

Phasesensitive Inversion Recovery (PSIR) Single Shot TrueFISP for Assessment of Myocardial Infarction at 3 Tesla

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Purpose: The aim of the current study was to show if CNR could be improved without loss of diagnostic accuracy, if a PSIR Single Shot TrueFISP sequence is used at 3.0 Tesla instead of 1.5 Tesla.

Material and Methods: 10 patients with myocardial infarction were examined at a 1.5 Tesla MR System (Avanto, Siemens, Medical Systems) and at a 3.0 Tesla MR system. Imaging delayed contrast enhancement was started 10 minutes after application of contrast material. A phasesensitive inversion recovery (PSIR) Single Shot TrueFISP sequence was used at 1.5 and 3.0 Tesla and compared with a segmented IR turboFLASH sequence at 1.5 Tesla (1), which served as reference method. Infarct volumes and CNR of infarction and normal myocardium were compared with the reference method.

Results: The PSIR Single Shot TrueFISP technique allows for imaging 9 slices during a single breath hold without adaptation of the inversion time. The mean value of CNR between infarction and normal myocardium was 5.9 at 1.5 T and 12.2 at 3.0 Tesla (magnitude images). The CNR mean value of the reference method was 8.4. The CNR mean value at 3.0 Tesla was significantly ($p=0.03$) higher than the mean value of the reference method. The correlation coefficients of the infarct volumes, determined with the PSIR Single Shot TrueFISP technique at 1.5 Tesla and at 3.0 Tesla and compared to the reference method, were $r=0.96$ ($p=0.001$) and $r=0.99$ ($p=0.0001$).

Conclusion: The use of PSIR Single Shot TrueFISP at 3.0 Tesla allows for accurate detection and assessment of myocardial infarction. CNR is significantly at higher 3.0 T compared to 1.5 T. The PSIR single shot technique at 3.0 T provides a higher CNR than the segmented reference technique at 1.5 T.

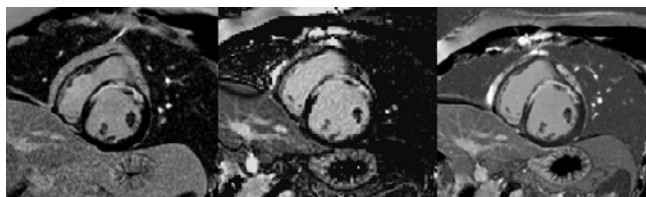


Fig1: 73-year-old male patient with myocardial infarction.

a) Segmented IR turboFLASH at 1.5 Tesla b) PSIR Single Shot TrueFISP at 1.5 Tesla.
c) PSIR Single Shot TrueFISP at 3 Tesla.

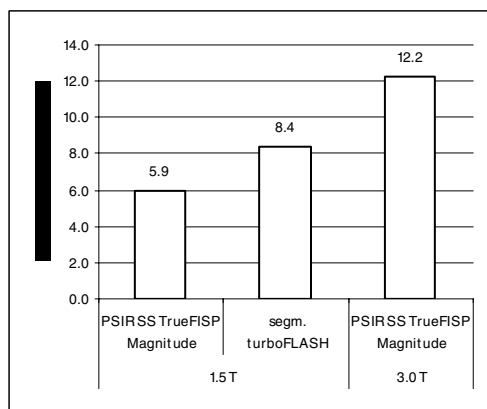


Fig 2: Contrast/Noise Ratio (Magnitude Images).

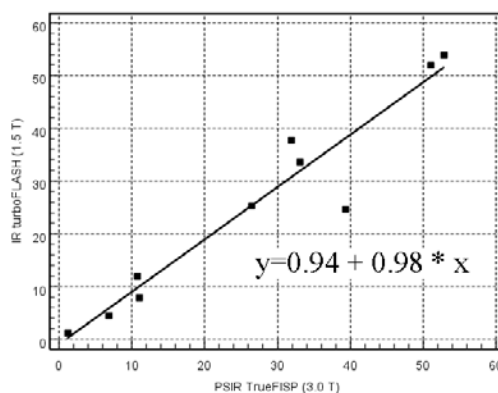


Figure 3: Infarct Volumes: Reference technique (segmented IR turboFLASH) and PSIR Single Shot TrueFISP at 3 T.

1. Simonetti OP, Kim RJ, Fieno DS, Hillenbrand HB, Wu E, Bundy JM, Finn JP, Judd RM. An improved MR imaging technique for the visualization of myocardial infarction. *Radiology* 2001; 218: 215-223
2. Kellman P, Arai AE, McVeigh ER, Aletras AH. Phase-sensitive inversion recovery for detecting myocardial infarction using gadolinium-delayed hyperenhancement. *Magn Reson Med*. 2002; 47: 372-383