

# A Comparison of UV Protection in Clear Eyeglass Lenses

Study shows that UV absorbers in the lens material, such as with ZEISS UVProtect, have the greatest impact

**A systematic, scientific study of different clear eyeglass lenses shows that UV absorbers in the lens material most effectively protect the eyes from UV radiation. An anti-reflective UV coating on the reverse side of the lens provides a small amount of additional protection.**

[Press Kit ZEISS UVProtect](#)

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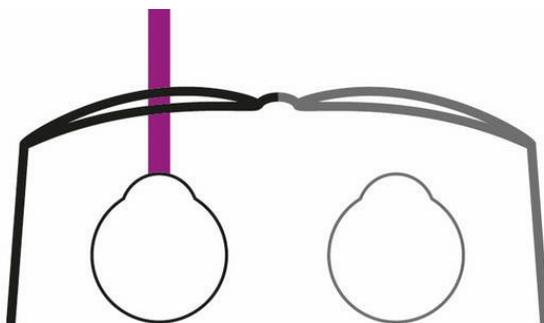
Aalen, Germany | 3 April 2019 | ZEISS Vision Care

## How UV radiation reaches the eye

There are three ways UV radiation can reach the eye when wearing glasses: by passing through the front of the lens, by traveling past the lens from the side and entering the eye directly, or by being reflected into the eye off the reverse side of the lens. The largest portion of UV radiation can reach the eye from the front since the lenses offer the largest solid angle for the radiation to pass through. A recent scientific study<sup>1</sup> confirmed that eyeglass lenses offer the greatest potential<sup>2</sup> for UV protection.

The portion of UV radiation that reaches the eye and the surrounding tissue was measured on a model of the human head. Measurements were performed for different situations involving eyeglasses, both with and without UV absorbers as well as with and without a back UV anti-reflective coating on the reverse side. A simulation was then performed to validate the results.

### 1) Direct, transmitted UV radiation



Protection is possible with suitable UV absorbers in the lens material

Approx. 90% of the potential incoming radiation

## Top priority: the right material

Under the test conditions, the spectacles were able to block 93 percent of the UV radiation, when the lens material contained special UV absorbers like with ZEISS UVProtect. Without the additional absorbers, just 64 percent of the UV radiation was blocked by the 1.5 index material tested. The test also showed that a back UV anti-reflective coating on the reverse side of the lens for enhancing the protective material further reduces the overall UV exposure by approximately one percent. Thus, it was possible to achieve maximum protection of 94 percent in the test situation. The remaining six percent of UV radiation, which can no longer be affected after selecting frames, reaches the eye directly by passing between the glasses and the face.

The degree to which frames can prevent UV radiation from reaching the skin and eye depends on various, real-world factors like the size of the frames, their position on the face and the wearer's behavior. Spectacles can only offer complete UV protection with wrapped frames like ski goggles that provide complete coverage.

However, the study conducted by Rifai et al. demonstrated one thing in particular: the lens material with integrated UV protection has a significant positive effect on the eye's exposure to UV radiation. ZEISS has equipped all its clear plastic lenses with UV absorbers, which can filter out UV radiation up to 400 nanometers (the uppermost wavelength range for UVA radiation). These provide the most effective protection for the anatomic structures behind the eyeglass lens. An additional back UV anti-reflective coating on the reverse side of ZEISS lenses comes standard, as do the absorbers in the material.

## What consumers should pay attention to with UV protection

UV radiation can result in short and long-term damage to the eye. Research and clinical studies show that cataracts, for example, can develop more quickly due to repeated exposure to UV radiation. Acute UV-induced damage like photokeratitis and conjunctivitis (inflammation of the retina and conjunctiva) has also been observed. The risk stems from the fact that people do not have an innate sense for detecting UV radiation. Moreover, UV radiation is omnipresent: on cloudy day, when it rains, in every season – including those periods when people do not normally wear sunglasses. So, when selecting glasses, what should consumers pay attention to regarding UV protection?

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1) The material



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2) The frame



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3) A back UV anti-reflective coating



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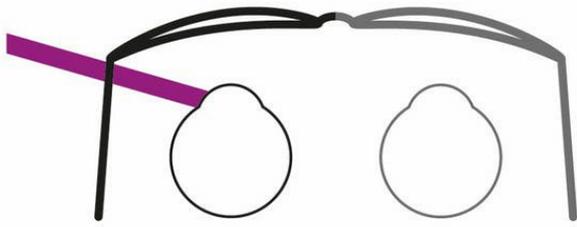


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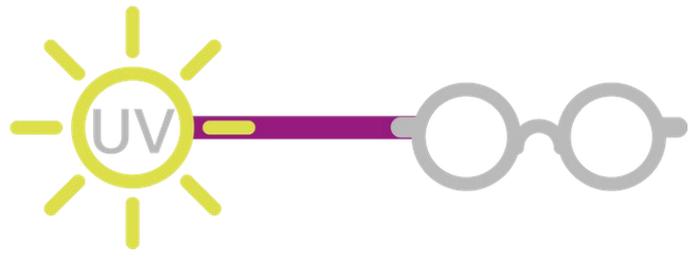
ZEISS is an internationally leading technology enterprise operating in the fields of optics and optoelectronics. In the previous fiscal year, the ZEISS Group generated annual revenue totaling more than 5.8 billion euros in its four segments Industrial Quality & Research, Medical Technology, Consumer Markets and Semiconductor Manufacturing Technology (status: 30 September 2018).

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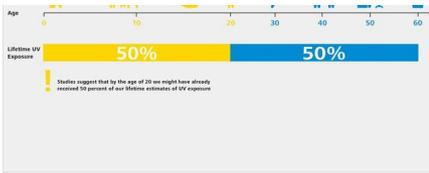
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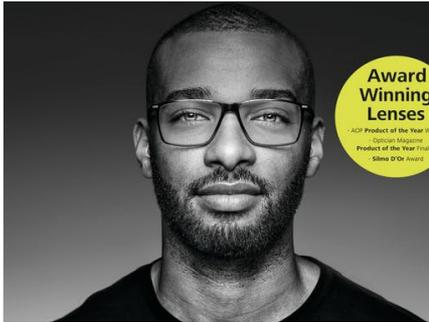
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