



Defense Health Agency (DHA) Clinical Communities Speaker Series

Resource List – July 2020

Health Innovations and Promising Practices

Light's Effects on Human Health, Alertness, and Sleep

The Centers for Disease Control outlined in the article [The color of the light affects the circadian rhythms](#) the conclusions that blue light has the strongest impact and exposure to blue light (and white light, which contains blue light) during the sensitive period can make it difficult for you to fall asleep and stay asleep. Furthermore, exposure to white light during the day can have positive effects, including boosting alertness and mood. Red light has no effect on the circadian clock, so use of a dim red light at night can be helpful for effective sleep patterns. Yellow and orange light have little effect on circadian clock, therefore use of a very dim yellow or orange light at night can also be useful for sleep.

The sleep-wake and circadian cycles are influenced by light, particularly in the short-wavelength portion of the visible spectrum. Most personal light-emitting electronic devices are enriched in this so-called “blue” light. Exposure to these devices in the evening can disturb sleep. Interventions to reduce short-wavelength light exposure before bedtime may reduce adverse effects on sleep. The authors in the article, [Interventions to reduce short-wavelength \(“blue”\) light exposure at night and their effects on sleep: A systematic review and meta-analysis](#) conducted a systematic review and meta-analysis to examine the effect of wearing color-tinted lenses (e.g., orange or amber) in frames to filter short-wavelength light exposure to the eye before nocturnal sleep.

In dentistry, blue light is widely used for tooth bleaching and restoration procedures involving composite resin. In addition, many dentists use magnification loupes to enable them to provide more accurate dental treatment. Therefore, the use of light is indispensable in dental treatment. However, light can cause various toxicities, and thermal injuries caused by light with irradiation regarded as particularly important. In recent years, the eye damage and non-thermal injuries caused by blue light, the so-called “blue light hazard”, have gained attention. Unfortunately, much of the [research](#) in this field has just begun, but recent findings demonstrated that blue-light irradiation generates reactive oxygen species (ROS) and induces oxidative stress in oral tissue.

Sleep and circadian rhythms are among the most powerful but least understood contributors to cognitive performance and brain health. Within the article, [A randomized, double-blind, placebo-controlled trial of blue wavelength light exposure on sleep and recovery of brain structure, function, and cognition following mild traumatic brain injury](#) the authors capitalized on the circadian resetting effect of blue-wavelength light to phase shift the sleep patterns of adult patients (aged 18–48 years) recovering from mild traumatic brain injury (mTBI), with the aim of facilitating recovery of brain structure, connectivity, and cognitive performance.



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