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Investigation of *in vitro* Hydrophilic and Hydrophobic Dual Drug Release from Polymeric Films Produced by Sodium alginate-MaterBi[®] Drying Emulsions

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Abstract

Emulsions are known to be effective carriers of hydrophobic drugs, and particularly injectable emulsions have been successfully implemented for *in vivo* controlled drug release. Recently, high internal phase emulsions have also been used to produce porous polymeric templates for pharmaceutical applications. However, emulsions containing dissolved biopolymers both in the oil and water phases are very scarce. In this study, we demonstrate such an emulsion, in which the oil phase contains a hydrophobic biodegradable polymer, MaterBi[®], and the water phase is aqueous sodium alginate dispersion. The two phases were emulsified simply by ultrasonic processing without any surfactants. The emulsions were stable for several days and were dried into composite solid films with varying MaterBi[®]/alginate fractions. The films were loaded with two model drugs, a hydrophilic eosin-based cutaneous antiseptic and the hydrophobic curcumin. Drug release capacity of the films was investigated in detail, and controlled release of each model drug was achieved either by tuning the polymer fraction in the films during emulsification or by crosslinking sodium alginate fraction of the films by calcium salt solution immersion. The emulsions can be formulated to carry either a single model drug or both drugs depending on the desired application. Films demonstrate excellent cell biocompatibility against human dermal fibroblast, adult cells.

Key Words: Emulsions, MaterBi[®], alginate, eosin, cutaneous antiseptic, curcumin, drug release.

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