Studies of magnetic chitosan/Fe3O4 micro/Nanoparticles for nattokinase delivery

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ABSTRACT

In this study, chitosan/iron (II, III) oxide/ nattokinase micro/nano particles were produced by low-temperature spray-drying. The magnetic micro/nano particles were further study the transportation behavior between cells using an in vitro model of human oral squamous cell carcinoma (KOSC-3). In order to prepare micro/nano particles, three suspensions of 0.5、1、1.5% (w/v) chitosan with iron oxide were first mixed with nattokinase and then spray-dried in a low temperature condition. The samples were analyzed by field emission scanning electron microscopy (FESEM). It was found that the size of all the particles were in the range of 767 nm to 2.1 μm. The cytotoxicity of micro/nano particles was determined by MTT assay. No observable toxicity was noted on KOSC-3 cells by incubation with chitosan/iron (II, III) oxide/ nattokinase micro/nano particles. In vitro studies performed on KOSC-3 cell showed a pronounced opening of the cell junctions obtained by transepithilial electrical resistance (TEER) assay. In the meantime, the medium in the outside of insert was taken and a QuantiProTM BCA assay kit was used to investigate the release and transportation of nattokinase. The results indicated that the samples from multi-stage electromagnet collector had significantly improved transportation properties by the attraction of a magnet. However, the largest and smallest particles behave differently and that is worthy of further study.

Keywords : chitosan、Fe3O4、nattokinase、KOSC-3、drug release

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