

Nanovesicles and Human Skin Interaction: A Comparative Ex-Vivo Study

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Streszczenie

The topical administration of drugs on the skin by nanovesicular systems can represent a tool to treat skin pathologies. The study of nanovesicle biodistribution after skin administration is crucial to understanding their transdermal potential. A formative study enabled us to investigate the influence of some methods in the production of nanovesicles based on phosphatidylcholine, differing in their ethanol amount. Particularly, both liposomes and ethosomes produced by different methods, i.e., microfluidics and solvent injection, were considered. The evaluation of size distribution, shape and internal morphology was performed using photon correlation spectroscopy, cryogenic electron microscopy, hyperspectral dark-field microscopy and small-angle X-ray scattering. Transmission electron microscopy was then used to observe and compare the transdermal passage of selected liposomes and ethosomes applied to human skin explants in a bioreactor. The mean diameters of nanovesicles prepared by the ethanol injection method were smaller with respect to those obtained by microfluidics, measuring roughly 140 and 230 nm, respectively. The uni- or multilamellar ultrastructure of the vesicles was influenced by the solvent injection procedure. Ultrastructural analysis of skin penetration revealed (i) the ability of intact vesicles to cross the different skin layers, with ethosomes produced by the water injection method showing greater transdermal potential and (ii) the role of ethanol as a penetration enhancer.

Słowa kluczowe

skin, ethosome, liposome, transmission electron microscopy, hyperspectral dark microscopy, microfluidics

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