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CHANGES OF T1 VALUES IN THE NMR IMAGING OF EXPERIMENTAL CLOTS.

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Recently,cardiovascular thrombi have been studied on their shapes and properties by the NMR imaging.

In this study,the clots were made from human hole blood with CPD by adding thrombin in vitro,and T1 values and percent water contents of the clots were subsequently measured with a given time interval after clotting.

Both T1 values and percent water contents of the clots were gradually decreased after clotting,and the T1 values were directly proportional to the percent water contents (r=0.64).The T1 values of the clots,however, were not solely dependent on the percent water contents and there might be another factors involved in determination of their values.

The result suggests that a watery and fresh thrombus might have a longer T1 value than that of an organized thrombus.

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ECG GATED NMR-CT FOR MYOCARDIAL INFARCTION.

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We have applied ECG gated NMR-CT to 13 patients with myocardial infarction (MI). NMR machine has superconductive magnet and data acquisition is spin-echo technique (TR: depends on patient heart rate, TE: 35 and 70 msec). The time between the recent attack and NMR study was 9 days to 9 years. On NMR images, We examined the wall thickness and T_2 relaxation time in the areas of MI. The lesions of old MI were depicted as the area of thin wall and T_2 relaxation time of those lesions were similar to the area of non-infarcted myocardium. The lesions of recent MI (up to 3.5 months from the recent attack) were shown as the same wall thickness as the non-infarcted myocardium and the area of prolonged T_2 relaxation time compared with that of non-infarcted myocardium. T_2 relaxation time of each area of old MI, recent MI and non-infarcted myocardium was 42.9 ± 11.1, 61.7 ± 20.1, 40.3 ± 8.5 msec. respectively. In conclusion, ECG gated NMR images offer the useful informations to diagnose MI, especially in the differential diagnosis between old and recent MI.

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BLOOD FLOW IMAGING BY NMR.

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This paper describes the combined use of IR and SR imaging of blood flow, prompted by the frequent observation in clinical NMR-CT scanning of low-intensity IR images of veins perpendicular to the slice, for which SR images are often higher in intensity than those of fatty tissue.

Application of Bloch's equation to spin-lattice relaxation times as affected by blood flow for the SR and the IR mode allows derivation of the effective spin-lattice relaxation time for each mode. The flow velocity can be calculated as the difference between the reciprocals of these two times. These calculations indicate the time for the IR mode to be virtually unaffected by the flow velocity, thus allowing flow-dependent images to be obtained in the SR mode alone, and further indicate it is possible to obtain flow-distribution images by combining the two modes.

The flow-dependent images with the SR mode and flow distribution images with the combined SR and IR modes, as obtained by application of this method show blood flow imaging to be possible with the conventional pulse sequence by calculation of these times.

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CLINICAL EVALUATION OF NMR IMAGE IN THE DIAGNOSIS OF PRIMARY BONE TUMORS.

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Diagostic capability of NMR image in malignant primary bone tumor was evaluated comparing with those of X-ray examination and RN image. Asahi Mark-J with 0.1T resistive magnet was used. Six patients with osteosarcoma and a patient with Ewing's sarcoma underwent NMR imaging of the bone. NMR detected not only the bone abnormalities in high contrast image but also spread in the bone marrows and the soft tissues, which correlated well with the findings of surgically removed specimens. Comparing with X-ray examination and RN image, NMR image was superior in visualization of soft part extent of the lesions. NMR seemed to become one of the most useful imaging method for the diagnosis of malignat bone tumor.