







Potential effects of Blue light

- 1. Circadian rhythm
- 2. Direct damage to the retina

What is Circadian Rhythm? And why do we have it?

"Circadian" (circa – about; diem – day)

Coined in 1959 by Franz Halberg to describe physiologic processes that follow a 24-hour rhythm

Two major criteria

 Endogenous: Internally driven rhythm with a period of ~24 hours (persists even in 24 hours of darkness)

2. Entrainable: The rhythm can be reset by external stimuli (e.g. light or heat)



























Intrinsically photosensitive retinal ganglion cells

- 3-5% of retinal ganglion cells express "melanopsin" protein that are directly photosensitive
- Important for non-imageforming light reception like pupillary light response and circadian entrainment
- Absorption peak of 470-480 nm

Human phase response curve to a single 6.5 h pulse of shortwavelength light

Melanie Rüger, Melissa A. St Hilaire, George C. Brainard, Sat-Bir S. Khalsa, Richard E. Kronauer, Charles A. Czeisler, Steven W. Lockley

constructed previously using a similar protocol. Eighteen young healthy participants (18-30 years) were studied for 9-10 days in a time-free environment. The protocol included

Blue light was most effective in phase-shifting the human circadian rhythm



Evening use of light-emitting eReaders negatively affects sleep, circadian timing, and next-morning alertness



Is blue light all bad?











Strategies for decreasing blue light

• Should we do it?

Strategies for decreasing blue light

- Should we do it? No perfect answer
 - Block with glasses
 Block with IOL
 Decrease exposure for devices









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Summary

- There is evidence (some from animal models, some from human studies) that blue light might have negative effects on circadian rhythm and retinal health, but no proven benefit to blocking blue light
- "Absence of evidence is not evidence of absence"

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- There is evidence (some from animal models, some from human studies) that blue light might have negative effects on circadian rhythm and retinal health, but no proven benefit to blocking blue light
- "Absence of evidence is not evidence of absence"
- Multiple strategies to support motivated patients who want to reduce blue light exposure