Cognitive fatigability

Cognitive fatigability (CF) can be defined as an inability to maintain performance throughout a sustained cognitive task. Individuals with multiple sclerosis (MS) are more susceptible to CF than healthy controls (HCs); however, the neural correlates underlying CF are still under investigation. Arterial spin labeling (ASL) perfusion imaging provides a non-invasive method of objectively quantifying cerebral blood flow (CBF) during sustained attention tasks. To date, no study has yet evaluated CF in MS using this methodology. 10 MS and 10 HCs completed a 20-min psychomotor vigilance task (PVT). CF was evaluated by dividing the PVT into quintiles and examining performance from the 1st to the last. Mean reaction times (RTs) and number of lapses were recorded. Global and regional CBF changes were evaluated throughout the PVT as well as during pre- and post-task rest. Increased susceptibility to CF was noted in the MS group. Distinct patterns of CBF activation were observed in areas comprising fronto-parietal, cortico-striatal, cerebellar, and basal ganglia regions; however, when and how these regions were engaged differed between the MS and HC groups. In particular, dysfunction in CBF to the middle frontal gyrus may underlie the CF effects observed. In addition, individuals with MS appear to struggle with “switching off” regions of the attentional network at rest following sustained cognitive effort. Findings support the use of ASL as an appropriate methodology for evaluating CF in MS with an overall pattern of attentional network dysfunction being observed. Objectively quantifying CF in this manner can help validate patients' subjective complaints [1].

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Berard JA, Fang Z, Walker LAS, Lindsay-Brown A, Osman L, Cameron I, Cruce R, Cron GO, Freedman MS, Smith AM. Imaging cognitive fatigability in multiple sclerosis: objective quantification of cerebral blood flow during a task of sustained attention using ASL perfusion fMRI. Brain Imaging Behav. 2019 Aug 29. doi: 10.1007/s11682-019-00192-7. [Epub ahead of print] PubMed PMID: 31468375.