# EEG Coherence as a Marker for Alzheimer’s Dementia

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Alzheimer’s dementia (AD) is a neurodegenerative disease that affects one out of three seniors. It has killed more people than breast and prostate cancer together, making it the sixth leading cause of death in the United States. Improving the accuracy and reducing the time needed to diagnose AD could not only allow for more timely interventions, but could have a cost reduction impact in the billions. This study explored neuropathology of AD, synaptic dysfunction that is present early in the course of the disease and results in the disruption of functional connectivity necessary for executive functioning. To measure brain functional connectivity, task-related electroencephalographic (EEG) coherence was used, which measures the synchronicity of activity in collaborating areas of the brain. EEG coherence of patients with AD was compared to healthy controls while they worked on a series of mental tasks. Results demonstrated a significant connectivity decrease in the Alzheimer’s group when challenged with tasks requiring comprehension, analysis, perceptual-motor response and executive functioning. Four potential biomarkers were identified. The EEG biomarker detected while drawing a 3-D cube (test #13) in the frontal beta frequency (FB), 13-FB marker, was further evaluated as most statistically significant. The 13-FB marker was detected in all participants with neurodegenerative dementias, demonstrating 100% sensitivity and 95% specificity. The 13-FB marker could help diagnose neurodegenerative dementias, facilitate early recognition of reversible causes of cognitive impairment and distinguish normal aging from very early symptoms of dementia.

**Awards Won:**
Fourth Award of $500