A Primer on Sunscreens

By Suzanne Patterson

It is a well-known fact that exposure to the sun's ultraviolet (UV) radiation can cause damage to human skin resulting in premature skin surface aging and wrinkling, and significantly raises the risk of skin cancer. To better understand sunscreens as a vital part of a skin care routine for protection some basic science about UV effect on skin should first be understood.

Facts About UV Radiation:

The sun produces an electromagnetic spectrum of solar radiation which consists of three types of light: infrared, visible light, and ultraviolet. Ultraviolet light, which is not visible to the human eye, emits radiation in three varying bands or wavelengths: UVA, UVB, and UVC. Very little of UVC gets past the ozone layer in the atmosphere and doesn't affect skin, however UVA and UVB radiate down to the earth's surface, and they are the most damaging to skin. The majority of radiation we receive comes from the UVA ray, and it is linked to skin conditions such as surface growths, discolorations, premature wrinkling, leathery texture complexion, and precursor conditions to skin cancers.

UVA is referred to as the "aging" light ray because of its longer wavelength and ability to reach beyond the epidermis (outer skin layer), and affect the dermis layer where collagen and elastin fiber bands are networked and new skin cells form. Because of the positional latitude of the United States the UVA ray is ten times more constant in the US than the UVB ray. The damaging effects of UVA radiation is silent, cumulative, and permanent and doesn't show up on the skin's surface until years later.

UVB is the "burning" shorter wavelength light ray and the radiation from UVB light is extremely powerful in its ability to burn the skin. UVB intensity varies upon the time of day, altitude, and season of the year, and is strongest from 10:00 AM to 2:00 PM, especially in higher altitudes where every 1,000 foot of altitude increases sun concentration by 4%. Depending on individual skin tone (how fair or dark) skin can begin to redden and show burning in as little as 10-15 minutes. Sunburned skin, and repeated burns, greatly increases the chance for skin cancers to develop later on.

Reflected Radiation:

Most people don't realize that sun radiation is still present during cloud cover or hazy days with the same ability to burn and damage skin. Surface areas such as water, snow, cement, or any surface that reflects light can reflect radiation back to your skin. UVA rays can even penetrate glass such as car and home windows, so it wise to assume that the sun's light rays are always a constant concern to skin protection.

How Sunscreens Work:

Active sunscreen ingredients are either chemical derived or a physical micronized formation. Chemical sunscreens work by absorbing radiation through the molecule

chain in the synthetic ingredient, and have been shown to be highly effective in blocking more UVB than UVA radiation when used alone. Physical sunscreens contain micron mineral particles that block and reflect light by scattering light rays. These sunscreens block UVA very well and UVB to a satisfactory degree so they are considered to be more "broad spectrum" protection if used alone.

Broad Spectrum Active Ingredients:

For effective UVB protection, look for any of these active ingredients in a broad spectrum sunscreen:

- Octisalate
- Octinoxate (highly effective UVB blocker)
- Homosalate
- Micronized Titanium dioxide

For effective UVA protection, look for any of these active ingredients in a broad spectrum sunscreen:

- Oxybenzone
- Micronized Titanium dioxide (highly effective UVA blocker)
- Micronized Zinc Oxide (highly effective UVA blocker)
- Avobenzone

Always make sure the phrases "broad spectrum sunscreen protection" or "UVA/UVB broad spectrum sunscreen protection" are stated on the package when purchasing sunscreen products. Although chemical sunscreens are effective protection, many people cannot tolerate them as the main active ingredient because of skin sensitivity, particularly with Avobenzone. Hybrid sunscreens were proven the most effective in clinical trials against both UVA/UVB because they contain the best of both a chemical and physical ingredient to provide maximum broad spectrum protection. This is especially important for sensitive and fair skinned individuals.

Durability:

A sunscreen product reaches a saturation point in its ability to absorb or reflect UV radiation so they must be reapplied periodically to skin to maintain consistency in its SPF (Sun Protection Factor) ability to protect skin. The SPF number is the time in minutes rating of the active ingredient's ability to maintain its UV protection before the early stages of burning begins. The FDA formulated an SPF rating calculated at the average amount of time skin begins to burn, which is 10 minutes. An SPF rating of 15 means 10 minutes multiplied by 15 SPF is approximate1y 50 minutes of protection from radiation damage before reapplication is necessary. A rating of 20 SPF times 10 minutes gives 200 minutes, and so on. Keep in mind that this is strictly a guideline only and your best protection is vigilance in sunscreen application.

The "blocking" ability of a sunscreen's SPF factor must also be taken into account for protection. For instance, the lower the SPF numbers the lower its strength to block the saturation of radiation at any given time. An SPF of 2 blocks up to about 45% of UV radiation, whereas an SPF of 28 blocks about 98%. Ratings higher than 30 do not offer any more blocking protection because there is still a small percentage of UV penetration to skin regardless of the greatest amount of active ingredient. This is a strong reason to keep vigilant about liberal sunscreen reapplication.

Wearability:

Sunscreen must also be reapplied frequently to maintain skin protection in exposure to external moisture conditions, such as swimming humidity, sweating, etc., as any kind of moisture can further reflect or intensify light rays on skin. No sunscreen product is 100% waterproof in wear, and the FDA has banned the use of the term “waterproof” in sunscreen labeling. However sunscreens that undergo strict FDA trials and meet the criterion are permitted the use of “water resistant” labeling. This simply means the product offers approximately 40 minutes of protection under moisture conditions, but again, this is just a guideline. Reapplication of sunscreen is simply a must for consistent protection when skin is exposed to prolonged moisture.

Application:

Sunscreens are available in direct and indirect forms, meaning a sun screen that is a stand alone product, or as an additive ingredient into a variety of makeup products. Sunscreen as an additive makeup ingredient is more of a “psychological sale” of a product by cosmetic companies than its actual ability to be an active UV blocking agent. It may say it contains a high SPF factor but the amount of the actual sunscreen ingredient is vastly minimal in the mix compared to a stand alone sunscreen product. The inherent nature of makeup is to migrate, separate, fade, or rub off, and there is most likely little chance of it being reapplied properly. This makes indirect forms a very poor choice for sufficient protection compared to a stand alone product.

The hybrid sunscreens on the market provide great choices for even the most sensitive skins, but no sunscreen ingredient is guaranteed to be 100% irritation or skin breakout free. The potential can be minimized by choosing products whose inert ingredients include antioxidants and skin soothers, and experimenting with products that work best for you.

A special note: If you are using a skin resurfacing agent, such as prescription or over the counter retinoids, hydroxy acids, or any other products of this sort, or have had dermatological procedures (lasers, chemical peels, etc.) then you are at a higher risk of sun damage because of an altered skin surface. It is very important that you are extra vigilant about total and continual UV protection for obvious reasons.

Some Points To Keep In Mind For Effective Sunscreen Application:

- Apply sunscreens liberally! Be generous in your coverage, and apply at least 10 to 15 minutes before you go outdoors so it has time to bond sufficiently with skin for maximum protection.

- It is a common misconception that using different products together containing sunscreen adds up the total SPF factor for coverage. For instance, adding an SPF 15 in a sunscreen moisturizer to an SPF 2 in a makeup product does not make your total coverage SPF 17. You would need to buy a single product that has SPF 17 to be sure you were getting the proper amount of rated protection.

- Many people believe darker skin tones are not susceptible to sunburn because they have a higher melanin content than fair skin does. UV radiation affects all skin tones! More melanin does provide a bit longer natural protective ability to remain unprotected than fair skin does before sun damage begins, but consider it a gamble. Darker skin tones often don't show the effects of burning right away so there is a false sense of security even though the damage is done. Being vigilant about sunscreen protection for all skin tones will prevent serious skin problems later on.

- UV radiation protection for children and babies is extremely important because of their sensitive developing skin, and they deserve the same vigilance in protection as adults. Don't be fooled by sunscreen product packaging that is marketed towards children, as all sunscreen products are required to be formulated to the same FDA standards. Any sunscreen of choice will work for all ages.

- The small but sun sensitive parts of the face are often neglected. The ears, lips, and neck get the same UV exposure as the rest of the body, and burning often goes unnoticed until damage is done. Make sure to extend your sunscreen application to these areas, and use a lip balm that offers good UV protection.

- Should you get a visible sunburn be sure to get treatment right away as a radiation burn continues to progress in skin damage sensitivity for as long as 12 to 18 hours after exposure has ended. Use cool water or aloe vera gel, or other proven cooling agents. Do not use ice as this can damage nerve endings or cause a complication of ice burn. Likewise, don't use heavy creams or ointments as it will cause the heat to intensify in feeling and may hinder healing. Most importantly, consult your doctor about ways to further reduce the inflammation and pain of sunburn.