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Project title: Behavior and EEG in Alzheimer's Disease

Introduction/Objectives: Brain wave studies have shown that gamma frequencies tend to increase and alpha frequencies tend to decrease with increasing attention or memory load. The purpose of our study was to measure gamma and alpha wave frequencies in normal control and Alzheimer's disease patients to see if a significant difference could be measured by EEG in their gamma and alpha frequencies while performing a memory task.

Methods: 15 control and 7 Alzheimer's subjects were recruited from an ongoing study using the NDDR database. During testing, subjects completed a neurocognitive test as well as a computer-based N-back task. EEGs were recorded during the N-back task from surface electrodes.

Results: The RBANS were scored and the EEG data was analyzed for gamma and alpha wave frequencies. The EEG data showed that the control group's gamma frequency average increased 17.1% from baseline and their alpha frequency decreased 8.14% from baseline in tasks requiring higher memory loads. Data also showed that their gamma frequencies increased 6.5% between individual memory tasks of increasing difficulty. The EEG data for the Alzheimer's group showed that their gamma frequencies increased 14.1% from baseline and their alpha frequencies decreased 6.6% from baseline. However, the Alzheimer's group's gamma frequencies increased only 0.37% between each individual memory task of increasing difficulty.

Summary/Discussion: As expected, gamma waves increased and alpha waves decreased with tasks involving higher memory loads in control subjects. Besides the initial increase in gamma waves from baseline, no further significant increases in gamma waves were seen in Alzheimer's subjects between tasks indicating that gamma frequencies were at their maximum at the beginning of testing with no further ability to increase with higher memory loads. The results of this study indicate a difference between controls' and Alzheimer's subjects' gamma wave behavior that could be of clinical value.