# Light through the Eyelids and Its Effect on Melatonin

A previous study at the LRC reported a method for measuring the spectral transmittance of individual human eyelids. In this study, LRC researchers built a prototype light mask using narrow-band "green" light ($\lambda_{max}$ = 527 nm) that was used to deliver light through closed eyelids in two within-subjects studies.

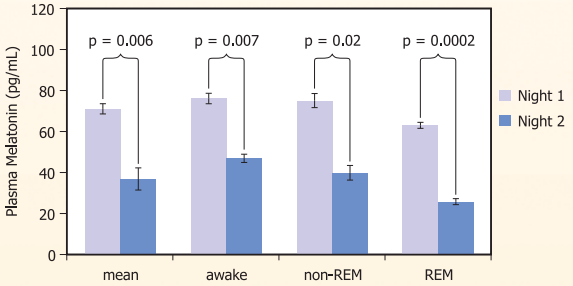
**Light mask used in the two studies to deliver individualized doses of 527 nm, "green" light.**

## Experiment 1: Melatonin Suppression through Closed Eyelids

The first study investigated whether an individual-specific light dose could suppress melatonin by 40% through the closed eyelid without disrupting sleep. The light doses were delivered at three times during the night:

- beginning: while subjects were awake
- middle: during rapid eye movement (REM) sleep
- end: during non-REM sleep

Compared to a dark control night, light delivered through eyelids suppressed melatonin after 60-minute light exposure by 36% at the beginning, 45% at the middle, and 56% at the end of the night.

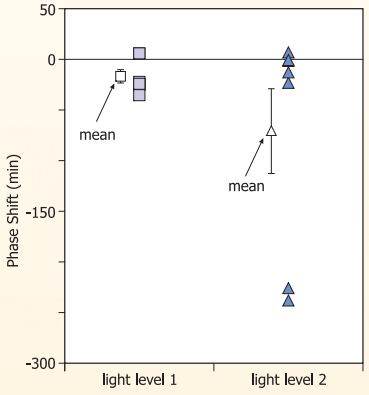



**Mean ± SEM melatonin concentrations for all subjects. On Night 1, subjects did not wear the light mask; on Night 2, the light mask was on.**

## Experiment 2: Phase Delaying the Timing of Dim Light Melatonin Onset (DLMO) through Closed Eyelids

The second study investigated whether two individual-specific light doses expected to suppress melatonin by 30% and 60% and delivered through subjects' closed eyelids before the time of their predicted minimum core body temperature would phase delay the timing of their DLMO.

Compared to a dark control night, melatonin was suppressed by 25% and by 45% after light levels 1 and 2, respectively. Circadian phase, as measured by DLMO, was delayed by 17 minutes after 60-minute exposures to light level 1 and 71 minutes after 60-minute exposures to light level 2.




**DLMO change (minutes) for light level 1 (left) and light level 2 (right).**

## Publication

Figueiro MG and Rea MS. 2012. Preliminary evidence that light through the eyelids can suppress melatonin and phase shift dim light melatonin onset. *BMC Res. Notes* **5**:221, published online 2012 May 7. doi: 10.1186/1756-0500-5-221

## Sponsor

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## Conclusions

These studies demonstrate that individual-specific doses of light delivered through closed eyelids can suppress melatonin and phase shift DLMO, and may be used to treat circadian sleep disorders, such as delay sleep phase or advance sleep phase disorders.

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