

Development of bioabsorbable nanofiber tube with bilayer structure

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When the gap between the nerve stump is wide, a guide tube is effective to get nerve repair. The guide tube for nerve regeneration requires suitable surface structure for cell adhesion, bioabsorbable property sufficient radial stiffness against stenosis. The purpose of this study is to develop bioabsorbable nanofiber tube that has high ability to resist radial deformation. Nanofiber tube of length 30 mm, inner diameter 5 mm was produced by electrospun. Sodium alginate (SA) was used as natural bioabsorbable polymer with a low inflammatory response, high flexibility and high cell adhesiveness. SA solution concentration were 2.0, 4.0 and 6.0 w/v%. Tip to target distance were 100, 150 and 200 mm. The relationship between fiber diameter and tip to target distance was examined to decide SA solution concentration by using the design of experiments. SA nanofiber tube with bilayer structure was produced under the obtained conditions. According to a scanning electron microscope observation, the thickness of nanofiber tube was about 2 μm , and fiber diameter of inner layer and outer layer about 280 nm and 519 nm respectively. The radial compressive test carried out to evaluate the tube compressive stiffness. The compressive stiffness of bilayer SA nanofiber tube showed approximately three times greater than that of mono layer SA nanofiber tube with fiber diameter of 280 nm.

Biography

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