Truly Know your DMEK Graft: Can Pan-endothelial Damage Analysis In Association with Specular Microscopy Tell You More?

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Disclosures

• The authors have no financial interests to disclose
Background

Evaluation of Eye Bank Prepared DMEK Grafts to Determine Suitability for Transplantation

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Background
Introduction

• Specular microscopy combined with slit lamp examination is standard practice
  – Typically 50-100 cells are counted in each image
  – 1-3 images taken and densities are averaged
  – An 8mm graft with 2500 endothelial cell density (ECD) has 125,663 total cells
    • 2000 ECD = 100,530 cells
    • 3000 ECD = 150,796 cells
  – We are providing an ECD based on an average of .1% of the cells in a graft
ECD by specular microscopy
Introduction

• Is the standard method the most accurate final report of cell density?
• Is there a different method for obtaining cell counts on difficult to evaluate tissue post processing?
• How do we account for cell loss and damage when reporting endothelial cell densities to the transplanting physician?
Methods

- Graft peeled
  - Forceps method
  - Peripheral hinge

- Stained with Trypan Blue
  - Rinsed with BSS

- Imaged and analyzed with Fiji
Fiji Trainable Software
Fiji Trainable Software

Comparison

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<th>Damage</th>
<th>Pre ECD</th>
<th>Predicted ECD</th>
<th>Post ECD</th>
<th>Difference</th>
<th>%Difference</th>
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P = .21

Predicted ECD = (% damage) (Pre ECD)

Predicted ECD compared to Post processing ECD for level of significance
Results

- Mean ECD values by specular microscopy:
  - $2790 \pm 162$

- Mean ECD by pan-endothelial cell damage analysis:
  - $2701 \pm 258$ (p=.21)

- 4/10 grafts showed 8% or greater differences than reported ECD values (8-19%)
Conclusions

• The small size of the study may be a reason for limited variation.

• While there is no statistical difference, some cases show the ECD as reported increased while damage analysis indicates we should expect a lower ECD.

• ECD Damage analysis more accurately reflects the true endothelial cell density at time of transplant than specular imaging alone.

• Clinical indication remains unclear and further investigation seems warranted.