

On behalf of Vision Expo, we sincerely thank you for being with us this year.

Vision Expo Has Gone Green!

We have eliminated all paper session evaluation forms. Please be sure to complete your electronic session evaluations online when you login to request your CE Letter for each course you attended! Your feedback is important to us as our Conference Advisory Board considers content and speakers for future meetings to provide you with the best education possible.



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Financial Disclosure

Pete Hanlin is employed by Essilor of America.

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Blue Light




Pete Hanlin, ABOM
Senior Director Professional Solutions
Essilor of America


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The SUN is the source of HBL

It's a simple matter of mathematics...



**A smart phone emits
0.0013 watt/m² at 435nm**



**The sun emits
0.175 watt/m² at 435nm
(facing away from the sun
on a normal day)**

The woman in the top image would need to view her smartphone for **over 2 hours** to receive the same HBL exposure the woman in the bottom image receives in **ONE MINUTE**.

Exposure to the sun is a proven risk factor for AMD (Beaver Dam Study). It is unknown whether exposure to LED and CFL lighting is sufficient to be a risk factor.

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The SUN is the source of HBL

Dark lenses are necessary to provide outside protection against HBL.

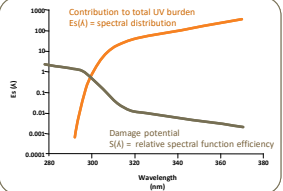
- ✓ sunglasses & photochromic lenses filter 85-97% of HBL

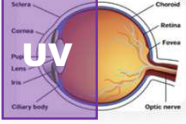


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Light and the Human Eye – UV

UVC is absorbed by the atmosphere
UVB is absorbed by the cornea
UVA is absorbed by the crystalline lens





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Light and the Human Eye – HEV

“Near UV Visible” is largely absorbed by the anterior eye
 “Harmful Blue” reaches the retina (decreasing with age)
 “Beneficial Blue” reaches the retina (decreasing with age)

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The Retinal Environment

The outer portion of the rods and cones do replenish- in the form of “discs.”

STRUCTURE OF THE RETINA

Every day, a number of discs slough off into the RPE- where they are digested (completely replaced every 10 days).

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The Retinal Environment

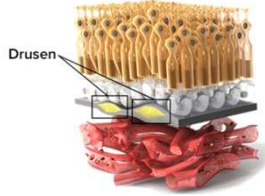
Retinal cells are part of the brain (develop from neural tube) and do NOT regenerate.

However, they are exposed to radiation in an oxygen-rich environment (this is a potentially bad combination).

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The Retinal Environment

As we age, the process for digesting those discs breaks down resulting in an accumulation of debris...



Drusen

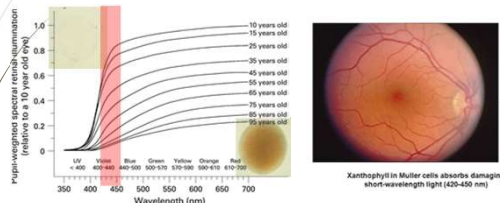
...this debris can eventually be detected in the form of lipofuscin and then drusen (a component of which is A2E).

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Light and the Human Eye – HEV

The eye has two forms of "natural" protection against blue light:

- crystalline lens yellows with age
- macula lutea has yellow pigmentation (Xanthophyll)



High-wavelength spectral transmittance (relative to a 10 year old eye)

Wavelength (nm)

10 years old
25 years old
35 years old
45 years old
55 years old
65 years old
75 years old
85 years old
95 years old

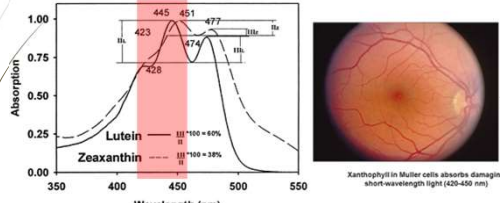
Xanthophyll in Muller cells absorbs damaging short-wavelength light (420-450 nm)

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Light and the Human Eye – HEV

The eye has two forms of "natural" protection against blue light:

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Absorption

Wavelength (nm)

Lutein III *100 = 60%
Zeaxanthin II *100 = 38%

Xanthophyll in Muller cells absorbs damaging short-wavelength light (420-450 nm)

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Light and the Human Eye – HEV

Approximately 3,600,000 cataract surgeries are performed each year in the US...

...clear IOLs are implanted in about **2,000,000** eyes per year.

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Blue Light Research

*RPE = Retinal Pigment Epithelium
Source: IDV/R&D ESSILOR 2011.

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AMD Statistics

69% of people diagnosed are already late-stage*
40% of people are 20/200 at initial diagnosis**
25% missed cases of AMD in one study***

Source: *Wong et al., "Noninvasive, Quantitative, High-Resolution OCT-Based Assay of Retinal Pigment Epithelium Alterations in Age-Related Macular Degeneration." *Investigative Ophthalmology and Visual Science*, 2010. **Wong et al., "Prevalence of Age-Related Macular Degeneration in a Population-Based Study." *Archives of Ophthalmology*, 2001. ***Wong et al., "Prevalence of Age-Related Macular Degeneration in a Population-Based Study." *Archives of Ophthalmology*, 2001.

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Summary

Harmful Blue Light (415-455nm) is known to have adverse effects on the retina at the levels encountered in sunlight!

Electronic devices and modern lighting emit Harmful Blue Light- but it is NOT known if the levels are sufficient to cause damage.

There are NO known benefits associated with Harmful Blue Light.

Photochromic lenses provide the best overall protection from Harmful Blue Light available in a single lens.

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Thank You... Questions???

Recommended Reading:
Hiroyuki Nagai, MD, et al., Prevention of increased abnormal fundus auto-fluorescence with blue light-filtering intraocular lenses, J Cataract Refract Surg 2015; 41:1855-59

-Pete Hanlin, ABOM
Senior Director Professional Solutions
Essilor of America

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