Sunshine has a dark side

1

1

Objectives

- At the conclusion of this session the participants should:
  1. Be aware of the clinical research that supports the harmful effects from the sun.
  2. Have the knowledge and tools to communicate the clinical research to patients.
  3. Understand the various forms of radiation that negatively impact eye health

2

2

Agenda

- Facts and myths of the impact of sun radiation
- UV and HEV radiation
- Clinical research and findings
- Challenges today in providing high quality outdoor eyewear
- Outdoor frame and lens solutions
- Your sun solution plan
- Business and patient benefits

3

3

Facts and Myths

- **MYTH:** Eighty percent of a person's lifetime sun exposure is acquired before age 18, so if I'm older, it doesn't matter how much sun I get.
- **FACT:** Actually, only about 23 percent of lifetime exposure occurs by age 18. You can — and should — help prevent sun damage at every age

4

4

Facts and Myths

- **MYTH:** You can't get sun damage on a cloudy day.
- **FACT:** Just because you can't see your shadow doesn't mean you're safe from the sun's damaging rays. Believe it or not, up to 80 percent of the sun's UV rays can penetrate through clouds and fog

5

5

Facts and Myths

- **FACT:** The cumulative effects of ultraviolet radiation (UVR) and blue light exposure have been implicated as a cause of keratitis, pingueculae, cataracts, eye and skin cancers, wrinkles, and age-related macular degeneration.



6

6

Facts and Myths

- **FACT:** The National Institute of Heath estimates that more than 45 million Americans age 40+ will be blind or visually impaired from AMD, glaucoma, diabetic retinopathy or cataracts by the year 2025

7

7

Facts and Myths

- **FACT:** A small amount of UVR comes from artificial sources. The overwhelming bulk of UV to which people are exposed comes from the sun
- **FACT:** UV can cause health effects both through direct damage to DNA and through photosensitizing reactions that cause the production of free radicals and oxidative damage

Source: The Eye and Solar Ultraviolet Radiation, Report of a June 18, 2011 Roundtable. Salt Lake City, Utah; Sponsored by Essilor of America

8

8

Facts and Myths

- **FACT:** Intense exposure to the sun can cause your eyes to seem bloodshot, swollen or hyper-sensitive to light. Even just several hours of intense, unprotected exposure to UV radiation can cause a variety of short-term problems, ranging from irritating to painful

9

9

Facts and Myths

- **FACT:** The most extreme of short term problems is photokeratitis, which essentially is sunburn of the eye. It's also known as "snow blindness," although a ski slope in winter isn't the only place that reflected UV rays can sharply increase the risk to unprotected eyes. The condition can be quite painful and can result in a loss of vision for 24 to 48 hours.

10

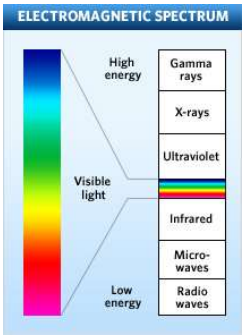
10

Let's look at UV Rays

11

11

Electromagnetic Spectrum



- Ultraviolet (UV) rays are higher in energy and do not fall within the realm of visible light, as shown here. In the electromagnetic spectrum, radio waves have the lowest energy, and gamma rays have the highest energy

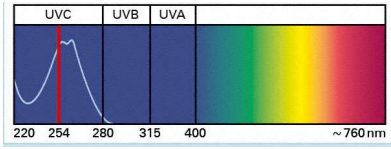
12

12

UV Radiation

The three categories of invisible high-energy UV rays:

- **UVC rays.** These are the highest-energy UV rays and potentially could be the most harmful to your eyes and skin. Fortunately, the atmosphere's ozone layer blocks virtually all UVC rays.

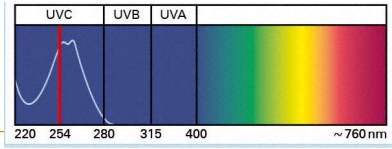


13

13

UV Radiation

- But this also means depletion of the ozone layer potentially could allow high-energy UVC rays to reach the earth's surface and cause serious UV-related health problems. UVC rays have wavelengths of 100-280 nanometer (nm).



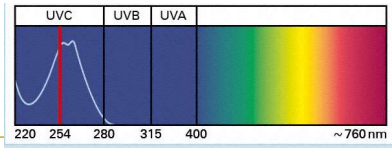
14

14

UV Radiation

- **UVB rays.** These have slightly longer wavelengths (280-315 nm) and lower energy than UVC rays. These rays are filtered partially by the ozone layer, but some still reach the earth's surface.

  In low doses, UVB radiation stimulates the production of melanin (a skin pigment), causing the skin to darken, creating a suntan.

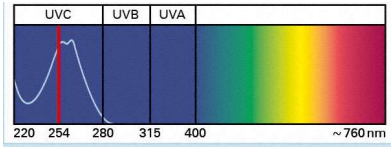


15

15

UV Radiation

- But in higher doses, UVB rays cause sunburn that increases the risk of skin cancer. UVB rays also cause skin discolorations, wrinkles and other signs of premature aging of the skin.

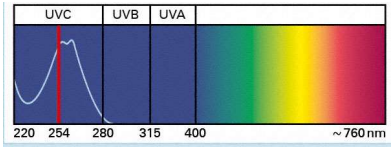


16

16

UV Radiation

- **UVA rays.** These are closer to visible light rays and have lower energy than UVB and UVC rays. But UVA rays can pass through the cornea and reach the lens and retina.

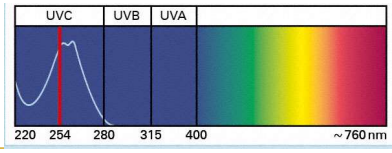


17

17

UV Radiation

- Overexposure to UVA radiation has been linked to the development of certain types of cataracts, and research suggests UVA rays may play a role in development of macular degeneration.

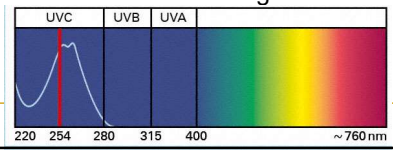


18

18

HEV Radiation

- High-energy visible (HEV) radiation, or blue light, is visible. Although HEV rays have longer wavelengths (400-500 nm) and lower energy than UV rays, they penetrate deeply into the eye and can cause retinal damage.

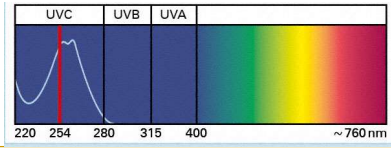


19

19

HEV Radiation

- According to a European study published in the October 2008 issue of *Archives of Ophthalmology*, HEV radiation — especially when combined with low blood plasma levels of vitamin C and other antioxidants — is associated with the development of macular degeneration.

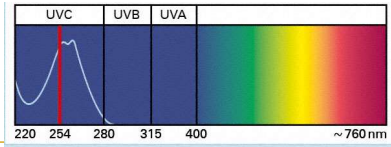


20

20

HEV Radiation

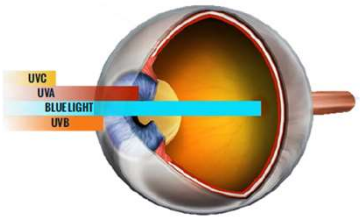
- Accumulation affects the cone's ability to process light leading to possible oxidative damage, which can be irreversible in the retina.



21

21

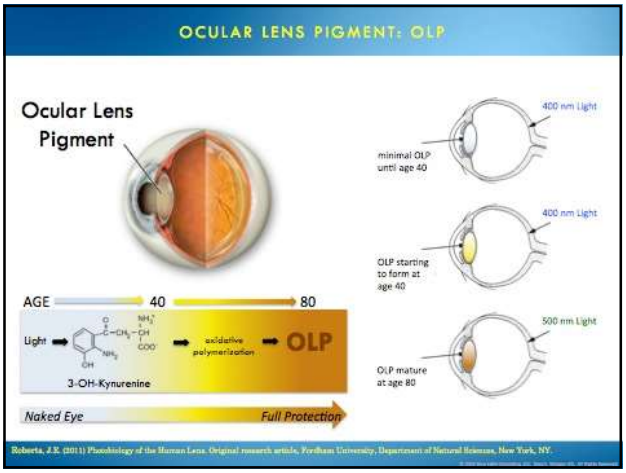
Blue light is the **highest energy visible light** that gets to the retina (back of eye) where AMD occurs. (Plancks Law – the lower the wavelength the higher the energy or potential damage) Most UV or non-visible light is screened out by the cornea and lens before it can hit the retina.



**The young human lens transmits a small window of UV-B light (320 nm) to the retina*

REFERENCE: Albert R. Wielgus, Joan E. Roberts. Retinal Photodamage by Endogenous and Xenobiotic Agents Photochemistry and Photobiology, 2012, 88: 1320–1345

22



23

BLUE LIGHT – CONSEQUENCES ACROSS ENTIRE RANGE

Impaired Daily Vision: Glare & Strain

400nm 500nm

400 nm – 440 nm

Age-Related Macular Degeneration

400nm 500nm

400 nm – 440 nm

Sleep Cycle Disruption

400nm 500nm

459 nm – 484 nm

NOTE: See ARVO Research Document

24

UV and HEV – Dr. R W Young

- "Sunglasses that block all UV and HEV will slow the pace of ocular deterioration and delay the onset of age-related disease."
  - Most traditional sun lenses do not block blue light
  - Options include blue blocking coatings and BluTech lenses

25

25

UV and HEV – Dr. R W Young

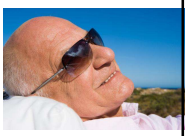
- "A 20-year delay would practically eliminate these diseases as significant causes of visual impairment in the United States."
- Approximately one quarter of the population has a significant cataract by age 75. Using the 20-year delay predicted by Dr. R W Young that age would be delayed to 95

26

26

Outdoor Risk Factors

- Anyone who spends time outdoors is at risk for eye problems from UV radiation. Risks of eye damage from UV and HEV exposure change from day to day and depend on a number of factors, including:
  - **Geographic location.** UV levels are greater in tropical areas near the earth's equator. The farther you are from the equator, the smaller your risk.



27

27

Outdoor Risk Factors

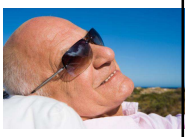
- **Elevation.** UV levels are greater at higher altitudes
- **Time of day.** UV and HEV levels are greater when the sun is high in the sky, typically from 10 a.m. to 2 p.m. (Varies depending on the season and location)

28

28

Outdoor Risk Factors

- **Environment.** UV and HEV levels are greater in wide open spaces, especially when highly reflective surfaces are present, like snow and sand.
- In fact, UV exposure can nearly double when UV rays are reflected from the snow.
- UV exposure is less likely in urban settings, where tall buildings shade the streets.



29

29

Outdoor Risk Factors

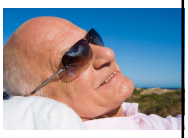
- **Medications.** Certain medications, such as tetracycline, sulfa drugs, birth control pills, diuretics and tranquilizers, can increase your body's sensitivity to UV and HEV radiation.

30

30

Measuring Ultraviolet Rays

- In the United States, the risk for UV exposure is measured using the UV Index.
- Developed by the NWS and EPA, the UV Index predicts each day's ultraviolet radiation levels on a simple 1 to 11+ scale. In addition to publishing the UV Index daily, the EPA also issues a UV Alert when the level of solar UV radiation that day is expected to be unusually high.



31

31

Measuring Ultraviolet Rays

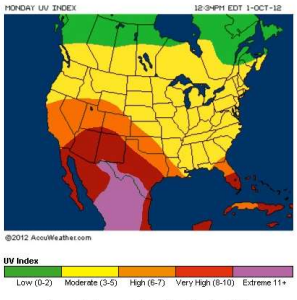
UV Index	Risk Level	Recommendations
2 or less	Low	1. Wear sunglasses. 2. If you burn easily, use sunscreen with an SPF* of 15+.
3 - 5	Moderate	1. Wear sunglasses. 2. Cover up and use sunscreen. 3. Stay in the shade near midday, when the sun is strongest.
6 - 7	High	1. Wear a hat and sunglasses. 2. Cover up and use sunscreen. 3. Reduce time in the sun between 10 a.m. and 4 p.m.
8 - 10	Very high	1. Wear a hat and sunglasses. 2. Cover up and use sunscreen. 3. Minimize sun exposure between 10 a.m. and 4 p.m.
11+	Extreme	1. Wear a hat and sunglasses. 2. Apply sunscreen (SPF 15+) liberally every two hours. 3. Try to avoid sun exposure between 10 a.m. and 4 p.m.
*SPF = sun protection factor Information based on U.S. Environmental Protection Agency standards.		

f

32

32

Measuring Ultraviolet Rays



The UV index map is updated twice daily.

http://www.allaboutvision.com/uv/

33

33

Clinical Evidence

- The Beaver Dam Eye Study (www. bdeyestudy.org) funded by the National Eye Institute is an ongoing study that collects information on the prevalence and incidence of age-related cataract, macular degeneration and diabetic retinopathy. The study was designed to discover (or detect) causes of these conditions.

34

34

Clinical Evidence

- Of importance to us are:
  - Increased sun exposure from teen years and into the 30s revealed increased risk of developing early retinal changes that result in AMD.
  - Males with higher levels of UVB exposure were 1.36 times more likely to develop cortical cataracts.
  - Male smokers were 3.3 times and female smokers were 2.5 times more likely to have exudative (wet) macular degeneration.

35

35

Clinical Evidence

- Sun-sensitizing medications have an interactive effect. From the *Journal of the American Medical Association*, August 2010, "The lens of the eye develops from the same layer of tissue as the skin, and medication that increases the skin's response to the sun may modify the effect of sunlight exposure on the eye as well. The use of sun-sensitizing medications is increasing.

36

36

Who's at greatest risk?

- Children
  - The average child is exposed to three times more UV than the average adult
- Adults
  - Particularly those spending a great deal of time outdoors whether for work or play
  - Taking sun-sensitizing medication

37

37

Outdoor Eyewear Challenges

- Frames need to provide sufficient coverage to block sunlight from all angles
  - Large eyesize
  - Wrap front
  - Wide temples
  - Strap for children
  - Strap for sports

38

38

Outdoor Eyewear Challenges

- How about HEV?
- Blue filtgering lens material or coatings required
- BluTech Lenses
  - Polarized lenses that reduce glare and improve contrast and visibility by selectively filtering blue light
  - Incorporates ocular pigment and melanin in the lens material
  - Great for driving, golfing, water and snow sports.
  - Also available for indoor use

39

39

Sun Solution Plan

- Talk to prescription and non-prescription patients about the potential harm from the sun
- Use manufacturer supplied materials to educate your patients
- Everyone in your office must be involved
  - Educate all staff and doctors
  - Develop and use scripts to educate patients
  - Gather sun data on History form

40

40

Sun Solution Plan

- Stock a significant assortment of quality, UV protective sunglasses

- Recommend lenses to protect against HEV

- Merchandise sunwear – create feature display areas

41

41

Sun Solution Plan

- Create bundles to encourage second pair purchase

- Recommend to all contact lens wearers
- Use social media to market sunwear
  - Groupon
  - Facebook

42

42

Conclusions

- Eye protection from childhood through adulthood may delay age related disorders by as much as 20 years
- Protection from harmful UV Rays is required by all
- UV damage is cumulative and may lead to diseases and disorders that create disabilities and blindness
- Your role is to educate your patients.

43

43

Sunshine has a dark side

44

44