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

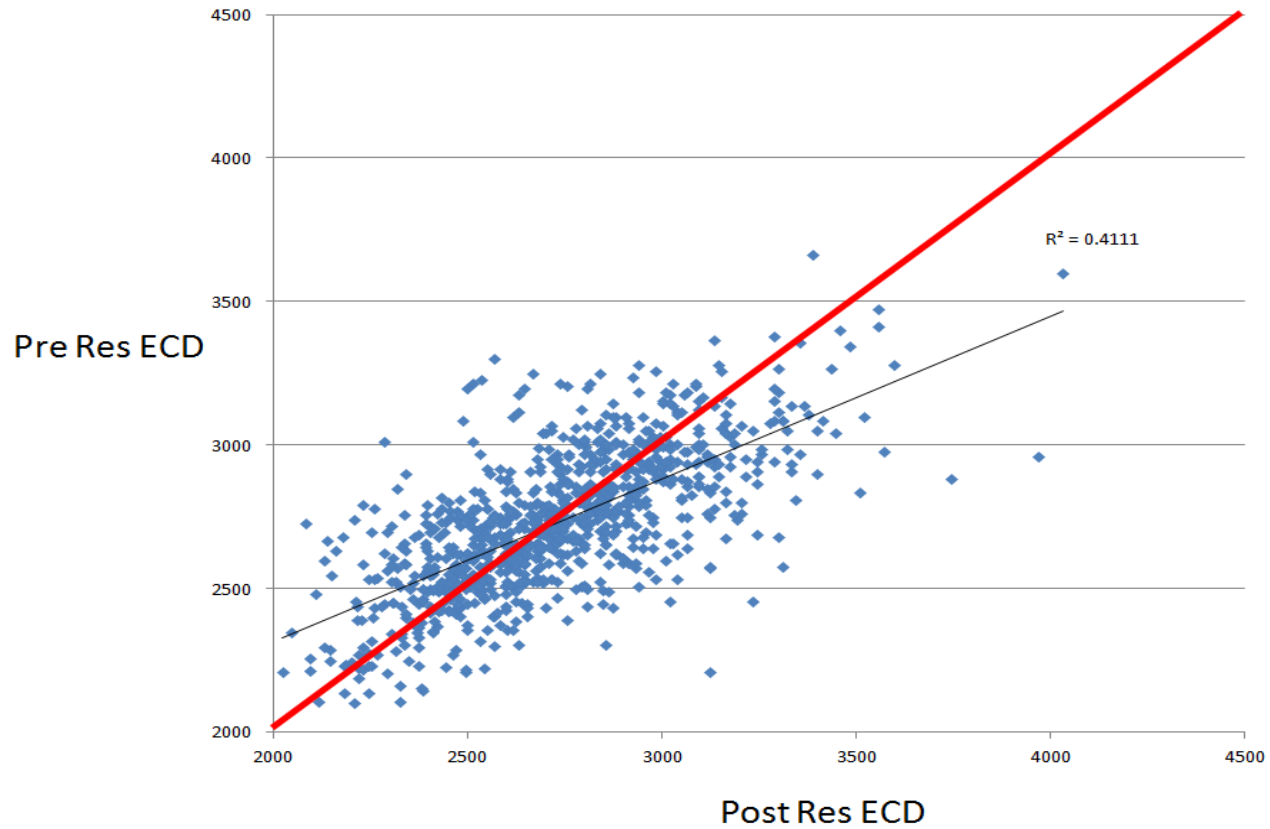Evaluation of Eye Bank Prepared DMEK Grafts to Determine Suitability for Transplantation

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LIONS EYE BANK
of OREGON
VISION RESEARCH
LABORATORY

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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
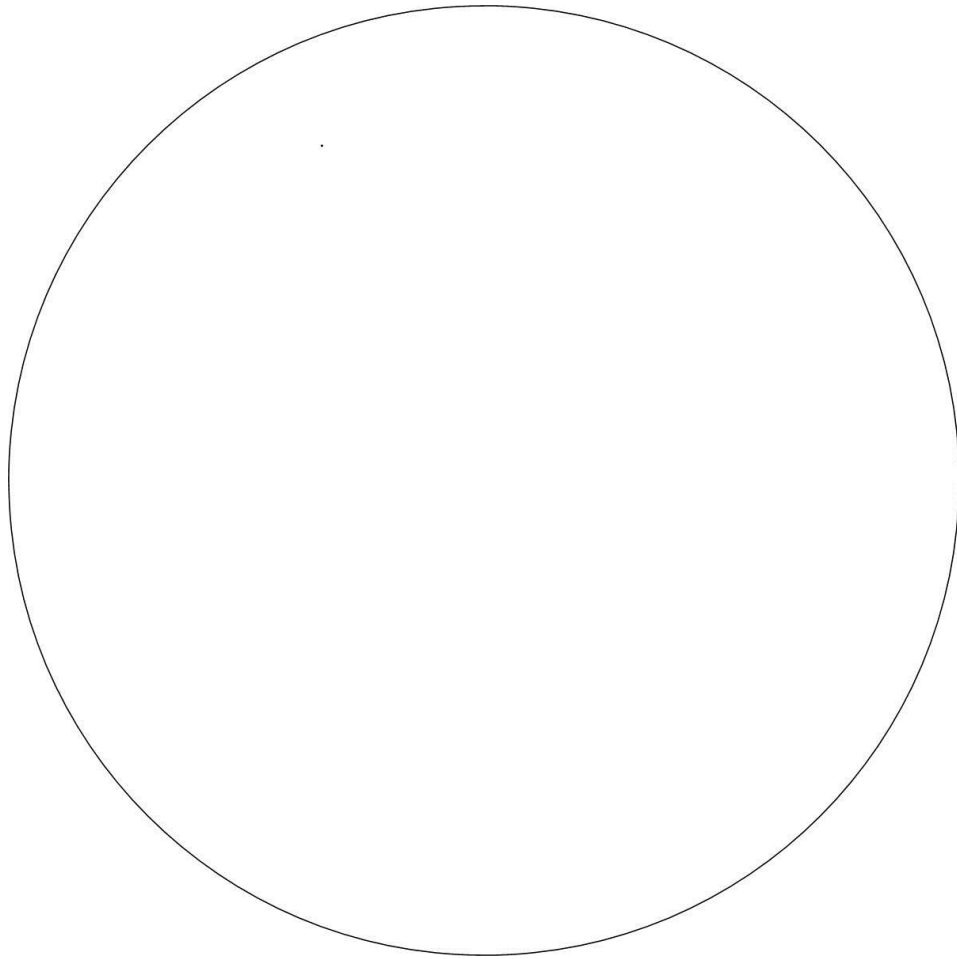
Introduction

- 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?
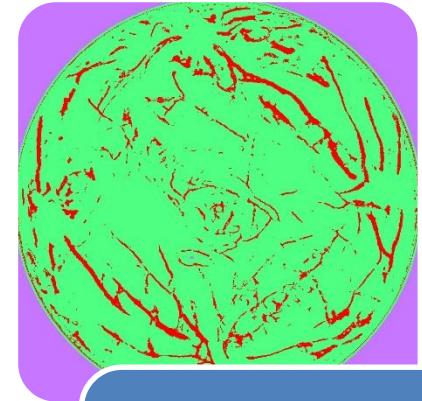
Methods

Graft peeled
- Forceps method
- Peripheral hinge

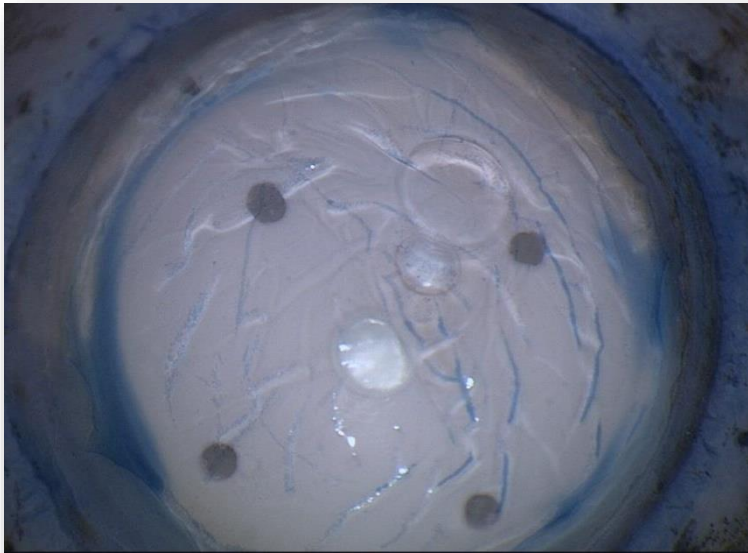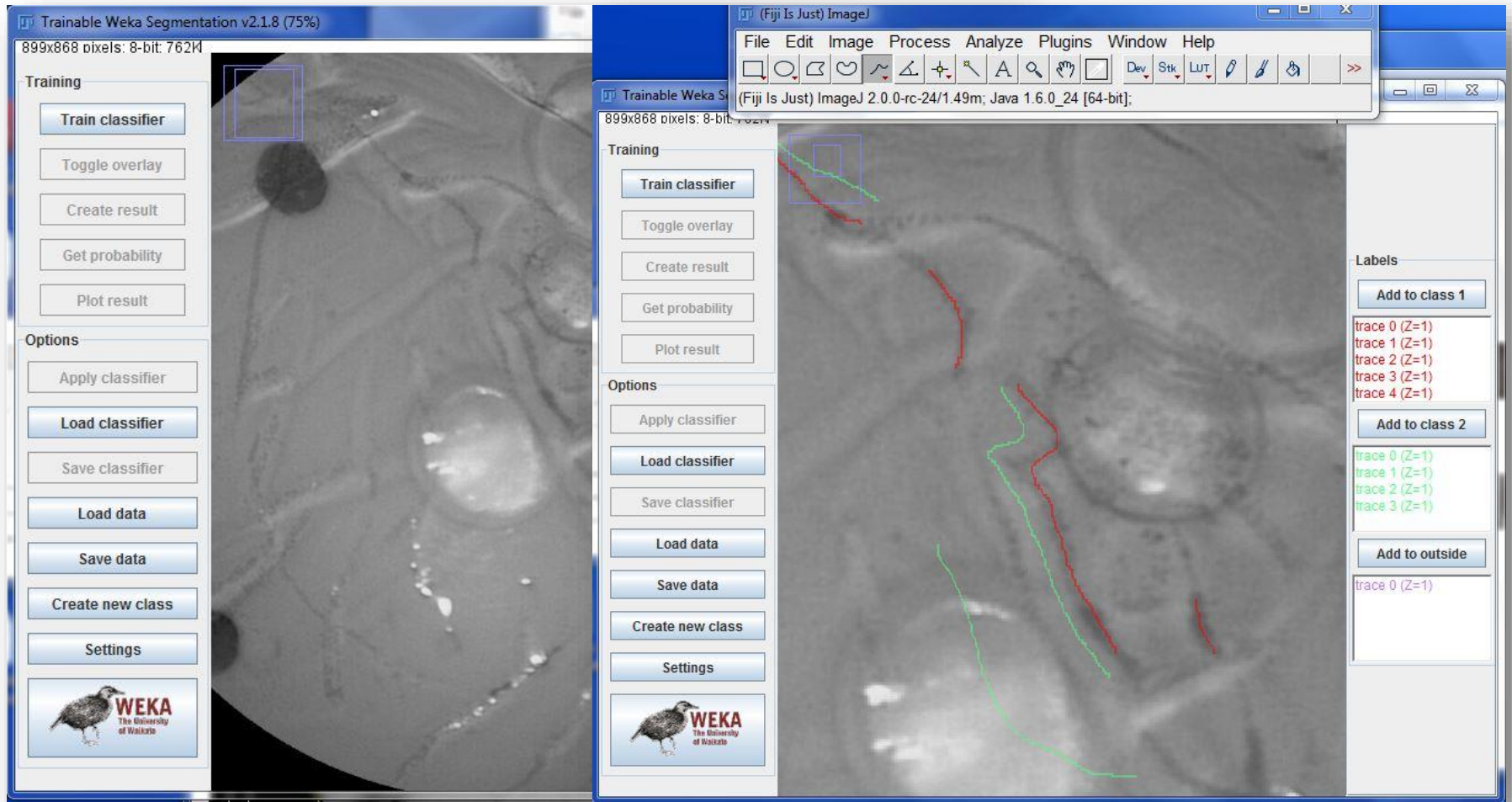**Stained with Trypan Blue**
- Rinsed with BSS

Imaged and analyzed with Fiji

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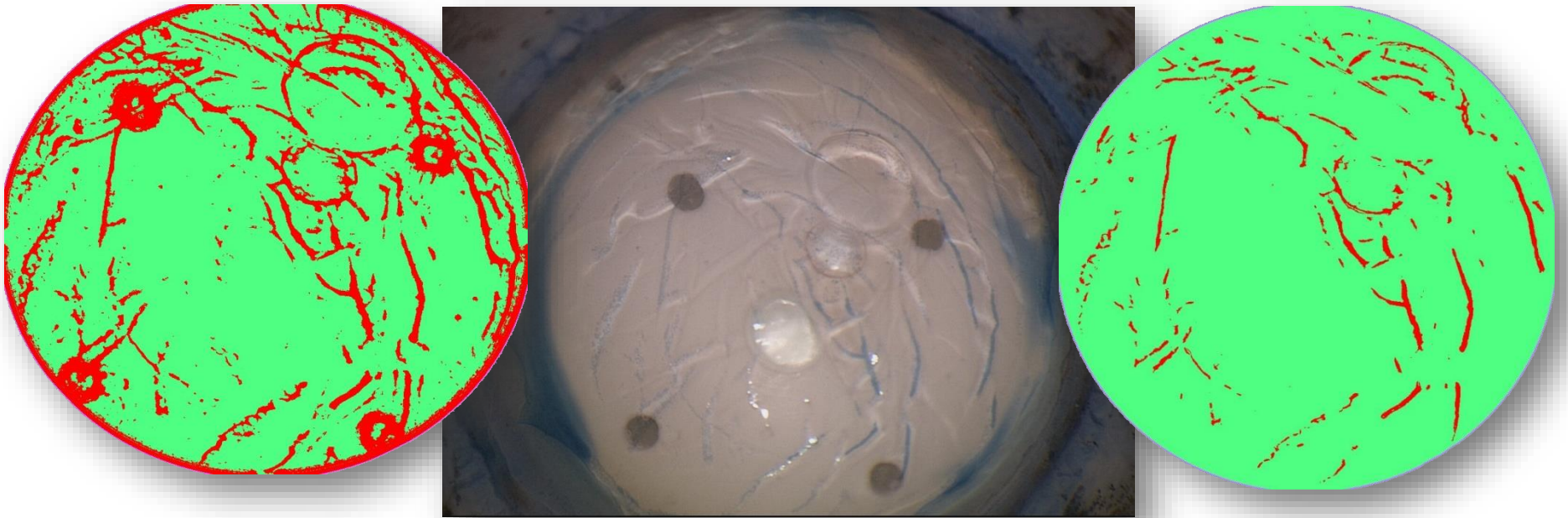
Fiji Trainable Software

Fiji Trainable Software

Jardine, et al. Current Eye Research, 2014.

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Fiji Trainable Software

Comparison

Damage	Pre ECD	Predicted ECD	Post ECD	Difference	%Difference
4.1%	2475	2374	2618	244	9.3%
4.2%	2336	2238	2755	517	18.8%
3.0%	2825	2741	2786	45	1.6%
4.2%	2809	2691	2710	19	0.7%
5.8%	3165	2981	3040	59	1.9%
4.4%	3115	2978	2959	-19	-0.6%
10.7%	3030	2706	2660	-46	-1.7%
2.8%	2994	2910	3030	120	4.0%
3.5%	2591	2500	2725	225	8.2%
4.7%	3040	2897	2618	-279	-10.7%

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 ± 162

- Mean ECD by pan-endothelial cell damage analysis:
  - 2701 ± 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