Hepatic T1-times on Cardiac Magnetic Resonance Reflect Liver Fibrosis and Predict Outcome

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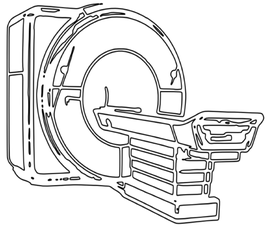
Objective

Non-alcoholic fatty liver disease (NAFLD) is associated with dismal outcomes in patients with cardiac disorders but infrequently assessed by cardiologists. Cardiovascular magnetic resonance (CMR) is evolving as one-stop-shop imaging modality in cardiology, allowing for non-invasive myocardial tissue characterization by T1-mapping. On standard CMR exams, hepatic tissue is also assessable on T1-maps. **However, it is unknown whether hepatic T1-times are associated with 1) established NAFLD scores, and 2) outcomes in patients referred for CMR.**



513 patients

Hepatic T1-mapping on CMR

100±40 months follow-up

137 events

Fig. 1: Key study data.

Patients and Methods

In **consecutive patients undergoing CMR** we assessed **hepatic and myocardial T1-times, and the NAFLD Fibrosis Score (NFS)**. The NFS uses a number of clinical (age, body mass index, diabetes) and laboratory results (AST/ALT, platelets, albumin) to stratify patients into three categories (no/mild fibrosis; indeterminant score; severe fibrosis/cirrhosis).

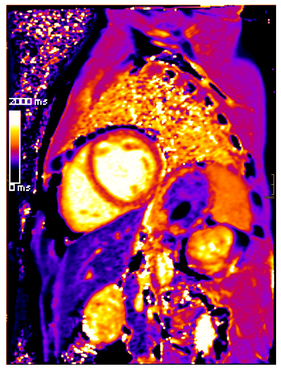


Fig. 2: Native T1-map allowing for non-invasive tissue characterization of the myocardium and the liver.

Correlation analyses were used to test the association between hepatic and myocardial T1-times as well as the NFS. We used Kaplan-Meier estimates and Cox-regression models to investigate the association between hepatic T1-times and a **composite endpoint of heart failure hospitalization and cardiovascular death**.

Results

513 patients were included (57±18 y/o, 49% female). Hepatic T1-times were 588±98ms on average weakly correlated with the NFS (r=0.11, p=0.04). During follow-up (100±40 months), a total of 137 (27%) events occurred. **Higher hepatic T1-times were associated with higher risk for events** (log-rank, p=0.01, for quartiles), which was consistent across different NAFLD risk groups based on the NFS. On Cox regression analyses, higher hepatic T1-times yielded significantly higher risk estimates for events (adj. HR 1.20 [95%CI: 1.04-1.38] per 1-SD increase, p=0.01) even when adjusted for age, sex, left and right ventricular ejection fractions, and myocardial T1-times.

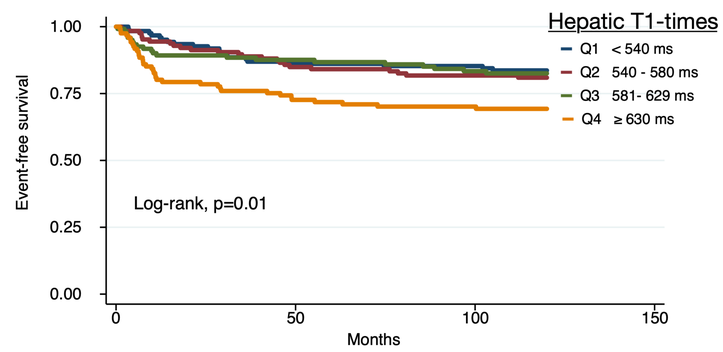


Fig. 3: Kaplan-Meier-curves stratified by hepatic T1-time quartiles.

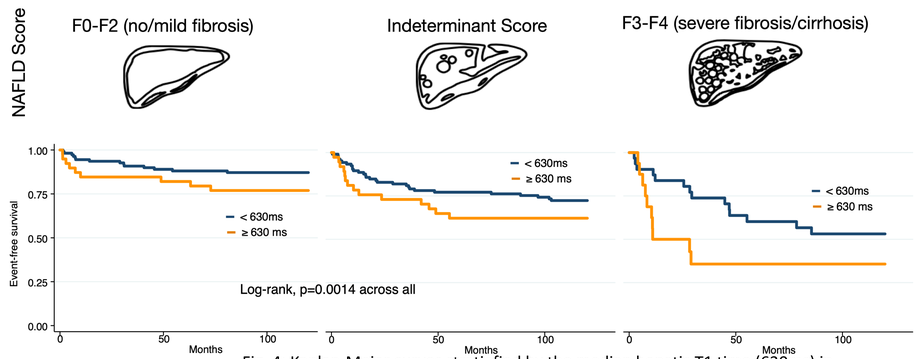


Fig. 4: Kaplan-Meier curves stratiefied by the median hepatic T1 time (630ms) in patients with no/mild fibrosis, indeterminant NAFLD score, and cirrhosis.

Conclusion

Hepatic T1-times assessed on standard CMR reflect severity of NAFLD and predict outcome on top of established risk factors, including myocardial T1-times, in an all-comer CMR cohort.

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