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PARAMETER WEIGHTING INDEXES IN MRI OF LEC RAT
LIVERS TAKEN UNDER A MAGNETIC FIELD OF 7 TESLA

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Using an SIS 300/183 MR imaging system with a powerful gradient coil, MR images of livers of Long-Evans cinnamon (LEC) rats were taken under a strong magnetic field of 7.05 Tesla. LEC rats are known to accumulate several metals such as copper and iron in their livers and suffer from acute hepatitis from the age of 15 to 26 weeks. Since some metals are paramagnetic, it was inferred that the relaxation times, T1 and T2, characteristic of LEC rat livers were largely changed by these paramagnetic metal ions under the strong magnetic field and thereby MRI images of the livers were strongly affected. In the present study, MR images of the livers of three LEC rat groups (prior to, in the midst of, and after acute hepatitis) were first taken under various imaging conditions. The best images were obtained when taken under proton-weighting conditions (the repetition period for the entire sequence (TR) = 2000 ms and the echo time (TE) = 20 ms), but when MR images obtained from the livers in the acute hepatitis phase (15–26 weeks) were compared with those obtained from the livers of the normal Wistar rats, MR images were observed to have bad contrast due to the drop in MR signal intensity.

To explain this phenomenon, the relaxation times, T1 and T2, of livers of LEC and Wistar rats were then measured by the inversion-recovery and Carr-Purcell-Meiboom-Gill methods in Fourier-transform NMR spectrometry, respectively, and MR signal intensities and the parameter weighting indexes of MR images taken under various conditions were calculated using these relaxation times. The results indicated that short T1 and T2, low MR signal intensity and a high T2-weighting index were responsible for the difficulty in obtaining clear MR images of acute LEC rat livers.