Event Related Potentials elicited during Cognitive Tasks: Biomarkers for Mild Cognitive Impairment?

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BACKGROUND

• 10% of persons with Mild Cognitive Impairment (MCI) will convert to dementia each year (Graham et. al., 1997)
• ERPs are derived from electroencephalograms (EEG) - measure the brain’s response to cognitive events
• Studies have shown that ERPs can distinguish between groups of patients with MCI and Healthy Controls (HC)
• Event-related potentials (ERPs) as potential biomarkers of early cognitive change
• Study Question: Can ERPs elicited during working memory, inhibitory controls and semantic memory tasks identify people with MCI

METHODS

• 15 MCI participants recruited from the Bruyère Memory Program; 17 HC recruited from the community
• Classifications of MCI/HC confirmed by clinical committee
• Participants performed n-back, go/no-go, and verbal recognition tasks while EEG recording
• EEGs: NeuroScan NuAmps 4.3 Brain Analyzer 2.1
• The P200, P300 and N400 ERP components analyzed
• Receiver operating characteristics (ROC curves): amplitudes and latencies

RESULTS

Test | ERP Paradigm | Sensitivity (%) | Specificity (%) | Area Under the Curve | P
---|---|---|---|---|---
N-Back | P200 Latency | 86.7 | 82.4 | .85 | <.001
Go/No-Go | P300 Amplitude | 80.0 | 76.5 | .74 | .022
Verbal Recognition | N400 Amplitude | 80.0 | 71.6 | .79 | .005

DISCUSSION

• First comparison of the diagnostic utilities of these ERP paradigms
• ERP P200 latency for the n-back task = best diagnostic accuracy in this population – measuring working memory
• ERP differences in three paradigms suggest differences in working memory, inhibitory control and semantic memory in MCI
• EEG changes may predate cognitive changes: bio-marker?
• Repeat with a larger sample size
• Compare ERP data from other cognitive paradigms

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