
Degradation of carboxymethyl chitin by solution plasma treatment and evaluation of anticancer activity of the degraded products

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Polymer degradation by solution plasma process was carried out in order to prepare low molecular weight carboxymethyl chitin (CM-chitin). The effects of salt types, salt concentrations and plasma treatment time on molecular weight reduction of CM-chitin were investigated. The plasma-treated CM-chitin was characterized by FTIR and NMR spectroscopy. The reduction of molecular weight of CM-chitin after solution plasma treatment was primarily observed by investigating the viscosity reduction using Ubbelohde viscometer. The molecular weights and molecular weight distribution of the degraded products of CM-chitin were measured by GPC. It was found that degradation of CM-chitin dissolved in 0.01 M NaCl aqueous solution by solution plasma treatment had the fastest initial degradation rate followed by CM-chitin dissolved in 0.01 M CaCl₂·2H₂O, 0.01 M KCl and deionized water, respectively. The degraded CM-chitin with the lowest molecular weight of 38 kDa was obtained after degradation of CM-chitin dissolved in 0.01 M NaCl by solution plasma treatment for 60 min. The FTIR spectrum of the degraded CM-chitin revealed that there was no change in chemical structure of CM-chitin. Anticancer activity of the degraded CM-chitin was examined by using MTT assay. It was found that CM-chitin with the molecular weight of 38 kDa possessed cytotoxicity against HeLa cancer cells.