

Insights: Publications

Fabrication of Chitosan/PEGDA Bionanocomposites for Enhanced Drug Encapsulation and Release Efficiency

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Drug delivery systems (DDS) have evolved in the last decades with the development of hydrogels and particles. However, challenges such as high systemic uptake, side effects, low bioavailability, and encapsulation efficiency continue to be significant hurdles faced by such DDSs. Particles and hydrogels can be specifically designed for targeted DDSs to mitigate some of these problems. This study developed chitosan (Cs) particles (Ps) and composite films using poly(ethylene glycol) diacrylate (PEGDA) as a copolymer to encapsulate gentamicin (GtS) for drug delivery. We demonstrated that lysozyme degrades the chitosan β -1,4 glycosidic bonds to release GtS. PEGDA increased drug encapsulation efficiency by shielding the repelling forces of like charges between Cs and GtS. The data show that PEGDA does not hinder enzymatic degradation while increasing drug encapsulation efficiency and producing more homogeneous particles. Additionally, we utilized Michael's reaction to cross-link Cs, CsPs, and PEGDA to produce a film designed for drug delivery. The film is an anchor for CsPs to prevent premature drug release. The cross-linking of Cs and PEGDA does not affect lysozyme activity, and CsPs could successfully release GtS without affecting GtS activity.

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