THE ROLE OF CUTANEOUS MICROBIOTA HARMONY IN MAINTAINING A FUNCTIONAL SKIN BARRIER

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Interplay between Skin Cells and Bacteria in Host Defense and Inflammation

- There is a balanced interplay between the host cells and resident and/or transient bacterial populations that is continuously affected by intrinsic (host) and extrinsic (environmental) factors (Figure 1).
- These factors alter the composition of the skin micro-organism community and influence skin barrier function by inducing an unbalanced state of dysbiosis that may be evidenced in chronic inflammatory skin diseases, such as atopic dermatitis, psoriasis, rosacea, or acne [1-3].
- Factors involved in the relationship between skin microbiota and the skin barrier function are summarized in Table 1.

Table 1. Relationship between skin barrier and skin microbiota

Relationship Between Skin Barrier and Skin Microbiota

- Probiotics: May affect comorbidities and diffuse many skin problems (e.g., slagging) involved in stratum corneum cohesion.
- Lipids: Break down surface lipids with potentially harmful by-products including fatty acids.
- Unseas: Virulence factor found in various pathogenic bacteria; essential in host colonization and in maintenance of bacterial cells in tissues.
- Biofilm: Protect bacterial colonies on the skin.
- Bacteriocins: Bacterial peptides regulating bacterial population.
- Quorum sensing: Needed for microbiota balance; effect not known on the skin.
- Skin nutrition: Supports commercial bacterial growth.
- Skin education: Immunology, by lipoxygenases (Gram-positive and Gram-negative bacteria).
- How Skin Human Barrier Interacts with Skin Microbiota

MOISTURIZERS FOR MAINTENANCE OF THE SKIN BARRIER AND A NORMAL SKIN MICROBIOME

Actions of Moisturizers

- Moisturizers bind water to the stratum corneum, improving the skin surface hydration. This has been shown repeatedly to improve the epithelial barrier function and reduce stinging, scaling, redness and cracks associated with xerosis.
- «To moisturize» does not only mean providing moisture, it also means preventing moisture evaporation from the skin. Moisturizers can be formulated with emollient, humectant, moisturizing, or occlusive agents; and some formulations have potential probiotic activity since they may provide food for the skin microbiota.
- Moisturizers may also have anti-inflammatory properties that potentially impact the skin microbiota.

Formulaion of Skin Care Products

- An important focus for the development of skin care products is maintaining an ecological balance in each skin niche [4-6].
- Classical moisturizers are able to protect the skin, but new generation formulations have been specifically developed to manage inflammation and preserve or restore both the skin barrier and the skin microbiota diversity.
- Key components of skin care products:

Prebiotics

- Prebiotics are ingredients and/or nutrients that selectively feed and/or fortify or of commercial skin bacteria.
- Prebiotics that might be included in skin products also have the potential to support maintenance of the normal skin microbiota [7-9].

Other Components

- Emollient agents, such as ceramides, included in moisturizers may be good carbon and nitrogen sources for bacteria. Ceramidase activity has been found in the bacterial skin flora and it has also been noted that skin ceramide levels are reduced in patients with atopic dermatitis [11-12].

Niacinamide (vitamin B3) is combined with emollients in some skin products and it is also employed in culture media for some bacteria. It may have benefit in promoting skin health as it has been shown to inhibit the growth of methicillin-resistant S aureus [20].

CONCLUSIONS

Understanding the complex relationship between normal skin barrier function and the skin microbiome is critical for the rational development of new skin care products. Appropriately developed formulations have the potential to selectively increase the activity and growth of beneficial microbiota, prevent skin dysbiosis, and restore or maintain efficient skin barrier function.

- This is particularly important for conditions in which barrier dysfunction may occur, such as dry skin, atopic dermatitis, reactive skin, exposure to aggressive cosmetic or hygiene routines; after aesthetic procedures; or the use of therapeutics including antibiotics and corticosteroids.

The studies reviewed suggest inclusion of prebiotics and selenium-rich thermal spring water may all increase the efficacy of moisturizers and that some of these benefits may be due to positive effects on skin microbiota.

REFERENCES