Abstract

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Title of thesis: Evaluation of preparation of monolayer lipid skin barrier models

Skin, the protective barrier of human body, consists of several layers. The uppermost one is the stratum corneum, part of epidermis, whose extracellular matrix is composed mainly of ceramides, cholesterol and free fatty acids. The composition and arrangement of skin lipids are essential for the proper skin barrier function. Various multilayer and monolayer models are used to study skin lipids at the molecular level. Some of the evaluation methods are Langmuir monolayers at the air interface.

In this work I dealt with the behavior of monolayer lipid models at four different pH values of the liquid subphase. Lipids isolated from human skin, lipid mixture prepared from the individual components, and a mixture of fatty acids were compared as well. Langmuir isotherms and the Brewster angle microscopy at different compression rates were used for this purpose.

The results showed that pH of the subphase has no major effect on lipids arrangement. Lipids were most likely to form a tight monolayer at neutral pH 7,0, at a higher pH (7,4), the molecules occupied a larger area. The physiological pH of the human skin is about 5.5, but at this value the lipids are not the most tightly arranged.

Free fatty acids, which were part of both samples, probably have an important effect on lipid organization and their behavior in the mixture. The influence of pH on the shape of fatty acid isotherms shows the same trend comparing isotherms of lipid mixtures.