



Blue Light is Your Friend and Your Enemy

PERHAPS YOU'VE HEARD THAT USING A SMART PHONE OR TABLET AT BEDTIME CAN MAKE IT MORE DIFFICULT TO FALL ASLEEP. THE CULPRIT IS BLUE LIGHT, BUT BLUE LIGHT IS ESSENTIAL TO OUR HEALTH.

MAYBE IT'S LIKE FLUORIDE: A LITTLE IS GOOD FOR OUR TEETH, BUT TOO MUCH IS LETHAL.

If you've ever walked by a house at night when a television is turned on in a room with a window that faces the street, you've probably seen a blue glow. A lot of blue light is in the images that come from electronic devices.

Modern operating systems even have *night modes* that reduce the amount of blue light screens emit. The screen may appear to be amber when this mode is activated, but our eyes adjust to the change within moments.

What Light Is

IN HIGH SCHOOL PHYSICS, WE LEARNED THAT LIGHT HAS SOME PROPERTIES OF PARTICLES AND SOME PROPERTIES OF WAVES. THAT MAKES DISCUSSIONS OF LIGHT DIFFICULT.

Light color is measured in degrees Kelvin. Daylight is in the 5000 to 6000 degree range, which is blue. Standard incandescent light bulbs emit light around 3000 degrees Kelvin, which is yellow.

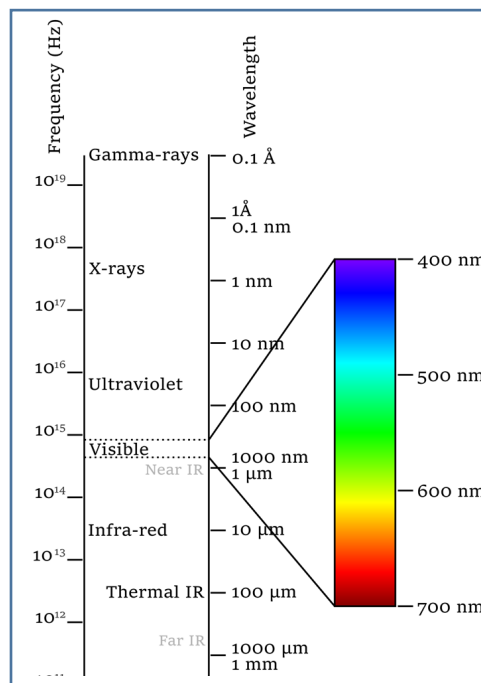
Confusingly, warm colors (reds) have lower Kelvin temperatures than cool colors (blue).

The color of light can also be described by measuring its wavelength. Ultraviolet light is shorter than 375 nanometers (nm), visible blue light starts there and the full visible spectrum ends with red at 700 nanometers.

Visible light occupies a tiny slice of the wavelength spectrum that includes gamma rays, X-rays, and UV on the lower end, and AM radio, FM radio, TV, and radar on the higher end.

The Prevent Blindness website says that lower wavelengths have more power, and that

partially explains why blue light has benefits and dangers: It boosts alertness and helps regulate our circadian rhythm, and nearsightedness may result from a lack of exposure to blue light. But too much blue light can elevate blood pressure, worsen cardiovascular disease, encourage weight gain,



increase the risk of type-2 diabetes, cause mood disorders and memory problems, reduce academic performance, and even increase risk-taking behavior.

Today's computer screens are safer than the cathode-ray tubes that were common with early personal computers. The CRT screens emitted a lot of ultraviolet light and that led to eye strain. A specific wavelength of UV light (280nm) kills bacteria and viruses, and these lights are being promoted to sanitize homes in this COVID-19 era. These lights are effective but dangerous because they can cause sunburns, blindness, and skin cancer.

And yet some UV is essential because it helps the body manufacture vitamin D, which is needed for bone strength.

VISIBLE LIGHT IS ONE SMALL PART OF THE OVERALL ELECTROMAGNETIC SPECTRUM THAT INCLUDES RADIO AND TELEVISION SIGNALS. SHORTER WAVELENGTHS RESULT IN HIGHER FREQUENCIES. ULTRAVIOLET, X-RAYS, AND GAMMA RAYS POSE SOME DANGER TO THE BODY. IMAGE BY VICTOR BLACUS, BASED ON ELECTROMAGNETIC-SPECTRUM.PNG, CC BY-SA 3.0.



RICHARD SALVIDGE RECEIVES A HEALTHY DOSE OF LIGHT THERAPY AT EIELSON AIR FORCE BASE, ALASKA. LIGHT THERAPY FROM THESE LAMPS, MORE COMMONLY KNOWN AS HAPPY LIGHTS, ARE A PREVENTIVE MEASURE AGAINST SEASONAL AFFECTIVE DISORDER OR SAD. MR. SALVIDGE IS A CIVILIAN CONTRACTOR FROM HEIDELBERG, GERMANY. U.S. AIR FORCE PHOTO BY/AIRMAN 1ST CLASS YASH ROJAS.

We Need Blue Light, Too

BLUE LIGHT FROM SCREENS ISN'T DANGEROUS, BUT EXCESS EXPOSURE CAN CAUSE EYESTRAIN THAT CAN BE WORSENERD BY FATIGUE, DRY EYE SYNDROME, AND POOR LIGHTING. SYMPTOMS INCLUDE SORE EYES AND DIFFICULTY FOCUSING.

Studies also suggest that long-term exposure to blue light can affect retinal cells and lead to problems that resemble those of macular degeneration, which can lead to permanent vision loss.

Some of us don't get enough blue light and suffer from *seasonal affective disorder* (SAD). This problem is treated with light panels that emit a lot of blue light to mimic our exposure to the sun.

So we need it, but too much can be a problem. Using a computer, tablet, or phone for extended periods at night can create sleep problems that lead to fatigue during the day.

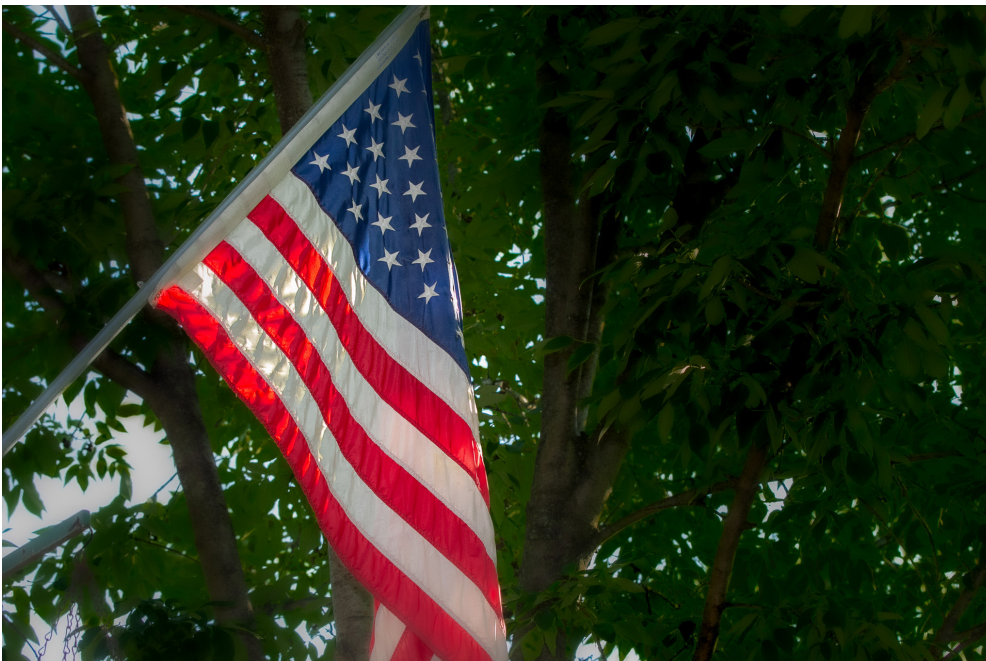
The Prevent Blindness website suggests five ways we can reduce exposure to blue light:

1. Decrease the time spent in front of screens, or take frequent breaks to give your eyes a rest.
2. Screen filters are available for smart phones, tablets, and computer screens to decrease the amount of blue light emitted.
3. Computer glasses with yellow-tinted lenses that block blue light can help ease computer digital eye strain by increasing contrast.
4. Anti-reflective lenses reduce glare and increase contrast, and they also block blue light from the sun and digital devices.
5. If you are scheduled for cataract surgery, talk to your ophthalmologist about using an intraocular lens that can protect the eye and retina from blue light, or ensure that eyeglasses you use when working with digital devices filter blue light.

We blink more slowly when using computer screens and this reduces the eyes' natural lubricants, disrupts sleep patterns, suppress production of melatonin, and may cause headaches. California health officials recommend turning off electronic devices two hours before bedtime, and "off" means off. No cheating to preview tomorrow's weather or check in with a friend on a social media site. If you enjoy reading before bed, use a book or a magazine instead of an e-reader.

Research suggests reducing the brightness of screens limits the problem. Many computers can sense a room's ambient light and adjust brightness. If not, make the adjustment manually. Another recommendation is to watch videos on your television, not a computer monitor; that's because televisions emit less blue light and they're viewed from further away.

One recommendation from an earlier age still applies: The *20-20-20 Rule*: For every 20 minutes of screen time, look away from the screen for at least 20 seconds and focus on something that's at least 20 feet away. 🇺🇸



**HAPPY AND PATRIOTIC INDEPENDENCE DAY!
A FLAG IN WORTHINGTON, OHIO, REMINDS US OF THE IMPORTANCE OF VOTING DURING THESE UNCOMMONLY PERILOUS TIMES FOR THE REPUBLIC.**