

# Skincare Bootcamp: The Evolving Role of Skincare

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**Background:** Although cosmetic procedures have a significant impact on certain aspects of aging, such as deep, wrinkling, sagging, and volume loss, they fail to address the overall quality of the skin.

**Methods:** Daily skincare routines potentially can have a significant long-term impact on the overall quality of a person's complexion.

**Results:** By expanding our product knowledge, we can help our patients individualize their at-home skincare routine using effective products and ingredients designed to address their specific skin concern and support the professional care we deliver.

**Conclusions:** Here, we discuss the types of products and ingredients suitable for the most common dermatologic concerns, from wrinkling to skin sensitivity, acne to sun damage. (*Plast Reconstr Surg Glob Open* 2016;4:e1152; doi:10.1097/GOX.0000000000001152; Published online 14 December 2016.)

In 1967, the zoologist Desmond Morris<sup>1</sup> declared that “Flawless skin is the most universally desired human feature,” explaining the primordial human need to “advertise” health, well being, and fertility with an even-toned, clear, and radiant complexion. In the quest to achieve perfect skin, consumers of all ages are constantly searching for the “best” skincare products. Whether they shop at drug stores, department stores, or online, consumers are faced with a paradox of choice. They look to their friends, physicians, or favorite bloggers for independent recommendations, often purchasing expensive products that fail to live up to their reputed benefits.

As reported in a market survey conducted in October 2015,<sup>2</sup> consumers perceive that factors such as “regular facial cleansing, lifestyle, sun exposure, diet, and compliance with a daily skin regimen” ranked higher and impacted their skin’s appearance more than “going to a dermatologist or getting professional skincare treatments.” Their observation has merit. Extrinsic aging, which includes ultraviolet exposure, pollution, and lifestyle choices such as smoking, sleeping positions, diet, and daily skincare habits, is estimated to account for 80% of the visible signs of skin aging,<sup>3,4</sup> whereas intrinsic aging, which is genetically determined and subject to the influence of one’s overall health, stress level, and propensity to develop skin conditions such as acne, rosacea, or eczema, accounts for only 20%.

The visible results of intrinsic aging of the skin include thinning, atrophy, fine lines, and dryness.<sup>5</sup> By contrast, extrinsic aging manifests as stratum corneum thickening, mottled pigmentation, dullness, dryness, wrinkles, and laxity.<sup>6</sup> A loss of elasticity leads to sagging, whereas a reduction in the rate of epidermal cell turnover causes prolonged wound healing, dryness, an overall dull appearance caused by thinning of the epidermis, and thickening of the stratum corneum.<sup>7,8</sup> Complete renewal of the epidermis requires 40 to 60 days in the elderly compared with 28 days in young adults.<sup>9</sup> Dermal collagen fibrils harden, and collagen production decreases on average by 68% by age 80.<sup>10,11</sup> An obvious clinical example of intrinsic versus extrinsic aging can be seen by comparing sun-exposed facial skin with the sun-protected skin of the upper inner arm. In most people, these 2 areas of the skin demonstrate profound differences in pigment, texture, tone, sagging, and wrinkling. It should also be noted that inflammation, whether from barrier disruption, allergic reactions, ultraviolet exposure, pollution, or the use of irritating topical products, can accelerate skin aging.<sup>7</sup>

Beyond serving as our “billboard” to the world, the principal functions of skin include protection, excretion, secretion, absorption, thermoregulation, pigment pro-

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duction, sensory perception, and the regulation of immunological processes. Age-related physiological changes negatively impact these functions by impairing the skin's barrier function, decreasing epidermal cell turnover, as well as keratinocyte and fibroblast proliferation, and reducing the vascular network responsible for delivering oxygen and nutrients to the tissues while removing metabolic byproducts.<sup>7,12</sup>

A plethora of services, from rhytidectomies and blepharoplasties to injections with volumizing fillers, neurotoxins, and laser resurfacing, are the bread and butter of plastic surgery or cosmetic dermatology practices. However, unless we address our patients' at-home skincare routine as part of our treatment plan, we are missing an opportunity to enhance the results of their cosmetic procedure.

A great starting point is to help our patients pinpoint their primary complexion concern, whether it is acne, discolorations, sun damage, sensitivity, or lines and wrinkles. Daily skincare routines potentially have the most significant long-term impact on the overall quality of a person's complexion. By expanding our product knowledge, we can help our patients individualize their at-home skincare routine by using effective products that address their specific concern and support the professional care we deliver. As a mirror of our overall well being, healthy youthful-looking skin improves the self-confidence and self-esteem of our patients and enhances their quality of life.

### SKINCARE: CURRENT STATE OF PLAY

Skincare products can be composed of either cosmetics or Food and Drug Administration (FDA)-approved actives (this category includes drugs, whether over the counter [OTC] or prescription or even "cosmeceuticals"). According to current FDA regulations, a purely cosmetic product or ingredient is defined by its intended use. In chapter VI of the 1938 Federal Food, Drug and Cosmetics Act, cosmetics are defined as "articles intended to be applied to the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance without affecting the body's structure or functions."<sup>13</sup> In contrast, an FDA-approved OTC contains an "active" ingredient capable of altering the structure or function of the skin. The term "cosmeceutical" is an ambiguous marketing term, coined by Dr. Albert Kligman, used to describe cosmetic ingredients that have biologically active ingredients.<sup>14</sup> When used over time, the combination of cosmetics and OTC drugs in a skincare regimen has the potential to produce significant demonstrable benefits.

The perception of youthful, healthy skin stems from a number of features of the epidermis and dermis, including the density and quality of the extracellular matrix, the distribution of cells within connective tissue, the appearance of cornified cells at the skin surface, and variations in skin's natural fluorescence.<sup>15-17</sup> Alterations in skin physiology result in a number of visible skin conditions, including xerosis, acne, and abnormal pigmentation, that impact one's appearance. A combination of OTC and cosmetic skincare products delivered in a regimen can play a significant role in assisting consumers to restore their skin's health and beauty.

Because cosmetic products and ingredients have remained mostly unregulated, without the need of FDA premarket approval (with the exception of color additives), the skincare industry has experienced a surge of new ingredients and delivery vehicles over the past 3 decades. This is exemplified by the expanding volume of ingredient monographs added to the *International Cosmetic Ingredient Dictionary and Handbook* managed by the Personal Care Product Council.<sup>18</sup> Improvements in skincare ingredient technology and advancements in delivery and formulation designs have led to the creation of more effective products, spurring the growth of the U.S. skincare industry from \$10.7B in 2005 to \$13.8B in 2015.<sup>19</sup>

### Basic Skincare Needs

Protection, prevention, cleansing, and moisturizing are the key components of an effective skincare routine. Because most sun damage results from everyday, incidental ultraviolet exposure, rather than occasional bursts while on vacation, dermatologists recommend daily use of sunscreens. The most effective active ingredients for blocking out both ultraviolet A and ultraviolet B are either zinc oxide or avobenzone. Categorized as OTC drugs, sunscreens must undergo safety and efficacy testing and meet stringent labeling requirements.<sup>20</sup> No new sunscreen actives have been approved by the FDA since the 1990s, but advancements in formulation chemistry and technology have improved sunscreen esthetics, ease of application, and performance in an effort to encourage consumer compliance. Sunscreen should always be a mandatory final step of every at-home skincare program.

There is a dizzying array of cleansers for removal of makeup, pollution, and excess sebum and moisturizers for hydration and delivery of beneficial ingredients. Some contain FDA-approved active ingredients for restoration of the skin's barrier function, but most do not. The formula's vehicle should ideally support a specific skin type (oily, dry, or combination) and enhance the activity of an active ingredient if present. Formulas with similar or identical ingredients do not necessarily perform to the same degree. A formula is unique, like a recipe. The combination of eggs, sugar, flour, and butter, depending on the amount of each ingredient, as well as the mixing and cooking process, can create either a pancake or a soufflé. The same is true when it comes to product formulations, and a misinformed consumer can be fooled by the marketing tactics of competitive products. Clinical testing and before and after photos are your best guide for making specific product recommendations to your patients.

In general, gel-based and bar cleansers are best for oily complexions, whereas cream or lotion-based ones are better for normal to dry skin. Moisturizers supply humectant agents, which draw water into the stratum corneum from the environment and dermis below. Moisturizers also include occlusive agents that act as a barrier to transepidermal water loss. In almost all cases, products contain both humectants, like hyaluronic acid, urea, and allantoin, and occlusives, including petrolatum, mineral oil, and lanolin. Humectants are present in the water phase of a formula; occlusives are in the oil phase. Oil in water formulations tend

to be lightweight gels, lotions, and serums and are best suited for normal to dry skin. Water in oil formulations may be ointments or creams and offer superior hydration for dry skin. Recommending the appropriate cleanser, moisturizer, and sunscreen for your patients will depend on their skin type, that is, normal, dry, or oily. The specific FDA-approved active and/or functional cosmetic ingredients that patients should look for in their products will depend on their primary skin condition, concern, or goals, as outlined below.

### Improving Texture and Tone

The key attribute of a youthful, healthy-looking complexion is radiance. Radiance is determined by light reflectance from the surface of smooth skin. With age, radiance diminishes as the epidermal cell turnover rate slows down. This results in the buildup of dead keratinocytes in the stratum corneum and follicular ostia, creating the appearance of rough, dry skin, enlarged pores, and poor light reflection.

Exfoliation, through chemical or physical means, is the process of removing excess corneocyte buildup, which in turn stimulates cell turnover, resulting in a more polished, smoother, translucent surface. Over the past 2 decades, exfoliation has gained in popularity because of its almost immediate demonstrable benefits and the ease and variety of available products.<sup>21,22</sup>

Commonly used chemical exfoliants include glycolic, lactic, and malic acids, known as  $\alpha$ -hydroxy acids (AHAs), and salicylic acid, which is a  $\beta$ -hydroxy acid. Concentrations in excess of 10% to 15% in the case of AHA and 2% in  $\beta$ -hydroxy acid require professional administration; however, concentrations below this threshold may be safely used at home on a regular basis.<sup>23</sup> Exfoliating products continue to evolve as manufacturers seek the right balance of ingredients, generally in concentrations ranging from 7% to 10% and buffered to a pH above 3.5, to reduce the risk of burning and irritation.<sup>24</sup> Recent market introductions include polyhydroxy acids, such as lactobionic acid and gluconolactone. Because of their larger molecular size, these acids are better tolerated. They also help to strengthen the skin's barrier function and serve as antioxidant chelating agents, absorbing free radicals generated by ultraviolet exposure.<sup>21</sup> Mandelic acid is a good choice for gentle exfoliation of sensitive skin.<sup>23</sup> Finally, as our understanding of the relationship between desquamation and hydration advances, new strategies for exfoliation have emerged, including using glycerin to aid desmosomal digestion, thereby promoting keratinocyte desquamation through improved epidermal moisture levels.<sup>25</sup>

Physical exfoliation is available for consumers in a wide range of products as an alternative to or in combination with chemical exfoliation; these products include topical cleansing scrubs containing a variety of abrasive solid particulates, mechanical facial brushes, sonicating devices, and mildly abrasive cosmetic tools such as microexfoliating rollers. Physical exfoliation induces an immediate desquamation, which in some cases can produce a temporary disruption of the skin barrier, resulting in increased transepidermal water loss.<sup>26</sup> Such products may not replace the need for professional peels, deep needle rolling, or laser treatments but can be helpful in maintaining visible radiance.

### Redensification

Skin that is well protected from extrinsic aging may appear smooth and unblemished, but noticeable changes in contour, firmness, wrinkling, and loss of elasticity will nevertheless emerge with advancing age. Epidermal and dermal thinning, as keratinocyte and fibroblast replication slows, is a manifestation of intrinsic aging, which is further exacerbated by extrinsic factors, most notably ultraviolet exposure.<sup>27</sup> Epidermal thickness decreases by approximately 6.4% per decade<sup>28</sup>; this is because of decreases in the amount of glycosaminoglycans, hyaluronic acid, collagen, and elastin, resulting in an overall dermal thinning of 6% per decade.<sup>27</sup>

A cornerstone prescription therapy since 1969 in the treatment of aging skin has been the topical, synthetic form of vitamin A, tretinoin. The effectiveness of retinoic acid chemistry is derived from binding receptors that modulate the cellular processes of proliferation and differentiation, as well as immune function. The result is a redensification of extracellular constituents through the upregulation of collagen and glucosaminoglycans, leading to improved mechanical firmness and elasticity.<sup>29</sup> In a study published in the *Journal of the American Academy of Dermatology*, the application of prescription 0.05% tretinoin during a 12-month period resulted in clinical improvement in photoaged skin by stimulation of dermal collagen synthesis and angiogenesis.<sup>30</sup> These benefits often come at a "price"—pruritus, application site irritation, erythema, and peeling are frequent side effects.<sup>29</sup>

Nonprescription forms of retinoic acid precursors have given consumers access to this chemical moiety. At identical concentrations, the prescription all-trans retinoic acid is approximately 10 times stronger than the commercially available retinol. Although less effective, retinol has the benefit of low irritation potential when used daily.<sup>31</sup> Retinol is inherently an unstable molecule, making it difficult to retain activity in product formulations. Other less biologically active but more chemically stable forms of vitamin A, such as retinyl-palmitate, are commonly used skincare ingredients, often at low concentrations for the sake of marketing claims.

Progress continues in the creation of novel vitamin A delivery systems and stabilization techniques to allow maximum benefit with minimal side effects. Retinaldehyde, which requires only one enzymatic conversion to metabolize into the active form of vitamin A, is one such example.<sup>32</sup> Studies have demonstrated that retinaldehyde is well tolerated, yielding significant improvement in epidermal thickness and activating markers, such as cellular retinoic acid binding protein type II and keratin-14, which are also activated by retinoic acid.<sup>29</sup> On the horizon are other commercially available derivatives, including hydroxypinacolone retinoate, that similarly promise an effective and easily tolerated form of retinoic acid.<sup>33</sup>

New and improved active forms of topical vitamin A provide consumers access to products based on their desired level of efficacy, tolerance for side effects, cost, and convenience. A retinoid-containing product should be included in everyone's skincare arsenal to address the signs of skin aging.

### Managing Sensitivity

Sensitive skin is a self-diagnosed condition. It is estimated that 50% of women and 40% of men view themselves as having sensitive skin to some degree.<sup>34,35</sup> They describe their skin as highly reactive, itchy, uncomfortable, red, and dry and that it is exacerbated by the environment (ultraviolet radiation, temperature, and wind), topical medicinal and cosmetic products, pollution, stress, and hormones.<sup>36</sup>

Although the exact pathophysiology of sensitive skin is not fully understood, there is evidence that 3 broad areas may be involved: barrier function, inflammation, and sensory nerve abnormalities. The barrier function is compromised in sensitive skin compared with normal skin,<sup>37</sup> allowing allergens and irritants into the skin.<sup>36,38</sup> Inflammation ensues, escalating the cycle of sensitivity, damage, and inflammation. The neuropathic origin of sensitive skin may be a result of degeneration of intraepidermal nerve fibers.<sup>39</sup>

In treating a patient with sensitive skin, it is important to repair and maintain barrier function and reduce inflammation. Barrier repair is best performed with the delivery of moisture through humectants, such as glycerin and hyaluronic acid, and prevention of transepidermal water loss with the use of barrier molecules, including petrolatum and dimethicone. In addition, natural moisturizing factors, lipid complexes, and ceramides all act to strengthen the skin's barrier function. Preventing contact with known irritants, allergens, solvents, surfactants, and sensitizing preservatives<sup>40</sup> is also important in allowing the skin to recover. The use of topically applied chamomile has been reported as a beneficial antiinflammatory ingredient to soothe sensitive skin.<sup>41</sup> As a general rule, it is wise to recommend products with a limited number of ingredients.

### Maintaining Blemish-free Skin

Acne is a medical condition that undermines a person's confidence and impacts his/her quality of life. For both teens and adults, acne is stigmatizing. Acne sufferers are often viewed as unhealthy, unattractive, unclean, and unlovable. The spectrum of breakouts ranges from blackheads and an occasional pimple to chronic, widespread nodulocystic lesions, with scarring potential. The darker one's skin type, the more likely one is to experience postinflammatory hyperpigmentation. These dark marks often last from months to years, frequently causing as much psychological distress as the inflammatory lesion that preceded it.

The role of OTC products in managing mild to moderate breakouts is significant and continues to evolve. OTC medications include salicylic acid (0.5%–5%), benzoyl peroxide (2.5%–10%), and sulfur (3%–10%). The keratolytic activity of salicylic acid helps to unclog pores and exfoliates the stratum corneum. Benzoyl peroxide provides broad-spectrum antimicrobial action against *P. acnes* without the risk of resistance, and sulfur has a mild inhibitory action on bacteria and modest antiinflammatory benefits.

A meta-analysis comparing the efficacy of a combination prescription medicine containing benzoyl peroxide

and clindamycin with that of benzoyl peroxide and salicylic acid demonstrated that, at weeks 10 to 12, benzoyl peroxide plus salicylic acid had the best treatment profile for acne vulgaris.<sup>42</sup>

Research today suggests that acne is a complex condition involving hyperkeratinization, excessive sebum production, bacterial proliferation, and an inflammatory immune response.<sup>43</sup> Acne is incurable and commonly persists in adult women for more than 20 years.<sup>44</sup> It can be effectively managed with a combination of medicines (OTC and/or prescription) specifically targeting each step of the underlying pathogenesis. The drawback of topical acne medications is the dryness, redness, and irritation they often cause, making daily compliance a challenge. In particular, adult women find that the chronic irritation caused by topical acne medications is at cross-purposes with their desire to address their concerns regarding skin aging.

To ensure patient compliance with a treatment regimen for mild to moderate adult acne, products must be hydrating, be effective, and cause minimal to no irritation. Formulations should be esthetically pleasing, without a medicinal odor, and ideally contain antiaging ingredients. Sulfur is difficult to tolerate in a leave-on product because of its offensive smell. Therefore, sulfur masks left on the skin for 10 to 15 minutes before washing off are a recommended alternative to a leave-on product. Exfoliating cleansers with small grains that mechanically slough off dead cells and unclog pores or those with salicylic acid are worthwhile choices. Benzoyl peroxide at a low strength (2.5%) is generally effective for long-term treatment and prevention of breakouts. Retinoids, either prescription or OTC, offer benefits for acne and aging. Because many acne treatment actives, including retinoids and benzoyl peroxide, are slightly sun sensitizing, daily sunscreen must be used in conjunction with these ingredients and is especially critical to address concerns about skin aging. In acne-prone skin, noncomedogenic, oil-free products with either zinc oxide or avobenzone as an active ingredient are recommended. Topical antioxidants, including resveratrol, quercetin, and cinnamic acid, provide potential benefit for both the inflammatory components of acne and photodamage.<sup>45,46</sup> Finding the "best" medicated acne skincare products for an individual depends on their underlying skin type (oily, dry, or combination), disease severity, and the specific secondary issues they wish to treat, including aging, sensitivity, or pigmentation. Recognizing that the majority of patients self-treat their acne, helping your patients select an appropriate regimen will improve their overall appearance and increase their satisfaction with the services you provide.<sup>43</sup> A referral to a board-certified dermatologist is highly recommended for moderate to severe acne.<sup>43</sup>

### Creating and Maintaining an Even Skin Tone

In many cultures, an even-toned, fair complexion is a prized attribute. Hyperpigmentation, in the form of postinflammatory dark marks, melasma, or solar lentiginos, increases the perception of an aged appearance to a greater degree than wrinkles.<sup>47</sup> Subsurface pigmentation

creates “dull” skin and a loss of radiance, in the same way that particulates floating in a lake absorb light, blunting light reflection, and causing the water to look “muddy” rather than clear.

Most females deal with dull and unevenly pigmented skin through the application of camouflage (makeup foundation). In-office procedures, such as lasers, peels, or microdermabrasion, are generally effective; however, there is a risk of causing postinflammatory hyperpigmentation. In addition, unless properly counseled about continued sun protection along with the use of skin-brightening products, patients become frustrated when their pigmentation reoccurs.

A topical at-home medicated skincare system is a safe, effective, and low-risk alternative or complement to resurfacing procedures. Used daily, a combination of products containing a prescription or nonprescription strength hydroquinone and retinoids, along with exfoliation and sun protection, generally yields overall lightening of abnormal pigmentation within 8 to 12 weeks. One study concluded that a combination of prescription 4% hydroquinone with 0.3% retinol achieved superior results in comparison to 0.05% tretinoin for improving photo-associated hyperpigmentation.<sup>48</sup>

A uniform complexion can be maintained with “brightening” agents that include ingredients like kojic acid, AHAs, licorice root, and water-soluble derivatives of vitamin C, found in a variety of products from cleansers to toners and moisturizers. The development of new cosmetic-grade functional brightening agents, such as hexylresorcinol, pterostilbene, and 1-methylhydantoin-2-imide, is ongoing as cosmetic companies seek well-tolerated, effective alternatives to hydroquinone, the FDA-approved lightener.

## CONCLUSIONS

As we grow older, our skin’s inherent antiaging mechanisms diminish: defenses weaken, critical processes slow, and the rate of breakdown of key constituents increases. Although cosmetic procedures have a significant positive impact on specific aspects of aging, such as deep wrinkling, sagging, and volume loss, they do not necessarily address the overall quality of the skin. Recommending an at-home skincare regimen based on your patient’s individual needs is synergistic with the services cosmetic dermatologists and surgeons provide. Clinically proven products, formulated with the right ingredients for a specific skin concern and delivered in an esthetically appealing system, will both maximize the outcome and increase the longevity of benefits from the treatments we provide while empowering the patient to personalize and control their skincare journey.

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