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POSTER PRESENTATION

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T2-mapping in volunteers: influence of sequence, spatial orientation and interindividual variability

Ralf Wassmuth[*], Jeanette Schulz-Menger

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Background

CMR T2-mapping is a promising tool for characterizing myocardial edema. We applied T2-mapping in volunteers to compare two mapping sequences and to assess feasibility, reproducibility and spatial homogeneity.

Methods

We scanned 26 volunteers (10 female, 20-70 years, mean 32±13 years, median 28 years, BMI 23±3 kg/m2) with a normal ECG, no cardiac disease and no symptoms of inflammation.

Using a 1.5 T scanner and a dedicated 12-element cardiac coil we applied a FLASH-based and SSFP-based mapping sequence in midventricular short axis (SAX) and four-chamber-view (4CV). The map was based on three images with an echo time of 0, 24 and 55 ms. Spatial resolution was 2.1 mm/pixel. Scan time was 12 heart beats.

In Osirix 3.3.2. we manually drew 6 segments in SAX and 4CV, each. Additionally, we drew a global region of interest (ROI) covering the whole LV myocardium in SAX and 4CV. The same investigator analyzed 10 data sets twice. 5 volunteers were scanned twice on separate days. Results were compared with a paired student t-test.

Results

After excluding one subject due to obvious pathologies, 25 datasets with sufficient image quality were evaluated. Table 1 gives mean and range for global ROI.

FLASH and SSFP correlated better in 4CV than in SAX (correlation coefficient 0.92 vs. 0.80; p< 0.04). T2-values did not correlate with heart rate (p=0.3).

With both sequences anteroseptal segments had higher T2-values than inferior and inferolateral

Table 1

	FLASH	SSFP	
SAX	52±8; 42-60	57±10; 46-69	p< 0.001
4CV	58±10; 47-74	61±14; 51-80	p<0.005
	p<0.001	p<0.001	

segments in SAX (for FLASH 58±6 vs. 48±4; p< 0.001). In 4CV the basal septum had higher T2-values than the anterolateral segment with FLASH (62±7 vs. 54±8 ms; p<0.001), but not with SSFP (58±6 vs. 60±11 ms; p=0.3). Mean absolute difference between a single segment and a global measurement was 4±1 ms and 3±1 ms for FLASH and SSFP in SAX and 5±2 ms for FLASH and SSFP in 4CV (p=0.3).

Mean difference for repeated analysis was 1.6±1.9 ms (correlation coefficient 0.9) and 2.2±2.2 ms (correlation coefficient 0.7) for repeated scans.

Conclusion

T2-mapping is feasible with low intraobserver variability and does not depend on heart rate. SSFP-based T2-mapping resulted in slightly higher values than FLASH. Mapping in 4CV resulted in higher T2-values than in SAX. We could detect small spatial differences across the heart. However, these intraindividual spatial variations were smaller than considerable interindividual variability.

Charite, University Berlin, Berlin, Germany
Full list of author information is available at the end of the article

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