

## T2-component of Conventional Cine SSFP Sequences is sufficient to detect Myocardial Edema in Patients with acute reperfused Myocardial Infarction

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### Introduction:

T2-weighted single-phase STIR sequences are applied in ischemic heart disease to identify acute myocardial infarction by identification of tissue edema. However, in the same session usually functional imaging is performed as well with cine SSFP sequences that have T2/T1 weighting. These sequences, due to their inherent T2 weighting, could possibly be sufficient to detect myocardial edema, abolishing the necessity to run a separate T2-STIR sequence.

### Hypothesis:

The T2-weighting of standard cine SSFP sequences is sufficient to detect tissue edema in patients with acute reperfused myocardial infarction.

### Methods:

11 patients with acute myocardial infarction (age 59±10 years, all male) underwent a CMR study on day 3±2 post successful reperfusion therapy. On a clinical 1.5T system (Avanto, Siemens Medical Solutions, Germany; 6-channel phased array coil) an imaging protocol was applied, covering the entire left ventricle in short axis slices (thickness 10mm, spacing 0) with a) Cine SSFP (TR 90msec, TE1.1 msec, flip angle 60), b) T2-weighted STIR (TR=2 RR intervals, TE=61msec) and, c) 10 minutes after injection of 0.2mmol/kg bodyweight of Gd-DTPA (Magnevist, Bayer Health Care, Canada) Late Enhancement (IR-GE, inversion time adjusted manually to 240-450msec).

Based on the late enhancement images, a representative image slice with myocardial infarction was chosen from each patient. A segmental analysis was performed in a blinded fashion, using an image slice in the centre of the infarct. Following visual segmental analysis after optimizing the contrast window, a semi-quantitative analysis was performed using validated software. Segments with more than 7 conjunct pixels with a signal intensity >2 standard deviations above remote myocardium were classified positive for edema. This approach was used for the T2-STIR images and the SSFP cine slices. The results for both sequences were correlated using kappa statistics and compared using 4x4 tables.

### Results:

A total of 66 segments from 11 patients were analyzed. All patients with edema on T2-STIR also had high signal on Cine SSFP.

On the segmental analysis, 49 segments were positive for edema on the standard T2-STIR, and 17 were negative. On the quantitative SSFP analysis 45/49 positive segments were detected, 4 segments were missed; from the 17 negative segments on T2-STIR, 14 were negative on Cine SSFP. The kappa value for segmental correlation was 0.73.

The visual analysis yielded a kappa value for SSFP/T2-STIR correlation of 0.76.

### Conclusion:

Cine SSFP imaging may be used to detect myocardial edema in patients with acute myocardial infarction. Small discrepancies in the segmental analysis may be explained by differences in the T2 weighting of the sequences, segment registration errors, and artifacts. Further studies are necessary to assess diagnostic accuracy and clinical performance in a larger patient cohort.

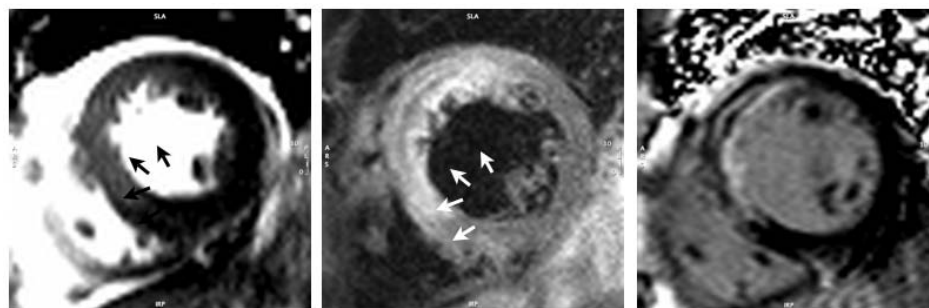


Figure: Cine SSFP (left), T2-STIR (middle) and late enhancement (right). Note the high signal on the cine SSFP image (black arrows), corresponding to the high signal on T2-STIR (white arrows).