# British Society of Cardiovascular Magnetic Resonance (BSCMR) Young Investigator Award

Oral presentations

Diffusion tensor magnetic resonance imaging of myocardial disarray in hypertrophic cardiomyopathy


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## Abstract


**Introduction** Disarray and fibrosis are a likely nidus for fatal arrhythmia in hypertrophic cardiomyopathy (HCM). These microstructural changes can be inferred by mapping the diffusion of water using diffusion tensor cardiac magnetic resonance (DT-CMR). Fractional anisotropy (FA) quantifies directionality of diffusion. We hypothesised that diastolic FA will be reduced in HCM and represents the arrhythmogenic substrate.

**Methods** 50 HCM patients (47±14 y, 74% male) and 30 controls (46±16 y, 70% male) underwent DT-CMR of the mid-ventricular slice in diastole, cine, late gadolinium enhancement (LGE) and extracellular volume (ECV) imaging at 3 T.

**Results** FA was reduced in HCM (slice mean 0.49±0.05 *v* 0.52±0.03, p<0.001). Controls had a mesocardial ring of increased FA. In HCM, this ring was disrupted by reduced FA in hypertrophied segments and corresponding insertion points, consistent with published HCM histology: disarray and fibrosis invade circumferentially-aligned mesocardial fibres at these locations. LGE and ECV were significant predictors of FA. FA in the hypertrophied segment was reduced in HCM with ventricular arrhythmia (n=15; 0.41±0.03 v 0.46±0.06, p=0.007) but no difference detected in LGE and ECV. A decrease in FA of 0.05, increased the odds of ventricular arrhythmia by 2.5 (p=0.015) and remained significant after correcting for LGE and ECV.

**Conclusion** DT-CMR allowed *in vivo* assessment of HCM microstructure which matched patterns of disarray and fibrosis found at histology. Low FA was associated with ventricular arrhythmia and is likely to represent disarray after accounting for fibrosis. We

propose that diastolic FA is the first *in vivo* marker of disarray and a potential independent risk factor in HCM.