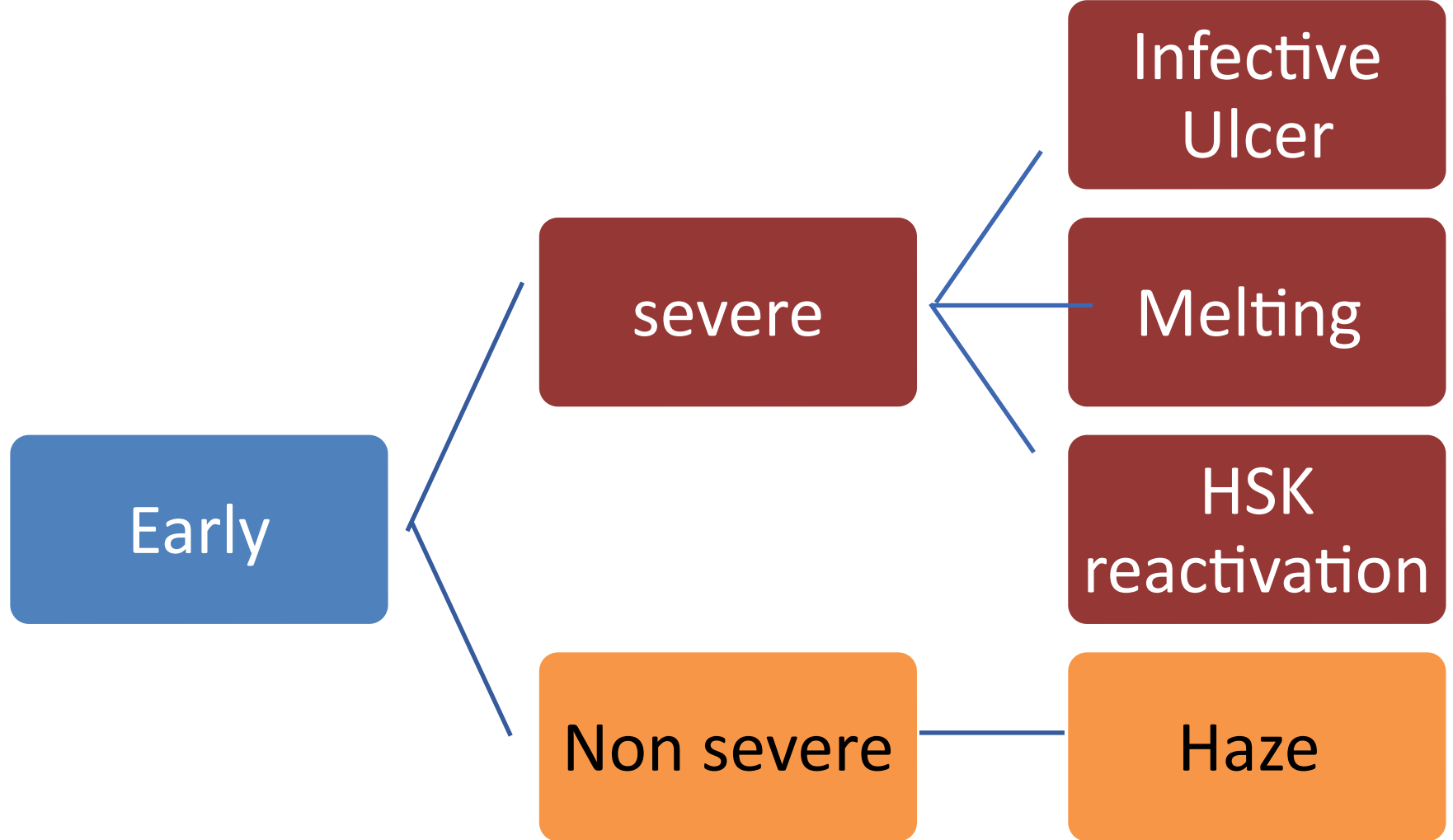
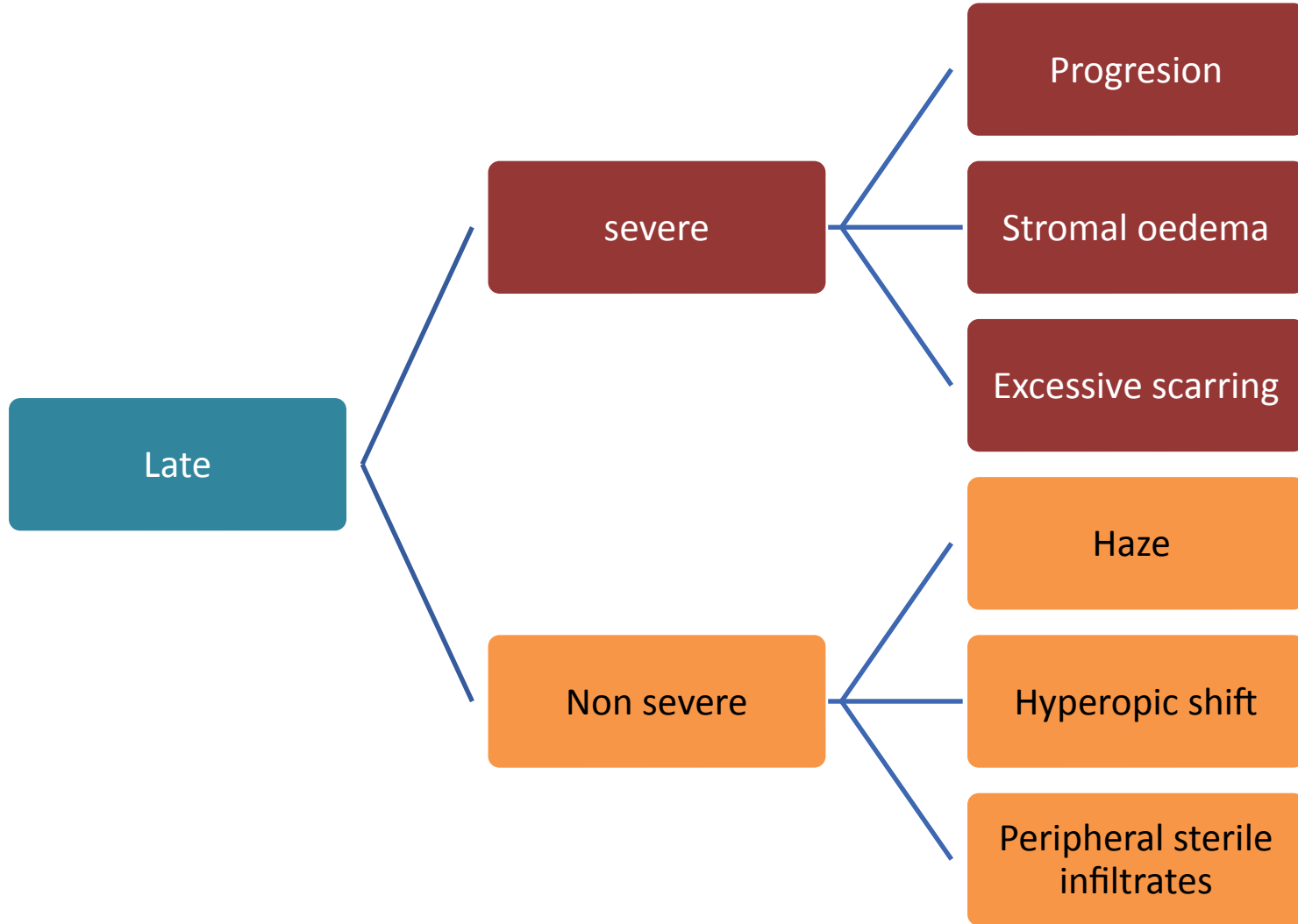


Miltos Balidis PhD, FEBOphth, ICOphth

Collagen cross linking stories
complications







Infiltrates

KCN Progression

CXL

Endothelial damage

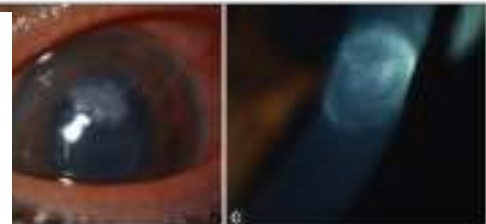
Hyper flattening

Corneal infiltrates after corneal collagen cross-linking

George F Mangioris¹, Domniki N Papadopoulou, Miltiadis O Balidis, Jordan L Poulas, Nikolaos Th Papadopoulos, Theo Seiler

Affiliations + expand

PMID: 20438026 DOI: 10.3928/1081597X-20100326-01

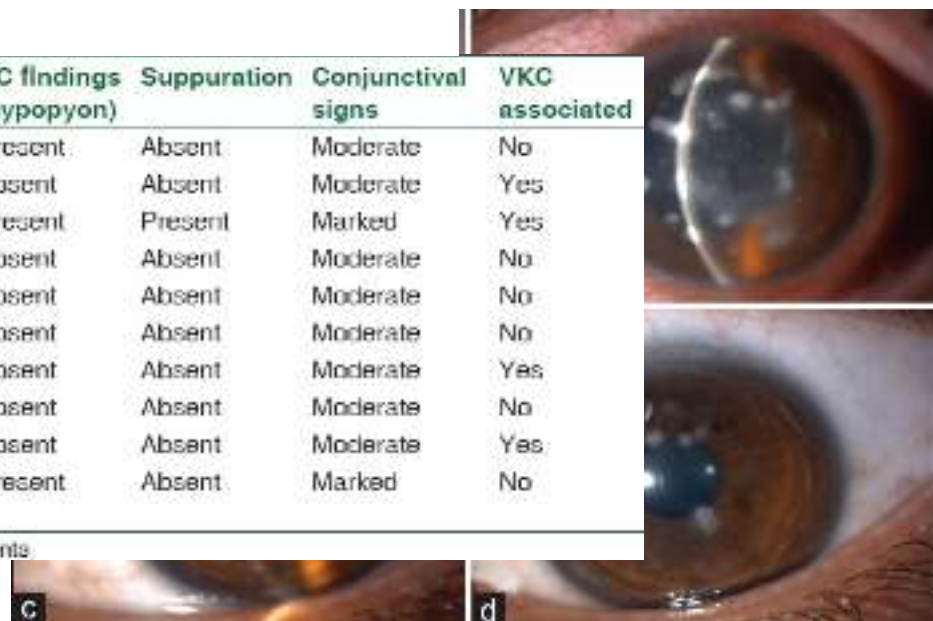


[ated corneal collagen cross-linking for](#)



Type of keratitis	Location	Infiltrate size (mm)	Level of lesion	Focality	AC findings (hypopyon)	Suppuration	Conjunctival signs	VKC associated
Infectious	Central	3x3	Superficial stromal	Focal	Present	Absent	Moderate	No
Infectious	Central	3.5x3	Superficial stromal	Focal	Absent	Absent	Moderate	Yes
Infectious	Central	6x6	Deep stromal	Multiple foci	Present	Present	Marked	Yes
Sterile	Mid-peripheral	1x1	Superficial stromal	Multiple foci	Absent	Absent	Moderate	No
Sterile	Mid-peripheral	2x1	Superficial stromal	Multiple foci	Absent	Absent	Moderate	No
Sterile	Mid-peripheral	3x2	Superficial stromal	Multiple foci	Absent	Absent	Moderate	No
Sterile	Mid-peripheral	2x1	Superficial stromal	Multiple foci	Absent	Absent	Moderate	Yes
Sterile	Mid-peripheral	2x1	Superficial stromal	Multiple foci	Absent	Absent	Moderate	No
Sterile	Mid-peripheral	4x1	Superficial stromal	Focal	Absent	Absent	Moderate	Yes
Sterile (INTACS)	Mid-peripheral + central	2x2	Superficial stromal	2 foci	Present	Absent	Marked	No

AG: Anterior chamber, VKC: Vernal keratoconjunctivitis, INTACS: Intra stromal corneal ring segments

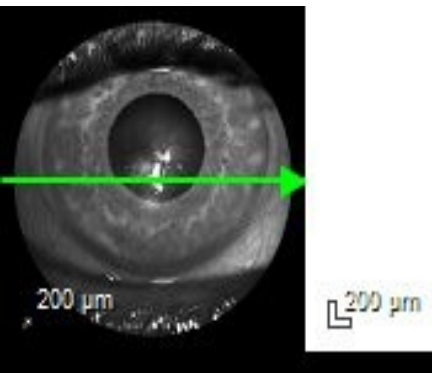
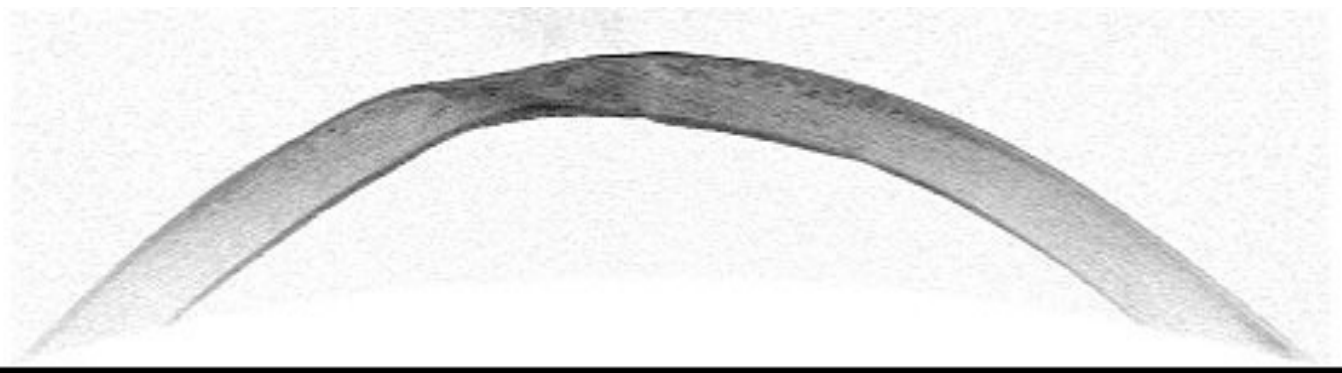
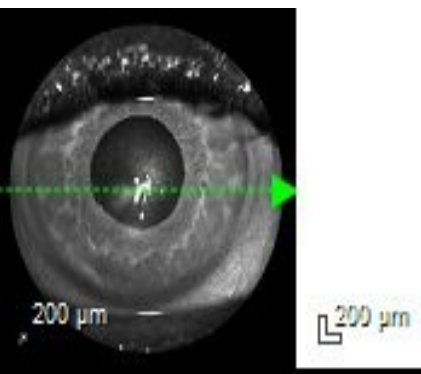


Presentation

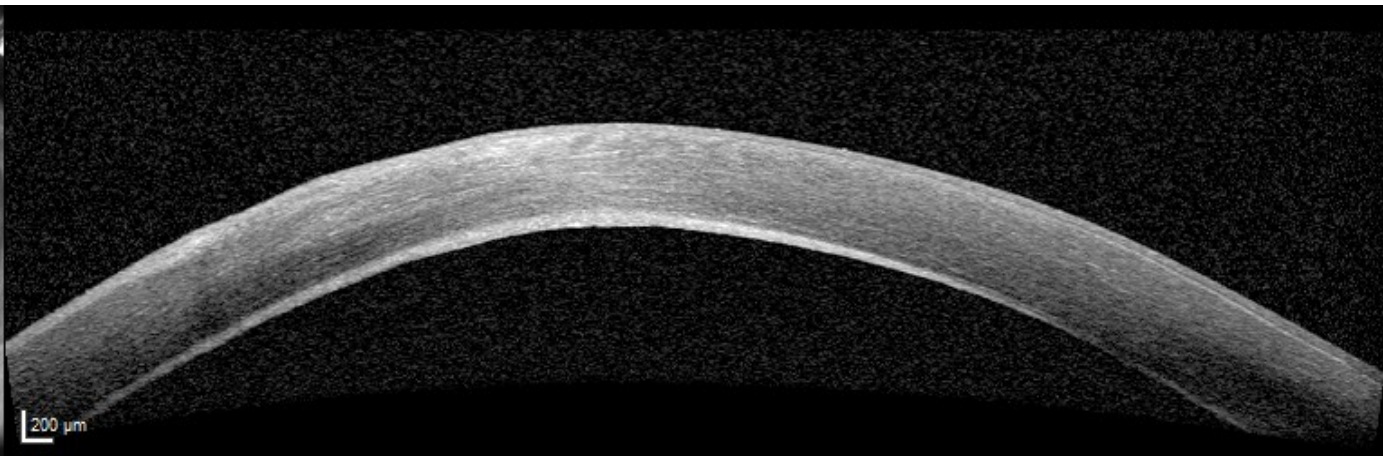
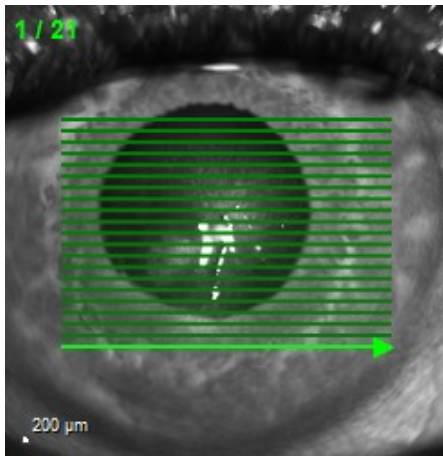
- 58 years old male KCN
- Keratoconus RE > LE
- Unilateral reduction of VA 12 months post CXL!

Clinical examination

- CVA 0.5 / 10 4 / 10
- RE severe central stromal scarring, tissue loss with peripheral edema
- No evidence of guttata or pigment on the endothelium
- Bilateral nuclear sclerosis(++)of the crystalline lens,



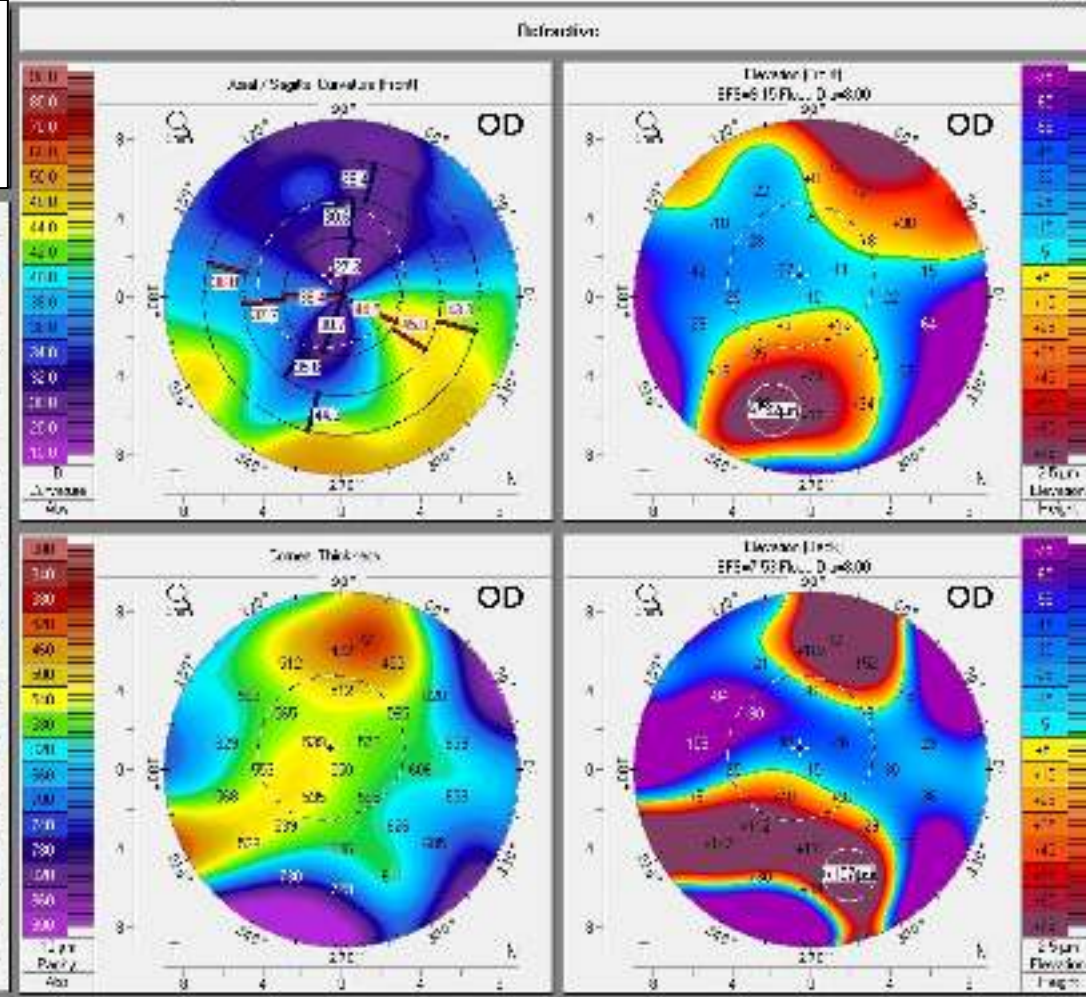
Ocular imaging



12/10/2016, OD

IR&OCT 20° ART [HR] ART(9) Q: 26

HEIDELBERG
ENGINEERING

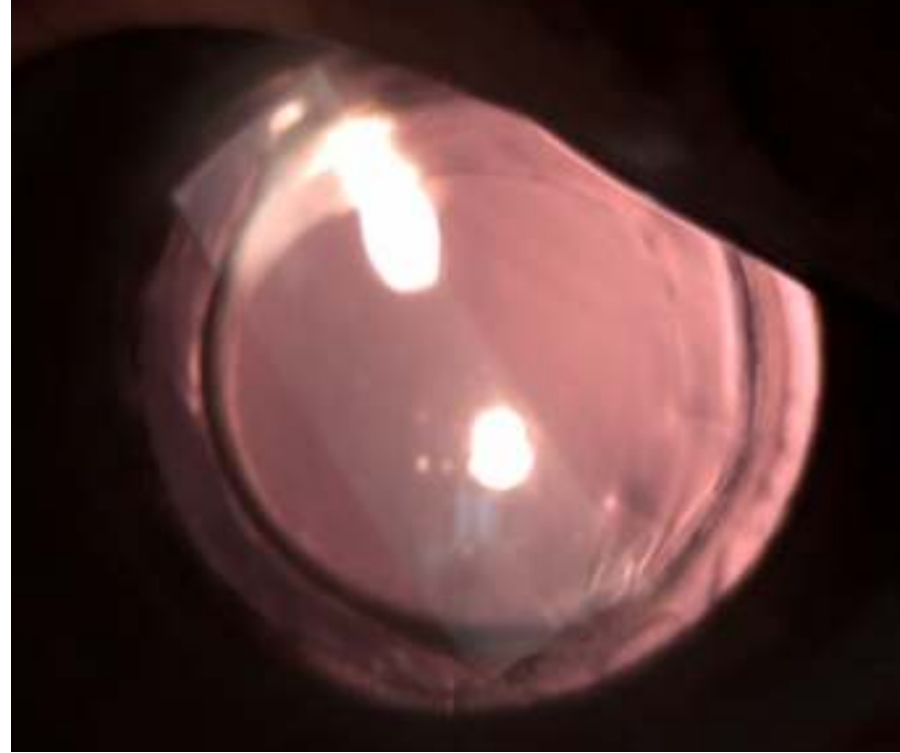
[illegible]

Post CXL edema and scarring

- RE PKP
- LE Phaco and toric IOL



RE PKP 5/10



LE Phaco TORIC IOL 10/10

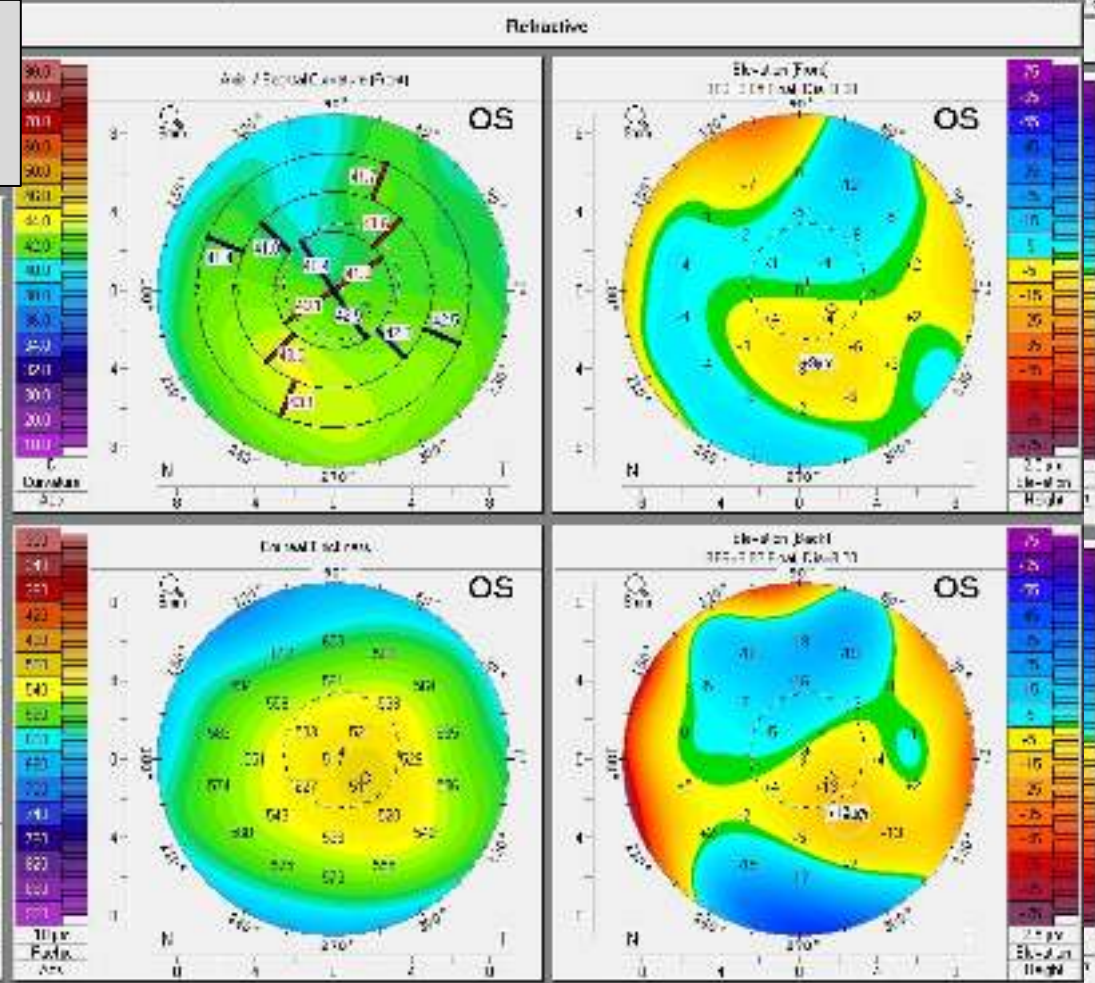
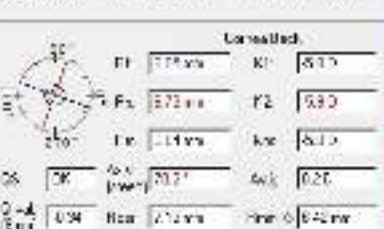
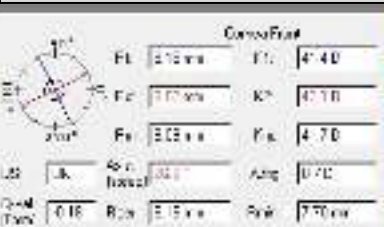
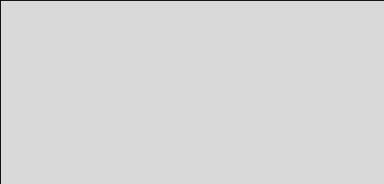
2 months post cataract operation

- Left eye BCVA reduced to 2/10

What to do ?

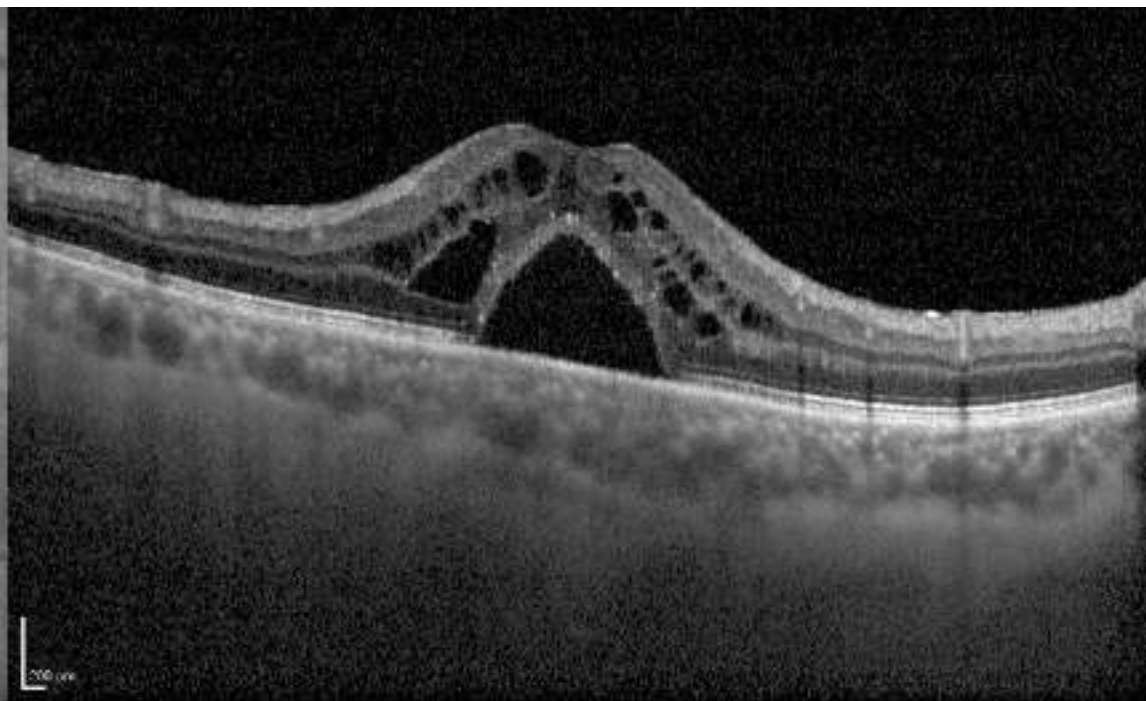
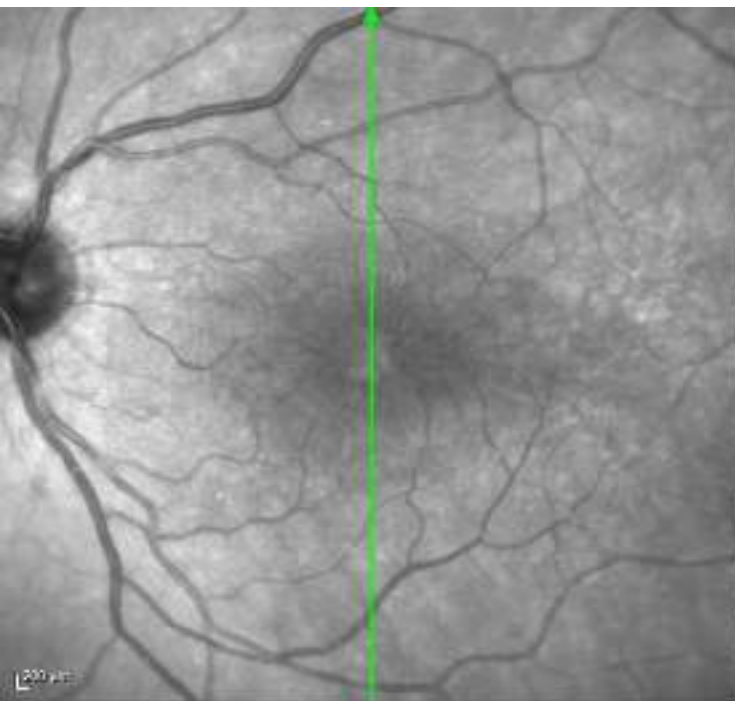


- Slit lamp and Bscan (late onset endophthalmitis?)
- Pentacam
- Confocal Endothelial Microscopy
- OCT



- Axis almost unchanged

OCT Spectralis



2/10/2017, OS

IR&OCT 30° ART EDI [HS] ART(60) Q: 33

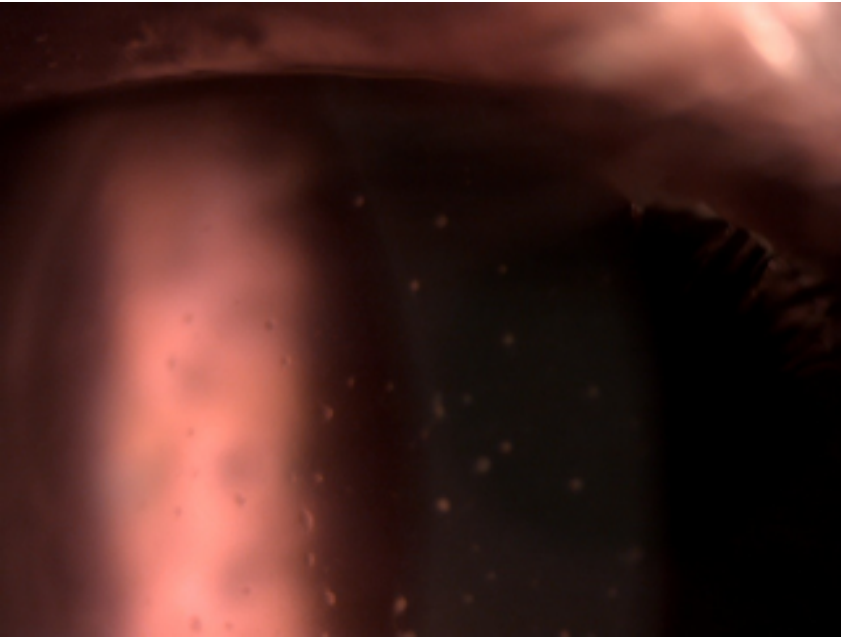
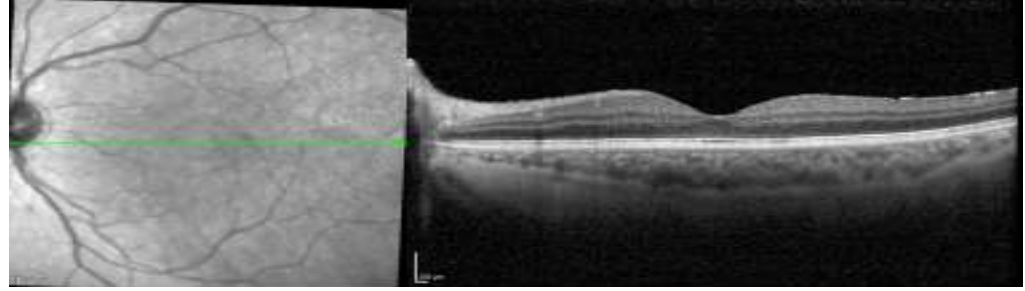
HEIDELBERG
ENGINEERING

Right Eye

- Phaco Toric IOL
- BCVA 8/10 (2/12 post op)
- 4/12 post
 - BCVA Sudden drop 3/10
 - Photosensitivity

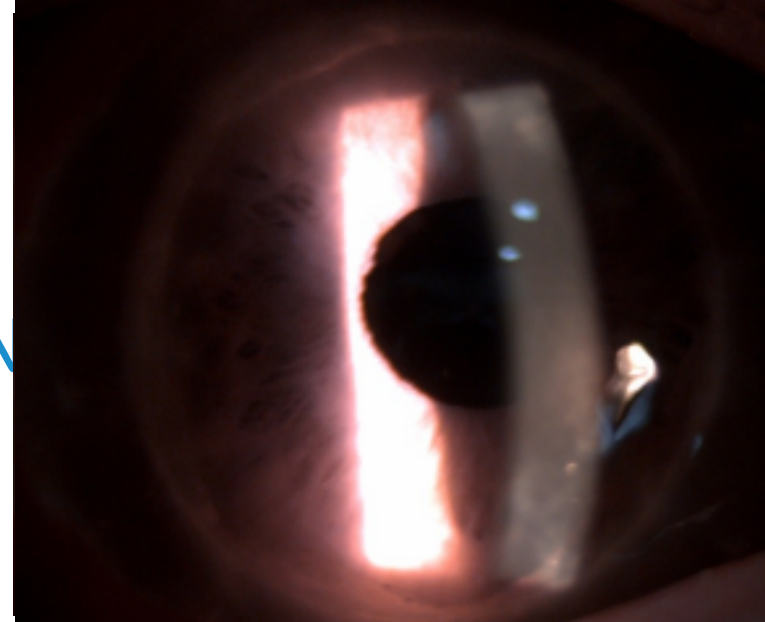
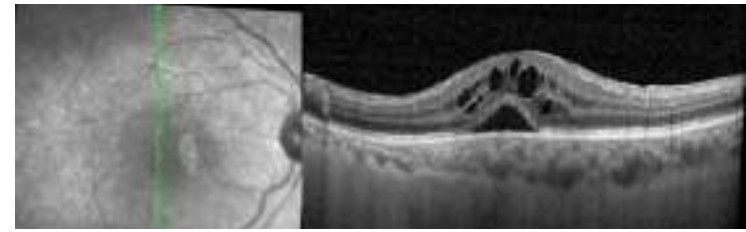
Left Eye

- Start topical triple treatment
- V/A 10/10 after 3/12
- Stable VA



Slit lamp and
OCT examination

Late endothelial rejection

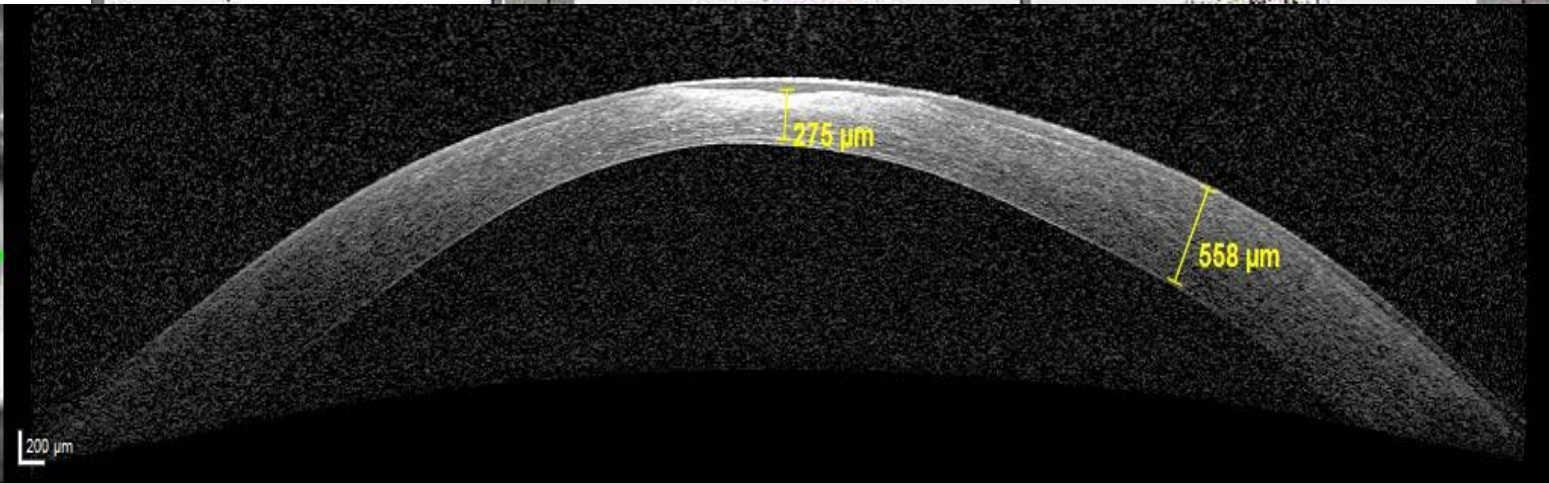


Follow the Rules

- 70 yo male
- Keratoconus and high myopia (>8 diopters each eye)
- 2011 – MYOPIC PRK WITH CXL (no data)
- VA drop , acute hydrops 6/12 ago



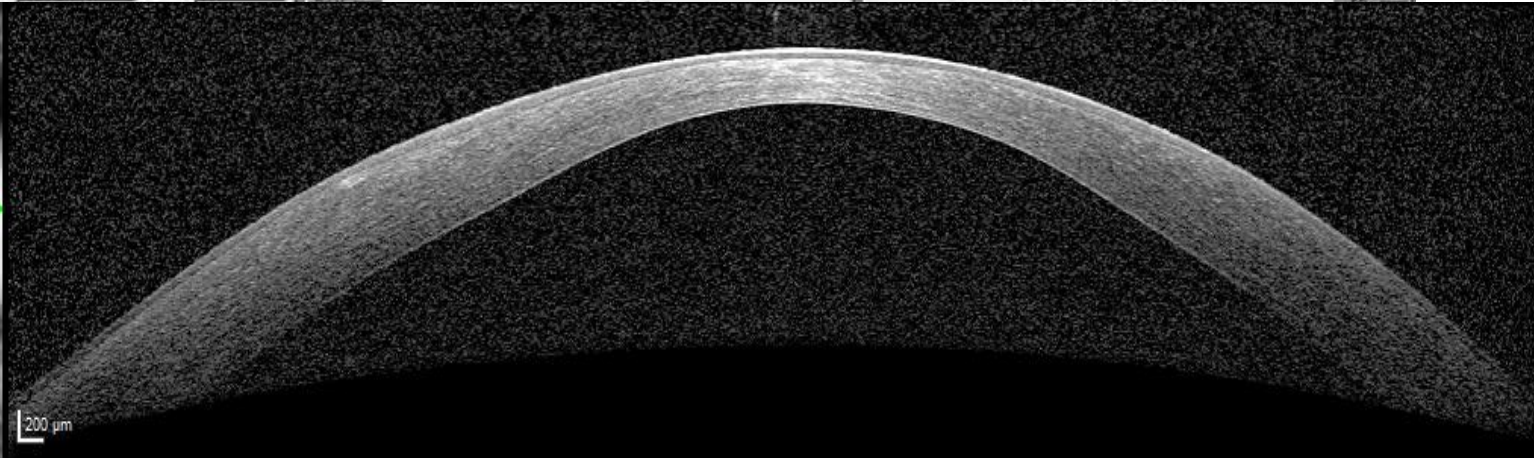
10 الطبعة الأولى: ٢٠١٩



IR&OCT 20° ART [HR] ART(7) Q: 26

Kilowatt Peak	4850	0.73	284		
Concave Volume	37.9 m ³	8.60m	115m		
Convex Volume	161 m ³	Angle	70.2°		
A.L. Depth (m)	17.5 mm	Map Size	240mm		
Brain OP/DP Scale	90 mm/s	Low Th.			

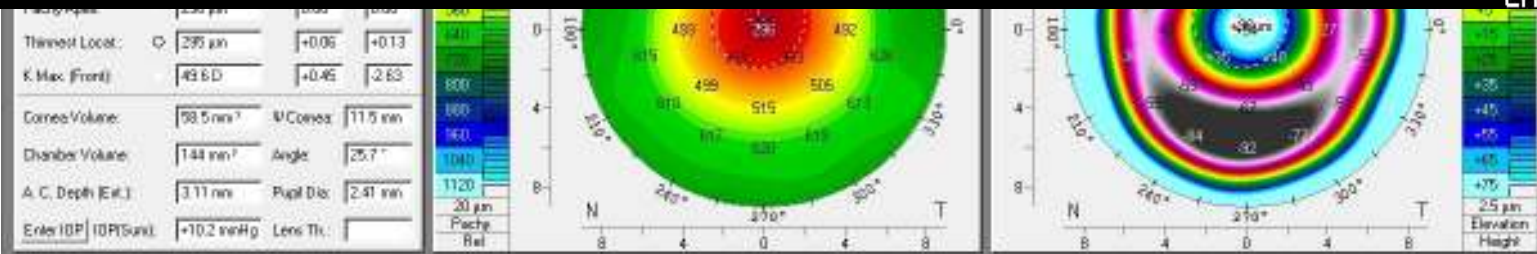
ID:		910	Avail / Sagittal Curvature (Front)	Elevation (Front)	75
		010		BFS=7.46 Flare Dia=0.00	00



IR&OCT 20° ART [HR] ART(8) Q: 27



HEIDELBERG
ENGINEERING



- 1,2 % PROGRESSION OF KC AFTER PRK-CXL
ACCORDING TO ATHENS PROTOCOL

Author, Year	Patients	Improvement BCVA $\geq$ 1 Snellen line	No Change BCVA	Loss BCVA
Koller T, 2009 (55)	105	NR	NR	2.9% (95% CI 0.6% - 8.5%) $\geq$ 2 Snellen line
Agrawal V, 2009 (49)	37	20 (54%)	10 (28%) Lines Not defined	NR
Arbelaez M, 2009 (50)	20	12 (60%)	8 (40%) Lines Not defined	–
Doors M, 2009 (52)	20	10 (50%)	5 (25%) Lines Not defined	NR
El-Raggal T, 2009 (53)	15	4 (27%)	NR	1 (7%) 1 line
Ralskup-Wolf F, 2008 (6)	142	75 (53%)	29 (20%) Lines Not defined	NR
Hersch P, 2011 (47)	49	22 (45%)	23 (46%) Within 1 Snellen line	4 (10%) 1 Snellen line
Wollensak G, 2003 (7)	22	11 (50%)	9 (41%) Within 1 Snellen line	2 (9%) $\geq$ 1 Snellen line
Range 27%		27% – 60%	20% – 46%	2.9% – 10%

Complication and failure rates after corneal crosslinking

Tobias Koller, MD, Michael Niedenz, PhD, Thorsten Seiler, MD, PhD



PRK Xtra

- Pre op
 - RE -7.75 / -1.00 @ 50 10/10-2
 - LE -4.50 / -4.50 @ 165 8/10
- Bilateral PRK Xtra
- 1st year
 - RE +0.25 / -0.50 @ 150 10/10+2
 - LE +0.50 / -1.00 @ 135 9/10

Lost Market:

First Name:

ID:

Date of Birth:

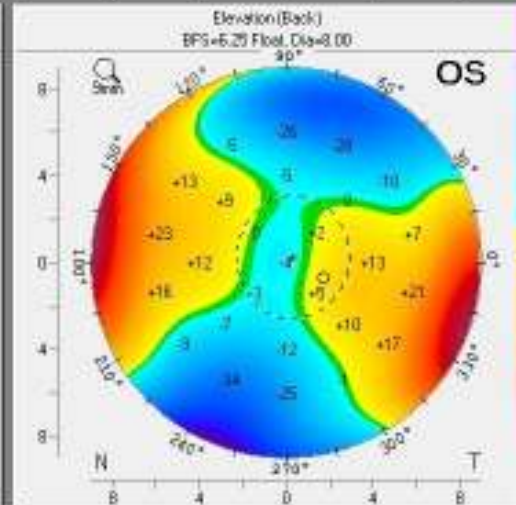
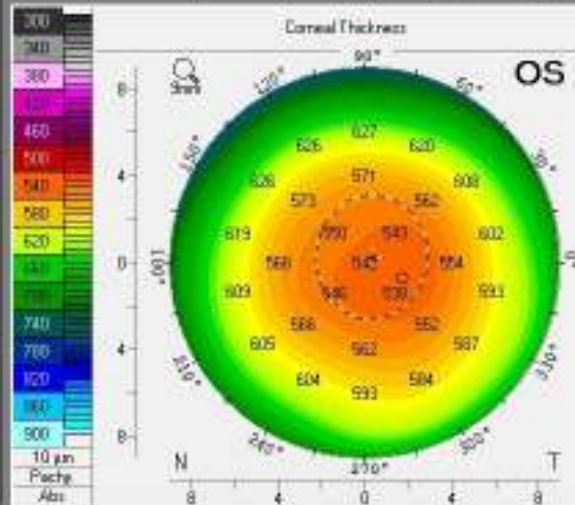
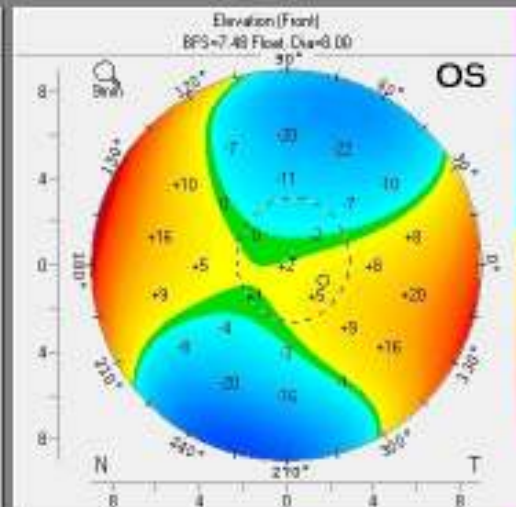
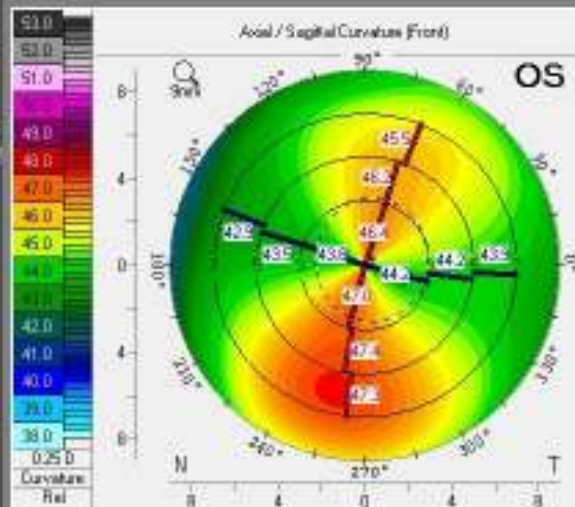
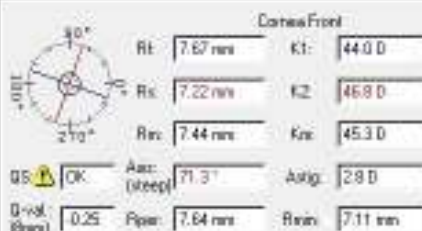
Exam Date:

12/03/2014

Time:

14:59:27

Exam Info:

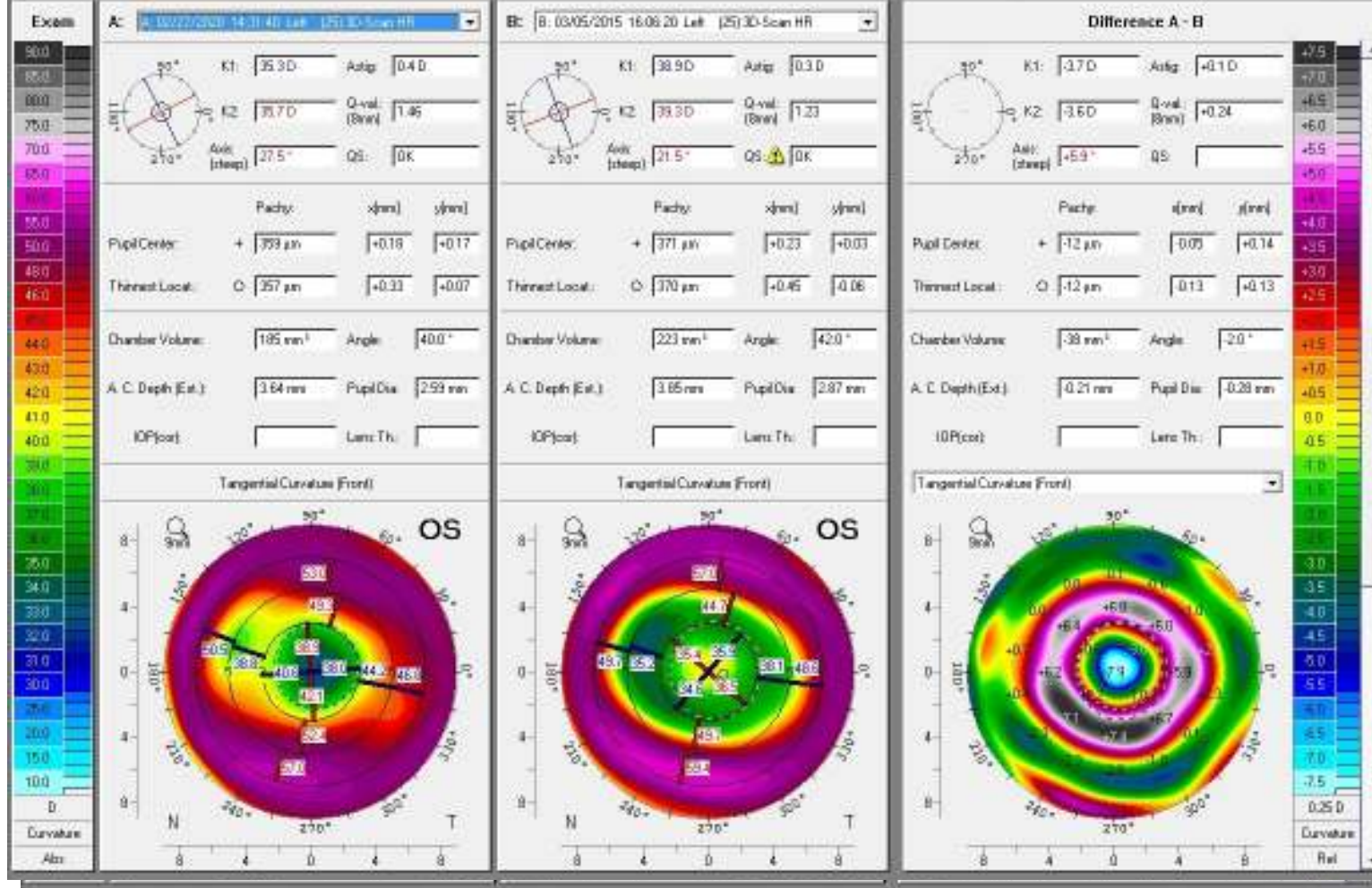


- 6th post op year

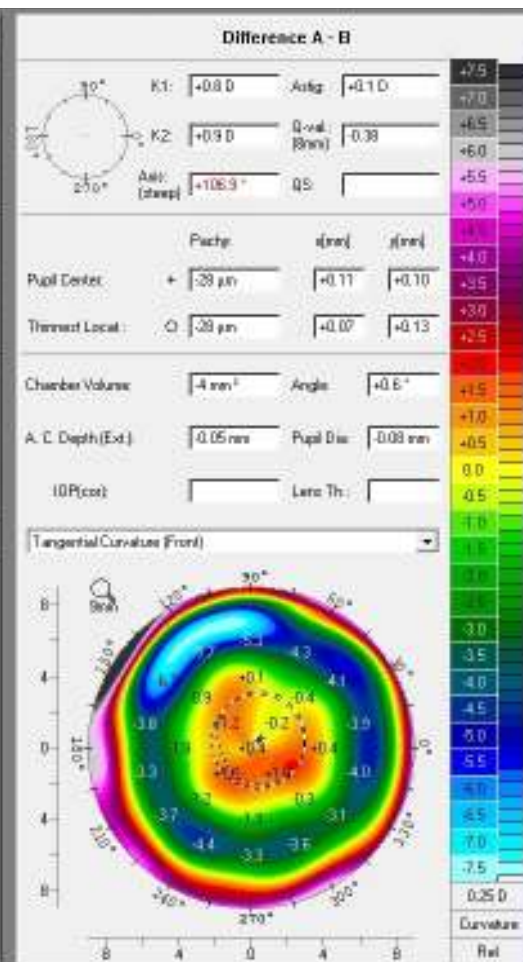
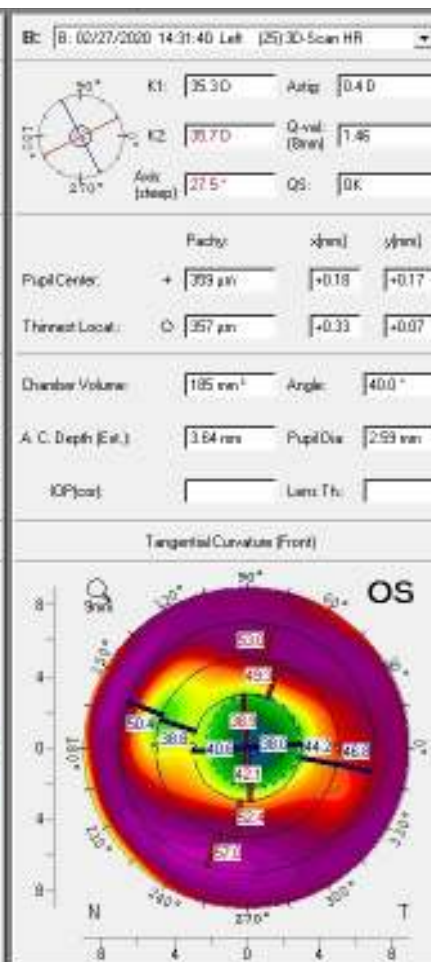
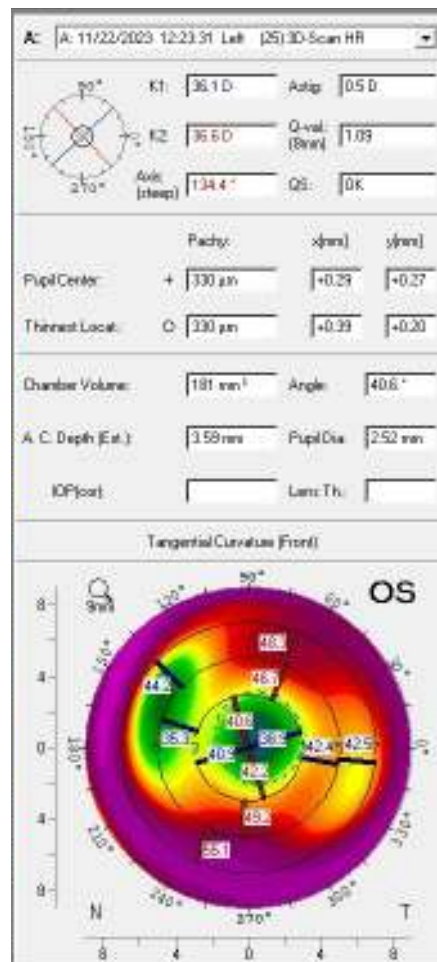
- RE +2.00/ -0.50 @ 105 7/10

- LE +3.50 / -1.00 @ 155 8/10

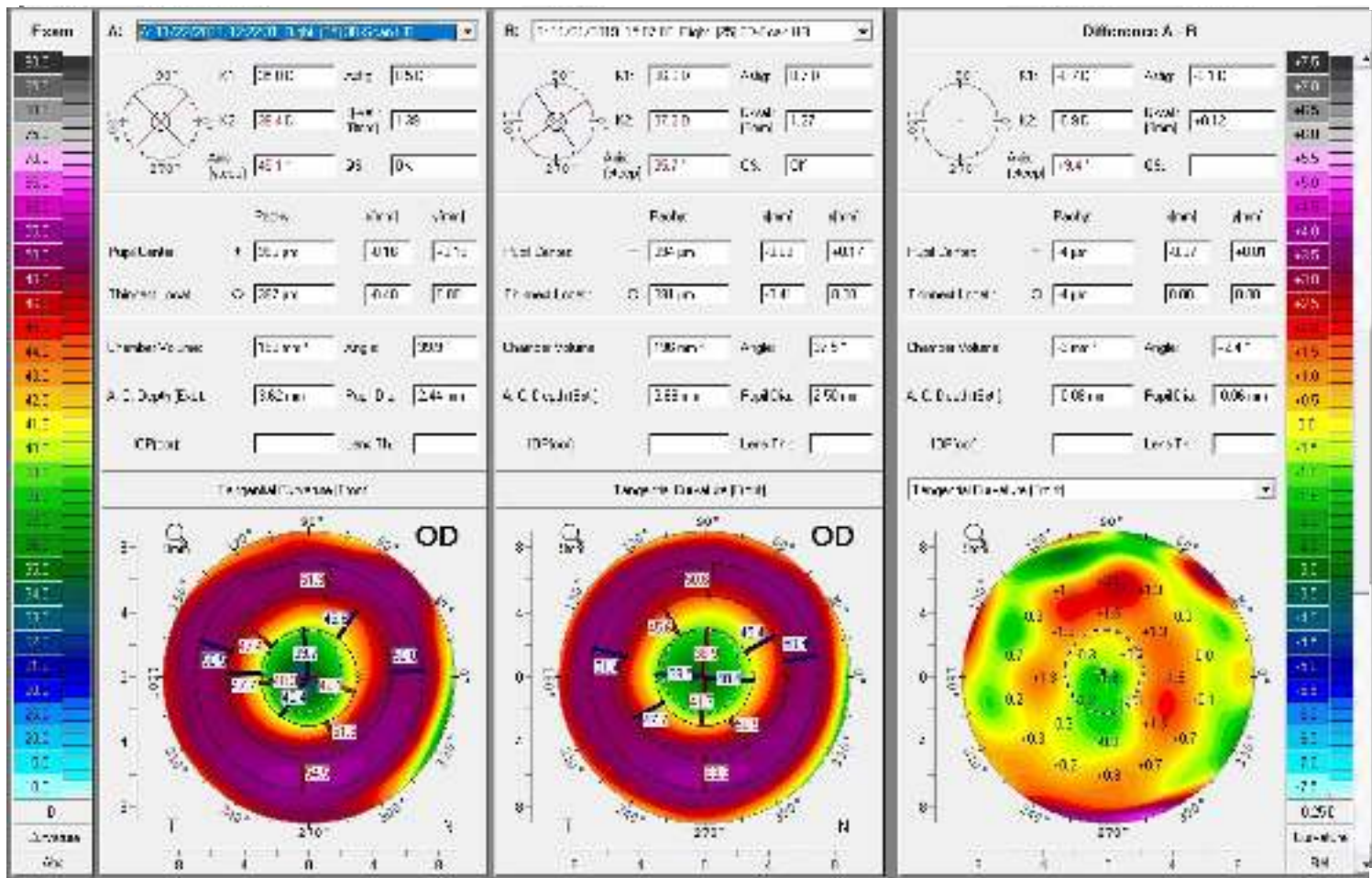
6th post
op year



- LE PRK retreat
 - 3 months post op
- +0.50 / -0.50 @ 105
9/10



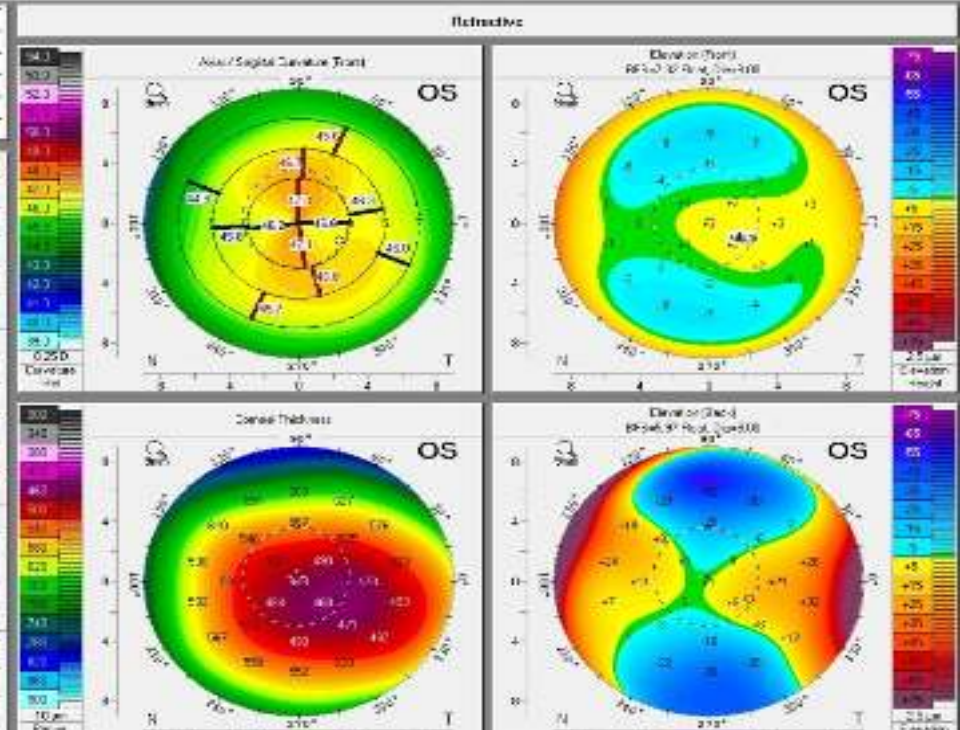
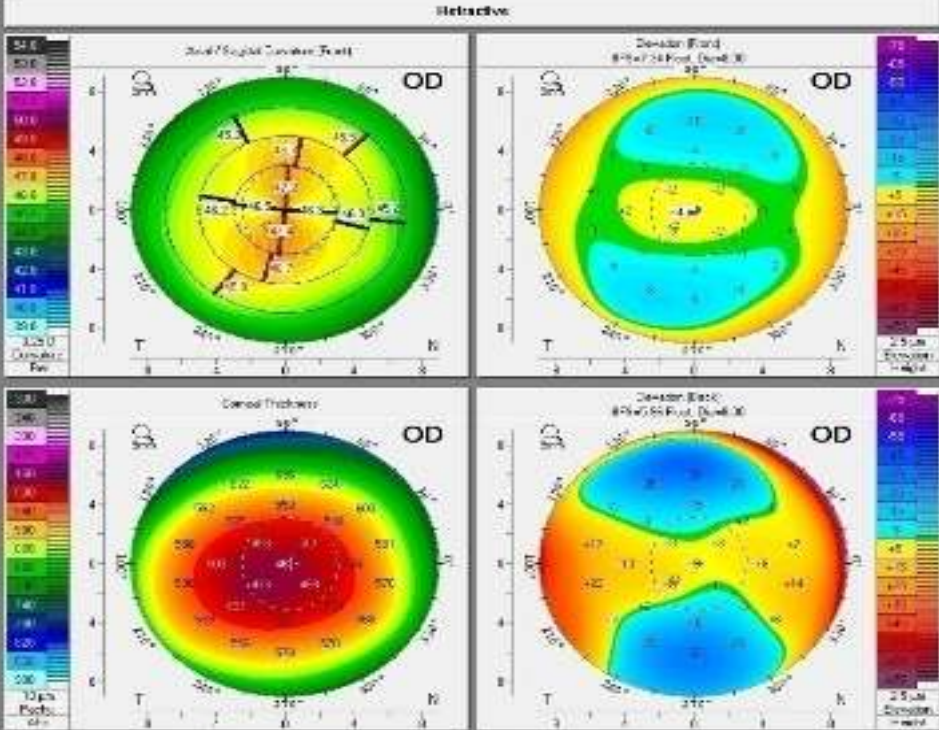
5-9th
post op
year OD





The devil is in the details



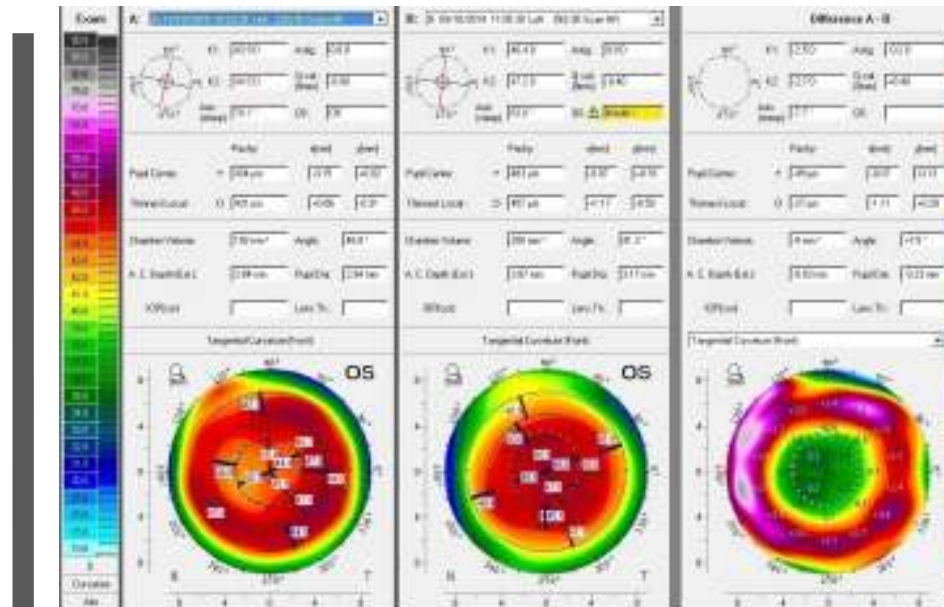
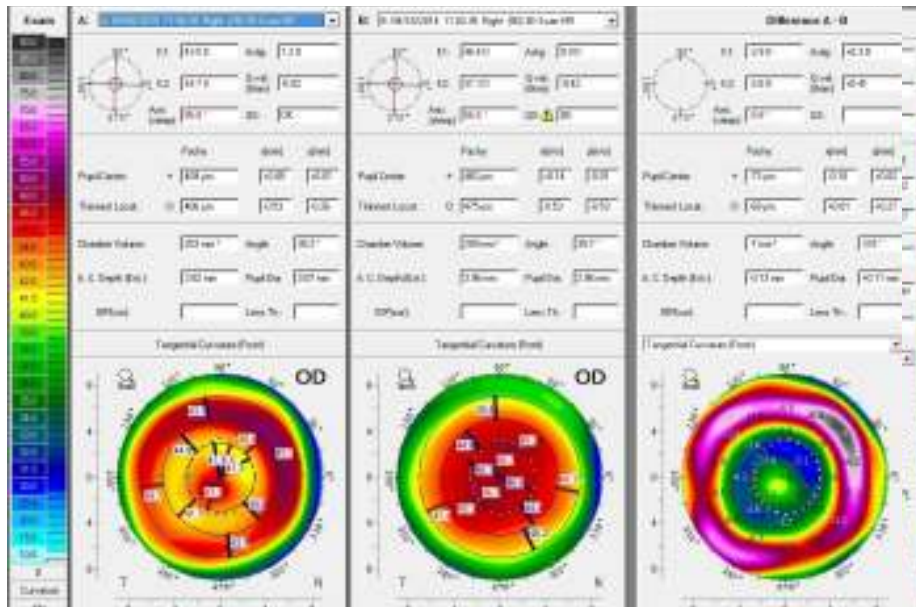


Bilateral PRK Xtra

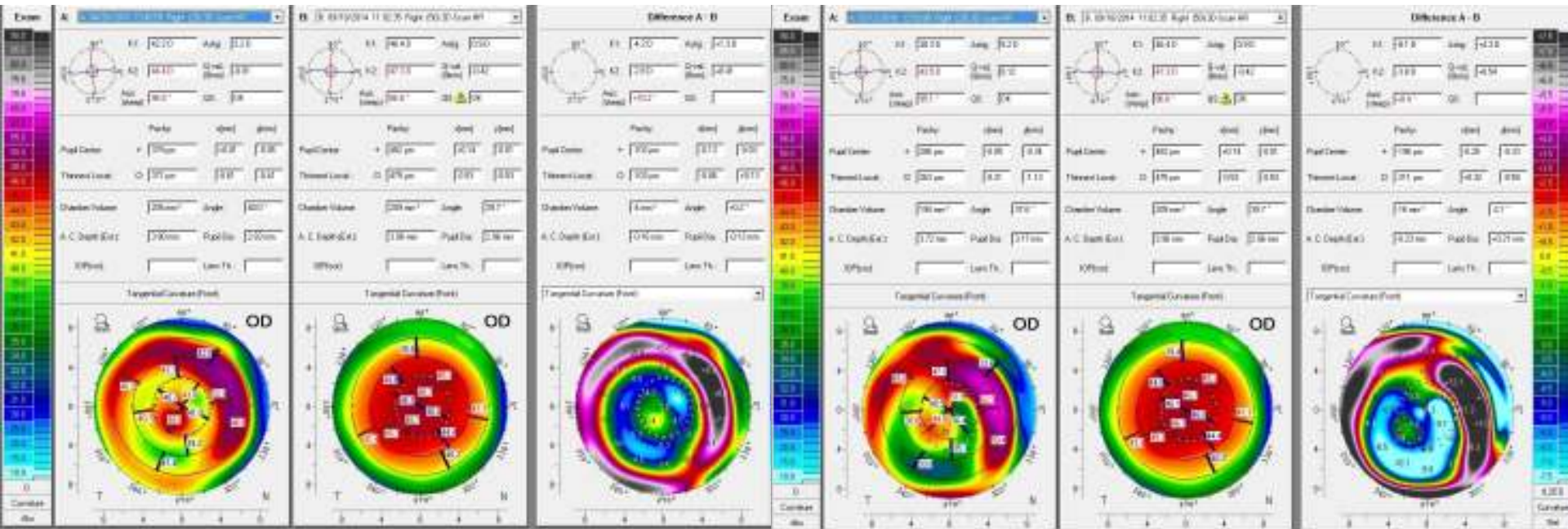
RE -3.00 /oz 6.50 / abl depth 55,52

RE -2.75 /oz 6.50 / abl depth 41,83

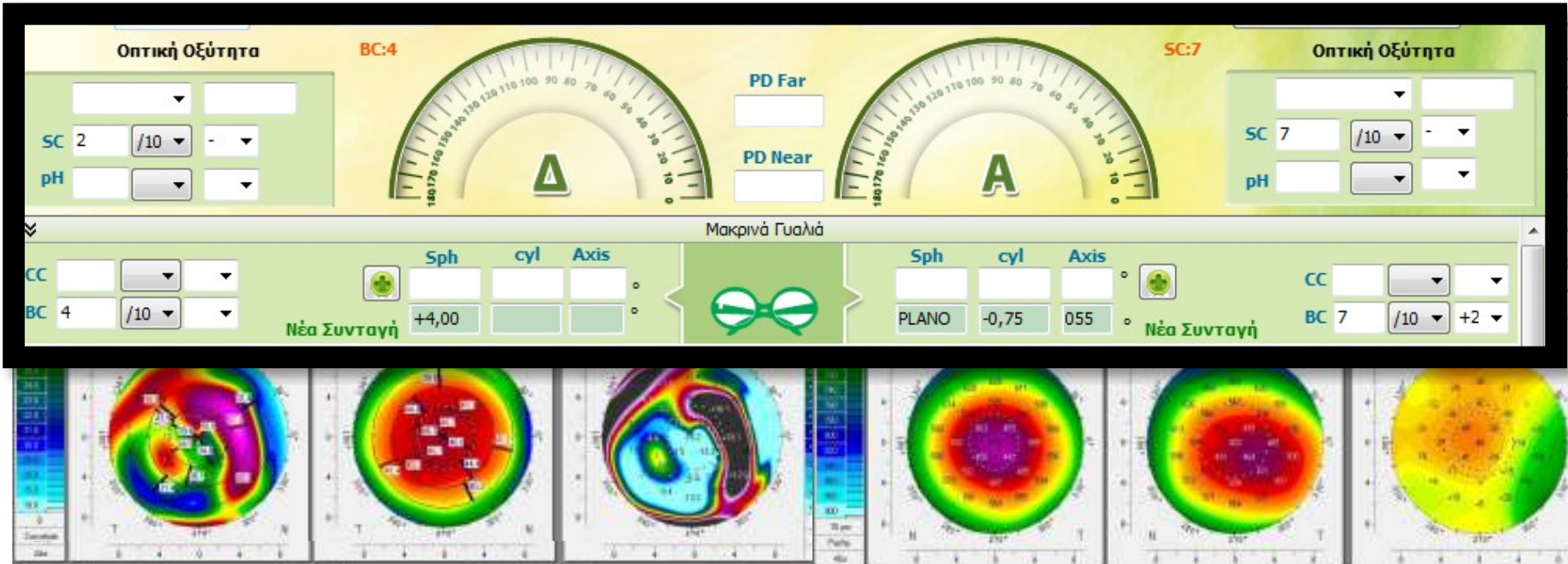
Pre and 1year post operative Pentacam



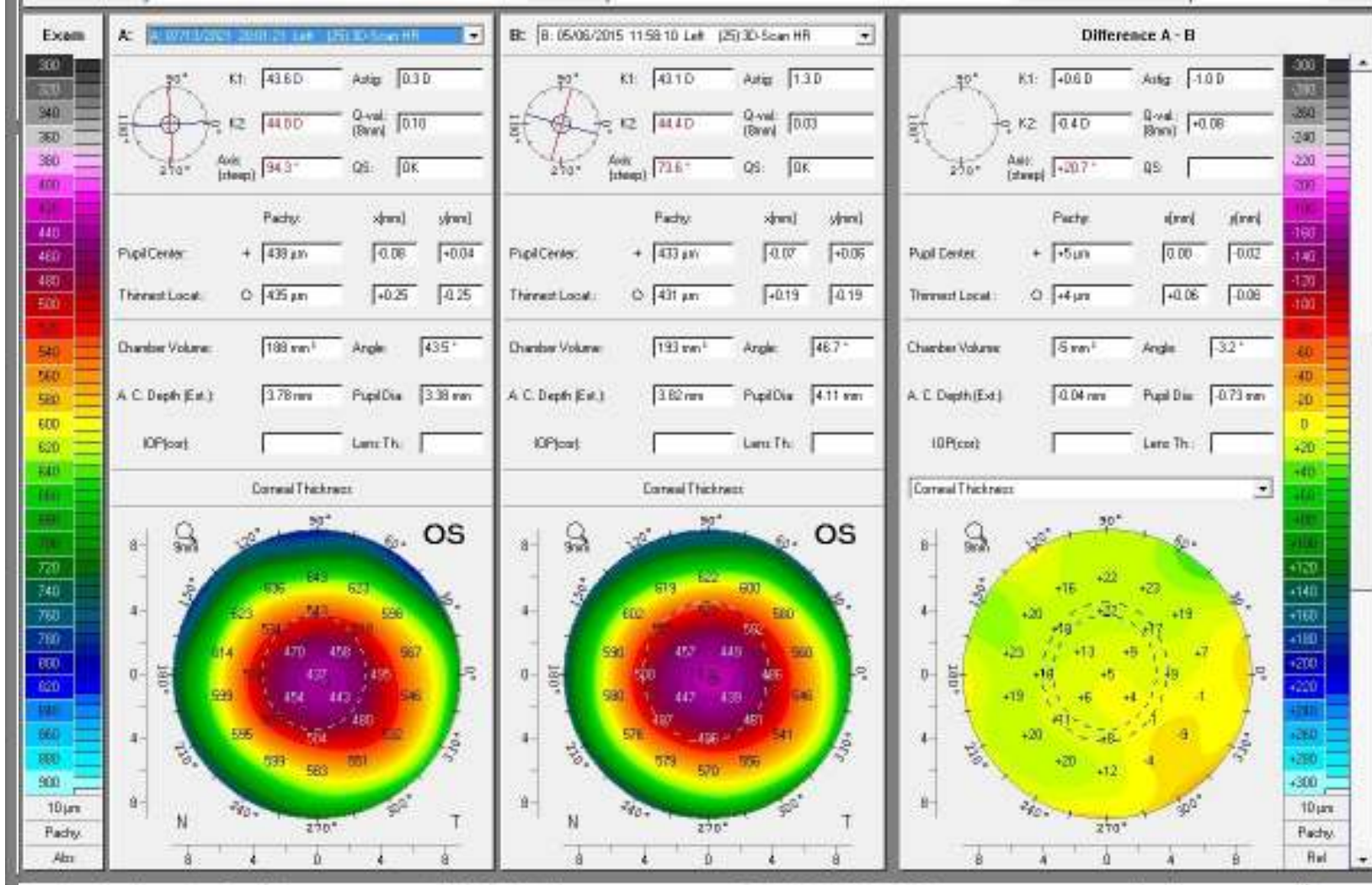
Right eye 2 to 4 years post operative



Right and left eye comparison 2 to 4 years post operative



REDALK

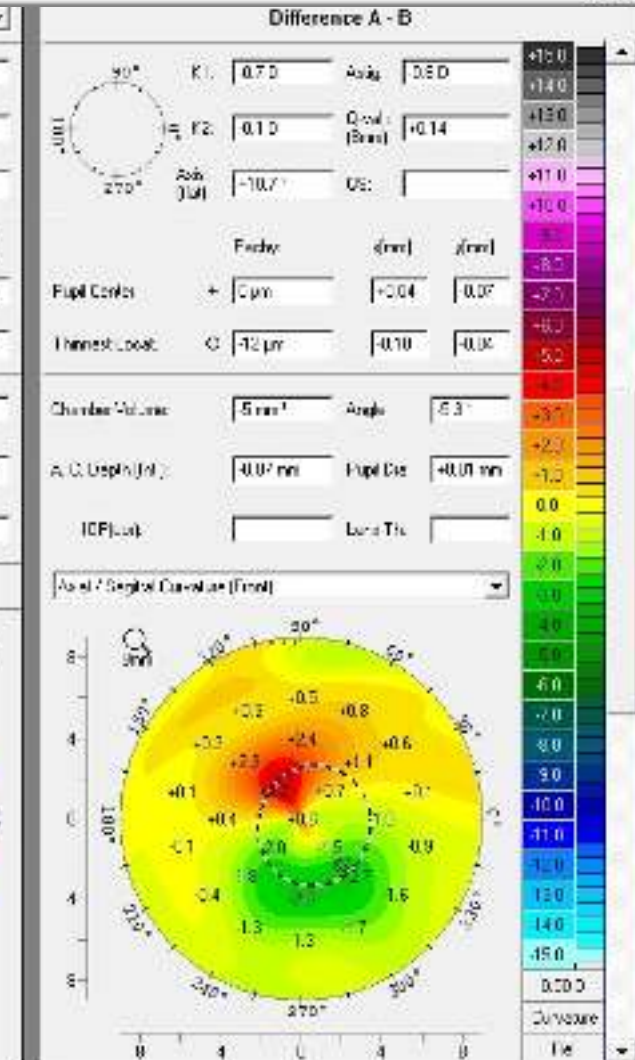
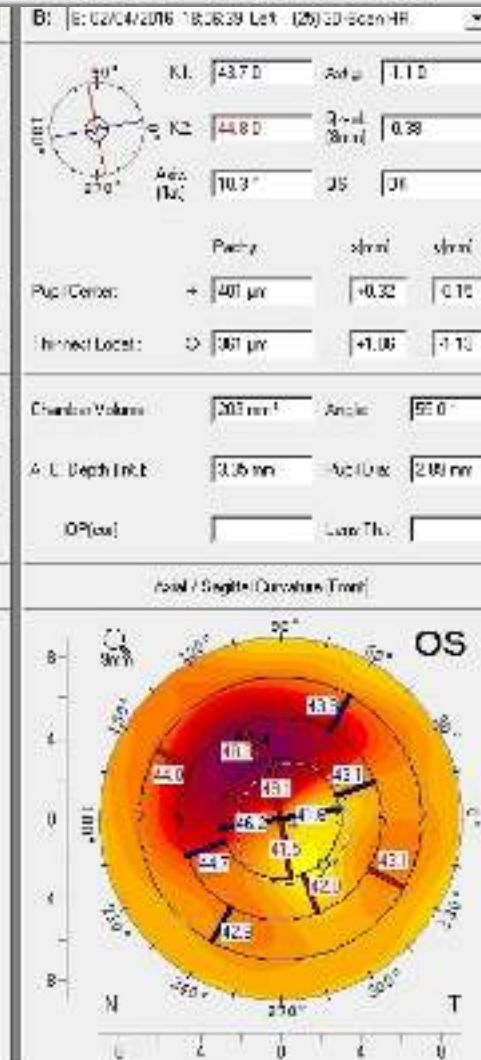
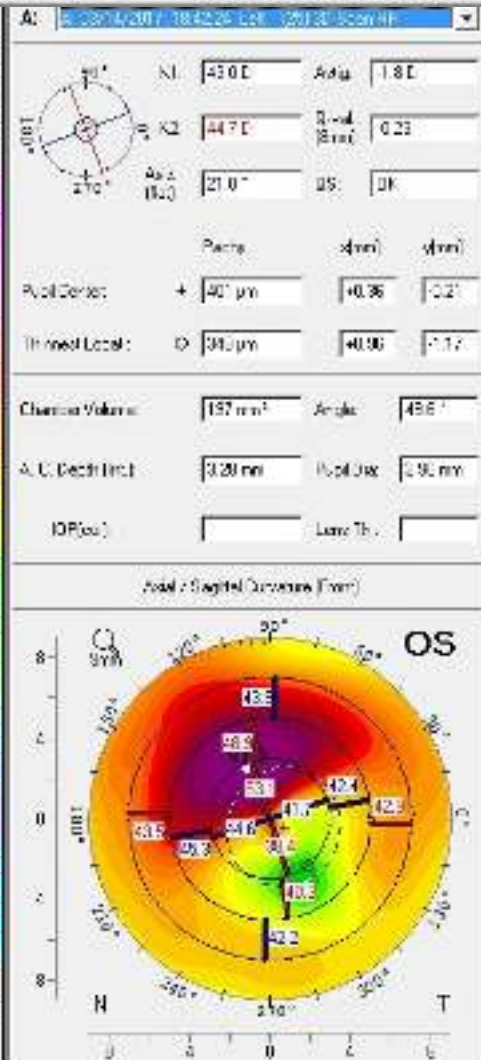
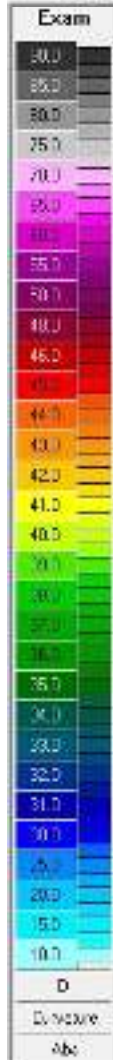




3 min accelerated CXL

- 2011
 - RE +1.25 /-2.50 60 7/10
 - CXL, Dresden protocol 30min
- 2012
 - LE 10/10
 - ACXL 3 min protocol

- 2017
 - RE +1.25/-0.25 @75 9/10
 - **LE +1.00 / -1.75 @20 9/10**
- 2021
 - RE +1.50/-1.50 @75 8/10
 - **LE +1.50 / -3.50 @20 5/10**



2nd
WKC
WORLD
KERATOCONUS
CONGRESS

12-14
June
2025

Athens Congress Center
Athens
GREECE

www.wkcongress2025.com

29th ESCRS WINTER MEETING
ATHENS
MEGARON - ATHENS, GREECE
28 FEBRUARY - 02 MARCH 2025

Website: www.esprs.org | Email: info@esprs.org | Facebook: www.facebook.com/esprs | Twitter: [www.twitter.com/esprs](https://twitter.com/esprs) | LinkedIn: www.linkedin.com/company/esprs | Instagram: www.instagram.com/esprs



43rd CONGRESS OF THE ESCRS
COPENHAGEN
12-16 SEPTEMBER 2025
Bella Center, Copenhagen - Denmark

