The effect of oil components on the physicochemical properties and drug delivery of emulsions: Tocol

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摘要

Abstract

An emulsion system composed of vitamin E, coconut oil, soybean phosphatidylcholine, non-ionic surfactants, and polyethylene glycol (PEG) derivatives (referred to as the tocol emulsion) was characterized in terms of its physicochemical properties, drug release, in vivo efficacy, toxicity, and stability. Systems without vitamin E (referred to as the lipid emulsion) and without any oils (referred to as the aqueous micelle system) were prepared for comparison. A lipophilic antioxidant, resveratrol, was used as the model drug for emulsion loading. The incorporation of Brij 35 and PEG derivatives reduced the vesicle diameter to <100 nm. The inclusion of resveratrol into the emulsions and aqueous micelles retarded the drug release. The in vitro release rate showed a decrease in the order of aqueous micelle system > tocol emulsion > lipid emulsion. Treatment of resveratrol dramatically reduced the intimal hyperplasia of the injured vascular wall in rats. There was no significant difference in this reduction when resveratrol was delivered by either emulsion or the aqueous micelle system. The percentages of erythrocyte hemolysis by the emulsions and aqueous micelle system were 0 and 10%, respectively. Vitamin E prevented the aggregation of emulsion vesicles. The mean vesicle size of the tocol emulsion remained unchanged during 30 days at 37 ˚C. The lipid emulsion and aqueous micelle system, respectively, showed 11- and 16-fold increases in vesicle size after 30 days of storage.