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Skin barrier models: From barrier formation to possible topical application of barrier lipids

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The skin barrier, located in the stratum corneum (SC), is an essential component in the existence of land mammals, including humans. The structure is composed of the corneocytes, free (ceramides, free fatty acids and cholesterol) and covalently bound lipids.1 The amount of barrier lipids and also their arrangement in the intercellular space of the SC can change and that change is typical for some skin diseases and for damage of the barrier function as well. Understanding the process of the arrangement of lipids into lamellar structures is essential for finding new more effective approaches to treating skin diseases. The aim of this work is to develop a simple and valid procedure for delipidization and then incorporation of lipids into damaged skin barrier as well. For this purpose, skin barrier models were used, i.e., extracted human SC with topically applied barrier lipids. With the lipid replenishment, there was emphasis placed on the control of the time and physico-chemical conditions during the lipid lamellae formation, especially on the change in pH of the aqueous phase. The barrier lipids extracted from healthy human skin were transferred to an aqueous alkaline environment (HEPES buffer solution; pH around 8) to form lamellar lipid vesicles, so-called liposomes/cerosomes. In this work, the amount of hydrochloric/acetic acid, which acidifies the lipid vesicles to a physiologically acidic pH, was monitored. Dialysis membranes for controlled acidification were used to achieve the slow arrangement of barrier lipids. The prepared models were evaluated by X-ray diffraction (repeated distance of lipid lamellae) and infrared spectroscopy (orthorhombic vs. hexagonal packing and phase separation).

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References:

1. Vávrová K., Kováčik A., Opálka L. European Pharmaceutical Journal, 64(2), 28–35 (2017)