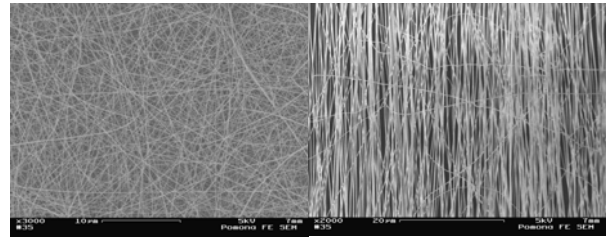


# Rabbit Corneal Fibroblast Behavior on Aligned Electrospun Scaffolds

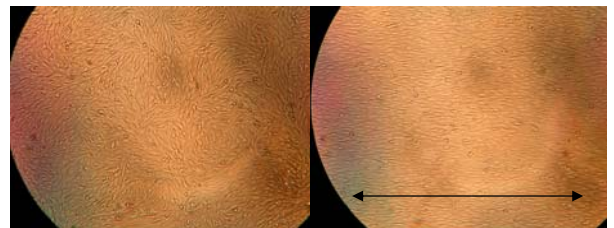
Lindsay Wray and Liz Orwin

**Background.** One goal in our lab is to engineer a scaffold material for use in growing an artificial corneal equivalent. Previous work in the lab has developed a protocol for electrospinning aligned collagen fibers 100 nanometers in diameter. The arrangement of these electrospun fibers replicates the microstructure of collagen found in the extracellular matrix (ECM) of the natural cornea. We believe that when a scaffold that mimics the ECM of the natural cornea is cultured with cells it will exhibit the correct transparency properties and protein expression levels.

**Approach.** Rabbit corneal fibroblasts (RCFs) were cultured on aligned and unaligned electrospun scaffolds. The cell-seeded scaffolds were cultured for seven days and then fixed for immunofluorescence imaging.

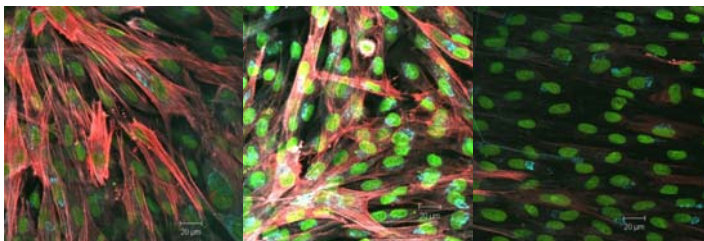
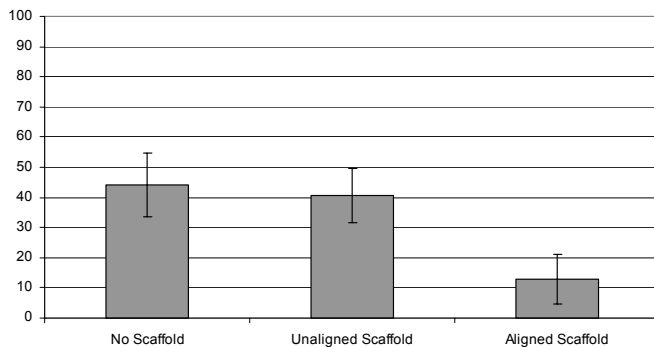


**SEM images of unaligned (left) and aligned (right) electrospun fibers. Aligned fibers are achieved by electrospinning onto a modified collecting device.**



**Light microscope images of cells cultured for three days on unaligned (left) and aligned (right) electrospun fibers. Cells growing on the aligned scaffold elongate along the axis of fiber aligned. Arrow indicates direction of fiber alignment.**

Percentage of Cells Expressing  $\alpha$ -sma



No scaffold

Unaligned

Aligned

**The no scaffold and unaligned scaffold samples had similar levels of cells expressing  $\alpha$ -sma. The cells cultured on the aligned scaffolds exhibited a significant decrease in  $\alpha$ -sma expression ( $p < 0.01$ ).**

**Results.** The cell-seeded scaffolds were stained for alpha smooth muscle actin ( $\alpha$ -sma) because expression of this protein within RCFs is correlated to corneal hazing and blindness. Downregulation of this protein within the cells would indicate that the construct exhibits the appropriate transparency properties. Immunofluorescence images reveal that cells cultured on unaligned electrospun scaffold express similar levels of  $\alpha$ -sma as the no scaffold controls. The cells on the aligned scaffold express significantly less  $\alpha$ -sma.

**Future Work.** The level of  $\alpha$ -sma protein expression was qualitatively assessed. This semester protein expression will be quantitatively assessed with Western Blot Analysis.

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