FACULTY OF REHABILITATION MEDICINE
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Department of Occupational Therapy

Blue Spectrum Light, its Impact on Sleep, and what you can do about it

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Introduction: This handout is a summary of the detailed material presented in the companion video at http://cbotlabs.wix.com/sleepenvironment .

What is blue light?

Blue light is the 'blue' part of the visible light spectrum and has a wavelength of 400 nm to 500 nm. (Ayaki et al, 2016)

Sources of blue light

Blue light naturally comes from the sun, but can also be found in artificial light sources such as: Fluorescent lights, LED lights, and TV/Computer Screens. (Gringras, Middleton, Skene, & Revell, 2015)

Blue light impacts sleep

Photoreceptors in our eyes, called melanopsin are uniquely sensitive to blue spectrum light. When we are exposed to blue spectrum light, it suppresses the production of melatonin. (Holzman, 2010) Melatonin is a hormone that our bodies produce at night which is needed to help us fall asleep. When melatonin production is suppressed due to exposure to blue light, sleep is delayed. (Ayaki et al., 2016)

What you can do:

While there are no formal guidelines specific to blue spectrum light, there is lots of research saying that the blue spectrum light can prevent sleep. There are several devices which can be used to reduce blue spectrum light. Some of the devices include: amber lenses, apps, screens to place over your devices, computer software, and blue blocking light bulbs.

- **Amber lenses** are one intervention commonly used to block blue light. The lenses are designed to block short wavelength light (blue spectrum light) and if worn at night would block the suppression of melatonin caused by blue light. There are many different types of Amber lenses that you can purchase. One store in Edmonton carries Gunnar Eyewear which has a variety of styles that cost $70-90 dollars.

- There are several **apps** you can download to your phone. These apps lessen the amount of blue light emitted. There is limited research in this area, examining the effectiveness of these apps. There are many free apps that you can download on google play for android devices. Recently Apple has released iOS 9.3 which comes with Night Shift mode, the user can set at which time it starts to decrease the blue light emitted and then by morning it will go back to its normal settings.

- We also found you can purchase a variety of **screen protectors** you can place over your computer screen, phone, or tablet that will filter out blue light.

- Another option is downloading **software** on your computer that will adjust the screen color based on the time of day. An example of this is "f.lux". This software is available for windows and mac.

- There are also **lightbulbs** that emit less blue light than standard light bulbs and LED lights. One option available for purchase is the GE Align PM Lightbulb.

Resources

- Additional information on Gunner eyewear: https://gunnar.com/
- Additional information on f.lux: https://justgetflux.com
- Additional information on IOS 9.3 Night Shift: http://www.apple.com/ios/updates/
- Additional information on General Electric Align PM Lightbulb: http://www.gelighting.com/LightingWeb/align/index.jsp
- Technology tips to make your home more sleep friendly: http://sleep.org/articles/technology-for-sleep-friendly-home

Key References

Ayaki, M., Hattori, A., Maruyama, Y., Nakano, M., Yoshimura, M., Kitazawa, M., & ... Tsubota, K. (2016). Protective effect of blue-light shield eyewear for adults against light pollution from self-luminous devices used at night. *Chronobiology International: The Journal of Biological & Medical Rhythm Research*, *33*(1), 134-139.

Holzman, D. (2010). What's in a color? The unique human health effects of blue light. *Environmental Health Perspectives*, *118*(1), A22-7 1p. doi:10.1289/ehp.118-a22

Additional References

Gringras, P., Middleton, B., Skene, D. J., & Revell, V. L. (2015). Bigger, Brighter, Bluer-Better? Current Light-Emitting Devices - Adverse Sleep Properties and Preventative Strategies. *Frontiers in Public Health*, *3*233. doi:10.3389/fpubh.2015.00233

Zeitzer, J.M., Dijk, D., Kronauer, R.E., Brown, E.N., & Czeisler, C.A. (2000). Sensitivity of the human circadian pacemaker to nocturnal light: melatonin phase resetting and suppression. *Journal of Physiology, 526 (3), 695-702.*