Reviewer’s report

Title: Comparison of short axis and long axis acquisitions of T1 and extracellular volume mapping using MOLLI and SASHA in patients with myocardial infarction and healthy volunteers

Version: 0 Date: 14 Nov 2018

Reviewer: Sebastian Weingaertner

Reviewer's report:

Xanthis et al. submitted a manuscript comparing myocardial T1 times acquired in different slice orientations using MOLLI and SASHA. The study performs thorough evaluations and has a comprehensive data basis including native T1 times, and ECV of two methods. The major strengths are: 1) Cross-orientation comparison of SASHA T1 mapping that has not been previously explored in literature, to the best of my knowledge. 2) The approach of confining the analysis to the areas of intersection provides a different angle compared with previous studies. In summary the study is scientifically sound, the data is suited to corroborate the conclusion and the material contributes to a comprehensive evaluation of T1 mapping techniques, which is an area of interest to many readers. I can recommend the paper for publication after some minor concerns are addressed, as listed below.

Specific Points

(Page numbering starts from the title page providing author details and word count, etc.)

1. The present study differs from previously published reports on inter-orientation reproducibility by the areas the T1/ECV is assessed. The analysis in the present paper is confined to the area of intersection. Hence, the same tissue is evaluated twice. This provides means to evaluate reproducibility of the measurement technique in the presence of changed imaging plane orientations. In comparison previous studies evaluated the reproducibility of T1 measured across the entire myocardium in different orientations. Hence, the present study provides data on technical variability in in-vivo measurements, while other studies provide data that is confounded by biological variability of the measured (and different) tissue between the slices. Hence, I would encourage the authors to highlight this in the discussion. Additionally, the authors should elaborate in the discussion on the inter-slice vs. intra-slice variability. For example in Figure 4 the intra-slice variability for ECV seems large compared to the inter-slice variability. Furthermore, this kind of reproducibility data will be illustrative to compare the methods. Hence, I would encourage the authors to include additional analysis to compare inter-slice reproducibility between the two techniques and include a corresponding figure.

2. Page 3, Line 41: should read "...used techniques in CMR are..."
3. Page 4, Line 22-24: Why is the number of women listed for healthy subjects but not for patients?

4. Page 4, Line 26: Mind the caps in "Regional ethics committee"

5. Page 5, Line 56: Should read "Differences … were"

6. Page 6: Throughout results, please provide p-values consistently throughout the results.

7. Page 6, Line 18: Please state explicitly at the beginning of the first paragraph of the Results, that these results are all MOLLI data.

8. Page 7, Line 7: Was motion correction performed with Siemens in-line MOCO? Was it performed consistently for all data? Previous reports found Siemens motion correction suffered from a high failure rate in SASHA due to the low contrast, even at 3T (Weingartner et al. "Myocardial T1-mapping at 3T using saturation-recovery: reference values, precision and comparison with MOLLI", JCMR 2016; 18:84). Please elaborate and/or discuss.

9. Page 7, Line 55: Please consider replacing "Last" by, "Lastly" or "Finally" throughout the manuscript

10. Page 8, Line 27: Should read "…presented the lowest agreement…"

11. Figures 3, 5 and 8: Please add dashed lines to indicate the level of agreement in the Bland-Altman plots.

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.
I am able to assess the statistics

**Quality of written English**
Please indicate the quality of language in the manuscript:

Acceptable

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I received patent royalties from Samsung for a patent describing the SAPPHIRE T1 mapping method. I also have several other patents granted and in-processing related to myocardial T1 mapping.

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