

Moderated poster presentation

## High resolution imaging of the right ventricle using ZOOM MRI

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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):M8 doi:10.1186/1532-429X-12-S1-M8

This abstract is available from: <http://jcmr-online.com/content/12/S1/M8>

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### Introduction

ZOOM is a spin echo based technique with high spatial resolution [1]. ZOOM differs from traditional spin echo imaging in that the 180° refocusing radiofrequency pulse is applied perpendicular to the 90° excitation pulse, limiting the field of view to the intersection of these pulses. Turbo spin echo (TSE) black blood images are acquired routinely during MRI assessment of patients with arrhythmogenic right ventricular dysplasia (ARVD). High spatial resolution is necessary for characterizing the thin RV wall in suspected ARVD patients, which is typically only 2-3.5 mm thick.

### Purpose

To present an optimized ZOOM technique for cardiac imaging and demonstrate the utility of ZOOM for assessment of the RV wall in suspected ARVD patients.

### Methods

Twenty-two consecutive patients (9 M/13 F, 42 ± 14 years) undergoing MRI for evaluation of ARVD were included. Axial ZOOM and traditional TSE images were acquired from the diaphragm to the RV outflow tract, with the following common imaging parameters: TR = 2 beats, TE = 55 ms, slice thickness = 7 mm (gap = 3 mm), TSE factor = 25, NSA = 2, trigger delay = mid-diastole, breath-hold = 14 sec (@60 bpm). For ZOOM only, field-of-view = 200 × 100 mm, acquired spatial resolution = 0.9 × 0.9 mm, acquisition window = 175 msec. For TSE only, field-of-view = 320 × 275 mm, acquired spatial resolution = 1.5 ×

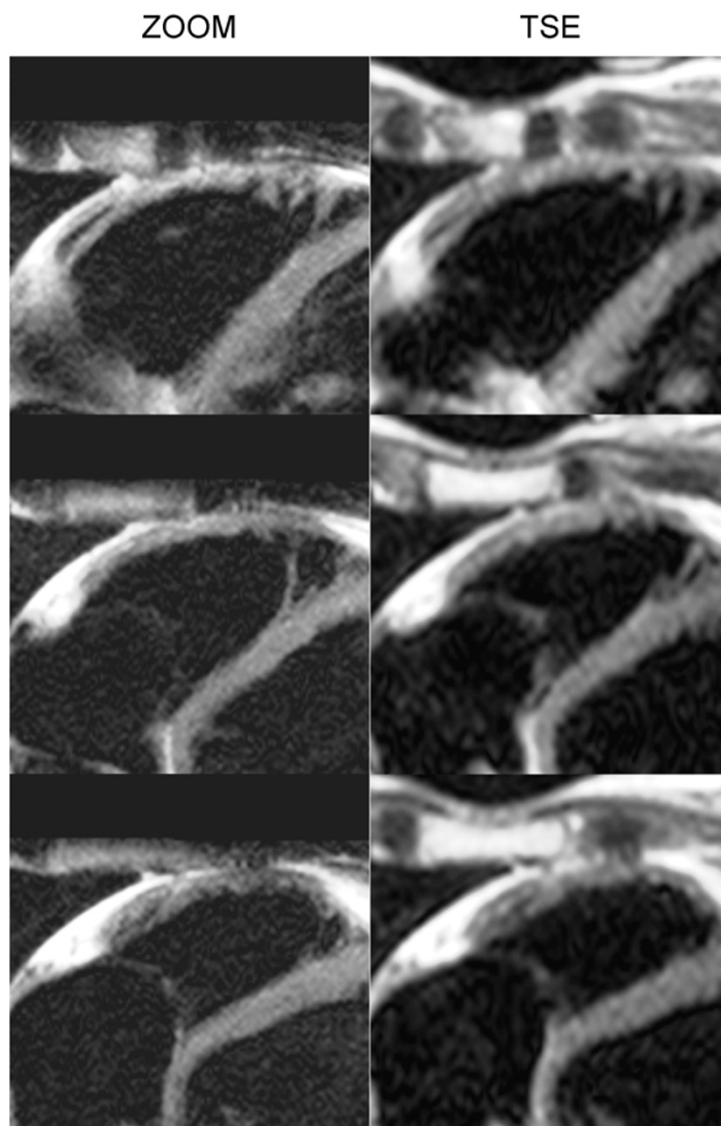
1.6 mm, SENSE factor = 1.4, acquisition window = 269 msec. Image quality was assessed independently by 2 reviewers using a 5-point scale. Additional patients (n = 5) were included to determine SNR and CNR using the method described by Pruessman et al. [2].

### Results

Figure 1 displays anatomically matched TSE and ZOOM images. Image quality was good on average, with mean scores for TSE of 3.1 ± 0.5 (Reader 1) and 2.7 ± 0.5 (Reader 2) and mean scores for ZOOM of 3.5 ± 0.6 (Reader 1) and 3.1 ± 0.7 (Reader 2). Image quality tended to be better for ZOOM images than for TSE (p = 0.05 Reader 1, p = 0.02 Reader 2). Also, TSE image quality was significantly higher for Reader 1 (p = 0.01); however, there was no significant difference between readers in ZOOM image quality (p = 0.15). There was no significant difference between image types in RV SNR (TSE 27 ± 7, ZOOM 24 ± 1, p = 0.40), blood pool SNR (TSE 3 ± 1, ZOOM 3 ± 1, p = 0.72), or CNR (TSE 24 ± 7, ZOOM 21 ± 2, p = 0.37).

### Conclusion

We have described an optimized ZOOM pulse sequence for cardiac MRI, with sub-millimeter spatial resolution (0.9 mm in-plane), a short diastolic acquisition window (175 ms), and a breathhold duration comparable to standard TSE imaging. We believe that this increased spatial resolution could help improve assessment of the RV wall in patients with diseases such as ARVD.



**Figure 1**

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### References

1. Feinberg , et al.: *Radiology* 1985, **156**:743-7.
2. Pruessman , et al.: *MRM* 1999, **42**:952-62.

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