Shiva Asadpour, J Tissue Sci Eng 2016, 7:2(Suppl)
http://dx.doi.org/10.4172/2157-7552.C1.025

Electroconductive and biocompatible carbon nanotube/polyurethane/collagen scaffolds for cardiac tissue engineering

Shiva Asadpour
Tehran University of Medical Sciences, Iran

Cardiovascular diseases cause highest mortality in the world each year which discloses the limitations in common therapies. Cardiac tissue engineering based on cells, scaffolds and engineering strategies have been employed as potential therapies for the treatment of heart diseases. To mimic the native myocardial environment, carbon nanotubes (CNTs) as conductive material and collagen as a natural polymer were used in composites to obtain electroactive and biocompatible scaffolds. Scaffolds were fabricated based on polyurethane (PU), collagen, PU/collagen, PU/CNT, PU/collagen/CNT by electrospinning and spray methods. To prepare CNT- polymer solution, carbon nanotubes were added to polymer solution and then sonicated for 5 h at room temperature to obtain a homogenous suspension and nanofibrous scaffolds were then prepared. Aligned and random polyurethane were also fabricated as controls. The scaffolds were seeded with H9c2 cardiac myoblasts and cultured for up to 8 days to investigate cell viability, adhesion and morphology in scaffolds without electrical stimulation. The metabolic activity of cells in PU/collagen/CNT composites was significantly higher than other scaffolds. With increasing the concentration of collagen within the composites, the fiber diameters and elasticity of scaffolds decreased and biocompatibility increased. Mechanical properties of scaffolds were increased by polyurethane component. Polyurethane/collagen/carbon nanotube composites had excellent electrical properties. Our findings indicated that the incorporation of carbon nanotube and collagen into nanofibrous scaffolds provided electrically conductive and biocompatible constructs for cardiac tissue.

shiva.asadpour2020@gmail.com

Notes: