Maintenance and Repair of the Hydrolipidic Film with Skin Molecular Mimetic Emollients and Surfactants

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Abstract

The skin's barrier function mainly resides within the stratum corneum layer of the epidermis. It relies on the presence of keratinocytes (or corneocytes) embedded into a lipid-rich matrix. Another class of lipids is also secreted at the surface of the epidermis. Those lipids, when in contact with the environment interact with water forming the hydrolipidic film important for the skin sensorial attributes. Lipids of the hydrolipidic film can also diffuse back into the lipid matrix of the stratum corneum thereby actively participating in the skin barrier function. The use of soaps or detergents (normally containing surfactants) can have a deleterious effect on the integrity of the hydrolipidic film by creating lipid-depleted areas. Furthermore, surfactants from soaps can interact with proteins of the stratum corneum causing their denaturation. Ultimately, protein denaturation will trigger skin irritation, a phenomenon that is often associated with the repeated use of soaps. Through *in vitro* experiments and clinical trials, the efficacy of the ingredients Olivem®300 and the Olivem®400 series has been demonstrated. A very distinctive feature of those ingredients is the molecular similarity with the lipid composition of the hydrolipidic film found at the surface of the epidermis. Furthermore, the addition of Olivem®300 and the Olivem®400 series to soap, detergent or cleanser formulations can greatly reduce the pro irritancy potential. In other words, the Olivem®300 and the Olivem®400 series make cleansing formulations more compatible with the skin, especially with the hydrolipidic film.

Introduction

The importance of the skin barrier function is now well established as an important element for skin hydration and homeostasis. Traditionally, lipids of the stratum corneum and keratinocytes (or corneocytes) are themselves identified as the main components of the skin barrier function(1). A thin layer composed of various lipids including fatty acids is produced at the surface of the epidermis and combines with molecules of water. This phenomenon is responsible for the deposition of thin layers of fatty acids and water – hydrolipidic film – at the surface of the epidermis that plays important roles in the sensorial quality of the skin (Figure 1). One important feature of the hydrolipidic film is to provide a high surface energy(2) to the skin. This surface energy covering the epidermis gives a hydrophilic character to the skin; this is what makes the skin surface wettable. Lipids of the hydrolipidic film also diffuse retroactively within the lipid matrix of the stratum corneum (3). In the process, hydrolipidic film lipids merge with the lipid matrix already established between the keratinocytes of the stratum corneum. The hydrolipidic film is thus not only important for the skin sensorial aspect and wettability but also functionally contributes to the skin barrier function.

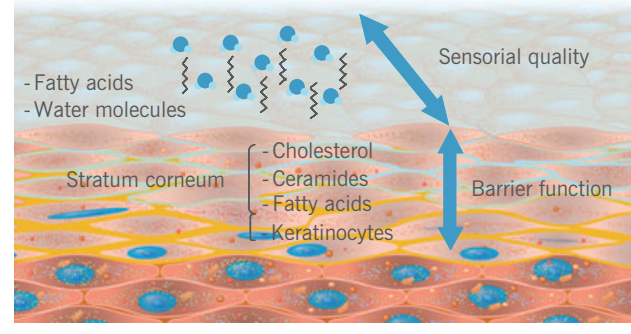

Figure 1: The hydrolipidic film and its interaction with the epidermis

The hydrolipidic film is composed of various lipids including fatty acids that can interact with water molecules to form a thin hydrolipidic film at the surface of the epidermis. The lipid fraction of the hydrolipidic film can also penetrate into the upper layers of the epidermis merging with the lipid matrix (a mixture of cholesterol, ceramides and fatty acids) embedding keratinocytes. The hydrolipidic film contributes to the skin sensorial quality as well as to the barrier function of the skin.

Cleansers and soaps may contain surfactants that can discompose the integrity of the hydrolipidic film thereby provoking lipid-depleted areas at the surface of the epidermis. This delipidifying action leads to a change in skin topography and may lead to alterations of the skin sensorial quality. Results can include skin dryness, roughness, flakiness and a tightening feeling. Moreover, surfactant micelles and surfactant monomers can also penetrate into the upper layers of the epidermis interacting with stratum corneum lipids and proteins, respectively. Ultimately, soap applications might lead to barrier function defect and induction of skin erythema(4).