

Spindle trains are associated with cognitive performance in patients with Parkinson's disease

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Background: Sleep spindles have been associated with cognitive performance across the lifespan and across disease and might serve as a marker of cognitive state. In patients with Parkinson's disease (PD), reduction in sleep spindles' density has been associated with impaired cognition across multiple domains and with cognitive decline. Recently, trains of sleep spindles (i.e., occurrence of ≥ 2 spindles within 6 seconds) have been proposed to play a role in sleep-dependent memory consolidation. Whether spindle trains are reduced in PD patients compared to older adults, and whether they are associated with cognitive performance in this population remains unknown.

Methods: PD patients (n=46, mean age=65.4) and a sample of healthy older adults (n=25, mean age=64.9) underwent a comprehensive neuropsychological assessment and overnight polysomnography. Five cognitive domains were assessed: attention, executive functions, learning and memory, visuospatial abilities, and language. Trains of spindles were detected on artefact-free epochs of N-REM 2 and 3, over frontal, central, temporal, parietal, and occipital derivations. We performed two-way ANOVAs (Group x Derivation) to compare spindle trains between groups, and Pearson's correlation between spindle train measures and composite scores for each cognitive domain.

Results: In preliminary analyses comparing spindle trains between PD patients and controls, number of trains, mean size of trains and proportion of spindles in trains were significantly decreased in PD compared to controls. In patients, lower number of trains during N-REM 2 was associated with lower scores on composites of attention across all derivations. In healthy controls, spindle trains were not associated with cognition.

Conclusions: These preliminary results suggest that the organization of spindles into trains differs in PD patients compared to older adults, with fewer trains and fewer spindles occurring as part of a train in PD. Our results also suggest that these differences are associated with poorer attention in patients.