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Delivery of Positively Charged Proteins Using Hyaluronic Acid Microgels

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Abstract : In this study, hyaluronic acid (HA) microgels were developed for the goal of protein delivery. First, a hyaluronic acid-tyramine conjugate (HA-TA) was synthesized with a degree of substitution of 13 TA moieties per 100 disaccharide units. Then, HA-TA microdroplets were produced using a water in oil emulsion method and crosslinked in the presence of horseradish peroxidase (HRP) and hydrogen peroxide (H₂O₂). Loading capacity and the release kinetics of lysozyme and BSA, as model proteins, were investigated. It was shown that lysozyme, a cationic protein, can be incorporated efficiently in the HA microgels, while the loading efficiency for BSA, as a negatively charged protein, is low. The release profile of lysozyme showed a sustained release over a period of one month. The results demonstrated that the HA-TA microgels are a good carrier for spatial delivery of cationic proteins for biomedical applications.

Keywords : microgel, inverse emulsion, protein delivery, hyaluronic acid, crosslinking
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