Abstract

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Title of diploma thesis: Study and Evaluation of Topically Applied Ceramides onto Disrupted Skin Barrier

Skin is the largest organ of the human body and serves several key functions, such as protection against external influences and regulation of body temperature. Healthy skin is able to maintain the integrity and stability of the organism due to its complex structure. The skin is composed of several layers of cells, including the stratum corneum (SC), which forms the main protective barrier.

Ceramides (CER) are one of the main types of barrier lipids found in the SC. These lipid molecules, along with other lipids, create a hydrophobic matrix that protects the skin from dehydration and other external influences. The lack of CER in the skin barrier leads to the disruption of its function and the worsening of the skin condition. This is associated with many diseases, such as dermatitis, psoriasis, and others. The study of CER in the SC is important to understand the mechanisms of skin protection and to develop new therapeutic approaches for the treatment of skin diseases.

Topical administration of barrier lipids, especially CER, is one possible treatment route for skin diseases. Therefore, the aim of this work was to prepare formulations containing CER and assess their effect on modelled damaged SC; specifically, CER AP and CER EOS were studied. Several emulsion formulations were prepared, and the effect of individual components and CER concentration on the stability of the formulations was investigated. The individual formulations were evaluated by optical microscopy, and the effect of barrier lipids on modelled damaged skin tissue was described by transepidermal water loss (TEWL) and infrared spectroscopy. Three permeation experiments were performed in this work, and the results show that lipids from topical formulations penetrate into damaged SC, but the TEWL values do not indicate statistical improvement of the barrier properties of this barrier. It was also found that topically applied lipids do not statistically worsen the arrangement of lipid chains in SC models.

This work could serve as a basis for changing the composition of formulations and thus contribute to a better understanding of the impact of CER on damaged SC. This could facilitate their use in the therapy of pathophysiological processes in the skin barrier.