Role of Self-Emulsifying Drug Delivery Systems in Optimizing the Oral Delivery of Hydrophilic Macromolecules and Reducing Interindividual Variability

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Abstract:

Self-emulsifying drug delivery systems (SEDDS) have been widely employed to improve the oral bioavailability of poorly soluble drugs. In the past few years, SEDDS were extensively investigated to overcome various barriers encountered in the oral delivery of hydrophilic macromolecules (e.g., protein/peptide therapeutics and plasmid DNA (pDNA)), as well as in lowering the effect of food on drugs' bioavailability. However, the main mechanism(s) by which SEDDS could achieve such promising effects remains not fully understood. This review summarizes the recent progress in the use of SEDDS for protecting protein therapeutics and/or pDNA against enzymatic degradation and increasing the oral bioavailability of various drug substances regardless of the dietary condition. Understanding the underlying mechanism(s) of such promising applications will aid in the future development of rationally designed SEDDS. Entrapment of hydrophilic macromolecules in the oil phase of the formed emulsion is critical for protection of the loaded cargoes against enzymatic degradation and the enhancement of oral bioavailability. On the other hand, drug administration as a preconcentrated solution in the SEDDS preconcentrate allows the process of drug absorption to occur independently of the dietary condition, and thus reducing interindividual variability that results from concomitant food intake.

Keywords:

Self-emulsifying drug delivery systems (SEDDS), Protein/peptide therapeutics, Plasmid DNA, Gene delivery, Food, Oral delivery.

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