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论文

含悬挂羧基手臂聚乳酸材料的内皮细胞黏附及其细胞活性

王珺[1], 王蔚[1], 刘媛[1], 朱晓翠[1], 袁直[1], 汤石明[2], 刘民[2], 汤华[2]

1. 功能高分子材料教育部重点实验室, 南开大学高分子化学研究所, 天津 300071;
2. 天津医科大学天津市生命科学中心实验室, 天津 300070

摘要:

为了考察内皮化材料表面的细胞活性, 在前期工作的基础上, 分别在聚乳酸(PLA)、乳酸-苹果酸共聚物(PLMA), 以及含悬挂羟基或羧基的乳酸-苹果酸共聚物膜(PLMAHE,PLMACA)表面种植人脐静脉内皮细胞(HUVEC), 成功地制备了内皮化表面. 通过测定内皮化材料表面内皮细胞释放的内皮型一氧化氮合酶(eNOS)以及一氧化氮的释放量, 间接考察了内皮细胞的抗凝血活性; 另外, 通过内皮化表面的血小板黏附实验, 直接观察了血小板在内皮细胞上的黏附情况. 实验结果表明, 含羧基材料表面的内皮细胞活性比PLA和PLMAHE的高; 相对其它材料PLMACA能更有效地保留黏附于其表面内皮细胞的活性, 其单位内皮细胞的eNOS以及NO的释放量分别为(41.8±8.1) μmol/10^4 cells和(0.76±0.16) U/10^4 cells. 电镜照片(SEM)显示, 各种材料表面的内皮细胞均能有效地减少血小板的黏附与聚集; 在内皮细胞脱落的区域, PLMACA仍能较好地实现其抑制血小板黏附的功能, 有望成为新型血管修复(替代)材料.

关键词: 内皮细胞 细胞活性 细胞黏附 聚苹果酸

HUVEC Adhesion on Polylactides with Pendant Carboxyl Arms and Its Cell Activity

WANG Jun[1], WANG Wei[1], LIU Yuan[1], ZHU Xiao-Cui[1], YUAN Zhi[1*], TANG Shi-Ming[2], LIU Min[2], TANG Hua[2]

1. Key Laboratory of Functional Polymer Materials, Ministry of Education, Institute of Polymer Chemistry, Nankai University, Tianjin 300071, China;
2. Tianjin Life Science Research Center, Tianjin Medical University, Tianjin 300070, China

Abstract:

In order to investigate the cell activity on the endothelialization surfaces, human umbilical vein endothelial cells(HUVEC) were seeded on poly(lactic acid)(PLA), poly(lactide-co-β-malic acid)(PLMA), its derivatives with hydroxyl arms(PLMAHE) and extended carboxyl arms(PLMACA) polymer films on the basis of our preliminary work. The amounts of endothelial nitric oxide synthase(eNOS) and nitric oxide (NO) released by endothelial cells were examined to study the anticoagulant property of endothelial cells adhered on polymer films. The platelet adhesion experiment was carried out to observe the amount and morphology of the platelets adhered on the endothelialization surfaces. The results show that the carboxyl functionalized surfaces have a better cell activity than PLA and PLMAHE, and copolymers with pendant carboxyl arms(PLMACA) could obviously preserve the HUVEC activity on the copolymer films compared with other materials. The amount of eNOS and NO released by HUVEC is (41.8±8.1) μmol/10^4 cells and (0.76±0.16) U/10^4 cells, respectively. The scanning electron microscopy(SEM) images demonstrate that endothelial cells adhered on the material surfaces could reduce the platelet adhesion and aggregation effectively. PLMACA also show a good blood compatibility on the exposed surface areas formed by the fallen of endothelial cells adhered on the material surfaces. In conclusion, the copolymer PLMACA is a hopeful material for vessel substitution with good HUVEC compatibility.

Keywords: Human umbilical vein endothelial cells(HUVEC) Cell Activity Cell Adhesion Poly(malic acid)

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