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NMR-CT FINDINGS OF BRAIN TUMORS.

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NMR-CT findings of more than 30 patients with brain tumor were analyzed and compared with the results of X-ray CT. NMR-CT was performed with a Siemens superconducting system (Somatom) operating at a field strength of 0.35T and a SE (spin echo) sequence was employed in most cases.
The multiplanar facility of NMR is seemed to provide more anatomical information than X-ray CT. The fact that the images of NMR-CT are unaffected by artifacts from bony structures is also considered to be of great diagnostic value.
Although, the associated brain edema or the cystic part was not differentiated from the tumor tissue in some cases. The inability to show changes of bony structure and calcifications clearly is also a drawback of NMR-CT.

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NMR-CT IN DIAGNOSING SPINAL DISORDERS.

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In order to evaluate clinical utilities of NMR-CT in diagnosing disorders of the spinal cord and canal, 66 patients (30 tumors, 11 syringomyelias, 3 anomalies, 2 traumas, 1 AVM, 5 others) were performed NMR-CT from April to October 1984. Surface coil (15cm in diameter) designed for examinations of the spinal disorders was applied to 43 cases of them. Our using machine was 0.35T superconducting NMR-CT (Magnetom). Spin echo sequences (T_1 weighted:400-600/35; T_2 weighted:1600-2000/60-120msec) were mainly used.

NMR-CT is suitable for screening examinations of the spinal disorders, because it has two valuable advantages. One of them is ability to obtain any optional plane images particularly sagittal ones. And the other is high contrast resolution, so the spinal cord, cerebrospinal fluid, intervertebral disc, and bone marrow of the spine were easily distinguishable. Surface coil was also useful for examinations of the spinal disorders except limitations of the imaging areas. It was also possible to increase the spacial resolution as the result of increasing S/N ratio during the same aquisition time. Disadvantages of NMR-CT in the spinal disorders were long imaging time, low detectabilities of the bony diiorders and calcifications, and difficulty to image the scoliotic patients.

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NMR-IMAGE vs ANATOMICAL FEATURE.

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Nuclear magnetic resonance provides a great deal of information, in addition to the indication of nuclei types and quantities according to signal amplitude. NMR pixel value is goverened by at least four parameters, proton density, p, spin-lattice relaxation time T_1, spin-spin relaxation time T_2 and proton flow velocity, V. The extent to which the signal is weighted toward one or several of these parameters is related to the sequence in which RF and the gradient magnetic field pulses are applied.

Hence the anatomical feature derived from NMR image is strongly dependent on the pulse sequence applied.

Are there any pulse sequence independent structural parameters through the series of NMR image obtained by different mode.

This problem was investigated based upon the multi-Gaussian analysis of NMR signal intensity histogram.

And the answer was "no".

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Gray Scale Model to Diagnosis of NMR-CT

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The important point for clinicians to interprete pattern of diagnostic imaging system is how to understand the principle of image production mechanism. In the case of NMR-CT,it is very difficult to interprete the image contrast because there are tissue specific parameters and operator dependent parameters (intrinsic parameters for example proton density,T1 and T2 and pulse sequence timing parameters for example recovery time,delay time and echo time) respectively. When these understanding are neglected, NMR-CT images can only be compared with X-lay CT images in terms of spatial resolution.Under these situation, the important functional information which can be obtained from NMR-CT imaging will not be evaluated. In this report, we demonstrated the various gray scale model in which NMR signal intensity was measured through theoretical equation with various parameters and displayed visually. These model will help clinician's understandings about NMR-CT image and can be used for the supplementary interpretative scale to diagnose the NMR-CT images.