High Resolution and Extended Coverage in First-Pass Myocardial Perfusion Imaging using a Real-Time Imaging Platform

Chia-Ying Liu, Krishna S. Nayak

Department of Electrical Engineering, University of Southern California, Los Angeles, CA, USA

Introduction: First-pass myocardial perfusion imaging requires volumetric coverage, high spatial and temporal resolution, and strong T1 contrast. We have implemented such a sequence within a flexible real-time system to enable rapid prototyping and evaluation of new perfusion pulse sequences.

Materials and Methods: We based this work on a real-time MRI platform developed by Santos et al. [1]. We used a cardiac gated pulse sequence, including a hard-pulse saturation (5 ms) followed by a spiral imaging acquisition (12.5 ms TR, 36° flip, 10 interleaves) [2]. Experiments were performed in healthy volunteers on a GE Signa Excite 3T scanner. Six short-axis slices were interactively localized. Prior to injection, the saturation pulse amplitude was interactively adjusted to maximize suppression of non-enhanced myocardium (video part 1). First-pass imaging was performed with all six slices acquired each R-R interval (video part 2, 830 ms R-R).

Results and Discussion: First-pass images using the proposed sequence achieved good contrast, higher spatial and temporal resolution, and volume coverage compared to clinical protocols. Future work will include the implementation of off-resonance correction, alternative k-space sampling schemes (EPI, VDS), and new contrast preparation pulses to improve image quality.

References: