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论文

纳米细菌纤维素膜的表征与生物相容性研究

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摘要:

利用木醋杆菌静态培养法制备的由纳米纤维组成的细菌纤维素膜具有超细的三维网络结构和适当的孔隙率. 利用光镜、扫描电镜和原子力显微镜对其进行结构表征发现, 细菌纤维素膜具有极为精细的纳米网络结构, 冻干膜的孔径约为0.6~2.8 μm; 纤维素带宽度约为50~80 nm. 采用湿重与浮重结合法测定烘干膜和冻干膜的孔隙率分别约为70%和90%. 由于细菌纤维素含有大量的羟基, 故烘干膜表现出极好的透湿性. 将细菌纤维素膜分别与成纤维细胞和软骨细胞进行复合培养, 并将成纤维细胞和细菌纤维素膜的复合物进行裸鼠皮下移植实验. 结果显示, 移植的复合物很好地融入了裸鼠正常皮肤, 成纤维细胞和软骨细胞在细菌纤维素表面形成连续的细胞层, 绿色荧光蛋白表达正常. 以上结果表明, 细菌纤维素膜非常适合细胞贴附和增殖, 表现出较好的生物相容性, 有望成为新型组织工程支架材料.

关键词: 细菌纤维素; 生物相容性; 组织工程支架

Research on Characterization and Biocompatibility of Nano-bacterial Cellulose Membrane

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Abstract:

Bacterial cellulose membrane, possessing nanofibers, an ultrafine 3-dimensional network and proper porosity, was prepared by static culture of *Acetobacter xylinum* and characterized by light microscope, SEM(Scanning electron microscope) and AFM(Atomic force microscope). The results show that BC has extremely fine network of nano-structure, the pore size of freeze-dried BC is 0.6 to 2.8 μm; the width of cellulose is 50 to 80 nm. By measuring their dry weight and wet weight, the porosities of air-dried BC and freeze-dried BC were determined, respectively. The porosity of air-dried and freeze-dried BC is about 70% and 90%, respectively. The water vapor permeability of air-dried BC is quite excellent because the existence of a large number of hydroxyl. BC co-culture with fibroblasts(FBs) and chondrocytes, respectively, and subcutaneous implant of FBs-BC composition into nude mouse. The composition is well intergrated into the skin of nude mouse. FBs and chondrocytes form continuous cell layer on the surface of BC and the expression of GFP is normally. The results demonstrate that BC membrane is suitable for cell attachment and proliferation, and shows better biocompatibility. It is expected to become a promising tissue engineering scaffold.

Keywords: Bacterial cellulose; Biocompatibility; Tissue engineering scaffold

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