ABSTRACT

Charles University, Faculty of Pharmacy in Hradec Králové

Department of Pharmaceutical Technology

Author: Iva Hrdinová

Supervisor: doc. PharmDr. Andrej Kováčik, Ph.D.

Title of diploma thesis: Study of corneocyte lipid envelope

The *stratum corneum* (SC) is the uppermost layer of the human epidermis. The structure of this layer is composed of corneocytes which are surrounded by a lipid matrix. Besides the free lipids (ceramides, free fatty acids, and cholesterol), there are covalently bound lipids called the corneocyte lipid envelope (CLE). While the role of free lipids is known, the effect of the CLE on the SC permeability is still unclear. In this work, we aimed to answer the question: "*Is the CLE important in the skin permeability, and does the CLE play any role as a template for the free lipid arrangement in the SC?"* A partial aim of this work was to develop a valid method for the preparation of the CLE models, including SC delipidation/relipidation procedures. We prepared the SC models from the human epidermis. First, we extracted the free lipids from SC with organic solvents, and then we saponified the extracted SC with alkaline methanol. The free lipids were then applied onto the extracted and saponified SC in an organic solvent under different temperature conditions (room temperature vs. heating). The barrier properties of the prepared models were investigated by measuring trans-epidermal water loss (TEWL), electrical impedance, and the permeability of the model permeant. While we observed a significant decrease of TEWL and flux of model permeant in extracted SC models + applied lipids, we did not see any differences in the case of saponified SC models with barrier lipids. This study confirms our hypothesis that the CLE act as a template for the orientation of the free barrier lipids and prevents permeable boundaries between the free lipids and corneocytes.