

# added protection

By Ameann DeJohn

Enhanced protection and repair are the benefits of today's advanced sunscreen technology.



As the press often reminds us, ozone depletion is real. Up in the stratosphere, small amounts of ozone (a natural filter from damaging UVC rays in particular) are constantly being created by the action of sunlight and oxygen. At the same time, some of that ozone is broken down by natural processes, creating a delicate balance for the Earth's atmosphere. Unfortunately, careless human activity has been negatively affecting that natural balance for some time: Certain

manufactured substances such as chlorofluorocarbons and hydrochlorofluorocarbons have destroyed ozone faster than it's formed.

Why should this concern you as a day spa owner (other than as a human being living on this planet)? One problem of ozone depletion that directly affects your clients is that atmospheric protection from the sun's UV rays is becoming increasingly compromised, and this is detrimental to skin.

The most obvious solution is sunscreen use, something spa therapists have been recommending to clients for years. Thanks to advances introduced in technology and ingredients over the past few years, sunscreen's protective nature is being enhanced. In addition, manufacturers have added skincare ingredients designed to neutralize, and even repair, subsequent free-radical damage, making it easier than ever for you to deliver excellent results to your clients.

### Detecting Damage

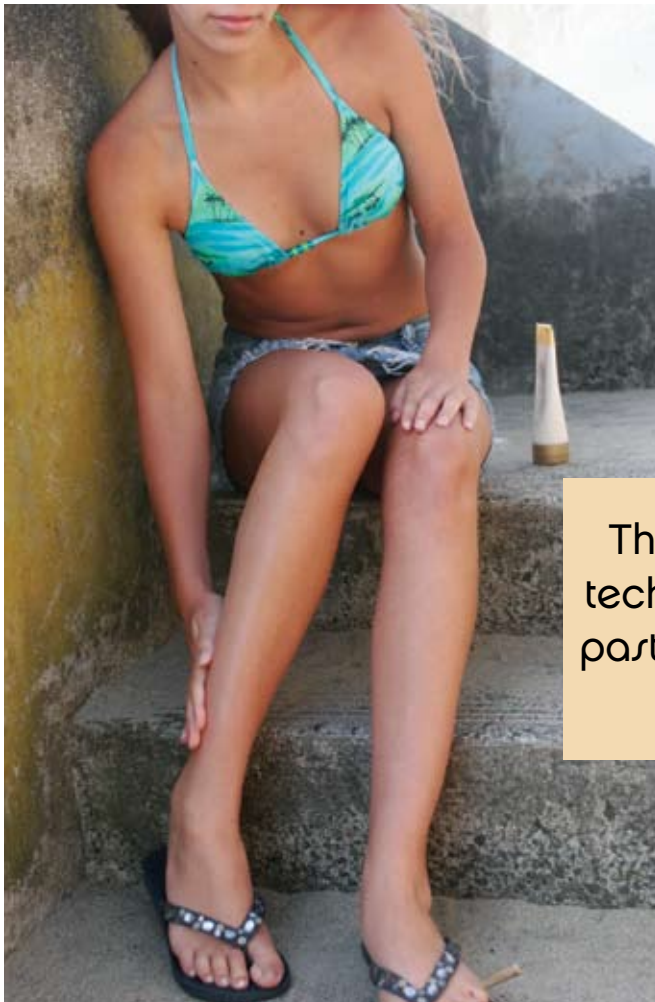
UV radiation of varying wavelengths prompts a number of well-documented reactions in the skin:

**UVB:** UVB rays (in the 290-315 nm wavelengths) are the strongest ultraviolet rays that actually, although only partially, reach the Earth's surface. (UVC rays are stronger, but can't penetrate

the atmosphere due to the ozone layer's protection; the stratosphere partially deflects a percentage of UVB rays.) UVB radiation is responsible for burning the skin—maximum erythema, or reddening, occurs at 308-311 nm—and can cause surface pigmentation and free-radical damage.

**UVA:** UVA rays (in the 315-400 nm range), while less powerful, penetrate deeper into the skin. UVA radiation is capable of tanning the skin with very weak reddening effects, and causing the deterioration of collagen and elastin. Regardless of the weather, UVA wavelengths are always present, and can cause DNA damage to cells deep within the skin, increasing the risk of certain types of skin cancer as well as hypo- and hyperpigmentation.

SPF ratings measure only the level of UVB protection afforded by a sunscreen. A product with an SPF 15 would allow you to stay in the sun 15 times longer than normal before burning. Although the public is quite familiar with the SPF rating system, it has only recently become aware of the need to protect against UVA radiation and to look for increased UVA protection. Currently, however, there's no agreed-upon standard to measure UVA protection—a fact so important that the U.S. Food and Drug Administration held off until recently on final revisions of its sunscreen monograph, which have been in the works since 1999, to get a better handle on changing UVA measurement technology and labeling requirements. That's why newer product science is looking to not only block UVA rays, but also help mitigate, and even reverse, the damage they do.



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### A Step Forward

Thankfully, new technologies are being developed that could shape our sun protection future. "We've made a number of critical formulation decisions based on emerging science and consumer UVA awareness," says Rob Trow, CEO of Environ Skin Care ([environ.co.za](http://environ.co.za)). "We've based our skincare

product development on the belief that today's formulations must have physical *and* chemical blockers, plus powerful antioxidants to combat the formation of free radicals. Also, UV filters must not contain particles or nanoencapsulate molecules that could carry chemical blockers deep into the skin."

Currently, most sunscreens work by containing ingredients that either:

- Are organic chemical compounds (chemical blocks) that work by absorbing UV rays and dispersing them as heat throughout the epidermal layers; examples include oxybenzone and avobenzone;
- Are opaque mineral materials (physical blocks), such as titanium dioxide and zinc oxide, that work on the skin's surface like millions of tiny mirrors to reflect ultraviolet radiation; or
- Are a combination of both, which is typically the best choice for broad-spectrum coverage.

"On the horizon, I see new, more effective formulas in terms of coverage, like true full-spectrum (UVA and UVB) products with ingredients that are suitable for all skin types," says Dr. Christian G. Jurist, national educational director for Cosmopro/Pevonia (cosmopro.com). "I also think that sunscreen products will last on the skin for a longer time without reapplication. This is one of the nuisances of sunscreen application; most people fail to use the correct amount and reapply it properly."

"Now, manufacturers can create sun protection products that are much more elegant and sophisticated," says Dr. Diana Howard, vice president of technological development for Dermalogica (dermalogica.com). "They've changed the nature of the raw ingredients and sunscreen actives to be more protective and better for the skin."

Mark Lees, president of Mark Lees Skin Care (marklees.com), notes that "manufacturers are coming up with better ways of keeping sunscreen on the skin with additions like polymer or suspension systems (boosters) that raise the SPF without



adding active ingredients. These work well for broad-spectrum (UVA and UVB) coverage in daily skincare products, and it also gives us formulas that are cosmetically pleasing for everyday use."

Some new formulations include ingredients that help counteract irritation commonly experienced when active ingredients in sunscreens penetrate the epidermis. According to Rebecca James Gadberry, president of YG Laboratories (yglabs.com), adding a combination of seawhip (a type of soft coral) and dipotassium glycyrrhizinate (an anti-inflammatory agent isolated from licorice root), to sunscreen formulations can help suspend irritating actives on the skin's surface.

Coral is taking a leading role in some of the newest sunscreen developments. The Australian Institute of Marine Science (AIMS) and an Australian sunscreen company recently reached an agreement to develop a coral sunscreen based on the discovery of a natural ultraviolet filtering compound found in reef corals. After developing a synthetic copy of the compound to avoid depleting natural marine resources, AIMS patented the use of the molecule. The sunscreen, code-named 855, is very hypoallergenic and has demonstrated great efficiency in absorbing and dissipating

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UVB radiation. Sunscreen 855 should be on the market within five years.

The only problem with plant-based developments is getting the technology recognized in the U.S. market, thanks to stringent FDA guidelines for over-the-counter drugs. “‘Natural’ sunscreens aren’t recognized as approved sunscreen actives by the FDA,” explains Sigrid Konrad, Babor’s (babor.com) vice president of training and education. “As a result, we manufacture our usual sunscreens to meet FDA standards, and then add natural ingredients like *Azadirachta indica* (neem), a plant used in the Amazon as a native sunscreen that also contains powerful antioxidants to neutralize the effects of the sun and the environment.”

### European Involvement

Some interesting sunscreen technology has come from the European scientific community. For instance, the European-born Optisol UV absorber is an inorganic active ingredient offering broad-spectrum UVA and UVB protection and serving as an effective free-radical scavenger. In addition, Optisol significantly enhances the photostability of cosmetic formulations that already contain actives and/or organic UV absorbers, minimizing free-radical generation caused by their instability.

The complexities of shepherding new ingredients through FDA approval channels can be daunting, however. L’Oréal’s patented sun protection ingredient ecamsule (also known as Mexoryl SX, which protects primarily

in the UVA range) has been used in Europe in La Roche-Posay’s sunscreen Anthelios SX. Since this product also contains two other actives that bring UVB protection, Anthelios SX in its current formulation has been approved for use in the United States by the FDA.

Ecamsule as a stand-alone ingredient, however, is *not* on the FDA’s approved list of sunscreen additives. Before L’Oréal could either sell the ingredient or use it in another formulation, the company would have to either hope for it to be added to the FDA’s approved sunscreen ingredient list, or submit an Abbreviated New Drug Application to the agency for approval. From there, the FDA would consider the ingredient’s range of protection, water resistance and UV stability when subject to irradiation—a process that might take years.

Luckily for the future of ecamsule, it does reasonably well on all fronts. Water resistance may be its biggest challenge because ecamsule must be neutralized in production to its salt form to be water soluble. This can make ecamsule difficult to use as an ingredient in water-resistant formulations. Ecamsule does have a good UV protection curve, peaking at 345 nm (slightly lower than avobenzone), and so can be used to boost an SPF factor. Ecamsule undergoes a 40% degradation in stability after being subjected to 10 minimum erythematous doses (MED) of UV radiation. (One MED is the minimum amount of radiation that will cause redness in fair skin.)

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In contrast, avobenzone loses 65% of its stability under the same MED dose (although there are ways to help increase avobenzone’s stability).

### **Undoing Damage**

Led by Kerry M. Hanson, senior research scientist, a research team at the Department of Chemistry at the University of California, Riverside, recently discovered that sunscreens containing any of the three ingredients octinoxate, oxybenzone and octocrylene have the potential to produce reactive oxygen species (ROS), free radicals that are linked to skin inflammation, stratum corneum damage and even some forms of cancer. “To safeguard against actually incurring free-radical damage from your sunscreen, make sure it contains a blend of antioxidants,” advises Gadberry. “Ingredients like green tea and vitamins C and E help neutralize ROS activity, but it’s important that the antioxidants themselves be stabilized for optimum protection. If you’re uncertain about the stability of the antioxidants in your sunscreen, ask the manufacturer for clinical data.”

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55% of free radicals that form,” says Howard. “However, Dr. Kerry Hanson at the University of Illinois found that using an SPF8 product plus vitamin E will reduce free radi-

cals by 88%; using an SPF8 with vitamins E and C will produce a 92% reduction.”

In an article printed in the December 2006 issue of *Cosmetic*

*Surgery Times*, Dr. David H. McDaniel foresees an aggressive approach to aging gracefully that will include DNA repair, and further suggests that the technology to individualize cosmeceutical skin-care therapy to a unique DNA and lifestyle is just around the corner. In the article, McDaniel states, “We need a radically new approach to protection against premature aging. The best protection should include an effective SPF, a potent antioxidant with a high EPF (environmental protection factor) and, for those who have already experienced strong sun exposure, the new DNA repair enzymes.”

Perhaps one of the most interesting pending advancements in DNA repair comes from the dermatology field. A prescription skin lotion containing Dimericine, a new drug from AGI Dermatics (agiderm.com), is currently waiting for FDA approval. Dimericine encapsulates the DNA repair enzyme T4 endonuclease V in a liposome engineered to deliver the enzyme into the cells of the skin, and it has been shown to actually reduce the incidence of premalignancies, as well as skin cancer. In clinical testing (reported in *The Lancet*) on xeroderma pigmentosum, a genetic disease predisposing sufferers to skin cancer, Dimericine reduced the incidence of premalignant actinic keratosis and basal cell carcinoma. Says Dr. Daniel B. Yarosh, AGI founder, “Soon DNA repair will be as commonplace as sunscreen is now in a total approach to skin health.” ●

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