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PD en Evaluación, Desarrollo y Utilización Racional de Medicamentos

NIOSOMES BASED ON A CATIONIC LIPID AND DIFFERENT HELPER LIPIDS FOR GENE DELIVERY

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Gene therapy has become one of the main areas of interest for scientists since it focuses on the possibility of delivering normal functioning genes into the cell to obtain therapeutic effects. However, the entry of the DNA into the cells and the protection of the genetic material against enzymatic digestion before reaching the nucleus, are two important factors that might hamper this process along with the comprehension of mechanisms of their intracellular delivery. On the other hand, it has been found that the addition of helper lipids in cationic lipids formulations affect transfection efficiencies, usually increasing it, and intracellular trafficking. Moreover, studies of cellular trafficking by the cationic carriers are still in progress. Therefore, there are few reports regarding this topic. In the present study, we designed four different niosome formulations based on the same cationic lipid and only changing the helper lipid (squalene, squalane, cholesterol, and without helper lipid) to analyze their intracellular uptake, cell trafficking, transfection efficiency, and cell viability. Synthesized amino lipid was formulated with tween 80 and different helper lipids. Resulted niosomes were characterized in terms of size, zeta potential, morphology and physical stability. Upon the addition of the pCMS-EGFP reporter plasmid, nioplexes were obtained. In vitro experiments were performed to evaluate the transfection efficiency and viability in ARPE-19 cells. For trafficking and uptake analysis, we employed Cy3-labeled plasmid DNA. Our results showed that the composition of the niosomes based on different helper lipids clearly affects the physicochemical parameters of the niosomes and therefore, the transfection efficiency and the entry via. Similar studies could be extended to more cationic lipids to advance in the research of safe and efficient non-viral vectors for gene delivery purposes. These findings might provide valuable information for designing cationic carriers and avoiding unexpected toxic side effects derived from cationic liposomal components.