Chitosan/carboxymethylcellulose-stabilized poly(lactide-co-glycolide) particles as bio-based drug delivery carriers

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Poly(lactide-co-glycolide) (PLGA) colloidal particles stabilized by complexes of two oppositely charged polysaccharides, chitosan (cationic, CS) and sodium carboxymethylcellulose (anionic, NaCMC), were fabricated. Dichloromethane containing dissolved PLGA was first emulsified in an aqueous phase containing mixtures of CS and NaCMC. Evaporation of dichloromethane from the resulting emulsion led to CS/NaCMC-covered-PLGA particles. CS and NaCMC contents affected the short-term stability of PLGA particles and also their intrinsic characteristics. The particles displayed pH-dependent characteristic. Zeta potential varied from +54 to −50 mV when pH was varied from 3 to 10. CS/NaCMC-covered-PLGA particles showed colloidal stability, over a wider pH range as compared to CS-covered-PLGA particles. Curcumin, a model hydrophobic drug, was encapsulated into the particles up to 10 wt% of PLGA. The CS/NaCMC-covered-PLGA particles loaded with curcumin showed delayed release in mildly acidic conditions and faster release in neutral and basic conditions. Cytotoxicity experiments were carried out with human colorectal carcinoma cells.

Keywords: Carboxymethyl cellulose; Chitosan; Encapsulation; Polyelectrolyte complex; Release kinetics; Suspension

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