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A Review Oflipid-Based Drug Delivery System: Advances in Oral Application

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Abstract: *Lipid-based drug delivery systems (LBDDS) have emerged as a highly effective approach for improving the solubility, permeability, and oral bioavailability of poorly water-soluble drugs. These systems—comprising lipid solutions, emulsions, self-emulsifying systems, solid lipid nanoparticles (SLN), and nanostructured lipid carriers (NLC)—utilize physiological lipid digestion pathways to enhance drug solubilization and absorption. LBDDS facilitate increased gastrointestinal residence time, lymphatic transport, efflux inhibition, and reduced first-pass metabolism, making them particularly advantageous for oral delivery. Advances in nanotechnology and excipient design have further improved the stability, targeting efficiency, and therapeutic performance of lipid-based formulations. Despite challenges related to formulation complexity, scalability, and stability, LBDDS have demonstrated substantial promise in overcoming barriers associated with conventional drug delivery. This review highlights the mechanisms, classification systems, formulation strategies, and applications of LBDDS, emphasizing their role as a versatile and innovative platform for enhancing the therapeutic outcomes of modern pharmaceuticals.*

Keywords: Lipid-based drug delivery system (LBDDS); Oral drug delivery; Bioavailability enhancement; Poorly water-soluble drugs; Solid lipid nanoparticles (SLN); Nanostructured lipid carriers (NLC); Self-emulsifying drug delivery systems (SEDDS); Self-microemulsifying drug delivery systems (SMEDDS); Lipid formulation classification system (LFCS)

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