Effect of fat deposition in the liver on multi-parametric quantitative values at 3.0T MRI

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Target Audience: Radiologists who are interested in quantitative MRI of the liver.

Purpose: Quantitative MRI such as relaxometry, diffusion weighted image and MR elastography (MRE) is widely used for the objective evaluation of both diffuse and focal liver lesions. In this study, we tried to assess the effect of fat deposition in the liver (L_{fat}) on multi-parametric MRI values at 3.0T MRI.

Materials and Methods: Sixty healthy volunteers (Age, 37.8 ± 12.5 year; male:female, 44:16) without liver disease were prospectively enrolled and underwent MRI at 3.0T MR system. L_{fat} was measured by modified Dixon method 3D FFE sequences (TR/TE1, 3.3ms/1.2ms; slice thickness (ST), 2mm). In all patients, T1 (Lock-Locker sequences; TR/TE, 10ms/0.8ms; 16 phases; ST, 8mm), T2 (TSE sequence; TR, 500ms; 8 echoes with interval of 12ms; ST, 8mm), and T2* (FFE sequence; TR/TE, 200ms/2.8ms; 17 echoes with interval of 2.7ms; ST, 5mm) relaxometry, DWI (b=0,50,400,800; TR/TE, 1579ms/58ms; ST, 5mm) and multi-frequency MRE (transducer frequency, 28Hz/56Hz/84Hz; 3D gradient FFE sequence; TR/TE, 75.8ms/6.7ms; ST, 4mm) were acquired. Pearson correlation coefficient was calculated for evaluating the relationship between BMI and L_{fat} and between L_{fat} and multi-parametric MRI values.

Results: There was a significant positive correlation between BMI and L_{fat} (Pearson correlation coefficient = 0.566, P<0.001). There was a significant positive correlation between T2 value and L_{fat} (0.684, P<0.001) and a week negative correlation between T2* value and L_{fat} (-0.283, P=0.028). However, there was no significant correlation between T1 value and L_{fat}, Between ADC and L_{fat}. and between all MRE modulus (shear, loss and complex modulus) and L_{fat} in all three transducer frequencies (P >0.05).

Conclusion: L_{fat} can affect T2 and T2* values. Hence, L_{fat} should be adjusted when T2/T2* values are used as quantitative parameter for the evaluation of focal or diffuse liver disease.
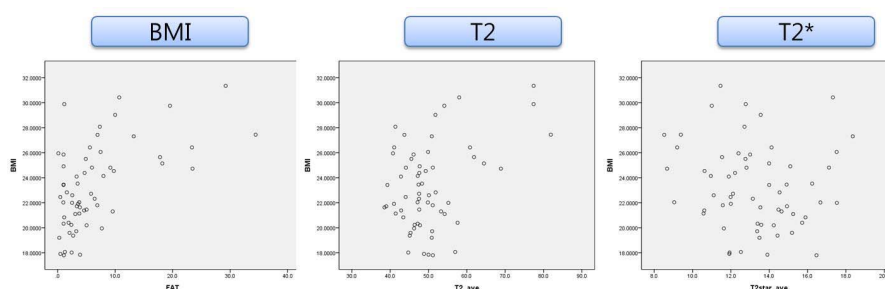

Figure: There was a significant difference between BMI and L_{fat}, and between T2/T2* values and L_{fat}.