

Journal of

Supplement 55
August 2016

REHABILITATION MEDICINE

The International Non-profit Journal

International official journal of the

– *International Society of Physical and Rehabilitation Medicine (ISPRM)*

Official journal of the

– *UEMS European Board and Section of Physical and Rehabilitation Medicine (EBPRM)*

– *European Academy of Rehabilitation Medicine (EARM)*

Published in association with the

– *European Society of Physical and Rehabilitation Medicine (ESPRM)*

– *Canadian Association of Physical Medicine and Rehabilitation (CAPM&R)*

– *Asia Oceania Society of Physical and Rehabilitation Medicine (AOSPRM)*

– *Baltic and North Sea Forum for Physical and Rehabilitation Medicine (BNFPRM)*

ABSTRACTS

**The 10th World Congress of International
Society of Physical and Rehabilitation
Medicine**

May 29–June 2, 2016, Kuala Lumpur, Malaysia

Published by the non-profit
Foundation for Rehabilitation Information

www.medicaljournals.se/jrm

ISSN 1650-1977

ABSTRACTS

THE 10TH WORLD CONGRESS OF INTERNATIONAL SOCIETY OF PHYSICAL AND REHABILITATION MEDICINE

MAY 29–JUNE 2, 2016, KUALA LUMPUR, MALAYSIA



ISPRM 2016

10th International Society of Physical and
Rehabilitation Medicine World Congress

Kuala Lumpur, Malaysia | May 29 – June 2



ORAL PRESENTATIONS (MAY 29–JUNE 2, 2016)

PAEDIATRIC REHABILITATION I

1

FUNCTIONAL MOVEMENT-POWER TRAINING FOR CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER: A RANDOMIZED CONTROLLED TRIAL**S.S.M. Fong¹, X. Guo², Y.T.Y. Cheng¹, T.T.T. Yam¹, K.P.Y. Liu³, D.J. Macfarlane¹**

¹The University of Hong Kong, Institute of Human Performance, Hong Kong, Hong Kong- China, The Hong Kong Polytechnic University, Department of Rehabilitation Sciences, Hong Kong, Hong Kong- China, ²University of Western Sydney, School of Science and Health Occupational Therapy, NSW, Australia

Introduction/Background: Children with developmental coordination disorder (DCD) demonstrate both central nervous system and peripheral neuromuscular deficits that may affect their balance ability. This study compared the effectiveness of a novel functional movement–power training (FMPT) program, a traditional functional movement training (FMT) program and no training in the improvement of postural control strategies and neuromuscular performance in this population. **Material and Methods:** This was a single-blinded randomized controlled intervention trial. One hundred sixty-one children with DCD (age: 6–10 years) were randomly assigned to the FMPT, FMT, or control groups. The two intervention groups received FMPT or FMT twice a week for 3 months continuously. Physical measurements were taken before, after and 3 months after the end of the intervention period. The primary outcomes were the composite score and strategy scores on the sensory organisation test as measured by a computerised dynamic posturography machine. Secondary outcomes included the knee muscle peak force and the time taken to reach the peak force which were evaluated using hand-held dynamometer. **Results:** The balance strategies adopted in sensory challenging environments of the FMPT participants showed greater improvement from baseline to post-test than those of the FMT participants (7.10 points; $p=0.008$) and the control participants (7.59 points; $p=0.005$). The FMPT group also exhibited greater improvement from baseline to the post-test in the knee extensor peak force and time to peak force in the knee flexors. **Conclusion:** The novel FMPT program was more effective than the conventional FMT program in the enhancement of balance strategies and neuromuscular performance in children with DCD.

STROKE I

2

ACTIVE MOBILITY EARLY AFTER STROKE (AMOBES). A RANDOMISED CONTROLLED TRIAL**A. Yelnik¹, F. Colle², C. Lamy³, C. Monchaud², M. Brondel⁴, C. Kemlin⁴, A. Leger⁵**

¹GH Lariboisière F.Widal, PRM, Paris, France, ²Sainte Anne hospital, PRM, Paris, France, ³Sainte Anne Hospital, Neurology, Paris, France, ⁴Pitié-Salpêtrière Hospital, PRM, Paris, France, ⁵Pitié-Salpêtrière Hospital, Neurology, Paris, France

Introduction/Background: Active and intensive physical therapy (PT) facilitates motor recovery when provided at a subacute stage after stroke. The efficiency of very early intensive PT (within the 2 first weeks) has been much less investigated. Early intensive rehabilitation might be beneficial for neural plasticity but also det-

perimental by worsening the cerebral ischemia. The AVERT study (Bernhardt 2015) showed negative effect of high dose of very early mobilisation. **Material and Methods:** Patients have been recruited in this multicentre randomized controlled trial (9 stroke units with PRM teams) to compare “soft” (20 mn/day apart from respiratory needs) versus “intensive” PT (idem + 45 minutes of intensive exercises/day), initiated within the 72 first hours after a first hemispheric stroke. Blind assessment has been made. The primary criterion was the motor control assessed by the Fugl Meyer score at D90. Secondary criteria were: Fugl Meyer at D15, D30, D45, postural balance (PASS), autonomy (Rankin and FIM) at D15, D30, D45, D90, unexpected medical events, length of hospital stay, quality of life (SIS) at D90. The study has been approved by the local ethics committee n°2011/37, registered on clinical trial.gov NCT01520636. **Results:** 103 of the 104 included patients could be analysed, 64 males, 67 right hemispheric lesions, 80 ischemic lesions, NIHSS <8 in 19 patients, 8–15 in 42, >15 in 42; age 66.2±13/67.2±11. No significant difference between groups was observed for the primary criterion (median 41.5 [14;76] versus 54 [22;80] $p=0.32$), neither for any of the secondary criteria. The number of unexpected medical events was the same in the two groups. **Conclusion:** The conclusion of this study is congruent to that of previous studies. Very early intensive exercises after stroke do not seem to be more effective on motor recovery than a soft PT preventing immobility related complications.

3

KNEE HYPEREXTENSION ORTHOSIS ON LOWER EXTREMITY MOTOR FUNCTIONS IN INDIVIDUALS WITH STROKE: A RANDOMIZED CONTROLLED TRIAL**L.R. Liao¹, H.B. Liu², X.Q. Deng³, M.X. Liao²**

¹Guangdong Provincial Work Injury Rehabilitation Hospital, Department of Physical Therapy, Guangzhou, China, ²Guangdong Provincial Work Injury Rehabilitation Hospital, Department of Physical Therapy, Guangzhou, China, ³Guangdong Provincial Work Injury Rehabilitation Hospital, Department of Prosthesis & Orthotics, Guangzhou, China

Introduction/Background: Knee hyperextension is common in individuals with stroke and known to cause secondary gait deviations. However, their impact on the knee joint is not fully understood. The aims of this study are to investigate the effects of knee hyperextension orthosis on lower limb functions in individuals with stroke. **Material and Methods:** Sixty people with stroke (mean age: 61.2 years, SD: 9.2) were randomly assigned to the experimental group ($n=8$) and control groups ($n=8$), from Jun 2015 to Dec 2015. All stroke patients were given conventional rehabilitation therapy (physical therapy, occupational therapy and traditional Chinese medicine treatment, 180 minutes/day in total, 6 days/week); in addition, the experimental group was used of functional knee hyperextension orthosis in indoor ground walking training for 30 minutes, while the control group without used of the functional knee hyperextension orthosis in indoor ground walking training for 30 minutes. Outcome measurements included the Fugl-Meyer Assessment of Lower Extremity (FMA-LE), Berg Balance Scale (BBS), Time-Up and Go test (TUG), 10 Meters Walking Test (10MWT) and 6 Minutes Walk Test (6MWT) assessment of the lower extremity motor function of all stroke patients. The assessments were performed at baseline, 4-week and 8-week treatment. **Results:** After 4-week and 8-week of treatment, intention-to-treat analysis revealed a significant time effect for FMA-LE, BBS, TUG, 10MWT and 6MWT ($p<0.05$). After 4-week of treatment, the time by group interactions effects were significant for the TUG (22.62±5.45), 10MWT (17.21±4.45) and 6MWT (150.97±3.438), respectively; after 8-week of treatment, the FMA-LE (19.92±4.87) and BBS

(40.74±797), TUG(19.11±4.42), 10MWT (15.13±3.98) and 6MWT (172.21±28.64), respectively, the differences were statistically significant ($p<0.05$). **Conclusion:** Using the functional knee hyperextension orthosis on walking training, can significantly improve the recovery of stroke patients with lower extremity motor function, it is recommended further application in clinic.

4

ROLE OF CIMT IN STROKE

E.H. Khan¹, D.N.A. Dina¹

¹Shaheed Suhrawardy Medical College, Physical Medicine and Rehabilitation, Dhaka, Bangladesh

Introduction/Background: Stroke is the common and disabling global health-care problem. In most cases, it is accompanied by considerable motor functional loss. Retraining motor functions especially for upper limbs are necessary as it plays an important role in performing activities of the daily living (ADL). Constraint induced movement therapy (CIMT) is one of the rehabilitative interventions for motor recovery. **Material and Methods:** To observe the impact of constraint induced movement therapy (CIMT) on upper limb motor functions of post stroke survivors. A Quasi experimental study was conducted at the Department of Physical Medicine and Rehabilitation in Shaheed Suhrawardy Medical College Hospital (ShSMCH) for six months. The patients eligible for CIMT were evaluated clinically and by standardized assessment tools at enrollment and followed up at 2 and 4 weeks after giving conventional rehabilitation and CIMT. Motor functional abilities of hemiparetic upper limb were assessed by Fugl-Meyer assessment. **Main Outcome measures:** Motor functional abilities of hemiparetic upper limb after giving CIMT were assessed at 2 weeks and at 4 weeks using Fugl-Meyer assessment. **Results:** A total 60 patients were interviewed, among them mean age was 52.77±10.30. Most of the patients (60%) were found in 46–60 years age group Most of them (72%) were male. Mean of onset of stroke duration were 34.62±48.66 and most of the patients 78.3% in 1–30 days group Ischemic stroke was in 77% patients Among patients right sided hemiparesis was 75% and HTN was 51.7%. Mean of FM baseline status was 45.57±7.56. Among them Moderate impairment was found 86.7%. Follow-up after two and four weeks, FM score status was found ($p=0.000$) statistically significant. **Conclusion:** Constraint- induced movement therapy (CIMT) along with conventional therapy has a fruitful impact on post stroke hemiparetic upper limb survivors who were eligible for CIMT.

PAIN I

5

PRELIMINARY STUDY: MANAGEMENT OF ISCHIALGIA ON BIOMECHANICAL ABNORMALITIES

M.R. Rachmawati¹, N. Sidarta¹

¹Faculty of Medicine- Trisakti University, Anatomy/Physical Medicine and Rehabilitation, Jakarta, Indonesia

Introduction/Background: Ischialgia is a common problem found in daily practice. There was still few practitioners who has realized that the biomechanical abnormalities can associated with an Ischialgia. The prevalence of Biomechanical abnormalities i.e functional leg length disparity (FLLD) accompanied by foot pronation was 60–90% among population. External hip rotation will be occurred in the longer leg, which caused excessive contraction and inflammation of the Piriformis muscle and will be produced a Piriformis syndrome, as a result from pressure of an Ischiadical nerve passed on it. Treatment on the piriformis muscle an correction of the Biomechanical abnormalities expectedly will reduce the pain and increase the function. **Material and Methods:** A preliminary study on 7 subjects by convenient random sampling. **Results:** The

mean age of subjects was 38.6±1.3 years old. The whole subject had one side Ischialgia. The mean of pain intensity using a VAS scale was 7.2±0.5. The mean of pain onset was 4.3±1.5 months. All of subjects admitted can not walk for more than 100 m because of pain. Four subjects had right ischialgia, while the rest was on left side. All subject had Ischialgia on the higher side of the pelvic. All subjects received laser therapy by 2,500 Hz of frequency, and 125 mW of intensity for 15 minutes daily during 5 days on a Piriformis muscle area, Used of footwear which had a medial arch support and a supported on heel by a 0.5 cm lifter on the shorter leg. The pain intensity reduced to 2.3±0.3 ($p=0.02$) after treatment, and all of subjects claimed to be able to walk more than 100 m without pain. **Conclusion:** Biomechanical abnormalities associated with ischialgia. Treatment on the piriformis muscle, as well as correction on the pronation foot and FLLD will reduce pain and improve function.

6

RANDOMISED CONTROLLED TRIAL OF CERVICAL NERVE ROOT PULSED RADIOFREQUENCY VIA POSTERIOR APPROACH FOR THE CERVICAL RADICULOPATHY

L. Xiao¹, Q. Zhou², D. Xiong³, J. Yang³

¹Shenzhen Nanshan Hospital of Guangdong Medical College, Pain Management, Shenzhen, China, ²Guangdong Medical College, Pain Management Center, Shenzhen, China, ³Shenzhen Nanshan Hospital of Guangdong Medical College, Pain Management Center, Shenzhen, China

Introduction/Background: The procedures of pulsed radiofrequency (PRF) and/or cervical nerve root block (CNRB) via the posterior approach for cervical radioculopathy (CR) were done for many years. The purpose of this study was to compare the efficacy of CNRB, PRF versus the combination via the posterior approach. **Material and Methods:** We used a prospective, randomized, controlled study. 62 Patients were randomized into three parallel groups A, B and C. Group A included patients receiving CNRB alone, Group B PRF alone, and Group C the combination. The patients received Electric Acupuncture Therapy if there was no good effect at the time of 1month. The VAS of 0 to 10 was used to measure pain intensity. Global perceived effect (GPE) was scored by the patient on a 7-point scale. The outcomes were evaluated at 1 week, 1 month, 3 months and 6 months. **Results:** All the patients experienced the procedure successfully. The VAS scales dropped significantly in three groups at any time follow up ($p<0.001$). There was no significant difference between group A and B ($p>0.05$). However, there was a significant improvement in group C when compared with either group A or group B at times of one more months follow up ($p<0.001$). There was no difference in success rate of GPE with positive result in all three groups at 1week follow up, but, there was significant difference amongst group A, B and C at one more months follow up ($p<0.001$). The necessity of electric acupuncture therapy (EAT) was significantly decreased in group C as compared to group A or B ($p<0.05$). No serious complications were observed in any of the patients. **Conclusion:** The posterior approach of combined CNRB and PRF done via posterior approach appears to be safe and efficacious for CCR. The combination therapy yielded better outcomes than either CNRB or PRF alone.

MUSCULOSKELETAL CONDITION I

7

BLOCK RANDOMISED EXERCISE CLASSES FOR PEOPLE WITH SHOULDER PAIN: EFFECTIVENESS OF TWO DIFFERENT EXERCISE CLASSES AND AN INVESTIGATION OF PROGNOSTIC CORRELATES

E. Barrett¹, K. McCreesh¹, K. O' Sullivan¹, J. Lewis²

¹University of Limerick, Department of Clinical Therapies, Limerick, Ireland, ²University of Hertfordshire, Department of Allied Health Professions and Midwifery, Hertfordshire, United Kingdom

Introduction/Background: Shoulder pain is a common musculoskeletal condition. Patients are traditionally treated with one-to-one physiotherapy. There are no outcome studies of exercise classes for people with non-specific shoulder pain. It is unclear if postural exercise improves the outcomes of shoulder treatment. The correlation of somatic (non-musculoskeletal) symptoms to outcomes in shoulder pain has not been studied. The aims are: 1.To determine the effectiveness of an exercise class in people with non-specific shoulder pain. 2.To compare the outcomes of a shoulder exercise class with and without a postural exercise component. 3.To investigate if Subjective Health Complaints (SHC), Nordic Assessment Score (NAS) or baseline pain intensity are associated with treatment outcomes? **Material and Methods:** Eligible participants were recruited after referral to physiotherapy. Block randomisation was used to allocate participants to a shoulder exercise class or a shoulder and thoracic exercise class, once a week for 6 weeks. Primary outcomes were the Disabilities of the Arm, Shoulder and Hand (DASH) and Numeric Rating Scale (NRS) and were measured at baseline, 6 weeks and 6 months by the primary investigator (blinded to treatment allocation). SHC and NAS were measured at baseline. **Results:** 32 participants were included. Mean NRS and DASH improved significantly at both follow ups (6 week change NRS=2.6 (± 1.6), DASH=30.2 (± 23.7), 6 months change NRS=3.1(± 2.1), DASH=27.6 (± 24.9), $p < 0.05$). There was no significant between-group difference in NRS and DASH ($p > 0.05$). SHC was strongly correlated with baseline pain ($r_s = 0.58$) and disability ($r_s = 0.52$). SHC, NAS and pain at baseline were strongly correlated with disability at 6 months ($r_s = 0.51$, $r_s = 0.47$, $r_s = 0.48$ respectively). **Conclusion:** A 6 week exercise class was effective in improving pain and disability in people with shoulder pain, which was improved further at 6 month follow-up. Posture may not be an important aspect of shoulder pain treatment. SHC, NAS and pain intensity have strong prognostic value in shoulder pain.

8

CONSERVATIVE TREATMENT OF ADHESIVE OF SHOULDER: EFFECTIVENESS OF COMBINATION OF INTRAARTICULAR DISTENSION AND COMMUNITY BASED STRETCHING EXERCISE PROGRAM

K. Wangjam¹

¹JN Institute of Medical Sciences, Physical Medicine and Rehabilitation, Imphal, India

Introduction/Background: Different methods of conservative treatment are used for treatment of adhesive capsulitis/frozen shoulder. Of these, 'pressure controlled arthrographic distension', followed by 'care-giver operated home based stretching' exercise program was evaluated for treatment of stage II frozen shoulder. Objective was to assess its effectiveness by prospective cohort study. **Material and Methods:** Materials and Methods: sixty eight patients diagnosed as adhesive capsulitis shoulder, 30 males and 38 females were included. Mean age of these patients was 51.5 ± 15.6 years and mean duration of disease was 4.2 ± 4.8 months; studied from Nov 2014 to Dec, 2015. Intervention: supra-spinatus nerve block, followed by intra-articular instillation of 15 to 20 ml of saline mixed with 5 ml of 2% xylocaine and 2 ml of methyl-prednisolone acetate; so that intra-articular pressure was around 100 mm of Hg. This was followed by demonstration of home-based stretching exercise program to designated care-givers to be started immediately after injection. The same was to be done at home and continue three times daily; to be repeated 15 to 20 times per session. Outcome measures: change in range of motion of abduction (Abd), flexion (Fl), external rotation (ER), internal rotation (IR) and Constant-Murley Score (CMS) for functional assessment of shoulder. Minimum follow-up was 12 weeks and maximum 24 weeks; mean being 15.8. **Results:** There was significant change of ROM shoulder from

mean initial Abd from 46.30 to 135.0 FL from 87.60 to 172.70; ER from 30.50 to 85.60 and IR from 15.70 to 80.60. Further, there was also improvement in CMS 27.6 to 89.3. Statistical tool used for comparison was paired *t*-test. **Conclusion:** Conclusion: Combination of pressure controlled intrarticular hydraulic distention and community based stretching exercise method of treatment of adhesive capsulitis of shoulder was one of the most cost-effective and functionally effective methods of treatment.

PRM INTERVENTION I

9

EFFICACY OF RADIAL EXTRACORPOREAL SHOCK WAVE THERAPY FOR DISABLING PAIN DUE TO SEVERE PRIMARY KNEE OSTEOARTHRITIS: A RANDOMIZED CONTROLLED TRIAL WITH SUBJECTIVE AND OBJECTIVE ENDPOINTS

C. Schmitz¹, M. Imamura², S. Alamino Felix de Moraes², W.T. Hsing², F.M. Alfieri², L. Battistella²

¹Ludwig-Maximilians-University of Munich, Department of Neuroanatomy, Munich, Germany, ²University of São Paulo School of Medicine, Institute of Physical Medicine and Rehabilitation, São Paulo, Brazil

Introduction/Background: Radial extracorporeal shock wave therapy (rESWT) with high energy flux density (EFD) of 0.25 mJ/mm² was demonstrated in the literature to be effective and safe in the treatment of disabling pain due to severe primary knee osteoarthritis. However, such high-energy rESWT devices are not in widespread use, and it is unknown whether this condition could also effectively be treated with a conventional rESWT device with EFD not exceeding 0.16 mJ/mm². **Material and Methods:** 105 female patients suffering from disabling pain due to severe primary knee osteoarthritis between 3 and 480 months (median, 72 months) were randomized into two groups. Patients in the rESWT group received three sessions of rESWT (2,000 impulses per session applied around the entire knee with EFD between 0.10 and 0.16 mJ/mm²). Patients in the placebo group received three sessions of sham rESWT using a placebo handpiece. Outcome measures included assessment of pain on movement and physical function at one week (W1) and three months (M3) after the last treatment session. **Results:** Both rESWT and sham treatment reduced the mean VAS score by approximately 25% at W1 and M3, with no statistically significant differences between groups. The rESWT group showed a statistically significantly better mean WOMAC score for pain at the treated side than the placebo group at W1 and M3, whereas differences in mean WOMAC scores for stiffness and limitations in physical function at the treated side and mean WOMAC scores for pain, stiffness, and limitations in physical function at the untreated side were not statistically significantly different between the groups at W1 and M3. **Conclusion:** rESWT as performed in the present study is not sufficient to treat disabling pain due to severe primary knee osteoarthritis. For this condition a much higher energy flux density must be applied in order to achieve treatment success.

10

CORRELATION OF SONOGRAPHIC LONGITUDINAL-SAGITTAL TECHNIQUE AND TRANSVERSE-AXIAL TECHNIQUE OF ARTICULAR CARTILAGE MEASUREMENT IN PATIENTS WITH KNEE OSTEOARTHRITIS

A.K. Malvar¹, C. Gonzalez-Suarez^{1,2}, M.M. Bernardo¹, B.G. Tan-Sales^{1,2}, S. Aycardo², R. Chan², M. Tan-Ong², D.D. Feliciano¹, F. de los Reyes³

¹University of Santo Tomas Hospital, Department of Physical Medicine and Rehabilitation, Manila, Philippines, ²University of Santo Tomas, Faculty of Medicine and Surgery, Manila, Philippines, ³University of the Philippines - Diliman, School of Statistics, Quezon City, Philippines

Introduction/Background: Musculoskeletal ultrasound has been used in the diagnosis of osteoarthritis which includes the measurement of the anteroposterior diameter of the articular cartilage. There are two methods of assessing the articular cartilage thickness. The first method measures it at the femoral trochlear area with the ultrasound transducer placed immediately above the patellar and perpendicular to the long axis of the extremity (Yoon, 2008). The second method assesses the articular cartilage in the longitudinal plane where the transducer head was placed along the midline of the lateral and medial condyles. The primary objective of this study is to compare articular cartilage thickness using longitudinal and transverse techniques in patients with knee osteoarthritis. **Material and Methods:** A systematic knee sonographic examination was performed in patients with knee osteoarthritis by Altman's classification of idiopathic osteoarthritis. Longitudinal-sagittal scanning in the medial and lateral knee joint space was performed with the patient's knee positioned in 90 degrees flexion, while suprapatellar transverse-axial scan was done in a maximally flexed knee of a supine patient. Articular cartilage was evaluated as thickness (narrowing), severity of focal cartilaginous lesions (abrasion), and loss or maintenance of clarity of the cartilaginous layer (clarity). **Results:** Eighty-seven participants (mean age=65±7.9) were recruited, 73 of which were female and 14 were male (female to male ratio 5:1). Mean body mass index was 26.43±4.0 kg/m². 86% (75 out of 87) had bilateral knee pain and mean visual analog score for knee pain was 4.6/10 on left and 4.1/10 on right. There is a significant correlation in the cartilage thickness between both scanning techniques at the lateral left (r=0.596), medial left (r=0.575) and medial right articular cartilage (r=0.249) knee except for the left lateral articular cartilage. **Conclusion:** Sonographic scanning of the articular cartilage could be either measured in the transverse suprapatellar or longitudinal planes.

11

ULTRASOUND THERAPY VERSUS SHOCK WAVE THERAPY IN TREATMENT OF PLANTAR FASCIITIS

S. Alrawaili¹

¹King Saud Medical City, Medical Rehabilitation Administration, Riyadh, Kingdom of Saudi Arabia

Introduction/Background: The purpose of this study is to compare the effects of ultrasound therapy combined with stretching and strengthening exercises versus shock wave therapy combined with the same exercises on pain severity, functional disability of the foot, foot pressure and ankle dorsi and plantar flexion ROM in patients with plantar fasciitis. **Material and Methods:** Thirty male and female patients with chronic unilateral plantar fasciitis included in this study. Their age ranged from 35–45 years with body mass index less than 30 kg/m². The patients were assigned randomly into two groups. Group (A) consisted of 15 patients who received ultrasound therapy combined with stretching and strengthening exercises, and Group (B) consisted of 15 patients who received shock wave therapy and the same exercises of group (A). **Results:** The results of this study showed significant improvements in both groups. There was a statistically significant differences between groups in pain severity, functional disability of the foot and foot plantar pressure in favour of group (B), and there was a statistically non-significant differences between groups in ankle range of motion. **Conclusion:** This study showed that treatment of plantar fasciitis with shock wave therapy combined with therapeutic exercises is more effective than ultrasound therapy combined with the same exercises.

PAEDIATRIC REHABILITATION II

12

DELAYED AMPUTATION AND PROSTHETIC FITTING IN PATIENTS WITH CONGENITAL TIBIAL DEFICIENCY

N. Haga¹, S. Fujiwara¹, K. Okada², H. Mano¹, T. Shibata³, H. Tanaka⁴, K. Takikawa⁵

¹Graduate School of Medicine - The University of Tokyo, Department of Rehabilitation Medicine, Tokyo, Japan, ²Graduate School of Medicine - The University of Tokyo, Department of Orthopedic Surgery, Tokyo, Japan, ³Tazawa MFG Co., Department of Prosthetic, Tokyo, Japan, ⁴National Rehabilitation Center for Disabled Children, Department of Orthopedics, Tokyo, Japan, ⁵Shizuoka Children's Hospital, Department of Pediatric Orthopedics, Shizuoka, Japan

Introduction/Background: Treatment for congenital tibial deficiency has not been established. In complete deficiency (Jones type 1a), Brown procedure (BP) and knee disarticulation (KD) are options, while in distal malformation (type 2 and 4), reconstruction of the foot and Syme amputation (SA) both with tibiofibular synostosis are options. Though KD and SA are preferably performed before two years of age, the surgery is delayed in some patients because of the parents' hesitation to accept amputation or because the initial reconstruction surgery lead to poor functional outcome. The objective of this study is to report the course of patients with delayed amputation. **Material and Methods:** Among the 16 patients with 23 affected limbs who visited our Limb Malformation Clinic, five with seven limbs underwent amputation after five years of age, for whom we retrospectively examined Jones classification, course of treatments and the functional outcome. **Results:** One patient (unilateral type 1a) underwent KD at age five without any preceding surgery. Two patients (unilateral and bilateral type 1a) who experienced BP at age one underwent KD at age six and nine due to contracture or instability of the knee joint. One (unilateral type 1a) experienced BP at age eight months, femoral lengthening at age 11, and transfemoral amputation at age 18 due to fixed knee joint and limb length discrepancy. These five limbs were fitted with endoskeletal prosthesis with polycentric knee joint. Two patients (unilateral type 2 and 4), who experienced foot reconstruction with tibiofibular synostosis around age one, underwent SA at age six and seven due to recurrent foot deformities. They were fitted with endoskeletal and exoskeletal prostheses. All five patients developed no phantom pain after amputation surgery, and obtained ambulation without walking aids. **Conclusion:** When necessary, delayed amputation is a safe and effective procedure for patients with congenital tibial deficiency.

13

IMPROVED PASSIVE RANGE OF MOTION AND MODIFIED ASHWORTH SCALE SCORES AFTER RADIAL EXTRACORPOREAL SHOCK WAVE THERAPY IN VERY YOUNG SPASTIC CHILDREN WITH CEREBRAL PALSY

C. Schmitz¹, T. Wang², L. Du², M.C. Kiessling¹, L. Shan², W. Wang², J. Feng², F. Jia²

¹Ludwig-Maximilians-University of Munich, Department of Neuroanatomy, Munich, Germany, ²First Hospital of Jilin University, Department of Pediatric Neurological Rehabilitation, Changchun, China

Introduction/Background: Radial extracorporeal shock wave therapy (rESWT) has been demonstrated to be effective and safe in

the treatment of spasticity. However, it is unknown whether this could also be an option for treating very young children with cerebral palsy suffering from spasticity with the aim to improve motor function development. *Material and Methods:* 66 children (mean age 27.0±13.6 months; mean±SD) with diagnosed cerebral palsy were divided into two groups according to their parents' decision. Children in the rESWT group ($n=34$) received conventional physiotherapy and one session of rESWT per week for three months (1500 impulses at energy flux density of 0.03 mJ/mm² per session; shock waves applied to the gastrocnemius and soleus muscles of the affected leg). Children in the control group ($n=32$) received conventional physical therapy for three months. Passive range of motion (pROM) and Modified Ashworth Scale (MAS) scores of spastic muscles were examined at baseline (BL), after the first rESWT session, and at one month (M1), three months (M3) and six months (M6) after BL. Gross motor function measure (GMFM) was performed at BL, M3 and M6, and the Gesell developmental schedule (GDS) was assessed at BL and M6. *Results:* Children in the rESWT group showed statistically significant improvements in mean pROM and mean MAS scores immediately after the first rESWT session as well as at M1 and M3, but not at M6, compared to children in the control group. No statistically significant differences between the rESWT group and the control group were found in mean GMFM and mean GDS data. *Conclusion:* The combination of physiotherapy and rESWT is more effective than physiotherapy alone in the treatment of spasticity in very young children with cerebral palsy. However, more rESWT sessions and/or higher energy flux density are needed to further improve treatment success.

14

TASK-SPECIFIC BALANCE TRAINING FOR CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER: A RANDOMIZED CONTROLLED TRIAL

S.S.M. Fong¹, X. Guo², K.P.Y. Liu³, W.Y. Ki⁴, L.H.T. Louie⁵, R.C.K. Chung², D.J. Macfarlane¹

¹The University of Hong Kong, Institute of Human Performance, Hong Kong, Hong Kong- China, ²The Hong Kong Polytechnic University, Department of Rehabilitation Sciences, Hong Kong, Hong Kong- China, ³University of Western Sydney, School of Science and Health Occupational Therapy, NSW, Australia, ⁴Emporia State University, Health- Physical Education and Recreation Department, Emporia State, USA, ⁵Hong Kong Baptist University, Department of Physical Education, Hong Kong, Hong Kong, China

Introduction/Background: The sensory organisation of balance control is compromised in children with developmental coordination disorder (DCD). This study was conducted to evaluate the efficacy of a task-specific balance training (functional-movement training, FMT) programme in improving sensory organization and postural control in a DCD population. *Material and Methods:* A single-blinded, randomised controlled trial involving more than 88 children with DCD was carried out. The participants were randomly assigned to either a FMT group or a control group. The FMT group received two task-specific training sessions per week for 3 months and the control group received no training during the study period. Measurements of the participants' sensory organisation (somatosensory, vestibular and visual ratios), balance and motor proficiency (Movement Assessment Battery for Children, MABC scores) and center of pressure sway velocity (Unilateral Stance Test, UST scores) were taken at baseline, immediately after FMT and 3 months after FMT. *Results:* The FMT group ($n=47$) showed greater improvements than the control group ($n=41$) in somatosensory ratio at 3 months ($p<0.001$) and 6 months ($p<0.001$), but the within-group changes were not significant ($p>0.05$). The results of both the MABC and the UST also suggested that the balance performance of the FMT group was significantly better than that of the control group at 3 and 6 months (all $p<0.05$). *Conclusion:* Task-specific balance training was effective in improving the sensory organisation and balance performance of children with DCD.

15

BOTULINUM TOXIN-A IN POSTOPERATIVE PEDIATRIC STIFF HIPS

R. Tamer¹, Y. awaad²

¹Al-Takhassusi Hospital, Riyadh, Kingdom of Saudi Arabia, ²Oak Wood Health System, Pediatric Neurology, MI, USA

Introduction/Background: The aim of the study is to show the functional contribution of botulinum toxin-A in the treatment of postoperative pediatric stiff hips. *Material and Methods:* Four pediatric patients with postoperative stiff hips were included. Three patients with complicated developmental Dysplasia of the hip after multiple revision surgeries, and a case of cerebral palsy after hip surgery were given botulinum toxin injections. In selected muscles as an adjunctive therapy to the standard orthopedic and rehabilitation management. *Results:* All patients experienced a significant reduction in pain with a significant improvement in posture, range of motion and mobility. *Conclusion:* The preliminary results of botulinum toxin-A injection when given to selected muscles seem to be promising in relieving pain and improving range of motion in pediatric patients with postoperative stiff hips. It may be considered as an option in the treatment of difficult cases of postoperative stiff hips refractory to physiotherapy.

16

STOP TAKING ON POUNDS (STOP): A PEDIATRIC WEIGHT MANAGEMENT PROGRAM FOR UNDERSERVED, AT-RISK MINORITY CHILDREN

F. Kuo¹, L.A. Goebel², C. Mushi-Brunt¹

¹Indiana University, School of Health and Rehabilitation Sciences, Indianapolis, USA, ²Indiana University, School of Medicine, Indianapolis, USA

Introduction/Background: Overweight and obesity have tremendous consequences on health and worldwide economy (Cawley, 2010). Both are linked to a number of chronic diseases and long-term psychosocial impact, including cardiovascular risk, hyperlipidemia, hypertension, diabetes, sleep apnea, lack of body image, and bullying (Freeman et al., 2007; Dietz, 1998). Most communities are characterized by unhealthy lifestyles when it comes to diet and physical activity. Healthy lifestyles, including healthy eating and physical activity, can lower the risk of becoming obese and developing related diseases (CDC, 2012). *Material and Methods:* Since 2008, an inter-professional team has adapted and implemented a culturally sensitive pediatric weight management program called the S.T.O.P. (Stop Taking on Pounds) Program. The program is a six-month culturally sensitive weight management program for children between the ages of 8 and 15 years old that uses a family approach for obesity prevention and intervention. The program includes an inter-professional team of physicians, dietitians, occupational and physical therapists, mental health clinicians, and nurses. The health care professionals work with youth participants in adopting a healthier lifestyle by developing a nutrition plan, making healthier food choices and finding fun ways to be more physically active. Graduate occupational therapy students (OTS) work closely with the Program leaders to assist delivery of interactive activities. *Results:* These activities include: taste healthy food and drink choices, playing the Wii or other interactive games, learning healthy recipes, group fitness activities, and strategies to address bullying, etc. The Program is offered in two culturally diverse Centers. Both Centers provide opportunities for OTS to collaborate inter-professionally while working with community members from diverse cultures, and to apply cultural competencies & professional communications. *Conclusion:* This presentation will: (1) discuss facts about childhood obesity, its contributing factors, physical & psychosocial impacts in development; (2) describe an inter-professional collaboration in a community-based pediatric weight management program for underserved, at-risk minority children.

PHYSICAL AND REHABILITATION MEDICINE DIAGNOSTICS

17

A DEVICE WITH USING MAGNETIC SENSOR CAN DETECT DIFFERENCE OF FINGER DEXTERITY BETWEEN PEOPLE WITH COGNITIVE DISORDER AND AGE MATCHED HEALTHY PEERS

I. Kondo¹, S. Suzumura¹, A. Ohsawa¹, T. Nagahama¹, A. Kandori², Y. Sano²

¹National Center for Geriatrics and Gerontology, Rehabilitation medicine, Obu, Japan, ²Hitachi Ltd- Research and Development Group, Healthcare innovation center, Kokubunji, Japan

Introduction/Background: Deterioration of dexterity has been reported in the population of dementia. Skillful using of hand is closely related to keeping the ability of daily living in this population. Finger tapping was used as an indicator to know the extent of decay in hand dexterity for the patients with dementia but there was the controversy whether the ability of finger tapping could detect the difference between people with cognitive disorder and healthy peers. Recently, we invented a new device to measure the finger tapping movement with using magnetic sensor. (UB-1®)The purpose of this study was to define parameters of finger tapping measured with using UB-1 to detect the difference of finger tapping between people with cognitive disorder and age matched control. **Material and Methods:** Subjects were six men and eight women diagnosed Alzheimer disease or mild cognitive disorder (AD/MCI group: average age 72.5 SD 6.1) and age matched peers (6 men and 7 women) without cognitive disorder (Control group: average age 71.7 SD 7.9). The parameters of finger tapping were total moving distance, energy balance, standard deviation (SD) of contact duration, SD of tapping interval, and SD of phase difference between taps of both hands. **Results:** There were statistically significant differences between AD/MCI group and Control group in total moving distance ($p=0.03$), SD of contact duration ($p=0.02$), SD of tapping interval, ($p=0.03$). **Conclusion:** It was dependent on the parameter of finger tapping whether we could detect the difference between patients with cognitive disorder and healthy peers. We are going to use these parameters to define the difference of hand dexterity for the extent of cognitive disorder and also to monitor the deterioration of hand function in the course of progression of dementia.

18

THE ROLE OF ULTRASOUND IN DIAGNOSIS OF THE CAUSES OF LOW BACK PAIN: A REVIEW OF THE LITERATURE

P. Noormohammadpour¹, R. Kordi¹, P. Heidari², M. Roshtam³, F. Farahbakhsh¹

¹Sports Medicine Research Center - Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran, ²Nuclear Medicine and Molecular Imaging - Massachusetts General Hospital, Harvard Medical School, Boston, USA, ³Department of Neurosurgery - Shariati hospital, Tehran University of Medical Sciences, Tehran, Iran

Introduction/Background: Low back pain (LBP) is among the most prevalent musculoskeletal conditions in the developed countries. It is a common problem causing disability and imposing a huge economic burden to individuals and state organizations. Imaging plays an important role in diagnosis of the etiology of LBP. **Material and Methods:** The electronic databases included: PubMed, Ovid SP Medline and ISI and Google Scholar. In every search engine another search was performed using various permutations of the following keywords: ultrasonography, ultrasound imaging, low back pain, back muscles, paraspinal muscles, multifidus, transverse abdominis, muscle size, spinal canal, sacroiliac joint and

spondylolisthesis. **Results:** Magnetic resonance imaging (MRI) is widely used in evaluation of patients with LBP; however, high costs, limited availability and contraindications for its use have restricted MRI utilization. In a quest for a less expensive and readily available tool to investigate LBP, clinicians and researchers found ultrasonography (US) as an alternative. In this review we discuss the US application in diagnosis of some common causes of non-specific chronic LBP. Discussed topics include evaluation of spinal canal diameter, paraspinal and transabdominal muscles, sacroiliac joint laxity, pregnancy related LBP, sacroiliitis, and spondylolisthesis using US in patients with LBP. **Conclusion:** While the first researches on employing ultrasound in diagnosis of patients with LBP had been focused on spinal canal diameter, recent studies have been mostly performed to evaluate the role of transabdominal and paraspinal muscles on core stability and thereby LBP occurrence. On the other side, Doppler ultrasonography has recently played an important role in objective measurement of joint laxity as a common etiology for LBP. Doppler imaging also in pregnant patients with LBP has been recommended as a safe and sensitive method. As conclusion, according to recent and most prestigious studies, focusing more on transabdominal muscle thickness can be considered as future approach in investigations.

CANCER REHABILITATION

19

FUNCTIONAL STATUS AND ASSOCIATED FACTORS IN TURKISH PATIENTS WITH COLON CANCER: PRELIMINARY RESULTS

B. Kara¹, G. Kaya²

¹Gulhane Military Medical Academy, School of Nursing, Ankara, Turkey, ²Gulhane Military Medical Academy, Department of Oncology Clinic, Ankara, Turkey

Introduction/Background: Patients with colon cancer are at risk for developing functional impairment. However, studies on functional status in this population are limited. The aim of this study was to evaluate functional status and to determine its associations with demographic/disease-related characteristics and perceived family support in Turkish patients with colon cancer. **Material and Methods:** This cross-sectional study included 30 patients (53.3% male) with colon cancer who were followed up by an oncology outpatient clinic in a training hospital in Turkey. Inclusion criteria were age 18 years or older, colon cancer diagnosis for at least one month, aware of diagnosis, having received at least one chemotherapy regimen, ability to communicate in Turkish and agreeing to participate in the study. Exclusion criteria were cognitive impairment, history of major psychiatric disorder, the presence of substantial physical disability and unstable clinical status. Data were collected by using an information form, the Functional Living Index-Cancer (FLIC), and the Cancer Patient Social Support Scale (CPSS). Descriptive statistics, the Mann-Whitney *U* test and Spearman's correlation coefficient were used for the analysis of data. A *p* value of <0.05 was regarded as statistically significant. **Results:** The mean age of the patients was 60.0 ± 11.8 years (range =22–75) and the median duration of disease was 12 months. The majority of the patients (90%) had metastases, and 36.7% had comorbidity. The mean FLIC score of the patients was 112.9 ± 22.4 , and the mean CPSS total score was 147.4 ± 12.7 . The FLIC scores were lower in females than males ($z=-2.163$, $p=0.031$). The FLIC scores were also positively correlated with the CPSS total ($r=0.55$, $p=0.002$) and subscale scores (emotional support: $r=0.54$, $p=0.002$, and information support: $r=0.56$, $p=0.001$; respectively). **Conclusion:** The functional status of the patients was higher than moderate level. Better understanding of factors associated with functional status may provide more effective interventions to improve health and well-being in patients with colon cancer.

20

THE EFFICACY OF COMPLEX DECONGESTIVE PHYSIOTHERAPY (CDP), PREDICTIVE FACTORS OF RESPONSE TO CDP AND QUALITY OF LIFE (QOL) IN BREAST CANCER-RELATED LYMPHEDEMA(BCRL)

S. Liao^{1,2}, H.Y. Huang¹, D.R. Chen¹, S.T. Chen¹, H.W. Lai³

¹Changhua Christian Hospital, Department of Physical Medicine and Rehabilitation, Changhua, Taiwan, ²HungKuang University, Department of Physical Therapy, Taichung, Taiwan, ³Changhua Christian Hospital, Division of General Surgery- Department of Surgery, Changhua, Taiwan

Introduction/Background: The aim of this study was to identify the efficacy of CDP, the predictors of lymphedema severity and response to CDP and QoL in BCRL patients. *Material and Methods:* We performed a retrospective analysis of 73 BCRL patients who were treated with a CDP program between Jan 2013 and Sep 2015. The PEV (percentage of excess volume), PREV (percentage reduction of excess volume) and QoL (EORTC C30 and BR23) were recorded. *Results:* The patients' mean age was 57.3 years and BMI was 25.7; 71 (97.3%) patients received radiotherapy and 12.4±1.6sessions of CDP, and the duration of lymphedema was 19.3 months. The latency period of lymphedema was 43 months, and 60% of BCRL occurred within 3 years after surgery. Lymphedema severity, baseline and post-CDP PEV (percentage of excess volume), was 35.9% and 15.1%. The duration of lymphedema was a predictive factor for PEV, and PEV was a predictive factor for CDP sessions. The CDP efficacy, PREV (percentage reduction of excess volume), was 63.8%, and was correlated with PEV, duration of lymphedema and bandaging time, but not with the number of CDP sessions. PEV ($p=0.001$) and bandage time ($p=0.038$) were the predictive factors for CDP efficacy. Baseline lymphedema severity and bandage time were the most important predictive factors for CDP efficacy. The QoL (EORTC C30), global health status, emotional function, cognitive function, dyspnea and insomnia; and EORTC BR23, future perspective, breast and arm symptoms were significantly improved after CDP. The cognitive function in EORTC C30 is correlated with CDP efficacy. *Conclusion:* This study showed 12 sessions of CDP interventions could not only reduce lymphedema severity but also improve QoL in BCRL. The key to predicting successful lymphedema treatment is the lymphedema severity and patient's compliance to bandaging.

21

AN INITIATIVE IN CANCER REHABILITATION: RESULTS FROM A US NATIONAL INSTITUTES OF HEALTH EXPERT GROUP

N. Stout¹, L. Gerber², L. Chan¹

¹National Institutes of Health, Rehabilitation Medicine, Bethesda, USA, ²George Mason University, Health Administration and Policy, Fairfax, USA

Introduction/Background: Functional impairments and disability impact a majority of cancer patients during and after disease treatment. Current cancer care delivery capabilities far outweigh the needs of a growing population of patients. Among the most pressing needs is a better approach to identify and manage functional impairments and disability. Rehabilitation providers diagnose and treat physical, psychological and cognitive impairments to maintain or restore function, reduce symptom burden, and reduce disability in this medically complex population. However, rehabilitation services rarely enter comprehensive oncology care. *Material and Methods:* In 2014, the Rehabilitation Medicine Department of the Clinical Center at the National Institutes of Health (NIH) in the United States convened an interdisciplinary, expert panel to explore

23

DISABILITY AND QUALITY OF LIFE IN WOMEN WITH BREAST CANCER IN MOROCCO

A. Hajjioui¹, F. Aich², M. Fourtassi³

¹Faculty of Medicine and Pharmacy- University Mohammed Benabdellah Fez, Physical and Rehabilitation Medicine, Fez, Morocco, ²Faculty of Medicine and Pharmacy- University Mohammed Benabdellah Fez, Physical and Rehabilitation Medicine, Fez, Morocco, ³Faculty of Medicine and Pharmacy- University Mohammed I Oujda, Physical and Rehabilitation Medicine, Oujda, Morocco

Introduction/Background: Cancer is now considered a chronic disease which may result in disability and affect the patients' quality of life. The aim of our study was to characterize the various components of disability in patients with breast cancer, and to investigate the factors associated with them. **Material and Methods:** This is a cross-sectional study including 140 patients with breast cancer, all stages combined. In these patients, we evaluated the physical and psychological disabilities by clinical examination and self-administered questionnaires as HAD, ISI, and MAF. Disability of the upper limb was assessed using the quick-DASH questionnaire. The socio-economic and occupational handicap, and quality of life were assessed using specific items of the EORTC-QLQ30. **Results:** Our patients had a mean age of 49.4±11.12 years, 56% were married, 67% were illiterate and 96.4% housewives. The main deficiencies were shoulder limited range-of motion (7.8%), lymphedema (10%), pain (21.5%), insomnia (26.5%), fatigue (18, 5%), anxiety (46%) and depression (46%). Upper limb disability as objectified by the quick-DASH was found in 7.8% of cases and was correlated with various deficiencies; namely joint limitation ($p<0.001$), pain ($p<0.001$), insomnia ($p<0.001$), fatigue ($p=0.02$), anxiety ($p=0.04$) and lymphedema ($p=0.08$). Self-assessment of the quality of life on a VAS was above average in all patients. Impaired quality of life was correlated with the presence of upper limb disability ($p<0.001$) and with the various deficiencies, namely insomnia ($p<0.001$), fatigue ($p<0.001$), pain ($p<0.001$), joint limitation ($p<0.001$) and depression ($p=0.07$). **Conclusion:** Thus, improving the quality of life of patients with breast cancer cannot be achieved without the proper management of impairments and disabilities related to cancer and/or its treatment.

REHABILITATION DISASTER RELIEF

24

RAPID IMPLEMENTATION OF TELEMEDICINE AFTER EARTHQUAKE DISASTER 2015 AT SPINAL INJURY REHABILITATION CENTRE, NEPAL

R. Dhakal¹

¹Spinal Injury Rehabilitation Centre, Spinal Unit, Kavre- Banepa, Nepal

Introduction/Background: Recent ongoing development of a specialty called "Disaster Rehabilitation" has increased awareness of the importance of rehabilitation intervention as part of post-disaster emergency response. Natural disasters can cause significant numbers of severe, disabling injuries, resulting in a public health emergency requiring assistance from rehabilitation medicine experts. Telemedicine can be an ideal mode in places with inadequate health resources. **Material and Methods:** Prospective observational study and the experience of the author with telemedicine at spinal injury rehabilitation center (SIRC) during the earthquakes in 2015. **Results:** A total of 81 earthquake spinal cord injury (SCI) patients were admitted for comprehensive care by multidisciplinary medical rehabilitation team within four weeks of post-disaster time at SIRC. Problem cases such as third trimester pregnancy with incomplete unstable spine fracture, undiagnosed SCI in pediatric population, misdiagnosed spine fracture, SCI with stroke and SCI complications/associated injuries were well managed through tele-consulta-

tion with SpiNepal group. This approach proved to be immediately available at minimal cost. **Conclusion:** Tele-consultation through various means such as telephone, e-mail, and video conferencing can improve the quality of health care by aiding in diagnosis and management of patients, and to train health care professionals. This long distance accessibility of specialty and subspecialty expert care can reach a larger population base thereby reducing the morbidity and mortality after SCI and eventually increasing the quality of life. Information technology and modern portable communication devices should be incorporated in disaster preparedness and post-disaster SCI rehabilitation.

25

INTERNATIONAL CIVIL-MILITARY COORDINATION FOR REHABILITATION IN DISASTERS: AUSTRALIA-PAKISTAN 2015 HINDU-KUSH EARTHQUAKE

F. Khan¹, B. Amatya¹, T.M. Sayed², A. Elmalik¹

¹Royal Melbourne Hospital, Department of Rehabilitation Medicine, Parkville, Australia, ²Armed Forces Institute of Medical Rehabilitation AFIRM, Rehabilitation Medicine, Rawalpindi, Pakistan

Introduction/Background: On Oct 26th 2015 an earthquake (7.5 Richter scale) struck the Hindu-Kush region of Pakistan and Afghanistan, resulting in 398 fatalities and >2,500 reported injuries. The exact numbers are unknown as most were in the Pakistani Tribal belt of the North West Frontier province with migratory populations across borders. Due to difficult terrain and political uncertainties- only Armed Forces were able to evacuate the injured and provide care for many in military run hospitals. **Material and Methods:** The Armed Forces Medical Institute of Pakistan and the Armed Forces Institute of Medical Rehabilitation (AFIRM), invited a 6-member multidisciplinary rehabilitation team from Royal Melbourne Hospital (RMH), Australia for deployment to Rawalpindi and Peshawar (12th-22nd Nov 2015). **Results:** The RMH team were embedded within the host military medical teams and assisted in rehabilitative care for acute spinal and traumatic brain injuries, amputations and multi-trauma victims, including those in recent earthquake. The RMH team activities included: addressing priorities identified by the AFIRM; educational workshops, seminars and training of local healthcare professionals and final year medical/nursing students for specific rehabilitation issues (post-disaster rehabilitation, rehabilitation models of care, pain management, spasticity care, prosthetic/orthotics prescription, nursing management, rehabilitation triage process and systems of care, identification of barriers/enablers in service provision etc.); and attitudes/approaches to engage people with disabilities. They also visited a number of centres in the civilian settings supported by various NGOs such as the International Red Cross and others. **Conclusion:** A collaborative, integrated approach involving military and civilian medical teams (and NGOs) can work effectively by clearly delineating roles that contribute to improved management of disaster victims. There are however, challenges which can be overcome through planning, organization and recognition of specific mission outcomes relevant to each partner (humanitarian versus medical assistance). This presentation will provide an overview of these issues in the Hindu Kush context.

26

MEDICAL REHABILITATION IN NATURAL DISASTERS

B. Amatya¹, F. Khan¹, J. Gosney², F.A. Rathore³, F. Burkle Jr⁴

¹Royal Melbourne Hospital, Department of Rehabilitation Medicine, Parkville, Australia, ²International Society of Physical and Rehabilitation Medicine ISPRM, Committee on Rehabilitation

Disaster Relief CRDR, Geneva, Switzerland, ³University of Health Sciences- CMH Lahore Medical College, Department of Rehabilitation Medicine, Lahore, Pakistan, ⁴Harvard School of Public Health, Harvard Humanitarian Initiative, Cambridge, USA

Introduction/Background: Natural disasters may result in significant loss of life and long-term disability from severe injuries. Current data shows a significant increase in the numbers of injuries sustained relative to mortality, indicating that medical rehabilitation is integral to comprehensive disaster management. The aim of this systematic review is to present an evidence-based overview of the effectiveness of medical rehabilitation intervention in natural disaster survivors and outcomes that are affected. **Material and Methods:** Data Sources: A comprehensive literature search was conducted using medical and health science electronic databases (PubMed, Medline, EMBASE, CINAHL, and Cochrane Library) up to Sep 2014. **Study Selection:** Two independent reviewers selected studies reporting outcomes for natural disaster survivors following medical rehabilitation that addressed functional restoration and participation. **Data extraction:** Two reviewers independently extracted data and assessed the methodological quality of the studies using Critical Appraisal Skills Program's (CASP) appraisal tools. **Results:** A meta-analysis was not possible due to heterogeneity amongst included trials, therefore a narrative analysis was performed for best evidence synthesis. Ten studies (2 randomised controlled trials, 8 observational studies) investigated a variety of medical rehabilitation interventions for natural disaster survivors to evaluate "best" evidence to date. The interventions ranged from comprehensive multidisciplinary rehabilitation to community educational programs. Studies scored low on quality assessment due to methodological limitations. The findings suggest 'some' evidence for the effectiveness of inpatient rehabilitation in reducing disability, improving participation and quality of life; and for community-based rehabilitation for participation. There was no data available for associated costs. **Conclusion:** The findings highlight the need to incorporate medical rehabilitation into response planning and disaster management for future natural catastrophes. Access to rehabilitation and investment in sustainable infrastructure and education is crucial. More methodologically robust studies are needed to build evidence for rehabilitation programs, cost-effectiveness and outcome measurement in such settings.

SPORTS IN REHABILITATION AND SPORTS REHABILITATION

27

BACK TO SPORTS AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

G. Gruber¹, M. Glehr¹, G. Bernhardt¹, A. Leithner¹

¹Medical University of Graz, Orthopedic Surgery, Graz, Austria

Introduction/Background: Anterior cruciate ligament (ACL) ruptures belong to the most common serious ligamentous injuries in pivoting, jumping and cutting sports. Most athletes who sustain an ACL rupture have to undergo surgical reconstruction thus pointing out the high individual and socio-economic value of this injury. Although a return to athletic competition as soon as possible is the primary treatment goal after ACL injury many athletes will never return to their preinjury level after ACL-reconstruction. To evaluate the percentage of athletes who were able to return to their preinjury competitive level after ACL reconstruction we performed a concise review of recent orthopedic literature. **Material and Methods:** We searched medline for all published literature from Jan 2005 until Jan 2015 using the following key words: ACL reconstruction, ACL reconstruction results, return to sports after ACL reconstruction. Inclusion criteria were original research in english language, mature patients, primary ACL reconstructions, no major concomitant surgical procedures such as high tibial osteotomy, meniscus transplantation or cartilage transplantation and a follow-up of at least 12

months. **Results:** Finally 41 studies were included for full review. The present study demonstrates that the overall return to preinjury sports participation rate is 64%. Only 49% of the athletes were able to return to their preinjury competitive sporting level. **Conclusion:** The present review of recent orthopedic literature reveals that despite of satisfactory results regarding impairment measurement after ACL reconstruction only 64% of patients were able to return to their preinjury sporting ambitions and less than half of the athletes could resume competitive sports. These results are comparable to previous reviews and should lead to further research in terms of contextual factors such as co-injuries, individualized rehabilitation programs and psychological aspects affecting the rehabilitation period after ACL surgery.

28

PREVENTIVE EFFECT OF EXERCISE TRAINING PROGRAM ON HAMSTRING INJURIES IN ADOLESCENT MALE MALAYSIAN SOCCER PLAYERS

A. Farhan¹, M. Kadhim², G. Shihap³

¹Universiti Teknologi MARA, Department of Physiotherapy, Puncak Alam, Malaysia, ²Baghdad University, College of physical Education and Sports Science, Baghdad, Iraq, ³Baghdad University, College of Physical Education and Sports Science, Baghdad, Iraq

Introduction/Background: The incidence rates of hamstring muscle injuries in several sports is high, particularly that involve stretch shortening cycle activities, such as sprinting, high-intensity running, stopping, starting, quick changes of direction, and kicking. **Material and Methods:** Fifty Malaysian boys from two sport schools [25 experimental (EXP), 25 control (CON)] (age 13.3±0.4 yr; body mass index of 20.9±1.5 kg/m²; stature: 1.6±0.1 m) participated. The EXP group followed the prevention program 5 days per week, for 12 weeks. The CON group was instructed to continue training and warm-up as usual. A prevention exercise program designed exclusively for adolescent male soccer players was including jumping, eccentric strength, agility, balance, dynamic stretching and speed. Over 1 year all injuries were documented monthly by physiotherapist. Complete monthly injury reports were available for 50 players. **Results:** Two hamstring injuries occurred in the EXP group and 9 occurred in the CON group, corresponding to incidence of hamstring injury rates of 0.42 and 1.94, respectively, per 1,000 player hours, which equates to 78% fewer injuries in the EXP group. The greatest effects were observed for moderate injuries and injuries incurred during match. **Conclusion:** The study demonstrated that it was possible to reduce incidence of hamstring muscle injuries among adolescent male soccer players by implementation of preventive program. Based on these positive results, the authors recommend that the players need better education regarding injury prevention strategies and should include such interventions as part of their regular training.

29

LOW BACK PAIN STATUS OF FEMALE UNIVERSITY STUDENTS IN RELATION TO DIFFERENT SPORT ACTIVITIES

P. Noormohammadpour¹, M. Rostami², M. Mohammad Ali³, F. Farahbakhsh¹, M.H. Pourgharib Shahi¹, R. Kordi¹

¹Sports Medicine Research Center - Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran, ²Department of Neurosurgery - Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran, ³Department of Epidemiology and Biostatistics - School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

Introduction/Background: The main purpose of this study was to investigate the prevalence of low back pain (LBP) and its absence rate among female university student athletes in different types of

31

SELF-AWARENESS OF NEUROPSYCHOLOGICAL FUNCTIONING AT FIVE YEARS FOLLOWING TRAUMATIC BRAIN INJURY*N. Marsh¹**¹Sunway University, Psychology, Bandar Sunway, Malaysia*

Introduction/Background: A patient's lack of insight into their deficits following traumatic brain injury can negatively impact on their long-term adaptation and limit their successful reintegration into the community. *Material and Methods:* The neuropsychological functioning of a group of 71 adults was assessed at approximately five years (mean =65 months) following significant (i.e., ventilation required for >24 hours) traumatic brain injury. The average age of the group was 31 years and 52 (73%) were male. Neuropsychological assessment included the cognitive domains of attention, verbal memory, and executive functions. Emotional functioning, specifically anxiety and depression, was also assessed. In addition to the psychometric measures the patients completed a comprehensive self-report measure which included items on the perceived presence and severity of cognitive and emotional difficulties. *Results:* Overall outcome as rated on the Glasgow Outcome Scale was 13 (18%) with severe disability, 22 (31%) with moderate disability; and 36 (51%) had made a good recovery. The correspondence between the objective and self-report assessment of cognitive functioning was high for prevalence of problems but the patients underestimated the severity of their deficits. For emotional problems patients self-reported a higher prevalence than that found on the psychometric measures of depression and anxiety. *Conclusion:* In general patients are aware of continuing problems with both their cognitive and emotional functioning. However there is a tendency for them to underestimate the severity of their cognitive deficits. The difference between results on the psychometric measures and self-reports for anxiety and depression may illustrate a possible difference between the presence of a clinical disorder and the subjective daily experience of the patients.

32

POST-TRAUMATIC AMNESIA AFTER BRAIN INJURY: REFLECTIONS FROM AN EARLY ACUTE SPECIALIST REHABILITATION SERVICE IN UNITED KINGDOM*F. Anwar¹, S. Antiga¹**¹Cambridge University Hospitals NHS Foundation Trust, Rehabilitation Medicine, Cambridge, United Kingdom*

Introduction/Background: The natural history of recovery from brain injury follows a typical course and includes a period of post-confusional recovery of function called post-traumatic amnesia (PTA). Emergence from PTA is measured by direct testing. Procedures used for this purpose include: Galveston Orientation and Amnesia Test (GOAT) and Westmead Post-Traumatic Amnesia Scale. *Aim:* Rapid Access Acute Rehabilitation Unit (RAAR) is a specialist rehabilitation service within a British Major Trauma Centre was developed with expertise to look after patients in PTA. The aim of this article is to analyse the data regarding patients admitted with PTA and to review the safe management of this group of patients while they remain in PTA. *Material and Methods:* This is a prospective study, which included all patients with a diagnosis of PTA admitted to the RAAR unit from 1st Sep to 26th Nov 2015. Data was collected for demographics, type of injury sustained, duration of PTA and destination at discharge. The assessment tool used to record PTA in our unit was GOAT. *Results:* Our study sample included 28 patients with a mean age of 41.39 years. 4 were female and 24 were male. The type of injuries sustained included: subarachnoid haemorrhage, cerebral contusions, skull fractures, intracranial haemorrhage, extradural haematoma

and diffuse axonal injuries. 2 patients deceased during admission due to neurosurgical complications. 1 patient did not emerge from PTA prior to repatriation to local hospital. 1 patient is still in PTA at current date. 24 patients emerged from PTA prior to discharge from our rehabilitation service. The average PTA duration of this group was 16.7 days (range 3–46 days). *Conclusion:* The safe management of patients in PTA along with expert assessment of their rehabilitation needs are imperative to maximise recovery and to plan a safe discharge.

33

SIMPLE AND INEXPENSIVE CLINICAL INTERVENTION FOR PROLONGED DISORDERS OF CONSCIOUSNESS- IS THERE A LIGHT AT THE END OF THE TUNNEL?

K. Yelden¹, A. Kempny¹, L.M. James², A. Leff³, S. Farmer⁴, S. Dupont¹, D. Playford³

¹Royal Hospital for Neuro-disability, Research, London, United Kingdom, ²Cromwell Hospital, Neurophysiology, London, United Kingdom, ³UCL, Institute of Neurology, London, United Kingdom, ⁴UCLH, Neurology, London, United Kingdom

Introduction/Background: Sleep is a physiological state where memory processing, learning and brain plasticity occur. Patients with prolonged disorders of consciousness (PDOC) show none or minimal sign of awareness of themselves/their environment but appear to have sleep-wake cycles. This research study aims to answer the following questions: 1. Do the patients in PDOC maintain any circadian rhythm? If so, is it normal? 2. If not, can we improve it by using simple and inexpensive clinical interventions namely light, melatonin and caffeine? 3. Could these interventions lead to improvement of consciousness/brain functions? *Material and Methods:* 10 people with PDOC, 2 to 8 years after brain injury were included in the study (5 female, age 30–71). Coma Recovery Scale-revised (CRS-R), 24-hour polysomnography (PSG) and 4-hourly saliva melatonin measurements were performed twice at baseline and again following intervention. Intervention was consist of melatonin treatment at night and blue light therapy and caffeine treatment in the morning for five weeks. The PSG data were collected using an ambulatory EEG system. Detailed visual inspection and micro-structure assessment of sleep recording were performed in order to score sleep stages. Melatonin results were analysed with cosinor analysis. *Results:* Baseline sleep architecture was abnormal in all patients. With intervention, improvement of sleep stages and/or sleep-wake patterns were detected in 8/10 patients. Cosinor analysis of saliva melatonin results revealed that averaged baseline % rhythmicity was low. (Mean: 31%, Range: 13%–66.4%, SD: 18.4). Increase in %Melatonin Rhythm following intervention was statistically significant ($p=0.012$). Paired samples *t*-test revealed statistically significant improvement of CRS-R scores with intervention ($p=0.034$). *Conclusion:* Sleep and circadian rhythms are severely deranged in PDOC. Clinical intervention with melatonin, caffeine and blue light treatment led to improvement of all physiological parameters measured – and most importantly of CRS-R scores. Further studies with increased number of patients in earlier stages of PDOC are required.

34

THE APPLICABILITY OF ERRORLESS LEARNING STRATEGY IN NEUROLOGICAL REHABILITATION: A SYSTEMATIC REVIEW OF CLINICAL TRIALS

J. Zhang¹, X. Tang¹, D. Ma¹, Y. Kang¹, M. Zhang¹

¹West China Hospital - Sichuan University, Rehabilitation Medicine Center, Chengdu, China

tions are frequently performed interventions, but their efficacy is controversial. One of the main limitations to caudal epidural injections is the fairly high failure rate when no imaging guidance is used. Fluoroscopy and ultrasound may help identifying the sacral hiatus and may allow caudal epidural injections to be performed more accurately and safely. *Material and Methods:* Our purpose was to determine if there are any differences in efficacy and safety of caudal epidural corticoanesthetic injections guided by ultrasound or fluoroscopy in outpatient with subacute or chronic low back pain, refractory to conservative treatment. We conducted a retrospective study where we evaluated 16 patients in our outpatient clinic, with low back pain related to disk herniation or associated with lumbar spine stenosis, refractory to conservative treatment. A caudal epidural injection (Lidocaine + Depo-medrol) guided by ultrasound or fluoroscopy was performed. We considered injection as successful when: with ultrasound guidance fluid was observed in the sacral canal; with fluoroscopic guidance radio-opaque contrast was observed in the sacral canal. Back Pain Index Score (BPI), Modified Oswestry Low Back Disability Questionnaire (MOLBDQ) and VAS were applied at baseline and at 3 and 6 weeks after injection. Adverse events were recorded. *Results:* 16 patients (12♀; 4♂) with a mean age of 63.1 years were included. 9 patients were submitted to injection guided by fluoroscopy and 7, guided by ultrasound. Both techniques showed 100% accuracy in correct needle placement. VAS, BPI and MOLBDQ improved 3 and 6 weeks after the injections in both groups. There were no statistical differences in any of the scales, between the groups. No major adverse events were recorded. *Conclusion:* The results showed similar improvements in short-term pain relief, function, patient satisfaction and safety with both, ultrasound and fluoroscopic guidance. Further research should be done.

38

REHABILITATION RESULTS FOR BALLOON KY-PHOPLASTY PATIENTS IN OUR RECOVERY-PHASE REHABILITATION WARD

*J. Amano*¹, *Y. Mikami*², *K. Yamada*³, *Y. Fujimoto*³, *H. Kimura*²

¹Amano Rehabilitation Hospital, Rehab., Hatsukaichi, Japan, ²Hiroshima University Hospital, Rehab., Hiroshima, Japan, ³JA Hiroshima General Hospital, Orthopedics, Hatsukaichi, Japan

Introduction/Background: Balloon kyphoplasty (BKP) has been highly evaluated as an excellent method of treating vertebral body fractures. However, disuse progresses in vertebral body fracture patients and in some cases discharge to home is difficult even after BKP. Here we report the results of our assessment of the rehabilitation of post-BKP patients in our recovery-phase rehabilitation ward. *Material and Methods:* The subjects were 116 post-BKP patients (mean age 81.1 years) who were admitted to our recovery-phase rehabilitation ward. We assessed the following parameters: 1) interval between the onset of symptoms and BKP, 2) interval between the date of BKP and transfer to the rehabilitation ward, 3) mean length of hospital stay, 4) lower limb muscle strength, 5) Mini-Mental State Examination (MMSE) scores, 6) Functional Independence Measure (FIM) scores, and 7) discharge to home rate. *Results:* The mean interval between the onset of symptoms and BKP was 3.2 months, 2) the mean interval between the date of BKP and transfer to the rehabilitation ward was 11.6 days, and 3) the mean length of stay was 61.8 days. 4) Reduced lower limb muscle strength was observed in 86 (74.1%) of the cases on admission but had decreased to 66 (56.9%) of the cases at discharge. 5) Comparison of the MMSE scores on admission and at discharge showed significant improvement at discharge. 6) Scores on the motor parameters and cognitive parameters of the FIM showed improvement at discharge. 7) The mean rate of discharge to home was 83.6%. *Con-*

clusion: In Japan, which has a high population aging rate, vertebral body fractures rank high as a cause of interference with a healthy life expectancy. As a result of providing intensive rehabilitation in a recovery-phase rehabilitation ward for post-BKP patients with a disuse condition, mental and motor functions improved, and it was possible to raise the discharge-to-home rate to a high level.

39

COMPREHENSIVE NON-SURGICAL TREATMENTS DECREASE THE NEED FOR SPINE SURGERY IN PATIENTS WITH DEGENERATIVE SPONDYLOLISTHESIS

S. Sencan¹, H. Cil², E.E. Ozcan-Eksi², B. Tay², S. Burch², S. Berven², S. Demir-Deviren²

¹Marmara University Medical School, Department of Physical Medicine and Rehabilitation- Pain Management, Istanbul, Turkey, ²University of California- San Francisco, Department of Orthopaedic Surgery-Spine Center, San Francisco, USA

Introduction/Background: Even though non-surgical treatments were reported to be less effective than surgery in degenerative spondylolisthesis (DS), none of those studies used comprehensive non-surgical treatment (CNT). We hypothesize that utilization of transforaminal epidural steroid injections (TFE) and/or pain control with medications for acute pain and supporting this less painful period with a comprehensive exercise program is an effective treatment to decrease the need for spine surgery in DS. *Material and Methods:* We evaluated patients who underwent CNT for DS at the UCSF from 2009 to 2014. CNT defined as utilization of multiple non-surgical treatments integrated with each other including oral medications, patient education, bilateral TFEs, and a 6–8 week exercise program initiated in 2–3 days following TFE with home exercise program. We recorded patients' age, gender, comorbidity score, smoking status, duration of CNT, medication use, facet joint widening on T2-weighted axial lumbar spine MRI, and translation on flexion- extension lateral lumbar spine X-rays. *Results:* Only 17% of patients with DS (n; 171) chose to have surgery after receiving CNT. Patients who chose to have surgery and those who chose to have nonsurgical treatments were similar in age, comorbidity scores and follow-up duration (69.49±10.57 years; 1,080.74±813.20 days; $p>0.050$). The nonsurgical group had greater pain relief for a longer period of time after bilateral TFEs when compared to the surgical group (76.02±24.18% vs 52.93±34.29%; 1,558.95±223.14 vs 26.62±22.82 days $p=0.001$). Opioid use was significantly higher in the surgical group. The groups were similar in neuropathic pain medication usage. *Conclusion:* CNT should be considered as the first line treatment in DS as it may prevent the need for surgery. We recommend consideration of surgery earlier instead of trying non-surgical treatments in patients who get less than 50% relief from TFE less than a month since those are the patients who chose to have surgery.

40

EFFECTIVENESS OF A RESEARCH DESIGNED COST-EFFECTIVE LUMBAR BRACE AS AN ADJUNCT IN THE TREATMENT TO PATIENTS WITH NON-NEUROLOGICAL LOW BACK PAIN

J. Litang III¹, L. Adorable², F.C. Creer², L.M. Baylosis², T.C. Lagura², R. Garcia²

¹Southwestern University, College of Rehabilitative Sciences, Cebu City, Philippines, ²Southwestern University, College of Rehabilitative Sciences- Department of Physical Therapy, Cebu City, Philippines

Introduction/Background: Low back pain (LBP) is a common musculoskeletal symptom that may be either acute or chronic. Most LBP causes are musculoskeletal in origin and known non-specific

low back pain. As part of addressing these matters, the researchers came up with the cost-effective lumbar brace and utilizing this in the treatment of non-neurological LBP patients. *Material and Methods:* The cost-effective lumbar brace for the treatment parts are made up of abdominal support which is made up of 3 thick velcro and garter, back support, plastic Insert and velcro Belt to limit trunk extension and flexion. 30 patients with age range of 20–60 years old were given pre-test and post-test by means of Roland Morris Disability Questionnaire and the scores were made as baseline and starting score in which they were randomly assigned into two groups. They were divided into 2 groups but all patients underwent PT intervention Half of the group wore the modified lumbar brace for the whole day except during bathing and sleeping. Patients were given home instruction to not change any daily regimens and were informed to not take any pain reliever as it would invalidate the research outcome. The study used the independent *t*-test to determine the significant difference on the functional disability scores of patients before and after using the cost-effective lumbar brace. *Results:* There is a significant difference on the Mean Roland Morris Disability Questionnaire Scores of patients with non-neurological LBP between groups. The computed *t* value of 7.83 is greater than the critical value of 2.05 and the *p* value obtained is 0.00 which resulted in the rejection of the null hypothesis interpreted as significant improvement on the scores of patients between groups. *Conclusion:* The PT intervention together with the brace are proven be functional and effective in reducing disability and pain to non-neurological low-back pain patients.

41

THE EFFECT OF SPINOPELVIC ALIGNMENT ON CLINICAL OUTCOMES AFTER THE SURGERY IN PATIENTS WITH LUMBAR SPINAL STENOSIS AND DEGENERATIVE SPONDYLOLISTHESIS

E.E. Ozcan-Eksi¹, J. Bal¹, H. Cil¹, B. Tay¹, S. Burch¹, S. Berven¹, S. Demir-Deviren¹

¹University of California - San Francisco, Department of Orthopaedic Surgery-Spine Center, San Francisco, USA

Introduction/Background: A harmonious sagittal spinopelvic alignment for a neutral posture is provided by balanced spinopelvic curves (lumbar lordosis (LL), pelvic incidence (PI), sacral slope (SS) and pelvic tilt (PT)). The difference between PI and LL should be <100 to have balanced curves and avoid sagittal spinopelvic misalignment (SSM) that associates with poor clinical outcomes in degenerative spinal disorders. Aim of this study is to determine the effect of sagittal spinopelvic alignment on clinical outcomes after the surgery in patients with lumbar spinal stenosis (LSS) and DS. *Material and Methods:* Patients with LSS and DS who underwent spine surgery between 2012 and 2015 at UCSF were evaluated. We recorded age, gender, height, weight and BMI, visual analog scale (VAS), Oswestry disability index (ODI) and health status (EQ-5D) at baseline, 1- and 3-month follow-ups. We measured LL, PI, PT and SS. SSM was defined as $PI-LL >100$. *Results:* Patients with LSS and DS were comparable in terms of age, gender, and BMI. Patients with SSM (n:37) and those without SSM (n:18) were also similar in age, gender, BMI and spinopelvic curves except PT. PT was significantly higher in patients with SSM than in those without SSM (20.44±10.73 vs 14.50±6.71; $p=0.039$). As LL increased in patients with DS, low back pain scores increased at 3-month follow-up ($r=0.492$ $p=0.032$). As PI increased in patients with DS, patients had moderately higher EQ5D scores at 1- and 3-month follow-ups ($r=0.519$ $p=0.047$; $r=0.573$ $p=0.025$). As PT increased in patients with DS, EQ5D scores were higher at 3-month follow-ups ($r=0.562$ $p=0.029$). As SS increased in patients with LSS, patients had higher leg pain scores at 1-month follow-up ($r=0.751$ $p=0.003$). *Conclusion:* There is a significant relation between spinopelvic curves and clinical outcomes after surgery in patients with LSS and DS. Spinopelvic alignment needs to be included in surgical planning in patients with LSS and DS.

INTERNAL MEDICINE AND OTHER CONDITIONS

42

THE ROLE OF PMR IN DISABLING OBESITY

P. Capodaglio¹

¹*Istituto Auxologico Italiano - IRCCS, Rehabilitation, Verbania, Italy*

Introduction/Background: Given the figures of obesity worldwide, its impact on disability and on the National Health Systems, it appears mandatory for PMR to face this issue. The particular characteristics of morbid obesity as a chronic disease, its comorbidities and consequential disability that negatively impact both quality of life and health expenditure calls for an approach that involves PMR and not just treatment alone. **Material and Methods:** In 2010, the Italian Society of Obesity and the Italian Society of Eating Disorders have published a document where the rationale and the criteria of the comprehensive rehabilitation for the obese patient were described. In 2011, the Italian Ministry of Health has acknowledged the need for a multidisciplinary and integrated rehabilitation pathway for severely obese patients with comorbidities including multiple rehabilitative settings according to the severity of disability and to the phases of instability of the condition. It is important to devise pathways of care based on a multidisciplinary approach that not only deal with the weight issue in the long term, but, above all, prevent and treat its complications, improve function and quality of life and enhance participation. **Results:** In May 2013, delegates of the Italian Society of Physical and Rehabilitation Medicine, the Italian Society of Obesity and the Italian Society of Eating Disorders have joined in a panel of experts to discuss a consensus document on the organizational requisites of rehabilitation units devoted to patients affected by severe obesity with comorbidities. In Jun 2013, the International Society of Physical and Rehabilitation Medicine started a Special Interest Group on Rehabilitation in Obesity and Metabolic Conditions with the aim of gathering existing related national guide lines and documents and develop position papers of the PMR Societies and further guide lines. **Conclusion:** This presentation aims to provide an up-to-date overview of the state-of-the-art in the Rehabilitation of severely obese patients.

43

REHABILITATION INTERVENTIONS FOR COPD: AN OVERVIEW OF SYSTEMATIC REVIEWS

E. Luk^{1,2}, S. Kofoed^{1,2}, L. Irving^{2,3}, F. Khan^{1,2}

¹*Royal Melbourne Hospital, Rehabilitation, Melbourne, Australia,* ²*University of Melbourne, Medicine, Parkville, Australia,* ³*Royal Melbourne Hospital, Respiratory Medicine & Sleep Disorders, Melbourne, Australia*

Introduction/Background: Chronic Obstructive Pulmonary Disease (COPD) causes significant activity limitations. Persons with COPD are commonly referred to pulmonary rehabilitation programs. These have been recognised as an essential component of their ongoing management. However, pulmonary rehabilitation programs vary across centres and the optimal program has yet to be devised. To conduct a systematic review of commonly utilised rehabilitation interventions in the management of stable COPD. **Material and Methods:** Literature databases were searched to identify Randomised Controlled Trials (RCTs) and systematic reviews comparing non-pharmacological and non-surgical interventions with controls in stable COPD. Interventions included, but were not limited to, physical therapy, psychotherapy, education, dietetics or case management. **Results:** A total of eight systematic reviews and 13 RCTs involving 180 articles were analysed. Interventions included physical exercise, inspiratory muscle training, breathing exercises, self management, integrated disease management, nutrition and psychological interventions. Systematic reviews were analysed using the Assessment of Multiple Systematic Reviews

(AMSTAR) tool. Most reviews were rated high quality. Included trials were generally small. Physical exercise, inspiratory muscle training, self management and integrated disease management have been shown to be effective and have high quality of evidence based on the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) criteria. Breathing exercises, nutrition and psychological interventions do not have consistent evidence of their effectiveness. **Conclusion:** Physical exercise has been commonly incorporated into pulmonary rehabilitation. Centres should consider the addition of other interventions such as inspiratory muscle training, self management and integrated disease management which have good evidence. Further large trials are required for some interventions such as breathing exercises and psychology.

44

COMPARISON OF THE EFFECT OF TREADMILL AND STATIONARY BICYCLE TRAINING ON STATIC AND FUNCTIONAL BALANCE IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

S. Sinaga¹, A. Ratnawati², T. Tambunan³

¹*Faculty of Medicine, Physical Medicine and Rehabilitation Department of Dr. Cipto Mangunkusumo National General Hospital, Jakarta, Indonesia,* ²*Persahabatan Hospital, Physical Medicine and Rehabilitation, Jakarta, Indonesia,* ³*Dr. Ciptomangunkusumo General Hospital, Physical Medicine and Rehabilitation, Jakarta, Indonesia*

Introduction/Background: Endurance Training is the corner stone of rehabilitation program for patient with Chronic Obstructive Pulmonary Disease (COPD). Treadmill and stationary bicycle training are types of training that involves large muscle groups in the lower extremity. In addition, treadmill exercise also involves trunk muscle. Postural control impairment often occurs in older population particularly those with chronic disease like COPD. The contribution of the trunk to the maintenance of balance may be compromised in people with COPD. Little is known regarding the effect of treadmill and stationary bicycle training on static and functional balance in COPD. **Material and Methods:** Ten male COPD patients aged 60 or older were equally assigned to a treadmill group and stationary bicycle group. Assessments were performed before and after the intervention using Berg balance scale (BBS) as well as the determination of oscillations from the center of pressure with posturography using Anima Gravicorder's envelope area measurement. The 1st group was submitted to treadmill training and the 2nd group performed stationary bicycle training. The intervention consisted of 10 minutes increase gradually to 30 minutes, 3 sessions per week for 10 sessions. Both groups also received pulmonary rehabilitation program. **Results:** After intervention, static posturography and BBS improve significantly in both group. A comparison of static posturography and BBS after the intervention between the two groups revealed that the treadmill group (-1.29 ± 1.17 ; 3.6 ± 2.61) showed larger increases than stationary bicycle group (-0.36 ± 0.36 ; 0.8 ± 1.10) but not significantly ($p=0.58$; $p=0.125$). **Conclusion:** Treadmill training and stationary bicycle training showed significant improvements in static posturography and BBS. Treadmill training is better than stationary bicycle training in improving static and functional balance impairment in COPD.

45

EVALUATE THE EFFECT OF LONG-TERM COMPREHENSIVE CARDIAC REHABILITATION IN CORONARY ARTERY DISEASE: A COHORT STUDY

S.K. Jong¹

¹*RIPAS Hospital, Occupational Therapy Unit, Bandar Seri Begawan, Brunei*

Introduction/Background: To assess changes in cardiac risk factors and self-reported quality of life among cardiac patients who

participated in an outpatient comprehensive rehabilitation programme. **Material and Methods:** This is a prospective study of cardiac patients enrolled from 2009–2013, who completed an 8-week programme (Phase II [P1 to P2]) and being followed up in an 18-month maintenance programme (Phase III [P2 to P3]). At each review, patients performed a structured, supervised exercise and were reminded the importance of continuing their healthy lifestyle. The Short Form (36) Health Survey (SF36), Exercise Test Time (ETT), Resting Blood Pressure (SBP/DBP), Resting Heart Rate (HR), Fasting Blood Sugar (FBS), Total Cholesterol (TC), High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL), Triglyceride (TG), Weight (WT), Waist Circumference (WC) and smoking status were recorded at enrolment (P1), end of Phase II (P2) and Phase III (P3). **Results:** There were 180 low risk cardiac patients, male ($n=137$, mean age 56.33 ± 9.75 years) and female ($n=43$, 55.21 ± 8.09 years), included in the study. Between P1 and P2, significant improvements were seen in the SF 36 scores, ETT, SBP, DBP, TC, LDL and WC (all p -values). **Conclusion:** Significant improvements were found in SF36, ETT and smoking cessation after 8 weeks' Phase II programme and these measures were sustained at the end of Phase III. HDL achieves overall significant improvement only at the end of Phase III. Our study shows positive effects of a rehabilitation programme that empowers patients to manage their own cardiac risk factors.

46

EFFECTS OF EXERCISE-BASED CARDIAC REHABILITATION ON ONE YEAR HEALTH CARE COSTS, MAJOR ADVERSE CARDIAC EVENTS AND QUALITY OF LIFE

A. Hautala¹, A. Kiviniemi², T. Mäkikallio², P. Koistinen³, O.P. Rynänen⁴, T. Seppänen¹, H. Huikuri², M. Tulppo²

¹University of Oulu, Center for Machine Vision and Signal Analysis, Oulu, Finland, ²University of Oulu, Medical Research Center Oulu- Oulu University Hospital and University of Oulu, Oulu, Finland, ³City of Oulu, Social and Health Services, Oulu, Finland, ⁴University of Eastern Finland, Kuopio University Hospital, Kuopio, Finland

Introduction/Background: The health care decision-making system requires evidence of the cost-effectiveness of medical therapies. Consequently, we evaluated the cost-effectiveness of an exercise based cardiac rehabilitation (ECR) program guided according to current guidelines. **Material and Methods:** All patients ($n=204$) had experienced a recent acute coronary syndrome and they were randomized to one year ECR ($n=109$) or usual care (UC) groups ($n=95$). The incremental cost-effectiveness ratio was calculated based on intervention and health care costs, and the differential incremental quality adjusted life years (QALYs) gained for patients who completed the one year intervention. **Results:** The total average cost per patient was significantly lower in the ECR ($n=78$) than in UC ($n=70$) ($1,652\pm 2,061\text{€}$ vs. $2,629\pm 5,309\text{€}$, $p=0.006$). The incremental cost of -997€ was divided by the baseline adjusted differential incremental QALYs (0.031) yielding an incremental cost-effectiveness ratio of -31516€/QALYs . Combined endpoint of mortality, recurrent coronary event or hospitalization for heart failure occurred for five patients in ECR and for 16 patients in UC ($p=0.004$, relative risk reduction 73%, number needed to treat 8). **Conclusion:** ECR is cost-effective and decreases the occurrence of adverse cardiac events. These results may be useful for policy makers charged to decide how limited health care resources should be best allocated in the era of exploding needs.

47

OVERNIGHT PULSE OXIMETRY IN REHABILITATION/CARE TRANSITIONS SETTINGS

J. Jacob¹, R. Varghese², L. Lame³, C. Smith⁴, D. Majors⁵

¹LOVELAND, USA, ²Grace Pointe Continuum Health, Director of Nursing, Greeley- Colorado, USA, ³Grace Pointe Continuum Health, MDS Co-ordinator, Greeley- Colorado, USA, ⁴Grace Pointe Continuum Health, Case Manager, Greeley- Colorado, USA, ⁵Grace Pointe Continuum Health, Administration- Member-Care Transitions Group, Greeley- Colorado, USA

Introduction/Background: Re-hospitalization in high risk cardio-pulmonary patients contributes to unnecessary medical expenditure. Post acute care transitions between acute hospital, inpatient rehabilitation settings and the community are fraught with risk of re-hospitalization. We evaluated overnight pulse oximetry as a screening tool in patients at high risk for return to acute hospital. **Material and Methods:** We have used continuous overnight pulse oximetry as a screening tool for nocturnal hypoxia in patients admitted to a Subacute Rehabilitation/Skilled Nursing Facility with stroke, heart failure, COPD, Trauma and Elective surgery. We found a high incidence of previously undiagnosed nocturnal hypoxia in these patients. The patients were prescribed oxygen for use at night in the facility as well as in the community. Clinical information including a printed copy of overnight pulse oximetry was forwarded to the patient's community physician for follow-up. Some of these patients were referred to a non-profit Care Transitions Coaching program with the support of local health systems with the goal of reducing preventable re-hospitalizations. **Results:** A large number of patients screened by continuous overnight pulse oximetry in an inpatient rehabilitation setting were found to have previously undiagnosed nocturnal hypoxia and apnea. **Conclusion:** Use of overnight pulse oximetry may prove valuable in reducing re-hospitalization in patients discharged from inpatient rehabilitation settings.

48

EFFECTS OF A RENAL REHABILITATION EXERCISE PROGRAM IN PATIENTS WITH END STAGE RENAL DISEASE: STUDY PROTOCOL FOR A MULTI-CENTER CONTROLLED TRIAL

M. Miura¹, S. Oowada², Y. Hirayama³, A. Hirayama⁴, O. Ito⁴, M. Kohzuki⁴

¹Tsukuba University of Technology, Department of Health, Tsukuba, Japan, ²Asao Clinic, Dialysis center, Kawasaki, Japan, ³Hirayama Hospital, Dialysis Center, Chiba, Japan, ⁴Tohoku University Graduate School of Medicine, Department of Internal Medicine and Rehabilitation Science, Sendai, Japan

Introduction/Background: Hemodialysis patients show reduced physical function and greater risk of arteriosclerosis because of hypertension, metabolic disturbances, and vascular calcification. Meanwhile, exercise training in hemodialysis patients improves fitness, physical function, quality of life, and markers of cardiovascular disease such as arterial stiffness. This study aimed to determine whether aerobic training and electrical stimulation to skeletal muscles for 12 weeks could improve physical function and dialysis efficacy in patients with end-stage renal disease (ESRD). **Material and Methods:** This was a multicenter trial. A total of 35 ESRD patients on three occasions (20 males, 15 females; age: 70.2 ± 11.7 years) were randomized to receive 12 weeks of aerobic training exercise during hemodialysis session (Ex-group: $n=19$), electrical stimulation to the lower limbs (ES-group: $n=6$), or no specific intervention (Cont-group: $n=10$). The Borg scale was used to control the intensity of training. At baseline and study completion, the primary outcome measures were grip strength, quad muscle torque, workout time, activities, dialysis efficacy, HDL-cholesterol, LDL-cholesterol, C-reactive protein (CRP), Interleukin-6 (IL-6) and blood pressure on the morning of the dialysis day. **Results:** In the Ex-group, handgrip, quad torque, and workout time increased significantly ($p<0.05$). Dialysis efficacy, HDL-cholesterol, LDL-cholesterol, CRP, and blood pressure on the morning of the dialysis day also improved significantly ($p<0.05$). These effects were not

observed in the Cont-group. In the ES-group, quad muscle torque and dialysis efficacy increased significantly ($p < 0.05$), IL-6 decreased significantly ($p < 0.05$), compared to the other two groups. **Conclusion:** In this study, the safety and efficacy of training and electrical stimulation during hemodialysis were confirmed without sudden drop of blood pressure or any other side effects. Therefore, training during hemodialysis session for 12 weeks might improve physical function with specific whole-body effects as well as local effects in ESRD patients.

49

CLINICAL DETECTION OF VENOUS THROMBOEMBOLISM (VTE) USING CALF MEASUREMENTS IN ACUTE INPATIENT CANCER REHABILITATION

A. Ng¹, J. Fu¹, Y. Guo¹, R. Yadav¹, A. Ngo¹, K. Shin¹, J. Bianty¹, J. Engle¹, H. Adham¹

¹University of Texas MD Anderson Cancer Center, Palliative and Rehabilitation Medicine, Houston, USA

Introduction/Background: Venous Thromboembolism (VTE) prophylaxis and treatment in cancer patients presents a major challenge in daily practice. There is a 4 to 7 fold increase in the frequency of VTE during treatment than patients without cancer. Patients have significantly worse survival, suffering from higher complications of bleeding and recurrent VTE. Cancer rehabilitation inpatients have a number of risk factors that could make them particularly at risk for VTE including reduced mobility and malignancy-related hypercoagulability. Our recent study revealed 5.6% incidence of patients with VTE. This study sought to evaluate calf measurement differences as a tool for early detection of VTE in the lower extremities. **Material and Methods:** Patients presenting to rehabilitation during Apr 2015 and Oct 2015 were identified and as part of their initial physical assessment, calf measurements were taken on both lower extremities. Nursing staff were trained on measuring calf circumferences and if the difference between the two calves were greater than 3 cm, clinicians were notified for an order for a Venous Doppler ultrasound (VDU). Ultimately, clinicians were left to use their judgement to order VDU or consider if other medical justification exists for their calf circumference differences. **Results:** There were 227 patients admitted to the acute cancer inpatient unit during Apr to Oct 2015. Of these patients, 6 patients (2.6%) did not have calves measured upon admission. Only 1 patient had a difference in his/her calf measurement to warrant a venous Doppler ultrasound. No positive VTE was identified during this study period. **Conclusion:** The high incidence of VTE among cancer patients and associated complications highlights the need to establish a systematic approach to prevention and treatment. In this prospective study, there were no VTE identified in the lower extremities as a result of this method. Future studies are needed to help establish improved methodology to help with clinical detection of VTE.

GERIATRICS

50

DELIRIUM IN ACUTE INPATIENT REHABILITATION: IMPLEMENTATION OF SCREENING AND INTERVENTIONS IN COLLABORATION WITH ACUTE CARE HOSPITALS

M. Oh-Park¹, A. Lee², K. Hreha³, K. Kim⁴, M. Lopreiato⁵, A. Barrett⁶

¹Kessler Institute for Rehabilitation, Physical Medicine and Rehabilitation, West Orange, USA, ²Kessler Institute for Rehabilitation, Physical Medicine and Rehabilitation, Saddle Brook, USA, ³Kessler Institute for Rehabilitation, Occupational Therapy Service, West Orange, USA, ⁴George Washington University, School

of Medicine and Health Sciences, Washington DC, USA, ⁵Kessler Institute for Rehabilitation, Nursing, West Orange, USA, ⁶Kessler Foundation, Stroke Lab, West Orange, USA

Introduction/Background: Delirium, defined as the acute decline in attention and cognition, is a leading complication with detrimental outcomes during hospitalization among older adults. Many patients in inpatient rehabilitation have multiple risk factors of delirium; therefore, valid and practical screening and interventions for delirium are critical for optimal recovery. This project describes the implementation process of currently available guidelines for delirium tailored to the acute inpatient rehabilitation setting and reports preliminary outcomes. **Material and Methods:** This is a descriptive study. The multidisciplinary Delirium Initiative Task Force (physicians, nurses, therapists, administrators) identified and initiated the following steps: 1) prioritizing delirium as an institutional-level quality indicator given its impact on existing quality measures (acute care transfers), 2) increasing awareness of delirium by education, 3) identification of screening and development of 1st version of the intervention guide (Kessler-Delirium Intervention Protocol: K-DIP-v1), 4) small scale trial of tools and feedback analysis, 5) outcome monitoring, 6) sharing the protocols and care process information with referring acute hospitals for continuity of care. **Results:** Confusion Assessment Method (CAM) was used for screening of delirium. 26 didactic delirium education sessions (17 for nursing, 3 for therapists, 6 for physicians) were provided over 24 months. Documentation of delirium status at admission improved from 11% to 98%. Prevalence of delirium at admission was 15.2%. Among patients requiring personal supervision 66% were positive for delirium. Medications were recognized as the most frequent incidental delirium etiology during the pilot phase of K-DIP-v1. **Conclusion:** This project highlights that implementation of practice guidelines requires well-orchestrated effort of multiple disciplines, including referring hospitals beyond the rehabilitation facility. Future studies are needed to tailor the interventions utilizing specific resources of rehabilitation facilities for patients with delirium.

51

APPROACHES TO FRAILTY REHABILITATION IN FRAIL AND PRE-FRAIL COMMUNITY LIVING OLDER PEOPLE

I. Cameron¹, S. Kurrle¹, K. Lockwood¹, N. Fairhall¹, C. Sherrington¹, S. Lord¹, N. Monaghan¹

¹University of Sydney, Kolling Institute, St Leonards, Australia

Introduction/Background: A number of approaches for rehabilitating and “treating” frailty are potentially feasible. These include direct interventions for the phenotypic characteristics of frailty, or more general approaches based on comprehensive geriatric evaluation and management and then targeted interventions based on health status, disabilities and other factors. This presentation reviews the approaches to “treatment” of frailty used in two randomized trials to ascertain whether a common approach can be applied both in frailty and pre-frailty. **Material and Methods:** Two randomized trials have been conducted. Both applied interdisciplinary multifactorial interventions based on phenotypic characteristics using Cardiovascular Health Study criteria and comprehensive geriatric assessment. One study involved with frail community living older people (ACTRN12608000250336) and the other pre-frail older people (ACTRN12613000043730). A narrative review of the feasibility, implementation and operation of the studies is provided, together with analyses of adherence to the interventions. **Results:** High rates of retention in the studies were achieved. The studies demonstrated that multifactorial interdisciplinary interventions could be delivered with coordination from a key staff member (physical therapists). The components of the interventions were broadly similar although the pre-frail participants were able to participate in higher intensity exercise programs, had fewer unstable health conditions and require fewer community support services. Adherence to the interventions was limited in both groups. **Conclusion:**

Implementation of frailty, and pre-frailty, rehabilitation and “treatment” programs are feasible and will be associated with benefit if adequate levels of adherence are achieved.

52

CHARACTERISTICS OF FALLS IN PATIENTS WITH HIP FRAGILITY FRACTURES IN ITALY: THE PHYSIATRIC APPROACH TO OSTEOPOROSIS 2 SURVEY

A. Moretti¹, F. Gimigliano², S. Mozzillo¹, G. Iolascon¹, R. Gimigliano¹

¹Second University of Naples, Department of Medical and Surgical Specialties and Dentistry, Napoli, Italy, ²Second University of Naples, Physical and Mental Health and Preventive Medicine, Napoli, Italy

Introduction/Background: Osteoporosis is a chronic condition characterized by loss of bone density and deterioration of bone strength that lead to a greater risk of fragility fractures. Fall is generally the main cause of fractures. Hip fractures are the most common ones and are usually correlated to a greater morbidity and mortality. The objective of this study was to evaluate the characteristics and circumstances of the falls in patients with hip fractures. *Material and Methods:* On behalf of the Italian Society of Physical and Rehabilitation Medicine (SIMFER) we performed a National Survey named PATO 2 (Physiatric Approach To Osteoporosis 2) addressed to 80 rehabilitation units in Italy. The physiatrists involved were asked to collect data about patients ≥55 years who sustained fragility fractures in the year prior to recruitment. For each patient a form including questions about different features of patients’ medical history was administered. In particular, we collected the following data: age, gender, fracture site, number of falls in the last 12 months and the year before the fall, characteristics of the fall that led to the fracture, including extrinsic and intrinsic risk factors. *Results:* In our population, 419 patients sustained a hip fracture, 70 experienced a fall, 119 incurred in multiple falls in the year before the fracture. Our results showed that the hip fractures mainly occurred at home (70.88%), in the morning (36.3%). The majority fell on their side (54%) but there were a significant percentage of patients (>40%) who fell with other injury mechanisms. *Conclusion:* The PATO 2 study provides a characterization of patients with a history of hip fragility fracture, particularly with regard to the characteristics and circumstances of falls. Our findings support the idea of a rationale in a holistic multidimensional approach to falls prevention for osteoporotic patients.

53

EFFECTS OF ELASTIC-BAND RESISTANCE EXERCISE ON PHYSICAL FUNCTION IN ELDERLY FEMALE ADULTS WITH SARCOPENIC OBESITY

C.D. LIAO^{1,2}, L. Li-Fong³, H. Yi-Ching⁴, H. Shih-Wei¹, L. Tsan-Hon^{1,5,6}

¹Shuang Ho Hospital-Taipei Medical University, Department of Physical Medicine and Rehabilitation, Taipei, Taiwan, ²National Taiwan University, School and Graduate Institute of Physical Therapy- College of Medicine, Taipei, Taiwan, ³Shuang Ho Hospital, Department of Physical Medicine and Rehabilitation, Taipei, Taiwan, ⁴National Taipei University of Nursing and Health Sciences, Department of Exercise and Health Science, Taipei, Taiwan, ⁵Taipei Medical University, Department of Physical Medicine and Rehabilitation- College of Medicine, Taipei, Taiwan, ⁶Taipei Medical University, Graduate Institute of Injury Prevention and Control, Taipei, Taiwan

Introduction/Background: Sarcopenia is associated with loss of muscle mass and also with an increased risk of physical disability

in elderly. However, the percentage of obese patients with sarcopenia has increased. This study aimed to investigate the effect of elastic-band resistance exercise on body composition and physical function in elderly female adults with sarcopenic obesity. *Material and Methods:* A total of 62 patients were randomly assigned to either an experimental group ($n=32$) or control group ($n=30$). The study group received elastic-band resistance training 3 times a week for 12 weeks, whereas the control group received only general function training over the same period. Measurements were collected before and after intervention. The measures were as follows: distance of functional forward reach; duration of single leg stance (eyes closed and open); timed sit-to-stand test; timed up-and-down stair test; timed 10-m walk; timed up-and-go test. Analysis was performed by ANCOVA using the pretest measures of both groups as the covariates. *Results:* A statistically significant improvement of all measures was observed in both the experimental and control groups after intervention (all $p<0.001$). However, the experimental group exhibited a significantly superior improvement compared with the control group ($p<0.001$). *Conclusion:* Elastic-band resistance exercise exerted a significant beneficial effect on the physical function in elder female with sarcopenic obesity. Further studies should include a control group that does not receive any intervention, and should follow the patients up for longer than we did. Elastic-band resistance exercise is important for sarcopenic obesity.

54

ARE DIETARY SUPPLEMENTS AND NUTRACEUTICALS EFFECTIVE FOR MUSCULOSKELETAL AND COGNITIVE FUNCTIONS IN OLDER PEOPLE? A SCOPING REVIEW

A. de Sire¹, A. Moretti¹, R. Gimigliano¹, F. Gimigliano², G. Iolascon¹

¹Second University of Naples, Department of Medical and Surgical Specialties and Dentistry, Napoli, Italy, ²Second University of Naples, Department of Physical and Mental Health and Preventive Medicine, Napoli, Italy

Introduction/Background: The market of dietary supplements and nutraceuticals is growing worldwide, in particular aimed to improve health in elderly. WHO reported that the number of individuals aged ≥60 years will triple in 2050; an inadequate intake of nutrients and low levels of physical activity were hypothesized to reduce muscle mass and physical performance in these subjects. The aim of this scoping review was to analyze the state of the art on micronutrients, available in nutraceuticals or in dietary supplements, in order to identify, according to EBM, which of them might improve musculoskeletal and cognitive functions in elderly. *Material and Methods:* We performed a scoping review. We started listing the micronutrients available in dietary supplements and nutraceuticals used to improve physical and cognitive functioning in elderly; we identified the relevant studies on PubMed, using as MeSH terms the selected micronutrients and adding through PubMed Search Builder the terms: “bone”, “skeletal muscle” and “central nervous system”/“brain”/“cognitive function”; we selected the effective micronutrients; we identified the effective and safe dosage regimens. *Results:* After an evaluation of scientific publications in medical literature in the last 10 years, with an evidence-based approach, we selected 12 positive relevant studies (1 systematic review, 7 randomized controlled trials, 3 prospective cohort studies, and 1 international society guideline recommendations). Of the 40 micronutrients defined as having “a health relationship on musculoskeletal and/or cognitive functions”, only 16 resulted to have an appropriate scientific evidence of their effectiveness in older people: beta-alanine, calcium, creatine, fluorides, leucine, magnesium, omega-3 fatty acids, potassium, vitamin B6, vitamin B9, vitamin B12, vitamin C, vitamin D, vitamin E, vitamin K2, and zinc. *Conclusion:* Our scoping review showed that the 16 selected micronutrients in appropriate doses might have an ancillary role in musculoskeletal and cognitive functions in older people.

55

IS THERE A RELATIONSHIP BETWEEN PAIN CHARACTERISTICS AND DEMOGRAPHIC VARIABLES AMONG OLDER RESIDENTS OF NURSING HOMES?

M. Foroughan¹, F. Mohammadi¹, Z. Jafari², V. Rashedi¹, A. Biglarian³

¹University of Social Welfare and Rehabilitation Sciences, Iranian Research Center on Aging, Tehran, Iran, ²Iran University of Medical Sciences, Department of Basic Sciences in Rehabilitation- School of Rehabilitation Sciences, Tehran, Iran, ³University of Social Welfare and Rehabilitation Sciences, Department of Biostatistics, Tehran, Iran

Introduction/Background: Pain is a frequently undetected and undertreated health problem among nursing home residents which is not studied adequately. The objectives of this study were to determine the prevalence of pain, pain characteristics, and self-care strategies, and also to recognize if demographic variables are associated with pain in older residents of nursing homes or not. **Material and Methods:** In this cross-sectional research which is implemented in Tehran-Iran, 13 nursing homes were approached through cluster sampling method and their residents were invited to participate in the study. The study was conducted with 394 elderly individuals. The data were collected with the Brief Pain Inventory (BPI), Abbreviated Mental Test score (AMTs) and a demographic questionnaire. **Results:** The mean age of the participants was 74.3±10.8 years, 141 (40.4%) were male, and mean of AMT score was 8.75 (SD: 1.24). 26% of the male and 51% of the female residents were identified as having chronic pain. Lower extremity on front side and lower part of trunk at back side were the most frequently reported as pain sites. Pain significantly interfered with general activity, mood, walking, normal work, relations with others, sleeping, and enjoyment of life. The findings also highlighted the participants applied self-care strategies in managing their pain which involved mostly taking prescribed medications. Based on the results, factors such as age, gender and education were significantly related with pain ($p<0.001$) and its intensity ($p<0.001$). **Conclusion:** The present study confirms the need for the development of effective pain assessment and management strategies underpinned by appropriate training of health care personnel of nursing homes. Consideration toward at risk population groups, such as female older adult, also is recommended. Further studies on the efficacy of management strategies of pain used in nursing homes may help older residents to live a life with higher quality.

REHABILITATION AFTER LIMB AMPUTATION

56

ULTRASOUND FINDINGS OF PATIENTS WITH RESIDUAL LIMB PAIN

K. Aydemir¹, Y. Demir¹, Ü. Güzelkücü¹, K. Tezel¹, B. Yılmaz¹

¹Gulhane Military Medical Academy - School of Medicine, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Amputation of a leg has multiple consequences. One of the most important sequels of a limb loss that may lead to limitations in daily activities and quality of life is the existence of pain perceived in stump. The current study was designed to document clinical and ultrasonographic findings of the patients with residual limb pain (RLP) following amputation and to investigate the relationship between these findings. **Material and Methods:** A chart review was performed to identify demographic and clinical data including the age (current and at the time of injury), disease duration, gender, reason for amputation, affected limb number, side and level of limb loss and ultrasonographic findings

of residual limb. **Results:** The study included a total of 160 patients. Trauma accounted for 94.3% of the amputations. A variety of nerve, muscle, cutaneous, vascular and bony pathologies was detected by US (Fig. 1). Inflammation and neuroma were leading pathologies in 20–29 and 30–39 age groups, with respectively. Inflammation/oedema was detected significantly more in patients with less than one year amputation duration ($p<0.001$). The neuroma was found to be a cause of pain after one year of limb loss ($p=0.036$). Infection/abscess was more common in patients with >5 years disease duration ($p=0.052$). Percentage of the neuromas in below knee amputees was significantly higher than non-below knee amputees (45.8% vs 28.6%). **Conclusion:** The leading findings were inflammation/oedema, neuroma and infection/abscess in US assessment. The US findings were different between groups divided by disease duration. Neuroma was found to be significant stump pathology in patients with below knee level amputation.

57

CORRELATION BETWEEN CORTISOL AND PHANTOM LIMB PHENOMEN IN TRAUMATIC LIMB AMPUTEE

W. Kusumaningsih¹

¹Jakarta, Indonesia

Introduction/Background: Amputation whether by accident or surgery, is a stress condition. A study to find the relationship between cortisol circulating level with phantom limb phenomenon was done in adults traumatic limb amputee. **Material and Methods:** A prospective analytic study for six months to analyze the correlation between cortisol circulating level and change in phantom pain (PP), telescoping (PS) and referred phantom limb sensation (RPLS) in fifty adults traumatic limb amputee without stump pain. Measurement was done twice, before and after. Subjects were allocated by random consecutive sampling into two independent groups, group using prosthetic (P group) and group not using prosthetic (NP group). Cortisol serum level was examined using radioimmunoassay method. Phantom pain was analyzed using visual analogue scale. Telescoping (PS) and referred phantom limb sensation was analyzed using the modification of visual imagery and vividness of movement imagery score. A pilot study to validate the score and the reliability has already been done before and results show strong significance correlation with Kappa score test. **Results:** Anova analysis show significance difference in the decrease of cortisol level within six months in each group ($p=0.008$) and between groups ($p=0.047$). Pearson correlation show significance negative correlation between decrease in cortisol level and increase in telescoping grade ($r=-0.331$, $p=0.019$). Significant positive correlation between decrease in cortisol level and decrease in phantom pain intensity ($r=0.390$, $p=0.005$). Significance negative correlation between decrease in cortisol level and increase in referred phantom limb sensation ($r=-0.377$, $p=0.007$). **Conclusion:** Decrease of cortisol level within its normal range in six months, show that body mechanism adaptation to stress reach good homeostasis balance in adult traumatic limb amputee. Within six months observation period, the changing pattern of phantom limb phenomenon in adult traumatic limb amputee or central adaption are related significantly with peripheral adaption, decrease of cortisol blood level, to reach homeostasis balance.

58

EFFECT OF DIABETES ON POSTOPERATIVE AMBULATION FOLLOWING BELOW KNEE AMPUTATION

A. Saraf¹

¹Ludhiana, India

Introduction/Background: Ambulation forms an important part of rehabilitation program after lower limb amputations. Diabetes Mellitus and its complications are commonly associated with below

knee amputation. In spite of this, there is an absence of studies on the effect of diabetes on the post operative ambulation of an amputee. This study analysed the role of diabetes as an independent factor affecting post operative ambulation and compared it with non diabetics in below knee amputation. **Material and Methods:** In this study a total of 105 below knee amputation patients were followed. Out of them, 48 amputees were diabetics and 57 non diabetic. Their post operative ambulatory level was compared by using Pinzur et al ambulation scale. Both groups were age, sex and BMI matched. **Results:** There was a worsening of ambulatory level in 33.3% diabetics as compared to 10.7% in non diabetics postoperatively. Of the prosthetic users, 78.4% were in non diabetic group and 21.6% were in diabetic group. 17.6% of prosthetic users required additional support, of whom 66.7% were diabetics. **Conclusion:** Diabetes Mellitus is an independent factor which has an adverse effect on the functional outcome of a patient after below knee amputation.

59

IBMAT: VALIDATION STUDY OF AN ICF BASED MOBILITY ASSESSMENT TOOL

S. Radhakrishnan¹, F. Kohler², K. Pieber³, C. Schiappasse⁴, A. Jayaraman⁵, J. Li⁶, C. Gutenbrunner⁷

¹Fairfield Hospital, Rehabilitation, Sydney, Australia, ²Braeside Hospital, Rehabilitation, Sydney, Australia, ³University of Vienna, Physical Medicine and Rehabilitation, Vienna, Austria, ⁴British Hospital, Rehabilitation, Buenos Aires, Argentina, ⁵Rehabilitation Institute of Chicago, Physical Medicine and Rehabilitation, Chicago, USA, ⁶University of Nanjing, Rehabilitation, Nanjing, China, ⁷University of Hannover, Physical Medicine and Rehabilitation, Hannover, Germany

Introduction/Background: The International Classification of Functioning, disability and health (ICF) provide a universal language for rehabilitation professionals across the globe. An International steering committee has been working on developing a mobility assessment tool based on ICF. A 22 item clinician administered tool was designed after systematic review of literature, expert surveys, patient focus groups and an International consensus conference. Initial studies done across two International centres showed the new instrument had reasonable inter-rater and intra-rater reliability with no ceiling or floor effect. The aim of this study was to establish the sensitivity to change of the ICF based Mobility assessment tool (IBMAT) and companion scoring instructions in lower extremity amputee rehabilitation. **Material and Methods:** Around 57 lower limb amputees were assessed across 3 study centres using the IBMAT. Sensitivity to change was measured by the number of items that changed in the IBMAT and the actual change was then measured by the Wilcoxon signed rank test for significance to change. **Results:** Ranking the median scores confirmed that running, sports, walking long distances, squatting and kneeling were the most difficult items, all with a median score of 4. Moving around within the home, lying down, sitting, standing, bending and moving around outside the home/other were the easiest items with a median score of 0. The other items were distributed across the remaining possible item scores of 1, 2 or 3. Analysis of change using the Wilcoxon signed rank test demonstrated that 17 of the items demonstrated significant improvement. Items which did not demonstrate improvement were at either end of the spectrum of difficulty. **Conclusion:** The spread of the medians between 0 and 4 and the high number of individual items showing significant change suggest that the IBMAT is a sensitive tool for measuring mobility changes in amputees.

60

EVALUATION OF USE OF PROSTHESIS, MOBILITY, AND QUALITY OF LIFE IN YOUNG AND ADULT UNILATERAL ABOVE KNEE AMPUTEES AFTER 7 YEARS OF 2008 SICHUAN EARTHQUAKE

S. Y. Chan¹

¹The Chinese University of Hong Kong, Department of Orthopaedics & Traumatology, Shatin, Hong Kong- China

Introduction/Background: A cross-sectional study was carried out to evaluate the use of prosthesis, mobility, and quality of life on 24 traumatic unilateral above knee amputees from StandTALL rehabilitation programme having passed the 7th year after 2008 Sichuan Earthquake. **Material and Methods:** All data were collected either at home visits or clinic sessions between Dec 2014 and May 2015 on-site. Main outcome measures included the 12-item Short Form Survey (SF-12), Amputee Mobility Predictor (AMP), Houghton Scale of Prosthetic Use (Houghton score), and Trinity Amputation and Prosthesis Experience Scales (TAPES). Results were calculated using independent *t*-test and bivariate correlation. **Results:** Adult amputees, comparing with young amputees, experienced worse psychological adjustment to limitation ($p=0.018$), more social activity restrictions ($p=0.072$). They also suffered from higher stump pain ($p=0.024$) and phantom pain ($p=0.044$). Patients using prosthesis more than 50% of their waking time had less functional restriction ($p=0.030$), higher K-Level ($p=0.098$), and higher score in Houghton Scale ($p<0.001$). Rehabilitation success was associated with less athletic restriction ($p=0.053$), less functional restriction ($p=0.077$) and higher prosthesis satisfaction ($p=0.085$). AMP score was correlated with psychosocial adjustment ($r=0.291$, $p=0.068$), inversely correlated with activity restriction score ($r=-0.291$, $p=0.072$). AMP score was also found to be directly correlated with Houghton Scale score ($r=0.299$, $p=0.065$) and physical health composition score in SF-12 ($r=0.304$, $p=0.048$). **Conclusion:** Adult unilateral amputees experienced greater difficulties on psychological adjustment to limitation and social activities, even 7 years after the operation. Effects experiencing stump and phantom pain were also greatly affected by age. Usage of prosthesis is also encouraged for better rehabilitation and mobility.

61

INFLUENCE OF TYPE OF INCISION ON REHABILITATION IN BELOW KNEE AMPUTATION

A. Saraf¹

¹Ludhiana, India

Introduction/Background: Below knee amputation is required in patients with advanced critical limb ischaemia or diabetic foot sepsis in whom no other treatment option is available. Till date there is no consensus as to which surgical closure achieves the maximum rehabilitation potential. In this study we assessed the effects of different types of incision on the outcome of below knee amputation focusing primarily on the relative merits of skew flap amputation versus Burgess flap closure. **Material and Methods:** This was a ten years retrospective and 2 years prospective study. A total of 144 patients were include of which 76 (53%) patients had Burgess closure while 59 (41%) had skew flap closure. 9 patients underwent atypical closure or skin grafting. These groups were compared on the basis of stump healing time, rate of infection, time for prosthetic fitting and compliance with prosthesis with either of the flaps made. **Results:** Below knee amputation using skew flaps conferred no advantage over Burgess flap. 76% stumps after Burgess closure and 71.4% after Skew flap healed well in time which was insignificant ($p>0.05$). Primary stump healing was 58% for skew flaps and 55% for Burgess flap which was not significant. Of the total 144 patients, 72.2% had prosthetic fitting. 60% of them underwent prosthetic fitting within 3 months in both the groups after closure. 66.8% of Burgess flap closure patients and 71% of Skew flap closure were happy with their prosthesis which was not significant. **Conclusion:** Stump healing time, rate of infection, prosthetic fitting timing and prosthetic compliance was similar in both groups. We thus conclude that there is no benefit of one type of incision over another. The choice of amputation technique can, therefore be a matter of surgeon preference taking into account factors such as previous experience of a particular technique, extent of non-viable tissue, and location of pre-existing scars.

62

MOBILITY, PROSTHESIS USE AND HEALTH-RELATED QUALITY OF LIFE OF 17 BILATERAL LOWER LIMB AMPUTEES FROM THE 2008 SICHUAN EARTHQUAKE

W.S. Li¹, S.Y. Chan¹, W.W. Chau¹, S.W. Law², K.M. Chan¹

¹The Chinese University of Hong Kong, Department of Orthopaedics & Traumatology, Shatin, Hong Kong- China, ²Prince of Wales Hospital, Department of Orthopaedics & Traumatology, Shatin, Hong Kong- China

Introduction/Background: The 2008 Sichuan Earthquake resulted in numerous severe injuries with long-term disabling effects, including a large number of bilateral lower limb amputees. This cross-sectional study aims to evaluate the mobility, prosthesis use and health-related quality of life of 17 young and adult bilateral lower limb amputees recruited through the “Stand Tall” rehabilitation programme 7 years after the Earthquake. **Material and Methods:** Data were collected from clinic sessions and home visits in Sichuan from Dec 2014 to May 2015. Patients’ mobility (Amputee Mobility Predictor), prosthesis use (Houghton Scale) and health-related quality of life (the Trinity Amputation and Prosthesis Experience Scale, Short Form-12) were evaluated through self-reported questionnaires and performance-based assessments. Mean and standard deviation of scores from the questionnaires by demographics, amputation level, prosthesis use and exercising hours were compared using *t*-tests. **Results:** Patients with preservation of either one or both knee joint(s), comparing with patients with no knee joint preservation, achieved higher mobility ($p=0.03$) and lower activity restriction ($p<0.01$). Patients using prosthesis more than 50% waking time had better general adjustment ($p=0.02$) and less functional restriction ($p=0.01$). Patients exercising over 3 hours per week achieved higher mobility ($p=0.08$). Patients with higher education level (diploma or above) performed better in the mental component of Short Form-12 ($p=0.09$). **Conclusion:** The results support the preservation of distal limb level and knee joint at surgical stage, which is associated with fewer activity restriction, higher mobility and better quality of life. The results also promote prosthesis use and exercise during rehabilitation for better mobility and general adjustments.

63

GAIT ANALYSIS AND PROSTHETIC REHABILITATION FOR A PATIENT AFTER CHILDHOOD ROTATIONPLASTY FOR FEMUR OSTEOSARCOMA

Y. Shimizu¹, H. Kadone², Y. Hada¹, Y. Idei³, K. Kishimoto⁴, T. Ueno¹, M. Yamazaki⁵

¹University of Tsukuba Hospital, Department of Rehabilitation Medicine, Tsukuba, Japan, ²University of Tsukuba Hospital, Center for Innovative Medicine and Engineering, Tsukuba, Japan, ³Kowagishi Laboratory, Department of Prosthesis and Orthosis, Tsukuba, Japan, ⁴University of Tsukuba Hospital, Service of Rehabilitation Medicine, Tsukuba, Japan, ⁵University of Tsukuba, Department of Orthopaedic Surgery, Tsukuba, Japan

Introduction/Background: Rotationplasty for femur malignancy is an auto-graft operation that is reported to be effective in preserving joint mechanical functions after removing limb portion. As this is performed generally during childhood, the patients need to be repeatedly prescribed with prostheses as they grow. **Material and Methods:** A 31-year-old female was seen in our clinic expecting to make a new prosthesis for her operated leg. She had undergone rotationplasty for osteosarcoma of right femur at 11 and undergone resection of lung metastasis at 13, thereafter she had had metastasis nowhere. She had been repeatedly prescribed her prosthesis in a special hospital for prosthesis, however without involvement of rehabilitation team. At the initial visit, her leg of the prosthetic side was longer and she had low back pain during walking. Her prosthe-

sis had instability in the knee joint, therefore her ankle was forced into varus position. Her trunk bended over the prosthetic side. The optimal walking speed was 42.0 m/min. **Results:** We planned a team prosthetic rehabilitation protocol that included exercises for muscle, range of joint motions and ambulation, and gait analysis. We made a new prosthesis with stability in the knee part and lessened leg length discrepancy. Gait analysis with the new prosthesis revealed reduced lateral fluctuation over the prosthetic side, and increased hip and knee flexion and improved toe clearance of the prosthetic side in swing phase. She reported that the low back pain became less. The optimal walking speed was 44.1 m/min. **Conclusion:** Since patients can preserve ability of independent gait after rotationplasty, rehabilitation team often did not involve in prescription when updating the prostheses. In this case, prescription of the new prosthesis with team rehabilitation was effective for the patient who had low back pain and gait problem after more than 20 years following rotationplasty.

SOCIAL INTEGRATION PROGRAMMES (CBR/ VOCATIONAL REHABILITATION)

64

EVALUATION OF CBR PROGRAM IN WEST SUMATRA

A. Nurdin¹, R.P. Yolanda², S. Ernafienti³

¹Padang, Indonesia, ²M Djamil Hospital, Physical Medicine and Rehabilitation, Padang, Indonesia, ³Ministry of Health, Primary Health Care, Batu Sangkar, Indonesia

Introduction/Background: Community Based Rehabilitation (CBR) is aimed to help People with Disability (PwD) deal with Activity of Daily Living (ADL), at home as well as within the community so that he could get involved in social activities in their neighborhood. **Material and Methods:** One cadre is responsible for one PwD. A book of manual will be provided for each caregiver of a PwD in accordance with what the PwD needs based on the matrix. Evaluation is made once in every six months by completing Form 2 during the period of 1012 to 2015. **Results:** From 2012 to 2015 the caregiver has populated as many as 30 personnel s of PwD in the project area of Batipuh II PHC. The data collected until Dec populated 26 PwD. During the period of 2012 to 2015 evaluation has been made 5 times. It is obtained that 4 PwD (40%) out of 10 identified as motoric disability has obviously gained some improvements, 1 PwD (10%) experiences with 1 aspen, and 5 PwD show no change. 7 PwD are identified with hearing and speech disability. The evaluation show that 6 PwD (85%) experience some improvements and, in the meantime, 1 PwD (15%) show no difference. 6 persons are identified with behavior disability. After evaluation 4 PwD (66%) experience some improvements and 2 PwD (34%) shows no difference. There are 3 persons identified with learning disability. The evaluation shows that 2 persons (66%) experience improvements, but 1 person (34%) indicates no difference. **Conclusion:** By enhancing the roles of caregiver and by using matrix, the book of manual and evaluation with Form 2, CBR Program is reportedly able to increase the independence level of PwD

65

CHALLENGES RELATED TO EMPLOYMENT EXPERIENCED BY THE PERSON WITH CEREBRAL VASCULAR ACCIDENT (CVA)

C.M.K. Hasan¹

¹Centre for the Rehabilitation of the ParalyzedCRP, Occupational Therapy, Dhaka, Bangladesh

Introduction/Background: Stroke is the third number of leading cause of death in Bangladesh and prevalence is 0.3% and most common in 51–60 years age groups. CVA also changes the personal

meaning of life, which in turn can influence return to productive life. Rehabilitation is the key aspects to improve quality of life and return back to work. In Bangladesh employment field it is not suitable for return their job. Different factors are related to successful engagement of productive life. CRP is only the non-governmental organization is actively involved in proper rehabilitation of stroke survivors which provides occupational therapy, physiotherapy and speech and language therapies to persons with CVA for ensure proper rehabilitation and given meaning of life. *Objective:* To explore the challenges experienced to return back work after CVA. To identify the physical, environmental, organizational, and personal factors which influence the employment. *Material and Methods:* The study was a qualitative grounded theory study. Ten participants selected by purposive sampling who have match inclusion criteria. Researchers used a structured and semi-structured questionnaire and previous documentation (FIM & SCIM scores). All data was analyzed using three stages: question analysis, content analysis and analysis of themes. *Results:* From the content analysis participants face some challenges: work stress, writing difficulty, working hour, move independently, hamper of self-care activities and not adequate facilities for rest. Some organization allow them some sour of extra facilities like: easy job given, flexible work load, support by other colleagues, flexible office time and extra leave allow. Most of the participants are very happy and their FIM and SCIM scores are significantly improve in maximum cases. Researcher also fined government offices are very flexible compare to other office and left side hemiplegic person with CVA are more successful. *Conclusion:* After completing rehabilitation when participants return back to their productive life again they are satisfied in maximum cases.

66

MULTI-ANNUAL EVALUATION OF THE EMPLOYMENT OUTCOMES OF PERSONS WITH DISABILITIES

A. Tabajl¹, Č. Bitenc¹

¹University Rehabilitation Institute Soča, Development centre for Vocational Rehabilitation, Ljubljana, Slovenia

Introduction/Background: Based on the recommendations of Court of Audit of the Republic of Slovenia, University Rehabilitation Institute, Republic of Slovenia prepared multi-annual evaluation, cost-benefit study and feedback analyses of the effects of vocational rehabilitation (hereinafter: VR) for persons with disabilities (hereinafter: PwD) with respect to the policies, actions, measurable targets, and the performance of the competent institutions and providers of vocational rehabilitation in achieving planned objectives. Study lasted from 2012 until the end of 2014. The analysis in 2013 focused on the entire concession period 2010–2013, which served as a pilot analysis. In doing so, we collected data on the characteristics of the target groups involved in vocational rehabilitation; special attention was paid to the degree of PwD's problems and their obstacles compared with other unemployed persons. Data on the outcomes from VR were collected as well as the indicative financial data of the population of PwD in the VR (benefits for users of VR, providers of VR, and rehabilitation commissions) for the calculation of the average cost of rehabilitation per VR service user. In 2014 the data were updated and new analyses were made. *Material and Methods:* Cohort study - retrospective. *Results:* Comparing outcomes for PwD in VR programme 2010–2013 – employment rate was 37.69%, with PwD not included in VR – employment rate was only 10.8–16.37%, which shows that PwD in VR had better employment outcomes than PwD not included in VR. Average costs for PwD in VR 2010–2014 were 4,077,42 €. After comparing this outcomes and costs with EUROFUND study (2012), which found out that cost for not being in employment, training or education, for Slovenia was 9,937 € in 2008 and 10,776 € in 2009. *Conclusion:* Based on the results, VR showed itself as being cost-effective and thus deserves even more attention and stronger promotion in the future years.

67

EVALUATION OF COMMUNITY BASE REHABILITATION PROGRAM IN BATIPUH II PUBLIC HEALTH CARE

R.P. Yolanda¹, A. Nurdin¹, S. ernafienti²

¹Instalasi Rehabilitasi Medik RSUP dr. M. Djamil, Ministry of Health Republic of Indonesia, Padang, Indonesia, ²UPT Puskesmas Wilayah Kerja Batipuh II, Dinas Kesehatan Kabupaten Tanah Datar, Tanah Datar, Indonesia

Introduction/Background: The purpose of CBR program to help people with disability (PwD) perform Activity Daily Living at home and community also to establish relation with sosial environment. CBR program evaluated by improvement of PwD ability in Activity Daily Living like self care, independency, play etc. *Material and Methods:* Every Cadre handled one PwD and every PwD caregiver given a guidebook based on the matrix. The evaluation is held every six months by filling form 2 from 2012 until 2015. *Results:* During the year 2012–2015 cadre was identified 30 pwd in the work area of batipuh 1 PHC. The data collected until Dec about 26 PwD. 10 PwD identified as a motoric disability after 5th evaluation 4 PwD (40%) had significant improvement, 1 PwD (10%) had improvement in one aspect, 5 PwD (50%) didn't had any improvement. 7 PwD identified as an hearing and speck disability after 5th evaluation 6 PwD (85%) had improvement and 1 PwD (15%) didn't had any improvement. 6 PwD identified as a behaviour disability after 5th evaluation 4 PwD (66%) had improvement and 2 PwD (34%) did not had any improvement. 3 PwD identified as a learning disability after 5th evaluation 2 PwD (66%) had improvement and 1 PwD (34%) didn't had any improvement. *Conclusion:* CBR program by increasing the role of kader and using form, matrix and guidebook has been proven increased PwD independency.

STROKE II

68

PREDICTORS OF LIFE-SPACE MOBILITY IN STROKE PATIENTS AT SIX MONTHS AFTER DISCHARGE

M. Nakao¹, Y. Maeno², I. Shinichi³, M. Ohnishi², M. Fuku², M. Rika², Y. Yokoshima², Y. Matsuba²

¹Yokohama, Japan, ²Yokohama Brain and Spine Center, Rehabilitation department, Yokohama, Japan, ³Tohoku University Graduate School of Medicine, Department of Physical Medicine and Rehabilitation, Yokohama, Japan

Introduction/Background: Stroke impairs movement, activities of daily living, and quality of life. Life-space mobility is associated with the quality of life. The determination of factors influencing the life-space mobility of stroke patients in the community after discharge is vital for ensuring appropriate interventions. The life-space assessment (LSA) score is validated for evaluating life-space mobility. Here, we aimed to determine the predictors of life-space mobility in stroke patients at 6 months after discharge from the post-acute rehabilitation unit which is called Kaifukuki (convalescent) ward. *Material and Methods:* In this retrospective cohort study, we enrolled 1,075 stroke patients who were discharged from the postacute rehabilitation unit of Yokohama Brain and Spine Center between Nov 1, 2008 and Jul 28, 2015. We assessed the patients' LSA score 6 months after discharge. Simple and multiple linear regression with a two-sided 95% confidence interval were used for statistical analysis. *Results:* The average patient age was 65 years (range, 16–95 years), and 369 (34.3%) patients were female. Stroke was caused by intracranial hemorrhage in 406 (37.7%), cranial infarction in 599 (55.7%), and subarachnoid hemorrhage in 70 (0.07%) patients. A total of 509 (47.3%) patients were followed up to 6 months. On simple and multivariate analysis, female gen-

der ($p < 0.0001$), age at admission ($p < 0.0001$), Brunnstrom stage of the limb at discharge ($p < 0.0001$, $p = 0.00029$), motor FIM (Functional independence measure) at discharge ($p < 0.0001$), and length of hospital stay ($p < 0.0001$) were associated with the LSA score. Accordingly, to predict LSA score at 6 months after discharge, we established the following formula: $48.6 - 7.27$ (female) $- 0.50$ (age) $+ 3.66$ (Brunnstrom stage of the limb at discharge) $+ 0.73$ (motor FIM at discharge) $- 0.17$ (length of hospital stay). **Conclusion:** The LSA score at 6 months after discharge can be predicted based on the gender, age, Brunnstrom stage of the limb, motor FIM at discharge, and length of hospital stay.

69

EFFECTS OF DIFFERENT KINDS OF MUSIC ON THE MOOD AND SELF-ESTEEM OF STROKE PATIENTS

F.C. Creer¹, L. Adorable², J. Litang III², E.J. Alfante², T. Dumagan²

¹Cebu City, Philippines, ²Southwestern University, College of Rehabilitative Sciences, Cebu City, Philippines

Introduction/Background: Stroke is one of the leading causes of disability among individuals in the society. People who suffer from stroke are said to have emotional setbacks such as negativity of mood and lack of will due to low self-esteem. Music acts as an effective distraction from pain and also helps bring about certain chemical processes in the brain that aid healing. This study was conducted to determine the effectiveness of different kinds of music on the mood and self-esteem of stroke patients as well as its positive effect on the physical and mental well-being of patients. **Material and Methods:** This experimental study involved 24 stroke patients with age range of 40–60 years. They underwent 10 sessions of music therapy for one hour per session, and were randomly assigned into four groups; the first group was listening to jazz type of music, second group was listening to upbeat type of music, third group was listening to melodrama type of music while the fourth group had no medium applied. Headphones, music players, Prime MD mood scale and Rosenberg self-esteem scale were used before, during and after treatment. Prime-MD Mood Scale and Rosenberg Self-Esteem Scale were given to the patients before and after every session all for 10 sessions. Data were then gathered and recorded. The significant difference of music therapy before and after treatment were analyzed using Kruskal Wallis Inferential Statistics with p value set at 0.05. **Results:** Though upbeat music has the highest increase on mood and self-esteem scores of stroke patients, the p values indicate no significant difference on self-esteem and mood scores among different kinds of music before and after treatment. **Conclusion:** Any kind of music during treatment has no bearing on the mood and self-esteem of stroke patients.

70

A FOLLOW-UP ON PERSONS 5 YEARS AFTER SUBARACHNOID HEMORRHAGE

K. Stibrant Sunnerhagen¹, L. Carlsson¹, H.C. Persson¹

¹Univ of Gothenburg, Neuroscience and Physiology/Rehabilitation Medicine, Gothenburg, Sweden

Introduction/Background: Subarachnoid hemorrhage (SAH) has high mortality, high morbidity among survivors, and is a major course of long-term disabilities. To develop treatment and rehabilitation for persons after SAH, long-term follow-up is needed. Several studies are published on short-term outcome with decreased Health-related Quality of Life (HRQoL), mental health and cognitive function, though outcome studies >12 months post-SAH are scarce. The aim of this study was to investigate physical/emotional status, participation and HRQoL, 5 years after SAH. **Material and Methods:** The study population were persons living in Gothenburg area, treated at Sahlgrenska University hospital after SAH

2009–2010. The study population received a survey in late 2014 with a set of questionnaires regarding life situation, Stroke Impact Scale, EQ5D and Impact of Participation and Autonomy. **Results:** Forty-two persons were still alive and 26 (62%), average age 59, responded, in mean 5.1 years post SAH (two reminders were sent out). The persons with SAH in this study had in general lower HRQoL compared to Swedish healthy norm values and particularly lower in the domain of anxiety and depression. Twenty-two of the persons with SAH had acceptable participation. Half of the study population was independent in their daily life, and 8 of 19 had returned to work full time. Emotional problems were common and several reported problems with fatigue, memory and executive function. **Conclusion:** This long-term follow-up in persons 5 years after a SAH showed in general high level of physical function and autonomy, but lower HRQoL and emotional health. Most of the persons after SAH had acceptable participation. Structured follow up is probably needed.

71

COMMUNICATION INTERVENTION MAKING IMPACT FOR PEOPLE WITH PRIMARY PROGRESSIVE APHASIA

R. Jokel¹

¹Rotman Research Institute, Toronto, Canada

Introduction/Background: Primary progressive aphasia (PPA) is a neurodegenerative disorder characterized by a gradual loss of ability to communicate. There is no cure for PPA, however, a focused language intervention may slow down the progression of language decline and maintain communication abilities in people with PPA. A novel comprehensive program for both patients with PPA and their spouses is presented. **Material and Methods:** Five individuals with PPA and their spouses were recruited. They participated in 10 two-hour sessions on a weekly basis. The first hour was focused on language therapy for the patients and concurrent counselling for spouses. Language therapy included word retrieval and production in both structured tasks and conversational speech. Counselling sessions were led by a speech-language pathologist and social worker. The second hour was devoted to education, problem solving, and practicing communication strategies in dyads. Each week a different health professional provided education on issues relevant to PPA, including, but not limited to, language and cognitive changes, emotional challenges (e.g., depression), diet and cognitive strategies promoting brain health, and current research in PPA. **Results:** Two questionnaires focused on quality of communication for patients and addressing knowledge base and coping strategies for spouses, were administered before and after the intervention program. Three out of the five patients showed significant improvements in their communication confidence, which resulted in improved quality of their life. All five spouses showed significant positive changes in their level of knowledge, ability to cope with the progression of the disease, facility with using strategies, and resourcefulness. These effects were maintained through monthly alumni meetings. **Conclusion:** In the absence of any effective therapeutic approaches in PPA, language intervention appears to be a viable tool in slowing down disease progression and improving quality of life for both patients and caregivers. The effects can be maintained when a follow-up strategy is built-in into the program.

72

KNOWLEDGE AND CONFIDENCE OF FINAL YEAR MEDICAL STUDENTS AND HOUSE OFFICERS REGARDING DIAGNOSIS AND MANAGEMENT OF STROKE: A CROSS SECTIONAL SURVEY FROM PAKISTAN

F.A. Rathore¹, K. Mohammad², J. Mohsin², S. Sohail²

¹CMH Lahore Medical College University of Health Sciences, Pa-

kistan, ³CMH Lahore Medical College University of Health Sciences, Rehab Medicine, Lahore, Pakistan

Introduction/Background: Stroke is the leading cause of neurological disability in the world. In Pakistan House officers (HOs) are usually the first contact for a stroke patient in an emergency room. Sometimes they have to make quick decisions regarding diagnosis and management. Thousands of current final year MBBS students will be performing the duties of HOs soon. The aim of the study was to document the knowledge and confidence levels of final year students and HOs in Pakistan regarding basic facts regarding initial diagnosis and management of stroke. **Material and Methods:** Ethics review committee approval was obtained. Questionnaire was constructed using textbooks of medicine and current stroke guidelines. The pre-tested self-administered questionnaire was distributed among 800 final year students and HOs in thirteen medical colleges and hospitals in four different cities. Response rate was 88.5%. Data analysis was by SPSS V.20. **Results:** There were 496 medical students and 212 HOs. Most (452, 63.9%) were females. The respondents (222, 31.4%) who had managed or assisted in management of stroke had a higher confidence level in its diagnoses ($p > 0.001$) and management ($p < 0.001$). Having a Family member with stroke was associated with higher confidence in diagnoses of stroke ($p < 0.05$) but It was not associated with confidence in its management (p -value = 0.41). Majority of the respondents correctly defined stroke (60.6%), identified CT-scan as the initial diagnostic modality (88.1%), knew the dosage of aspirin (64.9%) and time limit for thrombolysis (67.4%). Less than half (314) choose t-PA as preferred intervention in an acute ischemic stroke. **Conclusion:** This multi-center survey shows that knowledge and confidence levels of final year students and HOs in Pakistan regarding basic facts regarding initial diagnosis and management of stroke is adequate in most domains. There is a need to identify the weak areas and train the HOs in acute stroke diagnosis and management in ER.

73

LIFE SATISFACTION - QUALITY OF LIFE (QoL): AN ISSUE IN SPECIALIZED REHABILITATION. IMPRESSIONS FROM A MULTICULTURAL, MULTI-CENTER STUDY, THE SINs STROKE STUDY

B. Langhammer¹, S. Sällström², W. Deng³, S. Banura⁴

¹Oslo and Akershus University College and Sunnaas Rehabilitation Hospital, Faculty of Health, ²Sunnaas Rehabilitation Hospital, Nesoddtangen, Norway, ³Sichuan Bayi Rehabilitation Center, Chengdu, Sichuan, China, ⁴Bethlehem Arab Society Rehabilitation, BASR, Bethlehem, Palestine

Introduction: Quality of life (QoL) is a broad multidimensional concept that usually includes both objective and subjective, positive and negative aspects of life. QoL may be affected by the individuals' health, psychological state, level of independence, social relationship and environmental factors. Life satisfaction is considered purely subjective and related to goals. Sense of Coherence relate to three dimensions; comprehensibility, manageability and meaningfulness, with focus on factors that support human health and well-being. A salute-genic interpretation of the QoL concept may combine the global, external, interpersonal and personal resources of an individual. **Method:** he design was a prospective, descriptive study of the specialized rehabilitation of stroke patients in rehabilitation institutions in Norway, PR China, the United States, Russia, Israel, Palestine and Sweden. Patients with a primary diagnosis of stroke were consecutively invited to participate on admission to an institution for specialized rehabilitation. Outcome measures were the Barthel Index (BI), alternatively, the Functional Independence Measure (FIM), the Life Satisfaction Scale (LiSat-11), the Modified Rankin Scale (MRS), the National Institutes of Health Stroke Scale (NIHSS) and a semi-structured questionnaire with focus on the psychosocial situation. Tests were performed on admission, 18–22 days into rehabilitation, at discharge, six and twelve months

after discharge. The focus here will be presentation on the LiSat-11 from the participating clinics. **Results and Conclusion:** The preliminary results indicate that, irrespective of country and clinic, life satisfaction is perceived as dissatisfying post stroke. Four areas are especially vulnerable and these are the vocational situation, sexual life, physical and mental health. The presentation will preferably be in a symposium where presenters from four of the countries (Norway, China, Israel and Palestine) will participate.

BIOSCIENCES IN REHABILITATION

74

IMMUNE CELLS IN CHRONIC MUSCULOSKELETAL PAIN: OSTEOARTHRITIS, CHRONIC LOW BACK PAIN; AND CHRONIC WIDESPREAD PAIN

D. Dimmek¹, C. Korallus¹, J. Schiller¹, F. ten Brink¹, S. Buyny², C. Gutenbrunner¹, R. Jacobs², B. Nugraha¹

¹Hannover Medical School, Rehabilitation Medicine, Hannover, Germany, ²Hannover Medical School, Clinical Immunology and Rheumatology, Hannover, Germany

Introduction/Background: Immune system has been known to be involved in pathomechanism of chronic pain. However, further studies are needed to elucidate the correlation of immune cells in different types of chronic musculoskeletal pains with their clinical parameters, such as pain and mood-related behaviour (e.g. depression and anxiety). Therefore, in this study we determined subset of immune cells in chronic pain patients and compared them with healthy subjects (HS). Additionally, we also determined the correlation between clinical parameters (pain, mood-related behaviour) and immune cells in each group of chronic pain patients (osteoarthritis (OA); chronic low back pain (cLBP); and chronic widespread pain (CWP)). **Material and Methods:** This study was approved by local ethics committee (Nr. 6554). Three different types of pain patients ($n=55$), who have a history of pain (visual analogue scale (VAS) ≥ 4 during the past week) for at least three months, were recruited: OA, cLBP, and CWP (18–70 y.o). Eighteen HS were recruited. Pain and mood related behaviour were assessed by using VAS and Hospital and Anxiety Depression Scale (HADS-D), respectively. Different types of immune cells were determined by using fluorescence-activated cell sorting. (Statistics evaluation was done with SPSS 23. $\alpha < 0.05$ was set for significance). **Results:** Our results show that there are significant differences in regard to pain, depression and anxiety between chronic pain patients and HS ($p < 0.001$). Regarding immune cells parameter the differences were found in: CD3+CD4+, ($p < 0.05$); CD3+CD20+ ($p < 0.01$); CD3-CD56+dim ($p < 0.05$) and CD3-CD56+ ($p < 0.05$) lymphocytes. The depression score in all chronic musculoskeletal pain patients is correlated with the percentage of lymphocytes (R: -0.368 ; $p < 0.05$). Subgroup analysis of each group of patients show that depression score has negative correlation with CD3+CD4+ ($p < 0.05$) and CD3+CD8+ ($p < 0.05$) lymphocytes in OA; in cLBP depression score is correlated with CD3+CD20+lymphocytes ($p < 0.05$). **Conclusion:** Taken together, it seems immune cells play a role in pathomechanism of chronic musculoskeletal pain.

75

ECTOGENOUS ASC INJECTION AGGRAVATES ISCHEMIC STROKE IN A MOUNSE MODEL OF CORTICAL MICROSTROKE

H. Xiaofei¹, L. Yue², Q. Zhang³, D.X. Liu³, G.Q. Xu³, Z. Pei⁴, J.S. zeng⁴

¹The First Affiliated Hospital of Sun Yat-Sen Universit, Department of Neurology- Rehabilitation Medicine-, Guangzhou, China, ²First People's Hospital of Guangzhou Medical University, Rehabilita-

tion Medicine, Guangzhou, China, ³The First Affiliated Hospital of Sun Yat-Sen University, Rehabilitation Medicine, Guangzhou, China, ⁴The First Affiliated Hospital of Sun Yat-Sen University, Department of Neurology, Guangzhou, China

Introduction/Background: Apoptosis-associated speck-like (ASC) protein plays a detrimental factor in stroke, but the mechanism has not been indicated clearly. **Material and Methods:** 18 C57BL/6J mice were divided into three groups including T1 group with ASC injection, T2 group suffering from microstroke, and T3 group suffering from microstroke with ASC injection. The microstroke was induced by two-photon laser irradiation. The ASC was locally injected into the cortex and the ISF pathway was detected by two-photon image. Neuron death, microglia, astrocyte, endogenous ASC, and autophagosome were determined by immunofluorescently staining. Statistical analysis was performed by SPSS 19.0 software, one-way analysis of variance and further LSD *t*-test were used. *p* values <0.05 were considered statistically significant. **Results:** Firstly, the clearance in ISF pathway was significant slower in the T3 group compared with the T1 group (*p*<0.01). Secondly, among the three groups, there were significant more neuron death, microglia and astrocyte in T2 (*p*<0.001) and T3 (*p*<0.001) groups, which were significantly increased in T3 group compared with T2 group (*p*<0.001). Thirdly, the ASC expression was significantly increased in the T2 (*p*<0.01) and T3 (*p*<0.001) groups, which was significantly increased in T3 group compared with the T2 group (*p*<0.05). Additionally, the amount of microglia that co localized with endogenous ASC was significantly increased in T2 (*p*<0.01) and T3 groups (*p*<0.001), which was significantly more in T3 group compared with T2 group (*p*<0.001). Finally, there were significantly increased autophagosomes in T2 (*p*<0.001) and T3 (*p*<0.001) groups, which was significantly increased in T3 group compared with the T2 group (*p*<0.01). **Conclusion:** Our study demonstrated the oligomeric ASC aggravated the pathological outcome of stroke, which maybe a therapeutic target of stroke.

76

EFFECT OF LOW INTENSITY PULSED ULTRASOUND ON THE PROLIFERATION AND DIFFERENTIATION OF MYOBLAST IN VITRO

S. Bin¹, B. Chuanchuan¹, Z. Lingyun¹, Y. Zhong², W. Zhibin³

¹University-Town Hospital of Chongqing Medical University, Rehabilitation Medicine, Chongqing, China, ²Southwest Hospital-Third Military Medical University, Medical Laboratory, Chongqing, China, ³Gulangyu Recuperation Hospital of PLA, Rehabilitation Medicine, Xiamen, China

Introduction/Background: Low Intensity Pulsed Ultrasound (LIPUS) are widely used in the clinical treatment of bone fractures, fracture delayed union and nonunion. Our early studies found that LIPUS promote the repair of injured skeletal muscle in rats. The paper will further explore the effects of LIPUS irradiation on the cultured myoblasts proliferation and differentiation, in order to provide a scientific basis for the clinical application of LIPUS in skeletal muscle injury. **Material and Methods:** The myoblasts were isolated from mouse skeletal muscle and cultured in vitro. The irradiated group and the control group were established in the proliferating and differentiating myoblasts, respectively. Irradiated group are treated by LIPUS with the ultrasound frequency of 1.5 MHz and the spatial and temporal average intensities of 30 mW/cm², for 20 minutes every time, once a day. Proliferating myoblasts irradiated for 6 consecutive days and differentiating myoblasts for 4 consecutive days. The cell proliferation index (PI) was analyzed by flow cytometry, and expression of myoblast growth factor MyoD, heme oxygenase-1 (HO-1) myosin heavy chain (MHC) were detected by immunofluorescence staining, and myoblast fusion index were analyzed. **Results:** In the proliferating myoblasts, percentage of cells in G2/M and S phase in irradiated group were 19.30±5.14% and 37.00%±8.72%, while the control group 10.33±1.53% and

25.00%±4.36%. PI in irradiated group was more than the control group (*p*<0.05). The HO-1 fluorescent staining positive cell rate and average fluorescence intensity were 82±5.14% and 152±4.76% in irradiated group, while 60.01±3.22% and 138.70±5.08% in the control group. There was no significantly difference between the two groups in MyoD staining positive cell rate and average fluorescence intensity and myoblast morphology. The myoblast fusion index of irradiated group (18.73±6.81%) was significantly lower than that of the control group (37.52±11.23%, *p*<0.05), while the MHC expression did not change markedly. **Conclusion:** LIPUS irradiation can promote myoblasts proliferation and inhibit differentiation, while does not affect the myogenic properties of myoblasts.

77

FINGLIMOD INFLUENCES NEURAL STEM CELLS' BIOLOGICAL BEHAVIOR IN VITRO

Y. Yin¹, B.T. Tan¹

¹The Second Affiliated Hospital of Chongqing Medical University, Rehabilitation Medicine, Chongqing, China

Introduction/Background: Neural stem cells (NSCs) seem pros in repairing the injured brain and spinal cord. However, its sufficient proliferation, differentiation and migration are the key factors in reparative therapeutics for the central nervous system (CNS). Potent lipid mediator sphingosine-1-phosphate (S1P) as a transduction intracellular signal plays critical role in cells' biological behavior in the CNS. In this study we explored how Finglimod, an analogue of sphingosine-1-phosphate receptors (S1PRs), influence NSCs' biological behavior in vitro. **Material and Methods:** NSCs were prepared from telencephalon of embryos 14.5~16.5 days of Sprague Dawley rats and were cultured under different concentration (0 nM, 1 nM, 10 nM, 100 nM) of Finglimod. Immunocytochemistry of Nesting and BrdU were used to identify the NSCs' properties. Beta-tubulinIII and GFAP were employed to testify the NSCs' differentiation direction and CCK-8 assay was used to confirm the proliferation ability. Transwell dishes were used to check the migration ability of NSCs. **Results:** There was no obvious differentiation affects on NSCs that been observed between FTY groups and the control (Fig. 1). The abilities of proliferation and migration (Fig. 2) of NSCs were significantly higher under 10 nM and 100 nM Finglimod conditions than those of in the control group. However, for all the three Finglimod concentrations, there is no differentiation significant difference between neurons and astrocytes. Fig 1 The effect of different concentrations of FTY720-P (Finglimod) on NSCs differentiation. Fig 2 The effect of different concentrations of FTY720-P on NSCs migration. **Conclusion:** Finglimod as the analogue of S1PRs may takes part in NSCs' proliferation and migration in vitro. However, we didn't find NSCs had the tendency to differentiate into neurons with Finglimod. How Finglimod regulates NSCs' biological behavior still needs further study.

78

THE EFFECT OF 8-WEEKS VOLUNTARY WALKING TREADMILL EXERCISE TO THE ALTERED GAIT PATTERN IN TYPE 2 DIABETIC RAT MODEL

E.R. Nur Hidayati¹, S.C. Chen², C.C. Peng¹

¹Taipei Medical University, Graduate Institute of Clinical Medicine, Taipei City, Taiwan, ²Taipei Medical University Hospital, Physical Medicine and Rehabilitation, Taipei City, Taiwan

Introduction/Background: Diabetes mellitus affect gait ability due to nerve fiber damage. Exercise increase insulin sensitivity, expected to decrease inflammation that might improve diabetic neuropathy eventually. The aim of the study to evaluate the effect of walking aerobic exercise to altered gait pattern and intra epidermal nerve fiber (IENF) expression in type 2 diabetic neuropathy rat model. **Material and Methods:** Sprague Dawley rats (*n*=49) age 6 weeks were divided into 7 groups: control, Control exercise, high

fat diet only, diabetic, diabetic exercise, diabetic with metformin and diabetic with combination of metformin and exercise. Diabetes induced by streptozotocin injection (45 mg/kg ip) combined with high fat diet fed ad libitum. Metformin (60 mg/kg body weight) administered by oral gavage 5 times/week and aerobic exercise performed of 70% of maximal exercise testing (MET). At the end, assessing of altered gait pattern recording, heat pad analysis, skin paws histology and sciatic nerve morphometric and organ harvesting to histological analysis. Sciatic functional impairment (SFI) score was performed to analyze sciatic nerve regeneration. **Results:** At 8-week after intervention, there were tendency to increase print length ($p < 0.001$), increase stance phase time (383.39 ± 110.68 ms to 556.33 ± 14.77 ms with $p = 0.03$) and increase of toeing out in DM exercise group compared with DM without exercise group. SFI score was not change significantly in exercise or without exercise group. Morphometric parameter such as increase of axonal diameter in DMEX (6.91 ± 1.17) and DMEX (7.99 ± 0.91) with $p < 0.01$, and decrease of sciatic nerve perineum thickness in group with exercise although statistically not significant. Furthermore, statistically significant increase of epidermal layer thickness, and increase of the expression of PGP 9.5, interleukin-6 and TNF-alpha. **Conclusion:** Walking exercise improve stance phase time, decrease inflammation in skin paws and sciatic nerve, increase keratinocyte regeneration, and accelerate axon sciatic nerve regeneration although statistically did not change the SFI score.

ETHICAL ISSUES AND HUMAN RIGHTS

79

THE NATIONAL HEALTH AND DISABILITY ACTION PLAN 2015-2021: AN IMPORTANT STEP TOWARDS BETTER HEALTH FOR PEOPLE WITH DISABILITIES IN MOROCCO

A. Hajjioui¹, M. Fourtassi²

¹Faculty of Medicine and Pharmacy- University Mohammed ben-Abdellah Fez, Physical and Rehabilitation Medicine, Fez, Morocco, ²Faculty of Medicine and Pharmacy- University Mohammed I Oujda, Physical and Rehabilitation Medicine, Oujda, Morocco

Introduction/Background: Since the new constitution of 2011, the management of disability in Morocco has become a constitutional right. The adoption by WHO of the global disability action plan 2014–2021 has motivated policy makers to develop for the first time in the history of Morocco the national health and disability action plan 2015–2021. The aim of this work is to present progress and remarkable improvement in the health and disability policy in Morocco through the outline of this action plan. **Material and Methods:** We have consulted the Moroccan action plan on health and disability 2015–2021 and all the official documents of the Ministry of Health on disability in Morocco. **Results:** The National Action Plan on Health and Disability 2015–2021, aims to ensure access for people with disabilities to promotional health services, preventive, of care and rehabilitation based on the law approach, proximity and quality. It was prepared on the basis of a participatory approach in partnership with various institutional partners, civil society and international organizations. The Ministry of Health has allocated a budget of 747 million dirhams in the plan, which focuses on six strategic areas. This is to strengthen the programs and actions of prevention and early detection of pathologies causing disability, improving the care needs of people with disabilities, strengthening the training basic and further training, strengthening the regulatory framework and partnership, social mobilization and fight against stigma, monitoring and evaluation and research. **Conclusion:** The adoption of the Moroccan Government of a national action plan on health and disability is a fundamental and historic step in improving the management of disability and the development of the MPR in Morocco.

PAIN II

80

COMPARATIVE EFFICACY AND SAFETY OF GABAPENTINOIDS, KETAMINE, AND VENLAFAXINE FOR THE PREVENTION OF CHRONIC POST-SURGICAL PAIN: A SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS

Rongzhong Huang, Lehua Yu

Department of Rehabilitation Medicine, the Second Affiliated Hospital of Chongqing Medical University, Chongqing, China

Background: There is conflicting evidence regarding the efficacy of the most popular first-line therapies for chronic post-surgical pain (CPSP) – gabapentinoids and ketamine. Moreover, the serotonin-norepinephrine reuptake inhibitor (SNRI) venlafaxine has also shown promise for CPSP. The aim of this network meta-analysis will be to comparatively evaluate the efficacy and safety of gabapentinoids, ketamine, and venlafaxine in preventing CPSP. **Methods:** A comprehensive search of the MEDLINE, EMBASE, and Cochrane CENTRAL databases was performed. We included double-blind, placebo-controlled, randomized trials of one or more drugs administered systemically before, during, or after surgery, which measured pain three months or more after surgery. Random-effects network meta-analyses were used to compare the odds ratios (ORs) and 95% confidence intervals (CIs) for the primary efficacy outcome, secondary efficacy outcome, and primary safety outcome. We estimated the ranking probability for each drug, and the overall ranks were interpreted using the surface under the cumulative ranking (SUCRA) technique. We conducted a risk-benefit acceptability analysis using a Stochastic Multi-criteria Acceptability Analysis (SMAA). **Results:** Twenty-nine RCTs were included. Applying SUCRA, venlafaxine ranked the best followed by pregabalin for both primary and secondary efficacy outcomes, while venlafaxine was slightly superior to pregabalin in terms of the primary safety outcome, both of which were superior to ketamine. From SMAA, venlafaxine was found to be the most preferred therapy followed by pregabalin for both primary and secondary efficacy outcomes in combination with the primary safety outcome. **Conclusion:** Clinicians should consider venlafaxine and pregabalin as primary first-line treatments for the prevention of CPSP.

81

EFFECTS OF BOTULINUM TOXIN TYPE A INJECTION INTO VASTUS LATERALIS IN PATIENTS WITH PATELLAR LATERAL SUBLUXATION

T.N. Chen¹, F.T. Tang², R.C. Chan¹, C.L. Chou¹

¹Taipei Veterans General Hospital, Physical Medicine and Rehabilitation, Taipei, Taiwan, ²Chang Gung Memorial Hospital, Physical Medicine and Rehabilitation, Taoyuan, Taiwan

Introduction/Background: Patella lateral subluxation (PLS) is a common source of anterior knee pain. The main etiologies of patella lateral subluxation are: abnormal bony structure and muscle imbalance of the lower extremity. The muscle tone imbalance between vastus medialis obliquus (VMO) and vastus lateralis (VL) is the leading cause for muscle imbalance of the lower extremity. In recent years, Botulinum toxin type A (BTA) injection showed great benefit not only on spastic disease, but also weaken selected muscle antagonist or agonist. In this study, we applied BTA for the treatment of patella lateral subluxation through the blockage of vastus lateralis. **Material and Methods:** Fifteen bilateral PLS patients presented with anterior knee pain were recruited from outpatient clinic. We used Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) to assess pain, stiffness, and functional status of the knees. Isokinetic assessments with surface EMG were placed over VMO and VL to assess muscle power and SEMG

change between VMO and VL. The subjects were tested under angular velocity 60 rad/s, 120 rad/s, and 180 rad/s, and VMO, VL's ratio of maximal muscle activity were recorded. The assessments were performed before BTA injection, and 4, 8, 12 weeks after the injection. **Results:** Twelve weeks after BTA injection, there were significant improvement of the ratio between VMO and VL during angular velocity 60 rad/s, 120 rad/s and 180 rad/s, while there were no significant changes of torque during the three angular velocity test. The patients presented remarkable improvement after receiving BTA injection not only in the questionnaire of WOMAC, but also in the ratio between VMO and VL in EMG study. **Conclusion:** BTA injection was recommended for patellar lateral subluxation.

STROKE III

82

EARLY INJECTION OF BOTULINUM TOXIN TYPE-A AND ELECTRICAL STIMULATION IMPROVE UPPER EXTREMITY MOTOR FUNCTION IN SUBACUTE STROKE PATIENTS

T.S. Wei¹, S.Y. Liu¹, K.L. Chen¹

¹Changhua Christian Hospital, Dept. of Physical Medicine and Rehabilitation, Changhua County, Taiwan

Introduction/Background: Stroke patients commonly suffer from spasticity which contributes to motor impairments and poor quality of life. Appropriate management of spasticity is crucial for better motor performance. This study aimed to investigate the effect of early injection of botulinum toxin type-A (BTX-A) and electrical stimulation on motor function of affected upper limb in stroke patients. **Material and Methods:** This randomized controlled trial consecutively enrolled 34 stroke patients with spastic hemiplegia (8 females and 26 males), of which 12 subjects were allocated as control group (mean age: 58.7±9.5 years), 11 subjects received botulinum toxin injection at upper limb muscles (BTX group) (mean age: 54.3±13.4 years), and 11 subjects received botulinum toxin with electrical stimulation (BTE group) (mean age: 60.2±10.4 years). The dosage range of BTX-A injected were from 200 U to 300 U. All participants received regular rehabilitation. Besides demographic data, Modified Ashworth Scale (MAS), Modified Tardieu Scale (MTS), Fugl-Meyer Assessment Upper Extremity scale (FMA-UE) and Functional Independence Measure (FIM) of participants were measured before treatment (T0), after treatment at 1 month (T1) and 3 months (T2). Generalized Estimating Equation was used to analyze the differences among three groups at different time-points. **Results:** Compared with control group from T0 to T2, both BTX and BTE groups showed a significant improvement of FMA-UE (β : 4.2, $p=0.020$ and β : 6.3, $p=0.007$) and FIM (β : 10.0, $p=0.044$ and β : 11.7, $p=0.010$). BTE also showed a significant improvement of Tardieu score at elbow flexors (β : -20.1, $p=0.027$). Though there was no significant difference between BTX and BTE groups in FM and FIM at all time points, BTE group seemed to have more improvement of FMA-UE and FIM score. **Conclusion:** Early BTX-A injection is effective in improving spasticity and functional performance for subacute stroke patients, and combined use of electrical stimulation tends to have a more favorable outcome.

83

VISUAL FEEDBACK BALANCE TRAINING ON STABILOMETRIC PLATFORM IN CHRONIC STROKE REHABILITATION; A PRELIMINARY STUDY

W. Rahmi¹, F. Arisanti¹

¹University of Padjadjaran, Physical Medicine & Rehabilitation, Bandung, Indonesia

Introduction/Background: Providing visual biofeedback while performing balance activities is a way to improve postural balance

disorder following stroke. There are some evidence that subjects with stroke can improve their motor function even in chronic state (longer than 6 months) due to neuroplasticity. The purpose of this study is to evaluate the effect of visual force platform feedback balance exercise on functional balance and symmetry of weight distribution (WD) in chronic stroke patients. **Material and Methods:** Five hemiplegic chronic stroke patients in this study received 6 sessions of visual feedback balance training program in 2 weeks using stabilometric platform. The balance training program consist of pendulum, hunt and weight distribution exercises. Symmetry of WD was measured using stabilometric platform and functional balance performance using Mini-BESTest. Both measurements were conducted before and after the program. To evaluate the effects of the training, *t*-test was performed for normally distributed data and Wilcoxon matched pair test for not normally distributed data. The *p* level for both tests are <0.05. **Results:** Functional balance performance score were improved after the intervention ($p=0.0431$). WD on affected leg pre- vs post-intervention and unaffected leg pre- vs post-intervention were not significant with $p=0.8216$ for both. Symmetry of WD on affected vs unaffected leg pre-intervention and post-intervention were not significant with $p=0.5191$ and 0.24625, respectively. Noticeable improvements were found in WD on the affected leg although no statistically significant. **Conclusion:** Visual biofeedback balance training improves functional balance in sensory integration and dynamic balance categories, however the training does not improve WD symmetry in chronic stroke patients. Larger number of subjects and longer duration of intervention are necessary.

84

EFFECTS OF MIRROR THERAPY AND BIMANUAL ARM TRAINING ON HEMIPLEGIC UPPER EXTREMITY IN PATIENTS AFTER STROKE: A RANDOMIZED CONTROLLED TRIAL

F. Kenneth N.K.¹, K.H. Ting¹, C. Chan¹, S.W.L. Li²

¹The Hong Kong Polytechnic University, Rehabilitation Sciences, Hong Kong, Hong Kong- China, ²Tung Wah Hospital, Rehabilitation Medicine, Hong Kong, Hong Kong- China

Introduction/Background: Mirror Therapy (MT) has been proved to be useful on the recovery of hemiplegic arm in the evidence recently, however, it is not known whether the additional incongruent mirror illusion on the affected side can contribute to more motor improvements of the upper extremity in MT as compared to bilateral arm training (BAT) alone. This study compared the effects of MT with BAT on improving hemiplegic arm functions of patients with chronic stroke; and examined whether recruitment of the mirror neurons, as reflected in mu rhythm suppression, mediated recognition of the mirror illusion in pre/post MT, as compared to the BAT. **Material and Methods:** 84 participants with chronic stroke were recruited by convenience sampling from a convalescent hospital and 2 self-help groups in Hong Kong. Patients were randomly assigned to the MT or BAT groups and participated in a 6-week upper limb training program which consisted of two 45-minute training sessions per week. Both kinds of training were equivalent to each other except that there was a mirror in the MT group. Main outcome measures were upper extremity motor scales and functional arm tests. Participants were evaluated at baseline, post-treatment and 3 months follow-up. EEG was also done on the first and last sessions of the MT and BAT. **Results:** Participants in the MT group improved more on the Fugl-Meyer Assessment as compared to that of the BAT group across the 3 measurement occasions ($p=0.040$). No significant differences were found in functional arm tests between groups. Areas of interest in related EEG bands were examined. **Conclusion:** This study supported that MT was useful to enhance motor performance of upper extremity but might not be able to generalize to functional use as compared to pure BAT for the hemiplegic upper extremity. Evidence on recruitment of mirror neurons will be discussed.

85

10HZ REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION OF LESIONAL PRIMARY MOTOR CORTEX INCREASES UPPER LIMB MOTOR FUNCTION IN POST-STROKE PATIENTS

X. Guangxu¹, Z. Yin²

¹Nanjing, China, ²The First Affiliated Hospital of Nanjing Medical University, Rehabilitation Department, Nanjing, China

Introduction/Background: To investigate the effects of 10Hz repetitive transcranial magnetic stimulation (rTMS) and mirror therapy (MT) on upper limb motor functional recovery in patients with stroke. *Material and Methods:* Twenty-eight post-stroke patients were randomized into the MT group (n=14) and the rTMS group (n=14). All patients underwent conventional stroke rehabilitation, while the MT group underwent MT treatment and the rTMS group received 10 Hz rTMS intervention over M1 area of the affected hemisphere for 4 weeks. The indices of upper limb function including the upper extremity Fugl-Meyer assessment (FMA), the Hong Kong edition of FTHUK-HK and motricity index (MI) of upper limb were evaluated at baseline and post-treatment (Post 1: at the end of the 2-week treatment period; Post 2: at the end of the 4-week treatment period). *Results:* The FMA increased significantly in the rTMS group from baseline to Post 1 (7.0, 95% CI 4.4, 9.6) and Post 2 (14.1, 95% CI 9.5, 18.8), while the MT group improved from baseline to Post 2 (4.6, 65% CI -4.3, 13.6). The FMA changes in the rTMS group were significantly greater than the MT group (5.2, 95% CI 2.4, 8.0 at Post 1 and 7.6, 95% CI 3.3, 12.0 at Post 2). The MI increased significantly in the rTMS group from baseline to Post 2 (16.1, 95% CI 5.0, 27.2). In the MT group, two patients (14.3%) improved by 1 level at Post 1 and four patients (28.6%) improved by 1 level at Post 2. In the rTMS group, five patients (35.7%) improved by 1 level at Post 1 and six patients (42.9%) improved by 1 level at Post 2. One patient (7.1%) improved by 1 level at both Post 1 and Post 2. *Conclusion:* 10 Hz rTMS results in further improvement in motor recovery of the upper extremities in patients with stroke.

86

COMPARISON OF TWO PROTOCOLS: 2,400-PULSE LOW-FREQUENCY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION AND THETA BURST STIMULATION COMBINED WITH INTENSIVE OCCUPATIONAL THERAPY IN POST-STROKE HEMIPARETIC PATIENTS

N. Yamada¹, T. Kondo², M. Shimizu², M. Abo¹

¹Jikei University School of Medicine, Department of Rehabilitation Medicine, Tokyo, Japan, ²Shimizu Hospital, Department of Rehabilitation Medicine, Tottori, Japan

Introduction/Background: Several studies have reported that continuous theta burst stimulation (cTBS), a novel repetitive transcranial magnetic stimulation (rTMS) method, significantly improves the motor function of the affected upper limb in post-stroke hemiparetic patients. The purpose of this study was to assess the difference between the effect of 2,400-pulse low-frequency rTMS and 2,400-pulse cTBS combined with intensive occupational therapy (OT) on the treatment of upper-limb hemiparesis after stroke. *Material and Methods:* We considered 150 post-stroke patients with upper-limb hemiparesis in the 3rd-5th Brunnstrom recovery stages for hand-fingers and categorized them into two groups. One hundred and five patients (mean age: 60.8±13.0 years, time after stroke: 63.5±49.9 months) were subjected to low-frequency rTMS and 45 patients (mean age: 62.2±12.6 years, time after stroke: 71.8±63.6 months) were subjected to cTBS (three pulse bursts at 50 Hz). Each subject underwent the therapeutic protocol comprising 12 sessions of rTMS of 2,400 pulses applied to the non-lesional hemisphere and 240-min intensive OT (40-min one-to-one training for three times and 120-min self-training) daily for 15 days. The motor function of the affected upper limb was each

evaluated using the Fugl-Meyer assessment (FMA); the performance time of the Wolf motor function test (WMFT) was determined on the days of admission and discharge. *Results:* All patients completed the 15-day protocol without any adverse effects. Both groups showed significant increase in the FMA score and a short log performance time of the WMFT (p<0.001). However, the low-frequency rTMS group exhibited significant improvements in the FMA score and the log performance time of the WMFT compared to the cTBS group (p<0.05). *Conclusion:* In cTBS, application of 600 pulses per session was decided; however, the 2,400-pulse cTBS requires further modification such as optimization of the inter-pulse intervals between each set of 600 pulses.

PRM INTERVENTION II

87

IS OZONE THERAPY SUPERIOR TO HYALURONIC ACID INTRA-ARTICULAR INJECTION IN PATIENTS WITH KNEE OSTEOARTHRITIS? : A 6-MONTH CLINICAL TRIAL

S.A. Raeissadat¹, S.M. Rayegani², M. Moridnia³, S. Rahimi Dehgolan⁴

¹Shahid Beheshti University of Medical Sciences- Shahid Modarres Hospital, Physical Medicine and Rehabilitation Department, Tehran, Iran, ²Shahid Beheshti University of Medical Sciences- Shohada-e-Tajrish Hospital, Physical Medicine and Rehabilitation Department, Tehran, Iran, ³Shahid Beheshti University of Medical Sciences, Educational Deputy, Tehran, Iran, ⁴Shahid Beheshti University of Medical Sciences, Physical Medicine and Rehabilitation Department- PM&R Research Center, Tehran, Iran

Introduction/Background: Knee osteoarthritis (OA) is a common disease with great burden through pain and decreased function. Recent studies showed promising results of ozone application in osteoarthritis. The aim of this study was to compare the effects of ozone therapy versus hyaluronic acid (HA) intra articular injection in patients with knee OA. *Material and Methods:* Through a randomized clinical trial A total of 174 patients were enrolled and randomly allocated to 2 groups: ozone group and HA one. In this study we use 3 weekly injections of HA in a 20mg/2ml solution of Hyaluronic acid versus 10 ml of a 30 µg/ml solution of ozone. Our inclusion criteria were chronic pain or swelling at least for 3 months and imaging findings (Kellgren-Lawrence grade of 2 and 3). Patients were evaluated at baseline and 6 months after the last injection for pain, stiffness and function using the Visual Analog Scale (VAS) and the Western Ontario and McMaster Universities Arthritis Index (WOMAC) score. *Results:* No major adverse events were noted in the study. Total WOMAC score decreased in the ozone group from 40.8±9.8 to 20.4±4.9 (p<0.05) and in the HA group from 38.5±7.9 to 17.1±4.2 (p<0.05). A similar trend was observed in pain improvement according to VAS (table 1). Pain, stiffness and function significantly improved in both groups but no differences were found between groups. *Conclusion:* Both ozone and HA can be effectively used for selected patients with knee osteoarthritis but ozone showed no superiority to HA intra-articular injection.

88

EFFICACY OF LOW LEVEL LASER THERAPY IN THE MANAGEMENT OF LATERAL EPICONDYLITIS (TENNIS ELBOW)

S. Hossain¹, R. Amin², J. Islam³

¹Shaheed Suhrawardy Medical College, Department of Physical Medicine & Rehabilitation, Dhaka, Bangladesh, ²Dhaka Medical College, Department of Physical Medicine & Rehabilitation, Dhaka, Bangladesh, ³National Institute of Neuroscience, Department of Physical Medicine & Rehabilitation, Dhaka, Bangladesh

Introduction/Background: Lateral epicondylitis is a common clinical condition frequently referred to as tennis elbow. Conservative treatment is the primary choice of treatment, but a plethora of interventions—medical and physiotherapeutic—with different theoretical mechanisms of action have been reported, all with the single aim of reducing pain and improving functional status. Still the efficacy of low level laser therapy (LLLT) in treating lateral epicondylitis is controversial. **Material and Methods:** A randomized clinical trial was conducted at the department of Physical Medicine and Rehabilitation in Dhaka Medical College Hospital to assess the improvement of the functional capacity and reduce pain of the patients with lateral Epicondylitis by LLLT. In this study 60 patients was selected and randomized in two groups: Group A was treated with actual laser and Group B with placebo laser thrice a week for 4 weeks; activities of daily living (ADL) advice, exercises and NSAIDs for both group. Main outcome measures were visual analogue scale (VAS), criteria of Roles and Maudsley (1972) and grip strength by Mucha and Wannaske (1989). Follow-up measures were evaluated at baseline and weekly for 4 weeks. **Results:** Among the total 60 patients female 36 (60%) and male 24 (40%) with female-male ratio 1.5:1, mean age was 42.78±8.76. Most of the patients were middle class 49 (81.7%) and occupation was housewife 26 (43.3%). Repetitive lifting 37(61.7%) was found as a most common risk factor and onset was gradual in most cases 28 (46.7%). The mean elbow pain duration was 7.54±11.91 months. Among the study patients 15 (25.0%) was Hypertensive and 14 (23.3%) was Diabetic. Significantly greater improvements were shown in all outcome measures with the laser group than with the placebo group ($p<0.001$). **Conclusion:** This study suggested that LLLT in addition to conventional treatment is effective in relieving pain, and in improving the grip strength and subjective rating of physical function of patients with lateral epicondylitis.

89

PILOT CLINICAL STUDY ABOUT THE EFFECTS OF A DYNAMIC PSEUDOELASTIC ORTHOSIS EQUIPPED WITH SENSORS FOR THE TREATMENT AND EVALUATION OF CHRONIC STROKE PATIENTS

L. Garavaglia^{1,2}, F. Lazzari¹, G. Gasperini³, E. Guanziroli³, S. Pirovano³, G. Sammalì³, F. Passaretti¹, F. Molteni³, S. Pittaccio¹

¹National Research Council of Italy, IENI, Lecco, Italy, ²Politecnico di Milano, Electronics- Information and Bioengineering, Milano, Italy, ³Ospedale Valduce - Clinica Villa Beretta, Rehabilitation clinic, Lecco, Italy

Introduction/Background: We designed and built customised orthotic devices able to provide a non-linear corrective force for the repositioning of the elbow joint. The purpose of this study is to evaluate if those orthoses with pseudoelastic characteristics can improve posture and increase functional movement abilities in stroke patients. On-board sensors were used to investigate the dynamic interaction of patients and orthoses during standardised motor tasks. **Material and Methods:** Six chronic hemiplegic patients (age 56.16±7.22 years) were enrolled for the study and were prescribed to wear a custom-made orthosis for at least 6 hours a day for a month. Patients were evaluated before and after this period using several scales, including Fugl-Meyer (F-M), Modified Ashworth Score (MAS), and WOLF Motor Function Test (WMFT). Furthermore an accelerometer and an analogic potentiometer on-board the orthosis were used to evaluate quantitatively the performances of patients during the execution of motor tasks such as Reaching Forward, Hand to Mouth and Timed Up-and-Go. **Results:** The present orthotic treatment produced mild improvements in several articular and functional parameters. For instance MAS (Elbow) decreased by 1±0.89 ($p=0.02$), F-M (items A-D) improved by 1.66±1.13 ($p=0.01$) and WMFT increased by 4±4.35 ($p=0.05$). Improvement in movement speed in the hand-to-mouth task (from onboard sensor) seems to be greater

for patients with high pre-treatment MAS (Pearson $R^2=0.82$). Reaching Forward times decrease by 19.1±20.5% ($p=0.035$). Spectral analysis of measured accelerations can separate movement uncertainties from cloni. **Conclusion:** This pilot study showed that a pseudoelastic orthotic treatment can promote moderate reacquisition of segmental mobility of the upper limb in chronic hemiplegic patients. The parameters collected by on-board unit are a promising tool for identifying patterns of movement in evaluation tasks and monitoring variations during the therapy; this resource could be used in future for implementing home-based tele-rehabilitation.

PRM INTERVENTION II

90

DYNAMIC ORTHOTICS FOR DYSKINESIA AND DYSTONIA IN THE YOUNG: MATERIALS, DESIGNS AND PILOT CLINICAL TRIALS

L. Garavaglia^{1,2}, E. Pagliano³, G. Baranello³, M.T. Arnoldi³, A. Corlatti³, B. Bassi⁴, A. Lo Mauro², F. Passaretti¹, D. Riva³, A. Aliverti², S. Pittaccio¹

¹National Research Council of Italy, IENI Institute for Energetics and Interphases, Lecco, Italy, ²Politecnico di Milano, Electronics-Information and Bioengineering, Milano, Italy, ³Neurologic Institute Carlo Besta, Neurology of Development, Milano, Italy, ⁴Centro Ortopedico Emiliano - Ottobock, Centro Ortopedico Emiliano - Ottobock, Reggio Emilia, Italy

Introduction/Background: Movement disorders are neurological diseases affecting different age groups. They worsen patients' quality of life preventing the possibility of carrying out daily activities independently, and disturbing their social relationships especially in childhood. Drugs and surgery are among the most widely-employed means of controlling the symptoms of those disorders, but not often give the expected relief; an alternative solution is offered by orthoses that possess dynamic characteristics and can deliver a functionally-customised therapy. **Material and Methods:** We have designed functionally-customised devices exploiting the characteristics of a class of metallic materials, shape memory alloys (SMA), that possess some unconventional properties such as a nonlinear viscoelastic behaviour, wide hysteresis and internal friction, useful for controlling pathological limb motion and fighting ill-postures, while preserving the ability to carry out voluntary tasks. Three paediatric patients with dystonic and dyskinetic cerebral palsy were enrolled so far. The mechanical properties of the SMA were set and adjusted to address the clinical requests and individual patient's needs. Ad hoc protocols were devised to measure patients clinical status and biometric characteristics; an optoelectronic system and EMG were used to obtain quantitative information about upper-limb anatomy, kinematics and muscular activation to be employed as a basis for the personalised fabrication of the splints. Measurements on an age-matched healthy group were used as a reference for the motion tasks performed by patients. **Results:** The first observations suggest that wearing the personalised SMA-based dynamic orthosis, patients manage to carry out standardised motor tasks like reaching for objects or bringing food to one's mouth in a more direct way, with less stray motion. **Conclusion:** Preliminary results support the hypothesis that splints with nonlinear mechanical characteristics can provide posture control and stabilisation during the execution of upper-limb tasks. Clinical trials are continuing.

91

EFFECTS OF TASK-ORIENTED TRAINING ON STATIC AND DYNAMIC BALANCE IN WATER VERSUS ON LAND AMONG CHRONIC STROKE PATIENTS

J. Litang III¹, F.C. Creer², L. Adorable², Q.J. Benitez², C.J. Fuentes²

¹Southwestern University, College of Rehabilitative Sciences- Department of Physical Therapy, Cebu City, Philippines, ²Southwestern University, College of Rehabilitative Science- Department of Physical Therapy, Cebu City, Philippines

Introduction/Background: Preventing falls due to postural imbalance is an important objective in the rehabilitation of an acute or chronic stroke patients. When balance has been impaired due to reduction in the weight bearing capacity of a stroke patient, the body becomes unstable due to increased postural sways and reduced static reactions. This leads to the development of this study which was aimed at examining the effects on dynamic and static balance of chronic stroke patients given the same task-oriented training in water and on land. **Material and Methods:** Included in this experimental study were 14 chronic stroke patients with age range of 45–65 years old who could independently walk for at least 10 m, with Brunnstrom clinical stage recovery of at least 4 in the lower limb, with Mini Mental State Examination score of at least 24, and stable vital signs. Seven subjects underwent task-oriented training on a swimming pool and another seven on land, all for 12 sessions within four weeks. The training was composed of warming-up; balance, coordination, muscular strength and mobility tasks; and cooling down. Before and after the training, both groups were assessed using the Mini Balance Evaluation System Test (Mini-BESTest) static and dynamic balance scoring comprising of anticipatory, reactive postural control, sensory orientation and dynamic gait scores. **Results:** The significant difference in scores within each group and between the two groups were analyzed using paired *t*-test at *p*-value of 0.05. Results revealed that there was an increase in scores within each group. However, there was no significant difference in the scores between the two groups. **Conclusion:** Hence, task-oriented training could improve the static and dynamic balance scores among chronic stroke patients. Whether it is done on land or on water, does not matter.

92

THE EFFECTS OF VIBRO- MEDICAL INSOLE ON SENSATION AND PLANTAR PRESSURE DISTRIBUTION IN DIABETIC PATIENTS WITH MILD- TO- MODERATE NEUROPATHY

M. Bagherzadeh Cham¹, M.A. Mohseni-Bandpei², M. Bahramizadeh³, S. Kalbasi⁴

¹Tehran, Iran, ²University of Social Welfare and Rehabilitation Sciences, Department of Physiotherapy, tehran, Iran, ³University of Social Welfare and Rehabilitation Sciences, Department of Orthotics and Prosthetics, Tehran, Iran, ⁴Shahid Beheshti University of Medical Sciences, Research Institute for Endocrine Sciences, Tehran, Iran

Introduction/Background: Peripheral neuropathy and abnormal plantar pressure distribution are the major causes of ulceration in diabetic patients. Medical insole and random noise are used to alter plantar pressure and improve sensation, respectively. The first aim of this study was to determine the effect of vibro- medical insole on pressure sensation and the second was to measure the effects of vibro- medical insole with and without random noise on plantar pressure distribution in patients with mild- to- moderate diabetic peripheral neuropathy. **Material and Methods:** A total of 20 patients with mild- to- moderate diabetic neuropathy were included in the clinical trial pre- test, post- test study. Vibro- medical insole consists of medical insole and vibratory system. Medical insole was made for all participants based on their foot size and shape then vibratory system was inserted it. Pressure sensation was evaluated before and after 10 minutes walking with vibro- medical insole and peak pressure was measured using vibro- medical insole with and without random noise. Pressure sensation and peak pressure were evaluated with Semmes-Weinstein monofilaments and pedar-x system, respectively. **Results:** All participants showed improvement in pressure sensation with vibro- medical insole in heel, metatarsophalangeal heads and hallux of both feet (*p*<0.05). Peak pres-

sure significantly decreased in heel, MTP2,3, MTP4,5 and hallux (*p*<0.05) and increased in midfoot (*p*<0.05) using vibro- medical insole with and without random noise. Only the peak pressure of the heel region decreased using vibro- medical insole with random noise compared to without random noise (*p*=0.006). **Conclusion:** Vibro- medical insole may alter peak plantar pressure and random noise seems to improve pressure sensation in the diabetic patients with mild- to- moderate neuropathy. This work suggests that vibro- medical insole can be used for daily living activity to overcome sensory loss and probably decrease the risk of ulceration in diabetic neuropathy patients.

93

EFFECTS OF INTERFERENTIAL THERAPY ON PATIENTS WITH ACUTE LOW BACK PAIN

B. Ahmed¹, M.S. Alam², A. Salek¹, M.A. Rahman³

¹Bangabandhu Sheikh Mujib Medical University, Physical Medicine and Rehabilitation, Dhaka, Bangladesh, ²Dhaka CMH, Orthopaedics, Dhaka, Bangladesh, ³Mymensingh Medical College and Hospital, Physical Medicine and Rehabilitation, Mymensingh, Bangladesh

Introduction/Background: Acute low back pain (LBP) is the fifth most common reason for all physician visits. Most patients with acute LBP improve with conservative management. In conjunct with other conservative treatment an interesting non-drug therapy maybe a interferential therapy. **Introduction:** LBP is a common problem in Bangladesh. Acute LBP is usually defined by a period of complaints of LBP of six weeks or shorter. Interferential therapy can improve acute LBP. **Material and Methods:** Objective: To evaluate the effectiveness of interferential therapy on acute LBP and also to ensure the patients well-being by shortening recovery time and improve quality of life. **Method:** A prospective comparative study was carried out in the department of Physical Medicine and Rehabilitation, Bangabandhu Sheikh Mujib Medical University (BSMMU) for 3 months in 2015. The patients were divided into two groups (A & B). Patients of group A (36 patients) were treated with interferential therapy and non-steroidal anti-inflammatory drug (Aceclofenac). Patients of group B (30 patients) were treated with only NSAIDS (Aceclofenac). Main outcome measures: Subjective pain intensity, visual analogue scale, tenderness index, Ronald-Morris disability questionnaire (RMDQ) were completed by subjects' pre-treatment, per-treatment and post-treatment follow-up. **Results:** A total of 66 patients of acute LBP were included in this study. After treatment the result was compared and student's 't' test was done to see the level of significance. Method was found significant after treatment (*p*<0.05) and clinically meaningful reduction in functional disability(RMDI). 30 patients (83%) in group A and 18 patients (60%) patients in group B were improved. Patient compliances of group A were better than that in group B. **Conclusion:** Effects of interferential therapy on acute LBP is beneficial.

CONSUMER SESSION I

94

PRACTICAL TIPS ON SEXUALITY, RELATIONSHIPS AND COMMUNICATION AFTER SPINAL CORD INJURY

S. Ducharme¹

¹Wayland, USA

Introduction/Background: With longer life expectancies following SCI, the emphasis in rehabilitation over the past decade has gradually shifted to improved quality of life. Sexual adaptation to an SCI is a gradual process that extends over a prolonged period of time. Successful sexual adjustment is influenced by many factors such as age at time of injury, quality of social supports, physical health,

gender and severity of the injury. Sexual health following SCI requires attention to physical, psychological and relationship issues. To achieve a satisfying sexual adjustment, a person with an SCI will have to learn their new sexual abilities, as opposed to recapturing the past. Ultimately information on these issues will improve the individual's return to the family and community. *Material and Methods:* Sexual adaptation after an SCI is a learning process that involves psychological and physical adjustments. Providing sexual education to individuals with spinal cord injury and their partners is best accomplished by an interdisciplinary team approach in which medical and psychological issues can both be addressed. During the acute rehabilitation phase, a sensitive discussion regarding sexuality is appropriate. Even if the individual with a SCI does not initiate discussions about these topics, it is important for members of the rehabilitation team to provide basic information. *Results:* The availability of new medications, devices and procedures have greatly enhanced the possibility of having a satisfactory sexual life after a SCI. Toward this end, it is important that the person with a spinal cord injury have information about sexuality following injury in order that they make an informed decision regarding their sexual activities. *Conclusion:* This presentation will provide an overview of the physical, psychological and relationship issues as they relate to sexual functioning and fertility for men and women with spinal cord injury. Finally, specific information will be discussed as to who, when and what information should be provided to the individual and partner during the in patient rehabilitation hospitalization.

SPINAL CORD INJURY REHABILITATION

95

SPINAL CORD INJURY AND CHRONIC PAIN: USING AN IMPLEMENTATION SCIENCE APPROACH TO IMPROVE PRACTICE

J. Middleton¹, L. Katte¹, P. Siddall², K. Nicholson Perry³, J. Johnson⁴, P. Bragge⁵, J. Long⁶

¹Kolling Institute of Medical Research - University of Sydney, John Walsh Centre for Rehabilitation Research, Sydney, Australia, ²The University of Sydney, Pain Medicine, Sydney, Australia, ³Australian College of Applied Psychology, Psychology, Sydney, Australia, ⁴NSW Agency for Clinical Innovation, Pain Management Network, Sydney, Australia, ⁵Monash Sustainability Institute- Monash University, BehaviourWorks, Melbourne, Australia, ⁶Australian Institute of Health Innovation- Macquarie University, Centre for Healthcare Resilience and Implementation Science, Sydney, Australia

Introduction/Background: Chronic pain is a common secondary complication following spinal cord injury (SCI), causing interference with daily functioning and reduced quality of life in around 70% of people. It is often not well understood and sub-optimally managed in the community. *Material and Methods:* A theory-informed conceptual framework for Knowledge Translation (KT) was applied to examine existing evidence and develop agreed clinical standards (against which to measure current practice), explore context-specific gaps in resources and knowledge and define drivers of practice change. Consultation occurred through an expert forum, online survey, focus groups, stakeholder interviews, and clinician and consumer workshops. File audits explored knowledge and resource gaps, highlighting areas for practice improvement. Solutions were co-designed in partnership with a diverse community of practice. *Results:* Best practice principles were defined as: routine screening for SCI-related pain, comprehensive pain assessment, classification using internationally standardised terminology, screening for SCI pain-related red and yellow flags, and multi-disciplinary pain management. Over 80% of clinicians lacked confidence and resources to manage SCI-related chronic pain, with significant practice variation. Barriers to practice change included time and funding restrictions, limitations in workforce ca-

capacity and training. Facilitators were local capacity building, a 'hub and spoke' education model and promotion through primary health networks. Two online resources were developed: 1) an evidence-based decision support tool for clinicians to guide assessment and management planning, and 2) online consumer resources to support self-management. These resources and the clinical standards they embody formed the basis of a best practice intervention, and demonstrated acceptability, feasibility, fidelity and appropriateness when implemented in different clinical settings. *Conclusion:* Employing a knowledge translation framework guided evaluation of context-specific gaps in knowledge, resources and practice, a targeted and strategic approach to explore practice change and development of a suite of resources that may be applied across a range of health and community care settings.

96

BOTULINUM TOXIN EXTERNAL URETHRAL SPHINCTER INJECTION GUIDED BY ULTRASOUND FOR TREATMENT OF LOWER URINARY TRACT DYSFUNCTION

Y. Weixin¹, Z. Dawei¹, Z. Hongjun¹, C. Qingmei¹

The First Affiliated Hospital of Soochow University, Department of Rehabilitation, Suzhou, China

Purpose: This study investigates the effectiveness of botulinum toxin injection to the external urethral sphincter guided by ultrasound in the treatment of various types of lower urinary tract dysfunction. *Methods:* A total of 22 patients with urinary retention were caused by neurological dysfunction. The botulinum toxin (100 u) was injected into external urethral sphincter respectively in three different sites guided by ultrasound. Clinical effects and urodynamic parameters were compared at baseline and after treatment. *Results:* The 18 men and 4 women had various types of lower urinary tract dysfunction including detrusor sphincter dyssynergia (DSD) in 7, nonrelaxing urethral sphincter in 5, and detrusor underactivity in 10. After treatment, the urinary function and urodynamic parameters in each group improved significantly compared with the baseline ($p < 0.05$), and at 4 week up to a maximum efficacy. 3 (43%) patients with DSD had an excellent result and had 3 (43%) significant improvement; the nonrelaxing sphincter group had 3 (60%) and 2 (40%) respectively and the detrusor underactivity group had 5 (50%) and 3 (30%) respectively. There was no obvious side effects occurred in patients. *Conclusion:* The botulinum A toxin injection guided by ultrasound can accurately locate the external urethral sphincter. It is a simple and repeatability method for the treatment of lower urinary tract dysfunction.

97

INTERMITTENT HYPOXIA ENHANCES WALKING ENDURANCE IN INCOMPLETE SPINAL CORD INJURY PATIENTS

A. Navarrete-opazo¹, J. Alcayaga²

¹Teletón Rehabilitation Institute, Research & Development, Santiago, Chile, ²Universidad de Chile, Biology Department, Santiago, Chile

Introduction/Background: Spinal cord injury (SCI) interrupts descending synaptic pathways from brainstem pre-motor neurons to spinal motor neurons, thereby paralyzing muscles below the neurological level. Intermittent hypoxia (IH) elicits plasticity in the spinal cord and strengthens spare synaptic pathways, expressed as respiratory and somatic functional recovery in animals and humans with incomplete SCI. *Material and Methods:* This study corresponds to a randomized, triple-blind, placebo-controlled, multicentric, parallel clinical trial comparing the walking endurance of a 4-week protocol of IH (cycling 9%/21% FiO₂ every 1.5 min, 15 cycles/day) or continuous normoxia (Nx, 21% FiO₂) combined with body-weight supported treadmill training (BWSTT) in incom-

plete ASIA C and D sub-acute and chronic SCI patients in Santiago, Chile. Subjects received IH or Nx combined with 45 minutes BWSTT for five consecutive days. Then, this protocol was administered three times per week for 3 additional weeks. The outcome measure was a 6-meter-walking test (6MWT) assessed five days after daily IH (D5), weekly from week 2 to 4 (W4) and a 2-week follow-up (F2). Friedman and Kruskal-Wallis non-parametric tests were used for comparisons. *Results:* At D5, IH plus BWSTT significantly enhanced walking endurance expressed as distance (meters) versus baseline (IH: 43.06±10.68 vs. Nx: 6.13±3.41 m, $p<0.05$). The IH-enhanced walking endurance was maintained up to F2. Subgroup analysis showed that there was a greater walking endurance in younger (<35 years old) compared to older (>35 years old) subjects ($p<0.05$). *Conclusion:* Moderate repetitive IH represents a safe and effective therapeutic approach to improve walking endurance, in incomplete ASIA C and D SCI patients. Sponsorship: Fondecyt Grant 11140120.

98

A PROSPECTIVE COMPARISON STUDY OF FUNCTIONAL OUTCOMES AND DEMOGRAPHIC CHARACTERISTICS AFTER TRAUMATIC AND ATRAUMATIC SPINAL CORD LESIONS (SCL) IN INDIAN PATIENTS

S. Yadav¹

¹All India Institute of Medical Sciences, Physical Medicine & Rehabilitation, Delhi, India

Introduction/Background: The purpose of this study to compare neurological and functional outcomes in patients among traumatic and atraumatic spinal cord lesions after in-patient rehabilitation both at admission and discharge, correlation of duration and length of stay (LOS) and also Influence of age and gender on functional outcomes. *Study design:* Prospective, 1-year case series. *Setting:* In-patient rehabilitation unit of Department of Physical Medicine & Rehabilitation, All India Institute of Medical Sciences, New Delhi, India. *Material and Methods:* 36 patients with traumatic and atraumatic spinal cord lesions, admitted in spinal cord injury unit for rehabilitation, were prospectively followed-up. Demographic characteristics and Functional outcomes i.e. Spinal cord independence measure (SCIM), Modified Barthel's score (MBI), Rivermead mobility index (RMI) and quality of life basic data set of both groups were compared before admission and after discharge from rehabilitation unit. *Results:* In all, 19 patients were traumatic and 17 patients were atraumatic SCL in etiology. Age, duration of injury and functional outcomes were comparable on baseline in both categories. LOS was found to be similar in both groups (Traumatic 7.26±3.88 weeks v/s Atraumatic 7.29±3.72 weeks). Incomplete lesion was significantly higher in the atraumatic group when compared with the traumatic group ($p<0.002$). Outcomes measures i.e. SCIM, MBI, RMI and quality of life basic data set were significantly improved in both groups ($p=0.001$) following rehabilitation. In traumatic SCL, age, and LOS was found to be positively correlated significantly ($p=0.043$, $p=0.001$ respectively) with MBI scores. For atraumatic SCL, age was found to be positively correlated significantly with duration of injury ($p=0.039$) and LOS ($p=0.028$). In both categories, total SCIM was found to be positively correlated significantly ($p=0.01$) with MBI scores. *Conclusion:* According to the results of this study, although patients with atraumatic cases had more incomplete SCL but there was no significant difference in LOS and functional outcomes between traumatic and atraumatic SCL.

99

RESULTS OF A NOBEL NEUROREHABILITATION PROGRAM APPLIED IN 8 CHRONIC AND COMPLETE SCI PATIENTS TREATED WITH AUTOLOGOUS NEURAL STEM CELL

M.T. Moviglia Brandolino¹, G. Albanese¹, S. Picone¹, M. Spinelli¹, J. Ferrey¹, J. Garcia¹, J.P. Gill¹, L. Giunta¹, J. Lopez Arrubla¹, O. Maedo¹, F. Mamud¹, G. Martinez¹, J.L. Moviglia¹, A. Quevin¹, R. Perez Castellani¹, G. Rogala¹, B. Bolsoni¹, N. Fiorini¹, I. Tomaz¹, G.A. Moviglia¹

¹Universidad Maimónides, Centro de Investigacion en Ingenieria de Tejidos y Terapia Celular, CABA, Argentina

Introduction/Background: In order to restore spinal pathways, repair the damaged tissue and recover voluntary movements and sensitivity in chronic and complete SCI patients we developed a combined treatment using Autologous neural stem cell implant and a nobel neurorehabilitation program. *Material and Methods:* In Apr 2013 eight chronic SCI patients ASIA A (3/8 quadriplegic and 5/8 paraplegic) started with 6 months of an intensive neurorehabilitation program adapted to the level of the lesion. After this period they received the first intraarterial tissue implant with Autologous Stem cell derived from fat tissue previously differentiated to neural progenitor cells associated with autologous pro-reparative lymphocytes. Each patient received 3 implants with 12 months in between. Simultaneously they underwent an intensive (30 hours a week) and multidisciplinary rehabilitation program that look forward to work the compromised areas and recover the physiological functions with as less as possible of compensation and energy demand. *Results:* After 32 months of treatment 0/8 patients experienced any said side effects related to the treatment over level 1 of the NIH toxicity scale. 1/8 patients dropped the treatment after 18 months for personal reasons, he received only two implants. 6/8 patients showed functional changes: 4/5 paraplegic achieved independent walking, 2/3 quadriplegic achieved independent standing, 7/8 patients improved 4–7 points in SCIM scale. 2/3 quadriplegic recovered thermoalgesic sensitivity of both hands, 1/8 recovered anal sensitivity en in sphincter tone. 7/8 patients recovered (EMG+) electrical activity that correlates with voluntary movements in muscles previously negative up to 10 levels below the spinal lesion. 5/8 recovered vibratory sensitivity in points where it was previously absent. 8/8 patients improved latency en in lower limbs somatosensory evoked potential. *Conclusion:* Combined treatment applied in chronic SCI patients is safety safe, 7/8 patients showed electrophysiological and functional changes that would be due to recovery of injured tissue and reconnection between the ends of SCI.

100

USE OF ANTIBIOTIC AND INCIDENCE OF ANTIBIOTIC ASSOCIATED DIARRHOEA (AAD) IN PATIENTS WITH SPINAL CORD INJURIES: A UK NATIONAL SPINAL INJURY CENTRE EXPERIENCE

P. Santullo¹, M. Saif¹, S. Wong¹

¹Stoke Mandeville, Spinal Unit, Aylesbury, United Kingdom

Introduction/Background: The frequency of AAD could be as high as 60% during hospital outbreaks or intermediate (13–29%) during endemic periods 1. Little is known about the use of antibiotics and the extent of AAD in patients with spinal cord injuries (SCI). Our aim was to (1) record the use of antibiotics; (2) establish the incidence of AAD and; (3) assess if any seasonal variation on antibiotic use and incidence of AAD. *Material and Methods:* A retrospective audit was conducted in a UK SCI centre during Oct 2014 to Jun 2015. Data was collected by trained researcher from individual patient notes using a standardised questionnaire. We define AAD as 2 or more watery stools type 5, 6 or 7 (Bristol stool scale) over 24 hours. 2. *Results:* Three-hundred-and-nineteen adults (mean age: 55.9 years, 29.2% female) with SCI (58.2% tetraplegia; 43.7% complete SCI) were included. Of 76 (23.8%) patients on antibiotics, the top three indications for antibiotics were urinary-tract infections, pressure ulcers and skin-infection. Seventeen of 76 (22.3%) developed AAD. No statistical difference was observed on number of antibiotics, severity of SCI, use of proton-pump inhibitor and H2 blocker and use of laxatives in both groups. AAD was more common in the summer season when compared to spring, autumn and

winter. (44.4%, 10.5%, 9.1%, 29.4%, $p=0.02$). AAD was associated with older adult greater than 65 years (64.7% v 33.3%, $p=0.042$). **Conclusion:** This survey found AAD is common in SCI patients and maybe a risk factor for poorer outcome and increased hospital cost. A multicenter study is underway to establish the incidence and risk factors for AAD. **Acknowledgement:** The authors would like to thank Sunna Aslam, Lydia van Hamel-Parsons and Edmund Chiu for data collection. **References:** McFarland LY (2006) *Am J Gastroenterol* 101, 812–822. O'Donnell LD et al (1990) *Br Med J* 300, 439–440.

101

INTERNATIONAL SPINAL CORD INJURY SURVEY IN KOREA'S PERSPECTIVE : A PILOT SURVEY OF 100 SCI PERSONS

Z.A. Han¹, J.G. Moon¹, W. Kim², H.J. Im², B.S. Lee³, S.J. Lee⁴, C.I. Park⁵

¹National Rehabilitation Center, Spinal Cord Injury Rehabilitation, Seoul, Republic of Korea, ²National Rehabilitation Center, Public Rehabilitation Service, Seoul, Republic of Korea, ³National Rehabilitation Center, Spinal Cord Rehabilitation, Seoul, Republic of Korea, ⁴National Rehabilitation Center, Neurorehabilitation, Seoul, Republic of Korea, ⁵Konyang University, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: Disability data is essential in identifying problems and formulating appropriate policies to give effect on the identified shortcomings of the realities of persons with disabilities (PWDs). The International Spinal Cord Injury Survey (InSCI) within the Learning Health System for Spinal Cord Injury (LHS-SCI) initiative, has been created with the objective of internationally comparing the lived experience of people with SCI. After translation into Korean, the KoSCI (Korean Spinal Cord Injury Cohort Study) team has performed a pilot survey on 100 SCI persons. **Material and Methods:** 100 community dwelling SCI persons in Korea were interviewed face-to-face using the Korean Version of InSCI between 2015.10.19–2015.11.05. The InSCI included all ICF categories of the Rehabilitation Set and Core Set for SCI-Brief Long-Term. **Results:** Among the 100 SCI persons surveyed, 50 were paraplegic and 50 were tetraplegic. The average duration of SCI was 43.5±11.5 years with 76% of those being men. For final level of education 41 were university, 49 middle to high school education. 47% were married, 38% single etc. 89% replied that in the last 30 days they had much of a problem carrying out daily routines. 71% responded that that in the last 30 days they had experienced negative societal attitudes that influenced their participation in society. 34% replied that they were currently engaged in paid work. In the section regarding health problems, a high percentage of those surveyed responded that they had problems in the following domains of health; Contractures (88%), Chronic pain (87%), Sexual dysfunction (87%), Spasticity (85%), Bowel function (74%), Bladder function (74%), Sleep disturbance (73%), Urinary tract infections (68%), Orthostatic hypotension (68%), Pressure sore (54%), Respiratory problems (49%), Injury caused by loss of sensation (44%), Circulatory problems (44%). **Conclusion:** Survey results implied that substantial limitations in daily living existed for SCI persons in Korea. In the future, similar surveys should be performed in the general population to get a relative picture of the lived experienced of SCI persons in Korea.

102

HEALTH SURVEILLANCE AND RISK MANAGEMENT IN RURAL PERSONS WITH SPINAL CORD INJURY

J. Middleton^{1,2,3,4}, M. McCormick¹, A. De Wolf¹, O. Marial², G. Leong^{1,5}, S. Rowe¹, I. Cameron^{3,4}

¹NSW Rural Spinal Cord Injury Service, Spinal Outreach Service, Royal Rehab, Sydney, NSW, Australia, ²State Spinal Cord Injury

Service, NSW Agency for Clinical Innovation, Chatswood, NSW, Australia, ³John Walsh Centre for Rehabilitation Research, Kolling Institute, Northern Sydney Local Health District, St Leonards NSW ²⁰⁶⁵, Australia, ⁴Sydney Medical School Northern, University of Sydney, Sydney, Australia, ⁵Royal North Shore Hospital, St Leonards, Sydney, NSW, Australia

Introduction/Background: Timely access to primary and specialized health services for people with spinal cord injury (SCI) living in rural communities may be difficult. The Rural SCI Service (RS-CIS) was established in 2007 to provide a 'hub and spoke' model linking the rural sector with metropolitan-based Spinal Outreach Service and the SCI Units in NSW, Australia. **Materials and Methods:** Retrospective analysis of data regarding issues identified and recommendations made during monthly multidisciplinary rural clinic reviews held between Jan 2007 and Dec 2012. Descriptive statistical analysis of complications by neurological impairment, age and duration post-injury. **Results:** A total of 387 individuals were reviewed over 681 rural clinic episodes. The mean (standard deviation) age was 48±15 years, with mean time post-injury being 15±14 years. Common medical issues included musculoskeletal (58%) and neuropathic (44%) pain, autonomic dysreflexia (42%), pressure injuries (25%), gastro-oesophageal reflux (23%), obstructive sleep apnoea (OSA) (23%), sexuality/fertility (21%), recurrent urinary tract infections (20%), constipation (19%), spasticity (17%), faecal incontinence (16%), bladder leakage and dependent oedema (15%). Functional issues related mostly to seating (50%), but also other equipment and lack of exercise. Psychosocial concerns included mental health and wellbeing of person with SCI (22%), as well as carer concerns (30%). Bowel care time, OSA risk and upper limb pain increased with time post injury. Sexuality and mental health issues decreased with time post injury. OSA was also related to higher injury level and older age at injury. Increased bowel care time was also evident for older age at injury. A framework/schedule of health surveillance and red flag screening over the lifespan of the person with SCI has been proposed. **Conclusion:** The promotion and maintenance of optimal health, functioning, participation and quality of life over the life span of an individual with SCI involves ongoing surveillance, primary and secondary prevention and comprehensive interdisciplinary involvement. **Reference:** Middleton JW, McCormick M, Engel S, Rutkowski SB, Cameron ID, Harradine P, Johnson JL, Andrews D. Issues and challenges for development of a sustainable service model for people with spinal cord injury living in rural regions. *Arch Phys Med Rehabil* 2008; (89):1941–1947.

103

EXOSKELETONS FOR WALKING OF PARALYSED PATIENTS AS PART OF THE POST REHABILITATION CENTRE CONCEPT

L. De Maesschalck², P. Van Sanden³, T. Claes⁴, S. Claes⁴, J. Verellen², L. Van De Perre², I. Knipfels²

¹KU Leuven, Faculty Engineering Sciences, Geel, Belgium, ²Thomas More University College, Mobilab, Geel, Belgium, ³AZ Herentals, Physical Medicine and Rehabilitation- Post Rehabilitation Centre, Herentals, Belgium, ⁴AZ Herentals, Orthopaedic Surgery, Herentals, Belgium

Introduction/Background: In 2003 former Iron Man triathlon champion Marc Herremans who became paraplegic after spinal cord injury, set up together with his coach the foundation "To walk again (TWA)". His mission was to make disability sports & related rehabilitation services accessible to everyone. Their motto was: "Getting human capital out of their wheelchairs" "Because inactivity paralyzes both mind and body". Now we are taking the next step by starting up TWA-Post Rehabilitation Centres. **Material and Methods:** The post rehabilitation centre is a cooperation between a hospital rehabilitation department (AZ Herentals), a technical orthopaedic company, the TWA foundation and a university research lab (Mobilab, Thomas More University College). With this brand

new initiative we want to set the standard for accessible, stimulating and progressive post-rehabilitation services through sports and exercise, pairing medical technology with expert medical and academic support. We will give an overview of the activities already done and planned. The first project is the use of exoskeletons for paralysed patients. *Results:* The preliminary results from our research show the impact of the use of exoskeletons on physical, psychological and social issues. Furthermore an exploration of the consolidation phase will be explained. *Conclusion:* The unique collaboration between the rehabilitation and orthopaedic hospital departments, orthopaedic technicians, a university research lab and a private foundation forms the basis of the post rehabilitation concept for the benefit of disabled persons. The first project with exoskeletons for walking of paralysed patients show significant effects on their physical and psychosocial well-being.

AUTOIMMUNE AND INFLAMMATORY, NEURODEGENERATIVE DISEASE, PERIPHERAL NERVE INJURY

104

6-MONTH FOLLOW-UP OF HAND FUNCTIONAL OUTCOME AMONGST CHARCOT-MARIE-TOOTH PATIENTS IN RELATIONS TO MEDIAN AND ULNAR NERVES SIZES AND CMTNS2 SCORE

J. Samsuri¹, L. Abdul Latif¹, A. Shuhaimi¹

¹University of Malaya, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Charcot-Marie-Tooth (CMT) disease is a progressive disorder which affecting the quality of life overtime. Hand impairments are often overshadowed by the lower limb impairments, which the CMT patients normally unrealized until severely affecting their daily activities. Evaluating the shortest time that CMT patients may develop deterioration in hand functional and possible associated factor that can be used to predict the outcome in 6 months were the main of this study. *Material and Methods:* Cohort study was conducted on 20 CMT subjects. Exclusion criteria includes chronic illness, diabetes, entrapment syndrome, peripheral neuropathy, vitamin B deficiency etc. The assessment has 3 domains; CMTNS2 score, hand function (dynamometer, Purdue Pegboard), cross sectional area (CSA) of median and ulnar nerves (ultrasound). All the assessment done at baseline and repeated 6 months later. 20 age-sex match control were recruited and assess for hand functional and CSA of nerves once only. *Results:* We found that nerves sizes were larger and poor hand function were noted in CMT compared to controls ($p < 0.05$). Comparing between axonal and demyelinating CMT subtypes, the demyelinating subtype showed larger nerve CSAs ($p = 0.054$) and poorer hand functional ($p > 0.05$). In 6 months, the CMT subjects demonstrate better hand functional despite no significance difference of median and ulnar nerve CSAs. Significant positive correlation was found between duration of years and CMTNS2 score ($r = 0.780, p = 0.000$), and negative correlation between duration of years with grip strength ($r = -0.681, p = 0.004$) and median nerve ($r = -0.291, p = 0.273$). *Conclusion:* The nerve CSAs were not correlated with the improvement of hand functional, and larger sample sizes are required with serial of 6-monthly follow-up for at least 2 years durations to predict the hand functional outcome with the use of ultrasonography.

105

DOES LOW FREQUENCY ELECTRICAL STIMULATION ENHANCE PERIPHERAL NERVE REGENERATION FOLLOWING CRUSH INJURY TO RATS? AN ELECTROPHYSIOLOGICAL, HISTOPATHOLOGICAL AND HISTOMORPHOMETRICAL EVALUATION

G. Aydin¹, K. Katmerlikaya², D. Billur³, B. Bakar⁴, S. Aydin³, A. Tosun⁵, P. Bayram³, E. Yorulmaz⁶, İ. Özdemir⁷

¹Yıldırım Beyazıt University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Turkey, ²Şanlıurfa Balıklıgöl State Hospital, Department of Physical Medicine and Rehabilitation, Şanlıurfa, Turkey, ³Ankara University- Faculty of Medicine, Department of Histology-Embryology, Ankara, Turkey, ⁴Kırıkkale University Faculty of Medicine, Department of Neurosurgery, Kırıkkale, Turkey, ⁵Izmir Katip Celebi University, Department of Physical Medicine and Rehabilitation-, Izmir, Turkey, ⁶Haydarpaşa Numune Training and Research Hospital, Department of Physical Medicine and Rehabilitation, Istanbul, Turkey, ⁷Kırıkkale University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Kırıkkale, Turkey

Introduction/Background: We aimed to set a model of sciatic nerve injury (axonothmesis) in rats and investigate the effects of early and late onset electrical stimulation (ES) on nerve regeneration. *Material and Methods:* Thirty Wistar rats were included in the study. After performing sciatic nerve crush injuries, rats were randomized into either therapy or sham group. Sham group was later divided into 2 subgroups according to the sacrifice times (Group 1; 15th day of the injury; Group 2, 30th day of the injury). The 18 rats scheduled for ES were divided in 3 subgroups. Group 3 and 4 received ES for 15 days starting from the 1st day of the injury. Rats in Group 3 were sacrificed at the 15th day and rats in Group 4 at the 30th day of the injury. Rats in Group 5 received ES for 15 days starting from the 15th day of the injury and sacrificed at the 30th day. Low-frequency ES was applied on the sciatic notch for 2 minutes/day in treatment groups. The sciatic functional index was calculated on the 1st, 15th and 30th day of the injuries. Motor conduction studies were performed in all groups on the sacrifice day. Sciatic nerve biopsies were obtained for histomorphometrical and histopathological evaluation after sacrifice. *Results:* All of the functional, electrophysiological and histomorphometrical findings revealed that recovery was significantly better in Group 5 compared to the groups that did not received ES (Group 1–2) or to those that received ES during the first 15 days (Group 3–4). *Conclusion:* We assume that besides being a non-invasive, low cost and self-administrable procedure, low-frequency ES may enhance nerve regeneration in axonothmesis-type nerve injuries when started 2 weeks after the injury.

106

ELBOW FLEXION RESTORATION AFTER BRACHIAL PLEXUS RECONSTRUCTION AND THE ROLE OF SURFACE-EMG (S-EMG) BIOFEEDBACK

R. Haryadi¹, L. Arfianti², H. Suroto³

¹Surabaya, Indonesia, ²Airlangga University, Physical Medicine and Rehabilitation, Surabaya, Indonesia, ³Airlangga University, Orthopaedics, Surabaya, Indonesia

Introduction/Background: Surgical reconstruction brings new hope to traumatic brachial plexus injury patients. Post surgery recovery of function requires long term commitment to a comprehensive rehabilitation program. The ultimate long-term goal is to create a new pathway from the brain via grafted nerve/muscle tissue to achieve the intended movement. Biofeedback has an important place in training, especially in the early phase. It heightens the patient's awareness and motivation. The purpose of this study is to evaluate time to achieve functional result of S-EMG Biofeedback training in patients who underwent brachial plexus reconstruction to restore elbow flexion. *Materials and Methods:* We consecutively enrolled patients who underwent surgical reconstruction (nerve transfer or free-functioning muscle transfer/FFMT) to restore elbow flexion and S-EMG Biofeedback training in 2012–2015. Medical records from the PMR outpatient clinic were reviewed. We observed time to surgical reconstruction, time of recovery (defined as muscle contraction $\geq 100 \mu V$ recorded with S-EMG Biofeedback), and compliance to biofeedback training. *Results:* Twenty-two patients were included in the study. Mean time to surgical reconstruction

was 3.5±1.7 months for nerve transfer, and 29.6±35.6 months for FFMT. Among 18 patients underwent FFMT, 7 (37%) recovered within 11±4.7 months (mean± SD), while 11 patients (63%) needed further training. All 4 nerve transfer patients (100%) recovered with mean time to recovery of 10.0±6.4 months. Half of the patients complied to once in 2 weeks-training. *Conclusion:* Nerve transfer showed better outcome than FFMT. Compliance and time to surgery are factors influencing functional outcome. Progress often continues years after brachial plexus reconstruction.

107

TAI CHI TRAINING IMPROVES BALANCE CONTROL IN PATIENTS WITH SPINOCEREBELLAR ATAXIA

P.T. Liu¹, T.S. Wei¹, C.S. Liu²

¹Changhua Christian Hospital, Dept. of Physical Medicine and Rehabilitation & Center for Fall Prevention, Changhua, Taiwan, ²Changhua Christian Hospital, Neurology, Changhua, Taiwan

Introduction/Background: Patients with spinocerebellar ataxia (SCA) have injured motor and balance control which led to fall-related injuries. Tai Chi training can improve functional balance with decreases of fall risks in the elderly and patients with Parkinson's disease while fewer studies have utilized Tai Chi training on SCA. This study aimed to investigate the effect of Tai Chi training for balance control and gait performance in SCA. *Material and Methods:* A total of 21 patients with SCA (12 males) were enrolled. Nine subjects were allocated to group A (traditional intervention, mean age 46.3±13.9 years) and 12 subjects were group B (traditional intervention with a 3-month Tai Chi training, mean age 51.3±10.7 years). Besides demographic data, balance and gait performance including static balance, dynamic gait index were measured by a computerized dynography system (Infotronic, Ultraflex, Netherlands) and forward reach test was also assessed before and after the intervention. Independent *t*-test and paired *t*-test were used to analyze the differences between groups and before and after training. *Results:* The Tai Chi group demonstrated significant decreases in body sway length (from 284 mm to 232 mm, $p=0.021$), mean sway velocity (from 14.3 mm/sec to 13.0 mm/sec, $p=0.042$) and sway velocity in anteroposterior direction (from 11.0 mm/sec to 9.6 mm/sec, $p=0.032$) after training. There was no significant difference in dynamic gait and forward reach test between groups and time points. *Conclusion:* Tai Chi training could improve static balance for SCA whereas its effect on dynamic balance and gait were not observed in this study.

108

THE PHYSIOLOGICAL MECHANISM OF GAIT IMPROVEMENT WITH RHYTHMIC STIMULATION IN PATIENTS WITH PARKINSON'S DISEASE

D. Nishida¹, E. Yamada¹, K. Kato¹, K. Mizuno¹, H. Ebata², M. Liu¹

¹Keio University, Department of Rehabilitation School of Medicine, Tokyo Shinjuku-ku, Japan, ²Saiseikai Kanagawa-ken Hospital, Department of Rehabilitation Medicine, Kanagawa, Japan

Introduction/Background: Patients with Parkinson's disease (PD) suffer from gait disturbance, which, in some patients, can be improved with rhythmic stimulation. This effect is useful for their rehabilitation, but its physiological mechanism is not yet well understood. The purpose of this study is to investigate brain activation patterns with functional MRI (fMRI) in patients with PD while they are imaging gait with and without rhythmic stimulation. *Material and Methods:* The participants were 7 right-handed patients with PD (mean age: 71.5, 1 male), whose Yahr stages ranged from 2 to 3. They could walk by themselves, had no cognitive impairment, and could walk more smoothly with rhythmic stimulation than without. As a control group, we examined 7 healthy right-handed volunteers (mean age: 31.9, males). The participants were asked to image

gait with rhythmic stimulation (beep on 100 beats per minute) or with white noise during the fMRI imaging. *Results:* Gait imagery in patients with PD showed activation of supplementary motor area (SMA) and right cerebellar hemisphere, while with white noise, the activation pattern was more widespread, including parietal and occipital lobes as well as SMA and cerebellar hemisphere. In healthy controls, the activation was limited to SMA and cerebellar stimulation and with white noise. *Conclusion:* Both SMA and cerebellar hemisphere were activated while other regions were suppressed with rhythmic stimulation in patients with PD. This result suggests that rhythmic stimulation can enhance SMA and cerebellar activations to correct the motor and balance programs for the gait function in these patients. In this pilot study, we could suggest the mechanism of the immediate effect of gait improvement with rhythmic stimulation. *Acknowledgement:* This study is supported by "Brain Machine Interface Development" under the Strategic Research Program for Brain Sciences by Japan Agency for Medical Research and Development.

109

A NOVEL ULTRASOUND GUIDED STEROID INJECTION SAFELY RELIEVES CARPAL TUNNEL SYNDROME SYMPTOMS AND IMPROVED MOTOR NERVE CONDUCTION VELOCITY

C.W. Tang¹, F.T. Tang¹

¹Chang Gung Memorial Hospital Linkou Medical Center, Physical Medicine and Rehabilitation, Taoyuan, Taiwan

Introduction/Background: Carpal tunnel syndrome (CTS) is one of the most common upper limb compression neuropathies. The enlargement and deformation of the median nerve can be quantified under ultrasound, and the diagnostic criteria have been reported in previous studies. Among the conservative treatment, several studies supported the superior effectiveness of local corticosteroid injection for CTS compared to other interventions. However, the local injection of steroid might result in severe complication such as severe pain and permanent sensory loss. Thus, we developed a new US-guided technique whereby the carpal tunnel is injected with distal approach while using a long-axis view of median nerve, which the whole stretch of median nerve can be visualized during needle approach. *Material and Methods:* Eight subjects diagnosed with CTS were recruited. Clinical assessment included nerve conduction velocity and the cross section area of median nerve under ultrasound. Laboratory assessment were The Boston Carpal Tunnel Questionnaire (BCTQ), QuickDASH (Disability of the arm, shoulder and hand Questionnaire). All of the assessments were performed before the injection, 1 month, 2 months and 3 months after the injection. *Results:* Significant improvements were shown both in clinical and laboratory assessments. There were significant improvements of motor nerve conduction velocity compared to the pre-injection condition. Besides, under the ultrasound examination, the cross section area of median nerve shrink from 0.16 cm² to 0.1 cm² 3 months after the injection. Furthermore, there were significant decrease of score in both BCTQ and QuickDASH. *Conclusion:* Our results indicated that distal approached ultrasound guided injection safely and precisely delivered steroid to the median nerve, leading to effective inflammation decrease and nerve conduction velocity improvement. The subjects also experienced great life quality improvement according to BCTQ and QuickDASH. In conclusion, this novel injection way successfully treated CTS, and further larger scale studies are needed.

MUSCULOSKELETAL CONDITION II

110

HOSPITAL INPATIENT VERSUS HOME-BASED REHABILITATION AFTER KNEE ARTHROPLASTY (THE HIHO STUDY): PRELIMINARY RESULTS OF A RANDOMISED CONTROLLED TRIAL

M. Buhagiar^{1,2}, J. Naylor^{2,3,4}, I. Harris^{2,3,4}, W. Xuan^{2,4}, F. Kohler^{1,2}, R. Wright⁵, R. Fortunato⁶

¹HammondCare, Rehabilitation, Sydney, Australia, ²UNSW, South West Clinical School, Sydney, Australia, ³Whitlam Orthopaedic Research Centre, Liverpool Hospital, Sydney, Australia, ⁴Ingham Institute of Applied Medical Research, Research, Sydney, Australia, ⁵South Western Sydney Local Health District, Fairfield Hospital, Sydney, Australia, ⁶South Western Sydney Local Health District, Campbelltown Hospital, Sydney, Australia

Introduction/Background: Although commonly utilised as a treatment alternative following joint arthroplasty, no study has been done which establishes whether inpatient rehabilitation provides superior recovery of functional mobility when compared to a home based program. It is a significant cost to the Australian healthcare system, with a discrepancy of utilisation across Australia. **Material and Methods:** A two-arm parallel randomised controlled trial aimed to compare the effectiveness of inpatient to home-based rehabilitation following total knee arthroplasty. Persons recruited from two centres had undergone a primary total knee arthroplasty. Once cleared for discharge from acute care, participants were randomly allocated to either 10 days of inpatient rehabilitation followed by usual care (a 6-week hybrid home program) or usual care. Potential participants unwilling to undergo randomisation were invited to participate in an observational group receiving usual care. The primary outcome measured was the 6-minute walk test. Secondary outcomes included the 15-metre walk test, Oxford Knee Score and EQ-5D. **Results:** 419 patients were recruited, with 81 randomised to inpatient rehabilitation, 84 randomised to a home program, and 80 included in an observational group. Preliminary results were analysed at 10 and 26 weeks after surgery for 150 randomised participants. No significant differences between the groups were shown in unadjusted and adjusted analyses. Between groups, the mean difference (with a 95% confidence interval) for the measured outcomes were: 6-minute walk test: 0.4 m (-34 to 35); 15-metre walk test: 0.3 sec (-1.1 to 1.7); Oxford Knee Score: 2.2 (-0.7 to 5.1); and EQ-5D visual analogue scale: 2.1 (-8.2 to 4.0). **Conclusion:** Inpatient rehabilitation does not procure a superior level of recovery across a range of outcomes following total knee arthroplasty, when compared to a hybrid home program. Given the increasing demand for total knee arthroplasty and limited resources, considerations for cost-effective alternatives should be explored for future practice.

111

COMPUTER-ASSISTED CRYOTHERAPY IN REHABILITATION AFTER TOTAL KNEE ARTHROPLASTY

M. Glehr¹, G. Bernhardt¹, A. Leithner¹, S. Hasenhütt², P. Sadoghi¹, G. Rumpold-Seitlinger³, R. Poolman⁴, G. Gruber¹

¹Medical University of Graz, Department for Orthopedic Surgery, Graz, Austria, ²Hospital of the Ludwig-Maximilians-University, Department of Orthopedic Surgery, Munich, Germany, ³Medical University of Graz, Department for Anaesthesiology, Graz, Austria, ⁴Onze Lieve Vrouwe Gasthuis, Department of Orthopedic Surgery, Amsterdam, Netherlands Antilles

Introduction/Background: To enhance recovery and outcome after Total Knee Arthroplasty (TKA) in the last years more and more attention is drawn to the improvement of postoperative soft tissue treatment. The aim of this prospective, randomized and single blinded study was to evaluate the efficiency and safety, of a new cryotherapeutic device, the cTreatment® System, in patients undergoing primary and unilateral TKA surgery compared to the standard cold therapy regimen. **Material and Methods:** 97 patients were randomized into two groups receiving the cTreatment® or the standard cold therapy protocol with cold pack application until six days after the surgical intervention. Objectives consisting of joint mobility, pain intensity and knee girth were measured on admission day and second, fourth and sixth postoperative day (POD). Additionally total opiate consumption and the potential occurrence of

adverse effects were recorded. **Results:** Statistically significant divergences to the benefit of the cTreatment® were detected regarding the knee mobility on POD six concerning both flexion, reaching averaged 6,6 degrees more (86.2±7; $p=0.021$), and extension, reducing the deficiency to -1.05 degrees±2.33 ($p=0.022$). Pain in the numeric rating scale (NRS) score in motion was significantly lower in the cTreatment® group on POD two ($p=0.034$). There were no statistically significant differences between groups regarding the NRS in rest, patient controlled analgesia (PCA) consumption and girth measurements. No adverse effects were found in both study groups. **Conclusion:** Computer-controlled cooling therapy seems to have significant benefits in terms of postoperative remobilisation and pain, which might be attributed to a reduced inflammatory response, secretion and bleeding. The cTreatment® System appears to be a safe procedure.

112

MALNUTRITION ACCOUNTS FOR IMPOSSIBLE REHABILITATION AFTER HIP ARTHROPLASTY

G. Bernhardt¹, S. Eminovic¹, M. Glehr¹, G. Gruber¹, A. Leithner¹

¹Medical University of Graz, Department of Orthopedic Surgery, Graz, Austria

Introduction/Background: A few studies investigated the nutritional status and postoperative outcome in patients undergoing elective arthroplasty. This study aimed, first, to assess the prevalence of Protein Energy Malnutrition (PEM) and second, whether preoperative nutritional parameters are associated with impaired postoperative outcome including rehabilitation after hip arthroplasty. **Material and Methods:** We retrospectively evaluated the nutritional status of 1183 patients aged over 65 years undergoing total hip arthroplasty (THA). PEM was assessed using serum albumin and total lymphocyte count as predictors of clinical outcome. Studied outcome parameters were length of postoperative stay, readmission rate, postoperative complications within 6 months after surgery and 12-month postoperative mortality. **Results:** In 220 patients all data were available. Patients with PEM=Group B ($n=27$, 12.3%) were significantly older (mean age 81.3±7.0, $p<0.001$), had a lower BMI (24.7±4.1 kg/m², $p=0.022$) and showed more comorbid conditions (mean Charlson Comorbidity Index (CCI) 2.8±2.0, $p=0.002$) compared to well-nourished patients=Group A (age 75.6±6.2, BMI 26.8±4.3 kg/m², CCI: 1.7±1.7). Length of preoperative stay differed significantly ($p<0.001$) between PEM (median=7, ±36 days) and non PEM (median=1, ±22 days). Adjusted for preoperative characteristics, we observed a hazard ratio of 6.3 (95% confidence interval: 1.7-23.1) for PEM. **Conclusion:** We observed a higher postoperative complication rate for malnourished patients undergoing elective hip arthroplasty compared with well-nourished patients. Patients with complications were not able to perform the standard postoperative rehabilitation program. The results underline the importance of preoperative nutritional assessment of patients undergoing elective THA.

113

HYPOVITAMINOSIS D IN PATIENTS WITH RADIAL FRACTURES

A. Raza¹, S. Shais², F. Faisal³

¹CMH Malir, Rehabilitation Medicine Department, Karachi, Pakistan, ²CMH Malir, Rehabilitation Medicine, Karachi, Pakistan, ³CMH Peshawar, Rehabilitation Medicine Department, Peshawar, Pakistan

Introduction/Background: The Radius is a common site for fractures. A low energy fracture can be due to deficiency of Vitamin D. It remains unnoticed until it is checked in fracture cases. Vitamin D deficiency in young adults is an important causes of radial fractures. Dietary deficiency is common in young adolescents. Sunlight exposure is less. It is an important causes of repeated stress frac-

tures of sites like radius bone Patients are treated conservatively mostly with calcium and vitamin D supplementation. Plaster cast is applied for 4–6 weeks followed by comprehensive rehabilitation. **Material and Methods:** A cross sectional study 16 × Patients, both genders less than 16 years, age with fracture of distal radius were included in the study as per inclusion criteria from Accident & Emergency Department at CMH Malir. X rays were done to confirm the diagnosis. Patients had their vitamin D and calcium levels checked. **Results:** 16 fractures distal radius cases were studied (11 distal end & 5 green stick –stress fractures). The average patient age was 14 (range 8–16). Right sided fractures were more common. It was more common in males. 7 patients had a Vitamin D level consistent with deficiency, and a further 5 had a level consistent with insufficiency. Average Vitamin D levels in measured was 21.3 nmol/L. Normal range (30–150 nmol/L). The average level of serum calcium was found to be 2.50 mmol/L. Normal range is 2.02–2.60 mmol/L. **Conclusion:** Hypovitaminosis D was common in young male patients with Radial fractures. Vitamin D supplementation has been shown in prevention and treatment of radial fractures.

114

EFFECTS OF CALCIFEDIOL AND CHOLECALCIFEROL ON 25-HYDROXY-VITAMIN D3 LEVELS, MUSCLE STRENGTH, AND PHYSICAL PERFORMANCE IN POST-MENOPAUSAL WOMEN

D. Calafiore¹, M.T. Giamattei¹, A. Moretti¹, F. Gimigliano², G. Iolascon¹

¹Second University of Naples, Department of Medical and Surgical Specialties and Dentistry, Napoli, Italy, ²Second University of Naples, Department of Physical and Mental Health and Preventive Medicine, Napoli, Italy

Introduction/Background: Post-menopausal women generally present reduced serum levels of vitamin D, reduced VDR expression in skeletal muscle cells, and a gradual loss of muscle mass and muscle function. The relationship between serum 25-hydroxyvitamin D [25(OH)D3] levels and muscle strength has been extensively investigated, even though there is no agreement in literature. Therefore, the objective of our study was to evaluate the effects of vitamin D on 25(OH)D3 levels, muscle strength, and physical performance in post-menopausal women, comparing calcifediol and cholecalciferol. **Material and Methods:** In our prospective study we included postmenopausal women aged ≥ 50 years, referring to our outpatient rehabilitation service for the prevention and management of osteoporosis. We divided our population into two groups, according to the prescription performed (calcifediol or cholecalciferol). We evaluated at the baseline (T0) and after six months (T1): serum levels of 25(OH)D3, appendicular muscle strength, using the Hand Grip Strength Test (HGS) and the Knee Extensor Strength Test (KES), and physical performance, using the Short Physical Performance Battery (SPPB). **Results:** We assessed 205 post-menopausal women, mean aged 69.28 \pm 9.16 years; 103 treated with calcifediol and 102 with cholecalciferol. In Table 1 we showed the differences in outcomes within groups. **Conclusion:** Our results showed that post-menopausal women treated with calcifediol had significant improvements in serum levels of 25(OH)D3, muscle strength, and physical performance.

115

CLINICAL STUDY ON LOOSE JOINT TECHNIQUE ON THE ADHESIVE CAPSULITIS OF THE SHOULDER

Jingjie Zhou, Ming Zhang, Xiufang Zhang, Xiaomeng Gao, Wei Chen

Rehabilitation Department of Xuzhou Center Hospital, Xuzhou, Jiangsu, China

Objective: To investigate the loose joint technique on the adhesive capsulitis of the shoulder. **Method:** One hundred and twenty-one pa-

tients with adhesive capsulitis were selected and divided into three groups by randomized, double-blind method. Group A used mobilization therapy and physical factor therapy; group B used proprioceptive training + physical therapy; group C used joint loosening therapy + proprioception training + physical factor treatment. The shoulder joint functions were evaluated and compared amongst the three groups of patients the treatment efficiency was compared. **Results:** Using the standard of Constant assessment of the shoulder joint, the score on admission of patients of the three groups were; group A 26.48 \pm 1.223, group B 28.21 \pm 1.173, and group C 28.35 \pm 1.195. One month after treatment, the Constant score was; group A 53.02 \pm 1.251, group B 52.03 \pm 0.951, and group C 62.53 \pm 1.521. Three months after treatment, the Constant score was; group A 67.12 \pm 0.258, group B 65.79 \pm 0.852, and group C 86.71 \pm 0.847. **Conclusion:** A variety of rehabilitation treatment and comprehensive application including joint loosening therapy, proprioception training, and physical therapy can effectively improve the function of the shoulder joint for patients with adhesive capsulitis.

EXERCISE

116

COMPARISON BETWEEN HIGH INTENSITY INTERVAL TRAINING AND MODERATE INTENSITY CONTINUOUS TRAINING ON CARDIORESPIRATORY ENDURANCE IMPROVEMENT IN HEALTHY MALE

J. Paanganan¹, D. Poerwandari², I. Subadi²

¹S K Lerik Kupang Hospital, Physical Medicine and Rehabilitation, Kupang, Indonesia, ²Dr. Soetomo Hospital Surabaya/Airlangga University Surabaya Indonesia, Physical Medicine and Rehabilitation, Surabaya, Indonesia

Introduction/Background: The consequence of sedentary life style is decrease cardiorespiratory endurance. Cardiorespiratory endurance can improve by exercise and moderate intensity continuous training (MICT) is the most frequent used. Recently, high intensity interval training (HIIT) is developed to improve cardiorespiratory endurance. This study examined the difference of cardiorespiratory endurance improvement between high intensity interval training and moderate intensity continuous training in healthy male. **Material and Methods:** Twenty two healthy male (age: 21–40 years old) at Physical Medicine and Rehabilitation Clinic of Soetomo Hospital Surabaya were randomly assigned to HIIT and MICT. HIIT performed exercise with total 21–26 minutes per session (12 sessions; 4–6 x 30-s cycle sprints per session, 3 times a week) and MICT did exercise with total 40 minutes per session (30 sessions; conditioning with 64–<76% of maximal heart rate for 20 minutes per sessions). VO_{2max} were assessed before and after intervention. **Results:** Following 2 and 4 weeks HIIT, there were significant increase ($p < 0.05$) of VO_{2max} but not at MICT. There was no significant difference of VO_{2max} increase between HIIT and MICT after 2 and 4 weeks. **Conclusion:** High intensity interval training (time-efficient strategy) may be an alternative exercise to improve cardiorespiratory endurance

117

NURY'S EQUATIONS OF SIX-MINUTE WALK TEST BASED ON INDONESIAN ANTHROPOMETRICS: A SUGGESTION FOR MONGOLOID PATIENTS

N. Nusdwinuringtyas¹, W. Kusumaningsih¹

¹Faculty of Medicine- Universitas Indonesia, Physical Medicine and Rehabilitation, Jakarta, Indonesia

Introduction/Background: Six-minute walk test (6MWT) is a simple test recommended by American Thoracic Society to measure functional capacity. However, Cahalin and Paul Enright equation referred for prediction of peak oxygen uptake (VO_{2max}) and total

distance were created based on Caucasian subjects whose anthropometric characteristics are very different with Mongoloid people. This article aims to introduce Nury's equation, derived from Indonesian subjects, for prediction of VO_{2max} and total distance of 6MWT, and to see the possibility of its application in Mongoloid patients with similar anthropometric characteristics in other countries. *Material and Methods:* This cross-sectional study involved healthy Indonesian subjects ($n=123$) aged 18–50 years with sedentary lifestyle who performed 6MWT three times: (1) on 15-meter track, (2) cardiopulmonary exercise testing (CPET) (gold standard of VO_{2max}), and (3) gait analyzer (gold standard of actual walking distance). *Results:* Designed by incorporating several factors, including distance, body height, weight, sex, and age, two equations were created for prediction of VO_{2max} and total distance of 6MWT. The result of 6MWT can be interpreted in many ways, for instance by using actual walking distance, percentage to predicted total distance, predicted VO_{2max} which can be converted into Metabolic Equivalents (METs), and minimal clinically significant difference (MCID). *Conclusion:* Nury's equations are derived from Indonesian subjects whose ethnics are Mongoloid. Therefore, theoretically the anthropometric characteristics of Indonesian are similar with Mongoloid patients in other countries. Thus, multicenter studies regarding its application to Mongoloid patients in other countries, especially in Asia, are encouraged.

118

COMBINATION OF HIGH-INTENSITY EXERCISE THERAPY WITH ORTHOSIS THERAPY FOR PATIENTS WITH FOOT DEFORMITIES DUE TO RHEUMATOID ARTHRITIS

S. Toyama¹, R. Oda¹, D. Taniguchi¹, K. Ikoma¹, R. Ikeda¹, H. Fujiwara¹, A. Sagara², H. Maeda², T. Ikeda², Y. Mikami², T. Kubo¹

¹Graduate School of Medical Science- Kyoto Prefectural University of Medicine, Orthopaedics, Kyoto, Japan, ²Graduate School of Medical Science- Kyoto Prefectural University of Medicine, Rehabilitation Medicine, Kyoto, Japan

Introduction/Background: The high-intensity exercise therapy (hIET) for rheumatoid arthritis (RA) is reported to improve cardiopulmonary function and muscle strength, finally reducing functional impairment. Despite this, pain due to foot deformities is a nuisance in performing effective exercise, and we may achieve poor outcome. In this study, we researched the combination of hIET with orthosis therapy for foot deformities. *Material and Methods:* We enrolled 11 RA patients who could complete hIET for 3 months. Patients visited our institute at least once a week, and perform using exercise bike training (20 minutes), muscle strength training by therapist (20 minutes) and gait training (20 minutes). We used a slipsole as a therapeutic insole, which we attach shock-absorbing materials on the planter side of the slipsole. We measured pain, muscle strength and gait speed, evaluated health assessment questionnaire (HAQ) and Short-Form 36-Item Health Survey (SF-36) for QoL measurements, and then compared them before and after the 3-month hIET. *Results:* All patients were female, the average age was 68.8 years, and the average affected period was 105.8 months. The Steinbrocker stage was I: 3/II: 0/III: 5/IV: 3, and class I: 2/II: 8/III: 1/IV: 1. Most of the patients were in remission concerning disease activity. In the 3 months, pain decreased and muscle strength rose, finally gait speed improved. HAQ score had no change and SF-36 improved significantly. *Conclusion:* Rehabilitation for patients with RA is still in the developing state, however, recent development in drug therapy and surgical therapy has dramatically improved ADL. From the result of this study, we suggest that physical therapy with orthosis therapy may become an effective choice. We should share the efficacy of multidisciplinary rehabilitation not only with the physiatrist but with the rheumatologist. *Acknowledgement:* The presenting author received permission using SF-36 and obtained all of the clinical data when he worked for Social insurance Kobe Central Hospital.

119

THE EFFECT OF AEROBIC EXERCISE WITH AN ANTI-GRAVITY TREADMILL FOR PATIENTS WITH PAINFUL LOWER LIMB OSTEOARTHRITIS

Y. Mikami¹, K. Fukuhara¹, T. Kawae¹, H. Kimura¹

¹Hiroshima University Hospital, Rehabilitation Medicine, Hiroshima, Japan

Introduction/Background: Aerobic exercise is effective for lower limb osteoarthritis patients but sometimes it may be difficult to exercise because of pain. The anti-gravity treadmill can reduce the load on the lower legs and it is thought to be useful for lower limb osteoarthritis patients with pain. In the present study, we examined the effect of aerobic exercise using an anti-gravity treadmill for patients with painful lower limb osteoarthritis. *Material and Methods:* This study included fourteen patients (7 men and 7 women, mean age 63.2 y) who have severe painful lower limb osteoarthritis (hip, 9 patients; knee 4 patients; ankle, one patient). The patients were examined with an eight-minute walking test either on the ground or on an anti-gravity treadmill (50–80% of body weight) to measure their walking speed and Numerical Rating Scale (NRS) for pain after walking. The oxygen consumption rate was recorded with a mobile aeromonitor. Exercise strength and calorie output were calculated. *Results:* The mean walking speed was 3.6 ± 0.8 km/h on the anti-gravity treadmill and 2.8 ± 0.8 km/h on the ground. NRS after walking was 2.4 ± 2.0 on the anti-gravity treadmill and 4.2 ± 2.1 , on the ground. Mean oxygen consumption rate was 11.4 ± 0.2 ml/kg/min on the anti-gravity treadmill and 11.0 ± 0.2 ml/kg/min on the ground. Exercise strength and calorie output on the anti-gravity treadmill were 3.2 ± 0.8 METs and 30.1 ± 12.1 kcal and were 3.1 ± 0.7 METs and 29.2 ± 5.9 kcal on the ground, respectively. *Conclusion:* Patients on the anti-gravity treadmill were able to perform less painful aerobic exercise with similar exercise strength and calorie output to those moving freely on the ground. Therefore, the anti-gravity treadmill is here shown to be a useful instrument allowing patients with painful lower limb osteoarthritis to perform effective aerobic exercise in more comfort.

120

COST-EFFECTIVENESS OF A HOME-BASED EXERCISE THAT IMPROVES QUALITY OF LIFE AND FITNESS IN ADULTS WITH POLIO RESIDUALS: A RANDOMIZED CONTROLLED TRIAL

N. Gusi¹, J. Perez-Gomez¹, C. Serrano¹

¹University of Extremadura, Faculty of Sports Sciences, Caceres, Spain

Introduction/Background: Polio survivors has severe chronic sequela. The purpose was to evaluate the effects of a 12-week period of a home-based exercise training on Health-Related Quality of Life (HRQoL) and physical fitness in survivors of paralytic poliomyelitis. *Material and Methods:* Forty-one adults with polio residuals were randomly assigned into two groups: exercise group (EG, $n=23$) and control group (CG, $n=18$). EG exercised for 60 min, 2 supervised times a week plus and additional unsupervised weekly session a week, while CG continued their habitual leisure-time activities. Physical fitness was measured using the following tests: 6-minute walk, abdominal endurance, hand-grip dynamometry, sit and reach flexibility, performance oriented mobility assessment, time up and go and functional reach. HRQoL was assessed using the EuroQol five dimensions three levels (EQ-5D-3L) that allows to estimate the time-trade-off Quality of Life Adjusted Years (QALY) to perform a cost-utility analysis from societal perspective. An intent-to-treat non-parametric was used to analysis outcomes. *Results:* Positive effects occurred in the six-minute walking (6.3%), abdominal endurance (81%), right hand-grip (27.8%), left hand-grip (15.2%), and flexibility (30%), whereas the others fitness tests were unaffected. Also significant positive effects of physical ther-

apy were found in mobility, anxiety/depression and general health. HRQoL time-trade-off tariff of EG improved 32.5% ($p=0.004$) compared to CG. The incremental gain of EG versus CG was 0.028 (95% CI: 0.010 to 0.047) QALYs and the incremental cost 340.7 Euros. On the whole, the cost-utility ratio was 12,168 (95%CI: 7,449 to 34,070) Euros/QALY. *Conclusion:* The present exercise protocol was feasible, highly cost-effective, and improved HRQoL and fitness in adults with polio residuals and no adverse side-effects were detected. This study has been funded by the Spanish Ministry of Work and Social Affairs (Social Services, Family and Disability Department) (No. 118/06). Carlos Serrano was predoctoral student awarded by non-profit Valhondo Calaff Foundation.

121

PHYSICAL FUNCTIONING AND PHYSICAL ACTIVITY OF PATIENTS WITH JOINT REPLACEMENT AFTER SPORTS-RELATED INDIVIDUALIZED SUPPORT IN A REHABILITATION CLINIC: A RANDOMIZED CONTROLLED TRIAL

A. Gottschling-Lang¹, L. Köhler¹, K. Höppner¹, K. Thren², C. Gutenbrunner¹, M. Bethge³

¹Hannover Medical School, Department of Rehabilitation Medicine, Hannover, Germany, ²Klinik Niedersachsen, Rehabilitation Medicine, Bad Nenndorf, Germany, ³University of Lübeck, Institute of Social Medicine and Epidemiology, Lübeck, Germany

Introduction/Background: Primary aim of rehabilitation after joint replacement surgery is to recover physical functioning and the resumption of physical activity. Both of these are important factors for quality of life. Following the baseline results that were presented on the last ISPRM-congress, now, physical functioning, pain and the level of physical activity were analyzed for rehabilitation patients in a control (CG) and an intervention group (IG) during and after their stay in a rehabilitation clinic. Patients of IG received professional advice and individualized support for resuming regular sports programmes after their rehabilitation. *Material and Methods:* Rehabilitation patients aged between 60 and 85 years with implanted hip or knee replacement were included. Data were collected via standardized questionnaires for 3 measurements points: t0=begin of rehabilitation, t1=one month after rehabilitation, t2=nine month after rehabilitation. T2 will be completed in Mar 2016. Survey instruments: Godin Leisure Time Exercise Questionnaire (physical activity), Western Ontario and McMaster Universities Osteoarthritis Index (subscales physical functioning, pain). Intervention: individual and group discussions, identification of suitable local sports programmes. Statistical analyses: one-way repeated-measures ANOVA, unpaired *t*-test. *Results:* 295 patients were included in the analysis (average age: 71.2 years (SD 5.7), female: 57.6%; indication hip: 51.9%). Over the period of nine month, all patients show statistically significant improvements in the scales of pain (CG: t0=53.3, t1=24.3, t2=17.0, $p<0.001$, means IG: t0=55.9; t1=26.6, t2=15.7, $p<0.001$) and physical functioning (means CG: t0=55.2, t1=30.2, t2=25.2, $p<0.001$, means IG: t0=56.6, t1=28.7; t2=18.6, $p=0.001$). Mean differences between the measurement points in the self-reported level of physical activity (minutes per week) were only in the IG significant (means IG: t0=140.6, t1=166.7, t2=176.9, $p<0.05$) (unpaired *t*-test for t2: $p<0.05$). *Conclusion:* Nine month after the rehabilitation, patients of the intervention group show a significant higher level of physical activity than patients without professional advice and individualized support for resuming sports programmes.

PRM INTERVENTION III

122

ANALYSIS OF ADJUSTMENT AND CUSTOMIZATION OF ARTICULAR HEAD MOVEMENTS TO CONTROL A ROBOTIC ARM SYSTEM APPLIED TO ASSISTANCE FOR PEOPLE WITH DISABILITIES

J Rehabil Med Suppl 55

A. Angulo¹, E. Madrid¹

¹Pontificia Universidad Catolica Del Peru, Lima, Lima, Peru

Introduction/Background: According to the 2011 report presented by the World Health Organization, 15% of the people all over the world live with some disability. These conditions do not allow people to develop their daily life without any assistance. Many types of technologies have been developed to assist them; however, the adjustment and customization are still in study. In this regard, this paper presents an evaluation of usability of a robotic system for the assistance of people with disabilities in order to estimate their level of adaptation to this technology. *Material and Methods:* This work has been developed through a vision system for head movement recognition that is integrated with a robotic arm. The objective of the system is to recognize five intuitive movements previously established which are associated to robotic arm that move along a horizontal plane. During the experiment, 10 subjects participated; eight of them were people with extremity disability. Each participant made the test twelve times. *Results:* The results of the learning curves showed that users could adapt to the system around their fifth trial, affording a learning rate about 79%. *Conclusion:* These results demonstrate the capacity of the users to interact with robotic systems by articular head movements that can also be used in works related to high technologies for rehabilitation process.

123

DEVELOPMENT AND EVALUATION OF A WEARABLE DEVICE FOR STAIR DESCENDING

S.H. Lin¹, B.S. Yang^{1,2}

¹National Chiao Tung, Mechanical Engineering, Hsinchu, Taiwan,

²National Chiao Tung, Institute of Biomedical Engineering, Hsinchu, Taiwan

Introduction/Background: Stair negotiation is challenging for older people. A portion of falling accidents were reported to occur on stairs especially while descending. Existing assistive devices for stair climbing, such as stair-climbing wheelchair and ramps, are either bulky or inconvenient to be applied in many environments. Another assistive devices, wearable knee orthoses, can assist in level walking or standing, but they are usually used to limit the range of motion instead of providing assistance for stairs. Therefore, the goal of this study is to develop a device incorporated into existing knee orthoses to reduce the muscle demand on lower limbs for stair descending and to evaluate its efficacy. *Material and Methods:* The required knee extension torque was computed from previous studies. While the user descends stairs, the device will provide 10% of knee extension torque so as to reduce the muscle demand. Five adults are asked to perform stair ascending and descending at self-selected speed without any assistive device, with knee orthoses, and with knee orthoses and our devices on both legs. Our devices should be installed at the same axis of the knee orthoses. To evaluate the efficacy of our device, the electromyography signals of quadriceps of the dominant leg were collected by Trigno Wireless System (Delsys, Boston, USA, 2,000 Hz). *Results:* The muscle activation during the stance phase of descending when subjects use our device significantly reduce from that when subjects wear nothing. The peak EMG value of the vastus lateralis was 40% lower, and that of the vastus medialis was reduced by 39%. *Conclusion:* The study has successfully proved that our assistive device can provide effective intervention to reduce stair-descending muscle demand. In the future, older adults will be recruited to see whether they can get help from this device. Partial financial support from Taiwan Ministry of Science and Technology grants MOST-102-2218-E-009-015, MOST-103-2218-E-009-005, MOST-104-2218-E-009-005.

124

NEURAL INFORMATION BASED INTUITIVE PROSTHESIS CONTROL AFTER TARGETED MUSCLE REINNERVATION

T. Kapelner¹, M. Sartori¹, D. Farina¹

¹Institute for Neurorehabilitation Systems, University Medical Center Göttingen, Göttingen, Germany

Introduction/Background: Targeted Muscle Reinnervation (TMR) is a surgical procedure redirecting nerves that originally control muscles of the amputated limb into accessory muscles. It enables patients to control multiple degree of freedom myoelectric prostheses. Our previous results showed that using neural information it is possible to increase the control performance of traditional control methods in this patient group. In this study we investigated whether this novel control paradigm also improves performance for more intuitive, proportional control tasks. **Material and Methods:** A transhumeral TMR patient was equipped with high-density surface electrode grids and reflective markers for motion capture. The patient performed fluid mirrored movements with the phantom limb and the intact arm, in three degrees of freedom separately. We decomposed the recorded EMG using an offline automatic decomposition algorithm, and extracted time domain features of the raw EMG as well as neural features, i.e. the number of motor neuron discharges per analysis window. The proportional control performance of two Artificial Neural Network regressors using the two feature sets was compared based on the captured kinematics. We also investigated the surface representation of the decomposed motor units by spike triggered averaging of the multi-channel EMG signal. **Results:** The control performance with neural information was significantly better than with traditional features. Based on the surface territories of the decomposed spike trains we suggest that the performance increase is due to the fact that EMG decomposition can separate motor units even if their surface representations overlap. This is demonstrated by the observation that the total motor unit surface area that was active during each movement was smaller than 20% of the electrode grid surface. **Conclusion:** Neural information is capable to outperform traditional features in proportional control. This and our previous results indicate that this novel feature is a promising candidate for future control approaches in TMR.

125

DEVELOPMENT AND EVALUATION OF A LABOR-SAVING DEVICE OF HANDTRUCK FOR STAIR DESCENDING

Y.T. Lee¹, B.S. Yang^{1,2}

¹National Chiao-Tung University, Department of Mechanical Engineering, Hsinchu, Taiwan, ²National Chiao-Tung University, Institute of Biomedical Engineering, Hsinchu, Taiwan

Introduction/Background: Hand-carrying is the most common strategy to carry loading such as a suitcase on stairs, and might cause muscle fatigue and accidental injury. Although hand trucks with stair climber wheels for stair ascending are common, there are still few devices for stair descending. The force required to control the hand truck while descending makes it difficult to use hand trucks on stairs. Therefore, the aim of this research is to design an assistive device of hand truck to reduce the muscle activity during the stair descending process, and evaluate the efficacy of this device. **Material and Methods:** The assistive device is designed to attach on the hand truck and can provide a 100 N-supporting force by torque spring during the stair descending process. The device can also be storage while ascending. 10 adults were recruited to carry the 20 kg-loading by using hand truck with/without the designed device during the stair ascending and descending process. The electromyography signal of biceps brachii and deltoid muscle, vastus lateralis and erector spinae of dominant hand and dominant leg were measured by wireless electromyography sensors (Delsys, Boston, USA, 2,000 Hz). The data were separated step-by-step to find the peak value and calculated the integral EMG value of each cycle. Pair *t*-test was used to evaluate the significance of the result. **Results:** Comparing to the hand truck without assistive device attached, the peak EMG value of the deltoid muscle was reduced by 31.6%, and the iEMG value was reduced by 22.6% with sig-

nificant differences ($p < 0.05$) while descending with the device attached. **Conclusion:** The designed assistive device is able to reduce the muscle activity of deltoid muscle while descending, which can improve the difficult using of the hand truck on stairs. Partial financial support from Taiwan Ministry of Science and Technology grants MOST-102-2218-E-009-015, MOST-103-2218-E-009-005, MOST-104-2218-E-009-005.

126

THE USE OF END EFFECTOR DEVICES IN NEURO REHABILITATION TO REGAIN THE ABILITY TO WALK AND INDEPENDENCY IN STAIR CLIMBING PRACTICE

R. Aggajaro¹, P. Wongphaet²

¹Clinical Director Reha Technology AG, Medical Affairs, Basel, Switzerland, ²Invited lecturer at Department of Rehabilitation Medicine, Mahidol University, Bangkok, Thailand

Introduction/Background: Developed with the purpose of helping stroke survivors in regaining their mobility to actively take part in daily activities, the use of end effector technology has proven to deliver excellent results in multiple applications. The ability of walking and climb stairs up and down is essential part of everyday mobility. **Material and Methods:** The talk provides a review on the use of end effector robotic devices in floor and stairs climbing practice in sub-acute and chronic stroke patients. This includes a Cochrane review (Merholz 2013) and a randomized clinical trial (Hesse 2012) where the effectiveness of use of end effector technologies in combination with conventional therapy are compared with either conventional therapy approach only or other mechanical robotic gait interventions. (i.e. exoskeleton solution). End-effector devices analyzed are the GaitMaster4 (Tanaka 2012) the Gait Trainer GT 1' (Hesse 1999) and the G-EO System (Hesse 2010). By definition, on an end-effector device, patient's feet are placed on foot plates, whose trajectories simulate the stance and swing phases (Schmidt 2007). A total of 10 trials (9 Cochrane Review + 1 RCT) including 485 stroke patients (470+15) used an end-effector devices as the experimental intervention. The primary outcome observed is the ability to walk independently. Functional Ambulation Category (FAC) (Holden 1984). A FAC score of 4 or 5 indicated independent walking (including stairs FAC score 5) over a 15-metre surface. A FAC score less than 4 indicates dependency in walking. **Results:** As per the Cochrane review (Merholz 2013) the use of end effector electromechanical devices for gait rehabilitation of people after stroke increased the chance of walking independently on the floor (OR (random) 2.17, 95% CI 1.07 to 4.43; $p = 0.03$; level of heterogeneity, $I^2 = 48\%$). As per the RCT (Hesse 2012) the use of end effector electromechanical devices of the intervention, lead to walking independently on the floor and on the stairs (FAC score of 5) for seven non ambulatory stroke patients. **Conclusion:** Stroke patients (acute and subacute) who have received end effector electromechanical-assisted gait training in combination with physiotherapy after stroke are more likely to achieve independent walking and ability to climb stairs. Specifically, people in the first three months after stroke and those with high dependency in walking seem to benefit most from this type of electromechanical-assisted gait approach.

127

ROBOT-ASSISTED THERAPY COMBINED WITH TASK-SPECIFIC OR IMPAIRMENT-ORIENTED TRAINING FOR STROKE REHABILITATION: A RANDOMIZED CONTROLLED TRIAL

K.C. Lin¹, C.S. Hung¹, Y.W. Hsieh², C.Y. Wu², P.S. Jian¹

¹National Taiwan University, Occupational Therapy, Taipei, Taiwan, ²Chang Gung University, Occupational Therapy and Graduate Institute of Behavioral Sciences, Taoyuan, Taiwan

Introduction/Background: Robot-assisted therapy (RT) is promising for stroke rehabilitation. RT hybridized with task-specific or impairment-oriented training may possibly yield functionally relevant improvements. Comparative study of the different combination regimens is needed. To investigate the efficacy of RT combined with task-specific training or impairment-oriented training on motor function and quality of life in patients with chronic stroke. **Material and Methods:** This is a single-blind, randomized comparative efficacy study. 21 subjects with chronic stroke were recruited and randomized into 1 of 2 groups: (1) RT combined with task-specific (RTT) training (enrolled, $n=11$; completed, $n=11$) or (2) RT combined with impairment-oriented (RTI) training (enrolled, $n=10$; completed, $n=9$). Participants received 20 intervention sessions (90 to 100 min/day, 5 days/week for 4 weeks). Outcome measures including the upper limb subscale of Fugl-Meyer Assessment (FMA-UE), Stroke Impact Scale (SIS), Action Research Arm Test, and Medical Research Council Scale were administered at baseline, posttreatment, and at 3-month follow-up. Two-way repeated-measures analysis of variance was used to investigate the treatment effects. **Results:** The improvements of the RTT group in motor function measured by the FMA-UE and quality of life assessed by the SIS were significantly superior to the RTI group after the interventions. The improvements of the RTT group were maintained for 3 months. Both groups demonstrated significant within-group improvements in motor function, muscle power, and quality of life. **Conclusion:** RTT may be a more compelling approach to enhance motor function and quality of life for a long-term period than RTI. The combination of RT with task-specific training and with impairment-oriented training had similar benefits on upper limb motor function and muscle strength immediately after the interventions.

128

FEASIBILITY TO IMPLEMENT A NOVEL HOME-BASED VIRTUAL REHABILITATION PROGRAMME IN MALAYSIA

E.L. Tay¹, P.M. Chern², C.P. Wong¹

¹Monash University Malaysia, Jeffrey Cheah School of Medicine and Health Sciences, Bandar Sunway, Malaysia, ²Cheras Rehabilitation Hospital, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Effectiveness of physical rehabilitation programme often being determined by various factors, namely quality of the programme, family support and one's commitment. One of the main challenges in rehabilitation is resource constraints which hamper the consistency and continuity of an ongoing rehabilitation programme. Acknowledging that family factor also play an important role in successful rehabilitation, the research team is interested to explore the feasibility of implementing a novel home-based virtual rehabilitation programme in Malaysia. **Material and Methods:** A single-case experimental design (SCED) study has been conducted to evaluate the feasibility of a home-based virtual rehabilitation system over eight weeks. The system involves gamification of lower limbs exercises. All participants were required to play the game for at least 3 times a week, 30 minutes each session. Physical outcomes were measured using GMFM-88 at baseline, post-intervention and follow-up after a washout period of 8 weeks. Semi-structured interview was conducted with the parents to obtain feedback regarding the intervention. **Results:** This section highlights three children (S, D, K, aged between 7 to 10) who have completed the intervention. S, D and K have cerebral palsy and are receiving rehabilitation treatment in Cheras Rehabilitation Hospital. K did not meet the recommended activity time while the other two (S and D) fulfilled. Significant physical improvements were noticed among S and D who played the game consistently but no improvement was observed in K. It was observed that parents' commitment plays a major role in determining the success of a rehabilitation programme. All parents view the system positively, however time commitment has been reported to be one of the main challenges in ensuring the compliance level. **Conclusion:** The pro-

posed intervention is feasible and has potential to complement the current physical rehabilitation system. Further studies with wider range of games are needed to cater for children of different age groups and interest.

HUMAN FUNCTIONING SCIENCES

129

THE MAINZ MATRIX OF MOBILITY - A NEW STANDARDISED ASSESSMENT TOOL FOR MEASURING INDEPENDENT MOBILITY IN HOSPITALISED PATIENTS

U. Betz¹, L. Liebau¹, S. Stäblein¹, H. Maagh¹

¹University Medical Center, Institute of Physical Therapy- Prevention and Rehabilitation, Mainz, Germany

Introduction/Background: Apart from the obvious need for acute medical care in hospitalised patients, it is of great importance to begin with therapeutic rehabilitation interventions as early as possible. In order to plan, assess and document in-patient progress in terms of mobility in this context, the use of an objective standardised and multidisciplinary assessment tool is urgently required. This tool has to be independent of the patient's specific diagnosis and must be applicable across all medical disciplines. **Material and Methods:** To help assess and categorise a patient's mobility in characteristic situations of hospitalisation the Mainz Matrix of Mobility (MMM) was developed. The tool uses an also visually interpretable array to describe an individual's level of independence regarding eight common tasks involving mobility, based on a professional observer's appraisal. The respective degree of mobility is characterised according to seven descending categories added with specifying notes. **Results:** The MMM has been used by the therapeutic staff of all medical in-patient departments within the University Medical Centre (UMC) in Mainz since Jun 2014. So far over 15,000 patients, regardless of medical condition, have been assessed by the respective therapist twice during his/her in-patient stay. Once shortly after admission and again within 5 days of being discharged. The results are documented in the patient's electronic health record. Based on the parameters of age, sex, medical condition, medical department and period of in-patient stay, the results can automatically be analysed. The MMM and its respective results will be presented and discussed. **Conclusion:** The MMM allows for structured supervision and evaluation of mobility in hospitalised patients and has proven a valuable contribution to discharge and quality management of the UMC Mainz. Furthermore it serves as an important basis for multidisciplinary communication within the clinical decision-making process.

130

TOWARD A STANDARDIZED REPORTING OF FUNCTIONING OUTCOMES: COMPARABILITY OF COMMONLY USED OUTCOME MEASURES TO ASSESS FUNCTIONING USING HAND OSTEOARTHRITIS AS A CASE IN POINT

B. Prodinger¹, A. Tennant², T. Stamm³, D. Petersson², G. Stucki⁴

¹Swiss Paraplegic Research, ICF Unit, Nottwil, Switzerland, ²Swiss Paraplegic Research, ICF Unit, Lucerne, Switzerland, ³Medical University of Vienna, Section for Outcomes Research- CeMSIIS - Center for Medical Statistics- Informatics- and Intelligent Systems, Vienna, Austria, ⁴Swiss Paraplegic Research, Directorate, Lucerne, Switzerland

Introduction/Background: Functioning is an important outcome in rehabilitation. The heterogeneity of patient-reported outcome measures (PROMs) available to measure various domains of func-

tioning challenges the comparability of information collected by these instruments. This study aimed to examine whether it is possible to achieve comparability of PROMs commonly used to measure functioning using hand osteoarthritis as a case in point. *Material and Methods:* Content comparability and metric equivalence of existing information is required to achieve a common metric of commonly used PROMs. The International Classification of Functioning, Disability and Health (ICF) facilitates content comparability of existing PROMs. The Rasch model, which is a measurement model that builds upon the assumptions of fundamental measurement, is suited to examine metric equivalence of existing PROMs. To illustrate these methods, we have conducted secondary analysis of data from 253 persons who participated in the Vienna Hand Osteoarthritis Cohort Study. Participants completed the Health Assessment Questionnaire (HAQ), the Australian/Canadian Index for Hand Osteoarthritis (AUSCAN), the Functional Index for Hand Osteoarthritis (FIHOA), and the Cochin Scale. *Results:* All items except of the items of the AUSCAN pain- and stiffness-subscale could be linked to the ICF Activities and Participation component (A&P). Except the FIHOA, all items linked to A&P indicated issues of local dependency in the initial analyses. After accommodating those with testlets, all scales satisfied the assumptions of the Rasch model. As the four scales form a common metric, which satisfies the assumptions of the Rasch model, the scores can be equated. *Conclusion:* This study demonstrates the methods to establish comparability of existing PROMs. Numerous patient-reported outcome measures exist with similar, yet slightly different wording of items and response options. It is only once these instruments are transformed into a standardized reporting that scores can be compared and aggregated across e.g. clinical settings and clinical trials.

131

MEASURING PARTICIPATION BASED ON THE INSIDERS AND THE OUTSIDERS PERSPECTIVE

D. Van De Velde¹, P. Coorevits¹, L. Sabbe², S. De Baets¹, G. Vanderstraeten¹

¹Ghent University, Rehabilitation sciences and physiotherapy, Ghent, Belgium, ²University Hospital Ghent, Occupational therapy, Ghent, Belgium

Introduction/Background: Despite the consensus on the importance of participation as an outcome measure of rehabilitation a lot of problems remain in the operational application of the concept. There is still a need for a comprehensive participation measure combining the insiders and the outsiders perspective of the patient. Therefore a new participation measure, the GPS (The Ghent Participation scale) has been developed. *Material and Methods: Objective:* To examine the psychometric of the Ghent Participation Scale (GPS). *Design:* Cross sectional study with a test-retest sample. Patients: 365 former rehabilitation outpatients from 8 diagnostic groups in 6 rehabilitation centers. *Material:* The GPS and the IPA (Impact on participation and autonomy), the USER-Participation (The Utrecht Scale for Evaluation of Rehabilitation Participation - USER) and the SF-36 (Medical outcome study Short Form). *Results:* The GPS addresses participation in 3 dimensions: (1) performing activities according to preferred choices and wishes, (2) performing activities leading to social appreciation and acceptance (3) the need to delegate activities. The GPS shows a good internal consistency (Cronbach's α between 0.752 and 0.83). On item level, the test retest reliability was good, weighted kappa's ranged between 0.57 and 0.88. On the dimension level: intraclass correlation coefficients (ICC) ranged between 0.80 and 0.90. The construct validity was supported by high correlations between subscales form the GPS and 4 subscales of the IPA (range, $r = -0.71$ to -0.87) and 2 subscales of the USER-P (range, $r = 0.54$ to 0.72). Standardized response mean (SRM) ranged between 0.23 and 0.68 and the Area Under the Curve (AUC) ranged between 68 and 88%. *Conclusion:* The GPS appears to be a reliable and valid measure to rate participation irrespective of the individual's health condition. The GPS is responsive and is able to detect changes over time.

132

RETROSPECTIVE ANALYSES OF APPLIED ASSESSMENT INSTRUMENTS DURING FIRST REHABILITATION OF SPINAL CORD INJURY PATIENTS IN AN ACUTE AND REHABILITATION CLINIC IN SWITZERLAND

A. Scheel-Sailer¹, P. Lampart², A. Gemperli³, I. Bersch⁴, M. Baumberger⁵, B. Prodinger³

¹Swiss Paraplegic Centre, Acute Care and Rehabilitation, Nottwil, Switzerland, ²Swiss Paraplegic Centre Nottwil, Rehabilitation Quality Management, Nottwil, Switzerland, ³Swiss Paraplegic Research, Swiss Paraplegic Research, Nottwil, Switzerland, ⁴Swiss Paraplegic Centre, Clinic, Nottwil, Switzerland, ⁵Swiss Paraplegic Centre Nottwil, Acute Medicine and Rehabilitation, Nottwil, Switzerland

Introduction/Background: Assessments are part of the rehabilitation cycle, influencing the goal setting process and indicating quality of rehabilitation. There are different internationally discussed standards concerning time and choice of assessments during the rehabilitation after a spinal cord injury (SCI). The aim of this study is to get an overview of the currently applied assessment instruments during the first rehabilitation in an SCI specialized acute and rehabilitation clinic in Switzerland (the Swiss Paraplegic Centre, Nottwil). *Material and Methods:* Retrospective chart review of patients after SCI, aged 18 and older, admitted between Dec 2014 and Dec 2015. Key questions which guided the data extraction included basic patient characteristics, name of assessments, time point and responsible health professionals. Retrieved assessments were compared to ISCOS basic data set, common data element toolkits and linked to generic and SCI specific ICF-core sets to compare what has been recommended in contrast to what was actually performed. *Results:* 119 patients (83 male, 43 paraplegic patients, mean age 54 years, 65 traumatic SCI) were included (37 AIS A, 28 AIS B, 28 AIS C, 26 AIS D at admission). 53 assessments from codebook were screened, 40 assessments were conducted in which 16 only appeared in less than 20 patients. Most applied instruments were the SCIM ($n=918$), skin assessments ($n=427$), muscle test (lower extremity $n=427$, upper extremity $n=294$) and radiology ($n=279$). The AIS was applied 220 times and missed in two patients. *Conclusion:* Assessments are clinically established and integrated into goal setting and rehabilitation. National demanded standards are implemented with high quality, but detailed international standards are still missing. This data analysis serves to close the gap between clinically indicated assessments and assessments performed with a view for standardized politically demanded reporting. The next step would be to define and recommend meaningful standards of assessments and implement this into practice.

SPASTICITY

133

ONABOTULINUMTOXINA TO TREAT COMMON POSTURES IN POST-STROKE LOWER LIMB SPASTICITY: IDENTIFICATION OF A TREATMENT PARADIGM

A. Esquenazi¹, A. Alfaro², Z. Ayyoub³, D. Charles⁴, K. Dashtipour⁵, G.D. Graham⁶, J.R. McGuire⁷, I.R. Odderson⁸, A.T. Patel⁹, D.M. Simpson¹⁰

¹MossRehab Gait and Motion Analysis Laboratory, Physical Medicine and Rehabilitation, Elkins Park- PA, USA, ²Spasticity and Dystonia Clinic- Bacharach Institute for Rehabilitation, Spasticity and Dystonia Clinic, Pomona- NJ, USA, ³Rancho Los Amigos National Rehabilitation Center, Physical Medicine and Rehabilitation, Downey- CA, USA, ⁴Vanderbilt University, Neurology, Nashville- TN, USA, ⁵Loma Linda University School of Medicine,

Neurology/Movement Disorders, Loma Linda- CA, USA, ⁶Department of Veterans Affairs, Specialty Care Services, San Francisco- CA, USA, ⁷Medical College of Wisconsin, Physical Medicine and Rehabilitation, Milwaukee- WI, USA, ⁸University of Washington, Rehabilitation Medicine, Seattle- WA, USA, ⁹Kansas City Bone and Joint Clinic, Department of Rehabilitation Medicine, Overland Park- KS, USA, ¹⁰Icahn School of Medicine at Mount Sinai, Department of Neurology, New York- NY, USA

Introduction/Background: OnabotulinumtoxinA injection has been shown to reduce muscle overactivity in lower limb spasticity; however, many clinicians may not recognize the treatable common postures or be comfortable with muscle selection for injecting onabotulinumtoxinA because of limited experience and/or training. The objective of this study was to define a clinically recommended treatment paradigm using onabotulinumtoxinA for common postures in patients with lower-limb post-stroke spasticity (PSS). **Material and Methods:** Ten clinical experts in PSS participated in a modified Delphi panel process, which consisted of 2 rounds of voting to reach clinical consensus ($\geq 66\%$ agreement). The panel identified onabotulinumtoxinA treatment parameters for lower-limb PSS postures including muscles to inject, dose per muscle and posture, use of localization techniques, and treatment adjustments for suboptimal responses. Recommendations were tailored toward less experienced injectors. **Results:** Consensus was reached on targeted subsets of muscles for each posture. Doses ranged from 20U–150U for individual muscles and 50U–300U for postures. An onabotulinumtoxinA dilution of 50 U/mL (2:1 dilution ratio) was considered most appropriate; however, may vary in clinical practice (2:1 to 4:1) based on muscles involved. Experts agreed that localization techniques for muscle identification for all postures would help optimize efficacy. In cases of suboptimal response, all panel members would increase the dose, and the majority (89%) would increase the number of treated muscles. The panel identified 3 common aggregating lower-limb postures: 1) equinovarus foot and flexed toes; 2) extended knee and plantar flexed foot/ankle; and 3) plantar flexed foot/ankle and flexed toes. The recommended starting doses for each aggregate were 400 U, 400 U, and 300 U, with total maximum doses of 600 U, 600 U, and 500 U, respectively. **Conclusion:** The modified Delphi panel process provided consensus on common muscles and corresponding onabotulinumtoxinA treatment paradigms for postures associated with lower-limb PSS that can be used for guidance in optimizing clinical care.

134

THE ADULT SPASTICITY INTERNATIONAL REGISTRY (ASPIRE) STUDY: BASELINE DEMOGRAPHICS AND CLINICAL CHARACTERISTICS OF ADULT PATIENTS TREATED FOR SPASTICITY

G. Francisco¹, D. Bandari², G. Bavikatte³, W. Jost⁴, J. Largent⁵, A. Manack Adams⁶, A. Esquenazi⁷

¹University of Texas Health Science Center and TIRR Memorial Hermann, Physical Medicine and Rehabilitation, Houston, USA, ²Hoag Neurosciences Institute, Multiple Sclerosis Center of California, Newport Beach, USA, ³The Walton Centre, Neurology, Liverpool, United Kingdom, ⁴University of Freiburg, Neurology, Freiburg, Germany, ⁵Quintiles Real World Late Phase Research, Epidemiology, Cambridge, USA, ⁶Allergan plc, Medical Affairs, Irvine, USA, ⁷MossRehab Gait and Motion Analysis Laboratory, Physical Medicine and Rehabilitation, Elkins Park, USA

Introduction/Background: OnabotulinumtoxinA treatment for patients with spasticity is individualized, variable, and dependent on numerous factors, many of which are related to disease and burden characteristics. Baseline demographics and clinical characteristics of patients treated with onabotulinumtoxinA for spasticity are herein summarized. **Material and Methods:** This is a multicenter, prospective registry conducted at select North America, Europe, and Asia sites (NCT01930786). Primary objectives were to assess

treatment utilization, patient/physician treatment satisfaction, and botulinum toxin treatment incidence for other indications among patients treated with onabotulinumtoxinA for spasticity. Treatments were administered per routine care. Patients with spasticity of multiple etiologies, including those previously treated, were eligible. Baseline data as of Sep 10, 2015 are summarized (enrollment was completed Sep 11, 2015). **Results:** ASPIRE enrolled 727 patients treated by 63 healthcare-providers (69.4% PM&R's) across France, Germany, Italy, Spain, Taiwan, UK, and USA ($n=54$ sites). More patients ($n=602/715$, 84.2%) had lower limb (LL) spasticity (most common: equinovarus foot [35.2%] and extended knee [16.1%]), than upper limb (UL) spasticity ($n=513/716$, 71.2%; most common: flexed elbow [22.4%] and clenched fist [21.5%]). At baseline, most patients had spasticity with considerable increase in tone (35.0% LL; 40.7% UL) or more marked increase in tone (34.3% LL; 33.8% UL). Patients with spasticity due to stroke (58.1%), multiple sclerosis (15.7%), other etiologies (10.1%), cerebral palsy (9.8%), traumatic brain injury (5.9%), and spinal cord injury (5.4%), were on average 53.7 years old, primarily Caucasian (77.4%), and 36.8% were botulinum toxin naïve for spasticity treatment. Gender was nearly evenly distributed (52.1% female). Demographics were generally comparable across countries, except Taiwan. **Conclusion:** Global epidemiological data for spasticity is lacking. ASPIRE represents the largest existing international database prospectively evaluating demographics and clinical characteristics of spasticity across multiple etiologies. Further analyses will describe onabotulinumtoxinA utilization patterns, treatment satisfaction, individual/caregiver burden, and characterize the healthcare-providers treating spasticity.

135

MANAGEMENT OF SPASTICITY AND PAIN WITH INTRATHECAL PHENOL INJECTIONS: A REVIEW OF LITERATURE

F. Anwar¹, S. Antiga¹

¹Cambridge University Hospitals NHS Foundation Trust, Rehabilitation Medicine, Cambridge, United Kingdom

Introduction/Background: Spasticity is increased, involuntary, velocity-dependent muscle tone that causes resistance to movement. It is a neurological condition, which can cause muscle stiffness, pain, restriction in the movement of joints, loss of function in arms and legs and difficulty in walking. These problems cause patients to have difficulties in coping with daily activities, maintaining posture and personal hygiene. Chronic pain on the other hand has been described as an unpleasant sensation that persists for at least 6 months and often continuing for an indefinite period of time. Intrathecal injection of phenol is a form of treatment in patients with spasticity and pain. **Aim:** To highlight current evidences in the treatment of spasticity and chronic pain with intrathecal neurolytic phenol injections. **Material and Methods:** A computer based literature search was performed using MEDLINE, EMBASE, CINAHL and the Cochrane Library using the following key words: intrathecal, phenol, spasticity, pain. References from the studies were also examined to extend the search. We found 53 articles specifically relating to the use of intrathecal phenol injections either in spasticity or pain. **Results:** There is lack of randomized controlled studies addressing intrathecal phenol injections in our search. The articles were mainly observational studies, reports or non-randomized studies. The most common complications reported were: short duration of effect, headache, paresthesia, weakness of lower limb muscles, and bladder/bowel sphincter dysfunctions. Other devastating adverse effects such as anterior spinal artery syndrome, thrombosis of posterior spinal arteries and persistent paraplegia following the injections were rare. Several studies reported satisfactory results such as improvement of spasms and pain, mobility, activity of daily living and reduced nursing care. **Conclusion:** Intrathecal phenol can be valuable for the treatment of spasticity and pain when adapted for each individual and used as part of an overall program that includes MDT assessment and goal planning.

PRM INTERVENTIONS IV

136

EFFECTS OF LOW- AND HIGH-FREQUENCY REPETITIVE MAGNETIC STIMULATION ON NEURONAL CELL PROLIFERATION AND GROWTH FACTOR EXPRESSION: A PRELIMINARY REPORT**S.H. Kim¹, J.H. Kim¹, T.J. Park¹, J. Park¹**¹*Yonsei University Wonju College of Medicine, Rehabilitation medicine, Wonju, Republic of Korea*

Introduction/Background: Repetitive magnetic stimulation is a neuropsychiatric and neurorehabilitation tool that can be used to investigate the neurobiology of sensory and motor functions. Few studies have examined the effects of repetitive magnetic stimulation on the modulation of neurotrophic/growth factors and neuronal cells in vitro. Therefore, the current study examined the differential effects of repetitive magnetic stimulation on neuronal cell proliferation as well as various growth factor expression. Immortalized mouse neuroblastoma cells were used as the cell model in this study. **Material and Methods:** Dishes of cultured cells were randomly divided into control, sham, low-frequency (0.5 Hz, 1 Tesla) and high-frequency (10 Hz, 1 Tesla) groups ($n=4$ dishes/group) and were stimulated for 3 days. Expression of neurotrophic/growth factors, Akt and Erk was investigated by Western blotting analysis 3 days after repetitive magnetic stimulation. Neuroblastoma cell proliferation was determined with a cell counting assay. cell proliferation as well as various growth factor expression. Immortalized mouse neuroblastoma cells were used as the cell model in this study. **Results:** There were differences in cell proliferation based on stimulus frequency. Low-frequency stimulation did not alter proliferation relative to the control, while high-frequency stimulation elevated proliferation relative to the control group. The expression levels of brain-derived neurotrophic factor (BDNF), glial cell line-derived neurotrophic factor (GDNF), neurotrophin-3 (NT-3) and platelet-derived growth factor (PDGF) were elevated in the high-frequency magnetic stimulation group. Akt and Erk expression was also significantly elevated in the high-frequency stimulation group, while low-frequency stimulation decreased the expression of Akt and Erk compared to the control. **Conclusion:** In conclusion, we determined that different frequency magnetic stimulation had an influence on neuronal cell proliferation via regulation of Akt and ERK signaling pathways and the expression of growth factors such as BDNF, GDNF, NT-3 and PDGF. These findings represent a promising opportunity to gain insight into how different frequencies of repetitive magnetic stimulation may mediate cell proliferation.

137

ELECTROACUPUNCTURE AMELIORATE SUBCHONDRAL BONE LOSS AND INHIBIT CARTILAGE DEGENERATION IN A RAT MODEL OF OSTEOARTHRITIS**J. Zhou¹, X. Li², Y. Liao³, N. Li³**¹*The First Affiliated Hospital of University of South China, Department of Rehabilitation, Hengyang, China, ²Hunan Polytechnic of Environment and Biology, Department of Rehabilitation, Hengyang, China, ³The First Affiliated Hospital of University of South China, Department of Rehabilitation, Hengyang, China*

Introduction/Background: To investigate effects of electroacupuncture (EA) on subchondral bone mass and cartilage degeneration in an experimental animal model of osteoarthritis induced by anterior cruciate ligament transection (ACLT). **Material and Methods:** Thirty 3-month-old male Sprague Dawley rats were randomly divided into three groups: sham-operated control group (Sham group), anterior cruciate ligament transection (ACLT) without treatment (ACLT group), and anterior cruciate ligament transection with electroacupuncture treatment (EA group). One week after

anterior cruciate ligament transection, rats in EA group received 12-week electroacupuncture treatments. The bilateral Zusanli (ST36), Yinlingquan (SP9), Yanglingquan (G34), and Sanyinjiao (SP6) acupuncture points were used, and electric stimulation was generated by a SDZ-V nerve and muscle stimulator with a frequency of 3 Hz and an intensity of 1 mA. The 12-week electroacupuncture regimen included 30 min/day for 5 days/week. Enzyme linked immunosorbent assay (ELISA), micro-computed tomography and histology analysis were performed to evaluate serum CTX-I and CTX-II, subchondral bone mass and microarchitecture, and cartilage degeneration. **Results:** Electroacupuncture reduced CTX-I and CTX-II levels to the levels in Sham group. Subchondral bone mineral density (BMD) significantly decreased after ACLT. However, electroacupuncture increased BMD in ACLT rats. Compared to Sham group, trabecular bone volume ratio (BV/TV), trabecular thickness (Tb.Th), and trabecular number (Tb.N) were significantly lower, and trabecular separation (Tb.Sp) was significantly greater in ACLT group. However, electroacupuncture significantly increased BV/TV, Tb.Th, and Tb.N and reduced Tb.Sp in ACLT rats. ACLT-induced coarse articular cartilage surfaces, fibrous degeneration, and fissuring were suppressed by electroacupuncture treatment. Mankin scores increased significantly after ACLT. Electroacupuncture significantly reduced Mankin scores in ACLT group compared to Sham group. **Conclusion:** The results demonstrated that electroacupuncture can inhibit subchondral bone loss and protected articular cartilage in ACLT rats. However, whether electroacupuncture protect against articular cartilage erosion by inhibiting subchondral bone loss in ACLT rats need be further investigated.

138

THE ROLE OF ELECTRICAL STIMULATION IN MAINTAINING CORTICAL AND TRABECULAR BONE IN IMMOBILIZED MALE RAT'S LEGS**D. Tinduh¹, A. Prasetyo², H. Laswati Putra¹**¹*School of Medicine Airlangga University, Physical Medicine and Rehabilitation, Surabaya, Indonesia, ²KOJA Hospital, Rehabilitation Medicine, Jakarta, Indonesia*

Introduction/Background: Immobilization effect on musculoskeletal system induces bone loss secondary to increased resorption and decreased formation in the weight bearing bones and lead to uncoupling bone remodeling. Immobilization will lead to bone loss, especially on the weight bearing bone. In mature bone, disuse osteoporosis is manifested by increased bone resorption and bone turnover on endocortical and trabecular surfaces. Exercise will increase the thickness of cortical more than trabecular bone but electrostimulation inhibited the loss of trabecular more than cortical bone. **Material and Methods:** This pretest-posttest with control groups design study enrolled 16 male *rattus norvegicus* (Wistar strain), 3–4 months old, 150–200 g of weight. Seven rats underwent the gastrocnemius immobilization for two weeks using RANDALT splints on bilateral legs. After 2 weeks, splints were removed and the right legs were stimulated by NMES (surface electrodes were placed on gastrocnemius, with the ES mode: constant biphasic, asymmetrical square wave, frequency 2 Hz, pulse width 250 μ s, duty cycle 5:10s. Two sets of 3 hours period daily with 2-h rest in between, 3 \times /week for 4 weeks), but the left legs were not stimulated. The control group consisted of 9 non disuse rats. After 4 weeks, all samples were sacrificed and taken the tibial bone, decalcified, microtomed and prepared with Hematoxylin Eosin staining. Trabecular, cortical dan periosteum thickness were measured with micrometer and compared. **Results:** ES group showed trend of increased trabecular and periosteum thickness after legs immobilization, but the results were not significant compared to control group ($p=0.973$ and $p=0.847$, respectively) and no treated disuse legs ($p=0.390$ and $p=0.502$, respectively). Conversely, ES group showed significant reduced cortical thickness compared to control group ($p=0.019$). **Conclusion:** Electrostimulation 4 weeks after 2 weeks of immobilization, maintain trabecular and periosteum thickness but reduce cortical thickness.

139

CLINICAL TRIAL OF BACLOFEN AND ELECTRICAL STIMULATION IN MANAGEMENT OF SPASTICITY

L. Adorable¹, J. Litang III¹, F.C. Creer¹, K. Canezo¹, A. Dulap¹

¹Southwestern University, College of Rehabilitative Sciences, Cebu City, Philippines

Introduction/Background: Spasticity management has evolved in many years from the use of pharmacologic agents to application of modalities. This study determined the effect of Baclofen and electrical stimulation on patients with spasticity. **Material and Methods:** Included in this quasi-experimental study were 21 patients with upper motor neuron lesion who manifested spasticity. They were divided into three groups of seven. Group 1 was treated everyday with electrical stimulation on the antagonist muscle of the affected limb using bipolar technique of electrodes for 15 minutes; group 2 were treated with Baclofen 5 mg orally 3× a day with incremental increase every 3 days to 10 mg then 15 mg. Group 3 were given the management of both groups 1 and 2. The three groups were treated for 10 sessions and the spasticity of the subjects were measured using the Tardieu scale before and after 10 treatment sessions. Paired *t*-test was used to determine whether there is a significant change in the mean spasticity score before and after treatment in each group, and independent *t*-test was used to determine the significant difference in the mean score between groups, all at *p*<0.05. **Results:** There was significant difference in the Tardieu mean score before and after treatment in group 3 but there was none in groups 1 and 2. There was also significant difference in the Tardieu mean score between groups 1 and 3, and groups 2 and 3 while there was none between groups 1 and 2. **Conclusion:** The combination of electrical stimulation and oral Baclofen is most effective in the treatment of spasticity rather than electrical stimulation or Baclofen alone.

SWALLOWING

140

DOES RESPIRATORY PHASE INFLUENCE THE ANATOMY OF THE PHARYNX AND LARYNX? ANALYSIS USING 3D DYNAMIC COMPUTED TOMOGRAPHY

Y. Inamoto¹, S. Asami², E. Saitoh², H. Kagaya², S. Shibata², Y. Aoyagi², J.B. Palmer³

¹Fujita Health University, Faculty of Rehabilitation, Toyoake, Japan, ²Fujita Health University, Department of Rehabilitation Medicine I, Toyoake, Japan, ³Johns Hopkins University, Department of Physical Medicine and Rehabilitation, Baltimore, USA

Introduction/Background: We previously reported that gender, height, and age each had significant effects on configuration of pharynx and larynx using 3D images acquired by 320-row area detector CT (320-ADCT). The purpose of this study was to examine the effects of respiratory phase on the shape and size of pharynx and larynx. **Material and Methods:** Seven healthy female volunteers, (age 28±7 years, height 158±3 cm), underwent four single-phase asynchronous volume scans (0.275 s) with 320-ADCT during four points in the respiratory cycle (lung volumes): 1) end deep inspiration, 2) end deep expiration, 3) end tidal inspiration, and 4) end tidal expiration. Four measurements of volume and length (oropharyngeal cavity; V-OP, L-OP, laryngeal and hypopharyngeal cavity; V-LH, L-LH), and four measurements of cross-sectional area at the level of anterior and posterior nasal spines (A-APS), lower tip of soft palate (A-SP), base of epiglottis (A-Epglt), true vocal cords (A-TVC) were performed. Friedman test was used to analyze the effects of four points in respiration. **Results:** V-OP, V-LH, A-APS,

A-SP, and A-Epglt differed significantly among four respiration points (*p*<0.05). The volumes and areas were typically largest during deep respiration. However, pharyngeal lengths did not differ significantly among the four points in respiration. **Conclusion:** This is the first study analyzing the effect of respiration/lung volume on 3D configuration of pharynx and larynx. Our results showed that respiration, especially deep inspiration, changes the morphology of the pharynx and larynx. During deep inspiration, larger pharyngeal volume and area was observed with no change in length, suggested that the larger volume was produced by increasing cross-sectional area. Further study is necessary to determine the mechanism for these changes in anatomical configuration.

141

EFFECT OF VOLUME AND VISCOSITY ON PHARYNX AND UPPER ESOPHAGEAL SPHINCTER DURING SWALLOWING - EVALUATION USING HIGH-RESOLUTION MANOMETRY -

Y. Aoyagi¹, K. Aihara², S. Ando², Y. Masuda², S. Imaeda², Y. Inamoto³, S. Shibata¹, H. Kagaya¹, E. Saitoh¹

¹Fujita Health University- School of Medicine, Department of Rehabilitation Medicine, Toyoake, Japan, ²Fujita Health University Hospital, Department of Rehabilitation, Toyoake, Japan, ³Fujita Health University, Faculty of Rehabilitation, Toyoake, Japan

Introduction/Background: Various bolus have been used for patients with dysphagia. However, physiological effects of viscosity and volume have been rarely investigated in detail. The purpose of this study was to determine the effects of viscosity and volume on pharyngeal and upper esophageal sphincter (UES) parameters using high-resolution manometry (HRM). **Material and Methods:** Thirteen healthy adults (average age; 28.8±4.5 years) who were certified speech-language therapists or certified fellows by Japanese Society of Dysphagia Rehabilitation (JSDR) participated in this study. HRM with an outer diameter of 4 mm and 36 circumferential pressure sensors spaced 1 cm apart (Unisensor Inc.) was used. A manometric catheter was inserted nasally and positioned within the pharynx. Participants swallowed saliva, 3 ml thin liquid, 3ml nectar thick liquid, and 20 ml thin liquid, and 20 ml nectar thick liquid. Two trials were performed for each bolus and the task order was randomly assigned. Parameters in terms of pharyngeal and upper esophageal sphincter (UES) were analyzed using an accompanying software. **Results:** UES relaxation durations of 20 ml thin and nectar liquid were 595±117 ms and 595±225 ms respectively. They had significantly longer duration compared to saliva (428±90 ms), 3 ml thin liquid (519±83 ms), or 3 ml nectar thick liquid (472±145 ms) (Wilcoxon *t*-test, *p*<0.01). Maximum velopharyngeal pressure of 20 ml thin liquid was significantly larger than that of 20 ml thin liquid (*p*<0.05). Maximum velopharyngeal pressure of 3 ml thin liquid was significantly larger than that of 3 ml thin liquid (*p*<0.05). Maximum tongue base pressure did not change significantly by volume and viscosity. **Conclusion:** HRM revealed several physiologic modifications. It was found that UES relaxation duration and velopharyngeal pressure were affected by volume, but not by viscosity. Quantifying the effect of bolus in patients using HRM will be the future issues.

142

ASSESSMENT OF SWALLOWING USING HIGH-RESOLUTION MANOMETRY

D. Zulin¹, L. Yue¹, D. Meng¹, W. Yujue¹

¹Department of Rehabilitation, The Third Affiliated Hospital of Sun Yat-Sen University, Guangzhou, China

Introduction/Background: Assessing swallowing functions with high-resolution manometry (HRM) can be applicable both for clinical and research usage. With the space-time diagram and waveform diagram we can gauge peak pressure and contraction time in

palatopharynx and tongue base, upper esophageal sphincter (UES) resting pressure, UES peak pressure before and after swallow, UES residual pressure and UES relaxation time. These pressure and temporal data acquired from HRM reflect the biomechanical changes of swallow. In clinical settings we noticed several commonly seen manifestation including inadequate UES relaxation, weak pharyngeal contraction and discordance in pharyngeal contraction and UES relaxation. For patients after radiotherapy of nasopharyngeal carcinoma, HRM results commonly manifested with increased UES residual pressure and decreased pharyngeal contraction pressure with normal time-sequence. For patients after brainstem infarction, HRM results generally showed decreased pharyngeal contraction, delay in UES opening, poor coordination in pharynx and UES and absent UES pressure peak after swallow. **Results:** The typical HRM results of some other diseases are still under exploration. Regarding our past researches, we used HRM to 1. Explore the effect of bolus volume on pharyngeal swallowing, 2. To find out if there is any correlation between manometric and videofluoroscopic measurements of swallowing function, 3. To assess the effect of balloon dilatation on UES in brainstem stroke patients with dysphagia. All these researches have been finished and published in journals. HRM is an important tool in the assessment of swallowing and its application still need to be broadened.

143

THE POST STROKE CHECKLIST MERGED WITH DYSPHAGIA MEETS HEALTHCARE NEEDS IN POST-ACUTE STROKE PATIENTS

K.L. Chen¹, T.S. Wei¹, P.Y. Sung¹, C.C. Lin¹

¹Changhua Christian Hospital, Physical Medicine & Rehabilitation, Changhua, Taiwan

Introduction/Background: The healthcare after stroke varies greatly, depending on the patient's biopsychosocial conditions. Post stroke checklist (PSC) is an easy-to-use questionnaire to identify unmet needs in stroke patients. However, its design was based on Delphi panel's consensus and several medical association endorsements. Dysphagia is common after acute stroke and is believed to associate with aspiration pneumonia, a life-threatening medical complication. This study modified the PSC with dysphagia added as item 12 (dPSC) to evaluate the healthcare needs of stroke patients. **Material and Methods:** A total of 414 post-acute stroke patients were enrolled in this study (257 men, mean age 68.2±13.2 years) with time from onset 33.1±19.1 days and Functional Independent Measure (FIM) score 76.8±24.4. The dPSC includes: 1) Secondary stroke prevention, 2) Activities of daily living (ADL), 3) Mobility, 4) Spasticity, 5) Pain, 6) Incontinence, 7) Communication, 8) Mood, 9) Cognition, 10) Life after stroke, 11) Relationship with family, and 12) Dysphagia. The patients were requested to answer the questionnaire and to rate its impact score on life based on a 0–10 Visual Analogue Scale (VAS). Occurrence of aspiration pneumonia was also measured. **Results:** The Top 3 items in dPSC were mobility, ADL and dysphagia

in both reported rate (81.2%, 76.3% and 42.2%, respectively) and impact score (4.1, 3.9 and 2.7, respectively). In addition, reported rate and impact score of dysphagia in dPSC are highly associated with occurrence of aspiration pneumonia (p value <0.001 and p value =0.001) with an adjusted odds ratio of 4.1 (95% CI: 1.5–11.3; p value =0.006) in self-reported existence of dysphagia. **Conclusion:** The results suggest that the dPSC is a comprehensive and useful measurement to find unmet needs in post stroke patient. Furthermore, dPSC could predict occurrence of aspiration pneumonia, and could be an appropriate reference for further intervention.

144

CURRENT STATE OF POST-STROKE TUBE FEEDING IN A JAPANESE REHABILITATION WARD AND THE RECOVERY OF ORAL FEEDING THROUGH SWALLOWING THERAPY

T.Y. Wong¹, N. Kayoko², Y. Mikami³, C. Mihara¹

¹Hiroshima Kyouritsu Hospital, Nutrition Support Team, Hiroshima, Japan, ²Hiroshima Kyouritsu Hospital, Rehabilitation Ward, Hiroshima, Japan, ³Hiroshima Kyouritsu Hospital, Rehabilitation Department, Hiroshima, Japan

Introduction/Background: For patients with post-stroke dysphagia, tube feeding plays an important role in managing their nutritional needs. Although nasogastric feeding (NG) is used for the short term, percutaneous endoscopic gastrostomy (PEG) is the route of choice for long term tube feeding. Without the proper nutritional support, even the best rehabilitation regimen may not yield targeted results. In this study, we analyzed the current situation of tube feeding and dysphagia therapy in our rehabilitation ward. **Material and Methods:** Patients admitted into our rehabilitation ward from Jan 2012 to Dec 2014 (three years) were screened. Patients who were intubated (NG or PEG tube) when warded and patients who required intubation after admission due to insufficient oral intake were included in our analysis. **Results:** A total of 700 patients were admitted into our rehabilitation ward during the three year period. At admission, 630 (90%) patients were fed orally, 48 (7%) patients received PEG tube placement and 22 (3%) patients received NG. Out of the 22 patients receiving NG, 8 patients improved to full oral feeding whereas 14 patients required PEG tube placement after admission. Out of the 48 patients who receive PEG tube placement, 29 patients recovered to full oral feeding. 6 patients from the 630 patients who were fed orally at admission required PEG tube placement, with 4 of them recovering partial oral feeding at discharge. More than two thirds of tube feeding patients recovered at least partial oral intake upon discharge from our rehabilitation ward. More than half of patients who received PEG tube placement recovered full oral intake upon discharge. **Conclusion:** Tube feeding plays an integral role in providing the nutritional needs of patients with post-stroke dysphagia. The stable provision of nutrition along with rehabilitation therapy may contribute to the recovery of swallowing function.

SHORT ORAL PRESENTATIONS (MAY 29–JUNE 2, 2016)

145

GONIOMETRIC EVALUATION OF THE SPINAL SAGITTAL CURVES IN ADOLESCENTS: A RELIABILITY STUDY**S. Masiero¹, C. Ferraro¹, G. Aristide¹, M. Barazzuol¹, A. Del Felice¹**¹Physical Medicine and Rehabilitation, UOC di Riabilitazione Ortopedica, Padova, Italy

Introduction/Background: To investigate the intra-rater and inter-rater reliability of a pocket compass needle goniometer (IncliMed®, University of Padua) in the evaluation of spine curves in children and adolescents. It was a prospective reliability study conducted in an outpatient clinic. *Material and Methods:* Children and adolescents (mean age 12.5 years±2.5) without pathological alterations of the curvatures of the spine or affected by Scheuermann's kyphosis, postural kyphosis or idiopathic scoliosis were included. Hundred and thirty nine subjects participated to the inter-rater reliability assessment; thirty were enrolled in the intra-rater reliability assessment. Two observers measured the spinal sagittal curves of each participant with the surface goniometer IncliMed®. Hundred and thirty nine subjects were measured by the two raters within a temporal range of 10 minutes, in the same setting. Thirty returned at a mean distance of 28 days for the intra-rater data collection. Agreement limit and coefficient of repeatability were calculated according to the linear regression analysis, and the Bland and Altman method applied to obtain the average of the differences and the standard error of the mean of the differences. *Results:* The inter-observer variability for IncliMed® measurements was ±11° both for the kyphosis and for the lordosis. The intra-observer variability for kyphosis and lordosis measurements were respectively ±11° and ±12°. *Conclusion:* The IncliMed® method represents a reliable, non-invasive and user-friendly tool for the clinical measurement and monitoring of the spinal sagittal curves in children and adolescents.

146

SWOT MATRIX ANALYSIS OF PHYSICAL MEDICINE & REHABILITATION**S.M. Rayegani¹, S. Bagheri²**¹Tehran, Iran, ²PMR Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Introduction/Background: Strategic planning has been used and applied for many industrial disciplines. In recent years, application of strategic planning and SWOT matrix analysis is used in health care systems and disciplines. Because of growing medical and health care facilities and related cost/benefit issues, all health care systems including: departments, hospitals, centers, universities and specialties need to have their own analysis for better planning and decision making regarding future of their activities. Physical and rehabilitation medicine is among those medical specialties that seems to be analyzed in this way. *Material and Methods:* The first step of SWOT analysis in PRM involves the compilation and assessment of key data. Once the appropriate (and correct) data has been composed and analyzed, the capabilities of the specialty are evaluated. In the second step of SWOT analysis, the data collected is organized into four categories, which are: strengths, weaknesses, opportunities and threats (SWOT). The strengths and weaknesses of the field are internal factors, while opportunities and threats normally are a result of external factors playing their part. *Results:* The first step of SWOT analysis in PRM involves the compilation and assessment of key data. Once the appropriate (and correct) data has been composed and analyzed, the capabilities of the specialty are evaluated. In the second step of SWOT analysis, the data collected is organized into four categories, which are: strengths, weaknesses, opportunities and threats (SWOT). The strengths and weaknesses of the field are in-

J Rehabil Med Suppl 55

ternal factors, while opportunities and threats normally are a result of external factors playing their part. *Conclusion:* Strategic planning and matrix analysis of physical medicine and rehabilitation specialty using SWOT (Strength, Weakness, Opportunity and Power) is a new and highly needed concept for developing the field and needs to be regarded and applied in all discipline for better planning.

147

HOW TO IDENTIFY THE CONSTRUCT CONCEPT STRUCTURE FOR PSYCHOMETRIC MEASURE; A COMBINING METHOD WITH AKAIKE INFORMATION CRITERION AND GRAPHICAL MODEL**M. Akai¹, T. Doi²**¹International University of Health and Welfare, Graduate School, Minato-ku- Tokyo, Japan, ²Geriatric Care Facility Hakucho, Ward Supervision, Kita-ku- Tokyo, Japan

Introduction/Background: There are few well-established statistical methods to assess the validities of content (Selected items of measurement) and of construct (Meaning of measurement) in psychometric measures such questionnaire. There has been only choice to depend upon the opinion of experts with long experience or upon the comparison with preceding similar measures. We present a new method to confirm the items structure in questionnaire, which is reflected in content and construct validities, using statistical calculation in place of expert's knowledge. *Material and Methods:* The questionnaires for psychometric assessment usually deal with categorical data as form of a contingency table. Combining the calculation results with Akaike Information Criterion (AIC) and a factorized representation with graphical model could provide domain structures to describe the degree of association among items. The proposed method is intended to estimate the probability distribution on the basis of the comparison of model likelihood. Graphs were generated from data sources with pooling of two nodes and edges connecting those nodes according to the AIC values. *Results:* This combined method could provide domain structures supported content and/or construct validity by computer software automatically. The selection of variables is the search for the model with maximum likelihood among models to make clear what overall conceptual architecture is. Domain structures and their linkage from cited four questionnaires clearly gave an example of this approach. *Conclusion:* With this approach we will be able to analyze the relationship of each of the questionnaire items mathematically and to confirm latent structures within outcome instruments.

148

CONCURRENT VALIDITY OF TWO ICF CORE SETS FOR STROKE PATIENTS IN JAPANESE REHABILITATION WARDS**S. Kinoshita¹, M. Abo², K. Miyamura³, T. Okamoto¹, W. Kakuda², I. Kimura⁴, H. Urabe⁵**¹Nishi-Hiroshima Rehabilitation Hospital, Department of Rehabilitation, Hiroshima, Japan, ²The Jikei University School of Medicine, Department of Rehabilitation Medicine, Tokyo, Japan, ³Kawakita Rehabilitation Hospital, Department of Rehabilitation Medicine, Tokyo, Japan, ⁴Tokyo General Hospital, Department of Rehabilitation Medicine, Tokyo, Japan, ⁵Kyoto Ohara memorial Hospital, Department of Rehabilitation Medicine, Kyoto, Japan

Introduction/Background: We aimed to investigate whether International Classification of Functioning, Disability and Health (ICF) core set might be a useful clinical assessment tool for measuring functioning and disability in stroke patients, by analyzing its concurrent validity. *Material and Methods:* The stroke patients who were admitted to Kaifukuki (convalescent) rehabilitation wards at four medical institutions in Japan were enrolled. Two ICF core

sets, comprehensive ICF core set for neurological conditions for post-acute care (ICF-CS for stroke) and the ICF rehabilitation set, were evaluated with the qualifiers given by the psychiatrists at admission. Median value of the qualifiers and the numbers of the problem categories in “activity and participation” (d) component in two ICF core sets were analyzed. Correlations between these values of (d) component in each ICF core set and Functional Independence Measure (FIM) score were assessed using Spearman’s correlation coefficient. **Results:** During the period between May 1 and Oct 31, 2015, 117 stroke patients (mean age 70.1 ± 14.2 years, 53 women) were enrolled. The mean of median value of the qualifiers in ICF-CS for stroke and ICF rehabilitation set were 0.78 and 1.65, respectively. The mean numbers of problems categories were 50.1 (50.6%) in ICF-CS for stroke and in 21.1 (70.7%) in ICF rehabilitation set. Significant and strong correlations between FIM score and the values of (d) component in ICF-CS for stroke ($r = -0.86$ for the number, $r = -0.87$ for median value, all $p < 0.001$) and in ICF rehabilitation set ($r = -0.87$ for the number, $r = -0.88$ for median value, all $p < 0.001$) were identified. **Conclusion:** The “activity and participation” component in these two ICF core sets can reflect the degree of functioning and disability and might be useful clinical measures in post-acute stroke patients at rehabilitation setting.

149

EFFECTS OF CORE STRENGTH TRAINING USING STABLE VERSUS UNSTABLE SURFACES ON PHYSICAL FITNESS IN UNTRAINED HEALTHY SCHOOL-AGED CHILDREN: A PRELIMINARY STUDY

S.J. Dwidarti¹, T.D. Pandji¹

¹University of Padjadjaran, Physical Medicine & Rehabilitation, Bandung, Indonesia

Introduction/Background: Core strength training, which usually done on stable surfaces, is an effective way to enhance physical fitness in youth. Previous study revealed that core strength training on unstable surfaces could improve some components of physical fitness (i.e. strength, flexibility, balance, coordination, and speed), therefore it might also improve performance. This randomized controlled study specifically investigated the effects of core strength training performed on stable surfaces (CSTS) compared to that performed on unstable surfaces (CSTU) on physical fitness in school-aged children. **Material and Methods:** Twenty (10 girls and 10 boys) untrained healthy subjects (mean age: 14 ± 1 years, age range: 13–15 years) which were junior high school students in Bandung were randomly assigned to CSTS ($n = 10$) and CSTU ($n = 10$) groups. Subjects in CSTU group conducted core strength training on balance trainer and stability trainer, while those in CSTS group conducted the training on a flat mat. The difference between pre-test and post-test of both groups is compared. Training period lasted for 6 weeks (2 sessions/week), including frontal, dorsal and lateral core strength training. The components of physical fitness were assessed using standing long jump, 20-m sprint, stand-and-reach, jumping sideways, Y balance tests. **Results:** CSTS and CSTU groups show significant increase in post-test for all physical fitness tests (stand-and-reach, jumping sideways, Y balance, 20-m sprint and standing long jump), with $p < 0.05$. The increase on CSTU group is significantly greater than CSTS for most physical fitness tests, except the 20-m sprint, although on this test, the CSTU group shows higher increase than CSTS group. **Conclusion:** Core strength training can significantly improve physical fitness in school-aged children using both stable and unstable surfaces, however the unstable element gives additional effects in most physical fitness tests. Consequently, if the goal is to enhance physical fitness, CSTU has advantages over CSTS

150

THE EVALUATION OF POSTURAL BALANCE AND RISK OF FALL IN THE PATIENTS WITH PERITONEAL DIALYSIS

P. Doruk Analan¹, O. Ruya²

¹Baskent University, Physical Medicine and Rehabilitation, Adana, Turkey, ²Baskent University, Department of Nephrology, Adana, Turkey

Introduction/Background: In this study, it was aimed to evaluate the risk of fall and balance in the patient with peritoneal dialysis (PD), and to determine whether there is a correlation between the risk of fall and time of PD. **Material and Methods:** It was evaluated the data of 25 patients (11 men, 14 women). It was recorded time of PD and Berg Balance Scale (BBS), Body Mass Index (BMI) of the participants. Also, it was recorded balance tests and risks of fall by using the Tetrax Interactive Balance System. It was evaluated the correlations between these measurements. **Results:** The mean age of the study population was found 51.6 ± 12.8 . Mean time of PD was found 46.91 months (4–156). Risk of fall was found between 8% and 100%. Minimum score of BBS was 48 while the maximum score was 56. So, BBS scores showed a considerably good balance. Mean BMI was 25.89 ± 4.52 . There was low statistically significant correlation between time of PD and the risk of fall ($r = 0.321$). Also, it was not determined the significant correlation between the BMI and BBS, risk of fall ($r < 0.30$). BBS was negative correlated with risk of fall ($r = -0.517$). **Conclusion:** PD is a minor risk factor for the falling. BBS may not exactly show the risk of fall in this population. In this patients, BMI may not affect the balance.

151

APOPTOSIS AND NECROSIS-INDUCING CELL TOXICITY OF ROPIVACAINE AND BUPIVACAINE IN FIBROBLASTS, TENOCYTES AND HUMAN MESENCHYMAL STEM CELLS

A. Zhang¹, E. Kraft¹, M. Weigl¹, V. Jansson¹, P.E. Mueller¹

¹University Clinic of Munich, Orthopedic Surgery- Physical Medicine and Rehabilitation, Munich, Germany

Introduction/Background: Local anesthetics are frequently preferred for intraarticular pain management and in arthroscopic surgery. Our purpose is to analyze cell toxicity of ropivacaine and bupivacaine in fibroblasts, tenocytes and human mesenchymal stem cells (hMSC) regarding apoptosis and necrosis inducing effects. **Material and Methods:** Cell lines were incubated in DMEM with a cell density of $10,000/\text{cm}^2$. Ropivacaine and bupivacaine were added in varying concentrations of 0.5, 0.25 and 0.125 per cent. DMEM was used as negative control. The incubation period was 30 minutes. After medium change and 1 hour, 24 hours and 7 days of incubation, cells were harvested and analyzed via fluorescence-activated cell sorting (FACS) using double-staining with Annexin V and PI. Annexin V stains apoptotic cells while PI enables necrotic cells to be differentiated. **Results:** Bupivacaine shows in comparison to ropivacaine necrosis-inducing effects on all cell lines, the cell toxicity effect increasing steadily with the concentrations. Ropivacaine causes noticeably more necrosis and no effect in fibroblasts and hMSC in comparison to bupivacaine. Apoptosis-induced cell toxicity was not dependent on different cell lines, varying concentrations or time measurements. **Conclusion:** Our results advise to prefer ropivacaine over bupivacaine in clinical use, e.g. pain management and arthroscopic therapies. There are significantly higher toxicity rates in all cell lines using high concentration of ropivacaine at 1 hour and 24 hours after application. Furthermore, concentration of local anesthetics overall should be kept as low as possible.

152

THE IMPACT OF AEROBIC EXERCISE ON CRET2 KNOCK-IN MOUSE FOR GENETIC LABELING OF IS11+ MYOCARDIAL PROGENITOR CELLS BY CRISPR/Cas9 TECHNOLOGY

Y. Zhou¹, L. Wang², J. Sun¹, J. Hui¹, L. Xia¹, Q. Li¹, J. Fei¹

¹Sports and health research center, Physical Education Department, Shanghai, China, ²research center, Shanghai Municipal En-

gineering Design Institute Group Co. Ltd, Shanghai, China, ³research center, School of Life Science and Technology, Shanghai, China

Introduction/Background: Cardiomyocytes in adult mammals, as the terminal differentiation of cells, still retain a limited regenerative capacity in response to some specific stimuli, such as aerobic exercise, but little is known about the molecular mechanism for cardioprogenitor cell self-renewal. The construction of LIM-homeodomain transcription factor islet-1 (Isl1)-expressing cell is a helpful cellular model to explore the underlying mechanism of cardiomyocytes regeneration. **Material and Methods:** Isl1-CreERT2 knock-in mouse model was constructed, using clustered regularly interspaced short palindromic repeats associated RNA guiding endonuclease Cas9 (CRISPR-Cas9) genomic editing technology. Then the male Isl1-CreERT2 mice were cross-bred with Rosa26-loxP-neo-loxPLacZ transgenic reporter mice (Rosa26-lacZ+) to obtain Isl1-CreERT(KI)/Rosa26-lacZ+ mice. After 8 weeks aerobic exercise intervention, physiological parameters, including echocardiographic image, and biochemical indices were detected in Isl1+ positive cells by X-Gal staining. **Results:** Isl1-CreERT2 knock-in mouse model which harboring CreERT2 cassette downstream of the Isl1 promoter was constructed. Tamoxifen-induced Cre/loxP recombination, as depicted by blue cells, existed in heart sinoatrial node, cardiac ganglia, the aortic arch and pulmonary roots in adult mice. Isl1 expression profile was corresponding with previous research. Compared to wild control group, heart coefficients, ejection fraction (EF), fractional shortening (FS) and Left Ventricular End-Systolic posterior wall depth (LVPWS) in Isl1-CreERT(KI)/Rosa26-lacZ+ aerobic exercise mice were significantly increased ($p < 0.01$). **Conclusion:** By this work, we successfully established Isl1-CreERT2 knock-in mouse model. The animal model provides a useful tool for tracing cardiac progenitor cells in the study of cardiac regeneration. Furthermore, as shown in the echocardiographic image, cardiac function in transgenic mice was markedly improved after aerobic exercise training compared to the sedentary control mice. In conclusion, the study is important for cardiovascular diseases treatment, and will be useful to provide an experimental foundation and theoretical warrant in the field of biological, clinical and sports medical research.

153

THE ROLE OF NOTCH SIGNAL PATHWAY IN INFRASOUND ENHANCING PROLIFERATION ACTIVITY OF BONE MARROW MESENCHYMAL STEM CELLS

R. He¹, J. Fan¹

¹Nanfeng Hospital- Southern Medical University, Rehabilitation Medicine, Guangzhou, China

Introduction/Background: Previous studies had proved that infrasound could enhance proliferation activity of bone marrow stem cells. Notch signal pathway was a conservative signal pathway to control proliferation and differentiation. However, it was unclear about the role of Notch signal pathway in infrasound enhancing proliferation activity of bone marrow stem cells (BMSCs). **Material and Methods:** Primary BMSCs were derived from Sprague Dawley rats. The BMSCs, used at passage three, were divided into experiment group that received infrasound intervention and γ -secretase inhibitor to inhibit Notch signal pathway, and control group which received only γ -secretase inhibitor to inhibit Notch signal pathway. MTT was used to detect proliferation of BMSCs. qPCR and Western-blot were used to measure proteins and mRNA among Notch signal pathway. **Results:** Optical density value of experiment group was significantly higher than control group. The protein and mRNA of Notch1, Jag1 and Hes1 of experiment group was significantly less than control group. **Conclusion:** After inhibition of Notch signal pathway, Infrasound can also enhance proliferation activity of BMSCs. But the expression of relative proteins among Notch signal pathway was decreased.

J Rehabil Med Suppl 55

154

MODERATE TRAINING IMPROVED NEUROGENESIS AND HIPPOCAMPAL DEPENDENT MEMORY

H. Xiaofei¹, Y. Lan², Q. Zhang³, D.X. Liu³, G.Q. Xu³, Z. Pei⁴, J.S. zeng⁴

¹The First Affiliated Hospital of Sun Yat-Sen University, Department of Neurology- Rehabilitation Medicine, Guangzhou, China, ²Guangzhou First People's Hospital- Guangzhou Medical University, Department of Rehabilitation Medicine, Guangzhou, China, ³The First Affiliated Hospital of Sun Yat-Sen University, Rehabilitation Medicine, Guangzhou, China, ⁴The First Affiliated Hospital of Sun Yat-Sen University, Department of Neurology, Guangzhou, China

Introduction/Background: It is proposed that physical training improved memory during aging, but it has not been demonstrated clearly. **Material and Methods:** 18 Thy-1 GFP transgenic mice at age of 13 months were used in this study. Inhabited with or without a wheel, the mice were divided into three groups: the sedentary group, the moderate training group and the excessive training group. Brdu (0.9% in saline) was injected intraperitoneally twice a day during morris water maze training. Cell neurogenesis and proliferation were examined using Brdu and Ki67 immunofluorescence. Astrocyte, microglia neuron and c-fos were detected using immunofluorescence staining. Statistical analysis was performed by SPSS 19.0 software, one-way analysis of variance and further LSD *t*-test were used. *p* values < 0.05 were considered statistically significant. **Results:** Firstly, compared with the sedentary group, moderate training improved morris water maze task ($p < 0.01$), whereas excessive training have no significant effect ($p > 0.05$); the Brdu-positive cells and Ki67 expression were significantly increased in both of the moderate and excessive training groups ($p < 0.001$), which was not significantly different between the two training groups ($p > 0.05$). There were more Brdu-positive cells localized with neuron and GFP-labeled pyramidal cells forming subnets in moderate training group ($p < 0.05$), whereas there were more Brdu-positive cells co localized with microglia and astrocyte in the excessive training group ($p < 0.05$). Finally, the c-fos expression was significantly increased in both of these training groups ($p < 0.05$), there was no significant difference between them. **Conclusion:** Our study demonstrated that moderate training improved memory cognition during aging, whereas excessive training had no effect. Moderate training improved the new born cells differentiate into neuron and formed connection with the existed cells.

155

SOD MIMETIC TEMPOL ENHANCES EXERCISE TRAINING-INDUCED NITRIC OXIDE SYNTHASES IN THE KIDNEY OF SPONTANEOUSLY HYPERTENSIVE RATS

O. Ito¹, P. Cao¹, D. Ito¹, R. Rong¹, A. Sakuyama¹, Y. Ogawa¹, Y. Muroya¹, M. Kohzaki¹

¹Tohoku University Graduate School of Medicine, Department of Internal Medicine and Rehabilitation Science, Sendai, Japan

Introduction/Background: Both the exercise training (Ex) and superoxide dismutase (SOD) mimetic tempol have antihypertensive and renal protective effects in several hypertensive rats. We recently reported that Ex increases nitric oxide (NO) production and endothelial and neuronal NO synthase (eNOS and nNOS) expressions in the kidney and aorta of spontaneously hypertensive rats (SHR) and normotensive Wistar-Kyoto rats (WKY). To clarify the mechanism of the Ex-upregulated NO system in the kidney, the present study examined the effects of a combination with Ex and tempol on the renal NO system in SHR and WKY. **Material and Methods:** Five-week-old, male SHRs were randomly divided into four groups; a control group, an Ex group, a tempol group and an Ex+tempol group. The treadmill running was performed to the Ex and Ex+tempol groups, and tempol was given to the tempol and Ex+tempol groups for 8 weeks.

Results: In SHR, both Ex and tempol increased concomitantly H₂O₂ and nitrate/nitrite (NO_x) levels in plasma and urine and renal NOS activity and eNOS and nNOS expressions with decreasing NADPH oxidase activity. The effects of the combination with Ex and tempol on these parameters were cumulative in SHR. In WKY, Ex increased these parameters with increasing renal NADPH oxidase activity, but tempol did not change these parameters or affect the Ex-increased NOS activity and expression. Tempol increased the SOD activity in the kidney and aorta of SHR, but did not change it in those tissues of WKY. Ex increased the SOD activity in the renal inner medulla and aorta of SHR and only in the aorta of WKY. **Conclusion:** The effects of Ex and tempol on the NOS activity and expression are cumulative with decreasing NADPH oxidase activity and increasing SOD activity in the kidney of SHR. H₂O₂ may mediate the Ex-upregulated NO system in the kidney as well as vessels.

156

IS INTERVENTION-INDUCED HYPOPERFUSION IN HYPER-EARLY REPERFUSION NEUROPROTECTIVE?

Zhijie He, Hongyang Lu, Xiaojiao Yang, Li Zhang, Jie Jia
Department of Rehabilitation, Huashan Hospital, Fudan University, Shanghai, China

Introduction/Background: Reperfusion injury limits thrombolytic treatments in acute ischemic stroke. Neuroprotective strategies during hyper-early reperfusion need to be explored. There is strong evidence supporting the neuroprotective effect of exercise preconditioning on cerebral ischemia and reperfusion injury. Therefore, the present study investigated cerebral blood flow (CBF) in the hyper-early stage of reperfusion injury by laser speckle contrast imaging (LSCI), a full-field, high-resolution, real-time optical imaging technique. Rats underwent either treadmill training or stayed sedentary for 2 weeks, and were subjected to subsequent middle cerebral artery occlusion followed by reperfusion. We evaluated the rats' neurological scores and performed 2, 3, 5-triphenyltetrazolium chloride staining to determine the stroke outcome and show the neuroprotective effects of exercise preconditioning on ischemic stroke. Simultaneously, we measured CBF in the arteries, veins, and capillaries in hyper-early reperfusion (1, 2, and 3 h after reperfusion) and in the sub-acute stage (24 h after reperfusion) after experimental stroke. Twenty-four hours after reperfusion, exercise preconditioning improved capillary blood flow. However, in the hyper-early stage of reperfusion, reduced perfusion was observed in both the arteries and veins of rats in the exercise preconditioning group. Exercise preconditioning, as a neuroprotective strategy, improved the stroke outcome. In hyper-early reperfusion, exercise preconditioning reduced the blood perfusion of arteries and veins, which indicated intervention-induced hypoperfusion after reperfusion onset. This type of intervention, especially if associated with thrombolytic treatment administration, may be neuroprotective.

157

THE EFFECT OF CIRCUIT TRAINING EXERCISE ON SHORT-TERM MEMORY FUNCTION IN 5TH GRADE CHILDREN IN BADAN PERGURUAN INDONESIA ELEMENTARY SCHOOL BANDUNG INDONESIA

M. Prananta¹, D. Kuntari¹

¹University of Padjadjaran, Physical Medicine & Rehabilitation, Bandung, Indonesia

Introduction/Background: Short-term memory has a major role in cognitive process, intelligence and academic performance of children. Technological advancement, transportation and learning activities make children less active. Regular physical activity increases physical fitness. Children with better physical fitness will respond quickly to memory span and problem solving. Circuit

Training Exercise is an interval exercise in circuit that combines strength and aerobic training to increase flexibility, strength and endurance. The purpose of this study was to determine the effect of Circuit Training Exercise on short-term memory of 5th grade children in Badan Perguruan Indonesia (BPI) Elementary School, Bandung, Indonesia. **Material and Methods:** Seventy two 5th grade children aged 10–11 years divided into a control group and treatment group randomly. The treatment group was given Circuit Training exercises 3 times/week for 8 weeks. The control group was given regular exercise activity. The exercise test (Bench Step Test) and short term memory test, which were measured by Digit Span, Digit Backward and Forward, and Digit Symbol Coding, were taken before and after 8 weeks. **Results:** There are significant increase of Digit Span, sub test Digit Backward and Forward, and the Digit Symbol Coding scores in treatment group. In control group, there are no significant increase of Digit Span, sub test Digit Backward and Forward, and the Digit Symbol Coding scores. The difference between groups is also significant. **Conclusion:** There is significant increase on short-term memory function after the implementation of Circuit Training Exercise 3 times per week for 8 weeks in the 5th grade children in BPI Elementary School Bandung.

158

THE RESULTS OF QUALITATIVE GENERAL MOVEMENTS ASSESSMENT: THE BASIS OF MAKING SUPER-EARLY REHABILITATION THERAPY SCHEME FOR PRETERM INFANTS

Y. Liu¹, H. Huang¹

¹Children's Hospital of Kunming in Yunnan Province, Rehabilitation Department, Kunming, China

Introduction/Background: To investigate the scientificity of qualitative general movements (GMs) assessments results as the basis of making super-early rehabilitation therapy scheme for preterm infants. **Material and Methods:** According to the results of qualitative general movements (GMs) assessments, 93 preterm infants were divided into 3 levels and treated with corresponding rehabilitation therapy. Then we analyzed the feasibility and rationality of those rehabilitation therapy schemes, combining with their neurodevelopment outcomes at the age of 1 and a half year. **Results:** Among the qualitative general movements (GMs) assessments results of 93 preterm infants, there were 36 cases with abnormal GMs during the writhing period (in which there were 11 cases with cramped-synchronized GMs) and 13 cases with abnormal GMs during the fidgety period (in which there were 9 cases with an absence of fidgety movements). Super-early rehabilitation therapy schemes: Selected cramped-synchronized (CS) GMs cases and/or absence of fidgety movements (AFMs) cases as level A cases (12 cases), which were treated with comprehensive rehabilitation therapy, and then 9 cases' follow-up ending were neurodevelopmental disorders (CP 8 cases, CDD 1 case) by age 1 year and a half; Selected those cases with other abnormalities during writhing period and/or fidgety period as level B cases (24 cases), which were treated with selective rehabilitation therapy and offered family-based rehabilitation guidance, and then no case's follow-up ending was neurodevelopmental disorders by age 1 year and a half; Selected those cases with normal GMs during writhing period and/or fidgety period as level C cases (57 cases), which were offered family-based rehabilitation guidance and regular high-risk infants follow-up, and then 1 case's follow-up ending was neurodevelopmental disorders (CDD 1 case), which were found with abnormality at the follow-up of age 8 months and then were treated with selective rehabilitation therapy and offered family-based rehabilitation guidance as level B case. At the follow-up of 1 year (corrected age), all cases with neurodevelopmental disorders were treated with rehabilitation therapy for 4.50–11.77 months, mean (9.81±2.09) months. **Conclusion:** The results of qualitative general movements assessment could be the basis of making super-early rehabilitation therapy scheme for preterm infants. Classified rehabilitation therapy schemes is practical and instructive, it is worth promoting.

159

THE ASSOCIATION OF MATERNAL BODY MASS INDEX BEFORE LABOR AND NEONATAL HEALTH

S.C. Kung¹, J.C. Chow², D.C.J. Su¹, Y.J. Song³, W. Chou^{1,3}

¹Chi Mei medical center, Physical medicine and Rehabilitation, Tainan, Taiwan, ²Chi Mei medical center, Pediatrics, Tainan, Taiwan, ³Chia Nan University of Pharmacy, Recreation and Health-care Management, Tainan, Taiwan

Introduction/Background: The nutritional status of pregnant women influences neonatal health. Although there are guidelines suggesting proper gestational weight gain, no study has found out the best maternal body mass index (BMI) just before labor. The aim of this study was to determine the association between the maternal BMI before labor and neonatal health status, and try to find out the best maternal BMI before labor as a suggestion for body weight control during pregnancy. *Material and Methods:* The study subjects were pregnant women who were admitted to ChiMei medical center of Taiwan between 2013/01/01 and 2013/12/31. Data were collected including pregnancy and labor characteristics, maternal complications, and neonatal health. We used multivariable regression models to study the association of maternal BMI before labor and neonatal outcomes (including gestational age(GA), birth body weight(BBW), Apgar score at 1 and 5 minutes, and types of delivery). *Results:* 1,462 pregnant women and their newborns were recruited. The average of the last maternal BMI before labor was 27.12±3.82 kg/m². The average of GA was 38 week +4 days ±1.84 weeks. The average of BBW was 3,031±453 g. Quadratic regression analysis showed that maternal BMI square was closely associated with both Apgar score at 1 and 5 minutes (both $p < 0.001$) with the best BMI before labor for Apgar score at 1 and 5 minutes were 25.60 and 25.74 respectively. When the last maternal BMI before labor increasing or decreasing 1 kg/m², Apgar score at 1 and 5 minutes will drop 0.162 and 0.195 points respectively. As a result, both too high or too low of the last maternal BMI before labor increase the risk of poor health of newborn. *Conclusion:* Maternal BMI before labor was strongly associated with neonatal health. Public health programs should emphasize the importance of weight control among pregnant women for improving the quality of neonatal health.

160

CORRELATION BETWEEN EXERCISE CAPACITY AND PHYSICAL ACTIVITY IN BLUE-COLLAR AND WHITE-COLLAR WORKERS IN CARDIAC REHABILITATION: PRELIMINARY STUDY

M.L. Rama Susilawati¹, D.D.M. Moeliono¹

¹University of Padjadjaran, Physical Medicine and Rehabilitation, Bandung, Indonesia

Introduction/Background: White-collar, as well blue-collar workers, might have heart problems that make them undergo a cardiac rehabilitation program. Cardiac rehabilitation is the process by persons with cardiovascular disease are restored to and maintained at their optimal physiological, psychological, social, vocational, and emotional status. The goal is to improve or maintain a good level of cardiovascular fitness, thereby returning the individual to a normal and proactive life. Exercise capacity is measured in METs. Aim the study to measured correlation between exercise capacity and physical activity level in white and blue collar workers group. *Material and Methods:* 16 healthy subjects working at Hasan sadikin Hospital (11 male and 5 female), age range 25–40 years, divided white and blue collar group, 8 subjects in each group. Exercise capacity in METs, is measured using ergometer test with Astrand-Rhyming protocol, while data for levels of physical activity is collected using the Global Physical Activity Questionnaire (GPAQ). *Results:* The mean age of participants both group is 31.3±3.8 years. The mean of exercise capacity in white-collar group is 11±1.54 METs and in the blue-collar group is 11.7±1.64 METs. The mean GPAQ in white-collar group is 688±394.82 and the blue-collar group is 1,088.5±743.8.

J Rehabil Med Suppl 55

There are no significant difference in METs and GPAQ scores between white and blue collar group ($p < 0.5$). *Conclusion:* Exercise capacity measured in METs is one of many tools used to set goals in cardiac rehabilitation. There are no correlation between METs and physical activity between white and blue collar workers. Cardiac rehabilitation that evaluate patient from the beginning have to consider physical activity of patient beside type of working before rehabilitation in attempt to set goals that can be tolerated and achieved by patients and they can return to work and social.

161

INVESTIGATING THE EFFECT OF 6-WEEK HOME-BASED TOE-INWALKING EXERCISE ON THE FUNCTION OF NON-COPERANTERIOR CRUCIATE LIGAMENT DEFICIENT SUBJECTS

M. Khaleghipannah¹

¹Tehran, Iran

Introduction/Background: The primary goal of rehabilitation after anterior cruciate ligament rupture is to restore knee function. Generally, it is possible to train Non-copers into Copers through improving co-activation of the muscles surrounding the knee joint. Previous studies have showed that to-in walking exercise may ameliorate co-activation of knee peri-articular muscles and especially firing pattern of medial gastrocnemius. Therefore, present study was designed to determine the effect of to-in walking exercise program on function of noncooper subjects with anterior cruciate ligament injury. *Material and Methods:* Fourteen young men (age: 27.29±4.13 years) were instructed to practice to-in walking with shoes at home regularly for six weeks, seven days a week, thirty minutes a day. Quadriceps strength, subjects' absolute score and limb symmetry index for a pack of six various hop tests and their score in International Knee Documentation Committee form were assessed before and after exercise program. To control the effect of subjects' physical fitness variation on the test results, post-training scores were analyzed using a univariate general linear model with adjustment for pre-training scores for each test. *Results:* Subjects scores in single leg ($p = 0.04$ and $p = 0.02$ for injured and sound leg respectively), triple leg ($p = 0.001$ for sound leg), cross over ($p = 0.04$ for injured leg), figure of 8 ($p = 0.001$) and agility hop test ($p = 0.02$ for sound leg) improved significantly. Subjects' performance in 6-meter timed hop test did not change significantly. Limb symmetry indices did not change significantly except for triple hop test ($p = 0.01$). IKDC scores for sport activities ($p = 0.001$) and function ($p = 0.01$) improved significantly. Therefore, in spite of no change in symptom subclass of IKDC, total score of subjects increased significantly ($p = 0.01$) following exercise program. *Conclusion:* Hop test are one of the most important guides of subjects' performance following anterior cruciate ligament injury. It seems that the suggested exercise program has improved subjects' performance. The results supports recommendation of presented exercise program for rehabilitation of non-copers at home.

162

ANALYSIS OF ISOKINETIC KNEE STRENGTH (FLEXION AND KNEE EXTENSION) OF PROFESSIONAL SPORTS PEOPLE

A. Agar¹, M. sarı², A. cimbi¹

¹Zirve University, Physiotherapy and Rehabilitation, Gaziantep, Turkey, ²Yıldız Technical University, Mathematics, İstanbul, Turkey

Introduction/Background: This study aims to analyze the peak torques of professional football, basketball and volleyball players' dominant and non-dominant quadriceps and hamstring muscles. *Material and Methods:* In order to analyze, 30 data (10 basketball player, 10 volleyball player and 10 football player) would be used and various statistical techniques would be commonly implemented. *Results:* After the implementations, it could be safely assumed that relatively volleyball and football players, various biomechanic

factors (body weight, height and nonfat leg mass) would be more ascendant for basketball players ($p < 0.05$). On the other hand, cases examined both dominant and nondominant leg quadriceps and hamstrings with 60 and 300 deg/s angular velocity. Therefore, findings illustrated in eight situations that basketball players has significant difference compare to other groups ($p > 0.05$). In addition to, it could not be reached significant difference for three groups cases for other some biomechanic factors namely relative peak torque, h/q ($p > 0.05$). **Conclusion:** According to findings of the study, in stark contrast to other groups there is significant difference on the rate of weight and peak torque for basketball players.

163

A NOVEL PROSTHESIS: HIP PROSTHESIS IN SITTING POSTURE FOR BILATERAL TRANSFEMORAL AMPUTEE AFTER BURN

Y. Shimizu^{1,2}, H. Mutsuzaki³, T. Maezawa⁴, Y. Idei⁵, K. Takao⁶, R. Takeuchi³, S. Onishi⁷, H. Kadone⁸, T. Ueno¹, Y. Hada¹, M. Yamazaki⁹, Y. Wadano²

¹University of Tsukuba Hospital, Department of Rehabilitation Medicine, Tsukuba, Japan, ²Ibaraki Prefectural University of Health Sciences, Department of Rehabilitation Medicine, Ami, Japan, ³Ibaraki Prefectural University of Health Sciences, Department of Orthopaedic Surgery, Ami, Japan, ⁴Ibaraki Prefectural University Hospital of Health Sciences, Department of Physical Therapy, Ami, Japan, ⁵Kowa gishi Laboratory, Department of Prosthesis and Orthosis, Tsukuba, Japan, ⁶Ibaraki Prefectural University Hospital of Health Sciences, Department of Occupational Therapy, Ami, Japan, ⁷University of Tsukuba Hospital, Department of Orthopaedic Surgery, Tsukuba, Japan, ⁸University of Tsukuba Hospital, Center for Innovative Medicine and Engineering, Tsukuba, Japan, ⁹University of Tsukuba, Department of Orthopaedic Surgery, Tsukuba, Japan

Introduction/Background: Rehabilitation of bilateral transfemoral amputees is challenging and resumption of walking ability is difficult in these cases. The prognosis is particularly poor regarding not only function but also quality of life in patients with bilateral lower amputation because of a peripheral arterial disease. Moreover, amputation after burn is of clinical concern because the fragile skin of the stumps is difficult to adapt to a prosthetic socket. Therefore, we developed a novel "hip prosthesis in sitting posture (HPSP) (Fig. 1)" for rehabilitating a bilateral femoral amputee after a burn injury. Fig. 1. The socket of "hip prosthesis in sitting posture" (HPSP) comprises a pelvis part and bilateral thigh parts as a unit. Existing hip joints, knee joint, support pillars, and foot parts under the socket. **Material and Methods:** A 64-year-old male bilateral transfemoral amputee was transferred for rehabilitation 4 months following a burn injury. His wounds had not healed for 1 year 8 months after the burn (Fig. 2). Furthermore, as he could not use the existent prosthetic socket because of unhealed stumps, he started standing (Fig. 3) and walking exercises with HPSP. Fig. 2. Bilateral femoral stumps were immature, column-shaped, and edematous. Fig. 3. Standing with HPSP. **Results:** His refractory wounds healed at 1 month after initiating exercises using HPSP; he could begin rehabilitation with an existent prosthesis. He could walk with an existent prosthesis and walker. **Conclusion:** HPSP enabled a bilateral femoral amputee with unhealed stumps to stand and walk because of very little friction between the sockets and stumps. HPSP was an effective temporary prosthesis to prevent disuse until the wounds healed and to continue rehabilitation with existent prosthesis.

164

THE LONG-TERM EFFECTS OF ANTHROPO-SOPHIC MEDICINE IN PATIENTS WITH CHRONIC DISEASE: A SYSTEMATIC REVIEW

B. Kara¹

¹Gulhane Military Medical Academy, School of Nursing, Ankara, Turkey

Introduction/Background: Anthroposophic medicine (AM) is a physician-provided complementary therapy system and is used alone or in combination with conventional treatment. The practice of AM includes special medications, art therapy (painting, drawing, music, singing, sculpture, clay modeling, and speech exercises), rhythmic massage, eurythmy movement exercises, counselling and anthroposophic nursing. Many people with chronic disease use anthroposophic therapies to improve their emotional and physical health. Therefore, the aim of this systematic review was to examine the evidence regarding the long-term effects of AM in patients with chronic disease. **Material and Methods:** We searched PubMed, CINAHL, Scopus and Embase databases up to Nov 30, 2015 using the following keywords: anthroposophy, art therapy, rhythmic massage or eurythmy. We included only prospective, cohort studies published in English. **Results:** Eighteen studies met the inclusion criteria. The sample size of the reviewed studies ranged from 45 to 1,510. The studies investigated the effects of anthroposophic therapies or medications for mental, musculoskeletal, neurological, genitourinary or respiratory disorders or other chronic diseases. Anthroposophic therapies were used to stimulate salutogenetic self-healing capacities and strengthen autonomy both in children and adults. The long-term clinical outcomes of AM for chronic disease were assessed at the 4-, 12-, or 48-month follow-up periods. The results of studies confirmed the efficacy of AM with regard to long-term improvements in symptoms and quality of life, as well as long-term cost-effectiveness. Studies showed that adverse reactions to anthroposophic therapies were rare. The majority of these reactions were reported to be of mild to moderate intensity. The results also indicated that the level of patient satisfaction was high. **Conclusion:** The current evidences suggest that beneficial effects of AM on chronic disease symptoms, quality of life and health costs. More studies of high quality are needed to investigate the long-term effects of AM in this population.

165

CHALLENGING APPLICATION OF AN AIRWAY FOR INTERMITTENT ORO-ESOPHAGEAL TUBE FEEDING IN THE DYSPHAGIA PATIENTS OF IMPAIRED MENTALITY

C.H. Hwang¹, H.K. Shin¹, K.I. Koo²

¹University of Ulsan College of Medicine- Ulsan University Hospital, Department of Physical Medicine & Rehabilitation, Ulsan, Republic of Korea, ²University of Ulsan, School of Electrical Engineering, Ulsan, Republic of Korea

Introduction/Background: Authors examined whether the adding of the oro-pharyngeal airway (OPA) to intermittent oro-esophageal tube (IOET) feeding could set a promising anticipation off to the dysphagia patients of impaired mentality, comparing to the conventional approach. **Material and Methods:** Patients undergoing videofluoroscopic swallowing study (VFSS) were enrolled and assessed using the mini-mental state examination and National Institutes of Health Stroke Scale. During VFSS, we recorded the insertion time without and with OPA use (Fig. 1) in the same patient in a randomized order. Patients who could safely undergo IOET feeding were then randomly allocated to 2 groups based on the feeding method. Satisfaction Questionnaire with Gastrostomy Feeding (SAGA-8) scores and pneumonia incidence was assessed on the third and tenth day after the IOET feeding. Two-sample paired *t*-test, chi-square test, and one-way analysis of variance were used for statistical analysis. Fig. 1. **Results:** Of 226 patients who underwent VFSS, 31 were enrolled in this study. However, 21 patients were excluded, including 19 who could begin oral feeding and two with cricopharyngeal incoordination. After VFSS, the ten patients were randomly allocated and one patient withdrew during the study period. Pre-arm evaluation indicated that the IOET insertion time was significantly shorter in the OPA group than in the conventional group during VFSS (17.72±5.78s vs. 25.41±10.41s, $p=0.015$). Dur-

ing the second-arm evaluation, the SAGA-8 scores showed a significant difference (22.22 ± 3.42 vs. 23.22 ± 3.42 ; $p=0.06$), although no significant difference in SAGA-8 score was noted on the third day after IOET feeding. **Conclusion:** Although the high drop-out rate is a limitation of our study, the simultaneous use of the OPA during IOET feeding can be tried to the dysphagia patients of impaired mentality and beneficial in terms of easiness and satisfaction.

166

THE EFFECT OF BONE MARROW STEM CELLS ON CHRONIC DENERVATED SKELETAL MUSCLES

J. Li¹, S. Yuan², D. Ruoxian¹, L. Young¹, X. Jia³

¹Johns Hopkins University School of Medicine, Biomedical Engineering, Baltimore, USA, ²University of Maryland School of Medicine, Neurosurgery, Baltimore, USA, ³University of Maryland School of Medicine- Johns Hopkins University School of Medicine, Neurosurgery- Orthopaedics- Biomedical Engineering- ACCM, Baltimore, USA

Introduction/Background: Current animal models to study muscle reinnervation after peripheral nerve injury do not exclude confounding factors including axon mismatch after repair or limited speed of axon regeneration. Here we developed a delayed muscle repair model after nerve injury to evaluate the role of bone marrow stem cells (BMSCs) on chronic denervated muscles. **Material and Methods:** 20 adult male Wistar rats were randomly assigned into 4 groups ($n=5$). The delay muscle repair model was established by transecting the tibial nerve motor branches to the gastrocnemius muscle. Half were repaired after 6 weeks and the other half at 12 weeks. The distal end of the tibial nerve motor branches to the gastrocnemius muscle was then anastomosed to the proximal end of the nerve motor branch to flexor digitorum longus. At each time point, half were transplanted with 1×10^5 BMSCs immediately after anastomosis, into the portal of entry to the gastrocnemius muscle. The same volume of saline was injected in the other half as a control. Functional recovery analyses including wet muscle weight, electrophysiological analyses (by compound nerve action potential and motor evoked potential recordings), neurofilament staining and NMJ recovery (by immunofluorescence) were performed 4 weeks after the repair surgery. **Results:** Comparing the 6-week-injury groups to the control group, the wet weight of the gastrocnemius muscle was found to be significantly greater in BMSCs treated animals ($p=0.005$) with improved electrophysiological recovery (both $p<0.05$). Immunohistochemical staining of neurofilament and NMJ showed improved recovery in the BMSCs treated rats. There was no significant difference of wet muscle weight, electrophysiological recovery, or NMJ recovery for the 12-week-injury groups. **Conclusion:** BMSCs greatly promoted the functional recovery of reinnervated muscle with improved NMJ regeneration. However, the beneficial effect of BMSCs on denervated muscle regeneration may only be effective within a limited time window. Supported by Maryland Stem Cell Research Fund (2013-MSCRF-146-00) (to XJ).

167

CORRELATION OF CIRCULATING CYTOKINES WITH FATIGUE AND HEALTH-RELATED QUALITY OF LIFE DURING RAMADHAN FASTING IN GERMAN

S. Khoshandam Ghashang¹, S. Raha², I. Hamdan¹, C. Gutenbrunner¹, B. Nugraha¹

¹Hannover Medical School, Rehabilitation Medicine, Hannover, Germany, ²Hannover Medical School, Institute of Immunology, Hannover, Germany

Introduction/Background: In medicine, fasting has been considered as therapy, including for metabolic syndrome, chronic pain and hypertension. Intermittent fasting is recently discussed as part of cancer treatment. Another type of fasting is Ramadhan practiced by Mus-

lims worldwide. The effect of Ramadhan fasting has been known in diseases (schizophrenia and diabetes). Fasting has benefits for mood-related symptoms (MRS) and quality of life (QoL). The latter benefits need to be elucidated more, particularly in Ramadhan fasting. Therefore, our aim was to determine the effect of Ramadhan fasting on MRS and QoL and correlate it with cytokines. **Material and Methods:** This study was approved by local ethics committee (Nr. 6899). 54-male participants (age>18 y.o) were recruited and divided into two groups: fasting (FG) and non-fasting (NF). Main inclusion criteria: healthy, be planning to fast the whole month of Ramadhan. For NF, all subjects should meet the criteria of fasting group, except that they would not do fasting. 4-time points were defined: T0, T1, T2, and T3: 1-week before, 1-week after the first day, last week and 1-week after Ramadhan, respectively. In NF, the determinations of endpoints were at T0 and T2. Endpoints: fatigue (VAS); questionnaires for MRS and QoL: Hospital Anxiety and Depression Scale (HADS), Beck Depression Inventory-II (BDI-II), SF-12, Fatigue Severity Scale (FSS), Epworth Sleepiness Scale (ESS). Serum cytokines: interleukin-12 and TNF- α were determined by fluorescence-activated cell sorting method. (Statistics evaluation was done with SPSS 23. $\alpha<0.05$ was set for significance). **Results:** In FG, interestingly, on the last week of Ramadhan (T2), correlation between TNF- α and IL-12 with fatigue, SF-12, FSS, and ESS were detected. FG, BDI-II were improved at T3 compared to T1 ($p<0.05$). There were no significant differences between FG and NF on T0 and T2. **Conclusion:** Cytokines may mediate the benefit effect of Ramadhan fasting on Mood Related Symptoms and Quality of Life.

168

RETROGRADE-TRACING AND IMMUNOHISTOCHEMICAL STUDY OF SYMPATHETIC GANGLIA TO THE RABBIT MODEL OF CERVICAL SPONDYLOSIS OF VERTEBRAL ARTERY TYPE

L. Yu¹, H. Gou¹, Y. Jiang¹, S. Wang¹, Y. Sun¹

The Second Affiliated Hospital of Chongqing Medical University, Department of Rehabilitation Medicine, China

Introduction/Background: Injecting sclerosing agent next to transverse process of cervical vertebra is a practical method to produce cervical spondylosis of vertebral artery type (CSA) rabbit model. The purpose of this study was to explore the functions of sympathetic trunk nerve in this kind of CSA rabbit models. The rabbits were randomly divided into CSA group and control group. Transcranial Doppler (TCD) was used to detect the peak systolic velocity (PSV), end diastolic velocity (EDV), mean velocity (Vm), pulsatile index (Pi), resistance index (RI) of the vertebral artery after the sclerosing agent was injected next to the right side transverse process of cervical vertebra in the CSA group. To further investigate the effect of different lesion in neck soft tissues and cervical facet on the functions of sympathetic trunk nerve, fluorescent tracer fast blue (FB) was injected in hypoderm, upper trapezius muscle and next to parapophysis of C3- C5 sections, and combined fluorescent histochemical staining to observe the FB-positive neurons co-expressed neuropeptide Y (NPY) and tyrosine hydroxylase (TH)- immunoreactivity in right side sympathetic trunk ganglia (STG), and western blotting assay was used to detect the protein expressions of NPY and TH. The results shown that light blue fluorescence surround the interior walls and adventitia of the right side vertebral artery in CSA rabbits. The percentage of FB-positive neurons co-expressed NPY and TH-immunoreactivity and protein expression of NPY and TH in CSA rabbits was significant higher than other normal rabbits. Cervical facet lesion is a possible mechanism of the severe vertebral artery spasm and stenosis induced by the sympathetic nerve around vertebral artery was directly activated in CSA rabbits.

169

VOLUNTARY RUNNING ACCELERATES THE INTERSTITIAL FLUID DRAINAGE AND IMPROVE THE SPATIAL MEMORY IN VIVO AGING MICE

X. He¹, Y. Lan², Q. Zhang³, D. Liu³, G.Q. Xu³, Z. Pei⁴, J.S. Zeng⁴

¹The First Affiliated Hospital of Sun Yat-Sen University, Department of Neurology- Rehabilitation medicine, Guangzhou, China, ²Guangzhou First People's Hospital of Guangzhou Medical University, Department of Rehabilitation Medicine, Guangzhou, China, ³The First Affiliated Hospital of Sun Yat-Sen University, Rehabilitation medicine, Guangzhou, China, ⁴The First Affiliated Hospital of Sun Yat-Sen University, Department of Neurology, Guangzhou, China

Introduction/Background: The memory cognition is impaired during aging, which could be improved by physical training, but the mechanism has never been indicated clearly. **Material and Methods:** Inhabiting with or without a wheel, 12 C57BL/6J and 12 Thy-1 GFP transgenic male mice at age of 13 months were divided into sedentary group and voluntary running group. Treated differently for one week, morris water maze task was conducted. The ISF drainage was detected by measuring the change of the fluorescent intensity around the vessel in the living brain using two-photon image. The amyloid β accumulation, microglia and astrocyte were examined using immunofluorescence staining. Dendrites loss and synaptic plasticity were examined using thy-1 GFP transgenic mice. Statistical analysis was performed by SPSS 19.0 software and independent sample *t*-test was used. *p* values <0.05 were considered statistically significant. **Results:** Firstly, compared with the sedentary group, voluntary running remarkably improved the water maze task (*p*<0.001) without effect on the swimming speed (*p*>0.05). Secondly, voluntary running significantly accelerated the change of the fluorescent intensity around the vessel along perivascular spaces of arteries (*p*<0.05) but not veins or capillaries (*p*>0.05). In addition, voluntary running significantly decreased amyloid β accumulation (*p*<0.001), the amount of microglia (*p*<0.001) and astrocyte (*p*<0.001). Finally, using Thy1-GFP transgenic mice, we found voluntary running also decreased the dendrites loss (*p*=0.001) and improved the synaptic remodeling. **Conclusion:** This important finding suggested that voluntary running accelerated the clearance of solutes and metabolites along ISF drainage, decreased the A β accumulation and inflammation, protected dendrites survival and synaptic function, eventually improved spatial memory cognition.

170

EFFECT OF DIFFERENT ATMOSPHERIC ABSOLUTE HYPERBARIC OXYGEN ON THE EXPRESSIONS OF BCL-2 AND BAX IN RATS WITH INTRACEREBRAL HEMORRHAGE

X. Li¹, Y. Chen¹

The Second Hospital of Hebei Medical University, Department of Rehabilitation, Shijiazhuang, Hebei, China

Objective: To study the effect of different atmospheric absolute (ATA) hyperbaric oxygen (HBO) on the expressions of Bcl-2 and Bax in rats with intracerebral hemorrhage (ICH). **Methods:** The collagenase-induced method was used to set up the rat models. A total of 90 male SD rats with experimental intracerebral hemorrhage were randomly divided as control group (*n*=18, Without any treatment), ICH with oxygen treatment group (*n*=18, 1.0ATA atmospheric oxygen) and ICH with HBO therapy group (*n*=54, with 90% oxygen 24 hours after ICH, once daily). The rats in the HBO therapy group were again divided as 1.8ATA HBO, 2.0ATA HBO and 2.2ATA HBO, with 18 rats in each. Rats were sacrificed at the time points of 1 d, 3 d, 5 d after HBO. Each time point had 6 rats. The expressions of Bcl-2 and Bax were detected by immunohistochemical staining. **Results:** The expression of Bcl-2 in the perihematomal area in 1.0ATA oxygen treatment was increased and showed no significant difference as compared with that in control group at days 1, 3 and 5 post-ICH (*p*>0.05). HBO therapy significantly increased the expression of Bcl-2 in the perihematomal area compared with control group and 1.0ATA oxygen treatment at days 1, 3 and 5 post-ICH (*p*<0.05), however, the effect of HBO with 2.0ATA and

2.2ATA was superior to 1.8ATA (*p*<0.05). The expression of Bax in the perihematomal area in 1.0ATA oxygen treatment, HBO with 1.8ATA and 2.0ATA was reduced and showed no significant difference as compared with that in control group at days 1, 3 and 5 post-ICH (*p*>0.05). HBO therapy with 2.2ATA significantly reduced the expression of Bax in the perihematomal area compared with control group at days 1, 3 and 5 post-ICH (*p*<0.05). **Conclusion:** HBO therapy can increase the expression of Bcl-2 and reduce the expression of Bax, consequently increase the ratio of Bcl-2/Bax, play a role of inhibition of nerve cell apoptosis and neuroprotection. The effect of HBO with 2.0ATA and 2.2ATA was superior to 1.8ATA.

171

SOCIAL PARTICIPATION IN COMMUNITY-DWELLING OLDER ADULTS THROUGH THE LIFESTYLE REDESIGN® PROGRAM

F. Kuo¹

¹Suzhou, China

Introduction/Background: The purpose of this study was to evaluate the effect of Lifestyle Redesign® on social participation in community-dwelling older adults. Social participation is a foundation for older adults' well-being. Enhancing older adults' social involvement can potentially prevent the development of depression later in life and improve health. **Material and Methods:** This was a mixed methods design study. Twelve community-dwelling older adults aged 65 years and older participated in the program. The program took place at a senior center located in central Indiana, where regular activities were provided for low-income seniors from nearby neighborhoods. Ten week occupation-based group activities from the Lifestyle Redesign® (Mandel et al., 1999) program were implemented as intervention. An exercise program was provided on the same days to the same participants as its own control. Activities included in the exercise program were line dancing, chair aerobics, yoga, etc. The order of exercise and intervention was alternated every other week to prevent rater bias. Quantitative data was analyzed using descriptive and inferential statistics. Quality of life was explored through semi-structured interviews, then analyzed using thematic analysis. Social participation was measured using the Social Profile (Donohue, 2013) at the end of each session as repeated measures. **Results:** SPSS was used for quantitative data analyses. The Wilcoxon signed-ranks and Paired sample *t*-tests indicated statistically significant differences in social participation between the two programs. Overall, quantitative results supported higher levels of social participation in the Lifestyle Redesign® program than in control. Three main themes emerged that supported participants' quality of life were well-being, peace of mind, and relationships. **Conclusion:** Community-based program has positive effects on social participation in older adults. In achieving good quality of life while aging, it is important to maintain relationships with family and friends, and finding time to support and help others in need.

172

EFFECT OF POSTOPERATIVE AMBULATION LEVEL ON THE QUALITY OF LIFE IN A TRANS-TIBIAL AMPUTEE

A. Saraf¹

¹Ludhiana, India

Introduction/Background: Quality of life of a trans-tibial (TT) amputee is not only determined by his functional rehabilitation but also social, economical and psychological rehabilitation. A number of studies have analyzed the influence of lower limb amputation on these factors. This study analysed the effect of functional recovery on other parameters of quality of life in a TT amputee. **Material and Methods:** This was a 10 years retrospective and 2 years prospective study. A total of 160 patients of trans-tibial amputation were followed. Their postoperative ambulatory status was calculated using

Pinzur's ambulatory level. Their quality of life was determined on the basis of answers to a five point questionnaire which included their social, economic and psychological aspects. These parameters were correlated to assess the influence of functional recovery on the quality of life. **Results:** All the amputees with Pinzur's 0–1 level of ambulation suffered loss of income consequent to loss of job. All of them felt increased level of depression and anxiety after amputation. 50% of the patients with postoperative 0–1 level of ambulation felt socially neglected. Comparatively much less percentage of amputees with 5–6 level of ambulation suffered economic, social and psychological crisis. **Conclusion:** Quality of life of a TT amputee is determined not only by his functional rehabilitation but also social, economical and psychological factors. From this study we concluded that post operative functional outcome significantly affects the quality of life of an amputee. An amputee with better ambulation level fares better economically, psychologically and socially in comparison to an amputee with poor ambulatory outcome.

173

THE ADULT WITH CEREBRAL PALSY

T. Paternostro-Sluga¹

¹Vienna Danube Hospital, Department of Physical Medicine and Rehabilitation, Vienna, Austria

Introduction/Background: The aim of this review is to show which factors are affecting health and well-being in adults with cerebral palsy (CP). **Material and Methods:** A literature review was done using Pub Med and Medline. The key words "cerebral palsy", "aging" and "health care programs" were addressed. **Results:** The number of adults with CP is increasing. Nowadays up to 90% of children with cerebral palsy reach adulthood. The life time expectancy is only slightly less than in the general population. Well designed multiprofessional health programs are offered for children with cerebral palsy, but often there is only limited care for the adult patient with CP. Moreover there are age related conditions and secondary factors associated with adulthood and aging in CP patients. It is described that adults with CP experience an early employment loss and health condition changes during their 40ies and later. Secondary factors in the adult with CP are habitual sedentary behaviour, obesity and premature sarcopenia. Most common age related conditions in the adult with CP are chronic pain, fatigue, reduced physical performance and weakness, osteoarthritis, cardiometabolic disease and fragility. These factors and conditions are highly affecting health and wellbeing in the adults with CP. **Conclusion:** Future care for this group should include well organised interdisciplinary health care programs aiming at improving health and well being as well as work related programs to increase employment rates for the adult CP patient.

174

COGNITIVE FUNCTION IS AN INDEPENDENT PREDICTOR OF DYSPHAGIA IN PATIENTS WITH ACUTE EXACERBATION OF CONGESTIVE HEART FAILURE

J. Yokota^{1,2}, Y. Ogawa¹, S. Yamanaka³, Y. Takahashi³, H. Fujita³, N. Yamaguchi³, N. Onoue³, T. Ishiduka³, T. Shinozaki³, M. Kohzaki¹

¹Tohoku University Graduate School of Medicine, Department of Internal Medicine and Rehabilitation Science, Sendai, Japan, ²Sendai Medical Center, Department of Rehabilitation, Sendai, Japan, ³Sendai Medical Center, Department of Cardiology, Sendai, Japan

Introduction/Background: Dysphagia causes aspiration pneumonia, malnutrition and sarcopenia. Additionally, dysphagia increases mortality and length of hospital stay in congestive heart failure (CHF) patients and sometimes disturbs enforcement of cardiac rehabilitation. Thus, early detection and intervention for dysphagia is

important in CHF patients. The aim of present study was to clarify risk factors for dysphagia in patients with acute exacerbation of CHF. **Material and Methods:** This study used a cross-sectional design. Fifty six patients, who were admitted with acute exacerbation of CHF to the Department of Cardiology, Sendai Medical Center from May to Nov 2015, enrolled in present study. Clinical interviews, blood chemistry analysis, electrocardiography, echocardiography, Mini-Mental State Examination (MMSE), exercise tolerance test, and evaluation of status of activity of daily living (ADL) and nutrition were performed on admission. After attending physicians permitted to drink water, swallowing screening tests were performed. According to previous studies, patients were divided into a dysphagia group and a non-dysphagia group on the basis of Functional Oral Intake Scale (FOIS) level. A univariate analysis was performed, and then variables with significant difference between groups were entered into a multivariate model. **Results:** Among the 56 patients, 22 had dysphagia. There were more number of female and patients, who had a history of aspiration pneumonia, and NT-proBNP were higher in the dysphagia group compared with the non-dysphagia group. Age, MMSE score, exercise tolerance, status of ADL and nutrition were lower in the dysphagia group compared with the non-dysphagia group. In multivariate analysis, MMSE score was independently associated with a dysphagia. **Conclusion:** About 40% of patients admitted with acute exacerbation of CHF have dysphagia. The present study suggests that cognitive function may be the independent predictor of dysphagia in patients with acute exacerbation of CHF.

175

ONE CASE OF HUMAN UMBILICAL CORD DERIVED MESENCHYMAL STEM CELL THERAPY IN PATIENTS WITH CRITICAL LIMB ISCHEMIA DUE TO ATHEROSCLEROSIS OBLITERANS

Xinger Li, Jianping Chen, Yuanyuan Guo, Xi Qing, Yuxuan Zhan

Department of rehabilitation medicine, The fifth affiliated hospital of Guangzhou medical university, Guangzhou, China

Introduction: To investigate the curative effect and feasibility of human umbilical cord derived mesenchymal stem cell (hUC-MSC) therapy in patients with critical limb ischemia (CLI) due to atherosclerosis obliterans (ASO). **Materials and Methods:** One patient with CLI due to ASO (Fig. 1) accepted the hUC-MSCs therapy. The treatment process and ending event were reported and the related literatures were reviewed. **Results:** Before hUC-MSC transplantation, the patient suffered from severe pain due to the bedsores in the lower extremity and the gangrene of the hallux toe. There were sinus under the bedsores which were surrounding with a lot of purulent secretions (Fig. 2A, D, G). All treatment methods including revascularization had been tried with no significant effect and the patient had been asked to accept amputation. Then the patient was treated with hUC-MSCs transplantation for five times. Sinus closed, purulent secretions disappeared, wound scabbed and dried just after three times of treatment (Fig. 2B, E, H). Six months after transplantation, the patient had his necrotic hallux toe shedding and the wound healing completely that made him avoiding amputation (Fig. 2C, F, I). **Conclusion:** This case demonstrates that hUC-MSCs therapy is an effective treatment for patients with end-stage CLI due to ASO. UC-MSCs may be the potential alternative for bone marrow derived mesenchymal stem cells (BM-MSCs) and umbilical cord blood derived stem cells in the treatment of ASO. However, the evidence is not strong enough and larger, randomized, double blind, placebo-controlled, and multicenter trials are needed.

176

EFFECTS OF CORTICAL ELECTRICAL STIMULATION ON MOTOR PLASTICITY IN RATS WITH TRAUMATIC BRAIN INJURY

C.W. Peng^{1,2,3}, T.H. Hsieh⁴, S.C. Chen¹, M.H. Chow¹, C.H. Lai¹

¹Taipei Medical University, Department of Physical Medicine and Rehabilitation, Taipei, Taiwan, ²Taipei Medical University Hospital, Department of Physical Medicine and Rehabilitation, Taipei, Taiwan, ³Taipei Medical University, School of Biomedical Engineering, Taipei, Taiwan, ⁴Chang Gung University, Department of Physical Therapy and Graduate Institute of Rehabilitation Science, Taoyuan, Taiwan

Introduction/Background: Traumatic brain injury (TBI) is a growing public health concern, with increasing needs for more rigorous measures to quantify changes in the brain post-injury. Electrophysiologic methods, and in particular, transcranial magnetic stimulation (TMS) or cortical electrical stimulation (CES), have been demonstrated to provide prognostic value in several neurological disorders. However, no study has been reported to quantify the electrophysiological changes by using CES method following TBI. **Material and Methods:** This study investigated corticomotor excitability and inhibition in TBI rat model. Cortical excitability was studied in 12 TBI and in 12 normal rats using paired pulses CES. The parameters of testing included resting motor threshold (RMT), recruitment curve (REC) of motor evoked potential (MEP) and long-interval cortical inhibition (LICI) at long intervals (50, 100 and 200 ms). Furthermore, the changes of motor plasticity induced by intermittent theta burst stimulation (iTBS) were also tested in normal and TBI animals. **Results:** The TBI group overall revealed a lower RMT and narrower recruitment curves compared to normal rats ($p < 0.05$). The alterations in LICI were more pronounced in TBI rats ($p < 0.05$). In addition, MEPs enhanced immediately after iTBS in normal rats for 30 minutes ($p < 0.05$). In TBI rats, MEPs maintained the same level after iTBS without obvious change. These results showed that TBI rats had less response to iTBS and revealed that motor plasticity was reduced in TBI rats. **Conclusion:** This study was the first to demonstrate differences in motor plasticity and intracortical inhibition in TBI animal model. Based on our results, brain injury may alter the neural activity in electrophysiological performance. Longitudinal studies in individuals with TBI would be valuable to identify this hypothesis further, which might provide prognostic biomarkers and suggest novel therapeutic strategies. **Acknowledgments:** This study was supported by grants from the Ministry of Science and Technology, Taiwan (MOST103-2221-E-038-007-MY3) to C. W. Peng.

177

PROFILE OF ELECTRODIAGNOSTIC MEDICINE CONSULTATION REFERRALS IN ACADEMIC AND NON-ACADEMIC CENTERS

S.M. Rayegani¹, S. Sadeghi²

¹Shahid Beheshti University of Medical Center, Physical Medicine & Rehabilitation Research Center, Tehran, Iran, ²Shahid Beheshti University of Medical Center, PMR Research Center-, Tehran, Iran

Introduction/Background: Background: Electrodiagnostic studies give valuable diagnostic and follow up information about neuromuscular diseases to physician with various fields. The goals of this study were to evaluate demographic description of patients referred to EDX services and referring patients to determinate the tendency between the patient's types of payment and referring necessity. **Material and Methods:** Materials and methods: All EDX data were done in 3 separate centers in Tehran, which consist of a private center, a non-academic governmental clinic (Milad hospital) and an academic governmental clinic (Shohadaye Tajrish hospital) in 2012. Data of demographic characteristics, etiology and origin of referral, and final diagnose and payment methods were gathered. **Results:** During 1 year period, 9,567 patients were evaluated by EDX tests. The most common diagnosis was CTS, lumbosacral radiculopathy and cervical radiculopathy, respectively 28%, 24% and 12%. **Results:** Result, in about one third (31%) of cases was normal. The most common roots involved in lumbosacral and cervical radiculopathies were L5 (49.5%) and C6 (42%), respectively.

Interestingly, the percent of normal reports among group of patients paid fewer or no charge (third party payment) were less than groups of patients paid more charge. **Conclusion:** Conclusion: Despite the extensive application of imaging studies, such as MRI, there is increasing tendency to electrodiagnostic studies referrals from neuromuskuloskeletal physicians. This could be attributed to complementary role of electrodiagnostic studies to imaging studies, where electrodiagnosis is as a physiologic evaluation compared to imaging studies as anatomic/structural evaluation. Also, this study shows the most prevalent diagnoses were spinal roots lesion and peripheral nerves entrapment syndromes.

178

ANALYSIS OF EARLY PHYSICAL REHABILITATION (EPR) ACTIVITIES AFTER THE DESTRUCTION OF KUNDUZ TRAUMA CARE CENTER IN AFGHANISTAN AND IMPACT ON LOCAL REHABILITATION SYSTEM

E. Weerts¹, C. Kiekens²

¹Handicap International, Emergency and Rehabilitation, Brussels, Belgium, ²Head of PMR Department, UZ Leuven, Belgium

Introduction/Background: Between 2011 and 2016, HI was involved in the setup of Kunduz Trauma Care Center (KTCC) and could measure main elements on the physical recovery of patients using EPR that were treated at different times, using an important benchmark of care between a period of a functioning KTCC and an aftermath of physical rehabilitation care when KTCC got destroyed in Oct 2015. **Material and Methods:** KTCC was set up to cater to post-surgical trauma care that progressively managed patients with orthopedic conditions and later on evolved in including peripheral nerve damage and brain trauma as well. An overview of the trauma care provided showed an increasing pattern of EPR needs complemented with psychosocial approach for patients and their caretakers. This process was accompanied by training of local Physiotherapists and developing an interdisciplinary network with surgeon, nurses, psychologists and social workers. After destruction of KTCC, alternative care systems were created in remaining hospitals trying to approach the patient care with the same care principles reducing the EPR to its basics. **Results:** Following the destruction of KTCC, data indicated significant reductions in quality of care, management capacity, reduced lengths of stay and a serious impact on the availability of post-operative services for trauma patients. Comparative data collection between both situations allowed to formulate swiftly new arising needs. **Conclusion:** The tragic destruction of the KTCC and subsequent disruption of integrated EPR delivery highlighted the benefits of an integrated approach to early rehabilitation, and the importance of its inclusion as a core standard of trauma care.

179

TELEREHABILITATION FOR MANAGING CHILD WITH POST HAND TENDON REPAIR: A CASE REPORT

A. Wayan Budi¹, R.D. Haryadi²

¹Airlangga University, Physical Medicine and Rehabilitation Department, Surabaya, Indonesia, ²Airlangga University, Physical Medicine and Rehabilitation Department Physiatrist, Surabaya, Indonesia

Introduction/Background: Indonesia is an archipelago state with more than 13,000 islands. Due to geographical conditions and distribution of the medical services are scarce in some parts of the country many patients could not have access to rehabilitation services. We a patient with rupture of the flexor and extensor tendons. Reconstructive surgery was followed by telerehabilitation. **Material and Methods:** A 3-year-old girl sustained multiple flexor and extensor tendon rupture and median nerve injury of left hand in a traffic accident in remote Papua. She underwent surgery in Sura-

baya (Java), after the surgery she was referred to PMR clinic for rehabilitation. She returned to Papua 3 weeks after surgery. We decided to continue the program with telerehabilitation. For preparation, we trained her mother how to measure the outcome (ROM, muscle strength, and sensory), and how to do gentle stretching and massage. Because there was limited access for telecommunication, the instructions for therapy and supervision were done by text message and messenger applications with mobile phone. We also sent instructions how to make hand orthoses from local materials. *Results:* After 16 weeks of the telerehabilitation, there was improvement in ROM, muscle strength, dexterity, and functional ADL. *Conclusion:* Telerehabilitation programs can be delivered even if there was no sophisticated technology. It can help to deliver rehabilitation services in remote area that was impossible to reach by the traditional methods.

180

LIVING WITH SCI: DOES SELF-EFFICACY MATTER IN PHYSICAL FITNESS?

A. Abu Bakar¹, T.Y. Chung¹, N. Hasnan¹

¹University of Malaya, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Physical fitness among individuals with spinal cord injury (SCI) is fundamental for the prevention and control of non-communicable diseases (NCD) and long-term health maintenance. Persons with SCI are among the most physically inactive individuals and are particularly at risk of developing NCDs. Self-efficacy is important in maintaining physical fitness in able-bodied individuals as well as all persons with disabilities. Therefore we conducted a study to determine association between levels of fitness and self-efficacy among persons with SCI. *Material and Methods:* A cross-sectional correlation study comprising 38 eligible individuals with SCI who were able to self-propel a manual wheelchair was carried out (31 paraplegics and 7 tetraplegics). All subjects underwent fitness assessments using the 6-Min Push Test (6MPT), validated fitness test for SCI population. Self-efficacy was measured using the Moorong Self-Efficacy Scale (MSES) validated for use in SCI populations. The subject's independence level was determined from the Spinal Cord Independence Measure (SCIM) using the recall method. *Results:* Among the paraplegics, 35.5% ($n=11$) had high fitness level and 64.5% ($n=20$) had low fitness level. All tetraplegics had low fitness level. Mean MSES for high fitness level and low fitness level in paraplegics was 100 (± 10 SD), and 89 (± 17 SD), respectively. Positive association between MSES and 6MPT distance ($r=0.454$, $p<0.05$) was found in this group. Similarly it was also seen in both 6MPT distance and Recall-SCIM ($r=0.443$, $p<0.05$) as well as MSES and Recall-SCIM ($r=0.495$; $p>0.01$). *Conclusion:* Higher self-efficacy and independence level are associated with higher fitness level. It is therefore important that rehabilitation interventions include strategies to promote and improve self-efficacy and independence. These measures may lead to higher physical activity and fitness level.

181

PHYSICAL MEDICINE AND REHABILITATION IN FLOODS: IS IT REQUIRED?

S. Nasir Mansoor¹

¹CMH Hospital Pano Aqil Sind, Rehabilitation Medicine, Pano Aqil, Pakistan

Introduction/Background: Floods are one of the most frequent natural disasters in recent history. The aim of this study was to analyze the spectrum of medical issues during floods and to document the needs for medical rehabilitation expertise during floods in Pakistan. *Material and Methods:* A questionnaire based cross-sectional survey was designed. Doctors who provided services in the flood affected areas in the acute phase were interviewed. Data recorded included the area, time since flood, number and types of patients

seen per day, medical issues encountered and opinion about the need of rehabilitation medicine physicians. *Results:* Fifty questionnaire were distributed among doctors whom have worked in flood hit areas from 2010–2015. The response rate was 68% (34). All the doctors were general duty doctors or residents in their respective specialties. The areas covered were Rahim Yar Khan, Rojan, Dera Ghazi Khan, Muzaffargarh, Rajanpur, Nowshera, Charsadda and surrounding areas. The Doctors reached the flood area between 1–4 weeks and spent an average of 30 days in the flood affected areas. Average number of patients attended was 147 patients/physician/day (range 50–450). Gastrointestinal, respiratory and skin infections were the commonest ailments followed by conjunctivitis and trauma. Trauma included minor bruises and lacerations. There was only one case each of head injury and fracture reported while no spinal cord injury was reported. None of the respondents considered early rehabilitation intervention mandatory in acute flood situation however weekly visits of medical, surgical, skin, eye, gynecologist and psychiatrist were recommended by half of the respondents. Ninety percent of the doctors considered general duty doctors and paramedics trained in flood related medical conditions sufficient to handle the situation. *Conclusion:* No specialized rehabilitation services are required in initial days of floods, general duty doctors trained in common flood related ailments are sufficient, however evacuation of previously disabled person residing in the area should be catered for.

182

AMOUNT OF PHYSICAL ACTIVITY OF ELDERLY PERSONS LIVING IN TEMPORARY HOUSING IN A RADIATION-AFFECTED AREA AFTER THE GREAT EAST JAPAN EARTHQUAKE

N. Moriyama¹, Y. Urabe¹, N. Maeda¹, S. Onoda², T. Oikawa³

¹Graduate School of Biomedical and Health Sciences- Hiroshima University- Japan, Department of Sports Rehabilitation, Hiroshima, Japan, ²Minamisoma Municipal General Hospital- Japan, Department of Rehabilitation, Minamisoma, Japan, ³Minamisoma Municipal General Hospital- Japan, Assistant Director, Minamisoma, Japan

Introduction/Background: The Great East Japan Earthquake occurred on Mar 11, 2011, which struck the northeast district of Japan. Subsequently, reactors at the Fukushima Daiichi nuclear power plant exploded. Although 5 years have passed, many evacuees are still living in temporary housing. These people are at risk for decreased physical activity, which may adversely affect their health. This study aimed to investigate the amount of physical activity of evacuees living in temporary housing, and to identify whether the amount of physical activity was related to physical fitness and quality of life. *Material and Methods:* Sixty-four residents of temporary housing in Minamisoma city, aged ≥ 65 years participated in the study. The average daily steps of each participant were measured using a triaxial accelerometer to be representative of the daily physical activity. Grasping power, muscle strength of knee extension, dynamic balance (assessed by the timed up and go test), and the quality of life (using the Short Form Health Survey ; SF-36®) were also measured. *Results:* The average daily steps were 4,716 in men and 4,165 in women. A score of “physical function”, a subscale of SF-36® was identified as a factor related to the amount of their daily steps. No relationship was observed between the amount of physical activity and physical fitness and health-related quality of life except for “physical function”. *Conclusion:* Physical activity of the elderly residents of temporary housing complexes was shown to be less compared with the national average of age-matched individuals. This decrease in their activity level puts them at risk for developing lifestyle diseases. The result of this study suggests that facilitating the performance of activities of daily living (i.e., cleaning, laundry, bathing) for the residents in temporary housing may enhance their physical activity levels, because “physical function” of SF-36® refers to the ability to perform activities of daily living.

183

IMPLEMENTATION OF THE PARM GUIDELINES FOR STROKE REHABILITATION: A ONE YEAR STUDY

C. Gonzalez-Suarez^{1,2}, J.M. Dizon², K. Grimmer³, L. Liao¹, E. Beredo^{1,4}, E. Uyehara^{1,5}, C.R. Versales⁶, V. Orpilla⁶

¹Philippine Academy of Rehabilitation Medicine, Manila, Philippines, ²Centre for Health Research and Movement Science, University of Santo Tomas, Philippines, ³International Centre for Allied Health Evidence, University of South Australia, Australia, ⁴Philippine Orthopedic Center, Quezon City, Philippines, ⁵Veterans' Memorial Medical Center, Quezon City, Philippines, ⁶University of Santo Tomas Hospital, Manila, Philippines

Introduction/Background: The Philippine Academy of Rehabilitation Medicine (PARM) developed an implementation protocol using behavioral theories, effective dissemination and implementation strategies and the needs of healthcare professionals considering patient types and practice. We evaluated the effectiveness of the implementation strategies designed to improve adherence to recommended guidelines in improving stroke rehabilitation in the Philippines. **Material and Methods:** We conducted a one year pre-post implementation mixed methods study using medical chart reviews and focus group interviews and followed the guidelines for reporting implementation studies of complex interventions. Participants were doctors and allied health professionals involved in stroke rehabilitation in the rehabilitation training hospitals in Metro Manila. The implementation strategy consisted of: (1) training in evidence-based healthcare, guideline development and the implementation plan, (2) training to use the recommended outcome measures, assessments, interventions, exercises and the forms, and (3) practice visits among all others. **Results:** Significant improvements (p values <0.05) were noted in terms of length of stay, regular evaluation for pressure sore development, pressure sore risk assessment using objective outcome measures and use of pressure relieving aids. There were variations in outcomes in the other practices descriptors and auditing guidelines in line with the key recommendations from the contextualized stroke guidelines. The health professionals perceived and valued the guideline implementation as practical and collaborative. It provided summary of effective strategies in stroke rehabilitation and standardized practice. The orientation and training, reminders and the support provided by the research team facilitated adherence to the guidelines whilst dominating habits in practice and the hierarchical structure in hospitals were considered barriers to the implementation. **Conclusion:** Improvements in some descriptors and quality indicators were seen one-year post implementation of recommended guidelines. More work needs to be done to improve adherence to all of the key recommendations and indicators to improve acute stroke rehabilitation practices.

184

COMPARING THE EFFECTS OF SENSORY CUEING TREATMENT WITH CONSTRAINT INDUCED MOVEMENT THERAPY ON ACTIVITY PERFORMANCE IN CHILDREN WITH HEMIPLEGIC CEREBRAL PALSY

A. Dong¹, K.N.K. Fong¹

¹The Hong Kong Polytechnic University, Dept. of Rehabilitation Sciences, Kow Loon, Hong Kong- China

Introduction/Background: Children with hemiplegic cerebral palsy (CP) often suffer upper limb motor impairment which impacts on activity participation. Similar to constraint-induced movement therapy (CIMT), sensory cueing treatment (SCT) was developed to reduce developmental non-use of the hemiplegic hand in children with CP. This study aimed to investigate the effects of SCT, by comparing it with CIMT, on activity performance in children with

hemiplegic CP. **Material and Methods:** In a single-blinded RCT, 73 children with hemiplegic CP aged 5 to 16 years recruited in the community, received a 75-hour intervention in 3 groups (SCT, CIMT, and conventional treatment) during 15-weekday. Participants in SCT group wore a sensory cueing wristwatch on the affected arm for 5 hour/day and underwent repetitive bimanual and/or unimanual practice; whereas children received CIMT wore a cast for immobilizing the unaffected hand for 5 hour/day and completed unimanual practice with the hemiplegic hand. Both Caregiver Functional Use Survey (CFUS) and School Function Assessment (SFA) were used for evaluating hand use in self-care and participation in school activities respectively. **Results:** Significant gains in the amount of use (AOU) and quality of use (QOU) subscale of CFUS were found after SCT (AOU=0.81, QOU=0.79) and CIMT (AOU=0.73, QOU=0.74) immediately. Both SCT ($p=0.010$) and CIMT ($p=0.030$) showed significant group difference on CFUS-AOU subscales compared with the control group, but no significant difference was found between CIMT and SCT. The Physical School Tasks Participation subscale in SFA showed a significant improvement immediate posttest in SCT (mean change =7.79) compared to the CIMT group (mean change =7.12) but significant between-group difference was found between SCT and conventional treatment only ($p=0.037$). **Conclusion:** Both SCT and CIMT were superior to conventional treatment and showed similar effects in activity performance but SCT leads to a little better hand use. That suggests that SCT can be used as an alternative approach for interventions on the hemiplegic upper extremity in children with CP.

185

LOWER LIMB MUSCLE REFLEX CONTRACTION LATENCY, PEAK FORCE AND MOVEMENT CONTROL IN CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER

S.S.M. Fong¹, S.S.M. Ng², X. Guo², Y. Wang³, W.Y. Ki⁴, D.J. Macfarlane¹

¹The University of Hong Kong, Institute of Human Performance, Hong Kong, Hong Kong- China, ²The Hong Kong Polytechnic University, Department of Rehabilitation Sciences, Hong Kong, Hong Kong- China, ³The Sixth Affiliated Hospital of Sun Yat-sen University, Department of Rehabilitation Medicine, Guangzhou, China, ⁴Emporia State University, Health- Physical Education and Recreation Department, Emporia State, USA

Introduction/Background: This novel study aimed to (1) compare neuromuscular performance, postural control and motor skills proficiencies of typically developing children and those with developmental coordination disorder (DCD); and (2) determine the associations of these neuromuscular factors with balance and motor skills performances in children with DCD. **Material and Methods:** One hundred thirty children with DCD and 117 typically developing children joined the study. Medial hamstring and gastrocnemius muscle activation onset latencies in response to an unexpected posterior-to-anterior trunk perturbation were evaluated by electromyography and accelerometer. Hamstring and gastrocnemius muscle peak force and time to peak force were quantified by a hand-held dynamometer, and balance and motor skills performances were assessed with the Movement Assessment Battery for Children (MABC). **Results:** Independent t tests results revealed that children with DCD had longer hamstring and gastrocnemius muscle activation onset latencies ($p<0.001$) and lower isometric peak forces ($p<0.001$), but not times to peak forces ($p>0.025$), than children with normal motor development. Multiple regression analysis accounting for basic demographics showed that gastrocnemius peak force was independently associated with the MABC balance subscore and ball skills subscore, accounting for 5.7% ($p=0.003$) and 8.5% ($p=0.001$) of the variances, respectively. Gastrocnemius muscle activation onset latency also explained 11.4% ($p<0.001$) of the variance in the MABC ball skills subscore. **Conclusion:** Children with DCD had delayed lower limb muscle activation onset times (neuromuscular reaction time) and lower isometric peak forces. Gastrocnemius peak force

was associated with MABC balance and ball skills performances, whereas timing of gastrocnemius muscle activation was a determinant of MABC ball skill performance in children with DCD.

186

MENTAL ATTENTION IS ASSOCIATED WITH MOTOR PERFORMANCE IN CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER

S.S.M. Fong¹, D.J. Macfarlane¹, Y.T.Y. Cheng¹, T.T.T. Yam¹, E.Y.T. Yu², S.S.M. Ng³

¹The University of Hong Kong, Institute of Human Performance, Hong Kong, Hong Kong- China, ²The University of Hong Kong, Department of Family Medicine and Primary Care, Hong Kong, Hong Kong- China, ³The Hong Kong Polytechnic University, Department of Rehabilitation Sciences, Hong Kong, Hong Kong- China

Introduction/Background: Developmental coordination disorder (DCD) is a common movement disorder among children. Motor clumsiness is related to sensorimotor deficits and possibly mental attention problems. This study aimed to (1) compare motor performance and electroencephalographic (EEG) mental attention levels in children with DCD and those with typical development; and (2) determine the relationship between motor performance and the real-time EEG attention level in children with DCD. *Material and Methods:* Eighty-six children with DCD (mean age±SD=7.9±1.7 years) and 99 children with typical development (mean age±SD=7.4±1.6 years) participated in the study. Their motor performance was evaluated with the Movement Assessment Battery for Children (MABC). The participants' mental attention levels during the tasks of the MABC were evaluated by EEG measurement of the prefrontal cortex (Fp1). An independent t test was used to compare the outcome variables between the two groups. A multiple regression analysis was also performed to examine the relationship between motor performance and the mental attention level in children with DCD. *Results:* Children with DCD had higher impairment scores on the MABC and lower EEG-derived attention scores than their typically-developing peers ($p<0.05$). After accounting for the effects of age, sex, body mass index and physical activity level, the mental attention index remained significantly associated with the total impairment score on the MABC and explained 14.1% of the variance in children with DCD and without attention deficit hyperactivity disorder ($p=0.009$). *Conclusion:* Children with DCD had inferior motor performance and were less attentive to movements than their peers with typical development. Their poor motor performance may be explained by mental inattention during functional tasks.

187

THE EFFECT OF POSITIVE AND NEGATIVE REWARD REINFORCEMENT TIME ON COMPLIANCE TO PHYSICAL THERAPY MANAGEMENT AMONG AUTISTIC CHILDREN

J. Litang III¹, L. Adorable², F.C. Creer², A.A. Reales², C.A. Caparino²

¹Southwestern University, College of Rehabilitative Sciences, Cebu City, Philippines, ²Southwestern University, College of Rehabilitative Sciences- Department of Physical Therapy, Cebu City, Philippines

Introduction/Background: Communication is a significant problem in the treatment of autism and related pervasive developmental disorders. Therapists use positive reinforcement to help their students understand which behaviors to exhibit. To create ways in achieving task/management among children with autism which needs hard time and patience is the primary reason for the formulation of the study. *Material and Methods:* With the use of quasi-experimental method of research, the goal of this study is to determine the effect of positive and negative reward reinforcements' response time on compliance to

PT management among 18 autistic children with pervasive developmental disorder not otherwise specified (PDD-NOS) age range of 7–12 years old. Three of the six variables for positive reward were toys, snacks, and tablet games and the remaining three for negative were the parents, room and soft pool of balls. The subjects were divided into 2 groups; the first 9 were given positive reward reinforcement and the other 9 were given the negative reward reinforcement before the PT management was done. Each group was given the same set of PT management which was Gross Motor Skills of crawling up to 3 meters, rolling up to 2 meters, climbing up to 1 1/2 meters and alphabet mat exercise. The completion time for each task was recorded every other day for three days. Simple percentage was used to determine the profile of the subjects and mean was used to analyze the response time on compliance in the reward system. *Results:* The response time in complying PT management is longer among autistic children in negative reward reinforcement with mean of 181.74074 seconds compared to the ones who undergone the positive reward reinforcement which only took 157.57407 seconds. *Conclusion:* Positive reward reinforcement has faster response time in complying PT management than negative reward reinforcement.

188

CASE REPORT A CHILDHOOD LEUKEMIA SURVIVOR: A GROWING CHILD WITH MUSCULOSKELETAL DISABILITY

M.A.F.A.A. Amer¹

¹Faculty of Medicine - Alexandria University, PM&R, Alexandria, Egypt

Introduction/Background: Childhood acute lymphoblastic Leukemia (ALL) is associated with skeletal morbidity. Event-free survival in ALL has improved steadily with greater tendency to develop long-term complications including musculoskeletal disability. *Material and Methods:* A 13 -year- old girl known to be leukemic (of 1 year duration) and still under treatment presented with bilateral hip pain and generalized bone aches. At presentation: Clinical evaluation, laboratory investigation: CBC, peripheral blood film examination and blood chemistry, bone marrow aspiration, X-ray and CT of both hips and DXA scan. *Treatment:* decrease weight bearing, Ca and vitamin D supplementation. Follow up after 9 months (while still under treatment): clinical and x-ray of both hips. Follow up 3 years after completion ALL treatment: clinical, laboratory investigations including serum Ca level, serum phosphorus, serum osteocalcin, serum 25 OH vitamin D, serum parathormone and serum bone specific ALP, X-ray examination of both hips and DXA. *Results:* At presentation, the patient was diagnosed to have osteonecrosis (ON) of the left femoral head. DXA scan showed significantly low BMD (Z-score of -4 at spine and -3 total body less head BMD). The patient developed bilateral severe ON of both hip joints 9 months later while still under ALL treatment. Three years after treatment of ALL has been completed, there was no improvement in BMD (Z-score of -3.6 at spine and -4 total body less head BMD), there were osteoarthritic changes in both hip joints. The patient had normal parathormone level, normal bone specific ALP, low normal serum Ca, low normal serum 25 OH vitamin D and elevated serum osteoclastin level. *Conclusion:* Thanks to advances in treatment of leukemia, an increasing population of childhood ALL survivors has grown. Unfortunately, this could be associated with increase in skeletal morbidity such as ON and low BMD. These complications can impair the survivors' health-related quality of life.

189

THE COST AND USE OF REHABILITATION IN PATIENTS WITH HEMOPHILIA A IN TAIWAN: A NATIONWIDE POPULATION-BASED STUDY

C.M. Chen^{1,2}, Y.H. Yang^{3,4}, C.C. Chen^{2,5}

¹Chang Gung Memorial Hospital- Chiayi, Physical Medicine and Rehabilitation, Puzih, Taiwan, ²Chang Gung University, School of

Medicine- College of Medicine, Taoyuan, Taiwan, ³Chang Gung Memorial Hospital- Chiayi, Traditional Chinese Medicine, Puzih, Taiwan, ⁴National Taiwan University College of Public Health, Institute of Occupational Medicine and Industrial Hygiene, Taipei, Taiwan, ⁵Chang Gung Memorial Hospital- Chiayi, Division of Hematology and Oncology- Department of Medicine, Puzih, Taiwan

Introduction/Background: Rehabilitation plays an important role in the physical health of patients with hemophilia. However, comprehensive information regarding the costs and utilization of rehabilitation for such patients remains scarce. This population-based study used a nationwide database to examine the characteristics and trends of rehabilitation costs and use in Taiwanese patients with hemophilia A. **Material and Methods:** Data from 777 patients with hemophilia A who were registered in the National Health Insurance Research Database between 1998 and 2008 were analyzed. **Results:** The total costs for physical, occupational, and speech/swallowing therapy among patients with hemophilia A during the study period were USD 184,279.8 (71.2%), 52,743.5 (20.4%), and 21,671.7 (8.4%). Although the rehabilitation costs have increased since 2004, these values have fluctuated without additional year-over-year increases. Persistently positive growth of the total number of rehabilitations year by year only occurred in the physician clinics (1998: 166 sessions; 2008: 761 sessions) and not in medical centers, regional hospitals and community hospitals. The annual rates for outpatient rehabilitation among all patients with hemophilia A went from 4.3% (29/672) in 1998 to 11.4% (85/747) in 2007. The total rehabilitation costs were <0.1% of the total annual medical costs. **Conclusion:** In Taiwan, patients with hemophilia A underutilized rehabilitation. It is essential to enhance the professional abilities of therapists who treat patients with hemophilia A and encourage these patients to utilize rehabilitation resources to improve their musculoskeletal conditions.

190

AN ECONOMETRIC ANALYSIS OF REHABILITATION MEASURES: A RESEARCH PROTOCOL

T. Bersvendsen¹, E. Abildsnes², J. Jungeilges¹

¹University of Agder, Department of Economics and Finance, Kristiansand, Norway, ²University of Bergen, Department of Global Public Health and Primary Care, Bergen, Norway

Introduction/Background: To meet the upcoming challenges of multimorbidity and an aging population, innovative healthcare technologies and interventions have to be devised. Home-based reablement (HBR) provides significant resources to focus on intensive rehabilitation measures in the patients' home for a limited period. The goal is to restore or increase patients' level of functioning, thereby increasing patients' self-reliance and consequently her dependence on healthcare services. This project's goal is to investigate whether patients who have received HBR need less healthcare services than patients who receive usual homecare. **Material and Methods:** The project sets out to contrast costs and benefits of the HBR approach and the traditional homecare approach. For the analysis we use data from the Norwegian Patient Registry, Registry for Individual-based Nursing and Care Statistics, and the Register for Control and Payment of Primary Care Reimbursement Scheme. Connecting multiple data records from these sources creates a unique data. It allows the analyst to follow an individual's use of various healthcare services over time. **Results:** An assessment of the effects of HBR will be given by an econometric model. On the basis of this formal model combining concepts from micro-economic theory, mathematics and statistics, state-of-the-art statistical techniques will be used (i) to explain existing data, (ii) to estimate the current effects attributed to home-based reablement and (iii) to provide a basis for anticipating future demand for care services. A multidisciplinary approach combining an economic, medical and statistical expertise will be needed in the project. **Conclusion:** Information concerning the quality enhancing and cost reducing potential of alternative care approaches is necessary for a meaningful discourse of alternative healthcare services. Furthermore it would

be desirable to base forecasts concerning the need for health services in the future on the model developed during the project.

191

PRESSURE ULCER IN SCI: COST ANALYSIS STUDY

S. Rajasegaran¹, S.A. Khor Keat Sim¹

¹Hospital Sultan Ismail, Rehabilitation Medicine, Johor Bahru, Malaysia

Introduction/Background: Based on recent data from Malaysian Registry of Intensive Care, the incidence of PrU in Hospital Sultan Ismail, Johor Bharu increased from 8.1 to 10.7 per 100 ICU days from 2010 until 2013. **Material and Methods:** Primary objective: to investigate and analyze the cost of PrU management amongst SCI patients over one week. Secondary objectives: to compare the cost of PrU management between paraplegics and tetraplegics. A retrospective analysis of SCI patients seen by the rehabilitation medicine team from Mar to Sep 2015 with PrU had their inpatient records reviewed over seven consecutive days based on the most eventful week. Cost analysis was based on the recommendation of costing statements by NICE guidelines. **Results:** Total of 58 patients were reviewed, of which 33 of them has preexisting PrU. 13 were tetraplegics and 20 were paraplegics. They collectively had 55 PrU with an average of 3 PrU per patient. The sacrum was the commonest site of PrU ($n=28$) and majority had Stage II ulcers. Mean weekly cost for paraplegics was RM 1,398 and tetraplegics was RM 1,516. Mean cost of PrU increased with Stage from Stage II (RM 1161) to Stage III (RM 1542) followed by Stage IV (RM 1949). The average weekly cost of all SCI patients was RM 1444 (USD 344). **Conclusion:** Higher stage of PrU resulted in higher management cost. However the true magnitude of PrU cost cannot be fully appreciated due to the subsidized healthcare system. The average weekly cost of PrU management per SCI patient is twice the minimum wage in Malaysia. It is essential to evaluate our current practice in health management of SCI patients in order to prevent the occurrence of PrU. Greater urgency to arrest the deterioration of PrU will reduce cost escalation.

192

COST-BENEFIT STUDY OF SLOVENIAN ENTERPRISES FOR PERSONS WITH DISABILITIES AND EMPLOYMENT CENTRES: IS EMPLOYMENT OF PERSONS WITH DISABILITIES BENEFICIAL FOR COMMUNITY AND PERSONS WITH DISABILITIES?

A. Tabaj¹, Č. Bitenc¹

¹University Rehabilitation Institute Soča, Development centre for Vocational Rehabilitation, Ljubljana, Slovenia

Introduction/Background: The topic presents benefits and costs of forms of social enterprises – Enterprises for PwD and Employment centres as two main forms of social economy in Slovenia. Persons with disabilities in Slovenia are mainly employed on the open labour market (80%), social economy represents approximately 20% of all employment of PwD. Work in employment centres is the direct outcome of Slovenian employment rehabilitation services. The Slovenian thematic study was prepared in 2013 by Development Centre of Employment Rehabilitation at the University Rehabilitation Institute, Republic of Slovenia. The grounds for the study are based on the Slovenian Court of Audit Report recommendations. **Material and Methods:** Cohort study-retrospective and case-study. **Results:** State-aids for enterprises for PwD were reimbursed through the state with taxes from 95–114% from 2008–2012. In years of economic crises taxes paid by enterprises were lower, whilst in economic prosperity were higher (114%) than state-aids. For employment centre different methodology was used due to the specifics, but it turned out that 1 € (100%) invested in employment centre produced 152% benefits. **Conclusion:** Final conclusion is that the costs of supporting the enterprises and employment centres

are fully beneficial for the state and for persons with disabilities and should be promoted also in the future as one of the main options for employment of persons with disabilities with severe barriers to the employment.

193

SEMINAL FLUID ANALYSES PROFILE OF HIGH AMPLITUDE VIBROSTIMULATION INDUCED ANTEGRADE EJACULATION IN PATIENT WITH COMPLETE TRAUMATIC SPINAL CORD INJURY: REPORT OF TWO CASES

A.H. Zamli¹, K.G. Ong², N.A. Ismail¹

¹Hospital Sungai Buloh, Rehabilitation Medicine, Sungai Buloh, Malaysia, ²Hospital Raja Perempuan Zainab, Rehabilitation Medicine, Kota Bharu, Malaysia

Introduction/Background: It has been reported in the Western literatures that seminal fluid analyses profile of men with complete traumatic spinal cord injury are of poor quality with distinguishing characters of abnormal sperm quantity and viability. However, there is a dearth of evidence involving men with complete TSCI in our local setting, thus the objective of this study. *Material and Methods:* A retrospective review of seminal fluid analyses of two men with complete TSCI and successfully induced antegrade ejaculation using high amplitude vibrostimulation device was performed. *Results:* Results are shown in Table 1 containing summaries of the 2 cases. *Conclusion:* Severely impaired quantitative and qualitative ejaculation fluid analyses obtained using vibrostimulation as found in our patients' seminal fluid samples are in consistent with the Western publications. Thus, similar challenges in fertility management of the local SCI men population are expected. This is pioneer research evidence with potential for local setting application especially in assisting fertility counselling and management decision options.

194

MEETING GLOBAL NEEDS FOR CANCER REHABILITATION

N. Stout¹, L. Gerber², L. Chan¹

¹National Institutes of Health, Rehabilitation Medicine, Bethesda, USA, ²George Mason University, Health Administration and Policy, Fairfax, USA

Introduction/Background: Cancer is a leading cause of morbidity and disability world wide. Many of the side effects of cancer and its treatment can be mitigated or alleviated using a rehabilitation model of care that focuses on screening, evaluation, and intervention for impairments and functional loss that may arise as individuals are treated for and recover from cancer. *Material and Methods:* Literature review reveals scant findings regarding clinical practice guidelines for evaluation and assessment of patients with cancer-related functional impairment and disability. Little published clinical research addresses the functional sequela from impairments and whether these impairments should guide treatment. Further, there is little guidance offered regarding selection and use of clinical measurement tools that enable accurate screening and evaluation. There is a considerable need to outline international collaborative partners to develop guidelines for evaluation and rehabilitation treatments of patients with cancer throughout the various stages and phases of treatment and survivorship. In order to maximize patients' functional potential we will need to develop a roadmap for the future. *Results:* A strong evidence base exists to support cancer rehabilitation components of care delivery. However, there has been little focus on coalescing these supportive aspects of care into an agreed upon, comprehensive care delivery model for cancer rehabilitation. *Conclusion:* Future efforts should focus on creating an international coalition to work towards outlining the needs of the field and to generate concrete practice guidelines.

J Rehabil Med Suppl 55

195

REHABILITATION FOR METASTATIC SPINAL CORD COMPRESSION

S.A. Khor¹, R. Zainal¹, S. Rajasegaran¹, C.H. Phua¹, S.R. Zakaria¹, A.S. Yahaya¹

¹Hospital Sultan Ismail, Rehabilitation Medicine, Johor Bahru, Malaysia

Introduction/Background: Rehabilitation needs of cancer patients vary according to the stage and site of cancer involvement. The study objectives were to determine the common types of rehabilitation intervention required by patients with metastatic spinal cord compression (MSCC). *Material and Methods:* Retrospective review of a hundred consecutive cancer inpatients referred to Rehabilitation physician. Types of rehabilitation intervention provided by the rehabilitation team were analyzed between patients with or without MSCC. The severity of spinal cord injury was quantified using Lower Extremity Motor Score (LEMS). *Results:* Sixty cancer patients had MSCC with neurological deficit. Majority of patients had thoracic lesion ($n=36$), followed by cervical lesion ($n=15$) and lumbar lesion ($n=9$). Four patients had lesions in the spine but no neurological deficit. MSCC was associated with greater need for bowel management ($p=0.004$), bladder management ($p<0.001$), pressure ulcer management ($p=0.035$) and equipment prescription ($p=0.004$). Patients with more severe motor deficit (LEMS less than 25) were more likely to require bowel and bladder management ($p=0.002$). There was no difference in the need for respiratory management ($p=0.134$), musculoskeletal management ($p=0.073$), gait training ($p=0.166$) and ADL retraining ($p=0.661$) between the two groups. *Conclusion:* A multidisciplinary rehabilitation team with greater emphasis on specialized rehabilitation nursing should be prioritized for cancer patients with MSCC. Optimal management of MSCC must include neurogenic bowel care, neurogenic bladder care and pressure ulcer care. The rehabilitation interventions prescribed must be weighed according to patient's individual circumstances.

196

THE ROLE OF CONSERVATIVE METHODS TO INDUCE ANTEGRADE EJACULATION IN MEN WITH COMPLETE TRAUMATIC SPINAL CORD INJURY

A.H. Zamli¹, N.A. Ismail¹, K.G. Ong¹

¹Hospital Sungai Buloh, Rehabilitation Medicine, Sungai Buloh, Malaysia

Introduction/Background: Anejaculation is a known complication of men with complete traumatic spinal cord injury (TSCI) and this is one of the major challenges for fertility intervention. In Malaysia, the only available modality for medically assisted sperm retrieval is using surgical techniques. However, its availability is very limited, costly and involves high surgical expertise. Additionally, surgical sperm retrieval is an invasive procedure which carries potential risk of medical complications. The objective of this study is to determine the role of conservative methods to induce ejaculation in men with TSCI in our local setting. *Material and Methods:* All referral for non-surgical sperm retrieval trials from Aug 2014 to Nov 2015 were included. Each patient was subjected to conservative methods to induce ejaculation in a sequential manner. Prostatic stimulation was performed at 1 minute interval until completed 5 cycles, failing which low amplitude penile vibratory stimulation (PVS) was attempted for 2 minutes at 1 minute interval until completed 5 cycles. Upon failures of both methods, patients were further subjected to high amplitude PVS for 2 minutes at 1 minute interval until completed 5 cycles. Successful outcome was defined as occurrence of antegrade ejaculation. *Results:* 15 patients fulfilled all study criteria. The average age was 35.46 ± 7.00 years while the duration of injury was 9.86 ± 5.85 years. Fifty three percent (53%) of study subjects had neurological level at and above T6 while 47% had neurological level below T6. Induced ejaculations were unsuccessful with either prostatic massage or using low amplitude PVS.

The use of high amplitude PVS yielded an overall success rate of 53.3%. The success rates of patients with lesion at T6 and above and below T6 were 66.7% and 28.5% respectively. *Conclusion:* High amplitude PVS was the only method proved to have a role to induce ejaculation in men with complete TSCI in our local setting.

197

SURGERY SPARING EFFECT OF EPIDURAL STEROID AND GRAVITY LUMBAR REDUCTION THERAPY IN CONSERVATIVE TREATMENT OF PROLAPSED LUMBAR INTERVERTEBRAL DISC

A. Naorem¹¹JN Institute of Medical Sciences- Porompat, PMR, Imphal, India

Introduction/Background: Conservative treatment is the first choice in treatment of prolapsed lumbar intervertebral disc. Surgery is indicated when conservative treatment fails. Objective of the study was to study the effectiveness of two conservative methods: Epidural Steroid Injection (ESI) and Gravity Lumbar Reduction Therapy (GLRT) program in sparing back surgery. *Material and Methods:* 131 patients, male: female 59:82, of mean age – 51.6 ±11.6 years; suffering from PIVD, for mean duration of 10.58 ±3.8 weeks were included. Epidural steroid injection under fluoroscopic guidance was done 2 times in 2 weeks time. If there was no adequate improvement after 2 doses, GLRT was given 3 times daily; each session lasting for 30 minutes at the tolerated degree for 3 months. Improvement was assessed by using physician-specific parameters, like pain by VAS, degree of SLRT positivity, restriction of forward flexion in inches and claudication distance in meters, patient-specific functional score: ODI. At least 50% improvement in these scores was considered adequate. *Results:* Analysis of results was done by students' *t* test and chi square test. Mean base-line VAS score 6.48 reduced to 3.15 at 3 weeks, mean SLRT degree increased from 61.43 to 80.54, mean claudication distance increased from 89 meters to 237, mean restriction of forward flexion of spine decreased from 11 to 3.1 inches; and spine-specific function ODI decreased from 11.09 to 3.08. The subjects were followed for minimum of 6 months (Mean –7.4 ±2.3). Of 104 patients available to follow-up, 9 (8.6%) fail to improve. Of 9 cases who did not improve 4 were subjected to surgery within 2 months. *Conclusion:* Conservative management of PIVD with epidural steroid injection and GLRT was effective in avoiding back surgery in about 90% cases.

198

PES ANSERINUS TENDINITIS/BURSITIS AFTER TOTAL KNEE ARTHROPLASTY: MESOTHERAPY TREATMENT - OUR EXPERIENCE

J. Moreira¹, R. Lopes¹, R. Sales Marques¹, J. Rios¹, S. Estrela Rego¹, V. Milet¹, G. Leandro¹¹Centro Hospitalar do Algarve, Physical and Rehabilitation Medicine, Faro, Portugal

Introduction/Background: The term pes anserinus refers to the conjoined insertion of the sartorius, gracilis and semitendinosus muscles along the proximal medial aspect of the tibia. Pes anserinus tendinitis/bursitis is a common cause of knee pain and its development is associated with many causes, including gonarthrosis and, sometimes, the subsequent total knee arthroplasty (TKA). Mesotherapy is a minimal invasive technique that consists of subcutaneous injection of drugs with the objective of prolonging their effects at local level. *Material and Methods:* Our purpose was to determine the efficacy and safety of mesotherapy with ketorolac and lidocaine for pes anserinus tendinitis/bursitis associated with TKA, refractory to conservative treatment. We conducted a retrospective study where we evaluated 42 patients on our outpatient clinic, who were submitted to TKA. After exclusion criteria were applied, 8 patients remained. The WOMAC and VAS scales were assessed at baseline (3 weeks after initiating physiotherapy). Patients were submitted to mesotherapy at baseline, 2 and 4 weeks. The WOMAC and VAS

scales were applied at 6 and 12 weeks and adverse events were recorded. *Results:* 8 patients (8 TKAs), all women, were submitted to mesotherapy treatment and included in the present study. Mean age of 67.25 years and mean BMI of 27.6 kg/m². 4 TKAs were left and 4 right. Mean VAS values before mesotherapy treatment and at 6 and 12 weeks after were 7, 2.5 and 3.5, respectively. Mean WOMAC values before mesotherapy treatment and at 6 and 12 weeks after were 52.8, 25.6 and 38.2, respectively. The only adverse event was echimosis in the site of injection, in 2 patients. *Conclusion:* Mesotherapy treatment with ketorolac and lidocaine for pes anserinus tendinitis/bursitis after TKA, refractory to conservative treatment, seems to be a safe and effective technique.

199

THE EFFECTIVENESS OF CONSERVATIVE TREATMENTS IN THE MANAGEMENT OF IDIOPATHIC FROZEN SHOULDER: A SYSTEMATIC REVIEW OF RANDOMISED CONTROLLED TRIALS

E. Barrett¹, N. de Burca², K. McCreesh³, J. Lewis⁴¹Limerick, Ireland, ²University College Hospital Galway, Physiotherapy Department, Galway, Ireland, ³University of Limerick, Department of Clinical Therapies, Limerick, Ireland, ⁴University of Hertfordshire, Department of Allied Health Professions and Midwifery, Hertfordshire, United Kingdom

Introduction/Background: Frozen shoulder (FS) is a debilitating condition characterized by shoulder pain and a progressive loss of range of motion (ROM). In current practice, consensus is lacking regarding the optimum treatment pathway for patients with FS. A previous review has gathered the evidence for the management of FS up to 2010 (Favajee et al 2011). The aim of this systematic review was to synthesize evidence for the conservative management of idiopathic FS using randomized controlled trials (RCT's) from 2010 onwards. *Material and Methods:* The systematic review was registered with PROSPERO (CRD42015013728). Nine databases were searched by two independent reviewers. Trials were included if they investigated a conservative treatment in patients with idiopathic FS. Risk of bias was assessed by two independent reviewers using the Cochrane Collaboration's Tool for risk of bias. The Tugwell grading system was used to rank the strength of evidence. Effect sizes for pain, function and ROM were calculated to allow comparison between treatments. *Results:* Twenty-six relevant RCTs were included. The review found silver level evidence for corticosteroid injection, therapeutic exercise, shoulder joint mobilizations and acupuncture for improving short-term pain, ROM and function. There is single trial evidence to suggest that intra-articular botox, capsular distension and shockwave therapy may be as effective as corticosteroids for improving pain and ROM in the short-term. Whole-body cryotherapy, hyaluronic acid injections and suprascapular nerve block (SSNB) were reported to be effective adjuncts to physiotherapy by single trials. Supervised neglect and subcutaneous adalimumab injections were found to be ineffective by single trials. *Conclusion:* Practitioners should consider corticosteroid injection, exercise, shoulder joint mobilizations and acupuncture for improving pain, function and ROM in patients with idiopathic FS. Botox injection, hyaluronic acid injection, capsular distention, whole-body cryotherapy, shockwave therapy and SSNB may also be effective but require further research. Future trials should consider long-term follow-up, adequate power and disease stage.

200

COMPARISON BETWEEN THE EXTERNAL KNEE ADDUCTOR MOMENT AND KNEE FLEXOR MOMENT IN HEALTHY WOMEN WHO WALKED BAREFOOT AND WEARING HIGH HEEL SHOES

A. Pawana¹, I. Subadi¹, D.I. Sari¹¹Airlangga University Faculty Medicine, Dept of Physical Medicine & Rehabilitation, Surabaya, Indonesia

Introduction/Background: Millions of women use high heel shoes at work and social activities, but few know the effect of the force generated when using high-heeled shoes. Deviation of alignment due to high heels cause increased external knee adduction moment and flexor moment. The second moment can be used indirectly as the size of the load received knee on the medial side of the tibiofemoral joint. Several studies have reported that high-heeled shoes give a negative impact in the form of joint pain and improve knee progressive degenerative predispose to OA of the knee joint. To compare between the external knee adductor moment and knee flexor moment in healthy women who walked barefoot and wearing high heel shoes. **Material and Methods:** Fourteen healthy women age 26–35 years old were request to walking barefoot in floor 8 meter long and after that walking with high heel shoes 9 cm height. All subjects have no experience and daily use of high heel shoes. The motion of walking analyzed with C-Max Gait Analysis System. **Results:** There was significant difference knee adduction moment between walking in bare foot and 9 cm heel shoes. And also there was significant difference knee flexor moment between walking in bare foot and 9 cm heel shoes. **Conclusion:** Increasing height of heel shoes will increase moment adduction and flexion in the knee joint.

201

PERFORMANCE OF WOMEN WITH FIBROMYALGIA IN WALKING-UP STAIRS WHILE CARRYING A LOAD

N. Gusi¹, D. Collado-Mateo¹, P.R. Olivares², F.J. Dominguez-Muñoz¹, C. Maestre-Cascales¹, J.C. Adsuar¹

¹University of Extremadura, Faculty of Sports Sciences, Caceres, Spain, ²Universidad Autonoma de Chile., Instituto de Actividad Física y Salud, Talca, Chile

Introduction/Background: Fibromyalgia is a chronic disease that has a relevant impact on physical conditioning and the ability to perform activities of daily living. The objective was to analyze the step-by-step-performance and the trunk tilt of women with fibromyalgia in the 10-step stair climbing test compared with healthy controls. **Material and Methods:** The current study was a cross-sectional study. Twelve women suffering from fibromyalgia and eight healthy controls were recruited from a local association. Participants were asked to climb 10 stairs without carrying a load and 10 stairs with a load of 5kg in each hand. Mediolateral trunk tilt was assessed using the wireless motion capture device “Functional Assessment of Biomechanics (FAB)”, and the time between steps was assessed with weight bearing insoles. **Results:** Mean trunk tilt in the stair-climbing task carrying a load was significantly higher in women with fibromyalgia compared to healthy controls (2.31 (0.63) vs. 1.69 (0.51) respectively). Load effect was significantly higher for women with fibromyalgia compared with healthy controls at the intermediate and final part of the task. **Conclusion:** Trunk tilt in the stair climbing while carrying a load was higher for women with FM, which could increase the risk of falling. Additionally, women with FM experienced a higher slowdown as a consequence of the load, which supports the need of including specific strength and resistance training to physical therapies for this population. The current study has been co-funded by the Spanish Ministry of Economy and Competitiveness with the reference DEP2012-39828. This study has been also co-funded by the Government of Extremadura and European Union Regional Development Funds (FEDER), a way of making Europe (ref. GR10127). DCM is supported by a grant from the Spanish Ministry of Education, Culture and Sport (FPU14/01283). He was previously supported by a Predoctoral Fellowship from the Fundación Tatiana Pérez de Guzmán el Bueno.

202

THE EFFECTIVENESS OF TRANSFORAMINAL EPIDURAL STEROID INJECTION IN PATIENTS WITH RADICULAR LOW BACK PAIN: COMBINING

THE RESULTS WITH PREDICTIVE VALUE OF PAIN PROVOCATION

E. Adigüzel¹, D. Tecer², M.A. Taşkaynatan¹, A.K. Tan¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey, ²Gazi University, Department of PMR- Division of Rheumatology, Ankara, Turkey

Introduction/Background: Low back pain is the most common cause of disabilities all over the world. Epidural steroid injections are one of the most commonly used interventions in radicular back pain. **Material and Methods:** The effect of this study was to investigate the efficacy of transforaminal ESI on pain relief and functional impairments and to define whether pain provocation during injection has an effect on pain relief in mid-long term. Sixty two patients were included. All of the injections were done with C-arm fluoroscopy guidance and using a mix of betamethasone and lidocaine. Questionnaires, including a 100 mm visual analog scale (VAS), Oswestry disability index (ODI), and Short Form-36 were administered before injection, at 2 weeks, and 12 weeks after the injection. Also while injection of the drugs, patients were asked for any pain provocation. **Results:** The most frequent level of intervention was L5 level. While mean initial VAS score was 76.3±14.6 mm, it was reduced to 44.8±18.7 mm and 33.7±25.3 mm, respectively, at 2 and 12 weeks. While mean initial ODI score was 25.8±7.9 mm, it was reduced to 17.4±7.8 mm and 13.8±9.1 mm, respectively, at 2 and 12 weeks. All subgroup scores of SF-36 improved significantly in the follow-up period. Improvements in outcome measurements were statistically significant at 2 and 12 weeks after injection ($p<0,05$). Patients with positive pain provocation had significantly better pain relief in comparison with moderate or negative pain provocation. **Conclusion:** In this follow-up study, we found that TFESI is effective at both early periods and mid-long term as well. Pain provocation can predict better pain relief.

203

EFFECT OF WIIHABILITATION SYSTEM ON STRENGTH RATIO OF ANKLE MUSCLES IN ADULTS

A.A.E.H. Khalil¹, G.A.E. Mohamed¹, S.M. Abd Elrahman¹, N.S. Nassif¹

¹Faculty of Physical Therapy Cairo University, Biomechanics, Cairo, Egypt

Introduction/Background: The use of Wii training for rehabilitation has received substantial attention in the last few years. It is effective in improving balance and functional performance. It introduces a novel, feasible and low cost intervention for physical therapy field. However, there are no previous studies investigating its effect on strength ratios. Therefore, the study was conducted to examine the effect of Wii training on ankle muscles strength ratio in adults. **Material and Methods:** Thirty two male healthy volunteers participated in the study. They were randomly assigned into two equal groups (experimental and control). Participants in the experimental group performed Wii training program for six weeks. Data were collected using the Biodex Isokinetic system 3. Peak torque of dorsiflexors and planter flexors from the dominant ankle was measured at an angular velocity of 60°/sec which in turn used to derive ankle dorsiflexion/plantarflexion strength ratio. **Results:** 2×2 Mixed Design ANOVA revealed that the mean values of ankle dorsiflexion/plantarflexion strength ratio declined significantly ($p<0.05$) between the “pre” and “post” test records in the experimental group, meanwhile for the control group the difference between the “pre” and “post” test records was not significant ($p>0.05$). **Conclusion:** Wiihabilitation has an impact on ankle dorsiflexion/plantarflexion strength ratio. So, it can provide an effective training tool in terms of muscular strength and ankle strength ratio. Thus, it could be recommended in both prevention and rehabilitation of patients with chronic ankle instability.

POSTER ABSTRACTS (MAY 29–JUNE 2, 2016)

**CLINICAL PHYSICAL AND REHABILITATION
MEDICINE SCIENCES: CLINICAL PHYSICAL
AND REHABILITATION MEDICINE SCIENCES:
PAIN - ACUTE PAIN**

204

**A RARE CAUSE OF HIP PAIN: TRANSIENT OSTEO-
POROSIS**

Ü. Güzelküçük¹, Y. Demir¹, K. Tezel¹, K. Aydemir¹, B. Yılmaz¹

¹Gulhane Military Medicine Academy, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Transient osteoporosis of the hip is a rare cause of hip pain, and mostly affecting women in the third trimester of pregnancy as well as middle-aged men. *Material and Methods:* We present a case of transient osteoporosis of the hip in a 37-year-old male patient with a history of suddenly onset hip pain one month ago. *Results:* In physical examination, abduction and external rotation of the right hip was limited due to pain. His gait was antalgic. Laboratory values and radiogram of the femur were within normal ranges. Magnetic resonance imaging showed homogeneous high signal intensity on T2-weighted images consistent with the diagnosis of transient osteoporosis. His pain decreased within one month after joint protection and limited weight bearing in addition to diclofenac 75 mg twice a day for ten days. *Conclusion:* This case highlights the importance of considering a diagnosis of transient osteoporosis of the hip in patients who present with suddenly onset hip pain. Avoiding excessive activity is important in order to avoid pathologic fracture.

205

**UNUSUAL LOCATION OF THE CHONDROMYXOID
FIBROMA**

S. Lahrabli¹, F. Imidmani¹, A. El Fatimi¹

¹CHU IBN ROCHD, Physical Medicine and Rehabilitation, Casablanca, Morocco

Introduction/Background: The chondromyxoid fibroma is a rare benign bone tumor that represents less than 1% of all bone tumors and may raise diagnosis problems to the pathologist. *Material and Methods:* We report the case of a 46-year-old woman with no particular history, admitted for management of painful swelling of the 2nd left toe without alteration of her general condition. Clinical examination found a mass at the dorsum of the third phalanx of the second left toe, painful, hard and fixed at the deep plan. Foot X-ray showed an osteolytic lesion of the phalanx with dented outlines. The patient underwent a resection of the mass with the establishment of a small cortico-cancellous graft taken from the ipsilateral iliac crest and maintained by racking. *Results:* Pathological examination of the piece of surgical resection showed a chondromyxoid fibroma. The outcome was favorable with no clinical or radiological abnormalities after 10 months of decline. *Conclusion:* Bone tumors are rarely located in the foot; this low incidence exposed to delays and errors in diagnosis and in treatment decisions. The chondromyxoid fibroma is a rare benign tumor of the bone (2% of benign tumors). Pain is the most common symptom. If it affects long bones most of the time, its location in short or flat bones is rare. Imaging makes the positive diagnosis, and its treatment is the surgical resection of tumor tissue with filling the residual cavity by cortico-cancellous tissue to prevent recurrence.

206

**EPIDEMIOLOGICAL AND ETIOLOGICAL PROFILE
OF SHOULDER PAIN IN PHYSICAL MEDICINE
EXPERIENCE OF PHYSICAL MEDICINE AND
FUNCTIONAL REHABILITATION CHU IBN ROCHD
CASABLANCA MOROCCO: ABOUT 100 PATIENT**

S. Lahrabli¹, L. Fatima¹, A. El Fatimi¹

¹CHU IBN ROCHD, Physical Medicine and Rehabilitation, Casablanca, Morocco

Introduction/Background Objectives: Identify painful pathologies of the shoulder and describe their epidemiological characteristics during an ambulatory activity of physical and rehabilitation medicine over a period of year. *Material and Methods:* This is a retrospective study of the records of patients treated on 2 years for painful shoulder in a consultation of Physical and Rehabilitation Medicine of CHU of Casablanca (Morocco). We studied the epidemiological and the clinical parameters. *Results:* Of 1098 consultants, 100 patients consulted for painful shoulder (9%), the average age of patients was 55 years, with a female predominance. The most frequent pathologies were tendinopathy of the rotator cuff and adhesive capsulitis. The mean disease duration was five months. Analgesics are prescribed in almost all cases, the number of rehabilitation sessions and the number of infiltration was different depending on the etiology. *Conclusion:* Shoulder pain is a common reason for consultation in physical medicine; it is usually associated with pathology of the rotator cuff or adhesive capsulitis. Systematic scrutiny and allows to reach a lesion diagnosis allowing proper care is taken.

207

**THERAPEUTIC ULTRASOUND ATTENUATES POST-
INCISIONAL PAIN IN RATS**

C.Y. Liu¹, C.H. Hung¹, Y.W. Chen²

¹National Cheng Kung University, Physical Therapy, Tainan, Taiwan, ²China Medical University, Physical Therapy, Taichung, Taiwan

Introduction/Background: Post-incisional pain, a form of acute pain, is a paresthesia caused by abnormal stimulation in peripheral sensory nerve results from lesions in tissue, which usually last for a week. Further, a better management of postoperative pain results in faster recovery. Comparing Opioids which are common treatment for postoperative pain with therapeutic ultrasound, the later is more conservative and has fewer limitations. However, there is few study of using therapeutic ultrasound for post-incisional pain. Therefore, the purpose of this study was to investigate whether ultrasound therapy (USD) can reduce hypersensitivity of post-incisional pain. *Material and Methods:* We used an animal model of paw-incision (PI) operation in plantar side of the rat right hind paw to induce post-incisional pain. The rats were separated into six groups, including naive group, PI group, PI with 100% duty cycle USD group, PI with 20% duty cycle USD group, and PI with sham therapy group. The rats were given treatment once a day from the post-operative day 0 to post-operative day 5. Additionally, we used Von Frey Aesthesiometer and Plantar Test to determine allodynia and hyperalgesia respectively. *Results:* We found that PI group decreased the response at withdrawal latency and withdrawal threshold with significant differences compared with naive group. Furthermore, PI with USD group reached the best effect at 1 hour after treatment. Moreover, the level of withdrawal threshold return to baseline on post-operative day 2. Only the ultrasound therapy with

100% duty cycle showed significant differences when compared with sham therapy group. *Conclusion:* Therapeutic ultrasound, especially with 100% duty cycle, have the best effect to relieve pain at 1 hour after treatment and attenuates post-incisional allodynia within 2 days.

208

NATIONAL INDUSTRIAL KYOTO JAPANESE SWEETS CRAFTSMAN RETURN TO WORK FROM SEVERE PAIN WITH INCOMPLETE CERVICAL SPINAL CORD INJURY : A CASE REPORT

A. Oh¹¹Ashiya, Japan

Introduction/Background: A 65-year-old man got traffic incomplete cervical spinal cord injury. (ASIA D central cord) Tough preoperation views lower limbs muscular strength MMT 5 level, standing and walk was normal, elaborate nature of both hands but the left hand was affected remarkably (no writing, no skill of button) With particular acute unpalpable severe pain to both sides finger, it seems impossible to return to work to operate copper pot and to make a delicate Japanese confection. *Material and Methods:* He was performed laminoplasty C3/4/5/6/7 at 12 days after injury and reopened rehabilitation intervention from the next day. The numbness of the right fingers disappeared early, and both sides were expansion and contraction, opposition, the leading possibility together, but, as for the finger exercise, left exquisiteness characteristics were still low significantly. *Results:* Muscle training around the shoulder and movement training was performed. He improved the elaborate nature by performing the synkinesis of the fingertip of both fingers. This movement was movement even using in actual occupation. The muscle weakness around the left shoulder remained, but with gotten dexterity of both hands make the some power work possible. *Conclusion:* We can lead it to return to work by skill and improvement of the power by combine doing an early operation at early stage and high rehabilitation of the intervention for the patient who need a high finger function making a Japanese delicate sweet.

209

PREVALENCE OF IRRITABLE BOWEL SYNDROME IN HEADACHE PATIENTS

M.L.S. Tai¹, A.A. Asraff¹¹University of Malaya, Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Headache, particularly migraine, has been linked with irritable syndrome (IBS). The enteric nervous system as a source of numerous neurotransmitters and visceral reflexes is a possible aetiology to explain the link between IBS and migraine. In particular, serotonin is the main neurotransmitter of the gastrointestinal tract with role in the pathogenesis of IBS and migraine. An understanding of the relationship between IBS and migraine results in effective treatment of both diseases, with improvement of quality of life. The objectives of the study were to evaluate determine the prevalence of irritable bowel syndrome in Malaysian patients with primary headache and also to evaluate the quality of life in headache patients. *Material and Methods:* The patients with headache aged ≥ 18 years old were recruited from the neuromedical clinic in University Malaya Medical Centre. Age and gender matched controls without headache, comprising of relatives of patients were recruited. IBS questionnaire by World Gastroenterological Association was used to evaluate IBS. EQ-5D Health Questionnaire (EuroQol) was utilised to assess the health outcome. The outcome measures were mobility, self-caring, activities, pain/discomfort and anxiety/depression. *Results:* There were 13 patients with migraine, 12 patients with tension-type headache and one patient with mixed headache. *Conclusion:* Only one headache patient possibly had IBS. Headache patients had more problems with pain

and anxiety/depression compared to controls. The limitation of the study was small sample size.

210

PROLOTHERAPY FOR MUSCULOSKELETAL DISEASES: A SINGLE-CENTER ONE-YEAR ANALYSIS

L. Tekin¹, E. Ata¹, S. Akarsu¹, M.Z. Kuralp¹¹GATA Haydarpasa Training Hospital, Physical Medicine and Rehabilitation Medicine, Istanbul, Turkey

Introduction/Background: Pain is one of the most significant causes of disability around the world. The pain of musculoskeletal disease often occurs depending tendon and ligament injuries. Prolotherapy has been thought of as a method healing and strengthening ligaments and tendons. Hypertonic dextrose is the most common injectant. Accordingly, we aimed to assess the efficacy of a prolotherapy injection in the treatment of pain due to musculoskeletal disorders. *Material and Methods:* All patients were treated with a proliferant solution containing 16.5% dextrose and 0.01% lidocaine. 0.5 mL of proliferant was injected into the each points which are sensitive to palpation over the ligaments and tendons. Injections were typically done on three weekly interval. A total five injections were done in 3 month's time if needed. Patients were reevaluated of 3 months following their last prolotherapy session. *Results:* Totally 46 patients were analyzed. The average number of injections is 4.8 ± 1.3 . VAS score, SF-36 score showed significant improvement in the all patients. There were no adverse events. *Conclusion:* As this retrospective study, dextrose prolotherapy appears to be a safe and effective method for treating chronic musculoskeletal pain. Yet, future studies are needed for explaining the exact mechanism of dextrose.

211

A SUBCUTANEOUS HEMATOMA AS A COMPLICATION OF DRY NEEDLING

L. Tekin¹, E. Ata¹, A.B. Çarlt¹, S. Akarsu¹¹GATA Haydarpasa Training Hospital, Physical Medicine and Rehabilitation Medicine, Istanbul, Turkey

Introduction/Background: A 59-year-old woman presented with neck pain. Dry needling of the upper trapezius and neck muscles usually improves pain and disability in these patients. In our patient, her complaints worsened after dry needling session. Thereafter we planned magnetic resonance image (MRI) which revealed a hyperintense mass at the C2-T2 level, which also was confirmed by ultrasound to be a subcutaneous hematoma. Subcutaneous hematoma after dry needling is quite unusual and it has not been reported before in the literature. Herein, we present for the first time a case with acute cervical subcutaneous hematoma which developed dry needling. The aim of this case report is to improve awareness of this complication. *Material and Methods:* A case report. *Results:* Symptoms related to the subcutaneous hematoma resolved after anti-edema treatment. *Conclusion:* By highlighting the favorable outcomes that can be achieved with prompt management, we aimed to improve awareness in this particular complication to remind the physicians who applied dry needling of the importance of being aware of the subcutaneous hematoma. The practitioners who perform this procedure should have good knowledge of human anatomy. Moreover, continuous attention must be paid throughout the whole treatment procedure.

212

USE OF THE NON-MEDICATION ON THE TREATMENT OF ACUTE DISCOGENIC LOW BACK PAIN

O. Tondiy¹¹Kharkiv, Ukraine

Introduction/Background: The effect of the combination of the physical therapy (low-frequency variable magnetic field, electrical stimula-

tion) and of the acupuncture on the patients having discogenic low back pain was investigated. *Material and Methods:* 82 patients aged from 20 to 50 (38 females and 44 males) having acute (14–20 days) low back pain (osteochondrosis, osteoarthritis, spondyloarthritis) were observed. The pain was examined and measured according to the visual analogue scale. The patients were divided into two groups. The first group (60 patients) received in addition acupuncture (individual points) and physical therapy with low-frequency variable magnetic field and electrical stimulation treatment on the projection of pain. Every procedure exposure was 12–15 min. The complete course was 10–12 procedures. The second group (control, 22 patients), received only the basic medication (non-steroid anti-inflammations and myorelaxants). *Results:* The pain intensity of the patients in the first group was reduced after 7–10 days of treatment (70% patients) compared to the control group, where pain reduction after 14–16 days of treatment (44.4 patients); $p < 0.01$. *Conclusion:* The addition of the non-medication therapy (combination of acupuncture, low-frequency variable magnetic field and electrical stimulation) to the treatment of acute discogenic pain resulted in earlier remission.

213

TRANSCUTANEOUS ELECTRIC NERVE STIMULATION ALLEVIATES HYPERALGESIA CAUSED BY SKIN INCISION SURGERY IN RATS

H.L. Yang¹, C.H. Hung¹, Y.W. Chen²

¹National Cheng Kung University, Physical Therapy, Tainan, Taiwan, ²China Medical University, Physical Therapy, Taichung, Taiwan

Introduction/Background: Hypersensitivity caused by post-operative pain arise from central sensitization includes allodynia and hyperalgesia. Morphine and anti-inflammatory drugs are common use for pain control after surgery, but these drugs have side effects. Transcutaneous electric nerve stimulation (TENS) could cure pain via gate control theory that can change conducting pathway of nociception without invasion and side effects. The aim of this study is to characterize the effect of TENS on hypersensitivity caused by skin incision surgery. *Material and Methods:* Six week-old rats were randomly assigned into five groups: Naïve group, skin incision group (SI), SI with high frequency TENS group (HF), SI with low frequency TENS group (LF), and SI with sham treatment group (sham Tx). One cm-long skin incision is on the rats back and applied TENS immediately after the operation. TENS were set respectively at 100 Hz and 2 Hz, 20 mins/day for 6 days. Von Frey filament test was at 1h, 2 h, 4 h, 24 h after the treatment at primary and secondary area. The rats showed twitching reflexes on the skin when they sensitized mechanical stimulations as nociceptive stimulations. *Results:* HF and LF significantly attenuates postoperative ipsilateral primary and secondary hyperalgesia. TENS could suppress secondary hyperalgesia from the post-operative day 1 to post-operative day 6. However, the data showed no effect on allodynia. *Conclusion:* TENS could alleviate post-operative hyperalgesia and that is a local effect.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: PAIN - CHRONIC GENERALISED PAIN SYNDROMES (INCLUDING FIBROMYALGIA)

214

THE EFFICACY OF KINESIOTAPING IN THE TREATMENT OF LOW BACK PAIN ASSOCIATED WITH PREGNANCY

S. Akarsu¹, E. Ata¹, A.B. Carlı¹, D. Akarsu², A. Yılmaz³, L. Tekin¹

¹GATA Haydarpasha Training Hospital, Physical Medicine and Training Hospital, Istanbul, Turkey, ²Haydarpasha Numune Train-

ing And Research Hospital, Gynecology and Obstetrics, Istanbul, Turkey, ³GATA Haydarpasha Training Hospital, Gynecology And Obstetrics, Istanbul, Turkey

Introduction/Background: Most women develop some degree of musculoskeletal pain in pregnancy. The hormones progesterone and relaxin both cause the increased joint laxity necessary for parturition. Mechanical factors such as postural changes (lumbar hyperextension) probably also contribute to the musculoskeletal symptoms of pregnancy. Although joint laxity, and fluid retention within the lumbar discs are contributing causes, the major cause for the pain is usually due to exaggerated lordosis (sway back) which results in spasm of the lumbar muscles. Tender and tight muscles around the spinal column can typically be found on examination. Kinesio-taping technique facilitates circulation and motion due to elevation of skin and subcutaneous tissue, decreases inflammation and pain. *Material and Methods:* It was designed as prospective clinical trial. The aim was to evaluate the efficacy of kinesio-taping for the treatment of low back pain associated pregnancy in terms of pain and quality of life. The kinesio-taping was applied to the lumbar region of the patients who was clinically diagnosed with low back pain associated pregnancy. The kinesio-taping was applied for 2 consecutive 4-day intervals. Self-reported pain Visual Analogue Scale, Oswestry disability index and quality of life (SF-36) scores were measured at baseline, and after the treatments. *Results:* We report the results of an ongoing study in which 25 patients have been treated. All parameters which include Visual Analogue Scale, SF-36, Oswestry disability index after treatments were significantly better than at baseline in all groups. No any side effects were observed in the study. *Conclusion:* Findings demonstrated that Kinesio taping would be an effective method for reducing low back pain and improving functional performance. The application of kinesio-tape to the lumbar region in pregnancy who presented with low back pain may be a safe treatment option to relieve pain and improving quality of life.

215

DOES KINESIOTAPING INCREASE THE EFFICACY OF THE TREATMENT OF MYOFASCIAL PAIN SYNDROME?

E. Ata¹, M. Kosem¹, L. Tekin¹, M.Z. Kiralp¹

¹Gulhane Military Medical Academy - Haydarpasa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Myofascial pain syndrome is a regional pain condition that was caused by trigger points in muscle or muscle fascia. The most frequent symptoms are muscle pain, tenderness, and disability. The gold standard of treatment for MPS-infiltration of trigger points with local anesthetic. In recent years, Kinesio taping has been used to support injured muscle and joints, and relieve pain. In this study, the question of whether the kinesio-taping will contribute to trigger point injection in the treatment of myofascial pain syndrome was investigated. *Material and Methods:* Prospective, randomized, single-blinded, clinical trial using a repeated measures design. The study was designed to compare the effects of a local anesthetic (LA) injection, LA injection + sham kinesio-taping, and LA injection + kinesio-taping for the symptoms of MPS in terms of pain and quality of life. The subjects clinically diagnosed with MAS were randomly assigned to 1 of 3 groups. The patients in the group 1 received only injection treatment. Subjects in group 2 (sham kinesio-taping) and group 3 (kinesio-taping) wore the tape for 2 consecutive 3-day intervals, in addition to injection therapy. Self-reported pain (Visual Analogue Scale) and quality of life (SF-36) scores were measured at baseline, immediately after treatments, at 1 week and 1 month posttreatment. The patient satisfaction survey was also applied. *Results:* We report the results of an ongoing study in which 66 patients have been treated. All parameters at immediately after treatments, at 1 week and 1 month posttreatment were significantly better than at baseline in all groups. In comparison between the groups, better results were obtained in group 3 (LA injection

+ kinesio-taping). *Conclusion:* Results suggest that kinesiotaping after trigger point injections may increase the efficacy of treatment.

216

IS THERE A ROLE OF PER3 GENE VNTR POLYMORPHISM AND CLOCK GENE T3111C SNP POLYMORPHISM IN PATHOGENESIS OF FIBROMYALGIA SYNDROME ?

G. Aydın¹, A. Gozukucuk², D.B. Sayın³, H. Özdemir⁴, E. Yorulmaz⁵, A. Tosun⁶

¹Yıldırım Beyazıt University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Turkey, ²Adana Numune Training and Research Hospital-, Department of Physical Medicine and Rehabilitation, Adana, Turkey, ³Kirikkale University Faculty of Medicine, Department of Medical Biology and Genetics, Kirikkale, Turkey, ⁴Kirikkale University Faculty of Medicine, Psychiatry, Kirikkale, Turkey, ⁵Haydarpaşa Numune Training and Research Hospital, Department of Physical Medicine and Rehabilitation, İstanbul, Turkey, ⁶Izmir Katip Celebi University- Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Izmir, Turkey

Introduction/Background: Fibromyalgia syndrome (FMS) is a soft tissue rheumatism in which there is a widespread pain accompanying fatigue, stiffness and sleep disturbances. Etiology and pathogenic mechanisms are still unknown but it is suggested that environmental and genetic factors may play role in etiopathogenesis. In last studies about etiopathogenesis of mood and sleep disturbances it is shown that genetic variations of clock genes coding zones which regulates circadian rhythm is associated with diurnal preference, sleep disturbances and mood alterations. This reminds that the genes which regulate the circadian rhythm may contribute in the etiopathogenesis of FMS in which sleep disorders and depression are frequent. We planned to examine the probable effect of VNTR polymorphism of Per3 gene and T3111C polymorphism of clock gene in etiopathogenesis of FMS. Both of these genes are accused in sleep disturbances and depression and they regulate circadian rhythm. *Material and Methods:* In this aim 113 women with FMS were included in this study and control group was consisted of 88 healthy women. Socio-demographic characteristics, symptoms and signs of all the cases were recorded. All patients were assessed according to DSM-IV criteria by a psychiatrist. Fibromyalgia Impact Questionnaire, Visual Analog Scale, Beck Depression Inventory, Pittsburgh Sleep Quality Index and Horne-Ostberg Questionnaire were applied to all cases. VNTR polymorphism of Per3 gene and T3111C polymorphism of clock gene was analyzed with DNA sampling. *Results:* All parameters were compared between FMS and control groups and there was no statically significant difference between two groups. Our results suggest that these polymorphisms do not play a significant role in the genetics of FMS. *Conclusion:* However to clarify the effects of circadian rhythm genesis polymorphisms in the development of FMS and the relationship between comorbid conditions, further clinical studies with larger series that assess more variable associated with circadian genesis are needed to have more accurate consequences.

217

AN UNUSUAL LOCALIZATION OF HETEROTOPIC OSSIFICATION

A. Carli¹, I. Comertoglu², H. Turgut³, E. Ata⁴

¹Golcuk Military Hospital, Physical Medicine and Rehabilitation, Kocaeli, Turkey, ²Kasimpasa Military Hospital, Physical and Rehabilitation Medicine, İstanbul, Turkey, ³Bursa Military Hospital, Orthopedic Surgery, Bursa, Turkey, ⁴Gulhane Military Medical Academy- Haydarpaşa Training Hospital, Physical and Rehabilitation Medicine, İstanbul, Turkey

Introduction: Heterotopic ossification (HO) is defined as the formation of extra-skeletal bone inside soft-tissue. HO occurs following burns, chemical or physical trauma, fractures, injuries and in patients with genetic susceptibility. Although the clinical examination provides important diagnostic information; conventional radiography, ultrasound, magnetic resonance imaging and computer tomography are used to identify and characterize these lesions. *Case Report:* A 37-year-old male presented with a palpable mass on the lateral aspect of his left ankle. He did not remember any trauma to the left ankle. He declared that a gradual swelling on the lateral malleolus had been present since 2 years. X-ray of the ankle demonstrated a local heterotopic ossification area above the lateral malleolus. We referred the patient to the orthopedic service for surgical removal. *Discussion:* The objective of this report was to describe an unusual localization of heterotopic ossification that occurred without any predisposing factor. In patients with ankle pain and swelling, even if there is not a history of trauma or surgery, HO should be kept in mind.

218

THE M.P.R (MIOFUNCTIONAL AND POSTURAL REHABILITATION) A NEW AGE IN PHYSICAL REHABILITATION

S. Di Rocca^{1,2}, S. Shutz^{3,4}, P. Ortelli^{1,5}

¹M.P.R International School, Director, Bioggio, Switzerland, ²Associazione di Posturologia Interdisciplinare Svizzera, Vice President, Bioggio, Switzerland, ³M.P.R International School, Medical Director, Bioggio, Switzerland, ⁴Associazione di Posturologia Interdisciplinare Svizzera, President, Bioggio, Switzerland, ⁵Associazione di Posturologia Interdisciplinare Svizzera, Secretary, Bioggio, Switzerland

Introduction/Background: Posturology is the medical science that studies the body's static posture while Posturometry is the medical science used to measure the results. *Material and Methods:* In medical rehabilitation they are of crucial importance from the holistic point of view in both the diagnosis and treatment. The M.P.R. (Myofunctional and Postural Rehabilitation) is a method, that uses both posturology and posturometry, for a complete diagnosis, planning and treatment, in medical sciences, to treat patients with neuromuscular diseases. *Results:* Posturlogy allows medical sciences, to have a global and holistic approach, where as posturometry is used to scientifically measure posturology, transforming it into Science. By using posturology and posturometry in combination, this method allows medical sciences, to reach at the root of the problem. *Conclusion:* Combining both the results in rehabilitation will be pernanet, and longlasting. The aim of this poster, is to show the basis of posturology and posturometry, applied in the M.P.R.

219

THE EFFECT OF BO'S ABDOMINAL ACUPUNCTURE THERAPY ON SHOULDER-HAND SYNDROME AFTER STROKE

H. Chen¹, R. Pan¹, L. Zan¹, M. Li¹, Y. Guo¹, M. He¹, J. Zhan¹

The 2nd Affiliated Hospital, Guangzhou University of Chinese Medicine, Guangzhou, China

Objective: To observe the clinical therapeutic efficacy and safety of Bo's abdominal acupuncture therapy in treating Shoulder-hand syndrome after stroke. *Methods:* sixty-two participants with shoulder-hand syndrome after stroke were recruited and randomized to the treatment and control groups. The treatment group was given Bo's abdominal acupuncture therapy and regular rehabilitation exercise, while the control group was offered regular rehabilitation exercise alone. The acupuncture points were Zhongwan (CV 12), Shuifen(CV 9),Shangqu (KI 17 ipsilateral),Wailing(ST 26 ipsilateral), Huaroumen (ST 24 ipsilateral), Shangfengshidian (ipsilateral)

and Shangfengshiwaidian (ipsilateral). Treatment was conducted for 2 weeks. The outcome measure were Visual Analogue Scale (VAS), painless passive range of motion (PROM) of external shoulder rotation, Upper extremity section of Fugl-Meyer Assessment (FMA), Simple Test for Evaluating Hand Function (STEF) scores, and the degree of wrist swelling (DWS), administered before and after treatment. Results: The treatment group showed significant improvement on the VAS, PROM and DWS scale compared with that in the control group. No significant difference was observed on the FMA and STEF between the two groups. No serious adverse events were reported in this study. **Conclusion:** Bo's Abdominal acupuncture therapy resulted in significant improvement in shoulder-hand syndrome after stroke, especially in relieving the shoulder pain and the degree of wrist swelling, improve the PROM scale of the shoulder.

220

PHYSIOTHERAPY IN THE TREATMENT OF DISTURBANCES OF AUTOREGULATION OF CEREBRAL CIRCULATION IN PATIENTS WITH POST-CONCUSSION SYNDROME

I. Iakubenko¹, T. Litovchenko¹, L. Shevchenko², I. Kas²

¹Kharkov Medical Academy of Postgraduate Education, Neurology, Kharkov, Ukraine, ²Central Clinical Hospital Ukrzaliznytsi, Neurology, Kharkov, Ukraine

Introduction/Background: In the mechanism of a headache in patients with post-concussion syndrome one of the main components is a disturbances of autoregulation of cerebral circulation. The purpose of our research was to determine the effect of physiotherapy on the autoregulation of cerebral circulation in patients with post-concussion syndrome. **Material and Methods:** We observed 25 patients with consequences of traumatic brain injury. All patients were examined by Doppler ultrasound. Patients were divided into two groups: the first group were patients who received standard therapy. The second group included patients who received standard therapy and in addition physiotherapy using the method of magnetic therapy and darsonvalization. **Results:** In the first group we observed changes in the form of increased linear velocity of blood flow (BFV) to 0.33 ± 0.04 before treatment and 0.34 ± 0.02 after treatment. RI before treatment was 0.97 ± 0.02 and 0.94 ± 0.05 after treatment. PI before treatment was 1.76 ± 0.01 and 1.68 ± 0.02 after treatment. In the second group we observed increase in linear BFV to 0.32 ± 0.03 before treatment and 0.41 ± 0.04 after treatment. RI before treatment was 0.97 ± 0.02 and 0.86 ± 0.04 after treatment. PI before treatment 1.74 ± 0.03 and 1.21 ± 0.05 after treatment. **Conclusion:** The use of physiotherapy treatment in patients with the consequences of traumatic brain injury leads to normalization of autoregulation of cerebral blood flow by increasing the linear velocity of blood flow in the carotid arteries and decreasing of resistance indexes.

221

THE EFFECT OF HYPERMOBILITY ON MUSCULOSKELETAL DISORDERS IN YOUNG ADULTS

A. Ketenci¹, T. Sahbaz¹, C. Medin Ceylan¹, M.D. Korkmaz¹, B. Cigdem Karacay¹

¹Istanbul University Istanbul Medical Faculty, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: The aim of this study is to investigate the frequency of hypermobility and to analyze the relationship with musculoskeletal disorders in healthy individuals between 18–25 years. **Material and Methods:** A total of 196 individuals with no known musculoskeletal problems were included. Patients were evaluated according to the Beighton and Brighton hypermobility criteria. Individuals were questioned about their head, neck, back, waist and peripheral joint pain frequency and intensity. Presence of pes planus and subluxation of the jaw were investigated. 18 tender point assessment for fibromyalgia was done for each indi-

vidual. **Results:** 196 individuals (109 women/94 men) were evaluated. Mean age was 22.2 ± 1.43 years. Hypermobility was detected in 73 patients (37.2%) according to Beighton criteria, and in 42 patients (21.4%) according to Brighton criteria. There was statistically significant correlation between Brighton and Beighton criteria ($p < 0.0001$). According to the tender point examination 5 people were diagnosed with fibromyalgia. There was no statistically significant correlation between hypermobility and fibromyalgia ($p < 0.307$). 42 people revealed varying degrees of pes planus at the foot examination. There was no statistically significant correlation between hypermobility and pes planus ($p < 0.216$). There was no statistically significant correlation between hypermobility and subluxation of the jaw, head, neck, back, waist and peripheral joint pain frequency and severity. **Conclusion:** Hypermobility can be seen in 5–15% of healthy individuals without any symptoms or with chronic pain complaints. In our study hypermobility frequency is detected as 37.2% in young adults, which is higher than general population. Late onset of musculoskeletal disorders and young age of our study group may explain the lack of correlation between musculoskeletal disorders and hypermobility.

222

COGNITIVE BEHAVIORAL THERAPY-BASED EXERCISE FACILITATION METHOD USING THE "IKIIKI REHABILITATION NOTEBOOK" IN PATIENTS WITH CHRONIC PAIN

S. Kimura¹, Y. Sogawa¹, T. Harigai¹, N. Nomoto¹, N. Endo²

¹Niigata University Medical and Dental Hospital, Rehabilitation Center, Niigata, Japan, ²Niigata University Medical and Dental Hospital, Orthopedic surgery, Niigata, Japan

Introduction/Background: "Ikiiki" in Japanese means "active". The purpose of this study was to evaluate the efficacy of a cognitive behavioral therapy (CBT)-based exercise facilitation method using the "Ikiiki Rehabilitation Notebook" for patients with chronic pain. **Material and Methods:** The subjects were 4 males and 6 females (19–77 years of age, mean age 46) with chronic low back and/or lower extremity pain without specific lesions. Indications for using the notebook were as follows: 1) Numeric Rating Scale (NRS) for pain > 3 , and 2) the continuity of the pain > 3 months. Patients were asked to write in their notebooks daily regarding their emotion, mood, anxiety, and exercise routine (muscle exertion, gait distance). Once every 2 weeks, the patients returned to the clinic to go over the notebook/journal. The evaluation contents were NRS, PDAS (Pain Disability Assessment Scale), HADS (Hospital Anxiety and Depression Scale), PCS (Pain Catastrophizing Scale), EQ-5D (EuroQol 5 Dimension), AIS (Athens Insomnia Scale), PSEQ (Pain Self Efficacy Questionnaire). **Results:** The NRS, PDAS and EQ-5D, but not the other contents, improved significantly 8 months after starting to use the notebook. **Conclusion:** The "Ikiiki Rehabilitation Notebook/Journal" is a tool to educate patients about the cause and treatment of pain and to actively facilitate CBT-based exercise.

223

THE EFFECT OF GRADED EXERCISE ON FEAR-AVOIDANCE BELIEFS AND DISABILITY IN CHRONIC MECHANIC LOW BACK PAIN PATIENTS

A. Nazir¹, T. Prabowo¹, S.B. Sastradimaja¹

¹Hasan Sadikin Hospital, Physical Medicine and Rehabilitation, Bandung, Indonesia

Introduction/Background: Chronic low back pain (LBP) is a serious problem which could lead to varying degree of disabilities. The biggest portion of treatment expenses is due to its disabilities, therefore, the main goal of chronic LBP treatment should be reducing disabilities. Fear-avoidance beliefs (FAB) defined as activity limitation driven by fear, were thought to be an important factor causing disabilities. Graded exercise tends to reduce FAB, further to increase

physical activities and decrease disabilities. This kind of exercise has not been studied much and has become variable on its application. We want to implement this therapy in commonly found chronic mechanic LBP patients. **Objective:** To investigate the effect of graded exercise on FAB value and disability index in chronic mechanic LBP patients. **Material and Methods:** This is an interventional study with pre- and post- intervention measurement. The study was conducted in Dr. Hasan Sadikin General Hospital Bandung between Mar and May 2013. Sixteen subjects who met the inclusion and exclusion criteria were given gradually-increased exercise twice a week up to the sixth session. The outcome measures were Fear-Avoidance Beliefs Questionnaire-Physical Activity (FABQ-PA), Fear-Avoidance Beliefs Questionnaire-Work (FABQ-W), and Oswestry Disability Index (ODI). **Results:** There was a significant reduction on FAB value and disability index after intervention, tested with Wilcoxon Matched Pairs Test ($p < 0.05$). **Conclusion:** Graded exercise reduces FAB value and disability index in chronic mechanic LBP patients.

224

THE EFFECT OF LOW-LEVEL LASER THERAPY ON PAIN IN CARPAL TUNNEL SYNDROME

N. Noegraheni¹

¹Surabaya, Indonesia

Introduction/Background: Musculoskeletal diseases associated with daily activities or occupation have reached the highest proportion of epidemiology in recent years. Among the frequently encountered ones, Carpal Tunnel Syndrome (CTS) is the most common one. It is a peripheral mononeuropathy of median nerve which is increasingly found among workers or housewives. **Material and Methods:** This is an observational study using pre- and posttest design. The study was conducted in Outpatient Department of Physical Medicine and Rehabilitation of Haji Hospital, Surabaya. The samples were 27 female aged 23 to 64 years olds who had been given LLLT for five times in three weeks. The outcome was measured using scale of Visual Analog Score (VAS) before and after the course of treatment. **Results:** Before and after the course of treatment, the mean VAS was 5.33 ± 1.240 and 1.78 ± 0.982 respectively. The mean difference of VAS before and after the treatment was 3.56 ± 1.423 ($p < 0.0001$). Therefore, there was significant difference of VAS before and after the treatment ($p < 0.05$). **Conclusion:** Low-level laser therapy has shown to be able to reduce the degree of pain in Carpal Tunnel Syndrome.

225

THE COMPARISON OF EFFECTIVENESS OF AEROBIC EXERCISE AND AEROBIC EXERCISE WITH KINESIO TAPING TREATMENTS IN FIBROMYALGIA SYNDROME

B. Seferoglu¹

¹Ataturk University Medical Faculty, Physical Medicine and Rehabilitation, Erzurum, Turkey

Introduction/Background: Fibromyalgia syndrome is a common rheumatological condition characterised by chronic widespread pain and reduced pain threshold, with hyperalgesia and allodynia. **Material and Methods:** 40 patients with Fibromyalgia syndrome according to American College of Rheumatology (ACR) 1990 criteria for the classification of Fibromyalgia syndrome were included in this study and the patients were divided into two equal groups. We performed aerobic exercise program for 8 weeks to first group and aerobic exercise program for 8 weeks with Kinesio taping for 15 days to second group. Patients were evaluated by the Visual Analogue Scale (pain, fatigue, morning stiffness and sleep problem), Fibromyalgia Impact Questionnaire, Beck Depression Inventory, Short Form-36 and total tender point score at baseline and after the treatment. Statistical tests were conducted at the 0.05 significance level for all outcome measures. **Results:** We found that aerobic exercise and aerobic exercise with Kinesio taping treatment approaches

were effective on reducing the severity of pain, fatigue, morning stiffness and number of tender points ($p < 0.001$), reducing the severity of sleep problem ($p < 0.01$), improving the physical functioning ($p < 0.001$), improving the quality of life ($p < 0.05$) and reducing the level of depression ($p < 0.001$). When the efficacy of two treatments approaches was compared to each other, aerobic exercise with Kinesio taping treatment was more effective than only aerobic exercise treatment on reducing the severity of pain ($p < 0.001$), fatigue ($p < 0.05$) and sleep problem ($p < 0.05$), improving the physical functioning ($p < 0.05$) and improving the physical functioning and bodily pain ($p < 0.05$) subscales of Short Form-36. **Conclusion:** Our results suggested that aerobic exercise is a effective treatment method on reducing the symptoms and level of depression, improving the physical functioning and quality of life and Kinesio taping method provides a significant benefit in patients with Fibromyalgia syndrome. Further studies are needed to determine the effectiveness of Kinesio taping in treatment of Fibromyalgia syndrome.

226

CAUSES OF GENERALIZED MUSCULOSKELETAL PAIN AMONG PATIENTS ATTENDING PHYSICAL MEDICINE AND RHEUMATOLOGY CLINICS

T. Shafshak¹, E. Saba², E. Aly²

¹Alexandria, Egypt, ²Faculty of Medicine- Alexandria University, Physical Medicine- Rheumatology & Rehabilitation, Alexandria, Egypt

Introduction/Background: Generalized musculoskeletal pain (GMP) refers to axial pain involving the right and left side of the body; and extending to the upper and lower body segments. Fibromyalgia is a common cause for GMP. However, other causes may also contribute to GMP. The aim of this study was to identify the prevalence of the different causes of GMP among patients attending physical medicine and rheumatology clinics in Alexandria University Hospitals. **Material and Methods:** 100 patients with GMP were included. After careful examination (clinical, musculoskeletal and neurological examination); the appropriate investigations were performed whenever needed to confirm the diagnosis. The investigation done included the appropriate laboratory blood test (e.g. blood cell count, ESR, uric acid level, ANA, Thyroid hormone levels, parathormone level, Rose-Waaler, Anti-CCP, ALP, calcium level, phosphorus level and/or osteocalcin level) and the appropriate imaging procedure (e.g. X-ray, ultrasonography, CT, DXA and/or MRI). **Results:** The different causes of GMP in the studied patients were: primary generalized osteoarthritis (27%), rheumatoid arthritis (22%), primary fibromyalgia (14%), psychogenic rheumatism (8%), secondary fibromyalgia (5%), myofascial pain (3%), multiple sclerosis (1%), and mixed problems (20%). In the mixed problems group, GMP was due to concomitant occurrence of more than one cause of pain (e.g. osteoarthritis, spondylosis, spondylolisthesis, intervertebral disc prolapse, nerve root involvement, tenosynovitis, epicondylitis, plantar fasciitis, rheumatoid arthritis, painful neuropathies, carpal tunnel syndrome, periarthritis of the shoulder and/or osteoporosis). **Conclusion:** GMP can be caused by different disorders. Therefore, through clinical examination should be done to identify the exact cause of GMP before treatment is given.

227

AURICULAR ACUPUNCTURE FOR TREATING FIBROMYALGIA

L. Tekin¹, M.F. Abut²

¹GATA Haydarpaşa Training Hospital, Physical Medicine and Rehabilitation Medicine, Istanbul, Turkey, ²Private Clinic, Department of Acupuncture, Istanbul, Turkey

Introduction/Background: Fibromyalgia (FMS), which the cause is still unknown, is characterized widespread musculoskeletal multiple tender points, pain, fatigue, and low quality. The combination therapy is often preferred for a variety of symptoms. Nevertheless, there is no effective treatment. FMS is well known to be closely as-

sociated with stress. Indeed, the key components of FMS are pain and especially stress. Stress is the worst detriment to health Triggers the “fight or flight” response. In these patients, the sympathetic system is constantly hyperactive. Sometimes, the only way to turn off the adrenaline system and activate parasympathetic system is to eliminate the pain and stress. The autonomic and central nervous system could be modified by auricular acupuncture (AA). There are numerous studies showing that AA is effective on disorders including musculoskeletal pain, depression, insomnia, and other conditions regarding hyperactivity of the sympathetic system. A 42-year-old woman previously diagnosed with FMS was seen with widespread pain, irritability, exhaustion, and decreased quality of life. She had poor response to previous treatments. We decided to use AA, as it is the safest and effective alternative modality that can be often used in patient with FMS. *Material and Methods:* The patient received treatment 2 times a week for 7 weeks. Each treatment involved standard cleansing of the skin with alcohol and insertion of disposable, sterile, 0.25×40 mm length needles pricked to a depth of 1–2 mm for 20 min. *Results:* The patient’s symptoms gradually attenuated through the treatment course. At 3 months’ and 1 year’ follow-ups, she had minimal pain. Additionally, she said that she felt more relaxed and better. Overall, she also reported that the increased quality of life. *Conclusion:* We report a successful case of using AA to relieve symptoms of a patient with FMS. Consequently, AA for stress-related disorders such as FMS is a good treatment option in selected patients.

228

THE EFFECT OF DRY NEEDLING IN PATIENTS WITH NON-SPECIFIC SHOULDER PAIN: RESULTS OF AN ONGOING STUDY

L. Tekin¹, E. Ata¹

¹GATA Haydarpaşa Training Hospital, Physical Medicine and Rehabilitation Medicine, Istanbul, Turkey

Introduction/Background: Shoulder pain is a common musculoskeletal complaint and may cause an important functional disability. However, there is no definitive treatment to this painful condition. The aim of this study was to evaluate the effects of dry needling in patients with non-specific shoulder pain. *Material and Methods:* Prospective case control study. To date, 14 patients with shoulder pain lasting for more than one month were included in this study. All patients, before treatment, after treatment, and one month later, were evaluated in terms of the range of motion, Visual Analogue Score and Short Form-12. The patient satisfaction survey was also applied. *Results:* The authors report the results of an ongoing study in which 14 patients have been treated with dry needle therapy because of nonspecific shoulder pain. All patients showed significantly greater improvements in all parameters which included ROM, VAS, SF-12 and patient satisfaction survey. *Conclusion:* Results suggest a dry needling can be effective in reducing symptoms and improving function in patients with non-specific shoulder pain.

229

CLUNEAL NERVE ENTRAPMENT AND LIPOMA IMPINGEMENT: A CASE OF REFRACTORY LOWER BACK PAIN AND REVIEW OF THE LITERATURE

R. Y. Xu¹

¹New York, USA

Case Background: Patient is a 40 year-old professional golfer who was referred to our physiatry office for refractory lower back pain after traumatic fall one year prior and subsequent exacerbation during a golf swing. Pain was primarily in right lower back, radiating into buttock and posterolateral thigh with occasional left-sided symptoms. It was characterized as “torch-like” and “burning”. Symptoms were aggravated by sitting and lying on back. Previous procedures, including lumbar epidural steroid injection (ESI), piriformis and sacroiliac joint injections, and R L4–5 hemilaminectomy,

provided no significant relief. Incidentally, tender lipoma over right iliac crest was found and partially resected with complete pain relief for a week. In our office, direct compression of supra-gluteal region reproduced burning buttock and thigh pain. We suspected cluneal nerve entrapment so patient underwent medial superior cluneal nerve exploration and release from thoracolumbar fascia. A large lipoma of 9.6×8.5×2.9 cm lying directly over the nerve was resected. He also had successful diagnostic L5 transforaminal ESI in the interim so simultaneous L5-S1 foraminotomy was also performed. *Results:* Left-sided burning pain completely resolved. Right-sided relief was moderate and burning pain was complicated by swelling at surgical site. At time of abstract submission, patient was scheduled for ultrasound-guided cluneal nerve injection. *Discussion:* We describe a complex case of radiating back pain that could not be attributed to radiculopathy alone. Given successful diagnostic injections, it is possible that patient had L4 and L5 radiculopathy. However, not all radicular pain is purely radiculopathy. An unfortunate sequence of injuries and lipoma impingement also predisposed this patient to cluneal nerve entrapment. This patient’s symptoms and risk factors are consistent with those described in literature. *Conclusion:* Patients frequently have multiple superimposed causes of back pain. In presentations of predominantly unilateral back and buttock pain, cluneal nerve entrapment must be considered, especially in those with risk factors.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: PAIN - COMPLEX REGIONAL PAIN SYNDROMES

230

IMAGE GUIDED INJECTIONS OF BOTULINUM TOXIN TO BLOCK PAIN PATHWAYS

S. Geffen¹

¹Rehab+Fitness, Rehabilitation, Woolloongabba, Australia

Introduction/Background: Botulinum toxin (BTX) is now known to act on mechanisms of vesicular endocytosis and exocytosis common to the release of many neurotransmitters including amines, amino acids and peptides. These actions help explain BTX’s analgesic efficacy in treatment of chronic pain disorders (Wheeler and Smith, 2013). *Material and Methods:* We utilized BTX to provide targeted blockade in persistent pain disorders involving facial, chest and back sites. BTX-A doses of 100–400 i.u. were injected under computerised tomography (CT) guidance either at intra-muscular, intra-articular sites, and/or as a subcutaneous regional block. Three cases are described to illustrate the versatility of the technique and the duration of its action. Subject 1 had classic migraine and atypical facial pain associated with jaw movements and received BTX-A bilaterally in masseter and pterygoid muscles in addition to standard BTX migraine treatment (Diener et al, 2010). Subject 2 had chronic lower back pain associated with spastic lower limb diplegia secondary to cerebral palsy and received BTX-A to psoas and iliacus muscles, in addition to intra-articular long acting corticosteroid. Subject 3 had unilateral persistent post-traumatic chest and shoulder pain and received both an intra-articular sternomanubrial injection of BTX plus corticosteroid and a regional BTX block at several intramuscular and subcutaneous sites. *Results:* All three reported substantial pain relief for 3–4 months from treatment. All three reported functional gains following treatment. *Conclusion:* Botulinum toxin should be considered for use in persisting pain syndromes where muscle spasm and/or spasticity are a factor.

231

EFFECTIVENESS OF STELLATE GANGLION BLOCKADE USING LIGHT IRRADIATION IN PATIENTS WITH COMPLEX REGIONAL PAIN SYNDROME

C.D. Liao^{1,2}, L. Tsan-Hon^{1,3}, H. Yi-Ching⁴

¹Shuang Ho Hospital-Taipei Medical University, Department of Physical Medicine and Rehabilitation, Taipei, Taiwan, ²National Taiwan University, College of Medicine- School and Graduate Institute of Physical Therapy, Taipei, Taiwan, ³Taipei Medical University, Graduate Institute of Injury and Prevention, Taipei, Taiwan, ⁴National Taipei University of Nursing and Health Sciences, Department of Exercise and Health Science, Taipei, Taiwan

Introduction/Background: Stellate ganglion block (SGB) has been mostly used to relieve symptoms of Complex regional pain syndrome (CRPS) with several potential complications been reported. Noninvasive SGB application using light irradiation (SGI) can be clinically used as an alternative to conventionally injective SGB. However, the application protocol varied in previous studies and the clinical efficiency of SGI remains controversial. This study was aimed to identify the effects of SGI for patients with CRPS. **Material and Methods:** A comprehensive search of online database including Medline, PubMed, Ovid literature search engine, Embase, Europe PubMed Central, Cochrane, EBSCOhost online research databases, ProQuest Research Library, the Physiotherapy Evidence Database, WorldWideScience, Biosis, and Google Scholar databases, was performed to identify quasi-randomized or randomized controlled trials (RCT) that reported the efficacy of SGI in treating CRPS. The selected studies were subjected to a meta-analysis and risk of bias assessment. **Results:** Ten quasi-randomized controlled trials and 2 RCTs were included in the analysis. The results of the meta-analysis including the pain scores indicated that SGI is more effective compared with placebo sham irradiations (standard mean difference: -2.89; 95% confidence interval: -5.66 to -0.12). The risk of bias assessment indicated that all the included trials exhibited a low to moderate risk of bias. **Conclusion:** These findings indicated that SGI effectively relieves pain of CRPS. However, this evidence is limited by the potential risk of bias.

232

THE USE OF BOTULINUMTOXIN IN THE THERAPY OF NEUROPATHIC PAIN - CASE STUDY

M. Lippert-Grüener¹, M. Tomanova²

¹Charles University in Prague, The Third Faculty of Medicine and General Teaching Hospital, Prague, Germany; ²Rehabilitation Clinic Brandyš nad Orlicí, Rehabilitation Clinic, Brandyš nad Orlicí, Czech Republic

Introduction/Background: The local injection of Botulinumtoxin is proven particularly in diseases associated with increased muscle tone as an effective symptomatic therapy. Clinical experience suggests that botulinum toxin affects afferent nerve fibers, especially the pain fibers. Therefore, an influence of neuropathic pain by the neurotoxin seems possible. So far there are in the literature but only isolated reports. In the case report presented by us a sustained reduction of neuropathic pain has been demonstrated in a patient following a stroke. **Material and Methods:** We report on a 54-year-old patient, who had suffered idiopathic stroke. The patient was significantly affected by a burning pain in the paretic arm (pain scale 9). We treat the patient with a total dose of 150 IE Botulinumtoxin. **Results:** 20 days after the injection treatment we found an improvement in the mobility of the elbow joint and the wrist. Of crucial importance, however, was that the patient over an almost complete cessation of pain syndrome reported (pain scale 0–1). The arm was good to move passively and in the meantime could be started with a physiotherapy treatment already. **Conclusion:** To what extent can be made general recommendations for administering the neurotoxin in the treatment of neuropathic pain must first be awaited.

233

ROLE OF MIRROR THERAPY FOR PHANTOM LIMB PAIN IN BELOW KNEE AMPUTEES

A. Saraf¹

¹Ludhiana, India

Introduction/Background: The pain caused by surgery is usually of a transient nature, however the perception of pain in an amputated limb often persists. This prolonged pain, which is often refractory to pain-killing medication, nerve block and surgical treatment may severely affect the patient's quality of life. The phenomenon of phantom limb pain has been investigated using neurological, neurophysiological and psychopathological approaches. In this study we analysed the role of mirror therapy for treatment of phantom limb pain in below knee amputation. **Material and Methods:** 96 patients who had phantom limb pain after below knee amputation were included in this study. They had to visit the hospital four times a week for a 15-minute treatment period. In this technique they performed movement of unaffected limb while watching its mirror reflection and thus creating a visual illusion of movement of affected limb. The degree of pain relief was measured on visual analog scale. **Results:** 70 patients out of 96 reported an improvement of 4 or more degrees of VAS score after 6 months of the treatment. The result was statistically significant. **Conclusion:** Mirror therapy improves pain sensation of the amputated part when other treatment modalities fail. This therapy works on the principle of mirror neuron system. A mirror neuron fires both when a person acts or when a person observes same action performed by another. The mirror image of the normal body part helps reorganize and integrate the mismatch between proprioception and visual feedback of the removed body. This reorganization decreases the sense or emotion of phantom limb pain in the amputated part.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: PAIN - MISCELLANEOUS

234

ULTRASOUND-GUIDED SUBACROMIAL-SUBDELTOID BURSA INJECTION: COMPARISON OF TREATMENT EFFECT OF DIFFERENT VOLUME OF LIDOCAINE AND CORTICOSTEROID

J. Ahn¹

¹Inje University Sanggye Paik Hospital, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: To investigate the effect of ultrasound-guided subacromial-subdeltoid bursa injection of different volume of lidocaine and corticosteroid in patients with rotator cuff syndrome. **Material and Methods:** 16 Study participants were outpatients who came to clinic. Inclusion criteria are at least one of terminal arc pain, Neer's test, and Hawkins's test, Rotator cuff lesion (partial tear, bursitis, tendinosis) in ultrasound exam, limitation of shoulder motion due to pain, more than 1 month of pain duration, intractable on drug therapy. Subjects were injected with 3cc volume of 0.5% lidocaine mixed with 10 mg triamcinolone, 20 patients were injected with 6 cc volume of 0.5% lidocaine mixed with 10mg triamcinolone, and 10 patients were injected with 3 cc volume of 0.5% lidocaine mixed with 20mg triamcinolone. After a single injection, patients were followed up for 4 weeks. We initially evaluated visual analogue scale (VAS), shoulder disability questionnaire (SDQ), pain duration, current pain medication, last shoulder injection, passive range of motion, terminal arc pain. Rotator cuff lesion was examined by one physiatrist using ultrasonography. Ultrasound-guided subacromial-subdeltoid bursa injection was done by same physiatrist. Therapeutic effects were assessed using VAS, SDQ and ultrasonographic findings at 2, 4 weeks after injection. **Results:** Statistically significant improvements were shown in VAS, SDQ after 2 weeks, 4 weeks after each injection. But there is no significant difference between 3cc volume injection mixed with 10mg triamcinolone and 6 cc volume injection with 10 mg triamcinolone after 2 weeks, 4 weeks after injection. And there is significant difference of VAS between 3 cc volume injection mixed with 10 mg triamcinolone and 3 cc volume injection mixed with 20 mg triamcinolone after 4 weeks after each injection. **Conclusion:** Subacromial-subdeltoid bursa injection of the same total volume of lidocaine with different amount

of steroid has significantly different therapeutic effect. So we need to inject appropriate dose of triamcinolone as required.

235

DIFFUSE EDEMA IN ANTERIOR COMPARTMENT OF THE THIGH THAT WAS MISDIAGNOSED AS MYALGIA

S. Akarsu¹, E. Ata¹, L. Tekin¹

¹GATA Haydarpasha Training Hospital, Physical Medicine and Training Hospital, Istanbul, Turkey

Introduction/Background: Diffuse edema in anterior compartment of the thigh is a rare condition. The most common reasons are high-energy femur fractures and thigh contusions but low-energy injuries are also cause this problem. A case of a 37-year-old man who developed diffuse anterior thigh edema as a result of an injury while attempting a jump-over during pentathlon training described here. *Material and Methods:* A 37-year-old man with pain on his anterior thigh presented to our outpatient clinic. He had a history of injury to his left lower extremity 7 months ago while jumping over during a pentathlon training. He reported a tearing sensation on the left quadriceps femoris muscle followed by immediate pain and swelling. On physical examination, there was severe pain on the anterior and medial part of the left thigh with palpation. Motor examination was normal but increased pain was noted with knee extension and thigh adduction against resistance. His peripheral pulses were normal bilaterally. Firstly, he had been treated with ice, elevation, immobilization and some nonsteroidal anti-inflammatory drugs. He had taken some analgesics and myorelaxant drugs with the diagnosis of myalgia but his symptoms were not relieved through 7 months. *Results:* Magnetic resonance imaging (MRI) was performed to investigate the suspicion of the presence of edema anterior compartment of the thigh. MRI scan demonstrated the presence of extensive edema in the anterior compartment of the left thigh from groin level to suprapatellar area. There was also edema of adductor part of the thigh. The patient was consulted with an orthopedic surgeon and non-surgical treatments were suggested. Conservative treatments are going on and symptoms are decreased gradually. *Conclusion:* Diffuse edema in anterior compartment of the thigh that may cause severe consequences are usually associated with high-energy injuries but it may be also occurred with lower-energy injuries and this severe condition should not be overlooked.

236

PRIMARY SACRAL LYMPHOMA INITIALLY SUSPECTED TO BE SACROILIITIS ON BONE SCINTIGRAPHY

E. Alagöz¹, K. Okuyucu¹, Ş. Özyayın², Ü. Güzelküçük³, N. Arslan¹

¹Gülhane Military Medical Academy, Nuclear Medicine, Ankara, Turkey, ²Gülhane Military Medical Academy, Oncology, Ankara, Turkey, ³Gülhane Military Medical Academy, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Primary bone lymphoma (PBL) is an extranodal lymphoma and manifests as a localized solitary lesion forming approximately 3% of all malignant bone tumours, nearly 7% of extranodal lymphomas, 1% of all malignant lymphomas. *Material and Methods:* A 70 year-old woman had been suffering from hip pain referring to leg for last three months without fever, nocturnal sweating and weight loss. The patient having degenerative changes on lumbosacral x-ray graphy was considered to be affected by sacroiliitis and a whole-body bone scintigraphy was requested. On whole-body screening, irregular sacral and left sacroiliac joint activity was observed. A primary malignant bone tumour was thought firstly for differential diagnosis taking into account her age. In contrast-enhanced CT (CECT), a soft tissue mass causing bone destruction was noticed at left sacroiliac joint

area. The patient was diagnosed histopathologically as diffuse large B-cell lymphoma originating from sacrum. *Results:* As PBL is a curable entity and has nonspecific imaging patterns, it must be differentiated from other causes of lytic lesions such as carcinoma metastasis, primary bone tumours and various benign conditions. Common complaint is pain over the affected bone. Patients may go to rheumatologist, misdiagnosed with rheumatic disease and take nonsteroidal anti-inflammatory drugs in vain. Sometimes it creates severe disturbance because of a pathologic fracture. Solitary lytic lesion arouses doubt. But this appearance is not specific. In the same way, radionuclide bone scintigraphy shows nonspecific high tracer uptake. However, scintigraphy is valuable in staging, it can detect multifocal involvement which alters therapy. CT delineates cortical destruction and bone remodelling after treatment. PBL usually comes out with hypermetabolic appearance on FDG-PET which is a valuable tool especially for determining response to treatment. *Conclusion:* As mentioned above all imaging methods have different properties complementing each other that should be benefited from for diagnosis and handled in manipulation of ambiguous lesions ran into on classical imaging techniques.

237

CHRONIC RECURRENT MULTIFOCAL OSTEOMYELITIS IMITATING SPONDYLOARTHROPATHY ON BONE SCINTIGRAPHY

K. Okuyucu¹, E. Alagöz¹, Ü. Güzelküçük², N. Arslan¹

¹Gülhane Military Medical Academy, Nuclear Medicine, Ankara, Turkey, ²Gülhane Military Medical Academy, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Chronic recurrent multifocal osteomyelitis (CRMO) is a rare autoinflammatory disease affecting usually children. Patients may complain of pain, tenderness, swelling and limited motion. It is characterized by noninfectious bone lesions at multiple sites. Involvement of metaphysis adjacent to the growth plate is a particular finding. *Material and Methods:* 10 year-old female was complaining of joint stiffness at mornings and backache for 3 months. Pelvic X-ray graphy showed sclerosis and contour irregularity at right sacroiliac joint. Her laboratory tests were normal except high erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) and alkaline phosphatase (ALP) levels. Spondyloarthropathy was suspected by the clinician initially and a Tc99m-MDP bone scintigraphy was requested. There were increased activity in right sacroiliac joint, right trochanter major of femur, 5th and 7th thoracic vertebrae, first lumbar vertebrae (L1) on bone scintigraphy. Magnetic resonance imaging (MRI) revealed bone marrow oedema and soft tissue inflammation at the same locations. The diagnosis was established as CRMO by biopsy from L1 vertebrae. *Results:* Diagnosis of CRMO creates a real challenge. It is confused with a lot of diseases. Symptoms are not pathognomonic and laboratory findings are nonspecific. Although increased ESR, leukocyte count and CRP levels are usually present, they can be in normal range. Even a bone biopsy is sometimes fruitless. A multidisciplinary investigation is necessary. Radiologic evaluation begins with a plain radiograph of the symptomatic site. Osteolytic or sclerotic lesions may be seen on X-ray graphy. MRI demonstrates marrow oedema, soft tissue inflammation, periostitis and transphyseal disease. Whole body MRI and bone scintigraphy are performed to detect the extent of the disease. Almost all features and aspect of our patient are similar to those of CRMO and congruent with literature. However, the case was confused with spondyloarthropathy. *Conclusion:* CRMO may be confused with spondyloarthropathy easily and there is no gold standard imaging modality for it.

238

AN ALTERNATIVE TREATMENT OPTION IN THE TREATMENT OF PREGNANCY-INDUCED CARPAL TUNNEL SYNDROME

E. Ata¹, L. Tekin¹, M.Z. Kiralp¹

¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Carpal tunnel syndrome (CTS) is a frequent complication of pregnancy. The most typical symptoms are numbness and tingling in digits I-III and radial half of the ring finger. Burning dysesthetic wrist pain is another common symptom. CTS generally presents during the third trimester in pregnancy and the likely causes are hormonal changes and edema. Common treatment options are activity modification, splinting, steroid injection and surgery. Herein, we present a case of pregnancy induced CTS relieved with kinesiio-taping. **Material and Methods Case:** A 37-year-old right-handed primigravida, 37 weeks of gestation, presented with 4 weeks history of bilateral burning pain and numbness on his hands. The complaints became persistent in digits I-III and were exacerbated by activities. Symptoms were worse at night and she also complained of sleep disturbance because of pain. There was no history of diabetes mellitus, thyroid disorders, rheumatoid arthritis, osteoarthritis or any trauma to the upper extremities or neck in the past. She did not complain of any weakness in the hands, neck pain or radicular pain. Motor and sensory examination of both upper limbs was normal. Tinel's and Phalen's test sign was bilaterally positive. The patient received kinesiio-taping treatment with a specific technique for CTS. Tape application was changed every 4 days extending to a total of 4 sessions. **Results:** Significant reduction in pain and recovery of sleep disturbances noted and it was continued from the day after the first session to delivery. **Conclusion:** In recent years kinesiio-taping has become popular in musculoskeletal problems. The theory behind the kinesiio-taping is that the application of the tape improves lymphatic and blood circulation by lifting the skin. This technique also relieves pressure and irritation of the neurosensory receptors that can create pain. On the occasion of being drug-free treatment, kinesiio-taping may be an alternative treatment option in the treatment of pregnancy induced CTS.

239

CHRONIC PAIN IN PARKINSON'S DISEASE: FREQUENCY, CHARACTERISTICS, INDEPENDENT FACTORS, AND RELATIONSHIP WITH HEALTH-RELATED QUALITY OF LIFE

I. Gundogdu¹, E.A. Ozturk¹, Y. Demir², K. Aydemir², A. Cakci¹

¹Ministry of Health Diskapi Yildirim Beyazit Research and Educational Hospital, Department of Physical Therapy and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: This study was to evaluate the frequency, characteristics, severity, types, independent factors of chronic pain, and its relationship with health-related quality of life (HRQoL) in the same group of Parkinson's disease patients. **Material and Methods:** A Hundred and 13 individuals that consecutively referred to Movement Disorder Outpatient Clinic and with a confirmed diagnosis of Parkinson's disease were included in the study. Demographic variables, disease characteristics, disease-related motor symptoms and motor complications, comorbid conditions, and health-related quality of life were evaluated and recorded. Pain lasting longer than three months was defined as 'chronic pain' and participants were questioned relative to the characteristics of the chronic pain. The Visual Analogue Scale (VAS) (0–100 mm) was used for assessment of pain. **Results:** Seventy-three patients (64.6%) have been suffering from chronic pain. Of these, 12 (16.4%) had a pain at the time of diagnosis of PD. The source of pain was 89.0% musculoskeletal, 31.5% radicular/peripheral neuropathic, 15.1% dystonic, and 4.1% central parkinsonian. Twenty-six patients (35.6%) had different types of pain simultaneously. The pain type with the highest severity was central parkinsonian pain. Among the independent predictors of chronic pain were gender (female), UPDRS II (activities of daily living), UPDRS III (motor symptoms) rigidity sub-

score, and depression. When compared with individuals not having chronic pain, SF-36 Physical Component summary (PCS) and Mental Component summary (MCS) of the ones with pain were lower in patients with chronic pain. In addition, the most significant factor effective on SF-36 was shown as the chronic pain. **Conclusion:** This study showed that chronic pain is a common problem in patients with the Parkinson's disease, that different pain types may co-exist, and that they may negatively affect the HRQoL of patients. The chronic pain was correlated with both disease-related factors such as rigidity and daily living activities and also general factors such as gender and depression.

240

MUSCULOSKELETAL PAIN IN PARKINSON'S DISEASE: ITS PREVALENCE AND RELATIONSHIP TO DAILY LIVING ACTIVITIES, DEPRESSION AND QUALITY OF LIFE

I. Gundogdu¹, E.A. Ozturk¹, Y. Demir², K. Aydemir², E. Umay¹

¹Ministry of Health Ankara Diskapi Yildirim Beyazit Education and Research Hospital, Department of Physical Therapy and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: Although musculoskeletal problems are common, there have been few reports that describe the prevalence or clinical characteristics and impact of musculoskeletal problems in Parkinson's disease (PD). Our aim was to determine the prevalence of musculoskeletal pain and its impact on activities of daily living, depression and quality of life (QoL) in patients with PD. **Material and Methods:** 112 PD patients and 120 age- and sex-matched controls were interviewed by a rehabilitation specialist about their musculoskeletal problems. **Results:** The prevalence of musculoskeletal pain was significantly higher in the PD group than the control group (58.9% vs.42.5%, $p=0.012$). Commonly involved body sites were the low back (46.4%), knee (21.4%), and shoulder (21.4%) in PD group, and low back (26.7%), knee (20.0%) and ankle (11.7%) in control group. The low back and shoulder were more frequently involved in the PD group than in the control group ($p=0.002$, $p=0.016$ respectively). Older age, female, a higher scores on the UPDRS II, UPDRS III and depression, and lower Schwab-England and SF-36 scores were associated with musculoskeletal problems in the PD group. **Conclusion:** Musculoskeletal pain is a frequent problem in PD patients. As it can affect activities of daily living, mood and QoL, musculoskeletal pain should be evaluated attentively in PD patients so as to take measures against the development of pain during early stage which may be another disability in patients with PD which is itself a potential cause of severe disability.

241

THE EVALUATION OF POSTURAL BALANCE AND RISK OF FALL IN THE HEALTHY ADULT POPULATION CONSISTING OF A FACTORY EMPLOYEES

P. Doruk Analan¹, E.E. Kara¹, B. Leblebici¹

¹Baskent University, Physical Medicine and Rehabilitation, Adana, Turkey

Introduction/Background: In this retrospective study, it was aimed to evaluate the risk of fall and balance, and to determine whether there is a correlation between the risk of fall and Vestibular Evoked Myogenic Potentials (VEMP), which are the assessing the vestibular system, in the healthy adults consisting of a factory employees. **Material and Methods:** It was reached the data of 69 male participants. The mean age of the study population was found 33.26 ± 7.24 . It was recorded bilateral VEMP data and Berg Balance Scales (BBS) of the participants. Also, it was recorded balance tests and risks of fall by using the Tetra Interactive Balance System. It was evaluated the correlations between these assessments. **Results:** There was no statistically significant cor-

relation between age and the risk of fall. Also, it was not determined the significant correlation between the values of latency and amplitude of the bilateral VEMP waves, BBS, balance tests, and risk of fall ($r < 0.30$). BBS scores showed a considerably good balance while the risk of fall ranged between 0% and 78%. *Conclusion:* Advanced age may be not alone significant factor for the risk of fall. BBS may be not exactly show the risk of fall in the young adult population. VEMP measurements may not provide a significant contribution to evaluate the risk of fall and balance. Our participants can be considered as a cross-section of the population from the healthy young adults in the community. It is thought to work by underlining that there may be a risk of falling more than expected in the community.

242

EVALUATION OF ELECTRODIAGNOSTIC AND ULTRASONOGRAPHIC FINDINGS IN DETERMINATION OF MEDIAN NERVE ENTRAPMENT SITE IN CARPAL TUNNEL SYNDROME WITH INCHING METHOD

M. Emad¹, R. Jalli², S.A. Azadeh Ghahfarokhi³

¹Shiraz University of Medical Sciences, Physical Medicine and Rehabilitation, Shiraz, Iran, ²Shiraz University of Medical Sciences, Radiology, Shiraz, Iran, ³Shiraz University of Medical Sciences, PM&R, Shiraz, Iran

Introduction/Background: Carpal Tunnel Syndrome (CTS) is the most frequent entrapment neuropathy. The purpose of the present study is to evaluate diagnostic value of the inching method with electrophysiological and ultrasonographic assay for patients with symptoms and signs of CTS, and evaluate similarity of two methods for findings of sites of entrapments. *Material and Methods:* 32 hands with symptoms and signs of CTS that confirmed diagnosis with conventional electrodiagnostic study as case group and 30 hands as control group were enrolled in this study. Then for two groups, sensory and motor distal latencies by nerve conduction studies and cross sectional area (CSA) by ultrasonography were measured with inching technique. We suppose distal crease of the wrist as a point of no.4 & 3 points proximal of that (no.1 to3) and 4 points distal of that (no.5 to8) with one centimeter distance between each two points, and each segments between each 2 points are called 1 to7 from proximal to distal. *Results:* Mean age of participants was 45.58 ± 12.77 years and all of them were female. Mean of distal sensory latency (both antidromic and orthodromic) with inching method are greater in patients than control group (p -value < 0.05) specially in segment 5 and 6 (more in 6th). CSA of median nerve in all points in patient's group was more than control group. Between them, greatest CSA were in sixth and seventh points, respectively. *Conclusion:* We reveal significant difference of antidromic sensory latency between two adjacent points belonged to fifth and sixth segments. Difference of orthodromic sensory and motor latency between points was greater in patients than control group but only sixth segment had statistically significant difference. Also points 6 & 7 have 10.69 & 10.99 mm² CSA with higher sensitivity and specificity. so in this study 2 methods were shown that most sites of entrapment of median nerve in CTS are points 6 & 7.

243

REHABILITATION AFTER TOTAL KNEE PROSTHESIS: MICROWAVE THERMOGRAPHY AS A NONINVASIVE ANALYSIS OF ANTERIOR KNEE PAIN

M. Glehr¹, P. Sadoghi¹, G. Bernhardt¹, A. Leithner¹, A. Stibor², G. Gruber¹

¹Medical University of Graz, Department for Orthopedic Surgery, Graz, Austria, ²Eberhard Karls University of Tuebingen, Department of Physics, Tuebingen, Germany

Introduction/Background: Thermography has already been used as a noninvasive assessment of disease activity in some kinds of

inflammatory arthritis and as an evaluation of the temporomandibular joint, it is however a new method for objective pain evaluation. As far as we know, no study has been carried through as for the correlation between increase of temperature and anterior knee pain with total knee prosthesis so far. *Material and Methods:* In intention to reassess a five to ten years follow up of total knee prosthesis, 137 patients followed an invitation to the authors' institute. Thirteen ($n=9.5\%$) out of these 137 patients suffered from anterior knee pain of the retinaculum patellae and were included in this study. Frontal medial and lateral thermographic photos were taken from 90 degrees and 45 degrees. *Results:* The temperature differences between the rectangular field and the reference point increased significantly on the medial ($p=0.00037$) or lateral ($p=0.000002$) pain side of the knee. The thirteen knees with knee pain had significantly higher temperature differences between medial and lateral temperature differences, than the knees without knee pain. *Conclusion:* This study demonstrates that there is a significant correlation between anterior knee pain and an increase of superficial skin temperature around the retinaculum patellae. Our results confirm observations concerning the increase of temperature with pain around limbs by previous investigators. To our knowledge, this is the first report of an objective assessment of pain of the retinaculum patellae with total knee prosthesis. Our findings could help making it possible to localize and assess pain more precisely.

244

RELATIONSHIP BETWEEN THE SKIN IMPEDANCE OF STROKE PATIENTS AND PAIN MEASUREMENT

K. Kagechika¹, M. Nakata¹, M. Tsubokawa¹, F. Takeuchi¹, W. Ohsu¹, Y. Takagi², A. Nakanami²

¹Kanazawa Medical University, Rehabilitation Medicine, Uchinada, Japan, ²Tonami General Hospital, Rehabilitation Medicine, Tonami, Japan

Introduction/Background: To examine whether it is possible to evaluate of the pain by the measurement of the change in the skin impedance in patients with stroke. *Material and Methods:* The skin impedance obtained from the electrode applied to the hand was measured, and it made comparative study of the value before and after the pain treatment. The patients with omalgia and the low back pain in paralyzed side were done the hyperthermia of hot pack and the xylocaine intramuscular injection, and visual analogue scale was compared additionally before and after treatment as sight scale. *Results:* For the patients with omalgia and the low back pain, the difference was admitted in the individual value that was able to be put in the resting state, and the change was seen in response to the state of their posture. Impedance decreased with the exacerbation of the pain, and it has increased with the improvement of the pain sensation. The larger the improvement of the pain sensation was, the smaller increases of impedance when the low back pain was improved by the effect of the hyperthermia. *Conclusion:* The pain is a subjective phenomenon, and it is changeable. The objective evaluation is difficult because there are extremely a lot of troubles that cause the pain. The improvement of the pain and the change in the skin impedance were in the correlation. It was suggested that a quantitative evaluation of the pain sensation was possible though it was thought the change of the pain took place through the autonomic nerve system.

245

PERCEPTION OF PAIN DURING ELECTRODIAGNOSTIC TESTS

N. Lara¹, C. Rangel Gómez², C. Rangel Jimenez³

¹Universidad Nacional de Colombia, Physical Medicine And Rehabilitation, Bogota, Colombia, ²Quiron Unidad Médica IPS, Cundinamarca, Bogota, Colombia, ³Universidad de Cartagena, Bolivar, Cartagena, Colombia

Introduction/Background: In physical medicine and rehabilitation is common to do electrodiagnostic studies in order to iden-

tify neuromuscular diseases. Routinely we perform these studies without considering the sensations produced in the patient and the perception of pain with nerve conductions and electromyography. The two studies done more frequently. It is important to determine the level of pain produced by these tests, in order to know what the patient feels. And if there are future needs to modify the technique of the test or the test itself. Because currently the noninvasive techniques are becoming very important in the diagnosis of these diseases. For this reason we propose to assess the perception of pain through VAS (visual analog scale), in a population of adults who were brought out these studies. *Material and Methods:* This study is a prospective cross-sectional study, the sample were 50 patients, and the studies were conducted in upper and lower limbs, using a computer Cadwell Summit 1, stimulating between 40 and 70 milliamps in the nerve conductions according to the protocol of Dr. Kimura, and electromyography was performed with monopolar needle electrode 1 inch and a half in the muscle bellies. In each patient the perception of pain was assessed by VAS (Visual Analog Scale) scoring from 1 to 10 the level of perceived during the electromyography and nerve conductions separately. *Results:* The results showed the following: The perception of pain was much higher during the nerve conductions than electromyography. This means that despite the pain of a needle, pain sensation was higher during the electric stimulation. *Conclusion:* Nevertheless, the pain perceived in both tests was high, considering this kind of tests as painful and invasive tests that could be improved in the future.

246

THE USE OF ANALGESIA AT PHOENIX CENTRE FOR REHABILITATION

H. Osman^{1,2}, D. Harris¹, T. Molloy¹, L. Ready¹

¹Broadgreen Hospital, Phoenix Centre for Rehabilitation, Liverpool, United Kingdom, ²Cheshire and Merseyside Rehabilitation Medicine, Rehabilitation Medicine, Liverpool, United Kingdom

Introduction/Background: Pain is common symptom among rehabilitation patient, who are admitted with polytrauma, fractures, or spinal cord compression and can manifest in many forms. Good pain management is crucial in rehabilitation medicine. We undertook a study to profile our patient, analgesia use, and pain scores. *Material and Methods:* 3 month retrospective study of inpatients from Apr–Jun 2015 ($n=25$). The study end point was either patient discharge or optimised analgesia. We captured demographic data, injuries/treatments nature, and pain scores at admission and discharge/end points. Data displayed as median (range) unless otherwise stated. *Results:* 56% of patients were male and median age was 59 years (20–79). Study period was 56 days. 36% of patients were neurosurgical. Pain scores tend to improve and analgesia use tended to decrease over time. We compared our analgesia usage against WHO analgesia ladder and found our prescribing was compliant (100%). *Discussion:* We described the profile, pain prevalence, and use of analgesia in rehabilitation patient. Majority of patients come from surgical specialties, and experience a combination of pain caused by their initial insult and/or post-operative pain. Patients tended to be pain-free at study endpoint. Their analgesics rationalised and optimised, leading to reduce usage by endpoint. This reduced analgesia supports improved clinical status, and reduced exposure to harm through side effects in our patient population. *Conclusion:* Rehabilitation patients experience complex pain. We have shown that our patients have demonstrably reduced pain scores, optimised and typically reduced analgesia use at study end point. This may reflect a combination of a rationalised approach to analgesia, and therapeutic input from multidisciplinary team. *Limitations:* This study was retrospective, and small sample size (subgroup analyses were not possible). The only standard we could compare analgesia use to was WHO analgesia ladder. Further research would include prospective data- collection over longer period, and encompass multi-centres for comparison.

247

COMPARING THE ELECTRODIAGNOSTIC CHANGES BETWEEN TRAUMATIC FACIAL NERVE PALSY WITH BELL'S PALSY

S.R. Saeidian¹, S.M. Seyed Mahmood Latifi¹

¹Ahvaz Jundishapur University of Medical Sciences - Ahvaz - IRAN, Physical Medicine and Rehabilitation, Ahvaz, Iran

Introduction/Background: Following facial nerve palsies the significant electrodiagnostic (EDX) changes occur in related muscles. The aim of this study was to reveal whether there is any difference between EDX picture following traumatic Facial Nerve Palsy and with Bell's palsy. *Material and Methods:* The EDX changes of two groups consisted of thirty five patients suffered from traumatic and bell's type facial nerve palsies were compared in 5 years interval. The presence or absences of spontaneous activities in orbicularis oculi or frontalis muscles were considered. Also the amplitudes of compound muscle action potentials (CMAPs) of these muscles were obtained bilaterally. Then the CMAPs ratios between the involved sites and normal sites in each patient calculated. Finally the data of two groups were compared statistically. Regarding presence of spontaneous activities Chi Square and for the CMAPs statistical analysis the *t*-test were performed. *Results:* Only in 25% of patients with Bell's palsy the spontaneous activities were recorded while it was recordable in all trauma patients at $p=0.0001$. When the CMAPs were compared, it showed a significant change in frontalis muscle at $p=0.0001$, but did no significant difference revealed in orbicularis oris muscle at $p=0.16$. *Conclusion:* Following a trauma the electrodiagnostic changes of facial muscles are more severe than Bell's palsy. Therefore it could be expected the facial nerve injury following a trauma could be more severe than in bell's palsy.

248

COMPARING TWO METHODS OF TREATMENT OF SPASTIC UPPER LIMB AFTER STROKE- DISPORT INJECTION WITH THE METHOD OF ACCOMPANYING A STRETCHING EXERCISE TO THE DISPORT ALONE

S.R. Saeidian¹, N. Majdinasab², S.M. Latifi³

¹Ahvaz Jundishapur University of Medical Sciences - Ahvaz - Iran, Physical Medicine and Rehabilitation, Ahvaz, Iran, ²Ahvaz Jundishapur University of Medical Sciences - Ahvaz - Iran, Neurology, Ahvaz, Iran, ³Ahvaz Jundishapur University of Medical Sciences - Ahvaz - Iran, Health Research Center- Diabetes Research Center- PHD by Research, Ahvaz, Iran

Introduction/Background: Most of the post stroke patients suffer from pain and are spasticity in their upper limbs. The purpose of this study was to compare the effectiveness of disport injection alone with the method of including stretching exercises in addition to disport injection in the affected muscles. *Material and Methods:* The number of eight hemiplegic patients following their middle cerebral artery embolism divided in two identical groups. For the first group disport injected in their involve muscles and for the second group the stretching exercises was added to their shoulders, elbows, wrist and finger flexors in addition to the treatment plan for the first group. Based on Ashworth scale, the changes of their upper limbs spasticity were compared using Mann-Whitney test after 8 weeks. *Results:* There was a significant improvement in upper limb spasticity in the second group in compare with the first group at $p<0.05$. *Conclusion:* The present study reveals the disport injection did not exclude the need for upper limb stretching exercises in studied group.

249

COMPARING THE EFFECT OF THREE TYPES OF TREATMENT FOR HAND GRIP DISABILITY AMONG PATIENTS WITH TRAUMATIC BRAIN INJURY

S.R. Saeidian¹, N. Majdinasab², S. Latifi³

¹Ahvaz Jundishapur University of Medical Sciences - Ahvaz - Iran, Physical Medicine and Rehabilitation, Ahvaz, Iran, ²Ahvaz Jundishapur University of Medical Sciences, Neurology, Ahvaz, Iran, ³Ahvaz Jundishapur University of Medical Sciences, Health faculty, Diabetes Research Center, Ahvaz, Iran

Introduction/Background: Hand grip disability is a common disorder among Patients suffering from spasticity and weakness after traumatic brain injuries. The aim of this study was to compare the Effect of Three methods of treatments. **Material and Methods:** Fifteen Patients suffering from Rt. hand Spasticity and weakness because of Traumatic Brain injuries were collected three months after onset. They were divided to three groups consisted of five patients randomly. Their Glasgow coma score at hospital admission time were 3–6. For the first group disport was injected into the flexor elbow wrist and finger muscles. The second group received limb PNF and flexor stretching exercises along with Tizanidin 2mg BID. And the 3rd group received stretching and PNF exercise along with disport injections similar to the first group. Changes of their limbs spasticity and abilities to hold and carrying a ball during the treatments method were compared using non parametric and chi square statistical tests. **Results:** All three types of treatments led to decrease patients limbs spasticity ($p < 0.05$). The hand grip ability improved in the 2nd and 3rd groups. ($p < 0.05$). But there was not any advantage in using tizanidin or disport in this study. **Conclusion:** In order to gain a normal hand grip function not only the spasticity should be treated but also the other determinants such as weakness and patients insights and co-operation should be considered.

250

ASSESSMENT OF THERAPEUTIC EFFICACY OF WRIST SPLINT IN THE MANAGEMENT OF CARPAL TUNNEL SYNDROME (CTS) LITERATURE REVIEW

S. Salih¹

¹Bolton, United Kingdom

Introduction/Background: “Management of carpal tunnel syndrome should be based on severity. Patients with mild to moderate carpal tunnel syndrome have normal to mildly abnormal nerve conduction study and electromyography findings. Severe disease is suggested by worsening clinical symptoms and clearly abnormal electrodiagnostic studies. **Material and Methods:** Online databases had been searched, namely, PUBMED, MEDLINE, and Google Scholars for relevant literature published in English during the last 10 years. Selection Criteria; C. **Results:** Initial search yielded 46 articles. 21 articles were duplicates across the utilised databases. The vast majority of the articles were either describing therapeutic outcomes of surgical managements or comparative studies between surgical and non-surgical management of CTS. Six relevant articles were eventually identified: (Brininger et al 2007), (M. V. De Angelis et al 2008), (Shingo Nouta et al 2009), and (Forogh, B. et al 2012), (Bo Povlsen et al 2013), (Baker NA et al 2013). Overall, wrist splinting is an effective measure in managing mild to moderate CTS according to these clinical trials. However, almost all the included studies are vague about the precise definition of CTS symptom relief. This is arguably valid because there is no clear description of the nature of these patients apart from their age and sex. **Conclusion:** Good therapeutic response in an 84-year-old patient might not be the case, or might even be a life-impacting outcome in a 30-year-old active patient. It is, therefore, important to conduct studies more patient-profile specific i.e. tailored to patient’s age, occupation, living nature and levels of activities. This would potentially minimize levels of bias and produce robust and reliable outcomes. Moreover, this literature review is, merely, about assessing the use of wrist splint in CTS patients more or less solely, which is deemed successful according to the results.

251

A PATIENT, WHO HAS NEUROPATHIC PAIN AND DIFFICULTY OF WALKING IS DIAGNOSED WITH PAGET DISEASE

S. Sayilir¹, F.G. Uğurlu²

¹Muğla Sıtkı Koçman University- Faculty of Medicine, Physical Medicine & Rehabilitation, Muğla, Turkey, ²Yıldırım Beyazıt University- Faculty of Medicine, Physical Medicine & Rehabilitation, Ankara, Turkey

Introduction/Background: Paget Disease(PD) is a chronic progressive disease characterized by rapid bone resorption and deposition resulting in the mosaic pattern to the lameller bone. PD is characterised by focal abnormalities of increased bone turnover affecting the skeleton. Here we report an unusual case with PD mimicking lumbar discopathy with neuropathic pain. **Material and Methods:** Case report **Results:** A 64-year-old man presented with severe lower back pain, progressively increasing foot numbness, difficulty walking and limitation of lumbar spinal movement for a few weeks. The pain character was mechanical produced by walking and resolved by rest. He had antalgic posture because of decreased spinal mobility. He had also limitation and pain during lumbar spine motion with increased lumbar lordosis. Besides straight leg-raising test was positive at 30 degrees. On the other hand, he had local tenderness over the lumbar spine. In addition he had no peripheral arthritis. There was no abnormality on neurological and systemic examination except above findings. There was also moth-eaten radiolucent appearance on vertebral corpus of bone. On the other hand, radionuclide bone scan (scintigraphy) was made to observe distinction of bone changes. Technetium bone scan demonstrated an increased radioactive isotope uptake activity in the lumbar (L2–5) vertebrae. There were abnormal areas uptaken, including lumbar vertebrae. All blood investigations were normal except that serum alkaline phosphatase was raised upto 1,300 IU/L. He was diagnosed with Paget disease and bisphosphonate treatment was started. Neuropathic pain and alkaline phosphatase levels were dramatically reduced at the third month of follow-up. Repeat radionuclide bone scanning was significantly showed the reduced distribution of affected bones. **Conclusion:** We report an unusual case with PD based on high serum levels of alkaline phosphatase and radiography of affected bones mimicking lumbar discopathy with neuropathic pain. With successful therapy, the patient’s back pain resolved.

252

SUBCLINICAL PRONATOR SYNDROME IN PATIENTS WITH CARPAL TUNNEL SYNDROME: AN ELECTROPHYSIOLOGICAL STUDY

H. Sultan¹

¹Alexandria University - Faculty of Medicine, Physical Medicine and Rehabilitation, Alexandria, Egypt

Introduction/Background: Aim of the work. The aim of the present study was to detect subclinical pronator syndrome (PS) in patients with carpal tunnel syndrome (CTS) with the utility of the anterior interosseous/median (AIM) score. **Material and Methods:** The present study included 90 clinically diagnosed CTS hands and 60 asymptomatic hands of healthy volunteers as a control group. Clinical examination was done for all patients. The following tests were done: (1) Sensory nerve conduction studies: median and ulnar nerves; (2) Motor nerve conduction studies: median and ulnar nerves as well as the anterior interosseous nerve recording the pronator quadratus muscle with calculation of the AIM score. AIM score is a ratio of the antecubital motor latency of the anterior interosseous nerve to that of the median nerve. **Results:** There were 71 CTS hands (78.9%) with a median distal latency (DL) exceeding the reference value and the AIM score was decreased in 63 (70%) of them. Eight hands (8.9%) had a prolonged median DL associated with an AIM score within the reference range raising the prob-

ability of having PS. Five (5.6%) of these eight hands had electrophysiological findings in consistency with an established PS. The sensitivity of AIM for the concomitant detection of PS with CTS was 100% and the specificity 95.4%. None of the controls had PS. *Conclusion:* Subclinical PS is found in CTS patients and could be searched for electrophysiologically in those patients with evidence of moderate to severe degrees of CTS and the AIM score is useful in this aspect.

253

THE EFFECTS OF ACUPOINT STIMULATION USING THERAPEUTIC ULTRASOUND ON IMPROVE OF LIFE QUALITY AND SENSORY IMPAIRMENTS FOR CANCER PATIENTS WITH OXALIPLATIN-INDUCED PERIPHERAL NEUROPATHY

C.H. Yang¹

¹*China Medical University, Department of Physical Therapy Graduate Institute of Rehabilitation Science, Taichung, Taiwan*

Introduction/Background: Oxaliplatin-induced peripheral neuropathy (OIPN) is a common complication of chemotherapy without effective treatment. Acupuncture is used worldwide in medical treatment. But the risk of infection may be increased by needle insertion damaging the skin and patients sometimes feel pain. To avoid such drawbacks, an acupoint stimulation using therapeutic ultrasound has been considered as an alternative treatment. The aim of this study was to evaluate the analgesic effects of acupoint stimulation using therapeutic ultrasound in colorectal cancer patients with OIPN. *Material and Methods:* Patients with colorectal cancer received oxaliplatin administration were routinely referred from the Department of Oncology and Cancer Center. All of the subjects suffered from OIPN. Therapeutic ultrasound stimulation (1.0–1.5 W/cm²) at acupoints of Neiguan (PC6), Daling (PC7), Kunlun (BL60), Yongquan (KI1) were conducted and induced deqi sensation for 3 minutes/point and 12 sessions. Measurements using von Frey filament test, Pain Quality Assessment Scale (PQAS), Chemotherapy-induced neuropathy questionnaire (CINQ), EORTC QLQ-C30 and cold water immersion test were performed before and after 12-session treatments. *Results:* Significant improvements were found on mechanical sensation threshold and cold withdrawal threshold in upper and lower extremities, as well as the scores of PQAS, CINQ and QLQ-C30 after 12-session ultrasound at acupoints in colorectal cancer patients with OIPN. *Conclusion:* Neuropathic sensory symptoms in colorectal cancer patients with OIPN could be controlled and improved by therapeutic ultrasound stimulation at acupoints. Our results provide an alternative strategy to manage sensory impairments and life quality in cancer patients with chemotherapy-induced peripheral neuropathy.

254

REHABILITATION OF CHRONIC NECK PAIN AFTER THALAMIC HAEMORRHAGE

E. Yap¹

¹*Tan Tock Seng Hospital Rehabilitation Centre, Rehabilitation Medicine, Singapore, Singapore*

Introduction/Background: Dorsal midbrain/Parinaud's syndrome comprises: Upward gaze palsy, pupillary response to near stimulus but not to light and nystagmus with attempted convergence. These eye findings improve with resolution of underlying aetiology. Anomalous head posture (AHP): Head tilt, face turn, chin up or chin down, a combination of or variation of these postures may result from: Orthopaedic cause such as sternomastoid dystonia, torticollis; Ophthalmic or neurologic cause such as visual deficit, hearing loss. AHP tries to compensate these deficits to optimise visual or hearing function. *Material and Methods:* A 19-year-old lady had chronic axial neck pain after right thalamic bleed with intra-

ventricular haemorrhage a year ago. 4 vessels angiogram revealed arteriovenous malformation. She had bilateral extra ventricular drainage and subacute stereotactic radio-surgery. She recovered with residual upward gaze palsy from Parinaud's syndrome, left homonymous hemianopia, and deficit of high level rapid processing of visual information. She declined trial of prism lens. She had moderate posture related axial neck pain since the stroke, worse when she looked upwards. At rest her head was tilted 15 degrees to the left. She had global muscle hypertonia in both her upper trapezius and scalene muscles. She had normal motor strength in all four limbs and no dysesthesia. X-rays showed loss of cervical lordosis. *Results:* Rehabilitation was focused on rebalancing of neck muscles, craniocervical flexion exercises with biofeedback by palpation, optimisation of posture and ergonomics with mirror visual feedback. Her neck pain intensity improved to the mild range after 4 months of treatment. She resumed most of her daily activities by pacing and regular short rest breaks. *Conclusion:* Post stroke visual problems may result in compensatory head posture with chronic neck pain. Rehabilitation is focused on correctable visual deficit, rebalancing neck muscles, optimisation of posture and ergonomics with visual biofeedback and pacing of daily activities.

255

PRELIMINARY REPORT ON THE STUDY OF NEUROMUSCULAR ELECTRICAL STIMULATION AND TRANSCUTANEOUS NERVE STIMULATION'S EFFICACY ON HEMIPLEGIC SHOULDER PAIN

M. Zhou¹, F. Li²

¹*The First Rehabilitation Hospital of Shanghai, Rehabilitation Department, Shanghai, China,* ²*Huashan Hospital-Fudan University-Renhe Hospital Baoshan District of Shanghai-China, Rehabilitation Department, Shanghai, China*

Introduction/Background: The analgesic efficacy of neuromuscular electrical stimulation (NMES) on hemiplegic shoulder pain (HSP) has been confirmed, but whether NMES has a better efficacy than transcutaneous nerve stimulation (TENS) in easing HSP is still uncertain. It is related to NMES treatment mechanisms on HSP, that is, to solve problems through muscle motor relearning or low frequency electrical analgesic. This prospective and randomized controlled study is the first study to compare the efficacy of NMES and TENS on HSP, trying to demonstrate the pain relief mechanism of NMES on HSP. *Material and Methods:* 90 subjects are planned to be randomized into group NMES (36 cases), TENS (36 cases) or control group (18 cases). Currently enrolled NMES (17 cases), TENS (21 cases) and control group (11 cases). NMES group uses frequency 15 Hz and pulse width 200 us to stimulate the trapezius beam, supraspinatus and deltoid toe. TENS group uses frequency 100 Hz and pulse width 100 us to stimulate shoulder pain area. Both groups are stimulated for 20 times, 5 times a week for a total of four weeks, 60min each time. And they receive the same conventional rehabilitation treatment as the control group. The control group only receives conventional rehabilitation. Conduct numerical rating scale (NRS) assessment, active/passive range of motion (ROM) measurement of shoulder external rotation, anteflexion and abduction, upper extremity Fugl-Meyer score (FMA), Barthel index (BI) and stroke specific quality of life scale (SSQoLS) assessment at week 0 (baseline), week 2, week 4 and week 8, respectively. *Results:* After 4 weeks of treatment, compared with baseline, NRS score of the 49 patients in NMES group, TENS group and the control group reduces 1.94, 1.71 and 0.91 on average, but with no significant difference among the three groups ($p=0.097$). Shoulder passive ROM and FMA score, and BI improvement are not observed significant differences among the three groups. *Conclusion:* NMES and TENS efficacy on HSP has no significant difference, but the statistical trends show NMES might gain more efficacy. At present, the sample size is limited and the study is still continuing. Subsequent studies may further demonstrate whether there is a difference between these two.

**CLINICAL PHYSICAL AND REHABILITATION
MEDICINE SCIENCES: MUSCULOSKELETAL
CONDITIONS - INFLAMMATORY JOINT
DISEASES (E.G. RHEUMATOID ARTHRITIS,
ANKYLOSING SPONDYLITIS)**

256

THE WALKING MERMAID - MYTH OR FACT?

S.N. Abdul Majid¹

¹*Cheras Rehabilitation Hospital, Rehabilitation Medicine, Kuala Lumpur, Malaysia*

Introduction/Background: Rheumatoid arthritis is a chronic progressive disease causing inflammation in the joints and resulting in painful deformity and immobility, especially in the fingers, wrists, feet, and ankles. *Material and Methods:* A 27-year-old lady was referred for rehabilitation at Cheras Rehabilitation Hospital. She was diagnosed with Seropositive Rheumatoid Arthritis in Jul 2013 after a four years period of persistent and recurrent joint pain and swelling involving both her ankles, knees and elbow joints. She presented with generalized muscle weakness and muscle wasting which was found to be more prominent in the proximal muscles. Her muscle power ranged from 2/5 to 4/5 in the MRC rating scale. She was also noted to have multiple bilateral joint contractures involving her shoulders, wrists and knees. Due to her generalized muscle weakness and multiple joint contractures, she requires assistance in her basic ADLs and mobility. This lady was admitted for inpatient rehabilitation program with the aim of improving her functional independence and mobility status. *Results:* Therapy was initiated, however she progressed very slowly as it was interfered by joint pains. She could hardly stand because of the bilateral knee pain. Cryotherapy was also provided however this only improved her pain slightly. Hydrotherapy was then initiated. Her standing balance improved and by the 5th cycle of hydrotherapy, she was able to walk 5 rounds in the pool without holding the railings. She progressed very well in the hydrotherapy pool, walking independently under supervision of our therapist. However, she was not able to walk on normal ground. Due to her late presentation to hospital and hence to rehabilitation, this young lady's dream of walking again is still beyond expectations. *Conclusion:* Early initiation of therapy for patients with rheumatology problem is important to ensure good quality of life.

257

**A CASE OF HODGKIN LYMPHOMA WITH POLIAR-
THRALGIA AFTER COMPLETION OF CHEMO-
THERAPY**

E. Ata¹, L. Tekin¹, S. Akarsu¹

¹*Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey*

Introduction/Background: There are various musculoskeletal manifestations that may develop in a patient after chemotherapy. These manifestations may be due to metastasis to musculoskeletal structures, paraneoplastic syndrome or immune reactions as well as adverse reactions to cancer specific chemotherapy. One of them is that post-chemotherapy rheumatism is a non-inflammatory and self-limiting condition that manifests as symmetric or asymmetric arthralgia, arthritis and stiffness involves both large and small joints. It has been described in patients with some kinds of cancers including breast cancer, ovarian cancer, and non-Hodgkin's lymphoma within a few months after completion of chemotherapy. *Material and Methods:* A 39-year-old man presented with a 6 weeks history of symmetric arthralgia on his bilateral hand and foot joints. Roughly 8 months previously, he had Hodgkin lymphoma diagnosis and treated chemotherapy, including palonosetron, doxorubicin, cyclophosphamide, etoposide, vincristine. His last chemotherapy was 6 weeks before. Physical examination revealed no swelling

on any joints but on palpation there was tenderness bilateral hand and foot joints with palpation (at the proximal interphalangeal, metacarpophalangeal, ankle and metatarsophalangeal joints). There were no synovitis on ultrasonographic joint evaluation. He had no history of any other systemic disease and no family history of rheumatic disease. Laboratory results were as follows: erythrocyte sedimentation rate 65 mm/h, C-reactive protein 41 mg/L, negative positive results for RF, anti-ccp, ANA, anti-RNP, anti-SSA, anti-SSB, anti-SCL70, anti-jo1, anti-dsDNA and anti-Histon antibodies. Other laboratory findings were unremarkable. *Results:* Post-chemotherapy rheumatism was diagnosed. Oral asemiatazine 60 mg twice-a-day was commenced and continued for 3 weeks. Inflammatory markers and articular symptoms improved after treatment. *Conclusion:* In conclusion, post-chemotherapy rheumatism may be seen after completion of chemotherapy in patients with Hodgkin lymphoma. Clinicians should kept in mind this diagnosis to speed up the diagnosis process without unnecessary investigation and it will be better if the patients are informed about this complication for relieving their concerns.

258

A RARE SIDE EFFECT OF ADALIMUMAB

E. Ata¹, S. Kiraz¹, L. Tekin¹

¹*Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey*

Introduction/Background: Adalimumab is a fully human monoclonal anti TNF- α antibody used in the treatment of rheumatologic diseases. We described a case with cough after adalimumab treatment. *Material and Methods:* A 40-yr man who was diagnosed ankylosing spondylitis presented to our outpatient clinic due to the increase of his pains. His pains were at his waist, hips and heels bilaterally. Sulfasalazine (2,000 mg daily) and diclofenac (200 mg daily) treatments were discontinued because of their side effects. Adalimumab treatment (40 mg) was started every other week. Two days after the first adalimumab application, patient presented to our outpatient clinic with complaint of cough. There is no fever and there is no increased expectoration. There were also complaint of cough after the second and third applications and coughing increased at nights. As a result of chest diseases specialist consultation, there were no pulmoner pathology to explain the cough. *Results:* The reason of cough was considered Adalimumab and treatment was terminated. The patient had no complaint of cough in the control examination 2 weeks later. Biological agent treatment was rearranged and the cough didn't recurred with another agent. *Conclusion:* The cough is a rare side effect of adalimumab and it may be a precursor of adalimumab-induced pulmoner pathologies.

259

A RARE ADVERSE EVENT OF ADALIMUMAB

E. Ata¹, M. Kösem¹, E. Ersöz¹, L. Tekin¹

¹*Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey*

Introduction/Background: Blockage of tumor necrosis factor alpha (TNF- α) is highly effective in rheumatic diseases, especially in ankylosing spondylitis (AS) and rheumatoid arthritis (RA). The induction or exacerbation of psoriasis in patients treated with TNF- α antagonists is a well-established phenomenon. Herein, we described a patient with AS who was treated with adalimumab, a fully human monoclonal antibody, and who unexpectedly developed psoriatic skin lesions. *Material and Methods:* Case: A 37-year-old man who was diagnosed ankylosing spondylitis presented to our outpatient clinic due to his skin lesions. Sulfasalazine (2,000 mg daily) and indomethacin (75 mg daily) treatment was discontinued about a year ago because of insufficient antirheumatic effect and adalimumab (40 mg subcutaneously) treatment was started every other week. Ten

months after the first adalimumab injection, multiple erythematous pruritic skin lesions of up to 10 cm in diameter as well as some pustules on palms, arms and especially on both plantar area appeared. Psoriasis pustulosa was clinically and histologically confirmed by a dermatologist. **Results:** Adalimumab was discontinued but the psoriasis did not improve. Ciclosporin A and topical treatment for psoriasis were started by a dermatologist. A different anti TNF- α treatment is planned after becoming sure that the skin lesions are not infected, because of insufficient antirheumatic effect of Ciclosporin A. **Conclusion:** Psoriasis is a well-described adverse event that has been reported with all the currently available TNF- α antagonists. Also biological agents may induce psoriasis without any known predisposing risk factors. A change within the substance class reduces the severity of the symptoms in some patients, but which biological agent would prove to be less harmful could not be predicted.

260

A RARE CASE: COEXISTENCE OF ANKYLOSING SPONDYLITIS AND RHEUMATOID ARTHRITIS

E. Ata¹, E. Ersöz¹, M. Kösem¹, A. Selim¹, M.Z. Kıralp¹

¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Ankylosing spondylitis is a chronic inflammatory disease which affects sacroiliac junction and vertebrae. Rheumatoid arthritis is known as a chronic systemic inflammatory disease which affects peripheral small joints. We presented a case who has the diagnoses of these two diseases both. **Material and Methods:** A 45-year-old female who has been treated for ankylosing spondylitis for two years applied to our outpatient clinic with pain and swelling in her hand joints. The character of the pain was inflammatory. She had 1 hour of morning stiffness. There was no history of trauma. Her treatment was sulfasalazine 1000 mg/day and asetmetazin 120 mg/day related to ankylosing spondylitis. Her pain in his low back and hip was reduced by the treatment. Her low back and hip pain had increased in addition to the pain in the hand joints in the last 1 month. On physical examination, bilateral wrists, 1. and 2. MCP joints, 1., 2., 3., 4. PIP joints were swollen and painful with pressure. Lumbar range of motion was limited minimally in all directions. Lumbar Schober test was measured as 4,5 cm and chest expansion was measured as 4 cm. Laboratory tests were measured as: ESR: 34mm/h, CRP: 14,8 units, RF (+), Anti CCP (+). X-rays revealed soft tissue swelling of the hands. Increased joint fluid was detected in bilateral wrists and 1. and 2. MCP joints by ultrasonography. **Results:** Rheumatoid arthritis was diagnosed with ankylosing spondylitis in the light of these findings and treatment has been revised. **Conclusion:** Despite coexistence of rheumatoid arthritis and ankylosing spondylitis is a rare situation, it should be considered in the diagnosis.

261

IS IT PNEUMONIA OR PULMONARY INVOLVEMENT OF RHEUMATOID ARTHRITIS?

E. Ata¹, M. Kösem¹, L. Tekin¹

¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Pulmonary involvement is one of the extra-articular manifestations of rheumatoid arthritis and includes pleural effusion, parenchymal nodules, interstitial involvement, and airway disease. We present a case of a patient with pulmonary involvement of rheumatoid arthritis and treated with pulse steroid therapy. **Material and Methods:** Case: A 73-year-old female who had suffered from severe erosive seropositive (rheumatoid factor and anti-cyclic citrullinated peptide) rheumatoid arthritis for 40 years with productive cough and dyspnea for 4 weeks, admitted to our outpatient clinic. She had received some antibiotherapies with a diagnosis of pneumonia before referred to us but her symptoms

had not improved. According to her history, she had not received a regular treatment for 35 years but she have used leflunomide (20 mg per day) and prednisolon (4 mg per day) for last 5 years. On examination there was no fever and swelling of hand, wrist or any other joint. There was rheumatoid nodule on his left elbow. There was widespread bilateral rough rales by auscultation. There was morning stiffness around joints lasting 1 hour. Laboratory tests revealed: White blood cell 11.000, erythrocyte sedimentation rate of 114 mm/hour, C-reactive protein of 89 mg/dL, rheumatoid factor 190 U/mL, anti CCP positive, ANA negative, anti-dsDNA negative. Chest X-ray and BT showed a bilateral reticulonodular infiltration that was thought to be due to pulmonary involvement of rheumatoid arthritis. **Results:** We performed three courses of steroid pulse therapy (methylprednisolone 500 mg x 3 day/course) and her pulmonary symptoms were improved after treatment. Leflunomide was discontinued and methotrexate (10 mg/week) hydroxychloroquine (400 mg twice a day) and prednisone (4 mg/day) was started. There was no similar complaint at 3-month follow-up period. **Conclusion:** It should be kept in mind that productive cough and dyspnea may be due to pulmonary involvement of rheumatoid arthritis and pulse steroid therapy is a good option for treatment.

262

TREATMENT OF PULMONARY INVOLVEMENT OF RHEUMATOID ARTHRITIS WITH ADALIMUMAB

E. Ata¹, L. Tekin¹, M.Z. Kıralp¹

¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Rheumatoid arthritis (RA) is a systemic disease, characterized by symmetric joint involvement, but it can also affect other organ systems, including the lungs. The better-known pulmonary manifestations of RA are interstitial lung disease, rheumatoid nodules, and pleural effusions. Less common manifestations include bronchiolitis obliterans and cryoarthropathy. We present a case of a patient with pulmonary involvement of rheumatoid arthritis and treated with adalimumab. **Material and Methods:** Case: A 70-year-old man with a 36-year history of rheumatoid arthritis had been on methotrexate, sulfasalazine, and prednisone admitted to our outpatient clinic. He has suffered progressive dyspnea and productive cough for 8 years. His complaints were increased recently. On examination there were deformities on hand, wrist and left elbow joints due to RA. There was no rheumatoid nodule. There was decreased left lung sounds by auscultation. Laboratory tests revealed: erythrocyte sedimentation rate of 44 mm/hour, C-reactive protein of 35 mg/dL, rheumatoid factor 144 U/mL, anti CCP positive. Chest X-ray showed decreased left lung volume. CT showed widespread increased bronchial wall thickness on the left lung and bronchiectatic changes. It was thought to be due to pulmonary involvement of rheumatoid arthritis. **Results:** We decided to start adalimumab treatment (40 mg biweekly) continuing his on methotrexate. Dyspnea and productive cough was improved at 6-month follow-up period. **Conclusion:** There is evidence of an association between pulmonary complications and the use of anti-TNF agents, etanercept and infliximab in particular. Adalimumab is a humanized monoclonal antibody, it would have the potential advantage of being less immunogenic. However, some authors have suggested that its use might induce pulmonary complications. Herein, we want to draw attention to successful treatment of pulmonary involvement of rheumatoid arthritis with adalimumab but it should be kept in mind that it may also cause pulmonary complications.

263

FUNCTIONS OF THE INNER EAR IN PSORIATIC ARTHRITIS

I. Gundogdu¹, A. Gunes², M. Mutlu³, Y. Demir⁴

¹Ministry of Health Ankara Diskapi Yildirim Beyazit Education and Research Hospital-, Department of Physical Therapy and Rehabilitation, Ankara, Turkey, ²Golbasi Hasvak State Hospital, Department of Otorhinolaryngology, Ankara, Turkey, ³Ministry of Health Ankara Diskapi Yildirim Beyazit Education and Research Hospital-, Department of Otorhinolaryngology, Ankara, Turkey, ⁴GM-MA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: The aim of this study was to investigate the inner ear function in patients with psoriatic arthritis. **Material and Methods:** Twenty-four patients younger than 60 years of age who were followed up for at least for one year in the outpatient clinics of physical therapy and rehabilitation with the diagnosis of PsA according to CASPAR criteria, who did not complain of any hearing impairment and 38 healthy volunteers were included in the study. Distortion product otoacoustic emissions (DPOAE) values between 1 kHz–4 kHz, tympanometric examination results, Stapes reflex values, Speech reception threshold (SRT) and Speech discrimination (SD) values, pure-tone values between 250 and 8,000 Hz and high-frequency values between 10,000, 12,500 and 16,000 Hz were analyzed. Statistical comparisons between both groups were performed using chi-square test and Mann-WhitneyU test. $p < 0.05$ was accepted as the level of statistical significance. **Results:** Our study population consisted of 24 [9 male (37.5%) and 15 female (62.5%)] patients with a mean age of 47.21 ± 11.28 (range, 28 to 63) years and 38 [16 male (42.1%) and 22 female (57.9%)] healthy volunteers with a mean age of 44.39 ± 8.12 (range, 29 to 60) years as the control group. Mean duration of psoriatic arthritis was 7.62 ± 4.88 years. In the evaluation of hearing frequencies of the patients between 4,000 and 6,000 Hz, a statistically significant difference was found relative to the control group ($p < 0.05$). DPOAE values of the patients were analyzed within the 1000–4000 Hz interval. When compared with the control group, a statistically significant difference was found at 3,000 and 4,000 Hz. ($p < 0.05$). **Conclusion:** Our study provides strong evidence suggesting the necessity of monitorization of these patients regarding sensorineural hearing loss so as to take measures against the development of hearing loss during early stage which may be another disability in patients with PsA which is itself a potential cause of severe disability.

264

THE TURKISH VALIDITY AND RELIABILITY OF THE JENKINS SLEEP SCALE IN ANKYLOSING SPONDYLITIS

M.T. Duruöz¹, F. Ulutatar², C. Sanal Top², E.C. Öztürk², H. Gündüz³, Ö. Kayhan²

¹Marmara University School of Medicine, PM&R Dept. Rheumatology Div., Istanbul, Turkey, ²Marmara University School of Medicine, PM&R Dept., Istanbul, Turkey, ³Marmara University School of Medicine, PM&R Dept. Algology Div., Istanbul, Turkey

Introduction/Background: The aim of this study is to assess the validity and reliability of the Jenkins Sleep Scale (JSS) in a Turkish population with Ankylosing Spondylitis (AS). The JSS is not time consuming scale which assesses the sleep disturbance with 4 questions. **Material and Methods:** The back translation method was used to translate the JSS in Turkish. According to modified New York criteria the AS patients were recruited into the study consecutively. The internal consistency (Cronbach's alpha) was assessed for reliability. Face validity and construct validity (convergent and divergent validities) were evaluated. The relation of the JSS with the Pittsburgh Sleep Quality Index (PSQI), Multidimensional Assessment of Fatigue (MAF) scale, Ankylosing Spondylitis Quality of Life (ASQoL) scale and BASDAI were assessed for convergent validity. The relation of the JSS with age, body mass index (BMI) and disease duration were assessed for divergent validity. Pearson's correlation coefficient was used to assessed the relation between quantitative parameters. $p < 0.05$ accepted as significant. **Results:** Sixty AS patients (37 male) with 39.55 (SD:10.84) mean of age were recruited. The mean of

the BMI and the disease duration were 27.39 (SD: 4.22) and 54.35 (SD:68.20) months respectively. The Cronbach's alpha of JSS was 0.83. All questions are about sleep and they were well understood by patients which showed the face validity. The JSS has good correlation with functional and clinical parameters (convergent) and it has not significant correlation with non clinical parameters (divergent) (Table). The JSS has the best correlation with the Pittsburgh Sleep Quality Index ($r=0.75$). **Conclusion:** The Jenkins Sleep Scale is valid and reliable instrument in AS patients in a Turkish population.

	Pearson's (r)	Significance (p)
<i>Convergent validity of JSS</i>		
PSQI	0.75	<0.0001
MAF	0.60	<0.0001
ASQoL	0.48	<0.0001
BASDAI	0.57	<0.0001
<i>Divergent validity of JSS</i>		
Age	-0.10	0.4580
BMI	0.20	0.1280
Disease duration (month)	0.10	0.4340

265

EVALUATING THE CORRELATION BETWEEN PAIN, CLINICAL SYMPTOM, AND ELECTRODIAGNOSTIC SEVERITY IN CARPAL TUNNEL SYNDROME

S.R. Saeidian¹, S. Rasras¹, A. Dashtbozorg², S.M. Latifi³

¹Ahvaz Jundishapur University of Medical Sciences - Ahvaz - Iran, Physical Medicine and Rehabilitation, Ahvaz, Iran, ²Ahvaz Jundishapur University of Medical Sciences - Ahvaz - Iran, Orthopedy, Ahvaz, Iran, ³Ahvaz Jundishapur University of Medical Sciences - Ahvaz - Iran, Health Research Center-Diabetes Research Center, Ahvaz, Iran

Introduction/Background: Median nerve involvement in wrist is one of the most common compression neuropathy which drives the patients to musculoskeletal clinics such as orthopedy, neurology or physical medicine and rehabilitation clinics. For estimating the amount of nerve injury, all the amounts of patients' pain severity, clinical and electrodiagnostic severity data were used by different researchers. The aim of this study was to access the correlation between severities of pain complain, clinical symptom severity and duration of disease by EDX findings. **Material and Methods:** During two years period, all the patients came to Imam khomei hospital with hands pain and symptoms of carpal tunnel syndrome were collected. The correlation among their clinical symptom severity, disease duration, pain severity scale, electrodiagnostic severity, evaluated statistically. **Results:** The 370 patients consisted of 234 females and 136 males were included in this study. Based on electrodiagnosis, 104 patients suffered from minimal type of the disease. 166 mild, 59 moderate and 41 were involved in severe kinds of the disease. The patients' report of pain severity did Not show correlation with electrodiagnostic severity. But the duration of the disease was correlated with electrodiagnostic severity ($p=0.0001$, $r=0.35$). The electrodiagnostic severity was correlated with the clinical symptom severity at: $p=0.0001$, $r=0.54$. **Conclusion:** In order to evaluate severity of median nerve involvement in carpal tunnel syndrome, One should consider the patients clinical symptom severity and the electro diagnostic severity were more reliable rather than severity of pain complain which reported by patients.

266

LIPID PROFILE IN RHEUMATOID ARTHRITIS PATIENTS AND ITS RELATION TO DISEASE ACTIVITY

A. Saraf¹

¹Ludhiana, India

Introduction/Background: Cardiovascular morbidity and mortality are enhanced in Rheumatoid Arthritis (RA), which may be attributable to dyslipidemia. The dyslipidemia observed in RA appears to be dependent on disease activity, but only a few studies in the world literature are there, providing definite correlation and mechanisms. In this study we prospectively assessed the correlation of lipid profile with the disease activity. **Material and Methods:** A total of 60 patients who fulfilled the “Revised Criteria for the Classification of Rheumatoid Arthritis 1987” were included in this study. The patients who satisfied at least 4 out of 7 criteria were included in the study. The serum was collected from rheumatoid arthritis patients for the determination of lipid values which are triglycerides (TG), total cholesterol (TC), high density lipoprotein (HDL), low density lipoprotein (LDL). Disease activity was assessed by using DAS 28 ESR score. Disease activity was then correlated to the lipid profile of the patients using co-efficient of correlation. **Results:** Out of 60 patients, 42 (70%) patients had very active disease activity at the time of presentation. 16 (26.7%) patients had moderately active and 2 (3.3%) had inactive disease. Patients with very active disease were found to have low levels of LDL, HDL and TC as compared to patients with inactive disease. However the reduction in HDL levels was significantly higher than TC levels. Levels of TG were found to be higher in patients with very active disease. **Conclusion:** By causing greater reductions in HDL, RA does increase cardiovascular mortality and morbidity. In patients with RA it is more important to measure both total cholesterol and HDL and to use their ratio for the calculation of absolute cardiovascular disease risk. HDL, LDL, TC can be used as corroborating markers of disease activity in RA.

267

ASSOCIATION OF TAKAYASU’S DISEASE AND JUVENILE RHEUMATOID ARTHRITIS: A CASE REPORT

W. Said Lahmar¹, M. Rekik¹, M. Sghir¹, A. Haj Salah¹, W. Kessomtini¹

¹University Hospital Tahar Sfar, Physical Medicine and Rehabilitation, Mahdia, Tunisia

Introduction/Background: Takayasu’s arteritis (TA) is an uncommon vasculitis of young women that affects predominantly the aorta and aortic trunk above. Its association with juvenile chronic arthritis has been rarely reported. We report a new case of this association and we describe its management in physical medicine. **Material and Methods:** This is a 26 year old patient with a history of juvenile rheumatoid arthritis since the age of 4 years. It was a positive oligoarticular form (ANA + at 1/800) complicated by bilateral anterior uveitis. She was initially addressed for chronic neck and left shoulder pain. **Results:** The initial physical examination showed thoracic outlet syndrome. She received physical therapy without any improvement. Laboratory tests revealed inflammatory syndrome with a sedimentation rate at 120 in the first hour and inflammatory anemia at 7 g/dl. Since we found these results and the development of hypertension with syncope, we addressed the patient in internal medicine for suspected Takayasu arteritis. This diagnosis was established because of the existence of 5 ACR criteria: age <40 years, vascular claudication in the left upper limb, bilateral lower humeral and radial pulses, the systolic murmur at the subclavian artery, parietal thickening of right and left common carotid arteries. Doppler ultrasound of the neck vessels and thoracoabdominal angioscan revealed a damage of common carotid, subclavian, vertebral and thoracic aorta. The patient was treated with a high-dose of corticosteroids in combination with methotrexate. Despite this treatment, the left upper limb claudication persisted and the patient kept a left shoulder pain due to supraspinatus tendinitis for which she received two sub acromial injections and an appropriate rehabilitation program with a significant improvement. **Conclusion:** The association between Takayasu arteritis and juvenile rheumatoid arthritis is rare. Takayasu’s disease should be suspected whenever coexist joint symptoms and vascular signs mainly vascular claudication in the upper limb of a young woman.

268

POLYMYALGIA RHEUMATICA IN KOREAN POPULATION : DEMOGRAPHIC AND CLINICAL CHARACTERISTICS, AN EXPERIENCE IN A NONSPECIALIZED LOCOMOTOR PAIN CLINIC

D.H. Sung¹

¹Samsung Medical Center, Physical Medicine and Rehabilitation, Seoul, Republic of Korea

Introduction/Background: Although, polymyalgia rheumatic (PMR) is known as a common systemic inflammatory disease of the elderly, the incidence of PMR in Asian countries is quite lower than Western countries. Clinical and demographic characteristics of Korean PMR patients were reviewed. **Material and Methods:** We reviewed the records of 34 Korean patients diagnosed as PMR in a nonspecialized locomotor pain clinic of one general hospital during 2009–2015. Diagnosis was made based on the 2012 European League Against Rheumatism/American College of Rheumatology criteria. Demographic characteristics, clinical features, laboratory and imaging findings were reviewed. **Results:** The average age at diagnosis was 64.6. Among 34 patients, 24 were female. There was no seasonal preference in symptom development. Duration between onset of symptom to diagnosis was 8.3 months. Pain sites were shoulder (100.0%), hip (91.2%), and posterior neck, low back, and knee (Table 3). Morning stiffness was reported in 31 (91.2%) patients and it lasted over or equal to 45 minutes in 22 patients. Combined giant cell arteritis was detected in 5 cases (Table 1). Only 10 patients were diagnosed as PMR at initial presentation, and the others had variable previous diagnosis; lumbosacral radiculopathy (14.7%) and adhesive capsulitis (11.8%) (Table 2). Oral prednisolone were administered on 30 patients with tapering out schedule, and they showed different drug responses (remitting (60.0%), relapsing-remitting (23.3%), and progressive relapsing (16.7%)) (Fig. 1). **Conclusion:** Duration from onset to diagnosis, 8.3 months, was longer than other previous Korean reports, and misdiagnosis as lumbosacral radiculopathy and adhesive capsulitis were most frequent. Incidence of giant cell arteritis is higher than other previous Korean reports. Other demographic characteristics and clinical features including response to steroid were similar to previous Western and Korean reports. Lower incidence of PMR in Korean population may be attributable to a lack of awareness of this disease entity. High index of suspicion for PMR is needed.

269

CHARCOT NEUROARTHROPATHY OF THE KNEE JOINT: A CASE REPORT

S.H. Wan Mohamad Akbar¹, T.Y. Chung¹

¹University of Malaya Medical Centre, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Knee Charcot neuroarthropathy (CN) is rare unlike foot CN. Its incidence is unknown whereas the prevalence of foot CN ranges from 0.4–13% in diabetics. Cardinal signs of acute knee and foot CN are similar, namely swelling, redness, warmth, minimal or no pain with possibly elevated inflammatory markers. The main principle of acute management of CN is immobilisation and offloading. Experience in rehabilitation management of right knee CN is illustrated in this case report. **Material and Methods:** A 57-year-old man with chronic diabetes mellitus presented with a grossly deformed, painless, swollen and unstable right knee, which rapidly progressed over 5 months with no history of trauma. Inflammatory markers were raised and a diagnosis of right knee CN was made once infection, haematological, malignancy, gouty arthritis and degenerative causes were excluded. Radiological studies showed subluxation of the right knee joint with all major ligaments ruptured. He was limited to hopping with a walking frame and propelling a wheelchair due to fear of weight bearing. Refusing surgery, he agreed for a right knee- ankle- foot orthosis for joint protection while allowing stability in stance phase for ambulation. **Results:**

There were no further progress in joint swelling and instability. The patient adhered to off-loading strategies and physical therapy sessions to improve ROM and muscle strength in preparation for gait training with an orthosis along with modifications to activities of daily living. *Conclusion:* Although rare, physicians should be aware that Charcot neuroarthropathy can occur at the knee with debilitating consequences of limiting ambulation and function.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: MUSCULOSKELETAL CONDITIONS - DEGENERATIVE JOINT DISEASES (E.G. OSTEOARTHRITIS)

270

A RARE DIAGNOSIS OF HAND AND FOOT DEFORMITY: PACHYDERMOPERIOSTOSIS

S. Akarsu¹, E. Ata¹, L. Tekin¹

¹GATA Haydarpasha Training Hospital, Physical Medicine and Training Hospital, Istanbul, Turkey

Introduction/Background: Finger clubbing, which involves distal phalanx thickening and nail convexity, has been known since antiquity. Pachydermoperiostosis is an autosomal dominant disorder characterized by periosteal new bone formation, and involves the distal extremities. This disorder presents as clubbing, hyperhidrosis, progressive enlargement of hands and feet, and thickening of the skin. This abnormality, often associated with arthralgia and bone pain. Paraneoplastic hypertrophic osteoarthropathy (HOA) is probably the best known and the most extensively studied paraneoplastic syndrome in human pathology. The familial or idiopathic HOA appears at puberty and is not associated with other underlying diseases. We present the case with a familial HOA in order to call attention of physicians for this pathology. *Material and Methods:* 36 year-old man admitted to our clinic with a complaint of deformity in his fingers, toes, ankles and difficulty in walking. His complaints had been present since his infancy. The same pathology were present in some of his family members. In physical examination clubbings were present in all of his fingers and toes especially in thumbs and first toes. The other toes were irregular and disorganized and had developmental disorder. There were symmetrical edema and limitation in joint movements of his ankles. *Results:* He was diagnosed as familial HOA according to his clinical findings and conservative treatment were managed. *Conclusion:* Familial or idiopathic HOA are rare conditions. The familial or idiopathic forms of HOA occur either in the first year of life or at puberty. Current treatment modalities for pachydermoperiostosis are limited. Conventional drugs like non-steroidal anti-inflammatory drugs and colchicine are usually the first-line drugs. Some studies have reported that bisphosphonates can decrease pain and other symptoms related to hypertrophic osteoarthropathies.

271

POSITIVE EFFECT OF HOSPITAL COLORS ON PATIENTS' RECOVERY AFTER TOTAL HIP OR KNEE ARTHROPLASTY

G. Bernhardt¹, S. Eminovic¹, R. Kriesche¹, A. Leithner¹

¹Medical University of Graz, Department of Orthopedic Surgery, Graz, Austria

Introduction/Background: Hospitalization represents a stressful event. Several studies demonstrated wellbeing as a significant factor in patients' rehabilitation. Environmental stimuli are determining factors for patients' behavior and mood. The aim of the study was to describe the effects of colors in hospital rooms on patients recovery after total hip or knee arthroplasty. *Material and Methods:* We performed a prospective randomized, controlled study including 80 patients. The intervention group was randomized to colored patient

rooms while control group received medical care in conventional patient rooms. Data were collected at three timepoints [BGA1] to study patients' mood, anxiety and depression, quality of life (QoL) and pain. Standardized questionnaires including the Profile of Mood States Brief Form (POMS), Hospital Anxiety and Depression Scale (HADS), Short Form Health Survey (SF-12) and Brief Pain Inventory (BPI) were used. *Results:* There were significantly better results in the QoL summary scores in the intervention group three and six days postoperatively compared to the control group (PCS score 36.7±5.0 vs. 34.4±6.7; $p=0.029$ and MCS score 51.9±6.6 vs. 46.7±8.4; $p=0.015$). There were decreased total mood scores in both groups showing better results for the intervention group (intervention group: preoperative 76.0 vs. postoperative 30.0; 31.5; control group: preoperative 85.5 vs. postoperative 34.0, 33.0). *Conclusion:* To the best of our knowledge this is the first study evaluating the effects of colors on patients' mood, anxiety, depression, quality of life and pain. We could show a significant positive effect of colors on patients QoL. Further studies are needed to confirm our results in a larger cohort and to focus on effects of healthcare environment including the impact of colors on patients' rehabilitation.

272

EFFECT OF LOWER EXTREMITIES STRENGTHENING EXERCISE ON OBESE FEMALE'S KNEE CONDITION

E.H. Choi¹

¹Hallym University, Physical Medicine & Rehabilitation, Chuncheon-Si- Gangwon-Do, Republic of Korea

Introduction/Background: This research is proposed to evaluate the effects of lower body strengthening exercise on knee joint in obese women. *Material and Methods:* Eight females with BMI ≥ 25 who agreed to participate in obesity exercise program were recruited. They carried out cross fit exercise program composed of squatting and running exercise by 3 times per week for 12 weeks. Before initiating the program subjects' knee condition were checked by knee x-ray and tibial/femur scanogram to evaluate the degenerative change of the knee and Q-angle. Also subjects' knee flexion and extension forces were assessed by Contrex® isokinetic dynamometer and surface electromyography. After 3 months of obesity exercise program same evaluations were repeated to assess the difference after the program. *Results:* None of them showed any radiographic features of osteoarthritis before and after the exercise program. However, two subjects presented newly developed knee pain while the program. One participant who previously had knee pain complained of persistent symptom after the program. Another person who had knee pain experienced alleviation of the symptom. According to isokinetic dynamometer test and surface electromyography result, all of the participants exhibited overall improvement of knee extensors and flexors. Two subjects with newly occurred knee pain showed imbalanced muscle development between right and left lower limbs. One subject with persistent knee pain presented continuous knee extensor imbalance between two lower limbs. One person who showed relieved knee pain recovered more balanced knee motion power between two sides. No significant balance change between two limbs has been noted from symptom-free subjects. *Conclusion:* In spite of possible knee pain development, lower extremities strengthening exercise is recommended because it will allow muscle gain for obese people. However, lower body exercise without considering balanced strengthening would cause knee pain. Balanced strengthening of both sides should be more emphasized for obese people.

273

CARTILAGE REGENERATION IN SEVERE KNEE OSTEOARTHRITIS AFTER INTRA-ARTICULAR PLATELET-RICH PLASMA IN ASSOCIATION WITH HYALURONIC ACID INJECTION: CASE REPORTS

L.W. Chou^{1,2}, S.H. Chen¹, W.T. Wu¹, T.S. Kuan³, M.J. Kao⁴

¹China Medical University Hospital, Department of Physical Medicine and Rehabilitation, Taichung, Taiwan, ²China Medical University, School of Chinese Medicine - College of Chinese Medicine, Taichung, Taiwan, ³College of Medicine - National Cheng Kung University, Department of Physical Medicine and Rehabilitation, Tainan, Taiwan, ⁴Taipei City Hospital- Zhong Xiao Branch, Department of Rehabilitation, Taipei, Taiwan

Introduction/Background: Osteoarthritis (OA) is a degenerative disorder resulted from loss of joint cartilage and underlying bone, results in pain and loss of function. The treatment of knee OA is a challenge because of the poor capacity for self-regeneration on cartilage. These non-surgical interventions include the aggravating factor control, symptomatic treatment, prolotherapy and viscosupplementation. The combined use of platelet-rich plasma (PRP) and hyaluronic acid (HA) had not been used widely, lacks of clinical evidence, and much limitation in severe knee OA patient. **Material and Methods:** Three patients representing knee OA underwent PRP in association with intra-articular HA injection. PRP was prepared using SEPAX system (Biosafe SA, Eysins, Switzerland). An amount of 200 mL venous blood was drawn from the patient, then PRP, platelet-poor plasma, and red blood cell were collected individually after 20 minutes of processing using the VGR protocol. An amount of 20 cc PRP was drawn aseptically. Subsequently, each patient had been injected in the following areas: intra-articular, pes anserine, medial collateral, and lateral collateral ligament attachments. A total of 10 cc PRP (including 5 cc intra-articular injection) was used per knee joint at visit, then followed by three weeks of intra-articular HA injection course of each knee separately. **Results:** Three patients who received PRP in association with HA injection showed improved pain and function with advanced knee OA. The follow-up standard weight-bearing X-ray images of knees also confirm the improvement and may indicate the regeneration of the articular cartilage. **Conclusion:** Our cases provide the evidence of clinic and radiography of the new therapy of advanced knee OA. This treatment strategy of PRP in association with HA injection can offer a chance to treat severe knee OA instead of immediate operation or a chance for those who cannot receive operation, and can also postpone the need of arthroplasty and can increase daily activity function significantly.

274

CORRELATION BETWEEN PAIN AND RADIOGRAPHIC FINDINGS IN KNEE OSTEOARTHRITIS

R. Cua¹, C. Suarez¹, M.M. Bernardo¹

¹University of Santo Tomas Hospital, Physical Medicine and Rehabilitation, Metro Manila, Philippines

Introduction/Background: Osteoarthritis (OA) is the most common form of arthritis and is a leading cause of disability among the elderly. Plain radiographs have been used as a low cost initial screening tool in determining the extent of knee OA. **Material and Methods:** This paper reports on a subset of data on Visual Analogue Scale (VAS) and Radiographic findings produced from a large triple blind two armed randomized control trial conducted between Jan 2013–Dec 2015. The said study captured 4 general outcomes, including WOMAC, VAS, radiographic findings and ultrasound findings. This paper reports on the correlation of VAS and radiographic findings only. Pain scale was recorded using the Visual analogue scale. A standing anteroposterior radiograph of the involved knees were taken in weight bearing view in full extension. The joint space width was measured as the narrowest point in the lateral and medial tibiofemoral compartment target using a standard millimeter ruler with an accuracy of 0.5 mm. All radiographs were measured by a single radiologist who was blinded with the clinical information of the participants. **Results:** The VAS scores were negatively correlated with the medial and lateral tibial plateau joint spaces on the right and left knees. However, these does not support any significant correlations. [*p*-values are greater than .05 level of significance]. **Conclusion:** Pain measured by the VAS is not a good predictor for anatomic severity of knee osteoarthritis.

275

HEARING ABNORMALITIES IN PATIENTS WITH OSTEOARTHRITIS

I. Gundogdu¹, A. Gunes², E. Umay¹, Y. Demir³, K. Aydemir³, E.A. Ozturk¹

¹Dişkapi Yıldırım Beyazıt Education and Research Hospital, Department of Physical Therapy and Rehabilitation, Ankara, Turkey, ²Golbasi Hasvak State Hospital, Department of Otorhinolaryngology, Ankara, Turkey, ³GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: This study was designed to compare the prevalence of hearing abnormalities in patients with osteoarthritis and an age and gender matched control group without osteoarthritis. **Material and Methods:** Thirty-six patients (35 women, 1 man) younger than 65 years of age who were followed up for at least for one year in the outpatient clinics of physical therapy and rehabilitation with the diagnosis of hand and knee osteoarthritis according to ACR criteria, and age and sex-matched 30 healthy volunteers (28 women, 2 men) were included in the study. Distortion product otoacoustic emissions (DPOAE) values between 1 kHz–4 kHz, tympanometric examination results, stapes reflex values, speech reception threshold (SRT) and speech discrimination (SD) values, pure-tone values between 250 and 8,000 Hz and high-frequency values between 10,000, 12,500 and 16,000 Hz were analyzed. Statistical comparisons between both groups were performed using chi-square test and Mann-Whitney *U* test. **Results:** The mean age of OA and control groups was 53.78±6.12 and 53.30±4.48 years, respectively. Mean duration of osteoarthritis was 2.89±1.68 years. In the evaluation of hearing frequencies of the patients between 4,000 and 12,500 Hz, pure tone audiometry and tympanometric examination results, a statistically significant difference was found relative to the control group (*p*<0.05). There was no statistically significant difference between DPOAE values of the groups. **Conclusion:** Our current study demonstrates strong evidence for sensorineural hearing loss in patients with OA.

276

EFFICACY OF TWO DIFFERENT PLATELET REACH PLASMA KITS WITH DIFFERENT PLATELET COUNTS IN TREATMENT OF EARLY STAGE KNEE OSTEOARTHRITIS

B. Dernek¹, T. Aydin², F.N. Kesiktas³, P. Kursuz Koseoglu¹, D. Diracoglu⁴, N. Isiksacan⁵, I. Bilgi⁶, T.M. Duymus⁶, C. Aksoy⁷

¹Istanbul Kanuni Sultan Suleyman Training and Research Hospital, Physical Therapy and Rehabilitation Clinic, Istanbul, Turkey, ²Okmeydanı Training and Research Hospital, - Physical Therapy and Rehabilitation Clinic, Istanbul, Turkey, ³Istanbul Physical Medicine and Rehabilitation Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey, ⁴Istanbul University - Istanbul Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Istanbul, Turkey, ⁵Bakırköy Dr.Sadi Konuk Training and Research Hospital, Department of Biochemistry, Istanbul, Turkey, ⁶Istanbul Kanuni Sultan Süleyman Training And Research Hospital, Orthopedics and Traumatology Clinic, Istanbul, Turkey, ⁷Istanbul University - Istanbul Faculty of Medicine, - Department of Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Platelet-rich plasma (PRP) has been gaining popularity in the treatment of knee OA. There is in vitro evidence that PRP with higher PLT concentration releases more GFs than PRP with lower concentration. It remains unclear whether more platelets with more GFs cause better clinical results. In our trial we aimed to compare two different PRP kits with different platelet concentration in treatment of early stage knee osteoarthritis. **Material and Methods:** Easy PRP Kit® was injected to 20 patients (group 1) and Ycell PRP Kit® (group 2) was injected to 25 patients by the

for two times with one month interval. Platelet concentration of two different PRP kits was evaluated in the same biochemistry laboratory by manual counting method. According to platelet concentration easy PRP kit® produce approximately 1 million PLTs, and ycell PRP kit® produce approximately 3 million PLTs. Demographic data, Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and Visual Analog Scale (VAS) were used for objective clinical evaluation for first, third and sixth months after the injections. **Results:** There was no significant difference in two groups in terms of sex and age ($p < 0.05$). In both groups initial WOMAC total scores, WOMAC subgroup scores (pain, stiffness, function) and VAS scores were higher compared to the latter evaluations and there was no significant difference between two groups in terms of preinjection scores. Based on data of pre- and post-injections, there was significant reduction in VAS scores after the injections ($p < 0.001$) for both groups for first, third, and sixth month evaluations. **Conclusion:** We found similar results between VAS and WOMAC scores of patients with knee osteoarthritis for two different PRP kits. It seems that one million PLTs is enough for pain relief and functional recovery for short term. Long term results will give additional information about the efficacy of different platelet concentrations.

277

PREVENTION OF DVT AFTER JOINT ARTHROPLASTY

S. Inoue¹, D. Tokunaga², K. Imai², Y. Mikami³, T. Ikeda³, T. Kubo³

¹Maizuru Municipal Hospital, Rehabilitation, Maizuru, Japan, ²Kyoto Prefectural Rehabilitation Hospital for the Disabled, Rehabilitation, Joyo, Japan, ³Kyoto Prefectural University of Medicine, Rehabilitation, Kyoto, Japan

Introduction/Background: The purpose of the present study is to evaluate the efficacy of electrical stimulation with periodic alternating intervals (ES-PAI) in the prevention of deep vein thrombosis (DVT), joint arthroplasty of the lower extremities. **Material and Methods:** Two hundred twenty-three patients were enrolled in this study (female, $n=185$; male, $n=38$; average age 71.7 years [range: 37–88]). Total hip arthroplasty and total knee arthroplasty were performed in 112 and 111 cases, respectively, between Jan 2009 and Mar 2015. After the surgery, the bilateral calves were stimulated for 48 hours using ES-PAI. Stimulation was performed for 3 hours per day for 5 days from postoperative day 3. As an additional preventive measure against DVT, all of the patients were also treated using a compression stocking. Blood samples were taken to measure the D-dimer levels on postoperative days 7 and 14. Ultrasonography was performed to determine whether DVT was present before and after surgery. **Results:** Ultrasonography revealed DVTs in 7 cases before surgery and 13 cases after surgery; no cases presented the clinical symptoms of DVT. The average D-dimer levels were 6.6 $\mu\text{g/ml}$ and 8.1 $\mu\text{g/ml}$ on postoperative days 7 and 14, respectively. Anticoagulants were administered in 55 cases because of the presence of DVT, a high D-dimer level or swelling of the leg. **Conclusion:** The anticoagulant therapies that are administered to prevent DVT are associated with an increased risk of bleeding. Thus, some studies have been performed to investigate the use of physiotherapy techniques, such as intermittent pneumatic compression, in the prevention of DVT. We utilized ES-PAI for the purpose of stimulating the muscles of the leg. In the present study, 13 cases showed DVT after surgery, and there were no cases of fatal pulmonary embolism. We conclude that ES-PAI is a safe and effective treatment for preventing DVT.

278

REHABILITATION AFTER THE MULTI JOINT ARTHROPLASTY (BILATERAL THA AND BILATERAL TKA)

A. Iwashita¹, Y. Konishi², H. Okumura³, K. Matumoto³, S. Eguchi⁴

¹Yamato University, Faculty of Rehabilitation, Suita, Japan, ²Butsuryo College of Osaka, Faculty of Health Sciences, Osaka, Japan, ³Rakuyo Hospital, Department of Orthopaedic Surgery, Kyoto, Japan, ⁴Rakuyo Hospital, Department of Rehabilitation, Kyoto, Japan

Introduction/Background: The multi joint arthroplasty should adjust the final lower length. Therefore, we usually perform a surgery from the joint which close to the body trunk. In this study, we focus attention on the patient who scheduled for surgery of bilateral THA and bilateral TKA. We changed the order of surgery for the walking ability and the activity of daily living (ADL). **Material and Methods:** The patient is 78-year-old woman who had exhibited the varus bilateral hip joint, and the valgus knee joint by severe osteoarthritis. The patient stand by “cross-leg posture”. We changed the plan of surgery to 1) right-THA, 2) right-TKA, 3) left-THA, 4) left-TKA. We measured the time of 10m walking and Barthel Index (BI) before 1) as *i*), after 1) as *ii*), after 2) as *iii*), after 3) as *iv*), and after 4) as *v*). This study was obtained to consent from the patient. **Results:** The time of 10 m walking is *i*) 1:18 sec, *ii*) 1:01 sec, *iii*) 0.34 sec, *iv*) 0.33 sec, and *v*) 0.18 sec. The BI score is *i*) 80, *ii*) 65, *iii*) 75, *iv*) 80, and *v*) 100. **Conclusion:** Typically, the multi joint arthroplasty perform from the joint close to the body trunk. However the most important thing that we have to consider is the patient prognosis. In this case, the most important thing is that the patient can adapt to the new body environment. We consider that the patient get the high quality walking ability and ADL by adjusting the surgery plan and rehabilitation training.

279

SPORTS AND PHYSICAL ACTIVITIES OF ELDERLY PATIENTS WITH KNEE OSTEOARTHRITIS AFTER HIGH TIBIAL OSTEOTOMY

S. Kamada¹

¹Fukuoka University Hospital, Department of Rehabilitation, Fukuoka, Japan

Introduction/Background: We retrospectively investigated the preoperative and postoperative sports and physical activities (SPA) of elderly patients with medial compartment knee osteoarthritis who underwent opening wedge high tibial osteotomy (OWHTO). **Material and Methods:** Fifty-six patients (62 knees) with medial compartment knee osteoarthritis were investigated. The patients comprised 45 women and 11 men, with a mean age at surgery of 71.6 (range: 65–81) years. The mean follow-up period was 51 months. Patients who undertook SPA for their health for more than 30 min per time and more than once per week were defined as SPA cases. The preoperative and postoperative rates of SPA cases, time of resuming or starting SPA after surgery were investigated. Clinical results were assessed by the Lysholm score. **Results:** Fifteen patients (26.7%) did SPA before OWHTO, while 14 patients (25%) did SPA after OWHTO. There was no significant difference between the post and preoperative number of patients ($p=0.54$). One patient participated in two activities preoperatively. Nine patients did two or three activities postoperatively. The mean time to resuming or starting SPA after surgery was 14.1 months. The mean Lysholm score improved significantly from 60.8 preoperatively to 92.5 postoperatively ($p < 0.0001$). **Conclusion:** The number of patients who did SPA after OWHTO did not increase significantly compared with that before surgery. Many patients did not undertake SPA while some patients did two or three activities postoperatively. The rate of patients doing SPA was still less than 30% postoperatively, and it took a comparatively long time for patients to resume or start SPA. Patients without an SPA habit should be smoothly led from rehabilitation in the acute and convalescent phases to SPA from the viewpoint of preventing the disuse syndrome.

280

TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION IN PAIN MANAGEMENT OF OSTEOARTHRITIS OF KNEE

M. Khan¹

¹Dhaka, Bangladesh

Introduction/Background: Osteoarthritis is the most common form of arthritis prevalent in older population. Knee is the most common site among all joints to develop Osteoarthritis. Different modalities of physical therapy are used to improve clinical symptoms and function in knee Osteoarthritis. Transcutaneous Electrical Nerve Stimulation (TENS) is being used in a variety of painful acute and chronic conditions. This study evaluated the effect of TENS in reduction of pain in knee osteoarthritis. **Material and Methods:** Randomly selected 30 patients with osteoarthritis knee were recruited in group A and another 30 patient in group B at Dhaka Medical College Hospital during Mar–Aug 2013. Group A was given TENS at 80 Hz with an intensity 10–30 mA, 3 days a week for 20 minutes per day, along with non-steroidal anti-inflammatory drug (NSAID) medication and activities of daily living (ADL) instructions for 6 weeks. Whereas, group B was treated with NSAID & ADL instructions for the same duration. Main outcome measures were Visual Analogue Scale (VAS) on pain, 50 feet walking time in seconds and tenderness index. **Results:** Most of the cases with osteoarthritis knee belonged to the age group 56–60 years (35%) and male female ratio was 1:1.07. Majority of the study patients were housewives (36.7%). Among the patients, 58.3% (35) came from urban area and 71.7% were middle class people. Pain, tenderness and walking time were improved significantly ($p < 0.05$) among Group A individuals than Group B after 6 weeks. However, no significant difference was observed in terms of their socio demographic and economic characteristics ($n=60$, $p > 0.05$). **Conclusion:** Application of TENS along with NSAIDs and ADL instructions is more effective in reduction of pain and improving functional performances in patients with knee osteoarthritis than the drugs only treatment.

281

ASSESSMENT OF THE BODY BALANCE AFTER CRYOSTIMULATION IN PATIENTS WITH OSTEOARTHRITIS OF THE LOWER SPINE

M. Kiljanski¹, Z. Sliwinski², J. Szczegielniak³, M. Woszczak²

¹Jan Kochanowski University, Physiotherapy, Pabianice, Poland,

²Jan Kochanowski University, Physiotherapy, Kielce, Poland,

³Opole University of Technology, Physiotherapy, Opole, Poland

Introduction/Background: The author presents the results of a group of 126 people, consisting of 66 patients with degenerative changes of the lumbar spine and 60 healthy people. The examination was performed in SP ZOZ Stationary Centre in Zgorzelec. The aim of the study was to determine whether a four-week program of physiotherapy of general cryostimulation in patients with degenerative changes in the spine has an influence on their body balance and pain sensation. **Material and Methods:** 66 patients aged 23–61 in the study group were observed and analyzed, while the control group consisted of 60 people (44 women and 16 men) aged 22–50. All patients were referred by the doctor with the same diagnosis: M 47 - degenerative changes of the lumbar spine. Apart from an individually designed rehabilitation program, each patient participated in 20 sessions of general cryostimulation. **Conclusion:** 1. The use of general cryostimulation in patients with degenerative changes in the lumbar-sacral spine in combination with an appropriately chosen physiotherapeutic program decreases pain sensation in a statistically significant way. 2. The analgesic effect of general cryostimulation seems to change the protective state of muscle tonus, resulting in the improvement of lumbar spine mobility. 3. The cryogenic temperatures influence the state of the patient's body balance, described by the deviation ratio in the frontal and sagittal plane. 4. The recorded elongation of the path on the stabilometric platform after general cryostimulation is a result of changes in muscle tonus, which is confirmed by the greater values of deviations in the frontal and sagittal plane.

J Rehabil Med Suppl 55

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: MUSCULOSKELETAL CONDITIONS - DEGENERATIVE JOINT DISEASES (E.G. OSTEOARTHRITIS)

282

CORRELATION OF JOINT VOLUME AND PASSIVE ROM WITH QUANTITATIVE MEASUREMENT OF CONTRAST-ENHANCED MRI IN IDIOPATHIC ADHESIVE CAPSULITIS OF SHOULDER

Y.T. Lee¹, K.J. Yoon¹, J.Y. Lee¹, C.H. Park¹

¹Kangbuk Samsung Hospital - Sungkyunkwan University School of Medicine, Physical and Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: Several authors have suggested that the quantitative measurement of contrast-enhanced (CE)-MRI can show pathological lesions in idiopathic adhesive capsulitis of shoulder. The relationship between glenohumeral joint (GHJ) volume which has been considered the standard reference for diagnosis of idiopathic adhesive capsulitis and CE-MRI findings has not been investigated. The purpose of our study was to assess whether the quantitative measurement of CE-MRI correlates with GHJ volume and passive range of motion (ROM) in idiopathic adhesive capsulitis of shoulder. **Material and Methods:** Between 2007 and 2014, one-hundred-three patients (46 male, 57 female) with clinical diagnosis of adhesive capsulitis were treated with sono-guided hydrodilatation after CE-MRI and retrospectively recruited. GHJ volume was measured during sono-guided hydrodilatation. The patients were classified into three groups: 1) GHJ volume ≥ 11 ml, 2) 6 ml \leq GHJ volume ≤ 10 ml, and 3) GHJ volume ≤ 5 ml. For quantitative measurement of CE-MRI, thickness of enhancement (TOE) at the axillary recess and rotator interval were measured (Fig. 1A, 1B) and compared among groups using ANCOVA. Relationship between TOE and passive ROM was analyzed by Pearson's correlation. **Results:** Mean TOE at the axillary recess was gradually increased as the GHJ volume decreased across groups (P for trend < 0.001 , Fig. 2A) while this trend was not significant at rotator interval (P for trend = 0.066, Fig. 2B). TOE at the axillary recess negatively well correlated with abduction ($\rho = -0.400$, $p = 0.00$), forward elevation ($\rho = -0.378$, $p = 0.00$) and external rotation ($\rho = -0.297$, $p < 0.01$) (Fig. 3), but TOE at the rotator interval did not. **Conclusion:** Quantitative measurement of CE-MRI at axillary recess could help to differentiate idiopathic adhesive capsulitis of shoulder from other mimicking disease by representing capsular pathology such as decreased joint volume. Additionally, it appears to correlate with limitation of passive ROM of shoulder joint.

283

COMPARATIVE CLINICAL OUTCOME STUDY OF LOW-ENERGY EXTRACORPOREAL SHOCK WAVE THERAPY (ESWT) FOR CHRONIC ACHILLES TENDINOPATHY ACCORDING TO IMAGING STUDY FINDINGS

Y.T. Lee¹, K.J. Yoon¹, C.H. Park¹, J.Y. Lee¹

¹Kangbuk Samsung Hospital - Sungkyunkwan University School of Medicine, Physical and Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: Treatment of Achilles tendinopathy is primarily conservative. Several authors have reported that abnormal imaging finding is a poor prognostic marker for conservative treatment. If conservative treatment is unsuccessful, extracorporeal shock wave therapy (ESWT) could be an alternative. The purpose is to compare the effect of low-energy ESWT on chronic Achilles tendinopathy according to imaging findings. **Material and Methods:** Between 2007 and 2015, consecutive 46 patients (59 feet)

with clinical diagnosis of Achilles tendinopathy were treated with ESWT after imaging study (MRI or US). Thirty-five feet (25 patients) met our eligibility criteria were included and divided to two groups: (1) Image-confirmed group with obvious abnormal findings; (2) Image-uncertain group. Inclusion criteria were: (1) chronic heel pain >6 months with conservative treatment failure; (2) grade of poor or fair in Rolls-Maudsley score (RMS). ESWT (0.10–0.11 mJ/mm², 600–800 shocks) was given once a week until treatment is successful within maximum 12 sessions. Numeric rating scale (NRS) and RMS were evaluated before ESWT and at short-term follow up (a week after last ESWT session). “Good” and “Excellent” grade in RMS was defined as treatment success. **Results:** Baseline characteristics were similar between two groups. Repeated measure ANOVA demonstrated that ESWT significantly decreased NRS at short-term follow up ($p < 0.001$). Pain reduction effect of ESWT was found to be statistically similar between the groups (p for interaction=0.243) although pain was more decreased in Image-confirmed group than Image-uncertain group. Success rate of Image-confirmed group (92.8%) was significantly higher than Image-uncertain group (57.1%) ($p=0.028$). **Conclusion:** Low-energy ESWT appears to be beneficial on pain reduction in clinically diagnosed chronic Achilles tendinopathy. It is notable that in Image-confirmed group, pain reduction effect of ESWT was found to be similar and success rate was superior compared to Image-uncertain group.

284

EFFECTS OF NORDIC WALKING EXERCISE IN PATIENTS WITH HIP OSTEOARTHRITIS

S. Maniwa¹, K. Kawamoto¹, A. Noguchi¹, Y. Michibata¹, T. Tadenuma¹, Y. Sakai¹, T. Tanaka², M. Kadowaki², Y. Uchio²

¹Shimane University, Rehabilitation Medicine, Izumo, Japan, ²Shimane University, Orthopaedic Surgery, Izumo, Japan

Introduction/Background: Moderate physical activity provides health benefits even in the individuals with osteoarthritis. Nordic walking (NW) proved to be a feasible form of physical exercise that can be done by practically anybody. The purpose of this study is to elucidate the efficacy of NW in patients with hip osteoarthritis. **Material and Methods:** Nine female patients with hip osteoarthritis (age 64±2, BMI 24.4±3.7, Kellgren and Lawrence (K/L) grade 2: 2 hips, grade 3: 1 hip, grade 4: 5 hips) were recruited from an outpatient clinic. NW were instructed by physical therapists. In order to minimize the loads upon the joints during NW, patients were guided to avoid the increased stride length and were coached to prevent a “bouncy” walk. Patients were encouraged to perform NW for at least 15 min, 3 times a week for 6 months. Outcomes were assessed 6 months after intervention and included pain (NRS), Harris hip score (HHS), walking speed (10 meter walking time), TUG test, muscle strength, and EuroQoL5-D. Wilcoxon signed-rank test was used for statistical analysis. **Results:** One patient quitted due to discomfort at 3 months and 8 patients completed NW for 6 months. Hip pain decreased from 4.1 to 3.6 ($p=0.58$). Mean HHS improved from 67.9 to 80.1 ($p=0.04$). Ten meter walking time decreased from 8.4 sec to 7.7 sec ($p=0.03$) and TUG test improved from 9.5 sec to 7.1 sec ($p=0.03$) after 6 months. QoL and abductor strength of the hip did not improve significantly. Extensor strength of the knee improved only in the uninvolved side ($p=0.02$). No patients showed progression of the K/L grade. **Conclusion:** NW improved walking ability and function of the joints in patients with hip osteoarthritis. NW may delay the progression of the disease and may postpone the timing of total hip arthroplasty.

285

NON-SPECIFIC BACK PAIN IN CHILDREN AND ADOLESCENTS: AN ANALYTICAL CROSS-SECTIONAL STUDY

R. Moncer¹, A. Nouria², S. Jemni¹, S. Frioui¹, N. Abdelkafi², E. Toulgui¹, F. Khachnaoui¹

¹Sahloul Hospital, Rehabilitation, Sousse, Tunisia, ²Fattouma Bourguiba Hospital, Rehabilitation, Monastir, Tunisia

Introduction/Background: Non specific low back pain (LBP) is the most common form of low back pain, with a prevalence of 80–85% in the general population. In children, it is of the order of 30%. It leads to limitations of educational and social activity. Despite this high prevalence, it seems to be neglected by the child, family and doctors. Studies have implicated several risk factors in the genesis of symptoms, such as school furniture, the type of school back, family history of low back pain, overweight and high performance sport without finding direct causes. The aim of this study was to determine the prevalence of low back pain in children and adolescents, identifying factors directly associated with symptoms, which will allow us to establish a program to prevent non specific LBP in childhood. **Material and Methods:** We conducted an analytical cross-sectional study about 444 students, 201 boys and 243 girls, with average age of 14.95 years. **Results:** The prevalence was 22.3%, 95% CI [18.2 to 26.2]. This prevalence increases with age with a marked female predominance. The onset of symptoms started at about the age of 13.45 years. It is slightly moderate pain (AVS=3.37). It is in charge of school absenteeism in 13% of cases, of sports stop in 15% of cases. Logistic regression identified four factors directly associated with low back pain: The number of hours of computer games (OR=1.05 CI: 1.009–1.105), the satchel slung (OR=1.74 CI=1.03–2.93), overweight (OR=2.11 CI=1.18–4.37), and the imbalance of the shoulders (OR=2.4 CI=1.04–5.55). **Conclusion:** Low back pain in children and adolescents is a common symptom, multifactorial, which is responsible of limitations of school and leisure activities, that deserves to be evaluated by a longitudinal study with a standardized questionnaire.

286

THE CORRELATION OF KNEE PAIN WITH THE ANATOMICAL ABNORMALITY FINDING BY MUSCULOSKELETAL ULTRASONOGRAPHY IN SOUTH JAKARTA - 2015

R. Kumalasari¹, H. Angganawati², A. Suharti³, D.S. Gunaleila⁴, E.R. Nur Hidayati⁵

¹Budi Pratama Medical Center, Physical Medicine and Rehabilitation, South Jakarta, Indonesia, ²Cileungsi Government Hospital, Physical Medicine and Rehabilitation, Bekasi, Indonesia, ³Graha Permata Ibu Hospital, Physical Medicine and Rehabilitation, Depok, Indonesia, ⁴Tangerang Government Hospital, Physical Medicine and Rehabilitation, Tangerang, Indonesia, ⁵Taipei Medical University, Graduate Institute of Clinical Medicine, Taipei City, Taiwan

Introduction/Background: Osteoarthritis is the common etiology for knee pain over 40 y.o. Pain might arises from periarticular structures. It is critical to find the exact location of the pain source. Radiological finding in knee OA patients is moderately associated with pain. Ultrasonographic (US) examination can show more depth understanding of the cartilage and soft tissue structures that might affected. The objective of this study was to investigate the characteristic of the knee structures in patients presenting knee pain by ultrasonographic examination. **Material and Methods:** Retrospective study with inclusion criteria are knee pain, body mass index (BMI) > 23.0 kg/m², aged 50–70 years old, fulfilling the ACR clinical criteria for knee OA underwent US examination of the most symptomatic knee and had not received any injection for the symptom. The US protocol comprised assessment of suprapatellar recess, patellar tendon, Lateral Collateral Ligament, iliotibial band, Popliteal cyst, Cartilage, Joint fluid, Meniscus, and Iregular cortex. Visual analog scale (VAS) was using to evaluate pain symptom. Performing regression analysis to evaluate which variables that the most influence to the increase of knee pain. **Results:** 38 patient was eligible from 3 hospital in South Jakarta has been evaluated. Statistically significant between VAS complain and osteoarthritis incidences (2nd grade Kelgreen and Lawrence p . 0.014) although

weak correlation between increase pain with OA staging ($r = 0.157$, $p = 0.4$). Moderate positive correlation between VAS and BMI ($r = 0.473$, $p = 0.003$). However, source of knee pain derived from other site such as 2nd grade of quadriceps tendon sprain (57.9%) followed by suprapatellar tendon effusion (34.2%) medial collateral ligament sprain (32.7%), pes anserinus tendinitis (21.2%) and meniscus protrusion (21%). *Conclusion:* Knee pain did not correlate with the progression of knee osteoarthritis. Furthermore, US diagnostic can be used as alternative tools to evaluate the source of knee pain.

287

PERCEIVED HEALTH STATUS, SELF-REPORTED AND PERFORMANCE-BASED PHYSICAL FUNCTION IN A SAMPLE OF ADULTS WITH OSTEOARTHRITIS OF THE KNEE

O. Ogwumike¹, D. Ugwuanyi², A. Adeniyi¹

¹University of Ibadan/University College of Hospital, Department of Physiotherapy, Ibadan, Nigeria, ²University of Abuja Teaching Hospital Gwagwalada, Department of Physiotherapy, Abuja, Nigeria

Introduction/Background: Osteoarthritis (OA) is a disease of the whole joint including muscles, tendons ligaments synovium and bone. The knee is the most commonly affected and knee OA represents the leading cause of disability in the adult population. The substantial effect of knee OA on health, fitness, physical, emotional and social functioning of the afflicted, necessitates assessment of perceived health status and physical function of such patients. This study investigated relationship of perceived health status with self-reported and performance-based physical function of patients with knee OA. *Material and Methods:* This study is a cross-sectional survey of 197 adults (male 109, females 88) with knee OA. The Health Status Questionnaire HSQ-12 was used to assess perceived health, self-reported physical function was assessed using Osteoarthritis Index of Lequesne, while performance-based physical functions were assessed using Short Physical Performance Battery (SPPB) tests. Data were analysed using descriptive and inferential statistics with significance level set at 0.05. *Results:* Participants' mean age was (62.0±8.3) years. Significant positive correlation were observed between these variables: perceived health status and performance-based physical function ($r=0.416$; $p<0.001$), perceived health status and self-reported physical function and ($r=0.676$; $p<0.001$) performance based physical function and self-reported physical function ($r=0.415$; $p<0.001$). *Conclusion:* This study revealed that perceived health status had a direct relationship with self-reported physical and performance based function in adults with knee osteoarthritis.

288

SHORT-TERM CLINICAL RESULTS OF BILATERAL TOTAL KNEE ARTHROPLASTY (TKA)

M. Onishi¹, T. Yamakawa¹

¹Himeji Medical Center, Orthopedic Surgery, Himeji, Japan

Introduction/Background: To compare the results of patients treated with bilateral total knee arthroplasty (TKA) at one time and at twice, and the terms of the hospitalization with rehabilitation program for these patients. *Material and Methods:* Eleven patients (9 females and 2 males; mean age 80.2 years), who received bilateral TKA for bilateral varus knees. The femorotibial angle (FTA) was 179 degrees (176–185). Operations were performed using TriathlonR (StrykerR) with medial parapatellar approach and tourniquet in operation, clamping drain for an hour after administering tranexamic acid by injection to a joint cavity. *Results:* The operative duration was 2 hours and 20 minutes (1 hour and 50 minutes–3 hours and 24 minutes), amount of bleeding in operation was 200 ml (a little-250), amount of bleeding after operation was 215 ml (a little-280), score on The Japanese Orthopedic Association knee

criteria of “pain” and “ability to ascend and descend stairs” (JOA score) before operation was 35.5 (20–45), JOA score at the time of discharge was 68.8 (50–85), the terms of the hospitalization with rehabilitation program was 30 days (27–51). *Conclusion:* Using tourniquet in operation, clamping drain for an hour after administering tranexamic acid by injection to a joint cavity and shorting operative duration made amount of bleeding a little. Moreover, they didn't require blood transfusion and reduced patient's burden. These results suggest that it is possible for patients received bilateral TKA to discharge for about 4 weeks. The terms were only 1 week more than term of unilateral TKA critical path. The results of this study show that bilateral TKA at one time reduce the time of discharge for bilateral varus knees and raise patient's quality of life.

289

THE IMPACT OF VENOUS THROMBOEMBOLISM ON THE POST-OPERATIVE REHABILITATION AFTER TOTAL KNEE REPLACEMENT

M. Osaki¹, S. Nakashita¹, H. Nagashima², H. Hagino¹

¹Faculty of Medicine - Tottori University, Rehabilitation Medicine, Yonago, Japan, ²Faculty of Medicine - Tottori University, Orthopaedic Surgery, Yonago, Japan

Introduction/Background: Osteoarthritis of the knee (knee OA) is often seen in elderly women and needs total knee arthroplasty (TKA). Patients undergoing TKA are at a high risk for venous thromboembolism (VTE), consisting of deep venous thrombosis (DVT) and pulmonary embolism (PE). Once VTE is occurred, patients need to rest to prevent PE, therefore rehabilitation program will be delayed. In this study, we have investigated the impact of postoperative VTE on postoperative rehabilitation. *Material and Methods:* One hundred three patients (140 knees), who received TKA (84 females and 19 males) from Apr 2009 to Mar 2014 in Tottori University Hospital, were enrolled. The ages of patients were ranging from 56 to 93 years (average 76.6 years). *Results:* A rate of postoperative DVT through post-operative day (POD) 7 was 23.6% (33 extremities), and no symptomatic proximal-type DVT and PE were observed. There was no significant difference between patients with and without VTE, regardless of when the walking exercise started, the target range of knee motions, and the walking capacity. Only a preoperative range of knee motion significantly correlated with a risk of VTE. *Conclusion:* Occurrence of VTE did not significantly affect the progress of rehabilitation. In this study, we permitted to continue rehabilitation because proximal-type DVT and PE were absent. Since DVT often occurs within 24–48 hours after TKA, we must pay greater attention to the signs of VTE in post-TKA rehabilitation.

290

CORRELATION OF WESTERN ONTARIO AND MCMASTER UNIVERSITIES OSTEOARTHRITIS (WOMAC) AND SF36 IN PATIENTS WITH KNEE OSTEOARTHRITIS

S.A. Raeissadat¹, E. Ghorbani², L. Sedighipour³

¹PM&R Research Center of Shahid Beheshti University of Medical Sciences- Tehran - Iran, ²Physical Medicine and Rehabilitation, Tehran, Iran, ³Physiatrist - PM&R Research Center of Shahid Beheshti University of Medical Sciences - Tehran - Iran, ³PM&R Research Center of Shahid Beheshti University of Medical Sciences- Tehran - Iran, ³PM&R Research Center of Shahid Beheshti University of Medical Sciences- Tehran - Iran, ³PM&R Research Center of Shahid Beheshti University of Medical Sciences- Tehran - Iran

Introduction/Background: Osteoarthritis (OA) of the knee is prevalent musculoskeletal problem worldwide. This condition impairs functional capacity and decreases quality of life (QoL) in patients by producing pain, stiffness and limitation in range of motion of the

joint The aim of the present study was to evaluate the correlation between condition-specific and generic health status questionnaires for measuring health-related quality of life in patients with osteoarthritis (OA) of the knee. **Material and Methods:** This cross-sectional survey included a total of 424 patients aged 50 years and over, with symptomatic OA of the knees. Patients included fulfilled the American College of Rheumatology (ACR) criteria for knee OA. All patients completed the WOMAC and the SF-36 questionnaires and were assessed for radiographic severity. Also the intensity of knee pain was assessed using the visual analog scale (VAS). The correlation between radiographic findings, patients symptoms also between the scores of the questionnaires were evaluated. **Results:** A significant correlation was found between WOMAC pain, stiffness and function scores and all SF-36 domains and the strongest correlation was between WOMAC pain dimension and the SF physical function. There was no correlation between patients BMI and WOMAC or SF-36 scores. Patients with knee OA in grade 2 and 3 had lower HRQL (according to both WOMAC and SF 36 measure) compared to patients with knee OA in grade 1. **Conclusion:** There is agreement between dimensions of WOMAC and SF36 in measuring HRQL in patients with knee OA. Symptoms also correlate with radiographic findings. The use of both a generic measure of HRQL such as the SF-36, and a disease specific such as WOMAC is useful in characterizing the global burden of this disease.

291

EFFECTIVENESS OF CLINICAL GRADING OF OSTEOARTHRITIS OF THE KNEE AND ITS CORRELATION WITH RADIOLOGICAL GRADING

M.H. Rahman¹

¹Dhaka, Bangladesh

Introduction/Background: Osteoarthritis (OA) of the Knee joint is one of the commonest musculoskeletal disorders in Bangladesh. It affects more in females because they are working in squatting position in Bangladesh. Treatment and prognosis depend on the severity of the disease. There is a radiological grading of OA knee but no established clinical grading. The aim of this study was to develop a clinical grading of OA knee and to make a correlation with its radiological grading. **Material and Methods:** This study was conducted in the department of Physical Medicine & Rehabilitation, NITOR, Dhaka and Labaid Cardiac Hospital, Dhanmondi, Dhaka, Bangladesh during the period of Jan 2012 to Dec 2014. 400 patients were selected on the bases of ACR criteria. After taking clinical history and physical examination, X-ray of the knee A/P in standing and lateral views were taken. Clinical and radiological grading were done and data were processed accordingly. **Results:** 55% of our patients were female, 45% were housewife. 45% patients were bilateral involvement & 30% were right knee involvement only. 56% of our patients were in radiological grade II & 62% were found in clinical grade II. The findings of both the grading are similar and difference is not statistically significant. **Conclusion:** The results of two grading systems are near similar. Clinical grading depends social culture of country. So it will vary country to country and we can assess the severity of the disease with this grading.

292

ANALYSIS OF TIMING OF PEAK MUSCLE ACTIVITY DURING WALKING IN PATIENTS WITH SEVERE KNEE OSTEOARTHRITIS

K. Setogawa¹, K. Kamiya², T. Mizuno², K. Kajihara², Y. Honda², N. Kodama³, K. Domen⁴, R. Tsukagoshi⁵, H. Fujioka⁵, M. Okuno⁶, S. Yoshiya⁶

¹Hyogo College of Medicine Hospital, Rehabilitation, Nishinomiya, Japan, ²Hyogo College of Medicine Hospital, Rehabilitation, Nishinomiya, Japan ³Hyogo College of Medicine, Rehabilitation Medicine, Nishinomiya, Japan, ⁴Hyogo College of Medicine, Rehabilitation Medicine, Nishinomiya, Japan, ⁵Hyogo University

of Health Sciences, Physical Therapy - School of Rehabilitation, Kobe, Japan, ⁶Hyogo College of Medicine, Orthopaedic Surgery, Nishinomiya, Japan

Introduction/Background: Time lag of muscle activity around the knee during walking could aggravate knee osteoarthritis (OA) associated with increased ground reaction forces and decreased load capacity. We analyzed the timing of muscle activity of the knee in severe knee OA patients. **Material and Methods:** Eleven knees with severe knee OA (9 patients) and twelve healthy knees (6 healthy control) were examined. We measured the activities of the vastus medialis (VM) and semitendinosus (ST), the vastus lateralis (VL) and biceps femoris (BF) muscles, during comfortable walking. Co-contraction index (CCI) of the extensor and flexor muscles was calculated: the medial CCI by using the VM and ST data and the lateral CCI by using the VL and BF data. The obtained data were normalized with the stance phase corresponding to 100% and the terminal swing to 20%. The timing of peak muscle activity was compared between the OA and control groups using unpaired T test. **Results:** The walking speed of the severe knee OA patients was slower than that of the healthy subjects. In healthy subjects, the peak activity of each muscle and peak CCI at the medial or lateral aspect were observed during early stance phase immediately after heel strike. By contrast, in severe knee OA patients, the timing of peak muscle activities of the VM, BF and ST and timing of peak CCI at the medial or lateral aspect was delayed. **Conclusion:** Co-contraction between antagonistic muscles of the knee plays an important role to stabilize the knee and to disperse load on the knee. This study showed that the timing of peak CCI at the medial and lateral aspects was delayed in severe knee OA patients during walking. The delay of the timing of CCI might be related to progression of knee OA.

293

REHABILITATION CARE OF HEMOPHILIC ARTHROPATHY: A CASE REPORT

M. Sghir¹, M. Rekik¹, W. Said Lahmar¹, A. Haj Salah¹, W. Kessomtini¹

¹University Hospital Tahar Sfar, Physical Medicine and Rehabilitation, Mahdia, Tunisia

Introduction/Background: Hemophilia is an inherited bleeding disorder caused by the absence or deficiency of a clotting factor. Lack of factor VIII or factor IX defines respectively hemophilia A or hemophilia B. Hemophilic arthropathy occurs between 5–25 years. Articular bleeding leads to pain, joint swelling and muscle inhibition. With proper treatment, these symptoms disappear. The joint destruction caused by recurrent hemarthrosis results in hemophilic arthropathies. **Material and Methods:** We report the case of a hemophilic arthropathy. **Results:** It is about a 12-year-old boy who is followed up and treated for hemophilia A. He had repeated hemarthrosis of left knee leading to a joint limitation. The initial assessment revealed an effusion of the left knee with limited mobility (90/–15) and a stunning quadriceps. The patient underwent rehabilitation with coverage of factor VIII. It aimed at gain joint mobility, muscle building and the improvement of gate efficiency. The outcome was good with improvement of joint mobility (110/–5) and muscle strength. **Conclusion:** The multiplicity and randomness of articular manifestations of hemophilia require a multidisciplinary approach. Functional rehabilitation is one of various therapies implemented to ensure recovery, preservation, development and well-being of hemophilia patients.

294

EFFECTS OF SPECIFIC PHYSICAL MODALITIES IN CERVICAL SPONDYLOSIS

M.A. Shakoor¹

¹Bangabandhu Sheikh Mujib Medical University, Physical Medicine and Rehabilitation, Dhaka, Bangladesh

Introduction/Background: Osteoarthritis is the most common disease that affects more than 80% of the population aged 55 years and older. Pain in the neck is a common complaints of the patients attending the department of Physical Medicine and Rehabilitation. In clinical practice, neck pain is seen frequently as a presenting symptom and sometimes compromise the work capacity. Most of them are suffering from cervical spondylosis. **Material and Methods:** A clinical trial was performed in which a total of 125 patients were selected to find out the effects of specific rehabilitation on cervical spondylosis. The patient was selected on the basis of specific criteria. They were divided into two groups. In Group-A, 61 patients were treated with selective physical modalities that is – exercise, cervical collar, neck support, manual cervical traction at home, NSAID, warm moist compression and instruction in posture. In Group-B, 64 patients were treated with exercise, cervical collar, neck support, warm moist compression, NSAID and instruction in posture. **Results:** There was marked improvement of the condition of the patients of Group-A in response to treatment for 6 weeks ($p=0.007$). So the specific rehabilitation treatment was found significantly effective to reduce the sign & symptoms of cervical spondylosis. There was improvement after treatment in Group-B also ($p=0.01$). So NSAIDs with exercise were also found effective. At the time of first visit, there was no significant improvement between two groups ($p=0.001$) but there was significant improvement in Group-A than Group-B after six weeks treatment ($p=0.003$, 95% CI= -2.40 to -0.51). **Conclusion:** It may be concluded that specific therapy like home cervical traction is beneficial for the patients with cervical spondylosis.

295

THE TRANSITION AND EFFICACY OF PATIENT-PERCEIVED LEG LENGTH DISCREPANCY FOLLOWING TOTAL HIP ARTHROPLASTY

Y. Takeuchi¹, K. Iwakiri², Y. Kimura¹, N. Kumata¹, A. Kobayashi²

¹Shiraniwa Hospital, Department of Rehabilitation, Ikoma, Japan, ²Shiraniwa Hospital Joint Arthroplasty Center, Department of Orthopaedic Surgery, Ikoma, Japan

Introduction/Background: Total hip arthroplasty (THA) is an effective surgical intervention for relief of chronic pain and functional disability. Leg length discrepancy (LLD) after THA has several potential negative consequences for the patient activity and satisfaction. The aim of this study was to determine the transition of patient-perceived LLD after primary THA and its efficacy for the walking ability. **Material and Methods:** Thirty eight patients (33 females, 5 males) underwent primary THA for unilateral hip osteoarthritis. The patient-perceived LLD, walking speed, walking distance, walking satisfaction, the use of stick, and walking with or without limping were measured pre-operatively, three weeks and three months post-operatively. We have investigated the transition of the patient-perceived LLD over time, and we have compared the walking ability in the patient-perceived LLD residual group with that in LLD disappeared group. **Results:** The residual of patient-perceived LLD had shown 73.7% (28 subjects) at pre-operatively, 36.8% (14 subjects) at 3 weeks and 13.2% (5 subjects) at 3 months post-operatively, and there were decreased as progress passes. Patients with a patient-perceived LLD had a significantly poorer walking speed and the existence of limping at 3 weeks after the surgery ($p=0.04$, $p=0.004$, respectively). The limping and the use of the stick at 3 months after the surgery showed a significantly poorer in the LLD residual group than in the LLD disappeared group ($p=0.02$, $p=0.01$, respectively). **Conclusion:** The patient-perceived LLD was a tendency to disappear over time. The slow walking speed, the existence of limping and the use of the stick were significantly associated with the residual of the patient-perceived LLD postoperatively.

296

ASSESSMENT AND MANAGEMENT OF NEUROPATHIC PAIN IN PATIENTS WITH MUSCULOSKELETAL DISORDERS

S. Tomasevic-Todorovic¹, G. Mirjana¹, K. Boskovic¹, S. Pantelinac¹, F. Hanna²

¹Medical Faculty - University of Novi Sad, Medical Rehabilitation Clinic, Medical Rehabilitation Clinic, Serbia, ²Public Health Program -, Department of Health Sciences - College of Arts and Sciences - Qatar University, Doha, Qatar

Introduction/Background: The exact global prevalence of neuropathic pain is not known. Numerous studies have confirmed its presence in patients with musculoskeletal disorders. Therefore, adequate assessment of pain is necessary in order to achieve good management of pain which will help patients in their everyday lives. The aim of the study: Assessment of neuropathic pain component in patients with musculoskeletal complaints. Evaluation of pain management in patients with neuropathic pain. Investigation of fear-avoidance beliefs for patients with musculoskeletal pain. **Material and Methods:** The study included 41 patient (10 male and 31 female), mean age $M=57.44\pm 13.42$. Patients were tested at Rehabilitation clinic of Vojvodina Clinical center. All data was gathered via questionnaires in personal contact. We used following questionnaires: DN4 upitnik (Douleur Neuropathique 4), Pain Detect and FABQ (Fear Avoidance Beliefs Questionnaire). **Results:** We found that positive score on DN4 had 29 participants (70.7%), and 13 (31.7%) on Pain Detect. These tests showed big differenties in detection of neuropathic pain. Eight patients (19.5%) received adequate medication for their pain. There is 78% of patients with an elevated fear-avoidance score which means they are at risk for prolonged disability. **Conclusion:** Significant portion of patients with musculoskeletal disorders have neuropathic pain component. However, a prevalence estimate is not possible because of the different results on questionnaires. Reevaluation of metric characteristics of Serbian version of Pain Detect is necessary. Majority of patients with neuropathic pain is not treated adequately. The most of participants are at risk for prolonged disability

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: MUSCULOSKELETAL CONDITIONS - DEGENERATIVE JOINT DISEASES (E.G. OSTEOARTHRITIS)

297

THE RELATIONSHIP BETWEEN FEMORAL CARTILAGE THICKNESS AND MUSCLE STRENGTH IN KNEE OSTEOARTHRITIS

S. Tuna¹, N. Balci¹, L. Özçakar²

¹Akdeniz University School of Medicine, Department of Physical Medicine and Rehabilitation, Antalya, Turkey, ²Hacettepe University School of Medicine, Department of Physical Medicine and Rehabilitation, Antalya, Turkey

Introduction/Background: The objective of this study is to explore whether femoral cartilage thickness is related (and changes) with muscle strength in subjects with knee osteoarthritis. **Material and Methods:** Forty patients (27 F, 13 M) with knee OA were enrolled in the study. Isokinetic/isometric knee muscle strength measurements were performed at baseline, end of the muscle strengthening program and 3rd month control visit using a biodex dynamometer. Femoral cartilage thicknesses were measured using ultrasonography. **Results:** Seventy-nine knees of 40 patients (27 F, 13 M) aged 52.03 ± 11.72 years were analyzed. Isometric peak torque and total work values were significantly higher than the baseline measurements at 3rd month controls (all $p<0.05$). Cartilage thicknesses were significantly higher than the baseline measurements (all $p<0.05$) on

the 3rd month (Table I) Femoral cartilage thicknesses were positively correlated with isometric strength values at baseline. (Table II). **Conclusion:** We propose that femoral cartilage thicknesses increase on the 3rd month of strengthening therapy. Since this late phase thickening parallels the earlier increase in muscle strength (starting, on the 1st month), we speculate that regeneration rather than edema might be the primary underlying cause.

Table I. Baseline, 1st and 3rd month values of femoral cartilage thickness and knee muscle strengths

	Baseline (Mean±Std)	3 rd month (Mean±Std)	p
LFC	19.25±3.10	20.71±3.34	0.001*
ICA	20.63±4.74	21.73±4.56	0.028*
MFC	19.24±3.98	20.44±4.14	0.037*
exisomet30pt	93.63±52.23	97.85±59.60	0.028*
flxisokin60pt	53.23±34.27	67.08±59.43	0.001*
exisokin180work	33.23±32.59	47.79±40.75	0.001*

*: p<0.05

LFC: Lateral femoral condyle; ICA: Intercondylar area; MFC: Medial femoral condyle; exisomet30pt: At 30°, isometric extensor peak torque values; flxisokin60pt: At 60°/sec, isokinetic flexor peak torque values; exisokin180 work: At 180°/sec, isokinetic extensor work values.

Table II. The correlation between femoral cartilage thickness and knee muscle strengths.

	Baseline		
	ICA	MFC	
LFC			
exisomet30pt	r=0.030	r=0.012	r=0.008
exisokin180work	r=0.031	r=0.007	r=0.017
	3rd month		
exisokin180work	r=0.032	r=0.049	r=0.003
flxisokin180work	r=0.039	NC	r=0.002

r: Correlation Coefficient, NC: Non-correlate

298

THE IMPACT OF PHYSICAL THERAPY ON DEPRESSION AND QUALITY OF LIFE IN MUSCULOSKELETAL DISORDERS

S. Tuna¹, T. Özdemir¹, H.E. Öz¹, A. Aytekin¹, P. Özarslan¹, N.V. Balci¹

¹Akdeniz University School of Medicine, Department of Physical Medicine and Rehabilitation, Antalya, Turkey

Introduction/Background: Musculoskeletal disorders (MD) negatively affect individuals' quality of life and psychosocial situation. We aim to examine the effects of physical therapy on pain, depression and quality of life in musculoskeletal disorders. **Material and Methods:** Four hundred and fifty patients (110 F, 54 M) with musculoskeletal disorders -who were under physical therapy program- were enrolled in the study. Subjects were evaluated at baseline, end of physical therapy the program and 3rd month control visit with visual analog scale (VAS) for pain, Beck Depression Inventory (BDI) for depression and Short-form 36 (SF-36) for quality of life. **Results:** Four hundred and fifty patients (110 F, 54 M) aged 52.34±11.32 years (range, 26–77) were analyzed. 54 (35.1%) patients had depression. There was a significant difference among the three assessment in terms of VAS and BDI scores (all p>0.001). There was a significant difference among all three assessments of the mental component of quality of life (p=0.007) (Table I). There was a positive correlation between BDI scores and VAS scores at baseline and 3rd month (r=0.169 r=0.230). There was no difference in VAS and BDI scores between the painful regions (all p>0.05). **Conclusion:** Physical therapy programs have been found to be effective on pain depression and mental component of quality of life at the short and medium term in MD.

Table I.

	Baseline Mean±SD	1 st month Mean±SD	3 rd month Mean±SD	p
VAS	6.66±2.27 (1–10)	4.99±2.33 (0–10)	4.55±2.46 (0–10)	<0.001*
BDI	13.93±8.47 (0–43)	12.29±8.37 (0–50)	11.28±7.48 (0–37)	<0.001*
SF	59.37±23.03 (0–100)	62.68±24.47 (0–100)	65.91±24.75 (0–100)	<0.001*
RE	41.47±38.18 (0–100)	44.04±37.49 (0–100)	54.35±38.97 (0–100)	<0.001*
MCS	43.39±11.17 (19.70–84.00)	44.21±10.74 (25.50–66.90)	47.04±10.26 (24.90–66.90)	0.007*

*: p<0.05

VAS: Visual Analogue Scale, BDI: Beck Depression Inventory, SF-36: Short Form 36, SF: Social function, RE: Emotional role limitations, MCS: Total mental component.

299

INFLUENCE OF OCCUPATION ON LUMBAR SPINE DEGENERATION IN MEN: THE KOREAN NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY 2010-2013

S. Yang¹, W. Kim¹, K.H. Choi¹

¹Asan Medical Center, Department of Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: Certain lifetime occupations can influence lumbar spine degeneration (LSD). We aimed to investigate the association between various types of occupations and LSD using a nationwide survey. **Material and Methods:** Data were obtained from the 2010 to 2013 Korea National Health and Nutrition Examination Survey (KNHANES). Types of lifetime occupation were categorized into four occupational groups: white-collar (WC) workers, pink-collar (PC) workers, blue-collar (BC) workers, and agribusiness and low-level (AL) workers. LSD was evaluated using a modified version of the Kellgren-Lawrence grade. **Results:** The type of occupation was associated with increased risk of LSD. The risk of LSD increased in BC workers (OR 1.492; 95% CI 1.13–1.98) and AL workers (OR 2.539; 95% CI 1.75–3.68). The risk of severe LSD increased in BC workers (OR 1.734; 95% CI 0.78–1.98) and AL workers (OR 3.058; 95% CI 1.96–4.77). The risk of LBP tended to increase in AL workers (OR 1.380; 95% CI 1.00–1.90). **Conclusion:** LSD is influenced by the lifetime occupation: WC workers are least affected by LSD and AL workers are at greatest risk of LSD. These results may be due to differences in occupational physical loading and other environmental factors.

300

HYPERTONIC DEXTROSE INJECTION IN THE TREATMENT OF BAKER'S CYST

F. Yavuz¹, S. Kibar¹, B. balaban¹

¹The FizyoCare Medical Center, The Clinic of Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Baker's cysts are commonly encountered in pain management practices. **Material and Methods:** The aim of this case report was to report the effects of 25% dextrose prolotherapy to successfully treat a Baker's cyst with significant ultrasound (US) changes. **Case Presentation:** A 62-year-old female with a large Baker's cyst who had failed conservative treatment. She had decreased range of motion, swelling in the popliteal region, and pain in the right knee significantly impacting her physical activity. We evaluated her right knee with US imaging. A large Baker's cyst was determined in her right knee. We decided three injections of 25% dextrose into the right knee. Hypertonic dextrose was administered intra-articularly with antero-lateral approach, once weekly. At the end of the treatment sessions, the patient reported resolution of the posterior knee cyst and this was confirmed by US exam. **Conclusion:** Certainly 25% dextrose injection appears to be a reasonable treatment option for Baker's cyst treatment.

301

FOLLOW-UP OBSERVATION OF INDIVIDUALIZED REHABILITATION WITH CARF CONCEPT ON PATIENTS WITH CERVICAL SPONDYLOPATHY

W. Zhang¹, Z. Duan¹

¹Shanghai First People's Hospital -School of Medicine -Shanghai Jiao Tong Univers, Rehabilitation, Shanghai, China

Introduction/Background: To implement and study the follow-up effects of individualized rehabilitation guidance with CARF (Commission on Accreditation of Rehabilitation Facilities) concept on patients with cervical spondylopathy. *Material and Methods:* 80 patients with cervical spondylopathy were chosen from the outpatient rehabilitation department in Shanghai First People's Hospital Rehabilitation Center, whose main complaint was neck pain. They were randomly assigned into a individualized group a control group. Conventional rehabilitation treatment was given in each group. In addition, the individualized group was given individualized rehabilitation assessment and guidance with CARF concept. The rehabilitation treatment ended when their pain lever was below 2 point in VAS (Visual Analogue Scale). The length of treatment of each group was observed and then came a follow-up visit after two weeks. *Results:* 32 patients in control group and 33 patients in individualized group were reported. Before the experiment there was no significant difference in age, gender, education level and VAS score between two groups ($p>0.05$). When the treatment ended, we observed shorter treatment time in individualized group than that in control group to achieve the same effect ($p<0.05$). In the follow-up studies, the patients in individualized group showed better outcome in pain, psychological state, ability to work or study, work and home environment as well as the general health feeling ($p<0.05$). Furthermore, the difference of ability to work or study was extremely significant ($p<0.01$). *Conclusion:* Patients with cervical spondylopathy may maintain a better health status as a result of individualized rehabilitation guidance with CARF concept, which may also lead to a better long-term result.

302

ANTI-CONVULSANT INDUCED LOMBER VERTEBRA FRACTURE: A CASE REPORT

E. Adigüzel¹, F. Tok¹, İ. Safaz¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: Medication-induced osteoporosis is a common health problem but many physicians are unaware of this adverse reaction. While aging and post-menopausal period are well-known reasons of osteoporosis; chronic illnesses and drug-induced conditions are not too easily remembered. Both epilepsy and anti-convulsant treatments may result with osteoporosis. This adverse event is especially reported in post-menopausal women and men older than 65 years. Here we report a patient with osteoporotic vertebra fracture. *Material and Methods:* A 47-year-old male patient admitted to our outpatient clinic with 2-month history of back pain. His pain was worse at night and sitting position. Also he reported pain increase while coughing and sneezing. His pain did not relieve with rest. There was no history of trauma. He have been using levetiracetam 500 mg twice daily and valproic acid 500 mg twice daily for seven years due to epileptic seizures. On physical examination, mild tenderness of the lower back was noticed and spine movements were painful. There was no motor or sensory deficit. Magnetic resonance imaging revealed acute L2 vertebra fracture. Lomber vertebra total T-score was -3.0. There was no abnormality in laboratory investigations regarding secondary reasons of osteoporosis. *Results:* We diagnosed the patient as drug-induced osteoporosis and referred him to neurology department. Anti-convulsant treatment was changed with carbamazepin 200 mg once daily. We recommended TLSO bracing and prescribed zoledronic acid treat-

ment. *Conclusion:* Many medications which are commonly used may result with detrimental effects on bone health. Increasing our knowledge and being aware of these drugs will provide accurate diagnosis and optimal management of the patients.

303

A CASE OF A STRESS FRACTURE WITH ATYPICAL LOCATION

E. Ata¹, M. Kösem¹, E. Ersöz¹, S. Akarsu¹, L. Tekin¹

¹Gülhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Although stress fractures are more common in the lower extremities, may also seen in the upper extremities. Stress fracture of the clavicle is a rare entity which caused by repetitive mechanical stress. In the present report, we present a case with right shoulder pain because of stress fracture of clavicle. *Material and Methods:* Case: A 52-year-old woman presented to our outpatient clinic with severe right-sided pain in the shoulder for 3 months. There was also pain in the neck and right hemithorax. She had no history of trauma. The patient's complaints were not relieved with analgesic drugs. On physical examination, there was tenderness at the distal site of the right clavicle and on the acromioclavicular joint. Although passive range of motion of the right shoulder was full, active range of motion was limited. She felt pain during elevation of the right shoulder. Plain X-rays of the neck and shoulder was unremarkable. *Results:* The magnetic resonance imaging (MRI) detected an edematous appearance in the distal part of the right clavicle and acromioclavicular joint, suggesting a stress fracture of the clavicle. Local steroid injection was administered to the acromioclavicular joint. Two weeks after treatment, the patient's complaints improved significantly. *Conclusion:* The diagnosis of a stress fracture of the clavicle may be challenging. As seen our case, this rare entity may present with pain in the shoulder, neck and hemithorax. Various sporting activities were reported as predisposing factors for stress fractures of clavicle. There was no significant risk factor in our patient related to her stress fracture. In conclusion, even if there is no predisposing factor, stress fractures of the clavicle must be kept in mind in the differential diagnosis of shoulder pain and MRI may be helpful in the diagnosis.

304

AN ATYPICAL CASE OF SCHEUERMANN'S DISEASE WITH CERVICAL INVOLVEMENT

E. Ata¹, M. Kösem¹, S. Akarsu¹, L. Tekin¹, M.Z. Kıralp¹

¹Gülhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Scheuermann's disease (SD) is a juvenile osteochondrosis of the spine, which causes a structural hyperkyphosis of the thoracic or thoracolumbar spine. It is characterized by wedge shaped vertebral bodies, irregularities of the vertebral endplates, narrowed disk spaces, thoracic hyperkyphosis and interosseous disk herniation (Schmorl's node). The disease can be classified into two forms, typical and atypical. The typical form is more common and involves a thoracic kyphotic pattern, often with nonstructural compensatory hyperlordosis of the lumbar spine. The atypical form of SD, called lumbar SD, is often seen in athletically active adolescent males who present with localized back pain and radiographic vertebral changes of the thoracolumbar junction, and is more likely to be progressive and symptomatic. *Material and Methods:* Case: We report the case of a 30-yr-old man with a history of chronic cervical, mid-dorsal and low back pain, aggravated by standing, with no history of trauma. On physical examination, all spinal movements were full and pain-free. Muscle strength test and neurological examination were also normal. Radiographs evaluations were showed that kyphosis in the

sagittal planes as well as Schmorl's nodes at all spine, loss of the physiological cervical lordosis with disc space narrowing, wedge shaped vertebral bodies and the lumbar scoliosis. MRI findings were similar. The possibility of other causes such as vitamin D deficiency, release of excess growth hormone or infections was ruled out when all biochemical tests were normal. **Results:** Overall, the patient was diagnosed SD with cervico-thoraco-lumbar involvement. **Conclusion:** SD is usually confined to the thoracic and thoracolumbar spine. To our knowledge, this is the first report of a patient with cervical involvement. In conclusion, physicians should be aware that cervical spine may also be affected rarely and it can lead to cervical pain.

305

FUNCTIONAL CONSEQUENCES AND REHABILITATION AFTER SURGICAL TREATMENT OF TUMOR LIKE LESION - CASE REPORT

B. Marjanović¹, J. Bera¹, Z. Bajić²

¹Institute for Physical Medicine and Rehabilitation "Dr Miroslav Zotović", Department of Child Rehabilitation, Banjaluka, Bosnia and Herzegovina, ²University of Banjaluka, Faculty of Medicine, Banjaluka, Bosnia and Herzegovina

Introduction/Background: Bone tumor-like lesions (TLL) with their clinical and histological features are similar to tumors, while their true nature (cancer or non-cancer) is not clear. The group of TLL include, among other, eosinophilic granuloma (EO). Histologically EO is characterized by abnormal proliferation of histiocytes. Spinal localization of EO can be characterized by back pain, stiffness or scoliosis and can lead to neurological complications. **Material and Methods:** Case report: Four year old boy came to physical medicine specialist after surgical treatment of spinal TLL. Before surgery boy had pain in both legs and had feeling of tightness in his back. He had no neurological deficit at that time. MR LS spine showed pathological fracture L4 vertebrae and extremely reduced height of L4 vertebra surrounded by soft tissue mass. Surgical intervention was performed. Pathohistological finding confirmed the diagnosis of eosinophilic granuloma. Immediately after surgery there were clinical signs of peroneal paresis. This signs were present at boy's first visit to physical medicine specialist after surgery: the boy couldn't walk on his right heel, he couldn't perform full active dorsal flexion in right talo-crural joint. Anteflexion in the lumbar segment of the spine was reduced to a greater extent. After conducted intensive physical treatment over the next three years there was no significant improvement in clinical findings. The only improvement reflected in increased range of motion in the lumbar spine, but the signs of peroneal paresis were still present. **Results:** For the purpose of improving of activities of daily living the peroneal orthosis for the boy's right leg was prescribed and made. **Conclusion:** TLL can give different symptoms and even neurological complications. In this case peroneal paresis was not due to presence of TLL, but performed surgical intervention, and as such, had little potential for rehabilitation.

306

BONE MASS AND VITAMIN D LEVELS IN TURKISH PATIENTS WITH PARKINSON'S DISEASE: A CASE CONTROL STUDY

E.A. Ozturk¹, I. Gundogdu¹, E. Umay¹, Y. Demir², K. Aydemir²

¹Diskapı Yıldırım Beyazıt Education and Reserach Hospital, Physical Therapy and Rehabilitation, Ankara, Turkey

²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: The aim of this study was to evaluate bone mineral densitometry (BMD), vitamin D levels and frequency

of osteoporosis in Turkish male and female patients with Parkinson disease (PD) and compare it with that of healthy controls. **Material and Methods:** A consecutive 115 ambulatory PD patients and 117 age-sex matched healthy controls aged between 55–85 were included in the study. Demographic variables, DEXA and vitamin D levels were recorded. **Results:** The mean BMD was significantly lower in the lumbar spine and, femoral neck and total femur in both male (PD group; 0.986, 0.741, 0.901; control group; 1.098, 0.871, 0.995, respectively) and female PD patients (PD group; 0.804, 0.650, 0.771; control group 10.004, 0.810, 0.929 respectively) compared to healthy controls. Male PD patients also had a lower mean T-scores in the femoral neck and total hip compared with controls. Female PD patients also had a lower mean T-scores in the lumbar spine, femoral neck and total femur, had a lower Z-scores in the femoral neck and total femur compared with controls. The mean vitamin D levels were significantly lower both male (PD group; 12.6 ng/dL, control group; 20.6 ng/dL) and female PD patients (PD group 11.7 ng/dL, control group 18.6 ng/dL). Osteoporosis was detected in lumbar spine (male:14.9%, female:47.1%), femoral neck (male:29.8%, female:57.4) and total hip (male:12.8%, female:23.5%) in both male and female PD patients. Vitamin D deficiency was found in 89.4% and 92.6% of male and female patients with PD respectively. **Conclusion:** Regardless of gender, Turkish PD patients have lower bone mineral density and vitamin D levels and have higher rates of osteoporosis compared to healthy controls. These findings suggest the necessity of monitorization of these patients regarding vitamin D deficiency so as to take measures against the development of osteoporotic fractures which may be another cause of disability in patients with PD.

307

LOWER BONE MINERAL DENSITY AND VITAMIN D STATUS IN PATIENTS WITH PARKINSON'S DISEASE: WHEN?

E.A. Ozturk¹, I. Gundogdu¹, Y. Demir², K. Aydemir², A. Cakci¹

¹Diskapı Yıldırım Beyazıt Education and Research Hospital, Physical Therapy and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: There is no clear correlation between stage of the Parkinson's disease (PD), clinical features and bone mineral density (BMD), although controlled studies has showed that patients with PD had lower BMD and vitamin D levels. The specific purposes of the present study were (1) to assess BMD and vitamin D levels according to PD stage, (2) to demonstrate the relationship between clinical features of the disease, including mainly motor symptoms and BMD and vitamin D levels, (3) to compare results with healthy individuals. **Material and Methods:** Patients with PD admitted to Movement Disorder Outpatient Clinic for 8-month period were evaluated and divided into four groups according to Hoehn and Yahr (H&Y) staging. T scores of the BMD and vitamin D levels were compared between 4 groups of patients and age-gender matched healthy controls. In addition, relationship between clinical features of the patients with PD and BMD and vitamin D levels were investigated. **Results:** When compared to healthy individuals, even patients with early PD stage (H&Y stage 1 and 1.5) had lower BMD T scores and it was determined that increased disease stage had negative effect on the BMD T scores. Similarly, vitamin D levels of the patients, even in early stages, were lower than in controls and vitamin D levels reduced further with increasing duration of the disease. **Conclusion:** Decreased BMD has been developing since the early stages of the PD and has been prominent as the disease progresses. Vitamin D levels, of which is an important factor on the development of osteoporosis, go parallel with BMD. Therefore, patients with PD should be screened for developing osteoporosis and for sufficient vitamin D level in the early stages of the disease. Preventive methods for bone quality should be taken into consideration at onset of PD.

308

EFFECT OF WEIGHTED KYPHO-ORTHOSES(WKO) ON DYNAMIC BALANCE IN WOMEN WITH OSTEOPOROSIS

S.A. Raeesadat¹, M. Hashemi², S.M. Rayegani², L. Sedighipour², S. Pournajaf², M.H. Bahrami¹

¹PM&R Research Center- Shahid Beheshti University of Medical Sciences, Physical Medicine & Rehabilitation, Tehran, Iran, ²PM&R Research Center- Shahid Beheshti University of Medical Sciences, Physical Medicine & Rehabilitation, Tehran, Iran

Introduction/Background: It was suggested that posture training support with spinal orthosis including weighted kyphorthosis can improve balance in patients with osteoporosis. The aim of this study was to determine the effects of weighted kyphorthosis on improving dynamic balance tests in women with osteoporosis. **Material and Methods:** In this non-randomized controlled clinical trial, twenty three patients with osteoporosis were included. The patients were assigned into two groups: 1) control group who received 4-week home-based daily exercise program and 2) intervention group (weighted kyphorthosis) who performed exercises and wore weighted kyphorthosis for one hour twice a day. Patients were assessed using computerized balance tests by Balance Master (NeuroCom) (Limits of Stability, Step Quick Turn, Sit to Stand and Walk across tests) before and 4 weeks after start of treatment. **Results:** Speed in walk across test was improved significantly in both groups compared to baseline from (77.6±25 cm/s to 91.57±30 cm/s and from 72.60±20 cm/s to 88.73±18 cm/s) in case and control groups respectively. Improvement in right turn time in step quick turn, end point excursion and mean of excursion parameters of Limits of Stability was more significant in orthosis group in comparison with control group ($p<0.05$). **Conclusion:** Applying WKO together with exercise program improved some computerized balance tests in women with osteoporosis. WKO can be suggested as an effective intervention in postmenopausal women in order to reduce the risk of falling.

309

RELATIONSHIP AMONG BONE MINERAL DENSITY, BIOCHEMICAL MARKERS AND LIPID PROFILES ACCORDING TO POSTMENOPAUSAL PERIOD

S.U. Jeong¹, H.D. Kim¹, H.J. Jeong¹, D.K. Kim¹, Y.J. Sim¹, G.C. Kim¹

¹Kosin University Gospel Hospital, Physical Medicine and Rehabilitation, Busan, Republic of Korea

Introduction/Background: To verify whether osteocalcin, C-telopeptide, high density lipoprotein (HDL), triglyceride and bone mineral density (BMD) are related according to postmenopausal period. **Material and Methods:** One hundred and forty four women were divided into four groups according to the time past menopause: group I (0–5 years), group II (6–10 years), group III (11–15 years), group IV (more than 16 years). All groups were subdivided into osteoporosis group (t-score < -2.5) and non-osteoporosis group (t-score ≥ -2.5). Osteocalcin, C-telopeptide, high density lipoprotein (HDL), triglyceride, and BMD (g/cm²) by Dual Energy X-ray Absorptiometry (DEXA) were measured in all groups. **Results:** There were significant inverse correlation between BMD and postmenopausal period ($p<0.05$). Osteocalcin and C-telopeptide were correlated with postmenopausal period except for group IV but there was no statistical significance. Osteocalcin was increased in osteoporosis group compared to non-osteoporosis group but there was no statistical significance. C-telopeptide was increased in osteoporosis group compared to non-osteoporosis group except for group III but there was no statistical significance. HDL of Group III and Group IV had significant inverse correlations with postmenopausal period ($p<0.05$). **Conclusion:** No specific biochemical markers regarding the duration of menopause were found. Re-

gardless of the duration of menopause, checking both osteocalcin and C-telopeptide was statistically significant for the evaluation of postmenopausal osteoporosis.

310

ESTIMATION METHOD OF VOLUME AND TRABECULA ARCHITECTURE OF CANCELLOUS BONE IN HEMIPLEGIC PATIENTS

K. Kagechika¹, M. Nakata¹, M. Tsubokawa¹, F. Takeuchi¹, W. Ohsu¹, Y. Takagi², A. Nakanami²

¹Kanazawa Medical University, Rehabilitation Medicine, Uchinada, Japan, ²Tonami General Hospital, Rehabilitation Medicine, Tonami, Japan

Introduction/Background: We measured the bone mineral density (BMD) in the femoral neck and the calcaneus on both sides in stroke to investigate the effect of paralysis on osteoporosis. A new method for estimating in vivo bone mineral density and characterizing the shape of cancellous bone has been proposed using the result of ultrasonic inspection for the diagnosis of osteoporosis. **Material and Methods:** The method is based on two-dimensional bone area fractions (percent bone area between bone and bone marrow) calculated from the difference in the speed of ultrasonic wave propagation through cancellous bone. It was shown that the two-dimensional area fraction of a heel bone gives a good relationship to the BMD by DXA (dual energy X-ray absorptiometry) testing of human heel bone (calcaneus) and spine (vertebrae lumbar). **Results:** Shape characterization is based on the image simulation procedure employing eight random variables from a computer and the statistical result of fractal analysis for numerous cancellous bone patterns. We also demonstrate the validity of the shape characterization technique using autopsy specimens as a diagnostic tool for osteoporosis. **Conclusion:** This ultrasonic testing confirmed the presence of local osteoporosis on the affected side of the hemiplegics as well as DXA, and moreover it can express the volume and trabecula architecture of cancellous bone in hemiplegic patients.

311

THE EVALUATION OF PHYSIOTHERAPY PROCEDURE IN PATIENTS TREATED SURGICALLY FOR IDIOPATHIC DEGENERATIVE KNEE DISEASE BY TOTAL KNEE ARTHROPLASTY

M. Kiljanski¹, J. Oberbek², M. Synder³, J. Szczegielniak⁴

¹University of Computer Sciences and Skills, Physiotherapy, Łódź, Poland, ²Independent Public Health Care Facility Rehabilitation Centre in Pabianice, Rehabilitation, Pabianice, Poland, ³Medical University of Lodz, Rehabilitation, Łódź, Poland, ⁴Opole University of Technology, Physiotherapy, Opole, Poland

Introduction/Background: Obesity is a chronic disease that results from metabolic disorders of energy homeostasis. Its primary cause is a disorder of libido food. It is not only a factor predisposing to the development of diabetes or high blood pressure, but also diseases of the osteoarticular system, including osteoarthritis of the knee. One of the commonly methods for the diagnosis for adults is determined the rate of BMI. **Material and Methods:** Researches indexing relations between obesity and outcomes in patients after total knee arthroplasty show a wide diversity of views on this subject. BMI >30 kg/m² is believed by authors to make significantly worse the quality of life of patients and affects their pain and range of motion of the operated knee. We have examined 59 patients, of which there were 43 women and 16 men. Base of BMI coming from the first exam the patients were divided into 3 groups (≥29.99 kg/m²-G1; 30.00–34.99 kg/m²-G2; ≤35.00 kg/m²-G3. **Results:** The assessment of BMI as a prognostic factor in the planning of physiotherapy in patients after total knee arthroplasty is difficult and ambiguous. Obtained results for patients in each group are differed in subsequent studies. The influence of BMI on the level of pain, activities of daily

living and quality of life were particularly noticeable in patients with BMI 35.00 kg/m² and more. Based on the obtained results BMI can be considered as one of the factors influencing on behavior of physiotherapy in patients after total knee replacement.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: MUSCULOSKELETAL CONDITIONS - BONE DISEASES (E.G. OSTEOPOROSIS)

312

COMPRESSION OF THE POSTERIOR INTEROSSEOUS NERVE AT THE ELBOW BY A DEEP LIPOMA: ABOUT A CASE AND REVIEW OF THE LITERATURE

S. Lahrabli¹, F. Lmidmani¹, A. El Fatimi¹

¹CHU Ibn Rochd, Physical Medicine and Rehabilitation, Casa-blanca, Morocco

Introduction/Background: The posterior interosseous nerve syndrome is among the few tunnel syndromes at the elbow. The compressive etiology by a lipoma is the first to mention. Due to the purely motor role of posterior interosseous nerve, the reason for consultation is especially paralysis of the extensors of the fingers and thumb ulnar extensor carpi. **Material and Methods:** A 35 year old patient, who is a farmer, without any particular medical history consulted for a weakness in his left hand to progressive appearance for over 10 months with pain in the outside of the forearm (EVA 5/10) and inability to extend the fingers. Electromyographic examination objectified conduction block on the forearm posterior interosseous nerve (NIOP) to the elbow. Surgical exploration was a rounded mass. Histological examination confirmed the diagnosis of lipoma Parosteal. **Results:** The evolution after 6 months of rehabilitation was marked by improvement of symptoms and pain. **Conclusion:** The electromyographic examination is still disrupted. It visualizes a motor impairment with conduction block and neurogenic path. Complete the paraclinical examination and MRI allows better surgical management by showing the diameter of the mass and of its reports. We report the case of a patient with a syndrome of posterior interosseous nerve secondary to compression by a parosteal lipoma, surgical excision with radial neurolysis followed by rehabilitative care adapted enabled good functional recovery after 6 months.

313

TRANSIENT BONE MARROW OEDEMA SYNDROME: REPORT OF FOUR CASES IN A YEAR FROM NORTH MIDLANDS, UNITED KINGDOM

M. Mariappan¹, A. Menon²

¹North Staffordshire Rehabilitation Centre, Physical Rehabilitation Medicine, Stoke-on-Trent, United Kingdom; ²North Staffordshire Rehabilitation Centre, Physical Rehabilitation Medicine, Stoke-on-Trent, United Kingdom

Introduction/Background: Transient bone marrow oedema is a rare, self-limiting musculoskeletal disorder. The aim of this study is to share our experience of increasing incidence of this syndrome and to create awareness among rehabilitation physicians. **Material and Methods:** This is a retrospective descriptive study from the data collected through our bespoke database. All were presented with non-traumatic spontaneous onset of debilitating pain on activity with inability to weight bear on the affected side. There were functional limitation in terms of managing normal walking, flight of stairs and carrying out activities of daily living. Examination of all four cases revealed localised tenderness, antalgic gait with fairly reasonable range of movements. Blood parameters including inflammatory markers were normal. Diagnosis was confirmed by MRI scan after excluding other causes. **Results:** All the patients

were middle-aged female with the lower limb involvement. Mean age is 43 years. Hip (femoral head), Knee (femoral condyle), Tibia and Metatarsal bone are the affected sites. Presentation varied from two to eighteen months since its onset. MRI showed decreased signal intensity on T1 weighted and increased signal on T2 images of bone marrow. One patient had osteonecrosis with collapse of the articular surface and subsequently referred to surgeons. Second patient was treated with single infusion of 60 mg of pamidronate. The remaining two were treated with conventional analgesics. Out of four, three were completely resolved symptomatically and radiologically (had repeat MRI scan). Patient with tibial involvement also had CT and radionuclide scans to rule out osteoid osteoma and stress fracture. There were no reports of migration to other bones in our cohort. **Conclusion:** Transient bone marrow oedema is an uncommon entity and should be considered as differential diagnosis after excluding traumatic, ischaemic, inflammatory and neoplastic causes to prevent unnecessary interventions.

314

EQUINA CAUDA SYNDROME IN ACHONDROPLASTIC PATIENT: COMPLICATION SHOULD NOT BE OVERLOOKED

S. Frioui¹, A. Nouira¹, S. Jemni¹, E. Toulgui¹, N. Abdelkafi¹, I. Bel Hadj Youssef¹, N. Lazreg¹, F. Khachnaoui¹

¹Sahloul Hospital, Rehabilitation, Sousse, Tunisia

Introduction/Background: Achondroplasia is the most common inherited bone dysplasia. The most spinal deformities are cervicomedullary and lumbar spinal stenosis. **Material and Methods:** We report the case of a young woman with achondroplasia which presented paraplegia by spinal stenosis. **Results:** Woman aged 36 years followed for achondroplasia. For 3 years, she began to suffer from low back pain radiating to both legs and not systematized. She had difficulty in micturition with leaks evolving for several months. The evolution is marked by a worsening of the symptoms and limiting the walking perimeter with difficulties increasingly important to walk. Finally, three weeks before his hospitalization, the patient became bedridden. The clinical evaluation and exploration by Magnetic Resonance Imaging (MRI) have found a flaccid paraplegia complicating spinal stenosis, especially at L2-L3 level. The patient received a decompression surgery by L2-L3-L4 laminectomy. Neurologically, the patient presents paraparesis with muscular strength assessed at 2, both proximally that distally. Cutaneo abdominal reflexes are present and musculoskeletal reflexes are abolished in the lower limbs. The examination of the perineum shows hyposensitivity S2; S3; S4; S5, hyporeflexia to anal stretch with a testing of the levator ani to 2/5. We completed the detrusor sphincter evaluation by an urodynamic assessment which confirmed a peripheral neurogenic bladder. Clinical signs were consistent with cauda equina syndrome incomplete by narrow lumbar canal. One month after surgery, neurological examination shows no motor recovery. However, at the urinary level, it has conducted to bladder drainage by intermittent self-catheterization. **Conclusion:** The main vertebral deformities in achondroplastic patient are the magnum foramen narrows and spinal stenosis. If symptomatic, patient will present with neurological signs of myelopathy or equina cauda syndrome, as a function of the compression seat. The presences of neurological signs indicate a decompression surgery.

315

LONG -TERM EFFECTS OF BACK STRENGTHENING EXERCISES ON QUALITY OF LIFE IN WOMEN WITH OSTEOPOROSIS

A. Khalili¹, M. Heidari Almasi¹, S.A. Raeissadat², S. pour-najaf²

¹Boo-Ali hospital -Islamic Azad university of Medical Sciences -Tehran- Iran, Orthopedics, Tehran, Iran, ²Clinical Research Development Center at Modarres Hospital- Shahid Beheshti Uni-

versity of Medical Sciences- Tehran- Iran, Physical Medicine and Rehabilitation, Tehran, Iran, ³Modarres Hospital- Shahid Beheshti University of Medical Sciences- Tehran- Iran, Physical Medicine and Rehabilitation Ward-, Tehran, Iran

Introduction/Background: Kyphotic posture is among frequent complications of osteoporosis as the most common bone metabolic disease that have great effect on quality of life. The aim of the present study was to evaluate the effect of back extension strengthening exercises on physical and psychological aspects of health related quality of life using Short From quality of life questionnaire (SF-36) after 6 month following exercise program. **Material and Methods:** In this quasi-experimental clinical trial, postmenopausal women entered the study and randomized into case and control group. All of the participants were treated with pharmacotherapy, weight-bearing and balance training exercises. Case group also performed back extensor strengthening exercises at home. Each patient fulfilled the Persian version of SF36 quality of life questionnaire at baseline and 6 months after entering the study in both case and control groups and quality of life subscales were compared between two groups. **Results:** At the end of the study, all physical and mental parameters of SF-36 questionnaire improved significantly in exercise group except for role emotional as a subscale of mental health. In control group-, only some physical health dimensions including bodily pain, role physical and vitality and mental health status as a mental health subscale improved. **Conclusion:** In conclusion, performing back exercises had major impact on improving physical and most of the mental aspects of quality of life in patients with osteoporosis and could be considered in routine management in these patients.

316

EFFECTS OF BISPHOSPHONATES AND CALCIUM PLUS VITAMIN-D SUPPLEMENTS ON COGNITIVE FUNCTION IN POSTMENOPAUSAL OSTEOPOROSIS

U. Safer¹, V. Binay Safer², S. Ozbudak Demir³, I. Yanikoglu³

¹Gulhane School of Medicine- Haydarpaşa Training Hospital, Internal Medicine, Istanbul, Turkey, ²Istanbul Haydarpaşa Numune Training and Research Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey, ³Ankara Physical Therapy and Rehabilitation Training and Research Hospital, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Postmenopausal osteoporosis was linked to accelerated cognitive decline; however, little is known about the effects of medical treatment on cognitive functions. This study evaluated the effects of bisphosphonate treatment and calcium plus vitamin-D supplementation on cognitive functions in women with postmenopausal osteoporosis. **Material and Methods:** Forty-five women with postmenopausal osteoporosis who were started medical treatment were prospectively included. Medications included alendronate, zoledronic acid, risedronate or ibandronic acid along with a low or high dose of calcium plus vitamin D supplements. Cognitive function was assessed by the mini mental state examination (MMSE) test. All subjects had bone mineral density (BMD) measurement via Dual-energy X-ray absorptiometry at baseline and study completion. **Results:** Mean T-score improved significantly at one year except for femur neck area. Mean MMSE score did not significantly changed at 12 months (26.40±2.07 vs. 26.48±2.07; $p=0.513$), with no difference among bisphosphonates combined with calcium plus vitamin-D. Higher dose (1,200 mg/800 U/day) calcium plus vitamin-D supplementation tended to have a greater improvement compared to lower dose (600 mg/400 U/day) (Δ MMSE: 0.11±0.72 vs. -0.14±0.69). **Conclusion:** Cognitive functions of women with postmenopausal osteoporosis remained unaltered, whereas bone BMD T-scores were significantly improved at 12th month after the administration of bisphosphonates and calcium vitamin-D supplements. Higher doses of calcium vitamin d supplements were likely to have better cognitive effects compared to lower doses.

317

CLINICAL AND PSYCHO-SOCIAL OUTCOMES OF CONGENITAL LONGITUDINAL RADIAL DEFICIENCY

S. Sayilir¹

¹Muğla Sıtkı Koçman University- Faculty of Medicine, Physical Medicine & Rehabilitation, Muğla, Turkey

Introduction/Background: Congenital longitudinal radial deficiency (CLRD) also known as radial club hand is a relatively rare congenital anomaly characterized by variable degree of deficiency along the radial (or preaxial) side of the limb. In this report, we presented a patient who has CLRD with severe pain, loss of function and workforce loss. **Material and Methods:** Case report: **Results:** A 42-year-old man with right radial bone dysgenesis applied to our clinic with pain, limited elbow-wrist joints motions and for social payment medical report. Concerning radial bone dysgenesis, he has any rehabilitation programs or surgical treatments. He has not been able to use his right hand and elbow and his complaints has been increased for last 5–6 years. He has not work in any jobs for a long time due to his right arm. The medical history was otherwise non-contributory. On physical examination, right elbow was found to be fixed in extended and right hand fixed in flexion position. He had minimal motor functions of fingers. There were any functions such as taking objects, holding or clutching at the right hand. Right elbow and wrist joint showed severe degenerations. He was recommended for a rehabilitation program including; improving hand functions, strengthening exercises, range of motion exercises, but he did not agree for a treatment. **Conclusion:** In this report, we presented a patient who has CLRD with severe pain, loss of function and workforce loss. Due to all this factors his social and economic dependence has limited. Late diagnosis and treatment of the CLRD and the lack of an early rehabilitation program or surgical operation also made the clinical scenario further challenging. As such, his quality of life decreased and the wrist and elbow contractures restrict the access of surgical operations. Overall, since optimal management of CLRD necessitates early diagnosis and treatment for patients life of quality and limiting social and economic workforce loss.

318

UNILATERAL BOTH FEMORAL HEAD AND CONDYLES AVASCULAR NECROSIS DUE TO CHEMOTHERAPY AND PELVIC RADIOTHERAPY IN MALIGN MELANOMA PATIENT

K. Tezel¹, K. Aydemir¹, Y. Demir², M.A. Taskaynatan¹

¹Gulhane Military Medical Academy Hospital, Physical Medicine and Rehabilitation Department, Ankara, Turkey; ²Gulhane Military Medical Academy Hospital- TAF Rehabilitation Center, Physical Medicine and Rehabilitation Department, Ankara, Turkey

Introduction/Background: Avascular necrosis is the death of bone tissue due to a lack of blood supply. Also called osteonecrosis, avascular necrosis can lead to tiny breaks in the bone and the bone's eventual collapse. **Material and Methods:** 39-year-old male patient with a previous history of left femur diaphysis fragmented fracture and sciatic nerve injury with an open wound on left thigh caused by rifle projectile. After that injury patient had sequelae of left lower extremity 7 cm shortening and global muscle atrophy with weakness due to sciatic nerve palsy causing non functional left lower extremity. Patient has been mobile with unilateral forearm crutches till last year. Patient was diagnosed with malign melanoma on right sacral region. Surgeons agreed to treat patient with right hip radiotherapy and chemotherapy combination. Consequence of these combination therapy patient experienced right hip pain and limitations. He had a MRI evaluations and this studies revealed unilateral right femur head and condyles avascular necrosis which is very rare documented in medical literature. **Results:** Patient was treated with 30 session hyperbaric oxygen treatment which did not give satisfying result for him. Patient admitted to our rehabilitation

center for his joint pain and limitations with wheel chair dependent ambulation level. Patient had an EMG biofeedback electro muscle stimulation, active assistive ROM and straightening exercises, pool aqua therapy, hot pack, TENS physiotherapy program for 40 session. After these rehabilitation program he was discharged with progressed right hip and knee joint ROM right lower muscle strength providing him independent mobility with bilateral forearm crutches. **Conclusion:** Surgeons and oncologists should consider the patients general health condition and disabilities before treating with radiotherapy and chemotherapy.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: MUSCULOSKELETAL CONDITIONS - REGIONAL PAIN SYNDROMES OF THE NECK AND UPPER EXTREMITY (INCLUDING ENTHESOPATHY, TENDINITIS AND OTHERS)

319

COMPARISON OF DIFFERENT ELECTRODIAG- NOSTIC METHODS IN DIAGNOSIS OF MILD CAR- PAL TUNNEL SYNDROME

A. Ashrafi¹, Y. Sohrabi², S. Dayaghi¹, K. Yahyazadeh³

¹Shiraz University of Medical sciences, Physical Medicine & Rehabilitation- Geriatric Research Center, Shiraz, Iran; ²Shiraz University of Medical Sciences, Physical Medicine & Rehabilitation- Shiraz Burn Research Center, Shiraz, Iran; ³Farhangian University, Department of Languages, Shiraz, Iran

Introduction/Background: Carpal tunnel syndrome is the most common neurological entrapment in upper extremity and peripheral nerves. Its prevalence in women is five times more than men. It is a common belief that electrodiagnostic tests are more sensitive than physical examination in diagnostic approach. The purpose of this study was to compare some of these tests in diagnosis of mild carpal tunnel syndrome. **Material and Methods:** Totally, 100 hands were included in this study (50 hands as cases and 50 hands as controls). Some different electrodiagnostic methods such as: Interpolation, Combined sensory index and inversion of the F wave were evaluated in this case-control study to determine the most sensitive one in diagnosis of mild carpal tunnel syndrome. **Results:** The most sensitive method was sensory part of interpolation (sensitivity: 96% and specificity: 82%). Average velocity in carpal tunnel with sensory interpolation method was 45 m/s in control group and 39.2 m/s in case group that this difference was significant statistically. Phalen's test was the highest specificity (90%) and paresthesia known as the most common symptoms. **Conclusion:** Interpolation is suggested as the most sensitive method to detect mild cases of carpal tunnel syndrome.

320

COMPARISON OF DRY NEEDLING AND PHYSIO- THERAPY IN TREATMENT OF MYOFASCIAL PAIN SYNDROME

M. Bayat¹, S.M. Rayegani¹, M.H. Bahrami¹, S.A. Raeis-sadat¹

¹Shohada-e-Tajrish Hospital, Physical Medicine & Rehabilitation, Tehran, Iran

Introduction/Background: Myofascial pain is a common disabling problem. Different pharmacological and nonpharmacological treatment options are proposed for this syndrome. Considering the high prevalence of myofascial pain syndrome and lack of consensus in the best treatment choice, we conducted this study to compare the effectiveness of physiotherapy with dry needling. **Material and Methods:** This randomized controlled trial was performed on 28 patients with myofascial pain syndrome (MPS) of upper trapezius muscle in the Physical Medicine and Rehabilitation Center of Sho-

hadaye Tajrish Hospital from Apr 2009 to Apr 2010. After matching the age, sex, duration of symptoms, pain severity, and quality of life measures, subjects were randomly assigned into two subgroups of case (dry needling) and control (physiotherapy). One week and 1 month after receiving standard therapeutic modalities, outcomes and intragroup and intergroup changes in pain severity, pressure pain of trigger point (TP), and quality of life measures were evaluated and compared. **Results:** After 1 month, both the physiotherapy and dry needling groups had decreased resting, night, and activity pain levels ($p > 0.05$). Pressure pain threshold of TP and some scores of quality of life (SF-36) were improved ($p > 0.05$). Overall results were similar in both groups. **Conclusion:** It seems that both physiotherapy modalities and dry needling have equal effect on myofascial pain of the upper trapezius muscle.

321

AN EVALUATION OF THE EFFECTS OF LIDO- CAINE INJECTION TO THE TRIGGER POINTS ON PAIN AND DISABILITY IN PATIENTS WITH MYO- FASCIAL PAIN SYNDROME

P. Doruk Analan¹, S. Tok²

¹Baskent University, Department of Physical Medicine and Rehabilitation, Adana, Turkey; ²Baskent University, Department of Radiology, Adana, Turkey

Introduction/Background: The aim of this prospective pre-study was to evaluate the effects of lidocaine injections to the trigger points in the trapezius muscle on pain and disability in patients with myofascial pain syndrome. **Material and Methods:** 20 patients (15 women and 5 men) with myofascial trigger points in the trapezius muscle were included in the study, and clinical examinations were used for the diagnosis. B mode ultrasound (US) and Shear-Wave US elastography images of these patients were evaluated in the study. It was compared the Shear Wave Velocities (Vs) of the lesions with the normal appearing tissue at the same depth. Shear Wave Vs of the lesions were analyzed. Also, functional outcomes of the patients were evaluated using the visual analog scale (VAS), Neck Disability Index (NDI). All patients were treated with a 1 ml% 10 lidocaine injections to the trigger points by the same physiatrist. These variables (VAS, NDI and radiological images) were repeated 15 days after the treatment by the same physiatrist and radiologist, who was blinded just as the patients were. **Results:** The mean age of the study population was found 43.35 ± 11.73 . Some patients had multiple trigger points. VAS (resting, movement and night), NDI scores were improved significantly after the treatment ($p < 0.05$). At B-mode US, 21 of the 19 patients (42, 9%) had mass-like lesions. The mean Vs of the trigger points were significantly higher than the normal parenchyma (p value < 0.001). After the lidocaine injection treatment, the mean Vs of trigger points were nearly almost the same with the normal parenchyma. **Conclusion:** In patients with myofascial trigger points in the trapezius muscle, lidocaine injections effectively improved the disability, and pain. Also, this improvement was observed in the radiological images.

322

SCAPULA-SPINE DISTANCE AS A PREDICTOR OF IMPROVEMENT OF SHOULDER ABDUCTION AFTER MODIFIED RADICAL NECK DISSECTION WITH PRESERVATION OF ACCESSORY NERVE

R. Furukawa¹, T. Morihara¹, O. Onisi¹, M. Hiroshi², I. Norihide², S. Koushirou², O. Suzuyo², M. Yasuo², F. Hiroyoshi¹, K. Toshikazu¹

¹Kyoto Prefectural University of Medicine, Orthopaedics, Kyoto, Japan, ²Kyoto Prefectural University of Medicine, Rehabilitation Medicine, Kyoto, Japan

Introduction/Background: The shoulder abduction functions often decrease after resection of cervical lymph nodes around the acces-

sory nerve. Scapular motion is important to evaluate the shoulder function. Scapula-spine distance (SSD) is assessed for the location of scapula related to the spinal column. The purpose of this study was to evaluate the relationship between SSD and shoulder abduction after modified radical neck dissection with preservation of accessory nerve (MRND). **Material and Methods:** Thirty patients (thirty-eight shoulders) were underwent postoperative rehabilitation after the radical neck dissection with preservation of the accessory nerve, including twenty-six men and four women with a mean age of 60.4 years. SSD with 0 degree abduction and 90 degree abduction, and the range of shoulder abduction in preoperative and postoperative period (when starting rehabilitation, and 1, 3, 6, 12 months after surgery) were measured. They were categorized by Group A (SSD with 0 degree \geq SSD with 90 degree), and Group B (SSD with 0 degree $<$ SSD with 90 degree). **Results:** At the time of rehabilitation starting after operation, Group A was ten shoulders and Group B was twenty-eight shoulders. The range of shoulder abduction improved at next time measurement more than 80% in Group A. The shoulder abduction was correlated with differences between SSD with 0 degree and SSD with 90 degree abduction. **Conclusion:** The evaluation of the scapula muscle activation using SSD was able to predict the shoulder abduction degree and the recovery of the accessory nerve after MRND.

323

THE EFFECT OF 6 WEEKS SHOULDER EXERCISE PROGRAM ON THE SCAPULAR DYSKINESIS

R. J. Alibazi¹, A. Nodehi Moghadam², M. Rostami³, P. Kashfi³

¹University of Social Welfare and Rehabilitation Sciences, Physical Therapy Department, Tehran, Iran, ²University of Social Welfare and Rehabilitation Sciences, Physical Therapy Department, Tehran, Iran, ³University of Social Welfare and Rehabilitation Sciences, Physical Therapy, Tehran, Iran

Introduction/Background: Scapular dyskinesis is an abnormal scapular motion or position during active arm elevation. Dyskinesis is theorized to contribute to impingement syndrome by decreasing the subacromial space. One of the most common causes of scapular dyskinesis is scapulothoracic muscle imbalances. As a result by improving the shortness or inhibition of these muscles, we can expect less severe scapular dyskinesis and increased subacromial space. Thus the aim of this study was to evaluate the effect of 6 weeks shoulder girdle muscle exercises on the subacromial space and scapulohumeral rhythm in the subjects with scapular dyskinesis. **Material and Methods:** Twenty subjects with obvious scapular dyskinesis were participated in the study. Before and after 6 weeks exercise program any alteration of scapular orientation was assessed obviously by scapular dyskinesis test also the anterior outlet of subacromial space was measured via the acromiuhumeral distance (AHD) using ultra sonography in 3 position of 0°, 60° and 90° abduction. In addition Disability and pain was measured by quick DASH questionnaire. Exercise program consisted of stretching, strengthening and postural correction. In addition, subjects were given information about the anatomy and the importance of scapular position in shoulder kinematics. **Results:** The results showed after exercise program the scapular dyskinesis was improved as well as pain and disability of shoulder arm and hand was reduced significantly ($p < 0.05$). There were no differences in AHD pre to post treatment conditions in none of the positions ($p > 0.05$). **Conclusion:** The 6 weeks exercise program led to less severe scapular dyskinesis which improve function and reduce pain in shoulder girdle of subjects with scapular dyskinesis. However it seems that less scapular dyskinesis does not have any effect on AHD. More research needed to investigate the influence of internal factors.

324

CORRELATION BETWEEN CLINICAL FEATURES AND ULTRASONOGRAPHY IN ROTATOR CUFF DISEASE

J Rehabil Med Suppl 55

S. Kammili¹, S. Kalathummarath¹, R. Ramachandran¹, M. Manjalavil¹, S. Menon¹

¹Government Medical College- Kozhikode, Department of Physical Medicine and Rehabilitation, Kozhikode, India

Introduction/Background: Rotator cuff disease is a common entity in PMR practice. The diagnosis is clinical and imaging is needed to confirm the diagnosis and to decide on the appropriate treatment modality. Ultrasonography shows good specificity and sensitivity in detecting rotator cuff lesion. However it is operator dependant. This study intends to find out the correlation between the clinical examination findings and ultrasonography findings in cases of rotator cuff disease. **Material and Methods:** A total of 60 shoulders were examined. Patients with history of shoulder pain of any duration was entered in to the study. The major clinical tests were 1. Active and passive range of motion 2. Neer's and Hawkins Kennedy impingement tests 3. Different tests to assess integrity of individual rotator cuff tendons 4. Tests for shoulder instability. Ultrasonography was performed with high frequency linear array probe. Anterior transverse, anterior longitudinal and posterior transverse views were examined. The tendons were also assessed in modified krass position. The correlation between different clinical tests and ultrasonographic findings were assessed statistically. **Results:** Ultrasonographic findings showed good correlation with clinical findings. The sensitivity of different clinical tests to detect rotator cuff lesions varied. However a number of patients showed disparity between the clinical findings and ultrasonographic findings. **Conclusion:** Ultrasound is a very useful diagnostic modality in rotator cuff disease. We recommend its use in regular practice because it is user friendly and free from the risk of radiation. Ultrasound helps in reaching at a correct diagnosis because many a times the clinical features may not give the accurate picture even in best hands.

325

EVALUATION OF THE FREQUENCY OF COEXISTING C5-C6 ROOT COMPRESSION WITH ROTATOR CUFF PATHOLOGIES

C. Arifoglu¹, B. Oz², H. Kocyigit², O. Yoleri²

¹Erenkoy Fizik Tedavi ve Rehabilitasyon Hospital, PM&R, Istanbul, Turkey, ²Izmir Katip Celebi University Ataturk Training and Research Hospital, PM&R, Izmir, Turkey

Introduction/Background: The aim of this study was to evaluate the coexistence of C5 and/or C6 root compression with rotator cuff pathologies and its effect on pain and disability with clinical signs and shoulder MRI findings. **Material and Methods:** The study with 65 patients who fulfilled the inclusion and exclusion criteria of the study and who applied to our outpatient clinic with pain radiating from neck to shoulder. VNS, Quick DASH and SPADI were used to determine pain and function of shoulder joint, respectively. Cervical MRI was used to evaluate C5–C6 root compression and they were separated into two groups as patients with and without upper trunk root compression (UTRC). These groups were compared in regard to impingement grades, rotator cuff and bicipital muscle pathologies. **Results:** UTRC was detected in 44.6% of patients while 55.4% lacked it. C5 root compression was present in 12.3% and C6 root compression was present in 41.5% of patients. When patients were evaluated for clinical impingement syndrome with Hawkins and Neer tests, no difference was found with regard to neurologic examination and limitation of shoulder joint between 2 groups. Grade 2 impingement syndrome was the most common finding in shoulder MRI's of both groups. Subscapular muscle tear was significantly higher in patients with UTRC. The pain domain of SPADI revealed higher scores in the group without UTRC. Quick DASH and SPADI disability and total scores were not significantly different between the groups. **Conclusion:** Our findings reveal that pain radiating from neck to shoulder region that is caused by C5–C6 root compression does not create a predisposition for clinical, radiologic and functional pathologies of the shoulder joint. It seems difficult to diagnose the exact origin of pain in patients who refer

with neck pain radiating to shoulder as high ratio of impingement syndrome was also found at both groups.

326

CAN PLATELET RICH PLASMA BE ALTERNATE TO SURGERY IN PATIENTS WITH ROTATOR CUFF TEARS?

Ö. Akan¹, B.D. Mete², H. Kocyigit¹, K.B. Bayram¹, H.E. Yilmaz³, A. Tosun¹

¹Izmir Katip Çelebi University Atatürk Training & Research Hospital, PM&R, Izmir, Turkey; ²Izmir Katip Çelebi University Atatürk Training & Research Hospital, Radiology, Izmir, Turkey; ³Izmir Katip Çelebi University Atatürk Training & Research Hospital, Biochemistry, Izmir, Turkey

Introduction/Background: The aim of this study is to determine the efficacy of platelet-rich plasma (PRP) on pain and functional abilities in patients with partial and complete rotator cuff (RC) tear and whether this modality is an alternative method to the surgery. **Material and Methods:** The study included 90 patients who were randomized to four groups: partial tear PRP, partial tear control, complete tear PRP and complete tear control. One cc PRP was obtained from 20 cc blood after double centrifuged at 400g for 10 minutes. Under musculoskeletal ultrasound guidance, the PRP groups were given 3 injections of PRP in the affected shoulder at 3-week intervals. All groups were given a home exercise programme 3 times per week. The range of motion, Quick DASH, Shoulder Pain and Disability Index (SPADI), Constant and VAS scores were used for the evaluation of patients at 3, 6 and 9 weeks, 3 and 6 months for follow-up visits. **Results:** In all groups, a statistically significant improvement were observed in ROM, Quick DASH, SPADI, Constant and VAS scores ($p < 0.05$) at 6 months. Compared to control groups, more prominent improvements in all these clinical parameters were seen in PRP groups ($p < 0.001$). It was also observed that the improvements seen after their first injection in PRP patients had persisted at 6 months. There was no significant difference in their improvements in these clinical parameters between PRP injected patients with partial RC tear and PRP injected patients with complete RC tear. None of the patients had complications related with PRP injections. **Conclusion:** We found significant and sustained improvement in pain and function outcomes in PRP treated patients with RC tear. Our results suggest that PRP is the treatment option in both patients with partial and complete RC tear and it may be a strong alternative to surgery.

327

THERAPEUTIC EFFECT OF MULLIGAN TECHNIQUE WITH THE NECK MUSCLE TRAINING FOR TREATMENT OF THE NERVE ROOT TYPE OF CERVICAL SPONDYLOSIS

Z. Ming¹, J. Zhou¹, Y. Zhang¹, X. Zhang¹, H. Guo¹, J. Chen¹, W. Chen¹

Department of Rehabilitation Medicine, Xuzhou Central Hospital, Jiangsu, China

Objectives: To study the therapeutic effect of combining Mulligan technique with neck muscle training fortreatment of nerve root type of cervical spondylosis and observe its role in preventing recurrence. **Methods:** Eighty-six patients with nerve root type cervical spondylopathy were randomly divided into a control and an experimental group. The two groups are all treated with traction, ultrashort wave, interference current and medicine fumigation therapy. At the same time, the control group used traditional Chinese medical massage therapy as a supplement and the Mulligan manipulation and neck muscle strength training are adopted in the experimental group. After four weeks of treatment, the Cervical Spondylosis Clinical Assessment Scale (CASCS), Visual Analog Score (VAS) and ere used for evaluation and comparison before

and after treatment. Patients were followed up for one year to judge the recurrence rate of cervical spondylosis. **Results:** Before treatment, the CASCS, VAS and NDI scores in the two groups had no statistical significance ($p > 0.05$). But after four weeks of treatment, the two groups had a significant improvement in the CASCS, VAS and NDI scores (P).

328

EXTRACORPOREAL SHOCK WAVE THERAPY IN CALCIFIC ROTATOR CUFF TENDINOSIS

J.A. Mirallas Martinez¹, M.T. Sabater Querol¹, M.C. Tudela Salom¹, B. Cardells Beltran¹, A. Beltran Vives¹, S. Pina Buded¹

¹Hospital General Universitario de Castellón, Physical Medicine and Rehabilitation, Castellón, Spain

Introduction/Background: Extracorporeal shock wave therapy (ESWT) is suggested as a treatment alternative for calcific rotator cuff tendinosis (CRCT), which may decrease the need for surgery. We assessed the evidence for effectiveness, tolerance and satisfaction of ESWT for these disorders. **Material and Methods:** From 14 Feb, 2002 and 30 Sep, 2015, a prospective longitudinal descriptive study was performed on treatment with a Piezoelectric generator of ESWT, to 181 consecutive adults subjects with CRCT. All were treated, 1 session for week, 4 weeks, were assessed before each treatment and one month, after completion of therapy. The main outcome measures were: pain, tolerance and satisfaction through visual analog scale 0–10 (VAS), flux density and number of pulses, applied, limitations (in daily living, sporting and working activities), calcifications lithotripsi, and active articular range measurement of the shoulder. The frequency analysis was conducted. The level of evidence is 3. Randomised controlled trials (RCTs) were reviewed to evaluate the evidence of the effectiveness of ESWT in the management of CRCT. **Results:** The mean flux density and number of pulses applied were 0.59 ± 0.17 mJ/mm² and 2213.3 ± 756.2 , respectively. One month after completion of therapy with ESWT, the evaluation resulted in significant improvement in pain (64.8% less in activity) and in active articulation range measurement ($29.5^\circ \pm 16.4^\circ$ more in abduction). The limitations in daily living, sporting and working activities, that initially existed in 181 (100%) persisted in 20 (11.1%), 28 (15.6%) and 28 (15.6%) respectively and the calcifications persisted in 67 (37.2%). The tolerance was good and without secondary effects of interest. Mean flux density, number of pulses applied, and improvement in pain compared with other studies are respectively: 0.99 mJmm²/0.60 mJmm², 2,213.3/2,000, and 64.8%/21%–84%. Only high-ESWT is effective for treating CRCT. **Conclusion:** ESWT in CRCT are well tolerated, and shows a significant effectiveness for pain relief, functional restoration and calcifications lithotripsi, with a mean satisfaction of 8.53 ± 1.80 (VAS 0–10).

329

EXTRACORPOREAL SHOCK WAVES THERAPY IN LATERAL EPICONDYLITIS

J.A. Mirallas Martinez¹, B. Cardells Beltran¹, A. Beltran Vives¹, S. Pina Buded¹, J.A. Vasquez Castro¹, M. Hayani Al-nisr¹

¹Hospital General Universitario de Castellón, Physical Medicine and Rehabilitation, Castellón, Spain

Introduction/Background: Several treatments are available to treat lateral epicondylitis (LE), among these is the extracorporeal shock wave therapy (ESWT). We assessed the evidence for effectiveness, tolerance and satisfaction of ESWT in LE. **Material and Methods:** From 14 Feb, 2002 and 30 Sep, 2015, a prospective longitudinal descriptive study was performed on treatment with a Piezoelectric generator of ESWT, to 98 consecutive adults subjects with LE. All were treated, 1 session for week, 4 weeks and were assessed before each treatment and one month after completion of therapy.

The main outcome measures were: pain, tolerance and satisfaction through visual analog scale 0–10 (VAS), flux density and number of pulses applied, limitations, (in daily living, sporting and working activities), and active articular range measurement of the elbow. The frequency analysis was conducted. The level of evidence is 3. Randomised controlled trials were reviewed to evaluate the evidence of the effectiveness of ESWT in the management of LE. **Results:** The mean flux density and number of pulses applied were 0.23 ± 0.09 mJ/mm², and $1,168.03 \pm 311.2$, respectively. One month after completion of therapy with ESWT, the evaluation resulted in significant improvement in pain (79.2% less in activity); and in active articulation range measurement ($8.7^\circ \pm 10.3^\circ$) more in flexion-extension. The limitations in daily living, sporting and working activities that initially existed in 98 (100%), persisted in 2 (2.1%), 2 (2.1%) and 2 (2.1%) respectively. The tolerance was good without important pain in 76 (78.3%), and without secondary effects of interest. Mean flux density, number of pulses applied, and improvement pain compared with other studies are respectively: 0.23 mJ/mm²/ 0.27 mJmm², $1,168.03/1,000$, and $79.2\%/48\%/92\%$. To draw more definite conclusions high-quality RCTs examining different intensities and focusing on long-term follow-up results. are needed. **Conclusion:** ESWT in LE, are well tolerated, and shows a significant effectiveness for pain and relief, functional restoration, with a mean satisfaction of 8.4 ± 2.18 (VAS 0–10).

330

INFLUENCE OF CERVICAL POSTURE ON BREATHING PATTERN AND CHEST EXPANSION AMONG HEALTHY AND NECK PAIN POPULATION

N.H.A. Abdul Halim¹, N.S. Baharam¹, N. Mohamad¹, V. Mohan¹

¹Universiti Teknologi Mara, Physiotherapy, Puncak Alam, Malaysia

Introduction/Background: Alteration in head posture and neck muscles activation has been observed among neck pain patients due to variation of motor dysfunction. Motor dysfunction can further lead to changes in thoracic and rib cage mechanics. However, limited evidence exists regarding the alteration of cervical posture and respiratory involvement among neck pain patients. The main objective of this study was to compare the influence of cervical posture on the pattern of the breathing and chest wall expansion between healthy and neck pain population. **Material and Methods:** 40 subjects (20 healthy and 20 neck pain subjects) were recruited based on the selected criteria as set by the study protocol. Electronic head posture instrument (EHPI) has been used to measure their cervical posture and the breathing pattern was assessed by palpation method. Finally, the chest expansion was measured using measuring tape. Data obtained were analysed using SPSS version 21.0. **Results:** The results of the study showed a significant difference ($p < 0.05$) in cranio vertebral (CV) angle, breathing pattern, chest expansion between healthy and neck pain groups. Neck pain subjects showed reduced CV angle and chest expansion. In addition, there is also an alteration of breathing pattern among neck pain patients. However, there is no significant difference in upper thoracic (UT) angle and 4th intercostal space of chest expansion between the groups. **Conclusion:** The study proposed that neck pain patients may predispose to alteration in respiratory involvement. This study recommends that respiratory exercise could be included as part of rehabilitation measures among neck pain population.

331

AN ELECTRODIAGNOSTIC APPROACH TO CARPALTUNNEL SYNDROME IN DIABETIC NEUROPATHY PATIENTS

D. Mohasseb¹, G. Yunis¹, M. Hassan¹, M.S. Al-Moghazi Al-Morsy¹

¹J Rehabil Med Suppl 55

¹Faculty of Medicine- Alexandria University, Physical Medicine- Rheumatology and Rehabilitation, Alexandria, Egypt

Introduction/Background: Diabetic nerves have increased susceptibility to compressive injury. Prevalence of CTS is higher in diabetic patients with peripheral polyneuropathy (DPN) compared to diabetic patients without diabetes-related late complications. The median nerve of DPN patients shows vulnerability at the carpal tunnel which is difficult to differentiate from CTS. The assumption that electrodiagnostic criteria for CTS are the same in diabetic subjects without DPN as in the general non-diabetic population is considered by some authors to be misleading resulting in inaccurate diagnosis of CTS in subjects with diabetes. This study aimed at assessing the potential and value of electrophysiology in the diagnosis of CTS in patients with DPN and verifying the presence of correlations between clinical and electrophysiological findings in such patients, as well as assessing the extent of such relations. **Material and Methods:** The study included 60 patients and 20 healthy control subjects. All were thoroughly evaluated clinically and by electrodiagnostic techniques including sensory study of median, ulnar and superficial radial nerves, motor study of median and ulnar nerves, segmental sensory conduction of median nerve in the hand (dividing in into 2 segments: midpalm to digit segment and midpalm to wrist segment), and axillary F central latencies for median and ulnar nerves. **Results:** Results showed significant differences between patients with diabetic neuropathy only and those with carpal tunnel syndrome on top of neuropathy in the midpalm-wrist sensory latency, midpalm-wrist sensory conduction velocity, whole median (wrist-digit) sensory latency and median motor latency. Statistics showed the presence of relations between the electrophysiological changes and the patients' age, sex, occupation, duration of diabetes and compliance to medications used for diabetes management. **Conclusion:** Segmental median nerve conduction studies are a valuable tool for diagnosing CTS in DPN patients, especially midpalm to wrist sensory conduction study. Wrist to digit sensory conduction velocity study is good for both diagnosis and screening.

332

EPICONDYLITIS. WHAT TO DO WHEN ALMOST EVERYTHING IS NOT WORKING - A CLINICAL CASE

J. Moreira¹, G. Leandro¹, M. Costa¹, R. Sales Marques¹, J. Rios¹, S. Estrela Rego¹, V. Milet¹

¹Centro Hospitalar do Algarve, Physical and Rehabilitation Medicine, Faro, Portugal

Introduction/Background: Epicondylitis is a common, painful condition affecting the common extensor tendon at the elbow. The pathophysiologic process is a tendinosis that can occur by micro-trauma or repetitive stress. It is present in 1% to 3% of the general population, occurring predominantly in the fourth and fifth decades, with no gender predilection. Different rehabilitation techniques and treatments are being used, that can include: rest, physiotherapy, platelet-rich plasma (PRP) injection, botulinum toxin injection or ultrasound-guided percutaneous needle tenotomy. Surgery treatment is recommended when functional impotence and pain persist, despite all the other treatments already mentioned. **Material and Methods:** Clinical case of male patient diagnosed with epicondylitis, refractory to usual rehabilitation treatments. **Results:** Male patient, with a history of nephrolithiasis and Morton neuroma that, in Oct 2014, presented right elbow pain complaints (QPS=variable). At PMR outpatient clinic he was diagnosed with lateral epicondylitis and started a rehabilitation program (physical therapy and physical agents). Since there was little improvement of complaints, he did an ultrasound that showed slight thickening and heterogeneity of the extensor common tendon at the epicondyle entheses, consistent with tendinosis. He was then submitted to 5 sessions of mesotherapy. The complaints of moderate pain (in QPS) continued, motivating the execution of an elbow MRI that highlighted aspects

compatible with epicondylitis. He underwent PRP injection, after epicondylar eccentric strengthening, achieving transient improvement of complaints. As he kept repetitive episodes of intense pain relapse (with Mayo Elbow Score <60) he underwent ultrasound-guided fenestration of the right lateral epicondylar entheses, associated with BoNT/A chemodenervation. Until the present date he has completed two sessions of fenestration, ranking a score of 85 at the Mayo Elbow Score. *Conclusion:* There are several therapies for treating epicondylitis but most of them still have little scientific support. Further studies should be carried out. Nevertheless, ultrasound-guided fenestration, with or without chemodenervation, should be considered as a therapeutic approach.

333

CONFRONTATION OF CLINICAL DIAGNOSIS AND ULTRA-SONOGRAPHIC FINDINGS IN THE MANAGEMENT OF THE ROTATOR CUFF DISEASE

A. Nouira¹, S. Jemni¹, E. Toulgui¹, N. Abdelkafi¹, R. Moncer¹, F. Khachnaoui¹

¹Sahloul Hospital, Rehabilitation, Sousse, Tunisia

Introduction/Background: In rotator cuff diseases, the ultrasound is an extent of the physical examination, allowing to confirm the clinical diagnosis and to locate lesions of the rotator cuff. This study aims to determine the diagnostic value of clinical tests evaluating impingement syndrome and rotator cuff tears, through a confrontation of clinical examination versus ultrasonography of the shoulder. *Material and Methods:* Cross-sectional study involving 31 patients consulting for shoulder pain, suspicious for a diagnostic of rotator cuff tear, and explored by ultrasound. A clinical examination was performed just before the ultrasound. The radiologist had no knowledge of the results of the clinical assessment. *Results:* Impingement manoeuvres (Hawkins, Neer and Yocum) seem sensitive enough, respectively 69%, 75% and 69%, but low specificity (27%, 13% and 27%). Jobe's manoeuvre evoking a supraspinatus lesion by the demonstration of weakness and/or pain seems to have the same performance profile with a sensitivity of 72% and a specificity of 40%. The lift-off test or Gerber test is more specific (62%) than sensitive (25%) for the detection of the sub-scapularis tendon lesion. About the Patte's manoeuvre, our work found a medium sensitivity and specificity (57% and 69%). The palm-up test was sensitive enough (73%) in our study but poorly specific (37%). *Conclusion:* These findings encourage further assessment of performance of the clinical examination and ultrasound of the shoulder, as well as an effort to harmonize practices. Nevertheless, ultrasound is becoming a prime consideration in the context of rotator cuff tears.

334

PREVALENCE AND PERCEPTIONS OF WORK RELATED MUSCULOSKELETAL DISORDERS AMONG NURSES IN PAKISTAN: A CROSS SECTIONAL SURVEY

Y. Asmaa¹, R. Attique¹, F.A. Rathore¹

¹CMH Lahore Medical College University of Health Sciences, Department of Rehabilitation Medicine, Lahore, Pakistan

Introduction/Background: Work related musculoskeletal disorders (WRMDs) are the musculoskeletal disorders, induced or aggravated by work & circumstances of its performance. They lead to pain, discomfort, loss of work hours and poor quality of life. They have been reported in nurses from all around the globe. No information on WRMSDs among nurses in Pakistan is available. This study aimed to document the pattern of work-WRMSDs in Pakistani nurses and to explore their perceptions towards the contributory factors and prevention of WMSDs. *Material and Methods:* Cross sectional survey was designed. Questionnaire by Tinubu et al was modified keeping in view the local work environment. Convenient sampling technique was used. Questionnaires were distributed

among 150 nurses in six hospitals. Response rate was 78%. SPSS V.20 analyzed data. *Results:* There were 117 respondents, all females. Mean age was 32 (± 9.1) years. Most (55.6%) of the nurses were unmarried and had a work experience of 1–5 years (27.8%). Thirty-seven nurses reported work related ache/discomfort in last 12 months. Sixteen had pain involving single site while in 15 cases more than 2 sites were involved, with low back being the most frequent site (32%). The First episode of pain occurred during 5–15 years of service in (36.8%) & most (60.6%) of them sought help from medical professional. Most of them agreed (110) that rest is needed to get better, and neglecting problems of this kind can cause permanent health problems (105). Majority considered poor postures, repeated tasks, insufficient breaks and attending excessive number of patients in a day as the possible causes of WRMSDs. *Conclusion:* WRMDs were found in approx. one third of the nurses interviewed in this first study on WRSDs in Pakistan. There is a need to improve the ergonomics of nursing stations, regulate the work hours and train the nurses to prevent WRMSDs.

335

REHABILITATION CARE OF THE ADHESIVE CAPSULITIS OF THE SHOULDER IN DIABETIC PATIENTS: A COMPARATIVE STUDY WITH THE IDIOPATHIC FORM

M. Rezik¹, M. Sghir¹, W. Said Lahmar¹, A. Haj Salah¹, W. Kessomtini¹

¹University Hospital Tahar Sfar, Physical Medicine and Rehabilitation, Mahdia, Tunisia

Introduction/Background: The adhesive capsulitis (AC) of the shoulder is a benign disease. Although its spontaneous evolution is often favorable, it can be much longer and unusual among diabetic patients. Our study aims at analyzing the epidemiological and clinical profile of the AC in diabetic and idiopathic population, assessing the outcome of the treatment then comparing the results between the two populations. *Material and Methods:* We carried out a retrospective study. 83 patients representing 89 AC were enrolled and divided into 2 populations: 50 diabetic patients (P1) and 33 having idiopathic AC (P2). General characteristics were measured. Clinical assessment was performed before and after treatment (rehabilitation, corticosteroid injection). Functional assessment was performed by the modified Constant score. Statistical analysis was performed using the statistical software SPSS 20. *Results:* The median age of P1 was 55 years and 57 years for P2. The sex ratio of P1 and P2 was respectively 1.27 and 0.27. 54% of cases were type 1 diabetics and 46% were type 2. We noted a statistically significant improvement in pain, joint mobility in all sectors and the modified Constant score after treatment ($p < 0.05$). This improvement was significantly better in P2 than P1 especially in the internal rotation. *Conclusion:* Our results suggest that rehabilitation care is effective in diabetic and idiopathic population suffering from AC of the shoulder. This care should be early and regular with a balance in the diabetic in order to ensure a better response of the treatment.

336

CORRELATION BETWEEN POSTURE AND SCAPULAR DYSKINESIS IN YOUNG MUSICIANS

A. Frizziero¹, F. Vittadini¹, G. Gasparre¹, V. Wolenski¹, S. Masiero¹

¹Physical Medicine and Rehabilitation, Physical and Rehabilitation Medicine, Padova, Italy

Introduction/Background: Prevalence of Playing Related Musculoskeletal Disorders (PRMDs) is up to 86% of musicians. PRMDs mostly involved the shoulder (20%), the neck (22%) and the cervical and lumbar spine (20%). Scapular Dyskinesia is related to various conditions altering glenohumeral and acromioclavicular kinematics and the incidence is elevated in subjects exposed to repetitive

movements of the scapulo-humeral and scapulo-thoracic joints. **Material and Methods:** The sample included 32 musicians (mean age 20.8 years); 14 violinists, 3 violists, 10 cellists and 5 double bassists, recruited from the C. Pollini Conservatory in Padua, Italy. The average number of years of playing was 8.9 years and the average number of hours of practise per week was 22.7 hours. Subjects with concomitant orthopaedic, rheumatic and neurological conditions were excluded. All musicians underwent to clinical evaluation of shoulder and spinal column. **Results:** Humps were present in 37.5% of subjects (CI 35.1–93.5). The rate of hyperkyphosis in the same sample was equal to 34.4% (CI 30.6–88.4), while the rate of Scapular Dyskinesia was 46.9% (CI 29.1–65.3). Hyperkyphosis affects 60% of double bassists, 41.2% of violinists and violists, 10% of cellists, while Scapular Dyskinesia affects 60% of double bassists, 35.3% of violinists and violists and 30% of cellists on the left side, and 17.5% of violinists and violists and 10% of cellists on the right side. **Conclusion:** Playing music repeatedly may cause the onset of hyperkyphosis, exacerbation of underlying scoliosis and the onset of Dyskinesia. The prevalence of Scapular Dyskinesia and hyperkyphosis seems to be related to the posture required to play the specific instrument. The presence of a hump may be related to the number of hours per week spent playing music, indicating that prolonged and not properly controlled playing can lead to underlying structural axial alterations.

337

THE EFFECT OF SLING EXERCISE THERAPY IN PEOPLE WITH CHRONIC NECK PAIN

T. Li¹, C. Wang¹, G. Zhang¹, Y. Wang¹, Y. Sun¹

¹First Affiliated Hospital of Sun Yat-sen University, Department of Rehabilitation Medicine, Guangzhou, China

Objective: This preliminary study investigated the effects of reduce the sternocleidomastoid muscle (SCM) activity which indirectly reflect the deep cervical flexor function with sling exercise therapy (SET) and postural training. **Method:** From Jan 2013 to Jun 2013, 14 patients with chronic neck pain were included, 8 in SET group and 6 in control group. Before and after 4 weeks treatment, bilateral SCM EMG during the craniocervical flexion test (CCFT) were accessed, and take the root mean square (RMS), then the statistical comparison was conducted. Other assessment methods, including neck disability index (NDI), Visual Analogue Scale (VAS) were also conducted. Evaluation methods adopted blinded. **Result:** Two sets of data in age, height, weight, duration, VAS, NDI do not have statistically significant differences ($p > 0.05$). The results showed before the treatment RMS standardization value of sternocleidomastoid between the SET group and control group at each stage of CCFT were not statistically different ($p > 0.05$). And after treatment results in 24 mmHg, 26 mmHg, 28 mmHg, 30 mmHg of CCFT are significantly statistical different between the two groups ($p < 0.05$). **Conclusion:** SET for the treatment of patients with chronic neck pain was significantly better than posture training. SET reduce the abnormal excitability of SMG in the CCFT trials, and thus it indirectly illustrates the deep cervical flexor are activated.

338

EFFECTS OF A 3-WEEK MULTIDISCIPLINARY BIOPSYCHOSOCIAL REHABILITATION IN CHRONIC NECK PAIN: A NATURALISTIC PROSPECTIVE COHORT STUDY WITH INTRINDIVIDUAL CONTROL OF EFFECTS

M. Weigl¹

¹Ludwigs-Maximilians-Universität, Department of Orthopaedics-Physical Medicine and Rehabilitation-, München, Germany

Introduction/Background: In contrast to the large evidence of the effectiveness of multidisciplinary biopsychosocial rehabilitation

(MBR) in chronic low back pain, little is known about the effects of MBR in chronic neck pain (CNP). The aim of this study was to analyze the effects of a 3-week MBR in patients with CNP. **Material and Methods:** In this naturalistic prospective cohort study change of health status during waiting was compared to change of health status between entry in MBR and 3 months' follow-up. 53 consecutive patients with CNP who participated in a 3-week MBR at the day care clinic of the University Hospital Munich were included. The MBR comprised exercise therapy, hydrotherapy, occupational therapy, psychological interventions, patient education and instructions to home exercise programs. Assessments were scheduled before MBR (T0) (6 weeks to 9 months before entry), at entry (T1) and 3 months after MBR (T2). Primary outcome was the Disability/Pain scale (Dis) of the neck pain specific NASS questionnaire. Secondary outcomes were the NASS scale neurogenic symptoms (Neuro) and the SF-36 scales bodily pain (BP) and mental health (MH). Standardized effect sizes (ES) were calculated. Change scores T2-T1 and T1-T0 (waiting time) were tested for statistical significant differences by paired *t*-test after adjustment for different time periods. **Results:** Mean age was 61y (± 10), 70% were female. Patients improved significantly in the primary and secondary outcome measures (Table 1). **Conclusion:** In this study a 3-week CNP specific day clinic MBR showed moderate to large beneficial effects on disability, pain, neurogenic symptoms and mental health for at least 3 months.

Measure	Before	Entry	3 month	Entry-3month	<i>t</i> -test
	Mean (SD)	Mean (SD)	Mean (SD)	ES	<i>p</i> -value
Disability	2.73 (0,55)	2.74 (0,60)	2.29 (0,68)	0.74	<0.001
Neurogenic	2.51 (0,79)	2.71 (0,82)	2.00 (0,79)	0.87	<0.001
BP	44.4 (17,1)	45.6 (12,2)	55.7 (15,9)	0.83	0.032
MH	66.7 (16,8)	66.5 (17,4)	75.1 (14,6)	0.55	0.047

339

SONOGRAPHIC REPRESENTATION OF BIFID MEDIAN NERVE

F. Yavuz¹, S. Kibar¹, B. Balaban¹

¹The FizyoCare Medical Center, The Clinic of Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Bifid median nerve is an anatomic variant that exist in a small percentage of the population. **Objective:** The aim of this case report was to report the sonographic representation of bifid median nerve in patient with carpal tunnel syndrome (CTS). **Case Presentation:** A 35 year-old man was referred for physical therapy and rehabilitation because of a six-months history of numbness, tingling and discomfort in her right upper extremity. He had CTS diagnosed with an EMG. As part of a research study, sonographic images of his median nerve using an established protocol were obtained. The separation of the nerve was noted approximately 2 cm from the wrist crease with complet separation of the median nerve into two separate branches **Conclusion:** The sonographic evaluation reported in this case of the median nerve and carpal tunnel was affected by this unique anatomic arrangement of the nerve.

340

SONOGRAPHIC ENVISAGE FOR BILATERAL VARIATION OF EXTENSOR POLLICIS LONGUS

B. Aras¹, E. Adıgüzel¹, F. Tok¹, B. Yılmaz¹

¹Gulhane Military Medical Academy, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Dorsal tubercle of radius or Lister's tubercle is a useful sonographic landmark when examining extensor tendons at the wrist. It is located at the distal end of the radius and palpable on the dorsum of the wrist. This bony prominence serves as an important starting point for evaluation of dorsal wrist tendons. **Material and Methods:** A 25-year-old female presented

with a mild right forearm pain, which was exacerbated with wrist movements. Her complaints began with a fall on her forearm 1 year earlier and her physical examination, laboratory tests and plain radiography gave no information about her mild pain. An initial examination in our centre revealed mild tenderness over the right dorsal forearm with wrist flexion and extension. Range of motions of the wrist joint was unlimited. Neurological examination of the right upper extremity and systemic examination was unremarkable. There were no contributory findings and no laboratory abnormalities. *Results:* Sonographic imaging of the dorsal forearm demonstrated that extensor pollicis tendon which is in third compartment located radial side of the lister tubercle next to second extensor compartment which encompass extensor carpi radialis longus and brevis tendons. Fourth compartment which contains the extensor digitorum is located at the radial side of the lister tubercle. Similar findings were found on the left dorsal extensor compartments. *Conclusion:* Variations between lister tubercle and extensor compartments rarely have been seen. To our best knowledge, radial side of Lister's tubercle location of both third extensor compartments has not been mentioned as yet in the literature.

341

AN UNUSUAL CASE OF OS TRIGONUM SYNDROME SECONDARY TO A CAR ACCIDENT

V. Binay Safer¹, U. Safer², L. Kaya³

¹Haydarpasa Numune Egitim Hastanesi, Physical Medicine and Rehabilitation, Istanbul, Turkey; ²Gulhane School of Medicine-Haydarpasa Training Hospital, Internal Medicine, Istanbul, Turkey; ³Haydarpasa Numune Egitim Hastanesi, Radiology, Istanbul, Turkey

Introduction/Background: Os trigonum syndrome is a commonly reported cause of posterior ankle pain in ballet dancers, soccer players, runners, and gymnasts who frequently force the ankle into plantar flexion. In rare cases, the onset of os trigonum syndrome follows an acute injury. *Material and Methods:* A 62-year-old female patient was admitted with load-dependent ankle pain and swelling that lasted for 5 years, which started immediately following a car accident. *Results:* On plain radiographic examination, os trigonum was incidentally identified on a lateral view of the right ankle. *Conclusion:* Therefore, os trigonum syndrome should be taken into consideration in elderly individuals experiencing posterior ankle pain immediately after a recent trauma.

342

FLUOROSCOPY-GUIDED OSTEITIS PUBIS INJECTION: A CASE REPORT

M. Baskaya¹, C. Unal¹, S. Sencan¹, O. Gunduz¹

¹Marmara University School of Medicine, Department of Physical Medicine and Rehabilitation- Section of Pain Medicine, Istanbul, Turkey

Introduction/Background: Osteitis pubis (OP) is a noninfectious inflammation of the pubic symphysis which is characterized by pelvic and lower abdominal pain. Steroid injection into the most tender area with blind approach has been reported as a safe and effective treatment. Only limited number of studies have been reported the results of fluoroscopy guided corticosteroid injection (FGCI) into the symphysis pubis. Herein, a case that received OP injection is presented with the technical aspects and the results. *Material and Methods:* A 42-year-old female patient was admitted to Pain Medicine outpatient clinic with a complaint of right hip and groin pain for 6 months duration. Long lasting sitting and standing were aggravating her pain. Before the injection numeric-rating scale (NRS) for pain was 9/10. Pubic symphysis was tender with palpation and hip rotations were painful. Pelvis X-Ray was normal but pelvic MRI was compatible with OP. FGCI was performed due to ineffective treatment for 2 weeks with nonsteroidal anti-inflammatory

medication, and local cold application. The joint space was localized using fluoroscopy, and contrast agent (iohexol) was injected to confirm intra-articular placement. Thereafter a solution containing 1 ml %0.5 bupivacaine, 1 ml 40 mg dexamethasone, 1 ml %0.9 saline was injected. Figure 1 *Results:* Her complaints significantly regressed immediately after injection. One hour after injection her NRS for pain was 0/10. After one month, NRS was 4/10, her left hip was painless in all directions and there was less tenderness on palpation compared to before. No analgesic treatment was needed anymore. *Conclusion:* FGCI is an effective and safe treatment alternative for OP. Fluoroscopy guidance is an advantage to have the steroid reached at the target tissue. Nevertheless, controlled studies that compare blind injections and fluoroscopic guidance injections should be conducted.

343

THE EFFECT OF EXTRACORPOREAL SHOCK WAVE THERAPY ON PATIENTS WITH PIRIFORMIS SYNDROME

C.F. Huang¹, C.N. Hsu¹, T.W. Chen¹, C.L. Lee^{1,2}, C.H. Chen^{1,2}, M.H. Huang^{1,2,3}

¹Kaohsiung Medical University Hospital, Physical Medication and Rehabilitation, Kaohsiung, Taiwan, ²Kaohsiung Medical University, Department of Physical Medicine and Rehabilitation- Faculty of Medicine, Kaohsiung, Taiwan, ³Graduate Institute of Neuroscience, College of Medicine- Kaohsiung Medical University, Kaohsiung, Taiwan

Introduction/Background: Extracorporeal shock wave therapy (ESWT) have been proven clinical benefit in calcific tendinitis. It also improves tissue regeneration, connective tissue disorders, and inflammatory skin disease. However, inconsistent effects of ESWT on non-calcified tendinitis were reported. Piriformis syndrome, a clinically common chronic neuromuscular disorder which was sometimes refractory. The present study investigated the efficacy of ESWT in patients with piriformis syndrome. *Material and Methods:* Thirty-six subjects with piriformis syndrome were recruited and randomly assigned to three groups. Patients in group I-III received traditional rehabilitation programs (including hot packs and interferential current therapy), three times per week for 6 weeks. Group II received additional stretching exercise therapy. Group III received additional stretching exercise therapy and weekly shock wave therapy for piriformis syndrome. The main outcome measures were the changes in the hip range of motion (ROM), average latency of H-reflex (HAL), visual analogue scale (VAS), proprioception, timed up&go test (TUG), the muscle peak torques (MPT) of hip flexion and extension. Each assessment was performed at the baseline, after treatment and at follow-up 3 months later. *Results:* The results showed that both group II and group III presented greater improvement of the six outcome measures than group I ($p < 0.05$). Extracorporeal shock wave therapy (ESWT) will reduce the tightness of hip in patients with piriformis syndrome and enhance functional status of the patients. The improvement of hip ROM, VAS score, latency of H-response and muscle peak torques after treatment were greater in group III than group II ($p < 0.05$). All outcome measure showed significant improvement in group III ($p < 0.05$) after follow up 3 months. *Conclusion:* These results indicate that ESWT may provide greater benefits in the treatment of fibrotic piriformis muscle either in pain or functional status. Therefore, ESWT can be considered to have significant effect in treating patients with piriformis syndrome.

344

EFFECT OF THERAPEUTIC ULTRASOUND IN TREATMENT OF PLANTAR FASCIITIS

S.S. Khaing¹, T. Hlaing², K.M. Hla¹

¹University of Medicine Physical Medicine and Rehabilitation, Yangon, Myanmar Burma, ²University of Medical Technology

Mandalay, *Physical Medicine and Rehabilitation, Mandalay, Myanmar Burma*

Introduction/Background: Plantar fasciitis is the common cause of inferior heel pain in adults. Plantar fasciitis is an inflammation of the plantar fascia usually at the junction of the plantar fascia and periosteum of the calcaneus. This study will focus the effectiveness of ultrasound in plantar fasciitis. Aim was to determine the effect of therapeutic ultrasound in treatment of plantar fasciitis. Objectives were to assess the effect of therapeutic ultrasound in treatment of plantar fasciitis by using FAOS score and to determine the improvement of foot and ankle outcome score between Group A and Group B forth nightly for next 4 weeks. **Material and Methods:** Patients experiencing episodes of plantar heel pain were allocated randomly, at each episode, to receive ultrasound dose of 2 W/cm², 3 MHz continuous for 10 minutes, 5 days/week for 4 weeks, stretching exercise (Gastrosoleus, intrinsic muscle), pain relieving drugs and change of foot wear and placebo group to receive same treatment except ultrasound. All treatments were under taken by the same operator. Patients' pain score were measured on Foot and Ankle Outcome Score before the course of treatment commenced and at the end of the course. Data analysis was carried out by using SPSS version 11 and Epiinfo version –6. **Results:** Seventy patients experienced episodes of heel pain. Both groups showed a reduction in pain <improvement was 96.2% in the study group and 92.97% in placebo group ($p=0.000$). **Conclusion:** Therapeutic ultrasound at a dose of 2W/cm², 3MHz continuous for 10 minutes is more effective than placebo group in the treatment of plantar fasciitis.

345

EXTRACORPOREAL SHOCK WAVES THERAPY IN PLANTAR FASCIITIS

J.A. Mirallas Martínez¹, M.T. Sabater Querol², M.C. Tudela Salom³, J.A. Vázquez Castro¹, M. Hayani Al-nisr⁴, J. Lopez Escobar¹

¹Hospital General Universitario de Castellón, *Physical Medicine and Rehabilitation, Castellón, Spain*, ²Hospital General Universitario de Castellón, *Department of Physical Medicine and Rehabilitation, Castellón, Spain*, ³Hospital General Universitario de Castellón, *Department of Physical Medicine and Rehabilitation, Castellón, Spain*

Introduction/Background: The short-term pain relief and functional outcomes of the extracorporeal shock wave therapy (ESWT), in plantar fasciitis (PF) are satisfactory. However, owing to the lack of a long-term follow-up, its long-term efficacy remains unknown. We assessed the evidence for effectiveness, tolerance and satisfaction of ESWT for these disorders. **Material and Methods:** From 14 Feb, 2002 and 30 Sep, 2015, a prospective longitudinal descriptive study was performed on treatment with a Piezoelectric generator of ESWT, in 196 consecutive adults subjects with PF. All were treated, 1 session for week, 4 weeks, were assessed before each treatment and one month, after completion of therapy. The main outcome measures were: pain, tolerance and satisfaction through visual analog scale 0–10 (VAS), flux density and number of pulses, applied, limitations (in daily living, sporting and working activities) and active articular range measurement of the ankle. The frequency analysis was conducted. The level of evidence is 3. Randomised controlled trials (RCTs) were reviewed to evaluate the evidence of the effectiveness of ESWT in the management of PF. **Results:** The mean flux density and number of pulses applied were 0.32±0.11 mJ/mm² and 1,451.3±559 respectively. One month after completion of therapy with ESWT, the evaluation resulted in significant improvement in pain (88% less in walking) and in active articulation range measurement (4.37°±6.2° more in flexion-extension). The limitations in daily living, sporting and working activities, that initially existed in 196 (100%) persisted in 11 (7.6%), 14 (7.1%) and 14 (7.1%) respectively. The tolerance was good and without secondary effects of interest. Mean flux density, number of pulses applied, and improvement in pain compared with other studies are respectively:

0.32 mJmm²/0.45 mJmm², 1,451.3/2,000, and 88%/21–84%. **Conclusion:** ESWT in plantar fasciitis, are well tolerated, and shows a significant effectiveness for pain relief and functional restoration, with a mean satisfaction of 8.3±2 (VAS 0–10).

346

LEGG-CALVE-PERTHES DISEASE: TWO CASES REPORTS

M. Sghir¹, M. Rekik¹, W. Said Lahmar¹, A. Haj Salah¹, W. Kessomtini¹

¹University Hospital Tahar Sfar, *Physical Medicine and Rehabilitation, Mahdia, Tunisia*

Introduction/Background: The primitive osteochondritis of the hip or coxa plana is internationally known as Legg-Calve-Perthes disease (LCP). Its etiology remains mysterious, but its development is well known. In more severe cases, it can lead to a relatively early osteoarthritis. The challenge is trying to apprehend the prognosis in order to provide the most suitable treatment. **Material and Methods:** We report two cases addressed to our department for a hip pain. Case 1. We report a case of a 3-year-old boy without significant medical history, who consulted for lameness lasting for two weeks. Physical examination revealed an afebrile child with a limitation of external rotation of the left hip. Pelvis radiography and an X-ray of the hip confirmed the diagnosis of osteochondritis of the left hip. An Atlanta hip orthosis was prescribed. Case 2: A 13-year-old boy, without significant medical history, who consulted for a mechanical pain next to the right greater trochanter, that hampered walking and has been appeared since 2010 due to a trauma. On physical examination he had a lameness when walking and a limitation of internal rotation of the right hip. The diagnosis of osteochondritis of the right hip was confirmed by an X-ray and the child benefited from the prescription of an Atlanta hip orthosis. **Conclusion:** Although signs and evolution of the LCP disease are well known, its etiology and treatments are, nowadays, still poorly manageable.

347

ASSOCIATION OF OSGOOD-SCHLATTER DISEASE AND SEVER'S DISEASE: A CASE REPORT

M. Sghir¹, M. Rekik¹, W. Said Lahmar¹, A. Haj Salah¹, W. Kessomtini¹

¹University Hospital Tahar Sfar, *Physical Medicine and Rehabilitation, Mahdia, Tunisia*

Introduction/Background: The term “osteochondrosis” defines a number of conditions characterized by alterations of the epiphyseal's and apophysis' endochondral ossification in the growth period. The Osgood Schlatter disease is an anterior tibial osteochondrosis. Sever's disease is defined by the damage of the apophysis of the tuberosity of the calcaneus where the Achilles tendon is attached. **Material and Methods:** We report a rare case in which the two osteochondroses were associated. **Results:** We report a case of an 11 years old boy with a history of right ankle sprains. He consulted for talalgia. On physical examination there was neither limitation of the ankle nor swelling and triggered pain by the pressure of the calcaneus. Podiatric examination revealed bilateral hollow feet. X-ray of the right foot was in favor of Sever's disease. Orthopedic soles were prescribed. 3 years later, the child consulted for bilateral knee pain exacerbated by running, jumping or climbing stairs. Examination of the knee showed prominence and oedema of the anterior tibial tuberosity with a triggered pain. X-rays of both knees were in favor of bilateral Osgood-Schlatter disease. Symptomatic treatment was prescribed with sports restriction. **Conclusion:** The osteochondroses are an extremely common reason for consultation in adolescents. Their easy diagnosis is mainly based on the interrogation and physical examination. X-rays have a major role to confirm this diagnosis. The particularity of our case is in the combination of two osteochondroses.

**CLINICAL PHYSICAL AND REHABILITATION
MEDICINE SCIENCES: MUSCULOSKELETAL
CONDITIONS - BACK PAIN AND SPINE
DISORDERS**

348

TARLOV CYST AS A RARE CAUSE OF L5-S1 RADICULOPATHY

E. Adigüzel¹, B. Aras¹, S. Kesikburun¹, F. Tok¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: Perineural cysts are common (1 to 4.6%) and usually realized incidentally during magnetic resonance imaging of the spine. Most of these cysts are asymptomatic. Only 17% of them are symptomatic and treatment is necessary in this condition. Low back pain, radiating pain, and neurologic deficit are some of the signs and symptoms related to symptomatic Tarlov cysts. Here we report a case with huge Tarlov cyst causing radicular pain. *Material and Methods:* A 57-year-old male patient presented with a 6-months history of low back pain radiating to bilateral lower legs and soles. His pain was worse at day-time especially while standing and walking. There was no history of trauma or concomitant disease. Physical examination revealed a diminished ankle jerk on the bilateral side and hypoesthesia in the S1 dermatomes. Straight leg raising test was positive on the right side, and the Lasague's sign was also positive. *Results:* Radiographic examination of the lumbosacral spine was normal. Magnetic resonance imaging (MRI) revealed a large cyst in the spinal canal of S1-S2-S3 causing stenosis at the neural foramina of S1 and S2. The patient was referred to neurosurgery clinic. *Conclusion:* Tarlov cyst was first described by Tarlov in 1938. These cysts most frequently occur at the sacral region. They may be a rare cause, but should be considered in the differential diagnosis of radiculopathy.

349

A RARE CAUSE OF LOW BACK PAIN: LIMBUS VERTEBRAE

E. Ata¹, E. Ersöz¹, K. Murat¹, S. Akarsu¹, M.Z. Kuralp¹

¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Limbus vertebrae occurs with the reason of marginal herniation. It forms with the herniation of nucleus to the forward position. It has got typical shape different from smooth triangular bone fragment of the vertebral trunk. Fractures and developmental abnormalities should be kept in mind in the differential diagnosis. Because it is not often symptomatic, there is no special treatment. We presented two cases diagnosed with limbus vertebrae. *Material and Methods:* Case-1: 20-year-old male patient applied to outpatient clinic for back pain continuing for a year. His pain was increasing while long term of sitting and standing. There was no expansion in his pain. He had no history of trauma. He was taking analgesics when he had pain. His waist movements were open but he had back pain in the middle of the low back in flexion. Straight leg raising test was negative. There was no motor and sensorial deficits. There was no abnormal activity and pathological reflex in the deep tendon reflexes. Case-2: 21-year-old male patient applied to outpatient clinic for back pain continuing for two years. His pain was decreasing with resting and there was no expansion in his pain. There was a trauma history in his childhood. Physical examination revealed no positive findings except for the increased sensitivity of the pressure in the lumbar region. Straight leg raising test was negative. There was no motor and sensorial deficits. There was no abnormal activity and pathological reflex in the deep tendon reflexes. *Results:* Case-1: Limbus vertebra was

detected on the anterior superior margin of L3 vertebra with lateral lumbar graphy. Case-2: Limbus vertebra was detected on the anterior superior margin of L3 vertebra with lateral lumbar graphy. *Conclusion:* Although limbus vertebra is not common clinical condition, it is a pathology that should be considered in young patients with long term low back pain.

350

MYOFASCIAL PAIN SYNDROME AS THE CAUSE OF ACUTE RADICULAR PAIN: A CASE REPORT

M. Azadvari¹, S.Z. Emami Razavi¹

¹Tehran University of Medical Sciences, Physical Medicine and Rehabilitation, Tehran, Iran

Introduction/Background: Low back pain is a common disease among young people which causes pain, disability and losing many efficient working days. Low back pain can have various causes one of which, usually disregarded, is the Myofascial Pain Syndrome which is caused by trigger points in muscles and leads to occasionally acute low back pain with radicular patterns. Timely and correct diagnosis of the cause of low back pain can greatly contribute in opting for the proper medical plan. *Material and Methods:* case: The patient is a 34-year old man, suffering from chronic low back pain since four years ago. He had afflicted acute radicular pain to left leg, because of intense physical activity the day before seeking treatment. In the conducted examinations, the patient's Straight leg raise (SLR) test was positive at 20 degrees, his left leg's Achilles reflex was absent, and he could not stand on his left toes. Through palpation of gluteal area, several trigger points were palpated and discovered in the Gluteus muscles especially Gluteus Medius and Piriformis. *Results:* For the patients, conservative treatment including resting, medicine, and physiotherapy was started. Patient's pain was better mildly with these treatments but not completely relieved. After that dry needling process was conducted for the gluteal region trigger points. After six session of dry needling, the patient improved significantly, his SLR test was negative, and he returned to his previous normal performance. *Conclusion:* Attending to various causes of low back pain with radicular pattern, including Myofascial Pain Syndrome, can greatly help in selecting appropriate treatment plan. In cases in which the cause of low back pain is the existence of active trigger points in muscles, the use of specific treatments such as dry needling and injection can help avoid invasive and expensive treatments for the patient.

351

ISOMETRIC BACK EXTENSOR STRENGTH AS PROTECTIVE ROLE OF BACK PAIN

S. Baek¹, E.K. Kang¹, H.W. Park¹

¹Kangwon National University Hospital, Rehabilitation Medicine, Chuncheon-Si, Republic of Korea

Introduction/Background: To investigate the association between isometric back extensor strength (IBST) and back muscle mass and back-related disability. *Material and Methods:* 523 Korean farmers were recruited. IBST was measured 5 times and the mean of 3 median values excluding the maximum and minimum values were calculated. Subjects with IBST below the 25 percentile were considered to have weak ISBT. Back pain was back-related disability was assessed using the Oswestry Disability Index (ODI). Low back pain was defined moderate or more severe pain intensity based on ODI questionnaire item 1. Lumbar disc height change (LDC) was assessed based on radiographic mild or more severe disc height change noticed in either disc level of the L4/5 or L5-S1. *Results:* Cronbach's alpha of five IBST was 0.984. Mean IBST was 169.9±69.3 N (199.7±70.3 N for male, 140.7±54.3 N for female; $p < 0.01$) and the inter-quantile ranges were 166.5–248 N in <65 aged male, 132.8–222.4 N in ≥65 aged male, 105.7–178 N for <65 aged female, and 93.5–156.3 N for ≥65 aged female. Relative risk of low back pain was significantly higher in subjects with weak

IBST (OR 1.7, 95% CI: 1.1–2.6) compared to those with normal IBST. In subgroup with LDC, we found a significant association of IBST with ODI (beta=−0.17, $p=0.01$). However, in subgroup negative for LDC, we observed no significant association of IBST with ODI (beta=−0.12, $p=0.06$). **Conclusion:** Weak isometric back extensor strength was significantly associated with low back pain. In subjects with lumbar disc height change, increased isometric back extensor strength is associated with reduced back-related disability.

352

ANALYSIS ON THE CORRELATION BETWEEN DISC DEGENERATIVE CHANGES AND LUMBAR LORDOSIS

H. Bang¹, S. Chun¹, H. Hwang¹, S.G. Chung¹

¹Seoul National University hospital, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: The relationship among ages, disc degenerative changes and lumbar lordosis is not clear. **Material and Methods:** Five hundred and forty-seven magnetic resonance images (MRIs) and standing lumbosacral lateral standing radiographs of subjects were reviewed retrospectively. Total samples of 203 subjects (103 men and 95 women, 21–81 years) were analyzed. Disc degeneration scores (DDS) were evaluated by using a scoring system which were based on T2 signal intensity, disc extension beyond the interspace of vertebra (DEBIT), Modic changes and endplate integrity in MRI. The following morphometric parameters were measured in plain radiograph for lumbar lordosis: lumbar lordotic angle (LLA), vertebral tilt angle (VTA) and intersegmental angles (ISA) and sacral slope (SS). LLA was measured by using Cobb's method in the lateral standing radiographs of the lumbar spine. ISA is measured as the change of VTAs between adjacent vertebral bodies to compensate for imperfection of Cobb's method, deficiency of information of the intervening segments. Multiple linear regression analysis was used to assess the association of DDS and LLA with ages. **Results:** Total DDS, the sum of individual DDS between L1 and S1 level, had a strong positive correlation with ages ($r=0.553$, $p=0.000$) and a weak and negative correlation with LLA ($r=-0.358$, $p=0.000$). Young age group showed tendency with larger LLA. However, LLA showed no statistically significant correlation with ages ($r=-0.128$, $p=0.069$). Individual DDS showed a negative correlation with each ISA at the corresponding level. In multiple linear regression model, ages and LLA correlated significantly with the total DDS ($r^2=0.391$, $p=0.000$). **Conclusion:** Close cross-sectional relationships were observed among disc degeneration, lordosis and ages suggesting that disc degeneration could be associated with aging and decreased lumbar lordosis. Specifically, decrease of ISA was substantially correlated with degeneration of each disc and decrease of LLA had a strong interaction with total disc degeneration score while it showed no relationship with ages.

353

RELATIONSHIPS BETWEEN LOW BACK PAIN AND LUMBAR LORDOSIS: A SYSTEMATIC REVIEW AND META-ANALYSIS

S.W. Chun¹, H. Hwang¹, J. Cho¹, K. Kim¹, H. Bang¹, S. Chung¹, M. Cho¹

¹Seoul National University Hospital, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: Extreme contrariety exists in the way clinicians regard lumbar lordosis (LL) in the aspect of low back pain (LBP). The relation between LL and LBP has immense clinical significance since it the basis of therapeutic exercise for treating and preventing LBP. This study aimed to (1) determine the difference in LL in those with and without LBP and to (2) investigate confounding factors that might affect the association between LL and LBP. **Material and Methods:** A systematic electronic search of MEDLINE,

Cochrane, EMBASE, CINAHL, Scopus, PEDro, Proquest, ISI Web of Science, Google scholar using terms related with LL or sagittal alignment was performed. Observational studies that had information about LL assessed by radiologic image in both patients with LBP by degenerative spinal disease and healthy controls (HCs) were included. Standardized mean differences (SMD) and 95% confidence intervals (CI) were estimated and chi-square statistics were used to assess within-group heterogeneity. Additionally, age, spinal disease entity, and severity of LBP were assessed as possible confounding factors. **Results:** Total of 31 studies consisting of 3,254 LBP patients and 3,382 HCs were identified. Overall, LBP patients tended to have smaller LL, compared to HCs, however, the studies were heterogeneous. In the sensitivity analysis, age, severity of LBP, and spinal disease entity were significant. In the subgroup analysis of seven age-matched studies, LBP patients had smaller LL, compared to HCs (SMD: −0.227, 95% CI: −0.382 to −0.071) without statistical heterogeneity ($p=0.080$). In the four studies that compared patients with disc herniation to HCs, LBP patients had smaller LL (SMD: −1.237, 95% CI: −1.657 to −0.818) with no statistical heterogeneity ($p=0.108$). **Conclusion:** This meta-analysis demonstrates a strong relationship between LBP and decrease of LL especially when compared to age-matched HC. Among specific diseases, LBP by herniated discs had substantial association with loss of LL.

354

THERAPEUTIC BENEFITS OF PILATES IN PATIENTS WITH LOW BACK PAIN

F.C. Creer¹, J. Litang III², L. Adorable², T. Dumagan², E.J. Romero², L.D. Paja²

¹Cebu City, Philippines, ²Southwestern University, College of Rehabilitative Sciences, Cebu City, Philippines

Introduction/Background: Throughout the years low back pain has been a common health problem and a major cause of disability which affects the capability to perform activities of daily living. It has been estimated that four out of five adults (80%) will experience back pain at some point of their lives. Multiple modalities and exercises have been commonly employed to reduce low back pain with a common goal of reducing pain and muscle spasm. This study was conducted to investigate the therapeutic benefits of Pilates in alleviating low back pain and its efficacy in the improvement of disability due to low back pain. **Material and Methods:** This experimental study involved 20 individuals with age range 20–50 years, all with mechanical low back pain. They underwent 12 sessions of Pilates within 6 weeks for one to two hours per session. The Pilates regimen includes floating arms, arm lift, pelvic tilt, pelvic isometric, abdominal curl, single and double leg stretch, side leg lift, spine stretch forward, the bridge, knee lift, roll up, the hundred, leg extension, hip and lumbar stretch, isolated hamstring and psoas stretch, leg pull up, and cat stretch in progressive repetitions. The low back pain was assessed using the Numeric Pain Scale (NPS) and the level of disability using the Oswestry Disability Index (ODI) both before and after 12 sessions. The significant difference on NPS and ODI before and after 12 sessions of Pilates were analyzed using the paired *t*-test with *p* value set at 0.00. **Results:** There was significant reduction in the NPS (computed t 11.11 > critical t 2.09) and ODI (computed t 10.90 > critical t 2.09) before and after the intervention. **Conclusion:** Pilates as an intervention for mechanical low back pain can significantly reduce the pain scale and improve disability index.

355

INFLUENCE OF REHABILITATIVE APPROACH ON THE HEALTH RELATED QUALITY OF LIFE IN ADOLESCENTS WITH MILD-MODERATE IDIOPATHIC SCOLIOSIS: A PROSPECTIVE STUDY

A. de Sire¹, I. Fatatis¹, F. Russo¹, F. Gimigliano², G. Iolascon¹

¹Second University of Naples, Department of Medical and Surgical Specialties and Dentistry, Napoli, Italy, ²Second University of Naples, Department of Physical and Mental Health and Preventive Medicine, Napoli, Italy

Introduction/Background: Deformities in adolescents with idiopathic scoliosis negatively affect the Health Related Quality of Life (HRQoL), in particular self-esteem and self-image. It is proved that physiotherapeutic scoliosis-specific exercises improve physical function but there are few evidences on their effects on the perceived quality of life. The aim of our study was to evaluate the effects of rehabilitation on the HRQoL in adolescents with idiopathic scoliosis. **Material and Methods:** In this prospective study, we included adolescents (aged 10–19 years) with a diagnosis of mild-moderate idiopathic scoliosis (11–30° Cobb). We excluded female before the menarche and adolescents treated with corsets. The population was divided into two groups according to the Cobb's angle: 11°–20° and 21°–30°. All the participants underwent physiotherapeutic scoliosis-specific exercises. We assessed the HRQoL using the Scoliosis Research Society-22 (SRS-22) at the baseline (T0) and after 1 year (T1). **Results:** We evaluated 94 adolescents, 33 females and 61 males, with idiopathic scoliosis (34 thoracic, 50 thoracolumbar, and 10 lumbar), mean aged 14.6. In Table I we reported SRS-22 values. **Conclusion:** Our results demonstrated that physiotherapeutic scoliosis-specific exercises improve HRQL in our population of adolescents with idiopathic scoliosis, independently from severity.

356

COEXISTENCE OF ANKYLOSING SPONDYLITIS AND SCHEUERMANN'S DISEASE

E. Ersöz¹, E. Ata¹, L. Tekin¹

¹GATA Haydarpaşa Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Ankylosing spondylitis is a chronic inflammatory disease which involves the axial spine and sacroiliac joints and causes decreased range of movement of the spine. Scheuermann's disease is a juvenile osteochondrosis of the spine. It is characterized by wedge shaped vertebral bodies, irregularities of the vertebral endplates, narrowed disk spaces, thoracic hyperkyphosis and intraosseous disk herniation (Schmorl's node). Herein, we presented a case who has the diagnoses of these two diseases both according to some clinical and radiologic findings. **Material and Methods:** A 22-year-old man was admitted to our clinic with the complaint of low back. In his history, he had suffered from inflammatory back pain and stiffness of back movements lasting about one hour for 2 years. He declared that his symptoms was relieved partially with non-steroid anti-inflammatory drugs. His pain score was 8 according to visual analog score (VAS). On physical examination, lumbar spinal mobility was limited in all directions. Schober test result was 13.8 cm and chest expansion was 4 cm. Laboratory results were erythrocyte sedimentation rate 12 mm/h, C Reactive Protein 2.9 unit. Brucella agglutination test was negative and the other biochemical and hormonal blood tests were normal. Radiographic evaluations were showed that the patient has the kyphosis of 35°, Schmorl's nodes at all spine, loss of the physiological cervical lordosis, disc space narrowing, wedge shaped vertebral bodies and vertebral end plate irregularities as well as grade 3–4 sacroiliitis bilaterally. Sacroiliitis was confirmed by magnetic resonance imaging. **Results:** Indomethacin, 25 mg, orally three times daily and physical therapy including posture exercises was started. The patient's treatment is ongoing. **Conclusion:** Despite the coexistence of Ankylosing spondylitis and Scheuermann's disease is a rare condition, it should be considered in the diagnosis.

357

EMG BIYOFEEEDBACK ASISTED LUMBAR STABILIZATION EXERCISES IN OBESE PATIENTS WITH CHRONIC LOW BACK PAIN: A RANDOMIZED, CONTROLLED, PROSPECTIVE STUDY

S. Kibar^{1,2,3}, S. Karagül¹, S. Ay⁴, E.S. Ergin^{1,3}, D. Evcik^{5,6}

¹Ufuk University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Turkey, ²Ankara University Faculty of Medicine, Department of Anatomy, Ankara, Turkey, ³FizyoCare Medical Center, The Clinic of Physical Therapy and Rehabilitation, Ankara, Turkey, ⁴Ufuk University Faculty of Medicine- Ankara- Turkey, Department of Physical Medicine and Rehabilitation, Ankara, Turkey, ⁵Güven Hospital, Department of Physical Medicine and Rehabilitation, Ankara, Turkey, ⁶Ankara University Haymana Vocational School, Department of Therapy and Rehabilitation-, Ankara, Turkey

Introduction/Background: Obesity is related with lumbar strength deficit and chronic low back pain (CLBP). This study aimed to investigate the effectiveness of physical therapy including EMG-biofeedback assisted lumbar stabilization exercises (LSE) in obese patients with CLBP. **Material and Methods:** Fifty two overweight/obese patients with CLBP took part in this randomized, single-blind, controlled study. The patients were randomly assigned into two groups. Group-1 received ($n=26$) EMG-biofeedback assisted LSE, hotpack and transcutaneous electrical nerve stimulation (TENS), group-2 received hotpack, TENS and home exercise program five days a week for four weeks (20 sessions). Lumbar range of motion (ROM) was assessed via an inclinometer and pain was evaluated using visual analog scale (VAS). Oswestry questionnaire was used for functional capacity. Maximum voluntary contractions (MVC) of lumbar and abdominal muscles evaluated by EMG-biofeedback device and muscle activities were evaluated by pressure biofeedback unit (PBU). The evaluations were performed before and after treatment and three months later. **Results:** Forty nine patients completed the three months follow-up visit. There were no significant differences between group-1 ($n=24$, mean age=56.79±6.33) and group-2 ($n=25$, mean age=53±7.95) according to sociodemographic and clinical variables before treatment. At the end of the therapy (fourth week) and the third month follow-up, statistical significant improvements were observed in all parameters in group-1 ($p<0.025$), however there was no improvement in group-2 regarding MVC and muscle activity of lumbar and abdominal muscles ($p<0.025$). In the comparison of two groups, significant differences were determined in all parameters in favour of group-1 at fourth week. Additionally significant improvements in VAS, Oswestry scale, MVC and PBU evaluations except lumbar ROM were found in group-1 at the end of three months follow-up period. **Conclusion:** Physical therapy including EMG-biofeedback assisted LSE is more effective than physical therapy with home exercises in obese patients with chronic LBP in terms of pain, functional capacity, lumbar and abdominal muscle activity.

358

THE EFFECTIVENESS OF LOW INTENSITY LASER THERAPY ALONG WITH THE SCIATIC NERVE FIELD IN CHRONIC LUMBAR RADICULAR PAIN : A PROSPECTIVE, RANDOMIZED, PLACEBO CONTROLLED STUDY

S. Kibar^{1,2,3}, S. Karagül¹, S. Ay⁴, E.S. Ergin^{1,3}, D. Evcik^{4,5}

¹Ufuk University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Turkey, ²Ankara University Faculty of Medicine, Department of Anatomy, Ankara, Turkey, ³FizyoCare Medical Center, The Clinic of Physical Therapy and Rehabilitation, Ankara, Turkey, ⁴Güven Hospital, Department of Physical Medicine and Rehabilitation, Ankara, Turkey, ⁵Ankara University Haymana Vocational School, Department of Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: This study aimed to investigate the effect of low intensity laser therapy (LILT) along with the sciatic nerve in patients with lumbar disc herniation with radiculopathy. **Material and Methods:** Eighty-one patients with chronic radicular pain caused by lumbar disc herniation were randomly allocated into

three groups. All patients received transcutaneous electrical nerve stimulation (TENS) and hotpack application over low back region. In addition, group-1 ($n=26$) received LILT ($4\text{J}/\text{cm}^2$ for each points), group-2 ($n=26$) received TENS and group-3 ($n=29$) received sham LILT on sciatic nerve five days a week, for three weeks (15 sessions). Outcomes were assessed at the beginning, week 3 and after three months. Pain at low back and leg was measured by visual analog scale (VAS), neuropathic leg pain was assessed by Neuro-pathic Pain Diagnostic Questionnaire (DN4). Lumbar range of motion (ROM) was measured by inclinometer and modified Shober test (MST). Oswestry questionnaire (OQ) was used for measuring functional level and sleep quality was evaluated by Pittsburgh Sleep Quality Index (PSQI). **Results:** Seventy-five patients completed the three months follow-up evaluations. In post treatment evaluations, all parameters improved in group 1, 2 and 3, however no improvement was demonstrated in VAS score of leg pain (VASLP) in group-3. In comparison of two groups, group-1 was superior to group-2 in terms of VASLP and DN4 evaluations at the post treatment evaluations ($p<0.001$). At the end of third months, only VASLP was improved in group-1. Group-1 and 2 demonstrated significant superiority over group-3 with regard to VASLP, DN-4 and OQ results. No differences were found in PSQI and lumbar ROM between groups. **Conclusion:** Both LILT and TENS on sciatic nerve in lumbar disk herniation with radiculopathy were found to be effective. LILT was more effective than TENS in terms of leg and neuropathic pain. The leg pain improvement was the only parameter which was sustained, until third months.

359

THE EFFECTIVENESS OF COMBINED TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION AND INTERFERENTIAL CURRENT THERAPY IN CHRONIC LOW BACK PAIN: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED STUDY

S. Kibar¹, H.E. Konak¹, S. Ay¹, B. Doğanay Erdoğan², D. Evcik^{3,4}

¹Ufuk University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Ankara, Turkey, ²Ankara University Graduate School of Health Sciences, Department of Statistics, Ankara, Turkey, ³Güven Hospital, Department of Physical Medicine and Rehabilitation, Ankara, Turkey, ⁴Ankara University Haymana Vocational School, Department of Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: The effects of the transcutaneous electrical nerve stimulation (TENS) and interferential current therapy (IFT) were studied previously. As far as we know there is no study regarding the application of combined TENS and IFT in chronic low back pain (LBP). The present study aimed to investigate the effectiveness of TENS combined with IFT in chronic LBP. **Material and Methods:** A total of 123 patients were randomly divided into four groups. Group-1 received TENS (combination of conventional and burst modes), group-2 IFT (true IFT with a four-electrode arrangement), group-3 combined TENS/IFT, and group-4 placebo TENS/IFT five times a week for three weeks. All participants also received hot pack therapy. Lumbar range of motion (ROM) was assessed by an inclinometer and the modified Schober test. Pain during activity, the patients' and physicians' global assessments were evaluated by using a visual analog scale (VAS). Functional capacity was assessed by Rolland-Morris Disability Questionnaire (RMDQ). **Results:** All groups except group-4 showed significant improvements in all parameters ($p<0.001$). Group-3 was superior to group-2 in RMDQ and VAS values. Also group-3 had better global assessments scores compared to groups-1 and 2 ($p<0.001$). **Conclusion:** Combined TENS/IFT was more effective than IFT regarding functional levels and pain during activity in patients with chronic LBP. The findings of this preliminary study can offer favorable insight that can be applied to future studies concerning combined TENS/IFT therapy, with different application frequencies and modes or other combined therapies.

J Rehabil Med Suppl 55

360

SOME TECHNICAL MEANS OF REHABILITATION FOR PATIENTS WITH LOW BACK PAIN

A.N. Filippovich¹

¹Research Center of Medical Assessment and Rehabilitation - Minsk - Belarus, Minsk Region, Belarus

Introduction/Background: 78 patients with myotonic (MT) syndrome of lumbar osteochondrosis in the age group of 21–60 years old was conducted. Out of them men – 40 (51.3%), women – 38 (48.7%). **Material and Methods:** Patients went through the clinical estimation of neurologic status, manual testing of muscles, CT and MRI of back bone lumbar department, interferential and needle electromyography of the most damaged muscular groups, dosed loading veloergometry, revasography of feet, and shins. **Results:** It was established for the first time, that among MT-syndrome patients 54 (69.2%) an associated damage of two or more muscles prevailed. The most damaged ("key") muscles appeared to be gastrocnemius muscle (43; 55.1%), gluteus medius (42; 53.82%), quadriceps femoris (36; 46.2%), rectus abdominis and external oblique (32; 41.1%), peroneal muscle (29; 37.2%), piriform muscle (29; 37.2%), lumbar quadratus muscle (28; 35.9%), gluteus maximus (19; 24.3%), gluteus minimus (16; 20.5%), adductor (14; 17.9%) and abductor (11.5%) thigh muscles. Medical-rehabilitation complex on damaged extremity was appropriated in 27 patients with MT syndrome. The complex included oral reception of katadolon (100 mg 3 times a day for 10 days), tractions on Fintrac-471 table (with force from 3 to 55 kg, a course of 8–10 sessions) and also acupuncture with use acupuncture points of general action with vascular autonomic nervous system orientation (G14, MJ6, E36, RP6, TR5, V40) and locally-segmented points on the most damaged muscular groups (AT60, VB30 with deep introduction to piriform muscle; VB 34, VB41, F3). **Conclusion:** After treatment damaged extremity pain has completely disappeared in 19 patients, pain essentially decreased and increased tolerance of physical activity in 6 patients. It is established, that katadolon shows not only analgesic and neuroprotective, but also myorelaxing action on muscles of pelvic girdle and feet in patients with acute and chronic pain syndrom.

361

DO COMORBID PSYCHIATRIC CONDITIONS AND INFORMATION FORM APPLICATION EFFECT THE RESULTS OF TRANSFORAMINAL EPIDURAL STEROID INJECTION TREATMENT?

Y. Bahar¹, T. Ercalik², S. Sencan², O. Gunduz²

¹Marmara University School of Medicine, Physical Medicine and Rehabilitation, Istanbul, Turkey, ²Marmara University School of Medicine, Physical Medicine and Rehabilitation- Section of Pain Medicine, Istanbul, Turkey

Introduction/Background: The relationship between pain and mood is bidirectional. Pain can distort one's mood, and a distorted mood can prevent a pain from being diagnosed or it can alter the result of treatment. The aim of this study to assess the comorbid psychiatric conditions and information forms that given before effect on transforaminal epidural steroid injection (TFESI) treatment. **Material and Methods:** Patients with lumbar radiculopathy who were planned to have TFESI were randomized into two groups. The first group received written and visual content information form, the other group received verbal information. Before TFESI, measures were used as following; Hospital Anxiety and Depression Scale for depression and anxiety; Somatosensory-Amplification-Scale (SSAS) for the level of somatization, Numeric Rating Scale (NRS) for the pain level and Oswestry Scale (OS) for disability. Patients were evaluated, after the first hour with pain level, third week and third month of the injection with pain level and disability. **Results:** One hundred and ten patients (F=58, M=52) were included in this research. One hundred and seven patients at the third week, 49 patients at the third month were reevaluated. Fifty-three patients (48.2%) had

depression and thirty-two patients (29.1%) had anxiety. Forty-three patients had written and visual information, 67 had only verbal information. There wasn't any significant difference between anxiety and depression rates between the two groups. There wasn't statistically significant difference between NRS and OS of patients those had information form and those hadn't. When patients with anxiety were evaluated, the third week OS scores of patients with information form were slightly lower than without information form which was not statistically significant ($p=0.085$). There were no significant relationship between SSAS, NRS and OS scores ($p>0.05$). **Conclusion:** In this preliminary study we found that information forms can be beneficial for patients with comorbid anxiety about the functionality. The current comorbid conditions of patients with depression and anxiety is not an obstacle for responding to treatment.

362

ASSESSMENT OF POTENTIAL PREDICTIVE FACTORS FOR SURGERY IN PATIENTS WHO RECEIVED TRANSFORAMINAL EPIDURAL INJECTIONS

E. Guler¹, M. Baskaya², S. Sencan², T. Ercal², O. Gunduz²
¹Erciyes University School of Medicine, Department of Physical Medicine and Rehabilitation- Section of Pain Medicine, Kayseri, Turkey, ²Marmara University School of Medicine, Department of Physical Medicine and Rehabilitation-Section of Pain Medicine, Istanbul, Turkey

Introduction/Background: The aim of this study is to assess potential predictive factors for surgery after transforaminal epidural steroid injection (TFESI) in patients with single level unilateral lumbar radiculopathy. **Material and Methods:** In this retrospective study, we screened data of 550 patients who received single level TFESI between 2011–2015. Overall, 229 patients with available data were questioned for pain level by numeric rating scale (NRS), history of surgery and, if present, time to surgery after TFESI through phone interview. Data regarding presence of pre-procedural muscle weakness, electroneuromyography findings, NRS scores at baseline and on hour 1, on week 3 and at month 3, straight leg raise test, number of TFESI applied, Charlson comorbidity index, classification of disc hernia (grade 1–4) on T2-weighted axial MR images were extracted from hospital database. The data were compared between patients with or without history of surgery. **Results:** TFESI was administered at L5 in 119, S1 in 90 and L4 in 10 of 229 patients. The mean assessment time was 19.9 months from last TFESI. It was found that 33 patients (14.4%) underwent lumbar disc surgery after TFESI. The mean time from last TFESI to surgery was 5.27 months. MRI grade was found to be significantly higher in patients underwent surgery compared to those without surgery (3.76 vs. 2.42; $p<0.05$). All follow-up NRS scores of patients who didn't receive surgical treatment was statistically lower than the patients who underwent surgery (1 hour; $p=0.006$, 3rd week; $p=0.014$, 3rd month; $p=0.002$). No significant difference was found in any other parameters. **Conclusion:** In this study, higher NRS scores and MRI grades in patients who underwent surgery after TFESI compared to those without history of surgery can be considered as predictive factors for assessment of treatment response and surgery. Prospective studies and data will be helpful to identify predictive factors.

363

ACUTE EFFECTS OF KINESIO TAPING ON LOW BACK PAIN AND BACK MUSCLE ENDURANCE IN PATIENTS WITH LUMBAR DISC DEGENERATION: A CONTROLLED CLINICAL TRIAL

Y.M. Lo¹, Y.S. Yen¹, S.C. Kung¹, P.C. Hsiao¹, W. Chou¹, H.H. Cheng¹, N.J. Chang²

¹Chi Mei Medical Center, Physical medicine and Rehabilitation, Tainan City, Taiwan, ²Kaohsiung Medical University, Department of Sports Medicine, Kaohsiung, Taiwan

Introduction/Background: Kinesio taping (KT) has been widely used for low back pain. The effect of KT on lumbar disc degeneration patients has yet to be investigated. The aim of this study is to examine the acute effect of KT on pain, disability and back muscle endurance. **Material and Methods:** 36 patients (14 women and 22 men, aged 24–64 years) via using MRI examination were enrolled in this study. Kinesio® Tex Tape was applied for pain relief and facilitation of paraspinal muscle contracture. This study used a single group, pretest-posttest design. The visual analogue scale (VAS) and Oswestry Disability Index (ODI) were used to assess before and after taping. The Biering-Sorensen test were used to assess under three condition: no taping (T0); immediately after taping (T1); 24 hours after taping with the tapes remaining in situ (T2). **Results:** Patients' mean score of the worst pain intensity (VAS) before taping was (4.44±1.780), while after taping was (2.67±1.309). The reduction in VAS was significant ($p<0.05$). Among 36 patients, 24 patients have moderate or severe pain intensity (VAS≥4). The VAS of these 24 patients before taping was (5.50±1.103). After taping, the VAS became (3.33±1.049). The reduction in VAS was significant ($p<0.05$) and attained the minimal clinical important difference. Patients' mean score of ODI before taping was (26.67±9.94), while after taping was (22.44±10.01). The ODI mean score reduced significantly ($p<0.05$). Patients' Biering-Sorensen test recorded of T0 was 58.00 seconds; whereas 78.71 seconds at T1; 78.77 seconds at T2. There was the significant difference not only between T0 and T1 but also between T0 and T2 ($p<0.05$). **Conclusion:** Lumbar disc degeneration patients experienced statistically significant improvements in pain, disability and back muscle endurance after taping. Especially, KT reduced more pain in patients with severe or moderate pain. Thus, KT may be used as a complementary method in these patients. Further research is warranted on these patients' outcomes after KT applications for longer time periods.

364

PHYSICAL ACTIVITY TRACKERS AS OBJECTIVE MEASUREMENT TOOLS FOR ACTIVITY AND FUNCTION PRE AND POST STIMULATOR IMPLANT IN PATIENTS WITH BACK PAIN AND SPINE DISORDERS

W.P. McRoberts¹, H. Abdul¹, C. Apostol¹

¹Holy Cross Hospital, Interventional Spine & Pain Medicine, Fort Lauderdale, USA

Introduction/Background: Widespread dependency on subjective measurements of Spinal Cord Stimulator (SCS) treatment efficacy causes dissent among payers, patients and physicians. This hinders reimbursements of these devices for the treatment of spine disorders. A retrospective PearlDiver supercomputer (Warsaw, IN, USA), review using the ICD-9 codes for spine disorders showed 5,436,443 Medicare patients were diagnosed with back pain between 2005 and 2012. Of these, 42,322 underwent SCS implant. The efficacy of SCS can be mapped using Physical Activity Trackers (PATs), such as accelerometers, by monitoring physical activity (PA). Previous studies have revealed an inverse relationship of PA with pain, torpor and morbidity and mortality. Thus, we propose to broaden the utility of PATs as an objective measure of SCS efficacy to promote value-based reimbursements for neuromodulation. **Material and Methods:** We propose a prospective study utilizing PATs to map SCS trial and implant efficacy. The PA of 50 study subjects will be recorded for 7 days prior and during SCS trial. A similar 7-day monitoring period will be implemented at 3rd week, 6th week and 12th week intervals after the SCS implant. PA monitoring will be comprised of steps taken, calories expended and sleep parameters. The data collected could serve to establish the treatment curve for neuromodulation. **Results:** The information collected by PATs will be analyzed. Subjective assessment will be done by patient reported pain scales and questionnaires: numerical rating scale (NRS), the Short Form McGill Pain Questionnaire (SF-MPQ) and the SF-36 health survey. Statistical analysis will seek to confirm an association between pain and PA. **Conclusion:** PATs analysis in patients undergoing neuromodulation could provide objective evidence of the correlation be-

tween PA and pain. Correlating the results obtained from the study and determining the influence of PA on morbidity and mortality may be beneficial to patients, payers, and physicians.

365

IMPROVED INTEROCEPTIVE AWARENESS IN CHRONIC LOW BACK PAIN: A COMPARISON OF BACK SCHOOL VERSUS FELDENKRAIS METHOD

T. Paolucci¹, F. Zangrando¹, M. Iosa², S. De Angelis¹, C. Marzoli¹, G. Piccinini¹, V.M. Saraceni¹

¹Sapienza University of Rome, Medicina Fisica e Della Riabilitazione, Rome, Italy, ²Santa Lucia Foundation, Clinical Laboratory of Experimental Neurorehabilitation Fondazione Santa Lucia I.R.C.C.S., Rome, Italy

Introduction/Background: No randomized controlled trials have been conducted to determine the efficacy of the Feldenkrais method in patients with chronic low back pain (CLBP), in contrast to established traditional rehabilitation approaches, such as the Back School (BS). Thus, we aimed to measure the efficacy of the Feldenkrais method in relieving pain in patients with CLBP compared with a standardized rehabilitative method BS as the primary outcome. As a secondary measure, we determined the significance of interoceptive awareness during rehabilitation treatment with regard to the perception and improvement of chronic pain. **Material and Methods:** This study was designed as a single-blind randomized controlled trial. Fifty-three patients with a diagnosis of CLBP for at least 3 months were randomly allocated to the Feldenkrais (mean age 61.21±11.53 years) or Back School group (mean age 60.70±11.72 years). Pain was assessed using the visual analog scale (VAS) and McGill Pain Questionnaire (MPQ), disability was evaluated with the Waddell Disability Index, quality of life was measured with the Short Form-36 Health Survey (SF-36), and mind-body interactions were studied using the Multi-dimensional Assessment of Interoceptive Awareness Questionnaire (MAIA). Data were collected at baseline, at the end of treatment, and at the 3-month follow-up. **Results:** The 2 groups were perfectly matched at baseline with respect to all the computed parameters. At the end of treatment, there were no significant differences between groups with respect to chronic pain reduction (medians and interquartile ranges; for FG: 2.8 and 2.1, for BG: 5.0 and 5.5, $p=0.290$); VAS and MAIA-N sub scores correlated at Tend ($R=0.296$, $p=0.037$). By Friedman analysis, there were both groups experienced significant changes in pain ($p<0.001$) and disability ($p<0.001$) along the investigated period (tab 1). **Conclusion:** The Feldenkrais method has comparable efficacy as Back School in CLBP.

366

RECURRENT DISCITIS IN THE ACUTE REHAB SETTING

K. Patel¹

¹Atlanta, USA

Case Diagnosis: Recurrent Discitis: Setting: Acute Rehabilitation Facility. **Case Description:** A 67 year old female was admitted to the acute rehabilitation hospital for T4 Asia B spinal cord injury (SCI) secondary to spinal cord infarction. Prior to her SCI, she had T5–6 discitis due to methicillin sensitive staphylococcus aureus (MSSA), and a history of four failed left knee replacement surgeries, complicated by MSSA infection. She had completed a 16 week course of IV antibiotics prior to her arrival, and while at rehab initially demonstrated excellent participation in physical therapy and decreasing requirement of pain medications. However, after the first week, she suddenly began experiencing increasing back pain. She did not appear acutely ill, and her vitals and labs were unremarkable. Over the next couple days, her pain progressed despite aggressive medication adjustments, and she failed to tolerate physical therapy. A CRP and ESR were ordered, which returned >380 and 76, respectively - a significant increase from preadmission levels of 11 and 37, respectively. IV antibiotics were restarted, and blood cultures were obtained.

Repeat imaging showed worsening discitis T3-T6 with 2 right paraspinal muscular abscesses and significant circumferential epidural phlegmon T2-T7. Blood cultures grew MSSA. **Discussion:** Discitis is a serious and rare condition which can cause significant neurological injury. Frequently, discitis presents without any systemic signs, leukocytosis, or superficial signs of infection (present in only 10% of cases). Back pain and ESR/CRP elevation are the most consistent abnormalities seen in cases of diskitis. Blood cultures are positive in only one third to one half of cases, and recurrence of infection occurs in 2–8% of patients. **Conclusion:** Clinicians should have a low threshold to test for inflammatory markers (ESR, CRP) in patients with a history of discitis who have sudden unexplained back pain—even in the absence of the usual physical or laboratory signs of infection.

367

ACTIVE THERAPY FOR CHRONIC LOW BACK PAIN AMONG COAL MINERS, A RETROSPECTIVE CASE SERIES

R. Setianing¹

¹Surakarta, Indonesia

Introduction/Background: The high incidence of low back pain (LBP) among miners is believed to be due (at least in part) to high exposure to awkward postures, heavy manual work, and exposure to whole-body vibration (WBV) in the mining work environment. As a result of these risk factor exposures, LBP has consistently been the leading cause of occupational disability in the mining industry. This study was described the impact of active therapy for chronic low back pain among coal miners. **Material and Methods:** Retrospective study of fifteen patient with a chief complained of chronic LBP from the same mining company who were managed by active therapy (Documentation Based Care –DBC Program) for 6 weeks (12 sessions) from Aug 2013–Oct 2015. **Results:** The pain is decreased and with Wilcoxon test, we found that mean of VAS pre active therapy is 57.33 and post active therapy is 22.67. Mean of back trouble severity at pre active therapy is 60.533 and post is 23.13. From spine profile consist of sagittal range of motion (ROM) pre active therapy is 58.66° and post is 73.53°, rotation ROM pre active therapy is 81.33° and post is 117.44° and also the result of lateral bending ROM pre active therapy is 91.53° and post is 124.133°. Significant improvement of back pain intensity, back trouble severity and spine profile with $p<0.005$. **Conclusion:** The Active Therapy is a clinically good treatment for chronic low back pain among coal miners.

368

L5 PAINFUL MINOR INTERVERTEBRAL DYSFUNCTION (PMID), UNCOMMON CAUSE OF KNEE PAIN

M. Rekik¹, M. Sghir¹, W. Said Lahmar¹, A. Haj Salah¹, W. Kessomtini¹

¹University Hospital Tahar Sfar, Physical Medicine and Rehabilitation, Mahdia, Tunisia

Introduction/Background: Painful minor intervertebral dysfunction is the result of a mechanical and/or reflex spinal dysfunction. This mild disturbance is mostly due to posterior facet joint that is responsible for the irritation of the posterior branch of the corresponding spinal nerve. This irritation generates tissular algic changes in its territory: teno- periosteal, cutaneous (cellulitis) and muscular (movement restrictions, myalgia) defining the teno-cel-myalgic syndrome (TCMS). **Material and Methods:** We report an original case of PMID L5. **Results:** It is about a 28 years old woman, with no medical history, who consulted for dysesthesia and spontaneous parietal mechanical pain next to the outer edge of the left knee radiating to the upper third of the leg. Physical examination revealed that the left knee was not inflammatory or painful, and its mobility was normal. Furthermore, examination of the spine found a TCMS: Pain in the pressure of the L5 spinous process, myalgia of gluteus medius, tenalgia over the greater trochanter and cellulitis of the anterolateral surface of the left leg. X-rays of the knee were normal. The diagnosis of L5 PMID

was confirmed and the patient had spinal manipulation and functional rehabilitation with symptoms improvement. *Conclusion:* Faced with knee pain, we should examine the spine and look for a possible TCMS in order to not miss the diagnosis of L5 PMID.

369

COORDINATION EXERCISES IS AN EFFECTIVE METHOD OF PHYSICAL REHABILITATION AFTER LUMBOSACRAL DECOMPRESSION OPERATIONS, ACTING ON THE DEEP STABILIZATION SYSTEM OF THE SPINE

N. Sichinava¹, E. Styazkina², M. Gurkina³, V. Badiyeva⁴, A. Dmitriev⁵, A. Tanatarova⁴, V. Arkov⁶

¹Moscow Research and Practice Center of Medical Rehabilitation and Sports Medicine, Rehabilitation, Moscow, Russia, ²Federal State Budget Institution "Russian Scientific Center of Medical Rehabilitation and Balneology", Department of Physiotherapy Exercises, Москва, Russia, ³Federal State Budget Institution "Russian Scientific Center of Medical Rehabilitation and Balneology", Department of Physiotherapy Exercises, Moscow, Russia, ⁴Moscow Scientific Centre of Medical Rehabilitation- Recovery and Sport Medicine Deputy of Health Care of Moscow, Rehabilitation, Moscow, Russia, ⁵Moscow Scientific Centre of Medical Rehabilitation- Recovery and Sport Medicine Deputy of Health Care of Moscow, Rehabilitation, Moscow, Russia, ⁶Moscow Research and Practice Center of Medical Rehabilitation and Sports Medicine, Rehabilitation, Moscow, Russia

Introduction/Background: The most frequent consequence of neurosurgical treatment of intervertebral lumbosacral hernias is radicular pain syndrome. One of the reasons is overload of support structures thoracolumbar junction due to formed discoordination in the muscles of deep stabilizing system of the spine. *Purpose:* Substantiate of method and evaluate the effectiveness of coordination exercises in complex rehabilitation of patients with radiculopathy after lumbosacral decompression operations. *Material and Methods:* The study included 87 patients aged 23 to 59 years with radiculopathy who underwent decompression surgery on the lumbosacral spine in period from 3 months to 3 years. All patients were randomly divided into 3 groups of 29 people in each. To evaluate the efficacy we used clinical and functional methods of examination as well as questionnaires. *Results:* We detected a decrease in the severity of pain, 65.5%, 27.6% and 6.9% respectively in 1, 2 and 3 groups. Comparison of the VAS data after the course showed significant difference between groups on the criterion of Kruskal-Wallis ($H=24.41$; $p>0.001$). Data analysis after treatment demonstrated improvement in static-dynamic disorders that are closely associated with a reduced severity of hyper tonus paravertebral muscles ($\chi^2=22.8$, $p=0.000$ in 1st, $\chi^2=2.9$, $p=0.4$ in 2nd and $\chi^2=0.68$, $p=0.409$ in 3rd groups). Coordination exercises leads to normalization of the posturologic characteristics: decrease index of deviation center of mass in the frontal plane by 1.5 times ($p>0.05$) and a decrease in the sagittal plane by 2.5 times ($p<0.05$) as evidence of normalization load balancing on the lower limbs and increase stability in the main position. *Conclusion:* Coordination exercises is an effective method of physical rehabilitation after lumbosacral decompression operations, acting on the deep stabilization system of the spine and recovers the deficit of the movements management of the vertebral-motor segment through the normalization of these muscle groups.

370

RADIOLOGICAL PROGRESS REPORT OF CURING SCOLIOSIS ACCORDING TO THE FED METHOD BASED ON OWN MATERIAL

Z. Sliwinski^{1,2}, W. Kufel³, B. Halat¹, B. Michalak¹, D. Sliwinska¹, G. Sliwinski¹

¹Physiotherapy Center in Zgorzelec, Physiotherapy, Zgorzelec, Poland, ²Jan Kochanowski University, Physiotherapy, Kielce, Poland,

³Physiotherapy Center in Zgorzelec, Physiotherapy, Physiotherapy Center in Zgorzelec, Poland, ⁴Dresden University of Technology, Institute of Biomedical Engineering, Dresden, Germany

Introduction/Background: In the process of treating scoliosis X-ray is one of the objective methods of assessing the progress of therapy. In the assessment of scoliosis picture should cover the entire spine, hip bones with plates and hips, made standing in the AP and lateral projections. On the basis of a well-made images, you can specify the parameters of scoliosis (type of scoliosis, Risser test, the Cobb angle, the angle of rotation of the vertebrae, the index kifo - lordosis, etc.) which allows the selection of the proper physiotherapy and assessment of treatment effects. *Material and Methods:* We evaluated a group of 70 children diagnosed with idiopathic scoliosis in age from 7 to 18 years residing in the treatment by the Fed at the Centre for Rehabilitation in Zgorzelec. The children remained in the two monthly turnusach apart semester. During the stay twice a day participated in therapy by the Fed. Analysis and evaluation of X-ray were performed before treatment and at the end of the half-year stage. With images were evaluated Cobb angle, vertebral rotation by raimondii test Risser, type of scoliosis by King-Moe. *Results:* The results have been developed in the form of tables and charts, broken down by the scoliosis to 20°, 30°, 40° and above 40°. *Conclusion:* Comparison of X-ray images is one of objective assessment in the treatment of scoliosis. The results presented in the study are the evaluation of the effectiveness of the method the Fed.

371

ALTERED FRACTIONAL AMPLITUDE OF LOW FREQUENCY FLUCTUATION IN EXPERIMENTAL LOW BACK PAIN: A RESTING-STATE FMRI ALTERED FRACTIONAL AMPLITUDE OF LOW FREQUENCY FLUCTUATION IN EXPERIMENTAL LOW BACK PAIN: A RESTING-STATE FMRI

C. Wang¹, S. Zhang¹, W. Wu¹, Z. Liu¹, J. Yang¹

First Affiliated Hospital of Sun Yat-sen University, Department of Rehabilitation Medicine, Guangzhou, China

Objective: To explore the characteristics of the fractional amplitude of low frequency fluctuation (fALFF) in experimental low back pain using resting-state functional magnetic resonance imaging (fMRI). *Methods:* Twelve healthy subjects (male: 7, female: 5; age: 23.8±3.6 years old) were separately performed resting-state fMRI 3.0T scans at no-pain (baseline) and during pain of the back muscle (intramuscular injection of 5% hypertonic saline). The fMRI data were analyzed with paired *t*-test to compare fALFF changes of the brain between baseline and pain status by DPARSF, spm8 software. Correlation analysis was performed in the fALFF images during low back pain and pain intensity (visual analogue scale, VAS). *Results:* Subjects with low back pain showed significantly increased fALFF in the bilateral inferior frontal gyrus, bilateral cerebellum posterior lobe-cerebellar tonsil, right parahippocampal gyrus, and decreased fALFF in the right superior frontal gyrus, right posterior cingulate gyrus (PCC), left primary somatosensory cortex (S1), bilateral occipital gyrus ($p<0.001$, cluster threshold ≥ 10). Visual analogue scale was positively correlated with the fALFF value in the right inferior frontal gyrus, but negatively correlated with the fALFF value in the left S1 and occipital gyrus ($p<0.005$, cluster threshold ≥ 10). *Conclusion:* The findings reveal abnormal spontaneous resting-state activity in some brain regions in experimental low back pain, propose that disruptions of the cognition and emotion during pain stimulation.

372

BASELINE CORE MUSCLE STRENGTH OF LOW BACK PAIN PATIENTS AS MEASURED BY 3D NEWTON MACHINE AT SILOAM HOSPITAL KEBON JERUK, A PRELIMINARY STUDY

I. Wardhani¹, A. Kekalih²

¹Jakarta Barat, Indonesia, ²University of Indonesia, Community Health Department, Jakarta, Indonesia

Introduction/Background: Core muscle strength has been identified as an important factor in LBP. Studies showed trunk muscles atrophy (multifidus, transversus abdominis, paraspinal and psoas) contributed to LBP. This study aims to measure the mean initial core strength of LBP patients treated in Siloam Hospital KebonJeruk. This is a preliminary study for further study regarding methods in LBP rehabilitation. **Material and Methods:** Medical record data by convenience sampling from 55 medical record of LBP patient were analyzed. 3D Newton machine can be used to evaluate and train trunk muscle by placing the patient in positions of challenge against gravity through 360° rotation and 0° to 60° inclination control, muscle contraction recorded by computers to determine its strength. Results were recorded as degrees of the maximum inclination angle. **Results:** Fifty five patients were included in this analysis, age range 20 to 79, mean age 47.53 years old, with 26 (47.27%) were female. BMI results were 25.5±4.9. Median of muscle strength based on 3D Newton was 22 with range from 10 to 55 degrees. Mean core muscle strength of 3D Newton were 24.720. **Conclusion:** Most patients showed low core muscle strength on 3D Newton (less than 300), one exception is a patient who achieved 550, but has slight (20o) thoracolumbar scoliosis that might cause LBP. There is no correlation between anthropometric (BMI) with 3D Newton results as analyzed by SPSS 18.0. This is a baseline data for further studies of LBP evaluation and treatment using 3D Newton machine.

373

CORE MUSCLE STRENGTH IMPROVEMENT OF LOW BACK PAIN PATIENTS AFTER TRAINING WITH 3D NEWTON MACHINE AT SILOAM HOSPITAL KEBON JERUK, A PRELIMINARY STUDY

I. Wardhani¹, A. Kekalih²

¹Jakarta Barat, Indonesia, ²university of indonesia, Community Health Department, Jakarta, Indonesia

Introduction/Background: Core muscle strength is important for LBP improvement. Studies showed trunk muscles atrophy contributed to chronic LBP. This study aims to measure the core muscle strength of LBP patients before and after intervention of rehabilitation program in Siloam Hospital Kebon Jeruk. This is a preliminary study for further study regarding methods in LBP rehabilitation. **Material and Methods:** Purposive random sampling from medical record data of LBP patients who completed rehabilitation program from Jan 2013 to Nov 2015, 19 subjects were analyzed. Rehabilitation program for LBP consist of 3D Newton training to train core muscle strength in multiple position against gravity, endurance training with stationary bicycle or treadmill while using mobile lumbar traction by Vertetrac, and core muscle strengthening and stretching exercise using Redcord Sling devices, and choices of physical modality to reduce pain as needed. Duration of therapy is 1–1.5 hours, three times per week. Core muscle strength evaluation with 3D Newton was done before the first therapy session and after 12 sessions, which were 4–6 weeks in average. **Results:** In pre-intervention the core muscle strength was 20.9±4.5o. After 12 times (average 4 weeks) intervention with exercises the muscle strength increased to 30.9±4.8o with improvement 10.05 (CI 95% 8.7–11.4) and statistically significant (Paired *t*-test *p* value <0.001). **Conclusion:** This study showed that rehabilitation program that combined physical modalities and exercises with 3D Newton increased core muscle strength. Therapy duration 3 times weekly for one month were sufficient to increase 10.05 degrees of 3D Newton measurements. Further study needs to be done to correlate these changes with clinical complaints.

374

EFFECTIVENESS OF LUMBAR TRACTION VERSUS MCKENZIE METHOD IN PATIENTS WITH LUMBAR DISC HERNIATION : A RANDOMIZED CONTROLLED TRIAL

J Rehabil Med Suppl 55

Q. Wei¹

¹West China Hospital, Rehabilitation Medicine, Chengdu, China

Introduction/Background: Lumbar disc herniation is a highly prevalent disease, which is associated with high costs to the society, and it is still relatively difficult to treat and to maintain treatment effect. Lumbar traction and McKenzie methods are popular treatment approaches for patients with the symptoms caused by Lumbar disc herniation. These approaches have good biomechanical function, are widely available and have a modest cost. Although these treatments are already available for patients, the comparison of their treatment effect is unknown. Therefore, a randomised controlled trial is required to compare the effectiveness of these treatments in patients with lumbar disc herniation. **Material and Methods:** Two hundred and forty patients was randomly assigned to a four-week treatment program based upon the McKenzie method or Lumbar traction principles. Clinical outcomes (pain intensity, disability, quality of life, and trunk flexion range of motion) will be obtained at follow-up appointments at 1 and 3 months after randomisation. The data will be collected by an assessor who will be blinded to the group assignment. **Results:** Patients assigned to the McKenzie method group had greater improvements in pain (mean effect =2.06 points, 95% confidence interval =0.64 to 3.57) and disability (mean effect =2.54 points, 95% confidence interval =0.71 to 3.82) at 1 month. No differences between two groups were observed for quality of life and trunk flexion range of motion. **Conclusion:** The McKenzie method was more effective than the lumbar disc heiniation for pain intensity and disability after treatment in patients with symptoms caused by lumbar disc herniation.

375

INTERMITTENT CERVICAL TRACTION FOR TREATMENT OF NECK PAIN: META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

J.D. Yang¹, H.C. Chen¹, T.H. Liou¹

¹Shuang Ho Hospital - Taipei Medical University, Department of Physical Medicine and Rehabilitation, New Taipei City, Taiwan

Introduction/Background: Intermittent cervical traction is a treatment of neck pain widely used in clinical practice for a long time. The aim of this study is to appraise existing evidence of intermittent cervical traction in treating neck pain. **Material and Methods:** A comprehensive search of the PubMed, Cochrane, SCOPUS, and EMBASE databases was performed from inception dates to Nov 2015 without language limitation to identify randomized controlled trials that reported the efficacy of intermittent cervical traction in treating neck pain. The selected studies were subjected to meta-analyses and risk of bias assessment. **Results:** 8 randomized controlled trials were included in the analyses. The results of the meta-analysis revealed that intermittent cervical traction has mild improvement in neck pain, but were not statistically significant. The assessment of risk bias revealed that most of the included trials exhibited a moderate to high risk of bias. **Conclusion:** The current literature revealed that the effect of intermittent cervical traction for neck pain is still unclear but potentially effective. Further large and good-quality randomized controlled trials are needed to determine the effectiveness of intermittent cervical traction for neck pain.

376

KINESIO TAPING CAN IMPROVE MOVEMENT CONTROL OF LUMBAR SPINE IN PEOPLE WITH NON-SPECIFIC CHRONIC LOW BACK PAIN

Y. Zhou¹

¹Hong Kong, Hong Kong- China

Introduction/Background: Low back pain (LBP) is one of the greatly costly disorder in modern society, with the popularity in lifespan is as high as 84%, while the occurrence ratio of chronic low back pain is about 23%, among which 11–12% of the population leading to disa-

bled. Taping method especially kinesio taping has received popularity since 2008 Olympic Games' first seen application in top athletes, and gain consistent focus in its application range. We hypothesized that kinesio taping can improve movement control in non-specific chronic low back pain patients. **Material and Methods:** Thirty subjects with CLBP aged from 18–55 were received motor control test with a series of unexpected perturbation when upright standing on force plate. The reaction latency, time to stabilization, adjustments numbers, range of centre of pressure as well as average velocity were calculated as measurements of capacity of movement control. **Results:** After kinesio taping people with non-specific chronic low back pain showed significant reduce in time to stabilization, adjustments numbers, range of centre of pressure when compared with their baseline assessment, and decrease trend in reaction latency and average velocity, sham taping assessment showed same results with KT assessment. **Conclusion:** These data provided further evidence that kinesio taping method can improve movement control capacity in NCLBP patients, supporting application of kinesio taping method in treating CLBP patients. At the meantime, in consideration of the effectiveness of sham taping, perhaps there is no need to focus on specific taping method.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: MUSCULOSKELETAL CONDITIONS - MUSCULOSKELETAL TRAUMA (E.G. FRACTURES) AND SPORTS INJURY

377

A COMPLEMENTARY TREATMENT OPTION FOR WHIPLASH INJURIES

E. Ata¹, A.B. Carli¹, L. Tekin¹

¹*Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey*

Introduction/Background: Whiplash injury is an acceleration-deceleration mechanism of energy transfer to the neck which often occurs with motor vehicle accidents. Most of the patients who are exposed to whiplash injury return to daily activities within 1 week of their injury but some of the patients continue to experience persistent pain and disability beyond several months. The most common symptoms are neck pain and cervicogenic headache which are treated with some physical therapy modalities. **Material and Methods:** A 34 year-old female with neck pain. In her history, there was a whiplash injury 5 days ago. The patient's car was struck from behind while stopped, while she was sitting in the front passenger seat. Her head was thrown backward and then forward. On physical examination there was an increased paravertebral spasm on her neck with palpation. Servical range of motion was limited because of pain. Magnetic resonance imaging of the servical spine was normal. First some analgesic drugs and soft cervical collar were prescribed but the patient's pain was not relieved adequately. The patient received kinesio-taping treatment with a specific technique for cervical whiplash injury. Tape application was changed every 4 days extending to a total of 6 sessions. **Results:** Significant reduction in pain and increased cervical range of motion were noted. **Conclusion:** In recent years kinesio-taping has become popular in musculoskeletal problems. The theory behind the kinesio-taping is that the application of the tape improves lymphatic and blood circulation by lifting the skin. This technique also relieves pressure and irritation of the neurosensory receptors that can create pain. In conclusion, kinesio-taping may provide greater relief when combined with other traditional treatments for whiplash injuries.

378

A POTENTIAL SERIOUS COMPLICATION AFTER ASPIRATING LARGE EFFUSION IN WEIGHT-BEARING JOINTS

E. Ata¹, A.B. Carli¹, L. Tekin¹

¹*Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey*

Introduction/Background: Knee effusion is a common symptom of both traumatic and non-traumatic aetiology. Knee intra-articular aspiration is a simple and helpful treatment option and also provides useful information for the cause of swelling. **Material and Methods:** A 28-year-old man presented with pain and swelling on his right knee. He had a history of right knee trauma 2 months ago. Some conservative treatment such as analgesic drugs, elevation and ice-pack were prescribed by orthopedic surgeon before admitting our outpatient clinic. On physical examination there was swelling with inspection and ballottement with palpation on his right knee. Ultrasonography showed large effusion in his knee. 250 ml of heavily bloodstained fluid was aspirated by the guidance of ultrasonography and the patient was discharged. The patient reapplied to us the day after aspiration with the feeling of instability on his right knee. **Results:** Unfortunately, we had forgotten to wrap his knee with an elastic bandage dressing after aspiration. Elastic bandage dressing applied and the patient was discharged again with the instructions that included weight-bearing restriction for a few days and periodical ice application. **Conclusion:** Joint instability may be a serious complication after aspirating large effusion in weight-bearing joints. Although this complication is rare, it should be kept in mind. Elastic bandage dressing should be applied to the weight-bearing joint after aspirating and the patients should be warned to avoid forceful activity on the joint for a few days.

379

A CASE OF BILATERAL COLLES FRACTURE

E. Ata¹, M. Kösem¹, S. Akarsu¹, L. Tekin¹, M.Z. Kiralp¹

¹*Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey*

Introduction/Background: Colles fracture is an extra-articular, transverse fracture of the distal radial shaft. We present a case of a patient with bilateral Colles fracture occurred after falling from high level onto a hard surface and had severe limitations on his wrists-bilaterally after removing the circular cast. **Material and Methods:** Case: A 21-year-old man presented with complaint of decreased range of motion on his wrist joints bilaterally, with a history of falling down from height 50 days ago. He had bilateral Colles fracture and the fractures were managed conservatively by circular cast extending from the proximal interphalangeal joint to the elbow, for 40 days. After removing the cast he was referred to our outpatient clinic for rehabilitation. On physical examination right wrist flexion was measured 20 degrees and right wrist extension was limited in neutral position. Left wrist flexion was measured 25 degrees and extension was measured 10 degrees. Both right and left wrist movements were painful. There was no sensorial, vasomotor, sudomotor or trophic changes. **Results:** Transverse fracture lines were seen at the distal radius bilaterally. Physical therapy including bilateral wrist range of motion exercises with hot pack was started. The patient's treatment is ongoing. **Conclusion:** The Colles fracture usually occurs unilaterally and after the conservative treatment wrist movements heal with no severe joint limitations. This type of fractures also may heal with some residual malalignment such as a shortened radius, or a distal radial displacement, which disrupt the relationship of the distal radioulnar and radiocarpal joint articular surfaces. These malalignments result in decreased range of motion severely. We find the bilateral Colles fracture interesting and wanted to note that more serious wrist limitations may occur following the bilateral Colles fractures.

380

RAPID DIAGNOSIS OF HEMARTHROSIS WITH ULTRASONOGRAPHIC EXAMINATION

E. Ata¹, L. Tekin¹, M.Z. Kiralp¹

¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Knee pain is a common complaint in clinical practice. It can be represented by inflammatory, traumatic, structural bone disorder, joint anatomic abnormalities, inflammation of local tendons and synovial bursae. Acute hemarthrosis of the knee usually results from a significant injury of intra-articular or extra-articular structures of joint. We present a case of a patient with intra-articular hemarthrosis of knee detected with ultrasonography (US) and treated immediately. **Material and Methods:** Case: A 21-year-old man presented with right knee pain and swelling. There were not previous joint-diseases or infection but he had a history of trauma before 2 weeks. On examination there was ballotement on his right knee but there was no temperature difference between knees. His erythrocyte sedimentation rate was 4 mm/h, the C-reactive protein was 3, and other blood tests were normal. An US examination of the involved knee was performed and showed effusion in the suprapatellar bursa, without any signs of intra-articular abnormalities. By US-guided aspiration of the bursa, 40 ml of red-coloured fluid was collected. **Results:** The patient consulted with orthopedic surgeon for advanced treatment but surgical treatment was not considered. The patient had a complete recover after rehabilitation program within 2 months, with ultrasonographic signs of remission at the follow-up. **Conclusion:** In the last years US has become popular in the assessment of soft tissue in rheumatic disease, being it non-invasive and well-accepted by patients. Other advantages of ultrasound include: low running costs, needing short examination time and consents a multiregional assessment and a good guide in local injection of joint and periarticular tissues. Herein, we want to emphasize that ultrasonography is quick, successful, and economical option that can use diagnosis, treatment and follow-up in musculoskeletal disorders.

381

THE EFFICACY OF ULTRASOUND IN THE DIAGNOSIS OF TENDON ADHESION

Y. Demir¹, K. Aydemir¹, K. Tezel¹, B. Yılmaz¹

¹Gulhane Military Medicine Academy, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Peritendinous adhesions after repair of an injury to the digital flexor tendons are a major problem in hand surgery and can prevent healing. Detection of this type of injuries in time is of paramount importance. **Material and Methods:** 36 years-old male patient admitted to our clinic for flexor pollicis longus (FPL) tendon injury rehabilitation. Laceration to this tendon was resulted from an injury caused by glass cut 45 days ago. **Results:** In physical examination, he had minimal range of motion limitation on the right 1st metacarpophalangeal and interphalangeal joints. Any active flexion movement was detected on the distal interphalangeal joint. Physiotherapy program including range of motion, stretching and strengthening exercises was planned in addition to electrotherapy. After ten sessions, any active flexion was developed on the distal interphalangeal joint. Musculoskeletal ultrasound revealed hypoechoic area suggesting tendon adhesion and FPL tendon was not mobile due to adhesion at the level of injury side on the dynamic sonographic assessment. The patient was referred to an orthopedic service for surgery. **Conclusion:** Tendon adhesion might be an obstacle on the rehabilitation of the tendon injury and ultrasound may be helpful for diagnosis.

382

ASSESSMENT OF EXERCISE THERAPY ON AN ANTI-GRAVITY TREADMILL FOR POSTOPERATIVE LOWER LIMB FRACTURE PATIENTS IN PAIN

S. Fujita¹, R. Takahara¹, M. Sasaki¹, Y. Mikami², J. Amano¹

¹Amano Rehabilitation Hospital, Rehabilitation, Hatsukaichi-shi, Japan, ²Hiroshima University Hospital, Rehabilitation Medicine, Hiroshima-shi, Japan

Introduction/Background: In this study we had postoperative lower limb fracture patients who had difficulty walking long distances because of pain exercise on an anti-gravity treadmill (AlterG®, AlterG, Inc.), and we assessed their walking ability, perceived exertion (Borg Scale), and pain (visual analog scale [VAS]). **Material and Methods:** The subjects were 5 patients with residual pain after surgery for lower limb fracture. We designed a 5-day protocol and measured pain on the VAS on a level surface before conducting it, on the anti-gravity treadmill, and on a level surface after conducting it, maximum walking distance and time, and Borg Scale scores. We used pain resolution as the criterion for level of unweighting on the anti-gravity treadmill, and we set the speed at the fastest rate within the safe range. **Results:** The unweighting level of the anti-gravity treadmill was 10%–30%, and speed per hour was 1.6–3.4 km. Pain was relieved in every case on the anti-gravity treadmill; maximum walking distance and time were extended, and the Borg Scale score was the same or lower. In addition, after performing the protocol the maximum walking distance and time on a level surface were extended in comparison with walking on the level surface before the protocol, and the Borg Scale scores were the same or lower. **Conclusion:** Pain was relieved on the anti-gravity treadmill, and as a result of being able to exercise safely, whole-body exercise may make it possible to prevent disuse and increase endurance in elderly persons who have difficulty walking long distances because of pain. After the protocol an immediate effect was seen even on a level surface, and continuing to exercise on the anti-gravity treadmill can be expected to have a positive impact on sustaining and improving amounts of physical activity, and even improve social functioning as well.

383

EFFECT OF PROPRIOCEPTION TRAINING ON THE ANKLE JOINT DYSFUNCTION RECOVERY AND FIBULA REACTION TIME

Z. Hongwei¹, C. Wei¹, S. Jie¹, G. Zunke¹, Z. Ming¹, Z. JingJie¹, C. Jie¹

Department of Rehabilitation Medicine, Xuzhou Central Hospital, Xuzhou, Jiangsu Province, China

Objective: To study the effect of intensive rehabilitation training on ankle proprioception dysfunction and influence of Charcot-Marie-reaction. **Methods:** 64 cases of ankle joint dysfunction patients were randomly assigned into two groups and the control group 32 cases. Group 2 patients were given conventional comprehensive rehabilitation treatment, observation group increased proprioception intensive training on this basis. It was observed six weeks. **Results:** Before treatment, the patients in the control group and the observation group AOFAS ankle score [(66.20±6.52) and (65.40±7.81) points] and TUGT [(26.23±5.61) and (27.11±6.17) s] between the two groups, the difference There was no significant difference ($p > 0.05$), comparable. After treatment, before treatment 2 groups of patients AOFAS ankle score and TUGT time significantly increased compared with group ($p < 0.05$), comparable. After treatment, before treatment fibula reaction when the two groups were compared within the group was restored.

384

A COMPARISON OF POPLITEAL ARTERY BETWEEN FRACTURE AND NON-FRACTURE SIDE BY ULTRASOUND IN PATIENTS WITH FEMUR FRACTURE

Y.S. Yoon¹, K.J. Lee¹, H.J. Moon¹, T.Y. Seok¹

¹Presbyterian Medical Center, PM & R, Jeonju, Republic of Korea

Introduction/Background: Reduced physical activity and muscle atrophy is common in patients with femur fracture. The aim of this study is to assess whether immobilization after femur fracture surgery leads to atherosclerotic change in popliteal artery. **Material and Methods:** Fourteen patients who admitted for rehabilitation after surgical treatment of femur fracture (8 males and 6 females; mean age, 80.4±4.3 years) were enrolled. We evaluated intima-media thickness (IMT) of popliteal artery in longitudinal and transverse plane bilaterally using ultrasound. And peak systolic velocity (PSV) was measured by duplex ultrasound. **Results:** Mean IMT of popliteal artery was thicker in the fracture side than in the non-fracture side (1.37±0.39 mm vs. 1.11±0.52 mm) significantly ($p<0.05$). And mean PSV of that was increased in the fracture side than in the non-fracture side (52.44±18.55 cm/s vs. 44.47±14.27 cm/s), but there was no statistical significance ($p>0.05$). **Conclusion:** Femur fracture and consequential immobilization affected popliteal artery IMT, and it was highly related to progression of atherosclerotic plaque formation.

385

VALIDITY OF A POSTOPERATIVE REHABILITATION PROGRAM FOR DISTAL RADIUS FRACTURES

M. Muraoka¹, K. Watanabe², M. Uesugi¹

¹Kameda-Daiichi Hospital, Rehabilitation, Niigata, Japan, ²Kameda-Daiichi Hospital, Orthopedic Surgery, Niigata, Japan

Introduction/Background: To evaluate the validity of our 9-week postoperative rehabilitation program for distal radius fractures, we monitored hand function for 12 weeks. **Material and Methods:** Eighteen patients that underwent surgery for distal radius fracture were prescribed hand therapy postoperatively according to the following protocol. On postoperative day 1, a cock-up splint was applied and instructions given regarding active finger motion. From week 1 to 3, active hand motion was allowed for washing hands or bathing. At week 3 postoperatively, the splint was removed and active/passive range of motion exercises were begun. Muscle strengthening exercises were also added from gentle to strong. Hand function was longitudinally examined according to six items: wrist range of motion (ROM), pulp-palm distance (PPD), hand edema, grip strength, pinch power, and HAND 20 (illustrated questionnaire to evaluate disabilities of the upper limb). **Results:** ROM of the wrist was significantly increased at 3, 6, and 9 weeks, and maintained thereafter with final values of flex56/ext62 and pro75/sup82. PPDs decreased early and ROM of the fingers was almost full range at 4 weeks. Hand edema, grip strength, and pinch power recovery continued for 12 weeks, with gains from week 4 to 12 of -14 ml, +6 kg, +1.2 kg, respectively. The HAND20 score of 41 at 4 weeks improved to 21 at 9 weeks, similar to the hand function before the fracture. **Conclusion:** Good alignment secured by surgery, finger ROM exercises with a cock-up splint, and early consecutive hand therapy led to good results, indicating the validity of our 9-week rehabilitation program.

386

GAMEKEEPERS THUMB -CASE REPORT, RARE CAUSE OF PAIN, SWELLING AND LOSS OF FUNCTION OF THUMB

A. Raza¹, Z. Gil², F. Faisal³

¹CMH Malir, Rehabilitation Medicine Department, Karachi, Pakistan, ²CMH Malir Karachi, Rehabilitation Medicine Department, Malir Karachi Pakistan, Pakistan, ³CMH Peshawar Pakistan, Rehabilitation Medicine Department, Peshawar Pakistan, Pakistan

Introduction/Background: Injury to the ulnar collateral ligament of the thumb, was a common injury to thumb in British gamekeepers, is now most frequently an acute sports-related injury in skiers, football players and sportive events. Clinical differentiation of complete versus partial tears of the ligament is important. Partial tears are treated conservatively with comprehensive rehabilitation. Radiographic evaluation includes X rays and Comprehensive rehabilitation

includes education, rest, NSAIDs, therapeutic exercises and thumb spica for 4 weeks. It results in restoration of prehensile functions of thumb. **Material and Methods:** Case report of 16-year-old male, resident of Karachi Pakistan, had a foot ball hit on left thumb, while playing, resulting in injury to the thumb. It presented with pain swelling and loss of movement of thumb. He remained at home with painful swelling for 04 x weeks. It remained undiagnosed. He was brought in Accident & Emergency Department after 4 weeks in CMH Malir. He was clinically examined and valgus stress testing of the left thumb revealed abduction and pain. The MCP joint was unstable. X rays and MRI were advised. It revealed to be an injury to the ulnar collateral ligament with Avulsion fractures of the ulnar base of the proximal phalanx of the thumb (Gamekeeper's fracture) on X ray. MRI revealed a partial tear of the left ulnar collateral ligament. Patient was advised rest of left hand with NSAIDs for 4 weeks and thumb spica was fabricated. Patient was followed up after 4 weeks of comprehensive rehabilitation. The left thumb function was normal. There was no pain, swelling or functional losses in activities with left hand and thumb. **Results:** A case report. Image of left thumb shows Avulsion fractures of base of proximal phalanx (Gamekeeper's fracture). **Conclusion:** In traumatic conditions of thumb that includes pain and swelling around MCP joint, gamekeepers thumb, may be a rare cause. Comprehensive rehabilitation restores back the function.

387

REHABILITATION EFFECT FOR THE OLD DEMENTIA PATIENTS WITH POSTOPERATIVE PROXIMAL FEMORAL FRACTURE

S. Watanabe¹, H. Harashima¹, M. Watanabe¹, S. Miyano¹

¹Tokyo General Hospital, Department of Rehabilitation Medicine-Department of Orthopedics Surgery, Nakano-ku, Japan

Introduction/Background: The purpose of the present study was to evaluate the improvement of the basic motion ability, the balance ability and activity of daily living (ADL) in old dementia patients with proximal femoral fracture at the rehabilitation wards. **Material and Methods:** The subjects were 40 patients (Mean age; 84yo) with postoperative proximal femoral fracture. A period from an operation to our hospital admission was 19 days, and hospital stay was 46 days. Dementia group included 21 patients (Mean age 85yo. Mean MMSE: 14 points), non-dementia group included 19 patients (Mean age 84 years old. Mean MMSE: 27 points). Multi-disciplinary rehabilitation therapy was performed for two and half hours daily. Range of motion of hip joint (ROM), Ability for basic movement scale (ABMS), Functional Balance Scale (FBS) and Functional Independence Measure (FIM) were evaluated in all subjects on admission and at discharge. The results of the subjects on admission and at discharge were analyzed by the multiple comparison. **Results:** 1. We found no statistical difference at both groups about ROM, ABMS, and FBS between on admission and at discharge. 2. FIM scores of non-dementia group increased to 110 points at discharge from 99 points on admission. That of dementia group increased to 79 points at discharge from 70 points on admission. 3. Non-dementia group of FIM scores at discharge was significantly higher than dementia group. **Conclusion:** Multi-disciplinary rehabilitation therapy for proximal femoral fracture, with or without dementia, showed improvement of FIM scores. In addition, non-dementia group of FIM scores at discharge was significantly higher than dementia group.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: MUSCULOSKELETAL CONDITIONS - MISCELLANEOUS

388

BILATERAL CLEFT HAND AND FOOT: A RARE CONGENITAL DISORDER

B. Aras¹, E. Adigüzel¹, F. Tok¹, K. Tezel¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: Ectrodactyly is defined as deficiency or absence of one or more central digits of the hand or foot. The other names used for this malformation are split hand/split foot malformation. It is a rare congenital disorder which the central ray of the hand/foot is affected. This syndrome may present unilaterally or bilaterally. It may present isolated or associated with a syndrome. **Material and Methods:** A 21-old man was admitted to our rehabilitation centre with bilateral cleft foot and hands. Inability to hold things properly in the hands and difficulty in walking were the main complaints of the patient. On the right hand, there was a cleft with absence of second, third and fourth fingers. On the left hand, there was a cleft with absence of second and third fingers. Both feet also showed clefts with absence of second, third and fourth fingers. Wrists, forearms, elbows, ankles and knees were normal. The wrist and ankle joints had normal range of motion. **Results:** Left eye was operated for corneal leukoma. The other neurological and systemic examination was unremarkable. The patient did not have cleft palate or lip. On detailed questioning, he born of a non-consanguineous marriage full-term by normal vaginal delivery. The antenatal and the peri-natal history did not reveal any significant problem. The other medical and parental history was non-contributory. **Conclusion:** Ectrodactyly is a rare syndrome with congenital hand and foot abnormalities in which the central bony elements are absent. We present this interesting case to call physicians' attentions towards this syndrome.

389

POLAND'S SYNDROME: A RARE CASE REPORT

E. Adigüzel¹, B. Aras¹, S. Kesikburun¹, F. Tok¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: Poland syndrome is a rare congenital defect characterized by absence of unilateral chest wall muscles. The extent and severity of the abnormalities varies from case to case. Symptoms include absence of the sternal head of the pectoralis major and minor muscles, deficiency of subcutaneous fat and hypoplasia of the rib cage, and upper extremity. **Material and Methods:** In this paper we report an incidentally case in a patient with Poland syndrome. **Results:** A 23-year-old man was admitted to our outpatient clinic with complaints of difficulty in using the right shoulder. His complaints began in childhood and he had no history of trauma. Physical examination revealed hypoplasia in the right pectoral region and the right pectoral muscle could not be palpated. He had a muscle strength of 4/5 in the shoulder flexors and adductors according to manual muscle testing. Muscle strength of elbow, wrist and finger muscles were in normal limits. Deep tendon reflexes were normoactive and there was no pathological reflexes on the right extremity. No lymph node was palpable. Blood biochemistry and complete blood counts were within normal ranges. The plain radiography showed thoracic asymmetry. Nerve conduction studies of right upper extremity were normal. We did not perform needle EMG because of the absence of pectoralis major muscle. **Conclusion:** Clinicians should keep Poland syndrome in mind in the differential diagnosis of shoulder complaints. The diagnosis is based on typical clinical and radiographic findings in the corresponding pectoral region.

390

ROTATOR CUFF INJURY SECONDARY TO INVOLUNTARY SHOULDER MOVEMENTS IN A PATIENT WITH DYSKINETIC CEREBRAL PALSY

Ü. Doğan Duran¹, S. Kesikburun¹, Y. Demir¹, E. Adigüzel¹, Ö. Köroğlu², E. Yaşar¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation

Center, Ankara, Turkey; ²Bursa Military Hospital, Department of Physical Medicine and Rehabilitation, Bursa, Turkey

Introduction/Background: Dyskinetic cerebral palsy (CP) is one of the varieties of CP and characterized with stereotyped movements that is involuntary, uncontrolled in that the primitive reflex patterns. Upper extremity involvement is predominantly about spasticity pattern and contracture of hands and fingers secondary to spasticity in CP. Otherwise, rotator cuff injury in a patient with dyskinetic CP can be a variety of upper extremity involvement. **Material and Methods:** In this report we presented a 25 year old man with dyskinetic cerebral palsy complains about left shoulder pain due to supraspinatus muscle tearing and adhesive capsulitis occurred because of his hopeless dyskinetic shoulder movements. He suffers from the pain while resting or activity and increase by shoulder movements. He has scored the pain 90 on 100 point Visual Analog Scale (VAS). In examination, range of motion of his left shoulder was limited and painful. Flexion was limited to 100 degrees and abduction to 110 degrees. **Results:** Magnetic Resonance Imaging Examination (MRI) of his left shoulder verified as partial thickness tears of supraspinatus muscle and adhesive capsulitis. He was taken 3 milligrams of clonazepam daily because of his involuntary movements when he referred our clinic. We expended gradually dose of clonazepam to 6 mg twice a day and gave 75 mg of pregabalin twice a day. Although medical treatments, his complaint was remained unchanged. Hence we applied suprascapular nerve block and injected botulinum toxin-a to his left brachialis, pronator teres, flexor carpi radialis, flexor digitorum superficialis and flexor digitorum profundus muscles due to his left upper extremity spasticity. Lastly, we tried a shoulder brace that limits involuntary movements. Ultimately, his pain decreased to 30 mm on VAS and dyskinetic movements regressed. **Conclusion:** In a patient with dyskinetic cerebral palsy, involuntary movements must be beared in mind as a reason of locomotor system complaints.

391

A CASE OF DECREASED RANGE OF MOTION SECONDARY TO NECROTIZING FASCIITIS

E. Ata¹, M. Kösem¹, S. Akarsu¹, L. Tekin¹, M.Z. Kıralp¹

¹Gülhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Necrotizing fasciitis is defined as a rare, life threatening soft tissue infection characterized by rapidly developing necrosis of the subcutaneous tissue and fascia. In this report, a patient with necrotizing fasciitis affecting of his left lower extremity due to intravenous (IV) drug abuse and decreased range of motion on his left knee is described. **Material and Methods:** A 22-year-old man patient was admitted to our clinic with complaint of decreased range of motion and pain caused by joint movement on his left knee. He had a history of IV drug abuse for last three years and according to his medical history necrotizing fasciitis was diagnosed on his left lower extremity (affecting the anterolateral face of left thigh, about 25 centimeters proximal to the knee) and treated surgically 25 days ago. On physical examination ranges of his left knee motions were measured using a universal goniometer. Flexion was measured 90 degrees on prone position and extension was measured 110 degrees on supine position. **Results:** Following 15-day-physical therapy including passive range of motion (ROM) and stretching exercises with cold pack, measurements were repeated. Flexion was increased up to 115 degrees and extension was limited minimally (about 5 degrees). **Conclusion:** In this case, we noted that ROMs may be decreased in patients with necrotizing fasciitis even the joint is not affected primarily and early physical therapy may increases the ROMs.

392

THE IMPORTANCE OF EARLY REHABILITATION OF EOSINOPHILIC FASCIITIS-RELATED JOINT LIMITATIONS

E. Ata¹, E. Ersöz¹, M. Kösem¹, S. Akarsu¹, L. Tekin¹

¹*Gulhane Military Medical Academy - Haydarpasa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey*

Introduction/Background: Eosinophilic fasciitis (EF) is an uncommon, idiopathic entity characterized by diffuse fascial inflammation of extremities, peripheral eosinophilia and elevated acute phase reactants. We report a case of a patient with a history of decreased range of motion in multiple joints caused by EF. **Material and Methods:** Case: A 27-year-old man presented to our outpatient clinic with a complaint of decreased range of motion (ROM) on/affecting his left proximal interphalangeal (PIP) joints, wrist, elbow and ankle. He was diagnosed with EF 18 months ago, when cutaneous lesions defined on the scalp and both upper and lower extremities bilaterally. On physical examination, abduction and flexion was decreased minimally on the left shoulder. The passive range of motion of the left elbow was 110 degrees in flexion and -40 degrees in extension. Left wrist extension was limited in neutral position. Additionally, left 3-5. PIP joints were in flexion contracture. Left ankle plantar flexion was 20 degrees, dorsiflexion was limited in neutral position when measured passively. Physical therapy including ROM and stretching exercises was started. **Results:** All measurements were repeated after 1 month physical therapy (PT) but no significant improvement was seen in ROMs, because of contracture of the fascia near the joints. **Conclusion:** EF rapidly progresses to joint contractures because of inflammation and fibrosis of the fascia. Although complete recovery is possible, more frequently disorders of EF persists. Upper and lower extremity nerve blocks, serial splinting, application of physical modalities, massage, stretching and strengthening exercises and interdisciplinary pain management might be effective for treatment, but not clear. In this case, we wanted to note that early PT can help to prevent loss of joint mobility and improve joint flexibility.

393

EFFECT OF COLLAGEN HYDROLYSATE ON PAIN AND ARTICULAR CARTILAGE OF PATIENTS WITH KNEE OSTEOARTHRITIS

M.M. Bernardo¹, C.G. Suarez¹, B.G. Tan-Sales¹, S.M.O. Aycardo¹, R. Chan², M. Tan-Ong³, A. Malvar¹, D. Feliciano¹, F. de los Reyes⁴

¹*University of Santo Tomas Hospital, Department of Physical Medicine and Rehabilitation, Manila, Philippines,* ²*University of Santo Tomas Hospital, Department of Orthopaedic Surgery, Manila, Philippines,* ³*University of Santo Tomas Hospital, Department of Internal Medicine- Section of Rheumatology, Manila, Philippines,* ⁴*University of the Philippines, College of Statistics, Manila, Philippines*

Introduction/Background: Knee osteoarthritis is one of the major causes of disability in patients 45 years and above. Currently, the management for knee osteoarthritis is limited to symptom relief and prevention of disease progression. Search for an adjunct management has lead to studies on the potential benefits of nutraceuticals such as collagen hydrolysate. This study aims to determine the effect of collagen hydrolysate as an adjunct treatment for patients with knee osteoarthritis based on pain scale and articular cartilage thickness, clarity and abrasion using musculoskeletal ultrasound. **Material and Methods:** Patients from the University of Santo Tomas Hospital and the Marikina Senior Citizen Association ($n=110$) were randomized to either experimental (collagen hydrolysate + standard of care, i.e. exercise) or control group (placebo + standard of care). Subjects were assessed using visual analogue scale (VAS) and ultrasound (articular cartilage thickness at medial, lateral, central femoral area; clarity; abrasion) at baseline and after 6 months. **Results:** VAS scores showed statistical significant decrease for experimental and control groups after 6 months. There was significant increase in all thickness measures of the experimental group except in the lateral right knee. There was also a significant increase in the control group but only in the lateral and medial femoral areas. There was a

significant decrease in clarity grading (improvement) in the experimental and control group for all areas except the right medial and left central area in the experimental and control groups, respectively. There was, likewise, a decrease in abrasion ratings (improvement) for both experimental and control groups but were not significant. $(p\text{-value}<0.05)$. **Conclusion:** Intake of collagen hydrolysate combined with standard of care can significantly increase femoral articular cartilage thickness in more areas compared to control.

394

THE USE OF UCBL ORTHOSIS IN PATIENTS WITH FLATFOOT IN FOOT CLINIC, SIRIRAJ HOSPITAL

N. Chadchavalpanichaya¹, W. Dacharux¹

¹*Faculty of Medicine Siriraj Hospital, Rehabilitation Medicine, Bangkok, Thailand*

Introduction/Background: Pes planus or flatfoot is the common foot deformity. The orthosis common prescribed for treatment flatfoot is UCBL (University of California Biomechanics Laboratory) orthosis. Because this orthosis is rigid and forces the heel from valgus deformity to neutral position, the common complications are pain, skin redness or abrasion. Since it took professional times and skills to make UCBL orthosis and the cost of them were 120 USD/pair, it would be a big waste if the patients did not use these orthosis. As there was no information of the frequency and result of the use of UCBL orthosis in Foot Clinic, Siriraj Hospital, the present study was performed. **Material and Methods:** Studying from patient records and interview the patients' parents (if the patient was younger than 12 years old) or the patients themselves who had flatfeet and received UCBL orthosis from Foot Clinic, Siriraj Hospital between Jun 2013 and May 2014 about the latest UCBL orthosis after the first three months of use. **Results:** Forty-six participants were reviewed and included 22 males (47.8%) and 24 females (52.2%) with median age of 11.5 years. The majority had flexible flatfeet (87.0%). The use of UCBL orthosis that the participants had to use for more than 3 days/week and for more than or equal to 50% of daily walking and standing duration was 63%. Using these orthosis reduced foot pain and increased walking stability ($p\text{-value} = 0.009$ and 0.010 respectively). Only one factor associated with the use of UCBL orthosis was the satisfaction on orthosis fitting (Odds ratio = 13.20, 95% CI 2.20-79.70). **Conclusion:** The use of UCBL orthosis from the Foot Clinic, Siriraj Hospital was 63%. Using the UCBL orthosis could reduce foot pain and increase walking stability. Factor associated with the use of UCBL orthosis was the satisfaction on orthosis fitting.

395

EFFECTIVENESS OF HOLD RELAX STRETCHING AND HOLD-RELAX AGONIST CONTRACTION STRETCHING IN INCREASING EXTENSIBILITY OF TIGHT HAMSTRING MUSCLE AMONG PUBLIC UTILITY VEHICLE DRIVERS

F.C. Creer¹, J. Litang IIP¹, L. Adorable², M.P. Abong², R.S. Aranez²

¹*Cebu City, Philippines,* ²*Southwestern university, College of Rehabilitative Sciences, Cebu City, Philippines*

Introduction/Background: Public utility driving is one of the most exhausting and physically demanding jobs of public transportation. Long hours of operating the vehicle results to musculoskeletal problems and injuries among drivers. One common problem is tight hamstring muscles. A number of exercises and modalities have been applied in order to improve the extensibility of tight muscles. This study was conducted to determine the effectiveness of hold-relax stretching and hold-relax agonist contraction stretching techniques in increasing muscle hamstring extensibility in the improvement of functional performance among public utility vehicle drivers. **Material and Methods:** This experimental study involved 20 male individuals with age range of 20-35 years, all with

tight hamstring muscles. Tripod sign test was used in determining the presence or absence of tightness in the hamstring muscle. They underwent 10 sessions of stretching techniques within 2 weeks for 5 minutes per session. The hold-relax stretching technique includes a pre-stretch, end range, isometric contraction for 10 seconds followed by voluntary relaxation of the tight muscle. The hold-relax agonist contraction includes passive stretch of the extended leg to a point of mild discomfort for 10 seconds. Isometric contraction of the hamstrings was then performed for 5–10 seconds. Afterwards a second passive stretch for 30 seconds was done to increase the final stretch. The distance of middle finger to toe was recorded at the start and every after one week of therapy. The significant difference before and after therapeutic maneuver were analyzed using the paired and independent *t*-test with *p* value set at 0.00. **Results:** Both techniques have comparable effect on the extensibility of tight hamstring muscles after 1 week. However, hold-relax agonist technique after 2 weeks showed better improvement. **Conclusion:** Hold-relax and hold-relax agonist contraction stretching as an intervention for tight hamstring muscles can significantly improve functional performance and extensibility of hamstring muscles.

396

COMPARISON OF EARLY MOBILIZATION AND IMMOBILIZATION TECHNIQUES IN PATIENTS WITH PALMAR FASCIECTOMY FOR DUPUYTREN CONTRACTURE

E. Umay¹, I. Gundogdu¹, Y. Demir², K. Aydemir², A. Cakci¹
¹Dışkapı Yıldırım Beyazıt Education and Research Hospital, Physical Medicine and Rehabilitation, Ankara, Turkey, ²GMMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: Dupuytren contracture (DC) is a progressive fibro proliferative disorder resulting in abnormal “scar-like” tissue in the palmar fascia leading to progressive contracture of the involved digits. Surgical treatment is required in advanced cases. Immobilization with orthosis for three weeks post-surgery is commonly preferred rehabilitation procedure. However, this immobilization period may result in adhesion. We aimed to compare early mobilization and immobilization techniques in surgically treated patients for DC. **Material and Methods:** Thirty-five patients (7 female [20%], 28 male [80%]; mean age: 52.14±10.02 years) were included in the study. Early mobilization protocol was applied to the patients in group 1 (n: 21) in three days after partial fasciectomy, late mobilization protocol after immobilization for three weeks with orthosis was applied to the patients in group 2 (n: 14). Wrist, metacarpophalangeal, and interphalangeal joint angle in affected side were measured by goniometry. In addition, pain with visual pain scale; sensation with Semmes Weinstein monofilament test; gripping with Jamar dynamometer; lateral, palmar and pinch gripping with a pinchmeter; functionality with Duruoz hand index were performed before starting a rehabilitation program and at 12-week follow-up. **Results:** Range of motion, grip strength and functional status were significantly improved in both groups after rehabilitation programme. Patients in group 1 had better results in range of motion, grip strength and functional status when compared to patients in group 2. **Conclusion:** It seems that early mobilization protocol is more effective than late mobilization in terms with range of motion, grip strength and functional status in patients with partial fasciectomy.

397

PROGRESSIVE PSEUDORHEUMATOID DYSPLASIA: ORTHOPEDIC MANIFESTATIONS AND CHALLENGES OF CARE

B. Iheb¹, S. Jemni¹, S. Frioui¹, W. Osman², R. Moncer¹, A. Nouira¹, F. Khachnaoui¹
¹Sahloul Hospital, Department of Physical Therapy and Rehabil-

tation, Sousse, Tunisia, ²Sahloul Hospital, Orthopedic Department, Sousse, Tunisia

Introduction/Background: Progressive pseudorheumatoid dysplasia (PPD) is a rare autosomal recessive skeletal dysplasia, characterized by radiological skeletal abnormalities of spine similar to the Spondyloepiphyseal Dysplasia Tarda, and clinical manifestations of rheumatoid arthritis. **Material and Methods:** We present the case of 20 years old boy with PPD. He had barrel shaped chest, short trunk and pectus carinatum, kyphosis and exaggerated lumbar lordosis. Radiologic examination revealed flattening and irregularities of femoral head with short and broad neck of femur, decreased gap between vertebral bodies and platyspondyly. **Results:** His main complaints were: articular deformity; limited range of motion, gait disorders and pain. During evolution, he had for both knees, an anterior femoral osteotomy deflection; tenotomy of gracilis, adductor longus and femoral rectus was performed to retrieve the extension and abduction of both hips. **Conclusion:** The results after surgery and rehabilitation were marked by a minimal gain in range of motion and functional improvement.

398

CAMPTOCORMIA: MANAGEMENT IN REHABILITATION MEDICINE

B. Iheb¹, S. Boudoukhane¹, S. Migaou¹, S. Salah¹, A. Jellad¹, Z. Ben Salah¹

¹Sahloul Hospital, Department of Physical Therapy and Rehabilitation, Sousse, Tunisia

Introduction/Background: Camptocormia is an acquired postural disease leading to wide-ranging emerging rachidian kyphosis. The functional impact can be significant. When the etiology is better known, personalized treatments are often deceitful. The aim of the study was to describe the rehabilitation program in the treatment of camptocormia that associated: a specific vertebral relaxation, a suitable antikyphotic orthosis for the trunk and vitamin supplementation. **Material and Methods:** This is a descriptive study, involving 12 patients with camptocormia. Eleven among them had received antikyphotic orthosis combined with an adapted training program. Thyroid function and vit D measure were explored. We evaluated also back pain and perimeter of walk. **Results:** The average age of patients was 63 years with a sex ratio of 33%. The etiology observed in our study were deficiency of vit D (3 cases), myxedema thyroid (1 case), parkinson disease (1 case), myopathy (2 cases) and spinal stenosis (2 cases). Most of our patients (91%) have benefited from prescription of two types of orthosis: “ bivalve with sternal support (6 cases), monohull with front closure (5 cases).” The average time to wear the orthosis was 20 months. The follow-up of patients lasted 18 months (4–64 months). 43% wear the brace at least nine hours per day, 74% are able to put it alone. Respiratory and urinary tolerances were judged good and digestive and skin tolerances adequate (gastroesophageal reflux (1 case) scar at the 5th rib (1 case)). Patients were more satisfied in their social life, feel less tiredness and less back pain. **Conclusion:** The success of the orthosis seems compromised by the failure to obtain a satisfactory straight position and/or an ankle flexion, associated significant pathology, lack of motivation. A rehabilitation program based on “a postural correction with stretching the psoas muscle and strengthening spinal muscles” even with orthosis seems necessary to guarantee a satisfactory result.

399

INTERVENTIONAL ULTRASOUND GUIDED PROCEDURES FOR MUSCULOSKELETAL PATHOLOGY IN PHYSICAL MEDICINE AND REHABILITATION

B. Iheb¹, S. Boudoukhane¹, B. Ben Hmida¹, H. Migaou¹, A. Jellad¹, S. Salah¹, Z. Ben Salah¹, M. Golli¹

¹Monastir University, Department of Physical Medicine and Functional Rehabilitation, Monastir, Tunisia

Introduction/Background: Punctures and leaks of the musculoskeletal system are often all performed blindly. For several years, ultrasound offers an interesting alternative. Indeed, this is an inexpensive technique, non-irradiating, easy to access. However, the literature concerning them is limited. We report the experience of the services of “Physical Medicine and Functional Rehabilitation” and “Radiology” CHU Fattouma Bourguiba Monastir on using infiltrations under “ultrasound” in musculoskeletal pathology. **Material and Methods:** This is a descriptive study including all patients who received ultrasound-guided gesture which was the indication bone and joint pathology. The following parameters were sought: age, sex, the causal pathology, infiltration site, the product used, the percentage of improvement and side effects. **Results:** Fourteen ultrasound guided acts were performed in our institution for a period of 12 months. The average age of patients was 41 years (23–55 years) with a female predominance (42.8%). The articulations most infiltrated were the wrist and the hand (57.1%). Preferential indications in the upper extremities were: tenosynovitis De Quervain (21.4%), trapeziometacarpal osteoarthritis (21.4%), flexor tenosynovitis of the fingers (7.1%), post-traumatic neuroma (7.1%). For the lower limbs the indications were: talocrural osteoarthritis (14.3%), posterior tibial tenosynovitis (7.1%), Achilles tendinitis (7.1%) and sequelae of ankle sprain (7, 1%) and osteoarthritis (7.1%). The products used were cortivazol (14.28%), sodium hyaluronate (71.44%) and xylocaine (14.28%). The improvement was significant in 66% and no adverse effects were noted. **Conclusion:** The infiltration of Musculoskeletal ultrasound guided in musculoskeletal pathology is a quick gesture, easy to perform and well tolerated. This technique does not require a contrast agent injection. The authentication of the correct position of the needle is straight. In our study, the upper member represents 57.1% of USG gestures performed on 12 months and no adverse effects were noted.

400

ROLE OF D-DIMER IN EVALUATION OF DEEP VEIN THROMBOSIS WHEN VENOUS DUPLEX STUDY IS NEGATIVE: A CASE REPORT

A. Morrow¹, A. Bhargava²

¹Sinai Hospital, Physical Medicine and Rehabilitation, Baltimore, USA, ²Advanced Interventional Pain & Sports Medicine Center, Physical Medicine and Rehabilitation, Owings Mills, USA

Introduction/Background: A 69-year-old female presented with complaints of bilateral knee pain. The patient endorsed chronic left knee pain with recent onset of right knee pain after stepping off a bus. She was also being treated for cellulitis of the left second toe. **Material and Methods:** Left knee had decreased range of motion and she had swelling of the left leg. Severe osteoarthritis of left knee was observed on radiographs. Venous Duplex ultrasound of the left leg, done less than a week earlier, was negative for deep vein thrombosis (DVT). **Results:** She was noted to have elevated d-dimer level. Repeat venous Duplex study of both legs revealed a DVT in the right popliteal vein and CT chest angiography revealed bilateral pulmonary emboli. Patient was started on therapeutic anticoagulation. **Conclusion:** D-dimer has high sensitivity and low specificity for diagnosis of venous thromboembolism (VTE)¹. D-dimer levels may be underutilized in outpatient rehabilitation as normal elevations can be seen in other medical conditions including post-operative or post-injury patients². Venous ultrasonography may be preferred given high sensitivity and specificity for diagnosis of proximal DVT1. In this case study, d-dimer was instrumental in diagnosis of VTE and prevented a possible mortality. If d-dimer levels are elevated, further tests may be ordered including a repeat venous Duplex study and if required, CT angiography. If d-dimer levels are normal, this would serve as further evidence against VTE2. To conclude, in a patient presenting with persistent symptoms and high suspicion of DVT, a d-dimer level may be obtained even if the initial venous Duplex study is negative. **References:** 1. Bates et al. Diagnosis of DVT: Antithrombotic therapy and prevention of thrombosis, 9th ed: American college of chest physicians evidence-based clinical practice guidelines. Chest. 2012;141 (2

Suppl): e351S–418S. 2. Kelly et al. Venous thromboembolic events in the rehabilitation setting. PM R. 2010;2 (7):647–663.

401

COBB'S ANGLE IMPROVEMENT WITH CUSTOMIZED TLSO AS THE NON-OPERATIVE MANAGEMENT FOR ADOLESCENT IDIOPATHIC SCOLIOSIS (AIS) AND NEUROMUSCULAR SCOLIOSIS (NS) IN REHABILITATION MEDICINE SETTING

C.H. Phua¹, S.A. Khor¹, H. Hamid¹

¹Hospital Sultan Ismail, Rehabilitation Medicine, Johor Bahru, Malaysia

Introduction/Background: Current literature lacks evidence for the effectiveness of customized TLSO for the management of scoliosis. Typically, brace treatment is initiated after a lateral curve of 20–25 degrees is detected in immature patients. Progression of the curve to magnitudes greater than 40–45 degrees may require surgical intervention in selected patients. Early detection of scoliotic deformities followed by effective early bracing will reduce the need for surgical intervention. **Material and Methods:** A total of 22 patients with scoliosis in rehabilitation clinic in HSIJB were prescribed with customized TLSO and observed for Cobb's angle improvement post bracing. Initial baseline postural data were obtained from a set of radiographs, anteroposterior and lateral. Initial baseline postural data were obtained from a set of spine X-rays whereby Cobb's angle was measured. Cobb's angle was reassessed immediately after receiving the TLSO and between 3 to 6 months post bracing. Static postural changes, reported functional benefits and therapeutic compliance were assessed. **Results:** 68.2% had NS whereas 31.8% had AIS. Mean age was 13.45 years. Those with AIS had moderate to good brace compliance. Compliance to bracing was variable in the NS group. Majority of the patients showed improvement in Cobb's angle immediately post bracing. 45% showed moderate compliance (4–8 hours) on brace. 18% had good compliance (>8 hours) to TLSO. 32% had poor compliance (<4 hours) to bracing. Poor compliance was attributed to discomfort while wearing the brace. **Conclusion:** TLSO is a good non-surgical management for mild to moderate scoliosis. It can also be considered for those with severe NS where surgery maybe high risk. TLSO should be prescribed by an experienced clinician after weighing potential benefits to the patient. It should also be fabricated by a skilled orthotist as comfort is the main contributing factor for compliance.

402

COMPARISON BETWEEN LONG TERM EFFECTS OF PROGESTERONE VERSUS CORTICOSTEROID LOCAL INJECTIONS IN MILD AND MODERATE CARPAL TUNNEL SYNDROME: A RANDOMIZED CLINICAL TRIAL

S.A. Raeissadat¹, S. Shahraeeni¹

¹Shahid Beheshti University of Medical Sciences, Physical Medicine and Rehabilitation, Tehran, Iran

Introduction/Background: The goal of this study was to determine the long term effects of progesterone versus corticosteroid local injections in the treatment of female patients with carpal tunnel syndrome. **Material and Methods:** A randomized clinical trial was used for this study and 78 hands with mild and moderate Carpal Tunnel Syndrome categorized in two groups. Patients were treated with a single local injection of triamcinolone acetonide in one group and single local injection of 17-alpha hydroxy progesterone in the other group. Variables such as pain (based on Visual Analogue Scale), symptom severity and functional status (based on Bostone/Levine symptom severity and functional status scale) and nerve conduction study were evaluated before and 6 months after the treatments. **Results:** Six months after treatment, pain severity and median nerve sensory and motor latencies decreased and symptom severity scale improved in both groups. there were no meaningful differences be-

tween two groups regarding mentioned variables. But functional outcome was significantly better in progesterone than corticosteroid group ($p=0.04$). *Conclusion:* Both treatments were effective in the long-term management of mild and moderate disease, clinically and electrophysiologically but functional outcome is higher in progesterone group comparing with corticosteroid group.

403

IDENTIFYING NONHEREDITARY MYOSITIS OSSIFICANS TRAUMATICUS IN A COMMUNITY HOSPITAL

Q. Tran¹

¹Carolinas HealthCare System, Physical Medicine and Rehabilitation, Charlotte, USA

Introduction/Background: The patient is a 74-year-old African American male with a past medical history of CVA, DM2, HTN, sacral decubitus ulcers and a remote history of gun shot injury to the spine and the patient was admitted with the chief complaints of respiratory distress. She was found to have a midline abdominal incision from prior surgery and a hard mass was palpated extending along the incision involving epigastric, umbilical and hypogastric regions. Differential diagnosis for the patient's abdominal mass included gastric pacer, myositis ossificans and malignancy. CT abdomen revealed ectopic ossification. *Results:* Myositis ossificans (MO) is the nonneoplastic proliferation of cartilage and bone in muscle tissue. Muscle damage leads to prostaglandin synthesis, attracting inflammatory cells to the site of injury. Rapidly proliferating mesenchymal cells subsequently differentiate into osteoblasts in the setting of the tissue anoxia. Osteoid formation is minimal in the first 2–4 weeks post injury. ESR and serum alkaline phosphatase are typically elevated. Characteristic zoning occurs typically at the second or third month and helps distinguish MO from osteosarcomas. It commonly occurs following trauma, burns, neurologic injuries, and major surgeries. Incidence varies but is most common in the second and third decade of life and in the arms and thighs in individuals with recent trauma. It can also present in the setting of paralysis and rarely without trauma or as a hereditary disorder known as fibrodysplasia ossificans progressiva. Prophylactic measures include prostaglandin inhibition with nonsteroidal anti-inflammatory agents and radiation. Physical therapy with stretching, proprioceptive exercises, manual and mechanical active and passive mobilization are also beneficial. Extracorporeal shock wave therapy has also been described as a non-invasive, affordable treatment for myositis ossificans with few side effects. Surgical excision remains the definitive treatment. *Conclusion:* Rehabilitation physicians should be aware of the possibility of nonhereditary myositis ossificans in patients with recent trauma/surgery.

404

EFFECTIVENESS OF STRETCHING EXERCISE WITH DEEP AND SLOW BREATHING FOR THERAPEUTIC ENHANCEMENT: A QUALITATIVE STUDY

K. Wongwilairat¹, O. Buranruk², W. Eungpinithpong², R. Puntumetakul²

¹Student, Doctor of Philosophy Program in Human Movement Sciences, Faculty of Associated Medical Sciences - Research Center in Back, Neck, Other Joint Pain and Human Performance (BNOJPH), Khon Kaen University, Thailand, ²School of Physical Therapy, Faculty of Associated Medical Sciences - Research Center in Back, Neck, Other Joint Pain and Human Performance (BNOJPH), Khon Kaen University, Thailand

Introduction/Background: Stretching exercise is one type of the therapeutic exercise in physical therapy used for releasing muscle tension; however, the deep-slow breathing pattern (DSB) which are widely used to promote relaxation and homeostasis in a vari-

ety conditions/diseases are still less for applying with that exercise. Further, because the natural breathing pattern is different in person, the technique applied to guide them take DSB without the feeling to promote sympathetic response are the keystone as well. Thus, this study aimed to examine the factors associated with the effect of stretching exercise with DSB to promote relaxation. *Material and Methods:* Healthy participants with aged 20–23 years were recruited to perform stretching with DSB at right upper Trapezius muscle. The intervention using to guide them consisted of the guideline paper with picture, verbal instruction, and the video clip; the muscle tension scored by applying the visual analog scale (VAS) and the interview were recorded as the qualitative data. *Results:* The result showed the DSB pattern applied in the stretching was able to promote relaxation and decrease muscle tension. However, the verbal instruction, the manual guideline with a picture, and the video clip to guide the exercise direction which were done respectively, were the essential tools to make them imagine and perform correctly without fear, compared with the video clip opened together with verbal instruction to guide them alone. *Conclusion:* In conclusion, The DSB can promote relaxation and reduce tension when was used with stretching exercise; nevertheless, the techniques using to guide the practice were also an important element of the intervention. Therefore, the practitioner should concern about these factors for the result of relaxation during exercise as one of the alternative methods of the physical therapy for therapeutic enhancement.

405

BOTULINUM TOXIN TYPE-A (BONT-A)EFFECTS ON GAIT IN STROKE PATIENTS WITH SPASTIC HEMIPARESISBOTULINUM TOXIN TYPE A (BONT-A) EFFECTS ON GAIT IN STROKE PATIENTS WITH SPASTIC HEMIPARESIS

S. Yanagisawa¹, N. Kawate¹, M. Mizuma¹, M. Matumoto¹, M. Yoda¹

¹Showa University School of Medicine, Department of Rehabilitation Medicine, Tokyo, Japan

Introduction/Background: Botulinum toxin type A (BoNT-A) has been used for treating spasticity. However, no studies have examined the effects of BoNT-A on gait with objective techniques such as gait analysis employing a foot pressure measurement system. In this study, we evaluated changes in spastic gait after injection of BoNT-A with an objective instrument. *Material and Methods:* In total, 200–300 units of BoNT-A were injected into the spastic muscles in the affected lower leg of each patient. Each subject's gait was evaluated before and one month after the treatment by means of gait analysis employing a foot pressure measurement system with a sheet sensor. The measurements included gait speed and proportions of stance, swing, and double support in the gait cycle. Based on the changes in gait speed after treatment, the subjects were divided into decreased gait speed and increased gait speed groups. The proportions of St, Sw, and Ds phases in the gait cycle were compared between these two groups. The analysis was conducted using *t*-test with statistical significance set at $p<0.05$. *Results:* In the performance analysis for the affected legs, the decreased speed gait group exhibited an increase in St, decrease in Sw, and increase in Ds, while the increased gait speed group exhibited a decrease in St, increase in Sw, and decrease in Ds. *Conclusion:* Conclusions: We consider decreased speed and increased Ds in the decreased gait speed group to be attributable to the loss of stable support resulted from their spastic legs due to an acute reduction of spasticity with BoNT-A. On the other hand, the increased speed and decreased Ds in the increased gait speed group was attributed to improved flexibility of the ankle joints of the affected limb during the St phase due to spasticity reduction. Our results suggest objective instrumental evaluation to be useful for in-depth evaluation of the effects of BoNT-A and to provide useful information for planning rehabilitation regimens.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: NEUROLOGICAL AND MENTAL HEALTH CONDITIONS - STROKE

406

HEMORRHAGIC STROKE RELATED TO CRYPTOCOCCAL MENINGITIS SECONDARY TO HIV-INFECTION

E. Adigüzel¹, F. Tok¹, I. Safaz¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: Stroke as the first manifestation of acquired immune deficiency syndrome (AIDS) has been rarely reported in HIV infections. The most common causes of stroke in AIDS are central nervous system infections: toxoplasmosis, cryptococcal meningitis and tuberculosis. **Material and Methods:** A 28-year-old male presented with sudden onset of headache, weakness in upper and lower extremities on both side, numbness in right hand. Soon after fever, vomiting and somnolence occurred and the patient was hospitalized. In his history, common cold symptoms were seen and 15 kg loss within 6 months was present. On physical examination, deep tendon reflexes were hyperactive in upper and lower limbs; pathologic reflexes were present in addition to above-mentioned signs. On Brain MR multipl hemorrhagic areas were detected in bilateral parancimal tissues. On his laboratory examination, reduced white blood cells, anti-HIV antibodies were detected. Lumbar puncture resulted with a positive culture for Cryptococcus neoformans. **Results:** With help of these findings the patient was diagnosed as hemorrhagic stroke Related to Cryptococcal Meningitis secondary to HIV-Infection. Medication and physical therapy were planned. After medications and physical therapy, patient was significantly improved with independent ambulation and activities of daily living. **Conclusion:** Stroke related to opportunistic diseases in HIV infection should be kept in mind in the differential diagnosis of stroke of unknown origin, particularly in young adults without another risk factor. Rehabilitation strategies should be a part of such patients' management.

407

THE EFFECT OF DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF PATIENTS WITH STROKE ON REHABILITATION OUTCOMES

E. Yaşar¹, S. Kesikburun¹, Ü. Dogan Duran¹, Y. Demir¹, E. Adigüzel¹, U. Guzelkucuk¹, B. Yılmaz¹, R. Alaca¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: We have investigated demographic and clinical characteristics of patients with stroke treated in our brain injury unit and their effects on rehabilitation outcomes. **Material and Methods:** Medical records of 110 patients with stroke who was hospitalized in our rehabilitation center between Jan 2013 and Dec 2014 were reviewed. The demographic characteristics such as age, sex, training period as well as clinical characteristics including etiology, anatomical localization of the lesion, risk factors, and complications were investigated. The results of Berg balance scale, mini-mental state examination (MMSE) and Chedoke-McMaster stroke assessment scale were assessed. Outcome measures including functional independence measure (FIM) and functional ambulation classification (FAC) were used to assess the efficacy of rehabilitation program. Multiple linear regression analysis was applied to evaluate the factors affecting the difference between the outcome measure scores on discharge and admission. **Results:** 110 patients with stroke comprising 37 females (33.6%) and 73 males (66.4%) with an average age of 61.0±14.4 years were included in

the study. The etiology of the stroke was 75 (68.2%) ischemic and 35 (31.8%) hemorrhagic. The most frequent risk factors were hypertension (58.2%), smoking (37.3%), diabetes (24.5%), coronary artery disease (21.8%), dyslipidemia (19.1%) and presence of previous stroke (13.6). The most frequent complications were spasticity (80.0%), speech disorders (aphasia ve dysarthria) (52.7%), shoulder pain (33.6%), dysphagia (27.3%), urinary incontinence (26.4%), depression (20%), and convulsion (20%). The variables that strongly predicted the difference between FIM and FAC scores on discharge and admission were MMSE/training period ($p=0.041$ ve $p=0.023$), and MMSE/training period/Berg balance scale score ($p=0.021$, $p=0.047$ ve $p<0.001$), respectively. **Conclusion:** The results suggested that the higher MMSE and training period predicted the better recovery both on FIM and FAC scores and the higher Berg balance scale score predicted the better recovery only on FAC scores.

408

RADIAL HEAD DISLOCATION IN A STROKE PATIENT WITH UNKNOWN ETIOLOGY

M.S. Akaltun¹, Ö. Kuzu², B. Aras², F. Tok², E. Yaşar²

¹Gaziantep University, Physical Medicine and Rehabilitation, Gaziantep, Turkey, ²Gülhane Military Medical Academy, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: 60-year-old man with left hemiplegia according to ischemic cerebrovascular accident which occurred 3 months ago, admitted to our hospital. The patient was hospitalized for rehabilitation. He was cooperated and his Brunsstrom levels were 2 in upper extremity, hand and lower extremity. He had spasticity in elbow flexor and forearm pronators. Mild flexion limitation was detected in left elbow. Since left radial head was easily palpated during physical examination musculoskeletal sonography was performed. In sonography, anterior dislocation of left radial head was detected. Since the patient could not positioned optimally, plain radiograph did not reveal significant pathology. He or his family did not report any trauma to his left elbow before or after the stroke. He also did not describe pain in his elbow, but diffuse pain in left upper extremity. Shoulder dislocation is commonly seen in stroke patients but radial head dislocation is very rare in stroke patients. In this patient etiology was unclear whether it was occurred due to a complication of stroke or trauma or congenital anomaly. In this group of patients plain radiographs may not be helpful because of positioning difficulties. Ultrasound is an easily performed, patient friendly method for imaging and should be kept in mind in such cases who has difficulties while positioning for plain radiographs.

409

SYNTHETIC MARIJUANA - A NEW WORLD SCOURGE: A CASE REPORT OF A HEMORRHAGIC STROKE AND REVIEW OF THE NEUROLOGICAL COMPLICATIONS AND DIFFERENCES IN MANAGEMENT

A.F. Ambrose¹, A. Lichtenstein²

¹NYC, USA, ²Icahn School of Medicine at Mount Sinai, Department of Rehabilitation Medicine, New York City, USA

Case Description: A 36-year-old male with no past medical history developed acute hemiplegia after smoking synthetic marijuana (K2/Spice). CT head revealed a large right fronto-parietal hemorrhage. An extensive work-up for potential etiologies including stroke work-up in young patients, routine urine toxicology, cerebral angiography, MRI, and EEG were negative. The patient made a rapid recovery going from dense, flaccid hemiplegia to near-normal strength and minimal fine motor coordination impairments with two weeks of inpatient rehabilitation. **Discussion:** In 2011, the Drug Enforcement Administration placed 5 synthetic cannabinoids into Schedule I of the Controlled Substances Act. Subsequently,

manufactures have been creating new formulations to bypass the law and avoid detection. In Apr 2015, there was a spike in New York City emergency room visits for patients with K2 complications. 160 patients were seen in a 1-week period and 1,900 more the following month. Similar reports were made in other states and countries around the world. Synthetic marijuana, a newly available recreational drug found in bodegas, consists of herbs sprayed with synthetic tetrahydrocannabinol (THC)-like chemicals, the psychoactive ingredient in marijuana. It is either smoked or consumed as tea. Unlike regular marijuana, K2 is associated with higher incidence of adverse effects include agitation, seizures, vomiting, profuse sweating, uncontrolled spastic movements, hypertension, palpitations, hypokalemia, stroke, kidney damage, acute psychosis and death. Furthermore, marijuana, a partial agonist of THC receptors has a limited distribution while K2 and its metabolites bind as full agonists to the CB1 receptors which are found more widely. Synthetic cannabis cannot be detected on routine toxicology for marijuana but with K2 specific urine tests. *Conclusion:* Synthetic marijuana must be considered in the differential diagnosis of patients with strokes, acute agitation, or psychosis. A complete drug use history and K2 specific urine test can help make the diagnosis.

410

INCREASING INCIDENCE OF STROKE IN YOUNGER PEOPLE AND THEY ARE TOO SLOW IN SEEKING FOR MEDICAL HELP

D. Anderlini^{1,2}, G. Wallis¹

¹University of Queensland, Centre Sensorimotor Performance, Brisbane, Australia, ²Royal Brisbane and Women's Hospital, Neurology, Brisbane, Australia

Introduction/Background: Studies from the UK and the USA reveal that the average age of stroke patients is falling and that many patients get to the hospital too late for acute treatments. Give that stroke is the main cause of adult disability, we want to understand if the same is true in Australia. *Material and Methods:* Our retrospective study included patients who were admitted to the Stroke Unit of the Royal Brisbane Women's Hospital, between 2002 and 2015. We analyzed the patient data on the basis of age range (0–10, 11–20, etc.) and year of admission. *Results:* Preliminary analysis of data from 3,674 patients reveals that the rate of stroke patients patient ≤ 65 is increasing (from 25% to 35%), $p < 0.0001$. Average delay (time between symptoms onset and admission) is 0.45 for patients of age 10–45 compared to 0.30 for patients over 65, $p = 0.02$. This is a big worry because young people seem to get to the hospital later than older ones, missing the chance for acute therapy and facing a worse outcome with chronic disability. *Conclusion:* As a word of caution, the results have yet to be adjusted for catchment area changes, new stroke units opening, and changes in population statistics. Nonetheless, our study suggests that stroke is becoming more frequent in younger Australians. Primary and secondary prevention techniques are effective, as results from older shows, but that they need to be carried over to younger at-risk groups too, together with an awareness campaign.

411

POSTURAL CONTROL IN STROKE PATIENT

Z. Ben Salah Frih¹, S. Boudokhane¹, H. Migaou¹, S. Salah¹, A. Jellad¹

¹Fattouma Bourguiba University Hospital Monastir, Physical Medicine and Rehabilitation, Monastir, Tunisia

Introduction/Background: Postural problems are common following stroke and can result in a high incidence of falls particularly in those patients with motor, sensory, cognitive and emotional impairments. *Objective:* To describe postural control after stroke and its impact on independence social participation and quality of life. *Material and Methods:* 31 right-handed patients (mean age 61.3 years) were assessed at the beginning, 30 and 90 days follow-

ing stroke using trunk control test, postural assessment scale for stroke and Bourges index), motricity index, Ashworth scale, New Functional Ambulation Categories, Mini Mental Status Examination and Reintegration to Normal Living Index. *Results:* 87% ischemic stroke, 54.8% had right hemiparesis and 32.3% with right hemispheric stroke. The TCT was initially deteriorated (78, 3/100) testify the early disability of postural control. a high correlation with the PASS, NFDC, FILM in the locomotion domain and RNLI in the daily activity domain was noted at 1st and 3rd months. The postural control evaluation (PASS, EPA, EPD) shows the highest correlation with lower limb spasticity, the NFAC, FMI, locomotion domain and with the RNLI daily activity domain. The MMSE score was also much correlated to TCT and FIM locomotion domain. The site of the brain lesion was negatively affected to the value of TCT and PASS. *Conclusion:* Majority of patients have found the ability to walk in spite of persistence the postural disorder at different times of evaluation. The impaired postural control has the greatest impact on activity of daily living and gait. Postural control is the best predictor of achieving independent living.

412

EFFECTS OF ANKLE STRETCHING ON SPASTICITY IN PATIENTS WITH STROKE: A RANDOMIZED CLINICAL TRIAL

S. Bi¹, D. Siyu², H. Nan², L. Xi², Q. Shuyan³

¹PKU Care Rehabilitation Hospital, Rehabilitation Medicine Center, Beijing, China, ²Chinese PLA General Hospital, Rehabilitation Medicine Center, Beijing, China, ³Capital Medical University Affiliated Beijing Rehabilitation Hospital, Rehabilitation, Beijing, China

Introduction/Background: To observe ankle stretch effects on lower limb function in stroke and to explore its mechanism. *Material and Methods:* Twenty-five patients with stroke were randomly divided into two groups: 12 in ankle stretching group (experimental group) and 13 in straight leg raising group (control group). Both groups were trained by the LR2 Leg Rehabilitation Robot for 2 weeks for totally 12 sessions, 45 min/session. Before and after training, the spasticity of the ankle joint were assessed by passively move the ankle joint using isokinetic testing system; ankle joint muscle strength were also tested to get the active peak torque (PT), besides the active and passive range of motion (AROM, PROM) of the ankle were measured, torque- angular velocity slope (SLOPE); Clinical evaluation included the Modified Ashworth Scale (MAS), clinical spasticity index (CSI). *Results:* Before training, there was no significant difference between two groups in all the measured parameters. After 2 weeks training, the spasticity measured under different angular velocity showed a significant difference between the two groups except 240°/s; there was a significant difference between the two group on the muscle strength measured at the 60°/s, 120°/s, but not at 180°/s, also a significant difference between the two group on the SLOPE measured, the AROM, PROM, MAS value and CSI in experimental group were significantly better than control groups ($p < 0.05$). *Conclusion:* Ankle stretch can effectively reduce spasticity in patients with stroke, improve joint mobility and muscle strength.

413

LEUKOARAIOSIS AND FUNCTIONAL OUTCOME IN PATIENTS WITH SUBCORTICAL INFARCT

S.J. Choi¹, M.H. Chun¹, G.E. Kim¹, M.C. Jang¹, K.H. Do¹

¹Asan Medical Center, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: We studied the influence of leukoaraiosis on the functional outcome of subcortical stroke for the subacute period after onset. *Material and Methods:* We retrospectively analyzed 152 collected patients with acute subcortical infarct (corona radiate with or without basal ganglia infarct) at a single center from Sep 2011 to May 2015. Of these, the patients who previously had

history of stroke or cognitive impairment had excluded and forty one patients were enrolled. Functional outcome was assessed at acute phase (the time when transferred to the department of rehabilitation medicine) and subacute phase (discharge). We explored the relationship between leukoaraiosis severity at admission and clinical outcome at the time of discharge (approximately a month from onset), as assessed by the modified Rankin Scale (mRS) and functional ambulation categories (FAC). Leukoaraiosis severity was graded as mild, moderate, or severe on the Fazekas scale. Mann-Whitney test was performed to identify the correlation between the severity of leukoaraiosis and the functional outcomes. **Results:** Severe leukoaraiosis was diagnosed in 2 patients (4.8%), moderate leukoaraiosis in 8 patients (19.0%), mild leukoaraiosis in 19 patients (45.2%), and no leukoaraiosis in 12 (28.6%). In this study, we compared the absent or mild leukoaraiosis group (Group A) with moderate/severe leukoaraiosis group (Group B). There were no significant difference in the baseline characteristics of the study cohort by leukoaraiosis severity except for age and modified Barthel index (mBI). In comparison of no/mild group and moderate/severe group, there was significant difference in mRS and FAC at both acute and subacute phase. **Conclusion:** In this retrospective study, severe leukoaraiosis predicted poor functional outcome, including ambulatory function at both acute and subacute phase after stroke onset.

414

COMPARATIVE EFFICACY OF ELECTRICAL STIMULATION COMBINED WITH BILATERAL ARM TRAINING ON HEMIPLEGIC SHOULDER PAIN AND ARM FUNCTION IN INDIVIDUALS WITH STROKE

L.L. Chuang¹, Y.L. Chen¹, Y.J. Chang¹, A.L. Hsu²

¹Chang Gung University, Physical Therapy, Taoyuan, Taiwan,

²Mackay Memorial Hospital, Department of Physical Therapy, Taipei, Taiwan

Introduction/Background: Previous studies have shown that electrical stimulation of the supraspinatus and posterior deltoid has beneficial effects on subluxation, but have inconsistent results on hemiplegic shoulder pain (HSP) and arm function. Bilateral arm training (BAT) has been viewed as upper-limb intervention, especially proximal control of arm. EMG-triggered neuromuscular electrical stimulation combines with BAT (NMES-BAT) may offer benefits in relieving HSP and facilitating arm function. The aim of this research was to investigate the effect of NMES-BAT on pain relief and arm function as compared with transcutaneous electrical nerve stimulation (TENS) combined with BAT (TENS-BAT) for stroke patients with HSP. **Material and Methods:** Thirty first-ever stroke patients with HSP were randomized into NMES-BAT or TENS-BAT group for ES 20 minutes and BAT 20 minutes. The intensity with maximum muscle contraction was for NMES-BAT group, but with sensory level of stimulation intensity and without muscle contraction for TENS-BAT group. Outcome measures, including vertical Numerical Rating Scale with Faces Rating Scales for measuring pain intensity at rest, during shoulder AROM and PROM, Brief Pain Inventory (BPI) for measuring the worst pain intensity and pain interference, pain-free shoulder ROM, and Fugl-Meyer Assessment (FMA) for assessing motor impairment, were administered at pretreatment, posttreatment, and 1-month posttreatment. **Results:** NMES-BAT group significantly increased more shoulder abduction, reduced pain during shoulder AROM of affected shoulder joint, and the worst shoulder pain intensity after intervention and at follow-up, and reduced pain intensity during shoulder PROM at follow-up than TENS-BAT group. Both groups significantly reduced shoulder pain during AROM and PROM of the shoulder, reduced the BPI, increased pain-free shoulder ROM, and improved FMA after intervention. However, the retention effects on NRS-FRS during PROM and FMA at follow-up was only shown for NMES-BAT group, not for TENS-BAT group. **Conclusion:** EMG-triggered NMES with BAT improved more pain reduction and arm function than TENS with BAT.

415

THE EFFECT OF SENSORY-LEVEL ELECTRICAL STIMULATION OF THE MASSETER MUSCLE IN EARLY STROKE PATIENTS WITH DYSPHAGIA: A RANDOMIZED CONTROLLED STUDY

E. Umay¹, I. Gundogdu¹, Y. Demir², K. Aydemir², A. Cakci¹

¹Diskapi Yıldırım Beyazıt Education and Research Hospital, Physical Medicine and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: As the first study in literature, we aimed to evaluate the effects of sensory-level electrical stimulation (SES) to bilateral masseter muscles in early stroke patients with dysphagia. **Material and Methods:** Ninety-eight patients with dysphagia within the first month after ischemic stroke included in this study. Patients were evaluated by bedside screening tests (Bedside Dysphagia Score, Neurological Examination Dysphagia Score, Total Dysphagia Score and Mann Assessment of Swallowing Ability test) and flexible fiberoptic endoscopic evaluation of swallowing (FEES) methods. All patients were included in a traditional swallowing therapy. Patients were divided into two groups as "stimulation group" and "sham group". Sensory-level electrical stimulation (SES) was applied to bilateral masseter muscles. Evaluation parameters were compared between groups before and after therapy. **Results:** The average age of the 98 patients (22 [22.4%] female, 76 [77.6%] male) included in the study was 61.59±9.97 years, and the mean stroke duration was 14.52±5.53 days. There was a significant improvement in dysphagia severity scores evaluated by bedside screen tests and FEES, in cognitive and total functionality levels except motor functional independence level in stimulation group. In the sham group, there were no significant changes in the evaluation parameters. **Conclusion:** Sensory-level electrical stimulation (SES) applied to bilateral masseter muscles may provide an effective treatment for both dysphagia and cognitive function in early stroke patients.

416

DRUG-INDUCED DYSPHAGIA IN STROKE PATIENT: A CASE REPORT

E. Umay¹, I. Gundogdu¹, O. Delibas¹, Y. Demir², K. Aydemir²

¹Diskapi Yıldırım Beyazıt Education and Research Hospital, Physical Medicine and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: Dysphagia has many causes, both neurological and non-neurological; neurogenic events, particularly stroke is the most common cause of dysphagia. Herein, we present a drug-induced dysphagia case in a 57-year-old male with stroke, which can easily be misdiagnosed as a stroke-induced dysphagia. **Material and Methods:** A 57-year-old man was admitted to our PMR Clinic with the diagnosis of hemorrhagic stroke and left hemiplegia. Previous medical history revealed a schizophrenia for the last 25 years and was taking 25 mg/month fluphenazine decanoate which was stopped following stroke. **Results:** During inpatient rehabilitation, he was consulted to psychiatry for suspected hallucinations and intramuscular injection of 25mg fluphenazine decanoate has been restarted once every month. Three months after hospital discharge, the patient was readmitted to our clinic with complaints of excessive salivary flow, inability to close the lips, difficulty in chewing and swallowing, and coughing during or after meals. Neurological examination and magnetic resonance imaging of the brain revealed no evidence of acute infarction. Clinical swallowing evaluation and endoscopic evaluation revealed that the patient had dysphagia, a residue in valleculae and pyriform sinus, laryngeal penetration and reduced laryngeal elevation, but aspiration was not detected possibly due to sufficient cough reflex. More detailed history elucidated that the dysphagia was associated with Drug-induced Parkinsonism

(DIP) due to used antipsychotic. Thus, fluphenazine treatment shifted to atypical antipsychotic clozapine after stopping the fluphenazine, the patient experienced distinct improvement of dysphagia symptoms. Endoscopic control revealed an absence of residue and penetration. *Conclusion:* Dysphagia can be seen in DIP, however, it is most often associated with another symptom of the EPS, but can also be isolated, making its diagnosis more difficult. DIP should be considered in the differential diagnosis of dysphagia in patients with stroke receiving any antipsychotic drug.

417

CORRELATION BETWEEN HOMOCYSTEIN LEVEL AND FUNCTIONAL OUTCOME OF PATIENTS WITH ISCHEMIC STROKE AT SERUNI A WARD RSUD DR SOETOMO SURABAYA

R. Dian¹, M. Andriana¹, A. Andriati¹

¹Dr. Soetomo General Hospital, Physical Medicine & Rehabilitation, Surabaya, Indonesia

Introduction/Background: Stroke is very disabling disease but could be prevented with an appropriate risk factor management. Homocystein is one of secondary risk factor and independently has a role in vascular disease. Recent studies has showed homocystein was a risk factor for ischemic stroke, but studies about correlation between homocystein with functional outcome of patient with ischemic stroke was limited and had controversial result. *Material and Methods:* Objective: To analysis correlation between homocystein level and functional outcome as evaluated by Functional Independent Measure (FIM) of patient with ischemic stroke. Methods: A cross sectional study. Homocystein level was obtained from 16 patients with ischemic stroke at Seruni A Ward RSUD Dr Soetomo 24–72 hours after first attack. FIM 1 was measured at first week (day 2–7) and FIM 2 at second week (day 8–14). Data outcome was analyzed by Pearson Correlation. *Results:* Mean homocystein level of the subjects was $16,9 \pm 5,2$ mmol/L. Mean FIM 1 was $79,6 \pm 13,8$, FIM 2 $102,7 \pm 14,3$, and delta FIM $23,1 \pm 0,4$. Correlation between FIM 1, FIM 2, delta FIM and homocystein level showed no significant ($p > 0,05$). *Conclusion:* There was no correlation between homocystein level and functional outcome as evaluated by FIM.

418

THE ROLE OF INPATIENT REHABILITATION MEDICINE INTERVENTION IN CHRONIC STROKE

S.A. Easaw¹, M.I. Ahmad²

¹Department of Rehabilitation Medicine, Penang General Hospital, Penang, Malaysia, ²Rehabilitation Physician and Head of Department, Department of Rehabilitation Medicine- Penang General Hospital, Penang, Malaysia

Introduction/Background: Intensive rehabilitation medicine services, when offered as an organized and structured inpatient programme is able to offer a world of difference to post-stroke patients despite being introduced in the chronic phase. *Materials and Methods:* This case report looks at two patients who were admitted for inpatient rehabilitative intervention during the chronic post stroke phase of at least 18 months following the event of stroke. They were assessed in terms of motor and functional recovery as well as the psycho-social impact on the patient and their family. Each patient was admitted to a ward with rehabilitation medicine services and daily sessions of therapy, with an average stay of 3.5 weeks. *Results:* The Modified Barthel Index was used as a functional outcome measure which showed an average increment of 20.5% from the baseline score. *Conclusion:* The results show a positive outcome on the role of inpatient rehabilitation medicine intervention in chronic stroke patients and subsequently offers renewed hope and potential for these patients who should no longer be side-lined as “dead end cases”.

419

EEG IN STROKE PATIENTS UNDER TRANSCRANIAL MAGNETIC STIMULATION

G. Estrada¹, L. Morales², M. Alexandra³

¹Institute of Neurology and Neurosurgery, EEG, Havana, Cuba, ²International Center of Neurological Restoration, Neurophysiology, Havana, Cuba, ³University of Miami Hospital, Neurology, Miami, USA

Introduction/Background: A double-blind prospective and longitudinal study was carried out to assess the electrical brain activity and to evaluate the clinical evolution in a sample of 11 subjects with chronic stroke after rehabilitation and the application of rTMS (1 Hz). *Material and Methods:* The sample in study was randomly divided into two groups: 5 patients received sham rTMS and 4 patients received real rTMS both with daily sessions for 20 days. Electroencephalograms (EEG) were recorded before and after rTMS. The neurophysiological measures used were the resting EEG power spectrum, Delta/Alpha ratio (DAR), the spike-frequency and the spike-amplitude. Clinical characterization was assessed using Scandinavian (SS) and Barthel Index scales (BI). *Results:* 1 Hz rTMS caused a tendency toward increase ($p=0.06$) in the Alpha band power spectra in both brain hemispheres. There was also a decreasing tendency of the Delta band power spectra in both brain hemispheres. DAR diminished 23% more in the 1 Hz rTMS group than in the sham rTMS group, and the spike-frequency also increased in 1 Hz rTMS group after stimulations. Clinical Scales after the rTMS, a tendency toward the increase of punctuations in the SS ($p=0.06$) being higher in the 1 Hz rTMS group. *Conclusion:* Stroke patients who received 1 Hz rTMS sessions experienced modifications on resting EEG, suggesting a propensity to the cortical activation in both brain hemispheres and the increment of cortical excitability. 1 Hz rTMS group had a better clinical recovery and of the brain electrical activity, reflected in the modifications of the SS and DAR.

420

ROBOT-BASED REHABILITATION OF THE UPPER LIMBS IN ACUTE STROKE

H. Fan¹

¹Shaoxing People's Hospital, Department of Rehabilitation Medicine, ShaoXing, China

Introduction/Background: About 85% of stroke patients have varying degrees of upper limb paralysis, 30% to 60% of patients eventually left upper limb motor dysfunction. Upper limb rehabilitation robot is a new physical therapy technology to provide high-precision, high repeatability of training and visual, auditory comprehensive feedback. Our study was designed to observe the effect of upper limb rehabilitation robot for upper limb function in stroke patients. *Material and Methods:* One hundred patients with acute stroke were randomly divided into a control group (50 cases) and a therapy group (50 cases). All of the patients were treated with conventional medical treatment and rehabilitation training. The therapy group received robot training, 5 days per week for 12 weeks. The Fugl-Meyer assessment for the upper extremities (FMA-UE), the modified Ashworth scale (MAS), the modified Barthel index (MBI) were evaluated before and after 4 weeks, 8 weeks and 12 weeks of treatment. *Results:* After 4 weeks treatment, the average FMA-UE, FMA-UE (SE), FMA-UE (WH) score and average MBI of both groups had improved significantly compared with pre-treatment. Moreover, these scores continued to rise: 12-week >8-week >4-week. The average FMA-UE, FMA-UE (SE), FMA-UE (WH) and MBI scores of the therapy group were significantly higher than that of control group at the same time point. There was no significant difference in MAS scores between the 2 groups after 4 weeks; 8 weeks and 12 weeks of treatment. *Conclusion:* Robot-based rehabilitation can be applied to patients with acute stroke in a clinical setting and may be beneficial for improving the upper limb function and activities of daily living, but had no significant advantages in prevention of abnormal muscular tension.

421

EFFECT OF ACUPUNCTURE COMBINED WITH REHABILITATION TRAINING ON UNILATERAL SPATIAL NEGLECT

L. Feng¹

¹Shaoxing People's Hospital, Department of Rehabilitation Medicine, Shao Xing, China

Introduction/Background: Unilateral spatial neglect (USN) as one of the most common cognitive and behavioral disorders after stroke, seriously affect the recovery of motor function and activities of daily living in patients. In our study, acupuncture combined with rehabilitation interventions in stroke patients with USN, explore the effect of acupuncture treatment on rehabilitation of stroke patients with USN and its possible mechanisms. **Material and Methods:** 100 stroke patients with USN were divided into treatment group ($n=50$) and control group ($n=50$). Both groups were treated with rehabilitation training for 4 weeks. The treatment group was treated with acupuncture combined with rehabilitation training. Digital elimination test, Remove line test, The Fugl-Meyer assessment (FMA), the modified Barthel index (MBI) and the incidence of shoulder pain of the two groups were evaluated before and after the treatment. **Results:** During treatment. Two cases of the observation group off, shedding 4.00 percent rate. Three cases of the treatment group off, shedding 6.00 percent rate, both expulsion rate <20%. Before and after treatment, the scores of Digital elimination test and Remove line test of the two groups decreased significantly ($p<0.05$), FMA scores, MBI scores significantly increased ($p<0.05$), the incidence of shoulder pain in control group increased ($p<0.05$) but in treatment group not significantly changed ($p>0.05$); After the treatment. The treatment group improved more significantly USN degree ($p<0.05$), FMA and MBI scores were higher ($p<0.05$), the incidence of shoulder pain decreased ($p<0.05$), compared with the control group. **Conclusion:** Acupuncture combined with rehabilitation training can significantly improve symptoms of stroke patients with USN, improve hemiplegic limb motor function and activities of daily living.

422

ARM RECOVERY AFTER STROKE WITH COMBINED BOTULINUM-TOXIN AND PHYSICAL EXERCISE

O. Guseva¹, N. Zhukova², A. Vichodcev¹

¹Siberian State Medical University, Rehabilitation and Sport Medicine, Tomsk, Russia, ²Siberian State Medical University, Neurology, Tomsk, Russia

Introduction/Background: The program of prolonged stretching in conjunction with local injections of nerve blocking agents after stroke aims to improve upper limb function, but current evidence of functional benefits of exercise for arm function is discussed. We have evaluated the effects of combination of the stretching training and local botulinum-toxin injections. **Material and Methods:** 30 patients with post stroke time from 1 to 15 years were investigated. Were measured the active and passive movements and resting angles of paretic upper limb. The patients received the single botulinum-toxin 200 ME and then the intensive stretching training for arm with 4 hours per weekday during 30 days. Analysis was made using Mann-Whitney *U*-test, Wilcoxon matched pairs test and Spearman correlation. **Results:** The resting angles in the middle and proximal joints of the 2, 3, 4, 5 fingers decreased after 30 days of the treatment ($p=0.018-0.043$). The improvement of the upper limb function was significant only for the active flexion of the shoulder ($p=0.034$). No relationships between post stroke time and changes of the resting angles and active flexion of the shoulder were observed. **Conclusion:** Upper limb disability reduced after 30 days of the integrated therapy of the local injections of the botulinum-toxin and prolonged stretching program.

423

EFFECTS OF BOTULINUM TOXIN A INJECTIONS AND MULTIDISCIPLINARY REHABILITATION ON UPPER AND LOWER LIMB SPASTICITY IN POST-STROKE PATIENTS

T. Hara¹, M. Abo¹, H. Hara²

¹The Jikei University School of Medicine, Rehabilitation Medicine, Minato-Ku, Japan; ²Kikyougahara Hospital, Rehabilitation, Shiojiri-shi, Japan

Introduction/Background: Botulinum toxin type A (BoNT-A) is reportedly an effective treatment for upper and lower limb spasticity following stroke. Recent research effort has aimed at improving the active motor function of the upper and lower limbs with the addition of rehabilitation to BoNT-A therapy. The purpose of this study was to examine the effects of combined BoNT-A and inpatient multidisciplinary rehabilitation (MD) therapy on the improvement of upper and lower limb function in post-stroke patients. **Material and Methods:** A 12-day long inpatient treatment protocol was implemented on 51 post-stroke patients with spasticity. Assessments of upper and lower limb function were performed on the day of admission, on the day of discharge, and at three months following discharge. **Results:** At the time of discharge, all of the evaluated items showed a statistically significant improvement relative to the scores at admission. Only the FRT showed a statistically significant improvement when comparing the scores between admission and the 3-month follow-up. In subgroup analyses by levels of upper limb dysfunction and walking speeds. In upper limb function, there was no statistically significant difference between patients with severe and moderate levels. In lower limb function, patients who were classified into the household ambulation (HA) group based on their walking speed (<0.4 m/s) showed a significantly greater change ratio of the 10MWT comfortable gait speed relative to the other groups, from the time of admission to discharge. The HA group showed a greater FRT change ratio than the other groups from the time of admission to the 3-month follow-up. **Conclusion:** Our results indicated that the inpatient combined therapy of BoNT-A and MD may improve upper and lower limb function in post-stroke patients with upper and lower limb spasticity. In particular, our data suggest that simultaneous injections of BoNT-A to the upper and lower limbs may result in improved balance.

424

CLASSIFICATION OF SEVERELY HEMIPLEGIC STROKE PATIENTS AND PROGNOSIS

H. Yoshitake^{1,2}, N. Osamu¹, H. Takeshi³, N. Daisuke², T. Hidetoshi⁴, K. Hiroshi²

¹Tokyo Metropolitan University, Graduate School of Human Health Sciences, Tokyo, Japan, ²Hanno-Seiwa Hospital, Rehabilitation Center, Saitama, Japan, ³Saitama Medical University, Department of Neurology and Cerebrovascular Medicine, Saitama, Japan, ⁴Saitama Medical University, Department of Rehabilitation Medicine, Saitama, Japan

Introduction/Background: It is important to be able to predict whether a patient will be able to walking and activities of daily living (ADL) independently after suffering a stroke because rehabilitation programs are planned on the basis of such predictions. The purpose of this study was to classify stroke patients by their properties into several groups, and investigate their association with prognosis. **Material and Methods:** Seventy-two first attack stroke patients with severe hemiplegia at admission were included in this study. Their age were 39-87 years old (means age: 63.2 ± 11.3), their primary disease was cerebral infarction in 15, cerebral hemorrhage in 51 and subarachnoid hemorrhage in 6. All subjects were independent in their activities of daily living (ADL) before their strokes. We divided stroke patients into group by their properties and physical function on admission by the cluster analysis. Analysis was carried out by the one-analysis of variance. **Results:** Patients

were classified into 3 groups according to the cluster analysis. Age, time from stroke onset, nutritional status, neurological symptom, trunk ability and knee extension muscle strength on the non-paretic side at admission were significantly difference among the groups. Walking ability, ADL of discharge and the length of stay were significantly difference among the groups. *Conclusion:* These results suggest that the classification of severely hemiplegic stroke patients is useful to predict prognosis in a rehabilitation hospital.

425

A STUDY ON EFFECTIVENESS OF LOCOMOTOR TRAINING USING WEARABLE ROBOT HAL IN ACUTE PHASE STROKE PATIENTS

K. Hiruta¹, T. Ueno¹, K. Hideki², S. Yamauchi¹, T. Hisamatsu¹, A. Yamaguchi¹, S. Hirose¹, Y. Shimizu¹, K. Ishikawa¹, H. Kawamoto³, A. Marushima⁴, Y. Hada¹, M. Yamazaki¹

¹University of Tsukuba Hospital, Department of Rehabilitation, Tsukuba, Japan, ²University of Tsukuba, Center for Innovative Medicine and Engineering, Tsukuba, Japan, ³University of Tsukuba, Graduate School of Systems and Information Engineering, Tsukuba, Japan, ⁴University of Tsukuba Hospital, Department of Neurosurgery, Tsukuba, Japan

Introduction/Background: In patients with hemiplegia after stroke, early stage intervention is effective in general. In University of Tsukuba Hospital, we have been conducting locomotor training sessions using a wearable robot HAL (Hybrid Assistive Limb, Cyberdyne, Japan) for acute phase stroke patients since Aug 2014, expecting early recovery of locomotor function. This study reports gait changes in these patients after the HAL sessions. *Material and Methods:* The participants were acute phase stroke patients with hemiplegia who could maintain seated posture for 20 minutes, independently maintain standing posture using an All-in-One suspension device, and had detectable bio-electric potential from hip flexor muscles within 30 days after onset. These patients participated in HAL sessions twice per week in addition to conventional physiotherapeutic rehabilitation. Each session included 20 minutes of locomotor training using a single leg HAL and an All-in-One device. Before and after each session, functional evaluation was done by 10m walking test and 12 grade recovery grading. Gait changes were investigated by two-dimensional motion analysis (Dartfish Software 8.0). *Results:* After HAL sessions, decrease in the forward inclination angle of trunk was observed, as well as increase in knee extension angle and stance phase duration of the affected limb. In accordance, increased step length and walking velocity, and improvement of gait were observed. *Conclusion:* The observation indicates possibility of enhancing early functional recovery by early intervention in cases with detectable motor related bio-electric potential. On the other hand, physical therapy for acute phase stroke rehabilitation induces neural facilitation by voluntary loading on the affected limb exploiting reflexive muscle contraction. Our next step is to incorporate this mechanism into locomotor training using HAL.

426

ONE-LEG VERSUS TWO-LEG SYMPTOM-LIMITED CYCLING TESTS IN SUBACUTE STROKE PATIENTS: A PRELIMINARY STUDY

M. Hsu¹, J. Chen², J. Lin¹, Y. Chang³

¹Kaohsiung Medical University, Department of Physical Therapy, Kaohsiung, Taiwan, ²Kaohsiung Municipal Cijin Hospital- Kaohsiung Medical University, Department of Physical Medicine and Rehabilitation, Kaohsiung, Taiwan, ³Chang Gung University, Physical Therapy Department and Graduate Institute of Rehabilitation Science, Tao Yuan, Taiwan

Introduction/Background: Poor cardiorespiratory endurance is seen in individuals after stroke. Inadequate cardiorespiratory fitness may

possibly prevent stroke patients from performing independent daily activities as well as increase the risk of recurrent stroke. Hence, early interventions incorporating with aerobic training are suggested. Aerobic fitness is typically evaluated by a two-leg cycling test. However, this might not be feasible or practical for stroke patients in early-stage. The purpose of this study was to compare the one-leg versus two-leg symptom-limited cycling tests in early-stage stroke patients. *Material and Methods:* This study recruited 6 male subacute stroke patients (onset time: 2 weeks to 3 months) with an averaged age of 47.3 years old. Each subject was randomly received two symptom-limited exercise tests on a stationary bicycle within one week, one with one-leg cycling and the other with two-leg cycling. Oxygen consumption and heart rate were continuously monitored by Cortex Metamax 3B system (Cortex, Germany). Peak power, oxygen consumption (VO_{2peak}), heart rate (HR_{peak}), systolic/diastolic blood pressure (SBP_{peak}/DBP_{peak}) and rating of perceived exertion (RPE_{peak}) were recorded. *Results:* The one-leg and two-leg symptom-limited exercise test were safely performed. The cardiorespiratory fitness in the subjects was 2.88 ± 0.66 METs versus 3.18 ± 1.00 METs, respectively. Wilcoxon signed rank tests revealed that the VO_{2peak} , HR_{peak} , SBP_{peak}/DBP_{peak} , and RPE_{peak} obtained from the one-leg and two-leg exercise tests were no significant differences ($p > 0.05$). *Conclusion:* This pilot study suggests that for subacute stroke patients with very low fitness levels, physiological responses induced by one-leg cycling test are similar to those by two-leg cycling test. More studies to further confirm this evidence are needed.

427

MIDDLE CEREBRAL ARTERY TERRITORY INFARCT IN A YOUNG INDIVIDUAL WITH MARFAN SYNDROME

N. Hussein¹

¹Cheras Rehabilitation Hospital, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Marfan Syndrome is an autosomal dominant disorder of connective tissue with variable manifestations involving the cardiovascular system, ocular, musculoskeletal and other systems. Involvement of the cardiovascular system particularly aortic dilatation and dissection places high risk of morbidity and mortality in individuals with Marfan Syndrome. The multi-system involvement critically impacted rehabilitation course and outcome. *Material and Methods:* Descriptive case report to highlight the complexities and challenges of stroke rehabilitation of a young individual with Marfan Syndrome. *Results:* A 22-year old gentleman with Marfan Syndrome was referred to the inpatient rehabilitation facility for developing a massive right middle cerebral artery territory infarct. This occurred immediately upon completion of Bentall procedure; which was performed to treat his aortic valve and ascending aorta disease. The post-operative period was complicated with recurrent pericardial tamponade, requiring tamponade removal. The stroke related impairments were dense left hemiplegia, visuo-spatial deficits and psychological effect with low mood. Due to the Marfan syndrome, he has tall stature, bilateral partial lenses dislocation with visual acuity impairment, hyperlaxity of all joints and kyphoscoliosis. Stroke rehabilitation approaches which comprised of task-specific activities of daily living, physical and gait training were challenging due to the inter-related reduced cardiovascular status and dense weakness with premonitory hyperlaxities. The tall stature impacted on his balance and stability. Visual impairment also limited his overall progress. He endured a prolonged stroke rehabilitation phase, with strict cardiac precautions. He progressively improved and became independent within a course of 6 months. *Conclusion:* Marfan Syndrome is a connective tissue disease with multi-system complications. Rehabilitating a young individual with Marfan Syndrome and a massive right MCA infarct was tremendously challenging, with resultant meaningful outcome.

428

DUAL MUSCLE ELECTRICAL STIMULATION IMPROVED UPPER LIMB PARESIS OF PATIENTS WITH CHRONIC STROKE

J.I. Inobe¹, H. Ishi¹, T. Suetuna¹, S. Kisimoto¹, T. Kato¹

¹Inobe Hospital, Rehabilitation, Oita, Japan

Introduction/Background: We recently developed a dual muscle electrical stimulation system that stimulates synergistic muscles during shoulder flexion, elbow extension, wrist extension, and finger extension, and reciprocal muscles during scapular abduction and adduction, elbow flexion and extension, and forearm abduction and adduction. This system improves motor functions of the hemiparetic upper limbs. Here we investigated the effectiveness of this system in chronic stroke patients. **Material and Methods:** Participants: The eleven patients (male: female, 6:5; mean age: 65.9 years) with chronic stroke received dual electrical muscle stimulation. Six control patients who underwent training without this system. Interventions: The patients undergoing dual electrical muscle stimulation of the upper limb and control patients trained for 60 min per day, 5 days per week for 3 weeks. Main Outcome Measure: Outcomes were assessed using the upper extremity component of the Fugel-Meyer Assessment (FMA). **Results:** All patients completed the training successfully using this system without any incidents or complications. The mean FMA score increased from 24.09 to 30.09. ($p < 0.05$). The patients receiving this system had greater improvement in UE function than control patients (total, distal FMA, $p < 0.05$). **Conclusion:** This study demonstrates that our new dual muscle electrical stimulation system may be effective for rehabilitation of chronic stroke patients experiencing upper limb paresis.

429

OUR EXPERIENCE WITH INTRAMUSCULAR INJECTIONS OF BOTOLINUM TOXIN A FOR TREATMENT OF UPPER LIMB FLEXORS SPASTICITY AFTER STROKE

M. Ivanova¹, S. Al Kandari²

¹Physical Medicine & Rehabilitation Hospital, Physical Medicine & Rehabilitation, Sulibihat, Kuwait, ²Physical Medicine & Rehabilitation hospital, Physical Medicine Department, Sulibihat, Kuwait

Introduction/Background: Severe hypertonia in upper limb flexors muscles is a common complication in patients after stroke, interfering with the restoration of motor function and frequently causing difficulties in performing activities of daily living, pain and dysaesthesia of the affected limb. Botulinum toxin A has shown to be an effective antispastic agent. **Material and Methods:** An open-label non controlled trial for a duration of 16 weeks was designed to determine the efficacy of intramuscular injections of Botulinum toxin A in the treatment of 85 patients with spastic hemiparesis after stroke. The patients were assessed at baseline, 2, 4, 12 and 16 weeks after treatment by several outcome measures - modified Ashworth scale, motricity index arm score, semi-quantitative ordinal scale for severity of pain, patient's global response to Botulinum toxin A treatment, Barthel index of activities of daily living, difficulties encountered during three upper limb motor tasks. **Results:** Significant reduction of muscle tone, spasticity related pain and improvement in the three selected functional tasks/cleaning the palm of the affected hand, putting the affected limb into the sleeve/were observed one week after Botox A injections and were sustained throughout the 16 weeks follow up period. **Conclusion:** Botox A is effective and saves adjunctive treatment to on-going rehabilitation for patients with post stroke localized moderate to severe spasticity refractory to physical and medical treatments.

430

FUNCTIONAL OUTCOME OF BRAIN STEM STROKE AFTER COMPLICATED CEREBELLOPONTINE ANGLE TUMOR SURGERY

R.C. Jee¹, M. Mazlan¹

¹University of Malaya, Department of Rehabilitation Medicine-Faculty of Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Brain stem stroke is an uncommon complication of cerebellopontine angle (CPA) tumor surgery. In this case series, we reported two patients who suffered brain stem stroke following CPA tumor surgery. **Material and Methods:** Case one was a 20 years old lady who was diagnosed with right acoustic neuroma and developed neurological deficits (dysphonia, dysphagia, ipsilateral peripheral facial paralysis, ipsilateral hearing loss, contralateral hemiparesis with spasticity, and impaired coordination of ipsilateral limbs) resulted from right superior cerebellar peduncle and pontine infarct after the surgery. Case two was a 57 years old lady who was diagnosed with left trigeminal schwannoma and developed neurological deficits (dysphagia, contralateral central facial palsy, contralateral hemiparesis and hemi-sensory deficits) resulted from left pontine hemorrhage after the surgery. Computed tomography (CT) scan revealed a ring-enhanced tumor at right CPA, and hypodense lesion at right pons and superior cerebellar peduncle which was found on the post-operative scan. A space-occupying lesion at left CPA is shown. Post-operative scan showed hyperdense lesion over left pons. **Results:** After inpatient and outpatient rehabilitation therapies, they achieved moderate to high level of independence one year after the event. **Conclusion:** In this case series, we found that young age, high motivation and aggressive rehabilitation program are important determinants for good motor recovery and functional outcome. Medical complications such as pain, fatigue and depression should be detected and addressed as soon as possible to enable better participation in rehabilitation program.

431

THE VIDEO GUIDED MIRROR THERAPY FOR THE TREATMENT OF HAND IMPAIRMENT OF CHRONIC STROKE PATIENT, A CASE REPORT

Li Ding, Chuang Chen, Zhijie He, Jie Jia

Department of Rehabilitation, Huashan Hospital, Fudan University, Shanghai, China

Introduction: We used cameras and screens to provide the video guided mirror therapy (MT). During treatment, standard hand motion video and instruction voice were given to guide patients. This study was to observe the efficacy of the video guided MT immediately preceding physiotherapy, in treatment of hand weakness of chronic stroke patient. **Materials and Methods:** A 57 years old female patient with one-year history of right basal ganglia ischemia was admitted for her hand weakness. Our protocol included the left/right hand judgment training, the video guided MT, corresponding physiotherapy and regular usual treatment for 20 sessions, 4 weeks. During all the treatment, stretch techniques and some passive movements were offered by therapist. Outcome measures included fMRI during paralyzed and unaffected hand passive movement, and motor function tests (Brunnstrom, Wolf Motor Function Test (WMFT), Upper Limb Fugl-Meyer Assessment (UL-FMA), Berg Balance Scale (BBS) and 10-meter walk test), collected before and after treatment. **Results:** The patient accepted the treatment without any side effects and responded showing dramatic improvement, Brunnstrom stage of hand (IV to V), WMFT (50 to 60), UL-FMA (45 to 52, especially for her hand and wrist, item 19 to 30), BBS (52 to 56) and 10-meter walk test (fast velocity 1.26 to 1.44 m/s). fMRI analyses showed increased contralateral motor cortex (primary and premotor) and activation during hand passive movement after 4 weeks' video guided mirror training. **Conclusion:** Motor observation (MO) could activate the mirror neurons and promote the recovery. The standard motion videos help with

motor relearning, especially for the complex hand motion during MT. The combination of MT and videos may strengthen the effect of MO and motor relearning. The video guided mirror therapy immediately preceding physiotherapy availed to the improvement of motor function in chronic stroke patient with mild hand dysfunction.

432

DECREASED FUNCTIONAL CONNECTIVITY OF HOMOTOPIC BRAIN REGIONS IN CHRONIC STROKE PATIENTS: A RESTING STATE FMRI STUDY

Chaozheng Tang, Chuang Chen, Zhijie He, Jie Jia

Department of Rehabilitation, Huashan Hospital, Fudan University, Shanghai, China

Previous studies suggested that widespread degeneration of white matter integrity and dysfunction of brain networks far from the primary lesion correlated with motor recovery following stroke. However, the coordination of bi-hemispheric homologous areas was still unclear in chronic stroke patients. The present study mainly focuses on the functional connectivity (FC) between mirror regions of whole brain to investigate the inter-hemispheric interaction using a new fMRI method named voxel-mirrored homotopic connectivity (VMHC). Thirty left subcortical chronic stroke patients with pure motor deficit and thirty-seven age-, gender-, and handedness-matched healthy controls (HCs) received the resting-state fMRI scans. We employed the VMHC analysis to determine the brain areas showing significant difference between groups in the FC between homologous regions, and explored the relationships between mean VMHC of each survived area and clinical tests within patient group using Pearson correlation. To discriminate the patients with HCs, the receiver operating characteristic curve (ROC) analysis was performed. In addition, brain regions showing significant correlation between mean VMHC and clinical tests were defined as the seed regions for subsequent whole brain FC analysis. Relative to HCs, patients with chronic stroke displayed lower VMHC in these brain areas, including the bilateral precentral gyrus, postcentral gyrus, middle frontal gyrus, inferior frontal gyrus, thalamus, and cerebellum posterior lobe (CPL). What's more, the VMHC of CPL was positively correlated with Fugl-Meyer Score of hand (FMA-H), and negative correlation between illness duration and VMHC of this region was also detected. ROC analysis revealed that VMHC of the CPL could discriminate the chronic stroke patients from HCs with a high sensitivity and specificity. Most importantly, all of our main findings could be replicated by half verification. Our results showed that the functional coordination across hemispheres is impaired in chronic stroke patients, and increased VMHC of the CPL is significantly associated with higher FMA-H scores.

433

THE EFFECT OF JIN'S TRIPLE-NEEDLE THERAPY ON ALPHA RHYTHM POWER OF STROKE PATIENTS AND MOTOR MOVEMENT FUNCTION

Y. Xuejie¹, Y. Haibo¹, L. Da¹, Z. Tao¹, J. Jie¹

¹Department of Rehabilitation, Huashan Hospital, Fudan University, Shanghai, China

The Jin's Triple-needle therapy effect on electroencephalogram (EEG) of patients who have got stroke is observed to assume its cerebral electrical physiological mechanism of the curative effect for the patients' motor function and the daily life abilities. We selected 50 inpatients with motor dysfunction after stroke. First is to evaluate the motor function and daily life ability series scales for the patients before Jin's Triple-needle treatment and EEG monitoring, second is to let the patients have acupuncture treatment and the synchronization EEG monitoring, that is: Before the EEG detection, patients are required to close their eyes and relax. Five minutes after the EEG detection being operated the acupuncture

treatment (last for 15 minutes) is started. The EEG detection is ended five minutes after the treatment has been finished. Then the data were statistically analyzed. Therefore, the results show that the alpha rhythm power of right occipital EEG has positive correlation with Fugl - meyer limbs sensory function score and Fugl - Meyer lower limb motor function score ($p < 0.05$) and has high inverse correlation with the NIHSS score, mRS score ($p < 0.01$), especially has high positive correlation with Fugl - meyer balance function score, Fugl - Meyer upper limb movement function score, MBI scores and Fugl - Meyer activity joint pain scores ($p < 0.01$); While it also shows that alpha rhythm power of right occipital EEG has inverse correlation with Fugl - Meyer activity joint pain scores ($p < 0.05$). alpha rhythm amplitude increases more in the stage of after removing needles than the resting stage before acupuncture treatment.

434

BILATERAL TRANSCRANIAL DIRECT CURRENT STIMULATION IMPROVING HAND DYSFUNCTION AFTER CHRONIC STROKE

Chaozheng Tang, Chuang Chen, Jie Jia

Department of Rehabilitation Medicine, Huashan Hospital, Fudan University

Background: Hand function loss is the cardinal feature and most common presenting symptom following stroke, and spontaneous recovery often reach plateau in stroke patients six months after insult. Traditional rehabilitation strategies are too non-specific for patients to regain necessary hand recovery. Study, verifying the feasibility of new rehabilitation method delivered to stroke patient with severe hand impairment, has the crucial significance to enhance their self-care level. *Purpose:* This study describes the exciting effect that incorporates transcranial direct current stimulation (tDCS) and task-oriented functional stimulation therapy (FET) for stroke patients with minimal motor recovery. *Case Description:* The patient was a 51-year man who had a hemorrhage (left basal ganglia) 13 months prior to recruitment. At baseline evaluation, the patient was not able to voluntarily extend his any fingers beyond 5 degrees. From second days after fMRI and other tests, the patient received 20 min tDCS and 60 min FET per session for 4 weekdays. *Results:* All clinical measures [modified Ashworth Scale (pre: 6.5, post: 3.5), Fugl-Meyer Assessment (pre: 13, post: 20), Action Research Arm Test (pre: 6, post: 11), and Broetz Hand Function Test (pre: 14 post: 28)] improved substantially after 4 weeks treatment. And significant increment was also found in the lateralization index of activation of sensorimotor cortex (pre: 0.11, post: 0.82) and fractional anisotropy of affected posterior limb of internal capsule (pre: 0.12; post: 0.27). *Conclusions:* The improved outcome suggest that tDCS plus FET may provide a potential option for the chronic stroke patients with severe hand dysfunction, and this technique was feasible to accelerate the brain plasticity following stroke with relative less time consuming. However, further study was warranted to clarify the efficacy of this combined intervention.

435

A STROKE PATIENT WITH PERSISTENT DISTURBANCE OF CONSCIOUSNESS WHO RECOVERED FROM CERVICAL DYSTONIA AND COULD COMMUNICATE BY USING BOTULINUM TOXIN TYPE A TREATMENT.

K. Kagechika¹, M. Nakata¹, M. Tsubokawa¹, F. Takeuchi¹, W. Ohsu¹, Y. Takagi², A. Nakanami²

¹Kanazawa Medical University, Rehabilitation Medicine, Uchinada, Japan, ²Tonami General Hospital, Rehabilitation Medicine, Tonami, Japan

Introduction/Background: We introduce a case of severely quadriplegia with persistent disturbance of consciousness for 3 years. By the rehabilitation, he could get the ability of expressing his own will.

At age 26 he suffered from gigantic thalamic hemorrhage. *Material and Methods:* After 1 year treatment in a hospital he returned home and continued to take a physical, occupational and speech therapy at his home by visiting rehabilitation and at our hospital. At first we tried many method of the communication by his own voluntary muscles, but in vain he could not move any muscles of course could not speak and eat. (Glasgow Coma Scale was E3,V1, M4) After 1 year training, his conscious disturbance was getting changed for the better, and facial muscles and right hand could move and express his will. Because of his severely quadriplegia and he could write or draw by pen. He could not write accurately because of cervical dystonia preventing from his looking at paper at hand. So we set the monitor in front of his eye and trained the writing. Visual cognitive enable him to write and draw. After that we made another trial of injecting him with botulinum toxin at his neck. *Results:* The spasticity got decreased and he could turn his face toward the front. Now he can control his right hand by his own will, and express his will by writing. *Conclusion:* For the patients with conscious disturbance, long term rehabilitation e.g. visiting rehabilitation is very effective.

436

CORRELATION BETWEEN QUALITY OF LIFE AND UPPER EXTRIMITY FUNCTION IN STROKE PATIENTS

C.Y. Kang¹, J.H. Chang¹

¹National Cheng Kung University, Department of Occupational Therapy- College of Medicine, Tainan, Taiwan

Introduction/Background: To improve upper extremity (U/E) motor function is usually an urgent need for patients with stroke undergoing inpatient rehabilitation program. The quality of life (QoL) of patients with stroke are also affected by their U/E function. This study aimed to identify the relationship between QOL and U/E motor function, which affected hand function, bilateral hand function in stroke acute phase. *Material and Methods:* Thirty-nine inpatients (34 males, 5 females) with first stroke was enrolled in this study. The UE motor impairment was examined by Fugl-Meyer assessment-UE (FMA-UE). The affected hand function was examined by Simple Test for Evaluating Hand Function (STEF). The bilateral hand function was measured by Chedoke Arm and Hand Activity Inventory (CAHAI). And the QoL was evaluated by World Health Organization Quality of Life-Abbreviated form Taiwan version (WHOQoL-BREF) which has four domains related to physical, psychological, social relationship and environment factors respectively. *Results:* The FMA-UE and CAHAI had significant correlation with physical domain ($r=0.316$ & 0.334 respectively) and psychological domain ($r=0.320$ & 0.321 respectively) of WHO-QoL-BREF. The STEF had significant correlation with physical, psychological and social relationship domain ($r=0.318-0.402$) of WHOQoL-BREF. *Conclusion:* All of three hand function assessment tools (the STEF, CAHAI, and FMA-UE) had positive correlation with the physical and psychological domains of WHO-QoL-BREF. However, there was only the STEF correlated with the social relationship domain of WHOQoL-BREF. The results of the STEF could assist clinicians in noticing the psychological and social problems in patients with stroke. Thus, compared with the CAHAI and FMA-UE, the STEF seems more suitable to be used to further evaluate the affected hand functions in patients with stroke.

437

THE EFFECTS OF MIRROR THERAPY ON CENTRAL FACIAL PARESIS IN SUBACUTE STROKE PATIENTS

J.A. Kang¹

¹Asan Medical Center, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: The aim of this study was to investigate the additional effects of visual feedback training using mir-

ror therapy on facial paresis after stroke. *Material and Methods:* A prospective randomized controlled study. The experimental group ($n=10$) applied conventional orofacial exercise therapy and additional orofacial exercise using mirror therapy, whereas the control group ($n=11$) treated only with conventional orofacial exercise therapy. Mirror therapy was this: 1. Use mirror application, and reverse right and left. 2. Cover the half of the screen of tablet PC, that opposite to un-affected side. 3. Do oro-facial exercise with looking the screen. Therapy was conducted for fifteen minutes, two times for a day, total 14 days. All patients were checked the Regional House-Brackmann Grading Scale (HBGS) and the length between the corner of the mouth and earlobe at rest and during smile in bilateral side before and after the therapy. We calculated the difference and the ratio between bilateral side to compare the change of improvements between the two groups. *Results:* Baseline characteristics are similar between the two groups, including age, sex, type of stroke (ischemic or hemorrhagic), basal Modified bathel index (MBI), K-MMSE and NIHSS (except 4 patients, not recorded the score). The HBGS, length differences and length ratio between bilateral side during rest and smile showed significant differences after therapy in both groups. Compared to both groups, the improvements of facial movement which is measured by the length ratio (p -value=0.009) in additional mirror therapy group were significantly larger than conventional therapy group, but not by length differences. (p -value=0.063) *Conclusion:* This study showed the effects of conventional orofacial exercise therapy on facial paresis after stroke. And, additional visual feedback training using mirror therapy was more effective than conventional orofacial exercise therapy only. This study was small sized, so more enlarged studies will be conducted to confirm the effectiveness of the new rehabilitation method.

438

EFFECTS OF A COMBINED FUNCTIONAL ELECTRICAL STIMULATION WITH TRAINING ACTION OBSERVATION FOR BALANCE AND GAIT PERFORMANCE IN STROKE PATIENTS

K.Y. Kang¹

¹Wonkwang Health Science University, Physical Therapy, Iksan, Republic of Korea

Introduction/Background: The purpose of this study is to evaluate the functional effects of action observation plus functional electrical stimulation treatment on weight distribution, stability index, gait velocity and stride length of stroke patients. Subjects more than six months post stroke participated were divided into ten experiment group and ten control groups randomly. *Material and Methods:* TETRAX and GAITRite were measured at baseline, six-weeks after treatment. Experiment group and control group both received functional electrical stimulation treatment and experiment group received additional watching action observation. Repeated measure ANOVA was used to analyze the before and after the intervention. *Results:* The result of interaction between group and period showed significant increase in weight distribution (heel-toe), weight distribution (right-left), stability index, gait velocity and stride length ($p<0.05$). and between group showed not significant in weight distribution (heel-toe), stability index and stride length ($p>0.05$). *Conclusion:* Action observation plus functional electrical stimulation treatment should be considered as a therapeutic method for physical therapy for stroke patient to improve the weight distribution, stability index, gait velocity and stride length.

439

PREDICTABLE NEUROPSYCHOLOGICAL TESTS ON THE DRIVING ABILITY FOR PATIENTS WITH BRAIN DISORDERS

T. Kato¹, T. Suetsuna¹, M. Shiino¹, R. Yamazaki¹, N.

Kubota¹, J.I. Inobe², A. Inagaki³

¹Inobe Hospital, Rehabilitation, Oita, Japan, ²Inobe Hospital, Medicine, Oita, Japan, ³Oita University of Nursing and Health Sciences, Department of Nursing, Oita, Japan

Introduction/Background: Predicting driving ability for patients with brain disorders is difficult problem. The purpose of this study is to investigate the best combination of neuropsychological tests to predict the driving ability for patients with brain disorders. **Material and Methods:** We conducted a retrospective survey on 80 participants with brain disorders including strokes, traumatic brain injuries, and brain tumors. Participants underwent on-road evaluations in 2006 and 2015. All eligible data were analyzed by binary logistic regression analysis in the backward stepwise manner. Neuropsychological test results were entered as independent values. Pass or Fail results for on-road evaluation results were entered as dependent values. Validity of the test was examined by predicting the results of the driving evaluation for another 36 participants. Statistical analysis was conducted using SPSS ver. 17. **Results:** Twenty participants were classified in the “Fail” category. Sixty participants were classified in the “Pass” category. Both categories were based on the on-road test. There was significant difference between TMT-A, B, Kohs IQ, Rey copy, immediate recall and Star cancellation between the groups ($p < 0.05$). Binary logistic regression analysis suggested that TMT-A and Kohs IQ was the best combination to predict driving ability (Area under the curve 0.83). This model correctly classified 77% of another 36 participants with 80% and 76% on sensitivity and specificity. **Conclusion:** Driving requires integrated cognitive functions including visual attention, spatial cognition, and executive function. The results indicated that visual attention and spatial cognition, assessed by TMT-A and Kohs, may be important cognitive functions related to driving ability. Further studies with more participants are needed.

440

EVALUATION OF GAIT IN STROKE PATIENTS WITH SPASTIC HEMIPARESIS AFTER THE THERAPY OF BOTULINUM TOXIN TYPE A (BONT-A)

*N. Kawate*¹

¹Showa University School of Medicine, Rehabilitation Medicine, Tokyo, Japan

Introduction/Background: After the therapy of Botulinum toxin type A (BoNT-A) for lower limb spasticity, the patients' subjective evaluation of the outcome is lower than the objective evaluation. In this study, we evaluated changes in spastic gait after injection of BoNT-A with an objective instrument. **Material and Methods:** The subjects were 16 stroke patients (10 with cerebral hemorrhage and 6 with cerebral infarction). All were capable of walking barefoot. In total, 200–300 units of BoNT-A were injected into the spastic muscles (gastrocnemius, soleus, and posterior tibial) in the affected lower leg of each patient. Each subject's gait was evaluated before and one month after the treatment by means of gait analysis employing a foot pressure measurement system with a sheet sensor (ANIMA Corp.) The measurements included gait speed and proportions of double support (Ds) in the gait cycle. Based on the changes in gait speed after treatment, the subjects were divided into decreased gait speed (DGS; $n=7$) and increased gait speed (IGS; $n=9$) groups. The proportions of Ds phases in the gait cycle were compared between these two groups. **Results:** In the performance analysis for the affected legs, the decreased speed gait group exhibited an increase in Ds, while the increased gait speed group exhibited a decrease in Ds. **Conclusion:** We consider decreased speed and increased Ds in the DGS group to be attributable to the loss of stable support resulted from their spastic legs due to an acute reduction of spasticity with BoNT-A. On the other hand, the increased speed and decreased Ds in the IGS group was attributed to improved flexibility of the ankle joints of the affected limb. Our results suggest objective instrumental evaluation to be useful for in-depth evaluation of the effects of BoNT-A.

441

MOBILITY ASSESSMENT IN COMPARISON BETWEEN EARLY AND LATE REHABILITATION IN STROKE - A PROSPECTIVE MULTICENTRE COHORT STUDY IN BANGLADESH

*M.R. Khasru*¹, *A.K.M. Salek*¹, *M. Sakef*², *A.B. Siddiq*³, *F. Haseen*⁴, *M. Moniruzzaman*⁵, *M. Hasan*⁶, *D. Wilkinson*⁷

¹Bangabandhu Sheikh Mujib Medical University, Physical Medicine and Rehabilitation, Dhaka, Bangladesh, ²East Kent University- UK, Neuro Rehab, Canterbury, United Kingdom, ³Feni Diabetic Hospital- Feni, Physical Medicine and Rehabilitation, Feni, Bangladesh, ⁴Bangabandhu Sheikh Mujib Medical University, Public Health and Informatics, Dhaka, Bangladesh, ⁵Dhaka Medical College and Hospital, Physical Medicine and Rehabilitation, Dhaka, Bangladesh, ⁶ICDDR'B, Biostatistics, Dhaka, Bangladesh, ⁷University of Kent, Neuro Rehab, Canterbury, United Kingdom

Introduction/Background: Stroke is a leading cause of disability in Bangladesh (BD). Many investigators have argued that early rehabilitation could maximize recovery from stroke. Aim is to assessment mobility outcome with early and delayed initiation of rehabilitative intervention among patients after stroke. **Material and Methods:** Data was collected prospectively for 12 months in 2013 in this multi-centre study in Bangladesh after obtaining IRB approval and consent from patients. 4 groups of patients depending on commencement of Rehabilitation: a) Very Early: 0–24 hrs post stroke b) Early: 24–72 hrs post stroke. c) Intermediate: 3–7 days post stroke d) Late: 8–60 days post stroke. Dependent variables: NIH Stroke Scale, Spasticity, Inattention, Urinary incontinence. Independent variables: Age, Sex, occupation, Height, Weight, Body Mass Index, Site of lesion, Duration of stroke, co-morbidity, rehabilitative interventions, NIH score. (1st, 3rd & 12 wks). **Results:** Among all respondent ($n=235$) 57.4% were >60 years of age, 51.1% were male, all were right handed, Ischemic stroke were 70.2%. Co-morbidity assessment results showed DM38.3%, Hypertension 95.7%, IHD 4.3%. Among all respondent 17.0%, 42.6%, 23.4% and 17.0% were belonged in very early, early, intermediate and late rehab group respectively. Stroke severity was mild 21.3%, Moderate 59.6% and severe 19.1% on NIHSS score. During enrollment ($n=235$) High mobility restriction 85.1%, Moderate mobility restriction 8.5% and Low mobility restriction 6.4% on Rivermead Mobility Index. Duration between stroke and Rehabilitation initiation cross tabulation with Rivermead Mobility Index, improvement on mobility is found in all groups but more improvement in very early group and “p” value was <0.001 in both 3rd week and 12th week follow-up. On multinomial logistic regression analysis, factors shows the independent affiliation with highly mobility restriction to moderate mobility restriction of Rivermead Mobility Index included younger age <60years, male patient, married, hemorrhagic stroke, stroke on bilateral site. **Conclusion:** Limited evidence exists in this cohort.

442

CHARACTERISTICS AND RISK FACTORS OF LONG-TERM SEVERE DYSPHAGIA IN PATIENTS WITH ANEURYSMAL SUBARACHNOID HEMORRHAGE

*M.S. Kim*¹, *J.W. Choi*¹, *S.J. Jeon*², *D.W. Kim*³, *S.D. Kang*³

¹Wonkwang University and Hospital, Physical Medicine and Rehabilitation, Iksan, Republic of Korea, ²Wonkwang University and Hospital, Radiology, Iksan, Republic of Korea, ³Wonkwang University and Hospital, Neurosurgery, Iksan, Republic of Korea

Introduction/Background: We investigated characteristics and risk factors in patients with severe dysphagia at 6 months after aneurysmal subarachnoid hemorrhage (aSAH). **Material and Methods:** All patients with first-ever aSAH confirmed by brain computed tomography (CT) or magnetic resonance imaging (MRI) were identified retrospectively for 5 years (from May 1, 2010 to Apr 30, 2015). We excluded the patients accompanied with another intracranial hemorrhage or infarct.

Subjects were dichotomized severe dysphagia with nasogastric (NG) or percutaneous endoscopic gastrostomy (PEG) tube feeding and oral intake group at 6 months from the onset. Clinical characteristics of severe dysphagia were assessed by videofluoroscopic dysphagia scale (VDS) using videofluoroscopic swallowing study (VFSS). Clinical data including age, sex, past medical history, period of intubation, fasting glucose level, Glasgow Coma Scale (GCS), and Mini-Mental Status Examination (MMSE) at the time of the onset were collected through medical records. In addition, we investigated radiologic features including the amount of hemorrhage using Hijdra score, the presence of intraventricular hemorrhage (IVH), and location of aneurysm at the time of the onset to identify risk factors of long-term severe dysphagia. **Results:** Fifty nine patients fulfilled criteria and 18 patients still showed severe dysphagia at 6 months from onset. The mean VDS score of patients with severe dysphagia was 68.25 ± 12.85 , and the abnormalities in pharyngeal phase were prominent. The oral and pharyngeal transit times were also delayed considerably. In univariate analysis, age, diabetes mellitus, fasting glucose level, GCS, MMSE, Hajdra score, and the presence of IVH at the time of the onset were significantly associated with severe dysphagia ($p < 0.05$). Multivariate logistic regression analysis showed that GCS, MMSE, and Hajdra score were significantly correlated with severe dysphagia at 6 months ($p < 0.05$). **Conclusion:** The major risk factors of long-term severe dysphagia were GCS, MMSE, and the amount of hemorrhage at the time of the onset in patients with aSAH.

443

FOOT EDEMA IN HEMIPLEGIC PATIENTS AFTER STROKE - INCIDENCE AND CORRELATION BETWEEN EDEMA AND VARIOUS MEASURES

S.K. kim¹, Y.S. Jo²

¹Konkuk University School of Medicine, Rehabilitation Medicine, Chungju, Republic of Korea, ²Konkuk University School of Medicine, Neurology, Chungju, Republic of Korea

Introduction/Background: In post-stroke hemiplegic patients, edema often occur at upper limbs or lower limbs on the side of paralysis. The purpose of this study was to identify the incidence of the foot edema in post-stroke hemiplegic patients and to examine the relationships with various measurements. **Material and Methods:** Patients with post-stroke hemiplegia were recruited from 2014 until 2015 ($n=86$). The volume of foot was measured with a water displacement volumetry and edema was defined as the volume difference between unaffected and affected foot is more than two standard deviation. Additionally we investigated several measurements of lower limbs which included the strength of paretic side (Motricity Index), spasticity (Modified ashworth scale), sensibility, somatosensory evoked potential and the motor function (Lower Extremity Motor Coordination Test). **Results:** 20 patients among the 86 patients (23.3%) satisfied the our cut-off point of edema. Edema were significantly more often seen in patients with hypertonia, hypoesthesia and muscle weakness of paretic side (Table I.). And we found significant negative correlation between motor function of paretic side. **Conclusion:** In post-stroke hemiplegic patients, edema of the paretic foot is common at subacute period. And foot edema of the paretic side has significant association with muscle tone, sensibility, muscle strength and motor function. Thus, the active prevention and the management of foot edema in post-stroke hemiplegic patients is very important. We expect rehabilitation experts would take into account controlling and preventing edema as an important factor in rehabilitating and gait-training hemiplegic patients.

Table I. Foot edema and patient characteristics in patients with stroke at test

	N (total=86)	edema (%)	p-value
Tonus of the lower limb			
normo/hypotonia	62	11.3	
hypertonia	24	54.2	<0.0001
Sensibility			
normal	61	9.8	
hyposensibility	25	56.0	<0.0001
Motricity Index Score			
1-57	40	45.0	
58-100	46	4.4	<0.0001

444

WHEN AND HOW CAN WE PREDICT THE OUTCOME OF ACUTE STAGE OF STROKE PATIENTS?

Y. Kitaji¹, A. Okajima¹, W. Isozaki², A. Suzuki¹, Y. Shimizu¹, M. Yamazaki¹, K. Motohashi¹, H. Harashima¹, S. Miyano¹

¹Tokyo General Hospital, Department of Rehabilitation, Nakano-ward, Japan; ²Nursing Home Aqua Higashikojiya, Department of Rehabilitation, Ota-ward, Japan

Introduction/Background: The prediction of stroke outcome has been studied for a long time. However, we don't know when and how we can predict the outcome of acute stage of stroke patients. The purpose of this study is to find out the optimal outcome prediction time and the evaluation methods of the acute stage of stroke. **Material and Methods:** Subjects were 133 stroke patients in acute stage (age 74.7 ± 11.7 years, length of stay 49.8 ± 51.0 days, NIHSS at admission 6.2 ± 9.1 points; mean \pm SD). Exclusion criteria were length of stay less than 7 days and necessary to assist in ADL before the onset. Evaluation batteries were NIHSS, mRS, and Barthel Index. These measurements were performed every other day within one week from the onset. At discharge, we evaluated the post hospital disposition (home or others), independent or dependent at ADL, and improvement in mRS. Statistical analysis were used the proportional hazards analysis and the ROC curves. **Results:** 1) We can predict the outcome of the acute stage of stroke patients by NIHSS score at day 5 and BI score at day 7. 2) Cutoff point of NIHSS at day 5 was 2.5 points for post hospital disposition, ADL, and mRS. 3) Cutoff point of BI score at day 7 was 42.5 points for post hospital disposition, 37.5 points for ADL, and 27.5 points for mRS, respectively. **Conclusion:** These results suggest the possibility that efficient outcome prediction can be made by the evaluating the NIHSS at 5th day and BI at 7th day after onset, respectively.

445

DYSPHAGIA ACCORDING TO CONTRALATERAL PRE-EXISTING LESIONS INVOLVING CBT IN UNILATERAL CORONA RADIATA STROKE PATIENTS

E.J. Ko¹, K.H. Choi¹, S.U. Kwon²

¹Asan Medical Center, Department of Rehabilitation Medicine, Seoul, Republic of Korea, ²Asan Medical Center, Department of Neurology, Seoul, Republic of Korea

Introduction/Background: Dysphagia is a common functional impairment of stroke. Corticobulbar tract (CBT) is a very important tract involved in swallowing. CBT from one side of the brain project to the motor nuclei on both sides of the brainstem, therefore it is thought that impairment of CBT from only one side could save swallowing function because the tract of the other side is safe. High signal intensity lesions on T2-weighted MRI are frequent incidental findings, and they include age-related white matter changes (ARWMCs) and previous stroke sequelae. The aim of this study is to investigate dysphagia according to contralateral pre-existing lesions involving CBT in unilateral corona radiata stroke patients with CBT involvement. **Material and Methods:** It was a retrospective study and patients admitted to the Department of Neurology during Sep, 2011 to Aug, 2014 and patients with the first unilateral ischemic stroke within 7 days of onset, with corona radiata lesions involving CBT were included. All patients ($n=87$) went on bedside swallowing test (BST), and feeding method at admission was determined. After BST, some of the patients ($n=16$) who needed objective examination went on videofluoroscopic swallowing study (VFSS). **Results:** There was no difference in baseline characteristics between patients with pre-existing lesions involving CBT ($n=20$) and patients with pre-existing lesions without CBT involvement or no lesions ($n=67$). Feeding method at discharge showed significant difference according to contralateral pre-existing lesions involving CBT. ASHA NOMS showed significant difference, and PAS tended to present difference between the two groups. Using multivariate logistic regression analysis and multivariate linear re-

gression analysis, it is found that ‘pre-existing lesions involving CBT’, but not age, is the factor influencing feeding method at discharge and ASHA NOMS. *Conclusion:* Unilateral corona radiata stroke patients who have contralateral pre-existing lesions involving CBT seem to have dysphagia more than the others, and the prognosis of dysphagia is poor.

446

AN IMPORTANT ATTENTION FOR BOTULINUM TOXIN TYPE A TREATMENT IMPROVED PAINFUL FLEXOR TOE CAUSED BY STROKE SPASTICITY: A CASE REPORT

Y. Kurihara¹, H. Tanaka¹, K. Furuno², Y. Masakado³

¹Shonan Tobu General Hospital, Rehabilitation Medicine, Chigasaki, Japan, ²National Hospital Organization Tokyo Medical Center, Rehabilitation Medicine, Tokyo, Japan, ³Tokai University School of Medicine, Rehabilitation Medicine, Isehara, Japan

Introduction/Background: Target muscles for flexor toe spasticity are usually due to the flexor hallucis longus (FHL) and the flexor digitorum longus (FDL). There were some reports that the FHL and the FDL sent to fiber each other. *Material and Methods:* Case Description: A 64-year-old man had developed spastic right hemiplegia after the left putaminal hemorrhage six years ago. The Brunnstrom stage of lower limb was at stage III. His chief complaint was the severe 2nd, 3rd, 4th, 5th toe pain in standing and walking. *Results:* We injected Botulinum toxin A (BTA: Botox®) by electrical stimulation and US guided. The target muscles and doses as follows (only showed for flexor toe): In the initial treatment, target muscle and dose was the FDL 80 U, the flexor digitorum brevis (FDB) (2, 3, 4, 5 digit) 20 U×4 and quadratus plantae (QP) 40U. When the FDL was stimulated electrically during injection, the hallux toe flexed. The toe pain was disappeared in standing and reduced in walking. He could continue to gait exercise. After five months, he complained his hallux, 2nd and 3rd toe pain (especially 2nd toe pain severe) during gait, having callosity in the hallux toe. When he was walking, his hallux, 2nd and 3rd toe flexed in stance phase. In second treatment, target muscle and dose was the FHL 70U, FDL 70U, FDB (2, 3 digit) 30 U×2 and QP 40U. When the FHL was stimulated electrically, not only his hallux but also 2nd and 3rd digit flexed simultaneously. The toe pain reduced and his toe did not flex during walking. He has been free from painful flexor toe in walking during one year and disappeared of hallux toe callosity. *Conclusion:* When we perform the BTA treatment of the FHL and the FDL, we may pay attention to which digits are influenced by both the FHL and the FDL by means of contracture pattern.

447

FACTORS AFFECTING THE EARLY RECOVERY OF BALANCE FUNCTION IN STROKE PATIENTS

Y. Kyojun¹, M. Sohn¹

¹Chungnam National University Hospital, Department of Rehabilitation Medicine, Daejeon, Republic of Korea

Introduction/Background: To find factors affecting early recovery of balance function in stroke patients. *Material and Methods:* Medical records of 362 stroke patients admitted to rehabilitation department from May 1, 2014 to Apr 31, 2015 were reviewed retrospectively. Patients were included if Berg balance scale (BBS) was reported below 20 points of at initial evaluation, and improvement to acceptable balance (>20 points) until 2 months after transfer to rehabilitation department. Of 362 cases reviewed, 52 patients were ultimately included. And, they were divided into 2 groups (early recovery group, who improved within 4 weeks from the onset; late recovery group who improved after 4 weeks from the onset. Demographic, clinical characteristics, rehabilitation characteristics, and electrophysiological data were compared. *Results:* Twenty out of 52 patients were enrolled to the early recovery group. There was no significant dif-

ference between 2 groups in age, sex, lesion side, stroke location, TOAST classification, initial treatment, motor evoked potential of lower extremities, modified rankin scale (mRS). Patients with early recovery in balance function were more frequent in ischemic stroke (85.0%) than hemorrhagic stroke (15.0%) ($p<0.05$). Patients with late recovery tended to be complete lesion in tibial somatosensory evoked potential (SSEP) than those with early recovery ($p<0.05$). Time from onset to transfer in rehabilitation department was significantly shorter in stroke patients with early recovery ($p<0.05$). *Conclusion:* Our study suggests that recovery rate of balance function was slow for patients with hemorrhagic stroke. And slow recovery can be thought by SSEP of lower extremities which was considered for the predictive factor in recovery of balance function. The significant delay of transfer time to the rehabilitation department can attribute the slow recovery. Further studies with a larger sample size are needed for generalized conclusions.

448

ROBOTIC-ASSISTED GAIT TRAINING IN INDIVIDUALS WITH STROKE

C.H. Lai¹, P. Chih-Wei¹, K. Jiunn-Horng¹, H. Chih-Chao¹, C. Shih-Ching¹, J. Jia-Yu¹

¹Department of Physical Medicine and Rehabilitation, School of Medicine, College of Medicine, Taipei Medical University, Taipei, Taiwan

Introduction/Background: Stroke is a leading cause of long-term disability and affects cognition, walking ability, balance, and functional performance. Robot-assisted gait training system (RGTS) is important issues in the advanced rehabilitation medicine. RGTS allow delivering continuous support and guidance for the legs in a physiological gait pattern, higher repetition accuracy, and intensive training. Despite an increasing amount of RGTS intervention, determination of their effectiveness has remained controversial. The purpose of this study is to investigate the effects of RGTS and in individuals with stroke. *Material and Methods:* In this study, we compared the efficacy of RGTS combined with the conventional rehabilitation training (group A) to only undergoing conventional rehabilitation training (group B) in individuals with stroke. The Mini-Mental State Examination (MMSE), Berg Balance Scale (BBS), motricity index (MI), functional ambulation category scale (FAC) and Barthel Index (BI) were evaluated before and after training for all participants of both groups. *Results:* In group A, Participants showed significant improvement after training in BBS, FAC, BI and MI ($p<0.05$) and revealed a trend of improvement after training in MMSE. In group B, a trend of improvement occurred after training in BBS, FAC, BI, MMSE and MI. Between-group comparison, group A showed significantly greater gains in Berg balance scale and motricity index ($p<0.05$) than those in group B ($p<0.05$). *Conclusion:* Treatment with RGTS and traditional rehabilitation appears to be more effective than only undergoing traditional rehabilitation for enhancing returns in balance and muscle strength in individuals with stroke. *Conflicts of Interest/Disclosure:* All coauthors have no conflicts of interest to report; this work was supported by the National Science Council, Taiwan, under grants MOST103-2221-E-038 -012 and MOST104-2221-E-038 -008.

449

THE IMMEDIATE EFFECT OF WHOLE BODY VIBRATION ON SPASTICITY IN STROKE PATIENTS – A PILOT STUDY

W.C. Liao¹, Y.F. Chen², K.L. Chang¹, S.Y. Tseng¹, C.L. Lai¹

¹Department of Physical Medicine and Rehabilitation, Taichung Hospital- Ministry of Health and Welfare, Taichung, Taiwan, ²Department of Health Services Administration, China Medical University, Taichung, Taiwan

Introduction/Background: The whole body vibration training (WBV) had many benefits by previous studies, but the effect of

WBV application on improving muscle spasticity and functional performance in stroke patients were Insufficient. The purposes of this study try to find out if the two different frequencies WBV can immediately reduce muscle spasticity and pain and improve functional performance in stroke patients. *Material and Methods:* This study was performed at Department of Physical Medicine and Rehabilitation, Taichung Hospital, Taichung, Taiwan; and was approved by the Institutional Review Board of Jianan Mental Hospital. This study was Cross-over design. Total of 21 stroke patients were recruited in this study. The Participants stood on WBV platform for 5 minutes in a natural standing posture. Both high-frequency (30 Hz) and the low-frequency (20 Hz) WBV were performed respectively with a week apart, where all the vibration amplitude were 0–4 mm. The WBV device (LV-1000; X-trend, Taiwan) provided horizontal vibration. The study used modified Ashworth scale (MAS), Clonus, Time up and go (TUG) and Visual Analogue Scale (VAS) to measure the muscle spasticity, pain and function performance. *Results:* Total of 21 participants completed this study. The mean age were 60.37 years old and the onset time were 44.43 months after stroke. After high-frequency WBV, the TUG, ankle clonus, elbow flexor, wrist flexor and ankle extensor muscle tone had significant improvement ($p < 0.05$); After low-frequency WBV, the TUG, VAS, elbow flexor, wrist flexor, knee extensor and ankle extensor muscle tone had Significant improvement ($p > 0.05$); Comparing these two frequency, the high-frequency had better outcome on elbow and wrist extensor muscle tone, but low-frequency had better outcome on shoulder and knee flexor muscle tone. *Conclusion:* Our study showed the WBV had partial immediately effect on muscle spasticity and functional performance.

450

RELIABILITY AND VALIDITY OF THE UPRIGHT MOTOR CONTROL TEST IN ADULTS WITH CHRONIC STROKE

F.R. Lunar¹, E.J. Gorgon¹, R. Lazaro²

¹University of the Philippines, Physical Therapy, Manila, Philippines, ²Samuel Merritt University, Physical Therapy, Oakland, USA

Introduction/Background: Deficits in strength still persist and negatively influence function despite intensive rehabilitation within the first six months post-stroke. The Upright Motor Control Test (UMCT) is an example of a measure that can determine effectiveness of interventions that address this. However, there is limited evidence that describes its reliability and validity in chronic stroke. This study aimed to describe the inter-rater and retest reliability of the Upright Motor Control Test as well as its concurrent validity with the Five Times Sit to Stand Test as a measure of lower extremity strength in adults with chronic stroke. *Material and Methods:* Using an observational methodological design, three raters of varying clinical experiences measured UMCT flexion and extension scores of adults with chronic stroke on two different occasions scheduled two weeks apart. Participants had any or a combination of spasticity, lack of selective muscle control or patterning of the affected lower extremity. Five Times Sit to Stand Test scores were also obtained for concurrent validity. *Results:* For 16 participants, UMCT extension component had substantial to almost perfect inter-rater reliability (W range=0.67–0.92) while the flexion component had substantial interrater reliability (W range=0.69–0.71). Retest reliability for all raters were substantial to almost perfect for the extension (W range=0.73–0.89) and flexion (W range=0.71–0.89) components. Validity analyses indicated weak positive correlation of UMCT flexion scores ($p=0.183$) and fair negative correlation of UMCT extension scores ($p=-0.287$) with Five Times Sit to Stand Test scores. Only the knee extension correlation was statistically significant ($p=0.009$). *Conclusion:* Preliminary findings suggest reliability of UMCT for measuring strength in adults with chronic stroke. Validity results imply the potential of UMCT extension component as an alternative means of describing strength among adults with chronic stroke.

451

SENSITIVITY TO CHANGE IN THE KNEE EXTENSION COMPONENT OF THE UPRIGHT MOTOR CONTROL TEST IN AN ADULT WITH CHRONIC STROKE: A CASE REPORT

F.R. Lunar¹, R. Lazaro²

¹University of the Philippines, Physical Therapy, Manila, Philippines, ²Samuel Merritt University, Physical Therapy, Oakland, USA

Introduction/Background: Even after intensive rehabilitation within the first six months post-stroke, deficits in strength still persist and influence function in those with chronic stroke. Outcome measures are important to determine effectiveness of interventions that address this. The Upright Motor Control Test (UMCT) is one example of such measure but has not been studied extensively in literature. In particular, there is limited evidence that describes its sensitivity for adults with chronic stroke. The purpose of this case report is to determine the usefulness of UMCT in determining outcomes of a task-oriented circuit training designed for an adult with chronic stroke. *Material and Methods:* The patient is a 61 year old male who had a stroke 9 years ago. Assessment findings prior to the intervention reveal decreased left knee extensor strength, impaired static and dynamic balance as well as slow gait speed. Physical therapy sessions consisted of 1.5 hours of an exercise circuit comprised of progressive resistance exercises for the knee flexors and extensors as well as task-oriented repetitive exercises that simulate functional demands during community ambulation. *Results:* After completing twelve sessions, patient showed improvements in UMCT knee extension score from ‘weak’ to ‘moderate,’ improved overall lower extremity strength measured by the Five Times Sit to Stand test, increased gait speed, and improved static and dynamic balance. *Conclusion:* This case demonstrates that UMCT was able to detect an improvement in strength after 12 sessions of task-oriented circuit training in an adult with chronic stroke.

452

FUNCTIONAL ELECTRICAL STIMULATION IN COMBINATION WITH GAME-BASED VIRTUAL REALITY FOR HEALTH-RELATED QUALITY OF LIFE AND UPPER EXTREMITY FUNCTION: A RANDOMIZED, SINGLE BLINDED ON-GOING TRIAL

J. Lee¹, M.Y. Kim¹, J.Y. Lee¹, Y.J. Jeon¹, S. Joon-Ho¹

¹Korea National Rehabilitation Center, Rehabilitation Hospital, Seoul, Republic of Korea

Introduction/Background: Functional electrical stimulation (FES) has been used to improve distal upper extremity function in stroke patients, however it is not intriguing. Recently game-based virtual reality rehabilitation has gained popularity because of its characteristics of interactivity and meaningful play. Therefore, we hypothesized that FES combined with game-based virtual reality (VR) rehabilitation has specific effects on health-related quality (HRQoL) of life as well as functional improvement. The purpose of the present study was to investigate the effects of FES combined with game-based VR rehabilitation on HRQoL and distal upper extremity function. *Material and Methods:* The present study was a randomized, single-blinded controlled ongoing trial. Stroke patients were randomized to a VR Group (30 minutes of FES plus game-based VR rehabilitation system) or control group (30 minutes of FES only). The primary outcome was the change in Wolf Motor Function Test and stroke impact scale (SIS) version 3.0 scores was measured as a secondary outcome measurement. Outcome measurements were obtained at baseline and four weeks after intervention. The comparisons of these variables between two groups were performed using the RM ANOVA. *Results:* A total of 20 participants with stroke were enrolled (8 VR group, 12 control group). Both group showed improvement of Wolf motor function test ($p < 0.05$). The improvements in the SIS-total, emotion, and communication were greater

in VR group than in the control group ($p < 0.05$), however, the Wolf Motor Function test was not different between groups. **Conclusion:** FES with game-based VR rehabilitation might be more effective than FES for improving HRQoL despite of similar functional improvement. It suggests specific role of FES with game-based VR rehabilitation other than functional improvements.

453

STRENGTHENING USING SLIDING REHABILITATION MACHINE: A FEASIBILITY STUDY OF STROKE PATIENTS WITH SENSORY APHASIA

Y.S. Lee¹, H. Jaewon¹

¹Kyungpook National University Hospital, Department of Rehabilitation, Daegu, Republic of Korea

Introduction/Background: It is difficult to train stroke patients with sensory aphasia. This study was undertaken to examine the feasibility of strengthening training with a sliding rehabilitation machine on stroke patients with sensory aphasia. **Material and Methods:** Sliding rehabilitation machine (SRM) has rail and wheels which decrease friction during exercise. Patients can do weight bearing exercise in lying down position. The charts of patients who admitted to rehabilitation department from Jun 2012 to Nov 2015 were reviewed retrospectively. There are twenty four stroke patients with sensory aphasia. General characteristics of patients were collected. Acceptability and side effects of sliding rehabilitation machine was checked. And clinical parameters (Functional Ambulation Category, Berg Balance Scale, and Korean-Modified Barthel Index) at admission and discharge were gathered. **Results:** Korean version of the National Institute of Health Stroke Scale at admission is 19.9 ± 11.7 . Times from onset to admission to rehabilitation department were 11.0 ± 11.3 days. And duration of admission was 32.5 ± 6.4 days. All patients could use SLM for strengthening. There was no side effect due to use of SLM. Functional Ambulation Category was changed from 0.2 ± 0.7 to 1.3 ± 1.4 . Korean-Modified Barthel Index was changed from 18.0 ± 16.8 to 39.1 ± 21.6 . Berg Balance Scale was changed from 4.8 ± 10.2 to 20.3 ± 17.6 . **Conclusion:** These findings demonstrate the feasibility of an SRM in stroke patients with sensory aphasia. For more generalized use, randomized controlled study is needed.

454

ASSESSMENT OF THE ORAL HEALTH CARE OF STROKE PATIENTS BY CAREGIVERS

Y.S. Lee¹, K.E. Lee², T.I. Yi², S.A. Ha², S.T. Kim³

¹Myongji Choonhey Rehabilitation Hospital, Rehabilitation Medicine, Seoul, Republic of Korea, ²Bundang Jesaeng General Hospital, Rehabilitation Medicine, Bundang, Republic of Korea, ³Boon Dang Best Hospital, Rehabilitation Medicine, Bundang, Republic of Korea

Introduction/Background: The oral health care concerns are mainly related to mastication, dysphagia, nutrition, hygiene and quality of life. The oral hygiene status of stroke patients tends to be poor and it can contribute to increased bacterial load, dental caries as well as aspiration pneumonia. The objective of this study was to investigate the oral health care behavior of caregivers caring for stroke patients. **Material and Methods:** A self-administered questionnaire survey in 3 rehabilitation centers was conducted from Oct 8 to Nov 5, 2014, and 117 caregivers completed the questionnaire. **Results:** The 84.6% of caregivers were women and mean age were 55.6. They had been worked for an average of 6.11 years and cared an average of 9.4 patients. All caregivers answered that oral health care is important in stroke patients. And the 88.8% of caregivers had knowledge of the causal relationship between oral care and aspiration pneumonia. However, only 83% of them received oral health care training. This training was conducted by caregiver training programs (47.1%), hospital care program (26.7%), other caregivers (17%) and ward nurse (9.2%). But these training mostly took the form of a clinical demonstration or supervised practice. The 17% of caregivers who were not received any training tended

to prefer traditional methods. Hindering factors of oral health care was “time” and the most frequent responses regarding the time required for daily oral health care was “5 min or less (48.7%)”. The problem due to “poor cooperation due to cognitive impairment (38.4%)” and “difficulty of maintain a position due to paralysis (20.5%)”. Also, variety of solutions and products were used for oral care. Toothpaste (65.2%), gargling water (20.7) and chlorhexidine (7.6%) were commonly used products. However, only 23% of caregivers were provided with product such as gauze, chlorhexidine by hospital. **Conclusion:** It is necessary to develop an oral health care education program of caregivers for stroke patients.

455

THE ROLE OF BEHAVIOURAL DISTURBANCES IN STROKE REHABILITATION

M. Lippert-Grüener¹, M. Tomanova²

¹Charles University in Prague, The Third Faculty of Medicine and General Teaching Hospital, Prague, Czech Republic, ²Rehabilitation Clinic Brandýs nad Orlicí, Rehabilitation Clinic, Brandýs nad Orlicí, Czech Republic

Introduction/Background: For a good quality of life and a successful social and occupationally reintegration first of all the dimension of neuropsychological disturbances and behavioral disorder after brain damage is of major responsibility. Center of this study is an analysis of behavioral disorders after stroke. Especially following questions should be answered: how many patients in subacute disease phase after stroke have deficits in behavior, which kind and degree are those deficits, are there any differences in behavioral disorders between the groups of patients with or without limitations in activities of daily living (ADL). **Material and Methods:** In a retrospective study 61 patients 0–6 months after hemorrhagic or ischemic stroke were included. Examination of kind of behavioral disorders was made with the Neurobehavioral Rating Scale (NBRS), examination of daily behavior was with the Marburger Kompetenz Skala (MKS). **Results:** First of all, already in early phase of disease a huge spectrum of behavioral deficits can be recognized, mainly – next to wellknown symptomatic of depression and fear - limitations in capacity and attention. The results of the MKS-score of daily behavior showed most of all limits in recreational activities, physical work and mobility (driving a car, using the public transport) – this as well in self-assessments as well in foreign assessment. **Conclusion:** Behavioral deficits are of essential importance for social, familiar and occupational reintegration. Therefore they should have earning special consideration even in early phase of rehabilitation. Early comprehension of individually customized neuropsychological and behavioral therapy, accompanied by therapeutic care of the social and familiar environment, could be expected as an important factor for improvement of reintegration of these patients.

456

A COMPARATIVE STUDY OF DULOXETINE AND PAROXETINE IN JAPANESE PATIENTS WITH POST-STROKE DEPRESSION

S. Matsumoto¹, M. Shimodozono¹, K. Kawahira¹

¹Kagoshima University, Department of Rehabilitation and Physical Medicine, Kirishima City, Japan

Introduction/Background: Duloxetine is an anti-depressant that inhibits the reuptake of serotonin and norepinephrine. We considered that it is important to verify the anti-depressant effect of duloxetine using a fixed-dose design, and conducted a double-blind, controlled study to determine the non-inferiority of duloxetine in patients with post-stroke depressive disorders against the selective serotonin reuptake inhibitors, paroxetine, which is the most extensively used anti-depressant in Japan. **Material and Methods:** A double-blind, parallel-group, controlled study was performed to investigate if duloxetine was superior to paroxetine in terms of improvement in symptoms of

depression and pain in Japanese patients with post-stroke depression in a fixed-dose design. The efficacy and safety of duloxetine 60 mg/day were also assessed in comparison with those at the standard dose of 40 mg/day. **Results:** Changes in 17-item Hamilton depression rating scale (HAM-D) total score (mean±standard deviation) for group D1 (duloxetine 40 mg/day), group D2 (duloxetine 60 mg/day), and group PX (paroxetine 20 mg/day) were -14.9 ± 5.6 , -15.6 ± 6.4 , and -11.4 ± 6.2 , respectively, and the estimated differences in total score for group PX (Dunnett's 95% simultaneous confidence interval) were 3.8 (3.2 to 4.4) for group D1 and 4.2 (3.6 to 4.8) for group D2. The superiority of groups D1 and M2 to group PX was thus confirmed, because the upper confidence limit of differences between groups D1 and PX and between groups D2 and PX was more than 3.2. The groups D1 and D2 presented a reduction in the pain, which was not observed in the group PX. The incidence of treatment-related adverse events was 21% for group D1, 28% for group D2, and 30% for group PX, indicating no significant difference between the three groups. **Conclusion:** These results demonstrate that duloxetine 40 mg/day and 60 mg/day is superior to paroxetine in terms of efficacy on post-stroke depression and central pain.

457

INTRARATER AND INTER-RATER RELIABILITY OF THE PORTABLE GAIT RHYTHMOGRAM IN POST-STROKE PATIENTS

S. Matsumoto¹, T. Uema², K. Miyara², T. Nishi², A. Niibo³, J. Sameshima³, T. Hirokawa³, T. Kajii³, S. Megumi¹

¹Kagoshima University, Department of Rehabilitation and Physical Medicine, Kirishima City, Japan, ²Kirishima Rehabilitation Center of Kagoshima University Hospital, Department of Rehabilitation, Kirishima City, Japan, ³Tarumizu Municipal Medical Center- Tarumizu Central Hospital, Department of Rehabilitation, Tarumizu City, Japan

Introduction/Background: We developed a new monitoring device, the portable gait rhythmogram (PGR, MG-M1100), which measures acceleration induced by limb and trunk movements and gaits in daily life. The main features of the device is designed to allow identification of rhythmical gait movements from the voluntary limb and trunk movements or artifacts. No previously published study has adequately evaluated intra-rater or inter-rater reliability of the PGR, so the purpose of this study was to assess these measurement properties in post-stroke patients. **Material and Methods:** Two raters (A and B) tested 38 post-stroke patients. For the intra-rater reliability investigation, rater A tested the participants on three separate test occasions (days 1, 2, and 3) at the same time of day. For the inter-rater reliability investigation, raters A and B independently tested the participants on the same test occasion (day 3). **Results:** There was no significant systematic bias between test occasions or raters. Values of the intra-class correlation coefficient (2, 1) were 0.96 for intra-rater reliability of both the 10-m walking time and steps of 10-m walking and 0.97 (10-m walking time) and 0.98 (steps of 10-m walking) for inter-rater reliability. Values for the standard error of measurement were 1.46 (10-m walking time) and 1.62 (steps of 10-m walking) for the intra-rater investigation, and 1.26 (10-m walking time) and 1.04 (steps of 10-m walking) for the inter-rater investigation. At the 90% confidence level, the minimum detectable change was 3.8% and the error in an individual's score at a given point in time was $\pm 2.7\%$. **Conclusion:** The PGR demonstrated excellent intra-rater and inter-rater reliability in post-stroke patients. This provides a basis for future investigation of the measurement properties of the PGR in patients with other neurological disorders.

458

ANALYSIS OF UPPER LIMB MUSCLE STRENGTH IN THE EARLY PHASE OF BRAIN STROKE

E. Miller^{1,2}, J. Kostka¹, J. Redlicka², M. Starosta¹

¹Department of Physical Medicine, Medical University of Lodz,

Lodz, Poland, ²Neurorehabilitation Ward, III General Hospital in Lodz, Poland

Introduction/Background: The shortage in muscle strength is an important factor of lower quality of life people after stroke. Accumulating data present that it can be measured with a handheld dynamometer. Objectives in this study were; first to determine the muscles with the lowest strength in non-affected upper limb (non-A) and affected side (A); second to find differences between man and woman; third to made the correlation of these values with the age. **Material and Methods:** Sixty hospitalized in Neurorehabilitation Ward patients (40 male, 20 female) 1–2 weeks after stroke were enrolled to the study. Their age ranged from 50 to 80 years with a mean (sd) of 65.5 (18.7) years. Muscle strength values from shoulder (flexion, abduction, extension, external and internal rotation), elbow (flexion and extension) and wrist (extension) were measured using a MicroFet 2 hand-held dynamometer. All strength measurements were taken in standardized positions by one rater. The results are displayed in newtons [N], mean values of muscular strength, effect sizes and confidence intervals displayed as Cohen's d and 95% CI were determined. Moreover, we made the coefficients correlation for differences in muscular strength versus the Rivermead Motor Assessment (RMA) arm section. **Results:** Strength of (A) upper limb in comparison to (non-A) was 39% weaker. The severely affected muscle groups were the shoulder flexion 40% (women) versus 46% (man); elbow flexion 38% (women) versus 39% (man); wrist extension 35% (women) versus 45% (man). No significant correlations were found between muscle strength results and RMA or age. **Conclusion:** Muscle force of (A) upper limb demonstrates 39% decrease short time after stroke. Man shows more significant decrease than women (40% vs 35%). Functional assessment in RMA values show the better results in women (4.9±4.1) than man (3.4±3.2). Grant Medical University of Lodz, Poland 502-03/5-127-05/502-54-173.

459

CLINICOFUNCTIONAL CLASSIFICATION OF STROKE SURVIVOR : PROPOSED CLINICAL AND FUNCTIONAL PARAMETERS OF STROKE SURVIVORS

H. Mubarak¹, N. Mayasari², A. Sahlan³

¹Hasanuddin University, Physical Medicine and Rehabilitation, Makassar, Indonesia, ²Wahidin Sudirohusodo Hospital, Physical Medicine and Rehabilitation, Makassar, Indonesia, ³Hasanuddin Hospital, Physical Medicine and Rehabilitation, Makassar, Indonesia

Introduction/Background: Cerebrovascular incident or stroke is become the most common cause of disability. In USA stroke has caused medical costs annually \$75 billion in 2010. Functional outcome of stroke survivors comes in a great range of severity, from totally vegetative state to normal performance. To the best of our knowledge, there is still no classification in stratifying the stroke survivors based on their functional parameters. This classification will help the physiatrist setting up rehabilitation programs prioritizing of patient's certain impairments. It will provide reliable information to the employers of patients regarding patients' performance in vocational activities. It is also a useful tool for any use of health insurance in cost estimation and database for reimbursement. **Material and Methods:** Taking account of this issue, authors are proposing the novel clinicofunctional parameters of stroke survivors with the label Clinicofunctional Classification of Stroke Survivors (CCSS). The classification will stratify the stroke survivor into vegetative, non-vegetative total dependency, minimally independence, moderate independence, independent supervised, vocational limitation, vocational supervised, and normal respectively. Classification will be based on several measurements; they are Glasgow coma scale (GCS), Mini mental scale examination (MMSE), Fugl-Meyer Assessment Upper Extremity (FMA-UE), Barthel Index and Short form 36 questionnaires (SF-36), section role limitation due to physical health. **Results:** We have applied this classification to-

wards 16 stroke patients in Physical Medicine and Rehabilitation outpatient clinic and inpatient ward of Akademis Jaury Hospital in Makassar, Indonesia. Two patients were classified as Level II, 6 as level III, 3 as level IV, 4 as level V, and 1 as level VI. **Conclusion:** This classification can be used in clinical, epidemiology study, and medical funding purposes of the stroke survivors. Further study of this classification is needed to confirm its validity, reliability and responsiveness. Improvement of CCSS would create the better stratifying measurement of stroke survivor functional performance.

460

THE EFFECT OF COMBINATION THERAPY (BOTULINUM THERAPY, ORTHOSIS, REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION AND OCCUPATIONAL THERAPY) IN POST-STROKE OUTPATIENTS WITH SPASTIC UPPER LIMB HEMIPARESIS

Y. Nanri¹, T. Asami¹

¹Saga University, Rehabilitation Medicine, Saga, Japan

Introduction/Background: The purpose of this study was to determine the effect of combination therapy consisting of botulinum therapy (BTX), orthosis, repetitive transcranial magnetic stimulation (rTMS), and occupational therapy (OT) in post-stroke outpatients with spastic upper limb hemiparesis. **Material and Methods:** The study subjects were 12 post-stroke outpatients with spastic upper limb hemiparesis (age: 52 to 73 years, males: 10). BTX was injected into the spastic muscles and orthotic treatment was done prior to low-frequency rTMS over the unaffected hemisphere. rTMS and OT were done once per week (total 8 weeks; Fig. 1). Spasticity was evaluated using the modified Ashworth scale (MAS) and the motor function of the affected upper limb was evaluated using the Manual Function Test (MFT). **Results:** Based on pre-therapy, the median of MFT changes were +1.92 (after 1 month) and +2.50 (after 2 months). The median MAS changes were -0.38 (after 1 month) and -0.42 (after 2 months). **Conclusion:** Combination therapy resulted in improvements in MAS and MFT. In the future, we would like to investigate the added benefits of rTMS through comparisons of real stimulations with sham stimulations.

461

IS IT STROKE? DYSPHAGIA AS THE SOLE PRESENTATION

S. Nasir Mansoor¹

¹CMH Hospital Pano Aqil Sind, Rehabilitation Medicine, Pano Aqil, Pakistan

Introduction/Background: Sudden onset dysphagia in the elderly can have different etiologies but the most common that comes to mind is a motor neuron disease. Other conditions might include tumor and even CVA. Isolated dysphagia in stroke is rare. **Material and Methods:** Case description: We report a case of 70 years old gentleman with sudden onset of dysphagia and posing a diagnostic dilemma. The individual was brought to our clinic with 03 weeks history of dysphagia and no associated motor or sensory weakness. There was history of hypertension but not diabetes mellitus. There was no history of trauma or fall. On examination the patient has no neurological deficit except for dysphagia, his cranial nerves were normal and peripheral nervous system was unremarkable, his speech was normal. His base line investigations including blood complete picture, erythrocyte sedimentation rate, renal function tests, liver function test, urine routine examination, ECG were within normal limits. He had dysphagia more for solids and thin liquids. He was examined by the ENT specialist and recommended nerve conduction studies for suspicion of Motor neuron disease. His EMG NCS did not revealed any signs of motor neuron disease except for early peripheral axonal polyneuropathy. **Results:** He was recommended an MRI brain which revealed infarct in the

Pons. He was referred to speech pathologist. A barium swallow was carried out to assess the swallowing and swallowing therapy was initiated by compensatory maneuvers and by changing the consistency of food and positioning of the patient. **Conclusion:** Dysphagia presenting as the only symptom in CVA is rare and must be kept in consideration in patients presenting with similar symptoms.

462

THE SUSTAINED EFFECT OF PERONEAL NERVE FUNCTIONAL ELECTRICAL STIMULATION IN PATIENTS WITH CHRONIC STROKE: A PILOT MULTICENTER CLINICAL TRIAL.

M. Ochi¹, K. Noriaki¹, S. Satoru¹, H. Kenji¹

¹University of Occupational and Environmental Health, Rehabilitation Medicine, Kitakyushu, Japan

Introduction/Background: WalkAide is a sophisticated surface functional electrical stimulation system designed to restore mobility to patients with foot drop. WalkAide is single channelled with transcutaneous electrodes with the wireless control of stimulation through a tilt sensor. The purpose of study is to determine the effect of WalkAide assisted gait training in combination with physiotherapy after stroke. **Material and Methods:** This was a multicenter clinical trial. Twenty individuals who had experienced stroke ≥ 6 months previously and had a functional ambulation classification score of ≥ 5 took part in the 4-week intervention, and were followed up for 1-mo post intervention. WalkAide assisted gait training, and physical therapy was combined during interventions. **Results:** Participants showed significant gains in a lower extremity Fugl-Meyer assessment, 10-meter walk test, and 6-minute walk test on WalkAide ($p < 0.01$) between before and after intervention. Moreover, these significant gains were showed between before and 1-mo post intervention. No adverse event was reported. **Conclusion:** WalkAide assisted gait training was safe, and can significant improve lower extremity function and gait ability in independently ambulant chronic stroke patients. The improvement was sustained after interventions.

463

PROGNOSIS OF DYSPHAGIA AFTER THALAMIC HEMORRHAGE IN POST-ACUTE REHABILITATION HOSPITAL

H. Okazaki¹, S. Maeshima², S. Tanaka², S. Okamoto², S. Mizuno², T. Tsunoda², N. Asano², M. Masaki², S. Sonoda²

¹Fujita Health University, Department of Physical Medicine and Rehabilitation, Tsu, Japan, ²Fujita Health University, Department II of Physical Medicine and Rehabilitation, Tsu, Japan

Introduction/Background: Dysphagia is one of common symptoms after stroke. It has been reported that most of stroke patients recover their swallowing ability within one month. Few studies have shown factors which affect swallowing abnormalities, but these studies included all stroke types. Therefore, it is still unclear what factor affect prognosis of dysphagia in supratentorial stroke. In this study, we focused thalamic hemorrhage patients who received rehabilitation in a post-acute rehabilitation hospital and examined relationships between clinical evaluations and severity of dysphagia to clarify factors which affect dysphagia. **Material and Methods:** Subjects were 91 patients (34 females and 57 males, mean age 68.9 years, mean time from onset to admission 29.4 days, mean length of stay 70.2 days). Patients were classified using CT classification (Type I: hematoma located in thalamus, Type II: extending into internal capsule, Type III: extending into midbrain) and hematoma volume at onset was also measured. We investigated the functional oral intake scale (FOIS: Score is from 1 to 7 and lower means severe) for severity of dysphagia on admission and at discharge. Other clinical evaluations such as age, gender, length of stay, Glasgow coma scale (GCS) and Functional Independence Measure (FIM) were evaluated as well. Kruskal-Wallis test was performed to compare clinical evaluations across the FOIS

scores. *Results:* Ratio of patients who ate normal diet was 39.6% on admission and 67% at discharge. Among type of hematoma, type III was higher ratio of enteral feeding compared to type I and type II. Among FOIS at discharge, GCS, FIM motor and cognition were lower in FOIS 1 and 2 compared to FOIS 7 significantly, however, there were no significant differences in hematoma volume. *Conclusion:* Depressed level of consciousness maybe a major factor which affect severity of dysphagia after supratentorial stroke.

464

VASCULAR DEMENTIA: EXPLORING THE TIME-LINE

J. O'Riordan¹, P. Galinato¹

¹Changi General Hospital, Rehabilitation Medicine, Singapore, Singapore

Introduction/Background: There has been increasing interest in the role of deep white matter ischaemia in Vascular Dementia. In this study we aimed to further elucidate the role of deep white matter ischaemia and pre-existing cognitive impairment in those patients presenting with Acute Stroke. A significant number of patients have extensive deep white matter changes when MRI is performed. It is known that these changes are likely to represent the confluence of micro-infarcts. It might then be expected that these changes could represent a significant risk for vascular dementia. There have been many studies looking at the risk of dementia post-stroke. We wanted to find out whether those patients who developed cognitive impairments after a stroke had actually already started to develop these issues beforehand. Was the stroke simply a sentinel event in the timeline of their developing cognitive impairment? And could we use the Fazekas (a measure of the extent of deep white matter ischaemia) predict which patients were having early cognitive difficulties before the stroke occurred? Would this then change the way we manage patients? *Material and Methods:* Participants were recruited upon admission to our Acute Stroke Unit. 250 adult participants who had had an acute stroke confirmed on MRI were recruited. The MRI findings were confirmed by a Neuroradiologist. The pre-existing cognitive status of the participants was assessed using the AD8 (completed by close family member or friend). The cognitive status of the patients was assessed with an MMSE and Clock Test just prior to discharge from the Acute Hospital to allow for maximum recovery from Acute Medical Issues and Post-stroke Delirium. *Results:* The data presented will aim to delve further into specifically determining which are the major risk factors for developing cognitive impairment before, and in the early stages following, a stroke. *Conclusion:* Will these findings change our practice?

465

QUALITY OF LIFE, ANXIETY AND DEPRESSION SCALE IN PATIENTS AFTER STROKE

S. Papakosta¹, D. Galliopoulos², G. Skoufi², S. Valais², A. Triantaris², X. Vagenas², P. Kotoula², G. Koukoulis², C. Liaskos²

¹Larissa, Greece, ²"Arogi" Rehabilitation Center, Rehabilitation, Larissa, Greece

Introduction/Background: Little information is available about the course of quality of life (QoL), anxiety and depression, at post stroke (PS) patients and how Influence on activities of daily living. The aim of the study was to assess QoL, anxiety and depression at patients with ischemic stroke. *Material and Methods:* We calculated QoL (SS-QoL), Hospital Anxiety and Depression Scale (HADS-A, HADS-D) in patients with PS, a week after ischemic stroke and 6 months after. We tested 92 patients (48 men, 44 women) with stroke (median age 72, range 54–82). 34 patients had left sided paralysis (LSP) and 58 patients right sided paralysis (RSP). 30 patients tested at the first time point, and 62 patients tested 6 months after stroke. *Results:* There was significant difference at QoL between patients with LSP and RSP ($p=0.002$). In patients with LSP

there was statistically significant difference of QoL between early PS patients (1st time point) and posterior PS ($p=0.003$). HADS-D score were higher in female than male (9 ± 6.4 vs 5.75 ± 5.4 $p=0.039$) but this observation was not applied on HADS-A score. HADS-K score was also correlated with increased age ($r=0.645$, $p=0.033$). *Conclusion:* Patients with LPS have better QoL, while older and female patients have more depression feelings. The reduction of QoL and the increase of anxiety and depression in patients with LPS, 6 months after stroke may be associated with expectations that exist in the immediate time and frustration that occurs when they accepting the deficit.

466

EFFECTS OF A STROKE SURVIVORS' GROUP EXERCISE PROGRAM CUSTOMIZED ACCORDING TO INDIVIDUAL FUNCTIONAL LEVELS IN PHYSICAL AND PSYCHOLOGICAL ABILITIES

H. Park¹, K. Dongheon¹, L. Myoung-jun¹, K. Seck Jin², C. Ji Woo², L. Hye-jin², E. Seon-duck¹

¹National Rehabilitation Center Research Institute, Clinical Research for Rehabilitation, Seoul, Republic of Korea, ²National Rehabilitation Hospital, Health Promotion Center for the Disabled, Seoul, Republic of Korea

Introduction/Background: It has been previously shown that stroke survivors did very little physical activities after the onset of stroke. They were most active in therapy sessions, but when they were alone, nearly two-thirds of the time they were inactive. This physical and social inactivity is likely to cause the physical and psychological problems. The customized group exercise program (CGEP) was developed in order to increase physical activities for stroke survivors with various functional levels. This program was a combined exercise training program that included resistance, aerobic, balance, flexibility exercise and recreational sports. The purpose of this study was to examine the effect of the CGEP in stroke on physical and psychological abilities. *Material and Methods:* This study included 44 stroke survivors randomly assigned to either the CGEP group ($n=21$) or the control group ($n=23$). The exercise program customized according to functional levels was carried out for 24 sessions of 8 weeks (3-times a week); the duration of the program per day was 60-minutes. The subjects were assessed using Trunk Impairment Scale (TIS), Berg balance scale (BBS), 6-minute walk test, Timed Up and Go (TUG) to measure physical abilities and Stroke Specific Quality of Life (SS-QoL), Beck Depression Index (BDI) to measure psychological abilities. *Results:* Compared with the control group, the TGEP group significantly improved in TIS ($p<0.001$), BBS ($p=0.002$), 6-minute walk test ($p<0.001$), TUG ($p<0.001$), BDI ($p=0.029$) at the end of the intervention period. SS-QoL was increased in the CGEP group (9.23 ± 30.29) but the change was not significantly different. *Conclusion:* The CGEP program may help stroke survivors with various functional levels improve their physical and psychological abilities.

467

ANXIO-DEPRESSIVE PROFILE AND QUALITY OF LIFE IN STROKE PATIENTS. PREVALENCE AND ASSOCIATION WITH FUNCTIONAL STATUS A CROSS-SECTIONAL STUDY

S. Salah¹, M. Rekik¹, A. Nouira¹, S. Boudokhane¹, H. Migaou¹, A. Jellad¹, Z. Ben Salah Farih¹

¹Fattouma Bourguiba University Hospital Monastir, Department of Physical Medicine and Rehabilitation, Monastir, Tunisia

Introduction/Background: The objectives of this study were to assess the quality of life (QoL), and the anxio-depressive profile of stroke patients and to seek for associations between these status and the functional one. *Material and Methods:* Fifty patients with ischemic stroke (>3 months) were enrolled in our study. General characteristics were measured. Each patient completed the Hospital

Anxiety and Depression scale (HAD) and the SF12 scale. The functional status was assessed according to the Barthel index, the New Functional Ambulation Classification and the «Timed up and go test». Statistical analysis was performed using the statistical software SPSS 20. **Results:** The participants' median age was 58 years, 30 men (60%) and 20 women (40%). Cardiovascular risk factors were hypertension (66%), overweight (56%), dyslipidemia (50%), diabetes (44%), sedentary life style (38%), and smoking (20%). Our population suffered from cardiovascular diseases: transient ischemic attack (30%), carotid stenosis (14%), myocardial infarction (8%) and cardiac failure (8%). The dominant side was affected in 64% of cases. More than the half of the studied population (52%) was anxious and 48% was depressive. Almost the whole population (98%) had poor physical quality of life and 82% had poor mental one. Depressive profile and poor mental QoL were both associated with functional impairment as assessed by the Barthel Index. **Conclusion:** Our results suggest that poor quality of life, anxiety and depression were prevalent in ischemic stroke patients. Patients with functional impairment are prone to have depression and poor mental QoL. It seems then necessary to seek for these disturbances for a better management of patients with cerebral infarction.

468

RHYTHMIC AUDITORY STIMULATION AND FUNCTIONAL REHABILITATION IN STROKE PATIENTS

S. Salah¹, A. Nouira¹, M. Ismail¹, M. Rekik¹, S. Bou-dokhane¹, H. Migaou¹, A. Jellad¹, Z. Ben Salah Farih¹

¹Fattouma Bourguiba University Hospital Monastir, Physical Medicine and Rehabilitation, Monastir, Tunisia

Introduction/Background: Gait problems and deficits in upper extremity function are the main functional limitation experienced by stroke patients. Despite intensive rehabilitation, only few stroke patients recover full function of the affected side. The major part remains permanently disabled, limiting their participation in activities of daily living. Rhythmic Auditory Stimulation (RAS) has shown its effectiveness in improving movement of the affected extremities in stroke patients. The objective of this study was to investigate, simultaneously, the effects of RAS on the coordination and synchronization of the affected upper limb and on gait performances in ischemic stroke patients. **Material and Methods:** A prospective study comparing two rehabilitation protocols was conducted over a period of 3 months. A first group of patients ($n=2$; mean age: 59 years) received a rehabilitation program based on RAS (Mertonome for gait rehabilitation and Bilateral Arm Training with Rhythmic Auditory Cueing (BATRAC) for rehabilitation of the upper limb) and a second group ($n=2$; mean age: 62 years) received a conventional rehabilitation protocol (Bobath method). The functional status was assessed according to Barthel Index, new Functional Ambulation Classification, Get up and Go test, 10 meters walking test, Bourges score, and Wolf Motor Function (WMF) test, at the beginning and at the end of the rehabilitation protocol. **Results:** An improvement of balance and gait parameters, of the upper limb function and of functional status (Barthel Index), was obtained in both groups. This improvement was most important in RAS group. **Conclusion:** RAS improves walking speed and cadence of the step. It is also efficacious on postural control (sitting and standing balance). Rehabilitation of the upper limb by the BATRAC is more effective than the conventional rehabilitation as attested by the WMF test. Other randomized controlled trials with a larger number of patients, and a more prolonged follow up period are needed to confirm these results.

469

ORGANIZED INPATIENT CARE IN A STROKE CARE UNIT ARE IMPROVING PATIENT'S FIM EFFICIENCY

S. Shibata¹, H. Kagaya¹, C. Takami², S. Sasaki², Y. Iwata², S. Sato², E. Saitoh¹

J Rehabil Med Suppl 55

¹Fujita Health University, Rehabilitation Medicine, Toyoake, Japan, ²Fujita Health University Hospital, Department of Rehabilitation, Toyoake, Japan

Introduction/Background: Previous papers reported that patients who treated in the stroke care unit (SCU) are more likely to survive their stroke than the general word (GW), return home and become independent in looking after themselves. In our facility was opened the SCU in Mar 2011. The purpose of this study is to compare the consequences before and after the SCU opened. **Material and Methods:** We selected 86 cerebral infarction patients who admitted GW until Mar 2011, and 294 patients who admitted to the SCU since Apr 2011. The patients whose FIM score at the time of admission was greater than the 90 points were excluded. We compared the average length of stay, the proportion of home discharge, and the FIM efficiency. **Results:** There are three exclusive therapists in the SCU. The period from the onset of cerebral infarction to rehabilitation start, 4 days GW group, was 2 days SCU group. The training time per day was increased to 80 minutes in the GW to 120 minutes in the SCU. The length of stay in each GW group and the SCU group, was 31 and 24 days respectively. The proportion of home discharge was 39.5% and 52.7%. The FIM efficiency was 1.1 and 1.5. **Conclusion:** Early starting to inpatient rehabilitation is critical for reducing post-stroke disability. Improvement of FIM efficiency was obtained as a result of the early start of rehabilitation, and multidiscipline team approach.

470

COMPARISON OF FUNCTIONAL RECOVERY IN STROKE ACCORDING TO THE TRANSFER TO REHABILITATION DEPARTMENT: KOREAN STROKE COHORT STUDY

M.K. Sohn¹, S. Kim¹, J. Lee², D.Y. Kim³, S.G. Lee⁴, Y.I. Shin⁵, G.J. Oh⁶, Y.S. Lee⁷, M.C. Joo⁸, E.Y. Han⁹, Y.H. Kim¹⁰

¹Chungnam National University - School of Medicine, Rehabilitation Medicine, Daejeon, Republic of Korea, ²Konkuk University School of Medicine, Department of Rehabilitation Medicine, Seoul, Republic of Korea, ³Yonsei University College of Medicine, Department and Research Institute of Rehabilitation Medicine, Seoul, Republic of Korea, ⁴Chonnam National University Medical School, Department of Physical and Rehabilitation Medicine, Gwangju, Republic of Korea, ⁵Pusan National University Yangsan Hospital, Department of Rehabilitation Medicine, Pusan, Republic of Korea, ⁶Wonkwang University School of Medicine, Department of Preventive Medicine, Iksan, Republic of Korea, ⁷Kyung-pook National University College of Medicine, Department of Rehabilitation Medicine, Daegu, Republic of Korea, ⁸Wonkwang University School of Medicine, Department of Rehabilitation Medicine, Iksan, Republic of Korea, ⁹University of Jeju College of Medicine, Department of Rehabilitation Medicine, Jeju, Republic of Korea, ¹⁰Sungkyunkwan University School of Medicine, Department of Physical and Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: The purpose of this study was to compare functional recovery in the first-ever stroke patients according to the transfer to rehabilitation department. **Material and Methods:** Korean stroke cohort (KOSCO) is a large, multi-center prospective cohort study for all acute first-ever stroke patients admitted to participating hospitals in nine distinct areas of Korea. This study is designed as a 10-year, longitudinal follow-up investigating the residual disabilities, activity limitations, and quality of life issues arising in patients suffering from first-ever stroke. We investigated the difference of functional recovery patterns whether all of the participants were transferred to the rehabilitation department or not. The parameters associated with functional recovery included FAC, FMA, MMSE, mRS and NIHSS. All of the parameters were measured at 7 days, 3 months, 6 months, 12 months and 24 months after stroke onset. **Results:** Seven thousand and nine hundred fifty patients were reviewed excluding stroke patients who didn't agree

this study. The patient who were transferred to rehabilitation were 1,482 persons (18.6%). There were significant difference between 2 groups in educational year, weighted index of comorbidity, combined condition and age-related score, etiology of stroke, initial mRS and NIHSS. Mixed designed repeated measure analysis of variance (ANOVA) showed significant time effect and time cross group interaction in all functional parameters (FAC, FMA, MMSE, mRS, NIHSS). **Conclusion:** This study revealed that demographic characteristics and functional outcomes after transferring to rehabilitation department were different from those of not transferred patient. Although the level of severity of stroke in transferred group was much higher than that in not transferred group, the former showed significant time effect and time cross group interaction to recover their physiologic function. Thus, early transfer to rehabilitation department for post-stroke rehabilitation is very important not only to improve stroke patient's functional recovery but also to show a positive interaction including time effect.

471

EFFECT OF AGE AND COGNITIVE FUNCTION ON THE FIM MOTOR SUBSCORE AT DISCHARGE IN STROKE PATIENTS BASED ON EVERY MOTOR SUBSCORE ON ADMISSION

S. Sonoda¹, M. Watanabe¹, Y. Okuyama¹, S. Sasaki¹, S. Okamoto¹, H. Okazaki¹, N. Maeshima¹

¹Fujita Health University Nanakuri Memorial Hospital, Rehabilitation Medicine, Tsu, Japan

Introduction/Background: We have accumulated rehabilitation outcome data of more than 3,000 stroke patients in our hospital. So we can calculate the average score of the FIM motor subscore (FIM-M) at discharge in patients whose admission FIM-M was 13, 14, 15, ..., and 91, respectively. Using this method, effect of age and cognitive function on the ADL was examined. **Material and Methods:** Subjects were 3,575 stroke patients who were admitted to our comprehensive inpatient rehabilitation ward between Sep 2004 and Jun 2013. Average age was 67.3, average days since stroke onset to admission was 38.3 days, and average length of stay was 65.4 days. We stratified these patients into young (69 or less), aged (70 or more), poor cognition (cognitive subscore of the FIM (FIM-C) on admission was 19 or less), and good cognition (20 or more), resulting in 4 groups (YP: young and poor cognition, YG: young and good cognition, AP: aged and poor cognition, and AG: aged and good cognition). **Results:** The average FIM-M at discharge was highest in YG and lowest in AP in all admission FIM-M score. The average FIM-M in AG was lower than the one in YP if the FIM-M on admission of the patients was about 45 or less, however this relation was reversed if the FIM-M on admission was 45 or more. **Conclusion:** Effect of age and cognitive function to ADL status would vary depending upon the FIM-M on admission. We must pay attention to the patients' status when influences of inhibitory factors are considered.

472

NEUROSURGERY REHABILITATION SCHEMA AFTER SUBARACHNOID HEMORRHAGE: ACUTE POST-ACUTE AND CHRONIC - CASE PRESENTATION

I.S. Stratulat¹, C. Alexandru²

¹"Gr. T. Popa" University of Medicine and Pharmacy Iasi- Romania, Medical Rehabilitation, Iasi, Romania, ²Clinic Emergency Hospital " Prof. N. Oblu" Iasi- Romania, Neurosurgery Department, Iasi, Romania

Introduction/Background: A subarachnoid hemorrhage can occur spontaneously, usually from a ruptured cerebral aneurysm. Treatment is by prompt neurosurgery or radiologically guided interventions with medications and other treatments to help prevent recurrence of the bleeding and complications. Immediate complications include

sudden death, vasospasm, re-bleeding; long term complications include epilepsy, neurological symptoms, cognitive impairment, anxiety, depression or post-traumatic stress disorder. Only a fifth of the patients have no residual symptoms. **Case presentation:** We present the case of a 33-years old male patient that presented in the Neurosurgery Department of the Clinic Emergency Hospital "N Prof. N. Oblu" Iasi, Romania with severe headache, nausea and photophobia. The CT and angiogram performed revealed a subarachnoid hemorrhage emerged from a ruptured aneurysm. The patient underwent endovascular neurosurgery (coiling technique). Neurological complications were minimal - right Abducens nerve paralysis, slight motor deficit on the right arm and leg with minimum reduction of muscle strength. After 10 days of intensive medical treatment, the patient started the rehabilitation program in the neurosurgery unit, and after 3 weeks, he was transferred to the rehabilitation department. The rehabilitation protocol included psychological support, dietary regime with restriction of psycho-stimulants and avoidance of psycho-active drugs, physiotherapy to gain muscle strength, patient education concerning the reduction of stress and lifestyle changes. **Results:** The symptoms were diminished during hospitalization muscle strength was increased. The 3 months follow-up revealed partially remission of diplopia, the disappearance of nistagmus and dizziness; the 6 months follow-up revealed perfect stabilization of the embolization coils, disappearance of the diplopia. **Conclusion:** In this case, the outcome was excellent, the patient recovered 100% his motor function and neurological deficits. Common problems faced by patients following brain injury include physical limitations and difficulties with thinking and memory. Recovery and prognosis are highly variable and largely dependent on the severity of the initial status.

473

EFFECTS OF REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (RTMS) ON THE BALANCE FUNCTION OF PATIENTS WITH POSTERIOR CIRCULATION STROKE

C. Huang¹, M. Su¹, W. Yang¹

Department of Rehabilitation, First Affiliated Hospital of Soochow University, Suzhou, China

Purpose: To observe the effects of repetitive transcranial magnetic stimulation (rTMS) on the balance function of patients with posterior circulation stroke. **Methods:** 30 patients with posterior circulation stroke in the early stage were randomly divided into experimental group and control group (15 cases each group). Under the condition of giving the same basic treatment in two groups, the experimental group was treated with rTMS. Before rTMS treatment, immediately after rTMS treatment and after TMS treatment for 2 weeks 3 time points, Japan's University of Tokyo balance function assessment, Berg balance scale, Tetrax balance test SI and WDI index and TMS were respectively used to evaluate the balance function and cerebral function of patients. **Results:** Before treatment, experimental group and control group the balance function scores were no significant difference ($p>0.05$); immediately after treatment and 2 weeks after treatment, the balance function in patients of the two groups were significantly improved compared with before treatment ($p>0.01$), but the experimental group balance function improved better than the control group ($p>0.05$). **Conclusions:** rTMS can be used to evaluate and forecast the balance function of patients with stroke, and helps to improve the balance function of patients with posterior circulation stroke. rTMS has certain clinical application value in the balance improvement.

474

STUDY OF BY MUSCLE-SKELETON ULTRASOUND TO EVALUATE THE PERIPHERAL MAGNETIC STIMULATION ON SHOULDER DISLOCATION AFTER STROKE

P. Chen¹, M. Su¹, W. Yang¹

Department of Rehabilitation, First Affiliated Hospital of Soochow University, Suzhou, China

Objective: Rehabilitative physician frequently encounter shoulder dislocation in their practice. This study is to observe the effect of peripheral magnetic stimulation in rehabilitation training on patients with shoulder dislocation after stroke. **Methods:** A convenience sample of patients having shoulder dislocation was enrolled in the study. 30 patients were divided into treatment group and control group equally. Both groups accepted routine medicine and rehabilitation, and the treatment group received in addition magnetic stimulation of the scapular muscle on the hemiplegic side. The treatment of both groups lasted for 3 weeks. Their acromion-greater tuberosity (AGT) distance and coracoid-smaller tuberosity (CGT) distance in the healthy side and hemiplegia side were measured with muscle-skeleton ultrasound. The Fugl-Meyer movement function rating scale was used to assess the paralyzed Shoulder joint movement function in the patients with stroke, before and after treatment. **Results:** After treatment, the AGT distance of the hemiplegia side in both group reduced significantly ($p < 0.05$), and the treatment group reduced more than the control group after treatment ($p < 0.01$). The difference of the CGT distance between the healthy side and hemiplegia side reduced after treatment ($p < 0.05$), and the treatment group reduced more ($p < 0.01$). The Fugl-Meyer movement function score in the treatment group was obviously higher than the control group ($p < 0.05$). **Conclusion:** Peripheral magnetic stimulation combined with routine rehabilitation reduces or prevents shoulder joint subluxation. The effect is better than routine rehabilitation alone. Further larger studies are needed to confirm its efficacy.

475

AEROBIC RESPONSES OF SLOW SPEED NORDIC WALKING FOR HEALTHY PEOPLE

A. Sumiya¹, T. Hidetoshi¹, H. Mamiko¹, T. Shinjiro¹, T. Ayumi¹, M. Shigeru¹

¹International Medical Center - Saitama Medical University, Rehabilitation, Hidaka, Japan

Introduction/Background: Physical fitness is deteriorated in stroke patients. Nordic walking (NW) has the advantage of higher intensity of aerobic exercise compared with normal walking. Nevertheless, it has not been reported about the aerobic responses in the NW in stroke patients. The purpose of this study was to clarify the aerobic response of walking with two Nordic walking poles (2NP) and a single Nordic walking pole (1NP) in healthy people with slow speed that is assumed to be walking of stroke patients. **Material and Methods:** 23 healthy subjects walked on treadmill at 0.5 m/s for 5 minutes in free hand, 2NP and 1NP. We set 5 minutes interval between the tests. Oxygen uptake (VO_2), Heart rate (HR), oxygen pulse (O_2 pulse) had been measured by metabolic gas analyzer. The data was analyzed by one way analysis of variance and Bonferroni test. **Results:** The mean±SD increase of VO_2 were free hand walking 4.0 ± 0.6 , 2NP 6.6 ± 1.7 , 1NP 4.7 ± 0.8 (ml/kg/min), of HR were free hand walking 6.6 ± 5.6 , 2NP 10.1 ± 6.1 , 1NP 5.3 ± 4.3 (beat/min), of O_2 pulse were free hand 2.8 ± 0.7 , 2NP 4.1 ± 1.2 , 1NP 3.3 ± 0.8 (ml/bpm). There were significant differences between three trials in increase of VO_2 and O_2 pulse ($p < 0.05$). There were also significant difference between 2NP and 1NP in increase of HR ($p < 0.05$). **Conclusion:** These results suggest that walking in 2NP and 1NP can induce a higher intensity of aerobic response than free hand walking. Moreover, walking in 1NP can induce an appropriate aerobic response without increasing HR. Therefore, 1NP walking is thought to be effective for stroke patients with hemiplegia.

476

SCREENING TO OBSTRUCTIVE SLEEP APNEA (OSA) OF STROKE PATIENTS WITH RESPIRATORY PULSE-OXIMETER AT THE LOCATION OF THEIR POST-ACUTE INPATIENT REHABILITATION PROGRAM

J Rehabil Med Suppl 55

I. Szel¹, Z. Molnos¹, E. Papp¹, A. Terray-Horvath²

¹OORI National Institut for Medical Rehabilitation, Hemiplegia Osztály Ward for Hemiplegics, Budapest XII., Hungary, ²Military Hospital – State Health Centre, Neurology/Sleep Centre, Budapest XIII., Hungary

Introduction/Background: The high prevalence of obstructive sleep apnea (OSA) among stroke patients is well known - like the OSA's negative impact to their functional outcome and the higher risk to stroke recurrence. Although a proper feasibility study is available for screening and treatment of OSA in a rehabilitation facility since 2002*, there have been no reflections to these works in the literature. *Am. J. Phys. Med. Rehabil. 81 (8) 622–625. **Material and Methods:** In our stroke rehabilitation ward, a respiratory pulse oximeter (SleepViewTM) has been made available by the Sleep Centre of Budapest (Hungary). We started using it as a wearable patient monitor to screen our stroke patients during their post-acute rehabilitation program. The positively screened patients were sent to the Sleep Centre for profound investigation (polysomnography). Because of our limited capacity we could not screen all of our stroke patients. Therefore we selected patients with both hypertension and obesity (particularly with large waist circumference), and/or with any anamnestic data referring to OSA. **Results:** There were 68 tests carried out between Oct 2013, and Jul 2015, with 56 positive and 12 negative results. The astounding rate (82%) of the positively screened patients were confirmed by the detailed investigation of the Sleep Centre. **Conclusion:** According to our results -- in accordance with the literature – applying a respiratory pulse oximeter overnight as a wearable patient monitor is a proper tool to screening OSA. The higher rate of the positive results is explained by our double or triple selection criteria. Based on our work, we introduce applying CPAP (continuous positive airway pressure) therapy during the rehabilitation program to eliminate the deteriorative effects of the OSA timely.

477

A MISMATCH OF F-WAVE DATA AND CLINICAL FINDINGS IN A PATIENT WITH CEREBROVASCULAR DISEASE

S. Toshiaki¹, M. Tani¹, Y. Bunno¹, S. Yoshida¹

¹Graduate School of Kansai University of Health Sciences, Graduate School of Health Sciences, Osaka, Japan

Introduction/Background: In our previous study, the F-wave index of excitability of spinal neural function was correlated with the magnitude of muscle tone and the tendon reflex. We report physical therapy in a patient with cerebrovascular disease who showed mismatched F-wave data and clinical findings. **Material and Methods:** A 67-year-old male patient with cerebral hemorrhage and right hemiparesis was treated with physical therapy twice a week for 20 minutes. The morbidity period from onset was 114 months. He could not move the affected fingers, in particular the thumb. Clinical findings were as follows- MAS of the thenar muscles was 2, but the tendon reflex of the arm was equivalent to normative data. We tested the F-wave of the right thenar muscles after stimulating the right median nerve at the wrist at rest. The amplitude ratio of F/M was analyzed using measurable F-waves. **Results:** The amplitude ratio of F/M was 1.16%. The result was equivalent to normative data ($1.81 \pm 0.81\%$, Suzuki et al 1989). **Conclusion:** The patient has hyper tonus but normal tendon reflex with normal F-wave. From these results, we suggest that the cause of the thumb immobility may be muscle shortening and weakness, rather than a neurological factor.

478

DOES MIRROR THERAPY IMPROVE UPPER EXTREMITY MOTOR FUNCTION AFTER STROKE? A RANDOMIZED CONTROLLED TRIAL

O. Umit Yemisci¹, N. Gurbuz¹, S. Ayas¹

¹Baskent University, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Impaired upper extremity function is a common problem for stroke survivors. Conventional treatment methods implemented for this purpose are mostly insufficient in recovery of upper extremity motor functions. Mirror therapy is a technique that uses visual feedback about motor performance to improve rehabilitation outcomes. The aim of this study was to evaluate the effectiveness of mirror therapy on upper extremity motor recovery in first-ever stroke patients. **Material and Methods:** A total of 31 first-ever stroke patients (stroke onset <12 months) referred to a university affiliated rehabilitation centre were included in the study. Patients were randomly assigned to the mirror therapy group ($n=16$) or the control group ($n=15$). Both groups were administered with conventional stroke rehabilitation therapy. Mirror therapy group underwent 20 minutes of mirror therapy consisting of wrist and finger flexion and extension movements, while the control group performed sham therapy with similar duration, 5 days a week for 4 weeks. Fugl Meyer upper extremity motor function scale and Brunnstrom method were used to evaluate upper extremity motor recovery while Functional Independence Measure (FIM) was used to evaluate disability levels pre-treatment and post-treatment. **Results:** There was no statistical difference between groups regarding Brunnstrom recovery stage, Fugl-Meyer scale and FIM self-care scores at baseline. After treatment both groups showed statistically significant improvement in all outcome measures. Moreover patients in the mirror therapy group had greater improvement in upper extremity Fugl-Meyer motor scale values compared to the control group ($p=0.047$). **Conclusion:** Regaining motor function in the upper extremities is often more difficult than in lower extremities, which can seriously affect the progress in rehabilitation. Mirror therapy is a simple, inexpensive and above all patient oriented treatment. Implementing mirror therapy in addition to conventional therapy in upper extremity rehabilitation has supplemental benefit for stroke patients in improving upper extremity motor function.

479

IDENTIFYING THE LEADING PROBLEMS AMONG STROKE SURVIVORS IN UMMC USING POST STROKE CHECKLIST

R. Valentine¹, L. Latif¹, Z. Omar¹

¹University of Malaya, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Stroke survivors can experience long-term problems at different points in their recovery, and sometimes may not be captured in standard outcome measures. The Post Stroke Checklist (PSC) is a simple tool developed by a global panel of stroke experts to identify the unmet needs of stroke survivors, as an evaluation tool for the health provider management. This study aims to determine the leading problems among stroke survivors in University Malaya Medical Centre (UMMC), Malaysia. **Material and Methods:** The PSC was administered in 113 stroke survivors at outpatient clinic of neuromedical and neurosurgery rehabilitation department UMMC, with the consecutive sampling technique. Items were evaluated by medical officers and psychiatrists during Oct 2014 - Jan 2015. All patients were also scored with modified Rankin Scale (mRS) during the clinic visit. Actionable items were identified by positive responses to any question on the PSC. **Results:** There were 113 subjects who fit the criteria, with the median of age 61 (30–77), stroke ischemic 82.3%, first stroke 77.9%, and independent pre-morbid 96.5%. The median of mRS was 2 (0–5). The PSC identified actionable items in 89/113 (78.8%) patients. The most common items were mobility 49.6%, both ADL and spasticity 44.2%, fatigue 35.4%, pain 32.7%, communication 26.5%, and cognition 22.1%. There was strong correlation between mRS and total PSC score $r=0.679$, and statistically significant (Spearman $p<0.001$). **Conclusion:** The PSC captured the leading problems among stroke survivors in UMMC especially in terms of mobility, ADL, spasticity, fatigue, pain, communication, and cognition. It does need regular evaluation for each patients, to improve rehabilitation management in enhancing the stroke survivors' quality of

life. PSC may be used to predict the disability level among stroke survivors since it has strong correlation with mRS.

480

RETROSPECTIVE COMPARISON OF INPATIENT REHABILITATION FOR PATIENTS WITH STROKE: DIFFERENCES ACCORDING TO ETIOLOGY

M. Vazquez Guimaraens¹, X. Miguens Vazquez¹, T. Seoane Pillado², J.L. Caamano Ponte³, F.J. Cudeiro Mazaira⁴, M. Yebra Martinez⁵, A. Lopez Vazquez⁶, V. Rodriguez Lopez⁷, C. Crespo Lopez⁸, B. Maside Oliete⁹, N. Gomez Diaz¹⁰

¹Complejo Hospitalario Universitario De Ourense, Neurological Rehabilitation, Ourense, Spain, ²Complejo Hospitalario Universitario De A Coruna, Epidemiology Unit, A Coruna, Spain, ³Centro Terapeutico Xerontoloxico A Veiga, Geriatrics, Lugo, Spain, ⁴Universidade De A Coruna, Neuroscience, A Coruna, Spain, ⁵Complejo Hospitalario Universitario De Ourense, General Rehabilitation, Ourense, Spain, ⁶Hospital Germans Trias I Puyol, General Rehabilitation, Barcelona, Spain, ⁷Complejo Hospitalario Lucus Augusti, Intensive Care, Lugo, Spain, ⁸Complejo Hospitalario Universitario A Coruna, Neurological Rehabilitation, A Coruna, Spain, ⁹Hospital Clinic, Psychiatry, Barcelona, Spain, ¹⁰Complejo Hospitalario Universitario A Coruna, Anesthesiology, A Coruna, Spain

Introduction/Background: Stroke rehabilitation is an essential part of improvement after stroke because recovers patient's independence and modify your quality of life. The purpose of this study is to determine recovery subsequently rehabilitation therapy in survivors of intracerebral hemorrhage (ICH) compared with cerebral infarction. **Material and Methods:** Setting in Neurological Rehabilitation Unit in Coruña. We retrospectively identified all persons with a diagnosis of stroke who were consecutively admitted to Hospital de Oza between Jan 1, 2010 and Dec 31, 2014. Total of 365 cases (95% confidence level, 80% statistical power, ± 3.5 precision) met the inclusion criteria: patients who understood our language, first episode of stroke, injury confirmed radiological tests. The data points collected were age, gender, unit admission, pre-stroke living area, type of stroke, laterality of impairment, length of stay, and discharge destination. Functional status was measured using the FIM instrument (motor, cognitive and total score) recorded at admission and discharge. Recovery was determined by Δ FIM. The efficiency was characterized as the ratio between the increase of the FIM scale and number of days of hospitalization. Comparisons for quantitative variables were made using the Student's *t*-test or Mann-Whitney test, depending on which was considered proper, after checking for normality using the Kolmogorov-Smirnov test. Qualitative variables associations were analyzed using Pearson's χ^2 test. **Results:** At admission, FIM (cognitive and total score) in patients with infarction was higher than in ICH (19.6 vs. 16.8 $p=0.016$) and (54.3 vs. 48.4 $p=0.044$). The patients with ICH had longer rehabilitation length of stay than in patients with cerebral infarction (91.4 vs. 73.3 $p=0.004$). For Δ FIM and efficiency of FIM, there are no significant differences between groups (30.8 vs. 31.2 $p=0.856$) and (0.6 vs. 0.7 $p=0.256$). **Conclusion:** When comparing the efficiency by etiology, is observed that the ischemic group is more efficient because it improves more in less time, with no significant differences.

481

LEFT UNILATERAL NEGLECT OR ALIEN HAND SYNDROME? : A CASE REPORT

W.Y. Wan Rozita¹

¹Pulau Pinang General Hospital, Rehabilitation Medicine Department, Georgetown, Malaysia

Introduction/Background: The alien hand syndrome (AHS) is a rare post stroke complication characterized by involuntary and

uncontrollable movement behaviour of an arm. It is difficult to distinguish AHS from non-dominant hemispheric infarction with symptoms of hemianopia and left hemineglect as AHS patient can also have behaviour symptoms if it involved the frontal lobe. Despite of its non-life threatening condition, AHS can cause disabling impact on daily activities and has potential to cause self-injury, to a post stroke patient. *Material and Methods:* We report a clinical case of a 53-year-old gentleman who was initially presented and treated as visuospatial neglect following a right Middle Cerebral Artery (MCA) stroke after a bypass surgery and subsequently manifested as motor type AHS. In this case report, we highlighted the features of AHS and its management. *Results:* Although the AHS symptom were absent at presentation, patient was totally dependent due to stroke severity. He then improved from total dependency in ADL and mobility to an independent community ambulator at 2 months post stroke despite of the appearance of AHS symptoms which resolved spontaneously 2 months later. *Conclusion:* Although the AHS is a rare stroke syndrome, the knowledge on its clinical presentation is important as an early recognition of its symptoms can reduce the disabling impact to the patient hence allowing them to be more independent. The involvement of multidisciplinary team in managing this condition can ensure that such impairment does not limit patient's daily activities.

482

IS THERE A RELATIONSHIP BETWEEN TRUNK CONTROL AND RECOVERY OF UPPER EXTREMITY IN THE FIRST 6 MONTHS POST STROKE?

S.K. Wee¹, A.M. Hughes², M.B. Warner², J.H. Burridge², D.S.C. Yeo¹, K.H. Kong¹, K.F. Chan¹

¹Tan Tock Seng Hospital- Singapore, Rehabilitation Centre, Singapore, Singapore, ²University of Southampton- United Kingdom, Faculty of Health Sciences- Rehabilitation and Health Technologies Research Group, Southampton, United Kingdom

Introduction/Background: Impaired trunk control is commonly observed following a stroke. The trunk is considered an important postural stabilizer which enables dissociation of upper extremity (UE) from the trunk for function. Our recent cross-sectional study¹ has demonstrated a strong association between trunk control and UE function in stroke patients. However, the relationship between trunk control and recovery of UE over time has not been investigated yet. *Objective:* To evaluate the relationship between trunk control and recovery of UE in the first 6 months post stroke. *Material and Methods:* Forty-five subacute stroke patients were recruited for this longitudinal study. Trunk control was assessed using the Trunk Impairment Scale (TIS). UE impairment and function were assessed with Fugl-Meyer (FMA) and Streamlined Wolf Motor Function Test (SWMFT) respectively. The SWMFT consists of the performance time (SWMFT-Time) and functional ability scale (SWMFT-FAS). Participants were assessed once a month till 6 months post stroke. The individual growth curve (IGC) modeling technique was used to analyse intra-individual and inter-individual changes over time. *Results:* The IGC results demonstrated that the most rapid recovery of trunk control and UE occurred in the first 3 months followed by a deceleration in the rate of recovery from 4th to 6th month post stroke. The rate of change of the recovery curves of trunk control and upper extremity impairment was found to be similar over time. As TIS scores improved over time, both the UE impairment (FMA) and UE function (SWMFT-Time and SWMFT-FAS) improved almost in parallel with the TIS increase. A better degree of trunk control was associated with a better recovery of the UE. *Conclusion:* Trunk control has an association with the recovery of UE impairment and function in the first 6 months post stroke. Hence, improving trunk control has the potential to facilitate better recovery of the UE in stroke patients. *¹Physical Therapy 95 (8):1163–1171.

483

EFFECTS OF SENSORY CUEING ON PARETIC UPPER EXTREMITY IN SUBACUTE STROKE PATIENTS: A SHAM RANDOMIZED CONTROLLED TRIAL

X. Wei¹, F. Kenneth¹

¹The Hong Kong Polytechnic University, Department of Rehabilitation Sciences, Kowloon, Hong Kong- China

Introduction/Background: Remind-to-move is an emerging concept of reducing non-use of paretic upper extremity after stroke. This study was to investigate the effects of Remind-to-move by means of sensory cueing for promoting upper extremity recovery in subacute stroke patients. *Material and Methods:* Fifty-one subacute patients recruited from 3 hospitals, were randomly allocated to experimental, placebo, and control groups at the time when they were discharged from the hospital. The patients in both experimental or placebo groups would need to wear a wristwatch cueing device on their affected wrist 3 hours per day for 4 weeks, with a vibration cue emitted from the device every 10 mins. Only patients in the experimental group had to follow customized upper extremity movement exercise upon every cue. All patients were assessed by a blinded rater at four occasions (pre, 4-week, 8-week, 12-week). The assessments included: Fugl-Meyer Assessment (FMA), Action Research Arm Test (ARAT), Box and Block Test (BBT), Motor Activity Log (MAL), and Functional Independent Measure (FIM). *Results:* The study was on-going and we have recruited 15 patients in the experimental, 15 in the placebo, and 21 in the control group. All the baseline characteristics were comparable among groups. All groups showed significant improvement immediately after treatment. The patients in the experimental and placebo groups presented relative more recovery than these allocated to the control group, however, there were no significant differences between-group in the outcomes. Our findings showed that placebo effect of remind-to-move by means of sensory cueing is stronger especially increasing movement control, whereas sensory cueing itself prompt more hand use daily life. *Conclusion:* Placebo effect is strong in remind-to-move treatment. However, both experimental and placebo treatment cannot reduce disability in terms of ADL. Further investigation of the benefits of using different protocols in sensory cueing for various arm impairments is recommended.

484

IMPACT OF TIMING AND INTENSITY OF REHABILITATION ON SHORT-TERM OUTCOMES IN PATIENTS WITH ACUTE ISCHEMIC STROKE: A NATIONWIDE RETROSPECTIVE COHORT STUDY IN JAPAN

M. Yagi¹, H. Yasunaga², H. Matsui², K. Fushimi³, M. Fujimoto⁴, T. Koyama⁵, J. Fujitani⁴

¹St Marianna University School of Medicine- Toyoko Hospital, Department of Rehabilitation, Kanagawa, Japan, ²School of Public Health- The University of Tokyo, Department of Clinical Epidemiology and Health Economics, Tokyo, Japan, ³Tokyo Medical and dental University Graduate School of medicine, Department of Health Policy and Informatics, Tokyo, Japan, ⁴National Center for Global Health and Medicine, Department of Rehabilitation, Tokyo, Japan, ⁵Tokyo Metropolitan Geriatric Hospital, Department of Rehabilitation, Tokyo, Japan

Introduction/Background: To examine the concurrent effect of timing and intensity of rehabilitation on improving activities of daily living (ADL) among patients with ischemic stroke. *Material and Methods:* Using the Japanese Diagnosis Procedure Combination inpatient database, we retrospectively analyzed consecutive patients with ischemic stroke at admission who received rehabilitation ($n=100,719$) from Apr 2012 to Mar 2014. Early rehabilitation was defined as that started

within 3 days after admission. Intensive rehabilitation was defined as that conducted more than 3.0 unit per day. A multivariable logistic regression analysis and an instrumental variable analysis were carried out to examine the association of early and intensive rehabilitation with the proportion of improved ADL score. **Results:** The proportion of improved ADL score was higher in early and intensive rehabilitation group. The multivariable logistic regression analysis showed that the early rehabilitation group exhibited significant improvement in ADL (odds ratio 1.19; 95% confidence interval 1.12–1.26; $p < 0.001$), and the intensive rehabilitation more than 5.0 unit per day exhibited significant improvement in ADL (odds ratio 1.62; 95% confidence interval 1.38–1.92; $p < 0.001$). The instrumental variable analysis showed that increased proportion of improved ADL was associated with early rehabilitation (risk difference 2.8%; 95% confidence interval 2.0–3.4%; $p < 0.001$) and intensive rehabilitation (risk difference 5.6%; 95% confidence interval 4.6–6.6%; $p < 0.001$). **Conclusion:** The present results suggested that early and intensive rehabilitation improved ADL during hospitalization in patients with ischemic stroke.

485

AUTONOMIC DYSFUNCTION IN POST STROKE PATIENTS

B.S. Yuliawiratman^{1,2}, L. Latif¹, A. Suhaimi¹

¹University of Malaya, Rehabilitation Medicine, Kuala Lumpur, Malaysia, ²The National University of Malaysia, Rehabilitation Unit, Kuala Lumpur, Malaysia

Introduction/Background: To identify the presence of cardiovascular autonomic dysfunction manifested as orthostatic hypotension (OH) and reduced heart rate variability (HRV) during head up tilt test in early post stroke patients admitted to University of Malaya Medical Centre compared to controls. **Material and Methods:** This case-control pilot study included 11 ischaemic stroke patients and 11 non-stroke control subjects with similar risk factors who were admitted to a rehabilitation stroke unit of a single academic medical center. A 70 degrees head up tilt table test was applied to the subjects and a Task Force Monitor (TFM) was used to assess autonomic parameters, which include heart rate (HR), blood pressure (BP) and heart rate variability (HRV). **Results:** Stroke patients' had a mean drop of SBP (-16.45 mmHg) and DBP (-9.45 mmHg) ($p < 0.01$) and had a higher increase in HR mean (+10.63 bpm, $p < 0.05$) compared to controls during head up tilt test. There were no significant differences between LFnu, HFnu and LF/HF ratio (HRV parameters) at rest and during tilt, however, there was a highly significant increase of LF/HF ratio ($p < 0.01$) in stroke patients upon termination of tilt test. **Conclusion:** Presence of OH and reduced HRV seen in early post stroke patients in this study may indicate presence of sympatho-vagal imbalance signifying autonomic dysfunction. The use of tilt table as a tool to detect OH and changes in HRV using spectral analysis for measuring cardiovascular autonomic profile is a convenient, non-invasive approach for stroke clinicians to assess autonomic nervous system (ANS) function in this group early post stroke patients.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: NEUROLOGICAL AND MENTAL HEALTH CONDITIONS - TRAUMATIC BRAIN INJURY

486

ONE YEAR OUTCOME AFTER TRAUMATIC BRAIN INJURY: PRELIMINARY REPORT

Z. Abd Rahman¹, M. Mazlan¹

¹University of Malaya, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Traumatic brain injury (TBI) is a leading cause of disability among young adults population. Many pa-

tients continue to experience long-term disability. To date, there are limited studies looking at long term functional outcome among TBI patients in our population. The multi-cultural background and limited post-injury rehabilitation services in Malaysia may play a role in the long term outcome despite the similar acute injury factors as in developed countries. **Material and Methods:** This prospective cohort study was conducted in a tertiary referral centre in Kuala Lumpur. It aimed to explore the functional outcome of patients with moderate to severe TBI at 1 year post injury and examined the factors associated with good functional outcome. Patients' demographic data, pre-morbid comorbidities and injury details were obtained from medical records. The functional outcome was assessed at 1 year during follow-up using Glasgow Outcome Scale-Extended (GOSE). The GOSE score was then divided into 2 categories; good outcome (score of 7–8) and poor outcome (score of 2–6). The relationship between good outcome and patients' demographic data, premorbid comorbidities and injury severity was then analysed. **Results:** A total of 48 patients were recruited at 6 months. Majority of participants were male (85%), less than 40 years old (64.6%) and involved in MVA (83%). Racial distribution as follows: Malays (50%, $n=24$) followed by Chinese (29%) and Indians (17%). Twenty-two patients have completed their 1 year follow-up. Only 5 patients were rated as having good outcome. Patients with moderate TBI, no concomitant injuries, less than 40 years old, married and employed pre-injury were observed to have good functional outcome. **Conclusion:** Good functional outcome in other developed countries were associated with shorter duration of post traumatic amnesia and good education background. However, it is still too early to understand the factors associated with good outcome in our study population as the study is still ongoing.

487

INTER-RATER AGREEMENT OF THE TURKISH VERSION OF THE NEUROBEHAVIORAL RATING SCALE REVISED FORM AMONG PATIENTS WITH TRAUMATIC/HYPOXIC BRAIN INJURY

I. Gundogdu¹, E. Umay¹, E.A. Ozturk¹, Y. Demir², K. Aydemir², A. Cakci¹

¹Diskapi, Department of Physical Therapy and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: Traumatic Brain Injury (TBI) may cause serious deficits in cognitive, behavioral and emotional functions among patients and worsens rehabilitation outcome. Neurobehavioral Rating Scale-revised (NBRS-R) tool is sensitive monitoring system of cognitive, behavioral and emotional functions in TBI. We aimed to introduce the adaptation of NBRS-R in Turkish TBI patients and to investigate the inter-rater agreement of the Turkish revised scale. **Material and Methods:** We composed a semi-structured interview in Turkish patients using a multidisciplinary approach (physiatrist, psychiatrist, neurologist, psychologist) with the participation of four rehabilitation centers. Questions were created for each 29 scales, based on the recommendations of the original NBRS form. Four different interviewers from four centers applied this form to all of the patients. **Results:** Forty-five patients (aged between 18–60 years) with TBI were included in this study. The items evaluated by intra-class correlation coefficient (ICC) showed satisfactory stability and the reliability of the items ranged from moderate to very good. **Conclusion:** It's our suggestion that, NBRS-R tool will provide reliable and easily reproducible evaluation method of neurobehavioral deficits in TBI patients.

488

DYSFUNCTION OF HYPOTHALAMIC-HYPOPHY-SIAL AXIS INTERFERING WITH TRAUMATIC BRAIN INJURY REHABILITATION

E. Umay¹, I. Gundogdu¹, F. Nazli¹, Y. Demir², K. Aydemir², J. Meray³

¹Diskapı Yıldırım Beyazıt Education and Research Hospital, Physical Medicine and Rehabilitation, Ankara, Turkey, ²TAF-Rehabilitation Center, Physical Medicine and Rehabilitation, Ankara, Turkey, ³Gazi University School of Medicine, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Hypothalamo-pituitary dysfunction may be an important cause of long-term morbidity following brain injury. **Material and Methods:** 19-year-old woman with a history of head trauma and operation for the drainage of occipito-parietal hematoma following traffic accident three and half months ago, admitted to our clinic. Cranial MRI was consistent with diffuse axonal injury and she had been treated with intravenous dexamethasone starting dose at 100 mg/day and decreased day by day for 10 days and phenytoin at 300 mg/day. **Results:** After ICU follow-up for two and half months and she was transferred to rehabilitation clinic with an upper extremity Brunstrom stage of 6/6, hand stage of 5/6 and lower extremity stage of 4/6 on the left. She had complaints such as, overeating, weight gaining, palmo-plantar hiperhidrosis, amenorrhea, polyuria, and nocturia. There was edema and a livedoid-like appearance in upper and lower extremities, more prominent on the left presented with hiperhidrosis. Serum prolactin and morning cortisol levels were high, vasopressin, luteinizing and follicular stimulating hormone, estradiol levels were low. Thyroid stimulating hormone, adrenocorticotrophic hormone, growth hormone and somatomedin-C were normal. Cranial MRI revealed chronic ischemic changes in the right frontal parietal, occipital lobe and diencephalon. Through these findings, increased cortisol level was considered as secondary effect of the corticosteroid treatment, and other findings were evaluated as hypothalamic pituitary axis dysfunction secondary to trauma. There was no improvement in hiperhidrosis despite the aluminum-hydroxychloride treatment; botulinum toxin injection has not been accepted by the patient. At the end of 3rd month the patient was discharged with an AFO. Three months after the discharge, hiperhidrosis was decreased, and biochemical parameters related to thyroid functional tests, prolactin and cortisol levels were found to be normal. **Conclusion:** Hypothalamo-pituitary dysfunction should be kept in mind in the differential diagnosis of hyperhidrosis which can negatively affect the continuity of care.

489

COMMUNITY INTEGRATION AFTER TRAUMATIC BRAIN INJURY - A MALAYSIAN PERSPECTIVE

J. Joseph¹, M. Mazlan¹, N. Hamzah¹

¹Universiti Malaya, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: A successful integration into community is an important goal for rehabilitation after a traumatic brain injury (TBI); however, there is very limited data on the community integration (CI) outcome among TBI survivors in Malaysia. The present study investigated the level of CI as well as the possible relationship of patients' profiles for higher CI. **Material and Methods:** A cross sectional survey on 150 patients (130 male, mean age: 35.2±14 years, mean duration after TBI: 25.3±14.4 months, was carried out in a single tertiary centre with rehabilitation services after TBI (University of Malaya Medical Centre). CI was assessed via face to face or telephone interview using the Community Integration Questionnaire (CIQ). It is a 15 item-questionnaire which can be further divided into 3 sub-scores; home integration (HI), social integration (SI) and productive activity (P). Higher scores indicate higher level of integration. **Results:** The level of CI in our patients was low with total mean score of 12.13 (±6.75). Among the 3 sub-scores, the highest level of integration was found in SI (mean; 5.57±2.66) compared to HI (mean; 3.42±2.45) and P (mean; 3.11±2.46). Factors associated with significantly higher integration in all 3 sub-scores were less severe TBI, age less than 40 years, ability to walk (with or without aid) and absence of prominent behavioural and cognitive impairments. Factors such as duration after TBI and early inpatient rehabilitation were not associated with any

significant integration in all CI sub-scores. **Conclusion:** Despite the availability of an intensive rehabilitation services in this centre, the level of CI after TBI was still low. Nevertheless, people with better mobility and clinical status showed significantly higher level of integration for home, social and productive activity. Research is needed to design interventions that promote full engagement in community living among TBI survivors in this country.

490

FACTORS ASSOCIATED WITH LONG-TERM FUNCTIONAL AND PSYCHOLOGICAL OUTCOMES, IN PERSONS WITH SEVERE TRAUMATIC BRAIN INJURY

F. Khan¹, B. Amatya¹, R. Judson², P. Chung¹, M. Truesdale³, M. Galea⁴

¹Royal Melbourne Hospital, Department of Rehabilitation Medicine, Parkville, Australia, ²Royal Melbourne Hospital, Trauma Services, Parkville, Australia, ³Royal Melbourne Hospital, Emergency Services, Parkville, Australia, ⁴University of Melbourne, Department of Medicine Royal Melbourne Hospital, Parkville, Australia

Introduction/Background: With advances in medical care, the survival rates and functional outcomes of persons with traumatic brain injury (TBI) have improved dramatically. However, TBI survivors often have long-term physical, cognitive and behavioural disabilities, residual neurological deficits, medical complications and lifestyle consequences. The aim of this study was to examine factors impacting long-term functional and psychological outcomes in persons with severe TBI. **Material and Methods:** A prospective cross-sectional study assessed the long-term (up to 5 years) impact of TBI on participants' (n=103 non-compensable patients registered in a tertiary hospital Trauma Database from 2009 to 2010) current activity and restriction in participation using validated questionnaires. **Measures:** Global outcomes: Glasgow Outcome Scale-Extended, Functional Assessment Measure (FIMFAM); Cognitive Log, Centre for Epidemiologic Studies Depression; Health status: Community Integration Questionnaire, Community Integration Measure, Satisfaction With Life Scale; Caregiver outcomes: Caregiver Strain Index, Caregiver self-reported burden. **Results:** Participants' mean age was 48.6±7.9 years, majority were male (77%), 49% had some form of previous rehabilitation. The common causes of TBI were falls (42%) and motor vehicle accidents (27%). The TBI-related symptoms were: pain/headache (47%), dizziness (36%), bladder/bowel impairment (34%), sensory-perceptual deficits (34%). Participants reported minimal change in their physical function and cognition (FIM-FAM: motor (median (Md): 102, Inter Quartile Range (IQR): 93–111) and cognition (Md: 89, IQR: 78–95)). Participants were well-adjusted to community-living, however, reported high levels of depression. Factors significantly associated with poorer current level of functioning/wellbeing included: older age (≥60 years), presence of TBI-related symptoms, a lack of previous rehabilitation and those classified in 'severe disability categories' at admission. Caregivers reported high levels of strain and burden (55%). **Conclusion:** Cognitive and psychosocial problems are more commonly reported by TBI survivors in the longer-term than physical disability. More focus on participation and aging with disability in these persons is needed.

491

MODERATE AND SEVERE TBI PATHWAYS OF CARE AFTER DISCHARGE FROM INTENSIVE CARE UNIT IN FRENCH AREA : WHAT COMPLIANCE WITH FRENCH RECOMMENDATIONS ?

H. Marsollet¹, E. Richer¹

¹Centre de Rééducation- Château Rauzé-LADAPT, Cénac, France

Introduction/Background: Moderate and severe traumatic brain injury (TBI) is responsible for cognitive and behavioral sequelae

and long-term disability. Care pathway in Physical Medicine and Rehabilitation (PRM) for severe and moderate TBI are defined by the French Society of Physical Medicine and Rehabilitation (SOFMER) to improve quality of care and to ensure that the patients have access. The aim of this study was to describe pathways of care of moderate and severe TBI after discharge from intensive care unit (ICU) and assess the compliance with SOFMER recommendations. *Material and Methods:* A retrospective observational, monocentric study was conducted between Jan 2013 and Aug 2014. 150 patients with moderate and severe TBI hospitalized in ICU were included. Three categories of patients were defined according to their score on the Glasgow Outcome Scale (GOS) at discharge from acute care: category 1: GOS 5, category 2: GOS 4–3 and category 3: GOS 2. Their pathways of care were described and compared to the recommendations. *Results:* Among the 150, 69% were admitted to rehabilitation facility and 24% were directed home discharge. 45% was referred to specialized neurorehabilitation facility. The rate of compliance with the recommendations of SOFMER was 60% for category 1, 57% for category 2 and 100% for Category 3. *Conclusion:* The pathways of care of moderate and severe TBI is not fully compliant with SOFMER recommendations. Epidemiological studies of TBI are essential to understanding the local support organization, assess needs, study the relevance of the recommendations and develop strategies for improvement.

492

THE TEST-RETEST RELIABILITY OF THE QUALITY OF LIFE AFTER BRAIN INJURY IN JAPANESE VERSION; QOLIBRI-J AND QOLIBRI-OS-J ARE EXCELLENT

K. Ota¹, S. Megumi², M. Naito³, I. Kondo⁴

¹International University of Health and Welfare Hospital, Rehabilitation Medicine, Nasushiobara, Japan, ²Fujita Health University School of Health Sciences, Faculty of Rehabilitation, Toyoake, Japan, ³Nagoya University Graduate School of Medicine, Preventive Medicine, Nagoya, Japan, ⁴National Hospital for Geriatric Medicine, Rehabilitation Medicine, Obu, Japan

Introduction/Background: The Quality of Life after Brain Injury (QoLIBRI; 37 items) is a disease specific instrument of health-related quality of life (HRQoL) in persons with traumatic brain injury. A brief index of 6-item QoLIBRI Overall scale (QoLIBRI-OS) is also developed and has been available in many countries. It assesses a similar construct to the QoLIBRI total score and correlates highly with the total score from the full QoLIBRI scale ($r=0.87$). QoLIBRI and QoLIBRI-OS were reported to have good test-retest reliability (0.87–0.91 and 0.81) and validity. We developed Japanese version of QoLIBRI (QoLIBRI-J) and QoLIBRI-OS (QoLIBRI-OS-J) and examined the test-retest reliability of each indexes and the correlation with two indexes. *Material and Methods:* Subjects: 60 recruited persons with traumatic brain injured (48 male, 12 female: age 42.2 ± 14.4 , Glasgow Outcome Scale-Extended; GOS-E (3 to 8: median 5) Design: The test-retest reliability was investigated in 60 subjects by second administration of the questionnaire after a 2-week interval. The questionnaires were administered in one of three modes: by self-report (mail), self-report (participant present at the clinic), face-to-face interview. *Results:* Distribution of GOS-E score are as follows, 3: lower severe disability (13.3%), 4: upper severe disability (28.4%), 5: lower moderate disability (26.7%), 6: upper moderate disability (13.3%), 7: lower good recovery (13.3%), 8: upper good recovery (5.0%). The test-retest reliability of QoLIBRI-J total score was almost perfect (Intraclass Correlation Coefficient; ICC (1,1)=0.92, 95%CI 0.87–0.95) and the internal consistency was excellent (Cronbach $\alpha=0.97$). The ICC of QoLIBRI-J subscales: Cognition 0.89, Self 0.88, Daily life and autonomy 0.81, Social relationships 0.75, Emotions 0.82, Physical problems 0.77. The ICC of QoLIBRI-OS-J was 0.91 (95%CI 0.86–0.95). The QoLIBRI-J total score correlates highly with QoLIBRI-OS-J score ($r=0.803$). *Conclusion:* QoLIBRI-J and QoLIBRI-OS-J have good test-retest reliability and can be useful scale about HRQoL for TBI in Japanese.

493

GUILLAIN BARRE SYNDROME FOLLOWING TRAUMATIC BRAIN INJURY: A RARE CASE

E. Umay¹, I. Gundogdu¹, E.A. Ozturk¹, Y. Demir², K. Aydemir²

¹Diskapi Yıldırım Beyazıt Education and Research Hospital, Physical Medicine and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: Very rarely, Guillain Barre syndrome (GBS) has been reported following subdural and subarachnoid hemorrhage after head trauma. *Material and Methods:* To draw attention to this rare but potentially harmful association, we herein present the world's 6th case of GBS that developed 18-days after the head trauma. *Results:* A 63-year-old man sustained a head injury and admitted to neuro-ICU, where he was noted to be confused but not in coma. He had been discharged to home 2 weeks later. The patient presented with ascending weakness, numbness and paraesthesia 17 days after a head injury. Within 48 hours of symptom onset he developed a flaccid tetraplegia, dysarthria, fascial paralysis and dysphagia. Cranial CT and MRI revealed fracture of right temporal bone, left frontal lobe parenchymal hematoma and edema (25×22 mm), right temporal and occipital lobe contusions, which were similar to previous imaging results in the ICU. Lumbar puncture showed increased protein (958 mg/dl) but normal cell count and glucose levels. Electrophysiological investigations revealed sensorimotor demyelination polyneuropathy of upper and lower extremities entirely consistent with the diagnosis of GBS. He had no history of infection, vaccination or surgery in the last 4 weeks. He had no history of metabolic, endocrine or cardiac disease. After intravenous immunoglobulin treatment and 2 weeks of inpatient rehabilitation therapy, fascial paralysis was improved, dysphasia and dysarthria were recovered and, he was discharged to home with functional independence measurement motor subscore of 68/91 and he was ambulatory with a cane. *Conclusion:* It should be kept in mind that GBS can develop 1–3 weeks after head trauma as a result of immunogenic myelin protein release to systemic circulation inducing production of anti-myelin antibodies. Facial paralysis and motor weakness in the limbs can be misdiagnosed as secondary complications of brain damage, consequently, delay in diagnosis can take away the opportunity for early treatment of GBS.

494

METHODS OF ASSESSING ASSOCIATED REACTIONS OF THE UPPER LIMB IN STROKE AND TRAUMATIC BRAIN INJURY: A SYSTEMATIC REVIEW

G. Williams¹, M.B. Kahn², B.F. Mentiplay³, R.A. Clark³, K.J. Bower³

¹Epworth Healthcare, Physiotherapy, Melbourne, Australia, ²Epworth Healthcare, Physiotherapy Department, Melbourne, Australia, ³Australian Catholic University, Faculty of Health Sciences, Melbourne, Australia

Introduction/Background: Associated reactions (ARs) are abnormal, involuntary movements in the hemiplegic upper limb of people with stroke or traumatic brain injury. Incidence rates in people with stroke are cited to be up to 80%. Dynamic exertions, such as walking, provoke this increase in upper limb tone, manifesting in awkward and uncomfortable postures. However, current methods for assessing ARs appear to involve stationary testing positions, which may not adequately reflect the problem and its contributing factors. The overall aim of this systematic review was to evaluate existing methods for assessing ARs. Specifically, this review aimed to: (1) identify methods used to evaluate ARs in people with ABI, (2) determine their clinimetric properties, and (3) assess the clinical utility of these methods. *Material and Methods:* A systematic search of 10 databases was performed for Stage 1 to identify meth-

ods that quantify ARs of the hemiplegic UL. Stage 2 searched four databases to examine the clinimetric properties and clinical utility of these methods. Two independent reviewers identified relevant articles, extracted data, assessed study methodological quality and rated the clinimetric properties and clinical utility. **Results:** Eighteen articles were included. The methods used to evaluate ARs were surface electromyography (11), goniometry (5), dynamometry (5), electrogoniometry (1), subjective clinician (2), and patient rating forms (2). Electromyography, electrogoniometry and dynamometry implemented stationary, seated positions using maximal voluntary contractions of the less impaired UL as the provocative task. Standard goniometry most frequently tested ARs dynamically, using a mobility task to provoke the AR. There was limited clinimetric data available. Only half of the assessment methods were deemed clinically feasible. The most common methods were laboratory-based. **Conclusion:** There were a limited number of methods used to assess ARs in people with ABI, and the measurement properties of these outcomes were largely unreported. No gold standard was identified.

495

SCORING TENDENCY OF JAPANESE TRAUMATIC BRAIN INJURY INDIVIDUALS IN THE FRENCHAY ACTIVITIES INDEX (FAI)

M. Yamada¹, M. Suzuki¹, E. Saitoh²

¹Fujita Health University, School of Health Sciences, Toyoake, Japan, ²Fujita Health University, School of Medicine, Toyoake, Japan

Introduction/Background: To predict the outcome of the individuals with traumatic brain injury (TBI), it is considered to be important that understanding exactly their current community-based lifestyle following in-hospital rehabilitation. Frenchay Activities Index (FAI) is a stroke-specific questionnaire, to assess patients' ability to carry out the activities parallel to the daily living (APDL) in community. It consists of 15 items evaluating patients' ability to perform such as shopping, cooking, laundry and so on. It goes up to 45 points, and the higher score indicates the better ability for APDL. In the current study, the FAI was used to compare the scoring tendency of TBI patients with that of healthy Japanese people. And we aimed at revealing characteristic features of TBI patients' lifestyles. **Material and Methods:** Community-dwelling 60 Japanese TBI patients (48 males, 12 females, mean 41.4±16.6 years) and healthy 790 individuals (427 males, 463 females, mean 44.4±19.6 years) were interviewed with the FAI. **Results:** Average score (21.6 points) of TBI patients was significantly lower than healthy individuals' score (28.1 points) ($p<0.01$). Males with TBI (22.4 points) and females with TBI (18.5 points) showed significantly lower scores than healthy male (25.2 points) and healthy females (30.1 points), respectively ($p<0.01$). Furthermore, TBI patients also showed lower scores at any age than healthy individuals ($p<0.01$). **Conclusion:** However healthy Japanese female showed significantly higher score than male, since FAI contains many housework-biased questions. Results suggested that most persons after injury changed in independent function on APDL regardless of gender and age. Especially, it was exhibited that female changed "traditional" roles expected to perform (like housework) in Japanese community. The FAI score was characterized by gender and age in normal subjects. And by using these norm scores, we could reveal changed lifestyles of Japanese TBI persons more precisely and more adequately.

496

HETEROTOPIC OSSIFICATION FOLLOWING SEVERE ACQUIRED BRAIN INJURY-AUDIT OF CURRENT PRACTICE

A.M. Cortese¹, A. Mumin¹, K. Yelden²

¹Royal Hospital for Neuro-disability, Rehabilitation Medicine, London, United Kingdom, ²Royal Hospital for Neuro-disability, Research, London, United Kingdom

Introduction/Background: Neurogenic heterotopic ossification (NHO) is a disorder of aberrant formation of mature lamellar bone in extraskeletal soft tissues. Significant morbidity can be observed at the site of this formation of new bone, including pain and loss of motion especially around joints. In addition, the development of NHO increases the risk of complications such as urinary tract infection and pressure ulcers, which can significantly impair quality of life. NHO is largely described after traumatic and vascular damage of the CNS, with a particularly high rate of occurrence after traumatic brain injury (5–20%) and Spinal Cord Injury, but also after hip arthroplasty and burns. **Material and Methods:** Our hospital is a specialist hospital for severe acquired brain injury (ABI). Every patient is screened for NHO with XRays of the main sites of possible NHO formation (both shoulders, elbows, hips, knees). Therefore we have a huge amount of data collected in the last two years, since the introduction of a new imaging system, we decided to make a retrospective study to define the incidence of HO in our population, to study the HO distribution according to the aetiology of the acquired brain injury and the clinical risk factors the correlation with, gender, age, the association with the time from the ABI. **Results:** We reviewed our service to understand if it is appropriate to screen all the new admission or if the practice should be changed. Analysis of data in progress- however, preliminary results shows that although the overall prevalence of NHO is less common than we thought, it is being detected in usual cases such as in patients with brain tumours and moyamoya disease. **Conclusion:** Although preliminary; our results indicate that screening all admissions may not be necessary. We aim to present a concise clinical guideline/pathway in screening and diagnosis of NHO following severe acquired brain injuries.

497

EFFICACY OF TRANSCRANIAL DIRECT CURRENT STIMULATION IN THE TREATMENT OF FRONTAL LOBE DYSFUNCTION AFTER TRAUMATIC BRAIN INJURY

H. Zhang¹, W. Lib², H. Lia¹, R. Lia¹, Z. Liac¹

¹The First Hospital of Jinlin University Rehabilitation Department, China (2)The Second Hospital of Jinlin University Rehabilitation Department, China

Background: A majority of patients after Traumatic Brain Injury (TBI) experience severe frontal lobe function impairment, including cognitive emotional disorder, attention deficit, memory loss, psychomotor delay, declining in the speed of response, especially executive dysfunction. These impairments influence the activities of daily living of patients impressively. This study mainly discussed the efficacy of transcranial direct current stimulation (tDCS) on the frontal lobe dysfunction after TBI. **Methods:** In this study, one patient with frontal lobe dysfunction after TBI was analyzed retrospectively. Reaction time (RT) was used to assess the patient's attention function, Montreal Cognitive Assessment (MoCA) and Frontal Assessment Battery (FAB) were used to evaluate the cognitive and frontal lobe function respectively. The initial assessment results showed that the patient was in a low arousal state, and had attention deficit, memory loss, executive and intellectual dysfunction, orientation disorders. The patient received 12-week cognitive training, then 4 weeks of tDCS combined with cognitive training. The anode electrode was positioned on the left dorsolateral prefrontal cortex, cathode was applied to right deltoid muscle (1.4 mA for 20 minutes). We used the time-line chart to describe the changes of RT, and the subtests scores of MoCA and FAB were analysed by paired *t*-test ($p<0.05$), but MoCA changed little and no significant difference compared to pre-treatment ($p>0.05$). Following 4-week tDCS with cognitive training, FAB and MoCA scores were improved significantly compared with 12-week cognitive training alone. **Conclusion:** Cognitive training was beneficial to the recovery of frontal lobe function in patients with TBI, but if combined with tDCS would be more effective than treated with cognitive training alone. We concluded that tDCS could improve the cognitive function of patients with frontal lobe dysfunction after TBI.

498

THE EXPRESSION OF OREXIN A AND OX1R IN PREFRONTAL CORTEX OF TRAUMATIC BRAIN INJURY INDUCED COMATOSE RATS AFTER VAGUS NERVE STIMULATION

Zhen Feng, Xiao-yang Dong

Department of Rehabilitation Medicine, the First Affiliated Hospital of Nanchang University, Nanchang, Jiangxi Province, China

Background: Previous research have show that vagus nerve stimulation (VNS) could decrease daytime sleep and rapid eye movement in epilepsy patients caused by traumatic brain injury (TBI). In this study, we explore whether vagus nerve stimulation have waking-promoting effect and it is possible mechanism. **Method:** SD rats were randomly divided into four groups: control, sham-stimulated (TBI), stimulated (TBI +VNS) and antagonist group. Application of VNS in TBI-induced coma rats model and observe the behavior changes. Then, using ELISA, Western blot and immunohistochemistry technique to detect the expression of Orexin-A and OX1R level in prefrontal cortex (PFC). **Results:** Results have shown that electrical stimulation of vagus nerve could improve consciousness recovery in traumatic brain injury induced coma, the expression levels of orexin-A and OX1R increased in rat prefrontal cortex. Orexin-A expression gradually upregulated time-dependent during 24 hours, while the expression of OX1R reached a peak at 12 hours and then decreased. In addition, injection of OX1R antagonist, SB334867, to the intracerebroventricular of rats after traumatic brain injury, the number of rats restored to consciousness was decreased and the expression of orexin-A and OX1R in prefrontal cortex was down-regulated. **Conclusion:** Our finding suggested that vagus nerve stimulation could promote consciousness recovery in traumatic brain injury induced coma rats, and upregulation of orexin-A and OX1R expression in the prefrontal cortex may be one of mechanism involved in consciousness-promoting effects. Therefore, VNS may be a promising treatment for TBI induced coma in future. **Funding:** This study was funded by grants from the National Natural Science Foundation of China, No. 81260295, and the Graduate student innovation fund of Jiangxi Province of China, No. YC2015-S090.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: NEUROLOGICAL AND MENTAL HEALTH CONDITIONS - SPINAL CORD INJURY

499

CARDIOPULMONARY ARREST RELATED HYPOXIC ISCHEMIC SPINAL CORD DAMAGE: A CASE REPORT

S. Demir¹, E. Adigüzel¹, F. Tok¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: Ischemic spinal cord injury is one of the rare causes of spinal cord injuries. The most common spinal cord ischemia occurs in the lower thoracic and upper lumbar section of the spinal cord which is fed by the Adamkiewicz artery. In the present study, a patient with Conus medullaris lesion due to ischemic spinal cord lesions is described. **Material and Methods:** A 75-year-old male patient referred to our clinic with complaints of difficulty in walking and sensory loss. According to his history, he had a cardiopulmonary arrest and after 45 minutes of CPR he regained a pulse and started breathing. Leg weakness occurred after that. There was no ischemic damage in cranial magnetic resonance imaging (MRI). **Results:** EMG test was performed and there was T12 and L1 radiculopathy. On spinal MRI, ischemic damage at conus medullaris level has been detected and prolonged cardiopulmonary arrest related hypoxic ischemic spinal cord damage was considered.

The patient had short sitting balance when he was hospitalized in our hospital. Motor and sensory deficiencies were established in lower extremities. Rehabilitation programme was planned and after physical therapy, patient showed improvement in activities of daily living. **Conclusion:** Spinal cord injury may be caused by traumatic and non-traumatic factors. The most frequent non traumatic factors are spinal stenosis, tumors, and infections. Ischemic myelopathy is a disorder characterized by acute-onset, flaccid or spastic quadriplegia or paraparesis and is a rare cause of paraplegia.

500

AUTONOMIC DYSREFLEXIA DURING PRESSURE ULCER DEBRIDEMENT IN PATIENT WITH SPINAL CORD INJURY

B. Aras¹, E. Adigüzel¹, S. Kesikburun¹, İ. Safaz¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: In this case report, we present an unusual case of AD that triggered by bedside wound debridement. **Material and Methods:** A 29-year-old male with a 5-years-history of cervical 4 complete (American Spinal Injury Association [ASIA] A) tetraplegia was admitted to SCI rehabilitation unit with complaints of pressure ulcers. He had one grade 4 pressure ulcers in left gluteal region and one poorly healing grade 4 pressure ulcer in sacral region. During the procedure, his blood pressure elevated. We stopped the debridement, elevated the head of the bed, loosened his clothes, catheterized the patient and the other causes of AD was ruled out such as fecal impaction. Subsequently, his blood pressure decreased and the symptoms disappeared immediately. On the next day, we injected 1 ml 4% lidocaine to the edges of the wounds before the debridement. The patient tolerated the procedure well and he did not experience another AD episode. **Results:** Autonomic dysreflexia is an acute life-threatening hypertensive medical emergency which occurs in patients with SCI at or above T6. The most common causes are bladder and bowel disorders such as urinary retention or bowel irritation but pressure ulcers, ingrown toenails, sexual activity, invasive procedures (urodynamic studies, cystoscopy, rectoscopy), deep venous thrombosis, burns, insect bites, skin irritants, infections and fractures can also prompt a dysreflexic reaction. The bedside debridement is a common technique for management of pressure ulcers in SCI patients. This procedures carry a risk of triggering AD because it involves noxious cutaneous stimulation of peripheral afferent fibers. In the literature, rare AD cases that developed after noxious stimulation such as negative-pressure wound therapy, intramuscular injection and operative debridement were mentioned. **Conclusion:** Physicians must be careful about the risk of the developing AD in the management of pressure ulcers in high-level SCI patients.

501

MYOSITIS OSSIFICANS TRAUMATICA IN A SPINAL CORD INJURED PATIENT WITH EACH MATURATION STAGE SEEN ON RADIOLOGIC TESTS

E. Adigüzel¹, K. Katmerlikaya², E. Yaşar¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey, ²Kırıkkale University, Department of PMR, Kırıkkale, Turkey

Introduction/Background: Mature lamellar bone formation in non-osseous tissue is the main process both in myositis ossificans (MO) and in heterotopic ossification. Though the etiology is unclear, trauma is one of the causative factors. Here we present a MO case with characteristic developmental stages each evaluated on radiologic images, since trauma beginning to the ossification occurrence. **Material and Methods:** A 45-year-old paraplegic male was hospitalized. He had AIS-A T11 paraplegia due to motor vehi-

cle accident two months ago and he was on low-molecular-weight heparin (LMVH)(enoxaparin) 1 mg/kg given subcutaneously twice daily for anticoagulant prophylaxis. During rehabilitation programme, patient complained of a swelling on his left proximal anterior thigh. We recognized a tender, 6x4 cm sized, mild warm swelling at the inferior region of ligamentum inguinale with no range of motion (ROM) limitation at hip joint. Laboratory studies and plain x-ray examination showed no abnormality. Doppler ultrasonography showed 8,5x50 mm hematoma between muscle groups. Hip magnetic resonance imaging (MRI) was performed. MRI revealed a hematoma within vastus lateralis muscle. **Results:** We administered conservative treatment, and terminated LVMH treatment. Two days later, resolution of the hematoma was recognized below the skin and swelling began to relieve. After one week of bed rest, the patient restarted rehabilitation programme. On the third week follow-up there was a though mass at the localization of hematoma and a mild ROM limitation at hip. C-reactive protein was elevated to 50.6 mg/dl, alkaline phosphatase to 183 U/L and erythrocyte sedimentation rate to 26 mm/h. Plain x-ray examination revealed a large ossification at left that was not seen on previous x-ray. **Conclusion:** Clinical presentation of this patient was didactic because each stage of MO development was seen on radiologic imaging techniques. Clinicians should keep pathological stages of MO in mind when evaluating the patient with radiologic images.

502

WIDESPREAD HETEROTOPIC OSSIFICATION LIMITING FUNCTIONALITY OF A PATIENT WITH CENTRAL CORDSYNDROME: SHOULD IT BE THE FATE OF SPINAL CORD INJURY

T. Hatipoğlu¹, S. Kesikburun¹, E. Adigüzel¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: Herein we present a patient with central cord syndrome after ski accident who developed widespread HO in upper extremity joints and hip joints. **Material and Methods:** 61 year old male patient was admitted to our clinic with the complaint of strength loss especially in both upper extremities. The patient fell down while skiing three years ago and operated from the cervical vertebrae with the diagnosis of central cord syndrome. He was followed in intensive care unit for 3 days. He had no loss of consciousness. The patient was diagnosed with C4 ASIA D according to ASIA Impairment Scale and hospitalized. Due to HO, he was receiving Indometazin medication 50 mg daily and was operated from the right elbow because of range of motion limitation a year ago. Shoulder, elbow, wrist, and hip were limited bilaterally from place to place more than 50%. No significant swelling or redness was observed and the patient had no pain. X-rays revealed HO areas in aforementioned joints. Even he had good muscle strength in lower extremities, the joint limitations interfered with ambulation of the patient due to poor balance. He was also dependent on his all activities of daily living. HO can lead to many serious complications like joint limitations, ankylosis, immobility, decubitus ulcer, deep vein thrombosis and spasticity unless intervened at the proper time. **Results:** Heterotopic ossification (HO) is ectopic mature bone formation in the periarticular connective tissues. It is commonly seen after traumatic events but also can be neurogenic consequence of spinal cord injury in physical medicine and rehabilitation practice. HO is located mostly around large joints such as hip and knee. **Conclusion:** Particular in cases where HO seen in many joints as in our case, functional independence is significantly affected. Therefore prophylaxis and early diagnosis play critical role in patients with spinal cord injury.

503

NEUROLOGICAL WORSENING AFTER SURGERY OF SPINAL CANAL STENOSIS

M. Alcobendas Maestro¹, C. Vicario Espinosa², R. Casado López², A. Benavente Valdepeñas³, A. Esclarín de Ruz¹, A. Gil Agudo¹

¹Hospital Nacional de Parapléjicos, Physical Medicine and Rehabilitation, Toledo, Spain, ²Hospital Nuestra Señora del Prado, Orthopedic Surgery, Talavera de la Reina, Spain, ³Hospital Virgen de la Salud, Physical Medicine and Rehabilitation, Toledo, Spain

Introduction/Background: Surgical decompression of spinal canal stenosis (SCS) is commonly indicated in patients with neurological progressive deficit. Reported complications are not uncommon. Our objective has been to study incidence, type of lesion, associated complications and functional results in patients that suffered a neurological worsening after surgical decompression of SCS without evidence of technical complications. **Material and Methods:** Descriptive and retrospective study on adult patients diagnosed of spinal cord injury (SCI) after surgical decompression of SCS without evidence of surgical complications admitted in our institution (national reference centre in treatment of SCI) from 2010 to 2013. Demographic data, personal background, complications during admittance have been reported. Functional capacity was measured with scales SCIM III (Spinal Cord Independence Measure) for daily life activities valuation, and WISCI II (Walking Index Spinal Cord Injury) for gait ability in SCI. **Results:** 8 out of 821 patients admitted in our institution met the inclusion criteria during the study period. Age range was 41 to 74 years old. Five were cervical injuries, 1 thoracic and 2 lumbar; all of them were incomplete motor lesions. Seven patients had previous diseases, including vascular risk factors, and clinical symptoms of myelopathy, although all of them preserved independent gait capacity six months or more before surgery. After a physical treatment program, six patients showed neurological improvement. In all the cases, complications have been reported; urinary tract infection was the most frequent one. In the eight patients SCIM III score was higher than 75 points, and six of them recovered some kind of independent gait ability. **Conclusion:** Neurological worsening after surgical decompression of SCS without evidence of surgical complication is a severe but rare situation. Vascular risk factors, higher age and multilevel SCS are bad prognosis factors. These SCI are usually incomplete lesions; neurological and functional improvement are to be expected.

504

SPINAL CORD INJURY DURING PREGNANCY

M. Alcobendas Maestro¹, C. Vicario Espinosa², R. Palazón García¹, S. Ceruelo Abajo¹, J.D. Bravo Corrales¹, A. Gil Agudo¹

¹Hospital Nacional de Parapléjicos, Physical Medicine and Rehabilitation, Toledo, Spain, ²Hospital Nuestra Señora del Prado, Orthopedic Surgery, Talavera de la Reina, Spain

Introduction/Background: Major trauma during pregnancy is the cause of 15% of mother mortality among non-obstetric reasons. Spinal cord injury (SCI) is involved in 15% of these cases. The objective of this study is to review the SCI characteristics and complications during pregnancy. **Material and Methods:** In a retrospective study, every patient diagnosed of traumatic SCI during pregnancy (SCI-DP) admitted in our institution from 1995 to 2015 have been included. Demographic characteristics, lesion type and complications have been reported. **Results:** Five patients, with an age from 22 to 38 years old have been included in the study. In 3 of them trauma happened in the second trimester of pregnancy, and in the other 2, in the first trimester. In 3 cases SCI-DP was a cervical lesion and in 2 it was a thoracic lesion. Only 2 cases were complete lesions. The most frequent complication reported was urinary tract

infection (UTI), followed by respiratory insufficiency that required external ventilatory support, in third place, hemodynamical instability, and the less frequent was neuropathic pain and disreflexia. *Conclusion:* Several important factors must be considered when treating a SCI-DP. Respiratory insufficiency and hemodynamical instability jeopardize mother and fetus life, and after neurogenic shock, autonomic dysreflexia episodes, UTIs, constipation, and silent delivery are complications that must be ruled out. Frequent gynaecological controls and fetus monitorization after 32nd week are advisable, or in any moment if early delivery risk is detected by gynaecological exam or echography. SCI-DP management is a challenging pathology, since specific aspects of both, SCI and pregnancy, must be treated, with the objective of preservation of mother's and fetus' health, especially when gestation is advanced and the fetus is viable.

505

A CASE OF PARAPLEGIA DUE TO ANTERIOR SPINAL ARTERY OCCLUSION

E. Ata¹, S. Akarsu¹, L. Tekin¹

¹*Gulhane Military Medical Academy - Haydarpasa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey*

Introduction/Background: Anterior spinal artery syndrome is a medical condition where the anterior spinal artery, the primary blood supply to the anterior portion of the spinal cord, is interrupted, causing ischemia or infarction of the spinal cord in the anterior two-thirds of the spinal cord. The syndrome has characteristic symptoms that consist of sudden onset of flaccid quadriplegia with pain, dissociated sensory loss below the level of the lesion, and bladder dysfunction. It occurs most frequently in the watershed zones, such as the midthoracic region (T3-T8). The causes of the syndrome reportedly include arteriosclerosis, infection, vasculitis, embolic events, sickle cell anemia, cervical cord herniation, surgery and trauma. Treatment is determined based on the primary cause of anterior cord syndrome. *Material and Methods:* Case: A 70-year-old man with a 15-year history of diabetes mellitus and hypertension experienced pain and paresthesia in his lower limbs bilaterally. The pain suddenly increased, and following the pain bilateral weakness of the lower limbs developed suddenly. On admission, the patient had paraplegia, sensory disturbance of pain, decreased deep tendon reflexes and urinary incontinence. An MR study revealed an intramedullary high-intensity lesion on T2-weighted images at the T2-T6 region. *Results:* The patient's bladder dysfunction and the motor and sensory deficits strongly suggested that thoracic cord ischemia was due to the impaired anterior spinal artery flow. *Conclusion:* In conclusion, we described here a patient with sudden onset of flaccid quadriplegia with back pain, dissociated sensory loss, and bladder dysfunction thought to be due to anterior spinal artery occlusion. Acute transverse myelitis, spinal cord compression, and demyelinating disorders may cause similar findings but anterior spinal artery occlusion should be kept in mind in differential diagnosis, too.

506

PREVALENCE OF BRAIN AND SPINAL CORD INJURY IN AN ASSISTED HIGH COMPLEXITY PHYSIOTHERAPY

G.A. Baquero Sastre¹

¹*Manuela Beltran University, Physical Therapy, Bogotá, Colombia*

Introduction/Background: The brain and spinal cord injury by nervous system characteristics pose serious impacts for engine performance, and functional people thus will limit its shares, generating high costs for rehabilitation processes required and care special demand, should be borne in mind that changing lifestyles, and the presence of trauma and violence the occurrence of these lesions tend to have an increased frequency. *Material and Methods:* Investigation corresponds to a cross-sectional design in which pa-

tients who took consulted a Physiotherapy service of high complexity because of neurological injuries and particularly those directly implicating the cortex or the spinal, using collecting the health-care information statistical records for the period from Feb to Sep 2013, and for data analysis and raw prevalences were calculated with the corresponding specific standard error level. *Results:* In the study period were treated a total of 66 people with different types of neurological injuries of various ages of which 53.03% of males ($n=35$, $SE=0.05$) 46.96% ($n=31$, $SE=0.06$) for people with neurological conditions who were treated in Physiotherapy had lesions with involvement directly on the cerebral cortex, and 10.60% ($n=7$, $SE=0.09$) of the people with neurological morbidity have spinal injury 51.61% ($n=16$, $SE=0.07$) of those who were treated because brain injury were male, while in the case of people with spinal cord injuries were also the 71.42% of males ($n=5$, $SE=0.12$) *Conclusion:* Brain injuries are more frequent in its occurrence to spinal cord injuries and within the vascular origin are the most important, while spinal cord injury is the leading cause trauma.

507

PREVALENCE OF MEDULAR LESIONS SERVED IN ONE PHYSICAL THERAPY SERVICE OF HIGH COMPLEXITY

G.A. Baquero Sastre¹

¹*Manuela Beltran University, Physical Therapy, Bogotá, Colombia*

Introduction/Background: The medular lesions are events whit high frequency in the neurological pathologies, and their impacts have important effects in sensitive and motor elements related functional movements affecting the possibilities of performance of individuals, and levels of quality of life, with large economic costs for rehabilitation processes that are required for those affected. *Material and Methods:* Developed a cross-sectional study with patients treated by neurological and particularly medular lesions in one Physiotherapy Center of a Public Hospital of High Complexity in Bogota, between the months of Feb to Sep 2013, the selection mechanism of the population was a census of all elderly subjects 18 years old treated for neurological and medular lesions, and was calculated to analyze the information raw and specific prevalences with a level of standard error, and to see the relation of gender with the occurrence of medular lesions was calculated association measures type odds ratio and Chi Square test. *Results:* In the observation period of the study were treated for diverse neurological pathologies a total of 66 people, 10.60% ($n=7$, $SE=0.09$) of them had medular lesions, 42.85% of them were cases of spinal cord injury ($n=3$, $SE=0.26$), 28.57% had myelopathy events ($n=2$, $SE=0.37$), 66.6% of those who had spinal cord injury were male ($n=2$, $SE=0.27$, $\chi^2=0.23$, $p>0.05$, $OR=1.81$). *Conclusion:* Medular lesions are a frequent reason for consultation at neurological diseases in Physiotherapy, and they are linked mainly with traumatic nature that surpass infectious, and oncological, primarily affecting people of masculine gender.

508

CROSS SECTIONAL STUDY OF PATIENTS WITH TRAUMATIC SPINAL CORD INJURY IN A TERTIARY HOSPITAL: THE SARAWAK GENERAL HOSPITAL EXPERIENCE

L. Be Kim¹, S. Esther¹

¹*Sarawak General Hospital, Department of Rehabilitation Medicine, Kuching, Malaysia*

Introduction/Background: The general goals of rehabilitation in spinal cord injury (SCI) patients are improvement of function, mobility, prevention of secondary complications and reintegration into the community. There are not many SCI related studies from developing world such as Malaysia. Therefore, this study aims to determine demographic variables, clinical symptoms and perceived external factors of SCI patients. *Material and Methods:* This is a cross sectional study involving traumatic spinal cord injury (SCI)

patients ($n=35$) who under the care of Department of Rehabilitation Medicine Sarawak General Hospital. Data collection was done from Mar 2013 to Feb 2014. **Results:** Majority of the patients were young and less than 40 years old (66.9%), and predominantly male (85.7%). The major cause of SCI was road traffic accident (65.7%). 60% of SCI subjects were unemployed at that period of involvement and 74.2% were found to have total household income \leq RM1000. Sexual dysfunction was another major issue in 97.1% of study subjects. Neurogenic bladders were managed by catheterization (77.1%) and bowel regulation was achieved in most patients. Spasm was a common problem (97.1%), however it may not disturb their daily activities. Pressure ulcer was found in 31.4% subjects and inadequate pain control was encountered in 8.6% of them. Most patients had adequate support, managed to adapt to their illness and not depressed. 82.9% claimed to have good family support but 37.1% also claimed to have perceived home environmental barriers. Equipment issue was found to be managed relatively well in our setting. **Conclusion:** Our local findings of this SCI study provide further understanding and insights into the needs of SCI sufferers. We hope to facilitate development of targeted interventions for improvement of rehabilitation medicine services and enhance the quality of life among SCI patients in Sarawak.

509

QUALITY OF LIFE IN A SAMPLE OF TUNISIAN PATIENT WITH SPINAL CORD INJURY

I. Bel Haj Youssef¹, H. Migaou², B. Soumaya², S. sana², A. Jellad², B.S. Zohra²

¹Monastir, Tunisia, ²CHU Fattouma Bourguiba Monastir, Physical Medicine and Rehabilitation, Monastir, Tunisia

Introduction/Background: Spinal Cord Injury (SCI) results in complete or incomplete loss of function below the level of the lesion and has a broad impact on medical, social, psychological conditions and on quality of life (QoL). The main purpose of this study was to identify QoL of subjects presenting with residual neurological deficits from a spinal cord injury and living at home. **Material and Methods:** This is a cross-sectional descriptive study of a sample of SCI patients followed at a physical medicine and rehabilitation department. After informed consent was obtained, a clinical examination was conducted and questionnaires were filled out by the subjects. The following parameters were assessed: impairments, disability (Functional Independence Measure) and quality of life (Reintegration to normal Living index (RNLI), Nottingham Health Profile and Short Form SF36). **Results:** The mean age was 39.35 years with a men predominance 85%. The traumatic etiology account for 45%. The evaluation was performed after on average of 3 years. It showed that 15% live alone, and 45% were inactive. The average score of RNLI and Nottingham Health Profile and SF36 were respectively 57,8; 50,15 ; 36,42. For the scale of Nottingham, the highest score was the energy and the lowest score was sleep. Concerning the SF36 we noted that PCS compound was more affected. The lowest scores' domains were physical function (PF) and role emotion (RE). We didn't found any statistically significant correlation between among traumatic and non-traumatic SCI population. **Conclusion:** In recent years, the focus of rehabilitation outcomes has shifted from the illness itself to a broader picture of well-being; QoL is an important measure of the success of rehabilitations programmers for individuals with disabilities. This study has bias: a small sample and a cross sectional study.

510

PREDICTORS OF CHANGES IN SEXUAL LIFE AFTER SPINAL CORD INJURY

I. Bel Haj Youssef¹, M. houda², B. Soumaya², S. Salah², A. Jellad², Z. Ben Salah²

¹Monastir, Tunisia, ²CHU Fattouma Bourguiba Monastir, Physical Medicine and Rehabilitation, Monastir, Tunisia

Introduction/Background: The literature on spinal cord injury (SCI) has long gathered information on sexual ability after SCI, shifting the emphasis to the emotional aspects and the impact on quality of life and relationships. The purpose of this study is to analyze the relations and sexual life changes after SCI and to identify possible predictive factors. **Material and Methods:** This is a cross-sectional descriptive study of a sample of SCI patients followed at a physical medicine and rehabilitation department. After informed consent was obtained, a clinical and functional examination was conducted and questionnaires were filled out by the subjects. The IIFEL Score was used for evaluation of erection dysfunction. **Results:** Only nine manage to lead a sexual relationship with variable level of satisfaction caused by several troubles. Six declare their impotence. Among troubles cited; an erectile dysfunction in 9 cases, a problem of ejaculation (sloberly ejaculation in one case, psychogenic ejaculation in 2 cases). Six patients were unable by mechanical stress. IIFEL score averaged 17.13 (7–27). Three (15%) patients have severe erectile dysfunction, 7 (35%) have a moderate or medium dysfunction and 5 (25%) have little or no erectile dysfunction. The study of correlations showed a significant relationship between the IIFEL score and respectively the MIF score ($r=0.546$; $p=0.035$), HAD-A score ($r=0.617$; $p=0.014$) and the time taken PRM support ($r=0.683$; $p=0.005$). **Conclusion:** SCI leads to significant changes in almost all aspects of life. Rehabilitation specialists need to understand the importance of satisfaction with sentimental and sexual life and its influence on people with SCI reentering the community and restoring their well-being.

511

IMPLEMENTATION OF A RESPIRATORY REHABILITATION, VENTILATOR WEANING AND TRACHEOSTOMY DECANULATION PROTOCOL FOR TETRAPLEGIC PATIENTS: INITIAL EXPERIENCE IN A REHABILITATION CLINIC

I. Gundogdu¹, E.A. Ozturk¹, E. Umay¹, Y. Demir², K. Aydemir²

¹Ministry of Health Ankara Diskapi Yildirim Beyazit Education and Research Hospital, Department of Physical Therapy and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: The aim of our study has been to develop a respiratory rehabilitation, mechanical ventilator (MV) weaning and tracheostomy tube (TT) decannulation protocol (RRWT) and to evaluate the effectiveness of this protocol in tetraplegic patients. **Material and Methods:** Multidisciplinary RRWT protocol including respiratory assessment and management themes was developed and performed based on findings from other studies in the literature. Tetraplegic patients with the diagnosis of difficult-to-wean, who were admitted to the PMR clinic after having discharged from intensive care unit to their home with home type mechanical ventilator and/or TT, were included in this study. **Results:** RRWT protocol was applied to 35 tetraplegic patients (10 home type ventilator and tracheostomy-dependent, and 25 tracheostomized patients) with C1-C7 ASIA Impairment Scale grades A, B, and C injuries. Seven out of 10 patients successfully weaned from mechanical ventilator and 30 of 35 patients were decannulated. Four patients referred for diaphragm pace stimulation and tracheal stenosis surgery. The mean durations of MV weaning and decannulation were 37 and 31 days respectively. **Conclusion:** A multifaceted, multidisciplinary respiratory management program can change the process of care used for SCI patients.

512

SPINAL CORD INJURY RESULTING FROM GUNSHOT WOUNDS: A COMPARATIVE STUDY WITH NON-GUNSHOT CAUSES

Ü. Güzelkücü¹, Y. Demir¹, S. Kesikburun¹, E. Yaşar¹, B. Yılmaz¹

¹Gulhane Military Medicine Academy, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Spinal cord injury (SCI) is one of the potentially catastrophic consequences of gunshot wounds (GSW). Gunshot-induced spinal cord injury (GSWSCI) has become increasingly important with the rise in the number of civilian-owned guns, violence in urban areas and conflicts in many parts of the world. The primary purpose of the present study was to identify the clinical and demographic characteristics of SCI patients resulting from GSW. The secondary purpose was to compare SCI of military and civilian GSW, and to determine the difference between GSWSCI and non-gunshot-induced spinal cord injury (NGSWSCI). **Material and Methods:** The study included 1,043 consecutive patients with SCI that were divided into 2 groups according to etiology: patients with GSWSCI constituted the study group, and randomly selected patients with NGSWSCI were matched for gender, and week of admission constituted the control group. The demographic and clinical characteristics of the patients were recorded, compared, and analyzed. **Results:** The study group included 102 patients (mean age: 26.93±9.11 years). The vast majority of the patients were aged 16–30 years (68.6%) and 90.2% were male. The majority of the lesions were at the thoracic level (58.8%) and a complete injury (60.8%). Surgical stabilization of the spine was performed in 50 patients (49%). Compared to the NGSWSCI group, the GSWSCI patients were more likely to have a complete lesion (60.8% vs. 45.1%, $p=0.025$), had a lower rate of surgical stabilization (49% vs. 88.2%, $p=0.0001$), and a higher rate of associated injuries (54.9% vs. 25.5%, $p=0.0001$). Compared to the civilian GSWSCI group, the military GSWSCI patients had a higher rate of surgical stabilization and associated injuries (60% vs. 40%, $p=0.049$, 68.9% vs. 43.9%, $p=0.012$, respectively). **Conclusion:** The results revealed that GSWSCI and military GSWSCI patients may have different demographic and clinical features compared to NGSWSCI and civilian GSWSCI patients, respectively.

513

DELIRIUM IN A SPINAL INJURY REHABILITATION SETTING

J. Haider¹, S. Kollit¹, S. Kazmi¹, K. Harris¹

¹Rookwood Hospital, Welsh Regional SCI Rehabilitation Unit, Cardiff, United Kingdom

Introduction/Background: Delirium has been shown to be a common complication following traumatic spinal cord injury (SCI). The presence of delirium in patients within post-acute rehabilitation has been shown to predict poorer outcomes. The unique challenges posed by patients with SCI and delirium are not considered in various guidelines on delirium. We describe a case of a patient with a traumatic SCI who presented with delirium in a post-acute spinal rehabilitation setting and the resulting challenges we faced. **1. Cheung A et al. Onset, risk factors, and impact of delirium in patients with traumatic spinal cord injury** Journal of Neurotrauma; 30 (21) 1824–1829 Nov 2013. **Case:** A 70 year old gentleman sustained a traumatic SCI resulting in incomplete paraplegia (T5 ASIA C). His injuries were managed conservatively and he was eventually transferred to a regional SCI centre for ongoing rehabilitation. He then developed hyperactive delirium secondary to a urinary tract infection further compounded by pain, constipation and nosocomial pneumonia. **Results:** Specific complications of SCI make management delirium challenging. Managing neurogenic bladder and bowel aggravates agitation due to the invasive nature of interventions. Resultant constipation and incontinence worsens delirium creating a vicious cycle. Loss of sensation increases risk of self harm during periods of psychomotor agitation e.g. urethral tear from pulling indwelling catheter. Many of the standard medications used for complications of SCI have anticholinergic and other cognitive side effects which can prolong delirium. Difficulty engaging with specialist therapy regarding mobilisation, cough augmentation and spasticity management result in further complications prolonging delirium. **Conclusion:** Delirium in Spinal Rehabilitation de-

mands unique management considerations which are not reflected in current guidance on delirium and requires distinct solutions. We found a multi-discipline approach is beneficial in managing this situation e.g. specialist therapy interventions proved beneficial in calming agitation (wheelchair mobilisation and bed-mobility). Support for nursing staff from clinical psychology formulated strategies allowing for invasive continence care.

514

AN UNUSUAL COMBINATION: SPINAL CORD INJURY IN 2 PATIENTS WITH ADVANCED HUNTINGTONS DISEASE

J. Haider¹, S. Kollit¹, S. Kazmi¹

¹Rookwood Hospital, Welsh Regional SCI Rehabilitation Unit, Cardiff, United Kingdom

Introduction/Background: Spinal Cord Injury (SCI) and Huntington's Disease (HD) is a rare combination. We present two cases with advanced HD who sustained a SCI. Particularly striking was the pattern of change in severity of involuntary movements as the SCI evolved. There are sporadic case reports of other neurological disorders presenting with a change in the nature of chorea in patients with HD, however there has not been a description of the presentation of SCI in HD. **1. S Bassi et al. "Motor behaviour modifications after a stroke in a patient with Huntington's disease."** Journal of Neurology Neurosurgery & Psychiatry 1984Dec;47 (12):1358–1359. **Case:** Case 1 describes a 64 year old lady with advanced HD who was admitted to hospital with an increase in involuntary movements following a fall. She was treated for a suspected urinary tract infection however then developed urinary retention and loss of her usual involuntary movements. This subsequently progressed into an incomplete tetraplegia and an MRI revealed C2–7 spinal haematoma causing cord compression. She underwent decompression surgery. Some purposeful movement was regained but there was also increasingly florid chorea and dystonia in her face, neck and shoulders. Case 2 describes a 58-year-old gentleman who sustained a fall in a care home and then was noted to have a reduction in his involuntary movements. This then developed over days into a complete tetraplegia and loss of voluntary movement and an MRI revealed a complete dislocation of his cervical cord at C5. He was subsequently managed palliatively. **Results:** Both cases demonstrate unusual presentations of SCI in HD. The initial presentation is subtle as interpretation of neurology is difficult and may only manifest as a change in the severity of involuntary movements. **Conclusion:** An acute change in the severity of involuntary movements in patients with HD with a history of falls or trauma should trigger a suspicion for SCI.

515

SPINAL CORD INJURY - ASSESSING TOLERABILITY AND USE OF COMBINED REHABILITATION AND MLC601OR MLC901 (SATURN STUDY)

O. Htwe¹, R. Kumar², A. Baharudin³, M.H. Ariffin³, S. Abd. Rhani³, K. Ibrahim³

¹Universiti Kebangsaan Malaysia, Rehabilitation Unit- Department of Orthopedics and Traumatology, Cheras, Malaysia, ²Universiti Kebangsaan Malaysia, Department of Neurosurgery, Kuala Lumpur, Malaysia, ³Universiti Kebangsaan Malaysia, Rehabilitation Unit- Department of Orthopedics and Traumatology, Kuala Lumpur, Malaysia

Introduction/Background: "MLC601/MLC901 (NeuroAiD®)", a combination of natural products, has been shown to be safe and to aid neurological recovery after brain injuries. Spinal cord injury (SCI) is a devastating condition with limited therapeutic options. The primary objective of this study is to evaluate the safety and the potential efficacy of NeuroAiD in SCI. **Material and Methods:** SATURN (clinicaltrials.gov NCT02537899) is a prospective cohort

study of patients with moderately-severe to severe SCI, defined as American Spinal Injury Association (ASIA) Impairment Scale (AIS) A and B, treated with open-label NeuroAiD for 6 months in addition to standard care and followed for 24 months. Anonymized data will be prospectively collected at baseline and months 1, 3, 6, 12, 18, and 24 and will include information on demographics, main diagnostics, neurological and functional state assessed by the Spinal Cord Independence Measure (SCIM), ASIA -International Standard for Neurological Classification Spinal Cord Injury (IS-NCSCI) and Short Form (SF)-8 Health Survey. In addition, NeuroAiD treatment, compliance, concomitant therapies, and any side effects will be collected. Investigators will use a secured online system for data entry. The co-primary endpoints are safety, AIS grade, and improvement in ASIA motor score at 6 months. Secondary endpoints are AIS grade, ASIA motor scores and sensory scores, SCIM, SF-8 Health Survey, and compliance at other time points. The study is approved by the ethic committee of Hospital Universiti Kebangsaan Malaysia. *Results:* We targeted a sample size of 30. Since Jun 2015, 4 subjects have been included. Recruitment is ongoing. Data available from all subjects recruited by May 2016 will be presented. *Conclusion:* SATURN investigates the promising role of NeuroAiD in patients with moderately severe to severe SCI. In addition, the results of this study will provide important insights on designing future trials.

516

SUCCESSFUL REHABILITATION PROGRAM FOR CHRONIC SPINAL CORD INJURED PATIENT : A CASE REPORT

A.H. Ibrahim¹, N.A. Musa¹, N.H. Mohd Apandi¹, M.S. Muhd Latpi¹

¹Hospital Sultanah Nur Zahirah, Department of Rehabilitation Medicine, Kuala Terengganu, Malaysia

Introduction/Background: Spinal Cord Injury is a devastating event with lasting implications to one's life. Delayed in rehabilitation process can affect patient's level of independence in function. The aim of this case report is to create awareness that rehabilitation is an important treatment in spinal cord injury and despite delayed entry to spinal rehabilitation program, the benefits are still vast. *Material and Methods:* 22 year old man who had motor vehicle accident in Apr 2012 and sustained comminuted fracture T3 to T5 and subluxation T3/T4. Diagnosed as T3 AIS A at the time of injury, however refused for any surgical intervention and defaulted follow up after discharge home. He was first time reviewed by the rehabilitation team at 3 years post injury and he remains as complete paraplegia, T3 AIS A with neurogenic bowel and bladder. He was total dependent on caregiver in bed mobility, transfer and wheelchair ambulation. He was electively admitted to our hospital for active rehabilitation program. Prior to admission, prognosis and expected functional outcome explained. Short term goals were discussed and set before the admission. The rehabilitation progress was monitored using Spinal Cord Independence Measure. *Results:* Our patient showed marked improvement during his 3 weeks of active rehabilitation program. Spinal Cord Independence Measure scored 26/100 on admission and 65/100 upon discharge. *Conclusion:* Rehabilitation is an essential treatment for any spinal cord injured patient to achieve functional independence and improve quality of life.

517

USE OF ROBOT SUIT HAL IN REHABILITATION OF CHRONIC SPINAL CORD INJURY (TETRAPLEGIA, NEUROLOGICAL LEVEL C4): A CASE REPORT

A. Ikumi¹, S. Kubota², Y. Shimizu³, H. Kadone⁴, Y. Hada³, M. Yamazaki¹

¹University of Tsukuba, Department of Orthopedic Surgery- Faculty of Medicine, Tsukuba City, Japan, ²University of Tsukuba, Division

of Regenerative Medicine for Musculoskeletal System- Department of Orthopaedic Surgery- Faculty of Medicine, Tsukuba City, Japan, ³University of Tsukuba Hospital, Department of Rehabilitation Medicine, Tsukuba City, Japan, ⁴University of Tsukuba Hospital, Center for Innovative Medicine and Engineering, Tsukuba City, Japan

Introduction/Background: Recently, locomotor training with robotic assistance has been found effective in treating spinal cord injury (SCI). Our case study examined locomotor training using the robot suit hybrid assistive limb (HAL) in a patient with complete tetraplegia due to chronic SCI. This is the first report examining HAL in complete tetraplegia. *Material and Methods:* The patient was a 19-year-old man who dislocated C3/4 during Judo four years before. Following injury, he underwent C3/4 spinal fusion, but remained paralyzed despite rehabilitation. He has no brain damage. There is muscle atrophy under bilateral deltoid muscle. There is no sensation around the anus but partial sensation of pressure in lower limbs remains. Subject is mobile using an electric wheelchair. ASIA impairment scale is B (complete motor C4 lesion). HAL training was administered in 10 sessions (twice per week). The training sessions consisted of treadmill walking with HAL. For safety, three physicians supported the subject in balance and weight-bearing (Fig). The CAC mode, provides autonomic physical support based on output from force-pressure sensors in the subject's shoes was used. We evaluated the adverse event, walking time and distance, and the difference in muscle spasticity before and after HAL-training using a modified Ashworth scale (mAs). Fig: HAL+BWSTT, physician-support balance and weight-bearing in case study. *Results:* No adverse events occurred were observed that required rehabilitation to stop. Walking distance and time increased from 25.2 m/7.6 min to 148.3 m/15 min mAs following HAL training. *Conclusion:* Our case study indicates that HAL rehabilitation for complete tetraplegia (C4 level SCI) is effective for complete tetraplegia after SCI.

518

FUNCTIONAL RECOVERY OF DYSPHAGIA FOLLOWING CERVICAL SPINAL CORD INJURY AND ANTERIOR SPINAL SURGERY

R.C. Jee¹, N. Hasnan¹

¹University of Malaya, Department of Rehabilitation Medicine- Faculty of Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Swallowing dysfunction after cervical spinal cord injury (SCI) is under-recognized and leads to significant medical complications. *Material and Methods:* We report a 64 years old gentleman who sustained hyperextension injury of neck. He suffered C4 level complete neurological deficit immediately after the injury. Respiratory function and cranial nerves were intact. Cervical spine MRI showed spondylotic changes at C3 to C5 level, complicated with spinal cord edema at C3/C4 level resulted by spinal canal stenosis (figure). Neurogenic shock on day one of injury was stabilized with inotropic agent. On third day post injury, he underwent anterior cervical discectomy and fusion surgery. He choked on his meal after the surgery. Physical examination revealed weakness of right palate elevation, tongue deviation to right on protrusion and reduced gag response over the right side. Complication of aspiration pneumonia had hindered the rehabilitation progress for the following week. Fiberoptic endoscopic evaluation of swallowing (FEES) showed insufficient epiglottis closure and impaired coordination of pharyngeal muscles during swallowing process. *Results:* Recovery of dysphagia was slow despite aggressive swallowing therapies, practicing of swallowing maneuvers and compensatory strategies. Percutaneous endoscopic gastrostomy (PEG) was introduced due to prolonged need for nasogastric tube feeding. PEG feeding had been going on for more than 6 months post injury. He gained some motor recovery but still required maximal assistance in daily activities. *Conclusion:* Postoperative dysphagia is a known complication following anterior cervical spine surgery. The exact mechanism has not been clearly defined. Researcher observed a trend toward recovery over 2 to 6 months after surgery. However, it takes longer in

this case scenario. Bedside swallowing and neurological assessment should be performed for all patients with acute cervical spinal cord injury and those who undergo anterior cervical spinal surgery.

519

THE IN 2014 ACTUALIZED OSTEOPOROSIS GUIDELINES OF THE JOINT ORGANIZATIONS OF THE GERMAN-SPEAKING BONE RESEARCH SOCIETIES AND THEIR MEANING FOR PARALYZED ELDERLY PATIENTS

Y.B. Kalke¹

¹RKU - Universitaets- und Rehabilitationskliniken Ulm, SCI Centre of the Orthopaedic Department Ulm University, Ulm, Germany

Introduction/Background: In the German 28 SCI centres an increasing number of elderly patients with spinal cord disease or injury get admitted. A lot of these elderly patients have osteoporosis or are even admitted because of osteoporotic fractures with spinal cord involvement. The guidelines of the joint organizations of the German-speaking bone research societies should be used in this very special patient group. **Material and Methods:** The subjects of the guidelines are prevention, diagnostic assessment and treatment of osteoporosis in post-menopausal women and in older men. For the special case of glucocorticoid-induced osteoporosis there are separate guidelines. **Results:** Diagnostic assessment means specific medical history, X-ray, laboratory studies and osteodensitometry with DXA measurements of lumbar spine and femur. In the next step measures like nutrition rich in calcium, evaluation of osteoporosis supporting medication and if necessary further work up of secondary causes are initiated. Depending on vertebral fractures, gender, age, the result of the DXA T-score and on defined risk factors pharmacological treatment with alendronate, ibandronate, zoledronate, raloxifene, risendronate, strontium ranelate or teriparatide together with supplementation of calcium and vitamin D is mandatory. **Conclusion:** These osteoporosis guidelines should be used definitely in the SCI centres but require special knowledge for diagnostic tools, medical therapy and secondary effects of the different antiosteoporotic drugs. The DMGP (German speaking Society for SCI) founded therefore a specialized working group for "SCI and Osteoporosis".

520

TRAUMATIC AND NONTRAUMATIC SPINAL CORD INJURY IN GERMANY

Y.B. Kalke¹

¹RKU - Universitaets- und Rehabilitationskliniken Ulm, SCI Centre of the Orthopaedic Department Ulm University, Ulm, Germany

Introduction/Background: Since 1976 the German SCI Centres had been collecting detailed information about their patients including causes, level of lesion, gender and ASIA Impairment Scale. **Material and Methods:** Meanwhile more than 2200 acute SCI patients are treated in the 28 German SCI centres every year. **Results:** In 1976 only 14% of the patients had nontraumatic spinal cord injury, in the first six months of 2015 its part had been 58%. The average age of this patient group steadily increases and combined with it the number of female patients. **Conclusion:** The demographic and the economical factor win steadily on influence. More polymorbidity, tetraplegic patients and incomplete patients (AIS C and D) combined with increasing complexity and cost pressure are the challenges in the future for the SCI Centres in Germany.

521

THERMOREGULATORY RESPONSES IN PERSONS WITH SPINAL CORD INJURY

Y.I. Kamijo¹, Y. Nishimura¹, M. Banno¹, T. Moriki¹, T. Nakamura¹, F. Tajima¹

¹Wakayama Medical University, Rehabilitation Medicine, Wakayama, Japan

Introduction/Background: Persons with spinal cord injury (SCI) suffer from thermoregulatory dysfunctions, which are at high risk of both hyperthermia in the heat and hypothermia in the cold environment. Sweating and cutaneous vasodilation during heat stress and cutaneous vasoconstriction during cold stress are mainly controlled by sympathetic nervous system through thermoregulatory center and also peripheral reflex via sensory nerves. Preganglionic neurons are found within the spinal cord in segments Th1-L2; the heart for Th1-5 and blood vessels for Th1-L2. **Material and Methods:** Able-body (AB) and SCI subjects wore tube-lined suits and took a supine position while 33-°C water was perfused into the suits. Then 36- and 50-°C water were perfused into the suits for upper and lower bodies, respectively, to heat the whole body, while measuring sweat rate and skin blood flow (SkBF) on the chest (sensory intact) in all groups, and the thigh (sensory disturbance) in SCI. To cool the whole body, 25-°C water was perfused, while monitoring SkBF on both areas. Moreover, we evaluated effects of local heating and cooling in both sensory-intact and disturbance sites on SkBF in AB and SCI. **Results:** In our studies, sympathetic control of thermoregulatory responses were strikingly attenuated in cervical or high-thoracic SCI, and suppressed within sensory disturbance area but preserved in intact area in mid-to-low lumbar SCI. During mild cold stress, even a decrease in body core temperature was small and similar between AB and cervical SCI, cutaneous vasoconstriction was suppressed in cervical SCI. In contrast, cutaneous vasodilation and vasoconstriction in response to local heating and cooling were observed even within sensory disturbance area of the skin in SCI regardless levels of injury. **Conclusion:** In summary, thermoregulatory responses via central nervous system are absent or impaired in SCI depend on the injured level, but local reflex controls for thermoregulatory responses are preserved even in SCI subjects.

522

COMPARISON OF GAIT CAPACITY BETWEEN THE WPAL EXOSKELETON AND CONVENTIONAL ORTHOSES IN PERSONS WITH PARAPLEGIA

M. Katoh¹, S. Eüchi², S. Hirano², S. Tanabe³

¹Fujita Health University Hospital, Department of Rehabilitation, Toyoake, Japan, ²Fujita Health University, Department of Rehabilitation Medicine I - School of Medicine, Toyoake, Japan, ³Fujita Health University, Faculty of Rehabilitation - School of Health Sciences, Toyoake, Japan

Introduction/Background: The WPAL (Wearable Power-Assist Locomotor) is a robotic exoskeleton that has bracing struts with 6 motors for each hip joint, knee joint, and foot joint between the legs. The present study was performed to compare gait capacity (walking duration, distance, and level of assistance) between the WPAL and conventional orthoses in persons with paraplegia. **Material and Methods:** Twelve paraplegic persons were participated in the study. The range in age, time after injury, neurologic level, and ASIA (American Spinal Injury Association) classification were 22-61 years old, 0-20 years, T6-T12, and A-B, respectively. Nine participants used Primewalk, and the other participants used HALO (Hip and Ankle Linked Orthosis). The continuous walking duration and distance were measured at an individually comfortable speed while wearing their own orthoses or WPAL. The level of assistance required for walking was evaluated using the Functional Ambulation Category (FAC) test. The protocol was approved by the ethics committees at the two participating institutions, and all participants provided written informed consent. **Results:** The mean walking durations using orthoses and WPAL were 11.9±15.8 and 23.9±26.1 min, respectively. The mean walking distances were 158±244.0 m with orthoses and 364.9±496.4 m with WPAL. FAC scores were 3.3±0.8 with orthoses and 4.0±0 with WPAL. **Conclusion:** The results indicated that the participants could walk longer

distances and for a longer time using the WPAL compared with orthoses. From a perspective of walking independence, the results indicated significantly less assistance when walking with WPAL. These results suggests that WPAL exoskeleton might be useful for paraplegic persons with neurologic level T6-T12 and ASIA A-B classifications.

523

CAN SYRINGOMYELIA CHANGE THE SENSATION OF TEMPERATURE IN UPPER EXTREMITY? -SINGLE CASE STUDY-

H.C. Lee¹, J.M. Park¹, J. Park¹, S.H. Kim¹

¹Yonsei University Wonju College of Medicine, Rehabilitation Medicine, Wonju, Republic of Korea

Introduction/Background: Syringomyelia is a disorder in which a fluid-filled, gliosis-lined cavity forms within the spinal cord. Patients may experience severe neuropathic pain, weakness, abnormal sensation, particularly in the hands. We report the degree and difference of warm and cool sensation from a case diagnosed syringomyelia, and compared to data from patient diagnosed with traumatic myelopathy, incomplete, C4 (AIS-D) without syringomyelia and the normal one. *Material and Methods:* The fifty five years old female with traumatic myelopathy, incomplete, C5 (AIS-C) in 1993 visited outpatient clinic in May 2015, complaining of aggravated sensory deficit recently. The MRI finding showed syrinx over C4–6 as syringomyelia. The Case VI® computed aided sensory evaluator device was used to measure the threshold for warm and cold sensations to three models. The stimulus was given on both index fingers. The maximum intensity for heat sensation was set up at 45°C and cold was at 9°C. Threshold was represented as JND* unit in the 4, 2, and 1 stepping algorithm with null stimuli test. The threshold was measured by averaging the results after giving 20 stimuli for 3 seconds, with 10-second intervals in between. The test ended when there was wrong response to 3 consecutive stimuli. *Results:* The thresholds for heat sensation in syringomyelia patient are as described in the table below. The two subjects with traumatic myelopathy showed higher threshold for warm and cold sensation in both upper extremities compared to the control subject. However, there is no difference of temperature sensation in traumatic myelopathy patients between syringomyelia and non-syrinx. *Conclusion:* The results showed that traumatic myelopathy results in sensory deficit for temperature, but the syringomyelia itself does not affect the sensation for temperature.

524

REHABILITATION INTERVENTION IS NOT ASSOCIATED WITH A REDUCED RISK OF DEPRESSION IN PATIENTS WITH SPINAL CORD INJURY - A POPULATION-BASED COHORT STUDY

W.C. Lien¹

¹National Cheng Kung University Hospital, Department of Physical Medicine and Rehabilitation, Tainan, Taiwan

Introduction/Background: To investigate whether rehabilitation intervention provided within the first 3 months after spinal cord injury (SCI) may pose influence on the incidence of post-SCI depression. *Material and Methods:* A population-based cohort study. Medical claim data analyzed in this study comprised 2152 incident cases of newly developed SCI in 2001–2007. Among them, 265 received rehabilitation intervention within the first 3 months following SCI incidence. Study patients were followed to the end of 2009. Incidence rate of depression was estimated with Poisson assumption, and multiple Cox proportional hazard model was conducted to estimate the covariate adjusted hazard ratio (HR) of depression in association with rehabilitation. *Results:* Over the study period, 24 patients from the rehabilitation group treated for depression, representing an incidence rate of 17.72 per 1,000 person-years. The corresponding

figures for non-rehabilitation group were 148 patients and 15.43 per 1,000 person-years. After controlling for potential confounders, the adjusted HR of for depression was 1.18 (95% CI=0.76–1.83) in association with rehabilitation. Although specific analyses tended to suggest male and older SCI patients tended to have higher adjusted HR of depression, the risk estimates were compared to null statistically. *Conclusion:* There is little association detected between rehabilitation and depression in patients with SCI in Taiwan.

525

FACTORS ASSOCIATED WITH FATIGUE AMONG PERSONS WITH SPINAL CORD INJURY: A SYSTEMATIC REVIEW

N.H. Noor Hisham¹, H. Manaf², M. Justine², N. Hasnan³

¹Pusat Rehabilitasi PERKESO, Physiotherapy, Melaka, Malaysia,

²Universiti Teknologi MARA, Department of Physiotherapy, Selangor, Malaysia, ³University Malaya, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Purpose: To systematically review the factors associated with fatigue in persons with spinal cord injury (SCI). *Material and Methods:* A keyword literature search was conducted using PubMed, Medline, CINAHL, and Web of Science database and manual searches of retrieved articles from 2005 to 2014. The keywords used for literature searching were ‘fatigue’, ‘lethargy’, ‘tired’, ‘spinal cord injury’ and ‘spinal injury’. The searching was limited to English, academic journal, and human studies only. The studies were excluded if there were non-correlational studies and if the cause of SCI were related to back pain, spinal degeneration, degenerative disc, muscle fatigue. *Results:* Out of 730 hits, 207 duplicated studies were removed. There were 523 studies were screened on the titles, and only 33 studies were eligible. Thirty-three studies were screened on their abstracts, and 10 studies were eligible to be reviewed. Seven out of 10 studies showed a high prevalence of fatigue among people with SCI. Depression was found to be the most common factor associated with fatigue as shown in 5 studies. Pain was found as the second most common factor associated with fatigue, as shown in 3 studies. Fatigue may lead to depression as shown in 2 studies, as well as a barrier to physical functioning as shown in 2 studies. *Conclusion:* There is a high prevalence of fatigue among people with SCI. Depression and pain were the most common factors associated with fatigue. These may lead to depression and limited physical function. More studies need to be conducted to confirm whether fatigue affects the rate of return to work.

526

PSYCHOLOGICAL PROFILE OF SPINAL CORD INJURIES PATIENTS

A. Nouira¹, S. Jemni², S. Frioui², E. Toulgui², N. Abdelkafi², F. Khachnaoui²

¹Fattouma Bourguiba Hospital, Rehabilitation, Monastir, Tunisia,

²Sahloul Hospital, Rehabilitation, Sousse, Tunisia

Introduction/Background: Spinal injuries create a situation of disability experienced as physical, psychological and socio-economic pain; the purpose of our study is to evaluate the psychological profile of his patients. *Material and Methods:* A retrospective descriptive study, conducted at the physical medicine department of Sousse, including patient with spinal cord injury dating back at least 2 years. The assessment of the psychological state is made by the HAD score; *Results:* 50 patients with a mean age of 30 years and a sex ratio of 0.33. Plus that half of the patients had depression score between 8 and 10 (doubtful depression) and anxiety scores over 10 (some anxious state). A high HAD score was correlated with a higher socioeconomic level and decreased functional independence (MIF) We found no correlation between HAD and age. *Conclusion:* The spinal cord may be accompanied by restrictions on body, social and also psychological. So the management of spinal cord injured patients should be multi-

disciplinary. Furthermore, the physical, the psychological condition of these patients is an essential pillar in the proper delivery of care.

527

DIRECT COST OF TREATMENT FOR TRAUMATIC SPINAL CORD INJURY IN IBADAN, NIGERIA

O. Olaleye¹, T. Hamzat¹, O. Ojomo¹

¹University of Ibadan, Department of Physiotherapy, Ibadan, Nigeria

Introduction/Background: Traumatic Spinal Cord Injury (TSCI) is a devastating condition that affects all aspects of the individual's life and results in significant physical, financial and social cost. The huge financial burden of treatment is borne by the patient, their families and the society. Yet, information on the economic burden of TSCI is sparse in Nigeria. Economic burden of TSCI in Ibadan, Nigeria was investigated through estimation of direct costs of treatment. **Material and Methods:** An incidence-based costing approach was employed. All new cases of TSCI admitted into the University College Hospital, Ibadan over five years (2009–2013) were identified. Direct costs of in-patient and out-patient treatment over the first year of injury were estimated. Estimated cost included costs of hospital admission, diagnostic tests and procedures, surgical treatments, physiotherapy, drugs and non-drug items, nursing and cost of outpatient visits. **Results:** 109 (60 - tetraplegia; 49 - paraplegia) new cases of TSCI were identified. Total direct costs of in-patient treatment was N34, 079 381.30K (average= N312, 654.87 K per patient). About a third of the total cost (34.4%) was on routine consultations by neurosurgeons and a fifth was on diagnostic tests and investigations. Less than a fourth (24.2%) of the total cost of in-patient treatment was spent on therapeutic interventions (surgery, drugs and physiotherapy). The total cost of out-patient treatment was N9, 611 975.20 K (average N218, 453.98K per patient). Cost of drugs accounted for over a third (37.7%) of out-patient costs, followed by cost of routine consultations by neurosurgeons (28.6%). **Conclusion:** The direct cost of TSCI in Ibadan, Nigeria is enormous and majority of the patients had no health insurance cover. Most of these costs were on routine specialist consultations by the neurosurgeons. This could be reduced by ensuring consultations on requirements rather than routine. **Acknowledgement:** Study supported by grant from the Medical Education Partnership Initiative in Nigeria.

528

MANAGEMENT OF PATIENTS WITH SPINAL INJURY AT THE PHOENIX REHABILITATION CENTRE

H. Osman^{1,2}, G. Thompson¹, R. Leela¹, H. Dwerryhouse¹

¹Broadgreen Hospital, Phoenix Cent Re for Rehabilitation, Liverpool, United Kingdom, ²Cheshire and Merseyside Rehabilitation Network, Rehabilitation Medicine, Liverpool, United Kingdom

Introduction/Background: Phoenix Rehabilitation Unit opened Jun 2013. 185 admissions since opening, 38 of these patients were 'spinal' patients (20%). Spinal patients were classed as patient with spinal injury including laminectomies, spinal cord compressions and stenosis, resections of meningioma, myelopathies and spinal fractures polytrauma. **Aims of the audit:** Ascertain numbers of patients who have spinal injuries and the impact the therapy with regards (mobility, continence and pressure sore management). Looks at co-working with Southport spinal injury centre (SSIC). **Material and Methods:** Retrospective study looking at spinal patients admitted between (Jun 2013–Oct 2015). **Results:** • Male patients 27/38 71%. • Agerage 18–89 years, over 65 53%. • Spinal cord injury (61%), polytrauma- spinal fracture(s) (39%). • Mobility on admission: Wheelchair 68%, Frame (Zimmer/pulpit) 18%, Stick/crutches 5%, Supervision 3%. • Mobility on discharge: Independent 13%, Wheelchair 21%, Frame 32%, Stick/crutches 26%, Supervision 3%. • Urinary continence on admission continent 61%, intermittent catheterisation 5%, long-term catheter = 24%, incontinent at times 5%, urostomy 2.5%. On discharge 3 morecontinent, 3 less catheters, 1

more intermittent catheter, 1 less incontinent. • Bowelcontinence on admission continent 82%, incontinent 13%, assistance 2.5%. On discharge: 3 on bowel regime and 1 manual evacuation. • 5% pressure sores on admission. • 7 patients 18% referred to Southport Spinal Injuries Centre for advice/review and support. • Destination of discharge 89% discharged home & 11% to (SSIC) for further rehabilitation. **Conclusion:** We gained good experience managing spinal injuries patients. We work closely with Southport. We have good results. Most patients go home. Recommendations. Compare results with National results. All patients should be referred to Southport and put on National spinal Injuries database. Sexual function should be included in next audit. Workshops from (SSIC) regard bladder, bowel continence and sexual dysfunction. Reaudit.

529

MUSCLE STRENGTH BENEFITS OF FUNCTIONAL ELECTRICAL STIMULATION-EVOKED LOWER LIMB EXERCISE FOR SPINAL CORD INJURY SURVIVORS: A NARRATIVE REVIEW

N. Rosley¹, H. Manaf¹, N. Hasnan²

¹Universiti Teknologi Mara, Fisioterapi, Puncak Alam, Malaysia,

²Universiti Malaya Medical Centre, Rehab Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Spinal cord injury (SCI) is one of the leading causes of disability worldwide. It can lead to many complications which mostly affect muscle properties. Functional electrical stimulation (FES) has been used to restore motor functions or produce movements in patients with SCI. Although there are numerous literature reviews related to the benefit of FES among spinal cord patient, there has not been a careful systematic approach to support the enhancement of muscle strength gains from FES-evoked exercise for spinal cord patients. In this narrative review, we used systematic techniques to explore available literature reviews to explore the available evidence showing that how FES affect lower limb muscle strengths among SCI survivors. **Material and Methods:** A comprehensive systematic review strategies were conducted from electronic search engine from 1946 to 2015 to identify the relevant evidence and literature of potential lower limb muscle strength effect from training with FES. Inclusion criteria included (1) FES-evoked lower limb training, (2) muscle strength, and (3) among SCI survivors. No restrictions for a language were made. **Results:** One randomized controlled trial and 5 quasi-experimental studies were found from the search strategy that related to muscle strength as the outcome measure of FES training. Two outcomes categories were identified which are (1) preventative as muscle atrophy and (2) muscle strength. **Conclusion:** Even though there were numerous quasi-experimental studies, generally they implicated different style and method of research including sample sizes and protocols. Thus, it is hard to conclude which protocols can be implicated in the clinical practice. Although all the studies have shown positive changes in muscle fibers, the evidence still insufficient. Thus, this narrative review is so limited to achieved the particular standard of scientific evidence.

530

COMPARISON OF REHABILITATION OUTCOMES FOLLOWING FALLS RELATED AND TRAUMATIC SPINAL CORD INJURY

L. Smith¹, N. Kumar¹

¹Robert Jones and Agnes Hunt Orthopaedic Hospital, Midland Centre for Spinal Injuries, Oswestry, United Kingdom

Objectives: To study the demographics, injury characteristics, neurological and functional outcomes of patients with falls related spinal cord injury (FR-SCI) and compare these to those with traumatic SCI (T-SCI). **Material and Methods:** Analysis of 2 years prospective data collection, including 36 consecutive patients admitted to a tertiary care SCI rehabilitation unit with FR-SCI compared with

29 consecutive patients with T-SCI. Factors taken in to account for FR-SCI are, cause & height of fall, medication and alcohol use. Outcomes were further analysed comparing FR-SCI to T-SCI, including complications during inpatient stay, discharge outcome, length of hospital stay and ASIA Impairment Scale (AIS). Secondary outcome measures included initial-mobilisation and discharge SCIM-III scores, length of rehabilitation (LOR) and discharge destination. **Results:** Overall, individuals with FR-SCI were more likely ($p<0.0002$) to be older (mean age 60.5 vs 43.8 years) and have tetraplegia (78 vs 27%) than those with T-SCI. Common region of injury and AIS classification on admission for FR-SCI was cervical (78%) and AIS-C (44%) respectively. All AIS-B improved to AIS-C or D. No significant differences were noted in SCIM change ($p=0.05592$) or LOR ($p=0.16726$) between the 2 groups. However the significant difference was noted with discharge destination, amongst FR-SCI 42% were discharged to an interim facility, compared with only 3% of T-SCI. **Conclusion:** These results highlight the need for careful consideration with regards to discharge destination to be made of amongst the rehabilitation needs of older individuals who sustain fall related tetraplegia.

531

NON TRAUMATIC SPINAL CORD INJURIES COMPARED TO TRAUMATIC SPINAL CORD INJURIES - ARE THERE DIFFERENT REHABILITATION OUTCOMES?

L. Smith¹, N. Kumar¹

¹Robert Jones and Agnes Hunt Orthopaedic Hospital, Midland Centre for Spinal Injuries, Oswestry, United Kingdom

Objectives: To study the demographics, injury characteristics, neurological and functional outcomes of patients with non-traumatic spinal cord injury. (NT-SCI) and compare these to traumatic SCI (T-SCI). **Material and Methods:** Analysis of 2-year prospective data collection including 27 consecutive patients admitted to a tertiary care SCI rehabilitation unit with NT-SCI compared with 65 consecutive patients with T-SCI. Outcomes were analysed comparing NT-SCI to T-SCI, for co-morbidities and complications during inpatient stay and ASIA Impairment Scale (AIS). Secondary outcome measures included initial mobilisation and discharge SCIM III scores, length of rehabilitation (LOR) and discharge destination. **Results:** Overall, individuals with NT-SCI were more likely ($p=0.00066$) to be older (mean age 59.6 vs 43.7 years) and have paraplegia (88.9 vs 72.4%) than those with T-SCI. Common aetiologies for NT-SCI included post-surgical complications (37%), vascular (26%), infection (22%), myelopathy (11%) and tumour (3.1%). The most common region of injury and AIS classification at admission, for NT-SCI was thoracic (77%) and AIS-C (41%). Most (64%) of AIS-C patients improved to AIS-D during their admission. Common SCI-related complications (44%) in NT-SCI included urinary tract infection (33%) & pulmonary embolism (16.6%). Outcome comparisons did not reveal significant differences in SCIM change ($p=0.01875$), LOR ($p=0.87496$) or discharge destination between NTSCI and T-SCI. **Conclusion:** Rehabilitation outcomes were not significantly different between the non-traumatic and traumatic spinal cord injuries.

532

GOAL PLANNING MEETINGS (GPM) AT THE MIDLAND CENTRE FOR SPINAL INJURIES, UK: FUNCTION AND PATIENT SATISFACTION

L. Smith¹, N. Kumar¹

¹Robert Jones and Agnes Hunt Orthopaedic Hospital, Midland Centre for Spinal Injuries, Oswestry, United Kingdom

Introduction/Background: The Goal Planning Meeting (GPM) is central to rehabilitation. It benefits treatment planning, monitoring progress and providing information to patients. Through prospective study we noted deficiencies with; timing for the first GPM,

information on Keyworkers and attendance by team members, and sought to improve by revision of our protocol. **Objective:** To assess the function of, and patient satisfaction with, GPM's since revision of protocol. **Material and Methods:** All first time adults with spinal cord injury undergoing rehabilitation at the Midland Centre for Spinal Injuries, who had at least 2 GPM during the 11 month period from 1 Jan 20014 to 30 Nov 2014, were included. Patients with cognitive problems were excluded. 20 patients were included in this prospective study. The anonymised survey questionnaire with 20 questions based on the GPM were utilised again. 18 patients returned a questionnaire in 2012 and 2014. **Results:** Improvements were noted for 13/20 questions, including – 'The goals set at the meetings are relevant', 'The goal planning meetings helped to stay motivated', 'My needs were ignored', 'The goal planning process was explained well', 'Too many goals discussed', 'Meetings feel relevant to my care', 'Goals set are too hard', 'Meeting addressed my concerns', 'Waited too long for first meeting', 'My injury and care explained well' and 'GPM will help me live independently'. Mixed feelings were noted for 7/20 questions, including; 'I participate in setting the goals', 'My keyworker was crucial to GPM', 'I feel staff treat me as individual', 'I am happy with my rehabilitation', 'GPM is crucial to my rehabilitation'. **Conclusion:** Overall patients are happier with the Goal Planning process since the last audit cycle. However some areas for potential improvement have again been identified and on-going review of the Goal Planning process will be required to ensure standards are maintained or improved.

533

EFFECTS OF POSTURE ON CHEST WALL KINEMATICS IN PATIENTS WITH CERVICAL SPINAL CORD INJURY

T. Sugiyama¹, A. Tsubahara¹, K. Hanayama¹, K. Furu-sawa², M. Hyodo³

¹Kawasaki Medical School, Rehabilitation Medicine, Kurashiki, Japan, ²Kibikogen Rehabilitation Center for Employment Injuries, Rehabilitation Medicine, Kaga-gun, Japan, ³Odawara Municipal Hospital, Rehabilitation Medicine, Odawara, Japan

Introduction/Background: It is well known that posture influences chest wall movement during spontaneous breathing in healthy subjects. Patients with cervical spinal cord injury (SCI) who have intercostal muscle weakness often show abdomen dominant breathing pattern. However, it has not been reported if the effects of posture changes on breathing pattern in patients with cervical SCI. We utilized opto-electronic plethysmography (OEP) for investigating chest wall kinematics and the influence of posture. **Material and Methods:** Seven patients with chronic cervical SCI and 3 healthy subjects participated in the present study. Chest wall volume changes were measured with OEP. We put 45 reflective markers on the subject's chest wall and filmed using 6 infrared cameras. We measured 8 quiet breathing and 3 deep breathing in both supine position and head elevation 30 degrees (head up position). We reconstructed the position of markers on PC and estimated the volume changes of each part of the chest wall. **Results:** Tidal volume of patients with cervical SCI was larger in head up position than in supine position, whereas vital capacity was larger in supine position. Tidal volume decreased in head up position as compared with in supine position due to the reduction of the abdomen volume change. End-expiratory volume of upper thorax was larger than end-inspiratory volume at the quiet breathing in supine position in all patients with cervical SCI, which meant paradoxical respiratory movement. **Conclusion:** Chest wall kinematics and breathing pattern were influenced by position in patients with cervical SCI.

534

INTRATHECAL BACLOFEN (ITB) THERAPY TO SEVERE SPASTICITY

Y. Takagi¹, A. Nakanami¹, K. Kagechika², T. Yahata³

¹Tonami General Hospital, Rehabilitation, Tonami, Japan, ²Kanazawa Medical University, Rehabilitation, Uchinada, Japan, ³Kanazawa University, Rehabilitation, Kanazawa, Japan

Introduction/Background: To determine the outcome of intrathecal baclofen (ITB) therapy in patients with severe spasticity. **Material and Methods:** The baclofen of 50µg was administered to 33 patients who had severe spasticity due to 26 spinal cord injury, 1 syringomyelia, 1 cerebral infarction, 1 hereditary spastic paraplegia, 1 cerebral bleeding, 1 subarachnoid hemorrhage, 1 subpial lipoma, 1 cerebral palsy in lumbar puncture as a schooling injection, and the pump burial operation were performed to 25 patients. The change of the spasticity was evaluated by the Ashworth score points. **Results:** The improvement of the spasticity was remarkably admitted in all cases, and the pain from the spasticity disappeared. The pain was reduced by adjusting the amount of the medicine without the exacerbation of the spasticity. Two catheter-related complications were found. Additional operations of the exchange of the catheter were needed. The improvement of the spasticity was recovered of additional operations. **Conclusion:** In Japan, 25 cases have been clinically examined since 2002, and remarkable clinical effects were proved. And since Apr 2006, 1378 cases have been implanted of a programmable subcutaneous pump by the end of Oct 2015. The spasticity of the pain who doesn't obtain the improvement by the taking treatment is improved enough, and the reduction of the pain is seen, and the ITB therapeutic effect is expected that the improvement of patient and family's QoL can be attempted from the experience of these series.

535

EXOSKELETONS IN NEUROREHABILITATION

O. Uvarova¹, V. Daminov¹, I. Gorokhova¹

¹National Medical Pirogov Center, Medical Rehabilitation, Moscow, Russia

Introduction/Background: The aim was to study the effect of the exoskeleton Ekzoatlet the dynamics of neurological and psychological status, on the basic parameters of central hemodynamics, to assess the risks and trauma of the skin, soft tissues and joints of the lower extremities in patients with consequences of spinal cord injury. **Material and Methods:** The object of the study were 10 patients (8 males and 2 females) aged - from 18 to 32 years with a complete interruption of the spinal cord at the thoracic level and lower paraplegia with high motivation recovery distance. Training distance on a flat surface with the help of the exoskeleton held for two weeks, 5 times per week. On day 1 and day 14 conducted a comprehensive survey: evaluation of neurological status with the definition of digital values of strength and tone, depression test of Beck, electrocardiography, ultrasound duplex scanning of the veins and arteries of the lower extremities to rule out thrombosis, and the wall-occlusive lesions, ultrasound Study knee and ankle joints, and soft tissues of the lower extremities. **Results:** During the walk performed Holter monitoring, monitoring of blood pressure and oxygen saturation during the occupation. In carrying out a comprehensive survey of patients on the 1st and 14th day, we found no changes of neurological status and significant changes in muscle strength and tone the muscles of the lower extremities. **Conclusion:** Thus, on the basis of the study can draw preliminary conclusions about the safety of the exoskeleton Ekzoatlet prosthetic walking function in patients with consequences of spinal cord injury.

536

USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE IN PERSONS WITH SPINAL CORD INJURY IN INDONESIA: A SURVEY STUDY

S. Versayanti¹, R.P. Wirawan²

¹Dr. Cipto Mangunkusumo National General Hospital, Physical Medicine and Rehabilitation Resident Medical Faculty of University Indonesia, Jakarta Barat, Indonesia, ²Fatmawati General Hos-

pital, Physical Medicine and Rehabilitation Department, Jakarta, Indonesia

Introduction/Background: Spinal cord injury (SCI) is a devastating condition. Most patients want to walk normally again but neuron not always can be repaired. If the medicine failed to fulfill patients' expectation, then it will lead them to seek another alternative therapy such as looking for shaman, get reflexology, and or phytotherapy. **Material and Methods:** Subacute and chronic SCI outpatient were asked to fill the questionnaire assessing the utilization of complementary and alternative medicine (CAM). The questionnaire is consisted of six questions regarding the usage of CAM, indications for CAM treatment and treatment satisfaction. **Results:** Subjects were 36, 25 men and 11 women, mean age 41.17 years. The most common cause of SCI is trauma in 20 patient (55.6%) and 91.7% was paraplegic with 75% of the subjects were in chronic phase. The usage of CAM was seen in 23 patient (63.9%). Most used CAM is massage/reflexology 69.6% and phytotherapy 52.2%. Reasons in using CAM was for additional treatment 56.5% and no improvement from medical therapy 21.7% to improve walking 52.2%, pain 47.8% and difficulty in voiding and defecation 21.7%. CAM is used mainly in the first year of the SCI, and 39.1% of the subject was reported to be unsatisfied and 34.8% was reported to be highly unsatisfied. **Conclusion:** There is a demand for adjunctive CAM especially in the first year after SCI. But those who seek CAM found this alternative therapy unsatisfying.

537

CAUDA EQUINA SYNDROME FOLLOWING LUMBAR PUNCTURE IN A PATIENT WITH CRITICAL ILLNESS POLYNEUROPATHY : A CASE REPORT

W.N. Wan Mohd Zohdi¹, F.A. Hanapiah², N.D. Mohamad Ali³

¹Universiti Teknologi MARA, Discipline of Rehabilitation Medicine, Sungai Buloh, Malaysia, ²Universiti Teknologi MARA, Discipline of Rehabilitation Medicine, Institute of Pathology- Laboratory Medicine & Forensic, Sungai Buloh, Malaysia, ³Universiti Teknologi MARA, Medical Imaging Unit, Sungai Buloh, Malaysia

Introduction/Background: Spinal cord injury due to an iatrogenic cause can impose significant impairment that leads to deterioration in physical activities and psychosocial disruption. We present a case of 13 year-old girl who underwent a lumbar puncture procedure following confusional mental state in the setting of acute infection involving coagulation defect. Subsequently, she developed cauda equina syndrome secondary to subarachnoid hematoma at L3/L4 level that was later identified by magnetic resonance imaging of the lumbar spine. Because of the prolonged mechanical ventilation in the acute phase she developed chronic illness polyneuropathy. The subarachnoid hematoma from the lumbar puncture was initially obscured. She became wheelchair dependent post acute phase of the disease. With intensive therapy and serial functional evaluation, she achieved significant independence in activities of daily living despite poor neurological recovery of the affected muscles. **Material and Methods:** A case report. **Results:** As mentioned. **Conclusion:** Localization of spinal cord pathology can be delayed due to deterioration of an acute medical illness and when other neurological condition such as critical illness polyneuropathy is also present. Delay in the detection and intervention of spinal subarachnoid hemorrhage leads to significant morbidity and reduced functional outcome. Intensive rehabilitation is essential to provide significant functional independence.

538

THREE YEARS REVIEW OF NEUROGENIC BLADDER DYSFUNCTION AND ITS COMPLICATIONS A YEAR FOLLOWING SPINAL CORD INJURY

A.H. Zamli¹, S.A.A.Z. Md Isa¹, S. Shaharom¹

¹Hospital Sungai Buloh, Rehabilitation Medicine, Sungai Buloh, Malaysia

Introduction/Background: Neurogenic bladder dysfunction (NBD) is one of the well-known complications following spinal cord injury (SCI). To our knowledge, there was a dearth of publications on NBD and its complications following SCI in developing countries such as Malaysia, thus the objective of this study. **Material and Methods:** Retrospective review of eHospital Information System (eHIS) of Hospital Sungai Buloh involving all patients referred for SCI Rehabilitation program from Jan 2012 to Dec 2014 were reviewed. Relevant demographic and clinical data were retrieved and descriptive analyses performed. **Results:** A total of 109 SCI patients' electronic medical records reviewed. Majority of patients were male (80.7%). The mean age of the patients was 39.8 years (range 11–73 years). In regards to neurological level, 41.3% were categorized as cervical, followed by lumbar (30.3%) and thoracic spine (28.4%). The majority of the patients (78.9%) were diagnosed as having incomplete lesions. Traumatic SCI made up two thirds of injuries. A significant number (78.9%) of patients were clinically diagnosed with NBD upon rehabilitation discharge with residual dysfunction a year post SCI. In regards to mode of bladder management, 62.6% used intermittent catheterization, 24.8% used continuous bladder drainage (CBD) and 12.6% used suprapubic catheterization. Review of the ultrasound KUB surveillance findings revealed 14.7% of SCI patients were diagnosed with NBD complications which includes chronic cystitis, urinary calculi and hydronephrosis. Common factors in these patients were bladder management using CBD and cystometrically high pressure bladder. **Conclusion:** Prevalence of NBD in Malaysia is consistent with the reported data published in the developed countries. However, our complication rates are higher. Identified predisposing factors were patients on CBD and cystometrically high pressure bladders. Thus, it is recommended that CBD options for NBD management be reviewed and early routine cystometry studies be subjected to all SCI patients with NBD. This will ensure timely detection of high pressure bladder and its management.

539

DIAGNOSTIC ACCURACY OF SINGLE CHANNEL CYSTOMETRY FOR NEUROGENIC BLADDER DIAGNOSIS FOLLOWING SPINAL CORD INJURY: A PILOT STUDY

A.H. Zamli¹, Y.A. Yusmido¹, K. Ratnalingam¹

¹*Hospital Sungai Buloh, Rehabilitation Medicine, Sungai Buloh, Malaysia*

Introduction/Background: Neurogenic bladder dysfunction (NBD) is a common complication after spinal cord injury (SCI). Optimal management requires a precise diagnosis. Urodynamic study (UDS) has been recognized as the gold standard for NBD evaluation; however its availability remains limited due to its high cost. Previous studies reported reasonable accuracy of single channel cystometry (SCC) in diagnosing non-neurogenic bladder dysfunction; however no previous studies done involving NBD population. **Material and Methods:** This is a cross sectional study conducted between Aug 2013 and Aug 2014 at Rehabilitation Medicine Department of Hospital Sungai Buloh. Sixteen subjects completed evaluation using both diagnostic methods and their results were compared. SCC procedure involved manual intra-vesical pressure assessment using a 12F Nelaton catheter. Measurement included intra-vesicle pressure (cmH₂O) done at regular intervals from baseline, throughout bladder filling phase and voiding/leaking phase. Cystometric diagnoses of bladder dysfunction were based on the International Continence Society recommendation. Frequency and descriptive analyses were performed for all numerical and categorical data. Positive predictive value, negative predictive value and statistical significance analyses were performed using SPSS version 17.0 via Diagnostic Test for categorical data. **Results:** Out of total 16 subjects, 75% were male with 62.5% tetraplegia. The mean duration of SCI was 19.62±15.58 months and the most common method of bladder management was intermittent catheterization (75%), voluntary voiding (0.6%) and combination (0.6%). It was found that in 87.5% subjects, neurogenic bladder diagnosis was de-

TECTED by both diagnostic methods. SCC had 93.33% positive predictive value and 100% negative predictive value for NBD diagnosis. Mean duration to perform SCC were 37.81±13.28 minutes and no patients develop significant complications with both diagnostic procedures. **Conclusion:** Diagnostic accuracy of SCC for NBD post SCI diagnosis are consistent with studies involving non-neurogenic bladder. Thus, SCC may provide an accurate, practical and safe diagnostic method for diagnosing NBD in local SCI rehabilitation centers until urodynamic is widely accessible.

540

SEXUAL DYSFUNCTION IN MEN WITH SPINAL CORD INJURY: A SINGLE CENTER EXPERIENCE IN MALAYSIA

A.H. Zamli¹, N.A. Ismail¹, K. Ratnalingam¹, K.G. Ong¹

¹*Hospital Sungai Buloh, Rehabilitation Medicine, Sungai Buloh, Malaysia*

Introduction/Background: The sequelae of spinal cord injury (SCI) can affect every major organ system including sexual function. This can significantly impair the quality of life of the affected patients. Research publication that describe the effect of SCI involving local men is lacking, thus the objective of this study. **Material and Methods:** This is a cross sectional study conducted between 1st Jan–31st Jun 2015. All patients seen during their regular follow up reviews were screened. Basic demographic and clinical characteristic variables were retrieved. The International Spinal Cord Injury Male Sexual Function Basic Data Set – Form (Version 1.0) was used to obtain relevant data pertaining to sexual function. Frequency and descriptive analyses were performed. **Results:** A total of 32 patients fulfilled all study criteria. The mean age of injury was 39+9.57 years and the mean duration of injury was 7.23+5.82 years. The majority of patients (84.3%) has traumatic SCI. Patients with neurological level at cervical, upper thoracic, lower thoracic and lumbar region were 9.37%, 37.5%, 37.5% and 15.63% respectively. Motor complete lesions affected 65.6% of the patients. Preserved reflexogenic and spontaneous erection were reported by 75%, while only 18.75% reported preserved psychogenic erection. Successful coitus was reported in 40.6% of the patients. Ejaculation was reported to occur in only 12.5% of patients, all involving those with motor incomplete lesions. Orgasmic function is affected in all patients with impaired and unknown function was 46.8% and 53.2% respectively. The use of Sildenafil Citrate was reported by 46.6% of the patients. Only a single patient (3.12%) reported use intra-cavernosal injection to aid their erectile function. None of the patients reported use of vacuum erection device. **Conclusion:** Sexual dysfunction is a common problem involving SCI men in our local setting, if unaddressed may significantly affect quality of life. Most patients have preference for oral medication.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: NEUROLOGICAL AND MENTAL HEALTH CONDITIONS - AUTOIMMUNE AND INFLAMMATORY NEUROLOGICAL CONDITIONS (E.G. MULTIPLE SCLEROSIS)

541

USE OF SWALLOW CHAIR FOR EVALUATION AND DIRECT TRAINING IN A PATIENT WITH DYSPHAGIA CAUSED BY MULTIPLE CRANIAL NERVE NEUROPATHIES

R. Akahori¹, S. Shibata¹, K. Aihara², Y. Inamoto³, Y. Aoyagi¹, K. Onogi³, H. Kagaya¹, E. Saitoh¹

¹*School of Medicine- Fujita Health University, Department of Rehabilitation Medicine, Toyoake- Aichi, Japan, ²Fujita Health University Hospital, Department of Rehabilitation, Toyoake- Aichi, Ja-*

pan, ³School of Health Sciences- Fujita Health University, Faculty of Rehabilitation, Toyoake- Aichi, Japan

Introduction/Background: Posture adjustment is considered to be an effective compensatory technique in patients with dysphagia. We have developed the Swallow Chair (SC) for posture adjustment during evaluation, training, and meal consumption. Here, we present a case of severe dysphagia that the use of SC seems effective. **Material and Methods:** A 75-year-old man suffered a rash on the left cheek and acute dysphagia. He was diagnosed as left vagus nerve palsy caused by reactivation of Varicella Zoster virus (VZV). In spite of taking acyclovir and steroid, left facial palsy developed and dysphagia was prolonged. He underwent gastrostomy at 19 days after onset and was referred to our hospital at 135 days. **Results:** The videofluoroscopic examination of swallowing (VF) showed reduced laryngeal elevation and weak left pharyngeal contraction. In high-resolution manometry, the pharyngeal contractile pressure on both sides and the UES residual pressure especially in the left were low. SC revealed the optimal posture as a 45° reclining position combined with left trunk rotation and right head rotation. We used SC for direct training with honey-thick liquid at this posture. He was able to eat paste food in upright position with left head rotation at 163 days. He could eat gruel in the same position at 191 days. The left pharyngeal contractile pressure measured by high-resolution manometry during the intake of 2 ml of nectar-thick liquid drinking increased from 35 to 127 mmHg in 2 months. **Conclusion:** SC requires fewer items and less time for posture adjustment without giving fatigue and pain to the patients. We suppose that direct training by using SC for 2 months contributes to treat severe dysphagia in this case.

542

A CASE OF NEUROBRUCellosIS MISDIAGNOSED AT THE ONSET AS MULTIPLE SCLEROSIS

E. Ata¹, E. Ersoz¹, M. Kosem¹, L. Tekin¹

¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Central nervous system disease is a broad category of conditions such as stroke, brain tumor, degenerative conditions, multiple sclerosis, infections etc. And they may cause some functional problems. Neurobrucellosis is a rare clinical condition, which may manifest as stroke, encephalitis, meningitis, or demyelinating diseases such as multiple sclerosis. **Material and Methods:** A 21-year-old man admitted to our outpatient clinic for rehabilitation with gait disturbance, progressive motor weakness in his legs bilaterally and urinary incontinence. In his history, he was diagnosed with multiple sclerosis 1 year before and was still receiving interferon-beta 1b. On neurological examination, he had 4/5 motor scores in distal muscle groups of the lower extremities bilaterally and gait disturbance. There was also significant speech disorder. All the deep tendon reflexes were hyperactive and Babinski's sign was positive. Laboratory tests including the complete blood count, erythrocyte sedimentation rate, biochemical tests including vitamin B12, and serologic studies for known autoimmune disorders were normal. It was realized that there was no significant cranial and magnetic resonance image. So the patient consulted with neurology service. Cerebro-spinal-fluid (CSF) examination revealed low glucose (4 mg/dl) and elevated protein at 3550 mg/dl. The tuberculosis per was negative in the CSF. The Brucella Wright agglutinin test was positive in CSF. Brucella melitensis was reproduced in CSF culture. **Results:** The patient was consulted with infectious-diseases and neurology specialists. Rehabilitation was not started. Antibiotherapy was administered and there was significant improvement in neurological symptoms after this treatment. **Conclusion:** Initial clinical manifestations consist of demyelinating syndrome in this case so he was diagnosed with multiple sclerosis firstly. Herein we want to emphasize that the other etiological factors mimicking multiple sclerosis such as neurobrucellosis should be kept in mind.

543

REHABILITATION OF MILLER FISHER SYNDROME: MORE THAN MEETS THE EYES

N. Hussein¹

¹Cheras Rehabilitation Hospital, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Miller Fisher Syndrome (MFS) is a variant of Guillain-Barré syndrome (GBS) which classically presents as a triad of ataxia, ophthalmoplegia and areflexia. Literatures suggest that GBS and MFS have several subtypes which together form a continuous spectrum of discrete or overlapping syndrome. This results in heterogeneity within the spectrum which implicates rehabilitation management. **Material and Methods:** Series of case report highlighting the varying clinical course of patients referred for rehabilitation with an initial diagnosis of Miller Fisher Syndrome. **Results:** Case 1: A 25-year-old lady presented with progressive ascending limb weakness and respiratory impairment over 5 days, necessitating mechanical ventilation. Post-extubation, she was noted to have ophthalmoplegia, significant ataxia and areflexia. She was diagnosed as MFS and referred for rehabilitation. Rehabilitation focused on task-specific functional activities and high-level mobility. She improved significantly and became fully independent by 4 months. Case 2: A 46-year-old lady presented with progressive ascending limb weakness and respiratory impairment within 2 days which required mechanical ventilation. Post-extubation, she demonstrated ophthalmoplegia, ataxia and areflexia and was diagnosed as MFS. Subsequently, ophthalmoplegia and ataxia improved but she demonstrated persistent dysphagia with significant neck and bilateral arm weakness, suggestive of Pharyngeal-Cervical-Brachial variant of GBS. She improved with rehabilitation, with residual bilateral arm weakness during recent review at 10 months. Case 3: A 48-year-old lady presented with acute ophthalmoplegia, ataxia and areflexia, and diagnosed as MFS. Subsequently, she developed respiratory impairment requiring mechanical ventilation. Post-extubation, she demonstrated reduced conscious level with clinical features suggestive of Bickerstaff brainstem encephalitis. She endured a long rehabilitation phase and at 1-year follow-up, was still dependent in daily activities and mobility. **Conclusion:** Rehabilitation professionals must be aware of the typical GBS and MFS and various related subtypes; including the overlapping syndromes. Rehabilitation goals may assume an altered course during the rehabilitation phase; depending on the predominant clinical features and functional impairment.

544

IMPACT OF AEROBIC TRAINING ON COGNITIVE AND MOTOR FUNCTIONING IN PATIENTS WITH MULTIPLE SCLEROSIS

M. Niwald¹, E. Miller¹

¹Medical University of Lodz, Department of Physical Medicine, Lodz, Poland

Introduction/Background: Multiple Sclerosis (MS) is a neurodegenerative disease with wide range of clinical symptoms, including not only physical, but also mental and cognitive problems, which significantly affect patient's quality of life. Aerobic training (AT) may have a positive effect on both cognitive and motor functioning ability in MS. **Material and Methods:** The study group consists of 58 patients with multiple sclerosis hospitalized in Neurorehabilitation Ward III General Hospital of Lodz, Poland. Patients were divided into two groups according to their disability using the expanded disability status scale (EDSS). AT in patients with EDSS ≤ 6.5 was conducted using a bicycle ergometer in the sitting position and patients with EDSS > 6.5 in the supine position. The training was carried out with a constant underlying average load for 30 minutes (2×15min) daily for 30 days. The endpoint of the study was aerobic fitness. Secondary endpoints were walking ability, cognitive function and level of depression. **Results:** A total of 58 MS patients completed the trial. Significant improve-

ments were seen during AT. Moreover, AT improved walking ability, decreased depressive symptoms and enhanced several domains of cognitive function. *Conclusion:* This study showed that aerobic training could be beneficial for MS patients. Larger exercise studies are needed to confirm the effect on cognition. The study was funded by Medical University of Lodz; grant number: 502-03/5-127-05/502-54-174.

545

RAYNAUD'S PHENOMENON LEADING TO DRY GANGRENE

K. Patel¹, G. Kolodge², D. Strasser³

¹Atlanta, USA, ²Western University Health Sciences, School of Osteopathic Medicine, California, USA, ³Emory University, PM&R, Atlanta, USA

Case Diagnosis: Dry gangrene. *Setting:* Inpatient rehab hospital. *Case:* A 41 year old female was admitted to the acute rehabilitation hospital for autoimmune sensory ganglionopathy related to lupus. She had also suffered from Raynaud's phenomenon, for which she was taking amlodipine. She was also taking high dose prednisone (30mg daily) and hydroxychloroquine for her autoimmune conditions, as well as carvedilol for HTN. Social history was significant for smoking 1/2 packs daily. Her rehabilitation course was progressing as expected when she suddenly presented a beefy and erythematous distal tip of her left index finger which was cold and numb, suggestive of ischemia. Further questioning revealed that she had a history of developing felons and she experienced minor trauma to the finger the week before. Rheumatology consultation advised daily betadine and outpatient follow-up. However, over the next couple days, the patient continued to develop worsening of the digit until the distal portion ultimately turned black in color and began to emit a foul odor, suggesting necrosis and dry gangrene. Orthopedic consultation was obtained and eventually the digit was amputated. *Discussion:* Raynaud's phenomenon is a common condition which causes blood vessels to spasm, restricting blood flow to the fingers. When it is secondary to an autoimmune condition (e.g. lupus) it is associated with more severe restriction of blood supply and carries a higher risk of causing complications such as ulcers, scarring, and gangrene. Management of early ischemic changes consists of avoidance of cold temperatures, stress, caffeine, nicotine, beta blockers, and treatment with vasodilators and calcium channel blockers. Such approaches have been shown to avoid amputation in up to 86% of patients. *Conclusion:* Raynaud's phenomenon can lead to severe ischemia and dry gangrene, for which early conservative management is often successful. However, some cases still require partial amputation of the digit.

546

NEUROMYELITIS OPTICA: A CASE REPORT WITH A REVIEW OF LITERATURE

W. Said Lahmar¹, A. Hadj Salah¹, M. Rekik¹, H. Ben Brahim¹, M. Elayeb¹, M. Sghir¹, Z. Ben Salah Frih², W. Kessomtini¹

¹CHU Tahar Sfar, Department of Rehabilitation, Mahdia, Tunisia, ²CHU Fattouma Bourguiba Monastir, Department of Rehabilitation, Monastir, Tunisia

Introduction/Background: Neuromyelitis Optica (NMO) is a rare autoimmune disorder consisting of recurrent and simultaneous inflammation and demyelination of the optic nerve and the spinal cord. Through this observation, we present a review of the literature identifying specific clinical, biological and radiological aspects compared to multiple sclerosis (MS) and the new diagnostic criteria. *Material and Methods:* We report the case of a 40 years old female patient without past medical history, admitted for acute difficulty walking associated with bladder-sphincter disorder in the form of urinary retention. *Results:* Physical examination found a flaccid paraplegia predominant on the

left, a loss of thermoalgesic sensitivity level D4 and a bladder distension. The spinal MRI showed an aspect of a large marrow with cervico-dorsal hyper signal. Little enhancement is seen after injection of gadolinium. Brain MRI revealed non specific signal anomalies not meeting Barkhoff criteria. Visual evoked potential are altered relating with a bilateral optic neuritis. Cerebrospinal fluid analysis showed no abnormalities. Biological tests come back negative. The diagnosis of NMO was retained. Injectable corticosteroids were prescribed associated with motor and pelvic floor rehabilitation. The outcome was favorable after three months, with complete recovery of motor deficit and disappearance of bladder-sphincter disorder, though, she kept a paresthesia under the injury level. *Conclusion:* It is important to differentiate between NMO and MS because the medical condition of NMO is more severe than MS and the principles of treatment are different. The discrimination is based on a combination of clinical, laboratory, and neuroimaging features. The discovery of a highly specific serum autoantibody marker, NMO-IgG has helped to better clarify most of the differences with MS. Management is based on an early initiation of aggressive immunosuppressive treatment and an adapted rehabilitation protocol.

547

ASSESSMENT OF A POLYDISCIPLINARY REHABILITATION PROGRAM ON PATIENTS WITH POLYMYOSITIS AND DERMATOMYOSITIS

F. Kopchiuch¹, V. Tiffreau^{1,2}, E. Hachulla³, G. Marey³, A. Thevenon^{1,2}

¹CHRU, Physical and Rehabilitation Medicine, Lille, France, ²Université Lille Nord de France, UREPSS, Lille, France, ³CHRU, Service de Médecine Interne, Lille, France

Introduction/Background: Our aim was to evaluate the effect of a structured polydisciplinary rehabilitation program on patients with polymyositis (PM) and dermatomyositis (DM). *Material and Methods:* This is a prospective, multicentric randomized study. Twenty one patients with DM or PM were randomly allocated to a 4 weeks (12 sessions) program in a rehabilitation day hospital, followed by a home-based exercise program, or to further their usual treatment. The whole population was assessed at 1, 6 and 12 months by the Health Assessment Questionnaire Disability Index (HAQ, our main criterion for evaluating), the SF-36 quality of life questionnaire, the motor function measure (MFM), Kendall muscular testing score, the 6 minutes walking test, the pain visual analogic scale with an assay of C reactive protein and of creatin kinase. *Results:* The experimental group continued to improve till the end of the study. At 12 months, in the experimental group, the HAQ was better $p=0.026$, some subscales of the SF36 were higher (SF-36 GH (general health), $p=0.038$ and SF36 RP (role-physical), $p=0.023$), Kendall muscular testing ($p<0.05$) and pain ($p=0.04$). The program was well tolerated by all participants. *Conclusion:* A multidisciplinary rehabilitation program of 4 weeks (12 sessions) followed by home-based exercises significantly improves the functional status of persons with PM et DM during at least one year.

548

THE IMMUNOREGULATORY MECHANISMS OF MSCS ON EAE MICE

H. Zheng¹, Q. Liu², X. Hu³, A. Peng Xiang², X. Chen²

¹Guangzhou, Afghanistan, ²The Third Affiliated Hospital- Sun Yat-sen University, Cell-gene Therapy Translational Medicine Research Center, Guangzhou, China, ³The Third Affiliated Hospital- Sun Yat-Sen University, Department of Rehabilitation Medicine, Guangzhou, China.

Introduction/Background: In our previous study, we used the mesenchymal stem cells (MSCs) as salvage treatment for 19 patients who with refractory chronic GVHD, we also found that

clinical improvement was accompanied by the increasing ratio of CD19+CD5+ B cells and CD8+CD28- T, and the secretion of IL-10 by the CD19+CD5+ B cells was remarkably increasing. The aim of current study is to further investigate the immunoregulatory effect of MSC both with the CD8+CD28- T cells and CD19+CD5+ B cells in vivo and in vitro through using the animal model of the multiple sclerosis, which may provide rigorously scientific evidence for clinical employment of MSCs in the treatment of MS. **Material and Methods:** EAE model was established by C57BL/6 female mice immunized using myelinoligodendrocyte glycoprotein (MOG 35–55). The clinical condition was evaluated every day. On the 15th day after immunization, the different doses of MSCs were used to treat EAE mice via mouse tail intravenous therapy. On the 30th day after treatment, EAE mice were decapitated to observe the EAE mice spinal cord for neuropathology analysis, by using H&E staining and luxol fast blue staining, respectively. At the same time, the FACS flow cytometry were employed to to analysis CD8+ CD28- T cells and CD19+CD5+ B cells in spleen cells. **Results:** Compared with control group treated by PBS, the MSCs treatment could effectively promote clinical illness alleviates for EAE mice on the 15th day after immunization. The maximum average disease score and clinical illness scores were significantly improved, and the medium doses of MSCs treatment group is best. Neuropathology analysis showed that MSCs treatment could significantly reduce the inflammatory cells invasion and the demyelinating changes in the spinal cord. Furthermore, the CD8+CD28- regulatory T cells in spleen cells of MSCs treatment group were increased compared with that in the PBS treatment group, but the secreted levels of IFN- γ and IL-10 did not show obvious alteration compared with the PBS. Instead, the expression of CD19+CD5+ B cells were significantly increased in MSCs treatment group, and the expression of secreted IL-10 was also significantly increased compared with that in the PBS treatment group and normal C57BL/6 mice. The secreted level of IFN- γ from CD4+ T cells in MSCs treatment group were significantly reduced compared with that in PBS treatment group and normal C57BL/6 mice. **Conclusion:** MSCs could increase the number of CD19+CD5+ B cells and expression of secreted IL-10, as well as inhibit IFN- γ expression secreted from CD4+ T cells, resulting in relief of clinical disease in EAE mice by reduction of inflammatory cells invasion and spinal cord demyelinating changes.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: NEUROLOGICAL AND MENTAL HEALTH CONDITIONS - NEURODEGENERATIVE DISEASES (E.G. DEMENCIA)

549

EIGHT WEEKS OF HOME-BASED BALANCE TRAINING NOT AS EFFECTIVE AS THERAPIST- BASED DURING DUAL TASKS

E. Atterbury¹, K. Welman¹¹Stellenbosch University, Sport Science Department, Stellenbosch, South Africa

Introduction/Background: Parkinson's disease often manifests as a loss of automaticity. As a result difficulty with gait occurs, which are aggravated when paired with a secondary cognitive task. Dual-tasking is an essential part of independent-living and thus important to understand what effect it has on gait, and if possible improvements in dynamic balance can influence it. Therefore this study sets out to assess the effect of balance training on dual-tasking gait, and to investigate if a home-based programme is comparable to a therapist-supervised programme. **Material and Methods:** This experimental study included 39 participants with mild to moderate Parkinson's disease (H&Y I–III), divided into a Therapist-supervised group ($n=23$, age 65.4 ± 8.3 years) and a Home-based group ($n=16$, age 64.9 ± 7.1 years). Both groups followed 8 weeks of bal-

ance training, with the Therapist-supervised group attended classes with an exercise therapist, and the Home-based group followed a guided DVDs at home. Primary outcome measures included mobility and gait parameters, assessed with the modified instrumented Timed-up-and-Go (ITUG), and dual-tasking ability, assessed with the instrumented cognitive Timed-up-and-Go (CTUG). Secondary outcome measures included perceived fear of falling, assessed with International Fall Efficacy Scale (FES-I), and disease severity, assessed with Unified Parkinson's Disease Rating Scale (UPDRS). **Results:** The Home-based group showed a significant decrease in UPDRS III scores ($p<0.001$) after the intervention, and also showed significantly increased dual-task interference for duration, stride velocity, cadence and time in double support ($p<0.005$). The Therapist-supervised group maintained their disease severity and dual-task interference after the intervention ($p>0.05$). **Conclusion:** The dual-task interference showed that, unlike the Therapist-supervised group, the Home-based group was unable to maintain their gait performance when a secondary task was applied. This study has revealed that eight weeks of balance training with a therapist is more likely to maintain and improve gait during dual-tasking than without the presence of a therapist performed at home.

550

OCULAR MANIFESTATION OF MYOTONIC DYS- TROPHY

N. Lara¹, C. Rangel Gómez², F. Ortiz³, C. Rangel Jimenez⁴¹Universidad Nacional de Colombia, Cundinamarca, Bogota, Colombia, ²Quiron Unidad Medica IPS, Cundinamarca, Bogota, Colombia, ³Universidad Nacional de Colombia, Cundinamarca, Bogota, Colombia, ⁴Universidad de Cartagena, Bolivar, Cartagena, Colombia

Introduction/Background: Case diagnosis: A 30-year-old man, occupation: janitor in a building, presented to the service of physical medicine and rehabilitation in the National University of Colombia, with a 3-months history of progressive delayed right eye opening, without others symptoms. Initially he was sent to our service, suspected of facial paralysis. He came to rehabilitation service for performing cranial nerve VII study (nerve conductions and electromyography). **Material and Methods:** Case description: At clinical examination muscle strength was preserved, showed no weakness in limbs, only his face was expressionless and found right levator anguli oculi and oris weakness. He doesn't have difficulty swallowing or changes in voice. Tone, muscle strength and reflexes were normal. Neurological examination was normal. His medical history was otherwise unremarkable. **Results:** Nerve conductions were normal bilaterally, but electromyography showed myotonic discharges in right orbicularis Oculi and Oris muscles. For this reason the study was expanded to left 1st dorsal interosseus muscle showing similar findings with myotonic discharges. Clinical and neurophysiological evidence of myopathy supported the diagnosis of Myotonic Dystrophy. **Conclusion:** In Myotonic Dystrophy Usually the weakness is predominantly distal lower limbs, but in this case the facial weakness was predominant. Electrophysiological findings were decisive for diagnosis of a initial ocular manifestation of myotonic dystrophy.

551

FACTORS AFFECTING THE QUALITY OF LIFE IN PATIENTS WITH PARKINSON'S DISEASE

R. Matmurodov¹, K. Khalimova¹¹Tashkent Medical Academy, Neurology, Tashkent, Uzbekistan

Introduction/Background: The progression of clinical manifestations Parkinson's disease (PD) does not only depend on the clinical forms of the disease, but also depends on many factors that affect the quality of life and disability of patients. This leads to the development of socio-economic problems. To investigate the clinical and non-clinical basic factors affecting the quality of life of patients with PD. **Material and Methods:** The study involved 32

patients with PD and the control group consisted of 20 without PD. All patients underwent clinical neurological examination, including a detailed assessment of movement disorders using a standardized UPDRS. For the diagnosis of cognitive impairment in clinical practice and research are more commonly used neuropsychological research methods. To assess the quality of life in this study was used by the European Quality of Life Questionnaire of 5 questions (EuroQoL-5D). *Results:* All symptoms of PD had the greatest impact on the components of a questionnaire to determine the quality of life of patients. Analysis of the questionnaire showed that when the “mobility” met in 87.5%, “pain/discomfort”–84.3% and “anxiety/depression” at 90.6%, they have a “certain” or “significant” problems. Among the patients in the control group the percentage of people with a “specific” or “significant” problems of the above components was significantly lower (56.25%, 59.3% and 62.5%, respectively, $p < 0.001$). When carrying out a regression analysis of motor and non-motor symptoms and quality of life of patients with PD revealed significant correlation ($p < 0.05$) between the indicators and the quality of life on a scale UPDRS (II+III), duration of disease, cognitive impairment, depression and anxiety, autonomic disorders, psychosis, pain, and sleep disorders. *Conclusion:* The quality of life of patients with PD depends on the debut of the onset of disease, gender, duration, motor and non-motor symptoms and timely correction of these factors reduces disability in patients.

552

QUALITY OF LIFE PERCEPTION OF PATIENTS WITH AMYOTROPHIC LATERAL SCLEROSIS

S. Pinto¹, M. de Carvalho¹

¹Instituto de Medicina Molecular, Translational and Clinical Physiology Unit, Lisbon, Portugal

Introduction/Background: Quality of life (QoL) in Amyotrophic Lateral Sclerosis (ALS) is acknowledged as a critical issue in this dreadful disorder. Visual analogical scale (VAS) provides a simple and rapid measurement of personal health status perception, but the impact of functional disability on its scoring is unknown. The authors aimed to evaluate the ALS patient’s own perception of their health status at first visit. *Material and Methods:* Health condition VAS (0–100) of the QoL EQ-5D scale was assessed at first visit, before informing ALS patients on their final diagnosis. The revised ALS functional rating scale (ALSFRR-R) and its bulbar (ALSFRRb), upper limb (ALSFRRul), lower limb (ALSFRRll) and respiratory (RofALSFRR-R) subscales were recorded. Pearson’s test was applied for correlations between VAS EQ-5D and functional scores. Functional differences considering the median VAS EQ5D cut-off were assessed by Mann-Whitney *U* test. $p < 0.01$ was considered significant. *Results:* We included 156 ALS patients (95 men; onset age 63.9 ± 13 years; disease duration: 18.4 ± 26.5 mo), 91 with spinal, 49 bulbar, 9 respiratory and 7 axial onset form. Total median VAS EQ-5D was 55 (50, 60, 50 and 60 for each subgroup, respectively). For the whole population, spinal and bulbar-onset patients we found no correlation between VAS EQ5D and ALSFRSb or RofALSFRR-R ($p > 0.01$) but significant correlations with upper and lower limb subscores ($p < 0.01$). Significant positive differences were observed in the total population for ALSFRSR, ALSFRSul, ALSFRSll ($p < 0.001$) when considering the median cut-off. *Conclusion:* Patients’ own QoL perception assessed by the VAS is dependent on lower and upper limb function in spinal and bulbar-onset patients. Interestingly, bulbar impairment or respiratory symptoms had no significant impact on VAS. This results from the satisfactory respiratory function of most patients at first visit and optimistic view that bulbar symptoms (dysarthria) can be managed with rehabilitation. We speculate that significant cognitive changes with less insight in bulbar-onset patients influence results.

553

A CASE REPORT ON USE OF NERVE BLOCK FOR PARKINSON’S ASSOCIATED RIGIDITY

J Rehabil Med Suppl 55

K. Prasanna¹

¹Changi General Hospital, Rehabilitation Medicine, Singapore, Singapore

Introduction/Background: Patients with Parkinson’s disease have steadily deteriorating motor and cognitive function. Rigidity sets in mid to late stages which will further reduce the use of function. We report a case of an elderly lady who was diagnosed with Parkinson’s disease for over 5 years, who developed severe rigidity in the left arm and fingers which lead to severe tightness unable to get range of motion in the elbow and finger flexion and extension. Patient developed severe hygiene issues including self mutilation of finger soft tissues. *Material and Methods:* This is an isolated case report in which we used nerve block with 70% alcohol to radial, musculocutaneous, ulnar and median nerve under nerve stimulator to relax the elbow and fingers in order to improve hygiene in the palm, elbow (flexor aspect) and the fingers. *Results:* Results include good, well relaxed elbow and fingers. Accessibility to flexor aspect of elbow, palm and all fingers so that hygiene can be maintained by the carers. *Conclusion:* Nerve blocks with alcohol/Phenol are well reported in literature for use in spasticity. However it has been very rarely reported to be used in Parkinson’s associated rigidity. We report an elderly lady with severe Parkinson’s disease with associated severe tightness in the left arm for which this was successfully used to help with hygiene and care related issues.

554

A DURABLE GAIN IN MOTOR AND NON-MOTOR SYMPTOMS OF PARKINSON’S DISEASE FOLLOWING REPEATED CALORIC VESTIBULAR STIMULATION: A SINGLE-CASE STUDY

M. Saker¹, A. Podlewska², D. Wilkinson³

¹East Kent University Hospitals NHS Foundation Trust, Neuro-rehabilitation, Kent, United Kingdom, ²University of Kent, Neuropsychology, Canterbury, United Kingdom, ³University of Kent, Psychology, Canterbury, United Kingdom

Introduction/Background: The ascending projections from the vestibular brainstem nuclei are receiving growing interest as a potential therapeutic pathway in Parkinson’s Disease (PD). Recent studies have shown that artificial stimulation of the vestibular nerves via transmastoidal galvanic current improved mobility and reduced of postural sway. Following account is the first evidence that repeated sessions of vestibular stimulation can induce durable, clinically meaningful improvements. *Material and Methods:* Single case design study with a 70 year old PD patient with hypokinesia and non-motor symptoms who has had optimal combination of medications and 2 months of In-patient neuro-rehabilitation programme. Vestibular stimulation was induced using a caloric device (Scion Neurostim, LLC) through Thermal Current. Two sessions, spaced at least 4hrs apart, were administered by the patient (with the help of his wife) twice per day, 5 days per week for 3 months. Sham stimulation was delivered in the first month, followed by 2 months of active stimulation. Following approval by the University of Kent Psychology ethics panel and the participant’s informed consent, a range of standardised clinical outcome measures with high test-retest reliability and sensitive to both motor and non-motor symptoms were administered in random order by a researcher 2 weeks prior to sham stimulation, at the start and end of the 4 week sham block, at the end of the 1st and 2nd active blocks, and then at 5 months follow-up. *Results:* Improvement was observed across nearly all measures during the active relative to sham phase eg in Mobility, cognition, anxiety and sleep. Minimal Clinically Important Change on the UPDRS motor and ADL sub-scales, Schwab & England ADL test, and HADS depression scale, EQ-5D, MOCA noted. 2minute walk improved from 22 to 102 meters. Timed Up & Go were reduced from 20.4 to 13.3 seconds. *Conclusion:* Non-invasive home based deep brain stimulation as an adjunct to rehabilitation needs to be explored.

555

EFFECTS OF BALANCE REHABILITATION ON POSTURAL CONTROL IN A STROKE PATIENT WITH IDIOPATHIC PARKINSON'S DISEASE

S. Salah¹, N. Abdelkafi¹, A. Nouira¹, H. Migaou¹, S. Boudokhane¹, A. Jellad¹, Z. Ben Salah Frih¹

¹Fattouma Bourguiba University Hospital Monastir, Physical Medicine and Rehabilitation, Monastir, Tunisia

Introduction/Background: Parkinson's disease (PD) results in various impairments of balance performance. Falls are a very common and serious problem for people with PD, they can lead to devastating outcomes. Besides, the onset of a stroke will aggravate pre-existing balance disorders due to PD. Exercise is nowadays regarded essential in PD treatment, balance exercises have been sparsely tested in clinical trials in PD. The feasibility, safety and effectiveness of such training conditions in a hemiparetic PD patient remain unproven. The aim of this study was to evaluate the effects of balance training on postural control in a stroke patient with PD. **Material and Methods:** A 62-year-old ambulant man consulted initially for a recent right hemiparesis secondary to an ischemic stroke. He has been diagnosed to have idiopathic Parkinson's disease four years earlier. Neurologic examination revealed a mild motor deficit in the right side of the body. There was a non-velocity dependent increase in the muscle tone. The subject demonstrated an independent slow walking with frequent falls. He was evaluated eyes open (OE) and eyes closed (CE) on a posture platform. He had difficulty in integrating proprioceptive inputs when the visual input is removed with an instability in the frontal plane (instability index X: 1.55 (OE) and 1.39 (CE)). A training program to stimulate and facilitate the peripheral proprioceptors was set up. Posture exercises were given on a posture platform (15–20 minutes/day, 3 days a week) for a period of 2 months. This procedure was easy and well tolerated by the patient. Post training assessment showed an improvement in all parameters. **Results:** It seems that balance exercises dedicated to stimulate and facilitate the peripheral proprioceptors have beneficial effects in improving balance among hemiparetic individuals suffering from PD. **Conclusion:** Balance training exercises are feasible, safe, and effective in reducing both static and dynamic balance impairments in a stroke PD patient.

556

SONOGRAPHIC INVESTIGATION OF TRUNK MUSCLES OF PARKINSON'S DISEASE PATIENTS WITH PISA SYNDROME

J. Shiraishi¹, T. Okazaki¹, S. Saeki²

¹Wakamatsu Hospital of University of Occupational and Environmental Health, Department of Rehabilitation Medicine- Wakamatsu Hospital of University of Occupational and Environmental Health, Fukuoka, Japan, ²University of Occupational and Environmental Health, Department of Rehabilitation Medicine- University of Occupational and Environmental Health, Fukuoka, Japan

Introduction/Background: Pisa syndrome is often recognized in patients with Parkinson's disease, and its pathophysiology is unclear. We hypothesized that the trunk muscles might have an impact on Pisa syndrome, so we performed a sonographic investigation of the trunk muscles of Parkinson's disease patients with Pisa syndrome. **Material and Methods:** The participants comprised patients with Parkinson's disease (2 males and 8 females; mean age 72.6±2.3 years; Hoehn & Yahr stage II 2, III 4, IV 3; lateral flexion right 6, left 4) who had been treated with antiparkinson drugs at our hospital. Patients with spinal disease and other neurological diseases were excluded. We compared the thickness of the trunk muscles of the bending side with that of the unbending side using sonographic images of the transversus abdominis (TrA), internal oblique (IO), external oblique (EO), rectus abdominis (RA), and lumbar multifidus (LM) muscles. **Results:** The results showed that there was a significant difference between the EO thickness of the bending side (mean±SD: 3.42±0.33 mm) and that of the unbending side (5.24±0.56 mm) ($p=0.013$).

There were no significant differences between the muscle thickness of the bending side and that of the unbending side in the other trunk muscles. **Conclusion:** Our results revealed an asymmetry of the EO thickness in Parkinson's disease patients with Pisa syndrome; this asymmetry may be a cause of the postural abnormalities.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: NEUROLOGICAL AND MENTAL HEALTH CONDITIONS - LANGUAGE AND SPEECH DISORDERS

557

REMOTE TRAINING SUPPORT FOR COMMUNICATION AID USE IN CHILDREN WITH SPINAL MUSCULAR ATROPHY TYPE I

C. Sasaki¹, S. Sakai², T. Imura³, M. Takada¹, S. Morimoto¹, A. Nojiri¹, Y. Sakamoto⁴, T. Isaji⁵

¹Kumamoto Health Science University, Rehabilitation, Kumamoto, Japan, ²Hokkaido University, Functioning and Disability-Faculty of Health Sciences, Sapporo-Hokkaido, Japan, ³Chubu Gakuin University, Nursing and Rehabilitation, Seki-Gifu, Japan, ⁴Kumamoto Health Science University, Nursing, Kumamoto, Japan, ⁵Teikyo University School of Medicine, Rehabilitation Medicine, Tokyo, Japan

Introduction/Background: Most children with spinal muscular atrophy (SMA) type I have respiratory muscle weakness and require a tracheostomy, which makes speaking difficult. Furthermore, severe muscle weakness hinders nonverbal communication such as gestures. Because, both verbal and nonverbal communications are restricted, providing communication support using specialized devices is essential to preserve and develop the cognitive and intellectual functions. The purpose of this study was to investigate the effect of remote training support (RTS) for communication aid (CA) use in children with early-stage type I SMA. **Material and Methods:** In total, 19 children participated in the RTS program between Apr 2011 and Oct 2015. However, CAs could be used with 9 children, who formed the study sample. The subjects resided in different areas in Japan. Apart from visiting the subjects at their residence once or twice a year, for effective support, we also provided RTS using social networking services. We provided training in steps according to a systematic protocol that we designed (Table1). **Results:** See Table 2. **Conclusion:** There were 5 children with SMA who could communicate using CA before school age when provided with early systematic RTS. Although RTS has its limitations, we demonstrated that it can be effective in providing communication support for early-stage.

Table 1. Training protocol

Step	Understanding cause and effect
Step 1	Understanding cause and effect
Step 2	Can choose the targets using Auto Scanning methods
Step 3	Can communicate by choosing the words with CA
Step 4	Can communicate by make the words with CA
Step 5	Can communicate by framing sentences using the CA

Table 2. Improvement of each subject from baseline by protocol step.

Subject No	Sex/Age	Step at baseline	Step after RTS
1	F/14	2	5
2	F/11	2	4
3	F/10	2	5
4	F/9	1	4
5	M/7	1	4
6	F/7	2	5
7	M/6	1	3
8	F/6	1	4
9	F/3	1	3

558

THE EFFECTS AND MECHANISM OF MIRROR NEURON SYSTEM BASED TREATMENT ON PHONOLOGICAL AND SEMANTIC PROCESSING IN APHASIC PATIENTS: EVIDENCE FROM NEUROPSYCHOLOGICAL AND FUNCTIONAL NEURO-IMAGING STUDIES

C. Shan¹, Q. Ye¹, W. Chen¹, X. Ji¹, S. Zhang¹, B. Zhang², T. Yuan³

¹The First Affiliated Hospital of Nanjing Medical University, Department of Rehabilitation Medicine, Nanjing, China, ²The Affiliated Drum Tower Hospital of Nanjing University Medical School, Department of Radiology, Nanjing, China, ³Nanjing Normal University, School of Psychology, Nanjing, China

Introduction/Background: Mirror neuron system (MNS) based treatment, i.e. hand action observation training, can activate the MNS including critical language network in the left hemisphere and facilitate the recovery of language functions for aphasic patients after stroke. However, it is unknown whether phonological or/and semantic processing of aphasic patients may be promoted by this MNS based training. In this study, we try to reveal the effect of hand action observation training on phonological and semantic processing respectively for aphasic patients with phonological or semantic processing deficits and to explore the underlying neural mechanism. **Material and Methods:** Two patients, Zhang with Wernicke aphasia (mainly semantic disorders) and Wu with transcortical motor aphasia (TCMA, mainly phonological initiation and expression disturbance), accepted one week of hand action observation training. The changes of language functions (evaluated with western aphasia battery, WAB) and brain activations induced by phonological and semantic processing (measured with functional MRI, fMRI) were assessed and analyzed before and after one week treatment. **Results:** After one week hand action observation training, Zhang with Wernicke aphasia made significant progress in semantic comprehension ($p < 0.05$) and Wu with TCMA improved significantly in phonological retrieving, i.e. naming ($p < 0.05$). fMRI experiment showed that one week of hand action observation training could not induce additional activations in MNS including language networks for Zhang during phonological and semantic processing. However, for Wu, one week hand action observation training could result in activations in MNS including critical language areas such as Wernicke's area (BA22), Broca's area (BA44/45) and supramarginal gyrus (BA40) during phonological processing rather than semantic processing. **Conclusion:** Hand action observation training may improve semantic comprehension for aphasic patients with semantic disorders and this effect is probably not related with classical language area activation. In addition, for aphasic patients with phonological deficit, hand action observation training may facilitate language areas and phonological retrieving.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: NEUROLOGICAL AND MENTAL HEALTH CONDITIONS - NERVE INJURY

559

BILATERAL RADIAL NERVE PALSY IN A SOLDIER TIED WITH A RUBBER BAND

E. Adigüzel¹, S. Kesikburun¹, B. Aras¹, F. Tok¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: There is little information about bilateral radial nerve palsy of adult patients in the literature. **Material and Methods:** A 35-year-old male presented with two-week history of

bilateral wrist drop and numbness at lateral forearm and dorsum of the hands. The patient told that he was tied with a rubber band at bilateral upper arms while combat training and stayed in this position for about one hour. He felt numbness immediately and recognized muscle weakness thereafter. On presentation, motor examination revealed strength of 2/5 in left wrist and finger dorsiflexors and 1/5 in right ones according to manual muscle testing. There was hypoesthesia at bilateral posterior aspect of the forearm and hand corresponding to radial nerve sensation area. No sign of compression or constriction was detected on upper arm skin. Blood tests and plain x-ray graphics were normal. Electrodiagnostic test performed three weeks after onset of the symptoms revealed bilateral severe motor and sensorial conduction deficit of radial nerve at the level of bilateral upper arm. In needle EMG study, denervation potentials were seen in the brachioradial and extensor digitorum communis muscles. There was no motor unit action potential. **Results:** The patient was administered a three-week rehabilitation program consisting of progressive strengthening exercises and physical therapy including superficial heating, hydrotherapy and radial nerve stimulation. Six weeks after the initial assessment, muscle strength of left wrist and finger dorsiflexion increased to 4/5 but right side did not improve. Electrodiagnostic test showed mild motor and sensorial conduction deficit of radial nerve on the right side, but still severe on the left side. In needle EMG study, widespread denervation potentials were seen at right forearm radial nerve innervated muscles. Patient was referred to neurosurgery clinic for consultation but patient refused surgery. **Conclusion:** Because it is so uncommon, it may not be considered in the differential diagnosis. In conclusion, physician should be aware of the possibility of bilateral radial nerve palsy in such a compression.

560

MAGNETIC RESONANCE IMAGING VS. ULTRASOUND IN DIAGNOSIS OF TRAUMATIC SCIATIC NEUROMA

E. Adigüzel¹, F. Tok¹, İ. Safaz¹, M.A. Taşkınatan¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey

Introduction/Background: Peripheral nerve lesions can be diagnosed with clinical history and neurological examination. To assess the severity of the nerve injury, electromyography (EMG) and nerve conduction studies are used. Ultrasonography and magnetic resonance imaging (MRI) are used to localize and evaluate the extent of the injury. **Material and Methods:** A 32-year-old male presented with a 5-month history of numbness and tingling over the backside of the right thigh, lower leg and the sole. His complaints were worse at daytime and increased with walking and standing. There was a history of stab injury at the backside of the thigh five months earlier. On physical examination he had decreased sensation on the sole. There was no muscle weakness of lower extremity. Right achilles tendon reflex was decreased. Babinski reflex and ankle clonus were negative. A 1x1 cm sized scar tissue was observed on the skin due to stab injury. Nerve conduction studies and needle EMG revealed subacute partial axonal degeneration at tibial division of the right sciatic nerve. **Results:** We performed MRI. On T1 sequence, because of the similar intensity with the surrounding muscle sciatic nerve was not easily appreciated on the affected thigh. Also in the healthy side, sciatic nerve could not be differentiated. On T2 sequences, neuroma of the sciatic nerve was observed but hyperintense vascular structures could be easily interfered with the neuroma. Then we performed ultrasonography and neuroma was easily appreciated, and also normal sciatic nerve was easily differentiated from the surrounding muscular structure in the unaffected side. **Conclusion:** Although MRI provides images with high resolution; accessibility, cost and duration of this technique may limit its use. Beside these problems, depending on the MRI sequence, surrounding muscle tissue or hyperintense vascular tis-

sues may get interfered with injured nerve site. Ultrasonography provides easy and practical assessment of soft tissues including peripheral nerves.

561

A RARE CAUSE OF MEDIAN NERVE PALSY

E. Ata¹, S. Sakarsu¹, L. Tekin¹

¹*Gulhane Military Medical Academy - Haydarpasa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey*

Introduction/Background: Median nerve palsy is often caused by injuries to the arm, forearm, or wrist. It may also occur from blunt force trauma or neuropathy. Due to the close proximity of the median nerve and brachial artery, vascular pathologies of brachial artery may also cause nerve damages. Herein, we would like to report a case of median nerve palsy due to the pseudoaneurysm of brachial artery. **Material and Methods:** A 21 years-old man presented with weakness, numbness and paresthesias of the right hand in the area of median nerve distribution for the past 1 month. He had a history of brachial artery pseudoaneurysm after cardiac catheterization via the right brachial artery and he underwent a surgery due to his brachial pseudoaneurysm 1 week ago. On neurological examination, there was weakness of the flexor muscles of the thumb and index finger, thenar muscles, and wrist flexor muscles and he had also paresthesia of the right hand in the median nerve dermatome. Electroneurography and electromyography revealed subacute total axonal degeneration of right median nerve on the lesion level. **Results:** Physical therapy including strengthening exercises with electrostimulation was started. Pregabalin, 75 mg, orally two times daily was prescribed for paresthesias. The patient's treatment is ongoing. **Conclusion:** A pseudoaneurysm is a leakage of arterial blood from an artery into the surrounding tissue with a persistent communication between the originating artery and occurs when a blood vessel wall is injured. These pseudoaneurysms are mainly caused by arterial puncture for a diagnostic cardiac catheterization and arterial interventions. It is more common on the femoral artery than brachial artery. Herein, we want to emphasize that brachial artery catheterization can be damage to the median nerve by an arterial or venous pseudoaneurysm, which can compress the nerve and result in indirect damage.

562

COMPARING CLINICAL INDICATORS AND NEUROPHYSIOLOGICAL FINDINGS OF SURAL AND PERONEAL NERVES IN DETECTION OF DIABETIC NEUROPATHY

M. Azimi¹, S.P. Madani², B. Forogh²

¹*Sports Medicine Research Center- Neuroscience Institute, Sports Medicine Department- Tehran University of Medical Sciences, Tehran, Iran,* ²*Physical Medicine and Rehabilitation, Department of Physical Medicine and Rehabilitation- Iran University of Medical Sciences, Tehran, Iran*

Introduction/Background: Some clinical scoring systems as the quantitative tools have been developed to assess presence and severity of diabetic neuropathy based on both the patient's complaints and the physician's findings. The present study goaled to assess the presence and severity of the sural and peroneal nerve abnormalities using the Michigan Neuropathy Screening Instrument (MNSI) and the United Kingdom (UK) questionnaire compared with the electrophysiological assessments. **Material and Methods:** This cross-sectional study was conducted on 148 patients who suffered diabetes mellitus type I or II referred to Physical medicine and rehabilitation clinic. The findings of electrophysiological study such as Deep Peroneal and sural nerves conduction delay, velocity and amplitude were gathered. The patients were also assessed regarding clinical neuropathy status using the two instruments of MNSI and

UK. **Results:** Our study showed a significant agreement between electrophysiological assessment and both MNSI and UK tools in diagnosis of sural nerve neuropathy, however diagnostic agreement was not found between these tools and electrophysiological study in detection of Deep peroneal nerve neuropathy which is due to the weakness of screening questionnaires in detection of motor neuropathies. Based on the MNSI questionnaire, the main determinants of diabetic neuropathy included age higher than 50 years and disease duration longer than 10 years. Based on the UK questionnaire, female gender and diabetes duration longer than 10 years could predict diabetic neuropathy. According to electrophysiological assessment, age higher than 50 years was more prevalent with sural nerve neuropathy. **Conclusion:** EDx particularly Peroneal nerve conduction status are helpful methods to assess peripheral diabetic neuropathy. Clinical assessment using MNSI and UK questionnaire are also cost-benefit and available tools in screening suspected patients to neuropathy, especially predominantly sensory distal polyneuropathic processes. Due to weakness of screening tools in early detection of motor neuropathic process, routine electrodiagnostic evaluation of such patients, in spite of normal screening, is recommended.

563

SUPRASCAPULAR NERVE INJURY DISGUISED BY SUPRASPINATUS TENDON RUPTURE

Y. Demir¹, K. Aydemir¹, K. Tezel¹, B. Yılmaz¹

¹*Gulhane Military Medicine Academy, Physical Medicine and Rehabilitation, Ankara, Turkey*

Introduction/Background: Supraspinatus muscle is one of the four rotator cuff muscles and also abducts the arm at the shoulder. Tear of the tendon may cause impairment of upper extremity function. However, nerve injury may mimic tendon injury. **Material and Methods:** 45-year-old man was admitted to our clinic with weakness on the right shoulder. In his medical history, he had fallen down from a 2-meter height 45 days ago and was diagnosed with soft tissue injury in an orthopedic clinic and then he was prescribed analgesic drugs and shoulder bandage. **Results:** In physical examination, tenderness with palpation in the lateral side of the shoulder was revealed. He was unable to initiate right shoulder abduction and external rotation. Shoulder range of motion and laboratory findings was normal. The full-thickness supraspinatus tear was detected via shoulder ultrasonography (Figure 1) and this condition was confirmed with magnetic resonance imaging. Nerve conduction and electromyographic studies showed severe lesion of the right suprascapular nerve. **Conclusion:** Suprascapular nerve injury should be considered in patients with weakness of shoulder abduction. This condition might be disguised by supraspinatus tear.

564

HUMERAL FRACTURE AND RADIAL NERVE INJURY DURING THROWING: TWO CASE REPORTS

Y. Demir¹, K. Aydemir¹, S. Kızıltırnak¹, A.K. Tan¹

¹*Gulhane Military Medicine Academy, Physical Medicine and Rehabilitation, Ankara, Turkey*

Introduction/Background: Spiral fractures of the humerus have been reported in throwing activities such as baseball, softballs, handballs, javelins, and hand grenades. Nerve palsy may accompany humeral shaft fractures. **Material and Methods:** We present a series of two patients who presented with pain on the arm after throwing a subject. Humeral shaft fractures were detected on radiography early after injury and casts were applied to the patients. **Results:** After removal of the cast, both patients reported weakness of the wrist and finger extensor muscles. Nerve conduction studies and needle electromyography revealed radial nerve injury. **Conclusion:** The humeral shaft fracture should be kept in mind in case of pain after throwing a subject and radial nerve injury may develop secondary to that kind fracture.

565

MODIFICATION AND TRANSLATION OF THE BOSTON CARPAL TUNNEL QUESTIONNAIRE (BCTQ) INTO FILIPINO

D.D. Feliciano¹, C. Suarez¹

¹University of Santo Tomas Hospital, Physical Medicine and Rehabilitation, Manila, Philippines

Introduction/Background: Carpal tunnel syndrome (CTS) is an entrapment mononeuropathy of the median nerve within the carpal canal and presents as paresthesias of the hand and weakness of grip. It has become an increasingly recognized cause of work disability even among Filipinos. Combination of physical examination with the use of rating scales showed higher predictive value for diagnosing CTS. Among the CTS rating scales, BCTQ was found to be the most condition-specific questionnaire. Thus, we aimed to modify and translate the BCTQ into Filipino and assess its content validity, internal consistency and reliability. **Material and Methods:** Translation of the BCTQ was carried out in three phases. Phase I utilized a focus group discussion (FGD) among five participants with CTS to derive key themes for the cultural modification of the BCTQ (mod-BCTQ). Phase II involved forward and backward translation of the mod-BCTQ to produce a Filipino version (BCTQ-Fil). The BCTQ-Fil was pilot tested among three participants diagnosed with CTS. Phase III evaluated the internal consistency and reliability of the BCTQ-Fil. Twelve participants diagnosed with CTS accomplished the mod-BCTQ and BCTQ-Fil. Pearson correlation coefficients and Cronbach alpha scores were estimated for parallel forms reliability and internal consistency, respectively. **Results:** Modifications were made on items 13–18 of the original BCTQ based on generated FGD key themes. The BCTQ-Fil and its backward translation had good appraisal scores for content validity and adequacy. Pilot testing of the BCTQ-Fil showed good appraisal scores for ease of understanding. Reliability analysis of the BCTQ-Fil showed very high correlation with the mod-BCTQ ($r=0.95$, $p<0.0001$, 95% CI 0.84–0.98) and internal consistency (Cronbach $\alpha=0.80$). **Conclusion:** We have generated a culturally relevant, reliable and internally consistent Filipino translation of the BCTQ. Further testing of the BCTQ-Fil on larger and balanced populations for validation may improve its applicability to the Filipino community.

566

CO-OCCURRENCE OF TRIFID AND BIFID MEDIAN NERVES IN A PATIENT WITH BILATERAL CARPAL TUNNEL SYNDROME

F. Hojjati¹, R. Seyed Mansoor¹, L. Sedighpour¹, S.A. Raeissadat¹

¹Shohada-e-Tajrish Hospital, Physical Medicine and Rehabilitation, Tehran, Iran

Introduction/Background: Carpal tunnel syndrome (CTS) is the most common upper extremity neuropathy that may be associated with anatomic variations of the median nerve, such as bifurcation or trifurcation. High division of the median nerve proximal to the carpal tunnel (known as a trifid or bifid median nerve) is a noncommon median nerve anomaly with incidence rate of 2.8% for bifid variation. Trifurcation of the median is very rare. They both can lead to CTS because of higher cross-sectional area compared with a normal nerve. Surgical techniques with short incisions and endoscopic procedures demand a thorough knowledge of the anatomy and variations of the structures in the wrist. In these cases, obtaining magnetic resonance imaging and ultrasounds of the median nerve with anatomic variations helps surgeons avoid potential surgical hazards. **Material and Methods:** We report a 54-year-old female with a rare co-occurrence of trifid and bifid median nerves leading to bilateral CTS. Coming to our clinical center with both hands paresthesia and pain. There was no remarkable finding in PMH nor ROS. In physical examination we just found positive bilateral phalen test and tinel's sign. All EMG-NCS test were performed according to

Dumitru and Zwarts electrodiagnostic medicine textbook. **Results:** Nerve conduction studies revealed bilateral severe CTS. Electromyographic needle examination was normal. Ultrasonographic assessment of wrist demonstrated trifid right and bifid left median nerves. There was no finding resembling permanent median artery. Findings were confirmed by MRI study. The patient was referred for carpal tunnel release surgery. In surgical exploration, trifid and bifid median nerves were demonstrated [Figures 4 and 5]. **Conclusion:** Here, we reported a rare case with right trifid and left bifid median nerves documented by ultrasonography and MRI.

567

CORRELATION OF CLINICAL FEATURES, SOFT TISSUE ULTRASONOGRAPHY AND ELECTROPHYSIOLOGICAL STUDIES IN CARPAL TUNNEL SYNDROME

S. Kalathummarath¹, S. Thanissery Ramachandran¹, S. Kammili¹, S.H. Abdulgafoor¹

¹Govt Medical College, Physical Medicine and Rehabilitation, Kozhikode, India

Introduction/Background: Carpal tunnel syndrome is the most frequent entrapment neuropathy which occurs due to the compression of median nerve at wrist. **Material and Methods:** A cross sectional study was conducted at Department of PM&R Kozhikode in 60 CTS patients to correlate the electrophysiological studies and Ultrasonography findings. Using the high frequency linear transducer (10–18MHz) both transverse and longitudinal scanning of the median nerve is done. The cross sectional area (CSA) is measured at the tunnel inlet at the level of pisiform and also at 5 cm above wrist, to measure the wrist- forearm ratio (WFR). Transverse and anteroposterior axes are also measured at the level of pisiform for calculating flattening ratio (FR). Longitudinal view used to find out any swelling of median nerve proximal to the tunnel inlet. **Results:** In the present study a cut off value of CSA of the median nerve at wrist was taken as 10mm for the diagnosis of CTS. In this study we got an excellent agreement between the severity grading by NCS and USG which is consistent with most of the other studies. A dynamic examination can also be performed with USG. During the present study we came across bifid median nerve and persistent median artery. During the dynamic examination, intrusion of lumbrical muscle causing compression of the median nerve during the flexion of fingers also was found. **Conclusion:** The severity grading by Ultrasonography shows an excellent agreement with that of electrophysiological severity. The cross sectional area of the median nerve at the inlet is used for the severity grading by USG. The wrist forearm ratio and flattening ratio also is seen to increase with the severity of CTS. A routine ultrasound examination of the wrist in CTS patients can complement the electrophysiological examination in the diagnosis of CTS.

568

A CASE OF UNILATERAL PERONEAL PARALYSIS AFTER SQUAT EXERCISE

E. Kaya¹, P. Doruk Analan¹

¹Baskent University Adana Medical and Research Center, Physical Medicine Rehabilitation, Adana, Turkey

Case Diagnosis: Peroneal paralysis due to squat exercise. **Case Description:** A 23-year-old man admitted to our clinic with complaint of left foot drop for a day. The patient declared that his symptom showed up after squatting. We evaluated clinical findings and used electrophysiological studies to make diagnosis. In this case the patient sustained unilateral postural type nerve compression. It was considered to occur due to squat exercise. It was prescribed peroneal combined vitamin B medication and physiotherapy programme. The patient is currently still being followed up at our medical center. **Discussion:** Doing physical exercise is necessary as essential as sleep and nourishment for a healthy life. However, it can cause health

problems in this case where is a foot drop, a common and distressing problem that can lead to falls and injury, after squat exercise. Although the most frequent cause is a peroneal neuropathy at the neck of the fibula, other causes include anterior horn cell disease, lumbar plexopathies, L5 radiculopathy and partial sciatic neuropathy. And even when the nerve lesion is clearly at the fibular neck there are a variety of the causes that may not be immediately obvious such as habitual leg crossing, squatting. People who squat or kneel for long periods are particularly at risk of developing peroneal palsies as the fully flexed knee bears the whole weight of the body, the peroneal nerve is probably compressed between the biceps tendon above and the lateral head of the gastrocnemius and the head of the fibula below or, possibly, this position kinks and compresses the nerve within the fibular tunnel. **Conclusions:** When a patient presents with acute foot drop, peroneal neuropathy associated with exercise should be taken into account. It must be realized in peroneal paralysis which occurred due to positions and the person must avoid such behaviors.

569

ASSESSMENT OF THE EFFICACY OF LOCAL CRYOTHERAPY IN CHILDREN WITH CEREBRAL PALSY

M. Kiljanski¹, M. Woszczak¹, K. Marceł², J. Kaluza-Pawłowska³, K. Syrewicz⁴, P. Kiljanski⁴

¹Jan Kochanowski University, Physiotherapy, Kielce, Poland, ²Jagiellonian University, Physiotherapy, Krakow, Poland, ³University of Computer Sciences and Skills, Physiotherapy, Lodz, Poland, ⁴Independent Public Health Care Facility Rehabilitation Centre in Pabianice, Rehabilitation, Pabianice, Poland

Introduction/Background: Background. The author presents the results of a study of 60 children with infantile cerebral palsy carried out at a rehabilitation centre in the town of Zgorzelec. The study aimed to demonstrate that a 4-week programme of customised kinesiotherapy with cryostimulation of the lower limbs with liquid nitrogen vapour could have a beneficial effect on motor status as well as muscle tone and skin surface temperature in children with infantile cerebral palsy. **Material and Methods:** Material and methods. A group of children of both sexes aged 3–14 with infantile cerebral palsy underwent 4 weeks of customised kinesiotherapy combined with cryostimulation of both lower limbs. Muscle tone was determined with a Szirmai myotonometer using special methodology. The level of spasticity was estimated with the Ashworth test, and motor activity assessment was made before and after the treatment according to a score table designed by the authors. Thermovisual recordings of skin surface temperature in the lower limbs were made immediately before and 5 and 15 minutes after cryostimulation procedures at the beginning and end of the 4-week programme. **Results:** A comparison of the results of the motor activity assessment, Ashworth test and myotonometry before and after the rehabilitation programme shows that the use of cryostimulation in the rehabilitation of children with infantile cerebral palsy results in a reduction of spasticity in the lower limbs and improvement in motor activity. **Conclusion:** Thermovisual analysis of skin surface temperature demonstrates full adaptation of the children's vascular system, i.e. excellent safety of topical cryostimulation.

570

SONOANATOMY OF ULNAR NERVE AROUND THE ELBOW IN HEALTHY SUBJECTS

D.H. Kim¹, K.H. Kim¹, D.K. Kim¹, B.K. Park¹

¹Korea University Ansan Hospital, Physical Medicine & Rehabilitation, Ansan-si, Republic of Korea

Introduction/Background: The ulnar nerve has its sensory branches such as palmar ulnar cutaneous nerve (PUCN), dorsal ulnar cutaneous nerve (DUCN), and superficial sensory branch. The purpose of this study was to identify these sensory branches of the ulnar

nerve in the forearm by ultrasonography. **Material and Methods:** The ulnar nerves in the 30 forearms of 15 healthy adult volunteers were scanned using high-resolution ultrasound. The prominence of the pisiform was chosen as reference for measurements. Branching points and size of PUCN, DUCN, and superficial sensory branch were measured. The relative pathway of the DUCN to the ulnar styloid process was also investigated. **Results:** The PUCN was observed in the 23 forearms (76%), whereas the DUCN was seen in all the forearms. The average distance from the pisiform to the branching point of the PUCN and DUCN was 11.4 ± 1.2 and 7.0 ± 1.0 cm, respectively. The main trunk of the ulnar nerve split into the superficial and deep division 1.0 ± 0.3 cm distal to the pisiform. The cross sectional area of the PUCN, DUCN, and superficial sensory branch at the level 1 cm distal to each branching point was 0.3 ± 0.1 , 1.3 ± 0.4 , and 4.2 ± 1.0 mm², respectively. The DUCN had its course volar to the ulnar styloid process in 14 forearms and dorsal to the styloid process in 16 forearms. **Conclusion:** The arising points of the sensory branches of the ulnar nerve were well observed by high-resolution ultrasound. This anatomical information of the PUCN, DUCN, and superficial sensory branch could have a meaningful clinical application such as helping in the electrodiagnostic differentiation of ulnar nerve injury whether it was from the wrist or elbow.

571

SEVERITY CORRELATION BETWEEN ULTRASONOGRAPHIC CROSS SECTION AREA AND ELECTROPHYSIOLOGIC PARAMETERS IN CARPAL TUNNEL SYNDROME

K.J. Lee¹, Y.S. Yoon¹, E.S. Kim¹, S.G. Im¹

¹Presbyterian Medical Center, PM & R, Jeonju, Republic of Korea

Introduction/Background: The objective of present study is investigate the correlation between ultrasonographic cross sectional area of median nerve at the wrist (CSA-W) and electrophysiologic parameters in patients with carpal tunnel syndrome (CTS). **Material and Methods:** Thirty one wrists electrophysiologically diagnosed with carpal tunnel syndrome and underwent ultrasonography of median nerve at the wrist. CSA-W and electrophysiologic parameters were analyzed. After history taking and physical examination of the patients, Nerve conduction study (NCS) and Needle EMG were done and then ultrasonographic CSA was measured independently by another physician. **Results:** CSA-W was 14.48 ± 4.36 mm² in 31 wrists and correlations were observed with SNAP amplitude ($r = -0.52$, $p < 0.05$), SNAP conduction velocity ($r = -0.37$, $p < 0.05$), CMAP amplitude ($r = -0.55$, $p < 0.05$), positive sharp wave (PSW) ($r = -0.57$, $p < 0.05$), and IP patterns ($r = 0.39$, $p < 0.05$), respectively by spearman correlation. In multiple regression analysis, CSA-W showed correlation with CMAP amplitude ($p = 0.007$, regression coefficient = -0.54) and presence of PSW ($p = 0.02$, regression coefficient = 3.26). In addition, CSA-W showed correlation with presence of Tinel sign ($r = -0.55$, $p < 0.05$). **Conclusion:** CSA-W had negative correlation with CMAP amplitude and positive correlation with presence of PSW. We also found larger CSA-W showed more positive in Tinel sign.

572

BILATERAL RADIAL NERVE INJURY: A UNIQUE AND HORRIFIC CAUSE

S. Nasir Mansoor¹

¹CMH Hospital Pano Aqil Sind, Rehabilitation Medicine, Pano Aqil, Pakistan

Introduction/Background: Radial nerve injury is one of the commonest peripheral nerve injury encountered due to trauma, traction, compression and iatrogenic causes. Injuries like crutch palsy and Saturday night palsy are well known and well documented in literature. Bilateral radial nerve palsies are rare. We report a case of bilateral radial nerve injury in a young man due to a unique cause. **Material and Methods:** 25-year-old man was brought to electro-di-

agnostic clinic for bilateral wrist drop for the past two weeks. The patient had a history of quarrel with his relatives, whom tortured him by hanging him from his arms tied behind his back for 2 hours after which he was unable to eat food or do activities of daily living as he developed bilateral wrist drop. **Results:** On examination he had bruise across both elbows and cubital fossa. There was 1/5 power in both wrist extensors and triceps had 5/5 power bilaterally. There was sensory impairment in radial nerve distribution bilaterally. On electrodiagnostics study he had very small amplitude radial motor nerves bilaterally and radial sensory nerve was unrecordable. Electromyography showed involuntary activity (fibrillation potentials) in both Brachioradialis, extensor digitorum and extensor indices proprius. There was discrete recruitment pattern in these muscle groups upon activation. The median and ulnar nerves were normal. The final impression was axonal injury bilateral radial nerves with ongoing degeneration. The patient was advised wrist hand orthosis bilaterally, electrical muscle stimulation to wrist extensors and active assisted exercises. He was also prescribed tablet cobalamin twice daily. The treatment continued for 3 weeks and gradually the patient recovered strength of 3+/5 in his wrist and finger extensors. **Conclusion:** Radial nerve is prone to damage by stretching and compression in unusual positions. Trauma and torture cases of upper limb are prone.

573

RISK FACTORS OF PLANTAR ULCER AND LOWER EXTREMITY DEFORMITIES AND ANAGEMENT OF MEDICAL REHABILITATION IN MAKASSAR, SOUTH SULAWESI OF INDONESIA

I. Nurjaya¹, A. Fuad Hadi¹

¹Hasanuddin University, Medical Faculty, Makassar, Indonesia

Introduction/Background: Leprosy is a chronic infectious disease that attacks the peripheral nerves caused by *Mycobacterium leprae*. In Makassar, the incidence of leprosy by 2013 was 78 cases leading to the prevalence of 0.6 per 10,000 population. Thus, there is still a high percentage of patients with neuropathies of lower extremities who are at risk of progressive disabilities. This study aims to determine the risk factors that contribute to physical deformity and plantar ulceration. **Material and Methods:** This study was designed in cross sectional method. 100 consecutive patients of leprosy during September 2012 until September 2015 admitted with plantar ulcers and physical deformities including claw toes, foot drop, charcot joint and mutilation. They were studied for risk factors such as sociodemographical status, clinical features, and management of medical rehabilitation. Data were obtained from medical records and analyzed by chi square test. **Results:** Plantar ulcer was present in 89 (89%) patients while physical deformity occurred in 28 (28%) patients. Regarding to social-demographical status, the odds of plantar ulcer were significantly higher for female (p 0.019; OR 8.542), over 35 years old (p 0.043; OR 4.393), low education (p 0.051; OR 3.667), and low income (p 0.033; OR 6.370). Meanwhile, significant factors of clinical features which associated to plantar ulcer were multibacillary leprosy (p 0.038; OR 3.655) and onset over one year (p 0.018; OR 4.464). Risk for physical deformities was only gender which had significant relation, especially in male (p 0.009; OR 3.667). In medical rehabilitation, reconstruction of leprosy became the most frequent administered rehabilitation (45%). **Conclusion:** There were several risk factors associated with plantar ulcer and physical deformity. So that health promotion needs to be targeted at risk groups as a preventive measure against complications which can cause further disability.

574

HORNER'S SYNDROME AFTER HEART SURGERY - A CLINICAL CASE

F. Parada¹, H. Amorim²

¹Porto, Portugal, ²Centro Hospitalar de São João, Physical and Rehabilitation Medicine, Porto, Portugal

J Rehabil Med Suppl 55

Introduction/Background: Horner's Syndrome is caused by the interruption of the oculosympathetic pathway and is characterized by ipsilateral pupillary miosis, eyelid ptosis, enophthalmos and anhidrosis of the face. It is rare and mostly seen after cerebrovascular accidents, neck and thoracic neoplasms, complications of central venous catheterization and cervical surgeries. The authors present a clinical case of a Horner's syndrome after heart surgery. **Material and Methods:** Patient's records were retrospectively reviewed in order to present the clinical case. Photographs were taken with the patient's consent. **Results:** A 66-year-old female patient was submitted to a heart valve substitution surgery in July 2015. Early in the post-operative period a right sided ptosis was noticeable. No other deficits were identified at the time and she was discharged from the hospital without further evaluation. She was then referred to the physical medicine and rehabilitation department and evaluated in an outpatient setting. At the time of the evaluation on the physical examination right ptosis and miosis were identified. No other deficits were apparent on a thorough neurological examination. The clinical diagnosis of an incomplete horner's syndrome was established. A carotid ultrasound excluded carotid dissection. Chest X-ray revealed no masses in the upper lung and cervical X-ray and brain CT-scan also came back with no remarkable findings. She was immediately referred to follow-up by a neurologist. An iatrogenic direct lesion of the pathway in the lower cervical region during in-surgery central catheterization was deemed probable. **Conclusion:** Horner's syndrome is a diagnosis that should merit the attention of the physical medicine and rehabilitation specialist and although it can very rarely happen in an iatrogenic way after cardiac surgery its etiology should be further evaluated to better understand its underlying cause.

575

BILATERAL RADIAL NEUROPATHY IN THE NEWBORN : A CASE REPORT

H.J. Park¹, S.J. Won¹, W.I. Rhee¹, J.Y. Kim¹

¹The Catholic University of Korea-Yeouido St. Mary's Hospital, Rehabilitation Medicine, Seoul, Republic of Korea

Case Diagnosis: Bilateral radial neuropathy at the humerus level. **Case Description:** A boy was born at 39 weeks of gestation in other regional hospital. The birth weight was 3130 g and APGAR scores were 9/10. There were no abnormal findings during whole prenatal screening. On the seventh day after the birth, wrist drop of both upper limbs was detected. The child was transferred to our hospital on the next day. No skin lesions of arms were observed. The neurologic examination showed wrist drop with weak finger extension of both upper limbs. An ultrasound scan of the brain showed no discernible structural abnormality. Viral marker tests except rotavirus antigen were negative. At 10 days of age, nerve conduction studies and electromyography was performed. Surface recording over the extensor indicis proprius was used during the radial nerve motor conduction study. Conduction block was obtained by antecubital fossa versus spiral groove stimulation on either side. During the needle electromyography, profuse positive sharp waves were detected, and reduced recruitment patterns were observed in the both extensor digitorum communis. Nerve ultrasonography showed no compressive structure around radial nerves of both arms. A week later, weakness was improved slightly without physical therapy. **Discussion:** Isolated radial neuropathy is uncommon in the newborn. Although there have been several reports about isolated radial neuropathy, bilateral cases are rare. Most of reported cases had a cutaneous lesion or a subcutaneous fat necrosis. Other associated condition was a prolonged delivery. Our patient had no skin lesion and was born within an average time of delivery. **Conclusion:** Bilateral isolated radial neuropathy is rare in the newborn. According to previous study, the condition usually has a favorable outcome. It is important to distinguish other conditions which have wrist drop from isolated radial neuropathy.

576

MEDIAN AND ULNAR NEUROPATHY INDUCED BY POSTMASTECTOMY LYMPHEDEMA - CASE REPORT

S.G. Park¹, Y.J. Sim¹, G.C. Kim¹, H.J. Jeong¹, D.K. Kim¹

¹Kosin University Gospel Hospital, Department of Physical Medicine and Rehabilitation, Busan, Republic of Korea

Introduction/Background: Many complications of lymphedema such as infections, deep vein thrombosis are known well. But there is few report about neuropathy induced by lymphedema. We report a median and ulnar neuropathy which was not associated with chemotherapy and radiotherapy. **Case report:** A 65-year-old female patient presented with a tingling sensation on right hand, which had been presented for 7 years. She was diagnosed with right breast cancer and had an operation. And she had chemotherapy and radiotherapy. In 2008, swelling on right upper limb was onset, and a few months later tingling sense on right hand was onset. In physical examination, there was tingling sense on right hand. And circumference of right upper limb was increased by 5~6cm more than left side, forearm hardness in median and ulnar nerve territory was noted. There was no reduced muscular strength, and tinnel, phalen sign are all positive at right. And there was history of diabetes mellitus for 15 years. Initial electrophysiologic study (2008) showed non specific findings, but follow up study (2009) conducted in suggested right median sensory neuropathy in distal sensory branches. And ultrasonography showed that median nerve diameter change was observed at carpal tunnel level and absent at forearm mid-portion. Ultrasonographic findings were suspicious of a carpal tunnel syndrome, but it is ruled out on the basis of electromyography. The patient was conducted follow up electrophysiologic study in 2015, its finding was suitable for right median & ulnar neuropathy. **Results:** We supposed that neuropathy was progressive because peripheral nerves were vulnerable due to diabetes mellitus, peripheral nerves continuously compressed by extensive fibrosis of the tissues in forearm. **Conclusion:** We have experienced a rare case of median and ulnar neuropathy in the patient who had lymphedema after surgery for breast cancer had extensive fibrosis of the tissues in forearm.

577

ELECTRODIAGNOSIS AND SONOGRAPHY IN DIAGNOSIS OF ENTRAPMENT SYNDROMES COMPLEMENTARY? OR MUTUALLY EXCLUSIVE?

S.M. Rayegani¹

¹Tehran, Iran

Introduction/Background: Focal peripheral neuropathy is one of the most common clinical syndromes that are seen in daily routine practice of neuromusculoskeletal physicians, including surgeons, rheumatologists, neurologists and physiatrists. **Material and Methods:** Electrodiagnosis is so far gold standard for diagnosis of focal entrapment neuropathy. Complete electrodiagnostic medicine consultation including clinical history, physical examination, NCS and needle EMG are used for definite diagnosis. **Results:** Nowadays with emergence of imaging techniques, application of these modalities such as MRI and sonography are widely popular in the era of entrapment syndromes. There is different Cons and Pros about these 2 diagnostic tools. In the presentation the topic will be discussed in details. **Conclusion:** Growing practice of MSK ultrasonography mandate physiatrists to apply this invaluable diagnostic tool in their daily professional practice. Entrapment syndrome especially carpal tunnel syndrome is one of the most common clinical issues referred and treated by physiatrist. It is mandatory to understand cons and pros of routine electrodiagnostic medicine techniques and evolving ultrasonographic one for detection of these disorders.

578

PERIPHERAL NERVE COMPRESSION IN PATIENT WITH SEQUELS OF POLIOMYELITIS

W. Said Lahmar¹, A. Hadj Salah¹, M. Rekek¹, H. Ben Brahim¹, M. Elayeb¹, M. Sghir¹, Z. Ben Salah Frih², W. Kessomtini¹

¹CHU Tahar Sfar, Rehabilitation, Mahdia, Tunisia, ²CHU Fattouma Bourguiba Monastir, Department of Rehabilitation, Monastir, Tunisia

Introduction/Background: Poliomyelitis was generally considered a non progressive disease and paralytic polio survivors live with stable neuromuscular impairments. However, late complications may occur. Here we describe a case of a peripheral nerve compression. **Material and Methods:** We report the case of a 45 year old female patient with prior acute poliomyelitis at the age of one. The clinical presentation was a left monoplegia. She has a long leg brace but she didn't want to wear it so she used a forearm crutch to walk. She was referred to our unit with a chief complaint of easy fatigability of the right arm with paresthesia. The post polio syndrome was eliminated. **Results:** Physical examination revealed an atrophy of the hypothenar eminence and interosseous muscle of the right hand. Froment's sign and Wartenberg's sign are positives. The diagnosis of ulnar nerve entrapment at the upper third of the forearm caused by the forearm crutch was made and confirmed by EMG and nerve conduction studies. A protocol of rehabilitation was instituted and we encouraged the patient to regularly wear the leg brace and we educated her proper use of crutches. **Conclusion:** Neurological complications mainly consist of the post polio syndrome. Nerve entrapment syndromes of the upper limb are less frequent and can be caused by the use of crutches or wheelchairs. It should be prevented by an appropriate medical follow-up, patient counseling and suitable measures.

579

L5 NERVE ROOT COMPRESSION SECONDARY TO A SACRAL FRACTURE: A CASE REPORT

M. Rekek¹, A. Haj Salah¹, M. Sghir¹, W. Said Lahmar¹, W. Kessomtini¹

¹University Hospital Tahar Sfar, Physical Medicine and Rehabilitation, Mahdia, Tunisia

Introduction/Background: Root compressions resulting in pelvic trauma are rare. It is often about fractures of the sacrum and lumbosacral hinge. **Material and Methods:** This case is original because of the etiopathogenesis of its neurological damage. **Results:** We report a case of a 27-year-old man. He was a victim of a serious car accident, which led to a bilateral fracture of the obturator ring, a fracture of the right sacral ala, a sagittal trans-sacral foraminal fracture and a fracture of the right transverse processes of L4 and L5. The patient underwent surgical treatment (osteosynthesis). He was addressed to our Physical Medicine and Rehabilitation Department seven months after the trauma for additional care. Examination revealed walks with steppage gait with a foot levator muscles weakness estimated 1/5 and hypoesthesia in the right L5 territory. X-rays of the lumbar spine and the pelvis revealed L5-S1 grade 1 spondylolisthesis and a major bone remodeling of the right sacral ala fracture. The diagnosis of right L5 nerve root compression was established and confirmed by a lumbosacral scan. Indeed, the scan revealed a compression of the right L5 root in its extra-foraminal portion due to bone remodeling of the right sacral ala fracture. **Conclusion:** Neurological complications of fractures of the sacrum and lumbosacral hinge may be responsible for serious sequelae. A careful and a repeated neurological examination is required in order to avoid delay in diagnosis. Early diagnosis should lead to improve care mainly surgical one.

580

CLINICAL AND ELECTROMYOGRAPHIC DIAGNOSIS FOR RADIAL TUNNEL SYNDROME

M. Tang¹, Q. Luo¹, L. Ao¹

¹2nd Hospital of Kunming Medical University, Rehabilitation Medicine, Kunming, China

Introduction/Background: Our purpose is to discuss the clinical and electromyographic(EMG) diagnosis for Radial Tunnel Syndrome (RTS). **Material and Methods:** A total of 17 selected patients with pain in the lateral aspect of the elbow, Recorded the medical history, Tested objective examination, the compound muscle action potential (CMAP) of radial nerve and the sensory nerve action potential (SNAP)of superficial radial nerve. Needle EMG recorded the muscle Motor Unit Action Potentials (MUAPs). **Results:** 9 cases of 17 patients were diagnosed as RTS. In which 3 patients were interosseous nerve lesion and 1 patient was superficial radial nerve lesion. The remaining 5 patients were diagnosed with demyelination of radial nerve. Due to their latency difference of radial nerve CMAP ≥ 0.3 ms when the forearm in the neutral, pronation or supination position. The diagnosis was confirmed by the medical history, objective examination and to compare the latency difference of radial nerve CMAP. **Conclusion:** The diagnosis for RTS include four aspects: record the medical history, test superficial radial nerve sensory, muscle strength, passive evoked pain and exam whether the latency difference of radial nerve CMAP ≥ 0.3 ms compare in the neutral, supination or pronation positions.

Table 1 Medical history

	case (n%)
History of trauma or operation	3 (17%)
Posterior lateral pain of elbow joint	12 (71%)
Weakness of thumb or finger extension	3 (17%)
Weakness of wrist extension	1 (0.05%)
Lateral side numbness of thumb	1 (0.05%)

Table 2. Physical examination

	case (n%)
Decreased in muscle strength of finger extension	15 (88%)
Decreased in muscle strength of elbow supination	9 (53%)
Repeated supination or pronation to evoke pain	3 (17%)
Repeated wrist extension to evoke pain	4 (24%)

Table 3. EMG finding

EMG finding	case	Abnormal muscle activity
Abnormal SNAP of radial superficial	1	
Abnormal CMAP of radial nerve	1	
Latency differential of Radial nerve CMAP at three different positions ≥ 0.3 ms	5	
Abnormal muscle spontaneous potentials	3	APL EDC ECU
Abnormal muscle unit potentials	3	APL EDC ECU

581

HORNER’S SYNDROME WITH UNILATERAL BRACHIAL PLEXUS LESION CAUSED BY GUNSHOT PENETRATING TRAUMA

K. Tezel¹, Y. Demir², K. Aydemir¹, B. Yilmaz¹

¹Gulhane Military Medical Academy Hospital, Physical Medicine and Rehabilitation Department, Ankara, Turkey, ²Gulhane Military Medical Academy Hospital- TAF Rehabilitation Center, Physical Medicine and Rehabilitation Department, Ankara, Turkey

Introduction/Background: 23-year-old male was exposed to two rifle bullets penetration injury to his superior back left paravertebral region. One bullet embedded anterior neck subcutaneously and the other bullet left from anterior midline neck region. Intraoperative exploration revealed vocal cord injury, left carotis interna artery wall laceration, left hemothorax and left thyroid gland open wound. **Material**

and Methods: Following discharging from surgery ward patient admitted to our rehabilitation center for his left arm weakness. In physical exam revealed that he had left hand wrist and fingers extension and flexion and fingers abduction-adduction muscle weakness with slight hypoesthesia. Consequent EMG study showed that he had a left brachial plexus palsy. In his detailed and careful physical exam patient also having neurological deficits were noticed as asymmetric pupils, left eyelid lower than right side, with left sunken eye evident which are all characteristic for Horner’s syndrome pathognomic triad of ptosis, miosis, and enophthalmos. Patient had no hemifacial anhidrosis caused by loss of perspiring on the affected side of the face which was consistent with postganglionic sympatic injury at carotis artery level on left side. **Results:** Sympatic ganglion and chains are vulnerable as well as peripheral nerves and plexus to firearm injuries not only with the direct injuries also with sonic pressure waves and heating of the tissues. Detailed physical and neurological exam is very crucial in physical medicine and rehabilitation departments to detect and prevent other health problems. **Conclusion:** Sympatic ganglion and chains are vulnerable as well as peripheral nerves and plexus to firearm injuries not only with the direct injuries also with sonic pressure waves and heating of the tissues. Detailed physical and neurological exam is very crucial in physical medicine and rehabilitation departments to detect and prevent other health problems.

582

ULTRASONOGRAPHIC DIAGNOSIS OF CARPAL TUNNEL SYNDROME: WHICH IS THE MOST VALUABLE VARIABLE?

J.S. Yoon¹, W.S. Kim¹, S. Kang¹, C.H. Lee¹, S.B. Son¹

¹Korea University Guro Hospital, Physical Medicine and Rehabilitation, Seoul, Republic of Korea

Introduction/Background: Recently, ultrasonography has been used as a useful complementary tool for the evaluation of CTS. Although many ultrasonographic variables, such as cross sectional area (CSA) of median nerve at the wrist and wrist-to-forearm median nerve area ratio (WFR), have been reported that they had diagnostic values in CTS, it remains unclear which variable is more valuable in diagnosis of CTS. In this study, we aimed to compare the diagnostic value of the sonographic findings in CTS patients. **Material and Methods:** We carried out a retrospective analysis of 365 wrists in 156 consecutive patients with electrodiagnostic evidence of CTS and 57 wrists in 57 healthy volunteers. The median nerve CSA was measured at two sites: distal wrist crease and 12 cm proximal site in the forearm. The WFR was calculated for each wrist. Ultrasonography and electrodiagnosis were performed under blinded conditions. Receiver operating characteristic (ROC) curves were used to evaluate optimal diagnostic cut-off value between the inlet CSA and WFR. **Results:** The mean CSA in CTS group (15.0 mm²) was significantly larger than in CTS group (8.54 mm², $p < 0.001$). In addition, the mean WFR in CTS group (2.56) was also significantly larger than in control group (1.26, $p < 0.001$). There were significant correlations between the electrodiagnostic severity and the CSA ($r = 0.584$), and WFR ($r = 0.619$). The diagnostic cut off value of CSA for CTS was 10.5mm², which showed 100% specificity and 84.8% sensitivity. The cut-off value of WFR was 1.54, which revealed 98.2% specificity and 91.4% sensitivity. The area under the ROC curves were significantly larger in the WFR (0.963) than in the CSA (0.936, $p < 0.05$). **Conclusion:** Although both CSA and WFR of median nerve are valuable variables for diagnosis of CTS, the WFR would be more valuable than the CSA.

583

CORRELATION BETWEEN MAGNETIC RESONANCE IMAGING AND ELECTRODIAGNOSIS OF BRACHIAL PLEXOPATHY

J.S. Yoon¹, S.N. Yang¹, S. Kang¹, S.Y. Chung¹, S.B. Son¹

¹Korea University Guro Hospital, Physical Medicine and Rehabilitation, Seoul, Republic of Korea

Introduction/Background: Appropriate imaging and electrodiagnostic studies are essential part of the evaluation of the patient with brachial plexopathy. The aim of this study is to analyze both magnetic resonance imaging and electrodiagnosis studies of brachial plexopathy retrospectively and to verify the correlation between these two methods. **Material and Methods:** Patients who were examined brachial plexus Magnetic resonance imaging from Jan 2012 to Sep 2015 from Korea University Guro Hospital. The findings of electrodiagnostic study were evaluated and the level of injury was classified by root, trunk and cord level. The following clinical characteristics were analyzed for each patient: age, gender, affected side, cause of injury. **Results:** Forty-four patients (47.73±15.47, 24 male, 20 female) were enrolled for this study. Nine cases did not have electrodiagnostic study. Twenty-three cases were caused by brachial neuritis and 11 cases of brachial plexopathy were due to trauma such as fall down and traffic accident and 3 cases were due to tumor and 7 cases were due to any other reason. In terms of injury level, 36 out of 44 cases were consistent between magnetic resonance imaging and electrodiagnostic study. However, 8 cases had different findings between magnetic resonance imaging and electrodiagnosis. 7 cases of brachial neuritis and 1 cases of trauma did not consistent between MR findings and electrodiagnostic study. **Conclusion:** Majority case of brachial plexus injury showed inconsistent findings between magnetic resonance imaging and electrodiagnosis study.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: NEUROLOGICAL AND MENTAL HEALTH CONDITIONS - MENTAL DISORDERS (E.G. DEPRESSION; BIPOLAR DISORDERS)

584

LOCATIONAL SELECTIVE SEROTONIN REUPTAKE INHIBITORS (SSRIS) EXPOSURE HAS AN EFFECT ON RATS OFFSPRING'S DEVELOPMENT AND BEHAVIOR

C. Shu¹, C. Moxian¹, T. Mei¹, A. Lijuan¹

¹Department of Rehabilitation Medicine, The Second Affiliated Hospital of Kunming Medical University, Kunming, Yunnan Province, China

This study was supported by the national natural science foundation of China. (Grants No.: 81260296). **Objectives:** Prenatal and postnatal risk factors for neurodevelopmental disorders such as autism spectrum, cerebral palsy (CP) or schizophrenia are increasingly recognized. With the increase of incidence of depression, women are increasing prescribed SSRI during lactation, with potential implications for neurodevelopment and behaviors. Whether locational SSRI exposure has an effect on neurodevelopment and behaviors in the offspring is an important area of the research. **Methods:** Development hyperserotonemia (DHS) models were established in SD rats from postnatal day (PND) 5 to 21. The control group shall be the same amount of saline. The offspring from both groups were assessed on 13th day in a battery of well-validated tasks, including open field, free suspension and buried food pellets. **Results:** The weight of experimental group were significantly lower than control group ($p < 0.05$). The length of hair showed significantly lower until 13 d compared with control group ($p < 0.05$). The auditory sensitivity of experimental groups obviously increase ($p < 0.01$). There were no significant change in eye opening time. The time of free suspension experiment show significantly reduction in experimental group ($p < 0.01$). The buried food pellets time showed no significant change between groups. In open field tests, the stool of experimental groups were significantly increased ($p < 0.01$). **Conclusions:** The research suggested that locational SSRI exposure has a significant impact on offspring behaviors, especially on body weight, hearing, free hanging experiment and open-field test. The SSRIs during location would

effect on the offspring's development and will increase in depression- and anxiety-like behavior and alteration in social behaviors.

585

DEPRESSION AND ANXIETY IN MOTHERS OF CHILDREN WITH CEREBRAL PALSY

E. Toulgu¹, S. Mtawa¹, A. Nouria¹, S. Jemni¹, N. Abdelkafi¹, F. Khachnaoui¹

¹Sahloul Hospital, Rehabilitation, Sousse, Tunisia

Introduction/Background: Children with cerebral palsy (CP) present motor disability and require significant involvement of the parents, mainly of mothers, in the daily care of their children. The aim of this study is to examine depression in mothers of children with CP, with hypothesis to have an elevated risk of anxiety and depressive profile among mothers of children with cerebral palsy. **Material and Methods:** This study is a descriptive cross-sectional survey conducted at The Physical and Rehability Department of Sahloul Hospital in Tunisia. Where included 62 children with cerebral palsy with their mothers. The inclusion criteria for the study were being the mothers of a child having a CP and aged more than two years. Mothers with history of psychiatric disorder were not included. **Results:** This study included 62 children including 45 boys (sex-ratio 2.6). An evaluation of the functional status by the Gross Motor Function Classification System (GMFCS) of the children with CP was done, 27.4% were level II, 20.9% were level IV and 19.4% were level V. Moreover, 58.1% of the children were tetraplegic, and 24.2% were diplegic. Mothers of children were evaluated by the Hospital Anxiety and Depression Scale (HADS). Mothers had a normal depression score in 29%, a borderline score in 25.8% and an abnormal score in 45.2%. Concerning anxiety, mothers had a normal score in 12.9%, a borderline score in 27.4% and an abnormal score in 59.7%. The results also shown that the severity of the GMFCS was not associated with the HADS ($p = 0.230$). The clinical presentation of the CP was also not associated with the HADS ($p = 0.129$). **Conclusion:** Caring for children with CP (regardless to the severity of the clinical form) increases considerably the risk of emotional distress (depression and anxiety) among mothers.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: NEUROLOGICAL AND MENTAL HEALTH CONDITIONS - VEGETATIVE STATES, MINIMALLY CONSCIOUS AND LOW AWARENESS STATES

586

THE EFFECTS OF ACOUSTIC STIMULATIONS ON THE EEG VARIATIONS IN PATIENTS WITH MINIMALLY CONSCIOUS STATE

C.J.S. Wei¹, Z. Hongwei¹, S. Le¹

¹Rehabilitation Department of Xuzhou Center Hospital, Xuzhou, Jiangsu, China

Objective: To investigate the effects of acoustic stimulation on the variations of electroencephalogram (EEG) in patients with minimally conscious state (MCS) patient via audition of music at different tempos and appellations from kin for varied durations so as to shed new light on clinical awaking therapy for patients with MCS. **Methods:** 21 patients with MCS underwent audition of three types of audio clippings consisting of music in allegro (140 BPM), music in lento (80 BPM) and appellations from kin, with the EEG data recorded simultaneously, relative power values (RPVs) of θ , α and β waves in EEG (absolute power values (APVs) in stimulation to APVs at rest) across three audio clippings compared. **Results:** The RPVs of α waves under lento were higher than allegro or appellation from kin, with significant statistical differences (PL vs A < 0.05, PA vs AK < 0.01); while RPVs of β waves were lower than allegro or appel-

lation from kin, with significant statistical difference (PL vs A<0.05, PL vs AK<0.01). Paired *t* test of APVs under allegro for the initial 15 min and at rest revealed significant statistical differences ($p<0.01$); APVs under lento for the initial 5 min and at rest showed significant statistical differences ($p<0.05$); APVs under appellation for the initial 10 min and at rest exhibited statistical differences (P 5 min <0.01, P 10 min <0.05). *Conclusion*: 1. Audition of music promotes the information integration by the cerebral cortex in patients with MCS, in which music in allegro fortifies the synergistic effects across the functional areas in cerebral cortex. 2. In MCS patients with higher scores on audio scale of Coma Recovery Scale Revised (CRS-R), the durations of acoustic stimulations exhibited the following schema: music in allegro >appellation from kin>music in lento.

587

LIFE EXPECTANCY AND THE LAWBYMR MAN-MOHAN S DHILLONADVOCATE & SOLICITOR MALAYSIA

M.S. Dhillon¹

¹*P S Ranjan & Co, Advocates & Solicitor, Kuala Lumpur, Malaysia*

Introduction/Background: The assessment by a court in a common law jurisdiction of the life expectancy of the victim in a personal injury case is important when awarding compensation for future loss and damage but can be full of uncertainty. *Material and Methods*: In the English case of *Lim Poh Choo v Camden and Islington Area Health Authority* [1979] 2 All ER 910, Lord Scarman said at page 914:- "...Knowledge of the future being denied to mankind, so much of the award as is to be attributed to future loss and suffering (in many cases the major part of the award) will almost surely be wrong. There is really only one certainty: the future will prove the award to be either too high or too low." The court had to assess damages once and for all. The claimant, a young doctor, had suffered extensive and irreversible brain damage in a hospital accident. The House of Lords, when estimating her life expectancy, had taken into account the evidence given by an accountant on the following elements of discount:- (1) the accelerated payment; (2) the contingency that the claimant may not live out her full expectation of life; and (3) the availability of capital to meet the cost of care. *Results*: So as to ease the uncertainty, Parliament intervened and made provision for the periodic assessment of damages, following judgment. Frequently, the courts consider medical evidence, expert evidence from rehabilitation physicians, actuarial evidence, and statistical evidence when assessing life expectancy. *Conclusion*: The Malaysian courts frequently look to precedents in common law jurisdictions such as England and Wales regarding the principles involved in assessing life expectancy. It is proposed to consider in the paper medico-legal issues concerning the subject, taking into account the position in various countries and the role of the rehabilitation physician in assisting the court.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: NEUROLOGICAL AND MENTAL HEALTH CONDITIONS - MISCELLANEOUS

588

ACUTE INTERMITTENT PORPHYRIA: A RARE CAUSE OF ENCEPHALITIS

S. Demir¹, E. Adigüzel¹, F. Tok¹, E. Yaşar¹, B. Yılmaz¹

¹*Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey*

Introduction/Background: Porphyrias are group of diseases characterized by both in the genetic absence of enzymes responsible

for biosynthesis and in the increase of precursor molecules in blood and urine. This disease might lead to encephalitis besides the symptoms such as stomachache, fever, vomiting, epileptic seizure, hypertension and tachycardia. *Material and Methods*: A 36-year-old female patient presented with balance disorder and gait disturbance. According to her history, she had admitted to a hospital with the complaints of stomachache, fever, and vomiting. She had been diagnosed as acute intermittent porphyria with biochemical tests and enzyme level measurements. She had been admitted to inpatients clinic and during her monitoring, vision loss and hypertension had occurred and then in upper and low extremity loss of strength had been observed. *Results*: Brain magnetic resonance imaging (MRI) revealed multiple encephalitic lesions in cerebral and cerebellar regions. After stabilization of the neurologic condition, the patient was referred to our clinic. On physical examination, there was muscle weakness in bilateral upper and low extremities. Deep tendon reflexes were hyperactive and pathological reflexes were positive. Romberg test was negative but dysmetria and dysdiadokokinesia were noticed. Patient was able to walk independently in middle distances with very short and slow steps. Physical therapy was planned and after 3-weeks of treatment, patient's balance improved and walking distance increased. *Conclusion*: In this case presentation, we aimed to describe a rare case of encephalitis related to acute intermittent porphyria. As mentioned above, acute porphyria attack could cause neurological problems and this might lead to disability during whole lifetime. Appropriate rehabilitation treatment could ease activities of daily living.

589

CONGENITAL BILATERAL THENAR AGENESIS

B. Aras¹, S. Demir¹, E. Adigüzel¹, F. Tok¹, A.K. Tan¹

¹*Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey*

Introduction/Background: Congenital bilateral thenar muscle agenesis is a rare condition in the literature. *Material and Methods*: Here we report a case of bilateral thenar agenesis. *Results*: 20-year-old male patient was admitted to our outpatient clinic with complaints of weakness on both hands. The patient was learned that complaints have since birth. We learned that his complaints was seen since birth and there were nobody with similar symptoms in his family. In inspection of physical examination; bilateral thenar muscle atrophy and pectus ekskavatus was revealed. Elbow and wrist range of motion and muscle strength were full. 4/5 muscle strength in bilateral 2.3.4.5 finger flexion, 5/5 muscle strength in bilateral 2.3.4.5 finger extension, 3/5 muscle strength in bilateral thumb flexion, 2/5 muscle strength in bilateral thumb opposition, 3/5 muscle strength in bilateral finger abduction and adduction. In electromyography (EMG) examination; compound muscle action potential could not be obtained in bilateral abductor pollicis registered median nerve motor examination. Motor unit potential was not observed in needle EMG of the bilateral abductor pollicis brevis muscle. The results were evaluated in accordance with bilateral agenesis of the thenar muscles due to carpal tunnel syndrome. *Conclusion*: Congenital bilateral thenar muscle agenesis is a rare condition in the literature. Our case is meaningful because bilateral thenar of agenesis accompany pectus ekskavatus is not seen before in the literature.

590

DOES THE ARRANGEMENT OF THE INTERFERENTIAL CURRENT ELECTRODES AFFECT ITS EFFICACY ON PAIN?

E. AlZahrani¹, A. Beatti¹

¹*Prince Sultan Military College for Health Sciences, Physical Therapy, Dhahran, Kingdom of Saudi Arabia*

Introduction/Background: Interferential current (IFC) is regularly used for musculoskeletal pain reduction. The use of IFC is based on

minimizing skin impedance and producing maximum stimulation at the point of intersection of the two alternating currents, deep in tissue. However, previous systematic reviews found no clear reduction effect of pain with IFC. Recently, IFC was found to induce highest voltage outside the intersection of the two currents but lowest voltage in the intersection spot. It is probably true that placing the treated area outside the intersection spot of the currents would reveal a significant pain reduction. **Material and Methods:** 60 (30 males and 30 females) with subacute low back pain were assigned randomly to 1- external IFC application (where the most tender spot was located between two electrodes at 2 cm outside of the external borders of the electrodes) or 2- placebo external IFC application. Subjects were assessed for their pain before and after IFC session using visual analogue scale (VAS), pressure pain threshold (PPT), pain distribution and range of motion (ROM). Subjects received 20 minutes of IFC at 100 Hz and comfortable stimulation intensity. **Results:** Data collection is going on and by end of Apr we will be able to provide full report. **Conclusion:** Although primary data are promising, we cannot speculate the full picture at this stage.

591

A RARE CAUSE OF PARAPLEGIA: DRUG ABUSE

E. Ata¹, M. Kösem¹, L. Tekin¹, M.Z. Kiralp¹

¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Paraplegia is predominantly the result of a spinal cord injury due to an accident or other trauma. Most common accidents include motor vehicle accidents and falls in those aged over 65. There are also rare causes of the syndrome include arteriosclerosis, embolic events, infection, vasculitis, intervertebral disc herniations and surgery. **Material and Methods:** Case: A 50-year-old man presented to our outpatient clinic with a complaint of gait disturbance. He had been relatively healthy until about 2 years before his neurology visit when he started to have back pain and incomplete flaccid paralysis of the legs with absent deep tendon reflexes. He had no systemic diseases, such as diabetes or hypertension. The pain gradually increased, and bilateral weakness of the lower limbs developed over a 6-month period. On admission, the patient had paraplegia, decreased deep tendon reflexes. His muscle strength in the upper extremities was 5/5, but that of the lower extremities was 0–1/5. The patient underwent intrathecal baclofen therapy because of intractable spasticity. No urinary incontinence or sensory disturbance of pain and temperature were determined. It was suspected multiple sclerosis on the basis of the patient's clinical course, but in cerebro-spinal fluid examination IgG and protein levels were normal. Normal electromyography, sensory evoked potentials and visual evoked potentials ruled out the polyneuropathy. Magnetic resonance imaging showed no disc abnormality in the spinal column but there were cavitations due to syringohydromyelia in the cervical and thoracic regions. **Results:** There were no etiological factors that explain the symptoms except drug abuse. **Conclusion:** Paraplegia due to drug abuse is a rare cause of ischemic cord infarction. It is caused by hypoperfusion of the spinal arteries, leading to ischemia in the spinal cord. The presentation is usually with a chronic and painful myelopathy with impaired bladder and bowel control.

592

VALIDITY AND RELIABILITY OF THE TURKISH VERSION OF THE 39-ITEM PARKINSON'S DISEASE QUESTIONNAIRE (PDQ-39)

E.A. Ozturk¹, I. Gundogdu¹, Y. Demir², K. Aydemir², A. Cakci¹

¹Diskapi Yıldırım Beyazıt Education and Research Hospital, Physical Therapy and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: The aim of this study was to analyse the validity and reliability of the Turkish version of PDQ-39, an HRQoL scale specific for patients with Parkinson's disease. **Material and Methods:** A consecutive 100 patients with PD without cognitive dysfunction were included in the study. The Turkish version of PDQ-39 was analysed for reliability (internal consistency and reproducibility) and validity (construct and discriminative). The Turkish version of SF-36 that is a generic health condition scale was used to test construct validity. **Results:** The Turkish version of PDQ-39 manifested an acceptable internal consistency (Cronbach's alpha 0.75–0.93 and item-to-total correlations 0.51–0.88) compatible with the original UK version of the scale (Cronbach's alpha 0.69–0.94 and item-to-total correlations 0.67–0.91). It was established as reproducible (0.83–0.95) comparable to the original version (0.68–0.94). Sub-scales of PDQ-39 also showed convergence with SF-36 as in the original version of the scale. In addition, it was found that sub-scales of PDQ-39 were discriminative with the severity of disease. **Conclusion:** The Turkish version of PDQ-39 is a valid and reliable tool to evaluate health-related quality of life in Turkish patients with PD.

593

TREATMENT RESISTANCE IN HYPOXIC BRAIN INJURY CAUSED BY CARDIOPULMONARY ARREST DUE TO AN ALLERGIC ANAPHYLAXIS: SPASTICITY, MYOCLONUS OR BOTH?

E. Umay¹, I. Gundogdu¹, O. Delibas¹, Y. Demir², K. Aydemir²

¹Diskapi Yıldırım Beyazıt Education and Research Hospital, Physical Medicine and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: Chronic post-hypoxic myoclonus, also known as Lance and Adams syndrome (LAS), is a rare condition that occurs after successful cardiopulmonary resuscitation. **Material and Methods:** Forty-four year-old man with the diagnosis of HBI caused by cardiopulmonary arrest due to an anaphylactic reaction to antibiotic therapy was transferred to rehabilitation clinic for the therapy of tetraparesis and spasticity. He had a Rancho Los Amigos Scale score of 5/8, disability rating scale score of 18/29, functional independence measurement (FIM) cognitive subscore of 20/35, FIM motor score of 13/91. He had no active movement of neck, upper or lower extremities and had no ability to sit independently. He had apparent spasms occurred on and off all day long, triggered with all activities such as moving, touching and speaking, affecting neck, trunk, all upper and lower extremities. He had flexion posture in upper and lower extremities bilaterally. The degree of spasticity was 2–4/4 in upper and lower extremities by modified Ashworth scale. Diffusion-weighted MRI series revealed chronic ischemic changes, EMG revealed no lower motor neuron involvement and EEG was normal. He underwent spasticity therapy (oral baclofen 100 mg/day, oral tizanidine 18 mg/day, Botulinum toxin type A injections, intrathecal baclofen and physical therapy) for 45 days, without changes in his spastic pattern. **Results:** Treatment-resistant spasticity along with the spasm triggers necessitate re-reviewing of patient, which led us to think of the diagnosis of LAS, in which the diagnosis is made by clinical examination. After LAS treatment (clonazepam 4 mg/day, levetiracetam 1,000 mg/day as well as quetiapine 200 mg/day), spasms and its' frequency were improved partially. **Conclusion:** Concomitant complications can rarely be present in cases with HBI caused by cardiopulmonary arrest. Especially, muscle spasms may be a component of LAS rather than spasticity in the presence of treatment-resistant spasticity, LAS may be overlooked, which may also affect the prognosis of patient.

594

IMPLEMENTATION OF ILLNESS MANAGEMENT AND RECOVERY IN BRUNEI DARUSSALAM**S.N. Haji Awang Tengah¹**¹Jalan Muara, Brunei

Introduction/Background: Objective: This study investigated the feasibility and outcomes of the illness management and recovery program in Brunei. *Material and Methods:* Eight patients with schizophrenia were recruited. Participants were assigned (not randomly) to the intervention groups. Assessments were conducted at baseline, post treatment (five months) and follow-up (six months) and included self-reports and ratings by clinician and client on illness management, psychiatric symptoms, recovery, coping and hospitalization. *Results:* Results: in illness management, psychiatric symptoms, recovery and hospitalization. *Conclusion:* This controlled study showed that the Illness Management and Recovery program is effective in increasing clients' knowledge of their illness and helping them make progress toward personal goals. Adhering to the program protocol also increased clients' perceived ability to cope with their illness. However, the program, in its present form does not seem to lead to gains in general coping efficacy and social support from family members.

595

EVALUATION OF NEURAL PLASTICITY EFFECT OF AMANTIDINE IN POST REMOVAL OCCIPITAL BRAIN TUMOR USING MAGNETOENCEPHALOGRAPHY (MEG)**M.H. Hanafi¹, H. Abd Manan¹, Z. Idris¹**¹Universiti Sains Malaysia, Neurosciences department- School of Medical Sciences, Kota Bharu, Malaysia

Introduction/Background: Occipital lobe main function is as a visual processing centre for most visual related stimulation. Amantidine is a water-soluble drug that can penetrate most cell membranes including the central nervous system. Dopamine is postulated to improve the frontal lobe function, behavior and mood by reducing the glutamate activation. The effect of amantidine to occipital lobe is still under investigation. *Material and Methods:* We report a case of a 35-year old gentleman who develop a bilateral occipital lobe tumor. His tumor had to be removed to reduce the intracranial pressure and its complications. After the operation, he noted loss of vision for both of his eyes. We started his on 200mg amantidine daily to improve his central fatigue. We also did a MagnetoEncephalography (MEG) study to look at the effect of amantidine. *Results:* The MEG was repeated 3 months later and some improvements by were seen on the MEG data. *Conclusion:* Amantidine might help in the neuroplasticity of vision after the removal of occipital brain tumour.

596

FACTORS AFFECTING THE AMBULATORY FUNCTION AT DISCHARGE IN PATIENTS WITH POSTOPERATIVE CHRONIC SUBDURAL HEMATOMA**M. Harimoto¹, Y. Fujino¹, H. Takahashi¹, S. Makita¹, S. Takaishi¹**¹International Medical Center - Saitama Medical University, Rehabilitation, Hidaka, Japan

Introduction/Background: Patients with chronic subdural hematoma (CSDH) are perceived to be a significant improvement of neurologic manifestation after surgery of removing hematoma. However, some CSDH patients cannot discharge at home because of remaining disability of walking, even though they have no hemiparesis.

The purpose of this study was to reveal the factors associated with the walking ability at discharge in patients with postoperative CSDH. *Material and Methods:* Eighty-nine aged 54 to 97 postoperative CSDH patients who could walk independently before CSDH were participated in this study. We retrospectively review the data by patient's medical record, such as days from the date of surgery until getting out of bed, first start of walking and initial physical therapy (PT). We also check the age, dementia by Mini Mental State Examination, and the Brunnstrom recovery stage (BRS). Logistic regression analysis was performed to evaluate the association between these variables and walking ability at discharge. *Results:* The walking ability at discharge were significantly related the existence of dementia and days from the date of surgery until first start of walking. Odds ratio of the existence of dementia was 0.153, the 95% confidence interval was 0.039–0.608, $p < 0.05$. Odds ratio of days from the date of surgery until first start of walking was 0.469, the 95% confidence interval was 0.276–0.796, $p < 0.01$. *Conclusion:* Dementia thought to be most important factor to influence walking ability for patients with CSDH even though they have no other neurologic deficits after surgery. Patients with CSDH tend to be prone to disuse syndrome. Therefore, the present results suggest that it is important for CSDH patients with dementia to start walking rehabilitation as soon as possible after surgery.

597

A NEW TEST FOR MEASURING THE EXTENSIBILITY OF MEDIAN NERVE AND RELATED MYOFASCIAE IN SUBJECTS WITH INCREASED MECHANOSENSITIVITY: A RELIABILITY STUDY**T.C. Hsieh¹, L.Y. Tsai¹, T.J. Wang²**¹Mackay Memorial Hospital, Physical Therapy, Taipei, Taiwan,²National Yang-Ming University, Physical Therapy and Assistive Technology, Taipei, Taiwan

Introduction/Background: Increased mechanosensitivity of median nerve caused by persistent pressure is suggested clinically to be evaluated by Upper Limb Neurodynamic Tests (ULNT) which have been proved to be reliable and valid. However, clinical tests for evaluating the extensibility of median nerve and related surrounding myofasciae could not be found. Purpose: To assess the intra-rater and inter-rater reliabilities of a new test for measuring the extensibility of median nerve and myofasciae in subjects with increased mechanosensitivity. *Material and Methods:* Ten subjects (4 males and 6 females, mean age=35.8 years, SD=10.9) with increased median nerve mechanosensitivity (ULNT-1 median nerve test positive) participated into the study. In this new test, the range of motion of passive shoulder horizontal abduction combined with scapular depression, shoulder external rotation, elbow extension and wrist extension were examined by a custom-made large semi-circle goniometer supported on a table. A tape ruler was used to measure the distance between the notch of the sternum to the top of the 3rd finger in the starting position of 90 degrees of shoulder forward flexion and the end position of maximum shoulder horizontal abduction. The range of motion (ROM) and the length change between the starting and end positions were recorded as indices for the change of tissue extensibility. Subjects were tested two repetitions per test per session. Two sessions were performed within the same day and after 3 days. Two experienced physical therapists performed the tests. The intra-rater and inter-rater reliabilities were calculated with the intraclass correlation coefficients (ICCs). *Results:* Both range of motion and the length of shoulder horizontal abduction demonstrated excellent test-retest reliabilities (ICCs: ROM/Length: within-day: intra-rater =0.99/0.99, inter-rater =0.95/0.98; between-day: intra-rater=0.98/0.99, inter-rater=0.95/0.98). *Conclusion:* Well trained physical therapists can reliably measure the myofascial and median nerve extensibility in subjects with increased mechanosensitivity.

598

QUALITY OF LIFE IN A SAMPLE OF TUNISIAN PATIENT WITH SPINAL CORD INJURY

B. Iheb¹, H. Migaou¹, S. Boudoukhane¹, S. Salah¹, A. Jellad¹, Z. Ben Salah¹

¹Monastir University, Department of Physical Medicine and Functional Rehabilitation, Monastir, Tunisia

Introduction/Background: Spinal Cord Injury (SCI) results in complete or incomplete loss of function below the level of the lesion and has a broad impact on medical, social, psychological conditions and on quality of life (QoL). The main purpose of this study was to identify QoL of subjects presenting with residual neurological deficits from a spinal cord injury and living at home. **Material and Methods:** This is a cross-sectional descriptive study of a sample of SCI patients followed at a physical medicine and rehabilitation department. After informed consent was obtained, a clinical examination was conducted and questionnaires were filled out by the subjects. The following parameters were assessed: impairments, disability (Functional Independence Measure) and quality of life (Reintegration to normal Living index (RNLI), Nottingham Health Profile and Short Form SF36). **Results:** The mean age was 39.35 years with a men predominance 85%. The traumatic etiology account for 45%. The evaluation was performed after on average of 3 years. It showed that 15% live alone, and 45% were inactive. The average score of RNLI and Nottingham Health Profile and SF36 were respectively 57,8; 50,15 ; 36,42. For the scale of Nottingham, the highest score was the energy and the lowest score was sleep. Concerning the SF36 we noted that PCS compound was more affected. The lowest scores' domains were physical function (PF) and role emotion (RE). We didn't found any statistically significant correlation between among traumatic and non-traumatic SCI population. **Conclusion:** In recent years, the focus of rehabilitation outcomes has shifted from the illness itself to a broader picture of well-being; QoL is an important measure of the success of rehabilitations programmers for individuals with disabilities. This study has bias: a small sample and a cross sectional study.

599

PREDICTORS OF CHANGES IN SEXUAL LIFE AFTER SPINAL CORD INJURY

B. Iheb¹, H. Migaou¹, I. BelHajYoussef¹, S. Boudoukhane¹, S. Salah¹, A. Jellad¹, Z. Ben Salah¹

¹Monastir University, Department of Physical Medicine and Functional Rehabilitation, Monastir, Tunisia

Introduction/Background: The literature on spinal cord injury (SCI) has long gathered information on sexual ability after SCI, shifting the emphasis to the emotional aspects and the impact on quality of life and relationships. The purpose of this study is to analyze the relations and sexual life changes after SCI and to identify possible predictive factors. **Material and Methods:** This is a cross-sectional descriptive study of a sample of SCI patients followed at a physical medicine and rehabilitation department. After informed consent was obtained, a clinical and functional examination was conducted and questionnaires were filled out by the subjects. The IIFEL Score was used for evaluation of erectiondysfunction. **Results:** Only nine manage to lead a sexual relationship with variable level of satisfaction caused by several troubles. Six declare their impotence. Among troubles cities; an erectile dysfunction in 9 cases, a problem of ejaculation (sloppy ejaculation in one case, psychogenic ejaculation in 2 cases). Six patients were unable by mechanical stress. IIFEL score averaged 17.13 (7-27). Three (15%) patients have severe erectile dysfunction, 7 (35%) have a moderate or medium dysfunction and 5 (25%) have little or no erectile dysfunction. The study of correlations showed a significant relationship between the IIFEL score and respectively the MIFscore ($r=0.546$; $p=0.035$), HAD-A score ($r=0.617$; $p=0.014$) and the time taken PRM support ($r=0.683$; $p=0.005$). **Conclusion:** Only nine manage to lead a sexual

relationship with variable level of satisfaction caused by several troubles. Six declare their impotence. Among trouble cities; an erectile dysfunction in 9 cases, a problem of ejaculation (sloppy ejaculation in one case, psychogenic ejaculation in 2 cases). Six patients were unable by mechanical stress. IIFEL score averaged 17.13 (7-27). Three (15%) patients have severe erectile dysfunction, 7 (35%) have a moderate or medium dysfunction and 5 (25%) have little or no erectile dysfunction. The study of correlations showed a significant relationship between the IIFEL score and respectively the MIF score ($r=0.546$; $p=0.035$), HAD-A score ($r=0.617$; $p=0.014$) and the time taken PRM support ($r=0.683$; $p=0.005$).

600

PREDICTORS AND EFFECTIVE FACTORS ON QUALITY OF LIFE (QOL) AMONG TUNISIAN PATIENTS WITH SPINAL CORD INJURY (SCI)

B. Iheb¹, H. Migaou¹, I. Bel Haj Youssef¹, S. Boudoukhane¹, S. Salah¹, A. Jellad¹, Z. Ben Salah¹

¹Sahloul Hospital, Department of Physical Therapy and Rehabilitation, Sousse, Tunisia

Introduction/Background: The concept of QoL, proposed by the World Health Organization (WHO), has been defined as "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. **Objective:** To identify the factors that influence (QoL) after spinal cord injury. **Material and Methods:** This is a cross-sectional descriptive study including 20 SCI patients followed at a physical medicine and rehabilitation department. We have analyzed clinical, social and functional characteristic predicting QoL. **Results:** All domains of quality of life were influenced. The most important factors affecting QoL were age, evolution time after lesion, vocational status, functional inability, level of injury, bladder complications and depression. By increasing age, significant decrease occurs in the tow domains of SF36 general health (GH) and bodily pain (BP). The evolution time after lesion affected negatively these domains: physical function (PF), social function (SF), physical composite score PCS. Vocational status has a positive impact in quality of life preferentially in general health (GH), physical composite score (PCS) and daily functions. The functional inability, the level of injury and bladder or sexual complications were related significantly to several scores of QoL. **Conclusion:** Our results were consistent with published data. More studies seem necessary in the future to identify predictors factors of QoL in rehabilitation.

601

UTILITY OF MIRROR TREATMENT METHOD WITH DIGITAL IMAGE DISPLAY DEVICE IN STROKE PATIENTS WITH UPPER ARM DYSFUNCTION.

K. Kagechika¹, S. Ohkubo², T. Ohshima², M. Nakata¹, M. Tsubokawa¹, F. Takeuti¹, W. Ohsu¹, Y. Takagi², A. Nakanami²

¹Kanazawa Medical University, Rehabilitation Medicine, Uchinada, Japan, ²Toyama Prefectural University, Engineering, Toyama, Japan

Introduction/Background: The virtual image was furthermore drawn with the computer, and whether a quantitative evaluation was able to be done was examined. Whether it was a process of the mirror therapy. **Material and Methods:** To process the image, the image of both hands is taken into PC with the USB camera. Afterwards, the image used to undergo rehabilitation by reversing the image of a healthy hand, and doing making to binary and the difference is generated. Only the part of a healthy hand of the image taken with USB is reversed, and the reverse image is overlapped with the paralyzed hand. Therefore, the paralyzed hand is hid like past mirror therapy as for the image displayed on the screen, and

only a healthy hand is displayed. Only the part of a healthy hand of the image taken with USB is reversed, and the composite image has been synthesized to the paralyzed hand. Therefore, the image displayed on the screen differs from past mirror therapy, and can confirm the state of own paralyzed hand. *Results:* The image of the hand is acquired by the USB camera in the mirror box and the binarization of the image is done. The blue graph shown in figure shows the number of pixels when the image of a healthy hand is made two values, a red graph shows the number of pixels when the image of the paralyzed hand is made two values, and the graph of the pea green is a number of pixels when the difference between a healthy hand and the paralyzed hand is done. *Conclusion:* The paralysis, the disturbance of attention, and unilateral neglect influenced the identity frequency of the image, and the possibility of becoming an index that was quantitatively appreciable of the passage of the therapeutic gain and the improvement was suggested.

602

NEUROCOGNITIVE DYSFUNCTION ACCORDING TO TERRITORY OF HYPOPERFUSION IN PATIENTS WITH MOYAMOYA DISEASE

C.G. Kang¹, M.H. Chun¹, D.Y. Kim¹

¹Asan Medical Center, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: Moyamoya disease (MMD) is characterized by progressive stenosis of the major arteries of the Circle of Willis, resulting in compromised cerebral blood flow. Many previous studies reported that large proportion of MMD patients demonstrate disruption of neurocognition, particularly those mediated by subcortical and frontal regions. It is not yet known to what extent cognitive impairment in MMD is the consequence of ischemic damage to cerebral gray matter and/or dynamic factors such as cerebral hypoperfusion. The objective of this study was to demonstrate the relationship between territory of hypoperfusion and cognitive impairment in MMD. *Material and Methods:* MMD patients over 18 to 60 years of age referred to department of rehabilitation medicine were included. Baseline characteristics and disease related factors such as age, gender, age of onset, symptom duration, number of events, lesion side on angiography, whether patients received operation and K-MBI score was assessed through medical record. We reviewed all of enrolled patients' brain SPECT and classified patients by existing territory of hypoperfusion on brain SPECT. Then we compared characteristic of computerized neuropsychological test (CNT) results between two groups. *Results:* We recruited 26 MMD patients without focal stroke or cortical lesion and those who could conducted CNT. There was no statistical difference in age, gender, number of events, age of onset, symptom duration, number of events, lesion side, whether patients received operation and K-MBI score between two groups. Patients with frontal and parietal lobe hypoperfusion showed lower scores in visual CPT, auditory CPT, forward digit span test, backward digit span test, verbal learning test, trail making test compared to patients without hypoperfusion on brain SPECT. *Conclusion:* MMD patients with hypoperfusion in frontal and parietal lobe showed lower scores of CNT results in MMD patients without focal stroke. Therefore, hypoperfusion territory on brain SEPCT is related with characteristics of neurocognitive dysfunction in MMD patients.

603

REHABILITATION OF NEUROLOGICAL COMPLICATIONS IN SEVERE MALARIA: A CASE REPORT

S.K. Lui¹

¹Singapore General Hospital, Rehabilitation Medicine, Singapore, Singapore

Introduction/Background: As incidence of malaria declines in most urbanized nations, many physicians may be unfamiliar with the

neurological sequelae of malaria. This case describes the neurological complications and rehabilitation of an adult severe malaria survivor. *Material and Methods:* A 32-year-old Filipino seaman presented with 9 days of fever and delirium at a Singapore tertiary hospital. Peripheral blood film confirmed presence of *Plasmodium falciparum*. CT brain on admission was normal. He was immediately treated with intravenous artesunate, antibiotics and fluid resuscitation. On hospital day 3, he was orientated and could follow one-step commands. Despite clearance of parasitemia on hospital day 4, he developed expressive aphasia, intentional tremors and could only intermittently obey commands. Confounding factors such as electrolyte derangements were excluded. Repeated CT brain was unremarkable. MRI brain showed non-specific mildly raised diffusion weighted imaging signal in bilateral hippocampi. Electroencephalogram showed mild diffuse encephalopathy without epileptiform discharges. On hospital day 7, his verbal output improved but he was noted to have cerebellar speech. Cerebrospinal fluid (CSF) analysis was unremarkable. His blood, urine and CSF cultures were negative. Over the next few weeks, he was noted to be anxious, emotionally labile and agitated. Further assessment revealed he had depression and poor attention. *Results:* He underwent comprehensive inpatient rehabilitation program which included articulatory exercises, strengthening exercises, gait retraining, proprioceptive and balance training, reality orientation and retraining of his activities of daily living. He was started on trazodone and melatonin to aid his mood and sleep. Improvements were seen in his behaviour, mood and Functional Independence Measure. *Conclusion:* This case highlights the diagnostic dilemma and rehabilitation of severe malaria with neurological complications. Literature on rehabilitation in malaria survivors is scarce and is more often reported in children. As there is no "gold standard" to guide rehabilitation in survivors of severe malaria, it remains a challenge to rehabilitate these patients.

604

EVALUATION OF ASPECT OF SLEEPING PROBLEMS PATIENTS WITH THORACIC OUTLET SYNDROME

N. Milenovic¹, B. Popovic²

¹Special Hospital for Rheumatology Diseases "Jodna banja", Department for Physical and Rehabilitation Medicine- Faculty of Medicine- University of Novi Sad, Novi Sad, Serbia, ²Scope International, Scope International, Zrenjanin, Serbia

Introduction/Background: One of the most common cervical syndrome caused by compressing cervical circulation and neural structure is known as Thoracic Outlet Syndrome (TOS). One of the sign of TOS, which is not so commune evaluate, is problem with sleeping. Aim of the study is to evaluate aspects of sleeping problems at patient with TOS. *Material and Methods:* In the study was included 181 participant, 99 patients with diagnose TOS and 82 without. All participants were filled in questionnaire about their sleeping problems. *Results:* Patients with diagnose TOS were significantly more often talk about sleeping problems with their doctor ($\chi^2=17.64, p=0.00$), took part in the research of sleeping problems ($\chi^2=57.75, 16, p=0.00$) and were not satisfied with resolving their sleeping problems ($\chi^2=10.16, p=0.01$). All this results pointed on high patient's awareness about their sleeping problems. Also it was observed statistically significantly awareness of strong and loud snoring at patient with TOS ($\chi^2=11.18, p=0.01$) and their partners complains on loud snoring ($\chi^2=7.26, p=0.00$). But at the same time patient with TOS were more sensible on sounds during sleeping ($\chi^2=13.32, p=0.00$) and often wake-up because of them ($\chi^2=18.75, p=0.00$). Patients with TOS also had headache during the night ($\chi^2=18.15, p=0.00$) as well as wake-up headache ($\chi^2=30.45, p=0.00$). They often reported problem with breathing ($\chi^2=13.23, p=0.00$) and palpitation ($\chi^2=24.99, p=0.00$) during the sleeping. *Conclusion:* Our research definitively point on existence sleeping problems at patient with TOS which require further evaluation.

605

CORRELATION OF SERUM CREATINE KINASE LEVEL WITH PULMONARY FUNCTION IN DUCHENNE MUSCULAR DYSTROPHY

H.J. Oh¹, M.R. Suh¹, J.W. Lee¹, W.A. Choi¹, S.W. Kang¹

¹Gangnam Severance Hospital - Yonsei University College of Medicine, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: Because the majority of the Duchenne muscular dystrophy (DMD) patients die from respiratory failure, pulmonary functions are important to them. Serum creatine kinase (CK) reflect the dystrophic process including respiratory muscles. However it is unknown that serum CK level could reflect the pulmonary functions. **Material and Methods:** Total 202 DMD patients admitted to Rehabilitation Institute of Neuromuscular Disease in Gangnam Severance Hospital were studied from Jan 1st, 1999 to Mar 31th 2015. Subject assessment included age, height, weight, body mass index (BMI), pulmonary function tests - forced vital capacity (FVC), peak cough flow (PCF), maximal expiratory pressure (MEP), and maximal inspiratory pressure (MIP) - and laboratory measurements such as serum CK, CK-MB, troponin-T (Tn-T), and B type natriuretic peptide (BNP). Pulmonary function and respiratory muscle strength were measured in sitting position. VC, MEP, and MIP were expressed as percentages of predicted values. **Results:** The serum CK activities were elevated above normal even in the oldest DMD group beyond their 30s. Serum CK level was strongly correlated with pulmonary functions (sitting FVC (%), $p < 0.001$; supine FVC (%), $p < 0.001$; MIP (%), $p = 0.004$; and MEP (%), $p < 0.001$). **Conclusion:** Serum CK level is a reliable screening test even in advanced DMD patients, and a strong predictor for pulmonary functions.

606

STRIATAL HAND IN PARKINSON'S DISEASE

E.A. Ozturk¹, I. Gundogdu¹, Y. Demir¹, K. Aydemir², A. Cakci¹

¹Diskapi Yildirim Beyazit Education and Reserach Hospital, Physiscal Therapy and Rehabilitation, Ankara, Turkey, ²GMMA-TAF Rehabilitation Center, Department of Physical Therapy and Rehabilitation, Ankara, Turkey

Introduction/Background: Striatal hand deformity (SHD), which is the one of the postural deformities encountered in Parkinson's disease (PD), is an underrated phenomenon. This deformity is characterized by flexion of the metacarpophalangeal joints, extension of the proximal interphalangeal joints, flexion of the distal interphalangeal joints and ulnar deviation. It is also called 'rheumatoid-like' deformity due to typical image. It causes hand posture abnormality and impairs the life quality of patients by reduction in dexterity, pain and deformity. We aimed to demonstrate frequency of the SHD and features of the patients with PD. **Material and Methods:** SHD was screened in patients followed regularly by Movement Disorder Outpatient Clinic for 2-month period. Demographic variables (age, gender) and disease characteristics (duration of the diagnosis, dose of levodopa) were recorded. H&Y scale was used for disease staging and Unified Parkinson's Disease Rating Scale (UPDRS) II (activities of daily living), UPDRS III (motor symptoms) were used for symptoms of the disease. **Results:** A total of 65 patients were screened in 2-month period and SHD was detected in 3 cases (4.6%). When clinical features of the patients with SHD compared to others, there was only significant difference in UPDRS II ($p < 0.001$). **Conclusion:** SHD, which may affect quality of the life, should be screened in every patients, it should be considered in the differential diagnosis of inflammatory rheumatic disorders such as rheumatoid arthritis.

607

KINEMATIC ANALYSIS OF THE EFFECT OF ANKLE-FOOT ORTHOSIS ON THE HEMIPARETIC GAIT PATTERNS

K. Pongpipatpaiboon¹, M. Mukaino¹, E. Saitoh¹, K. Ohtsuka², F. Matsuda², K. Tsuchiyama², H. Tanikawa², J. Yamada²

¹Fujita Health University, Rehabilitation Medicine I, Toyoake, Japan, ²Fujita Health University, Faculty of rehabilitation, Toyoake, Japan

Introduction/Background: Ankle-foot orthoses (AFO) are frequently used for hemiparetic patients. AFO control ankle movement and influence holistic gait patterns, which helps improve gait stability and reduce energy expenditure. However, the exact mechanism of the holistic effect of AFO has yet to be clarified. In this study, we investigated the effect of AFO on holistic gait patterns and the relationship between joint movements and compensatory movement in the hemiparetic gait using quantitative kinematic analysis. **Material and Methods:** Ten subjects with hemiparesis participated in this study conducted in the gait analysis laboratory of a rehabilitation center at a university medical center. Each subject was evaluated in terms of their gait performance with and without AFO using a simplified three-dimensional treadmill gait analysis system. A kinematic analysis of the hemiparetic gait was performed using the Lisajous Overview Picture, a holistic image of marker trajectory, and quantitative comparisons assessing gait parameters, including the shortening of hip-toe length (SHTL), the changes in joint angles, and the displacements of joint position during the swing phase. **Results:** The use of AFO significantly decreased SHTL ($p = 0.047$) by increasing ankle dorsiflexion ($p = 0.009$) and reducing hip flexion ($p = 0.037$) during the swing phase. The elevation of hip and knee representing compensatory strategies was diminished by using orthoses ($p = 0.007$ and 0.005 , respectively). No significant difference was obtained in terms of the knee angle between orthoses and no orthoses. **Conclusion:** The use of orthoses resulted in sufficient foot clearance by decreasing SHTL, which helps limit compensatory movement during the swing phase. Decreased holistic movement by the AFO potentially contributes to the reduction in energy cost and improvement in gait distance, as shown in the previous studies.

608

PROFILE OF DYSTROPHIC MYOPATHY IN IRAN, REPORT FROM A DYSTROPHY NGO

S.M. Rayegani¹, F. Hojatt², L. Seddighi², S.A. Raeissadat²

¹Tehran, Iran, ²PMR Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Introduction/Background: Dystrophic myopathy is a big subtype of myopathic disorders which leads to weakness and disability. The main pathogenesis is the mutation of encoding gene responsible for producing cell membrane stabilizing proteins. According to high prevalence of muscle dystrophies in whole world and our country Iran; and according to high medical care cost, psychosocial affects and necessity of early diagnosis, treatment, delaying the disability and early rehabilitation, we just decided to do this project. **Material and Methods:** Design: all the medical files of 770 patients collected in to the Iranian society of muscular dystrophies; an Iranian NGO were reviewed. We just recorded needed medical information of patients. Then using statistical tests and SPSS.16 software, recorded information were analyzed. **Results:** Findings: The most frequent subtype of muscle dystrophies among the patients was Duchenne dystrophy counting for 36.85% of all subtypes recorded. We also found that the age of onset among patients of Duchenne dystrophy was younger than others (mean onset age was 5.21 ± 3.64) and among LGMD patients the onset age was the most (15.53 ± 8.18). We also found that the mean serum CPK and LDH levels were highest in Duchenne subtype among all subtypes recorded. Duchenne muscular dystrophy, Becker muscular dystrophy and FSH disease were more prevalent among males but LGMD had equal prevalence among both genders. **Conclusion:** Myopathic dystrophies are among most disabling genetic disease all around the world. It has subtypes with different genotypes and phenotypes which all lead to disability but with different amounts. Knowing the epidemiologic

information of these disorders will help medical care staff to plan the ideal approach for prevention, early diagnosis, treatment and rehabilitation of patients so helping them and their families to have a higher quality of life.

609

COMPLIANCE OF LOWER LEG ORTHOSIS IN MYOTONIC DYSTROPHY PATIENTS

T. Saotome¹, S. Endo¹, T. Sakurai¹, Y. Kobayashi¹, Y. Ooya², M. Murata²

¹National Center Hospital- National Center of Neurology and Psychiatry, Physical Rehabilitation, Kodaira, Japan, ²National Center Hospital- National Center of Neurology and Psychiatry, Neurology, Kodaira, Japan

Introduction/Background: Muscle weakness often affects mobility in Myotonic Dystrophy (DM) patients. We suggest using lower leg orthoses for patients which can be provided walking stability. However, we have difficulty in getting their acceptance and continuous use of orthosis. The aim of this study is to clarify the status of the use of lower leg orthoses in DM patients in our department. **Material and Methods:** A retrospective audit of the medical records from 2012 through 2014 was conducted to identify DM patients who referred to our rehabilitation department from neurologists. **Results:** Eighty-two patients were identified. The mean age was 45 years. Of these, 16 patients (19.5%) were prescribed some types of lower leg orthosis such as knee brace, solid type ankle-foot-orthosis (AFO), soft type AFO and insoles within this time frame. These patients showed abnormal gait and frequent falls due to knee instability, drop foot and ankle sprain injuries. All the patients were able to independent indoor walking while two patients used wheelchair outside. In 2015, only 5 patients prolonged using their orthosis. The main reasons for ceasing the use of orthosis were pain, did not feel the necessity to use orthosis, increased walking instability and beginning of use wheelchair. We also introduced lower leg orthosis for other 8 patients (9.8%) with the mean age of 47 years, but they declined for much the same reason as the patients who had stopped using orthosis. **Conclusion:** Small number of our DM patients continued use of lower leg orthosis. The results of this audit indicated that the difficulty of orthoses treatment in our subjects. A considerable reason is their personality trait and cognitive function. However, we could not find sufficient cognitive data of the patients. Also we couldn't reveal any factors for showing usefulness of orthoses treatment. Further study is needed in order to explain these things.

610

BEHAVIORAL MANAGEMENT OF CONVERSION DISORDER

J. Speed¹, J. Davis¹, J. Mackenzie¹, M. Musson¹

¹University of Utah, Division of PM&R, Salt Lake City, USA

Introduction/Background: Conversion Disorder is a clinically challenging entity in which neurologic symptoms such as motor weakness are not found to have an organic cause. Patients with conversion symptoms are occasionally seen in a rehabilitation setting, and there is no universally accepted treatment approach. We have treated a number of patients with conversion symptoms at our institution, and appear to have good outcomes. **Material and Methods:** Retrospective chart review identified 40 patients treated for conversion disorder symptoms involving gait (eg hemiparesis, paraparesis, tetraparesis). Exclusion criteria included concurrent serious medical, neurologic, or psychiatric disease – no patients met exclusion criteria. All patients were treated in an inpatient rehabilitation unit setting. Treatment utilized a behavioral approach, with an explanation to the patient that their symptoms were due to stress related interruption of communication between the brain and the affected body parts. The affected body parts were immobilized (typically by having the patient either in bed or in a wheelchair) except when

engaged in therapy. Patients were engaged in a stepwise progression of interventions focused on restoration of normal function, with copious positive reinforcement on mastering each step in the progression. Concurrently, patients were engaged in psychologic evaluation, assessing life stressors and potential symptom reinforcers, with subsequent interventions as appropriate. **Results:** Treatment duration ranged from 2 to 37 days (mean –16 days). FIM (Functional Independence Measure) ambulation scores pretreatment ranged from 1 to 5 with a mean of 2.5. Discharge FIM scores averaged 6.3 (range 1–7). Pretreatment and discharge FIM scores were significantly different using a signed rank test ($z=5.50, p<0.001$). FIM scores ranged from 3 to 7 (mean 6.5) at least one month after discharge from inpatient rehabilitation. Symptom duration and treatment duration were moderately correlated ($r=0.35, p=0.03$). **Conclusion:** Inpatient behavioral treatment of motor conversion disorder symptoms appears effective in a rehabilitation setting, with lasting treatment effects.

611

PSEUDONEGLECT IN NORMAL YOUNG AND OLDER ADULTS IN UNIVERSITY MALAYA MEDICAL CENTRE

M.L.S. Tai¹

¹University of Malaya, Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Neglect is a complex disorder characterized by failure to be aware of meaningful stimuli presented to the side contralateral to a brain lesion. Contralateral neglect is common in cortical strokes. Healthy young people have slight leftward attentional bias due to right hemispheric dominance (pseudoneglect). It has been postulated that normal aging is associated with a decline of the right hemisphere resulting in leftward attentional bias. The objective of the study was to evaluate whether the elderly people exhibit a rightward attentional bias in line bisection, as compared to the healthy young people. **Material and Methods:** All the study participants recruited were medical students and relatives of patients. They were divided into two groups: (a) young adults (18–49 years old) (b) older adults (50 years old and above). They were all healthy and did not have history of stroke and transient ischaemic attack. All participants performed line bisection test and star cancellation test. In line bisection test, participants were instructed to place a mark with a pencil through the centre of a 5 cm line. A deviation of more than 6 mm from the midpoint indicates unilateral spatial neglect. In star cancellation test, the stimuli were large 52 large stars, 13 letters and 10 short words interspersed with 56 smaller stars. The participants were instructed to cross out all the small stars. A cutoff of <44 indicates unilateral spatial neglect. **Results:** 46 study participants were recruited into the study. 36 participants (78.3%) were young adults, whereas 26 (21.7%) were older adults. All of them had normal line bisection tests and star cancellation tests. **Conclusion:** There were no age related changes in visual neglect in our study. However, the study was limited by small sample size.

612

THE EFFECT OF THE SENSORY DISTURBANCE AND THE DYNAMIC FOOT PRESSURE ON THE PLANTAR ULCER IN THE PATIENT WITH HANSEN'S DISEASE

S. Tashiro^{1,2}, Y. Oku³, N. Goto¹, T. Sugano¹, K. Kikuhara¹, N. Endo¹, C. Miyata⁴, K. Mizuno^{1,2}, Y. Asato⁵

¹National Tama-zenshoen Sanatorium, Department of Rehabilitation, Higashi-Murayama, Japan, ²Keio University School of Medicine, Department of Rehabilitation Medicine, Shinjuku-ku, Japan, ³Tokyo National Hospital, Department of Rehabilitation, Kiyoese, Japan, ⁴National Tokyo Medical Center, Department of Rehabilitation, Meguro-ku, Japan, ⁵National Tama-zenshoen Sanatorium, Department of Surgery, Higashi-Murayama, Japan

Introduction/Background: The patients with Hansen's disease are suffering from sequelae of the mononeuropathy multiplex even after the cure of the infection itself. Even though the plantar ulcer is one of the major concerns of these patients, the number of studies investigating its pathology is very few. So, here we investigated how the sensory disturbance influenced on weight bearing and how these factors affect the occurrence of plantar ulcer. **Material and Methods:** Five patients with sequelae of Hansen's disease were included in this study. The sensory disturbance, the dynamic foot pressure during gait and the history of the plantar ulcer was investigated for 11 sections of plantar surface of both foot. The lower threshold of the touch sensation was assessed using SW sensory tester. The dynamic foot pressure was assessed using F-scan system. **Results:** Although no significant correlation was observed between the touch sensation and the dynamic foot pressure, the sensory disturbance was relatively mild at places where highest weight bearing observed. Besides, all of plantar ulcer was, remarkably, observed at the place with both of severe sensory disturbance and high weight bearing. **Conclusion:** It is legitimate that the body weight is borne on the part without severe sensory disturbance consistent with previous studies. However the particular pattern seems the pathogenesis of the plantar ulcer in which high weight bearing is constrained to a plantar part with sensory loss due to the severe deformity of joints or the paresis. We consider it is important to check the weight bearing pattern as well as the sensory disturbance for the patients with Hansen's disease.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: INTERNAL MEDICINE AND OTHER CONDITIONS - HEART, CARDIOVASCULAR AND LYMPH DISEASES

613

PROGNOSTIC IMPLICATIONS IN PHASE I CAR- DIAC REHABILITATION

N.F. Ahmad Roslan¹, A. Suhaimi², L. Abdul Latiff²

¹Universiti Teknologi MARA, Discipline of Rehabilitation Medicine, Sungai Buloh, Malaysia, ²University Malaya, Department of Rehabilitation Medicine, Petaling Jaya, Malaysia

Introduction/Background: Impaired capacity on increasing heart rate during activity (Chronotropic Incompetence [CI]) and slow reduction of post peak-exercise heart rate (Heart Rate Recovery [HRR]) are parameters associated with risk of all-cause mortality, that be assessed with exercise during assessment in cardiac rehabilitation (CR). All these can be part of risk stratification to guide therapy intensity and medical supervision during programme. Aim of this study is to describe the prevalence and associated factors of abnormal CI and HRR in patients who underwent phase I cardiac rehabilitation in University Malaya Medical Centre. **Material and Methods:** CR assessment & treatment plan records as per AACVPR guidelines of 62 eligible patients diagnosed with ischemic heart disease and had been enrolled in phase I cardiac rehabilitation between May till Nov, 2013 were analysed. CI and HRR were calculated from the post phase I CR Exercise Stress Test. Abnormal CI is <0.8 and abnormal HRR is <12 bpm. **Results:** 83.9% ($n=52$) of patients have abnormal CI and 69.4% ($n=41$) have abnormal HRR. There are significant associations between diabetes ($p=0.005$) and CABG ($p=0.006$) and PCI ($p=0.013$) with abnormal HRR. There is no significant association of CI with age, race, gender, diabetes and post cardiac intervention. There is no significant correlation between CI and HRR. **Conclusion:** Abnormal CI and HRR is common following phase I CR. Patient characteristics associated with abnormal CI and HRR is a useful guide towards stratifying patient for a CR program.

614

RELIABILITY AND VALIDITY OF SEATTLE ANGI- NA QUESTIONNAIRE IN A TURKISH POPULATION (SAQ-TR)

M.T. Duruöz¹, F. Ulutatar², C. Sanal Top², A. Suhaimi³, M. Agirbasli⁴

¹Marmara University School of Medicine, PM&R Dept. Rheumatology Div., Istanbul, Turkey, ²Marmara University School of Medicine, PM&R Dept., Istanbul, Turkey, ³University of Malaya-Faculty of Medicine, Department of Rehabilitation, Kuala Lumpur, Malaysia, ⁴Marmara University- School of Medicine, Cardiology, Istanbul, Turkey

Introduction/Background: Seattle Angina Questionnaire (SAQ) is health related quality of life scale which was developed for patients with cardiac anginal problems. It has 5 subdomains: anginal stability, physical limitation, anginal frequency, treatment satisfaction and disease perception. Aim of this study is assessment of the reliability and validity of SAQ in Turkish population (SAQ-TR). **Material and Methods:** The SAQ was translated into Turkish by translation and back translation method. Patients who were diagnosed coronary artery disease and angina by a cardiologist were recruited into the study. Cronbach alpha was calculated for internal consistency (reliability) of scale. Face validity was assessed via cognitive debriefing interviews with patients. Convergent and divergent validities were assessed for determine the construct properties of questionnaire. Relation of the SAQ-TR with subsets of Nottingham Health Profile (NHP) and the MacNew quality of life scales were assessed for convergent validity. Relation of the SAQ-TR with non functional parameters were assessed for divergent validity. Spearman's correlation coefficient (rho) was used to assess the relation between quantitative parameters. $p<0.05$ was accepted as significant. **Results:** Sixty-seven patients with 58.58 (SD 9.34) year of age (59.7, male) were recruited. Cronbach alpha of subscales (SAQ) were changed from (0.52) to (0.90) which shows good internal consistency. All subscales of SAQ had significant relations with NHP (except social isolation) and MacNew questionnaires which shows convergent validity. Age, BMI and educational level have poor or not-significant relation with SAQ which shows divergent validity. **Conclusion:** The SAQ-TR has good reliability and validity properties in Turkish population. It is practical scale to assess the quality of life of patients with coronary artery disease and angina.

615

CHANGE IN THE RELATIONSHIP BETWEEN OXYGEN CONSUMPTION AND HEART RATE IN PATIENTS WITH ACUTE MYOCARDIAL INFAR- CTION: 6-MONTH FOLLOW-UP

J.Y. Han¹, Y. Choe¹, P.Y. Kim¹

¹Chonnam National University Medical School and Hospital, Physical and Rehabilitation Medicine, Gwangju, Republic of Korea

Introduction/Background: Exercise intensity is very important constituent of effective exercises prescription in improving cardio-pulmonary fitness. Exercise intensity is determined by percentage of maximal oxygen consumption ($\%VO_{2max}$). The percent of maximum heart rate ($\%HR_{max}$) has been widely suggested as an index of exercise intensity because the $\%HR_{max}$ and $\%VO_{2max}$ linearly related regardless of gender, exercise mode or age. We examined the change in variability in the correlation between percentage of maximum heart rate ($\%HR_{max}$) and the percentage of maximum oxygen consumption ($\%VO_{2max}$) over time after onset of acute myocardial infarction. **Material and Methods:** Among the patients referred for cardiac rehabilitation (CR) after percutaneous coronary intervention, 57 who had reached stage 3 of the modified Bruce protocol (mBP) on an exercise tolerance test (ETT) were enrolled in the study. All patients participated in a 4-week outpatient CR program. ETT was performed before CR and 1, 3, and 6 months after CR. $\%HR_{max}$ and $\%VO_{2max}$ were measured at each stage of the mBP by linear regression analysis. **Results:** (1) The correlation between VVO_{2max} and HR_{max} progressively changed in a favorable manner during CR. The R values before and 1, 3, and 6 months after were 0.461, 0.463, 0.516, and 0.626, respectively. (2) The relationship between $\%HR_{max}$ and $\%VO_{2max}$ indicated that the R2 value before and 1, 3, and 6 months

after were 0.663, 0.705, 0.737, and 0.799, respectively. *Conclusion:* The exercise intensity method prescribed for these patients should differ over time since the onset of acute myocardial infarction.

616

A PRELIMINARY STUDY ON COMPARISONS OF PHYSICAL PERFORMANCES FOR ACUTE MYOCARDIAL INFARCTION INPATIENTS AFTER PERCUTANEOUS CORONARY INTERVENTIONS OR CORONARY ARTERY BYPASS GRAFTING

C. Cheng¹, Y. Tsai², C. Chang², M. Huang¹, M. Hsu²

¹Kaohsiung Medical University Hospital, Department of Rehabilitation, Kaohsiung, Taiwan, ²Kaohsiung Medical University, Department of Physical Therapy, Kaohsiung, Taiwan

Introduction/Background: Individuals with acute myocardial infarction (AMI) suffer from decreased physical functions. Phase I cardiac exercise program is provided for inpatients with AMI to restore physical activity and prepare for discharge from hospitals. Recognizing the characteristics of physical performances in AMI patients after percutaneous coronary interventions (PCI) or coronary artery bypass grafting (CABG) can help physical therapists design precise exercise programs to optimize the efficacy of Phase I exercise therapy. Therefore, the purpose of this study was to compare muscle forces and walking ability in AMI inpatients after PCI or CABG. *Material and Methods:* This study recruited 9 inpatients who underwent PCI and 6 inpatients who underwent the CABG. Each subject received the 10 meter walk test (10MWT), 6 minute walk test (6 MWT), handgrip strength, and maximum inspiratory pressure (Pimax). Data were examined by normality distribution test before processed by further statistics. *Results:* Data on the 10 meter walk test (10MWT), 6 minute walk test (6 MWT), handgrip strength, and maximum inspiratory pressure (Pimax) in CABG group were lower than those in non-CABG group. However, the t test revealed that CABG AMI inpatients had significant lower Pimax ($p < 0.05$) but no significant differences between groups for the rest of parameters measured. *Conclusion:* Except the inspiratory muscle strength, the performance of each test in the CABG group appears to be similar to that in PCI group, which may result from the small sample size of this study.

617

INCREASE OF TOLERANCE OF THE ORGANISM TO EXTERNAL FACTORS AT METEOSENSITIVE PERSONS WITH THE ARTERIAL HYPERTENSION

E. Ivanova¹, F. Muharlyamov²

¹Chair of Medical Rehabilitation of the Moscow Regional Scientific Research Clinical Institute of M. F. Vladimirovsky, Ministry of Health of the Moscow region, Moscow, Russia, ²Moscow Scientific and Practical Center of Medical Rehabilitation- Recovery and Sports Medicine, Department of Health Care of Moscow, Moscow, Russia

Introduction/Background: Scientific researches revealed formation of responses of organism to action of the weather factors connected with inability of organism to support the homeostasis that worsen quality of life. Purpose: to prove application of methods of functional correction of the organism for meteosensitive persons with arterial hypertension. *Material and Methods:* 250 patients with an arterial hypertension and meteosensitivity aged from 25 until 50 years. Extent of change of tolerance to weather conditions under the influence of a course of recovery correction was estimated. It was observed during fast fluctuations of weather factors the increased irritability, fast fatigue, feeling of alarm, decrease in physical working capacity, and a sleep disorder. There were noted headaches, pain in heart, and increase of arterial pressure. Was studied the efficiency of application of a new biopower preparation for bathtubs mitofen in a pearl bathtub in the complex with the psychological relaxation and cardio trainings in the mode of the accu-

ing physical activities dosed step on cyclic and power simulators. *Results:* Mitofen has the expressed impact on mechanisms of tissue respiration and possesses anti-hypoxemic and antioxidant activity. After a course of recovery correction, it was observed: increase of activity and mood (85%), jet uneasiness when forming adverse weather conditions decreased. Normalization of variability of arterial pressure, especially in evening and night time is noted (in 84% of cases), decrease in the general vascular peripheral resistance (62%), improvement of a microcirculator blood-groove (90%), harmonization of functional activity of cardiorespiratory system at physical activity (86%) is revealed. *Conclusion:* Use of non-drug methods of correction of the increased meteosensitivity promotes activation of endogenous bioregulators, restoration of adaptation shifts and the weather climatic factors increasing tolerance of an organism to external adverse effects.

618

GAIT ABNORMALITIES IN PATIENTS WITH AORTOILIAC OCCLUSIVE DISEASE

T. Kakhana¹, O. Ito¹, D. Ito¹, M. Akizuki¹, Y. Sekiguchi², H. Goto³, M. Hashimoto³, D. Akamatsu³, T. Shimizu³, K. Tsuchida³, K. Kawamura³, Y. Tajima³, M. Umetsu³, M. Kohzuki¹

¹Tohoku University Graduate School of Medicine, Internal Medicine and Rehabilitation Science, Sendai, Japan, ²Tohoku University Graduate School of Medicine, Physical Medicine and Rehabilitation, Sendai, Japan, ³Tohoku University Graduate School of Medicine, Advanced Surgical Science and Technology, Sendai, Japan

Introduction/Background: Intermittent claudication is the most common symptom of peripheral arterial disease (PAD) presenting as ischemic leg pain and gait dysfunction. The symptoms are most commonly localized to the calf. We hypothesized that PAD patients show abnormal gait pattern, in particular in late stance phase, at comfortable and fast walking speed. *Material and Methods:* Sixteen symptomatic PAD patients (70±8 years old), who were 12 bilateral and 4 unilateral intermittent claudication (28 claudication limbs), and 10 healthy controls (20 healthy limbs) were recruited. All 16 patients had aortoiliac occlusive disease. With a 3-dimensional motion analysis device, peak ankle joint generated power (AJP: push-off power) and hip joint generated power (HJP: pull-off power) in late stance were analyzed at comfortable and fast walking speed. Ankle/hip (A/H) peak power ratio was calculated to determine whether hip or ankle power was dominantly used in late stance during walking. *Results:* Mean ankle-brachial index was 0.64±0.21 in claudication limbs. Compared with healthy controls, the PAD patients showed significant slower walking speed and shorter step length at both walking speed ($p < 0.001$). The peak AJP and HJP in late stance were significantly lower in the PAD patients at both walking speed. However, when gait speed adjusted, only peak HJP in late stance was significantly lower in the PAD patients at comfortable and fast walking speed ($p = 0.008$, $p = 0.035$, respectively). The A/H peak power ratio was higher in the PAD patients at comfortable and fast walking speed ($p < 0.001$, $p < 0.001$, respectively). *Conclusion:* PAD patients who with aortoiliac occlusive disease used relatively ankle planter flexors to compensate a muscle weakness of hip flexor at comfortable and fast walking speed. These results suggest that exercise training for hip flexor muscle may increase walking distance and mitigate calf pain during walking in PAD patients.

619

LONG-TERM OUTCOMES OF CARDIAC REHABILITATION IN ELDERLY AND YOUNGER PATIENTS WITH MYOCARDIAL INFARCTION

J.H. Kim¹, J.W. Choi¹, D.S. Sin¹, S.H. Rhie¹

¹Wonkwang University and Hospital, PM & R, Iksan, Republic of Korea

Introduction/Background: To investigate the long-term outcomes of cardiac rehabilitation (CR) on cardiopulmonary exercise capacity in elderly and younger patients with myocardial infarction (MI). **Material and Methods:** Of the MI patients who received hospital-based CR from May 2012 to Dec 2015, we retrospectively reviewed the medical records of the patients who continued follow-up through the outpatient clinic and community-based self-exercise after CR. A total of 43 patients (15 elderly patient (≥ 60) and 28 younger patient (< 60)) were included in this study. Exercise capacity was measured by symptom-limited exercise tests before and after hospital-based CR and 1 year after the onset of MI. **Results:** Before CR, elderly group had a significantly lower exercise capacity in peak VO_2 and METs than younger group. After CR, elderly groups showed a significantly improved exercise capacity in exercise time, RPP, HR-max, peak VO_2 , METs, Anaerobic Threshold. After CR, younger groups showed a significantly improved exercise capacity in exercise time, RPP, HR-max, SBP-rest, peak VO_2 , METs, Anaerobic Threshold. And after 1 year from the onset of MI, both groups showed a significantly improved exercise capacity compared with those before CR. Elderly group had a significantly lower exercise capacity in exercise time, and METs than younger group after 1 year from the onset of MI. **Conclusion:** Both elderly and younger groups showed improvement of cardiopulmonary exercise capacity after hospital based CR, but elderly group had a lower exercise capacity than younger group. When the patients continued follow-up through the outpatient clinic and community based self exercise after CR, elderly group still had a lower exercise capacity than young aged group after 1 year from the onset of MI, but both groups maintained improved exercise capacity by hospital based CR.

620

COMPARISON OF CARDIAC FUNCTION AFTER CARDIAC REHABILITATION BETWEEN RECOVERY AND NO-RECOVERY GROUP OF SEXUAL ACTIVITY

S.K. Lim¹, K.J. Lee¹, J.Y. Han²

¹Presbyterian Medical Center, Physical & Rehabilitation Medicine, Jeonju, Republic of Korea, ²Chonnam National University Medical School & Hospital, Physical & Rehabilitation Medicine, Gwangju, Republic of Korea

Introduction/Background: Sexual health is an important quality-of-life concern for the patients with acute myocardial infarction (AMI) in cardiac rehabilitation (CR). But, there are few studies yet on change of cardiac function after CR about sexual recovery. We compared the change of cardiac function in male patients with AMI with or without sexual recovery after CR. **Material and Methods:** Among 183 male patients with AMI who participated in CR from Feb 2013 to May 2015, 70 subjects were finally enrolled. Subjects who answered a questionnaire about sexual activity at start point and endpoint of CR, showed usual sexual activity before AMI and decreased sexual activity at start point of CR. Information on socio-demographic characteristics and cardiac function obtained at start point and endpoint of CR was used for analysis. The data was analyzed through Independent *t*-test to compare between the groups. **Results:** 1) Twenty-two of 70 subjects has improved sexual activity after CR, but 48 of them were continued the status of decreased sexual activity at end point of CR. 2) At start point of CR, age ($p=0.005$), body weight ($p=0.007$) body mass index (BMI) ($p=0.007$), dyslipidemia ($p=0.003$), f statin ($p=0.018$) and heart rate (HR) after recovery ($p=0.036$) were significantly different between both groups. 3) Both change of HRrest ($p=0.001$) and HRmax ($p=0.023$) were independently and positively associated with sexual recovery after adjustment for other factors. **Conclusion:** Male patients with AMI with sexual recovery showed a lot of change of HRrest and HRmax during ETT after CR than patients without sexual recovery. Age, body weight, BMI, dyslipidemia and statin were significantly different the groups in this study. Improvement of capability of more higher intensity training by HR seems to be associated with sexual recovery after CR. These points would have to be considered when educating patients under CR about sexual activity.

621

DIFFERENCE BETWEEN WOMEN AND MEN IN PHASE I CARDIAC REHABILITATION AFTER ACUTE MYOCARDIAL INFARCTION: A NATION-WIDE POPULATION-BASED ANALYSIS

W.C. Lin¹, H. Chi-Che¹, H. Chung-Han²

¹Chi-Mei Medical center- Chiali, Department of Physical Medicine and Rehabilitation, Tainan, Taiwan, ²Chi Mei Medical Center, Department of Medical Research, Tainan, Taiwan

Introduction/Background: Although numerous studies have investigated gender differences in patients who have had an acute myocardial infarction (AMI), few of them have examined the gender differences among inpatients receiving Phase I inpatient cardiac rehabilitation following AMI. **Material and Methods:** Using data from the Taiwan National Health Insurance Research Database, this study analyzed 6,713 adult patients who received inpatient cardiac rehabilitation following AMI between 2002 and 2011. The differences in comorbidity, medical service use, and prognosis between the male and female patients were analyzed to determine whether the comorbidities affecting their prognoses differed. **Results:** Female patients accounted for 23.18% of the sample, had a higher average age, and exhibited severe comorbidities; furthermore, they had significantly more days of hospitalization and days in an intensive care unit than did male patients. The gender differences in hospital mortality rate and 30-day mortality rate were non-significant, but female patients exhibited a significantly higher 1-year mortality rate. Moreover, the risk for 1-year mortality was higher among female patients with moderate or severe renal disease (odds ratio: 1.94) than among their male counterparts. **Conclusion:** Gender-related differences in age, comorbidity, and prognosis were confirmed in AMI patients receiving Phase I inpatient cardiac rehabilitation.

622

EFFECTIVENESS OF AN ACCELERATED CARDIAC REHABILITATION PROGRAM. STUDY WITH 300 PATIENTS

A.I. Lopez¹, C. Morejon², M. Ramos²

¹Hospital Puerta de Hierro, Physical Medicine and Rehabilitation, Madrid, Spain, ²Hospital Puerta de Hierro, Physical Medicine and Rehabilitation, Madrid, Spain

Introduction/Background: Assessing the potential long-term beneficial effect of an accelerated cardiac rehabilitation program in which patients have been included after suffering an acute coronary syndrome to see their effectiveness in relation to conventional cardiac programs (8–12 weeks) of longer duration. **Material and Methods:** This is a retrospective study of 300 patients who suffered an acute coronary syndrome, referred to a cardiac rehabilitation program between 2009 and 2014. The program consisted in 3 and 6 sessions of physical training and assistance to health education lectures and home exercise prescription. **Results:** Data based on the risk of new cardiovascular, neurological or psychological events are discussed; as well as return to working life and to physical exercise conditioning. **Conclusion:** The results of our study support the hypothesis that a cardiac rehabilitation program has a favorable impact on prognosis in patients who have suffered a cardiac event.

623

CARDIAC REHABILITATION AWARENESS WORKSHOP AS A TOOL TO ASSESS THE KNOWLEDGE ON HEALTHY LIFESTYLE AMONGST HEALTH-CARE PROVIDERS IN A DEVELOPING COUNTRY

I. Sabrina¹

¹Hospital Rehabilitasi Cheras, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Cardiac disease is the main cause of morbidity and mortality in Malaysia and worldwide. Increasing the knowledge and awareness of healthy lifestyle and cardiac rehabilitation programs may be used as a tool to prevent cardiac diseases. The aim of this study is to assess the knowledge on healthy lifestyle and cardiac rehabilitation amongst healthcare providers in a developing country. **Material and Methods:** A one-day Cardiac Rehabilitation Awareness Workshop was held in Hospital Rehabilitasi Cheras on the 8/6/2015. The workshop consisted of lectures on cardiac rehabilitation followed by hands-on demonstration on cardiorespiratory fitness, stress management, energy conservation techniques, cardiopulmonary resuscitation (CPR) and dietetic calories calculation. Participants were given 20 pre-test and post-test questionnaires to assess their knowledge on cardiac rehabilitation program, energy conservation techniques, healthy diet, benefits of exercise, anti-hypertensive and anti-lipid medications, stress management and cardiopulmonary resuscitation (CPR). The data was analysed using Microsoft Excel 2007. **Results:** Sixty-nine respondents comprising 25 nurses, 15 administrative staff, 19 allied health staff and 10 doctors returned the questionnaires. Most respondents (85%) achieved improved post-test scores of 16 and above (median 16, min 12, max 20) on topics such as indications for cardiac rehabilitation, benefits of exercise, stress management and cardiac medications. However, not many understood the components of healthy diet and energy conservation techniques (19% and 30% respectively). Test scores from hospital staff were higher than their colleagues in health clinics and private organisations (42% versus 16%). **Conclusion:** Cardiac Rehabilitation Awareness Workshop may be used as a tool to increase the awareness and knowledge on healthy lifestyle amongst healthcare providers. More focus should be given on healthy diet and energy conservation techniques to healthcare providers especially in health centres.

624

CARDIOVASCULAR AUTONOMIC DYSFUNCTION IN PATIENTS WITH PERIPHERAL VASCULAR DISEASE

M.S. Salim¹, A. Suhaimi¹, L. Abdul Latif¹

¹University of Malaya Medical Centre, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Abnormal Heart Rate Recovery (HRR) and Chronotropic Incompetence (CI) are markers for autonomic dysfunction and strong predictors for mortality of cardiovascular disease. Given the shared risk factors and pathophysiology in Peripheral Vascular Disease (PVD), HRR and CI remains unexplored in terms of clinical significance and utility in this population. This study aims to evaluate the HRR and CI in patients with PVD and to find associations of HRR and CI with severity of PVD. **Material and Methods:** In this case-control study, 16 patients with PVD (ABI<0.9) and 15 gender-, BMI- and age-matched healthy subjects were subjected to arm ergometry exercise testing to assess the autonomic response to graded physiological stress. HRR is the difference between heart rate (HR) at peak exercise and at first (HRR1) minute after exercise. Normal HRR is more than 12 beats/minute. Chronotropic response is: $[\text{peak HR} - \text{resting HR} / 220 - \text{age} - \text{resting HR}] \times 100$, a value of less than 0.80 is considered as CI. **Results:** Of all the 16 PVD patients, 15 (93%) had at least one of the two cardiovascular autonomic markers abnormalities and 6 (37.5%) having both abnormal HRR and CI. There were no significant difference observed in post-exercise test HRR between the groups ($p=0.260$); CI was significantly lower in the PVD patients compared to control ($p=0.031$). There were no significant association between HRR, CI and severity of PVD ($p=0.110$; $p=0.071$, respectively). **Conclusion:** The results of this study demonstrated that PVD could cause impaired cardiovascular autonomic function. However, it was still not proven that severity of PVD can influence HRR and CI.

625

MUSCULOSKELETAL LIMITATIONS AND PARTICIPATION IN CARDIAC REHABILITATION

M. Supervia Pola¹, R.W. Squires¹, C.M. Terzic², K.S. Vickers Douglas³, P.P. Reddy¹, M. Gimeno González⁴, R.J. Thomas¹

¹Mayo Clinic, Cardiovascular Diseases - Cardiac Rehabilitation, Rochester, USA, ²Mayo Clinic, Physical Medicine & Rehabilitation, Rochester, USA, ³Mayo Clinic, Psychology, Rochester, USA, ⁴Miguel Servet Hospital, Physical Medicine & Rehabilitation, Zaragoza, Spain

Introduction/Background: Cardiac rehabilitation (CR) is a cost-effective component of the continuum of care for cardiac patients that reduces morbidity, re-hospitalization rates and mortality. However, musculoskeletal limitations (MSLs) are a common condition in CR patients and may limit exercise training and CR participation. The purpose of this study is to examine the effect of MSLs on patient enrollment in cardiac rehabilitation. **Material and Methods:** Of 862 CR eligible patients who were sent a mailed survey one week after hospital discharge, 321 (37%) patients responded. Cardiac rehabilitation enrollment data were available in 303 patients. Demographic factors, comorbidity index, self-reported medical status, perceived health patient and patient health questionnaire score were recorded. MSLs were identified through a validated Musculoskeletal Limitations Screen. CR enrollment rates were compared in patients with and without MSLs. **Results:** Eighty three per cent of responders reported a musculoskeletal disorder at the time of hospital discharge. Arthritis was the most frequent diagnosis (44%). Muscle or joint pain was reported to limit the ability to do moderate exercise in 57% of the patients. Problems with balance affected 22% of whom 41% reported a fall within the past year. No significant difference in CR enrollment was observed when patients with MSLs were compared with those without MSLs (51% vs 59% respectively, $p=0.19$). **Conclusion:** Despite high prevalence of MSLs among CR eligible patients, we found that MSLs do not serve as a significant barrier to CR enrollment.

626

EFFECT OF CARDIAC REHABILITATION ON EXERCISE CAPACITY FOLLOWING MYOCARDIAL INFARCTION

Y.Y. Tan¹, A. Suhaimi¹, L. Abdul Latif¹

¹University Malaya, Rehabilitation Medicine- Faculty of Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Cardiac rehabilitation program is a well-established intervention designed to improve cardiac patient's physical and psycho-social functioning. However limited evidence was available for Malaysian patients. This study aims at investigating its effects on exercise capacity and morbidity and mortality rate following cardiac rehabilitation participation in University Malaya Medical Center (UMMC). **Material and Methods:** In a prospective randomized controlled trial, 74 patients who were referred to cardiac rehabilitation clinic after myocardial infarction were randomized into 2 groups. Cardiac rehab (CR) group ($n=37$) participated in 8 sessions of medically supervised exercise training and 2 sessions of occupational therapy. Usual care (UC) group ($n=37$) were encouraged to start low intensity exercise and gradually increase according to rate perceived exertion. Exercise capacity was measured by peak metabolic equivalent (MET), heart rate reserve and heart rate recovery recorded during exercise stress test. **Results:** Patients in CR group achieved maximum METs of 8.57 ± 2.73 compare to 5.74 ± 2.06 METs that were recorded in the UC group ($p<0.001$). Heart rate reserve (CR: 56 bpm; UC: 45bpm) and heart rate recovery (CR: 12.6bpm; UC: 9.4 bpm) were significantly better in cardiac rehab group with the p value of 0.023 and 0.003 respectively. Changes in HDL level between 2 groups (CR: $+0.18$ mmol/L; UC: -0.01 mmol/L) were significant. There was no signif-

icant difference with regards to mortality or major adverse cardiac event. *Conclusion:* This cardiac rehabilitation program proved to be effective in improving patient's exercise capacity. Nevertheless, its effect on mortality and morbidity needs to be investigated further with longer follow-up trials.

627

DOES ENHANCED EXTERNAL COUNTERPULSATION (EECP) SIGNIFICANTLY AFFECT MYOCARDIAL PERFUSION?: A SYSTEMATIC REVIEW AND META-ANALYSIS

R. Huang, L. Yu

Department of Rehabilitation Medicine, The Second Affiliated Hospital of Chongqing Medical University, Chongqing, China

Aims: Enhanced external counterpulsation (EECP) is currently applied for treating coronary artery disease (CAD) patients. However, the mechanism(s) by which EECP ameliorates angina pectoris and long-term left ventricular function remain largely unknown. The aim of this study will be to assess whether EECP significantly affects myocardial perfusion in CAD patients through a systematic review and meta-analysis of the available literature. *Methods and Results:* MEDLINE, EMBASE, and Cochrane CENTRAL databases were searched for prospective studies on CAD patients that underwent ECEP and reported data on changes in myocardial perfusion pre- and post-ECEP. The impact of EECP was assessed based on the weighted mean difference (WMD) in myocardial perfusion from pre-EECP to post-EECP. Statistical heterogeneity was assessed by the I² index, and publication bias was assessed through visual inspection of the funnel plot as well as Begg's and Egger's testing. Standard EECP therapy (i.e., 35 one-hour sessions of EECP within a seven-week period) significantly increased myocardial perfusion in CAD patients (pooled WMD: -0.19, 95% CI: -0.38 to 0.00, $p=0.049$). A random effects analysis was applied on account of significant heterogeneity (I²=89.1%, $p=0.000$). There was no evidence of significant publication bias (Begg's $p=0.091$; Egger's $p=0.282$). *Conclusions:* Standard EECP therapy significantly increases myocardial perfusion in CAD patients. This study's findings support the continued use of standard EECP therapy in CAD patients and provides one possible physiological mechanism to help explain the improvements in angina pectoris and long-term left ventricular function observed in CAD patients after EECP therapy.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: INTERNAL MEDICINE AND OTHER CONDITIONS - PULMONARY DISEASES

628

A PILOT RANDOMIZED CONTROL CROSS OVER STUDY EVALUATING THE EFFECTIVENESS AND SAFETY OF MECHANICAL PERCUSSOR COMPARED WITH CONVENTIONAL CHEST PHYSIOTHERAPY IN ADULTS WITH PRODUCTIVE COUGH

M.I. Ahmad¹

¹Penang General Hospital, Rehabilitation Medicine, Georgetown, Malaysia

Introduction/Background: Conventional Chest Physiotherapy (CCPT) remains the mainstay of treatment for sputum mobilization in patients with productive cough such as bronchiectasis and "Chronic Obstructive Airway Disease" (COPD). However CCPT is time consuming requires the assistance of a physiotherapist and limits the independence of the patient. Mechanical percussors which are electrical devices used to provide percussion to the exter-

nal chest wall might provide autonomy and greater compliance. We compared safety and efficacy of a mechanical chest percussor devised by Formedic Technology with conventional chest percussion. *Material and Methods:* Twenty patients (mean age 64years) were randomly assigned to receive either CCPT or mechanical percussor on the first day and crossed over by "Latin square randomisation" to alternative treatment for 6 consecutive days and the amount of sputum expectorated was compared by dry and wet weight. Adverse events and willingness to use was assessed by a home diary and a questionnaire. *Results:* There were 13 males and 7 females, eight diagnosed as bronchiectasis and 12 COPD. The mean dry weight of sputum induced by CCPT (0.54g+0.32) was significantly more compared with MP (0.40g+0.11); p -value= 0.002. The mean wet weight of sputum with CCPT (10.71g+8.70) was also significantly more compared with MP (5.99g+4.5); p -value<0.001. There were no significant difference in adverse events and majority of patients were willing to use the device by themselves. *Conclusion:* The mechanical percussor although produces less sputum is well tolerated and can be a useful adjunct to CCPT.

629

IMPROVING QUALITY OF LIFE OF CHILDREN WITH CYSTIC FIBROSIS THROUGH AEROBIC EXERCISES AND CHEST PHYSIOTHERAPY

B. Almajan-Guta¹, I. Ciuca², V. Almajan-Guta³, S. Gheltofan⁴, T. Slavici⁵

¹West University, Romanian National CF Center, Timisoara, Romania, ²University of Medicine and Pharmacy, Pediatric Department, Timisoara, Romania, ³Speranta Special Care Center, Physiotherapy, Timisoara, Romania, ⁴USAMVB, Sport, Timisoara, Romania, ⁵Politehnica University, Mechanics, Timisoara, Romania

Introduction/Background: Physiotherapy management is a key element of care for people with cystic fibrosis. Airway clearance techniques, physical exercise and inhalation therapy are part of treatment and are associated with improved long-term outcomes. Aerobic fitness is an independent predictor of survival and those with better physical fitness have better quality of life. *Material and Methods:* The study was conducted during 6 months on 20 children with CF from Romanian National Cystic Fibrosis Center, Timisoara, with age between 10–14 years old all randomized in 2 groups: control (clearance techniques: ACTB, PD, oscillating PEP) and study (same clearance techniques and aerobic training-3 days per week, 30 minutes per session; heart rate 75% of maximum heart rate) during 6 months. Our objective was to evaluate the efficiency of aerobic exercises combined with airway clearance techniques. *Results:* The results showed an improvement in all measured values of quality of well-being (the quality of sleep, respiratory manifestations, respiratory infections, number of hospitalization, fatigue during normal activities or effort, and the participation at school activities) at the study group compare to the control group. The results of 6 minute walk test increased from 531 120.5 meters to 545.4 120.8 meters. *Conclusion:* Combining airway clearance techniques and physical activities could optimize quality of life in patients with cystic fibrosis, promote airway clearance and improve maximum exercise capacity. Exercise should be considered and encouraged as part of overall physiotherapy management in CF. From time of diagnosis physical activity should be incorporated into the daily routine.

630

EVALUATION OF ACUTE EFFECT OF KINESIOLOGIC TAPING ON PULMONARY FUNCTIONS IN INDIVIDUALS WITH KYPHOTIC POSTURE

C. Cicik¹

¹Zirve University, Faculty of Health Sciences, Gaziantep, Turkey

Introduction/Background: This study was planned to evaluate the acute effect of kinesiological taping that applied on thoracic spine

with functional correction taping method on pulmonary function parameters in individuals with kyphotic posture. **Material and Methods:** 34 individuals with kyphotic posture (20 individuals without respiratory problems and 14 individuals with respiratory problems) who has the average of 49.53 ± 13.87 were included in our study. The demographic data of individuals, smoking status and lateral thoracic spine radiographs were taken. By applying pulmonary function tests, the data recorded prior to kinesiologic taping, after and after one week. The obtained data were compared to appropriate statistical analysis. **Results:** When pulmonary function parameters that obtained prior to kinesiologic taping and after kinesiologic taping are compared with the parameters that obtained after a week, in both groups it was found to be significantly increased in pulmonary functions (FVC, FEV1, FEV1/FVC, PEF, MMEF, MEF75, MEF50, MEF25) ($p < 0.05$). A statistically significant decrease ($\%13.49$) was observed in kyphotic angle in radiographs of them are taken before the kinesiologic taping and after a week ($p < 0.05$). **Conclusion:** Kinesiologic taping that applied on thoracic spine with functional correction taping method in individuals with kyphotic posture reduces the kyphotic angle and accordingly it was found to increase pulmonary function parameters both in individuals without respiratory problems and in individuals with respiratory problems.

631

EVALUATION OF COUGH ABILITY AFTER PULMONARY REHABILITATION PROGRAM IN COPD PATIENTS

S.C. Widjanantie¹, M.S. Dahlan²

¹Persahabatan Hospital- Indonesian National Respiratory Center, Physical Medicine and Rehabilitation, Jakarta, Indonesia, ²Epidemiology Indonesia, Epidemiology Indonesia, Jakarta, Indonesia

Introduction/Background: Airway secretion clearance is crucial in Chronic Obstructive Pulmonary Disease (COPD) management, because exacerbations are caused by trapping of airway secretions in peripheral airway due to ineffective cough. The aim of this study was to evaluate the effect of three months pulmonary rehabilitation program in ability for coughing as natural airway secretion clearance in COPD patients. **Material and Methods:** A retrospective cohort study was done to investigate cough ability, measured with Peak Cough Flow (PCF) in patients with stable COPD grade A to D, with PCF score < 270 L/minute, who were finishing three months pulmonary rehabilitation program between Jan to Jun 2015. All patients receive same pulmonary rehabilitation protocol with variety in using static cycle or treadmill for exercise modality. Statistical paired *t*-test was performed to compare PCF baseline and after three months value. **Results:** This study was measuring cough ability in 31 male patients with COPD with mean age 64.94 ± 10.08 . PCF baseline value was 191.61 ± 53.86 L/minute. At three months after intervention, PCF value was 240.32 ± 77.82 L/minute, with $p > 0.001$. Eighteen patients in static cycle grup (PCF baseline was 186.67 ± 58.11 ; after three months was 236.11 ± 80.38 ; $p < 0.001$). Thirteen patients in treadmill grup (PCF baseline was 198.46 ± 48.79 ; after three months was 246.15 ± 76.97 ; $p < 0.028$). **Conclusion:** Pulmonary rehabilitation program for COPD patients with variety of exercise modality give significantly improvement in cough ability to maintain airway secretion clearance in clinically stable COPD state.

632

RELATIONSHIP BETWEEN FUNCTIONAL EXERCISE CAPACITY AND BALANCE IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

S. Sinaga¹, A. Ratnawati², T. Tambunan¹

¹Faculty of Medicine, Physical Medicine and Rehabilitation Department of Dr. Cipto Mangunkusumo National General Hospital, Jakarta, Indonesia, ²Faculty of Medicine, Physical Medicine and

Rehabilitation Department of Persahabatan Pulmonary Rehabilitation Centre Hospital, Jakarta, Indonesia

Introduction/Background: Chronic obstructive pulmonary disease (COPD) is usually marked by reduced functional exercise capacity. Some studies have shown that COPD patients also develop balance impairment. Many factors contribute to the reduction of functional exercise capacity and balance impairment. Severity of COPD, lack of physical activity, lower extremity muscle weakness and inspiratory muscle weakness have been associated with both problems. So, purpose this study To analyse the relationship between functional exercise capacity and balance. **Material and Methods:** The subjects are twenty five male patients with COPD. Functional exercise capacity was assessed in patients with COPD using predicted VO_{2peak} from six minutes walking test (6MWT). For the balance assessment, berg balance scale (BBS) scores and posturography using Anima Gravicorder's envelope area measurement were used. Pearson's correlations examined relationships between functional exercise capacity and balance. **Results:** There were positive correlations between predicted VO_{2peak} and BBS (Pearson correlation test, $r = 0.616$ and $p = 0.001$). There were negative correlations between predicted VO_{2peak} and envelope area measurement (Pearson correlation test, $r = -0.586$ and $p = 0.002$). **Conclusion:** There is a significant relationship between functional exercise capacity and balance.

633

THE EFFECT OF PHYSICAL THERAPY INTERVENTION ON FUNCTIONAL MOBILITY OF PATIENTS AT RESPIRATORY CARE CENTER SETTING IN A REGIONAL HOSPITAL

C.P. Tseng¹, C.Y. Huang¹, J.C. Hsu¹, C.C. Chang¹

¹National Taiwan University Hospital - Hsinchu Branch, Physical Medicine and Rehabilitation, Hsinchu, Taiwan

Introduction/Background: Patients in Respiratory Care Center (RCC) setting are generally in older age and are usually in bed-ridden status for a considerable period of time due to their complex clinical condition. Previous studies indicated that their functional ability such as mobility in bed and in sitting were limited. The de Morton Mobility Index (DEMMI) is an accurate and valid method of measuring mobility for elder patients in the subacute hospital setting. Physical therapy intervention may improve the mobility and weaning process of the patient in RCC setting. The purpose of our study was to explore the improvement in DEMMI score of patients in RCC setting after physical therapy intervention. **Material and Methods:** We enrolled patients at RCC in a regional hospital in Taiwan from Apr to Sep, 2015. Patients who could not follow order were excluded. Patient received physical therapy, including functional mobility training, breathing retraining, chest mobility and strengthening exercise training, three to five times per week. The DEMMI was tested at the first day and the last day of PT intervention in RCC. The paired *t*-test was used to examine the improvements in DEMMI score. **Results:** Thirty-four patients (20 men and 14 women, 72.79 ± 12.40 years old) were included to our study. Patients received 11.00 ± 6.52 physical therapy intervention sessions during their stay at RCC. The DEMMI score significantly improved 9.61 in total score (pre: 6.84 ± 7.42 , post: 16.45 ± 11.43 , $p < 0.001$). **Conclusion:** After the intervention of physical therapy, the functional mobility of patients in RCC setting significantly progressed, especially in bed mobility, sitting ability, and standing ability. Therefore, early intervention of physical therapy was important for patients in RCC setting and had superior effect on the improvement of their functional mobility. We show gratitude to National Taiwan University Hospital Hsin-chu Branch for administrative support.

634

IMPACT OF DEVICE-GUIDED SLOW BREATHING COMPOUNDED WITH NEUROMUSCULAR

ELECTRICAL STIMULATION OF RESPIRATORY MUSCLES ON RESPIRATORY MUSCLE STRENGTH, DIAPHRAGM THICKNESS AND MOBILITY IN PATIENTS WITH COPD

M. Zhang¹, Y. Liu¹

¹Guangdong General Hospital/Guangdong Academy of Medical Sciences, Rehabilitation Department, Guangzhou, China

Introduction/Background: COPD results in a functional decline of respiratory muscles. Breathing training and neuromuscular electrical stimulation (NMES) were effective interventions to attenuate the decline in this population. The aim of this study was to evaluate the efficacy of device-guided slow breathing compounded with neuromuscular electrical stimulation of respiratory muscles, which we call respiratory electrical stimulation training with bio-feedback (RESTB) on maximal respiratory pressure, diaphragm thickness and mobility in patients with COPD. **Material and Methods:** This was a controlled, randomized, and prospective clinical trial, performed on 41 moderate to severe COPD patients distributed in two groups, training (TG) and control (CG). TG followed a 12-week period RESTB protocol, while CG followed a sham one. In addition maximum expiratory and inspiratory pressure, mobility of the diaphragm and diaphragmatic thickness were evaluated by ultrasound. **Results:** After training, in TG maximal inspiratory pressure, maximal expiratory pressure, diaphragm thickness rate, and mobility increased by 18%, 10.9%, 10%, and 8.5% respectively, and their values were significantly higher than CG ($p < 0.005$, $p < 0.02$, $p < 0.005$, and $p < 0.03$ respectively). **Conclusion:** Device-guided slow breathing compounded with neuromuscular electrical stimulation of respiratory muscles could improve respiratory muscle strength, diaphragm thickness, and diaphragm mobility in patients with COPD.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: INTERNAL MEDICINE AND OTHER CONDITIONS - BLADDER AND BOWEL DISORDERS

635

A CASE OF DROP FOOT RELATED TO IMMEDIATELY AFTER THE DIAGNOSIS OF CROHN DISEASE

P. Doruk Analan¹

¹Baskent University, Physical Medicine and Rehabilitation, Adana, Turkey

Case Diagnosis: Right drop foot related to immediately after the diagnosis of Crohn Disease. **Case Description-1:** A 17-year-old male admitted to our clinic complaining of drop foot for two weeks. He lost weight about 20 kg in the last two months. Also, he complaint the nausea and vomiting in this time. When he consulted a doctor with these complaints, he had diagnosed Crohn Disease, which is the type of inflammatory bowel disease (IBD). Also, he described the sprain of him right foot two weeks ago. After this injury, he had noticed the numbness and weakness in this foot. In the physical examination, they were determined that minimal steppage gait, weakness of the right foot and toe dorsiflexors, and paresthesia of the right L5 dermatome. **Case Description-2:** In his electroneuromyographic study, motor and sensorial nerve conduction studies were obtained normal. In the needle electromyographic examination, polyphasia and decreased recruitment of MUAPs were found in the tibialis anterior and extensor digitorum brevis and gastrocnemius muscles. Also, they were found the fibrillations and positive sharp waves in the tibialis anterior muscles. His lumbar magnetic resonance imaging was found normal. At this point, these clinical and electroneuromyographic findings were consistent with a right L4-S1 radicular involvement due to Crohn Disease. After these evaluations, he was prescribed a home exercise program comprised of progressive muscle strengthening additionally posture, gait, and proprioceptive training. **Conclusion:** The nervous system damage

in Crohn disease may occur early period of the IBD. This damage is one of the most underreported extraintestinal manifestations (EIMs) in spite of having a high impact on quality of life, morbidity in these patients; therefore, an early recognition of neurologic symptoms is crucial for treating EIMs affecting the nervous system.

636

URODYNAMIC PROFILE IN DIABETIC BLADDER

A. Nouira¹, S. Frioui², S. Jemni², I. Belhajjoussef², R. Moncer², F. Khachnaoui²

¹Fattouma Bourguiba Hospital, Rehabilitation, Monastir, Tunisia,

²Sahloul Hospital, Rehabilitation, Sousse, Tunisia

Introduction/Background: Objective: Describe the urodynamic profile of the diabetic neurogenic bladder. **Material and Methods:** Retrospective study conducted between Jan 2013 and Jan 2014, in the urodynamic unit of the Physical Medicine and Rehabilitation Department at the Sahloul hospital in Sousse on diabetic patients who were sent to us for conducting urodynamic assessment. Each patient had a clinical and urodynamic evaluation. **Results:** A total of 12 patients, mean age of 53 years with a female predominance. Pollakiuria and urinary incontinence were the predominant symptoms. Urodynamic studies have revealed abnormalities in 8 patients. In most cases, the bladder was hypocompliant and hypoesensitive. The maximum flow rates were higher than 15 mL/s in 4 patients with a post-micturition residue greater than 50 ml in 9 patients. Uninhibited detrusor contractions were found in 3 patients. Profilometry objectified urethral hypertension in 1 patient. **Conclusion:** Most diabetic patients will voiding disorders related to diabetic cystitis. Its prevalence varies between 25 and 90%. Voiding disorders were found at the examination in 40% of asymptomatic patients. Urodynamic studies confirms the bladder involvement and allows to objectify significant abnormal diabetic cystitis even without any symptoms. The most frequently observed abnormalities are decreased bladder sensitivity and a lack of detrusor contractility.

637

ANTIBIOTIC USAGE OF URINARY TRACT INFECTION IN REHABILITATION PATIENTS AT HOSPITAL REHABILITASI CHERAS

P. Ong¹

¹Hospital Rehabilitation Cheras, Pharmacy, Cheras, Malaysia

Introduction/Background: Urinary tract infection (UTI) is a common infectious disease with an estimated 150 million people worldwide diagnosed each year. Most common pathogen that caused UTI is Escherichia coli. Inappropriate used of antibiotic in the treatment of UTI probably linked to the emergent of resistant strain bacteria. This study was to determine the common pathogen associated with UTI in our rehabilitation patients and whether the usage of antibiotic in the treatment is concordance with the National Antibiotic Guideline (NAG) 2008. **Material and Methods:** This retrospective observational study was conducted from Sep 2012 to Sep 2014. All patients diagnosed to have UTI were recruited in the study. However patient with other concurrent infection has been excluded. The target sample size calculated using was 63 subjects. The result has been presented in descriptive manner. The comparison of antibiotic usage in UTI with National Antibiotic Guideline was analyzed by Fisher exact formula. **Results:** 58 patients were recruited initially but 36 of them had been excluded. The final sample size was 22 patients. Majority of patients were Malay male (59.09%) aged between 31–40 years old (31.8%). The UTI occurred most commonly in patients with spinal cord injury (63.6%) with increased frequency of urination (40.9%) as the main symptom identified. The highest isolated bacteria in these patient were E. coli (54.5%) followed by K. pneumonia (14%) and P. aeruginosa (14%). Yet 23.3% of organisms were ESBL-producing subtype which is an alarming observation. The most used antibiotics were Cefuroxime (20.9%), Nitrofurantoin (16.3%) and Ciprofloxacin (16.3%). 59% of the cases

were treated concordance to the NAG 2008. *Conclusion:* UTI in rehabilitation patients is common especially in spinal cord injury. This study showed our practice in antibiotic usage concordance to NAG is moderate. Thus adherence to the NAG helped to justify treatment regimen and preventing inappropriate use of antibiotic.

638

PREVALENCE AND MANAGEMENT OF URINARY TRACT INFECTIONS ON THE PHEONIX REHABILITATION CENTRE

H. Osman^{1,2}, G. Thompson¹, L. Ready¹

¹Broadgreen Hospital, Phoenix Cent Re for Rehabilitation, Liverpool, United Kingdom, ²Cheshire and Merseyside Rehabilitation Network, Rehabilitation Medicine, Liverpool, United Kingdom

Introduction/Background: Urinary tract infections are a common problem in rehabilitation units as many patients have impaired mobility, neurologically conditions, catheterised and constipated. *Aims of the audit:* Review prevalence of Urinary Tract Infections (UTI's) amongst rehabilitation patients and compare management with NICE/SIGN and trust guidelines. Ensure correct management and prevention of UTI's. *Material and Methods:* Retrospective study looking at patients admitted between Sep 2014 and Sep 2015. 68 patients. Parameters on excel-spread-sheet. Re-audit of audit completed Sep 2014. Parameters included Sex, age, injury type, UTI during admission?, positive/negative urine cultures, antibiotics prescribed as guidelines?, symptomatic UTI?, catheterised?, month of UTI, known urology patient?, referred to urology?, dietician concerns?, constipation? These are known risk factors for UTI. *Results:* • 35% (24/68) patients were treated for UTI. • 14/24 (58%) female. • 25% (6/24) had recurrent UTI's. • Directlyproportional relationship between age and UTI noted (58%) over 65 years. • 18/24 (75%) were neurology patients. • 16/24 (63%) of patients with UTI in wheelchairs therefore poorer mobility- (compared to 23/68 (34%) of total). • 14/24 grew E.Coli or Coliform spp. • 16/24 (67%) were symptomatic for UTI. • 15/24 (63%) managed with Nitrofurantoin, others according to sensitivities. • Some females received longer antibiotic course. • 10/12 (83%) of patients with catheters were treated for UTI. • 15/24 (47%) of UTI's were during summer (May- Aug). • 3/24 known to urology were treated for UTI. • 3/24 referred to urology with recurrent UTI's. • 18/24 on treatment for constipation. *Conclusion:* -Patients were appropriately treated for UTI's. -Appropriate referrals to urology. -Results support evidence for risk factors for UTI. • Ensure correct diagnosis of UTI. • Ensure antibiotics are adjusted according to sensitivities. • Only catheterise if necessary and early removal if possible. • Encourage best mobility patient is able. • Prevent dehydration and constipation – encourage oral fluid intake and regular bowel habit review.

639

COMPARATION OF PELVIC FLOOR MUSCLE ENDURANCE IN PRIMIPAROUS AFTER BIOFEEDBACK METHOD OF PELVIC FLOOR MUSCLE EXERCISE BEGINNING 3 AND 6 WEEKS POST NORMAL VAGINAL DELIVERY

Y. Susanti¹, R.D. Haryadi¹, R. Satyawati¹

¹Airlangga University Faculty Medicine, Physical Medicine and Rehabilitation, Surabaya, Indonesia

Introduction/Background: To compare pelvic floor muscle endurance in primiparous after biofeedback method of pelvic floor muscle exercise beginning at 3 weeks and 6 weeks post normal vaginal delivery. *Material and Methods:* This was a pre test – post test group experimental study in post partum outpatient clinic and Rehabilitation Medicine outpatient clinic Dr. Soetomo Surabaya general hospital, Indonesia. Primiparous women divided into 2 groups; within 3 weeks after normal vaginal delivery ($n=19$) and 6 weeks after normal vaginal delivery ($n=18$). Each participant underwent physi-

cal examination at the post partum outpatient clinic of the Obstetric Gynecology Department and pelvic floor muscle exercise training at the Rehabilitation Medicine outpatient clinic in the first visit. Intervention with pelvic floor muscles exercise was given 3 times per day at home for 6 weeks combined with biofeedback method of pelvic floor muscle exercise and evaluation at the end of 1st, 2nd, 4th, 6th weeks at the Rehabilitation Medicine outpatient clinic. Pelvic floor muscle endurance were evaluated with Myomed 932 pressure biofeedback instrument. *Results:* The pelvic floor muscle endurance before training in the 6 weeks group was higher than 3 weeks group (3.94 ± 1.16 second, $p=0.014$). Delta pelvic floor muscle endurance compared before and after biofeedback method of pelvic floor muscle exercise within groups, 1st and 3rd evaluation (after 2 weeks), 1st and 5th evaluation (after 6 weeks) between groups was significantly different ($p<0.05$). The pelvic floor muscle endurance after 6 weeks biofeedback method of pelvic floor muscle exercise between groups were the same and not significantly different (10 second, $p=0.45$). *Conclusion:* Biofeedback method of pelvic floor muscle exercise for 6 weeks can improve pelvic floor muscle endurance in primiparous that begins at 3 weeks and 6 weeks post normal vaginal delivery. Both groups have similar pelvic floor muscle endurance after 6 weeks biofeedback method of pelvic floor muscle exercise.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: INTERNAL MEDICINE AND OTHER CONDITIONS - CANCER

640

THE EFFECT OF COMPLETE DECONGESTIVE THERAPY ON UPPER LIMB FUNCTIONS AND QUALITY OF LIFE IN PATIENTS WITH POSTMASTECTOMY LYMPHEDEMA

D. Sezgin Özcan¹, M. Aras¹, S. Ünsal¹, Ü. Düzlü¹, C.S. Polat¹, F. Koseoglu¹

¹Ankara Physical Medicine and Rehabilitation Training and Research Hospital, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Lymphedema, a frequent complication of breast cancer treatment, limits daily living activities by causing upper limb dysfunction. Complete decongestive therapy (CDT) has proven to be effective in reducing the extremity volume in postmastectomy lymphedema (PML). We aimed to evaluate the effect of CDT on upper extremity functions and quality of life. *Material and Methods:* A total of 37 women with PML (age, 53.5 ± 11.2 years) were included in this study. All patients underwent CDT including skin care, manual lymphatic drainage, remedial exercises and compression bandages. Circumferential measurements were performed from specific anatomic landmarks before and after the treatment (wrist, mid forearm, elbow, mid upper arm, axilla). Arm volume and rate of the edema reduction were calculated by a formula for truncated cone by using circumferential measurements. We used Short Form-36 (SF-36) to evaluate the quality of life, Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire for upper extremity dysfunction and Visual Analog Scale (VAS) for evaluating the severity of pain and heaviness. *Results:* The mean of the edema reduction rate was $38.1 \pm 26.5\%$. We observed statistically significant reduction in pain and heaviness VAS scores among upper extremities with lymphedema ($p<0.001$). The median of post treatment DASH score was lower compared to pre-treatment [36.6 ($9.2-66.6$), 51.6 ($11.6-84.2$), respectively $p<0.001$]. Also, all of the SF-36 parameters which were evaluated pre-treatment increased significantly post-treatment ($p<0.01$). The decrease of DASH scores correlated significantly with the increase of physical component scores of SF-36 ($r=0.355$, $p=0.031$), while no correlation was detected with the increase of the mental component scores ($r=0.159$, $p>0.05$). *Conclusion:* CDT, a widely used treatment strategy of lymphedema, provides improvement of upper extremity functions and quality of life by reducing pain and sensation of heaviness.

641

REHABILITATION NEEDS OF WOMEN WITH NON-METASTATIC BREAST CANCER**S. Ergül¹, M. Aras¹, S. Ünsal-Delialioğlu¹**¹Ankara Physical Medicine and Rehabilitation Training and Research Hospital, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Breast cancer survivors might experience limitation of shoulder mobility, lymphedema, pain, fatigue, weight gain, depression. The aim of this study was to evaluate the these impairments and their effect on the life quality. *Material and Methods:* The study included 100 patients (age:55±10.8 years, disease duration: 4.9±4.4 years) with non-metastatic breast cancer. Patients were screened and examined for the presence of upper extremity impairments such as motion restrictions, lymphedema, pain, numbness and loss of strength. Lymphedema was noted as in three stages of severity and shoulder range of motion (ROM) was measured using a goniometer and a difference of $\geq 20^\circ$ between both sides was considered as impaired ROM. Fatigue Severity Scale (FSS), Short-Form 36 Health Survey (SF-36) and Beck Depression Scale (BDS) were administered. *Results:* Fifty-nine patients had shoulder pain and 31 had shoulder ROM limitation. Fifty-five patients had moderate to severe upper extremity lymphedema. Weight gain after the disease was common and forty-six patients were obese. Fifty-seven patients reported moderate-severe deconditioning. Sixty-two patients reported arthralgia. Eighteen patients had severe difficulties in daily living activities. Beck Depression Scale scores showed that 59 (59%) patients had symptoms of depression and SF-36 scores were significantly lower in these patients. Forty-one patients (41%) had moderate to severe fatigue as assessed by FSS. Only, seven patients did not report fatigue. Quality of life scores were lower ($p < 0.001$) in patients with moderate to severe fatigue or lymphedema. *Conclusion:* Our results show that women with breast cancer patients face many physical impairments of upper the extremity and functional limitations which reduce their quality of life. Inclusion of rehabilitation services through the follow-up period is needed.

642

A RARE CAUSE OF SCIATICA**E. Ata¹, S. Sakarsu¹, L. Tekin¹**¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Etiologies of traumatic, compressive, ischemic, neoplastic, or idiopathic etiologies may cause sciatica. Most common cause of sciatica is spinal disc herniation pressing on the lumbar or sacral nerve roots. Spondylolisthesis, spinal stenosis, piriformis syndrome and pelvic tumors are also causes sciatica. Herein, we report a case of severe sciatica due to metastatic transitional cell carcinoma of bladder. *Material and Methods:* A 45-year-old male presented with severe persistent pain in the upper thigh-lower buttock region, swelling in the left lower extremity and had difficulty walking for 15 days. The pain was radiating to the left leg, calf, and toes. He had a history of transurethral bladder tumor resection 11 mos ago. The tumor was diagnosed as non-muscle invasive but also high grade (Pt1) after surgery. On examination, there was severe pain in the buttock with palpation and hip movement. His muscle strength in the lower extremities was 5/5 bilaterally with an antalgic gait. Deep tendon reflexes were normal. Non-steroid antiinflammatory agents, tramadol and pregabalin did not reduce the pain and it was resistant even fentanyl. Metastasis of tumor was suspected. Magnetic resonance imaging showed a lesion of about 29×8 cm in diameter around the piriformis muscle in the left pelvis that compresses left sciatic nerve. The Tru-Cut biopsy confirmed the metastasis. *Results:* The patient was consulted with an oncologist. The pain was gradually relieved after systemic chemotherapy. *Conclusion:* Lymph nodes, bones, lung, and liver are the most common metastases from bladder cancer. Less fre-

quent metastatic sites include the pleura, brain, and skin. Muscular metastases from urothelial carcinoma are very rare. In conclusion, it should be kept in mind that persistent sciatica may be indicative of gluteal muscle metastasis in patients with bladder tumor.

643

AN EVALUATION OF THE EFFECT OF VITAMIN D LEVEL ON LYMPHEDEMA IN PATIENTS WITH MALIGNANCY**P. Doruk Analan¹**¹Baskent University, Physical Medicine and Rehabilitation, Adana, Turkey

Introduction/Background: In this study, it was aimed to determine whether there is a correlation between the serum level of vitamin D and lymphedema in patients with malignancy. *Material and Methods:* It was evaluated the data of 11 female patients. It was recorded type of malignancy, side of lymphedema, BMI, VAS and Q-DASH, Stemmer sign, serum levels of the 25 (OH)Vit D, calcium and phosphorus; the history of chemotherapy, radiotherapy, lymph node dissection; stage of lymphedema, the diameter differences between affected and unaffected extremities, the volumetric differences between affected and unaffected extremities, range of motion and motor deficits of the affected extremity. It was evaluated the correlations between these measurements. *Results:* The mean age of the study population was found 55±15.76. Ten patients had breast carcinoma, one patient had endometrial carcinoma. BMI was 30.7±10.83. Also, serum level of the 25 (OH)Vit D, calcium and phosphorus were found 13.14±8.42; 9.6±0.37; and 3.8±0.54; respectively. Two patients had stage 1 lymphedema while five patients had stage 2, the last 4 patients had stage 3 lymphedema. There was low statistically significant correlation between time of lymphedema, Stemmer sign, the diametric and volumetric differences and the level of 25 (OH) vitamin D. Also, there was negative correlation between 25 (OH) vit D levels and VAS, Q-DASH. *Conclusion:* Serum level of 25 (OH) vitamin D may be correlate with of lymphedema, Stemmer sign, diametric and volumetric differences. Also, low level of this vitamin can be precipitate the pain and decreased of the quality of life.

644

DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF OUR PATIENTS WITH LYMPHEDEMA SECONDARY TO MALIGNANCY**P. Doruk Analan¹**¹Baskent University, Physical Medicine and Rehabilitation, Adana, Turkey

Introduction/Background: The aim of this study was to evaluate the demographic and clinical characteristics of patients with lymphedema secondary to malignancy, who were treated at the PMR Department of Baskent University in Adana, Turkey. *Material and Methods:* A total of 95 female patients were included in the study. It was recorded type of malignancy, side of lymphedema, stage of lymphedema, BMI, VAS, Q-DASH, Stemmer sign, the history of chemotherapy and radiotherapy, ROM and motor deficits of the affected extremity. *Results:* The mean age of the study population was found 52.3 (30–81) years. 75 patients were house-wife. 8 patients were employee. Other patients were retired. 87 patients had breast carcinoma. Other malignancies were recorded as endometrial carcinoma (3 patients), cervix carcinoma (3 patients), ovarian carcinoma (1 patient), sarcoma in the lower extremity (1 patient). Side of lymphedema was right in 38 patients. The mean BMI was found 31.05 (19.57–43.28). The main precipitating factor of lymphedema was exhausting work (28 patients). Other factors were surgery, chemotherapy, radiotherapy, travelling by bus or aircraft, trauma, omega 7, biting by insects. 30 patients were not describe any precipitating factor for the lymphedema. Only 8 patients described the history of manual lymphatic drainage in the past. 13 patients dressed personal compression garments before the admission. 56 patients had limitation of ROM. Also, 8 pa-

tients had motor deficits in the affected extremity. Stemmer sign was found in 18 patients. In the patients with breast carcinoma, axillary cording was found in 11 patients. 12 patients had grade 1 lymphedema. 66 patients had grade 2 lymphedema. Other patients were grade 3 lymphedema. History of chemotherapy and radiotherapy were found in 89 and 82 patients, respectively. VAS was found 3 (0–10). In the patients with breast cancer-related lymphedema Q-DASH was 15.0 (0–81). **Conclusion:** Malignancy related lymphedema is multifactorial, disabling. The evaluation, demographic and clinical characteristics, and treatment are variable.

645

DISABILITY INSURANCE ASSISTANCE BY PHYSIATRISTS AT A CANCER CENTER

J. Fu¹, M.P. Osborn¹, J.K. Silver², R. Yadav¹, E. Bruera¹

¹University of Texas MD Anderson Cancer Center, Palliative-Rehabilitation & Integrative Medicine, Houston, USA, ²Harvard Medical School, Physical Medicine & Rehabilitation, Boston, USA

Introduction/Background: Cancer survivor numbers are rapidly growing around the world. Many survivors suffer from sequelae due to cancer and its treatment that make return to work impossible. Physiatrists are often asked to assist with the insurance disability application process. This is the first study to describe the experience of cancer physiatrists with disability insurance assistance. **Material and Methods:** Descriptive retrospective analysis of all new outpatient consultations from 1/1/2009–12/31/2013 at a tertiary referral based cancer center. **Results:** A total of 349 cancer patients who referred to the physiatry clinic were analyzed. 128/349 (36.7%) had the topic of disability and/or work accommodations brought up at some point with the physiatrist during the duration of their care in the PM&R clinic. Of those where disability/work accommodations was discussed, 55/128 (48.7%) patients were originally referred for disability assistance specifically. 63/128 (49.2%) had disability insurance paperwork completed by the physiatrist. Of those where disability insurance was filled out, 11/63 (17.4%) had federal social security disability paperwork and 52/63 (82.5%) had private disability insurance paperwork. 11/63 (17.4%) already were on disability and insurance paperwork was taken over by the physiatrist. 4/63 who initially had disability paperwork filled out decided to return to work. Outcomes of private disability insurance applications were 28/37 (75.7%) Approved, 3/37 (8.1%) Denied, and 6/37 (16.2%) Unknown/Lost to Follow-up/Died. Attempts were made to return to work with accommodations for 5/37(%) before private disability insurance application was pursued. The median form size was 33 items (standard deviation=25.95). **Conclusion:** Disability and return to work are topics frequently discussed in our outpatient physiatry clinic including many who were not originally referred for disability guidance. The majority of patients who applied for disability insurance with physiatry assistance were approved.

646

MULTIPLE MYELOMA WITH PRIMARY MUSCULOSKELETAL SYMPTOMS PRESENTING IN PHYSICAL MEDICINE & REHABILITATION CLINICS : A CASE REPORT

H. Habib¹

¹Bangabandhu Sheikh Mujib Medical University, Physical Medicine & Rehabilitation, Dhaka, Bangladesh

Introduction/Background: Multiple Myeloma is a malignancy of plasma cells with wide range of manifestations including musculoskeletal system. Here we are presenting a case, with inflammatory oligoarthritis that is not the usual way of presentation in the musculoskeletal clinics of Physical Medicine & Rehabilitation (PM&R). **Material and Methods:** To highlight the atypical presentations of patients with Multiple Myeloma Methodology: Descriptive case study. **Results:** A 61-year-old nondiabetic gentleman presented with inflam-

matory oligo-arthritis involving both knee, left ankle and wrist for 3 months. Physical examination revealed moderate anemia, tenderness elicited over the area between left 5th to 7th rib. Investigations: Hb – 8.6 g/dl, ESR – 120 mm in 1st hour, CRP – 120 mg/dl, PBF- dimorphic anemia, S. Creatinine – 1.2 mg/dl, S. Calcium – 9.3 mg/dl, RA and Anti-CCP are negative, imaging showed-mass lesion in left lower chest, CT guided FNAC of mass lesion showed suggestive of multiple myeloma, X-ray skull showed multiple lytic lesions, Urinary Bence Zones Protein was absent, Plasma Protein Electrophoresis- Monoclonal Bbetopathy, Synovial Fluid Study from right knee showed: hazy colour, WBC count- 9,000 cells/cmm predominantly neutrophils, MSU Crystals in polarized light microscopy and finally bone marrow study revealed Plasma cell Dyscrasia (about 60%). **Conclusion:** Lessons, we learnt from the case report is that we should not miss the diagnosis concentrating only on musculoskeletal symptoms. Meticulous history taking, thorough physical examinations and relevant investigations will guide the right way to establish the diagnosis.

647

THE CANCER REHABILITATION SCREENING TOOL: MALAY TRANSLATION AND OBSERVATIONS IN BRUNEI NATIONAL CANCER CENTER PATIENTS

A.J. Haig¹, V. Tie¹, K. Kok¹, S. Smith², M. Manivasagam¹, M. Haig³

¹Brunei National Cancer Center, Rehabilitation, Brunei, Brunei, ²The University of Michigan, Rehabilitation, Michigan, USA, ³Yale University-, Rehabilitation, New Haven Connecticut, USA

Introduction/Background: The rehabilitation needs of cancer patients are complex and often difficult to identify because of the variable course of disability. The Cancer Rehabilitation Screening Tool (CRST) is 14-question survey designed for low-effort screening on oncology wards and clinics. The Brunei National Cancer Center (NCC) has initiated a program of rehabilitation screening, however the predominant language in Brunei and 268,000,000 people is Malay/Indonesian. The current study validates a Malay version of the CRST and assesses the rehabilitation needs of Bruneians with cancer. **Material and Methods:** The CRST was translated into Malay, then back-translated by 5 bilingual Bruneians. Back-translation was compared to the original by an American non-clinician. The CRST was then distributed to inpatients and some outpatients at the NCC, a center that deals primarily with cancer of high severity. **Results:** Back-translation showed high fidelity to the original English. Eighty-one patients, 44% inpatient, 58% female, average age 51±15 (s.d.) completed the CRST. Colorectal (22%), breast (16%), lymphoma (12%) and lung (12%) cancers were most common, with 63% widespread, 20% local and 17% unknown stage of cancer. Positive answers to pain questions (62%), function questions (73%) and future risk questions (64%) were found. **Conclusion:** The CRST is valid for Malay/Indonesian speaking populations. Most Brunei National Cancer Center patients surveyed had important issues best dealt with by a rehabilitation expert. Validation vs. the impact of rehabilitation intervention must still be done. However oncology units in Malay/Indonesian speaking regions should consider routine use of this tool, now validated in the regional language, to compare CRST responses to rehabilitation consultations.

648

THE CANCER REHABILITATION SCREENING TOOL: A SHORT TEST TO IDENTIFY REHABILITATION NEEDS ON ONCOLOGY WARDS AND OUTPATIENT SERVICES

A.J. Haig¹, S. Smith¹, P. Tappenden¹, M.E. Hobson¹, G. Kanphade¹, J. Magenau²

¹The University of Michigan, Department of Physical Medicine and Rehabilitation, Ann Arbor- Michigan, USA, ²The University of

Michigan, Department of Medicine- Oncology Division, Ann Arbor- Michigan, USA

Introduction/Background: For survivors and those still suffering from cancer, medical rehabilitation is increasingly an important pathway to improved quality of life. Because the disability from cancer comes more haphazardly than the sudden onset of stroke, trauma, and other disorders typically treated by rehabilitation physicians, the major challenge is to routinely identify rehabilitation need. Also, because of the variable course of the disease, the 'need' for rehabilitation is different from the presence of certain conditions including pain or paralysis. So a simple function survey is not appropriate. **Material and Methods:** An expert committee of psychiatrists, oncologists, physical therapists, occupational therapists, speech-language pathologists, rehabilitation psychologists, oncology nurses and rehabilitation nurses held a brainstorming session on potential functional needs of cancer patients. An extensive 67 question survey was designed. This survey was given to 82 bone marrow transplant inpatients and used to assist in clinical rehabilitation screening. (Smith S, ACRM2015) The group reconvened and brainstormed on the essential questions that drove these cases to need rehabilitation intervention and on pragmatic issues such as language and length of survey. A final survey was designed and distributed to bone marrow transplant inpatients. **Results:** The resulting Cancer Rehabilitation Screening Tool (CRST) includes 12 yes-no questions and a final open-ended question. It was given to 40 volunteer patients. The 12 questions can be grouped in terms of pain, function, and risk, as below. Subject responses were: -Pain: Severe 17%, Undiagnosed 12%, Disabling 12%, New 10%. Any 'yes' 42%. -Function: Problem with work 10%, uses an assistive device 22%, needs help with basic activities of daily living 12% and have stopped doing fun activities 30%. Any 'yes' 52%. -Risk: Caregiver burnout 7%, good chance of repeat hospitalization 12%, considering a nursing home 2%, at risk for falling 5%, and have emotional or thinking problems that are not addressed 2%. Any 'yes' 27%. The final question, 'Do you have any other concerns that you wish a rehabilitation doctor would address?' netted pertinent questions from 6 (12%) of the subjects. **Conclusion:** The Cancer Rehabilitation Screening Tool is a rapid simple survey that can be used routinely by oncology inpatient teams to identify issues that may be addressed by a rehabilitation team. A substantial percentage of bone marrow transplant inpatients have pain, function, or risk of disability issues that are potential targets for rehabilitation consultation.

649

PRIMARY NON-HODGKIN'S LYMPHOMA PRESENTING AS RADICULAR SYNDROME: A CASE REPORT

C.T. Huang¹, W.C. Lin²

¹Chi Mei Medical Center, PM&R, Tainan, Taiwan, ²Chiali Chi Mei Hospital, PM&R, Tainan, Taiwan

Introduction/Background: Primary bone lymphoma is an extremely rare and distinct clinicopathological entity that has been recognized as a malignant neoplasm composed of lymphoid and myeloid tissues. **Material and Methods:** The purpose of this article is to report and discuss a case of primary non-Hodgkin's lymphoma presented with unilateral cervical radiculopathy in a 76-year-old woman. Cervical MRI revealed C5 vertebral body lesion involving whole body, bilateral pedicle, left lamina and spinous process, with vertebral body central necrosis, which lead to first impression of TB spine. However, after patient underwent decompression surgery, biopsy revealed diffuse large B-cell lymphoma. **Results:** Our patient received decompression surgery followed by serials of chemotherapy. Outcome was favorable with partial remission of the neurological symptoms. **Conclusion:** Clinical onset and radiographic evaluation is uncharacteristic in early stages of primary bone lymphoma in spine. Spinal MRI is mandatory in cases with persist pain or poor response to conservative treatment. Surgery is indicated in all patients with deteriorated neurological status. A review of the literature of patients with primary bone lymphoma presenting with spinal cord/root compression is presented.

650

CLINICAL CHARACTERISTICS OF VIDEOFLUOROSCOPIC SWALLOWING STUDY (VFSS) IN PATIENTS WITH HEAD AND NECK CANCER AFTER RADIATION THERAPY

M. Jung¹, S. Jee¹

¹Chungnam National University Hospital, Department of Rehabilitation Medicine, Daejeon, Republic of Korea

Introduction/Background: To evaluate functional characteristics of swallowing and compare parameters for dysphagia in head and neck cancer patients after radiation therapy. **Material and Methods:** Medical records of 32 cases with head and neck cancer from Jan 2012 to May 2015 referred for videofluoroscopic swallowing study (VFSS) were reviewed retrospectively. We divided the patients into 2 groups; Early status group (< 1 month after radiation therapy), late status group (> 1 month after radiation therapy). Regarding VFSS results, we measured modified penetration aspiration scale (MPAS) and american speech-language-hearing association national outcome measurement (ASHA-NOMS) level. For the swallowing physiology, oral transit time (OTT), pharyngeal delay time (PDT), and pharyngeal transit time (PTT) were recorded. Patients answered to questionnaires of quality of life; MD Anderson Dysphagia Inventory (MDADI), EQ-5D-5L index, EQVAS, Quality of Life Questionnaire-Core 30 (QLQ-C30), Functional Oral Intake Scale (FOIS). We compared demographics, quality of life, MPAS, ASHA-NOMS and swallowing physiology between 2 groups. **Results:** We analyzed 32 cases (28 men, 4 women; mean age 63 years). Sixteen patients (50%) were located to the early status group and vice versa. The site of tumor was oropharynx (n=12), oral cavity (n=6), hypopharynx (n=5), nasopharynx (n=5) and larynx (n=4). No patient in early status group showed penetration or aspiration and 8 patients (50%) showed penetration or aspiration in late status group (p=0.006). PTT was longer in late status group (p=0.044). MPAS of yoplait, soup, fluid was higher and ASHA-NOMS level was lower in late status group (p<0.05). EQVAS, FOIS was significantly different between 2 groups (p<0.05). **Conclusion:** Dysphagia was prevalent 1 month after radiation therapy. Patients at late status group had lower quality of life due to swallowing dysfunction. Most patients with dysphagia showed a problem in pharyngeal phase. Our study suggests, before starting rehabilitation, it is necessary to evaluate swallowing function appropriately.

651

THE EFFECTS OF POSTOPERATIVE MYOFASCIAL RELEASE THERAPY FOR BREAST CANCER PATIENTS : SINGLE CENTER, PROSPECTIVE OBSERVATIONAL PILOT STUDY

C.J. Kim¹, P. Kyun Woo², P. Eun Ha¹, O. Hyun Jin¹, L. Jae Min¹, S. Jae Kwang¹

¹Daejeon Wellness Hospital, Rehabilitation, Daejeon, Republic of Korea, ²Daejeon Wellness Hospital, Medical Oncology, Daejeon, Republic of Korea

Introduction/Background: Breast cancer operation often results in pain, impaired shoulder function, those make lowering quality of life of patients. But there is little concern about early rehabilitative intervention for postoperative breast cancer patients. Myofascial release is known to be effective in controlling symptoms in patients with chronic myofascial pain syndrome. To measure the effectiveness of myofascial release therapy in breast cancer patients with postoperative pain, impaired range of motion (ROM) and satisfaction rate of patients' global assessment, we performed the study. **Material and Methods:** A single center, prospective, observational study was conducted in Daejeon Wellness hospital in Korea. Manual therapy including myofascial release therapy started in the first 4~6 weeks after breast cancer surgery, and lasted for 4 weeks. **Results:** 18 patients were enrolled. But 3 patients were dropped. Total

15 patients completed the study, every patients had pain on postoperative affected shoulder, 8 patients had impaired ROM. Mean pain intensity (VAS) of first day was 3.8 and that of last day was 2.25. 93% of patients experienced pain improvement. The improvement in mean range of motion of the affected arm was abduction 30 (SD 14.3), external rotation 38.3 (SD 20.4), forward flexion 48.8 (SD 20.8). Satisfaction rate of the patients' global assessment was 83%. **Conclusion:** This study demonstrated that manual therapy including myofascial release decrease shoulder pain intensity and improved range of motion. Also satisfaction rate was increasing after myofascial release. We conclude myofascial release therapy is very effective manual therapy for patients after breast cancer surgery, further study may show promising results.

652

RISK FACTOR FOR UPPER LIMB DYSFUNCTION IN PATIENTS WITH HEAD AND NECK CANCER: A 1-YEAR PROSPECTIVE STUDY

E. Kobayashi¹, H. Matsumoto¹, M. Osaki¹, H. Hagino¹

¹Faculty of Medicine - Tottori University, Rehabilitation Division, Yonago, Japan

Introduction/Background: We investigated the risk factors for upper limb dysfunction within 1 year of operation in patients with head and neck cancer. **Material and Methods:** We evaluated the medical records of 49 patients who underwent neck dissection for head and neck cancer between 2012 and 2015 at the Tottori University Hospital. All participants provided written informed consent. Patient characteristics and information regarding the presence of lymph node dissection, postoperative chemotherapy, radiation therapy, complications, and albumin and total protein levels before and at 1 month after the operation were assessed. Preoperative and 1-month postoperative range of motion (ROM) in the neck and shoulder were measured using a goniometer. Upper limb dysfunction was assessed before and 1 year after the operation by using the Japanese Orthopaedic Association (JOA) shoulder score. The patients were divided into 2 groups – dysfunction and no-dysfunction groups – according to the JOA score 1 year after the operation; reduction of ≥ 2 standard deviations in the preoperative JOA score was defined as upper limb dysfunction. **Results:** The dysfunction group consisted of 10 patients (20.4%), who were significantly older than the patients in the no-dysfunction group. Preoperative and 1-month postoperative albumin and total protein levels were significantly lower in the dysfunction group. The 1-month postoperative range of shoulder flexion, abduction, horizontal abduction, neck flexion, extension, and side flexion were significantly lower in the dysfunction group. In the multivariate analysis, the 1-month postoperative range of shoulder flexion (odds ratio, 0.95; 95% confidence interval, 0.915–0.978) was a significant risk factor for upper limb dysfunction at 1 year after the operation. **Conclusion:** Limited 1-month postoperative shoulder flexion poses a risk for upper limb dysfunction. For individuals with limited shoulder flexion after the operation, ROM improvement by exercise therapy is necessary to prevent disability in the future.

653

PHYSICAL FUNCTION AND HEALTH-RELATED QUALITY OF LIFE OF PATIENTS UNDERGOING SURGICAL TREATMENT FOR MALIGNANT PLEURAL MESOTHELIOMA

S. Morishita¹, T. Tanaka¹, M. Hashimoto², Y. Itani¹, Y. Honda¹, M. Nagase¹, S. Hasegawa², K. Domen³

¹Hyogo College of Medicine Hospital, Department of Rehabilitation, Nishinomiya, Japan, ²Hyogo College of Medicine, Department of Thoracic Surgery, Nishinomiya, Japan, ³Hyogo College of Medicine, Department of Rehabilitation Medicine, Nishinomiya, Japan

Introduction/Background: Malignant pleural mesothelioma (MPM) is a rare form of cancer that affects the thin cell wall lining of the body's internal organs and structures. Studies have shown that patients with lung cancer have decreased pulmonary function and exercise capacity after compared to before pneumonectomy. However, to date, the physical function and health-related quality of life (QoL) details of patients with MPM treated surgically have not been discerned. The aim of this study was to investigate the physical function and health-related QoL of patients undergoing pleurectomy/de-corticication (P/D) for MPM. **Material and Methods:** The 16 patients (14 men, 2 women) underwent P/D for MPM between Dec 2013 and Mar 2015. Physical function was assessed using tests for hand-grip strength, knee-extensor strength, 6-min walk test (6MWT), and pulmonary function tests including those for forced expiratory volume (FEV) and vital capacity (VC). The patients' health-related QoL was assessed using the Medical Outcome Study 36-item Short Form Health Survey (SF-36). **Results:** The 6MWT, FEV, and VC significantly decreased after compared to before P/D ($p < 0.01$). There were no significant differences in hand grip or knee extensor strength before and after P/D. Additionally, on eight SF-36 subscales, health-related QoL, physical functioning, role physical, bodily pain, and vitality significantly decreased after P/D ($p < 0.05$). On the other SF-36 subscales, health-related QoL did not differ significantly before and after P/D. **Conclusion:** Patients with MPM who undergo P/D have decreased physical function and health-related QoL. Exercise capacity and pulmonary function decreased more than limb muscle strength after surgery. Physicians, nurses, and rehabilitation staff should note these findings, which may provide insight into the development of customized rehabilitation strategies for patients with MPM who undergo P/D.

654

RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND PHYSICAL FUNCTION IN ALLOGENEIC HEMATOPOIETIC STEM-CELL TRANSPLANTATION PATIENTS

S. Morishita¹, K. Kaida², S. Yamauchi¹, T. Wakasugi¹, O. Saino¹, K. Ikegame², H. Ogawa², K. Domen³

¹Hyogo College of Medicine Hospital, Department of Rehabilitation, Nishinomiya, Japan, ²Hyogo College of Medicine, Division of Hematology- Department of Internal Medicine, Nishinomiya, Japan, ³Hyogo College of Medicine, Department of Rehabilitation Medicine, Nishinomiya, Japan

Introduction/Background: A previous study reported that allogeneic hematopoietic stem cell transplantation (allo-HSCT) patients exhibit decreased physical activity and function following allo-HSCT, when compared to pre-treatment levels. The purpose of this study was to evaluate physical activity and physical function in allo-HSCT patients. **Material and Methods:** The study included 32 patients (men: $n=17$ and women: $n=15$) who underwent allo-HSCT between Jun 2013 and Mar 2015. Patients were evaluated for up to 3 weeks before, and 7 weeks following the transplantation. Daily steps and physical activity were assessed using a triaxial accelerometer. Physical function was assessed using tests for hand-grip strength, knee-extensor strength, a 6-min walk test (6MWT) and a functional reach test (FRT). Further, a timed up and go test (TUG) was performed to give a metric for balance function. **Results:** Physical activity of >3 metabolic equivalents (METs) was significantly increased following transplantation, compared to pre-transplantation ($p < 0.05$). However, daily steps and physical activity of 1–2 METs, and 2–3 METs did not show significant change before or after HSCT. Hand-grip strength, knee-extensor strength, and 6MWT were significantly decreased following HSCT in allo-HSCT patients ($p < 0.01$). Additionally, the TUG metric was observed to significantly increase following HSCT ($p < 0.01$). Daily steps and physical activity of 2–3 METs and >3 METs was positively correlated with hand-grip, knee-extensor strength, 6MWT, and FRT ($r = 0.35-0.54$, respectively, $p < 0.05$). Furthermore, daily steps and physical activity of 2–3 METs and >3 METs were negatively correlated with TUG

($r=-0.43$ – -0.49 , respectively, $p<0.05$). **Conclusion:** Physical activity is associated with physical function. Physicians, nurses, and rehabilitation staffs should recommend exercise as a means of increasing physical activity for allo-HSCT patients.

655

USEFULNESS OF ULTRASONOGRAPHY IN EARLY DETECTION OF SECONDARY LYMPHEDEMA: PRELIMINARY STUDY

G. Park¹, H.S. Bae¹

¹Ewha Womans University- School of Medicine, Department of Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: This study is aimed to evaluate usefulness of ultrasonography for early detection of secondary lymphedema. When lymphedema is untreated, it is easy to be aggravated, especially in upper limb lymphedema. Current practice recommends its early identification to initiate treatment with seemingly a better therapeutic outcome. **Material and Methods:** Only stage 0 and 1 patients were recruited by “the international society of lymphology”. Twenty women who had secondary lymphedema while in treating for unilateral breast cancer were subjected. Arm circumferences, skin and subcutaneous thickness and elasticity index were measured. Patients were divided by 2 groups depending on circumference difference between affected and unaffected extremities; less than 2 cm as one group and 2 cm and greater for the other according to clinical practice guideline by “the Korean society of lymphology”. Skin thickness, Subcutaneous thickness, Elasticity Index and arm circumference were compared each other. **Results:** Mean age of the twenty patients was 55, and mean duration of disease was 31 months. Twelve patients who had the circumference difference less than 2 cm had significantly thicker skin on the affected upper limb comparing to the other ($p<0.05$). There is no significant difference in subcutaneous thickness and elasticity index. The other 8 patients who had the difference of arm thickness less than 2cm didn't have only statistical significance on skin thickness of the affected arm but also on subcutaneous tissue thickness when they were compared with the unaffected arm ($p<0.05$). Eight patients also had significantly greater elasticity index of the affected arm than that of unaffected arm ($p<0.05$). **Conclusion:** In this study, ultrasonography was considered as a useful tool for early detection of secondary lymphedema by comparison of affected and unaffected limb. The skin thickness preceded cutaneous tissue change in early stage. The cutaneous tissue change is possible mechanism of the lymphedema progression.

656

URINARY INCONTINENCE AND QUALITY OF LIFE IN PROSTATE CANCER

D. Calafiore¹, M. Pinto²

¹Second University of Naples, Medical and Surgical Specialties and Dentistry, Naples, Italy, ²Istituto Nazionale Tumori di Napoli, Health Policy- Pharmacy and Quality of Life, Naples, Italy

Introduction/Background: Urinary incontinence is a frequent event after radical prostatectomy that restricts patients' social and quality of life. The aim of our study is to evaluate the role of early rehabilitation in the improvement of both urinary continence and Quality of Life after prostate cancer surgery. **Material and Methods:** We enrolled 31 men who received radical prostatectomy in the previous month and presented urinary incontinence (Pad test >50 gr/24 hrs). Given their informed consent, they underwent a rehabilitation program including pelvic floor exercises, biofeedback and educational training for 3 months 3 times/week. Inclusion criteria were: age <75 years, absence of severe comorbidities (New York Heart Association III-IV classes, breathlessness by Medical Research Council scale >3 , neurological diseases, renal and liver failure) and other cancer (- excluding squamous/basal skin carcinoma). We recorded: age, Body Mass Index (BMI), comorbidities, Pad Test and SF-12 Utah Health Status Survey - Physical Health Composite Scale (PCS) and Mental Health Compos-

ite Scale (MCS) - scores before (T0) and after treatment (T1). **Results:** Patients personal data were: age 66.23 years ± 5.2 , BMI 24.97 ± 8.5 , 22 (71%) patients presented comorbidities. Our results were: T0 Pad Test >50 g/24 hrs in 31 patients (100%), T1 Pad test <50 gr/24 hrs in 29 patients (93.5%) and >50 g/24 hrs in 2 patients (6.5%), SF12 T0 PCS score 46.41 ± 7.34 and T1 PCS score 51.43 ± 7.26 (p value 0.011), T0 MCS score 49.95 ± 11.95 and T1 MCS score 51.43 ± 7.26 (p value 0.029). **Conclusion:** Early rehabilitation significantly improves urinary continence and Quality of Life in a short time and it has to be strongly recommended after radical prostatectomy.

657

MANAGEMENT OF THE PATIENTS WITH BONE METASTASIS UNDER BONE METASTASIS CANCER BOARD

Y. Sakai¹, K. Kakutani², H. Hara², Y. Ejima³, M. Nakayama¹, Y. Kobayashi¹, T. Kawamoto², K. Maeno², R. Sasaki³, Y. Kizawa⁴, M. Kurosaka², T. Akisue⁵

¹Kobe University Graduate School of Medicine, Division of Rehabilitation Medicine, Kobe, Japan, ²Kobe University Graduate School of Medicine, Department of Orthopaedic Surgery, Kobe, Japan, ³Kobe University Graduate School of Medicine, Department of Radiological Oncology, Kobe, Japan, ⁴Kobe University Graduate School of Medicine, Department of Palliative Care Medicine, Kobe, Japan, ⁵Kobe University Graduate School of Health Sciences, Department of Rehabilitation Science, Kobe, Japan

Introduction/Background: Because of increasing in the numbers of cancer survivor, patients with bone metastasis are also increased. Skeletal related event and followed decreasing ADL and QoL which caused by bone metastasis (BM) become more important problem in cancer patients. However, treatment and management for BM are often insufficient because of ignored and unmotivated by physicians. Therefore, we established the cancer board for bone metastasis (Bone Metastasis Board: BMB) with multidisciplinary and multidepartment for early diagnosis, appropriate treatment and maintain ADL and QoL in BM patients. In this study, we report the effect of BMB on surgical treatment and rehabilitation for BM. **Material and Methods:** 238 Patients with BM who were registered in BMB from 2013–2014 were enrolled in this study. (148 males, Average of age; 66.4 years) We collected the data of their backgrounds, Barthel index (BI), Euro-QoL-5-dimension (EQ5D), performance status (PS) and pain retrospectively. In addition we also investigated the number of operation for SRE and prescription of rehabilitation before and after starting BMB. **Results:** The number of operations were increased about 3 times (2012: 12cases, 2013: 41cases, 2014: 32cases) after starting BMB. The number of prescriptions of rehabilitation were increased about 7 times (2012: 10 cases, 2013: 71 cases, 2014: 65 cases) after stating BMB. There was no significant difference between 2013 and 2014 in the backgrounds of registered patients. The patients who were prescribed rehabilitation had lower ADL, QoL and PS, and they had severer pain and high frequency of pelvic metastasis. From multivariate stepwise logistic regression analysis showed the risk-factor of death in the duration of follow-up was low stairs score of BI (Odds ratio: 0.899, 95%CI: 0.857–0.943). **Conclusion:** After stating BMB, the number of operation and rehabilitation were increased. We might missed the patients who needed appropriate treatment for BM before stating BMB. This cancer board was useful for the management of BM.

658

THE EFFECT OF INTERMITTENT PNEUMATIC COMPRESSION AND DECONGESTIVE LYMPHATIC THERAPY VERSUS EFFECT OF DECONGESTIVE LYMPHATIC THERAPY ALONE IN BREAST CANCER RELATED UPPER EXTREMITY LYMPHEDEMA

T. San¹, K.S. Oo², K.M. Hla¹

¹University of Medicine, Physical Medicine and Rehabilitation, Yangon, Myanmar Burma, ²University of Medicine, Physical Medicine and Rehabilitation, Yangon, Myanmar Burma

Introduction/Background: Breast cancer is one of the most common cancers in Myanmar. Approximately one in four breast cancer patients developed upper extremity lymphedema after operation or radiation treatment. Aim of the study was to determine the combined effect of Intermittent Pneumatic Compression (IPC) with Decongestive Lymphatic Therapy (DLT). **Material and Methods:** This study was hospital based prospective controlled clinical study. Sixty-six patients were selected by eligible criteria from Radiation Oncology Department and Physical Medicine and Rehabilitation Department of Yangon General Hospital, Myanmar. After getting informed consent, they were divided into group A (IPC and DLT) and group B (DLT) alone. Group A patients received DLT (Manual Lymphatic Drainage by physiotherapist, skin care, bandaging and exercises) combined with IPC at 40–70 mmHg for 30 minutes for four weeks. Group B patients also received DLT alone for four weeks. For next four weeks, patients of both groups performed DLT by patients themselves. Outcome measures such as pain (VAS), swelling by girth measurement (cm) and Range of Motion of both shoulders (ROM) were collected at 1st, 2nd, 4th, 6th and 8th week. For comparison between two groups, Pearson's Chi-square and Independent *t*-test were applied. **Results:** Thirty-three patients were selected for each group. Age group of 50–59 years and the right upper limb involvement were commonest in all patients. VAS and ROM scores were improved in both groups. The mean scores of swelling reduction were (2.89±1.14) in group A and (0.99±0.40) in group B ($p<0.001$) at the end of 4th week. The mean scores of swelling reduction were (2.90±1.26) in group A and (1.92±0.91) in group B ($p=0.001$) at the end of 8th week. **Conclusion:** The combined effect of IPC and DLT (Group A) gave better swelling reduction effect than DLT alone (Group B) in lymphedema patients. It showed that IPC can be used together with DLT treatment.

659

MULTIDISCIPLINARY TEAM APPROACH TO THE PATIENTS WITH PELVIC METASTASES: ANALYSES OF 46 PATIENTS

Y. Shinoda¹, R. Sawada², F. Yoshikawa¹, H. Kobayashi², T. Sakae², H. Kawano³, H. Nobuhiko¹

¹The University of Tokyo Hospital, Rehabilitation Medicine, Tokyo, Japan, ²The University of Tokyo Hospital, Orthopaedic Surgery, Tokyo, Japan, ³School of Medicine- Teikyo University, Orthopaedic Surgery, Tokyo, Japan

Introduction/Background: Bone metastasis to pelvis, especially to acetabulum, is one of the most problematic situation for cancer patients. Few guidelines have been published for the treatment and rehabilitation for pelvic metastases. In our hospital, multidisciplinary team for bone metastases was organized in 2012, and the team examines all of the patients with bone metastases. The team consists of physiatrists, physical therapists, occupational therapists, orthopedic surgeons, spine surgeons, radiologists, radiotherapists, palliative care team, nurses and medical social workers. Our goal is to keep ADL and QoL of these patients. In this study, we analyzed treatments of pelvic metastases and ambulatory ability of these patients. **Material and Methods:** This study included 46 patients who had metastases around acetabulum and sacroiliac joint which were diagnosed with plain X-ray images from Apr/2013 to Aug/2015. We examined axial CT images for all the patients and when cortex deficiency was identified around the acetabulum, we investigated sagittal and coronal CT sections. We recommended partial or no weight bearing if the deficiency was extensive. We allowed FWB (full weight bearing) in other patients. We administered bone modifying agents to all patients, and we performed radiotherapy to the patients with impending fracture and/or refractory pain. **Results:** The median age was 65 years and the average follow-up period was 248 days. Radiotherapy was performed to eleven patients, but no

operation was performed. Twelve patients were not allowed FWB ambulation and were taught how to move without FWB. Among them, only three patients could not walk with crutches, but could transfer to wheelchair by themselves. No fracture occurred in the follow-up period. **Conclusion:** In this study, all patients with pelvic metastases around acetabulum or sacroiliac joint could walk by themselves with or without crutches, except for three wheelchair-confined patients. The multidisciplinary team approach might be useful for keeping ADL of the patients with bone metastases.

660

REDUCTION IN MUSCLE OXYGEN METABOLISM DURING HSCT ENGRAFTMENT IN THE CLEAN ROOM

T. Wakasugi¹, S. Morishita¹, K. Kaida², Y. Itani¹, S. Ori¹, S. Mabuchi¹, K. Ikegame², N. Kodama³, H. Ogawa², K. Domen⁴

¹Hyogo Collage of Medicine Hospital, Department of Rehabilitation, Nishinomiya, Japan, ²Hyogo Collage of Medicine Hospital, Division of Hematology- Department of Internal Medicine, Nishinomiya, Japan, ³Hyogo Collage of Medicine, Department of Rehabilitation, Nishinomiya, Japan, ⁴Hyogo Collage of Medicine, Department of Rehabilitation Medicine, Nishinomiya, Japan

Introduction/Background: Allogeneic hematopoietic stem cell transplantation (allo-HSCT) has been increasingly used to treat malignant hematopoietic disease. Patients undergoing allo-HSCT are treated with high-dose chemotherapy and total body irradiation, followed by infusion of donor-harvested bone marrow, peripheral blood stem cells, and cord blood. HSCT patients are treated in a clean room for a long time and often have induced disuse syndrome because of inactivity. Near-infrared spectroscopy (NIRS) is a clinical, noninvasive method for monitoring changes in skeletal muscle oxygenation. This study aimed to investigate metabolic and hemodynamic changes in skeletal muscle oxygenation using NIRS during engraftment in the clean room. **Material and Methods:** This study included 10 male patients who underwent HSCT between May 2013 and Mar 2015 at the Hyogo College of Medicine Hospital in Japan. Muscle O₂ saturation of hemoglobin (SmO₂) levels in the tibialis anterior was measured non-invasively using NIRS. Changes in SmO₂ were measured for 3 min after repeated isometric dorsiflexion until exhaustion. SmO₂ levels were compared pre- and post-transplantation. Body weight, hemoglobin concentration, calf circumference, and ankle dorsiflexion muscle strength were measured simultaneously. **Results:** Following the exercise task, the maximum amplitude of SmO₂ (Δ SmO₂) decreased after HSCT (25.37%±11.84% vs. 13.6%±7.21%). The Hb level did not significantly change before and after HSCT (8.99±2.38 mg/dl vs. 9.99±2.2 mg/dl). Body weight decreased by approximately 20% (60.84±15.86 kg vs. 56.78±15.03 kg) during engraftment. Calf circumference decreased after HSCT (33.65±4.73 cm vs. 30.85±4.24 cm). Ankle dorsiflexion muscle strength decreased after HSCT (6.62±3.44 kgf vs. 4.07±1.72 kgf). **Conclusion:** Reduction in muscle oxygen metabolism after HSCT was involved during engraftment in the clean room.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: INTERNAL MEDICINE AND OTHER CONDITIONS - METABOLIC DISORDERS (E.G. OBESITY, DIABETES MELLITUS)

661

EFFECTS OF EXERCISE TRAINING ON CHRONOTROPIC RESPONSE AND EXERCISE CAPACITY IN PATIENTS WITH TYPE 2 DIABETES

W. Chen¹, G. Gao¹, M. He¹, J. Lli¹, J. Zhou¹

Rehabilitation Department of Xuzhou Center Hospital, Xuzhou, Jiangsu, China

Objective: To observe effects of 12-week exercise training program on chronotropic response and exercise capacity in patients with type 2 diabetes (T2DM), and try to explore the mechanism. **Methods:** System-limited cardiopulmonary exercise testing was performed in 60 T2DM patients, undergoing medical therapy and had no sports taboo, from Jun 2013 to Dec 2014 in our Department. They were randomly assigned to 12-week exercise training program or a no exercise control group. After 12 weeks, testing was performed again. HRstage, CR indexes, HRRT, exercise capacity, physical parameters and biochemical indexes were assessed. **Results:** 1. The change of physical and biochemical data were compared before and after treatment as follows: after 12 weeks, exercise group had lower ($p < 0.05$). The control group had no change on these indexes ($p > 0.05$). 2. The change of HRstage and CR indexes were compared before and after treatment as follows: HRstage were significantly ($p < 0.05$). 3. The change of HRRT were compared before and after treatment as follows: the exercise group had higher ($P < 0.05$). 4. The change of exercise capacity were compared before and after treatment as follows: exercise time, Peak VO_2/kg and Peak VO_2/kg pred were significantly ($p < 0.01$) increased in the exercise group, which the control group had no change ($p > 0.05$). Peak VO_2/kg had a positive correlation with rHR and HRRes ($r=0.42, 0.49$ respectively, $p < 0.01$) in exercise group. **Conclusion:** T2DM patients had cardiovascular autonomic neuropathy (CAN), which is showed in chronotropic incompetence and lower heart rate recovery. Exercise training can improve heart chronotropic function and heart rate recovery in patients with T2DM, which induce them become more adapt to the exercise stress. It can also optimize their body metabolism and enhance exercise capacity.

662

DOES EXERCISE AFFECT MEAN PLATELET VOLUME IN OBESE FEMALES?

M. Dođru¹, A. Sahin², E. Yilmaz Yalcinkaya², E. Ergin Solmaz³

¹Istanbul Physical Therapy and Rehabilitation Training and Research Hospital, Sports Medicine, Istanbul, Turkey, ²Istanbul Physical Therapy and Rehabilitation Training and Research Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey, ³Istanbul Physical Therapy and Rehabilitation Training and Research Hospital, Diet and Nutrition, Istanbul, Turkey

Introduction/Background: The purpose of this study was to determine the impact of exercise training on the mean platelet volume (MPV) in obese female patients. **Material and Methods:** This retrospective study has collected 71 cases of obese female patients. We studied the effects of a hypocaloric diet ($n=35$, age: 47.57 ± 10.5 yr, body mass index: 35.7 ± 3.0 kg/m^2) and a hypocaloric diet with exercise training ($n=36$, age: 40.11 ± 9.7 yr, body mass index: 33.5 ± 2.5 kg/m^2) on MPV. Exercise training consisted of five 60-minutes exercise sessions per week during 6 weeks. Each exercise session consisted of 45 min of aerobic walking exercise and 15 minutes of resistance exercises. The exercise intensity was established by heart rate levels that corresponded to the age-predicted maximal heart rate formula, $220 - \text{age}$. Body mass index, metabolic parameters and MPV were measured at baseline and after 6 weeks diet and exercise treatment. **Results:** There was a positive correlation between weight loss and reduction in MPV in both groups. However, exercise training didn't have any significant effect on MPV. It is concluded that weight loss decreased the plasma MPV levels independently of exercise training. **Conclusion:** Previous studies have demonstrated that MPV is significantly higher in obese patients and associated with cardiovascular risk factors. It has also been demonstrated that MPV levels were decreased in obese patients after diet treatment. Our findings agree with those of other studies. Further studies with long-term exercise may be needed to obtain a positive effect on the MPV.

663

ANAEROBIC THRESHOLD MAY BE ESTIMATED BY FREQUENCY ANALYSIS OF HEART RATE VARIABILITY DURING AN INCREMENTAL EXERCISING TEST IN PATIENTS WITH OBESITY

A. Masayuki¹

¹Department of Internal Medicine and Rehabilitation Science, Tohoku University Graduate School of Medicine, Sendai, Japan

Introduction/Background: Frequency analysis of heart rate variability (HRV), which is convenient and noninvasive, is widely used to evaluate autonomic nervous system activity. We have found that anaerobic threshold (AT) are estimated from changes in the high-frequency (HF) component of HRV in an incremental exercising test in healthy young adults. The aim of this study was to clarify whether frequency analysis of HRV estimates AT in patients with obesity. **Material and Methods:** Subjects participated were nine patients with obesity (male/female ratio, 6/3). The subjects performed an incremental exercise to exhaustion to determine peak VO_2 and ventilator threshold (VT) using a cycle ergometer with expired gas analysis. Frequency analysis of HRV was performed during exercise. Electrocardiographic R signals were obtained at 1,000Hz, and then HF component (0.15–0.40 Hz) and low-frequency (LF) component (0.04–0.15 Hz) were extracted. **Results:** Mean values for age, height, weight and body mass index were 49.9 ± 11.7 years, 171.6 ± 6.6 cm, 86.7 ± 12.4 kg and 29.3 ± 2.8 kg/m^2 , respectively. HF declined with soon increasing exercise intensity in most cases, and HF at VT was significant lower compared with resting level. The ratio LF to HF did not change to VT and tended to elevate with increasing exercise intensity over VT. The point that HF reached a plateau against the workload was defined as HRVT-HF. Heart rate at HRVT-HF significantly positively correlated with heart rate at VT. In addition, the Bland-Altman analysis showed that heart rate at HRVT-HF was coincident with heart rate at VT. **Conclusion:** This study clarified that HF was decreased with a concomitant increase in exercise intensity and it was significantly lower at AT level compared with resting level in patients with obesity. These results suggest that HF may be useful for deciding optimal exercise intensity in patients with obesity.

664

EFFECT OF ABDOMINAL RESISTANCE EXERCISE ON ABDOMINAL SUBCUTANEOUS FAT OF OBESE WOMEN: A RANDOMIZED CONTROLLED TRIAL USING ULTRASOUND IMAGING ASSESSMENTS

P. Noormohammadpour¹, R. Kordi¹, S. Dehghani¹, M. Rostami¹, M.A. Mansournia²

¹Sports Medicine Research Center- Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran, ²Department of Epidemiology and Biostatistics, School of Public Health- Tehran University of Medical Sciences, Tehran, Iran

Introduction/Background: The aim of this study was to compare the effect of diet and an abdominal resistance training program to diet alone on abdominal subcutaneous fat thickness and waist circumference of overweight and obese women. **Material and Methods:** This randomized clinical trial included 40 overweight and obese women randomly divided into 2 groups: diet only and diet combined with 12 weeks of abdominal resistance training. Waist and hip circumferences and abdominal skin folds of the subjects were measured at the beginning and 12 weeks after the interventions. In addition, abdominal subcutaneous fat thickness of the subjects was measured using ultrasonography. Percentage body fat and lean body mass of all the subjects were also measured using a bioelectric impedance device. **Results:** After 12 weeks of intervention, the weight of participants in both groups decreased; but the difference between the 2 groups was not significant ($p=0.45$). Similarly, other variables including abdominal subcutaneous fat, waist circumference, hip circumference, body mass index, body fat percentage, and skin fold thickness were reduced in both groups; but there were no

significant differences between the groups. *Conclusion:* This study found that abdominal resistance training besides diet did not reduce abdominal subcutaneous fat thickness compared to diet alone in overweight or obese women.

665

DIABETES MELLITUS : A SYNONYM TO FUNCTIONAL HYPOPARATHYROIDISM

A. Saraf¹

¹Ludhiana, India

Introduction/Background: Poor control of blood glucose levels in patients of Diabetes Mellitus often results in low bone mineral density. The reason for this decrease in bone mass is at present uncertain. In this study, we evaluated correlation of calcium metabolism with blood glucose levels and normal renal function. *Material and Methods:* A total of 130 diabetic patients (35 Type 1, 95 Type 2) were enrolled in this study. In all patients plasma calcium (Ca), serum phosphate (PO₄), serum parathyroid hormone (PTH), and 24-h urinary calcium (uCa) were determined under both poor and improved control (for at least 7 days) as ascertained by four blood glucose determinations daily. *Results:* Improvement of blood glucose level was associated with reduction of uCa both in Type 1 (6.7 ± 1 vs 5.0 ± 0.9 mmol/day) and in Type 2 patients (4.3 ± 0.4 vs 3.1 ± 0.4 mmol/day). It was also found that considerably more Type 1 patients (15 out of 35) had PTH values below the detection limit (1.5 pmol/l) during poor than during improved control (4 out of 35). Type 2 patients also showed this difference but to a lesser extent. 33 out of 95 patients had PTH level below detection limit during poor control as compared to only 5 patients who had good control. Comparison between the two types of diabetes showed that in Type 1 under poor control, Ca and PTH were lower, while uCa was higher, and after improved control, only uCa continued to be higher. *Conclusion:* Increased uCa excretion and decreased PTH levels are associated with uncontrolled blood glucose levels (especially in Type 1 diabetes). Therefore decreased serum PTH levels in uncontrolled Diabetes Mellitus may be one of the factors leading to reduced bone mass. Hence it is justified to call Diabetes Mellitus a synonym to functional hypoparathyroidism.

666

EFFECTS OF LOW-TO-MEDIUM INTENSITY INTRADIALYTIC RESISTANCE TRAINING IN ELDERLY CHRONIC HEMODIALYSIS PATIENTS - PRELIMINARY EFFECTS AFTER ONE YEAR OF INTERVENTION

K. Shiota¹

¹Waseda Univ., Faculty of Sport Science, Tokorozawa, Japan

Introduction/Background: To analyze the effects of intradialytic resistance training on physical function in 8 hemodialysis patients aged ≥60 years. *Material and Methods:* Physical function (10-m walk test), blood pressure, heart rate, and biochemical data were analyzed before and after 3 and 12 months of exercise therapy. Focusing on muscle strengthening of the trunk and legs while on bed rest, the exercise load of the intervention was individualized for each patient. *Results:* Significant differences were observed in ankle plantar flexor strength, the Timed Up and Go test, and maximum walking speed between before and after 3 months of intervention. However, no significant differences were observed from 3 to 12 months, indicating that there was no long-term improvement upon low-to-medium resistance training during hemodialysis. *Conclusion:* Further studies with increased sample sizes are required to elucidate the appropriate intensity, frequency, and duration for an effective resistance training program in this population.

J Rehabil Med Suppl 55

667

THE LEVEL OF AWARENESS OF PHYSICAL ACTIVITY IN PEOPLE WITH OVERWEIGHT AND OBESITY

M. Hagner -Derengowska¹, J. Siminska², K. Pietkun², K. Ogurkowski², K. Nowacka², W. Hagner²

¹Nicolaus Copernicus University, Department of Clinical Neuropsychology, Bydgoszcz, Poland, ²Nicolaus Copernicus University, Department of Rehabilitation, Bydgoszcz, Poland

Introduction/Background: Obesity is evolving as a result of continuing for a long time positive energy balance, which are conducive to environmental elements. An important factor causing obesity is insufficient physical activity undertaken. Excessive body weight is usually negatively affects quality of life, appearance, and also those who are overweight accompanied by negative feelings, low self-esteem and self-esteem. *Material and Methods:* The study enrolled 40 adult overweight and obesity (30 women, 10 men). The subjects were randomly matched with evidence of overweight and obesity. The research method was an anonymous questionnaire containing 25 questions. Most of the information was associated with physical activity, quality of life and diet. The questions concerned the activities undertaken related to the reduction of body weight or failure of these activities and their causes. Other questions concerned the eating habits and associated addictions. *Results:* Analysis of the results subjects with obesity shows that respondents are dissatisfied with the quality of life, low physical fitness. Overall quality of life of people with excess body weight in the scale of 1–5 was an average of 3.84. Most respondents (62.10%) indicated lack of desire for physical activity in the fight against obesity. In a survey performed analysis on obstacles to the taking of physical activity - among men dominated the answer to lack of time, while the majority of women indicated lack of motivation and lack of desire for physical activity. *Conclusion:* The results of the survey showed that awareness of physical activity in a group of subjects with obesity, demonstrated a mean level of knowledge about physical activity and healthy lifestyles. Regular physical activity and well maintained diet significantly positive effect on mental and physical.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: INTERNAL MEDICINE AND OTHER CONDITIONS - BURNS

668

FACTORS INFLUENCING THE OUTCOME OF PATIENTS WITH BURN INJURIES

J. Nishimoto¹, Y. Fujino¹, R. Uchida¹, H. Takahashi¹, S. Makita¹

¹International Medical Center - Saitama Medical University, Rehabilitation, Hidaka, Japan

Introduction/Background: Several studies reported that the percentage of total body surface area (%TBSA) or the burn index (BI) in patients with burn injuries has no effects on their outcome. However, what factors influencing the outcome of patients with burn injuries are still unknown. Therefore, the purpose of this study was to evaluate the characteristics or demographic data for burn injuries patients and investigate the factors related to their outcome. *Material and Methods:* Twenty-nine patients participated in this study. Patients were divided into two groups; group that was discharged to home (Group D), and group that was transferred to another hospital (Group T). We investigated age, %TBSA, BI, Prognostic Burn Index (PBI), the frequency of physical therapy (PT), occupational therapy (OT) and speech therapy (ST), days from onset to initial rehabilitation, days from onset to initial ambulation, length of hospital stay, Functional Independence Measure (FIM) at initial and final examination, FIM gain, the injuries

of respiratory tract, and surgery of skin grafting. PBI consists of age plus BI that was devised scale as the severity of burn injury in Japan. We compared these indices using unpaired *t*-test and chi-square test. **Results:** In Group D, PBI was significantly lower than Group T. Frequency of PT and FIM at final examination in Group D were significantly higher than Group T. However, the other factors showed no significant difference between the two groups. **Conclusion:** This results suggested that interaction of age and severity of burn injury has a significant effect on outcome. The respiratory tract injuries are thought to relate to severity of burn injuries. However, this study showed that the content of burn injuries of extremities or trunk had significantly influenced on their outcome. Finally, it is important to increase the PT frequency for burns patients with high PBI.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: INTERNAL MEDICINE AND OTHER CONDITIONS - ORGAN TRANSPLANTATION

669

TEST TO RETEST RELIABILITY OF OBJECTIVE POSTURAL CONTROL MEASURES IN LUNG TRANSPLANT RECIPIENTS

**G. Ebenbichler¹, S. Doblhammer², M. Pachner³, P. Anner⁴,
K. Kersch-Schindl¹, P. Jaksch⁵**

¹Vienna Medical University, Physical Medicine & Rehabilitation, Vienna, Austria, ²Unfallkrankenhaus Meidling, Trauma Surgery, Vienna, Austria, ³Vienna Medical University, School of Dentistry, Vienna, Austria, ⁴Vienna Medical University, Department of Emergency Medicine, Vienna, Austria, ⁵Vienna Medical University, Department of Thoracic Surgery, Vienna, Austria

Introduction/Background: After surgery, lung transplant recipients (LuTX) are typically cachectic, sarcopenic and limited in their mobility with an increased risk of falls. Assessment and treatment outcome monitoring of impaired postural performance seems relevant to the rehabilitation process of these patients. This study sought to examine the test-retest reliability of three postural stability measures. **Material and Methods:** A total of 50 LuTX recipients underwent quantitative posturographic testing (SMART EquiTest, Neurocom, USA) with all the Sensory Organization Test (SOT), the Motor Control Test (MCT) and the Limits of Stability Test (LOS). LuTX recipients were assessed twice, 2 days before discharge from the acute hospital stay, 1 to 3 days later (day 2), and after completion of rehabilitation (day 3). The main variables of interest were the equilibrium composite score derived from the SOT, the average delay of motor response from the MCTs, and the distance of the maximum trunk excursion in the anterior posterior direction (MXE, cm) from the LOS. Reliability was evaluated with the intraclass correlation coefficient (ICC_{2,1}), Bland Altman plots, the standard error of measurements, and the smallest detectable differences (SDD). **Results:** Relative reliability was found varied and ranged from poor for the MCT (ICC_{2,1}=0.2), fair for the SOT Equilibrium score (ICC_{2,1}=0.6), to excellent for the LOS-MXE (ICC_{2,1}=0.86). Unlike the other variables, the SOT equilibrium score improved significantly between baseline and the first retest with such changes to the better being clearly larger than those between the second and third test days. The SEM was 7.1 points for the SOT equilibrium score, 17.1 ms for the MCT, and 10.7mm for the MXE, respectively. **Conclusion:** Among the three SMART Equitest protocols, the LOS was the only test that enabled an excellent level of reliability and an acceptable level of detection of expected changes in postural stability as a result of planned rehabilitation intervention in LuTX recipients.

670

HANDS TO THE HEART: INDIA'S FIRST TWO CASES OF BILATERAL CADAVERIC HAND TRANS- PLANTATION

R. Sankaran¹, S. Iyer², M. Sharma²

¹Amrita Institute of Medical Sciences and Research Centre -, Physical Medicine and Rehabilitation, Cochin, India, ²Amrita Institute of Medical Sciences and Research Centre -, Plastic Surgery, Cochin, India

Introduction/Background: While Solid organ transplantation is prominent in Southeast Asia, we present the first 2 cases of Mixed Composite Tissue transplantation. Both of our patients had traumatic bilateral transradial amputation. Each consented to cadaveric hand transplant. The surgery consisted of: forearm ORIF, pulvertaft weave of tendons, vessel anastomosis and neurotization. **Material and Methods:** Rehabilitation began immediately with orthotics and PRoM. ADL retraining, selective strengthening, and electrical stimulation were added later. Each was evaluated monthly using: PRoM, SHUEE (Shriners Hospital Upper Extremity Exam), 9 hole peg test, and Surface EMG of the hand muscles. Outcomes were measured with the DASH (Disabilities of the Arm, Hand, and Shoulder) and Chen functional scoring. **Results:** Patient 1 was the victim of crush injuries while defending female passengers in a train. As some muscles were avulsed the remainder were joined and abnormal mechanics emerged. This manifested as some digits overlapping. The donor hand also had a volar plate fracture of D3 on the right which impaired grasp. These were addressed in rehabilitation. Surface EMG at 8 months showed recruitment pattern in ADM and FDI bilaterally. Chen score at 12 months was 1, and DASH showed a net change of 60 points. Patient 2 was a military captain whose injury occurred after defusing his 31st landmine of the day. As all muscles were present the tendon weave was done for each individual muscle. Postoperatively there was restriction due to malunion. Surface EMG done at 8 months showed activity in the L ADM. Comparatively he had a smoother rehabilitation course. DASH and Chen scores at one year are pending for this patient. **Conclusion:** Mixed Composite Tissue transplantation is a feasible procedure that translates into improved quality of life.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: INTERNAL MEDICINE AND OTHER CONDITIONS - MISCELLANEOUS

671

BODY COMPOSITION ANALYSIS AND ESTIMA- TION OF PHYSICAL FITNESS BY SCORING GRADES IN SAUDI ADULTS

S.S. Habib¹

¹King Saud University, Physiology, Riyadh, Kingdom of Saudi Arabia

Introduction/Background: Obesity is a global problem with a fast increase in prevalence. Little data are available on fitness scoring and body composition in Saudi population. Therefore, we aimed to determine the prevalence of different categories of body composition in healthy Saudi adults and its relationship with fitness scoring. **Material and Methods:** An epidemiologic cross-sectional study on 428 healthy adult Saudi subjects aged 18–72 years (Mean±SD, 36.90±15.22). All participants underwent body composition analysis assessed by bioelectrical impedance analysis. Measurements included body weight, body mass index (BMI), protein mass, fat mass, percent body fat (%BF) and fitness scoring based on the target values. **Results:** The mean BMI and fitness score was 27.22±5.65 & 69.3±8.48 respectively. The percent prevalence of underweight, normal weight, overweight, obesity class I, obesity

class II and obesity class III was 2.91 ($n=13$), 33.81 ($n=139$), 35.27 ($n=145$), 19.46 ($n=80$), 6.32 ($n=26$) and 2.18 ($n=9$) respectively. About 13.4% ($n=57$) individuals had poor fitness, while 28.7% ($n=123$) had fair fitness scores. Good fitness score was seen in about 50.9% ($n=218$). Only 7.8% ($n=33$) subjects had normal body fats and 10.7% ($n=46$) subjects showed lesser body fats than required. While the percentage of subjects with extra body fats ranging from <2kg, 2–4.9, 5.0–9.9, 10.0–14.9, 15–19.9 and ≥ 20 kg was 12.1 ($n=52$), 19.4 ($n=83$), 15.6 ($n=67$), 15.6 ($n=65$), 9.0 ($n=38$) and 10.3 ($n=44$) % respectively. Significant gender differences were observed in BMI, fitness score, %BF and other parameters of body composition. **Conclusion:** The prevalence of obesity, percent body fat and poor fitness is high in Saudi population with significant gender differences. In this regard public awareness programs including exercise and diet teaching are required at large scale to cope up with the growing burden of obesity.

672

REHABILITATION OF ACUTE MYOSITIS; DOES IT MATTER?

S. Hassan¹, R. Bunyan², K. Darawil¹

¹King Fahad Specialist Hospital, Rehabilitation Medicine- Neuroscience center, Dammam, Kingdom of Saudi Arabia, ²King Fahad Specialist Hospital, Neurology- Neuroscience Center, Dammam, Kingdom of Saudi Arabia

Introduction/Background: Myositis is an inflammatory myopathy manifested by proximal limb muscles weakness, elevated creatinin kinase, electromyography changes, and muscle inflammation in biopsy. Myositis can cause immobility in different ways. This might be a direct cause of muscle weakness, or indirectly through pain, disuse, and or joint stiffness. Rehabilitation has been recommended mainly in chronic phase. Some researchers considered that rehabilitation for patients in acute phase may improve their functional prognosis without major side effect. **Material and Methods:** In this communication the author presents two cases of myositis that had different presentation with different types of myositis, and impairment of mobility. The clinical scenario, backed up by a diagnostic work up, of each case will be discussed, and a review of their rehabilitation course and the outcome when rehabilitation is performed early. **Results:** In this case discussion the author will describe the various physical impairments associated with myositis, and will review the assessment of these impairments and highlights the measures to overcome any resulting functional limitations. **Conclusion:** Myositis can cause severe forms of muscle weakness, and the important of early referral to the rehabilitation team might be overlooked during the acute stage. The aim of this paper is to shed a light over the different patterns of physical disabilities in this group of patients and emphasizes the importance of a multidisciplinary approach to assist the recovery process in a timely fashion.

673

MISDIAGNOSED PSORIATIC ARTHRITIS: A CASE REPORT

M. Kaplan¹

¹Gulhane School of Medicine- Haydarpasa Training Hospital, Internal Medicine, Istanbul, Turkey

Introduction/Background: Psoriatic arthritis (PsA) is a type of arthritic inflammation that occurs in about 15 percent of patients who have a skin rash called psoriasis. This particular arthritis can affect any joint in the body and symptoms vary from person to person. Research has shown that persistent inflammation from psoriatic arthritis can lead to joint damage. Early diagnosis is important to avoid damage to joints. **Material and Methods:** In Dec 2014, a 65-year-old woman was admitted to the Internal Medicine department of our hospital with complaints of polyarthralgia and polyarthritis involving the toes, ankles and proximal interphalangeal joints. On the

contrary, her joint pain and swelling were obvious and increased on her toes. Her family history and previous medical history were unremarkable. The patient had visited different hospitals with similar symptoms 3 and 4 months ago and had been given different antibiotics and painkillers. **Results:** On her physical examination, we found subfebrile fever: 37.8 C, Heart rate:96/min, and blood pressure:120–80 mmHg. Examination of the abdomen, chest and central-peripheral nervous system was unremarkable. Hematological investigations revealed leukocytes: 9,400/mm³ (4,000–10,000/mm³), Hemoglobin:11 gr/dl (13.5–18 g/dl). Hematocrit: 34% (42–52); Thrombocytes: 298,000 mm³, Erythrocyte sedimentation rate:32 mm/hour (0–30 mm/hour), The electrolytes, renal and cardiac parameters, sugar, thyroid function tests were all found to be normal. The serological tests for antinuclear antigen (ANA), Rheumatic factor (RF), Antistreptolysin O (ASO) and anti-neutrophil cytoplasmic antibody (ANCA) were also found to be negative. **Conclusion:** PsA may be more common than previously described. In addition, the burden of disease is demonstrated both in terms of progression of clinical and radiological damage and in terms of quality of life and functional status of these patients. Moreover, patients with PsA are at an increased risk of death, which is related to the severity of their disease.

674

COMPARING THE EFFECT OF BOTULINUM TOXIN TYPE B INJECTION AT DIFFERENT DOSAGE FOR PATIENT WITH DROOLING DUE TO BRAIN LESION

H.D. Park¹, H. Seok Hyeon¹

¹Seoul Medical Center, Rehabilitation Center, Seoul, Republic of Korea

Introduction/Background: To investigate Botulinum toxin type B (BNT-B) injection's effect and duration depending on dose for patients with brain lesion. **Material and Methods:** Twenty one patients with brain lesion and severe drooling were included and divided into three groups. All patients received conventional dysphagia therapy. Group A patients ($n=7$) received an injection of 1,500 units and group B patients ($n=7$) received an injection of 2,500 units of BNT-B in submandibular gland under ultrasound guidance. Group C patients ($n=7$) received conventional dysphagia therapy. Saliva secretion was assessed quantitatively at baseline and at weeks 1, 2, 4, 8, and 12. The severity and frequency of drooling was assessed using the Drooling Quotient (DQ) by patients and/or caregivers. **Results:** Group A and B reported a distinct improvement of the symptoms within 2 weeks after BNT-B injection. Compared to the baseline, the mean amount of saliva decreased significantly throughout the study. However, there was no meaningful difference between the two groups. The greatest reductions were achieved at 2 weeks and lasted up to 8 weeks after BNT-B injection. Group C did not show any differences. **Conclusion:** Local injection of 1,500 units of BNT-B into salivary glands under ultrasonic guidance proved to be a safe and effective dose for drooling in patient with brain lesion, as did 2,500 units.

675

CORTICAL OXYGENATION DURING HIGH-INTENSITY CYCLING EXERCISE: A NEAR-INFRARED SPECTROSCOPY STUDY

A. Tsubaki¹, N. Takehara¹, H. Takai², Y. Tokunaga³, D. Sato¹, H. Tamaki¹, H. Onishi¹

¹Niigata University of Health and Welfare, Institute for Human Movement and Medical Sciences, Niigata-city, Japan, ²Marukawa Hospital, Department of Rehabilitation, Shimoniikawa-gun, Japan, ³Niigata Rehabilitation Hospital, Department of Rehabilitation, Niigata-city, Japan

Introduction/Background: Exercise therapy is a core component of rehabilitation for patients with cardiopulmonary disease and dia-

betes. Although high-intensity exercise is frequently used in mild cases, its effects on brain oxygenation are unknown. Near-infrared spectroscopy (NIRS) can help visualize cortical oxygenation patterns. The aim of our study was to evaluate cortical oxygenation during high-intensity exercise. **Material and Methods:** Ten healthy volunteers (aged 22.9 ± 2.1 years; 4 women) participated. After a 4-min rest and 4-min warm up, exercises were performed for 10 min at a workload of $70\% \text{VO}_{2\text{peak}}$, followed by an 8-min post-exercise rest. Cortical oxyhemoglobin (CO_2Hb) and deoxyhemoglobin (CHHb) signals from the supplemental motor area (SMA) and sensorimotor cortex (SMC) were measured with NIRS. Skin blood flow (SBF) from the forehead, as well as muscle oxygenation (MO_2Hb) and deoxygenation (MHHb) from the right vastus lateralis were measured. All parameters were expressed as change from the rest phase average and were calculated every minute. **Results:** Temporal changes in CO_2Hb , CHHb, MO_2Hb , MHHb, and SBF are shown. CO_2Hb decreased during the latter half of exercise in both areas. The peak time of CO_2Hb in the SMA was 6.1 ± 3.5 min and was significantly later than that of CO_2Hb in the SMC, which was at 3.6 ± 1.7 min. The peak time of SBF (9.4 ± 0.7 min) was significantly later than of the SMA or SMC. CO_2Hb increased again during post-exercise rest. The peak values of CO_2Hb did not show significant changes between exercise and post-exercise rest in either area (Table 1). **Conclusion:** CO_2Hb decreased during the latter half of high-intensity exercise, and these changes differed between the SMA and SMC.

Table 1.

	Exercise (mM·cm)	Post-exercise rest (mM·cm)	p value
SMA	0.059 ± 0.025	0.045 ± 0.025	0.537
SMC	0.047 ± 0.014	0.018 ± 0.016	0.133

676

VITAMIN D DEFICIENCY IN INPATIENT REHABILITATION

T.C. Wee¹, S. Pande¹, P. Galinato¹

¹Changi General Hospital, Rehabilitation Medicine, Singapore, Singapore

Introduction/Background: Vitamin D deficiency is a highly prevalent condition, especially in older adults, with an estimated prevalence of 50–90% depending on the definition used and the population studied. There is growing evidence that vitamin D exhibits not only skeletal effects but also a number of non-skeletal effects. The objectives of this study were *i*) to estimate the difference in length of stay (LOS) and *ii*) functional outcomes between inpatients with and without vitamin D deficiency. **Material and Methods:** All inpatients discharged from inpatient rehabilitation from Nov 2014 to Jun 2015 who had serum 25-hydroxyvitamin D level obtained during that inpatient episode were included in the study. The LOS was calculated in number of days by subtracting day of admission from day of discharge. Functional outcomes were assessed using the Functional Independence Measures (FIM). The FIM is a measure of a person's disability and indicates how much assistance is required for one to carry out activities of daily living. **Results:** 40 out of 497 (8%) inpatients screened had serum 25-hydroxyvitamin D level obtained during that inpatient episode. 72.5% were vitamin D deficient. The mean age was 69.4 (15 to 89) years. Stroke and deconditioning formed 37.5% and 32.5% of the patients respectively. 1 patient was a nursing home resident. The mean total LOS and rehab LOS were 44.7 (10 to 141) days and 27.4 (4 to 92) days respectively. There were no statistical differences in LOS, FIM change and FIM efficiency between inpatients with and without vitamin D deficiency. **Conclusion:** We are unable to draw a firm conclusion due to the small sample size. More studies should be done to establish the prevalence of vitamin D deficiency in the inpatient rehabilitation population and its impact on rehabilitation outcomes.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: PAEDIATRICS - DEVELOPMENTAL DISORDERS

677

ROBINOW SYNDROME: A RARE CASE REPORT IN PMR PRACTICE

E. Adigüzel¹, Ç. Neyişçi², F. Tok¹, E. Yaşar¹, B. Yılmaz¹

¹Gülhane Military Medical Academy, Department of Physical Medicine and Rehabilitation- Turkish Armed Forces Rehabilitation Center, Ankara, Turkey, ²Gülhane Military Medical Academy, Department of Orthopedics, Ankara, Turkey

Introduction/Background: In 1969, Robinow et al. described a syndrome including mesomelic limb shortening, hemivertebrae and genital anomalies. Autosomal recessive and dominant inheritance have been described in this syndrome. Clinical presentation in autosomal recessive form tends to be more severe with fusions of vertebrae and ribs, hemi-vertebrae, radial head dislocation, and increased mortality. Here we present a pediatric patient with Robinow syndrome. **Material and Methods:** A 10-year-old boy presented with difficulty using upper extremities. According to the history, his complaints were present until early childhood. On physical examination, flexion of both elbows was limited at 100° , supination of both elbows was limited at 20° and he had full extension. He had dysmorphic face, hypertelorism and a scar tissue on the face due to operations of cleft lips and palate. There was maxillary hypoplasia and prognathism. **Results:** Plain x-ray graphics revealed vertebral segmentation and fusion anomalies. Both of the ulna and radius bones were hypoplastic and bowing deformity was present in both radius. Both of the radius heads were dislocated. Upper extremities were shorter than normal. Undescended testicle and concealed penis were present. With these findings, the patient was diagnosed with Robinow syndrome. **Conclusion:** Complaints or physical findings of pediatric patients in physical rehabilitation and medicine practice may be components of congenital syndromes. Robinow syndrome is a rare disease but clinicians should be aware of this syndrome because of its' musculoskeletal components.

678

DIRECTION-SPECIFIC IMPAIRMENT OF STABILITY LIMITS AND FALLS IN CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER

S.S.M. Fong¹, S.S.M. Ng², L.M.Y. Chung³, W.Y. Ki⁴, D.J. Macfarlane¹

¹The University of Hong Kong, Institute of Human Performance, Hong Kong, Hong Kong- China, ²The Hong Kong Polytechnic University, Department of Rehabilitation Sciences, Hong Kong, Hong Kong- China, ³Hong Kong Institute of Education, Department of Health and Physical Education, Hong Kong, Hong Kong- China, ⁴Emporia State University, Health- Physical Education and Recreation Department, Emporia State, USA

Introduction/Background: Limits of stability (LOS) is an important yet under-examined postural control ability in children with developmental coordination disorder (DCD). This study aimed to (1) compare the LOS and fall frequencies of children with and without DCD, and (2) explore the relationships between LOS parameters and falls in the DCD population. **Material and Methods:** Thirty primary school-aged children with DCD and twenty age- and sex-matched typically-developing children participated in the study. Postural control ability, specifically LOS in standing, was evaluated using the LOS test. Reaction time, movement velocity, maximum excursion, end point excursion, and directional control were then calculated. Self-reported fall incidents in the previous week were also documented. **Results:** Multivariate analysis of variance results revealed that children with DCD had shorter LOS maximum excursion in the backward direction compared to the control group ($p=0.003$). This was associated with a higher number of falls in daily life ($\rho=-0.556$, $p=0.001$).

No significant between-groups differences were found in other LOS-derived outcomes ($p>0.05$). **Conclusion:** Children with DCD had direction-specific postural control impairment, specifically, diminished LOS in the backward direction. This is related to their falls in daily life. Therefore, improving LOS should be factored into rehabilitation treatment for children with DCD.

679

VALIDITY OF A SINGLE-CHANNEL ELECTROENCEPHALOGRAPHIC DEVICE IN CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER

S.S.M. Fong¹, W.W.N. Tsang², Y.T.Y. Cheng¹, W.Y. Ki³, D.J. Macfarlane¹

¹The University of Hong Kong, Institute of Human Performance, Hong Kong, Hong Kong- China, ²The Hong Kong Polytechnic University, Department of Rehabilitation Sciences, Hong Kong, Hong Kong- China, ³Emporia State University, Health- Physical Education and Recreation Department, Emporia State, USA

Introduction/Background: The NeuroSky single-channel, dry-electrode and wireless electroencephalographic (EEG) recording system is a fairly new measure of mental status in adults and children. This study aimed to examine the validity of this EEG recording device (Mindwave Mobile EEG headset and NeuroView data acquisition software) and investigate the influence of eye blink artifacts on EEG-derived attention-meditation measurements in children with developmental coordination disorder (DCD). **Material and Methods:** Thirty-seven children with DCD (with or without attention-deficit disorder) participated in the study. Validity of the NeuroSky EEG device was assessed by correlating the EEG-derived attention and meditation indices with scores on other mental status measures (duration of gaze fixation and Movement Assessment Battery for Children (MABC) bicycle/flower trial item score) in the DCD-attentive group and then comparing the EEG-derived attention and meditation indices of the DCD-attentive group ($n=20$) with those of the DCD-inattentive group ($n=17$), and among the frequent-blinking group (7–8 eye blinks/trial), moderate-blinking group (5–6 eye blinks/trial), and rare-blinking group (3–4 eye blinks/trial). **Results:** The EEG-derived attention index was correlated with the duration of gaze fixation ($r=0.648$, $p=0.002$) and the MABC bicycle/flower trial item score ($r=-0.688$, $p=0.001$). A significant difference in the EEG-derived attention index was found between the DCD-attentive group and DCD-inattentive group ($p=0.003$), but no significant results were found for the EEG-derived meditation index. With regard to eye blinks, no significant differences in the EEG-derived attention or meditation indices were detected between the three blinking groups ($p=0.887$). **Conclusion:** The NeuroSky single-channel EEG device accurately measured the overall mental attention level in children with DCD and was not influenced by eye blinking. Thus, this portable device has potential utility in such children for whom ease of use is the first priority.

680

ARTICULATION OF SOUNDS, ORAL PRAXIA, BYTE, LATERALIZATION AND GRAPHOMOTORICS IN CHILDREN OF PRESCHOOL AGE

S.M. Golubovic¹, M. Milacic²

¹Faculty of Special Education and Rehabilitation University of Belgrade, Belgrade, Serbia, ²Faculty of Special Education and Rehabilitation University of Belgrade, Department of Speech and Language Pathology, Belgrade, Serbia

Introduction/Background: Articulation of sounds and spontaneous speech were examined in children of preschool age in order to identify children with disorder in pronunciation of sounds and the state of spontaneous speech. **Material and Methods:** In 82 children of preschool age of 6 to 6,7 years of age, was examined articulation of sounds, oral praxia, byte, lateralization and graphomotorics. **Re-**

sults: From 82 examined children, 39 children/47.56%, had disorder in pronunciation of sound in Serbian language, 18 boys 43.95%, and 21 girls 51.22%. Deviation in Test of oral praxia had only 1 boy 1, 22%. Eleven children had incorrect byte 13.41%, 7 boys 17.07% and 4 girls 9.76%. Right handed boys 31/75.61%, right handed girls 38/92.68%, left handed girls 3/7.32%. Well developed of graphomotorics had 70 children/85.37%, while 12 children/14.63% have undeveloped graphomotorics of hand, 7 boys/17.7% and 5 girls/12.19%. **Conclusion:** High frequency 47.56% of appearance of speech disorders of sounds in children of preschool age requested immediate logopedic treatment. This was urgent concerning the fact that children needed to start with the first grade of school in 3 months, and also a fact that there were high percentage of left handed children 15.8% and 14.63% with undeveloped graphomotorics.

681

THE VALIDITY OF DENVER DEVELOPMENTAL SCREENING TEST II AND BAYLEY SCALES OF INFANT DEVELOPMENT III IN INFANT WITH LANGUAGE DEVELOPMENT DELAY

S.U. Jeong¹, S.H. Ryu¹, H.J. Jeong¹, G.C. Kim¹, D.K. Kim¹, Y.J. Sim¹

¹Kosin University Gospel Hospital, Physical Medicine and Rehabilitation, Busan, Republic of Korea

Introduction/Background: There are various language assessment tool to test the language development delay in infants. Sequenced Language Scale for Infants (SELSI) is one of the most widely used tool to assess language delay in Korea. Thus we analyzed the validity of the language sector in Denver Developmental Screening Test II (DDST II) and that in Bayley Scales of Infant Development III (Bayley III) compared with SELSI. **Material and Methods:** This study was conducted on 33 infants suspected of having language development delay who visited the department of physical medicine and rehabilitation at Kosin University Gospel Hospital from Nov 2012 to Jun 2015. The results of history taking, physical and neurologic examination performed by 1 pediatric rehabilitation specialist indicated that all the infants were suspected of having language development delay. **Results:** The sensitivity of DDST II-language sector (DLS) and Bayley III-expressive language sector (BELS) is high and that of Bayley III-receptive language sector (BRLS) is low (92.86%, 92.59%, 73.08%, respectively). The specificity of BRLS is very high and that of BELS is high (100.00%, 83.33%, respectively). The specificity of DLS is low (60.00%) (Table 1). The equivalent age as a result of BRLS or BELS was significantly associated with that of SELSI ($r=0.829$, $r=0.870$, respectively) ($p<0.001$). Correlation between the equivalent age as a result of BRLS and that of SELSI was high degree. And correlation between the equivalent age as a result of BELS and that of SELSI was high degree too. However, Cohen's kappa value of BRLS and DLS with SELSI indicated moderate agreement ($\kappa=0.535$, $\kappa=0.529$, respectively) (Table 2). Whereas that of BELS with SELSI indicated good agreement ($\kappa=0.713$) (Table 2). **Conclusion:** We suggest that DDST II-language sector is useful for screening test in infant with language development delay. And Bayley III-language sector would not replace SELSI to evaluate language development in infants with development delay.

682

CHARACTERISTICS OF THE MOTOR DEVELOPMENT OF AUTISM SPECTRUM DISORDER CHILDREN UNTIL THE UNASSISTED WALKING STAGE

M. Kawamura¹, J. Amano¹, Y. Mikami², R. Kawamura³

¹Amano Rehabilitation Hospital, Rihabilitation, Hiroshima, Japan,

²Hiroshima University Hospital, Rehabilitation, Hiroshima, Japan,

³Kawamura Children Clinic, Pediatrician, Hiroshima, Japan

Introduction/Background: Although articles on the interpersonal relations, social skills, and clumsiness of the movements of autism

spectrum disorder (ASD) children are seen in the literature, there have been few reports of the motor function development of ASD children in infancy. We investigated the motor development characteristics of ASD children before the stage at which they acquired the ability to walk unassisted. **Material and Methods:** The subjects were 84 ASD children, mean age 6.4 ± 2.4 months, who did not have any clear underlying disease, and based on their charts we retrospectively selected motor function acquisition ages until acquiring the ability to walk unassisted. We assessed six motor function acquisition, and we calculated the numbers of children classified according to whether within the normal range and early or late outside the normal range, mainly by using the Revised Japanese Version of Denver Developmental Screening for reference. We also investigated the number of parameters outside the normal range and sequence of motor function acquisition. **Results:** Mean ages when the motor functions were acquired were: head control, 3.5 ± 0.8 months; turning over while asleep in bed, 5.7 ± 1.4 months; sitting unassisted, 7.6 ± 1.7 months; crawling, 9.2 ± 2.5 months; standing while hanging on for support, 10.2 ± 2.2 months; and walking unassisted, 15.0 ± 3.6 months, and ages in months were within outside the normal range in 66 infants, and sequence of motor function acquisition was irregular in 56 infants. **Conclusion:** We concluded that when motor development delay or a course of motor development outside the normal range in terms of age in months at the time of acquisition is observed despite the absence of any clear underlying disease, it is necessary to bear the possibility of ASD in mind and intervene early, while monitoring the course of the child's interpersonal relations, social skills, and motor development.

683

ACCEPTANCE OF ELEMENTARY SCHOOL STUDENTS WITH DEVELOPMENTAL DISORDER AND NEEDS FOR REHABILITATION SPECIALIST SUPPORT AT AFTER-SCHOOL CHILDCARE PROGRAM

R. Kobayashi¹, Y. Ito¹, Y. Ishibashi¹

¹Tokyo Metropolitan University, Graduate School of Human Health Sciences, Tokyo, Japan

Introduction/Background: We conducted a survey regarding the acceptance of elementary school students with developmental disorder and the needs for support by rehabilitation specialist at after-school childcare program. **Material and Methods:** Subjects consisted 340 after-school childcare facilities in Okayama prefecture. The 115 facilities responded (response rate 34%). **Results:** Total number of the enrolled students aged 7–12 are 5,192. 438 (8.4%) students of them have some developmental disorders. Average number of students with developmental disorder per one facility are 3.8. Breakdown of them by diagnosis consisted physical disability (0.4%), mental retardation (1.2%), AD/HD (1.9%), LD (0.3%) and ASD (4.5%). Rate of after-school childcare facility have careworkers trained about disability care is 45%. Rate of the facility provided a consultation service is 48%. Rate of the facility provided on site guidance by rehabilitation specialists is only 4%. Many of facilities sought some practical advice on care. **Conclusion:** Although interested facilities could have been responded, our results suggested the need to rehabilitation specialist's support.

684

ELECTROMYOGRAPHIC COMPARISON OF RESPIRATORY MUSCLES ACTIVITIES BETWEEN TERM AND PRETERM INFANTS WITH DESATURATION DURING FEEDING

Kwon, G. Y.¹

¹Catholic University of Daegu College of Medicine, Rehabilitation Medicine, Daegu, Republic of Korea

Introduction/Background: To evaluate the differences respiratory muscles activities between full-term and preterm infants with desaturation during feeding and the correlation between respiratory mus-

cles activities and clinical variables. **Material and Methods:** Seven preterm infants (Group 1: mean age 37.3 ± 0.7 weeks, mean weight 2585.7 ± 492.9 g) who had respiratory distress syndrome with desaturation during feeding and fifteen age-matched full-term infants (Group 2: mean age 37.9 ± 1.0 weeks, mean weight 2846.7 ± 464.4 g) were recruited. The oromotor function was evaluated by videorecording analysis using the coefficients of variation (COV; standard deviation/mean) of the swallow-breath (SW-BR) intervals and breath-breath (BR-BR) intervals during swallow runs, the percentage of 'apneic swallows' (runs of ≥ 3 swallows without interposed breaths) during feeding were used. Electromyographic (EMG) activities of the diaphragm and rectus abdominis muscles were recorded via surface electrode. The differences of RMS between both groups, and the correlation between RMS and clinical variables such as gestational age (GA), weight (Wt), Apgar score at 1 minute and 5 minutes after birth was evaluated using independent *t*-test and Pearson's correlation coefficient. **Results:** The RMS of diaphragm (RMS-D) and rectus abdominis (RMS-R) was significantly greater in group 1 than that in group 2 (RMS-D, 310.7 ± 64.2 vs. 193.5 ± 42.0 ; RMS-R, 42.2 ± 16.7 vs. 25.2 ± 8.0 ; $p < 0.01$). The Apgar score at 1 minute and 5 minutes after birth was significantly lower in group 1 than that in group 2 (5.1 ± 2.6 vs. 8.5 ± 0.9 ; 7.9 ± 1.6 vs. 9.9 ± 0.4 ; $p < 0.01$), respectively. Oromotor function in group 1 was normal. The RMS-D and RMS-R were negatively correlated with GA ($r = -0.693$, -0.578 , $p < 0.01$), Wt ($r = -0.649$, -0.526 , $p < 0.05$), Apgar score at 1 minute ($r = -0.466$, -0.591 , $p < 0.05$) and 5 minutes ($r = -0.464$, -0.605 , $p < 0.05$) in all infants. **Conclusion:** This study showed that higher respiratory muscles activities in preterm infants with desaturation during feeding than term infants. In addition, respiratory muscles activities were negatively correlated with all clinical variables.

685

THERAPEUTIC EFFECT OF MICROCURRENT THERAPY IN PRETERM INFANTS WITH DESATURATION DURING FEEDING - A PILOT STUDY

D.R. Kwon¹

¹Catholic University of Daegu College of Medicine, Rehabilitation Medicine, Daegu, Republic of Korea

Introduction/Background: Previous study showed that higher respiratory muscles activities in preterm infants with desaturation during feeding than term infants. In addition, microcurrent therapy relieved myocontracture in children with cerebral palsy. Therefore, the aim of our study was to investigate the efficacy of portable microcurrent therapy device (PMTD) of the respiratory muscles activities in the treatment of preterm infants with desaturation during feeding. **Material and Methods:** Eleven preterm infants (mean age 37.5 ± 1.2 weeks, mean weight 2450 ± 429.1 g) who had respiratory distress syndrome with desaturation during feeding were recruited. Six out of eleven infants had brain lesions including 4 of periventricular leukomalacia and 2 of germinal matrix hemorrhage (grade I and III). All infants received 15 minutes of PMTD (Granthe®; Cosmic Co., Seoul, Korea, intensity: $25 \mu\text{A}$, frequency: 8 Hz) applied to the abdominal muscles daily for 2 weeks. The root-mean-square (RMS) envelope of the Electromyographic signal was calculated to quantify the activities of respiratory muscles. RMS of the diaphragm and rectus abdominis (RA) muscles, feeding volume (FV), and desaturation frequency (DF) were measured before treatment and at 1 and 2 weeks after initial treatment. Measured parameters including RMS, FV, and DF were analyzed with a repeated measure of analysis of variance for effect of time. The oromotor function was evaluated by videorecording analysis during feeding. **Results:** The RMS of the RA/diaphragm muscles was $48.5 \pm 16.1/260.4 \pm 93.5$, $42.7 \pm 14.4/239.3 \pm 76.6$, and $35.0 \pm 11.8/216.8 \pm 69.3$ before treatment and at 1, 2 weeks after initial treatment, respectively ($p < 0.01$). There were statistically significant increase between FV at the time points tested ($p < 0.01$). There were statistically significant decrease between DF at the time points tested ($p < 0.01$). Oromotor function in all infants was normal. No adverse events were observed. **Conclusion:** Our pilot study demonstrated that PMTD of the abdominal

muscles could be effective in improving the desaturation in preterm infants with desaturation during feeding. Further study is needed.

686

TREATMENT OF CLUBFOOT BY PONSETI TECHNIQUE COUPLED WITH REHABILITATION

W. Said lahmari¹, M. Rekik¹, H. Ben brahim¹, A. Hadj Salah¹, M. Elayeb¹, M. Sghir¹, Z. Ben Salah Frih², W. Kes-somtini¹

¹CHU Tahar Sfar, Department of Rehabilitation, Mahdia, Tunisia, ²CHU Fattouma Bourguiba Monastir, Department of Rehabilitation, Monastir, Tunisia

Introduction/Background: We try through this case to detail the stages of the management of clubfoot with the Ponseti technique combined with rehabilitation and to assess the results obtained in short and long term. *Material and Methods:* We report a case of a 30-day-old boy with bilateral clubfoot. Clinical evaluation was done by the scores of Diméglio [D] and Pirani [P]. He benefited from 5 weekly cruro-foot plasters followed by percutaneous tenotomy of Achilles tendon. The 6th plaster was immediately performed. 3 weeks later, the relay was provided by rehabilitation (3 sessions/week) and immobilization by steen Beek splints. The clinical and radiological assessment in short term was made at the end of treatment and after 3 months of rehabilitation. The long term evaluation was performed after one, two and three years of evolution. *Results:* Initially feet were classified grade IV (D=19/20) with ($p=5.5/6$). The feet have become Grade I (D=5/20) after the 4th plaster. After the sixth one both feet scores have decreased ($p=0/6$), (D=0/20). In long term, the result remains stationary. The scores (D/P) are respectively (0/0), (0/0.5), (1/0.5) after one, two and three years of evolution. *Conclusion:* The Ponseti method is based on a sequential correction of deformities. This method allowed rapid morphological correction. She saved the child from the extensive surgery. The combination of physical therapy remains essential to consolidate the result and prevent recurrences.

687

ORTHOPEDIC AND FUNCTIONAL EVOLUTION OF OSTEOGENESIS IMPERFECTA ABOUT TWO CASES

W. Said lahmari¹, M. Rekik¹, M. Elayeb¹, A. Hadj Salah¹, H. Ben Brahim¹, M. Sghir¹, Z. Ben Salah Frih²

¹CHU Tahar Sfar, Department of Rehabilitation, Mahdia, Tunisia, ²CHU Fattouma Bourguiba Monastir, Department of Rehabilitation Monastir, Monastir, Tunisia

Introduction/Background: Osteogenesis imperfecta (OI) is a rare genetic disorder characterized by abnormal synthesis of type I collagen leading to bone fragility and repeated fractures. The functional prognosis is variable. Rehabilitation care is essential to preserve bone and muscle mass. *Material and Methods:* We report two cases of OI from healthy parents. The diagnosis was suggested by the occurrence of multiple bone fractures when acquiring standing position. The girl BJ was 13 years old, who had a skull fracture, limb fractures treated with intramedullary nailing and percutaneous pinning. The brother MJ was 11 years old. He was less affected. *Results:* Clinical examination of BJ revealed macrocephaly, short stature, vicious attitudes (cross-legged) and muscle weakness. She couldn't walk and was completely dependent. Radiological assessment showed bone deformities of the limbs, chest and spine. The boy had an intramedullary nailing of the 2 femurs and percutaneous pinning of the left humerus. He had an unequal leg length, a pelvic obliquity and lumbar scoliosis, he used a walker. Both children have never had a rehabilitation care. Treatment with bisphosphonate was indicated for both; an electric wheelchair was prescribed for the girl and possibly a realignment surgery to improve the sitting position. The brother received a prescription of a corset. *Conclusion:* OI is characterized by bone fragility, ligamentous laxity, a dentinogenesis imperfecta, blue sclera and hearing loss. The sever-

ity and evolution of the disease is very variable. OI has a different evolution from one patient to another, it is impossible to make a general prognosis. It must be done on a case by case. Currently, there is no cure. An early multidisciplinary, continuous and prolonged throughout life care could improve the quality of life.

688

REHABILITATION TREATMENT OF SPINAL MUSCULAR ATROPHY TYPE II

W. Said lahmari¹, M. Rekik¹, H. Ben Brahim¹, A. Hadj Salah¹, M. Elayeb¹, M. Sghir¹, Z. Ben Salah Frih², W. Kes-somtini¹

¹CHU Tahar Sfar, Department of Rehabilitation, Mahdia, Tunisia, ²CHU Fattouma Bourguiba Monastir, Department of Rehabilitation Monastir, Monastir, Tunisia

Introduction/Background: Spinal muscular atrophy type II (SMA) is an autosomal recessive hereditary disease. Paralysis of trunk muscles and limbs leads to orthopedic and respiratory complications. The aim of the study is to analyze neuro orthopedic complications of SMA type II and to define the modalities of rehabilitation treatment. *Material and Methods:* A retrospective study during the last four years including children with SMA type II addressed to the Mahdia rehabilitation unity. It was a clinical and a radiological assessment. Physical examination included spontaneous attitude, neurological examination, joint and spinal assessment. An x-ray analysis of spine and pelvis was required. A rehabilitation protocol and an adapted orthosis were prescribed. *Results:* 8 patients. Mean age 11.57. They had flaccid tetraparesis, a frog-leg position in 12.5%, flexion deformity of elbow in 50%, of knee in 100%, of hip in 75%, subluxed hip in 50%, dislocated in 37.5%, scoliosis in 75% and respiratory failure in 25% of cases. A child died by a respiratory complication. *Conclusion:* SMA is a progressive disease leading to respiratory and orthopedic complications which could be mortal. The SMA's short - and medium - term prognosis and the improvement in child's quality of life depend on precocity and the multidisciplinary care. Rehabilitation has a prominent place.

689

THE EVALUATION OF CHOSEN BODY POSTURE PARAMETERS IN CHILDREN WITH SCOLIOSIS - OWN MATERIALS

Z. Sliwinski^{1,2}, W. Kufel¹, B. Halat¹, M. Kiljanski^{2,3}, Z. Sliwinska¹, G. Sliwinski¹

¹Physiotherapy Center in Zgorzelec, Physiotherapy, Zgorzelec, Poland, ²Jan Kochanowski University, Physiotherapy, Kielce, Poland, ³University of Computer Science and Skills, Physiotherapy, Lodz, Poland, ⁴Dresden University of Technology, Institute of Biomedical Engineering, Dresden, Germany

Introduction/Background: Treatment of children with scoliosis requires the monitoring and evaluation of parameters of the body posture. The raster stereography method, due to its harmlessness to the child, can be used at any time to evaluate the therapy progress. *Material and Methods:* We evaluated 89 children with idiopathic scoliosis treated by the FED method at the Rehabilitation Center in Zgorzelec. The children were evaluated by the 4D DIERS Formetric III at the beginning and the end of the month of the stay. Some of the respondents were evaluated six months after the physiotherapy by the FED. One of the parameters that were selected to assess the therapy progress is the torso rotation area beginning from the highest turnover occurring in the X-ray. *Results:* Preliminary results in both the assessed after a month and in the group six months after the therapy show a reduction in the rotation parameter by an average of 40. *Conclusion:* After a preliminary analysis of the body posture in children with idiopathic scoliosis assessed by DIERS Formetric III 4D, one can apply for efficacy FED and stereography raster suitability as a fast, secure way to follow-up the progress of therapy.

690

ANALYSIS OF BODY POSTURE OF CHILDREN WITH IDIOPATHIC SCOLIOSIS IN THE IMAGE DIERS AFTER THE APPLICATION OF KINESIOLOGY TAPING APPLICATION

Z. Sliwinski^{1,2}, W. Kufel¹, B. Halar¹, B. Michalak¹, D. Sliwinska¹, G. Sliwinski³

¹Physiotherapy Center in Zgorzelec, Physiotherapy, Zgorzelec, Poland, ²Jan Kochanowski University, Physiotherapy, Kielce, Poland, ³Dresden University of Technology, Institute of Biomedical Engineering, Dresden, Germany

Introduction/Background: In the process of treating scoliosis essence of treatment is to maintain normal patterns of attitudes through appropriate antigravity muscle tone. Stimuli proper posture pattern in the period in which the child does not perform exercises provide appropriately selected and made corset. The use of dynamic slicing applications - Kinesiology Taping at the surface of the skin also stimulates the child to maintain proper muscle tone shaping correct posture. **Material and Methods:** Evaluated in a group of 40 children diagnosed with idiopathic scoliosis in age from 10 to 15 years residing in the treatment by the FED at the Centre for Rehabilitation in Zgorzelec. Each child before treatment, the day of admission to the ward had made an assessment method Diers. Then an application of Kinesiology Taping. Used applications ligamentous took the form of V and were used on curves thoracic and lumbar scoliosis. Next, a re-image method Diers assessing mathematical representation of the body surface after the application of Kinesiology Taping. **Results:** The results obtained after the application of Kinesiology Taping show that the image of body posture changes, which record the images method Diers. **Conclusion:** Kinesiology Taping techniques are useful in the treatment of idiopathic scoliosis. Alter the tension of the skin and muscles make it easy to maintain the correct posture pattern.

691

APPLICATION OF THE KINESIO TAPING METHOD ON SWALLOWING DIFFICULTLY OF NEWBORN: A CASE REPORT AND LITERATURE REVIEW

W.T. Wu¹, C.L. Lin², H.Y. Lin³, L.W. Chou⁴

¹China Medical University Hospital, Department of Physical Medicine and Rehabilitation-, Taichung City, Taiwan, ²China Medical University Hospital, Department of Physical Medicine and Rehabilitation-, Taichung, Taiwan, ³China Medical University Hospital, Department of Medical Education, Taichung, Taiwan, ⁴China Medical University Hospital, Department of Physical Medicine and Rehabilitation, Taichung, Taiwan

Introduction/Background: Preterm infants were at increased risk for impaired sucking and swallowing. During the neonatal period, the neurobehavioral organization of these baby was poor compared with other infants. Original purpose of Kinesio Tape were edema control, joint protection, and proprioception increasing. Because the input of stimulation for facilitation and inhibition could be achieved through taping, the target muscle groups and coordination could be improved by rehabilitation. We reported this preterm infant suffering from brain edema at birth and still difficultly swallowed until 40 weeks. The swallowing reflex was much delay, and lips closure, rooting reflex combined with dysfunction grade of jaw movement. **Material and Methods:** We performed Kinesio Taping methods for the baby. Under the theory which direction of tape from origin to insertion will help facilitating the muscle, and inhibition function would be noted when the direction was insertion to origin. An I type tape with eighth part of width, two-third of a grid on length was given for taping on the orbicularis oris with anchor site at midpoint for lips closure. To improve hyoid bone elevation by inhibiting sternohyoid muscle but facilitating mylohyoid muscle, a Y type tape with one quarter on width, two-third of a grid on

length was used. The posterior border of symphysis of mandible was anchor site, and then we taped on mylohyoid muscle and sternohyoid muscle. We used a tape with half in width, two-third of a grid in length and three separations, anchoring on lower border of zygomatic arch, to facilitate the masseter muscle. **Results:** After the treatment, the sucking function and lips closure were much improved than previous. One weeks later, the baby was discharged without NG tube. **Conclusion:** We considered that Kinesio Taping method was useful and could be added into the regular rehabilitation for infants suffered from impaired sucking and swallowing.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: PAEDIATRICS - CEREBRAL PALSY AND SPINA BIFIDA

692

URODYNAMIC PROFILE AT CHILDREN WITH URINARY DISORDERS

I. Bel HajYoussef¹, S. Froui¹, S. Jemni¹, A. Zaoui¹, F. Khachnaoui¹

¹CHU Sahloul Sousse, Department of Physical Medecine and Rehabilitation, Sousse, Tunisia

Introduction/Background: The urodynamic assessment in children is a difficult exam to perform and interpret, due to the absence of nomogram based on age, the need to consider the anxiety and the lack of cooperation especially in children multi-operated. **Material and Methods:** Of 200 patients referred for urodynamic assessment during the two-year period (2012–2014), 52 were aged less than 15 years. The objective is to describe the urodynamic profile in this age group. **Results:** There were 37 girls and 15 boys. The most important clinical signs were urinary leakage and enuresis. We have found these causes: spina bifida in 7 cases, malformations of the urinary tract in 6 cases and thoracolumbar scoliosis in 5 cases. The neuro-perineal examination was normal in over 50% of cases. The flow measurement was dysuria in 22 children. A cystometry, the bladder was hypersensitive in 28 cases, hypocompliante in 18 cases, unstable in 27 cases and hypercontractile in 18 cases. Profilometry was normal in 17 cases, hypotonia and sphincter hypertension were identified in 11 and 20 cases respectively. We have concluded with an overactive bladder in 14 cases, immature bladder in 13 cases and normal test in 5 cases. **Conclusion:** This invasive exploration was done in the context of an initial balance sheet or in the follow-up of congenital or acquired neurological bladders and malformations bladders. An imaging balance sheet and a urine culture generally precede this event. As in adults it is a valuable tool in the therapeutic choice.

693

HEALTH-RELATED QUALITY OF LIFE IN FAMILY OF CHILDREN WITH NEUROLOGICAL DISABILITY

Z. Ben Salah Frih¹, S. Boudokhane¹, S. Salah¹, H. Migaou¹, A. Jellad¹

¹Fattouma Bourguiba University Hospital Monastir, Physical Medicine and Rehabilitation, Monastir, Tunisia

Introduction/Background: Diagnosis of a long term disability in a child will bring on a major upheaval in the lives of the whole family involved and leads to a long-standing relationship with health care personnel. **Objective:** To describe parent's experiences with their child's illness and to report the impact of the handicap on family members. **Material and Methods:** It was an analytic prospective survey. A self-questionnaire was designed and filled by parents. We assessed parent physical and mental health (SF-12), psychological distress (HAD), perceived impact on daily life, marital and family dynamics (FICD). Different scales were translating on the Arabic

language. *Results:* 45 families participated in the study. The mean age of parents was 42 years. There are 19 children with cerebral palsy. The cognitive and motor disability was noted on 58% of cases. The FICD positive items were 15/25, and the negative items were 30/40. It suggests the negative impact on the financial and a family's social contact. Mother's physical and mental health score was 40.9% and 39.3%, which is lower than the father ($p < 0.05$), mothers had also a highest risk of anxiety (53%) and depression (24%). The FICD total score, the HAD and the mental health was according to the type of child's disability and the number of children. *Conclusion:* This study suggests a considerable negative impact on the family, including emotional responses such as anxiety, sorrow and powerlessness. There also have a feeling that the child's disability dominates the lives of the whole family, in addition to stressors such as increased responsibility and load.

694

MODIFIED TARDIEU SCALE TO ESTIMATE LENGTH OF SEMIMEMBRANOSUS AND SAGITTAL KNEE ANGLE DURING GAIT CYCLE IN SPASTIC CEREBRAL PALSY

Y. Cho¹, D.W. Rha¹, J.Y. Choi¹, E.S. Park²

¹Severance Rehabilitation Hospital- Yonsei University College of Medicine, Department and Research Institute of Rehabilitation Medicine, Seoul, Republic of Korea, ²Severance Rehabilitation Hospital- Yonsei University College of Medicine, Severance Rehabilitation Hospital- Yonsei University College of Medicine, Seoul, Republic of Korea

Introduction/Background: Previous researches reported that popliteal angle did not correlate well with knee angle during gait in individuals with cerebral palsy (CP). The aim of this study was to investigate whether the modified Tardieu scale (MTS) used for the assessment of hamstrings spasticity, is associated with length of hamstrings and knee flexion angle during gait cycle in children with CP. *Material and Methods:* Thirty seven children diagnosed with spastic CP (Gross Motor Function Classification System Levels I–II) who had no prior surgery participated (22 males, age 8.4±2.5 years). The MTS for knee flexor and the three-dimensional computerized gait analysis were conducted. R1, R2, and R2-R1 angles of MTS were measured in supine position. The muscle-tendon length was estimated using the Lower Limb Extremity Model-2010 and inverse kinematics analysis by OpenSim was conducted. Pearson correlation coefficients were calculated to estimate association of R1 (muscle reaction to passive fast stretch), R2 (passive range of motion), and R2-R1 (dynamic component of spasticity) angles with biomechanical parameters. *Results:* Knee flexion angle at initial contact and end of swing, maximal knee extension angle during stance phase were significantly correlated with R1 angle and R2-R1 angle of MTS, but not with R2 angle. The length of semimembranosus at initial contact, end of swing, and minimal length were strongly associated with R1 rather than R2 or R2-R1 angles. *Conclusion:* The MTS for knee flexor demonstrated a strong relationship between R1 angle and length of hamstring or sagittal knee angle on kinematics rather than R2 angle. R1 angle which means muscle reaction to passive fast stretch may be useful for estimating hamstrings length or sagittal knee angle during gait cycle rather than passive range of motion. *Acknowledgment:* This study was supported by a faculty research grant of Yonsei University College of Medicine (6-2014-0065).

695

EFFICACY AND SAFETY OF BOTULINUM TOXIN USE IN THE MANAGEMENT OF BRUXISM IN CHILDREN WITH CEREBRAL PALSY

D.O. Gonzalez¹, G. Calvo², B.G.L. Legorreta³, G. Morales⁴

¹Universidad Tetelon, Epidemiologia, Tlalnepantla- Estado de Mexico, Mexico, ²Centro de Rehabilitacion Infantil Teleton, Cli-

nica ¹B, Tlalnepantla- Estado de Mexico, Mexico, ³Centro de Rehabilitacion Infantil Teleton, Clinica ⁵, Tlalnepantla- Estado de Mexico, Mexico, ⁴Centro de Rehabilitacion Infantil Teleton, Odontopediatria, Tlalnepantla- Estado de Mexico, Mexico

Introduction/Background: Cerebral Palsy (CP) is the most common cause of motor disability in childhood; bruxism is a common oral disease on them. *Objective:* To evaluate the efficacy and safety of botulinum toxin use in the management of bruxism in children with cerebral palsy at Centro de Rehabilitación Infantil Teletón Estado de México. *Material and Methods:* Quasi-experimental clinical trial. The sample was selected according to inclusion and exclusion criteria. Initially facial symmetry, the presence of muscular pain in masseter and temporal muscles, temporomandibular joint evaluation, labial incompetence, oral mucosa lesions, dental wear, anterior and posterior crossbite were assessed; subsequently, masseter and temporalis muscles were infiltrated with botulinum toxin type A; and were evaluated at 8 and 12 weeks again. *Results:* Nineteen children with a mean age of 6.79 years were included in this study. The Shapiro-Wilk test was performed to obtain p -values less than 0.05, so the McNemar test was used to compare means values. At 8 weeks, pain in the masseter and temporalis muscles, showed a statistically significant difference; with a value of 0.021 and 0.006. At 12 weeks, labial incompetence, pain in the masseter muscle and temporal regions obtained a statistical significance of 0.016, 0.002 and 0.001 respectively. Wilcoxon test was applied to GAS scale and showed a statistical significance of 0.00 at 12 weeks, the other variables had no statistical significance. *Conclusion:* Intramuscular injection of botulinum toxin type A, in the masseter and occipital muscles (a dose of 1–2 IU/kg) in children with cerebral palsy and bruxism, is effective and safe to control pain in masseter and temporalis muscles, and labial incompetence.

696

CHILDREN WITH DISABILITIES IN MOROCCO : EPIDEMIOLOGICAL AND CLINICAL PROFILE

A. Hajjioui¹, A. Khouna², M. Fourtassi²

¹Faculty of Medicine and Pharmacy- University Mohammed ben- abdellah Fez, Physical Medicine and Rehabilitation, Fez, Morocco, ²University Mohammed First- Faculty of Medicine and Pharmacy- Oujda, Physical Medicine and Rehabilitation, Oujda, Morocco

Introduction/Background: Knowledge of demographic and clinical characteristics of children with disabilities in Morocco is a major step to establish a support of PRM adapted to their situation and their needs. The aim of the study is to review the socio-economic characteristics of Children with disabilities in the eastern region of Morocco, types and the main causes of disability, and their needs in PRM. *Material and Methods:* The study was conducted at the Mohammed VI national center of disabled in Oujda. Since its opening in 2011 until the month of May 2015, 576 patients were received at this centre. Demographic data, the course of pregnancy and childbirth, data on disability and the medical and educational care were collected. In case of missing information, the family was contacted by telephone to complete the data. *Results:* The most perinatal complication was neonatal suffering 44.8%. The population of the study was divided into 3 groups according to their diagnosis: Orthopedic Disabilities 3.6% sensorial Disabilities 4.2% and 92.8% neurological Disabilities. The Prevalence of mental retardation is 55.4% (21 trisomy, autism, others), and cerebral palsy is 34.5%. Among the children with neurological disabilities, the prevalence of mental retardation is 55.4% (21 trisomy, autism, others..), and cerebral palsy is 34.5%. The most dominant form of cerebral palsy in multiple disabilities was 28.9%. *Conclusion:* Taking early and adequate care for pregnant women, childbirth, neonatal infections are suffering and measures that significantly reduce the disability rate. Other epidemiological studies on the child's disability are needed in Morocco to better organize the care in PRM.

697

INTEREST OF CONSTRAINT-INDUCED MOVEMENT THERAPY IN THE REHABILITATION OF CHILDREN WITH ERB'S PALSY

A. Hajjioui¹, S. El Bachiri², M. Fourtassi²

¹Faculty of Medicine and Pharmacy- University Mohammed ben- abdellah Fez, Physical Medicine and Rehabilitation, Fez, Morocco, ²University Mohammed I- Faculty of Medicine and Pharmacy- Oujda., Physical Medicine and Rehabilitation, Oujda, Morocco

Introduction/Background: Constraint-induced movement therapy (CIMT) is a new rehabilitation method that aims to change the patient's behavior toward the affected limb. It is mainly based on brain plasticity, learned non-use and inter-hemispheric inhibition. The effectiveness of this technique was widely proven in the central neurological disorders, yet it remains insufficiently studied in the damage to the peripheral nervous system such as brachial plexus injuries. Our aim was evaluating the efficacy of constraint-induced movement therapy in three children with Erb's Palsy (OPBP). **Material and Methods:** The study included three children suffering from OPBP. These children participated in an intensive rehabilitation program using CIMT for a week during the month of Aug 2015. An analytical and functional assessment of the affected limb was performed before and after the intensive rehabilitation course. **Results:** Significant analytical performance improvements, especially in muscle strength was observed in each of the 3 patients with an average gain of 0.8 points on the scale testing of muscle strength MCR. A marked improvement in functional performance was observed, including the strategy of small objects grasp, the speed to perform the manual dexterity test with an average gain of 14 s for all three children. The evaluation of the transport phase objectified an average gain of 4 cm in height, and an average gain of 3.3 s in the horizontal movement after the intensive rehabilitation training. **Conclusion:** The results observed in our study and those reported in the literature clearly point to the effectiveness of CIMT in OPBP motor sequelae.

698

A PILOT STUDY TO EXPLORE THE PHYSICAL NEEDS OF SCHOOL GOING CHILDREN WITH SPINA BIFIDA AT THE TERTIARY HOSPITAL, MALAYSIA

O. Htwe¹, L. Thaveethu², A. Nur Khaiilatuf³, M.S. Naicker⁴, S. Ibrahim⁵, A.S. Naicker²

¹Universiti Kebangsaan Malaysia, Rehabilitation Unit- Department of Orthopedics and Traumatology, Cheras, Malaysia, ²- Faculty of Medicine- University Kebangsaan Malaysia, Rehabilitation Unit -Department of Orthopedics and Traumatology, Kuala Lumpur, Malaysia, ³University Kebangsaan Malaysia Medical Centre, Occupational therapy Unit- Rehabilitation Medical Services Department, Kuala Lumpur, Malaysia, ⁴Faculty of Medicine- University Malaya, Department of Pathology-, Kuala Lumpur, Malaysia, ⁵Faculty of Medicine- University Kebangsaan Malaysia, Department of Orthopedics and Traumatology-, Kuala Lumpur, Malaysia

Introduction/Background: In developing countries, the need of special schools, purpose-designed facilities with an appropriate number of care staffs, for disable children with Spina Bifida are not well implemented in comparison to developed nations which are practicing the policies to allow better integration of Spina Bifida children. In our country, none of the studies have been done so far that specifically looked into the school placement of children with Spina Bifida. This study aimed to assess the physical problems such as mobility, transport and school environment of school going children with Spina Bifida who were following up at the tertiary hospital, Malaysia. **Material and Methods:** This study is a cross sectional interview based pilot study. Parents and patients with Spina bifida who were following up at the rehabilitation clinic, tertiary hospital, Malaysia were interviewed between the period of Feb 2013–Feb 2014 by us-

ing self designed proforma. Although 56 patients with spina bifida were identified from medical record office, only 10 patients met the inclusion criteria. **Results:** Total of 10 patients (4–18 years) were included. Seventy percent of the patients were wheel chair bound and the rest needed the mobility aids. Only 30% of the schools had disable friendly toilet facilities while the remaining 10% had limited wheelchair accessible facility. Forty percent of the schools didn't have adequate access to the classrooms and academic programs, another 40% were having full accessibility and the rest had a mixture of accessibility to classrooms and academic programs. Majority of the schools had accessible school entrances and covered car parks. **Conclusion:** This study will set a platform for larger in depth studies that will be able to identify and highlight the factors contributing to mobility and access issues that can lead to interventions and bring out an improved quality of life and learning experiences.

699

CLINICAL PRESENTATIONS AND PHYSICAL FUNCTIONING OF CHILDREN WITH SPINA BIFIDA IN TERTIARY HOSPITAL, MALAYSIA

O. Htwe¹, N.H. Hassan², A. Naicker¹

¹Universiti Kebangsaan Malaysia, Rehabilitation Unit- Department of Orthopedics and Traumatology, Cheras, Malaysia, ²University Kuala Lumpur- Malaysia, Institute of Medical Sciences Technology, Malaysia

Introduction/Background: The higher the lesion of the spina bifida, the greater the complications (medical as well as physical) for the individual leading to limited functional independence. None of the study has been done so far in our centre looking into the clinical presentations and physical functioning in this group of children with spina bifida. The aim of this study was to investigate the clinical presentations and functional independence in children with spina bifida. **Material and Methods:** It was a descriptive cross-sectional hospital-based study done at the tertiary hospital, Malaysia between Jun 2011–Dec 2011. Data were obtained from medical history records and during a face-to-face interview using PedsQL questionnaire to assess the physical functioning of children with spina bifida. **Results:** Fifty-six spina bifida patients (27 boys and 29 girls) were recorded among 56831 deliveries between 2002 to 2011, giving a prevalence of 8.6 per 10,000 live births. Malays constituted the highest number (48%), followed by Chinese (32%) and Indian (20%). Myelomeningocele (Lumbo-sacral spine region) (53.6%) was the most common type. The rest were lipomyelomeningocele (16%), spina bifida occulta (14.3%), meningocele (10.7%) and lipomeningocele (5.3%). Neurogenic bladder was the most common presentation (70%), followed by Neurogenic bowel (57%), tethered cord syndrome (40%), hydrocephalus (30%), pressure ulcers (20%) and scoliosis (18%). Most of the children ($n=27$) can walk long distance without problems (48%), 21 of them can even run and exercise independently. Eighty six percent of them were independent in bathing. Experience of low energy level was noted in more than 50% of the children. **Conclusion:** These data will be very useful for establishing the national database of Spina Bifida in our country and help to better understand the spina bifida associated medical complications and physical needs of the children with spina bifida. Government sectors will be able to distribute the funding when they know exactly the patient's needs.

700

BENEFITS OF INTENSIVE MEDICAL REHABILITATION TREATMENT FOR CHILDREN AFFECTED BY CEREBRAL PALSY BY RECOGNIZING AND SATISFYING MATERNAL CONCERN

F. Khan¹

¹Chennai, India

Introduction/Background: Cerebral palsy is a very common paediatric disability in India. The birth of a disabled child in a fam-

ily generates heavy physical and emotional burden on the families. Initially parents exhaust their resources looking for a cure. By the time they bring the child for rehabilitation they could not find resources. So the treatment is given up and neglected. Keeping this in mind, Ambattur Rotary Charitable trust started Bal Sanjeevani Cerebral Play Medical Rehabilitation Centre in Ambattur Rotary Hospital in Chennai in India on Dec 2006. Eighty percent (80%) of the children had improved on their GMFC scales and the dropout of children during the treatment was ten percent (10%). While planning rehabilitation taking the concern of the mother is important to reduce the drop outs and increase the satisfaction of the mothers. This helps the mother and family to actively participate in rehabilitation program in the centre and at home. **Material and Methods:** Till now 811 children had been treated there of which 58 percent are male and 42 percent are female children. Ninety eight percent (90%) of the mother's main concern was motor dysfunction of their children. So an intensive program to improve motor function in the children was started. The children had intensive program to reduce spasticity, improve posture and augment existing motor functions. The modalities used are apart from regular exercise therapy, therasuits, bungees, aquatherapy, functional electrical stimulation, surface emg bio feedback, balance boards and virtual reality video games. **Results:** Eighty percent (80%) of the children had improved on their GMFC scales and the dropout of children during the treatment was ten percent (10%). **Conclusion:** Understanding maternal concern is important to reduce the drop outs and increase the satisfaction of the mothers. This helps the mother and family to actively participate in rehabilitation program in the centre and at home.

701

IS BOTULINUM TOXIN INJECTION EFFECTIVE IN PREVENTING PROGRESSION OF HIP DISPLACEMENT IN CHILDREN WITH SEVERE CEREBRAL PALSY?

T.B. Khoo¹, B.H. Ching¹

¹Paediatric Institute- Kuala Lumpur Hospital, Department of Paediatrics, Kuala Lumpur, Malaysia

Introduction/Background: Hip dislocation has severe adverse impact on children with cerebral palsy (CP) and their caregivers. In this study, we aim to determine whether botulinum toxin (BoNT) injection over hip adductors is effective in preventing the progression of hip displacement in children with severe CP. **Material and Methods:** This is a case-control study. Patients aged 2–18 years old with CP and Gross Motor Function Classification System (GMFCS) IV or V, who attended our Child Neurology or CP Clinic with hip surveillance done were recruited, from Sep 2013 till Dec 2015. The hip joint migration percentage (MP) was measured on their hip radiographs, within 12 months duration pre and post-BoNT injections. The rate of MP (rMP) was calculated, annualized and compared between the two groups. **Results:** Twenty-six patients fulfilled the inclusion criteria, in which 16 patients had BoNT injections and the remaining 10 patients served as the control group. There were no significant differences in their demographic data, age of first hip radiograph, first MP, acetabular index, frequency of physiotherapy and the use of assistive devices between the 2 groups. A total of 29 hips from BoNT group and 16 hips from control group were studied. The mean rMP of BoNT injection group ($-4.1\% \pm 11.4$) was significantly lower than the control group ($4.8\% \pm 11.7$), with $p=0.02$. **Conclusion:** In this study, there was a significant improvement in the hip migration percentage following BoNT injections on children with severe CP, hence contributing to their hip stability. This interesting finding needs to be verified by a larger case-control study with a longer follow up period.

702

PARENTS FEAR OF ANTIEPILEPTIC DRUG WITHDRAWN IN CHILDREN WITH CEREBRAL PALSY

M. Knezevic-Pogancev¹, J. Milenovic², N. Milenovic³, B. Popovic⁴

¹Child and Youth Health Care Institute of Vojvodina, Developmental Neurology and Epileptology, Novi Sad, Serbia, ²Nursary School "Happy Childhood", "Cika Jova", Novi Sad, Serbia, ³University of Novi Sad- School of Medicine, Department for Physical and Rehabilitation Medicine, Novi Sad, Serbia, ⁴Scope International, Scope International, Zrenjanin, Serbia

Introduction/Background: The decision to withdraw anti-epileptic drugs is based mostly on a balanced view of the overall risk of seizure relapse and factors most likely to affect that risk. The aim of this study was to find out the children with cerebral palsy parents and family's attitudes towards the fear of having anti-epileptic drug withdrawal, after three years of seizure control. **Material and Methods:** This research was carried out at the Institute for Child and Youth Health care of Vojvodina in Novi Sad. During the study, which lasted from 2004 to 2014, a face-to-face interview about fear of having the anti-epileptic therapy withdrawn was done within the examination of patients having epilepsy and patient having epilepsy and cerebral palsy. The study population included 100 parents from both group. **Results:** In general, the patients of children with cerebral palsy were ready to accept a significantly higher risk of having recurrences after the anti-epileptic drug withdrawal ($p<0.05$) than parents of children having epilepsy without any other health problem. None of parents was ready to accept the risk 50% higher than the one in the general population. **Conclusion:** It is important to take into consideration the parents fear from having recurrences of epileptic seizures before opting for the antiepileptic drug withdrawal. Fear of anti-epileptic drugs withdrawal is higher in parent of children having epilepsy without any other problem than in parents of children having epilepsy and cerebral palsy.

703

CEREBRAL PALSY AND EPILEPSY

M. Knezevic-Pogancev¹, M. Natasa², P. Budimir³

¹Child and Youth Health Care Institute of Vojvodina, Developmental Neurology and Epileptology, Novi Sad, Serbia, ²University of Novi Sad, Faculty of Medicine- Department for Physical and Rehabilitation Medicine, Novi Sad, Serbia, ³Scope International, Rehabilitation, Zrenjanin, Serbia

Introduction/Background: Cerebral palsy is the most common cause of physical disability in early childhood. Epilepsy is known to have a high association with cerebral palsy. All types of epileptic seizures can be seen in patients with cerebral palsy. Complex partial and secondary generalized ones are the most frequent seizure types. **Material and Methods:** In persons with cerebral palsy and mental retardation, the diagnosis of epilepsy presents unique difficulties. Generally they are not able to describe the epileptic events themselves, parents are not able to describe them without fear and persons trained in epilepsy witness the events only rarely. Some syndromes, such as infantile spasms. **Results:** West and Lennox-Gastaut syndrome, are particularly frequent, whereas children with cerebral palsy are rarely free of epilepsy. It has been observed that epileptic seizures in children with cerebral palsy tend to have an earlier onset; they often appear in children with cerebral palsy and mental retardation; they are more severe in patients with a more severe degree of cerebral palsy. The overall outcome of seizures in children with cerebral palsy is poor, requiring prolonged course of antiepileptic medications, polytherapy with higher incidence of refractory seizures and hospital admissions for status epilepticus. The presence of a neurological deficit, as well as cerebral palsy, does not necessarily mean a poor prognosis after the discontinuation of antiepileptic drugs, but the risk of a relapse in persons with cerebral palsy is high. **Conclusion:** The objective of the paper was to show the relationship between cerebral palsy and epilepsy and to determine the occurrence, associated factors, nature and prognosis of epilepsy in children with cerebral palsy.

704

EFFECTS OF LATERAL ELECTRICAL SURFACE STIMULATION ON SCOLIOSIS IN CHILDREN WITH SEVERE CEREBRAL PALSY

E.J. Ko¹, I.Y. Sung¹, G.J. Yun¹, J.A. Kang¹, J. Kim¹, G.E. Kim¹

¹Asan Medical Center, Department of Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: The aim of this study is to evaluate the effects of lateral electrical surface stimulation (LESS) on scoliosis and trunk balance in children with severe cerebral palsy (CP). **Material and Methods:** Children with severe CP (GMFCS level IV or V) and stationary or progressive scoliosis were enrolled. LESS was performed at 40–80 mA intensity, 200 μ s pulse width, 25 Hz frequency, on for 6 seconds and then off for 6 seconds on the convex side of the trunk curve. The children were recommended to receive 2 sessions of LESS/day, 1 hour/session, for 3 months at home. Trunk curvature and balance were evaluated using radiologic (Cobb's, kyphotic, and sacral angles) and functional [the sitting score of the Gross motor function measurement (GMFM)-88, and Trunk control measurement scale (TCMS)] measurements at 4 periods: (a) 3 months before, (b) just before, (c) 1 month after, and (d) 3 months after the treatment. After 3 months of treatment, LESS diaries, containing the stimulation duration and intensity, were collected and questionnaires were administered to the parents or main caregivers of the children. **Results:** Eleven children were enrolled (median age, 9 years). Their median Cobb's angle was 25°, and it showed significant improvements after both 1 and 3 months of LESS. The LESS intensity correlated with the improvement in the GMFM-88 sitting score. The parents or main caregivers of the children believed that LESS had several positive effects, and no major adverse effects were reported. **Conclusion:** LESS improves scoliosis in children with severe CP and may improve trunk balance after LESS.

705

STUDY ON CORRELATION BETWEEN QUALITY OF LIFE OF FAMILY MEMBERS OF CEREBRAL PALSY CHILDREN AND BURDEN OF CARE

X. Li¹, Z. Wu², Z. Jiang², X. Qi², X. Kong²

¹Jiamusi University, Heilongjiang Provincial Pediatric Cerebral Palsy Prevention and Treatment Intervention Center-Pediatric Neurorehabilitation Laboratory, Jiamusi, China, ²Jiamusi University, Third Affiliated Hospital, Jiamusi, China

Introduction/Background: Study on correlation between quality of life (QoL) of family members of cerebral palsy children and burden of care. **Material and Methods:** Select 50 children with cerebral palsy 50 cases of primary caregivers as experimental group, select 50 normal children the main caregivers of 50 cases as control group. The research is the investigative study using Zarit caregiver burden interview (ZBI), the MOS item short form health survey (SF-36) as tools to questionnaire the children and primary family caregivers. **Results:** The analysis on the relevancy about QoL and nursing burdens to Primary family caregivers with cerebral palsy children shows: Care burden of the experimental group was higher than control group ($p < 0.00$), the QoL is lower than the control group ($p < 0.05$). Cerebral palsy children's burden of primary family caregivers of nursing and QoL between eight dimensions are negatively correlated ($p < 0.05$), with statistical significance. **Conclusion:** The presence of cerebral palsy children for primary family caregivers of Care burden and QoL brought serious influence and need social attention.

706

REASONS FOR ADMISSION AMONG PEOPLE WITH CEREBRAL PALSY IN DIFFERENT AGE CATEGORIES

W.C. Lin¹, H. Chi-Che², H. Chung-Han³

¹Chi-Mei Medical Center- Chiali, Department of Physical Medicine and Rehabilitation, Tainan, Taiwan, ²Chi Mei Medical Center- Chiali, Department of Physical Medicine and Rehabilitation, Tainan, Taiwan, ³Chi Mei Medical Center, Department of Medical Research, Tainan, Taiwan

Introduction/Background: People with cerebral palsy (CP) constitute one of the largest diagnostic groups in pediatric rehabilitation. Because the life expectancy of CP patients has increased, related health concerns extend to elderly people with CP. Thus, this study investigated the reasons for admission among people with cerebral palsy in different age categories. **Material and Methods:** Using data from the Taiwan National Health Insurance Research Database, this study analyzed all patients with cerebral palsy who received inpatient rehabilitation between 2002 and 2011. In these claims data, the diseases were coded according to the International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM). The diagnosis of CP was defined as ICD-9-CM 343. The reasons for admission were defined as primary or secondary diagnosis codes. **Results:** A total of 2,526 (43.8% female) patients with cerebral palsy received inpatient rehabilitation between 2002 and 2011; 2,263 (89.6%) were in the age group of 0–19 years, 184 (7%) were in the age group of 20–39 years, 66 (2.6%) were in the age group of 40–59 years, and 13 (0.5%) were older than 60 years. This study identified the top 5 reasons for admission as pneumonia ($n=5,605$, 24.3%), bronchopneumonia ($n=4,732$, 20.5%), acute respiratory failure ($n=3,624$, 15.7%), epilepsy ($n=1,620$, 7%), and chronic respiratory failure ($n=1,584$, 6.9%). Diseases of the nervous system, respiratory system, and gastrointestinal system were the most common reasons for admission in the age group of 0–19 years. In the age group of 20–39 years, “injury and poisoning” were unique and represented the third reason for admission. In the age group of 40–59 years, “muscular and connective tissue disorders” were unique and constituted the second reason for admission. The top 3 reasons for admission among elderly patients were diseases of the respiratory system, genitourinary system, and circulatory system. **Conclusion:** The most common reasons for admission among people with cerebral palsy were pneumonia, respiratory failure, and epilepsy.

707

QUALITY OF LIFE IN LUMBAR MYELOMENINGOCELE BOY WITH UNILATERAL TRANSFEMORAL AMPUTATION : A CASE REPORT

S. Md Rifin¹, Y.A. Yusmido¹

¹Hospital Tengku Ampuan Afzan, Rehabilitation Medicine Department, Kuantan, Malaysia

Introduction/Background: Chronic neuropathic foot ulcer is a common complication for spina bifida patients with bilateral talipes equinovarus due to insensate skin and abnormal ankle position which can lead to more detrimental subsequences. After all conservative management including orthosis for pressure off loading, limb amputation is the final option and can cause more disability to patients. **Material and Methods:** A patient with lumbar myelomeningocele and bilateral talipes equinovarus was assessed using Pediatric Quality of Life Inventory 4.0 (PedsQL 4.0) to evaluate and compare quality of life pre transfemoral amputation and post prosthesis restoration. Score was given to each items assessed and total mark was calculated in which lower score indicates better quality of life. **Results:** Total PedsQL 4.0 score increased from 23/92 pre amputation to 25/92 post prosthesis restoration. Physical health score shows increment from 11/32 pre amputation to 15/32 post prosthesis restoration (12% increment). The emotional functioning score shows no different pre amputation and post prosthesis restoration with score of 0/20. The social functioning score shows marked increment from 3/20 to 7/20 (20% increment). In contrast, his school functioning score display marked reduction with pre amputation score of 9/20 as compared to 3/20 post prosthesis restoration (30% reduction). **Conclusion:** Lower limb amputation in

myelomeningocele patient does lead to disability in physical and social functioning but also helps to enhance quality of life in school functioning. The decision for amputation is formidable especially for a growing child, thus detailed discussions among healthcare providers, parents and patients are crucial.

708

FEEDING AND SWALLOWING PROFILE IN CEREBRAL PALSY CHILDREN IN PMR OUTPATIENT CLINIC: A PRELIMINARY STUDY

S.M. Mei Wulan¹, R.D. Ratna Darjanti Haryadi², N.I. Noor Idha Handajani²

¹Surabaya, Indonesia, ²School of Medicine Airlangga University/ Soetomo General Hospital, Dept. PMR, Surabaya, Indonesia

Introduction/Background: To present feeding and swallowing profile among children with cerebral palsy (CP) examined with the Feeding and Swallowing Questionnaire (FSQ). The profile has clinical value and has the potential to develop interventions that improve outcome. In this study, we present a preliminary feeding and swallowing problems by identifying the responses for specific questions. **Material and Methods:** Thirty-one children with cerebral palsy participated (17 boys, 14 girls). Mean age was 5.7 years. Feeding and swallowing data were collected from parent questionnaires. **Results:** showed that feeding and swallowing problems identified are using a feeding tube 12.9%, thickened liquids 32.3%, using special feeding techniques 48.4%, receiving feeding therapy 77.4%, not had received a swallow study 100%, experienced choking during meals 38.7% and experienced coughing during meals 32.2%. **Conclusion:** Results provide preliminary support for the profile of feeding and swallowing abilities of children with cerebral palsy into seven profile groups. Further investigation is necessary to confirm the feeding and swallowing problems.

709

EVALUATION OF ATTITUDE OF NURSERY SCHOOL TEACHER ABOUT CEREBRAL PALSY ON ORGANISATION OF HABILITATION AND REHABILITATION PROCESS

M. Jasna¹, N. Milenovic², K.P. Prof Marija³, P. Budimir⁴

¹"Happy Childhood", Nursery School, Novi Sad, Serbia, ²Faculty of Medicine- University of Novi Sad, Department for Physical and Rehabilitation Medicine, Novi Sad, Serbia, ³Faculty of Medicine-University of Novi Sad, Department of Pediatrics, Novi Sad, Serbia, ⁴Scope International, Scope International, Zrenjanin, Serbia

Introduction/Background: Cerebral palsy (CP) is a common group of permanent movement disorders that appear in early childhood and characterized with different signs and symptoms. It occurred in 1.5–2.5 per 1,000 live births. Because of different clinical expression it required different and personalized approach in treatment in habilitation and rehabilitation process. **Material and Methods:** Research was conducted on 90 teachers at Nursery School "Happy Childhood" from Novi Sad. Teachers filled in ammoniums questionnaire focused on attitude about different aspect of CP. **Results:** Teachers recognized that in 98% children with CP are not blind and deaf, in 92% changes are permanent and in 90% children with CP could not run. But only in 38% was recognized that children with CP are not mostly in wheel chair and in 42% that all children with CP must have problem with speech. It was observed statistically significant correlation ($p < 0.05$; $r = 0.42$ and $p < 0.05$; $r = 0.29$) which was pointed on fact that was recognized that child with CP impairment of intellectual capacities could not be connected with using wheel chairs and having problem with speech. Also it was observed one statistically significant correlation ($p < 0.05$; $r = -0.35$) which indicated that teachers who are working shorter could not recognized that children with CP have problem with running and

second ($p < 0.05$; $r = -0.35$) which indicated that teachers who are personally known child with CP recognized disorders as permanent- they recognized them as changeable with possibility of progression. **Conclusion:** According to the results it can be concluded that is need to increase level of knowledge about CP trough different way of educations and lectures which can help that inclusive model of nursery school education can help children with CP to be easier include in the regular contemporary school program.

710

COMPARATIVE RESULTS WITH DIFFERENT PHYSICAL AND REHABILITATION MEDICINE KIND OF ENDEAVORS APPLIED IN SPASTIC CHILDREN WITH CEREBRAL PALSY

A. Mirea^{1,2}, G. Onose^{1,3}, L. Padure^{1,2}

¹University of Medicine and Pharmacy "Carol Davila", Physical and Rehabilitation Medicine, Bucharest, Romania, ²National Teaching Centre for Children Neurorehabilitation "Dr. Nicolae Robanescu", Paediatric Physical and Rehabilitation Medicine, Bucharest, Romania, ³Emergency Teaching Hospital "Bagdasar Arseni", Physical and Rehabilitation Medicine, Bucharest, Romania

Introduction/Background: Cerebral palsy (CP) describes a group of disorders of posture and motor development, which determines activity limitation, caused by brain non-progressive lesion during fetal or first years of life. Spasticity is a disabling condition still incomplete resolved. **Material and Methods:** We evaluated 214 CP inpatients, aged 2–18 years old, who benefited of anti spasticity therapy, divided in 3 groups: 63 inpatients who received, aside standard specific kinesitherapy, extracorporeal shockwave therapy (ESWT) sessions. 62 inpatients who had, aside standard specific kinesitherapy, botulinum toxin injections. The control group benefited only of kinesitherapy. During hospitalization (12 days), all inpatients were assessed based on the: CP topography, modified Ashworth Scale (MAS), gross motor function measure-66 (GMFM-66), gross motor function classification scale (GMFCS) level and an adapted questionnaire on pain related to spasticity (aQPS). **Results:** MAS decrease was significant ($p < 0.001$) in the groups receiving (aside standard specific kinesitherapy) botulinum toxin (medium MAS: 3–1.21) and ESWT (2.66–1.84). Statistical analysis revealed significant differences ($p < 0.001$) between GMFM-66 progresses between the 3 groups, the biggest being observed in the botulinum toxin group (medium GMFM-66: 55.48 –63.04), but also important in the ESWT one (53.30–58.02). We observed a significantly ($p < 0.001$) pain-relieving effect of ESWT (aQPS: 19.39–5.87), too. **Conclusion:** ESWT represents a minimally invasive efficient method against spasticity and the pain related to it, and because of being more accessible (as cost and child's better psychological tolerance), it may represent a real alternative to the botulinum toxin treatment.

711

THE EFFECT LOADED SIT TO STAND WITH PERIODISATION GROSS MOTOR FUNCTION MEASURE DIMENSION D FOR PALSY CEREBRAL SPASTIC DIPLEGIA

T. Misdalia¹

¹Hospital Gevremant Arifin Achmad, Physical and Rehabilitation Medicine, Pekanbaru, Indonesia

Introduction/Background: Cerebral palsy is a non progressive disorder of movement and posture on immature brain. Children with cerebral palsy will present selective loss of motor control, spasticity and muscle weakness. Standard protocol in this area is passive range of motion which is not strengthening exercise. the other way to strengthening muscle is by giving periodization loaded sit to stand exercise to observe the effect in dimension standing D and

walking, of gross motor function measure (GMFM 88) for spastic diplegic cerebral palsy. *Material and Methods:* This study examined cerebral palsy of spastic diplegic type with level I, II, and III gross motor function classification system (GMFCS) with aged 7–14 years. subjects were divided into 2 groups, group 1 with intervention of periodization loaded sit to stand with 10 RM load which was measured on first and fourth week, and control group which was given 7 weeks of 3 times/week at home. *Results:* Show an Increase of motor ability in intervention group in dimension standing (D) and walking, of gross motor function measure higher than control group (dimension D 17,79 vs 0,82). periodization of loaded sit to stand strengthening exercise are able to improve standing, walking in cerebral palsy spastic diplegic are better than control group *Conclusion:* Loaded Sit to Stand exercise with periodization can make increasing functioning GMFM Dimension D for Palsy Cerebral Spastic Diplegia patient.

712

THE EFFECT OF COMBINED CASTING, BOTULINUM TOXIN INJECTION, AND PHYSICAL THERAPY FOR LESS THAN 1-YEAR-OLD CHILD WITH CEREBRAL PALSY

M. Nishimura¹

¹Shiga Medical Center for Children- Moriyama- Shiga, Department of Rehabilitation Medicine, Moriyama- Shiga, Japan

Introduction/Background: Botulinum toxin type A is licensed for the treatment of spasticity in children older than 2 years. On the other hand, equinus gait is the most common problem with spastic cerebral palsy, which results in an unstable and inefficient gait pattern. We treated with combined casting, botulinum toxin injection, harness therapy, and physical therapy for an eleven month old girl with cerebral palsy before she got an equinus gait pattern. *Material and Methods:* The case was born at 36 weeks' gestation with a birth weight of 2,548 g. She had gradually appearing motor delay and was found to have diagnosed with cerebral palsy at age eight month. She begun to stand up with support, and her left equinus foot had become conspicuous. At age eleven month, she was injected botulinum toxin of 20 units into 5 area (adductor, gracilis, gastrocnemius and medial hamstrings) only one time, and long leg cast applied at the same time. After casting was removed, long leg brace was changed and a short leg brace underwent after that for 6 months. *Results:* For early therapeutic intervention to address this problem, the limitation of her left ankle was improved and positive ankle joint power was increased. Therefore her gait was improved and she was able to walk normally which became 3 years old. *Conclusion:* Due to botulinum toxin and casting, the range of motion of lower limbs was improved and her plantar sensitivity was reduced. Furthermore, by supporting a muscle and alignment of the lower limbs by harness, and repeating a new gait pattern by physical therapy, she acquired a walking pattern at heel contact. For a child with mild cerebral palsy, an early aggressive combined therapy before gets the walking pattern by the equinus position is possible to acquire a normal gait for life.

713

ANALYSIS OF THE CLINICAL CHARACTERISTICS OF CHILDREN WITH CEREBRAL PALSY CAUSED BY HUMAN CMV INFECTION

J. Qiu¹, X. Chen², C. Xu¹, L. Yang²

¹Zhejiang Provincial Rehabilitation Guidance Center for Disabled Persons, Rehabilitation Medicine, Hangzhou, China, ²Zhejiang Civil Affairs Rehabilitation center, Pediatric Rehabilitation, Hangzhou, China

Introduction/Background: To Analyze the clinical characteristics of children with cerebral palsy caused by human CMV(HCMV) infection. *Material and Methods:* Fifty-one cases of HCMV infec-

tion were studied by analyzing related clinical symptoms of cerebral palsy, finding its characteristics, and analyzing its causes by comparing with control group of 50 patients with cerebral palsy caused by other causes. *Results:* The clinical symptoms of cerebral palsy caused by HCMV infection were similar to those of cerebral palsy caused by other reasons, However, the clinical symptoms of cerebral palsy caused by other reasons were more severe. 37.25% of cerebral palsy caused by HCMV infection showed damage to liver function. Brain CT and MRI for cerebral palsy caused by other reasons showed that 30% of alba was damaged with local cyst. Developmental quotient determination of cerebral palsy caused by HCMV infection showed 90.20% of the patients was in moderate to severe defects, whereas the percentage of patients with cerebral palsy caused by other causes was 52.6%. There was a significant difference between the two groups with respect to their developmental quotient. The motor function in 88.23% of patients with cerebral palsy caused by HCMV infection was class II–III, which was mainly in slight to moderate damage. *Conclusion:* The movement function of cerebral palsy caused by HCMV was mostly in the slight to moderate damage, However the mental development obviously was mostly in moderate to severe defects, which showed the mental damage was much greater than the motor function damage. In patients with cerebral palsy caused by other causes, the degree of motor function damage was greater than the degree of intelligence damage. Besides, The children with cerebral palsy caused by HCMV infection were easy to suffer multiple organ injury such as liver damage. The brain CT and MRI showed 30% of the brain damage caused by other reasons of cerebral palsy was in the alba.

714

CORRELATION BETWEEN SLEEP DISTURBANCE IN MALAYSIAN CHILDREN WITH CEREBRAL PALSY AND THEIR PRIMARY CAREGIVERS

S. Rajasegaran¹, S.A. Khor Keat Sim¹, S.A. Mohd Fu'ad¹, A. Bint Ali¹

¹Hospital Sultan Ismail, Rehabilitation Medicine, Johor Bahru, Malaysia

Introduction/Background: Background: Primary objective: To compare frequency and type of sleep disturbances (SD) among children with cerebral palsy (CP) and their association with SD in their main care givers. Secondary objectives: To determine association of several factors eg. CP type, Gross Motor Function Classification System (GMFCS) level, epilepsy, bed sharing, visual loss, use of night orthoses, sedative drugs and carer vocation with sleep disturbances in these children. *Material and Methods:* Methods: This was a prospective cross sectional study involving 99 children between the age of 4–18 years with CP and their main caregivers. SD was assessed using Sleep Disturbance Scale for Children (SDCS) in CP children and Pittsburg Sleep Quality Index (PSQI) in caregivers. Pearson Chi Square test and Fisher's exact test was used to analyze association between SD and associated factors. *Results:* Results: 84 children have at least one component of SD, 17 children have pathological sleep total score (TS) >70 with difficulty initiating and maintaining sleep being the most common complaint (26.3%). 71% of carers have pathological SD. TS in children had significant correlation with PSQI in adults ($p=0.035$). Children with quadriplegic type CP ($p=0.031$), concomitant seizures ($p=0.003$), bed sharing ($p=0.005$) and caregivers ($p=0.035$) had statistically significant association with SD. There were no significant association ($p>0.05$) between SD and other factors (GMFCS level, use of orthoses, visual impairment and sedative medication). *Conclusion:* Conclusion: A high number of CP patients and their carers have SD, therefore screening of SD in CP children and their caregivers is important. Whether SD in children caused SD in carers or vice versa could not be confirmed. Our study shows that use of night orthoses and use of sedative medication eg. Anti-epileptics or baclofen does not affect sleep. This should convince parents of common misconceptions on factors that affect their child's sleep.

715

MANAGEMENT OF CEREBRAL PALSY CHILD WITH PROTEIN-S DEFICIENCY

W. Said Iahmar¹, M. Rekik¹, A. Hadj Salah¹, M. Elayeb¹, H. Ben Brahim¹, M. Sghir¹, Z. Ben Salah Frih², W. Kessom-tini¹

¹CHU Tahar Sfar, Department of Rehabilitation, Mahdia, Tunisia, ²CHU Fattouma Bourguiba Monastir, Department of Rehabilitation, Monastir, Tunisia

Introduction/Background: Protein-S deficiency has never been reported associate to a cerebral palsy (CP) in literature. Through this case we expose the difficult rehabilitation of a cerebral palsy child with protein-s deficiency. **Material and Methods:** This is 16-month old boy, born by forceps with a fetal distress. At the age of 1 month, he developed a thrombosis of the upper right limb. The diagnosis of protein-S deficiency was made (29%). He was treated by anticoagulant and subsequently sent in our clinic for (CP) rehabilitation. **Results:** We found in our clinical examination a psychomotor retardation and a spastic tetraparesis. The child underwent a soft rehabilitation and had orthosis. He took initially Baclofen, which was stopped because of convulsions. Botulinum toxin could not be injected because of anticoagulant. **Conclusion:** The CP rehabilitation had always be inhibited by the co- existence of other diseases. Particularity of child with CP and protein-s deficiency reside in anticoagulant treatment. This requires vigilance with orthosis wearing and cast making. Another problem is about spasticity treatment by unbearable toxin injection because of anticoagulant. A soft rehabilitation and adapted orthosis are the only alternative that we can offer to those children.

716

SCOLIOSIS IN NON-AMBULATORY CEREBRAL PALSY

P.Y. Yang¹, H.J. Jou², N.H. Meng³, H.S. Shiue⁴, T.I. Han³

¹Taichung, Taiwan, ²Kuang Tien Hospital, Department of Orthopedic Surgery, Taichung, Taiwan, ³China Medical University Hospital, Department of Physical Medicine and Rehabilitation, Taichung, Taiwan, ⁴EDA hospital, Department of Physical Medicine and Rehabilitation, Kaohsiung, Taiwan

Introduction/Background: The goals in caring for patients with cerebral palsy are to optimize their function and prevent deformity. Spinal deformity is common in cerebral palsy and will result in functional impairment and pain. The purpose of this study is to assess the development of scoliosis in adolescent non-ambulatory cerebral palsy. The incidence of scoliosis, factors related to the severity of scoliosis, and the progression of scoliosis will be assessed in this study. **Material and Methods:** This is a retrospective study. The participants were institutionalized non-ambulatory adolescents with cerebral palsy. All the participants had a series of radiographs including spine and pelvic x ray. They were followed for four years. The basic data including age, sex, and Gross Motor Function Classification System were recorded. We retrospectively reviewed the radiographs to assess the progression of the scoliosis and analyze the factors related to the severity of scoliosis. **Results:** There were 34 participants recruited in this study. The average age was 15.2 years at the beginning of the study. The incidence of scoliosis is 52.9% (18/34). During the four year follow up, there were five participants who have rapid progression of scoliotic curve. Three of them had a spinal curve more than 40° before age 12. None of them had hip dislocation. We divided our participants into four subgroups according to the severity of scoliosis: normal, mild (Cobb's angle below 20°), moderate (20°–40°), and severe (above 40°) group. The incidence of hip dislocation is highest in the severe scoliosis group. **Conclusion:** The incidence of scoliosis is high in non-ambulatory cerebral palsy patients. Those who have a spinal curve above 40 degrees before age 12 years have higher risk of curve progression. Early detection of scoliosis and early treatment will prevent progression to severe scoliosis.

717

CAREGIVER'S SATISFACTION AND ANKLE FOOT ORTHOSIS COMPLIANCE AMONG CHILDREN WITH CEREBRAL PALSY

Y.T. Wong¹, A. Ahmad Fauzi¹, L. Abdul Latif¹

¹University Malaya Medical Centre, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: The main objective of this study is to explore caregiver's satisfaction on ankle foot orthosis (AFO) provided to their children with cerebral palsy (CP) and to determine the relationship between caregiver's satisfaction and AFO compliance. **Material and Methods:** This was a cross sectional study conducted in Pediatric Rehabilitation Clinic in University of Malaya Medical Centre (UMMC) involving 123 participants who are the caregivers of CP children. Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0) questionnaire was used to assess caregiver's satisfaction on AFO. A self-structured questionnaire on caregiver reported AFO usage by their children for the past 6 weeks was documented to assess compliance. Socio-demographic and medical background data were obtained from caregivers and medical records. Independent sample *t*-test and chi-square test were used to compare differences between continuous data and categorical data respectively. Multiple logistic regression was performed to look at factors which may influence AFO compliance when adjusted with other confounders. **Results:** In general, caregivers were fairly satisfied with AFO (mean total QUEST score 3.53, range 1.00–5.00). Nevertheless, most CP children (77.2%) have poor AFO compliance. Significant association was found between caregiver's satisfaction (device/service subscale and total QUEST scores) with AFO compliance ($p < 0.01$). Multiple logistic regression analysis model identified total QUEST score as a protective factor (OR 0.28, $p < 0.05$) for AFO compliance, while 2 other factors were associated with poor compliance, including caregiver perceived AFO non-compliance (OR 233.67, $p < 0.001$) and Gross Motor Functional Classification Scale (GMFCS). GMFCS IV and V which consist of 54% children, had 19.1 (OR 19.13, $p < 0.05$) and 29.3 (OR 29.32, $p < 0.05$) higher odds respectively for poor AFO compliance. **Conclusion:** Caregiver's satisfaction is significantly associated with AFO compliance among children with CP. A multidisciplinary approach during AFO prescription and subsequent follow up is important to ensure caregiver or user satisfaction and good compliance for optimum intended therapeutic outcome.

718

EFFECTS OF TRANSCUTANEOUS ELECTRICAL ACUPOINT STIMULATION (TEAS) ON MOTOR FUNCTIONS IN CHILDREN WITH CEREBRAL PALSY: A PRELIMINARY STUDY

B. Zhang¹, Y. Zhu¹, C. Jiang¹, J. Zhao¹, F. Wang¹, B. Cheng¹, C. Li¹, Y. Bai¹

¹Fudan University Huashan Hospital, Department of Rehabilitation Medicine, Shanghai, China

Introduction/Background: Transcutaneous electrical acupoint stimulation (TEAS) is the application of electrical stimulation to mimic acupuncture. This non-invasive technique has been used for treating respiratory diseases, pain and enhancing motor functions of stroke patients. The study aims at evaluating the effects of TEAS on motor functions in children with cerebral palsy. **Material and Methods:** Twenty-eight patients with Modified Ashworth Scale (MAS) of the wrist \geq Grade 1 were included and randomly assigned to either the therapeutic group (TG, $n=14$) and the control group (CG, $n=14$). TEAS was performed at Shousanli (LI10) and Waiguan (SJ5) 20 minutes per day, 5 days per week only in the TG. Therapeutic exercise was performed 40 minutes per day, 5 days per week in both groups. Gross motor function measure (GMFM) and Modified Barthel Index (MBI) were used at baseline (M0) and at the end of the 8th week (M2). The differences between M0 and M2 in the GMFM

and MBI scores are presented as Δ GMFM and Δ MBI, respectively. **Results:** The average age, gender, GMFCS grades and types of paralysis were not statistically different between groups at baseline ($p > 0.05$). The Δ GMFM scores in the TG and CG between M0 and M2 were 43.50 ± 32.52 and 24.64 ± 16.80 , respectively, increased by 30% and 17%. The difference of Δ GMFM between groups was obvious, though without statistical significance ($p = 0.065$). The Δ MBI scores in the TG and CG between M0 and M2 were 20.93 ± 13.93 and 11.57 ± 8.08 , respectively, increased by 40% and 21%. The Δ MBI were statistically different between groups ($p = 0.041$). The Δ MBI was found related with the group division ($p = 0.039$), while the Δ GMFM not ($p = 0.073$). **Conclusion:** TEAS might be helpful in promoting motor functions in children with cerebral palsy.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: PAEDIATRICS - MISCELLANEOUS

719

MOTOR BEHAVIOR OF THE BLIND CHILDREN- MILESTONES, HANDLING AND PHYSIOTHERAPY INTERVENTION

B. Almajan-Guta¹, V. Almajan-Guta²

¹West University, Physiotherapy, Timisoara, Romania, ²Speranta Special Care Center, Physiotherapy Early Intervention, Timisoara, Romania

Introduction/Background: Studies made on groups of blind children and groups of children without visual impairment in similar conditions have pointed out the fact that the medium age at which the main milestones of motor development are performed, are significantly delayed. Fine and gross motor development of the blind babies are crucial in order to achieve maximum independence. **Material and Methods:** The longitudinal study compared the developmental data concerning 9 motor skills of 11 blind children (retinopathy of prematurity) from Special Care Center "Speranta" Timisoara with age 2 months -3 years old, to a control group of sighted children at the same age. **Objectives:** to establish the age when they perform the milestones; to evaluate the motor behavior of the blind children; to advise the parents how to handle their babies. **Results:** The results the motor development of blind children was delayed in all the stages, but significant in 5 motor skills that were examined ($p < 0.05$). This delay shows the major importance of vision in motor development and in self-care skills, but also is caused by the lack of stimulation and no/poor motor experience. **Conclusion:** Early intervention and individualized programs of the physiotherapist for the achievement of maximum potential of the child, a safe and an adequate stimulating environment, proper handling could shorten the motor developmental delay and could improve the quality of life of those children.

720

EVALUATING MOTOR FUNCTION AND BIOMARKERS OF FUKUYAMA CONGENITAL MUSCULAR DYSTROPHY

R. Harada^{1,2}, M. Ikeda-Taniguchi^{3,4}, A. Unzaki³, T. Ueha⁵, M. Nakayama⁶, M. Inoue², S. Akahane², H. Nishimoto², T. Toda⁴, M. Kurosaka², S. Yoshitada⁵

¹Kobe University Hospital, Department of Rehabilitation Medicine, Kobe, Japan, ²Kobe University Graduate School of Medicine, Department of Orthopaedic Surgery, Kobe, Japan, ³Kobe University Graduate School of Medicine, Department of Pediatrics, Kobe, Japan, ⁴Kobe University Graduate School of Medicine, Department of Neurology/Molecular Brain Science, Kobe, Japan, ⁵Kobe University Graduate School of Medicine, Division of Rehabilitation Medicine, Kobe, Japan

Introduction/Background: Fukuyama type congenital muscular dystrophy (FCMD) is an autosomal recessive, severe childhood muscular dystrophy with brain and eye involvement. FCMD is mainly caused by an ancestral insertion of 3-kb SVA type retrotranspositional element into the 3' untranslated region of the causative gene, fukutin. Recently Mariko Taniguchi-Ikeda et al succeeded in optimizing antisense oligonucleotides therapy for FCMD model mice and myoblasts. Since FCMD is an incurable disease, there is few study on motor function and natural history of FCMD. There is a need to develop sensitive, non-invasive outcome measures of FCMD patients that can be readily available to human clinical trials in the near future. **Material and Methods:** We collected clinical data and serum from 15 FCMD patients. Clinical data contains evaluation using the Gross Motor Function Measure and the Hammett-Smith Functional Motor Scale, and Ultrasound (US) images and share-wave elastography of muscles. **Results:** Both GMFM and HFMS are highly correlated with traditional Ueda classification. US images of patients' muscles were bright, and share-wave elastography showed significantly high elasticity in biceps brachii and brachial muscles in FCMD, compared to normal control. MicroRNA 206 (miR206), which is highly expressed in regenerating muscle fibers, was significantly overexpressed in FCMD compared to normal controls. Correlation coefficient of miR206 with serum CK level, serum creatinine level, and motor measure were also high. **Conclusion:** GMFM and HFMS can be useful for assessment of FCMD. US study, muscle elastography and serum miR206 can be useful for monitoring muscle wasting progression and motor function level of FCMD.

721

20 YEARS TRACE AND SURVEY OF DISTINCTIVE NEONATES DISPOSAL IN THE MANG AND THE REVELATION TO REHABILITATION

G. Huang¹, L. Yang², C. Zhou³

¹Kunming, China, ²Honghe University, Rehabilitation, Honghe, China, ³The Second Peoples Hospital of Honghe Prefecture, Rehabilitation, Yunnan, China

Introduction/Background: To explore the behavior and significance of distinctive neonate disposal during the Mang in the natural state. **Material and Methods:** Social survey and cross-sectional investigation were carried out to the Mang in China. **Results:** After 20 years trace and a cross-sectional investigation, none of children with cerebral palsy or mental retardation and 1 case of children with suspicious mental problem were found., and no case with cerebral palsy was found. **Conclusion:** In the absence of modern medical means, the dispose of the neonates with distinctive method in the Mang is to abandon therapies of "problem newborn" initiatively, which is to prevent the waste of resource in maximum. It is the unique choice of the Mang to follow the natural law for racial maintenance.

722

A CASE REPORT OF SOTOS SYNDROME WITH 5Q35.2-Q35.3 DELETION AND REVIEW OF THE LITERATURE

H. Huang¹

¹Children's Hospital of Kunming in Yunnan Province, Rehabilitation Department, Kunming, China

Introduction/Background: To summarize the clinical features and the genetic factors of Sotos syndrome and to look for an effective method to rehabilitate. **Material and Methods:** Report the clinical manifestation, genetic testing results and other relevant factors of a patient with Sotos syndrome and review the literatures. **Results:** Sotos syndrome is a overgrowth syndrome, which features mainly overgrowth in childhood, craniofacial abnormalities, developmental delay and learning difficulties, meanwhile with some different characteristics. More than 75% of cases are due to the mutation

and deletion of NSD1 gene (located in chromosome 5q35, normally encoding a histone methyltransferase protein). *Conclusion:* Sotos syndrome is a rare syndrome with comprehensive clinical manifestations. The nosogenesis is usually the mutation or deletion of NSD1 gene and the current treatment is symptomatic treatment.

723

EFFECTIVENESS OF FOOT ABDUCTION BRACE (FAB) PRODUCED BY PROF DR R SOEHARSO ORTHOPAEDIC HOSPITAL AS CORRECTION MAINTENANCE FOR IDIOPATHIC CLUB FOOT

S. Jusuf¹¹Surakarta, Indonesia

Introduction/Background: Club Foot is anomalies frequently seen in the newborns. This condition limited the child's walking ability. Without adequate treatment, it will interfere the patient's living. Orthopaedic management of the club foot in The Prof Dr R Soeharso Orthopaedic Hospital using the Ponseti method. Management of Rehabilitation Medicine for the club foot is maintained the corrected club foot after the period of conservative treatment with Ponseti serial cast by Orthopedic Surgeon. The FAB is bracing used to maintained the corrected foot for 24 hours a day until 3 months, and the FAB used for 12 hours a day until the age of 4 years. *Material and Methods:* This study used cross sectional design with data collected from the medical records from Jan at 2013 until Dec at 2014. Flexibility assessment of the foot by measuring of cavus, adductus, varus and equinus degrees pre Ponseti cast, pre FAB and post using FAB. These samples included 18 children, or 27 feet, due to not all the children had bilateral club foot. *Results:* the number of baby boy is more dominant for 11 children (61.1%) when classified according to age at first treatment is the highest percentage in the age group of 1–2 months of age that there are 10 children (55.6%), the age group of 0–1 month there were 6 children (33.3%), and the age of 2–3 months there were two children (11.1%). A total of 27 club foot were given treatment with Foot Abduction Brace (FAB) for 3 months after getting serial handling Ponseti Cast and calculated by Repeated Measures test was showed that a significant (<0.005). *Conclusion:* The Foot Abduction Brace produced by Prof Dr R Soeharso Orthopaedic Hospital is adequate treatment to maintained the correction of the club foot.

724

FEASIBILITY OF APPLYING THE ICF CORE SET FOR CHILDREN & YOUTH TO CLINICAL SETTING IN REHABILITATION

K.E. Lee¹, T.I. Yi¹, S.A. Ha¹, Y.R. Choe¹¹Bundang Jesaeng General Hospital, Department of Rehabilitation Medicine, Seong-nam si- Gyeonggi-do, Republic of Korea

Introduction/Background: The International Classification of Functioning children and youth (ICF-CY) core set is a list of important items regarding the evaluation of functioning and disability in children and youth. The aim of this study was to evaluate the potential feasibility of application of the brief ICF-CY core set to clinical settings in rehabilitation. *Material and Methods:* A self-administered questionnaire was developed using ICF-CY components that were identified in all four preparatory phase studies to develop ICF-CY core set. Total 90 subjects were divided 3 groups by age. Main caregiver of the patients checked the relevant issues related to disability. And then, ICF second level categories were analyzed and compared with the brief ICF-CY core set. The data were analyzed using frequency analysis. *Results:* At the domain level, the activities and participation domain was highly checked in the all age groups. Items related with activities of daily lives were frequently mentioned. But dressing was not involved in brief ICF core set. In the body functions domain, mental functions of language, mobility of joint functions, and gait pattern functions were

very frequently linked, in over 75% of the subjects. In the younger age groups, they were more likely to focus on gait pattern functions and it was not included in brief ICF core set regardless of the age group. For the body structures domain, structure of brain which was in brief ICF-CY core set was the most frequent problem in all aged groups. Also, most of the items in environmental factors were also included in the brief ICF core set. *Conclusion:* The body structure and environmental factors might be feasible for application of the brief ICF-CY core set to clinical settings. However, other component may not be directly applied. Future research will be essential for applying the brief ICF-CY core set to clinical settings.

725

DISABILITY ASSESSMENT IN YOUNG CHILDREN WITH DISABILITIES

K. Nyein Yin¹, H. Ohnmar², H. Lasimbang¹, Z.A. Mustafa-pha¹, F. Ahmedy¹, P. Favazza³, K. Ghio³, G. Siperstein³¹University Malaysia Sabah, Faculty of Medicine and Health Science, Kota Kinabalu, Malaysia, ²University Kebangsaan Malaysia, Rehabilitation Unit- Department of Orthopaedics and Traumatology- Faculty of Medicine, Kuala Lumpur, Malaysia, ³University of Massachusetts Boston, Center for Social Development and Education, Boston, USA

Introduction/Background: In the early childhood years, children begin to learn fundamental motor skills which is not maturationally driven but requires environmental support and multiple opportunities to acquire and hone these skills. Motor development has been linked to other areas of development such as language and social skills, working memory and verbal fluency, children's understanding of spatial, temporal and sequential concepts (e.g., up/down, first, then) and later cognitive performance, kindergarten readiness skills, and social/play skills. This study reported the preliminary data of assessment of disability in children with disabilities. *Material and Methods:* Thirty eight preschool children (age: 3–5 year, 26 boys and 12 girls) from 4 community based rehabilitation centres, 4 centres of non-governmental organisation for the children with disabilities, and 2 private preschools in Kota Kinabalu district were included. Their severity of disability was assessed by using ABILITIES index. *Results:* Twenty three autism, 8 Down syndrome, 4 slow learners, one hydrocephalus, one speech delay and one attention deficit hyperactive disorder (ADHD) cases were included in this study. All the children had normal ability with audition, limb (left) and overall health. Intellectual functioning was not normal in 89.5% of the children. Disability in communication with others was found in 78.9%. Disability in social skill was detected in 68.4%. Inappropriate behavior occurred in 47.4%. Understanding other abilities and structural status were not normal in 7.9%. Left eye and right eye abilities were lacking in 5.3% and 2.6% accordingly. Lacking in right limb abilities was in 2.6%. Tightness in tonicity and looseness in tonicity was found in in 2.6% of the children. *Conclusion:* Understanding of specific impairment is essential in implementing well-structured rehabilitation program including motor program (Young Athletes program) so as to improve the clinical outcome and quality of life of children with disabilities.

726

REHABILITATION IN MANAGEMENT OF ARTHROGRYPOSIS : A CASE REPORT

I.K. rambe¹, E. Sungkar¹¹University of Padjadjaran, Physical Medicine & Rehabilitation, Bandung, Indonesia

Introduction/Background: Most children with arthrogryposis have the potential of living satisfying and productive life if could reach their potential functional. Rehabilitation programs aim to achieve their fullest potential to facilitate and promote maximal independ-

ent function in mobilization, activities of daily life and so improve quality of life. Services that commonly comprise rehabilitation are rehabilitation nursing, physical therapy, occupational therapy, recreational therapy, speech therapy, orthotics services, nutrition services, social worker, and psychology counseling. *Material and Methods:* A girl, 2 years old was born with contractures in elbow, wrist, knee and ankle joints. X ray of upper and lower extremities revealed arthrogryposis of these joints. There is no delayed teeth and speech, and the sensory impress normal. Serial casting was undertaken at the age of 5 days to 3 months once a week in Orthopaedics Department. It is continued with bilateral Ankle Foot Orthosis (AFO) at the age of 9 month in Physical Medicine & Rehabilitation Department, then switched to Hip Knee Ankle Foot Orthosis (HKAFO) since 2 months ago. Cock up splint was undertaken at the age of 7 months to present. Physical therapy intervention including stretching, strengthening, mobility training, and occupational therapy interventions including training in fine motor skills and play therapy were undertaking regularly once a week for 1,5 years to improve range of motion and functional performance. *Results:* Range of motion of contracted joints has been increased gradually in lower extremities. Mobilization function including sitting independently from prone position, standing and side to side walking with support has been achieved. However, hand dexterity is poor and no improvement in fine motor skill. *Conclusion:* Several services in rehabilitation can improve functional performance in arthrogryposis. Further follow up and evaluation of interventions is still be needed to achieve optimal function in mobilization and activities of daily life at an age-appropriate level.

727

THE STUDY OF THE EXPRESSION OF NF-KB AFTER EARLY INJECTION OF SDF-1A ON HIBD RATS

L. Zhang¹, X.Y. Sun²

¹Third Affiliated Hospital of Jiamusi University, Department of Children Cerebral Palsy Two, Jiamusi, China, ²Welfare houses of Weifang, Paediatrics, Zhucheng, China

Introduction/Background: To explore if the expression of NF-κB and Rho associated kinase in HIBD rat after the injection of SDF-1a has the protective effect on brain. *Material and Methods:* Ninety 7-day Wistar rats were randomly divided into 3 groups: sham group, control group(HIBD) and intervention group (HIBD+SDF-1a). In sham and control group, rats received intraperitoneal injection of the same dose of NS, while intervention group received intraperitoneal injection of SDF-1a after surgery. At 24 h, 3 d, 7 d after HI, 10 rats were randomly selected from each group to observe pathological changes. Using immunohistochemical method to observe NF-κB p65 protein and Rho kinase. We use western blot to detect the expression of protein NF-κB p65 and RT-PCR to detect the mRNA expression of Rho kinase. *Results:* (1) Pathological changes of brain tissue: The brain tissue were normal and the outline was clear, sham operation group has no pathological changes; control group's ligated side brain was seriously injured. At 24 h, we can see obvious edema and hemorrhage. At 3 day, the ligated side brain has local congestion and liquefaction necrosis. At 7 day, the ligated side was atrophy; Compared with control group, the intervention group has light changes. (2) Expression of NF-κB p65 protein: The level of NF-κB p65 protein was low in sham operation group; The expression was increased at 24 h in control group, peaked at 3 day, then was reduced at 7 day but still remained at a high level; Sham group and intervention group has significantly difference ($p < 0.05$); The expression was significantly reduced in intervention group, and the difference is statistically significance ($p < 0.05$). *Conclusion:* SDF-1a peripheral injection can protect the newborn rat brain with HIBD. It can inhibit the expression of inflammatory factor NF-κB protein p65 to reduce the degree of brain damage and adjust the nerve growth.

728

ANALYZE THE CAUSES AND MEASURES OF INFANTS' EMESSES IN HYPERBARIC OXYGEN CABIN

Y. Zhang¹, G. Huang¹, Y. Liu¹, Y. Yang¹

¹Children's Hospital of Kunming in Yunnan Province, Rehabilitation Department, Kunming, China

Introduction/Background: To discuss the common causes of infants' emeses in the course of hyperbaric oxygen therapy and find out the effective measures. *Material and Methods:* Analyze the causes of 600 cases of infants vomiting in the course of hyperbaric oxygen therapy and summarize the solving experiences. *Results:* The top four reasons of infants vomiting in the course of hyperbaric oxygen therapy are: 75.5% was not following the before entering cabin dietary guidance combining crying in the cabin, 7.2% was hiding the messages of not suitable to entering cabin combining crying in the cabin, 6.3% was crying in the cabin, and 5.8% was caused by feeding. Researchers took appropriate measures depending on the situations. Except 13 infants were ended the therapy in advance, the rest all had a normal and safe therapy and no asphyxia happened. *Conclusion:* Not following the before entering cabin dietary guidance combining crying in the cabin is the main cause of infants' emeses in hyperbaric oxygen cabin. Taking appropriate measures according to the different situations, end the therapy in advance if necessary, is the effective measure to make sure infants will not be checked on vomits.

729

COMPREHENSIVE REHABILITATION INTERVENTION FOR 27 CASES OF PREMATURE INFANTS WITH LOW BIRTH WEIGHT INFANTS

L. Zheng¹, Y. Liu¹, G. Huang¹

¹Children's Hospital of Kunming in Yunnan Province, Rehabilitation Department, Kunming, China

Introduction/Background: To evaluate the effect of early comprehensive rehabilitation intervention in early stage of cerebral nerve development in premature infants with low birth weight. *Material and Methods:* Brain of children with low birth weight infants in 103 cases of normal early development were found in 27 cases with abnormal brain development by comprehensive rehabilitation intervention, including physical therapy, massage, acupuncture, hyperbaric oxygen, psychological rehabilitation and other means, the results compared with the control group. *Results:* 103 cases of infant normal preterm low birth weight infants midbrain nerve abnormalities were abnormal rate from 26.2% to 9.7% (27/103) (10/103), the difference was statistically significant ($2=9.521, p=0.002$), 27 cases of premature and low birth weight infants were abnormal after the rehabilitation of children with GDS score compared with control group, in addition to the "no difference in social" outside, other factors and DQ were the control group, the difference was statistically significant ($t=2.204\sim 2.924, p=0.032\sim 0.005$). *Conclusion:* Early rehabilitation is an effective method to promote children's recovery and reduce the abnormal rate.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: GERIATRICS - DEMENTIA

730

THE EFFECT OF KINECT-BASED TAI-CHI EXERCISING PROGRAM FOR OLDER ADULTS WITH MILD DEMENTIA

P.S. Lin^{1,2}, C.C. Hsieh¹, Y.T. Wei¹, Y.C. Hsu¹, Y.C. Huang¹

¹Chang Gung University, Department of Physical Therapy & Grad-

uate Institute of Rehabilitation Science, Taoyuan, Taiwan, ²Chang Gung University & Chang Gung Memorial Hospital, Healthy Aging Research Center, Taoyuan, Taiwan

Introduction/Background: Tai Chi chuan is a popular Chinese mind-body exercise. It needs mind concentration and challenges both physical and cognition. Many studies have shown its beneficial effects of physical and cognitive function in older adults without cognitive impairment, but evidence in those whom with cognitive impairment is limited. There are growing applications of the interactive game-Kinect in health promotion and rehabilitation to enhance motivation and participation of the clients. The purpose of this study is to investigate the effect of a 6-month kinect-based tai-chi program on physical and cognitive function in mild demented older adults. **Material and Methods:** A convenient sample of older adults aged over 60 in daycare centers were recruited and clustered randomized (by center) to 6-month kinect-based tai chi exercise, 45 min/session, 2 times/week ($n=20$) or control groups ($n=20$). Cognitive function (Cognitive Abilities Screening Instrument (CASI)), physical fitness tests (grip strength, knee extension strength (KES), 30 sec sit-to-stand (30-STSS), arm-curl test, timed up and go (TUG), 5-meter walking time (5-MW), 6 minute walking distance (6-MWT), functional reach (FR), one leg stand time, chair sit-and-reach (CSR), and reaction time), emotion status (Geriatric Depression Scale(GDS)) and proxy reported quality of life, MPBC behavior measure and Zarit's caregiver burden scale (ZCBS) were measured at baseline and after intervention. Two-way (group \times time) repeated measure ANOVA was adapted for analysis. **Results:** There were no significant differences of basic characteristic data between 2 groups. Significant interaction effects were found in FR, 6-MWT, MPBC behavior measure and ZCBS. For CASI score, the interaction did not reach significance, but with the Tai-chi group revealed relative maintenance and the control significantly decline after 6 month. **Conclusion:** A 6-month kinect-based tai chi exercise program is feasible, fun and effectiveness for the mild demented OAs in improving balance, endurance and behavior problems, reducing care burdens, and at least maintaining cognitive function.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: GERIATRICS - SARCOPENIA

731

FUNCTIONAL IMPAIRMENTS AND DYSMOBILITY SYNDROME IN PATIENTS WITH PREVALENT FRA- GILITY FRACTURES: A RETROSPECTIVE CASE- CONTROL STUDY

F. Gimigliano¹, A. Moretti², A. de Sire², R. Gimigliano², G. Iolascon²

¹Second University of Naples, Department of Physical and Mental Health and Preventive Medicine, Napoli, Italy, ²Second University of Naples, Department of Medical and Surgical Specialties and Dentistry, Napoli, Italy

Introduction/Background: Osteoporotic fractures are burdensome on the healthcare management of older people and are associated to impaired bone strength, muscle weakness, and falls. Recently two new concepts have been proposed to identify functional impairments: the dysmobility syndrome and the skeletal muscle function deficit (SMFD). The aim of this study was to investigate the role of fragility fractures as risk factor for dysmobility syndrome and/or SMFD in post-menopausal women. **Material and Methods:** In this retrospective case-control study we examined data from the medical records of post-menopausal women. Cases were represented by women who had had a fragility fracture at least a year before the evaluation and controls were women without any fragility fracture. In our population, we identified the presence of dysmobility syndrome, dynapenic SMFD, sarcopenic SMFD, and mixed SMFD,

according to the criteria proposed by Studenski and Binkley respectively. **Results:** In our population of 121 post-menopausal women, 77 women (63.6%) had already sustained an osteoporotic fracture. The risk for dysmobility syndrome was significantly higher (adjusted OR for age and serum 25-OH vitamin D3 of 2.46) in the cases compared with the controls. **Conclusion:** Early diagnosis of conditions limiting mobility, including dysmobility syndrome, in patients with a history of fragility fractures might be useful to identify those who have a higher risk of new fractures.

732

PREDICTIVE ACCURACY OF HARRIS-BENEDICT EQUATION FOR RESTING ENERGY EXPENDITURE IN PATIENTS WITH CEREBRAL INFARCT DURING ACUTE CARE

T. Koyama¹, A. Nagano², K. Domen¹

¹Hyogo College of Medicine, Department of Rehabilitation Medicine, Nishinomiya, Japan, ²Nishinomiya Kyoritsu Neurosurgical Hospital, Department of Nursing Care, Nishinomiya, Japan

Introduction/Background: Estimation of resting energy expenditure is essential in planning nutrition support. For this purpose, the Harris-Benedict equation has been widely used in clinics. The aim of this study was to assess the predictive accuracy of this equation in comparisons with other existing equations in patients with cerebral infarct during acute care. **Material and Methods:** We assessed the Harris-Benedict, Mifflin, Owen, Japanese simplified, Wang, and Cunningham equations. The Owen and Japanese simplified equations use sex and weight as explanatory variables, the Harris-Benedict and Mifflin equations include sex, weight, age and height, and the Wang and Cunningham equations use fat-free mass measured using bioelectrical impedance technology. Actual resting energy expenditure values were assessed by indirect calorimetry on days 2 and 7 and were then averaged. The absolute values of the differences between the actual resting energy expenditure and the predicted values derived from the equations were used in analyses. The values from the Harris-Benedict equation were statistically compared with those from the rest five equations (Wilcoxon signed-rank test, $p < 0.01$). **Results:** A total of 30 patients were analyzed. Actual resting energy expenditure values ranged from 796 to 1,660 kcal (median 1,085, IQR 973–1,249). The difference between actual resting energy expenditure and predicted values was the smallest with the Harris-Benedict equation (median 57, IQR 27–120), followed by the Cunningham (median 109, IQR 40–209), the Wang (median 128, IQR 60–225) the Mifflin (median 132, IQR 81–225), the Japanese simplified (median 151, IQR 83–244) and the Owen (median 165, IQR 96–217) equations ($p < 0.01$). **Conclusion:** The present results indicated that the Harris-Benedict equation provides the most accurate prediction of resting energy expenditure for patients with cerebral infarct during acute care, suggesting appropriate clinical availability of this equation.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: GERIATRICS - RISK OF FALLS IN THE ELDERLY

733

THE EFFECT OF FEAR OF FALLING TO FUNC- TIONAL MOBILITY AND BALANCE OF COMMUNI- TY-DWELLING ELDERLY

P.M. Kurniawati¹, C.P. Wijaya², M. Melina²

¹Surabaya, Indonesia, ²Widya Mandala University, Medical School, Surabaya, Indonesia

Introduction/Background: Fear of Falling (FOF) is one major obstacle in elderly people. They tend to restrict their activity which

could lead to a decrease in their functional mobility capability and their balance. FOF tends to be presented whether there is falling experience or not. So the purpose of this study is to find the relationship of Fear Of Falling using Fall Efficacy Scale –I (FES-I), the functional mobility using Timed Up and Go test (TUG test) and Functional Reach Test (FRT) as the balance parameter in community –dwelling elderly people which has fall experience and which is not. *Material and Methods:* It was a cross-sectional study to a 128 elderly healthy subjects from the catholic church community-dwelling, 93 females and 38 males, 68.87±5.8 years old, in which is 11 subjects has falling experience. Pearson and Spearman's rho of correlation and were used to analyse the relationship between FES-I, TUG and FRT. *Results:* There was no significant differences of FES-I score between fall- experience and no fall-experience elderly group ($p=0.074$, $p>0.05$). There was a strong correlation between The FES-I and FRT ($r=-0.749$, $p<0.05$) but no correlation between FES-I and TUG ($r=0.548$, $p=>0.05$) in fall-experience elderly group. In the no-fall experience group there was a weak correlation between FES –I and TUG ($r=-0.254$; $p<0.05$) and between FES-I and FRT ($r=-0.204$; $p<0.05$). *Conclusion:* The experience of falling has no effect in older Adults' Fear of Falling and their functional mobility. The FOF in the group that has experienced falling is related to the balance ability. More subjects have to be examined to understand the relationship of mobility limitation and fear of falling.

734

ASSOCIATIONS BETWEEN FALLS AND PHYSICAL PERFORMANCE FOR COMMUNITY-DWELLING OLDER ADULTS WITH VERY MILD TO MILD COGNITIVE IMPAIRMENTS: A PILOT STUDY

R.J. Tsai^{1,2}, C. Tzu-Wen¹

¹Cardinal Tien Hospital, Physical Therapy, New Taipei City, Taiwan, ²Graduate Institute of Physical Therapy- College of Medicine- National Taiwan University, Taipei, Taiwan

Introduction/Background: Falls and cognition impairments are common in older adults. Elderly with mild cognitive disorders are considered at higher risk for developing dementia. Those who have both cognitive impairments and physical limitations can interfere with the ability to maintain independent living or cause traumatic injuries. Fall is also one of the major causes of elderly traumatic injury. Aims of this study were to investigate associations between falls and physical performance for community-dwelling older adults with very mild to mild cognitive impairments. *Material and Methods:* A cross-sectional designed study was conducted. Demographic data (gender, age, BMI, MMSE, falls, education level, comorbidity) and physical performance (balance and mobility) were collected. Balance and mobility ability were assessed by Berg Balance Scale (BBS), and Timed "Up and Go" test (TUG), respectively. All participants were informed and signed the ethic content. Descriptive and nonparametric analysis was conducted with SPSS. *Results:* 15 participants, diagnosed with very mild to mild cognitive impairments, were recruited from neuro-psychiatrists. Demographic data was showed as followed: male: 12; age: 79.73±3.58; BMI: 23.04±4.42; MMSE: 20.64±2.04; no. of falls: 1.13±2.61; education level: high school; co-morbidity: 2; BBS: 51.40±4.29; TUG: 15.00±5.29; expressed as mean±SD or medium. Fall incidence is 3/15. All variables showed low linked except no. of falls in past 6 months and age of participants. Fall has a moderate correlation with age and mobility (spearman correlation coefficient $\rho=0.57$; 0.66 , $p<0.05$). Age was moderate to strong correlated with mobility and balance function ($\rho=0.55$; -0.73 , $p<0.05$). *Conclusion:* Aging increase the risk of fall and interfere physical performance, and falls are affected by mobility ability rather than balance function. Although the sample size was small, in clinical implication and fall prevention issue, health-care professionals should focus on the functional mobility performance. We need a large sample size to concrete the founding in the future study.

735

INPATIENT FALLS IN A HOSPITAL REHABILITATION DEPARTMENT

A.A. Tsur¹

¹Galilee Medical Center, Rehabilitation, Nahariya, Israel

Introduction/Background: The aim of the study was to review the various causes which may lead to inpatient falls in the rehabilitation department of a general hospital. *Material and Methods:* We surveyed 80 cases of patient falls, 38 men and 17 women, who were hospitalized in the Rehabilitation Department at the Galilee Medical Center, Israel between the years 2008–2012. Those patients were divided into two groups: one group included patients who fell only once ($n=41$), and the second group included patients who fell twice or more during hospitalization ($n=14$). The various data examined were: the illness or injury for which the patients were hospitalized in the rehabilitation department, hour of day the fall occurred, existence of illness or previous injury which may have influenced the occurrence of the fall, action which caused the fall, location in the hospital where the fall occurred, and the injury caused by the fall if any. *Results:* The patients who fell once were hospitalized in the rehabilitation department for various reasons, for example: cerebral injury of vascular, or traumatic origin, after amputation of a lower limb, due to a fractured lower limb or due to partial injury to the spinal cord; as opposed to patients who fell twice or more who only suffered from cerebral injury (Fischer's Exact Test, $p=0.004$ 2-sided). These patients fell, mainly after slipping which occurred after weight-bearing, walking or standing (Chi Square Test, $p=0.005$ 2-sided, $p=0.004$ 1-sided), whereas in patients who fell only once, the event usually occurred when transferring from one place to another (Chi Square Test, $p=0.038$ 1-sided). *Conclusion:* It appears that recent cerebral damage constitutes a frequent risk factor for falls in patients during hospitalization in the rehabilitation department. In addition, those same patients tend to fall while weight-bearing on both legs.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: GERIATRICS - OTHER GERIATRIC CONDITIONS

736

STATIONARY GERIATRIC EARLY REHABILITATION; A RANDOMISED OUTCOME STUDY OF 2.308 PATIENTS

C. Angleitner¹, P. Heise², I. Reiter¹, U. Ewerth¹, P. Golmayer²

¹Hospital of the Sisters of Charity Ried, Department of Geriatrics and Remobilisation, Ried, Austria, ²Hospital of the Sisters of Charity Ried, Institute of Physical Medicine and Rehabilitation, Ried, Austria

Introduction/Background: Stationary geriatric early rehabilitation is very well implemented and sufficiently standardized in many countries. But is stationary geriatric early rehabilitation sufficiently in functional outcome for patients from all assigning specialist departments? *Material and Methods:* The retrospective study includes all the patients from 2008 to 2014 which our department of Geriatrics and Remobilisation took over from the neurologic, traumatologic, orthopaedic and internal/cardiological departments. The development was measured with the FIM (functional independence measure). The take over FIM was taken inside 72 hours after arriving and the discharge FIM was taken inside the last 48 hours before leaving. *Results:* The study contains 2.308 patients, 753 orthopaedic patients with an average age of 76.59 years, a residence time from 17,43 days and a FIM development from 98 to 113 points; 637 traumatological patients with an average age of 81.89 years, a residence time from 18,78 days and a FIM development from 83 to 103 points; 632 neurological patients with an average age of 76.62 years, a residence

time from 19.22 days and a FIM development from 73 to 90 points as well as 286 cardiological/internal patients with an average age of 80.02 years a residence time from 18.23 days and a FIM development from 77 to 96 points. The FIM development of all patient groups is 1.22 (± 0.17 points) per therapeutic day. The recommended aim value of the American Rehabilitation Counselling Association (ARCA) amounts to 1 FIM point per therapeutic day. *Conclusion:* It is possible to obtain a sufficient functional progress for all patients in stationary early geriatric rehabilitation independently from which specialist department they were overtaken from.

737

INNOVATIVE HEALTH DEVICES IN IMPROVING PHYSICAL ACTIVITY OF OLDER ADULTS ATTENDING THE COMMUNITY CARING CENTERS IN TAIWAN: A PILOT STUDY

S. Chen¹, Y.R. Zheng², W.D. Chang³, Y.C. Lan²

¹China Medical University, Department of Physical Therapy, Taichung, Taiwan, ²China Medical University, Department of Health Risk Management, Taichung, Taiwan, ³China Medical University, Department of Sports Medicine, Taichung, Taiwan

Introduction/Background: In order to cope with the rapidly aging population and to achieve the goal of “active aging in place”, the Taiwanese government launched many elder-centered community caring centers for the older adults. The community caring centers provided services focusing on health promotions with the overall goal of reducing long-term medical expenses. However, there has been little available evidence about the barriers and facilitators of people’s health in the community caring centers in Taiwan. This study therefore aimed to investigate physical activity in older adults attending community caring centers in order to develop more tailored innovative health promotion programs for this population. *Material and Methods:* Individuals who regularly attend the community caring center were invited to participate and completed the following questionnaires: basic demographic data and physical activity (International Physical Activity Questionnaire; IPAQ). Participants were also invited to wear a wrist-band physical activity recording health device for 3 days. *Results:* Overall, 127 participants completed the questionnaires (age: 74.5 \pm 9.3 y/o; females: 71%), and of those, 5 also agreed to wear the physical activity recording health device. The average physical activity was 2.35 hour/day where as sitting was 5.02 hour/day. The physical activity captured by the wearable health device was highly correlated with moderate physical activity captured by IPAQ ($p=0.0344$). *Conclusion:* The reported time for physical activities is comparable to the time the older adults spent in the community caring centers, indicating that most older adults do not spend extra time for other physical activities outside the centers. With the good validity of wearable health device tested by the older adults, in the future, the wearable health devices may serve as reminders and provide interactive platforms for older adults to improve their physical activity in the community.

738

LARYNGEAL ELEVATION TIME MEASUREMENT FROM THE SKIN SURFACE USING A NEWLY-DEVELOPED INFRARED LASER INSTRUMENT

K. Hanayama¹, S. Shimizu¹, T. Sugiyama¹, H. Abe¹, T. Hiraoka¹, A. Tsubahara¹, H. Metani¹, S. Seki¹

¹Kawasaki Medical School, Department of Rehabilitation Medicine, Kurashiki, Japan

Introduction/Background: Impaired laryngeal movement is an important sign which may reflect swallowing disorder. As for screening tests for dysphagia, repetitive saliva swallowing test is an easy and sensitive method, however, the examiner must palpate the subject’s thyroid cartilage. The optical laryngeal organ motion analysis system (NESSiE ; Ideaqest Inc., Japan) is an instrument which detects the

laryngeal movement from the skin using infrared Laser. It does not disturb the movement of the larynx. In the current study, we measured laryngeal elevation time and investigated if age makes any difference in it. *Material and Methods:* One hundred healthy volunteers (52 females) were recruited. The subjects’ age was 44.5 years old on average (S.D. 9.5 years). They included 30 subjects who aged 60 or more. Each subject was fixed to the stable posture of the head and asked to swallow a spoonful of jelly and 3mL of water. The NESSiE radiated matrix of bright spots on the skin surface of the subject’s throat, then filmed with a CCD camera and recorded during swallow. Displacement of the bright spot matrix was analyzed and calculated laryngeal elevation time. *Results:* The laryngeal elevation time was successfully measured in all subjects. Positive correlation was found between age and the laryngeal elevation time ($r=0.440$, $p<0.001$) when the subjects swallowed water. Among the subjects aged 60 or over, higher correlation coefficient was obtained ($r=0.571$, $p<0.001$). However, for jelly, we did not find any significant correlation between age and the laryngeal elevation time. *Conclusion:* We measured laryngeal elevation time using a newly-developed optical laryngeal organ motion analysis system. Positive correlation was found between age and the laryngeal elevation time in water swallowing, whereas no significant correlation in jelly swallow.

739

EFFECTS OF THE USE OF THE RACOL®-NF SEMI-SOLID ENTERAL FORMULA AND AN ADAPTER ON THE TIME OF NURSING WORK

Y. Ikenaga¹, J. Mitoma¹, I. Ohori¹, R. Nozaki¹, M. Urushihara¹, H. Nishimura¹, Y. Katsuki¹

¹Yawata Medical Center, Rehabilitation, Yawata-Komatsu, Japan

Introduction/Background: Semi-solid enteral formula is widely used in patients receiving enteral tube feedings owing to its beneficial effects of reducing the incidence of complications such as vomiting and diarrhea, but requires considerable time for preparation. The RACOL®-NF SemiSolid is a ready-made semi-solid enteral formula and that can be directly connected to feeding tubes with an adapter. We studied whether the use of the RACOL®-NF SemiSolid enteral formula and an adapter reduced the time of nursing work in comparison with the conventional procedures (CP). *Material and Methods:* Five trained nurses were recruited for the evaluation. A 92-year-old woman who had a percutaneous endoscopic gastrostomy (PEG) tube was administered semi-solid nutrients. In the CP, the semi-solid enteral formula was prepared by mixing dextrin with liquid nutrient, sucked with a syringe and administered. In the new procedures (NP), the RACOL®-NF SemiSolid for Enteral Use was directly connected to a PEG tube with an adapter, and administered by using a pressurizing bag. The times for preparation, administration, and cleaning were measured with a stopwatch. All the data from the CP and NP were compared by using the Mann-Whitney *U*-test, and defined as significant when *p* values were <0.05 . The present study was approved by the ethics committee. *Results:* The mean time for preparation was 158.7 s in the CP and 69.9 s in the NP ($p<0.01$). The mean time for administration was 345.8 s in the CP and 313.0 s in the NP ($p=0.49$), allowing nurses to participate in the care of other patients. The mean times for cleaning were 214.0 s and 90.5 s respectively ($p<0.01$). *Conclusion:* The use of the RACOL®-NF SemiSolid enteral formula and an adapter reduced the time of nursing work by approximately 4 minutes, which may eventually contribute to lighten the burden of care givers.

740

BODY MASS INDEX (BMI) INFLUENCE ON OUTCOME OF PATIENTS WITH KNEE ARTHROPLASTY AND HIP ARHTOPLASTY/INTERTROCHANTERIC FEMORAL FRACTURE

S. Papakosta¹, P. Kotoula², D. Galliopoulos², G. Skoufi², S. Valais², X. Vagenas², T. Petsepis², C. Liaskos²

¹Larissa, Greece, ²Arogi Rehabilitation Center, Rehabilitation, Larissa, Greece

Introduction/Background: Total knee arthroplasty (TKA) for obese patient entails more postoperative complications. Studies demonstrate that revision rates after total knee arthroplasty (TKA) are higher in obese patients. There is little knowledge on the association between BMI and pain activity on the early outcome of patients with total knee arthroplasty (TKA) and patients with Hip arthroplasty or operated intertrochanteric femoral fracture (HA-IFF). The aim was to evaluate the impact of BMI on severity of pain during the outcome of patients with TKA and HA-IFF. **Material and Methods:** The study involved a group of 76 patients (61 female, 15 males) (30 with TKA and 46 with HA-IFF) (median age 75, range 62–93) who were examined the day after surgery and 6 weeks after. A 10-point visual analogue scale (VAS) was used to estimate the severity of pain at these 2 time points. **Results:** Left orthopedic events were more common in male patients compared to female (13/15 male vs 34/61 females $p < 0.005$). Patients with HA-IFF tended to be statistically more elderly than TKA patients (76 ± 5 vs 71.2 ± 6.8 $p = 0.063$). A statistical correlation was observed at comparison of BMI and VAS score only at the 2nd time point (6 week after the surgery) ($r = 0.578$, $p = 0.024$) and not the day after surgery ($r = 0.121$, $p = 0.722$). **Conclusion:** Increased BMI can influence the severity of pain 6 weeks after surgery in patients with TKA and HA-IFF. Future prospective studies will be needed to validate these calculators and to refine them with time.

741

CERVICO AS ALTERNATIVE TREATMENT OF GERIATRIC PATIENTS WITH CERVICAL RADICULOPATHY

I. Yuanita¹

¹ProSpine, PT.Meridian Medical Indonesia, Surabaya, Indonesia

Introduction/Background: Cervical radiculopathy is a disease process marked by nerve compression. In geriatric patients, conservative intervention strategies with cervical traction together with other modalities and exercise therapy should be done with strict precautions. Cervico is customizable dynamic ambulatory traction device with ability of conducting both symmetric and asymmetric traction to cervical spine. **Material and Methods:** A 73-year-old woman presented to our facility with neck and upper extremity radiating pain for 2 months. She felt weakness in right hand (manual muscle test 4). MRI scan revealed spinal cord compression at central and paracentral C4–5 and C5–6 level. Neural foraminal stenosis were found at the both C6 level, right C7 level, and left C7 and right C5 level from the most severe consecutively. Electromyography and nerve conduction studies revealed right C7 nerve root compression with moderate denervation, right C5 and C6 irritation without denervation. The degree of foraminal stenosis in accordance with the degree of neurological disturbances. She was planned to have operation if no improvement occur after rehabilitation program. **Results:** Cervico was given asymmetrically (right traction force more than left side) on cervical area starting from 10 minutes and customized every therapy. After 16 programs in 1.5 month consist of exercise of upper extremity with cervico, massage and laser, pain gradually reduced from visual analogue scale 7–8 until 0. This patient then consulted to neurologist and no surgical intervention required. **Conclusion:** Cervico as dynamic traction has been proven to be effective in alleviate pain in geriatrics with cervical radiculopathy. Further research are needed to evaluate effectiveness and safety of cervico treatment for geriatrics.

742

THE OUTCOME OF CONVALESCENT REHABILITATION IN PATIENTS AT 90-YEAR AND OLDER, A 5-YEAR RETROSPECTIVE STUDY

T. Tamaru¹, Y. Tamaru¹, K. Ishizaki¹, H. Yamakawa¹, M. Matsubara¹, S. Kurokawa¹

¹Kaikoukai Rehabilitation Hospital, Rehabilitation, Yatomi, Japan

Introduction/Background: In Japan, aging society is one of the most important social problems, so the most patients have got older and older nowadays. Kaifukuki rehabilitation means the integrated rehabilitation ward system, common in Japan, for the convalescent patients with cerebrovascular diseases (CVD), after orthopedic surgery (OPS) because of fracture of lower limb and disuse syndrome (DUS) after pneumonia or abdominal surgery and so on. Especially we were concerned the outcomes of the convalescent rehabilitation for the patients at 90-year and older. **Material and Methods:** We retrospectively investigated the medical records of the hospitalized patients for the last 5 years. The all subjects were 2,318 hospitalized patients, and the two groups were divided by the age at 90-year older or younger. We compared the difference of the patient attribute and the outcome of rehabilitation between the two groups. The assessment of activity of daily life was used by Functional Independence Measure (FIM, 18–126 points). **Results:** The number of the patients at 90-year and older was 281 (12.1%), the younger group was 2037 patients. The percentage of the originated disease in the older group was that, CVD: 20.3%, OPS: 68.7%, DUS: 11.0%, on the other hand, the younger group was that, CVD: 46.4%, OPS: 44.0%, DUS: 9.6%. The average data of the patients of the older /the younger group showed that, the mean age was 92.8/74.2, the duration of acute hospital was 26.4/31.6 days, the duration of kaifukuki rehabilitation was 66.3/72.4 days, FIM score at the beginning was 70.5/79.3, FIM score at discharge was 87.9/97.7, FIM increase was 17.3/18.4 points (insignificant), the percentage of home discharge was 80.8%/84.0%, respectively. **Conclusion:** These data showed the effectiveness of kaifukuki rehabilitation for super old patients as well as for younger patients.

743

HOME-BASED PHYSICAL THERAPY FOR DISABLED ELDERLY PEOPLE AT A REGIONAL HOSPITAL IN TAIWAN

J.C. Yang¹, C.Y. Huang¹, Y.C. Tsai¹, Y.H. Chen¹, J.C. Hsu¹, C.P. Tseng¹, C.F. Lo¹, H.Y. Chen¹, H.T. Tsai¹, C.C. Chang¹, W.H. Chen¹, C.H. Su¹, M.R. Tsai¹, Y.C. Chein¹, Y.T. Lai¹

¹National Taiwan University Hospital - Hsinchu branch, Physical Medicine and Rehabilitation, Hsinchu, Taiwan

Introduction/Background: Taiwan has already been defined as an “aging society” by WHO in 1993, which means that the proportion of elderly people exceeded seven percent of the population. According to the data of Ministry of Health and Welfare, it suggested that elderly population is expected to rise above the fourteen percent threshold in 2018, making Taiwan an “aged society”. Therefore, to satisfy the needs of this rapidly increasing elderly population, the government has been promoting long-term care programs and building a comprehensive environment for elderly care. In addition, the government designed a national long-term care insurance system, and has started for preparations in Jul 2009. The long-term care insurance aiming on “self-help, mutual-aid and risk-sharing” scheme. Many elderly people who suffered from chronic illness or injuries need care and assistant in activities of daily living (ADLs) due to disability. With regard to the care of disabled elderly people, who make up about twenty percent of all elderly people, we provided home-based physical therapy for this population after they discharge from the hospital. **Material and Methods:** Three hundred forty seven patients received home based physical therapy from 2011 to 2015 in our hospital. The intervention of home-based physical therapy basically including the functional activity training, balance training, strengthening training, endurance training, and the most important of all, caregiver training (especially caring techniques in positioning, passive range of motion, rolling, transfer). Physical therapists provided one session per week, and six sessions per year at most. **Results:** Patients and their families were highly satisfied by the home-based physical therapy, scoring 4.5 in 5. **Conclusion:** Home-based physical therapy may improve

the quality of care in disabled elderly people, and ease their families' financial burdens as well. We show gratitude to National Taiwan University Hospital Hsin-chu Branch for administrative support.

744

FIM SCORE CHANGE AT THE TIME OF ADMISSION AND DISCHARGE IN OUR GERIATRIC HEALTH-CARE FACILITY

T. Yonemura¹, K. Ito¹, A. Hirakawa¹, H. Ogata¹

¹Sagamihara Royal Care Center, Rehabilitation, Sagamihara, Japan

Introduction/Background: In Japan, rising social welfare costs urgently require fundamental reform of the system of medical and nursing care services. One of the important roles in geriatric healthcare facilities like ours is to promote discharge from elderly facility to home. In this study, the effects of rehabilitation on geriatric residents were investigated. *Material and Methods:* Of 208 geriatric residents who were admitted to our facility between Apr 2014 and Mar 2015, 197 geriatric residents were examined with the Functional Independence Measure (FIM) at the time of admission and discharge from our facility and divided into 3 groups based on residence prior to admission: 1) hospital, 2) home, and 3) elderly facility. The FIM measures how much geriatric residents can carry out activities of daily living (ADL) independently and contains 18 tasks composed of 13 motor tasks and 5 cognitive tasks. *Results:* There was a significant difference in FIM gains of hospital group and home group, respectively. In some motor tasks, the median FIM gains (2 points) were observed in the hospital group. The effects of rehabilitation in FIM motor subscale of hospital group were high, and ability of transfer tasks showed improvement. *Conclusion:* In terms of our facility which covered by long-term care insurance, geriatric residents who transferred from hospital or home to our facility can receive 7 times per week intensive rehabilitation therapy for 3 months, but those who transferred from elderly facility are institutionally restricted in a rehabilitation therapy twice a week. FIM score improved when our rehabilitation therapy showed the effect on geriatric residents who were considered to be "not disabled" among those who transferred from hospital or home to our facility.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: REHABILITATION ADDRESSING TO SPECIFIC ISSUES - SENSORY AND MOTOR CONTROL (INCLUDING POSTURAL CONTROL)

745

A REVIEW OF POSTURAL CONTROL AND GAIT PATTERN IN THE DIABETIC PERIPHERAL NEUROPATHY : A NARRATIVE REVIEW

A. Mustapa¹, H. Manaf¹, N. Mustafah², M. Justine¹

¹Universiti Teknologi Mara, Physiotherapy, Puncak Alam, Malaysia, ²Universiti Teknologi Mara, Medicine, Sungai Buloh, Malaysia

Introduction/Background: Diabetic peripheral neuropathy (DPN) is the most common and debilitating microvascular complication of Diabetes mellitus (DM) mainly in Type 2 DM patients. The aim of this paper is to review the published study on the impairment of postural control and gait pattern in DPN. *Material and Methods:* A review was performed by obtaining publication of all papers from various databases reporting on postural control and gait pattern in DPN. A keyword literature search was conducted using PubMed, Medline, CINAHL, and Web of Science database. The keywords used for literature searching were 'postural control', 'balance', 'spatiotemporal gait parameters', 'diabetes mellitus', and 'diabetic peripheral neuropathy'. The searching was limited to English, aca-

demical journal, and human studies only. *Results:* 55 studies were eligible and were screened on their abstracts. Only 13 studies were eligible to be reviewed. 6 studies found strong evidence of postural control impairments in DPN with indepth analysis of balance in 3 studies, postural sway in 2 studies, and static balance in 1 study. While 7 studies showed noticeable gait deficit in DPN with 4 studies explore on gait pattern, 2 studies investigate gait stability, and 1 study look into gait variability. *Conclusion:* This review has made an endeavor to state DPN patients have been demonstrated with postural instability and gait imbalance that contribute to the falls incidence. Further works are warranted to investigate the characteristics of postural control and gait pattern that is considered risky to fall in DPN.

746

EFFECT OF VIBRATOR STIMULI FOR PATIENT WITH DYSKINESIA.~CASE REPORT~

S. Ikeda¹, M. Kubota¹, T. Kato¹, Y. Niizeki¹, J.I. Inobe¹

¹Inobe Hospital, Rehabilitation, Oita-shi, Japan

Introduction/Background: Dyskinesia is known as an involuntary movement that occurs through a combination of neurological symptoms including dystonia, chorea, and tremors. Recently, the possibility of vibrator stimuli reducing dyskinesia was reported. In this study, we reported the effect of vibrator stimuli on tremors. *Material and Methods:* 70-year-old woman who suffered limb dyskinesia due to chronic subdural hematoma. Her ICARS score was 32/100 and FIM eating score was 6 points. To reduce the dyskinesia, vibrator stimuli (THRIVE, Daito Co., Ltd) was applied to 16 points, including wrist extensor and flexor, triceps, biceps, and quadriceps for one minute, respectively, per day for three weeks along with conventional physical therapy. The surface EMG of upper limbs during nose-finger test, and ICARS score were compared before and after the sessions. *Results:* In the EMG, the average amplitude of the wrist extensor muscle and biceps during nose-finger test increased from 18.9 μ V to 35.9 μ V and 12.6 μ V to 42.1 μ V, respectively. Her ICARS score also improved from 32 to 21. Finally, her FIM eating was increased to 7 points. *Conclusion:* We determined that short-term vibrator stimuli has the potential to improve dyskinesia through this case. Earlier studies reported that increasing proprioceptive information by vibrator stimuli might be effective against tremors. In this case, the enhanced proprioceptive information induced by vibrator stimuli may improve dyskinesia. Further studies with increased number of patients are needed to verify the efficacy of vibrator stimuli to dyskinesia.

747

AGE AND GENDER RELATED NEUROMUSCULAR AND KINEMATIC PATTERN DURING TRUNK FLEXION-EXTENSION IN CHRONIC LOW BACK PAIN PATIENTS

T. Kienbacher¹, R. Habenicht¹, J. Kollmitzer², P. Mair³, G. Ebenbichler⁴

¹Karl Landsteiner Institute of Outpatient Rehabilitation Research, PMR, Vienna, Austria, ²University of Biomedical Engineering- Vienna- Austria, Biomedical Engineering, Vienna, Austria, ³Harvard University, Department of Psychology, Boston, USA, ⁴Medical University of Vienna, Department of PMR, Vienna, Austria

Introduction/Background: The root mean square surface electromyographic activity of lumbar extensor muscles during dynamic trunk flexion and extension and the specific ranges of motion have been recommended to objectively assess muscle function in chronic low back pain patients. However, literature in older patients is sparse. This cross sectional study sought to examine these age (<40 versus 40 to 60 versus >60 years) and sex related differences during a standardized trunk flexion-extension task. *Material and Methods:* A total of 216 patients [62 aged 60–90 years (33 females), 84 aged 40–59 years (44 females), and 70 aged 18–39

years (34 females)] performed testing by holding static positions at standing, half, and full trunk flexion. The lumbar extensor muscle activity and the ranges of motion at the hip and lumbar spine were recorded and calculated from L5 and T4 levels. Permutation ANOVA with bootstrapped confidence intervals were performed to examine for group differences. Ridge regressions investigated the impact of physical-functional and psychological variables on the half flexion relaxation ratio (HFR). *Results:* Measurements revealed highest muscle activity at standing in the oldest and the female group. Patients over 60 years showed lowest activity changes from standing to the half (increments) and from half to the maximum flexion position (decrements) together with lowest lumbar ranges of motion leading to significantly lower HFR. Females had higher gross trunk ranges of motion than males. The lumbar range of motion and the muscle activity at standing had significant impact to the HFR. *Conclusion:* This standardized trunk flexion-extension task involving isometric test positions is feasible for older patients and those younger. The neuromuscular activation pattern and the kinematics changed according to age and sex. The test discriminates between impaired and unimpaired neuromuscular regulation of back extensors potentially allowing the design of individual treatment programs.

748

THE EFFECTS OF FUNCTIONAL ELECTRICAL STIMULATION (FES) COMBINED MOBILE ARM SUPPORT (MAS) ON UPPER EXTREMITY AND OCCUPATIONAL PERFORMANCE SATISFACTION IN SUBACUTE STROKE PATIENTS

I.J. Kong¹, M.Y. Chang²

¹Inje University, Rehabilitation Science, Gimhasi, Republic of Korea, ²Inje University, Occupational Therapy- College of Biomedical Science and Engineering, Gimhae, Republic of Korea

Introduction/Background: The purpose of this study was to investigate the effect of functional electrical stimulation combined mobile arm support on upper extremity and occupational performance satisfaction in subacute stroke patients. *Material and Methods:* Five patients who had subacute hemiplegia over 3 months, less than 12 months after they were diagnosed as stroke patient by physician were participated. They received conventional occupational therapy without FES combined MAS for 4 weeks, and then performed FES combined MAS on a hemiplegic upper extremity daily for 30 minutes a session, five days a week, for an additional 4 subsequent weeks. The outcome was assessed using the Fugl-Meyer Assessment (FMA) for upper extremity and occupational performance satisfaction was assessed using the Canadian Occupational Performance Measure (COPM). *Results:* In a conventional occupational therapy session without FES combined MAS, there were no significant changes on upper extremity. In the FES combined MAS session, there were significant improvement of upper extremity ($p < 0.05$). In addition occupational performance satisfaction show significant improvement. *Conclusion:* To improve upper extremity FES combined MAS intervention in subacute stroke patients will be actively useful.

749

EFFECTS OF REAL-TIME AUDITORY STIMULATION FEEDBACK ON BALANCE AND GAIT AFTER STROKE: A RANDOMIZED CONTROLLED TRIAL

B. Lee¹, C.H. Yang¹, J.H. Kim²

¹Sahmyook University, Physical Therapy, Seoul, Republic of Korea, ²Andong Science College, Department of Physical Therapy, Andong, Republic of Korea

Introduction/Background: The aim of this study was to examine the effects of Real-time Auditory stimulation Feedback (RAF) on balance and gait in stroke patients and to suggest a more effective

method of gait training. *Material and Methods:* Twenty four chronic stroke patients who were more than six months post-stroke participated in this study. All participants were randomly assigned to two groups: Real-time Auditory stimulation Feedback (RAF) group ($n=12$) and treadmill group ($n=12$). To start the RAF treadmill training, foot switches were attached to the participants' heel and Microsoft visual C++ 2011 software was used. When participants started to walk and make an initial contact on their less affected side, the software sensed the foot pressure through the foot switch and provided real-time auditory stimulation for the participants. Patients in the RAF group received three 30-minute sessions of treadmill gait training combined with RAF per week over a period of four weeks. Patients in the treadmill group received general treadmill training under the same experimental condition without RAF. The following clinical measures were used for assessment of static balance and gait abilities: Balancia (software), Timed Up and Go Test. Spatiotemporal gait parameters were also collected using the GAITrite system. *Results:* Significant differences in outcomes for average perturbation velocity and total perturbation distance in closed eyes condition were observed in the RAF group compared with the control group ($p < 0.05$). In addition, measurements for the TUG test indicated significant differences in the RAF group ($p < 0.05$). Results for gait speed, step length and stride length, single limb support percentage of the affected side, and gait asymmetry showed a more significant difference in the RAF group compared with the control group. *Conclusion:* Gait training using RAF is effective for restoration of balance and gait ability, and it improves the existing problem of rhythmic auditory stimulation gait training.

750

THE DIFFERENCE OF THE MUSCLE ACTIVITY OF UPPER LIMB IN THE POST-STROKE PATIENT WITH MILD HEMIPARESIS BETWEEN IN USE OF NORDIC POLE AND T-CANE

Y. Nakazato¹, T. Minakawa², Y. Hirano², D. Nishio², H. Takahashi³, H. Kigawa²

¹Hanno City, Japan, ²Hanno-Seiwa Hospital, Rehabilitation Center, Hanno City, Japan, ³Saitama Medical University- International Medical Center, Department of Rehabilitation, Hidaka City, Japan

Introduction/Background: Nordic walking is recommended as an aerobic exercise because it promotes exercise of whole body, not only lower limb but also upper limb. Nordic pole is payed attention as walking device of post-stroke patients with hemiplegia. *Material and Methods:* We examined the difference of muscle activity of upper limb between using lateral Nordic pole and T-cane in the post-stroke patient with hemiplegia, who was a 64 years old man with mild hemiplegia (Brunnstrom stage V). We used surface electromyogram (s-EMG) for evaluation of upper limb activity walking with lateral Nordic pole and T-cane in the stroke patient. S-EMG electrodes were attached on the motor point of the deltoid (DL), biceps brachii (BB), triceps brachii (TR) and wrist extensor (WE) on the non-paretic side. After walk speed was stable, we calculated integrated value of myoelectric potential (mV.s) of 10 seconds. *Results:* Compared with using T cane, the increasing rate of integrated value of myoelectric potential of the patient using lateral Nordic pole showed 103%, 11%, -26% and -13%, respectively in the DL, BB, TR and WE. When the patients walked using T cane, the WE showed constant higher discharge at swing and stance phase on the non-paretic side. The burden of the wrist is heavy to support the weight with use of T cane, which could cause the risk of carpal tunnel syndrome. When the patient walked using lateral Nordic pole, the discharge of the WE showed remarkable discharge at only a swing phase on the non-paretic side. The discharge of the DL by Nordic pole use had doubled in comparison with T cane use. *Conclusion:* Our report suggests that the use of Nordic pole may not only increase the aerobic activity but also decrease the burden of the wrist for post-stroke patients.

751

AGE-DEPENDENT GAINS AFTER BALANCE TRAINING IN ATAXIC NEUROPATHIES**P. Thoumie¹, B. Missaoui², S. Bendaya¹, M. Mane¹, M. Ferrari¹, B. Bertheas¹**¹Hopital Rothschild APHP, Service de Rééducation Neuro-Orthopédique, Paris, France, ²Fondation Sainte Marie, Hopital de Jour, France

Introduction/Background: The purpose of this study was to measure the effectiveness of a rehabilitation program in a population of patients with ataxic neuropathy and to determine the influence of age on the gains observed in static and dynamic conditions. **Material and Methods:** Twenty two patients with characterized bilateral sensory ataxia were included in this study. The main inclusion criterion was proprioceptive loss with a decrease in joint position sense at the big toe level or reduced turning torque perception at the foot level. All had clinical, electrophysiological and histological data corresponding to a well defined polyneuropathy. Three clinical tests were used to assess balance abilities: the Berg Balance Scale, the Timed Up-and-Go test and the Functional Reach Test. The instrumental evaluation of balance and gait was performed using a force Platform and a Locometre. The rehabilitation program consisted of 15 sessions (three sessions per week for five weeks, each session lasting 2 hours and 30 minutes) comprised of different exercises aiming to improve sensory perception, and static and dynamic balance. **Results:** Patients were divided in two subgroups corresponding to a middle-age group (medium age =55 y) and an older adults group (m=75 y). At the end of this program, balance control assessed using the three clinical tests improved similarly in both groups (Two ways Anova training x age, training effect $p < 0.001$, age group effect NS). By contrast, only middle-age adults were able to increase the contribution of sensory afferent with a significant reduction of Romberg sign (KHI-2=6.6, $p=0.01$). Changes in instrumental data were not significant. **Conclusion:** These results show that ataxic patients can improve their balance with better results in dynamic than static conditions whatever their age. Nevertheless, an age effect can be pointed out as older adults unless younger do not succeed to improve sensory integration during static balance.

752

EVIDENCE OF EFFECTS ON DIFFERENT MODALITIES OF ACUPUNCTURE: AN FMRI STUDY**D. Wang^{1,2}, R. Zhang¹, X. Dong^{1,2}**¹Heilongjiang University of Chinese Medicine, Department of Acupuncture and Moxibustion, Harbin, China, ²Second Affiliated Hospital of Heilongjiang University of Chinese Medicine, Department of Acupuncture and Moxibustion Three Ward, Harbin, China

Introduction/Background: Acupuncture, as one of complementary and alternative therapies, played a vital role for stroke patients. However, the intrinsic mechanism of different modalities of acupuncture was unclear. **Material and Methods:** In current study, ten healthy volunteers were enrolled. All subjects firstly underwent electroacupuncture (EA). In order to decrease the effect of post-stimulation of acupuncture the manual acupuncture (MA) was performed a week later. Both EA and MA were performed at Waiguo (SJ-5) and Shou-sanli (LI-10) on the left upper. EA was performed at the frequency of 2Hz. MA consisted of rotating the needle clockwise and counterclockwise for 1 min at a rate 60 times per minute. MRI was performed on a 3.0T system. The fMRI data was analyzed by SPM 12. **Results:** 1. The specific cerebral activated areas of EA vs. MA was bilateral SMA and contralateral cerebellum. 2. The specific cerebral activated areas of MA vs. EA was ipsilateral SMA and ipsilateral SI. **Conclusion:** EA may be more effective for the motor areas of brain activation than MA. And MA may be more effective for the sense areas.

*J Rehabil Med Suppl 55***CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: REHABILITATION ADDRESSING TO SPECIFIC ISSUES - SPASTICITY MANAGEMENT**

753

IS DRY-NEEDLING REALLY EFFECTIVE IN THE TREATMENT OF SPASTICITY?**E. Ata¹, A.B. Carli¹, L. Tekin¹**¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Spasticity in stroke patients is one of the reasons for the disability. It may affect patients' self-care and activities of daily living and disrupts the patient's appearance, balance and walking pattern. There are some methods in the treatment of focal and multifocal spasticity such as stretching, bracing, oral antispastic drugs, local injection methods and orthopedic surgery. Herein, we present a case of poststroke spasticity whose spasticity was not decreased with dry-needling. **Material and Methods:** A 57-year-old woman with 41 months history of stroke resulting in right hemiplegia was admitted to our outpatient clinic. She had spasticity of the elbow, wrist and hand on the right side. Botulinum toxin injection treatment was planned but we applied dry-needling before botulinum toxin injection. Muscles including biceps brachii, pronator teres, flexor carpi radialis, flexor digitorum superficialis and profundus were needled with 0.30×50 mm sterile acupuncture needle. Needling was applied using fast-in and fast-out method during 30 seconds for each muscle. **Results:** Dystonia on the wrist and fingers was observed immediately after dry needling. Dystonia was relieved in a few minutes. Degree of spasticity was measured same, 15 minutes after the dry needling, in comparison to baseline. **Conclusion:** There are some reports demonstrating positive effects of dry needling in the treatment of spasticity. We experienced dystonia and nondecreasing spasticity with dry needling in our case. We believe that there is need for further studies in the larger group of patients, with control groups and longer follow-up periods of patients, in order to reach a definitive judgement on this issue.

754

BOTULINUM TOXIN INJECTION PRACTICE AMONGST REHABILITATION PHYSICIANS IN MALAYSIA**P.M. Chern¹**¹Hospital Rehabilitasi Cheras, Department of Rehabilitation Medicine, Cheras, Malaysia

Introduction/Background: Botulinum Toxin A (BoNT-A) injection for spasticity management has been a known worldwide practice for many years and has been practiced by many rehabilitation physicians in Malaysia. However, there is a paucity of data on the actual practice amongst the rehabilitation physicians in the country. The purpose of this study is to describe the current practice of BoNT-A injection amongst rehabilitation physicians in Malaysia. **Material and Methods:** A questionnaire survey was sent out via email to practicing rehabilitation physicians working in Malaysia. Information collected inclusive of the demographic data, BoNT-A injection practice and the availability of standardized protocol for post BoNT-A injection therapy. The data collected were recorded and analyzed. This study obtained the approval from the Ministry of Health's Medical Review & Ethics Committee (MREC). **Results:** A total of 23 rehabilitation physicians responded to the survey, one did not consent to participate. Of the 22 consented respondents, 54.5% ($n=12$) aged 30–39 years old whereas 45.5% ($n=10$) aged 40–49 years old. Of these, 22.7% ($n=5$) were males and 77.3% ($n=17$) were females. 18 respondents (81.8%) were from Ministry of Health's hospitals whereas 18.2% ($n=4$) from teaching hospitals. Most (54.5%, $n=12$) has less than 5 years working experience as a

rehabilitation physician, 27.3% ($n=6$) has 5–9 years' experience and 18.2% ($n=4$) has 10–14 years' experience. 21 respondents (95.5%) performed BoNT-A injections as part of their spasticity management program. Majority (54.5%, $n=12$) has standardized protocol for post BoNT-A injection therapy, 36.4% ($n=8$) has no standardized protocol and one respondent was unsure of the availability of the protocol. **Conclusion:** The findings of this survey report the first Malaysian descriptive data on the practice of BoNT-A injection amongst rehabilitation physicians. This insightful information may assist in the future development of the local spasticity management program.

755

EFFECTS OF ACTION OBSERVATION TRAINING WITH BRAIN-COMPUTER INTERFACE CONTROLLED FES ON IMPROVING THE UPPER EXTREMITY PERFORMANCE AND THE BRAIN ACTIVATION IN PATIENT WITH STROKE

B. Lee¹, S. Kim¹

¹Sahmyook University, Physical Therapy, Seoul, Republic of Korea

Introduction/Background: The purpose of this study was to investigate the effect of action observation training (AOT) with brain computer interface controlled functional electrical stimulation (BCI-FES) system on motor recovery of paretic upper extremity in patients with stroke. **Material and Methods:** Twenty six participants were randomly divided into two groups: AO-BCI group ($n=13$) or control group ($n=13$). The real-time online performance of the integrated BCI-FES system was tested in the AO-BCI group. The EEG signals of the stroke patients were recorded using the PolyG-I. The attention level was a relative ratio of brain waves that represent attention, (SMR+Middle Beta)/Theta. The EEG patterns underlying upper extremity movements were detected in real-time and the information was subsequently used to trigger the FES of the upper extremity action through a USB Output board. If patients correctly imagined the movement and their attention level went up the attention threshold, FES was triggered and stimulated wrist extensor muscles of the affected upper extremity. Detailed parameters of the FES were stimulation time 15 seconds with a 3 second rest, frequency 60 Hz, current 20–27 mA, pulse width 150 μ s. AO-BCI group practiced a 30 min of the intervention on the paretic upper extremity 3 sessions per week during 4 weeks. We compared the outcomes of the Fugl-Meyer Assessment of the Upper Extremity (FMA-UE), Wolf Motor Function Test (WMFT), Motor Activity Log (MAL), Modified Barthel Index (MBI), and Electroencephalographic (EEG) recordings from alpha, beta power, concentration and activation. **Results:** There were significant differences between two groups in FMA-UE, WMFT, MAL and MBI ($p<0.05$) and the results of EEG including alpha power (C4) and Beta power (C3 and C4), concentration (F3, F4 and C3) and activation (C4) ($p<0.05$). **Conclusion:** This study demonstrated that AO plus BCI-FES can enhance motor function of upper extremity and brain activation for stroke patients. This training method may be feasible and suitable for individuals with stroke.

756

FACTORS INFLUENCING THE THERAPEUTIC EFFECTIVENESS OF PHENOL MOTOR POINT BLOCK IN PATIENTS WITH CEREBROVASCULAR DISORDERS USING ANKLE PLANTAR FLEXION TORQUE

H. Maeda^{1,2}, S. Sonoda^{1,3}, K. Takeda³, S. Mizuno¹, A. Orand³, H. Miyasaka³, G. Tanino³

¹Fujita Health University- School of Medicine, Department of Rehabilitation Medicine II, Tsu, Japan, ²Ise Municipal General Hospital, Rehabilitation Unit, Ise, Japan, ³Fujita Health University, Fujita Memorial Nanakuri Institute, Tsu, Japan

Introduction/Background: Spasticity, defined as a velocity-dependent increase in tonic stretch reflexes, disturbs activities of daily living in patients with cerebrovascular disorders. Phenol motor point block

and botulinum toxin are often used to treat spasticity. It is important to identify the candidate symptoms for the abovementioned treatments and to determine their effectiveness; however, validation of those indications is not enough. This is partially because the choice of methods for evaluating muscle tone is limited. In this study, the therapeutic effectiveness of phenol motor point block in patients with spasticity of the lower extremity was assessed by measuring ankle plantar flexion torque. Patient factors influencing the therapeutic effectiveness were evaluated. **Material and Methods:** Twelve patients with spasticity of the lower extremity after cerebrovascular disorders were enrolled in this study. The average time from onset to intervention was 361.6 \pm 849.0 (median, 73.5) days. Plantar flexion torques at 5°/s or 90°/s under passive ankle dorsiflexion were measured before and after treatment with phenol motor point block in flexor muscles of the lower leg. The change of torque differences at a dorsiflexion of 10° between 90°/s and 5°/s before and after treatment was used as an indicator of the therapeutic effectiveness. Patient factors influencing therapeutic effectiveness were evaluated using the indicator. **Results:** Therapeutic effectiveness showed a significant negative correlation with plantar flexion torques at 5°/s before treatment ($r=-0.741$, $p=0.006$) and with the time from onset ($r=-0.680$, $p=0.015$). A significant positive correlation between therapeutic effectiveness and presence of self-exercise ($r=0.661$, $p=0.019$) was observed. **Conclusion:** Patients who were less affected by immobilization including those with small plantar flexion torque at 5°/s or those who engaged in self-exercise are expected to achieve large therapeutic effectiveness with regard to phenol motor point block against spasticity of the lower extremity.

757

COMPARISON OF EFFECT ON BOTULIUM TOXIN A AFTER MULTIPLE INJECTIONS IN THE UPPER LIMB

H. Onaka¹, H. Kagaya¹, Y. Okochi¹, K. Fujimura¹, M. Iwashima¹, A. Oishi¹, S. Hirano¹, E. Saitoh¹

¹Fujita Health University Hospital, Rehabilitation, Toyoake, Japan

Introduction/Background: The Botulinum toxin A is now widely used in Japan to reduce the spasticity in the limbs in Japan. Although the effect of Botulinum toxin A injection is different from person to person, it is still unclear whether the outcome of multiple injections to the same person differs or not. The aim of this study is to compare the effect on Botulinum toxin A after multiple injections in the upper limb. **Material and Methods:** Forty, 26 and 17 chronic stage of stroke patients who had Botulinum toxin A injection twice, three times and four times, respectively were enrolled in this study. The average age of the patients was 54 years old. The first time injection was performed at 1380 days after the onset of stroke, while the average interval between injections were 376 days. The frequent injected muscles were flexor digitorum superficialis, wrist flexors, biceps brachii and pectoralis major. Modified Ashworth scale (MAS), stroke impairment assessment set (Knee-mouth test and finger function test) were performed before and 2, 6 and 12 weeks after the injections. **Results:** The MAS before injection did not differ in each injection. It was significantly improved after 2 weeks after the injection. However, the effect after multiple injections did not show any significant differences. **Conclusion:** The effect on Botulinum toxin A injection was the almost same after multiple injections in the upper limb.

758

ORTHOPEDIC SELECTIVE SPASTICITY-CONTROL SURGERY PERFORMED AFTER CONVALESCENT REHABILITATION IN A PATIENT WITH SUBARACHNOID HEMORRHAGE: A CASE REPORT

K. Takahashi¹, Y. Uchiyama¹, R. Hatamoto¹, Y. Wada¹, K. Domen²

¹Sasayama Medical Center Hyogo College of Medicine, Department of General Medicine and Community Health Science, Sasayama

ama Hyogo, Japan, ²Hyogo College of Medicine, Department of Rehabilitation Medicine, Nishinomiya Hyogo, Japan

Introduction/Background: Recently, it has been reported that functional ability and activities of daily living (ADL) could improve further by continuous rehabilitation after convalescence rehabilitation in some post-stroke patients. We report a patient with subarachnoid hemorrhage who underwent orthopedic selective spasticity control surgery (OSSCS), followed by inpatient rehabilitation continued after convalescence rehabilitation. **Material and Methods:** A 41-year-old man suffered from subarachnoid hemorrhage (Hunt & Kosnik grade 5) due to the rupture of an anterior communicating artery aneurysm. He underwent the craniotomy clipping and lumboperitoneal shunt surgeries for the treatment of hydrocephalus, which he developed later. Then, he was transferred to a convalescent rehabilitation hospital on the 49th day from onset of SAH and underwent inpatient rehabilitation for 6 months. He was discharged on the 239th day and returned home, but was admitted in our hospital for further rehabilitation on the 256th day. **Results:** The strong pain due to spasticity was particularly observed in both lower limbs. The pain and spasticity in the lower limbs were very difficult to treat and had limited the knee extension range of motion. The OSSCS was then performed because botulinum toxin type A treatment was not effective against the pain and spasticity. The pain and spasticity improved after the surgery, and the sitting and standing postures also improved, which reduced the burden of care in ADL. The total Functional Independence Measure score improved by 21 points at discharge, compared to that at admission. **Conclusion:** The OSSCS, followed by inpatient rehabilitation, can improve not only pain and spasticity but also functional ability and ADL, even after convalescent rehabilitation.

759

EFFICACY OF THERAPEUTIC APPLICATION OF LOW-FREQUENCY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (RTMS) FOR POST-STROKE UPPER LIMB SPASTICITY

C.J. Tan¹, L. Abdul Latif¹, H.T. Goh¹

¹Universiti Malaya, Rehabilitation Medicine, Petaling Jaya, Malaysia

Introduction/Background: Approximately 20–43% of the post-stroke patients developed spasticity and motor deficit. In this study, we evaluated the efficacy of low frequency repetitive transcranial magnetic stimulation (rTMS), as a novel technique to improve post stroke spasticity and motor function. This study is a preliminary randomized, double blinded, sham controlled done in a group of stroke (subacute and chronic) patients attending Rehabilitation clinic, University Malaya Medical Centre in Malaysia. **Material and Methods:** Nineteen post-stroke patients (age, 56.26±10.06, range 38–75 years) ; time after stroke (40.05±35.16, range 4–124 months) with spasticity of upper limb (MAS 1–3) were recruited. After consented, they were divided into two groups, interventional and sham. The intervention group (n=10) received real rTMS with a frequency of 1 Hz, intensity 90% of resting motor threshold in a continuous train of 10 minutes, 600 pulses at the “hot spot” of the first dorsal interosseus muscle in the unaffected hemisphere once a day for 5 days consecutively. The sham group (n=9) received sham rTMS once a day for 5 days as well but the site was at the vertex. A blinded assessor assessed using Fugl-Meyer of the Arm, Modified Ashworth Scale and Tardieu Scale. The secondary outcomes included d Motor Evolved Potential, Motor Activity Log and Jebsen Taylor hand Function Test were assessed as well. All the assessment was done at baseline (pre-treatment), one week after treatment and at four weeks follow-up. ANOVA multi factorial repeated measures analysis of variance analysis was used to reveal statistically significant. **Results:** The intervention group showed significant improvement in the upper limb motor function and the effect persisted up to one month after treatment. Other than that, there was no significant improvement in the spasticity and motor evolved potential. **Conclusion:** This study showed that low frequency TMS to contralateral lesion site improved motor impairment of upper limb with no effect on spasticity.

760

H-REFLEX AND T-REFLEX CHANGES IN BOTULINUM TOXIN TYPE A TREATMENT FOR LOWER-LIMB SPASTICITY IN POST-STROKE PATIENTS

Y. Uchiyama¹, R. Hatamoto², K. Takahashi¹, Y. Wada¹, T. Ogino², M. Katsutani³, K. Domen⁴

¹Sasayama Medical Center Hyogo College of Medicine, Department of General Medicine and Community Health Science, Sasayama Hyogo, Japan, ²Sasayama Medical Center Hyogo College of Medicine, Department of Rehabilitation, Sasayama Hyogo, Japan, ³Nishinomiya Kyouritsu Rehabilitation Hospital, Department of Rehabilitation, Nishinomiya Hyogo, Japan, ⁴Hyogo College of Medicine, Department of Rehabilitation Medicine, Nishinomiya Hyogo, Japan

Introduction/Background: The evaluation of the spasticity is essential for the judgement of the effect in botulinum toxin type A (BoNTA) treatment. However, there is no established quantitative evaluation of the spasticity currently. In this study, we recorded the electrophysiological change of lower-limbs before and after BoNTA treatment and we examined a new electrophysiological index for the judgement of the effect in BoNTA treatment. **Material and Methods:** The object of this study was 5 chronic post-stroke patients with hemiparesis and lower-limb spasticity. We recorded M-response, H-reflex and T-reflex by tibial nerve stimulation of the affected side before and 4 weeks after BoNTA treatment. The observed value was the biggest M-response amplitude (Mmax), the biggest H-reflex amplitude (Hmax), and the biggest T-reflex amplitude (Tmax). The Modified Ashworth Scale (MAS) score of ankle plantar flexor was also recorded. **Results:** There was no significant difference in Hmax/Mmax and Tmax/Mmax by the comparison between before and after BoNTA treatment. However, Tmax/Mmax had a tendency to decrease, at least not increase in either patient. There was a correlation only between Tmax/Mmax and the MAS score ($\rho=0.74$, $p=0.014$, Spearman's rank correlation coefficient). **Conclusion:** Tmax/Mmax may be a better index of lower-limb spasticity than Hmax/Mmax in BoNTA treatment. This is because Tmax/Mmax reflects achilles tendon reflex clinically, which includes both of the extrafusal and intrafusal effects caused by BoNTA. Further study with more patients are needed to make the index of Tmax/Mmax as the standard electrophysiological evaluation of BoNTA treatment for lower-limb spasticity.

761

REDUCED PLANTAR-FLEXION CONTRACTURE POST BOTULINUM TOXIN A INJECTION IN TRAUMATIC BRAIN INJURY PATIENT. A CASE REPORT

M.R. Zetty Noreeta¹

¹Penang General Hospital, Rehabilitation Medicine, Penang, Malaysia

Introduction/Background: Upper motor neuron (UMN) lesion is the primary cause of motor impairment and movement dysfunction in post traumatic brain injury (TBI). These symptoms of UMN syndrome have physiologic implications for muscles which often subsequently develop stiffness and contracture thereby further negatively affecting effective movement. One of the commonest complication in post TBI is ankle contracture (Modified Ashworth Scale 4) which can lead to secondary limitation in mobility. This may be due to the fact that limb positioning and joint ROM may be neglected when the emphasis after acute brain injury is more on life preservation. Traditionally, contracture resulting from spasticity have been managed by a combination of intervention including passive ROM and passive lengthening through prolonged positioning or casting. However, as spasticity has also role in the pathophysiology of contracture, another option to treat contracture is by giving local injection procedure such as chemical neurolysis using alcohol, phenol or Botulinum Toxin Type A injection. **Material and Methods:** We report a case of severe TBI patient with bilateral ankle contracture. High dose of Botulinum toxin type A was injected to the bilateral gastrocnemius and solius

muscles. Patient was assessed at pre and post intervention with using both clinical assessment and outcome measures which were, passive range of motion measurement using goniometer, Modified Ashworth Scale (MAS), six minutes walking test, Berg Balance Scale and Modified Barthel Index. Clinical follow up was obtained at 2 weeks, 2 months and 6 month post intervention. *Results:* After the injection and undergone intensive rehabilitation involving stretching, functional gait training including ground walking and body weight supported gait training, patient has shown impressive improvement in both clinical assessment and outcome measures. *Conclusion:* The outcome of patient from this case report suggests that Botulinum toxin A injection is effective in treating ankle contracture and improve functional gait in head-injured subject.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: REHABILITATION ADDRESSING TO SPECIFIC ISSUES - REHABILITATION AFTER LIMB AMPUTATION

762

PROSTHETIC REHABILITATION FOLLOWING DEEP VEIN THROMBOSIS

K. Asafu-adjaye¹, S. Ankolekar¹

¹Norfolk Community Health and Care NHS Trust, Specialist Rehabilitation, Norwich, United Kingdom

Introduction/Background: Interruptions to amputee rehabilitation is a common occurrence. Meikle et al studied the frequency of interruptions in 254 patients admitted for rehabilitation and discovered interruptions in 30% of the patients[1]. Deep vein thrombosis (DVT) is a common complication in those following lower extremity amputation[2]. Immobility (venous stasis), surgically induced venous endothelial trauma (vascular injury), and the substantial incidence of autoantibodies to phospholipid in vascular surgery patients (hypercoagulability) places amputees at high risk. Although interruptions are common and result in longer lengths of stay, these interruptions do not adversely affect rehabilitation outcomes. There is no published literature on successful prosthetic rehabilitation following a DVT in the amputation stump. Our case study supports published literature that return to complete rehabilitation in this scenario can lead to successful prosthetic rehabilitation. *Material and Methods:* Case study of successful rehabilitation following a DVT in the amputation stump. *Results:* A 67-year-old male underwent left below knee amputation on 21/10/2014. On 23/12/2014 he developed a DVT in his left lower limb. His stump increased in size and prosthetic rehabilitation was stopped. We re-established goals, and re-initiated rehabilitation. A larger prosthesis was delivered and he successfully achieved prosthetic rehabilitation with a final SIGAM mobility grade of SIGAM-F[3]. *Conclusion:* Prosthetic rehabilitation can be successfully completed following a DVT in the amputation stump. Due to frequent fluctuation in stump volume regular follow-up is essential. *Reference:* Interruptions to amputee rehabilitation. Archives of Physical Medicine and Rehabilitation. 83(9): p. 1222–1228. Deep vein thrombosis associated with lower extremity amputation. Journal of Vascular Surgery, 1995. 22(5): p. 612–615. The SIGAM mobility grades: a new population-specific measure for lower limb amputees. Disability and Rehabilitation, 2003. 25(15): p. 833–844.

763

QUALITY OF LIFE AND FUNCTIONALITY IN PATIENTS WITH ACQUIRED UPPER LIMB AMPUTATIONS

T.R. Chamlian¹, C.L. Sado²

¹UNIFESP/AACD, Fisiatria - Ortopedia e Traumatologia, São Paulo, Brazil, ²Universidade Federal de São Paulo, Fisiatria-Ortopedia e Traumatologia, São Paulo, Brazil

Introduction/Background: The aim of Rehabilitation of individuals who have undergone upper limb amputation is to promote independence in ADL, if possible, with prostheses. *Objective:* evaluate the quality of life and functionality of patients with acquired upper limb amputations treated at Disabled Child Assistance Association (AACD). *Material and Methods:* 39 patients answered the questionnaire, which included items related to general characteristics, amputation, rehabilitation, activities of daily living, occupation, driving and pain in the stump. Beck Anxiety and Depression Inventory were applied. Statistical nonparametric tests with equality of two proportions, confidence interval for mean of 95% e p-value <0.05 were used. *Results:* Of the 39 patients, 76.9% were male, 87.2% had traumatic amputation, 87.2% had unilateral amputation and 48.7% received a prosthesis. 47.4% abandoned their prosthesis and 52.6% were dissatisfied with the prosthesis. The patients had greater difficulty in performing ADL with the prosthesis. The degree of satisfaction for ADL and the presence of pain were not related to work, prosthesis and anxiety or depression. *Conclusion:* The use of upper limb prostheses hampered the performance of activities of daily living for patients and most were dissatisfied with the prosthesis. Despite this, most patients were satisfied with their ability to perform ADL.

764

DIFFERENCE IN FOOT PLANTAR PRESSURE BETWEEN BIPEDAL WALKING AND WALKING ON SINGLE LIMB WITH WALKING FRAME OR CRUTCHES

C.S.K. Cheng¹, T.Y. Chung¹

¹University of Malaya, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Diabetes mellitus can lead to amputations. Increase in plantar pressure will increase risk of foot ulceration and amputation. It is thought that walking on single limb with the support of a walking aids will affect the peak plantar pressure compared to bipedal walking. The purpose of this study is to find out if there is any difference in peak plantar pressure between normal bipedal walking and walking on single limb with walking aids. *Material and Methods:* This was a cross sectional, non-controlled, non-randomized study. 51 healthy subjects were recruited. They walked barefoot on Footscan Pressure Plate using a 2-step protocol. Right and left foot peak plantar pressure of their bipedal walking, walking on single limb using walking frame and using axillary crutches were recorded. 5 trials were required for each method. Friedman test and post hoc analysis with Wilcoxon signed-rank tests were used to determine the difference in peak plantar pressure for the 3 methods. Mann-Whitney test was used to determine to difference in peak plantar pressure of right and left foot. *Results:* There is a statistically significant difference in peak plantar pressure between the 3 methods of walking ($p < 0.005$). Post hoc analysis also had a significant difference in peak plantar pressure when doing multiple comparisons. When comparing right and left foot pressure, only walking on single limb with crutches had a significant difference ($p = 0.027$). There is a statistically significant positive correlation between the BMI of the subjects and all the three methods of walking for both right and left foot ($p < 0.0005$) using Spearman's rank correlation coefficient. *Conclusion:* The results have shown that single limb walking with walking aids is safe in a normal healthy subject. There is no increase in peak plantar pressure. If the result is to be extrapolated to the diabetic patient, it has to be done with caution.

765

HOFFA'S DISEASE IN A PATIENT WITH UNILATERAL BELOW KNEE AMPUTATION

Y. Demir¹, K. Aydemir¹, K. Tezel¹, B. Yılmaz¹

¹Gulhane Military Medicine Academy, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Hoffa's fat pad impingement, also known as Hoffa's disease, is an inflammation of the infrapatellar

fat pad and it might be a rare cause of the knee pain. *Material and Methods:* A 33-year-old male patient was admitted to our clinic with right knee pain. He stated that the pain was worsening while walking with prosthesis. *Results:* On physical examination of the right below knee amputee, minimal swelling in the lateral of the right patella and tenderness with palpation were detected. Range of motion of the right knee was normal but the patient had pain during the examination. Visual analog score was evaluated 4. X-ray examination was normal. Magnetic resonance imaging of right knee showed the presence of hyperintense area and increased fat pad volume compatible with Hoffa's disease at the lateral side of the knee (Figure 1). We administered diclofenac sodium 75 mg twice a day for ten days and he was advised for resting, elevation and cold application. Ten days later, his knee pain and swelling disappeared. *Conclusion:* Hoffa's disease is rare clinical condition. It can be difficult to distinguish this clinical entity from other pathologies. Clinicians should take into consideration this pathology in cases that have pain in the region of knee. Presence of this syndrome may prevent prosthesis use.

766

MULTIDISCIPLINARY APPROACH TO CHILDREN WITH CONGENITAL UPPER EXTREMITY DEFICIENCY

S. Fujiwara¹, S. Noguchi², T. Shibata³, A. Nara², H. Mano², M. Yoshikawa⁴, K. Ohnishi⁵, N. Haga¹

¹Graduate School of Medicine - The University of Tokyo, Department of Rehabilitation Medicine, Tokyo, Japan, ²The University of Tokyo Hospital, Department of Rehabilitation Medicine, Tokyo, Japan, ³Tazawa MFG Co., Prosthetic & Orthotics, Tokyo, Japan, ⁴Nara Institute of Science and Technology, Graduate School of Information Science, Ikoma, Japan, ⁵School of Science and Engineering Tokyo Denki University, Division of Electronics and Mechanical Engineering, Saitama, Japan

Introduction/Background: Currently, patients with upper limb deficiency can try to use upper limb prostheses as conventional rehabilitation approach. Their introduction is not troublesome, if the patients themselves have requests to use them or know their usefulness. However, in case of children under school age including infants, such decision or request is often made by the parents or adult supervisors. Therefore, it is sometimes difficult to have young children utilize the prostheses. Here we report our multidisciplinary approach to introduce prosthetic hands to children. *Material and Methods:* Thirteen patients with 15 affected limbs under elementary school age visited our Limb Malformation Clinic. Among them, 12 patients with 14 affected limbs tried various types of prosthesis. All prosthetic hands are fabricated by certified prosthetist-orthotists (CPO) with occupational therapists (OT) and medical doctors (MD). CPO cooperated with engineers to fit children to some types of prosthesis. Engineers remodeled toys under suggestions of OT and MD, to control them by myoelectric signals from residual limbs. *Results:* Several types of prostheses and devices were introduced to 12 patients; passive hands with some function, body-powered prostheses, myoelectric hands, prosthetic hands with sports and recreational devices (S&R), 3D printed robotic prosthesis the 'Robohand', three-fingered functional hand the 'Finch' fabricated by 3D printer, and a motor-driven plastic toy train the 'Plarail' controlled by myoelectric signals. Ten out of 12 patients actively used the main prosthesis, but the remaining two patients ceased its use. The usages of prostheses and the Plarail which the ten patients used are shown. *Conclusion:* We introduced a variety of prostheses: functional prosthetic devices and toy-like ones. Those functional prostheses and toys stimulated children's interest like their toys, contributing to easier introduction of the prostheses through recognition of their utility and enjoyment.

767

A CONCEPTUAL FRAMEWORK TO STUDY LOWER LIMB AMPUTATION (LLA) IN JOHANNESBURG, SOUTH AFRICA

L.L. Godlwana¹, A. Stewart¹

¹University of the Witwatersrand, Physiotherapy, Johannesburg, South Africa

Background: It is important to outline the mapping and integration of reviewed concepts and ideas to inform studies addressing amputee health in Johannesburg, in order to support the rationale, answer the research questions, develop, implement, report and evaluate research in this population. From previous research on this population, the researchers noticed that the current rehabilitation available following LLA in Johannesburg's public tertiary hospitals was insufficient. This led to the postulation and expectation that an additional and more supportive intervention is needed if one is to improve patient outcomes in this population. *Aim:* To produce a conceptual framework that can be used to study the LLA population. *Methods:* A summary of the problems reported as experienced/encountered by persons with LLA was identified in the literature. These included problems specific to developing countries and in particular South Africa. From this process, mapping of what these problems are and how they can be resolved was done using the International Classification of Functioning, Disability and Health. The epidemiology, quality of life, activity levels, participation levels and body image were the main outcomes to be investigated once the conceptual framework was developed. *Results:* In this framework the identified problems were addressed in two forms namely, a randomised controlled trial and an epidemiological study. These problems included mobility, impairment, socioeconomic and psychological challenges. The conceptual framework strengthened the testing of an intervention added to current treatment against the current treatment alone. *Conclusion:* A range of challenges patients face including difficulty getting to hospital, poor socioeconomic backgrounds, low levels of education and limited financial resources remain a huge threat to rehabilitation especially that patients in this population are already faced with mobility challenges due to the vascular amputation, the comorbidities as well as other broad spectrum issues.

768

BILATERAL LOWER EXTREMITY AMPUTATION AFTER TOXIC SHOCK SYNDROME NOW WITH LOCKED KNEE: A CASE REPORT

J. Green¹, T. Plaut²

¹New York University- NYU Rusk Institute, Rehabilitation Medicine, New York, USA, ²Woodhull Medical Center, Rehabilitation Medicine, Brooklyn, USA

Introduction/Background: Patient is a 29 year old female who while pregnant with her first child had an episode of bleeding and was found to have a placenta previa and therefore underwent emergent C-section. She then developed a Staph infection which progressed into toxic shock syndrome and then necrotizing fasciitis affecting all of her extremities causing her to require a bilateral below the knee amputation. She spent a total of 3 months in the hospital before being transferred to our Acute Inpatient Rehabilitation Unit where it was noticed she had a locked knee. *Material and Methods:* A few different methods were attempted to release the patient's locked knee. Initially, aggressive range of motion (ROM) twice a day by a skilled licensed physical therapist was tried. Then medications, including anti-inflammatory medications and neuropathic medications, were administered. A knee injection with cortisone was offered but patient refused due to fear of risk of infection. Bracing was also considered but was deferred as the patient had a new skin graft on the anterior aspect of same leg that had a locked knee. *Results:* Aggressive ROM was successful in achieving knee flexion of up to 40 degrees during the patient's therapy session but it was found not

to be sustainable throughout the rest of the day. Medications didn't seem to have any affect either. Serial bracing was felt to be the best option and it was decided to be revisited once the patient's skin graft had fully healed. **Conclusion:** In conclusion, this is the first case in the literature of a patient s/p amputation after toxic shock syndrome then developing a locked knee. Different methods of treatment for locked knee were attempted but none were successful in releasing the knee from extension. Patient has now been referred to orthopedics for manipulation under anesthesia.

769

LOWER LIMB AMPUTATION AFTER CORONARY BYPASS SURGERY

Ü. Güzelkücü¹, Y. Demir¹, K. Tezel¹, K. Aydemir¹, E. Yaşar¹, B. Yılmaz¹

¹Gulhane Military Medicine Academy, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Amputations secondary to vascular conditions accounted for 82% of limb loss discharges, with the incidence increasing by 27% from 1988 to 1996. Severe lower limb ischemia after coronary artery bypass grafting (CABG) may lead to amputations. **Material and Methods:** We present a series of two patients who presented with amputation secondary to CABG. **Results:** Patient 1 was a 72 years old female. She had developed cyanosis of the left foot 2 hours after CABG. Because of increased cyanosis, left above knee amputation was performed. Patient 2 was 70 years old female. She was diagnosed with a deep venous thrombosis of her right femoral vein 2 days after CABG. The patient underwent thrombosis resection. Upon continued complaints, right above knee amputation was performed. **Conclusion:** CABG may trigger limb ischemia in older people. Close monitoring of the limbs should be performed in patients with CABG.

770

NON-HEALING SURGICAL WOUND ON THE STUMP

Ü. Güzelkücü¹, Y. Demir¹, K. Tezel¹, K. Aydemir¹, S. Kesikburun¹, B. Yılmaz¹

¹Gulhane Military Medicine Academy, Physical Medicine and Rehabilitation, Ankara, Turkey

Introduction/Background: Successful treatment of difficult wounds requires education of the patient and not just the wound care. **Material and Methods:** We present a case of non-healing surgical wound on the stump. 26-year-old male amputee was admitted our clinic for chronic wound on the stump. He had received parenteral cefazolin for five weeks in addition to daily dressing. **Results:** On physical examination, he had wound on the right below-knee stump (Figure 1a). Clinician realized that patient had effort in order to see his wound by traction of the skin on the stump. He was advised to use mirror for wound control. After ten days, his chronic wound became smaller. **Conclusion:** A simple prevention may solve complicated problem. Patients with wound should be advised to use mirror for wound monitoring in order to block traction.

771

PHANTOM PHENOMEN PROFILES IN TRAUMATIC LIMB AMPUTEE AND DIABETIC LIMB AMPUTEE: THE INDONESIAN EXPERIENCE

W. Kusumaningsih¹, J. Emelia²

¹Jakarta, Indonesia, ²Bekasi District Hospital, Rehabilitation Medicine, Bekasi, Indonesia

Introduction/Background: In traumatic limb amputee, phantom sensation was based on Neuromatrix theory by Melzack. Pream-

putation pain experience through disinhibition of somatosensory pain memory lead to phantom pain. In diabetic limb amputee with distal sensory neuropathy, no pain sensation through ascending system will be percept at somatosensory cortical area and there are no engram of preamputation pain memory. With poor distal vascularization, this lead to diabetic limb and with ulcer proceed to limb amputation. **Material and Methods:** A literature review of two pilot studies using descriptive design. First study is the profiles of phantom phenom in fifty traumatic limb amputee adults, phantom pain (PP) with preamputation experience (PNPA) and phantom sensation (PS), single terminal limb amputee with mature stump without stump pain. Second study, profiles of phantom phenom (phantom pain, phantom sensation and stump pain) in thirty four single limb diabetic amputee adults, men and women. **Results:** Traumatic amputee study, phantom sensation was 100%. Phantom pain was 31 (62%) and no phantom pain 19 (38%). Subjects with preamputation experience are 31 (62%) and no preamputation experience 19 (38%). Diabetic amputee study, phantom pain was 3 (8.8%) and no phantom pain 31 (91.2%). Phantom sensation 2 (5.9%) and no phantom sensation 32 (94.1%). Stump pain is 20 (58.8%) and no stump pain is 14 (41.2%). Amputation profile show that from 34 single limb diabetic amputee, 22(64.71%) has history of amputation and 12 (35.29%) has never been amputated before. Minor amputation surgery are 22 (64.7%) and 12 (35.3%) mayor amputation surgery. **Conclusion:** There was differences in phantom phenom profiles between adults traumatic limb amputee and diabetic limb amputee. In the future it is recommended to do an analytic study with prospective design for two independent groups, adult traumatic and adult diabetic limb amputee, within same time period and compare the profiles differences.

772

AMPUTEE REHABILITATION FOR NON-PROSTHETIC USERS

M. Mariappan¹, C. Hurd², P. Ramamurthy², J. Lindsay²

¹North Staffordshire Rehabilitation Centre, Physical Rehabilitation Medicine, West Midlands, United Kingdom, ²West Midlands Rehabilitation Centre, Amputation and Prosthetics, West Midlands, United Kingdom

Introduction/Background: The incidence of amputation in the UK is approximately 5,000 per annum with an estimated prevalence of 62,000. Increasing numbers of older amputees with multiple comorbidities present a major challenge to Rehabilitation Services with significant impact on Specialist Rehabilitation Centres as it is unrealistic to prescribe prosthesis for all amputees. **Material and Methods:** Amputees who are 'Non-prosthetic users' are reviewed in the Community by our team after six months to identify outstanding issues affecting successful rehabilitation. A retrospective view was undertaken of our 'Non-prosthetic users' database for three consecutive years (2012–2014). **Results:** There were 170 patients in the study group (48 in 2012; 69 in 2013 & 53 in 2014) with median age of 68. Eighty-six had Tans-femoral, 26 had Trans-tibial and 40 had Bilateral Lower-Limb Amputations. The overwhelming aetiology was 'Dysvascularity' (99) with a high proportion (52) associated with Diabetes. In the period, 65 of the group had died. There were 49 visits and 101 recorded telephone calls. We have collected 11 above knee prosthesis following patients abandoning limb wearing. Two were prescribed prosthesis. Several amputees were given support and signposted. **Conclusion:** Amputee Care must be considered as a 'Complex Adaptive System' and comprehensive liaison between primary, secondary and tertiary care sectors and local community services is vital for successful seamless rehabilitation in those unable to achieve functional benefit from prosthetic replacement. Review of non-prosthetic users is an essential part of the Amputee Care Path to meet appropriate care standards for Amputee Rehabilitation.

773

MANAGING TRANSTIBIAL AMPUTATION WITH RIGID REMOVABLE DRESSING: UNIVERSITY MALAYA MEDICAL HOSPITAL (UMMC) EXPERIENCE AND CHALLENGES

M. Sandrajagan¹, T.Y. Chung¹

¹University of Malaya, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Early postoperative stump management of lower-limb amputation is critical to a patient's long-term outcome. The purpose of dressings is to help meet the goals of post-operative management: healing, providing protection from outside trauma, managing pain, initiating early weight bearing, controlling edema while properly shaping the residual limb, preventing flexion contractures and regaining preoperative functional level. Despite good clinical outcomes from the use of the rigid dressing in amputee rehabilitation, the practice of immediate application of a rigid dressing after amputation has not been universally applied here. We report a case illustrating the challenges and experiences of managing a young patient with removable rigid dressing (RRD) post transtibial amputation. **Material and Methods:** A 20-year-old young man with Congenital Pseudoarthrosis was planned for an elective transtibial amputation as definite treatment along with prosthetic restoration. Clinically he had a deformed and shortened left tibia and had undergone multiple surgeries since childhood. He was pre-morbidly independent and healthy. He was counselled on and consented to a trial of RRD. Immediate post amputation rigid dressing with Plaster of Paris was applied in the operative theatre and changed on post op day 2 to a RRD. He was followed up regularly the next 2 months. **Results:** Residual limb oedema and post-operative pain scores were minimal. Wound healing was also enhanced. The rigid dressing was changed early on post operation day 2 due to blood soaking through but wound inspection did not reveal any active bleeding. No other complications were encountered. **Conclusion:** In view of our experience we conclude that the use of the RRD system in early stump management is both effective and efficient. We hope that the use of the RRD system will be actively promoted in Malaysia.

774

MOBILIZATION STATUS OF DIABETICS VERSUS NON-DIABETICS AFTER BELOW KNEE AMPUTATION: A COMPARISON

A. Saraf¹

¹Ludhiana, India

Introduction/Background: Mobility following below knee amputation has a direct impact on the quality of life. Early and independent mobilization develops confidence in the below knee amputee. This helps the patient to become psychologically, socially and economically independent. In this study we compared mobilization status of diabetics versus non-diabetics amputees. **Material and Methods:** This was a 2 years prospective and 10 years retrospective study. A total of 144 below knee amputees using various supports for mobilization were included in this study of which 63 were diabetics and 81 non diabetics. They were followed for a minimum period of 1 year. On follow up they were observed for the type of support used for mobilization. **Results:** Of 144 amputees, 92 patients initially used crutches for mobilization. 40 patients used walker, 7 used wheelchair and 5 remained bed ridden before they died. Of 92 patients using crutches, 22 were in diabetic group and 70 in non diabetic group. 31 patients of diabetes and 9 patients of non diabetic group used walker. 5 patients in diabetic group and 2 patients in non diabetic group could mobilize only on a wheelchair. 104 patients started using prosthesis for mobilization of which 30 were in diabetic group and 74 in non diabetic. The result was statistically significant. Of 104 prosthesis users, 43 were using it for less than 6 hours per day, 55 were using 6–12 hours per day and 6 patients were using it for >12 hours/day. **Conclusion:** Non diabetics preferred crutches and prosthesis for mobilization in

comparison to diabetics. More diabetics were bedridden or on wheel chair after amputation. Non diabetics were using prosthesis for longer time in comparison to diabetics. Major causes for this difference was preoperative lower ambulatory grading in diabetics, weaker muscle mass, old age, co-morbid conditions, increased incidence of infection and prolonged stump healing time.

775

HOW EFFECTIVE IS THE REPEATED IN-PATIENT REHABILITATION IN THE LOWER EXTREMITY AMPUTEES?

I. Vareka^{1,2}, T. Osladiš¹, M. Jindra³, R. Varekova⁴

¹University Hospital Hradec Králové and Medical Faculty Charles University in Hra, Department of Rehabilitation, Hradec Králové, Czech Republic, ²Faculty of Physical Culture-Palacky University in Olomouc, Department of Physiotherapy, Olomouc, Czech Republic, ³University Hospital Hradec Králové, Department of Rehabilitation, Hradec Králové, Czech Republic, ⁴Faculty of Physical Culture- Palacky University in Olomouc, Department of Natural Sciences in Kinanthropology, Olomouc, Czech Republic

Introduction/Background: Most of our patients with lower extremity amputations undergo only one in-patient rehabilitation (approx. 3 weeks). However, some patients are repeatedly hospitalized for various reasons. The aim of our study was to determine the effectiveness of the second hospitalization. **Material and Methods:** The experimental group consisted of 24 men (11 above-knee amputees and 13 below-knee amputees; age 64.9 years, SD 11.2). The Functional Independence Measure scale (FIM) was performed at the admission (A) and the dismissal (D). We used the Wilcoxon test ($p < 0.05$) to find out the significance of scores change in selected FIM items (walking, stair climbing) or group of the items (Self-care=ADL). **Results:** In the above-knee amputees, the walking and stair climbing were significantly improved as well as the ADL. In the below-knee amputees, the ADL and stair climbing were significantly improved but not the walking, because the walking ability was very good at the end of the first hospitalization. **Conclusion:** The repeated in-patient rehabilitation is beneficial in the lower limb amputees including the below-knee ones.

776

ASSOCIATION BETWEEN HAND GRIP STRENGTH AND ABILITY TO AMBULATE IN TRANSFEMORAL AND TRANSTIBIAL AMPUTEES

W.N. Wan Mohd Zohdi¹, T.Y. Chung², F.A. Hanapiah¹

¹Universiti Teknologi MARA, Rehabilitation Medicine, Sungai Buloh, Malaysia, ²University of Malaya, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Mobility in patients who undergo lower limb amputation stays as main issue in amputee rehabilitation, where the main aim is to get the patients to achieve independent walking with prosthetic restoration. Poor overall aspects of quality of life following lower limb amputation is much secondary to restricted mobility. Better walking ability and functional performance with a prosthesis is associated with its increased use following rehabilitation. To ensure optimal use of a prosthesis which would involve self donning and doffing, the amputees need to have good hand function. This research aimed to study the association between hand muscle strength and hand function with ability to ambulate among transtibial and transfemoral amputee, and to establish predictors for ability to ambulate and hand grip strength in the lower limb amputee. **Material and Methods:** This cross-sectional study was conducted in University Malaya Medical Centre. 42 subjects were assessed for hand grip strength using Jamar dynamometer, hand function using Jebsen Taylor test and ability to ambulate using Amputee Mobility Predictor (AMP). AMP score was then recoded into Medicare Functional Classification System (MFCL) K-level. **Results:** Mean hand grip strength in this group

was 24.8 kgs, and K-level 2 dominated the group. Increasing K-level was associated with increasing hand grip strength ($p < 0.05$) and K-level 4 had the best hand grip strength with the mean of 34.0 kg. Prosthesis use was found to be significantly associated with hand grip strength in multivariate analysis. None of the task in Jebsen Taylor test and the demographic variables was found to have significant association with K-level in multivariate analysis. **Conclusion:** Hand grip weakness present significantly in the lower limb amputee group. Hand grip strength differed significantly in different K-level, where amputees with better hand grip strength had better ability to ambulate. Hand function and demographic factors had no significant association with ability to ambulate.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: REHABILITATION ADDRESSING TO SPECIFIC ISSUES - WOUND AND PRESSURE SORES MANAGEMENT

777

A PRESSURE ULCER SUCCESSFULLY TREATED WITH MEDICAL HONEY DRESSING

E. Ata¹, A.B. Carli², L. Tekin¹

¹Gulhane Military Medical Academy - Haydarpaşa Research and Training Hospital, Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Pressure ulcer is defined as a localised injury to the skin or underlying tissue, frequently occurring over bony prominences. It remains a significant healthcare concern today for the clinicians. The heel and the sacrum are the most common areas affected. Numerous papers have reported that heel wounds in particular are associated with poorer outcomes when compared with other parts of the foot. Herein, we present a case who had pressure ulcer on his heel and successfully treated with medical honey dressing. **Material and Methods:** We summarize the case of a 33-year-old man who had sustained complete paraplegia at T11 level for 2 months and pressure ulcer. The pressure ulcer on the right heel was noted to be stage II and we measured its diameter $3 \times 2 \times 1$ cm². Medical grade honey wound dressing was applied every other day. Wound was irrigated with 0.9% NaCl solution at each dressing change. **Results:** At the end of the 3 weeks, the wound was healed completely. **Conclusion:** Various dressing materials have been used for dressing the pressure ulcers. Medical honey dressing is a cheap and practical material using in developing countries. Broad-spectrum antimicrobial activity, deodorization, debriding and anti-inflammatory actions and stimulation of new tissue growth are useful properties of honey for pressure ulcers. We suggest that medical honey dressing can be an effective treatment for pressure ulcers.

778

MANAGING CHRONIC PRESSURE ULCER IN CON- GENITAL LIMB DEFICIENCY WITH TOTAL CON- TACT CASTING: UNIVERSITY MALAYA MEDICAL CENTRE EXPERIENCE AND CHALLENGES

Y.W. Neoh¹, T.Y. Chung¹

¹University of Malaya- Faculty of Medicine, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Total contact casting (TCC) has been traditionally used for the treatment of non-healing neuropathic ulcers. TCC works on the concept that it redistributes load thus diminishes pressure on the wound and limits all muscle-tendon activity. Despite good clinical outcomes, the practice of application of TCC has not been well accepted by patients. We present a case as illustration of the challenges and experiences of managing a young patient with congenital limb deficiency and chronic ulcer using TCC. **Material and Methods:** A 38 year-old gentleman with

an underlying congenital limb deficiency (right transverse defect at talus and partial calcaneus) presented with a chronic ulcer for the past 30 years. The ulcer at the distal limb had developed since the age of 8 years, as he initially walked without any customised footwear. Prior to commencement of TCC, biopsies and radiography were performed to rule out malignant changes or underlying osteomyelitis. After several sessions of counselling, he agreed for TCC. **Results:** The ulcer had measured 2 cm \times 2 cm \times 1 cm. After 8 weeks of TCC application, ulcer size reduced and a review 2 months later revealed a healed ulcer. The main challenge was in convincing the patient on the efficacy of casting and the duration of non-weight bearing which hinders the occupation and activities of an active young man. **Conclusion:** In view of our experience we conclude that the use of TCC in management of non-healing ulcers is effective even in ulcers of long standing durations. More importantly, in a patient-centered care model, it should be related to the patient how the inconvenience of TCC is worth the returns of proper ulcer healing, thus engaging the patient to become an active participant in his wound care and improving adherence to therapy.

779

INVESTIGATION OF DEEP TISSUE INJURY IN JAPANESE FEMALE WHEELCHAIR BASKETBALL PLAYERS

Y. Shimizu^{1,2}, H. Mutsuzaki³, K. Tachibana⁴, K. Hotta⁵, K. Tsunoda⁶, T. Fukaya⁷, E. Ikeda⁸, M. Yamazaki⁹, W. Yasuyoshi²

¹University of Tsukuba Hospital, Department of Rehabilitation Medicine, Tsukuba, Japan, ²Ibaraki Prefectural University of Health Sciences, Department of Rehabilitation Medicine, Ami, Japan, ³Ibaraki Prefectural University of Health Sciences, Department of Orthopaedic Surgery, Ami, Japan, ⁴Ibaraki Prefectural University of Health Sciences, Department of Physical Therapy, Ami, Japan, ⁵Ibaraki Prefectural University of Health Sciences, Department of Occupational Therapy, Ami, Japan, ⁶Meiji Yasuda Life Foundation of Health and Welfare, Physical Fitness Research Institute, Hachioji, Japan, ⁷Tsukuba International University, Department of Orthopaedic Surgery, Tsuchiura, Japan, ⁸Yamagata University, Art and Sciences- Faculty of Education, Yamagata, Japan, ⁹University of Tsukuba, Department of Orthopaedic Surgery, Tsukuba, Japan

Introduction/Background: In adaptive sports, the risk of secondary disorders has increased dramatically. This study aimed to investigate deep tissue injuries (DTIs) and clarify any associated factors. The purpose of this study was to investigate DTIs in female wheelchair basketball players of the Japanese national team using ultrasonography, and to determine the factors associated with DTIs. **Material and Methods:** Twenty-two female wheelchair basketball players on the Japanese national team participated in this study. The sacral and bilateral ischial regions of each participant were examined using ultrasonography to detect DTIs in the sacral region and the bilateral ischial regions. Statistical analyses: We used the chi-squared test for categorical data and the Wilcoxon rank-sum test for continuous data. A significance level of $p < 0.05$ was used to determine the association between DTI findings and each factor. **Results:** Fifteen players (68.2%) had DTI findings that were more frequent with central nervous system disorder (12/14: 85.7%) than skeletal system disease (3/8: 37.5%, $p = 0.0195$). Players in the lower class (1.0 to 2.5) had more DTI findings (10/11, 90.9%) than players in the higher class (3.0 to 4.5) (5/11: 45.5%, $p = 0.0173$). Players who used a wheelchair in daily life were more likely to have DTIs (11/13: 84.6%) than players who only used a wheelchair for playing basketball (4/9: 44.4%, $p = 0.0457$). Players with DTI findings had lower systolic blood pressure ($p = 0.048$), lower red blood cell (RBC) count ($p = 0.0483$) and lower serum creatinine level ($p = 0.0252$) than players without DTIs. **Conclusion:** Players with central nervous system disorders, who were classified as pelvic instability class and who used a wheelchair in daily life were more likely to have DTIs. A periodic medical check is necessary for players to maintain a sporting life.

780

PRESSURE RELIEVING EFFECT OF THE PRE-ISCHIAL SHELVES IN SPINAL CORD INJURY PATIENTS

H. Shin¹, Z.A. Han¹

¹National Rehabilitation Center, Department of Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: Pressure ulcers are one of the most common complications of spinal cord injury. Pressure ulcers make rehabilitation duration of spinal cord injury patient longer, and worsen their quality of life. Despite most of patients use pressure relief seating cushions, the sacrum and ischium are common sites of pressure ulcers. Therefore, we additionally applied the pre-ischial shelf between the wheelchair seat and the cushion. In the present study, we wish to identify the pressure relief effect of the pelvic well. **Material and Methods:** Patients were recruited from Aug 2014 to Jun 2015. A total 77 patients with spinal cord injury underwent interface pressure mapping during period were included in this study. Patients with neuromuscular disorder other than spinal cord injury were excluded. The interface pressure distribution between the seat cushion and the buttock-thigh was obtained using the XSENSOR® X3 system. Patients were seated over the seat cushion without the pre-ischial shelf. Average pressure, peak pressure and contact area were obtained. The interface pressure was subsequently obtained with the pre-ischial shelf inserted under the seat cushion. Paired *t*-test was used to compare the pressures and contact area. The level of statistical significance was defined as $p < 0.05$. **Results:** The average age of total 77 patients was 42.55 (16 to 72). The average height and weight were 170.65 cm (153 cm to 191 cm) and 64.44 kg (33 kg to 88 kg). Respectively, 39 of total 77 patients were paraplegics, and 38 were tetraplegics. Without the pre-ischial shelf, the average and peak pressure was 46.10 mmHg and 155.03 mmHg. The contact area was 1136.44 cm². With the pre-ischial shelf, the average and peak pressure was significantly reduced to 44.09 mmHg and 131.42 mmHg (p -value < 0.05). The contact area was significantly increased to 1,216.99 cm² (p -value < 0.05). **Conclusion:** For spinal cord injury patient, pre-ischial shelves will help to reduce pressure during sitting. We expect it to be useful for preventing pressure ulcers in the buttock area.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: REHABILITATION ADDRESSING TO SPECIFIC ISSUES - MANAGEMENT OF FATIGUE AND SLEEP DISORDERS

781

EFFECTIVENESS OF A NEW MULTIMODAL AND COMBINED MULTIMODAL-AEROBIC THERAPY IN BREAST CANCER SURVIVORS WITH CANCER-RELATED FATIGUE ON SELF-REGULATION, INTERNAL COHERENCE AND ITS IMPACT ON CRF

A. Nikolaou¹

¹Hannover Medical School, Rehabilitation, Hannover, Germany

Introduction/Background: Cancer-related fatigue (CRF) is a major symptom in breast cancer survivors (BC). We carried out a 10-week multimodal-intervention including sleep education/restriction, psychoeducation, eurythmy- and painting-therapy, as self-contained (MT) or combination-therapy (CT) together with aerobic training (AT). Here we report how MT and CT compared to AT influenced patients' salutogenic capacities assessed by the self-regulation scale (SRS) and internal coherence scale (ICS). **Material and Methods:** In a comprehensive cohort design study BC with chronic CRF were randomized or allocated by preference. SRS, ICS and Cancer Fatigue Scale (CFS-D) were captured at baseline (T0), after

10 weeks of intervention (T1) and in a six-month follow-up (T2). Analyses controlled for patient preference and for internal dependencies between correlations (p -value < 0.05 for all reported differences). **Results:** Of 278 screened BC 65 were randomized and 61 allocated by preference to the treatment arms. Socio-demography was almost balanced. A significantly higher self-regulation compared to AT was confirmed at T1 for CT and MT; at T2 for CT; and a higher ICS at T2 for CT and MT. SRS was stronger correlated with CFS-D at T1 and T2 vs. T0 (RhoT0 = -0.35; RhoT1 = -0.47; RhoT2 = -0.65) and ICS had moderate correlations at T0, T1 and T2 without significant changes (RhoT0 = -0.61; RhoT1 = -0.57; RhoT2 = -0.68). **Conclusion:** In this study a new multimodal and combined CRF-therapy was superior in improving, at first, self-regulation, and six months later ICS compared to exercise-therapy. Further analyses and long-term follow-up are indicated to evaluate the predictive impact of SRS and ICS in the context of a multimodal CRF-intervention.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: REHABILITATION ADDRESSING TO SPECIFIC ISSUES - SEXUAL FUNCTIONING IN PEOPLE WITH DISABILITY AND CHRONIC HEALTH CONDITIONS

782

THE EFFECTS OF CARDIAC REHABILITATION ON ERECTILE DYSFUNCTION IN MEN WITH ISCHAEMIC HEART DISEASE: A PROSPECTIVE COHORT STUDY

A.H. Ibrahim¹, W.A. Wan Ahmad², L. Abdul Latif³, A. Suhaimi³

¹University Science Malaysia, Department of Orthopaedic, Kota Bharu, Malaysia, ²University of Malaya, Department of Internal Medicine, Kuala Lumpur, Malaysia, ³University of Malaya, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: ED is defined as inability to have and maintain an erection for satisfying sexual intercourse. It has gained interest as a predictive sign of latent onset ischemic heart disease (IHD). With the high rates of ED in the IHD population and many shared risk factors between the two, can addressing endothelial dysfunction, abnormal autonomic regulation and psychological stress leading to IHD leads to lesser ED signs or symptoms. **Material and Methods:** Prospective cohort study conducted in University Malaya Medical Centre from Jan 2013 until Feb 2014. Subjects were recruited during Cardiac Rehabilitation (CR) clinic visit 6 weeks after an IHD. Subjects were assigned to the intervention group or control group based on their enrolment into CR. Demographic data, International Index Erectile Function 5 (IIEF-5) were recorded at baseline and at 3 months. Physical capacity was measured using Metabolic Equivalent (METs), peak heart rate and two-minute heart rate recovery (2HRR) from Exercise Stress Test (EST) parameter. Risk parameters were measured using HbA1c, LDL and systolic blood pressure. **Results:** There was no significance difference in baseline IIEF-5 score between the intervention (11.43±4.7) and control group (10.22±5.3). Both group had improvement in IIEF-5 score from baseline by 3 months which was significant ($p < 0.01$). In the intervention group, the mean IIEF-5 score improvement is (5.36±2.32), and in control group is (1.44±2.08). Inter-group comparison shows significant difference in the post intervention mean IIEF score ($p = 0.01$). There was a moderate degree significant relationship between post intervention IIEF score and peak heart rate score ($r = 0.346$, $p = 0.031$). Significant relationship was seen between post intervention IIEF score and LDL result ($r = 0.26$, $p = 0.04$). **Conclusion:** Cardiac rehabilitation program had shown give positive effect on erectile dysfunction. There were also significant relationships between erectile dysfunction with LDL parameter and maximum heart rate (EST).

**CLINICAL PHYSICAL AND REHABILITATION
MEDICINE SCIENCES: REHABILITATION
ADDRESSING TO SPECIFIC ISSUES - OTHER
SPECIFIC FUNCTIONS**

783

IDENTIFYING BARRIERS AFFECTING PARTICIPATORY AND SOCIAL FUNCTION AFTER TRAUMATIC BRAIN INJURY REHABILITATION

N. Abdul Aziz¹¹Cheras, Malaysia

Introduction/Background: This study is to assess the changes in participatory and social function (PSF) at discharge and at 3 to 6 months after acute inpatient rehabilitation of patients with moderate and severe traumatic brain injury (TBI). We have already identified in a previous informal survey that about a third of our clients reported deterioration in PSF after completing their inpatient stay. We attempted to identify the factors limiting individuals from integrating back into community. *Material and Methods:* The outcome variables of PSF were measured by using Mayo-Portland Adaptability Inventory-4 Participation Index (M2PI). M2PI is a validated measure that describes 8 domains of social participation. 60 clients were recruited and interviewed over a 10 month period from a consecutive sample of inpatients in a national rehabilitation centre for TBI in New Zealand. Each consenting client was interviewed at discharge and then via phone call at three to six months post discharge. *Results:* The average time from Discharge to the Follow up assessment was 117 days or approximately 4 months. Approximately two thirds of clients reported that their PSF outcomes stayed the same or improved after discharge from inpatient TBI rehabilitation. The remaining one third of clients reported reduction in some aspect of PSF. Our most significant finding was that 45% of those clients reporting deterioration identified mood problems as a factor. This compared to reported mood problems in only 10% of the clients who were the same or improved after discharge. *Conclusion:* These findings show a concerning reduction in PSF in a third of TBI clients post discharge from inpatient rehabilitation. These results also highlight the importance of identifying, providing education and treating mood problems in treatment programs, which we consider will increase positive outcomes in the short to medium term after TBI.

784

ADAPTATION OF PHYSICAL ACTIVITY PRESCRIPTION AND EXERCISE TRAINING FOR CARDIAC REHABILITATION PROGRAM IN PHYSICALLY DISABLED POPULATION: A CASE SERIES

F. Ahmedy¹, N. Mahli², U. Ibrahim², A. Suhaimi²¹Universiti Malaysia Sabah, Faculty of Medicine & Health Sciences, Kota Kinabalu, Malaysia, ²University of Malaya Medical Centre, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Current guideline based physical activity prescription and exercise training for outpatient cardiac rehabilitation program as part of secondary prevention are well documented but intended for able-bodied cardiac patients. Similar program specifically for physically disabled population with presentation of coronary artery disease (CAD) has yet to be established despite higher risk of recurrent CAD events resulting from reduced mobility and functional level secondary to disabilities. *Material and Methods:* Formulating physical activity prescriptions and exercise training for three different disabled patients presented with CAD are described; 1) 40-year-old male post-coronary artery bypass grafting (CABG) for triple-vessels disease with pre-operative left-sided hemiparesis, spasticity and gait abnormalities secondary

to right subcortical stroke, 2) 63-year-old male acquiring primary angioplasty secondary to inferior ST elevation myocardial infarction (STEMI) with underlying prosthetically restored left transtibial amputation, and 3) 29-year-old male thrombolysed for inferior STEMI with background of complete paraplegia secondary to traumatic spinal cord injury (SCI) complicated with bilateral hip disarticulation attributed to osteomyelitis. *Results:* In determining risk assessment methods for exercise testing, arm ergometer sub-maximal stress test is feasible for stroke and SCI patients in the absence of functional bilateral lower extremities whereas 6-minute walk test (6MWT) and Amputee Mobility Predictor (AMP) with prosthesis (AMPRO) are outcome measures that reflect amputee's walking performance in consideration of higher energy expenditure from prosthetic usage. Physical activity prescription and exercise training for outpatient cardiac rehabilitation are formulated and modified to accommodate these different disabilities. *Conclusion:* Physically disabled population are at risk of CAD owed to physical inactivity accentuated by underlying disabilities. Risk assessment, physical activity prescription and exercise training warranted modifications by emphasising on activity limitations imparted by different disabilities. These would promote patients compliance in order to optimised benefit from outpatient cardiac rehabilitation program as part of secondary prevention.

785

IMPROVEMENT OF HEART RATE RECOVERY WITH SHORT-TERM EXERCISE TRAINING AT OUTPATIENT CARDIAC REHABILITATION PROGRAM IN POST-CORONARY ARTERY BYPASS GRAFTING SURGERY: A CASE REPORT

F. Ahmedy¹, K. Nyien Yin¹, A. Suhaimi²¹Universiti Malaysia Sabah, Faculty of Medicine & Health Sciences, Kota Kinabalu, Malaysia, ²University of Malaya Medical Centre, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Heart rate recovery (HRR) post-exercise is an established independent prognostic factor for overall mortality. Attenuated HRR indicates depressed parasympathetic vagal modulation and persistent sympathetic response, reflecting cardiac autonomic dysfunction. Exercise training remains the mainstay of intervention for now, however the appropriate training duration still remains unclear. *Material and Methods:* We describe resolution of abnormal HRR after 6 weeks of exercise training at outpatient cardiac rehabilitation program (CRP) in a patient treated with coronary artery bypass grafting (CABG) for triple-vessel disease, a 69 years old gentleman with underlying risk factors of dyslipidaemia and obesity (body mass index of 33). Modified Bruce Protocol exercise treadmill stress testing is utilised as objective assessments at entry and exit of the training. Parameters observed include peak heart rate (HR), HRR at 1 minute post-testing (expressed as beats per minute (bpm)) and maximum metabolic equivalents (METs) achieved. Patient completed 6 weeks of outpatient CRP sessions. Each session began with 10 minutes stretching followed by 30 minutes of aerobic exercises with major upper and lower limbs strengthening exercises and subsequent 10 minutes cool down period. *Results:* Patient completed Stage II of entry treadmill stress testing and stratified as moderate risk for exercise training in view of maximum METs of 4.60 and abnormal HRR of 2 bpm despite normal left ventricular ejection fraction of 69%. At the exit treadmill stress testing, patient completed stage IV with normalisation of HRR to 12 bpm and improvement of maximum METs to 7.80. *Conclusion:* Conventional outpatient CRP adopted 12-weeks exercise training to demonstrate improvement in HRR but this might render patients compliance. Normalisation of HRR achieved by 6 weeks of exercise training as portrayed by our patient would serve as a precursor for short-term outpatient CRP in promoting compliance.

786

TEST-RETEST RELIABILITY OF SINGLE AND DUAL-WALKING TESTS**Y.J. Chang¹, I.I. Lin¹, L.L. Chuang¹, Y.Z. Huang^{2,3}, A.M. Wong^{1,4}**¹Chang Gung University, Department of Physical Therapy and Graduate Institute of Rehabilitation Science, Taoyuan, Taiwan,²Chang Gung University, School of Medicine, Taoyuan, Taiwan,³Chang Gung Memorial Hospital, Department of Neurology, Taoyuan, Taiwan, ⁴Chang Gung Memorial Hospital, Department of Physical Medicine and Rehabilitation, Taoyuan, Taiwan

Introduction/Background: Dual-walking test is known as a sharpened test for early stage gait deviations in people with CNS lesions. Cognitive tasks, such as spatial memory, stroops, and calculation, have been commonly used during dual-walking tests but the reliability have not be established. **Material and Methods:** Nine healthy individuals were participated with informed consent. All subjects executed identical single cognitive, single walking, and dual-walking tasks twice with a one-week apart. During single cognitive tests, subjects received spatial memory, stroop, and calculation tests in sitting position. During dual-walking and single walking tests, subjects walked on a instrumented gait mat with and without added cognitive tasks, respectively. No priority instructions were given during dual-walking tests. Spatial-temporal gait parameters were recorded. The test-retest reliability was analyzed with the intraclass correlation coefficient (ICC) for determining the degree of consistency and agreement between twice assessments. **Results:** Gait parameters (eg. velocity, step length, step time, step width) showed good reliability during single walking tasks (ICC \geq 0.75). Part of gait parameters (eg. velocity, step time, double limb support time) showed poor to moderate reliability during dual-walking tasks with spatial memory and stroop. Gait parameters showed good reliability during dual-walking tasks with calculation task (ICC \geq 0.75). **Conclusion:** These findings showed that the single and dual task gait test with calculation are reliable measure with good reliability. The calculation dual-walking tests had better reliability than spatial memory and stroop tests. **Acknowledgements:** This study was supported by the Ministry of Science and Technology (MOST 104-2221-E-182-016), Healthy Ageing Research Center at Chang Gung University (EMRPD1E1711, CMRPD1B0332), and Chang Gung Medical Research Programme (CMRPD3E0111). Special thanks to Neuroscience Research Center, Chang Gung Memorial Hospital at Linkou.

787

CLINICAL PREDICTORS OF ORO-ESOPHAGEAL TUBE FEEDINGSUCCESS IN PATIENTS WITH DYS-PHAGIA**J.K. Choi¹, Y.M. Cheon¹, M.H. Chun¹, K.H. Do¹**¹Asan Medical Center, Physical Medicine & Rehabilitation, Seoul, Republic of Korea

Introduction/Background: Dysphagia cause aspiration pneumonia, under-nutrition, or under-hydration. Previous study reported that OE tube improved aspiration and swallowing function and reduced pneumonia and reflux. However, the optimal guide line for the indication of OE tube in people with dysphagia is still unclear. We investigated patients with dysphagia applied OE tube training and evaluated the difference between success and failure group. **Material and Methods:** Dysphagia patients with brain lesion that were hospitalized in the rehabilitation department were recruited. All patients received OE tube treatment were divided into two groups with the presence or absence of OE tube feeding in ward and success or failure of OE tube insertion at swallowing treatment room. We assessed the patients' Korean version of mini-mental status examination(K-MMSE) score and follow up command step for cognitive function, VFSS findings, interval from OE tube treatment to OE tube feeding, initial feeding method, final feeding method, reasons of OE tube training

failure and pneumonia history. **Results:** 372 patients were reviewed and 76 appropriate patients selected in the study. 56 patients were success group and 20 patients were failure group. The characteristics of groups are shown. By comparing the variables in each group, there were significant differences between the two groups in age, K-MMSE, and follow up command. Borderline significance was observed in location of lesion and sex. The reasons of OE tube train failure were gag reflex (40.0%), Refuse or noncooperation (30.0%) and no or severely reduced swallowing reflex (25.0%). The results of the multivariable analysis using a logistic regression are shown in table 3. Age, K-MMSE and cause of dysphagia emerged as the three main predictors of OE tube failure. **Conclusion:** The results of our study suggest that among the factors that affect dysphagia, younger age, higher K-MMSE and stroke may improve OE tube feeding success rate in patients with severe dysphagia.

788

TREATMENT OF “DYSTONIC CLENCHED FIST” WITH BOTULINUM TOXIN: A CASE REPORT OF A PATIENT WITH PARKINSON’S DISEASE**S. Hayamizu¹, E. Mori¹, S. Yamada²**¹Sanno Rehab. Clinic, Rehabilitation Medicine, Ota-ku, Japan,²Kyorin University Hospital, Rehabilitation Medicine, Mitaka City, Japan

Introduction/Background: “Dystonic clenched fist” in Parkinson’s disease(PD) causes severe pain, skin trouble, palmar infection in worst case, and finally deteriorates activities of daily living and QoL of the patient. However, there are few reports on therapeutic treatment and rehabilitation approach of the symptom. **Material and Methods:** Case presentation: We present the case of a 71-year-old Japanese man with a longer than 10-year history of PD and drug therapy. He came to our clinic with the complaint of gait disturbance 6 years ago. He showed poor facial expression, severely stooped with spinal kyphosis, and could not walk without frequent assistance. His stage was III in Hoehn Yahr Staging. A weekly home-visit rehabilitation program for preventing falls started, and his caregivers were instructed to support his home exercise. However, deformities of his left hand and fingers progressed gradually in the course, which resulted in pain and skin corns, and aggravated hygiene condition of the hand in a few years. We treated this “dystonic clenched fist” with botulinum toxin A (BTXA, Botox®). Flexor digitorum superficialis was selected as a target muscle because of the flexion contracture of PIP joints and surface EMG findings recorded during active and passive movements of the fingers and wrist. BTXA injection was administered three times in a year, while patient continued home-visit rehabilitation. **Results:** Finally, the pain was significantly relieved with accompanying muscle relaxation and the palmar infection odor was extinguished. **Conclusion:** The case shows that the BTXA injection can be useful treatment for “dystonic clenched fist” in PD, and rehabilitation in parallel with the treatment can reinforce the effects of the BTXA.

789

SHAKER EXERCISE COMBINED WITH INTEGRATED VOLITIONAL CONTROL ELECTRICAL STIMULATION: A RANDOMIZED CONTROLLED TRIAL**H. Kagaya¹, T. Momota², Y. Aoyagi¹, Y. Inamoto², S. Shibata¹, K. Onogi², E. Saitoh¹**¹Fujita Health University, Department of Rehabilitation Medicine I- School of Medicine, Toyoake, Japan, ²Fujita Health University, Faculty of Rehabilitation- School of Health Sciences, Toyoake, Japan

Introduction/Background: Shaker exercise is known to strengthening the suprahyoid muscles and improves the opening of the upper esophageal sphincter in patients with dysphagia. It consists of 3 repetitive 1-min sustained head raisings interrupted by a 1-min rest

period followed by 30 consecutive repetitions of head raisings in the supine position 3 times a day for 6 weeks. However, this exercise is hard to complete and induces high drop-out rate. Recently, the integrated volitional control electrical stimulator (IVES) (PAS system®: OG Giken Co., Ltd, Japan) has developed in Japan. This system increases electrical stimulation with the increase in electromyography signal of the target muscles. Our hypothesis is that Shaker exercise combined with IVES strengthening the suprahyoid muscles earlier. **Material and Methods:** This study was approved by the Institutional Review Board and a written informed consent was obtained from all subjects. Twenty-six healthy subjects were randomly allocated into the Shaker exercise group (S group) and Shaker exercise combined with IVES group (SI group). The surface electrodes were put on the suprahyoid muscles in SI group. The electrical stimulation was given only when the suprahyoid muscles activate during head raising. Both group performed exercise for 2 weeks. The jaw opening force and head flexion force were measured. **Results:** The muscle force during jaw opening showed significant increase in SI group compared with that in S group. The head flexion force increased significantly in both groups. **Conclusion:** Shaker exercise combined with IVES strengthening the suprahyoid muscles earlier.

790

EFFECT OF GREATER AMOUNT OF TRAINING ON THE IMPROVEMENT OF WALKING ABILITY OF HEMIPLEGIC PATIENTS IN COMPREHENSIVE INPATIENT REHABILITATION

K. Kawakami¹, G. Tanino², K. Tomida¹, Y. Kato¹, M. Watanabe¹, Y. Okuyama¹, S. Sonoda^{2,3}

¹Fujita Health University Nanakuri Sanatorium, Department of Rehabilitation, Tsu, Japan, ²Fujita Memorial Nanakuri Institute-Fujita Health University, Division of Rehabilitation, Tsu, Japan, ³School of Medicine- Fujita Health University, Department of Rehabilitation Medicine II, Tsu, Japan

Introduction/Background: In compliance with the maximum allowed training hours of the hemiplegic patients set by Japanese medical insurance system, our study aimed at determining the effect of maximum hours of physical therapy training on walking improvement of the hemiplegic. **Material and Methods:** The hemiplegic patients whom participated in this study were hospitalized in Kaifukuki (comprehensive inpatient) rehabilitation ward. While Ninety one hemiplegic patients (PT3unit Group) in 2005 received 50–60 minutes of physical therapy training per day, the other 86 hemiplegic patients (PT6unit Group) from years between 2012 and 2014 received 90–120 minutes of physical therapy training. The functional independence measure (FIM) score was used to assess patients walking ability at the time of admission, at 2 and 4 weeks after admission and at the time of discharge. After dividing the patients according to degree of motor paralysis, between groups comparison was made. **Results:** In the patients with complete paralysis of the affected lower limb, the FIM walking score was significantly higher in the PT6unit Group compared to the PT3unit Group at 4 weeks (1.3 ± 0.5 vs. 2.7 ± 1.1) and at discharge (2.3 ± 1.2 vs. 4.5 ± 0.8). Similarly, in the patients with severe paralysis, the FIM walking score was significantly higher in the PT6unit Group compared to the PT3unit Group at 4 weeks (3.6 ± 1.1 vs. 4.2 ± 1.3) and at discharge (4.9 ± 1.0 vs. 5.5 ± 0.7). There were no significant differences between the patients with moderate and mild paralyzes in both the PT6unit and PT3unit Groups. **Conclusion:** Higher amounts of physical therapy exercise contributed to improvements in the walking ability of patients with complete and severe paralyzes of the lower limb.

791

APPLYING A BALLOON CATHETER TO A STUDY ON ASYMMETRIC BOLUS PASSAGE THROUGH THE PHARYNGOESOPHAGUS

Y.K. Kim¹, H.J. Lee², H. Seok³

¹Myongji Hospital, Rehabilitation Medicine, Goyang, Republic of Korea, ²Inje Univ. Ilsan Paik Hospital, PM&R, Goyang, Republic of Korea, ³Bucheon Soonchunhyang hospital, PM&R, Bucheon, Republic of Korea

Introduction/Background: In swallowing, the bolus passed mainly through either of piriformis sinus. We want to check if a balloon catheter can be useful in investigating this functional asymmetric bolus passage. **Material and Methods:** For patients who presented aspiration of pharyngeal remnant during VFSS lateral view, we added a balloon catheter swallowing step in the following AP view evaluation. First, patients swallowed semisolid paste to determine presence of asymmetric passage through the hypopharynx. Subsequently we inserted a catheter through a nostril and placed in one piriformis sinus and inflated the balloon, waiting for swallowing of the balloon down to the esophagus. For the next swallowing where we increased the balloon size from 0 to 5mL until they failed to swallow it. Then we moved the catheter to the other piriformis sinus and followed the same procedure. We compared ballooning sizes in both directions and correlated presence and direction of asymmetric passages between semisolid and catheter evaluation. **Results:** We recruited twenty patients with neurogenic dysphagia and included eighteen for analysis. All of them showed asymmetric passage in both semisolid and catheter evaluations. Dominant swallowing directions determined by the two evaluation methods produced identical results. Two patients, one with left hemiplegia and the other with quadriplegia, presented right dominant passage, the the rest, i.e. sixteen patients presented left dominant passage. Most patients whose duration after onset were longer than five months, thirteen out of fourteen, presented left dominance even in five left hemiplegic patients. On the other hand, fifteen among eighteen patients did not allow the catheter to pass along non-dominant paths, while only three patients allowed the catheter to pass bilaterally. **Conclusion:** A catheter swallowing test could be a simple and safe alternative to real food test. Additionally we observed that brain lesion might have a principal effect on the function of the pharyngoesophagus at acute or subacute phase.

792

VISUAL AND HEARING IMPAIRMENT IN THE SETTING OF INTENSIVE REHABILITATION

L. Lan¹, E. Hines²

¹Queensland Health, Rehabilitation, Brisbane- Queensland, Australia, ²University of Queensland, Medicine, Brisbane, Australia

Introduction/Background: There is a plethora of anecdotal evidence regarding the negative psychosocial impact of auditory and visual impairment in the general population. [1–4]. **Material and Methods:** However, the incidence of hearing impairment (HI), vision impairment (VI), or dual (hearing and vision) impairment (HVI) in patients undergoing physical rehabilitation (PR) and the effects thereof on functional recovery are not well delineated at this juncture. [5]. **Results:** In this prospective cohort study of 18 patients admitted to The Prince Charles Hospital Rehabilitation Unit, we completed hearing and vision examinations, administered a combined NIH and Queensland Health functional hearing and visual questionnaire, and assessed basic level of cognitive function using a Mini-Mental State Exam (MMSE) at time of examination. HI alone, VI alone, and HVI were found in 50%, 61%, and 39% of patients respectively, while 22%, 17%, and only 0.06%, of patients had no hearing deficits, no visual deficits, no sensory impairments in either modality, respectively. **Conclusion:** Additionally, a correlation between dual sensory impairment and length of stay (LOS) was seen in the group of patients whose LOS was greater than the mean. **References:** 1. Varma R, Wu J, Chong K, Azen SP, Hays RD. *Ophthalmology*. 2006 Oct;113(10): 1846–53. 2. Rudberg MA, Furner SE, Dunn JE, Cassel CK. *J Gerontol*. 1993 Nov; 48(6): M261–5. 3. Resnick HE, Fries BE, Verbrugge LM. *J Gerontol B Psychol Sci Soc Sci*. 1997 May; 52(3): S135–44. 4. Campbell VA, Crews JE, Moriarty DG, Zack MM, Blackman DK. *MMWR CDC Sur*.

793

EFFECT OF ROBOT-AIDED TRAINING WITH ELECTRICAL STIMULATION ON FUNCTIONAL IMPROVEMENT OF HEMIPLEGIC UPPER LIMB OF SUB-ACUTE STROKE PATIENTS

H. Miyasaka¹, A. Orand¹, H. Ohnishi², N. Shindo², K. Itoh², G. Tanino¹, K. Takeda¹, S. Sonoda³

¹Fujita Memorial Nanakuri Institute- Fujita Health University, Rehabilitation, Tsu, Japan, ²Fujita Health University Nanakuri Sanatorium, Rehabilitation, Tsu, Japan, ³Department of Rehabilitation Medicine II- School of Medicine- Fujita Health University, Rehabilitation, Tsu, Japan

Introduction/Background: We investigated the improvement effect of robot-aided training combined with neuromuscular electrical stimulation (NMES) on the hemiparetic upper limbs after stroke. **Material and Methods:** Thirty hemiparetic patients admitted to Nanakuri Sanatorium, Fujita Health University participated in the study. Mean age of the patients was 60.9±11.5 years old. Mean days after the onset of stroke at the start of robot training were 66.0±14.5. The patients were divided into two groups (15 patients for each group); Robot (InMotion ARM Robot™) aided training with NMES group (RNG) and without NMES group (RG). Both groups received 2 weeks of training for 5 days per week. Anterior deltoid and triceps brachii muscles were electrically stimulated by using Trio 300 (Ito Co., Ltd., Tokyo). Frequency and pulse width of the stimulating signal were 20 Hz and 250 µs, respectively. The NMES under motor threshold was continued for the whole session of robot-aided arm training. We evaluated Fugl-Meyer assessment (FMA) and flexion and abduction angles of shoulder joint at the beginning and end of 2 weeks robot training and compared them between RNG and RG. **Results:** The FMA gains of the RNG and RG groups were 6.5±7.0 and 2.8±4.1, respectively ($p=0.06$). Increased range of the shoulder flexion (18.0±16.6) and abduction (19.0±19.8) angles of RNG were significantly larger than those of RG (flexion: 4.3±15.7, abduction: 5.0±14.6), respectively ($p<0.05$). **Conclusion:** The application of robot-aided training with NMES was more effective for recovery of hemiparetic arm function than robot only training. The long time electrical stimulation under motor threshold may make easy to move the paretic arm and may consequently increase the voluntary movement with less assistance during robot training.

794

EFFECTIVENESS OF MANUAL WHEELCHAIR TRAINING PROGRAM: A BEFORE AND AFTER STUDY TRIAL

N. Mohamad Hashim¹, J.P. Lee¹, N.H. Mohamad Hanapi¹, C.H.R. Lee¹, R.C. Jee¹, N. Hasnan¹, J.P. Engkasan¹, A. Ahmad Fauzi¹

¹University of Malaya, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Persons with a spinal cord injury (SCI), the ability to use wheelchair is indispensable. In spinal cord injury rehabilitation, the basic wheelchair training which includes transfer and propel are not enough for community ambulation. When optimized, this skill allows them to return to their role in the community, be it employment or recreational activities. The objective of this study was to determine the effect of an advanced wheelchair skills training among SCI populations. **Material and Methods:** Structured 6-days advance wheelchair skills training workshop was held in a tertiary hospital, conducted by a professional peer trainer and therapists. The training programme consisted of 12 varying wheelchair skills. Patients who were at least 1 year post injury, used a manual wheelchair as a primary mobility, able to self-propel, and were non ambulatory were included. Those who have cognitive impairment were excluded. Participants' wheelchair skills were assessed before and after completion of the programme using the Wheelchair Mo-

bility Test. Descriptive analysis of the result was done using Wilcoxon Signed Rank Test (WSRT). **Results:** Fourteen participants completed the programme (age 18–51, 10 males, 10 paraplegia). The mean total pre-training score was 14 (range 7–24), while the post-training was 19.5 (ranged 11–25). The WSR test showed an overall improvement in the participants' skills score; a median of 14 to 19.5 ($Z=3.192, p=0.001$). Skills in ascending stairs showed the most improvement (average rank 0 to 6.0, $p=0.001$) followed by descending stairs (average rank 0 to 4.5, $p=0.008$). Negotiating high platform and large threshold test showed a reduction in score; average rank from 4.2 to 3.5 and rank 4.67 to 3.5 respectively. Despite improvements in back wheel balance, overcoming small threshold and low platform, overcoming grater and going down the long and short ramp, were not statistically significant. **Conclusion:** Advanced wheelchair skill training has shown some benefits in certain wheelchair skills.

795

RELIABILITY AND VALIDITY OF FUNCTIONAL INDEPENDENCE MEASURE (FIM) IN STROKE PATIENTS

N. Rahman¹, T. Uddin², M. Moyeenuzzaman², M.A. Sha-koor², A. Rabbani²

¹National Institute of Cancer Research & Hospital, Physical Medicine & Rehabilitation, Dhaka, Bangladesh, ²Bangabandhu Sheikh Mujib Medical University BSMMU, Physical Medicine and Rehabilitation, Dhaka, Bangladesh

Introduction/Background: Functional Independence Measure (FIM) is used to assess the performance of basic daily living skills using a 7-level scale that measures major gradations in function from complete independence to total assistance. Advances in science and technology have improved survival from once-fatal diseases and injuries, led to an increasing number of people with chronic disease and disability. For outcome measures, the need for cross-culturally applicable instruments for clinical research has also increased. The intention of the study was to develop a culturally adapted Bangla version of FIM and to assess its reliability and validity in Bangladeshi stroke patients. **Material and Methods:** This observational study was carried out in Physical Medicine & Rehabilitation and Neurology department of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh during the period Mar 2013 to Feb 2014. According to established cross-cultural adaptation procedures, recommended by Beaton et al. a pre-final Bangla version was developed and after comprehensibility testing among 10, 12-year children and among 30 adult respondents, a final version was established. It was then interviewed and re-interviewed to 48 stroke patients 1 week apart. Reliability was assessed using internal consistency (Cronbach's alpha), inter-rater reliability and the intraclass correlation coefficient (ICC). Content validity was evaluated by 3 expert Physiatrists and construct validity was tested by association with the Physical Functioning Subscale (PF-10) of 36-Item Short Form Health Survey (SF-36). **Results:** Cronbach's α was 0.97 and ICC was 0.95 with 0.92 and 0.96 for motor and cognitive sub-total. Only cognitive scale score showed 35% ceiling effect. Content validity was 100%. The motor subscale showed good correlation ($r=0.87$) with PF-10 of SF-36. **Conclusion:** The interviewer-administered Bangla FIM appears to be a reliable and valid instrument. We recommend it for assessing level of independence or degree of disability in Bangladeshi people with activity limitation.

796

POTENTIAL BENEFICIAL EFFECTS OF LISTENING TO PREFERRED PLEASANT MUSIC ON BRAIN-INJURED PATIENTS WITH IMPAIRED CONSCIOUSNESS

M.Y. Shih¹, P.L. Tsai¹, Y.T. Huang², P.S. Jian¹

¹National Cheng Kung University, Occupational Therapy, Tainan, Taiwan, ²Shih Chien University, Department of Music-, Taipei, Taiwan

Introduction/Background: Sensory stimulation has been a common intervention for patients of brain injury with impaired consciousness. Among auditory stimulus, music is a novel material due to its potential effects on inducing emotion. Recent studies suggest that listening to pleasant music may not only evoke positive mood, but also lead to neural regeneration and changes in arousal. However, such beneficial effects on patients with impaired consciousness secondary to severe brain injury have not been fully explored. The purpose of the present study was to investigate the potential positive effects of listening to pleasant music on brain-injured survivors with impaired consciousness. **Material and Methods:** An ABA single-subject design was used. Two participants who experienced severe brain-injury and impaired consciousness were recruited to listen to their preferred pleasant music for 30 minutes every day for 4 weeks. Information about preferred pleasant music of each participant was collected at the beginning from their influential family members through interview. Outcome measures included tallies of motor behaviors and heart rate at 1-minute intervals throughout 3-minute pre-intervention baseline, intervention and 3-minute post-intervention phases of each sessions, and were analyzed for assessing changes in responsiveness across time intervals within sessions. **Results:** Although none significant findings were found, both patients did demonstrated changes in responsiveness while listening to preferred music. One patient showed more motor behaviors, while the other patient presented fewer behaviors. In addition, heart rate of both participants decreased during the music intervention. **Conclusion:** The findings suggest that listening to preferred pleasant music may cause physiological relaxing effect, but inconsistent behavior responses in brain-injured patients with impaired consciousness. Future research using randomized controlled trials is warranted to validate the findings.

797

PROBLEMS IN THE CARE AND EMOTIONAL EXPERIENCES OF PARENTS OF CHILDREN WITH DISABILITIES AND REHABILITATION PROCESS

M. Hagner -Derengowska¹, J. Siminska², K. Pietkun², K. Ogurkowski², I. Glowacka², N. Krystyna², W. Hagner²

¹Nicolaus Copernicus University, Department of Clinical Neuropsychology, Bydgoszcz, Poland, ²Nicolaus Copernicus University, Department of Rehabilitation, Bydgoszcz, Poland

Introduction/Background: Families have obligations towards the child in terms of care, treatment at home, and provide rehabilitation. Parents should be involved in the rehabilitation process because it is born between them and the child bond and sense of security. Positive factors stimulating the activity of parents lead to a change in parental behavior, lower levels of depression. Sometimes when we have a handicapped child, change the relationship between the spouses – some supportive, some depressed. **Material and Methods:** The material were families having children with disabilities. Among the respondents, the biggest percentage of mothers of children with disabilities. Most respondents were people aged 31–40 years. The research method was a survey, which consisted of choosing the answers of the following proposals. **Results:** The functioning of families with a disabled child is associated with many problems. Daily care and rehabilitation of the disabled child are stressors. Research suggests that mothers are more frequently subjected to stress, because they play the role of care - educational, as well as pay attention to the reactions of others to their child, which indicated (47 subjects). **Conclusion:** Rehabilitation is of great importance in the development of a disabled child in his convalescence. The study shows that 53% of surveyed children have rehabilitation. Parents care in this way about the baby's health, but also learn the correct mutual relationship.

798

ULTRASOUND MEASUREMENT OF SOFT TISSUE THICKNESS AND COMPLIANCE IN PATIENTS WITH BREAST CANCER-RELATED LYMPHEDEMA

C. Basoglu¹, M. Corum¹, S. Esmailzadeh¹, A. Oral¹, D. Sindel¹

¹Istanbul Faculty of Medicine- Istanbul University, Department of Physical Medicine and Rehabilitation, Istanbul, Turkey

Introduction/Background: Breast cancer-related lymphedema (BCRL) is a disorder resulting from an abnormal accumulation of fluid in the interstitial space due to impairment in lymph flow. Besides the accumulation of fluid, histological changes are observed in BCRL. The aim of this study was to examine soft tissue characteristics at the lymphedematous limb using ultrasonography in patients with BCRL. **Material and Methods:** 40 patients who had undergone breast cancer surgery and who were suffering from subsequent lymphedema were recruited from the physical medicine and rehabilitation outpatient clinics in a university hospital providing BCRL rehabilitation. Skin thickness and thickness of the subcutaneous tissue as well as compliance were measured in both affected and unaffected upper extremities at two points, one being 10 cm proximal (along the line between the bicipital groove and the midpoint of the lateral and medial epicondyles) and the other being 10 cm distal (along the line between the midpoint of ulnar styloid process and radial styloid process and the midpoint of lateral and medial epicondyles) to the elbow crease. **Results:** In the affected upper limb, the thickness of the skin and subcutaneous tissue was significantly related to the stage and time since the onset of lymphedema ($p < 0.05$). Additionally, compliance of soft tissue was reduced while lymphedema stage and duration increased ($p < 0.05$). **Conclusion:** In this small sample of individuals with BCRL, we were able to demonstrate the thickness of soft tissue and reduced compliance at the lymphedematous limb with ultrasonography. Ultrasonography may be a useful tool for examining the soft tissue in patients with BCRL with additional advantages of showing histological changes which cannot be assessed by arm circumference measurement alone.

799

RECOVERY FROM TUBE FEEDING WITH INTENSIVE REHABILITATION IN CONVALESCENT REHABILITATION WARD

K. Sugihara¹

¹Hiroshima City Rehabilitation Hospital, Rehabilitation, Hiroshima-shi, Japan

Introduction/Background: In convalescent (recovery stage) rehabilitation ward of Japan, patients can receive rehabilitation including physical, occupational, and speech therapy for 3 hours every day within 3~5months by health insurance. We retrospectively investigated the change of the swallowing function in dysphagic patients who need tube feeding at admission. **Material and Methods:** We reviewed the records of dysphagic patients who admitted to convalescent rehabilitation ward of Hiroshima City Rehabilitation Hospital from emergency hospital between Apr 2012 and Mar 2015. During hospital stay, dysphagic patients received swallowing training every day by ST and nurse, and evaluated with videofluoroscopic examination every month. **Results:** Totally 1,218 patients admitted, and who needed nasal tube feeding were 31, and gastric were 62. Male 50, female 25, average age 66.9±17.3 years old. Primary disease was stroke (50.5%), neuromuscular disease (10.8%). Until discharge, 17patients of nasal tube-feeding (54.8%) and 14 of gastric tube-feeding (22.6%) were able to meet nutrition needs by only oral intake. And about 80% of them could go back their home. but 67% of tube feeding patients go nursing home. Average tube feeding period were 90.8 and 114 days respectively but there was no significant differences. **Conclusion:** On average, 32.3% tube feeding patients on admission could recover by only oral intake with intensive rehabilitation in convalescent rehabilitation ward.

800

CONTRALATERAL LOWER LIMB STABILIZATION INFLUENCES HIP ABDUCTOR MUSCLE STRENGTH MEASURED BY HAND-HELD DYNAMOMETER

H. Tanikawa¹, M. Mukaino², F. Matsuda¹, K. Inagaki³, Y. Kotsuji³, K. Ohtsuka¹, H. Kagaya², E. Saitoh², Y. Kanada¹

¹Fujita Health University, Faculty of Rehabilitation- School of Health Sciences, Toyoake-Aichi, Japan, ²Fujita Health University, Department of Rehabilitation Medicine I- School of Medicine, Toyoake-Aichi, Japan, ³Fujita Health University Hospital, Department of Rehabilitation, Toyoake-Aichi, Japan

Introduction/Background: In hemiplegic patients after stroke, hip abductor muscle strength is an important indicator of walking ability to predict recovery potential. Although many earlier investigations employed a hand-held dynamometer (HHD) to measure muscle strength quantitatively, there is no standardized method to measure hip abductor muscle strength. The purpose of this study was to investigate the influence of contralateral lower limb muscle function on hip abductor muscle strength using an HHD. **Material and Methods:** Thirty healthy subjects and 59 hemiplegic patients participated in this study. Their hip abductor muscle strength was measured in the supine position with or without stabilization of the contralateral lower limb (stabilizing method-vs-non-stabilizing method, respectively). Strength as measured by both methods was compared on each side for the lower limb and correlation coefficients for the two methods were calculated. In addition, correlation coefficients between measurements of strength by the two methods on both sides were calculated. In the hemiplegic patients, multiple regression analysis was performed using the strength on the affected side as the dependent variable, and the strength on the unaffected side and the degree of paralysis as independent variables. **Results:** Strength measured using the stabilizing method was significantly lower than when using the non-stabilizing method. The correlation between strength on both sides was high in healthy subjects despite contralateral lower limb stabilization, but low in hemiplegic patients when using the non-stabilizing method. The strength of the affected side was strongly influenced by the unaffected lower limb function in measurements using the stabilizing method. **Conclusion:** Measurements of hip abduction strength made using the stabilizing method do not reflect the strength correctly because they are influenced by contralateral lower limb function.

801

THE EFFECT OF THE APPLICATION OF BELT ELECTRODE TO THE STROKE PATIENTS FOR NEUROMUSCULAR ELECTRICAL STIMULATION: A PILOT STUDY

G. Tanino¹, K. Tomida², A. Suzuki², M. Ando², I. Watanabe², J. Tanabe², A. Orand¹, K. Takeda¹, S. Okamoto³, S. Sonoda³

¹Fujita Memorial Nanakuri Institute- Fujita Health University, Division of Rehabilitation, Tsu, Japan, ²Fujita Health University Nanakuri Sanatorium, Department of Rehabilitation, Tsu, Japan, ³Fujita Health University- School of Medicine, Department of Rehabilitation Medicine II, Tsu, Japan

Introduction/Background: In the rehabilitation of stroke patients, while the amelioration of the paretic side is important, strengthening the weakened non-paretic side is also crucial. While neuromuscular electrical stimulation (NMES) applications to specific muscles are reported in a large number of researches, it is not suitable for severe stroke patients. Therefore, we applied NMES to the whole bodily parts of paretic and non-paretic lower limbs and investigated NMES effect. **Material and Methods:** Ten first stroke hemiplegic patients were recruited from comprehensive inpatient rehabilitation ward with an age mean and standard deviation of 56±18. The mean and

standard deviation of the onset of the stroke to the intervention were 73±22. The intervention was the daily application of NMES for 20 minutes for 4 weeks (28 times) to both of the paretic and non-paretic lower limbs. To each lower limb, 3 belt electrodes were applied to the proximal and distal portions of the thigh, and to the area just above the ankle. Two assessments were made at the beginning and after 4 weeks. Thirty deg/sec isokinetic knee extensions assessment method was used for non-paretic lower limb evaluation. For the paretic lower limb functional assessment, the total points of hip-flexion, knee-extension, and foot-pad tests of stroke impairment assessment set (SIAS) and total points motor item of Functional Independence Measure (FIM) were used. **Results:** At the beginning and after 4 weeks of intervention assessments results of non-affected lower limb's torque changed from 84±45 Nm to 102±47 Nm ($p<0.05$), SIAS lower limb's total points changed from 3.1±2.9 to 4.8±2.9 ($p<0.05$), and FIM motor items total points changed from 48±19 to 59±18 ($p<0.01$). **Conclusion:** Four weeks of intervention improved the non-paretic lower limb's muscle strength, and paretic limb's function and ADL. This might suggest the positive effect of belt-shape electrodes of NMES for the rehabilitation of the hemiplegic.

802

USEFULNESS OF ULTRASONOGRAPHY OF THE SUPRAHYOID MUSCLES DURING SWALLOWING

A. Tsubahara¹, S. Shimizu², K. Hanayama², T. Hiraoka², H. Abe², T. Sugiyama², H. Metani², S. Seki²

¹Kawasaski University of Medical Welfare, Rehabilitation, Kurashiki, Japan, ²Kawasaki Medical School, Rehabilitation Medicine, Kurashiki, Japan

Introduction/Background: New development of convenient and noninvasive evaluation methods are required to predict functional recovery in patients with dysphagia, although videofluorography is known to be the standard evaluation. Recently, ultrasonography of the suprahyoid muscles has been introduced to be a noninvasive method for assessment of swallowing function. We have already reported that intra-rater reliability of some parameters increased by fixation of the neck and head using a pillow attached to the backrest. The present study aimed to prove interrater reliability of several parameters related to function of the suprahyoid muscles during swallow using ultrasound. **Material and Methods:** Ten healthy volunteers participated in this study. Each participant deeply seated on a chair with a pillow attached to the backrest for fixation of the neck and head. A 3.5 MHz ultrasound probe was placed under the jaw in the midsagittal plane for measurement of the hyoid bone, mandible and geniohyoid muscle. Three examiners recorded ultrasound images three times for each measurement before and during swallowing 3 ml jelly. The same procedure was repeated to the same participants 7 days after. Muscle length (mm), area (mm²) and contraction ratio (%) of the geniohyoid were calculated from the recorded ultrasound images by an examiner. Correlation coefficients were evaluated for mean values of these parameters as inter-rater reliability as well as intra-rater reliability in each examiner. **Results:** Although the intra-rater reliability for each parameter was significantly high as a whole, correlation coefficients were relatively low in the examiner-3. While the inter-rater reliability between the examiner-1 and examiner-2 was high, the one between examiner-1 and examiner-3 was relatively low. **Conclusion:** The parameters of contractility in the geniohyoid muscle were indicated to have high reproducibility. Ultrasonography of the suprahyoid muscles has the possibility of becoming useful method for clinical application through repeated practice.

803

EFFECT OF SURFACE ANESTHESIA ON ASSISTED BALLOON DILATATION TO TREAT DYSPHAGIA OF NASOPHARYNGEAL CARCINOMA

H. Zhou¹, P. Zhang¹, L. Chen¹, P. Liang¹, J. Liu¹, Z. Guan¹

¹The First People's Hospital of Foshan, Department of Rehabilitation Medicine, Foshan, China

Introduction/Background: To investigate assisted balloon dilatation with surface anesthesia to treat nasopharyngeal carcinoma after radiotherapy which leads to benign stricture of cricopharyngeus and dysphagia. **Material and Methods:** 54 dysphagia patients were selected after radiotherapy for nasopharyngeal carcinoma and randomly divided into anesthesia group and non-anesthesia group (without surface anesthesia group), anesthesia group received anesthetics before treatment while non anesthesia group received treatment without anesthetics. All patients were treated with low frequency electric stimulation and assisted balloon dilatation for 3 weeks. All of them were assessed by videofluoroscopic swallowing study and conscious of difficulty swallowing pre and post treatment. **Results:** Pharyngeal delay time and cricopharyngeal opening of both groups were improved after treatment ($p < 0.01$), Laryngeal elevation and forward were widely increased ($p < 0.01$), conscious of difficulty swallowing and invalid swallowing as well as the aspiration rate were decreased ($p < 0.05$) which data showed non anesthesia group improved better than anesthesia group ($p < 0.01$). Among them there was a significant decrease ($p < 0.01$) of the aspiration rate in the non-anesthesia group before the treatment (57.1%) and after the treatment (3.6%). Improvement rate of non-anesthesia group (89.3%) was higher than the anesthesia group (61.5%) ($p < 0.05$). **Conclusion:** Balloon dilatation combined with low frequency electric stimulation therapy will have synergistic effect and they can improve patients' swallowing function after radiation induced cranial nerve damage, thus improve the survival quality of patients. And assisted balloon dilatation without anesthesia had better effect than that of surface anesthesia.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: SPORTS IN REHABILITATION AND SPORTS REHABILITATION

804

SPORT CLINIC FOR DISABLED SPORTS ATHLETES - PILOT STUDY

S.F. Hsieh¹

¹Mackay Memorial Hospital, Physical Medicine and Rehabilitation, Taipei, Taiwan

Introduction/Background: Sport for people with disabilities is an important measure for both rehabilitation and participation. The number of disabled athletes is growing. However, their sport injuries and musculoskeletal injuries are not understood. **Material and Methods:** We set up a special clinic for disabled sports athletes in a tertiary hospital in Taipei Taiwan. This clinic was run on one Saturday each month from Aug to Dec 2015. This clinic is organized by a rehabilitation specialist with international classification experience, one resident, one nurse, and equipped with radiography, musculoskeletal ultrasonography and other imaging modalities if required. **Results:** Thirteen national and international level athletes were evaluated. The average age is 46.7 year old. Among these 8 male and 5 female athletes, 7 of them are table tennis athletes, 3 specialize in para-badminton, 1 in wheelchair dance, 1 in archery and 1 in athletics. Nine of the 13 players have polio, 2 with spinal cord lesion, 1 with lower limb trauma and 1 with achondroplasia. Most patients reported more than 2 active musculoskeletal problems. Noteworthy was that many of them reported multiple experiences of office visits in clinics and treatment failures. Shoulder pain and elbow pain were top two complaints. Other common complaints were hand numbness, hip pain, upper back pain and low back pain. **Conclusion:** This retrospective pilot study of the patients visiting the sport clinic for disabled athletes will help further improving this special clinic. Also, these preliminary information will

help building a cohort for this population which has heavy health needs and high risk of musculoskeletal injuries.

805

ULTRASOUND-GUIDED CUTANEOUS NERVE HYDRODISSECTION AND CORTICOSTEROID INJECTION AS ADJUNCT TREATMENT FOR CHRONIC ANTERIOR KNEE PAIN: A CASE REPORT

J.M. Lleva¹, C. Gonzalez-Suarez¹

¹University of Santo Tomas Hospital, Physical Medicine and Rehabilitation, Manila, Philippines

Introduction/Background: In the literature, there is no clear consensus regarding terminology and etiology for pain in the anterior aspect of the knee. Knee pain has a high prevalence in athletes and may cause a major impact on their careers. However, based on the present literature, it may not be possible to decide what is the most appropriate and effective treatment for chronic anterior knee pain. We have selected the case of an athlete who underwent a new technique to treat his chronic anterior knee pain and to assess its efficacy in reducing pain scores. **Material and Methods:** A retrospective inpatient and out-patient chart review was conducted and interviews of the patient and physicians (orthopedic surgeon, anesthesiologist, and sonologist) present during the procedure was conducted to validate and supplement the information obtained from the chart review. Pain scores were graded retrospectively by recall of pre-interventional pain and post-interventional pain. **Results:** This study described an ultrasound-guided, percutaneous technique that utilized hydrodissection with D5W (dextrose 5% in water) to perform an external neuroplasty of the sensory branches of the lateral femoral cutaneous nerve and saphenous nerve to the knee, along with corticosteroid injection to the anterior knee. This procedure resulted in immediate and intermediate relief of pain associated with severe, chronic anterior knee pain. **Conclusion:** This procedure may potentially represent an alternate treatment for patients not responding to conservative treatment measures or in patients with contraindications or partial contraindications to surgical neurolysis.

806

IDENTIFYING RISK FACTORS FOR INJURIES IN UNIVERSITY RUGBY PLAYERS

R. Mirsafaei Rizi¹, E.W. Yeung¹, S.S. Yeung¹, N. Stewart²

¹The Hong Kong Polytechnic University, Rehabilitation Sciences, Kowloon, Hong Kong- China, ²Hong Kong Rugby Football Union, Hong Kong Rugby Football Union, Hong Kong, Hong Kong- China

Introduction/Background: Rugby is a demanding game with many physical collisions and tackles potentially leading to musculoskeletal injuries. Because of the nature of the sports, rugby not only requires a range of individual skills but also well-developed fitness. The role of physical fitness in the risk of rugby-related injury is not well known. The purpose of this prospective cohort study was to determine the influence of physical fitness as risk factors for injuries, taking exposure time into account. **Material and Methods:** Rugby players from 3 Hong Kong universities ($n=84$; 75M:9F; 20.6 ± 1.1 years) were recruited at the beginning of the season 2014/15. Players were asked to complete a questionnaire relating to demographic characteristics, playing experience and history of previous injuries. The players then underwent pre-season assessment of physical fitness including power, strength, speed, agility, endurance, stability and flexibility. Any rugby-related injuries sustained during the season were reported online. At the end of the season, independent variables were selected and analysed using Cox proportional hazards regression to identify predictors of injury. **Results:** The injury incidence was 47.08/1000 match hours and 3.59/1,000 training hours. A majority of injuries (70%) occurred in the first 35 hours of exposure. Most injuries (30.4%) were severe and 78.4% of injuries were caused by contact. Ankle joint was the most

prevalent injury site and the ligamentous injury was most common (39.1%). Cox regression revealed that history of previous injury (HR=2.86, 95%CI=1.0–7.6), gender (HR=4.09, 95%CI=1.4–11.9) and hip flexors tightness (HR=1.10, 95%CI=1.0–1.2) were significant predictors of injury. *Conclusion:* Players with previous injury history and female players are at a greater risk for rugby-related injuries in university players. The transition from off-season training to increase in training volume may need careful consideration to prevent injuries. *Acknowledgments:* The authors thank the Hong Kong Rugby Football Union and players from the 3 university rugby teams.

807

SPORT INJURY RISK FACTORS OF LOWER EXTREMITY IN ADOLESCENCE ATHLETES AT SENIOR HIGH SCHOOL OF SPORT AT SIDOARJO - EAST JAVA PROVINCE - INDONESIA

D. Tinduh¹, I.P. Alit Pawana¹, D. Novembri Utomo²

¹School of Medicine Airlangga University, Physical Medicine and Rehabilitation, Surabaya, Indonesia, ²School of Medicine Airlangga University, Orthopaedic and Traumatology, Surabaya, Indonesia

Introduction/Background: Sport injury is a consequence of sport activity, and can occur acutely or chronically. It affects the sport performance, absence from training sessions or games and reduce quality of life. Risk factor of sport injury of lower extremity can be classified as intrinsic risk, exposure to extrinsic risk and inciting event factors. Intrinsic risk factors will lead to the predisposed athlete, exposure to extrinsic risk factors make the susceptible athlete and inciting event factors will trigger injured athlete. Prevention of sport injury in adolescence athletes is emerged because it has significant impact to athletes performance. At very early phase, the identification of intrinsic risk factors is very important. *Material and Methods:* This cross sectional design study enrolled 65 adolescence athletes from senior high school of Sport consecutively. They were evaluated for intrinsic risk factors of lower extremity injury, consists of type of sport, age, gender, body composition, injury event, lumbar mobility, quadriceps angle, star excursion balance test (SEBT), and landing task. The correlation of variables has been analysed and set in a logic sequence. Type of sport were classified from most high contact/impact to less high contact/impact. *Results:* Type of sport was correlated negatively to lumbar mobility ($r=-0.250$; $p=0.044$), non weight bearing quadriceps angle ($r=-0.342$; $p=0.005$) and injury event ($r=-0.326$; $p=0.008$). Lumbar mobility was correlated positively to non weight bearing quadriceps angle ($r=0.337$; $p=0.006$), landing task ($r=0.343$; $p=0.005$) and posteromedial reach distance of SEBT ($r=0.258$; $p=0.038$). Landing task was correlated positively to non weight bearing quadriceps angle ($r=0.290$; $p=0.019$) and negatively to anterior reach distance of SEBT ($r=-0.268$; $p=0.031$). Injury event was correlated positively to posterolateral reach distance of SEBT ($r=0.300$; $p=0.015$). *Conclusion:* Non weight bearing quadriceps angle is an important intrinsic risk of sport injury of lower extremity.

808

PRIMARY PREVENTION FOR RISK FACTORS OF ISCHEMIC STROKE WITH BADUANJIN EXERCISE INTERVENTION IN THE COMMUNITY ELDER POPULATION: A RANDOMIZED CONTROLLED TRIAL

G. Zheng¹, Q. Fang¹, B. Chen¹, H. Yi², Q. Lin², J. Tao¹, L. Chen¹

¹Fujian University of Traditional Chinese Medicine, College of Rehabilitation Medicine, Fuzhou, China, ²Fujian University of Traditional Chinese Medicine, Department of Physical Education, Fuzhou, China

Introduction/Background: Controlling risk factors by regular exercise is effective and cost-effective for primary prevention of ischemic stroke. As a traditional Chinese Qigong, Baduanjin exercise may be beneficial to decrease risk of the ischemic stroke, but the evidence is still insufficient. The aim of this trial is systematically evaluate the protective effects of Baduanjin exercise on ischemic stroke risk in the community elder population with high risk factors. *Material and Methods:* A total of 170 eligible participants were randomly allocated into the Baduanjin exercise and control group (usual physical activity group) in a 1:1 ratio. Participants in the Baduanjin group accepted a 12-week Baduanjin exercise training with a frequency of 5 days per week and 60 minutes one day, while those in the control group maintained their original physical activity. Primary and secondary outcomes including cerebral hemodynamic parameters, cardiopulmonary function, plasma risk indexes, physical parameters, or psychological variables were measured at baseline, after 12-week intervention and additional 12-week follow up period. *Results:* Comparing to usual physical activity group, participants in Baduanjin group were observed significantly low hemodynamic parameters of left vertebral artery and basilar artery, blood pressure, heart rate, waist circumference, hip circumference, waist-to-hip ratio, Pittsburgh sleep quality index score and mood state scale (POMS) at post-12-week intervention or additional 12-week follow-up period but no significant difference on cardiac structure, cardiac function, static pulmonary function parameters and blood lipid levels. *Conclusion:* Regular Baduanjin exercise may be benefit to improving cerebral hemodynamic parameters, blood pressure, sleep and mood in community elder adults with risk factors of ischemic stroke. Trial registration: Chinese Clinical Trial Registry: ChiCTR-TRC-13003588. *Acknowledgements:* This study is supported by the Program for Fujian Provincial Health and Family Planning Commission (2014-ZQN-ZD-27), Fujian University of Traditional Chinese Medicine (X2012002-Xietong).

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: SOCIAL INTEGRATION PROGRAMMES AND REHABILITATION FOR SPECIFIC - COMMUNITY BASED REHABILITATION

809

DEPRESSION IN PARENTS OF CHILDREN WITH DISABILITIES - EVALUATION OF DISORDERS ON THE BASIS OF THEIR OWN

M. Hagner -Derengowska¹, J. Siminska², K. Pietkun², K. Ogurkowski², I. Glowacka², K. Nowacka², W. Hagner²

¹Nicolaus Copernicus University, Department of Clinical Neuropsychology, Bydgoszcz, Poland, ²Nicolaus Copernicus University, Department of Rehabilitation, Bydgoszcz, Poland

Introduction/Background: Raising a child with a disability reduces fulfillment parents, which contributes to a reduction in the quality of life of caregivers. At a time when parents find out about the birth of a disabled child, they can not imagine how to deal with such a problem. When starting a continuous rehabilitation of the child and the daily struggles with the disease, some parents may appear depressive disorders. *Material and Methods:* To study included 57 parents of children with disabilities. Responses were obtained from both the marriage and of single parents. Respondents gave basic information in order to verify the gender, age, gender, age, and children information in order to investigate whether these factors are correlated with each other, and ultimately check the level of significance associated with the emergence of depressive disorders. *Results:* The studies that women are weaker than men emotionally. The results showed that among the families surveyed more frequent in girls with disabilities. The results indicate that the resident has a significant effect on depres-

sive disorders, it is concluded that increased disability greater the problems which is associated with elevated risk of cardiac depression. The results of the survey show that in the study group, 40% of respondents appeared moderate depression and, in 30% of the respondents have depression mild and 21% severe form of depression. *Conclusion:* Parents of disabled children are struggling with problems such as stress, financial problems, health problems. Frequently deterioration in the relationship between parents deteriorating since the emergence of a disabled child. Parents of disabled children often are exposed to the presence of depression at a moderate level.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: SOCIAL INTEGRATION PROGRAMMES AND REHABILITATION FOR SPECIFIC - VOCATIONAL REHABILITATION

810

PERSONALIZED RECREATIONAL THERAPY FOR DISABLED DEMENTIA PATIENTS - EXPERIENCES OF A COMMUNITY-HOSPITAL-BASED DAY CARE CENTER IN TAIPEI, TAIWAN

C.Y. Lin^{1,2,3}, W.K. Chung⁴, K.H. Chang⁵

¹Yangming Branch- Taipei City Hospital, Department of Neurology- Department of Education and Research, Taipei, Taiwan, ²National Taipei University of Nursing and Health, Department of Health Care Management, Taipei, Taiwan, ³National Yang-Ming University, Institute of Health and Welfare, Taipei, Taiwan, ⁴Wan Fang Hospital - Taipei Medical University, Department of Neurosurgery- Department of Physical Medicine and Rehabilitation, Taipei, Taiwan, ⁵Wan Fang Hospital - Taipei Medical University, Department of Physical Medicine and Rehabilitation, Taipei, Taiwan

Introduction/Background: Issues related to aging is a great concern in Taiwan. Aging population comprised 12% of the population in 2014, will hit 14% in 2018 and 20% in 2025, making Taiwan a super-aged country. The government is making efforts to provide the elderly with adequate provisions, reduce the burden on caretakers and spur development of sectors catering to the specific needs of this population group. As a government-owned community hospital, our day care center is the first institution providing recreational therapy for disabled dementia patients in Taiwan. *Material and Methods:* In the day care center of Yangming Branch, Taipei City Hospital, Taiwan, we arrange recreational therapy programs to stimulate cognitive functions, gross and fine motor function, and equilibrium. For our 19 patients, mainly females, personalized programs are provided for 40 minutes per session, 3 sections per day, and 5 days a week. The patients experience different programs every month in a cycle of 24 months. *Results:* Through therapy, most of the patients have lessened the behavioral and psychological symptoms of dementia by markedly decrease the use of antidepressant and hypnotic medications and maintained the functional reservoir for independence. Moreover, caregivers burden also has decreased significantly. *Conclusion:* Day care center of Yangming Branch, Taipei City Hospital, Taiwan, a government-owned community hospital, is the first institution providing recreational therapy for disabled dementia patients in Taiwan. According to our experiences, recreational therapy can help disabled dementia patients improve or maintain their functional and psychological status. Moreover, care givers burden decreases significantly. The authors believe that the programs can apply not only to hospital-based day care center, but also in non-hospital-based day care centers. More patients and their caregivers can benefit from recreational therapy. Dr. Lin and Dr. Chung have equal contribution to this poster.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: SOCIAL INTEGRATION PROGRAMMES AND REHABILITATION FOR SPECIFIC - SUPPORT, ASSISTANCE AND INDEPENDENT LIVING

811

LIFE SKILLS TRAINING FOR ADOLESCENT REFUGEES FROM SOUTHEAST ASIA

F. Kuo¹, K.L. VanKoeveering²

¹Suzhou, China, ²Indiana University, School of Health and Rehabilitation Sciences, Indianapolis, USA

Introduction/Background: Refugees often face trauma, separation, and difficulty with acquisition of the host culture that may influence their self-efficacy. Community-based programs can be an appropriate approach to address developmental needs of youth refugees. *Material and Methods:* Participants. 27 students participated in the life skills training program ($n=27$, mean age =17.33, 70.4% female). Design. This was a mixed methods design study. Wilcoxon Signed Rank test or paired samples t test were used to compare pre and post training outcomes. Measures included: Generalized Self-Efficacy Scale; Seattle Social Development and Rochester Youth Development; Attitude Toward Conflict; Denver Youth Survey; Program Feedback Form; and qualitative feedback through curricular addendums, reflective notes and participants feedback. *Intervention.* Participants engaged in ten one-hour group training, incorporating Bandura's Self-Efficacy theory and the logic model process. The Program included five modules: attitude, responsibility, communication, problem solving and college or job preparations. *Results:* Descriptive and inferential statistics were conducted on the six assessment tools completed prior to and following each of the appropriate training modules. Scoring improved for all measures. The Program Feedback Form indicated the life skills training has a significant effect on student's English skills ($t=7.51$, 95% CI=1.628-2.943, $p=0.001$), knowledge ($t=4.89$, 95% CI=1.396-3.604, $p=0.001$) and self-perceived ability to prepare for college. The life skills training demonstrated potential for improving the skills development of self-efficacy and college preparation for participants. Qualitative thematic analysis revealed students' values in education, religious activities, relationships, future aspirations, helping others, and volunteerism within a variety of contexts. *Conclusion:* Adolescent refugees often face with obstacles and new opportunities during the resettlement. Due to cultural differences, these opportunities may be perceived as a struggle. The findings suggest the importance of skills training for adolescent refugees by building their capacities.

CLINICAL PHYSICAL AND REHABILITATION MEDICINE SCIENCES: MISCELLANEOUS

812

LONG TERM OUTCOMES IN DIABETIC CHARCOT FOOT

N. Abdul Rahman¹, A. Ahmad Fauzi², T.Y. Chung², L. Abdul Latif³

¹Petaling Jaya, Malaysia, ²University Malaya, Rehabilitation Medicine, Kuala Lumpur, Malaysia, ³University Malaya, Rehabilitation Medicine Department, Kuala Lumpur, Malaysia

Introduction/Background: Diabetic Charcot foot can cause gross structural deformities of the foot and ankle, and subsequent skin ulceration and lower limb amputation. The main objective of this study is to explore complications of diabetic charcot foot in particular mortality, amputation, foot surgery and foot ulcer. *Material and*

Methods: This is a retrospective cohort study. Data from diabetic patients diagnosed with Charcot foot at the Diabetic Foot Care and Wound Management Clinic, University of Malaya Medical Centre (UMMC) were from 2001–2014. It was retrieved retrospectively for medical background, previous treatments for diabetes and Charcot foot as well as outcomes. Kaplan Meier survival analysis was used to analysed survival period for mortality and amputation. Multiple logistic regression analysis was done to measure associated factors related to Charcot foot complication outcomes. **Results:** The mortality rate during the follow-up period was 15.3% ($n=15/98$). The mean survival time based on Kaplan- Maier Survival Analysis is 44.8 months (± 5.5). The remaining 83 alive sample population (84.7%) were analysed. 45.8% ($n=38$) had history of amputation. Recurrent ulcers (OR 8.5, 95% CI 1.8–39.1), presence of ischaemic heart disease (OR 5.2, 95% CI 1.4–19.2) and chronic Charcot at diagnosis (OR 3.9, 95% CI 1.1–13.0) have higher predilection to subsequent amputation. 75.9% ($N=63$) had recurrent ulcer and 53% ($n=44$) had foot surgery. Results have shown that patients with ulcer during diagnosis have 4 times likelihood to develop recurrent ulcer and patients with recurrent ulcer have 3 times likelihood to have foot surgery (excluding amputation). **Conclusion:** Recurrent ulcer in Charcot foot patients has high predilection towards limb amputation and foot surgery. Further exploration on risk factors associated with recurrent ulceration by specifically looking into foot and gait abnormalities, and footwear post charcot will be valuable to improve rehabilitation management in this group of patients.

813

EPIDEMIOLOGY OF SPINAL CORD INJURIES IN MALAYSIA TERTIARY REHABILITATION CENTER

N.B. Ahmad Kasah¹

¹Hospital Rehabilitasi Cheras, Rehabilitation Medicine, Cheras, Malaysia

Introduction/Background: Hospital Rehabilitasi Cheras (HRC) is the first rehabilitation hospital in Malaysia. Being a tertiary and also the only rehabilitation hospital in Malaysia, HRC has received referrals from all states in Malaysia for intensive spinal rehabilitation program or other specialised rehabilitation programs that are offered by this centre. Hence, epidemiology data on spinal cord injured patients that was analysed in this study should represent the data for the whole country of Malaysia. **Material and Methods:** Data on all new patients admitted to Spinal Rehabilitation Ward in HRC from Aug 2014 until Nov 2015 was collected from the registry book and hospital records. Analysis was done on the incidence, age, gender and level of injury. **Results:** From Aug 2014 until Nov 2015 a total of 109 new patients were admitted to Spinal Rehabilitation Ward, HRC. 79 (72.5%) of them are male and 30 (27.5%) are female. Age group of the studied population are as shown in the table 1. 28 patients (25.7%) sustained complete spinal cord injury (AIS A) while the other 81 patients (74.3%) has incomplete injuries (AIS B, C or D). For the aetiology of injuries, the result is as shown in table 2. **Conclusion:** Data gained in this study will provide useful information to guide future studies on spinal cord injury especially on changing of epidemiology pattern, aetiology and level of injuries. It may also of benefits for efficient resource allocation for the rehabilitation management of spinal cord injured patients in Malaysia.

Table 1:

Age group	Cases, n (%)
<19 years	5 (4.6%)
20–39 years	46 (42.2%)
40–59 years	34 (31.2%)
60–79 years	23 (21.1%)
> 80 years	1 (0.9%)

Table 2:

Aetiology	Cases, n (%)
Transport	43 (39.4%)
Non traumatic causes	40 (36.7%)
Fall	22 (20.2%)
Assault	2 (0.2%)
Other traumatic causes	1 (0.9%)
Unknown cause	1 (0.9%)

814

ATTITUDE, BELIEFS AND KNOWLEDGE OF IRANIAN PHYSIATRIST TOWARD EVIDENCE BASED MEDICINE AND IT'S BARRIERS. A CROSS-SECTIONAL STUDY

S.A. Raeissadat¹, M.H. Bahrami², S.M. Rayegani², M. Babae³, M. Moridnia⁴

¹Shahid Beheshti University of Medical Sciences, Clinical Research Development Center of Shahid Modarres Hospital and Physical Medicine and Rehabilitation Research Center, Tehran, Iran, ²Shahid Beheshti University of Medical Sciences, Physical Medicine and Rehabilitation Research Center, Tehran, Iran, ³Arak University of Medical Sciences, Physical and Rehabilitation Medicine -Vali-Asr Hospital, Tehran, Iran, ⁴Shahid Beheshti University of Medical Sciences, Clinical Research Development Center of Shahid Modarres Hospital, Tehran, Iran

Introduction/Background: Evidence-based medicine (EBM) is a new philosophy which tries to lead clinical services to effective and advantageous ways with the least side effects and errors. Different studies have been performed in medical and paramedical fields about individuals' EBM attitudes. To date, few articles are available about specialists' EBM status, specifically physiatrists' status in the area of EBM. In this study, besides evaluating the present status of physiatrists' attitudes, knowledge and skill in the area of EBM and the existing obstacles, we provide necessary issues for further studies. **Material and Methods:** This cross sectional study was performed in 2014 among Iranian physiatrist in the annual congress of Iranian P&RM as well as monthly meetings of the society. Evaluation of Iranian physiatrists' attitudes, knowledge and skill in the area of EBM and the existing obstacles was performed by valid and reliable questionnaire. **Results:** 128 questionnaires were fulfilled (response percentage 52.2%). Respondents mainly had a positive point of view towards EBM. Members of faculty and those who had attended EBM workshops also had more positive attitudes ($p=0.01$ and $p=0.003$, respectively). About 70% of responders had acceptable knowledge about EBM. Members of faculty, participants who had attended workshops and physicians who spent more time on research and article review had more knowledge ($p=0.001$). The 3 most common sources used for research were PubMed, Google scholar and Cochrane, respectively. About the sources used in clinical practice, the most common source used was reference books (86.5%). 3 major obstacles were recognized: Lack of knowledge about principles, advantages and applications of EBM, difficulty with getting access to associated databases and lack of sufficient activity in judging and analyzing related articles. **Conclusion:** Our study showed that although significant percentages of physiatrists are familiar with EBM usefulness, they are not familiar enough with its concepts and applications.

815

CATEGORIZING ACUTE REHABILITATION HOSPITAL READMISSIONS

K. Feeko¹, J. Melvin¹

¹Thomas Jefferson University, Rehabilitation Medicine, Philadelphia, USA

Introduction/Background: Hospital readmissions have been identified via The Affordable Care Act as indicators of poor health care quality and sources of unnecessary expenses. CMS identifies readmissions as being from any cause and within 30 days after discharge from a hospital. As a result, the Center for Medicare and Medicaid Services (CMS) has developed a system to penalize hospitals for their readmissions through levying fines. Readmission to acute hospitals after rehabilitation hospital stays present complexities beyond usual acute hospital discharges where readmission can occur either directly from a rehabilitation hospital or after discharge from rehabilitation to the community. **Material and Methods:** The authors reviewed a sample of 220 discharges from

Thomas Jefferson University Hospital rehabilitation unit readmitted to TJUH acute beds. The readmissions occurred from 01/2014 to 06/2015. Readmissions were categorized as: (1) from the rehabilitation hospital to the acute hospital or (2) from the community to the acute care hospital. Secondary analysis classified the cases into categories to provide meaningful information to implement policies to minimize readmissions. These categories are (1) incomplete management, (2) recurrences, and (3) development of new conditions. *Results*: Total readmissions: 62. Readmissions directly from rehabilitation hospital: 49 (79%). Cases with new conditions: 36 (73%). Cases with incomplete care or recurrences: 13 (27%). Readmissions directly from the community: 13 (21%). Cases with new conditions: (54%). Cases with incomplete care or recurrences: 6 (46%). *Conclusion*: (1) Most of the cases were readmitted to acute hospitals before completion of their rehabilitation hospital admissions. (2) Relatively few cases were readmitted to the acute hospital after a rehabilitation hospital discharge to the community and when readmission did occur, the majority of cases were due to the development of novel conditions.

816

RESEARCH STATUS ABOUT PLATELET RICH PLASMA APPLICATIONS AND ITS EFFECTS IN MUSCULOSKELETAL DISORDERS IN IRAN

S.A. Raeesadat¹, S.M. Rayegani², M. Babae^{3,3}, Z. Hashemi²

¹Physical Medicine and Rehabilitation Research Center of Shahid Beheshti University of Medical Sciences and Clinical Research Development Center of Shahid Modarres Hospital, Physical Medicine and Rehabilitation, Tehran, Iran, ²Physical Medicine and Rehabilitation Research Center of Shahid Beheshti University of Medical Sciences, Physical Medicine and Rehabilitation, Tehran, Iran, ³Arak University of Medical Sciences-Vali-Asr Hospital, Physical Medicine and Rehabilitation, Tehran, Iran

Introduction/Background: Trend to non surgical treatments in musculoskeletal disorders is growing up. Platelet rich plasma (PRP) applications and studies in Iran have been started about 15 years ago. The purpose of this study was to review literatures on PRP application in musculoskeletal disorders in Iran from 2000 and 2015. *Material and Methods*: A review of literatures in Google scholar, PubMed, SCOPUS, and Cochrane Central Register of Controlled Trials was performed by keywords including "platelet rich plasma" and "Iran". Besides, Persian translation of these keywords was used in searching of Iranian database including, Iranmedex, Irandoc and IRCT. Then studies which were related to musculoskeletal disorder were selected. *Results*: Of 137 studies 33 articles were related to musculoskeletal disorders including knee osteoarthritis, tendon repair, tennis elbow tendonitis, chondrogenesis and sciatic nerve injury. The first study was published in 2005. The studies peaked in 2015 when 14 literatures were published. About one third of the all studies were randomized clinical trial (10 from 33 articles). Most of articles were about knee osteoarthritis with 14 literatures. *Conclusion*: Application of PRP and relevant research in musculoskeletal disorders have been increased in recent years in Iran with special focus on knee osteoarthritis.

817

HEALTHY WORK ENVIRONMENT - A CHALLENGE?

P. Jansson von Vultée¹

¹Uppsala Universitet, Socialmedicin, Uppsala, Sweden

Introduction/Background: In Sweden, leave due to sickness was high during the 1990s. The Swedish Social Insurance Agency was able to decrease sick days in the period between 2000 and 2010 but sick days are rising again in Sweden, mostly due to psychological problems among women and partly due to their work environment. It is important to find methods to identify poor work settings

to prevent absenteeism due to sickness. The paper aims to discuss these issues. *Material and Methods*: The authors created a web questionnaire focusing on the organizational setting and its impact on employee wellbeing – reported as mental energy, work-related exhaustion and work satisfaction. The questionnaire measures good and poor work environment factors to help managers improve organizational settings. The questionnaire was validated qualitatively and quantitatively. *Results*: It is possible to measure individual wellbeing in an organizational context at an early stage. The authors followed a company undergoing organizational change and identified groups at risk of developing illness. *Conclusion*: Managers uncertain about employee mental status can measure employee wellbeing easily and cost effectively to prevent illness. The authors created a method, statistically evaluated, to proactively identify good and poor work Environments to promote healthy co-workers. Furthermore it is a plausible way to treat unhealthy work settings.

818

THE COMPONENT ANALYSIS OF TOE CLEARANCE IN THE HEMIPLEGIC GAIT

F. Matsuda¹, M. Mukaino², K. Ohtsuka¹, K. Tsuchiyama³, H. Kainuma⁴, M. Hidaka³, R. Sassa³, E. Saitoh², T. Teranishi¹, K. Yoshikiyo¹

¹Fujita Health University, School of Health Sciences, Toyoake, Japan, ²Fujita Health University, School of Medicine, Toyoake, Japan, ³Fujita Health University Hospital, Department of Rehabilitation, Toyoake, Japan, ⁴Fujita Health University Banbuntane Hotokukai Hospital, Department of Rehabilitation, Nagoya, Japan

Introduction/Background: Previous studies have shown that toe clearance during the swing phase affects the risk of tripping; this is considered a predominant cause of falls. In healthy subjects, toe clearance is obtained mainly by lower limb movements. However, in stroke patients, the compensatory movements are more important in obtaining toe clearance. The purpose of this preliminary study is to clarify the system of obtaining toe clearance in stroke patients in comparison to healthy subjects. This will be done by a component analysis of the toe clearance. *Material and Methods*: Thirteen patients with hemiparesis after a stroke and thirteen normal subjects participated in this study. A motion analysis system, the Kinema-Tracer® (Kissei Comtec, Nagano), was used for the kinematic analysis of the gait. The toe clearance is composed of the shortening of the hip-toe length (SHTL) (the distance from the hip to toe marker), hip hiking distance, foot elevation by circumduction, and the elevation of the pelvis by the unaffected limb. A Wilcoxon rank-sum test was conducted to find the difference between the patients with hemiparesis and normal subjects. *Results*: In the stroke patients, the toe clearance and the SHTL were significantly smaller than the healthy controls (3.6±1.6 cm vs 8.6±2.6 cm and -0.1±2.2 cm vs 8.5±2.7 cm, respectively). However, the hip hiking distance, foot elevation by circumduction, and the elevation of the pelvis by the unaffected limb were significantly greater (2.7±1.6 cm vs 0.6±0.8 cm, 0.2±0.3 cm vs -0.3±0.2 cm, and 1.1±2.1 cm vs -0.4±0.5 cm, respectively). *Conclusion*: In patients with hemiparesis, strategy for obtaining toe clearance was significantly changed in hemiparetic patients. SHTL reflecting the lower limb joint function was decreased, while the compensatory movements were increased. The component analysis of the toe clearance may help targeted rehabilitation to improve toe clearance and potentially reduce the risk of falls.

819

A SURVEY ON THE ATTITUDES OF PATIENTS AND THEIR FAMILIES TOWARDS INPATIENT REHABILITATION

K.M. Kwok¹, J. O'Riordan²

¹Singapore General Hospital, Rehabilitation Medicine, Singapore, Singapore, ²Changi General Hospital, Rehabilitation Medicine, Singapore, Singapore

Introduction/Background: There is a worldwide trend towards focusing on patient-centred goals when measuring rehabilitation outcomes, and the perceptions of patients and their caregivers towards the initial inpatient rehabilitation are critical in establishing clinically significant and relevant outcomes. There is a paucity of research involving the perceptions of patients and their family towards inpatient rehabilitation and our clinical experience seemed to suggest that a substantial number may view rehabilitation as a passive extension of hospitalisation merely to prolong rest or to allow the organisation of discharge plans. The aim of this study is to garner objective data to confirm the extent of these passive perceptions, upon which further interventional studies will be based. We hope to start the process of identifying and altering these perceptions by focusing on specific aspects of patient education, with an ultimate goal of improving the active involvement of the patients and their families as part of the rehabilitation team in formulating importantly relevant goals. **Material and Methods:** This is a pilot, prospective study involving 100 sequential patients admitted to the post-stroke rehabilitation unit in Changi General Hospital, Singapore. A standard proforma comprising of a multiple-choice question that addresses perceptions of the main purpose of the inpatient rehabilitation stay, is passed to each patient and one nominated family member, both at the time of admission and at discharge. **Results:** As the study is currently ongoing, the results will be reported at a later date. **Conclusion:** As the study is currently ongoing, the conclusion will be reported at a later date.

820

THE EFFECTS OF HANDRAILS ON THE TREADMILL-WALKING OF HEMIPLEGICS

K. Ohtsuka¹, M. Mukaino², I. Watanabe³, H. Tanikawa¹, J. Yamada¹, M. Ohno³, T. Teranishi¹, Y. Kanada¹, E. Saitoh²

¹Fujita Health University, School of Health Sciences, Toyoake, Japan, ²Fujita Health University, School of Medicine, Toyoake, Japan, ³Fujita Health University Nanakuri Sanatorium, Department of Rehabilitation, Tsu, Japan, ⁴Fujita Health University Hospital, Department of Rehabilitation, Toyoake, Japan, ⁵Fujita Health University Banbuntane Hotokukai Hospital, Department of Rehabilitation, Nagoya, Japan

Introduction/Background: The use of handrails during treadmill-walking affects the gait patterns of hemiplegics. The purpose of this study was to clarify the effects of the use of handrails on time-distance factors during the treadmill-walking of hemiplegics. **Material and Methods:** Ten hemiplegics (52±17 years of age; 167.1±5.8 cm in height; 63.1±9.2 kg in weight; mean±SD) participated in this study. The time after onset was 1074±1104 days. A KinemaTracer® three-dimensional motion analysis system (Kissei Comtec Co., Ltd., Matsumoto, Japan) was used in this study. The treadmill speed was set at a comfortable speed for overground walking. The following spatio-temporal parameters during treadmill-walking were compared between the conditions with and without handrails: stride length (cm), step length (cm), step width (cm), single support time (sec), double support time (sec), swing time (sec), single support phase (%), double support phase (%), and swing phase (%). For statistical analysis, a Wilcoxon Matched-Pairs Signed-Rank Test was used to compare the two conditions of walking. **Results:** The stride length and step length of both sides were significantly longer and the step widths of both sides were smaller with the use of handrails. Single support time and the ratio of the single support phase in the gait cycle of the affected side were significantly longer when walking with handrails. There were no significant differences between the two gait conditions in the other time factors. **Conclusion:** The results of the present study show that the use of handrails in the treadmill-walking of hemiplegics increases stride length and step length, the narrower step width and the longer single support.

821

DOLS AND ITS USE AT PHOENIX CENTRE FOR REHABILITATION, LIVERPOOL ENGLAND

H. Osman^{1,2}, A. Al Rehaman¹, L. Ready¹, G. Thompson¹

¹Broadgreen Hospital, Phoenix CentRe for Rehabilitation, Liverpool, United Kingdom, ²Cheshire and Merseyside Rehabilitation Network, Rehabilitation Medicine, Liverpool, United Kingdom

Introduction/Background: Article 5 of Human Rights Act states that ‘everyone has the right to liberty and security of person. No one shall be deprived of liberty DoLS [unless] in accordance with a procedure prescribed in law’. Supreme Court judgment in Mar 2014 made reference to ‘acid test’ to see whether a person is being deprived of liberty, which consisted of two questions: Is the person subject to continuous supervision and control? Is the person free to leave? . Restraints/restrictions (examples). — using locks or key which stop a person going out. — use of medication to calm a person. — close supervision. — supervised when out. — restricting contact with friends and family (if they cause person harm). — physically stopping a person from doing harm. — removing items from a person which cause harm. holding a person so they can be given care. **Material and Methods:** — Retrospective study, Jun 2014 to Oct 2015 carried at Phoenix rehabilitation Centre. — 9 patients on DoLS from introduction of new legislation. — 6 patients completed a hospital episode, 3 patients remaining as inpatients. — Looking at admission and discharge FIM/FAM score, Rehab Complexity Score on admission and discharge and reason for being on DoLS. **Results:** — All 9 patients are on DoLS due to brain injury, causing cognitive impairment, all deemed not to have capacity and want to leave. — 6 had their DoLS rescinded and discharged, all improved significantly. — Mean FIM/FAM change is 53.67 (upper range 103, lower range 17). — Mean RCS change is 4.33 (upper range 17, lower range 6). **Conclusion:** — Despite misbelief that being on DoLS leads to non-compliance with rehabilitation, patients do improve greatly. — DoLS should be not be seen as a negative impact on a patient’s rehabilitation goals. — Education regarding DoLS. — Re-audit

822

DEVELOPMENT OF PMR IN PAKISTAN: CHALLENGES AND OPPORTUNITIES

F.A. Rathore¹, A.Z. Qureshi², S.R.A. Kirmani³

¹CMH Lahore Medical College University of Health Sciences, Pakistan, ²Physical Medicine and Rehabilitation Rehabilitation Hospital, Rehabilitation Hospital- King Fahad Medical City, Riyadh, Kingdom of Saudi Arabia, ³College of Physicians and Surgeons of Pakistan, Department of PMR, Karachi, Pakistan

Introduction/Background: Pakistan is a low resourced country with an evolving health care system. Emphasis is on communicable diseases and disability management is not a priority. The foundations of PMR were laid in early 1960’s and in 1997 the first residency program was established by the College Physicians and Surgeons of Pakistan (CPSP). The aim of the research is to document the historical developments of PMR in Pakistan along with the achievements and barriers involved, and present a model for future growth. **Material and Methods:** An online literature search was conducted on Medline, Google scholar, Science direct and Springer link with key words rehabilitation; history; Pakistan; disability ; rehabilitation medicine; physiatrist; physiatry ;developing countries and challenges (2000–2015; English language only). The pioneers of PMR in Pakistan were approached for sharing their experiences and identifying the challenges they faced while establishing this specialty. **Results:** There were less than 10 physiatrists in Pakistan in 1997. They collaborated on clinical and academic platforms to promote the specialty. In Dec 2015, the numbers of qualified Physiatrists increased to 51, most of which have completed their training in Pakistan. There are five accredited PMR training centers with 13 residents. The 2005 earthquake allowed the physiatrists to display

their pivotal role in the management of major disabilities. More than 20 physiatrists have been trained abroad. There are two tertiary care PMR institutes with international liaison for training. National and International conference have been held and number of research publications is increasing each year. *Conclusion:* Development of PMR in Pakistan was a challenging task, which was managed well. The baton has been passed to the next generation of Physiatrists. There has been improved academics, better rehabilitation services and advancement in research. This model can be emulated by other developing countries having little or no PMR services.

823

PRACTICE ATTITUDE AND CAREER SATISFACTION IN IRANIAN PHYSIATRISTS

L. Sedighipour¹, S.M. Rayegani², S.A. Raeissadat³

¹Physical Medicine and Rehabilitation/PM&R Research Center-Shahid Beheshti University of Medical Sciences, Physical Medicine and Rehabilitation, Tehran, Iran, ²PM&R Research Center-Shoahada Hospital, Physical Medicine and Rehabilitation, Tehran, Iran, ³Shahid Modarres Hospital, Physical Medicine and Rehabilitation Department, Tehran, Iran

Introduction/Background: The aim of the present survey was to evaluate physiatrists career satisfaction and current practice patterns and problems in Iran. *Material and Methods:* A 31-item, 3-page questionnaire was distributed among physiatrists attending 2014 annual congress of PM&R in Tehran, capital of Iran. *Results:* Two hundred forty physicians were asked to fill out the questionnaire, 170 physicians finally returned the completed forms (110 male and 60 females). The mean age of physicians was 40 y/o (26–81). Approximately 60% of physicians were satisfied with their residency training for practical skills. Results showed that 80% of physiatrists were satisfied with their current profession and income. Satisfaction was not significantly correlated with age, sex and years of practice. Iranian physiatrists spent a mean of 1 hour per week for research in PM&R. Younger physicians dedicated more time to research compared to older ones. The mean workload of physiatrists was 40 (±20) hours per week. Physiatrists spent 3 (±4) hours a day with their families. Problems with work (in order of frequency) consisted of: 1) dealing with insurances and payment problems for physiatrists working in governmental systems 2) dealing with complicated cases specifically in electrodiagnosis 3) insufficient residency training in rehabilitation field. Physiatrist were willing to extend their knowledge in the following fields as fellowship or extra training courses: 1) neuromusculoskeletal disorders (60%) 2) sonography guided injections, interventional pain management (54%) 3) neurorehabilitation (47%) 4) updates in electrodiagnosis (40%) 5) spinal cord and cardiac rehabilitation (37%) and 6) peripheral manipulation (37%) and 6) miscellaneous (growth factor injections, biofeedback, new physical modalities...) (34%). *Conclusion:* Most of the Iranian physiatrists have good attitude toward their current practice and job. Greater residency training, continuous postgraduate education in new evolving fields such as neurorehabilitation, dealing with insurance and payment problems are among the great needs and challenges in this group of specialists.

824

A RANDOMIZED CONTROL TRIAL OF FUNCTIONAL OUTCOME IN CARDIAC REHABILITATION FOLLOWING CORONARY ARTERY BYPASS GRAFT

Y.A. Yusmido¹, A. Suhaimi²

¹Hospital Tengku Ampuan Afzan, Rehabilitation Medicine, Kuantan, Malaysia, ²University Malaya Medical Center, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Cardiac rehabilitation (CR) is a programme that helps patients recover from a cardiac event and following cardiac surgery to restore and maintain all aspect of their optimal

functions and reduce their risk of future cardiovascular event. The objective of this study is to evaluate outcomes of CR programme in post CABG patient based on their psychological and physical parameters and the secondary objective is to determine the association between the risk factors and the SF-36, and the EST result. This study is aimed to measure patient outcomes, the quality of care following cardiac surgery and the effectiveness of CR programme. *Material and Methods:* This single blinded randomized control trial study was conducted in University Malaya Medical Centre from Oct 2012 until Jun 2013. Subjects were recruited during first visit to Cardiac Rehabilitation clinic and randomized into CR group and NCR group. Demographic data and baseline SF-36 were recorded at 6–8 weeks post CABG ($n=37$) and repeated at 3 months later with EST test ($n=30$). The psychological outcomes were measured using SF-36 health-related domain questionnaire and physical capacity was measured using METs and 2HRR from EST parameters. *Results:* All health-related components post-study SF-36 result between the two groups shows higher mean rank in the CR group with significant difference noted in the mental health component ($U=63$, $p=0.002$). There is also significant difference between two groups in the post Metabolic Equivalent of task (METs) with p values of 0.019. No relationship noted between the METs level with presence of cardiac risk factors. *Conclusion:* CR program will give positive effect on the mental health and METs level which can be related to the component of cardiac rehab such as supervised exercise program, education on secondary prevention and behavioural strategies.

BIOSCIENCES IN REHABILITATION: MECHANISMS OF TISSUE INJURY (E.G. INFLAMMATION, REPETITIVE STRAIN) AND DEVELOPMENT OF ORGAN DYSFUNCTION (E.G. ATROPHY, SPASTICITY, CHRONIC PAIN)

825

TREADMILL EXERCISE PROMOTES NEUROGENESIS IN ISCHEMIC RAT BRAINS VIA CAVEOLIN-1/VEGFSIGNALING PATHWAYS

Y. Zhao¹, Q. Pang¹, M. Liu¹, J. Pan¹, B. Xiang¹, T. Huang¹, F. Tu¹, C. Liu¹, X. Chen¹

¹The Second Affiliated Hospital & Yuying Children's Hospital of Wenzhou Medical Co, Physical Medicine and Rehabilitation center, Wenzhou, China

Introduction/Background: Using a model of MCAO, we have previously demonstrated that treadmill exercise promotes angiogenesis in the penumbra through Caveolin-1/VEGF signaling pathways. However, the function of Caveolin-1/VEGF signaling in neurogenesis has not been determined after MCAO. In this study, we aimed to investigate the potential of treadmill exercise to promote neurogenesis after MCAO and whether Caveolin-1/VEGF signaling pathways are involved. *Material and Methods:* After MCAO, SD rats were treated with treadmill exercise. Daidzein (a specific inhibitor of Caveolin-1) was used to confirm the effect of Caveolin-1/VEGF signaling on exercise-mediated neurogenesis. And we used behavioral assessment to evaluate functional outcome, Bromodeoxyuridine to label dividing cells, TTC staining to estimate the extent of brain infarct, Immunofluorescence to label the neurogenesis, and Western blot to analyze the total protein expression of Caveolin-1 and VEGF in the peri-infarct region. *Results:* First, we found that both Caveolin-1 and VEGF total protein expression were increased by exercise and consistent with the improved neurological recovery, decreased infarct volumes and increased 5-bromo-2'-deoxyuridine (BrdU) in ipsilateral Subventricular zone (SVZ), BrdU/DCX and BrdU/Neun-positive cells in peri-infarct. Second, we observed that the increased expression of VEGF, improved neurological recovery, decreased infarct volumes, increased BrdU/DCX and BrdU/Neun-positive cells induced by treadmill exercise were significantly inhibited by the Caveolin-1 inhibitor. *Conclu-*

sion: Our results indicate that treadmill exercise improves neurological recovery in ischemic rats possibly by enhancement of SVZ-derived NSCs proliferation, migration and differentiation in the penumbra. Moreover, Caveolin-1/VEGF signaling involves in exercise-mediated NSCs migration and neuronal differentiation.

826

SUBSTANCE P PLAYS A CRUCIAL ROLE IN THE ANALGESIC EFFECT OF LOW LEVEL LASER THERAPY ON CHRONIC MUSCLE PAIN

D.S. Han¹, C.C. Chen²

¹National Taiwan University Hospital BeiHu Branch, Department of Physical Medicine and Rehabilitation, Taipei, Taiwan, ²Academia Sinica, Institute of Biomedical Sciences, Taipei, Taiwan

Introduction/Background: Low-level laser therapy (LLLT) is widely used in pain control in the field of physical medicine and rehabilitation. However, its analgesic mechanism is still not known. Substance P is a neuropeptide, composed of 11 amino acid residues, and is secreted with noxious stimulation. It functions as a neurotransmitter in sensory neurons of the spinal cord. The objective of this study is to establish the rodent model of LLLT on chronic muscle hyperalgesia, and to reveal the mechanism of the analgesic effects of LLLT in the rodent model of chronic muscle pain. **Material and Methods:** We employed the chronic hyperalgesia mouse model proposed by Sluka et al. and determined the optimal LLLT frequency, dosage, and timing. The withdrawal response of mouse hind paws was defined as foot lifting when a 0.2-mN von Frey filament was applied. Mice were injected with pH 4.0 saline on days 0 and 1. The withdrawal responses shown before and after i.m. acid injection confirmed acid-induced mechanical hyperalgesia for the following laser treatment. From days 4 to 8 after the first acid injection, mice received 0 ($n=11$) and 8 ($n=8$) J/cm² dosages of the laser treatment every day. NK1 and TRPV1 receptor antagonist were employed as pretreatment. **Results:** LLLT at 8J/cm² showed analgesic effect in chronic muscle pain model. The analgesic effect can be blocked by pretreatment of NK1 receptor antagonist — RP-67580. When applying LLLT on Tac1^{-/-} mice, we did not observe analgesic effect. Besides, pretreatment with TRPV1 receptor antagonist—capsazepine at injection site can block the analgesic effect. **Conclusion:** Intramuscular substance P induced by LLLT and acid injection could inhibit intramuscular nociceptor activation, and result an anti-nociceptive effect against chronic mechanical hyperalgesia. In the future, small molecules that can facilitate substance P production can be new candidate to treat chronic diffuse muscle pain.

827

TRANSCUTANEOUS CARBON DIOXIDE (CO₂) APPLICATION INHIBITS MUSCLE ATROPHY AFTER FEMORAL SHAFT FRACTURE IN RAT

M. Inoue¹, Y. Sakai², K. Oe¹, T. Ueha², T. Koga¹, H. Nishimoto¹, S. Akahane¹, R. Harada¹, S.Y. Lee¹, T. Niikura¹, R. Kuroda¹, M. Kurosaka¹

¹Kobe University Graduate School of Medicine, Department of Orthopedic Surgery, Kobe, Japan, ²Kobe University Graduate School of Medicine, Division of Rehabilitation Medicine, Kobe, Japan

Introduction/Background: Muscle atrophy may cause a difficulty in returning to normal life after fracture or invasive surgery. However, there are few report for treatment in muscle atrophy after injury and fracture fixation. Previously, we demonstrated that transcutaneous CO₂ application up-regulated oxygen pressure in local tissue, which showed the potential to prevent muscle atrophy. In the present study, we therefore investigated the effect of CO₂ application in muscle atrophy after femoral shaft fracture. **Material and Methods:** Forty-two Sprague-Dawley rats were used in this study. K-wire was inserted into the femoral intramedullary canal and a closed femoral

shaft fracture was produced. The rats were divided into two groups; no treatment group (CO₂-) and treatment group(CO₂+). Treatment was performed five times a week. Briefly, the hair of the limbs was shaved, and hydrogel were applied to lower limbs. The adaptor was attached on them and CO₂ was administrated into the adaptor for 20 minutes. Tibialis anterior muscle (TA) and soleus muscle (SOL) were dissected. Evaluations were performed by muscle weight, histological examination and gene-expression analysis with real-time PCR at postfracture days 0, 7, 14, and 21. **Results:** The change of weight in TA and SOL is shown. The muscle weight in CO₂+ is significantly higher than CO₂- at day 14 and day 21. In histological analysis of SOL, muscle fiber diameter was reduced in both groups after day 14. Nevertheless, the extent of atrophy was less in the CO₂+. The CO₂- showed a tendency to change into fast muscle at day 21. In mRNA analysis of SOL, CO₂+ significantly enhanced gene expression in synthesis-related gene (PGC-1 α , VEGF and IGF-1) at day 7 and 21. FOXO-1 in CO₂- was intensely increased at day 7 and day 14. However, FOXO-1 in CO₂+ decreased at day 14. Atrogin-1 decreased at day21. **Conclusion:** The results suggest that transcutaneous CO₂ application may prevent muscle atrophy after femoral shaft fracture.

828

COMPARISON OF BODY COMPOSITION AND METABOLIC PROFILE IN CHRONIC SPINAL CORD INJURY PATIENTS DEPENDING ON THE SEVERITY OF SPASTICITY

I.Y. Jung¹, H.R. Kim², S.M. Chun¹, J.H. Leigh¹, Y.A. Choi¹, H.I. Shin¹

¹Seoul National University College of Medicine, Rehabilitation Medicine, Seoul, Republic of Korea, ²Korea National Rehabilitation Center, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: To investigate the effects of spasticity on anthropometric dimensions (waist circumference; WC, waist-to-height ratio; WtHR, and body mass index; BMI), body composition (body fat percentage; BFP, and bone mineral density; BMD) and metabolic profiles (leptin, lipid profile, fasting blood sugar; FBS and glycosylated hemoglobin; HbA1c) in patients with chronic motor complete spinal cord injury (SCI). **Material and Methods:** Fifty-six participants were divided into two groups (no or mild spasticity group, 29; severe spasticity group, 27; age, 42.5 \pm 9.5 years) based on the assessment of the extensor muscles according to the modified Ashworth Scale (MAS). BFP and BMD assessment used by dual energy x-ray absorptiometry and metabolic profile such as leptin, total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), triglyceride (TG), FBS, and HbA1c were measured by blood test. Height, weight and WC were also checked for WtHR and BMI. **Results:** Patients with no or mild spasticity showed a larger WC and WtHR than patients with severe spasticity ($p=0.033$, $p=0.006$, respectively). The levels of leptin and BFP in the no or mild spasticity group were significantly higher than those in the severe spasticity group ($p<0.001$, $p=0.002$, respectively). However, no difference in BMD and the levels of total cholesterol, LDL, HDL, TG, and HbA1c were observed between these groups. **Conclusion:** The results of the study suggest that spasticity may in fact have a beneficial effect on body composition and metabolism in individuals with chronic motor complete SCI.

829

OXIDATIVE DNA DAMAGE INCREASED IN POLIO SURVIVORS

Y. Matsushima¹, A. Hachisuka¹, H. Itoh¹, K. Hachisuka², S. Saeki¹

¹University of Occupational and Environmental Health, Rehabilitation, Kitakyushu, Japan, ²Moji Medical Center, Rehabilitation, Kitakyushu, Japan

Introduction/Background: Post-polio syndrome (PPS) is generally defined as a clinical syndrome of new muscle weakness, fatigue, and pain in poliomyelitis survivors. The cause of PPS remains unclear, although muscle weakness in PPS are possibly associated with an ongoing process of denervation and reinnervation, reaching a point at which denervation is no longer compensated for by reinnervation. The cause of this denervation is unclear, but overuse, aging, immunological factors and chronic inflammation are thought to be contributing factors. We hypothesized that oxidative stress may influence the mechanism of the onset in PPS. The purpose of this study was to examine the oxidative stress markers in polio survivors and compare with those in healthy controls. **Material and Methods:** Subjects were 26 polio survivors (12 males, 15 females, 59.3±5.1 years old) and 13 healthy controls (4 males, 9 females, 58.0±5.8 years old). Plasma and urine samples were collected in those subjects. We measured urinary 8-hydroxydeoxyguanosine (8-OHdG) which was the marker of oxidative DNA damage using the HPLC-ECD method. We also measured urinary 8-isoprostane in ELISA and plasma thiobarbituric acid reactive substance (TBARS) those were the markers of lipid peroxidation. We compared those of the polio survivors with those of healthy controls. **Results:** The level of urinary 8-OHdG was significantly increased in polio survivors compared with that of healthy controls. No difference were found in 8-isoprostane and TBARS. **Conclusion:** These results indicate that oxidative DNA damage increased in polio survivors and it may influence the mechanism of the onset in PPS.

830

OLIG2 UP REGULATION PROMOTE FUNCTION RECOVERY IN SPINAL CORD INJURY ADULTS RATS

B. Tan¹, Y. Liu², Y. Yin¹, G. Jia¹, Z. Long², S. Li¹, Y. Wu², L. Yu¹

¹Department of Rehabilitation Medicine, The Second Affiliated Hospital of Chongqing Medical University, Chongqing, China, ²The 3rd Department of Research Institute of Surgery, Daping Hospital, The Third Military Medical University, State Key Laboratory of Trauma, Burns and Combined Injury, Chongqing, China

Background: Olig2 (Oligodendrocyte transcription factor 2) is thought to be the one of the most important factor in spinal cord mature since it affects the development of motor neuron and oligodendrocyte. However, the role of Olig2 in spinal cord injury (SCI) and the possible cure effects are still under obscure. **Main techniques and methods:** Contusion SCI model (150 kdynes) were prepared by Allen's impact. The expression of Olig2 were estimated by western-blot, RT-PCR after SCI. Lent-EGFP-Olig2 overexpression vector and control lentivirus vector were made. 5µL virus (10⁸TU/ml) was injected into the lesion 5mm rostral and caudal to the epicenter. Basso, Beattie&Bresnahan locomotor rating scale (BBB scale) and Catwalk analysis were used to evaluate the recovery hind limb motor function. HE staining and Electron Microscope (EM) were employed to measure the spared tissue and changes in the myelin. **Results:** Olig2 showed a transient high level (3d) but persistent low level after SCI (at day 7 and 14) naturally. Rats in the Lent-Olig2 group (Olig2 group) had a better function regain because BBB scores (week 4, 6 and 8) and Catwalk analysis (in max contact area, swing speed, and contact intensity) showed significant difference compared with the control virus group (GFP group). Spared tissue in the Olig2 group is much more and a quite better myelin conditions were also found. Additionally, there were more A2B5/GFP and MBP/GFP double positive cells in the Olig2 group. **Conclusions:** Olig2 keeps a low level after SCI. Upregulation Olig2 locally induce better outcomes in SCI rats, which may have connection with the pro-remyelination effect of Olig2. **Funding acknowledgements:** National Natural Science Foundation of China, No. 81071599; Chongqing Education Commission Project VKJ1500237.

831

EFFECTS OF PHYSICAL EXERCISE ON COGNITIVE FUNCTION: NITRIC OXIDE SYNTHASE CON-

TRIBUTING TO AB ACCUMULATION IN SPONTANEOUS HYPERTENSIVE RATS

L. Zhang¹, X. Hu¹, J. Luo¹

¹Affiliated 3rd Hospital of Sun Yat-san University, Rehabilitation, Guangzhou, China

Introduction/Background: This study is aimed to examine whether the effect of physical exercise on nitric oxide synthase (eNOS) is benefit to decrease Aβ accumulation. **Material and Methods:** A total of 20 spontaneous hypertensive rats (SHR) were randomly divided into physical exercise hypertensive group (PE, n=10), which was given running wheel exercise for 3 months, and sedentary hypertensive group (SED, n=10). A total of 10 Wistar rats were set as normotensive group (NC, n=10), which were fed in standard cages without any special training exercise. The blood pressure (BP) was monitored every week. The rats were sacrificed after Morris water maze test. The specific marker heme oxygenase-1 (HO-1), endothelial eNOS, β-site APP-cleaving enzyme 1 (BACE1)/Aβ were checked in endothelial cells, brain cortex and hippocampus. **Results:** BP in PE is much lower than that in SED (p<0.05), but higher than that in NC (p<0.05). Water maze performance in PE is better than that in SED (p<0.05) and a little worse than NC (p>0.05). Immunofluorescence analysis and western blotting in SED showed less HO-1/eNOS expression as compared to NC, however, BACE1/Aβ accumulation was significantly up-regulated in endothelial cells, brain cortex and hippocampus. After 12 weeks physical exercise, there were significant up-regulation of HO-1/eNOS expression and down-regulation of BACE1/Aβ expression in endothelial cells, brain cortex and hippocampus. **Conclusion:** Physical exercise decreases BP and improves cognitive function in hypertensive rats through up-regulation of HO-1/eNOS which may decrease BACE1 expression and Aβ accumulation.

BIOSCIENCES IN REHABILITATION: CELL AND TISSUE ADAPTATION AND MALADAPTATION (E.G. PLASTICITY, MOLECULAR MECHANISMS AND MEDIATORS)

832

ELECTROACUPUNCTURE IMPROVES SYNAPTIC PLASTICITY VIA ACTIVATION OF CAMP/PKA/ CREB PATHWAY IN HIPPOCAMPUS CA1 AREA IN RATS WITH VASCULAR DEMENTIA

C. Zheng¹, X. Han¹, X. Huang¹

¹Tongji Hospital- Tongji Medical College- Huazhong University of Science and Tech, Rehabilitation Medicine, Wuhan, China

Introduction/Background: Electroacupuncture (EA) has beneficial effects on vascular dementia (VaD) patients. It has been suggested that the cAMP/PKA/CREB pathway has an essential role in learning and memory. MicroRNA132 (miR132) is up-regulated by CREB phosphorylation and may cause the decrease of p250GAP which may participate in long-term synaptic plasticity. However, whether cAMP/PKA/CREB pathway and miR132-p250GAP participate in the effect of EA on VaD remains unclear. **Material and Methods:** In this study, Sprague-Dawley (SD) rats were induced to develop VaD through permanent, bilateral occlusion of common carotid artery (2VO). H89 (a PKA-selective peptide inhibitor) was given with intracerebroventricular (ICV) injection before EA treatment at Baihui (GV20) and Dazhui (GV14) after 2VO operation. On Day 7, 14 and 21, changes of behavioral test by Morris water maze (MWM) task, synaptic transmission by long-term potentiation (LTP) recording, dendritic spine morphology by Golgi silver staining and histological examination by Nissl staining were analyzed for the VaD evaluation. p-CREB and p250GAP expression in the hippocampus were detected by western blot. The expression of miR132 in the hippocampus was detected by Real-Time PCR. **Results:** On Day 7, 14 and 21, 1) EA reversed neuron loss, dendritic spine density decrease, synaptic transmission impairment and be-

havioral injury in VaD rats and administration of H89 blocked the influence of EA. 2) EA significantly improved the down-regulated p-CREB and reduced the up-regulated p250GAP protein expression in the hippocampus of VaD rats. H89 had inhibitory influence on the EA effect. 3) EA improved the down-regulated miR132 expression significantly, which was inhibited by H89. **Conclusion:** EA has beneficial effects on synaptic plasticity in the hippocampus in vascular dementia rats via activation of the cAMP/PKA/CREB pathway and regulation of miR132-p250GAP.

833

EFFECTS OF LOW-MAGNITUDE VERTICAL VIBRATION ON M2-RELATED CYTOKINE EXPRESSION IN MONOCYTES VIA HISTONE MODIFICATION

C.H. Chen¹, Y.J. Chen¹, C.H. Hung²

¹Kaohsiung Medical University, Physical Medicine and Rehabilitation, Kaohsiung, Taiwan, ²Kaohsiung Medical University, Pediatrics, Kaohsiung, Taiwan

Introduction/Background: Whole-body vibration training is widely used in rehabilitation and sports activities to improve muscle strength, balance and flexibility. Polarized macrophages are important for immunity and broadly classified into two groups: M1 and M2 macrophage. M2 macrophage activation is usually anti-inflammatory. However, the effects of vertical vibration (VV) on human macrophage M2 polarization are unknown. This study is to evaluate the effects of VV on the M2-related cytokine and chemokine production and detailed mechanism. **Material and Methods:** Human monocyte cell line, THP-1 cell, was treated with different frequencies of VV. To investigate whether the polarization effect on macrophage was via histone modification, the cells were pretreated with anacardic acid or methylthioadenosine. The expression of M2-related cytokine and chemokine (CCL22, TGF- β and IL-10) were determined by ELISA and real time PCR. VV-associated histone modifications were examined by chromatin immunoprecipitation (ChIP) assays. **Results:** VV significantly enhanced M2-related cytokine and chemokine expression, including CCL22/MDC, TGF- β and IL-10 in mRNA and protein levels. Activation of the M2 polarization concomitant with enhanced levels of tri-methylated H3K4, acetylated H3, and H4 at the TGF β gene locus promoter area. **Conclusion:** VV significantly enhanced M2-related cytokine and chemokine expression via histone modification. VV may have anti-inflammatory effect on monocyte.

834

EFFECT OF NON-PHARMACOLOGICAL INTERVENTION ON OBESE PEOPLE IN TERMS OF BODY COMPOSITION AND CYTOKINES

E.H. Choi¹, Y.H. Lim¹, J.Y. Lim¹

¹Hallym University, Physical Medicine & Rehabilitation, Chuncheon-Si- Gangwon-Do, Republic of Korea

Introduction/Background: Early cardiovascular changes in simple obese population cannot be detected by conventional Framingham risk score or ABI test. Recently several cytokines were focused as the early marker of endothelial changes instead of CV risk and ABI test. This study is designed to identify the markers that show the simple obese patients' endothelial status according to weight loss. Also we analyzed the changes of markers after our intensive non pharmacological intervention program. **Material and Methods:** From 2015 Jan to Mar, simple obese patients (BMI \geq 25) were recruited. ($n=14$ M=1 F=13) Their mean age was 44.9 years (35–60). They participated in 13 weeks of intensive program composed of diet, exercise and educational program. Lipid battery test, blood sugar test, cytokines (Nitrite, INF-a, IL-6, VEGF), Framingham score, both arms and ankles' pulse wave velocity (mm/s), body composition (BMI, fat%, muscle mass (kg)) and physical test (grasp power, flexibility, sit up) were checked before and after the program. All the tests were also carried out from age- sex matched

control group. **Results:** After 13 weeks of exercise program, participants showed marked reduced weight, fat mass, total cholesterol, and LDL ($p<0.05$), but the amount of muscle mass had not been decreased. Despite low cerebrovascular risk and pulse wave velocity, obese participants showed higher nitrite level compare to control group. After 13 weeks of program nitrite level was significantly decreased regulated after 13weeks program to the level of control group. **Conclusion:** Nitrite elevation is supposed to be related to the early endothelial change in obese people. Non-pharmacological intervention is helpful not only reducing fat component but also controlling the endothelial devastating cytokine.

835

A STUDY OF HUMAN ACTIVIN A TYPE 1 RECEPTOR (ACVR1) AND NOGGIN (NOG) GENE MUTATION IN DEVELOPMENT OF NEUROGENIC HETEROTOPIC OSSIFICATION POST TRAUMATIC BRAIN INJURY

O. Htwe¹, R. Rajan², E. Ismail², L. Soo Fin², A.S. Naicker³, J. Thanabalan²

¹Kuala Lumpur, Malaysia, ²University Kebangsaan Malaysia, Department of Surgery, Kuala Lumpur, Malaysia, ³University Kebangsaan Malaysia, Rehabilitation Unit - Department of Orthopaedics and Traumatology, Kuala Lumpur, Malaysia

Introduction/Background: Pathophysiology of Neurogenic Heterotopic Ossification (NHO), pathological ectopic bone formation, is unclear, however, the diversity of its etiology suggests that factors released after the traumatic brain injury (TBI), spinal cord injury (SCI) such as Bone Morphogenic Proteins (BMPs) are potent inducers of mesenchymal stem cells causing osteogenic differentiation. Gene mutation or alteration of signal transduction involving BMP pathway could lead to dysregulation of bone formation. Two important proteins involved in the BMP signaling pathway are Human Activin A type 1 Receptor (ACVR1) and Noggin (NOG). None of the study has been done so far to determine the mutation in BMP signaling pathway and the development of NHO post TBI. The aim was to identify the patients with NHO and determine if there was a genetic mutational basis to the development of HO within this subset of patients. **Material and Methods:** This cross-sectional cohort study was done at the Neurosurgery clinic, tertiary hospital, Kuala Lumpur, Malaysia from Jun 2012 to Jun 2013. Fifty patients with previous history of TBI were included. Polymerase Chain Reaction-Restriction Fragment Length Polymorphism (PCR-RFLP) method was used for genetic analysis. PCR products for gene ACVR1 and NOG were 350 bp and 237 bp. Sequencing was performed to determine the presence of mutation of ACVR1 617 G>A, and NOG 283 G>A. **Results:** Three patients (6%) were identified with NHO with no evidence of ACVR1 or NOG mutation. **Conclusion:** There was no relationship between development of NHO and ACVR1 or NOG gene mutation in this study. Further study involving a larger sample of patients with TBI may provide better insight into the pathophysiology and potential risk factors that trigger this debilitating condition.

836

ANGIOGENESIS EFFECT OF LOW-LEVEL LASER IN DIABETES HINDLIMB ISCHEMIC MICE

S.J. Huang¹

¹China Medical University, Department of Physical Therapy / Graduate Institute of Rehabilitation Science, Taichung, Taiwan

Introduction/Background: Diabetes mellitus (DM) has been one of the top ten causes of death in Taiwan, representing it seriously affect people's health. DM is a chronic illness that requires continuing medical care to prevent complications, including vascular disease. Many studies show low level laser therapy (LLLT) can increase angiogenesis on patients with diabetes. The aim of this study

is to understand whether LLLT can increase angiogenesis in diabetic hindlimb ischemic mice. **Material and Methods:** The study is conducted in vivo. First, twenty male C57Bl/6 mice were randomly divided into four groups; control, DM, LLLT, and DM+LLLT. Mice were induced diabetes by intraperitoneal injecting streptozotocin to destruct islet. The left femoral artery was excised and induction of tissue ischemia was confirmed by laser Doppler perfusion imaging. LLLT was applied for continuous following five days. The gastrocnemius and soleus muscle were processed for immunofluorescence staining for CD31 and collagen IV. CD31+/Collagen IV+ area was calculated to determine density of vessels. **Results:** The LLLT has positive benefits for angiogenesis in both healthy and diabetic mice. The results of laser Doppler show the LLLT improve blood perfusion in DM+LLLT compared to DM group as well as LLLT compared to control. The numbers of capillary were also significantly increased (control 89 ± 38 vs. LLLT 222 ± 53 mm², DM+LLLT 100 ± 27 vs. DM 44 ± 29 mm²). **Conclusion:** This study demonstrated that LLLT not only increase the angiogenesis but also improve blood perfusion in Diabetes Hindlimb Ischemic Mice.

837

CILOSTAZOL DECREASES THE FUNCTION OF NOREPINEPHRINE AND SEROTONIN TRANSPORTER, WHICH IS KNOWN AS CELLULAR TARGET OF ANTIDEPRESSANTS

H. Itoh¹, Y. Matsushima¹, Y. Toyohira², N. Yanagihara², S. Saeki³

¹University of Occupational and Environmental Health, Department of Rehabilitation Medicine- School of Medicine, Kitakyushu, Japan, ²University of Occupational and Environmental Health, Department of Pharmacology- School of Medicine, Kitakyushu, Japan, ³University of Occupational and Environmental Health, Department of Rehabilitation Medicine- School of Medicine, Kitakyushu, Japan

Introduction/Background: Depressive disorder is considered to be a common and important neuropsychiatric post-stroke complication. Moreover, apathy occurs in various neurological disorders including stroke. Monoamine transporters including the norepinephrine transporters (NET), the serotonin transporter (SERT), and the dopamine transporter are located in the plasma membrane of the presynaptic nerve terminals. Most inhibitors of the monoamine transporters, especially of the norepinephrine transporter and serotonin transporter, are clinically important antidepressants. Those antidepressants increase extracellular monoamine concentration by inhibiting the neuronal re-uptake of monoamines through the monoamine transporters. Most antidepressants act through inhibition of either the NET or the SERT or both transporters. Cilostazol is a selective phosphodiesterase III inhibitor that was originally prescribed as an anti-platelet agent, and increases cerebral blood flows in the cerebral infarction. Additionally, it acted as a neuroprotective agent by increasing cyclic adenosine monophosphate levels. The antidepressive effects of cilostazol on post-stroke depression have been reported, but the exact mechanism of this action is unknown. Monoamine transporters are regulated by phosphorylation/dephosphorylation because its intracellular region has many putative sites for phosphorylation by a variety of kinases including PKA. In this study, we examined the direct effects of cilostazol on NET and SERT function. **Material and Methods:** SK-N-SH and SERT-transfected COS-7 cells were incubated with [3H]norepinephrine (0.1 μM) or [3H] serotonin (50 nM) in the presence or absence of cilostazol to assess the monoamine uptake. **Results:** Cilostazol decreased the [3H]norepinephrine uptake by SK-N-SH cells and the [3H] serotonin uptake by SERT-transfected COS-7 cells in a concentration-dependent manner (10–100 μM). **Conclusion:** The blood concentration of cilostazol in treating patients with cerebrovascular disease has been reported to be 13.8 μM after a single oral dose of 100 mg. These results indicate that cilostazol inhibit NET and SERT function at clinically relevant concentration, which is likely to show the antidepressant effect on post-stroke depression.

838

HYPOXIC CONDITIONED MEDIUM FROM MESENCHYMAL STEM CELLS PROMOTES LYMPHANGIOGENESIS

D.H. Jang¹, J.Y. Kang²

¹The Catholic University of Korea, Department of Rehabilitation Medicine- Incheon St. Mary's Hospital, Incheon, Republic of Korea, ²National Traffic Injury Rehabilitation Hospital- College of Medicine- The Catholic University of Korea, Department of Rehabilitation Medicine, Yangpyeong-Gun, Republic of Korea

Introduction/Background: This study was conducted to evaluate the lymphangiogenesis potential of hypoxic conditioned media from MSCs. **Material and Methods:** Human bone marrow derived-MSC (hMSC) and human lymphatic endothelial cells (hLEC) were used. To investigate the effects of MSCs-secreted factors in starved hLEC, endothelial basal medium (EBM)-2 media (control), normoxic conditioned media (NCM), or hypoxic conditioned media (HCM) were treated into hLEC, respectively. Proliferation, migration and tube formation of LECs were tested to investigate ability for lymphangiogenesis of each media in vitro. Quantitative real-time polymerase chain reaction (qRT-PCR) was performed to measure mRNA expressions of lymphangiogenic factors; epidermal growth factor (EGF), fibroblast growth factor (FGF), hepatocyte growth factor (HGF), insulin-like growth factor (IGF-1), vascular endothelial growth factor-A (VEGF-1), and vascular endothelial growth factor-C (VEGF-C). Mitochondrial-related factors (MFN1 and MFN2) in hLEC were analyzed using qRT-PCR and western analysis. The hindlimb mouse model of lymphedema was obtained. Each media (EBM-2, NCM, and HCM) was injected subcutaneously at the site of the damaged area every 3 days. Four weeks after the surgery, the mice were sacrificed. Lymphatic vessel regeneration was evaluated through immunohistochemical staining with anti-LYVE-1 antibody. The lymphatic vessels were observed after injection of FITC-dextran solution under the fluorescence microscope. **Results:** hMSCs expressed lymphangiogenic factors including EGF, FGF2, HGF, IGF-1, VEGF-A, and VEGF-C. hLECs were treated with each media. Proliferation, migration and tube formation of hLEC were improved by HCM relative to NCM. Moreover, expression of mitochondrial-related factors, MFN1 and MFN2, was improved in HCM treated LECs. Lymphedema mice injected with HCM showed significantly decreased lymphedema via promoted lymphatic vessel formation compared to EBM-2 or NCM treated mice. **Conclusion:** Taken together, this study revealed that HCM from MSCs contained high levels of secreted lymphangiogenic factors and promoted lymphangiogenesis by regulating mitochondrial-related factors.

839

MLC601 FOR BRAIN INJURIES - OPEN LABEL USE IN A SERIES OF PATIENTS

R. Kumar¹, F. Fadzil¹, B.H. Soon¹, P. Kamalanathan¹, A. Jaffar¹, S. Paramasvaran¹, T. Charng Jeng¹, J. Thanabalan¹, A. Abu Bakar¹

¹University Kebangsaan Malaysia, Neurosurgery, Cheras, Malaysia

Introduction/Background: "MLC601 (NeuroAiD®)", a combination of natural products, is used to improve recovery after ischemic stroke. Its neurorestorative properties in preclinical model of stroke and traumatic brain injury (TBI) make it an attractive treatment for brain injuries. We aimed to evaluate the safety and potential efficacy of "MCL601 (NeuroAiD®)" in brain injuries. **Material and Methods:** The NeuroAiD Safe Treatment (NeST) Registry (clinicaltrials.gov NCT02536079) is designed as a product registry that would provide information on the use and safety of NeuroAiD in clinical practice. We analyzed anonymized information of TBI and intracerebral hemorrhage (ICH) patients included in the NeST Registry (www.neuroaid.com/en/nest/main/index). Patients who

agree are prospectively entered using online forms for baseline and subsequent visits. Data collected include demographics, diagnosis, medical history, modified Rankin Score (mRS), Glasgow Coma Scale (GCS), National Institute of Health Stroke Scale (NIHSS), compliance and side effects. **Results:** Thirty-nine patients from Malaysia were included in the NeST registry, 25 with ICH (mean age 59.5±14.6 years; female 11) and 14 with TBI (mean age 42±16 years; female 3). Median GCS for TBI patients was 11 (range 3–15) at baseline, 12.5 (6–15) at visit (V) 2, 14.5 (10–15) at V3 and 15 (6–15) at V4. Median NIHSS for ICH patients was 11 (0–33) at baseline, 10 (0–24) at V2, 5 (0–18) at V3 and 3 (0–8) at V4. mRS was improving over time for both TBI and ICH patients (figures). One patient with Sjogren's reported side effect (skin rash/lip ulcer) at day 35 of "MLC601 (NeuroAiD®)" intake. **Conclusion:** "MLC601(NeuroAiD®)" was safe in our series of TBI and ICH patients who were overall improving on functional, neurological and cognitive measures while on treatment.

840

EFFECT OF EXERCISE TRAINING PREVENTS RENAL FIBROSIS IN RATS WITH HYPERTENSION

T.W. Kuo¹, Y.Y. Lin², A.L. Yang³, S.D. Lee⁴

¹China Medical University, Department of Physical Therapy Graduate Institute of Rehabilitation Science, Taichung, Taiwan, ²China Medical University, Graduate Institute of Clinical Medical Science, Taichung, Taiwan, ³University of Taipei, Graduate Institute of Exercise Science, Taipei, Taiwan, ⁴China Medical University, Department of Physical Therapy- Graduate Institute of Rehabilitation Science, Taichung, Taiwan

Introduction/Background: Several evidence indicates that fibrosis plays a critical role in the pathogenesis and progression of hypertensive kidney disease. Exercise training is well to have various benefits for protection and treatment of hypertension-related kidney disease or kidney failure. However, the mechanisms regulating renal anti-fibrotic effects of exercise training remain unclear. Therefore, this study investigated the effect of exercise training on hypertension-induced renal damage and fibrosis. **Material and Methods:** Twenty male spontaneously hypertensive rats (SHR) were randomly divided into sedentary group (SHR, n=10) and hypertension rats underwent treadmill running exercise for 60 min/day, 5 sessions/week, for 10 weeks (SHR-EX, n=10). Age-matched ten male Wistar-Kyoto rats (WKY, n=10) were used as a normotensive reference group. After exercise training, the excised renal cortex from rats were measured by histopathological analysis and Western Blotting. **Results:** The SHR group exhibited high blood pressure and interstitial fibrosis relative to WKY group. In addition, these alterations were accompanied by increases in renal cortex gene expression of transforming growth factor beta (TGF-β) and connective tissue growth factor (CTGF) involved in the fibrotic response (renal fibrosis-related pathway). By contrast, this situation became better after exercise training interventions. By contrast, the serum anti-oxidative levels of superoxide dismutase (SOD), catalase (CAT) were decreased in SHR as compared with normotensive animals and this decreased could be increased after exercise training. **Conclusion:** Our results indicated that exercise training could protect against renal damage through improving serum anti-oxidative levels and reducing renal fibrosis-related pathway in hypertension. It suggested that exercise training would ameliorate of renal function in the population of hypertension.

841

THE EFFECT OF TOMATO JUICE ADMINISTRATION COMBINED WITH PHYSICAL EXERCISE ON NEURON CELL NUMBER OF POSTMENOPAUSAL RAT BRAIN

P.M. Kurniawati¹, H. Laswati², M. Andriana³

¹Surabaya, Indonesia, ²Medical Faculty of Airlangga University,

J Rehabil Med Suppl 55

³Physical Medicine and Rehabilitation, Surabaya, Indonesia, ³Medical Faculty of Airlangga University, Physical Medicine and Rehabilitation, Surabaya, Indonesia

Introduction/Background: Cognitive function will be decreased with age. Postmenopausal women has a higher incidence of dementia. Estrogen has important role in the development and plasticity of neuron cells. Recently phytoestrogen in the postmenopausal women could overcome estrogen deficiencies and also moderate intensity physical activity has proven increasing estrogen. So, the objective of this research was to evaluate the effect of tomato juice administration combined with physical exercise on neuron cells number in menopause rat brain. **Material and Methods:** Twenty eight postovarectomy female rats (*Rattus norvegicus*), were randomized into 4 groups: the control group (2cc aquadest administration), the tomato juice administration (44 mg/200 grm body weight), the physical exercise group (swimming for 30 minutes three times perweek and the group of combination of tomato juice and physical exercise (IV). Treatment was given for 4 weeks. Number of the brain neuron cell were observed and calculated histomorphometry by light microscope. All statistical test were carried out by SPSS. and significance was set at $p < 0.05$. One-way Anova and post hoc test were used to analyze and determine the difference between groups. **Results:** The tomato juice administration group showed the largest of number of brain neuron cell expression (145.43±17.728), followed the Combination exercise and tomato juice administration group (140.57±22.449), the exercise group (136.86±23.104) and the smallest number is the control group (96.43±28.965). LSD Post Hoc test method showed a significant difference ($p > 0.05$) among all treatment groups. **Conclusion:** The administration of tomato juice and physical exercise intervention on menopause rat increase the neuronal cells in the post central gyrus cerebral cortex and the tomato group showed the highest increasing of neuron cells.

842

CELLULAR AND MOLECULAR REGULATION IN THE BRAIN AFTER SPINAL CORD INJURY

J. Park¹, S.H. Kim¹, Y.H. Lee¹

¹Yonsei University Wonju College of Medicine, Rehabilitation Department, Wonju, Republic of Korea

Introduction/Background: After spinal cord injury (SCI), functional and structural reorganization occurs at multiple levels of brain including motor cortex. However, the underlying mechanism still remains unclear. The current study was performed to investigate the alterations in the expression of the main regulators of neuronal development, survival and death, in the brain following thoracic contusive SCI in a mouse model. **Material and Methods:** Six-week-old male imprinting control region mice (n=100; 25–30 g) were used in this study. We analyzed the expression levels of regulators such as brain-derived neurotrophic factor (BDNF), glial cell line-derived neurotrophic factor (GDNF), nerve growth factor (NGF), histone deacetylase (HDAC) 1 and Methyl CpG binding protein (MeCP) 2 in the brain following thoracic contusive SCI. In addition, we evaluated the number of neuronal cell in secondary motor cortex (M2 area) and the number of astrocyte in hippocampus and thalamus by immunohistochemistry. **Results:** The expression of BDNF levels were elevated compared with control group at week 1 and 2 after SCI and there was significant difference in week 2 week after injury ($p < 0.05$). The expression of NGF levels were elevated at week 2 and 4 compared with control group, but these difference were not significant ($p > 0.05$). The GDNF levels were significantly elevated at day 3 and week 1 compared with control group ($p < 0.05$). The difference of HDAC1 expression levels significantly elevated at week 1 compared with control group ($p > 0.05$). The difference of MeCP2 levels were not significant at day 3 and week 1, 2, 4 and 8 compared with control group ($p > 0.05$). The number of M2 neurons in SCI group was somewhat less than control group. While, the number of astrocyte in hippocampus was increased in SCI group compared with the control

group. **Conclusion:** These results demonstrate that the up-regulation of BDNF, GDNF and HDAC1 may play an important role in brain reorganization after SCI.

BIOSCIENCES IN REHABILITATION: BIOLOGICAL MECHANISM OF INTERVENTIONS (E.G. PAIN RELIEF, MOTOR LEARNING)

843

EFFECTS OF CONSTRAINT-INDUCED MOVEMENT THERAPY (CIMT) ON BRAIN GLUCOSE METABOLISM OF CEREBRAL ISCHEMIC RATS: A MICRO PET/CT STUDY

Y. Bai¹, Y.Y. Li², B. Zhang², C. Li², P.L. Liu², D. Liang²,
W.Q. Bao³, Y.Y. Kong³, F.Y. Jiao³, Y.H. Guan³

¹Shanghai, China, ²Huashan Hospital- Fudan University, Department of Rehabilitation Medicine, Shanghai, China, ³Huashan Hospital- Fudan University, PET Center, Shanghai, China

Introduction/Background: CIMT has been reported that it can improve functions in both patients with stroke and ischemic rats. However, the underlying mechanism of its therapeutic effects in stroke remains unclear. The current study is to observe the neuroprotective effect of CIMT in ischemic rats using positron emission tomography (PET). **Material and Methods:** Cerebral ischemia was induced in rats using the middle cerebral artery occlusion (MCAO) procedure, with the regional cerebral blood flow monitored in vivo by laser Doppler flowmetry. Adult male Sprague Dawley rats were divided into the Normal group ($n=4$), Sham group ($n=6$), Control group ($n=6$), and the CIMT group ($n=6$). CIMT started at d8 post-operatively and lasted for 2 weeks. Micro PET/CT imaging with ¹⁸F-FDG was used to evaluate glucose metabolism of different parts of the brain at baseline, before and after treatment, respectively. Behavioral recovery was evaluated by the balance beam walking test (BBW) and foot fault test (FFT) in all rats. **Results:** CIMT improved behavioral performance in ischemic rats as evaluated by FFT and BBW tests. After 2 weeks' CIMT, compared with the other groups, the CIMT group had lower standardized uptake values (SUVs) in some areas of the ipsilateral hemisphere, such as cingulate, motor, somatosensory regions of the cortex, as well as hippocampus anterodorsal ($1.80\pm 0.10\%$ vs. $1.92\pm 0.08\%$, $1.32\pm 0.14\%$ vs. $1.48\pm 0.09\%$, $1.18\pm 0.14\%$ vs. $1.42\pm 0.15\%$, $1.68\pm 0.09\%$ vs. $1.79\pm 0.06\%$, all $P < 0.05$); and higher SUVs in the acbcore shell and cortex insular of contralateral hemisphere at d22 ($2.07\pm 0.06\%$ vs. $1.96\pm 0.12\%$, $1.97\pm 0.14\%$ vs. $1.82\pm 0.07\%$, both $p < 0.05$). **Conclusion:** CIMT improved the neurological outcome in cerebral ischemic rats, possibly associated with the increased glucose utilization in the contralateral hemisphere.

844

DIFFERENT FREQUENCY OF ELECTRIC ACU- PUNCTURE TREATMENT OF HAND THE INFLU- ENCE OF THE BLOOD FLOW VELOCITY IN PATIENTS WITH CEREBRAL APOPLEXY

Xiaoli Zhang, Jie Jia

Department of Rehabilitation, Huashan Hospital, Fudan University, Shanghai, China

Objective: To study the different frequency of electric acupuncture treatment of hand the influence of the blood flow velocity in patients with cerebral apoplexy. **Methods:** 61 patients with cerebral apoplexy were respectively adopted 2 HZ and 10 HZ cupping therapy, two days in a row, each patient curative frequency sequence in excel table random sort; Acupuncture points with ipsilateral upper hand shou san li and wai kuan, 20 min per treatment. Including

every time before and after treatment with Shanghai university, independent research and development of new high resolution laser blood flow imaging system to evaluate the blood flow velocity in the patients with hand. **Results:** After 2 HZ and 10 HZ cupping treatment, patients with hand blood flow velocity was increased, the difference was statistically significant, and the treatment results of 2 HZ more significantly than 10 HZ. **Conclusion:** The electric acupuncture treatment can promote the hand stroke patients blood flow velocity, accelerate the limb blood circulation, has a positive effect on upper limb function of patients with stroke after rehabilitation, and 2 HZ is better than 10 HZ.

845

HIGH-FREQUENCY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION IMPROVES FUNCTION- AL RECOVERY, AND PROMOTES NEUROGENESIS POSSIBLY THROUGH BDNF SIGNALING PATH- WAYS IN A RAT MODEL OF ISCHEMIC STROKE

J. Luo¹, X. Hu¹, L. Zhang¹, Q. Zhang¹, H. Zheng¹, L. Li¹

¹Affiliated 3rd Hospital of Sun Yat-san University, Rehabilitation Medicine, Guangzhou, China

Introduction/Background: Repetitive transcranial magnetic stimulation (rTMS) has rapidly become an attractive therapeutic approach for stroke. However, its underlying mechanism remains elusive. This study was performed to investigate whether high-frequency rTMS can improve functional recovery or promote neurogenesis, and to examine the role of BDNF-TrkB pathways in high-frequency rTMS-induced effects in a rat model of middle cerebral artery occlusion (MCAO). **Material and Methods:** A total of 56 adult wistar rats after MCAO were randomly divided into four groups: 20 Hz group ($n=16$), iTBS group ($n=16$), control group (Sham stimulation group, $n=16$) and sham-operated group ($n=8$, filament was not inserted into the artery). The rats were sacrificed on the 7 and 14 days after evaluating the neurological function. And neurogenesis around the peri-infarction region were checked with the specific marker Ki67, Nestin, DCX, CD31 and NeuN. **Results:** The results showed that 20 Hz rTMS and 50 Hz iTBS significantly improved neurological function and reduced infarct volume. Moreover, they promoted neurogenesis as evidenced by the increased Ki67/Nestin-positive and Ki67/DCX-positive cells in ischemic hemisphere. These beneficial effects were in conjunction with the elevated BDNF and TrkB proteins. **Conclusion:** High-frequency rTMS improves functional recovery and promotes neurogenesis possibly through BDNF signaling pathways in ischemic rats.

846

EFFECTS OF CHRONIC EXERCISE ON RENAL DYSFUNCTION IN THE RATS WITH POLYCYSTIC KIDNEY

T. Miura¹, O. Ito¹, M. Komatsu¹, M. Abe¹, Y. Ogawa¹, N. Mori¹, M. Kohzuki¹

¹Tohoku University Graduate School of Medicine, Internal Medicine and Rehabilitation Science, Sendai, Japan

Introduction/Background: Polycystic kidney (PCK) disease is an inherited renal cystic disease characterized by the development of renal cysts and the decline of renal function. Several studies reported that chronic exercise (Ex) has renal protective effects in animal models of kidney diseases. However, no studies have reported the effects of Ex in animal models of PCK. Therefore, we assessed the effects of Ex on renal function in the rats with PCK. **Material and Methods:** Six week-old, male PCK rats were divided into two groups, a sedentary (Sed) group and an Ex group. The Ex group underwent a moderate exercise with treadmill running for 8 weeks (20 m/min for 60 min/day, 5 days/week). The rats were housed once two weeks in a metabolic cage and their 24 hours urine samples

were collected. After 8 weeks, the rats were killed by decapitation, and trunk blood was collected. **Results:** After 10 week-old, body weight significantly lower in the Ex group than in the Sed group. Kidney weight/body weight or blood pressure were not difference between the groups. In laboratory data, urinary protein excretion significantly lower in the Ex group than the Sed group (192.4 ± 31.2 vs. 71.1 ± 5.8 mg/day at 14 week-old, $p=0.02$) as well as blood urea nitrogen (18.1 ± 0.3 vs. 16.4 ± 0.4 mg/dl, $p=0.013$) and serum creatinine (0.35 ± 0.0 vs. 0.32 ± 0.0 mg/dl, $p=0.01$). **Conclusion:** Ex has renal protective effects in the PCK rats independently of systemic blood pressure.

847

CORRELATION BETWEEN EXPRESSION OF HSP 70 AND OPIOID MU RECEPTOR IN LOW-LEVEL LASER THERAPY

I.L. Wardhani¹, A. Andriati¹, I. Subadi¹, E. Rianto², A.C. Pitaloka³, R. Hendrarti¹

¹School of Medicine Airlangga University/Dr. Soetomo General Hospital, Physical Medicine and Rehabilitation, Surabaya, Indonesia, ²School of Medicine Airlangga University, Biochemistry, Surabaya, Indonesia, ³School of Medicine Airlangga University, PBL Unit, Surabaya, Indonesia

Introduction/Background: Low-Level Laser Therapy stimulates cell stress and stressed cells tend to express both heat shock protein 70 (HSP 70) and opioid substances. The purpose of this study is to find correlation between the expression of HSP 70 and Opioid Mu receptor. **Material and Methods:** Thirty Wistar strain rats with complete Freund adjuvant (CFA)-induced inflammatory pain were divided into 3 groups: K0 ($n=10$), the normal rats; K1 ($n=10$), the CFA-induced rats; and P1 ($n=10$), the CFA-induced rats with low-level laser therapy. Immunohistochemical examinations using monoclonal anti-HSP 70 and Opioid Mu receptor antibodies were carried out on samples taken from the plantar skin of the foot and spinal cord. Data was analyzed using anova and pearson correlation with SPSS 17. **Results:** There was a significant elevation in the expression of HSP 70 on the low-level laser therapy group compared with control (17.7 ± 1.767 and 11.00 ± 0.919), $p \leq 0.05$. There was also a significant elevation in the expression of opioid Mu receptors on the low-level laser therapy group compared with the control group (13.20 ± 1.751 and 3.40 ± 0.843), $p \leq 0.05$. and there was correlation between the expression of HSP 70 and opioid Mu receptor ($p \leq 0.05$). **Conclusion:** There is a correlation between the expression of HSP 70 and the expression of opioid Mu receptor after Low-Level Laser Therapy.

848

THE EFFECTS OF LOW- AND HIGH-FLUENCE LASER THERAPY ON CARTILAGE DEGENERATION IN RATS WITH ADJUVANT-INDUCED ARTHRITIS

C.C. Yang¹, Y.L. Hsieh²

¹Cheng Ching General Hospital, Physical Medicine and Rehabilitation, Taichung, Taiwan, ²China Medical University, Department of Physical Therapy, Taichung, Taiwan

Introduction/Background: Low-level laser therapy (LLLT) is the proven and recommended intervention for managing rheumatoid arthritis (RA) on pain, but dosage on delay of cartilage degeneration is still controversy. The purpose of this study was to investigate the effects of combined use of low- or high-fluence laser therapy (LILT or HILT) on pain and inflammation in rats with complete Freund's adjuvant-induced arthritis (CIA). **Material and Methods:** Monoarthritis was induced in adult male Sprague-Dawley (250–300 g) via intraarticular injection of complete Freund's adjuvant into the tibiotarsal joint. The CIA animals were divided into five groups: control (no treatment), LILT, HILT, sham-LILT and sham-HILT groups. Three days after CIA, LILT (4.5 J/cm^2) and HILT (72 J

cm^2) were administered for 10 consecutive days. Functional evaluations of edema and pain behavior, histology, matrix metalloproteinase-3 (MMP3) and cartilage oligomeric matrix protein (COMP) immunofluorescence staining were performed. **Results:** The mechanical withdrawal pain threshold and swelling were significantly improved in HILT group when compared with those in the LILT, sham-HILT, sham-LILT and control groups. HILT also significantly reduced MMP3-like immunoreactivity and enhanced in COMP-like immunoreactivity in cartilage. **Conclusion:** HILT has a prominent effect on reduction of nociception and chondrocyte degradation in RA model. It was possible to suggest that the LLLT at high fluence has a positive effect on prevention of RA pathological progression.

BIOSCIENCES IN REHABILITATION: MISCELLANEOUS

849

INTERLEUKIN-6 RECEPTOR POLYMORPHISMS CONTRIBUTE TO THE NEUROLOGICAL STATUS OF KOREAN PATIENTS WITH ISCHEMIC STROKE

K. Jinkyu¹, Y. Seung Don Yoo², K. Hee-Sang², K. Dong Hwan²

¹Seocheon-gun Public Health Center, Department of Physical Medicine & Rehabilitation, Seocheon-gun, Republic of Korea, ²College of Medicine- Kyung Hee University, Department of Physical Medicine & Rehabilitation, Seoul, Republic of Korea

Introduction/Background: To investigate whether single nucleotide polymorphisms (SNPs) of interleukin 6 receptor (IL6R) gene contribute to the neurological status of Korean patients with ischemic stroke (IS). **Material and Methods:** One hundred and twenty IS patients and 289 control subjects participated in this study, and we selected and genotyped two single nucleotide polymorphisms (SNPs) of IL6R gene (rs4845617, 5TUR; rs8192282, Ala31Ala) by direct sequencing. IS patients were classified into the clinical phenotypes according to the National Institutes of Health Stroke Survey (NIHSS) score and the Modified Barthel Index (MBI) score. We obtained odds ratios, 95% confidence intervals, and p values adjusting age and sex as covariables. Hardy-Weinburg equilibrium was evaluated by chi-squared test and multiple logistic regression models were used to analysis genetic data. Haploview version 4.2 was also used to determine the linkage disequilibrium block and haplotype between 2 SNPs, and clinical features in IS patients. **Results:** In SNP rs4845617, the AG genotype frequency is significantly higher in the NIHSS scores < 6 group (NIHSS2), and the A allele frequency is higher in the NIHSS scores ≥ 6 group (NIHSS1) in IS patients ($p=0.011$ in codominant 2 model, $p=0.006$ in recessive model, and $p=0.008$ in log-additive model). Allele frequencies of rs4845617 and rs8192282 demonstrated no significant difference in IS cases and controls. The frequency of AG haplotype is higher in the NIHSS1 group and that of GG haplotype is higher in the NIHSS2 group in IS patients ($p=0.014$, $p=0.0024$). **Conclusion:** These results suggest that rs4845617 of IL6R gene may be associated with neurological outcome of Korean patients with ischemic stroke.

850

PREDICTIVE VALUE OF INTRAOPERATIVE BULBOCAVERNOSUS REFLEX DURING UNTETHERING SURGERY FOR POST-OPERATIVE VOLUNTARY VOIDING

K. Kim¹, M.K. Oh¹, H. Hwang¹, H. Bang¹, S. Chun¹, J.H. Cho¹, S.G. Chung¹

¹Seoul National University Hospital, Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: Neurogenic bladder is one of the major disabilities in tethered cord syndrome. Intraoperative monitoring

of bulbocavernosus reflex (BCR) is known to be helpful to predict and prevent bladder dysfunction after untethering surgery. However, its predictive value for post-operative voiding function has not been confirmed in children with spinal dysraphism. **Material and Methods:** We performed a retrospective review of 114 pediatric patients who underwent untethering surgery between Jan 2013 and May 2015. We excluded 8 patients whose diagnosis was not spinal dysraphism, 12 patients in whom BCR was not performed, and 30 patients whose BCR at baseline was not obtained. Finally, 64 patients were enrolled and classified based on whether BCR was preserved or lost during surgery. As a functional outcome, voluntary voiding without need of assistive technique (such as intermittent catheterization or Valsalva maneuver) was checked at admission, at discharge, 2 months, 6 to 12 months after surgery. **Results:** Among the 64 patients, BCR was lost during surgery in 12 and preserved in 52. The positive predictive value of intraoperative BCR (failure to void/loss of BCR) was 58.3%, 50%, and 44.4% at discharge, 2 months, and 6–12 months after surgery, respectively. The negative predictive value (independent voiding/preservation of BCR) was 67.3%, 76.9%, and 91.7% at the same time points. The sensitivity and specificity of BCR was 29.2%, 87.5% at discharge, 33.3%, 87.0% at 2 months, and 57.1%, 86.8% at 6–12 months. **Conclusion:** Intraoperative BCR during untethering surgery in children with spinal dysraphism can predict long-term bladder function with high specificity (86.8%) and moderate sensitivity (57.1%). It indicates that when BCR is preserved, voluntary voiding function can be reliably expected after surgery.

851

THE MECHANISM OF VAGUS NERVE STIMULATION(VNS) IN THE TREATMENT OF A MODEL RAT WITH ACUTE FOCAL CEREBRAL ISCHEMIA

X. Lu¹, T. Yan², D. Jin², C. Zhuangping²

¹Guangdong, China, ²Sun Yat-sen Memorial Hospital, Department of Rehabilitation, Guangdong, China

Introduction/Background: To investigate the mechanism of vagus nerve stimulation (VNS) in the treatment of a model rat with acute focal cerebral ischemia. **Material and Methods:** 30 adult male Sprague-Dawley (SD) rats were randomly divided into 6 groups ($n=5$), using a computer program. These groups involve a sham operation group (sham group), a model group of middle cerebral artery occlusion (MCAO group), a VNS-treated 30 minutes after MCAO group (VNS group), a VNS group but pre-treated by α -bungarotoxin intracerebroventricularly (antagonist group), a VNS group but pre-treated by saline intracerebroventricularly (saline group), and a PHA-543613-treated 30 minutes after MCAO group (agonist group). While α -bungarotoxin is an antagonist of $\alpha 7$ nicotinic acetylcholine receptor ($\alpha 7$ nAChR), PHA-543613 is an agonist of $\alpha 7$ nAChR. The MCAO group was induced by intraluminal suture technique. The VNS was applied with the stimulation intensity of 0.5 mA, the interval was 0.5 ms, and the frequency was 20Hz. Stimulation was induced once every 5 min within 1h and each lasted for 30s. At 24 h after modeling of MCAO or the sham of MCAO of each group, the neurobehavioral scores were measured. The relative quantity of $\alpha 7$ nAChR was calculated through Western Blot. **Results:** The mean neurobehavioral scores of each group are 17.25 of sham group, 8.75 of MCAO group, 11 of VNS group, 9 of antagonist group, 12 of saline group, 11.75 of agonist group. The mean percentage that brain infarct volume account for the opposite half of the brain are 0 of sham group, 0.63 of MCAO group, 0.24 of VNS group, 0.51 of antagonist group, 0.27 of saline group, 0.28 of agonist group. The mean ratios that the gray value of $\alpha 7$ nAChR account for the gray value of GAPDH are 0.52 of sham group, 0.46 of MCAO group, 0.63 of VNS group, 0.53 of antagonist group, 0.63 of saline group, 0.69 of agonist group. The results showed higher neurobehavioral score, less infarct volume, more expression of $\alpha 7$ nAChR of VNS group and agonist group comparing with that of MCAO group and antagonist group ($p<0.05$). **Conclusion:**

VNS might take its neuroprotective role through the mediation of $\alpha 7$ nAChR in the treatment of a model rat with acute focal cerebral ischemia.

852

EFFECT OF PAIRED ASSOCIATIVE STIMULATION ON MOTOR CORTEX EXCITABILITY IN RATS: A PRELIMINARY STUDY

X. Zhang¹, T. Guo¹

¹Tongji Hospital- Tongji Medical College- Huazhong University of Science and Technology, Rehabilitation Medicine, Wuhan, China

Introduction/Background: Paired associative stimulation (PAS) has influence on motor cortex excitability in human, but its probable mechanism remains unclear. In this study, we explored whether PAS can affect motor excitability in rats, then investigated the potential mechanisms. **Material and Methods:** We recorded resting motor threshold (RMT) and somatosensory evoked potentials (SEP) of ten rats at first. The non-sedated rats were held by flexible fixator and recorded RMT at gastrocnemius muscle. While SEP of the tibial nerve were recorded with subdermal electrodes in sedated rats and calculated the P1 latency, N1 latency. Interstimulus interval (ISI) was determined by plus or minus 2.4, 4, 8, 10, 12ms on the basis of P1 latency respectively, that is, the ISIs are 1, 3, 5, 9, 11, 15, 17, 23 and 25ms. Then fifty-five SD rats were randomly divided into PAS groups, TMS (only) group, PNS (only) group, received PAS intervention with different ISIs, TMS intervention and PNS intervention, respectively. The RMT and amplitude of motor evoked potential (MEP) were recorded before and after intervention. **Results:** The average RMT is (35±5.27)%. The latency of N1 and P1 are (13.6±1.14) ms and (20.3±1.02) ms. When electric stimulation of the left tibial nerve at ankle followed 5ms later by a TMS pulse over motor cortex, the MEP amplitude significantly decreased compared with pre-intervention, RMT increased (Pre: 28.4±9.10%, Post: 33.6±6.11%), but without significant difference; the MEP amplitude significantly increased when electric stimulation of the left tibial nerve at ankle followed 15ms later by a TMS pulse over motor cortex, compared with pre-intervention, RMT decreased (Pre: 35.6±6.27%, Post: 28.0±8.37%), but without significant difference. In PAS groups with other ISIs, TMS group and PNS group, the RMT and MEP amplitude slightly changed, compared with before, but without significant difference before and after intervention. **Conclusion:** PAS can influence the motor cortex excitability in rats. Whereas TMS (only) and PNS (only) probably have slight effect on it.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PHYSICAL AND REHABILITATION MEDICINE DIAGNOSTICS AS RELATED TO ORGAN SYSTEMS AND BODY FUNCTIONS - DIAGNOSIS AND ASSESSMENT OF MENTAL FUNCTIONS (INCLUDING NEUROPSYCHOLOGICAL ASSESSMENT)

853

WHETHER CARRYING APOE4 OR NOT SEEMS TO BE NOT AN INFLUENCE FACTOR ON THE REHABILITATION OUTCOME FOR PEOPLE WITH SPINAL CORD INJURY

J. Zhou, L. Yao, X. Yun

2st Hospital of Kunming Medical, Rehabilitation Medical Department, Kunming, China

Introduction/Background: Preliminary evidence showed that the ApoE4 allele was associated with poorer rehabilitation outcomes, while the ApoE3 and ApoE2 were associated with better responses

in people with central nervous system impairment. But the difference APOE e4 allele status in sensory–light touch recovery and motor recovery during rehabilitation need warrant further study. *Material and Methods:* 47 people with spinal cord injury from 2014 through 2015 participated in this study. Median age was 37 years (range 23–51), 32 were male (68%). The restriction fragment length polymorphism polymerase chain reaction (PCR-RFLP) and gene sequencing were used to analyze ApoE genotyping. All participants were divided into ApoEε4 carrier group and ApoEε4 non-carrier group accordingly. A comprehensive rehabilitation program with the dosage of 40min/session per day, 5 sessions per week over 20 sessions was applied to all the participants. Outcome measures were American Spinal Injury Association (ASIA), Functional Independence Measurement (FIM). The change scores of these measurements between the two groups of participants were compared. *Results:* Eight patients were classified as ApoEε4 carrier, while 39 participants were non-ApoEε4 carrier. Baseline assessment showed that there were no significant differences at the injury severity or functional level for these two groups of participants. Both groups of participants improved significantly in light touch, pinprick sensation, motor scores and FIM scores after the rehabilitation program ($p < 0.01$). The change scores (ASIA or FIM scores), however, were not significantly. *Conclusion:* Whether carrying ApoEε4 or not seems to be not an influence factor on the rehabilitation outcome for people with spinal cord injury. The association between ApoEε4 and rehabilitation prognosis for people with spinal cord injury remains to be explored.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PHYSICAL AND REHABILITATION MEDICINE DIAGNOSTICS AS RELATED TO ORGAN SYSTEMS AND BODY FUNCTIONS - DIAGNOSIS AND ASSESSMENT OF FUNCTIONS OF THE CARDIOVASCULAR, HAEMATOLOGICAL, IMMUNOLOGICAL, AND RESPIRATORY SYSTEMS

854

NATURAL KILLER CELL ACTIVITY IN PERSONS WITH CERVICAL SPINAL CORD INJURY INCREASED AFTER THE WHEELCHAIR HALF MARATHON RACE

M. Banno¹¹Higashimurogun, Japan

Introduction/Background: We reported that individuals with cervical spinal cord injury (CSCI) showed no increase in natural killer cell activity (NKCA) in response to 20-min arm exercise. It could be argued that this lack of response was due to the short duration and intensity of the exercise. *Material and Methods:* The present study compared the effects of wheelchair half marathon race on NK cell count, NKCA and other hematological and hormonal parameters in 6 subjects with CSCI and 7 control subjects with spinal cord injury between T4 and L1 (SCI), before, immediately after and 2 hour after recovery. *Results:* NK cell counts increased at both time points after the race in SCI, but not in CSCI, compared with before the race. NKCA increased immediately in both groups of subjects after the race, and then returned to the pre-race level at 2 hours after the race. Plasma cortisol did not change in both groups throughout the study. Plasma adrenaline increased sharply in SCI after the race, then returned to the pre-race level at 2 hours after the race, whereas no change was observed in CSCI throughout the study. *Conclusion:* The present study demonstrated that wheelchair half marathon race increases NKCA despite the lack of increase in plasma adrenaline in CSCI, suggesting the activation of NKCA by mechanisms other than circulating adrenaline level.

855

CARDIOVASCULAR PHYSIOLOGICAL CHANGES IN SCUBA DIVING - ANALYSIS OF DISABLED MALE DIVERS DUE TO TBI

T. Isaji¹, C. Sasaki², M. Yamamoto¹, Y. Honda¹, N. Ogata¹¹Teikyo University School of Medicine, Rehabilitation Medicine, Tokyo, Japan, ²Kumamoto Health Science University, Rehabilitation, Kumamoto, Japan

Introduction/Background: Scuba diving (diving) is popular among not only healthy young people but also elderly and disabled people as a recreational sport. There are however only few reports for the physiological influences on the body during diving and the standards of the safety and limit for the disabled people have not been established yet. Purpose of this study is to obtain the basic data of the changes of the cardiovascular physiological index during diving in disabled people. *Material and Methods:* Two disabled male divers (A: 56-year-old total dependent and B: 43-year-old partial dependent) due to traumatic brain injury for around twenty years were recruited. Electrocardiogram, blood pressure (BP), and oxygen saturation (SpO₂) were recorded by the Holter recorder for 24 hours, including normal daily activities (daytime), sleeping and two divers with special dry suit for waterproofing. Each diving (20 m/40 minutes) was performed by boat entry in the sea of Okinawa Japan. *Results:* Maximum heart rate (HR) was recorded in the daytime, and minimum HR was recorded during the daytime and sleeping. Although average HR during diving in subject B was significantly higher than that recorded during other time, it was significantly lower in subject A. Some ventricular and supraventricular paroxysmal contractions were observed equally throughout measurement time in both subjects. Maximum and minimum systolic BP was recorded in the daytime and during sleeping, respectively. Average systolic BP during diving was significantly higher than that recorded only during sleeping in subject A, whereas both during daytime and sleeping in subject B. Average SpO₂ during diving was significantly higher than that observed during other time in both subjects. *Conclusion:* There were no specific changes in the disabled male during diving regarding HR, BP and SpO₂, all within the usual physiological variance. However, low active total dependent diving, “Towing-diving”, may suppress HR and could not elevate BP.

856

DEVELOPMENT OF QUANTITATIVE METHOD TO EVALUATE THORACOABDOMINAL MOVEMENT USING FIBER GRATING SENSORS

F. Liu¹, Y. Taki², K. Shimizu³, K. Tamura⁴, S. Tashiro¹, C. Miyata⁵, T. Otsuka⁶, T. Tsuji¹, K. Kaneko⁶, Y. Takino⁶, K. Tairaku⁶, A. Wada⁶, A. Anzai⁶, Y. Yamada⁶, Y. Otaka¹, K. Mizuno¹, Y. Aoki⁴, M. Liu¹¹Keio University, Rehabilitation Medicine, Shinanomachi, Japan, ²National Hospital Organization Tokyo Medical Center, Department of Rehabilitation, Tokyo, Japan, ³National Hospital Organization Utano Hospital, Department of Rehabilitation, Kyoto, Japan, ⁴Keio University, Department of Electronics and Electrical Engineering, Yokohama, Japan, ⁵National Hospital Organization Tokyo Medical Center, Department of Palliative Care, Tokyo, Japan, ⁶National Higashi-Saitama Hospital, Department of Rehabilitation Medicine, Hasuda, Japan

Introduction/Background: Researchers have reported various methods to quantify the respiratory movement in patients with respiratory dysfunction. However, these methods available have shortages in facility, convenience and clinical applicability. The purpose of this study is to develop a new method to quantify respiratory movement using fiber grating (FG) sensors with reliability and validity as well as clinical usefulness. *Material and Methods:* The chest wall movement was measured in ten healthy subjects according to

a method of Respiratory Movement Evaluation Tool (RMET) using FG sensors 3 times to test inter- and intra-rater reliability. In addition, the values of spirometry were simultaneously measured to assess the validity of RMET. Furthermore, in order to test its clinical applicability, the same measurement was performed at bedside in three patients with Duchenne muscular dystrophy (DMD). *Results:* The real time recordings of thoracoabdominal movements of 6 divided areas within 10 minutes beginning from equipment preparation was possible with this new method. Because of its portability, the measurement was possible at any place such as bedside and rehabilitation room without imposing a burden to the participants. In healthy persons, the Intraclass correlation coefficients (ICCs) (1,1) and ICCs(2,1) were above 0.82. Significant correlations were observed between the respiratory amplitudes measured with RMET and the tidal volumes measured with spirometry. In patients with DMD, the ICCs(1,1) and ICCs(2,1) were above 0.84. The respiratory amplitudes measured with our method significantly correlated with tidal volumes. *Conclusion:* We developed a novel quantitative method; RMET for evaluation of respiratory movement using FG sensors that is easy-to-use and clinically feasible. RMET demonstrated sufficient reliability and validity even in patients with DMD as well as healthy persons.

857

APPLICATION OF CARDIOPULMONARY TEST IN PATIENTS WITH LATE-ONSET POMPE'S DISEASE UNDER ENZYME REPLACEMENT THERAPY - A CASE REPORT

C.Y. Yang¹, C.L. Chou¹

¹Taipei Veterans General Hospital, Physical Medicine and Rehabilitation, Taipei, Taiwan

Introduction/Background: Pompe's disease is a rare form of autosomal recessive disorder. The lack of endogenous α -glucosidase leads to the build-up of excessive glycogen to affect various body tissues, particularly in the heart, skeletal muscles, respiratory muscles, liver and nervous system. No definite treatment had been available until 2006 when α -glucosidase alfa was first introduced and approved for treatment of Pompe's disease. As an enzyme replacement therapy, it has shown to halt the deterioration of muscle dysfunction and to improve the functional capacity in late-onset Pompe's disease. *Material and Methods:* We present two cases, a pair of siblings, a brother and a sister, aged 16 and 19. They were diagnosed with late-onset Pompe's disease at the age of 6 and 9, respectively. For both, enzyme replacement therapy (Myozyme, 20 mg/kg every 2 weeks) was initiated in Oct 2007, and cardiopulmonary testing was conducted in 2013 and 2015 in Taipei Veterans General Hospital. *Results:* Over the two years of follow-up period, the percentage of predicted forced vital capacity (FVC) slightly declined; the maximum inspiratory/expiratory pressure remained unchanged in the brother but mild decline in inspiratory pressure was noted in the sister. However, the cardiac capacity declined gradually in both siblings regarding the maximal oxygen consumption as well as functional aerobic impairment value. *Conclusion:* This case highlights the importance of cardiopulmonary exercise testing in monitoring the pulmonary and cardiac capacity in patients with late-onset Pompe's disease under enzyme replacement therapy. The results of our subsequent observation correspond to the previous studies suggesting that enzyme replacement therapy alone could not completely halt the deterioration of cardiopulmonary function. Respiratory muscle training and aerobic training, both equally critical in maintaining the cardiopulmonary function in the population having late-onset Pompe's disease, should be built into the rehabilitation strategy.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PHYSICAL AND REHABILITATION MEDICINE DIAGNOSTICS AS RELATED TO ORGAN SYSTEMS AND BODY FUNCTIONS - DIAGNOSIS AND ASSESSMENT OF FUNCTIONS OF THE DIGESTIVE, METABOLIC, AND ENDOCRINE SYSTEMS

858

SWALLOWING FUNCTION AND NUTRITIONAL STATUS IN COMMUNITY-DWELLING ELDERLY: COMPARISON WITH COMMUNITY-DWELLING YOUNG ADULTS

S.C. Ahn¹, C. Kang Hee¹

¹Chungnam National University School of Medicine, Department of Rehabilitation Medicine, Daejeon, Republic of Korea

Introduction/Background: As the entry to an aging society, the swallowing impairment, causing the malnutrition, dehydration and aspiration pneumonia, was important social concerns. We investigated the effects of aging on swallowing function and nutritional status. *Material and Methods:* A total of 30 community-dwelling elders (CDE), in which videofluoroscopic swallowing study (VFSS) with plain yogurt, porridge, rice, 2.5 ml and 5 ml water, fiberoptic endoscopic evaluation of swallowing (FEES) and blood test were conducted. Videofluoroscopic dysphagia scale (VDS), the American Speech-Language-Hearing Association National Outcome Measurement System (ASHA NOMS), modified penetration-aspiration scale (mPAS), the number of mastication, albumin level and total lymphocyte count (TLC) were measured. The tooth condition and Swallowing Quality of Life (SWAL-QoL) questionnaire were checked. The values were compared to those of community-dwelling young adults (CDY). *Results:* Mean age was 72.8±4.2 years in CDE and 22.2±1.6 years in CDY. The incidence of dysphagia was 23.3% in CDE, 3.3% in CDY. At least one or more abnormality of VDS findings was observed in 27 volunteers (90.0%) in CDE and 20 volunteers (66.7%) in CDY. In coating on the pharyngeal wall among sub-scale of VDS, CDE group showed significantly higher prevalence than CDY group. The CDE group revealed significantly lower SWAL-QoL, shorter oral transit time, longer pharyngeal delay time, lower ASHA-NOMS, larger total VDS score and lower albumin level than CDY group. Penetration on a liquid was showed in both group. *Conclusion:* Elderly population had poorer swallowing function compared with healthy young adults. And, unrecognized penetration on a liquid was possible to occur in healthy population regardless of age. Therefore, it was additional point to be considered that unrecognized swallowing problems could also occur in healthy population.

859

THE RELIABILITY OF QUALITATIVE ANALYSIS OF VIDEOFUOROSCOPY SWALLOWING STUDY

D. Meng¹, Y. Wang², G. Wan², X. Wei², C. Xie², H. Wu², Z. Dou²

¹Guangzhou, China, ²3rd Affiliated Hospital- Sun Yat-sen University, Department of Rehabilitation, Guangzhou, China

Introduction/Background: To apply the digital acquisition and analysis system of videofluoroscopy in analyzing temporal and kinematic parameters for Videofluoroscopy Swallowing Study and verify the reliability of this method. *Material and Methods:* 18 patients with dysphagia due to different causes received videofluoroscopy swallowing study (VFSS) and were requested to completed six swallows (3 ml, 5 ml thin liquid, thick liquid, and paste with 60% w/v Barium Sulfate Suspension respectively in the natural sitting position. Two raters analyzed the video twice at an interval of 4 weeks separately. Chosen parameters included oral transit

time (OTT), softpalate elevation time (SET), hyoid movement time (HMT), laryngeal closure time (LCT), UES opening time (UOT), hyoid anterior movement (HAM), hyoid superior movement (HSM), UES opening diameter (UOD) and pharyngeal constriction rate (PCR). *Results:* Reliability varied among different parameters. Most parameters presented with an acceptable reliability besides HAM and HSM. *Conclusion:* Using the digital acquisition and analysis system of videofluoroscopy showed acceptable reliability and could be promoted in clinical researches regarding swallowing.

860

PLASMA INTERLEUKIN-6 CHANGES AT WHEELCHAIR BASKETBALL GAMES OF SPINAL CORD INJURY PERSONS

Y. Nishimura¹, T. Nakamura¹, Y.I. Kamijo¹, M. Banno¹, T. Kinoshita¹, F. Tajima¹

¹Wakayama Medical University, Rehabilitation Medicine, Wakayama, Japan

Introduction/Background: Many physicians are already known, that sports activities are recommended for wheelchair-bound handicapped individuals. Ludwig Guttmann started wheelchair basketball in 1944 through a rehabilitation program in England, by adapting the existing sport to wheelchair use. Today, wheelchair basketball is one of the major sports practiced by individuals with disability. Pedersen et al. identified skeletal muscle as an endocrine organ that secretes cytokines and other peptides. Molecules mediating these endocrine effects are classified as 'myokines.' The first identified and most studied myokine is interleukin-6 (IL-6). IL-6 is markedly upregulated and released during the post-exercise period, and is known to enhance lipid oxidation, improve insulin-stimulated glucose uptake, and has anti-inflammatory effects. The magnitude of post-exercise rise in plasma IL-6 correlates with the exercise duration and intensity, the muscle mass involved in the mechanical work, and the endurance capacity of the muscle. The purpose of this study is to analyze the changes in plasma IL-6, tumor necrosis factor- α (TNF- α) and C-reactive protein (CRP) during wheelchair basketball game. *Material and Methods:* Five wheelchair basketball players with SCI voluntarily participated in this study. All subjects were healthy except for their SCI-related medical problems. Blood sampling were conducted approximately 1 hour before the game warm-up time, and immediately after the game. IL-6, TNF- α , CRP and blood cell counts were measured. *Results:* Plasma IL-6 and monocyte numbers were significantly increased immediately after exercise in all subjects, but TNF- α and CRP showed no changes after the game. The results showed a significant relationship between exercise-induced increases in IL-6 and accumulated play duration, although the IL-6 changes did not correlate significantly with the increased number of monocytes. *Conclusion:* This study demonstrated a significant increase in plasma IL-6 levels immediately after the wheelchair basketball game in individuals with SCI.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PHYSICAL AND REHABILITATION MEDICINE DIAGNOSTICS AS RELATED TO ORGAN SYSTEMS AND BODY FUNCTIONS - DIAGNOSIS AND ASSESSMENT OF NEUROLOGICAL, MUSCULOSKELETAL AND MOVEMENT RELATED FUNCTIONS (INCLUDING GAIT ANALYSIS, POSTUROGRAPHY)

861

EFFECTS OF CONCURRENT-TASK ON GAIT PERFORMANCE IN CHILDREN WITH TRAUMATIC BRAIN INJURY: A NARRATIVE REVIEW

R.A. Abdul Rahman¹, F.A. Hanapiah², H. Manaf¹

¹Universiti Teknologi Mara UiTM Puncak Alam Campus, Department of Physiotherapy, Puncak Alam, Malaysia, ²Institut Patologi-Perubatan Makmal dan Foresik I-PPerForM- Universiti Teknologi MARA- Malaysia, Discipline of Rehabilitation Medicine- Faculty of Medicine- Universiti Teknologi MARA-Malaysia, Sungai Buloh, Malaysia

Introduction/Background: Children with post-traumatic brain injury (TBI) may show deficits in a wide range of cognitive and functional mobility. Processing speed and attention deficit are common impairment existing post-injury. Gait performance in this population is characterized by high level of variability that is associated with poor balance. Concurrent-task is said to be particularly complex and demanding for the children following severe TBI as they have attention and processing speed deficit. Therefore, the purpose of this study is to review published articles regarding the effects of concurrent-task on gait performance in children with TBI. *Material and Methods:* Five databases were searched for relevant peer-reviewed studies. Keyword terms included 'traumatic brain injury', 'acquired brain injury', 'children', 'gait', 'walking', 'dual-task', and 'concurrent task'. The inclusion and exclusion criterion were identified. Studies related were included and summarized. Best-evidence synthesis was used to address the gaps. *Results:* Seven of the articles appraised, 3 studies were selected. Two studies examined the balance component and gait characteristic in children with post-TBI. Only one study investigates the influence of concurrent-task on gait performance in this population. *Conclusion:* Children with a post-TBI demonstrated with deterioration of gait performance as compared with typical developed children. The introduction of concurrent cognitive task caused significantly deterioration of gait speed, step length, step time and step length variability in children with post-TBI. Therefore, the addition of secondary task during walking may affect the gait performance. However, this study does not include concurrent motor task and assessment for attention deficit. Further research is required to explore in depth about the effects of concurrent task on gait performance.

862

EVALUATION OF BALANCE WHILE WALKING AND SIT-TO-STAND USING MOBILE MEASUREMENT SYSTEMS

S. Mohr¹, P. Breyer¹, T. Bochdansky¹, A. Sabo¹

¹University of Applied Sciences Technikum Wien, Institut of Sports Engineering and Biomechanics, Vienna, Austria

Introduction/Background: Mobility is one of the key parameters for health and consequently quality of life. Assessments like Romberg Test or Timed-up-and-go-Test (TUAG) ascertain the status of mobility and evaluate postural control in clinical environments whereas mobile measurement systems would provide movement data on a daily basis even in home environments. Purpose of this study was to evaluate parameters of postural control that can be live-monitored via mobile measurement sensors. *Material and Methods:* A system of five synchronized inertial measurement units (IMUs) (Motion Module, ETH Zürich, CH) was used to record motion data. The IMUs were applied on different landmarks of the upper body. Additionally, instrumented insoles equipped with force-sensing resistors acquired temporal gait parameters. For reference, VICON® 3D-motion-analysis recorded accurate spatial gait trajectories. Four subjects performed five repetitions of a predefined movement sequence, each comprised of five meter straight forward walking and sit-to-stand movements. Three such sequences were executed by increasing aggravated equilibrium conditions. First under regular conditions on concrete floor with good visibility, second on ky-Bounder® foam mat with good visibility, third on the foam mat with closed eyes. *Results:* Recorded IMU-data were transformed to global coordinates by a rotation matrix using quaternions. The initial ground contact was ascertained using thresholds of acceleration and angular velocity to define single strides. Stride duration was calculated and single strides were time normalized. These data

sets were analysed with regards to variability and abnormality of rotatory and translational indicators. Indicators such as the angular velocity demonstrated decreasing waviness under increasing aggravated equilibrium conditions, whereas the standard deviation rose. **Conclusion:** Stride sequence identification under instable walking conditions will always be a challenging task due to the indistinct detection of initial contact. Nevertheless, during increased movement instability, higher stride variability was identified. Results motivate to investigate development of systems for accompanying monitoring of upper body postural control and movement parameters.

863

RADIOGRAPHIC EVALUATION OF FLEXIBLE FLAT FOOT WITH RIGID FOOT ORTHOSES: 3 YEARS FOLLOW UP STUDY

K. Bong-ok¹, S. Bok¹, S.Y. Ahn¹, S.H. Park¹

¹Chungnam National University Hospital, Department of Rehabilitation Medicine, Daejeon, Republic of Korea

Introduction/Background: To evaluate the long term effects of a custom-made rigid foot orthosis (RFO) in children over six years old with pes planus. **Material and Methods:** The medical records of 24 children diagnosed with flexible pes planus, fitted with RFOs based on the inverted technique, and who had more than four consecutive radiological studies were reviewed. The resting calcaneal stance position (RCSP), anteroposterior talocalcaneal angle (APTCA), lateral talocalcaneal angle (LTTCA), the lateral talometatarsal angle (LTTMA), and calcaneal pitch (CP) of both feet were measured to evaluate foot alignment. A follow-up clinical evaluation with radiological measurements was performed after 12–18 months, 24–30 months, and after 36 months of RFO application. Post hoc analysis was used to test for significant differences between the radiological indicators and RCSP. **Results:** With RFOs, all radiological indicators and RCSP statistically significantly improved toward the corrective direction from baseline measurement except LTTCA. LTTCA showed improving tendency but not statistically significant. **Conclusion:** RFO is an effective treatment for flexible flat foot, which have significant improvement of radiologic findings after 24 months. The direction of improvement is hind foot to mid foot in flexible flat foot.

864

THE DIAGNOSTIC ACCURACY OF ULTRASONOGRAPHY IN CARPAL TUNNEL SYNDROME: A SYSTEMATIC REVIEW AND META-ANALYSIS

M.L. Buenavente¹, C. Suarez¹, F. Dela Cruz¹, M.V. Gesmundo¹, F. Regala¹

¹University of Santo Tomas Hospital, Department of Physical Medicine and Rehabilitation, Manila, Philippines

Introduction/Background: Ultrasonography has been widely used as a means of diagnosing carpal tunnel syndrome recently, and there is available evidence of the accuracy of the cross sectional area (CSA) of the median nerve at the wrist in the diagnosis of carpal tunnel syndrome. This systematic review and meta-analysis focused on the diagnostic accuracy of other ultrasound parameters aside from CSA, which includes flattening ratio, bowing of the flexor retinaculum, wrist-forearm ratio, color Doppler and mobility of the median nerve. **Material and Methods:** We did an extensive database search of studies published from 1990 to 2015 and found 21 studies with high methodological quality assessed by QUADAS and CASP. Data extracted were meta-analyzed using the MetaDiSc 1.4 software when possible. **Results:** Color Doppler [sensitivity= 0.83 (0.80–0.86); specificity=0.88 (0.82–0.92)] and wrist-forearm ratio [sensitivity=0.88 (0.83–0.93); specificity=0.93 (0.86–0.97)] were highly sensitive and specific, while flattening ratio only had moderate sensitivity [0.64 (0.60–0.67)], but with better specificity [0.86 (0.83–0.89)]. Bowing of the flexor retinaculum was moderately sensitive [0.76 (0.73–0.79)] and specific [0.70 (0.65–0.75)]. Transverse mobility of the median nerve was significantly reduced in patients with carpal

tunnel syndrome, while there is negligible reduction in longitudinal mobility compared to normal controls. **Conclusion:** The use of color Doppler and wrist-forearm ratio are promising ultrasound measures that can be used in diagnosing carpal tunnel syndrome.

865

AN ALGORITHM TO CALCULATE THE SPINE POSTURE USING A TRACKING MOBILE DEVICE

S. Butnariu¹, A.S. Nica², G. Mogan¹, G. Mologhianu², C. Antonya¹

¹Transilvania University Brasov, Automotive and Transport Engineering, Brasov, Romania, ²University of Medicine and Pharmacy "Carol Davila", Medical Rehabilitation Dpt., Bucharest, Romania

Introduction/Background: In fact, the problem is the following: after the identification and diagnosis of impaired posture, the doctor recommended to the patient some exercises and retain the recommended posture during current activities outside the hospital. Fairness execution of these exercises and, especially, to maintain a posture of the spine, left to the patient and his family. **Material and Methods:** The problem arises when the patient can not realize itself if his posture is correct. At this time, the patient needs a device to be able to identify and measure the position of the spine. Of course, this equipment will have to meet several conditions to work properly: not prejudice the position of the spine, not inconvenience the patient, without risk of electrical shock, do not contain materials that can harm the patient, easily fitted, easily maintained able to operate for at least 24 hours continuously, it can communicate with a PC/tablet/smartphone, contain a mechanism for warning in case of extreme positions, to adapt to any backbone to be designed according to different typologies the human body, to be easily handled, etc. **Results:** The proposed equipment must be able to identify the correct posture of the spine, depending on the measured values of sensors included therein. For this application, we proposed a vest type equipment that will take the patient and that will contain enough sensors to be used in calculating spine posture. This article wishes to propose an algorithm able to calculate the coordinates of several points, based on measurements made with portable equipment, in order to determine the spine posture. **Conclusion:** This article seeks to determine the spine posture depending on coordinates of certain points within the patient's body surface.

866

ABDOMINAL MUSCLE TRAINING WITH PRESSURE SENSOR

M. Cho¹, S.G. Chung¹, K. Kim¹, J. Lee², H. Hwang¹, J. Cho¹, H. Bang¹, S. Chun¹

¹Seoul National University Hospital, Rehabilitation Medicine, Seoul, Republic of Korea, ²Seoul National University, Interdisciplinary Program of Bioengineering, Seoul, Republic of Korea

Introduction/Background: Abdominal muscles are important for stable movement of the spine and abdominal muscle exercises have shown clinical value for rehabilitating patients. However, there is a lack of available devices to help train abdominal muscles. In this study, a belt-type pressure sensor is proposed, and its efficacy in muscle training is evaluated. **Material and Methods:** 17 healthy males were included in this study. Two pressure sensors were placed on a belt and the belt was worn around the waist of the subjects in order to visualize the pressure signals from abdominal contractions. The subjects were asked to follow 10 times step signals by applying pressure to the belts by contracting their abdominal muscles. Each subject repeated this exercise 5 times and the results were analyzed. First, the reaction time taken to achieve 70% of the target value was measured. Second, the stability of the applied pressure was measured by analyzing the root mean squared error of the pressure signal from the target value. The results from the subjects were analyzed using Wilcoxon signed-rank test. **Results:** The reaction time was improved between the first exercise session and the second session

($p=0.035$), as well as between the first session and the fourth session ($p=0.001$), and between the first session and the fifth session ($p=0.001$). This showed that the abdominal contraction time was reduced over all, likely due to training effect from repetitive exercising. The stability of the pressure signal also showed significant improvement between the first session and the fifth session ($p=0.39$). This showed that repetitive exercising can help stabilize abdominal muscles contraction. **Conclusion:** By using a belt-worn pressure sensor to monitor muscle activities during simple training exercises, abdominal muscle control can be effectively improved.

867

BRAIN PLASTICITY FOR UPPER EXTREMITY FUNCTION INDUCED BY THE ELECTROMYOGRAPHY-CONTROLLED FUNCTIONAL ELECTRICAL STIMULATION AMONG STROKE PATIENTS

Y. Hara¹, H. Fuseya¹, M. Tuchiya¹

¹Nippon Medical School, Department of Rehabilitation Medicine, Tokyo, Japan

Introduction/Background: Integrated volitional controlled electrical stimulation (IVES) which induces greater muscle contraction by electrical stimulation in proportion to the integrated EMG signal picked up is a novel EMG-controlled FES therapy. Brain function was evaluated by SPECT and Near-infrared spectroscopy (NIRS) which is a recently developed neuroimaging methodology. This study was designed to investigate hemiparetic upper extremity function and brain function facilitated by IVES in chronic stroke patients. **Material and Methods:** 12 chronic stroke patients with moderate to severe residual hemiparesis underwent 5 months of task-orientated rehabilitation therapy with IVES. Before and after treatment, upper extremity function was clinically evaluated with the Fugl-Meyer (FM) assessment. The brain function at rest was evaluated with SPECT among 5 of them. The cortical activation patterns with oxygenated hemoglobin (Oxy-Hb) concentration changes during voluntary hand or shoulder movement were assessed using multi-channel NIRS. **Results:** Prior to EMG-FES treatment, most subjects showed dominant perfusion in the contralesional sensory-motor cortex (SMC) in NIRS and SPECT. After EMG-FES treatment, SMC with dominant perfusion tended to change to the ipsilesional side during hand and shoulder movement (Figure). Cerebral blood flow in the ipsilesional SMC was greater during EMG-FES than during voluntary hand and shoulder movement. After EMG-FES therapy, upper extremity function improved in most patients with significant improvement in FM score. Clinical improvement was accompanied by an increase in ipsilesional SMC activation during VOL and EMG-FES condition. **Conclusion:** EMG-FES may have more influence on cortical perfusion than voluntary movement alone. The sensory motor integration due to EMG-FES may facilitate the perfusion of the ipsilesional SMC and result in functional improvement of hemiparetic upper extremity at long time chronic stage in stroke.

868

PRE- AND POST-OPERATIVE CERVICAL RANGE OF MOTION IN PATIENTS WITH CERVICAL MYELOPATHY MEASURED BY THREE-DIMENSIONAL MOTION ANALYSIS SYSTEM

H. Inokuchi¹, M. Tojima², H. Mano¹, Y. Ishikawa³, F. Yoshikawa⁴, A. Yozu⁴, S. Fujiwara⁴, Y. Nakahara⁴, J. Ohya⁵, T. Chikuda⁵, Y. Shinoda⁴, N. Ogata⁶, N. Haga³

¹Graduate School of Medicine - The University of Tokyo, Department of Rehabilitation Medicine, Tokyo, Japan, ²Waseda University, Faculty of Sport Sciences, Tokyo, Japan, ³Graduate School of Engineering- The University of Tokyo, Department of Precision Engineering, Tokyo, Japan, ⁴The University of Tokyo Hospital, Department of Rehabilitation, Tokyo, Japan, ⁵The University of Tokyo

Hospital, Department of Orthopaedic Surgery and Spinal Surgery, Tokyo, Japan, ⁶Teikyo University, Department of Rehabilitation, Tokyo, Japan

Introduction/Background: Neck has wide range of motion (ROM) required for physical activities of daily livings. Perioperative cervical ROMs in patients with cervical myelopathy have been reported to be limited in sagittal plane, but no reports in other directions. We aimed to measure ROMs and center of rotation (COR) of neck in three dimensions using our original neck motion measurement system using three-dimensional motion analysis system. **Material and Methods:** Patients planned a surgery for cervical myelopathy in our institution were recruited and their pre- and post-operative neck motions during flexion, extension, lateral bending and rotation, as well as those of controls matched for sex and age, were captured using VICON, a three-dimensional motion analysis system whose reliability and validity have been already confirmed. We calculated ROMs and CORs for each movement. For the ROMs of lateral bending and rotation, we re-categorized smaller ROM side as limited side and larger ROM side as unlimited side. We performed paired *t*-test to compare ROMs and CORs among controls and pre- and post-operative groups. **Results:** Nine patients (eight males; age 61.0±14.2 years) and nine controls (eight males; age 62.0±15.4 years) were enrolled in the study. Compared with the controls, pre-operative ROMs were limited in extension, limited-side lateral bending, and unlimited-side rotation, and post-operative ROMs in extension, limited- and unlimited-sides lateral bending, and unlimited-side rotation. No significant difference between pre- and post-operative ROMs was found in any motions. CORs had no significant difference among controls and pre- and post-operative patients. **Conclusion:** Not only flexion-extension but also lateral bending and rotation are limited in the patients with cervical myelopathy pre- and post-operatively. No ROM limitation after surgery is assumed to be due to early rehabilitation and localization of surgery. No difference in CORs suggests cervical myelopathy and its surgery influences only the range but not the pattern of neck movement.

869

QUANTITATIVE EVALUATION OF REVASCULARIZATION AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

H. Inoue¹, K. Hara¹, Y. Arai¹, H. Kanamura¹, S. Nakagawa¹, H. Kan¹, R. Terauchi², K. Sawada³, H. Maeda³, T. Ito³, M. Horii², Y. Mikami³, T. Kubo¹

¹Kyoto Prefectural University of Medicine, Orthopaedics, Kyoto, Japan, ²University Hospital- Kyoto Prefectural University of Medicine, Unit of Rehabilitation Medicine, Kyoto, Japan, ³Kyoto Prefectural University of Medicine, Rehabilitation Medicine, Kyoto, Japan

Introduction/Background: For anterior cruciate ligament reconstruction, hamstring is widely utilized as the material for tendon grafts, but fusion of the bone tunnel wall and tendon graft maturation of the tendon graft require a prolonged period. The purpose of this presentation was quantitative evaluation of hemodynamics after anterior cruciate ligament reconstruction using magnetic resonance angiography. **Material and Methods:** The subjects were 100 patients (100 knees; 36 men and 64 women) who underwent reconstruction with multi-stranded semi-tendinosus tendons employing the one root method between 2005 and 2012. The mean age was 23.7 years. Partial weight bearing was initiated one week after surgery, and full weight bearing at 4 weeks. The patients were retrospectively divided into those who underwent MRA 2, 3, 4–6, and 7 or more months after surgery. The mean signal intensities of the bone tunnel walls in the femur and tibia as well as tendon graft parenchyma in the bone tunnels were measured. **Results:** On MRA, the signal intensities of the bone tunnel walls in the femur and tibia were greater than the tendon graft at 2 months after surgery. At 3 months after surgery, the intensity of the tendon graft was greater than the bone tunnel wall. At 4–6 months and 7 months or more

after surgery, the intensity decreased in the bone tunnel wall and tendon graft. *Conclusion:* Hemodynamics to the bone tunnel walls and tendon graft after ACL reconstruction was assessed quantitatively up to 2 years after surgery using MRA. Blood flow reached the bone tunnels wall at 2 months after surgery, and flowed into the graft in the bone tunnels at 3 months. After 4 months, the intensity of the bone tunnel wall and tendon graft parenchyma decreased on both the femoral and tibial sides.

870

PROPOSED EQUATION BETWEEN FLEXOR CARPI RADIALIS H-REFLEX LATENCY AND UPPER LIMB LENGTH

S. Khosrawi¹, P. Taheri¹, S.H. Hashemi¹

¹Isfahan University of Medical Sciences, Physical Medicine and Rehabilitation, Isfahan, Iran

Introduction/Background: H-reflex is a valuable electrophysiological technique for assessing nerve conduction through entire length of afferent and efferent pathways, especially nerve roots and proximal segments of peripheral nerves. The aim of this study was to investigate the relation between normal values of flexor carpi radialis (FCR) H-reflex latency, upper limb length and age in normal subjects, and to determine whether there is any regression equation between them. *Material and Methods:* By considering the criteria of inclusion and exclusion, 120 upper limbs of 69 normal volunteers (68 hands of 39 men and 52 hands of 30 women) with the mean age of 39.8±11.2 years participated in this study. FCR H-reflex was obtained by standard electrodiagnostic techniques, and its onset latency was recorded. Upper limb length and arm length were measured in defined position. The degree of association between these variables was determined with Pearson correlation and linear regression was used for obtaining the proposed relations. *Results:* Mean FCR H-reflex latency was found to be 15.88±1.27 ms. There was a direct linear correlation between FCR H-reflex latency and upper limb length ($r=0.647$) and also arm length ($r=0.574$), but there was no significant correlation between age and FCR H-reflex latency ($P=0.260$). Finally, based on our findings, we tried to formulate these relations by statistical methods. *Conclusion:* We found that upper limb length and arm length are good predictive values for estimation of normal FCR H-reflex latency but age, in the range of 20–60 years old, has no correlation with its latency. This estimation could have practical indications in pathologic conditions.

871

THREE-DIMENSIONAL MOTION ANALYSIS OF THE SCAPULA, UPPER LIMBS AND THE TRUNK WITH AN ELECTROMAGNETIC GONIOMETER

H. Kimura¹, M. Yukio¹, S. Tetsuhiko¹, H. Kazuhiko¹

¹Hiroshima University Hospital, Rehabilitation Medicine, Hiroshima, Japan

Introduction/Background: Motion analysis is an important tool to measure motion accurately. Thought it was difficult to investigate three-dimensional movement of the scapula in sports activity, we succeeded to record kinematic data of the scapula. The purpose of this study is to analyze the movement of the scapula, upper limbs and the trunk using electromagnetic goniometer, Liberty (Polhemus, USA). *Material and Methods:* This time, we compared a healthy athlete and a paraplegia athlete on movement of the scapula, upper limbs and the trunk with the Liberty. *Results:* The healthy athlete shows greater trunk motion and the paraplegia athlete tends to have greater scapular motion to compensate for lack of trunk rotation. Therefore, both scapular flexibility and control are necessary in the paraplegia athlete who is hard to convey a power by kinetic chain from the trunk like a healthy athlete. *Conclusion:* A paraplegia athlete should have different training from that of a healthy athlete.

872

NOVEL PRESSURE SENSOR DEVICE TO MEASURE AND TRAIN ABDOMINAL BRACING

J. Lee¹, S.G. Chung², H.C. Kim³, H. Hwang², J. Cho², M. Cho²

¹Seoul National University, Medical Electronics Lab, Seoul, Republic of Korea, ²Seoul National University Hospital, Rehabilitation Medicine, Seoul, Republic of Korea, ³Seoul National University, Biomedical Engineering, Seoul, Republic of Korea

Introduction/Background: Abdominal bracing has been developed in order to alleviate low back pain (LBP). For accurate abdominal bracing, it should be quantitatively qualified at training, but so far it has been mostly monitored by visual observation or manual palpation. Surface electromyogram (sEMG) can be used for quantitative analysis of core muscle activation but it is uneasy to use in clinical settings because of the complexity of preparation and post-processing. In this study, we present a pressure sensor device that could be worn around the waist for ubiquitous monitoring of core muscle activities. *Material and Methods:* 15 healthy male subjects (26.8±3.0 years) participated in this study. While wearing the pressure sensor belt around the waist and sEMG on rectus abdominis, each subject performed isometric truncal flexion at various strengths based on their maximum voluntary contraction guided by visual feedback from a monitor. Each subject performed 2 sets of 5 leveled exertions, only differing by the tightness of the belt. The correlation between sEMG and pressure sensor output was calculated. Furthermore, 3 subjects were selected to perform 5 identical sessions of abdominal bracing training in standing posture. The data from the sessions were compared to see if the pressure sensor device could determine the improvements in abdominal flexion. *Results:* The median correlations between sEMG and the pressure data was 0.8659 in the normal condition while it was 0.9429 in the tighter condition. The changes of pressure data during abdominal bracing training showed a decrease of reaction times and increase of consistency with additional training sessions. *Conclusion:* The pressure sensor device quantified the activities of abdominal muscles accurately both in the normal and tighter conditions while the tighter condition provided a more accurate measurement. The sensor could be used to train abdominal bracing in clinical practices with further development and modification.

873

AMBULATORY MEASUREMENT OF HUMAN BODY ORIENTATION BASED ON INERTIAL AND MAGNETIC SENSOR FOR PHYSICAL MEDICINE AND REHABILITATION

J.K. Lee¹, S.I. Ji²

¹Hankyong National University, Dept. of Mechanical Eng., Anseong-Si, Republic of Korea, ²Hankyong National University, Mechanical Engineering, Anseong, Republic of Korea

Introduction/Background: An accurate orientation estimation of human body segments is an important biomechanical quantity for various fields such as rehabilitation, sports science, and virtual reality. There are numerous applications that can tremendously benefit by having an orientation measurement performed in an unconstrained environment (e.g., outdoors), by utilizing a sourceless (or self-contained) sensing system that does not require external sources. In this regard, the use of miniature inertial and magnetic sensors has been gaining a lot of interest, as they are ideal “wearable” sensors for the practice of physical medicine and rehabilitation. This research proposes a novel quaternion-based pseudo Kalman filter (KF), in order to maximize the computational efficiency and implementation simplicity. *Material and Methods:* In the proposed pseudo KF, time-update process for prediction is based on the quaternion itself, while measurement-update process for correction is performed through the quaternion error. As a result, the simplified KF structure is achieved. To study the proposed algorithm's per-

formance under various dynamic conditions, three different tests in terms of the magnitude and duration of the body accelerations were performed. For each of the above tests, the orientation was estimated using three different quaternion-based estimation methods: an extended direct KF, an indirect KF, and the proposed method. **Results:** The three methods have a similar degree of accuracy in orientation estimation. In terms of the computational efficiency, the proposed method was about two times faster than the other two, due to the simplified pseudo KF procedures. **Conclusion:** The proposed orientation estimation method can be applied to accurately capture 3D human body orientation in real-life settings. Hence, the method may enhance assessment of the patient for the practice of physical medicine and rehabilitation, by utilizing long period time measurement data.

874

EFFECTS OF BOSTON BRACE ON ASYMMETRIC SITTING POSTURE AND BACK MUSCLE ACTIVITY IN AIS

T.H. Lee¹, S.K. Bok¹

¹Chungnam National University Hospital, Department of Rehabilitation Medicine, Daejeon, Republic of Korea

Introduction/Background: To investigate the effect of Boston brace to adolescent idiopathic scoliosis on postural balance and muscle function. **Material and Methods:** The patients ($n=10$) were consecutively selected by a physician from the outpatient clinic of the Department of Rehabilitation Medicine. The 10 patients had adolescent idiopathic scoliosis (AIS) with a Rt. thoracic and Lt. lumbar curve and no previous conservative or surgical treatment for the scoliosis. To assess the postural asymmetry, we used unstable hip board with 3-axis accelerometer which shape and appearance was hemisphere. Inclination angle in dynamic sitting, sitting force in static sitting were measured in frontal plane. Muscle activation patterns were recorded using the Noraxon Telemetry 2400T (Noraxon Inc., Scottsdale, USA). Wireless surface electrodes were attached to the external oblique, thoracic erector spinae, lumbar erector spinae, and lumbar multifidus muscles, bilaterally. Cobb's angle of thoracic and lumbar spine were measured in whole spine plane film. All measurements were performed before and 6 months after fitting of the Boston brace. Statistical analysis was performed using USA version SPSS 22.0 software. **Results:** After fitting the Boston brace, difference in muscle activity pattern between both sides of the external oblique muscles and lumbar erector muscles of subjects with AIS were significantly decreased in right tilting. And difference in muscle activity pattern between both sides of the Lumbar multifidus were significantly decreased in left and right tilting. Also the difference in sitting force between both sides and Cobb's angle of thoracic and lumbar spine were significantly decreased After fitting the Boston brace. But there were no significant differences in the change of the inclination angle. **Conclusion:** AIS cause postural asymmetry and muscular imbalance in sitting, and it is associated with loss of postural balance and muscle function. By fitting the Boston brace in AIS patients, we expect the improvement of postural asymmetry and muscular imbalance in sitting.

875

NEUROMARKERS FOR PREDICTING THE RECOVERY AFTER STROKE

Y.C. Lin¹, C.C. Chen¹, S.H. Lee², M.M. Chen³, M.C. Su¹, W.J. Wang⁴

¹National Central University, Graduate Institute of Biomedical Engineering, Taoyuan City, Taiwan, ²Taipei Veterans General Hospital, The Rehabilitation Center, Taipei City, Taiwan, ³Landseed Hospital, The Rehabilitation Center, Taoyuan City, Taiwan, ⁴National Central University, Department of Computer Science and Information Engineering, Taoyuan City, Taiwan

Introduction/Background: Successful motor behavior relies on the orchestration of functionally connected motor cortices by means of excitatory, inhibitory, and frequency-specific oscillatory mechanisms and poststroke motor deficits were induced by disturbances in this orchestrated balance. Given the fact that the dynamic modulations of oscillatory power at 10-, 20- and 30- Hz in the motor system are of central importance in the characterization of neuronal network function in disease, we tested the hypothesis whether the frequency-specific network parameters could serve as good neuromarkers for predicting the recovery after stroke. **Material and Methods:** The EEG data of were 37 patients were recruited and processed offline by dynamic causal modeling (DCM) for induced responses to extract the frequency-specific network features. Logistic regression was employed for two-class classification and 5-fold cross validation was used to evaluate the constructed model. In addition, a set of 16 new EEG were tested for construct validity. **Results:** We found that the SMA beta rhythms are the most significant neuromarkers in the poststroke motor network and the beta +theta or beta+gamma features can yield the best prediction of 92% accuracy. A set of 16 new data further validates the predictive values of these neuromarkers of 81.3% accuracy. Specifically, the subcortical lesion and the time to rehab after stroke are the most significant clinical variables that could affect the prediction accuracy in this model. Importantly, these neuromarkers may have functional roles that are the keys to recovery. **Conclusion:** Frequency- and area-specific network parameters in the poststroke motor network are good neuromarkers for predicting the recovery after stroke and have the potential to help the design of individualized rehab strategy.

876

CLINICAL AND ELECTROMYOGRAPHICAL FINDINGS IN PATIENTS WITH POST POLIOMYELITIS SYNDROME

M. Lissens¹

¹KU Leuven, Faculty Engineering Sciences, Geel, Belgium

Introduction/Background: Thanks to vaccination programs worldwide, acute poliomyelitis nowadays is rarely seen anymore. However, 12.5 million polio survivors can several decades later be contracted with new symptoms due to so-called post poliomyelitis syndrome (PPS). Prime symptoms of PPS include fatigue, pain, weakness, new muscle atrophy and difficulties in activities of daily life (ADL) or functional loss. Additional presenting problems are pulmonary dysfunction, sleep disorders, dysphagia, cold intolerance, osteo-arthritis, as well as social and psychological problems. **Material and Methods:** In this study we evaluated 159 patients with post poliomyelitis using thorough anamnesis, clinical and electromyographical (EMG) exam. **Results:** Fatigue was present in 85%, pain in 84.5%, weakness in 83% and new muscle atrophy in 37%. ADL-difficulties or functional loss were reported in 78%: walking problems in 69.5%, difficulties in climbing stairs in 64%, problems with dressing in 19%. Pulmonary dysfunction was seen in 21%, sleep disorders in 61%, dysphagia in 9%, cold intolerance in 45%, osteo-arthritis in 65% and social and psychological problems in 35%. Muscle weakness, progressive muscle atrophy and EMG abnormalities (neurogenic motor unit action potentials and giants motor units) were not only seen in previously atrophic limbs and muscle groups, but also in visually normal appearing limbs and muscle groups, most pronounced in proximal muscles, both ipsi- and contralateral. **Conclusion:** Clinical improvement in acute poliomyelitis occurs through recovery of mildly affected neurons, collateral sprouting, and strengthening (hypertrophy) of intact musculature. However, over 50% of motor units may be lost without symptoms, and even without visual muscle atrophy. This is the reason why in PPS neurogenic and giants motor units can be found and why PPS patients feel after decades of almost normal functioning new symptoms such as weakness, fatigue, pain... In rehabilitation medicine it is important to investigate musculature in PPS accurately in order to set up adequate rehabilitation programs in which affected muscles are not overloaded.

877

MOTOR COMPLICATION BASED ON THE AMOUNT OF MOVEMENT AFTER TOURNIQUET AVASCULARIZATION

H. Maeda¹, H. Iwase¹, K. Kaneko¹, Y. Takei², Y. Kakinuma², K. Mitsui², M. Maeda³

¹Juntendo University, Orthopaedics, Tokyo, Japan, ²Tokyo Denki University, School of Engineering, Tokyo, Japan, ³Maeda Hospital, Orthopaedics, Tokyo, Japan

Introduction/Background: Temporary blockage of blood flow by pressing using a tourniquet is frequently applied to stop hemorrhaging and secure a surgical field in emergency medical care and orthopaedic surgery. The tourniquet pressure is set based on the blood pressure as an index, but the criteria for its setting are vague, and various complications (numbness, walking difficulty, depth vein thrombosis) often develop due to an excess pressure. Motor complication hinders rehabilitation and daily life. We investigated whether or not motor complication develops after avascularization by measuring the amount of movement and take a blood sample in rats. **Material and Methods:** A tourniquet was applied to Wistar rats (13-week-old males) under halothane inhalation anesthesia. The pressure for avascularization was loaded for 2 hours at 40 kPa (300 mm Hg, $n=13$), 30 kPa (225 mmHg, $n=12$), 20 kPa (150 mm Hg, $n=15$), 0 kPa (control, $n=25$). Tissue oxygen saturation (rSO₂) was measured as evaluation of avascularization. Movements were counted for 3 days to determine the amount of movement using a behavioral experiment device. The body weights before and after the behavioral experiment, and levels of creatine kinase (CK) after the behavioral experiment were measured. **Results:** rSO₂ significantly decreased in all pressure groups. On movement measurement, the total amount of movement over the 3-day period decreased in the order of the cuff pressure of 20 kPa (average±standard deviation: 11,105±3,420 counts), 30 kPa (9,829±2,761) and 40 kPa (7,957±1,972) when it was compared with control (14,219±2,944). The amount of movement per day improved to the control level on the second day in the 20 kPa pressure group. No improvement was observed in the 30 or 40 kPa group. Claudication was noted in the 40 kPa group. In addition, a significant difference was noted in body weight changes and levels of CK between the 40 kPa and control groups. **Conclusion:** 30 kPa in particularly 40 kPa induce motor complications by damage of muscle tissue and behind in rehabilitation after surgery. rSO₂ measurement can be used as tourniquet evaluation during surgery and control of optimum cuff pressure.

878

PERIPHERAL NERVE ULTRASOUND IN CHARCOT MARIE TOOTH (CMT) PATIENTS: CORRELATION WITH UPPER AND LOWER LIMBS FUNCTIONS

K.G. Ong¹, J. Samsuri², L. Abdul Latif², N. Shahrizaila³, A. Suhaimi²

¹Hospital Raja Perempuan Zainab², Rehabilitation Medicine, Kota Bharu, Malaysia, ²University Malaya, Rehabilitation Medicine, Kuala Lumpur, Malaysia, ³University Malaya, Medical Department, Kuala Lumpur, Malaysia

Introduction/Background: Charcot-Marie-Tooth (CMT) disease is the most common inherited form of neuropathy and has a heterogeneous clinical presentation. Recently, nerve ultrasound (US) has been increasingly used to characterise the nerve morphology of CMT patients. In this study, we investigated the relationship between US and functional parameters in subtypes of CMT patients. **Material and Methods:** A total of 20 CMT patients were recruited and compared to 20 age and gender matched normal controls. Nerve conduction studies were performed to establish the patterns of CMT, either demyelinating or axonal using a cut-off of 38 m/s in either median or ulnar nerve conduction velocities. US of the median, ulnar, tibial, peroneal and sural nerves were performed, specifically

recording the nerve cross-sectional areas (CSA). The nerve CSA were correlated with functional assessments including CMT Neuropathy score version 2, Purdue pegboard and dynamometry for upper limbs and walking speed for lower limbs. Figure 1: Ultrasound showed enlarged median nerve in Demyelinating CMT Patient. **Results:** Comparative studies between demyelinating ($n=14$) and axonal ($n=6$) types of CMT were also performed. We found that CSAs of all nerves were significantly larger in CMT patients compared to controls. The median, ulnar and sural nerves CSA of demyelinating CMT were significantly larger than axonal CMT ($p<0.05$). CMT patients performed significantly poorer in functional assessments compared to normal controls. In the demyelinating CMT, the ulnar and sural nerve showed a significant positive correlation with CMTNS 2 but no other functional parameters. In the axonal CMT patients, median and ulnar nerve CSAs showed significant negative correlation with Purdue score whereas tibial nerve CSA showed positive correlation with walking speed. **Conclusion:** Nerve US has a role in differentiating between demyelinating and axonal forms of CMT. We found significant relationship between nerve size and functional parameters. Further studies incorporating more CMT patients and longitudinal assessments are recommended.

879

IMPACT OF VIRTUAL REALITY BASED GAMING SYSTEM ON COURSE OF RECOVERY OF NEUROLOGICALLY CHALLENGED CHILDREN

J. Prakash¹, P. Prashun²

¹Institute of Medical Sciences- Banaras Hindu University, Orthopaedic Surgery, Varanasi, India, ²Biped Health Technologies Pvt Ltd, Research and Development, New Delhi, India

Introduction/Background: Given the incidence of pediatrics therapy in loss of motor coordination and upper body strength, the need has arisen to consider more self-managed, home based rehabilitation approaches. Virtual reality technology is currently used as a part of advanced physical rehabilitation assessment and therapy alongside conventional therapy. **Material and Methods:** 18 neurological challenged children (age group 5–10 years) were selected for the study. Half of them ($n=09$) were managed with conventional therapy while remaining ($n=09$) was treated by virtual reality based gaming system. Data collected with each game was sent to IIT-Bhuvneswar for analysis and correlated clinically. Outcome was assessed at 4, 8 and 12 week as with Fugl-Meyer scale. **Results:** Children managed with reality based gaming system recovered faster and more accurate in terms of reaction time, joint attention, visual perception and problem solving attitude. Also rehabilitation with amusement depicted a good compliance. **Conclusion:** This Concept of combining action execution and observation with automatic individualized training through non-immersive virtual reality based gaming system gives an extra edge in management of these differently abled children. Still a long-term follow-up with more advance games is the intriguing field of research.

880

PLATFORM COBS ASSOCIATED NEUROMUSCULAR ELECTRICAL STIMULATION IN THE REHABILITATION OF CHILDREN WITH CEREBRAL PALSY

Y. Sanchez¹

¹La Habana, Cuba

Introduction/Background: The platform Cobs Biofeedback is an informative response equipment and training that can be used in early diagnosis, prevention assessment and rehabilitation of balance disorders. Balance problems in children with cerebral palsy are common, caused by muscle imbalance between agonists and antagonists which not infrequently conspires with gain patterns of development according to their age. Neuromuscular electrical stimulation in these children can be of great help in muscle

strengthening. *Material and Methods:* A Longitudinal, prospective and applied for during the period from Feb to Dec explanatory study 2013. The universe consisted of all patients admitted to the pediatric rehabilitation with a diagnosis of cerebral palsy was made. The sample consisted of 35 patients, aged between 5 and 12 years of age, classified in levels I, II, III of the gross motor function classification system, which studies a control group and two groups using the random method simple. The rehabilitation program was used according to the protocol for the service for the control group and patients in the study groups were added to the training program Cobs platform and NMES on the tibialis anterior for the group I and NMES single with rehabilitation program for the group II. GMFCS and Ashworth Spasticity were applied static equilibrium besides the Cobs platform assessed at baseline and at the end. *Results:* 100% of the subjects showed alterations in some of the measured parameters, the variables most affected were the load and the symmetry index which improved in 15% and 20% respectively. Prevalent for the female groups with 62% and the age group of 7–8 years with 38% overall. *Conclusion:* The sensitivity of the Biofeedback Cobs platform is demonstrated as a tool for the diagnosis of balance disorders in children with spastic cerebral palsy and its therapeutic efficacy associated with electrical stimuli in training them in a comprehensive rehabilitation program.

881

USING 524 BALO TRAINER THERA IN REHABILITATION OF CHILDREN WITH CEREBRAL PALSY

Y. Sanchez¹

¹La Habana, Cuba

Introduction/Background: To evaluate the therapeutic efficacy of Balo Trainer Thera in the balance of cerebral palsy patients treated at the “Julio Díaz” Hospital. *Material and Methods:* An experimental, longitudinal, prospective study was conducted explanatory applied during the period Dec 2014 to Sep 2015. The universe was composed of all patients admitted to the pediatric rehabilitation diagnosed with Cerebral Palsy. The sample consisted of 15 patients, aged between 10 and 18 years old, classified in levels I, II, III classification system gross engine function, which were distributed in a study group and a control group using the random method simple. The rehabilitation program was used as the protocol of the service for the control group and patients in the study group were added to the training program Thera Balo trainer. Gross Motor function scales were applied, and Ashworth spasticity in addition to static balance the Cobs platform assessed at the beginning and end. *Results:* 100% of the subjects showed changes in some of the measured parameters, variables most affected were the load and symmetry index which improved by 15% and 20% respectively. He predominated for females groups with 62% and the age group of 10–12 years with 38% overall, coordination and balance of the study group by 15% compared to the control was improved. *Conclusion:* The high sensitivity of Thera trainer balo 524 in the diagnosis and treatment of balance of children with cerebral palsy in training them within a comprehensive rehabilitation program was demonstrated.

882

CORRELATION BETWEEN MAXIMUM VOLUNTARY ISOMETRIC CONTRACTION OF KNEE EXTENSOR USING MODIFIED SPHYGMOMANOMETER WITH BAG METHOD AND USING HAND-HELD DYNAMOMETER ON HEALTHY ADULTS

E. Setiawan¹, M. Prananta¹

¹University of Padjadjaran, Physical Medicine & Rehabilitation, Bandung, Indonesia

Introduction/Background: Isometric muscle strength examination is a basic assessment in physical medicine & rehabilitation practice.

The most common way is using Manual Muscle Testing method, but it is very subjective and less sensitive, especially in differentiating grade 4 and 5 for evaluating treatment result of quadriceps femoris muscles. The more objective way is using hand-held dynamometer (HHD), but it is often expensive, especially in developing country. An alternative way is using modified sphygmomanometer (MS) with bag method, which is cheaper, but also offer objective examination. *Material and Methods:* Fifteen healthy subjects (3 males & 12 females) enrolled in this observational quantitative, correlational analytical cross sectional study. Subjects' age ranges from 28–53 years old. Maximum voluntary isometric contraction (MVIC) was collected on the dominant leg side of each subjects using MS and HHD on a modified N-K table set for 60° knee flexion. Data taken were mean of 3 measurements. *Results:* Data collected for regression analysis inputs are age, body weight, body height, body mass index, MS, and HHD measurements. Pearson correlation test is used for normally distributed data and Spearman correlation test is used for not normally distributed data. In regression analysis for HHD, only MS was included because correlation coefficient was already very high ($r=0.995$), so that other variables could not be included. Regression formula for HHD is $0.1147 \times MS$. *Conclusion:* MVIC of knee extensor measured using MS and HHD are significantly correlated. MS can be used as an alternative way to measure MVIC of knee extensor, besides using HHD. Prediction formula for HHD is $0.1147 \times MS$.

883

ESTIMATION OF VISCOELASTICITY AND MUSCLE CONTRACTION COMPONENTS DURING PASSIVE ANKLE DORSIFLEXION FOR EVALUATING SPASTICITY

K. Takeda¹, H. Maeda², S. Mizuno², K. Ohno¹, A. Orand¹, G. Tanino¹, H. Miyasaka¹, S. Sonoda²

¹Fujita Memorial Nanakuri Institute- Fujita Health University, Division of Rehabilitation, Tsu, Japan, ²School of Medicine- Fujita Health University, Department of Rehabilitation Medicine II, Tsu, Japan

Introduction/Background: For assessment of spasticity, we have developed a resistance torque and EMG (electromyogram) measurement device for ankle joint during passive rotation. In the present study, we propose a new method to divide the ankle planter flexion torque during passive dorsiflexion into elastic, viscous, and neural components. *Material and Methods:* An electromotor installed ankle-foot orthosis was developed and was used to rotate an ankle joint. The angle and resistance torque during passive dorsiflexion were measured at 1 kHz sampling. EMGs of the gastrocnemius (GC) and tibialis anterior (TA) muscles were also recorded simultaneously. In this study, we measured these parameters at two different angular velocity; approximately 5 deg/s (low velocity) and 90 deg/s (high velocity). For the measured resistance torque of the low velocity condition, a three-piece liner regression was applied to evaluate the coefficients of elastic element which depend on the muscle length. We hypothesized that the measured torque difference between conditions of high and low velocity is parallelly composed of viscous component and neural components (GC and TA) with time delay, then these components were separated by using a system identification approach from the torque difference. EMG signals were rectified and integrated via a time window of 400 ms for the separation. The delay time from neural activity to measured torque was determined so that the residual error was lowest because it varies subjects. *Results:* The plantar flexion torque of ankle joint which formed by passive rotation could be divided into elastic, viscous, GC neural, and TA neural components with less residual error. *Conclusion:* We developed a system which measures ankle-joint stiffness during passive dorsiflexion, and proposed a new method to estimate viscoelasticity and muscle contraction components in the plantar flexion torque for evaluating spasticity.

884

EVALUATION OF CONTACT PRESSURE ON TOTAL SURFACE BEARING AND PATELLAR TENDON BEARING SOCKETS DURING GAIT

K. Totoribe¹, E. Chosa¹, G. Yamako², X. Zhao³, H. Hamada³, K. Ouchi⁴, Y. Fukao¹, H. Kuroki¹, G. Deng⁴

¹University of Miyazaki Hospital, Rehabilitation Unit, Miyazaki, Japan, ²University of Miyazaki, Organization for Promotion of Tenure Track, Miyazaki, Japan, ³University of Miyazaki, Orthopaedic Surgery, Miyazaki, Japan, ⁴University of Miyazaki, Mechanical Systems Engineering, Miyazaki, Japan

Introduction/Background: Total surface bearing (TSB) sockets and patellar tendon bearing (PTB) sockets are widely used for trans-tibial amputees. We evaluated the pressure pain threshold of the stump when using each type of trans-tibial prosthetic socket in an individual with below-knee amputation, as well as their stress dispersion effects using a gait analysis system and finite element analysis (FEA). **Material and Methods:** We measured the pressure pain threshold of the trans-tibial residual limb at the onset of mild pain. In order to develop a finite element model, geometric data were obtained by computed tomography from a subject with left trans-tibial amputation. Kinematic data were collected using a three-dimensional motion analysis system (VICON). Force data were recorded from six force plates. Three load conditions of foot flat (FF), mid-stance (MS), and heel off (HO) during gait were considered. **Results:** Pressure pain threshold measurements of the lower limb showed that the patellar tendon, anterolateral and anteromedial tibia, and popliteal fossa tended toward a high pain threshold; the fibular head and distal stump region were pressure sensitive. Comparatively uniform pressure distribution was observed in the TSB socket model, whereas a tendency toward pressure on the patellar tendon, anterolateral and anteromedial tibia, and popliteal fossa was observed in the PTB socket model. The contact pressure in both models tended to be high in FF and low in MS. Maximum pressure at the socket-residual limb interface was higher in the PTB socket model. **Conclusion:** All contact pressure values in the FE models were lower than the subject's actual threshold values of pain pressure. The contact pressure of the PTB socket was highest on the patellar tendon during FF. FEA combined with real analysis was useful for evaluating the effects of the different socket shapes and will help to optimize prosthetic sockets for individual patients.

885

THE INFLUENCE OF HEEL HEIGHT INCREASE IN MALE INTO ERECTOR SPINAE MUSCLE ACTIVITY WHILE WALKING

Y. Waluyo¹

¹Makassar, Indonesia

Introduction/Background: Heel height enhancement has been considerably related to lower back pain. The enhancement of heel height has been proven to change the way we walk by placing the feet in the plantar flexion position and enhancing ground reaction force. **Material and Methods:** This was a pre-experimental study with a cross sectional approach. This study was done in the Gait Analysis Laboratory of Department of Medical Rehabilitation of Dr. Soetomo Hospital Surabaya. The study involved 18 to 35-year-old males living in Surabaya who had fulfilled the inclusion criteria. The subject of study was asked to walk subsequently barefoot, with 3 cm, and with 5 cm high heels. EMG surface was used during the walk to assess the erector spinal muscle activity. **Results:** We enrolled healthy sample of 15 males who are in inclusion criteria. The difference of erector spinal muscle activity between those who walked barefoot compared to 3 cm heels was 5.52% while walking barefoot compared to 5 cm heels was 7.42% and contraction between those who walked with 3 cm compared to those with 5 cm high heels was 14.826%. Analysis using a paired *t*-test showed a significant difference between erector spinal muscle contrac-

tion while walking with 3 cm high heels compared to barefoot ($p=0.046$) and while walking with 5 cm compared to those with 3 cm high heels ($p=0.031$). There was no significant difference in muscle contraction while walking barefoot or with 5 cm high heels ($p=0.204$). **Conclusion:** There are difference between erector spinal muscle activity in males who walked barefoot and those who walked with 3 cm high heels, and between those who walked barefoot and those with 5 cm high heels. However, there was no difference in erector spinae muscle activity when walked with 3 cm compared to those with 5 cm heels.

886

THE SLIDING PHENOMENON OF THE KNEE FACES ON THE GAIT - THE OBSERVATION IN THE SAGITTAL PLANE

H. Yamamoto¹

¹Himeji Dokkyo University, Faculty of Health Care Sciences, Himeji, Japan

Introduction/Background: The Correct measurement of knee joint angle during gait is difficult due to the knee being a moving axis and looseness of the soft tissues. We devised a method of measurement that solved those problems. Our method can also be used to measure the length between condyle of femur and upper end of tibia, and we measured horizontal sliding between the femur and the tibia on gait. **Material and Methods:** Subjects were healthy ten men (21.5±0.4 years), their informed consent were obtained. Joint angle measurement involved imaging markers and calculating the angle from digitized coordinates. Markers were placed at two points between the greater trochanter and lateral epicondyle when trisected (markers 1, 2). Similarly, we also placed markers at two points between the head of the fibula and lateral malleolus when trisected (markers 3, 4). We can estimate the end of thigh and upper end of tibia by measuring a thigh and tibia lengths. **Results:** About five of 10 subjects, a momentary change horizontal sliding was observed. It was 16.2±3.4% of the stance phase in the time, and the movement distance was 2.0±0.2 mm. It was the same time when the the flexion of the knee became biggest and the hip joint which started an extension from heel contact presents flexion momentarily. **Conclusion:** By the conventional method to analysis gait with an image, the movement in the knee is not able to measure. By our devised method, the measurement of the horizontal sliding between the femur and the tibia distance is possible on gait. Momentary osseous movements are observed. The phenomenon shows that osseous friction occurs, and it is thought that it is origin of the knee OA. The exercise therapy requires the attention to that phenomenon.

887

COMPARISON OF THE SOLID ANGLE SIZE OF THE SHOULDER COMPLEX SINUS WITH AND WITHOUT THE EFFECT OF COMPENSATORY TRUNK MOTION IN HEALTHY MALES

N. Yoshida¹, S. Nishishita¹, H. Tohi¹, M. Shimbara², K. Matsumoto³, T. Sakamoto³, K. Domen⁴

¹Institute of Rehabilitation Science- Tokuyukai Medical Corporation, Department of Research, Toyonaka, Japan, ²Kansai Rehabilitation Hospital, Department of Rehabilitation, Toyonaka, Japan, ³Kansai Rehabilitation Hospital, Department of Diagnosis and Treatment, Toyonaka, Japan, ⁴Hyogo College of Medicine, Department of Rehabilitation Medicine, Nishinomiya, Japan

Introduction/Background: Sinus of the shoulder complex is defined as the total range of angular motion of the upper arm when the trunk is fixed. In measurement, trunk motion, if it is measured, does not need to be constrained, because the sinus can be shown as upper arm motion range in trunk-fixed coordinates (t-Sinus) instead of that in world coordinates (w-Sinus), which is

larger than t-Sinus by trunk motion. Meanwhile, size difference between w-Sinus and t-Sinus of patients, e.g. after stroke, could be a quantitative index of coordinated or compensatory trunk motion involved in shoulder motion for a novel assessment of motion recovery. The purpose of this study was to establish the normal value of ratio of w-Sinus and t-Sinus of the shoulder complex. *Material and Methods:* Twelve healthy male adults (mean±SD age, 26.1±3.4 years) without shoulder dysfunction participated in this study. The full active motion ranges of right and left upper arm of the participants sitting on a chair without trunk constraint were recorded using PATRIOT electromagnetic tracking system (Polhemus, USA). Posture data of sensors attached on the upper arm and the sternum were used for spherical coordinate analysis to calculate the solid angle size of w-Sinus and t-Sinus. *Results:* The mean sizes of right and left t-Sinus were 5.44±0.57 [steradian] and 5.27±0.62, respectively, and that of w-Sinus were 8.15±0.80 and 7.90±0.90, respectively. The mean ratios of w-Sinus to t-Sinus were 1.51±0.15 and 1.51±0.15 for right and left side respectively (no significant difference by Wilcoxon signed-rank test). *Conclusion:* As for the shoulder complex motion with natural trunk motion in healthy males, w-Sinus was found to be approximately 1.5 times larger than t-Sinus with little individual variability and bilateral difference. For future evaluation of compensatory trunk motion in shoulder motion of patient, this value could be used as reference-value for normal range.

888

EFFECTS OF PULSED ELECTROMAGNETIC FIELDS ON OVARIECTOMY-INDUCED OSTEOPOROSIS AND RANK EXPRESSION IN RATS

J. Zhou¹, H. Liu², Y. Liao¹, W. Feng¹, N. Li¹

¹The First Affiliated Hospital of University of South China, Department of Rehabilitation-, Hengyang, China, ²West China Hospital-Sichuan University, Department of Rehabilitation, Chengdu, China

Introduction/Background: To explore effects of pulsed electromagnetic fields (PEMFs) on ovariectomy-induced osteoporosis and receptor activator of NF-κB (RANK) expression in ovariectomized (OVX) rats. *Material and Methods:* Sixty female Sprague-Dawley rats were randomly divided into two batches (Thirty rats for each batch). In the first batch, the rats were randomly divided into three groups ($n=10$): sham-operated (Sham-0 group), ovariectomized (OVX-0 group) or ovariectomized and treated with PEMFs starting at the day of OVX (Early PEMFs group). In the second batch, the rats were randomly divided into three groups ($n=10$): sham-operated (Sham-12 group), ovariectomized (OVX-12 group) or ovariectomized and treated with PEMFs starting at 12 weeks after OVX (Late PEMFs group). Both early and late PEMFs treatments were administered with field frequency of 8Hz, intensity of magnetism of 3.8mT, for 40 minutes per day, 5 days per week for a total of 12 weeks. Serum 17β-oestradiol (E2), C-terminal cross-linking telopeptide of type I collagen (CTX-I), bone mineral density (BMD), bone strength, and mRNA and protein expression of RANK were determined by enzyme-linked immunosorbent assay (ELISA), dual energy X-ray absorptiometry, biomechanical assessment, qRT-PCR, and west-blot, respectively. *Results:* Both early and late PEMFs treatment increased serum E2 levels, reduced serum CTX-I levels, and increased BMD and bone strength of the L5 vertebral body in OVX rats. Although early PEMFs treatment similarly increased BMD and bone strength of the femur, late PEMFs treatment did not. Both early and late PEMFs treatments did not affect mRNA expression of RANK, while reduced protein expression of RANK in OVX rats. *Conclusion:* Early PEMFs treatment could completely, while late PEMFs treatment partially prevent bone loss, and deterioration of bone strength in OVX rats. PEMFs may exert these favorable biological responses, at least partially, through inhibiting the protein expression of RANK. The discrepancies between mRNA and protein expression need be further investigated.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PHYSICAL AND REHABILITATION MEDICINE DIAGNOSTICS AS RELATED TO ORGAN SYSTEMS AND BODY FUNCTIONS - DIAGNOSIS AND ASSESSMENT OF FUNCTIONS OF THE SKIN AND RELATED STRUCTURES

889

DIABETIC INFLUENCES ON THE BIOMECHANICAL PROPERTIES OF HUMAN SKIN

J.W. Park¹, M.K. Cho², S.H. Lee³, H.S. Nam³

¹Soonchunhyang University Hospital, Department of Physical Medicine & Rehabilitation, Seoul, Republic of Korea, ²Soonchunhyang University Hospital, Department of Dermatology, Seoul, Republic of Korea, ³Soonchunhyang University, Division of Molecular Cancer Research in Soonchunhyang Medical Research Institute, Cheonan, Republic of Korea

Introduction/Background: Diabetic skin is known to have deficient wound healing properties, but little is known of its intrinsic biomechanical properties. We hypothesize that diabetic skin has inferior biomechanical properties at baseline, rendering it more prone to injury. Skin from diabetic and nondiabetic humans underwent biomechanical testings. *Material and Methods:* Cutometric testings were used for determining the distensibility (Uf), elasticity (Ua/Uf) and viscoelasticity (Uv/Ue) of the diabetic ($n=39$) and nondiabetic ($n=41$) human skin. Western blot analysis was used for determining 1) collagen I and III, 2) MMP (matrix metalloproteinase)-1, and 3) AGERs (advanced glycation endproduct receptors) and their binding ligands (CD36, HMGB1, Ezrin, Thrombospondin). MMP-2 and MMP-9 levels were assessed by gelatine zymography. *Results:* At baseline, human diabetic skin was biomechanically inferior compared to nondiabetic skin, with excessive distensibility ($p<0.001$) as well as decreased elasticity ($p<0.001$) and viscoelasticity ($p<0.001$). Collagen I and III levels were significantly lower in diabetic skin ($p<0.001$). Surprisingly, MMP-1, and active forms of MMP-2 and MMP-9 which play a leading role in degradation of the collagen matrix were significantly higher in diabetic skin ($p<0.001$). In addition, the expression of AGE receptors and their binding ligands possibly involved in collagen metabolism were detected only in the diabetic skin. *Conclusion:* These findings suggest that the predisposition of diabetics to wounds may be the result of impaired tissue integrity at baseline, and are due, in part, to an excessive expression of active forms of MMPs, and to the up-regulation of the AGE receptors and their binding ligands, rather than to the direct impacts of their peripheral neuropathies. Further therapeutic and preventive strategies for diabetic wounds care should be empathized to improve the strength of diabetic skin at high risk area.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PRM INTERVENTIONS RESEARCH - EXERCISE

890

KINEMATIC ANALYSIS OF TONGUE-HOLD SWALLOW IN HEALTHY SUBJECTS ANALYSIS USING 3D DYNAMIC COMPUTED TOMOGRAPHY

K. Aihara¹, Y. Inamoto², S. Eiichi³, A. Yoichiro³, K. Hitoshi³, S. Seiko³, I. Yuriko¹, J.B. Palmer⁴

¹Fujita Health University, Department of Rehabilitation, Toyoake-Aichi, Japan, ²Fujita Health University, Faculty of Rehabilitation, Toyoake-Aichi, Japan, ³Fujita Health University, Department of Rehabilitation Medicine, Toyoake-Aichi, Japan, ⁴Johns Hopkins University, Department of Physical Medicine and Rehabilitation, Baltimore, USA

Introduction/Background: The tongue-hold swallow is designed as an exercise to improve contact between the tongue base and the posterior pharyngeal wall during swallow. Although it is a well-known swallowing exercise, its physiological mechanism is not fully understood. The purpose of this study was to analyze the kinematics of tongue-hold swallowing in three dimensions using dynamic 320-row area detector computed tomography (320-ADCT). **Material and Methods:** Six healthy adults (22–29 years), all proficient in tongue-hold swallow, underwent 320-ADCT during three swallows in 45 degree reclining position using: 1) saliva swallow (SS), 2) tongue-hold swallow (THS), and 3) 4-ml nectar-thick liquid swallow (NS). 3D images were created at an interval of 0.10 seconds (10 frames/s). The parameters measured were: (1) timing of critical events, (2) hyoid and larynx displacement, (3) cross-sectional area of UES, and (4) thickness of the posterior pharyngeal wall (PPW) at the anterior arch of atlas and the anterior inferior corner of C2. **Results:** In THS, the hyoid and larynx were positioned significantly higher at swallow onset and at maximum elevation ($p < 0.05$) than in NS or SS; there was also a trend toward greater displacement in THS. UES maximum cross-sectional area and duration of UES opening was highest NS and was larger in THS than SS. Increase in PPW bulging was seen in three subjects at atlas and two at C2. **Conclusion:** This preliminary study is the first to analyze the tongue-hold swallow in three dimensions, it was compared with saliva swallow and thick liquid swallow. We found THS not only affected the position of PPW, but affected the hyolaryngeal motion and UES opening. This demonstrates the need for further study of the tongue-hold swallow as swallowing exercise.

891

BENEFITS OF CALISTHENICS IN PATIENTS WITH ISCHEMIC CARDIOMYOPATHY ATTENDING A CARDIAC REHABILITATION SERVICE

A.N. Contreras¹, C.L. Varela², A. Gibraltar¹

¹Instituto Mexicano del Seguro Social, Unidad de Medicina Física y Rehabilitación Norte, D.F. Mexico, ²Instituto Mexicano del Seguro Social, Unidad de Medicina Física y Rehabilitación Norte, D.F. Mexico

Introduction/Background: Ischemic heart diseases are the second leading cause of death in Mexico and the first cause in medical attention in tertiary level hospitals. Calisthenics is a physical exercise system centered in movements from upper, lower limbs and trunk, graded by difficulty that increases the oxygen uptake (VO₂) and that is needed to develop activities. **Material and Methods:** Prospective, longitudinal and descriptive study from Mar to Jul 2014 in a Cardiac Rehabilitation Service. At first, an exercise stress test was performed; patients with metabolic equivalents (METS) of 7 or less enlisted the calisthenic program which lasted 4 weeks (12 sessions minimum). Eventually, the stress test was performed again. **Results:** 5 patients where included. 3 (60%) females and 2 (40%) males. METS rank in the first exercise test where from 3.2 to 6 and at the end of calisthenics (2nd test) all patients achieved 7 METS ($p = 0.008$). According to the New York Heart Association (NYHA) functional classification, 4 patients where class IIb and 1 IIIb at the beginning. At the end of the program, the 5 where class Ib. Maximum heart rate, Borg scale and quality of life had no statistical significance. **Conclusion:** Patients with ischemic heart disease improve heart function and NYHA functional classification with a calisthenic program by itself, which can be implemented in other hospitals levels as an economical and effective intervention. **Acknowledgements:** We thank our colleagues who provided the insight that greatly assisted the study.

892

AEROBIC EXERCISE IMPROVES DIABETIC NEPHROPATHY WITH DOWNREGULATION OF OXIDATIVE STRESS IN TYPE2 DIABETIC RATS

D. Ito¹, P. Cao², T. Kakihana², Y. Ogawa², G. Hu², O. Ito², M. Kohzuki², H. Kiyomoto¹

¹Tohoku University Graduate School of Medicine, Miyagi Community Health Promotion, Sendai, Japan, ²Tohoku University Graduate School of Medicine, Internal Medicine and Rehabilitation Science, Sendai, Japan

Introduction/Background: Aerobic exercise is known to have multiple beneficial effects including renal protection in type 2 diabetes mellitus and obesity. However, the mechanisms regulating these actions of aerobic exercise remain unclear. The present study evaluated the effects of chronic aerobic exercise on early stage of diabetic nephropathy focusing on renal oxidative stress, using Zucker diabetic fatty (ZDF) rats as an animal model of obese type 2 diabetes. **Material and Methods:** Male ZDF rats (6 weeks old) underwent forced treadmill exercise for 8 weeks (Ex-ZDF). Sedentary ZDF (Sed-ZDF) and Zucker lean (Sed-ZL) rats served as controls. **Results:** Exercise ameliorated hyperglycemia with increased insulin secretion, and reduced albumin excretion and normalized creatinine clearance in ZDF rats. Endothelial and neuronal nitric oxide synthase (NOS) protein expression, and NOS activity in the kidneys of Sed-ZDF rats were lower compared with Sed-ZL rats, while both NOS expression and NOS activity were upregulated by exercise in ZDF rats. Renal nicotinamide adenine dinucleotide phosphate (NADPH) oxidase activity and expression of p47phox protein were significantly higher in the kidneys of the Sed-ZDF group compared with the Sed-ZL group, and there was no significant difference between the Ex-ZDF and Sed-ZL groups. Further, morphometric evidence of renal damage was alleviated in response to exercise. **Conclusion:** Downregulated NADPH oxidase and upregulated NOS in the kidneys may be potential mechanisms by which chronic aerobic exercise can alleviate early diabetic nephropathy in ZDF rats. Chronic aerobic exercise may be a novel therapeutic approach for preventing the development of renal dysfunction in patients with early stage of type 2 diabetes mellitus and obesity.

893

THE EFFECT OF A MANUAL GAIT TRAINING MACHINE WITH NORMAL GAIT TRAJECTORY ON BALANCE OF STROKE PATIENTS

D. Koo¹, H. Kim¹, M.J. Lim², S.D. Eun²

¹Korea National Rehabilitation Research Institute, Department of Rehabilitation & Assistive Technology, Seoul, Republic of Korea, ²Korea National Rehabilitation Research Institute, Department of Clinical Research for Rehabilitation, Seoul, Republic of Korea

Introduction/Background: People with stroke usually have deficits in locomotion skills because of hemiparetic disabilities. Hemiparesis is one of reasons for the decreased balance control in stroke patients. Research has shown that gaiting training could improve balance capabilities. Thus, the purpose of this study was to investigate if the gait training had an effect on balance ability of stroke patients. **Material and Methods:** 21 stroke patients participated in this research. 10 subjects received a manual gait training based on normal gait trajectory and 11 subjects were assigned to the control group. The subjects in the experimental group were trained for 30 minutes per day, three times a week for six weeks, and the control group did not get any gait training. In order to compare balance abilities between the two groups, two force plate forms (AMTI, USA) and infrared 3D motion capture system were used. To evaluate balancing abilities of patients, SD (standard deviation) of COP (center of pressure) path and force difference between affected and unaffected legs during standing with the static posture, and SD of COM (center of mass) movement during gait were analyzed. **Results:** The results showed that after the training force difference between affected and unaffected legs during standing posture was decreased in the training group. Also, SD of COP and COM were reduced. **Conclusion:** In the present study, the gait training for the stroke patients has affected their balance. This was because manual gait training required more lower extremity strength than normal walking on the ground. This training effect obtained in this study may have helped the patients stood stably.

**BIOMEDICAL REHABILITATION SCIENCES
AND ENGINEERING: PRM INTERVENTIONS
RESEARCH - PROSTHETICS AND ORTHOTICS**

894

**AN APPLICATION OF NEW-TYPE KAFO FOR
PATIENTS WITH SEVERE HEMIPLEGIA AFTER
STROKE: SMOOTH REPLACEMENT OF KAFO
WITH AFO**

*M. Katsutani¹, N. Kazuhiro¹, S. Tenjiku², T. Ohta¹, K. Do-
men³*

¹Nishinomiya Kyoritsu Rehabilitation Hospital, Rehabilitation, Nishinomiya-city, Japan, ²Kawamuragishi Co.-Ltd, Certified Prosthetist and Orthotist, Osaka, Japan, ³Hyogo College of Medicine, Physical Medicine and Rehabilitation, Nishinomiya, Japan

Introduction/Background: Retaining gait ability is critically important for patients with severe hemiplegia after stroke. Knee-ankle-foot orthosis (KAFO) are often prescribed at early stage for such patients. They typically retain independent gait with or without canes after several months when KAFO were replaced with ankle-foot orthosis (AFO). However, this replacement often prevents patients from gait training because the motion of knee joint is quite different between these orthosis. Applying a new-type KAFO implanted with a specific joint device for the knee portion, we successfully treated a case with severe hemiplegia after ischemic stroke. *Material and Methods:* A 50-year old, male patient with severe hemiplegia on the left side was transferred to our convalescent rehabilitation hospital at day 52. A KAFO implanted with a specific joint device for the knee portion was prescribed. We set the knee portion of KAFO to allow three levels of flexion-range settings; 1) fixed at 0 degree, 2) flexible from 0 to 5 degrees, 3) flexible from 0 to 10 degrees. Gait training was performed 60 minutes everyday. A surface electromyography (EMG) was recorded from rectus femoris, vastus medialis, hamstrings and tibialis anterior muscles every two weeks. During EMG assessment, the KAFO was set for above mentioned three different settings. We applied the setting in which EMG showed the best results for gait training. *Results:* At initial stage, the EMG data were the best for setting 1). At day 68, the EMG data showed the best results for setting 2). At day 82, the EMG data showed the best results for setting 3), when AFO was prescribed to replace KAFO. Finally, the gait training was successful with AFO. *Conclusion:* This case suggests that gait training with transitional settings of knee-joint motion may facilitate smooth replacement of KAFO with AFO.

**BIOMEDICAL REHABILITATION SCIENCES
AND ENGINEERING: PRM INTERVENTIONS
RESEARCH - HEAT AND COLD**

895

**EFFECT OF LOW-INTENSITY PULSED ULTRA-
SOUND ON COLLAGEN DEGRADATION IN MILD
TO MODERATE KNEE OSTEOARTHRITIS: A RAND-
OMIZED CONTROLLED STUDY**

J. Gessal¹

¹Airmadidi, Indonesia

Introduction/Background: The efficacy of low-intensity pulsed ultrasound (LIPUS) has been reported in the management of knee osteoarthritis (OA). However, the mechanism is not yet clear. In recent years, collagenases, particularly matrix metalloproteinase 13 (MMP-13), are thought to be primarily involved in type II collagen degradation in OA. Objective: To investigate the effect of LIPUS on collagen degradation in grade 1 to 3 knee osteoarthritis (OA). *Material and Methods:* We conducted a randomized control trial

before and after therapy, from Jun to Sep 2014 at Kandou Hospital, Manado, Indonesia. Sixty one participant were included. After randomization, 28 patients were categorized as therapy group and 33 patients as control group. We applied 12 sessions of LIPUS, 20 minutes each, with frequency 1 MHz, and intensity of 0.2 W/cm², duty cycle of 20%. We examined MMP-13, before, after 6 and after 12 LIPUS sessions. We used the wilcoxon test to compare the median between groups with a *p* value of 0.05 was considering as significant. *Results:* The mean age of patients in therapy and control groups were 56.3 (10.9) and 56.8 (11.2) and the mean of body mass index were 25.53 (3.21) and 25.77 (3.23). Twenty (71.4%) patients in therapy group and 24 (72.7%) patients in control group have grade 3 OA. There was a significant difference of changing median MMP-13 before and after 12 sessions, between therapy (0.8 (-29.2 to 117.2) and control groups (0.2 (-88.8 to 134.6) *p*=0.020. *Conclusion:* Twelve sessions of LIPUS have a benefit effect over collagen degradation in knee OA patients. However, further studies are needed to determine the optimal US dose and application parameters.

896

**EFFICACY OF CRYOTHERAPY FOLLOWING TO-
TAL HIP ARTHROPLASTY**

*Y. Takeuchi¹, K. Iwakiri², Y. Kimura¹, N. Kumata¹, A. Kob-
ayashi²*

¹Shiraniwa Hospital, Department of Rehabilitation, Ikoma, Japan,

²Shiraniwa Hospital Joint Arthroplasty Center, Department of Orthopaedic Surgery, Ikoma, Japan

Introduction/Background: Local cryotherapy is effective for the relief of postoperative pain following total knee arthroplasty. However, there have been extremely few reports with the efficacy of postoperative cryotherapy following total hip arthroplasty (THA). This study investigated the efficacy of cryotherapy following THA. *Material and Methods:* Twenty four patients (24 females) underwent primary THA for unilateral osteoarthritis and were divided randomly classified into a cryotherapy group (12 subjects) and a control group (12 subjects). The cryotherapy group was fitted with icing system device for postoperative 72 hours (temperature, 5°C), and the control group was not. The primary outcomes were the thigh swelling, pain visual analog scale at rest and on walking, and the patient satisfaction with walking at pre-operatively, 4, 7, 14 and 28 days after surgery. The secondary outcome was evaluated using the Japanese Orthopaedic Association Hip score (JOA Hip score) at pre-operatively and 28 days after surgery and the walking speed at pre-operatively 2 weeks and 1 month after surgery. The thigh swelling, VAS scores, walking speed and JOA Hip score were compared between the groups. The Student *t*-test was used for statistical analysis. *Results:* The thigh swelling at 4, 7 and 28 days after surgery showed a marginally higher level of improvement in the cryotherapy group than in the control group (*p*=0.09, *p*=0.05, *p*=0.07 respectively). The walking speed at 14 and 28 days after surgery tended to be faster in the cryotherapy group than in the control group (*p*=0.06, *p*=0.08 respectively). *Conclusion:* Postoperative continuous cryotherapy is a simple, non-invasive, and effective approach for the reduction of thigh swelling and the early improvement of walking ability following THA.

897

**EFFECT OF CAPACITIVE AND RESISTIVE ELEC-
TRIC TRANSFER SYSTEM ON LOCAL BLOOD
CIRCULATION AND SKIN SUPERFICIAL/DEEP
TEMPERATURE**

*Y. Tashiro¹, S. Hasegawa¹, S. Nishiguchi¹, N. Fukutani¹,
H. Shirooka¹, Y. Nozaki¹, H. Hirata¹, M. Yamaguchi¹, S.
Tasaka¹, T. Matsushita¹, K. Matsubara¹, T. Tsuboyama¹, T.
Aoyama¹*

¹Kyoto University Graduate School of Medicine, Physical Therapy, Kyoto, Japan

Introduction/Background: This study aimed to clarify the effects of Capacitive and Resistive electric transfer system (CRet system) and hotpac (HP) on local blood circulation and skin superficial and deep temperature. **Material and Methods:** The participants were 13 healthy males. They underwent all three interventions on different days: (1) CRet system (CRet group), (2) hotpac (HP group) and (3) CRet system without power (sham group). The intervention and measurement were applied at the lower erector spinae muscle. INDI-BA® active ProRecovery was used in the CRet group, and the moist heat method was used in the HP group. Oxygenated, deoxygenated, and total hemoglobin in the muscle were measured before and after the 15-minutes intervention, together with the temperature at the skin surface, at the depth of 10 mm, and 20 mm. The local blood circulation and tissue temperature were followed until 30 minutes after the intervention and collected at the interval of 5 minutes. Statistical analysis was performed using a 2-way repeated-measures analysis of variance, and a Bonferroni post hoc multiple comparison test. **Results:** Oxygenated and total hemoglobin levels were significantly higher in the CRet group than in the HP group continuously for 30 minutes after the intervention ($p < 0.05$). The temperatures at 10mm and 20mm were significantly higher in the CRet and HP groups than in the sham group continuously for 30 minutes after the intervention ($p < 0.05$), and the temperature at 20mm was significantly higher in the CRet group than in the HP group ($p < 0.05$). **Conclusion:** The effects of CRet system and HP were maintained for 30 minutes after the intervention on local blood circulation, and the effect is generally higher in the CRet system than HP. In addition, the CRet system intervention warmed deep tissue more effectively than HP intervention.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PRM INTERVENTIONS RESEARCH - ELECTROTHERAPY (INCLUDING FUNCTIONAL ELECTROPHYSIOLOGICAL STIMULATION)

898

THE EFFECT OF ELECTRICAL STIMULATION, RESISTANCE EXERCISE AND ELECTRICAL STIMULATION PLUS RESISTANCE EXERCISE TO DISUSE ATROPHY IN INCREASING SOLEUS MUSCLE FIBERS DIAMETER OF RATTUS NORVEGICUS

A. Prasetyo¹, I. Pawana², R. Satyawati², N. Nugrahaeni²

¹Tangerang Selatan, Indonesia, ²Dr. Soetomo Hospital Airlangga University- School of Medicine, Physical Medicine & Rehabilitation, Surabaya, Indonesia

Introduction/Background: Immobilization causes muscle atrophy, i.e. a decreasing in skeletal muscle fiber diameter. During immobilization, protein synthesis and the amount of myofibrils fibers decreases. Protein degradation can be inhibited electrical stimulation through the inhibition of NF-κB activation pathway, activation of pathways (IGF-1)/Akt/PI3K, MGF. Resistance exercise also contribute to prevent activation of Ubiquitin-proteasome pathway by suppressing Atrogin-1 and murf-1 and activates pathways (IGF-1)/Akt/PI3K with increased Akt, MGF. **Material and Methods:** RCT design, at Animal Laboratory Biochemistry. Thirty male Rattus norvegicus, Wistar strain, 3–4 months, 150–200 g. Rats' legs were immobilized 2-weeks using splints, followed 4-weeks of treatments. There were 3-groups of 10-rats. First group received electrical stimulation with frequency of 2 Hz, 2 × 3 hours/day with 2-hours rest in between. Second group was given resistance exercise, i.e. a load of 25–35% of their body weight was attached to each rats while climbing 6-steps stairs, 40-cm tall with 45° inclination, with 3-repetitions every treatment. Third group was given the first groups treatments as well as the second groups treatments. In the end, soleus muscle was taken-turned into histopathology preparation, stained with Hematoxylin eosin. The diameter of the soleus muscle fibers were measured using micrometer 400 × magnification. **Results:** There was a significant difference ($p < 0.05$) be-

tween the soleus muscle fibers diameter between the control group and the group receiving electrical stimulation. However, electrical stimulation lowers the diameter of disused soleus muscle. There was a significant difference ($p < 0.05$) in soleus muscle fibers diameter between the control group and the group receiving resistance exercise. There was no significant difference ($p > 0.05$) between the control group and the group receiving both treatments. **Conclusion:** There are no effect of electrical stimulation, electrical stimulation plus resistance exercise to disuse atrophy in increasing the soleus muscle fiber diameter of Rattus norvegicus. There is effect of resistance exercise to disuse atrophy in increasing the soleus muscle fiber diameter of Rattus norvegicus.

899

COMBINATION THERAPY WITH CENTRAL AND PERIPHERAL SIMULTANEOUS ELECTRICAL STIMULATION ON STROKE PATIENTS WITH HEMIPLEGIC ARMS

S. Saeki¹, J. Shiraishi¹, N. Kato¹, M. Ochi¹, H. Itoh¹, Y. Matsushima¹

¹University of Occupational and Environmental Health, Department of Rehabilitation Medicine, Kitakyushu, Japan

Introduction/Background: Combination therapy using central and peripheral stimulation methods for hemiplegic stroke has been gaining attention. We have developed a new combination therapy involving arm training with both bilateral transcranial direct current stimulation (BTDCS) as central stimulation and integrated voluntary electrical stimulation (IVES) as peripheral simultaneous stimulation. The purpose of this study was to examine the adaptation and feasibility for combination therapy with BTDCS and IVES as a preliminary study. **Material and Methods:** Subjects were 4 first-stroke patients with event onset more than 6 months before the study. Exclusion criteria were previous stroke, preceding epilepsy, severe cognitive impairments, serious cardiac or orthopedic problems, or metallic implants. Treatment intervention comprising 1 session with the combination therapy of IVES (60 min) and BTDCS (2 mA '15 min) each day was performed for 3 weeks, 5 days a week (15 sessions in total). Outcome measures were changes in Fugl-Meyer motor function assessment (FMA) and Motor Activity Log (MAL) during the intervention as compared with baseline. **Results:** The intervention was completed for all 4 patients with right hemiplegia. Improvement (d) was as follows: Case 1 (Brunnstrom stage (BRS) arms/finger=5/5; d FMA=-1; d MAL=8), Case 2 (3/2, 2, 0), Case 3 (5/5, 10, 9), and Case 4 (3/2, 1, 1). No adverse effects were seen during the intervention. **Conclusion:** Stroke patients with more than BRS arms/finger 5/5 were feasible, and no problems with this protocol were identified.

900

THE EFFECT OF REHABILITATION WITH FUNCTIONAL ELECTRICAL STIMULATION FOR STROKE PATIENTS: A PROSPECTIVE OBSERVATIONAL PILOT STUDY

K. Sota¹, T. Wakasugi¹, Y. Honda¹, T. Harada¹, S. Morishita¹, Y. Uchiyama², N. Kodama³, K. Domen⁴

¹Hyogo College of Medicine Hospital, Rehabilitation, Nishinomiya, Japan, ²Sasayama Medical Center Hyogo College of Medicine, Rehabilitation, Sasayama, Japan, ³Hyogo College of Medicine, Rehabilitation, Nishinomiya, Japan, ⁴Hyogo College of Medicine, Physical Medicine and Rehabilitation, Nishinomiya, Japan

Introduction/Background: An important goal for stroke patients is the recovery of gait performance, because almost all stroke patients experience gait disturbances. In the Japanese guidelines for stroke rehabilitation, the effect of rehabilitation with functional electrical stimulation (FES) is equal to ankle-foot orthosis in stroke patients

with drop foot; however, the therapeutic effect of FES is unclear. The purpose of this pilot study was to investigate the therapeutic effect of rehabilitation with FES in stroke patients using a multicenter, prospective observational design. **Material and Methods:** Study participants were stroke patients with recent stroke onset within 6 months or more. Enrollment occurred at 8 hospitals in Japan. All subjects provided written and informed consent. Study patients underwent physical therapy and gait-related training with FES. Measurements included the 10-m gait speed test (10mGS), timed up & go test (TUG), 6-min walk test (6MWT), and Fugl-Meyer assessment for lower extremities (FMA-LE). The patients were stratified, based on phase of stroke onset, into a convalescent group (stroke onset within 6 months; $N=59$) or chronic group (stroke onset over 6 months; $N=28$). **Results:** In the convalescent group, statistically significant differences were observed between pre- and post-rehabilitation in FMA-LE (21.6 ± 7.1 and 23.7 ± 6.7 , $p<0.05$), 10mGS (0.76 ± 0.40 and 0.88 ± 0.31 , $p<0.05$), TUG (19.6 ± 11.6 and 15.4 ± 11.0 , $p<0.05$), and 6MWT (240.7 ± 96.6 and 291.9 ± 109.7 , $p<0.05$). Similarly, in the chronic group, statistically significant differences were observed between pre- and post-rehabilitation in FMA-LE (23.6 ± 6.1 and 24.5 ± 5.7 , $p<0.05$), 10mGS (0.88 ± 0.29 and 0.94 ± 0.28 , $p<0.05$), TUG (12.9 ± 4.1 and 12.1 ± 3.6 , $p<0.05$), and 6MWT (296.4 ± 91.0 and 314.0 ± 92.1 , $p<0.05$). **Conclusion:** In this study, significant differences were observed after rehabilitation with FES in stroke patients with recent or several months of stroke onset. In particular, convalescent group patients showed the capacity to recover from stroke following FES; however, this remains to be validated in future studies.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PRM INTERVENTIONS RESEARCH - PHARMACOLOGICAL INTERVENTIONS (E.G. PAIN, SPASTICITY, ANTI-INFLAMMATORY DRUGS)

901

THYMELAEA LYTHROIDES EXTRACT INHIBITS MICROGLIA ACTIVATION IN THE ADULT HIPPOCAMPUS AND BEHAVIORAL ALTERATIONS INDUCED BY EARLY POSTNATAL IMMUNE STIMULATION IN MALE RATS

I. Berkiks¹, A. Elhessni¹¹Ibn Tofail University-, Laboratory of Genetic- Neuroendocrinology- and Biotechnology -Faculty of Sciences-, Kenitra, Morocco

Introduction/Background: Brain vulnerability to inflammation is high during the early postnatal age and perinatal infection could result in long-lasting neuropsychiatric disorders, including autism and schizophrenia, and mood disorders including depression. In the present study, we have assessed the efficacy of an extract of the medicinal plant *Thymelaea lythroides*. **Material and Methods:** To counteract hippocampal microglia activation and depressive-like behaviors in adulthood in male rats that were injected with LPS (lipopolysaccharide) at 14 days of age. The effect of *Thymelaea lythroides* extract was compared to the effect of minocycline, a molecule known to inhibit microglia activation. **Results:** Our findings indicate that LPS injected animals showed in adulthood high levels of TNF α (10662 ± 1.72 , $p<0.001$) and Iba1 immunoreactivity in the hippocampus (DG: 69.9 ± 5.66 ; CA1: $62.9.48\pm 1.37$; CA3: 63.64 ± 1.77 , $p<0.001$) and significant depressive-like behavior in forced swimming test and anxiety-like behavior in elevated plus maze test. *Thymelaea lythroides* extract and minocycline had similar actions in counteracting the effects of perinatal LPS. **Conclusion:** In summary, the present study confirms the previous findings that neonatal injection of LPS induces depressive-like behavioral deficits, high level of TNF α production and microglia reactivity and further support the idea that this is a reliable neuroinflammation and depressive-like animal model. Moreover, we demonstrate for the first time, that *Thymelaea lythroides*, similarly

to the anti-inflammatory drug minocycline, inhibits the microglia activation and TNF α release in the hippocampus, and attenuates the LPS induced behavioral alterations.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PRM INTERVENTIONS RESEARCH - ACUPUNCTURE AND COMPLEMENTARY AND ALTERNATIVE THERAPIES

902

INTEGRATING NEUROSCIENCE AND YOGIC PRACTICES TO IMPROVE INPATIENT REHABILITATION IN ACQUIRED BRAIN INJURY PATIENTS: PILOT PROGRAM QUALITATIVE OUTCOMES

N. Buckalew¹, S. Mitchell²¹Rehabilitation Hospital of the Northwest, General Inpatient Rehabilitation, Post Falls, USA, ²Himalayan Institute of Pittsburgh, Education- Board Member, Pittsburgh, USA

Introduction/Background: With escalating U.S. healthcare costs and limited rehabilitation stays, maximizing low-cost tools that optimize function and encourage participation with long-term carry over are increasingly important. Yogic practices such as meditation, breathwork, and visualization offer promise in meeting these needs and goals, and are supported by an abundance of neuroscience as promoting neuroplasticity. We highlight the piloting of an inpatient chair-based yoga program for those with acquired brain injury (ABI) and the qualitative outcomes. **Material and Methods:** For 1 year the class was offered on Saturdays for 1 hour to patients and their family/friends. We concomitantly collected participant and staff written/oral surveys regarding the class's qualitative aspects. As self-help skills we teach meditation, breathing, and visualization with minimal chair-based movement integrating principals of neuroplasticity to aid ABI recovery (principally stroke and brain cancer). **Results:** Of the 123 participants, 100% of responders (32 paper and 38 oral survey) rated the program highly. Breathing techniques (72%) were the most favored skill learned. Qualitative responses included: "I slept the best ever in my life;" "This was the first time I felt integrated since my diagnosis of brain cancer;" and "You showed me that I can heal." Follow-up survey 8 months later of participants from the first class demonstrated they were still using the techniques. Staff results are best summarized as follows: "The patients and family ... have expressed the class has many positive ... and lasting effects - more relaxed, sleep better, feel more connected with themselves or their loved ones, less pain, and more motivated." **Conclusion:** Our results indicate that yoga can improve overall patient experience while providing low cost self-help skills with the potential for long-term carry over. As a result of this pilot, the program has expanded to all units in the first rehab hospital, and to three more rehab hospitals in the same healthcare system.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PRM INTERVENTIONS RESEARCH - VIRTUAL REALITY

903

THE RELATION BETWEEN RECOVERY AND MOTION FEATURES IN VIRTUAL REALITY FOR STROKE REHABILITATION

Y.H. Liao¹, C.C. Chen¹, S.H. Lee², R.C. Chan², S.C. Yeh³¹National Central University, Department of Biomedical Sciences and Engineering, Taoyuan, Taiwan, ²Taipei Veterans General Hospital, Physical Medicine and Rehabilitation Department, Taipei,

Taiwan, ³National Central University, Department of Computer Science and Information Engineering, Taoyuan, Taiwan

Introduction/Background: Owing to the plasticity of the brain, take rehabilitation therapies could modify the disability after stroke. However, the brain recovery mechanism is still not clear nowadays. This study is focused on discovering the key motion features that related to better recovery results. **Material and Methods:** We used Fugl-Meyer (FM) assessment to assess patients' impairment preceding and after rehabilitation. And classify patient to the good recovery and general recovery group according the improvement of the assessment. Treatment is built by virtual reality (VR) system to record the motion trajectory and calculate motion features. Our VR scenario is similar to play basketball game. It is aim to train the paralytic arm extension, rotation and raising. The scenario divided to two stages: before and after patient get the basketball. Motion features are calculated in each stage. Separately compare how the assessment and motion features changed in the two groups. **Results:** The significant relations between the variation of assessment and motion features are most in the first stage (Fig 1). This result reflect that human brain make plan to execute the motion in the first stage. For the good recovery group, patients improve to master the motion, but less related to the speed. Notably, the relation trends of the max instantaneous speed are contrary in the good and general recovery group. This may suggest that protocol should focus on increase motion accuracy for good recovery patients but increase speed for general recovery patients. **Conclusion:** This study shows that VR can be an useful instrument to understand the rehabilitation courses through recording motion trajectory and calculating motion features. The changes of the motion features related to recovery, but the variated trend are different in each group. We show that to maximize the gain of therapy, the rehabilitation protocol should be individualized.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PRM INTERVENTIONS RESEARCH - REHABILITATION TECHNOLOGY, INCLUDING IMPLANTS, PROSTHESIS, ORTHOSES

904

ANKLE-FOOT ORTHOSIS CONSTRAINED MOVEMENTS DOES NOT ALTER POWER OUTPUT DURING FUNCTIONAL ELECTRICAL STIMULATION CYCLING IN PARAPLEGIC

P.N.F. Hamdan¹, N.A. Hamzaid¹, N. Hasnan²

¹University of Malaya, Biomedical Engineering, Kuala Lumpur, Malaysia, ²University of Malaya, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Previous research has investigated functional electrical stimulation (FES) cycle power output (PO) from the perspective of knee and hip joint biomechanics. However, ankle-foot biomechanics and, in particular, the effect of the Ankle-Foot Orthosis (AFO)-constrained movements on cycle PO has not been widely explored. Therefore, the purpose of this study was to determine whether AFOs of a fixed position (FP), in dorsi-plantarflexion (DPF), in dorsiflexion (DF), and in plantarflexion (PF)-constrained movements might influence PO and joint kinematics during FES cycling exercises. **Material and Methods:** One complete paraplegic (T4) and five able-bodied (AB) participants, participated in this study. All underwent 1-minute cycling with recumbent tricycle (paraplegic with FES-assisted) for each of the AFOs-constrained movements. The muscles stimulated during FES cycling were quadriceps, gluteus maximus and hamstrings. The PO of each condition were analyzed. **Results:** The normalized PO during FES and voluntary cycling in all constrained ankle movements ranged (1.7%–6.7%) and (11.2%–70.8%), respectively. The PO generated during FES cycling is lower than the voluntary cycling. There were no significant differences in the PO generated by the AFOs-constrained movements

($p > 0.05$) for both FES and voluntary cycling. However, FP AFO reported the highest PO during FES cycling. DPF AFO provided the greatest ankle range of motion (ROM) with similar ROM pattern of the ankle, knee, and hip in all participants. **Conclusion:** The present study revealed that four different types of AFO-constrained movements did not have an influence in altering PO during FES and voluntary cycling. Future work involving more paraplegics and lower limb muscles stimulation will be investigated. This finding might serve as a reference for future rehabilitative cycling protocols.

905

ANATOMICAL SINGLE-BUNDLE ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING CALCIUM PHOSPHATE HYBRIDIZED TENDON GRAFT IN GOATS

H. Mutsuzaki¹, H. Fujie², H. Nakajima³, M. Fukagawa², S. Nomura³, M. Sakane⁴

¹Ibaraki Prefectural University of Health Sciences, Department of Orthopaedic Surgery, Ami-machi- Inashiki-gun, Japan, ²Tokyo Metropolitan University, Biomechanics Laboratory- Faculty of System Design, Hino, Japan, ³Ibaraki University, Department of Agriculture, Ami-machi- Inashiki-gun, Japan, ⁴University of Tsukuba, Department of Orthopaedic Surgery, Tsukuba, Japan

Introduction/Background: We previously developed a novel technique using an alternate soaking process that improves tendon-to-bone healing by hybridizing the tendon graft with calcium phosphate (CaP). However, the effects of the CaP-hybridized tendon graft on anatomical single-bundle anterior cruciate ligament (ACL) reconstruction remains unclear. To determine the effects of CaP-hybridized tendon grafts compared with untreated tendon grafts 6 months after anatomical single-bundle ACL reconstruction in goats. **Material and Methods:** We analyzed the knee kinematics and in situ forces in the grafts and the histology of the tendon-bone interface (CaP group, $n=5$; control group, $n=5$). **Results:** The in situ forces under applied anterior tibial loads at 60° and 90° of knee flexion in the CaP group were greater than those in the control group ($p < 0.05$). The red safranin-O stained area indicating glycosaminoglycans in the cartilage layers in the CaP group at the anterior surface of the femoral bone tunnel at the joint aperture site and the posterior surface of the tibial bone tunnel at the joint aperture site were greater than those in the control group ($p < 0.05$). The lengths of the nonbonding gap area between the anterior surface of the femoral bone tunnel and the posterior surface of the tibial bone tunnel in the control group were greater than those in the CaP group ($p < 0.05$). **Conclusion:** The biomechanical properties of the CaP-hybridized tendon graft were improved compared with the untreated tendon graft 6 months after anatomical single-bundle ACL reconstruction in goats because of enhanced tendon-to-bone healing with the cartilage layer and a smaller nonbonding gap area at the joint aperture site. Anatomical single-bundle ACL reconstruction using CaP-hybridized tendon grafts may lead to better long-term clinical results, because of undergoing active rehabilitation.

906

GAIT CHANGES IN PATIENTS WITH HEMIPLEGIA AFTER STROKE DURING WALKING WITH A NON-ACTUATED LOCOMOTOR ASSISTIVE DEVICE ACSIVE

T. Ueno¹, H. Kadone², Y. Shimizu¹, A. Endo¹, Y. Hada¹, M. Yamazaki³

¹University of Tsukuba Hospital, Rehabilitation, Tsukuba, Japan, ²University of Tsukuba, Center for Innovative Medicine and Engineering, Tsukuba, Japan, ³University of Tsukuba, Department of Orthopedic Surgery, Tsukuba, Japan

Introduction/Background: ACSIVE is a newly developed locomotor assistive device for patients with motor impairment in lower

limbs. It is a simple three link mechanism tied to pelvis and affected shank by belts. It has a rotation spring embedded at the hip joint, and by storing energy during the latter half of stance phase and releasing it during swing phase, it can assist locomotor limb motion without using powered actuator. In this presentation, we report gait changes in chronic phase patients with hemiplegia after stroke during walking with the device. *Material and Methods:* The participants were five chronic stroke outpatients with hemiplegia. All of them could walk independently outside using cane or ankle foot orthosis. Data was obtained using a motion capture system (VI-CON MX T20s cameras) and a wireless EMG measurement system (Delsys Trigno Lab). The participants performed 10m walking at preferred speed without ACSIVE and, after 10 minutes of practice, performed 10m walking with ACSIVE. Surface EMGs were measured bilaterally from gluteus maximus, rectus femoris and hamstring muscles. Kinematic data was obtained as sagittal hip, knee and ankle joint angles. *Results:* Walking velocity did not show significant change. Among the joint angles, increase of knee flexion during initial swing and hip flexion during terminal swing was observed in walking with the device compared to walking without it. Meanwhile, hip extension did not show apparent changes. As for the surface EMGs, decreased activation of gluteus maximus and rectus femoris muscles was observed in all the participants. *Conclusion:* Increasing hip and knee flexion angles while reducing muscle activation and not obstructing hip extension, the device realizes energy effective gait assistance for hemiplegic patients.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PRM INTERVENTIONS RESEARCH - ROBOTS, AIDS AND DEVICES

907

SMART MONITORING DEVICE FOR BODY BALANCE POSTURE IN STROKE REHABILITATION APPLICATIONS

Z. Ahmad¹, I. Mat Sahat¹

¹Universiti Malaysia Pahang, Faculty of Mechanical Engineering, Pekan, Malaysia

Introduction/Background: Stroke is the most leading cause of death around the world and this number increase time by time. People who are suffered by this disease will have no abilities to control their body due to brain lack of oxygen and consequently brain cells begin to die. Loss body balance is one of the most problems occur to the patient because the level of anxiety is too high. In order to recovery their confidence, this device will help them to practice independently in anywhere without any guidance from the physiotherapist. *Material and Methods:* This device is having a flexible pad shaped to conform under beneath an insole for three critical locations to ensure the good body posture. An electronic module of Bluetooth communication was used to transferring signals obtains by sensors. There are three sensors force sensitive resistor (FSR) for each right and left insoles. The sensors were attached under the shoe insole to get the reaction force of body or weight distribution. Inserting force sensors in the insole provide specific information and therefore the point of the sensor placement result in obtaining the critical part under the insole. All sensors obtained the force data simultaneously and real-time during the gait activity by a micro-controller which placed at the body. The analog inputs were transmitted via bluetooth data transmission that gains the force data in real time on smartphone. Android application was develop to display all the data obtained from the experiment conducted. *Results:* The reliability of this device is well performing when compared to the commercial force plate. The goal is to help an educate patient, to inform the attending doctor, and to monitor the patient's adherence to the amount of weight applied to the lower extremity. *Conclusion:* This monitoring device is most beneficial and would have excellent therapeutic benefits.

908

USING ROBOTIC-ASSISTED GAIT TRAINER IN NEUROREHABILITATION PATIENTS: PRELIMINARY RESULT FROM BUMRUNGRAD INTERNATIONAL HOSPITAL, THAILAND

C. Ariyakul¹, N. Wongsriuang¹, Y. Wongnor¹

¹Bumrungrad International Hospital, Department of Rehabilitation and Physical Therapy, Wattana, Thailand

Introduction/Background: Robotic-assisted gait trainer (RAGT) is a fascinating new rehabilitation device to promote motor relearning by task-specific repetitive approach. *Objective:* Given limited evidence, this study is aimed to describe the results of using RAGT on gait ability of neurorehabilitation patients. *Material and Methods:* Forty-four neurorehabilitation patients (32 stroke, four spinal cord injury (SCI), three bilateral hemiparesis, and six deconditioning patients) without cognitive impairment were recruited in this study. Gait ability were evaluated with Functional Ambulation Categories (FAC) in stroke patients while SCI and other patients were evaluated with Walking Index for Spinal Cord Injury and level of assistance, respectively. All patients were given RAGT manufactured by G-EO Evolution for approximately 18 sessions during the 6-month study period. *Results:* The patients were 56 years of age on average, 68% were male, 39% were Thais. Robotic-assisted gait training improved FAC score by 58%/points, 25%/points, and 67%/points in stroke, SCI, and bilateral hemiparesis patients, respectively. However, there is no significant change of FAC score in deconditioning group. Interestingly, stroke patients with low baseline FAC score (physical dependent gait) could achieve greater result than those with high baseline FAC score (physical independent gait). *Conclusion:* Robotic-assisted gait training could help improve gait ability of neurorehabilitation patients, especially, in stroke patients. This corresponds with the results of SCI and bilateral hemiparesis patients.

909

EFFECTS OF ROBOT-ASSISTED GAIT TRAINING ON PUSHER BEHAVIOR IN SUBACUTE STROKE PATIENTS: A RANDOMIZED CONTROLLED CLINICAL TRIAL

J. Bergmann^{1,2}, C. Krewer¹, P. Bauer^{1,3}, E. Koenig^{1,2}, K. Jahn^{1,2}, F. Mueller^{1,2}

¹Schoen Klinik Bad Aibling, Motor Research, Bad Aibling, Germany, ²Ludwig-Maximilians University of Munich, German Center for Vertigo and Balance Disorders DSGZ, Munich, Germany, ³University of Applied Sciences Rosenheim, Faculty for Applied Health and Social Sciences, Rosenheim, Germany

Introduction/Background: Pusher behavior is a severe disorder of body orientation in space. It hampers the rehabilitation process and prolongs hospitalization. Effective approaches to treat pusher behavior are needed. In a pilot study we found a positive immediate effect of a single-session robot-assisted gait therapy on pusher behavior in stroke patients. The aim of this randomized controlled study was to determine the effectiveness of repeated robot-assisted gait training on pusher behavior compared to conventional physiotherapy. *Material and Methods:* 28 stroke patients with pusher behavior (Scale for Contraversive Pushing (SCP) score >0 per component) were randomly allocated to either the intervention group (robot-assisted gait training with the Lokomat) or the control group (conventional physiotherapy). During the two-week intervention period patients received five times per week the corresponding therapy. Before, after and at a follow-up two weeks after the intervention period pusher behavior was assessed using the SCP. *Results:* During the study, both groups significantly improved pusher behavior ($p \leq 0.007$), additionally the intervention group showed a significantly larger improvement than the control group ($p = 0.028$). Paired comparisons revealed a significant larger decrease of pusher

behavior in the intervention group than in the control group from before to after intervention ($p=0.026$), but no difference between groups from after intervention to follow-up ($p=0.874$). At the end of the intervention period, 6/14 patients of the intervention group and 1/14 patient of the control group improved in a way that they were no more classified as pushers on the SCP. At the end of the study 9/14 patients of the intervention group and 5/14 patients of the control group were no more diagnosed with pusher behavior. *Conclusion:* Two weeks of repeated robot-assisted gait training seem to be effective to permanently reduce pusher behavior. The forced upright body position during locomotion might recalibrate the disturbed inner reference of verticality in patients with pusher behavior.

910

EVALUATION OF UPPER LIMB OUTCOMES AFTER COMBINATORY TRAINING USING ROBOT-ASSISTED THERAPY WITH STANDARD ARM THERAPY FOR SEVERE POSTSTROKE HEMIPARESIS

K. Chua¹, C. Kuah¹, C.Y. Ng¹, V.A. Deshmukh¹, L. Yam¹

¹Tan Tock Seng Hospital, Rehabilitation Centre, Singapore, Singapore

Introduction/Background: Robot-assisted therapy (RAT) is an efficient driver of intensive, repetitive and task specific therapy following poststroke upper limb hemiparesis. We present upper limb (UL) outcomes of stroke patients who enrolled in an outpatient RAT program combining the Armeo Spring® (Hocoma, Switzerland) device with standard arm therapy (SAT). *Material and Methods:* A retrospective study of outcome data from a Standing Database Registry of all patients who fulfilled criteria and participated in RAT using the Armeo Spring Device from Feb 2012 to Oct 2013. The program constituted of twelve 45 minute long AS sessions followed by 6 SAT of equal duration, supervised by occupational therapists. Outcome measures were performed at 4 time points: baseline, post-RAT, post-SAT and at 1 month post programme completion. These included the Fugl Meyer Motor Assessment-Upper Extremity (FMA-UE) test, Action Research Arm Test (ARAT), Grip Strength (KgForce), Modified Ashworth Scale (MAS) and Visual analogue Score for pain (VAS 0–100). *Results:* Altogether, 36 patients were enrolled in the programme. Data from 27/36 who completed the program were included for analysis. (mean age 52.9 years (SD 15.45), time since stroke 707.9 days (SD 894.7). The mean FMA-UE was 18.07 (SD 11.95) at baseline, 20.81 (SD 12.24) at post-RAT, 22.89 (SD 12.44) at post-SAT and 26.25 (SD 12.69) at 1 month post-programme. Similarly, mean ARAT was 5.04 (SD 7.40), 5.85 (SD 7.61), 6.33 (SD 6.98) and 8.25 (SD 7.33) at the 4 time points respectively. ($p<0.05$). There were no adverse events. *Conclusion:* Combinatory RAT with SAT programme using an unweighted robotic orthotic device for severe poststroke UE hemiparesis was found to be safe and effective in reducing motor impairments after stroke with short-term sustainable gains. Discontinuation reasons in 25% of subjects were related to social reasons.

911

ASSESSMENT OF DYNAMIC ORTHOTIC UPPER-LIMB REHABILITATION BY MEANS OF ON-BOARD SENSORS

F. Lazzari¹, L. Garavaglia^{1,2}, F. Passaretti¹, S. Pittaccio¹

¹National Research Council of Italy, IENI Institute for Energetics and Interphases, Lecco, Italy, ²Politecnico di Milano, Electronics-Information and Bioengineering, Milano, Italy

Introduction/Background: This study presents the application of a pseudoelastic orthosis for upper-limb repositioning in hemiplegic patients. The focus of the present contribution is on the possibility to evaluate the dynamic interaction between the patient and the orthotic device during set motor tasks by means of sensors mounted on-board the orthosis. *Material and Methods:* Six hemiplegic pa-

tients (age 56.16 ± 7.22 years, >6 months after event) were enrolled for the study, and were prescribed a custom-made dynamic orthosis with pseudoelastic elements to be worn at least 6 hours a day for a month. The orthosis was equipped with an electro-goniometer (elbow joint axis) and a tri-axial accelerometer (lateral upper arm). Measurements were conducted at the beginning (T0) and at the end of the study (T1) during three standardised tasks: Reaching Forward (RF) Hand-to-Mouth (HM), Timed Up-and-Go (TUG). Data acquired from 15 healthy volunteers were used as baseline for comparisons. *Results:* The recordings indicate the evolution of elbow flexion-extension angle during the execution of the motor tasks, and the accelerations of the upper arm. Timecourses were segmented to the level of movement repetitions and sub-movement phases. In general, patients' acceleration curves are less smooth than those for the healthy volunteers indicating uncertainties in limb space positioning and controlling, and the presence of involuntary jerks (cloni). Those effects are promptly separable using spectral analysis. In the time domain, movement phase duration can be measured, adding information about sub-movements (e.g. for the TUG task). Direct comparison with normality curves can help visualise motor deficits and the use of compensatory strategies including the shoulder. *Conclusion:* This preliminary study shows that adding wearable sensors to a dynamic orthosis has a potential for connecting therapy monitoring to treatment. Future works could lead to exploit these technologies for the development of advanced home-based rehabilitation protocols.

912

THE EFFECT OF ROBOTIC ASSIST ON STANCE AND SWING IN HEMIPLEGIC GAIT

S. Hirano¹, E. Saitoh¹, S. Sonoda², H. Kagaya¹, M. Mukaino¹, S. Tanabe³, K. Ohtsuka³, M. Katoh⁴, G. Tanino⁵, J. Yamada⁴, D. Imoto⁴, M. Imaida⁶

¹Fujita Health University, Department of Rehabilitation Medicine I- School of Medicine, Toyoake, Japan, ²Fujita Health University, Department of Rehabilitation Medicine II- School of Medicine, Tsu, Japan, ³Fujita Health University, Faculty of Rehabilitation-School of Health Sciences, Toyoake, Japan, ⁴Fujita Health University, Department of Rehabilitation, Toyoake, Japan, ⁵Fujita Health University Nanakuri Sanatorium, Department of Rehabilitation, Tsu, Japan, ⁶Toyota Motor Corporation, Partner Robot Division, Toyota, Japan

Introduction/Background: Gait Exercise Assist Robot (GEAR) is a robot which is designed to provide effective exercise for the reconstruction of hemiplegic gait. GEAR system is composed of KAF robotic device, low-floor treadmill, monitor for patients, navigational panel, harness for safety suspension and suspension of robotic device. One of the features of GEAR is precise assist control like stance and swing assist. It is thought that patient can walk without feeling negative effect of affected leg if we can get appropriate setting. However, it has not been demonstrated that gait pattern really change in a positive way. Then we conducted preliminary study to evaluate the effect of stance and swing assists on the gait with GEAR. *Material and Methods:* <Study 1> Subjects are 5 hemiplegic patients using GEAR for daily exercise. We conducted 20 seconds gait analysis for 3 consecutive level of stance assist with 3D motion analyzer "KinemaTracer". Gait speed of each patient on the treadmill was set as much as the comfortable gait speed on the ground. <Study 2> Subjects are 3 hemiplegic patients using GEAR for daily exercise. We conducted gait analysis for 3 consecutive level of swing assist. Other conditions were same as study 1. These studies were approved by the Institutional Review Board and written informed consents were obtained from all patients. *Results:* <Study 1> With the elevation of stance assist, knee buckling and snapping reduced, but medial whip became larger. <Study 2> With the elevation of swing assist, step length of affected leg became larger, medial whip became smaller, but retropulsion of the hip became larger. *Conclusion:* Elevation of stance and swing assist was effective to reduce abnormalities like knee buckling or snapping,

but derived abnormalities like retropulsion of the hip in some case. We have to change assist level with an awareness of tradeoff of multiple abnormal gait pattern.

913

A STUDY ON USER SATISFACTION WITH ELECTRIC WHEELCHAIR

B.S. Lee¹, J.A. Lee², H. Choi², J.H. Bae², H.R. Pak²

¹Korea National Rehabilitation Center, Department of Physical and Rehabilitation Medicine, Seoul, Republic of Korea, ²Korea National Rehabilitation Institute Research, Dept. of Clinical Research on Rehabilitation, Seoul, Republic of Korea

Introduction/Background: People with severe disabilities depend highly on wheelchair as their primary means of mobility. The purpose of this study was to investigate wheelchair users' usability and satisfaction with electric wheelchair. *Material and Methods:* Fifty subjects (spinal cord injury 20, stroke 22, cerebral palsy 4, muscular disease 3, and amputation 1) were recruited. Both usability and satisfaction were evaluated; usability of the electric wheelchair users was evaluated by a questionnaire constructed by the investigators which included 5 categories of safety, operability, efficiency, satisfaction and esthetics; satisfaction was assessed by the Qubec User Evaluation of Satisfaction with assistive technology (QUEST) tapping into both device and service satisfaction issues. The 5-point Likert scale was used for each question (5-very dissatisfied, 4-somewhat dissatisfied, 3-neither satisfied nor dissatisfied, 2-somewhat satisfied, 1-very satisfied). *Results:* Wheelchair users' average age was 53.06 years, and the average onset time was 206.94 months with average use time of electric wheelchair 82.72 hours per a day. In usability satisfaction questionnaires, mean scores of safety 2.33, operability 1.79, efficiency 2.06, satisfaction 2.50, esthetics 1.90. Among the QUEST items, the wheelchair users were more or less satisfied with devices themselves but least satisfied with the issues related to service such as repair & servicing, follow-up service. *Conclusion:* In the present study, the electric wheelchair users were somewhat satisfied with their wheelchairs in terms of usability. However, they wanted to have more of such services as maintenance, repair and follow-up. Electric wheelchair users' needs obtained from the usability evaluation and satisfaction survey should be met in providing. *Acknowledgements:* This work was supported by Korea Health technology R&D Program (HI14CO745) funded by the Ministry of Health & Welfare, Republic of Korea.

914

DEVELOPMENT OF BRAIN MACHINE INTERFACE (BMI) ROBOT THERAPY FOR SHOULDER FLEXION MOVEMENT IN PATIENTS WITH HEMIPARETIC STROKE

F. Liu¹, K. Takasaki², M. Hiramoto¹, K. Mizuno¹, S. Kasuga², T. Noda³, K. Shindo⁴, Y. Otaka¹, S. Tachiro¹, J. Ushiba², M. Liu¹

¹Keio University, Rehabilitation Medicine, Shinanomachi, Japan, ²Keio University, Graduate School of Science and Technology, Yokohama, Japan, ³Advanced Telecommunications Research Institute International, Department of Brain Robot Interface, Kyoto, Japan, ⁴Tokyo Metropolitan Rehabilitation Hospital, Department of Rehabilitation Medicine, Tokyo, Japan

Introduction/Background: Recently, the efficacy of Brain machine interface (BMI) therapy for stroke patients with severe hemiparesis has been reported. We succeeded in facilitating recovery of completely paralyzed finger extensor muscles using EEG-BMI powered orthosis triggered by contralateral event-related desynchronization (ERD) during motor imagery (J Rehabil Med 2011). However, training of proximal muscles is also important to achieve practical upper extremity use in daily life. Physiologically, proximal muscles are known to be bilaterally innervated. The purpose of this study is

to investigate the feasibility of BMI therapy for proximal muscles using ipsilateral ERD. *Material and Methods:* We developed a novel BMI system based on motor imagery using pneumatic shoulder flexion assist robot controlled by ipsilateral ERD. Healthy persons ($n=3$) and patients with stroke ($n=3$) performed a 1-day BMI training, and success rates of BMI neurofeedback were recorded. One patient with stroke also received a 3-day BMI training and had pre- and post- clinical assessment. *Results:* All participants finished the BMI training without complications. In the single day BMI training, healthy persons marked an average success rate of $56\pm4\%$, and stroke patients demonstrated a success rate of $79\pm21\%$. After the 3-day BMI training, one participant exhibited improvement in the Fugl-Meyer score and shoulder active and passive range of motion. *Conclusion:* We demonstrated the feasibility of BMI therapy using ipsilateral ERD neurofeedback. Further research is needed to clarify the clinical efficacy of the BMI therapy.

915

NEW ANALYSIS METHOD FOR THE ASSESSMENT OF TASKS PERFORMED USING AN ARM ROBOT

A. Orand¹, H. Miyasaka¹, K. Takeda¹, G. Tanino¹, K. Ohno¹, S. Sonoda²

¹Fujita Memorial Nanakuri Institute - Fujita Health University, Rehabilitation, Tsu, Japan, ²School of Medicine - Fujita Health University, Department of Rehabilitation Medicine II, Tsu, Japan

Introduction/Background: Drawing curved shape subjects such as a circle is one of the tasks that are used in the robotic therapy of the hemiplegic patients. Detailed analysis of the drawn subjects can give the assessors a better view of the performance of the patients. A new detailed analysis method for the assessment of drawn circles using an arm robot is presented in this study. *Material and Methods:* Nine and one hemiplegic patients respectively with and without unilateral spatial neglect (USN) participated in our study. InMotion Arm Robot was used for the assessment of the tasks. For each assessment, the patient sat comfortably at a desk with his forearm secured to the robot's moving arm using Velcro straps. A circle with the diameter of 16 centimeters was displayed to the patient. Starting at 9 or 3 o'clock position, the patient was instructed to move the target on the screen along the circle circumferentially back to starting point. For each position, the patient repeated the same movement for 5 times and for 2 directions, once clockwise and once counter clockwise. There was no assistance from the arm robot while the patients carried out the tasks. Root mean square analysis method was used for evaluation of the tasks. Each of the 5 times repeated tasks was divided into 10 degrees portions or arcs. Each arc was compared against the 10 degrees portion of the circumference of the circle. *Results:* The root mean square errors of the 10 degrees portions were calculated. Four tasks circles quarters' mean errors were also determined. The results are shown in the following 2 figures. *Conclusion:* A new analysis method is designed and developed that can help the assessors to evaluate patients performance more precisely. The method can also be developed further for the diagnosis of USN of the hemiplegic.

916

AN INVESTIGATION OF CARETAKERS NEEDS FOR CHANGES IN ELECTRIC WHEELCHAIR

B.S. Lee¹, H. Choi², J.A. Lee², J.H. Bae², H.R. Pak²

¹Ministry of Health & Welfare National Rehabilitation Center, Physical and Rehabilitation Medicine, Seoul, Republic of Korea, ²Ministry of Health & Welfare National Rehabilitation Center, Clinical Research on Rehabilitation, Seoul, Republic of Korea

Introduction/Background: An electric wheelchair must meet not only its users' needs but also their caretakers'. The purpose of this study was to investigate caretakers' demands and requests in electric wheelchair development. *Material and Methods:* Fifty

caretakers' demands and requests were obtained by questionnaires consisting of such questions as to demographic information, care experience, care time, and care burden, and the survey also included the usability satisfaction questionnaire for electric wheelchair. The 5-point Likert scale was used for each question (5-very dissatisfied, 4-somewhat dissatisfied, 3-neither satisfied nor dissatisfied, 2-somewhat satisfied, 1-very satisfied). *Results:* Caretakers' average age was 54.54 years, and the average duration of their care experience was 80.98 months with average care time 9.80 hours per day. They reported that the biggest problem of electric wheelchairs was they were too heavy and difficult to control and that the greatest difficulty in helping electric wheelchair users was helping them with transfer to and from the wheelchair. In usability satisfaction, mean satisfaction scores of the items ranged from 2.44 to 3.60 (risk of transfer 2.44, difficulty of operability 2.64, inconvenience of battery charging duration 2.86, inconvenience of cleaning 3.60, and, inconvenience of carriages 3.60). *Conclusion:* In the present study, the caretakers of electric wheelchair users requested an electric wheelchair to be easier for transfer, not too big and heavy. They also wanted electric wheelchairs made easier for operation, having reduced battery charging time, and more convenient for cleaning and carrying. Such issues and several others related to usability of electric wheelchair need to be further identified which will be very helpful in developing electric wheelchairs in the future. *Acknowledgement:* This work was supported by Korea Health technology R&D program (HI14CO745) funded by Ministry of Health & Welfare, Republic of Korea.

917

PILOT STUDY ON THE ROLE OF PASSIVE AND ASSISTED ANKLE JOINT MOTION BY A PORTABLE DEVICE FOR BEDRIDDEN PAEDIATRIC PATIENTS AFFECTED BY UPPER MOTONEURON LESIONS

S. Pittaccio¹, L. Garavaglia^{1,2}, E. Molteni³, E. Beretta³, E. Vassena⁴, S. Strazzer³

¹National Research Council of Italy, Institute for Energetics and Interphases, Lecco, Italy, ²Politecnico di Milano, Electronics- Information and Bioengineering, Milano, Italy, ³Eugenio Medea - La Nostra Famiglia Bosisio Parini, Acquired Brain Injury Unit, Lecco, Italy, ⁴Eugenio Medea - La Nostra Famiglia Bosisio Parini, Epileptology, Lecco, Italy

Introduction/Background: Upper motoneuron lesions (UML) affect people of all ages and are a major cause of disability in the young. Lower limb rehabilitation is a fundamental part of post-acute care in neurological disease. In this context passive mobilisation could be of help for acute patients in a very early stage of their recovery to safeguard tissue properties and prevent the worsening of neural damages that cause cognitive and motor impairment, when paresis prevent the beginning of active workout and so physical treatment may be delayed. This research investigates the potential role of early passive motion in stimulating cortical areas of the brain dedicated to the control of the lower limb in UML. *Material and Methods:* Seven pediatric patients (aged 15.35±4.36) took part in the study. They were treated for two weeks (2 daily sessions) with a robotic passive ankle mobiliser (Toe-Up!). The device was implemented using specially-designed shape-memory-alloy-based actuators. Range of motion, muscle length and Ashworth score were measured before and after this treatment. At the same time-points brain activity was recorded by 64-channels electroencephalography (EEG) under four different conditions: rest, active dorsiflexion of the ankle, assisted and passive mobilisation of the same joint. The acquired data were processed to obtain cortical ERD/ERS (Event Related Desynchronisation/Synchronisation) maps, which were then compared. *Results:* Preliminary results show that this therapy is very well tolerated and that its application specifically improves ankle PROM (+4.71°, $p=0.063$) and plantarflexor muscle length (+7.57°, $p=0.007$). EEG data for the passive/assistive condition showed hints of improved desynchronisation in at least one frequency band. *Conclusion:* The results of this pilot study suggest that passive mobilisation by the

Toe-Up! device produces valuable clinical effects and set a basis for the study of cortical re-organisation in UML patients treated with ankle passive/assistive mobilisation.

918

DUAL-TASK MOTOR PERFORMANCE CHANGES IN UPPER EXTREMITY THROUGH ROBOTIC REHABILITATION AMONG PATIENTS WITH STROKE

J.H. Shin¹, P. GyuLee¹

¹Korea National Rehabilitation Center, Rehabilitation Hospital, Seoul, Republic of Korea

Introduction/Background: Dual-task performance, called as cognitive-motor interference (CMI), was generally known to be deteriorated compared to single-task performance. Upper extremity movements require more cognitive demands and is closely related to activities of daily living, thus investigations about the dual-task performance of upper extremity would be meaningful. We aimed to explore the motor performance according to cognitive tasks during robotic rehabilitation in patients with stroke with longitudinal assessments. *Material and Methods:* A total of 22 patients with first-ever stroke participated in this study. Participants received robotic intervention using InMotion 2, which was specifically designed for clinical rehabilitation applications. Robotic evaluations were administered at Day 5 and Day 20 of robotic intervention under three cognitive conditions (no cognitive task, Controlled Oral Word Association Test (COWAT), and digit span test (DST)). The effects of robotic rehabilitation and cognitive tasks on motor performance (smoothness, mean velocity, reach error and path error) were analyzed using within-subject 2 (time; Day 5, Day 20) × 3 (cognitive tasks; No cognitive tasks, COWAT, DST) repeated measures analysis of variance. *Results:* There was a significant main effect of time ($p=0.007$) and cognitive task ($p=0.020$) on smoothness, respectively without interaction ($p=0.796$). Reach error showed a trend of improvement in all cognitive condition ($p=0.078$), without main effects of cognitive task ($p=0.247$) and interaction ($p=0.607$). There were no main effects of cognitive task and time on mean velocity and path error without any interaction. These results were not different between young and old age group, or between severely motor impaired and mildly impaired group. *Conclusion:* The motor performance changes indicate that cognitive tasks have specific effects on upper extremity motor performance and rehabilitation have effects on dual-task performance as well as single task performance in stroke patients.

919

THE EFFECT OF PASSIVE ROBOT WALKING HELPER WITH AN INTENTION-BASED GUIDANCE SYSTEM ON STROKE PATIENTS

H.S. Shiue¹, J.T. Wu², C.H. Ko³, K.Y. Young²

¹EDA hospital, Physical Medicine and Rehabilitation, Kaohsiung City, Taiwan, ²National Chiao Tung University, Department of Electrical Engineering, Hsinchu City, Taiwan, ³I-Shou University, Department of Electrical Engineering, Kaohsiung City, Taiwan

Introduction/Background: Most robot walking helpers use active system but they may increase the risk of fall especially when users have no will to walk. We develop a passive robot walking helper with brake system. Along with the selected path and the walking intention which was detected by the forces applied on the force-sensing grips, the receding horizon passive control strategy will derive the braking torques and then guide the user to the desired target. *Material and Methods:* Twenty two stroke patients aged from 34 to 81 years (mean [SD] 59.8 [12.6] years) with mean duration of stroke for 3.2 (3.0) years were invited. They were asked to ambulate on 10-meter straight line. In the first time, they used robot walking helper without intention-based guidance system which meant no brake. In the second time, they walked with passive robot walking helper with intention-based guidance system. Only the data of the middle 6-me-

ter were corrected. Questionnaire for understanding the users' experience including comfortability, fall prevention, and physical support was also done. *Results:* The mean time of 6-meter walking was 31.4 seconds for ambulation with robot walker without brake and was 24.4 seconds for ambulation with passive robot walker (p -value <0.01). The maximal deviation from targeted path was 0.44 meter and 0.18 meter, respectively, and was not statistically significant. These users rated higher score in all domains for walking with passive robot walking helper in the questionnaire especially in fall prevention (4.41) and physical support (4.59). *Conclusion:* A passive robot walking helper with an intention-based guidance system may provide more support and more safety for stroke patients.

920

THE ROLE OF SOUND IN ROBOT-ASSISTED HAND-FUNCTION-TRAINING POST-STROKE

F. Speth¹, M. Wahl¹

¹Humboldt University Berlin, Rehabilitation Science, Berlin, Germany

Introduction/Background: Currently there is an increasing research interest of neurology and technology on the effectiveness of sound and music applied to robot-assisted post-stroke therapies. Usually rehabilitation-robots are combined with virtual-reality-scenarios containing audio-visual displays. So far sound was neither specified for robot-training, nor were sound-induced effects evaluated focusing on function and motivation. Sound might influence recovery in function, cognition and mood. Therefore we studied effects of specified sound for robotic hand-function-training post-stroke. *Material and Methods:* A 2-armed clinical trial with 34 stroke patients suffering from a hand paresis syndrome ranging from severe to mild grades of severity was performed. Both, the control-group ($n=14$) and the sound-group ($n=20$) received robot-assisted hand-function-training over three-weeks with total nine 45-minute long therapy-sessions. The control-group trained without sound and the sound-group with polychromatic music and game related sound-feedback. A test-battery was applied to detect changes in function with the Box-and-Block-Test (T0, T2) and motivation with the Intrinsic-Motivation-Inventory (T1). The goals of this study were 1) to investigate if specified sound applied to robotic hand-function-training compared to training without sound promotes recovery, and 2) if sound is effective for all grades of severity of a hand paresis syndrome. *Results:* Compared to the control-group, the sound-group showed significantly higher ratings in the Intrinsic-Motivation-Inventory independently of the grade of severity. In the domain function, results showed that therapeutic effects can be boosted and deteriorated by sound depending upon grade of severity: Mild to moderate cases benefited significantly from sound, whereby for severe cases functional effects of robot-therapy were decreased significantly. *Conclusion:* The results reveal that sound applied to robotic hand-function-training post-stroke can motivate patients, while leading to ambivalent effects in function depending upon grade of syndrome-severity. Concluding, sound should be applied to robotic training post-stroke carefully by taking into account that sound can increase and deteriorate therapeutic effects dependent upon patient characteristics like grade of severity.

921

THE EFFECTS OF EMG-DRIVEN REHABILITATION ROBOTIC FOR HAND AND ELBOW TRAINING ON PERSONS AFTER STROKE

E.A. Susanto¹, R.K.Y. Tong¹

¹The Chinese University of Hong Kong, Division of Biomedical Engineering - Department of Electronic Engineering, Hong Kong, Hong Kong- China

Introduction/Background: Stroke has been a major cause of disability worldwide for decades. Stroke rehabilitation, however, remains very challenging; only able to promote limited motor function

recovery in hand and elbow functions. Robot-assisted rehabilitation has the potential to be integrated with physical therapy and occupational therapy for upper-limb rehabilitation by providing intensive, repetitive, and task-specific training. We propose the use of intention-driven hand and elbow exoskeleton robot to facilitate upper-limb rehabilitation after stroke. *Material and Methods:* A total of nine individuals with chronic stroke from 3 different sites: one hospital and two elderly centers, underwent 20 sessions of twice-a-week training using the hand and elbow exoskeleton robot. EMG signals from the affected upper limb were captured to indicate the user's intention and directly drive the robotic system. Motor Status Scale (MSS) and upper-extremities Fugl-Meyer Assessment (FMA) were assessed before and after the 20-session training and were used as the primary outcome measures. The non-parametric Wilcoxon's Signed Rank Test was used and 95% confidence interval was applied. *Results:* All nine subjects completed the 20-session-training in this study (4 males and 5 females, with average age of 53.4 ± 17.0 years old and average stroke onset of 24.5 ± 29.1 months). The results showed significant MSS improvement ($p=0.038$) after training, from 22.96 ± 10.52 to 25.80 ± 9.42 . FMA also improved from 28.89 ± 14.23 to 35.22 ± 17.50 in average, despite not being significant ($p=0.067$). 77% of the subjects experienced improvements in both MSS and FMA. *Conclusion:* The overall results showed the potential efficacy of the method proposed in this study to promote upper-limb motor function recovery after stroke. Additionally, the successful completion of this clinical trial one hospital and two elderly centers suggests the feasibility of this robotic training to be adopted in clinical settings.

922

GAIT RETRAINING STRATEGIES USING THE NEW EXOSKELETON ROBOT HAL FOR ACUTE STROKE PATIENTS

T. Ueno¹, H. Kadone², K. Hiruta¹, S. Yamauchi¹, T. Hisamatsu¹, Y. Shimizu¹, A. Yamaguchi¹, M. Sakamaki², Y. Ito², H. Kawamoto³, A. Marushima⁴, Y. Hada¹, M. Yamazaki¹

¹Tsukuba University Hospital, Rehabilitation, Tsukuba, Japan, ²Tsukuba University, Center for Innovation Medicine and Engineering, Tsukuba, Japan, ³Tsukuba University, Faculty of Engineering- Information and Systems, Tsukuba, Japan, ⁴Tsukuba University, Neurosurgery, Tsukuba, Japan

Introduction/Background: For acute stroke patients, task-specific mobility training may enhance beneficial neuroplasticity and recovery from paralysis. Hybrid Assistive Limb (HAL) is the new exoskeleton robot that synchronizes with slight voluntary activation of muscle and supports hip and knee joint movements. In this study, we developed a new exercise program using HAL in addition to regular rehabilitation method for acute stroke patients and discussed its feasibility and effectiveness. *Material and Methods:* Subjects were 28 acute stroke patients. Average duration from onset was $9.7\text{ days}\pm 5.2\text{ days}$. Average NIHSS was 9.8 ± 5.2 . A new exercise consists of five steps, were determined according to the function of the paralyzed limb, step I: exercise on the bed, step II: standing-up, step III: walking training bringing up knees (Maring style), step IV: add knee extension (kicking motion), step V: increase hip work (long strides walk style). We set control method for HAL depending on each step and provided an integral HAL and regular rehabilitation program. Video and surface electromyogram were recorded before and after the program and evaluated. *Results:* It was shown that the five steps program was in accordance with the recovery of the central nervous system described by the Brunnstrom stages. The step II for standing-up exercise could be safely done by patients who showed no initial myogenic potential, which improved afterwards. From step III to step V range of motion of the knee and hip joint during walking increased and the walking cycle was improved after one intervention. The whole program improved these factors further and increased walking speed, stride length and cadence. *Conclusion:* By selecting a proper HAL control, we could carry out the new exercise program using HAL safely

and effectively from early phase. We consider that this program will be feasible and beneficial for acute stroke patients.

923

TILT TABLE TEST WITH AN INTEGRATED BIO-SENSOR SYSTEM TO IDENTIFY RISK FACTORS OF DIZZINESS IN HOSPITALIZED STROKE PATIENTS

T.S. Wei¹, L.W. Yen², T.C. Lai³, C.H. Lee⁴

¹Changhua Christian Hospital, Dept. of Physical Medicine and Rehabilitation, Changhua County, Taiwan, ²Changhua Christian Hospital, Dept. of Physical Medicine and Rehabilitation and Center for Fall Prevention, Changhua County, Taiwan, ³Changhua Christian Hospital, Dept. of Physical Therapy, Changhua County, Taiwan, ⁴Mingdao University, Dept. of Information Communication, Chuanghua, Taiwan

Introduction/Background: Stroke patients are a high risk group for falls which may result from dizziness. This study utilized self-developed integrated biosensor system during tilt table test (TTT) to predict the occurrence of dizziness and to help clinical staff efficiently monitor this condition. **Material and Methods:** A total of 63 stroke patients were recruited (37 men, mean age 72.7±10.8 years). Besides demographic data, Functional Independence Measure (FIM) score was assessed for subjects before testing. During TTT, the system continually recorded subjects' real-time heart rate (HR), blood pressure (BP) and blood oxygen saturation. Independent *t*-test was used to analyze the differences between groups. Multivariate logistic regression was used to predict the risk factors of dizziness. **Results:** There were 21 patients with dizziness (mean age 78.1±9.3 years) and 42 patients without (mean age 69.9±10.6 years). 85.7% dizziness patients met the criteria of orthostatic hypotension and only 38.2% orthostatic hypotension patients had symptom of dizziness. Patients with dizziness showed higher age ($p=0.004$) and resting HR ($p=0.02$), and lower FIM score ($p=0.009$) than patients without. Independent predictors of dizziness included the resting HR (adjusted Odds Ratio (aOR): 1.06; 95% confidence interval (CI): 1.01–1.11; $p=0.024$), the FIM score (aOR: 0.96; 95% CI: 0.93–1.00; $p=0.041$), the HR increasing more than 20 beats during TTT (aOR: 7.28; 95% CI: 1.30–40.70; $p=0.024$) and the diastolic blood pressure (DBP) decreasing more than 10 mmHg during TTT (aOR: 3.71; 95% CI: 0.96–14.32; $p=0.058$). Area of ROC curve for our model is 0.823 ($p<0.001$). **Conclusion:** TTT with automatic integrated system is a useful and efficient diagnostic aid tool to identify risk factors of dizziness in stroke inpatients for further fall prevention.

924

KINEMATICS MODELING AND ANALYSIS OF CENTRAL-DRIVEN ROBOT FOR UPPER LIMB REHABILITATION AFTER STROKE

W. Cao¹, J. Yi¹, Q. Meng¹, H. YU¹

¹University of Shanghai for Science and Technology, Shanghai, China

Background: The rehabilitation of upper limb function is most important for the stroke patients. There are many universities and companies devoting to researches on the upper limb rehabilitation robots. However, all motors on this type of robots are mostly mounted near movement joints. This design greatly increased not only the size of the robot arm, but also the influence of motor noise and radiation. **Objective:** Proposing a structure of upper limb rehabilitation robot not only reducing the volume of the robotic arm in the structure, but also decreasing the influence of motor noise, radiation and other adverse factors on upper limb dysfunction patient. **Methods:** Presenting a novel center-driven upper limb rehabilitation robot. According to the Denavit-Hartenberg (D-H) parameters method, the forward and inverse kinematics equations have been deduced. The motion simulation has been done to receive the angle-time curve of each joint and the position-time curve of handle

by using SolidWorks software and under setting rehabilitation path. **Results and Conclusion:** Experimental results show that the rationality with the structure design of central-driven has been verified by the handle can move under setting rehabilitation path, and the effectiveness with kinematics equations has been proved by the error was less than 3° which comparison with the angle-time curve of calculated and received during motion simulation.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: PRM INTERVENTIONS RESEARCH - MISCELLANEOUS

925

EXPOSURE OF PHOTOTHERAPY INTRAVENOUSLY ON COGNITIVE DEFICIT IN PATIENTS WITH CHRONIC INSULT IN BRAIN

Y.C. Lin¹, S.T. Chang^{1,2}

¹Taichung Veterans General Hospital, Department of Rehabilitation, Taichung, Taiwan, ²National Defense Medical Center, Department of Physical Medicine and Rehabilitation- School of Medicine, Taipei, Taiwan

Introduction/Background: Individuals with chronic insult in brain (CIB) will cause cognitive deficit to hinder daily performances. The orbitofrontal cortex is critical for decision-making, and the frontal operculum may operate in awareness of limb functioning. Cognitive deficit is a result of disturbance in cerebral blood flow in aforementioned brain areas. The phototherapy intravenously with laser has been widely applied to treat pathological diseases. The purpose of the study aimed at investigating the frontal operculum and orbitofrontal gyrus activities after phototherapy. **Material and Methods:** A total of 15 CIB patients were enrolled with another 15 patients as control. The interventional equipment is a He-Ne Laser YJ-ILIB-5 device (Taiex) with a continuous output beam of power 1.2–3.8 mW. A course of phototherapy with ten sessions was performed in two weeks, five times a week, 60 minutes in each session. Brightness of brain perfusion scan obtains the activities of orbitofrontal gyrus, frontal operculum, and precentral gyrus. The generalized estimating equation was used for statistics for the association of interest and for the correlations among potential confounders. **Results:** The brain perfusion scan showed a slight improvement of perfusional activities after a 10-day phototherapy. After adjustment for potential confounders, significant differences were not demonstrated for gender, body weight, or interaction between brightness of other brain regions. However, the brightness for the precentral gyrus on both sides were significantly differences compared to the analogous values for the frontal operculum ($p<0.0001$), but not orbitofrontal gyrus ($p>0.0001$). **Conclusion:** Our data suggest phototherapy may be an effective therapeutic modality for the cognitive deficit resulted from malfunction of cerebral tissue activities, e.g. frontal operculum. The results stand for new evidence of phototherapy intravenously with laser for the cognitive deficit in CIB patients.

BIOMEDICAL REHABILITATION SCIENCES AND ENGINEERING: MISCELLANEOUS

926

ESTIMATION OF MUSCULAR ACTIVITY IN LOWER LIMBS ACCORDING TO CYCLE-PEDALING DIRECTION WITH SPINE POSITION

S.H. Shin¹, M. Yu², S.R. Kang³, T.K. Kwon³

¹Chonbuk National University, Healthcare engineering, Jeonju, Republic of Korea, ²Chonbuk National University, R&BD Strategy Center, Jeonju, Republic of Korea, ³Chonbuk National University, Division of Biomedical Engineering, Jeonju, Republic of Korea

Introduction/Background: Early rehabilitation training could be contributed to improvement both sense of balance and recover in muscle function by relaxing the tension and stiff muscles. Moreover, early training helped being able to maintain body balance with stimulated blood circulation and strengthened cardiopulmonary function. Especially, cycle training is well known for typical aerobic exercise, it provided a various effects as enhancement of range of motion(hip, knee, ankle), muscles power and cardio pulmonary function. **Material and Methods:** The aim of the study was to investigate positive effect of early rehabilitation training by evaluating the pattern of lower-limbs muscles activity during cycle training in spine position. 16 elderly men and 16 young men who have no medical history participated in the study. We estimated muscular activities in rectus femoris, biceps femoris, tibialis anterior, medial gastrocnemius, soleus of right and calculated pedaling conditions during cycle training. The pedaling conditions consist of the forward direction of clockwise and the backward direction of counterclockwise. **Results:** The results showed that the RMS value of biceps femoris and soleus muscle in elderly group were the higher significantly during the forward pedaling directions than the backward pedaling direction. In young group, RMS value of rectus femoris, biceps femoris and tibialis anterior were the higher significantly ($p < 0.05$). **Conclusion:** This study found that the muscular activity pattern were different according to age and pedaling directions. It could be applied to development of new cycle training method for the elderly or patients as fundamental research.

927

EVALUATION OF LOWER LIMB PATTERN DURING STAIREVALUATION OF LOWER LIMB PATTERN DURING STAIR DESCEND ACCORDING TO BODY WEIGHT SUPPORT PERCENTAGES WITH ACTIVE HARNESS SYSTEM

S.M. Song¹, C.H. Yu², K. Kim³, W.K. Song⁴, T.K. Kwon²

¹Chonbuk National University, Department of Healthcare Engineering, Jeonju, Republic of Korea, ²Chonbuk National University, Division of Biomedical Engineering, Jeonju, Republic of Korea, ³Chonbuk National University Automobile-part & Mold Technology Center, R&D Division- New Technology Fusion Team, Jeonju, Republic of Korea, ⁴National Rehabilitation Center, Research Institute- Translational Research Center for Rehabilitation Robots, Seoul, Republic of Korea

Introduction/Background: To meet the demands for cost-effective rehabilitation system, robot rehabilitation systems were highly developed. Although many robot rehabilitation systems have already used, they still have limitation for doing various activities such as stair ascend or sit down etc. Therefore we developed multi-degree of freedom body weight support system called as active harness system. In this paper we measured lower limb pattern during stair descend in accordance with change rate of body weight support with active harness system. **Material and Methods:** The active harness system is followed by user's intention of activities using mounted load cell and potentiometer. The load cell controls the body weight support rate and speed of up/down direction. The potentiometer controls the speed of front/back direction. The 20 healthy male subjects were conducted 2 steps of stair descend walking with 0%, 30%, and 50% of body weight support, respectively. The EMG and foot pressure were measured for evaluation. The 8 EMG electrodes located in left and right lower limbs muscles. **Results:** The foot pressure results show that the forefoot pressures were rapidly decreased along with increase of body weight support rate. These results indicate that the flexion of knee joint and plantarflexion were supported by body weight support system. The result from assistance of knee joint flexion and plantarflexion caused decline of rectus femoris muscle activities. However the biceps femoris muscle activities were increased during stair descend. This pattern is caused by subjects' intentional dorsiflexion due to the longer sustainment time of stance phase leg. The longer sustainment time is

results from the slow speed of change body weight support system which set for patients' safety. **Conclusion:** The lower limbs patterns during stair descend were changed by body weight support rate. This experiment shows that the active harness system can help rehabilitation of patients who have disability with active daily living.

INTEGRATIVE REHABILITATION SCIENCES: REHABILITATION SYSTEMS AND SERVICES RESEARCH - HEALTH POLICY AND LAW (INCLUDING MEDICAL AND SOCIAL MODEL OF DISABILITY AND REHABILITATION)

928

EFFECTS OF GALBANUM OIL ON PATIENTS' PAIN WITH KNEE OSTEOARTHRITIS : A RANDOMISED CLINICAL TRIAL

Z. Emami Razavi¹, M. Karimi², M. Azadvari¹, M. Khamessi³
¹TUMS, Physical Medicine & Rehabilitation, Tehran, Iran, ²TUMS, Iranian Traditional Medicine, Tehran, Iran, ³IUMS, PMR, Tehran, Iran

Introduction/Background: Knee osteoarthritis (OA) is considered a major public health issue causing chronic disability worldwide with the increasing number of aging people. Many sufferers with knee OA are using complementary and alternative medicine including herbal drug, herbal patch and etc. This trial is aimed to compare the efficacy of Galbanum oil in the management of knee OA with Diclofenac gel as parallel randomized control. **Material and Methods:** In this randomized control trial (RCT), Thirty two patients with chronic knee pain due to osteoarthritis were randomly allocated into two groups. The intervention group ($n=16$) received Galbanom oil and control group ($n=16$) received diclophenac. The interventions are given for 1 month, 3 times per day. Outcomes were assessed using Persian version of Western Ontario McMaster University Osteoarthritis Index (WOMAC) and Visual Analog Scale (VAS) scores. **Results:** Both groups experienced significant improvement in VAS score but no statistically significant difference was observed between topical Galbanum oil and topical Diclofenac gel regarding knee pain, morning stiffness and physical function over the 1 and 2 months follow-up period. **Conclusion:** It seems that using topical Galbanum oil is clinically effective for patients suffering from knee osteoarthritis in order to decrease their pain, morning stiffness and limited function; its effect is comparable with topical Diclofenac gel.

INTEGRATIVE REHABILITATION SCIENCES: REHABILITATION SYSTEMS AND SERVICES RESEARCH - HEALTH STRATEGIES IN PRM

929

PENETRATION OF THE BACKQUACK™ HUMOROUS EDUCATIONAL VIDEO GAME INTO AMERICAN COMMUNITIES

A.J. Haig¹, S. Loar¹, E. Maslowski²

¹Ann Arbor- Michigan, USA, ²The University of Michigan, ³-D computing laboratory, Ann Arbor- Michigan, USA

Introduction/Background: Prevention of back pain is almost impossible. However prevention of medical misadventure comes through community and physician education and patient empowerment. Back pain is boring, so flashy humor may reach populations better than serious campaigns. **Material and Methods:** Prospective controlled trial of media blitz featuring the free BAcKQuack™ video game (www.backquack.net) in 3 American communities with 3 control communities. The goal of BackQuack™ is to become the worst possible doctor (a 'quack') by giving bad advice to a 2 dimen-

sional patient. For consumers BackQuack™ includes a history form and numerous education pamphlets. For clinicians the textbook Back Pain (Haig and Coldwell, 2005, ACP press) is embedded. In intervention communities hospitals, clinics and community organizations distributed posters and joke cards and there were press releases to the local media. Website use was tracked and surveys sent to consumers (600 control, 600 intervention community members both before and after intervention) and physicians (all listed physicians in all communities before and after intervention). *Results:* Use of BackQuack™ online increased from 27/month (s.d. 15.4) prior to intervention to 126.5/month (s.d. 72.3) during intervention, then dropped to 71.3 (s.d. 13.8) in the subsequent 15 months. Survey responses were disappointing with 20.9 to 29.7% community responses and no change in recognition of 'Backquack™ vs sham names. Physician responses increased with intervention from 3.5% to 15.2% with 35.8% recognition. *Conclusion:* Increased website use and physician recognition of BackQuack™ suggest that community awareness did increase, however mailed surveys did not capture this increase. BackQuack™ remains online as a viable free tool for physician and community education. Future research might directly measure change in competency, empowerment, and health-care utilization of participants, especially physicians, back pain patients, and children. *Acknowledgements:* Funded by the Center for Healthcare Research & Transformation.

930

CBR AND CBID IN INDONESIA 1985-2015

F.H. Idris¹

¹Jakarta Pusat, Indonesia

Introduction/Background: CBR (Community Based Rehabilitation) is a Community-Development, to empower PWD, The family and The Community, in prevention of disability, detection, and rehabilitation /habilitation all aspect of life. CBR is a strategy and program to achieve Community-Based Inclusive Development (CBID), where Persons With Disability (PWD) are fully included in all aspects of community life and have full access to all facilities and services, with the principle of the UN Convention on the Rights of Persons with Disabilities (CRPD). *Objective:* To review CBR practice in Indonesia 1985–2015. *Material and Methods:* Design: CBR implementation, time: 1985–2015, Place: Bandung CBR (30 years), south sulawesi CBR (20 years), Jakarta CBR (17 years), Piddie CBR (10 years), Ponorogo CBR (3 years), Banten CBR (3 years), south Kalimantan CBR (2 years), Indonesia: Inclusion criteria: CBR area using adapted WHO guidelines and manuals. Tools: Ferial H Idris CBR method adapted from WHO CBR manuals, Analysis: descriptive analytic. *Results:* Develop standard training of CBR, standard Detection in CBR area, matrix manuals for family members, matrix intersectoral guidelines, intensification and extensification CBR areas, empowerment PWD, the family, and the community. *Conclusion:* People With disability, the family and the community could be empowered through CBR program.

931

COMMUNITY BASED REHABILITATION IN ITALY

G. Pestelli¹

¹Forli, Italy

Introduction/Background: Italy is a country in which MDs in rehabilitation preferred to bring up medical rehabilitation instead of social rehabilitation. For a long time medical rehabilitation into the hospitals was signed as the true rehabilitation for the best doctors. The system forgot community and territories thinking that "poor" doctors was able only for poor people. *Material and Methods:* In the last years, thank to the activity of SIMFER, Italy discovered to do a real ad efficacy rehabilitation in the communities. SIMFER edited a pamphlet in which declared the guide lines for the rehabilitation out of the hospitals and recently edited a new document about cronichal model of care. So we start to think about the possibility to develop community rehabilitation. In our country, so as

in all the world, the problems of poor people are present a lot and we have the necessity to give answers with some activities without bureaucracy and near the needs of disable people. *Results:* In 2012 start the first experience of CBR in a little village in Emilia Romagna region, called Bertinoro. MDs in rehabilitation and physiotherapists, start to teach something about rehabilitation to a group of volunteers. The teachers had experience in low resources countries. Now we have in Italy activities in CBR in Bagnoregio and Valmontone, near Rome, in a lot of villages in Romagna and also in Ferrara and near Turin. We are trying also in surrounding of Naples. We try to be active in the places of poor people. *Conclusion:* We think that medical and social rehabilitation must have the same objective: to develop quality of life of disable people and give a chance of participation for all. And work all together. Our words are: "To arrive where it is difficult to arrive".

INTEGRATIVE REHABILITATION SCIENCES: REHABILITATION SYSTEMS AND SERVICES RESEARCH - REHABILITATION SERVICE ORGANIZATION

932

THE REHABILITATION OF THE CHILD WITH CONGENITAL LIMB DEFICIENCY IN RURAL INDIA

T. Datta¹, D. Ghosh²

¹National Institute for the Orthopaedically Handicapped, Prosthetic and Orthotics, Kolkata, India, ²HMM College for Women, Economics, Kolkata, India

Introduction/Background: Birth of a child with congenital anomalies is a traumatic event for the parents as well as the community. Treat well number of such children in our center with different experience in rehabilitation, social life and functional ability. In Indian subcontinent the mother is a house wife and has to shoulder other responsibilities in the family and community which is lacking due to the larger involvement and engaged with the child and the parents becoming non supportive in the event of treatment. Philosophy of treatment is to make the mother independent first to overcome the social discrimination. *Material and Methods:* We prepared a multi functional ADL supportive seat with a developmental reflex and coordination. The plastic molded seat is attached with very small casters and the height of the seat is kept very low considering the height of the Child's residual foot so that the child can feel the touch of his toes to the ground. It is important that all possible sensory contact with the feet be stimulated. The infant should be permitted to see his feet uncovered and encourage playing with them. *Results:* To train the child for input acute sensory control we used simple baby piano switches attached with the residual limb ends and speaker. So from very flicker to mild and mild to moderate movement of limbs creates different sound and music which the child take it as an amusement and develop movement/function as well. The whole treatment and rehabilitation process of the child were performed at home with continuous follow up. *Conclusion:* We identified ten different categories of limb deficient child under this method we observed significant outcome and improvement in access to rehabilitation as well as fulfillment of our goal that is to make the child independent. This is our holistic approach to rehabilitation for the limb deficient child.

933

EXPERIENCE OF WORK PERFORMANCE IN READYMADE GARMENT (RMG) OF BANGLADESH OF THE PERSON WITH SPINAL CORD INJURY (PSCI) AFTER COMPLETING REHABILITATION AND VOCATIONAL TRAINING

C.M.K. Hasan¹, A.D. Nupur¹

¹Centre for the Rehabilitation of the Paralyzed CRP, Occupational Therapy, Dhaka, Bangladesh

Introduction/Background: Spinal Cord Injury (SCI) is one of the major physically disabling conditions in Bangladesh in between 18 to 30 years. CRP is only the organization in Bangladesh where rehabilitation of the PSCI. After completing a rehabilitation program, when the PSCI return to their productive life but this rate is less than 5% and its depend on injury level, types and severity of the injury. They face difficulties to perform job in RMG export industry. PSCI in Bangladesh face huge discrimination due to their status of disability, poverty and physical limitation. **Objectives:** To identify the physical, environmental and personal factors which influence the job and find out the existing facilities of RMG for PSCI's. **Material and Methods:** The study was a qualitative grounded theory study. Eight participants selected by purposive sampling who have match inclusion criteria. Researchers used a structured and semi-structured questionnaire and observation check. All data was analyzed by: question analysis, content analysis and analysis of themes. **Results:** Researcher find from the content analysis most of the participant face different types of physical, environmental and personal problems like leg pain, swallowed leg, burning sensation, feeling heaviness, poor strength in leg, very crowded, difficulty to move one floor to another floor, going to toilet, no rest facility, and long hour office. Participant got some facilities from garment factories. Providing with lift facilities, overtime facilities, enough lighting, sitting arrangement, sick leave permission, shown sympathy, payment timely and easier job is given. During observation the researcher observe PWS face different types of challenge during work performance. Most difficult task is given pressure on foot paddle by both legs and ironing cloth. Researcher find WWDs job performance is good. Maximum worker opinion for modify their workplace. **Conclusion:** PSCI engage productive work and financial security and make a good example for physically challenges people.

934

LAUNCH OF THE AFRICAN SPINAL CORD INJURY NETWORK (AFSCIN) : A CALL FOR PARTICIPANTS

C. Kiekens¹, E. Burger², H. Sloopman³, S. Muldoon⁴, R. Reeves⁵

¹KU Leuven, PRM, Leuven, Belgium, ²University of the Witwatersrand, Gauteng Health Department, Johannesburg, South Africa, ³Heliomare, PRM, Wijk aan Zee, Netherlands, ⁴Livability, International & Complex Care Development, Dublin, Ireland, ⁵Mayo Clinic, PRM, Rochester, USA

Introduction/Background: Persons with SCI in Africa are likely to experience poor pre-hospital care, inadequate radiology imaging services, lack of specialized units, absent or inadequate rehabilitation services and poorly trained staff. **Material and Methods:** A trans African SCI symposium was organised in Gaborone (Botswana) Nov 2–4 2015 with support of ISCOS and SASCA. The aim was the establishment and launch of AFSCIN as a mechanism to address common challenges in SCI management across Africa, similar to what ASCoN achieved in Asia. The objective of AFSCIN is to strengthen the process of developing strategic guidance for service delivery and liaison with key stakeholders in Africa, by exchanging knowledge, experience and skills and coordinating individual efforts by each country. **Results:** Eight African countries were represented by 75 people: Botswana, Cameroon, Congo, Madagascar, Malawi, Namibia, South Africa, Tanzania, Zambia and Zimbabwe. The symposium was joined by ISCoS members and Education committee representatives from South Africa, Ireland, USA, Belgium, UK, and the Netherlands. After the opening by the Assistant Health Minister, each country presented its challenges and successes in SCI management and some epidemiological data. Specific presentations were done on ISCoS, a Vietnamese model of a cost recovery system and appropriate assistive technology in a low/middle income country context. Two workshops were held: one on the

relevance and priorities for AFSCIN for each country, the second to identify strategies, specific actions and priorities for AFSCIN, based on the six building blocks of chapter 5 of the WHO-ISCoS IPSCI on a “Health Systems strengthening” approach. **Conclusion:** There is a great need for a joint AFSCIN initiative to improve lives of persons with SCI in Africa. The enthusiasm and involvement of the participants was most encouraging. Most inspiring was the peer support. We call for other countries to join the effort and participate in the second AFSCIN meeting spring 2017.

935

MUSCULOSKELETAL INTERFACE SERVICE : A NOVEL BIOPSYCHOSOCIAL MODEL TO MANAGE MUSCULOSKELETAL DISEASE AT THE PRIMARY-SECONDARY INTERFACE IN NORTH MIDLANDS, UNITED KINGDOM

M. Mariappan¹, E. Hall², K. Stevenson³, A. Menon⁴

¹North Staffordshire Rehabilitation Centre, Physical Rehabilitation Medicine, Stoke-on-Trent, United Kingdom, ²North Staffordshire Rehabilitation Centre, Musculoskeletal- Rheumatology and Rehabilitation, Stoke-on-Trent, United Kingdom, ³North Staffordshire Rehabilitation Centre, Musculoskeletal, Stoke-on-Trent, United Kingdom, ⁴North Staffordshire Rehabilitation Centre, Musculoskeletal and Rheumatology, Stoke-on-Trent, United Kingdom

Introduction/Background: The Musculoskeletal Interface Service (MIS) was launched as a novel initiative to improve the quality of care for patients with non-surgical and non-inflammatory musculoskeletal disease, avoiding inappropriate referrals to expensive secondary care with significant reduction in wait times to access orthopaedics and rheumatology services. **Material and Methods:** Family Physicians and Physiotherapists use a national electronic referral system for patients >18 years with no red flags or features of inflammatory arthritis. Patients are offered a choice of clinic site and time including out of hours, where assessment by clinicians (Extended Scope Practitioners, Rheumatologist, Primary care and Rehabilitation Physicians) following locally agreed evidence based guidelines and algorithms ensure consistency and quality of care within the team. Over half the patients are assessed by the ESPs with appropriate medical support. A rapid access to MRI & neurophysiology helps formulate a holistic management plan with patient involvement. Appropriate treatments are provided including intra-articular injections, exercise advice and referrals to secondary care are made with the necessary investigations. Robust clinical governance structures are in place with annual staff appraisals, regular teaching sessions and active involvement with clinical research studies. **Results:** 13,500 patients are reviewed annually, 90% of those are seen within three weeks of referral with average wait times for MRI/NCS around two weeks. Conversion rates from onward referral to Orthopaedics are approximately 70% - a big increase from 20% prior to the commissioning of the service. Follow-up rates are only 10% with, huge rate of patient's satisfaction/recommendation of the service at 95%. **Conclusion:** This Musculoskeletal Interface Service provides a comprehensive, evidence based specialist seamless service for patients. The novel nature of our service comes from the multidisciplinary nature of its workforce, its engagement with patients, stake holders and its willingness to utilise new strategies to ensure good service model provision and service delivery.

936

A SURVEY OF REHABILITATION MEDICINE SERVICES IN FOSHAN OF CHINA

Z. Pande¹, F. Hongyu¹, Z. Chengguo¹, H. Wenti²

¹The First People's Hospital of Foshan, Rehabilitation Department, Foshan, China, ²Foshan City Health and Family Planning Board, Medical Administration Department, Foshan, China

Introduction/Background: China is a developing country, the modern rehabilitation medicine start late, lack of medical rehabilitation services capacity become increasingly prominent. **Objective:** To investigate the rehabilitation medicine care system status of Foshan City, China. **Material and Methods:** A cross-sectional questionnaire survey, to collect data for statistical analysis. **Results:** 111 (96.5%) medical institutions completed the survey. 81 (72.9%) hospitals have rehabilitation department, 86 (77.5%) medical institutions can provide rehabilitation therapy; 51 (45.9%) institutions have rehabilitation beds, rehabilitation beds account for 4.2% of the total number of beds. The average number of rehabilitation physicians and therapists of each hospital was 4.2 and 5.7 persons, licensed practice scope is rehabilitation medicine of physicians in rehabilitation department was only 18.9%. There were 6.34 rehabilitation physicians and 8.6 rehabilitation therapists per 100,000 population in Foshan. Secondary rehabilitation agencies undertake the largest rehabilitation medicine workload of citywide, per hospital of third rehabilitation agencies undertake the largest rehabilitation medicine workload. These two levels of rehabilitation agencies undertake the workload of outpatient rehabilitation therapy and inpatient rehabilitation therapy was 91.9% and 96.5%, respectively, is the lead agency of the rehabilitation care system. **Conclusion:** Foshan has built three level rehabilitation medicine care system, but the rehabilitation hospitals and primary medical institutions lack the capacity of rehabilitation services, the indentation of rehabilitation physicians and therapists is big.

937

ASSISTIVE DEVICES USED FOR ACTIVITIES OF DAILY LIVING(ADL'S)

S. Ray¹, S. Rahman², D. Mando², P. Pau³, R. Rana⁴

¹Centre for the Rehabilitation of the Paralyzed CRP, Occupational Therapy Department, Dhaka, Bangladesh, ²Centre for the Rehabilitation of the Paralyzed CRP, Occupational Therapy Department, Dhaka, Bangladesh, ³Bangladesh Health Professions Institute BHPI, Occupational Therapy, Dhaka, Bangladesh, ⁴Centre for the Rehabilitation of the Paralyzed CRP, Occupational Therapy, Dhaka, Bangladesh

Introduction/Background: Assistive technology is any device that is used to enhance a person's functioning and participation (Scherer, 2001). Occupational therapists have expertise in assessing clients for assistive technology and outlining recommendations of devices/modifications that meet the needs of the client within their environment (Petty et al, 2005). In Bangladesh the Hand Therapy Unit has been providing these services since 2008 under the Occupational Therapy Department at The Centre for the Rehabilitation of the Paralyzed. **Objectives/Purposes:** The assistive devices can help a person to engage in his/her regular activities where it may not be possible otherwise due to impairment or disability. For example, for a person whom demonstrates weakness in the finger, preventing him/her to write, a modified pen and writing splint may give him/her the opportunity to complete writing activities successfully. **Material and Methods:** Material: The products for activities of daily living (ADL's) refers to the various devices that assist us, particularly the persons with disability, to complete routine daily activities such as writing, typing, grooming, eating, cooking etc. Most of these are products are considered "low tech" devices which are inexpensive and available locally. These devices can make a remarkable difference in the individuals life. **Methods/Process:** A combined approach is used to illustrate a continuum of Occupational therapy intervention. This begins with establishing or restoring functional skills (remediation) and continuing the modification of the task or the environment (adaptive and compensatory technique). This process is congruent with the rehabilitative frame of reference. Patient centered functional assessment is completed for each patient. **Results:** A person can complete his/her ADL's with ease with the device, whereas this would likely not be possible in the absence of the device. **Conclusion:** Patient Satisfaction Survey on Assistive Devices used very effectively for the activity of daily living.

938

CHALLENGES AND POTENTIAL IMPROVEMENTS IN THE ADMISSION PROCESS OF PATIENTS WITH SPINAL CORD INJURY - AN INTERVIEW BASED QUALITATIVE STUDY OF AN INTERDISCIPLINARY TEAM

A. Scheel-Sailer¹, F. Röthlisberger², S. Boes³, S. Rubinelli⁴, K. Schmitt⁵

¹Swiss Paraplegic Centre, Acute Care and Rehabilitation, Nottwil, Switzerland, ²Inselspital Bern, Orthopedics, Bern, Switzerland, ³University of Lucerne, Department of Health Science, Lucerne, Switzerland, ⁴University Lucerne, Health Science, Lucerne, Switzerland, ⁵Swiss Paraplegic Centre, Rehabilitation Quality Management, Nottwil, Switzerland

Introduction/Background: The admission process of patients to a hospital is the starting point for inpatient services. In order to optimize the quality of the health service process, one need a better understanding of the patient admission workflow. The aim of this study was to identify challenges and potential improvements in the admission process of spinal cord injury patients at a specialized clinic from the perspective of an interdisciplinary team of health professionals. **Material and Methods:** Semi-structured interviews with eight health professionals (medical doctors, physical therapists, occupational therapists, nurses) at the Swiss Paraplegic Center (acute and rehabilitation clinic) were conducted based on a maximum variety purposive sampling strategy. The interviews were analyzed using a thematic analysis approach. **Results:** The interviewees described the challenges and potential improvements in this admission process, focusing in particular on five themes. First, the characteristics of the patient and his/her family influence different areas in the admission process and play a special role. Improvements in the exchange of information between the hospital and the patient could speed up and simplify the admission process. In addition, challenges and potential improvements were found concerning the rehabilitation planning, the organization of the admission process and the interdisciplinary work. **Conclusion:** This study identified five themes of challenges and potential improvements in the admission process of spinal cord injury patients at a specialized clinic. When planning adaptations of process steps in one of the areas, awareness of effects in other fields is necessary. Improved pre-admission information would be a first important step to optimize the admission process. A common IT-system providing an interdisciplinary overview and possibilities for interdisciplinary exchange would support the management of the admission process meaningful. Managers of other hospitals can supplement the results of this study with their own process analyses, to improve their own patient admission processes.

INTEGRATIVE REHABILITATION SCIENCES: REHABILITATION SYSTEMS AND SERVICES RESEARCH - COMMUNITY-BASED PARTICIPATION RESEARCH

939

CROSS-VALIDATION AND CULTURAL ADAPTATION OF THE DUTCH VERSION OF THE PARTICIPATION AND ENVIRONMENT MEASURE OF CHILDREN AND YOUTH (PEM-CY)

M. Coussens¹, N. Bulckmans¹, D. Van de Velde¹, S. De Baets¹, A. Desoete², H. Van Waevelde¹, A. Oostra³, G. Vanderstraeten¹

¹Ghent University, Rehabilitation Medicine, Ghent, Belgium, ²Ghent University, Faculty of Psychology and Educational Sciences Department of Experimental Clinical and Health Psychology, Ghent, Belgium, ³University Hospital Ghent, Department of Pediatrics and Medical Genetics, Ghent, Belgium

Introduction/Background: Participation refers to a child's involvement in important everyday activities. The PEM-CY examines participation frequency, extent of involvement and desire for change in sets of activities typical for the home, school or community (Khetani et al., 2015). It also includes an assessment of the effect of environment on children's participation. The aim of this study is 1) to translate, culturally adapt and investigate the psychometric properties of the Dutch version of the PEM-CY and 2) to draw a profile of the level of participation among children between 5 years and 11 months and 10 years of age with Attention Deficit Hyperactive Disorder (ADHD), Autism Spectrum Disorder (ASD) and Developmental Coordination Disorder (DCD) in Belgium (Flanders). **Material and Methods:** Convenience and snowball sampling methods are used to survey caregivers of children ($N=50$). Ethical approval is received. Information about child and family demographics is assessed by a short question-naire that includes information regarding participants' demographic, child and family characteristics (gender, maternal and paternal level of education, level of income & current employment, age of the child if/when re-ceiving diagnosis, access to intervention etc.). The web-based Dutch PEM-CY version will be completed by one of the parents. **Results:** Participation data reported by parents are currently being collected and compared by group, age and disability type. Preparatory descriptive analyses are conducted. **Conclusion:** The use of PEM-CY is in research and clinical practice to assess participation of children with disabilities and delays in terms of 1) home, school and community patterns, 2) perceived environmental supports and barriers to participation and 3) activity-specific parent strategies to promote participation will be evaluated. Data collected will be useful for a better description of participation of children with developmental disorders such as ADHD, DCD and ASD leading to more participation oriented interventions.

940

A MULTI-COMPONENT INTERVENTION TO IMPROVE DIET AND PHYSICAL ACTIVITY PEOPLE WITH INTELLECTUAL DISABILITIES IN COMMUNITY RESIDENCES

S.H. Ho¹, Y.S. Kim¹, B.K. Hong¹, H.R. Lee¹, H.K. Park¹

¹Korea National Rehabilitation Center, Department of Rehabilitation Standard & Policy, Seoul, Republic of Korea

Introduction/Background: People with intellectual disabilities (ID) have an increased risk for unhealthy diets, physical inactivity and weight disturbances. The aim of the current study was to investigate the effectiveness of a novel and complex intervention to improve diet and physical activity in community residences for people with ID. **Material and Methods:** We included 37 community-dwelling individuals with met the following inclusion criteria (1) aged $13 \geq$ years, (2) registered people with intellectual disabilities as of Jan 1, 2015 (3) not enrolled in a weight loss program in the last 6 months. A multi-component intervention was developed to improve rehabilitation for people with ID. All subjects participated in the once-a-week, ten-week program combining exercise and nutrition components for 60 min. The exercise consists of individual and group activity. The nutritional education is a right food choices, health habits, usage of nutrition labeling and so on. In addition, the short message service(SMS) was provided to caregiver for encourage and motivate the participants regarding lifestyle modifications. Program outcomes were assessed using body composition analysis, blood pressure, blood test, and pulse. Functional performance was measured by the forced vital capacity(FVC), the Forced expiratory volume 1(FEV1), the six minute walk test(6MWT), hand grip, and sit-to-stand test. Quality of life was estimated using the EuroQol 5-Dimension Questionnaire (EQ-5D). **Results:** A total number of 37 community residences expressed an initial interest in participation but four loss, leaving 33 residences for baseline measurements. A total of 33 participants, 22 men and 11 women aged 17–42 years. The program participants were significant reductions in the Triglyceride ($p=0.0009$), and increase FVC ($p=0.038$),

FEV ($p=0.034$), Hand grip Rt ($p=0.010$), Hand grip Lt ($p=0.005$), and sit-to-stand test ($p<0.001$). The percent body fat is reduced but the differences were not significant ($p>0.05$). **Conclusion:** This innovative intervention was effective in improving physical activity. It is likely that even greater effects could be achieved by improvements in implementation strategies, leading to higher fidelity.

941

AN ACTION RESEARCH ON ASSISTING A FAMILY CAREGIVER OF A PERSON WITH SPINAL CORD INJURY IN HONG KONG - A PILOT STUDY

W.S. Wu¹, H.B. Ku²

¹The Hong Kong Polytechnic University, Faculty of Health and Social Sciences, Hong Kong, Hong Kong- China, ²The Hong Kong Polytechnic University, Department of Applied Social Sciences, Hong Kong, Hong Kong- China

Introduction/Background: Spinal cord injury (SCI) is a catastrophic event to both patients and their families. However, the needs of the family caregivers are often being neglected. The current study aimed to identify the needs of a family caregiver in taking care of a person with SCI in the Hong Kong community and to evaluate the effectiveness of the corresponding actions implementation. **Material and Methods:** We adopted action research as our methodology which aimed to improve our practice through the experiment. Family caregivers of the persons with SCI ($n=4$) were recruited from the Hong Kong local community. In the first phase, semi-structural interviews were conducted to identify their needs in caring their relatives. The Chinese version of 1) Depression Anxiety Stress Scales 21 (DASS21) and 2) Short Form-36 questionnaire (SF-36) were also used to assess their mental health status and health related quality of life (HRQoL). After needs identification, corresponding actions were implemented to the subject ($n=1$) in the following phase. Effectiveness of these actions was also evaluated. **Results:** Family caregivers were found to have poor mental health status and HRQoL because of the caregiving role. Of note, family caregivers of those SCI persons with lower functional level usually had poorer mental status and HRQoL. Ranges of the family caregivers' needs were identified. Corresponding actions implemented on the family caregiver were found to be effective in relieving the negative mental status and to improve their HRQoL. **Conclusion:** This was the first action research addressing the needs of the family caregivers of SCI in the Hong Kong community. A wide range of needs of those family caregivers was identified which facilitates the understanding of the relationship of caregiving and the caregivers' mental health and HRQoL status. Needs of the caregivers for the persons with SCI are worthwhile to receive more attentions in the community.

INTEGRATIVE REHABILITATION SCIENCES: REHABILITATION SYSTEMS AND SERVICES RESEARCH - MISCELLANEOUS

942

WHY SOME KURDISH HEALTH CARE USERS IN GERMANY DECIDE NOT TO USE REHABILITATIVE SERVICES ALTHOUGH THEY WOULD LIKE TO: A QUALITATIVE STUDY

N. Koyun¹, P. Brzoska¹

¹Chemnitz University of Technology, Behavioral and Social Science- Unit of Epidemiology, Chemnitz, Germany

Introduction/Background: Migrants in Germany utilize rehabilitative services less often than the majority population, independently of demographic and socioeconomic factors. While some studies explored potential barriers that migrants face in rehabilitative care, usually those attending rehabilitative services were surveyed. Lit-

tle is known about non-participants. We explore subjective reasons for non-utilization among Kurdish migrants who state they would like to use such services but refrain from doing so. By studying this population group we focus on a migrant community in Germany that has hardly been examined in health services research before. **Material and Methods:** Qualitative semi-structured interviews were conducted with 10 Kurdish individuals of different age, sex and socioeconomic position. Respondents were recruited by means of snowball sampling. Only those who stated a desire or subjective need to utilize rehabilitative services were included. Interviews were transcribed and content-analyzed based on a system of categories and sub-categories. **Results:** Four categories of reasons could be identified that respondents described as barriers for using rehabilitative care. First, respondents reported fears of 'getting lost', of 'showing themselves up' and of not being able to communicate with health professionals resulting from poor proficiency of the German language. Second, respondents felt poorly informed about rehabilitative service, e.g., regarding which providers suit their needs and expectations best. Third, fears and reservations concerning particular treatments/excises during rehabilitation were reported, which respondents considered discomfiting or culturally inadequate. Fourth, respondents complained about a perceived lack of appropriate long-term aftercare following rehabilitation, rendering the utilization of rehabilitation subjectively less useful. **Conclusion:** Respondents expressed several reservations concerning rehabilitative services comprising language-, culture- and system-related domains, which in part have not been highlighted by health services research in Germany before. The findings emphasize the necessity for diversity-sensitive health care services, which--unlike migrant- or culture-specific services---are able to take into account the heterogeneous needs of an increasingly diverse population.

943

COMPARING THE EFFECTIVENESS OF YOGA AND HIGH INTENSITY INTERVAL TRAINING ON WEIGHT RELATED OUTCOMES IN FEMALE MEDICAL STUDENTS IN SUEZ CANAL UNIVERSITY

M. Emad Abd-El-Fattah¹, M. Hassan Mahmoud², M. Ibrahim Elnabawy³, M. Loay Salem⁴, N. Hussein Ahmed Ahmed⁵, M. Abdelhamid⁶, H. Akf

¹Faculty of Medicine Suez Canal University, Physical Medicine-Rheumatology and Rehabilitation, Ismailia, Egypt, ²Faculty of Medicine- Suez Canal University, Neurosurgery, Ismailia, Egypt, ³Faculty of Medicine- Suez Canal University, Radiology, Ismailia, Egypt, ⁴Faculty of Medicine Suez Canal University, Family Medicine, Ismailia, Egypt, ⁵Faculty of Medicine Suez Canal University, Intern, Ismailia, Egypt, ⁶Faculty of Medicine- Suez Canal University, Community Medicine, Ismailia, Egypt

Introduction/Background: Obesity and Overweight among young women represent serious health issues with an increasing global prevalence. Female medical students in particular are under variable sources of stress that can cause overeating, and most require a form of motivation to engage in exercise. Group exercises, with novel techniques may be a promising approach. Yoga is a discipline that originated in India with the goal of uniting mind, body and spirit. It has been reported that it can improve weight related outcomes. High Intensity Interval Training (HIIT) is an exercise protocol that involves repeated cycles of brief high intensity anaerobic exercise followed by longer low intensity aerobic exercise. This study aimed to compare the effectiveness of Yoga training, and HIIT in improving weight related outcomes, among young females. **Material and Methods:** The study was carried out as a quasi-experimental design on 24 volunteering female medical students from the Faculty of Medicine, Suez Canal University, assigned non-randomly to one of two groups. One group received a 6-week dynamic Yoga training program, and the second group received a 6-week program of HIIT. Both groups received instructions to follow a balanced diet throughout the course of the study. The weight

related outcome measured before and after the intervention were the body mass index (BMI), body composition, hip/waist ratio and a complete lipid profile. **Results:** There were significant differences between the pre and post measurements of both groups, in LDL, HDL, serum Cholesterol and triglyceride levels, as well as fat percentage ($p < 0.01$), however neither group showed statistically significant difference regarding the BMI. There was no significant difference in any of the measured parameters between the two groups. **Conclusion:** Both Yoga training and HIIT are effective modalities in improving serum lipid profile and fat percentage, however their role in improving body measurements and BMI is still to be proven.

944

RISK OF CEREBRAL PALSY AMONG CHINESE CHILDREN: AN N:M MATCHED CASE-CONTROL STUDY

G. Jing¹, H. Luna¹, Z. Bin¹, W. Lina¹

¹Huai'an Maternity and Children Care, Children Rehabilitation, Huai'an, China

Introduction/Background: Cerebral Palsy (CP) refers to a group of permanent disorders of the development of movement and posture, causing activity limitation, attributed to non-progressive disturbances occurring in the developing fetal or infant brain. The etiologies of CP are complex, many studies have found the etiologies and pathogenesis, but in most cases, the cause of CP is still poorly understood. Unknown data could be available from maternal questionnaire which including maternal health care and nutrition during pregnancy, environmental factors, delivery situation and so on. This study describes an N:M matched case-control study conducted in Huai'an, Jiangsu province, China, to investigate relative epidemiologic risk factors for children cerebral palsy. **Material and Methods:** Data was collected by using a maternal self-design questionnaire. An N:M matched case-control study was conducted with 114 cerebral palsy cases and 1286 non-cerebral palsy controls. Data was statistical analyzed for descriptive study, univariate logistic regression analysis and multivariate N:M matched conditional logistic regression analysis with SPSS. **Results:** Univariate analysis resulted in 20 significant factors for CP. Mother's age older than 30 when the child was born (adjusted OR 1.63, 95%CI 0.98–2.72), mother's alcohol intake during pregnancy (adjusted OR 4.17, 95%CI 1.23–14.08), living in peripheral villages (adjusted OR 1.71, 95%CI 1.18–2.48), father's occupational contact of harmful substances (adjusted OR 3.34, 95%CI 1.61–6.93), and multiples (adjusted OR 3.10, 95%CI 1.65–5.84) were found to be risk factors for CP in the total CP group in our multivariate analysis, while high mother's education level (adjusted OR 0.60, 95%CI 0.46–0.76), folic acid supplement (adjusted OR 0.50, 95%CI 0.30–0.82), have menstrual disorders (adjusted OR 0.38, 95%CI 0.14–1.02) and high birth hospital level (adjusted OR 0.68, 95%CI 0.52–0.90) were found to be protective factors. **Conclusion:** The main risk factors of cerebral palsy focus on gestation and perinatal period. The incidence rate would be lower, if we take precautions and reduce the risk factors.

945

THE CLINICAL RESEARCH OF EARLY INTERVENTION TO CEREBRAL SUB-HEALTH INFANTS BY TRADITIONAL CHINESE MEDICINE

Z. Liu¹

¹Nanhai Maternity and Children's Hospital Affiliated to Guangzhou University of T, Children Rehabilitation, Foshan, China

Introduction/Background: To observe the effect of early intervention to cerebral sub-health infants by TCM (Traditional Chinese Medicine). **Material and Methods:** 60 cases clinical cured cerebral sub-health infants aged 2m–6m with moderate to severe brain damage in perinatal period were early intervened mainly by our TCM, mainly by massage of attacking vital points of DU meridian,

benefiting kidney, strengthening the qi of spleen and five-elements music listening treatment, assisted with physical therapy etc. The course of the intervention was 3 months. The DQ of Gesell were compared before intervention, 3 months and 18 months after intervention. *Results:* 3 months and 18 months after the intervention, the DQ of the infants were increased compared with the DQ before the intervention. And the difference is significant for statistics ($p < 0.001$). 18 months after the intervention, the DQ of 45 cases were higher than 70. *Conclusion:* The intervention by TCM can reduce the probability of the occurrence of cerebral palsy, mental retardation and other sequelae which were caused by perinatal brain damage, and promote the development of movement, cognitive, language, social and other functions. And its mechanism may be related to the promotion of brain development, promoting damaged neuronal repair.

946

OVERNIGHT TRIP TO KINUGAWA HOT SPRING FOR THE STROKE PATIENTS WHO WERE DISCHARGED FROM OUR CONVALESCENT REHABILITATION HOSPITAL

D. Nishio¹, M. Matsukawa¹, Y. Hirano^{1,2}, H. Kigawa¹, Y. Ohe³, T. Hayashi⁴, H. Takahashi⁵

¹Hanno-Seiwa Hospital, Rehabilitation Center, Hanno, Japan, ²Tokyo Metropolitan University, Graduate School of Human Health Sciences, Arakawa, Japan, ³Tokyo Metropolitan Rehabilitation Hospital, Department of Rehabilitation Medicine, Sumida, Japan, ⁴Saitama Medical University International Medical Center, Department of Neurology and Cerebrovascular Medicine, Hidaka, Japan, ⁵Saitama Medical University International Medical Center, Department of Rehabilitation Medicine, Hidaka, Japan

Introduction/Background: Stroke patients who have poor walking ability often give up a trip, since they need much assistance during going out. However, our convalescent rehabilitation hospital carries out the travel for outpatients as recreation every year. Now we report our trial of the trip carried out in Oct, 2013. *Material and Methods:* 13 patients, 10 patients' family, 1 doctor, 4 nurses, 1 care worker, 8 therapists and 2 other persons participated. The profiles of the patients were as follows. The gender was 4 men and 9 women. The age was 46–83 years old (65.4±8.0 years old). Most patients needed assistance in ambulation and activities of daily living. *Results:* Participants stayed at a hotel with a hot spring in Nikko, Tochigi on 2nd and 3rd, Oct 2013. A motor coach with an elevating machine was used for movement. Medical staffs assisted patient's toileting in a restroom at each place. Events on the first day were hot spring bathing and a banquet, and events on the second day were sightseeing and shopping in a neighboring park. Bingo and karaoke which were held at a banquet deepened the friendship between the participants. There were no patients who complained fatigue and physical deconditioning. No accidents such as fall occurred. On the other hand, a mattress had to be piled up instead of a bed because preliminary negotiations with hotel staffs were insufficient. *Conclusion:* When stroke patients want to make a trip, it is important to secure safety. Many medical staffs who comprehend the physical function of the patients joined the trip. Appropriate assistance to the stroke patients led to make a good trip. Organizing a trip by medical staffs is useful for improving quality of life of stroke patients at home.

947

IMPACT OF ENVIRONMENTAL BARRIERS ON PERCEIVED PARTICIPATION BY PEOPLE LIVING WITH SPINAL CORD INJURY IN SWITZERLAND

J. Reinhardt¹, C. Ballert², M.W.G. Brinkhof², M.W.M. Post³
¹Switzerland, ²University of Lucerne, Department of Health Sciences and Health Policy, Lucerne, Switzerland, ³Swiss Paraplegic Research, Rehabilitation, Nottwil, Switzerland

Introduction/Background: To describe the impact of environmental barriers perceived by people living with spinal cord injury in the Swiss community and to compare this across subpopulations. *Material and Methods:* Subjects: A total of 1,549 participants in the community survey of the Swiss spinal cord injury Cohort study. *Methods:* The perceived impact of environmental barriers on participation was measured with the Nottwil Environmental Factors Inventory Short Form (NEFI-SF). Physical independence was measured with the Spinal Cord Independence Measure Self Report (SCIM-SR). Perceived barriers were compared across people with different demographic and lesion characteristics. Multivariable regression modelling applying fractional polynomials was used to evaluate the overall perceived impact of barriers in relation to demographics, spinal cord injury characteristics, and physical independence. *Results:* Most perceived barriers were climatic conditions and inaccessibility of public and private infrastructure. Older participants, those with longer time since injury and participants with complete lesions indicated more problems with access. Females reported more attitudinal barriers. Approximately one-third of participants with complete tetraplegia reported obstacles related to assistance with personal care. A higher level of physical independence was associated with fewer perceived barriers. *Conclusion:* Despite living in a rich country with a well-developed social security system, many people with spinal cord injury in Switzerland experience participation restrictions due to environmental barriers; in particular women, people with non-traumatic spinal cord injury and limited physical independence.

948

GERIATRIC INPATIENTS IN RIPAS HOSPITAL, BRUNEI: PATIENT CHARACTERISTICS AND REHABILITATION NEEDS

S.P. Teo¹

¹Raja Isteri Pengiran Anak Saleha Hospital, Department of Internal Medicine, Bandar Seri Begawan, Brunei

Introduction/Background: Geriatric medicine is a new medical subspecialty in Brunei. Information on co-morbidities and health care needs of older inpatients is essential for service development and planning. *Material and Methods:* Retrospective review of electronic records for geriatric inpatients for three months. Pre-admission function, co-morbidities and input from allied health professionals were reviewed. Days of hospital admission under Geriatrics care were classified under the following categories: medical treatment, rehabilitation, discharge planning and others. Days under other teams were coded separately. Outcome measures such as length of stay, mortality and readmission rates were assessed. *Results:* The 76 admissions consisted of 63 patients, equal gender proportions. Median age 85 years. Katz Index of Independence scores classified 67% with severe functional impairment and 26% with full function. More than a third had dementia. Only one-fifth were independent with mobility. Almost half were bed bound or transfers only. 60% were referred for physiotherapy input, 25% occupational therapy input, 60% dietetics and 30% for speech language therapist input. Median length of stay was 8 days. The distribution of bed days in hospital were classified as: medical treatment 32%, rehabilitation 19%, discharge planning 19%, admission under other teams 25% and others 6%. Inpatient mortality rate was 12%. For the remaining patients, 5% had a 30 day mortality and 20% were readmitted within a month. *Conclusion:* Older patients admitted under geriatric medicine in RIPAS Hospital have a high burden of co-morbidities, dementia, and poor functional status. Inpatient assessment and rehabilitation required much input from medical and allied health professionals. A dedicated geriatrics ward is warranted to strengthen comprehensive geriatric assessment and multidisciplinary intervention to improve function outcomes. Community support services should also be developed urgently to manage such dependent patients after discharge.

**INTEGRATIVE REHABILITATION SCIENCES:
COMPREHENSIVE REHABILITATION
INTERVENTION RESEARCH - REHABILITATION
SERVICE EVALUATION (INCLUDING
ACUTE, POST-ACUTE AND COMMUNITY
REHABILITATION SERVICES)**

949

QUALITY ASSURANCE IN MEDICAL REHABILITATION AFTER MUSCULOSKELETAL INJURIES - CONCEPT, METHODS AND FIRST RESULTS OF A PILOT PROJECT TO COMPARE CENTERS FOR REHABILITATION

E. Froese¹, K. Bahr¹, J. Moock¹

¹VBG - German Social Accident Insurance Institution, Rehabilitation, Hamburg, Germany

Introduction/Background: After work accidents the VBG, a German Social Accident Insurance Institution, provides rehabilitation in accredited rehabilitation centers. By law, the VBG is responsible to implement external quality assurance measures in rehabilitation centers to support their internal quality management. Thus, a pilot project to assess quality of rehabilitation processes and results after musculoskeletal injuries in in- and outpatient medical rehabilitation centers was started in Apr 2015 and is scheduled to Mar 2016. The contribution briefly explains the pilot phase for utilising the quality assurance program. *Material and Methods:* A newly developed therapy goal agreement process was implemented in rehabilitation centers. Up to five individual goals were fixed at the beginning of the therapy by patient, VBG case manager and medical professional. Goal attainment was assessed at the end of therapy by all involved parties. Process quality was assessed by a 9-item-questionnaire measuring e.g. adequacy of treatment planning and quality of reporting. Quality of treatment outcome was assessed by generic and specific patient-reported outcomes on admission and discharge. Descriptives and multiple regression methods were used for data analyses, adjusting for sociodemographics and clinical baseline data. On a first step the SF-12 physical functioning score was used for center ranking. *Results:* So far, data of 139 patients (mean (sd) age: 46.7 (11.5) years, female: 26.3%) were analysed. The mean SF-12 physical functioning score at baseline was 30.8±8.3 and at follow-up 35.6±9.3. Multiple regression analyses revealed variation across rehabilitation centers in SF-12 physical functioning score. *Conclusion:* First results of our ongoing project suggest that the concept and instruments used in our pilot project allow a fair comparison of rehabilitation centers and give helpful support to their internal quality management. After completion of the pilot phase comprehensive analyses of data records are performed which will offer more significant information until the congress in 2016.

950

MINDFULNESS BASED TECHNIQUES IN A GROUP SETTING OF PATIENTS WITH SEVERE AND NEWLY ACQUIRED PHYSICAL INJURIES

H. Høye¹, G. Månnum¹, P.S. Lyby²

¹Sunnaas Rehabilitation Hospital, Nesoddtangen, Nesoddtangen, Norway, ²Cato Rehabilitation Centre, Son, SON, Norway

Introduction/Background: Many individuals with severe and newly acquired physical injuries are in need of techniques that help them to manage distress and pain. Mindfulness meditation can be defined as a moment-to-moment awareness colored by attitudes such as acceptance and non-judgement. It is a growing understanding that active underlying mechanisms are attention regulation and emotion regulation, and the technique has applied successfully to a multitude of psychological and physical symptoms and disorders. However, a scarce amount of research have been conducted concerning

the method's usefulness for severely injured patients in rehabilitation. This pilot study evaluated the usefulness of the method in such a setting. *Material and Methods:* Seven inpatients with spinal cord injury and multiple traumas, attended a Mindfulness Based Stress Reduction (MBSR) program adapted to a rehabilitation setting. The participants practiced for 45 min two days a week over a four week period. Inclusion criteria were subjective reports of distress and/or pain. Pain Catastrophizing Scale (PCS), Mindfulness Attention Awareness Scale (MAAS), Hopkins Symptoms Checklist -25 (SCL-25) and questions of quality of life (ISCOS quality of life) was given pre and post intervention, as well as a qualitative evaluation questionnaire. *Results:* Index of catastrophic thinking (PCS) and index of total symptoms of depression and anxiety (SCL-25) decreased significant among four and six individuals, respectively. Other self-report measures were relatively stable. On qualitative questions probing overall gain, six patients reported that they experienced "great gain" from the program. Moreover, the method was evaluated as "helpful in stress management", "defocusing pain", "relaxing body and mind", "having a time-out/finding peace", "falling asleep at night", "processes of change", "increasing concentration" and "increasing body awareness". *Conclusion:* Learning mindfulness based techniques yielded positive results for most of the participants, especially in relation to managing pain and distress symptoms.

951

MEDICAL REHABILITATION IN MADAGASCAR: CHALLENGES IN IMPLEMENTING THE WORLD HEALTH ORGANISATION DISABILITY ACTION PLAN

F. Khan¹, B. Amatya¹, H. Mannan², F.M. Burkle Jr³, M.P. Galea⁴

¹Royal Melbourne Hospital, Department of Rehabilitation Medicine, Parkville, Australia, ²University College Dublin, School of Nursing- Midwifery & Health Systems, Dublin, Ireland, ³Harvard School of Public Health, Harvard Humanitarian Initiative, Cambridge, USA, ⁴University of Melbourne, Department of Medicine Royal Melbourne Hospital, Parkville, Australia

Introduction/Background: In Madagascar, similar to other sub-Saharan African countries, much effort has gone to improve acute health care sector, and post-acute care system, including rehabilitation, is undeveloped at many levels. This article provides an update on medical rehabilitation in Madagascar by using local knowledge to outline the potential barriers and facilitators for implementation of the WHO 'Disability Action Plan' (DAP) of 2014-2021. *Material and Methods:* A 14-day extensive workshop program (Sep-Oct 2014) was conducted at the University Hospital Antananarivo and Antsirabe, with the Department of Health Madagascar, by rehabilitation staff from Royal Melbourne Hospital, Australia. Attendees were rehabilitation professionals ($n=29$) from three main rehabilitation facilities in Madagascar, who identified various challenges faced in service provision, education and attitudes/approaches to people with disabilities. Their responses and suggested barriers/facilitators were recorded following consensus agreement, using objectives listed in the DAP. *Results:* The barriers and facilitators outlined by participants in implementing the DAP objectives include: engagement of health professionals and institutions using a multi-sectorial approach, new partnerships, strategic collaboration, provision of technical assistance, future policy directions, research and development. Other challenges for basic policies on rehabilitation included: access to rehabilitation services, geographical coverage, skilled work-force shortages, limited info-technology systems; lack of care-models and facility/staff accreditation standards; limited health services infrastructure and 'disconnect' between acute and community based rehabilitation (CBR). *Conclusion:* The DAP summary actions were useful planning tools to improve access, strengthen rehabilitation services and CBR, and collate data for outcome research.

952

SERVICE EVALUATION STUDY OF EARLY MORTALITY POST-DISCHARGE FROM REGIONAL SPINAL INJURIES UNIT, OSWESTRY, UNITED KINGDOM

M. Mariappan¹, J. Chowdhury², A. Osman³, N. Kumar³

¹North Staffordshire Rehabilitation Centre, Physical Rehabilitation Medicine, Stoke-on-Trent, United Kingdom, ²The Robert Jones & Agnes Hunt Orthopaedic Hospital, Midland Centre for Spinal Injuries, Oswestry, United Kingdom, ³The Robert Jones & Agnes Hunt Orthopaedic Hospital, Midlands Centre for Spinal Injuries, Oswestry, United Kingdom

Introduction/Background: The early mortality (within one year) has been observed in patients with high level spinal cord injury (SCI) following holistic management from our centre. Although, adequate measures including prioritising the discharge venue and care package for these complex patients are carefully planned, we are observing increasing incidence of deaths in patients discharged to nursing homes/interim facilities. The aim of this project was to evaluate the epidemiological and etiological factors contributing to early mortality with the purpose of eliminating/minimising it following completion of comprehensive spinal rehabilitation programme. **Material and Methods:** The data was collected from our bespoke spinal injury register database retrospectively for three years (Jan 2011–Dec 2013). All consecutive patients who have passed away within one year post-discharge were included. Details including cause of death, epidemiology, type of spinal injury, comorbidities, complications during inpatient stay and transfers to high dependence unit (HDU) were analysed. **Results:** Out of 380, 15 patients who met the criteria were included in this project. Mortality rate was noted as 4.1% and the majority were due to heart failure. 14 patients had traumatic SCI and 1 had non-traumatic SCI. 8 of the patients were smokers whilst 7 were non-smokers. Majority of the patients had tetraplegia and remained so after discharge. Mean age of deceased was 65.3 years compared to 51.0 years among control age distribution. Most patients multiple co-morbidities and has been transferred to HDU to deal with the complications during their inpatient stay. SCIM (Spinal Cord Injury Measurement Score) showed insufficient improvement in their scores at the time of discharge. **Conclusion:** Early mortality noted in this cohort of patients with SCI was associated with advancing age, multiple comorbidities and complications and were largely unavoidable. This may attributed to diminished number of functional cells for tissue repair, cardiac reserve and altered homeostasis and were not related to the discharge destination.

953

VOCATIONAL REHABILITATION BEST PRACTICES EVALUATION - QUALITATIVE STUDY

A. Tabaj¹, Č. Bitenc¹

¹University Rehabilitation Institute Soča, Development centre for Vocational Rehabilitation, Ljubljana, Slovenia

Introduction/Background: Retrospective qualitative cohort study 2010–2014: “Best practices evaluation in vocational rehabilitation”, population 5,321 persons, was carried out in 2014 in Slovenia. Information was gathered through Slovenian vocational rehabilitation network specific questionnaire. In depth interviews analysed information from vocational rehabilitation providers, rehabilitees, rehabilitation counsellors at Employment Service in Slovenia and employers. We collected 11 best practices. Criteria: outcomes, changes in characteristics of a person, advancements in quality of life and statements of a person and employers. **Material and Methods:** Qualitative study- retrospective cohort study. **Results:** Almost all studied cases were connected with the employment outcome (10), which was successful regardless of barriers of disability. Mainly (7) they were in supported employment. Positive changes in education, work experience, social network, and support

were found out. Of highest importance was high motivation and successful social inclusion. In many cases motivation was the main factor. **Conclusion:** Employment counsellors exposed that the regular contacts and monitoring the rehabilitees and professional workers is the key factor for successful outcomes. In practice this means regular month contacts. In best practices it was observed that the key feature was also longer vocational processes, which enabled cooperation with stakeholders. The quality of contacts between Employment service and providers enabled trust and innovative solutions with career orientation and active labour market policy measures. Employers as the main reasons for success exposed positive attitudes, potentials, ability to learn, talents, professional attitudes and concerns of rehabilitees. It was very interesting that that spoke of good impact on the working culture, when they trained and employed person with disability. Rehabilitees exposed good information of the process of vocational rehabilitation at the start as one of the major concerns, which help them in cases that they were afraid of engagement. Training experience gave them better view on their abilities, gathering new knowledge, with constant support of professional workers.

INTEGRATIVE REHABILITATION SCIENCES: COMPREHENSIVE REHABILITATION INTERVENTION RESEARCH - REHABILITATION PROGRAMME EVALUATION (E.G. HOME-BASED REHABILITATION)

954

IMPACT OF MODIFIED HOME ENVIRONMENT TO THE SPINAL CORD INJURY PATIENT

S. Rahman¹

¹Centre for the Rehabilitation of the Paralysed CRP, AHEAD-CRP, Dhaka, Bangladesh

Introduction/Background: Spinal Cord Injury is a life threatening condition which creates so many dysfunctions in an individual's life such as unique personal, family and community challenges in activities of daily living, return to previous work and modification of home and vicinity. An accessible home and environmental modification allows for free and safe movement, function and access for SCI regardless of age, sex or condition makes access by all, without obstacles, with dignity and with as much autonomy as possible. **Material and Methods:** The study followed the interactive approach of qualitative design for search the Impact of modified home environment. In-depth interview were preceded for the participants. **Results:** The consequences were presented by performing the coding system of the data and five themes were produced outcome. In this research, 30 (thirty) participants the mean age of participants was 33.57 years and Std. Deviation ±12.470 whereas male and female ratio was 5:1. In this study 73% samples were recruited from different villages and 27% from urban. On the basis on multiple responses, all participants were modified their living room, toilet, bathroom and kitchen. Study found that modified home environment allows free mobility individuals with SCI, 80% participants had positively impact on reduce Independence, 77% participants got self-independence in functional tasks and had improved social relationship and communication though participant had faced interim economic hardship during way to home modification. Overall more than 65% participants had reported that modified home environment has a vital role to lead a quality and meaningful life. **Conclusion:** An accessible home environment initiative to individual with SCI can enhance functional status to community. The integrated plan interventions are more effective to survive with a quality of life. In Bangladesh, both Government and Non-Government Organization are could ahead to take an effective measures for further action in all aspects for SCI rehabilitation to the community.

**INTEGRATIVE REHABILITATION SCIENCES:
COMPREHENSIVE REHABILITATION
INTERVENTION RESEARCH - REHABILITATION
TECHNOLOGY ASSESSMENT (E.G. TELE-
REHABILITATION)**

955

**THE EFFECTIVENESS OF LEAP MOTION FOR
UPPER ARM REHABILITATION AFTER STROKE:
SINGLE CENTER, PROSPECTIVE PILOT STUDY**

C.J. Kim¹, P. Kyun Woo², L. Ui Choul¹, L. Hyuk¹, B. So Young¹

¹Daejeon Wellness Hospital, Rehabilitation, Daejeon, Republic of Korea, ²Daejeon Wellness Hospital, Medical Oncology, Daejeon, Republic of Korea

Introduction/Background: Chronic cerebral infarction often results in upper arm sequelae like paralysis, impaired arm function, neuropathic pain. Physical rehabilitation for stroke patients is sometimes boring and repetitive, patients usually cannot maintain their concentration. Leap motion is newly developed Human-Computer Interaction (HCI) device for healthy peoples, we try to apply it for stroke patients. We anticipate free-hand interaction with leap motion will arouse patient's interest, it might be an effective and safe therapeutic device for neurorehabilitation. *Material and Methods:* A single center, prospective, pilot study was conducted in Daejeon Wellness hospital in Korea. Patients were randomly selected from traditional rehabilitation group, virtual rehabilitation therapy with leap motion has been done for 4 weeks. We estimated ADL (modified Barthel index), upper extremity function (manual function test), rating of perceived exertion (Borg scale), degree of depression (geriatric depression score) for effectiveness of treatment, before and after the study. *Results:* 15 patients were enrolled, 14 patients completed the study. Median time after stroke was 4.8 months and average MMSE was 27.2. Mean modified Barthel index before study was 68.07 and manual function test score of affected side arm was 20.35, Borg scale of previous rehabilitation treatment was 12.71, GDS was 10.9. After 4 weeks of treatment with leap motion, modified Barthel index was 70, manual function test score was 24.35, Borg scale was 12, GDS was 10.23. None of the patients experienced any adverse event during the study period. *Conclusion:* This study demonstrated that virtual rehabilitation with leap motion could be a novel interactive treatment for stroke patients.

**INTEGRATIVE REHABILITATION SCIENCES:
COMPREHENSIVE REHABILITATION
INTERVENTION RESEARCH - REHABILITATION
STRATEGIES FOR SPECIFIC ISSUES
(INCLUDING REHABILITATION STRATEGIES
FOR DEVELOPING COUNTRIES AND
REHABILITATION AFTER NATURAL DISASTERS)**

956

**IDENTIFICATION OF REHABILITATION NEEDS
FOR CHILDREN WITH SPINA BIFIDA AND HYDRO-
CEPHALUS IN EAST AFRICA**

W. De Groot¹

¹Gent, Belgium

Introduction/Background: Implementation of the medical pillar within Community Based Rehabilitation (CBR) programs is still a challenge in developing countries. When confronted with a specific approach based on only one pathology like spina bifida and hydrocephalus (SB/H), this becomes even more challenging. After closure of the meningomyelocele or shunting for hydrocephalus, these children return to their homestead having a high complication risk.

Material and Methods: This study is conducted with the help of 6 national east-african associations for spina bifida and hydrocephalus that are members of the INGO's Child-Help and IFglobal. A survey was developed to determine contextual factors that help to identify the needs of these children in their continued follow up in the community, which is called Life Long Care. In this study different topics of the continuum of care and rehabilitation, like community follow up, detection of complications, mobility, material distribution, incontinence management, inclusion and empowerment are addressed. *Results:* Mapping of these different aspects in the continued care for children with spina bifida and hydrocephalus in developing countries resulted in an identification of the needs. In most developing countries a community follow up is lacking. Subsequently children have contractures, are incontinent and experience pressure sores. The distribution of supplies of catheters and oxybutinine is insufficient. Not one program is focusing on the development of the child and its transition phases. A system of referral to the hospital based on clinical criteria needs to be installed in most settings. *Conclusion:* An important effort needs to be made in order to improve the follow of children with spina bifida and hydrocephalus in the community of east-african countries. The findings of this survey can be used to outline the process of their community based rehabilitation. Also, guidelines should be developed to link the institution with the community.

957

**RAPID IMPLEMENTATION OF MEDICAL REHA-
BILITATION TEAM AT SPINAL INJURY REHABI-
LITATION CENTER, NEPAL DURING EARTHQUAKE
2015**

R. Dhakal¹

¹Spinal Injury Rehabilitation Centre, Spinal Unit, Kavre- Banepa, Nepal

Introduction/Background: Natural disaster causes significant number of spinal cord injuries (SCI). This requires coordinated efforts of foreign medical teams (FMTs) to support local or national team f or medical/surgical management in acute care and rehabilitation settings. *Material and Methods:* An account of the experiences and a descriptive study of the response of spinal injury rehabilitation center during the first four weeks after the earthquake in Nepal. *Results:* Eighty earthquake and thirty other SCI patients were managed by a group led by physiatrists after the FMTs and local experts were divided into Acute/special care unit, Active medical rehabilitation unit and Step-down facility unit. On top of solving medical problems and performing medical rehabilitation, the Multi-disciplinary teams managed nutritional, recreational, psychological, vocational, educational and social problems of the patients and their family. *Conclusion:* Coordinated efforts of local experts with FMTs are very much helpful to take care of the large volume of earthquake victims with SCI in developing country like Nepal. FMTs should be coordinated by the centralized body. Injury and rehabilitation sub-cluster groups should be led by the experts who have experiences on medical care and rehabilitation of complex disability like SCI. Along with medical rehabilitation, community reintegration program should be included in the integral health care system after a disaster. Nepal Government should immediately initiate the formulation of a national policy to establish a national rehabilitation hospital and to produce sufficient manpower in rehabilitation medicine.

958

**DISABILITY AND ENVIRONMENTAL FACTORS IN
SPINAL CORD INJURED 2008 WENCHUAN EARTH-
QUAKE VICTIMS SEVEN YEARS AFTER THE
DISASTER**

J. Reinhardt¹, Y. Yang¹, H. Li¹, C. He¹

¹Sichuan University and Hongkong Polytechnic University, Institute for Disaster Management and Reconstruction, Chengdu, China

Introduction/Background: Earthquakes leave many victims with permanent disabilities requiring long-term medical, psychological, and social rehabilitation. Spinal cord injury (SCI) is one of the most severely disabling condition caused by earthquakes. However, a solid scientific evidence base on long-term medical, psychological, vocational, and educational rehabilitation needs of earthquake victims with SCI and appropriate interventions is lacking to date. Therefore, we aimed to comprehensively understand long-term medical and psychosocial problems and needs of SCI victims from the major 2008 Wenchuan earthquake in China. **Material and Methods:** We comprehensively describe a series of cases of patients with SCI who have been visited at their home by a rehabilitation team which performed clinical examinations, standardized patient-reported outcomes assessment, qualitative interviews, and environmental assessments. **Results:** Physical independence of the patients varied from severe to mild dependence. Pain and neurogenic bladder were the most frequently reported medical complications. Many of the patients were emotionally unstable and showed mild to severe depressive symptoms. None of the patients had returned to work or education although this was a frequently uttered desire. The economic situation of all patients and often their families was considered difficult and environmental barriers to social participation were also frequently perceived. Rehabilitation measures available to the patients were deemed insufficient. **Conclusion:** Seven years after the Wenchuan earthquake, many victims with SCI showed complex medical and psychosocial needs, most of which could be met with relatively low-cost rehabilitation interventions. County level rehabilitation centers seemed underequipped and staff lacked training. Vocational and educational rehabilitation measures and psychological counselling were considered of pivotal importance.

959

COMMUNITY AND RELIGIOUS LEADERS AS THE EARLY RES-PONDER OF NATURAL DISASTERS

T. Uddin¹

¹BSM Medical University, PMR, Dhaka, Bangladesh

Introduction/Background: Natural disasters are frequently visiting the Asian countries although disaster rehab responses are not adequately met in the past. International networking before and the FMT Lessons learnt from Nepal EQ 2015 digging out the challenges and the potentialities we have in the region is the milestone of disaster rehab response. Rehabilitation response community projects needs to be prioritized assuming these are the basic building blocks of Disaster Rehab response grass root units. **Introduction:** South Asian countries hosts approximately one third of the world's population and these thickly populated countries have poverty, Poor health sector infrastructure with less health budgets in addition to political crises. **Material and Methods:** The project: Communal harmony, religious mindedness of people in the region keep them closer, as well there are many grassroots political committees that this bondage can be utilized in the management of pre disaster rehab programs and post disaster injuries; specifically during the post disaster periods they can be working as early responders at the disaster site. Although Bangladesh is a Muslim majority country; it has huge number of mosques and other common religious places where number of religious leaders are placed to conduct the religious works. We have been conducting sessions of training Muslim leaders (imam and muazzin) to work as the early responder during the cyclones at the coastal districts of Bangladesh following cyclone SIDR. **Results:** Initial reports of the project were promising in terms of acceptability, participatory, and effectiveness. Local people can respond disasters earlier. **Conclusion:** Conclusions and recommendations: Physical Medicine and Rehabilitation leaders are encouraged to undertake Rehabilitation disaster response projects based in the community that should be supported by the local governments, influenced by International agencies like WHO and ISPRM.

INTEGRATIVE REHABILITATION SCIENCES: COMPREHENSIVE REHABILITATION INTERVENTION RESEARCH - MISCELLANEOUS

960

PREDICTORS OF STROKE REHABILITATION OUTCOME IN PALESTINE

A. Amro¹, A. Rhoda², Z. Abdeen³

¹Al-Quds University, Physiotherapy, Jerusalem, Palestine via Israel, ²University of Western Cape, Physiotherapy, Cape Town, South Africa, ³Al-Quds University, Al-Quds Nutrition and Health Research Institute, Jerusalem, Palestine via Israel

Introduction/Background: Stroke is a major cause of death and disability worldwide, limited information is available about the outcome of stroke in Palestine. **Aim:** To investigate stroke rehabilitation outcomes, and factors predicting these outcomes in stroke patients. **Material and Methods:** Design: A one-year hospital-based, observational, descriptive cohort study. **Sample:** One hundred and thirty nine (139) stroke patients were recruited from two main hospitals in Hebron city. **Procedure:** Objective assessment, patient interview, file screening and observation of the recruited cases was performed, impairment, functional activity and participation were captured at baseline (T1), three months (T2), and six months (T3). **Sample description:** Mean age of the sample was 67.64 year, 39.6% of the sample consisted of males, The majority of patients (80.6%) had an ischemic stroke. Severity at baseline, measured by National Institute for Health Stroke Scale (NIHSS), indicated that 46.8% had severe stroke, 41% moderate stroke, and 12.2% mild stroke. **Results:** Significant improvement occurred between the baseline and the three months' assessments, and between the three-month and the six-month assessments, on the three assessment domains of ICF (impairment as measured by RMA, functional activity and participation as measured by MRS). ($p < 0.05$). Predictors of six months functional activity, as measured by the Barthel Index were; total physiotherapy hours in the home rehabilitation setting at T2 and T3 ($B = -0.220$) and the total occupational therapy hours in the inpatients setting at T2, and T3 ($B = 2.48$). Lower level of functional activity at six months, was predicted by the age patient ($B = -0.461$), and swallowing problems at baseline ($B = -19.959$). The model explains 64.21% of the variation in functional activity at six months. **Conclusion:** Positive family and patients' personal contributions to the rehabilitation program were associated with better stroke outcome in terms of reduced impairment, improved functional activity, and better social participation.

961

EFFECT OF CUTANEOUS ACUPUNCTURE STIMULATIONS ON GAIT PATTERN IN PATIENTS WITH CHRONIC HEMIPARESIS

M. Matsumoto¹, M. Mizuma¹, N. Kawate¹

¹Showa University School of Medicine, Rehabilitation Medicine, Yokohama, Japan

Introduction/Background: Acupuncture is used as one of the techniques for muscle re-education and facilitation to re-establish voluntary control of body movements in patients. Using surface electromyogram we showed in a previous study that patients with chronic hemiparesis increased their gait speed significantly after cutaneous acupuncture and showed a trend of modifying muscle hyperactivities. In this study we continued to assess effects of cutaneous acupuncture to hemiparetic gait patterns. **Material and Methods:** Video recordings were taken of sixteen healthy volunteers (no cortex or spinal lesions, 8 males/8 females, 44.8 years \pm 16.2) and seven chronic hemiparesis patients (Brunnstrom stages IV to VI, 5 males/2 females, 55.7 years \pm 15.1) during continuous walking before and 15 minutes after acupuncture (duration of 15 minutes). The videos were taken from the sides and the gait analyzed for its straightness by focusing on cadence, affected single stance and double stance phases. Acupuncture with uninsertable brush shaped

needles (11 mm diameter, made of resin) on the plaster were applied on affected lower extremity, mainly around on Gastrocnemius and Achilles tendon. **Results:** Both, patients and healthy volunteers, did not show any significant differences in their gait patterns after stimulation. However, in patients with hemiplegia: the gait speed increased significantly, the cadence showed no changes, the ratio of double stance phases of the hemiparetic (initial heel contact) side decreased and the unaffected side increased, and the ratio of affected single stance phase extended. In healthy volunteers: the gait speed and the cadence increased, the ratio of both side double stance phases decreased, and the ratio of stimulated single stance phase extended. **Conclusion:** Acupuncture treatment increased gait speed and showed an improvement in the gait pattern. To assess long-term impact on the gait pattern, longer observations are required.

962

PHYSIOLOGICAL AND BIOMECHANICAL EFFECTS OF FAR-INFRARED SPECTRUM IRRADIATION COMBINED WITH ERGONOMICS INTERVENTION ON NECK MUSCLES

X. Zhu¹, Y. Wang¹, T. Chen¹, K. Chen¹

¹The 6th Affiliated Hospital of Sun Yat-sen University, Department of Rehabilitation Medicine, Guangzhou, China

Introduction/Background: Studies have shown that spectrum irradiation can produce thermal effects in inner parts of body and be used in relieving stress levels of soft tissue on neck. Neck pillow also have been found to be beneficial in reducing pain of chronic neck pain. However, the effects of therapy combining these two factors on neck are unknown. The aim of the study is to observe physiological and biomechanical effects of far-infrared spectrum irradiation combined with ergonomical intervention on neck muscles. **Material and Methods:** A total of 30 healthy participants were assigned into group 1 ($n=16$) and group 2 ($n=14$). Both groups received ergonomical intervention and far-infrared spectrum irradiation for 30min by using a bio-spectrum treatment device, which contain a semi-customized cervical pillow and spectrum generator. Group 1 and group 2 were provided with low- and high-dose heat respectively. Muscle blood flow was measured using Laser Doppler flowmetry (PeriFlux 5000®, Sweden) before and after intervention in all subjects. Meanwhile, the ranges of neck motion and pressure-pain threshold (PPT) of bilateral upper trapezius were assessed by a musculoskeletal testing device (Microfit 3 Hoggan®, US). Data was collected, recorded and analyzed. **Results:** Both groups demonstrated significant improvement in muscle blood flow ($p=0.012$) and left lateral flexion motion ($p=0.045$) after intervention, while there was no significant difference between left ($p=0.458$) and right ($p=0.628$) PPT; flexion ($p=0.252$), extension ($p=0.675$) and right lateral ($p=0.057$) flexion motion. As for between-group comparisons, there was no statistically significant difference between the two groups for muscle blood flow ($p=0.342$), left ($p=0.563$) and right ($p=0.400$) PPT, and all directions of neck motion. **Conclusion:** The results indicated that the application of far-infrared spectrum irradiation combined with ergonomics intervention could improve the micro-circulation of neck muscles.

INTEGRATIVE REHABILITATION SCIENCES: EDUCATION AND TRAINING IN REHABILITATION - UNDERGRADUATE MEDICAL EDUCATION

963

ENRICHED ENVIRONMENT ATTENUATES DEPRESSIVE STATE OF POST STROKE DEPRESSION RATS BY IMPROVING BDNF

L. Niu, L.X. Jin, Y. Zhang, B. Liu, C. Li

Department of Neurology, The Second Affiliated Hospital of Chongqing Medical University, Chongqing, China

Objective: To investigate the effect and mechanism of enriched environment (EE) on post stroke depression (PSD) rats. **Methods:** Sprague Dawley rats were divided randomly into three groups: the sham, PSD, and EE. Rats in the PSD group underwent combined chronic unpredictable mild stress (CUMS) for 4 weeks after middle cerebral artery occlusion model (MCAO) surgery. Behavioral tests was assessed with sucrose preference test (SPT) and open field test (OFT). The levels of cyclic AMP (cAMP), protein kinase A (PKA), phosphorylated cAMP response element-binding protein (pCREB), as well as brain derived neurotrophic factor (BDNF) were determined. **Results:** (1) Compared with rats in sham groups, those in the PSD group exhibited a significantly decreased gain in sucrose preference (SP), and SM, duration of OFT. The rats in EE group exhibited increased SP, SM, and duration compared to the PSD group at week 4. (2) The expression of BDNF in PSD rats was decreased, and increased in EE rats from day 8 to day 29. (3) Compared with rats in PSD rats, the expression of cAMP, PKA and -pCREB were increased in EE group from day 8 to day 22. **Conclusion:** We conclude that EE stimulates recovery after PSD by enhancing BDNF through cAMP-PKA-pCREB pathway.

INTEGRATIVE REHABILITATION SCIENCES: EDUCATION AND TRAINING IN REHABILITATION - SPECIALIST TRAINING

964

EVOLUTION OF A TELE-EDUCATION PROGRAM TO ENHANCE THE TEACHING EFFORTS OF ISOLATED REHABILITATION PHYSICIANS

A.J. Haig¹, A.M.F. Hepnie², G.M.M. Rodriguez¹, V. Tie³

¹The University of Michigan, Physical Medicine & Rehabilitation, Michigan, USA, ²Brunei Ministry of Health, Brunei Ministry of Health, Brunei, Brunei, ³Jerudong Park Medical Center, Jerudong Park Medical Center, Brunei, Brunei

Introduction/Background: In many regions of the world there are isolated physicians who hope to build rehabilitation medicine. They often attract students who are passionate about rehabilitation, and there is a compelling public health need for more locally trained expertise in rehabilitation. However didactic education can be challenging for the already overwhelmed clinician. This project examined supportive distant tele-education for house officers. **Material and Methods:** The first PRM expert in the Brunei Ministry of Health rapidly attracted three house officers who could not leave the country for rehabilitation medicine training. A videoconferencing program was established in which the Brunei physician provided hands-on and bedside teaching, complimented by weekly tele-conferences including therapists at another facility. **Results:** Sessions were interactive, for example the local speech pathologist co-taught swallowing, the Bruneians mimicking various gait patterns for the camera, and local examples were discussed. Each lecture ended with a summary email and links to readings. Experiential 'homework' involved observing gait from a coffee shop and spending a day in a wheelchair. The house officers developed a 9-week agenda for the didactic education: gait analysis, spasticity, cognitive screening, bowel and bladder, brain injury, adaptive and mobility devices, falls, skin, and intensive care unit consultation. On completion their second set of priorities included sexuality, burns, cognitive impairment, cerebral palsy, arthritis and joint replacement, skin and pressure ulcers, cancer rehabilitation, employment, and osteoporosis in rehabilitation patients. **Conclusion:** Sessions were well-attended in both Brunei settings. The second set of topics, including different items and revisited complex topics, suggested increased sophistication and that student-driven priorities eventually cover the field. Further validation and expansion of the program is needed. This experiment raises the possibility that with support an isolated local expert might

develop a fellowship and eventually specialty certification in places where this would have been impossible in the past.

965

PRIOR ULTRASOUND TRAINING INFLUENCES INCORPORATION OF ULTRASOUND INTO OUTPATIENT MUSCULOSKELETAL PRACTICES

K. Patel¹, B. Abramoff²

¹Emory University, PM&R, Atlanta, USA

Introduction/Background: Ultrasound has proven to be of immense value to the practice of musculoskeletal medicine. However, incorporating ultrasound into a musculoskeletal practice requires overcoming significant barriers, including gaining adequate clinical training and familiarity with the ultrasound device. **Material and Methods:** Data regarding purchase of new ultrasound devices in the southeastern United States was obtained from the leading ultrasound device manufacturer, Sonosite Fujifilm, during the period of Jan 2014 to Dec 2015. We included outpatient musculoskeletal practices in the southeastern United States, specifically covering the states of Georgia, Alabama, Florida, and South Carolina. Hospitals and inpatient services were excluded, as was the purchase of used ultrasound devices. Data was collected from the practices on whether they had received manufacturer training, loaned a device, or were trained in ultrasound during residency, fellowship, or in a prior job. **Results:** Fifty-two outpatient musculoskeletal practices purchased 56 new ultrasound devices during the time period. Thirty six devices (61%) were bought by practices where the physicians were trained to use ultrasound during residency, fellowship, or a prior job. Ten devices (17%) were bought by practices where the manufacturer trained physicians, and 7 of these devices were also loaned to the practices after training. Fifteen devices (25%) were bought by practices where the physicians had no prior training with ultrasound nor loaned a device before purchase. Only 12% of practices loaned a device before purchase, and this was not associated with an increased likelihood of purchasing an ultrasound device ($p>0.05$). **Conclusion:** Our data suggests that ultrasound training during residency, fellowship, or a prior job is more strongly associated with the purchase of new ultrasound devices in outpatient musculoskeletal clinics than other factors, including training by the manufacturer or loaning the device. Thus, earlier exposure to ultrasound seems to promote continued use of ultrasound later in a physiatrist's career.

966

ONLINE/IN-PERSON 1 YEAR FELLOWSHIP IN PRM: A SUSTAINABLE BEGINNING FOR REHABILITATION MEDICINE IN SUB-SAHARAN AFRICA

A. Y. Tannor¹, A. J. Haig², Christian Asare³, Smith Sean⁴, C. Odonkor⁵

¹Komfo Anokye Teaching Hospital, Kumasi, Ghana, ²Mary Free Bed Rehabilitation Hospital, Grand Rapids, Michigan, USA, ³Good Shepherd Rehabilitation Hospital, Pennsylvania, USA, ⁴The University of Michigan, Ann Arbor, Michigan, USA, ⁵Johns Hopkins University, Baltimore, Maryland, USA

Introduction: Africa is poor with the huge burden of caring for 10% of its population with significant disabilities. Unfortunately, with only a handful of Physical and Rehabilitation Medicine (PRM) specialists in Sub-Saharan Africa, the development of a training program is daunting. Local authorities must recognize the specialty as legitimate in order for governments to fund education and deploy trained physicians into rehabilitation practice. After a decade of research and experimentation the International Rehabilitation Forum and Komfo Anokye Teaching Hospital in Kumasi, Ghana, have established a locally driven plan. **Methods:** The team developed a 1-year fellowship for family medicine or internal medicine specialists. Although a 3–5 year PRM residency is ideal, the 1 year

fellowship caused these established specialties to champion the field to the medical board. An on-line/in-person curriculum was developed with the following characteristics: Outside experts including Western and low-resource PRM specialists volunteer to sponsor weekly topics. Each topic requires independent reading, a practical handout, an on-line 'Skype' discussion with the sponsoring expert, an exercise (e.g. a detailed write-up of a case), and 3 questions submitted to the IRF for a final exam. A local non-specialist (in this case, a neurologist) ensures practical competency, and international visitors will provide hands-on skill training every quarter. **Results:** The hospital's medical director fully supported the plan and allocated a first trainee to it. The first two months of training and first on-site visitor have gone well. Leaders of the Family Medicine department of the Ghana College of Physicians are preparing to submit this program for credentialing. **Conclusion:** The skype lecture sessions have permitted rapid education and advice over long distances which will sustain the program. More PRM lecturers are needed for lectures and hands-on tutorials. The fellowship also needs accreditation by the Ghana College of Physicians. The training limits of a 1-year fellowship are acknowledged, however it is anticipated that, after a decade, trainee experts who meet international standards will build a locally led fully developed residency in PRM. African governments also need to understand the societal cost of disability and invest in rehabilitation by training rehabilitation team members as well as building more facilities. Ghana, the black star of Africa, has set the pace.

INTEGRATIVE REHABILITATION SCIENCES: EDUCATION AND TRAINING IN REHABILITATION - TRAINING IN SCIENCE AND RESEARCH

967

IMPLEMENTING QUALITY CONTROL EDUCATION DURING REHABILITATION RESIDENCY

A. F. Ambrose¹

¹NYC, USA

Introduction/Background: The Accreditation Council for Graduate Medical Education (ACGME) has identified practice-based learning and improvement, in which residents must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life long learning as a requirement for Rehabilitation residency curriculum. Patients expect physicians to provide safe, effective, and high value care. Residents are interested in learning and acquiring tools to provide high quality, cost effective care that will be necessary to their future practice. **Conclusion:** Quality control education should be integrated into the whole 3-year curriculum. In this talk I will discuss the following strategies. Core didactic lectures can lay the foundation of the principles, including using models from business and industry such as Deming's principle, Six sigma or Balanced scorecards. Residents should be trained to conduct Root Cause Analysis (RCA), i.e. Identifying the adverse event, gathering preliminary information, selecting appropriate team members, identifying contributing factors, identifying the root causes, designing and implementing changes to eliminate the root causes and finally measuring the success of changes. Residents should be actively involved in mortality and morbidity meetings, taking the lead in at least one RCA. This process can also be rolled into a Performance improvement project. Residents will learn to work effectively with other clinicians to improve the quality of care, health care delivery, learn about cost-effective care, recognize system error and advocate for system improvement, learn how to monitor transitions of care, providing Effective Handoffs and Safe Discharge Planning. This helps prepare future physicians to be stewards of safe, high quality, high value, patient centered care and develop a culture of safety and quality that trainees will carry with them throughout their career.

968

HABITUAL PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOUR ASSOCIATED WITH BONEHEALTH IN CHINESE GRADUATE STUDENTS: A CROSS-SECTIONAL STUDY

J. Dong¹, L. Xia², P. Chen³, Y. Zhou², J. Sun², L. Qin²

¹Shanghai, China, ²Tongji University, Department of Physical Education, Shanghai, China, ³Shanghai University of Sports, Rehabilitation, Shanghai, China

Introduction/Background: Graduate students in China spend a substantial amount of time per day on research work as sedentary behaviors and it is likely that the time spent physical activity (PA) will continue to reduce. There is no review of prospective studies that systematically examined the relationship between sedentary behaviors and bone health outcomes among graduate students. This cross-sectional study aimed to look for an association in between whole body bone mineral content (BMC) and Body composition (BC) as well as sedentary behaviour (SB) and physical activity. Moreover, we investigated whether there was an interaction effect between BC and SB or PA on BMC. **Material and Methods:** Healthy graduate students (Nmale=44, mean age: 22.6 ± 0.4 years; Nfemale = 41, mean age: 21.7 ± 0.3 years) were recruited from Tongji university. Wholebody bone mineral content (BMC) and bone mineral density (aBMD; g/cm²) were measured with dual-energy X-ray absorptiometry (DXA), body fat and lean body mass were measured by bioimpedance analysis (Inbody3.0; Biospace, Seoul, Korea). Habitual physical activity (PA) and sedentary behaviour (SB) were assessed using ActiGraph GT3X+ accelerometers with 1-second epoch set for data collection. The accelerometer output was derived as counts per minute divided all students and threshold for sedentary behavior (SB, <100 cpm), light (LPA, 101–1679), moderate (MPA, 1,680–3,367 cpm) and vigorous (VPA >3,368 cpm) activity were used to determine time spent at each activity intensity for each hour between 7 am to 12 pm. Regression analyses were used to study the associations between BMC and SB and PA, adjusting for age, gender and body composition. **Results:** Physical activity was positively associated with whole body BMC and BC (absolute value as well as z-score), after correction for relevant confounders. SB was negatively associated with BMC and aBMD (z-score) and light PA was positively associated with both BMC and aBMD (z-score). No gender differences were found. Moreover, an interaction effect between vigorous PA (VPA) on aBMD (z-score) and BMC (z-score) was found, a litter outcome between LPA and BC were occurred, indicating that graduate students with high VPA had higher values for BMC and aBMD of the whole body minus. **Conclusion:** Already at young age, physical activity and sedentary behavior influence whole body bone mass body composition. Moreover, this study indicates clearly that SB is negatively associated with whole body bone density. Promoting regular PA and limiting SB in young people can be expected to positively influence their bone mass accumulation, which can help in the prevention of osteoporosis later in life.

969

IMPROVING PEER-REVIEWED PUBLICATIONS IN PHYSICAL MEDICINE AND REHABILITATION THROUGH TRIAL REGISTRATION AND REPORTING GUIDELINES

A. Heinemann¹, L. Chan², G. Collins³, W. Frontera⁴

¹Northwestern University, Physical Medicine and Rehabilitation, Chicago, USA, ²National Institutes of Health, Rehabilitation Medicine, Bethesda, USA, ³American Congress of Rehabilitation Medicine, Archives of Physical Medicine and Rehabilitation, San Diego, USA, ⁴Vanderbilt University School of Medicine, Physical Medicine and Rehabilitation, Nashville, USA

Introduction/Background: The International Council of Medical Journal Editors promotes trial registration to avoid selective reporting of results, limit duplication of research findings, help patients

find trials in which they may want to enroll, and help ethics review boards. Journals demonstrate compliance with guidelines by requiring authors to register trials before enrolling patients. Registration of a trial requires documenting key aspects of research methodology in a public database. Beginning in 2016, Archives of Physical Medicine and Rehabilitation and 7 other journals, require post hoc registration of trials and prospective registration in 2017. Beginning in 2015, editors of these journals along with more than 30 other rehabilitation journals began requiring authors to use reporting guidelines, such as CONSORT and PRISMA. Reporting guidelines are structured outlines for authors to use when describing their methods. These are unprecedented efforts in medical rehabilitation. **Material and Methods:** The rehabilitation journal editors' reporting guideline initiative began Jan 1, 2015, in anticipation of the Equator Network's 2016 "Year of the Guideline." The rehabilitation journals involved includes a broad range of publications, including those focused on physical therapy, occupational therapy, rehabilitation nursing, speech pathology, as well as many multidisciplinary journals. Trial registration began Jan 1, 2016. **Results:** The presenters will discuss the implementation of trial registration and reporting guidelines, including types of reporting guidelines selected by authors, challenges encountered and resolutions. In addition, presenters will describe efforts to informing editors, authors, and reviewers on how best to apply these guidelines. **Conclusion:** The success of unifying 30+ rehabilitation journals to all use reporting guidelines is seen as a model for other disciplines and a key focus of the EQUATOR Good Reports campaign. We plan on monitoring article quality from before to after guidelines implementation to evaluate the effectiveness of this collaboration.

970

SYSTEMATIC REVIEW: MALAY CORE VOCABULARY FOR AUGMENTATIVE AND ALTERNATIVE COMMUNICATION (AAC) INTERVENTION

N. Onwi¹, K. Hill²

¹Hospital Rehabilitasi Cheras, Unit Terapi Pertuturan Speech Therapy Unit, Cheras, Malaysia, ²University of Pittsburgh- Pennsylvania., Communication Science and Disorders, Pittsburgh, USA

Introduction/Background: Core vocabulary is a small set of commonly used words that support communication and language learning. Core also consistent across ages, places, topics, activities and cognitive ability. Language-based augmentative and alternative communication (AAC) promotes the use of less word with more functions to help individual with complex communication needs (CCN) become active and independent communicator. This review aims to evaluate, summarize, and synthesize the data on Malay vocabulary frequency in typical speakers to support identification of core vocabulary potential for use in the language intervention. **Material and Methods:** Computer searches was conducted using six electronic databases (Academic Search Premier, Sage eReference, Springerlink, Escost, ProQuest, and Academic OneFile) from Jan to Apr 2012. Search terms are Malay, word frequency, lexicon, core vocabulary, augmented communicator, aided communication, speech therapy, language intervention, and complex communication needs. Two independent reviewers selected articles written in English based on the availability of word frequency, adequate sample size and medium to high quality methodological rigor. **Results:** 125 articles was found and four were reviewed as final. A total number of 47 words were found from four relevant research, compiled and summarized following its frequency of occurrence, word commonality and part-of-speech. Words compiled were all resourced from written materials including the Internet and daily newspapers, children books, magazines and documents written in Malay language. No spoken sample was found. Due to small sample size and methodological limitations, the level of scientific evidence within these research are confined. **Conclusion:** Selected studies should serves as primary references and may fill the holes in the current knowledge of Malay core vocabulary. The wordlist compiled appears relevant to become a valuable source of Malay words suitable for AAC intervention. A longitudinal study of spoken language sampling from

typical Malay speakers of all ages shall provide higher level of evidence for researching core vocabulary in Malay.

INTEGRATIVE REHABILITATION SCIENCES: EDUCATION AND TRAINING IN REHABILITATION - TRAINING OF OTHER REHABILITATION PROFESSIONALS

971

ACQUISITION OF KNOWLEDGE IN HEMIPLEGIC CARE VIA EXPERIENTIAL LEARNING MODEL

N. Hussein¹, Y. Ishak², I.Z. Zainal Abidin², M.L. Lee³

¹Cheras Rehabilitation Hospital, Department of Rehabilitation Medicine, Kuala Lumpur, Malaysia, ²Cheras Rehabilitation Hospital, Nursing Unit- Neurological Rehabilitation Ward, Kuala Lumpur, Malaysia, ³Cheras Rehabilitation Hospital, Nursing Unit- Neurological Rehabilitation Clinic, Kuala Lumpur, Malaysia

Introduction/Background: Experiential Learning is increasingly utilized in medical and health care education and is useful to promote acquisition of knowledge and skills. Experiential Learning cycle involves Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation which are relevant and effective in enhancing knowledge and clinical skill in basic hemiplegic care. *Material and Methods:* Illustrative report on utilizing Experiential Learning as a strategy to improve health care providers' knowledge on the important aspects of hemiplegic care. Course participants were health care providers from various clinical background who manage individuals with hemiplegic sequelae. Role play session was organized in addition to interactive lectures and hands-on demonstration workshop. Participants were assigned alternating roles of hemiplegic individuals, caregivers and health care providers. Simple low-cost apparatus was utilized to simulate hemiplegia and hemiplegic-associated impairments. Case scenarios were designed with focus on early interventions to prevent hemiplegic-associated complications and increasing personal independence. Focus domains in the course were hemiplegic shoulder care, transfers, mobility and activities of daily living. Reflective session was conducted. Course survey, pre and post-tests were performed to measure the participants' level of understanding and overall response. *Results:* A total of 80 participants enrolled in the course. Majority (80%) of the course participants were from the nursing units. Results from the pre and post-test questionnaires showed overall increased percentage of level of understanding of hemiplegic care. 90% participants reported increased confidence in their practical skills. 95% of the participants reported positive response in favour of utilizing Experiential Learning method to acquire transfer of knowledge. Incorporating role-play as an adjunct to interactive lectures and hands-on demonstration session was highly evaluated by participants to be an effective learning strategy. *Conclusion:* Experiential Learning is an effective tool in neuro-rehabilitation education to promote awareness, confidence, knowledge and understanding of basic hemiplegic care and is recommended as a learning strategy for health care providers.

972

IS IT PRACTICAL TO USE CANADIAN OCCUPATIONAL PERFORMANCE MEASURE IN OSCE?

T. Suzuki¹, D. Hirano²

¹Fujita Health University, Occupational Therapy, Toyoake- Aichi, Japan, ²International University of Health and Welfare, Occupational Therapy, Odawara, Japan

Introduction/Background: Few have reported on Canadian Occupational Performance Measure (COPM) used in the Objective Structured Clinical Examination (OSCE) for occupational therapy students in Japan. *Material and Methods:* We designed and conducted two different experiments to examine OSCE scores and measure the

difficulty of different tasks with and without COPM. 46 third year OT students who had not experienced clinical practice took part in experiment 1 whose session was 10 minute long. 37 third year OT students without the experience of clinical practice participated in experiment 2 whose session was 22 minute long. In each experiment, participants were randomly assigned to two groups of the same size. For two different types of simulated cancer patient, students conducted two intake interviews. OSCE scores were given according to the students' performance and the visual analogue scale measured the difficulty of the tasks. For statistical analysis, we used the Wilcoxon test and the Mann-Whitney test. *Results:* Experiment 1 showed no significant differences in OSCE scores between the two tasks, or no significant differences in difficulty ratings between them, regardless of the use of COPM. For intratask differences, while OSCE scores with COPM were significantly lower than those without COPM, task difficulty ratings with COPM was significantly lower than those without COPM. In experiment 2 whose examination session was extended up to 22 minutes, regardless of the use of COPM, no significant differences in OSCE scores and task difficulty ratings were observed between the two tasks, as in experiment 1. For intratask differences, OSCE scores were higher and task difficulty ratings were lower when COPM was not used. *Conclusion:* If the examination session is extended up to 40 minutes, it may be easier to use COPM in OSCE. As such a long examination session is not practical, it seems to be very difficult to conduct OSCE with COPM.

INTEGRATIVE REHABILITATION SCIENCES: REHABILITATION MANAGEMENT AND ADMINISTRATION - REHABILITATION SERVICE MANAGEMENT (INCLUDING INTEGRATED CARE AND SERVICE CONCEPTS)

973

A NOVEL HOSPITAL BASED SCHOOL HOLIDAY PROGRAMME IN MALAYSIA

P.M. Chern¹, M.A. Aziz¹

¹Hospital Rehabilitasi Cheras, Department of Rehabilitation Medicine, Cheras, Malaysia

Introduction/Background: Since the start of Cheras Rehabilitation Hospital's Paediatric Rehabilitation Service in year 2013, many activities were conducted for both in- and outpatient to improve the children's daily living skills and quality of life. One of the annual activities carried out is the hospital based school holiday programme, catered for school attendees. The programme aims to provide short burst of specific intensive medical rehabilitation training for school-going children under Paediatric Rehabilitation Medicine follow-up, to improve their fine and gross motor skills, mobility and activities of daily living; also to improve their motivation, behaviour and social interaction skills. *Material and Methods:* Structured programme with specific theme was conducted. The activities were tailored designed based on the theme chosen for the year with the inputs from multidisciplinary team (MDT) members. Various group activities were organized involving physical, mental, intellectual and social interaction skills. The participants of the programme were of similar capabilities and were enlisted after the MDT discussion to ensure optimal participation and maximum gained from the programme. Caregivers' feedbacks were obtained and recorded. *Results:* Two programmes were carried out thus far, one in year 2014 with the theme of Boot Camp, whereas in year 2015 with the theme of Camping. All caregivers agreed that their children learned many skills and more independent after the programme. They felt that the programme was excellent and would recommend it to other parents. They hope that the programme will continue because it helped the children to explore skills beyond their limitations, learn to solve problems and be able to interact with each other not only the children but also the caregivers regardless of age, gender and ethnicity. *Conclusion:* The hospital based school holiday programme, catered for school attendees has been a success and should be continued in helping the children to improve various skills during the process of intensive rehabilitation.

**INTEGRATIVE REHABILITATION SCIENCES:
REHABILITATION MANAGEMENT AND
ADMINISTRATION - MISCELLANEOUS**

974

**CAREGIVER CHARACTERISTIC OF PEDIATRIC
CASE IN PHYSICAL MEDICINE AND REHABILITA-
TION DEPARTMENT, HASAN SADIKIN GENERAL
HOSPITAL, BANDUNG, INDONESIA**

D.M. Sari¹, F. Arisanti¹, A. Nursyanti², D.Z. Arifin³, I.R. Defi¹

¹Padjadjaran University, Physical Medicine and Rehabilitation, Bandung, Indonesia, ²Hasan Sadikin General Hospital, Physical Medicine and Rehabilitation, Bandung, Indonesia, ³, Health Department of Purwakarta, Purwakarta, Indonesia

Introduction/Background: The increasing number of pediatric cases in Physical Medicine and Rehabilitation (PMR) Department of Hasan Sadikin General Hospital (HSGH) was made the importance to make the proper database of our patients and their caregivers. It will lead us to classify their pattern in the purpose of giving the best rehabilitation approach, including educational program. The aim of this study was to know the characteristics data of patients and their caregivers who visited our department in order to improve rehabilitation services and hospital facilities for supporting rehabilitation program. **Material and Methods:** A descriptive design using an interview guide approach was used to caregiver of pediatric patient, who came to PMR Department in HSGH within 2013–2014. The interview was done by our social worker team. Normal 0 false false IN X-NONE X-NONE. **Results:** A hundred and forty patients visited our department, 51 (38.6%) male and 81 (61.4%) female. The mean age of patients were 3.7±4.6 years old, majority of patients aged were 1 year old (18.9%). The highest level of education of parents were college graduate but only in a minor amounts (4.8% of mothers and 3.3% of fathers). Most of parents were senior high school graduate, 37.1% of mothers and 43% of fathers. For the occupational, 85.4% mothers were homemakers and 66.1% fathers were a private servants. Most patients had been diagnosed with cerebral palsy (35.6%), followed by speech delay (13%) and global delayed development (10.3%). Only 45% of patients used insurance for medical care. **Conclusion:** Pediatric patients who came to physical medicine and rehabilitation department, mostly around 1 year old. Only limited families had insurance and good educational background, so that we need to give the suitable educational rehabilitation program to be followed easily by the parents at the hospital and home setting. It will help us to improve the functional outcome of our patients.

**INTEGRATIVE REHABILITATION SCIENCES:
MISCELLANEOUS**

975

**SPINAL CORD INJURIES IN UAE: OVERVIEW OF
PATIENTS ADMITTED, MANAGED & REHABILITATED
IN NEURO-SPINAL HOSPITAL/DUBAI DURING
LAST 12 YEARS**

K. Al-Chalabi¹

¹Neuro-Spinal Hospital Dubai, Neuro Rehabilitation Department, Dubai, United Arab Emirates

Introduction/Background: Demographic Statistical Analysis of 232 patients (age, gender, nationality, etiology/nationality: UAE locals, Expats: Arabs & Non Arabs, levels & types of injuries, surgical & conservative managements). Overview of quality, concepts, status of comprehensive care, management & rehabilitation In UAE. **Material and Methods:** Spinal cord injured patients admitted in Neuro-Spinal Hospital during the period Feb 2003 till Dec 2014 was 232 patients. UAE locals were 114 (49%), expats 118 (51%). Males were 176 (76%) and females 56 (24%). Tetraplegia 66 (28%),

paraplegia 166(71.5%). Age: 153 (66%) are below 40 years. Etiology: RTA 135 (58%), fall from heights 44 (19%), sport injuries 23 (10%), diseases 20 (8.5%). Surgical procedures (fixation, decompression laminectomy, excision, baclofen pumps, spinal cord stimulation, sacral roots stimulations) were done on 140 patients (60%) while the rest were admitted for conservative treatment. **Results:** These figures are as per total number of the group, however for demographic purposes, they were subdivided into three main subgroups: UAE Locals, Arab Expats & Non Arab Expats just to show the variations between them as far as etiology, age, gender, level & types of injuries. For example RTAs among locals were 71%, while Arab expats 47% & 44% in non Arab expats, and accordingly there are differences in the other variables. **Conclusion:** In spite of all modern life facilities, services&high standard health care whether governmental or private which are afforded by local emirates or federal governments for all people, locals or residents, concept of SCI comprehensive care, management & rehabilitation is still not coping with the international standards. No national data about incidence, impact & awareness of such issue can be obtained or retrieved & no SCI center per se neither in the capital/Abu Dhabi nor in the other emirates. NeuroSpinal Hospital which is private tertiary highly specialized Neuro&Spine surgical referral center afford from A-Z comprehensive (surgical & conservative) management, rehabilitation & follow up services.

976

**EMPLOYEES' AWARENESS, ATTITUDES AND UTI-
LISATION OF AN EMPLOYEE WELLNESS PRO-
GRAMME IN A FINANCIAL SERVICES COMPANY
IN SOUTH AFRICA**

S. Dawad¹, M. Hoque²

¹Pretoria, South Africa, ²University of KwaZulu-Natal, Graduate School of Business and Leadership, Durban, South Africa

Introduction/Background: Globalisation brings new opportunities such as joint ventures but also adds pressure for South African workers and management to meet the challenges that exist when operating and competing with foreign companies and markets. A survival tactic is to have a healthy, engaged and highly productive workforce. Healthy employees are vital to assist in functioning and competing in the global business environment. In this context, employee wellness programmes (EWP) may assist in building and maintaining a productive workforce. **Material and Methods:** The aim of this study was to understand employees' awareness, attitudes and utilisation of an EWP in a financial services company in the Western Cape, South Africa. A probability sample of 301 employees was drawn from a population of 1,314 employees. The sample consisted of 63.1% females and 36.9% males. Data were collected using a web-based questionnaire. **Results:** A salient finding of this study was that over 70% of respondents who indicated that they had faced problems in the recent past, used the EWP to assist them with their problem. Bivariate analysis found that gender, marital status and years of service at the company were significantly associated with the use of the EWP. Various reasons were documented for non-utilisation of the EWP, with the main reason being that the operating hours of the services offered in the EWP were not convenient. **Conclusion:** It is recommended that communication regarding the EWP be improved, including communication about services offered, as well as opening times for the services in the EWP. A further recommendation is that times when services are offered should be extended.

977

**FUNCTIONAL RECOVERY OF TRAUMA PATIENTS
RECEIVING EARLY PHYSICAL REHABILITA-
TION IN KUNDUZ (AFGHANISTAN) AND TABARRE
(HAITI) MSF TRAUMA CENTERS**

B. Gohy¹, R. Van den Bergh², E. Ali³

¹Handicap International, Trauma, Lyon, France, ²Médecins Sans Frontières, Trauma, Brussels, Belgium, ³Médecins Sans Frontières, Trauma, Luxembourg, Luxembourg

Introduction/Background: Considering the needs and benefits for early physical rehabilitation for trauma patients in austere environments, Médecins Sans Frontières (MSF) has been collaborating since a few years with Handicap International (HI) This collaboration has allowed the integration of physical and functional rehabilitation in MSF trauma projects, including the Kunduz (Afghanistan) and Tabarre (Haïti) Trauma Centers. Both trauma centers provide a standardised package of trauma care, including physical therapy, but in highly differing contexts of urban violence (Tabarre) and active conflict (Kunduz). Within those centers, physiotherapists are part of a multidisciplinary team, which also comprises surgeons, medical doctors, nurses, mental health counsellors and hygiene promotion professionals, in the common objective to offer the best possible care for the trauma patients and optimize their recovery. **Material and Methods:** The cohort study uses retrospective data from the MSF trauma centers in Tabarre and Kunduz, analyzing the evolution in functional pain (0–5) and functionality (0–50) scores for patients with upper limb and lower limb trauma, admitted to the centers between Jan and Sep 2015. Scores at start and end of both in- and outpatient-based physiotherapy were collected, and putative associations with patient characteristics (socio-demographic, clinical and treatment) were assessed. **Results:** For upper limb trauma, a reduction in mean pain score was observed from 2.1 to 1.6 (22%) during the inpatient period, and from 1.8 to 0.5 (70%) over the course of outpatient follow-up. The functional score improved from 32 to 34 (6%) for inpatients and from 43 to 49 (14%), or up to almost complete regain of functionality, for outpatients. For lower limb trauma, a 25% and 60% reduction in pain score was observed for inpatients and outpatients respectively, and a functional recovery of 16% and 29% (up to a mean score of 47), respectively. Associations with the cause of trauma and with different interventions were also observed. **Conclusion:** A marked success of the physiotherapy in these resource-poor, violent settings was noted for both pain reduction and functional recovery in upper and lower limb trauma cases. Mapping of the associations between patient characteristics and functional evolution/outcomes will allow tailoring of the physical rehabilitation protocols. Further studies are needed to prospectively study specific trauma populations and protocols, and to assess the validity and sensitivity of the different scoring systems.

978

THE FACTORS INFLUENCING COMMUNITY REINTEGRATION IN PATIENTS WITH ACQUIRED DISABILITIES IN SOUTH KOREA

S. Min-a¹

¹National Rehabilitation Center, Department of Rehabilitation Medicine, Seoul, Republic of Korea

Introduction/Background: To ascertain the factors influencing community reintegration of patients with acquired disabilities who were given rehabilitation in post-acute rehabilitation center in South Korea. **Material and Methods:** A sample of 96 individuals with acquired disabilities who admitted to National rehabilitation center between Jun 2012 and Apr 2013 were included. Three times follow-up survey by telephone interview and retrospective chart review were carried out. **Results:** Among the 96 individuals, there were 83.3% with brain disorder, including 69.8% with stroke. The Community reintegration rate was 62.5%. Male, family member care-giver and better functional state had significantly positive impact on community reintegration. Among the reason for prolonged hospitalization, hope for further recovery was 45.5% and absence of home caregiver was 27.3%. **Conclusion:** Family member care-giver has a positive impact on reintegration. The burden imposed on family member influences community reintegration rate. On the contrary, the burden obstructs the nursing by family member. So community rehabilitation program has to

consider a various aspects of this problem. Hope for further recovery was the greatest perceived barrier to community reintegration. Effects of overly long time rehabilitation are less certain. So practitioner account for prognosis exactly and counsel the length of hospital stay early.

979

PROSTHESIS SERVICES FOR DIFFERENT TYPES OF AMPUTEES IN NATIONAL REHABILITATION HOSPITAL, MYANMAR

Y.M. Myint¹, N.N. Thein¹

¹National Rehabilitation Hospital, Rehabilitation, Yangon, Myanmar Burma

Introduction/Background: Objectives of this study are to describe the services providing of prosthesis in NRH workshop and to describe the workload of prosthesis service in NRH. National Rehabilitation Hospital (NRH) is the one of the central level hospitals under the Ministry of Health. It is a tertiary level teaching hospital and 50 bedded hospital. Now, NRH is being planned to upgrade to 200 bedded for more rehabilitation services. Multiple needs of the disable person could be met by multi-disciplinary team approach. Provision of Prosthesis and Orthosis is one of the major activities in the rehabilitation management of PWDs in NRH. Prosthesis & Orthosis service is provided to all PWDs from different areas of Myanmar. The goal of the rehabilitation process is to help amputee and his/her family prepare to return to an active life. **Material and Methods:** P&O workshop provides various types of Prosthesis and there are three phases of amputee management. These data are studied from 2012 to 2014. In 2012, total amputees are 237, 366 amputees in 2014 and in 2015, there are 556 amputees. Most of them are males and between 20 to 50 years. Causes of amputees are congenital and acquired such as occupational accidents, mine injuries, road traffic accidents, diabetes mellitus, peripheral vascular diseases and malignancies. **Results:** The workload of P&O workshop is increasing year by year because of more and more injuries. There are only 10 P&O technicians in Myanmar and P&O services are available at National Rehabilitation Hospital, Defense Services Rehabilitation Hospital and Hpan Orthopedic Rehabilitation center. **Conclusion:** Many PWDs with amputees are in out-reach areas. So, our visions are to do the mobile team services for P&O application in these areas, to produce advanced P&O devices using Rescin, Thermoplast and Silicon and to do human resources development for getting knowledge and efficient skills.

980

HEALTH RELATED REHABILITATION OF DISASTER VICTIMS, BANGLADESH PERSPECTIVE

S. Rahman¹

¹Bangabandhu Sheikh Mujib Medical University, Physical Medicine and Rehabilitation, Dhaka, Bangladesh

Introduction/Background: Disasters result in significant numbers of disabling impairments. Bangladesh is a disaster prone country. Floods and cyclones killed millions of people in Bay of Bengal during last centuries. Poor peoples of coastal areas were major victims. Deadly earthquakes are rare. Non-compliant building collapse had major casualties during recent past. Landslides during heavy rain in hilly areas also cause many deaths. The traditional health system response to disasters largely neglects health-related rehabilitation as a strategic intervention. Inadequate preparedness and insufficient equipment for rescue are major causes of death and disability. This review intends to emphasize the need of health related rehabilitation of disaster victims at low resource setting in Bangladesh. **Material and Methods:** We have gone through the recent events of natural disasters in Bangladesh, and observed the health related rehabilitation on the sufferers. We have also analyzed the national plan for disaster management 2010–2015 of government of Bangladesh to see the pattern of health related rehabilitation in disaster. We reviewed lit-

eratures on health related rehabilitation during a disaster to see our status in this regard. *Results:* Results of our review were disappointing. Health related rehabilitations in recent calamities were grossly neglected during rescue operations and management. National plans were not inclusive of health related rehabilitation. Rescuers and local hospital staffs were not well trained about transfer and initial management. Shelter centers and local hospitals were not equipped with essential equipment. *Conclusion:* Health-related rehabilitation potentially results in decreased morbidity due to disabling injuries sustained during a disaster. Health related rehabilitations are grossly neglected. Challenges to effective delivery of health related rehabilitations during disaster include a lack of trained responders, preparedness and system settings at site. This review recommends the training of local rescuers and health workers for transfer and acute care management of disaster victims.

981

OCCUPATIONAL SATISFACTION OF CHINESE PHYSIOTHERAPIST: A NATIONAL-WIDE ONLINE SURVEY

X. Wang¹, Y. Wang¹, B. Feng¹

¹The 6th Affiliated Hospital of Sun Yat-sen University, Department of Rehabilitation Medicine, Guangzhou, China

Introduction/Background: Recently in China mainland, as a result of high ageing population and high prevalence rate of chronic disease, a rapid growing need of Chinese physiotherapist profession is observed. Current survey aimed to explore current occupation satisfaction of physiotherapy practitioners in China mainland. *Material and Methods:* The survey was internet-based, anonymous, and voluntary which 1,849 participants working in different levels of hospitals national-widely of China mainland during Feb to mid-Mar 2015. Each participant completed an online survey with a set of self-rating questionnaires. The collected data were used to do the analysis if the completion rate of all the items reached 90%. The items contained self-reported satisfaction on working environment, payment, self-identity, job independence, and vocational perspective etc. *Results:* There were 1,849 surveys collected, and valid rate was 98.86%. The mean age of participants was 30.0±6.07 year-old. The years of practice in related profession was 6.4±5.4 years. The education levels of participants were diploma and below (20.0%), bachelor degree (63.7%), master degree and above (16.1%). There were titled mainly in junior therapist (60.7%) and middle rank therapist (21.3%). Results showed that no 'very satisfaction' was chosen for each item. The participants were satisfied more with item 'job independence' and 'vocational perspective', the satisfaction rate was 65.4% and 65.2% respectively. The most dissatisfaction of the participants was 'degree of profession recognition' (22.6%), followed by 'payment' (19.5%). *Conclusion:* Satisfaction rates of Chinese physiotherapists were fairly good, especially in job independence and vocational perspective, but they were not satisfied with profession recognition and payment. Physiotherapy was developed rapidly, and it is urgent to improve quality of physiotherapy profession practitioners, and to improve general satisfaction of Chinese physiotherapist profession.

HUMAN FUNCTIONING SCIENCES: THEORY AND MODELS OF FUNCTIONING (E.G. DISABILITY CREATION PROCESS)

982

CARDIOPULMONARY EXERCISE TESTING USING AN ERGOMETER DRIVEN WITH BOTH LEGS, ONE LEG, BOTH ARMS OR ONE ARM - A PRELIMINARY STUDY FOR HANDICAPPED PEOPLE

K. Fukuhara¹, Y. Mikami¹, T. Kawae¹, T. Sakamitsu¹, K. Hirata¹, H. Kimura²

¹Hiroshima University Hospital, Sports Medical Center, Hiroshima, Japan, ²Hiroshima University Hospital, Department of Rehabilitation Medicine, Hiroshima, Japan

Introduction/Background: In physical fitness, endurance is commonly measured by cardiopulmonary exercise testing (CPX) using an ergometer driven with both legs drive (BL-d). However, in some handicapped people such as amputees, it may be necessary to perform CPX using an ergometer driven with one leg (L-d), both arms (BA-d) or one arm (A-d). Since the correlations between the results for BL-d and for L-d, BA-d and A-d are unknown, CPX was performed for BL-d, L-d, BA-d and A-d in healthy men. *Material and Methods:* Twenty healthy male volunteers (mean age 28.3 y) performed CPX with BL-d, L-d, BA-d or A-d to examine the correlations between the results with BL-d and those with L-d, BA-d, and A-d. *Results:* Although most healthy men [IGG1] found CPX with BL-d very tiring, CPX with L-d and A-d was not so tiring: Peak VO₂/Weight (ml.kg⁻¹.min⁻¹) with BL-d, L-d, BA-d and A-d was 36.4±3.7, 27.2±4.0, 26.1±2.9 and 22.7±3.6, respectively. The value for BL-d was moderately correlated with that for BA-d. At the end of the exercise, the difference between central and peripheral ratings of perceived exertion (RPE) with BL-d, L-d, BA-d and A-d was 2.0, 3.7, 2.4 and 4.1, respectively. *Conclusion:* It is important to understand the difference between the results of CPX using BL-d and those with L-d, BA-d or A-d in interpreting the endurance of people with limb handicaps. In healthy men, the correlation of the results of CPX for BL-d between L-d and A-d was lower in comparison with that between BL-d and BA-d. The difference between central and peripheral RPE might cause the less correlations [IGG1]. The present study was conducted as a preliminary study for physical fitness testing of people with limb handicaps. However, we might have to choose the best way of drive for adapted sports athletes in consideration of the sports properties.

983

LUMBAR SPINE MUSCULOSKELETAL LOADING - BIOMECHANICAL EFFECT OF ORIGINAL REHABILITATION METHOD

M. Tomanova¹, M. Danieš², L. Lhostka³, M. Lippert-Grüner⁴

¹Rehabilitacni Ustav Brandys nad Orlicí, Brandýs nad Orlicí, Czech Republic, ²Czech Technical University in Prague, Faculty of Mechanical Engineering, Prague, Czech Republic, ³Czech Technical University in Prague, Faculty of Electrical Engineering, Prague, Czech Republic, ⁴University of Cologne, Medical Faculty, Cologne, Germany

Introduction/Background: Measurement of forces in vivo is technically complex and could be performed in a limited number of patients. Therefore internal joint, muscle and tendon forces are estimated on the base of mathematical modeling. The mathematical model could predict how the body position in rehabilitation effects loading of musculoskeletal system of human lumbar spine. *Material and Methods:* Four motion patterns were studied: (A) linear anterior-posterior pendulum movement (left-right in frontal plane), (B) linear diagonal pendulum movement (anterior-left to posterior-right), (C) elliptic movement started anteriorly and (D) shape eight movement pattern. The most complex movement pattern is the eight shape trajectory using in INFINITY method®. INFINITY method® is known to be focused on stabilization and strengthening of trunk muscles, back and abdomen muscles, including deep stabilization system, in relation to diaphragmatic breathing. *Results:* We focused on the dependence of L5/S1 spinal load on general displacement of the center of gravity of the upper body. Based on the values of spinal load, the safe zone of displacement was defined as 90%–110% of normal load, i.e. magnitude of anterior-posterior and left-right displacement was taken to be 2 and 4 cm, respectively. Within the safe zone, the most complex spine and muscle loading is observed for the INFINITY movement (D). The frequency of muscle and spine activation is more than double comparing to simple

movement pattern (A–C). *Conclusion:* Trajectory of motion pattern effects lumbar muscle activation considerably. While simple pendulum or elliptic movement induces a harmonic activation, the shape eight movement pattern requires complex muscle activation formula. The INFINITY method® (D) loading requires muscles to be active in three distinct regimes: higher variable activation, lower variable activation and mean constant activation. The constant activation regime is missing in other three loading pattern (A–C). Patient during INFINITY method® (D) builds not only strength in muscles, but learn neuromuscular system to precise control.

HUMAN FUNCTIONING SCIENCES: CLASSIFICATION OF FUNCTIONING (E.G. ICF CORE SETS; ICF UP-DATE AND REVISION)

984

ASSESSING CHILDREN WITH DISABILITIES USING ICF-CY UNDERWENT A NEW AQUATIC REHABILITATION PROTOCOL

L. Labianca¹, M. Fava², V. Pucci², M. Pane³, F. Turturro¹, G. Antonini⁴

¹II Faculty of Medicine La Sapienza University of Rome, Orthopedics and Traumatology, Rome, Italy, ²I.Ri.Fo.R. Institute for Research- Education and Rehabilitation, Rehabilitation, Rome, Italy, ³Policlinico Agostino Gemelli- Università Cattolica del Sacro Cuore, Pediatric Neuropsychiatry, Rome, Italy, ⁴II Faculty of Medicine La Sapienza University of Rome, Neurology, Rome, Italy

Introduction/Background: Assessing disabilities in children with sufficient detail to detect even minor changes is essential in daily clinical practice as well as for rehabilitation, new intervention strategies and research. This study investigated the relationship of ICF-CY Function area of children with neuromuscular diseases to that of the ICF-CY scores for Activity and Participation, with the aim of informing intervention goals, treatment strategies, and contributing, in general, to improve rehabilitation effectiveness of a customized aquatic protocol in terms of Quality of Life (QoL). *Material and Methods:* ICF-CY has been applied at time 0 and every 2 months to focus and to evaluate changes in areas of intervention. Children have been treated with a new water rehabilitation program (Active Induced Hydrostimulating Multisensorial Method, AIHM). Specific active, induced active exercises and stimulating activities (as touch, hearing, contact with operator) are developed in the method. Patients have been randomly assigned at two groups: AIHM Protocol (AG), where patients underwent the AIHM protocol. In this group areas of intervention have been defined by the ICF-CY. The Control Group (CG), where patients underwent a standard rehabilitation protocol. Aquatic therapy consist in a first phase of about 15 min of stretching exercises, using water resistance, 30 min of active exercise or active induced exercises and 10 min of play. Each patient underwent therapy two times a week for 2 years. QoL questionnaire has been administered to parents. *Results:* Fifty-four children aged 5–14yo were recruited, 24 were in the AG (12-SMAII, 6-Duchenne, 6-Cerebral Palsy) and 30 participated as CG (15-SMAII, 10-Duchenne, 5-Cerebral Palsy). ICF-CY function was found to be an independent predictor variables of ICF-CY activity and participation scores. Modifications in critical areas focused by ICF-CY have been more effective in the AIHM group than Control group ($p < 0.05$). QoL score was significantly higher in the AP group. *Conclusion:* The ICF-CY is effective in helping the rehabilitation team in focusing main areas of intervention and developing a customized rehabilitation protocol. The aquatic protocol seems to be more effective in improving critical areas focused by ICF-CY.

985

FEASIBILITY OF THE COMPREHENSIVE ICF CORE SET FOR NEUROLOGICAL CONDITIONS

IN POST-STROKE PATIENTS HOSPITALIZED AT REHABILITATION WARDS IN JAPAN

K. Miyamura¹, S. Kinoshita², I. Kimura³, H. Urabe⁴, T. Okamoto², W. Kakuda⁵, M. Abo⁵

¹Kawakita Rehabilitation Hospital, Department of Rehabilitation Medicine, Tokyo, Japan, ²Nishi-hiroshima Rehabilitation Hospital, Department of Rehabilitation Medicine, Hiroshima-shi, Japan, ³Tokyo General Hospital, Department of Rehabilitation Medicine, Tokyo, Japan, ⁴Kyoto Ohara Memorial Hospital, Department of Rehabilitation Medicine, Kyoto-shi, Japan, ⁵The Jikei University School of Medicine, Department of Rehabilitation Medicine, Tokyo, Japan

Introduction/Background: By using “comprehensive ICF core set for neurological conditions for post-acute care (ICF core set)”, we studied clinical characteristics of stroke patients in Japan. *Material and Methods:* We studied 117 stroke patients who were transferred to Kaifukuki-Rehabilitation-Ward (KRW) after acute management. Patients were hospitalized in 4 KRW in Japan from May 1, 2015 to Oct 31, 2015. We evaluated ICF core set (except e items: environmental factors) as well as age, gender, time between stroke onset and admission, site of lesion, handedness, Functional Independent Measure and Barthel index score on their admission. *Results:* Among b items, 4 ICF categories (Exercise tolerance functions, Muscle power functions, Muscle endurance functions, Gait pattern functions) of body function were identified as a problem in more than 80% of both hemorrhagic and ischemic stroke patients. In hemorrhagic stroke patients, more than 80% of them had problem in 3 more additional ICF categories (Attention functions, Higher-level cognitive functions and Blood pressure functions). Among s items, all studied patients had a problem in Structure of brain category of body structures. Among d item, 7 ICF categories (Lifting and carrying objects, Fine hand use, Hand and arm use, Walking, Moving around in different locations, Moving around using equipment, Washing oneself) of activities and participation were identified as a problem in more than 80% of the hemorrhagic and ischemic stroke patients. *Conclusion:* Comprehensive ICF core set on admission is useful to investigate the problems in disabilities and complications of stroke patients in rehabilitation wards in Japan.

HUMAN FUNCTIONING SCIENCES: MEASUREMENT OF FUNCTIONING (E.G. PSYCHOMETRICS OF ASSESSMENT TOOLS; OPERATIONALISATION OF ICF CATEGORIES)

986

DEVELOPING A METHOD OF MEASURING THE VELOCITY OF THE BOLUS DURING SWALLOW USING ULTRASONOGRAPHY

N. Arai¹, K. Hanayama², A. Yamamoto¹, S. Yamamoto², M. Satou¹, T. Sugiyama², A. Tsubahara²

¹Satou Memorial Hospital, Rehabilitation Medicine, Okayama, Japan, ²Kawasaki Medical School Hospital, Rehabilitation Medicine, Kurashiki, Japan

Introduction/Background: Videofluoroscopy is a gold standard as the image analysis of the swallowing dynamics. Recently, evaluation with ultrasound emerged as a useful method. The advantages of using ultrasound technique have been described in term of safety, portability, real-time imaging, and instrument cost. In general, the movement of the tongue, hyoid bone, and suprahyoid muscles were evaluated by the ultrasound. On the other hand, movement of the bolus during swallow is important associated with swallowing organ movement. This study aimed to explore the measurement method of velocity of the bolus using ultrasound. *Material and Methods:* One healthy male volunteer was examined. His head was secured in a stable posture and he was asked to swallow 5 ml of thickened

water. He underwent sonography and videofluoroscopic examination at the same time. We investigated the validity of the velocity of the bolus measured by sonography (Pulsed wave Doppler mode) compared with the videofluoroscopy. We repeated measurement 3 times. **Results:** The velocity waveform obtained with sonography produced similar pattern in all three trials. A minimum velocities of the bolus measured with sonography was in good agreement with the value with videofluoroscopy. **Conclusion:** We have developed a method of measuring the velocity of the bolus during swallowing using ultrasound. Results suggested that velocity waveform analysis would be required to obtain the bolus velocity as good indicator.

987

GROSS MOTOR FUNCTION MEASURE AND HAMMERSMITH SCALE IN ASSESSING CHILDREN AFFECTED BY SMA II UNDERWENT A NEW AQUATIC PROTOCOL

L. Labianca¹, M. Fava¹, F. Turturro², M. Pane³, G. Antonini⁴, A. Carducci², V. Pucci⁵

¹I.Ri.Fo.R. Research- Rehabilitation and Education Institute, Disability Management, Rome, Italy, ²II Faculty of Medicine La Sapienza University of Rome, Orthopedics and Traumatology, Rome, Italy, ³Università Cattolica del Sacro Cuore Policlinico Gemelli, Pediatric Neuropsychiatry - NEMO Center, Rome, Italy, ⁴II Faculty of Medicine La Sapienza University of Rome, Neurology, Rome, Italy, ⁵II Faculty of Medicine La Sapienza University of Rome, Physiotherapy, Rome, Italy

Introduction/Background: Spinal muscular atrophy is a genetic disease of the anterior horn cell with high morbidity rate in childhood. The Gross Motor Function Measure and Hammersmith functional scale are measures of motor function successfully used in children with spinal muscular atrophy. Aquatic therapy is known as an excellent way to maintain flexibility, mobility and strength. The aim of this study is to demonstrate as a new customized aquatic protocol is effective in improving motor skills in SMA population. **Material and Methods:** Patients were randomly assigned to 2 groups: Control Group (CG) that followed a standard rehabilitation protocol, and Aquatic Group (AG) that followed a new aquatic protocol. Specific active, induced active exercises and stimulating activities (as touching, hearing, contacting the therapist) are included in the aquatic method. Clinical outcomes included measures of motor function (Gross Motor Function Measure and Hammersmith Functional Motor Scale) and pulmonary function (forced vital capacity). Participants were evaluated every 2 months for one year. **Results:** Twenty-eight patients have been recruited. Fifteen assigned at AG, 13 at CG. Significant changes over 12 months in motor function were recorded. The GMFM total score improved by 18% following the aquatic intervention, no changes or worsening in the CG. Hammersmith scores were significantly higher in the AG than the CG at 8, 10 and 12 months. **Conclusion:** The outcomes of this study demonstrate the successful improvement of gross motor function in SMA children underwent this new therapy in water. The study provides clinical information for therapists utilizing aquatic therapy as a modality for children with SMA II. As the child begins to work on fundamental movement skills in the water (such as walking), there is a decreased fear of falling, which makes children feel comfortable in their surroundings. Water also gives children a sense of freedom and independence. In water the child can move around freely without constraints. The aquatic protocol described show as combining fundamental motor skills with fun and games is an important development strategy.

988

EFFECTS OF FREQUENCY FOLLOWING RESPONSE ON ACADEMIC PERFORMANCE AND SLEEP QUALITY AMONG SCHOOL CHILDREN

Y.K. Teng¹, C.Y. Chen², S.P. Lee³, S.D. Lee⁴

¹China Medical University, School of Nursing, Taichung, Taiwan, ²National Yang-Ming University, Institute of Neuroscience, Taipei, Taiwan, ³Asia University, Department of Foreign Language and Literature, Taichung, Taiwan, ⁴China Medical University, Graduate Institute of Rehabilitation Science, Taichung, Taiwan

Introduction/Background: Two consistent sounds with nearly analogous frequencies are transmitted to each ear respectively with stereo headphones, the brain incorporates the two signals and forms a sensation of a third sound extending over some range area Hz called frequency following response (FFR). FFR was reported to elevate melatonin level and improve sleep quality. The aims of this study are to explore the effects of FFR on academic performance and sleep quality among school children. **Material and Methods:** One hundred and thirty-nine children, who were recruited from the fourth grade of a primary school about 10 years old and assigned to a FFR group ($n=24$) or a control group ($n=115$). FFR was executed by thirty minutes a day, three times a week for ten weeks. Academic performance and sleep questionnaire was evaluated before and after FFR. The responses were distributed over a range of frequencies spreading from 25 Hz to 5 Hz. Thirty-minute FFR from 25 Hz to 5 Hz frequencies (provided by FFR Co., LTD, Taiwan) were applied. **Results:** Compared to children in the control group, standardized test scores of mathematics (0.300 ± 0.831 vs. -0.061 ± 0.767 , $p < 0.05$) and percentile rank in total score (66.7% vs. 41.7%, $p < 0.05$) as well as sleep quality scores were significantly improved in the training group after ten weeks of FFR. However, standardized test scores of Chinese, social science, and nature science were not changed after ten weeks of FFR. **Conclusion:** Ten weeks of frequency following response improved mathematics performance and percentile rank of total academic score among school children about 10 years old. We suggest that school children hearing frequency following response improves academic performance and sleep quality among school children.

989

INDEPENDENCE OF KINESTHETIC SHORT-TERM MEMORY FOR MOVEMENT FROM VERBAL SHORT-TERM MEMORY

H. Wei¹, N. Tanaka¹, S.I. Izumi¹

¹Tohoku University Graduate School of Medicine, Department of Physical Medicine and Rehabilitation, Sendai, Japan

Introduction/Background: We developed two kinds of short-term memory tasks for movement: visual and kinesthetic. The independence of these short-term memories from verbal short-term memory has not yet been examined. Verbal labels, or naming movement spans, can expand our short-term memory for movement. To investigate the independence of visual and kinesthetic short-term memory for movement from verbal short-term memory, we used a dual-task method in terms of double disassociation. **Material and Methods:** Eighteen young adults (9 women, 9 men; mean age \pm SD of 24 ± 2 years) participated in this study. The three short-term memory tasks mentioned above were completed first without and then with two secondary interference tasks. The secondary tasks included a verbal task (using the words of possible verbal labels for the movement spans) and a movement task. The order of the short-term memory tasks and the secondary tasks were counterbalanced across participants using Latin square design. **Results:** The scores of the tasks for visual short-term memory for movement with two secondary tasks were not significantly different. The scores of the tasks for kinesthetic short-term memory for movement with a secondary movement task were significantly smaller than those with a secondary verbal task, while the scores of verbal short-term memory tasks with a verbal secondary task were significantly smaller than those with a secondary movement task. **Conclusion:** These results suggest that kinesthetic short-term memory for movement and verbal short-term memory have distinct subcomponents of short-term memory.

**HUMAN FUNCTIONING SCIENCES:
FUNCTIONING EPIDEMIOLOGY (POPULATION-
BASED COMPARATIVE STUDIES OF
FUNCTIONING ACROSS CONDITIONS,
CULTURES, AND TIME, E.G. ON EMPLOYMENT
OF PEOPLE WITH DISABILITY)**

990

**PAEDIATRIC SPEECH AND LANGUAGE DISOR-
DERS IN MALAYSIA: A PRELIMINARY STUDY**

M.A. A Aziz¹, P.M. Chern¹

¹*Cheras Rehabilitation Hospital, Rehabilitation Medicine, Kuala Lumpur, Malaysia*

Introduction/Background: To date, there is lack of data on children with speech and language disorders in Malaysia especially those who received intensive paediatric rehabilitation service. This study reports the demographic data of paediatric patients attending intensive speech and language therapy in Cheras Rehabilitation Hospital (CRH). The report also includes number of attendance and its relation to the needs of speech-language therapist (SLT). *Material and Methods:* A retrospective study was done on the patients attending Speech Therapy Unit from Jul 2012 to Dec 2014. All patients were referred by paediatric rehabilitation specialist from Paediatric Rehabilitation Clinic and confirmed to have speech and language difficulties by qualified SLT. All data collected were recorded and analysed based on the demographic characteristics and number of attendance. *Results:* There was 1,065 attendance for speech and language therapy were recorded. The number of attendance was increasing yearly from 8.5% in 2012 to 37.3% (2013) and 54.2% (2014). Of these, 64.5% ($n=687$) were males and 35.5% ($n=378$) were females. The highest patients' attendance were from the preschool aged group, 54.4% ($n=579$), followed by school-aged, 29.7% ($n=317$) and adolescents, 15.9% ($n=169$). The number of new cases was also increased. In 2012, 18 new cases were received, 2013 (36 cases) and 2014 (54 cases). Majority of the attendance were the Malay patients (69.7%), Chinese (13.8%), Indian (11.1%) and others (5.4%). The progressing number of attendance and new cases was due to the increase number of residence SLT from two in 2012, three in 2013 and five in 2014. *Conclusion:* This study provides a preliminary descriptive data on patients attending intensive speech and language therapy in a rehabilitation centre in Malaysia. Since the number of attendance is increased every year, there is an urgent need of speech-language therapist to be recruited and located in a rehabilitation centre; therefore intensive training can be given to the patients.

991

**DEMOGRAPHIC AND CLINICAL PROFILES OF PA-
TIENTS WITH APHASIA IN MALAYSIA: A PRELIMI-
NARY DATA**

*M.A. A Aziz¹, F. Mukhtar¹, N. Onwi¹, N.H. Mahmud Mar-
zuki¹*

¹*Cheras Rehabilitation Hospital, Rehabilitation Medicine, Kuala Lumpur, Malaysia*

Introduction/Background: Aphasia is a disorder that affects the speech, language and communication skills of people after they have experienced brain damage such as stroke, head injury, or brain tumour. Currently, there is no data on profiling demographic and clinical characteristics of patients with aphasia documented in Malaysia. This study reports preliminary data of patients with aphasia attending intensive speech and language rehabilitation at Cheras Rehabilitation Hospital (CRH). *Material and Methods:* Data was collected retrospectively from Jan 2015 to Dec 2015 on the new cases attending Speech Therapy Unit at CRH. All patients were referred from Neuro-Rehabilitation Clinic and had completed comprehensive aphasia assessment using Western Aphasia Battery (WAB). All data collected were recorded and analysed based on the demo-

graphic characteristics and aphasia types and severity. *Results:* 85 patients were included in the study where 69% ($n=59$) were males and 31% ($n=26$) were females. The highest patients' referred were from the older adults group (aged older than 55 years; $n=38$), followed by middle-aged adults (ages 36–55 years; $n=30$) and young adults (ages 18–35 years; $n=17$). Majority of the patients were Malay (60%), Chinese (28%), Indian (11%) and others (5%). 58% of the patients completed their education up to secondary level, 29% tertiary and 13% primary. Most of the cases received had post-stroke onset between 1–3 years (62.4%). 53% of the patients had fluent aphasia and 47% had non-fluent aphasia. Of these, 38.8% patients had anomic aphasia, followed by global aphasia (29.4%), Broca's (14.1%), Conduction (8.2%) and so on. *Conclusion:* This study was the first to report descriptive profiles on patients with aphasia in Malaysia. It is important to have more local data on this population so that intensive rehabilitation can be given to the patients.

992

**CORRELATIONS BETWEEN VISUAL PERCEPTION
AND HAND FUNCTION OF PRESCHOOLERS IN
SOUTH KOREA**

M. Chang¹, I.J. Kong²

¹*Inje University, Occupational Therapy, Gimhae, Republic of Korea,* ²*Graduate School of Inje University, Rehabilitation Science, Gimhae, Republic of Korea*

Introduction/Background: Visual perception is the basis for reading, writing, and basic learning. This study investigated to compare the correlation of visual perception and hand function in Korean preschoolers. *Material and Methods:* The participants were thirty-eight preschoolers from public kindergarten in G city. Visual perception was measured using Motor-Free Visual Perception Test-3 and the hand function was measured using grooved pegboard test. *Results:* There was positive correlation between visual perception and hand function ($r=0.50$, $p<0.01$). Also, the results showed significant difference in visual perception and hand function according to their age groups ($p<0.05$). There was no significant difference of in visual perception and hand function according to their gender. *Conclusion:* This research presents the average abilities of visual skills and hand function in preschoolers. We confirmed the hand function is different according to the age. The results of this study can be provided basic data for the preschoolers.

993

**THE TREND OF GROWTH AND SEVERITY OF DE-
VELOPMENTAL DELAY OVER DIFFERENT AGES
IN TERM AND PRE-TERM CHILDREN**

H.H. Cheng¹, W. Chou^{1,2}, J.C. Chow³, L.C. Tung¹

¹*Chi Mei Medical Center, Physical Medicine and Rehabilitation, Tainan, Taiwan,* ²*Chia-Nan University of Pharmacy, Recreation Management Department, Tainan, Taiwan,* ³*Chi Mei Medical Center, Pediatrics, Tainan, Taiwan*

Introduction/Background: Prematurity is a risk factor of developmental delay. The earlier the prematurity, the more frequently and more severe the neurodevelopmental delay. The birth weight of the premature baby, as expected, were lighter than the term baby, and thus growth retardation and developmental delay occurred more easily in this group. Our study intend to compare the trend of growth changes and developmental delayed severity over different ages in term and pre-term children. *Material and Methods:* 2,125 children were enrolled in our study from 2011 to 2013. 931 children were selected as others had data omissions or error. They were divided into 7 groups according to age. From the 0-year-old (2-month-old to 11-month-old) to the 6-year-old (72-month-old to 83-month-old). Prematurity, gender, congenital complications, birth weight, ages, current height, weight, and body mass index (BMI) were recorded. Developmental evaluation involving motor, language, cognition,

and social-emotions were also diagnosed and recorded as “normal”, “suspected delay” or “confirmed delay”. *Results:* In our study, birth weight of prematurity group ($n=135$, $2,163.14\pm 723.43$ g) was lighter than the term children group ($n=796$, $3,158.96\pm 1,973.28$ g) ($p<0.001$). However, there was no difference in current body weight ($p=0.073$) and BMI ($p=0.401$). The subgroup analysis revealed that the current weight of the prematurity group was lighter in the 0-year-old ($p=0.028$) and 3-year-old group ($p=0.048$). BMI of the prematurity group was also lighter in the 3-year-old group ($p=0.032$). Furthermore, there was no difference in severity of developmental delay between term and pre-term children. (all p value >0.05). *Conclusion:* Birth weight in the prematurity group was lighter than the term children group. However, there is no major difference in the later body weight, body mass index, and the severity of developmental delay. This indicate that the nutritional status of premature babies are usually well handled.

994

ATTITUDES OF CARE PROVIDERS AGAINST PERSONS WITH DISABILITIES

M. Fourtassi¹, R. Haimami¹, A. Hajjioui²

¹University Mohammed I- Faculty of Medicine and Pharmacy Oujda, Physical Medicine and Rehabilitation, Oujda, Morocco, ²Faculty of Medicine and Pharmacy- University Mohammed benabdelhal Fez, Physical Medicine and Rehabilitation, Fez, Morocco

Introduction/Background: The attitudes of healthcare professionals towards people with disabilities (PWDs) condition their health management. Thus, it seems important to characterize these attitudes among different categories of medical and paramedical staff. Our study aimed to measure the attitudes of health professionals towards PWDs encountered both during medical practice and in daily life, and to study the factors that would influence these attitudes. *Material and Methods:* The study was conducted in the major hospitals of the city of Oujda, Morocco and targeted physicians, interns and residents, nurses, rehabilitation therapists and auxiliaries. The evaluation of attitudes towards PWDs was performed using the score ATDP, translated and validated in the Moroccan population. *Results:* 340 health professionals were included in the study, 12.1% were physicians, 22.4% training physicians, 48.8% nurses, 10.6% therapists, and 6.2% auxiliaries. The average age of the participants was 29.86 ± 8.4 years. 54.1% were male. They had an average of 5.42 ± 8.24 years of experience. 58% had disabled people in their close environment. The average score was 64.96 ± 12.8 . This score was not the demographic parameters such as age, sex, family status or years of experience. Physicians had the highest ATDP score followed by therapists. The score was significantly higher among people with HSP in their own surroundings. *Conclusion:* The results observed in our study clearly highlight the need to develop awareness campaigns about the specific needs of PWDs, towards medical and paramedical staff.

995

DISABILITIES WITH A POSITIVE OUTCOME? LESSONS FROM ANCIENT WAYS

T.S. Ahmad¹, N. Hasnan¹, N.A. Razak¹, K.A. Shazura¹

¹National Orthopaedic Centre of Excellence in Research and Learning, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia

Introduction: The Lenggong Valley, in the state of Perak contains the remains of an extraordinary man. Named the Perak Man, he lived in the Paleolithic period and was a member of the Austramelenoid family found in Australia, Indonesia, Papua New Guinea and Malaysia. His eleven thousand year old skeleton, the oldest complete to be found in South East Asia tells an interesting story.

Materials and Methods: Archaeological excavations conducted by Centre of Archaeological Research Malaysia followed by multi-

disciplinary and scientific study of the skeletal remains. *Results:* He was buried in a foetal position. His estimated height was approximately 154 cm and he had several abnormalities. He had a skeletal deformity of the upper limb, which was markedly shorter than the other side. His elbow was held flexed and wrist extended. He was found to have an abnormal left middle finger with a brachymesophalangia type 2A. He also had a scoliosis and a shorter left lower limb. It is highly probable that he walked with a limp. However he is estimated to have died at the age of 40 to 45 years, which is twice the life expectancy of his time. He was also buried in a way that indicated that he was an important person in the tribe, possibly a Shaman. With his multiple abnormalities, he was probably unable to hunt effectively, yet he was obviously given a better role to play and able to lead a long life of a respected person, being buried with full honours of his time. *Conclusion:* The Perak Man is an example of how an ancient civilization was able to adapt roles so that a disabled person could use qualities available to contribute to society and lead a respected life. Something present society with all its sophistication could think about and learn from.

996

AN INVESTIGATION OF HEARING LOSS AMONG CHILDREN ATTENDING INTENSIVE REHABILITATION IN MALAYSIA

S.J. Mohd Noor¹, M.A. Aziz¹, P.M. Chern¹

¹Cheras Rehabilitation Hospital, Rehabilitation Medicine, Kuala Lumpur, Malaysia

Introduction/Background: Hearing impairment is a common problem in children with developmental disabilities or who have multiple complex medical issues or disabilities. In many cases, however, hearing loss is overlooked because of the difficulty of assessing children who cannot speak, move, follow directions, or maintain concentration throughout a hearing test. This study investigated hearing loss among children attending intensive rehabilitation at Cheras Rehabilitation Hospital (CRH). *Material and Methods:* Data was collected retrospectively from Jan 2015 to Dec 2015 on all cases referred to Audiology Unit, CRH. All patients were referred by paediatric rehabilitation specialist from Paediatric Rehabilitation Clinic. Series of hearing test were conducted to determine hearing loss: 1) Otoscopic Examination; 2) Tympanometry; 3) Behavioral Assessment such as Pure Tone Audiometry and Visual Reinforcement Audiometry and Play Audiometry. If the patient was unable to comply with behavioural assessment, Otoacoustic Emission, Auditory Brainstem Response or Auditory Steady State Response test was conducted. *Results:* 116 cases were selected. 34% of the patients were males and 66% were females. 66% of them were Malay, Chinese (22%), Indian (10%) and others (2%). Of these, 27% were from 4–6 years old aged group, followed by 0–3 years old (23%), 13–18 years old (22%), 10–12 years old (16%) and 7–9 years old (12%). 80% of the cases were patients with neurological disorders, 8% were congenital disorders and 12% were other conditions. After the hearing assessment was done on these patients, we identified 20% of them had hearing loss. Amplification was suggested to these children in improving their hearing abilities. *Conclusion:* Children with complex disabilities should be screened for hearing loss at all age before they start the intensive rehabilitation for optimum result. This data supports the fact that children with certain congenital or genetic disorders, as well as children with a history of birth complications, are especially prone to hearing loss.

997

DISABILITY PREVALENCE IN MALAYSIA

M.Y. Yusniza¹, A. Noor Ani², M.K. Noraida³, O. Salimah⁴

¹Cheras Rehabilitation Hospital, Rehabilitation Medicine Department, Kuala Lumpur, Malaysia, ²Institute for Public Health, Centre for Family Health Research, Kuala Lumpur, Malaysia, ³Institute for Public Health, Centre for Family Health Research, Kuala Lum-

pur, Malaysia, ⁴Department of Public Health- Ministry of Health- Malaysia, Family Health Development Division, Putrajaya, Malaysia

Introduction/Background: Internationally comparable data on disability in a country is recommended by United Nation. This population-based study provides the first national prevalence on disability and population at risk. **Material and Methods:** Data from disability module in National Health and Morbidity Survey (NHMS) 2015 was analysed. NHMS was done as a population-base survey using multi-stage random sampling design to ensure representativeness of the population in Malaysia. A total of 19,931 adults aged 18 years and above were interviewed by trained enumerators using locally validated Washington Group Questionnaire (short version). Data was analysed using SPSS version 21. **Results:** Based on criteria of 'at least one of the six domains is scored 'severe (lots of difficulty)' or 'complete (unable to do it at all)', the prevalence of disability in this survey was 3.3% (95% CI: 3.0–3.7) with an estimated 672,529 population affected. This prevalence was significantly higher in rural compared to urban areas. Overall, the prevalence of severe difficulty in seeing, hearing, walking, remembering, self-care and communicating were 1.06%, 0.43%, 1.13%, 0.52%, 0.3% and 0.4%, respectively. By locality, there was significantly higher prevalence of severe difficulty in hearing, walking and remembering in rural as compared to urban areas. By complete difficulty, the overall prevalence in seeing, hearing, walking, remembering, self-care and communicating were 0.2%, 0.17%, 0.64%, 0.27%, 0.4% and 0.3%, respectively. There was significantly higher prevalence of complete difficulty in walking in rural as compared to urban areas. In all domains, the prevalence was noted to be increased with age but there was no difference by sex. **Conclusion:** Prevalence of disability was noted as significantly higher in rural areas. Findings of this survey can be used for service planning and resource allocation in Malaysia.

998

CHILDREN FLAT FOOT AND LOWER LIMB ROTATIONAL PROFILE: A CROSS-SECTIONAL DESCRIPTIVE STUDY

A. Nouria¹, S. Jemni², N. Abdelkafi¹, E. Toulgui², R. Moncer², F. Khachnaoui²

¹Fattouma Bourguiba Hospital, Rehabilitation, Monastir, Tunisia,

²Sahloul Hospital, Rehabilitation, Sousse, Tunisia

Introduction/Background: Flat foot in children is a common deformation, which appears during the first years of life. It requires a rigorous evaluation to rule out congenital or neurological abnormality. It is characterized by a decrease of the plantar concavity indeed collapse of the foot, often associated with other morphostatic deformations. The aim of this study is to find a correlation between the essential flat foot in children and lower limb disorders torsional. **Material and Methods:** It is a cross-sectional descriptive study, recruiting 110 children aged between 3 and 6 years old. Each child was given an assessment of the morphology of the foot (Contact Index II...) and lower limb rotational profile (intoeing and femoral antetorsion and tibial torsion). **Results:** Among 110 children, 21 have bilateral flat feet and 7 have unilateral flat feet, associated with an average value of Contact Index II equal to 0.921; the minimum value is 0.880 and the maximum value is 1.17. All children with flat feet have excessive femoral antetorsion; 45 (92%) are associated with a hip intoeing and 38 (80%) present an insufficient external tibial torsion. The analysis of multiple regression shows a significantly elevated correlation among the flat foot and excessive internal rotation of the hip ($F=70.36$, $r=0.77$, $p<0.001$), excessive femoral antetorsion ($F=54.78$, $r=0.73$, $p<0.001$) and insufficient external tibial torsion ($F=7.79$, $r=0.37$, $p<0.001$). **Conclusion:** The hypothesis of a possible association between the essential flat foot and torsional disorders of lower limbs is a subject evoked by several authors. In our study, we found a positive correlation between the exaggerated femoral antetorsion and flat foot; and a positive correlation between

the high hip intoeing and the flat foot. However, we found a negative correlation between insufficient external tibial torsion and flat foot.

999

PROFESSIONAL QUALITY OF LIFE AMONG HEALTH CARE WORKERS IN A REHABILITATION CENTER IN GREECE

S. Papakosta¹, G. Lialios², D. Galliopoulos³, C. Liaskos¹, G. Koukoulis¹, P. Kotoula¹, X. Vagenal¹, T. Petsepel¹, G. Skoufi¹
¹Arogi Rehabilitation Center, Rehabilitation, Larissa, Greece, ²University Hospital of Larissa, Obstetrics, Larissa, Greece, ³Arogi Rehabilitation Center, Urology, Larissa, Greece

Introduction/Background: Although health care workers (HCW) often gain satisfaction from assisting patients who experience stressful events, they are also at risk of secondary traumatic stress and compassion fatigue. The balance between satisfaction and fatigue is considered professional quality of life (QoL). The aim was to investigate the professional QoL among HCW in a Rehabilitation Center and its relationship with demographic data. **Material and Methods:** The sample consisted of 89 HCW (19 male, 70 female, age 33.2±6.7 years). All participants were surveyed by using the Professional Quality of Life Scale version IV: Compassion Satisfaction (CSS), Burnout (BS) and Secondary Trauma (STSS) Scales, and a questionnaire on demographic, personal and occupational characteristics. Assurances were given to workers concerning confidentiality and anonymity. **Results:** The majority of workers had low score for STSS (low 78.7%, moderate 21.3%, high 0%, mean 19.7±5.3), low to moderate BS (low 47.2%, moderate 52.8%, high 0%, mean 22.3±5.6) and moderate to high score for CSS (low 3.4%, moderate 56.2%, high 40.4%, mean 38.9±5.7). STSS score was statistically associated with lower education status ($p=0.027$), while higher CSS score had a female predominance ($p=0.003$). A statistically significant bivariate correlation were found between CSS and BS score ($r=0.535$, $p<0.005$) and between BS and STSS score ($r=0.434$, $p=0.001$). **Conclusion:** Workers in rehabilitation center has low stress and high compassion scores, which were also influenced by factors such as educational level. Awareness of these factors may help nurses to prevent or offset the development of this condition.

HUMAN FUNCTIONING SCIENCES: FUNCTIONING IMPACT ASSESSMENT (E.G. PREDICTION OF THE IMPLICATIONS OF POLICY AND LEGISLATION ON FUNCTIONING)

1000

NONINVASIVE POSITIVE PRESSURE VENTILATION IMPROVES THE EFFECTS OF AEROBIC TRAINING ON CARDIOPULMONARY FUNCTION

T. Nakamura¹, T. Moriki¹, Y.I. Kamijo¹, T. Kinoshita¹, F. Tajima¹

¹Wakayama Medical University, Rehabilitation Medicine, Wakayama, Japan

Introduction/Background: The purpose of this study was to determine the effect of aerobic training under noninvasive positive pressure ventilation (NPPV) on maximal oxygen uptake (VO_{2max}). **Material and Methods:** Ten healthy young male volunteers participated in the study. Before the training, stroke volume (SV) and cardiac output (CO) were measured in all subjects under 0, 4, 8, 12 cm H₂O NPPV at rest. Then, the subjects exercised on a cycle ergometer at 60% of pre-training VO_{2max} for 30 min daily for 5 consecutive days with/without NPPV. The 5-day exercise protocol was repeated after a three-week washout period without/with NPPV. VO_{2max} , maximum heart rate (HR_{max}), maximum respiratory rate (RR_{max}) and maximum expiratory minute volume (VE_{max}) were measured at pre- and

post-training. The percent changes in plasma volume (PV) during training were measured. NPPV at 12 cm H₂O significantly reduced SV and CO at rest. **Results:** VO_{2max} significantly increased after 5 days training with and without NPPV, but the magnitude of increase in VO_{2max} after training under 12 cm H₂O NPPV was significantly higher than after training without NPPV. VEmax significantly increased after training under NPPV, but not after training without NPPV. HR_{max} and RRmax did not change during training irrespective of NPPV. The percent change in PV was similar between training with and without NPPV. **Conclusion:** The 5-day training program with NPPV resulted in greater improvement in VO_{2max} than without NPPV. We concluded that aerobic training under NPPV is potentially efficient training method for health benefits.

1001

INITIAL VALIDATION OF THE JAPANESE VERSION OF THE QOLIBRI (QUALITY OF LIFE AFTER BRAIN INJURY)

M. Suzuki¹, M. Naito², K. Ota³, I. Kondo⁴

¹Fujita Health University, Department of Health Sciences, Toyoake, Japan, ²Nagoya University, Department of Preventive Medicine, Nagoya, Japan, ³International University of Health and Welfare, Department of Rehabilitation, Nasushiobara, Japan, ⁴National Center for Geriatrics and Gerontology NCGG, Center of Assistive Robotics and Rehabilitation for Longevity and Good Health CARRL, Obu, Japan

Introduction/Background: Although various TBI-specific measures are used in Japan to assess the effects of traumatic brain injury (TBI), a self-reported health-related quality of life (HRQoL) measure has not been introduced. The Quality of Life after Brain Injury (QoLIBRI) is a cross-culturally developed instrument to assess HRQoL of individuals after TBI. It contains 37 items on 4 Satisfaction scales "Cognition", "Self", "Daily Life and Autonomy", "Relationships", and 2 Bothered scales "Emotions" and "Physical Problems." This study aims to investigate concurrent validity of the Japanese version of QoLIBRI comparing with other instruments. **Material and Methods:** 72 Japanese with TBI completed the QoLIBRI, the Short Form (SF-36) version 2 and the Hospital Anxiety and Depression Scale (HADS). The Glasgow Outcome Scale-Extended (GOS-E) assessed recovery from disability of the patients. SF-36 provides the physical and mental component summaries (PCS and MCS). We investigated how the QoLIBRI total and sub-scores were related to results of other instruments, and examined how the subjects tended to score on QoLIBRI. **Results:** 17% of the subjects were classified by GOS-E as good recovery, with 43% and 39% classified as moderate and severe disability, respectively. Mean scores of the Japanese QoLIBRI (42.4%) were lower than those reported in Australia. Total QoLIBRI scores positively correlated with PCS and MCS ($r=0.47$ and $r=0.43$, respectively; $p<0.01$), while two items in the sub-scales, "Emotions" "Daily life and autonomy," did not correlate with them. Total and sub-scores of QoLIBRI negatively correlated with HADS (anxiety; $r=-0.57$, depression; $r=-0.70$, respectively; $p<0.01$). **Conclusion:** Although QoLIBRI and SF-36 differ in approach, their results were comparable as reported previously. QoLIBRI scores negatively correlated with HADS, suggesting that higher HRQoL scores leads to less anxiety and depression. The classification of the Japanese subjects by GOS-E showed different proportions from previous studies, which might lead to their lower QoLIBRI scores. Further investigation is necessary.

HUMAN FUNCTIONING SCIENCES: MISCELLANEOUS

1002

THE INFLUENCE OF THE EHLERS DANLOS SYNDROME ON MOTHERHOOD: A PHENOMENOLOGICAL, HERMENEUTICAL STUDY

S. De Baets¹, M. Vanhalst¹, M. Coussens¹, L. Rombaut², F. Malfait³, G. Vanhove⁴, P. Calders², G. Vanderstraeten⁵, D. Van de Velde¹

¹Ghent University, Faculty of Medicine and Health Care Sciences - Department of Rehabilitation Sciences and Physiotherapy - Occupational Therapy Program, Ghent, Belgium, ²Ghent University, Faculty of Medicine and Health Care Sciences - Department of Rehabilitation Sciences and Physiotherapy, Ghent, Belgium, ³Ghent University Hospital, Centre for Medical Genetics, Ghent, Belgium, ⁴Ghent University, Faculty of Psychology and Educational Sciences, Ghent, Belgium, ⁵Ghent University, Faculty of Medicine and Health Care Sciences, Ghent, Belgium

Introduction/Background: The consequences of the Ehlers-Danlos Syndrome affect many aspect of daily life. "Living with limitations" is a central theme in their life. The aim of present study was to explore the experiences of women in becoming a mother. **Material and Methods:** A phenomenological-hermeneutical study, using in-depth interviews. Cases were selected by a purposive sampling strategy. **Results:** This study showed that the EDS-HT syndrome affects daily life. The data analysis resulted in six themes. (1) The impact of the diagnosis is perceived as relieving in becoming and in being a mother; (2) EDS-HT influences emotions, causes a physical burden and has a major impact on social behavior; (3) Restructuring activities in daily life; (4) Children's and mothers' expectations do not correspond; (5) Support of the environment is of major importance; (6) The strength of the child reduces the feeling of illness. **Conclusion:** The diagnosis of EDS-HT is a catalysing factor in the choice of whether to become a mother. EDS-HT has a huge impact, which on his turn influences activities. Health care professionals can be of great importance to help patients in organizing their lives according to the available energy, in supporting their choices. The role of a 'coach' gains importance.

1003

RESEARCH ON CHARACTERISTICS OF CONVERSATIONAL UNDERSTANDING -AUDITORY MEMORY AND THEIR RELATIONSHIP FOR HEARING IMPAIRMENTS AGED 4-6

L. Fannie¹

¹Suzhou Hemin Medical Center, R&D Center, Suzhou, China

Introduction/Background: The most important function of language is communication, while understanding the language is the premise of communication. Conversational understanding is the most common and the most commonly used to get information in the daily life. The most important is the language rehabilitation system hasn't the conversational understanding test. So exploring the characteristics and influencing factors about conversational understanding on hearing impaired children has important implication. **Material and Methods:** This study explores the preparing of conversational understanding testing material from the perspective of language cognition and we form the material for 4~6 year old children. Concluding and adding the auditory memory test, we sum up the characteristics of hearing impaired children's auditory memory. On the study of relationship between the auditory memory and conversational understanding, we focus on which auditory memory test form is most relative to the ability of conversational understanding on hearing impaired children. **Results:** The research shows: (1) there is significant difference between hearing impaired children and age-matched normal children in conversational understanding ($p=0.014$), task levels has significant difference on conversational understanding result ($p=0.000$). (2) in auditory memory test, there is no difference between hearing impaired children and age-matched normal children in hearing working memory and auditory short memory, while the recall sentence is not ($p=0.02$). (3) the conversational understanding is associated with auditory memory, while the recall sentences is the most relevant; presumably, the recall sentences is one of the most important factors that affects conversational understanding result of

hearing impaired children. *Conclusion:* The meaning of this study were explored and forming the conversational understanding testing material for 4–6 years old children; summarized the test of auditory memory; increased the the recall sentences test; provided reference for clinical practice.

1004

OUTCOME OF A MULTIDISCIPLINARY REHABILITATION IN THE MANAGEMENT OF A WOMAN WITH KNEE OSTEOARTHRITIS IN INDIA USING THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH

S. Ganesh¹, R. Patel¹, R. Pandey², A. Satapathy¹, P. Mohanty¹, S. Das³, C. Mishra¹

¹Swami Vivekanand National Institute of Rehabilitation Training and Research, Physiotherapy, Cuttack, India, ²Swami Vivekanand National Institute of Rehabilitation Training and Research, Occupational Therapy, Cuttack, India, ³Swami Vivekanand National Institute of Rehabilitation Training and Research, Physical Medicine and Rehabilitation, Cuttack, India

Introduction/Background: The International Classification of Functioning, Disability and Health [ICF] is widely accepted as the framework for disability and rehabilitation. As disability is relative to a person's physical, social, and cultural environment, it may be argued that the manifestation of disability is dependent upon the demands and lack of support in the environments of the people affected. It becomes difficult to make a distinction between the biological and social component of a disability. The social part of the biopsychosocial model investigates how different social factors can influence health. The purpose of this study was to identify the role of environmental, cultural and accessibility factors in community reintegration and evaluate if a healthcare team can provide complete rehabilitation to a patient with knee osteoarthritis (OA). *Material and Methods:* The patient was a 57-year-old woman with bilateral knee OA. The patient was assessed using the ICF core set for OA. The components identified were linked to ICF categorical profile and assessment sheet. ICF allowed the team to identify the global, service program and cycle goals. The patient's clinical status was followed over a 4 month period. *Results:* At 16 weeks, patient was able to walk faster and reported an increased ability to sit continuously, climb stairs and undergo her routine activities for a full day without increase in pain. Though the patient is satisfied with the outcome of the treatment, her interaction with public sphere continue to pose problem in her attempts to reintegrate in to community. She is also concerned that her pace of doing activities has decreased within the household and outside world. *Conclusion:* The social construct of disability needs to be emphasized more seriously for the complete rehabilitation of patients, failing which the efforts of rehabilitation may not bear any success at the level of functioning.

1005

THE IMPORTANCE OF "THE MEAL" IN THE REHABILITATION

Y. Goto¹, M. Nakamura¹

¹Sapporo Medical University, School of Health Science, Sapporo, Japan

Introduction/Background: "The meal" is indispensable for us and cooking is the one of IADL (Instrumental Activities of daily Living). It is one of the special skills for the occupational therapist to support disabled persons or elderly persons by instructing their daily activities including cooking. Therefore, occupational therapists are demanded some techniques about cooking, the knowledge of health and nourishments, and the interests in "meals". In this

study, I surveyed the questionnaire about "cooking" and "meals" to the students of the occupational therapist training course. We asked them "How much are you interested in the items instead below?" *Material and Methods:* We asked fifty-eight occupational therapy subject students (37 female, 21 male). The questionnaire consisted of ten items (cooking by yourself", "cooking programs and magazines", "nourishment balance", "eating", "going to buy ingredients and foods", "cooking utensils", "your health", "confidence to your current eating habits", "anxiety to your current eating habits", and "confidence to your current health condition"). The results showed by Visual Analogue Scale (0%–100%). In addition, I asked the following questionnaires: "How many days a week do you cook?" and "Do you like cooking?". *Results:* As a result, the interest in "eating" degree was the highest score with an average of 80%, and other items remained 40–60% level, and the lowest score item was "the confidence to the current eating habits". Though more than 60% students liked cooking, there was little experience of cooking, and approximately 30% of the student did not have an opportunity to cook at all in a week. There was no difference in all items regardless of sex. *Conclusion:* Occupational therapists were demanded the knowledge about cooking, health and the nourishment. We must introduce the education about the meal to the students of the occupational therapist training course.

1006

QUALITY OF LIFE (QOL) AMONGST PATIENTS WITH DIABETIC FOOT PROBLEMS TREATED AT TERTIARY HOSPITAL, MALAYSIA

O. Htwe¹, D.A. Disimond², M.A. Baharum³, O.S. Jie³, M.M. Charep⁴, A.S. Naicker⁵

¹Kuala Lumpur, Malaysia, ²Hospital Queen Elizabeth, Rehabilitation Unit, Kota Kinabalu, Malaysia, ³Sarawak General Hospital, Rehabilitation, Sarawak, Malaysia, ⁴General Hospital, Rehabilitation, Kuala Lumpur, Malaysia, ⁵University Kebangsaan Malaysia, Department of Orthopaedics and Traumatology, Kuala Lumpur, Malaysia

Introduction/Background: Diabetic foot problems (DFP) is common among diabetic patients and often end up with amputation which leads to poor QoL. The objective of this study was to evaluate the QoL of patients with diabetic foot problems and its correlation with epidemiological factors. *Material and Methods:* This was a cross-sectional study, conducted at the tertiary hospital, Malaysia from Dec 2011 until May 2012. Pro forma and 36-item Health Survey form (SF-36) were used to collect the data from 85 patients with DFP who met the inclusion criteria. Data analysis was done by using SPSS version 19 and Quality Metric Health Outcome Scoring Software 4.5. Mann-Whitney *U* test, Kruskal Wallis test and Spearman correlation were used to analyze the variables. *Results:* The mean age of the respondents was 61.10±10.34 years. Females constituted 52.9% and the rest were male. It was observed that presence of peripheral vascular disease ($p=0.018$), presence of history of cerebrovascular accident ($p=0.012$), painful Ulcer ($p=0.012$), higher Diabetic Neuropathy Symptom Score ($p=0.006$), higher Diabetic Neuropathy Disability score ($p=0.05$) had a significantly lower physical component score (PCS) of SF-36 while the mental component score (MCS) had no significant changes. Statistically significant association was noted between marital status and MCS ($p=0.049$). However, no statistically significant association was noted between age, gender, employment status and MCS as well as PCS ($p<0.05$). *Conclusion:* Presence of comorbidities played a role in determining the QoL of patients with diabetic foot problems in terms of the physical functioning. Physicians must thus encourage all patients with diabetic foot problems to undergo a regular medical follow up and well-structured rehabilitation program to improve diabetic foot care knowledge and practice so as to improve physical functioning and QoL.

1007

WORK OF BREATHING DURING ARM BRACING IN NORMAL SUBJECTS**T. Ogino^{1,2}, K. Mase³, S. Murakami², K. Yamamoto⁴, K. Kihara⁵, T. Wada², Y. Uchiyama⁶, K. Domen⁷**

¹Hyogo College of Medicine- Graduate School of Medicine, Rehabilitation, Nishinomiya, Japan, ²Hyogo College of Medicine Sasayama Medical Center, Rehabilitation, Sasayama, Japan, ³Konan Women's University, Physical Therapy- Faculty of Nursing and Rehabilitation, Kobe, Japan, ⁴Konan Hospital, Rehabilitation, Kobe, Japan, ⁵Konan Women's University, Visiting Researcher, Kobe, Japan, ⁶Hyogo College of Medicine, General Medicine and Community Health Science, Sasayama, Japan, ⁷Hyogo College of Medicine, Rehabilitation Medicine, Nishinomiya, Japan

Introduction/Background: Although chronic obstructive pulmonary disease (COPD) patients get relief from their dyspnea by bracing their arms, one of the mechanics of this effect is thought the decrease of work of breathing (WOB). However, no study has investigated the WOB in the arm bracing position. The purpose of the present study was to investigate the WOB during arm bracing in normal subjects. **Material and Methods:** Six normal male subjects (age 34.5±6.7 years, height 176.0±8.0 cm, weight 67.0±4.6 kg) with normal pulmonary function were studied. All the subjects were studied in two standing postures: erect and with arm bracing. For the arm braced position, the subjects leaned forward with their arms stretched and rested their hands on a platform whose height was set so that the subjects could assume a trunk inclination that felt most comfortable. Respiratory rate was set at 20 tidal breaths/min with the use of a metronome, and tidal volume was set at 1L. All the subjects randomly adopted the two postures, and a preset respiratory pattern was measured for 30 seconds in each posture. Lung volume and flow rate were measured by a hot-wire flowmeter connected to a mouthpiece. Esophageal pressure was measured with a 12 cm long balloon catheter. The WOB was estimated using modified Campbell diagrams. **Results:** Lung volume increased and inspiratory resistive WOB decreased, while inspiratory elastic WOB increased significantly with arm bracing compared to the erect posture ($p<0.05$). As a result, total inspiratory WOB was significantly higher in the arm bracing than in the erect position ($p<0.05$). **Conclusion:** Arm bracing posture may decrease WOB for a high disorder of airway resistance such as COPD.

1008

IMPORTANCE OF TYING THE SCIATIC NERVE IN ABOVE KNEE AMPUTATION TO PREVENT NEUROMA FORMATION**A. Saraf¹**¹Ludhiana, India

Introduction/Background: Sciatic nerve is the thickest nerve in human body. Neural sheath of sciatic nerve is rich in microvascula-

ture. In this study we compared neuroma formation after tying the sciatic nerve to leaving its cut end open in patients who undergo above knee amputation. **Material and Methods:** In this study we followed a total of 90 patients who underwent above knee amputation. In half of these patients, cut end of sciatic nerve was left open and in other half, the nerve was tied. Patients in both the groups were age, sex and BMI matched. Neuroma formation in the stump was assessed one year after surgery. This assessment was done by measuring the diameter of sciatic nerve ending using sonogram. Sciatic nerve diameter was measured bilaterally at the same level, and the value of the normal limb was taken as control. **Results:** Out of 45 patients who underwent tying of sciatic nerve, only 10 patients developed thickening of the cut end of sciatic nerve in comparison to opposite limb. On the other hand, 45 patients in whom the cut end was left open, 35 patients developed neuroma formation. This result was statistically significant. **Conclusion:** Rich microvasculature of sciatic nerve results in the formation of haematoma beneath the cut end, if it is left open. This haematoma eventually results in growth of neural fibres. As a result of this, neuroma formation occurs at cut end of sciatic nerve in above knee amputation. We thus conclude, it is always wise to tie the cut end of sciatic nerve in above knee amputation to prevent neuroma formation.

1009

EFFECTIVENESS OF ENFORCED MOUTH OPENING EXERCISE IN PATIENTS WITH CONTRACTION OF THE MASSETER MUSCLE**S. Yura¹**¹Tonami General Hospital, Oral and Maxillofacial Surgery, Tonami, Japan

Introduction/Background: In patients with contracture of the masseter muscle, the masseter resection is often applied. The successful physiotherapy using a mouth opening exerciser contributes to evade the surgery. We devised a new exercise which controls pain and gives a clear idea of interincisal mouth opening distances during active exercise. **Material and Methods:** We introduced a mouth-opening exerciser (HU-OSII) for mouth opening exercises in patients with contracture of the masseter muscle. It is made of a 5-mm thick acrylic resin plate and is wedge-shaped with a cut tip. The exerciser has 3-mm long stairs so that patients can notice improvement in mouth opening during exercise. Every stair has an extremely gentle slope so that it permits gradual mouth opening without severe pain. The patients underwent 100 times of enforced opening using the exerciser without help, with one opening per second, 100 seconds total. This exercise was done twice a day, once in the morning and once at night. **Results:** The patient started physiotherapy with a mouth-opening exerciser (HU-OSI). The initial maximum mouth opening was 20 mm. Three months after physiotherapy, the maximum mouth opening had increased to 33 mm, and at the 12-month follow-up, it had stabilized at 37 mm. **Conclusion:** In patients with contracture of the masseter muscle, HU-OSII was easy, very effective for mouth opening exercises.

Author Index**A**

- Abdeen, Z. 280
 Abdelhamid, M. 275
 Abdelkafi, N. 87, 95, 101, 155, 163, 171, 292
 Abd Elrahman, S.M. 64
 Abd Manan, H. 174
 Abd Rahman, Z. 143
 Abd Rhani, S. 152
 Abdul Aziz, N. 227
 Abdulgafoor, S.H. 166
 Abdul, H. 109
 Abdul Halim, N.H.A. 100
 Abdul Latiff, L. 179
 Abdul Latif, L. 35, 182, 183, 208, 220, 226, 236, 255
 Abdul Majid, S.N. 79
 Abdul Rahman, N. 236
 Abdul Rahman, R.A. 250
 Abe, H. 214, 232
 Abe, M. 246
 Abiko, K. 12
 Abildsnes, E. 61
 Abo, M. 29, 48, 125, 288
 Abong, M.P. 118
 Abramoff, B. 282
 Abu Bakar, A. 58, 244
 Abut, M.F. 70
 Adeniyi, A. 88
 Adham, H. 18
 Adigüzel, E. 64, 92, 105, 116, 121, 147, 148, 164, 165, 172, 173, 197
 Adigüzel, E. 103
 Adorable, L. 15, 24, 30, 46, 60, 106, 118
 Adsuar, J.C. 64
 Agar, A. 52
 Agujaro, R. 41
 Agirbasli, M. 179
 Ahmad Fauzi, A. 208, 230, 236
 Ahmad Kasah, N.B. 236
 Ahmad, M.I. 124, 183
 Ahmad Roslan, N.F. 179
 Ahmad, T.S. 291
 Ahmad, Z. 264
 Ahmed, B. 31
 Ahmedy, F. 210, 227
 Ahn, J. 72
 Ahn, S.C. 249
 Ahn, S.Y. 251
 Aich, F. 10
 Aihara, K. 46, 159, 259
 Akahane, S. 209, 240
 Akahori, R. 159
 Akai, M. 48
 Akaltun, M.S. 121
 Akamatsu, D. 180
 Akan, Ö. 99
 Akarsu, D. 67
 Akarsu, S. 66, 67, 73, 79, 83, 92, 105, 113, 117, 149
 Akisue, T. 192
 Akizuki, M. 180
 Akl, H. 275
 Aksoy, C. 84
 Alaca, R. 121
 Alagöz, E. 73
 Alamino Felix de Moraes, S. 5
 Alam, M.S. 31
 Albanese, G. 33
 Alcayaga, J. 32
 Al-Chalabi, K. 285
 Alcobendas Maestro, M. 148, 149
 Alexandra, M. 124
 Alexandru, C. 139
 Alfante, E.J. 24
 Alfaro, A. 43
 Alfieri, F.M. 5
 Ali, A. 9
 Alibazi, R. J. 98
 Ali, E. 286
 Alit Pawana, I.P. 234
 Aliverti, A. 30
 Al Kandari, S. 127
 Almajan-Guta, B. 184, 209
 Almajan-Guta, V. 184, 209
 Al-Moghazi Al-Morsy, M.S. 100
 Alrawaili, S. 6
 Al Rehaman, A. 238
 Aly, E. 70
 AlZahrani, E. 173
 Amano, J. 14, 114, 199
 Amatya, B. 10, 144, 277
 Ambrose, A.F. 122, 282
 Amer, M.A.F.A.A. 60
 Amin, R. 29
 Amorim, H. 168
 Amro, A. 280
 Anderlini, D. 122
 Ando, M. 232
 Ando, S. 46
 Andriana, M. 124, 244
 Andriati, A. 124, 246
 Angganawati, H. 87
 Angleitner, C. 214
 Angulo, A. 40
 Ankolekar, S. 221
 Anner, P. 195
 Antiga, S. 12, 44
 Antonini, G. 288, 289
 Antonya, C. 251
 Anwar, F. 12, 44
 Anzai, A. 248
 Aoki, Y. 248
 Ao, L. 170
 Aoyagi, Y. 46, 159, 229
 Aoyama, T. 261
 Apostol, C. 109
 Arai, N. 289
 Arai, Y. 252
 Aranez, R.S. 118
 Aras, B. 103, 105, 116, 121, 147, 164, 173
 Aras, M. 187
 Arfianti, L. 35
 Ariffin, M.H. 152
 Arifin, D.Z. 285
 Arifoglu, C. 98
 Arisanti, F. 28, 285
 Aristide, G. 47
 Ariyakul, C. 264
 Arkov, V. 111
 Arnoldi, M.T. 30
 Arslan, N. 73
 Asafu-adjaye, K. 221
 Asami, S. 46
 Asami, T. 136
 Asano, N. 136
 Asare, Christian 282
 Asato, Y. 179
 Ashraf, A. 97
 Asmaa, Y. 101
 Asraff, A.A. 66
 Ata, E. 66, 67, 68, 71, 73, 79, 80, 83, 92, 105, 107, 113, 114, 117, 149, 159, 165, 173, 187, 218, 225
 Atterbury, E. 161
 Attique, R. 101
 Awaad, Y. 7
 Ayas, S. 141
 Aycardo, S. 5
 Aycardo, S.M.O. 117
 Aydemir, K. 20, 65, 74, 84, 93, 96, 114, 118, 123, 124, 143, 144, 145, 151, 165, 166, 170, 173, 174, 177, 222, 223
 Aydin, T. 84
 Aydın, G. 35, 67
 Aydın, S. 35
 Ay, S. 107, 108
 Aytekin, A. 91
 Ayumi, T. 140
 Ayyoub, Z. 43
 Azadeh Ghahfarokhi, S.A. 75
 Azadvari, M. 105, 270
 Azimi, M. 165
 Aziz, M.A. A 284, 290, 291
- B**
- Babae, M. 236, 237
 Badtieva, V. 111
 Bae, H.S. 191
 Bae, J.H. 266, 267
 Baek, S. 106
 Bagheri, S. 48
 Bagherzadeh Cham, M. 31
 Baharam, N.S. 100
 Baharudin, A. 152
 Baharum, M.A. 294
 Bahar, Y. 109
 Bahrami, M.H. 94, 97, 236
 Bahramizadeh, M. 31
 Bahr, K. 277
 Bai, Y. 209, 245
 Bajić, Z. 93
 Bakar, B. 35
 balaban, B. 91
 Balaban, B. 102
 Balcı, N. 90
 Balcı, N.V. 91
 Bal, J. 15
 Ballert, C. 276
 Bandari, D. 44
 Bang, H. 106, 247, 251
 Bang, M.S. 14
 Banno, M. 153, 248, 250
 Banura, S. 25
 Bao, W.Q. 245
 Baquero Sastre, G.A. 149
 Baranello, G. 30
 Barazzuol, M. 47
 Barrett, A. 18
 Barrett, E. 5, 63
 Baskaya, M. 103, 109
 Basoglu, C. 231
 Bassi, B. 30
 Battistella, L. 5
 Bauer, P. 264
 Baumberger, M. 43
 Bavikatte, G. 44
 Bayat, M. 97
 Baylousis, L.M. 15
 Bayram, K.B. 99
 Bayram, P. 35
 Beatti, A. 173
 Be Kim, L. 150
 Bel Haj Youssef, I. 95, 150, 175, 185, 201
 Beltran Vives, A. 99, 100
 Benavente Valdepeñas, A. 148
 Ben Brahim, H. 160, 169, 200, 208
 Bendaya, S. 218
 Ben Hmida, B. 119
 Benitez, Q.J. 30
 Ben Salah Frih, Z. 122, 138, 160, 163, 169, 200, 202, 208
 Ben Salah, Z. 118, 119, 150, 175
 Bera, J. 93
 Beredo, E. 58
 Beretta, E. 267
 Bergmann, J. 264
 Berkiks, I. 262
 Bernardo, M.M. 5, 84, 117
 Bernhardt, G. 11, 37, 75, 83
 Bersch, I. 43
 Bersvendsen, T. 61
 Bertheas, B. 218
 Berven, S. 15
 Bethge, M. 40
 Betz, U. 42
 Bhargava, A. 119
 Bianty, J. 18
 Bigliarian, A. 20
 Bilgi, I. 84
 Billur, D. 35
 Binay Safer, V. 96, 103
 Bin, S. 26
 Bint Ali, A. 208
 Bin, Z. 275
 Bi, S. 122
 Bitenc, Č. 23, 61, 278
 Bochdansky, T. 250
 Boes, S. 273
 Bok, S. 251
 Bok, S.K. 254
 Bolsoni, B. 33
 Bong-ok, K. 251
 Boskovic, K. 90
 Boudokhane, S. 119, 122, 138, 163, 202
 Boudokhane, S. 118, 175
 Bower, K.J. 146
 Bragge, P. 32
 Bravo Corrales, J.D. 149
 Breyer, P. 250
 Brinkhof, M.W.G. 276
 Brondel, M. 3
 Bruera, E. 188
 Brzoska, P. 275
 Buckalew, N. 262
 Budimir, P. 205, 206
 Buenavente, M.L. 251
 Buhagiar, M. 37
 Bulckmans, N. 274
 Bunno, Y. 140
 Bunyan, R. 196

- Buranruk, O. 120
 Burch, S. 15
 Burger, E. 272
 Burkle Jr, F. 10
 Burkle Jr, F.M. 277
 Burrridge, J.H. 142
 Butnariu, S. 251
 Buyny, S. 25
- C**
- Caamano Ponte, J.L. 141
 Cakci, A. 74, 93, 118, 123, 143, 173, 177
 Calafiore, D. 38, 191
 Calders, P. 293
 Calvo, G. 202
 Cameron, I. 18, 34
 Canezo, K. 46
 Cao, P. 50, 259
 Cao, W. 269
 Caparino, C.A. 60
 Capodaglio, P. 16
 Cardells Beltran, B. 99, 100
 Carducci, A. 289
 Carli, A. 68
 Carli, A.B. 113, 218, 225
 Carli, A.B. 67
 Çarli, A.B. 66
 Carlsson, L. 24
 Casado López, R. 148
 Ceruelo Abajo, S. 149
 Chadchavalpanichaya, N. 117
 Chamlian, T.R. 221
 Chan, C. 28
 Chang, C. 180
 Chang, C.C. 185, 216
 Chang, J.H. 129
 Chang, K.H. 235
 Chang, K.L. 133
 Chang, M. 290
 Chang, M.Y. 217
 Chang, N.J. 109
 Chang, S.T. 269
 Chang, W.D. 214
 Chang, Y. 126
 Chang, Y.J. 123, 228
 Chan, K.F. 142
 Chan, K.M. 22
 Chan, L. 9, 62, 283
 Chan, R. 5, 117
 Chan, R.C. 27, 263
 Chan, S.Y. 21, 22
 Charep, M.M. 294
 Charles, D. 43
 Charng Jeng, T. 244
 Chau, W.W. 22
 Chein, Y.C. 216
 Chen, B. 234
 Chen, C.C. 60, 240, 254, 263
 Chen, C.H. 103, 242
 Chen, Chuang 127, 128
 Chen, C.M. 60
 Chen, C.Y. 289
 Chen, D.R. 9
 Cheng, B. 209
 Cheng, C. 180
 Cheng, C.S.K. 221
 Chengguo, Z. 273
 Cheng, H.H. 109, 291
 Cheng, Y.T.Y. 3, 59, 198
 Chen, H. 68
 Chen, H.C. 112
 Chen, H.Y. 216
 Chen, J. 99, 126
 Chen, Jianping 56
 Chen, K. 281
 Chen, K.L. 28, 47
 Chen, L. 233, 234
 Chen, M.M. 254
 Chen, P. 140, 283
 Chen, S. 214
 Chen, S.C. 26, 56
 Chen, S.H. 84
 Chen, S.T. 9
 Chen, T. 281
 Chen, T.N. 27
 Chen, T.W. 103
 Chen, W. 99, 164, 193
 Chen, W.H. 216
 Chen, X. 161, 207, 239
 Chen, Y. 55
 Chen, Y.F. 133
 Chen, Y.H. 216
 Chen, Y.J. 242
 Chen, Y.L. 123
 Chen, Y.W. 65, 67
 Cheon, Y.M. 228
 Chern, P.M. 42, 219, 284, 290, 291
 Chi-Che, H. 181, 205
 Chih-Chao, H. 132
 Chih-Wei, P. 132
 Chikuda, T. 252
 Ching, B.H. 204
 Choe, Y. 180
 Choe, Y.R. 210
 Choi, E.H. 83, 242
 Choi, H. 266, 267
 Choi, J.K. 228
 Choi, J.W. 131, 181
 Choi, J.Y. 202
 Choi, K.H. 91, 131
 Choi, S.J. 123
 Choi, W.A. 177
 Choi, Y.A. 240
 Cho, J. 106, 251, 253
 Cho, J.H. 247
 Cho, M. 106, 251, 253
 Cho, M.K. 258
 Chosa, E. 257
 Chou, C.L. 27, 249
 Chou, L.W. 84, 201
 Chou, W. 51, 109, 291
 Chowdhury, J. 278
 Chow, J.C. 51, 291
 Chow, M.H. 56
 Cho, Y. 202
 Chua, K. 265
 Chuanchuan, B. 26
 Chuang, L.L. 123, 228
 Chung, C.K. 14
 Chung-Han, H. 181, 205
 Chung, L.M.Y. 198
 Chung, P. 144
 Chung, R.C.K. 7
 Chung, S. 106
 Chung, S.G. 106, 247, 251, 253
 Chung, S.Y. 171
 Chung, T.Y. 58, 82, 221, 224, 225, 236
 Chung, W.K. 235
 Chun, M.H. 123, 176, 228
 Chun, S. 106, 247, 251
 Chun, S.M. 240
 Chun, S.W. 106
 Cicik, C. 184
 Cigdem Karacay, B. 69
 Cil, H. 15
 Cimbiz, A. 52
 Ciuca, I. 184
 Claes, S. 34
 Claes, T. 34
 Clark, R.A. 146
 Collado-Mateo, D. 64
 Colle, F. 3
 Collins, G. 283
 Comertoglu, I. 68
 Contreras, A.N. 259
 Coorevits, P. 43
 Corlatti, A. 30
 Cortese, A.M. 146
 Corum, M. 231
 Costa, M. 14, 100
 Coussens, M. 274, 293
 Creer, F.C. 15, 24, 30, 46, 60, 106, 118
 Crespo Lopez, C. 141
 Cua, R. 84
 Cudeiro Mazaira, F.J. 141
- D**
- Dacharux, W. 117
 Dahlan, M.S. 184
 Daisuke, N. 126
 Da, L. 128
 Daminov, V. 157
 Daniel, M. 288
 Darawil, K. 196
 Dashtebzorg, A. 81
 Dashtipour, K. 43
 Das, S. 294
 Datta, T. 271
 Davis, J. 178
 Dawad, S. 285
 Dawei, Z. 32
 Dayaghi, S. 97
 De Angelis, S. 110
 De Baets, S. 43, 274, 293
 de Burca, N. 63
 de Carvalho, M. 162
 Defi, I.R. 285
 De Groote, W. 279
 Dehghani, S. 194
 Dela Cruz, F. 251
 Del Felice, A. 47
 Delibas, O. 124, 174
 de los Reyes, F. 5, 117
 De Maeschalck, L. 34
 Demir-Deviren, S. 15
 Demir, S. 147, 172, 173
 Demir, Y. 20, 65, 74, 81, 84, 93, 96, 114, 116, 118, 121, 123, 124, 143, 144, 145, 151, 165, 166, 170, 173, 174, 177, 222, 223
 Deng, G. 257
 Deng, W. 25
 Deng, X.Q. 3
 Dernek, B. 84
 Deshmukh, V.A. 265
 de Sire, A. 19, 107, 212
 Desoete, A. 274
 Dhakal, R. 10, 279
 Dhillon, M.S. 172
 Dian, R. 124
 Dimmek, D. 25
 Dina, D.N.A. 4
 Ding, Li 127
 Diracoglu, D. 84
 Di Rocca, S. 68
 Disimond, D.A. 294
 Dizon, J.M. 58
 Dmitriev, A. 111
 Doblhammer, S. 195
 Doğanay Erdoğan, B. 108
 Doğan Duran, Ü. 116, 121
 Doğru, M. 193
 Doi, T. 48
 Do, K.H. 123, 228
 Domen, K. 89, 190, 191, 193, 212, 220, 257, 260, 262, 295
 Dominguez-Muñoz, F.J. 64
 Dongheon, K. 137
 Dong Hwan, K. 246
 Dong, J. 283
 Dong, X. 218
 Dong, Xiao-yang 147
 Doruk Analan, P. 49, 74, 97, 167, 185, 187, 188
 Dou, Z. 250
 Duan, Z. 92
 Ducharme, S. 31
 Du, L. 6
 Dulap, A. 46
 Dumagan, T. 24, 106
 Duport, S. 13
 Duruöz, M.T. 81, 179
 Duymus, T.M. 84
 Düzlü, Ü. 187
 Dwerryhouse, H. 155
 Dwidarti, S.J. 48
- E**
- Easaw, S.A. 124
 Ebata, H. 36
 Ebenbichler, G. 195, 217
 Eguchi, S. 85
 Eiichi, S. 154, 259
 Ejima, Y. 192
 Elayeb, M. 160, 169, 200, 208
 El Bachiri, S. 203
 El Fatimi, A. 65, 95
 Elhessni, A. 262
 Elmalik, A. 10
 Emad Abd-El-Fattah, M. 275
 Emad, M. 75
 Emami Razavi, S.Z. 105
 Emami Razavi, Z. 270
 Emelia, J. 223
 Eminovic, S. 37, 83
 Endo, A. 264
 Endo, N. 69, 179
 Endo, S. 178
 Engkasan, J.P. 230
 Engle, J. 18
 Ercalik, T. 109
 Ergin, E.S. 107, 108
 Ergin Solmaz, E. 193
 Ergül, S. 187
 Ernaftenti, S. 22, 23
 Ersoz, E. 159
 Ersöz, E. 79, 80, 92, 105, 107, 117
 Esclarín de Ruz, A. 148

- Esmailzadeh, S. 231
 Esquenazi, A. 43, 44
 Esther, S. 150
 Estrada, G. 124
 Estrela Rego, S. 14, 63, 100
 Eungpinithpong, W. 120
 Eun, S.D. 259
 Evcik, D. 107, 108
 Ewerth, U. 214
- F**
- Fadzil, F. 244
 Fairhall, N. 18
 Faisal, F. 37, 115
 Fang, Q. 234
 Fan, H. 125
 Fan, J. 50
 Fannie, L. 294
 Farahbakhsh, F. 8, 11
 Farhan, A. 11
 Farina, D. 41
 Farmer, S. 13
 Fatatis, I. 107
 Fatima, L. 65
 Fava, M. 288, 289
 Favazza, P. 210
 Feeko, K. 237
 Fei, J. 49
 Feliciano, D. 117
 Feliciano, D.D. 5, 166
 Feng, B. 287
 Feng, J. 6
 Feng, L. 125
 Feng, W. 258
 Feng, Zhen 147
 Ferrari, M. 218
 Ferraro, C. 47
 Ferretty, J. 33
 Filippovich, A.N. 108
 Fiorini, N. 33
 Fong, K.N.K. 59
 Fong, S.S.M. 3, 7, 59, 198
 Forogh, B. 165
 Foroughan, M. 20
 Fortunato, R. 37
 Fourtassi, M. 10, 27, 203, 291
 Francisco, G. 44
 Frioui, S. 87, 95, 118, 155, 185
 Frizziero, A. 102
 Froese, E. 277
 Frontera, W. 283
 Froui, S. 201
 Fuad Hadi, A. 168
 Fuentes, C.J. 30
 Fu, J. 18, 188
 Fujie, H. 263
 Fujimoto, M. 143
 Fujimoto, Y. 14
 Fujimura, K. 219
 Fujino, Y. 174, 195
 Fujioka, H. 89
 Fujita, H. 56
 Fujitani, J. 143
 Fujita, S. 114
 Fujiwara, H. 39
 Fujiwara, S. 6, 222, 252
 Fukagawa, M. 263
 Fukao, Y. 257
 Fukaya, T. 225
 Fukuhara, K. 39, 287
 Fuku, M. 23
- Fukutani, N. 261
 Furukawa, R. 98
 Furuno, K. 132
 Furusawa, K. 156
 Fuseya, H. 252
 Fushimi, K. 143
- G**
- Galea, M. 144
 Galea, M.P. 277
 Galinato, P. 137, 197
 Galliopoulos, D. 137, 215, 292
 Ganesh, S. 294
 Gao, G. 193
 Garavaglia, L. 30, 265, 267
 Garcia, J. 33
 Garcia, R. 15
 Gasparre, G. 102
 Gasperini, G. 30
 Geffen, S. 71
 Gemperli, A. 43
 Gerber, L. 9, 62
 Gesmundo, M.V. 251
 Gessal, J. 260
 Gheltofian, S. 184
 Ghio, K. 210
 Ghorbani, E. 89
 Ghosh, D. 271
 Giamattei, M.T. 38
 Gibraltar, A. 259
 Gil Agudo, A. 148, 149
 Gill, J.P. 33
 Gill, Z. 115
 Gimeno González, M. 182
 Gimigliano, F. 19, 38, 107, 212
 Gimigliano, R. 19, 212
 Giunta, L. 33
 Glehr, M. 11, 37, 75
 Glowacka, I. 231, 235
 Godlwana, L.L. 222
 Goebel, L.A. 7
 Goh, H.T. 220
 Gohy, B. 286
 Golli, M. 119
 Golmayer, P. 214
 Golubovic, S.M. 198
 Gomez Diaz, N. 141
 Gonzalez, D.O. 202
 Gonzalez-Suarez, C. 5, 58, 233
 Gorgon, E.J. 133
 Gorokhova, I. 157
 Gosney, J. 10
 Goto, H. 180
 Goto, N. 179
 Goto, Y. 294
 Gottschling-Lang, A. 40
 Gou, H. 54
 Gozukucuk, A. 67
 Graham, G.D. 43
 Green, J. 223
 Grimmer, K. 58
 Gruber, G. 11, 37, 75
 Guangxu, X. 29
 Guan, Y.H. 245
 Guan, Z. 233
 Guanziroli, E. 30
 Guler, E. 109
 Gunaleila, D.S. 87
 Gundogdu, I. 74, 81, 84, 93,
 118, 123, 124, 143, 144, 145,
 151, 173, 174, 177
- Gündüz, H. 81
 Gunduz, O. 103, 109
 Gunes, A. 81, 84
 Guo, H. 99
 Guo, T. 247
 Guo, X. 3, 7, 59
 Guo, Y. 18, 68
 Guo, Yuanyuan 56
 Gurbuz, N. 141
 Gurkina, M. 111
 Guseva, O. 125
 Gusi, N. 39, 64
 Gutenbrunner, C. 21, 25, 40, 54
 Güzelküçük, Ü. 20, 65, 73,
 121, 151, 223
 GyuLee, P. 267
- H**
- Habenicht, R. 217
 Habib, H. 188
 Habib, S.S. 196
 Hachisuka, A. 241
 Hachisuka, K. 241
 Hachulla, E. 160
 Hada, Y. 22, 52, 126, 152, 264,
 268
 Hadj Salah, A. 160, 169, 200,
 208
 Haga, N. 6, 222, 252
 Hagino, H. 88, 190
 Hagner Derengowska, M. 194,
 231, 235
 Hagner, W. 194, 231, 235
 Haibo, Y. 128
 Haider, J. 151
 Haig, A.J. 189, 271, 281, 282
 Haig, M. 189
 Haimami, R. 291
 Haji Awang Tengah, S.N. 174
 Hajjioui, A. 10, 27, 203, 291
 Haj Salah, A. 82, 89, 101, 104,
 111, 170
 Halat, B. 111, 201
 Hall, E. 272
 Hamada, H. 257
 Hamdan, I. 54
 Hamdan, P.N.F. 263
 Hamid, H. 119
 Hamzah, N. 144
 Hamzaid, N.A. 263
 Hamzat, T. 155
 Hanafi, M.H. 174
 Hanapiah, F.A. 157, 225, 250
 Hanayama, K. 156, 214, 232,
 289
 Han, D.S. 240
 Han, E.Y. 138
 Han, J.Y. 180, 181
 Hanna, F. 90
 Han, T.I. 208
 Han, X. 241
 Han, Z.A. 34, 226
 Ha, P. Eun 190
 Harada, R. 209, 240
 Harada, T. 262
 Hara, H. 125, 192
 Hara, K. 252
 Harashima, H. 115, 131
 Hara, T. 125
 Hara, Y. 252
 Harigai, T. 69
- Harimoto, M. 174
 Harris, D. 76
 Harris, I. 37
 Harris, K. 151
 Haryadi, R. 35
 Haryadi, R.D. 57, 186
 Ha, S.A. 134, 210
 Hasan, C.M.K. 22, 272
 Hasan, M. 130
 Haseen, F. 130
 Hasegawa, S. 190, 261
 Hasenhütl, S. 37
 Hashemi, M. 94
 Hashemi, S.H. 253
 Hashemi, Z. 237
 Hashimoto, M. 180, 190
 Hasnan, N. 58, 153, 154, 155,
 230, 263, 291
 Hassan, M. 100
 Hassan Mahmoud, M. 275
 Hassan, N.H. 203
 Hassan, S. 196
 Hatipoğlu, T. 148
 Hatomoto, R. 220
 Hautala, A. 17
 Hayamizu, S. 228
 Hayani Al-nisr, M. 100, 104
 Hayashi, T. 276
 He, C. 280
 Hee, C. Kang 249
 Hee-Sang, K. 246
 Heidari Almasi, M. 96
 Heidari, P. 8
 Heinemann, A. 283
 Heise, P. 214
 He, M. 68, 193
 Hendrarati, R. 246
 Hepnie, A.M.F. 281
 He, R. 50
 He, X. 54
 He, Zhijie 50, 127, 128
 Hidaka, M. 237
 Hideki, K. 126
 Hidetoshi, T. 126, 140
 Hill, K. 283
 Hines, E. 230
 Hirakawa, A. 216
 Hiramoto, M. 266
 Hirano, D. 284
 Hirano, S. 154, 219, 265
 Hirano, Y. 217, 276
 Hiraoka, T. 214, 232
 Hirata, H. 261
 Hirata, K. 287
 Hirayama, A. 17
 Hirayama, Y. 17
 Hirokawa, T. 135
 Hirose, S. 126
 Hiroshi, K. 126
 Hiroshi, M. 98
 Hiroyoshi, F. 98
 Hiruta, K. 126, 268
 Hisamatsu, T. 126, 268
 Hitoshi, K. 259
 Hlaing, T. 104
 Hla, K.M. 104, 192
 Hobson, M.E. 189
 Hojatti, F. 178
 Hojjati, F. 166
 Honda, Y. 89, 190, 248, 262
 Hong, B.K. 274

- Hongjun, Z. 32
 Hongwei, Z. 115, 172
 Hongyu, F. 273
 Höppner, K. 40
 Hoque, M. 285
 Horii, M. 252
 Ho, S.H. 274
 Hossain, S. 29
 Hotta, K. 225
 Houda, M. 150
 Høye, H. 277
 Hreha, K. 18
 Hsiao, P.C. 109
 Hsieh, C.C. 212
 Hsieh, S.F. 233
 Hsieh, T.C. 175
 Hsieh, T.H. 56
 Hsieh, Y.L. 246
 Hsieh, Y.W. 41
 Hsing, W.T. 5
 Hsu, A.L. 123
 Hsu, C.N. 103
 Hsu, J.C. 185, 216
 Hsu, M. 126, 180
 Hsu, Y.C. 212
 Htwe, O. 152, 203, 242, 294
 Huang, C. 139
 Huang, C.F. 103
 Huang, C.T. 189
 Huang, C.Y. 185, 216
 Huang, G. 210, 211, 212
 Huang, H. 51, 210
 Huang, H.Y. 9
 Huang, M. 180
 Huang, M.H. 103
 Huang, R. 183
 Huang, Rongzhong 27
 Huang, S.J. 243
 Huang, T. 239
 Huang, X. 241
 Huang, Y.C. 212
 Huang, Y.T. 231
 Huang, Y.Z. 228
 Hu, G. 259
 Hughes, A.M. 142
 Hui, J. 49
 Huikuri, H. 17
 Hung, C.H. 65, 67, 242
 Hung, C.S. 41
 Hurd, C. 224
 Hussein Ahmed Ahmed, N. 275
 Hussein, N. 126, 159, 284
 Hu, X. 161, 241, 245
 Hwang, C.H. 53
 Hwang, H. 106, 247, 251, 253
 Hye-jin, L. 137
 Hyodo, M. 156
 Hyuk, L. 279
 Hyun Jin, O. 190
- I**
- Iakubenko, I. 69
 Ibrahim, A.H. 152, 226
 Ibrahim Elnabalawy, M. 275
 Ibrahim, K. 152
 Ibrahim, S. 203
 Ibrahim, U. 227
 Idei, Y. 22, 52
 Idris, F.H. 271
 Idris, Z. 174
 Iheb, B. 118, 119, 175
- Ikeda, E. 225
 Ikeda, R. 39
 Ikeda, S. 216
 Ikeda, T. 39, 85
 Ikeda-Taniguchi, M. 209
 Ikegame, K. 191, 193
 Ikenaga, Y. 214
 Ikoma, K. 12, 39
 Ikumi, A. 152
 Imaeda, S. 46
 Imaida, M. 265
 Imai, K. 85
 Imamura, M. 5
 Im, H.J. 34
 Imoto, D. 265
 Im, S.G. 167
 Imura, T. 163
 Inagaki, A. 130
 Inagaki, K. 232
 Inamoto, Y. 46, 159, 229, 259
 Inobe, J.I. 127, 130, 216
 Inokuchi, H. 252
 Inoue, H. 252
 Inoue, M. 209, 240
 Inoue, S. 85
 Iolascon, G. 19, 38, 107, 212
 Iosa, M. 110
 Irving, L. 16
 Isaji, T. 163, 248
 Isa, S.A.A.Z. 158
 Ishak, Y. 284
 Ishibashi, Y. 199
 Ishiduka, T. 56
 Ishi, H. 127
 Ishikawa, K. 126
 Ishikawa, Y. 252
 Ishizaki, K. 215
 Isiksacan, N. 84
 Islam, J. 29
 Ismail, E. 242
 Ismail, M. 138
 Ismail, N.A. 62, 158
 Ismal, N.A. 62
 Isozaki, W. 131
 Itani, Y. 190, 193
 Ito, D. 50, 180, 259
 Itoh, H. 241, 243, 261
 Itoh, K. 230
 Ito, K. 216
 Ito, O. 17, 50, 180, 246, 259
 Ito, T. 252
 Ito, Y. 199, 268
 Ivanova, E. 180
 Ivanova, M. 127
 Iwakiri, K. 90, 260
 Iwase, H. 255
 Iwashima, M. 219
 Iwashita, A. 85
 Iwata, Y. 138
 Izumi, S.I. 290
- J**
- Jacob, J. 17
 Jacobs, R. 25
 Jae Kwang, S. 190
 Jae Min, L. 190
 Jaewon, H. 134
 Jafari, Z. 20
 Jaffar, A. 244
 Jahn, K. 264
 Jaksch, P. 195
- Jalli, R. 75
 James, L.M. 13
 Jang, D.H. 243
 Jang, M.C. 123
 Jansson, V. 49
 Jansson von Vultée, P. 237
 Jasna, M. 206
 Jayaraman, A. 21
 Jee, R.C. 127, 153, 230
 Jee, S. 189
 Jellad, A. 118, 119, 122, 138, 150, 163, 175, 202
 Jemni, S. 87, 95, 101, 118, 155, 171, 185, 201, 292
 Jeong, H.J. 94, 169, 198
 Jeong, S.U. 94, 198
 Jeon, S.J. 131
 Jeon, Y.J. 133
 Jia, F. 6
 Jia, G. 241
 Jia, Jie 50, 127, 128, 245
 Jiang, C. 209
 Jiang, Y. 54
 Jiang, Z. 205
 Jian, P.S. 41, 231
 Jiao, F.Y. 245
 Jia, X. 53
 Jia-Yu, J. 132
 Jie, C. 115
 Jie, J. 128
 Jie, O.S. 294
 Jie, S. 115
 Jin, D. 247
 Jindra, M. 224
 Jing, G. 275
 JingJie, Z. 115
 Jingjie Zhou 38
 Jinkyu, K. 246
 Jin, L.X. 281
 Ji, S.I. 253
 Jiunn-Horng, K. 132
 Ji, X. 164
 Johnson, J. 32
 Jokol, R. 24
 Jong, S.K. 16
 Joo, M.C. 138
 Joon-Ho, S. 133
 Joseph, J. 144
 Jost, W. 44
 Jou, H.J. 208
 Jo, Y.S. 131
 Judson, R. 144
 Jungelges, J. 61
 Jung, I.Y. 240
 Jung, M. 189
 Justine, M. 154, 216
 Jusuf, S. 210
- K**
- Kadhim, M. 11
 Kadone, H. 22, 52, 152, 264, 268
 Kadowaki, M. 87
 Kagaya, H. 46, 138, 159, 219, 229, 232, 265
 Kagechika, K. 75, 94, 129, 157, 176
 Kahn, M.B. 146
 Kaida, K. 191, 193
 Kainuma, H. 237
 Kajihara, K. 89
- Kaji, T. 135
 Kakihana, T. 180, 259
 Kakinuma, Y. 255
 Kakuda, W. 48, 288
 Kakutani, K. 192
 Kalathummarath, S. 98, 166
 Kalbasi, S. 31
 Kalke, Y.B. 153
 Kaluza-Pawlowska, J. 167
 Kamada, S. 85
 Kamalanathan, P. 244
 Kamijo, Y.I. 153, 250, 293
 Kamiya, K. 89
 Kammili, S. 98, 166
 Kanada, Y. 232, 238
 Kanamura, H. 252
 Kandori, A. 8
 Kaneko, K. 248, 255
 Kang, C.G. 176
 Kang, C.Y. 129
 Kang, E.K. 106
 Kang, J.A. 129, 205
 Kang, J.Y. 243
 Kang, K.Y. 129
 Kang, S. 170, 171
 Kang, S.D. 131
 Kang, S.R. 270
 Kang, S.W. 177
 Kang, Y. 13
 Kan, H. 252
 Kanphade, G. 189
 Kao, M.J. 84
 Kapelner, T. 41
 Kaplan, M. 196
 Kara, B. 8, 53
 Kara, E.E. 74
 Karagül, S. 107, 108
 Karimi, M. 270
 Kashfi, P. 98
 Kas, I. 69
 Kasuga, S. 266
 Katmerlikaya, K. 35, 148
 Katoh, M. 154, 265
 Kato, K. 36
 Kato, N. 261
 Kato, T. 127, 130, 216
 Kato, Y. 229
 Katsuki, Y. 214
 Katsutani, M. 220, 260
 Katte, L. 32
 Kawae, T. 39, 287
 Kawahira, K. 135
 Kawakami, K. 229
 Kawamoto, H. 126, 268
 Kawamoto, K. 87
 Kawamoto, T. 192
 Kawamura, K. 180
 Kawamura, M. 199
 Kawamura, R. 199
 Kawano, H. 192
 Kawate, N. 120, 130, 281
 Kaya, E. 167
 Kaya, G. 8
 Kaya, L. 103
 Kayhan, Ö. 81
 Kayoko, N. 47
 Kazmi, S. 151
 Kazuhiko, H. 253
 Kazuhiro, N. 260
 Kekalih, A. 112
 Kemlin, C. 3

- Kempny, A. 13
 Kenji, H. 136
 Kenneth, F. 142
 Kenneth N.K., F. 28
 Kerschman-Schindl, K. 195
 Kesikburun, S. 105, 116, 121, 147, 148, 151, 164, 223
 Kesiktas, F.N. 84
 Kessomtini, W. 82, 89, 101, 104, 111, 160, 169, 170, 200, 208
 Ketenci, A. 69
 Khachnaoui, F. 87, 95, 101, 118, 155, 171, 185, 201, 292
 Khaing, S.S. 104
 Khaleghipanah, M. 52
 Khalil, A.A.E.H. 64
 Khalili, A. 96
 Khalimova, K. 162
 Khamessi, M. 270
 Khan, E.H. 4
 Khan, F. 10, 16, 144, 204, 277
 Khan, M. 86
 Khasru, M.R. 130
 Khoo, T.B. 204
 Khor Keat Sim, S.A. 61, 208
 Khor, S.A. 9, 62, 119
 Khoshandam Ghashang, S. 54
 Khosrawi, S. 253
 Khouna, A. 203
 Kibar, S. 91, 102, 107, 108
 Kiekens, C. 57, 272
 Kienbacher, T. 217
 Kiessling, M.C. 6
 Kigawa, H. 217, 276
 Kihara, K. 295
 Kikuhara, K. 179
 Kiljanski, M. 86, 94, 167, 201
 Kiljanski, P. 167
 Kim, C.J. 190, 279
 Kim, D.H. 167
 Kim, D.K. 94, 167, 169, 198
 Kim, D.W. 131
 Kim, D.Y. 138, 176
 Kim, E.S. 167
 Kim, G.C. 94, 169, 198
 Kim, G.E. 123, 205
 Kim, H. 259
 Kim, H.C. 253
 Kim, H.D. 94
 Kim, H.R. 240
 Kim, J. 205
 Kim, J.H. 45, 181, 217
 Kim, J.S. 14
 Kim, J.Y. 169
 Kim, K. 18, 106, 247, 251, 270
 Kim, K.H. 167
 Kim, M.S. 131
 Kim, M.Y. 133
 Kim, P.Y. 180
 Kim, S. 14, 138, 219
 Kim, S.H. 45, 154, 244
 kim, S.K. 131
 Kim, S.T. 134
 Kimura, H. 14, 39, 253, 287
 Kimura, I. 48, 288
 Kimura, S. 69
 Kimura, Y. 90, 260
 Kim, W. 34, 91
 Kim, W.S. 170
 Kim, Y.H. 138
 Kim, Y.J. 14
 Kim, Y.K. 229
 Kim, Y.S. 274
 Kinoshita, S. 48, 288
 Kinoshita, T. 250, 293
 Kiralp, M.Z. 67, 73, 80, 114, 173
 Kiraz, S. 79
 Kirmani, S.R.A. 238
 Kishimoto, K. 22
 Kisimoto, S. 127
 Kitaji, Y. 131
 Kiviniemi, A. 17
 Ki, W.Y. 7, 59, 198
 Kiyomoto, H. 259
 Kizawa, Y. 192
 Kiralp, M.Z. 66, 80, 92, 105, 113, 117
 Kızılırmak, S. 166
 Knezevic-Pogancev, M. 204, 205
 Knippels, I. 34
 Kobayashi, A. 90, 260
 Kobayashi, E. 190
 Kobayashi, H. 192
 Kobayashi, R. 199
 Kobayashi, Y. 178, 192
 Ko, C.H. 268
 Kocyigit, H. 98, 99
 Kodama, N. 89, 193, 262
 Ko, E.J. 131, 205
 Koenig, E. 264
 Kofoed, S. 16
 Koga, T. 240
 Kohler, F. 21, 37
 Köhler, L. 40
 Kohzuki, M. 17, 50, 56, 180, 246, 259
 Koistinen, P. 17
 Kok, K. 189
 Kolli, S. 151
 Kollmitzer, J. 217
 Kolodge, G. 160
 Komatsu, M. 246
 Konak, H.E. 108
 Kondo, I. 8, 145, 293
 Kondo, T. 29
 Kong, I.J. 217, 290
 Kong, K.H. 142
 Kong, X. 205
 Kong, Y.Y. 245
 Konishi, Y. 85
 Koo, D. 259
 Koo, K.I. 53
 Kopchiuch, F. 160
 Korallus, C. 25
 Kordi, R. 8, 11, 194
 Korkmaz, M.D. 69
 Köroğlu, Ö. 116
 Kosem, M. 67, 159
 Kösem, M. 79, 80, 92, 113, 117, 173
 Koseoglu, F. 187
 Kostka, J. 135
 Kotoula, P. 137, 215, 292
 Kotsuji, Y. 232
 Koukoulis, G. 137, 292
 Koushirou, S. 98
 Koyama, T. 143, 212
 Koyun, N. 275
 Kraft, E. 49
 Krewer, C. 264
 Kriesche, R. 83
 Krystyna, N. 231
 Kuah, C. 265
 Kuan, T.S. 84
 Kubo, T. 39, 85, 252
 Kubota, M. 216
 Kubota, N. 130
 Kubota, S. 152
 Kufel, W. 111, 201
 Ku, H.B. 274
 Kumalasari, R. 87
 Kumar, N. 156, 278
 Kumar, R. 152, 244
 kumata, N. 260
 Kumata, N. 90
 Kung, S.C. 51, 109
 Kuntari, D. 51
 Kuo, F. 7, 55, 235
 Kuo, T.W. 244
 Kurihara, Y. 132
 Kurniawati, P.M. 213, 244
 Kuroda, R. 240
 Kurokawa, S. 215
 Kuroki, H. 257
 Kurosaka, M. 192, 209, 240
 Kurrle, S. 18
 Kursuz Koseoglu, P. 84
 Kusumaningsih, W. 20, 38, 223
 Kuzu, Ö. 121
 Kwok, K.M. 238
 Kwon, G.Y. 199, 200
 Kwon, S.U. 131
 Kwon, T.K. 270
 Kyojun, Y. 132
 Kyun Woo, P. 190, 279
L
 Labianca, L. 288, 289
 Lagura, T.C. 15
 Lahrabli, S. 65, 95
 Lai, C.H. 56, 132
 Lai, C.L. 133
 Lai, H.W. 9
 Lai, T.C. 269
 Lai, Y.T. 216
 Lame, L. 17
 Lampart, P. 43
 Lamy, C. 3
 Langhammer, B. 25
 Lan, L. 230
 Lan, Y. 50, 54
 Lan, Y.C. 214
 Lara, N. 75, 161
 Largent, J. 44
 Lasimbang, H. 210
 Laswati, H. 244
 Laswati Putra, H. 45
 Latifi, S. 77
 Latifi, S.M. 76, 81
 Latif, L. 141, 143
 Law, S.W. 22
 Lazaro, R. 133
 Lazreg, N. 95
 Lazzari, F. 30, 265
 Leandro, G. 14, 63, 100
 Leblebici, B. 74
 Lee, A. 18
 Lee, B. 217, 219
 Lee, B.S. 34, 266, 267
 Lee, C.H. 170, 269
 Lee, C.H.R. 230
 Lee, C.L. 103
 Lee, H.C. 154
 Lee, H.J. 229
 Lee, H.R. 274
 Lee, J. 133, 138, 251, 253
 Lee, J.A. 266, 267
 Lee, J.K. 253
 Lee, J.P. 230
 Lee, J.W. 177
 Lee, J.Y. 86, 87, 133
 Lee, K.E. 134, 210
 Lee, K.J. 115, 167, 181
 Leela, R. 155
 Lee, M.L. 284
 Lee, S.D. 244, 289
 Lee, S.G. 138
 Lee, S.H. 254, 258, 263
 Lee, S.J. 34
 Lee, S.P. 289
 Lee, S.Y. 240
 Lee, T.H. 254
 Lee, Y.H. 244
 Lee, Y.S. 134, 138
 Lee, Y.T. 41, 86, 87
 Leff, A. 13
 Leger, A. 3
 Legorreta, B.G.L. 202
 Leigh, J.H. 14, 240
 Leithner, A. 11, 37, 75, 83
 Leong, G. 34
 Le, S. 172
 Lewis, J. 5, 63
 Lhostka, L. 288
 Liac, Z. 147
 Lia, H. 147
 Lialios, G. 292
 Liang, D. 245
 Liang, P. 233
 Liao, C.D. 19, 71
 Liao, L. 58
 Liao, L.R. 3
 Liao, M.X. 3
 Liao, S. 9
 Liao, W.C. 133
 Liao, Y. 45, 258
 Liao, Y.H. 263
 Lia, R. 147
 Liaskos, C. 137, 215, 292
 Lib, W. 147
 Li, C. 209, 245, 281
 Lichtenstein, A. 122
 Liebau, L. 42
 Lien, W.C. 154
 Li, F. 78
 Li-Fong, L. 19
 Li, H. 280
 Li, J. 21, 53
 Lijuan, A. 171
 Li, L. 245
 Li, M. 68
 Lim, J.Y. 242
 Lim, M.J. 259
 Lim, S.K. 181
 Lim, Y.H. 242
 Li, N. 45, 258
 Lina, W. 275
 Lin, C.C. 47
 Lin, C.L. 201
 Lin, C.Y. 235
 Lindsay, J. 224

- Lingyun, Z. 26
 Lin, H.Y. 201
 Lin, I.I. 228
 Lin, J. 126
 Lin, K.C. 41
 Lin, P.S. 212
 Lin, Q. 234
 Lin, S.H. 40
 Lin, W.C. 181, 189, 205
 Lin, Y.C. 254, 269
 Lin, Y.Y. 244
 Liou, T.H. 112
 Lippert-Grüener, M. 72, 134
 Lippert-Grüner, M. 288
 Li, Q. 49
 Li, S. 241
 Lissens, M. 254
 Li, S.W.L. 28
 Li, T. 102
 Litovchenko, T. 69
 Liu, B. 281
 Liu, C. 239
 Liu, C.S. 36
 Liu, C.Y. 65
 Liu, D. 54
 Liu, D.X. 25, 50
 Liu, F. 248, 266
 Liu, H. 258
 Liu, H.B. 3
 Liu, J. 233
 Liu, K.P.Y. 3, 7
 Liu, M. 36, 239, 248, 266
 Liu, P.L. 245
 Liu, P.T. 36
 Liu, Q. 161
 Liu, S.Y. 28
 Liu, Y. 51, 185, 211, 212, 241
 Liu, Z. 111, 276
 Li, W.S. 22
 Li, X. 45, 55, 205
 Li, Xinger 56
 Li, Y.Y. 245
 Lleva, J.M. 233
 Lli, J. 193
 Lmidmani, F. 65, 95
 Loar, S. 271
 Loay Salem, M. 275
 Lo, C.F. 216
 Lockwood, K. 18
 Lo Mauro, A. 30
 Long, J. 32
 Long, Z. 241
 Lopes, R. 63
 Lopez, A.I. 182
 Lopez Arrubla, J. 33
 Lopez Escobar, J. 104
 Lopez Vazquez, A. 141
 Lopreiato, M. 18
 Lord, S. 18
 Louie, L.H.T. 7
 Lo, Y.M. 109
 Lu, Hongyang 50
 Lui, S.K. 176
 Luk, E. 16
 Luna, H. 275
 Lunar, F.R. 133
 Luo, J. 241, 245
 Luo, Q. 170
 Lu, X. 247
 Lyby, P.S. 277
 Lyer, S. 195
- M**
- Maagh, H. 42
 Mabuchi, S. 193
 Macfarlane, D.J. 3, 7, 59, 198
 Mackenzie, J. 178
 Ma, D. 13
 Madani, S.P. 165
 Madrid, E. 40
 Maeda, H. 39, 219, 252, 255, 256
 Maeda, M. 255
 Maeda, N. 58
 Maedo, O. 33
 Maeno, K. 192
 Maeno, Y. 23
 Maeshima, S. 136, 139
 Maestre-Cascales, C. 64
 Maezawa, T. 52
 Magenau, J. 189
 Mahli, N. 227
 Mahmud Marzuki, N.H. 290
 Mair, P. 217
 Majdinasab, N. 76, 77
 Majors, D. 17
 Mäkikallio, T. 17
 Makita, S. 174, 195
 Malfait, F. 293
 Malvar, A. 117
 Malvar, A.K. 5
 Mamiko, H. 140
 Mamud, F. 33
 Manack Adams, A. 44
 Manaf, H. 154, 155, 216, 250
 Mandol, D. 273
 Mane, M. 218
 Manivasagam, M. 189
 Maniwa, S. 87
 Manjalavil, M. 98
 Mannan, H. 277
 Mano, H. 6, 222, 252
 Mansournia, M.A. 194
 Månnum, G. 277
 Marcel, K. 167
 Marey, G. 160
 Marial, O. 34
 Mariappan, M. 95, 224, 272, 278
 Marija, K.P. 206
 Marjanović, B. 93
 Marsh, N. 12
 Marsollet, H. 145
 Martinez, G. 33
 Marushima, A. 126, 268
 Marzoli, C. 110
 Masakado, Y. 132
 Masaki, M. 136
 Masayuki, A. 193
 Mase, K. 295
 Maside Oliete, B. 141
 Masiero, S. 47, 102
 Maslowski, E. 271
 Masuda, Y. 46
 Matmurodov, R. 162
 Mat Sahat, I. 264
 Matsubara, K. 261
 Matsubara, M. 215
 Matsuba, Y. 23
 Matsuda, F. 177, 232, 237
 Matsui, H. 143
 Matsukawa, M. 276
 Matsumoto, H. 190
- Matsumoto, K. 257
 Matsumoto, M. 281
 Matsumoto, S. 135
 Matsushima, Y. 241, 243, 261
 Matsushita, T. 261
 Matumoto, K. 85
 Matumoto, M. 120
 Mayasari, N. 135
 Mazlan, M. 127, 143, 144
 McCormick, M. 34
 McCreesh, K. 5, 63
 McGuire, J.R. 43
 McRoberts, W.P. 109
 Medin Ceylan, C. 69
 Megumi, S. 135, 145
 Mei, T. 171
 Mei Wulan, S.M. 206
 Melina, M. 213
 Melvin, J. 237
 Meng, D. 46, 250
 Meng, N.H. 208
 Meng, Q. 269
 Menon, A. 95, 272
 Menon, S. 98
 Mentiplay, B.F. 146
 Meray, J. 144
 Metani, H. 214, 232
 Mete, B.D. 99
 Michalak, B. 111, 201
 Michibata, Y. 87
 Middleton, J. 32, 34
 Migaou, H. 119, 122, 138, 150, 163, 175, 202
 Migaou, S. 118
 Miguens Vazquez, X. 141
 Mihara, C. 47
 Mikami, Y. 14, 39, 47, 85, 114, 199, 252, 287
 Milacic, M. 198
 Milenovic, J. 204
 Milenovic, N. 177, 204, 206
 Milet, V. 14, 63, 100
 Miller, E. 135, 160
 Minakawa, T. 217
 Min-a, S. 286
 Ming, Z. 99, 115
 Ming Zhang 38
 Mirallas Martinez, J.A. 99, 100, 104
 Mirea, A. 206
 Mirjana, G. 90
 Mirsafaei Rizi, R. 234
 Misdalia, T. 207
 Mishra, C. 294
 Missaoui, B. 218
 Mitchell, S. 262
 Mitoma, J. 214
 Mitsui, K. 255
 Miura, M. 17
 Miura, T. 246
 Miyamura, K. 48, 288
 Miyano, S. 115, 131
 Miyara, K. 135
 Miyasaka, H. 219, 230, 256, 266
 Miyata, C. 179, 248
 Mizuma, M. 120, 281
 Mizuno, K. 36, 179, 248, 266
 Mizuno, S. 136, 219, 256
 Mizuno, T. 89
 Moeliono, D.D.M. 52
- Mogan, G. 251
 Mohamad Ali, N.D. 157
 Mohamad Hanapi, N.H. 230
 Mohamad Hashim, N. 230
 Mohamad, N. 100
 Mohamed, G.A.E. 64
 Mohammad Ali, M. 11
 Mohammadi, F. 20
 Mohammad, K. 24
 Mohanty, P. 294
 Mohan, V. 100
 Mohasseb, D. 100
 Mohd Apandi, N.H. 152
 Mohd Fu'ad, S.A. 208
 Mohd Noor, S.J. 291
 Mohr, S. 250
 Mohseni-Bandpei, M.A. 31
 Mohsin, J. 24
 Molloy, T. 76
 Molnosi, Z. 140
 Mologhianu, G. 251
 Molteni, E. 267
 Molteni, F. 30
 Momota, T. 229
 Monaghan, N. 18
 Moncer, R. 87, 101, 118, 185, 292
 Monchaud, C. 3
 Moniruzzaman, M. 130
 Mook, J. 277
 Moon, H.J. 115
 Moon, J.G. 34
 Morales, G. 202
 Morales, L. 124
 Moreira, J. 14, 63, 100
 Morejon, C. 182
 Moretti, A. 19, 38, 212
 Moridnia, M. 29, 236
 Mori, E. 228
 Morihara, T. 98
 Moriki, T. 153, 293
 Morimoto, S. 163
 Mori, N. 246
 Morishita, S. 190, 191, 193, 262
 Moriyama, N. 58
 Morrow, A. 119
 Motohashi, K. 131
 Moviglia Brandolino, M.T. 33
 Moviglia, G.A. 33
 Moviglia, J.L. 33
 Moxian, C. 171
 Moyeenuzzaman, M. 230
 Mozzillo, S. 19
 Mtawa, S. 171
 Mubarak, H. 135
 Mueller, F. 264
 Mueller, P.E. 49
 Muharlyamov, F. 180
 Muhd Latpi, M.S. 152
 Mukaino, M. 177, 232, 237, 238, 265
 Mukhtar, F. 290
 Muldoon, S. 272
 Mumin, A. 146
 Murakami, S. 295
 Muraoka, M. 115
 Murata, M. 178
 Murat, K. 105
 Muroya, Y. 50
 Musa, N.A. 152

- Mushi-Brunt, C. 7
 Musson, M. 178
 Mustafah, N. 216
 Mustapa, A. 216
 Mustapha, Z.A. 210
 Mutlu, M. 81
 Mutsuzaki, H. 52, 225, 263
 Myint, Y.M. 286
 Myoung-jun, L. 137
- N**
- Nagahama, T. 8
 Nagano, A. 212
 Nagase, M. 190
 Nagashima, H. 88
 Naicker, A. 203
 Naicker, A.S. 203, 242, 294
 Naicker, M.S. 203
 Naito, M. 145, 293
 Nakagawa, S. 252
 Nakahara, Y. 252
 Nakajima, H. 263
 Nakamura, M. 294
 Nakamura, T. 153, 250, 293
 Nakanami, A. 75, 94, 129, 157, 176
 Nakao, M. 23
 Nakashita, S. 88
 Nakata, M. 75, 94, 129, 176
 Nakayama, M. 192, 209
 Nakazato, Y. 217
 Nam, H.S. 14, 258
 Nan, H. 122
 Nanri, Y. 136
 Naorem, A. 63
 Nara, A. 222
 Nasir Mansoor, S. 58, 136, 168
 Nassif, N.S. 64
 Natasa, M. 205
 Navarrete-opazo, A. 32
 Naylor, J. 37
 Nazir, A. 69
 Nazli, F. 144
 Neoh, Y.W. 225
 Neyişçi, Ç. 197
 Ng, A. 18
 Ng, C.Y. 265
 Ngo, A. 18
 Ng, S.S.M. 59, 198
 Nica, A.S. 251
 Nicholson Perry, K. 32
 Niibo, A. 135
 Niikura, T. 240
 Niizeki, Y. 216
 Nikolaou, A. 226
 Nishida, D. 36
 Nishiguchi, S. 261
 Nishimoto, H. 209, 240
 Nishimoto, J. 195
 Nishimura, H. 214
 Nishimura, M. 207
 Nishimura, Y. 153, 250
 Nishio, D. 217, 276
 Nishishita, S. 257
 Nishi, T. 135
 Niu, L. 281
 Niwald, M. 160
 Nobuhiko, H. 192
 Noda, T. 266
 Nodehi Moghadam, A. 98
 Noegraheni, N. 70
- Noguchi, A. 87
 Noguchi, S. 222
 Nojiri, A. 163
 Nomoto, N. 69
 Nomura, S. 263
 Noor Ani, A. 292
 Noor Hisham, N.H. 154
 Noor Idha Handajani, N.I. 206
 Noormohammadpour, P. 8, 11, 194
 Noraida, M.K. 292
 Noriaki, K. 136
 Norihide, I. 98
 Noura, A. 87, 95, 101, 118, 138, 155, 163, 171, 185, 292
 Novembri Utomo, D. 234
 Nowacka, K. 194, 235
 Nozaki, R. 214
 Nozaki, Y. 261
 Nugraha, B. 25, 54
 Nugrahaeni, N. 261
 Nupur, A.D. 272
 Nurdin, A. 22, 23
 Nur Hidayati, E.R. 26, 87
 Nurjaya, I. 168
 Nur Khaililatul, A. 203
 Nursyanti, A. 285
 Nusdwinuringtyas, N. 38
 Nyein Yin, K. 210
 Nyien Yin, K. 227
- O**
- Oberbek, J. 94
 Ochi, M. 136, 261
 Oda, R. 39
 Odderson, I.R. 43
 Odonkor, C. 282
 Oe, K. 240
 Ogata, H. 216
 Ogata, N. 248, 252
 Ogawa, H. 191, 193
 Ogawa, Y. 50, 56, 246, 259
 Ogino, T. 220, 295
 Ogurkowski, K. 194, 231, 235
 Ogwumike, O. 88
 Oh, A. 65
 Ohe, Y. 276
 Oh, G.J. 138
 Oh, H.J. 177
 Ohkubo, S. 176
 Oh, M.K. 247
 Ohnishi, H. 230
 Ohnishi, K. 222
 Ohnishi, M. 23
 Ohnmar, H. 210
 Ohno, K. 256, 266
 Ohno, M. 238
 Otori, I. 214
 Oh-Park, M. 18
 Ohsawa, A. 8
 Ohshima, T. 176
 Ohsu, W. 75, 94, 129, 176
 Ohta, T. 260
 Ohtsuka, K. 177, 232, 237, 238, 265
 Ohya, J. 252
 Oikawa, T. 58
 Oishi, A. 219
 Ojomo, O. 155
 Okada, K. 6
 Okajima, A. 131
- Okamoto, S. 136, 139, 232
 Okamoto, T. 48, 288
 Okazaki, H. 136, 139
 Okazaki, T. 163
 Okochi, Y. 219
 Okumura, H. 85
 Okuno, M. 89
 Oku, Y. 179
 Okuyama, Y. 139, 229
 Okuyucu, K. 73
 Olaleye, O. 155
 Olivares, P.R. 64
 Omar, Z. 141
 Onaka, H. 219
 Ong, K.G. 62, 158, 255
 Ong, P. 186
 Onishi, H. 197
 Onishi, M. 88
 Onishi, S. 52
 Onisi, O. 98
 Onoda, S. 58
 Onogi, K. 159, 229
 Onose, G. 206
 Onoue, N. 56
 Onwi, N. 283, 290
 Oo, K.S. 192
 Oostra, A. 274
 Oowada, S. 17
 Ooya, Y. 178
 Oral, A. 231
 Orand, A. 219, 230, 232, 256, 266
 Orie, S. 193
 O'Riordan, J. 137, 238
 Orpilla, V. 58
 Orтели, P. 68
 Ortiz, F. 161
 Osaki, M. 88, 190
 Osamu, N. 126
 Osborn, M.P. 188
 Osladil, T. 224
 Osman, A. 278
 Osman, H. 76, 155, 186, 238
 Osman, W. 118
 Ota, K. 145, 293
 Otaka, Y. 248, 266
 Otsuka, T. 248
 Ouchi, K. 257
 Özarslan, P. 91
 Özyayın, Ş. 73
 Oz, B. 98
 Ozbudak Demir, S. 96
 Özçakar, L. 90
 Ozcan-Eksi, E.E. 15
 Özdemir, H. 67
 Özdemir, İ. 35
 Özdemir, T. 91
 Öz, H.E. 91
 Ozturk, E.A. 74, 84, 93, 143, 145, 151, 173, 177
 Öztürk, E.C. 81
- P**
- Pachner, M. 195
 Padure, L. 206
 Pagliano, E. 30
 Paja, L.D. 106
 Pak, H.R. 266, 267
 Palazón García, R. 149
 Palmer, J.B. 46, 259
 Pande, S. 197
- Pandey, R. 294
 Pande, Z. 273
 Pandji, T.D. 48
 Pane, M. 288, 289
 Pang, Q. 239
 Pan, J. 239
 Pan, R. 68
 Pantelinac, S. 90
 Paolucci, T. 110
 Paongan, J. 38
 Papakosta, S. 137, 215, 292
 Papp, E. 140
 Parada, F. 168
 Paramasvaran, S. 244
 Park, B.K. 167
 Park, C.H. 86, 87
 Park, C.I. 34
 Park, E.S. 202
 Park, G. 191
 Park, H. 137
 Park, H.D. 197
 Park, H.J. 169
 Park, H.K. 274
 Park, H.W. 106
 Park, J. 45, 154, 244
 Park, J.M. 154
 Park, J.W. 258
 Park, S.G. 169
 Park, S.H. 251
 Park, T.J. 45
 Passaretti, F. 30, 265
 Patel, A.T. 43
 Patel, K. 110, 160, 282
 Patel, R. 294
 Paternostro-Sluga, T. 56
 Paul, P. 273
 Pawana, A. 63
 Pawana, I. 261
 Pei, Z. 25, 50, 54
 Peng, C.C. 26
 Peng, C.W. 56
 Peng Xiang, A. 161
 Perez Castellani, R. 33
 Perez-Gomez, J. 39
 Persson, H.C. 24
 Pestelli, G. 271
 Petersson, D. 42
 Petsepes, T. 215, 292
 Phua, C.H. 9, 62, 119
 Piccinini, G. 110
 Picone, S. 33
 Pieber, K. 21
 Pietkun, K. 194, 231, 235
 Pina Buded, S. 99, 100
 Pinto, M. 191
 Pinto, S. 162
 Pirovano, S. 30
 Pitaloka, A.C. 246
 Pittaccio, S. 30, 265, 267
 Plaut, T. 223
 Playford, D. 13
 Podlowska, A. 162
 Poerwandari, D. 38
 Polat, C.S. 187
 Pongpipatpaiboon, K. 177
 Poolman, R. 37
 Popovic, B. 177, 204
 Post, M.W.M. 276
 Pourgharib Shahi, M.H. 11
 Pournajaf, S. 94, 96
 Prabowo, T. 69

- Prakash, J. 255
 Prananta, M. 51, 256
 Prasanna, K. 162
 Prasetyo, A. 45, 261
 Prashun, P. 255
 Prodinger, B. 42, 43
 Pucci, V. 288, 289
 Puntumetakul, R. 120
- Q**
 Qingmei, C. 32
 Qing, Xi 56
 Qin, L. 283
 Qiu, J. 207
 Qi, X. 205
 Quevin, A. 33
 Qureshi, A.Z. 238
- R**
 Rabbani, A. 230
 Rachmawati, M.R. 4
 Radhakrishnan, S. 21
 Raeissadat, S.A. 29, 89, 94, 96, 97, 120, 166, 178, 236, 237, 239
 Raha, S. 54
 Rahimi Dehgolan, S. 29
 Rahman, M.A. 31
 Rahman, M.H. 89
 Rahman, N. 230
 Rahman, S. 273, 278, 287
 Rahmi, W. 28
 Rajan, R. 242
 Rajasegaran, S. 9, 61, 62, 208
 Ramachandran, R. 98
 Ramamurthy, P. 224
 Rama Susilawati, M.L. 52
 Rambe, I.K. 211
 Ramos, M. 182
 Rana, R. 273
 Rangel Gómez, C. 75, 161
 Rangel Jimenez, C. 75, 161
 Rashedi, V. 20
 Rasras, S. 81
 Rathore, F.A. 10, 24, 101, 238
 Ratna Darjanti Haryadi, R.D. 206
 Ratnalingam, K. 158
 Ratnawati, A. 16, 184
 Rayegani, S.M. 29, 48, 57, 94, 97, 169, 178, 236, 237, 239
 Ray, S. 273
 Raza, A. 37, 115
 Razak, N.A. 291
 Ready, L. 76, 186, 238
 Reales, A.A. 60
 Reddy, P.P. 182
 Redlicka, J. 135
 Reeves, R. 272
 Regala, F. 251
 Reinhardt, J. 276, 280
 Reiter, I. 214
 Rekić, M. 82, 89, 101, 104, 111, 138, 160, 169, 170, 200, 208
 Rha, D.W. 202
 Rhee, W.I. 169
 Rhie, S.H. 181
 Rhoda, A. 280
 Rianto, E. 246
 Richer, E. 145
- Rifin, S. 206
 Rika, M. 23
 Rios, J. 14, 63, 100
 Riva, D. 30
 Rodriguez, G.M.M. 281
 Rodriguez Lopez, V. 141
 Rogala, G. 33
 Rombaut, L. 293
 Romero, E.J. 106
 Rong, R. 50
 Rosley, N. 155
 Rostami, M. 8, 11, 98, 194
 Röthlisberger, F. 273
 Rowe, S. 34
 Rubinelli, S. 273
 Rumpold-Seitlinger, G. 37
 Ruoxian, D. 53
 Russo, F. 107
 Ruya, O. 49
 Ryu, S.H. 198
 Ryyänen, O.P. 17
- S**
 Saba, E. 70
 Sabater Querol, M.T. 99, 104
 Sabbe, L. 43
 Sabo, A. 250
 Sabrina, I. 182
 Sadeghi, S. 57
 Sado, C.L. 221
 Sadoghi, P. 37, 75
 Saeidian, S.R. 76, 77, 81
 Saeki, S. 163, 241, 243, 261
 Safaz, I. 121
 Safaz, İ. 92, 147, 165
 Safer, U. 96, 103
 Sagara, A. 39
 Sahbaz, T. 69
 Sahin, A. 193
 Sahlan, A. 135
 Said Lahmar, W. 82, 89, 101, 104, 111, 160, 169, 170, 200, 208
 Saif, M. 33
 Saino, O. 191
 Saitoh, E. 46, 138, 146, 159, 177, 219, 229, 232, 237, 238, 265
 Sakae, T. 192
 Sakai, S. 163
 Sakai, Y. 87, 192, 240
 Sakamaki, M. 268
 Sakamitsu, T. 287
 Sakamoto, T. 257
 Sakamoto, Y. 163
 Sakane, M. 263
 Sakarsu, S. 165, 187
 Sakel, M. 130, 162
 Sakurai, T. 178
 Sakuyama, A. 50
 Salah, S. 118, 119, 122, 138, 150, 163, 175, 202
 Salek, A. 31
 Salek, A.K.M. 130
 Sales Marques, R. 14, 63, 100
 Salih, S. 77
 Salimah, O. 292
 Salim, M.S. 182
 Sällström, S. 25
 Sameshima, J. 135
 Sammali, G. 30
 Samsuri, J. 35, 255
- Sanal Top, C. 81, 179
 Sana, S. 150
 Sanchez, Y. 256
 Sandrajagran, M. 224
 Sankaran, R. 195
 Sano, Y. 8
 San, T. 192
 Santullo, P. 33
 Saotome, T. 178
 Saraceni, V.M. 110
 Saraf, A. 20, 21, 55, 72, 82, 194, 224, 295
 Sari, D.I. 63
 Sari, D.M. 285
 Sari, M. 52
 Sartori, M. 41
 Sasaki, C. 163, 248
 Sasaki, M. 114
 Sasaki, R. 192
 Sasaki, S. 138, 139
 Sassa, R. 237
 Sastradimaja, S.B. 69
 Satapathy, A. 294
 Sato, D. 197
 Satoru, S. 136
 Sato, S. 138
 Satou, M. 289
 Satyawati, R. 186, 261
 Sawada, K. 252
 Sawada, R. 192
 Sayed, T.M. 10
 Sayilir, S. 77, 96
 Sayın, D.B. 67
 Schache, A. 13
 Scheel-Sailer, A. 43, 273
 Schiacappasse, C. 21
 Schiller, J. 25
 Schmitt, K. 273
 Schmitz, C. 5, 6
 Sean, Smith 282
 Seck Jin, K. 137
 Seddighi, L. 178
 Sedighpour, L. 89, 94, 166, 239
 Seferoglu, B. 70
 Seiko, S. 259
 Sekiguchi, Y. 180
 Seki, S. 214, 232
 Selim, A. 80
 Sencan, S. 15, 103, 109
 Seoane Pillado, T. 141
 Seo, H.G. 14
 Seok, H. 229
 Seok Hyeon, H. 197
 Seok III, J. 15, 24, 30, 46, 60, 106, 118
 Seok, T.Y. 115
 Seon-duck, E. 137
 Seppänen, T. 17
 Serrano, C. 39
 Setianing, R. 110
 Setiawan, E. 256
 Setogawa, K. 89
 Seung Don Yoo, Y. 246
 Seyed Mahmood Latifi, S.M. 76
 Seyed Mansoor, R. 166
 Sezgin Özcan, D. 187
 Sghir, M. 82, 89, 101, 104, 111, 160, 169, 170, 200, 208
 Shafshak, T. 70
- Shaharom, S. 158
 Shahraeeni, S. 120
 Shahrizaila, N. 255
 Shais, S. 37
 Shakoor, M.A. 90, 230
 Shan, C. 164
 Shan, L. 6
 Sharma, M. 195
 Shazura, K.A. 291
 Sherrington, C. 18
 Shevchenko, L. 69
 Shibata, S. 46, 138, 159, 229
 Shibata, T. 6, 222
 Shiga, T. 12
 Shigeru, M. 140
 Shihap, G. 11
 Shih-Ching, C. 132
 Shih, M.Y. 231
 Shih-Wei, H. 19
 Shiino, M. 130
 Shimbara, M. 257
 Shimizu, K. 248
 Shimizu, M. 29
 Shimizu, S. 214, 232
 Shimizu, T. 180
 Shimizu, Y. 22, 52, 126, 131, 152, 225, 264, 268
 Shimodozono, M. 135
 Shindo, K. 266
 Shindo, N. 230
 Shin, H. 226
 Shin, H.I. 240
 Shin, H.K. 53
 Shin, J.H. 267
 Shinjinrou, T. 140
 Shin, K. 18
 Shinoda, Y. 192, 252
 Shinozaki, T. 56
 Shin, S.H. 270
 Shin, Y.I. 138
 Shiota, K. 194
 Shiraiishi, J. 163, 261
 Shirooka, H. 261
 Shiue, H.S. 208, 268
 Shu, C. 171
 Shuhaimi, A. 35
 Shutz, S. 68
 Shuyan, Q. 122
 Sichinava, N. 111
 Sidarta, N. 4
 Siddall, P. 32
 Siddiq, A.B. 130
 Silver, J.K. 188
 Siminska, J. 194, 231, 235
 Simpson, D.M. 43
 Sim, Y.J. 94, 169, 198
 Sinaga, S. 16, 184
 Sindel, D. 231
 Sin, D.S. 181
 Siperstein, G. 210
 Siyu, D. 122
 Skoufi, G. 137, 215, 292
 Slavici, T. 184
 Sliwinska, D. 111, 201
 Sliwinska, Z. 201
 Sliwinski, G. 111, 201
 Sliwinski, Z. 86, 111, 201
 Sloodman, H. 272
 Smith, C. 17
 Smith, L. 156

- Smith, S. 189
 Sogawa, Y. 69
 Sohail, S. 24
 Sohn, M. 132
 Sohn, M.K. 138
 Sohrabi, Y. 97
 Song, S.M. 270
 Song, W.K. 270
 Song, Y.J. 51
 Sonoda, S. 136, 139, 219, 229, 230, 232, 256, 265, 266
 Son, S.B. 170, 171
 Soo Fin, L. 242
 Soon, B.H. 244
 Sota, K. 262
 Soumaya, B. 150
 So Young, B. 279
 Speed, J. 178
 Speth, F. 268
 Spinelli, M. 33
 Squires, R.W. 182
 Stäblein, S. 42
 Stamm, T. 42
 Starosta, M. 135
 Stevenson, K. 272
 Stewart, A. 222
 Stewart, N. 234
 Stibor, A. 75
 Stibrant Sunnerhagen, K. 24
 Stout, N. 9, 62
 Strasser, D. 160
 Stratulat, I.S. 139
 Strazzer, S. 267
 Stucki, G. 42
 Styazkina, E. 111
 Suarez, C. 84, 166, 251
 Suarez, C.G. 117
 Subadi, I. 38, 63, 246
 Su, C.H. 216
 Su, D.C.J. 51
 Suetsuna, T. 130
 Suetuna, T. 127
 Sugano, T. 179
 Sugihara, K. 232
 Sugiyama, T. 156, 214, 232, 289
 Suhaimi, A. 143, 179, 182, 183, 226, 227, 239, 255
 Suharti, A. 87
 Suh, M.R. 177
 Sullivan, K. O' 5
 Sulong, N.Z. 9
 Sultan, H. 77
 Su, M. 139, 140
 Su, M.C. 254
 Sumiya, A. 140
 Sung, D.H. 82
 Sung, I.Y. 205
 Sungkar, E. 211
 Sung, P.Y. 47
 Sun, J. 49, 283
 Sun, X.Y. 211
 Sun, Y. 54, 102
 Supervia Pola, M. 182
 Suroto, H. 35
 Susanti, Y. 186
 Susanto, E.A. 268
 Suzuki, A. 131, 232
 Suzuki, M. 146, 293
 Suzuki, T. 284
 Suzumura, S. 8
 Suzuyo, O. 98
 Synder, M. 94
 Syrewicz, K. 167
 Szczegielniak, J. 86, 94
 Szel, I. 140
- T**
- Tabaj, A. 23, 61, 278
 Tachibana, K. 225
 Tachiro, S. 266
 Tadenuma, T. 87
 Taheri, P. 253
 Tai, M.L.S. 66, 178
 Tairaku, K. 248
 Tajima, F. 153, 250, 293
 Tajima, Y. 180
 Takada, M. 163
 Takagi, Y. 75, 94, 129, 157, 176
 Takahara, R. 114
 Takahashi, H. 174, 195, 217, 276
 Takahashi, K. 220
 Takahashi, Y. 56
 Takai, H. 197
 Takaishi, S. 174
 Takami, C. 138
 Takao, K. 52
 Takasaki, K. 266
 Takeda, K. 219, 230, 232, 256, 266
 Takehara, N. 197
 Takei, Y. 255
 Takeshi, H. 126
 Takeuchi, F. 75, 94, 129
 Takeuchi, R. 52
 Takeuchi, Y. 90, 260
 Takeuti, F. 176
 Takikawa, K. 6
 Takino, Y. 248
 Taki, Y. 248
 Tamaki, H. 197
 Tamaru, T. 215
 Tamaru, Y. 215
 Tambunan, T. 16, 184
 Tamer, R. 7
 Tamura, K. 248
 Tanabe, J. 232
 Tanabe, S. 154, 265
 Tan, A.K. 64, 166, 173
 Tanaka, H. 6, 132
 Tanaka, N. 290
 Tanaka, S. 136
 Tanaka, T. 87, 190
 Tanatarova, A. 111
 Tan, B. 241
 Tan, B.T. 26
 Tan, C.J. 220
 Tang, Chaozheng 128
 Tang, C.W. 36
 Tang, F.T. 27, 36
 Tang, M. 170
 Tang, X. 13
 Taniguchi, D. 39
 Tanikawa, H. 177, 232, 238
 Tani, M. 140
 Tanino, G. 219, 229, 230, 232, 256, 265, 266
 Tannor, A.Y. 282
 Tan-Ong, M. 5, 117
 Tan-Sales, B.G. 5, 117
 Tan, Y.Y. 183
 Tao, J. 234
 Tao, Z. 128
 Tappenden, P. 189
 Tasaka, S. 261
 Tashiro, S. 179, 248
 Tashiro, Y. 261
 Taşkaynatana, M.A. 64, 96, 165
 Tay, B. 15
 Tay, E.L. 42
 Tecer, D. 64
 Tekin, L. 66, 67, 70, 71, 73, 79, 80, 83, 92, 107, 113, 114, 117, 149, 159, 165, 173, 187, 218, 225
 Ten Brink, F. 25
 Teng, Y.K. 289
 Tenjiku, S. 260
 Tennant, A. 42
 Teo, S.P. 276
 Teranishi, T. 237, 238
 Terauchi, R. 252
 Terray-Horvath, A. 140
 Terzic, C.M. 182
 Tetsuhiko, S. 253
 Tezel, K. 20, 65, 96, 114, 116, 165, 170, 222, 223
 Thanabalan, J. 242, 244
 Thanissery Ramachandran, S. 166
 Thaveethu, L. 203
 Thein, N.N. 286
 Thevenon, A. 160
 Thomas, R.J. 182
 Thompson, G. 155, 186, 238
 Thoumie, P. 218
 Thren, K. 40
 Tie, V. 189, 281
 Tiffreau, V. 160
 Tinduh, D. 45, 234
 Ting, K.H. 28
 Toda, T. 209
 Tohi, H. 257
 Tojima, M. 252
 Tok, F. 92, 103, 105, 116, 121, 147, 164, 165, 172, 173, 197
 Tok, S. 97
 Tokunaga, D. 85
 Tokunaga, Y. 197
 Tomanova, M. 72, 134, 288
 Tomasevic-Todorovic, S. 90
 Tomaz, I. 33
 Tomida, K. 229, 232
 Tondiy, O. 66
 Tong, R.K.Y. 268
 Toshiaki, S. 140
 Toshikazu, K. 98
 Tosun, A. 35, 67, 99
 Totoribe, K. 257
 Toulgui, E. 87, 95, 101, 155, 171, 292
 Toyama, S. 39
 Toyohira, Y. 243
 Tran, Q. 120
 Triantaris, A. 137
 Truesdale, M. 144
 Tsai, H.T. 216
 Tsai, L.Y. 175
 Tsai, M.R. 216
 Tsai, P.L. 231
 Tsai, R.J. 213
 Tsai, Y. 180
 Tsai, Y.C. 216
 Tsang, W.W.N. 198
 Tsan-Hon, L. 19, 71
 Tseng, C.P. 185, 216
 Tseng, S.Y. 133
 Tsubahara, A. 156, 214, 232, 289
 Tsubaki, A. 197
 Tsubokawa, M. 75, 94, 129, 176
 Tsuboyama, T. 261
 Tsuchida, K. 180
 Tsuchiyama, K. 177, 237
 Tsuji, T. 248
 Tsukagoshi, R. 89
 Tsunoda, K. 225
 Tsunoda, T. 136
 Tsur, A.A. 213
 Tuchiya, M. 252
 Tudela Salom, M.C. 99, 104
 Tu, F. 239
 Tulppo, M. 17
 Tuna, S. 90, 91
 Tung, L.C. 291
 Turgut, H. 68
 Turturro, F. 288, 289
 Tzu-Wen, C. 213
- U**
- Uchida, R. 195
 Uchio, Y. 87
 Uchiyama, Y. 220, 262, 295
 Uddin, T. 230, 280
 Ueha, T. 209, 240
 Uema, T. 135
 Ueno, T. 22, 52, 126, 264, 268
 Uesugi, M. 115
 Ugurlu, F.G. 77
 Uguwanyi, D. 88
 Ui Choul, L. 279
 Ulutatar, F. 81, 179
 Umay, E. 74, 84, 93, 118, 123, 124, 143, 144, 145, 151, 174
 Umetsu, M. 180
 Umit Yemisci, O. 141
 Unal, C. 103
 Ünsal-Delialioğlu, S. 187
 Ünsal, S. 187
 Unzaki, A. 209
 Urabe, H. 48, 288
 Urabe, Y. 58
 Urushihara, M. 214
 Ushiba, J. 266
 Uvarova, O. 157
 Uyehara, E. 58
- V**
- Vagena, X. 137, 215, 292
 Valais, S. 137, 215
 Valentine, R. 141
 Van den Bergh, R. 286
 Van De Perre, L. 34
 Vanderstraeten, G. 43, 274, 293
 Van de Velde, D. 43, 274, 293
 Vanhalst, M. 293
 Vanhove, G. 293
 VanKoevering, K.L. 235
 Van Sanden, P. 34
 Van Waevelde, H. 274
 Vareka, I. 224

- Varekova, R. 224
 Varela, C.L. 259
 Varghese, R. 17
 Vasquez Castro, J.A. 100, 104
 Vassena, E. 267
 Vazquez Guimaraens, M. 141
 Verellen, J. 34
 Versales, C.R. 58
 Versayanti, S. 157
 Vicario Espinosa, C. 148, 149
 Vichodcev, A. 125
 Vickers Douglas, K.S. 182
 Vittadini, F. 102
- W**
- Wada, A. 248
 Wadano, Y. 52
 Wada, T. 295
 Wada, Y. 220
 Wahl, M. 268
 Wakasugi, T. 191, 193, 262
 Wallis, G. 122
 Waluyo, Y. 257
 Wan Ahmad, W.A. 226
 Wan, G. 250
 Wang, C. 102, 111
 Wang, D. 218
 Wang, F. 209
 Wangjam, K. 5
 Wang, L. 49
 Wang, S. 54
 Wang, T. 6
 Wang, T.J. 175
 Wang, W. 6
 Wang, W.J. 254
 Wang, X. 287
 Wang, Y. 59, 102, 250, 281, 287
 Wan Mohamad Akbar, S.H. 82
 Wan Mohd Zohdi, W.N. 157, 225
 Wan Rozita, W.Y. 142
 Wardhani, I. 112
 Wardhani, I.L. 246
 Warner, M.B. 142
 Watanabe, I. 232, 238
 Watanabe, K. 115
 Watanabe, M. 115, 139, 229
 Watanabe, S. 115
 Wayan Budi, A. 57
 Weerts, E. 57
 Wee, S.K. 142
 Wee, T.C. 197
 Wei, C. 115
 Wei Chen 38
 Wei, C.J.S. 172
 Weigl, M. 49, 102
 Wei, H. 290
 Wei, Q. 112
 Wei, T.S. 28, 36, 47, 269
 Wei, X. 142, 250
 Weixin, Y. 32
 Wei, Y.T. 212
 Welman, K. 161
 Wenli, H. 273
 Widjanantie, S.C. 184
 Wijaya, C.P. 213
 Wilkinson, D. 130, 162
 Williams, G. 13, 146
 Wirawan, R.P. 157
 Wolenski, V. 102
 Wolf, A. De 34
 Wong, A.M. 228
 Wong, C.P. 42
 Wongnor, Y. 264
 Wongphaet, P. 41
 Wong, S. 33
 Wongsriruang, N. 264
 Wong, T.Y. 47
 Wongwilairat, K. 120
 Wong, Y.T. 208
 Won, S.J. 169
 Woo, C. Ji 137
 Woszczak, M. 86, 167
 Wright, R. 37
 Wu, C.Y. 41
 Wu, H. 250
 Wu, J.T. 268
 Wu, W. 111
 Wu, W.S. 274
 Wu, W.T. 84, 201
 Wu, Y. 241
 WU, Z. 205
- X**
- Xia, L. 49, 283
 Xiang, B. 239
 Xiaofei, H. 25, 50
 Xiao, L. 4
 Xiaomeng Gao 38
 Xie, C. 250
 Xi, L. 122
 Xiufang Zhang 38
 Xong, D. 4
 Xuan, W. 37
 Xu, C. 207
 Xuejie, Y. 128
 Xu, G.Q. 25, 50, 54
 Xu, R.Y. 71
- Y**
- Yadav, R. 18, 188
 Yadav, S. 33
 Yagi, M. 143
 Yahata, T. 157
 Yahaya, A.S. 62
 Yahyazadeh, K. 97
 Yamada, E. 36
 Yamada, J. 177, 238, 265
 Yamada, K. 14
 Yamada, M. 146
 Yamada, N. 29
 Yamada, S. 228
 Yamada, Y. 248
 Yamaguchi, A. 126, 268
 Yamaguchi, M. 261
 Yamaguchi, N. 56
 Yamakawa, H. 215
 Yamakawa, T. 88
 Yamako, G. 257
 Yamamoto, A. 289
 Yamamoto, H. 257
 Yamamoto, K. 295
 Yamamoto, M. 248
 Yamamoto, S. 289
 Yamanaka, S. 56
 Yamauchi, S. 126, 191, 268
 Yamazaki, M. 22, 52, 126, 131, 152, 225, 264, 268
 Yamazaki, R. 130
 Yam, L. 265
 Yam, T.T.T. 3, 59
 Yanagihara, N. 243
 Yanagisawa, S. 120
 Yang, A.L. 244
 Yang, B.S. 40, 41
 Yang, C.C. 246
 Yang, C.H. 78, 217
 Yang, C.Y. 249
 Yang, H.L. 67
 Yang, J. 4, 111
 Yang, J.C. 216
 Yang, J.D. 112
 Yang, L. 207, 210
 Yang, P.Y. 208
 Yang, S. 91
 Yang, S.N. 171
 Yang, W. 139, 140
 Yang, Xiaojiao 50
 Yang, Y. 211, 280
 Yang, Y.H. 60
 Yanikoglu, I. 96
 Yan, T. 247
 Yao, L. 248
 Yap, E. 78
 Yaşar, E. 116, 121, 148, 151, 172, 197, 223
 Yasunaga, H. 143
 Yasuo, M. 98
 Yasuyoshi, W. 225
 Yavuz, F. 91, 102
 Yebra Martinez, M. 141
 Yeh, S.C. 263
 Yelden, K. 13, 146
 Yelnik, A. 3
 Yen, L.W. 269
 Yen, Y.S. 109
 Yeo, D.S.C. 142
 Yeom, H.G. 14
 Ye, Q. 164
 Yeung, E.W. 234
 Yeung, S.S. 234
 Yi-Ching, H. 19, 71
 Yi, H. 234
 Yi, J. 269
 Yilmaz, B. 170
 Yin, Y. 26, 241
 Yin, Z. 29
 Yi, T.I. 134, 210
 Yilmaz, A. 67
 Yilmaz, B. 20, 65, 92, 103, 105, 114, 116, 121, 147, 148, 151, 164, 165, 172, 197, 222, 223
 Yilmaz, H.E. 99
 Yilmaz Yalcinkaya, E. 193
 Yoda, M. 120
 Yoichiro, A. 259
 Yokoshima, Y. 23
 Yokota, J. 56
 Yolanda, R.P. 22, 23
 Yoleri, O. 98
 Yonemura, T. 216
 Yoon, J.S. 170, 171
 Yoon, K.J. 86, 87
 Yoon, Y.S. 115, 167
 Yorulmaz, E. 35, 67
 Yoshida, N. 257
 Yoshida, S. 140
 Yoshikawa, F. 192, 252
 Yoshikawa, M. 222
 Yoshikiyo, K. 237
 Yoshitada, S. 209
 Yoshitake, H. 126
 Yoshiya, S. 89
 Young, K.Y. 268
 Young, L. 53
 Yozu, A. 252
- Yuanita, I. 215
 Yuan, S. 53
 Yuan, T. 164
 Yu, C.H. 270
 Yue, L. 25, 46
 Yu, E.Y.T. 59
 YU, H. 269
 Yujue, W. 46
 Yukio, M. 253
 Yu, L. 54, 183, 241
 Yu, Lehua 27
 Yuliawiratman, B.S. 143
 Yu, M. 270
 Yun, G.J. 205
 Yunis, G. 100
 Yun, X. 248
 Yura, S. 295
 Yuriko, I. 259
 Yusmido, Y.A. 158, 206, 239
 Yuzniza, M.Y. 292
- Z**
- Zainal Abidin, I.Z. 284
 Zainal, R. 9, 62
 Zakaria, S.R. 62
 Zamli, A.H. 62, 158
 Zangrando, F. 110
 Zan, L. 68
 Zaoui, A. 201
 Zeng, J.S. 25, 50, 54
 Zetty Noreeta, M.R. 221
 Zhang, A. 49
 Zhang, B. 164, 209, 245
 Zhang, G. 102
 Zhang, H. 147
 Zhang, J. 13
 Zhang, L. 211, 241, 245
 Zhang, Li 50
 Zhang, M. 13, 185
 Zhang, P. 233
 Zhang, Q. 25, 50, 54, 245
 Zhang, R. 218
 Zhang, S. 111, 164
 Zhang, W. 92
 Zhang, X. 99, 247
 Zhang, Xiaoli 245
 Zhang, Y. 99, 211, 281
 Zhan, J. 68
 Zhan, Yaoyuan 56
 Zhao, J. 209
 Zhao, X. 257
 Zhao, Y. 239
 Zheng, C. 241
 Zheng, G. 234
 Zheng, H. 161, 245
 Zheng, L. 212
 Zheng, Y.R. 214
 Zhibin, W. 26
 Zhong, Y. 26
 Zhou, C. 210
 Zhou, H. 233
 Zhou, J. 45, 99, 193, 248, 258
 Zhou, M. 78
 Zhou, Q. 4
 Zhou, Y. 49, 113, 283
 Zhuanping, C. 247
 Zhukova, N. 125
 Zhu, X. 281
 Zhu, Y. 209
 Zohra, B.S. 150
 Zulin, D. 46
 Zunke, G. 115

