

BLUE LIGHT

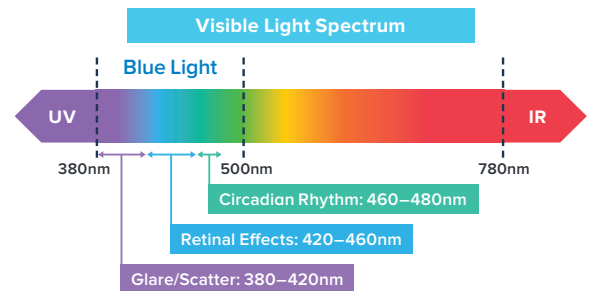
TECHNICAL EDUCATION

How to determine the right amount of concern about Blue Light



WHAT IS BLUE LIGHT?

As its name describes, Blue Light is electromagnetic radiation that is both “high-energy”, (and thereby has potential to cause harmful changes in living tissues), and is visible. Although high energy, (blue and violet) visible light has less energy than UV radiation, it is absorbed by the retina and therefore has the potential to damage retinal cells. Cellular damage from light is wavelength dependent and can only harm tissues that absorb it. Blue Light is absorbed by the retina. Once they are damaged or destroyed, retinal photoreceptor and pigment epithelium cells cannot be replaced. We are born with a limited number and cannot grow new ones. Hoya has decided to classify visible blue light to be 380 - 500nm. This follows the ISO and ANSI standard that states the same.



SOURCES OF BLUE LIGHT

The primary source of Blue Light occurs outdoors from the sun. An estimated 25 to 30 percent of sunlight consists of Solar Blue Light rays.

From the data in the following table, it's apparent that a person spending their entire day indoors using a computer and other electronic devices will still have significantly less Blue Light exposure than a person spending a nominal amount of time in natural sunlight outdoors, without protective sunglasses.

Relative Blue Light Exposure Risk from Natural and Man-Made Sources

Light Source	Blue Power Output ($\mu\text{W}/\text{cm}^2$)	Exposure time required to equal 15 minutes in full sun
Sunlight	1000-1500	15 min
LED lighting	270	1 hour
Compact fluorescent light	38	10 hours
Incandescent lighting	10	38 hours
Computer screen	30	13 hours
Smart phone (iPhone 6)	36	10 hours

Power values measured by Blue Spec light meter; 425-465 nm. Light source distances (approx.): LED, CFL and incandescent ceiling lights (3-6 ft.); computer screen (24 in); phone (12 in).

PROS OF BLUE LIGHT EXPOSURE

Exposure to some Blue Light appears to be necessary for maintenance of the body's circadian rhythm, (24-hour sleep cycle), that is essential for maintaining healthy brain wave activity, hormone production, cell regeneration and other physiological processes.

Blue Light wakes us up and keeps us alert during the day. Blue Light signals the body to release serotonin, a hormone that makes us feel awake and alert while contributing to our sense of well-being. When Solar Blue Light levels decrease, the body begins to suppress levels of serotonin and releases melatonin, a hormone that facilitates sleep.

Normal circadian rhythm is essential to wakefulness and sleep. Disruption of circadian rhythm leads to suppressed immune response which is linked to obesity, behavior disorders, depression and increased cancer rates. Research on sleep requirements indicates that we require 6.5 hours of uninterrupted sleep nightly. Exposing the eye to Blue Light 1-3 hours before bedtime may suppress production of our sleep hormone melatonin and disrupt our circadian rhythm.

DANGERS OF BLUE LIGHT EXPOSURE

Protecting ocular health from Blue Light is important as its cumulative and irreversible damage, to the retina and the crystalline lens, is associated with Age-Related Macular Degeneration and Cataracts.

A defining characteristic of Age-Related Macular Degeneration (AMD) is damage to the retinal pigment epithelium and photoreceptor cells, and associations have been made between cumulative exposure to sunlight and AMD risk.

AMD is the number one cause of blindness in adults age 55 and over. According to the National Eye Institute 1 in 6 by age 55 and 1 in 3 by age 75, will develop AMD. They estimate that AMD will reach epidemic proportions by the year 2020. There is no cure and treatment only slows the progression of the disease.

Normal Vision



AMD Vision





PRACTICE PREVENTION

The potential for retinal damage and future vision complications from blue light is a factor. The best way to protect eyes from this threat is to educate consumers about the need to consistently wear quality sunglasses that block both UV and Blue Light when outdoors.

The best way to protect eyes from the threat of Blue Light is to shield them from the primary source of this harmful radiation — the 800-pound gorilla of Blue Light — natural sunlight.