

Production, Extraction and Purification of Fungal Chitosan and Its Modification for Medical Applications

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Abstract : Chitosan has received much attention as a functional biopolymer for diverse applications, especially in pharmaceuticals and medicine. Chitosan is a positively charged natural biodegradable and biocompatible polymer. It is a linear polysaccharide consisting of β -1,4 linked monomers of glucosamine and N-acetylglucosamine. Chitosan can be mainly obtained from fungal sources during large fermentation process. In this study, three different fungal strains *Aspergillus niger* NCIM 1045, *Aspergillus oryzae* NCIM 645 and *Mucor indicus* MTCC 3318 were used for the production of chitosan. The growth mediums were optimized for maximum fungal production. The produced chitosan was characterized by determining degree of deacetylation. Chitosan possesses one reactive amino at the C-2 position of the glucosamine residue, and these amines confer important functional properties to chitosan which can be exploited for biofabrication to generate various chemically modified derivatives and explore their potential for pharmaceutical field. Chitosan nanoparticles were prepared by ionic cross-linking with tripolyphosphate (TPP). The major effect on encapsulation and release of protein (e.g. enzyme diastase) in chitosan-TPP nanoparticles was investigated in order to control the loading and release efficiency. It was noted that the chitosan loading and releasing efficiency as a nanocapsule, obtained from different fungal sources was almost near to initial enzyme activity (12026 U/ml) with a negligible loss. This signifies, chitosan can be used as a polymeric drug as well as active component or protein carrier material in dosage by design due to its appealing properties such as biocompatibility, biodegradability, low toxicity and relatively low production cost from abundant natural sources. Based upon these initial experiments, studies were also carried out on modification of chitosan based nanocapsules incorporated with physiologically important enzymes and nutraceuticals for target delivery.

Keywords : fungi, chitosan, enzyme, nanocapsule

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