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DSC in Neurodegenerative Disease

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Dynamic susceptibility contrast (DSC) MRI is a robust perfusion imaging method that is gaining attention in neurodegenerative disease. By quantifying cerebral blood flow (CBF) and cerebral blood volume (CBV), DSC provides a window into microvascular dysfunction, an increasingly recognized contributor to Alzheimer's disease (AD) and amnestic mild cognitive impairment (aMCI).

DSC consistently demonstrates hypoperfusion in temporoparietal cortices, posterior cingulate gyrus, and frontal regions in AD, while aMCI shows subtler changes often limited to parietal and temporal cortices. In some cases, relative hyperperfusion in hippocampal or cingulate regions may reflect early compensatory responses. These perfusion signatures are closely aligned with other imaging biomarkers and support DSC as a clinically relevant tool for detecting and monitoring disease.

Emerging applications extend the relevance of DSC beyond cortical perfusion. Measurement of choroid plexus blood flow may provide novel biomarkers linking vascular dysfunction to impaired glymphatic clearance and neuroinflammation. In parallel, advanced modeling of DSC data enables estimation of oxygen extraction fraction (OEF) and cerebral metabolic rate of oxygen ($CMRO_2$), bridging hemodynamics with tissue energetics. These measures are particularly valuable in neurodegeneration, where impaired oxygen utilization and vascular inefficiency contribute to cognitive decline.

In summary, DSC MRI not only identifies perfusion abnormalities in AD and MCI but also holds promise for probing choroid plexus function and cerebral oxygen metabolism. By complementing structural and molecular imaging, DSC offers a versatile and clinically accessible tool to advance precision diagnostics and therapeutic monitoring in dementia.

Keywords: *Alzheimer's disease, Mild cognitive impairment, Dynamic susceptibility contrast MRI, Cerebral perfusion, Oxygen metabolism, Choroid plexus*