Parkinson's Disease Progression: Exploring the Relationship between Motor Performance and Cognitive Function

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Background/Objective: Numerous studies have examined motor and cognitive decline in neurodegenerative diseases such as Parkinson's Disease (PD) and results vary considerably. Studies also show that decline does not occur synchronously across all aspects of cognition or motor functions in PD. The goal was to examine if correlations exist between decline in specific motor and cognitive functions.

Experimental Design: A cohort of 15 PD patients (age 49-81;6 female) and 9 healthy controls (age 53-75;4 female) were enrolled and their motor and cognitive functions were assessed. Decline in motor function, covering tremor, rigidity and bradykinesia was evaluated using the Movement Disorder Society Unified Parkinson's Disease Rating Scale (MS-UPDRS) scores. Cognition, covering attention, memory, language, and visuospatial functions, was assessed using the Montreal Cognitive Assessment (MoCA) test. Inertial measurement units (recording at 100 Hz), placed on both wrists, recorded linear acceleration and angular velocity while subjects performed the pronation/supination and kinetic tremor tasks of the MS-UPDRS. Using angular velocity, response time (RT) to initiate movement in each task was computed. Data analysis correlated MS-UPDRS scores with MoCA scores, and RTs.

Results: There were no significant correlations between MS-UPDRS and cognitive MoCA scores. There was a significant relationship between deficits in visuospatial function (MoCA) and increased RT in the pronation/supination task.

Conclusion/Potential Impact: Using correlation analyses, no correlation was found between MS-UPDRS and MoCA scores. However, RT on the pronation/supination task correlated positively with visuospatial deficits, suggesting a common voluntary attentional deficit. Although no relationship was found between a clinical score of bradykinesia and RT, measures of movement velocities (measured but not analyzed) may correlate better. Identification of interrelating factors between hard-to-measure cognitive and easy-to-measure motor changes in PD patients may aid clinicians in implementing simple and timely interventions to more easily track and ameliorate cognitive deficits and improve patients' overall functional status.