# ZEISS Vision Care UV before blue light: Prioritizing light protection for your eyes

When it comes to eye health, consumers and eye care professionals have many concerns. One is Ultraviolet (UV) radiation - where decades of research have shown UV rays destroy ocular structures, and can cause cancer in the skin surrounding the eye.

More recently, there has been a growing worry over blue light, especially from smart phones and other digital devices. To some degree, the blue light conversation has eclipsed UV concerns. Yet the evidence against blue light is at best unclear. While the media has latched on to blue light, there is today no firm clinical evidence to suggest that blue light from digital devices poses a health risk anywhere close to that of UV. Simply put, the health risks from UV are very real, very well documented and therefore need to be addressed first.

# UV - An undisputed threat to eye health

### Scientific and international regulatory bodies agree: UV is harmful to the human eye and its surrounding tissues

Ultraviolet Radiation — otherwise known as ultraviolet light — is radiation that ranges from 100 to 400nm. While UV is mostly invisible, it can nonetheless severely damage the eyes and their surrounding structures.

UV interacts strongly with molecules in human cells. Research has shown that the effects of UV damage accumulate over a lifetime; early and frequent retinal exposure may contribute to age-related macular degeneration later on in life. Other known effects of UV exposure include:

- Photoaging of the eyelids and surrounding skin
- Skin cancers of the same regions, accounting for up to 10 percent of all skin cancers<sup>1</sup>
- Degenerative and unsightly growths on the conjunctiva
- Acute and painful inflammation of the cornea
- Melanoma of the iris, a potentially deadly type of cancer
- Nuclear sclerosis of the lens leading to reduced vision and ultimately to cataracts that require surgery



Figure 1: In her lifetime, this child will face many UV hazards.

# **Closing the UV Protection gap in eyeglasses**

#### Most of today's eyeglasses do not fully block all UV

Given the potential harm that ultraviolet radiation may cause, it might seem obvious that eye care professionals would offer the best UV protection when recommending eyewear. However, this is not always the case. Many eye care professionals and eyeglass wearers incorrectly believe that they already offer or have full UV protection.

The truth is that **four out of five clear lenses sold today do not fully block UV light** up to 400nm<sup>2</sup>. The World Health Organization, as well as multiple medical, scientific, and international regulatory institutions define 400nm as the threshold for UV light, yet today's most common clear lens materials only block wavelengths shorter than 380nm or even 360nm. In addition, arbitrary industry standards have somewhat conveniently defined the upper limit of UV to 380nm, allowing lens manufacturers to claim 100 percent UV protection for lens materials such as polycarbonate when they only block UV below 380nm. But 400nm is in fact the scientifically and clinically accepted UV threshold, and is applied in sunglasses, cosmetics and sunscreen products.

While the spectral gap between 380 and 400nm may not sound like much, it actually accounts for 40 percent of all solar UV radiation at sea level.



Figure 2. ISO 8980-3 solar UVR spectrum normalized to its maximum value at wavelength of 400 nm

ZEISS has closed this significant spectral gap by including UVProtect technology in all ZEISS clear plastic lenses. This technology provides complete UV blocking in the lens — all the way to 400nm — and maintains lens clarity without any noticeable tint.



# The tenuous case against blue light

#### Unproven eye health risk from everyday blue light

Recently, there has been growing concern about visible blue wavelengths between 400 and 500 nm – the spectral region associated with blue light hazard (BLH). Some studies have linked long-term exposure to blue light in sunlight to macular degeneration.<sup>3,4</sup> Other research has contradicted these claims<sup>5,6</sup> while many blue light studies have notable shortcomings.

#### For these and other reasons, the U.S. National Eye Institute has no formal opinion on blue light.

#### Blue light hype in the media?

Unfortunately, blue light's potential eye damage risks have been greatly exaggerated in the media. A 2018 study by researchers at the University of Toledo showed that blue light could damage the retina.<sup>7</sup> However, the study used a 445 nm blue laser, far brighter than a digital screen, to damage human cells in vitro.

Many press outlets interpreted the study to mean blue light from electronic devices can severely injure retinas. For example, a headline from Fortune Magazine stated: *Blue Light Emitted From Electronics Can Cause Accelerated Blindness, Study Finds.*<sup>8</sup>

If blue light were any hazard at all, natural outdoor light would be a far larger risk than any digital source. **Outdoor blue light is many times brighter than any digital display**.



Figure 3: Spectral radiance of smartphone and typical outdoor scene

There is a serious disconnect between the findings in the study and media stories. Given the current scientific evidence, the long-term eye health risk of blue light from digital devices (or even natural sources) is almost certainly overstated.

#### The best way to protect our eyes is to fully block UV

#### ZEISS UVProtect eyeglass lenses block UV to 400nm

The greatest eye health benefits come from preventing UV exposure. Clear lenses with ZEISS UVProtect block virtually all UV to 400 nm with no noticeable tint. Importantly, these lenses are effective because they *absorb* UV.

The risks of UV exposure over a lifetime are well documented, and there is no good reason today to accept eyeglass lenses that provide only partial UV protection – even if they claim 100% UV protection (up to 380nm) or include UV AR coatings.

Meanwhile, the debate over blue light will likely rage on, but the scientific and clinical data on UV are unequivocal. Eye health conversations may include blue light, but they absolutely need to start with UV protection first.

#### Get the UV facts at www.zeiss.com/UVProtect

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# ZEISS UVProtect.

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<sup>1.</sup> Skin Cancer Foundation - http://www.skincancer.org