

The Case for Ultraviolet Light - UV Protection

Introduction

There has been much ado made of UV protection in sunscreen, but what exactly are UV rays and why should you care? First, what do we mean by ultraviolet? Electromagnetic radiation (a form of energy) occurs along a spectrum – from cosmic radiation on one end to electric power on another. Ultraviolet refers to the area at the end of the visible spectrum (above the wavelength where we can see “violet”. Think about the colors of the rainbow – the red is at a longer wavelength than the violet). So when we refer to “ultraviolet”, we are referring to radiation of a specific wavelength range. UV-A and UV-B simply refer to different wavelengths along the spectrum.

UV rays can lead to sunburn and other serious skin-related issues - premature aging and skin cancer (melanoma). They can also cause snow blindness and cataracts. The length and intensity of exposure affects risk, and some people, especially those with fair skin, are more susceptible.

Unless you've resigned yourself to cave-dwelling for the foreseeable future, exposure to UV is a nearly every day occurrence – and it's critical to be knowledgeable and protect yourself.

Awareness: UV Danger Zones

Most UV light is generated from the sun and is filtered out in the atmosphere by the ozone layer. Small amounts are vital for helping our bodies manufacture Vitamin D. Too much can damage our DNA and immune system. Over the years, increasing pollution levels have contributed to the depletion of the protective layer of the global ozone by approximately 4 percent per decade since the 1970's. This weakened ozone layer increases our exposure to UV rays and, if proper precautions aren't taken, these rays can cause serious damage.

Consider the numbers:

- One in five Americans will develop skin cancer in the course of a lifetime.
- Melanoma (a type of skin cancer) is the most common form of cancer in the United States with more than 7000 deaths annually.
- The cost to treat metastatic melanoma ranges from \$10,000 to \$150,000 per incident per patient and averages \$59,000.
- Outdoor workers receive 6 to 8 times more UV exposure than indoor workers.

And it's not just during the summer that UV rays are a concern (although they are stronger in the summer). Sunburn knows no seasons and many winter weather fans, exposed to UV reflected from the snow and ice, develop the tell-tale redness if they don't use proper protection.

In addition to the rays produced by the sun, workers in certain trades are exposed to UV rays from man-made sources. Ultraviolet light is generated by welding and is used for drying paints and stains, locating cat urine (black light), or killing germs.

Results of Overexposure

Unfortunately, overexposure to UV radiation often has no immediate warning signs. Symptoms of overexposure, including different stages of erythema (sunburn) or photokeratitis (welder's flash), typically appear 4-24 hours after an exposure has occurred.

Although "sunburn" may not appear for several hours, it can result after a only a few seconds of exposure. Symptoms also vary based on a person's genetic makeup. Pale to fair skin individuals are

more susceptible to these burns. In addition, various medications (i.e. birth control) can increase photosensitivity and exacerbate symptoms.

Chronic exposure to UV radiation has been linked to premature skin aging, wrinkles, skin cancer, and weakened immune systems. UV exposure can also cause serious damage to the cornea – the outer protective coating on the eye. Photokeratitis – or Snow Blindness – is a painful inflammation of the eye caused by UV radiation-induced lesions on the cornea. Symptoms include a "sand-like" feeling in the eye that can last several days. Chronic exposure to short term UV radiation (from playing outdoor sports, for example) can lead to the formation of cataracts.

Protect Yourself

The National Weather Service and Environmental Protection Agency developed the UV Index to help the public understand their risk to UV rays. The index runs from 1 (low) to 11+ (very high). Both the National Health and Medical Research Council (NHMRC) standard as well as the International Commission on Non-Ionizing Radiation Protection (ICNIRP) recommend that on a "moderate" UV day (UV ray index of 5) , a person working outdoors should not be exposed for more than 8 hours.

Since there are no specific UV regulations in the U.S., common sense dictates the following actions be taken:

- 1) **Stay out of the sun.** The best thing to do is to work in the shade. Ordinary glass will filter UV-B rays, tinted glass is good at filtering UV-A rays, and special glass will filter all of it, but you can't tell the difference by looking at it. Clouds are also not a good filter - UV rays can pass through clouds, fog, and up to a foot of water!
- 2) **Wear PPE.** People whose livelihood requires them to work in the sun should wear a wide-brimmed hat and UV protected clothing to keep the sun off their face and body. This is particularly important when the sun is its strongest – from 10 am to 3 p.m.

New standards have evolved to help consumers understand the UV effectiveness of certain materials. Ultraviolet Protection Factor (UPF) ratings for clothing range from 15 to 50 and estimate the effectiveness of blocking UV-A and UV-B rays (SPF, for comparison, only refers to UV-B protection unless otherwise specified). A UPF of 50 means that only 1/50 of the UVR gets through, so the higher the number, the better (50 is currently the highest rating).

Regular clothing will block some of the UV rays, depending upon the type of fabric and tightness of the weave. A typical white tee shirt has a UPF rating of 5 to 7, meaning that roughly 20 percent of UVR is still going into your skin. For many individuals, this can still result in a burn after just 15 minutes of exposure.

- 3) **Wear sunscreen.** For exposed skin that's hard to cover, like your face, sunscreens are the way to go, but remember they are not a cure-all. Old time mountain climbers used to apply thick, white, zinc-oxide creams on their noses to block the UV rays. Modern sunscreens are clear and actually absorb UV energy and many protect against UV-A and UV-B rays.

The Sun Protection Factor (SPF) of sunscreens are a relative indication of how long a person can stay in the sun. For example, an SPF of 10 means that a person can stay out 10 times longer than if they had no sunscreen..Keep in mind that sunscreen can be absorbed by the skin, worn off by work, or washed away by sweat. Buy and use the level you need. Apply it 30 minutes prior to sun exposure, and reapply often.

- 4) **Protect your eyes with quality sunglasses that filter out most UV light.** Whether they are store bought, prescription, or safety glasses make sure they block at least 99 percent of both UVA and UVB rays. Cheap sunglasses can actually cause more harm, as they can cause your pupils to dilate, exposing them to more UV and increasing your chances for cataract surgery in the future.

- 5) **Pay attention to the UV Index (it is reported to 50+ major cities each day).** It measures the relative danger of the UV in your city. Adjust sunscreen and UPF clothing accordingly. The higher the UV scale, the more intense and dangerous the UV rays:

UV Index	Exposure Category
0 to 2	Low
3 to 5	Moderate
6 to 7	High
8 to 10	Very High
11+	Extreme

Summary

There is no getting around it – by nature of their jobs, outdoor workers are exposed to ultraviolet radiation. The effects of UV overexposure range from a short-term sunburn to chronic cataracts, skin cancer, or immune system disorders. Because of the potential severity, important precautions must be taken. Whether you work outdoors or not, it's critical to always be conscious of your environment, pay attention to the UV Index, and stay out of direct sun. But if shade isn't an option – wear proper PPE, the appropriate sunscreen, and protective sunglasses to maximize protection.

References / Sources:

http://www.rmsunscreen.com/pdf/UV_Law_Suit_Info.pdf

http://en.wikipedia.org/wiki/UV_rays

<http://en.wikipedia.org/wiki/Sunscreen>

<http://www.mayoclinic.com/health/uv-protection/AN00832>

www.rei.com Expert Advice -"How to Choose Sunscreen"

AS/NZS 4399:1996: Sun Protective Clothing - Evaluation and Classification

<http://www.arpansa.gov.au/pubs/rps/rps12.pdf>

http://www.arpansa.gov.au/is_protct.htm

<http://www.epa.gov/sunwise/uviscale.html>

<http://www.esrl.noaa.gov/csd/assessments/ozone/2006/>

<http://fuse.pha.jhu.edu/~wpb/spectroscopy/measure.html>

<http://www.arpansa.gov.au/pubs/rps/rps12.pdf>

http://www.arpansa.gov.au/pubs/rps/rps12_risfinal.pdf

http://www.arpansa.gov.au/pubs/rps/pub_list.pdf

http://www.osha.gov/SLTC/radiation_nonionizing/index.html#ultraviolet

<http://www.epa.gov/ozone/science/effects/AHEFApr2006.pdf>

Written By:

Diana Stegall, CSP, ARM, ALCM, CFPS

Content Development/Writer, and

Richard A. Pollock, CSP

CLMI Safety Training

Minneapolis, MN

© CLMI Safety Training, 2014

