

Orthokeratology

My Personal Journey to Wave



Dr. Bill Tullo
Medical Director
OCULUS Inc.



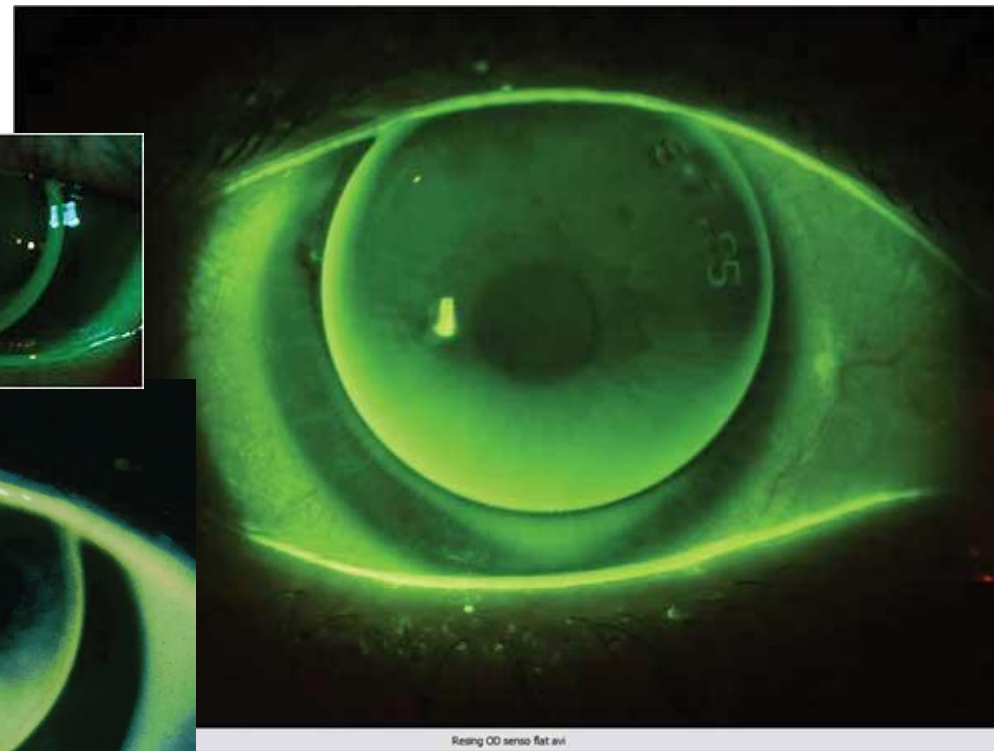
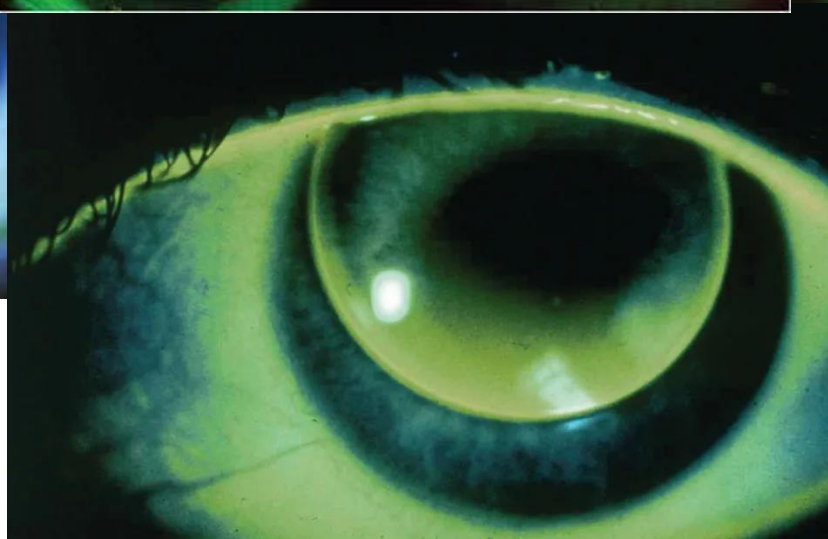
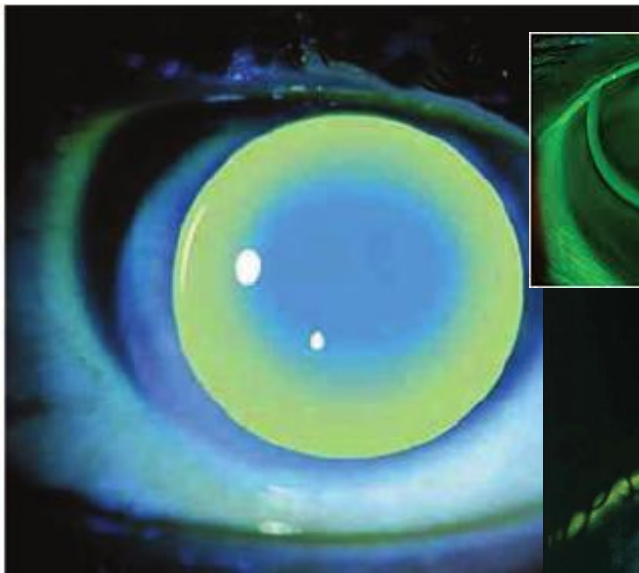
Beginning.....



	SPHERE	CYLINDER	CYLINDER	ADD
OD	-1.50	-1.00	098	+2.25
OS	-2.00	-0.50	068	+2.25

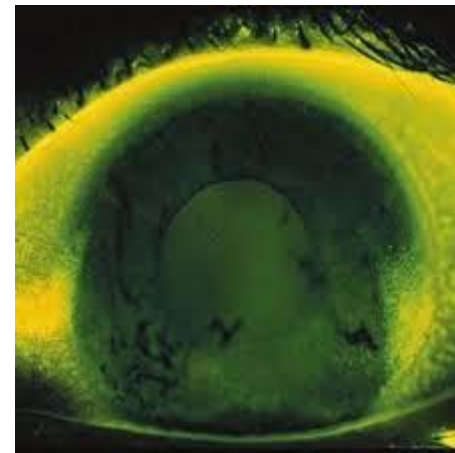
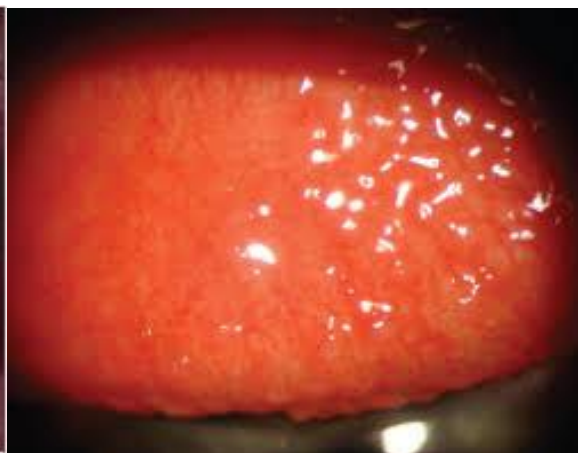
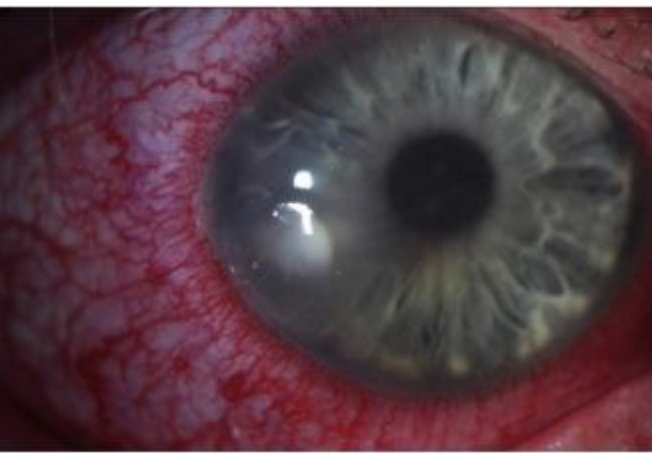
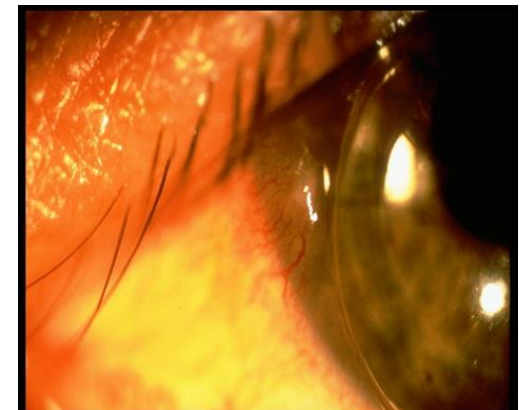
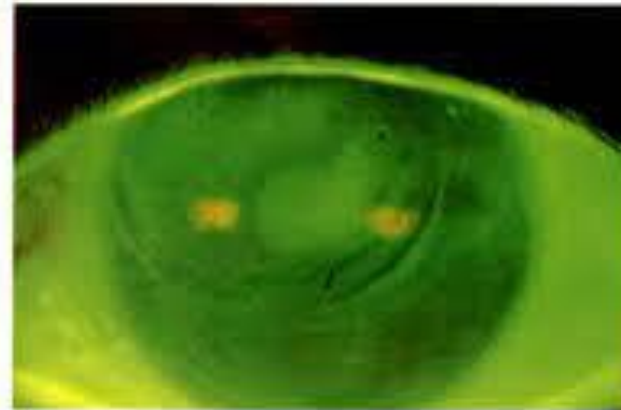
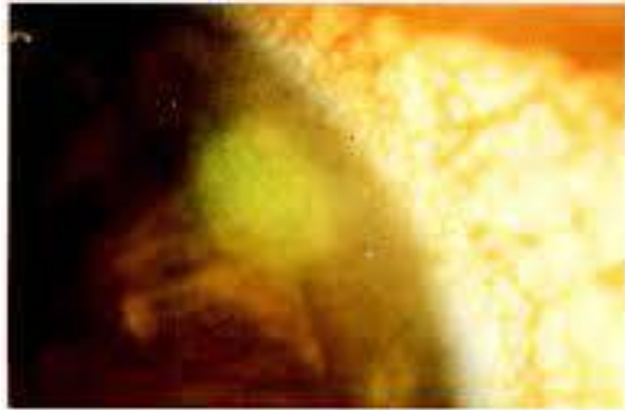


Flat...Flat...Flatter

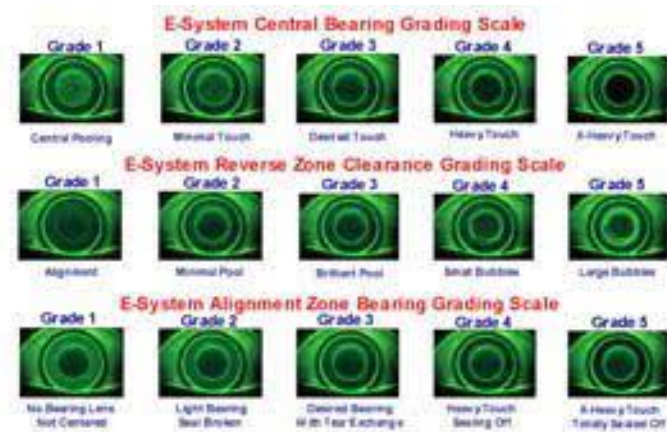


Reeing OD senso flat avl

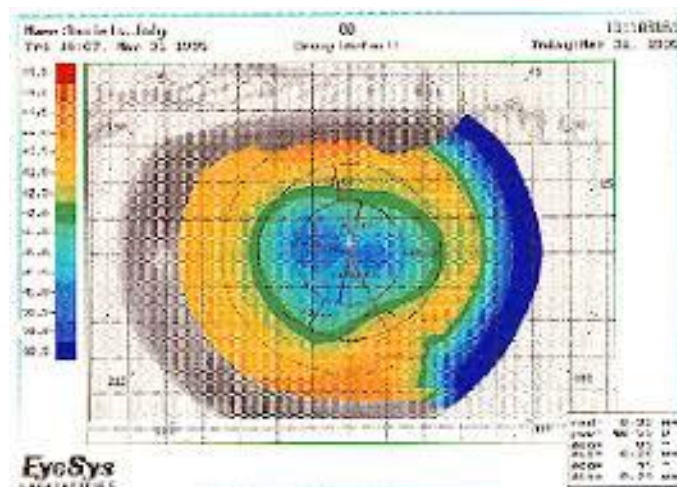
Complications!!



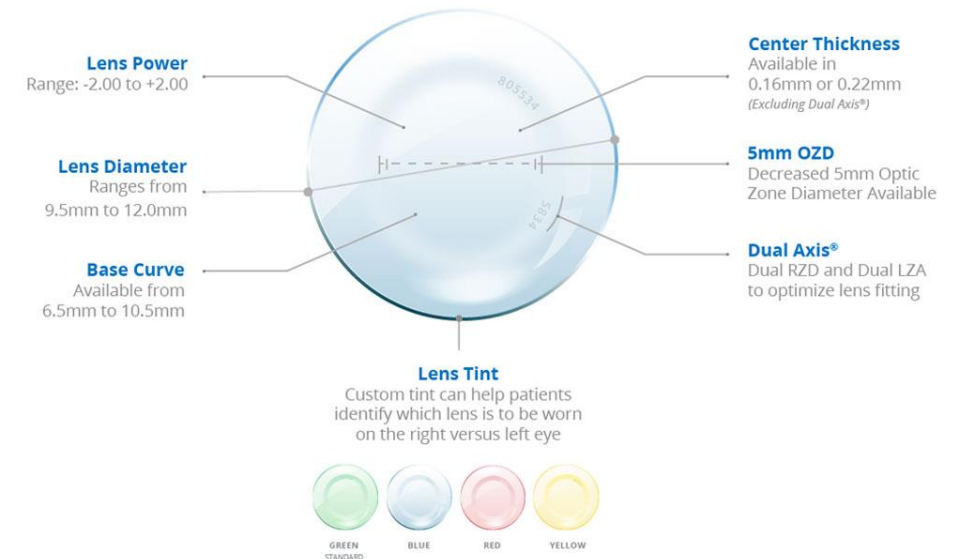
Contex OK Lenses



Corneal Topography



Paragon CRT



Limitations.....

- Residual astigmatism
- Low-moderate myopia
- Limited customizations
 - Oval OZ
 - Quadrant design

Wave NightLens® & Pentacam®

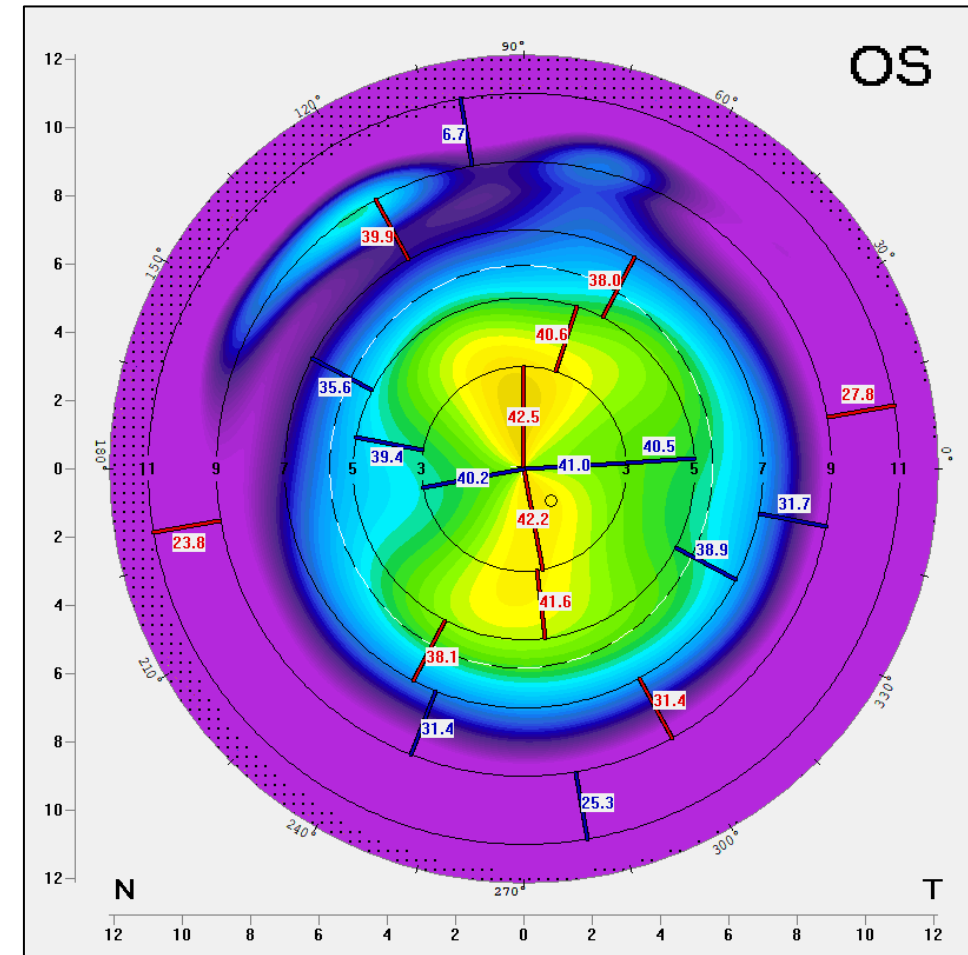
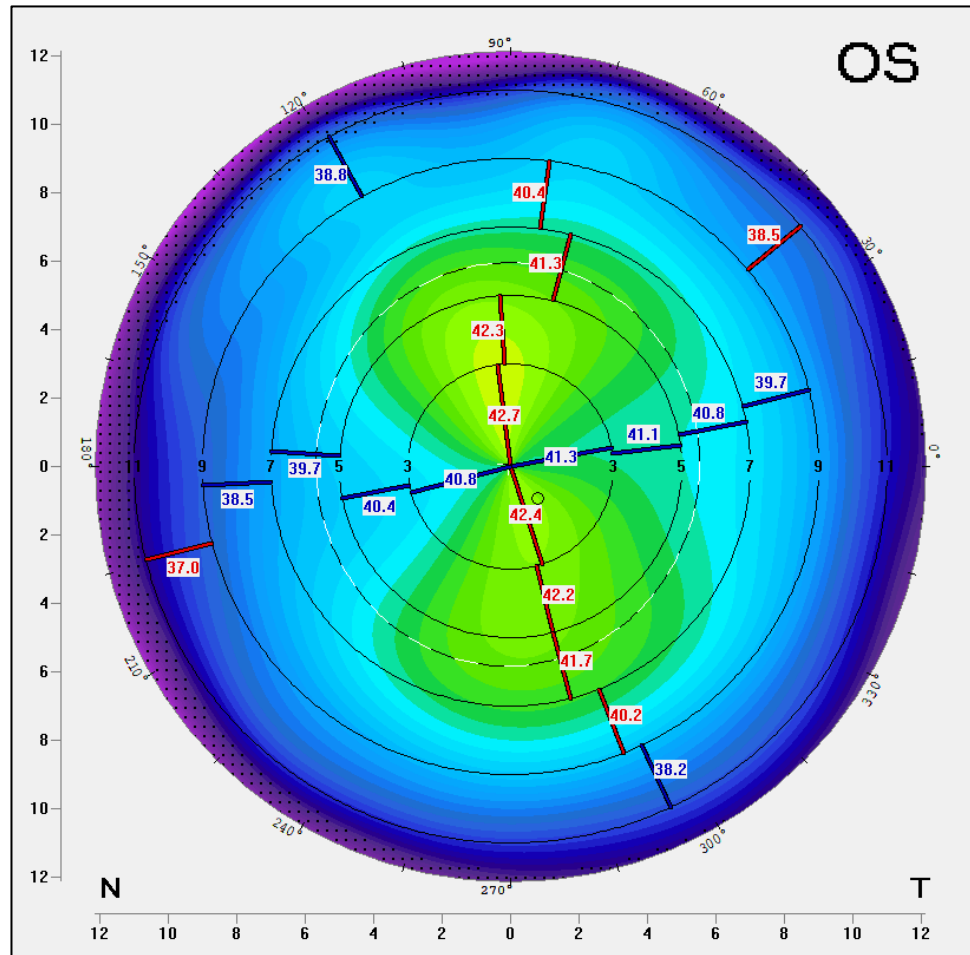


Pentacam® Design- Wave NightLens®

- Must have good maps
- No extrapolated data
- Repeatable



11.0mm of real data



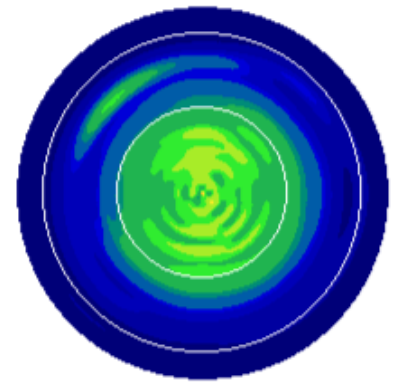


Topography

OS



- Dominant
- Non-dominant



N

T

Enter Refraction or Trial Lens Data

Spectacle Plane Refraction Error

Sphere (D)
 Cylinder (D)
 Axis (°)

Trial Lens Data and Over-Refraction

Base Curve (mm)
 Power (D)
 Sphere (D)
 Cylinder (D)
 Axis (°)

Corneal Diameter

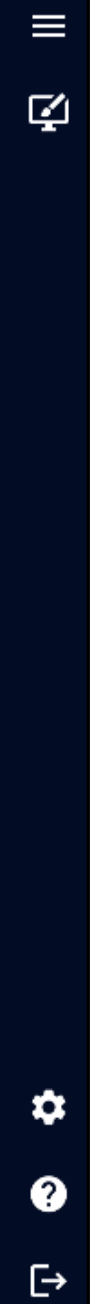
HVID (mm)

Pupil Size

Pupil (mm)

Cancel

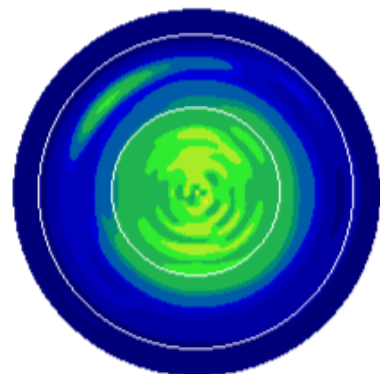
Next





Topography

OS



N

T



OD

OS

Select Lens Type and Parameters

NightLens

ScleraLens

CorneaLens

Custom Lens

Back

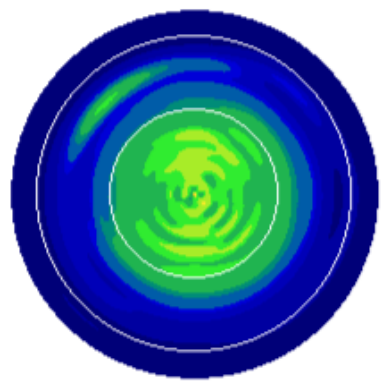
Start Design





Topography

OS



N

T

Select Lens Type and Parameters

Template Settings

Template:

OAD (Lens Diameter) (mm):

Target Power (D):

BOZD (Optic Zone) (mm):

IC Diameter (mm):

Central Clearance (μm):

Tear Layer Mode: Prism Axial Tangential

Lens Geometry: FForm GSym RSym

Edge Lift (mm):

Edge Angle (°):

Edge Thickness (ET) (mm):

Center Thickness (CT) (mm):

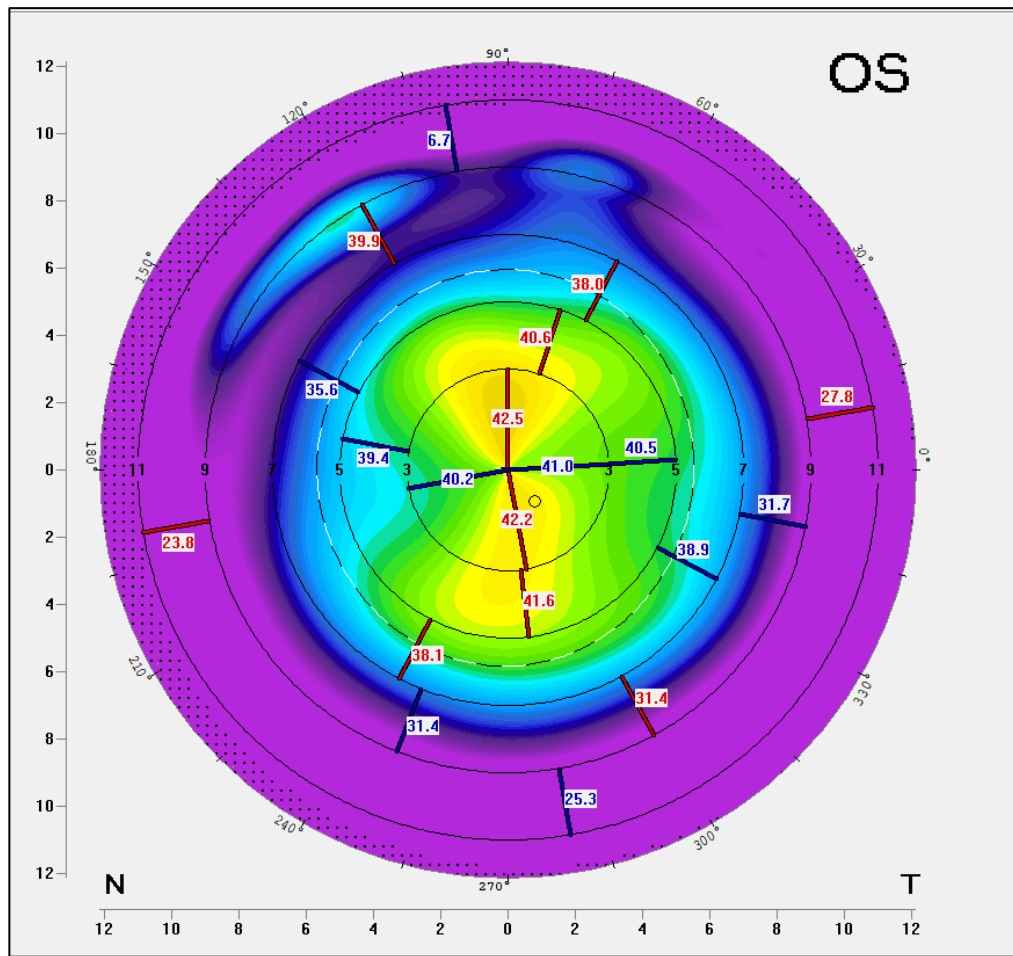
MB
 Node (D)
 S (D)



Initial Design - Common Modifications

- BOZD
 - Age
 - Amount of myopia control desired
- Alignment zone
 - Decrease sag 10 microns if flat periphery

Pentacam® - Wave Modifications



Modifications

Alignment Zone

Reverse Zone

Base Curve

Optic Zone Diameter

Modify Alignment Zone

Increase SAG

Decrease SAG

Amount (µm):

Area:

Cancel Apply

Patient CG

- 2014 - 9 yr old female
- OD -3.00 -1.50 x 169 K 42.37/43.87 x 173
- OS -3.00 -1.75 x 007 K 42.25/43.87 x 003

Patient CG

- Paragon CRT
- OD CRT 100 8.6 10.5 +0.50 525/.33
- OS CRT 100 8.6 10.5 +0.50 525/.33

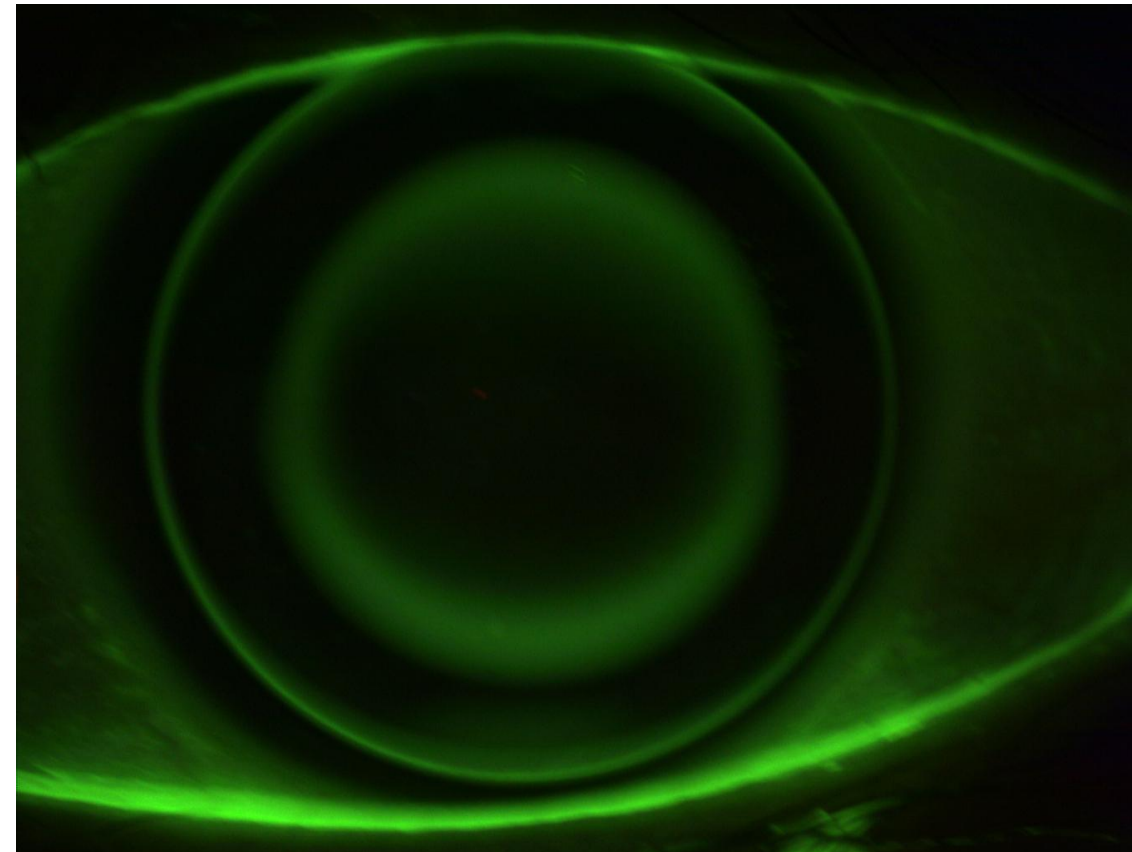
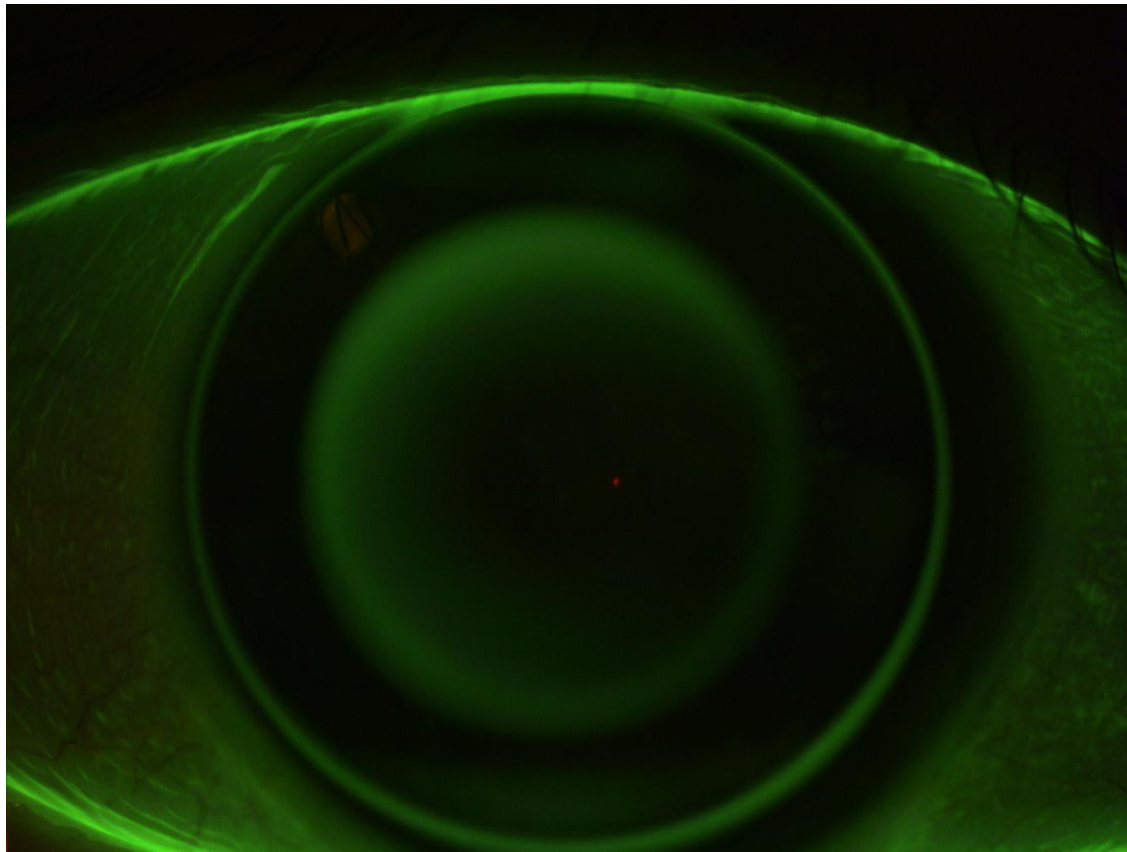
Patient CG

- 5 months later, 4 lens exchanges, 11 OV's
- OD UCVA 20/20-3 +0.75 -1.75 x 180 20/20-2
- OS UCVA 20/25+2 +1.00 -2.00 x 010 20/20-2
- Happy patient!! Happy doctor !?!

Patient CG 2021- 7 yrs later

- OD Paragon CRT DA 8.70 11.0 +0.50 525/600 .33
- OS Paragon CRT DA 8.70 11.0 +0.50 500/600 .32
- OD UCVA 20/25-1 +0.50 -1.50 x 173
- OS UCVA 20/25+1 +0.25 -1.75 x 009
- CC: Blur at night!

Paragon CRT



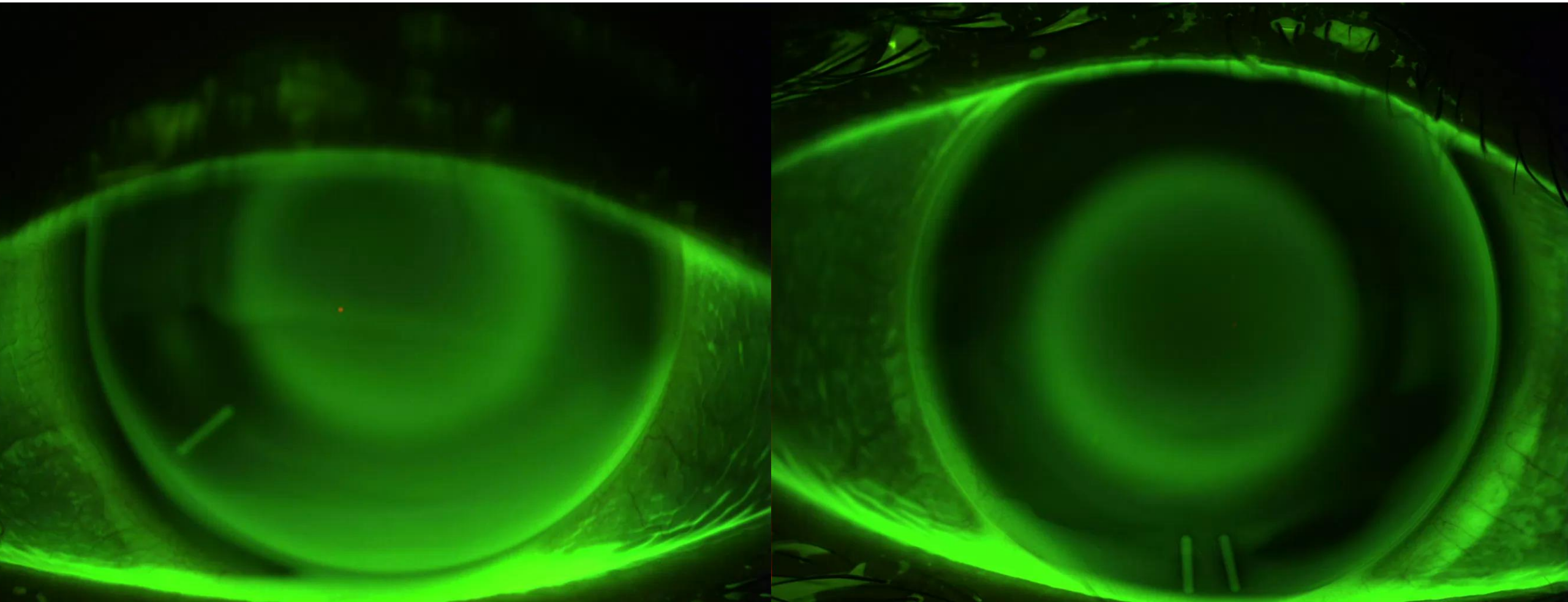
Patient CG

- Washout x 5 weeks refit to Wave NightLens using Pentacam data
- OD -2.50 -2.00 x 176
- OS -2.75 -2.00 x 007

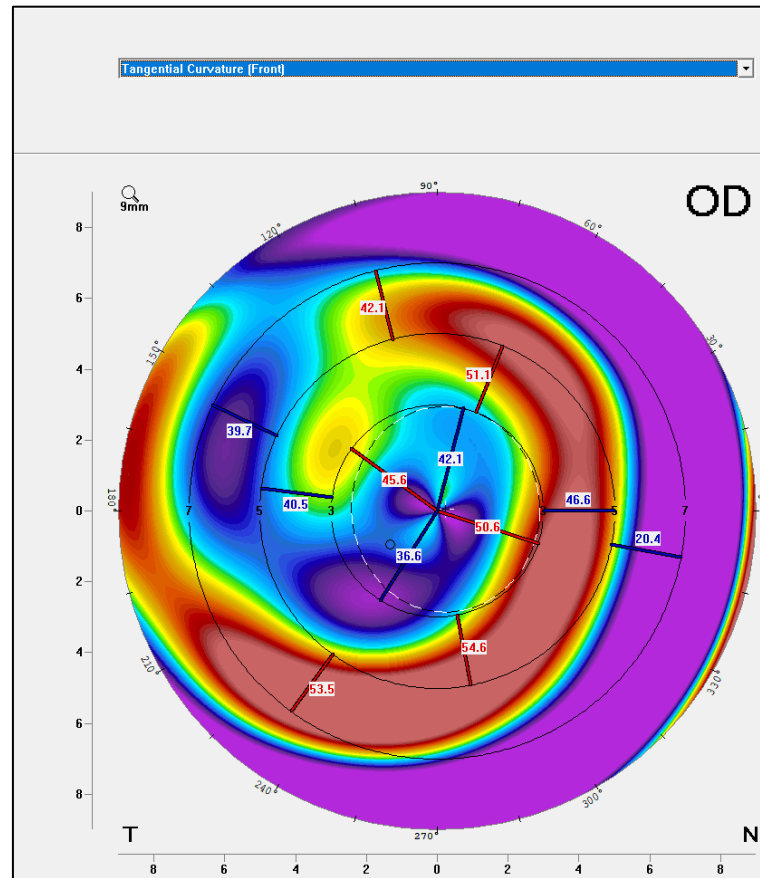
Patient CG

- Wave NightLens® refit-
- OD 8.79 12.0 +1.77 Boston XO2 Red
- OS 8.87 12.0 +1.71 Boston XO2 Yellow
- OD UCVA 20/20+ +0.25 -0.25 x 002
- OS UCVA 20/20+ +0.50 -0.50 x 178

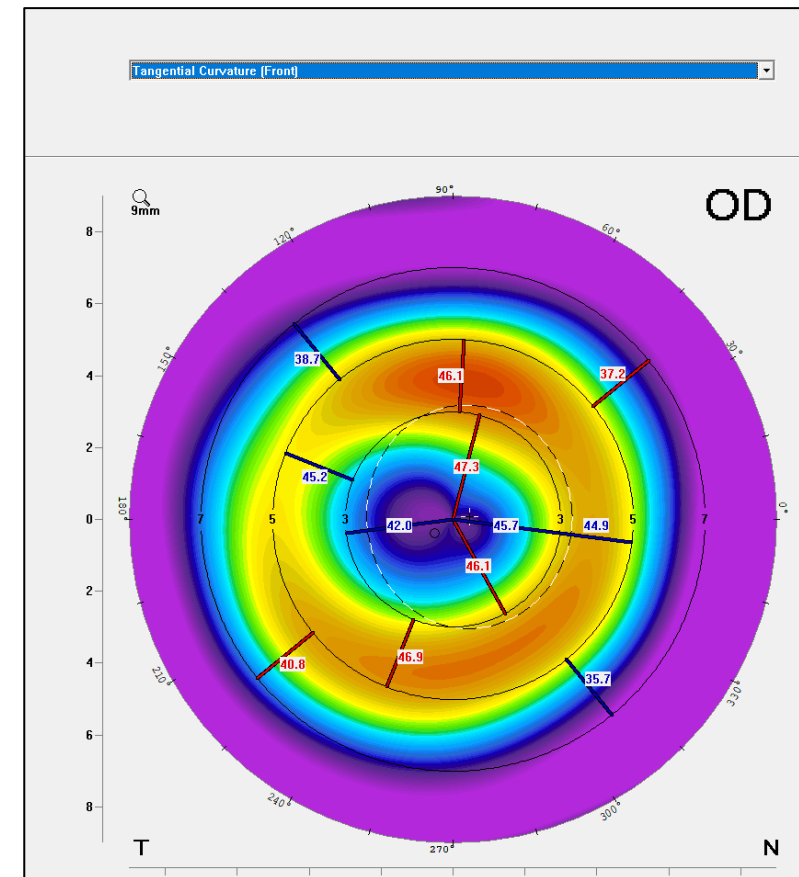
Wave NightLens



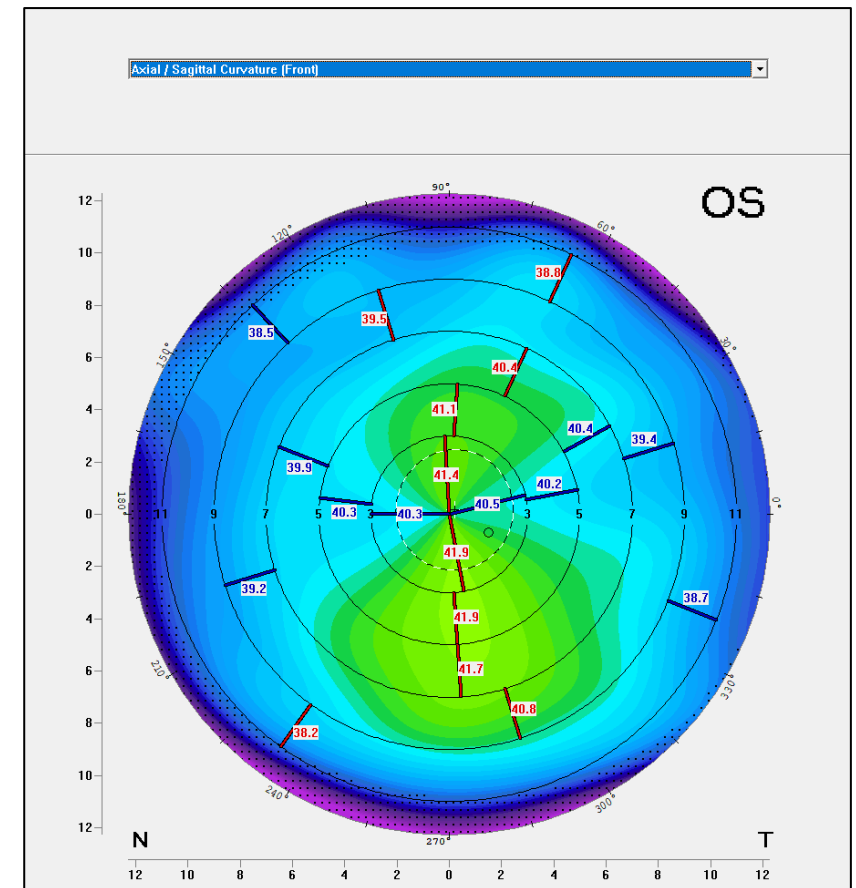
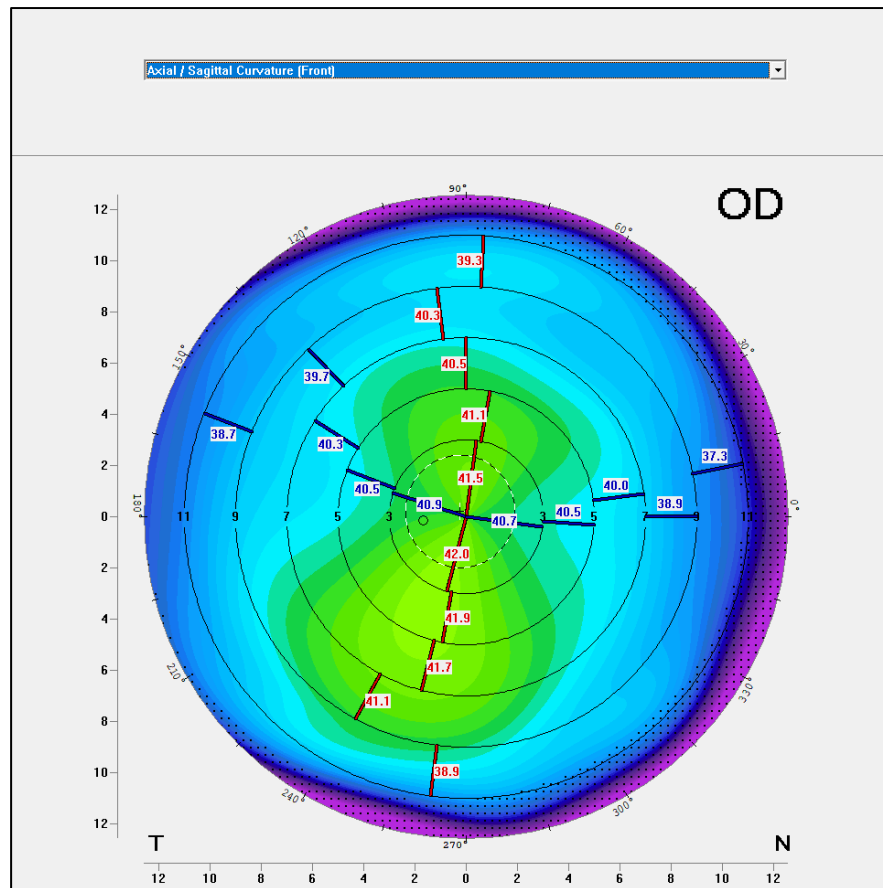
Paragon



NightLens[®]



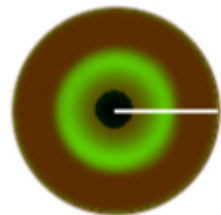
Pre-Tx Maps



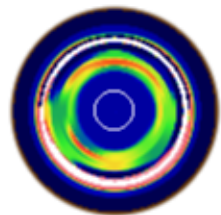
Map AVG

Quad View ▼

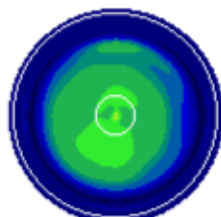
Fluorescein Map



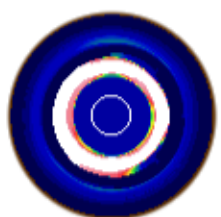
Curvature Front



Topography



Curvature Back



K = 8.18

.91D x 166

Manual Modification

ALL 1/2 1/4

Modification Increments

1x ▼

Modification Area



OR_x

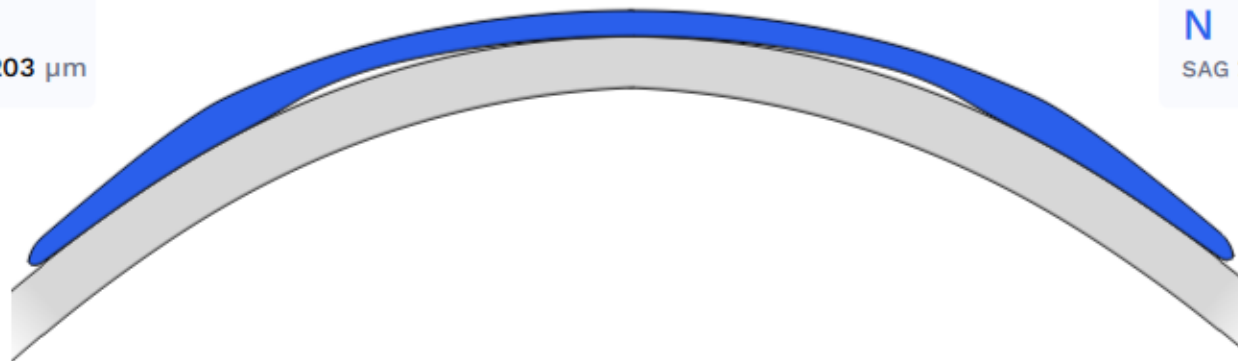
Lens Profile



CT (mm) 0.25
ET (mm) 0.20
OAD (mm) 11.80

T
SAG 2203 μm

N
SAG 2155 μm

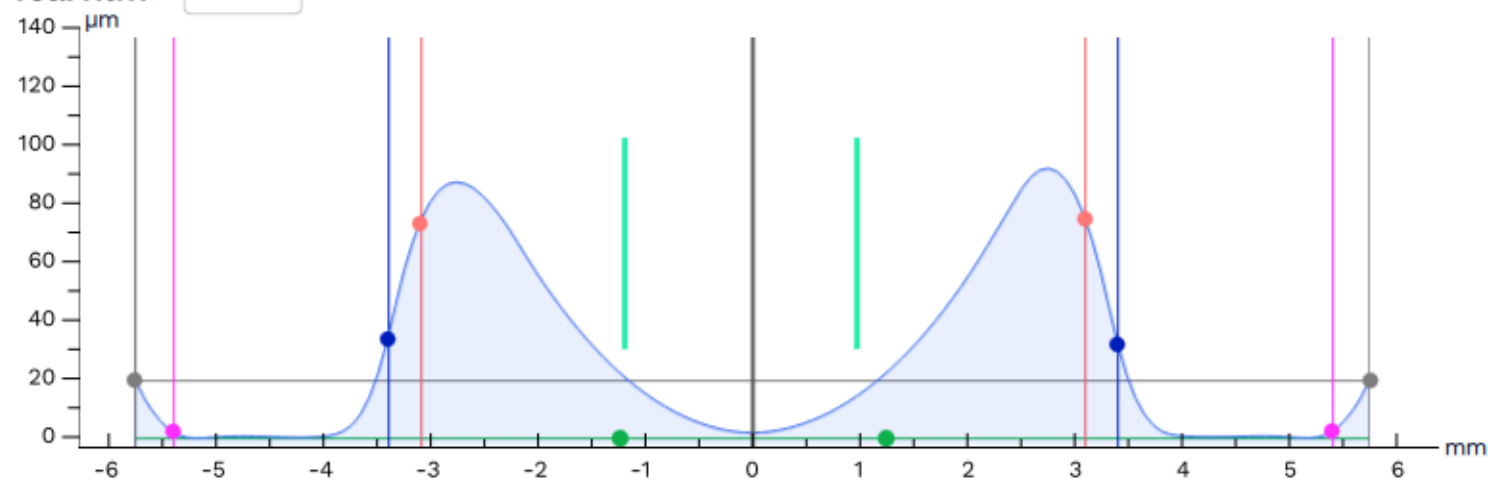


DEMAND 9.36 / 8.91D POWER +1.18D BASE CURVE 10.45mm



Tearfilm

140 ▼ EDGE ANGLE 35.6°



	Edge	PC	IC	OZ	Central Clearance	OZ	IC	PC	Edge
TL (μm)	19.9	2.2	34.0	73.5	1.9	75.2	33.3	2.3	19.8
SAG (μm)	2203	1940	699	533	0	528	696	1902	2155
DIA (mm)	11.52	10.80	6.80	6.20	0	6.20	6.80	10.80	11.52

Sph (D) -8.00
Cyl (D) -1.25
Axis 147

Apply

Dominant eye

Yes

HVID (mm) 12.90
Pupil 2.18

Lens Type and Material

Markings

Clinical Notes

Summary

Lens Geometry

Free Form

Lens Power +1.18 +/- 0.02
Base Curve 10.45 +/- 0.0

OAD 11.80
CT 0.25
ET 0.20

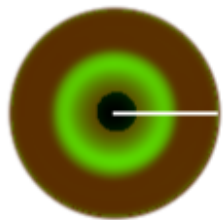
Add MF Zone

Print Rx

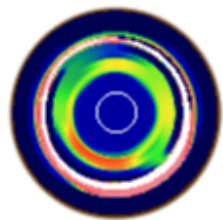
Map AVG

Quad View ▼

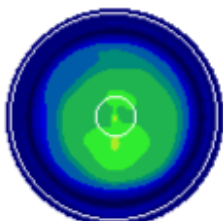
Fluorescein Map



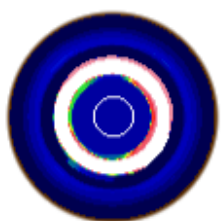
Curvature Front



Topography



Curvature Back



K = 8.23

1.20D x 005

Manual Modification

ALL 1/2 1/4

Modification Increments

1x ▼

Modification Area



OR_x

Lens Profile



OD

OS

CT (mm) ET (mm) OAD (mm)

0.25 ▼

0.20 ▼

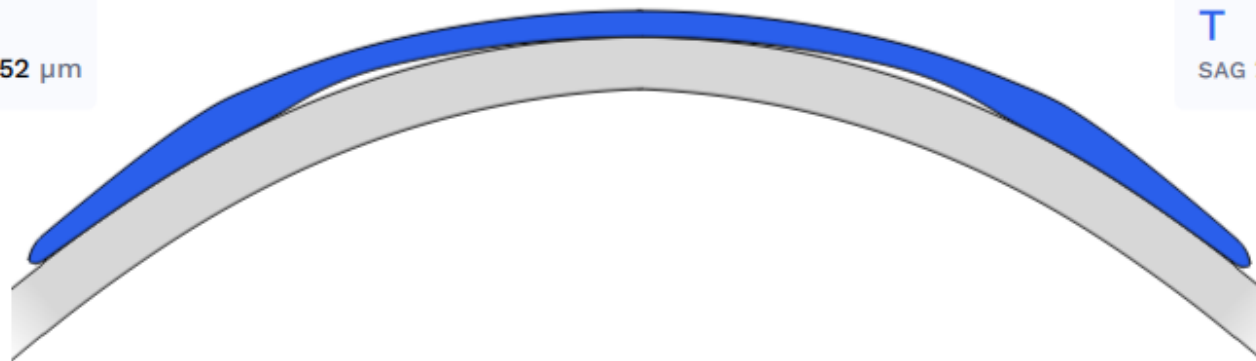
11.80 ▼

N

SAG 2152 μm

T

SAG 2186 μm



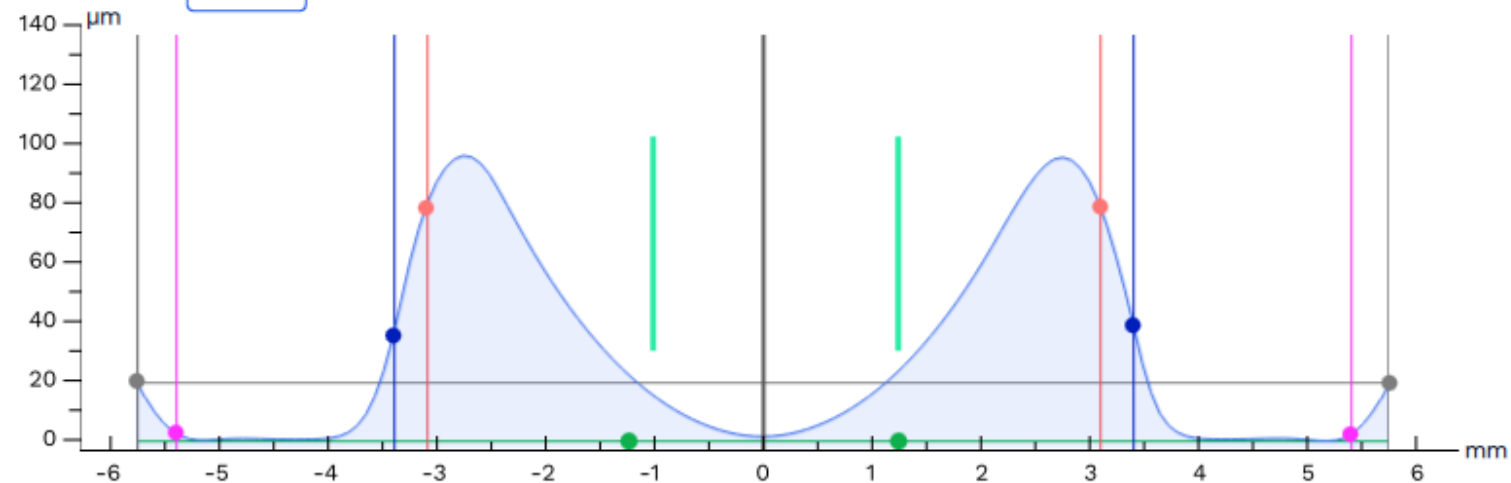
DEMAND 9.98 / 9.38D POWER +1.67D BASE CURVE 10.73mm



Tearfilm

140 ▼

EDGE ANGLE 36.4°



	● Edge	● PC	● IC	● OZ	Central Clearance	● OZ	● IC	● PC	● Edge
TL (μm)	20.3	2.7	35.7	78.7	1.5	79.3	40.2	2.2	19.7
SAG (μm)	2152	1898	689	520	0	523	689	1926	2186
DIA (mm)	11.52	10.80	6.80	6.20	0	6.20	6.80	10.80	11.52

Geometry

Free Form

Material

Boston Equ 2

Color

Yellow

Fenestration F

Plasma Hydra

Markings

Clinical Notes

Summary

Lens Geometry

Free Form

Lens Power Base Curve

+1.66 +/- 0.01 10.73 +/- 0.01

OAD CT ET

11.80 0.25 0.20

Add MF Zone

- -

Print Rx

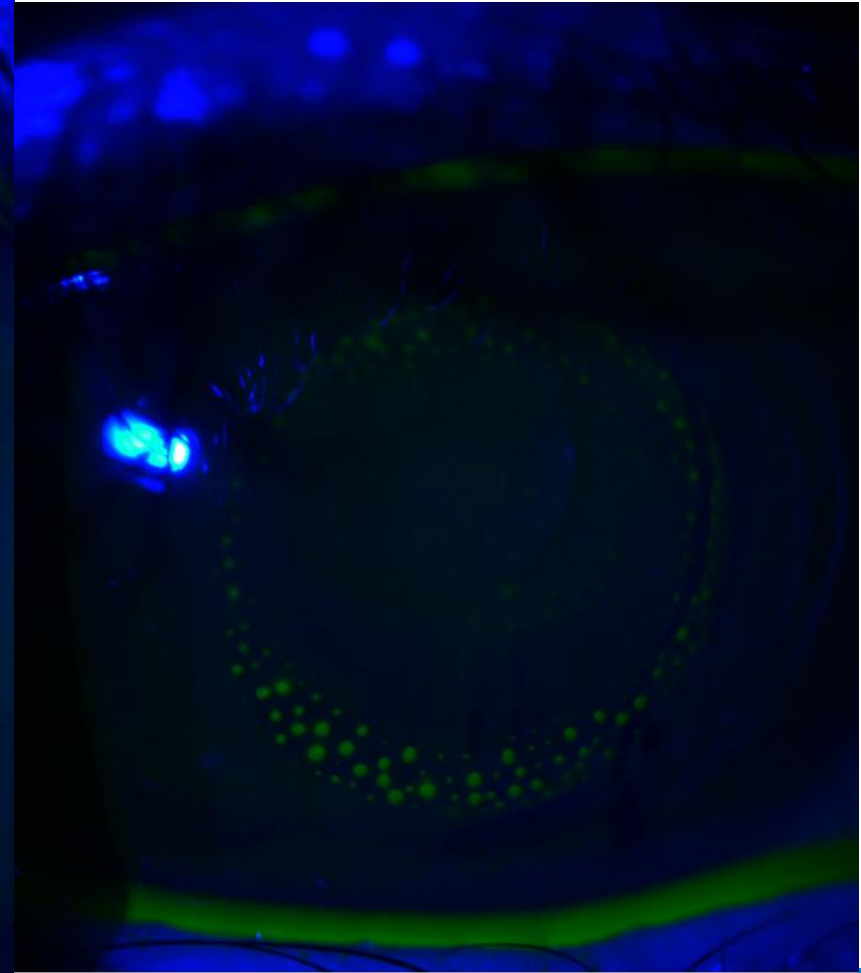
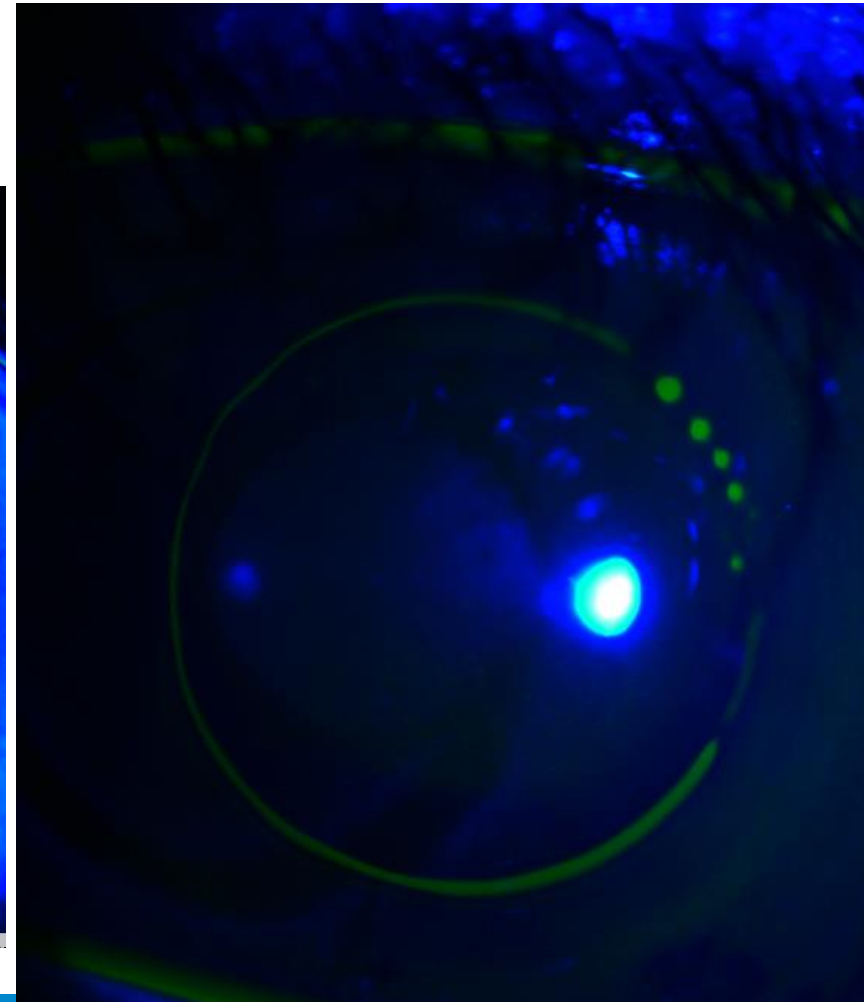
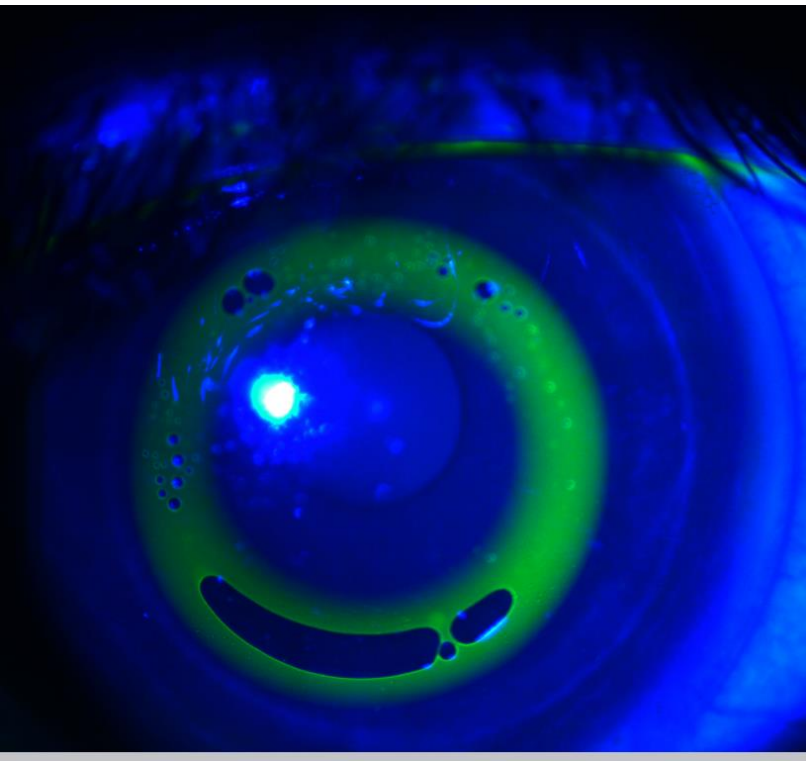
Last saved on Ordered

04/15/2022 04/15/2022

Patient AA

- 4 months post Tx
- OD UCVA 20/50 -1.25 -1.00 x010 20/20
- OS UCVA 20/30 +2 -0.75 DS 20/20
- OU UCVA 20/25+2 and NOT HAPPY!!

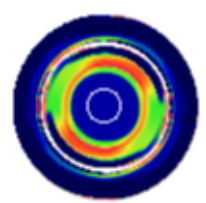
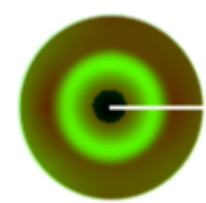
Patient AA



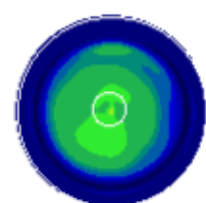


Map AVG Quad View

Fluorescein Map Curvature Front



Topography Curvature Back



K = 8.18 .91D x 166

Manual Modification

ALL 1/2 1/4

Modification Increments
1x

Modification Area



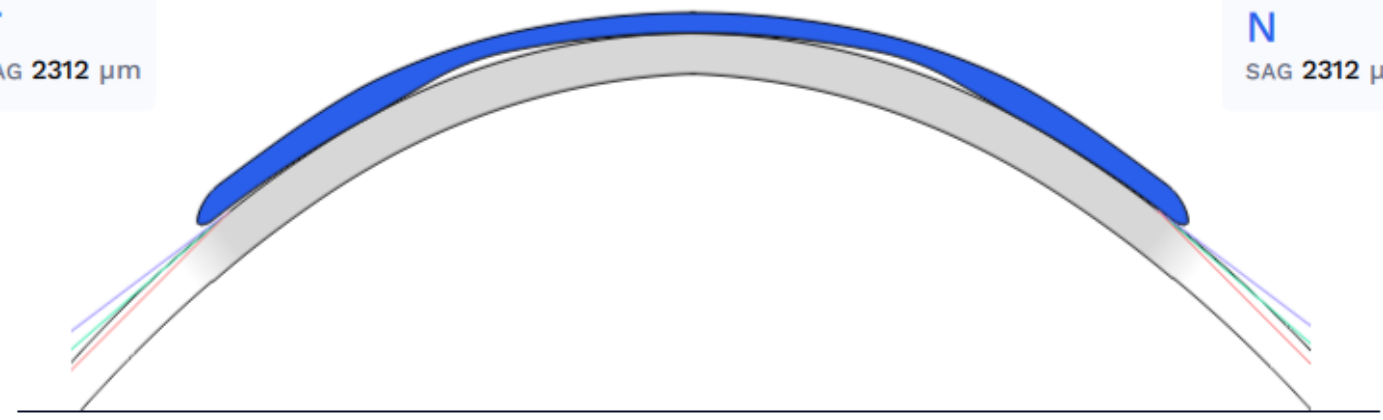
Lens Profile



CT (mm) 0.25 ET (mm) 0.30 OAD (mm) 12.30

T SAG 2312 μm

N SAG 2312 μm

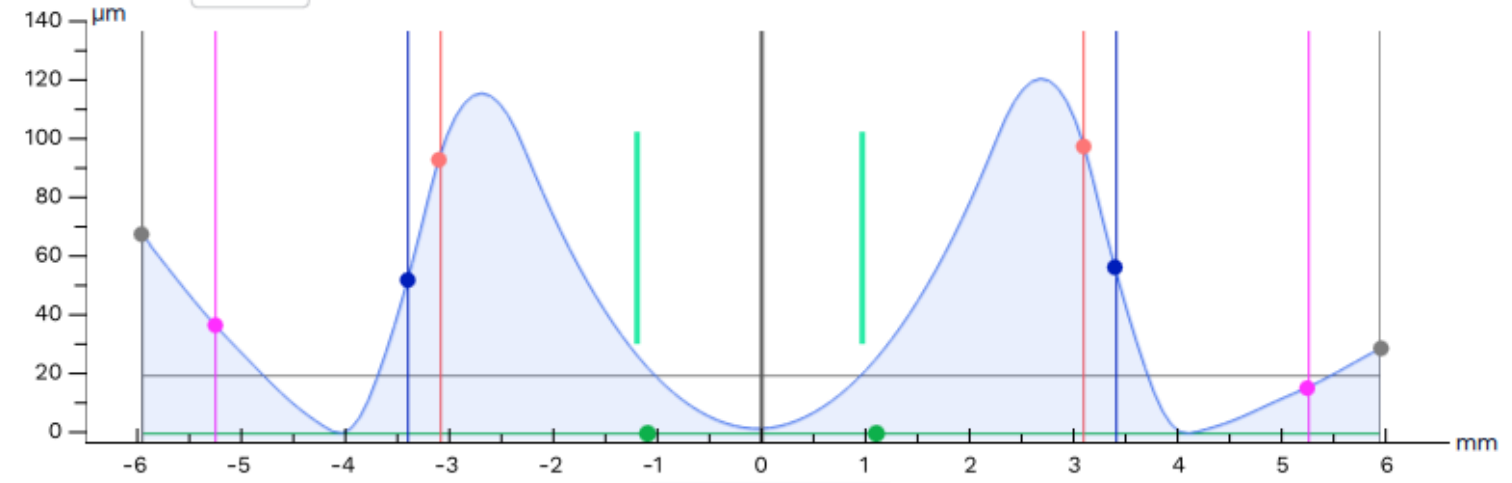


DEMAND 12.79 / 12.34D POWER +4.64D BASE CURVE 11.71mm

45° 41° 37°

Tearfilm

140 EDGE ANGLE 38.2°



	Edge	PC	IC	OZ	Central Clearance	OZ	IC	PC	Edge
TL (μm)	67.9	36.9	52.3	93.3	1.6	98.4	57.0	15.6	29.0
SAG (μm)	2312	1788	677	509	0	509	677	1788	2312
DIA (mm)	11.92	10.50	6.80	6.20	0	6.20	6.80	10.50	11.92

Geometry

GSym

Material

Optimum Extra

Color

Glacier Blue

Fenestration Prism

Plasma Hydra-PE

Markings

Clinical Notes

Summary

Lens Geometry

GSym

Lens Power +4.61 +/- 0.03 Base Curve 11.69 +/- 0.01

OAD 12.30 CT 0.25 ET 0.30

Add - MF Zone -

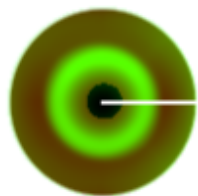
[Print Rx](#)

Last saved on 10/03/2022 Ordered on 10/03/2022

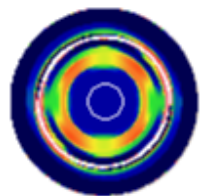
Map AVG

Quad View

Fluorescein Map



Curvature Front



Topography



Curvature Back



K = 8.23

1.20D x 005

Manual Modification

ALL 1/2 1/4

Modification Increments

1x

Modification Area



ORx

Lens Profile



OD

OS

CT (mm) ET (mm) OAD (mm)

0.25

0.30

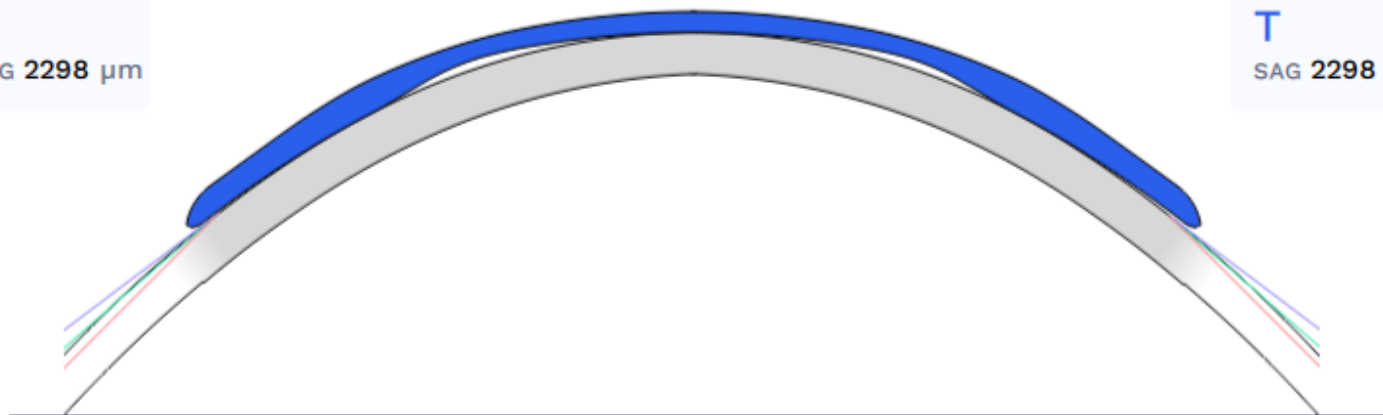
12.30

N

SAG 2298 μm

T

SAG 2298 μm



DEMAND 12.95 / 12.35D POWER +4.66D BASE CURVE 11.86mm

45°

41°

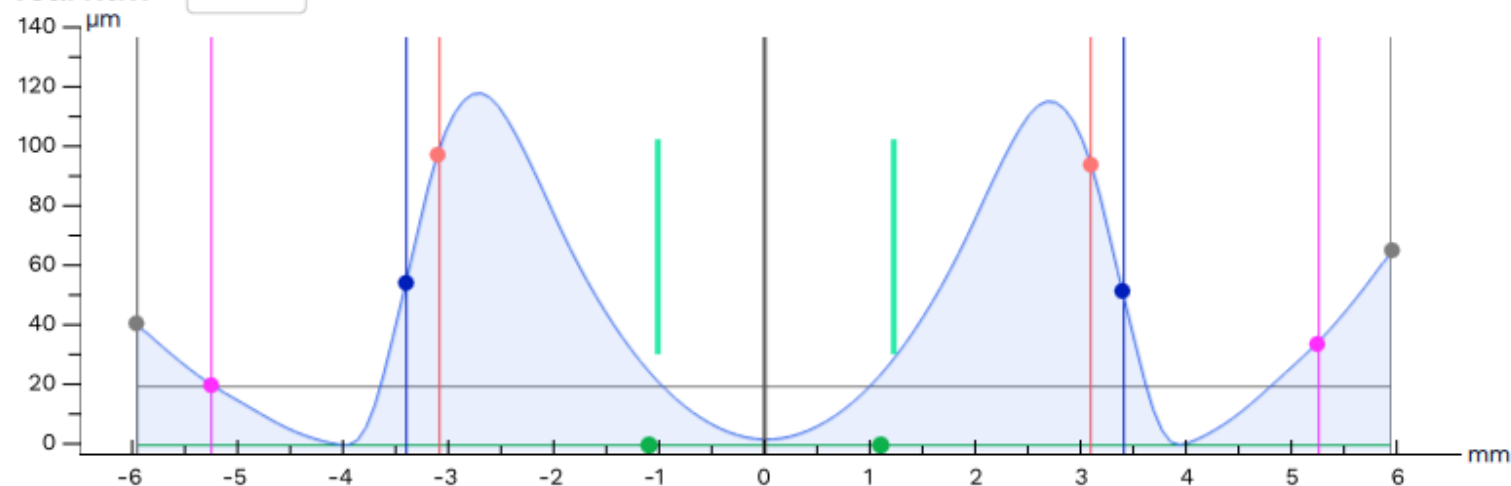
37°



Tearfilm

140

EDGE ANGLE 37.8°



	Edge	PC	IC	OZ	Central Clearance	OZ	IC	PC	Edge
TL (μm)	40.9	20.4	54.6	97.6	1.8	94.9	52.2	34.3	65.5
SAG (μm)	2298	1779	674	504	0	504	674	1779	2298
DIA (mm)	11.92	10.50	6.80	6.20	0	6.20	6.80	10.50	11.92

Geometry

GSym

Material

Optimum Extra

Color

Glacier Blue

Fenestration

Plasma Hydro

Markings

Clinical Notes

Summary

Lens Geometry

GSym

Lens Power Base Curv

+4.64 +/- 0.03 11.85 +/-

OAD CT ET

12.30 0.25 0.30

Add MF Zone

- -

Print Rx

Last saved on Ordered

10/03/2022 10/03/20

Patient AA

- 12/2022
- OD UCVA 20/20-2 +0.50 -0.50x 022
- OS UCVA 20/20 +0.75 DS
- OU UCVA 20/20 HAPPY!!!

Wave NightLens® - Lessons

- You can correct high myopia
- You can correct high astigmatism
- You can solve almost any patient symptom
- You can slow down myopic progression
- You can charge for your expertise!

Orthokeratology Fees

Up till 2019

- \$1,500 for new fit
- \$500 for subsequent years

2020 – today

- Tiered fitting fees
 - 1 - \$2,500
 - 2- \$3,500
 - 3 - \$4,500
 - \$950 for subsequent years

Last Thursday in my office

- 18 patients scheduled
- For the first 16 patients billed \$3,950 in professional fees over 6 hrs
- Last hour saw 2 new orthoK kids
- Billed \$7,000 in professional fees



Wave NightLens® - Bottom Line

Before

- Average fitting fees 3x lower
- 2.85 lenses per eye
- 10.5 office visits
- Higher chair time and COG

After

- Average fitting fees 3x higher
- 1.15 lenses per eye
- 6.5 office visits
- Lower chair time and COG



*Thank
you*

