

Light Mask May Help Teens Wake for School



Many teens struggle to wake up in the morning for school, and their circadian clocks may be to blame. These teenagers may actually be suffering from delayed sleep phase syndrome, a sleep disorder that occurs when their “internal” clock is delayed relative to the schedule they keep.

The LRC is examining how light treatment, particularly short-wavelength (blue) light, can affect a person’s sleep/wake cycle, one of many biological cycles that repeat approximately every 24 hours called circadian rhythms.

Setting the internal clock

Circadian rhythms are synchronized to the solar day by the 24-hour light/dark cycle. Light stimuli travels through the retina to reach the brain’s master clock.

Research has demonstrated that manipulating the timing, duration, intensity, and spectrum of light stimuli can increase the effectiveness of light on resetting the body’s internal master clock. To maximize the impact on the internal clock, the timing of light treatment should be linked to a person’s minimum core body temperature (MCBT), which typically occurs about one and a half to two hours before a person awakens naturally.

Light applied just before MCBT while one is asleep, will result in a maximum phase delay of the internal clock. The person would go to bed later and wake up later the next morning. Conversely, light applied just after MCBT will result in a maximum phase advance where one goes to bed earlier and wakes up earlier the next morning.

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Light therapy while you sleep

Scientists at the LRC have developed a light mask, an automated device worn during sleep. The mask can phase advance teenagers’ internal clocks by delivering light through closed eyelids right after the body has reached its minimum core body temperature and the subject is still asleep.

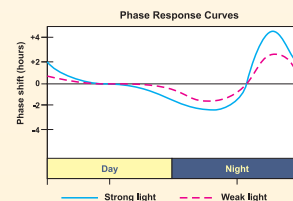
The same principles can be applied to other segments of the population suffering from sleep disturbances, including those with Alzheimer’s disease, seasonal affective disorder, sleep deprivation, or jet lag.



The mask incorporates four blue light-emitting diodes (LEDs), a battery power source, and a small single-board computer that controls the LEDs based on MCBT.



An LRC researcher models the latest prototype.



Phase-shifting effect of light; the maximum effect occurs at night during sleep.

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