A New Functional Moisturiser with 3-in-1 Strategy to Improve the Skin Barrier Function

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Introduction

One of the skin's primary functions is to protect our body from external aggressions such as allergens, irritants, chemicals, as well as from water loss from the inside.

Stressful environmental conditions – including weather (cold, wind, sun) and pollution – in addition to daily-used products, such as soap and surfactants, may alter the skin's natural water balance and affect its protective functions. If the skin's protective barrier is compromised, skin becomes dry and flaky and more sensitive to external stress factors and aggressions, such as pollution, air-conditioning and frequent cleansing. Dry skin is also more prone to inflammation and injuries.

To support the skin's natural mechanism of moisturisation we have designed Aqu'Activ™, an active ingredient to restructure the stratum corneum from the inside and to ensure an optimal regulation of epidermal homeostasis, resulting in improved moisturisation and elasticity.

Functional Moisturisation

The skin provides the first and most efficient defence of the body against water loss and external aggressions. Located at the level of the epidermis, the upper thinnest layer called stratum corneum (SC) especially ensures this barrier function by means of the specific structure, often referred to as a 'brick and mortar' model, of corneocytes ('bricks') and intercellular lipid domains (hydrophobic 'mortar'). Failure of skin barrier function increases trans-epidermal water loss and leads to dry and flaky skin, inflammation and injuries[1].

The skin's internal or endogenous mechanism of maintaining moisturisation is centred on barrier function preservation. The biological mechanisms involved favour healthy skin by action on keratinocyte differentiation across the constitutive layers of the epidermis to allow a permanent supply of SC constitutive cells. Additionally, control of skin semi-permeability through corneocyte cohesion plays a key role in skin moisturisation and protection.

In parallel, a well-balanced extracellular lipid composition is essential to efficient functional moisturisation. More precisely, the lipid matrix composition involves three predominant classes of biomolecules: ceramides, cholesterol and fatty acids. The biosynthesis of these lipids occurs throughout the constitutive layers of the epidermis before delivery into the intercellular space by secretion of lamellar bodies. Lipids in the SC are further processed by enzymatic activity (e.g. ceramidase induced ceramide degradation).

Impairment of skin homeostasis arises from defective cell differentiation, incomplete cornified envelope formation and/or perturbation of the lipid matrix resulting from reduced lipid biosynthesis and ceramidase over-activity.

The Three Dimensions of Aqu'Activ™

Composed of a calcium compound and a ceramidase inhibitor, Aqu'Activ™ is a preservative-free functional moisturiser that acts in a 3D manner to restructure SC functions from the inside, ensuring an optimal condition of the epidermis.

First, it supports keratinocyte differentiation, by increasing the levels of the enzyme transglutaminase 1 and the protein involucrin, two specific markers of this process. Secondly, it enhances the level of tight junction proteins occludin and ZO-1 that play an important role in connecting neighbouring cells. And thirdly, it maintains an optimal lipid balance by accelerating the synthesis of new lipids and inhibiting ceramide degradation.

Aqu'Activ™'s mechanism of action, and thus the efficacy of its two active components, was demonstrated in several *in vitro* tests.