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Quantitative In Vivo T2 Measurements Differentiate Both Infarcted and Peri-Infarct from Normal Myocardium

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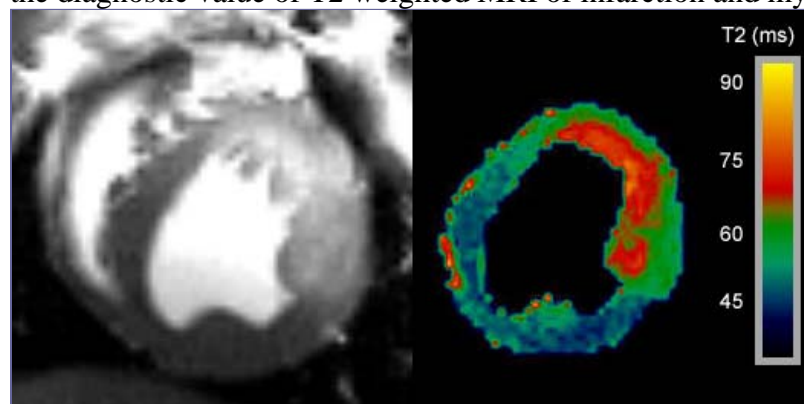
Abstract:

Introduction: T2-weighted MRI, which reflects water content and mobility, has been recently shown to delineate the area at risk (AAR). However, in-vivo T2 measurements within the viable and infarcted regions of the AAR have not been presented to date. We hypothesized that state-of-the-art T2 methods could discriminate different T2 relaxation constants not only between the AAR and remote myocardium but also between viable and infarcted tissue within the AAR.

Methods: Acute myocardial infarction was created by coronary occlusion (90 min N=9, 180 min N=5) followed by reperfusion in canines. In-vivo imaging was performed 3 days post-infarction at 1.5T. T2-prepared steady-state free-precession (T2P-SSFP) was used to measure T2 prior to Gd-DTPA infusion. Infarct size was determined by delayed contrast enhancement.

Results: T2 Bright regions within the left anterior descending coronary artery were detected in all experiments and were larger and generally of greater transmural extent than the regions of delayed enhancement. Using regions of interest determined by the delayed enhancement, T2 showed step-wise abnormalities from normal to peri-infarct and infarcted myocardium (45 \pm 4 vs 60 \pm 5 vs 67 \pm 5 ms; all pairwise comparisons significant). A threshold T2 of 54 ms distinguished normal from abnormal in all but one region.

Conclusions: The degree of edema or mobility of water varies between infarcted myocardium and the peri-infarct zone and both are significantly different from normal. Due to the subtlety of T2 abnormalities in the heart, parametric maps can display T2 in an objective manner and could improve the diagnostic value of T2 weighted MRI of infarction and myocarditis.



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