

## Relationship between cardiac magnetic resonance derived extracellular volume fraction and myocardial strain in patients with non-ischemic dilated cardiomyopathy

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**Background:** The feature tracking (FT) technique has been proposed as a robust method to evaluate the myocardial strain using conventional cine magnetic resonance imaging (MRI) of the left ventricle. Data is limited regarding the relationship between FT-derived myocardial strain and diffuse myocardial fibrosis evaluated by T1 mapping in patients with non-ischemic dilated cardiomyopathy (NIDCM).

**Purpose:** The aim of this study was to evaluate the correlation between extracellular volume (ECV) by T1 mapping and myocardial strain by FT in patients with NIDCM.

**Methods:** A total of sixty-four patients with NIDCM (62±12 years) and 15 controls (62±11 years) were studied. Using a 1.5T MR scanner, pre- and post-T1 mapping images of LV wall at mid-ventricular level was acquired to calculate ECV by modified Look-Locker inversion recovery (MOLLI) sequence. Radial strain (RS), circumferential strain (CS) and longitudinal strain (LS) was assessed by FT technique. ECV and myocardial strain were compared using a 6-segment model at mid-ventricular level.

**Results:** Compared to the controls, the NIDCM patients had a significantly

higher ECV (0.30±0.02 vs. 0.24±0.01,  $p<0.001$ ) and impaired myocardial strain (RS, 24.2±3.0 vs. 52.2±6.2,  $p<0.001$ ; CS, -7.5±2.1 vs. -15.3±2.2,  $p<0.001$ ; LS -10.4±3.5 vs. -20.2±4.7,  $p<0.001$ , respectively). Similar results were obtained when comparing all 6 myocardial segments (segment 7–12) (all  $p$  values  $<0.001$ ). In a segment-based analysis, a significant positive correlation was found between the ECV and CS ( $r=0.26$  to  $0.41$ ; all  $p$  values  $<0.05$ ), a negative correlation was found between the ECV and RS ( $r=-0.31$  to  $-0.41$ ; all  $p$  values  $<0.05$ ). In a patient-based analysis, there were significant positive correlations between the ECV and CS ( $r=0.45$ ,  $p<0.001$ ), ECV and LS from 2-chamber view ( $r=0.30$ ,  $p=0.006$ ), ECV and LS from 4-chamber view ( $r=0.37$ ,  $p<0.001$ ). There was a significant negative correlation between the ECV and RS ( $r=-0.43$ ,  $p<0.001$ ) (FIGURE)

**Conclusions:** In NIDCM patients, severity of myocardial fibrosis evaluated by T1 mapping is associated with impaired myocardial strain by FT technique.

