

## 9. 5 4D time-resolved MR angiography with Keyhole (4D-TRAK): 60-times accelerated MR angiography using CENTRA, Keyhole and SENSE at 3.0T.

Winfried A. Willinek, MD<sup>1</sup>; Dariusch R. Hadizadeh, MD<sup>1</sup>, Jürgen Gieseke; PhD<sup>2</sup>; Marcus v. Falkenhausen, MD<sup>1</sup>; Romhild Hoogeveen, PhD<sup>2</sup> and Hans H. Schild, MD<sup>1</sup>

**1 Department of Radiology, University of Bonn, Germany;**

**2 Philips Medical Systems, Best, The Netherlands**

Detailed characterization of hemodynamics and angioarchitecture is of utmost interest in almost all MRA applications including in MRA of arterio-venous malformations (AVM) in which depiction of arterial feeders, dimension of nidus and draining veins allow for correct classification according to the grading system of Spetzler and Martin. Catheter angiography is still considered the standard of reference in many of these applications due to its high temporal and high spatial resolution. 4D-TRAK is a new method of 4D time-resolved MRA with CEN-

TRA Keyhole. In combination with SENSE (acceleration factor (AF), 8) half fourier imaging (AF, 1.25) and Keyhole with a keyhole percentage of 16 (AF, 6) a total acceleration factor of 60 (8 x 1.25 x 6) was implemented on a clinical whole body 3.0T system. 50 dynamic scans with 140 slices each were acquired at a temporal resolution of 608 msec./dynamic and high spatial resolution (true voxel size, (1.1 x 1.4 x 1.1) mm<sup>3</sup>). A part from cerebral AVM, clinical applications included lower leg MRA, supraaortic MRA and MRA of hemodialysis shunts.