The Importance of Maintaining Hydration for Skin Barrier Health

Highlights From a Dermatology Experts’ Roundtable

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Topic Highlights

3 Introduction
4 Stratum Corneum Structure and Function: A Balancing Act
5 Impact of Hydration on Skin Barrier Function
6 Choosing an Appropriate Cleanser
7 The Elements of Effective Moisturizers
8 Fundamental Skin Care: A Doctor-Patient Dialogue
11 References
12 CME Post-Test and Evaluation

Accreditation Statement
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This activity has been developed for physicians and other clinicians who specialize in dermatology and pediatrics.

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Program Goals
The skin is the body’s main defense against water loss and environmental stresses. The outermost layer of skin, the stratum corneum (SC), acts as the primary interface to the environment. Maintaining an optimal level of moisture in the skin is critical for the overall health and function of the skin. Moisture loss due to SC barrier damage leads to irritation, itch, and dryness. Skin disorders, such as psoriasis and atopic dermatitis, compromise the skin barrier and cause an increase in transepidermal water loss. Furthermore, SC damage can lead to the persistence of these disorders. The use of harsh cleansing products, dermatologic treatments, ultraviolet light exposure, and a lack of optimal moisturization can also lead to dry and damaged skin.

A well-balanced skin care regimen can enhance the skin’s natural defense against photodamage and dryness and may improve overall skin quality. Inadequate hydration of the skin can often lead to flare-ups of skin diseases, such as eczema, acne, and psoriasis. The combination of a skin care routine, which emphasizes moisturization, with dermatologic treatments has been shown to ameliorate disease symptoms, as well as any dryness that may occur from the associated treatments.

Educational Objectives
After reading this supplement and taking the test, participants should be able to:

- Describe the essential role of moisture in skin barrier function.
- Discuss the effects of daily cleansing and moisturizing on the skin barrier and compare/contrast specific product benefits.
- Discuss the clinical importance of maintaining an appropriate daily skin care regimen both in combination with dermatologic treatments and procedures and to sustain general skin health.
- Identify a practical approach for encouraging clinicians to complement the treatment of common dermatologic conditions with an optimal daily cleansing and moisturizing skin care regimen.

Introduction
Michael D. Tharp, MD, Chair

The maintenance of a healthy skin barrier is essential, especially for those patients being treated for common skin disorders that can be exacerbated by dry skin (eg, psoriasis, atopic dermatitis, and photodamage). All of these disorders can be linked to fundamental barrier dysfunction, which makes the skin vulnerable to environmental insults that cause dryness and irritation. While some patients use cleansers regularly, many patients with dry skin are not using moisturizers. Maintaining healthy skin on a daily basis is crucial for both adults and children even in the absence of such disorders. Skin care practices vary significantly among patients with respect to their choices of cleansers and moisturizers. Furthermore, parents make everyday skin care choices for their young children. These choices can impact the overall health of the skin. The clinician can play a vital role in communicating the importance of a daily skin care routine in which mild cleansing, moisturization, and sun protection are paramount. In particular, the maintenance of adequate skin hydration is an essential component for the daily function of the skin barrier, and proper care helps the skin retain its hydration status.

The purpose of this supplement is to explore the role and importance of skin barrier hydration as it relates to a daily skin care regimen. The role of the physician in educating patients about fundamental skin care, as well as how daily skin care can complement various treatments for skin disorders, will be discussed. This supplement begins with an overview of stratum corneum structure and function. It also introduces the critical role of moisture in skin barrier maintenance and function. A roundtable discussion is then presented by a panel of expert faculty that includes David J. Leffell, MD, of Yale University School of Medicine; Seth J. Orlov, MD, PhD, of New York University School of Medicine; and Heidi A. Waldorf, MD, of the Mount Sinai School of Medicine. This publication aims to serve as a valuable tool for dermatologists and pediatricians who address skin care in their medical practices.
The Importance of Maintaining Hydration for Skin Barrier Health

As the primary defense against the elements, our skin protects against ultraviolet radiation, microorganisms, and toxic agents. However, another critical function of the skin barrier is to guard against dehydration. The stratum corneum (SC) is the most superficial layer of the skin and functions as our principal interface with the environment. Although largely impermeable to water, the SC does allow for a small but critical exchange that maintains adequate hydration levels and, as a result, its flexibility. Certain essential SC functions, such as desquamation or the enzyme-driven process of skin shedding at the surface, are regulated by hydration levels within the SC.

The SC was once thought to be a layer of biologically inert dead skin cells. However, advancements in dermatologic science have demonstrated that it is a biochemically and metabolically active structure. The SC is composed of a discontinuous layer of terminally differentiated keratinocytes, or corneocytes, surrounded by a matrix of lipids (Figure 1). The composition of the SC has been compared to that of a brick wall, where the corneocytes act as the bricks of the structure and the specialized lipids function as the mortar that holds the structure together (Figure 2). The lamellar lipid layer acts as the water barrier in the SC, while the corneocytes protect against mechanical stress and injury.

The lipid composition within the SC is unique and accounts for approximately 20% of the SC volume. Ceramides constitute 50% of the lipid content by mass, followed by cholesterol (25% by mass) and fatty acids (10% to 20%). Nine classes of ceramides are found in the SC, with the predominant species being ceramide with omega-hydroxy fatty acid linked to sphingosine; 20% to 30% of the omega-esterified fatty acid in the SC is linoleic acid. Despite their abundance in many cell membranes, phospholipids are not found in the SC. These fatty acids are predominately saturated with chain lengths that vary from C14 to C20. While triglycerides and free fatty acids are detected in the SC, they are believed to be sebaceous contaminants that facilitate desquamation by disrupting barrier structure toward the surface of the skin. The SC lipid supply is replenished from the contents of the lamellar bodies found in the stratum spinosum and stratum granulosum. Lipids are enzymatically cleaved as they approach the SC junction, fusing together to form the lipid matrix.

An average of 12 to 16 layers of corneocytes make up the SC on most body surfaces. The structure of a corneocyte can be reduced to two components: an outer, hardened protein envelope called the cornified envelope (CE) and a highly organized keratin macrofibrillar matrix (Figure 2). A series of highly cross-linked proteins form the surface of the CE, rendering it highly insoluble. The CE is surrounded by a monolayer of long-chain ceramides that provide a hydrophobic surface that nestles the corneocyte within the lipid matrix of the SC, thereby maintaining the water impermeability of the skin barrier. The internal keratin structure of the corneocyte is also bound to the CE. Therefore, the corneocyte can be thought of as a continuous, intricately

Continued on page 10
Impact of Hydration on Skin Barrier Function

Hydration and Normal Skin
Dr. Tharp: First, let’s discuss the importance of hydration for maintaining optimal skin barrier function and, second, whether people with “normal” skin should be concerned about moisture levels.

Dr. Leffell: Well, I think we should start off by recognizing that the role of the stratum corneum (SC)—once considered to be a lowly form of detritus that no one really understood—clearly turned out to be not only more complex than it would appear under the light microscope, but physiologically relevant for maintaining water balance within the body. The SC is composed of a matrix of corneocytes embedded in a lipid bilayer (Figures 1 and 2). Together these two components form an effective water-impermeable barrier, and anything that perturbs this matrix has the opportunity to disrupt the normal water balance found in the skin.

We recently had a dramatic example of how critical the SC is in establishing a homeostasis between the environment and the skin. David Blaine, the magician, was living in a bell of water for about 7 days. Those of us who saw pictures of him on the news witnessed that by the second day, the skin on his hands was disintegrating. This was a very dramatic example of over-hydration particularly, but highlights the role that the skin plays in maintaining the proper water balance; it also demonstrates the way in which the skin is designed to make sure that the water that is on the inside stays on the inside and the water that is on the inside stays on the inside.

Dr. Waldorf: In order for the SC to remain intact, it must maintain flexibility, and moisture is critical for keeping the SC pliable.

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Hydration and Skin Diseases
Dr. Orlow: Patients with atopic dermatitis experience increased transepidermal water loss (TEWL) because of their barrier dysfunction. As a result of their barrier dysfunction and their skin being quite dry, it is more likely to fissure and crack, which then gives entry to microorganisms and leads to infection. Keeping atopic skin well hydrated by using products with both humectants and occlusives is important to help reduce TEWL and the resulting cracked, dry skin. Several studies have demonstrated an abnormal ceramide metabolism in patients with atopic dermatitis, suggesting that the biochemical mechanisms that maintain optimal hydration levels and the ultrastructural integrity of the SC are impaired.3, 19, 20

Dr. Tharp: There is some very interesting information that suggests that these lamellar bodies, which are the lipid source in the SC, are also a source of important proteins, including antimicrobial peptide, that help fight against infection.21 Abnormal lamellar body formation may affect antimicrobial peptide production and function, which appears to be the case in patients with atopic dermatitis. Atopics are known to have abnormal ceramide synthesis and thus alterations in minimal barrier function. This barrier dysfunction may affect lamellar body formation and ultimately antimicrobial peptide synthesis. All of the components within the SC—the corneocytes, lipid matrix, and protein complexes, such as natural moisturizing factor, that help attract and retain moisture in the skin—are crucial for maintaining optimal skin barrier function and the formation of antimicrobial peptides. When any of these components is dysfunctional for any reason, skin becomes dry and damaged (Figure 3 on page 6). This is apparent in skin at any age.

Comparison of Pediatric and Adult Skin
Dr. Orlow: Indeed, there are some differences between juvenile and adult skin. However, there is a paucity of information on this subject. Some say that the SC in children is thinner than the SC in adults; however, there is not a drastic difference in epidermal thickness. The subcutis becomes thicker as children mature into adults. At birth, the infant is covered in vernix caseosa, which is a sebum-rich creamy material covering that accumulates during gestation. But after that is wiped away, children are devoid of sebum production and sebum lipids until puberty, when sebaceous glands become active. This is a huge difference. So, while we have oily skin when we are children, we do not have malodorous skin in the same way that we do as adults. Therefore, children do not need to be washed as vigorously as peripubertal and pubertal children and adults feel that they want to be.
Choosing an Appropriate Cleanser

Mild Cleansers Need to Maintain Hydration Levels

Dr Tharp: This is a good segue into cleansing practices. A myriad of cleansers now on the market can lead to confusion when patients need to select a cleanser that is appropriate for their skin. Therefore, it is important for dermatologists to discuss considerations for choosing a cleanser with their patients. It is equally important to dispel myths that skin must feel tight and scrubbed in order for it to be truly clean.

Dr Waldorf: I agree. The largest battle I have with patients is their preconception that the cleanser should leave the skin feeling tight and stiff. Unfortunately, this tightness is likely related to the removal of lipids and then the presence of residual surfactants from the soap. I try to convince patients that they can use a nondrying cleanser that contains a gentle synthetic detergent (syndet). A syndet-based cleanser will remove dirt, makeup, excess oil, and bacteria, without stripping the surface lipids or disturbing the stratum corneum (SC) proteins, which can lead to dry, stiff skin (Figure 3).22

I prefer cleansers that are nondrying, nonfoaming lotions or creams (Table 1).23 If patients are wearing waterproof makeup, I inform them about cleansers or makeup removers that are nonirritating and can be used in those specific areas where makeup is applied, but they do not need to use the same cleanser on the rest of the face. I recommend that they look for nondrying products that contain, for example, glycerin or other ingredients that will signal that they are less drying.24 The only time I ever recommend using an actual soap is when a patient comes in from the garden and may have been exposed to poison ivy.

Dr Leffell: I really emphasize using a moisturizing body wash to my patients (Table 1). I think that it is very effective to moisturize while the skin is being hydrated. Any nonsoap cleanser that will signal that they are less drying.24 The only time I ever recommend using an actual soap is when a patient comes in from the garden and may have been exposed to poison ivy.

Dr Orlow: The advice I give to my pediatric patients is not vastly different. I actually use several adult products in my pediatric practice. I like the mild cleansing bar and feel it works nicely; as Dr Waldorf mentioned, the nonfoaming wash is preferred (Table 1). I do not necessarily recommend products to patients that are targeted specifically for use on infants and children. Just because a product is labeled “for children” does not indicate mildness. While there are a number of products geared for use on children that are perfectly acceptable, I do not suggest a product simply because it is marketed for child use. I recommend a product because that particular patient would benefit from using it or it would help ameliorate disease symptoms. Whether for an adult or a child, I recommend a product I believe in.

Effects of Harsh Cleansing Practices

Dr Tharp: In our daily practices, I am sure we all see patients who are using harsh products on their skin that cause dryness and irritation. Often, crimes of commission, not only omission, cause dry skin.

Dr Leffell: That is a great point. It bears a lot of mention here now. Patients are inundated with information about the importance of using antibacterial products; patients will apply antibacterial cleansers to their hands constantly and use antibacterial wipes on their faces. These products, despite all the additive moisturizers such as aloe, tend to be very drying and can be very irritating to the skin. In addition to that, we depend on a certain natural flora of the skin for intrinsic antibacterial protection. I think patients are uncomfortable with the notion that their skin has “good” bacteria. I believe it is important for people to understand that our bodies have a natural balance that we really have to strive to maintain. Using harsh cleansing devices to aggressively exfoliate the skin (eg, dermabrasion, microdermabrasion)—all of these things interfere mechanically with the integrity of the skin barrier function.

Dr Orlow: I think the place where I see mechanical abuse the most is in my teenage patients with acne. There is the belief that acne is caused by dirt and you can scrub it away; there-
The Elements of Effective Moisturizers

**Effective Moisturizers**

Dr Leffell: There are three elements that make up an effective moisturizer: occlusives and emollients (to help reduce transepidermal water loss), and humectants (that attract and retain moisture). Glycerin is one of the most common humectants, and it is my understanding that, from a compounding point of view, glycerin is probably one of the more versatile. But, of course, there are also synthetic humectants that are available (Table 2).25

Dr Waldorf: In terms of ingredients in moisturizers, I think one of the best advances in product manufacturing is the extended use of various silicone derivatives. Having dimethicone or cyclomethicone in a product will often make it much more cosmetically elegant.26 It gives the moisturizer a nice slip and takes away the sticky sensation that keeps people from wanting to apply it to their face or their body. Women like products that can put on their face and can easily apply cosmetics over. Many of the moisturizers that have a significant amount of dimethicone in them serve double duty as makeup primers.

Dr Orlow: Sometimes I will recommend oils to my patients. Some people do like oils for their skin, such as baby oils.

Dr Waldorf: I also recommend petroleum jelly as an effective moisturizer and makeup remover; it's a multifunctional product (Table 2). After a deep laser peel, I recommend petroleum jelly to my patients, and some of them continue using it even after their skin is healed because it leaves them feeling soft and smooth. Even my acne patients can use it for their skin.

Of course, sun protection is arguably the most important part of caring for one's skin on a daily basis. I urge my patients to use lotions that contain the appropriate sun protection factor (SPF), minimally 15, and broad-spectrum ultraviolet (UV) protection on their face and body every day.

**The Importance of Body Moisturization and Ultraviolet Protection**

Dr Leffell: Skin is a much-neglected part of the body's topography and offers a large amount of surface area that can dry out. I will often start patients who have neglected to moisturize their body's skin with what I call the industrial-strength moisturizers, the urea- or the lactic acid–containing moisturizers; that is primarily to demonstrate to them the benefits of moisturizing.27 When they use those products, they see a dramatic change in their skin texture, and then I can taper them off and get them onto something that is milder for everyday use.

Dr Waldorf: I agree with Dr Leffell. The skin is a neglected area, and making small changes in moisturizing habits can have a huge impact on skin health. A problem with daytime facial moisturizers that contain sunblock is that they come in very small containers. Patients will use sunblock on their face from this very expensive little container and not use it on the rest of their body. I try to persuade them to purchase a sunblock that is appropriate for their face and their body that comes in a large enough size so they will extend their application to the rest of their body.

Dr Orlow: I think another one of the things that has made our job easier in terms of conveying the importance of UV protection to patients and improving their compliance has been the improvement in the available products. There are so many “day lotions” and creams that suit patients’ needs in terms of mildness and moisture intensity that contain sun protection. That has made it much easier because a cosmetically acceptable product that is also efficacious works for both doctor and patients.

Dr Waldorf: My older patients frequently use lactic acid moisturizers, particularly for their lower legs where they have completely neglected their care. I try to get them into the mantra of applying things like the little kids’ song—head, shoulders, knees, and toes—to emphasize how efficiently they can moisturize their entire body.

Dr Leffell: With my male patients, I take advantage of the fact that their one common daily activity in most cases is shaving; I tell them that they should use a moisturizer with SPF after they shave to help reduce irritation and protect their skin from the sun. Also, more and more topical agents are becoming available for treating pre–skin cancers such as actinic keratoses and skin cancer itself. There is no question that by creating an inflammatory response, these agents disrupt the barrier and superimpose additional skin stress on patients who do not have the greatest skin to begin with. Invariably you have to find a way not only to moisturize these patients but also to make sure that they are being very gentle in their cleansing approach. Because of the increase in the incidence of skin cancer, especially in younger women, we are seeing an increasing convergence of these issues more and more in the dermatology field.

**Pseudoscience vs. Realistic Benefits**

Dr Waldorf: Another message I try to convey to my patients about choosing a moisturizer is that more expensive does not mean better. I tell patients that most of the expense of these products is going into the packaging, not the ingredients. Some of the expense may be from certain ingredients that enhance the cosmetic elegance of a product. If patients prefer one moisturizer over another and they are going to use it more frequently because they like the feel of it on their skin, that is acceptable; this is true as

Continued on page 11
Fundamental Skin Care Advice

Dr Tharp: We have established that gentle cleansing and frequent moisturization are crucial for maintaining healthy skin, as well as ameliorating common symptoms of skin diseases. Essentially, throughout this discussion we have assembled the building blocks that are the cornerstones to a properly functioning skin care regimen (Table 3). Let’s now discuss effective methods for answering our patients’ questions about daily skin care regimens.

Dr Leffell: First and foremost, I tell them to keep it simple. Use a nonsoap cleanser. Then, depending on the patient’s skin type, we will select an appropriate moisturizer. I usually approach their inquisitiveness as an opportunity to talk about some of the topics we discussed today about how the skin protects itself, how the skin is designed to hold moisture in, and how to avoid potential irritants. But I think the biggest problem that we as dermatologists have is in advising patients about a proper daily skin care regimen is getting patients back to basics and helping them understand that the more expensive a product is does not necessarily imply that it is better for them. And it extends, as I said, the continuum from moisturizing body washes, which I think are probably the greatest innovations for skin care from the point of view of simplifying your life, to moisturizers.

What I recommend, what I look for, are moisturizers that have a minimum of ingredients that, of course, are fragrance-free and noncomedogenic, and tend to be elegant. Patients need to be able to apply the moisturizer and not know that they’re wearing it all day. Of course, the advice I give to my patients will depend on the season. Last winter in the Northeast, it seemed to be very dry, and I had many patients approach me with dry skin. My advice was to wash once a day with a nonsoap cleanser and rinse the face, or simply wash the face with clean tap water. Use a good moisturizing body wash, and apply a moisturizer immediately after bathing and at bedtime.

Dr Waldorf: The two essentials for a daily skin care regimen that I recommend are cleansing and protecting. I have my patients cleanse with a nondrying, nonfoaming cleanser in the morning and apply a moisturizer that contains sunblock. At night I have them cleanse again with a nondrying, nonfoaming cleanser and then apply a moisturizer if needed.

The reason I have most of my patients cleanse twice a day with a nondrying cleanser is twofold. First, I find that just washing with water is more drying than using a cream or lotion cleanser. Secondly, most of these patients are women who do wear makeup; in the morning, some may have residual makeup on their faces, especially if they wear waterproof makeup. I tell my patients to keep one cleanser in the shower and one by the side of the sink so they cleanse at night and then cleanse again in the morning. It may be that at night it’s a different cleanser. It may be a heavier cleanser to take off their makeup and in the morning something lighter.

With my male patients, I am typically the one suggesting daily skin care to them. Many men are not used to applying lotions and creams. I take a stepwise approach with men; I start with having them find a sun-protecting product they are willing to use in the morning and change from washing their face with an antibacterial deodorant soap to something milder. Then, we will start with a spray, gel, or light lotion sunblock. As they get used to making these changes, I can add a heavier moisturizer when needed. I find that the stepwise approach is helpful. I do not make many changes right away; simply changing a cleanser can make a big difference.

Dr Tharp: It is important for people to understand that low-foaming cleansers have a lower surfactant level. When recommending a cleanser to patients, some dermatologists would differentiate from summer to winter, in terms of these cleansers. For example, in the summer when it is humid and oil production may be increased, some patients may want to use cleansers with a higher surfactant level on their skin to remove this excess oil; in other words, they switch from a low-foaming to a more-foaming product.

Dr Waldorf: In my practice, I recommend against my patients using a harsher cleanser in the summer because so many of my patients are using retinoids. I have acne patients using retinoids, and the summer months allow me to increase the frequency of use as well as the strength of the treatments that I am prescribing. In the winter, I prescribe retinoids less frequently, but patients still have to comply with a mild cleansing and moisturizing routine to preserve the effects of their treatment.

Pediatric Fundamental Skin Care Advice

Dr Orlow: I don’t mind if my pediatric patients cleanse daily, but daily bathing must be followed by moisturization. You certainly do not need to use cleansers on a daily basis on an infant, but if you do, you definitely want to make sure that they are very gentle cleansers. I stress this even more when it comes to shampoo. Adults decide they want to shampoo children’s heads simply because they shampoo their own scalps daily, but it is not necessary. I see parents shampooing children who have no hair on their scalps; they do it by rote. Overall, I stress that parents be gentle when cleansing their babies and wash them with warm water to avoid giving the baby the chills. Of course, daily bathing habits should differ for patients with a skin disorder. For patients with atopic dermatitis, for example, we classically use oilated oatmeal suspensions as a way to introduce moisture into their skin.

Fundamental Skin Care and the Compromised Barrier

Dr Waldorf: I have a very large population of rosacea patients who have very sensitive skin. When devising a skin care strate-

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**Table 3**

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<thead>
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<th>The Steps of Fundamental Skin Care</th>
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<tr>
<td>1. Use a mild, nonsoap-based cleanser to remove dirt, sweat, and excess oils from the skin.</td>
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<tr>
<td>2. Immediately after cleansing, use a moisturizer to replenish lipids and hydrate the skin.</td>
</tr>
<tr>
<td>3. Protect skin from harmful UV rays by using a broad-spectrum sunblock every day.</td>
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The Importance of Maintaining Hydration for Skin Barrier Health

...gy for a patient with sensitive skin, I start by using a mild cleanser, mild moisturizers, moisturizers with sunblock in the morning, and a heavier moisturizer at night (Figure 4). I might change from a cream moisturizer in the winter to a lotion moisturizer in the summer. Once the patients start having procedures done that may be more irritating to their skin or once they start using retinoids, then I increase the moisturization intensity. For many of these patients, I will have them use their standard moisturizer and put an occlusive over it, such as petrolatum at night.

Dr Leffell: Certainly, I think atopic patients need to be made aware that they are more sensitive to irritation and that they really need to take extra care of their skin. Using products with both humectant and more occlusive properties is a must. On the other hand, not bathing is not a good idea. Bathing for an atopic patient is important, in part, because you want to remove irritants that have come into contact with the skin and you want to prevent *Staphylococcus aureus* from proliferating on the skin. After bathing, application of a moisturizer will help seal in moisture and prevent dryness.

Dr Waldorf: Another popular procedure in cosmetic dermatology is normalizing desquamation through the use of alpha-hydroxy acids and beta-hydroxy acids, as well as retinoids. While effective in regulating desquamation, these products can be quite irritating. We do have to balance the use of these products while we’re trying to normalize the stratum corneum (SC) in terms of desquamation with maintaining moisture. If I know that a patient has the tendency to use a scrub or something very harsh to exfoliate, I try to suggest products that are less damaging. For these patients, I will allow them to use a home microdermabrasion once a week. There are products I have tested that are over-the-counter and have smooth beads rather than rough beads. I will specifically recommend these products and tell them they can be used once a week and they must moisturize afterwards. For most of those patients, aside from atopic dermatitis patients, I find that pointing them toward an in-office procedure such as microdermabrasion, which we can do in a more controlled setting, can satisfy their craving for a deep cleaning.

Dr Tharp: I also stress the importance of moisturization to my acne patients.

Dr Waldorf: Ultimately, I try to stress to patients that the absence of an appropriate skin cleansing and moisturizing regimen can sabotage their acne therapy. I frequently see both teens and adults who come in having been given various prescription acne products by someone other than a dermatologist without any other instructions. These patients often abandon their treatment because it was too harsh for their skin. After a quick dialogue, I find out that they were using a drying cleanser and they were not moisturizing—and living in New York during January. Therefore, I have to re-educate them about appropriate skin care and explain that having well-hydrated skin is not going to sabotage their treatment or worsen their acne. In fact, if they keep their skin appropriately moist, we will be able to use more effective acne medications for them. As far as which products I recommend, as long as their skin is well hydrated, I let patients use their preferred products.

Dr Orlow: Patients who previously might not have had to pay much attention to their skin will find that they need to moisturize more frequently, once placed on acne medication. Of course, even people with normal skin benefit from following the same skin care regimens we recommend to our patients with compromised skin barriers.

Dr Tharp: This is a very good point, Dr Orlow, which is why I try to discuss the benefits of a daily skin care regimen as often as I can during patient examinations.

Dr Waldorf: In my practice, I discuss skin care regimens with at least 90% of my patients because that is a large part of why they are coming to me as their dermatologist. In addition to their skin health, they do not want to feel embarrassed about asking about skin care. They say, “I’m here for a mole check, and I want to know how to take care of my skin.” Sometimes, as I do a skin exam, I will say, “You know, you’re really dry. What are you washing with?” That opens up the conversation about daily skin care. We also do try to instill in our patients that not following a good regimen will sabotage their care. Obviously, sometimes the skin regimen is focused on the area where they have the problem. If patients come in with athlete’s foot and warts, we will educate them about how to take care of their feet. But we can use the foot care regimen as a starting point for discussing general skin care.

Dr Orlow: In my practice, once patients are old enough to start to take care of themselves, around 10 years of age, it is reasonable for me to have a conversation with them about everyday skin care. I make it a point to try to distinguish young patients from their parents, directing my comments to the patient and encouraging each patient to comply with a beneficial skin care regimen and a healthy diet. Sometimes my advice varies with what they have been told by their parents. But it helps build confidence...
when patients realize that I am discussing it directly with them. Their parents may still remind them to apply their medicine, but for the most part these patients can be self-sufficient and should be treated as such.

Dr Leffell: I will bring up daily skin care if it is related to the patients’ symptoms. However, I would say about 30% of the time I see something that prompts me to discuss a daily skin care regimen, and it is always appreciated. There is clearly a desire on the part of patients to learn and hear more about proper skin care. But I’m not even sure that they know it is an appropriate topic to discuss with their dermatologist. I often wonder how many women, for example, get their skin care information from their cosmetologists.

Conclusion

Dr Tharp: We’ve just discussed the central role of moisture in the skin in terms of its function, the clinical importance of maintaining an appropriate daily skin care regimen, and the practical approaches for encouraging clinicians to start incorporating some of these recommendations into their conversations with their patients. One of the great advantages now, compared to 10 or 20 years ago, is that people are more cognizant about their skin and generally seem to be more interested. As a community, we need to take advantage of this newfound interest to help promote healthy skin through gentle cleansing, adequate moisturization, and sun protection.

Dr Waldorf: When skin is well hydrated, the SC remains intact and pliable, which is critical for maintaining optimal skin barrier function. Once the intact SC is perturbed, protection against environmental factors is lost, leading to decreased hydration. Lower levels of moisture within the skin exacerbate dryness, and this becomes a cyclic problem. In addition, environmental factors such as decreased humidity, colder temperatures, dry forced heating, and ultraviolet exposure contribute to dry, damaged skin. The drying effects of prescription and over-the-counter topical agents (including abrasive cleansers, toners, and astringents) can all interfere with the barrier function, even in normal skin.

Dr Orlow: Atopic dermatitis patients need to be made aware that they’re more sensitive to irritation because of increased transepidermal water loss caused by skin barrier dysfunction. Therefore, these patients need to take extra care of their skin and use the gentlest of cleansing and moisturizing products. It’s important for them to bathe regularly, moisturize, and avoid further irritation to their skin.

Dr Leffell: I tell my patients to keep it simple and use a non-soap mild cleanser, and I recommend a moisturizer that is appropriate for their skin. I explain how the skin protects itself, how the skin is designed to hold moisture in, and what kinds of things can irritate it and lead to dryness.

Dr Tharp: We all agree that dermatologists should take the time to review their patients’ skin care practices during visits and recommend a daily skin care regimen that includes gentle cleansing, adequate moisturization, and sun protection to help their patients achieve optimal skin health and appearance.

Stratum Corneum Structure and Function: A Balancing Act

Continued from page 4

cross-linked protein complex that lends structural integrity to the SC as a whole. Corneocytes are bound to one another by corneodesmosomes, which are intercellular protein structures that contribute to barrier durability. These structures link corneocytes together within the same plane, as well as those in upper and lower layers. Differences in lipid composition in both the lamellae and the corneocytes lead to varying degrees in permeability of different skin surfaces, such as the soles of the feet and the face. While some differences between adult and juvenile skin have been noted (eg, in SC thickness), this particular area of research has not yet been extensively explored.

Skin is a dynamic organ that is constantly renewing its cellular population and shedding layers through exfoliation, a highly regulated process that preserves tissue integrity and optimal thickness. Although the lipid content does contribute to the mechanical structure of the SC, corneodesmosomes are the primary structures that must be degraded to facilitate desquamation. Several proteases degrade corneodesmosomes in a precise pattern that is poorly understood. While the protease activity is regulated by hydration levels and pH, it is now thought that organizational changes in the lipid bilayers close to the skin surface influence the degradative process.

Adequate hydration within the SC ensures that the outermost layer of skin remains supple and flexible, as well as facilitating the processes described above. The SC contains a complex of water-soluble, low–molecular-weight compounds referred to as natural moisturizing factor (NMF). Derived from the hydrolysis of filaggrin, NMF is found within corneocytes and acts as a humectant to protect the SC from desiccation. Changes in SC water content initiate the enzymatic activity responsible for hydrolyzing filaggrin, which indicates that the SC is constantly responding to an ever-changing environment to maintain proper hydration, thereby facilitating optimal structure and function.

The vital importance of adequate hydration within the SC is most apparent when the barrier is perturbed by mechanical stress or disease states and thus loses moisture to the environment. Minor insults to the skin barrier can remain localized and have little impact on overall skin health. However, severe or repeated barrier damage may induce cytokine release and an inflammatory response that leads to hyperplasia and abnormal keratinization. The enzymatic processes that initiate desquamation, corneocyte turnover, repair, and hydration become misregulated, thus setting the stage for more pronounced damage over time.

Understanding the importance of hydration in the metabolic regulation of SC structure and function has given insight into its potential role in skin diseases. It is now apparent that the compromised skin barrier associated with various disorders such as atopic dermatitis and psoriasis is not merely a consequence of these diseases but may add to and perpetuate the inflammatory responses associated with them. With this knowledge, we are better prepared to treat and prevent dry skin with daily skin care practices, such as moisturization, to restore barrier function and improve overall skin quality.
Choosing an Appropriate Cleanser
Continued from page 6

b ring the sink with an abrasive pad will not unclog the drain.

Dr Waldorf: I think we all see acne excoriée in our practices, especially in patients in their 20s and 30s.

Dr Tharp: As we have discussed thus far, mild cleansing with non-soap products helps the skin retain essential lipids and proteins required to keep the SC well hydrated. Of course, no matter what type of cleanser is used, just bringing skin into contact with water will wash some of these important elements away. Therefore, moisturizing after bathing is vital for maintaining SC flexibility and hydration. Just as we have specific attributes we look for in cleansers, there are also certain qualities that define effective moisturizers.

The Elements of Effective Moisturizers
Continued from page 7

long as it is nonirritating, it is not competing with other things we are doing medically, and they are using it regularly.

Dr Orlow: Some of the claims made for these expensive ingredients are based on pseudoscience. In the case of retinols, there is some biological plausibility to their activity, but some of the claims for other ingredients are scientifically unsound. The concept that collagen is important to maintaining skin elasticity is valid. But rubbing collagen and elastin onto your skin is not going to improve the elastic qualities of your skin.

Dr Leffell: I think we all agree that one of the implications of a “barrier” is that molecules above a certain size do not permeate the skin. However, convincing patients of that is very difficult. I find the bricks-and-mortar explanation of the skin barrier a helpful tool for explaining skin permeability to patients.

Dr Waldorf: In terms of collagen and, for example, hyaluronic acid, I stress to the patient that these ingredients do have moisturizing qualities. However, topical application of these ingredients will not have the same effect as injecting collagen products or hyaluronic acid products into the skin.

Again, it is important to educate patients so they know what they are spending their money on. To spend money on a cream because it has something in it that they think is going to be incorporated in the skin, but is actually impermeable, is nonsensical. However, this does not mean hyaluronic acid is a bad ingredient. On the contrary, it is actually an ingredient that, when mixed with active ingredients (eg, certain topical retinoid derivatives), can make the overall product more palatable to the skin.

Dr Leffell: Hyaluronic acid is certainly something that can cause things to be less irritating. I think the other issue is a tendency to take a scientific finding and a disease state and then make a claim that somehow adding that to normal skin will make it work better. For instance, I question whether ceramides offer substantial moisturizing benefits when added to a product.

Dr Orlow: There are some studies that suggest that ceramide-enriched moisturizers are preferable when compared to moisturizers that lack ceramides. However, there are not enough data to definitively laud the effects of ceramides on normal or atopic skin.

References

The Importance of Maintaining Hydration for Skin Barrier Health

CME Post-Test

Release Date: November 2006    Expiration Date: November 30, 2007    Estimated Time to Complete This Activity: 1.25 hours

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Please circle the most appropriate response. Seven correct responses are required for credit.

1. The outer, hardened protein structure of the corneocyte is called:
   a. Corneodesmosome  c. Cornified envelope
   b. Filaggrin  d. Collagen

2. Dry skin is characterized by the following signs or symptoms:
   a. Pruritus    c. Flakiness
   b. Tightness  d. All of the above

3. Acne patients should moisturize their skin.
   a. True  b. False

4. Natural moisturizing factor:
   a. Is a naturally occurring humectant
   b. Is synthesized from the hydrolysis of filaggrin
   c. Both a and b
   d. Neither a nor b

5. Which of the following is not one of the fundamentals of skin care?
   a. Washing with a gentle cleanser
   b. Moisturizing after bathing
   c. Bathing with very hot water
   d. Using a lotion that offers photoprotection

6. Patients with atopic dermatitis experience increased__________
   because of their barrier dysfunction.
   a. Transepidermal water loss
   b. Sebum production
   c. Photodamage
   d. Pustules

7. Sunblock with a minimum SPF of 15 should be used:
   a. When it is sunny out  c. Daily, rain or shine
   b. At tanning salons  d. Only during the summer months

8. Children should be washed as rigorously as adults.
   a. True  b. False

9. An ideal moisturizer has__________properties.
   a. Occlusive
   b. Humectant and occlusive
   c. Occlusive, humectant, and exfoliative
   d. Occlusive, humectant, and emollient

10. Children do not produce:  
     a. Sweat  c. Corneocytes
     b. Sebum  d. None of the above

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Course Evaluation

Please print

Name: ___________________________ Specialty: ___________________________
Degree: MD DO PharmD RPh NP RN BS PA Other_________________________
Affiliation: ___________________________
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(All information is confidential.)

CME Credit Verification
I verify that I have spent ___ hour(s) ___ minutes of actual time working on this CME activity. No more than 1.25 CME credits will be issued for this activity.

PRETEST ASSESSMENT: Please rate your current knowledge of hydration for skin barrier health on a scale of 1 to 5, with 1 being the lowest and 5 the highest.  
1 2 3 4 5

COURSE EVALUATION: Please evaluate the effectiveness of this activity by circling your choice on a scale of 1 to 5, with 1 being the lowest and 5 the highest.

Objective #1: Describe the essential role of moisture in skin barrier function.  
1 2 3 4 5

Objective #2: Discuss the effects of daily cleansing and moisturizing on the skin barrier and compare/contrast specific product benefits.  
1 2 3 4 5

Objective #3: Discuss the clinical importance of maintaining an appropriate daily skin care regimen both in combination with dermatologic treatments and procedures and to sustain general skin health.  
1 2 3 4 5

Objective #4: Identify a practical approach for encouraging clinicians to complement the treatment of common dermatologic conditions with an optimal daily cleansing and moisturizing skin care regimen.  
1 2 3 4 5

How do you rate the overall quality of the activity?  
1 2 3 4 5

How do you rate the educational content of the activity?  
1 2 3 4 5

Was the presented information fair, objective, balanced, and free of bias in the discussion of any commercial product or service?  
____ Yes  ____ No

If no, please comment: ___________________________

Suggested topics for future activities: ___________________________

Suggested authors for future activities: ___________________________

After participation in this activity, have you decided to change one or more aspects in the treatment of your patients?  
____ Yes  ____ No

If yes, what change(s) will you make? ___________________________

If no, why not? ___________________________

Would you be willing to participate in postactivity follow-up surveys?  
____ Yes  ____ No

Would you be willing to participate in a phone, e-mail, or in-person discussion exploring ways to improve our CME activities?  
____ Yes  ____ No

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