Measurement of Descemet Membrane Thickness with Fourier-domain Optical Coherence Tomography and its Impact on Tissue Handling in the Anterior Chamber

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Purpose

Currently, surgeon tissue selection for Descemet membrane endothelial keratoplasty (DMEK) is biased toward older donors\(^1\) in order to increase the likelihood of acquiring thicker, easier to handle Descemet membrane (DM). An objective method to measure the DM thickness could aid tissue selection for DMEK.

Method

• 47 corneas from 42 donors and a line scan was performed with FD-OCT
• Scans analyzed at OHSU for DM thickness
• Unfold time was recorded for 34 grafts during the DMEK surgery
• Correlation performed to see if DM thickness is related to speed of tissue unfolding
Corneal Descemet Imaging with FD-OCT

A

B

C

D

Epithelium
Bowman's interface
Stroma
Descemet's interface
Descemet Membrane Thickness Measurement

Descemet Membrane Thickness = distance between “a” and “b”
Determining Unfold Time

- Standard DMEK protocol utilized by three separate surgeons (Yoeruek tap³)
- Graft unfold time measured from first tap until the graft is totally opened and ready for final positioning with a bubble

Age: average 66.3 ± 6.5 (range 54-75) yr
DM thickness: average 18.0 ± 2.3 µm
Pearson correlation: $r = 0.2825$, p-value = 0.054 (marginally significant)
Descemet Thickness vs. Unfold Time

Pearson’s correlation $r = -0.42$, p-value 0.013 (significant)

*Logarithmic (log) transform was performed on variable “unfold time” to meet the data normality assumption of parametric statistical tests.
Pearson correlation $r = -0.0137$, p-value $0.94$ (non-significant)

*Logarithmic transform was performed on variable “unfold time” to meet the data normality assumption of parametric statistical tests.*
Conclusion

• DM thickness could be measured with OCT.
• Marginal statistically significant correlation was detected between age and DM thickness in our study.
• Thicker grafts unfolded faster during DMEK.
Conclusion

• Age information by itself may not be sufficient in donor cornea selection.

• OCT DM thickness measurements may aid the surgeon with more predictable DMEK surgery.
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