

论文

可注射性壳聚糖基温敏性凝胶的制备及其生物相容性

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摘要:

以壳聚糖(Chitosan,CH)为基,加入不同配比的β-甘油磷酸钠(Glycerophosphate salt,GP)和羟乙基纤维素(Hydroxyethyl cellulose,HEC)制备成不同组成的壳聚糖基温敏性凝胶体系。研究了2种凝胶体系初始凝胶化温度、成凝胶化时间、在缓冲溶液中的溶胀性、对骨髓间充质干细胞的细胞毒性及生物相容性,并用扫描电镜观察了干凝胶的微观结构。结果表明:所制备的壳聚糖-β-甘油磷酸钠(CH-GP)和壳聚糖-β-甘油磷酸钠-羟乙基纤维素(CH-GP-HEC)温敏性的凝胶,pH为6.8~7.4,当温度升高到某一温度时可以形成凝胶。CH-GP凝胶随GP浓度的增加初始凝胶化温度降低,37℃成凝胶时间缩短,凝胶中较低磷酸盐浓度(GP质量浓度为100~400 mg/mL)有利于细胞的生长。在CH-GP凝胶的基础上,加入不同质量浓度的羟乙基纤维素(HEC),可以降低凝胶支架中的β-甘油磷酸钠含量,并可调节成凝胶化时间、初始凝胶化温度以及凝胶强度。HEC的加入量与37℃成凝胶时间及初始成胶温度呈反比。

关键词: 壳聚糖 甘油磷酸钠 羟乙基纤维素 可注射性水凝胶 生物相容性

Preparation and Biocompatibility of Injectable ChitosanBased Hydrogel

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Abstract:

The thermo-sensitive gel system based on chitosan-glycerophosphate salt (CH-GP) complex and chitosan-glycerophosphate salt-hydroxyethyl cellulose complex (CH-GP-HEC) were prepared in this study. Various factors affecting the properties of gels (the gelation time, the incipient gelation temperature (IGT), microstructure of the hydrogels, the swelling degrees of gels in buffer solutions, cell toxicity and the biocompatibility with bone mesenchymal stem cells (BMSC) were tested. The results showed the gels system can be quickly gelated with pH values from 6.8 to 7.4. The gelation time and IGT were reduced with GP concentration increasing. The results of biocompatibility showed that lower GP concentration (100—400 mg/mL) was beneficial for cell proliferation and growth. Based on keeping the properties of the gels, the glycerophosphate salt contents of the complex could be decreased largely, and the gelation time, IGT and gel strength could be modulated by addition of various concentration of hydroxyethyl cellulose (HEC) to CHGP complex. The HEC concentration is the opposite to gelation time and IGT.

Keywords: chitosan(CH); glycerophosphate salt(GP); hydroxyethyl cellulose(HEC); injectable gel; biocompatibility

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