

MEASUREMENT OF ARTERIOLAR BLOOD VOLUME IN BRAIN TUMORS USING ADVANCED MRI WITHOUT EXOGENOUS CONTRAST AGENT

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Arteriolar cerebral-blood-volume (CBVa) is an important perfusion parameter that can be measured using inflow-based vascular-space-occupancy (iVASO) MRI without exogenous contrast agent administration. The purpose of this study is to assess the potential diagnostic value of CBVa in brain tumor patients by comparing it with total-CBV (including arterial, capillary and venous vessels) measured by dynamic-susceptibility-contrast (DSC) MRI. Twelve brain tumor patients were scanned using iVASO and DSC MRI. Region-of-interest analysis was performed to compare the resulting perfusion measures between tumoral and contralateral regions, and to evaluate their associations with tumor grades. CBVa measured by iVASO MRI significantly correlated with WHO grade. Total-CBV measured by DSC MRI showed a trend of correlation with WHO grade. The signal-to-noise ratio was comparable between the two methods, while the contrast-to-noise ratio between tumoral and contralateral regions was higher in iVASO-CBVa than DSC-CBV in WHO II/III patients but comparable in WHO IV patients. A trend of positive correlation between DSC-CBV and iVASO-CBVa was observed. In this initial patient study, CBVa demonstrated a stronger correlation with WHO grade than total-CBV. Further investigation with a larger cohort is warranted to validate whether CBVa can be a better classifier than total-CBV for the stratification of brain tumors, and whether iVASO MRI can be a useful alternative method for the assessment of tumor perfusion, especially when exogenous contrast agent administration is difficult in certain patient populations.