

Ultra-thin Descemet Stripping Automated Endothelial Keratoplasty (UT-DSAEK)

– why I prefer this technique?

prof. Iva Dekaris

*University Eye Hospital “Svjetlost”, Zagreb,
Medical School, University of Rijeka, Croatia*

5th International Conference on Clinical & Experimental Ophthalmology,
Valencia, Spain, 2015



Endothelial Keratoplasty (EK)

- preferred way to restore vision when the inner cell layer of the cornea stops working properly from:
 - Fuchs' dystrophy,
 - bullous keratopathy,
 - or other endothelial disorders

Endothelial keratoplasty: is there more techniques than diseases itself?



Which is the best technique for visual rehabilitation??

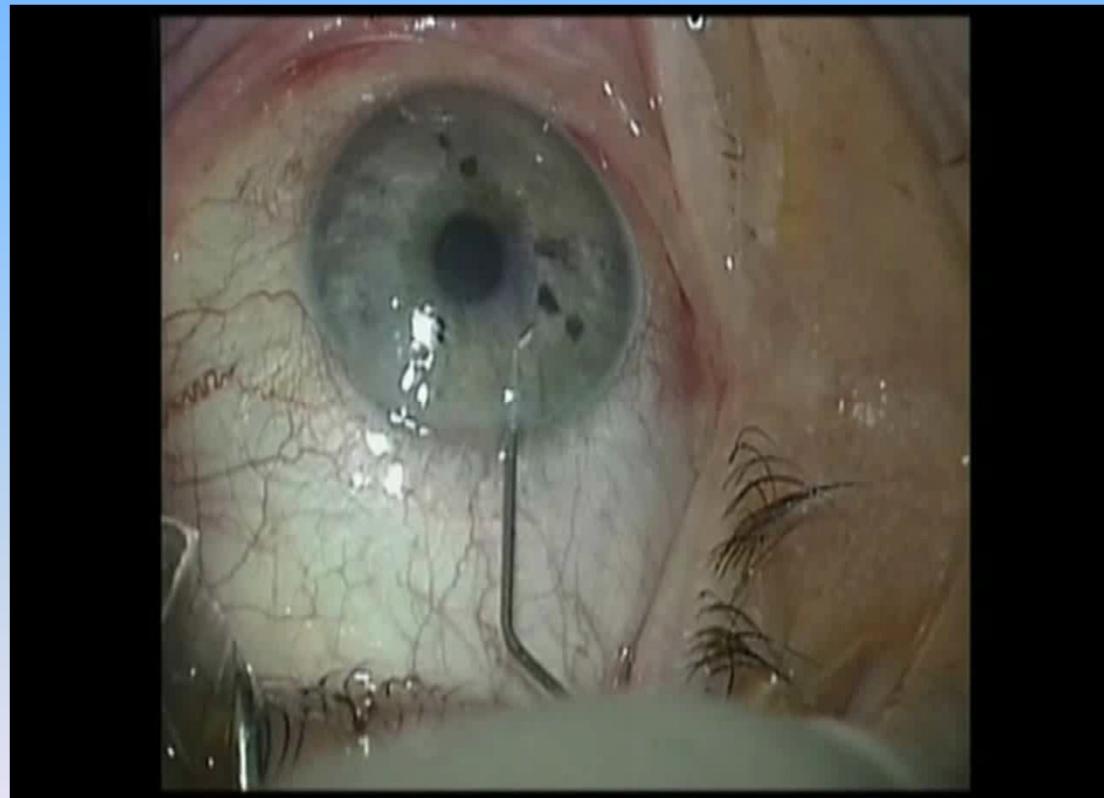
DMEK!!! - agreed by almost everybody

-Best and fastest visual recovery

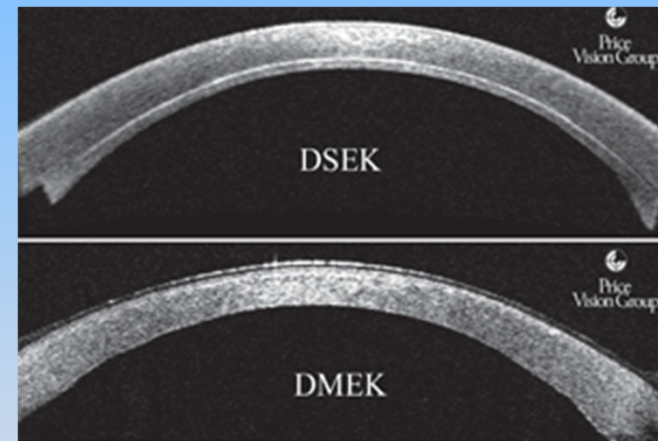
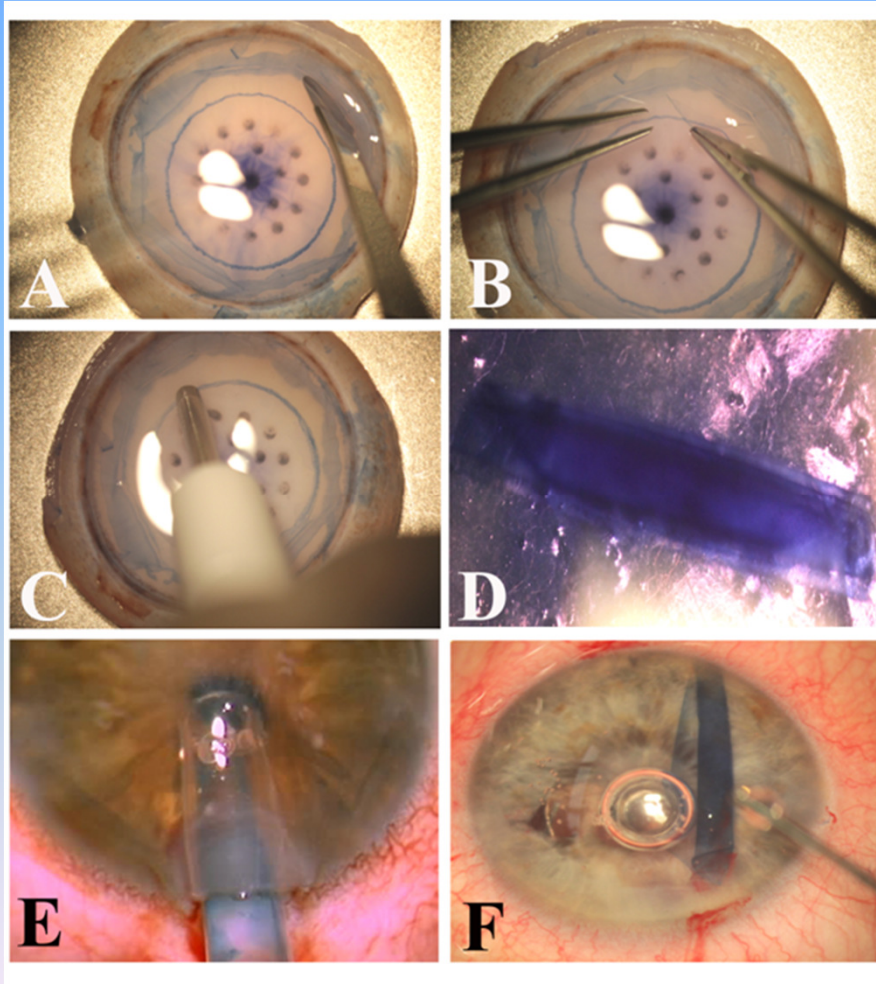
-Near normal anatomical restoration of a cornea

-Much less immune reactions: 1 in a 100 rejection rate

However, DSAEK technique still remains a **gold standard:**



Only few centers in USA and Europe are regularly performing DMEK – **WHY?**



prof. Kruse, Uni-Klinik Koln

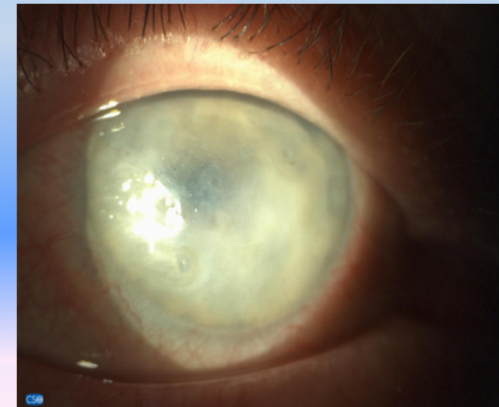
Drawbacks of DMEK:



- Reubling rate of >50%
- Not feasible in all endothelial diseases:
long standing corneal edema, haze or structural alteration from the prior edema
- Currently more time-consuming preoperatively, perioperatively and postoperatively
- *there is a **higher risk of loosing the tissue** during donor preparation*

DMEK - when not recommended at all:

- stromal **scarring** and/or NV
- glaucoma tube **shunt**
- iris defect or missing iris, or any sort of **opening to the posterior chamber**
- **too deep** anterior chamber, *either due to a previous pars plana vitrectomy or genetics*
- **too shallow** anterior chambers



Despite all difficulties postoperative visual recovery
IS IMPRESSIVE, BETTER THEN WITH DSAEK



Hardly
visible **very**
THIN
DMEK graft

DATA ON VISUAL ACUITY

DMEK

- Burkhart ZN; J Cataract Refract. Surg. 2014:
in 49 Fuchs eyes CDVA at 1 year is **1.0**
- Maier P; Dtsch Arztebl Int. 2013,
0.8 or more in **36-79%** of patients
- Tourtas; Am J Ophthalmol. 2012:
in 38 Fuchs, BSCVA at 6 mths **0.73**
- Guerra et al; Cornea 2011: fellow 15 eyes
BSCVA at 12 mths **0.8**, 85% patients
prefer DMEK
- Price et al; Ophthalmology, 2009 :
60 eyes, Fuchs, PBK, grafts: signif.
higher number of **1.0 or 0.8** vision
then DSAEK

DSAEK

- Ivarsen A; Br Ophthalmol. 2014;
in 125 eyes CDVA after 6 months
0.5-0.8; after 4 years **0.7-0.8**
- Maier P, Dtsch Arztebl Int. 2013, review:
VA of **0.8** or more in **23-47%**
- Tourtas, Am J Ophthalmol. 2012:
in 35 Fuchs eyes BSCVA at 6
mths **0.5**
- Guerra et al; Cornea 2011:
BSCVA at 12 mths **0.63**

REPORTED COMPLICATION RATES

DMEK

-Tourtas, JAMA Ophthalmol 2013

53 eyes, graft detachment **33-78%** in first 4 days ; rebubling rate: **6.7-30.4%**

-Gorovoy; Cornea 2014: 75 eyes, Fuchs, PBK, grafts: **97%** successful striping; **2.7%** rebubling rate; **2.7%** grafts failed

-Price et al; Ophthalmology, 2009 : 60 eyes, Fuchs, PBK, grafts: **83%** successful striping; **63%** rebubling rate; **8%** grafts failed

Graft rejection:

- Maier P, Reinhard T; Dtsch Arzt Int. 2013, review:
1-3% of cases

- Anshu, Price, Ophthalmol 2012, 140 eyes:
1% graft rejection in 1, 2 years

DSAEK

- Nakagawa H et al; Am J Ophthalmol. 2014 ,

134 eyes, **8,9%** graft dislocation

- Foster JB. Cornea 2012:

detachment rate **6-25%**

- Villarubia et al. Arch Soc Esp Ophthalmol 2011,
75 eyes: **22.5%** detachments

Graft rejection:

- Nakagawa H et al; Am J Ophthalmol. 2014

2.2% of cases

- Maier P, Reinhard T; Dtsch Arzt Int.2013:

0-8% of cases

-Anshu, Price, Ophthalmol 2012: 140 eyes:

8% and 12% rejection in 1, 2 years

However, THERE ARE LACKING COMPARISONS

WITH **ultra-thin DSAEK**,

DMEK

UT-DSAEK

- Chaurasia S....PriceMO; Ophthalmol. 2013:
471 eyes (DMEK and triple DMEK);
6 months BSCVA was **0.8-1.0**
3,3% graft failed; **30%** rebubling rate
- Tourtas, ... Kruse; Am J Ophthalmol. 2012:
in 38 Fuchs BSCVA at 6 mths **0.73**
- Dapena, Melles. Arch Esp. Oftalmol. 2011:
75% of cases reaching **0.8** or better
within 1-3 months; **63%** rebubling
rate; **8%** grafts failed
- Anshu, Price, Ophthalmology 2012:140 eyes:
1% graft rejection in 1 & 2 years

- Busin et al, Ophthalmology 2013,
285 eyes, Fuchs, PBK, other:
BSCVA at 3, 6, 12, and 24 months
was **0.7, 0.8, 0.84, and 0.95,**
respectively.
- total graft detachment in **3.9%**
- primary failure in **1.4%**
- probability of a rejection episode at
3, 6, 12, and 24 months was **0%,**
0.4%, 2.4%, and 3.3%

Ultra-thin DSAEK

UT-DSAEK with a **double-pass technique** provides very thin DSAEK grafts!

Busin M, et al. Ultrathin DSAEK with the Microkeratome Double-Pass Technique: Two-Year Outcomes. Ophthalmology. 2013 Jun;120(6):1186- 94.

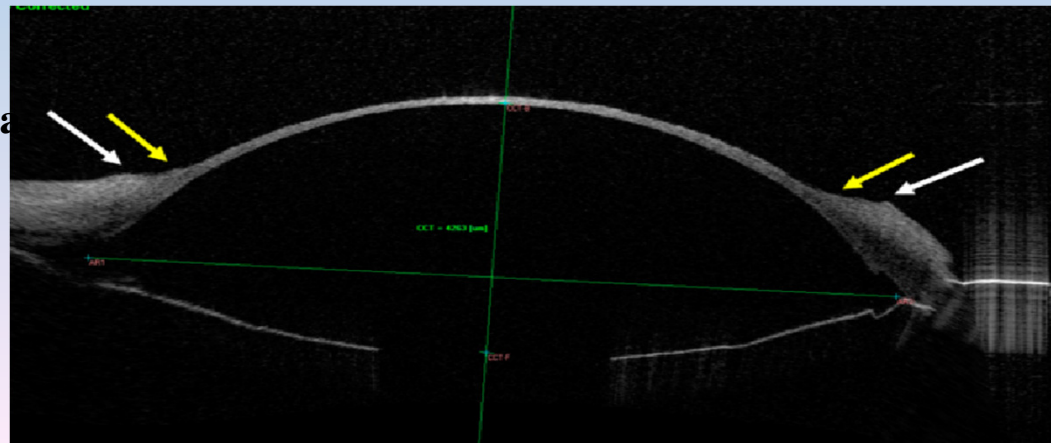
One pass very thin grafts –
Gebauer microkeratome



- Ultra-thin (UT) graft of **100 micrometers and less** is created with two microkeratome passes:
 1. debulking
 2. refinement



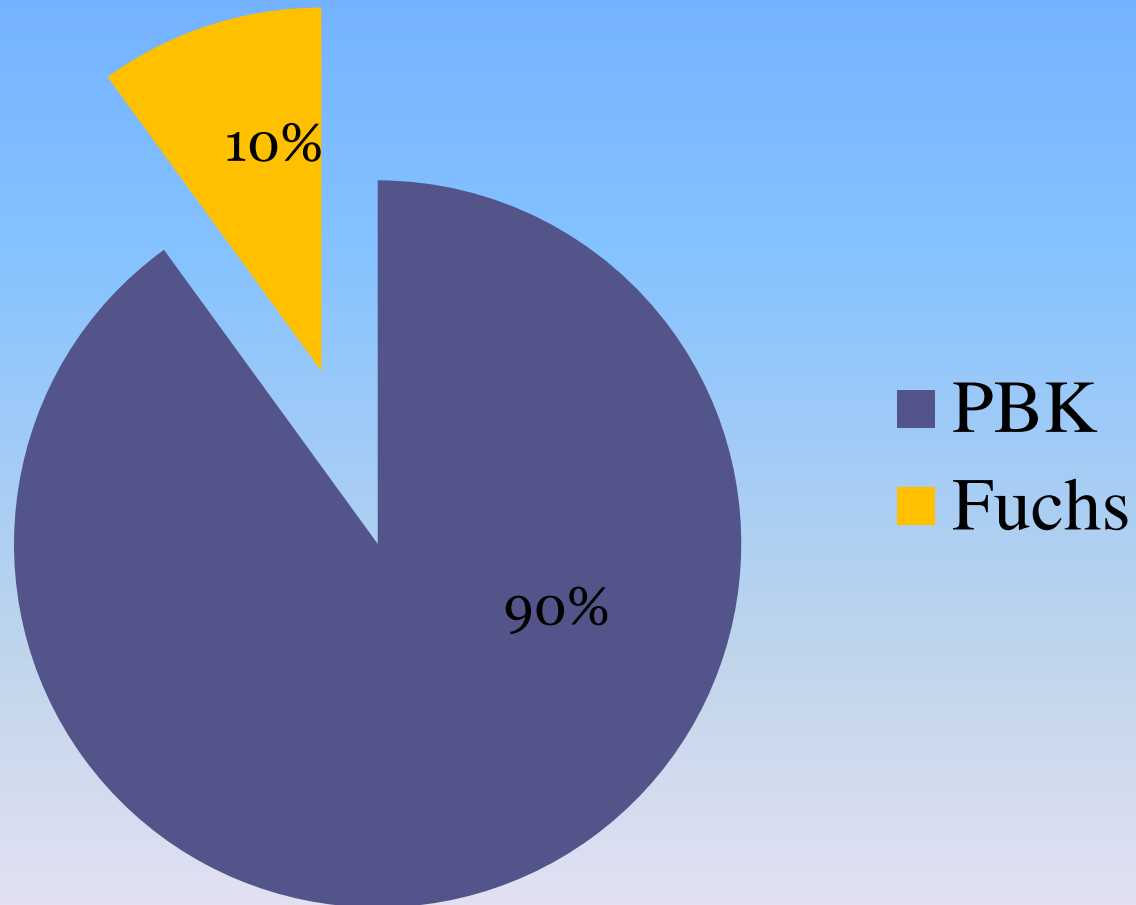
Anterior OCT image of a donor cornea
after preparation for UT-DSAEK.



Ultra-thin DSAEK

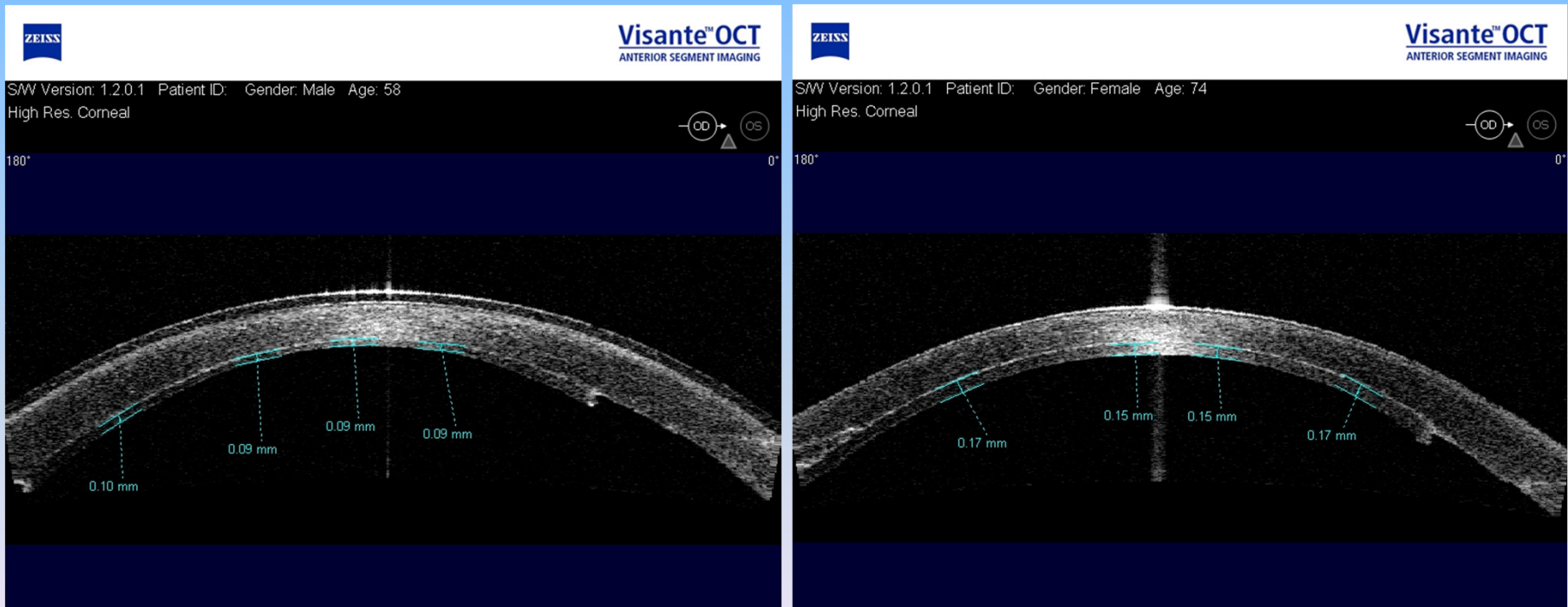


Indications for EK in our Hospital



In our hands:

Evaluation of **visual outcome and endothelial cell loss** after UT- DSAEK (<100 μ m) and compare it to conventional DSAEK (lamellas of 100-200 μ m) and PK



OCT comparison of UT vs Conventional DSAEK

Patients and Methods

- **Pseudophakic bullous keratopathy:**
 - 40 DSAEK
 - 15 UT-DSAEK
 - 20 PK grafts
 - Grafts thicknesses were measured at the visual axis (VA) by AS-OCT (Zeiss Visante)
 - BCVA
 - Follow up was 12-36 months

Groups (based on the lamellar thickness on first post-op day):

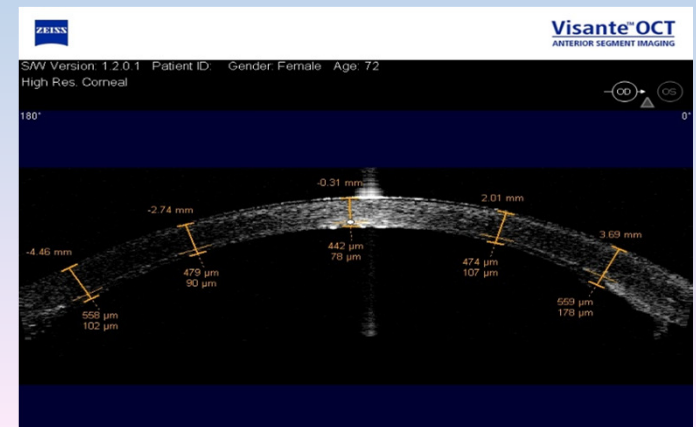
1. **< 100** μm Ultra-thin DSAEK (mean 78 ± 21.3 μm , n=15)
2. **$\geq 100 < 180$** μm (mean: 137.5, n=22)
3. **$\geq 180 < 250$** μm (mean: 220, n=12)
4. **≥ 250** μm (mean: 260, n=6)

The only difference in surgical procedure was in donor preparation:

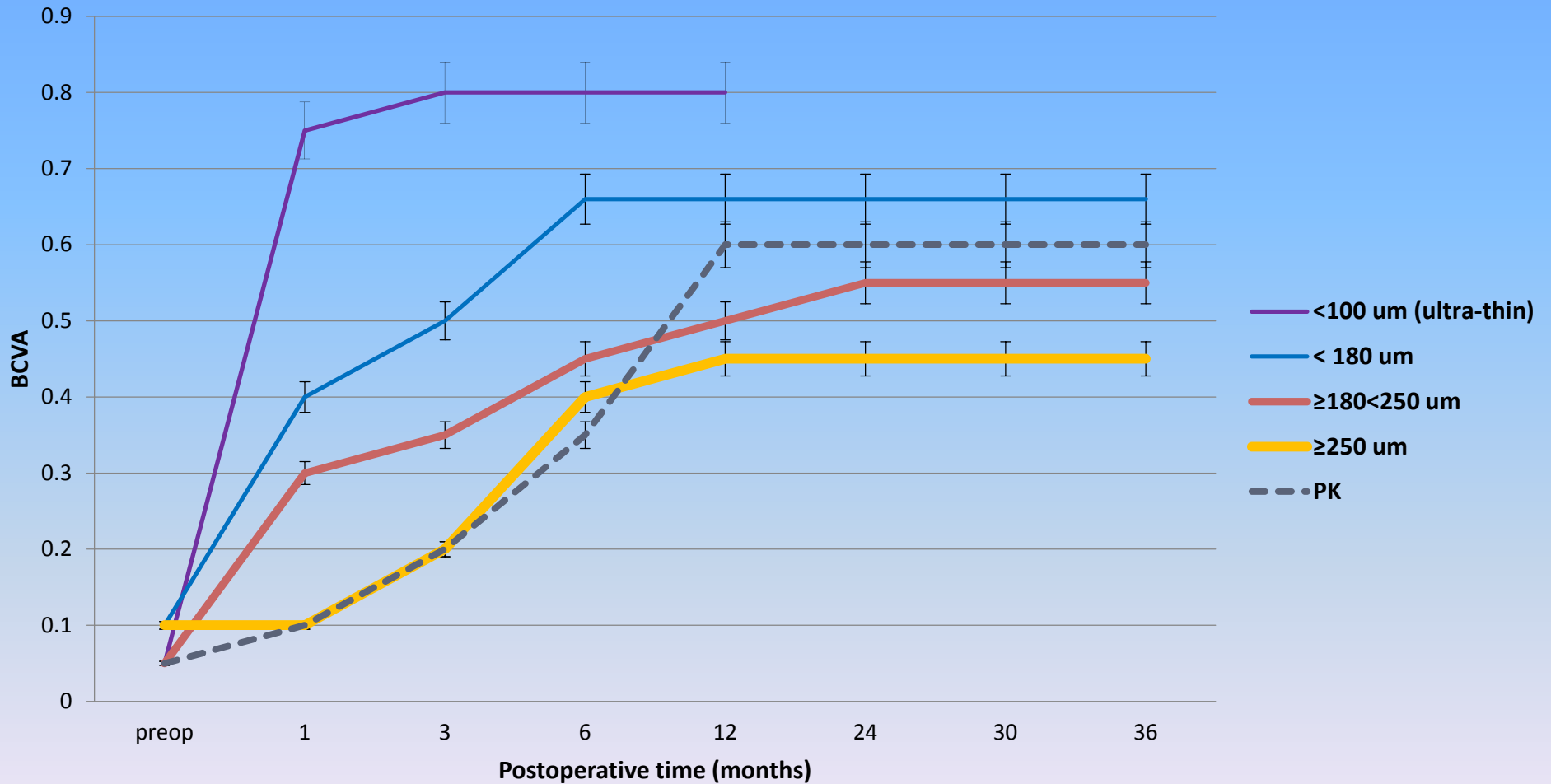
DSAEK: one cut with microkeratome

UT-DSAEK: “double pass” of microkeratome

-same surgeon

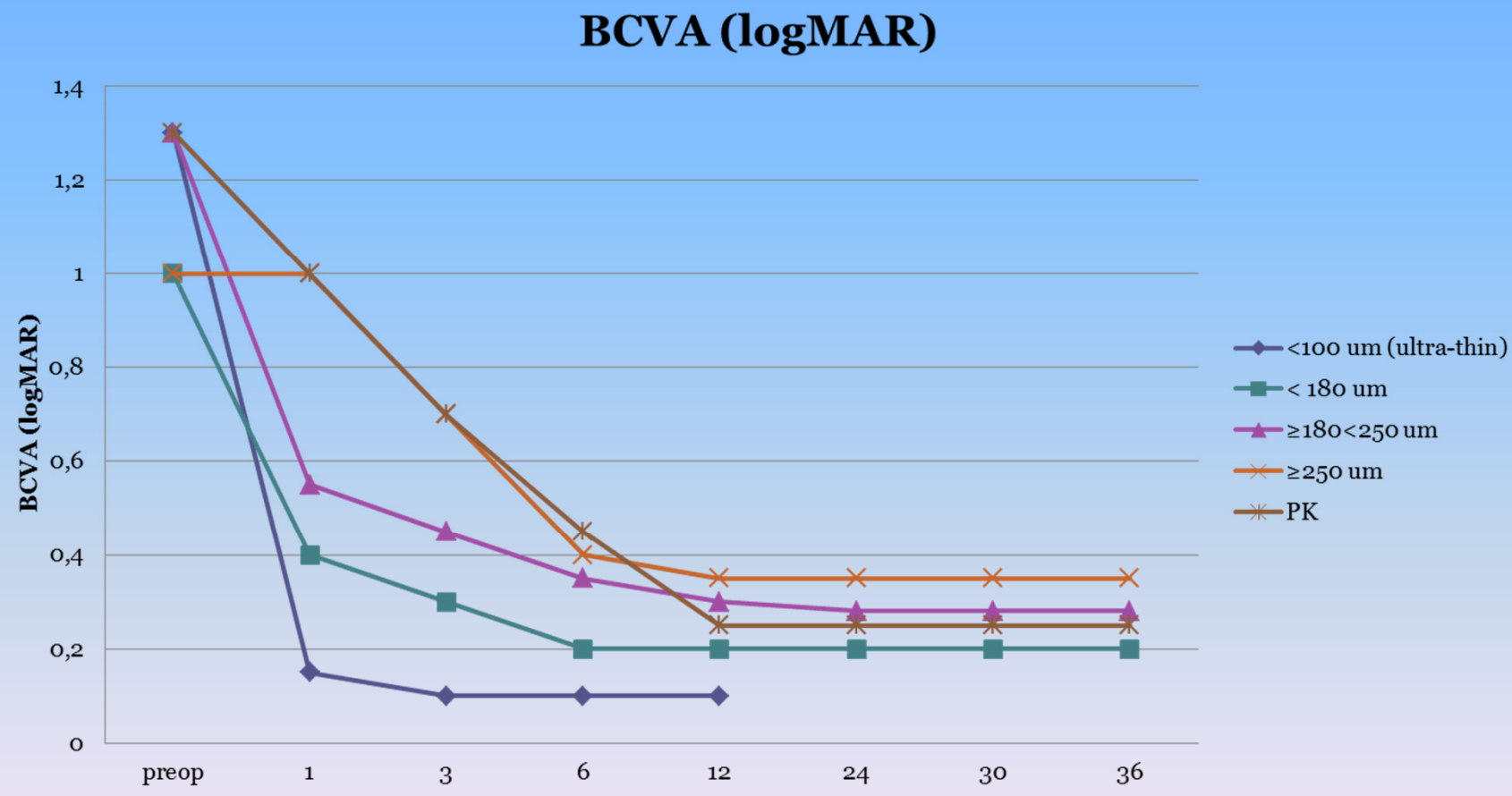


BCVA: UT- DSAEK, DSAEK and PK



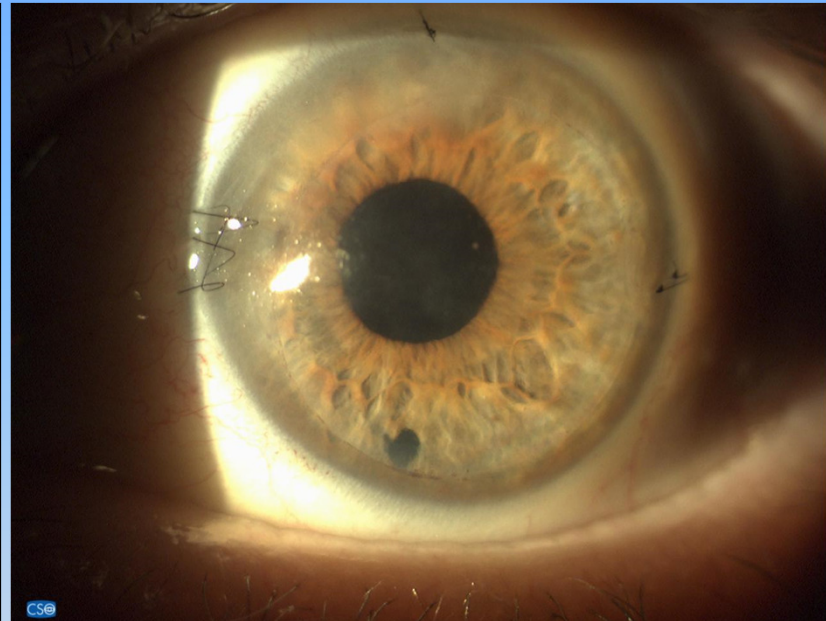
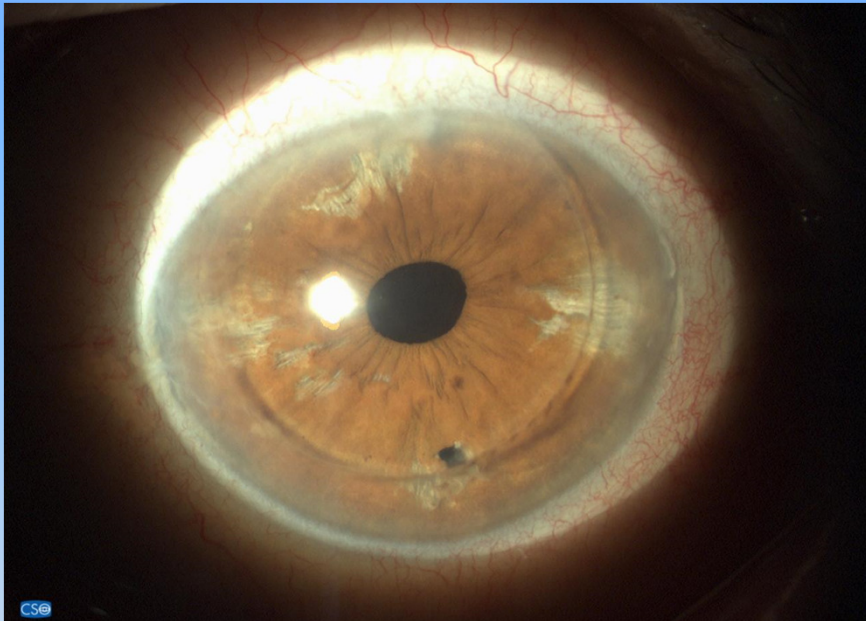
Dekaris et al. DSAEK – Is a Thinner Donor Lamella the Better Choice? *J Transplant Technol Res* S2:004, 2012. doi:10.4172/2161-0991.S2-004

BCVA: UT- DSAEK, DSAEK and PK



P<0,05

DSAEK on the right eye and UT- DSAEK on the left eye



	DSAEK	UT DSAEK
BCVA after 1 week	0,4	0,5
3 months	0,75	0,9
6 months	0,8	0,95

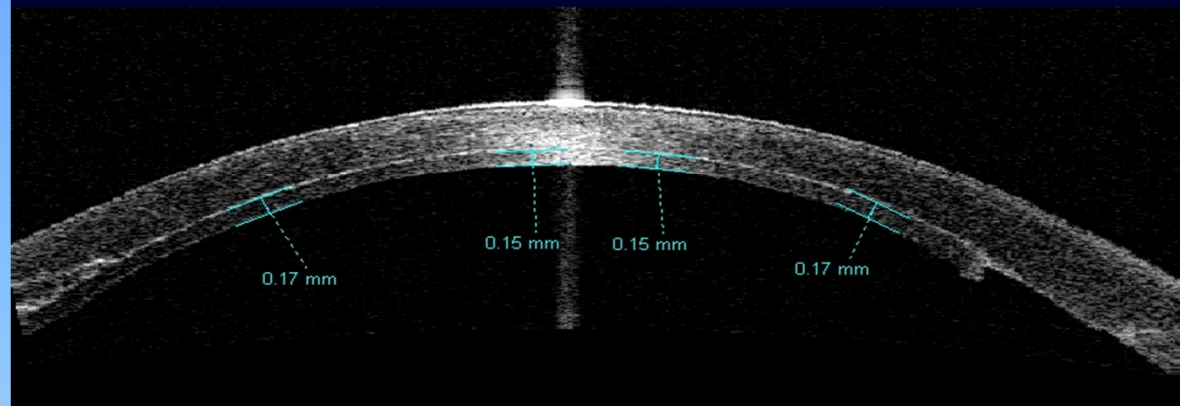


SW Version: 1.2.0.1 Patient ID: Gender: Female Age: 74
High Res. Corneal



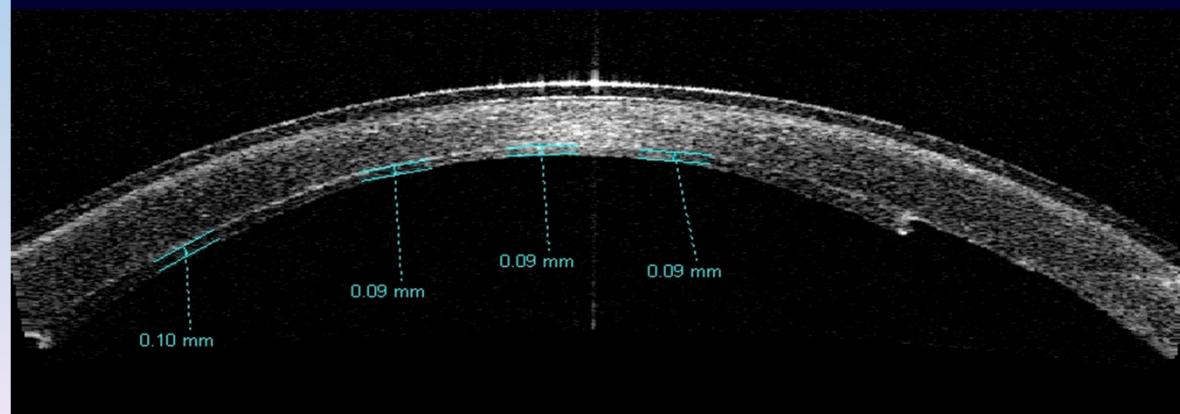
180°

0°

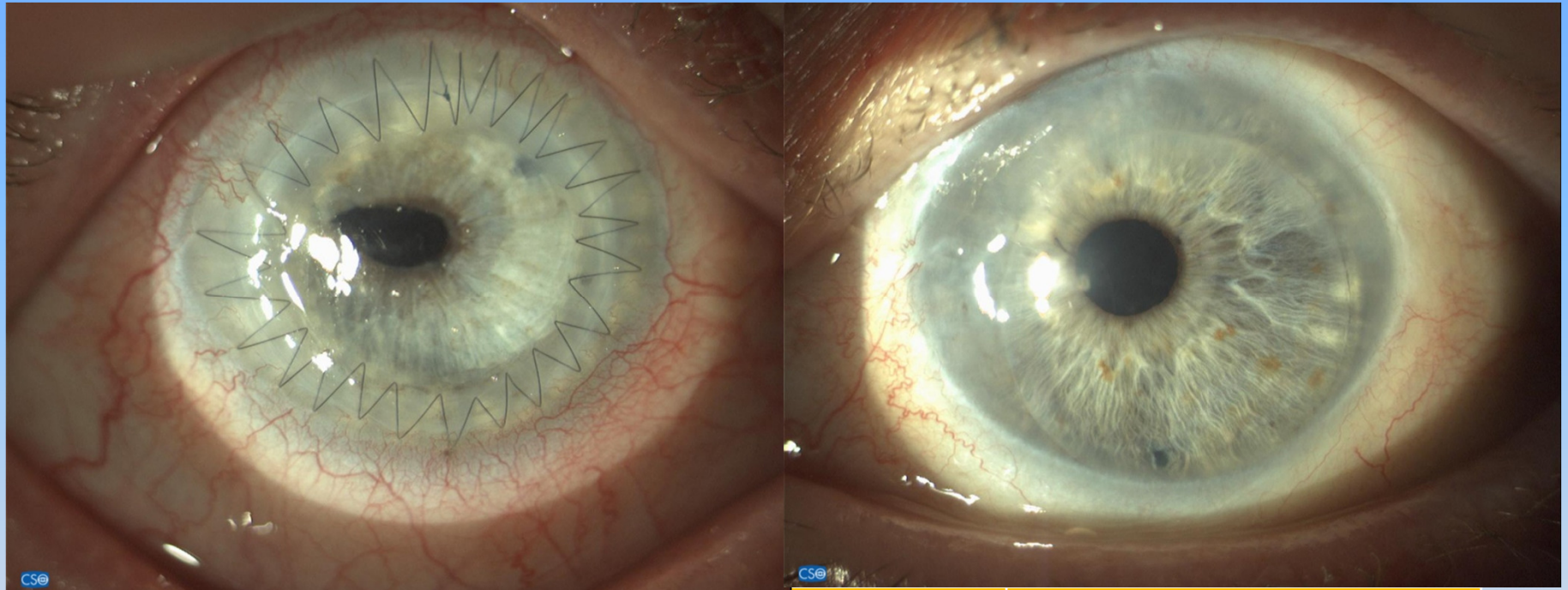


180°

0°



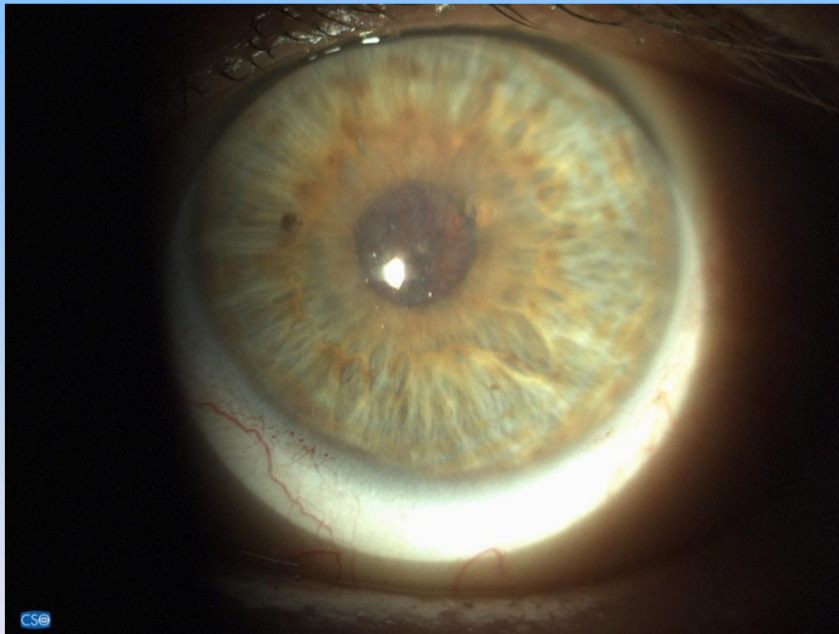
Comparison - same patient: PK right and UT- DSAEK left eye



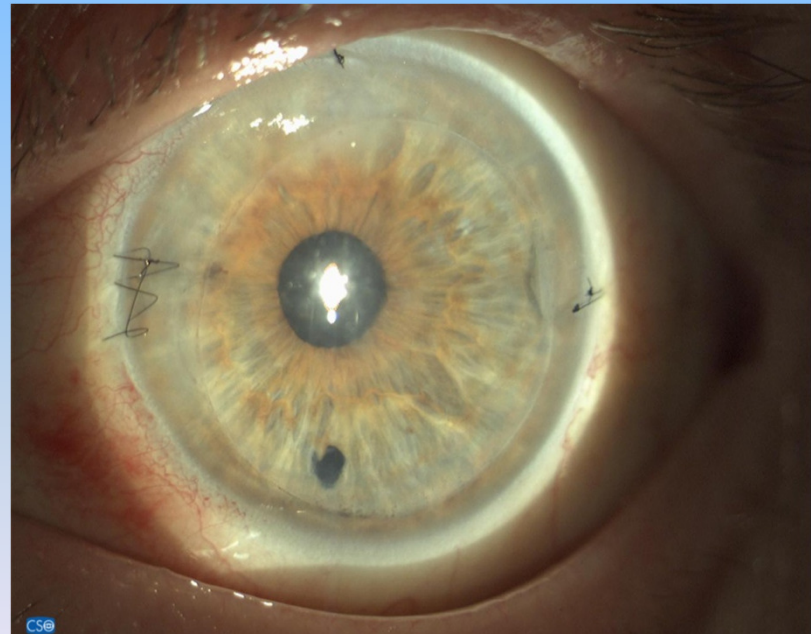
	PK	UT DSAEK
BCVA after 1 week	0,15	0,55
3 months	0,35	0,95
6 months	0,65	1,00

UT- DSAEK

1.day

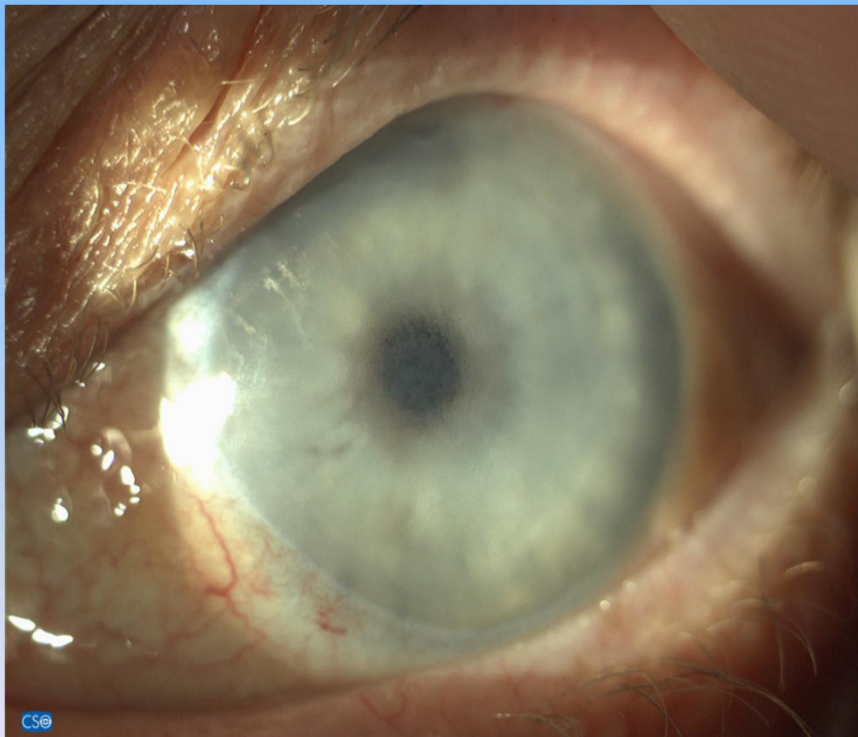


1. week

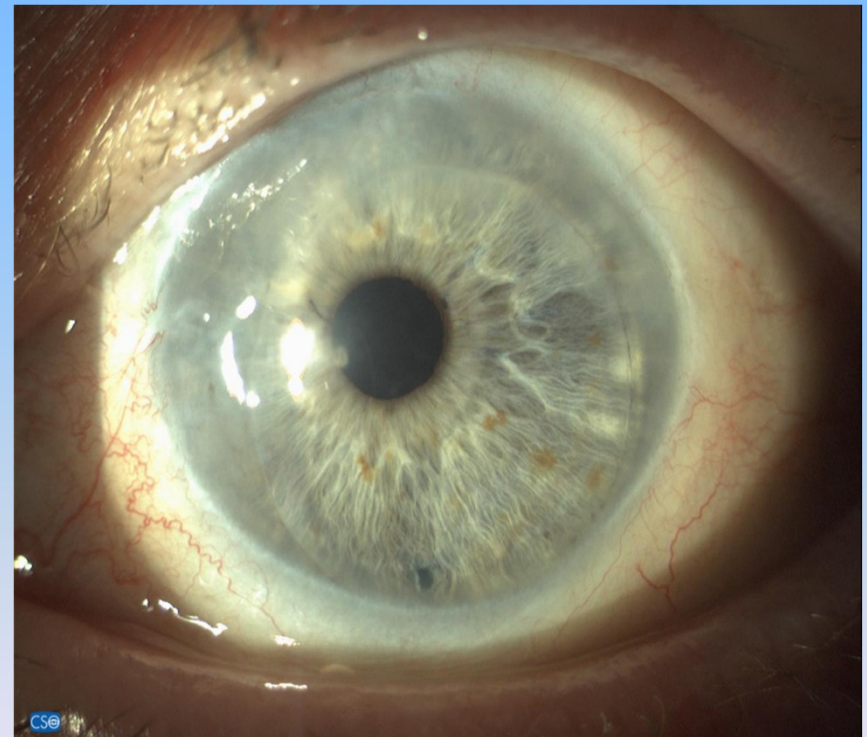


UT-DSAEK

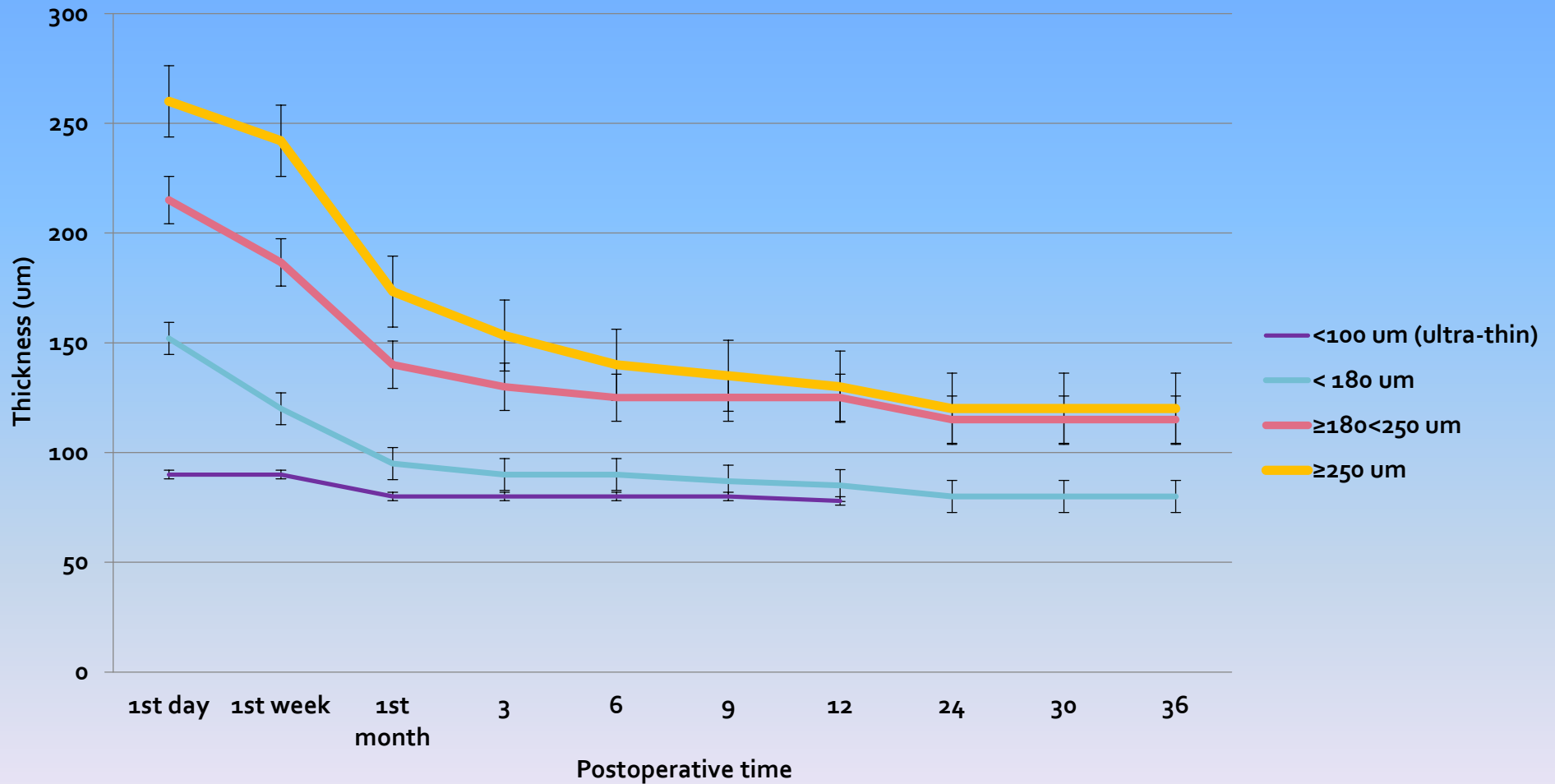
Preoperative



1. month

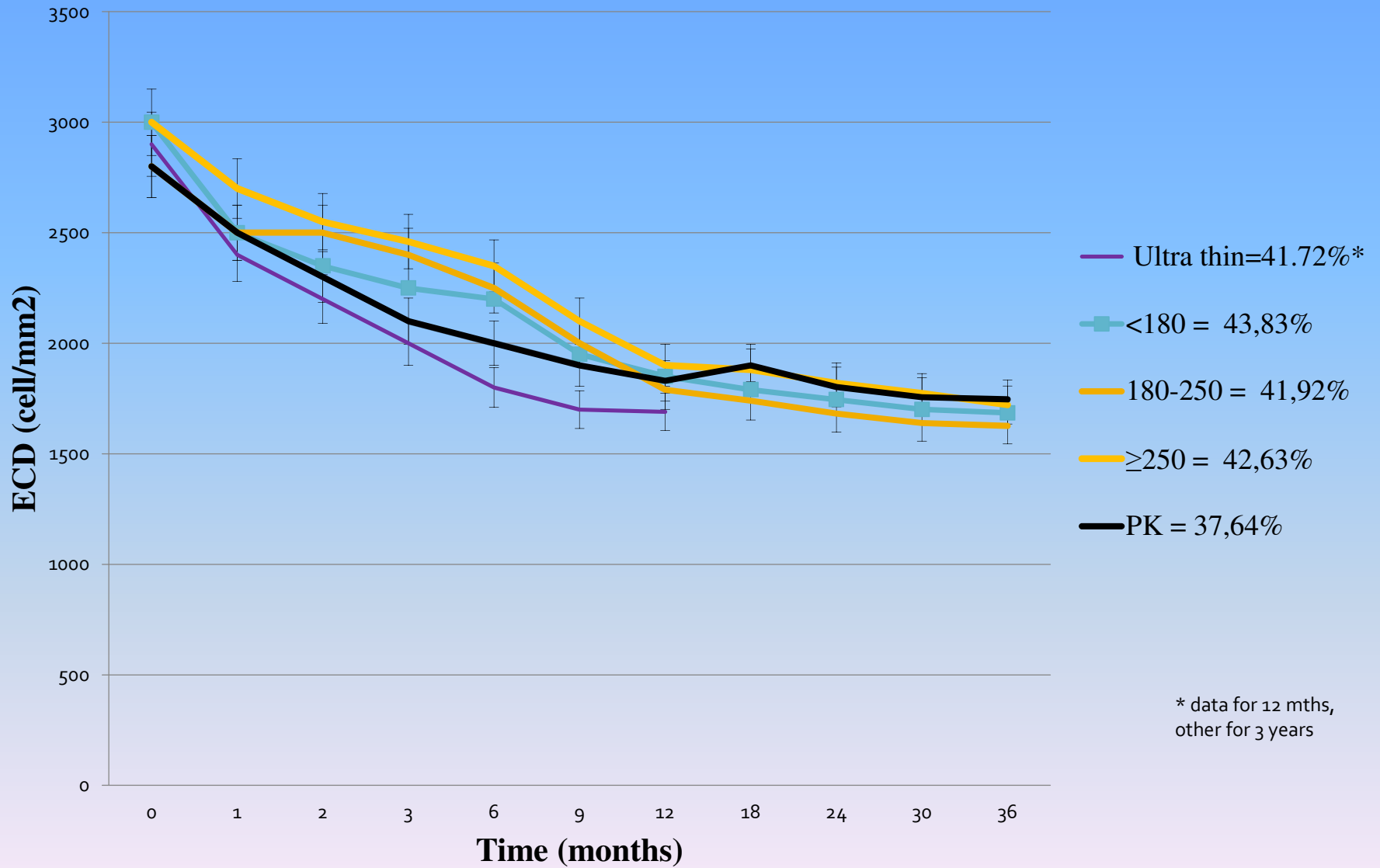


Change of lamellar thickness over 36 postoperative months measured at visual axis by AS-OCT



Dekaris et al. DSAEK – Is a Thinner Donor Lamella the Better Choice?
J Transplant Technol Res S2:004, 2012. doi:10.4172/2161-0991.S2-004

Endothelial Cell Density Loss



OUR EXPERIENCE WITH UT-DSAEK

- UT-DSAEK provides **faster and more complete visual rehabilitation** as compared to conventional DSAEK
- UT-DSAEK grafts enable **visual acuity values comparable to DMEK** results from the literature

DISCUSSION – UT DSAEK

- Visual outcomes of UT DSAEK are **comparable with those published for DMEK and better than those reported after DSAEK** in terms of both speed of visual recovery and percentage of patients with 20/20 final visual acuity.
- Ultra-thin DSAEK provides **visual recovery advantages of DMEK** plus the **ease of DSAEK** without increasing endothelial cell loss.

Busin M, et al. Ultrathin Descemet's Stripping Automated Endothelial Keratoplasty with the Microkeratome Double-Pass Technique: Two-Year Outcomes. Ophthalmology. 2013 Jun;120(6):1186- 94.

- DSAEK with corneal lamellar thickness < 120 μm is an interesting therapeutic **alternative to DMEK**

Maier AK et al. Ophthalmologe, 2013 Apr 12.[Influence of donor lamella thickness on visual acuity after Descemet's stripping automated endothelial keratoplasty (DSAEK).][Article in German]

When selecting a surgical technique....

- indication profile of your patients
- duration of the disease in your cases
- equipment available to you
- availability of “back-up” cornea
- your own surgical experience
- possibility of close follow-up of your patients

Fuch's dystrophy	→	DMEK
PBK	→	DMEK/UT-DSAEK
Complicated AC situations	→	(UT)-DSAEK
Eyes with corneal scarring and neovascularisations	→	PKP

Nonetheless, randomized controlled trials are needed to determine which operative method is best in each stage of corneal disease!

If you end up with (UT)-DSAEK as a choice, always try to keep your grafts AS THIN AS POSSIBLE



Eye and Vision Research Developments



Mohit Parekh
Stefano Ferrari
Diego Ponzin
Editors

Eye Banking

Changing Face of Corneal Transplantation

NOVA

Chapter 7

Ultra-Thin Descemet's Stripping Automated Endothelial Keratoplasty (UT-DSAEK)

Iva Dekaris
University Eye Hospital „Svjetlost“,
Zagreb, Croatia

