



## 8. THE IMPORTANCE OF DAYLIGHT EFFECTS ON THE CIRCADIAN RHYTHM AND NEGATIVE CONSEQUENCES OF EVENING LIGHTENING OF DISPLAYS

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**Introduction.** Light is electromagnetic radiation with wavelengths between 400 and 700 nm visible to the human eye. Over recent years, a technological revolution has occurred in which conventional lightning has been replaced by light-emitting diodes (LEDs). The main sources of LED exposure are smartphones, TV and computer displays, and blue lightning sources (wavelengths between 400-500 nm). Nevertheless, natural light is considered the main “zeitgeber” that regulates circadian rhythm, sleep, mood, alertness and cognitive function by influencing photoreceptor cells in the retina (maximum sensitivity at 460-480 nm).

**Aim of study.** It is to establish the different effects on the circadian rhythm between natural light and light emanating from modern screens.

**Methods and materials.** An analysis of scientific sources between 2018 and 2023 was carried out using the PubMed search engines HINARI and Google Academic.

**Results.** Previous studies have shown that light effects depend on its physical characteristics, meteorological and atmospheric conditions, exposure time and intensity. Daylight contains all the visible spectrum, which changes throughout the day. The luminance of a sunny day varies between 20,000 and 100,000 lux, of a rainy day, between 3000 lux, and twilight up to 1000 lux. This variation regulates the circadian rhythm, the 24-hour sleep-wake cycle. Furthermore, sunlight stimulates the production of serotonin, and it is often associated with increased alertness and productivity. Blue light exposure in the evening hours from modern displays delays the time of the biological clock and thus sleep by suppressing melatonin secretion. Using the “night shift” or other filter modes of modern smartphones, the colour balance of the screen can be shifted to “warmer” (longer wavelength), which may reduce melanopsin activation by 67% at full display brightness. Nonetheless, dimming the smartphone to its minimum level reduces melanopsin activation to less than 1%. On the other hand, blue light therapy in the morning may be effective for seasonal affective disorders.

**Conclusion.** Due to the high sensitivity of the retina to blue light, the colour temperature and wavelength frequency the usage of blue light emitting technologies at night is deleterious. On the other hand, the spectral variety of natural light and changing intensity during the day facilitate the circadian rhythm regulation. However, more specific research is needed to differentiate the effects of light according to its biophysical characteristics.