


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

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

First published: 31 December 2021

<https://doi.org/10.1002/alz.054218>

Citations: 3

Abstract

Background

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

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising purposes. To learn more, view the following link: [Privacy Policy](#).

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 entrainment with mild AD. After 3 months of daily stimulation, 40Hz entrainment prevented hippocampal atrophy and ventricular enlargement and the extent of ventricular enlargement differs between groups ($p = 0.034$, $p = 0.024$, $p = 0.043$, respectively). Circumference also improved with 40Hz stimulation ($p = 0.03$). Performance on the face-name 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 stimulation shows promise as a novel disease modifying therapeutic for Alzheimer's disease.

Citing Literature



© 2023 Alzheimer's Association®. All rights reserved. Alzheimer's Association is a not-for-profit organization.

[SECURITY & PRIVACY POLICY](#) | [ALZ.ORG](#)

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising purposes. To learn more, view the following link: [Privacy Policy](#).

About Wiley Online Library

[Privacy Policy](#)
[Terms of Use](#)
[About Cookies](#)
[Manage Cookies](#)
[Accessibility](#)

< Back

Contact Us
Training and Support
DMCA & Reporting Piracy

Opportunities

Subscription Agents
Advertisers & Corporate Partners

Connect with Wiley

The Wiley Network
Wiley Press Room

Copyright © 1999-2023 John Wiley & So

This website utilizes technologies such as cookies to enable essential site functionality, as well as for analytics, personalization, and targeted advertising purposes. To learn more, view the following link: [Privacy Policy](#).