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Probiotics are “body-friendly” bacteria that help balance our “good” and “bad” bacteria to help strengthen the immune system and support the body’s ability to remain healthy. Probiotics are live bacterial culture that, when applied topically, influence the composition of skin microflora. The first mention of topical probiotics as a therapeutic treatment for skin conditions appeared in the medical literature in 1912, and was termed “topical bacteriotherapy.” It was not until 1999 that researchers were able to hone-in on exactly how probiotic application to the skin might improve dermatological health. They found that *S. thermophilus*, a species of probiotic typically found in yogurt increased ceramide production in keratinocytes, the cells that create our skin, strengthening the lipid barrier of the skin and make it more resilient to dryness.¹

The cosmetic industry studied probiotic technology for nearly 15 years; finally, in 2017, researchers understand how it can help skin, according to New York City-based dermatologist Whitney Bowe MD. Recently there have also been an increasing number of skin care products entering the market touting probiotics. In this column, we will briefly review the science supporting the use of topical probiotics in skin care products.

Clinical Studies

Research has shown that the bacteria in our gut interacts with the immune system, which results in changes in skin. Harmful bacteria in the gut can lead to inflammation like redness, acne and rosacea. It is advisable to incorporate foods and drinks that are rich in probiotics, like yogurt, miso soup, sauerkraut and Kombucha (fermented tea).

Some prefer to take a probiotic supplement, too. Using a topical probiotic is beneficial, as it offers a protective shield and triggers the production of natural moisturizers in the skin. The October issue of *Journal of Microbiology and Biotechnology* published research findings that middle-aged adults showed improved skin hydration and elasticity and reduced wrinkles after taking a clinical dosage of oral probiotic supplement *Lactobacillus plantarum* for 12 weeks.

“Scientists are just starting to discern what constitutes a normal, healthy skin microbiome,” said Alan C. Logan, an independent researcher and co-author of “Your Brain on Nature.”

It is clear, however that the microbes residing on healthy skin make important contributions to the proper barrier maintenance. They also interact with the immune system and protect against harmful bacteria. A cream containing the lysate of *S. thermophilus* was found to significantly increase stratum corneum ceramide levels in healthy females after two weeks of application.² Skin hydration was also improved following use of probiotic lysate-containing cream.

Through the fermentation process, probiotic bacteria produce acidic compounds like lactic acid, reducing the pH of the skin. The skin microbiome is influenced by pH, sebum content, barrier function and hydration.³ A slight acidic pH favors the growth of *Propionibacterium*, it discourages the growth of most pathogens. Probiotic strains produce potent antimicrobials such as bacteriocidins, organic acids that prevent pathogen adhesion while more alkaline pH encourages the majority of resident species.

Propionibacterium species are more plentiful where sebaceous glands are present. Dry areas of the skin have the greatest diversity of species while having the lowest absolute number of bacteria. Furthermore, extrinsic factors such as geographic location, occupation and the use of antibiotics or cosmetics can influence skin microbiota.⁴

Studies indicate that alterations in skin microflora play a significant role in conditions such as atopic dermatitis, psoriasis, acne and skin cancer.⁵ Researchers⁶ demonstrated that a cream containing 10% *B. Longum* lysate improved sensitive skin after two months compared to vehicle control. There was a reduction in stinging after lactic acid, as well as an improvement in clinical dryness. In vitro studies on *B. Longum* lysate suggest, that it may reduce skin sensitivity by reducing neuron reactivity and neuron accessibility.⁷

Products and Benefits

Although probiotic bacteria have documented skin benefits, live cultures are generally not preferred in cosmetics. Rather than including live bacteria cultures, many of the probiotic skin care formulae use bacteria fragments or metabolites. The reason is that there is not currently any science developed to support the idea that live cells are any more effective when

applied to the skin than these fragments. In near future, some brands using live bacteria might emerge.

In 2013, the **American Academy of Dermatology** proposed the use of probiotics in the treatment of rosacea.⁸ Prebiotics are non-digestible, plant-based carbohydrates that discourage the growth of pathogens while preserving beneficial bacteria. Prebiotics can be incorporated into skin care products and are an excellent alternative to live bacteria.⁹ Bacterial lysates are also used in cosmetic formulations. Bacterial cell lysates provide broad biologic activity that can be harnessed to provide skin benefits. Skin care products containing these are well positioned for treating conditions characterized by an altered microflora. Cosmetics containing probiotics may also be helpful for improving skin health and beauty.

¹⁰ According to Dr. Erin Gilbert MD, Ph.D., probiotics are one of the most cutting edge concepts in skin care today. Probiotics based topical products address and correct a multitude of skin conditions including premature aging, acne, hypersensitivity, dullness, rosacea and inflammation. Probiotics when taken internally help with the health of digestive and immune system. It is beneficial in all skin types. Probiotics have proven themselves to be a powerful tool to achieve healthy, balanced and radiant skin.

Yun Company just launched (April 2017) to the European market two products contain live probiotics: ACN and ACN + creams with probiotic microcapsules. The probiotic bacteria are first deactivated and then stabilized by microencapsulation. Encapsulating the bacteria provide protection against the adverse environmental conditions in cosmetic formulations, thereby improving viability. The performance of the probiotic ingredient can be negatively affected by the preservative and emulsification system in the cosmetic product. Microcapsules provide protection. When product is applied topically, the microcapsules burst and deliver the probiotic. These products are packaged in airless tubes to prevent oxidative damage and are proven to last between six months to a year with no chemicals added to preserve the formulation. All products are biome friendly and they do not need refrigeration.

More and more companies are now entering the probiotic market including **L'Oréal** and **Estée Lauder. Clinique's Redness Solutions** foundation, for example features lactobacillus to reduce flushing by balancing the skin's pH. The British brand **Aurelia** is built around bifidobacteria, which is said to strengthen the skin's barrier, and **Elizabeth Arden's** SuperStart Renewal Booster contains a probiotic blend believed to boost skin's natural defenses.

More Study Ahead

In cosmetics, there is no standardized definition of probiotics and this makes it very difficult for consumers to really understand what to expect from a cosmetic product carrying a probiotic label. The health of our skin comes from deep within us. In recent years, study of the microbiome has led to innovations in medicine and health, including dermatology. The clinical studies conducted with topical prebiotics, probiotics and bacterial cell lysates do provide demonstrable skin benefits. It appears that more studies are warranted to confirm these skin benefits.

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