

Understanding Moisturizers: A Hierarchical Approach

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The tremendous variety of moisturizers that are currently available in the marketplace makes product selection bewildering for both dermatologists and patients. When examined closely, each moisturizer appears more inviting than the next one. Whereas moisturizer A makes the skin smoother and more radiant, moisturizer B promises to minimize fine facial lines. What should patients do if they desire both smooth skin and wrinkle reduction? Do patients need to purchase both moisturizers? Of course, some patients also need to camouflage dyspigmentation, as well as find a moisturizer that contains the newest beneficial antioxidant. One solution is to apply 4 moisturizers to the face to ensure that no ingredients are missed. However, 4 moisturizing preparations applied to the face might simultaneously produce a strange-smelling, sticky substance; therefore, what is the solution to this dilemma?

It is critical for dermatologists to recognize that whereas many moisturizers available for purchase differ subtly, there are some basic functions that moisturizers provide that can be easily organized into 4 categories. These categories are summarized in Table 1, forming a hierarchical organization for moisturizers. I have termed it a hierarchical organization because it lists the properties of moisturizers from basic to most complex; least expensive to most expensive; unsophisticated to sophisticated in terms of formulation; and oldest to newest. A discussion of this hierarchy should help dermatologists better unravel confusion in the moisturizer market.

Achieving Smooth, Soft Skin

The most basic need that a consumer hopes a moisturizer will achieve is smooth, soft skin, and currently, all moisturizers in the marketplace accomplish this goal. After applying a sample of moisturizer to a patient's hand, their immediate inclination is to see how the product changes

the tactile properties of the skin. Most dermatologists have been confronted by drug company representatives who want to apply new topical drug formulations to their hands; however, dermatologists can only assess the tactile properties of the product.

Do the tactile properties of moisturizers translate into better skin functioning? The answer is no because the result of smooth, soft skin is an assessment of the organization of the corneocytes on the skin's surface. As the intercellular lipids are removed, the edges of the corneocytes fold, which creates an irregular skin surface. This irregular surface feels rough when stroked because of increased skin friction. Emollients, which are thin, oily substances, can deposit between the desquamating corneocytes and function like glue to adhere the corneocytes back to the skin's surface, thereby decreasing friction and creating the feel of smooth, soft skin that is desired by patients. Table 2 lists some of the commonly used emollients.

It is important to separate emolliency from moisturization. Emollients smooth down scaly skin, but they do not necessarily increase the water content of the skin. Moisturizers that sell for less than \$5 for a 16-oz formulation are mainly emollients. Most moisturizers are emollients, but not all emollients are moisturizers. As can be seen from Table 2, emollients are bifunctional. Typically, it is the concentration and number of ingredients that separates a moisturizer from an emollient. Lower-priced moisturizers, which are typically lotions, contain water

TABLE 1

Hierarchical Organization for Moisturizers

- To produce the feel of smooth, soft skin
- To increase skin hydration
- To improve the appearance of the skin
- To deliver cosmeceutical ingredients to the skin

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TABLE 2

Emollients for Smooth, Soft Skin

- **Silicone:** dimethicone, cyclomethicone
- **Vegetable oils:** grape seed, borage, jojoba, sesame seed
- **Alcohols:** cetyl alcohol, stearyl alcohol
- **Petrolatum derivatives:** petrolatum, mineral oil

as the first ingredient. The water delivers the emollients to the skin's surface and then evaporates. This type of moisturizer is met with high consumer enthusiasm because it leaves the skin feeling smooth and soft without a greasy film; however, these moisturizers may not optimally increase skin hydration. Patients who use this type of moisturizer will note that frequent applications are required because the emollient effect is temporary. Many lotions marketed to teenagers, both male and female, and women that contain high concentrations of fragrances have a temporary effect as well.

Increasing Skin Hydration

Moisturizers that are medically relevant increase skin hydration, improve the skin's tactile properties, and contain the same ingredients listed in Table 2, but with a greater variety and in higher concentrations. Products that increase skin hydration will leave behind a more noticeable film because it is the film that creates an artificial barrier. Most moisturizers function by placing a water-impermeable film over the skin's surface, which decreases water evaporation from the skin to an atmosphere of lower humidity. It is important to note that moisturizers do not moisturize the skin. In the strictest sense, the term *moisturizer* is a misnomer because moisturizers do not add water to the skin. Any water found in a moisturizer formulation is a vehicle that evaporates, which may dry the skin further without enhancing the water content of the skin. This explains why frequent applications of moisturizers that are intended to function as emollients will further damage xerotic skin due to repeated wetting and drying of the skin's surface.

Moisturizers that hydrate the skin function by decreasing transepidermal water loss, as mentioned previously, and by attracting water to the dehydrated stratum corneum and epidermis. Substances that reduce transepidermal water loss are oily occlusive substances, such as

petrolatum, mineral oil, dimethicone, and cyclomethicone. Substances that attract water to the skin are known as humectants, such as glycerin, sorbitol, propylene glycol, hyaluronic acid, sodium pyrrolidone carboxylic acid, and proteins. The best moisturizers that deliver skin hydration will contain both occlusive and humectant ingredients. The sum of these skin effects results in an environment that is optimal for barrier repair. In short, moisturizers do not moisturize the skin, but rather facilitate barrier repair by encouraging the natural restorative process.

Skin hydration can also result in decreased wrinkle depth, which creates the appearance of more youthful skin. Wrinkles resulting from dehydration, most common around the eyes and upper cheeks, may benefit from the application of a moisturizer that contains occlusive and humectant ingredients. Even though wrinkle reduction may appear to be a functional benefit, it is a result of increased skin hydration that will be temporary unless barrier repair of the skin occurs.

Improving the Appearance of Skin

Emolliency and skin hydration are 2 basic needs of a moisturizer, but improving the appearance of skin is an additional requirement for products that function in the realm of appearance enhancement. The skin's appearance can be enhanced by the methods presented in Table 3. With advancing age, the even distribution of melanin, hemoglobin, and collagen becomes more irregular. Products that can deliver a pigmented film to the skin's surface or enhance light reflection from the skin's surface may improve the appearance of the skin. Liquid, cream, and cream-to-powder facial foundations are moisturizers that contain talc and iron oxide in order to camouflage the underlying skin and spread pigment particles evenly over the skin's surface, as well as increase skin hydration, thereby leaving the skin smooth and soft.

Another strategy for improvement of the skin's appearance is to stain the corneocytes brown, which is the

TABLE 3

Methods for Enhancing the Skin

- Create a temporary, colored layer on top of the skin's surface
- Place a semipermanent stain on the corneocytes
- Increase reflection from the skin's surface with light-reflecting particles, such as mica

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function of progressive self-tanning creams. Products with a low concentration of dihydroxyacetone bind to the protein of the stratum corneum in order to create melanoidins that have a brown color. With each application, the depth of the brown color increases, giving the skin a tanned appearance that camouflages underlying pigment irregularities. This brown color can be considered semipermanent and will last for 1 to 2 weeks. The moisturizing vehicle increases skin hydration while delivering dihydroxyacetone to the skin's surface and fulfilling multiple functions.

Lastly, the appearance of the skin can also be improved by applying a film of light-reflective particles to the skin's surface. The most popular products that contain light-reflective particles are moisturizing mineral makeup foundations. Mineral makeup facial foundations have a high concentration of mica, which reflects light. Amongst the ground-up pigments are tiny spheres containing moisturizing ingredients, which allow the powder to adhere to the skin's surface. Mineral makeup foundations provide minimal moisturization, but excellent emolliency and moderate skin camouflage.

Delivering Cosmeceuticals to the Skin

The most sophisticated and expensive moisturizers are modern and deliver emolliency, moisturization, an improvement in appearance, and cosmeceutical ingredients to the skin's surface, as well as possess the ability to repair the skin's barrier, increase skin hydration, and improve the functioning of the skin. The moisturizing vehicle serves as a carrier for active agents, transporting

them to the skin's surface. Once on the skin's surface, the active agent must reach the proper skin destination in an active form with the ability to separate from the vehicle carrier. This is certainly a tall order for any skin care product; therefore, do these products actually achieve their goal? Many of them are extremely well-formulated moisturizers and contain cosmeceutical ingredients added to distinguish them from other products, or to allow expanded marketing claims. This is the area in which growth will occur in the moisturizer market.

The delivery of cosmeceuticals and the claims that can be made are hampered by the current classification of cosmeceutical moisturizers as cosmetics in the United States. Japan has addressed this issue by creating a category of quasi-drugs. Change is unlikely to be forthcoming in the United States because more pressing issues of drug regulation remain before the US Food and Drug Administration. Nevertheless, cosmeceuticals represent an important moisturizer category to watch for in the future.

Summary

The plethora of moisturizers in the marketplace can be categorized based on their ability to deliver a variety of skin benefits. These benefits can be summarized as smooth, soft skin, increased skin hydration, an enhanced appearance of the skin, and delivery of cosmeceuticals to the skin, with a modern moisturizer delivering in each of these areas. By understanding the hierarchical functioning of moisturizers, it is possible for dermatologists to effectively examine the benefits of moisturizer use. ■