

# Sunscreen Use in the Treatment of Melasma

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Melasma is a recurrent skin disorder characterized by hyperpigmentation due to melanocytic dysfunction. Melasma can have a negative psychological impact on patients, which significantly affects their self-esteem. Melasma treatments that have temporary effects leave patients with unsatisfactory results. Using a prescription depigmenting agent in combination with a retinoid often will improve melasma symptoms. In addition, a maintenance regimen should be used to prevent recurrence of lesions. Although many maintenance therapies are available, proper sunscreen protection is vital to prevent lesion recurrence. When selecting a sunscreen, it is important to choose one that contains both UVA and UVB filters. Frequent application of sunscreen to exposed areas is necessary during intense sun exposure. Additionally, patients need to be educated about the hazards of both UVA and UVB exposure.

**M**elasma, a localized hyperpigmentation occurring predominately on the face and neck, affects millions of people worldwide. This condition is observed more often in women, especially during the second, third, and fourth decade of life. The causes of melasma include sun exposure, genetic inheritance, and hormones such as estrogen. Melasma is caused by increased melanin production. Melanin is produced by melanocytes packaged in vesicles known as *melanosomes*. The melanosomes are transferred to keratinocytes in a mechanism that is dependent on the protease-activated receptor 2.

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## TREATMENTS FOR MELASMA

In the past, melasma treatments have focused on inhibiting tyrosinase, the rate-limiting enzyme necessary for melanin production. Depigmenting agents block tyrosinase, which results in decreased skin pigmentation. These agents, though temporarily effective, often fail to offer long-term protection for most patients with melasma. The most effective commonly used depigmenting agents include hydroquinone, kojic acid, glycolic acid,<sup>1</sup> cucumber extract, licorice extract, and vitamin C. Using these ingredients in combination has become popular, and many prescription and over-the-counter products containing various combinations of these ingredients currently are available. Hydroquinone, the most effective of the skin lightening agents, is available over-the-counter in strengths of 2% or less and by prescription in strengths of 4%. Hydroquinone is believed to disturb melanosome structure, which leads to full melanocytic degradation; however, keratinocytes show no injury. Adverse effects of hydroquinone include irritant and contact dermatitis. However, these effects occur only in patients treated with formulations containing greater than 4% concentrations of hydroquinone.<sup>2</sup> Pharmacies can custom formulate skin

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creams containing hydroquinone into strengths of up to 12%. Although products containing greater than 4% concentrations of hydroquinone are more effective, they also are associated with a higher incidence of side effects.

In 1975, Kligman and Willis<sup>3</sup> described the utility of combining hydroquinone with tretinoin and a mild steroid. Dermatologists wrote recipes for formulations using various strengths of hydroquinone, tretinoin, and a steroid until a prescription product containing these ingredients was approved by the US Food and Drug Administration (FDA) for the treatment of melasma. This combination product (Tri-Luma<sup>®</sup> Cream) was shown to improve melasma in 75% of patients after 8 weeks of nightly use. Morning application of a depigmenting agent containing sunscreen, such as Claripel<sup>™</sup> Cream or Glyquin<sup>®</sup> Cream, can hasten clearing of hyperpigmented lesions when used in combination with Tri-Luma Cream. In addition, skin care products, such as cleansers and moisturizers, that contain exfoliating agents and depigmenting agents may contribute to the efficacy of the aforementioned prescription products.

### SUNSCREEN USE IN MELASMA TREATMENT

Despite the many treatment options available, it seems that patients with melasma do not experience prolonged improvement unless treatment is combined with the use of a sunscreen, especially one that filters UVA radiation. Sunlight is one of the key causative factors in the increase of melanocytes seen in melasma. UV light causes an augmented synthesis of melanosomes; exposure to UV irradiation leads to the hyperfunction of melanosomes and thus to dermal skin damage.<sup>1</sup> In a study by Vázquez and Sánchez,<sup>4</sup> 26 (96.3%) of 27 participants who used a broad-spectrum sunscreen showed improvement versus 21 (80.8%) of 26 participants who used its vehicle, suggesting that the daily sunscreen use is necessary for improving melasma.

Many people with melasma are unaware of the damaging effects of sun exposure to unprotected skin. In addition, many do not know that UVA light is able to penetrate glass windows, indicating a need for indoor protection. Educating patients with melasma about UVA rays and their ability to penetrate glass is vital for a successful treatment outcome. In contrast, most patients with melasma recognize that UVB light causes damage to their skin. UVB light is the leading cause of sunburn, which usually starts within 24 to 48 hours after exposure to the sun.<sup>5</sup> Once their skin turns red or tan, patients realize that they have received sun exposure. In fact, erythema and tanning from UVB radiation are so predictable that UVB light is used to determine the sun protection factor of sunscreens. Sensitivity to UV wavelengths can

be measured individually by the minimal erythema dose, which is the smallest dose of UVB radiation that produces a detectable erythema 24 hours after sun exposure.<sup>5</sup> UVA radiation, however, has more subtle effects. Because UVA light does not cause rapid reddening and tanning of the skin, patients often are unaware of their exposure to it. Nevertheless, UVA radiation can cause deleterious effects to the skin (such as photoaging) and worsens melasma.

### PATIENT EDUCATION

Informing patients about the risks of UV light exposure is essential for the prevention of hyperpigmentary disorders. Patients should be informed that sun protection is necessary throughout the day, even if they do not plan to be outdoors. Most patients are under the impression that UVB rays are less intense before 10 AM and after 3 PM and have been taught to avoid sun exposure during these peak hours. Most people do not realize that UVA light exposure is constant and occurs throughout the day.

After patients have been informed about the dangers of UVA radiation, they should be counseled regarding sunscreen selection. In the United States, no information about UVA radiation appears on sunscreen labels; only information about UVB radiation protection is included. The reproducibility of the results of testing sun protection factors has been an obstacle in the labeling of UVA light values on sunscreen products. As a result, patients have no way of knowing the level of UVA protection offered by the sunscreen they purchase.

When possible, patients with melasma should be given a list of acceptable sunscreens or sunscreen ingredients to ensure that they are getting sufficient photoprotection (Table). Sunscreen products have either chemical agents, which absorb UV energy, or physical blocking agents, which reflect and scatter UV light.<sup>6</sup>

### PHYSICAL SUNSCREENS

Physical sunscreens block UVA and UVB light. Many people with sensitive skin prefer physical sunscreens because, unlike chemical sunscreens, they are not associated with allergic reactions. Common ingredients found in physical sunscreens are titanium oxide, zinc oxide, and iron oxide. Physical sunscreens initially were thought to be safer than their organic counterparts. The addition of iron oxide also increased the photoprotective ability of this type of sunscreen to include UVA and visible light.<sup>7</sup> In the past, physical sunscreens were white, thick, and aesthetically unpleasing to consumers. Subsequently, micronized preparations became available that are less opaque and more cosmetically elegant. However, even these micronized sunscreens can look white or violet on darker skin types; therefore, they are

## Sunscreen Products and Their Role in Photoprotection

Product Name	Coverage
<b>Bain de Soleil®</b>	
All Day For Kids SPF 30 with titanium dioxide for normal to oily skin	UVA protection
Mademoiselle Sunblock SPF 15 and SPF 30 with titanium dioxide for normal to oily skin	UVA protection
<b>Coppertone</b>	
Shade UVA Guard™ SPF 15 and SPF 30 for normal to dry skin	Avobenzene-based UVA protection
<b>Dermazone Solutions</b>	
LyphaZome® Moisturizing Sunscreen MAX SPF 29	Avobenzene-based UVA protection
<b>L'Oreal</b>	
Ombrelle Lotion SPF 15 and SPF 30	Avobenzene-based UVA protection
<b>La Roche-Posay</b>	
Anthelios XL Crème SPF 60	UVA/UVB protection containing Mexoryl SX and Mexoryl XL
<b>Lancôme</b>	
Sôleil Expert Sun Care® Face and Body Lotion With Pure Vitamin E SPF 15 and SPF 25	Avobenzene-based UVA protection
Sôleil Expert Sun Care® SPF 15 Water-Light Body Spray With Pure Vitamin E for normal to dry skin	Avobenzene-based UVA protection
<b>SkinCeuticals</b>	
Sport UV Defense SPF 45	Contains 4.5% micronized zinc oxide
<b>Westwood-Squibb</b>	
PreSun® Ultra Clear Gel SPF 30	Avobenzene-based UVA protection

often formulated with a color foundation to mask these undesirable colors.

### CHEMICAL SUNSCREENS

Chemical sunscreens are composed of organic chemicals that absorb UVB or UVA substances and can be used in combination with physical sunscreens. Chemical sunscreens

act as filters by absorbing and reflecting UV radiation from the epidermis. These sunscreens can cause allergic reactions in susceptible individuals and are often soluble in oil, which makes the formulations greasy.

Many UVB-absorbing sunscreen ingredients are on the market, including paraaminobenzoic acid, a substance that does not have good water solubility. Cinnamates

have replaced paraaminobenzoic acid derivatives, which have acquired a negative reputation with the public because of their relationship to allergic reactions. Cinnamates such as octocrylene are used to improve the sunscreen's water resistance and the photostability of dibenzoylmethanes.<sup>7</sup> Salicylates increase the amount of UVB coverage in sunscreens. Although other UV filters are soluble in oil, phenylbenzimidazole sulfuric acid is water soluble and offers protection against UVB exposure. This ingredient is used to produce sunscreens with decreased oiliness. Octocrylene is another popular UVB-blocking agent that often is used in conjunction with UVA-blocking ingredients.

By comparison, fewer UVA-absorbing sunscreens are available on the US market. Benzophenones are the most commonly used chemical UVA blocking agents. Oxybenzone, a benzophenone that is commonly used in sunscreens, has been known to cause allergic reactions.<sup>8</sup> Most sunscreens with UVA filters protect against short-wave UVA light; however, sunscreens containing avobenzone (Parsol<sup>®</sup> 1789), can block longer waves of UVA light. Sunscreen formulations containing avobenzone provide the maximum UVA protection of those available on the US market. Unfortunately, avobenzone also has been known to cause photoallergic dermatitis reactions.<sup>9</sup> In addition, some patients experience stinging upon application of sunscreens containing this agent. The newer UVA light-absorbing agents Mexoryl SX and Mexoryl XL have not yet been approved by the FDA for use in the United States, though they are used widely throughout Europe and Latin America. These ingredients represent a major advance in sun protection because they can absorb and reflect a larger range of UVA rays than other sunscreen agents. For example, Mexoryl SX filters UVA rays in 320- and 360-nm range and Mexoryl XL effectively blocks both UVA and UVB rays. The FDA has been considering the approval of Mexoryl SX in the United States for more than 8 years and it is believed that this approval is imminent. However, it will be much longer before Mexoryl XL is approved. An effective sunscreen available outside of the United States contains a mixture of octocrylene, Mexoryl SX, Mexoryl XL, and avobenzone. The product, known as *Anthelios XL*, blocks a broad range of UVA and UVB rays, including those in the 290- to 380-nm range.

In addition to using the correct sunscreen, patients should be educated about the amount of sunscreen to

use. It has been found that many patients do not apply the proper amount of sunscreen necessary for optimal photoprotection. Studies show that most people apply one quarter of the necessary amount of sunscreen.<sup>10</sup> This is especially true for facial sunscreens that are greasy and cosmetically unappealing. Also, many people are not aware that sunscreens should be applied 30 minutes prior to sun exposure to achieve the best results.

## CONCLUSION

Melasma can cause psychological trauma and low self-esteem in affected patients. Many therapies are available, but proper sunscreen protection is vital to prevent recurrence. Finding an effective sunscreen for everyday use can be difficult, and selecting a suitable product can cause much frustration in patients searching for a solution to their problem. When selecting a sunscreen, it is important to choose one containing both UVA and UVB filters. Frequent application is necessary during intense sun exposure. Patients should be instructed to wear sunscreen indoors, while driving, and at work. Because even the best sunscreen does not offer 100% protection from UV rays, sun avoidance is necessary. Patients with melasma should be psychologically prepared for recurrence of lesions, even with treatment and routine sunscreen use.

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