ENDOGENOUS CONTRAST MRI OF CARDIAC FIBROSIS: BEYOND LATE GADOLINIUM ENHANCEMENT

Oral Contributions
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Background: The gold standard for detecting infarct size is late gadolinium enhancement (LGE). While LGE provides an accurate qualitative measure of fibrosis, it has potential adverse effects and does not provide a quantitative or direct measurement of cardiac collagen. Aim of this study was to validate novel methods of endogenous contrast fibrosis detection using T1ρ and T2*-mapping in a porcine infarct model.

Methods: 16 Dalland Landrace pigs (69±5 kg) underwent balloon occlusion (90 min) of the left anterior descending artery, followed by reperfusion. At 8 weeks follow-up in vivo 3T MRI was performed. T1ρ and T2*-mapping were acquired using multiple gradient echo sequences. After LGE imaging, pigs were sacrificed for triphenyltetrazolium chloride (TTC) staining and histology.

Results: T1ρ relaxation time was significantly higher in the infarct region (61±11 ms), compared to healthy remote myocardium (36±4 ms) (p<0.001). A significant lower T2* was found comparing infarct to remote areas (17±5 ms vs. 24±7 ms, p<0.002). Areas with a higher T1ρ and 1/T2* correlate with corresponding LGE images and TTC staining (figure). Perl's Prussian blue staining showed an abundance of iron in the infarct area compared to remote myocardium.

Conclusions: T1ρ-mapping in vivo seems promising for direct detection of myocardial fibrosis without using contrast agents. Even after 90 min ischemia, chronic changes in T2* signal intensity could relate to post-reperfusion intramyocardial hemorrhage with iron deposits.