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# Gamma frequency sensory stimulation prevents brain atrophy, im and memory in probable mild Alzheimer's patients

Diane Chan, Ho-Jun Suk, Brennan L Jackson, Noah Milman, Danielle Stark, Vanesa Ferr Arit Banerjee, Erin Kitchener, Elizabeth B Klerman, Edward S Boyden, Emery N Brown ...

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## Abstract

### Background

Non-invasive gamma frequency light and sound stimulation at 40Hz reduc disease (AD) pathology and improved performance during behavioral testi models of AD (Iaccarino et al., *Nature*, 2016; Martorell et al., *Cell*, 2019; Ada *Neuron*, 2019). Sensory stimulation inducing 40Hz entrainment reduced an hyperphosphorylated tau burden and prevented brain atrophy in differen of AD. Performance on tasks testing short-term memory and spatial learni 6 weeks of daily 40Hz stimulation. We therefore hypothesized that translat entrainment with light and sound can be used as a disease-modifying ther



04042922). Control devices delivered constant light and white noise while devices with the active setting produced patterned and synchronized light and sound at 40Hz. Electroencephalogram (EEG) was used to evaluate for safety and entrainment when using the 40Hz stimulation. Weekly phone questionnaires were used to assess safety. Magnetic resonance imaging was used to evaluate brain structure and actigraphy was used to record sleep. Face-name association delayed recall was done to assess changes in cognition.

### Results

novel light and sound device safely and effectively induced 40Hz entrainm
with mild AD. After 3 months of daily stimulation, 40Hz entrainment preve
hippocampal atrophy and ventricular enlargement and the extent of ventr
differs between groups (p = 0.034, p = 0.024, p = 0.043, respectively). Circa
also improved with 40Hz stimulation (p = 0.03). Performance on the face-n
delayed recall test improved in accuracy (p = 0.004).

## Conclusions

Gamma frequency light and sound stimulation can be used safely daily for
prevents AD-related degeneration. Induced entrainment using sensory sti
shows promise as a novel disease modifying therapeutic for Alzheimer's d

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