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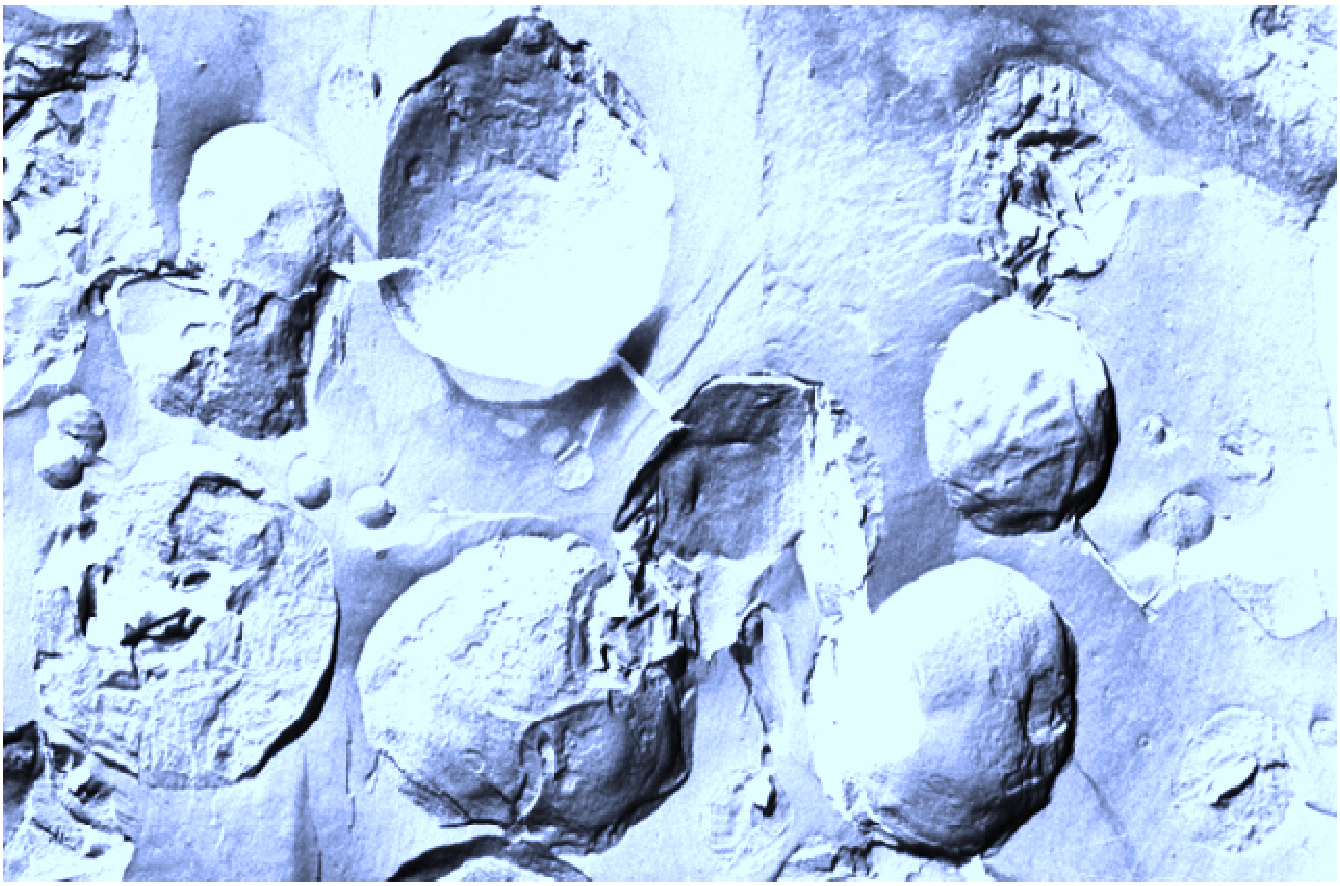


Liposomes and Nanoparticles
Delivery systems for cosmetic actives

mibelle SWISS QUALITY PRODUCT

Liposomes and Nanoparticles
Delivery systems for cosmetic actives

Nanoparticles
Ideal delivery systems for skin actives

Liposomes and nanoparticles are small vesicles formed by a monolayer or at least one bilayer membrane respectively of soy lecithin (phospholipids) under high pressure homogenization (1).

Whereas liposomes are typical carriers for hydrophilic substances, nanoparticles are the ideal delivery system to transport and protect lipophilic agents.

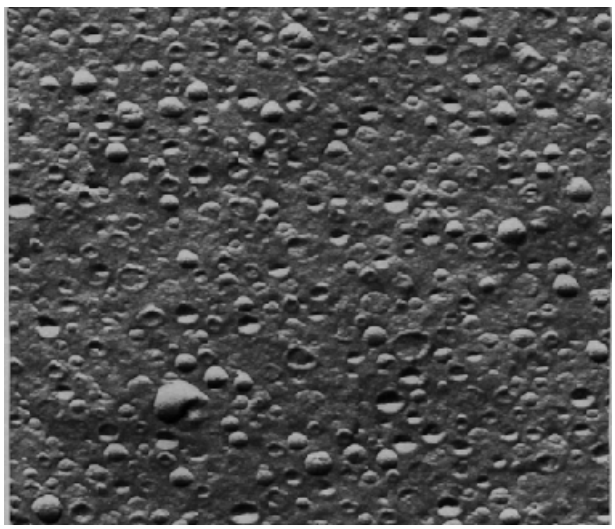
Additionally, these small Nanoparticles show unique physical properties and offer new application possibilities. Nanoparticles and Liposomes are very stable and have a high affinity to the Stratum corneum.

They perfectly fuse with the lamellar lipid structure of the Stratum corneum. Therefore, an enhanced bioavailability of the encapsulated material to the skin is achieved. They increase the stability of the active substances and their penetration into the skin (2).

Lecithin
Multifunctional Cosmetic Properties

Lecithin with its main component phosphatidylcholin exerts additionally positive effects on the skin as it reinforces the skin barrier by fusion with the Stratum corneum. It supports skin regeneration, enhances skin humidity, and promotes anti-aging and anti-acne properties (1).

EM of Nanoparticles



Freeze Fracture Electron Micrograph

Magnification: 100'000 x

Active Ingredients

Enhanced penetration with Nanoparticles and Liposomes

Efficacy of cosmetic active substances is determined by bioavailability. Most natural substances are not in a suitable form for performance, they have to be modified or converted. These modifications occur only in the living part of the epidermis. Prior to conversion the actives have to cross the Stratum corneum (3).

Therefore, bioavailability is highly dependent on the penetration potential of the active. However, penetration is a critical step for activity and is addicted to the formulation of the substances.

At the surface of the Stratum corneum the vesicles adsorb and fuse with the skin lipids and the active agents were released. In the external layer of the Stratum corneum the components of the Nanoparticles interact with keratin and the external lipid domain of the corneocytes. In the deeper cell layers a "depot effect" for the entrapped substances can be reached.

Clinical investigations clearly demonstrate that topical application of drugs, encapsulated in liposomes result in increased concentrations of the agents in the epidermis and dermis compared to conventional formulations.

On the other hand, the systemic concentration of these drugs are reduces compared to the controls (4). These results prove that liposomes are suitable vehicles for a selective drug delivery in the skin. Nanoparticles have a structure similar to Liposomes and can therefore perform in a similar way.

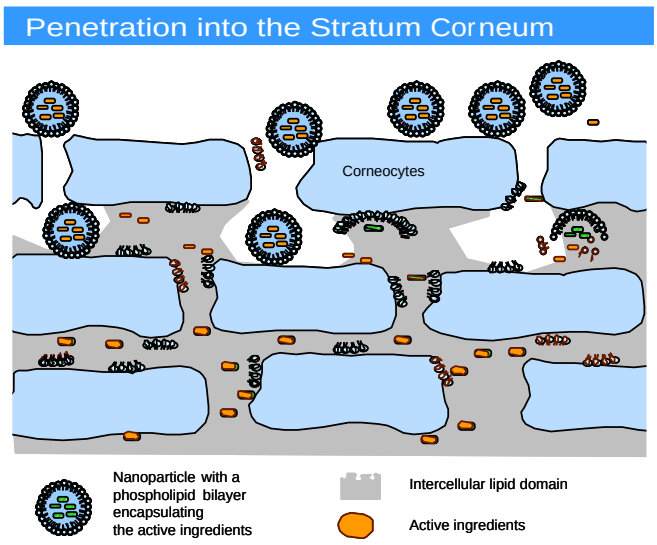


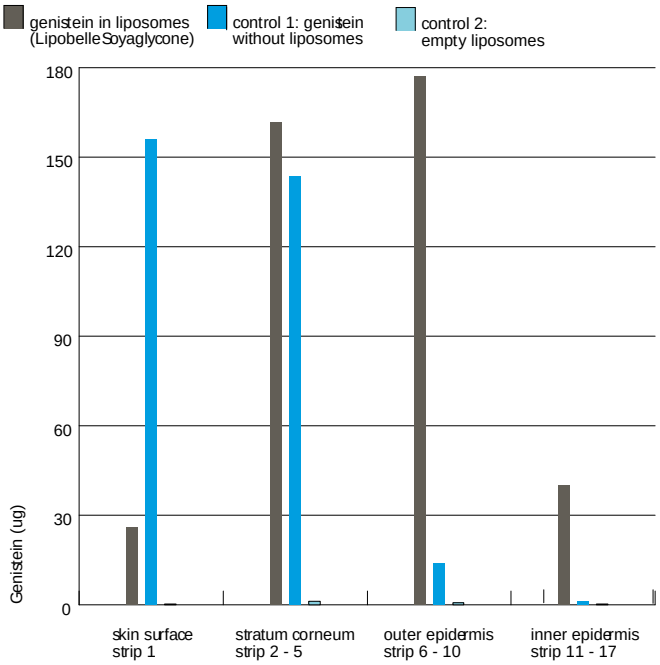
Fig.: Hypothetical interaction of Nanoparticles with the Stratum corneum.

Study results

Penetration and metabolism of topical liposomal Genistein

The penetration enhancement properties of Nanoparticles and Liposomes were shown in the following study, conducted with Genistein as active substance. Percutaneous absorption and metabolism of genistein found on stripped Stratum corneum after application of the following test preparations: 0.3% genistein in Liposomes, 0.3% genistein without Liposomes, and 0.55% genistin in Liposomes (3).

The study results demonstrate that Liposomes can tremendously enhance penetration of active substances into skin. Instead of remaining in the outermost layers (strip 1-3), actives in Liposomes penetrate into deeper layers of the Stratum corneum (strip 4-10).



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(3) Schmid, D., *et al*. Penetration and Metabolism of Isoflavones in Human Skin. *Cosmetics and Toiletries* 118, 71-74 (2003)

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