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The utility of arterial spin labelled perfusion-weighted magnetic resonance imaging in measuring the vascularity of high grade gliomas: A prospective study

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Background: Dynamic Susceptibility Contrast (DSC) Perfusion Weighted Imaging (PWI) currently remains the gold standard technique for measuring cerebral perfusion in glioma diagnosis and surveillance. Arterial Spin Labelling (ASL) PWI is a non-invasive alternative that does not require gadolinium contrast administration, although it is yet to be applied in widespread clinical practice. This study aims to assess the utility of ASL PWI in predicting glioma vascularity by measuring maximal tumour signal intensity in patients based on pre-operative imaging and comparing this to maximal vessel density on histopathology.

Methods: Pseudo Continuous ASL (PCASL) images were acquired pre-operatively in 21 patients with high grade gliomas. The maximal signal intensity within the gliomas over a region of interest of 100 mm² was measured and also normalised to the contralateral cerebral cortex (nTBF-C) and cerebellum (nTBF-Cb). Maximal vessel density per 1 mm² was determined on histopathology using CD31 and CD34 immuno staining on all participants.

Results: A statistically significant correlation was observed between maximal signal intensity ($p < 0.05$) and nTBF-C ($p < 0.05$) to maximal vessel density based on histopathology. Although a positive trend was also observed nTBF-Cb, this did not reach statistical significance. Average vessel density did not correlate with age, sex, previous treatment, or IDH status.

Conclusions: ASL PWI imaging is a reliable marker of evaluating the vascularity of high grade gliomas and may be used as an adjunct to DSC PWI.

Keywords: Magnetic Resonance Imaging (MRI), Cerebral Blood Flow (CBF), Cerebral Blood Volume (CBV), Dynamic Susceptibility Contrast (DSC), Perfusion Weighted Imaging (PWI), Arterial Spin Labelling (ASL), Glioma.

Biography

Gurkirat Chatha work's at Alfred Hospital in Melbourne, Australia. He is currently an advanced trainee in Neurosurgery and sitting his fellowship exams this year. He plans to undertake fellowship in skull base and spinal surgery.

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