



KEY POINTS

- This article reviews the anatomy of the lip area and considers how it changes with aging.
- In addition, it describes topical ingredients to improve hydration, fullness, barrier function and more.

Getting Lippy

Lip Aging and Topical Treatments: A Review

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The lips and eyes serve as visual foci for the face and youthfulness. The upper lip is especially important to the visual definition of attractiveness.¹ As such, consumers interested in a healthy and younger appearance have increased market interest in both lip products, such as fillers and other treatments, and lip aging.

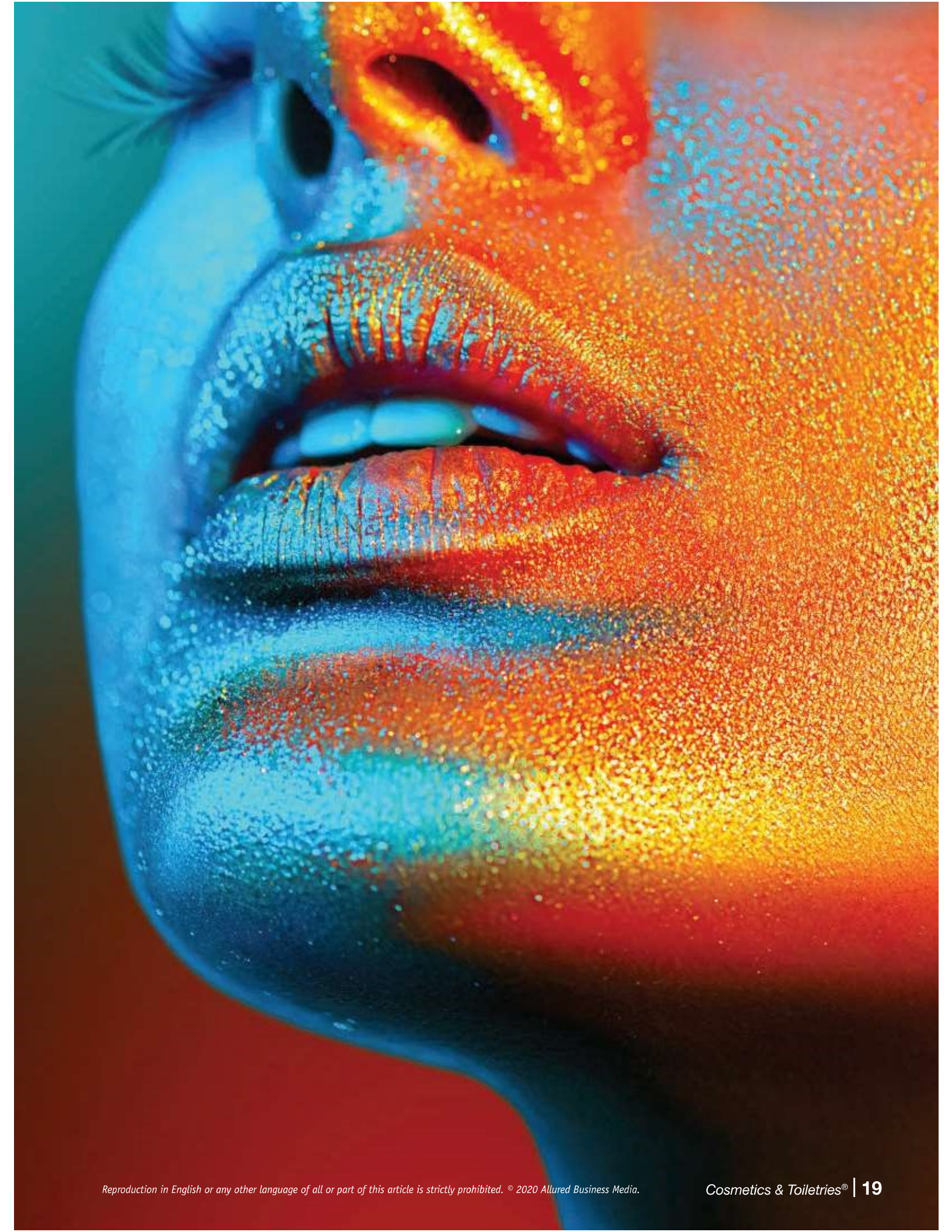
To formulate products for this particular body site, it is helpful to understand its biology since the structure varies from other facial skin. In fact, lips are more susceptible to earlier signs of aging than facial skin. For example, the lip area succumbs more readily to environmental assaults. Pollution, smoking, and

UVA/UVB, blue light and infrared exposure all easily target the lips with free radical damage, accelerating the aging process.

This article reviews the anatomy of the lip area and considers how this changes with age. In addition, it describes topical ingredients to improve hydration, fullness, barrier function, etc.

Macroscopic Lip Aging

Visible signs of aging of the lips and perioral area are primarily due to atrophy.² This results in a combination of sagging and deflation. In both men and women, upper lip measurements tend to lengthen while thickness and volume decline. These changes in lip geometry result in thinning and volume loss.³





With age, increasing changes in shape and color join dryness and chapping as visible signs of lip aging.

Bony changes of the underlying maxilla and dentition are also important to the changing appearance of lips with age.⁴ Bone density loss related to osteoporosis may cause a loss in lip contour and underlying support; in relation, dental health maintenance is important to lip shape.

The described structural changes are most successfully approached by using lip fillers and augmentation procedures. Here, successful lip rejuvenation should synergistically address both lengthening and volume loss.⁵

Microscopic Lip Aging

Smaller, progressive cellular changes also account for visual lip aging including dryness, cracking, the formation of lines within lips, “barcode lines” (previously termed *smoker’s lines*), blurring of the vermillion border, loss of volume, decreased rosiness/redness and decreased definition of the lip bow.

Until the age of 40, drying and chapping related to dehydration are the most visible lip problems. These issues continue into later years of life but after 40, increasing changes in shape and color⁶ join dryness and chapping as visible signs of lip aging.

Lip Anatomy and Age Defenses (or Lack Thereof)

Lip skin is poorly protected against transepidermal water loss (TEWL). In fact, TEWL

is approximately three times greater on the lips than on the cheeks, and this remains relatively constant on both skin sites from the ages of 21 to 80.⁷

Lips are eversions of the oral mucosa and have remarkably poor barrier function. This is due to their very thin stratum corneum.⁸ In relation, water-holding capacity directly impacts skin softness and smoothness⁹—and therefore, lip beauty.

The lips also are more fragile. They possess larger surface corneocytes and fewer cell layers than the face (see **Figure 1**). In fact, there are about five cellular layers in lip epidermis, compared with 15-20 cellular layers in other facial areas.¹⁰ This incomplete corneocyte development predisposes to further water loss and, in turn, fragility.

Lip roughness also correlates with stratum corneum ceramide levels, and the average carbon numbers of lip ceramides vary from other areas of the skin.¹¹ This leads to further impaired barrier function and TEWL.

The lips also lack the protection conveyed by several skin structures found elsewhere on the body. They have no protective hair follicles or sweat glands, which help with temperature regulation. The upper lip contains sebaceous glands¹² although the sebum content is less fortifying.

Lips also have few melanocytes.¹³ Depending on genetic background and Fitzpatrick type, the SPF equivalent of melanin in lips is far less than the amount found in other areas of the body, which ranges from three to four in Caucasian skin¹⁴ and up to 13.4 in the darkest Fitzpatrick skin types.¹⁵

Finally, blood vessel concentrations are more numerous and nearer to the surface in lips. While eleidin, a clear protein found between epidermal cells of the lips,¹⁶ allows the desired pink or ruby red color of the vessels—and youth—to show through, these surface vessels

The global lip care market was worth US \$1.94 billion in 2018 and is anticipated to reach \$2.51 billion by 2024; a projected CAGR of 3.7% over the forecast period.



Source: MarketWatch



Emollients and moisturizers are essential to lip products because they fortify the skin barrier and smooth, plump and moisturize the skin surface.

also predispose the lips to more dehydration and cracking.

Taken together, all of these factors contribute to a more fragile lip surface and increased susceptibility to environmental stress and aging.

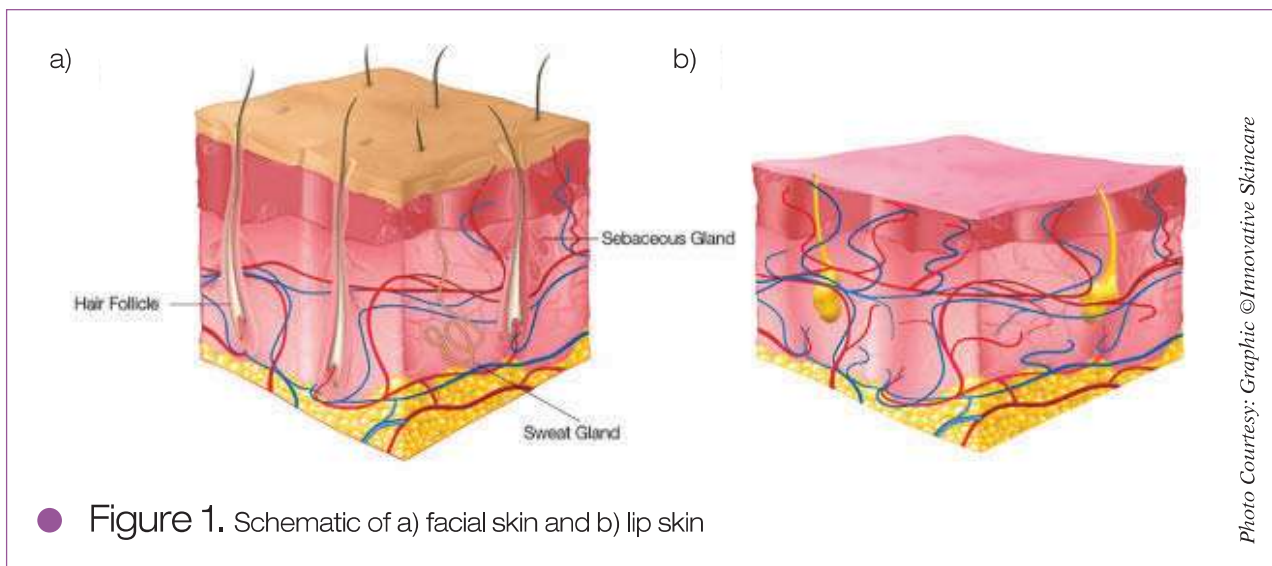
Topical Treatments

Following are examples of several ingredients that are helpful to counteract the intrinsic qualities of “more damage and less protection” in lip skin. Some of these have been used for years, and some are new.

Plumping effects: Freeze-dried hyaluronic acid (HA) filling spheres, for example, have previously been incorporated into products. Here,

the water usually held within hyaluronic acid has been removed by freeze-drying. The resulting structures form into small sphere that nestle within wrinkles and efficiently absorb water, swelling and immediately plumping the wrinkle.

A new generation of smaller and more complex HA filling spheres is also now available. These contain even smaller freeze-dried HA spheres and, in addition, within the sphere, a botanical borrowed from Traditional Chinese Medicine—*Amorphophallus konjac* root powder. The plant, also known as the voodoo lily or devil’s tongue flower,¹⁷ grows in Indonesia. Its roots contain glucomannan,¹⁸ a carbohydrate that absorbs large amounts of water. This water-





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also does double duty as an energy source for environmentally weakened or aging mitochondria, the energy factories within cells.

Emollients and moisturizers: Perhaps the most obvious topical treatments are emollients and moisturizers. These are essential to lip products because they fortify the skin barrier and smooth, plump and moisturize the skin surface. Some, such as cocoa butter,²¹ also serve as antioxidants. Other examples include glycerin,²² squalane,²³ and corn kernel oil²⁴—a lipid source that is bio-identical to human skin.

Anti-aging actives: The fullness associated with youthful, beautiful lips may also be augmented by topicals. Several ingredients increase collagen and elastin synthesis, including the safe and effective growth factor analog copper tripeptide-1.²⁵

Inflammatory agents: In contrast to the reparative and protective benefits of the described ingredients, some lip products, especially plumpers, may contain ingredients that temporarily increase apparent lip volume—albeit at a cost: up-regulated inflammatory processes, which ultimately are *pro-aging*.²⁶ These ingredients include extracts such as hot peppers, containing capsaicin, and high menthol concentrations, i.e., cinnamon or wintergreen. These only briefly cause the desired effect of lip swelling but as noted, do so by generating irritation.²⁷

Summary

Compared with facial and other areas of skin, the lip area is subject to greater damage and has fewer protective mechanisms. Thus,

holding ability is useful when combined with freeze-dried HA, which again, acts by immediately and effectively plumping lip wrinkles. Smaller and absorbable molecular chains of HA¹⁹ also are used to bridge distances between cells and increase fullness and plumpness.

Antioxidants and enzymes: Antioxidants also are useful to fortify the lip's lack of protection. Vitamins E and C in combination are an efficient team to protect both the lipid-rich and water-rich parts of lip skin cells. Finally, extremozymes,²⁰ or enzymes created by plants living in extreme environments, can proactively protect the lip's fragile DNA from a hostile environment.

Exfoliation: Despite attempts to care for lips, chapping and dryness still sometimes occur. In these cases, gentle exfoliation can remove the dry skin to prepare the lip for product application. Sucrose, a carbohydrate sugar, may be included in cosmeceuticals as an exfoliant. It



when selecting appropriate topicals for the lip area, the recommended objective is to fortify its protection and thereby lessen damage and slow the signs of aging.

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