Synopsis of Original Research Paper

Encapsulation of proteins in chitosan particles coated with anionic polysaccharides and analyses of their functions

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In this study, chitosan particles were employed as a protein carrier. Glucose oxidase (GOD) was encapsulated in chitosan particle coated with anionic polysaccharides such as hyaluronic acid and pectin. Encapsulation efficiency of GOD, size of the particles, and controlled release of GOD from the particles were investigated. Water-soluble chitosan was employed to encapsulate proteins (BSA and GOD) at neutral pH condition. Protein-encapsulated chitosan particles were prepared by using cross-linker such as citric acid triacetate. Compared to other cross-linkers, citric acid was showed the higher encapsulation efficiency for BSA (30-40%). However, the stability of ionic cross-linked chitosan particle was significantly decreased by the addition of salt. Therefore, the chitosan particle was covalently cross-linked. Encapsulation efficiency was significantly increased (>80%), and the release of GOD from the covalently cross-linked chitosan particles was significantly suppressed at neutral pH. Next, coating of the chitosan particles with anionic polysaccharides were carried out. Hyaluronic acid-coated chitosan particles showed the aggregation. Pectin-coated chitosan particles showed high encapsulation efficiency for GOD (60-90%), the particle size was submicron order. The aggregation of the particle coated with pectin was also suppressed. The release of GOD from the pectin-coated chitosan particles was significantly suppressed in the absence of NaCl, and increased depending on the concentration of NaCl. The controlled release of proteins from chitosan particle was achieved by using cross-linker and coating with anionic polysaccharide.