

J Clin Endocrinol Metab. 2003 Sep;88(9):4502-5. Related Articles, Links

**High sensitivity of the human circadian melatonin rhythm to resetting by short wavelength light.**

Lockley SW, Brainard GC, Czeisler CA.

Division of Sleep Medicine, Brigham and Women's Hospital, and Harvard Medical School, Boston, Massachusetts 02115, USA.

The endogenous circadian oscillator in mammals, situated in the suprachiasmatic nuclei, receives environmental photic input from specialized subsets of photoreceptive retinal ganglion cells. The human circadian pacemaker is exquisitely sensitive to ocular light exposure, even in some people who are otherwise totally blind. The magnitude of the resetting response to white light depends on the timing, intensity, duration, number and pattern of exposures. We report here that the circadian resetting response in humans, as measured by the pineal melatonin rhythm, is also wavelength dependent. Exposure to 6.5 h of monochromatic light at 460 nm induces a two-fold greater circadian phase delay than 6.5 h of 555 nm monochromatic light of equal photon density. Similarly, 460 nm monochromatic light causes twice the amount of melatonin suppression compared to 555 nm monochromatic light, and is dependent on the duration of exposure in addition to wavelength. These studies demonstrate that the peak of sensitivity of the human circadian pacemaker to light is blue-shifted relative to the three-cone visual photopic system, the sensitivity of which peaks at approximately 555 nm. Thus photopic lux, the standard unit of illuminance, is inappropriate when quantifying the photic drive required to reset the human circadian pacemaker.