Clinical Utility of Quantitative Fat Imaging

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The following clinical cases are presented to demonstrate the potential clinical utility of IDEAL IQ and how it could be used in conjunction with the MR-Touch application for assessment of diffuse liver disease.

Case 1

A 41-year-old patient with diabetes and recalcitrant hypertriglyceridemia (TG=1022) being treated with plasmapheresis. Note the decrease in triglyceride fat fraction and decrease in the size of the liver.

IDEAL IQ used in conjunction with MR-Touch may play an important role in the non-invasive assessment of diffuse liver disease.

Case 2

A 16-year-old patient with Polycystic Ovary Syndrome (PCOS) and non-alcoholic steatohepatitis (NASH) related to PCOS-associated insulin resistance. MR-Touch and IDEAL IQ images acquired at 3T reveal elevated liver stiffness and significant triglyceride fat deposition at 31%. The T2* measured from the R2* map (20 ms) was within normal limits. Biopsy results confirmed severe steatohepatitis with mild fibrosis.
Case 3

A 10-year-old patient presented with abdominal pain. Conventional MR scan revealed an enlarged liver on fat saturated T2 weighted images and a drop-out of signal on the out-of-phase image, indicating the presence of triglyceride fat. MR-Touch demonstrates markedly elevated liver stiffness (red regions), while IDEAL IQ demonstrates elevated triglyceride fat fraction (22%) and elevated T2* (40 ms). These findings, in addition to the enlarged liver, are consistent with steatohepatitis. Biopsy performed on the same day demonstrated severe steatohepatitis with severe fibrosis, just short of cirrhosis, concordant with imaging findings from MR-Touch and IDEAL IQ. Given the lack of alcohol intake and negative viral serologies, both imaging and biopsy findings are concordant and consistent with NASH, the aggressive subset of NAFLD.

Discussion

IDEAL IQ is a promising MR-based technique that provides volumetric, whole-liver coverage in a single breath-hold and generates estimated T2* and triglyceride fat fraction maps in a non-invasive manner.