Flexion. The demand for strength in hip flexion to manage the activities of daily living is not greater than that of lifting the foot up a step or a curb, while the range of hip flexion must be large, e.g. to be able to rise from a chair. The flexion force of the ilopsoas muscle was very weak in all patients, which did not change between the examinations. This was thought to be due to the bad lever arm condition of the muscle being shortened as a result of the operation. Despite this weakness all patients except one could lift the foot up a step using the lateral hip flexors at the same time.

No great difference could be seen in flexion force since the first examination.

Extension. Of all tested muscles the gluteus maximus was the strongest in all patients. The muscle was not inscised during the operation. One patient (K. S.) increased his strength from 0 to 116%, indicating that he was stronger on his operated side. Another patient (K. L.) had abandoned his cane, increased 20%, and was now almost as strong as on the non-operated side. Good hip extension strength was related to weight bearing on the operated leg and consequently also to ability to walk without a cane, to gait velocity and to maximal walking distance.

It was also obviously related to formation of a hip joint roof on the os ilium, to an intact femoral head and to young age. One patient (A. K.) who did not put any weight on her hip, walked with two crutches and had no hip joint roof or femoral head, consequently showed little strength in hip extension.

Abduction. All patients compensated for the bad lever arm condition of the gluteus medius by using the tensor fasciae latae and rectus femoris when trying to abduct. When instructed to use the gluteus medius in the supine position the torque was half of the torque of the non-operated side in the strongest patient (K. S.). This, however, was not sufficient to abduct the leg against gravity. On weight bearing, the bad lever arm condition grew even worse making it impossible to avoid a Trendelenburg gait. One patient (K. L.) showed an increase since the previous examination, which corresponded to his increase in weight bearing. The increase was less than 15%, but in this particular instance the increase was so marked in comparison with initial registrations that it can still be regarded as a real and valid increase.

When, with regard to the tumour, surgery can be radical without necessarily depriving the patient of the lower limb, a satisfactory functional result can be expected. This material shows that gait ability and hip muscle strength are reduced, function is surprisingly good many years after the operation. An important factor to consider is also the psychological advantages.

REFERENCES

Address for offprints:
Elsa Ohlsson
Department of Orthopedic Surgery
Karolinska Hospital
S-171 76 Stockholm
Sweden


HLA-B7 AS A DIAGNOSTIC SCREENING TOOL IN CHRONIC LOW BACK PAIN

Johan Sandström, Gunnar B. J. Andersson and Lennart Rydberg

From the Department of Orthopaedic Surgery, Sahlgrenska Hospital, and the Blood Centre, Sahlgrenska Hospital, Göteborg, Sweden

ABSTRACT. Forty-five of 52 consecutive patients with chronic low back pain were screened for presence of HLA-B7 antigen one year after they were included in a rehabilitative program. Six (13.3%) were positive and, when re-examined radiographically, 2 had signs of ankylosing spondylitis. The proportion of antigen-positive individuals is similar to that found in a population study of healthy Swedish blood donors, and within the other populations of healthy controls. It is concluded that HLA-B7 is of limited diagnostic value as a screening test for ankylosing spondylitis in a patient group with chronic low back pain.

Key words: HLA-B7, ankylosing spondylitis, low back pain, prediction

Chronic low back pain is a common cause of functional limitation and disability, not infrequently leading to prolonged or permanent sickness absence from work. Being a symptom and not a disease, chronic low back pain can arise from several aetiologies. Degenerative changes are considered to be the most frequent cause, but chronic low back pain can sometimes indicate inflammatory disease. Back pain of inflammatory etiology can be difficult to diagnose, at least in the early stages. Great interest was therefore expressed when a statistically significant association was reported (1) between ankylosing spondylitis (AS) and a histocompatibility complex antigen HLA-B27. Typing for HLA-B27 has thereafter been used as a diagnostic tool, but the clinical value of its use on a routine basis has been uncertain.

In recent years the association between HLA-B27 and AS has been clearly documented. The specificity is low, however, reducing the value of routine typing for screening purposes. Calin (2) found the sensitivity to predict ankylosing spondylitis from the presence of HLA-B27 to be 95%, whereas the specificity was only 20%. In 1979 JuGS (4) reported a surprisingly high percentage (42.4%) of HLA-B27-positive subjects in a series of patients with chronic low back pain, and concluded that the diagnostic value was significant. Some uncertainty arose from the fact, however, that JuGS's papers reported on patients from a rheumatology ward, where selection can have prevailed.

The purpose of the present study was to evaluate the diagnostic role of HLA-B27 in a group of patients with chronic low back pain, in which inflammatory disease was not clinically suspected on the basis of history, physical examination and radiographs.

PATIENTS AND METHODS

HLA-B27 typing was done on a group of patients, who formed part of a study material in which the purpose was to evaluate different prospective factors in patient rehabilitation. Typing was done at least 6 months after the onset of the main study in which 52 patients took part. The inclusion criteria in the study were that the subjects should have been off work for at least 3 months, be less than 50 years of age, and have no signs of root compression. Radiographs were taken of all patients before inclusion, and at that time showed no signs of AS. All patients were Caucasians. Data about their physical status, pain history and psychological and social status will be presented elsewhere. No signs of inflammatory disease were noted. All patients were asked to participate in the HLA-B27 screening. Seven chose not to. Of the remaining 45 patients, 29 were male, 16 female. The mean age was 41 years (range 28-51).

Histocompatibility antigen typing was performed using a standard microlymphocytotoxic technique (5). New roentgenographs of the sacro-iliac joints and lumbar spine were taken in the patients shown to be HLA-B27 positive, about one year after the start of the study.

RESULTS

Six of the 45 patients were HLA-B27-positive (13.3%). Two of these patients had radiographic signs of AS at follow-up. One patient, a 49-year-old...
old man, had at that time no clinical signs of the disease and worked full time as a taxidriver. The other one, a 39-year-old woman had continued back pain, and was in need of treatment.

DISCUSSION
The prevalence of HLA-B27 antigen is different in different ethnic groups. In Caucasian populations, it varies between 5 and 10% (1, 3, 7). In a material of 500 healthy blood donors from the same region as the probands, 10.6% were HLA-B27-positive (6). The present study does not indicate any significant increased proportion of individuals with HLA-B27 among chronic low back patients, as defined above, when compared with these healthy control populations. The outcome of our investigation is that analysis of the HLA-B27 antigen is both expensive and of limited clinical value as a screening test for AS in patients with low back pain.

The test may be of diagnostic value, however, along with other symptoms and signs. These include the history, where suffering after rest is also noted and limitations of chest and spinal mobility on physical examination. Furthermore, involvement of other joints would constitute a relative indication, as well as the difficulty of interpreting subtle changes on the radiograms.

ACKNOWLEDGEMENTS
This study was supported by a grant from The Göteborg Medical Society, The Askor Foundation and The Delegation for Social Research (within the Ministry for Health and Social Affairs).

REFERENCES

Address for offprints: Johan Sandström
Department of Orthopedic Surgery I
Sahlgrenska University Hospital
413 45 Göteborg
Sweden

Scand J Rehab Med 16: 29-34, 1984

EFFECTS OF ELECTRICAL STIMULATION ON SPINAL SPASTICITY
Lojze Vodovnik, Bruce R. Bowman and Patricia Hufford
From the Rancho Los Amigos Rehabilitation Engineering Center, University of Southern California, Downey, California, USA

ABSTRACT. Seven spinal cord injured (SCI) patients with clinical signs of knee-joint spasticity were tested with the Warrenburg protocol test and an electromyograph. All patients were subjected to four-channel rhythmic electrical stimulation of the tibia muscles for three consecutive days. In five patients some improvement of spasticity was achieved. No increase of spasticity was observed in any patient. Combining results from two separate but similar studies it is contended that about one-half of randomly selected SCI patients with knee-joint spasticity might benefit by electrical stimulation.

Key words: Spinal cord injury, spasticity, electrical stimulation.

The use of electrical stimulation for relieving spasticity can be traced back to Duchenne in 1871 (14). However, even today there does not seem to exist a well documented rationale for electrical stimulation of spastic extremities. Therefore this treatment procedure is either ignored (3) or discussed in broad terms. Thus Scherber (18) states that for spinal cord injured (SCI) patients "electrical stimulation is of little therapeutic value and may even make spasticity worse". Other authors report mostly about beneficial effects but the specific techniques and stimulation sites do not seem to be of primary importance (1, 4, 6-11, 13-15, 17-19, 23-25). One of the present authors (P. Hufford) encountered after electrical stimulation of a paraepileptic patient the occurrence of dysreflexia. Patients who might develop dysreflexia should therefore be carefully monitored (blood pressure etc.).

On a normal neuromuscular system electrical stimulation exerts little influence in changing the excitation—inhibition equilibrium. In systems with a deficit it supraspinal volitional excitation (parastas), stimulation can improve volitional control (5, 16, 22). In spastic extremities which lack adequate inhibition, stimulation might act inhibitory. Thus quite specific and selective effects are achieved through rather generalized, non specific stimulation. A hypothesis attempting to explain these phenomena has been proposed recently (21) but experimental proof is still lacking.

METHOD
Four channels of cyclic stimulation has been applied to the flexors and extensors of both knee joints in seven patients with spinal cord lesions and clinical signs of spasticity in the knee joint.

During the first half period of activity (5 sec) stimulation activated the flexor of one leg and the extensor of the other leg. In the second half period the remaining two extensors and flexors were activated. It was postulated that such a stimulation sequence would produce reciprocal movements similar to the ones in gait and might favorably influence the neural reorganization at the spinal cord.

Stimulation currents were obtained from two dual channels Respod (DR) units produced by Medtronics, Inc. The stimulators were triggered from an external clock circuit which enabled a variable cycling rate. The typical period of the cycle was 10 sec. Thus for 5 sec the ipsilateral quadriceps and the contralateral hamstrings were stimulated and the next 5 sec the contralateral quadriceps and the ipsilateral hamstrings received stimulation. The stimulation parameters included compensated monophasic square pulses at a rate of 30 pulses per second with a 300 usec pulse duration. The current amplitude was set to approximately 100 mA with the rise time of the pulse train set to 2 sec.

Stimulation was applied through carbon rubber electrodes 5 x 10 cm in size. Between the electrodes and the skin a conductive electrolyte jelly (Spectra 360) was applied. The electrodes were placed over inferior parts of the quadriceps and hamstrings muscles.

A typical experiment for each patient lasted five days and was always performed in the afternoon. On the first day (usually Monday) the patient was positioned in a semireclined position on a table so that the legs could freely swing about the knee joint (Fig. 1). Electrodes were attached to one leg only (usually the left one). In addition to the two pairs of stimulation electrodes a neural ground

1 Visiting from Faculty of Electrical Engineering, Edvard Karleki University, Ljubljana, Yugoslavia.