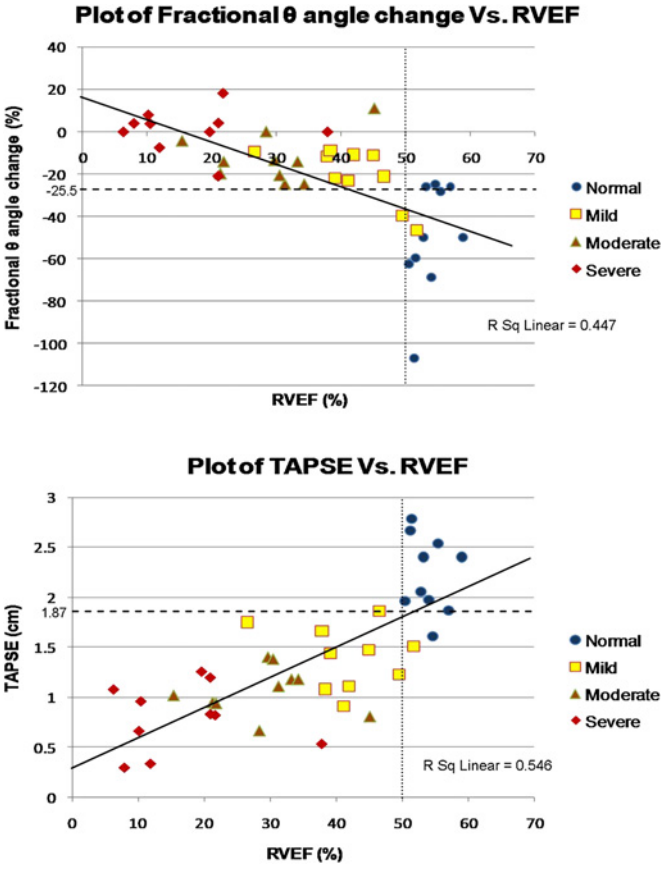
is a predominantly Echo-validated rapidly—derived surrogate of RV function. Correlations between RVEF and systolic changes in annulo-apical angles (AAAs) have not previously been evaluated.

Objective To assess the use of changes in AAAs and TAPSE as rapidly-derived surrogate markers of RV systolic function using CMR.

Methods We measured RV volumes from short-axis bSSFP stacks in patients undergoing clinically indicated CMR scans. RVEF was calculated from volumes derived by semi-automated endocardial contouring (QMass®MR 7.2). AAAs (α, β, θ angles—see Abstract 083 figure 1), subtended by a triangle connecting the medial and lateral extent of the tricuspid valve annulus and RV apex, and fractional changes in AAAs (ΔAAA/EDAAA×100, whereby ΔAAA-=EDAAA−ESAAA) were measured from end-diastolic (ED) and end-systolic (ES) 4chamber SSFP cine still frames. TAPSE was measured as the change in length of a line connecting the lateral tricuspid valve annulus with the RV apex from ED to ES. Parameters were compared with RVEF using Spearman rank correlations; ROC curves constructed to assess accuracy of the parameters in predicting an RVEF<50%.

Results 40 subjects were included: 10 normals, 10 mildly-impaired, 10 moderately-impaired, and 10 with severely-impaired RV systolic function. Median (25th−75th percentile) RVEF for each subgroup was 53.5% (51.4%−55.7%), 41.5% (38.1%−47.2%), 30.0% (21.7%−33.5%), and 15.8% (9.6%−21.2%), respectively. Correlations with RVEF: TAPSE (0.74, p<0.001), fractional changes of α angle (0.64, p<0.001), β angle (−0.39, p<0.05), and θ angle, which had the highest correlation (−0.77, p<0.001). Smaller increases or a decrease in magnitude of the θ angle from ED to ES are associated with lower RVEFs, whereby a fractional θ angle change of ≥ −25.5% predicts RVEF<50% [97% sensitivity, 91% specificity, AUC=0.98]. The cut-off for TAPSE is ≤1.87 cm [100% sensitivity, 82% specificity, AUC=0.98]. Intra- and inter-observer reproducibility is excellent as shown by intra-class correlation coefficients for TAPSE (0.98 and 0.87, respectively) and fractional θ angle change (0.96 and 0.94, respectively).

Conclusion Both fractional θ angle change and TAPSE strongly correlate with RVEF, and are accurate predictors of RVEF<50%. These measurements provide an excellent alternative to the more time-consuming derivation of RVEF obtained volumetrically by endocardial chamber tracing.



Abstract 083 Figure 2 Scatter graphs for fractional θ angle change and TAPSE, both plotted against RVEF. Dotted vertical lines represent the ROC cut-offs of RVEF<50%. Dashed horizontal lines represent cut-offs of ≥ −25.5% and ≤1.87 cm for fractional θ angle change and TAPSE, respectively.

084 IN VIVO ASSESSMENT OF CELLULAR INFLAMMATION FOLLOWING ACUTE MYOCARDIAL INFARCTION

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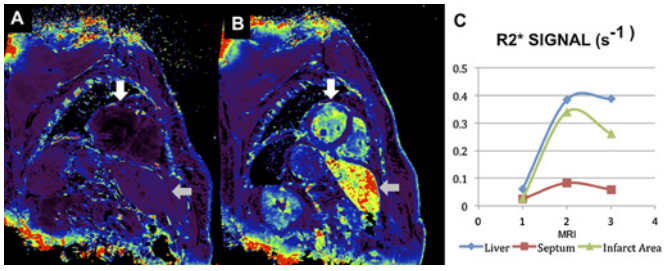
Background Inflammation following myocardial infarction has detrimental effects on reperfusion, myocardial remodelling and left ventricular function. MRI using ultrasmall superparamagnetic particles of iron oxide (USPIO) can be used to detect cellular inflammation in tissues.

Methods 15 patients were recruited up to 5 days after ST-segment elevation myocardial infarction. Nine patients underwent cardiac MRI (3 Tesla) at baseline, and at 24 and 48 h following infusion of USPIO (4 mg/kg; Ferumoxytol, AMAG). Six control patients underwent the same scanning protocol without infusion of USPIO. T2*-weighted multi-gradient-echo sequences were acquired and R2* maps (inverse of T2*) were generated to assess USPIO accumulation. Baseline scans were registered to subsequent 24 and 48 h scans and the infarct zone was defined on Gadolinium-enhanced T2-weighted images. An "object map" was created that defined corresponding regions of interest (ROI) on all scans for each subject. The ROIs included infarct zone, peri-infarct zone, remote myocardium, liver, blood pool and skeletal muscle. The R2* values for each ROI was calculated.

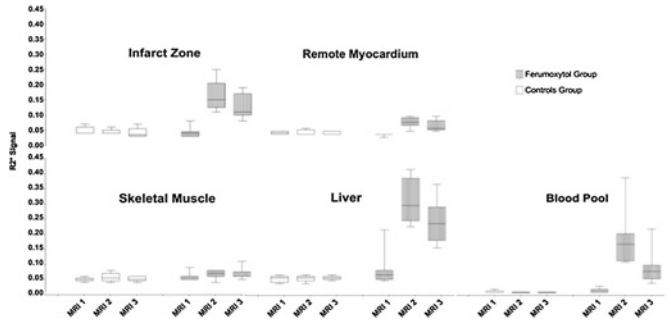
Results In the control group, the R2* value in the infarct zone remained constant: baseline, 0.047 s^{-1} (95% CI 0.034 to 0.059); 24 h, 0.043 s^{-1} (95% CI 0.035 to 0.052) and 48 h, 0.040 s^{-1} (95% CI 0.024



Abstract 084 Figure 1 In this subject, late gadolinium enhancement had revealed an infarct of the anterior left ventricular wall. Panels A and B are R2 acquisition images of the same subject taken on day 1 (A, pre-USPIO), and day 2 (B post-USPIO) in a patient given ferumoxytol. The white arrow indicates the area of infarction corresponding to the late gadolinium enhancement. In this area there is sequential higher uptake of USPIO as indicated by the red/green colour in this area. This is consistent with neutrophil and macrophage influx. Ferumoxytol is also taken up by the liver reticulo-endothelial system (grey arrow). These findings are confirmed by the quantitative analysis of the R2* signal (Panel C).

to 0.056). In the infarct zone, the R2* value increased from a baseline of 0.041 s^{-1} (95% CI 0.029 to 0.053) to 0.164 s^{-1} (95% CI 0.125 to 0.204) at 24 h and 0.128 s^{-1} (95% CI 0.097 to 0.158) at 48 h following USPIO administration ($p<0.01$; non-parametric repeated measure one-way ANOVA, Dunn's post test comparison).

Conclusion USPIO are taken up into the infarcted myocardium following acute myocardial infarction and can be quantified by MRI. This approach appears to image infarct-related cellular inflammation and represents an important novel method of assessing recovery following acute myocardial infarction.



Abstract 084 Figure 2 Comparison of R2* signal in different tissues. Highest uptake of USPIO is seen in the infarct zone, liver and blood pool. There is a small increase in R2* signal in the remote myocardium. There is no increase in R2* signal in the control group for any tissue.

085 SYSTOLIC VS DIASTOLIC ACQUISITION IN CARDIOVASCULAR MAGNETIC RESONANCE MYOCARDIAL PERFUSION IMAGING

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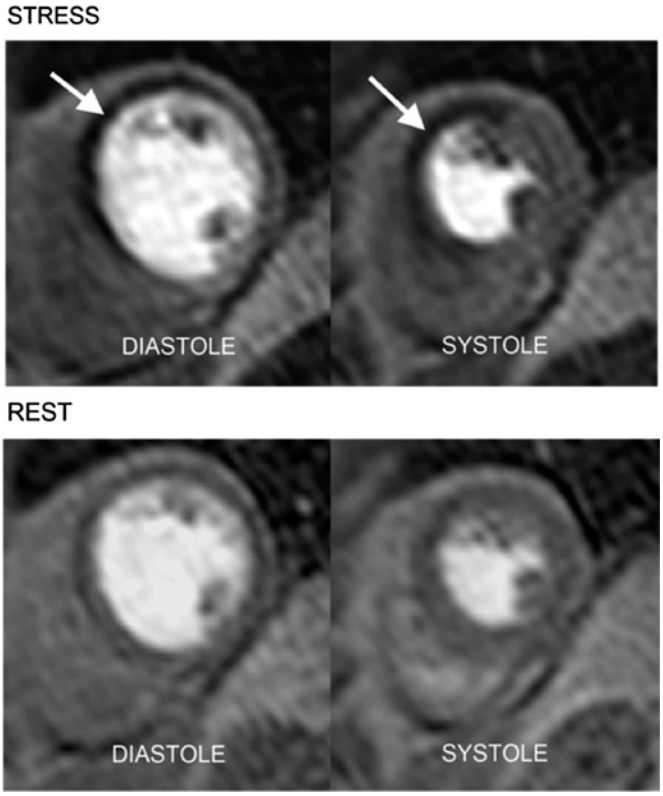
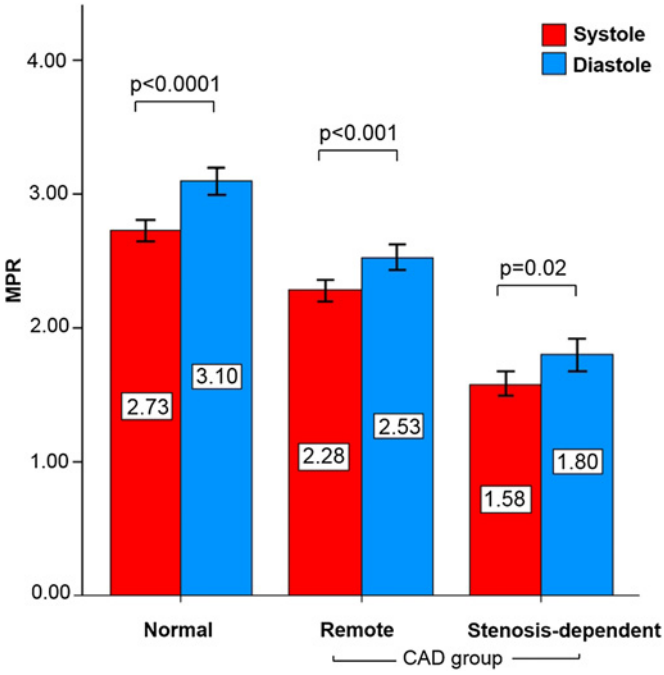
Introduction Although differences in systolic and diastolic myocardial blood flow (MBF) estimates have been shown in healthy volunteers, the impact of cardiac phase on detecting coronary artery disease (CAD) using cardiovascular magnetic resonance (CMR) myocardial perfusion imaging is unknown. The aim of this study was to compare MBF estimates in systole and diastole in patients with suspected CAD and determine if either phase has greater diagnostic accuracy.

Methods Following invasive coronary angiography, 40 patients (68% men, 64±8 yrs) underwent stress/rest perfusion-CMR (1.5T Philips) which was acquired at mid-systole and end-diastole simultaneously. Based on angiographic stenosis >70% (quantitative coronary angiography), patients were grouped as having "CAD" or "no CAD." In patients with CAD, myocardial segments were classified as "stenosis-dependent" (downstream of a significant stenosis) or "remote." For each segment, MBF (Fermi-constrained deconvolution) and myocardial perfusion reserve (MPR) were calculated. The diagnostic accuracy of each phase was determined with receiver operator characteristic analysis.

Results 21 patients (53%) had CAD. A typical example of a patient with ischaemia is shown in Abstract 085 figure 1. Resting MBF was similar in the two cardiac phases for both normal and CAD patients (all p values >0.05). MBF at stress was greater in diastole than systole in normal, remote and stenosis-dependent segments (3.75±1.5 vs 3.15±1.1 ml/g/min; 2.75±1.20 vs 2.38±0.99 ml/g/min; 2.49±1.07 vs 2.23±0.90 ml/g/min; all p values <0.01). MPR was also greater in diastole than systole in all three segment groups (all p values <0.05) (Abstract 085 figure 2). On receiver operator characteristic analysis, the optimal MPR cut-off for the detection of CAD was 1.95 for systole and 2.04 for diastole (area under curve 0.82 vs 0.79; p=0.30).



Abstract 085 Figure 1 Example perfusion-CMR images with acquisition in diastole and systole. This patient had a subtotal occlusion of the left anterior descending artery. Corresponding stress perfusion defects (white arrows) are seen in the anterior; anteroseptal and inferoseptal segments of a mid-ventricular slice acquired in both diastole and systole.



Abstract 085 Figure 2 Comparison of MPR between systole and diastole. Segmental MPR (mean±SEM) in diastole and systole for normal segments, remote CAD segments and stenosis-dependent CAD segments.