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Poster presentation

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Myocardial T_1-Mapping in chronic myocardial infarction: preliminary results of unenhanced and contrast enhanced MR imaging using Gadobutrol

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Purpose

At a given field strength tissues present with specific T_1-values. Reference values for normal unenhanced myocardium have been established. We hypothesize, that infarcted myocardial tissue can be delineated from normal myocardium by means of T_1-maps in unenhanced and contrast-enhanced scans.

Materials and methods

13 patients with chronic myocardial infarction were examined at 1.5 T (Magnetom Avanto, Siemens Healthcare). A modified Look-Locker inversion recovery (MOLLI) sequence (TR/TE 200.7/1.03 msec; TI 100-4000 msec; flip 35°) was performed pre- and 10 min post-contrast (0.15 mmol/kg gadobutrol, Bayer Schering Pharma) at an apical, midmyocardial and basal short axis position. For calculation of T_1-values signal intensities of myocardial and infracted tissue were measured at 11 points of time [1]with two blocks of 3 and a third block 5 consecutive image acquisitions. Within each block TI increased by steps of 80 msec.

15 minutes after contrast medium application a single slice IR GRE was employed for imaging of delayed enhancement.

Data were post-processed with an in-house built software (PMI 0.4). T_1 maps were created on the basis of unenhanced (fig. 1) and enhanced (fig. 2) data. Areas of normal and infarcted myocardial tissue were identified on delayed enhancement images and the regions of interest were copied to the unenhanced and enhanced MOLLI images. The analyses of T_1-values were performed for normal myocardium (MYO), infarcted myocardium (CMI) and the left ventricular cavity (LVC). In addition T1-ratios of MYO/LVC and CMI/LVC were calculated.

Student's t-test was used for statistical analysis of acquired and calculated data.

Results

The comparison of T_1-values of MYO (fig. 3) and CMI (fig. 4) revealed significant differences in pre-contrast scans (1028 ± 36 vs.1210 ± 63 msec; $p < 0.001$), as well as CMI T_1-values in comparison to LVC (1210 ± 63 vs.1509 ± 70 msec; $p < 0.001$). The calculated ratios of MYO/LVC and CMI/LVC were also significantly different (0.68 ± 0.04 vs.0.79 ± 0.06; $p < 0.001$) in pre-contrast scans. In post-contrast evaluations differences of T1-values in MYO and CMI were equally high (360 ± 46 vs.224 ± 55 msec; $p < 0.001$) resulting in significantly different T1-ratios of MYO/LVC (1.5 ± 0.21) and CMI/LVC (0.9 ± 0.10; $p < 0.001$).

Conclusion

MR-measurements of T_1-values with the LVC as reference allow for differentiation of infarcted areas from normal myocardium. Further studies are warranted for a normalization of values in order to reduce the dependency on contrast timing, dose and agent.

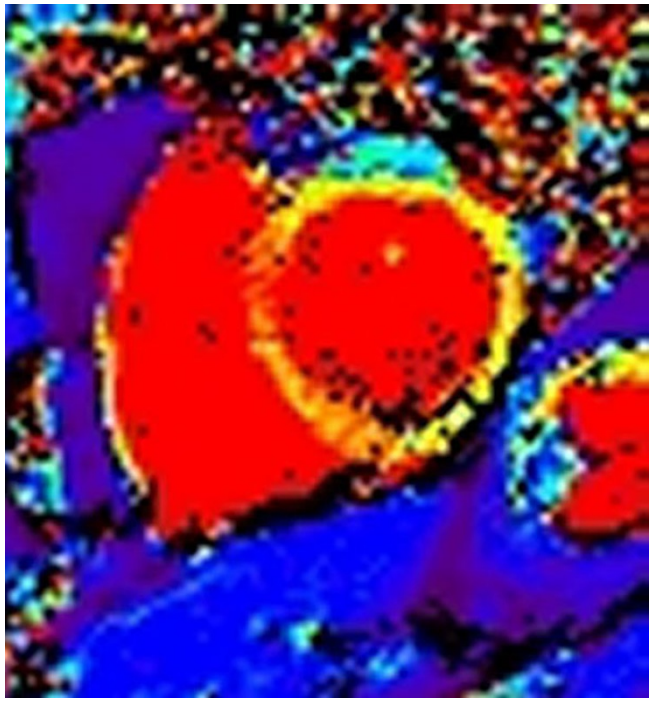

Figure 1

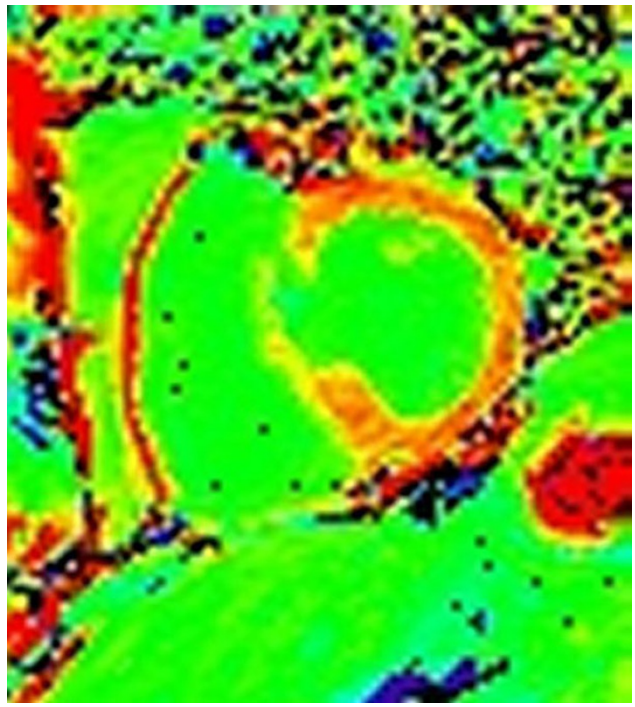

Figure 2

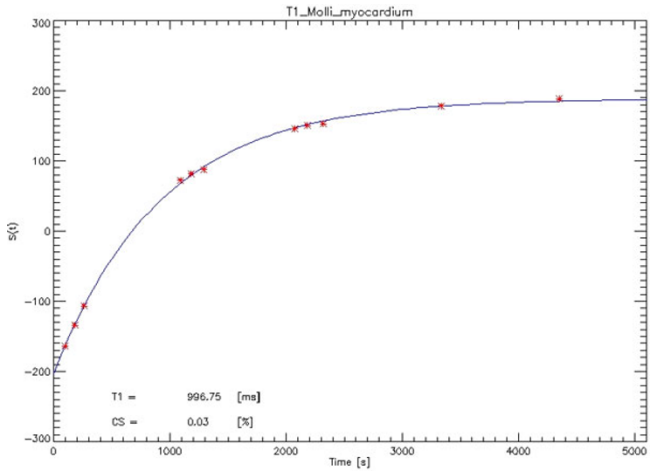

Figure 3

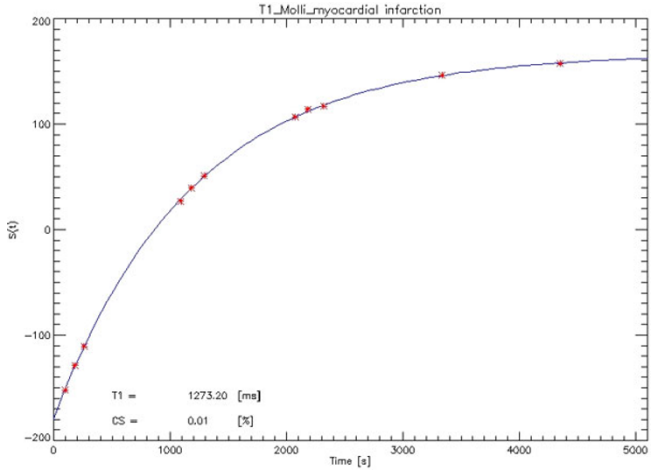

Figure 4

References

1. Daniel Messroghli R, *et al.*: **Optimization and Validation of a Fully-Integrated Pulse Sequence for Modified Look-Locker Inversion-Recovery (MOLLI) T1 Mapping of the Heart.** *JMRI* 2007, **26:**1081-1086.