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### Citation

Jang, Jihye, Sébastien Roujol, Tamer A Basha, Shingo Kato, Sophie Berg, Warren J Manning, and Reza Nezafat. 2015. "Evaluation of a free-breathing myocardial T1 mapping using magnetization-prepared slice interleaved spoiled gradient echo imaging in patient." Journal of Cardiovascular Magnetic Resonance 17 (1): Q130. doi:10.1186/1532-429X-17-S1-Q130. http:// dx.doi.org/10.1186/1532-429X-17-S1-Q130.

## **Published Version**

doi:10.1186/1532-429X-17-S1-Q130

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WALKING POSTER PRESENTATION

# Evaluation of a free-breathing myocardial T<sub>1</sub> mapping using magnetization-prepared slice interleaved spoiled gradient echo imaging in patient

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*From* 18th Annual SCMR Scientific Sessions Nice, France. 4-7 February 2015

### Background

Quantitative myocardial  $T_1$  mapping shows promise for assessment of various cardiomyopathies. Most available sequences are generally acquired within a breath-hold using a balanced SSFP (bSSFP) imaging readout. However, the signal obtained from a bSSFP imaging readout is  $T_2$ dependent, sensitive to magnetization transfer and has increased susceptibility to the  $B_0$  field inhomogeneity leading to regional variations in  $T_1$  estimates (1). Recently, we developed a novel  $T_1$  mapping sequence for free-breathing, multi-slice, myocardial  $T_1$  mapping using a slice-interleaved  $T_1$  sequence with spoiled gradient echo (GRE) imaging readout. However, the feasibility of this sequence in patient has not yet been studied. In this study, we sought to demonstrate the feasibility of this sequence in patients and its ability to detect abnormal  $T_1$  times.

#### Methods

Sixteen patients referred to clinical CMR for assessment of cardiomyopathy (54±21y, 13 m) and eleven control healthy adult subjects (35±21y, 4 m) were recruited for this study. Subjects were scanned on a 1.5 T Philips scanner. Native  $T_1$  mapping was performed using a freebreathing slice interleaved acquisition which enables simultaneous acquisition of 5 slices using multiple inversion recovery (IR) experiments (2). All the 5 slices are acquired once in each IR experiment, which enables the sampling of the undisturbed  $T_1$  recovery curve. Each  $T_1$ weighted image was acquired using an ECG-triggered acquisition with a GRE imaging readout (TR/TE/ $\alpha$ =4.3/ 2.1ms/10°, FOV=280×272 mm<sup>2</sup>, voxel size=2×2 mm<sup>2</sup>, slice thickness=8 mm, 5 slices, number of phase-encoding lines=43, linear ordering, 10 linear ramp-up pulses, SENSE factor=2.5, half Fourier=0.75, bandwidth=382Hz/ pixel). Prospective slice tracking was combined with retrospective image registration to correct for respiratory motion. Myocardial native T<sub>1</sub> values were evaluated using a 16 myocardial segment model for all healthy subjects and patients.

#### Results

Native  $T_1$  times in the healthy subject control group were 1094±24ms. Figure 1 shows an example of native  $T_1$  maps obtained in three patients where native  $T_1$  times (1114ms, 1086ms, and 1111ms) were in the same range as in the healthy subject control group. Homogeneous and consistent  $T_1$  times were obtained over the whole myocardium in these patients and the visual quality of  $T_1$  map was excellent. Figure 2 shows an example of native  $T_1$  times can be observed (1197ms and 1158ms). Elevated  $T_1$  times were consistent across multiple myocardial segments.

#### Conclusions

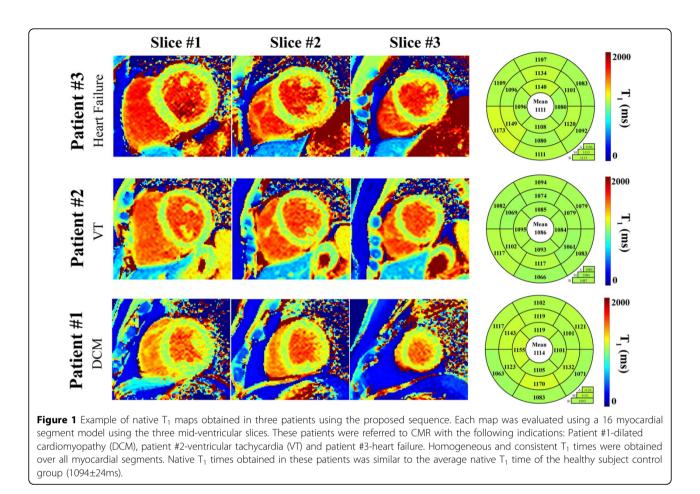
Free-breathing myocardial  $T_1$  mapping using magnetization-prepared slice interleaved spoiled gradient echo imaging is feasible in patients and provides excellent  $T_1$  map quality which enables the detection of altered native  $T_1$ times in the presence of specific cardiomyopathies.

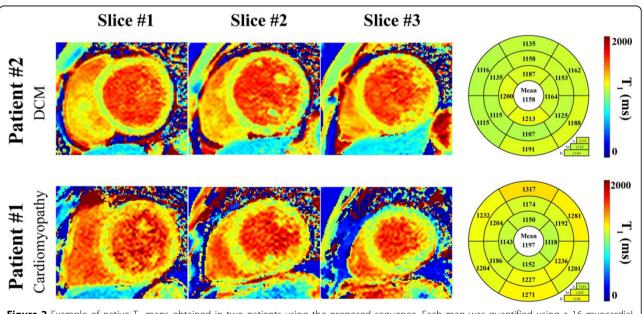
Full list of author information is available at the end of the article



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**Figure 2** Example of native  $T_1$  maps obtained in two patients using the proposed sequence. Each map was quantified using a 16 myocardial segment model using the three mid-ventricular slices. These patients were referred to CMR with the following indications: Patient #1-assessment of cardiomyopathy and patient #2-dilated cardiomyopathy (DCM). Elevated native  $T_1$  times were observed in these patients when compared to the healthy subject control group (1094±24ms).

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#### Published: 3 February 2015

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doi:10.1186/1532-429X-17-S1-Q130

Cite this article as: Jang et al.: Evaluation of a free-breathing myocardial  $T_{1}\xspace$  mapping using magnetization-prepared slice interleaved spoiled gradient echo imaging in patient. Journal of Cardiovascular Magnetic Resonance 2015 17(Suppl 1):Q130.

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