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Preparation and Characterization of Chitosan-Hydrocortisone Nanoshell for Drug Delivery Application

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Abstract : Chitosan is a polymer that is usually produced from N-deacetylation of chitin. It is emerging as a promising biocompatible polymer that is harmless to humans. For the reason that many merits such as good adsorptive, biodegradability, many researches are being done on the chitosan for drug delivery system. Drug delivery system (DDS) has been developed for the control of drug. It makes the drug can be delivered effectively and safely into the targeted human body. The drug used in this work is hydrocortisone that is used in Rheumatism, skin diseases, allergy treatment. In this work, hydrocortisone was used to make allergic rhinitis medicine. Our study focuses on drug delivery through the nasal mucosa by using hydrocortisone impregnated chitosan nanoshells. This study has performed an investigation in order to establish the optimal conditions, changing concentration, quantity of hydrocortisone. DLS, SEM, TEM, FT-IR, UV spectrum were used to analyze the manufactured chitosan-hydrocortisone silver nanoshell and silver nanoshell, whose function as drug carriers. This study has performed an investigation on new drug carriers and delivery routes for hydrocortisone. Various methods of manufacturing chitosan-hydrocortisone nanoshells were attempted in order to establish the optimal condition. As a result, the average size of chitosan-hydrocortisone silver nanoshell is about 80 nm. So, chitosan-hydrocortisone silver nanoshell is suitable as drug carriers because optimal size of drug carrier in human body is less than 120 nm. UV spectrum of Chitosan-hydrocortisone silver nanoshell shows the characteristic peak of silver nanoshell at 420 nm. Likewise, the average size of chitosan-hydrocortisone silver nanoshell is about 100nm. It is also suitable for drug carrier in human body. Also, multi-layered silver shell over chitosan nanoshells induced the red-shift of absorption peak and increased the intensity of absorption peak. The resultant chitosan–silver nanocomposites (or nanoshells) exhibited the absorption peak around 430nm attributed to silvershell formation. i.e. the absorption peak was red-shifted by ca. 40 nm in reference to 390 nm of silver nanoshells.

Keywords : chitosan, drug delivery, hydrocortisone, rhinitis, nanoshell
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