Non-lamellar Lipid Nanostructures in Drugs and Cosmetics: Solubilization, Encapsulation and Controlled Release

F. Tiberg[1,2], J. Barauskas[2], M. Johnsson[1], F. Joabsson[1], K. Thuresson[1]

[1]Camurus AB, Lund, Sweden

[2]Physical Chemistry 1, Lund University

Lund, Sweden

Liquid crystalline nanoparticles (LCNP) of well-defined shape, morphology and size have been prepared with use of different lipid constituents and preparation procedures. These are discussed in the context of potential applications in pharmaceuticals and cosmetics with focus on structure-composition-function relationships. Rational design and preparation procedures of high-definition LCNP particles have opened a wide-range of applications and future product opportunities in pharmaceuticals and cosmetics as exemplified below:

In injectable drug delivery high safety demands favor use of naturally occurring diacyl lipids for solubilization and encapsulation of active agents. A highly suitable LCNP system is for this application is composed of phosphatidyl choline (PC) and diacyl glycerol (DAG) dispersed and stabilized with polysorbate 80. Here we present physicochemical properties of dispersions and their solubilizing, encapsulating and sustained release characteristics of drug compounds from different drug classes (small molecules and peptides) and relate these to pharmacokinetic in-vivo behavior.

In non-parenteral applications the choice of lipid constituents is less restrictive and desired properties are often different, emphasizing permeation enhancement of active compounds in many applications such as transdermal delivery. Using self-dispersing and highly flexible “sponge” particle structures as is obtained with monoacyl lipids in combination with e.g. diacyl glycerol and suitable fragmentation agent is shown to provide an effective transdermal and oral delivery system.