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EVALUATION OF AGING OF THE BRAIN BY MEASUREMENT OF IN VIVO T-1 VALUES.

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Aging process of the brain was evaluated by measurement of in vivo T-1 value. Normal volunteers, as well as patients with neither neurological deficit nor abnormal findings on X-ray CT, were studied with FONAR QED-80α system, composed of dual functions of imaging display by Steady-state-free-precession (SSFP) technique (static magnetic field;433.6G) and measurements of T-1 relaxation times by field focusing technique. Age distribution ranged from 7 to 83 years old. T-1 values of cerebral gray matter altered with aging. Younger group below 25 in age revealed signifficantly prolonged values of T-1. In adult group (aged 26-45), the T-1 values were found to be shortend as compared with others. T-1 values tended to be prolonged in elder group above 46 years old. Otherwise, T-1 values of cerebral white matter, basal ganglia and other areas revealed no signifficantly difference corresponding to aging of the brain.

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ANALYSIS AND SYNTHESIS OF T_1 IMAGES BY NMR-CT.

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T_1 images as currently utilized in clinical practice are generally obtained by calculation from two IR or SR images having different parameters. In analytical chemistry on the other hand the T_1 values themselves are obtained from numerous IR signal measurements at various delay times, a method which not only yields a precise determination of T_1 but also allows analysis as to the number of components contributing to this value. This paper describes our application of the method of least squares, utilizing the T_1 and equilibrium magnetism parameters, to numerous IR images obtained by NMR-CT with various delay times, to obtain an analysis of T_1 for individual pixels and to construct both T_1 images and error approximation images. Analysis of the T_1 values thus obtained for brain tissues in vivo indicates a single-component T_1 for many of the pixels. Comparison between the T_1 image thus obtained and that obtained by the conventional method, moreover, shows a close agreement between their respective T_1 values at numerous pixels, thus confirming the validity of conventional T_1 images.

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THE RELAXATION TIMES OF THE CVA.

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The relaxation times of lesions of the cerebral infarction and the cerebral hemorrhage are examined T1 and T2 relaxation times of the cerebral infarction are significantly longer than those of the cerebral hemorrhage. In relation to its time course, the relaxation times of the both lesions lengthen significantly. And the slope of the regression line of the cerebral infarction is significantly higher than that of the cerebral hemorrhage.

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NMR-CT IMAGING OF MALIGNANT BRAIN TUMORS.

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Using with NMR-CT placed in the National Institute of Radiological Sciences,malignant brain tumor imaging study has been performed . Our experince and results will be reported . The Asahi Mark-J 10 NMR-CT scanner used in this study is an improved version of the Mark-1 scanner developed at Aberdeen Univ., and constructed by Asahi Chemical Group. It employs a resistive magnet to obtain a static magnetic field of 0.1 Tesla,with scanning by the spin-warp and 2-DFT method. Available pulse sequences are saturation-recovery(SR),inversion-recovery(IR) and calculated T_1. In addition to the improved quality of the image by the increased data samples from 128x128 to 256x256,the choice of appropriate pulse sequences makes images more sharp. Differentiation the tumor from the surrounding edema,intratumoral and peritumoral structures are shown to allow ready observation by NMR-CT. The availability of coronal and sagittal as well as transverse section is seen to yield more precise anatomical information and helpful to approach the lesion surgically.