

SAN LUIS DERMATOLOGY AND LASER CLINIC
NEWSLETTER
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SUN PROTECTION

GENERAL:

Ultraviolet light is produced in a broad spectrum as the highest light energy produced by the sun. Ultraviolet C, at 250-290 nanometers, is just adjacent to xrays on the electromagnetic spectrum. Fortunately, very little UVC enters our atmosphere; the majority is filtered out by the ozone layer. UVB, at 290-320 nanometers, is the highest energy light to enter the atmosphere. These are the rays that sunburn you. Next is UVA or long ultraviolet. Although it has 1/400th the energy of UVB, it penetrates more deeply into the skin. Despite its low energy, it plays an important role in causing skin cancer for two reasons: 1) It is more difficult to block than UVB, and 2) When UVB is blocked there is no sunburn redness and pain. Thus, more UVA is absorbed.

Environmental factors greatly affect the amount and energy of ultraviolet.

- Water reflects about 50% of UV
- Snow reflects almost 100% of UV
- UV increases by 4% per 1000 feet of elevation
- Although the sun does not seem as intense on cloudy days, nearly two-thirds of UV penetrates through the thickest cloud cover
- 30% of the light we absorb is reflected: off of sand, water, buildings, and the ground. Thus a hat allows considerable UV damage.
- The top layer of the skin, the stratum corneum, is made up of stacks of dead skin cells. It is responsible for reflection, scattering, and absorption of 50% of the UV that strikes our skin surface. The stratum corneum is thicker and healthier in younger individuals and it is removed by many moisturizers containing alpha hydroxy acids (decreasing protection).

Ultraviolet causes skin cancer and melanoma by causing mutations in keratinocytes and melanocytes respectively. It appears that cancer is a two-step process: Initiation and promotion. Ultraviolet can supply both steps in some cases, while in others UV can provide one step and environmental factors such as chemical carcinogens or trauma can supply the other.

Skin cancers have a DNA signature that allows determination of whether they are caused by UVB or UVA. It was always thought that UVB caused more cancer because of its higher energy, but recently it has been shown that UVA may even be more important because it penetrates more deeply.

As if skin cancer were not enough reason for sun protection, it is important to remember that ultraviolet causes thinning of both epidermis and dermis, severe damage to the elastic

tissue and collagen in the dermis, and dilation and weakness of the blood vessels. This all results in lax, coarse, mottled, and wrinkled skin which is easily bruised and which we identify with the politically correct nomenclature of photo-damaged skin.

Because of the medical and esthetic problems associated with ultraviolet damage, sun protection has become an important part of nearly everyone's behavior.

SUNSCREENS AND SUN BLOCKS

I like to make a distinction between sunscreens and sun blocks.

SUNSCREENS are chemicals which absorb ultraviolet light. They go through a chemical reaction, being changed from one chemical to another. They can be very effective but have four drawbacks.

- The chemical change they undergo is not reversible, so they are used up in a finite amount of time on the skin, requiring reapplication.
- The new chemical formed may be hazardous in and of itself, or it may be metabolized in the skin or internally into something completely different. There is evidence that some sunscreen chemicals are metabolized into estrogens. Rinsed off the skin in the water, they enter the ecosystem and may alter the fertility of fish and amphibian populations. If you scuba dive in Cozumel, they will not allow you to wear any chemical sunscreens for just that reason.
- Some sunscreens cause intense allergies, some by themselves, and others, ironically, with the stimulus of ultraviolet. The sunscreen ingredient Oxybenzone is responsible for 25% of all photoallergies in the U.S.
- Sunscreens are notoriously poor blockers of UVA. Even the best ones are used up within an hour or two of UV exposure.

SUNBLOCKS are opaque blocking agents that reflect or scatter UV rays, thus preventing them from entering the skin. Most are composed of zinc oxide or titanium oxide. They are, in my opinion, far superior to sunscreens because they are not used up by the UV rays; they are not metabolized into dangerous chemicals; they do not cause allergies, and they are excellent blockers of UVA as well as UVB. They have their own set of problems.

- They are thick, white, and hard to apply. If not applied properly, the user looks like a mime.
- If the size of the particles is too small, so-called nano particles, they can actually be absorbed into the body and cause damage. Look for and avoid sunblocks with nano particles.

I am a strong advocate of sunblocks over sunscreens. When nothing else is available, I will wear sunscreens but, for the above reasons, I do not like them.

There are many good sunblocks. My personal preference is SHIELD 40 by Solbar. I have mastered the application of it so that my wife doesn't laugh at me for looking too white,

and I have never burned through it. It can be found on-line or your pharmacist will order it for you.

APPLICATION: Most people do not apply sunblocks (screens also) properly. They apply too close to actual sun exposure, do not apply enough, and they do not reapply in a timely manner or promptly after swimming.

Sunblocks should be applied twenty minutes before you want them to work. They should be rubbed in until they disappear, even zinc and titanium products. When they disappear, they have gotten down into the stratum corneum where they work maximally. Even the best blocks should be reapplied after four to six hours, and after thirty to sixty minutes in the water.

THERE ARE NO WATERPROOF SUNSCREENS. The FDA was going to make manufacturers strike that from their labeling, but it hasn't happened.

SUN PROTECTIVE CLOTHING: There are many outstanding lines of sun protective clothing. Since I ride horses in the hot California sun and often at altitude, I have had an opportunity to try many of them. My favorite is Coolibar. I like their styling, their fabrics, the Velcro tabs on shirt pockets that keep me from losing my chapstick and my knife, and I think they are better ventilated than most. Find them on line.