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**"The Effects of Cognitive Impairment and Brain Atrophy on the Development of Depression in Patients with Multiple Sclerosis"**

**Background:** Multiple sclerosis (MS) is an autoimmune, neurodegenerative disease characterized by the demyelination of axons within the central nervous system leading to the development of motor, sensory, and cognitive deficits. The cognitive impairment present in people with MS typically presents as deficits in complex attention, memory, and planning. 25-50% of patients with MS will develop depressive symptoms during the course of their disease. Depression can also affect aspects of cognition, particularly executive functioning, which can mimic the cognitive deficits seen in patients with MS. Previous studies have found that depressive symptoms appear more often in patients in the later stages of MS as compared to the earlier stages of the disease. The objective of this study was to determine if a correlation existed between the presence of cognitive deficits, depression, and the severity of MS, which was estimated by measuring the degree of atrophy found in the brains of patients with MS by analyzing MRI scans

**Methods:** Participants with MS were administered the Symbol Digit Modalities Test (SDMT), a measure of information processing speed, and the Center for Epidemiological Studies Depression Scale (CES-D), a measure of depressive symptoms. T-scores were calculated for the SDMT and a score of ≤40 was considered impaired compared to norms provided by the test makers. On the CES-D, a score of 16 or above classified a patient as at risk for a diagnosis of depression. Participants' clinical MRI scans dated within a year of administration of the tests were analyzed and the width of the third ventricle was measured. Third ventricle width was measured by hand using FreeSurfer software. The axial slice with the longest segment of the third ventricle was chosen and a vertical line was drawn along the length. We then measured the length of the segment, divided that in half, and drew a horizontal line halfway down and used its length to represent the width. Both inter-rater and intra-rater reliability were calculated using intraclass correlation.

**Hypothesis:** It is hypothesized that depression will be predicted by greater levels of brain atrophy and cognitive impairment.