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Abstracts

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Review Article

LEKTI-1 in sickness and in health

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The stratum corneum (SC) is a biosensor that mediates responses to a variety of exogenous insults through various signalling mechanisms, including the activation of SC serine proteases (SP) kallikrein cascade. The SPINK5 gene encodes an SP inhibitor, the lympho-epithelial-Kazal-type-1 inhibitor (LEKTI-1), which in turn will buffer the excess of SP cascade initiation, key in the maintenance of permeability barrier homeostasis. We demonstrate that LEKTI processing can occur within the SC after secretion from stratum granulosum keratinocytes at least partially by klk7, an SC-specific chymotryptic SP. Unlike the recently described LEKTI-2, neither recombinant full-length LEKTI-1 nor recombinant LEKTI-1 fragments exhibit antimicrobial activity. Finally, we discuss the pathophysiological implications of LEKTI-1 in skin biology as well as its contribution to the pathogenesis of Netherton Syndrome and its potential involvement in atopic dermatitis.

Review Article

Natural surfactants used in cosmetics: glycolipids

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Cosmetic surfactant performs detergency, wetting, emulsifying, solubilizing, dispersing and foaming effects. Adverse reactions of chemical synthesis surfactant have an effect on environment and humans, particularly severe in long term. Biodegradability, low toxicity and ecological acceptability which are the benefits of naturally derived surfactant that promises cosmetic safety are, therefore, highly on demand. Biosurfactant producible from microorganisms exhibiting potential surface properties suitable for cosmetic applications especially incorporate with their biological activities. Sophorolipids, rhamnolipids and mannosylerythritol lipids are the most widely used glycolipids biosurfactant in cosmetics. Literatures and patents relevant to these three glycolipids reviewed were emphasizing on the cosmetic applications including personal care products presenting the cosmetic efficiency, efficacy and economy benefits of glycolipids biosurfactant.

The alkaline pH-adapted skin barrier is disrupted severely by SLS-induced irritation

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The pH of the healthy skin is 5.5 and maintained by many regulatory mechanisms. The pH of the skin care product we use on a daily basis can have an influence on the skin properties. To investigate how the physical properties of skin change after the alkaline or acidic pH of the skin care products are applied on the skin for a long term, we adjusted the pH of the skin care products to 3, 5 and 8 (A, B, C), with glycolic acid and triethanolamine. For 5 weeks the skin care products were applied on 20 healthy subjects' ventral forearm and the skin physical properties were measured. After 5 weeks, skin responses to the external stress of 1% (w/v) SLS (sodium lauryl sulphate) irritation and erythema by UV were measured. Skin colour and skin UV response were not altered by the pH. However, on the C-applied site (pH 8) the transepidermal water loss of stratum corneum (SC) increased significantly, the water content increased and desquamation decreased, respectively, and the SLS significantly impaired the skin barrier in comparison with other sites. The alkaline skin care product impaired the skin barrier after repeated application over 5-week period and the skin barrier was disrupted severely by 1% SLS exposure because SC was already impaired by alkaline pH and sensitive to external stress. This suggests that the pH of daily skin care products is very important for skin barrier homeostasis.

Effects of topical gluco-oligosaccharide and collagen tripeptide F in the treatment of sensitive atopic skin

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Sensitive skin is a dermatological problem of increasing incidence in western countries and is sometimes associated with atopic condition and bacterial sovrainfection. The purpose of this study is to evaluate in a double blind, randomized, placebo controlled trial the efficacy of gluco-oligosaccharide and collagen tripeptide F in controlling the signs and symptoms of sensitive atopic skin. Forty female subjects (age, 30–59 years) affected by non-lesional atopic sensitive skin entered the study. Skin sensitivity was determined by a dermatologist on the basis of medical history, stinging test, dermatological examination and a questionnaire. A treatment with the test products (active and placebo) was carried out for 4 weeks. Measurements and clinical evaluation were carried out at baseline and at the end of the study. The following objective parameters investigated were bacterial count, skin pH and colour, transepidermal water loss (TEWL), stratum corneum hydration, skin roughness and mechanical properties. Clinical assessment included also a scoring system for dryness, desquamation, irritation, erythema and papules. Significant differences were found in the active treated group when compared with the placebo and in particular for instrumental parameters of roughness ($P < 0.02$), volume ($P < 0.01$), TEWL ($P < 0.02$), erythema ($P < 0.0006$) and clinical parameters of dryness, desquamation and irritation ($P < 0.001$). Moisturization levels and skin colour improved significantly in both the active and placebo groups. In conclusion, the study shows that the modulation of bacterial proliferation and normalization of skin barrier properties and stratum corneum moisturization can improve the symptoms of sensitive skin.

In vitro evaluation of the cutaneous penetration of sprayable sunscreen emulsions with high concentrations of UV filters

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The aim of this study was to evaluate the possible penetration through human skin of organic and inorganic filters contained in sunscreen emulsions packaged in aerosol cans, using an in vitro method. Experiments were carried out on two different types of emulsion: W/Si and W/O. This study was conducted using static diffusion cells (Franz cells). The determination of organic UV filters [Methylene Bis Benzotriazolyl Tetramethylbutylphenol (MBBT); Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine (BEMT); Diethylamino Hydroxybenzoyl Hexyl Benzoate (DHHB); Ethylhexyl Methoxycinnamate (EMC); and 2-Ethylhexyl Dimethyl PABA (ED-PABA)] was performed by High Performance Liquid Chromatography (HPLC). Therefore, it was important to develop a single analytical method for the quantification of the five organic filters with the aim of facilitating the experiment. The determination of inorganic filters [titanium dioxide (TiO_2) and zinc oxide (ZnO)] was performed using an emission spectrometric analysis method (ICP-OES). The HPLC and ICP-OES methods were validated. After a penetration test of 24 h duration, the results showed very low penetration only for two of the organic filters (maximum penetration of 1.21 $\mu g\ cm^{-2} h^{-1}$ for EMC and 0.14 $\mu g\ cm^{-2} h^{-1}$ for MBBT) and no penetration for the inorganic filters. Moreover, more than 50% of each sunscreen agent stayed on the surface on the skin. These results are consistent with those in the literature that presents similar experiments. This study showed that the sprayable sunscreen products developed, which contained high concentrations of UV filters, presented a low level of skin penetration.

Comparative analysis of solar radiation-induced cellular damage between ex vivo porcine skin organ culture and in vitro reconstructed human epidermis

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Reconstructed human epidermis models (RHE) constitute an innovative alternative to study phototoxicity and photoprotection in the cosmetic industry. However, little information is currently available concerning the harmful effects of solar-simulated radiation (SSR) in these in vitro skin models. In this study, the phototoxic effects of a single acute SSR dose of 275 kJ m^{-2} were evaluated in a validated RHE model (from SkinEthic), and were compared with those obtained from an ex vivo skin organ culture recently developed from domestic pig ears. The RHE model was well differentiated in vitro and released a significant level of the cytosolic enzymes lactate dehydrogenase (LDH) and extracellular signal-related kinase 2 (ERK2) protein in the culture medium 24 h after SSR exposure. The SSR-induced cytotoxicity was related to the formation of sunburn cells and the appearance of DNA damage (thymine dimer and DNA fragmentation) in keratinocytes. Interestingly, these DNA alterations were associated with the activation of the caspase-3 protease, mainly in the basal layers of the epidermis. In addition, the RHE model responses were comparable with porcine skin following solar irradiation, and none of the above cellular responses was observed in non-irradiated skin models. Finally, topical application of a broad-spectrum UVB + A sunscreen formulation efficiently protected both the RHE and pig skin against the deleterious effects of SSR. Thus, both RHE and ex vivo pig skin organ culture models are complementary tools in the assessment of SSR-induced DNA damage and apoptosis, and they may be used to evaluate the photoprotective capacity of cosmetic formulations.