



## What is High Energy Visible (HEV) Blue light?

Most individuals are familiar with the risks associated with excessive exposure to ultraviolet (UV) light. Sunburn, skin and eye cancers, cataracts, painful solar keratitis, and macular degeneration are just some of the conditions caused by excessive sun exposure.

Unfortunately, most individuals know very little about the potential dangers of high energy visible blue light, also referred to as HEV light.

Ultraviolet light is the *invisible* portion of the short wavelength light spectrum between 200 nm and 380 nm. It is divided into three types, UV-A, UV-B, and UV-C. High energy visible blue light is the bluish-purple portion of the *visible* light spectrum from 380 nm to 450 nm.

High energy visible blue light occurs naturally in our environment and can be seen by the human eye in the form of haziness in the sky, fuzziness around objects, and blurred edges to letters on a computer screen.

High energy visible (HEV) blue light is also produced artificially in our environment. Fluorescent lights, halogen, and LED lights all emit HEV light. In addition, LCD computer monitors, tablets, smart phones and TV's all emit HEV light. As our society increases the use of these technologies, our eyes are being exposed to higher levels of HEV light.

### From the Doctor . . .

*In today's world of technology, we are all spending more time with our computers and smartphones. Scientific research is showing that these devices emit a high level of high energy visible blue light, also known as HEV light. Increased exposure to HEV light may be potentially harmful to our health.*

*Our office is dedicated to providing protective and preventative eye care solutions to ensure a lifetime of good vision.*

*This information guide will provide some general information about HEV light, will discuss some of the potential risks associated with excessive HEV light and will cover some of the current recommendations for reducing exposure.*

*If you have questions about the risks associated with HEV light exposure, please contact our office!*

*Craig Swanson, O.D.*

## Risks Associated with HEV Blue Light.

Moderate exposure to HEV light is beneficial to our overall health. Normal levels of HEV light in the atmosphere helps to regulate our body's internal "clock" or circadian rhythm. Too much or too little HEV light confuses our "clock".

Excessive exposure to HEV light has been associated with both ocular and systemic health risks. In the human eye, the natural lens acts as a filter to absorb ultraviolet light, thus protecting the delicate retina. However, high energy blue light has no natural barrier and thus easily reaches the retina. This HEV light can cause blurred vision, haziness, and eye fatigue. Scientific studies have shown that chronic exposure to HEV light can also weaken and damage the delicate pigment layer at the back of the eye. In particular, the central part of the retina known as the macula is particularly susceptible to damage. Consequently, long term or excessive HEV light exposure is a risk factor for developing macular degeneration, which is one of the leading causes of blindness.

Too much HEV light, especially late in the day or at night, has also been associated with insomnia



and poor sleep patterns. Excessive HEV light exposure is thought to disrupt the production of the hormone melatonin in our bodies. Melatonin regulates our body's natural clock or circadian rhythm. Poor quality sleep can lead to depression, poor mental concentration, hypertension, heart disease, diabetes and obesity. Maintaining a healthy circadian rhythm is important to our overall well-being.

With the increased use of electronic devices (computers, tablets, smart phones) and compact fluorescent/LED lights in our society, our eyes are exposed to increasingly higher levels of HEV light. Doctors and researchers are concerned about the potential long term vision and health effects associated with these artificially higher levels of HEV light.

## Children's Risk from UV and HEV Light

Children under the age of 18 years are at a higher risk for damage from both ultraviolet (UV) light and high energy visible blue (HEV) light. The natural lens in a child's eye is pristinely clear and has not yet developed the natural protective pigmentation that the adult lens possesses. Since chronic, excessive HEV light exposure has been linked to cellular damage of the pigment layer of the retina and disruption of the body's internal "clock", there is considerable concern that children are at a greater health risk. Doctors and researchers are closely monitoring and investigating these potential risks, which include retinal damage, sleep disorders, poor concentration, irritability, and chronic general health conditions.

### How can you protect yourself from HEV light dangers?

With the increased use of electronic devices and compact fluorescent and LED lights in our society, your eyes are exposed to increasing levels of HEV light. Fortunately, there are new protective eye care products available, such as special tints, lens coatings, and even vitamin/nutritional supplements. For outdoor activities, brown or copper sunglasses filter out HEV light more effectively than black or grey sunglasses. For indoor use (i.e., computer work), using a special tint such as that found in Blutech lenses (by Eye Solutions Technologies, LLC) and using a blue-blocking non-glare coating such as Previncia (by Essilor) can effectively eliminate HEV light dangers. In addition, eating a heart healthy diet rich in anti-oxidants from green and yellow fruits and vegetables and supplementing your diet with eye specific nutrients like Lutein can help support the health of the retina.

Be sure to have regular eye exams and ask the doctor for recommendations on how to limit ocular exposure to HEV light dangers.

**Indoor BluTech Lenses:** Indoor BluTech lenses use a combination of infused ocular lens pigment and melanin to protect the eyes from harmful high-energy light. The slight champagne color of the lenses protects from fluorescent and CFL light bulbs, computer screens, tablets, smart phones and televisions.

**Outdoor BluTech:** Outdoor BluTech lenses use the same advanced technology as the indoor lenses, but also incorporate polarization to reduce glare. These brown lenses provide advanced protection from the sun's ultraviolet (UV) rays and harmful HEV light that can damage the retina.

**RB TECH UV:** RB Tech UV non-glare lenses reduce annoying surface reflections from eyeglasses, allowing more comfortable and clear vision under all environments. RB Tech UV is a general purpose non-glare lens that specifically reflects away HEV better than traditional non-glare lenses.

**Previncia by Essilor:** Previncia is a task specific non-glare lens that reflects away 20% of HEV blue light and is a nice option for computer glasses. The surface of Previncia lenses has a bluish-purple appearance that shows that it is reflecting away HEV blue light.



### Lutein May Reduce the Risk For Macular Degeneration

*Lutein is a carotenoid (or pigment) that is present in fruits and vegetables. The body does not produce Lutein; however it accumulates in the retina from the foods that we eat and protects the macula from HEV light damage. Lutein is sometimes referred to as the "sunscreen of the retina." Lutein is found in dark green leafy vegetables and yellow fruits and vegetables. Some Lutein rich foods include:*

1. Kale
2. Spinach
3. Broccoli
4. Corn
5. Lettuce
6. Peas
7. Carrots
8. Tangerines & Oranges

*Fresh fruits and vegetables are generally better than cooked, frozen or canned. For more information, visit [www.macular.org](http://www.macular.org)*