Poster #PO069

Endothelial cell loss is not influenced by donor endothelial cell density above 2800 or below 2300 cells/mm² after standardized DMEK

Authors: P. James Sanchez, MD[1], Christopher S. Sáles, MD, MPH[1], Mark A. Terry, MD[1], Zachary M. Mayko, MS[2], Christopher Stoeger, MBA, CEBT[2], Michael D. Straiko, MD[2]

1. Devers Eye Institute, Legacy Research Institute, Legacy Health ,Portland, OR, United States, 2. Lions VisionGift, Portland, OR, United States.

Introduction

To determine whether high or low donor endothelial cell density (ECD) influences 6-month endothelial cell loss (ECL) after standardized DMEK.

Corneal surgeons' preference for DMEK tissue with the highest ECD possible might be worth revisiting if implanting tissue with < 2300 cells/mm² delivers acceptable postoperative ECD and equivalent ECL to what is achieved with higher preoperative cell counts.

Methods

ECD was measured prospectively in eye bank prepared DMEK grafts prior to implantation and 6 months after implantation.

ECL at 6 months was retrospectively reviewed for patients who underwent DMEK for Fuchs endothelial dystrophy using the Devers standardized DMEK technique.

Examples of healthy endothelium: <2300 and >2800 cells/mm²

Fig 1a

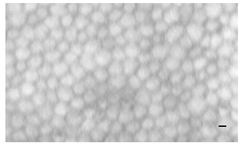

Fig 1b

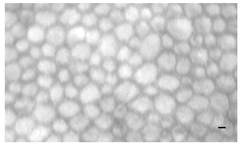

Figure 1a. Specular image of a DMEK preperation with an endotheliel cell density above 2800 cells/mm²

Figure 1b. Specular image of a DMEK preperarion with an endotheliel cell density below 2300 cells/mm²

Financial Interest Disclosures - None

MAT – None; CGS – None; PJS – None; ZMM – None; MDS – None

ECDs Derived by Specular Images on a Single Layer of Endothelium Can Vary Dramatically

Example of a DMEK graft prepared with a Pre Resection ECD below 2300 cells/mm²

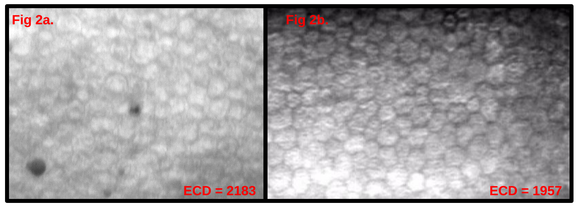

Figure 2a and 2b are specular images taken of the same endothelium. 2a is before DMEK preperation and 2b is 6 months later.

Example of a DMEK graft prepared with a Pre Resection ECD above 2800 cells/mm²

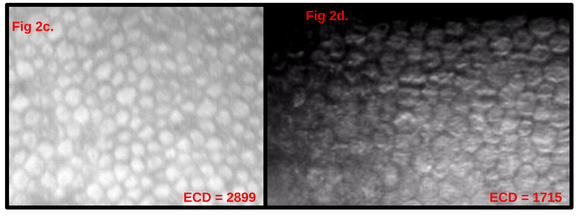

Figure 2c and 2d are specular images taken of the same endothelium. 2c is before preperation and 2b is 6 months later.

Figure 3.

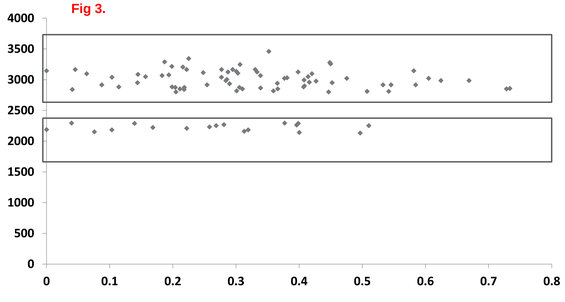

Figure 3 is a scatter plot showing the percent endotheliel cell loss for grafts broken up into each of their cohorts.

Endothelial Cell Loss Between Pre Resection and 6 months Post Op

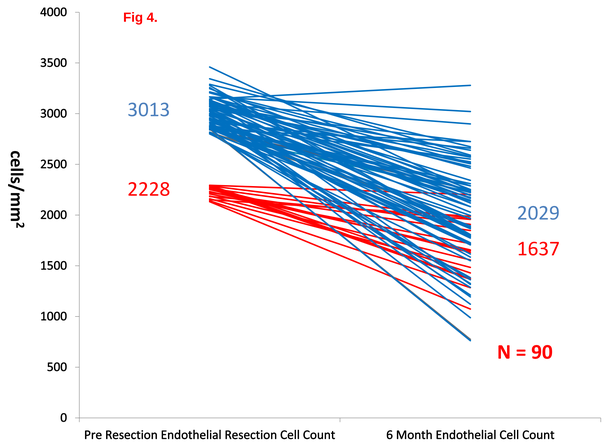

Figure 4 shows the decrease in average ECD before transplantation (Pre Resection) and 6 months after transplantation. Red lines indicate grafts with initial ECDs below 2300 cells/mm² and blue lines with initial ECDs above 2800 cells/mm².

Results

Review of our database showed 19 cases that fit the inclusion criteria and had donors with a pre-resection ECD less than 2300 cells/mm².

- **Mean pre-resection ECD was 2228 ± 57**
- **Mean 6 month ECD was 1637 ± 298**
- **Endothelial cell loss was 26.5%**

A total of 71 cases fit the inclusion criteria and had donors with a pre-resection ECD greater than 2800 cells/mm².

- **Mean pre-resection ECD was 3013 ± 148**
- **Mean 6 month ECD was 2029 ± 516**
- **Endothelial cell loss was 32.8%**

There was no significant difference between the percent endothelial cell loss between the donors with less than 2300 cells/mm² and those with greater than 2800 cells/mm². The 6 month ECD of the group that started with higher cell denisities was significantly greater than the group that started with lower cell densities.

Conclusion

There was no difference in percent endothelial cell loss between grafts with pre-implantation endothelial cell densities less than 2300 or greater than 2800 cells/mm². This shows that DMEK surgeons can expect similar levels of endothelial cell loss whether they implant tissue with relatively high or relatively low endothelial cell density. The patients who received donor tissue with higher cell densities, however, had significantly greater 6 month cell density values.

Clinical Significance

We found that our standardized DMEK technique achieved equivalent percent endothelial cell loss at 6-months, whether the donor had fewer than 2300 cells/mm² or more than 2800 cells/mm². This suggests that tissue with lower ECDs does not have a higher propensity to lose endothelial cells as a result of DMEK surgery compared to donor tissues with higher ECDs. Higher donor ECDs, however, confer significantly higher 6 month ECDs. The clnical significance of the difference in 6 month ECD is yet to be determined. Long-term studies of DMEK graft survival are needed.

References

Terry, Mark A., et al. "Endothelial keratoplasty: the influence of preoperative donor endothelial cell densities on dislocation, primary graft failure, and 1-year cell counts." Cornea 27.10 (2008): 1131-1137.

Price, Marianne O., et al. "Descemet's stripping endothelial keratoplasty: five-year graft survival and endothelial cell loss." Ophthalmology 118.4 (2011): 725-729.

Ing, Jeffrey J., et al. "Ten-year postoperative results of penetrating keratoplasty." Ophthalmology 105.10 (1998): 1855-1865.

Nishimura, Julie K., David O. Hodge, and William M. Bourne. "Initial endothelial cell density and chronic endothelial cell loss rate in corneal transplants with late endothelial failure." Ophthalmology 106.10 (1999): 1962-1965.

Contact: P. James Sanchez– pjamessanchez@gmail.com