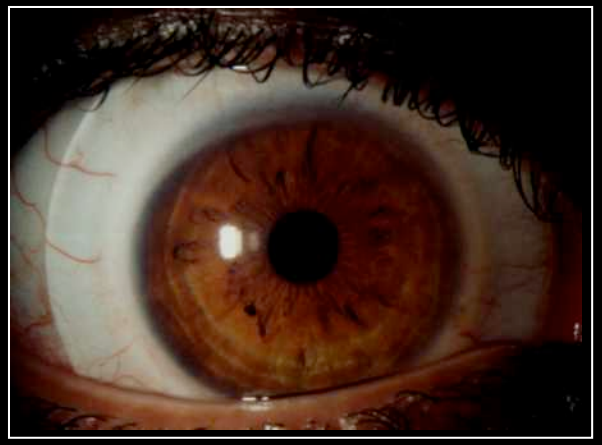


Scleral Lens Fitting and Troubleshooting

Buddy Russell, COMT, FCLSA, FSLS, LDO

Scleral Lenses

- Originally, glass scleral contact lenses were made by very skilled glass blowers at the end of the 19th century.
- Feinbloom and Obrig pioneered PMMA for manufacturing scleral lenses in 1938.
- They were fitted in England by Dallos from 1938 until early 1970.

History of Therapeutic CL

The story of therapeutic lenses began in Wiesbaden, Germany, in 1887 when master glass blower and prosthetic eye maker Frederick A. Muller were asked to fabricate a protective glass shell for a patient with severe exposure following removal of a malignant lid tumor. The patient continued to wear the glass shell successfully until his death 21 years later.

Scleral Lens Indications

Refractive Errors

- Irregular astigmatism,
  Post trauma, PK, KC,
  PRK, RK, LASIK
- Centration
- Lens stability

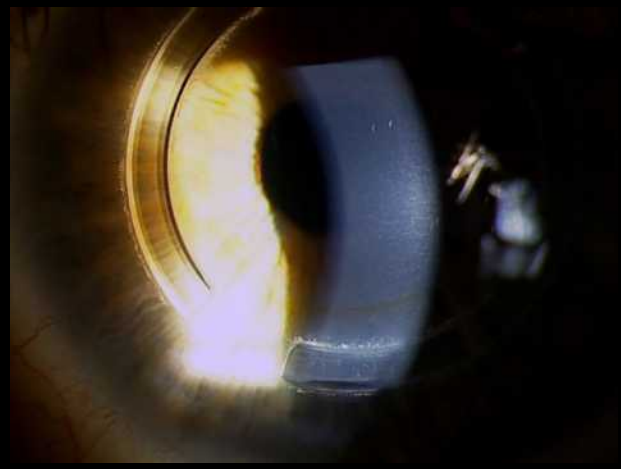
Therapeutic Indications

- Exposure, OSD
- Symblepharon management

Improvement in quality of life

Scleral Lens Indications
Refractive

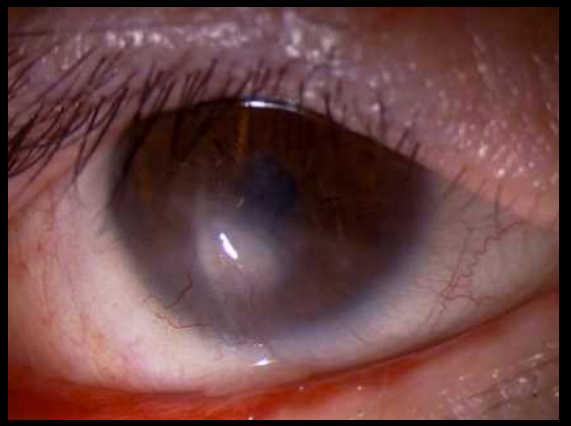
- Ectasias
  - Keratoconus
  - Pellucid marginal degeneration
- Post surgical
  - RK/AK/Hex-K
  - Lasik/Lasek/PRK
  - Penetrating keratoplasty
  - ICRS
- Scars
  - Salzmann's
  - Post trauma
- Other lens failures

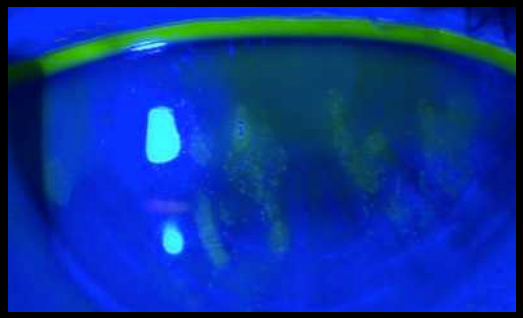


Scleral Lens Indications

Ocular surface disease

- Stevens Johnson Syndrome
- Ocular pemphigoid
- Kerato-conjunctivitis Sicca
- Sjogren's syndrome
- Graft-host disease
- Exposure keratitis





Scleral Lenses

- In the beginning…
- After that…

Ocular Impression Tools for Scleral Lens Fitting


DAC

Early GP Scleral Lenses

- **Don Ezekial (Australia) first reported using GP sclerals in 1983**

  Gas Permeable Haptic Lenses. J BR Contact Lens Assoc. 1983;6:158-161.

- **Ken Pullium (UK) developed GP scleral lenses from impressions**

  A Study of 530 patients referred for rigid gas permeable Scleral Contact Lens Assessment. Cornea. 1997;16:612-622

- **Later, Polymer Technology developed the raw material used to produce scleral GP lenses**

  Rosenthal. Fluid-ventilated, gas permeable contact lens to avoid keratoplasty. Eye & Contact Lens.2005;3:130-134.

Material Dk and Tear Thickness Impact on Oxygen Transmission

Predicted values of oxygen transmissibility (Fatt *Dk/t* units) under the center of scleral contact lenses with a *Dk* of 150.

Dk=150	Clearance (μm)	100	150	200	250	300	350	400
Lens thickness (μm)								
250		34.3	28.2	24.0	20.9	18.6	16.6	15.0
300		30.8	25.8	22.2	19.5	17.4	15.7	14.3
350		27.9	23.7	20.7	18.3	16.4	14.9	13.6
400		25.5	22.0	19.3	17.2	15.6	14.2	13.1
450		23.5	20.5	18.2	16.2	14.8	13.5	12.5
500		21.8	19.2	17.1	15.5	14.1	13.0	12.0

L Michaud et al Cont Lens Ant Eye 35(6) 2012

Lens Manufacturing

Newest Materials

Acuity 200 **DK = 200**

Contamac Infinite **DK = 200**

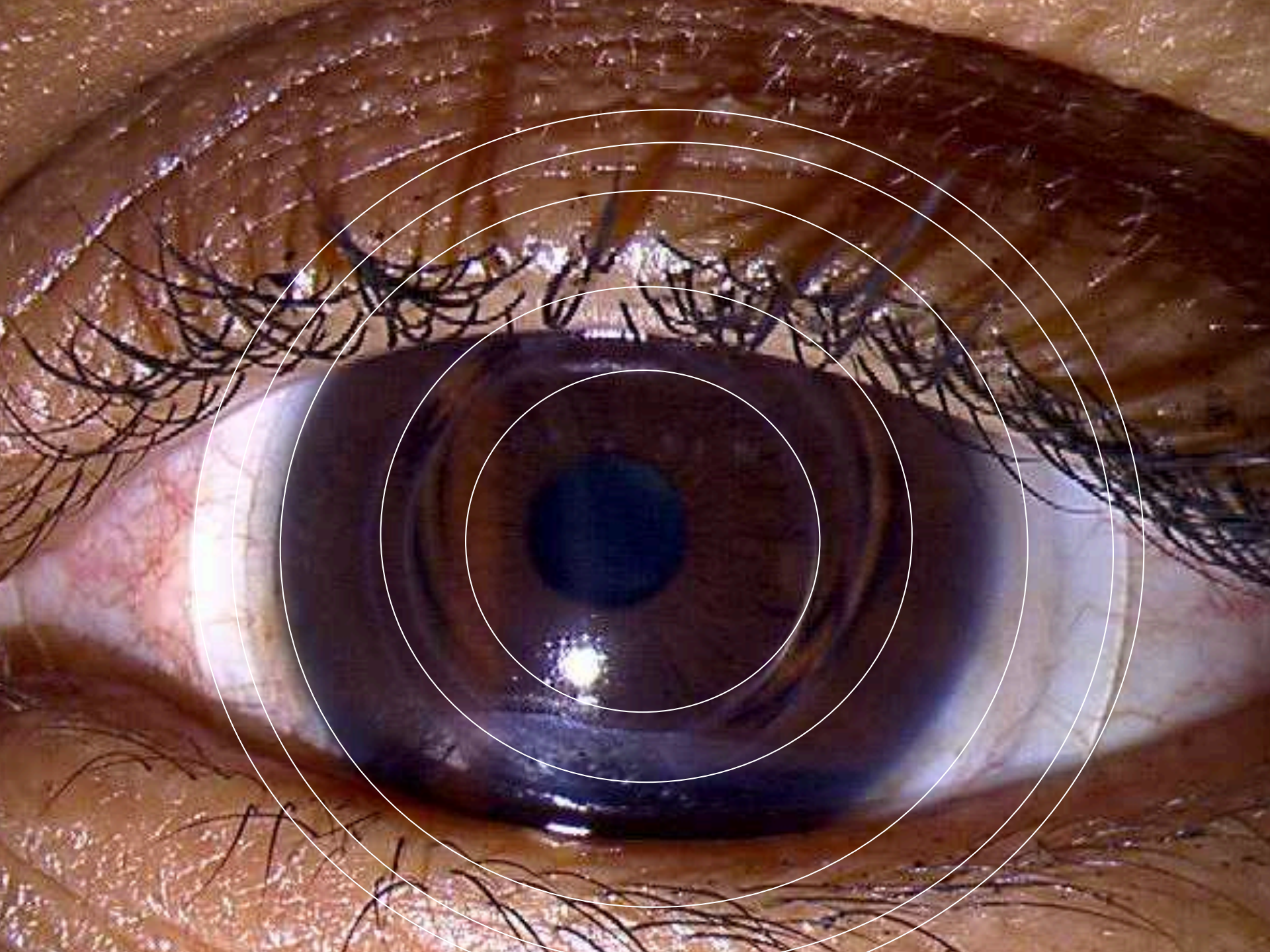
What Does That Mean?

200 DK

———

.35 CT

DK/T 57



Scleral Nomenclature

- Base curve
- Optic zone
- PC 1
- PC 2
- PC 3
- PC 4

- Central curvature of optic zone
- Width of BC / power

- Usually most width BC + PC 1 = corneal zone
- Limbal zone
- Scleral zone
- Edge zone

Scleral Nomenclature

Chamber size

OZ + PC 1 & PC 2

9.4 + (1.7 + .9) x 2

2.6 x 2 = 5.2

5.2 + 9.4 = **14.6**

Haptic size

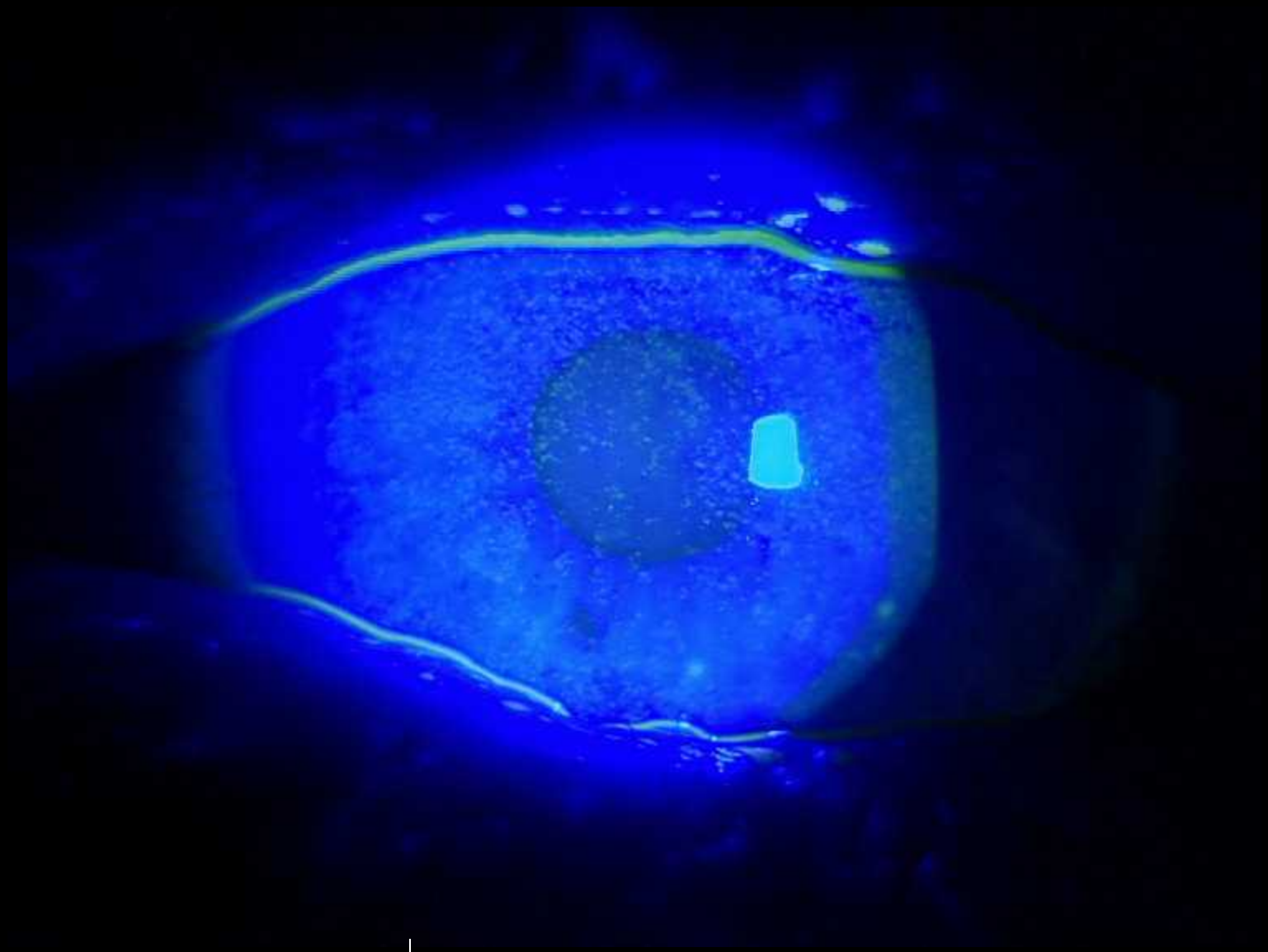
PC 3 + PC 4 x 2

.4 + .5 = .9

.9 x 2 = **1.8**

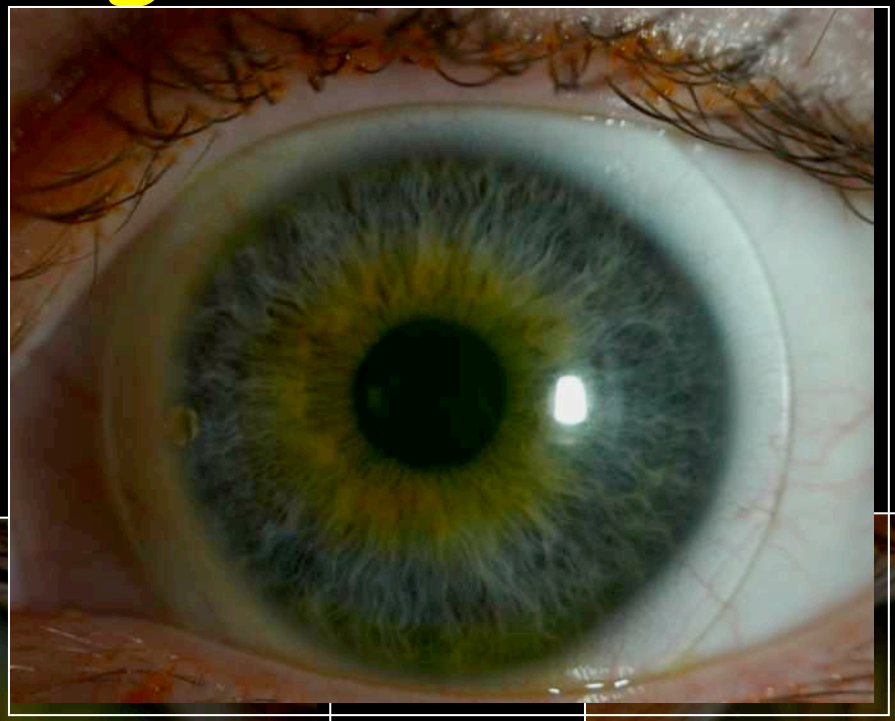
Total Diameter

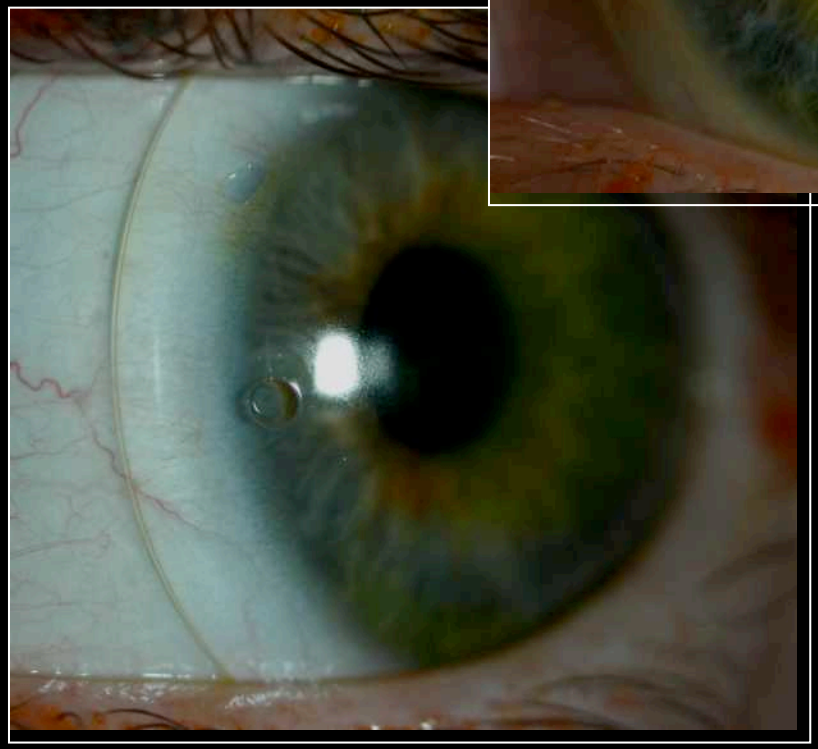
14.6 + 1.8 = **16.4**

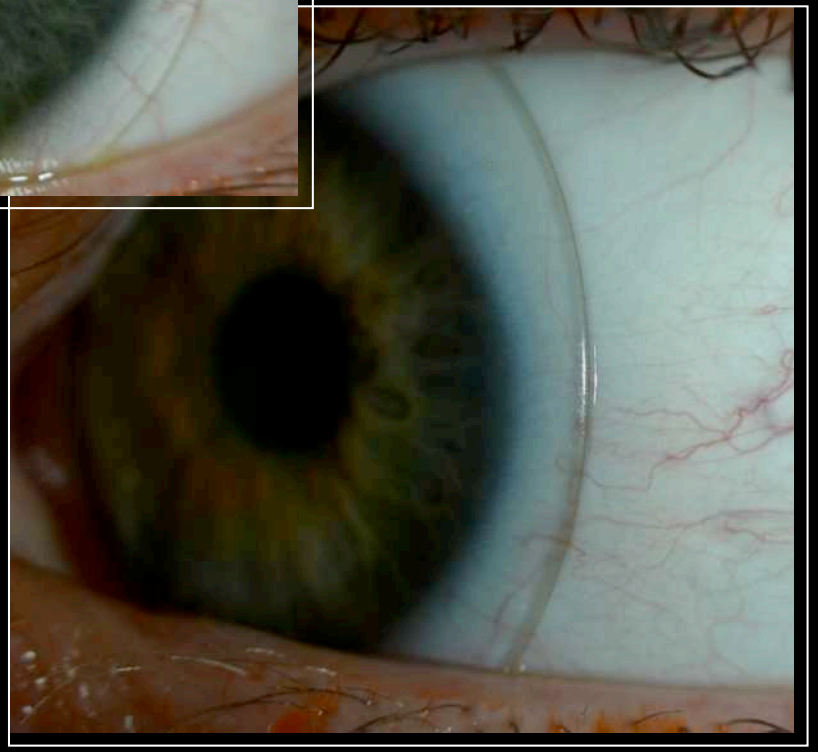


Subjective does not equal Objective

Fitting Scleral Designs



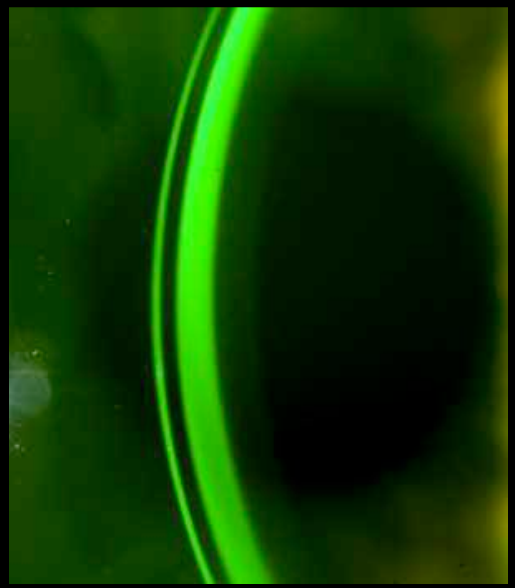


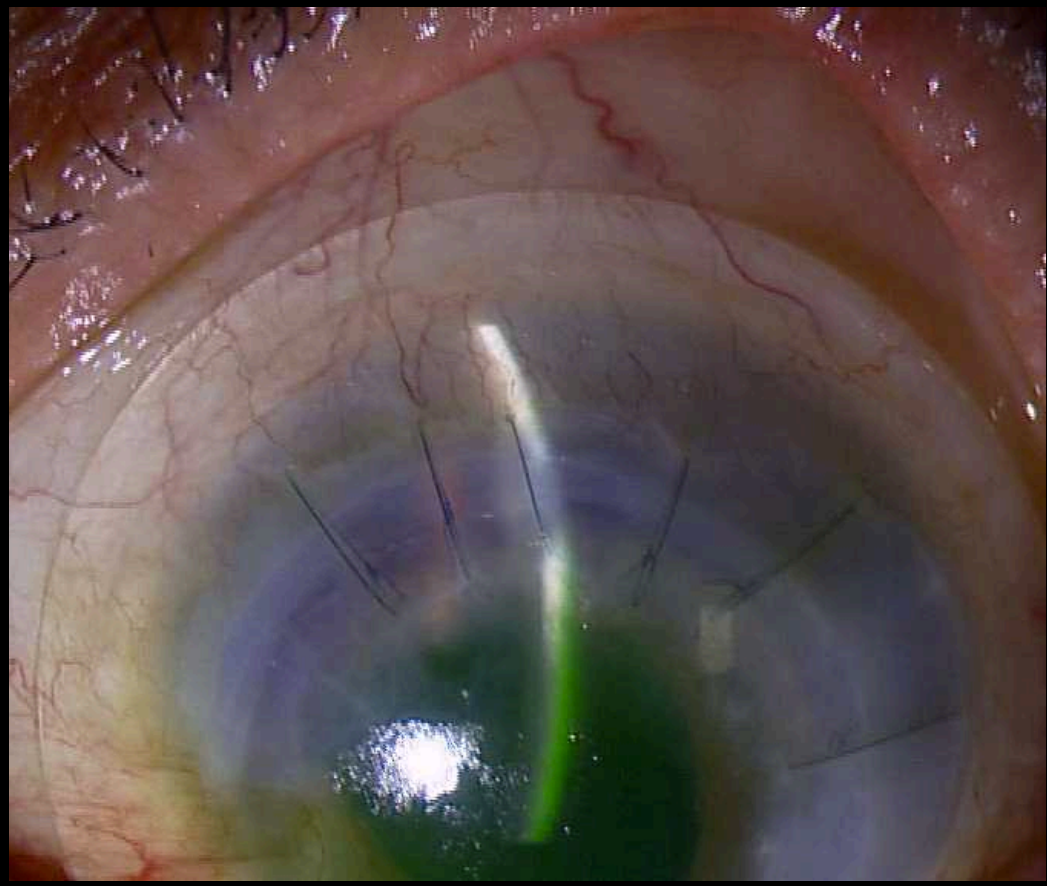


"Where do I start?"

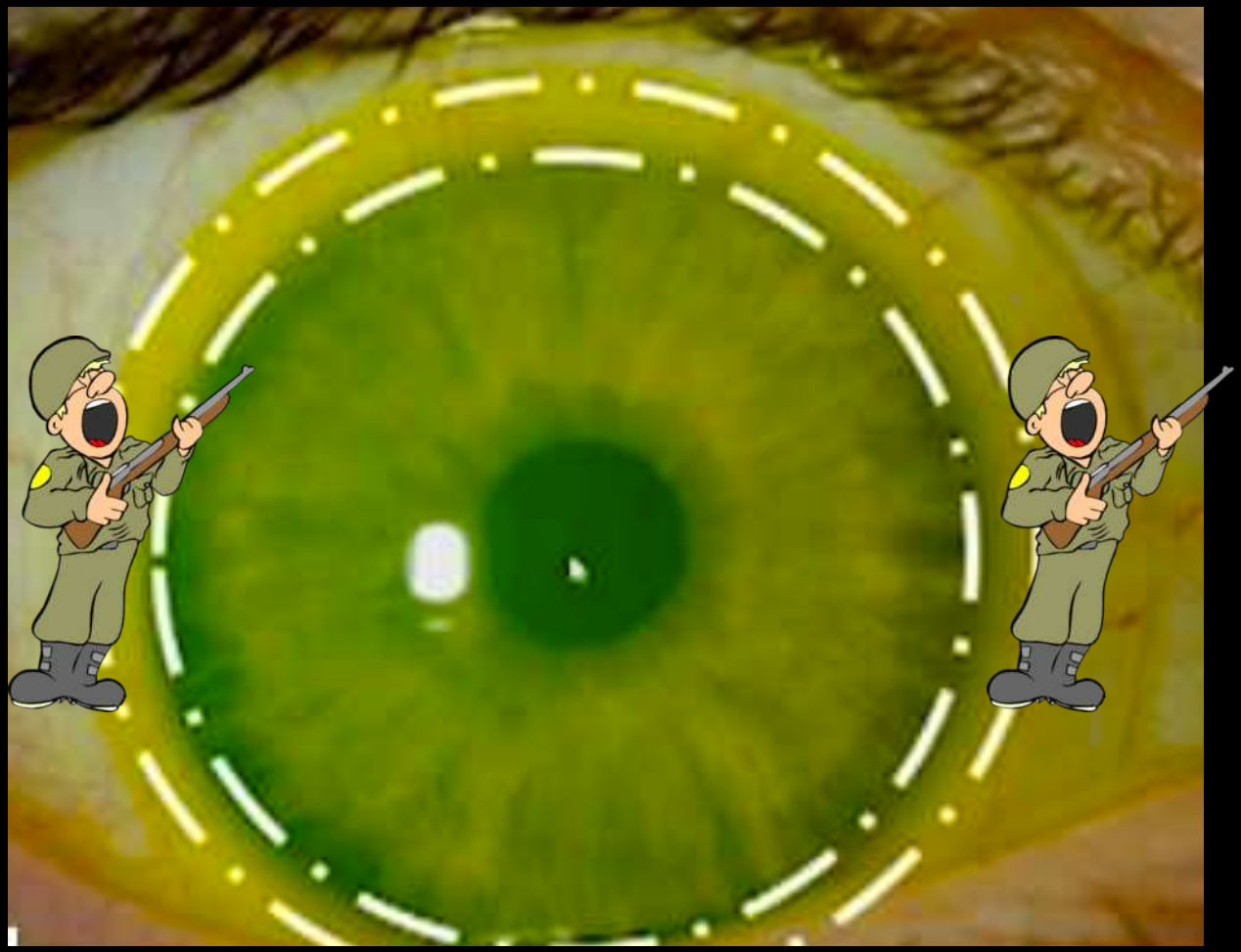
3 Decisions

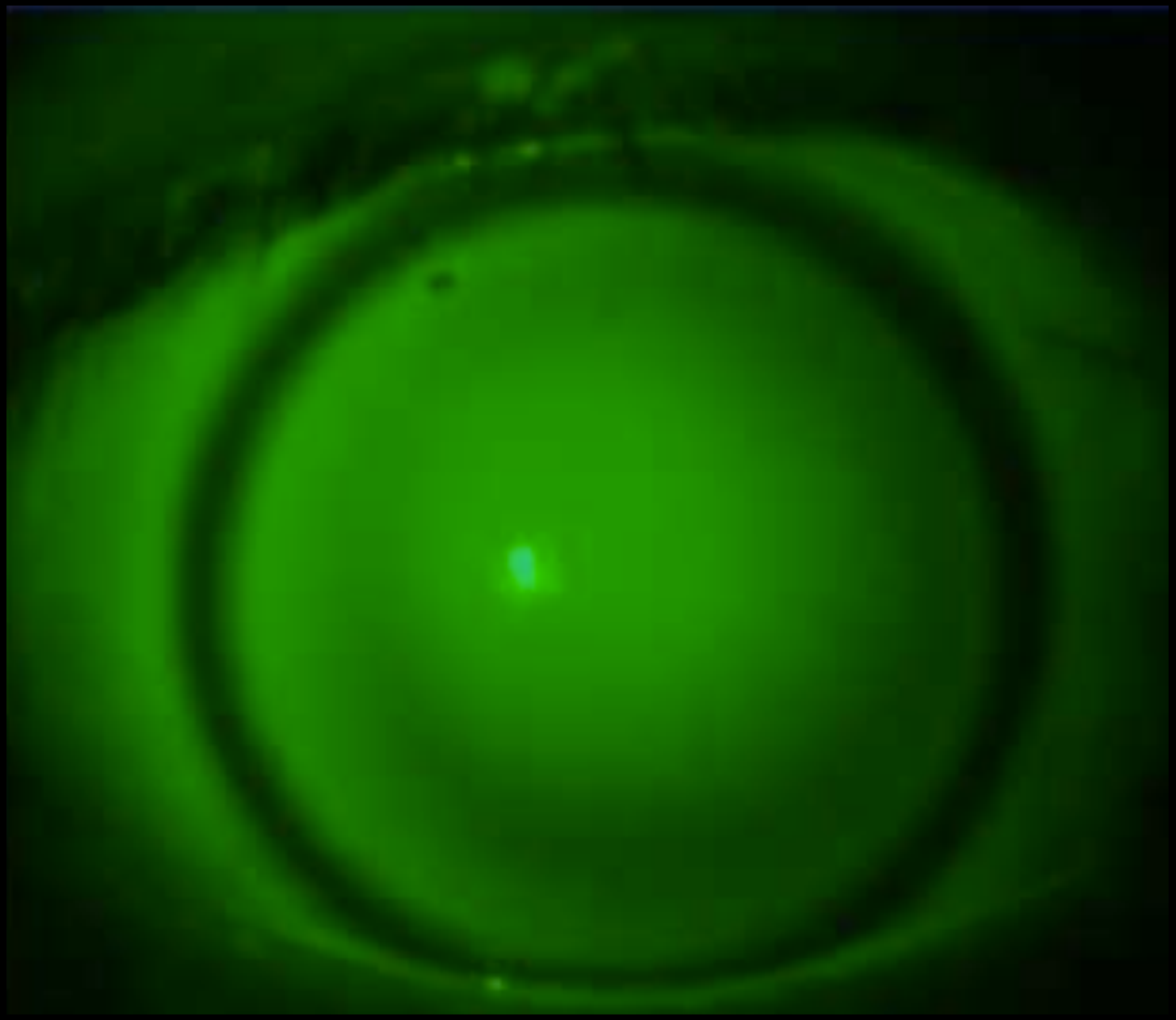
- How large?
- What depth?
- Align haptic



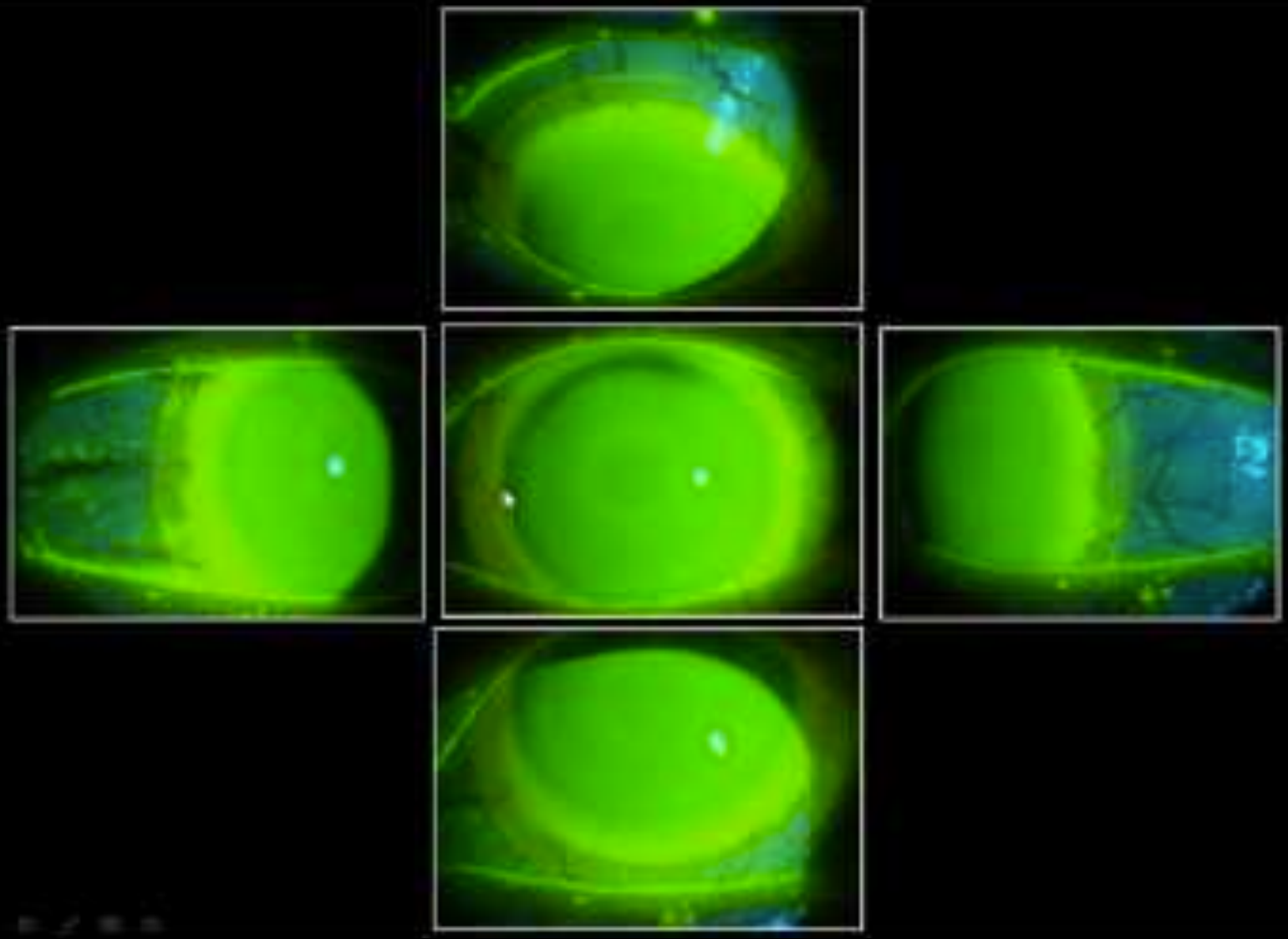


Protect the Limbus

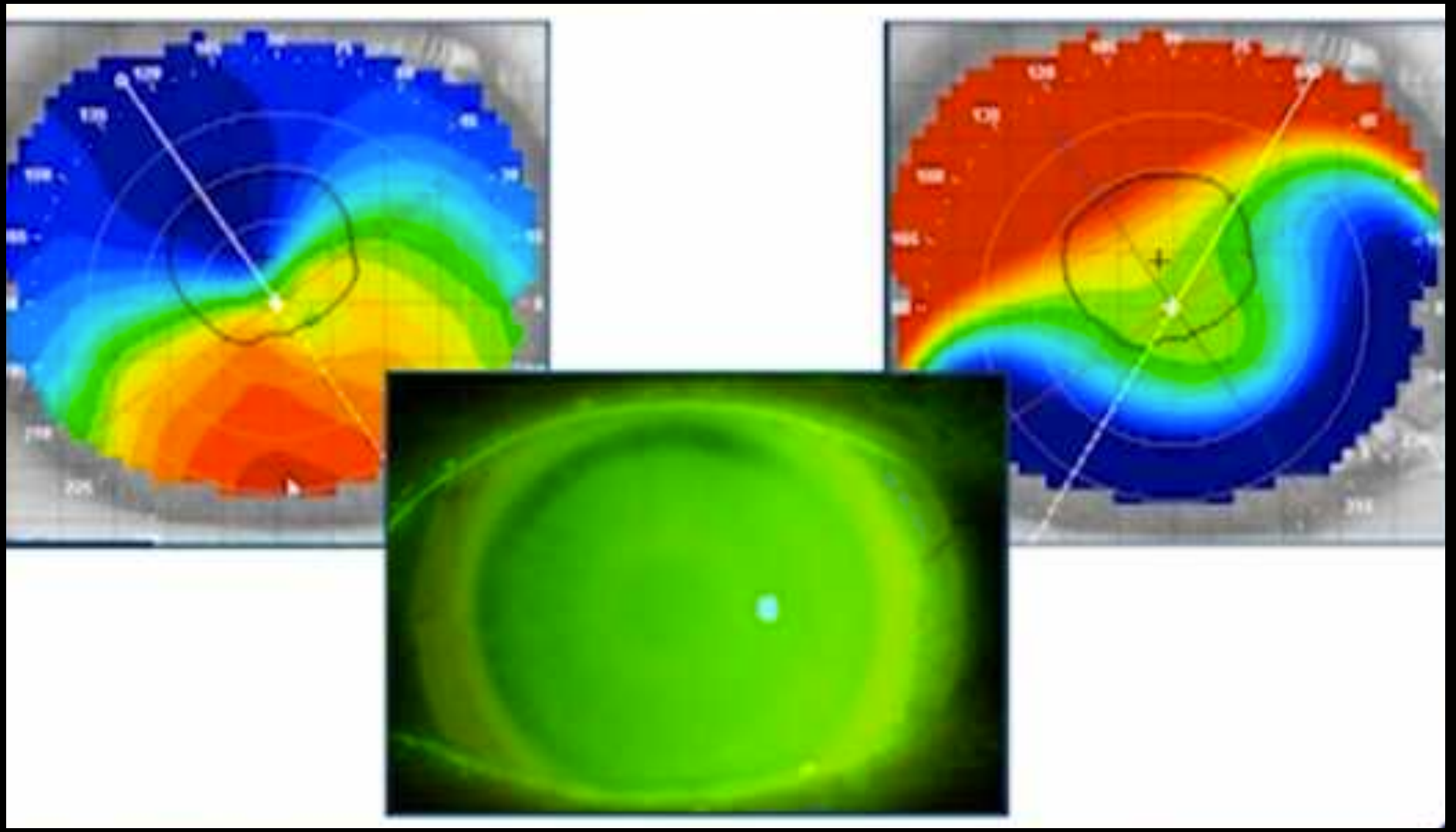




Check in All Gazes



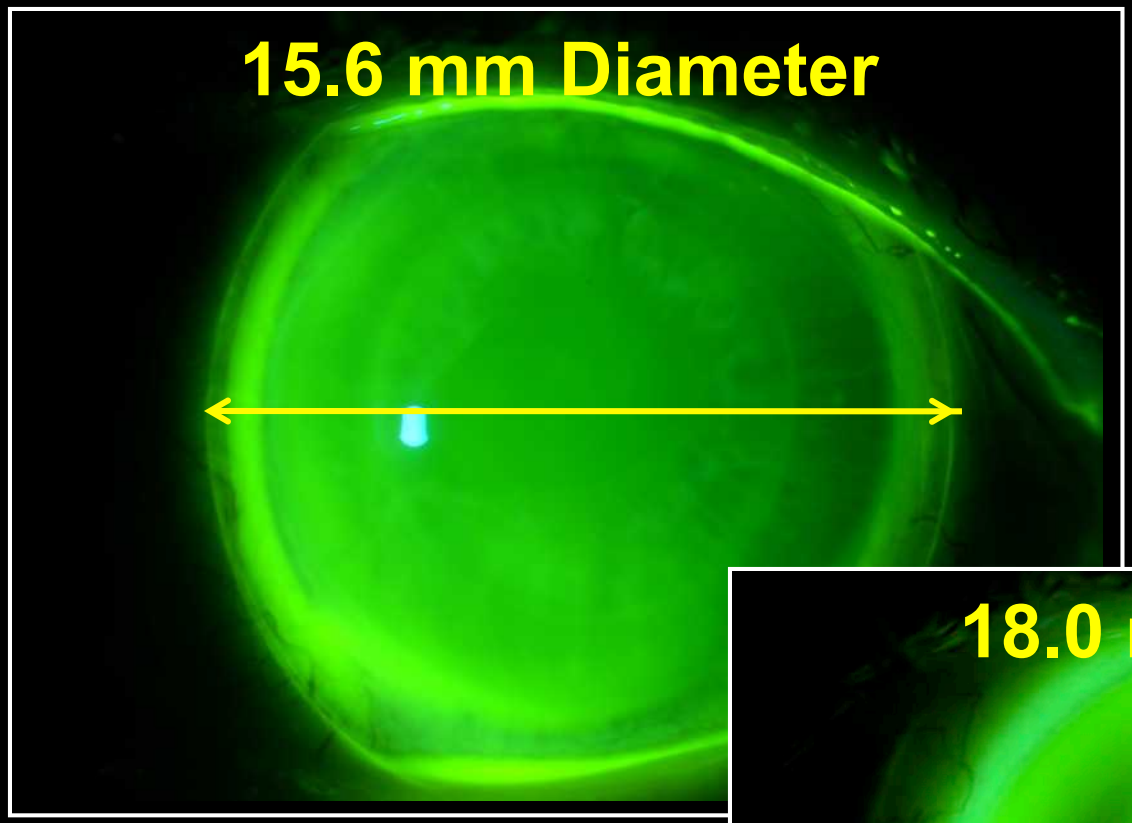
Elevation Display May Help



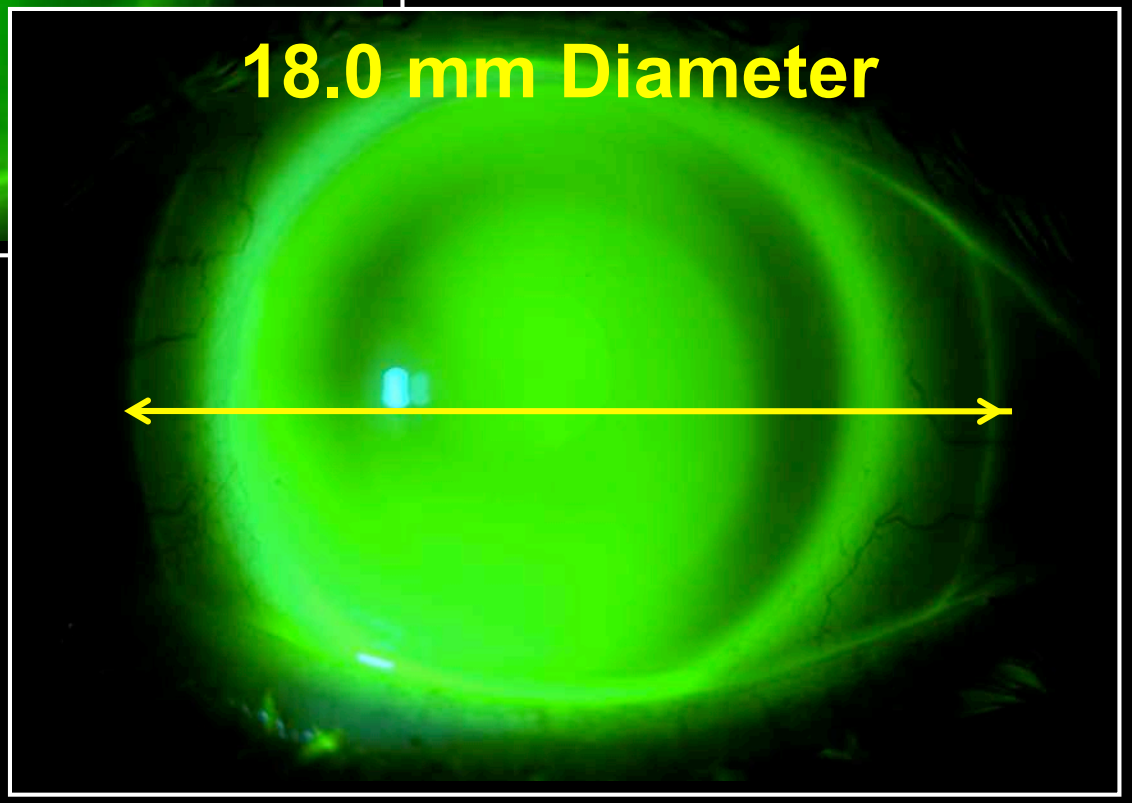

White Light


Cobalt Light


Limbus

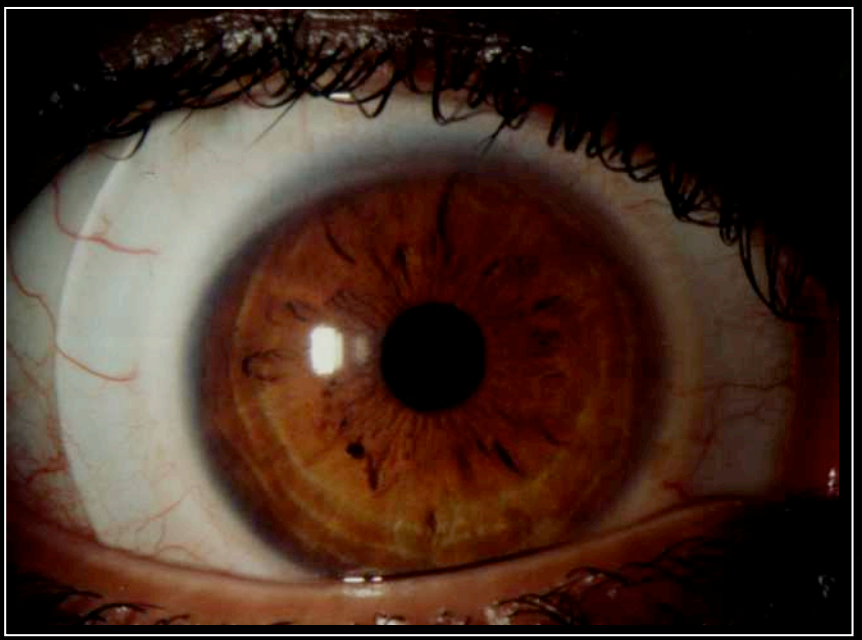


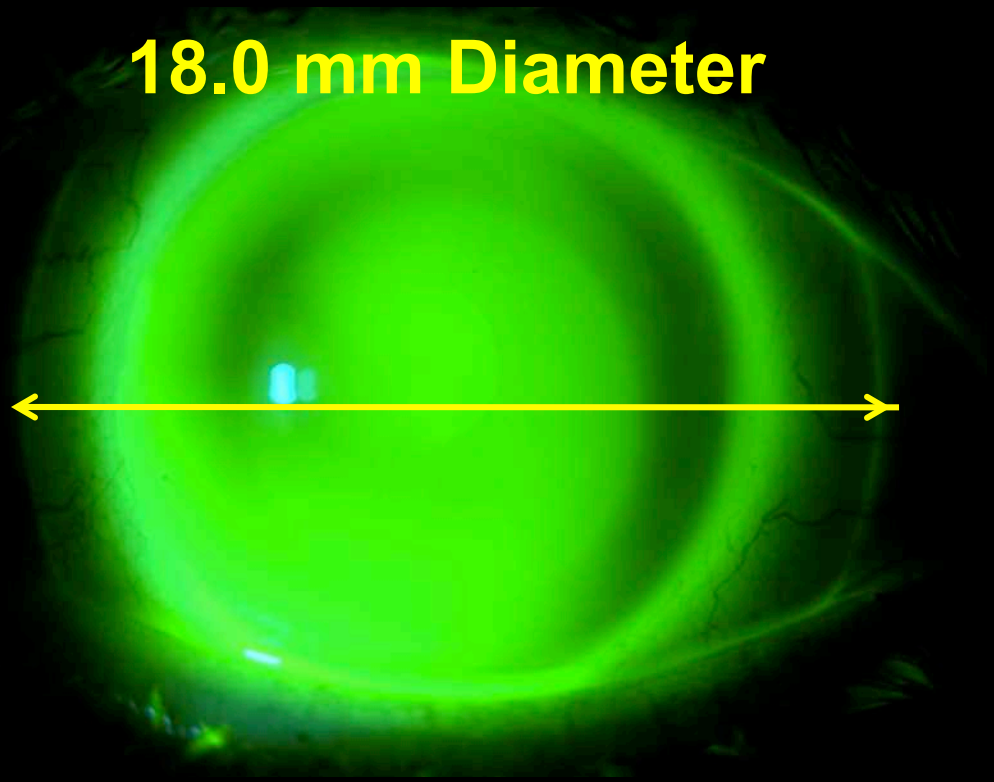
Step #1 Lens Diameter



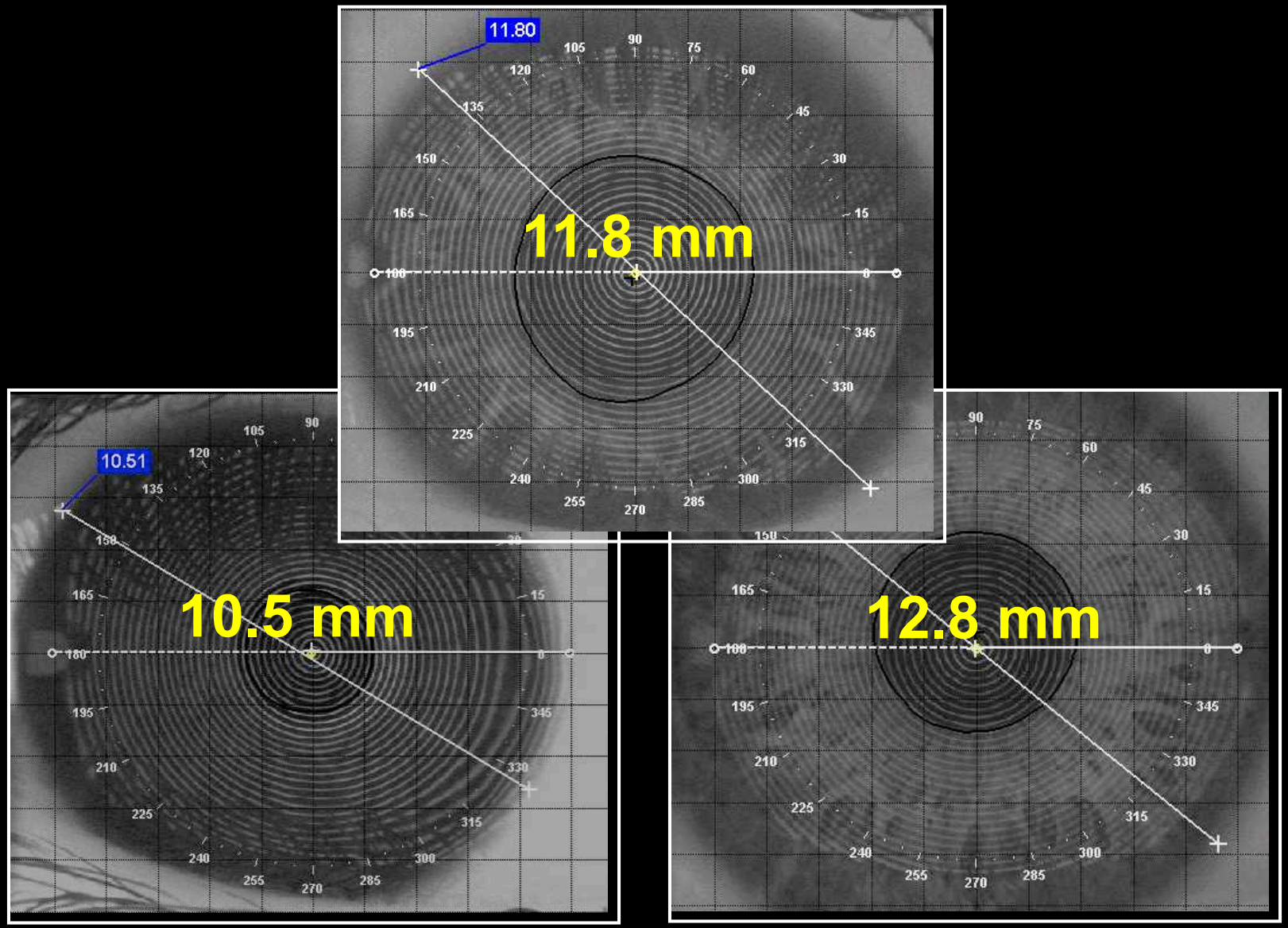
Step #1 Lens Diameter

- Cornea diameter
- Fissure size
- Conjunctiva challenges

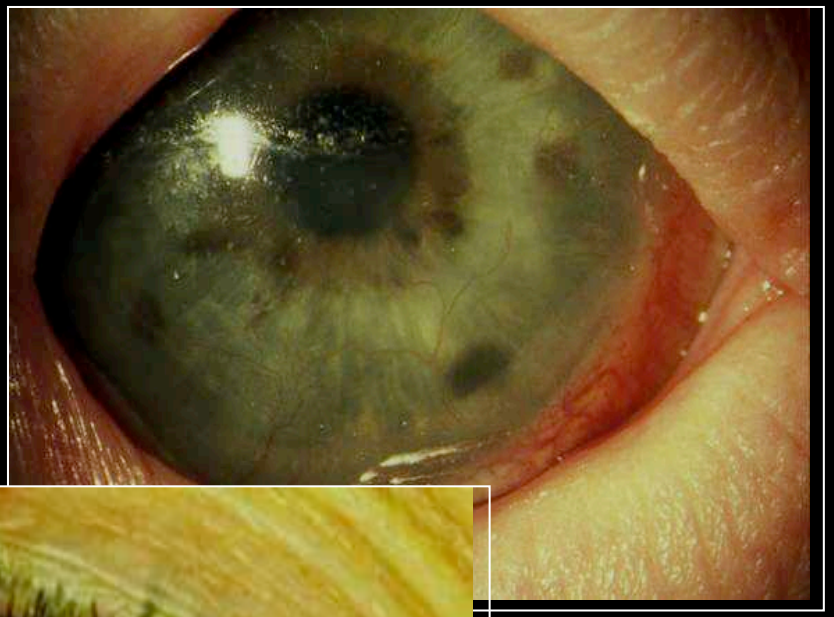




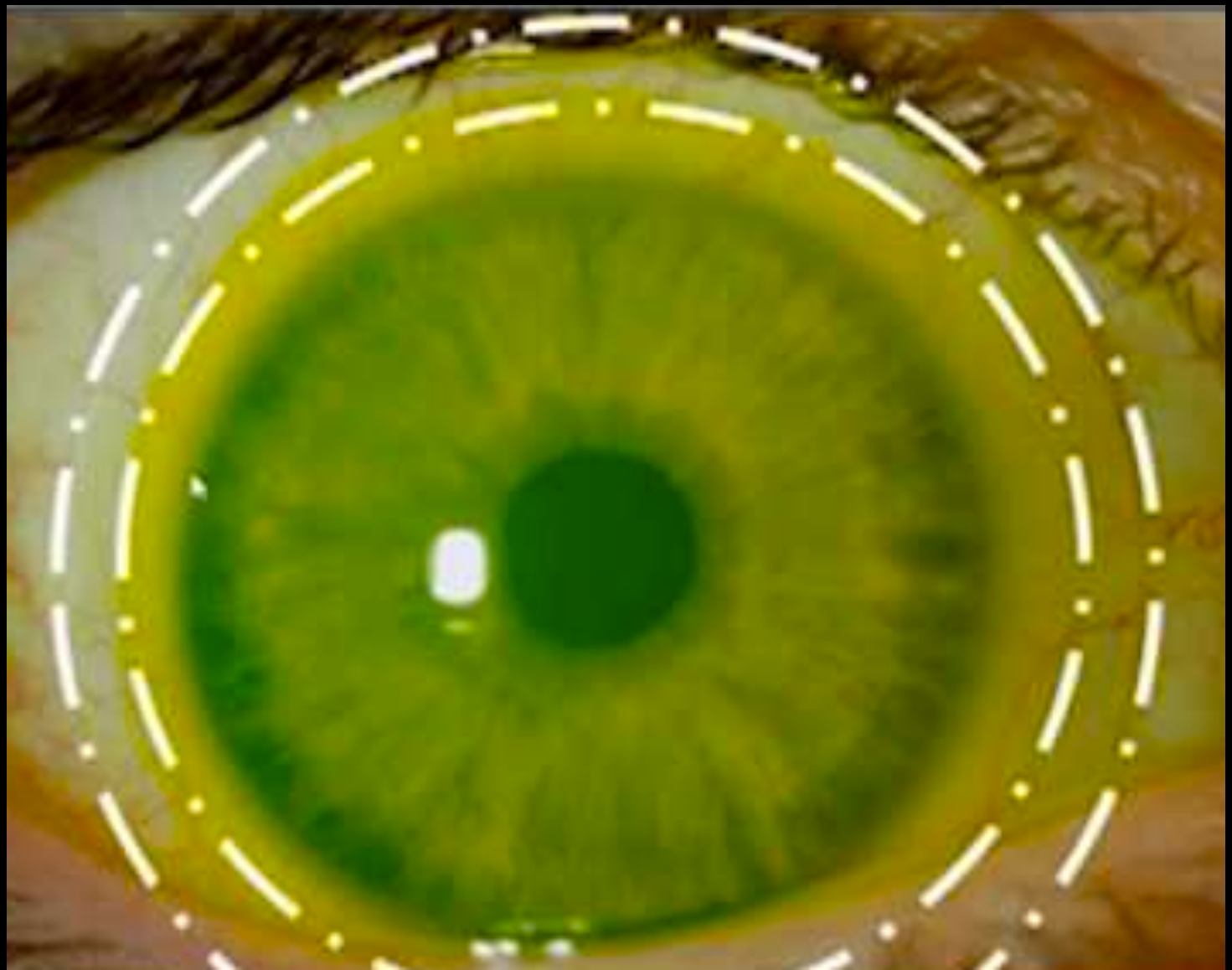
Corneal Diameter & Scleral Lenses



Fissure Size and Lens Diameter

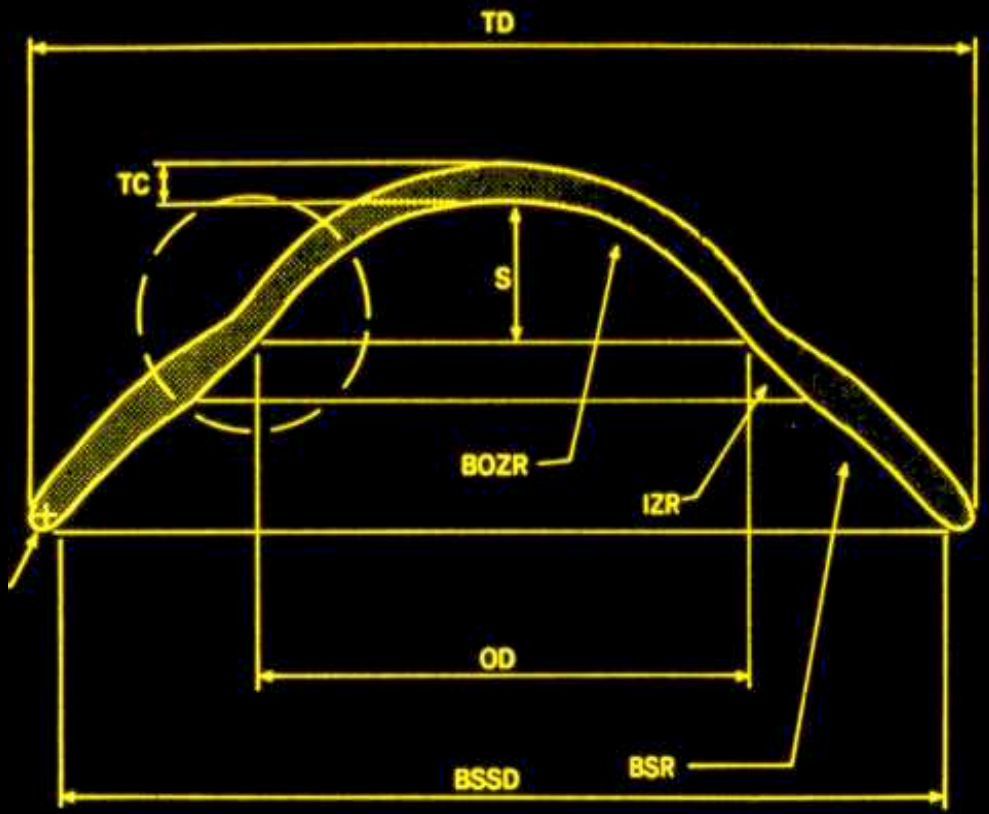


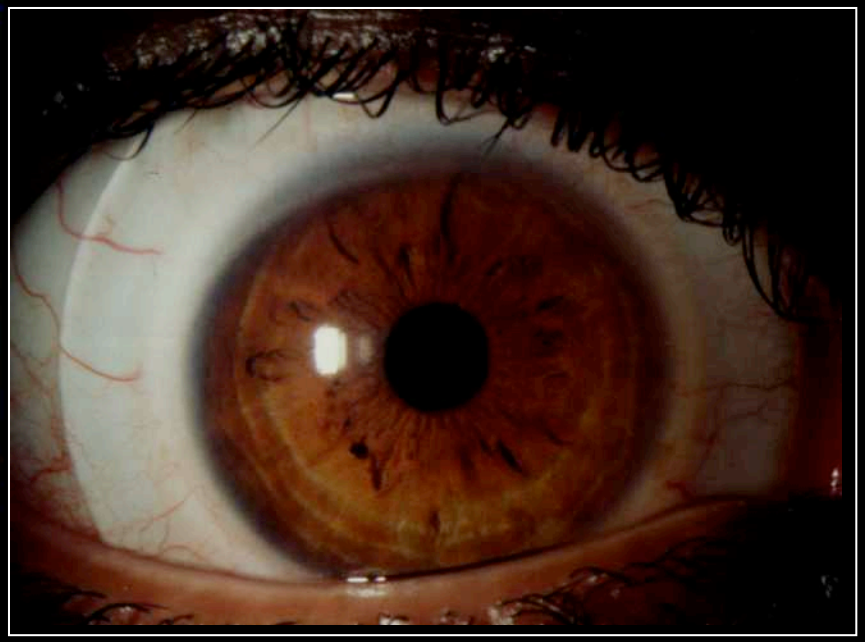
Landing the Lens

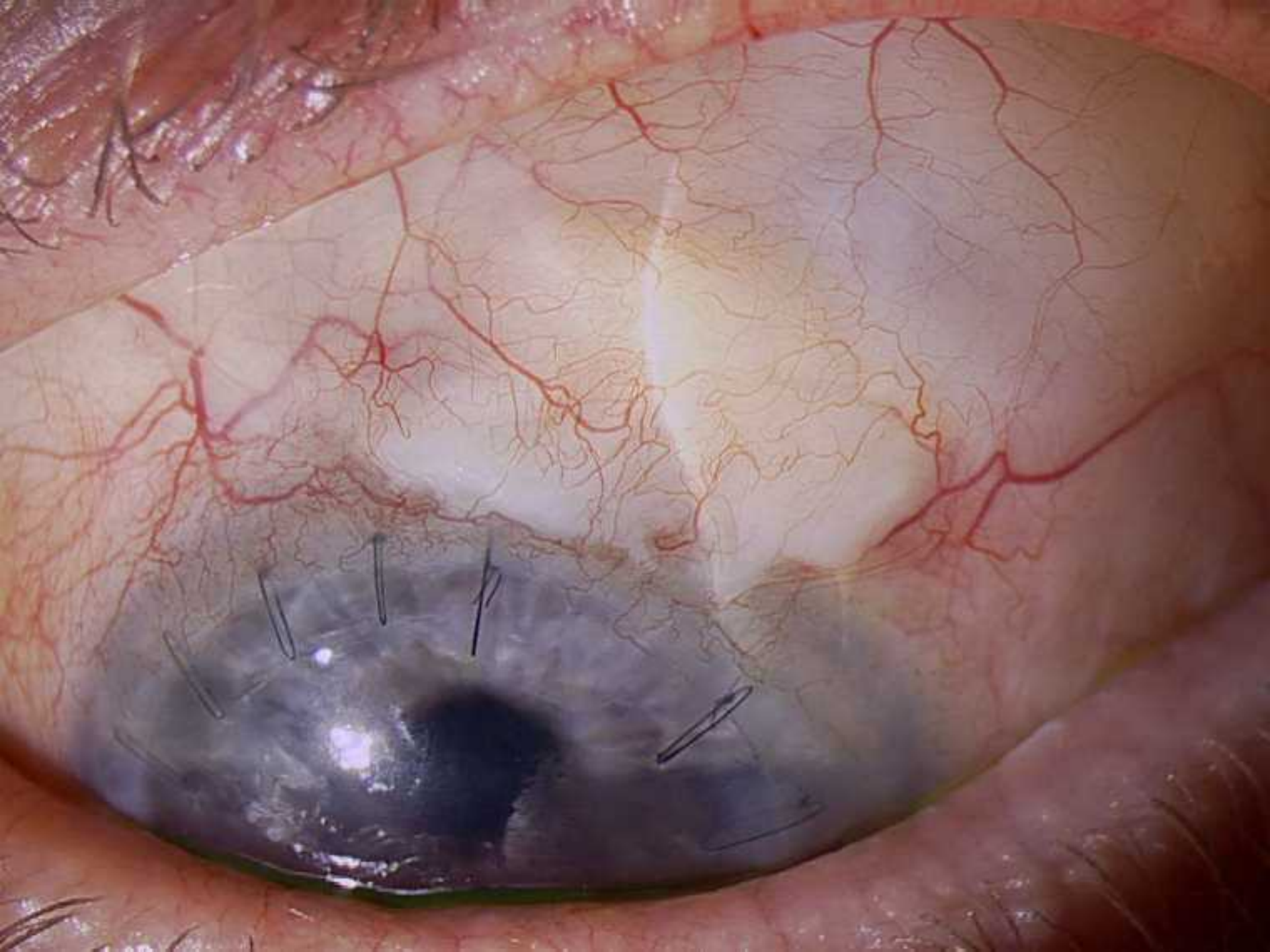


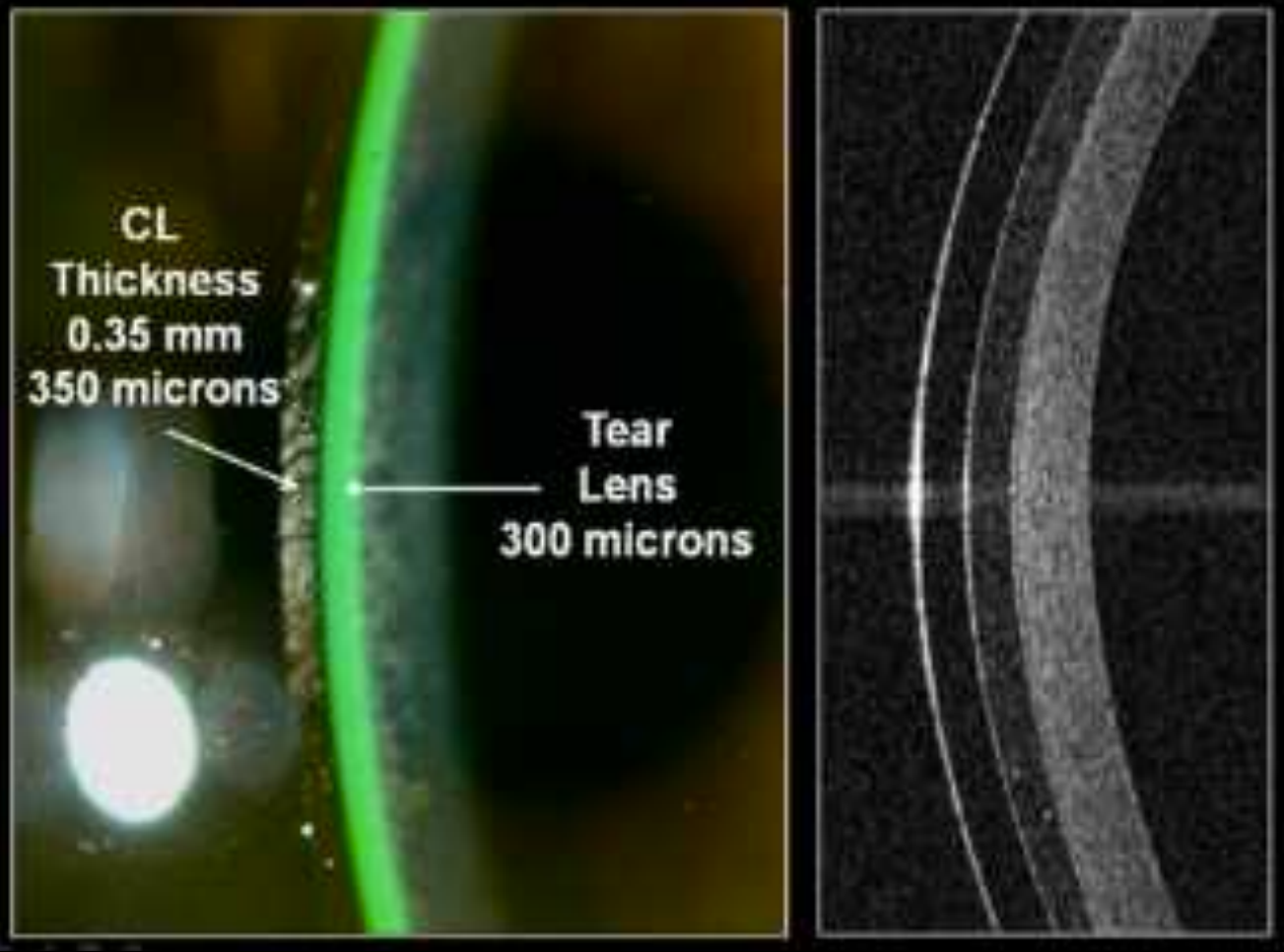
Weight
Pressure
Bearing…

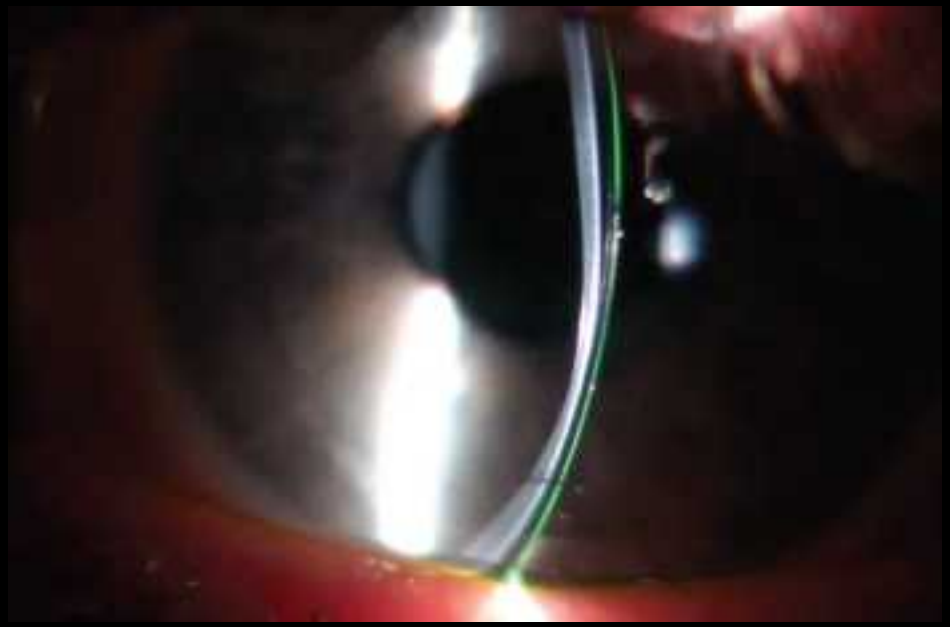
ONLY on the sclera

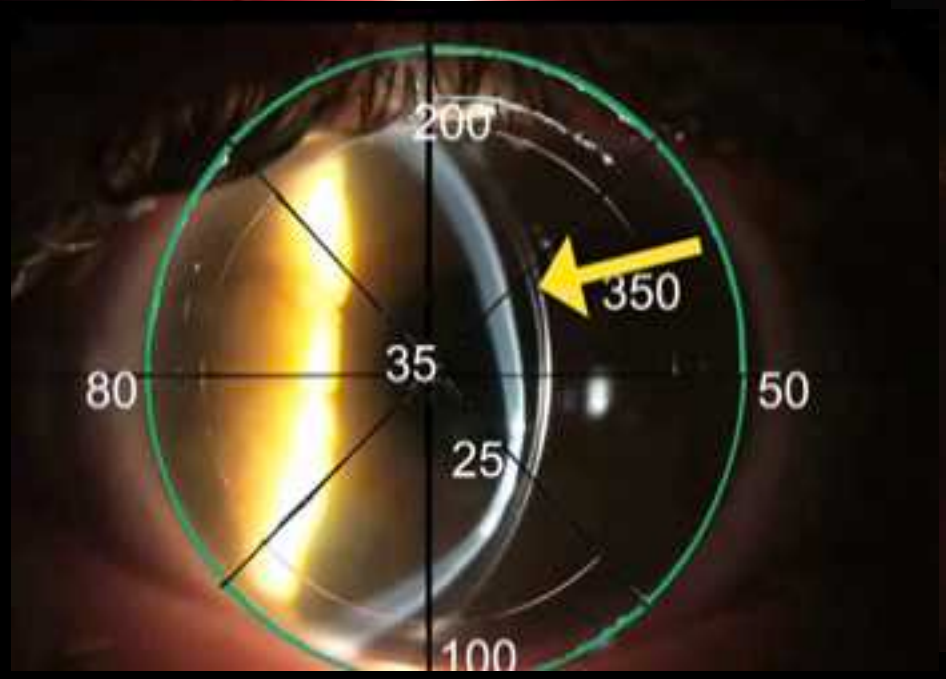


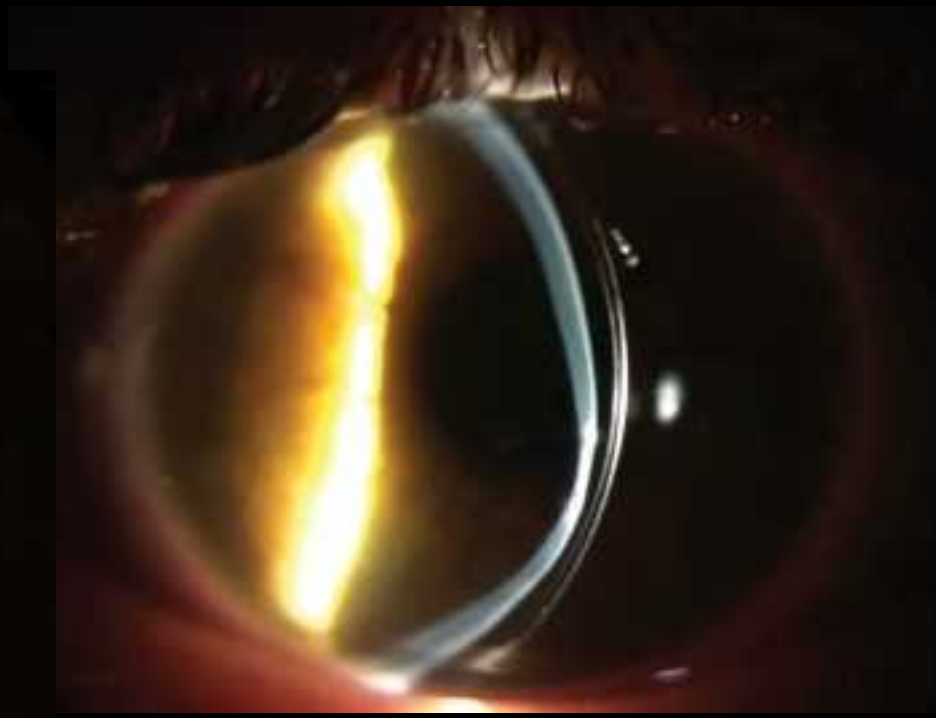




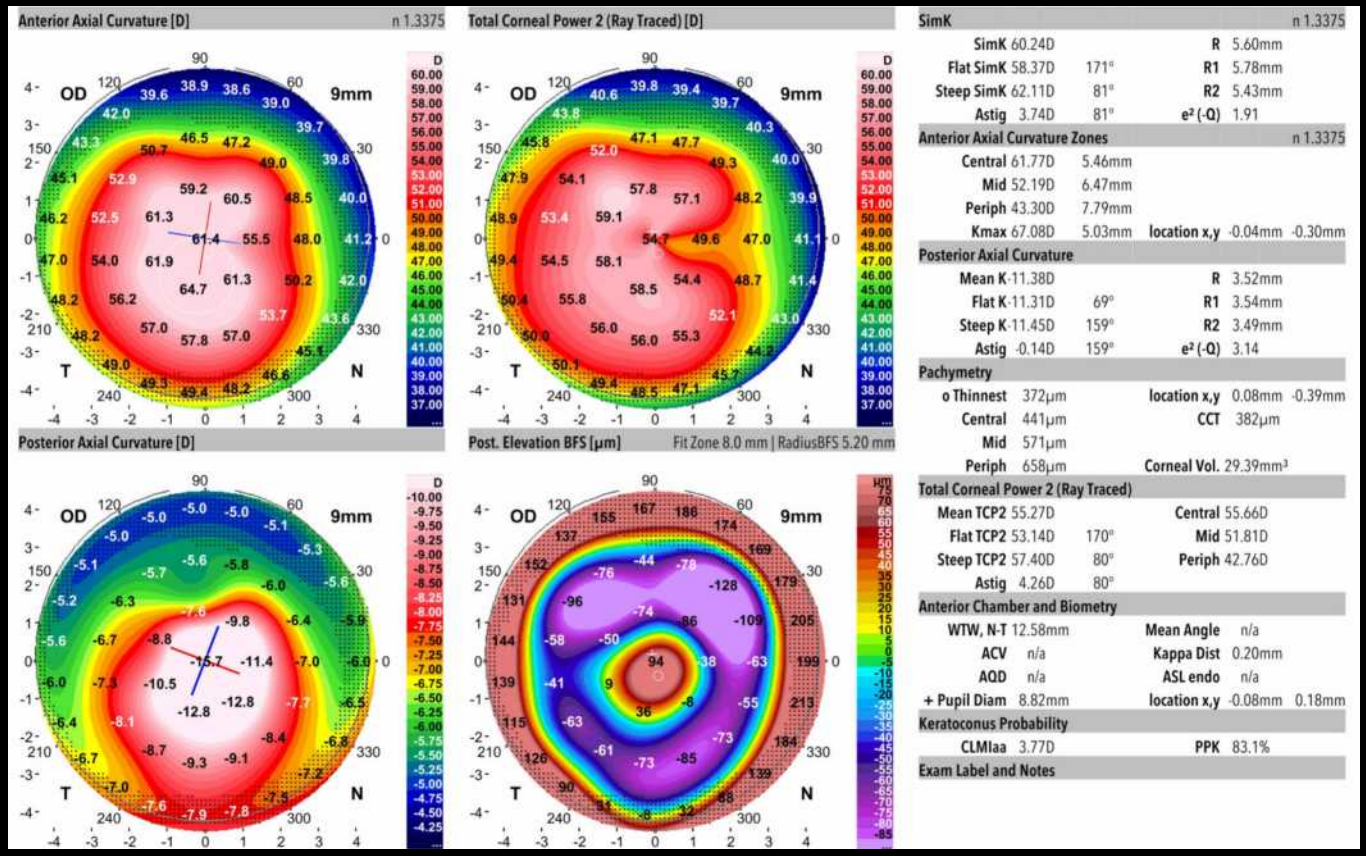

CL
Thickness
0.35 mm
350 microns
Tear
Lens
300 microns

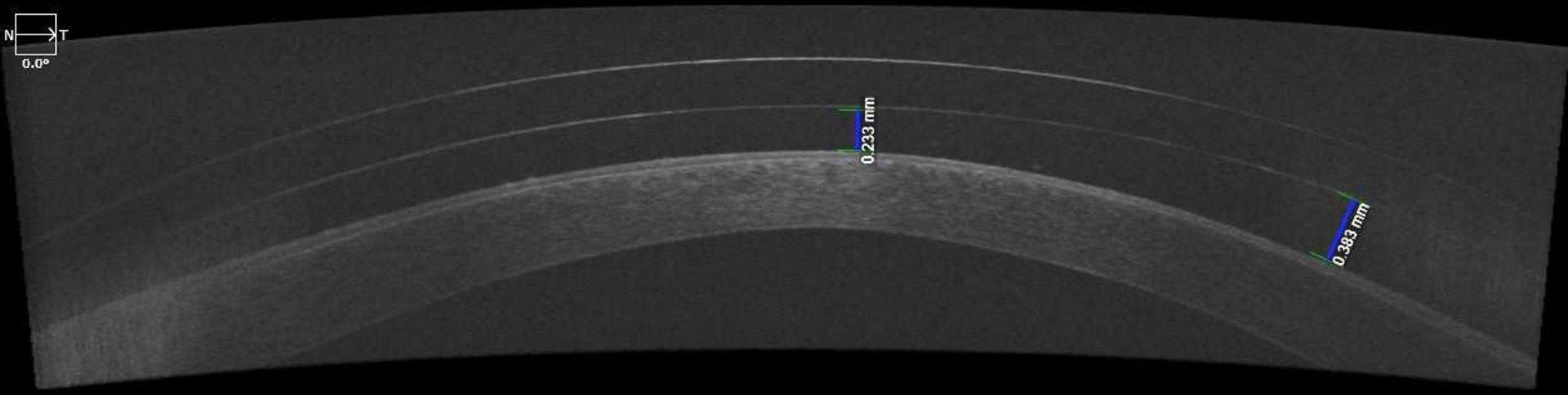


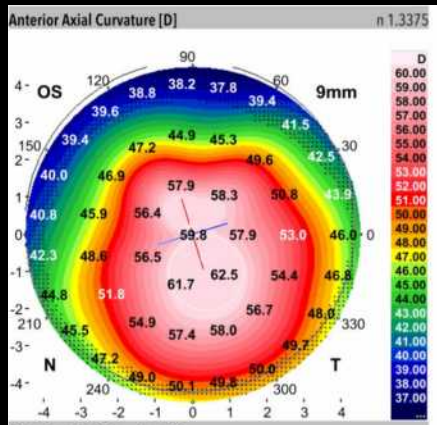

200
350
80
35
50
25
100

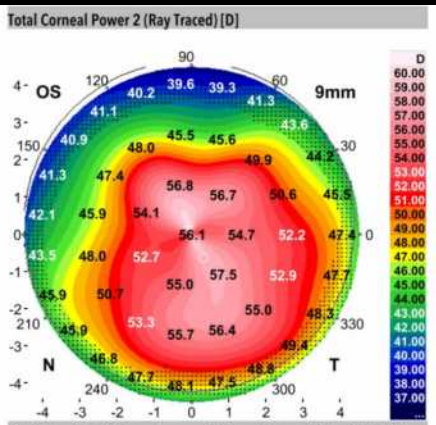


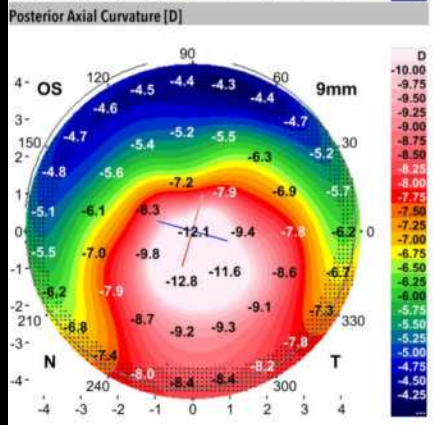

T
N
2.0°
0.131 mm
0.295 mm

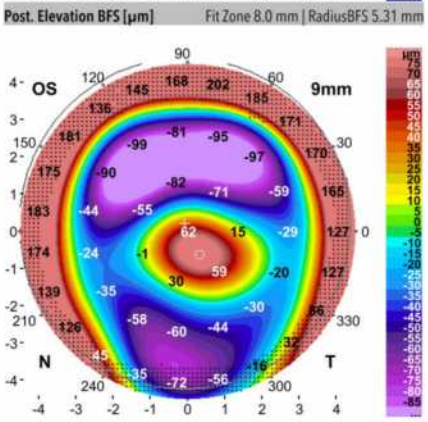

Anterior Axial Curvature [D]
n 1.3375
Total Corneal Power 2 (Ray Traced) [D]
Posterior Axial Curvature [D]
Post. Elevation BFS [µm]
Fit Zone 8.0 mm | RadiusBFS 5.20 mm
OD
9mm
T
N
SimK n 1.3375
SimK 60.24D
R 5.60mm
Flat SimK 58.37D 171°
R1 5.78mm
Steep SimK 62.11D 81°
R2 5.43mm
Astig 3.74D 81°
e² (-Q) 1.91
Anterior Axial Curvature Zones n 1.3375
Central 61.77D 5.46mm
Mid 52.19D 6.47mm
Periph 43.30D 7.79mm
Kmax 67.08D 5.03mm
location x,y -0.04mm -0.30mm
Posterior Axial Curvature
Mean K -11.38D
R 3.52mm
Flat K -11.31D 69°
R1 3.54mm
Steep K -11.45D 159°
R2 3.49mm
Astig -0.14D 159°
e² (-Q) 3.14
Pachymetry
Thinnest 372µm
location x,y 0.08mm -0.39mm
Central 441µm
CCT 382µm
Mid 571µm
Periph 658µm
Corneal Vol. 29.39mm³
Total Corneal Power 2 (Ray Traced)
Mean TCP2 55.27D
Central 55.66D
Flat TCP2 53.14D 170°
Mid 51.81D
Steep TCP2 57.40D 80°
Periph 42.76D
Astig 4.26D 80°
Anterior Chamber and Biometry
WTW, N-T 12.58mm
Mean Angle n/a
ACV n/a
Kappa Dist 0.20mm
AQD n/a
ASL endo n/a
+ Pupil Diam 8.82mm
location x,y -0.08mm 0.18mm
Keratoconus Probability
CLMIaa 3.77D
PPK 83.1%
Exam Label and Notes









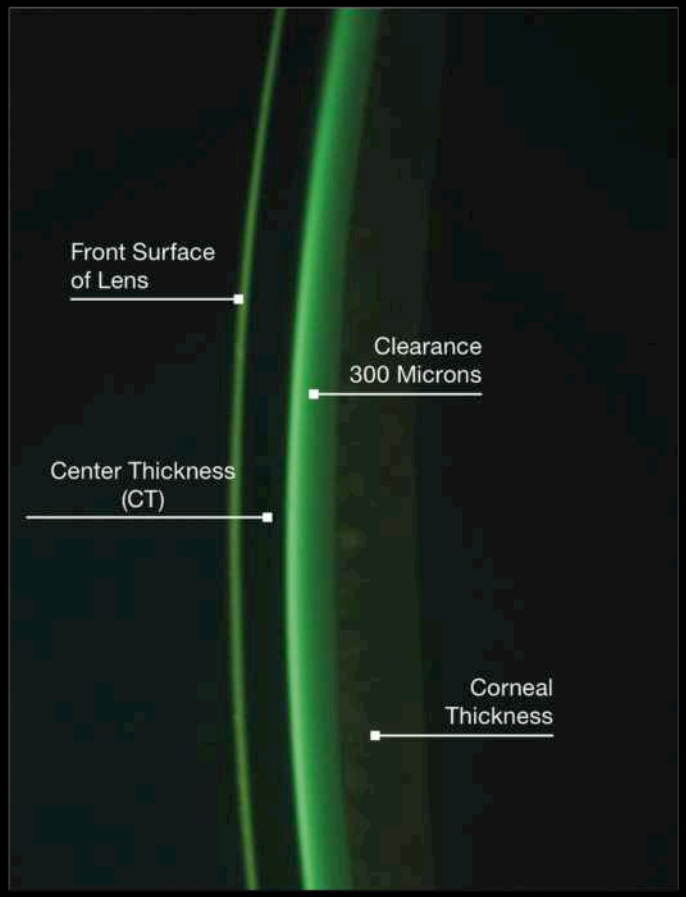


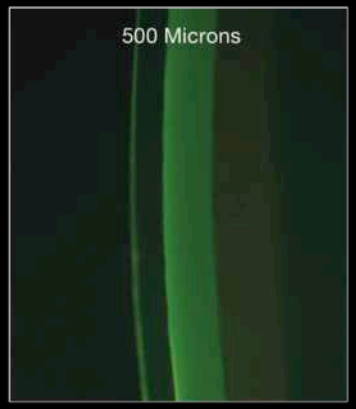
SimK				n 1.3375
SimK	59.15D		R	5.71mm
Flat SimK	57.18D	17°	R1	5.90mm
Steep SimK	61.12D	107°	R2	5.52mm
Astig	3.94D	107°	e² (-Q)	1.95
Anterior Axial Curvature Zones				n 1.3375
Central	59.88D	5.64mm		
Mid	51.12D	6.60mm		
Periph	43.44D	7.77mm		
Kmax	65.36D	5.16mm	location x,y	0.08mm -0.29mm
Posterior Axial Curvature				
Mean K	-10.01D		R	4.00mm
Flat K	-9.57D	164°	R1	4.18mm
Steep K	-10.45D	74°	R2	3.83mm
Astig	-0.87D	74°	e² (-Q)	2.88
Pachymetry				
Thinnest	397µm		location x,y	0.32mm -0.62mm
Central	457µm		CCT	420µm
Mid	565µm			
Periph	661µm		Corneal Vol.	29.31mm³
Total Corneal Power 2 (Ray Traced)				
Mean TCP2	55.54D		Central	55.48D
Flat TCP2	53.57D	21°	Mid	50.51D
Steep TCP2	57.50D	111°	Periph	43.25D
Astig	3.93D	111°		
Anterior Chamber and Biometry				
WTW, N-T	12.64mm		Mean Angle	n/a
ACV	n/a		Kappa Dist	0.23mm
AQD	n/a		ASL endo	n/a
+ Pupil Diam	8.88mm		location x,y	-0.08mm 0.21mm
Keratoconus Probability				
CLMIaa	4.64D		PPK	96.9%
Exam Label and Notes				

Ferris State University
Michigan College of Optometry
Vision Research Institute

SCLERAL LENS FIT SCALES

To accurately estimate the amount of vaulting (clearance) underneath the posterior surface of a scleral lens necessitates a reference point for comparison. Although some have suggested corneal thickness for the reference, we prefer the center thickness (CT) of the lens itself which will be listed on the manufacturer's invoice. In each of the examples below, the CT is 0.30mm (300 microns). In most scleral lens designs, the ideal amount of clearance is about 300 microns.



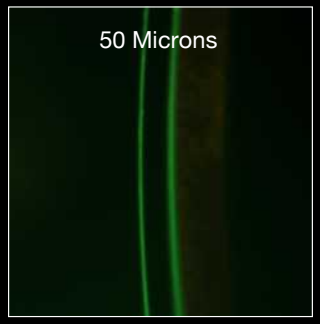


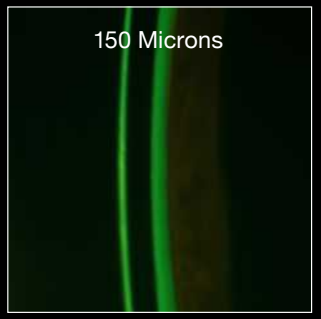
See reverse side for Limbal Vaulting and Edge Landing examples

Ferris State University
Michigan College of Optometry
Vision Research Institute

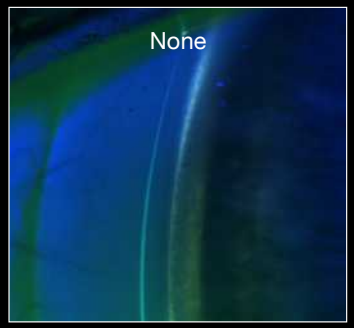
SCLERAL LENS FIT SCALES

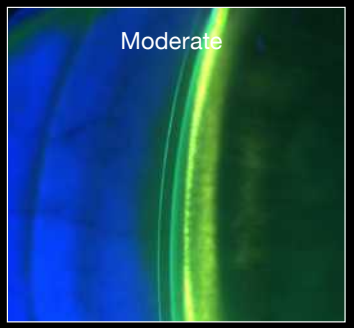
CENTRAL VAULTING



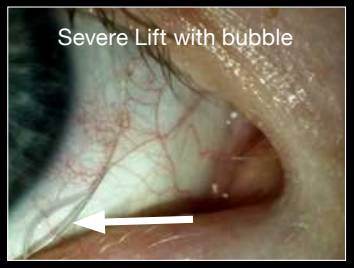


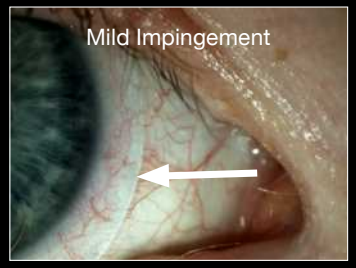
LIMBAL VAULTING

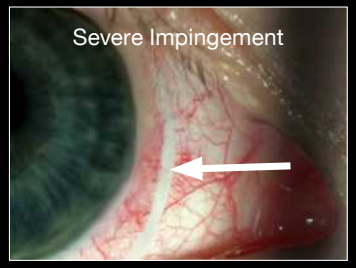


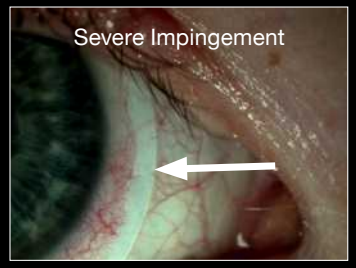


EDGE RELATIONSHIP







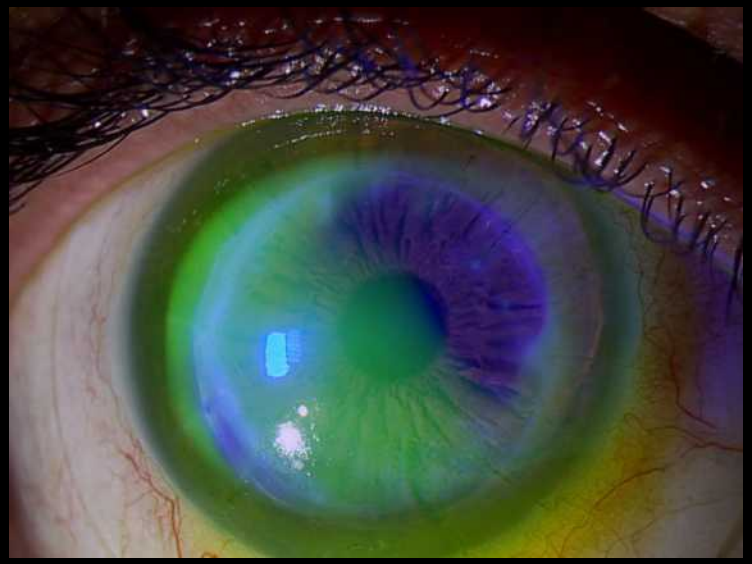


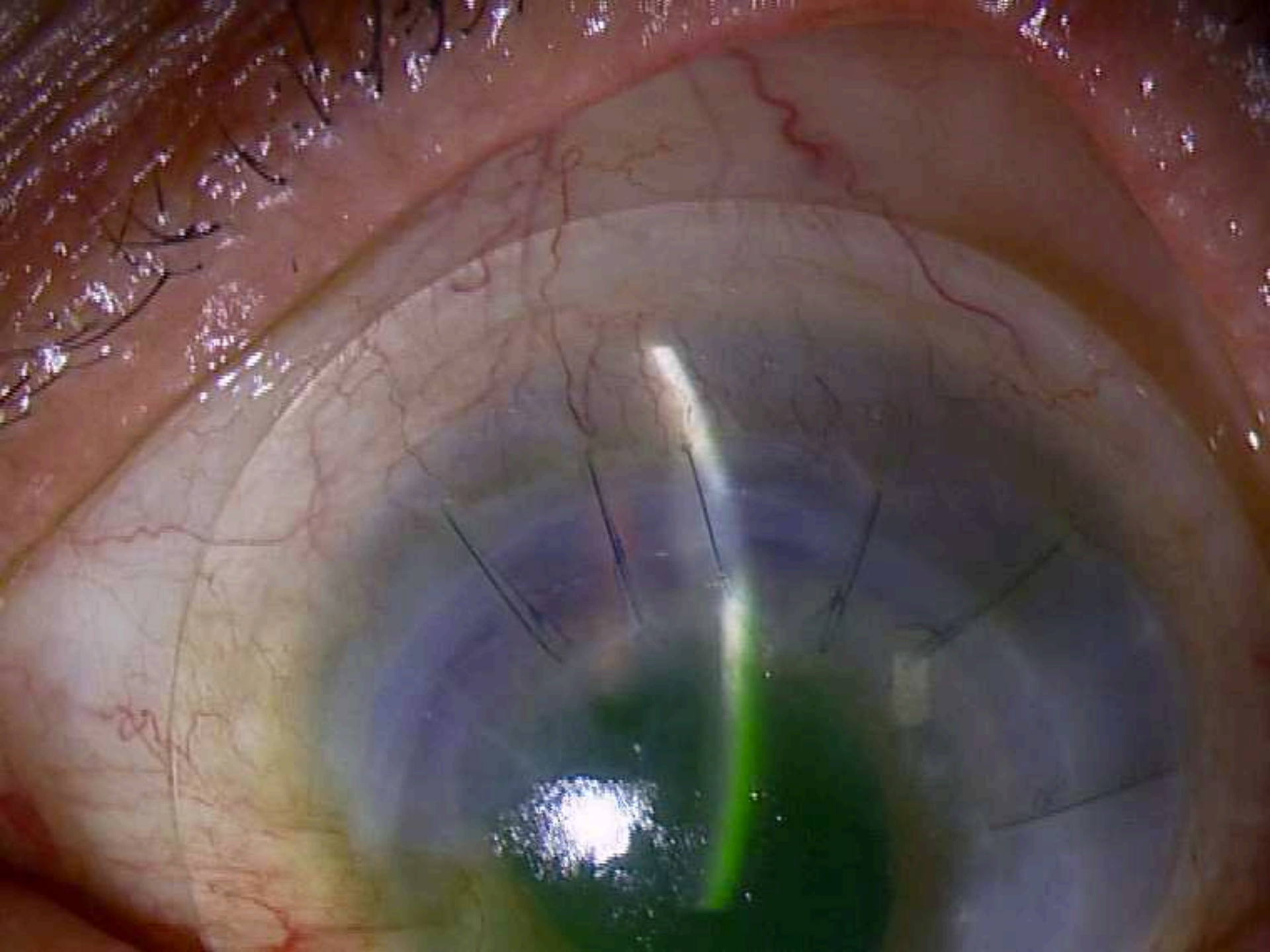
Supported by an unrestricted educational grant from Bausch + Lomb Boston Materials

Authors: Josh Lotoczky, OD; Chad Rosen, OD; Craig W. Norman, FCLSA
Contact info: CraigNorman@ferris.edu

Reservoir Chamber Depth

Example:
Insufficient fluid chamber depth

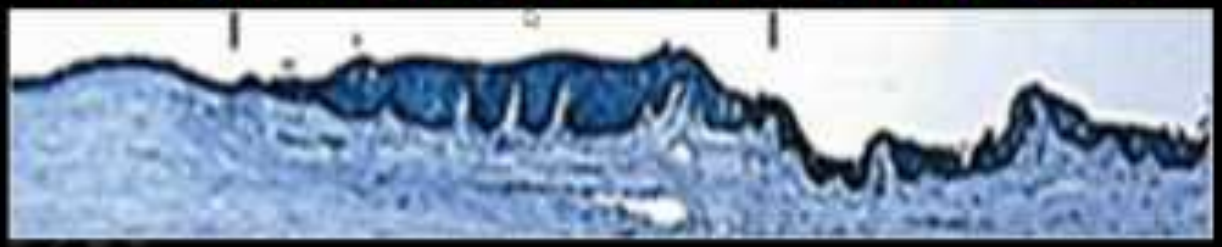




Lens Settling

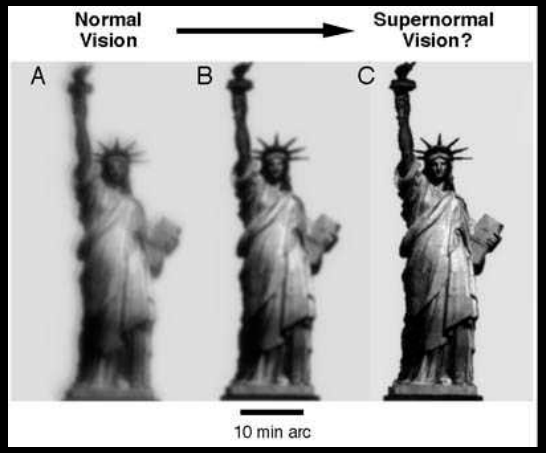
15 Normal Eye Subjects

- Following 8 hours of lens wear the scleral lenses "settled" on average 96 um.
- The amount of "lens settling" varied with a range in sagittal depth loss from 70 to 180 um.
- Following one month of scleral lens wear John Mountford found the average lens settling to be 146 microns with a range of 106 to 186 microns.



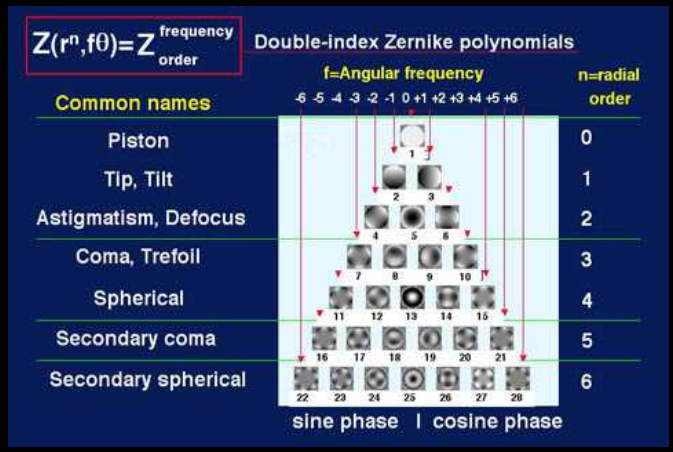
Impact on Vision
Same Effective RX

49 D -10.00 16.5



42 D -3.00 16.5

* using wide RC
to achieve same depth

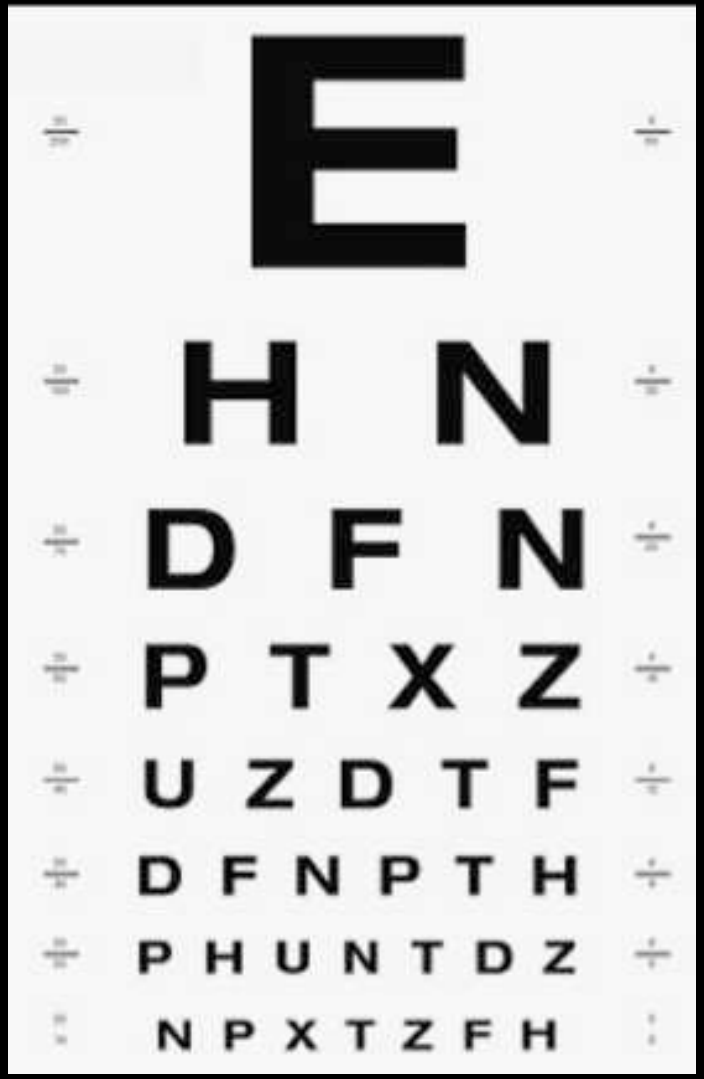


Higher Order Aberrations

Spherical
symmetrical

Coma
comet

Trefoil
triple



The "Perfect" Scleral Lens

- Provides complete alignment 360 degrees
- Uncompromised vision
- Corneal alignment
- Limbal shape control
- Sufficient oxygen delivery
- Wettable surface
- Easily maintained
- Stays clean despite the environment

The "Perfect" Scleral Lens

Provides complete alignment 360 degrees

Cont Lens Anterior Eye. 2017 Jun;40(3):162-169. doi: 10.1016/j.clae.2017.03.009. Epub 2017 Mar 20.

Surface coverage with single vs. multiple gaze surface topography to fit scleral lenses.

DeNaeyer G[1], Sanders DR[2], Farajian TS[3].

Author information

1 Optometrist at Arena Eye Surgeons, United States.
2 Center For Clinical Research and President and CEO, Visionary Optics LLC, United States. Electronic address: drsmd@drsmd.com.
3 Precision Ocular Metrology, LLC, United States.

Abstract

OBJECTIVES: To determine surface coverage of measurements using the sMap3D® corneo-scleral topographer in patients presenting for scleral lens fitting.

METHODS: Twenty-five eyes of 23 scleral lens patients were examined. Up-gaze, straight-gaze, and down-gaze positions of each eye were "stitched" into a single map. The percentage surface coverage between 10mm and 20mm diameter circles from corneal center was compared between the straight-gaze and stitched images. Scleral toricity magnitude was calculated at 100% coverage and at the same diameter after 50% of the data was removed.

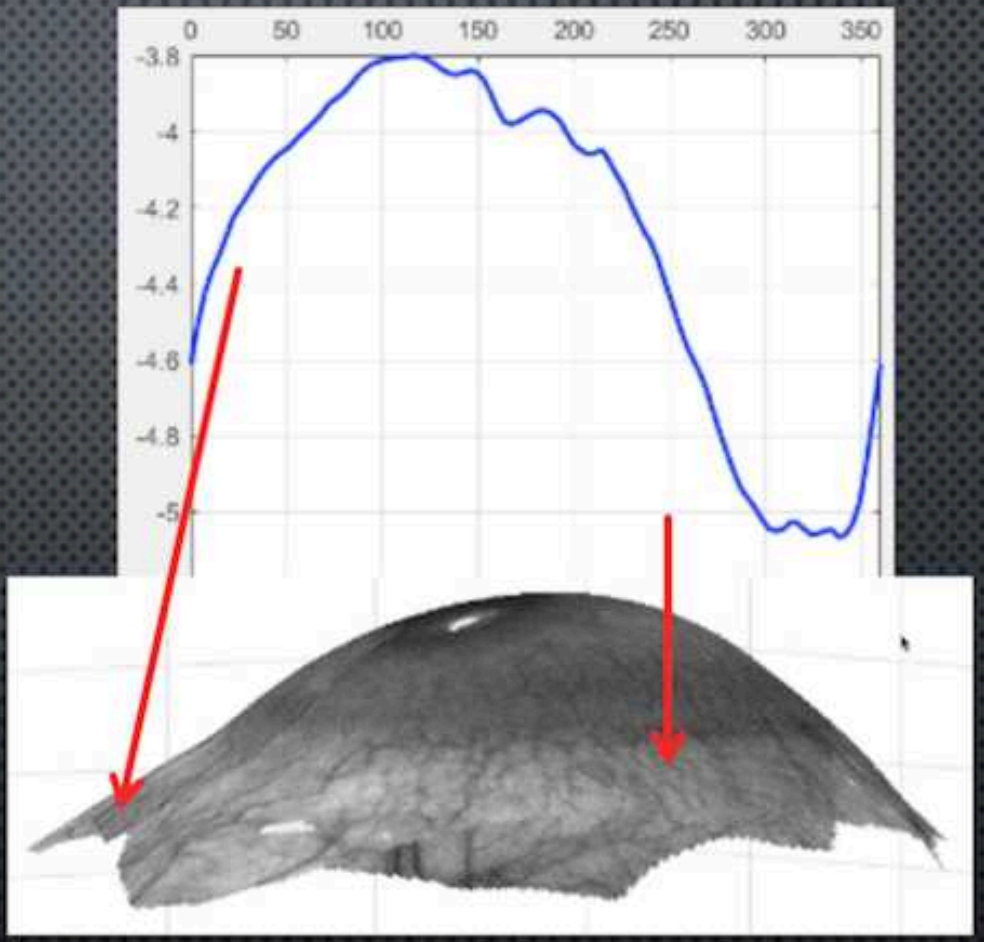
RESULTS: At a 10mm diameter from corneal center, the straight-gaze and stitched images both had 100% coverage. At the 14, 15, 16, 18 and 20mm diameters, the straight-gaze image only covered 68%, 53%, 39%, 18%, and 6% of the ocular surface diameters while the stitched image covered 98%, 96%, 93%, 75%, and 32% respectively. In the case showing the most scleral coverage at 16mm (straight-gaze), there was only 75% coverage (straight-gaze) compared to 100% (stitched image); the case with the least coverage had 7% (straight gaze) and 92% (stitched image). The 95% limits of agreement between the 50% and 100% coverage scleral toricity was between -1.4D (50% coverage value larger) and 1.2D (100% coverage larger), a 2.6D spread. The absolute difference between 50% to 100% coverage scleral toricity was ≥0.50D in 28% and ≥1.0D in 16% of cases.

CONCLUSIONS: It appears that a single straight-gaze image would introduce significant measurement inaccuracy in fitting scleral lenses using the sMap3D while a 3-gaze stitched image would not.

KEYWORDS: Ocular surface coverage; Scleral lenses; Scleral topography

- 4 PRIMARY CATEGORIES OF SHAPE

- RESULTS SUGGEST THAT THE MAJORITY OF EYES MAY BENEFIT FROM **CUSTOM BACK SURFACE** HAPTICS



DeNaeyer G, Sanders D, van der Worp E, Jedlicka J, Michaud L, Morrison S. Qualitative Assessment of Scleral Shape Patterns Using a New Wide Field Ocular Surface Elevation Topographer.
JCLRS [Internet]. 16Nov.2017 [cited 5Oct.2018];1(1):12-. Available from: http://www.jclrs.org/index.php/JCLRS/article/view/11

Table 1 Scleral Surface Patterns x in 140 Scleral Lens Patients

Group	Pattern Description	N(%)
1	Spherical	8 (5.7%)
2	Toric-Regular	40 (28.6%)
3	Asymmetric High or Low Points	57 (40.7%)
4	Periodicity different from 180°	35 (25%)

65.7%

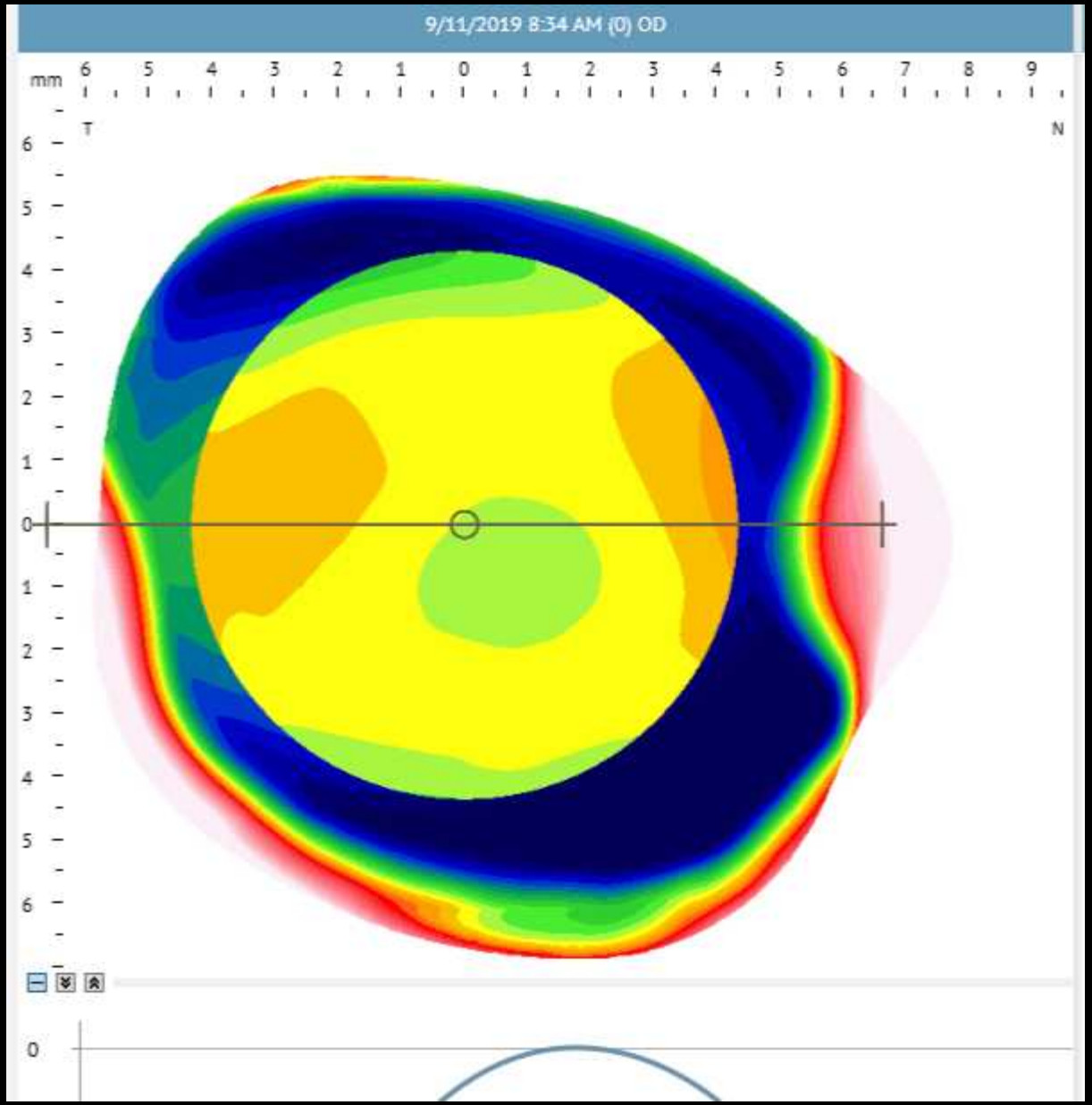
Groups 3 and 4 have scleral shapes that are <u>different</u> from commonly designed spherical or toric haptic designs!

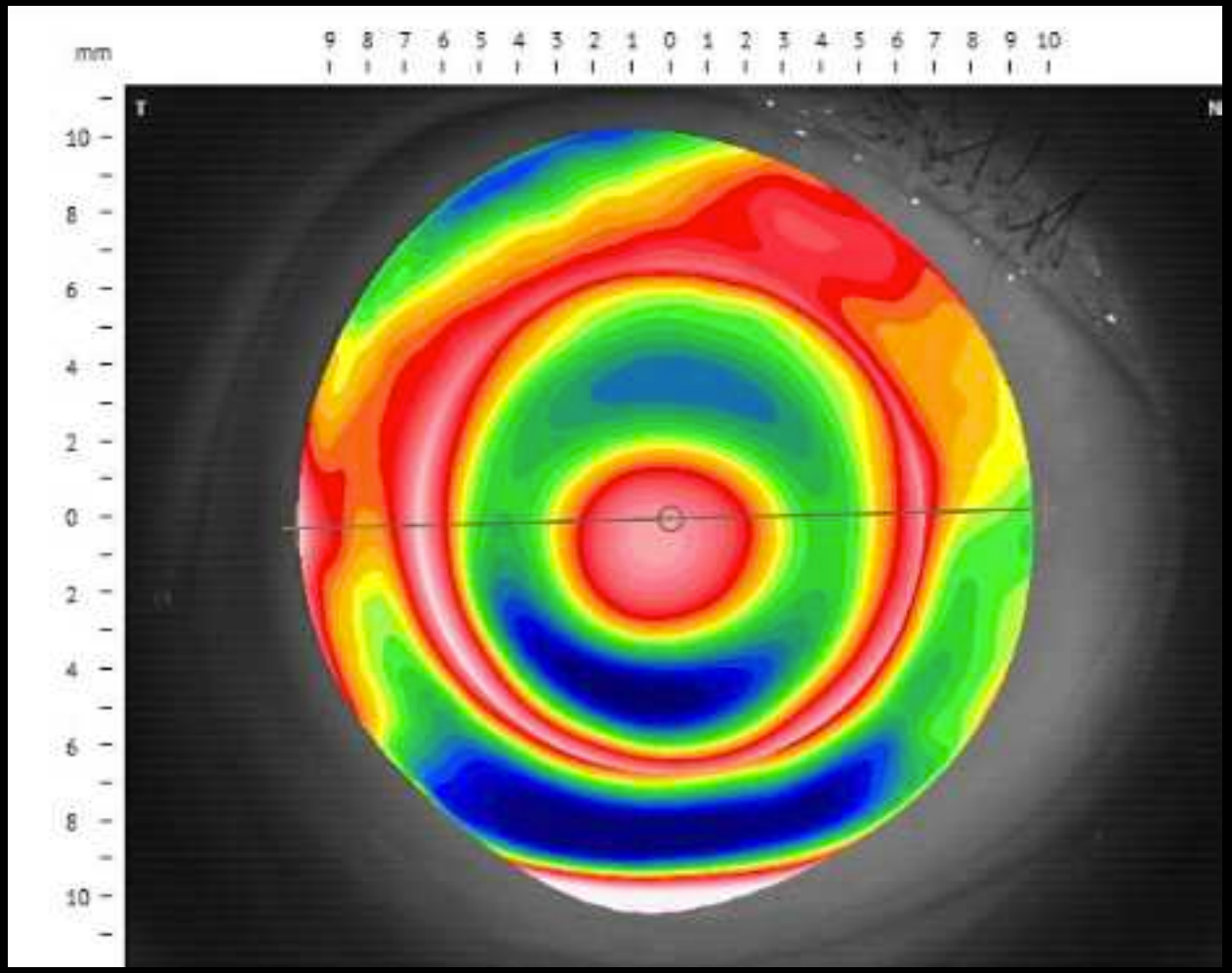
Courtesy of Greg DeNaeyer, OD, FAAO, FSLS

The "Perfect" Scleral Lens

Provides complete alignment 360 degrees

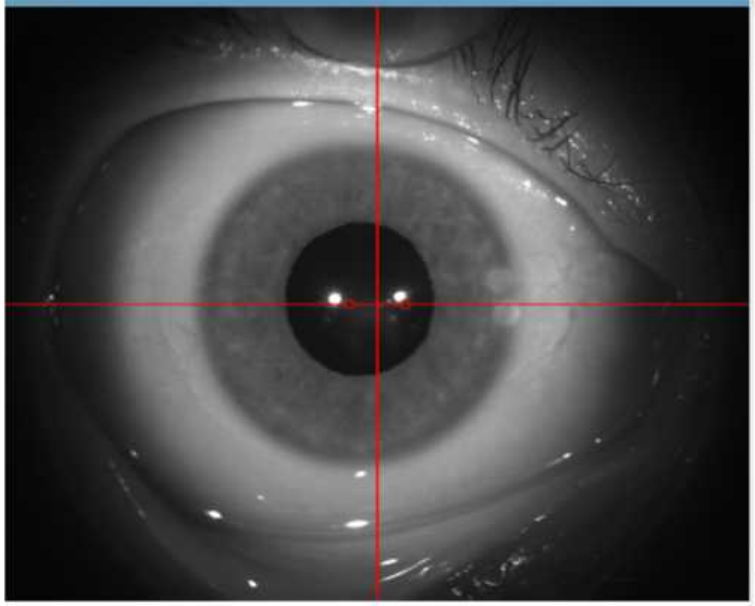
- Spherical
- Toric
- Asymmetrical
- Quadrant specific
- Angles
- Manage additional lesions (1 or more)


9/11/2019 8:34 AM (0) OD
mm
6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9
T
N
6 5 4 3 2 1 0 1 2 3 4 5 6
0

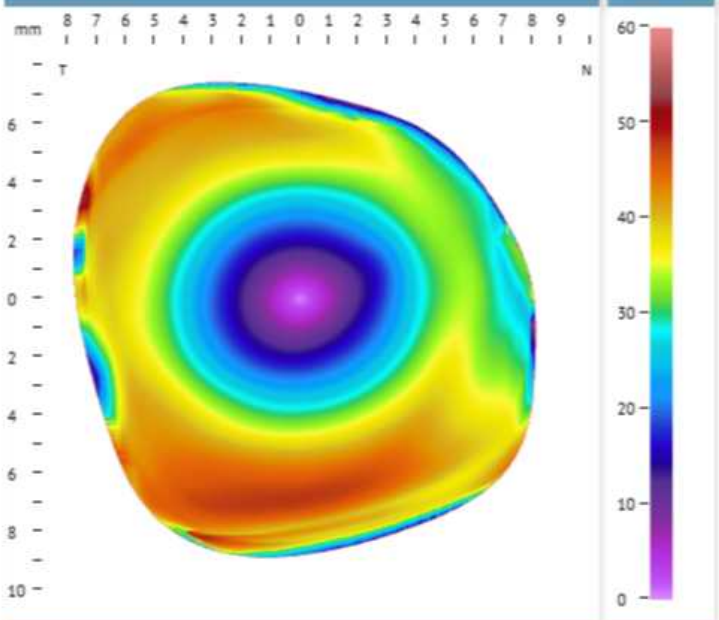

mm
9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 10
10 8 6 4 2 0 2 4 6 8 10
T
N

Combined measurement - 6/20/2019 1:59 PM (0) OD

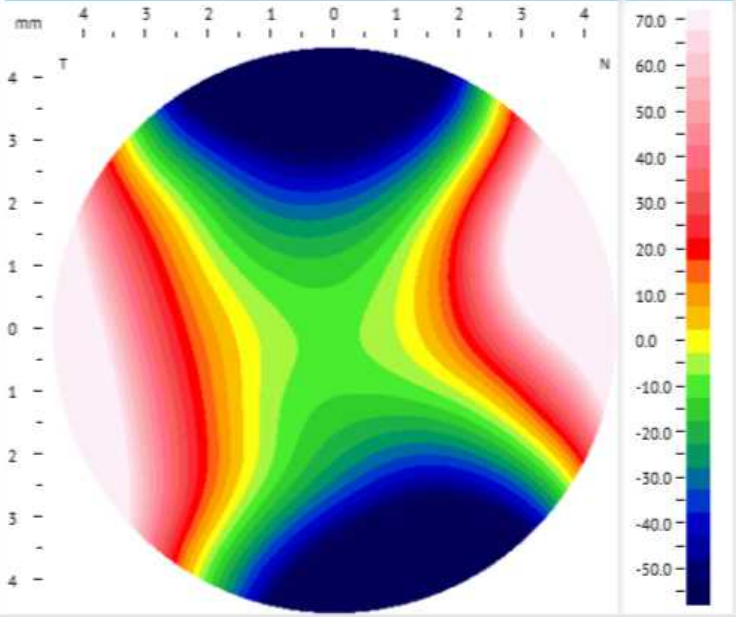
Source



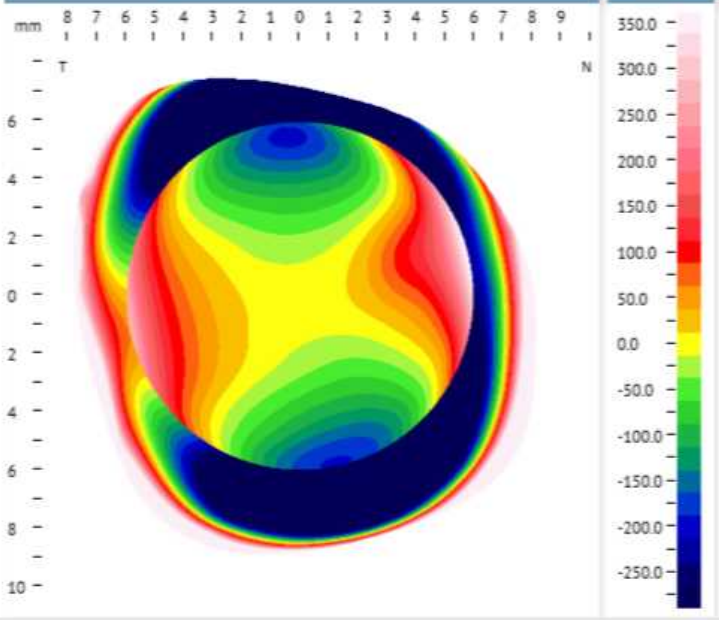
Tangent angles

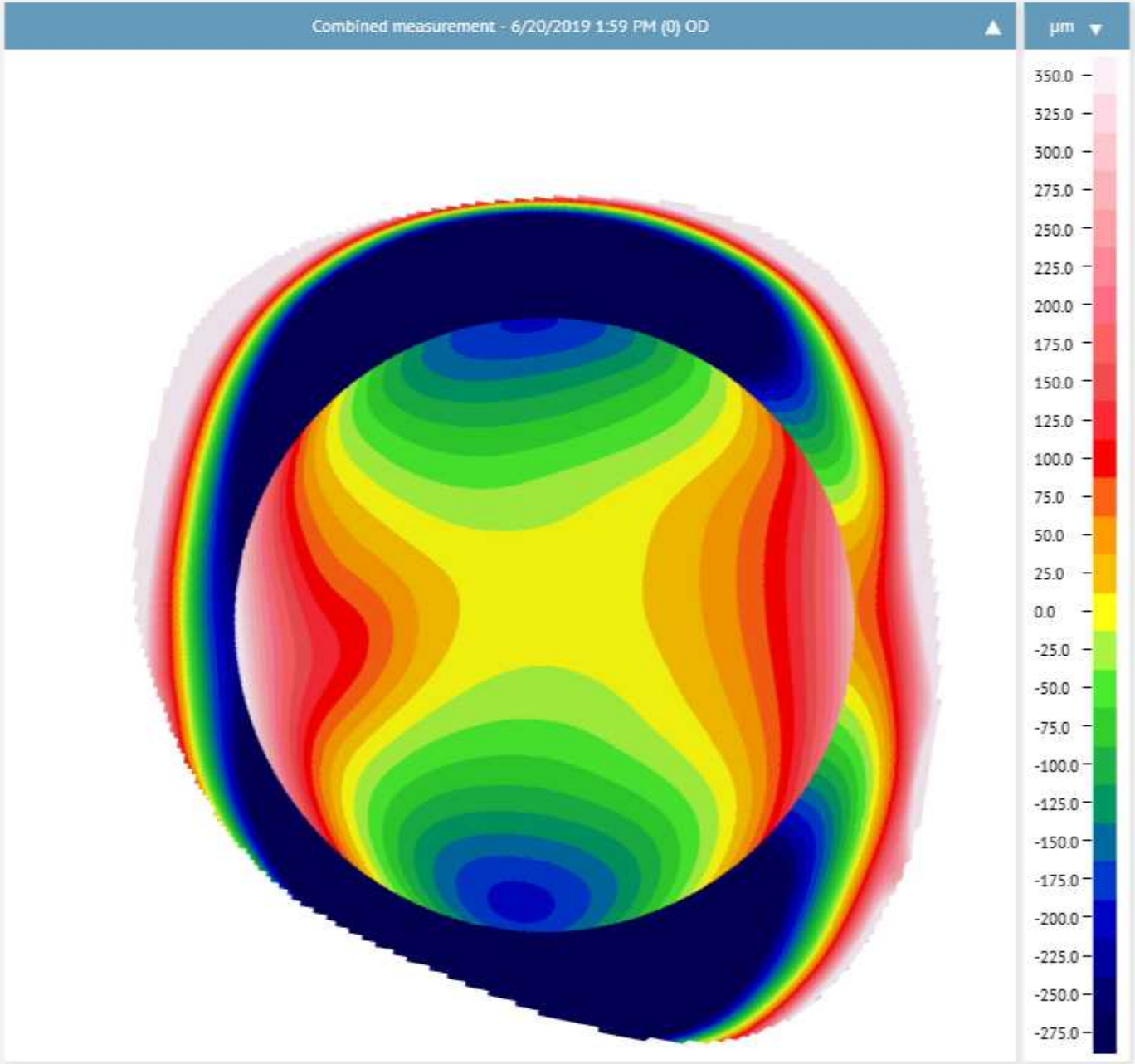


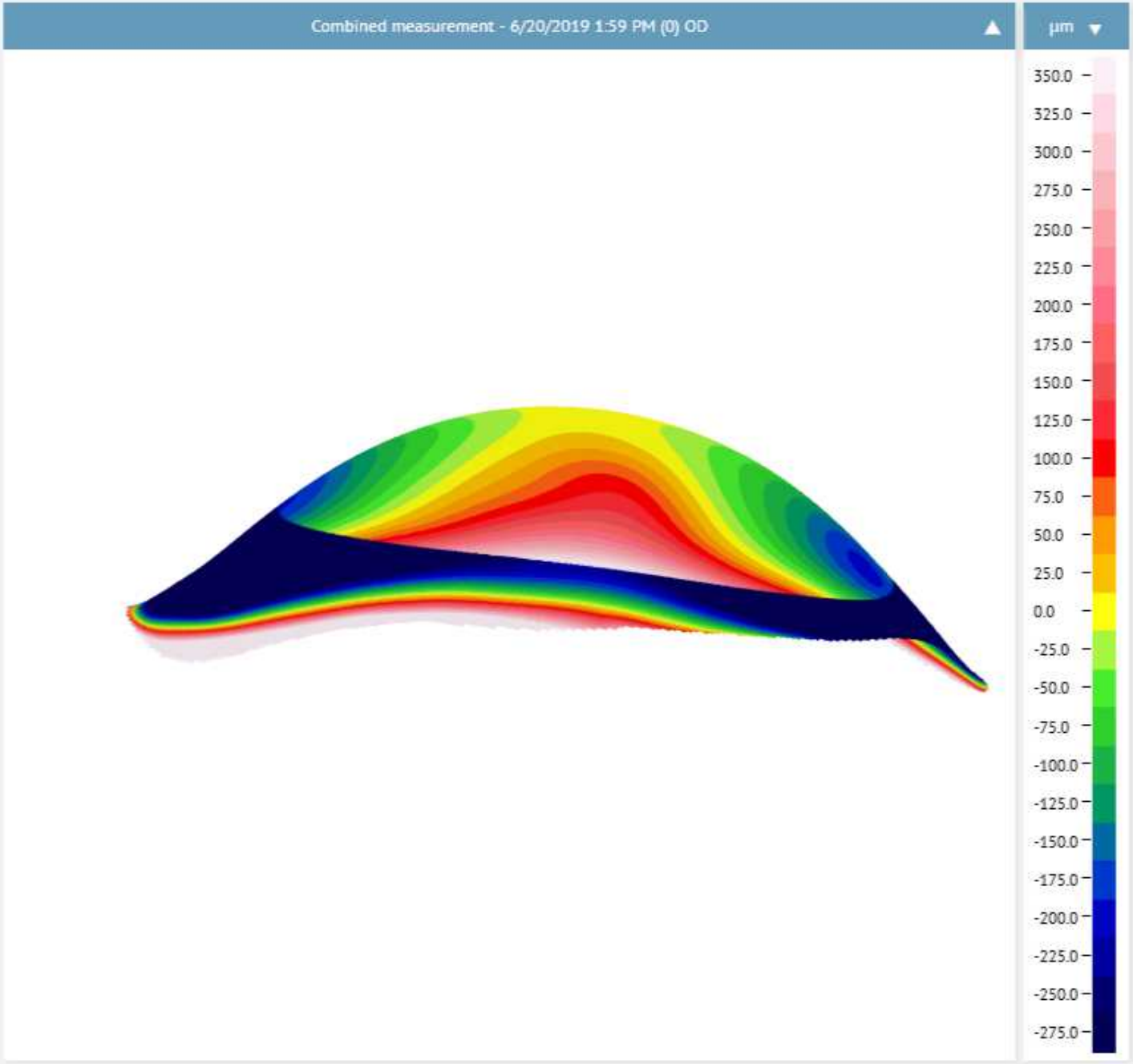
Corneal elevation

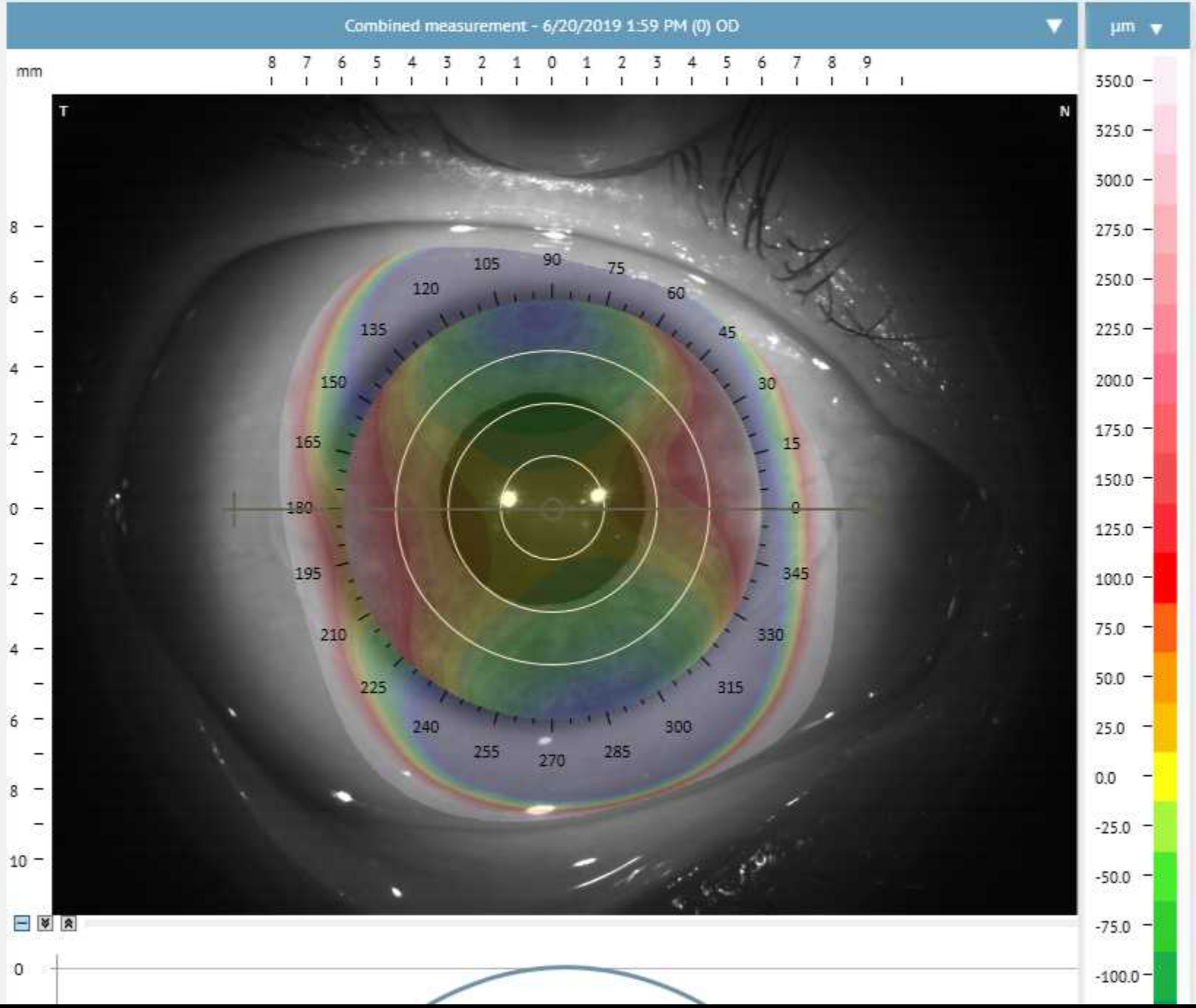


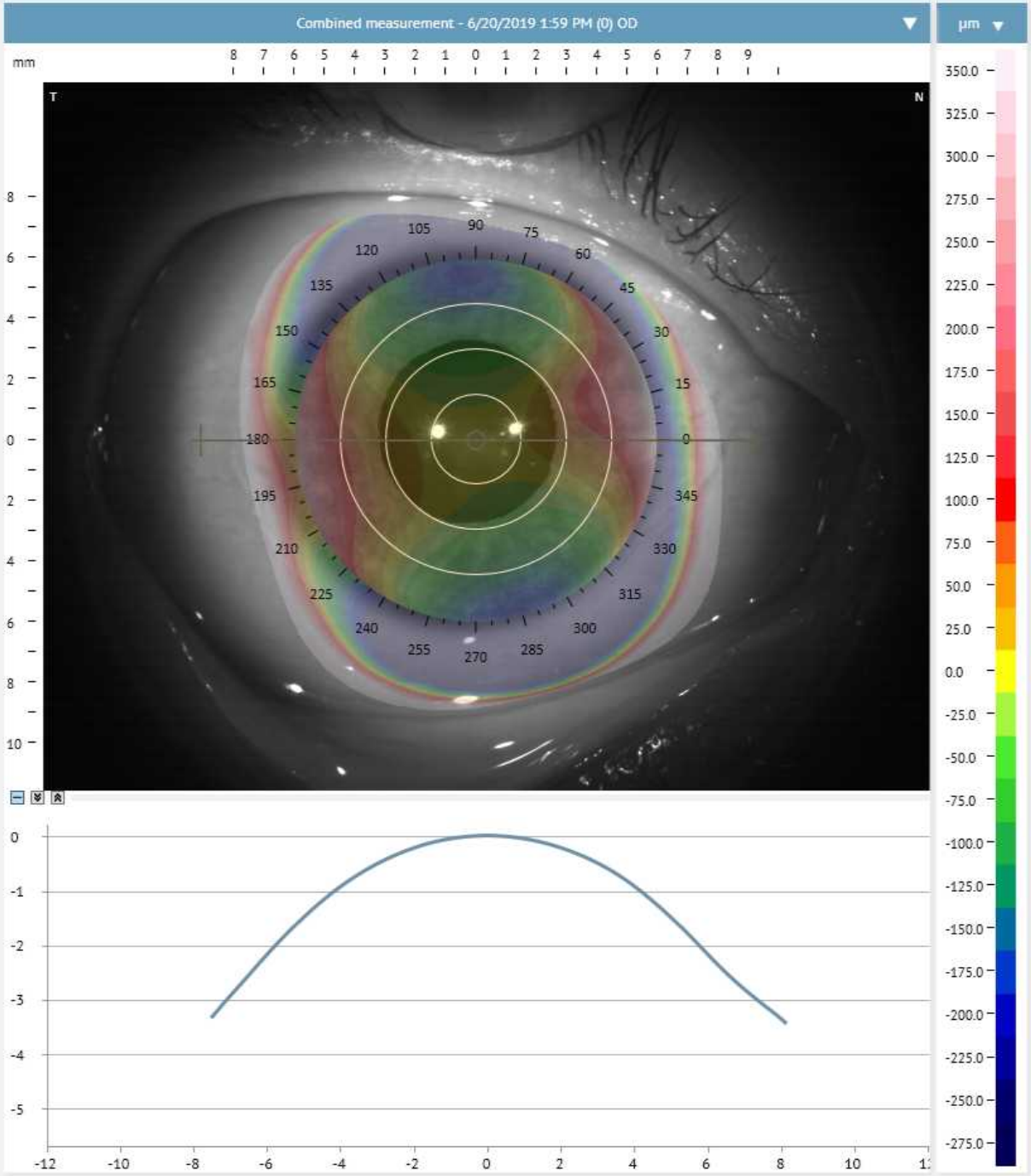
Bisphere elevation




Combined measurement - 6/20/2019 1:59 PM (0) OD
µm
350.0
325.0
300.0
275.0
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
-125.0
-150.0
-175.0
-200.0
-225.0
-250.0
-275.0

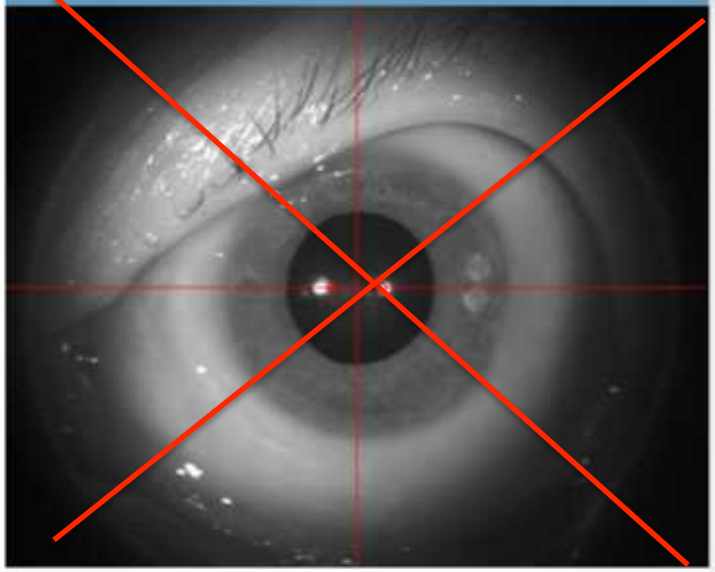

Combined measurement - 6/20/2019 1:59 PM (0) OD
µm
350.0
325.0
300.0
275.0
250.0
225.0
200.0
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
-125.0
-150.0
-175.0
-200.0
-225.0
-250.0
-275.0


Combined measurement - 6/20/2019 1:59 PM (0) OD
µm
mm
T
N
8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9
8 6 4 2 0 2 4 6 8 10
105 90 75 120 60 135 45 150 30 165 15 180 0 195 345 210 330 225 315 240 300 255 270 285
350.0 325.0 300.0 275.0 250.0 225.0 200.0 175.0 150.0 125.0 100.0 75.0 50.0 25.0 0.0 -25.0 -50.0 -75.0 -100.0
0


Combined measurement - 6/20/2019 1:59 PM (0) OD
µm
mm
T
N
8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9
8 6 4 2 0 2 4 6 8 10
105 90 75 60 45 30 15 0 345 330 315 300 285 270 255 240 225 210 195 180 165 150 135 120
350.0 325.0 300.0 275.0 250.0 225.0 200.0 175.0 150.0 125.0 100.0 75.0 50.0 25.0 0.0 -25.0 -50.0 -75.0 -100.0 -125.0 -150.0 -175.0 -200.0 -225.0 -250.0 -275.0
0 -1 -2 -3 -4 -5
-12 -10 -8 -6 -4 -2 0 2 4 6 8 10

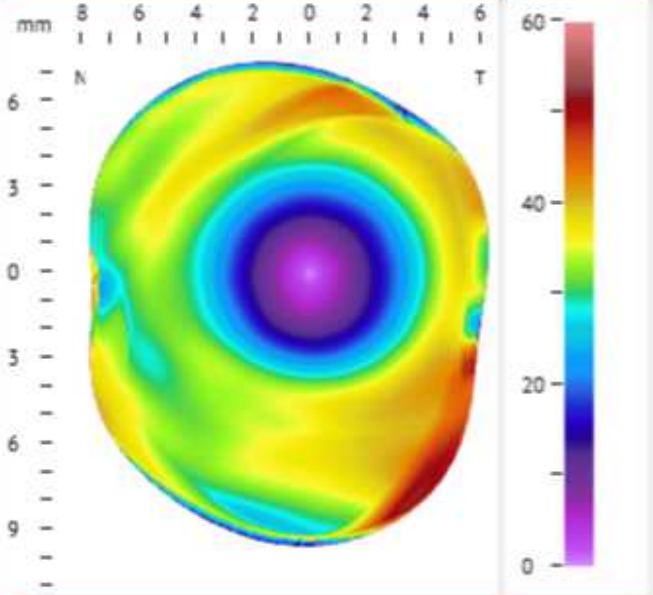
Combined measurement - 8/21/2019 9:36 AM (0) OS

Source



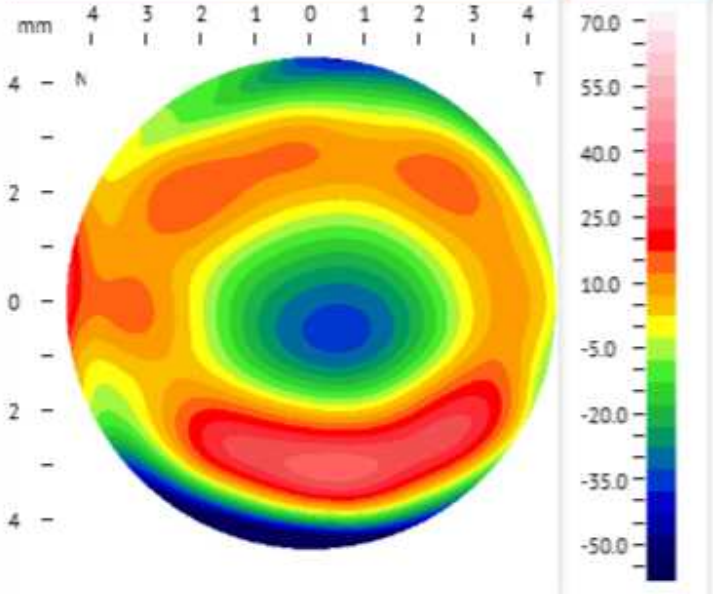
Tangent angles

° Ansi



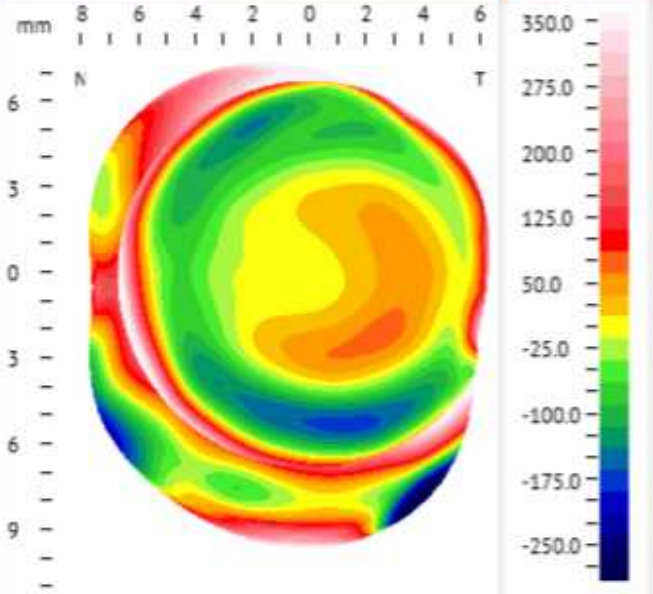
Corneal elevation

µm



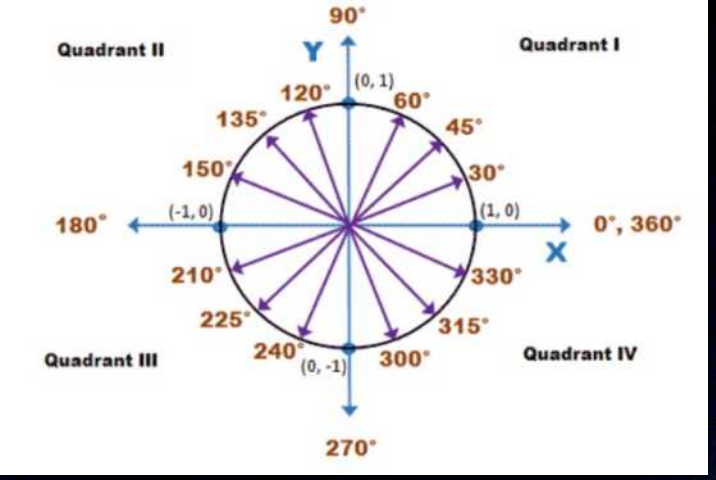
Bisphere elevation

µm

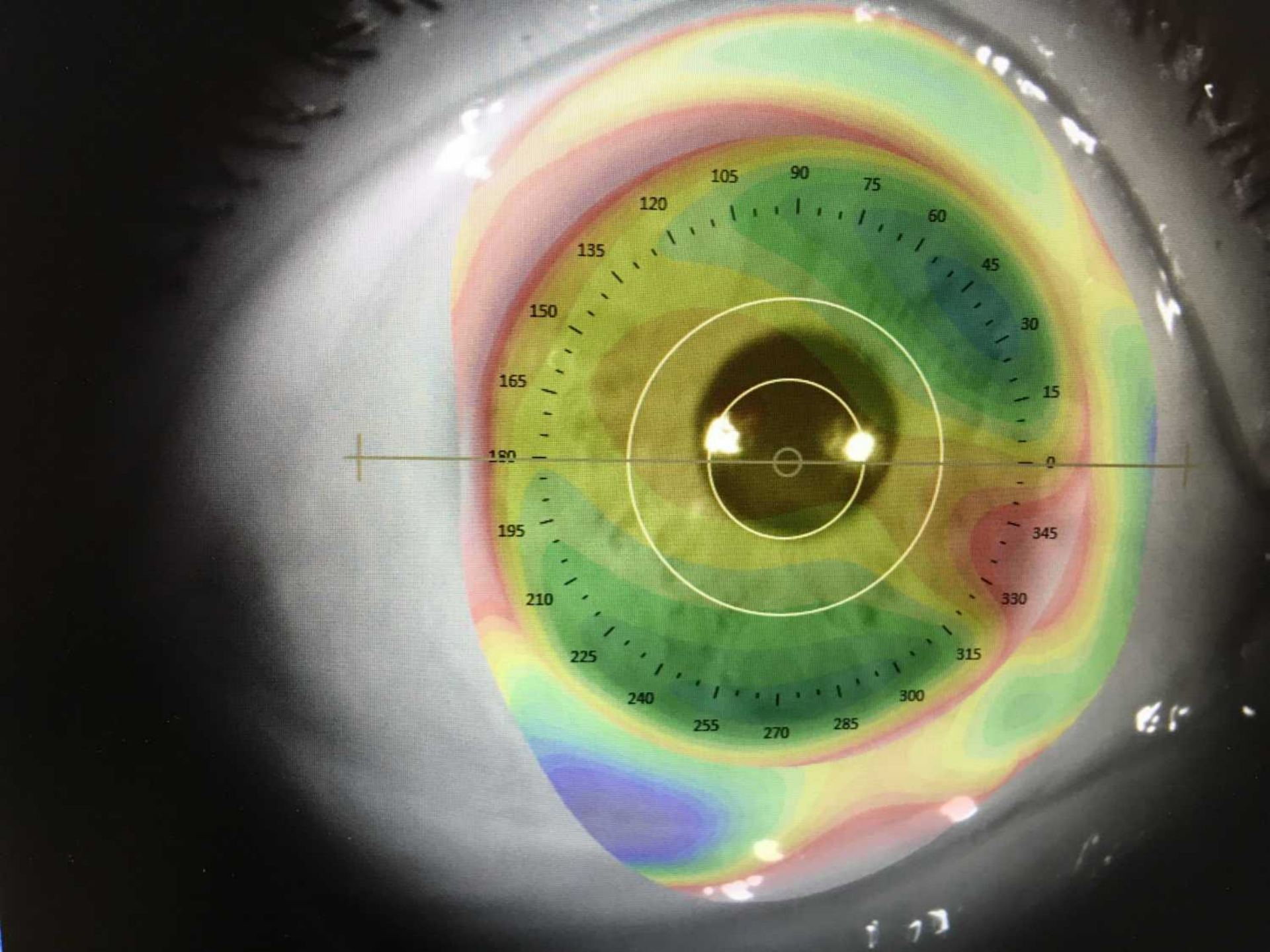


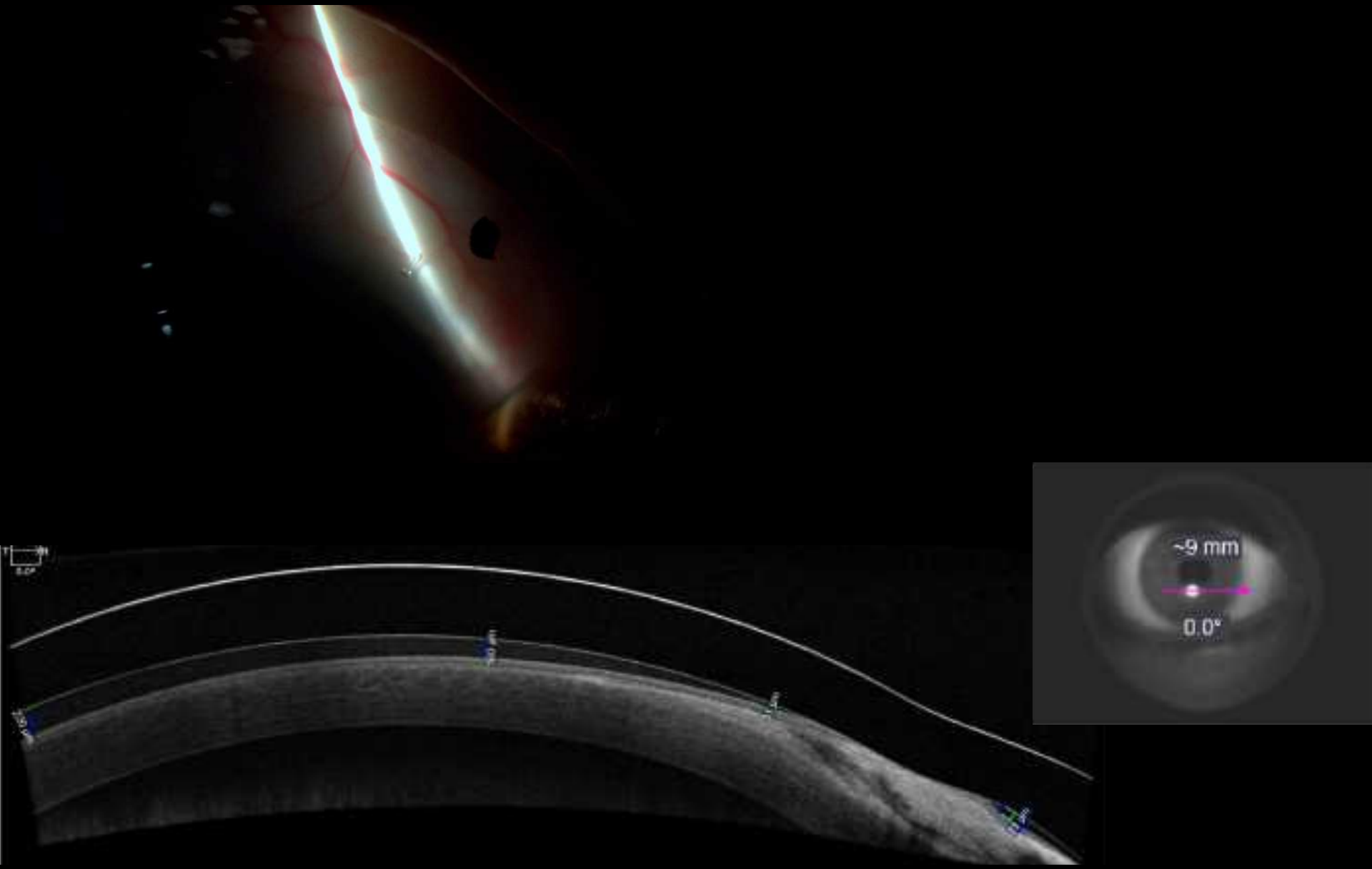

169°

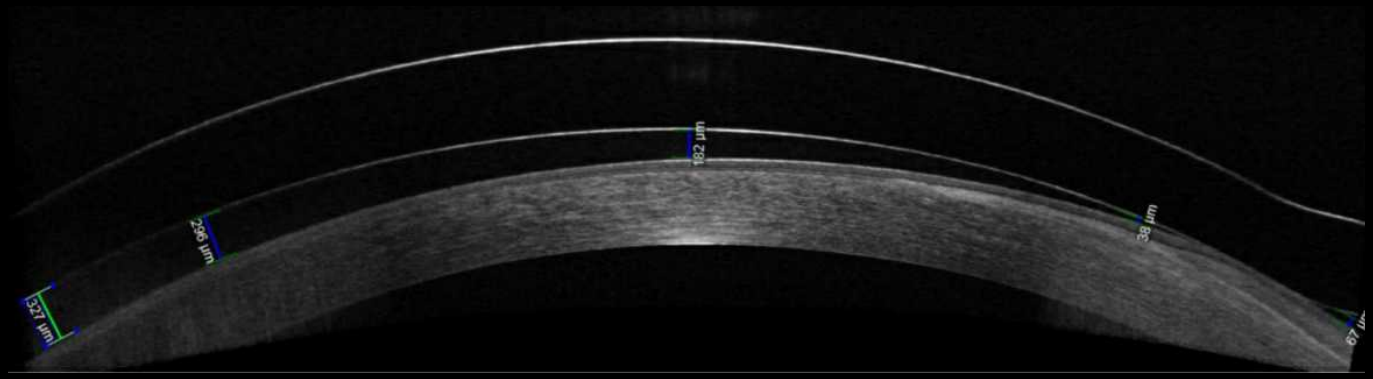
Axis Assistant App

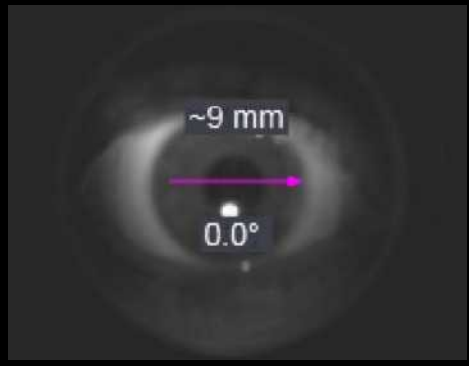

90°
Quadrant II
Y
Quadrant I
(0, 1)
120°
60°
135°
45°
150°
30°
180°
(-1, 0)
(1, 0)
0°, 360°
X
210°
330°
225°
315°
240°
300°
Quadrant III
(0, -1)
Quadrant IV
270°

Axis 338

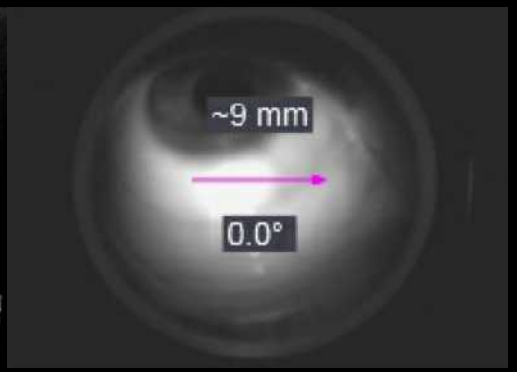

105
90
75
120
60
135
45
150
30
165
15
180
0
195
345
210
330
225
315
240
300
255
270
285

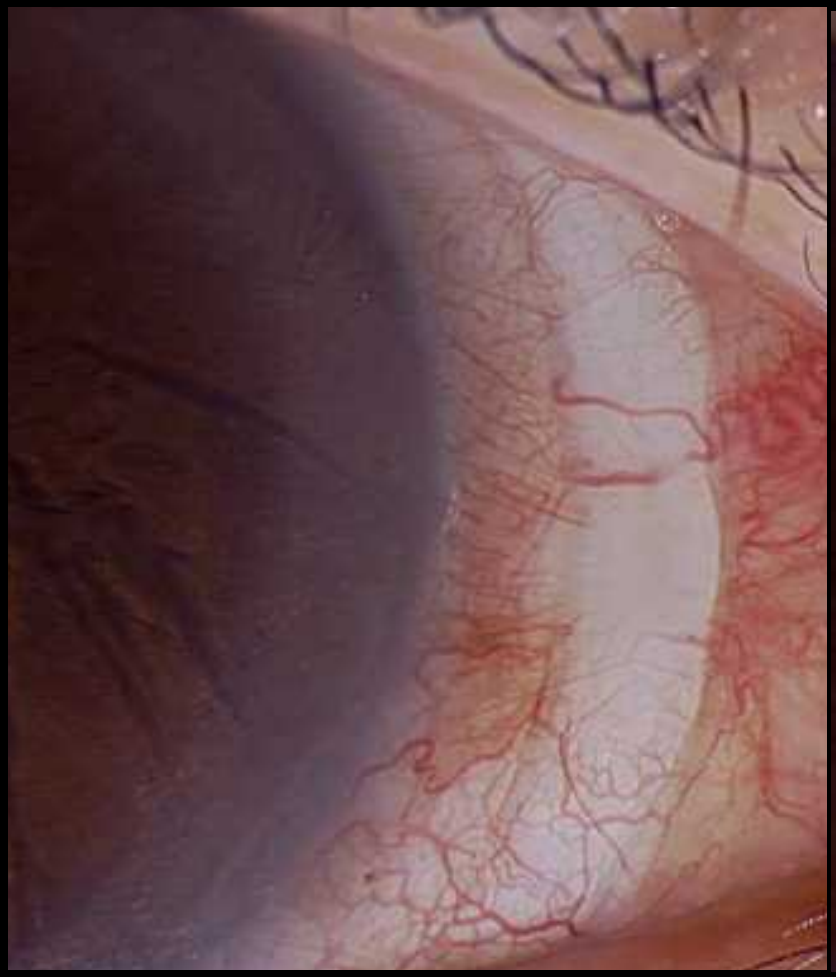
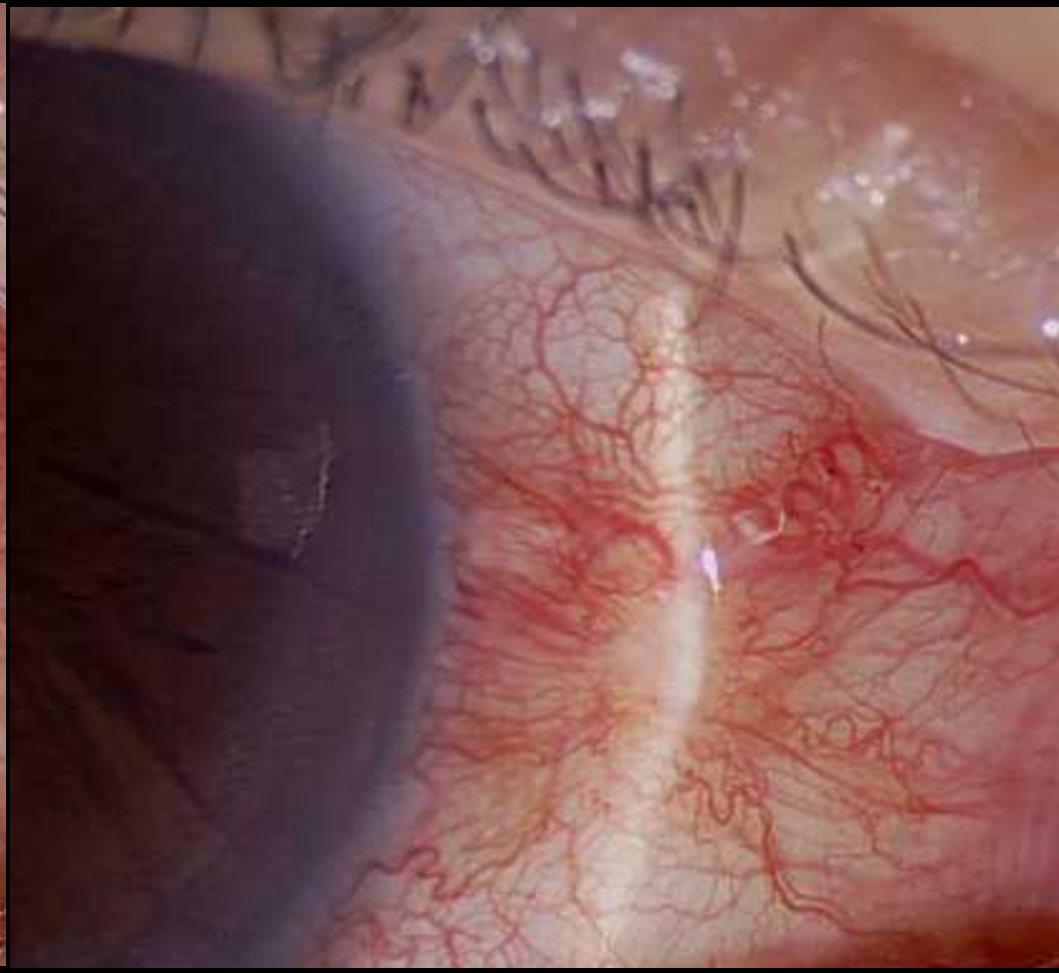

~9 mm
0.0°

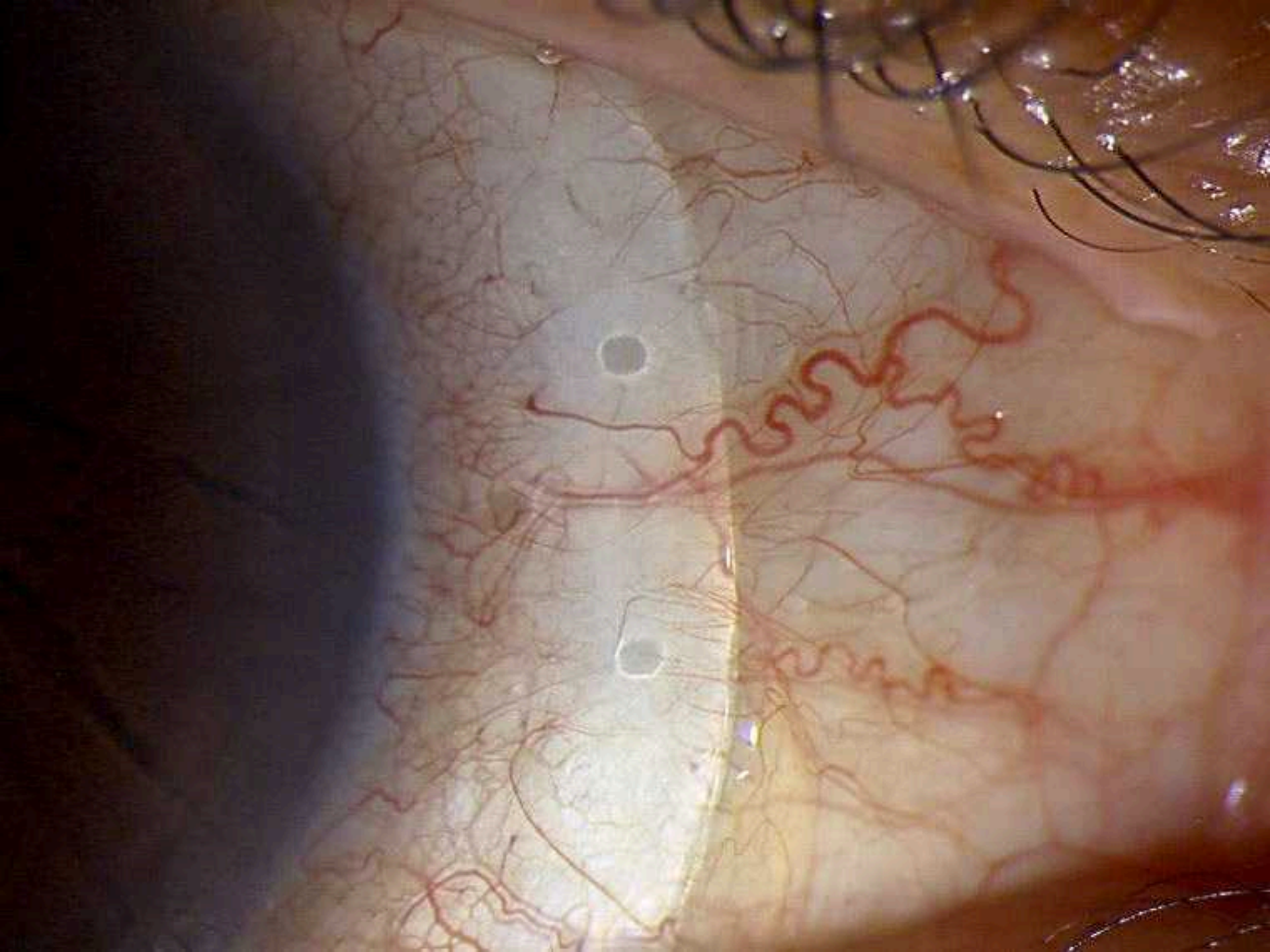

296 µm
182 µm
38 µm
521 µm

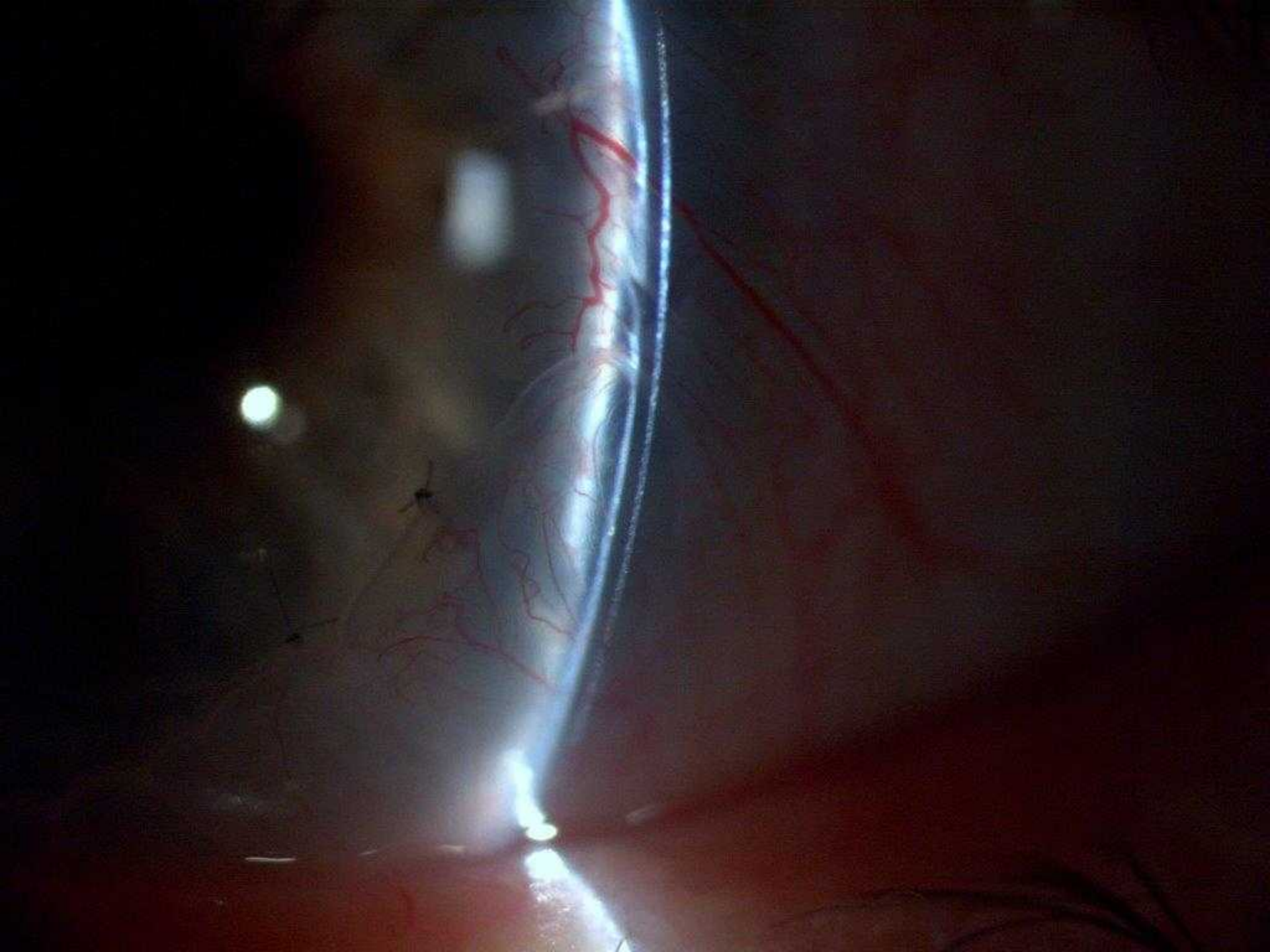

~9 mm
0.0°

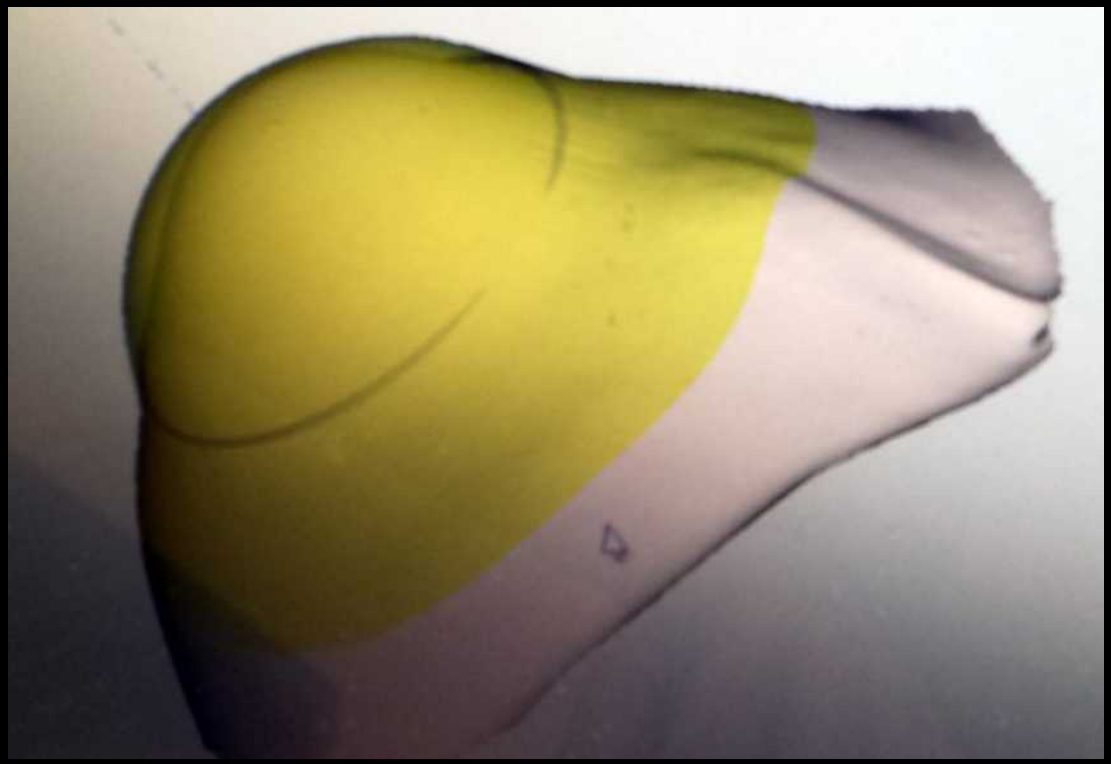

0.0°

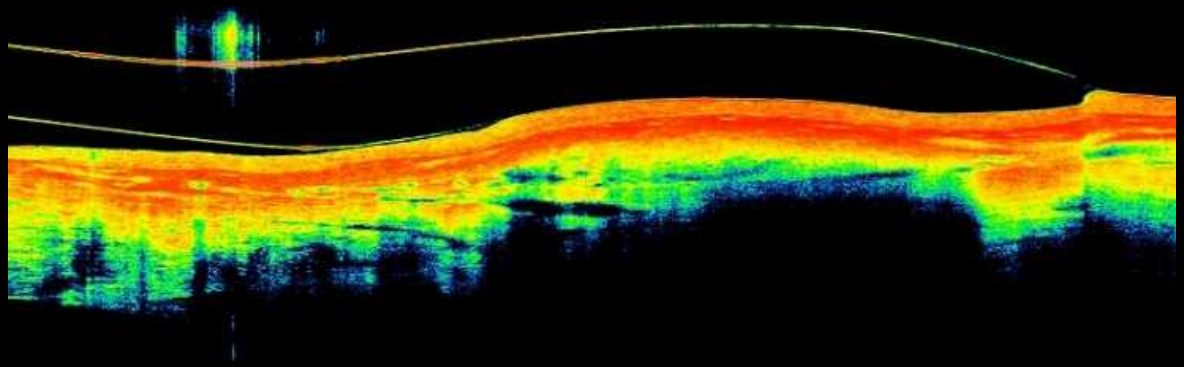

~9 mm
0.0°

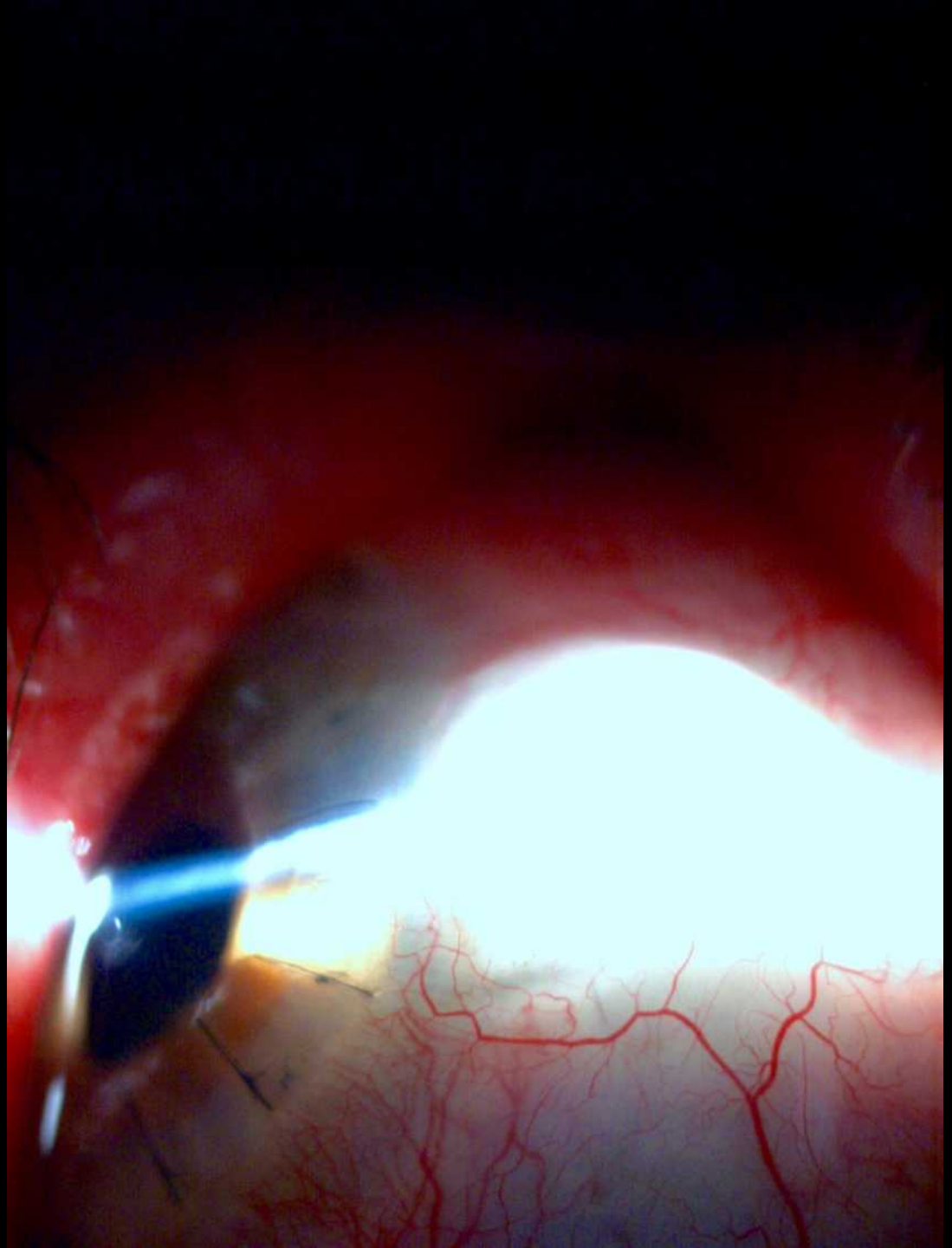









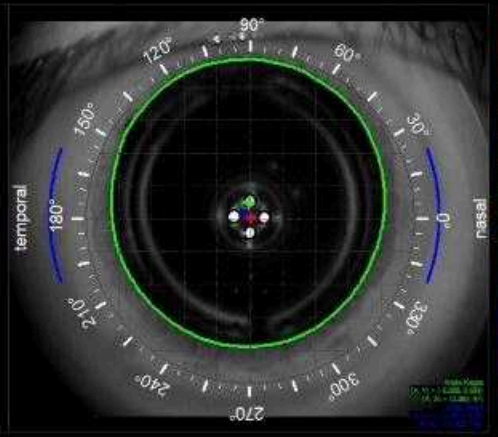


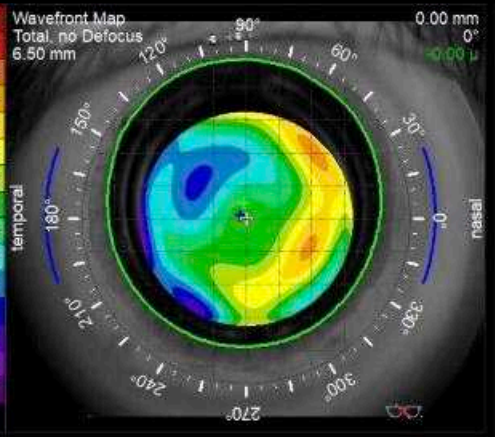


The "Perfect" Scleral Lens

Uncompromised vision

- Spherical
- Toric
- HOA
- Front surface asphericity
- Multifocal
- Any combination





02-07-2019 17:15:20 OD

Clinic
Physician
Operator

Limbus / Pupil / Scan	11.85 / 8.54 / 6.50 mm
Fixation Target Position	+ 2.50 D

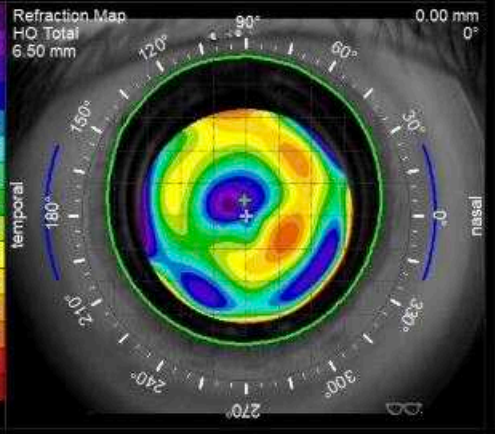
Tracey Refraction	+0.87 D -0.25 D x 109°
+1.98 D	-0.39 D x 133° @ D <= 2.50 mm /D = 12.00 mm
+0.93 D	-0.25 D x 109° @ D <= 4.00 mm /D = 12.00 mm
	@ D <= 8.00 mm /D = 12.00 mm
+1.04 D	-0.30 D x 147° @ D <= 6.50 mm /D = 12.00 mm

Root Mean Square @ D <= 6.50 mm

Total	1.850 µ
LO Total	1.404 µ
Defocus	- 1.365 µ
Astigmatism	0.329 µ x 57°
HO Total	1.204 µ
Coma	0.921 µ x 96°
Spherical	- 0.248 µ
Secondary Astigmatism	0.247 µ x 87°
Trefoil	0.275 µ x 43°

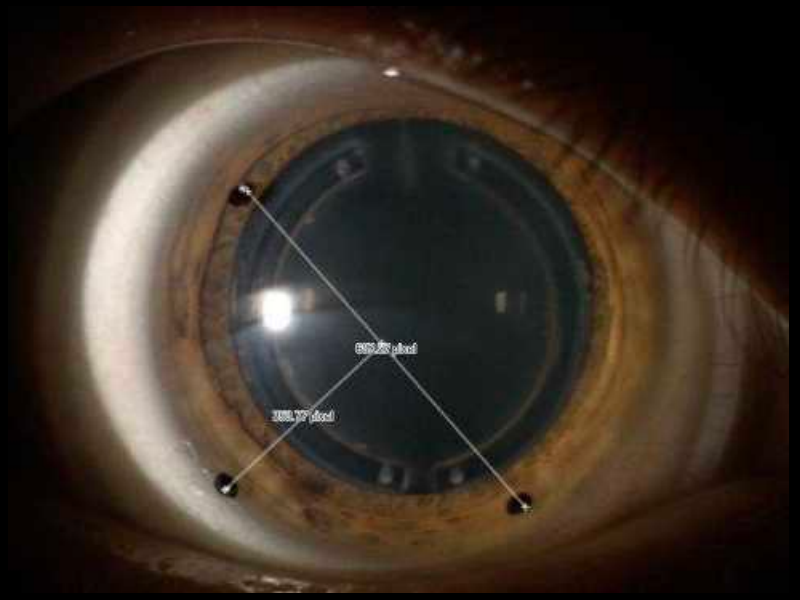
Root Mean Square HO Total 6.50 mm

z	n	m	Name	µ
3	2	-2	Astigmatism	0.000
4	2	0	Defocus	0.000
5	2	2	Astigmatism	0.000
6	3	-3	Trefoil	0.215
7	3	-1	Coma	0.910
8	3	1	Coma	0.921
9	3	3	Trefoil	0.170
10	4	-4	Tetrafoil	0.121
11	4	-2	Astigmatism	0.027
12	4	0	Spherical	0.248
13	4	2	Astigmatism	0.246
14	4	4	Tetrafoil	0.164
15	5	-5	Pentafoil	0.129
16	5	-3	Trefoil	0.078
17	5	-1	Coma	0.060
18	5	1	Coma	0.070
19	5	3	Trefoil	0.016
20	5	5	Pentafoil	0.070
21	6	-6	Hexafoil	0.098
22	6	-4	Tetrafoil	0.041
23	6	-2	Astigmatism	0.049
24	6	0	Spherical	0.136
25	6	2	Astigmatism	0.097
26	6	4	Tetrafoil	0.020
27	6	6	Hexafoil	0.150



Pupil size is larger than 6.00 mm.
Aligned on IR dots.
Angle Kappa Distance: 0.462 mm @ 97°
Angle Alpha Distance: 0.182 mm @ 156°

Version 6.2.0 2018-06-01.C



INTERNAL - RMS Total. no Defocus 3.00 mm

z	Name	µ	1
3	Astigmatism	0.122	
5	Astigmatism	0.120	
6	Trefoil	0.012	
7	Coma	0.009	
8	Coma	0.023	
9	Trefoil	0.002	
10	Tetrafoil	0.022	
11	Astigmatism	0.016	
12	Spherical	0.023	
13	Astigmatism	0.008	
14	Tetrafoil	0.024	

TOTAL EYE - RMS Total. no Defocus 3.00 mm

z	Name	µ	1
3	Astigmatism	0.148	
5	Astigmatism	0.062	
6	Trefoil	0.013	
7	Coma	0.009	
8	Coma	0.017	
9	Trefoil	0.017	
10	Tetrafoil	0.018	
11	Astigmatism	0.017	
12	Spherical	0.032	
13	Astigmatism	0.014	
14	Tetrafoil	0.025	

05-06-2019 16:28:04 **OD**

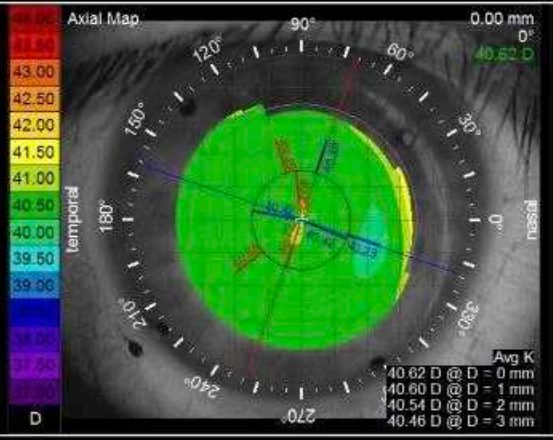
Pupil 5.72 mm / Scan 3.00 mm

Tracey Refraction	-1.50 D -0.75 D x 124°
2.00 mm	-1.13 D -0.96 D x 130°
5.00 mm	
6.00 mm	
3.00 mm	-1.48 D -0.73 D x 124°
HO Total @ D <= 3.00 mm	0.069 µ
Coma	0.019 µ x 27°
Spherical Aberration	+ 0.032 µ
Trefoil	0.022 µ x 12°
Angle Alpha D =	0.167 mm @ 148°

Averaged Exam

CORNEA - RMS Total. no Defocus 3.00 mm

z	Name	µ	1
3	Astigmatism	0.026	
5	Astigmatism	0.058	
6	Trefoil	0.001	
7	Coma	0.000	
8	Coma	0.006	
9	Trefoil	0.019	
10	Tetrafoil	0.004	
11	Astigmatism	0.001	
12	Spherical	0.009	
13	Astigmatism	0.006	
14	Tetrafoil	0.002	



05-06-2019 16:28:16 Manual **OD**

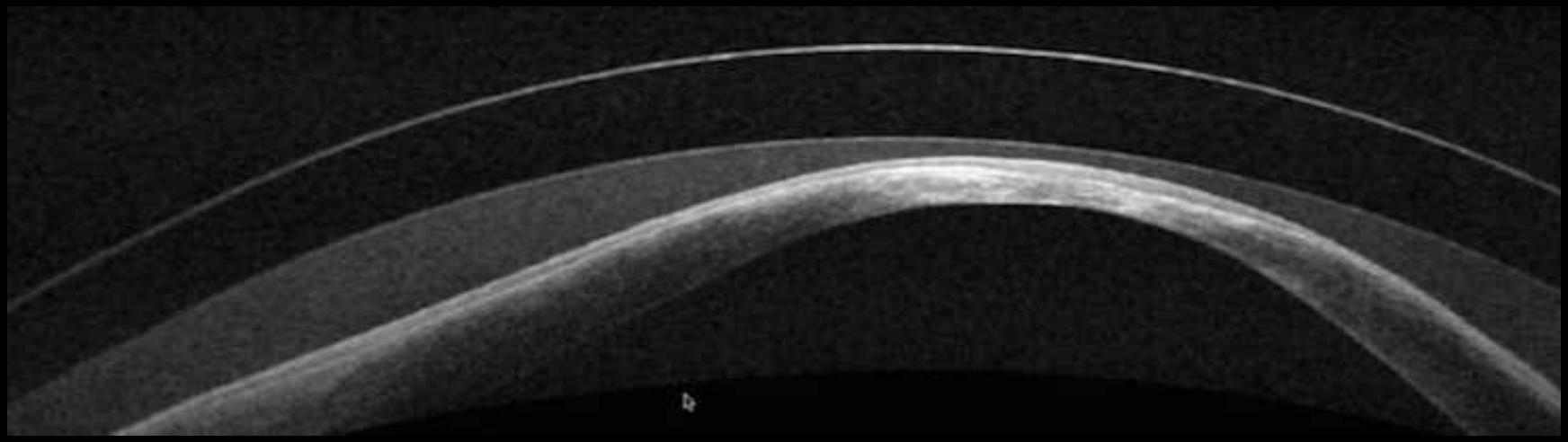
Refractive Power @ D <= 3.00 mm	
Steep	40.84 D x 83°
Flat	40.60 D x 163°
Astigmatism	0.24 D x 83°
Effective RP	40.73 D
Central Radius / Power	8.31 mm / 40.62 D
Corneal SphAb @ D = 6.00 mm	0.242 µ
I-S Axial Power @ D = 6.00 mm	0.01 D

with DigiForm

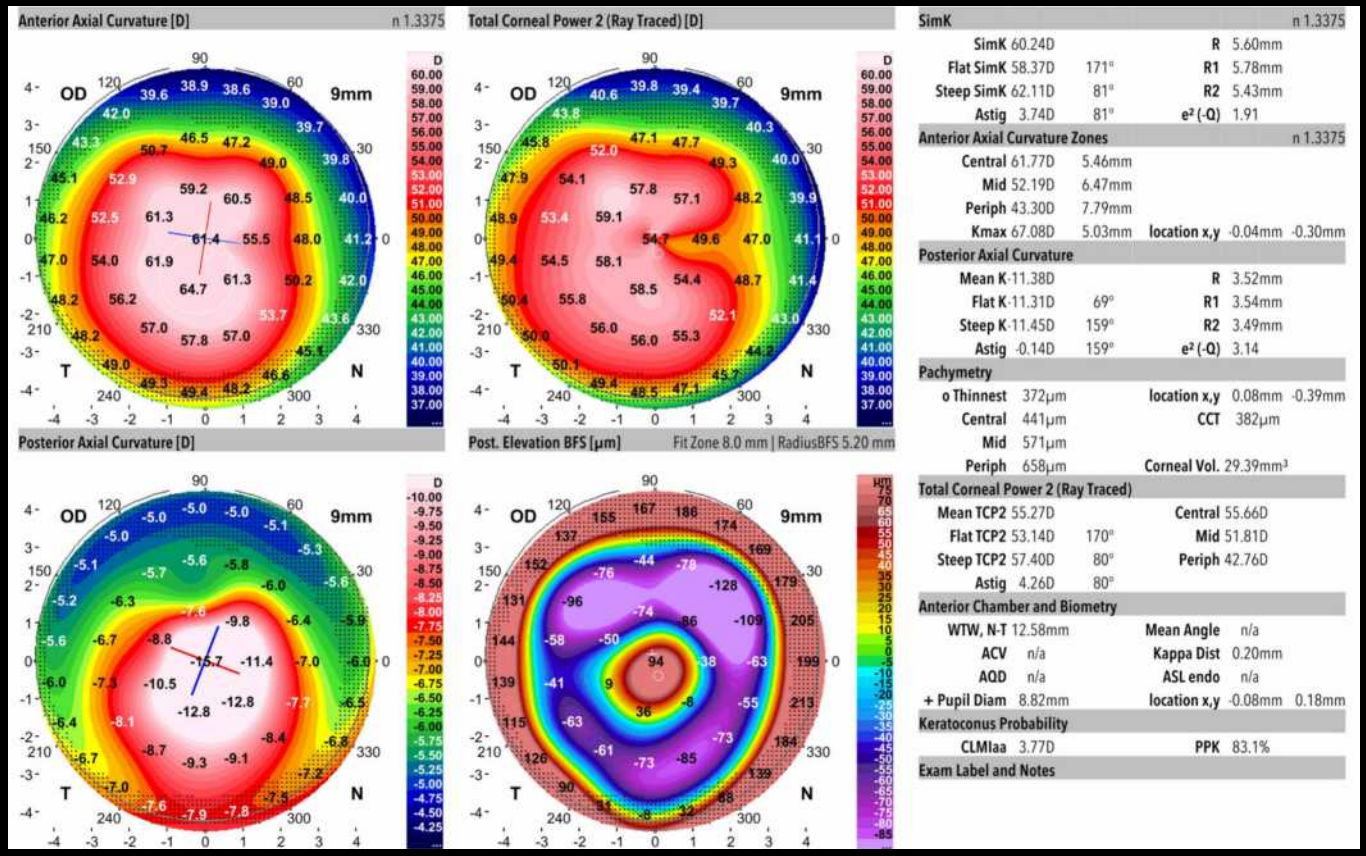
Version 6.2.0 2018-06-01 COMBOV

The "Perfect" Scleral Lens

Corneal alignment



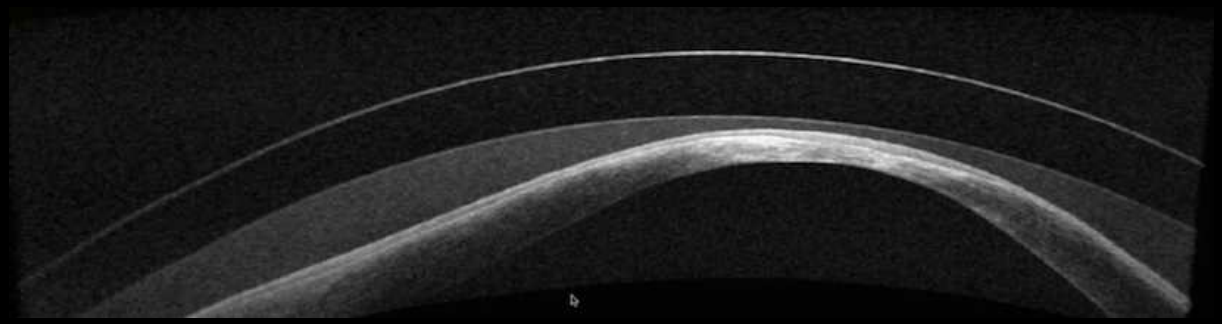

T
N
2.0°
0.131 mm
0.295 mm

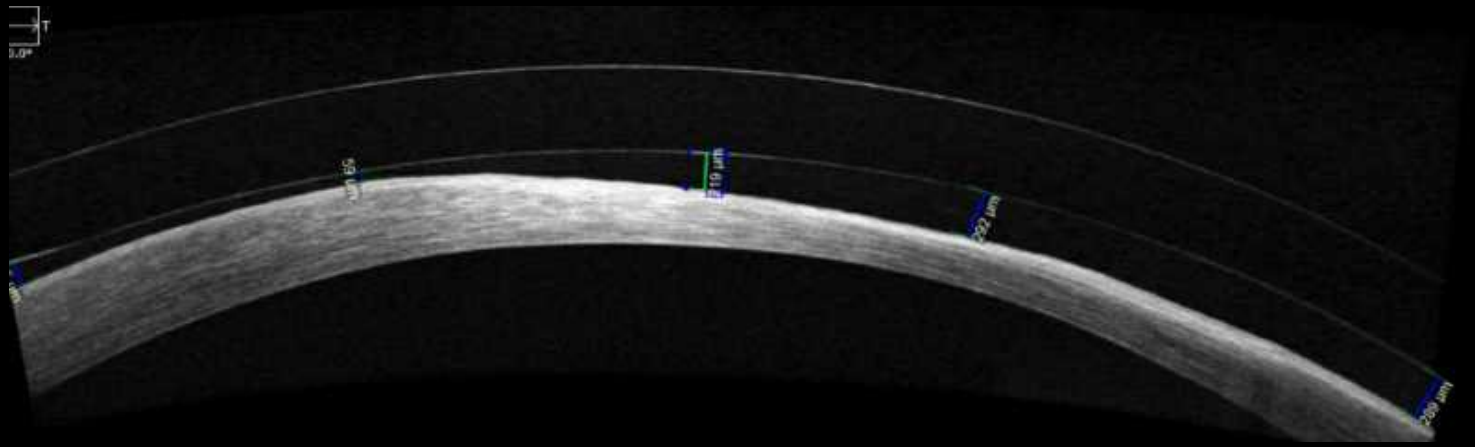

Anterior Axial Curvature [D]
n 1.3375
Total Corneal Power 2 (Ray Traced) [D]
Posterior Axial Curvature [D]
Post. Elevation BFS [µm]
Fit Zone 8.0 mm | RadiusBFS 5.20 mm
OD
9mm
T
N
SimK n 1.3375
SimK 60.24D
R 5.60mm
Flat SimK 58.37D 171°
R1 5.78mm
Steep SimK 62.11D 81°
R2 5.43mm
Astig 3.74D 81°
e² (-Q) 1.91
Anterior Axial Curvature Zones n 1.3375
Central 61.77D 5.46mm
Mid 52.19D 6.47mm
Periph 43.30D 7.79mm
Kmax 67.08D 5.03mm
location x,y -0.04mm -0.30mm
Posterior Axial Curvature
Mean K -11.38D
R 3.52mm
Flat K -11.31D 69°
R1 3.54mm
Steep K -11.45D 159°
R2 3.49mm
Astig -0.14D 159°
e² (-Q) 3.14
Pachymetry
Thinnest 372µm
location x,y 0.08mm -0.39mm
Central 441µm
CCT 382µm
Mid 571µm
Periph 658µm
Corneal Vol. 29.39mm³
Total Corneal Power 2 (Ray Traced)
Mean TCP2 55.27D
Central 55.66D
Flat TCP2 53.14D 170°
Mid 51.81D
Steep TCP2 57.40D 80°
Periph 42.76D
Astig 4.26D 80°
Anterior Chamber and Biometry
WTW, N-T 12.58mm
Mean Angle n/a
ACV n/a
Kappa Dist 0.20mm
AQD n/a
ASL endo n/a
+ Pupil Diam 8.82mm
location x,y -0.08mm 0.18mm
Keratoconus Probability
CLMIaa 3.77D
PPK 83.1%
Exam Label and Notes

The "Perfect" Scleral Lens

Corneal alignment

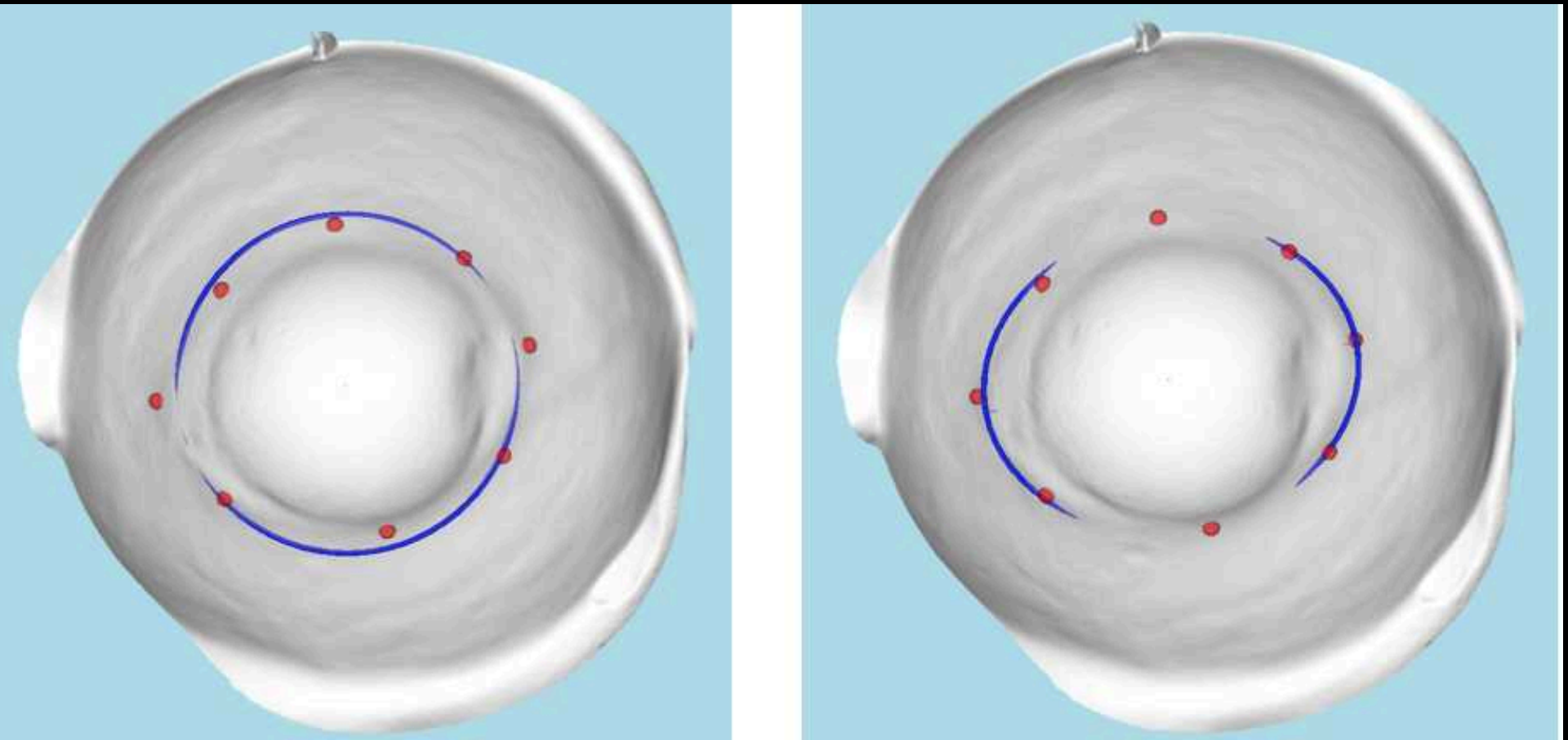
Prolate
Oblate
Custom



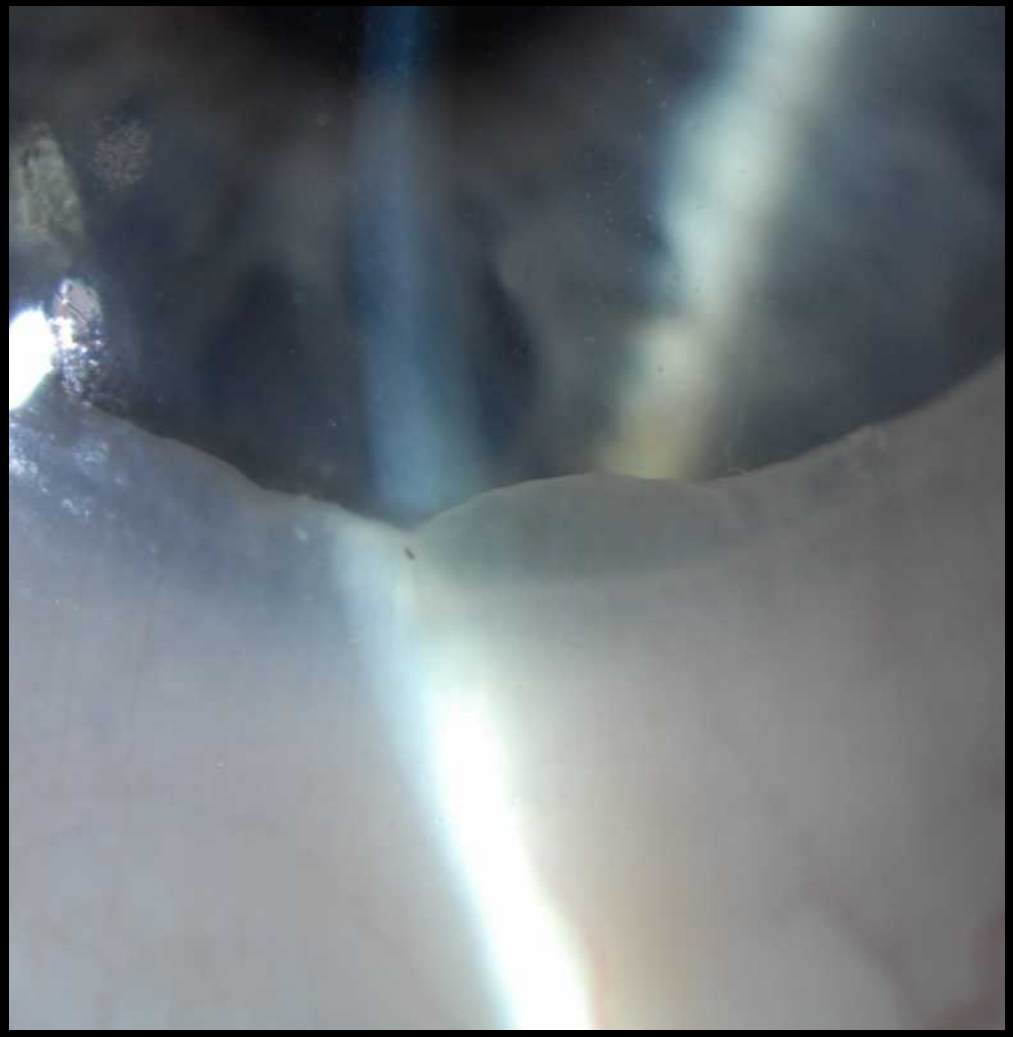


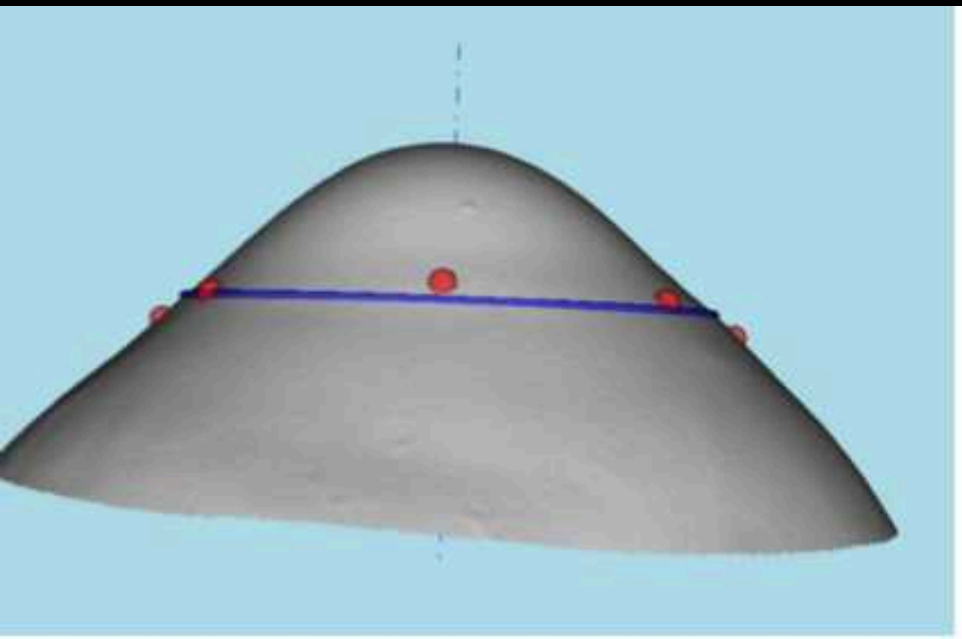
The "Perfect" Scleral Lens

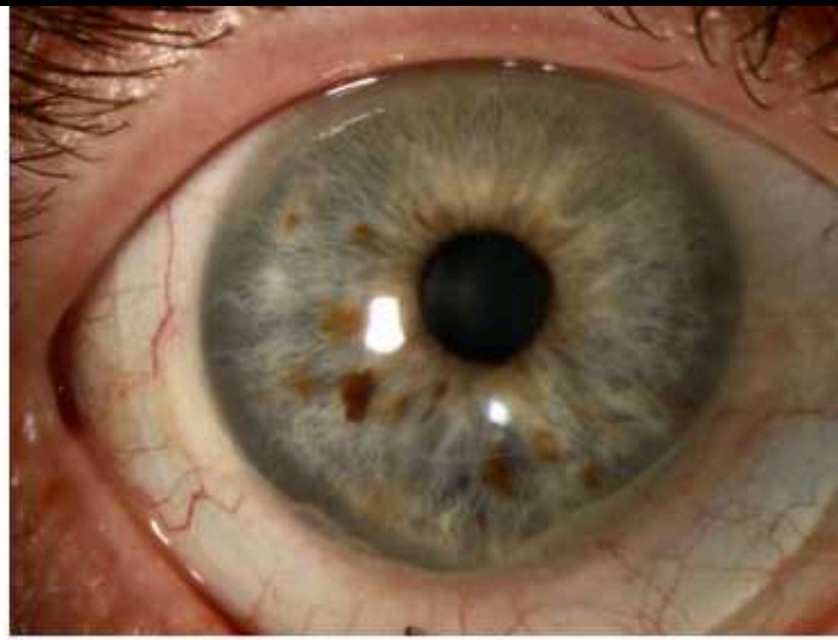
Limbal shape control

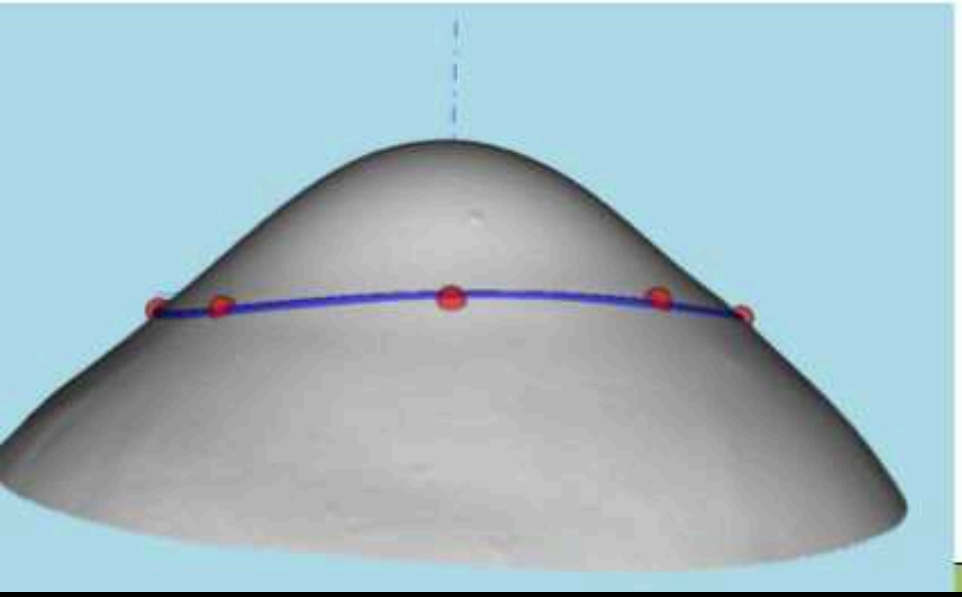


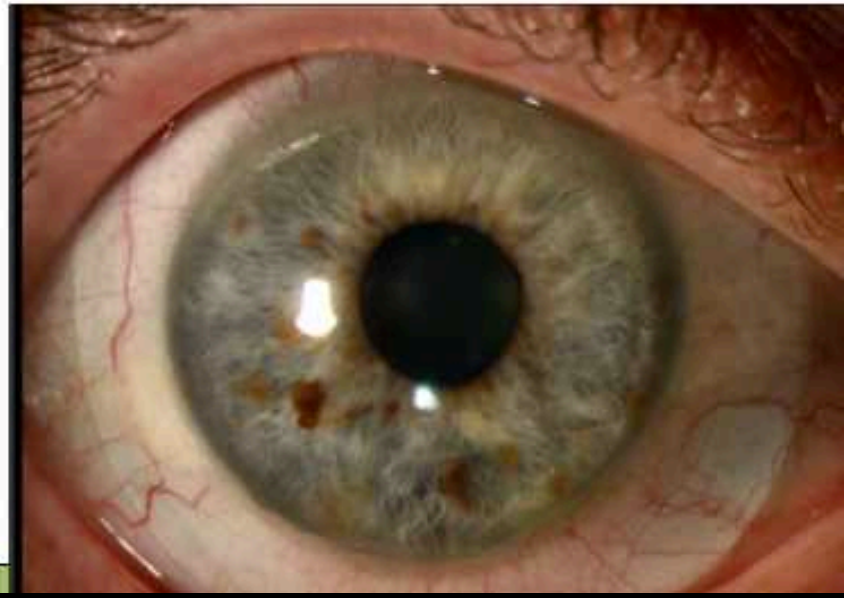
Conjunctivochalasis

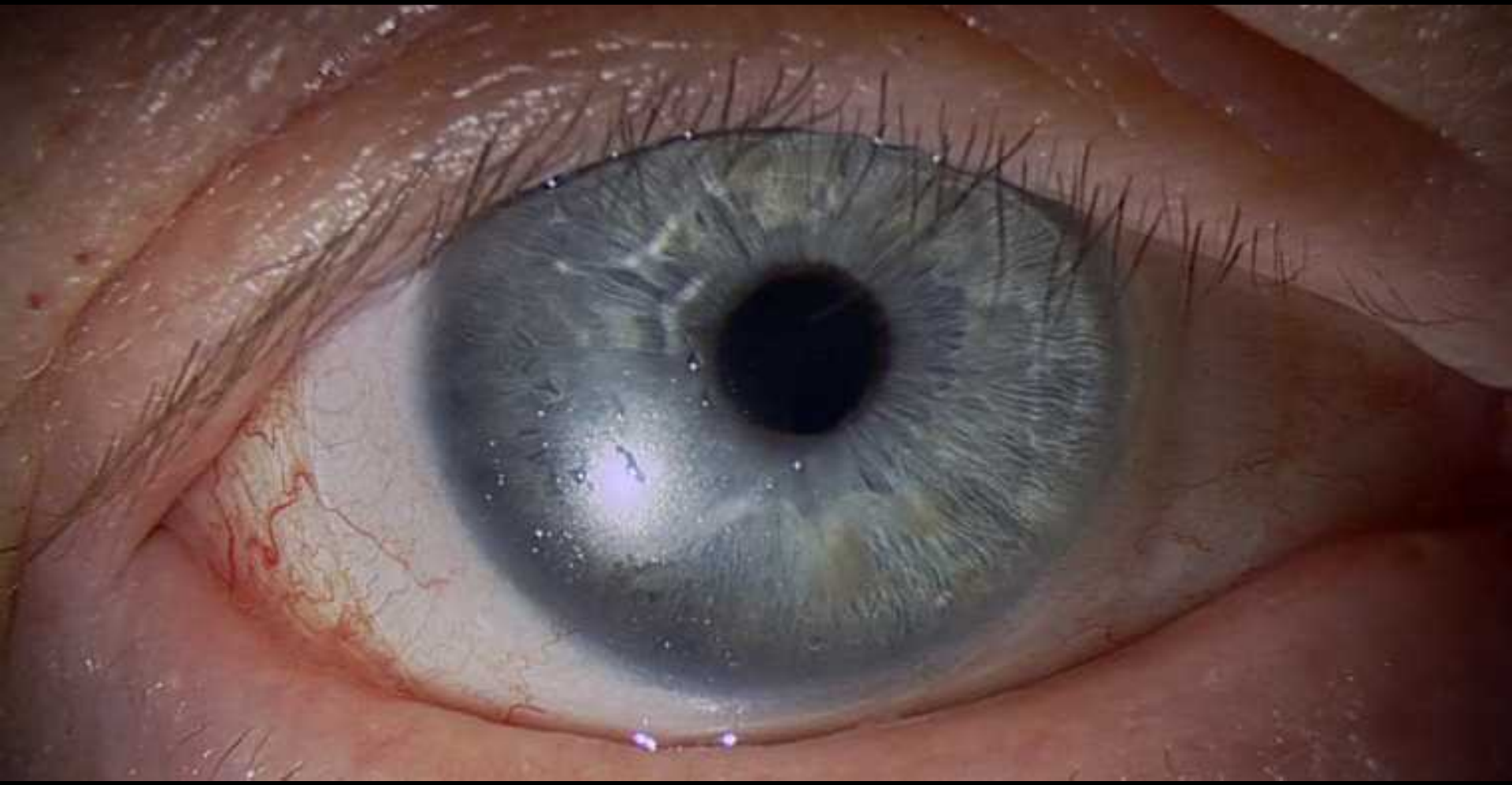




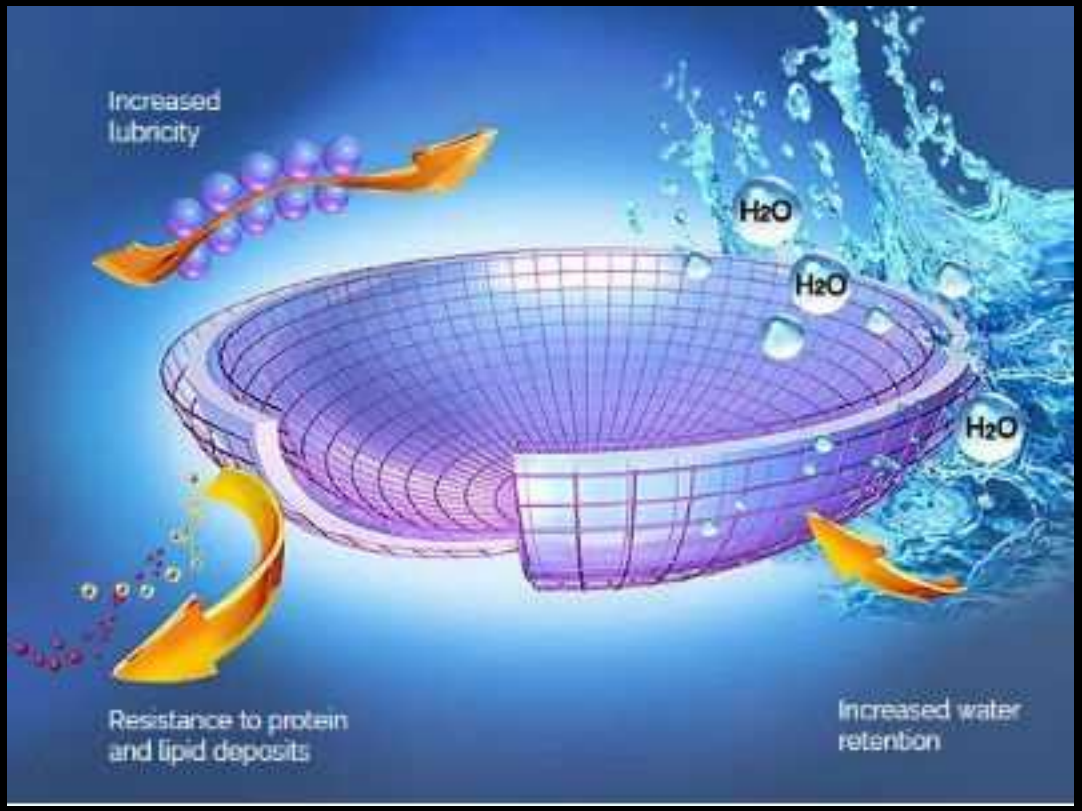






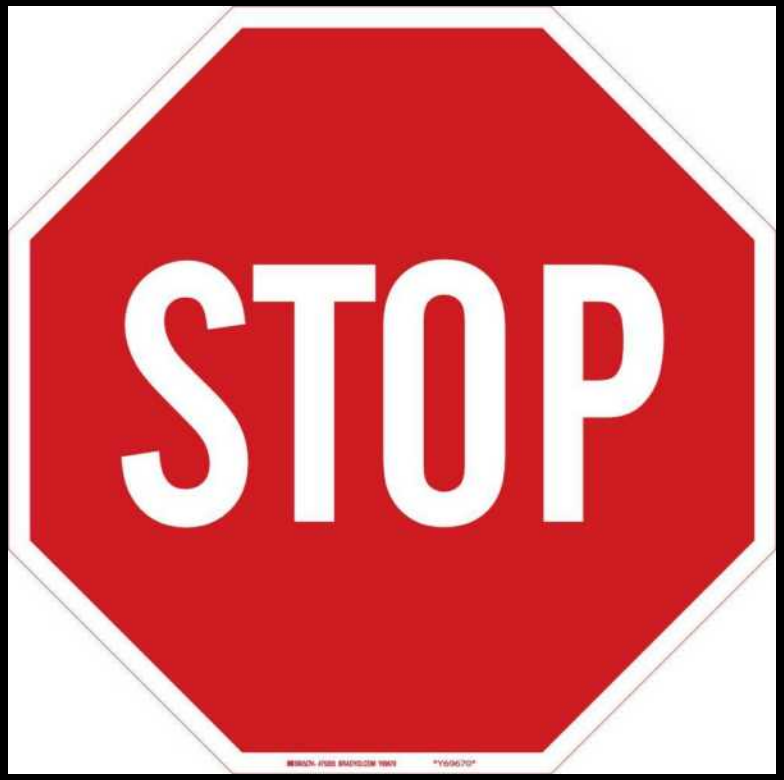


Hydra-PEG


Increased lubricity
H2O
H2O
H2O
Resistance to protein and lipid deposits
Increased water retention

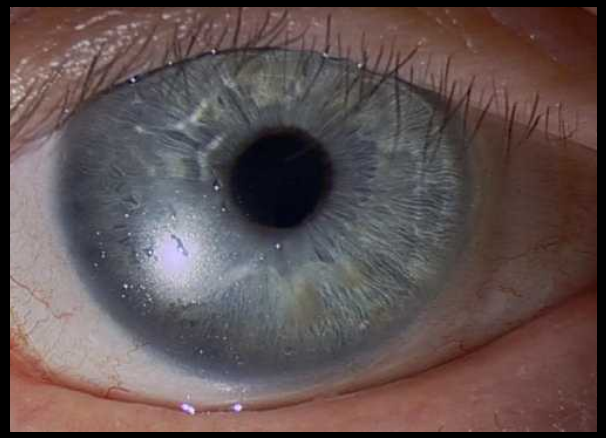
The "Perfect" Scleral Lens

Easily maintained



The "Perfect" Scleral Lens

Stays clean despite the environment



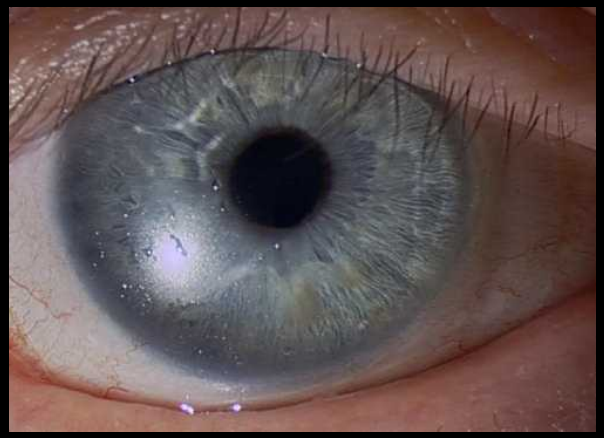
Environmental contamination of tear film

Use basic hand soaps

Avoid fragranced or moisturizing (most liquid) hand soaps

Environmental contamination of tear film

- Do not apply oil-based cosmetics or moisturizers to eyelids
- oils can spread along skin and contaminate the tear film



Clean and Disinfect applicators & plungers with isopropyl alcohol wipes