

TerranearPMC Safety Share

Week of April 23, 2012- Protecting Ourselves from Ultra Violet Light

Winter is over and the days are longer. Soon guys will be walking the streets in T-shirts and shorts while females will be wearing as little as the law will allow (when Sonny Bono was mayor of Palm Springs, California, he introduced a law that banned women's thongs in public – it was voted in by the city council). Yet as comfortable or alluring as some of us may want to be, increasing the sun's exposure on our skin can be risky business. Natural sunlight contains ultraviolet (UV). UV is electromagnetic radiation (non-ionizing) where the wavelengths are shorter than visible light (violet being the color at the end of the visible light spectra for the shorter wavelengths). The shorter the wavelength, the greater the energy, so UV contains higher energy than wavelengths in the visible spectra, but less energy than those wavelengths classified as x-rays. Because UV falls outside the visible spectrum, the human eye cannot perceive them. When these high-energy wavelengths strike your skin, they generate free radicals and can also directly damage your DNA. Over the short term, this UV-induced damage can produce a painful burn; over the long term it causes premature aging of the skin, as well as millions of new cases of skin cancer each year.

There are three classifications of UV rays; UVA, UVB and UVC – listed in descending wavelength and increasing energy. As sunlight passes through the atmosphere, all UVC and approximately 90% of UVB radiation is absorbed by ozone, water vapor, oxygen and carbon dioxide. UVA radiation is less affected by the atmosphere. Therefore, the UV radiation reaching the Earth's surface is largely composed of UVA with a small amount of UVB. The shorter wavelengths, UVB rays, do not penetrate deeply into skin; they cause significant damage to DNA and are the primary cause of sunburn and skin cancer. The longer wavelength UVA rays penetrate the deeper layers of skin, where they produce free radicals. UVA exposure has been linked to premature aging of the skin and immunologic problems.

The human skin has natural defenses from UV exposures. Within the outer layer of the skin (the epidermis) melanin, is produced. This is a pigment and is the reason for the various skin colors among humans. The more melanin produced the darker one's skin. The photochemical properties of melanin make it an excellent photoprotectant. This is because it efficiently absorbs harmful UV-radiation and transforms the energy into heat, thus preventing indirect DNA damage that is responsible for the formation of malignant melanoma and other skin cancers. If the energy of the UV photon were not transformed into heat, then it would lead to the generation of free radicals or other harmful reactive chemical species (e.g. singlet oxygen, or hydroxyl radical).

The production of melanin is called melanogenesis and one of the mechanisms that stimulate melanogenesis occurs when DNA has been damaged by UVB-radiation. This results in the production of melanin and a delayed development of a tan. While this melanogenesis-based tan takes more time to develop, it is long-lasting.

We can protect ourselves from UV waves by wearing hats as well as light colored shirts and pants (dark colors absorb sun rays while light color reflect them). Of course, since the weather is warm, our clothes

should be made of a thin or light-weighted fabric. However clothes shouldn't be so thin so that they are see-through; such material does not adequately control sun exposure. Wear UV-absorbent shades. Sunglasses don't have to be expensive, but they should block 99 to 100 percent of UVA and UVB radiation. When possible, limit your exposure during the times of 10 am to 4 pm. This is when UV rays are most intense. If you're unsure about the sun's intensity, take the shadow test: If your shadow is shorter than you, the sun's rays are the day's strongest.

Sunscreen is also an excellent way to protect our skin. Sunscreen products act like a very thin bulletproof vest, stopping the UV photons (specific energy units) before they can reach the skin and inflict damage. It contains organic sunscreen molecules that absorb UV and inorganic pigments that also absorb UV while also scatter and reflect UV. To deliver a high level of protection, a sunscreen product must have sufficient quantities of these protective agents and it must have a certain physical consistency which allows the sunscreen to be applied evenly over the skin's varying features (cracks, bumps, curves, etc).

The term SPF that appears on sunscreen labels stands for Sun Protection Factor, but it is really a *sunburn* protection factor. Products with a higher SPF allow fewer of the photons that produce sunburn to strike the skin. In simple terms, you can view an SPF 10 sunscreen as allowing 10 out of every 100 photons to reach the skin and an SPF 20 product as allowing only 5 out of every 100 photons to reach the skin. Because sunburn is primarily a UVB effect, it is possible for a sunscreen product to deliver high SPF while allowing a significant percentage of the incident UVA photons to reach the skin (the cause of premature skin aging). To deliver true broad spectrum protection, products must also block a significant fraction of the UVA photons. Therefore, a proper sunscreen needs to block both UVA and UVB rays. Look for ingredients like zinc oxide or titanium oxide reflect; materials that are designed to scatter ultraviolet (UV) radiation as well as organic ingredients like octyl methoxycinnamate (OMC) or oxybenzone that absorb UV radiation and then dissipate it as heat (in the U.S., sunscreens are required to contain significant levels of zinc oxide, avobenzone or titanium dioxide).

Always choose and use a sunscreen that has a SPF 15 or higher, protects against both UVA and UVB, and is waterproof/sweat proof (note: there is no occupational standard regarding required SPFs). Sunscreen should be applied generously to all exposed skin – most people do not use enough sunscreen and therefore do not get the maximum protection. It should be reapplied every two hours and even more frequently if you are sweating, getting wet, or are in a windy climate. Always begin the application 30 minutes before going outside.

Children, especially infants are greatly susceptible to UV rays. Just one blistering sunburn in childhood more than doubles a person's chances of developing melanoma later in life. According to one US study, 54 percent of children become sunburned or tanned in their second summer versus 22 percent in their first. Parents need to be extra vigilant about sun protection all the time. Studies have indicated that many parents don't know the best ways to protect their young children. Infants under 6 months of age should be kept out of the sun – period! Their skin is too sensitive for sunscreen. An infant's skin possesses little melanin, and therefore, they are especially susceptible to the sun's damaging effects.

When one door closes, another opens; but we often look so long and so regretfully upon the closed door that we do not see the one which has opened for us – Alexander Graham Bell.