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β-CYCLODEXTRIN GRAFTED INJECTABLE GELATIN HYDROGEL FOR THE CONTROLLED RELEASE OF HYDROPHOBIC DRUGS

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Injectable hydrogels have been researched in the field of tissue engineering, drug delivery and tissue adhesives. Particularly, hydrogel as a drug delivery carrier have advantages such as minimally invasive implantation, localization and controllable release behavior. However, in the case of hydrophobic drugs, poor solubility and aggregates may cause initial burst release which can show cytotoxicity and side effects. To solve this, cyclodextrins, a family of cyclic oligosaccharides with a hydrophilic surface and a lipophilic cavity, were applied to enhance the hydrophobic drug's solubility. They can solubilize and carry hydrophobic molecules via host-guest interaction. In this study, β-cyclodextrin (CD) grafted *in situ* forming gelatin hydrogels via enzymatic reaction were developed to release lipophilic drug, dexamethasone (DEX) sustainably. We synthesized CD modified gelatin-hydroxyphenyl propionic acid (GH) conjugates (GH-CD) as follows; GH was firstly synthesized by EDC/NHS chemistry and then CD was conjugated with GH by DCC/DMAP chemistry. The chemical structure of GH-CD was characterized by 1H NMR spectrum. Approximately 15% modification of CD was confirmed by thermal gravimetric analysis (TGA) analysis. The amount of HPA (146.62 μmol/g) in the GH could be calculated by measuring UV absorbance at 275 nm. The GH-CD hydrogels were prepared via horseradish peroxidase (HRP)-mediated reaction in the presence of hydrogen peroxide (H2O2). The gelation time was controlled from 15 sec to 2 min with various concentrations of HRP (0.02-0.1 mg/ml). It was found that H2O2 concentration (0.08-0.2 wt %) can control the mechanical strength (1-3 kPa) of the hydrogels. Due to the solubilizing effect of CD, GH-CD (5 wt%) hydrogel with DEX (1 mg/ml) showed transparency compared to GH hydrogel with DEX. Furthermore, GH-CD hydrogels released DEX (for 9 days) in a more sustained manner than that of GH hydrogels (for 3 days). We hope that the CD modified injectable hydrogels can be useful carriers for various hydrophobic drugs.

Biography

Prof. Ki Dong Park has completed his B.S. in Industrial Chemistry from Hanyang University in 1981, Seoul, Korea. He completed his Ph.D and Postdoctoral studies in Pharmaceutics from University of Utah in 1990, and 1991 respectively. He was awarded from American Society for Artificial Internal Organs (ASAIO), Outstanding Paper Award, KIST, Korean Minister of Science and Technology Award, Grand Prize of Korean society for biomaterials, LG Chemical Polymer Award of The Polymer Society of Korea, Grand Prize of Korean society for biomaterials. He is editorial Board of 11 journals. He is presently President and Honorary President of Korean Society for Biomaterials.

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