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Nanostructured Lipid Carriers as the Most Promising Approach in Ocular Drug Delivery System

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Colloidal system particularly lipid nanoparticles received considerable attention over the past few years among the most popular drug delivery systems for ophthalmic application. Solid lipid nanoparticles (SLN) and Nanostructured lipid carriers (NLC), regarded as the first and second generation of lipid nanoparticles respectively, have emerged as promising approaches to deliver drugs due to their ability to prolong the residence time of dosage forms, reduce systemic absorption and administration frequency, and enhance bioavailability of drugs. As novel generation of nanoparticles, NLC consist of a mixture of biocompatible lipids, surfactants, and drugs, resulting in a structure with more crystal imperfections favorable to accommodate drugs. Despite that the drug plays the most important role in therapy, the formulation design and selection of suitable lipids are of great importance, as they are crucial for the performance of the delivery system. NLC combine the advantages of SLN and overcome limitations, such as poor long-term stability, low drug loading capacity, and possibility of drug expulsion. As drug delivery devices, NLC show great promise for ocular administration, due to their better biocompatibility, modified drug release kinetics, avoidance of organic solvents during production process, and feasibility of large scale production. Therefore, NLC system is a potential approach to improve ocular bioavailability and safe profile of drugs.

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