20/20 Vision After DSAEK and DMEK: Are They Equal?

2016 Fall Educational Symposium

October 14, 2016

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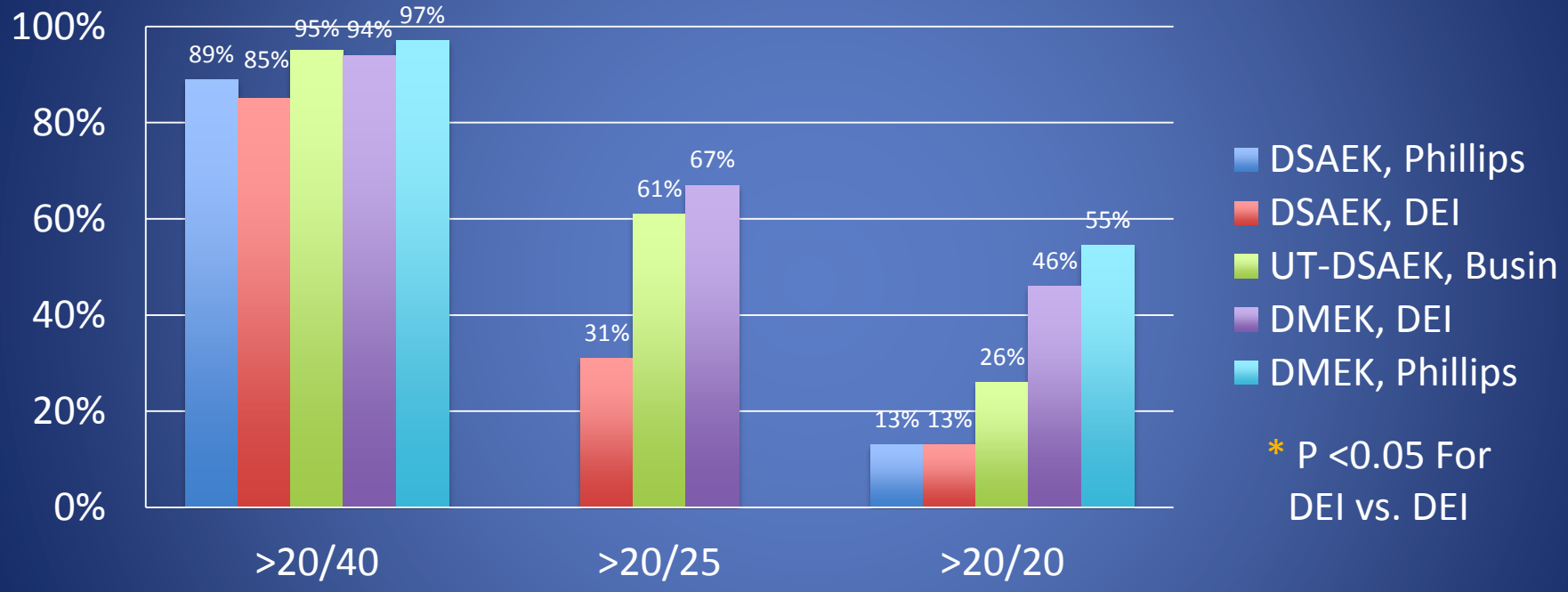
Disclosures

No financial interests relevant to this talk

Vision: DSAEK Versus DMEK



Terry MA et al: The First 100 Eyes of Standardized Descemet Stripping Automated Endothelial Keratoplasty versus Standardized Descemet Membrane Endothelial Keratoplasty. Ophthalmology. 2015 Nov;122(11):2193-9

Phillips P et al: An experienced DSAEK surgeon's transition to DMEK: Outcomes comparing the last one hundred DSAEK surgeries with the first one hundred DMEK surgeries exclusively using previously published techniques. Cornea 2016. In press

Busin M et al: Ultra-thin DSAEK with microkeratome double pass technique. Ophthalmology. 2013; 120:1186-94.

DSAEK and Contralateral Eye DMEK

- Guerra et al (Price Group): Cornea 2011;30:1382-1386
  - N = 15 pts with both DSAEK and DMEK
  - Average best spectacle corrected visual acuity (BSCVA) at 1 year?
    - DMEK 20/24, DSAEK 20/32
  - Percent 20/20 or better?
    - DMEK: 38%, DSAEK 8%
  - Which surgery would patients recommend to a friend or relative?
    - DMEK 62%, DSAEK 15%, No Preference 23%

DSAEK and Contralateral Eye DMEK

- Rootman et al: Am J Ophthalmol. 2015 Jan;159(1):155-9
  - N = 17 pts with both DSAEK and DMEK
  - Average BSCVA at 6 months?
    - DMEK 0.25 (20/36), DSAEK 0.39 (20/49)
  - Subjective level of average satisfaction?
    - 6 after DMEK, 4.87 after DSAEK
  - Which surgery would they prefer if given a choice?
    - DMEK 80%, 20% no preference

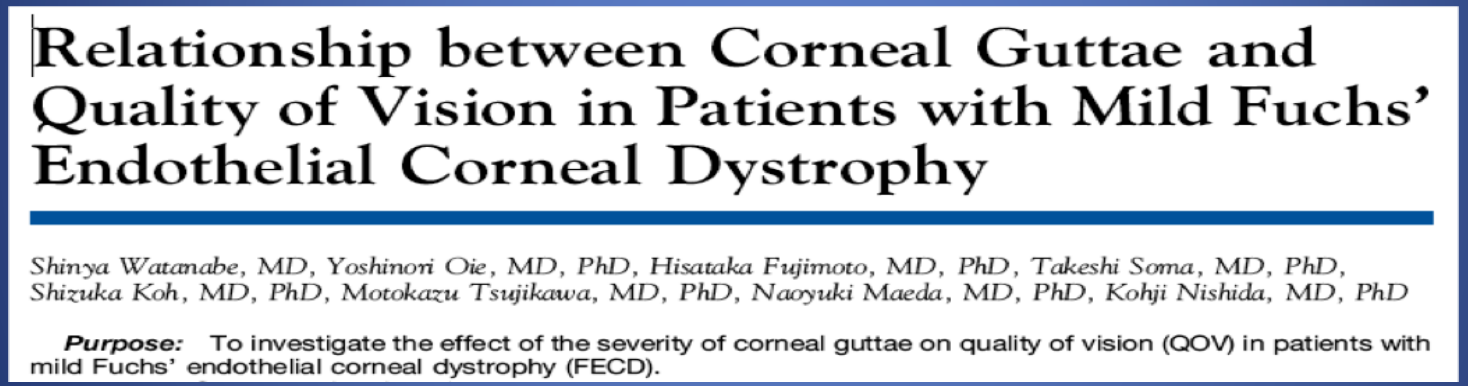
“Ultrathin” DSAEK Versus DMEK

- Van Zyl, Terry et al: ARVO 2014
  - N = 21 pts with DMEK and contralateral ultrathin DSAEK
    - < 100 um post op
  - Average BSCVA at 6 months?
    - DMEK 20/24, DSAEK 20/28
  - Percent 20/20 or better?
    - DMEK: 45%, DSAEK 18%
  - Which eye do you prefer?
    - 74% DMEK, 21% DSAEK, 5% no difference

- Patients generally prefer their DMEK eye
- In our experience, this holds true even when visual acuities are similar between the eyes
  - Why?
- Snellen visual acuity obtained using high contrast charts does not tell the whole story

Visual Quality

- 20/30 DSAEK female post-op preferred that eye compared to her 20/20 eye with 3-4+ guttae



Relationship between Corneal Guttae and Quality of Vision in Patients with Mild Fuchs' Endothelial Corneal Dystrophy

Shinya Watanabe, MD, Yoshinori Oie, MD, PhD, Hisataka Fujimoto, MD, PhD, Takeshi Soma, MD, PhD, Shizuka Koh, MD, PhD, Motokazu Tsujikawa, MD, PhD, Naoyuki Maeda, MD, PhD, Kohji Nishida, MD, PhD

Purpose: To investigate the effect of the severity of corneal guttae on quality of vision (QOV) in patients with mild Fuchs' endothelial corneal dystrophy (FECD).

Ophthalmology. 2015 Oct;122(10):2103-9

- Examined patients with mild Fuchs without edema
- Corneal guttata cause light scatter
- Impacts contrast sensitivity

Functional Vision Study

We evaluated 13 patients with DSAEK in one eye and DMEK in the fellow eye

	DSAEK EYE	DMEK EYE
Age	70.5	70.5
Pre-op BSCVA	20/40	20/38
Post-op BSCVA	20/26	20/22
Pre-op CCT	646	636
Post-op CCT	657	543
6 mos ECD	1974	1967
% Triple Procedure	43%	64%

Results: DMEK eyes showed superior contrast sensitivity compared to DSAEK eyes and approached the contrast sensitivity of normal eyes.

Corneal Higher Order Aberrations (HOAs)

- Degrade visual quality
- Fewer posterior corneal HOAs in DMEK compared to DSAEK

Corneal Higher-Order Aberrations after Descemet's Membrane Endothelial Keratoplasty

Michael Rudolph, MD,[1] Kathrin Laaser, MD,[1] Bjoern O. Bachmann, MD,[1] Claus Cursiefen, MD,[1] Daniel Epstein, MD, PhD,[2] Friedrich E. Kruse, MD[1]

Ophthalmology. 2012 Mar;119(3):528-35

Higher-Order Aberrations after Endothelial Keratoplasty: Comparison of DMEK and "thin" DSAEK

Julia C. Talajic[1], Cor van Zyl[1], Michael D. Straiko[1], Zachary Mayko[1,2], Mark A. Terry[1]. [1]Ophthalmology, Devers Eye Institute, Portland, OR; [2]Lions VisionGift, Portland, OR.

ARVO 2014

- Are HOAs more prevalent in DSAEK compared to DMEK when best corrected visual acuities are identical?
  - Could this explain patient preference for DMEK?
- In this present study, we identified patients with equivalent 20/20 BSCVA after DSAEK and DMEK and then analyzed higher order aberrations.

Methods

- Retrospective review of a consecutive series of patients with 20/20 BSCVA after surgery
  - After a minimum of 6 months
- Forty-nine eyes of 41 patients in the DSAEK group
- Ninety-six eyes of 77 patients in the DMEK group
- Corneal aberrations were measured using the Pentacam rotating Scheimpflug camera

Pentacam

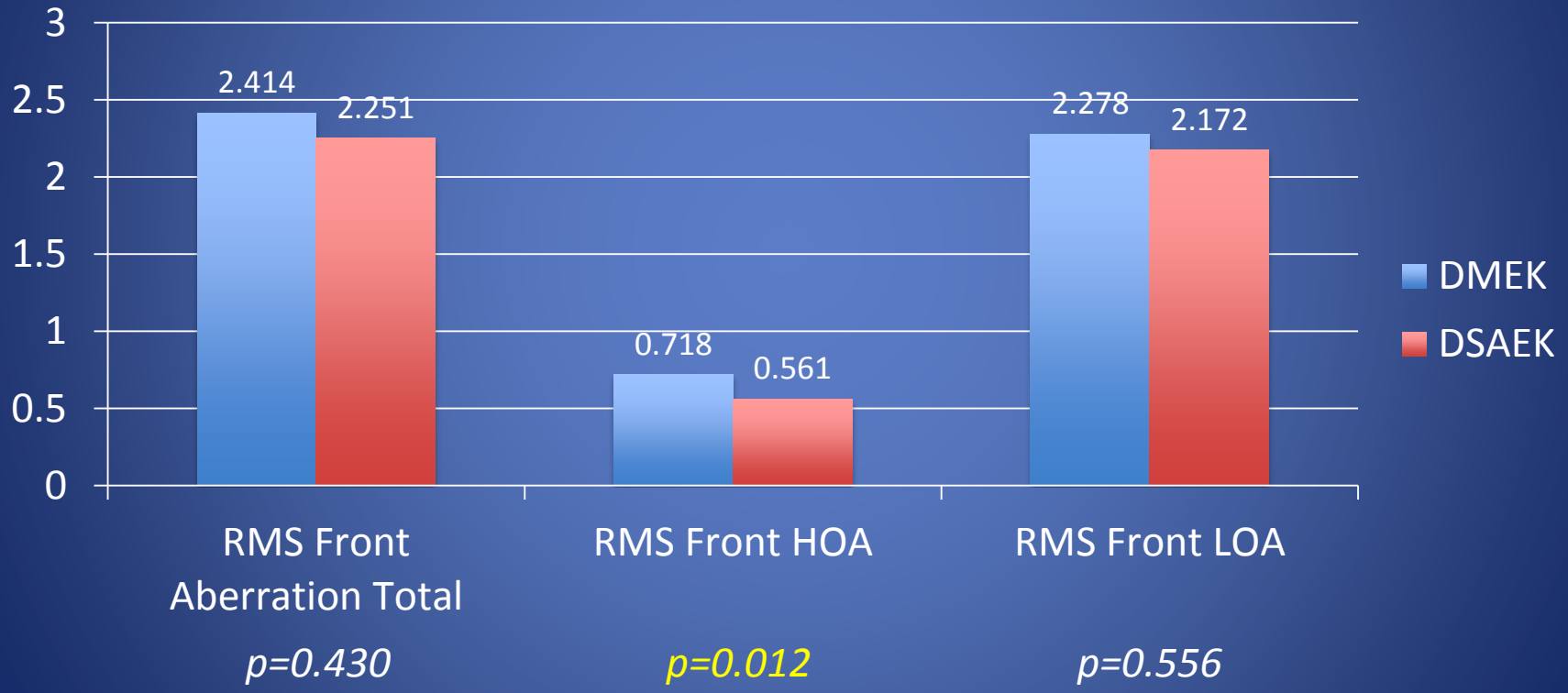
- Utilized in many studies to analyze higher order aberrations
  - Kruse et al: Ophthalmology. 2012 Mar;119(3):528-35
  - Melles et al: Am J Ophthalmol. 2014 Jul;158(1):71-79

- Good Pentacam repeatability coefficients have been found using the on-board software
  - Muftuoglu et al: Corneal higher-order aberrations after Descemet's stripping automated endothelial keratoplasty. Ophthalmology 2010;117:87884

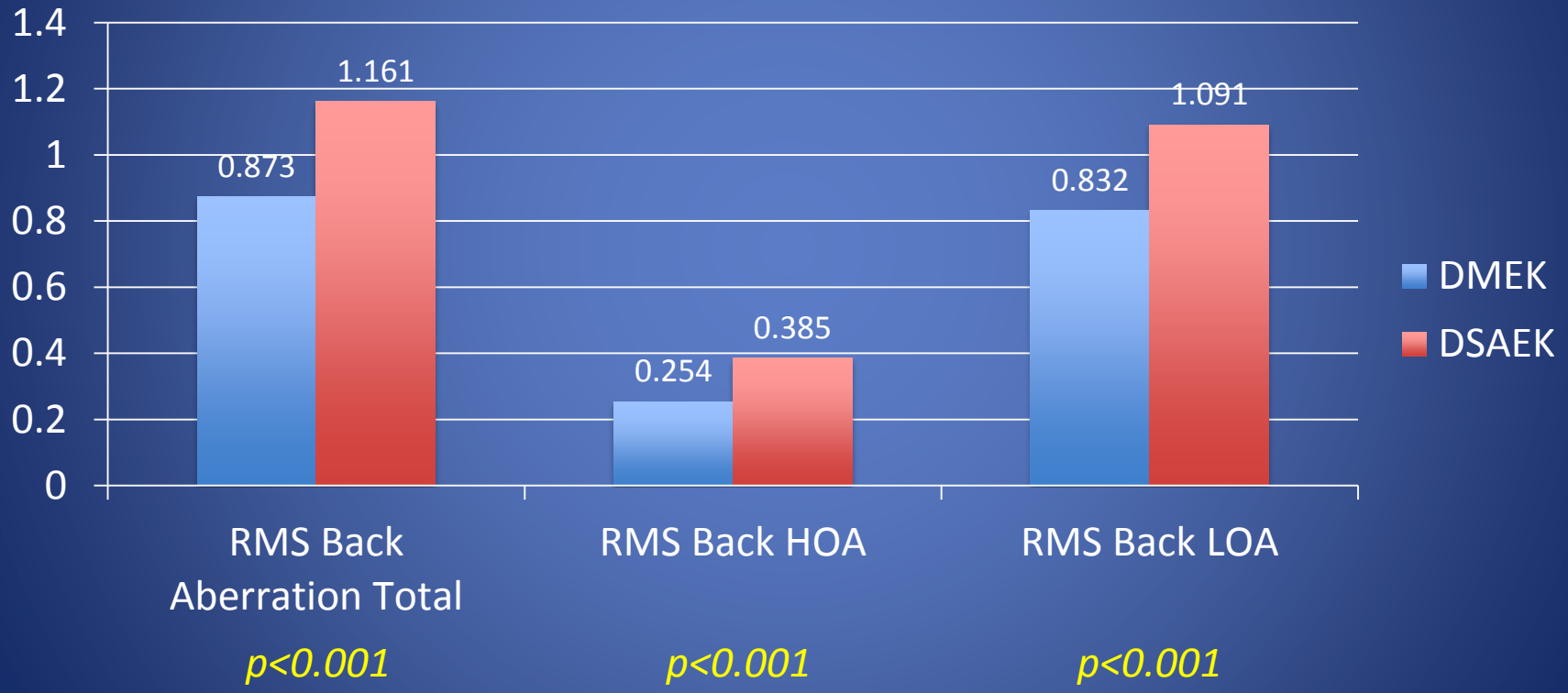
Demographics

	DSAEK (N=49)	DMEK (N=96)
Age (Mean ± SD)	65.2 ± 8.7	65.3 ± 9.1 years
Gender	34.7% Male 65.3% Female	33.3% Male 66.7% Female
Follow up	6-36 Months (Average 15)	6 Months
Triple Procedure	85.7%	80.2%
DSAEK Thickness <140 Microns Pre-op* (N=38)	55.2%	NA
Pre-op Visual Acuity (Mean)	20/41	20/32

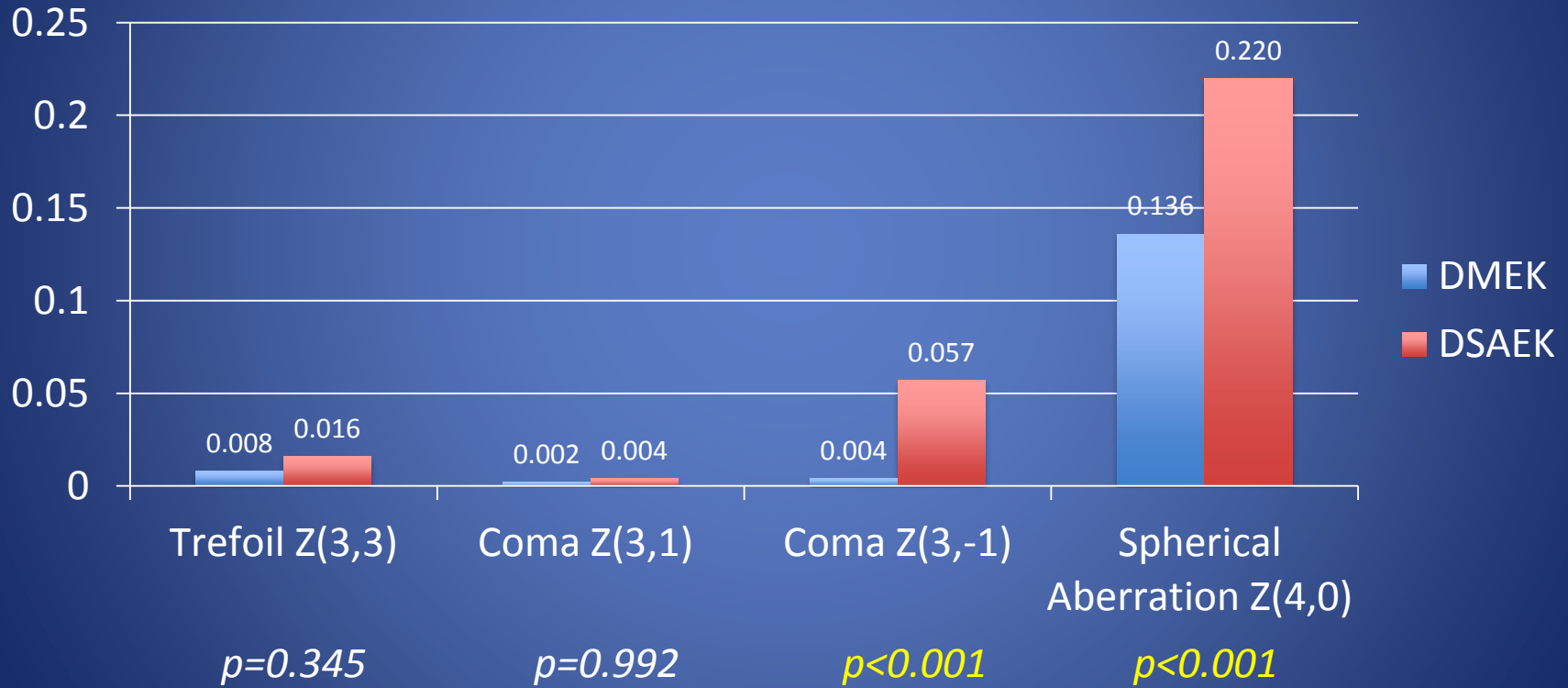
Results – Cornea Front



Results – Cornea Back



Results – Cornea Back



- No significant differences were found in total corneal higher order aberrations

Discussion

- Data from this cohort of patients with 20/20 BSCVA after DSAEK and DMEK revealed the following:
  1. Greater total anterior HOAs in DMEK when compared to DSAEK
     - Why higher in DMEK than DSAEK?
     - Not found in other studies[1]
  2. Greater posterior HOAs in DSAEK when compared to DMEK

1. Kruse et al: Ophthalmology. 2012 Mar;119(3):528-35

Discussion

- A significant correlation between anterior corneal HOAs and BSCVA has previously been reported[1]
- In our 20/20 BSCVA cohort, DSAEK anterior HOAs approached those of controls in other studies[2], while DMEK anterior HOAs were slightly higher
- Likely that you need to be below a certain threshold of anterior HOAs to be able to achieve 20/20 BSCVA
  - Threshold may be higher in DMEK given fewer posterior HOAs and resultant better quality of vision

1. Van Dijk et al: Am J Ophthalmol. 2014;158(1):71-9
2. Kruse et al: Ophthalmology. 2012 Mar;119(3):528-35

Discussion

- Posterior HOAs
  - Influence visual quality more than visual acuity
  - Fewer posterior HOAs after DMEK when compared to DSAEK, even with equivalent 20/20 vision
    - Highly statistically significant
    - At least partially explains patient preference of DMEK over DSAEK, even when Snellen visual acuities are equivalent

Conclusion

- Patient preference for vision after DMEK compared to DSAEK is likely due, at least in part, to differences in posterior corneal higher order aberrations
  - Fewer in DMEK compared to DSAEK
    - Even with equivalent 20/20 BSCVA
  - Degrade visual quality
    - Do not significantly affect Snellen visual acuity
- Future studies comparing DSAEK and DMEK outcomes should include measures of quality of vision
  - Not all 20/20 eyes are created equal

Future Directions

- Expand our testing of patients with DMEK and contralateral DSAEK, with equivalent Snellen 20/20 visual acuity, to include the following:
  - Contrast sensitivity
  - Light scatter
  - Patient preference
    - Tailored questionnaire

Thank you!

Questions?