

Oral presentation

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## Fused 3-dimensional whole-heart coronary artery, coronary vein and myocardial scar imaging at 3 T: Feasibility in patients with ischemic and non-ischemic cardiomyopathy

James A White\*<sup>1</sup>, Nowell Fine<sup>2</sup>, Lorne Gula<sup>2</sup>, Raymond Yee<sup>2</sup>, Mohammed Al-Admawi<sup>2</sup>, Anna MacDonald<sup>2</sup>, Qi Zhang<sup>3</sup>, Terry Peters<sup>3</sup> and Maria Drangova<sup>3</sup>

Address: <sup>1</sup>London Health Sciences Centre/Robarts Research Institute/Lawson Health Research Institute, London, ON, Canada, <sup>2</sup>London Health Sciences Centre, London, ON, Canada and <sup>3</sup>Robarts Research Institute, London, ON, Canada

\* Corresponding author

from 13th Annual SCMR Scientific Sessions  
Phoenix, AZ, USA. 21-24 January 2010

Published: 21 January 2010

*Journal of Cardiovascular Magnetic Resonance* 2010, **12**(Suppl 1):O35 doi:10.1186/1532-429X-12-S1-O35

This abstract is available from: <http://jcmr-online.com/content/12/S1/O35>

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### Background

Patients with cardiomyopathy are frequently considered for vascular-based interventions aimed at improving systolic performance. Cardiac Resynchronization Therapy (CRT) and Coronary Artery Revascularization (CAR) are dependent upon the presence of appropriate vascular targets and health of related myocardium for clinical success. A combined evaluation of coronary vascular targets and myocardial scar may benefit the planning of such procedures.

### Methods

53 consecutive patients were enrolled prior to device (ICD and/or CRT) therapy (N = 42) or CAR (N = 11). All patients had imaging performed using a 3.0 Tesla MRI scanner. A cardiac-gated, 3-D whole-heart inversion-recovery gradient echo pulse sequence with respiratory navigator was used to obtain both a contrast-enhanced coronary MRA (0.2 mmol/kg gadolinium infusion at 0.3 ml/sec) followed in 25 minutes by a late enhancement (scar) dataset. Both datasets were obtained using an isotropic voxel resolution of 1.3 × 1.3 × 1.3 mm. All coronary artery and coronary vein segments were evaluated by consensus opinion for vessel image quality using a standard visual scoring system (score 0 to 4). Contrast to noise (CNR) and signal to noise (SNR) measurements of the proximal coronary artery and vein segments and myocardial scar were performed. Spatially matched datasets were

then fused using 3-D segmentation of myocardial scar with fusion to coronary MRA for volume rendered visualization Figure 1.

### Results

The mean age was 56.6 ± 14.5 years. Combined coronary MRA and 3D scar imaging was successfully performed in 49 (92%) patients. Of 588 proximal-mid coronary artery and coronary vein segments 570 (97%) were scored as clinically evaluable. The mean quality score of the proximal-mid coronary artery segments and coronary vein segments was 3.1 ± 0.9 and 3.2 ± 0.9, respectively. The SNR and CNR scores were 57.3 ± 35.3 and 48.3 ± 31.6 respectively for the left main coronary artery. The respective values for the right coronary artery was 47.2 ± 31.4 and 38.2 ± 28.1, respectively for the right coronary artery. The mean quality score for myocardial scar imaging was 2.90 ± 0.98, with an SNR and CNR of 54.2 ± 29.9 and 49.4 ± 29.3 respectively. Image fusion was successful in all patients with quality scores of 2 or greater.

### Conclusion

This study demonstrates clinical feasibility of MRI to provide matched isotropic 3-D imaging of coronary anatomy and myocardial scar. This novel fusion technique has the potential to assist in the pre-procedural planning of vascular-based cardiac interventions where myocardial scar is relevant to clinical response.

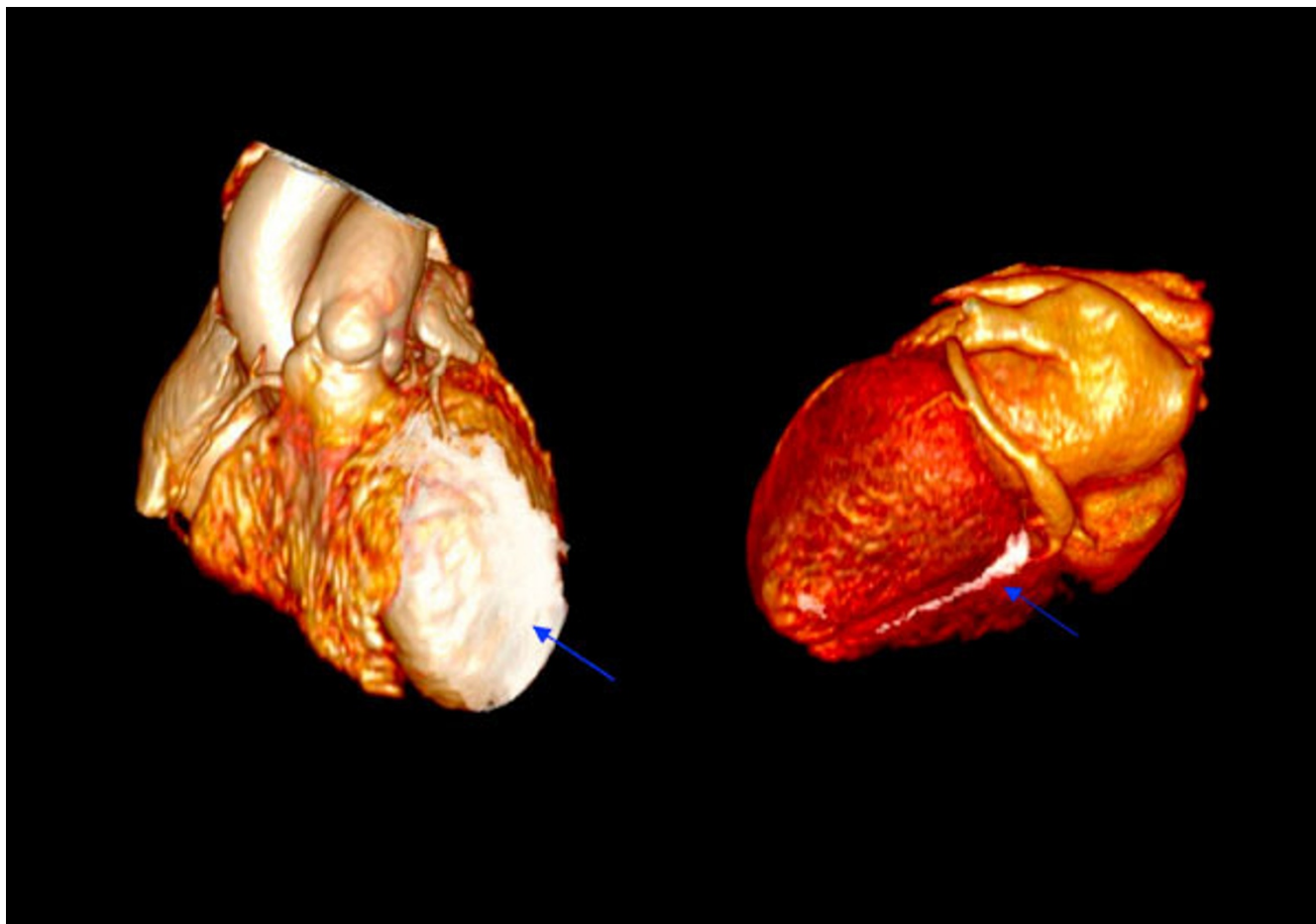


Figure 1

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