

Abstract

Charles University in Prague, Faculty of Pharmacy in Hradec Králové

Department of Pharmaceutical Technology

Author: Anna Nováčková

Supervisor: Mgr. Barbora Školová, Ph.D.

Title of thesis: Study of skin barrier defects by lipid monolayers

Ceramides (Cer) together with free fatty acids and cholesterol form the intercellular space of the uppermost skin layer, the *stratum corneum* (SC). This lipid matrix presents the skin barrier, which protects human organism from environmental factors (endogenous substances, physical radiation) as well as prevents the body from water loss. Cer are synthesized from polar precursors: glucosylated Cer (GCer) and sphingomyelins by splitting the polar part by the hydrolytic enzymes β -glucocerebrosidase (β -GCer-ase) and sphingomyelinase. A lack of these enzymes leads to accumulation of precursors and a non-functional skin barrier is formed. The goal of this work was to study the β -GCer-ase defects by monolayer lipid models of the SC. The impact of GCer quantity on lipids organisation was evaluated by several techniques (Langmuir monolayers at the gas-liquid interface, Brewster angle microscopy and atomic force microscopy).

At the gas – liquid interface mixtures with precursor do not organise spontaneously at lower surface pressures (1.5 mN/m). However, with increasing surface pressure (20 mN/m) is the area per molecule of the mixtures with GCer lower than in the sample without precursor. The lipid mixtures containing both Cer and GCer are more compressible, while compressibility of mixtures containing only Cer or GCer is low. GCer does not prevent lipids from forming domains, but these are smaller and monolayer can form bilayer with higher surface pressures.

Results of this work brought interesting findings about behaviour of GCer in the monolayer lipid model of SC, which can be used for further research.