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Artificial Membrane Comparison for Skin Permeation in Skin PAMPA

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Abstract : The modified Franz cell is the most widely used model for in vitro permeation studies, however it still presents some disadvantages. Thus, some alternative methods have been developed such as Skin PAMPA, which is a bio- artificial membrane that has been applied for skin penetration estimation of xenobiotics based on HT permeability model consisting. Skin PAMPA greatest advantage is to carry out more tests, in a fast and inexpensive way. The membrane system mimics the stratum corneum characteristics, which is the primary skin barrier. The barrier properties are given by corneocytes embedded in a multilamellar lipid matrix. This layer is the main penetration route through the paracellular permeation pathway and it consists of a mixture of cholesterol, ceramides, and fatty acids as the dominant components. However, there is no consensus on the membrane composition. The objective of this work was to compare the performance among different bio-artificial membranes for studying the permeation in skin PAMPA system. Material and methods: In order to mimetize the lipid composition`s present in the human stratum corneum six membranes were developed. The membrane composition was equimolar mixture of cholesterol, ceramides 1-O-C18:1, C22, and C20, plus fatty acids C20 and C24. The membrane integrity assay was based on the transport of Brilliant Cresyl Blue, which has a low permeability; and Lucifer Yellow with very poor permeability and should effectively be completely rejected. The membrane characterization was performed using Confocal Laser Raman Spectroscopy, using stabilized laser at 785 nm with 10 second integration time and 2 accumulations. The membrane behaviour results on the PAMPA system were statistically evaluated and all of the compositions have shown integrity and permeability. The confocal Raman spectra were obtained in the region of 800-1200 cm-1 that is associated with the C-C stretches of the carbon scaffold from the stratum corneum lipids showed similar pattern for all the membranes. The ceramides, long chain fatty acids and cholesterol in equimolar ratio permitted to obtain lipid mixtures with self-organization capability, similar to that occurring into the stratum corneum. Conclusion: The artificial biological membranes studied for Skin PAMPA showed to be similar and with comparable properties to the stratum corneum.

Keywords : bio-artificial membranes, comparison, confocal Raman, skin PAMPA
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