

**WALKING POSTER PRESENTATION**

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# Native left ventricular myocardial $T_1$ spatial heterogeneity in non-ischemic dilated cardiomyopathy

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## Background

Myocardial fibrosis is involved in the pathology of non-ischemic dilated cardiomyopathy (NICM). Recently, the application of native (non-contrast) myocardial  $T_1$  measurement has been proposed as an imaging biomarker of cardiac remodeling. However, spatial heterogeneity in  $T_1$  measurements has been observed across different segments and slices. Furthermore,  $T_1$  values measured with current  $T_1$  mapping sequences are influenced by myocardial  $T_2$  values. The objective of this study was to 1) assess the spatial heterogeneity of  $T_1$  measurements across different segments and slices in healthy subjects and patients, and 2) determine the association of native  $T_1$  with myocardial structure and function.

## Methods

We prospectively studied 39 NICM patients (LVEF $\leq$ 50% without evidence of prior infarction by CMR) and 30 subjects with normal LV systolic function without known cardiovascular disease. CMR was performed using a 1.5-T MRI scanner (Philips Achieva). Native  $T_1$  mapping was performed using slice-interleaved  $T_1$  mapping sequence (STONE) [1].  $T_2$  mapping was performed using slice-interleaved  $T_2$  mapping [2]. Voxel-wise  $T_1$  and  $T_2$  were estimated using a 2-parameter and 3-parameter model [3]. All images were corrected for motion [4].  $T_1$ ,  $T_2$ , and extra-cellular volume (ECV) measurements were measured using a 16 segments AHA model across the base, mid, and apical LV.

## Results

NICM participants ( $57 \pm 15$  years) were predominantly male (74%). By design, all had a reduced LV ejection fraction (mean LVEF  $34 \pm 10\%$ ). Figure 1 shows native  $T_1$ ,  $T_2$ , and ECV in two patients with a NICM. Parametric maps to the right in each panel demonstrate full ventricular coverage. The regional distribution of native myocardial  $T_1$  was similar in patients with and without NICM[RN1], as shown in Figure 2. Relative to subjects without NICM, subjects with NICM had a higher native  $T_1$  ( $1131 \pm 51$  vs.  $1070 \pm 28$  msec;  $p < 0.0001$ ), a higher ECV ( $0.28 \pm 0.04$  vs.  $0.25 \pm 0.02$ ,  $P = 0.001$ ) and a longer myocardial  $T_2$  ( $52 \pm 8$  vs.  $47 \pm 5$  msec;  $P = 0.01$ ). After multivariable adjustment, a lower global native  $T_1$  time was associated with a higher LVEF ( $b = -0.59$ ,  $P = 0.0003$ ), higher right ventricular ejection fraction ( $b = -0.47$ ,  $P = 0.006$ ), and lower left atrial volume index ( $b = 0.51$ ,  $P = 0.001$ ).

## Conclusions

In NICM, native myocardial  $T_1$  is elevated in a homogeneous manner, suggesting a global (not regional) abnormality in myocardial tissue composition. This low variability is similar between healthy and NICM patients across different segments. For subjects with NICM, native  $T_1$  is associated with biventricular systolic function and left atrial volume, and may represent a non-contrast marker of tissue remodeling in this cohort.

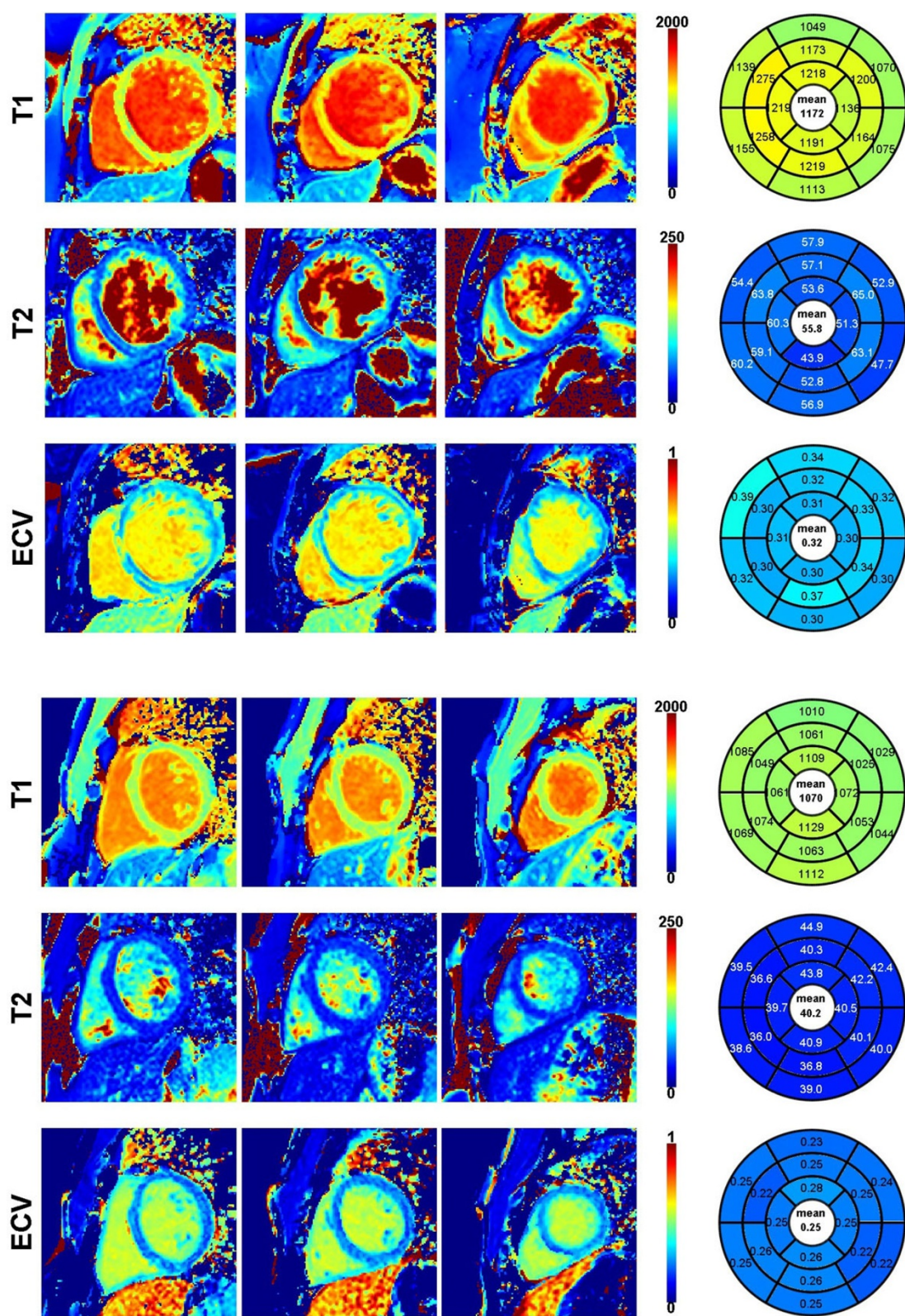
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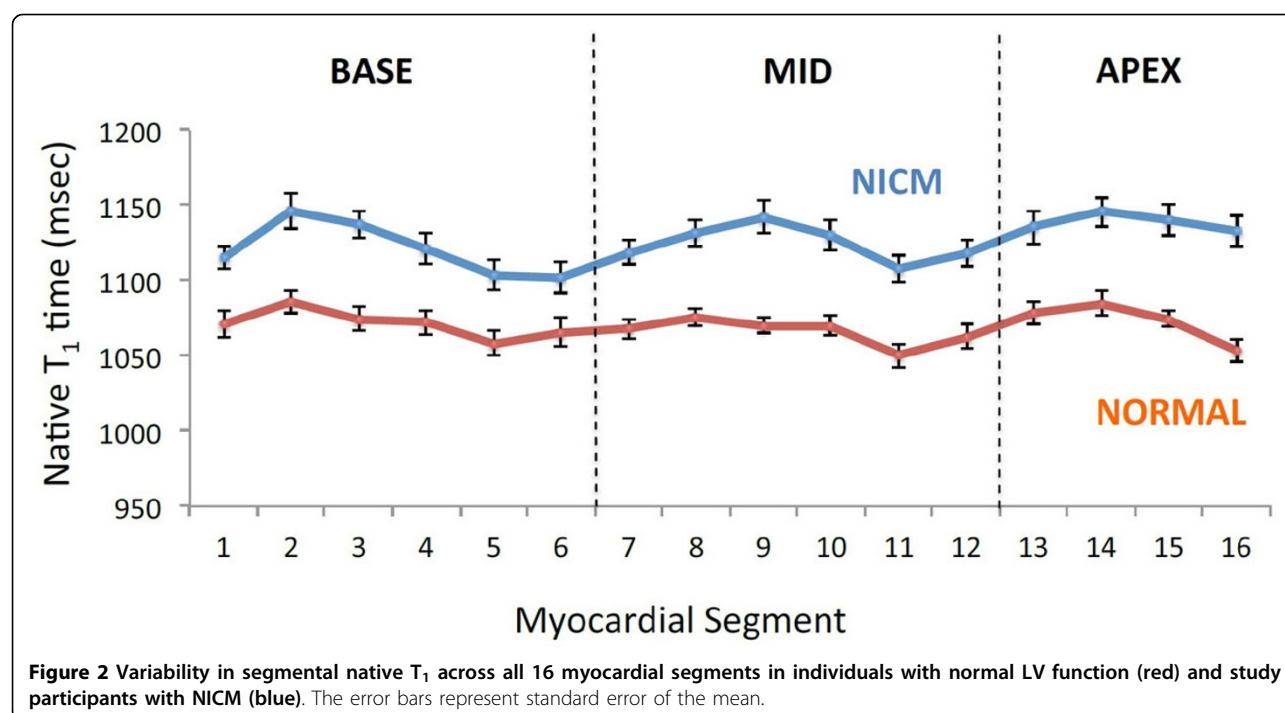
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**Figure 1** (A) Images from a 47-year-old woman with a NICM with moderate reduction in LV function (LV ejection fraction 30%). (B) Images from a 39-year-old healthy male (LV ejection fraction 61%).



#### References

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