

## **POSTER PRESENTATION**



# Infarct myocardium tissue heterogeneity assessment using pre-contrast and post-contrast T1 maps acquired with Modified Look-Locker Inversion Recovery (MOLLI) imaging

Zhong Chen<sup>1\*</sup>, Tobias Voigt<sup>1</sup>, Andrea Wiethoff<sup>1</sup>, Siobhan Crichton<sup>1</sup>, David Murday<sup>2</sup>, Anoop Shetty<sup>1</sup>, Aldo Rinaldi<sup>1</sup>, Eike Nagel<sup>1</sup>, Valentina O Puntmann<sup>1</sup>, Tobias Schaeffter<sup>1</sup>, Reza Razavi<sup>1</sup>

*From* 15th Annual SCMR Scientific Sessions Orlando, FL, USA. 2-5 February 2012

#### Summary

T1 relaxation-time mapping allows direct myocardial signal quantification and therefore enables true quantitative characterisation of myocardial tissue heterogeneity. Differences between healthy myocardium and scarred tissues can be reliably distinguished from the R1 values derived from pre-contrast T1 maps. In patients with scarred tissues,  $\Delta$ R1 value derived from both the preand the post-contrast T1 maps provides better distinction between grey zone and scar core than either precontrast or post-contrast R1 value alone.

#### Background

Cardiac magnetic resonance imaging with late gadolinium enhancement (LGE-CMR) has been the standard tool for assessing regional fibrosis. Tissue heterogeneity quantification by traditional signal-intensity (SI-) based methods is not without limitations. T1 relaxation-time mapping allows direct myocardial signal quantification and therefore enables true quantitative characterisation of myocardial tissue heterogeneity. We aim to explore tissue heterogeneity assessment using T1 maps generated with the modified Look Locker (MOLLI) sequence in patients with previous myocardial infarct.

### Methods

Seven patients with ischaemic infarct history underwent left ventricular scar assessment with standard inversion-

 $^1 \mathrm{Imaging}$  Sciences & Biomedical Engineering, Kings College London, London, UK

Full list of author information is available at the end of the article



#### Results

The T1 relaxation-times for each region were significantly different on both the pre- and the post-contrast T1 maps; p<0.05. At 20 minutes post-contrast, the T1 values were significantly reduced in all regions with the greatest reduction seen in scar core; p<0.05. The R1 and the  $\Delta$ R1 (defined as (PostContrastR1-PreContrastR1)/ PreContrastR1) for each region are plotted in Figure 1.

ROC curve analysis showed that the native pre-contrast R1 provided the best prediction for healthy myocardium whereas the  $\Delta$ R1 provided better prediction for scar core and grey zone than either the pre-contrast or the post-contrast R1 value alone (Figure 2). A cut-off of pre-contrast R1 of 0.996 provided the best distinction for the healthy myocardium; a  $\Delta$ R1 of 2.47 provided the



© 2012 Chen et al; licensee BioMed Central Ltd. This is an open access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/2.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.





best distinction between the scar core and the grey zone.

### Conclusions

T1 maps acquired from MOLLI sequence allow quantitative assessment of tissue heterogeneity. Differences between healthy myocardium and scarred tissues can be reliably distinguished from the R1 values derived from pre-contrast T1 maps. Potentially, patients without scarred myocardium do not need post-contrast imaging. In patients with scarred tissues,  $\Delta$ R1 value derived from both the pre- and the post-contrast T1 maps provides better distinction between grey zone and scar core than either pre-contrast or post-contrast R1 value alone.

#### Funding

N/A

#### Author details

<sup>1</sup>Imaging Sciences & Biomedical Engineering, Kings College London, London, UK. <sup>2</sup>Southampton University Hospitals NHS Trust, Southhampton, UK.

Published: 1 February 2012

doi:10.1186/1532-429X-14-S1-P263

**Cite this article as:** Chen *et al.*: Infarct myocardium tissue heterogeneity assessment using pre-contrast and post-contrast T1 maps acquired with Modified Look-Locker Inversion Recovery (MOLLI) imaging. *Journal of Cardiovascular Magnetic Resonance* 2012 14(Suppl 1):P263.