

# Non-flickering 40 Hz light improves episodic memory in cognitively unimpaired older adults

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Aleddra

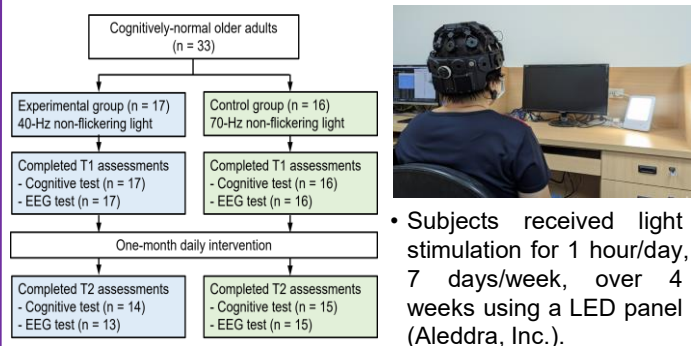


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## Introduction

- Previous studies showed that 40 Hz flickering light could reduce amyloid-beta pathology in animal models of AD and may attenuate hippocampal atrophy in humans.
- However, flickering light often causes visual discomfort, limiting long-term adherence.
- Non-flickering 40 Hz light technologies have been developed to improve tolerability, but their efficacy remains unclear.
- This study evaluated the intervention effects of a novel non-flickering 40 Hz light on cognition and resting-state EEG (including power spectral density [PSD] and functional connectivity [FC]) in cognitively unimpaired older adults.

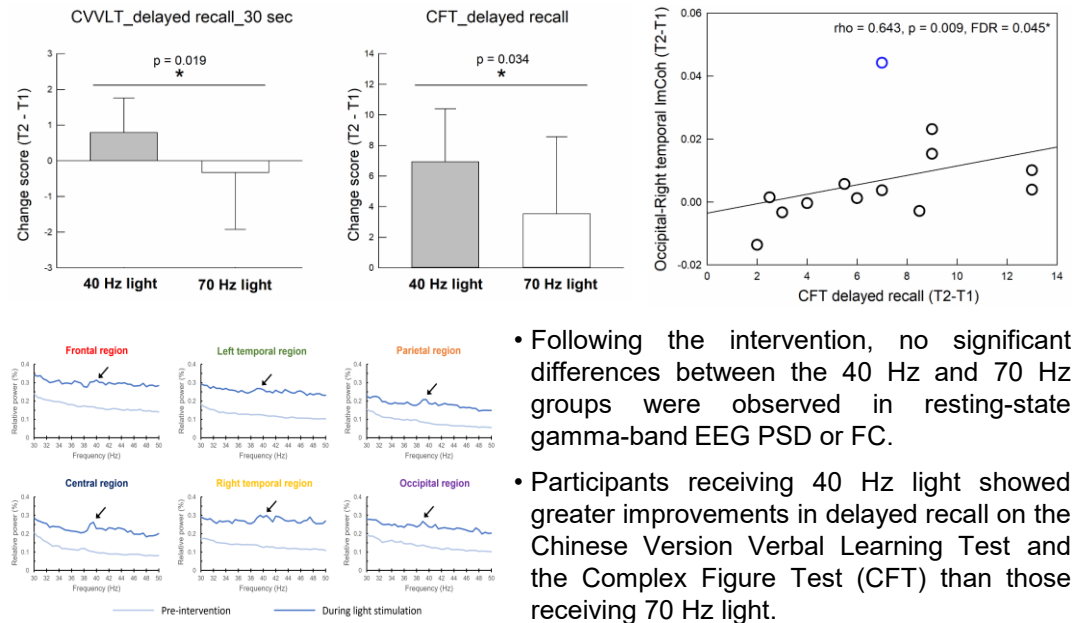
## Methods



• Subjects received light stimulation for 1 hour/day, 7 days/week, over 4 weeks using a LED panel (Aleddra, Inc.).

Memory improved without group-level EEG changes, but individual memory gains tracked connectivity changes.

## Results



- Following the intervention, no significant differences between the 40 Hz and 70 Hz groups were observed in resting-state gamma-band EEG PSD or FC.
- Participants receiving 40 Hz light showed greater improvements in delayed recall on the Chinese Version Verbal Learning Test and the Complex Figure Test (CFT) than those receiving 70 Hz light.
- Improvements in visuospatial memory (i.e., CFT) were linked to increases in occipital-temporal imaginary coherence (ImCoh,  $p = 0.009$ ).
- Real-time EEG recordings from a subset of subjects demonstrated robust 40 Hz activity across widespread cortical regions during stimulation.

## Conclusion

- Non-flickering 40 Hz light stimulation may enhance episodic memory in cognitively normal older adults. The dissociation between behavioral and neural findings suggests individualized neural responses to gamma-frequency stimulation.