research>>

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Research interests: tissue engineering, biomaterials, regenerative medicine, wound healing, plant protein-based scaffolds, cell adhesion, cell-biomaterial interactions

Thesis work: My PhD thesis work is aimed at developing a novel electrospun soy protein-based scaffold for skin tissue engineering and wound healing applications, to circumvent some of the limitations of currently available animal or synthetic material-derived skin substitutes and other treatments for non-healing wounds. I optimized specific parameters for electrospinning soy protein isolate (SPI) with a minimal addition of poly(ethylene oxide) (PEO) to generate such a scaffold with handling and mechanical properties similar to those of skin (see Figure 1). In addition to validating its ability to promote the growth and proliferation of human dermal fibroblast cells alone (see Figure 2) and in co-culture with human epidermal keratinocytes (see Figure 3), I am also working toward identifying some of the biological mechanisms by which fibroblasts attach to the scaffold by investigating the differential expression of genes when fibroblasts are cultured on SPI compared to collagen type I, a ubiquitous native extracellular matrix (ECM) protein. Finally, the efficacy of SPI/PEO scaffolds on wound healing will be investigated using an established *in vivo* rat model.

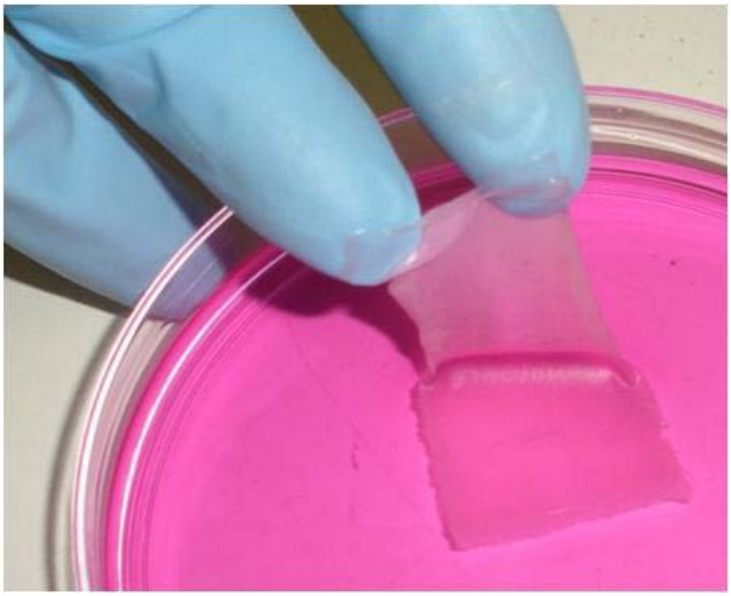

Figure 1. Electrospun SPI/PEO scaffold in cell culture medium.

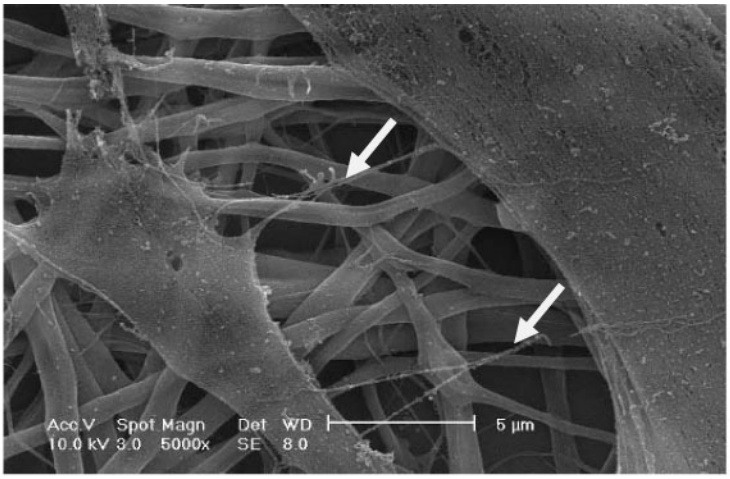

Figure 2. Human dermal fibroblasts spread out on electrospun SPI/PEO scaffolds after 8 days in culture. Arrows point to native extracellular matrix secreted by the fibroblasts. Scanning electron micrograph, scale bar 5 µm.

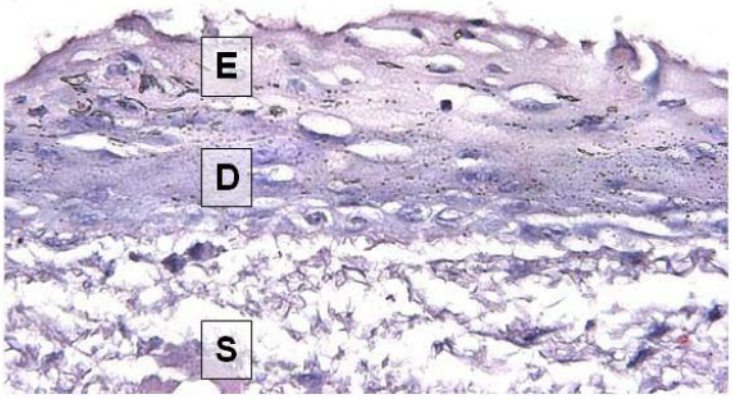

Figure 3. Tissue engineered skin equivalent based on the SPI/PEO scaffold on day 14 of culture. Human dermal fibroblasts (D) and epidermal keratinocytes (E) were co-cultured at an air-liquid interface on multi-layered electrospun SPI/PEO scaffolds, and epidermal stratification can be seen. H&E stained histological section, original magnification 200x.