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Enhanced stability of chitosan based nanoparticles via tandem ionotropic/covalent crosslinking and subsequent evaluation as drug delivery vehicles

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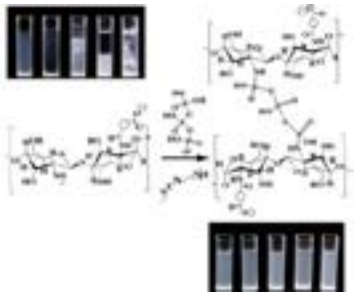
Chitosan-based nanoparticles prepared by ionotropic gelation are prone to stability issues. The aim of this work is to chemically modify chitosan by grafting to succinate, phthalate, glutarate and phenylsuccinate moieties and to investigate the suitability of the resulting polymers as covalently-crosslinked nanocarriers. Corresponding nanoparticles (NPs) were formulated by ionotropic gelation using tripolyphosphate (TPP) anion then they were covalently crosslinked using 1-ethyl-3-(3-dimethylaminopropyl)-carbodiimide (EDC). Infrared and thermal analysis confirmed the formation of phosphoramide bonds within the NPs indicating the involvement of TPP in covalent crosslinking. This is the first time to report phosphoramide covalent crosslinking within nanoparticles matrices. The resulting NPs were found to resist drastic pH and calcium ion conditions. Size analysis indicated the NPs to be spherical and less than 500nm in diameter. Loading studies using Safranine O showed enhanced NPs drug loading upon covalent crosslinking compared to ionotropic gelling. Doxorubicin-loaded NPs were of superior cytotoxic properties compared to free doxorubicin.



Recent Publications

1. Isra Dmour and Mutasem O Taha (2018) Natural and semisynthetic polymers in pharmaceutical nanotechnology. In book: Organic Frameworks as Smart Nanocarriers for Drug Delivery Chapter: 2. Elsevier. Doi: 0.1016/B978-0-12-813663-8.00002-6.
2. N M Najib, N Idkaidek, M Beshtawi, B Mohammed, I Admour, S M Alam et al. (2005) Bioequivalence evaluation of two brands of fluoxetine 20 mg capsules (Flutin and Prozac) in healthy human volunteers. Biopharmaceutics and Drug Disposition. 26(6):243-247.
3. N M Najib, N Idkaidek, A Adel, B Mohammed, S Al Masri et al. (2005) Comparative bioavailability of two brands of atenolol 100 mg tablets (Tensotin and Tenormin) in healthy human volunteers. Biopharmaceutics and Drug Disposition. 26(1):1-5.

Biography

Isra' Dmour received her Master's degree in Pharmaceutical Technology from the Jordan University of Science and Technology in 1999. She is currently an Independent Monitor for several pharmaceutical companies. During her career she had the opportunity to attend several European and US FDA inspections conducted for the purpose of generic products registration. Her professional experience also included the establishment of a quality system within CROs for ISO accreditation. She is currently preparing her PhD thesis in the University of Jordan on Polymeric Micelles as a Drug Delivery System.

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