

POSTER PRESENTATION

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Validation of Small-Animal Look-Locker Inversion Recovery (SALLI) Cine versus Cine MR in assessment of left ventricular function

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Background

Small-Animal Look-Locker Inversion Recovery (SALLI) is a novel imaging method that generates simultaneously cardiac T1 maps, cine MR and inversion recovery-prepared images for high heart rates. T1 mapping by SALLI has been tested and compared with histology, however the assessment of left ventricular (LV) function has not yet been validated.

Our aim was to compare the measurement of LV function between the SALLI sequence and the standard Cine MRI sequence.

Methods

8 healthy rats and 4 rats with surgically induced myocardial infarction were imaged. MRI was performed on a whole-body 3.0T MR unit with a 70 mm solenoid coil for rats. After generation of survey images and of a long-axis set of cine images, a stack of LV short-axis cine images was acquired (phases 30, TR 6.8 ms, TE 3.3 ms, flip angle 15°, field of view 80 x 64 mm, acquired voxel size 0.4 x 0.4 x 1.5 mm, number of signal averages 3, slices 7, inter-slice gap adjusted to allow for coverage of the entire LV; range -0.5 to -0.4 mm).

Short axis SALLI MR imaging was then performed in the same 7 short axis orientations from apex to base. Typical SALLI parameters were as follows: 64 x 64-mm field of view, 0.60 x 0.60 mm pixel size, 3.0 mm- thick sections, 5.2/2.2, 10° flip angle, 4000-msec AD, 4000-msec RD, 12 phases (i.e., temporal resolution of 16.7 ms at 300 beats per minute), temporal undersampling factor of two, three

signals acquired, and acquisition time of 8 minutes 30 seconds per slice.

Images were transferred to a cardiac MRI analysis software package and analysed in a blinded fashion to assess the ejection fraction from the stack of short-axis cine slices and the short axis SALLI slices. For each of the sets of data the image quality was visually assessed (good, no artifacts=1, minor artifacts=2, non-evaluable, major artifacts=3).

Results

Data was available for 12 Rats. Image quality was good or adequate in all cases and was not significantly differ-

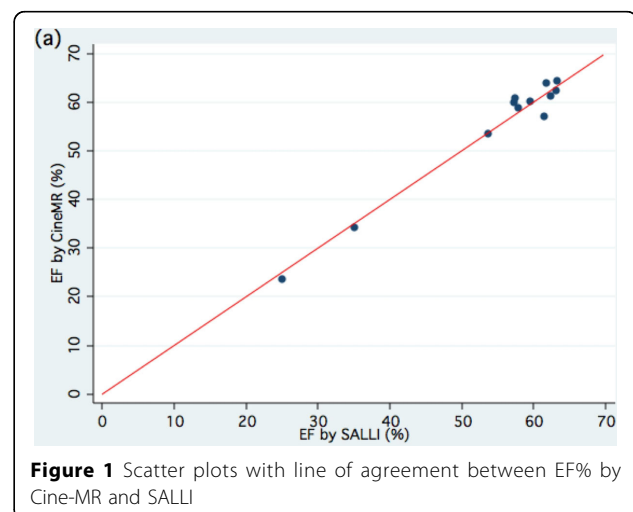


Figure 1 Scatter plots with line of agreement between EF% by Cine-MR and SALLI

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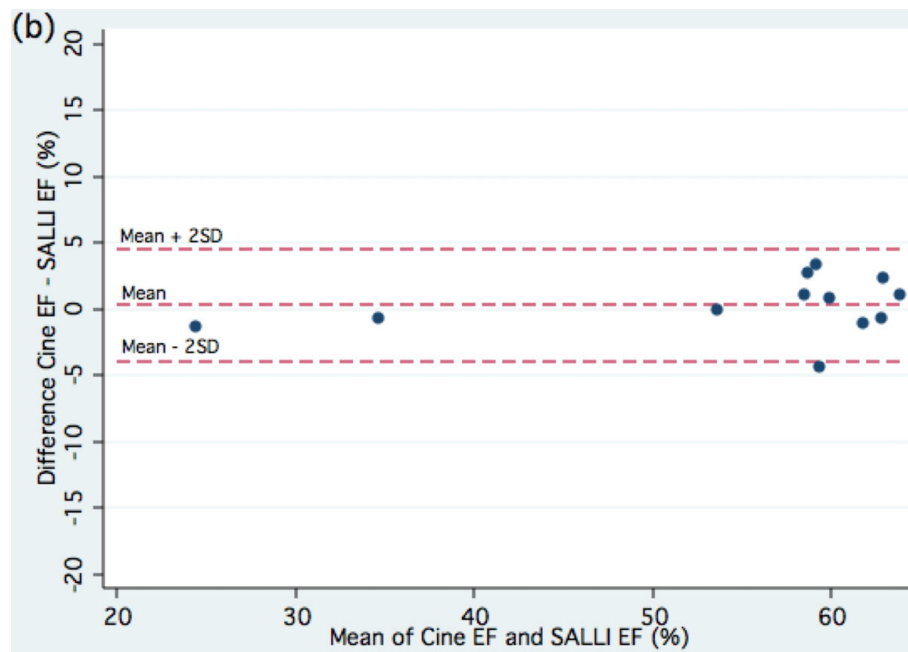


Figure 2 Bland-Altman plot for comparisons between techniques

ent ($p=0.56$) between cine-MR (1.2 ± 0.4) and SALLI (1.3 ± 0.5). Left ventricular function as measured by both methods was very similar.

EF by cine MR was $55.1 \pm 3.7\%$ and by SALLI it was $54.8 \pm 3.5\%$. No significant difference was found between the methods of measurement (mean difference $0.3 \pm 2.1\%$, $p=0.63$).

Conclusions

The aims of this study were to validate the accuracy of SALLI cine imaging versus standard MRI cine imaging in the assessment of left ventricular function. Both methods provided similar results across a range of ventricular function and suggest that SALLI cine provides comparable measurement of left ventricular function. Image quality was similar between both methods and interpretable in all cases.

As SALLI generates multimodal (Cine MR, T1 maps and Inversion-Recovery prepared) images from the same dataset, this may not only save time, but also allow comparison of findings without the need for further image registration.

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