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Prognostic significance of infarct core pathology in ST-elevation myocardial infarction survivors revealed by quantitative T2-weighted cardiac magnetic resonance

David Carrick[2,1*], Caroline Haig[3], Samuli M Rauhalammi[2], Nadeem Ahmed[2], Ify Mordi[2], Margaret McEntegart[1], Mark Petrie[1], Hany Eteiba[1], Stuart Hood[1], Stuart Watkins[1], Mitchell Lindsay[1], Ahmed Marous[1], Aleksandra Radjenovic[2], Ian Ford[3], Niko Tzemos[2], Keith G Oldroyd[2,1], Colin Berry[2,1]

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Background

Myocardial transverse relaxation time (T2, ms) is a fundamental magnetic property of tissue that is related to water content and mobility. The pathophysiological and prognostic importance of native myocardial T2 in acute ST-elevation myocardial infarction (STEMI) patients is unknown. We aimed to assess the clinical significance of native T2 within the infarct core using cardiac magnetic resonance (CMR) imaging.

Methods

We performed a prospective single center cohort study in reperfused STEMI patients who underwent CMR 2 days and 6 months post-MI. T2-weighted CMR (investigational prototype T2-prepared TrueFisp sequence) was measured in myocardial regions-of-interest. The infarct territory and microvascular obstruction were depicted with late gadolinium enhancement CMR. All-cause death or heart failure hospitalization was a pre-specified outcome that was assessed during follow-up.

Results

324 STEMI patients (mean±SD age 59±12 years, 237 males, 121 with anterior STEMI) gave informed consent and had CMR (14 July 2011 - 22 November 2012). All 324 had follow-up assessments (median duration 860 days). Infarct size was 18 ±14% of LV mass. One hundred and sixty four (51%) patients had late microvascular obstruction whereas 197 (61%) patients had an infarct core revealed by native T2. Native T2 within the infarct core (53.9±4.8) was higher than in the remote zone (49.7±2.1 ms; $p<0.01$) but lower than in the area-at-risk (62.9±5.1 ms) ($p<0.01$). In multivariable linear regression, native T2 in the infarct core was negatively associated with heart rate, Killip class, and peak neutrophil count at presentation (all $p<0.05$).

Baseline T2 core (ms) was univariably associated with LVEF (0.31 (0.04, 0.58); p=0.023). Baseline T2 core was not associated with LVEF or volumes at 6 months.

Thirty (10.4%) patients died or experienced a heart failure event. These events included 5 cardiovascular deaths, 3 non-cardiovascular deaths and 22 episodes of heart failure (Killip Class 3 or 4 heart failure (n=20) or defibrillator implantation n=2). T2-core (ms) was associated with all-cause death or heart failure hospitalization (hazard ratio 0.786, 95% CI 0.658, 0.939; p=0.008) including after adjustment for LVEF at baseline (p=0.017) or LV end-diastolic volume at baseline (p=0.009).

Conclusions

Infarct core revealed by native T2 was common and independently associated with all-cause death or heart failure hospitalization post-discharge.

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[2]Institute of Cardiovascular and Medical Sciences, University of Glasgow, Glasgow, UK
Full list of author information is available at the end of the article

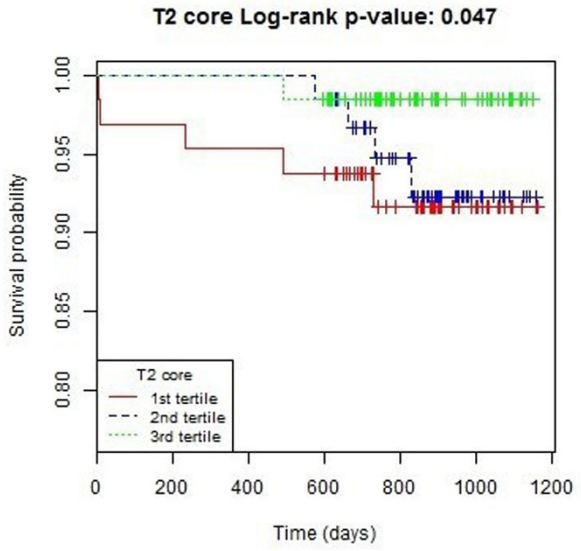

Figure 1 Kaplan-Meier survival curves grouped according to baseline infarct core T2 (lowest T2 tertile vs.tertiles 2 and 3) and all-cause death or heart failure (n=39) from and including the index admission to the end of follow-up (censor time 839 (598 to 1099) days).

Authors' details
[1]Golden Jubilee National Hospital, Clydebank, UK. [2]Institute of Cardiovascular and Medical Sciences, University of Glasgow, Glasgow, UK. [3]Robertson Center for Biostatistics, University of Glasgow, Glasgow, UK.

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