Outdoor Ultraviolet Radiation Hazards and Protection

FACT SHEET 24-017-1115

Introduction. Many people enjoy participating in outdoor activities and view these activities as an important part of an enjoyable, healthy lifestyle. Some may even have to work in the sun. Outdoor activities and work are too often conducted without proper protection against the hazards to the skin and eyes from overexposure to ultraviolet radiation (UVR). This fact sheet lists the sources of outdoor UVR exposure and discusses why personal protective measures are important year round, not just in the summer months.

When is the hazard from direct sunlight at its worst? The amount of solar UVR exposure increases dramatically as the sun gets higher in the sky, and is not related to the outdoor temperature. Many overexposures occur outside the summer months, because people underestimate the UVR hazard in cooler temperatures. Clouds that are blocking visible sunlight may still allow as much as 70% of solar UVR to reach the ground. The exposures are most intense when the sun is more than halfway to being directly overhead, usually between 10:00 a.m. and 4:00 p.m. Another good rule of thumb is the "shadow rule," which states that the UVR hazard is worst when the shadow you cast on the ground is shorter than you are tall. These rules can serve as good indicators of when extra protective measures should be taken to reduce UVR exposure.

Besides direct sunlight, how else might I be exposed to UVR when I'm outside? The blue sky is another source of solar UVR exposure. People protected from direct sunlight (e.g., by canopies or tree shade) can still get sunburns if they are exposed long enough to UVR that is scattered from the surrounding blue sky.

UVR is also reflected from the ground. Green grass does not reflect much, but paved areas, sand, bodies of water and especially fresh snow reflect much more and increase your risk for overexposure. Fresh snow can actually double the UVR hazard that you receive outdoors. Experienced skiers protect themselves against winter sunburns and snow blindness, and these are caused by UVR reflected from the snow.

What are the short- and long-term effects of UVR overexposure to the skin? Short-term effects on the skin vary from a light reddening of the skin (known as "erythema," more commonly known as "sunburn") to blistering. The term "sunburn" is misleading. The effect is not caused by heating, and UVR over-exposures can occur outside the summer months. The amount of exposure depends on the sun's height in the sky, not the outdoor temperature. Some people are more sensitive to UVR exposures than others and should protect themselves accordingly. Skin type is a large factor in UVR sensitivity. Skin types range from fair-skin, which always burns and never tans, to deeply pigmented skin, which almost never burns. Protective measures should be practiced regardless of skin type.

Long-term effects may include premature aging of the skin, non-melanoma skin cancer, and malignant melanoma skin cancer. Individuals with fair-skin or light-colored eyes are most at risk for developing skin cancer, especially if there is a family history of it. Contact your doctor if you experience new growths on your skin, a mole that is changing, a sore that is not healing, or other concerns.

Am I better protected if I get a tan from sunlight, or indoor tanning devices? Tanned skin caused by UVR exposure is a sign of UV-related injury, and the World Health Organization has classified solar UVR and indoor tanning devices as Class I human carcinogens. Skin can adapt and become slightly more protective against sunburn by tanning and thickening, but there is no such thing as a healthy tan.

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What are the short- and long-term effects of UVR overexposure to the eyes? Short-term effects of high UVR exposure to the eye include damage to the outer corneal layers. This damage is known as photokeratitis, also known as "snow blindness." Snow blindness may feel like a "sand in the eye, foreign body" discomfort, but severe overexposures are experienced as painful swelling. These effects are temporary.

Long-term effects of chronic UVR overexposure to the eyes include increased risk for cataracts, which can lead to significant vision loss, as well as increased risk for pterygium, an eye growth that may reduce vision if advanced enough. Pterygium incidence is higher among people who live in areas where the ground reflects more UVR, like snow areas and beaches. It is sometimes referred to as "surfer's eye."

How should I protect myself against UVR overexposure? Reduce outdoor activities during the midday hours of 10:00 AM to 4:00 PM, especially in the summertime. When outside, shade and clothing are the first line of defense. Protect the skin with wide-brimmed hats, long-sleeved shirts, and clothing that covers the legs. If you have ever visited the tropics, you might notice that the locals are more likely to use shade and clothing to protect themselves against the sun, while tourists tend to be less aware of the risk.

Sunscreens with a minimum SPF of 15 should be used in addition to - not "instead of" - other sun-protective behaviors (e.g., shade and clothing). These sunscreens should be labeled as offering "broad spectrum" protection, also labeled as multi-spectrum protection, or UVA/UVB protection. Sunscreen should be applied liberally and reapplied every 2 hours. Protect the eyes with wide-brimmed hats and sunglasses, especially wraparound sunglasses. People in snow environments should wear sunscreen and sunglasses due to the increased UVR exposure from ground reflections.

What about higher SPF sunscreens? Are they worth it? It depends. Higher SPF sunscreens, up to SPF 50, offer some additional safety margin. This provides some additional benefit because customers usually do not apply enough sunscreen to get the full protection indicated by the SPF, and usually do not reapply it. Unfortunately, customers using high SPF sunscreens may be less likely to use clothing and shade for protection, and more likely to increase their exposure time outdoors, because of a false sense of security. For reasons such as these, the Food and Drug Administration has considered capping the highest SPF rating on sunscreen at 50+.

For more information about sunscreens, see the Environmental Protection Agency's (EPA's) fact sheet "Sunscreen: The Burning Facts" at http://www.epa.gov/sunwise/doc/sunscreen.pdf

What about receiving enough vitamin D? Solar UVR exposure stimulates vitamin D production, which is important for healthy bones and other processes. People who receive too little solar UVR exposure may become vitamin D deficient, which can lead to rickets in children and osteomalacia in adults, among other health problems. However, the U.S. Surgeon General does not recommend using sunlight exposure as a source of vitamin D, because of the wide variations nationwide in solar UVR and people's skin sensitivities. Adequate sources of vitamin D can be found in healthy diets (e.g., fatty fish like salmon and tuna, egg yolks, and vitamin D-fortified foods), and overexposure to solar UVR is not necessary to ensure healthy levels of vitamin D. Consult your doctor if you have concerns about possible vitamin D deficiency.

Can some prescription drugs increase my sensitivity to UVR? Yes. Increased UVR damage can occur with some medications, including some oral antibiotics and non-steroid anti-inflammatory drugs. Consult your doctor or pharmacist if there is any concern.

Where can I find additional information on sun safety and skin cancer?

- The EPA's SunWise Program: http://www2.epa.gov/sunwise/free-sun-safety-resources
- The U.S. Centers for Disease Control and Prevention's Skin Cancer Prevention Fact Sheets: http://www.cdc.gov/cancer/skin/basic_info/fact_sheets.htm
- The American Cancer Society: http://www.cancer.org/acs/groups/cid/documents/webcontent/003184-pdf.pdf
- The U.S. Surgeon General's Call to Action to Prevent Skin Cancer: http://www.surgeongeneral.gov/library/calls/prevent-skin-cancer/call-to-action-prevent-skin-cancer.pdf