

Poster presentation

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## Efficiency and reproducibility of the right ventricular long axis imaging plane for the evaluation of right ventricle

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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):P78 doi:10.1186/1532-429X-12-S1-P78

This abstract is available from: <http://jcmr-online.com/content/12/S1/P78>

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### Introduction

There are limitations when using the short axis imaging plane (SAX) for assessing RV function, as the tricuspid valve may not be clearly identified. An imaging plane aligned with the horizontal long axis of the RV (RVHLA) could improve visualization of the basal RV, making endocardial contour tracing easier.

### Purpose

To illustrate the prescription of a horizontal long axis imaging plane for right ventricular (RV) functional analysis; and to compare the time required and the variability of right ventricular functional assessment obtained with this RV long axis plane with analyses performed with a conventional left ventricular short axis (SAX) stack of cine images.

### Methods

Thirty-four clinical cardiac MRI exams that contained two cine bFFE stacks - one in the SAX orientation, the second aligned with the horizontal long axis of the RV (RVHLA) - were evaluated. Two radiologists independently derived RV volumes on each of these two cine stacks of images for the 34 exams. Readers recorded the number of slices needed and the time required to manually draw the endocardial contours to perform the RV functional analysis for each cine stack. The resulting RV functional metrics obtained included the end diastolic volume (EDV), end systolic volume (ESV), and ejection fraction (EF). The

number of slices, analysis time, and the RV metrics were then compared between readers and between imaging planes (SAX vs RVHLA).

### Results

The average number of slices needed to cover the RV and the contour drawing times (CDT) for both readers were significantly lower with the RHLA cine stack (number of slices  $9.6 \pm 1.3$ ; CDTs  $7.8 \pm 1.8$  minutes), when compared to the SAX set of images ( $10.5 \pm 1.4$  slices; CDT  $9.1 \pm 1.6$  minutes). Bland-Altman analysis performed between reviewers revealed lower mean differences (reviewer 1 - reviewer 2), narrower limits of agreement, and smaller coefficient-of-variations (CoV) for the RV functional metrics obtained with the RHLA imaging plane when compared to the SAX cine stacks (table 1).

### Conclusion

In this study, RV functional analysis performed with an imaging plane aligned along the horizontal long axis of the right ventricle (RHLA) resulted in shorter analysis times and lower inter-observer variability when compared to analysis done with a conventional SAX orientation.

**Table 1: Bland Altman analysis and coefficients of variability for RV functional metrics between reviewers**

	Mean difference (reviewer 1 - reviewer 2)	Upper limit of agreement	Lower limit of agreement	CoV
RVEDV (mL)				
RHLA	11.5 (5.5, 17.6)	46.4 (35.8, 56.9)	-23.3 (-33.8, -12.8)	8.4
SAX	23.1 (14.1, 32.1)	74.6 (59.1, 90.2)	-28.4 (-44.0, -12.9)	13.0
RVESV (mL)				
RHLA	8.1 (0.7, 15.4)	50.2 (37.4, 62.9)	-34.1 (-46.8, -21.3)	19.5
SAX	16.7 (8.0, 25.4)	66.7 (51.6, 81.7)	-33.3 (-48.3, -18.2)	22.5
RVEF (%)				
RHLA	-1.4 (-3.0, 0.2)	7.7 (4.9, 10.4)	-10.5 (-13.2, -7.7)	9.1
SAX	-2.5 (-4.9, -0.2)	11.0 (6.9, 15.0)	-16.0 (-20.0, -11.9)	14.6

Note - values in parenthesis are 95% CI.

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