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论文

具有抗凝性能的肝素化 ϵ -己内酯/L-丙交酯共聚酯的合成及电纺丝加工

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摘要:

以辛酸亚锡为催化剂, 1,4-丁二醇为引发剂, 制备出 ϵ -己内酯/L-丙交酯共聚酯(PLCL). 以1-(3-二甲氨基丙基)-3-乙基碳二亚胺/N-羟基琥珀酰亚胺为缩合剂将肝素连接在PLCL两侧端基上. 采用 ^1H NMR技术测定了共聚酯端基的肝素化率; 用XPS分析了肝素化后聚酯中N和S含量, 利用甲苯胺蓝紫外分光光度计法测定了表面肝素含量, 并根据静态接触角测定结果讨论了材料表面的亲水性变化. 凝血酶原时间、凝血酶时间和部分凝血活酶时间测试数据表明, 肝素化后PLCL的抗凝血性能得到明显改善. 探索了该共聚酯进行电纺丝加工的可行性.

关键词: ϵ -己内酯; L-丙交酯; 肝素; 体外抗凝血性能; 电纺丝

Synthesis and Characterization of Anticoagulant Heparinized ϵ -Caprolactone/L-Lactide Copolymers and Their Electrospinning Study

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Abstract:

Heparin-conjugated biodegradable copolymers were synthesized by attaching heparin to the ends of the copolyesters of ϵ -caprolactone and L-lactide(PLCL) in the presence of 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride and N-hydroxysuccinimide. They were characterized by means of ^1H NMR, FTIR, XPS and UV-spectrophotometer techniques. The results indicate that heparin is successfully covalently coupled to PLCL, and the heparin-conjugated content is increased with increasing the ϵ -caprolactone molar content in the copolyesters. The PLCL surface after heparining became more hydrophilic than before due to the decrease of hydrophilic static contact angle. The clotting time of PLCL containing heparin was evaluated by activated partial thromboplastin time(APTT), thrombin time(TT) and prothrombin time(PT) measurements. The antithrombincity of the copolymers modified with heparin was improved among which the sample LC-90-H was the best. Finally, ultrafine fibers of LC-90-H were prepared by electrospinning process. It shows the promise to be applied in the inner-layer of tissue engineering blood vessel scaffolds.

Keywords: ϵ -Caprolactone; L-Lactide; Heparin; Antithrombincity; Electrospanning

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