

Significant Improvement in Cognition after Transcranial and Intranasal Photobiomodulation: A Controlled, Single-Blind Pilot Study in Participants with Dementia

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Introduction

This controlled, single-blind, pilot study investigated if transcranial and intranasal photobiomodulation (PBM) therapy in the near-infrared (NIR) 810nm wavelength, could improve cognition in dementia.

Methods

The light-emitting diode (LED) devices for PBM were engineered to target cortical nodes of the Default Mode Network (DMN) that are dysregulated in Alzheimer's disease. Nineteen participants were randomized into a 12-Week Active or Sham treatment series, with a 4-Week, No-Treatment follow-up. Patients were assessed with MMSE and ADAS-cog tests. The protocol involved weekly, in-clinic use of a combined transcranial-plus-intranasal PBM device; and daily at-home intranasal-only PBM device.

Results

Participants with moderate-severe impairment (Baseline MMSE 5-24) receiving Active treatment showed significant ($p < 0.03$) improvements on assessment scores after 12 weeks. They reported better sleep, fewer angry outbursts, less anxiety and less wandering. After the 4-Week, No-Treatment follow-up, some declines were noted. Participants with mild impairment (Baseline MMSE 25-30) in both the Active and Sham groups showed no significant improvements in their scores. No adverse events were related to the treatments.

Conclusion

Results from this controlled study are the first to report significant cognitive improvement in dementia participants following PBM treatments. They suggest future large-scale controlled studies are warranted. The safety, low-cost and ease of transcranial-intranasal NIR LED application show potential for long-term home treatments. No study-related adverse events occurred.

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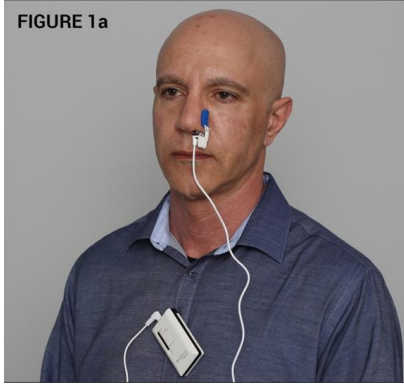


FIGURE 1a: Vielight 810



FIGURE 1b: Vielight Neuro, left view



FIGURE 1c: Vielight Neuro, right view

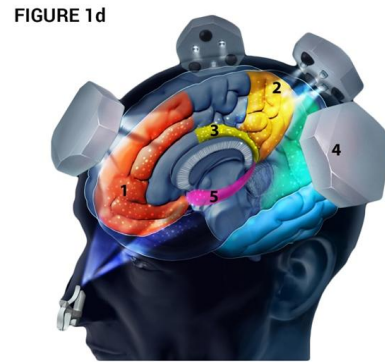


FIGURE 1d: Targeted Default Mode Network Nodes:

1. Mesial Prefrontal Cortex
2. Precuneus
3. Posterior Cingulate Cortex
4. Inferior Parietal Lobe
5. Hippocampus

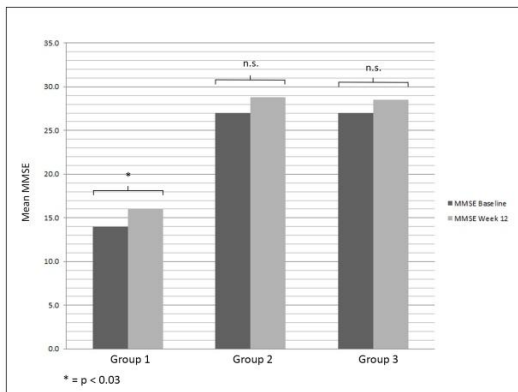


FIGURE 2a. Changes in MMSE scores over 12 weeks.

Group 1. Baseline MMSE score of 5 to 24 (Active Intervention)

Group 2. Baseline MMSE score of 25 to 30 (Active Intervention)

Group 3. Baseline MMSE score of 25 to 30 (Sham Intervention)

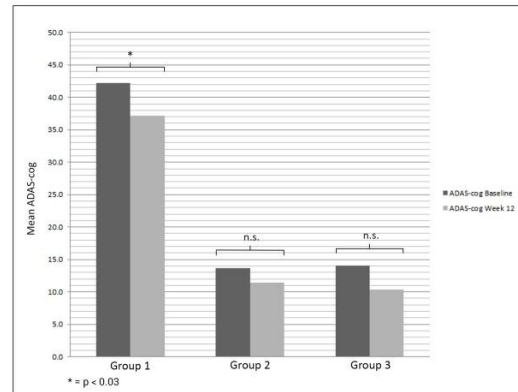


FIGURE 2b. Changes in ADAS-cog scores over 12 weeks.

Group 1. Baseline MMSE score of 5 to 24 (Active Intervention)

Group 2. Baseline MMSE score of 25 to 30 (Active Intervention)

Group 3. Baseline MMSE score of 25 to 30 (Sham Intervention)