Imaging in Chronic Liver Disease: A Comparative Analysis Using Magnetic Resonance Elastography and Multiparametric Magnetic Resonance Imaging

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PURPOSE:

To assess the comparative diagnostic value of multiparametric MRI (mpMRI) and magnetic resonance elastography (MRE) in real-world clinical practice for managing suspected chronic liver disease.

METHODS:

- A retrospective analysis of the prospective MR exams of 77 patients referred to tertiary chronic liver disease practices.
- Patients underwent MRE and mpMRI as a part of their routine clinical care. MRE measures liver fibrosis with liver stiffness (kPa).
- mpMRI quantifies liver fibro-inflammatory disease activity (iron-corrected T1, cT1), fat (proton density fat fraction, PDFF), and iron content (T2*). T1 (cT1) mapping was performed using a modified Look-Locker sequence (LiverMultiScan; Perspectum, Oxford, UK), T2* using DIXON and PDFF using the IDEAL approach.
- Whole liver median cT1 and PDFF were calculated from four axial images through the mid-liver.

RESULTS:

Characteristic	Full cohort
N, n	77
NAFLD/NASH Diagnosis	42 (55%)
Mixed Chronic Liver Disease[1]	45%
Normal Liver Stiffness (≤3.0 kPa)	55 (71%)
Normal Liver Stiffness and Active Disease Activity (cT1>800 ms)	22
Normal Liver Stiffness and High-Risk NASH status (cT1>875 ms)	11

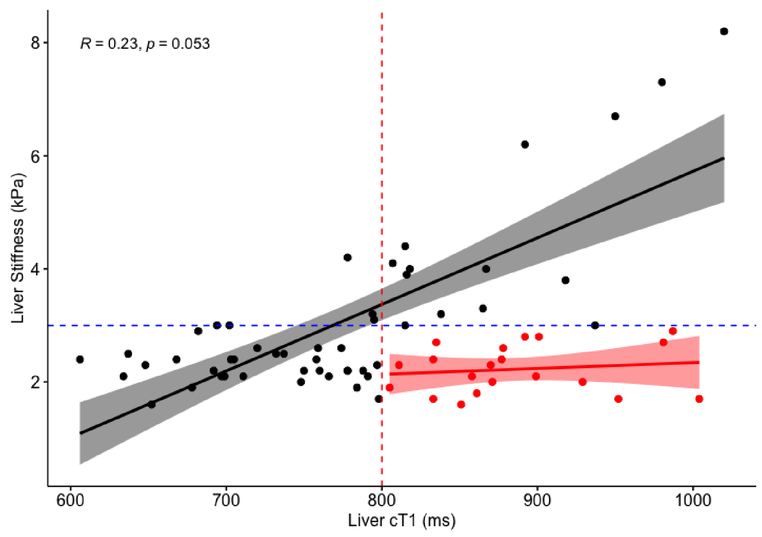
1. Alcoholic liver disease, viral hepatitis, hemochromatosis, high ferritin, etc

The majority, 71% (55), had normal liver stiffness (≤3.0kPa), however, 29% (22) of these had active disease activity (cT1>800ms), with 14% (11) having elevated cT1 indicative of high-risk NASH (cT1>875ms). There was a linear significant correlation between MRE and cT1 (r=0.411, p-0.0004), and those with elevated MRE (MRE>3kPa) had cT1 864±74ms. Moreover, cT1 correlated with PDFF (r=0.5, p<0.001), but MRE did not (r=-0.055, p=0.65).

RESULTS:

In terms of device performance, mpMRI was successful in 99% (76) of patients, whilst MRE was successful in 90% (69), with technical failure in 9% (7); both had an unreliable result in 1 patient. Most MRE technical failures were in patients with elevated liver iron (T2*<12.5ms).

Figure 1. Linear significant correlation between MRE and cT1. Notice the red line (cT1 values signifying patients with liver disease activity; nevertheless, MRE shows normal liver stiffness.



CONCLUSION:

- MRE and mpMRI provide clinically useful complementary information on the state of liver health.
- mpMRI identifies patients who are at risk of worse outcomes with underlying liver disease activity but have normal liver stiffness.
- This subset of patients should be followed closely to assess the added benefit and predictive value of liver cT1, in addition to MRE
- Technical failure of MRE was significant and caution should be taken in utilizing MRE in patients with suspected high liver iron.

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