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The Role of Heart Rate Variability in Mild Cognitive Impairment

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Mild Cognitive Impairment (MCI) is a clinical condition characterized by cognitive deficits that do not significantly interfere with daily functioning. It represents an intermediate stage between normal aging and dementia and is considered a preclinical phase that may progress to more severe neurodegenerative disorders, such as Alzheimer's disease. In addition to cognitive symptoms, MCI has also been associated with physiological alterations, including changes in autonomic nervous system (ANS) functioning. Recent studies have highlighted a correlation between heart rate variability (HRV) and cognitive performance in individuals with MCI, suggesting HRV as a potential biomarker of cognitive decline.

The aim of the present study is to examine the relationship between ANS functioning and cognitive impairment in individuals with MCI by assessing resting-state HRV and comparing it with a healthy control (HC) group. A total of 98 participants aged 50 to 88 years (mean age: 64.4 ± 8.49) were recruited and divided into two groups based on clinical diagnosis: healthy controls (N=51) and MCI (N=47). While no significant differences emerged in socio-demographic or physiological variables, the MCI group showed significantly poorer performance on cognitive assessments. Regression analyses revealed that HRV variables significantly predicted cognitive performance in specific domains, particularly executive functions. Among individuals with MCI, high-frequency HRV was positively associated with executive performance, whereas low-frequency HRV showed a negative association.

These findings support the role of HRV as a potential marker of executive function decline in MCI, reinforcing its potential as a non-invasive biomarker for the early detection of cognitive deterioration.

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