

## Renal Transplant: Nonenhanced Magnetic Resonance Angiography with Quiescent-Interval Single-Shot

Pegah Entezari<sup>1</sup>, Mauricio S Galizia<sup>1</sup>, Christopher Glielmi<sup>2</sup>, Jeremy Collins<sup>1</sup>, Michael Markl<sup>1</sup>, Robert R Edelman<sup>3</sup>, and James C Carr<sup>1</sup>

<sup>1</sup>Department of Radiology, Northwestern University-Feinberg School of Medicine, Chicago, IL, United States, <sup>2</sup>Cardiovascular MR R&D, Siemens Healthcare, Chicago, IL, United States, <sup>3</sup>Department of Radiology, NorthShore University HealthSystem, Evanston, IL, United States

**Introduction:** Quiescent-Interval Single Shot (QISS) is a non-contrast MRA technique which has been shown to be equivalent to contrast-enhanced MRA (CE-MRA) in patients with lower extremity peripheral arterial disease (PAD).<sup>1,2</sup> Steady-state free precession (SSFP) MRA with inversion recovery has been shown to have image quality comparable to that of CE-MRA in depicting the renal arteries and detecting renal arterial stenosis in patients with renal transplants.<sup>3</sup> However, to our knowledge, QISS has not been assessed for evaluating the renal arteries. The purpose of this study is to investigate QISS as an alternative nonenhanced MRA technique for evaluating renal arterial stenosis in patients with renal transplants.

**Methods:** All measurements were performed on a 1.5T MR system (MAGNETOM Avanto, Siemens Healthcare, Erlangen, Germany). Ten patients with kidney transplant (x female) were examined with an ECG-gated QISS sequence (TE/TR of 1.4/3.4 ms, 1 group of 48 axial 3 mm slices, 1x1 mm in-plane resolution, flip angle of 90 deg., 5/8 partial Fourier acquisition, GRAPPA factor of 2, 40 x 32 mm FOV). The same patients were also examined with a respiratory-navigator segmented three-dimensional (3D) fast imaging with SSFP sequence and a slab-selective inversion prepulse (NATIVE TrueFISP, Siemens Healthcare, Erlangen, Germany).<sup>3</sup> Two radiologists, blinded to the clinical data and to each other results, scored image quality in the renal transplants using a 5-point scale (0-nondiagnostic, 1-poor, 2-fair, 3-good, 4-excellent). The same radiologists also assessed the presence of arterial stenosis in the images, using another 5-point scale (0-normal patency, 1-mild stenosis, 2-moderate stenosis, 3-severe stenosis, 4-occlusion). A difference in diagnosis of more than one point was considered a misdiagnosis, and the percentage of misdiagnosis was calculated for each observer.

**Results:** One observer gave slightly higher image quality scores for QISS, and the other gave slightly higher image quality scores for the SSFP MRA. However, there were no significant differences in terms of image quality between the methods. Both observers had one misdiagnosis each using the SSFP MRA as gold standard (12% of misdiagnosis).

**Discussion:** Although patients with renal transplant usually present with normal renal function, there is a concern about giving gadolinium-based contrast material in this population, prompting the use of nonenhanced MRA techniques. Our study demonstrated similar image quality for both SSFP MRA and QISS. Because QISS is a two-dimensional technique, with thinner slices than SSFP MRA, it necessitates a shorter time for volume filling by nonsaturated blood. Therefore, QISS is a potential alternative for the imaging of patients with renal transplants when there is insufficient blood flow.

**Acknowledgements:** This was supported in part by NIH R01HL09691.

### References:

1. Edelman RR et al. MRM 2010; 63:951-8.
2. Hodnett et al. Radiology 2011; 260:282-93.
3. Liu X et al. Radiology 2009; 251:535-42.

	SSFP MRA	QISS
Observer 1	2.7 ± 1.6	3.3 ± 1.1
Observer 2	3.0 ± 1.1	2.8 ± 1.1

**Table 1.** Image quality of both nonenhanced MRA techniques for two independent observers.