The Use of Rhythmic Light Therapy To Entrain Gamma Oscillations and the Circadian System in Patients With Alzheimer's Disease and Related Dementias (ADRD)

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The increasing prevalence of dementia, particularly Alzheimer's disease (AD), has prompted urgent exploration of interventions for patients, particularly those with Mild Cognitive Impairment (MCI), who are at increased risk of progressing to AD. Neural oscillations, notably gamma oscillations at 40 Hz, have shown promise in framing cognitive functions and their implications in AD pathology. Previous research in both animal models and humans has demonstrated the potential of 40 Hz oscillations in reducing AD pathology and influencing cognitive function. The posterior cingulate cortex and dorsal anterior cingulate cortex are emerging imaging markers associated with AD, and alterations in cross-frequency bands have also been linked to learning and memory impairments. Based on these past observations, a novel intervention using light to enhance circadian entrainment and administer neurostimulation was pioneered to improve sleep and cognition in older adults with MCI and mild AD. A range of benefits from this light intervention on alertness and cognition were observed, with consistent enhancement in brain response across all participants. Understanding the complexities of non-pharmacological interventions and their impact on cognitive functions is crucial for developing new therapeutic approaches. This study lays the groundwork for effective and non-invasive interventions targeting neural oscillations, offering promising avenues for the management of cognitive impairments, a venture where the US government alone spends $3.7 billion annually.

Awards Won:
Fourth Award of $500