# AbstractID: 6455 Title: MR vessel size imaging of brain tumors using double contrast agent injections

**Purpose**

Microvascular dimensions can be estimated by MR vessel size imaging (VSI) which requires measurements of $\Delta R_2^*$ and $\Delta R_2$ following contrast passage, cerebral blood volume, and apparent diffusion coefficient (ADC). Recently, this method has been applied in human subjects using a double-echo sequence with a constant ADC. However, such sequence is not widely available in clinical scanners and may result in limited resolution. In addition, ADC can vary between different tissues and lesions. This study proposed a set of imaging protocols including double contrast injections and ADC measurement for VSI in patients with brain tumors.

**Methods**

Seven patients with brain tumors were examined on a 3T clinical MR scanner. VSI data were acquired during two injections of 0.2 ml/kg Gd-DTPA (Magnevist) (4 ml/s): (1) GE-EPI (TR/TE=1500ms/35 ms) and (2) SE-EPI (TR/TE=1500ms/70ms), each with 60 phases, matrix size = 64, and slice thickness = 5 mm. Three-directional diffusion-weighted MRI was performed with b = 1000 s/mm^2. Vessel diameters in gray matter, white matter and tumor regions were calculated with the measured ADC and compared to the results with an assumed constant ADC (800 mm^2/s).

**Results**

Vessel diameters in normal gray and white matters were obtained as 18.8+/- 8.4 and 15.5+/- 4.7 μm, respectively, which was in agreement with previous studies. The vessel caliber of tumors ranged from 68.0 to 179.1 μm. Results calculated with constant ADC introduced 3-24% errors in VSI of tumors, depending on the discrepancies between the true and assumed ADCs.

**Conclusion**

This study included ADC measurements in the clinical protocol of MR VSI, which is crucial for accurate assessment of microvascular dimensions in lesions. A double contrast agent injection approach was tested and proven being capable of providing reasonable vessel calibers. This approach has potential for VSI with higher resolution, which is currently under investigation.