

Blue Light

A hidden cause of insomnia, depression, and obesity

Evening light takes a toll on both physical and mental health, particularly the blue-wavelengths that come from electronic devices and energy-efficient bulbs. The brain relies on blue light to set the biological clock, and disruption of that clock is a major cause of insomnia, depression, and bipolar disorder.

The science

For many years it was thought that the eye uses two receptors to detect light: rods and cones. In the 1990s, researchers discovered a third receptor that's uniquely sensitive to blue light. It's this receptor (called *melanopsin*) that sets the biological clock. Amazingly, we share this same receptor with ancient organisms that dwell deep in the ocean.

The hormone involved in that clock is called melatonin. When blue light falls in the evening, melatonin rises, inducing sleep. In the morning, a burst of sunlight shuts melatonin off, allowing you to wake refreshed. Melatonin also has other functions in health, including metabolic effects (it can reduce weight gain) and antioxidant effects (meaning it can help prevent cancer).

The problem

Evening light has been linked to insomnia, depression, and bipolar disorder. It also raises the risks of weight gain, cancer, diabetes, heart disease, and obesity.

The first hints of this problem came in the 1980s, when night-shift nurses were found to have markedly higher rates of breast cancer. This led to a host of research on the effects of evening light, shift-work, insomnia, and melatonin on health. With the spread of flat-screen TVs, electronic reading devices, and fluorescent, halogen, and LED bulbs, those

risks are starting to affect people who don't even work the night shift.

People with mood disorders are particularly vulnerable to this. Many have an intuitive sense that something's wrong with their hormones, and they are right about that. The hormones responsible for sleep are disrupted during mood disorders, as are those involved in the stress-response (e.g. cortisol, epinephrine). This may be why a behavioral therapy that helps people regulate sleep – called *CBT-insomnia* – can double the rate of response to antidepressants.



Glasses like these can improve sleep and prevent depression, obesity, diabetes and cancer.

Even dim light can interfere with hormones like melatonin, such as reading under a dim lamp. The brief flash of light we get from a midnight trip to the bathroom causes problems as well. While light of any kind can suppress melatonin, blue light does so more powerfully. A Harvard study found that blue light lowered melatonin levels by twice as much, and for twice as long, as green light.

In terms of screens, size matters, but so does distance. You'll get the same dose of blue light from a smartphone at reading distance as you would from a large TV across the room.

A solution

Fortunately there are simple ways to reduce blue light without a major lifestyle upheaval.

Glasses are available that filter out blue light, allowing your melatonin to rise naturally after the sun sets. The world still looks bright through them, though it has a warm, yellow glow, so you can still read, watch TV, and do your usual activities at night (for safety, do not use them while driving or operating dangerous machinery).

In terms of melatonin, wearing these glasses is equivalent to living in dim light throughout the evening. Studies have confirmed that that makes a difference. People sleep better and have less depression and mood swings when they use them regularly.

Consumer Reports found that these inexpensive versions offered the best level of blue-light filtration:

- Uvex Skyper in SCT Orange lens, model # 3S1933X (\$7-11 at Amazon).
- Uvex Ultraspec 2000 in SCT Orange lens, model # S0360X (\$7 at Amazon). This model fits over regular glasses.



For more stylish options, try:

- Swanwick Blue Light, ASIN: B01EIP0CXC on Amazon
- Models at lowbluelights.com or cet.org

Test your lenses by looking at a rainbow image – the blue portion should appear grayish.

Lamps, bulbs, and apps

Somnilight sells low-blue light reading lamps (somnilight.com). Some dawn simulators, which improve wakefulness by creating a virtual sunrise in the morning, also have that evening light feature (e.g. the PER2LED on Amazon).

Bulbs with low-blue emissions are available at lowbluelights.com. If you purchase energy-efficient bulbs, look for ones with a warm or yellow color spectrum. However, even with that shift the incandescent bulbs have a better blue light profile.

For computers, a free software from Google engineers will turn down the blue light

in your monitor at night (justgetflux.com); a version for Mac computers is called *Candlelight* by Oliver Denman. The makers of smartphones and tablets are also responding to the health risks. In 2016 Apple released iOS 9.3 that has a *Night Mode* setting of iPhones/pads, and Amazon's Kindle has a low blue light feature (*Blue Shade*). For Androids there is the *Twilight* app. These apps are easy to use, but the glasses are more powerful at filtering out the blues.

Is all blue light bad?

No. Blue light is only harmful in the evening. In the morning, a burst of blue light can help you get going by shutting down melatonin.

You should minimize blue light in the evening, as early as sunset. The exact time needs to be personalized. A good routine to start is:

- *Sunset*: flux will turn on automatically on your computer, and you can shift to warmer, yellow lights for other activities.
- *One hour before bed*: put on blue-light filtering glasses. If you're having more severe insomnia, try 2-3 hours before bed. Take them off just before going to bed.
- *Bedtime*: Get your room as dark as possible. Use black-out curtains or a sleep mask if needed. Your eyelids are not enough – light filters through them.

Further Reading

On the science and psychology of blue light:
psycheducation.org/treatment/bipolar-disorder-light-and-darkness

Blue light filters for bipolar mania and rapid cycling:
moodtreatmentcenter.com/darktherapy.pdf

CBT-insomnia (a sleep therapy that can improve mood):
moodtreatmentcenter.com/cbtinsomniashort.pdf
moodtreatmentcenter.com/cbtinsomnia.pdf

Dawn simulators for morning wakefulness:
moodtreatmentcenter.com/dawnsimulator.pdf

—Chris Aiken, M.D., updated 1/24/2017