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Reconstruction of Rabbit Corneal Stroma with Dermal Fibroblasts

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1 Introduction

The objective of this study was to explore whether dermal fibroblasts can be used as a cell source for reconstruction of the corneal stroma.

2 Materials and Methods

Dermal fibroblasts were isolated from newborn rabbits, cultured and expanded in vitro. Cells of the 2nd or 3rd passage were seeded on polyglicolic acid (PGA) non-woven fibers to form a cell-scaffold construct. The constructs were then implanted into mother rabbit corneal stroma after culturing in vitro for 1 week. Dermal fibroblast cells were transfected with Green Fluorescence Protein (GFP) gene to mark the implanted cells. Engineered stroma were observed continuously and harvested after 8 weeks for gross and histological evaluation. Chondrocyte-PGA complex and PGA alone was used as negative control.

3 Results

The engineered tissue in the stroma became transparent gradually over a period of 8 weeks, showing no difference compared to the positive control. Histologically, engineered stromal lamellar was relatively regular and similar to positive control. The engineered tissue was confirmed under fluorescent microscope when GFP-labeled cells were used. By transmission electron microscopy examination, no significant difference in the diameter of collagen fibers was observed between engineered stroma and normal cornea. Cartilage tissue was formed in cornea stroma and cornea didn't turn transparent with chondrocyte-PGA complex, and no new stroma tissue was observed with PGA alone.

4 Conclusion

This is the first study demonstrate that dermal fibroblasts could replace corneal stroma cells to reconstruct corneal stroma. The successful restoration of corneal transparency by dermal fibroblasts suggests that it might be an alternative cell source for corneal stroma engineering.

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