

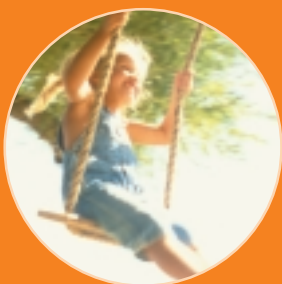
Sun

The Burning Facts



Although the sun is necessary for life, too much sun exposure can lead to adverse health effects, including skin cancer. More than 1 million people in the United States are diagnosed with skin cancer each year, making it the most common form of cancer in the country, but it is largely preventable through a broad sun protection program. Ninety percent of skin cancers are linked to sun exposure.¹

By themselves, sunscreens might not be effective in protecting you from the most dangerous forms of skin cancer. However, sunscreen use is an important part of your sun protection program. Used properly, certain sunscreens help protect human skin from some of the sun's damaging ultraviolet (UV) radiation. But according to recent surveys, most people are confused about the proper use and effectiveness of sunscreens.² The purpose of this fact sheet is to educate you about sunscreens and other important sun protection measures so that you can protect yourself from the sun's damaging rays.



How Does UV Radiation Affect My Skin? What Are the Risks?

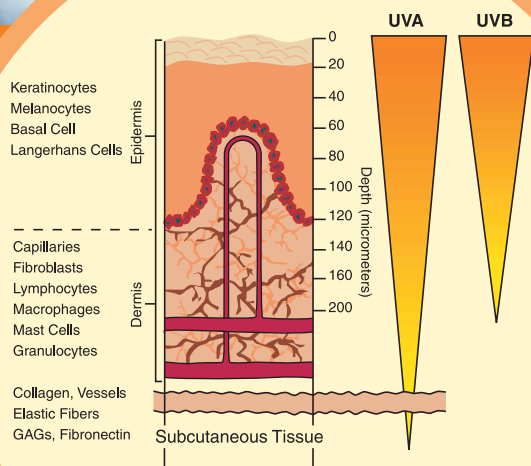
UV rays can have a number of harmful effects on the skin. The two types of UV radiation that can affect the skin, UVA and UVB, have both been linked to skin cancer and a weakening of the immune system. They also contribute to both premature aging of the skin and cataracts (a condition that impairs eyesight), and cause skin color changes.

UVA Rays

UVA rays, which are not absorbed by the ozone layer, penetrate deep into the skin and heavily contribute to premature aging. Up to 90 percent of the visible skin changes commonly attributed to aging are caused by sun exposure.³

UVB Rays

These powerful rays, which are partially absorbed by the ozone layer, mostly impact the surface of the skin and are the primary cause of sunburn. Because of the thinning of the ozone layer, the effects of UVB radiation will pose an increased threat until the layer is restored in approximately 50 years.



Penetration of UV Into the Skin

Are Some People Predisposed to Adverse Health Effects?

Everybody, regardless of race or ethnicity, is subject to the potential adverse effects of overexposure to the sun. Some people might be more vulnerable to certain conditions, however.

Skin Type

Skin type affects the degree to which some people burn and the time it takes them to burn.

The Food and Drug Administration (FDA) classifies skin type on a scale from 1 to 6.

Individuals with lower number skin types (1 and 2) have fair skin and tend to burn rapidly and more severely. Individuals with higher number skin types (5 and 6), though capable of burning, have darker skin and do not burn as easily.

¹ American Cancer Society, "Cancer Facts and Figures 1999."

² IARC Working Group (2001) Sunscreens (IARC Handbooks of Cancer Prevention, Vol. 5), Lyon, International Agency for Research on Cancer, pp. 23-52.

³ Taylor, C.R. et al, *Photoaging/ Photodamage and Photoprotection*, J Am Acad Dermatol, 1990; 22: 1-15.

⁴ Stern RS, Weinstein MC, Baker SG. Risk reduction for nonmelanoma skin cancer with childhood sunscreen use. *Arch Dermatol*. 1986; 122: 537-545.

^{5,6} American Academy of Pediatrics, *Ultraviolet Light: A Hazard to Children*, Pediatrics, 1999; 104: 328-333.

⁷ IARC Working Group (2001) Sunscreens (IARC Handbooks of Cancer Prevention, Vol. 5), Lyon, International Agency for Research on Cancer, pp. 148-149.



How Do Sunscreens Work?

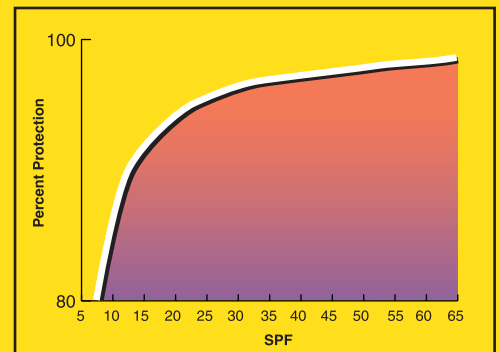
What Is the Sun Protection Factor (SPF)?

Sunscreens protect your skin by absorbing and/or reflecting UVA and UVB rays. The FDA requires that all sunscreens contain a Sun Protection Factor (SPF) label. The SPF reveals the relative amount of sunburn protection that a sunscreen can provide an average user (tested on skin types 1, 2, and 3) when correctly used.

Sunscreens with an SPF of at least 15 are recommended. You should be aware that an SPF of 30 is not twice as protective as an SPF of 15; rather, when properly used, an SPF of 15 protects the skin from 93 percent of UVB radiation, and an SPF 30 sunscreen provides 97 percent protection (see chart to the right).

Although the SPF ratings found on sunscreen packages apply mainly to UVB rays, many sunscreen manufacturers include ingredients that protect the skin from some UVA rays as well. **These “broad-spectrum” sunscreens are highly recommended.**

SPF vs. UVB protection



Effects Resulting From Sun Exposure?

The same individuals who are most likely to burn are also most vulnerable to skin cancer. Studies have shown that individuals with large numbers of freckles and moles also have a higher risk of developing skin cancer. Although individuals with higher-number skin types are less likely to develop skin cancer, they should still take action to protect their skin and eyes from overexposure to the sun. Some dark-skinned individuals can and do get skin cancer.

Additional factors

Certain diseases, such as lupus, can also make a person more sensitive to sun exposure. Some medications, such as antibiotics and antihistamines and even certain herbal remedies, can cause extra sensitivity to the sun's rays. Discuss these issues with your physician.



What Are the Active Ingredients in Sunscreen?

Chemical (Organic) Ingredients

Broad-spectrum sunscreens often contain a number of chemical ingredients that absorb UVA and UVB radiation. Many sunscreens contain UVA-absorbing **avobenzone** or a **benzophenone** (such as dioxibenzene, oxybenzone, or sulisobenzene), in addition to UVB-absorbing chemical ingredients (some of which also contribute to UVA protection). In rare cases, chemical ingredients cause skin reactions, including acne, burning, blisters, dryness, itching, rash, redness, stinging, swelling, and tightening of the skin. Consult a physician if these symptoms occur. These reactions are most commonly associated with para-aminobenzoic acid (PABA)-based sunscreens and those containing benzophenones. Some sunscreens also contain alcohol, fragrances, or preservatives, and should be avoided if you have skin allergies.

Physical (Inorganic) Ingredients

The physical compounds titanium dioxide and zinc oxide reflect, scatter, and absorb both UVA and UVB rays. These ingredients, produced through chemical processes, do not typically cause allergic reactions. Using new technology, the particle sizes of zinc oxide and titanium dioxide have been reduced, making them more transparent.

Summary

All of the previously mentioned chemical and physical ingredients have been approved by the FDA. The following table lists these ingredients and includes information regarding the type and amount of ray protection that they provide and their class.

| FDA Monograph Sunscreen Ingredients | Amount of Ray Protection | | Chemical (C) or Physical (P) |
|--|-----------------------------|-----|---------------------------------|
| | UVA | UVB | |
| Aminobenzoic acid (PABA) | ○ | ● | C |
| Avobenzone | ● | ◐ | C |
| Cinoxate | ◐ | ● | C |
| Dioxybenzone | ◐ | ● | C |
| Homosalate | ○ | ● | C |
| Menthyl anthranilate | ◐ | ● | C |
| Octocrylene | ◐ | ● | C |
| Octyl methoxycinnamate | ◐ | ● | C |
| Octyl salicylate | ○ | ● | C |
| Oxybenzone | ◐ | ● | C |
| Padimate O | ○ | ● | C |
| Phenylbenzimidazole | ○ | ● | C |
| Sulisobenzene | ◐ | ● | C |
| Titanium dioxide | ◐ | ● | P |
| Trolamine salicylate | ○ | ● | C |
| Zinc Oxide | ● | ● | P |

Protection Level: ● = extensive ◐ = considerable ◑ = limited ○ = minimal



How Can I Maximize My Sun Protection?

Because the active sunscreen ingredients will not usually block out the complete spectrum of UVA and UVB rays, sunscreens by themselves might not offer enough protection to prevent skin cancer and some of the other sun-related ailments. To thoroughly protect yourself, you should take as many of the following **action steps** as you can:

- Limit time in the strong, midday sun between 10 a.m. and 4 p.m.
- Seek shade.
- Wear sunglasses with 99-100 percent UVA and UVB protection.
- Wear tightly woven, long-sleeve clothing.
- Wear a wide brim hat.
- Apply broad-spectrum sunscreen rated SPF 15 or higher.

Can I Get a Tan Without the Sun?

Sunless tanners and bronzers are applied to the skin like a cream and can provide a temporary, artificial tan. The only color additive currently approved by FDA for this purpose is dihydroxyacetone (DHA). Application can be difficult, and areas of the skin can react differently, resulting in an uneven appearance.

Bronzers stain the skin temporarily, and they can generally be removed with soap and water. They may streak after application and can stain clothes. Sunless tanners and bronzers might not contain active sunscreen ingredients. Read their labels to find out if they provide any sun protection.



How Can I Protect My Kids?

Children

An estimated 80 percent of a person's sun exposure occurs before age 18.⁴ For this reason, it is important that children be protected from overexposure. Many parents do not properly apply sunscreen on their children. Sunscreen should be applied and reapplied to all exposed areas. Blistering sunburns during childhood significantly increase the risk of developing skin cancer later in life.⁵ Encourage your children to take all sun safety action steps.

Babies

Keep babies out of direct sunlight. The American Academy of Pediatrics recommends using sunscreen on infants for small areas such as the face and back of hands where protection from clothing is inadequate.⁶

SunWise School Program



In response to the serious public health threat raised by overexposure to UV radiation, EPA is working with schools and communities across the nation through the SunWise School Program. SunWise aims to teach children in elementary and middle school and their caregivers how to protect themselves from overexposure to the sun. For more information, go to the SunWise Web site at <<http://www.epa.gov/sunwise>>.

Is a Suntan Healthy?

There is no such thing as a healthy suntan. Any change in your natural skin color is a sign of skin damage. Every time your skin color changes after sun exposure, your risk of developing sun-related ailments increases.

Will Sun Protection Deprive Me of Vitamin D?

Sun exposure is not required to get a sufficient amount of vitamin D. Most people get an adequate amount of vitamin D in their diets. If you are concerned about not getting enough vitamin D, consider taking a multivitamin or drinking vitamin D-fortified milk daily.

Are Tanning Lotions Safe?

The FDA considers it an important public health issue that users of sun-tanning products be told when the products do not contain a sunscreen and thus, do not protect against sunburn or other harmful effects to the skin. The FDA requires that all such products carry the following label:

“Warning—This product does not contain a sunscreen and does not protect against sunburn. Repeated exposure of unprotected skin while tanning may increase the risk of skin aging, skin cancer, and other harmful effects to the skin even if you do not burn.”

(Title 21 of the Code of Federal Regulations, Section 740.19)



How Does the Outside Environment Influence Exposure?

The intensity of the sun's UV rays reaching the Earth's surface varies and should be considered when you plan outdoor activities. The National Weather Service issues the UV Index, a daily forecast of UV intensity.

| The UV Index | |
|--------------|----------------|
| Index Number | Exposure Level |
| 0 to 2 | Minimal |
| 3 to 4 | Low |
| 5 to 6 | Moderate |
| 7 to 9 | High |
| 10+ | Very High |

You can obtain your local UV Index forecast daily from local weather stations or newspapers. The U.S. Environmental Protection Agency's Web site provides daily local UV forecasts for your ZIP

code. The address is <<http://www.epa.gov/sunwise/uvindex.html>>. The higher the UV Index forecast, the

stronger the sun will be and the greater the need to follow all the sun protection action steps.

In general, UV strength is greatest from 10 a.m. to 4 p.m. during sunny summer days. Up to 80 percent of UV rays pass through clouds, however, meaning that sunburn is possible on cloudy days as well. UV exposure is greater at low latitudes (nearer to the equator) and/or high altitudes. Snow, water, and sand also increase sun exposure by reflecting incoming UV rays, making it especially important for skiers, boaters, and beachcombers to wear clothing and hats and apply sunscreen.

How Do I Apply Sunscreen?

Use a broad-spectrum sunscreen with an SPF rating of 15 or higher. Apply sunscreen 20 minutes before going out into the sun (or as directed by the manufacturer) to give it time to absorb into your skin. Apply it well and regularly—about 1 ounce every 2 hours (or as directed by the manufacturer)—and more often if you are swimming or perspiring. A small tube containing between 3 and 5 ounces of sunscreen might only be enough for one person during a day at the beach.

Do not forget about lips, ears, feet, hands, bald spots and the back of the neck. In addition, apply sunscreen to areas under bathing suit straps, necklaces, bracelets, and sunglasses. Keep sunscreen until the expiration date or for no more than 3 years, because the sunscreen ingredients might become less effective over time.

According to the FDA, "water resistant" sunscreens must maintain their SPFs after 40 minutes of water immersion, while "very water resistant" sunscreens must maintain their SPF after 80 minutes of water immersion. Either type of water-resistant sunscreen must be reapplied regularly, as heavy perspiration, water, and towel drying remove the sunscreen's protective layer.



Is Sunscreen Fail-Safe?

Using sunscreen does not mean it is safe to spend more time in the sun, especially when the UV Index is high. Although a sunscreen with an SPF of 30 offers protection from sunburn, it does not block all of the sun's damaging rays. In fact, there is no evidence that sunscreens protect you from malignant melanoma, the deadliest form of skin cancer. There is only limited evidence that sunscreens protect you from several other types of skin cancer.⁷ To fully protect yourself, remember to seek shade, avoid peak hours of sun exposure, and wear protective clothing in addition to applying sunscreen.