

00189 Transglutaminase-2 Is Critical for Corneal Barrier Function

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Aims: Transglutaminase (TG)-2 is a ubiquitous multi-functional protein that is expressed in all living cells, and has been suggested to play important role in barrier function. Barrier properties of the cornea are critical to maintain corneal transparency and quality of vision. To study the role of TG-2 in corneal barrier function, we compared corneal barrier function of TG-2 knockout (KO) mice and wild type (WT) mice.

Methodology: Ussing chamber assay was used to evaluate permeability of cornea explants from both TG-2 KO and WT mice. Corneal thickness changes under hypo-osmolar pressure were measured by anterior segment optical coherence tomography. The permeability of two different sizes of dextran-FITC conjugates on the ocular surface of KO and WT mice were documented with fluorophotometry. The area under the fluorescence peak was measured using the ImageJ software and plotted. A repeat measures ANOVA model with the area under the curve as dependent variables and the genotype of the mice as one of the independent variables.

Result: The cornea explants of TG-2 KO mice showed increased corneal permeability evidenced by the greater current and voltage differences in Ussing chamber assays. The increase in corneal permeability was also supported by the more rapid increase in corneal thickness (swelling) overall when hypo-osmolar pure water was added to the ocular surface of these mice. In both 10kDa dextran-FITC and 70kDa dextran-FITC fluorophotometry experiments, the genotype was a significant independent variable. For both types of dextran-FITC, there was significant interactions between the individual mouse and the genotype ($F=36.48$, $p<0.001$; $F=7.23$, $p=0.001$ respectively), suggested that the rate of penetration of these conjugates into the anterior chambers were significantly faster in TG-2 KO than in WT mice.

Conclusion: Cornea barrier function was damaged in TG-2 KO mice, suggesting that TG-2 plays vital role in maintaining corneal epithelial barrier function.