The Relationship Between Brain Volume and Cognitive Function in Parkinson's Disease

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Parkinson’s disease (PD) is identified and associated with symptoms such as changes in gait stability, slowness of movement, essential tremor, and changes in cognitive function. Symptoms and their severity are typically indicative of underlying regional brain pathology. This relationship has been well characterized for PD related motor deficits but not cognitive deficits. With this work, a relationship between brain volume and cognitive functions, such as sequencing, visual scanning, and gait control were investigated in a small group of PD subjects through the use of imaging and neuropsychological testing. It was hypothesized that a decrease in frontal lobe brain volume would be associated with disease severity, specifically cognitive deficits. Regional frontal lobe brain volumes were quantified from high-resolution anatomical MR scans using biomedical image quantification programs, and statistical analyses were used to quantify correlations between brain volume and cognitive functions. It was found that three regions in the PD frontal lobe have significant differences in volume when compared to normal controls. These same regions also correlated to a loss in cognitive function. These findings support the hypothesis and the viability of these regions as a sensitive and specific biomarker for Parkinson's Disease.

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