Measurement of Descemet Membrane Thickness with Fourier-Domain Optical Coherence Tomography and its Impact on Tissue Preparation

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Purpose

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

Method

- 22 corneas from 19 donors and performed a cross line scan with FD-OCT (Optovue RTVue)
- Raw data analyzed at OHSU for DM thickness
- 17 corneas prepared for DMEK and rated according to difficulty of peel
- Correlation
  - Is DM thickness related to age?
  - Is DM thickness related to handling?
OCT Overview

Our study:
Average of 21 A-scans from central 5 mm area

Courtesy of David Huang, MD, PhD - OHSU - www.coollab.net
Descemet Membrane Thickness

Descemet Membrane thickness = distance between “a” and “b”
## Peel Rating Scale

<table>
<thead>
<tr>
<th>Scale</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Easy peel</td>
</tr>
<tr>
<td>1.5</td>
<td>Easy peel, tissue broke off edges during peel without adverse impact on graft zone</td>
</tr>
<tr>
<td>2</td>
<td>Moderate difficulty</td>
</tr>
<tr>
<td>2.5</td>
<td>Moderate difficulty, tissue broke off edges during peel without adverse impact on graft</td>
</tr>
<tr>
<td>3</td>
<td>Difficult peel but successful</td>
</tr>
<tr>
<td>3.5</td>
<td>Difficult peel and tears present at periphery but tissue still suitable for grafting</td>
</tr>
<tr>
<td>4</td>
<td>Unsuccessful</td>
</tr>
</tbody>
</table>
Descemet Thickness vs. Age

- Age: average 66.6 ± 6.4 (range 54-75) yr
- DM thickness: average 17.9 ± 2.2 (15-21.6) µm
- n=22

$y = 0.088x + 12.06$

$R^2 = 0.0654$

P-value of the slope = 0.25
Difficulty of peel = 1, average Descemet thickness 18.0 µm (15.5-21.5, n=13)

Descemet thickness is either significantly thinner (Ave 15.5 µm, n=2)

Descemet thickness is significantly thicker (Ave 21.3 µm, n=2)
### Descemet Thickness vs. Difficulty of Peel

**Graph and Table:**

- **Graph Notes:**
  - P = 0.0003
  - Easy
  - Moderate
  - Difficult
  - Unsuccessful

- **Table:**

<table>
<thead>
<tr>
<th>Group</th>
<th>Peel Rating</th>
<th>Ave DM Thickness µm</th>
<th>Range µm</th>
<th>n</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>easy</td>
<td>1</td>
<td>18.0</td>
<td>15.5-21.5</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>thin</td>
<td>&gt;1 (2.5-3)</td>
<td>15.5</td>
<td>15.4-15.5</td>
<td>2</td>
<td>0.003</td>
</tr>
<tr>
<td>thick</td>
<td>&gt;1 (1.5-2)</td>
<td>21.3</td>
<td>21-21.6</td>
<td>2</td>
<td>0.003</td>
</tr>
</tbody>
</table>
Conclusion

• DM thickness could be measured with OCT.

• No statistically significant correlation was detected between age and thickness of DM in our study.

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

• In this small sample, there was a trend for either very thin or thick grafts to be more difficult to prepare for DMEK.
• A larger sample to determine the significance of these measurements is warranted.
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Questions?

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