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Meeting abstract

1133 Is CSPAMM still needed at 3 T?

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Introduction

Imaging at 3 T significantly improves myocardial tagging using spoiled gradient echo based sequences (GRE). At 1.5 T, tagging sequence with SSFP readout offers high contrast and robust quantification of contraction, similar to imaging at 3 T with GRE sequences. CSPAMM further improves myocardial tagging persistency by subtracting complementary tagged images at cost of a lower temporal resolution.

The purpose of this study was to evaluate the performance of CSPAMM balanced SSFP tagging sequence at 3 T. We optimize this sequence at 3 T and compare it with the same sequence at 1.5 T, considered as the gold standard for tag imaging. We also investigate the performance of CSPAMM vs SPAMM, at both field strength, with a special emphasis on the impact of the lower temporal resolution on the accuracy of the strain measurements.

Methods

5 volunteers and 1 patient were imaged using both a 1.5 T Avanto system and a 3 T Trio system (Siemens Medical Solutions, Erlangen, Germany). We used an ECG gated, single breath hold balanced SSFP line tagging sequence with LISA for SPAMM and CSPAMM acquisition. The temporal resolution was 39 ms for CSPAMM and 21 ms for SPAMM. The field of view was 340 × 340 mm, matrix 256 with 32% phase resolution, bandwidth 850 Hz, slice thickness 7 mm, TE 1.28 (TE 1.54 @ 3 T) and Flip angle 20° (15° @ 3 T).

As we don't use any parallel imaging technique, contrast to noise ratio (CNR) was simply defined as difference of signal in the myocardium (line) and in an adjacent tag over the standard deviation of the background noise. The relative contrast was calculated by subtracting the signal intensity of the myocardium from that of the tag and dividing by that of the myocardium (n = 6).

Images were analyzed using Extrema Temporal Chaining (ETC) method. Myocardial strain was calculated from the tracked contours at endocardium, mid-wall and epicardium in six cardiac sectors and then averaged over the 5 volunteers.

Results

For all volunteers and patient, and all sequences gave very good image quality at both 1.5 T and 3 T (Fig. 1). In particular, off-resonance effects was not limiting at 3 T. As expected, we measured an improved absolute CNR when imaging at 3 T, both for CSPAMM and SPAMM (Fig. 2). In addition, CSPAMM demonstrated an improved tag contrast persistency versus SPAMM at both field strengths (Fig. 3). The strain measurements were successfully performed with ETC in every case. No significant differences were found between CSPAMM at 3 T, CSPAMM at 1.5 T and SPAMM at 3 T, regarding circumferential shortening.

Conclusion

CSPAMM with balanced SSFP is feasible at 3 T and still improves considerably myocardial tagging MRI. It combines gain of absolute CNR from the field strength with

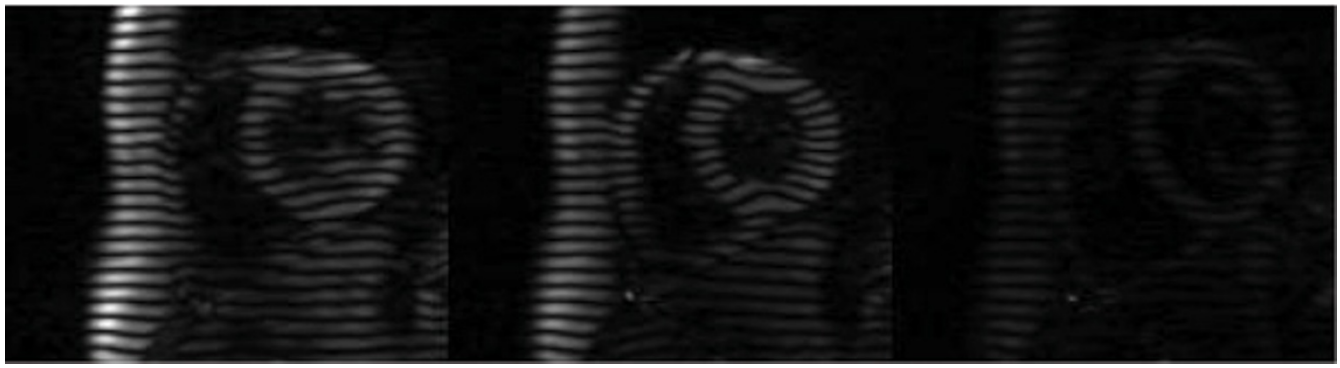

Figure 1
Mid ventricular short axis view using balanced SSFP CSPAMM line tagging sequence at 3 T. From left to right: first phase, end systole and last phase.

improved relative tag contrast, easing thus the post processing. Moreover our preliminary study seems to show that the lower temporal resolution of the CSPAMM technique (compared to SPAMM) does not affect the accuracy of the evaluation of the circumferential shortening. To conclude, CSPAMM with balanced SSFP at 3 T

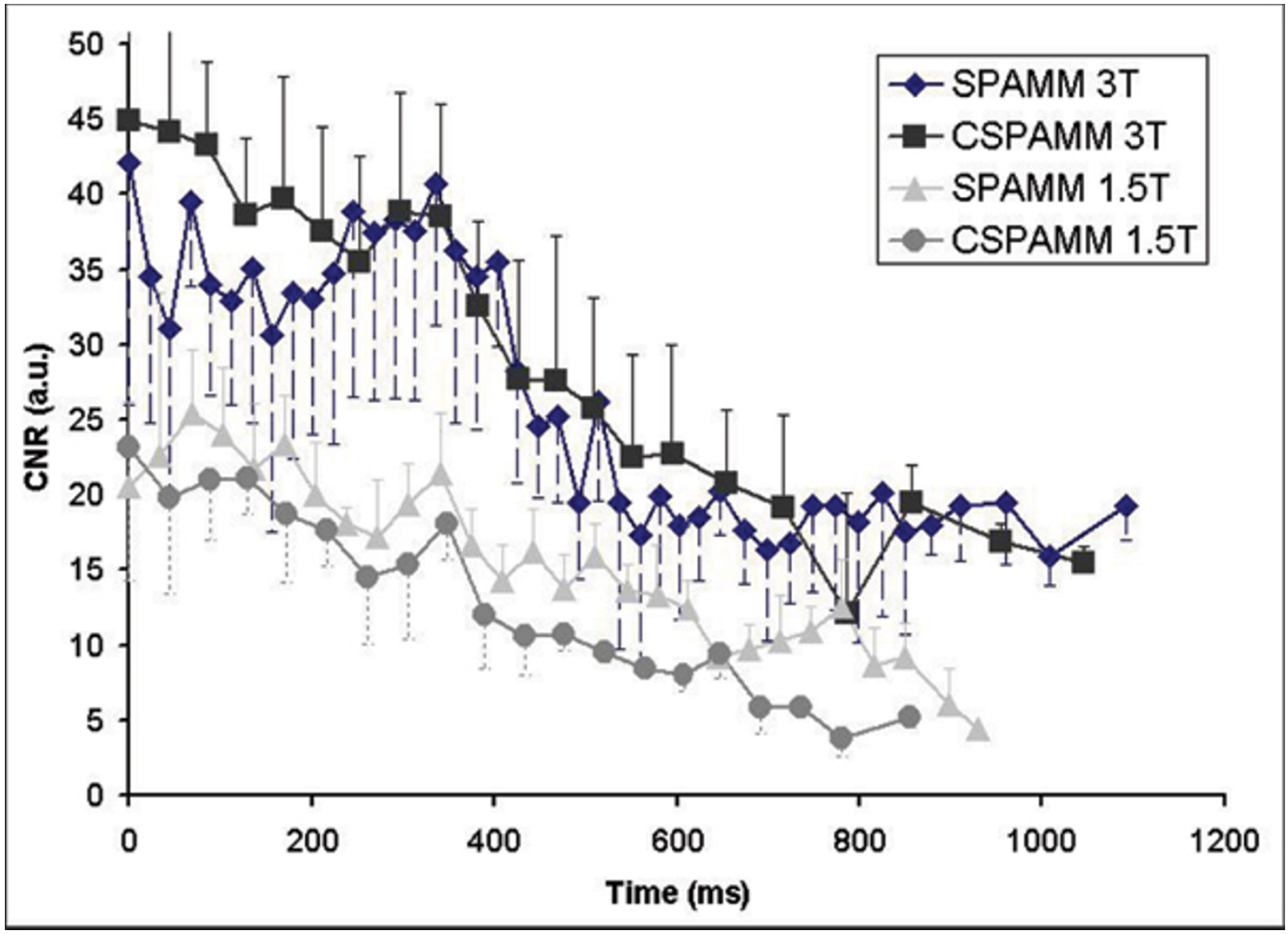

Figure 2
Mean ± SD CNR values for all volunteers and patient.

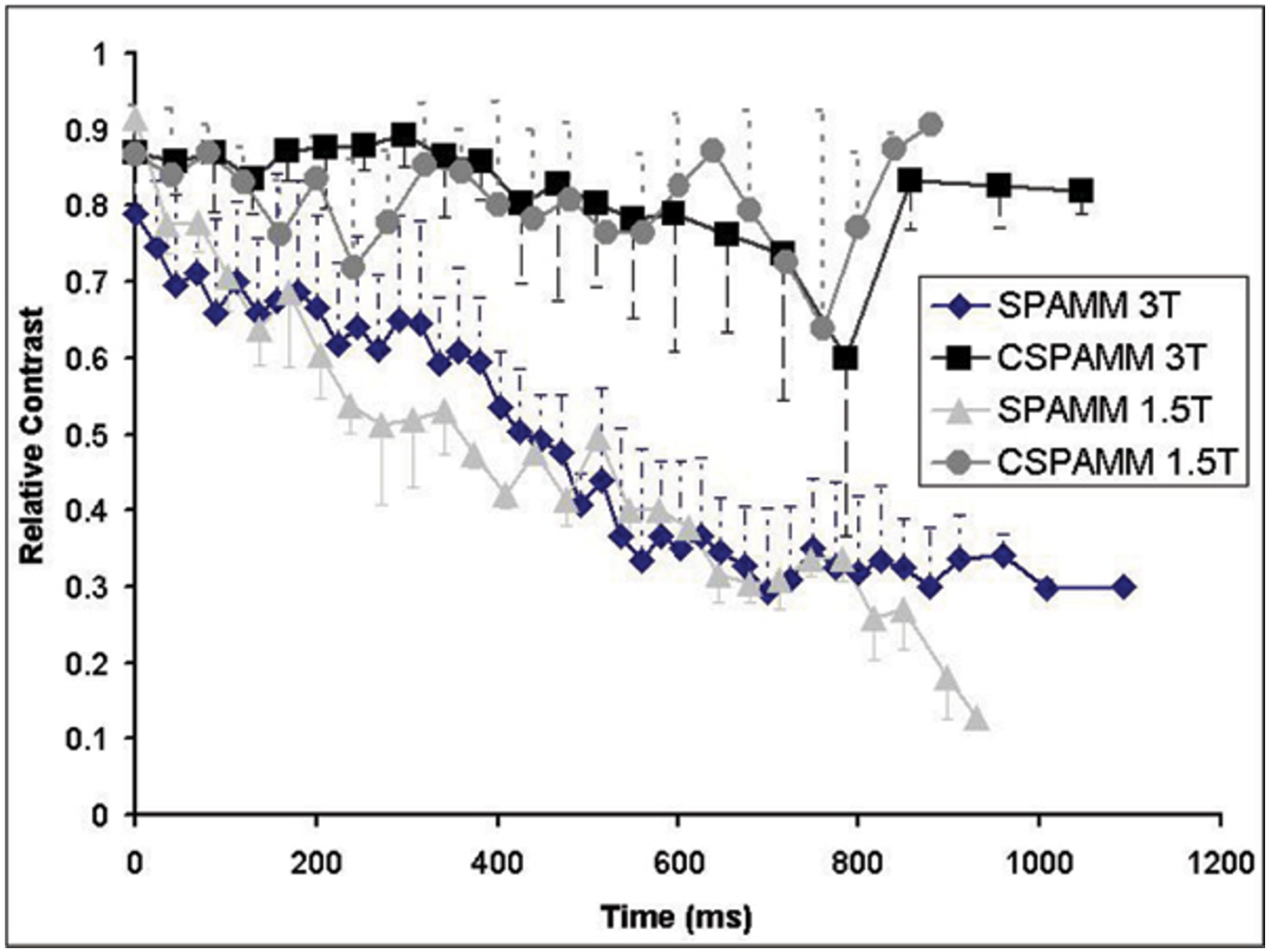

Figure 3
Mean ± SD relative tag contrast values for all volunteers and patient.

appears to be a powerful technique to study myocardial function including diastolic relaxation.

References

1. Valeti VU, *et al.*: *JMRI* 2006, **23(4):**477-80.
2. Johnson TR, *et al.*: *Eur Radiol* 2007, **17(9):**2218-24.
3. Fischer SE, *et al.*: *MRM* 1993, **30(2):**191-200.
4. Zwanenburg JJ, *et al.*: *MRM* 2003, **49(4):**722-30.
5. Jacob JP, *et al.*: *ACIVS* 2006, **4179:**p897-908.