

[Understanding Vision](#) Oct 16, 2017

## Blue Light: the good and the bad

How much blue light do we need? And how and when should we be protecting ourselves against it?

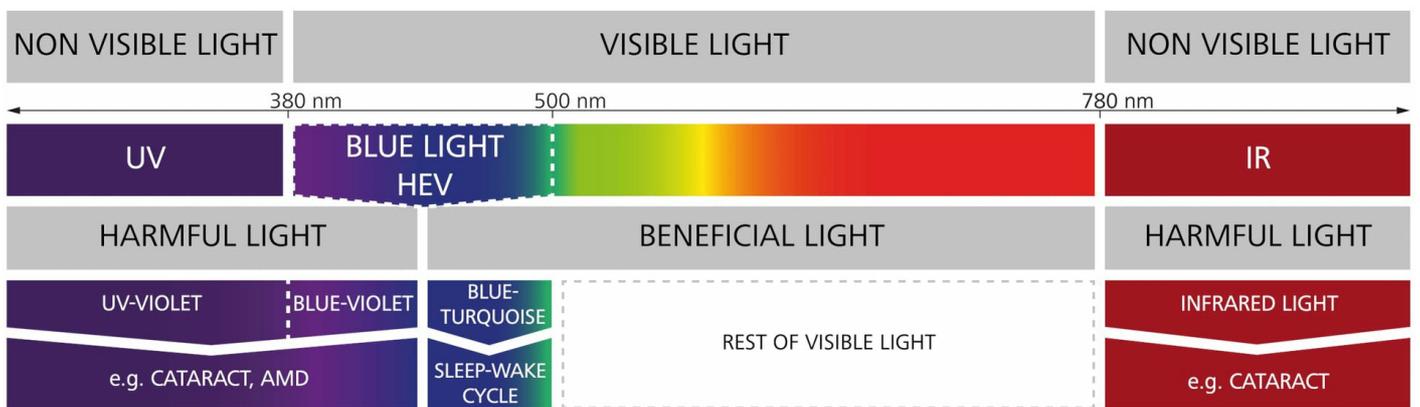
**A debate is raging over the beneficial and the damaging effects of blue light. On the one hand, blue light can be a helpful tool in combating winter depression and insomnia. On the other hand, blue light can permanently damage the human eye. So what's the deal with blue light? And what has changed about the artificial light we experience every day? Why do our bodies need the biological effects of this wavelength? And how and when should we protect ourselves from the potentially damaging effects of blue light? Read on to find out more about the good and the bad of blue light.**

### The visible spectrum

The light that reaches and enters the human eye is divided into visible light, comprising wavelengths from 380 to 780 nm, and non-visible light, which includes light in the ultraviolet range (UV light) and the infrared range (IR light).

Experts have been aware for some time that UV light can potentially damage biological tissue, such as our skin and eyes. That is why people typically take precautions to protect themselves from the sun, using items such as sun cream or a pair of sunglasses. However, visible blue-violet light also has the potential to cause damage to our eyes. Although blue-violet light has less energy than ultraviolet light, it is almost entirely unfiltered as it passes through the eye and reaches the retina. By way of contrast, ultraviolet light is almost entirely absorbed by the front part of the eye, and significantly less than 5% of it reaches as far as the retina.

The blue component of light between 380 and 500 nm is also known as high-energy visible (HEV) light. In particular blue-violet wavelengths between 380 and 440 nm are seen as potentially damaging and have been implicated as one of the possible causes of photoreinitis, i.e. damage to the retina caused by high-energy incident light.



HEV - High Energy Visible Light, UV - Ultraviolet Light, IR - Infrared Light ©ZEISS 2017

## Beneficial aspects of blue light

Light does more than just help us see, it is also an important means of regulating our biological rhythms and affects our general well-being. Light influences whether or not we are awake, focused and productive and feel energized and healthy.

Scientific studies have confirmed the biological effect of light on our body. Ultraviolet light, for example, influences the production of vitamins. Exposure to bright light and, in particular, the portion of blue light affects our hormonal balance. Hormones in the body regulate how a person feels as well as their sleep-wake cycle. In daylight, the portion of blue light is relatively high, whereas it is significantly reduced in the evening.

When it's bright outside, the body releases serotonin – also known as one of the "happy hormones" – and cortisol, a stress hormone. Both of these make us feel awake and active. However, melatonin is considered a sleep hormone and causes us to feel tired and sleep soundly when it is dark.

Light, in particular blue light that reaches the retina, also affects our psychological well-being. That is why light therapy is successfully employed to treat winter depression and insomnia. But, as is so often the case, the axiom "everything in moderation" still applies. Exposure to too much light also carries certain risks and can even be damaging.

## Damaging effects of blue light

Too much light in the ultraviolet and blue-violet bands can damage the human eye. As well as leading to painful inflammation of the conjunctiva and cornea, it can also cause damage to the eye's crystalline lens (e.g. cataracts) and especially to the retina (macular degeneration).

That's why it is so important to wear sunglasses with 100% UV protection in strong sunshine, especially in situations where there is a lot of glare such as on water or snowy mountain slopes.

## The modern world: light sources with a high proportion of blue light

From light-emitting diodes (LEDs) and xenon light to energy-saving bulbs and electromagnetic radiation from screens, all the "new light sources" that are designed to make our lives better and easier contain a higher proportion of blue light than the old traditional light bulbs. The different spectral composition of the light means that we are exposed to significantly more blue light than before. Could this be having a detrimental effect on our eyesight?

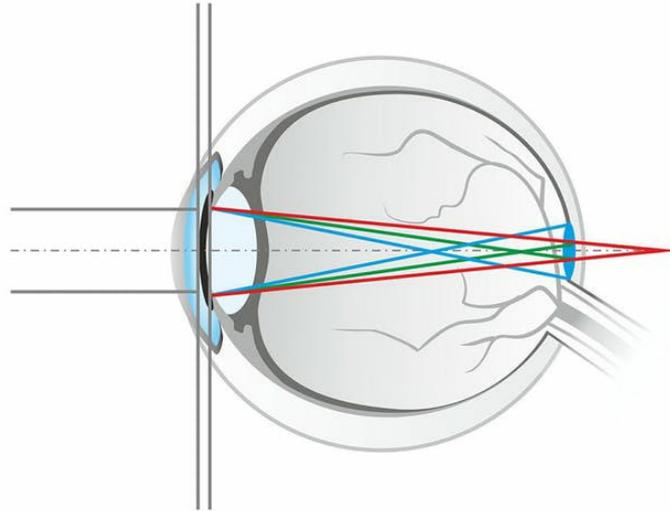
**But it is important to remember** that spending one hour outside on a normal overcast day exposes our eyes to 30 times more blue light than spending one hour inside sitting in front of a screen.

## Clear spectacle lenses with a blue light filter

It makes sense that clear spectacle lenses do not require UV protection if we mainly wear them

indoors. However, it is possible to get clear lenses with a blue light filter, such as [DuraVision® Blue Protect](#). But why?

Blue light radiation from light sources or screens can be irritating or tiring for some people's eyes. A blue filter can provide people with sharper vision: the different wavelengths of visible light are refracted in slightly different ways by the cornea and crystalline lens, so not all of them strike the same focal point on the retina. Some people will be familiar with these kind of phenomena – for example the fact that it's easier to clearly see red at a distance and blue close up, or the way in which infographics with red, green and blue lines are more tiring to keep in focus than lines which are all shaded in the same or similar colours.



Some people find that light sources with a high proportion of blue light can make them feel more restless at night. When we find ourselves in a dark room or outside at dusk or at night-time, our eyes switch to a different mode of vision. In low light the human eye shifts from green sensitivity to the high-energy blue spectrum. That means we perceive blue light more intensely, which can give the sensation of increased glare. This effect will be familiar to drivers who have been blinded by the glaring headlights of oncoming vehicles, especially those with modern xenon or LED headlights. Spectacle lenses with a blue light filter can create more comfortable vision in these situations.

> [DuraVision® BlueProtect](#) is a lens coating for clear lenses which can be applied as an additional layer. It offers all the benefits of a traditional [DuraVision® Premium](#) coating by ZEISS, including optimized hardness in an easy-clean design. BlueProtect also includes a blue filter which attenuates blue light in the 380 to approx. 450 nm band. That means improved visual comfort for anyone who wants protection against blue light during indoor activities without losing the beneficial effects of blue light in the approx. 450 to 500 nm band! Spectacles with DuraVision® BlueProtect can be worn all day long, unless you choose to wear your sunglasses for outdoor activities or use [PhotoFusion](#) lenses, which also offer 100% UV protection.

## How digital devices are changing our vision

Tablets, smart phones and other digital displays are not only changing the light spectrum we are exposed to – they are also changing our visual behaviour. It's important to recognize that we are spending far more time looking at things "close up" than we did before. That's often because the background brightness is too low. This is even a problem among children: "school myopia" refers to the increasing propensity of children to suffer from shortsightedness once they start school.





If we fail to spend enough time looking into the distance, then our eyes don't get as much opportunity to relax, and we essentially "unlearn" the ability to focus quickly for various distances.

- > [That causes digital eye strain](#). In addition, we naturally blink less when we're staring at digital displays, so our cornea is moistened less frequently by tear fluid. This can lead to
- > [tired, strained eyes](#). And in the worst case it can even impair our vision.

**Our tip: We recommend giving your eyes more frequent breaks by looking into the distance much more often – even when you are in the middle of working on your laptop, tablet or smartphone. And make sure your eyes are exposed to enough brightness while ensuring they are adequately protected against excessive UV and blue-violet light.**

## My Vision Profile

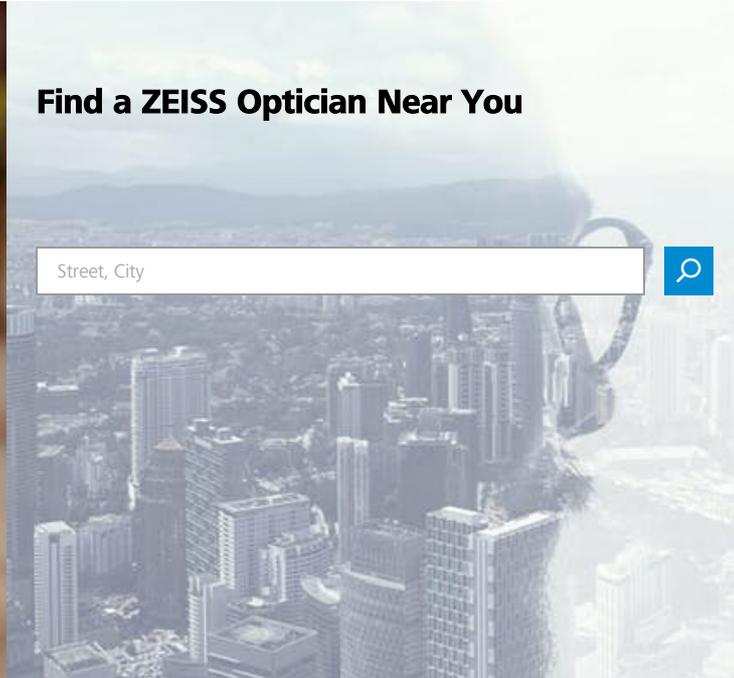
Determine your personal visual habits now and find your individualised lens solution.

[Check Your Vision Profile Now!](#)



## Find a ZEISS Optician Near You

Street, City



## Related Articles



### Constant clear visibility thanks to high-tech coatings

Innovative spectacle lens finishes that optimally protect your spectacle lenses and increase your



### Ten tips for choosing the right lens coating

BETTER VISION with new lens coatings – for more comfort and greater durability

visual comfort

[Understanding Vision](#) Oct 16, 2017

Tags: Glass Finishing

[Understanding Vision](#) Oct 16, 2017

Tags: Glass Finishing

## Related Products



### Digital lenses

Put an end to digital eyestrain.

---

[Learn more](#)



### DuraVision BlueProtect

The lens coating with a blue-light filter.

---

[Learn more](#)



---

**Explore**

- Understanding Vision
- Health + Prevention
- Lifestyle + Fashion
- Driving + Mobility
- Sports + Leisure
- Work Life

**Help me choose**

- Distance + Reading Glasses
- Varifocal Lenses
- Sunglasses
- Working Glasses
- Sports Glasses
- Glasses for Children
- Lens Coatings
- Contact Lenses
- Lens Cleaning
- At the Optician

**Services**

- My Vision Profile
- Online Vision Check
- Newsroom

**For Eye Care Professionals**

- Keep Eyes Wide Open When Choosing Your Business Partner
- Instruments + Technologies
- ZEISS Spectacle Lenses
- ZEISS Cleaning Solutions