ULTRATHIN DSAEK: THE PRESENT STATUS

Massimo Busin, MD
FORLI' - ITALY

DSAEK

TODAY

GOLD STANDARD

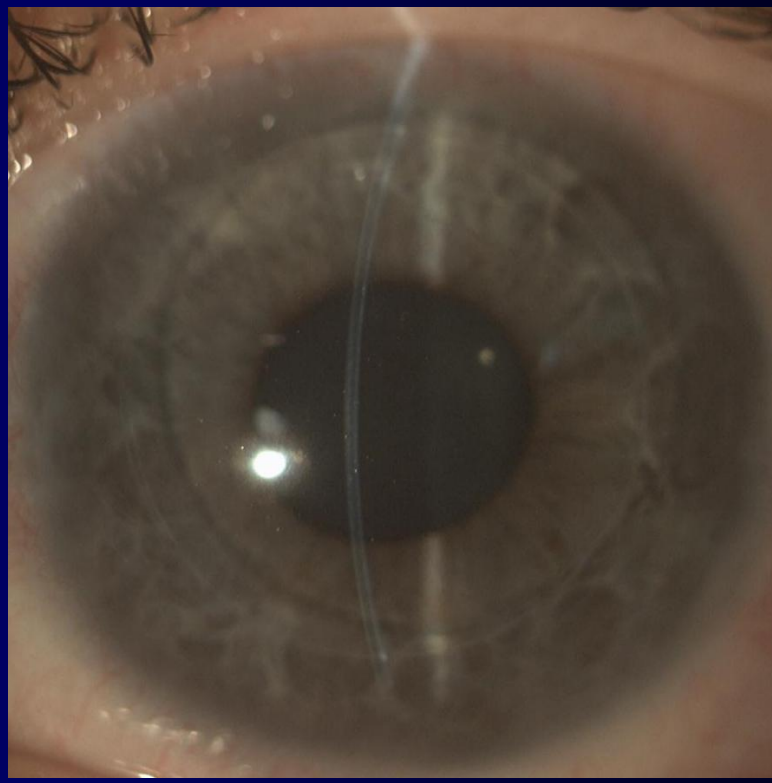
FOR THE SURGICAL TREATMENT OF ENDOTHELIAL DECOMPENSATION

DSAEK VISUAL OUTCOME

BSCVA ≥ 20/40

38% to 100%

at 3-6 months



72.96% at 1 month*

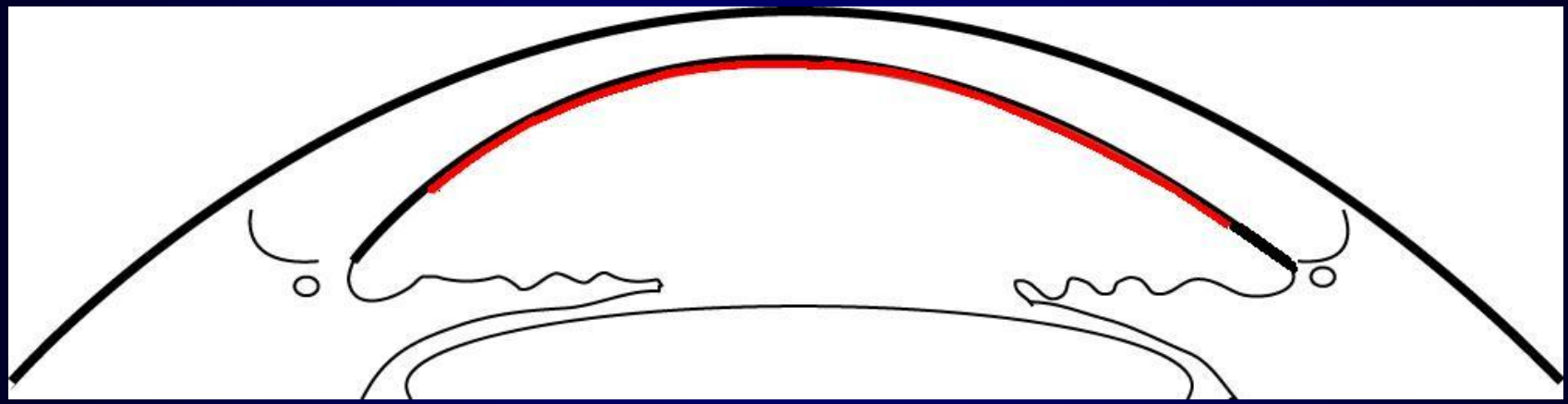
81.13% at 3 mos*

***Personal Data, Excluding Co-Morbidities**

SUTURELESS POSTERIOR ONLAY LK

(D)escemet (M)embrane (E)ndothelial (K)eratoplasty

DMEK (Melles, 2006)



DSAEK vs DMEK

Patients with BSCVA ≥ 20/20

DSAEK = 0% to 33%*

DMEK = 20% to 45%

***DSAEK Personal Data**

DSAEK vs DMEK

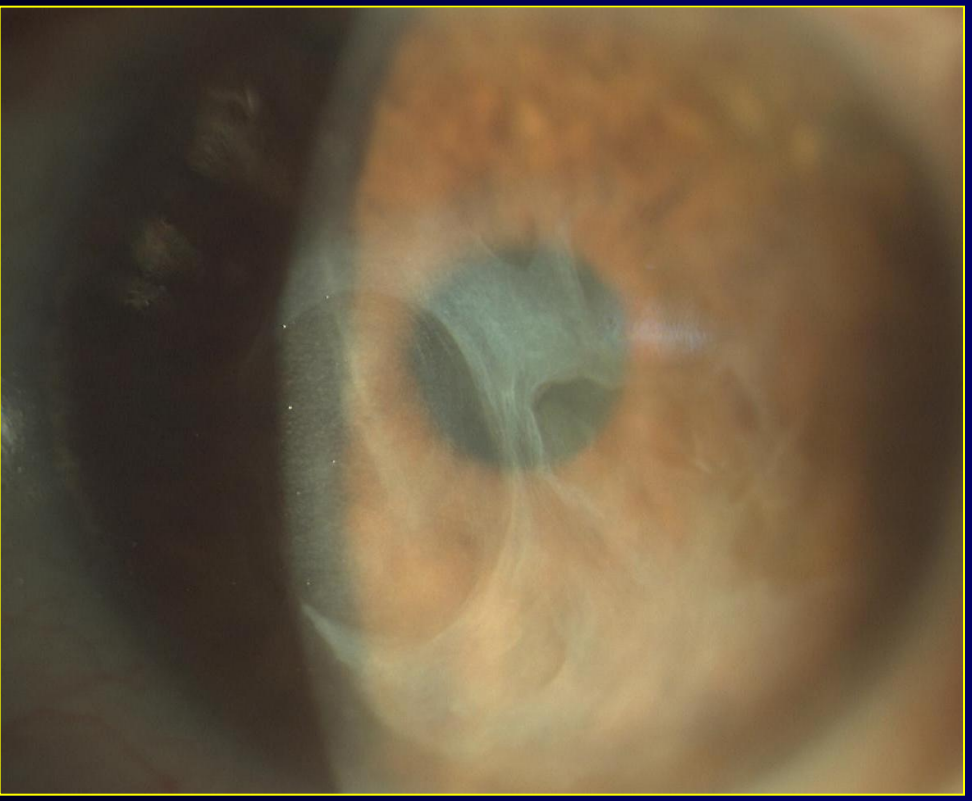
Graft Rejection Rate in Fuchs'

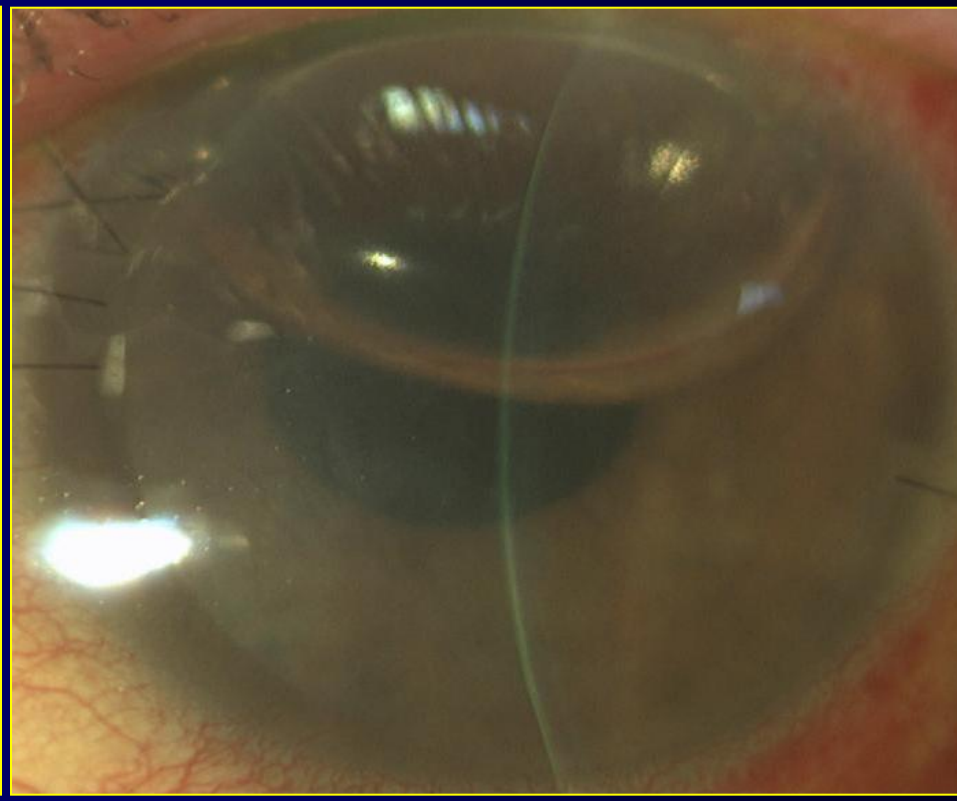
DSAEK = 2% - 18%

DMEK = < 1% (13%)

DSAEK vs DMEK

POOR VISUALIZATION



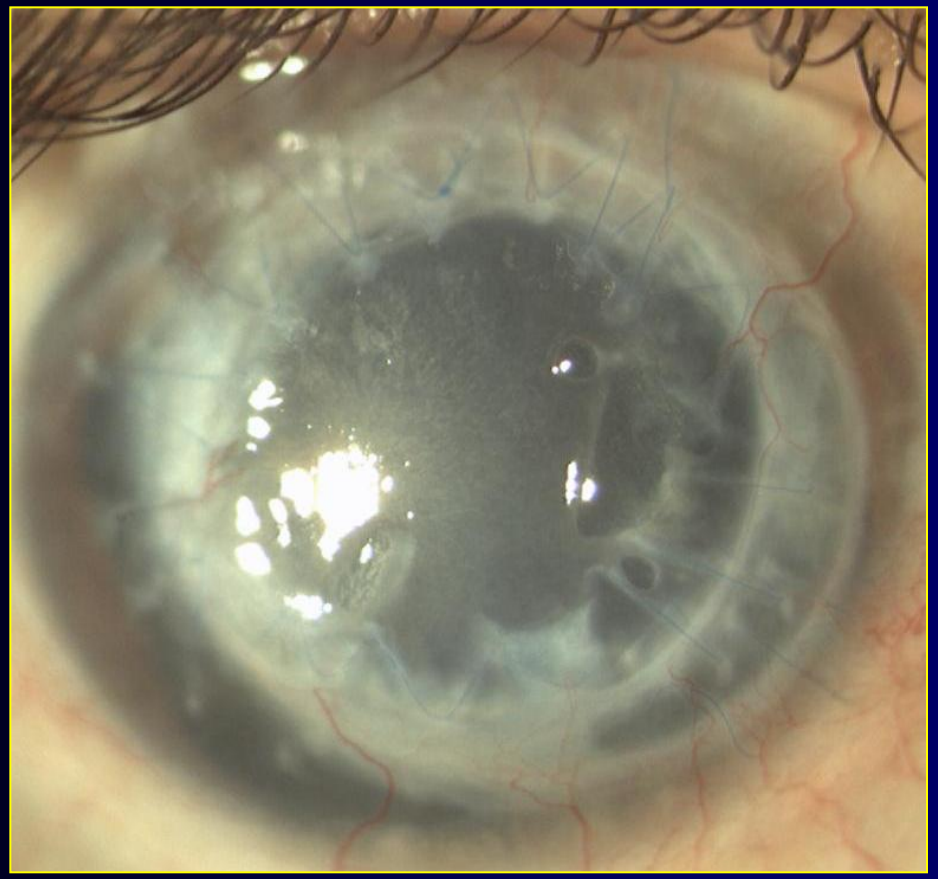


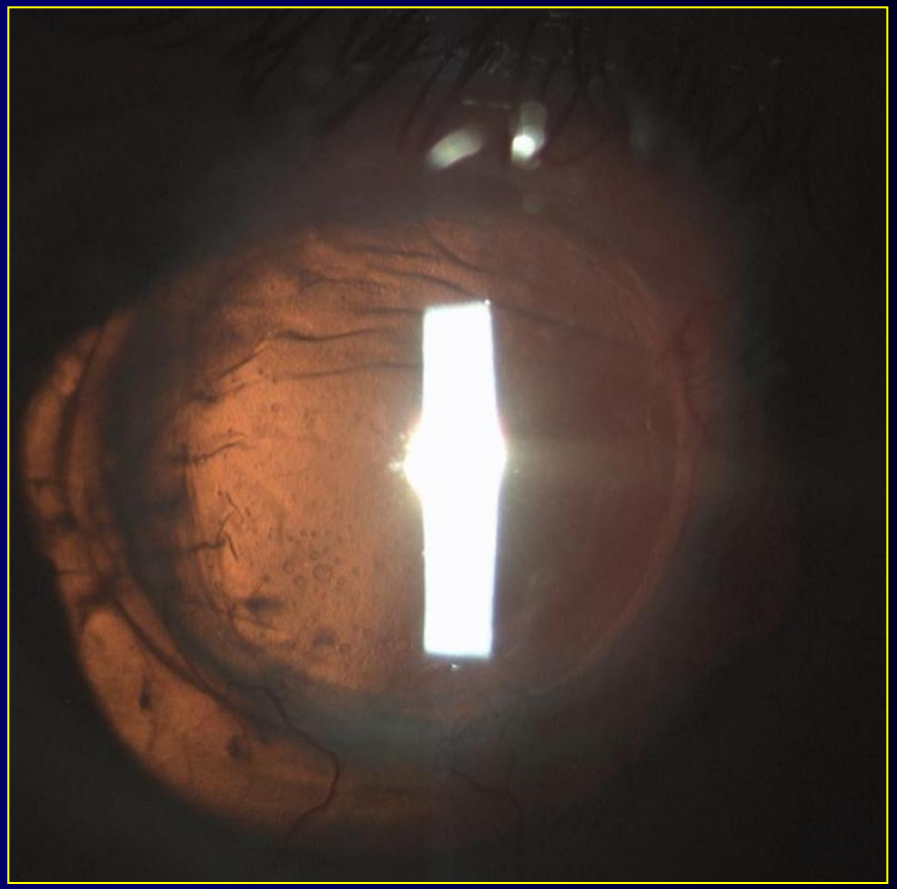
DSAEK vs DMEK

POSTERIOR SURFACE IRREGULARITIES

DSAEK vs DMEK

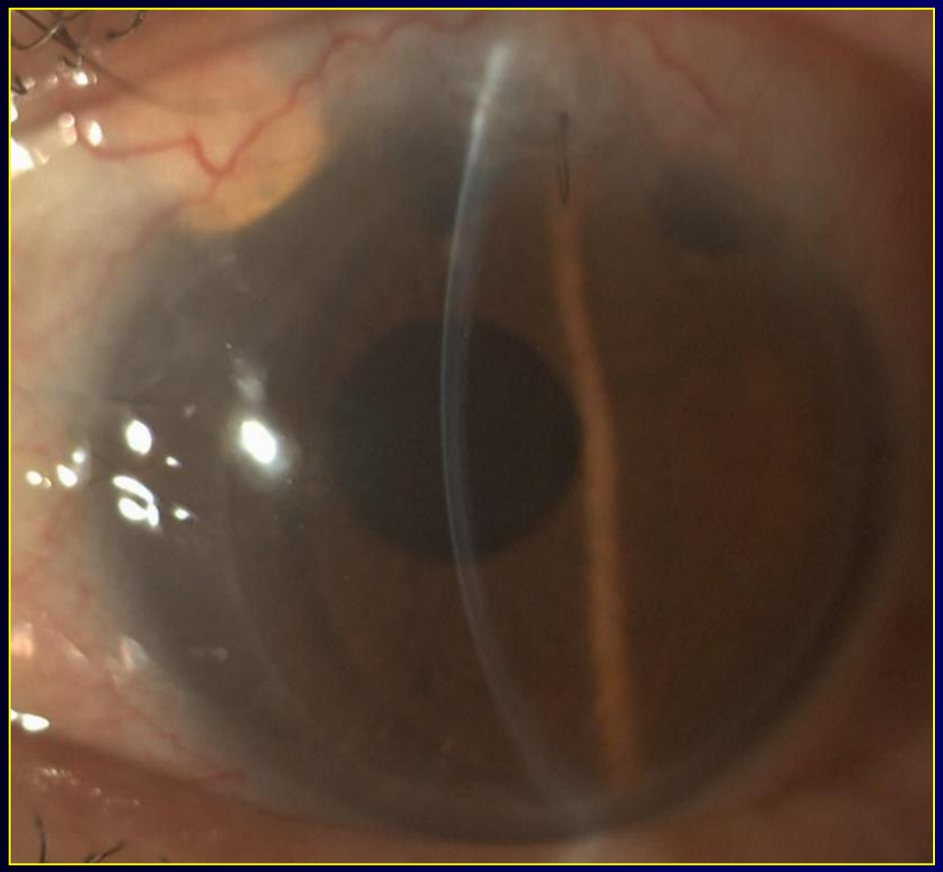
POSTERIOR LUXATION

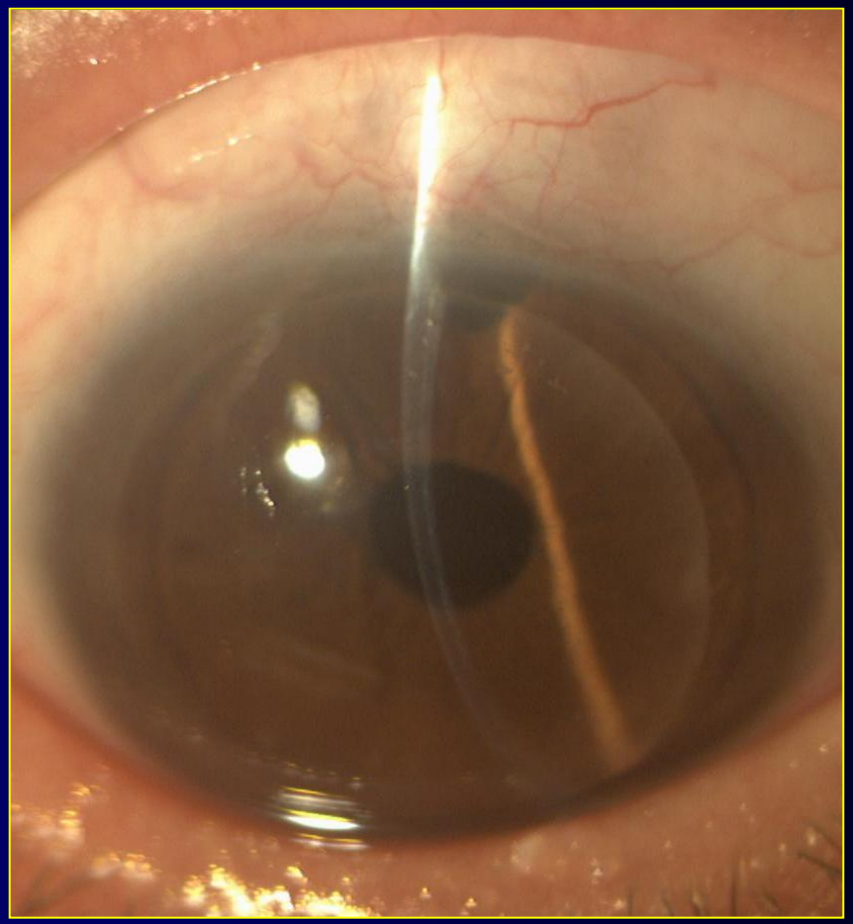




DSAEK vs DMEK

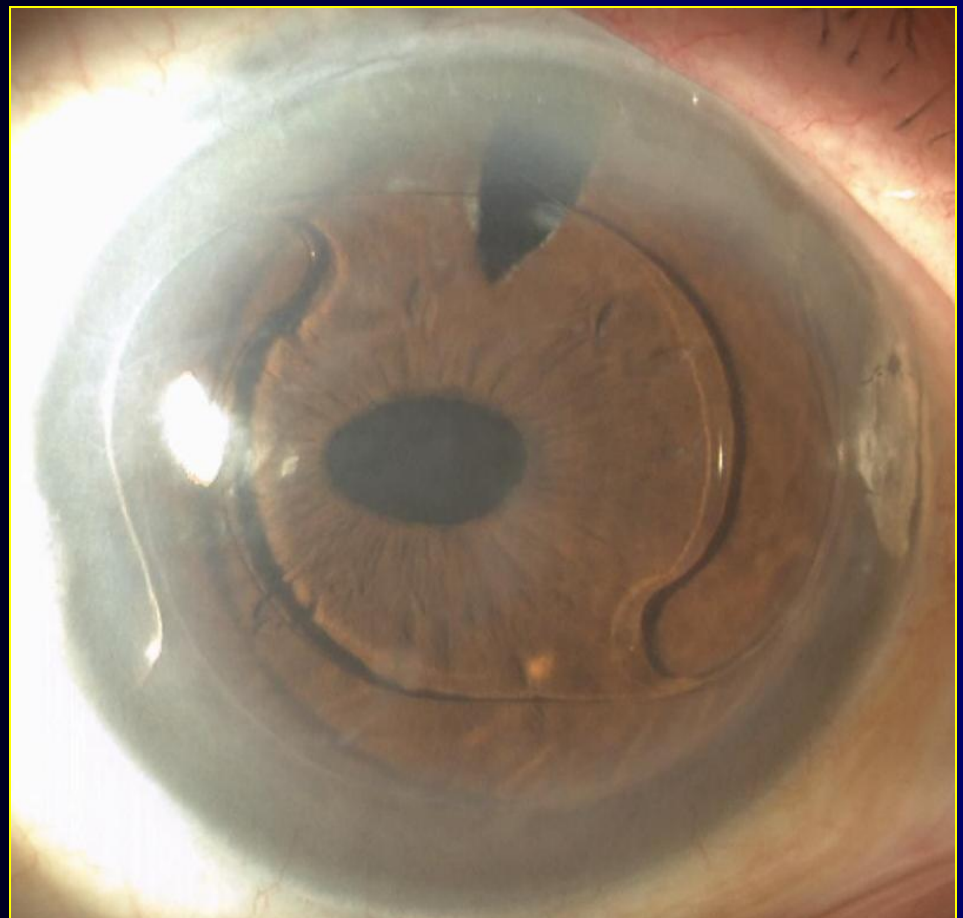
GRAFT MIGRATION

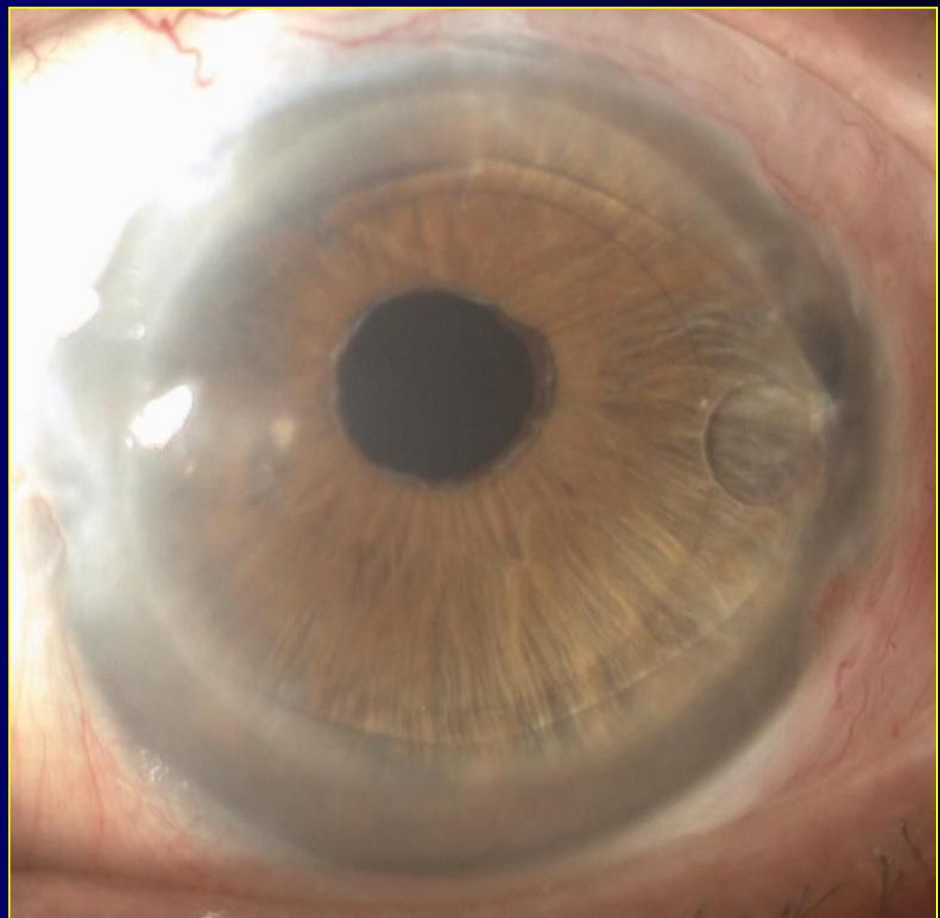




DSAEK vs DMEK

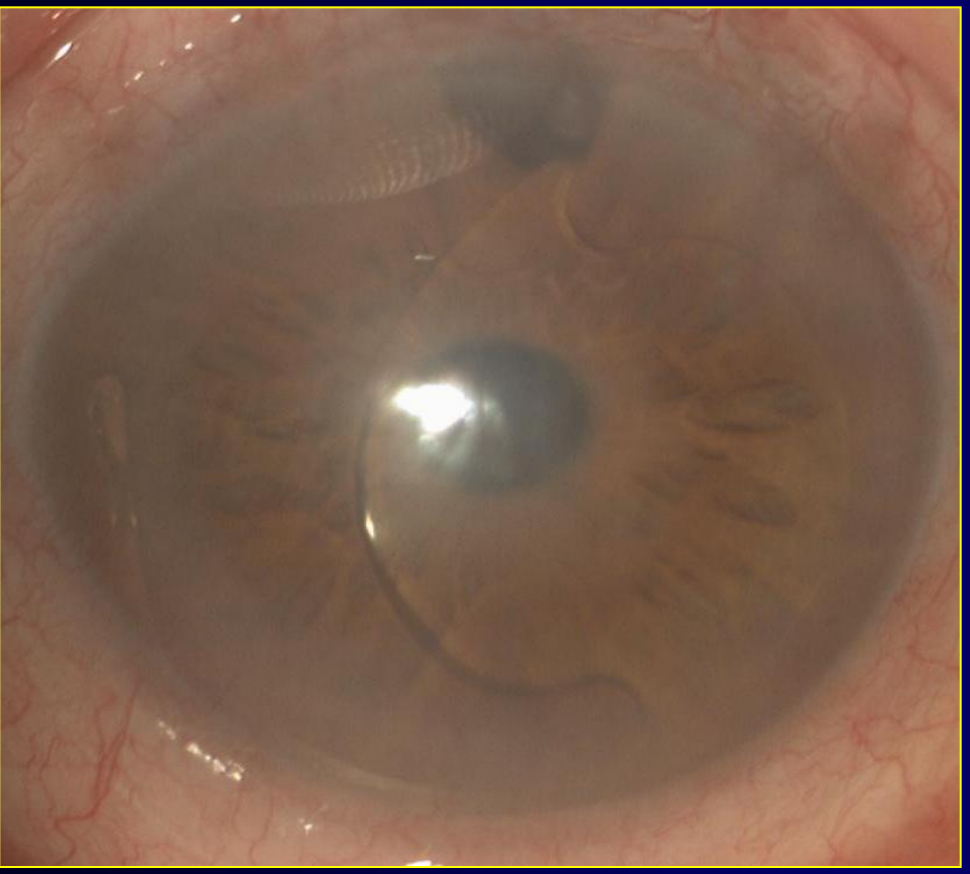
DSAEK & ACIOL

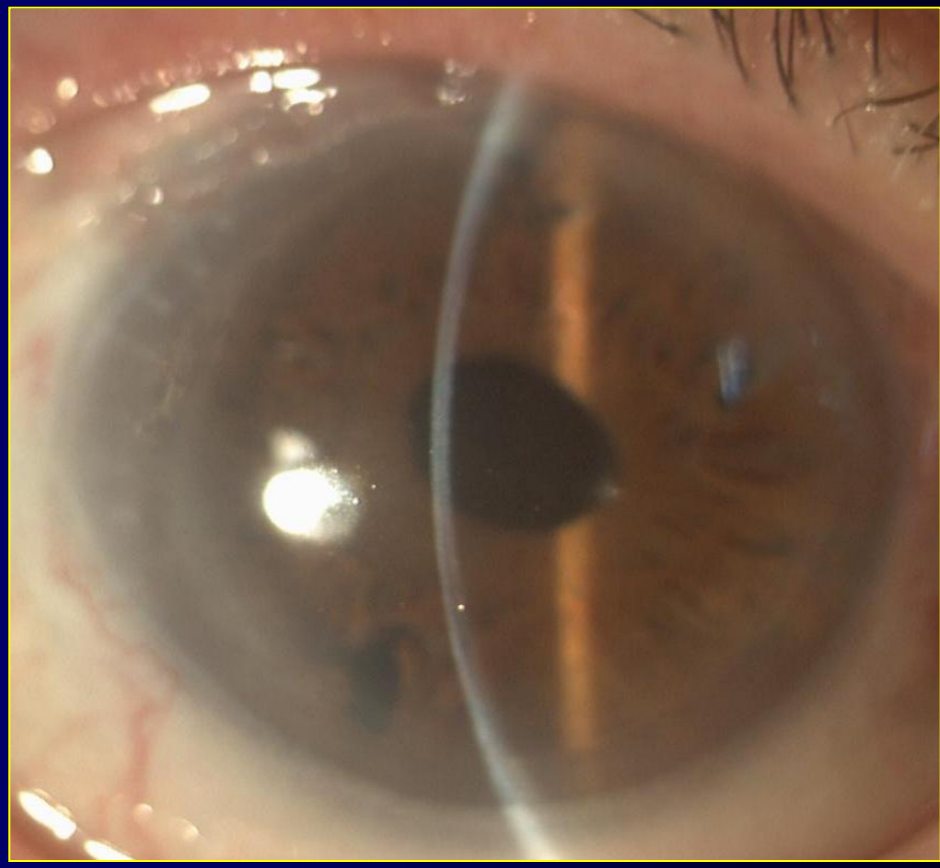




DSAEK vs DMEK

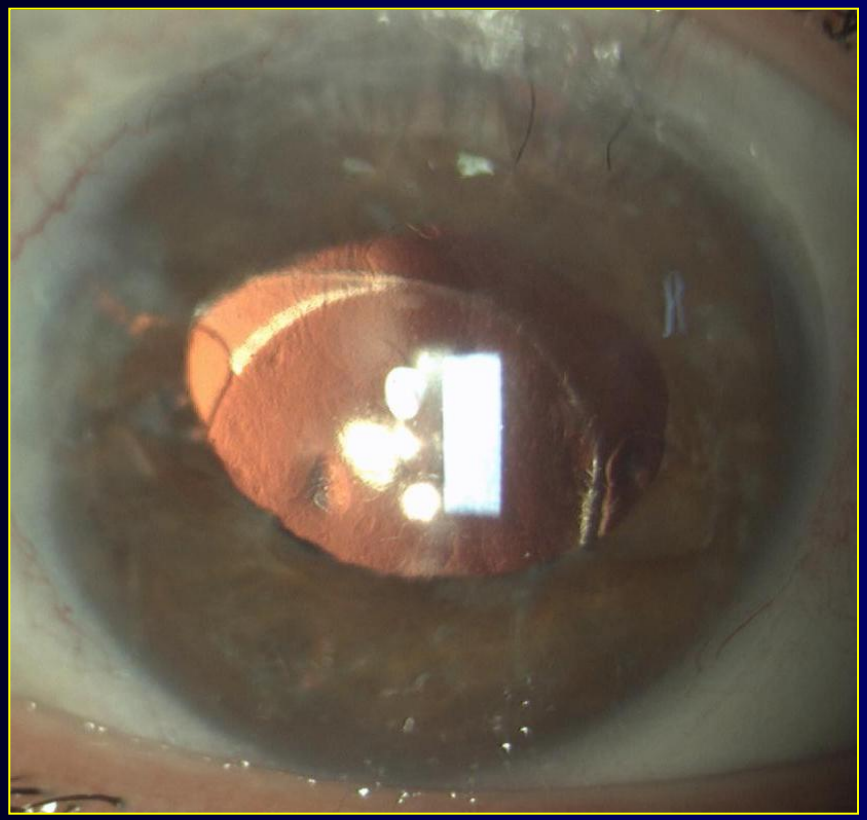
DSAEK & IOL EXCHANGE

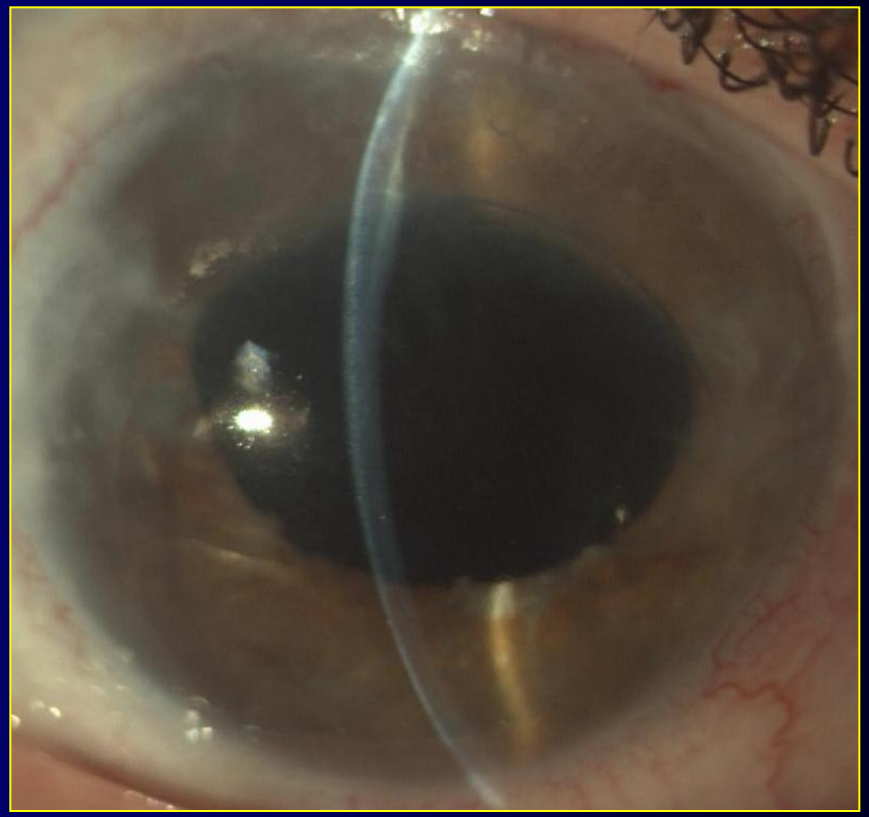




DSAEK vs DMEK

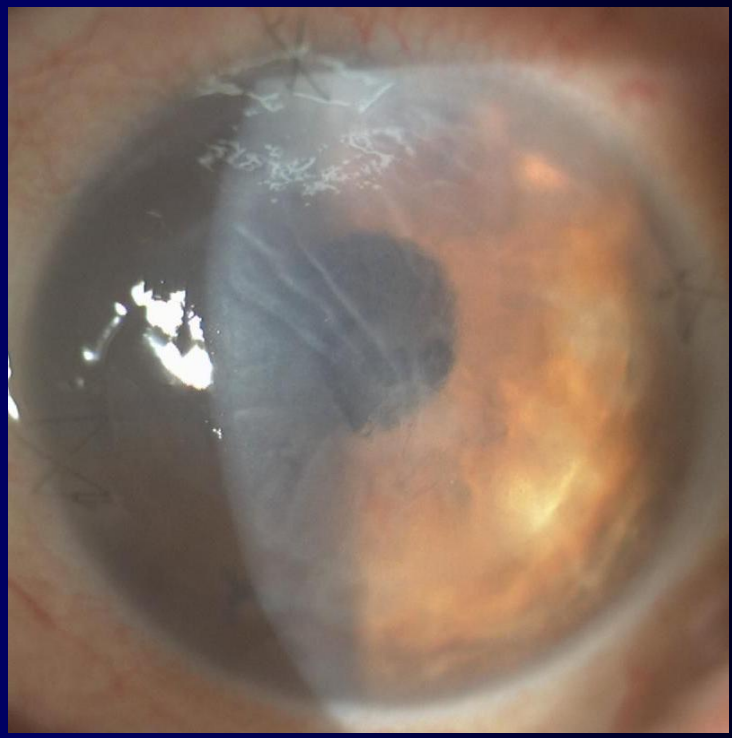
DSAEK & ACIOL in PC





DMEK CONS

- Waste of Tissue
  up to 16%
- Detachment Rate
  up to 63%
- Primary Graft Failure
  up to 8%



DMEK CONS

NOT FOR EVERY SURGEON !!!

NOT FOR EVERY EYE !!!

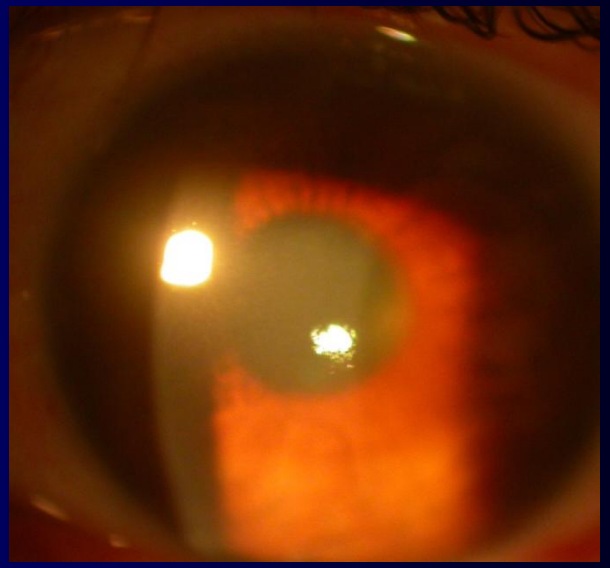
EK IN THE USA

In 2011:

DSAEK n ± 21,000

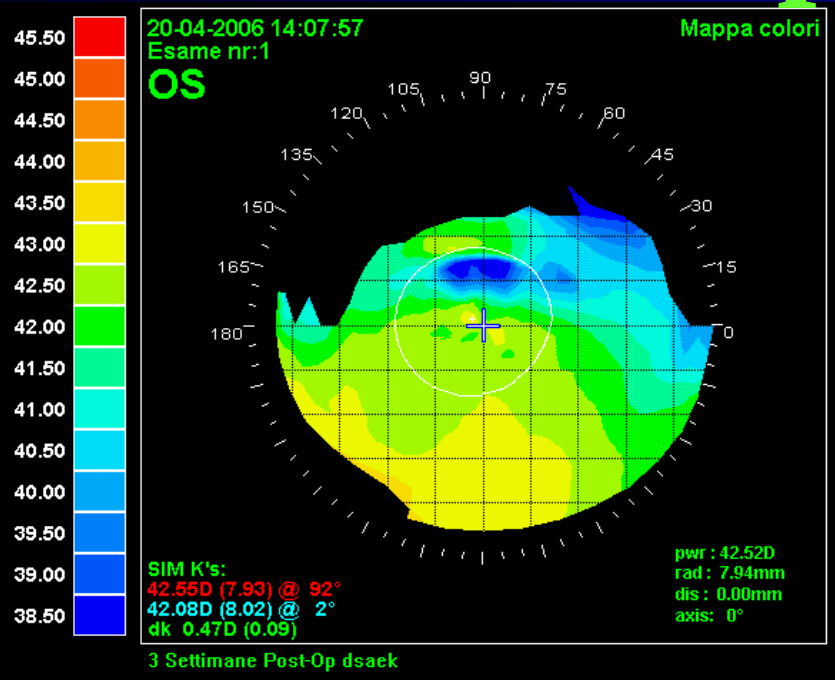
DMEK n = 343

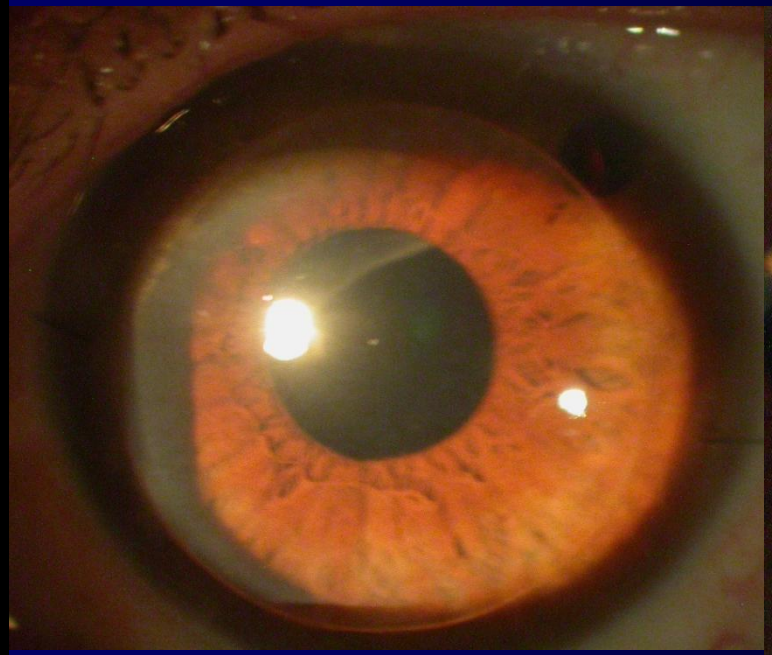
55-Year Old Patient with Fuchs' Dystrophy + Cataract

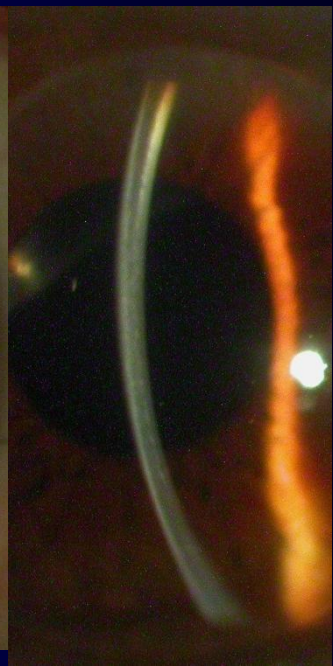


BSCVA preop: 20/100

UCVA 1 m postop: 20/20 !!!







DSAEK vs DMEK

IDEAL GRAFT FOR EK

- Thin Endothelial Grafts (DMEK-Like)
- Ease of Preparation (Microkeratome)
- Ease of Delivery (DSAEK-Like)

DSAEK vs DMEK

- LESS THAN 50% OF DMEK PATIENTS WITH 20/20 POTENTIAL SEE 20/20 !!!
- IS THE INTERFACE THE TRUE PROBLEM ???

DSAEK vs LASIK

SAME:

- **Microkeratome-Dissected Surface**

DIFFERENT:

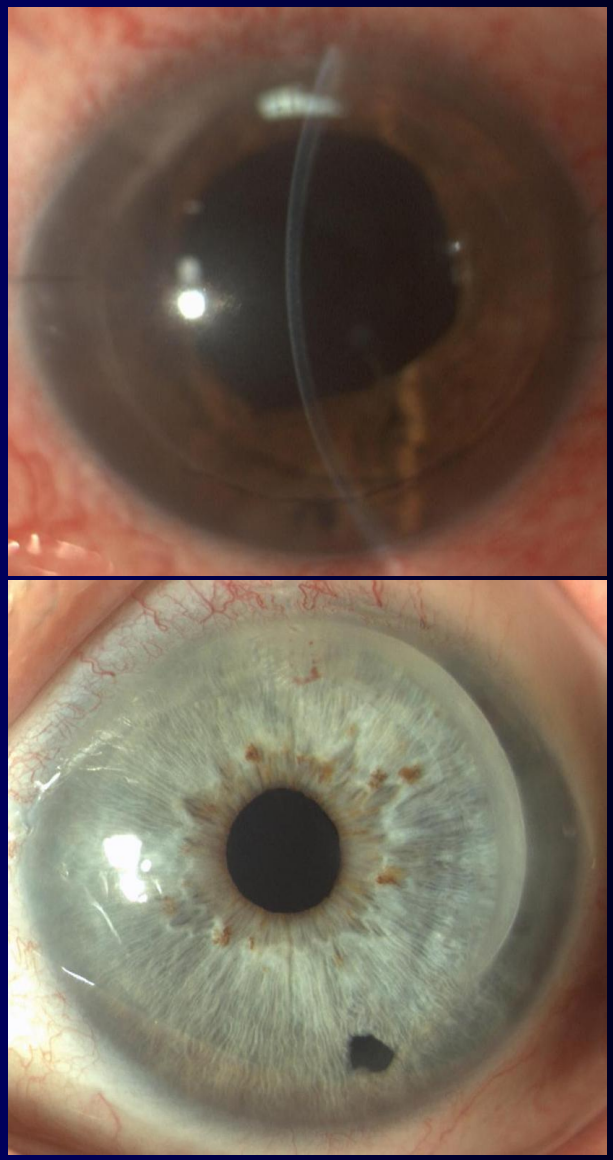
- **Donor vs Same Tissue**
- **Thickness of Lamella?**
- **Orientation of Collagen Fibers**

RECENT

DSAEK Grafts Thinner Than

131 µm

Lead to Improved Visual Outcomes (Neff et al. 2010)



MORE RECENT

THICKNESS DOES NOT MATTER!!!, but…….

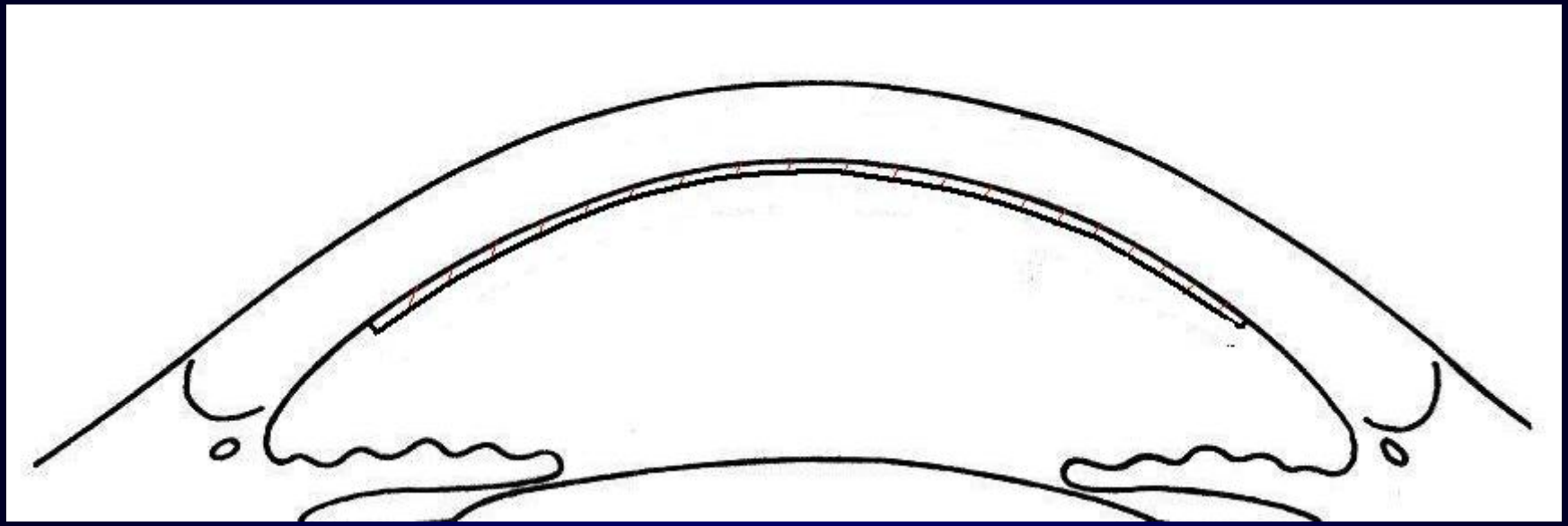
> 200 µm (↓↓ BSCVA)

< 100 µm (↑↑↑ BSCVA)

(Terry et al. Ophthalmology 2012)

SUTURELESS POSTERIOR ONLAY LK

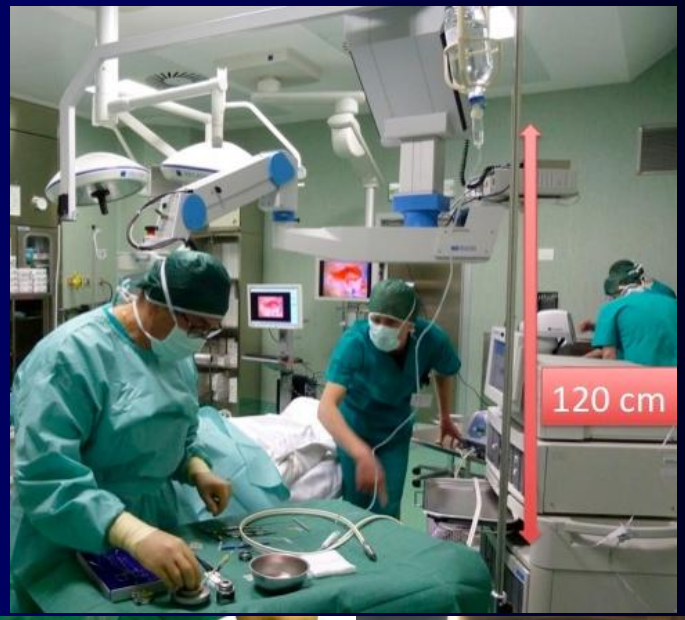
U(ltra)T(hin)-DSAEK (Busin, 2009)



UT-DSAEK (Double-Pass)

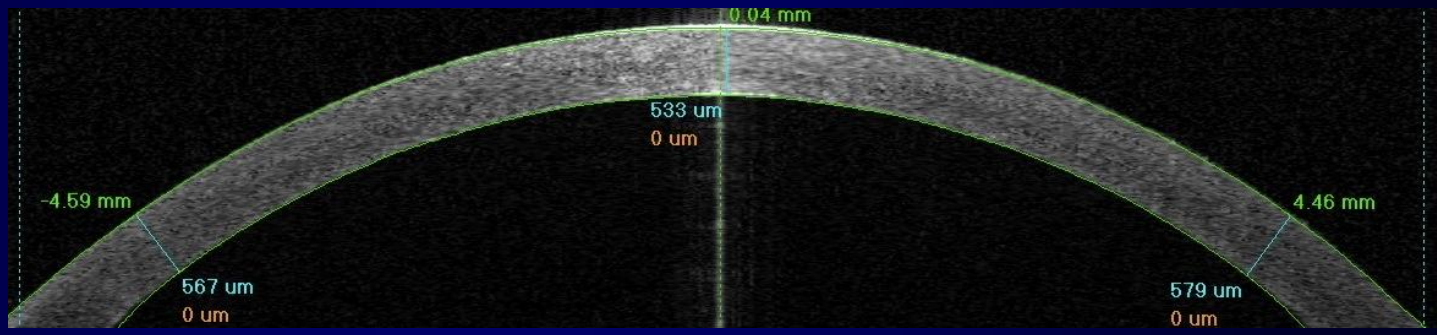
OUR SETUP

- Controlled Pressure (120 cm H_2O)
- Closed System (Clamp at 50 cm)
- Organ Colture (550 – 620 µm)

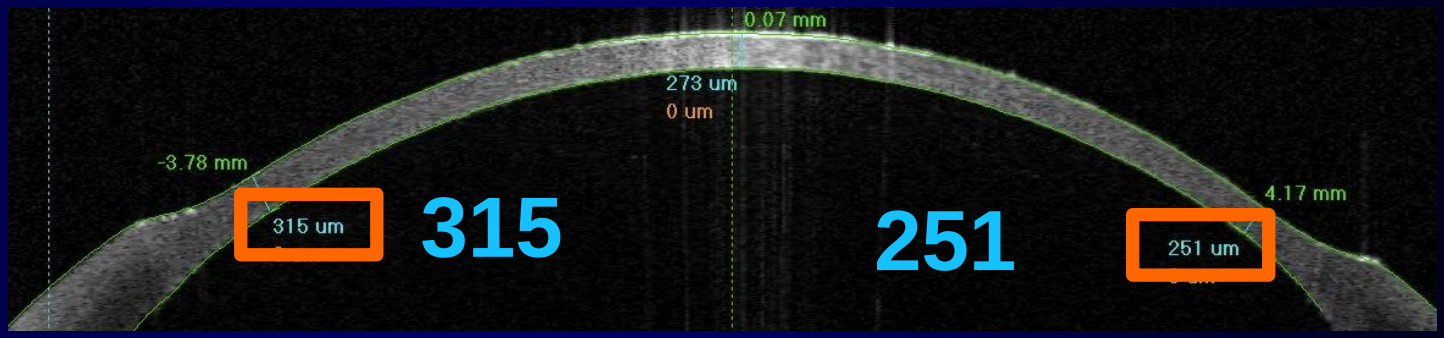


UT-DSAEK (Double-Pass)

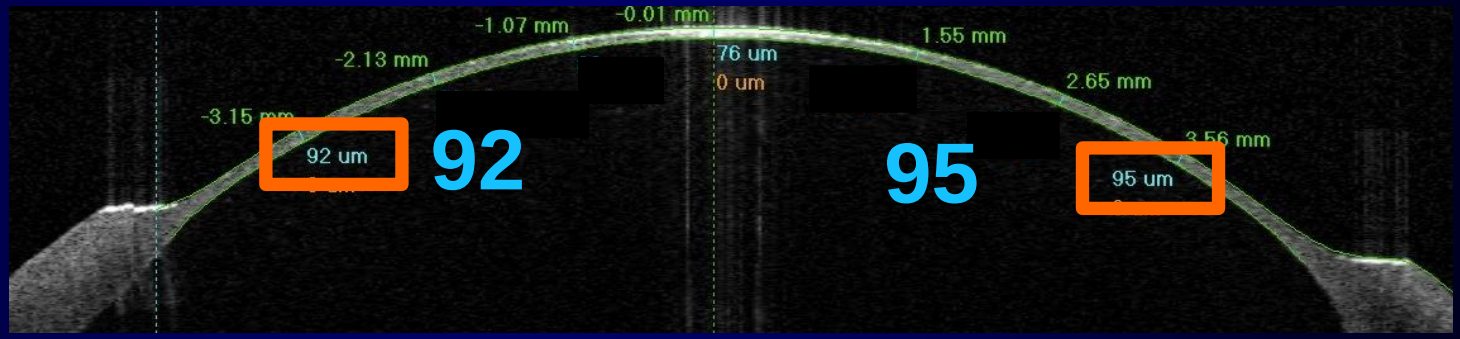
PRE CUT



1st CUT



2nd CUT



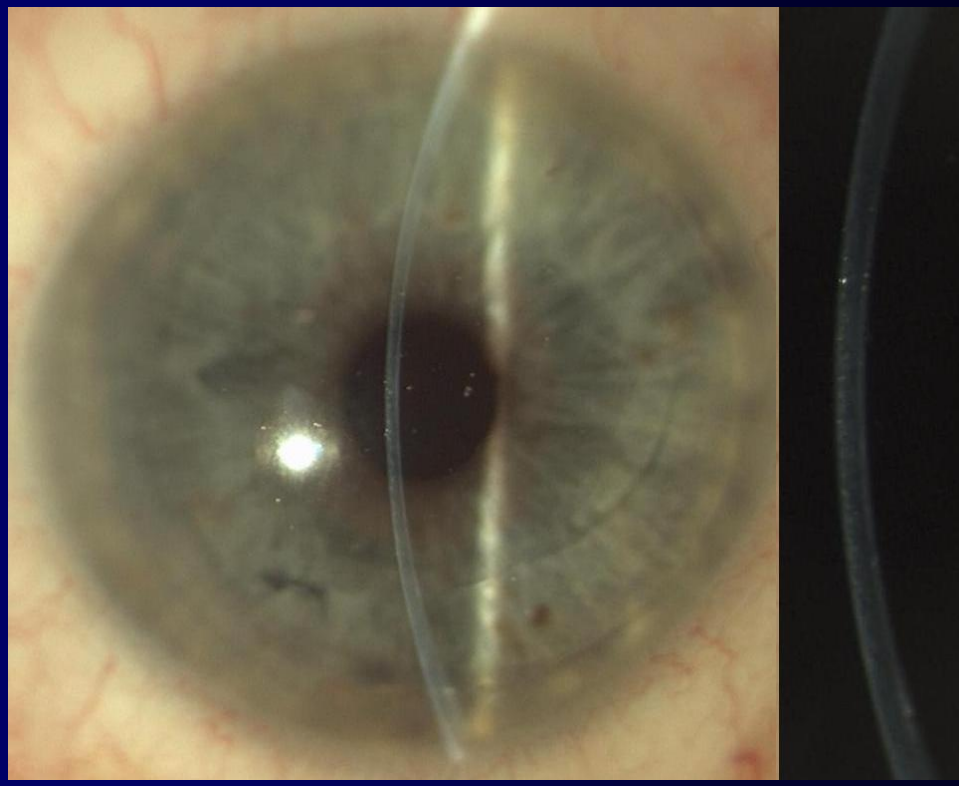
RESULTS

Prospective Study

(Ophthalmology in Press)

PURPOSE

To evaluate the outcomes of Ultra-Thin (UT) DSAEK performed in eyes with 20/20 visual potential



UT-DSAEK (Double-Pass)

Prospective Evaluation:

- ✓ **04/2012 = 285 Surgeries**
- ✓ **1, 3, 6, 12, 24 Months Exams**
- ✓ **Visual Potential (History, Postop OCT, HRT-II, etc.)**
- ✓ **12-Month Data for 163/292**

DEMOGRAPHICS

- 285 Eyes of 279 Patients
- M/F = 154/96
- Age 67.9±13.5 (range 14-92)
- F/U = ≥ 6 months

INDICATIONS

- Fuchs 174 (62%)
- PBK/ABK 63 (22%)
- Repeat EK 22 (8%)
- Decomp PK 15 (6%)
- Other 9 (3%)

UT-DSAEK & LENS

PREOPERATIVE

- PC-IOL n = 152
- Phakic n = 124
- Aphakic n = 12
- AC-IOL n = 3
- Phakic IOL n = 1

UT-DSAEK & LENS

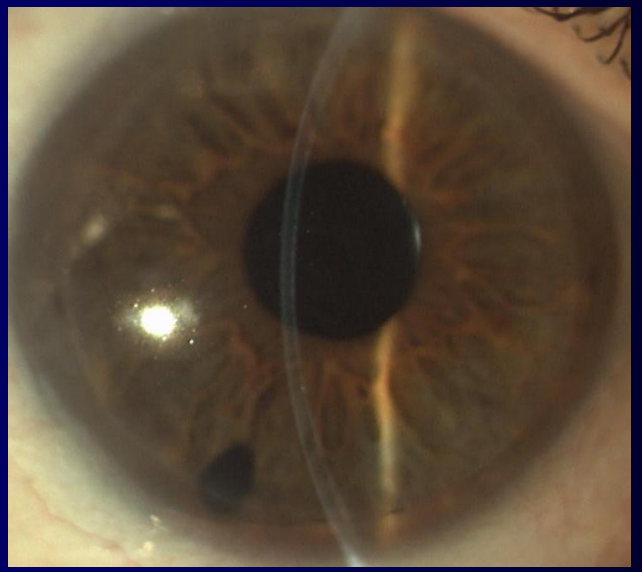
POSTOPERATIVE

- PC-IOL n = 248
- Phakic n = 24
- Aphakic n = 7
- AC-IOL n = 0
- Phakic IOL n = 0

UT-DSAEK & LENS

IOL/LENS MANAGEMENT

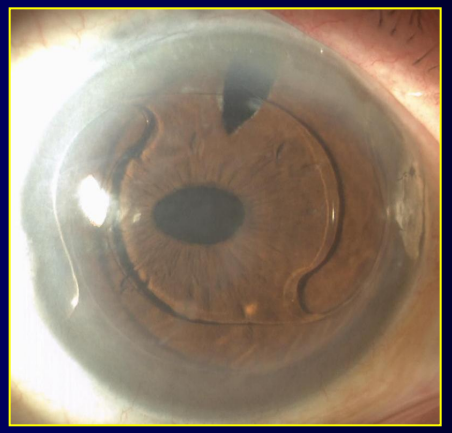
- **PC-IOL**
  Always Left
  in Place



UT-DSAEK & LENS

IOL/LENS MANAGEMENT

- AC-IOL
  - Kelman

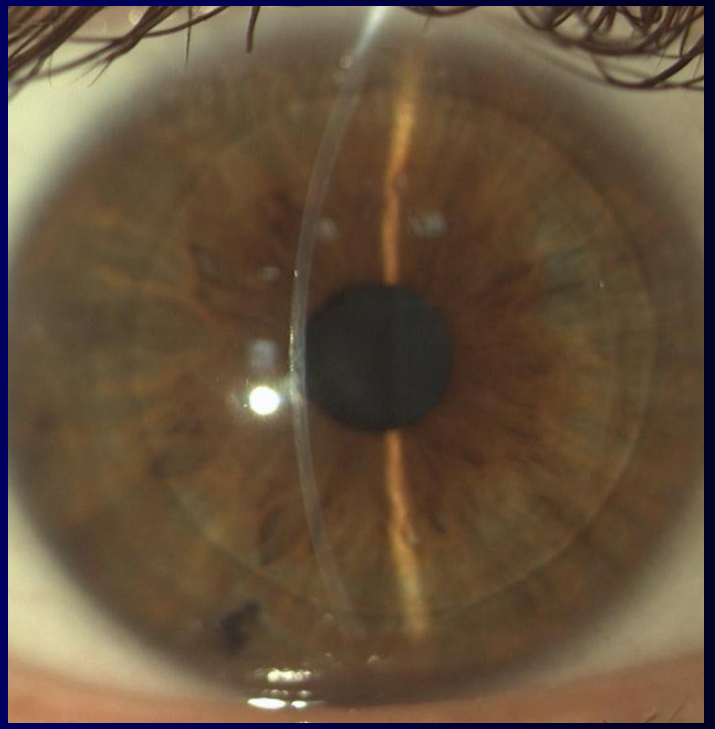


Removed/
  - Exchanged
  - Iris-Claw Left in Place

UT-DSAEK & LENS

IOL/LENS MANAGEMENT

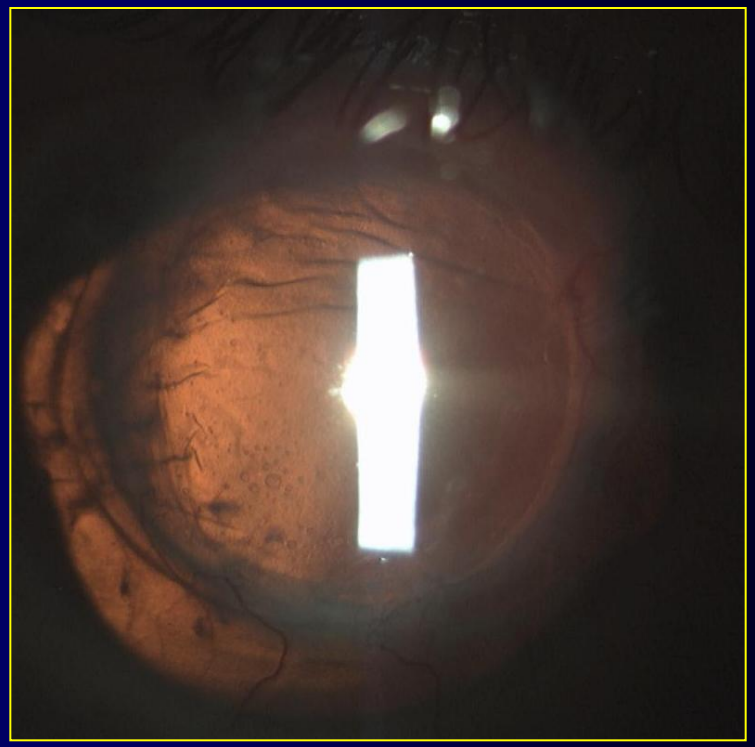
- **Natural Lens:**
  - **Age > 60 DSAEK + Phaco**
  - **Age < 60 DSAEK Only**



UT-DSAEK & LENS

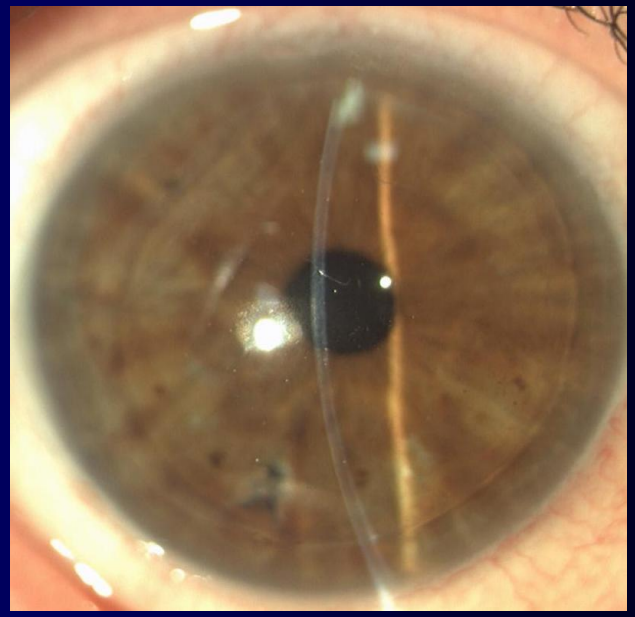
IOL/LENS MANAGEMENT

- **Aphakia**
  DSAEK +PCIOL
  if Appropriate
  (Other Eye !!!)



UT-DSEK (Double Pass)

Busin et al. OPHTHALMOLOGY (in press)

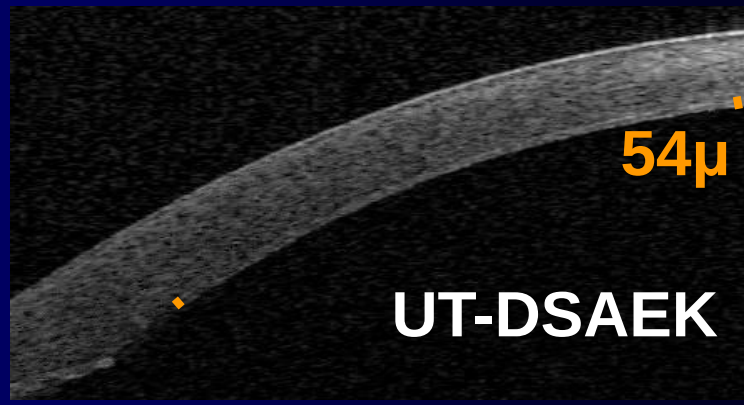


264 UT-DSAEK Grafts

CGT<151µm = 260(98.5%)

CGT<131µm = 233(89.0%)

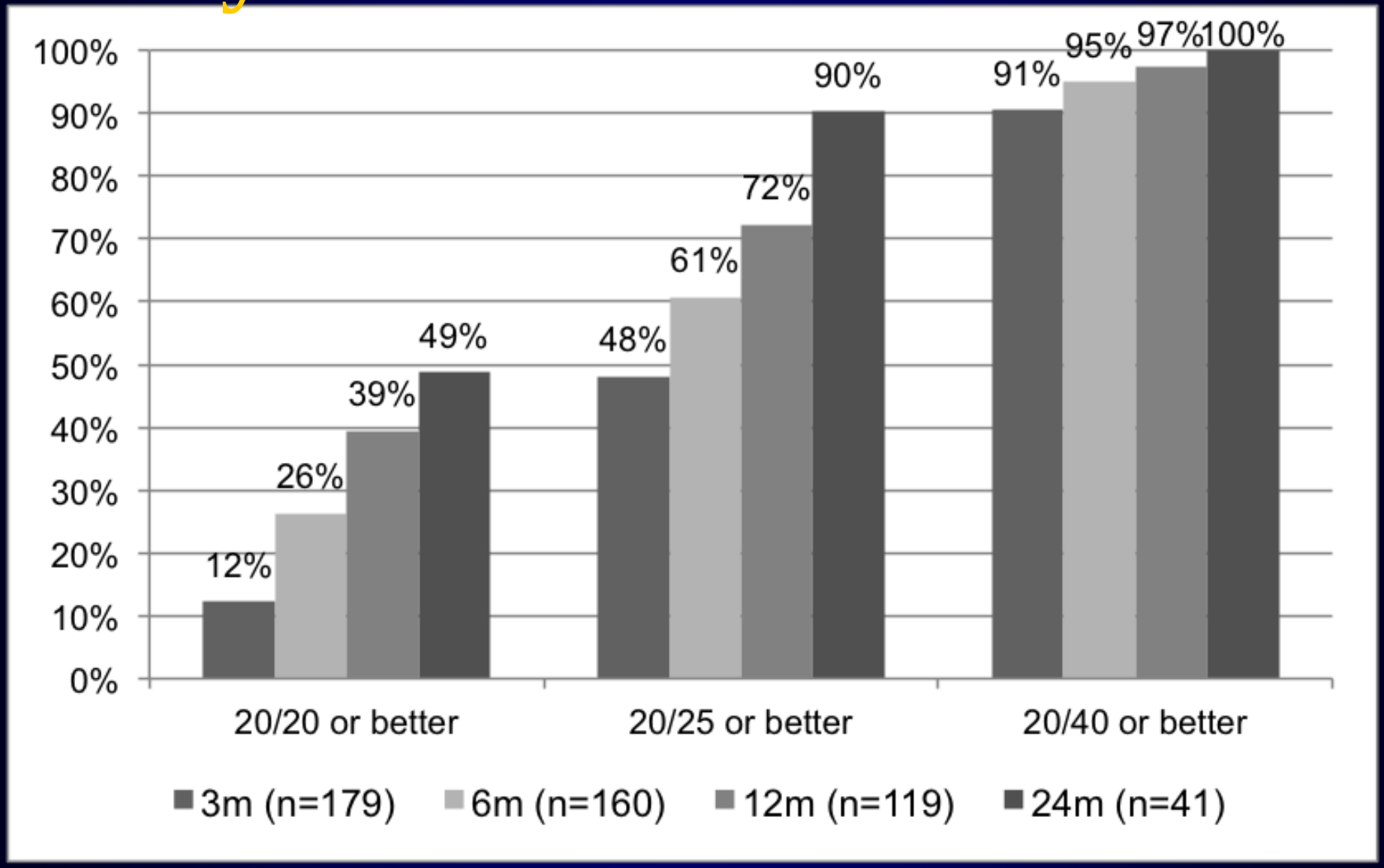
CGT<101µm = 182(69.0%)



ISSUE # 1

BSCVA ≥ 20/20 in Eyes with 20/20 Potential

BSCVA post UT-DSAEK in Eyes with 20/20 Potential



ISSUE # 2

Why not 100% BSCVA of 20/20 ???

DSAEK/UT-DSAEK/DMEK

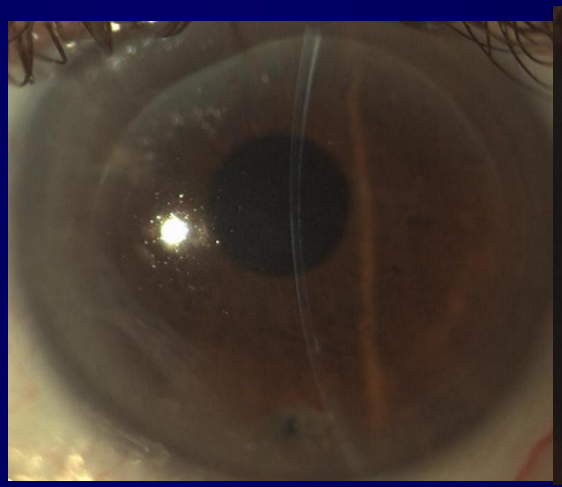
POSSIBLE CAUSES

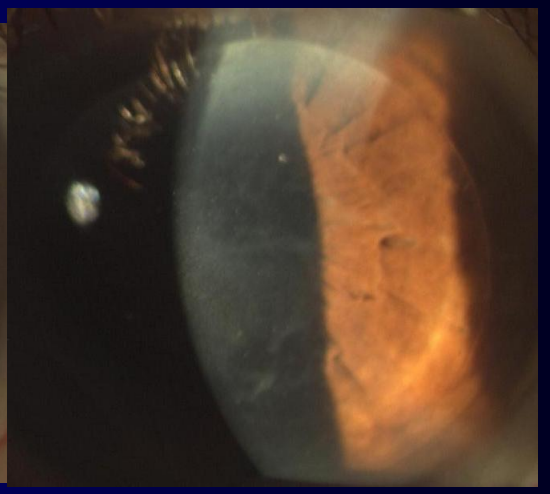
- INTERFACE ?
- GRAFT THICKNESS ?
- HOA ?
- RECIPIENT CORNEA !

DSAEK/UT-DSAEK/DMEK

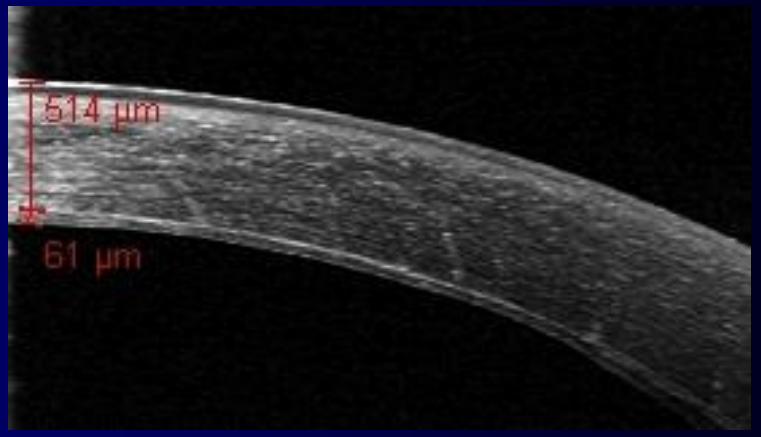
INTERFACE/THICKNESS

6 mos Postop
UT-DSAEK





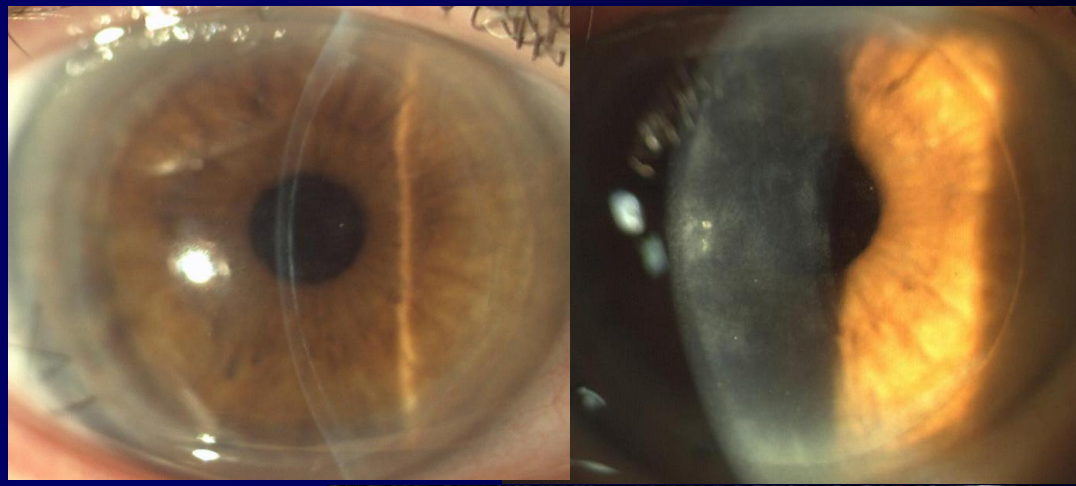
BSCVA = 20/22.5
CGT= 61 µm



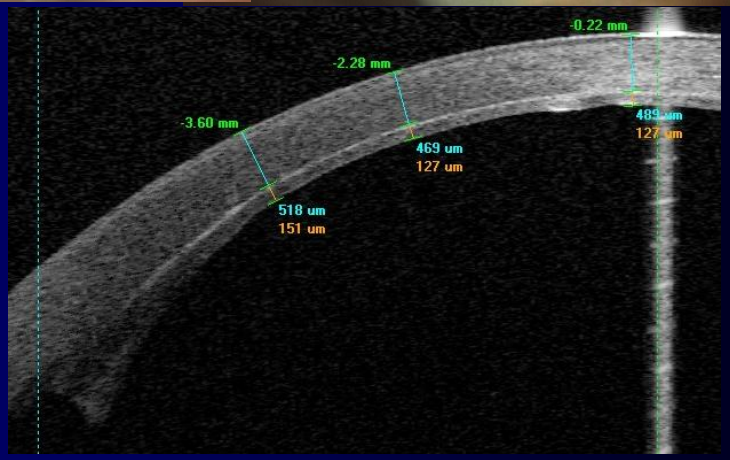
DSAEK/UT-DSAEK/DMEK

INTERFACE/THICKNESS

12 mos Postop
DSAEK



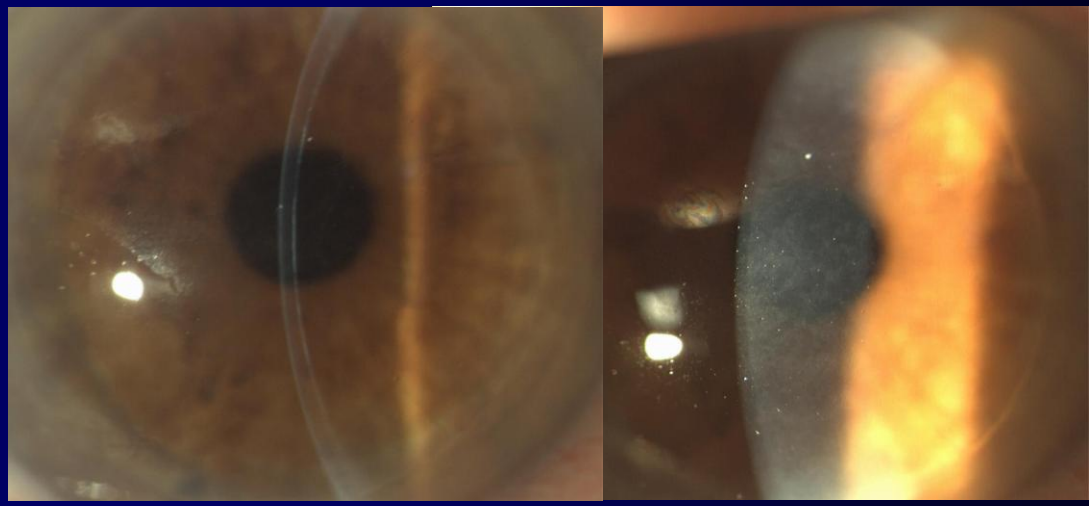
BSCVA = 20/50
CGT= 127 µm



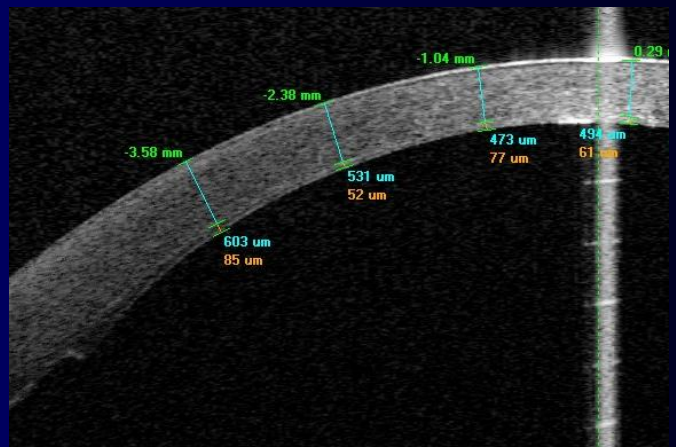
DSAEK/UT-DSAEK/DMEK

INTERFACE/THICKNESS

3 mos Postop
re-DSAEK
(UT-DSAEK)



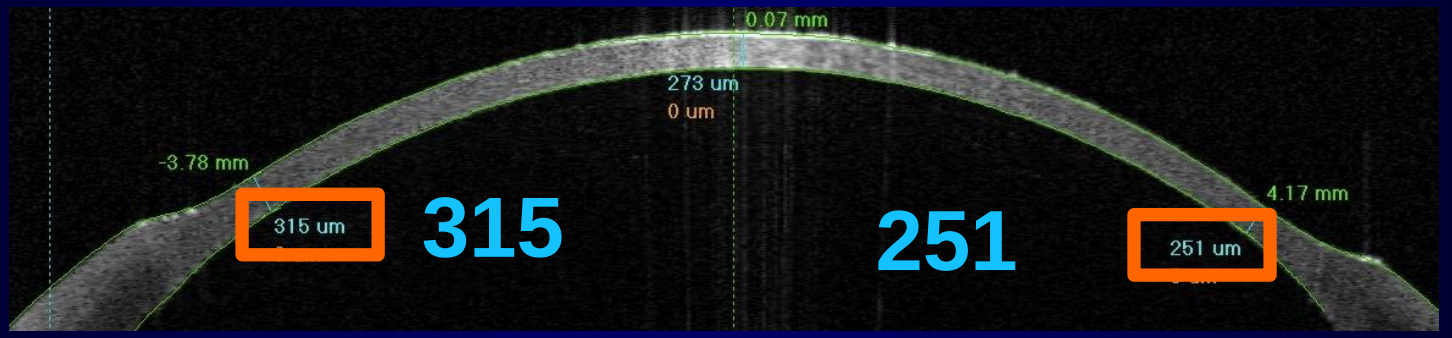
BSCVA = 20/25
CGT= 61 µm

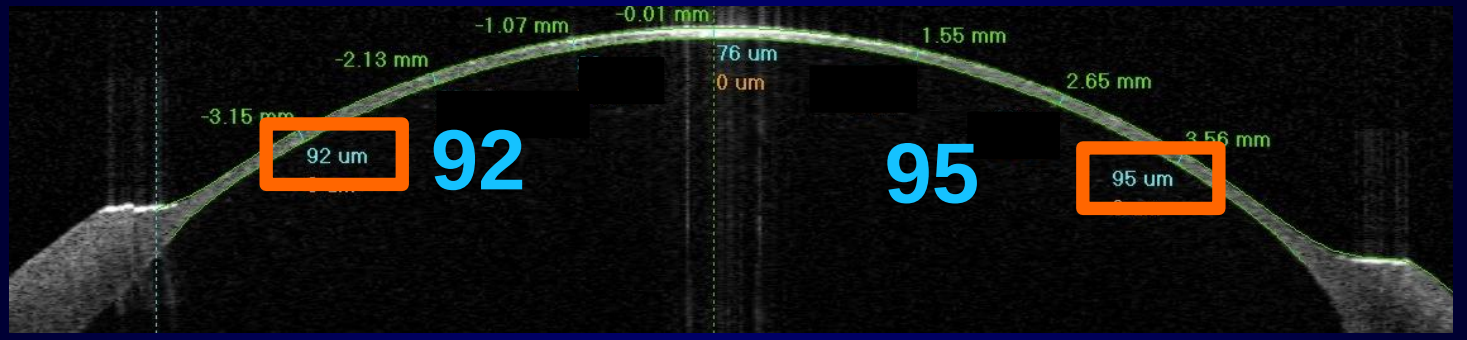


DSAEK/UT-DSAEK/DMEK

High Order Aberrations

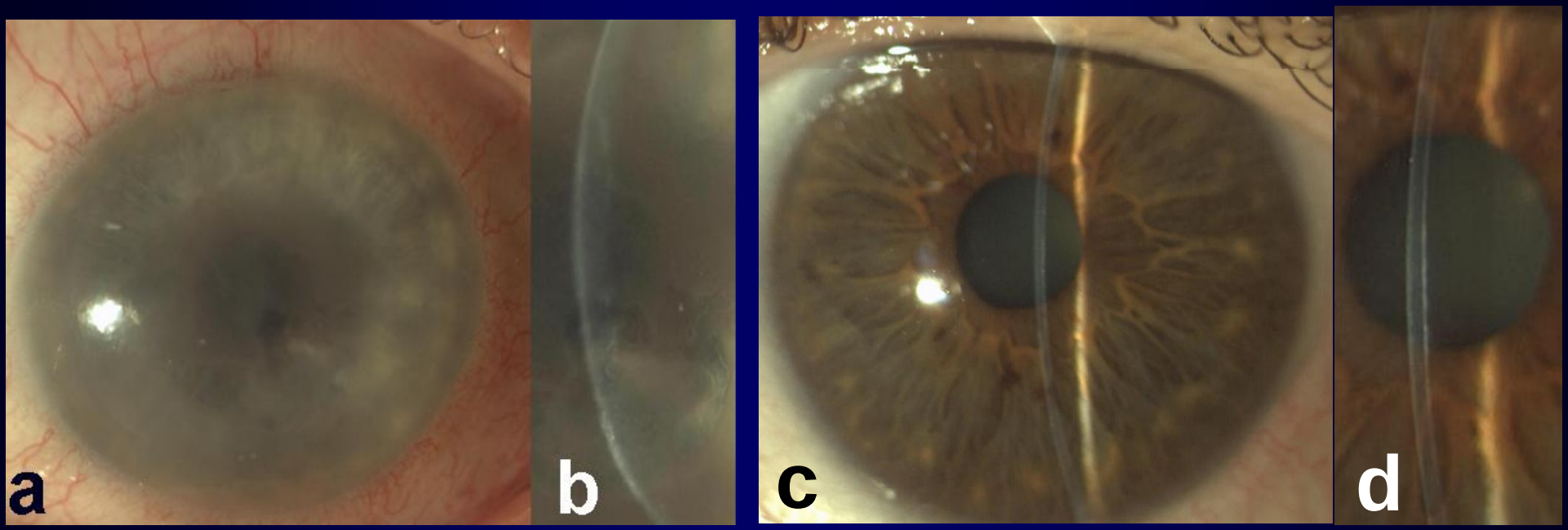
UT-DSAEK = Planar Graft !!!





DSAEK/UT-DSAEK/DMEK

RECIPIENT CORNEA



DIFFERENT PREOPERATIVE CONDITION !!!

ISSUE # 3

SPEED OF VISUAL RECOVERY

DMEK

Descemet's Membrane Endothelial Keratoplasty

Prospective Study of 1-Year Visual Outcomes, Graft Survival, and Endothelial Cell Loss

Frederico P. Guerra, MD,[1] Arundhati Anshu, MD,[1] Marianne O. Price, PhD,[1] Arthur W. Giebel, MD,[2] Francis W. Price, MD[1,3]

Ophthalmology *Volume 118, Number 12, December 2011*

Conventional DSAEK

Three-Year Visual Acuity Outcomes after Descemet's Stripping Automated Endothelial Keratoplasty

Jennifer Y. Li, MD,[1] Mark A. Terry, MD,[1,2] Jeffrey Goshe, MD,[1] David Davis-Boozer, MPH,[2] Neda Shamie, MD[3]

ARTICLE IN PRESS

Ophthalmology 2012;xx:xxx

BSCVA preop

DMEK

0.51± 0.44

logmar

20/65

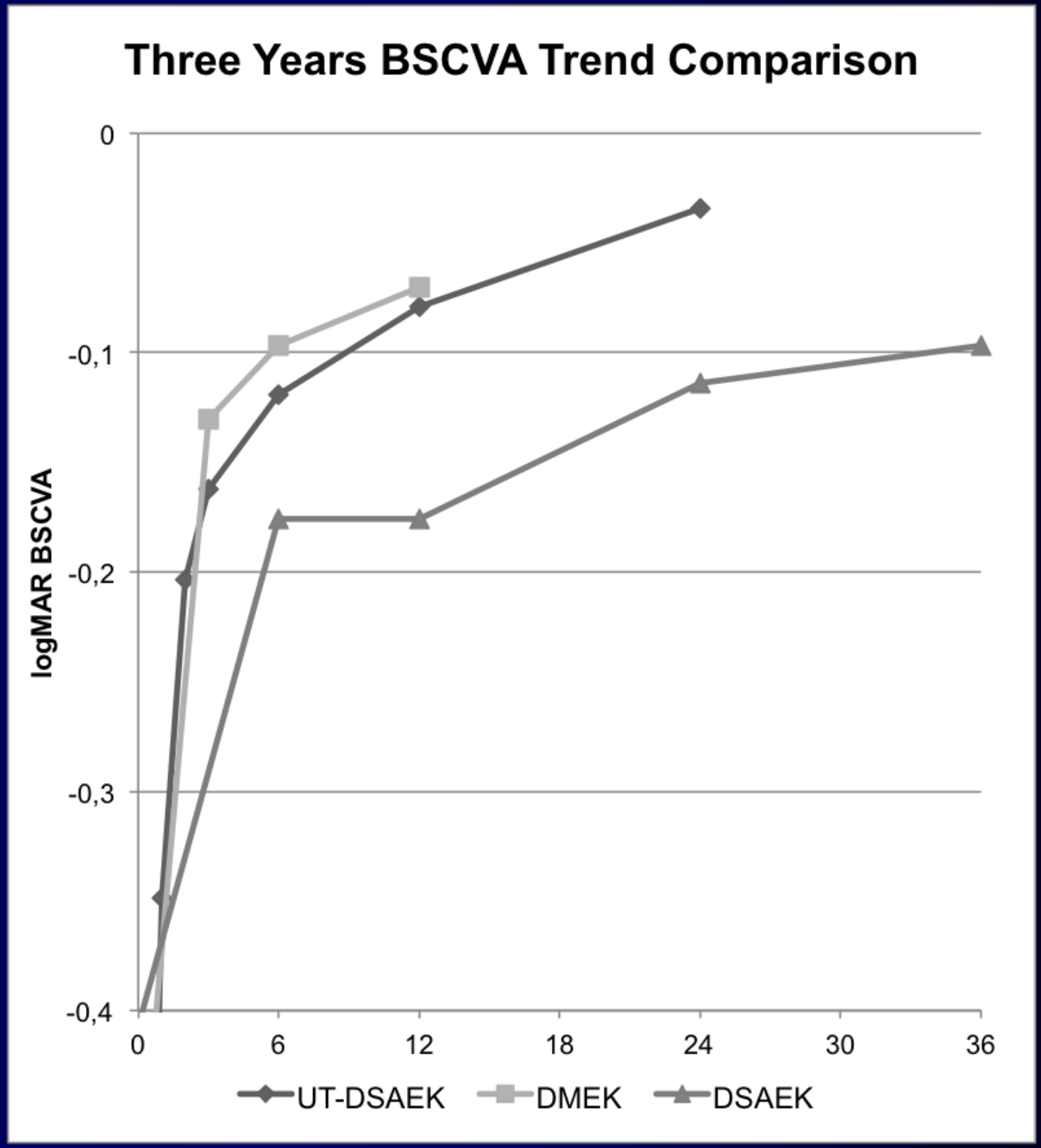
BSCVA preop

UT-DSAEK

0.76 ± 0.49

logmar

20/115



ISSUE # 4

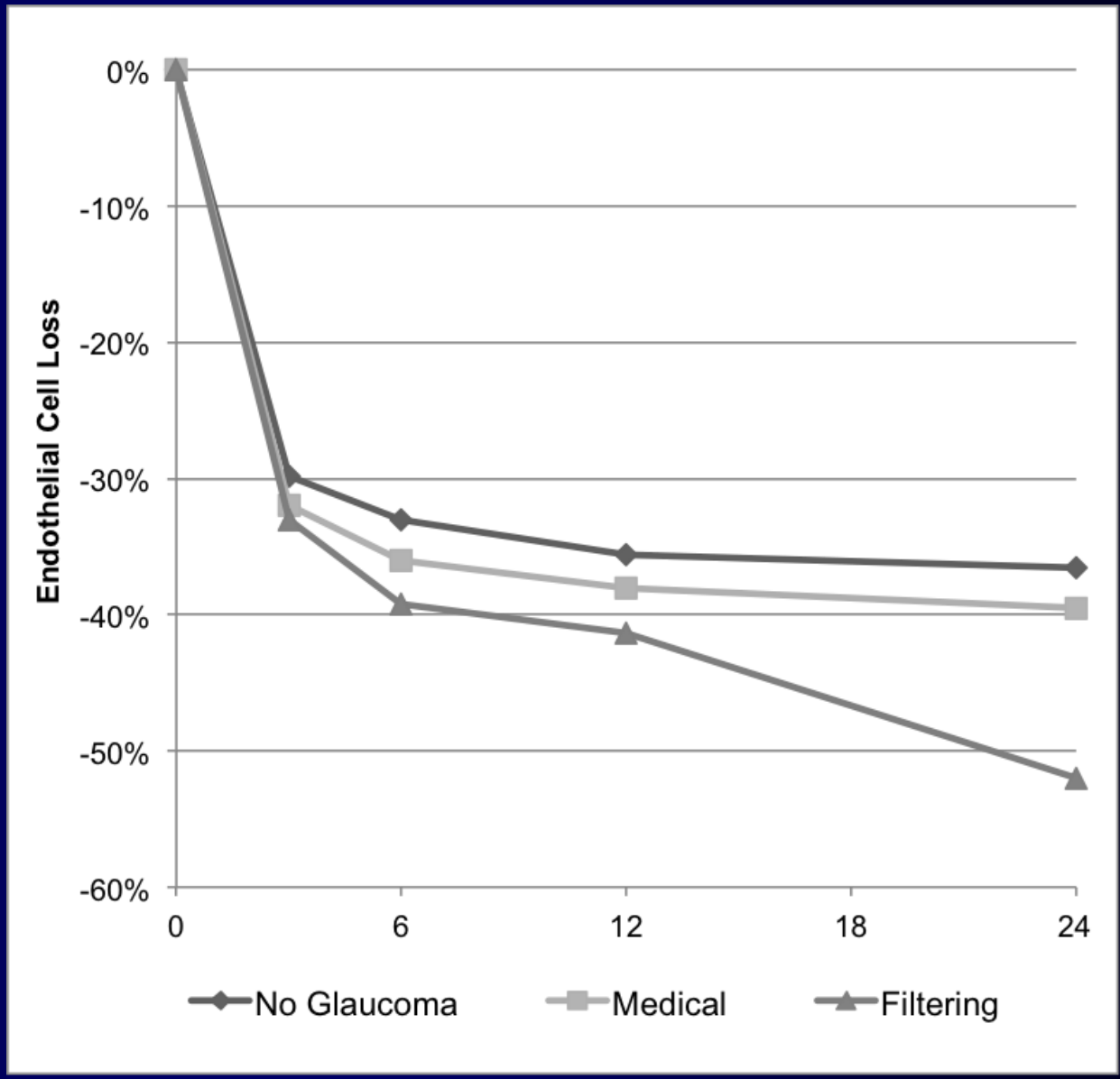
ENDOTHELIAL CELL LOSS

UT-DSAEK ECL (Overall)

F/U (mos)	ECL (% Eye Bank)
6	29.10%
12	32.58%
18	36.15%
24	36.35%

UT-DSAEK ECL

ECL Higher in Eyes Operated on (Shunts/Trab.) !!!



ISSUE # 5

IMMUNOLOGIC REJECTION

UT-DSAEK Imm. Rej.

IMMUNOLOGIC REJECTION

Low-Risk Eyes	n = 237
High-Risk Eyes	n = 48
Previous Graft(s)	n = 39
Corneal Vascul.	n = 6
Herpetic Endothelit.	N = 3

POSTOPERATIVE TREATMENT

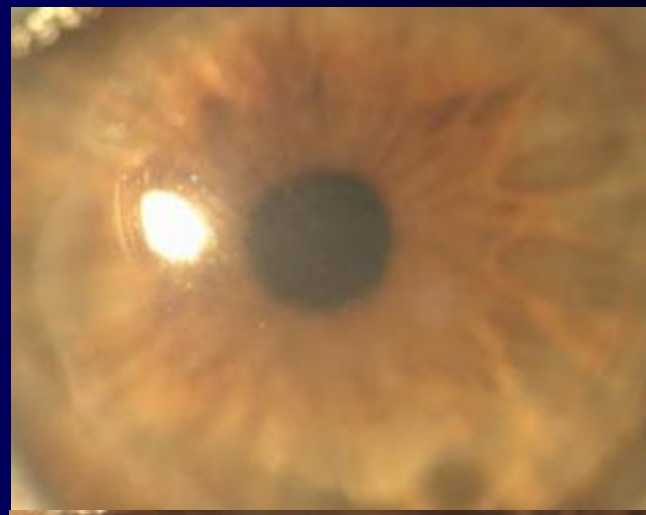
Topical Dexamethasone 0.1%

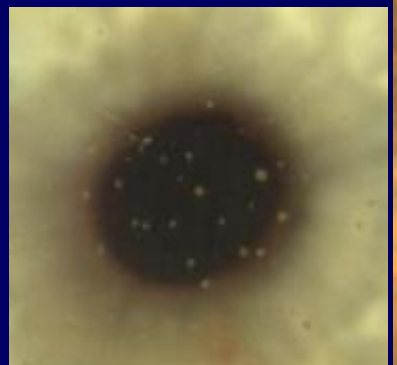
- ✓Tapered off over a 5-month Period (from 2-Hourly to qd)
- ✓ qd Lifelong (unless Contraindicated)

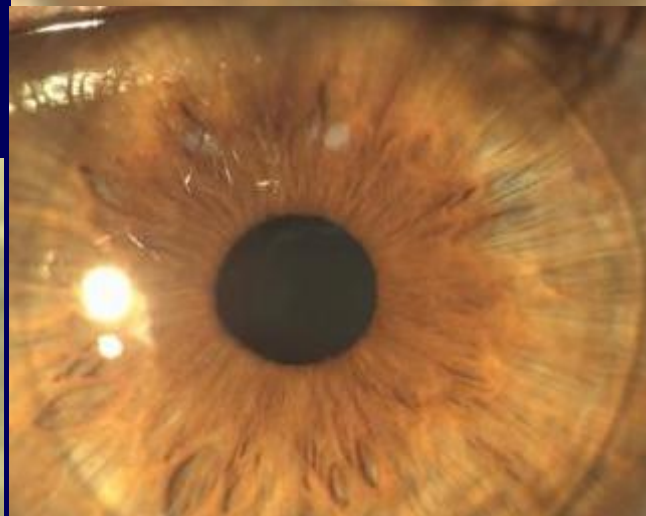
For Eyes at High Risk 1.0-1.5 mg/Kg Prednisone p.o. Tapered off over a 2-month Period

UT-DSAEK Imm. Rej.

- ✓**Endothelial Rejection in 4/162 Eyes (2.47%)**
  - **Low Risk n=3/142(2.1%)**
  - **High Risk n=1/21 (4.8%)**
- ✓**All Cases Resolved with Steroidal Treatment !!!**







Immunologic Rejection

Risk of Corneal Transplant Rejection Significantly Reduced with Descemet's Membrane Endothelial Keratoplasty

Arundhati Anshu, MD,[1,2] Marianne O. Price, PhD, MBA,[1] Francis W. Price Jr, MD[2]

Ophthalmology 2012;119:536–540

DMEK

Immunologic Rejection

Graft Rejection After Descemet's Stripping Automated Endothelial Keratoplasty

Graft Survival and Endothelial Cell Loss

Jennifer Y. Li, MD,[1] Mark A. Terry, MD,[1,2] Jeffrey Goshe, MD,[1] Neda Shamie, MD,[1] David Davis-Boozer, MPH[2]

Ophthalmology 2012;119:90–94

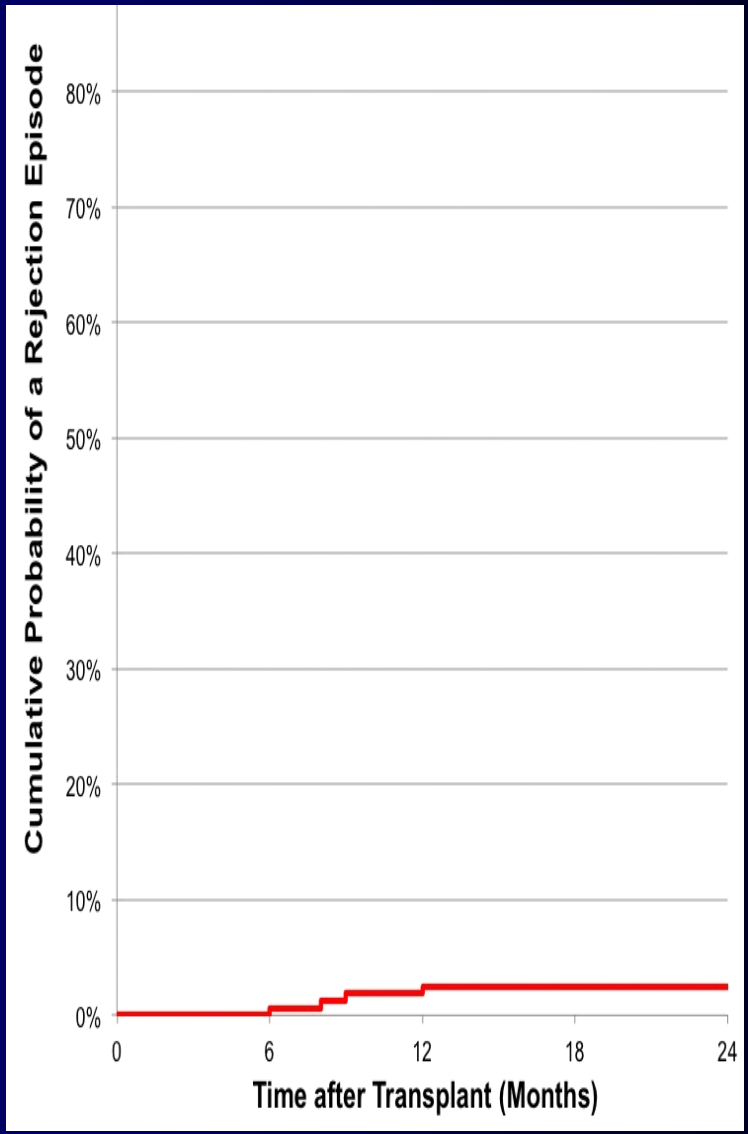
CONVENTIONAL DSAEK

UT-DSAEK Imm. Rej.

Kaplan-Meier Probability of Rejection Episode

1 year = 2.5%

2 years = 2.5%



DSAEK/UT-DSAEK/DMEK

Cumulative Probability (K-M)

	DSAEK*	UT	DMEK
1 Year	6%	2.5%	1%
2 Years	10%	2.5%	1%

*Fuchs Indications Only

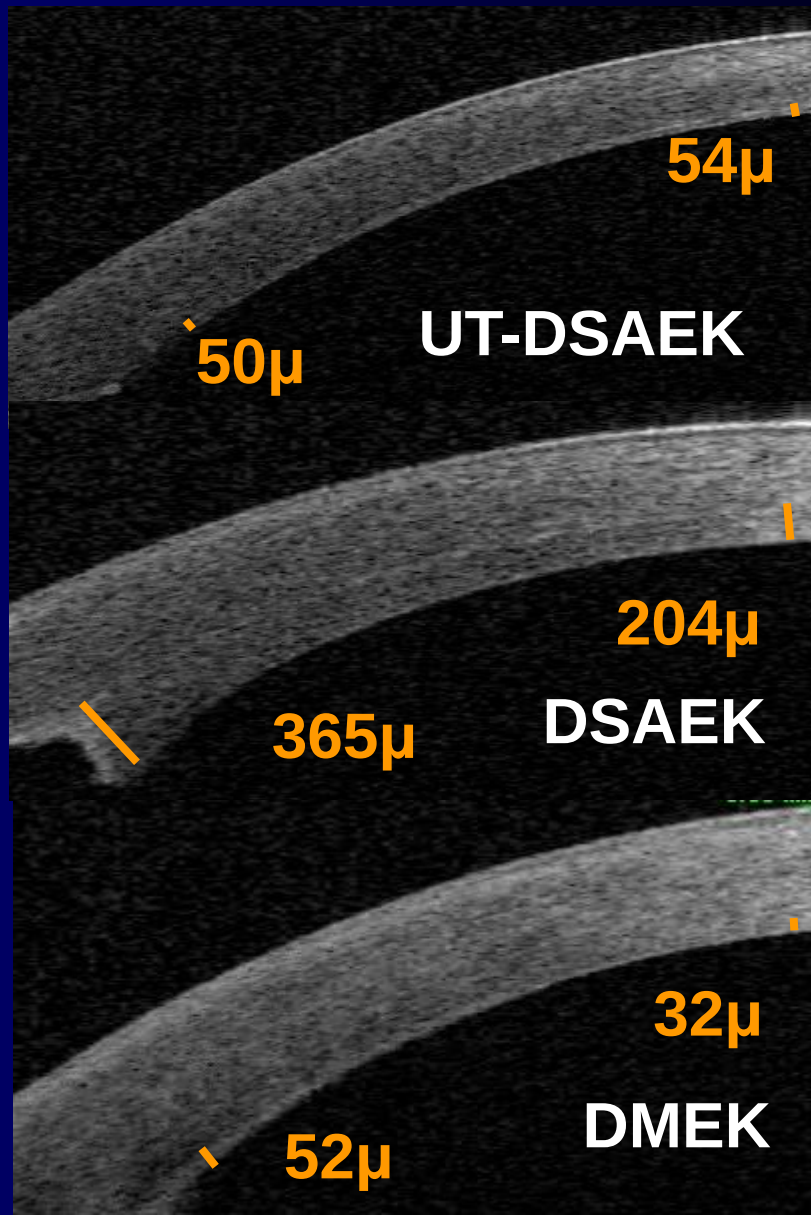
COMPLICATIONS

	UT-DSAEK	DMEK*
Air Re-injection	3%	17-77%
Primary Failure	1%	9%
$Rejection_{1yr}$	2.5%	0-13%
Tissue Loss	1%	0-13%

Data for Fuchs or PBK indications only

CONCLUSIONS

Outcomes of UT-DSAEK Compare Favorably with Those of Conventional DSAEK and Do Not Differ Substantially from Those of DMEK



MICROKERATOME TECHNIQUES COURSE FORLI’ (ITALY)