ABSTRACT SUBMISSION

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Electrospinning 3D Nanofiber Scaffold for Tissue Engineering

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ABSTRACT (NO MORE THAN 500 WORDS:)

Electrospinning nanofiber can biomimetic Extracellular Matrix and suitable for tissue scaffolding. In our research silk-P(LLA-CL) complex nanofibers tube scaffold have been fabricated for nerve tissue engineering, collagen-P(LLA-CL) nanofibers tube scaffold have been fabricated for blood vessel tissue engineering. Coaxial electrospinning has been used to spin the growth factor into nanofibers to promote the tissue regeneration, NGF in nanofiber promoted nerve regeneration, VEGF in nanofiber promoted endothelia cell proliferation.

Electrospinning fabrication technique most commonly produces relatively 2D mats and the construction 3D structure nanofibers with higher porosity is still a major challenge. In our research, two methods were used to fabricate the 3D nanofiber scaffolds. A dynamic electrospinning method were developed to fabricate the nanoyarn scaffold. The nanoyarn scaffold contained 3D aligned microstructures with larger interconnected pores and higher porosity comparing with nanofiber scaffold. The nanoyarn scaffold have been successfully used for tendon tissue regeneration of rabbit. The nanoyarn has also used to prepare bilayer blood vessel scaffold to be as out layer to regenerate the smooth muscle tissue. Gelatin/PLA nanofiberous 3D scaffold was fabricated by using combined electrospinning and freeze-drying methods. Thus obtained 3D nanofiber scaffold could promote cells infiltration in three dimensionally, it also been succeeded for tissue engineering in rabbit articular cartilage. Gelatin/PLA nanofiberous 3D scaffold also be immobilized with BMP-2 peptides and used for bone tissue regeneration, it helped for critical skull regeneration in rat.