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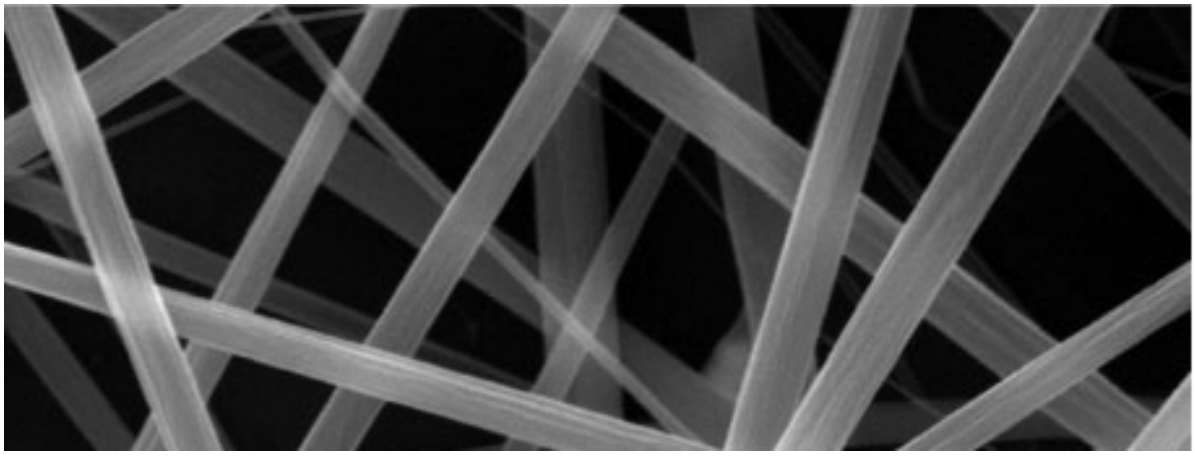

Co-electrospun PLGA-gelatin-elastin (PGE) scaffold as a non-thrombogenic scaffold for vascular tissue engineering

By systematically adjusting the relative ratio of PLGA and gelatin, I co-electrospinned tertiary blends of poly-(lactide-co-glycolide) (PLGA), gelatin, and elastin (PGE). The morphology and mechanical properties of the blend PGE fibers was characterized by scanning electron microscopy (SEM) and tensile tests (Instron) respectively. The suitability of the composites as vascular scaffolds was assessed *in vitro* by evaluating their interactions with human endothelial cell line (EA.hy926, ECs), and bovine aortic smooth muscle cells (SMCs) in terms of cell morphology and cellular in-growth. My data indicate that PGE blend fibers supported ECs and SMCs attachment and proliferation with small variances in cell morphology and cytoskeletal spreading for different PGE compositions initially but no differences upon confluence. In addition, histology data demonstrated the unique ability of PGE scaffolds to support EC monolayer formation on the surface while concomitantly fostering penetration of SMC cells into the PGE scaffold. To genetically understand how PGE scaffold interacts with ECs as a prerequisite for a non-thrombogenic endothelium formation, I used a focused PCR array (SA Bioscience/Qiagen) to compare differential genes expression of extracellular matrix (ECM) and adhesion related genes in human aortic endothelial cell (HAEC) monolayer cultured on PGE321 with that on gelatin-coated surface. My results indicate that HAECs seeded on PGE321 and on gelatin shared a similar expression pattern of ECM and adhesion molecules and HAEC monolayer has a significant lower E-selectin gene expression on PGE321 upon confluence. Further, the mRNA expression level of tissue factor (TF) on HAEC monolayers cultured on various natural proteins and synthetic biomaterials were compared using qRT-PCR. HAEC monolayers (24hr post-seeding) on PGE321 expressed the same TF mRNA level as on both gelatin and fibronectin (FN) coated surfaces, at both basal level and TNFα-induced level respectively. This demonstrates that PGE321 is a potential non-thrombogenic substrate for endothelium formation thus may be useful scaffold for application in small diameter vascular graft.