

# “Inflow“ Renal MR-Angiography with Steady-State Free-Precession and Slab-Selective Spin Inversion: Intraindividual Comparison with ce-MRA in Patients

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## Introduction

Recently, an inversion-prepared steady-state free-precession (SSFP) MR angiography (MRA) technique was introduced for the visualization of renal arteries without contrast medium (inflow-MRA)<sup>1</sup>. A slab-selective inversion pre-pulse, which covers the imaging volume, was applied prior to imaging in order to suppress signal from stationary tissue. During an inversion delay unsaturated blood from the aorta enters into the renal arteries. This inversion concept allows for selective visualization of the renal arteries.

In this study, the reliability of the novel inversion-prepared SSFP MRA technique was evaluated in patients and compared to contrast-enhanced MRA (ce-MRA).

## Materials and Methods

103 renal arteries in 45 patients were investigated on a 1.5 T whole-body MR-system using a free-breathing navigator-gated and cardiac-triggered 3D SSFP sequence (TR/TE 3.8/1.9 ms, flip-angle 85°, TI 325 ms, spatial resolution 1.1x1.1x2.0 mm<sup>3</sup>, acquisition time approximately 2 min) with a preceding slab-selective inversion pulse. In all patients ce-MRA was performed for comparison.

Images were evaluated in terms of artifacts and visualization of the renal arteries by two radiologists. In addition, the stenosis-grade was assessed if renal artery stenoses were present.

## Results

ce-MRA revealed 52 renal artery stenoses. Using inflow-MRA 51 stenoses were assessed and the stenosis grade was in agreement with ce-MRA. Using inflow- and ce-MRA, images without artifacts were acquired in 42 and 40 patients, respectively. Artifacts, which did not impair the visualization of the renal arteries, were seen in 3 patients regardless of sequence. Severe artifacts were present in 2 patients using ce-MRA. With both techniques, the renal arteries including the segment vessels were visualized in 44 patients; the visualization of the renal artery was limited to the main vessel in 1 patient.

## Conclusion

Inflow-MRA with SSFP and a preceding slab-selective inversion pre-pulse represents an alternative diagnostic tool to ce-MRA negating the need for contrast medium and breath-holding. Inflow-MRA can be performed repeatedly and might be particularly useful in patients with respiratory insufficiency.

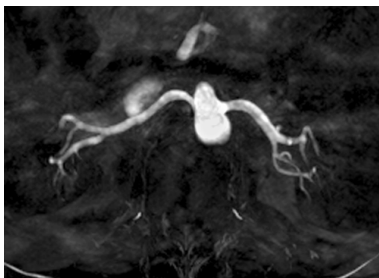


Fig. 1:  
Inflow-MRA in a 52 year-old male patient. The blood in the aorta and in the renal arteries including the segment vessels is selectively visualized. On both sides a slight narrowing can be seen at the proximal portion.

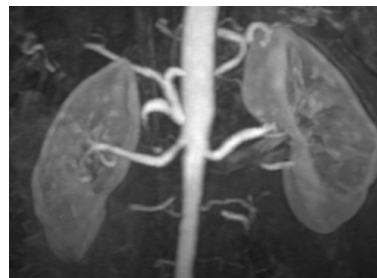


Fig. 2:  
Ce-MRA obtained in the same patient as in Fig. 1. verifying the narrowing of the renal arteries on both sides.

## Reference

1. Katoh et al. *Kidney Int.* 2004