

研究论文

壳聚糖修饰PLGA阳离子型纳米微球的制备与表征

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收稿日期 2006-3-17 修回日期 网络版发布日期 2006-10-10 接受日期

摘要 采用单乳化-溶剂(O/W)挥发技术制备表面带正电荷的壳聚糖(CHS)修饰聚乙/丙交酯(PLGA)纳米微球(PLGA/CHS), 通过正交试验优化了纳米微球的制备条件. 结果表明, 微球粒径可控制在150~200 nm内, 在pH=4时, 纳米微球表面电位最高为55 mV. 影响微球粒径的主要因素是聚合物的浓度, CHS的分子量和浓度以及介质的pH值对微球表面电位也有明显影响. 制备粒径较小而表面电位较高的PLGA/CHS纳米微球条件为: $\rho(\text{CHS})=3 \text{ mg/mL}$, $\rho(\text{PLGA})=10 \text{ mg/mL}$, $V_o/V_a=1/4$. SEM图像显示经CHS修饰的PLGA的纳米微球形状规整, 荧光显微观察和XPS分析结果证实CHS包覆于微球表面.

关键词 [阳离子纳米微球](#) [丙交酯-乙交酯共聚物](#) [壳聚糖](#)

分类号 [0631](#)

Preparation and Characterization of Cationic Chitosan-modified Poly(D, L-lactide-co-glycolide) Copolymer Nanospheres

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Abstract Chitosan(CHS)-modified poly(D,L-lactide-co-glycolide) copolymer(PLGA)(PLGA/CHS) nanospheres with cationic surface were prepared by emulsion-solvent-diffusion(O/W) method. The preparation conditions were optimized by orthogonal factorial design. The diameter of PLGA/CHS nanospheres is in the range of 150 nm to 200 nm, and the ζ potential of PLGA/CHS nanospheres was up to 55 mV when pH was 4. The most important factor which affects the diameter of PLGA/CHS nanospheres is the concentrations of PLGA solutions, whereas the major factors which affect the ζ potential of PLGA/CHS nanospheres are the concentrations of CHS solutions and the molecular weight of CHS($M_{w, \text{CHS}}$). On the other hand, the pH-value of aqueous phase also affected the ζ potential of PLGA/CHS nanospheres obviously. The optimized conditions for preparing the smallest diameter of PLGA/CHS nanospheres with a higher positive potential were: $\rho(\text{CHS})=3 \text{ mg/mL}$, $\rho(\text{PLGA})=10 \text{ mg/mL}$, $V_o/V_a=1/4$. SEM micrograph reveals that the morphology of PLGA/CHS nanospheres was regular. And the results of fluorescence inverted micrograph and XPS analysis indicate that each of the PLGA nanospheres was encapsulated by CHS. The information obtained from this study is useful for preparing CHS-modified particles and the cationic nanospheres hold promise as injectable spheres that are suitable for drug delivery, gene transfection and tissue engineering applications.

Key words [Cationic nanospheres](#) [Poly\(D, L-lactide-co-glycolide\) copolymer](#) [Chitosan](#)

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