

# Detecting early myocardial involvement in systemic sclerosis using cardiac magnetic resonance T1 mapping and speckle tracking echocardiography in correlation with plasma concentration of C-terminal pro-endothelin-1

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**Background:** Systemic sclerosis (SSc) leads to progressive myocardial fibrosis and subsequent alteration in function. Cardiac magnetic resonance (CMR) T1-mapping and speckle tracking echocardiography (STE) are two recent modalities able to quantify diffuse fibrosis and deformation, respectively. We aimed to determine whether these methods could detect left ventricular (LV) dysfunction at an early stage of SSc, and whether there was a relationship between myocardial alteration and plasma levels of C-terminal pro-endothelin-1 (CT-proET-1).

**Methods:** 54 consecutive SSc patients with normal conventional echocardiography and no CMR late gadolinium enhancement, and 16 healthy controls underwent CMR T1-mapping and STE. CT-proET-1 was measured in 35 patients.

**Results:** As compared with the controls, SSc patients had shorter global (354 ±23 ms vs. 367 ±23, P=0.04) and basal inferoseptal LV post-contrast T1 values (336 ±22 ms vs. 353 ±24, P=0.01). In addition, basal inferoseptal segment in SSc patients showed decreased longitudinal peak systolic strain as compared with controls (-16.3 ±4% vs -19.6 ±4%, P=0.009). T1 value correlated with parameters of longitudinal function (P<0.001). Finally, CT-proET-1 level was higher in patients with shorter T1 value (78 ±8 vs. 52 ±3 pmol/L,

P=0.03) and correlated with peak early diastolic strain rate (r=0.51, P=0.002) within the basal inferoseptal segment.

**Conclusion:** CMR T1-mapping and STE can detect early abnormalities in the course of SSc, which might reflect the increase in diffuse interstitial fibrosis, and their consequences on the myocardial function.

**KEYWORDS:** cardiac magnetic resonance, T1-mapping, speckle tracking echocardiography, systemic sclerosis, myocardial fibrosis.

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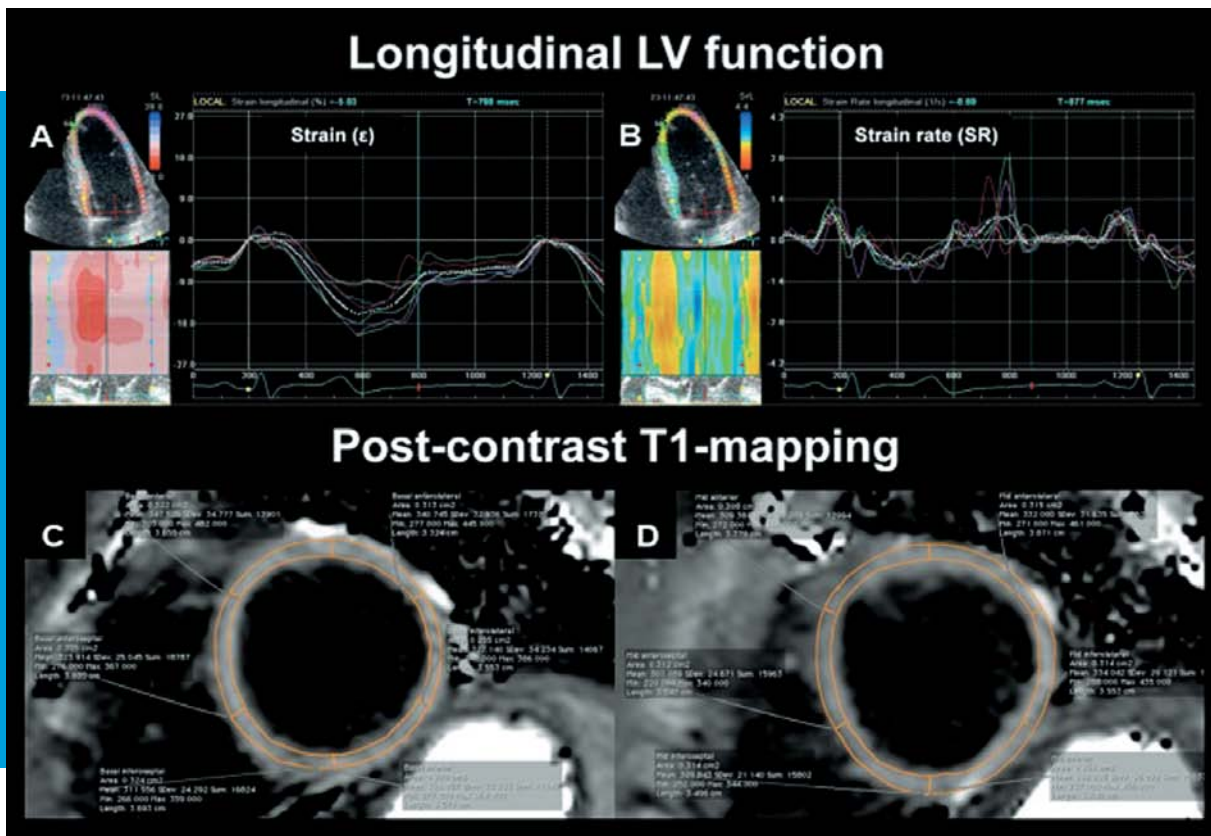
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**Figure 1.** Examples of speckle tracking echocardiography and CMR T1-mapping measurements. LV longitudinal function: the figure shows an example of deformation imaging by speckle tracking echocardiography in the 4-chamber view. The analysis of longitudinal strain (A) and strain rate (B) was performed. Post-contrast T1-mapping: the figure shows the parametric T1 relaxation time pixel maps of the basal (C) and mid (D) LV slices generated from the MOLLI sequence. The epicardial and endocardial LV contours were manually traced and each slice was divided into standard six segments, then T1 relaxation time for each segment was calculated.

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