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Elastin content and distribution in endothelial keratoplasty tissue determines direction of scrolling

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Abstract:

Purpose: Descemets membrane endothelial keratoplasty (DMEK) and pre-Descemets endothelial keratoplasty (PDEK) tissues always scroll with the endothelial cells (EC) outside. We designed a study to understand the reason for this behaviour.

Design: Experimental study.

Methods: Elastin content in Descemets membrane (DM), pre-Descemets layer (PDL), central and peripheral stroma, sclera and trabecular meshwork were measured by the Fastin elastin assay kit. Distribution of elastin in DM, PDL and anterior lens capsule (ALC) were examined by immunohistology. The effect of recombinant elastase enzyme and the effect of complete removal of EC and epithelial cells on the scrolling of DM and ALC respectively, were studied.

Results: PDL showed the highest elastin content among the different tissues studied. Elastin localized as a distinct anterior band in the DM and was uniformly distributed in the PDL demarcating the latter from corneal stroma. Enzymatic treatment of DM with elastase reversed scrolling and corresponded with degradation or disappearance of elastin. Removal of EC did not affect the direction of scrolling. ALC behaved in the same manner with regard to distribution of elastin, scrolling and removal of epithelial cells.

Conclusions: This pattern of elastin distribution in DM explains why DMEK and PDEK tissues always scroll with the EC outside. This behavior is not influenced by the EC. High elastin content and uniform distribution in the PDL suggest a structural difference from the posterior stroma.