Innovations in Photoprotection

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Photoprotection is important for all patients, yet compliance is disappointingly low. Sometimes innovative tactics are needed to get patients to adopt good health practices. The biggest challenge in encouraging the use of photoprotection is the delay between initial sun exposure and the onset of visible effects of photodamage. For instance, many adolescents continually use natural and artificial means of photoexposure because they claim they cannot see any problems with their skin, which certainly reflects the naivety of youth, but dermatologists need to be creative in their recommendations to encourage regular sun-avoidance behavior in patients of all ages. This article examines innovations in photoprotection that can be used to encourage compliance in patients who fail to heed traditional warnings. Creative photoprotection methods include sunscreen-containing moisturizers, facial powders, facial foundations, and hair conditioners.

Sunscreen-Containing Moisturizers

Perhaps the most important innovation for facial photoprotection compliance is the sunscreen-containing moisturizer, which has many different names in the marketplace, such as antiaging moisturizer, aftershave balm, pigment-lightening moisturizer, protective moisturizer, sun-shield moisturizer, wrinkle-preventing moisturizer, and more. All of the creative names for sunscreen in a moisturizing vehicle are ultimately too numerous to list; it also is interesting to note that each of these names focuses on a different benefit of photoprotection.

The only chemical that may decrease the appearance of photoaging is sunscreen. Recent guidance from the US Food and Drug Administration on sunscreens does allow claims to be made regarding photoaging and cancer prevention when sunscreen is used in combination with other sun protection strategies. Sunscreen also can prevent sun damage when the protective stratum corneum has been injured, such as after shaving, hence the new addition of sunscreen to a variety of aftershave products. The concept of protection from the sun is emphasized on products with terms such as *protective* and *shielding*. Regardless of the name given to these products, the ability to improve sunscreen use compliance by concomitantly improving skin texture and appearance is highly beneficial for dermatologists. Most sun is received through casual intermittent sun exposure, and these products can be excellent, but they are not designed to be used for photoprotection when skin is wet from water contact, sweating, or high humidity.

Sunscreen-containing moisturizers provide moisture by decreasing transepidermal water loss through the creation of an optimal environment for barrier repair. With occlusive agents such as dimethicone, petrolatum, and mineral oil, as well as humectants such as glycerin, propylene glycol, and hyaluronic acid, a therapeutic moisturizer can aid in the restoration of corneocyte and intercellular lipid organization. In addition, a sunscreen-containing moisturizer can deliver effective UVA and UVB photoprotection, simultaneously preventing sunburn, photoaging, and skin cancer. In products that also contain retinol, niacinamide, or green tea, additional antiaging benefits may be achieved. In short, sunscreen-containing moisturizers can be designed to moisturize the skin, repair the barrier, stop sunburn, prevent skin cancer, minimize photoaging, and potentially reverse oxidative insults, all in one bottle.

Most sunscreen-containing moisturizers are formulated with a sun protection factor (SPF) of 15 to 30. Products with SPF 15 can be designed with minimal UVA photoprotection and may or may not be labeled as broad spectrum. Formulations with SPF 30 or higher must contain both UVA and UVB photoprotective ingredients and should be recommended to patients. It is important to note that products with SPF 30 often are labeled with more robust antiaging claims supported by sun filters offering protection in the UVA range. These formulations usually contain a cocktail of inorganic and organic filters.

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Usually microfine zinc oxide is used as an inorganic filter in a small particle size to minimize skin whitening but also absorb both UVA and UVB radiation. Octyl methoxycinnamate commonly is used as an organic UVB filter, sometimes combined with octocrylene. Octocrylene is necessary to stabilize avobenzone, which is used as the organic UVB filter. Oxybenzone also is employed as both an organic UVB filter and a short-wavelength UVA filter; this combination of filters provides broad-spectrum photoprotection.

Although these products offer superior photoprotection, an issue that has arisen from increased use of SPF 30 moisturizers is an increased incidence of allergic contact dermatitis from oxybenzone and avobenzone. Over the last month, I have received 10 inquiries from other dermatologists regarding the rise in adverse effects from moisturizers, even those products labeled as appropriate for sensitive skin. Although I have not been able to patch test these patients, statistically the most obvious sensitizer in these formulations was oxybenzone. It can be difficult to patch test patients for every ingredient in complex modern sunscreen-containing moisturizers, but the best suggestion I can offer to these patients is to find formulations that do not contain oxybenzone. Sometimes it may be necessary for these patients to use a standard moisturizer with no SPF rating followed by a sunscreen that contains only zinc oxide and/or titanium dioxide. Another solution is to use a powder that provides sun protection through pigments rather than organic sun filters.

Facial Powders

For patients with sensitive skin or allergic contact dermatitis to organic filters, facial powder also is an effective method of photoprotection. A traditional moisturizer can be applied to the face followed by the powder, which is typically rubbed from a compressed cake compact. An underlying moisturizer provides a nice base for the powder and increases adherence to the skin, avoiding the problem of easy removal because it can dust off as easily as it dusts on, which can give some unreliability. The photoprotective properties of facial powders come from kaolin and pigments such as iron oxide that camouflage the underlying skin and serve as inorganic sun filters. Some newer facial powders actually list an SPF rating on the package. These products may contain an increased amount of zinc oxide or tiny spheres that contain moisturizing ingredients and organic filters. This form of powder is not sold in a pressed compact but rather comes loose in a plastic cylindrical jar with a brush attached to one end. The powder sifts down onto the brush during application and is deposited across the surface of the skin. These powders, which also can double as facial foundations, have higher SPF ratings, but application of a thick even film of pigment is required to achieve the labeled SPF. A variety of SPF-rated powders can be purchased by patients through mass merchandisers, but there also is a private-label line sold exclusively to dermatologists for resale.

Applying a facial powder over a sunscreen-containing moisturizer or traditional sunscreen also can boost the SPF of the product. This combination may be necessary for patients who are extremely photosensitive, such as patients with polymorphous light eruption and discoid or systemic lupus erythematosus. An effective regimen might include the application of a sunscreen-containing moisturizer followed by a traditional sunscreen, then finishing with an SPF-containing facial powder. Many patients are mistaken, however, in thinking that adding the SPF of each product (in this case, SPF 30 for each) would produce an SPF of 90. The SPF of this combination would still be 30, but 3 methods of photoprotection are more likely to result in achieving the labeled SPF of 30. In practice, most patients who use an SPF 30 product will only achieve approximately 50% of the total protection, yielding an SPF of 15. Another method for increasing SPF in highly photosensitive patients is to add another cosmetic such as a facial foundation.

Facial Foundations

Facial foundations also can be helpful in encouraging sun-protection compliance. There are 4 basic formulations: oil-based, water-based, oil-free, and water-free facial foundations. The most popular facial foundations are liquid, oil-in-water emulsions that contain a small amount of oil in which the pigment is emulsified with a relatively large amount of water. The primary emulsifier usually is a soap, such as triethanolamine, or a nonionic surfactant; the secondary emulsifier, present in a smaller quantity, usually is glyceryl stearate or propylene glycol stearate.

Facial foundations are designed to color, blend, and camouflage the underlying skin to create the illusion of a perfect complexion. The extent to which a foundation conceals or covers the underlying skin is known as coverage. Higher coverage products deliver better photoprotection, while lower coverage products deliver less photoprotection. The photoprotective elements in facial foundations are inorganic filters, most commonly titanium dioxide, zinc oxide, talc, kaolin, and precipitated chalk.

Sheer-coverage foundations with a minimal amount of titanium dioxide are almost transparent, with an SPF of approximately 2, while moderate-coverage foundations

are translucent and have an approximate SPF of 4 to 5. Thick waterproof cream foundations that are used for camouflage or postsurgical purposes completely obscure the underlying skin and have an unlimited SPF because they function as a total physical sunblock. For patients with severe photosensitive facial skin disease, these waterproof cream foundations offer superior photoprotection. In addition to the normal photoprotective constituents of a facial foundation, other inorganic and organic filters that have been previously discussed also can be added. Selecting the proper mixture of sunscreen filters in a facial foundation is the key to achieving superior photoprotection and aesthetics while offering a high, broad-spectrum SPF.

Hair Conditioners

Sunscreen filters also are finding their way into hair care products that claim to prevent color fading. Protecting hair from UV exposure improves color purity and retention, lengthening the time between applying hair dyes, which is a positive trend in dermatology, as it reinforces our sun-safe message to patients. However, symptoms of hair aging (eg, gray hair, reduced hair count) cannot be improved. Hair is a complex nonliving structure with an outer cuticle that provides a hard protective barrier for the inner cortex. The cortex is composed of fibrillar proteins that are responsible for the mechanical strength of the hair shaft. Sunlight can damage the strength of the hair shaft by increasing the scission of the cystine disulfide bonds and producing oxymelanin, an oxidative photodegradation product of eumelanin.

A new product in the hair care market is the sheen spray, which can be applied to towel dried or dry hair as a nonaerosol spray. These sprays contain UVA sunscreen filters and preserve the cosmetic appearance of hair, but no SPF can be placed on these products because there is no government-established way of determining an SPF rating for a hair care product. As a result, no photoprotective claims can be made. Instead, claims for these sprays are based on prevention of color fading and increased sheen, which are characteristics of healthy hair. The sheen sprays list no active ingredients, similar to sunscreens that are considered over-the-counter drugs, and are true cosmetics, but they can be important in improving hair appearance. For patients with outdoor lifestyles, dermatologists can mention that use of this type of hair photoprotection can improve hair appearance.

Summary

Sunscreen filters are finding their way into many skin and hair care products. This multifunctional approach to product development is an excellent tactic for increasing photoprotection compliance in patients. Innovations in photoprotection are certainly helping promote the sun-safe message of dermatology.

Suggested Readings

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