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Collagen/poly(D,L-lactic-co-glycolic acid) composite fibrous scaffold prepared by independent nozzle control multi-electrospinning apparatus

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The objective of the present study was to evaluate non-woven collagen/poly(lactic-co-glycolic acid) fibrous scaffold (Col/PLGA FS) prepared by a co-electrospinning process using a novel multi syringe electrospinning system for tissue engineering applications, as compared to collagen and PLGA FSs. The morphological and mechanical properties of the FSs were assessed by scanning electron microscopy (SEM) and a universal testing machine (UTM). The changes in chemical composition due to the incorporation of collagen to PLGA were determined by Fourier transform infrared spectroscopy-attenuated total reflection mode (FTIR-ATR). The biocompatibility of the FSs was also evaluated in vitro in cultures of mouse fibroblasts and in vivo by subcutaneous implantation studies in rats. SEM image of the samples showed that the fiber size distribution of Col/PLGA FS became narrow compared to PLGA FS due to the incorporation of collagen of small fiber diameter. The FTIR-ATR spectrum of Col/PLGA FS revealed the characteristic bands of collagen and PLGA, indicating the co-existence of two fibrous structures. The poor mechanical properties of collagen FS was improved by co-electrospinning with PLGA. In vitro L929 cell proliferation assay revealed that the cyto-compatibility of Col/PLGA FS was increased compared to that of PLGA. In addition, Col/PLGA FS showed increased the hydrophilic property enough to absorb the exudates at the interface with mild foreign body reactions.

Biography

Heung Jae Chun had received Ph.D. degree from the Biomedical Engineering & Science Institute, Drexel University (Philadelphia, PA, USA) from 1991-1994 under the advice of Prof Richard B. Beard. For the additional 2 years (1994-1996) at BMESI, he worked on the development of the "polymeric chemoattractants for human melanoma cells" as post-doctoral position.He has published 91 SCI original research papers, including Oncogene, Biomaterials, Polymer Reviews and authored the international books including "Nanofibers-Production, Properties and Functional Applications", Three-Dimensional Nanofiber Scaffolds for Regenerative Medicine, Ch. 17, , In Tech and "Encyclopedia of Biomedical Polymers and Polymeric Biomaterials" Polymeric Scaffolds for Regenerative Medicine, Taylor & Francis Publishes, in Press, 2014. His major scientific contribution has been to appreciate and analyze the importance of natural, synthetic and hybrid scaffolds for adult stem cells on the target diseases; myocardial infarction, retinal ischemia, and osteolysis.

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