

AB027. Varying pattern of proteases secretion in Fuchs corneal endothelial dystrophy

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Background: The goal of this project was to analyze the relationship between cell morphology and proteases/proteases inhibitors (PIs) secretion profile in fuchs endothelial corneal dystrophy (FECD) corneal endothelial cells (CECs).

Methods: Cell morphology was determined using a circularity index ($4\pi \times \text{area} / \text{perimeter}^2$) for each CECs population extracted from surgical FECD specimens (N=2) and healthy Eye bank corneas (N=3). CECs were cultured 28 days post-confluency. Supernatant was collected and analysed using Proteome Profiler Array detecting 35 proteases and 32 PIs (R&D Systems). Proteome signal was analyzed using Image Studio Lite and correlated with the population's circularity index.

Results: Calculation of circularity index reported different morphologies among FECD populations (0.59 ± 0.18 and 0.64 ± 0.17) and healthy populations (0.44 ± 0.18 , 0.66 ± 0.13 and 0.71 ± 0.11). Proteome arrays revealed the presence of 10 proteases (ADAMTS1, Cathepsin A, B, D, and X/Z/P, DPPIV/CD26, MMP-2, 3 and 12, uPA/Urokinase) and 10 PIs (Protease Nexin II, Cystatin B and C, EMMPRIN/CD147, Latexin, Lipocalin-1, Serpin E1, TFPI, TFPI-2, TIMP-1, 2 and 4). Healthy and FECD specimens showed similar variation patterns according to morphology for secretion of ADAMTS1, MMP-3 and 12. However, opposing patterns between healthy and FECD populations were observed for Cathepsin B and D. Moreover, some proteins did not show variation according to phenotype in healthy CECs, but did in FECD CECs: Cathepsin A, Cystatin C, TFPI-2 and total TIMPs. For the other proteins, secretion did not vary according to morphology or no specific pattern was distinguishable.

Conclusions: To conclude, our results suggest that cell phenotype is linked to the secretion of certain proteases/PIs in both groups. However, there seems to be differences in secretion of particular proteases and PIs between FECD and healthy specimens as morphology did not have a similar influence. These differences might initiate an imbalance between proteases and PIs explaining the irregular thickening of the Descemet membrane seen in FECD.

Keywords: Fuchs endothelial corneal dystrophy (FECD); cornea; corneal endothelial cells (CECs); protease; phenotype

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