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Preoperative assessment of the hepatic fat fraction in living liver donor candidates using breath-hold, triple-echo dixon water-fat separation imaging and T2-corrected magnetic resonance spectroscopy

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PURPOSE: To evaluate the diagnostic performance of breath-hold T2*-corrected triple-echo Dixon water-fat separation imaging and T2-corrected ^{1}H-magnetic resonance spectroscopy (MRS) for assessment of the hepatic fat fraction (FF) using histologic assessment as a standard of reference.

MATERIALS AND METHODS: Seventy-three liver donor candidates who had undergone histologic evaluation of hepatic FF and who had undergone preoperative MRI including both T2*-corrected triple-echo Dixon imaging and T2-corrected MRS on a 3.0 T scanner, were included in this study. One radiologist performed regions of interest measurements on the FF map calculated from the triple-echo Dixon imaging. Single voxel ($3 \times 3 \times 3$ cm^3) MRS was also performed in the right liver lobe. The degree of histologic fat deposition was semi-quantitatively assessed by liver pathologists and also by computerized image analysis of pathology slides. The statistical analysis was performed by using the Spearman correlation coefficient, and receiver operating characteristic (ROC) analysis was also performed to detect abnormal hepatic FF.

RESULTS: The results of the hepatic FF obtained by triple-echo Dixon imaging and MRS were significantly correlated with the hepatic FF assessed by computerized image analysis of the pathology slides. ($r = 0.595$ and 0.636, respectively). By ROC analysis, the Az values for detection of 5% or greater macrovesicular fat accumulation on triple-echo Dixon imaging and MRS were 0.906 and 0.895, respectively.

CONCLUSION: Both triple-echo Dixon imaging and T2-corrected MRS allowed noninvasive assessment of the hepatic FF for the living liver donors and therefore, preoperative assessment of steatosis might be sufficiently achieved using both triple-echo Dixon imaging and T2-corrected MRS.