

Abstracts of Theses from the Scandinavian Countries

Abstracts of Scandinavian theses on oncologic subjects are published under this heading. The full theses are as a rule published by the universities or as supplements to different journals. They can usually be obtained after contact with the author.

Magnetic resonance imaging and spectroscopy of the bone marrow in vivo—with special attention to the possibilities for tissue characterization in patients with leukemia

K. E. JENSEN

Department of Magnetic Resonance, Hvidovre Hospital, Denmark

Magnetic resonance imaging (MRI) is a non-invasive method which makes it possible to examine the human bone marrow as calcium containing bone tissue does not contribute with MR-signal. The diagnostic use of MRI is essentially based on differences in the relaxation process (characterized by the relaxation times T_1 and T_2) between normal and malignant tissue. As fat and water have different relaxation times, MRI is well suited for examination of the bone marrow which mainly contains fat cells and water-containing blood cells. All MR examinations in the present study were performed with a total-body MR scanner with a field strength of 1.5 tesla.

In patients with acute leukemia the bone marrow in the lumbar vertebral bodies were examined with MRI and T_1 measurements at the time of diagnosis and in connection with chemotherapy. At the time of diagnosis T_1 was prolonged in patients compared to normal subjects. In patients with complete remission a pronounced reduction of the T_1 values was observed and in most patients they became similar to the values in normal subjects. In patients without complete remission none or only slight reduction of the T_1 values was observed. In patients with relapse after initial complete remission, the T_1 values increased in connection with the leukemic relapse. In other bone marrow diseases with increased cellularity in the marrow (polycythemia vera, myelodysplastic syndrome, and chronic leukemia) there was also a prolongation of the T_1 relaxation times.

With volume selective MR proton spectroscopy it is possible to measure the fat/water ratio in the bone marrow and thus study dynamic changes of the bone marrow content. By this method simultaneous imaging and spectroscopy can be obtained and the relaxation time (T_1 and T_2) for the fat and water components selectively measured. The applicability of the method for investigating dynamic changes of the bone marrow cellularity was evaluated in patients with renal insufficiency receiving treatment with erythropoietin. The measurements showed that MR proton spectroscopy made it possible to follow changes in the amounts of fat cells and blood cells in the bone marrow. Also patients with acute leukemia were examined by volume selective proton spectroscopy. At the time of diagnosis the selective T_1 relaxation time was significantly prolonged compared to that of normal persons and also compared to that of patients with polycythemia vera.

These preliminary results show that the bone marrow cellularity obviously is not the only factor of importance for the T_1 relaxation process and that spectroscopic MR methods (in relation to MRI) seem to improve the possibility to distinguish between leukemic bone marrow and the hypercellular bone marrow in patients with polycythemia vera. In connection with induction of complete remission in patients with acute leukemia, a reduction of the selective T_1 value for the water component was observed. MRI combined with volume selective proton spectroscopy may there-

fore make it possible to study the bone marrow in acute leukemia in relation to chemotherapy.

May 1992

Circulating immune complexes and human cancer—A critical review

A. BUKH

Institute of Medical Microbiology, University of Aarhus, Aarhus, Denmark

There is a general opinion that the malignant transformation of cells results in expression of new antigens on the cell surfaces and that the body can form specific antibodies against these tumour antigens resulting in cancer-related circulating immune complexes (cIC). The demonstration of such cancer-related cIC, however, evokes a series of methodological problems. The reason is first of all the use of antigen-nonspecific IC assays for the detection of cIC in human cancer sera. Besides possible cancer-related cIC, these assays also measure cIC which are formed as a part of the normal defence against the wide spectrum of antigens to which the body also is presented. The cIC, detected with these assays, vary with regard to size, antibody class, complement-binding properties, and antigen/antibody ratio. It is therefore recommendable to use several assays based on different detection principles.

During the last decade several studies on cIC levels in human cancer sera have been reported, however with contradictory results. In patients with breast cancer, rates of elevated cIC levels between 0 and 100% have been reported! As the techniques used can be criticized from many points of view we found it important to further investigate whether cIC can be detected in human cancer sera. Patients with breast cancer, lung cancer and malignant melanoma were consecutively included in the study. Cancer-related cIC were defined as cIC values above the normal range for cIC, determined by cIC values found in a group of sex- and age-matched healthy blood donors. The collection and preservation of the samples were performed in such a way that the procedures should not cause false positive or false negative results. cIC analyses were performed by 4 different assays (solid-phase C1q-anti-IgG RIA, solid-phase C1q-pA RIA, anti-C3d anti-IgG RIA, and pIgM-RF ELISA).

Preoperatively, cancer-related IgG-cIC were found in 0–11% of the examined patients. There was no relation between cIC level and preoperative tumour volume. Operative removal of the primary tumour had no significant influence on the cIC level. Serial measurements were performed in patients with breast cancer and malignant melanoma. No significant relation between the cIC level and the development of recurrence could be found. From these investigations it was reasonable to conclude that cancer-related cIC could not be detected in the peripheral blood of the examined cancer patients. As some formed cIC might be removed on their way from the tumour to the peripheral blood, we compared, in some patients with lung cancer, the cIC level in peripheral venous blood and arterial blood from the pulmonal vein which drained the tumour area. No difference was found in the rate of cancer-related cIC.

Our studies on patients with breast cancer, lung cancer and malignant melanoma gave no evidence of the existence of cancer-related cIC in the blood. This does of course not exclude the existence of tumour antigens on the cell surface but our results indicate that the formed IC are not released to the blood or are momentarily removed from the blood stream. Another explanation could be the fact that existing tumour antigens are not capable of provoking a synthesis of specific antibodies.

August 1992

Predictors of mortality, COPD morbidity, and respiratory cancer—With special reference to respiratory symptoms, lung function, and occupational exposure to cement dust

J. VESTBO

Medical Department and Chest Clinic, Bispebjerg Hospital, Denmark

The predictive value of pulmonary symptoms (cough, expectoration, chronic bronchitis, and dyspnoea) and reduced pulmonary function and the importance of long-standing exposure to cement dust for mortality, pulmonary morbidity and cancer was studied among 1 404 middle-aged men from Aalborg. Expectoration, chronic expectoration, dyspnoea and reduced lung function were associated with mortality after adjustment for age and smoking habits. Dyspnoea, but not expectoration or chronic expectoration, had an independent predictive value beyond the value obtained by information about the patient's lung function (FEV₁); presence of dyspnoea increased the death risk during the observation period by about 50%. Lung morbidity was primarily assessed at hospital admittance from an available patient register ('Landspatientregistret'), secondarily by information about medicine intake obtained by a questionnaire ultimo 1985. Both lung symptoms and FEV were strongly related to admittance for pulmonary disease in general and chronic obstructive pulmonary disease (COPD), adjusted for age and smoking. Lung symptoms had an independent association with COPD-admittances beyond information about lung function. The risk of at least one hospital admittance for lung disease during the period 1977–1986 increased by a factor 3 by the presence of one symptom and as regards COPD-admittance by a factor 4–6. Lung symptoms were also related to medicine intake. Dyspnoea, cough and FEV₁, but not expectoration, were related to respiratory cancer after adjustment for age and smoking. The value of lung function measurements with nitrogene washing examination was also studied. However, the findings at these examinations had no significant correlation to mortality, hospital admittance or cancer. The influence of long-standing cement dust exposure on the mortality is difficult to evaluate due to a certain selection (healthy worker effect). Cement workers had no increased risk of later hospital admittance and no increased cancer risk in the present study.

August 1992

Magnetic resonance imaging of spinal tumors—A study using a 0.3 tesla vertical magnetic field.

MING HUA LI

Department of Radiology, University Hospital, S-221 85 Lund, Sweden

A total of 168 patients with spinal tumors were evaluated with MRI (0.3 T scanner, vertical magnetic field). The study shows that MRI is a sensitive method for demonstration of spinal tumors. MRI also provides a possibility to separate different histological types of tumors based on their morphology and signal characteristics.

Intramedullary tumors (25 cases): Ependymomas (6 cases) and astrocytomas (7 cases) were most common. Ependymomas have a more irregular signal pattern than astrocytomas. Astrocytomas are more common in the upper spine and are more often completely cystic. Contrast enhancement is important for separation of cyst, edema and solid tumor.

Intradural extramedullary tumors (31 cases): Neuromas (14 cases) and meningiomas (11 cases) were most common. Neuromas always had markedly increased signal intensity on T2-weighted images. Meningiomas were only hyperintense occasionally. Neuromas were more inhomogeneous than meningiomas on T1-weighted images. Contrast enhancement is valuable for delineation of small tumors.

Extradural tumors (91 cases): 76 patients had metastases, 7 primary spinal tumors and 8 multiple myelomas. T1-weighted images are almost always superior to other sequences because tumor invasion in the fatty bone marrow is seen as a low signal area in contrast to the high signal from the fat.

Spinal lymphomas (14 cases): May be divided into vertebral, paraspinal and epidural tumors. Most cases have all locations. Typically, spinal lymphoma often involves the paravertebral lymph nodes with invasion of adjacent vertebrae and extension through the intervertebral foramen to intraspinal compartment.

Spinal neurofibromatosis (7 cases): Most patients had multiple, often bilateral neurofibromas. One patient had a meningioma and one spinal dysplasia with meningoceles. MRI is superior to other modalities for evaluation of the full extent of the disease. The coronal view is often valuable because of the arrangement of the tumors. In addition to providing diagnosis, MRI is of great value in treatment follow-up.

December 1992