Relative cerebral blood flow

Relative cerebral blood flow changes can be measured by a novel simple blood flow measurement technique with endogenous water protons as a tracer based on flow-sensitive alternating inversion recovery (FAIR). Two inversion recovery (IR) images are acquired by interleaving slice-selective inversion and nonselective inversion. During the inversion delay time after slice-selective inversion, fully magnetized blood spins move into the imaging slice and exchange with tissue water. The signal enhancement (FAIR image) measured by the signal difference between two images is directly related to blood flow. For functional MR imaging studies, two IR images are alternatively and repeatedly acquired during control and task periods. Relative signal changes in the FAIR images during the task periods represent the relative regional cerebral blood flow changes. The FAIR technique has been successfully applied to functional brain mapping studies in humans during finger opposition movements. The technique is capable of generating microvascular-based functional maps [1].

Relative cerebral blood flow has rarely been studied as part of the preoperative assessment of tumor grade, although relative cerebral blood volume is known to be useful for this assessment.

First-pass gadopentetate dimeglumine-enhanced T2-weighted echoplanar perfusion MR imaging is useful for the preoperative assessment of tumor grade. A relative cerebral blood flow ratio, in addition to a relative cerebral blood volume ratio, can be a useful tool in the evaluation of the histopathologic grade of cerebral gliomas [2].

1)
Kim SG. Quantification of relative cerebral blood flow change by flow-sensitive alternating inversion recovery (FAIR) technique: application to functional mapping. Magn Reson Med. 1995 Sep;34(3):293-301. PubMed PMID: 7500865.

2)
Shin JH, Lee HK, Kwun BD, Kim JS, Kang W, Choi CG, Suh DC. Using relative cerebral blood flow and volume to evaluate the histopathologic grade of cerebral gliomas: preliminary results. AJR Am J Roentgenol. 2002 Sep;179(3):783-9. PubMed PMID: 12185064.