

研究论文

聚(二甘氨酸乙酯)磷腈的合成及其生物相容性

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摘要 氨基酸酯基取代的聚磷腈由于具有优良的水解性能并能降解成无毒产物, 因而成为一类非常有吸引力的生物医用材料. 采用两步法合成了聚(二甘氨酸乙酯)磷腈(PEGP). 首先采用开环聚合的方法制备中间体聚二氯磷腈, 再利用亲核取代方法合成PEGP. 通过红外光谱、核磁共振及元素分析等确证了产物的结构. 用蒸汽压下降法测得PEGP的分子量为12959, 用DSC法测得其玻璃化转变温度为-21.5 °C. 采用体外细胞培养的方法评价了肝癌细胞HepG2和人工合成纤维细胞在PEGP薄膜表面的生长性能. 结果表明, 该材料不但没有细胞毒性, 反而具有良好的促进细胞生长的能力, 显示聚(二甘氨酸乙酯)磷腈在组织工程和再生医学中的潜在应用价值.

关键词 [甘氨酸乙酯](#) [聚磷腈](#) [生物医用材料](#) [生物相容性](#)

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Synthesis, Physical Properties and Biocompatibility of Poly[di(ethyl glycinato)phosphazene]

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Abstract Polyphosphazene substituted by amino acid ester in side chains is a kind of attractive biomaterial because it is readily biodegradable and nontoxic. In this work, poly[di(ethyl glycinato)phosphazene](PEGP) was synthesized and its physical and biological properties were assessed. The intermediate polydichlorophosphazene was obtained *via* a ring-opening polymerization of hexachlorocyclotriphosphazene, which resulted in the final PEGP with a nucleophilic substitution with glycino ethyl ester. Characterizations by infrared spectroscopy(IR), nuclear magnetic resonance(NMR) and elemental analysis confirmed the molecular structure of the resulted polymer. Vapor-pressure osmometer(VPO) and differential scanning calorimetry(DSC) were used to measure the number average molecular weight as 12959, and glass transition temperature to be -21.5 °C, respectively. *In vitro* culture of HepG2 cell line and human fibroblasts was performed on the PEGP membranes to assess the PEGP cytocompatibility. Both HepG2 cells and fibroblasts could normally spread on the PEGP membrane with nondetectable cytotoxicity. The fibroblasts cultured on the PEGP membrane had a comparable proliferation rate with that cultured on tissue culture dish, while the HepG2 cells cultured on the PEGP membrane had a significantly faster proliferation rate than that cultured on tissue culture dish. Therefore, PEGP has a great potential to be used in the fields of tissue engineering and regenerative medicine.

Key words [Glycino ethyl ester](#) [Polyphosphazene](#) [Biomedical material](#) [Biocompatibility](#)

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