Today's Multifocal Contact Lenses

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Objectives

Establish the need

Establish dominant eye determination

Establish appropriate setting for evaluating vision

Discuss new design features in multifocal lenses

The target group

The need

40% of US population is over 40

~8.2 million

Comprised predominantly of GenX and Baby Boomers

Multifocal lens purchases still slowly rising

- Presbyopes now only comprise 22% of contact lens fits
- Of those only 45% are multifocals despite their advantages

Less than 10% of the marketplace is MF, despite the need.

The conversation

As they are approaching presbyopia begin discussing options for increased magnification for ease of use with devices.

Talk to challenging scenarios.

- The menu in a dimly lit restaurant.

Talk to ocular fatigue.

Consider lenses that provide a transition.

- Lenses that have a very small amount of plus “boost” or “bump” types of designs
- Blue blocking

Their needs

Establishing their needs

Prioritize their needs

Remind them of their needs

Gen X

- Very accustomed to technology and multi-tasking with devices
  - Less complaints initially due to knowledge of zooming text
- Grew up with disposable types of contact lenses
- Do not want to wear readers
- Do not want to look “old”

Boomers

- Less technology use but more are embracing
- Need to be able to read smaller print like prescription bottles
- Reading and signing financial documents

Other groups who may benefit

Myopia management
- Distance center designs

Accommodative insufficiency

Convergence excess with high ACA

State and Ask

My goal is to meet most of your needs, most of the time.

What is your most important goal?

What is you next biggest need?

Determine if there is a 3rd and less important need.

Repeat these back and emphasize their priorities.

This can be very important on follow-up.

Environment

Lighting
- Artificial vs natural
- Harsh?
- Dim or Bright

Ergonomics
- How far away is the device?
- How is your device positioned?
- Where do you hold your work?

Specific tasks
- Are you able to adjust fonts?

Dry?

Dusty?

The benefits of newer multifocals

Improved range of clear vision

Less glare and ghosting than older designs

Improved low contrast sensitivity

Maintenance of stereopsis

Improved options for correction of astigmatism and presbyopia

Determine dominance

Sighting tests are obsolete and do not provide the data needed for today's multifocals

Blur suppression or Sensory dominance

Which eye is able to accept more blur at distance?

With best correction in place and both eyes open, have the patient look at a distance chart with their best corrected acuity visible.

Select a +2.00 loose trial lens.

Dip this lens over the right eye only.

- Ask does this blur those lines or is it about the same.

Repeat for the left eye.

The eye with the greatest perceived blur is your dominant eye.

Alternative test

Instead of a +2.00 lens use a lens of power equivalent to their add power

If both eyes are equal with these tests, choose the eye with the best acuity and/or the least cylinder.

Intro to PPL lenses

PROGRESSIVE POWER LENSES

PPL lenses

Progressive power lenses differ from PALs in that the power distribution is radial

PPL lenses may be distance of near center

For near center, the power changes in the direction of the distance prescription radially in the periphery

For distance center, there is increasing add power radially in the periphery

These lenses provide simultaneous images from different focal points in the patients view.

Therefore, there is adaptation as they neurally adapt to which image to attend to.

Can take up to 2 weeks occasionally more so diagnostic lenses are very beneficial.

Aspheric, Concentric or EDOF

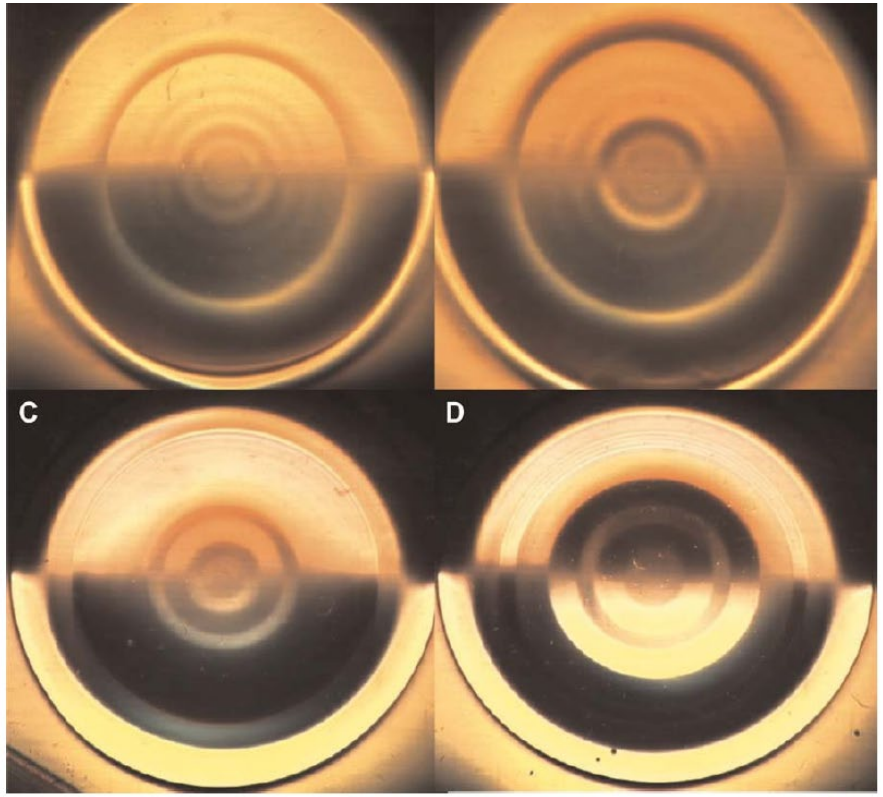


FIGURE 1.
Contact lens optical quality analyzer (CLOQA) images for EDOF and AOP lenses. All lenses are −3.00 D. (A) $EDOF_L$; (B) $EDOF_H$; (C) AOP_L; (D) AOP_H.

Short-Term Visual Performance of Novel Extended Depth-of-Focus Contact Lenses

Tilia, Daniel; Bakaraju, Ravi C.; Chung, Jiyoon; Sha, Jennifer; Delaney, Shona; Munro, Anna; Thomas, Varghese; Ehrmann, Klaus; Holden, Brien A.

Author Information

Optometry and Vision Science 93(4):p 435-444, April 2016. | DOI: 10.1097/OPX.0000000000000806

Summary

Presbyopes desire to feel “normal”

Assessing needs is a first step

Then determining dominant eye (plus acceptance)

Glasses over is inexpensive but cumbersome. Do not judge the patient’s pocketbook. Offer the best option.

Monovision can be successful but has limitations

MF lenses (PPL) are more successful and provide binocularity

Soft lens MF options

Slit lamp eval

Centration is essential for most designs

Movement should be present but not excessive
- Soft lenses ~0.25-0.5 mm
- Hybrids ~0.5mm
- Scleral none-perceptible

No impact on conjunctival vasculature
- No drag
- No blanching
- No impingement

Evaluation

Use real world materials and assess with both eyes open
- Paragraph text
- Magazines and articles with varying fonts and contrast
- If they have real world needs, have them bring samples
  - Sheet music
  - Sewing material
- Phones
  - Text messages
  - Maps/GPS
- Computers/Tablets
- Take them out of the exam room
  - View in-office signs
  - Look out windows to see license plates and street signs

Soft Bifocal Pearls

Evaluate with both eyes open

Over-refract with loose lenses
- The phoropter will change gaze position and pupil size.
- So, do not use it.

Demonstrate lenses accepted at distance also at near
- Adjusting the distance will impact the near

Consider contrast sensitivity distance VA

Let the lenses settle for several minutes

As a general rule, the stronger the add, the smaller the zone for distance VA

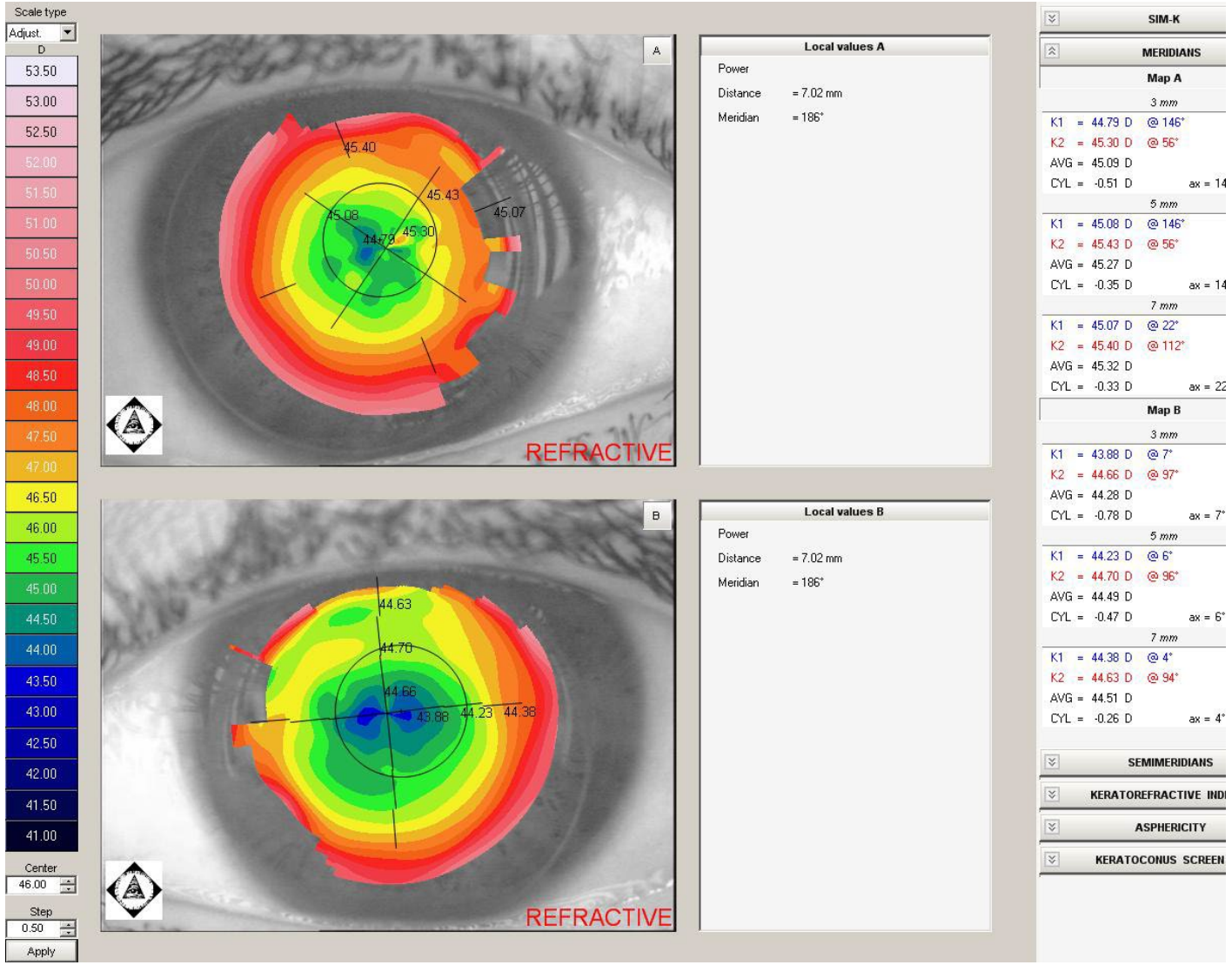
Follow the individual fitting guides for selection and adjustement.

THEY ARE DEVELOPED BY FITTING HUNDREDS OF PATIENTS AND WHEN UPDATED ARE THE RESULTS OF THE OUTCOMES OF THOUSANDS OF LENS ORDERS.

Advanced evaluation and troubleshooting opportunity.

Over-topography with a refractive map

- Should map the pupil
- Show powers across the pupil to help you see where the powers are



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Newest designs

USE THE FITTING GUIDES!

UltraMF (sphere and astigmatism) and Biotrue MF

Sphere:
- +6.00 to -10.00

Toric:
- Sphere
  - +4 to -6 in 0.25 steps
- Cylinder (10-degree steps)
  - -0.75, -1.25, -1.75 around the clock
  - -2.25 and -2.75 20 either side of H and V

Low and High adds

Center Near
- Concentric progressive
  - Intermediate and distance zones

SA optimized by power

They recommend testing dominance with +1.50

Start with vertex corrected spherical equivalent for sphere

For toric, do not over-correct cylinder

Ultra Multifocal for Astigmatism

3 zones: center near

SiHy

Sphere
- +4 to -6 in 0.25 steps

3 cylinders
- -0.75, -1.25, -1.75

Axes
- Around the clock

IF PATIENT IS WEARING:

TWO LOW ADDS

	NEAR VISION		DISTANCE VISION	
	DOMINANT EYE	NON-DOMINANT EYE	DOMINANT EYE	NON-DOMINANT EYE
Initial Lens	**Low Add**	**Low Add**	**Low Add**	**Low Add**
Refinement 1	**Low Add**	**High Add**	**Bausch + Lomb ULTRA® sphere**	**Low Add**

Refinement 2: If vision is still unsatisfactory, make small changes by adding +0.25D at a time to non-dominant eye (wearing High Add lens) using hand-held lenses, and continue evaluating vision binocularly in normal room illumination. Adjust contact lens power when vision is satisfactory.

Refinement 2: If vision is still unsatisfactory, make small changes by adding -0.25D at a time to dominant eye (wearing Bausch + Lomb ULTRA® spherical lens) using hand-held lenses, and continue evaluating vision binocularly in normal room illumination. Adjust contact lens power when vision is satisfactory.

TWO HIGH ADDS

	NEAR VISION		DISTANCE VISION	
	DOMINANT EYE	NON-DOMINANT EYE	DOMINANT EYE	NON-DOMINANT EYE
Initial Lens	**High Add**	**High Add**	**High Add**	**High Add**
Refinement 1	**High Add**	**Add +0.25D to the non-dominant eye**	**Low Add**	**High Add**

Refinement 2: If vision is still unsatisfactory, make small changes by adding +0.25D at a time to non-dominant eye using hand-held lenses, and continue evaluating vision binocularly in normal room illumination. Adjust contact lens power when vision is satisfactory.

Refinement 2: If vision is still unsatisfactory, make small changes by adding -0.25D at a time to dominant eye (wearing Low Add lens) using hand-held lenses, and continue evaluating vision binocularly in normal room illumination. Adjust contact lens power when vision is satisfactory.

Case

49 yom

Patient is a basketball coach and is ~6’6”

His goals are to be able to clearly see what is happening on the court and still be able to see clearly when he looks down at his clip board.

Frustrated with glasses especially during games.

Off the court, his goals are the computer and driving

Distance refraction

+0.75 -2.25 x 095

+1.00 -2.75 x 090

+2.00 in phoropter

+1.25 as measure with patient holding material

Needs

Distance and intermediate

OD dominant

Chose low adds due to his stature and goals

We did not have the -2.25 and -2.75 cylinders and our plus lenses were +0.50 steps in our fitting sets

Therefore, first lenses

+0.50 -1.75 x 090 LOW OU

20/20 D and N at his preferred working distance

OR with loose lenses was +0.25 OS

However, we only had +1.00

He was given both L lens options and returned with the original lenses after having coached for a couple of weeks.

Acuvue Oasys Max Multifocal

Concentric aspheric ring design

Distance center

+6.00 to -9.00

Low up to +1.25

Mid up to +1.75

High up to +2.50

Adds Blue blocker

Acuvue one day moist Pupil optimized by power

https://www.jnjvisionpro.com/business-center/calculators-tools/acuvue-multifocal-fitting-calculator

Guillon M, Dumbleton K, Theodoratos P, Gobbe M, Wooley CB, Moody K. The Effects of Age, Refractive Status, and Luminance on Pupil Size. Optom Vis Sci. 2016 Sep;93(9):1093-100. doi: 10.1097/OPX.0000000000000893. PMID: 27232893; PMCID: PMC5006796.

Conclusions

Both age and refractive status were found to affect pupil size with larger pupils measured for younger patients and myopes. Designs for multifocal contact lens corrections should take both age and refractive status into consideration; a faster progression from distance to near corrections across the optical zone of the lens is expected to be required for established presbyopes and hyperopes than it is for early presbyopes, myopes, and emmetropes.

Initial lens selection

Lens power closest to vertex correct spherical equivalent

ADDS

+0.75 to +1.25 LOW OU

+1.50 to +1.75 MID OU

+2.00 to +2.50 MID on Dominant, HIGH on Non-Dominant

Distance troubleshooting

If OR yields no Rx change

For low and mid add powers, step the dominant eye down

- If two lows, remove the low from the dominant eye and replace with a single vision lens
- If wearing two mids, remove the mid from the dominant eye and replace it with a low

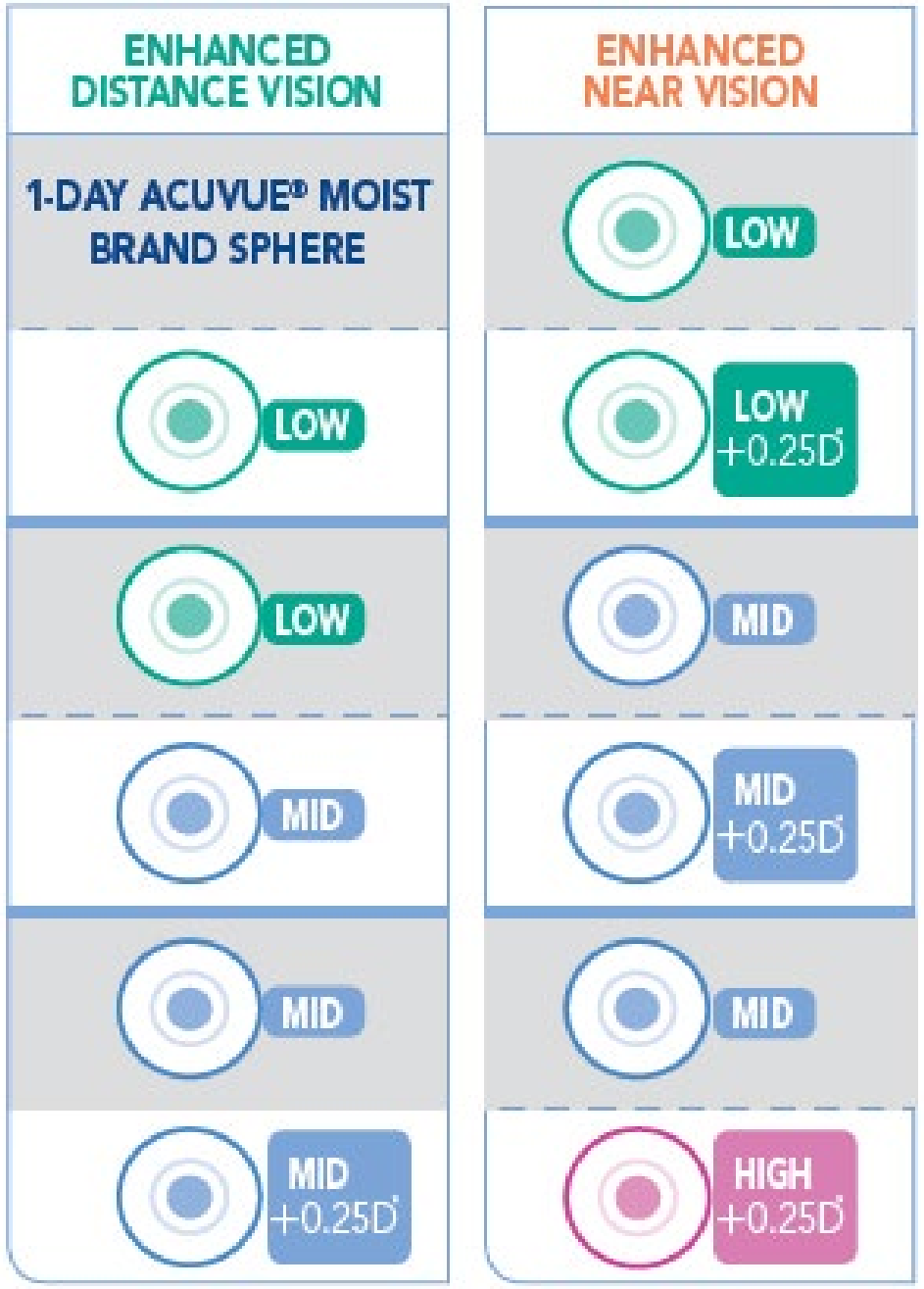
For high add powers, reduce the high in the non-dominant to the mid and add +0.25

Oasys fitting guide

ADD	EYE	LENS SELECTION
+0.75D to +1.25D	Dominant Eye	LOW
	Non-dominant Eye	LOW
+1.50D to +1.75D	Dominant Eye	MD
	Non-dominant Eye	MD
+2.00D to +2.50D	Dominant Eye	MD
	Non-dominant Eye	HIGH

Advanced distance adjustments

Adjustments of distance vision with no additional distance OR



*Add +0.25D to the distance power.

Near adjustment with no distance OR

Add +0.25 to the non-dominant eye power

Case

41 yom

-5.75 -1.25 x 180

-5.75 -0.25 x 180

+1.00 add

Dry eye

Wants part time wear

OD dominant

Primary needs distance and computer

Favorite past-time quilting

First lens Moist MF

Spherical equivalent

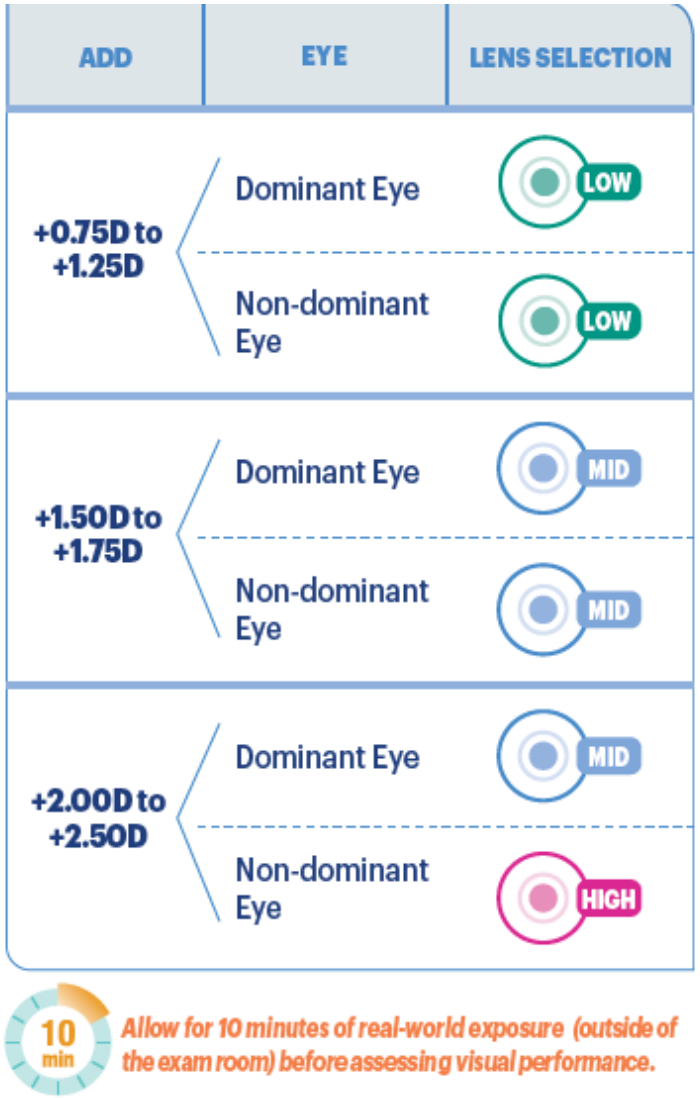
Vertex distanced

-5.75 low

-5.50 low

20/25 D

20/25 N



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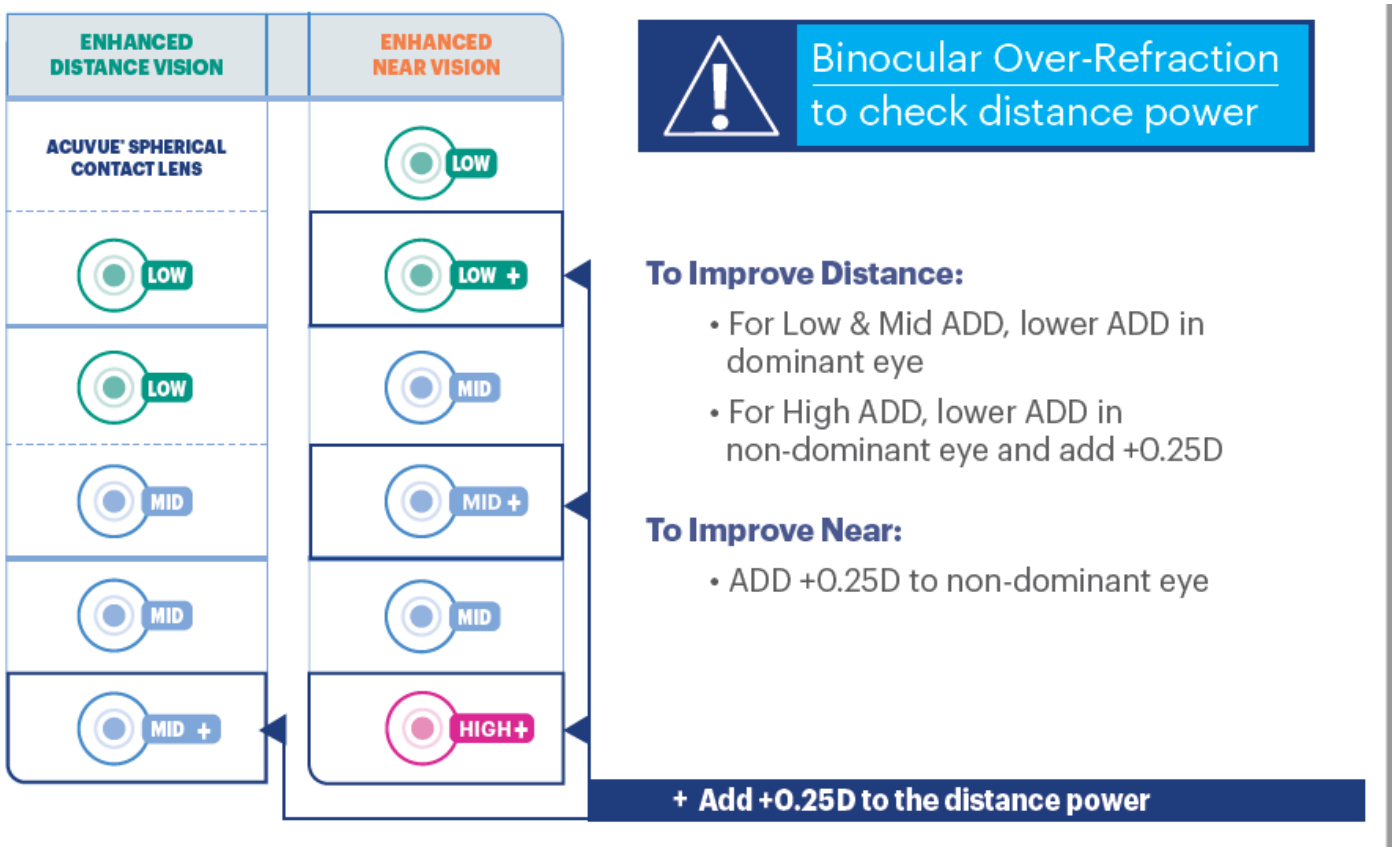
Follow up

Distance vision is not clear

Happy with near VA

Sphere OR no improvement

Spherocylindrical improves



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Next lens

Lower the add which means single vision

OD dominant eye

-5.50 -1.25 x 180

20/20 D

20/25 N

Age 43: having more challenges at near and intermediate; dryness has worsened

-5.75 -1.25 x 180

-6.50 -0.50 x 180

Add +1.50

Calculator recommendation for Left eye

-6.25 mid

We opted to stay with toric in the right eye

Lenses applied

OD: Oasys one day -5.50-1.25x180

OS: Max -6.25 Mid in the Left eye

Okay but distance not as clear

OR at distance was +0.25 OS

Dispensed -6.00 mid left

Follow up

Patient very happy with distance and intermediate his primary needs

Increased WT

Wears +1.00 readers over when quilting

Naturalvue

EDOF – extended depth of focus

Distance center with peripheral add of up to +20 making it a great option for myopia control as well

Daily disposable

+4.00 to -12.25

https://vtivision.com/practitioners/fitting-tools/naturalvue-quickstart-calculator/

EDOF designs

Less glare and ghosting than traditional concentric and progressive designs
Better clarity reported by patients
Improved low contrast sensitivity

1. Bakaraju RC, Ehrmann K, Ho A. Extended depth of focus contact lenses vs. two commercial multifocals: Part 1. Optical performance evaluation via computed through-focus retinal image quality metrics. J Optom. 2018 Jan-Mar;11(1):10-20. doi: 10.1016/j.optom.2017.04.003. Epub 2017 Jun 9. PMID: 28606456; PMCID: PMC5777930.
2. Bakaraju RC, Tilia D, Sha J, Diec J, Chung J, Kho D, Delaney S, Munro A, Thomas V. Extended depth of focus contact lenses vs. two commercial multifocals: Part 2. Visual performance after 1 week of lens wear. J Optom. 2018 Jan-Mar;11(1):21-32. doi: 10.1016/j.optom.2017.04.001. Epub 2017 Jun 12. PMID: 28619486; PMCID: PMC5777928.
3. Tilia D, Munro A, Chung J, Sha J, Delaney S, Kho D, Thomas V, Ehrmann K, Bakaraju RC. Short-term comparison between extended depth-of-focus prototype contact lenses and a commercially-available center-near multifocal. J Optom. 2017 Jan-Mar;10(1):14-25. doi: 10.1016/j.optom.2016.04.003. Epub 2016 May 7. PMID: 27161603; PMCID: PMC5219826.

Case

14 yof

History of VT for CE and oculomotor dysfunction

SRx

OD -1.00-0.50x118

OS -0.50

OS dominant

Add +2.50

Both parents are myopes
- Father -2.75 and CE
- Mother -5.50

Lenses

Naturalvue per calculator

-1.25

-0.50

OR

OD +0.50

OS +0.25

Final lenses

-0.75

-0.25

BV status

With SRX and no add 6EP

With SRX and add 2 XP

With MF CL ortho

Same patient age 17

SRx

OD -1.25-0.50x158

OS -0.25

Add +2.50

c/o blur with signs when driving with contact lenses

Calculator now recommends

OD -1.50

OS -0.25

Follow-up

Feels distance vision especially when driving at night and reading signs is much improved

Note: refractive error has only increased -0.25 OD in over 3 years

Energys MyDay

0.30 bump in add with aspheric technology

Distance center

Wetting agents

Marketed to decrease digital fatigue

+8.00 to -12.00
- 0.25 steps between +5.00 and -6.00

Remember on return

Revisit those needs

Clarify the needs previously designed

Reassure

- Most of their needs most of the time

Specialty lens options

EXPANDING TO MEET THE NEEDS OF HIGHER ASTIGMATS AND IRREGULAR CORNEAS

The Astigmatic Presbyope

45% of total population requiring vision correction has 0.75D astigmatism

65% of that population is presbyopic

35% of that population has 0.75D and greater cylinder correction

35 million presbyopic patients require cylinder correction of 0.75D and greater

Many custom sources

Metro: Metrofocal
- Distance center

SpecialEyes
- Distance and Near Center Options

Art Optical: Intelliwave
- Aspheric with aberration control

Custom Multifocals

Order empirically

Set realistic expectations
- DVA 20/30+ to 20/25
- NVA 20/40 paragraph

Newest designs are delivering more

Focus on the needs they expressed

Hybrid lenses

DUETTE MF

SYNERGEYES ID MF

Both are best ordered with accurate HVID measurements to assure a well fit skirt. Online calculators available. Fit assessed based on centration and movement

DUETTE

Near pr distance center

Base curve chosen +0.50 steeper than flat K

Skirt ordered based on HVID

Power -0.50 more than vertexed flat meridian power

ID

Distance center EDOF

Send in Ks or topo and Rx
- BC will be related to Ks
- Skirt customized to HVID

https://rxconnect.synergeyes.com/public/#/calculator

Case

ASH

15yom

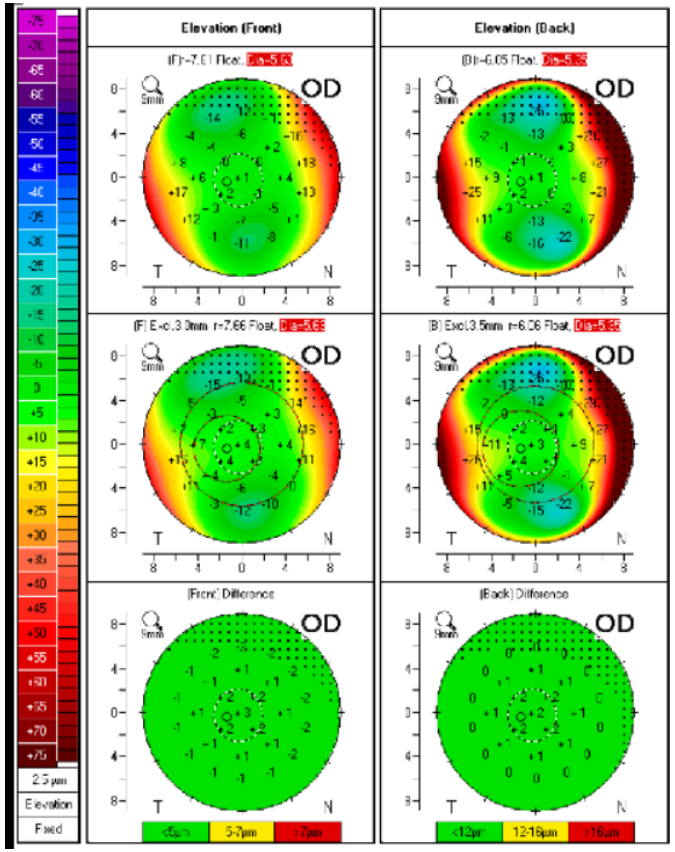
ROP and steep corneas

High stable, regular cylinder

Pentacam: Belin and Belin Progression are normal

Progressive myopia

Pachys ~590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Elevation (Back)
OD
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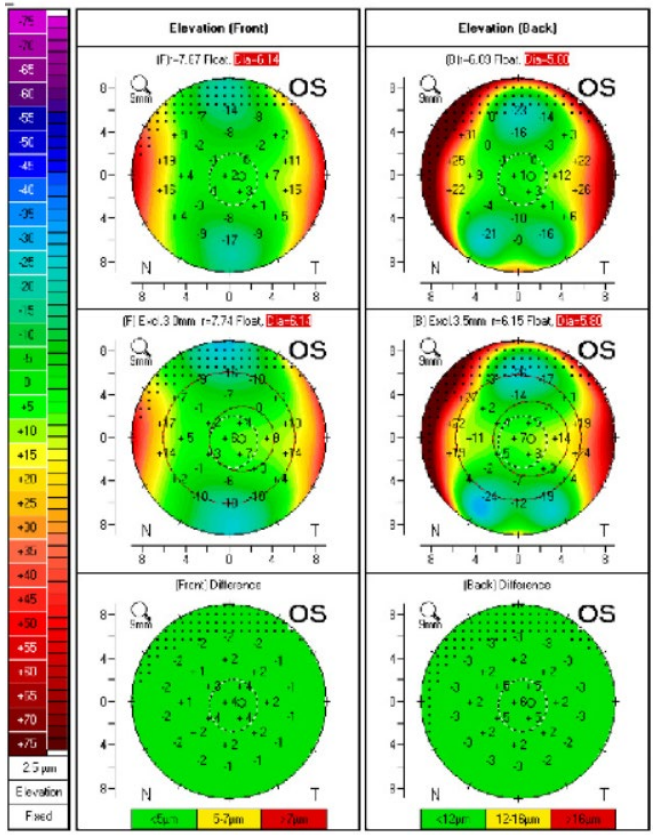
2.5 µm
Elevation
Fixed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Elevation
Fixed

OD

-8.00-2.00x020 20/20-2

HVID 10.9

SimKs 43.5/45.8

Previous soft lenses

BVA 20/25-2, worsens on upgaze

Vertex

-7.25-1.50x020

-9.00-3.00x180 20/20-2

HVID 10.7

SimKs 43.3/45.6

Previous Soft Lenses

BVA 20/30-1, worsens on upgaze

Vertex

-8.00-2.50x180

Empirical

Sent consultant topos and srx

Designed lenses with Hydrapeg (pt has significant MGD)

Lenses were designed slightly flatter BC and steeper skirt due to small eyes

7.55 -9.00 high

7.55 -9.50 high

Skirts 46

EP (enhanced profile to minimize flexure on astigmatic eye)

Outcome

OD 20/20-1

OS 20/20-3

Good comfort

Mom very happy with vision as he will be getting his driver's permit in 4 months

Advanced options in sclerals

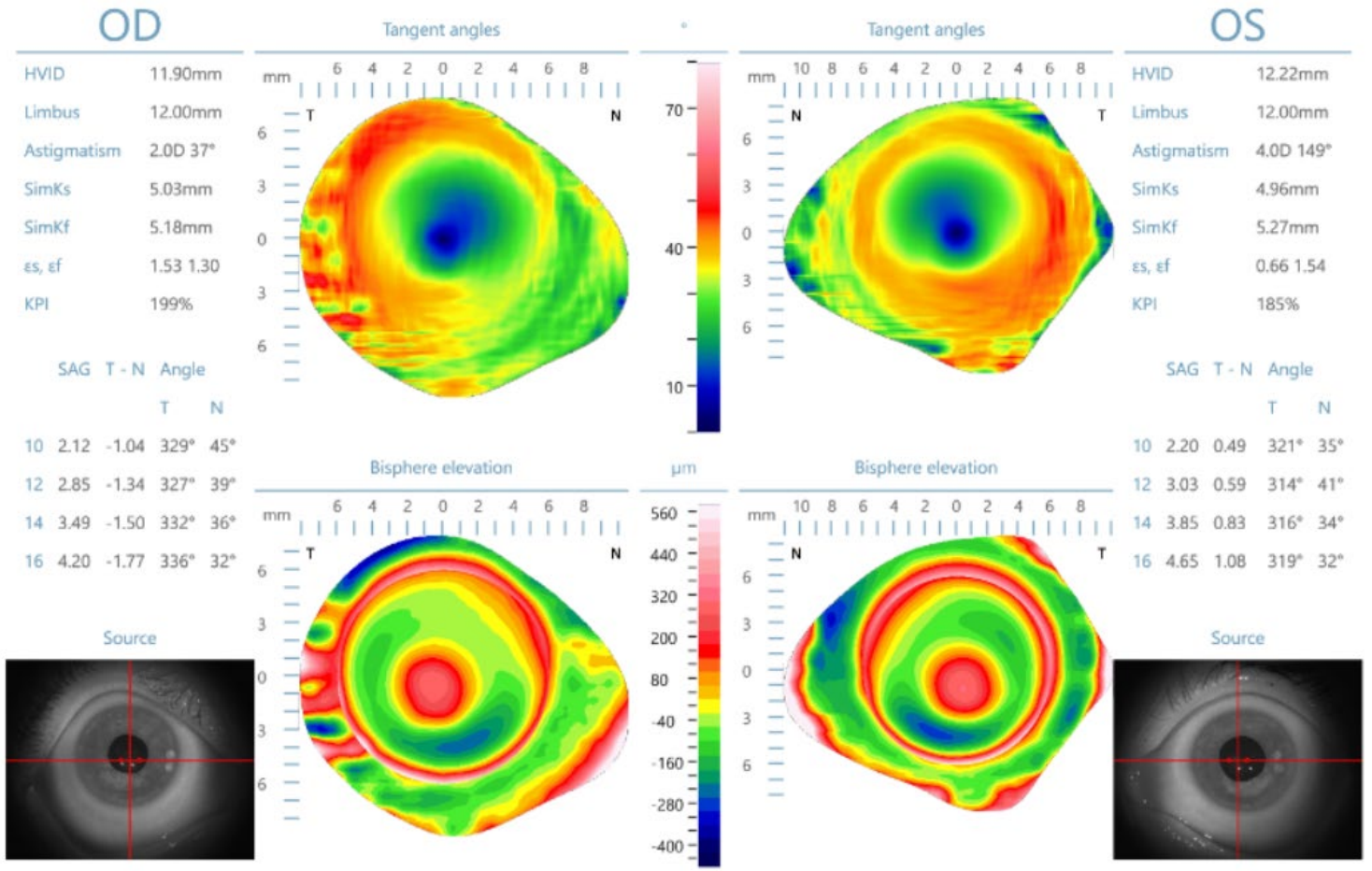
Instrument driven fittings can assist with lens centration and placement of optics over visual axis

Assessing the lens position relative to the pupil

Order the lens with specified decentration of multifocal optics

Profilometry suggesst where lens will sit

Multiple companies can now decenter optics based on their customized designs



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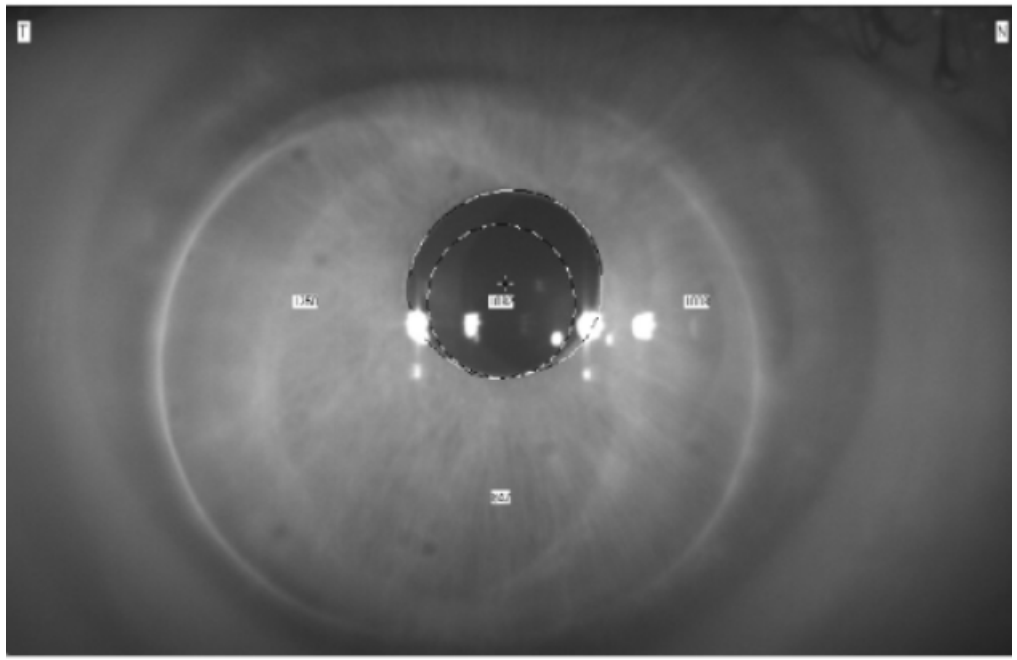
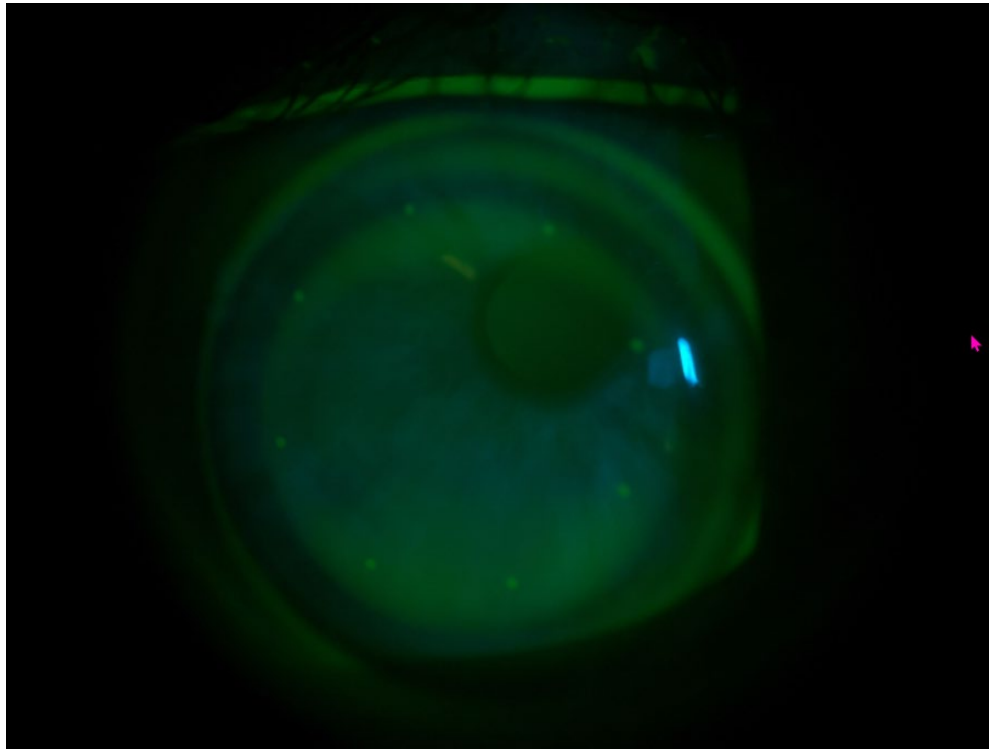
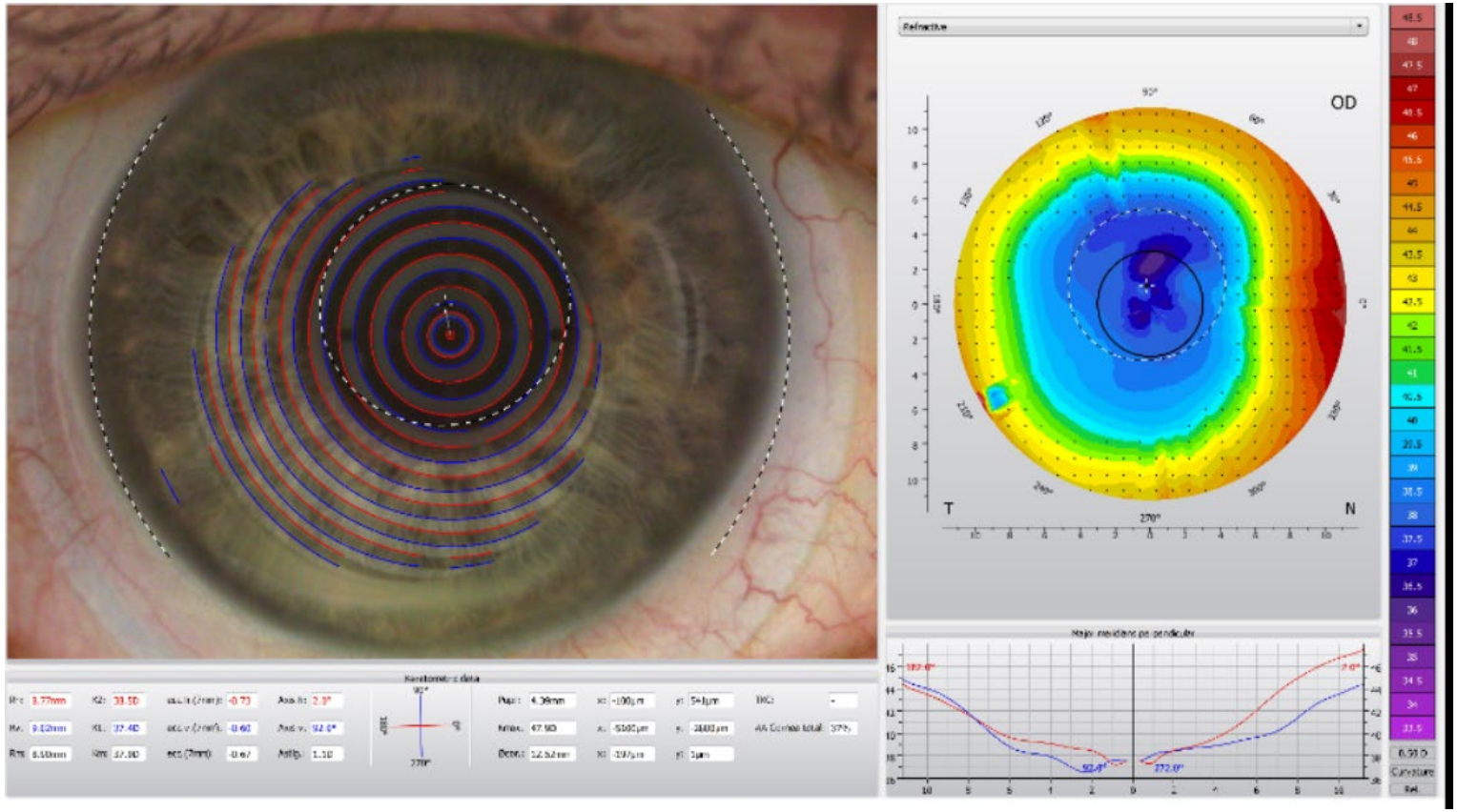
Working from lens position You can also determine how to decenter the optics





To achieve a well centered power map over the center of the pupil, despite lens decentration



Summary

Multiple options

Consider wants/needs

Assess dominant eye

Provide diagnostic lenses whenever possible
- Explain adaptation and give them time

Over-refract with both eyes open

No phoropter

Real world visual assessment

Consider custom/specialty options for challenging Rxs or corneas