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Niosomes as carriers for enhanced and prolonged transdermal drug delivery

Marzia Brunelli, Andrea Molin, René M. Rossi and **Giuseppino Fortunato**
Empa, Laboratory for Biomimetic Membranes and Textiles, Switzerland

Statement of the Problem: Chronic skin conditions affect a high percentage of the population worldwide. Despite their efficacy, prolonged exposure to currently available treatments can lead to serious consequences, allowing to exploit their benefits to a limited period of time.. Recently, a new type of nanoparticles called niosomes (NNPs) emerged as a potential drug delivery system for the treatment of skin diseases due to their numerous advantages: NNPs are known to be non-toxic due to their non-ionic surfactant-based nature, highly stable, and easy and cheap to produce. NNPs also performed enhanced transdermal penetration of drugs compared to liposomes due to their ability in modifying the skin bilayer structure through the variation of the surface charge by the use of dicetylphosphate (DCP) and by the incorporation of enhancers in the niosomal formulation such as α-linolenic acids (Ω3). Methodology & Theoretical Orientation: Niosomes were developed by thin film formation and selected formulations were tested (no DCP, DCP and Ω3). Optimization of the loading efficiency of pyranine (HPTS) was performed, to achieve encapsulation of a fluorescence molecule able to assess the release capability over time and track the penetration of NNPs through the skin. Release studies were performed by the use of Franz cells on either gel formulations or encapsulating the NNPs into electrospun fibers to further steer the release over time. Penetration was assessed *in vitro* onto human skin. Findings: The highest values of loading efficiency into niosomes were obtained for NNPs Ω3 amounting to 86.8±0.9%. Preliminary results showed that NNPs provide a controlled release when encapsulated into electrospun fibers. Conclusion & Significance: This study presents a novel complex system combining the properties of nanoparticles and electrospun membranes as wet dressings to be used for the treatment of skin diseases, providing a sustained release over time and enhanced penetration capabilities..