

ABSTRACT

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Title of Diploma Thesis: Synthesis and study of ceramides with deuterated acyl chain

Ceramides are a complex group of lipids belonging to sphingolipids. They are the most important component in *stratum corneum* and play an essential role in protecting the skin from excessive water loss and other environmental damages. Despite the fact that ceramides are a subject of intensive research, the exact effect of their structure on barrier skin function has not been fully explained.

The aim of this diploma thesis was to synthesize a series of ceramides derived from sphingosin with deuterated acyl chains with chain length 4C, 16C and 24C and their study using Fourier transform infrared spectroscopy to understand the behaviour of ceramides in SC and their structure-activity relationships.

The study of the synthesized ceramides using ATR-FTIR spectroscopy revealed that, at skin temperature, lipid chains are arranged in orthorhombic subcell, mostly with *all-trans* conformation. While the CerNS24 prefers extended conformation with its acyl associated with the acyl of LA and cholesterol associated with the sphingosin chain in prepared lipid mixtures, the CerNS16 does not mix with LA and adopts either hairpin conformation or extended conformation with random distribution of sphingosine and acyl chain. The results of this work confirmed that long hydrophobic chains in NS-type ceramides are necessary for the proper skin barrier function.