Scientific Sun Care: Ingredient Technology and Advanced Delivery Systems
by Dr. Claudia Aguirre (as seen in Dermascope Magazine)

The sun has an eternal allure for humans. Exposure to sunlight chemically changes our brain chemistry for the better, as a winter in Sweden or Seattle will demonstrate. And basking even for a few moments gives us a profound feeling of well-being through a boost in endorphins. It would seem like a foregone conclusion that we need to protect our skin from ultraviolet (UV) rays, every day, winter and summer, rain or shine. But the fact is most people do not. The incidence of skin cancer is up, not down, despite decades of public service information about the risks of UV radiation.

Concluding that misleading marketing and packaging claims by the manufacturers of sun protection products have been a major factor in poor consumer compliance with solar defense, the FDA recently changed the legally acceptable vocabulary for these products. Hopefully, this will result in more effective product use and a resulting lowering of skin cancer incidence.

Even though government agencies are putting work into regulating the fast-paced world of over-the-counter drugs in cosmetics, professional skin care is based on scientific research and sometimes makes changes faster than governmental rules. Professional products are sold with the added benefit of a thorough skin analysis and education from a professional skin care therapist. Therefore, these prescribed products afford the same level of sun protection as a drugstore sunscreen while maintaining a tailored approach to a client's specific skin concerns.

Scientific Sun Care

Unlike a generic sunscreen product, professional products accommodate the specific needs of the client, allowing them to apply sun protection while actively treating skin issues including skin aging, oiliness and sensitivity. As we know, many chemical sunscreens irritate genetically sensitive, sensitized or recently resurfaced skin, making physical sunscreens ideal for this skin type. For many years, researchers have understood that photoaging is multi-factorial, stemming not only from UVA and UVB rays, but also from free radical formation. More recently, the effects of infrared (IR) radiation have also surfaced as the new photoaging culprit. The past decade has shown that IR rays can penetrate deeply into the epidermis and dermis of the skin, increasing free radical formation, matrix metalloproteinase (MMP) production and subsequent skin aging. Although there are no direct filters against IR radiation as there are with UV, we can fight some of the detrimental effects of IR with antioxidants. Antioxidant supplementation is necessary to fight oxidative stress and resulting skin damage stemming from not only IR radiation, but also environmental pollution, UV, and even visible light. The problem with formulating with many antioxidants is their volatile and fragile chemical nature. Take vitamin C: this is a potent antioxidant with many benefits when taken orally or applied topically. But it is highly degraded by sunlight and oxygen, making it difficult to formulate into a stable and efficacious formula. This is where technological advances in delivery systems can make an immense difference.

Microencapsulation

Microencapsulation generally involves capturing a solid or liquid particle inside a microstructure. Products that use microencapsulated vitamins – like C, E or their derivatives – can effectively provide the necessary antioxidants to skin in a formula that is meant for exposure to UV, as in a sunscreen. This resolves the dilemma of protecting skin from UV, IR, pollution and the like while protecting it from free radical damage – all in a single formulation.

Liposomes are a special case of microencapsulation in that their outer structure is composed of lipids or oils. One specific type, known as oleosomes, is found naturally in various plants and seeds and provides a reservoir of energy and plant oils for the growing plant. Just like microcapsules can be loaded with antioxidants, these plant oleosomes can also be loaded with active substances such as sunscreens, providing both a means of delivery, as well as a stabilized environment for actives that may break down under normal conditions. An added benefit to using plant oleosomes in sunscreen formulations is that the levels of interfering emulsifiers can be decreased. When there are high levels of emulsifiers (which maintain the integrity of a formula), they diminish the activity of sunscreens, meaning more of the sunscreen actives must be used. This is especially important in formulating for sensitive skin, as the high levels of chemical sunscreens can be irritating to skin. With oleosomes, you can diminish the total level of sunscreens yet afford the same level of broad-spectrum protection as any other sunscreen. One extra benefit is that these oleosomes already come loaded with beneficial vitamin E for additional skin protection.

Although microencapsulation technology has been around for decades, it is advancing every day to provide formulators with a variety of options to deliver active ingredients in a safe and efficient way. But scientific sun care does not stop at preventing sun burn… inevitably people will sunburn and repairing the damage is just as important as preventing it.

After sun care

Even though it may only happen in a matter of minutes, sunburn is the skin's response to extreme UV exposure and indicates severe damage. Use gentle treatment and ingredients which calm inflammation, cool down the temperature and minimize oxidative damage. Perhaps the best known method of treating a sun burn is by using aloe vera gel on the skin. Science has shown that this age-old remedy does indeed work. The polysaccharides and other compounds found in aloe work together to reduce inflammation while promoting skin repair through various wound healing mechanisms. Aloe not only promotes repair, but also has antibacterial, antiviral, antifungal, and antioxidant properties.

Another symptom of sunburn is hyperalgesia, which is the heightened sensitivity of the skin as the result of intense UV exposure. Not only is skin in this condition sensitive to even the slightest pressure (such as the weight and texture of a light shirt) – the sunburned individual may experience sharp flashes of keen neural pain through the skin as the nerves recover from solar assault.

Although it may sound counterintuitive, hot spicy peppers can actually help with this increased sensitivity. Both capsaicin and sanshool, compounds which are present in two differing pepper species, are effective analgesics because they flood sensory neurons to the point of overload and temporary numbness. And this is a great relief for sunburned skin.

Antioxidants also play a role in post-sun repair. Potent antioxidant enzymes, like superoxide dismutases and catalases, can repair some of the UV damage. Plant extracts (including Japanese alder) can mimic enzymes to promote cellular repair. But just because some of the damage can be repaired does not mean it is okay to go out into the sun the next day for another blast! The skin is still trying to heal and so must be kept out of direct sunlight for a minimum of 72 hours.

Sun damage does not require a beach, a bikini, or a passport. Skin therapists need to educate themselves and prepare clients to offset the subtler, incremental damage with a range of daily defense tools that optimize sun protection while enhancing skin health.

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Questions and Answers: FDA announces new requirements for over-the-counter (OTC) sunscreen products marketed in the U.S. http://1.usa.gov/MFnBAv

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