

学位論文抄録

Fundamental and clinical studies of arterial spin labeling for
the evaluation of intracranial lesions

(頭蓋内病変の診断における arterial spin labeling の有用性の基礎的及び臨床的研究)

笹尾 明

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Abstract

Background and Purpose: Arterial spin labeling (ASL) is a noninvasive MR imaging technique, used for visualization and quantification of cerebral perfusion using magnetically labeled blood as an endogenous tracer. The purpose of this study is: 1) to optimize the location and thickness of labeling slab for relative cerebral blood flow (rCBF); 2) to evaluate the reliability of glioma perfusion by ASL; 3) to demonstrate the feasibility for depicting tumor perfusion of hypervascular extra-axial brain tumors with regional perfusion ASL imaging (RPI).

Materials and Methods: All ASL perfusion studies were performed on a 3T MRI unit. In the first basic study using healthy volunteers, the optimized conditions for the location and thickness of labeling slab were assessed. In the second clinical study, two observers independently measured standardized tumor blood flow (sTBF) from ASL and dynamic susceptibility contrast-enhanced (DSC) MR images in 24 patients with histologically proven glioma. In the third clinical study, conventional ASL and RPI studies were performed in 8 consecutive meningioma patients. Two neuroradiologists independently evaluated overall image quality, the degree of tumor perfusion, and the extent of the tumor vascular territory on conventional ASL and RPI.

Results: Labeling thickness ranging from 100 mm to 200 mm showed relatively stable rCBF values; 15-mm labeling gap was the most stable for rCBF values. In the second clinical study, the intermodality agreement for maximum sTBF was good to excellent on DSC and ASL images. The reproducibility of maximum sTBF measurements was similar. In the third clinical study, there were no cases of having images interfering with interpretation in conventional ASL and RPI.

Conclusion: With use of the optimized conditions, ASL at 3T yielded similar measurements and reproducibility to DSC perfusion MRI in the evaluation of glioma perfusion. RPI is feasible for depicting tumor perfusion of hypervascular extra-axial brain tumors.