085

**MYOCARDIAL SEGMENTAL ANALYSIS FOR
T1-MAPPING IMAGING: A NOVEL SEMI-AUTOMATED
METHOD**

N C Edwards,¹ N Nundlall,² W E Moody,¹ N Davies,¹ C J Ferro,¹ J N Townsend,¹
R P Steeds¹ ¹*University of Birmingham & Queen Elizabeth Hospital Birmingham;*
²*Queen Elizabeth Hospital Birmingham*

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Introduction Cardiac MRI T1-mapping techniques allow direct signal quantification of the myocardium in order to detect

Figure 1

myocardial tissue heterogeneity and derive the extracellular volume of distribution (ECV). Existing analysis techniques frequently involve manual contouring with a region of interest in the inter-ventricular septum and therefore exclude other myocardial segments which may be involved in diffuse fibrotic disease processes. We present a new in-house semi-automated, clinically applicable segmental analysis method compared to manual analysis.

Methods Ten healthy volunteers and 10 patients with the inherited metabolic disease Alström Syndrome (mean age 32 years SD 10, male 75%) underwent cardiac MRI (1.5 T). Myocardial extracellular volume (ECV) was assessed using T1-mapping (modified look-locker inversion recovery sequence) pre and 15 min post gadolinium (0.1 mmol/kg). Late gadolinium images were acquired 5–7 min after contrast. Analysis of the T1 signal was performed by: i) manual contouring (Argus, Siemens) and ii) new semi-automated analysis plug-in (ImageJ) which allowed segmentation of the IV based on the American Heart Association 17 segment model and derivation of average T1 intensity (figure 1). The myocardial ECV was calculated as previously reported.¹ Reproducibility data are presented as intra-class correlation coefficients (ICC) +95% CIs.

Results There was good agreement between the mean measurements for the two methods; automated 0.258 (SD 0.03) vs manual 0.255 (0.03) with highly significant results suggesting strong agreement in their measurements; (ICC 0.95 (0.86–0.98), $p < 0.01$). Bland-Altman analysis confirmed high reproducibility with acceptable bias (figure 2). Intra observer variability for the semi-automated method was lower (basal septum ICC 0.96 (0.9–0.98) (figure 2) than for manual analysis (ICC 0.92 (0.85–0.96) and was comparable in controls and patients (ICC 0.94 (0.8–0.99), $p < 0.01$ and (0.97 (0.85–0.99), $p < 0.01$).

Conclusions Simple semi-automated analysis is quick and highly reproducible. It allows derivation of ECV in all myocardial segments which allows characterisation of heterogeneous myocardium in a range of diseases entities.

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REFERENCE

1 Sado DM, *et al.* Cardiovascular magnetic resonance measurement of myocardial extracellular volume in health and disease. *Heart* 2012; 98:1436–41.

Figure 2