Abstract

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Title of diploma thesis: **STUDY OF FREE SPHINGOID BASES IN SKIN BARRIER**

The skin barrier, localized in the *stratum corneum* (SC), consists of corneocytes and an intercellular matrix formed from three types of lipids – ceramides, free fatty acids, and cholesterol, represented in an equimolar ratio. The overall arrangement of lipids is organized and highly specialized.

Ceramides are structurally formed from the fatty acid acyl attached to a sphingoid base. In minor but not insignificant amounts, free sphingoid bases can also be found in the skin barrier. Several studies show that there is an increased concentration of free sphingoid bases in skin barrier disorders, such as atopic dermatitis. Although it is assumed that the presence of free sphingoid bases affects the skin barrier, it is not elucidated the way of their participation till today. The lack of studies or their diverse results leads us to the main goal of this thesis – to clarify how free sphingoid bases influence the skin barrier.

In this work, the model membranes were prepared by the isolation of human SC *ex vivo*. Sphingosine (S), dihydrosphingosine (dS), and phytosphingosine (P) were applied onto the SC. For more comprehensive assessment there were used both bases themselves and some of their mixtures in defined ratios, which mimic the condition of physiological and pathological SC. Sphingoid bases were applied as 1% suspensions in the mixture of propylene glycol and ethanol in a ratio of 7:3 (v/v), as same as their mixtures. The experiment investigated the permeation parameters – transepidermal water loss (TEWL), electrical impedance (EI), and membrane permeability for the model permeant theophylline (TH). Permeation parameters were measured for each

group of samples in two phases – before and after application of suspensions of sample or mixture of solvents on the control membranes. Based on the evaluation of results of permeation experiments in this thesis, it is possible to confirm the assumption that free sphingoid bases influence all three tested parameters. In model membranes with added suspensions of S, dS and P, there were observed increased TEWL, decreased EI, and increased flux of TH. It can be concluded that the individual sphingoid bases are not equivalent. Each of them influenced the permeation parameters in a varying manner.

This thesis outlines the issue of the influence of free sphingoid bases on the permeability properties of the skin barrier. It becomes a part of more complex knowledge which could further include, for example, the influence of free sphingoid bases on the structural arrangement of SC or pathological processes in the skin barrier.