Reviewer’s report

Title: Rapid T1 Quantification based on 3D Phase Sensitive Inversion Recovery

Version: 2 Date: 1 March 2010

Reviewer: Tom CC Hu

Reviewer’s report:

Comments for Authors:

Review of Biomed Central

“Rapid T1 Quantification based on 3D Phase Sensitive Inversion Recovery”

The manuscript is succinctly written.

The paper describes a series of experiments to measure the myocardial absolute longitudinal T1 relaxation post-Gadolinium from a single breath-hold 3D Phase Sensitivity Inversion Recovery sequence (PSIR). In addition, equations are derived to take the acquisition and saturation effects on the magnetization into account. To the best of the reviewer’s knowledge, this is one of the first few studies where rapid T1 quantification based on phase sensitive inversion recovery has been used.

In reviewing the manuscript, a few general questions arose. When answered, these would provide some clarification and added detail to the submission.

Specific Comments/Questions:

1 Abstract, Methods, Page 2 – “…healthy and fibrotic myocardium was measured at about 15 minutes post-contrast.” Would the 15 minutes post-contrast time period provide the optimal contrast delayed-enhancement? Please elaborate.

2 Background, Page 3 – “Quantification of the absolute T1 relaxation provides a measure for absolute local contrast media concentration.” How would one be able to calibrate the contrast media concentration in the clinical situation? Please elaborate.

3 Background, Page 5 – “A perfect inversion pulse is assumed, a small deviation of the complete inversion has only a negligible effect on the calculations.” How much would this small deviation effect the final T1 estimation? How much would the difference make in terms of healthy versus infracted myocardium post-contrast media? Please elaborate.

4 Methods, Page 8 – “For the in-vivo measurements the Tinv was by default set to 300 ms and the flip angle to 18 degrees.” Would this be much differ between the infracted and healthy myocardium? Would one be able to further optimize the Tinv due to infracted myocardium? Any potential incomplete recovery from the 18 degrees flip angle?
5 Results, Page 11-12 – “…although the LL results in slightly lower R1 values.” What are the potential explanations for this difference?

6 Discussion, Page 13 – “…Fig. 4 shows that small changes in heart rate have less influence on the typical T1 values than the noise level of the measurement.” How much is the T1 variation due to irregular heart rate (R-R)? Please elaborate.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare that I have no competing interests