

**Quantitative assessment of cerebrovascular reserve capacity using
perfusion-weighted magnetic resonance imaging:
comparison with positron emission tomography study**

Hidehiko Endo, Takashi Inoue, Kuniaki Ogasawara, Takeshi Fukuda
Satoshi Ota, Akira Ogawa

Department of Neurosurgery, Iwate Medical University
19-1 Uchimaru, Morioka 020-8505, Japan

Abstract

Perfusion-weighted magnetic resonance imaging (PWI) is now considered useful for the quantitative evaluation of hemodynamics. This study assessed the relationship between hemodynamic parameters obtained by positron emission tomography (PET) and PWI, and evaluated the usefulness of cerebral blood volume (CBV) measurement for the assessment of cerebrovascular reserve capacity (CVRC). Seventeen patients with chronic occlusive cerebrovascular disease underwent PET and PWI. CVRC was measured by PET as the difference in cerebral blood flow (CBF) before and after acetazolamide challenge. Quantitative values of CBF and CBV were measured by PWI. Twelve healthy volunteers were also studied as controls. There was a significant correlation between PET-CBF and PWI-CBF ($r=0.64$, $p<0.0001$) and a significant negative correlation between PET-CVRC and PWI-CBV ($r=-0.70$, $p<0.0001$). Using cutoffs for PET-CVRC at 15.1% and PWI-CBV at 15.2 ml/100g provided good sensitivity (80%) and specificity (92%) to detect abnormal reduction of PET-CVRC based on PWI-CBV in the patient group. PWI may therefore be clinically useful to assess hemodynamics.