

# Feasibility Demonstration of Light through Closed Eyelids to Promote Sleep Health

Light is most effective at changing the timing of the circadian clock when applied close to the core body temperature minimum that occurs about 2-3 hours prior to natural waking. The present study investigated, in a home setting, if individually tailored light treatment using flashing blue light delivered through closed eyelids during the early part of the sleep period delayed circadian phase and sleep in a population of healthy older adults and in those suffering from early awakening insomnia.



A light mask delivered light during sleep.

Twenty-eight participants (9 early awakening insomniacs; 19 normal sleepers) completed an eight-week, within subjects study. Twice, participants collected data during two baseline weeks and one intervention week. During the intervention week, participants wore a flashing blue (active) or a flashing red (control) light mask during sleep. Light was expected to delay circadian phase. Saliva samples for determining dim light melatonin onset (DLMO) were collected at the end of each of the baseline and intervention weeks. Wrist actigraphy and Daysimeter data were collected throughout the entire study.

Compared to baseline, flashing blue light, but not flashing red light, significantly ( $p < 0.05$ ) delayed DLMO (Figure 1). The mean  $\pm$  standard deviation (SD) phase shift was  $0:06 \pm 0:30$  minutes for the flashing red light and  $0:34 \pm 0:30$  minutes for the flashing blue light. Compared to Day 1, sleep start times were significantly delayed (by approximately 46 minutes) at Day 7 after exposure to the flashing blue light (Figure 2). The light intervention did not affect sleep efficiency.

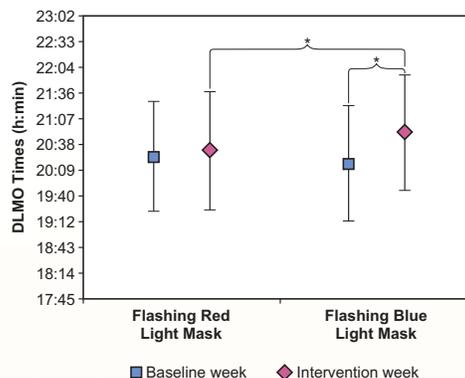


Figure 1. Mean  $\pm$  SD DLMO times for baseline and intervention for both light conditions (flashing red and flashing blue lights). \* = statistically significant

The present study demonstrated the feasibility of using light through closed eyelids during sleep for promoting circadian alignment and sleep health for individuals living at home. This novel device can potentially increase compliance to light treatment and promote circadian alignment with social obligations in those suffering from circadian sleep disorders.

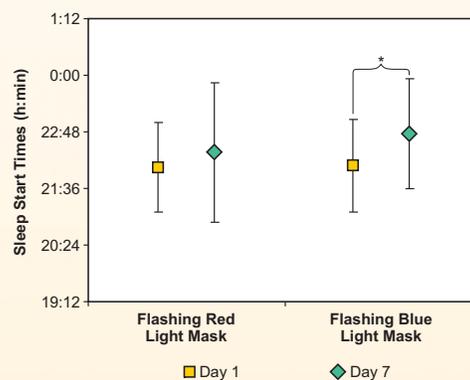


Figure 2. Mean  $\pm$  SD sleep start times at Day 1 and Day 7 during the intervention weeks for both light conditions (flashing red and flashing blue lights). \* = statistically significant

## Citation

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