



Week 5 Participant Manual:
Staying Super in the Sun



Week 5 Contents

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- Understanding UV Rays
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Journaling

- What are your initial thoughts in regards to our need to protect ourselves from the sun?
- What are some things you need to do with your everyday life to properly protect yourself from the sun?



Safe Sun Tips

Premature Aging of Skin

Repeated exposure to the sun damages elastin fibers in the skin and accelerates the aging process. Skin loses elasticity, starts to sag and wrinkle, and becomes leathery. The damage is irreversible, with signs beginning to show in the early 20s on fair-skinned individuals. Once even a small amount of damage has occurred, repeated exposure to the sun increases the effect. Besides leathery, wrinkled skin, other signs of damage are brown patches or spots, or skin with a yellow or grayish hue.

The Person

As the amount of melanin in skin increases, so does the natural protection from sunburn. Individuals with dark complexions, especially those with olive, brown, or black skin, can remain in the sun for longer periods before burning occurs. Blondes, redheads, and individuals with fair skin burn readily. In some instances, these people never tan because of the absence or very low levels of melanin in the skin. Therefore, individuals must consider their skin type when selecting sun protection products and planning time in the sun.

Babies under six months of age should be kept out of direct sunlight at all times. Sunscreens should not be used on infants under six months of age. Use hats, clothing, and shading to protect small babies from the sun.

Location and Atmospheric Conditions

The number of ultraviolet rays that reach the skin affect the speed and intensity of tanning or burning. When the atmosphere is thick, fewer ultraviolet rays pass through or reach the skin. At the equator and at higher altitudes, such as the mountains, possible radiation from the sun is greatest because of a clearer and less dense atmosphere to filter out ultraviolet rays. As one moves away from the equator or toward sea level, burning is less intense due to thicker atmospheric conditions. The number of ultraviolet rays at the equator is four times greater than those in Alaska or the southern tip of South America. Also, the southern United States receives one to one and a half times the number of ultraviolet rays as the north.

People who enjoy the sun know that severe burns are likely on hazy, overcast, cloudy-bright days. This effect is called sky radiation. The UVB rays, especially, scatter throughout molecules in the atmosphere and cause burning. Because sunlight seems less intense, less bright, and less warm, individuals normally take fewer precautions and thereby increase the potential for a bad sunburn.



Be aware that tanning and burning can occur on hazy days when the sun does not appear to be shining brightly.

Have respect for ultraviolet rays from the sun. They not only create problems on hazy days but also can burn the skin through clothing or while sitting in areas shaded from direct sunlight. Ultraviolet rays bounce off bright surfaces, such as snow, pavement or sand. One can be burned while sitting under a beach umbrella. Sky radiation on hazy days can hit the skin at angles and burn individuals not in direct sunlight.

Ultraviolet rays pass through some fabrics such as open-weave fabrics, lightweight knits, and nylon stockings. T-shirts worn while swimming reduce burning but still allow ultraviolet rays to pass through. Ultraviolet rays penetrate water but lose half their intensity. Nevertheless, burning can occur on parts of the body submerged in the water.

Most car, home, and office windows block UVB rays but may allow some UVA rays to pass through increasing UV exposure. Tinted windows help block more UVA rays, but that depends on the type of tinting. Although window exposure probably does not pose a great risk most people should avoid extended periods of time close to a window with direct sunlight.

Seasonal Conditions

The amount of ultraviolet radiation available changes with the seasons. In the North Temperate Zone, the maximum radiation possible occurs on June 21. During each season UV rays can cause skin damage depending on length of exposure and skin type.

Be especially careful at midday during warm weather months. Ultraviolet rays are most intense between 10:00 a.m. and 4:00 p.m. The American Academy of Dermatology recommends you wear sunscreen every day if you are going to be in the sun for more than 20 minutes. Plan activities before 8:00 a.m. and after 6:00 p.m. to minimize your exposure to UV rays.

Prevention of Sunburn Damage: Know Which Products Protect

To prevent sun damage to your skin you need to avoid overexposure to ultraviolet light. Using sunscreen and following some recommended practices will help. Do select products that provide protection. Let's review the various types of sun care products and evaluate those that contain ingredients to filter out ultraviolet rays (UV radiation) and limit the quantity of rays that can be absorbed by the skin. Some products offer this protection; others do not.



Sun Screens

Sun screens contain one or more protective chemicals that absorb and scatter ultraviolet rays. These have a numerical rating system to indicate the specific amount of protection. The numbers, known as Sun Protection Factors (SPF), are listed on the product label. The next section will discuss these in detail.

The higher the SPF number, the greater the protection. Although no sunscreen blocks UV radiation 100 percent. Sun screens are available in many forms including lotions, creams, gels, sprays, ointments and wax sticks. Besides sun screens use a lip balm with SPF of 15 or higher to protect your lips from sunburn.

Sun screens should be applied 20 to 30 minutes before going out into the sun to allow time for the sun screen to start working. Apply liberally and reapply every 2 hours to provide maximum effectiveness. Do not use sunscreens to increase the time spent in intense sunlight or in place of protective clothing.

Lubricants

Suntan preparations often contain a lubricant that reduces the drying effect of the sun on skin. However, suntan lotions, oils, gels, and other moisturizers without extra protection (sun screen), or home preparations, such as mineral oil or baby oil and iodine, only benefit as a lubricant and do not provide protection from the sun's rays.

Screen Selection: Use the SPF Rating

Select a sun screen or sun block product according to the SPF rating to achieve optimum protection for your needs. SPF is a numerical rating system to indicate the degree of protection provided by a sun care product. Sunscreen does not give you total protection. When applying sunscreen of SPF correctly your skin gets the equivalent of 1 minute of UVB rays for each 15 minutes you spend in the sun. Thus, 2 hours in the sun wearing SPF 15 sunscreen is the same as spending 8 minutes unprotected. SPF of 15 or greater is recommended to be used year-round by all skin types with those of very fair or fair complexion using an SPF of 30 or more.

Water Proof and Application

Sun protection is lost through heat, humidity, perspiration, and rubbing off. Reapply sunscreen to continue protective benefits. For added protection when exposed to water, as when swimming or water skiing, look for water proof products. Look for labels that read water proof or water resistant. Follow label directions since protection time varies, water proof typically provides protection for at least 80 minutes when swimming or sweating. Whereas, water resistant usually only provide protection for 40 minutes. People should reapply after swimming or perspiring heavily.



Clothing for Sun Protection

Covering up when in the sun is one approach to ultraviolet ray protection. Wearing a long-sleeved shirt and long pants or long skirts will provide optimum protection. Generally, fabrics with a tighter, denser weave, in dark colors, layered, and a matte or dull finish, give the best protection. Unfortunately, these fabrics tend to be hot and less comfortable to wear. Knit constructions, such as cotton t-shirts, give relatively poor protection (SPF rating of 4.8) since UV rays pass through loops on the knit structure.

Several companies are marketing sunlight or UV resistant fabric. These fabrics usually have a tighter weave or knit and are usually darker in color. Many sun-protective fabrics have a label listing the Ultraviolet Protection Factor (UPF) value, which is the level of protection the clothing garment will provide from the sun's UV rays (on a scale from 15 to 50+). The higher the UPF, the more protections from UV rays.

Three categories of UPF protection include:

15 to 24 provides "Good UV Protection"

25 to 39 provides "Very Good UV Protection"

40 to 50 provides "Excellent UV Protection"

A garment labeled "sun-protective" or "UV-protective" has to have at least a UPF of 15. Garments can lose their sun-protective effectiveness if they are too tight or stretched out, damp or wet, and worn and washed frequently.



The ABC's of UV

The sun which makes life possible on Earth can also be lethal. Visible sunlight is only a fraction of the huge amount of energy given off by this continuous thermonuclear reaction. Some is in the form of ultraviolet radiation.

Some kinds of ultraviolet can be very harmful to living things, because they directly damage cells and DNA, which carries genetic information. Fortunately, Earth's atmosphere normally protects living things from most incoming UV.

Oxygen as it normally exists in the atmosphere comes in molecules consisting of two oxygen atoms attached chemically. A small fraction is in molecules containing three oxygen atoms -- called ozone. Both oxygen and ozone are virtually transparent to visible light. They block ultraviolet not by shading or reflecting but by taking up its energy in various chemical reactions. Key among those reactions are the transformation of two-atom oxygen into three-atom ozone and the transformation of ozone back to oxygen.

Ozone is particularly abundant in a certain layer of the lower-mid stratosphere, at an altitude of about 19 miles. The largest part of incoming UV radiation is absorbed by this so-called "ozone layer."

The ozone layer has been eroded by the large-scale release of certain man-made chemicals into the atmosphere. The most common ozone-destroying chemicals are the chlorofluorocarbons -- or CFCs. In the Montreal Protocol of 1987, the nations of the world agreed to phase out and eventually ban such chemicals.

The wavelengths of ultraviolet radiation (220-400 nanometers) are shorter than the wavelengths of visible light (400-790 nm). A nanometer (nm) is one-billionth of a meter. Ultraviolet radiation is not all the same. The shorter the wavelength, the more energy it contains, and the more damage it can do to living things. The oxygen, ozone, and other gases in the atmosphere do not block all wavelengths equally. Scientists find it convenient to break the UV portion of the spectrum down into three smaller bands — or "types" of UV radiation.

UV-A. The wavelengths of UV-A radiation range between 320 and 400 nm -- the closest to visible light. These longer-wavelength UV rays carry less energy than other kinds of UV. UV-A rays are often considered less damaging to human skin, because they do not cause appreciable sunburn. But UV-A penetrates to the lower layers of skin, and can damage its supportive elastic tissues (collagen). Years of UV-A exposure tend to cause skin to wrinkle and sag. Scientists also believe UV-A is a contributing cause of skin cancer. UV-A rays are generally not absorbed by the ozone layer.



UV-A rays penetrate deepest into the skin. While it's unclear how many skin cancers are attributable to UV-A, they are not blocked by glass or most sunscreens.

UV-B ranges in wavelengths between 280-290 and 315-320 nm. These more energetic rays are the ones that cause sunburn, or erythema. They also damage the skin's immune response and promote formation of cataracts in unprotected eyes. Small doses of UV-B can benefit people by promoting the body's production of vitamin D, but larger doses raise the risk of skin cancer. Most, but not all, UV-B is absorbed by the ozone in the atmosphere.

UV-B causes most sunburns and, experts think, most skin cancers. Some UV-B is partly absorbed by high-altitude ozone. It is blocked by window glass, most sunglasses, and (to varying degrees) sunscreens. A few insidious rays, however, penetrate the top layer of skin and cause aging, immune-system damage and cancer.

UV-C. This most energetic -- and dangerous -- band of ultraviolet is generally considered to include waves shorter than 290 or 280 nm and range to as short as 220-150 nm. UV-C is the most damaging to humans, plants, and animals. Fortunately, nearly all of the UV-C coming from the sun is absorbed by ozone and other gases.

UV-C are entirely absorbed by ozone molecules in the atmosphere.

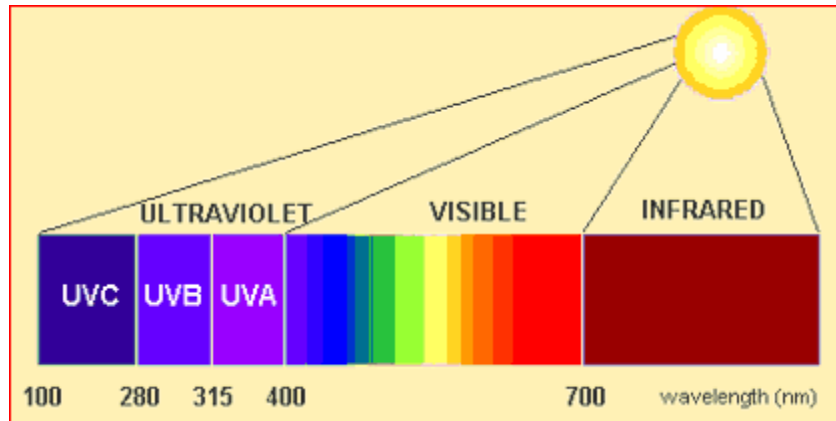
For many years, sunscreens were only designed to block UV-B rays, since they were the ones causing sunburn. The SPF rating of sunscreens only measures their ability to block UV-B. Dermatologists today recommend use of "broad spectrum" sunscreens, which also protect against UV-A. Sunscreen products containing zinc oxide (Z-cote) or avobensome (Parsol 1789®) will also protect against UV-A.

The skin cancer story is largely a story of sunlight, which causes most, but not all, cases of the disease. Knowing your enemy is the best way to start the battle against the sun.



The dangerous part of sunlight is the waves in high-energy ultraviolet (UV) region. These come in three flavors, ranging from low to high energy: UV-A, UV-B, and UV-C.

As you can see, most of the concern focuses on UV-B. These rays penetrate the epidermis (the top layer) and damage cells. If UV-B passes through a cell nucleus, it can strike DNA molecules in the chromosomes, breaking them or forming abnormal chemical bonds. In severe cases, entire [chromosomes](#) can be reshuffled. Sunlight is most damaging in childhood, when cells are dividing rapidly -- creating opportunities for persistent mutations.



Still, much of the DNA damage is harmless. The body has evolved remarkable mechanisms that constantly monitor and fix DNA, and many of the unrepaired cells commit suicide.

Graphic above from: <http://earthobservatory.nasa.gov/Features/UVB/>

But if mutated cells divide without normal limits, that's cancer.

Skin cancer, like other tumors, can spread through metastasis, in which diseased cells hitch a ride in blood or lymph to other organs. Before metastasis, many skin cancers are easy to treat by surgical removal or topical chemotherapy.



Understanding Skin Cancer

Skin cancer has three faces: basal cell carcinoma, squamous cell carcinoma and melanoma. Basal cell and squamous cell carcinomas account for the vast majority of skin cancers. Thankfully, they are the least deadly: When treated early, the cure rate is upwards of 95 percent. Both cancers are likely related to the lifetime sunlight exposure.

Basal cell carcinoma is a slow-growing cancer that rarely metastasizes and is almost never fatal. These growths begin in the lowest layer of the epidermis (called the basal layer, and made, appropriately, of basal cells). Basal cells continually divide to replenish the 2 square meters of surface skin that is continually weathering away.

About 75 percent of skin cancers are basal cell carcinomas, which usually develop on sun-exposed areas like the head and neck. They sometimes appear as a red patch of skin or a pearly, translucent bump. They can also be an irritable open sore that doesn't heal, or a scar-like lesion.

Squamous cell carcinoma is less common. In rare cases, it can spread and be life threatening. These cancers develop in higher levels of the epidermis, where cells grow tough to protect the body. Accounting for one-fifth of all skin cancers, squamous cell carcinoma is directly related to sun exposure. It occurs on the most sun-exposed areas, such as the head and neck. Squamous cell carcinoma can appear as a scaly red patch that sometimes scabs or bleeds; an open sore that refuses to heal; or a raised, wartlike growth.



Pic. Ref: http://www.pharmacy-and-drugs.com/illnessessimages/squamous_cell_carcinoma1.jpg

Melanoma is a different story. Far more severe than other skin cancers, it is also the least common. Melanoma occurs in the pigment-producing cells of the epidermis. These so-called melanocytes produce melanin, the pigment that



darkens skin and helps protect deeper cells from UV. Melanocytes also make benign growths called moles. Melanoma occurs in varying shades of brown or black or in multicolored patches of red, white, and blue.

Melanoma can be deadly, but it is often curable if caught early. It is also the least predictable skin cancer. It can occur anywhere, not just in sun-exposed skin. About 70 percent of melanoma cases develop in normal skin, while only 30 percent develop in moles. It can occur anytime, and is not strongly associated with lifetime accumulation of sun exposure. Some experts believe melanoma is linked to a few severe sunburns in early life, but others say this link is tenuous and almost impossible to prove.

Oddly, melanoma is not as tightly correlated with sun exposure as other skin cancers. Even more oddly, it's not proven that sunscreen can protect against melanoma.

Protect thyself

If you've read much about skin cancer, you know that early detection matters. Beware of large moles and moles with irregular borders or mingled tones. Keep a careful watch for changes in all blemishes. You probably know that the darker your skin, the lower your risk. That's because dark-skinned people have more melanocytes, and thus more protective melanin. But no one is invulnerable, and skin cancer can take so many forms that it can be difficult to recognize.

By all accounts, everyone should be aware of the ABCD warning signs of skin cancer: (Asymmetry, Border irregularity, Color variation, Diameter larger than a pencil eraser).

Refer to chart below. But what if you have lots of moles, and most are funny-shaped or multicolored? What if there are too many to keep track of? Chances are you should get checked by a dermatologist. (Chances are that the modestly moley should also get checked, too.)

In between self-checks and doctor's visits, remember these precautions. Since skin cancers are linked to severe sunburn, experts urge you to minimize your sun exposure. But even for those who are reluctant to adopt a vampirish existence and stay indoors from 10 a.m. to 4 p.m., there is hope. For one thing, protective clothing and sunscreen help to prevent burns and reduce cumulative exposure.

However, there are some further cautions. For one thing, most people just don't slather heavily enough. "The average person who applies sunscreen only puts on about one-fifth of the amount used in testing to establish SPF [sun protection factor rating for sunscreen]," says Eric Kilber, a resident in the University of Wisconsin-Madison

department of dermatology, "so if you put on SPF 30, it's probably more like SPF 6. It should be generously applied. A couple of small blobs will not cover your face trunk and arms."

Secondly, he urges caution in the wet tee-shirt department. Not just any shirt will keep the rays at bay. "A white tee-shirt is not much protection especially if it gets wet," Kilber says. "Tightly woven, bright-colored clothes, please."

**LOOK FOR DANGER SIGNS
IN PIGMENTED LESIONS OF THE SKIN**
Consult your dermatologist immediately if
any of your moles or pigmented spots exhibits:

			
A Asymmetry-one half unlike the other half.		B Border irregular- scalloped or poorly circumscribed border.	
			
C Color varied from one area to another; shades of tan and brown; black; sometimes white, red or blue.		D Diameter larger than 6mm as a rule (diameter of pencil eraser).	

Reference

U.S. Environmental Protection Agency



Important Reference Links

<http://www2.epa.gov/sunwise>

This website done by the United States Environmental Protection Agency is a very user-friendly website and is constantly updated with the most current information on how we can protect ourselves from the harmful effects of too much sun.

http://www.unep.org/pdf/Solar_Index_Guide.pdf

The Global Solar UV Index (UVI) described in this document was developed in an international effort and is a simple measure of the UV radiation level at the Earth's surface. It serves as an important vehicle to raise public awareness and to alert people about the need to adopt protective measures when exposed to UV radiation.

Skin Self Examinations

- Conduct regular self-examinations on you and your loved ones.
- Use the chart below as your guide (Ref. www.SkinCancer.org)
- Contact your doctor with any concerns. Regular self-examinations could save your life!



Asymmetry

If you draw a line through this mole, the two halves will not match, meaning it is asymmetrical, a warning sign for melanoma.



Border

The borders of an early melanoma tend to be uneven. The edges may be scalloped or notched.



Color

Having a variety of colors is another warning signal. A number of different shades of brown, tan or black could appear. A melanoma may also become red white or blue



Diameter

Melanomas usually are larger in diameter than the size of the eraser on your pencil (1/4 inch or 6 mm), but they may sometimes be smaller when first detected.



Evolving

When a mole is evolving, see a doctor. Any change – in size, shape, color, elevation, or another trait, or any new symptom such as bleeding, itching or crusting – points to danger.



Vitamin D Food Sources

Salmon	Catfish
Herring	Makerel
Tuna	Eel
Swordfish	Mushrooms (especially Shiitake)
Sardines	Egg yolk

In addition many foods are fortified with Vitamin D (such as: milk, yogurt, orange juice and ready to eat cereals).

Examples of Foods that Contain Vitamin C, E and Selenium

Vitamin C

Bell Peppers (all kinds)	Oranges
Broccoli	Papaya
Cantaloupe	Strawberries
Grapefruit	Sweet potatoes (all kinds)
Kiwi	

Vitamin E

Almonds	Sunflower seeds
Hazelnuts	Swiss chard
Olive oil	Wheat germ
Peanuts	

Selenium

Brazil Nuts	Oats
Butter	Poultry (turkey and chicken)
Eggs	Root vegetables that are grown in selenium rich soil
Mushrooms	Fish (cod, sardines, salmon, tuna)
Shellfish (clams, mussels, oysters, shrimp)	