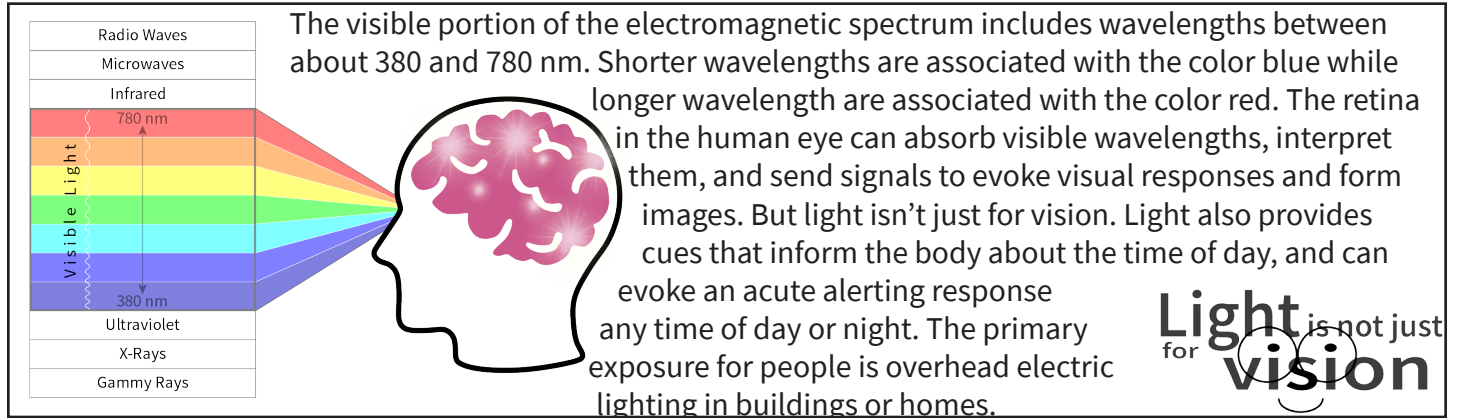
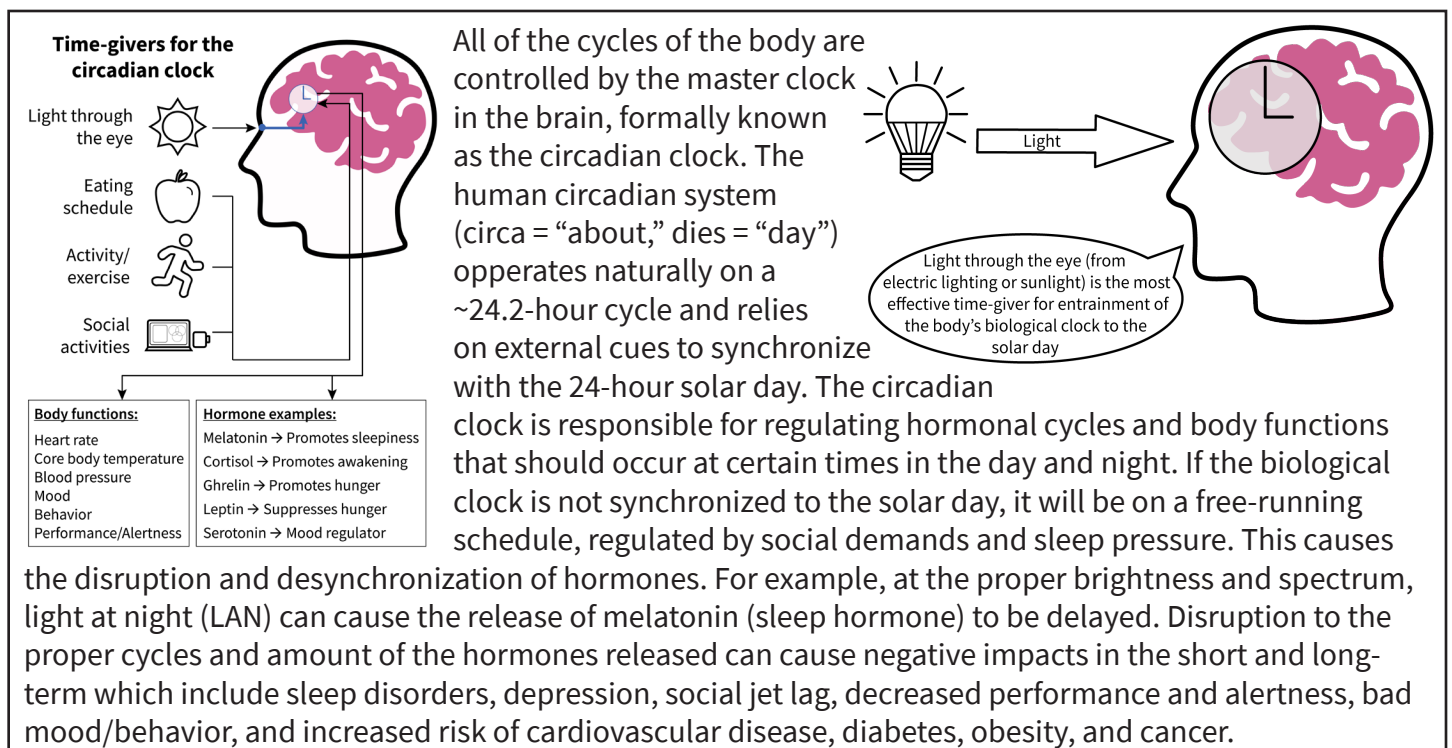


Light & the Circadian System

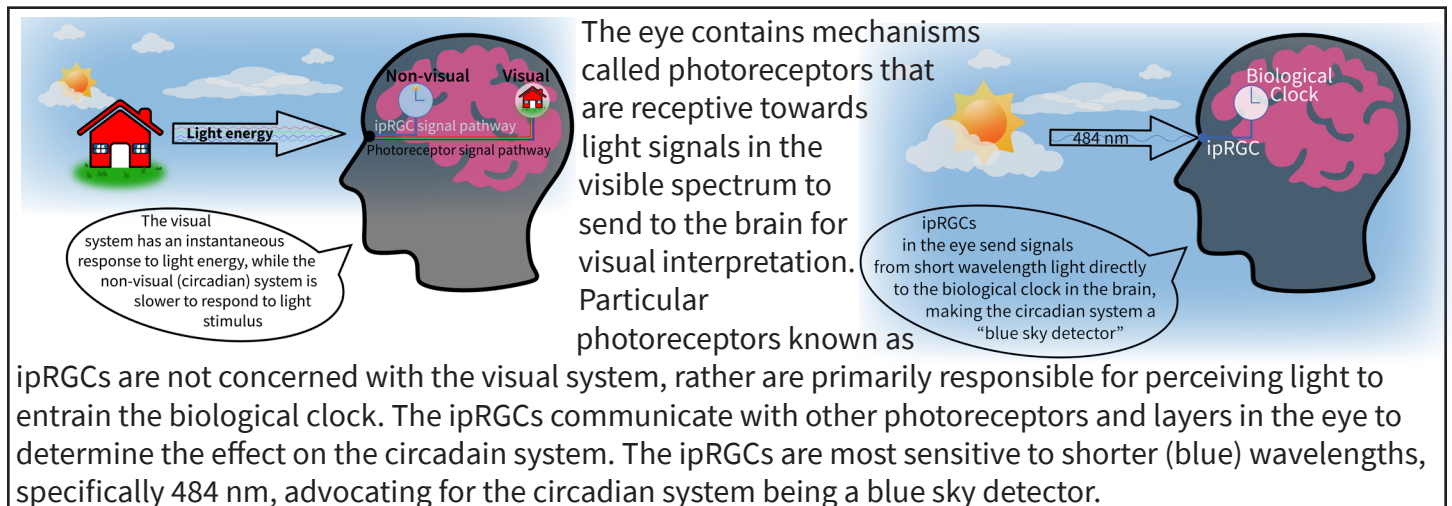
What is light?



Circadian system's time-givers

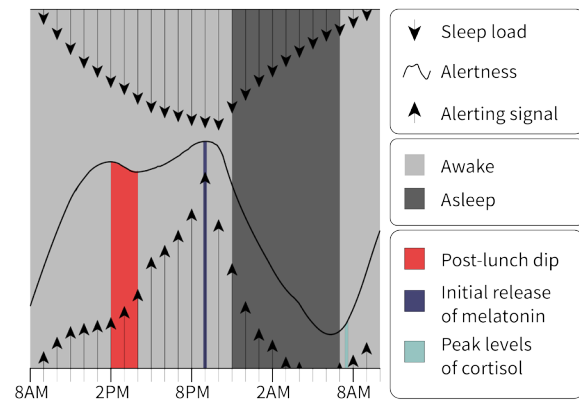


Circadian system's receptors



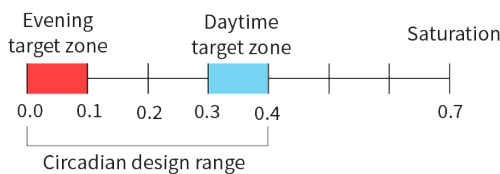
Sleep pressure & daily alertness

The circadian system cycles on a daily schedule. As a person is awake, sleep pressure continues to accumulate, and will dissipate during sleep. The rhythmic biological clock sends alerting signals



throughout the day to maintain attentiveness. At around 2 pm, the body's alerting signal is not enough to overcome sleep pressure, and drowsiness occurs, which is termed as a 'post-lunch dip.' Light can be used, similar to a cup of coffee, to create an alerting effect and combat sleep pressure. The melatonin hormone is released 2 hours before a person's natural bedtime in anticipation of telling the body to sleep. Adversely, cortisol alerts the body to wake up. If a person's circadian system is not entrained to their social schedule, it may be hard to fall or stay asleep at night and a morning alarm will be required.

Circadian stimulus



The CS (circadian stimulus) metric, developed by the LRC, is used to assess how effective a light source is in stimulating the circadian system. This is done by measuring the suppression of the body's production of melatonin resulting from the exposure to that source.

The amount of light that reaches the eye along with its SPD (spectral power distribution) can be used to determine the CS value. Sources containing a higher concentration of shorter wavelengths have the most impact on CS, which can be determined by a source SPD. The same spectrum at varying brightness levels also change CS. A CS value above 0.3 for an hour duration has been shown to have an impact on the circadian system. To slightly delay the biological clock to synchronize with the solar day, daily circadian lighting designs should target between 0.3-0.4 CS in the daytime hours, and below 0.1 in the evening and night-time hours. This can be done by changing SPD and/or light levels. Typical lighting in buildings do not provide bright enough light to achieve a CS above 0.3 to stimulate the circadian system, leaving the biological clock in what is known as circadian darkness. This causes the biological clock to lag behind and not synchronize with the solar day, causing short-term and long-term effects. Whether you want to have a regulated schedule, healthier diet, exercise routine, more energy, better sleep and mood, or reduced risk of disease, proper circadian entrainment is the origin to which these initiatives can be achieved.

