Αγγλική Περίληψη

Development and characterization of polymeric cellulose acetate nanofibrous scaffolds as coatings on heart valves

Cellulose acetate (CA) nanofibers have versatile biotechnological applications, such as heart disease treatment. In recent years the interest is focused on creating cellulose acetate scaffold for heart valve tissue regeneration, using strategies at nanoscale. The aim of this research was to create biofunctional scaffolds from biodegradable polymer cellulose acetate, enhance biocompatibility with functional molecules and estimate its functionality to their application in cardiac tissue regeneration. We primarily produced the scaffolds of cellulose acetate and then studied their properties before and after subculturing with L929 cells (mouse fibroplasts from adipose tissue).The biodegradable polymeric nanofibrous scaffolds were developed by the Electrospray Deposition method. The MTT assay, a known cytotoxicity assay, was used to determine their cytocompatibility behavior in direct and indirect contact with L929s cells under static conditions. We also studied the degradation of polymeric scaffolds in the range of 2 months, while SEM microscopy was applied to observe the proliferated cells on the nanoscaffolds. The wetting behavior and morphology of the nanoscaffolds were assessed by contact Angle and Atomic Force Microscopy (AFM), respectively. Since it has become characterization of biodegradable scaffolds and study the parameters affecting the adhesion and proliferation of cells, used cellulose acetate scaffolds on aortic metallic valve surface. The surface of scaffolds was amplified with functional molecules, such as RGD peptides and laminins which immobilized through biotin- streptavidin bond, to increase biocompatibility and then cultured L929s cells. To coat a metallic valve with cellulose acetate nanofibrous scaffolds constitutes a new way for the treatment of heart diseases. The use of cellulose acetate scaffolds for cardiac tissue regeneration is very promising for the future.