

Multifocal Contact Lens Selection and Evaluation

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Discussion Topics



- Preparation for Fitting
- Soft multifocal lens design and fitting
- GP Multifocal lens design and fitting
- Hybrid Multifocal design and fitting
- Scleral Multifocal Design and fitting

Estimated – 2.1 billion presbyopes worldwide by 2030

Preparation for Fitting

- Be pro-active
 - Many patients are unaware that multifocal contact lenses are an option
 - Distance CL with over-readers are still the predominant CL modality for presbyopic patients

Morgan PB, Efron N. Global Contact Lens Prescribing 2000-2020. *Clin Exp Opt* 2022;105:298-312.

Bennett ES. Contact Lens Correction of Presbyopia. *Clin Exp Opt* 2008;91:265-78.

Morgan PB, Efron N, Woods CA. An International Survey of Contact Lens Prescribing for Presbyopia. *Clin Exp Opt* 2011;94:87-92.

Preparation for Fitting

- Explore the Patient's Visual Environment
- Hobbies
- Occupation
- Everyday tasks
- How do they plan to use the lenses?
- What are the primary tasks?
 - near, intermediate and distance



Tell me you are a presbyope
without telling me you are
presbyope....

Patient Selection

- Educate the patient on options
 - Multifocals, Monovision, Over-spectacles
- Determine their motivation & expectations
- Need Current Refraction & Add, Dominant eye
- Need to use astigmatic soft multifocals, GP's or specialty  >0.75 cyl power

One size fits all???

- Why do we take an extensive history....THERE is no one size fits all.

My family:

Father: Biofinity MF Toric

Sister: Ultra for Presbyopia

Husband: Oasys Multifocal

Self: Total 30 Multifocal



Eye Dominance

Right handed or Left handed



Sensory dominance: +1.00D to +1.50D;
*Dominant eye is “less comfortable”
visually while being blurred*

Sight Dominance



Set their expectations

- Longer fitting process possible-multiple visits
- Lens adaptation required
- Fit most of the needs most of the time
- Educate about the design
- Make them a partner in the process
- Try “real world” environment- not 20/20
- Share success stories with them

Most important considerations:

High probability for success

- Definite need for a visual correction
- Current contact lens wearer
- Tear BUT ≥ 10 seconds
- Good ocular health
- History of successful contact lens wear

Moderate probability for success

- Very low ametropia or emmetropia
- New wearer but motivated; aware of possible vision compromise
- Tear BUT between 6 and 9 seconds
- Large pupil size (>5 mm in room illumination): limits available choices for correction
- Low lower lid and/or flaccid lids: rules out segmented lens designs

Low probability for success

- New wearer with very low ametropia or emmetropia; unwilling to accept vision compromise
- Unrealistic expectations
- Tear BUT ≤ 5 seconds (repeated measurements) and/or PRTT ≤ 9 mm
- Poor hygiene
- Poor manual dexterity
- Irregular corneas

Pupil Size

- Directly related to positive outcomes
 - 3-5 mm: most likely for success
 - Older patients
 - Smaller pupils, higher add powers
 - Think smaller optic zone, center near design
 - Myopic Patients vs Hyperopic Patients



Larger pupils



Smaller pupils

-Guillon M, Dumbleton K, Therodoratos P, Gobbe M, Wooley CB, Moody K. The effects of age, refractive status, and luminance on pupil size. *Optom Vis Sci.* 2016;93(9):1093-1100.

doi:10.1097/OPX.0000000000000893

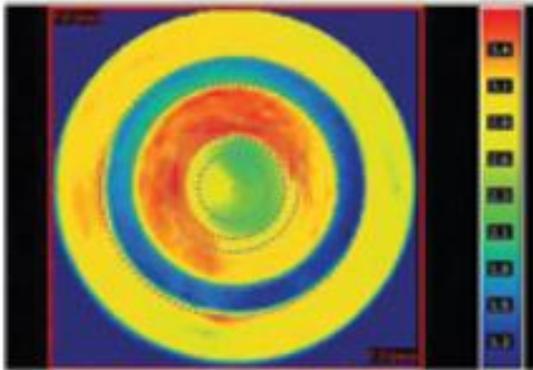
-Cakmak HB, Cagil N, Simavli H, Duzen B, Simsek S. Refractive error may influence mesopic pupil size. *Curr Eye Res.* 2010;35(2):130-136. doi:10.3109/02713680903447892

Soft Multifocal Designs

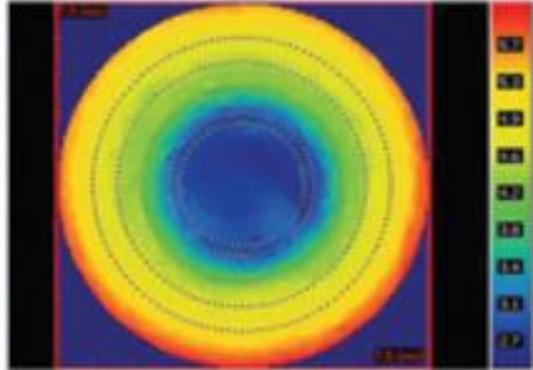
- Center Near
 - Near focal power located in the middle of the lens and distance in the periphery
- Center Distance
 - Distance focal power located in the middle of the lens and near in the periphery
- Combination

Soft Multifocal Designs

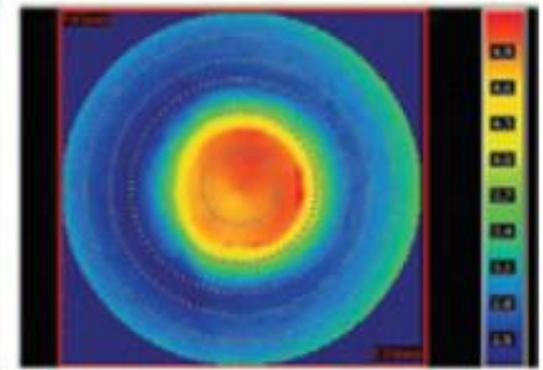
Simultaneous
Vision



Center Distance
Multifocal



Center Near
Multifocal



At left is a simultaneous vision multifocal lens, which alternates between near and distance zones. In the center is a distance-center multifocal lens. At right is a near-center multifocal lens.

Image: Robert L. Davis, OD

Image source:

<https://www.reviewofcontactlenses.com/article/succeeding-with-soft-multifocals>

Soft Multifocal Designs

- Center Near Design
 - Better near vision
 - Higher patient satisfaction and success, especially with advancing presbyopia
- Center Distance Design
 - Emerging Presbyopes
 - Emmetropes
- Combination – lots of flexibility

Soft Multifocal Design

Center Near

N lens

Near vision
Spherical central zone

Intermediate vision
Progressive zone

Distance vision
Spherical zone

Lens edge

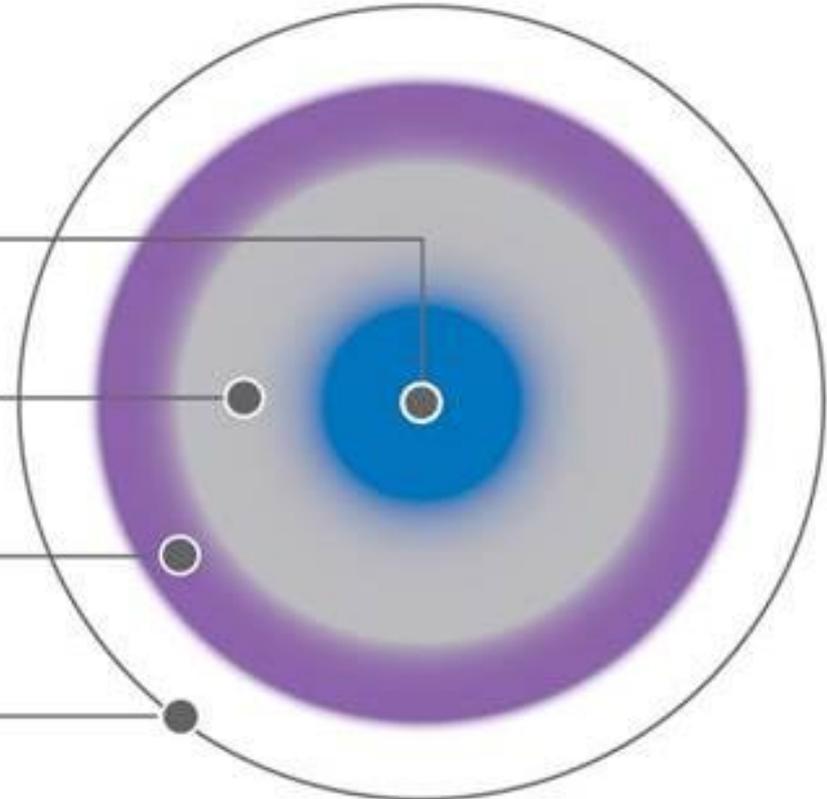


Photo courtesy of CooperVision

Soft Multifocal Design

Center Distance

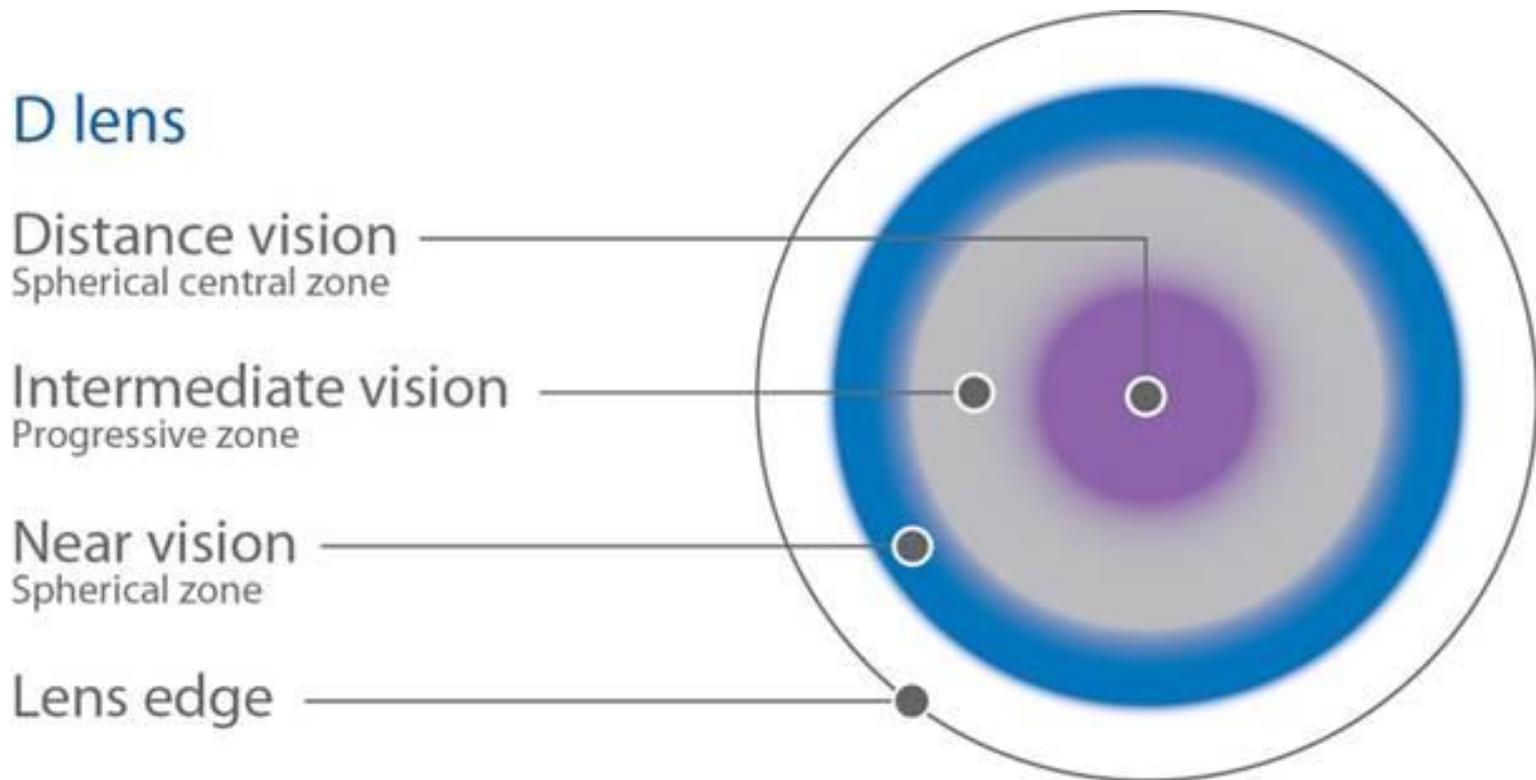
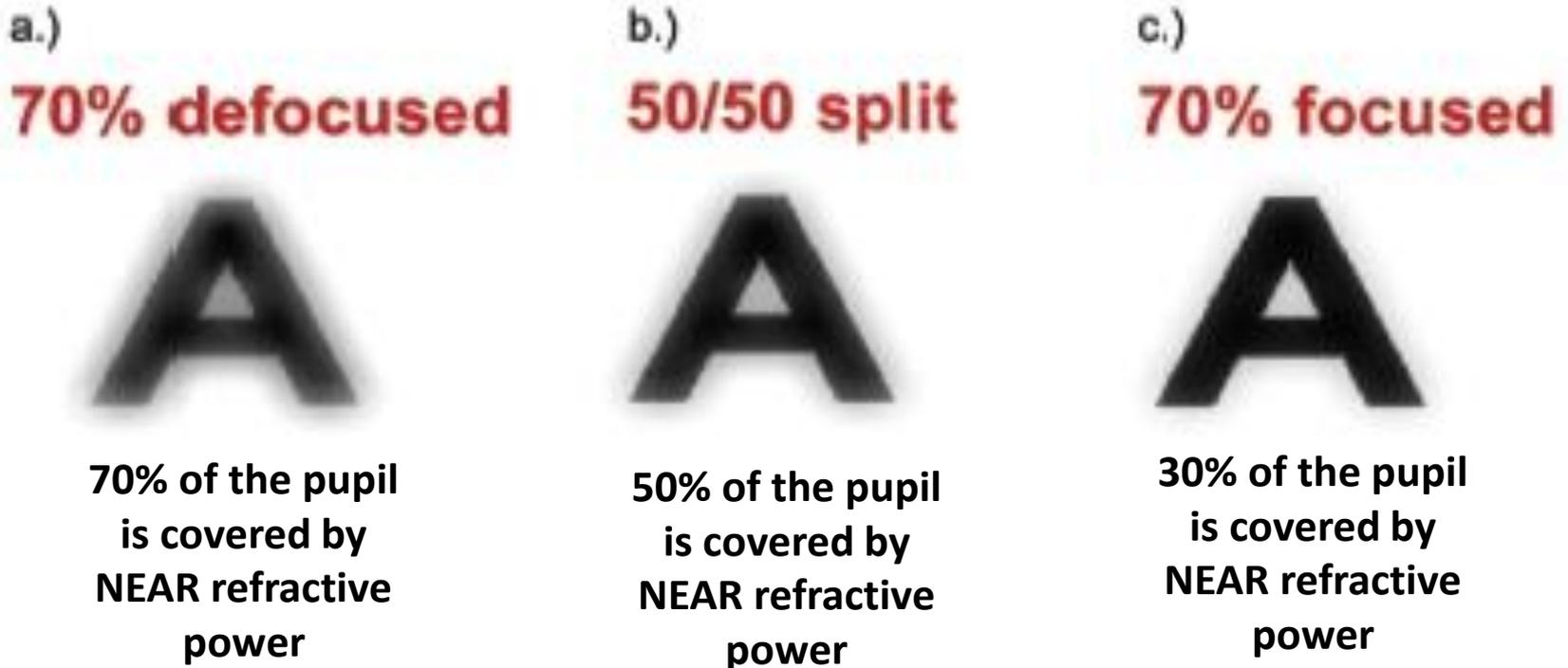


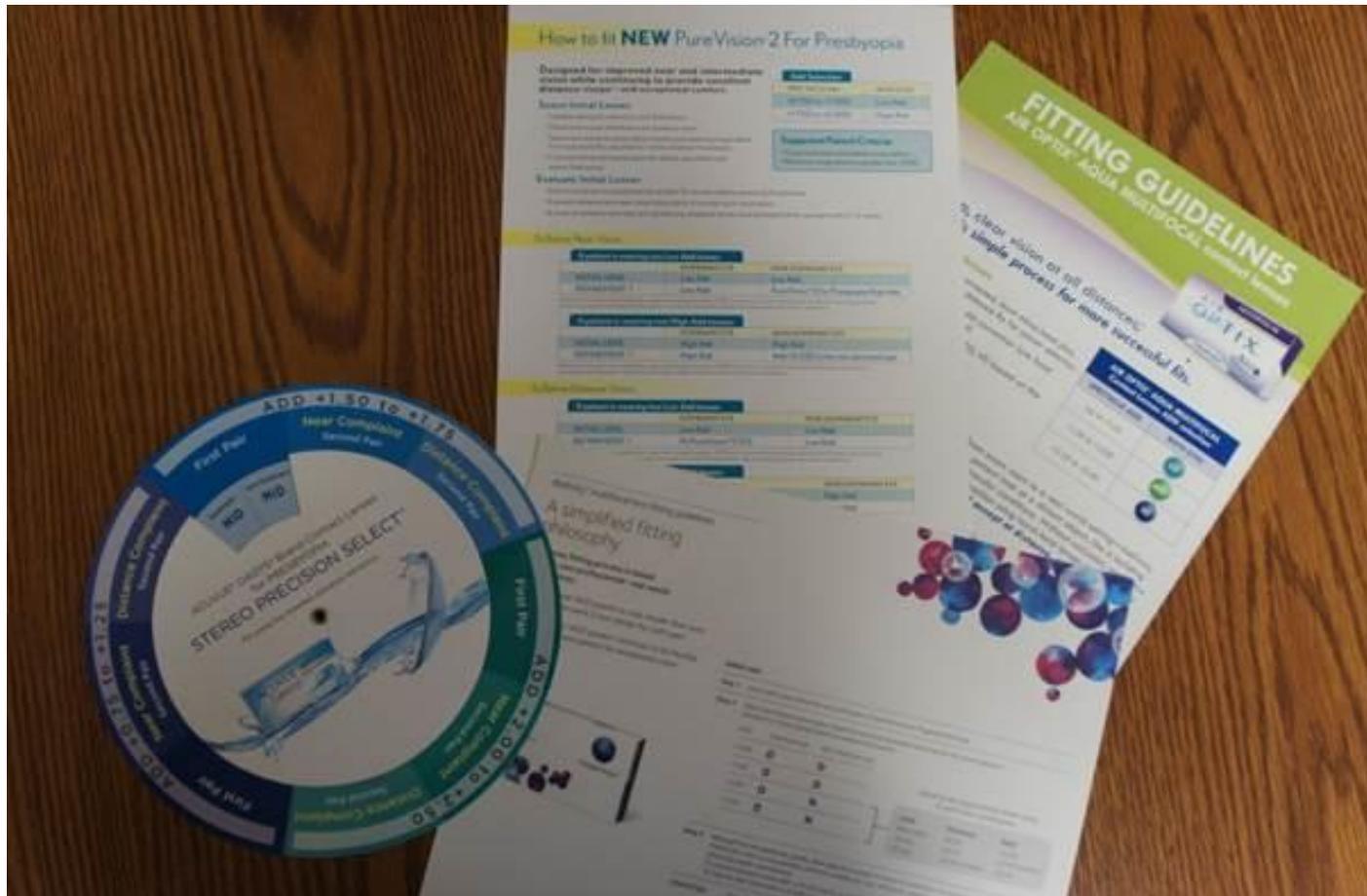
Photo courtesy of CooperVision

Soft Multifocal Design

Simulated images of a wearer **viewing at distance** through a simultaneous vision lens



Soft Multifocal Fitting



Soft Multifocal Fitting

- Manifest Refraction
- Add power
- Dominant Eye
- Patient's Visual Requirements
- Determine lens design: Center Near, Distance, Combination
- Use fitting guide to select initial lenses

Newer fitting guide trends:

- Hyperopes
 - Note that fitting guides recommend adding additional plus power to the distance Rx in initial lens
- Myopes/Emmetropes
 - Keep the dominant eye in a lower add power
 - Increase add power in non-dominant
 - Increase distance plus power in non-dominant

Fitting Guide Examples

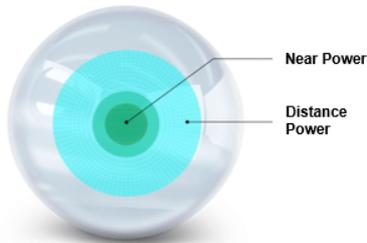
INITIAL CONTACT LENS SELECTION		
Spectacle Rx Add	Dominant Eye	Non-Dominant Eye
+0.75D to +1.25D	LOW	LOW
+1.50D to +1.75D		MED
+2.00D to +2.50D		HIGH

DISTANCE VISION ENHANCEMENT	
	For Dominant Eye
Adjustment Steps	±0.25D

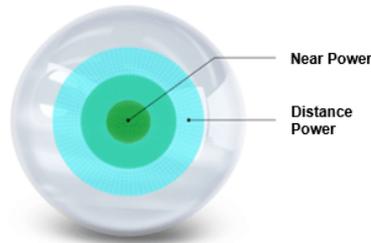
NEAR VISION ENHANCEMENT	
	For Non-Dominant Eye
Adjustment Steps	±0.25D

DO NOT CHANGE ADD POWER.

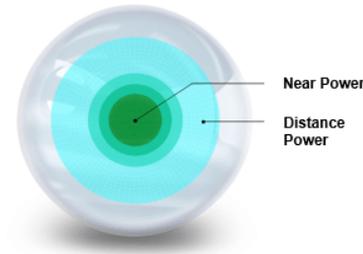
Low Add
Aspheric center-near design



Medium Add
Aspheric center-near design



High Add
Spherical center-near design,
with dual intermediate zones



For illustrative purposes only

Takeaway: Push the plus at Distance, especially in the non-dominant eye for success

Fitting Guide Examples

ADD	EYE	LENS POWER	ENHANCED DISTANCE VISION	ENHANCED NEAR VISION
+0.75D to +1.25D	Dominant Eye	 LOW	ACUVUE® MOIST® SPHERE	 LOW
	Non-dominant Eye	 LOW	 LOW	 LOW +0.25D
+1.50D to +1.75D	Dominant Eye	 MID	 LOW	 MID
	Non-dominant Eye	 MID	 MID	 MID +0.25D
+2.00D to +2.50D	Dominant Eye	 MID	 MID	 MID
	Non-dominant Eye	 HIGH	 MID +0.25D	 HIGH +0.25D

- Choose initial lens based on vertex-corrected, least minus/most plus, spherical equivalent distance Rx and **add +0.25D for each eye**
- Determine lowest acceptable spectacle ADD

Initial ADD Selection	
Spectacle Add	Both Eyes
Up to +1.25	LO
+1.50 to +2.00	MED
+2.25 to +2.50	HI

Comparison of Initial Lenses:

OD -1.50DS

OS -2.00-0.50 X180

Add +1.75

*OD dominant eye

Total 30/Dailies
Total 1 MF

OD: -1.25 Med
OS: -2.00 Med

Ultra for Presbyopia
Biotrue Presbyopia
Infuse MF

OD: -1.50 High
OS: -2.25 High

AV Moist for
Presbyopia
AV Oasys MF

OD: -1.50 Mid
OS: -2.25 Mid

MyDay/
Clariti 1 day
MF

OD: -1.50 Low
OS: -2.25 Med

Takeaway: Always start with the fitting guide
recommended first set of lenses

Soft Multifocal Fitting

- Over-refraction with hand-held trial lenses
- Normal room illumination
- Assess binocularly with everyday reading materials



Soft Multifocal Fitting

- Over-refracting Tips:
 - Both eyes open
 - Use flippers without a phoropter
 - Can place flipper power over one eye or both
 - Check the vision with the desired flipper power at the other distance to confirm adequate vision



Soft Multifocal Fitting

- Over-refracting Tips:
 - Example: patient complains of distance blur, good near vision.
 - VA 20/25 at Dist OU; 20/20 NR
 - With both eyes open, looking at distance chart, normal room illumination
 - Use -0.25D flipper
 - Over dominant eye first, then over both eyes.
 - Now check the vision at near with the new flipper power to confirm it is still adequate



Soft Multifocal Fitting

Examples:

- Manifest Refraction
- Add power
- Dominant Eye
- Patient's Visual Requirements
- 47 yo female
- -3.50DS OU 20/20
- +1.50
- Left eye
- Distance Vision important, CPU and digital devices

Young Presbyope, Center Near Design, Low Add Power OR
Combination design with Center Distance OS and Center Near OD.

TRIAL LENSES: USE THE FITTING GUIDE

Soft Multifocal Fitting

-3.50 DS OU, +1.50 D, OS dominant

INITIAL CONTACT LENS SELECTION		
Spectacle Rx Add	Dominant Eye	Non-Dominant Eye
+0.75D to +1.25D	LOW	LOW
+1.50D to +1.75D		MED
+2.00D to +2.50D		HIGH

- Center Near Design:
- OD: -3.50 LOW add
- OS: -3.50 MED add

FITTING GUIDE		
Spectacle Rx	Dominant Eye	Non-Dominant Eye
ADD*	DESIGN	DESIGN
+1.00D	D	D
+1.50D	D	D
+2.00D	D	N
+2.50D	D	N

- Combination Design:
- OD: -3.50 D lens +1.50
- OS: -3.50 D lens +1.50

D refers to a centre Distance design. N refers to a centre Near design. *Always round down to the nearest available ADI
 1. CVI data on file 2019. Retrospective analysis; N=55 subjects (110 eyes); DV Rx +1.25D to -3.25D, ADD powers +1.25 to +2.50DS.

Soft Multifocal Fitting

-3.50 DS OU, +1.50 D, OS dominant

Center Near Design:

OD: -3.50 LOW add

OS: -3.50 MED add

DISTANCE VISION ENHANCEMENT	
	For Dominant Eye
Adjustment Steps	±0.25D

NEAR VISION ENHANCEMENT	
	For Non-Dominant Eye
Adjustment Steps	±0.25D

DO NOT CHANGE ADD POWER.

- 2 week follow-up, good near vision, wants better distance vision
 - 20/25 DISTANCE OU
 - 20/20 NEAR OU
- *Use flippers, start with OS only -0.25D*
- *Not good enough – try -0.25D OU*
- *Confirm near vision is still good*

New trial lenses:

OD: -3.75 LOW add

OS: -3.75 MED add

Soft Multifocal Fitting

Examples:

- Manifest Refraction
- Add power
- Dominant Eye
- Patient's Visual Requirements
- 62 yo male
- -2.50DS OU 20/20
- +2.50
- Right eye
- Distance Vision important, CPU and digital devices

Mature Presbyope: Center Near Design, High Add Power
TRIAL LENSES: USE THE FITTING GUIDE

Soft Multifocal Fitting

-2.50 DS OU, +2.50 D, OD dominant

INITIAL CONTACT LENS SELECTION		
Spectacle Rx Add	Dominant Eye	Non-Dominant Eye
+0.75D to +1.25D	LOW	LOW
+1.50D to +1.75D		MED
+2.00D to +2.50D		HIGH

- Center Near Design:
- OD: -2.50 LOW add
- OS: -2.50 HIGH add

FITTING GUIDE		
Spectacle Rx	Dominant Eye	Non-Dominant Eye
ADD*	DESIGN	DESIGN
+1.00D	D	D
+1.50D	D	D
+2.00D	D	N
+2.50D	D	N

- Combination Design:
- OD: -2.50 D lens +2.50
- OS: -2.50 N lens +2.50

D refers to a centre Distance design. N refers to a centre Near design. *Always round down to the nearest available ADI
 1. CVI data on file 2019. Retrospective analysis; N=55 subjects (110 eyes); DV Rx +1.25D to -3.25D, ADD powers +1.25 to +2.50DS.

Soft Multifocal Fitting

-2.50 DS OU, +2.50 D, OD dominant

- Combination Design:
- OD: -2.50 D lens +2.50
- OS: -2.50 N lens +2.50
- 2 week follow-up
- Distance is great; would like better near
 - 20/20 OU distance
 - 20/30 OU near
- *Use flippers, start with OS only +0.25D (looking at near)*
- *Not good enough – try +0.25D OU*
- *Confirm dist vision is still good*

DO NOT CHANGE ADD POWER.

DISTANCE VISION ENHANCEMENT	
	For Dominant Eye
Adjustment Steps	±0.25D

NEAR VISION ENHANCEMENT	
	For Non-Dominant Eye
Adjustment Steps	±0.25D

New Trial Lenses:

OD: -2.50 D lens +2.50

OS: -2.25 N lens +2.50

Why a fitting guide is important:

- 48 yo Male
 - Complaints about eyes crossing after looking at distance for long periods
 - Current lenses: -5.00/ +2.50 and -4.75/ +2.50
 - Goals: good distance vision and CPU vision
 - MR: -4.50 -0.50 x 180 -4.00 -0.50 x 180 +1.50 add
 - New lenses: “D” lens OU
 - -4.50 +1.50D -4.00 +1.50D

Soft Multifocal Fitting

- Troubleshooting:
 - Lens Fit – if the lens is not centered on the eye or not moving with blink – select a different lens design
 - Most standard multifocal soft lenses only have one base curve and diameter, resulting in needing to change to a different lens design if the lens is not fitting well.

Soft Multifocal Fitting

- Troubleshooting:

- **Vision**

- Complaints at Near: use plus powered flippers or loose lenses to over-refract, while patient is looking binocularly
 - Start with +0.25D if not enough try +0.50D
 - Start with non-dominant eye only, before trying over both eyes
 - Complaints at Distance: use minus powered flippers or loose lenses to over-refract, while patient is looking binocularly
 - Start with -0.25D if not enough try -0.50D
 - Start with non-dominant eye only, before trying over both eyes

ALWAYS assess vision at other distance
during OR process

A quick word about modified Multifocals

- Do not shy away from trying “non-normal” ideas
 - Adjust the distance power to be a “modified multifocal”
 - If the patient does not see well at near with one design, but sees great at distance
 - Try a different multifocal near design on the non-D eye
 - Example:
 - Air OptixMF OD -2.50 / Med add
 - Biofinity MF OS -2.50 / +2.50 N lens

	Manufacturer	Name	Type	BC1	BC2	DIA	Sphere	Cyl.	Axis	Add
OD	Cooper Vision	Proclear 1dayMF	Disp Daily	8.70		14.2	+1.50	0.00	0	Med
OS	Cooper Vision	Clariti1d MF	Disp Daily	8.60		14.1	+0.50	0.00	0	High

	Manufacturer	Name	Type	BC1	BC2	DIA	Sphere	Cyl.	Axis	Add	Add Desc	Seg	Ser.	Color
OD	Bausch&Lomb	PureVision 2 MF		8.6		14.	+3.25			High	<input type="radio"/> N <input type="radio"/> D			
OS	Cooper Vision	Biofinity MF N		8.6		14.	+4.25			2.50	<input type="radio"/> N <input type="radio"/> D			

A quick word about Multifocal Toric Lenses

- Determine the best lens powers for the astigmatic prescription
- Determine which MF Toric lens
- Use the fitting guide
- If selected lens design is unstable, try the other design.

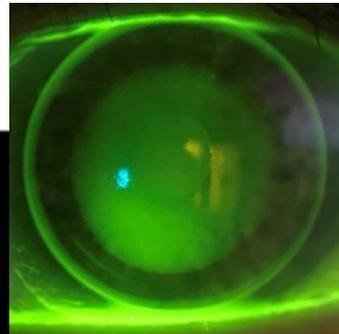


GP Multifocals

- Aspheric MF Lens Design

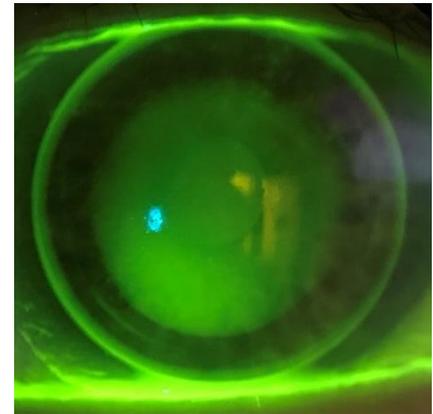
Gradual change in curvature generating a change in power in the lens.

- Simultaneous vision design
- Front Surface Aspheric – fit approximately on-K, looking for an alignment pattern, like a spherical GP lens
- Back Surface Aspheric – fit steeper than flat K – typically have a slightly steep fitting pattern.



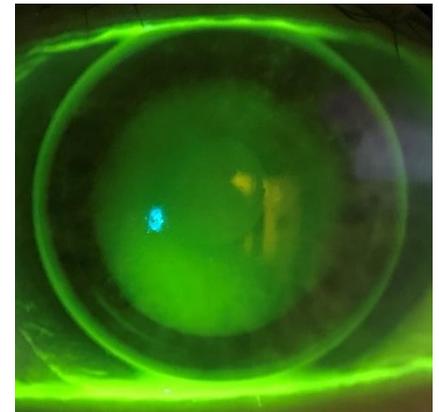
GP Multifocals

- Aspheric MF Lens Design
 - Can be either: **center-distance or center near**
 - Goal of good lens centration
 - Low-medium adds may work best, Emerging presbyopes
 - Computer users/Intermediate vision
 - Use fitting guide for initial lens selection

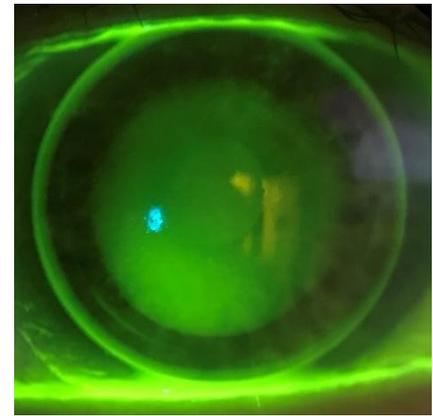


GP Multifocals

- Aspheric MF Lens Design
 - Fitting:
 - Manifest Refraction with add power
 - Horizontal Visible Iris Diameter
 - Used to determine the lens diameter
 - Dominant Eye
 - Pupil Size



GP Multifocals



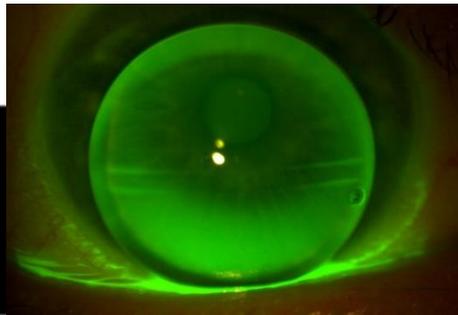
- Aspheric MF Lens Design
 - Troubleshooting:
 - **Inferior Decentration**
 - steepen the lens base curve
 - **Lateral Decentration**
 - increase the lens diameter
 - **Superior Decentration**
 - use a back surface aspheric design to improve lens centration
 - **Vision Concerns**
 - perform OR same way as with soft multifocal lenses
 - Can adjust distance or near zone size, add power, and distance lens power

GP Multifocals

- Translating MF Design

alternating vision design that is prism ballasted with a distinct distance portion and a near portion.

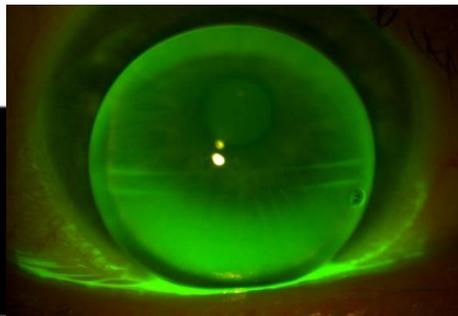
- *Typically fit slightly flatter than flat K*
- Sits on or near the lower lid, need lower lid at or near limbus
- Near Segment, good for any add power, good for critical near demands, ideal location is at the lower pupil margin
- Near portion moves up in front of pupil with downgaze



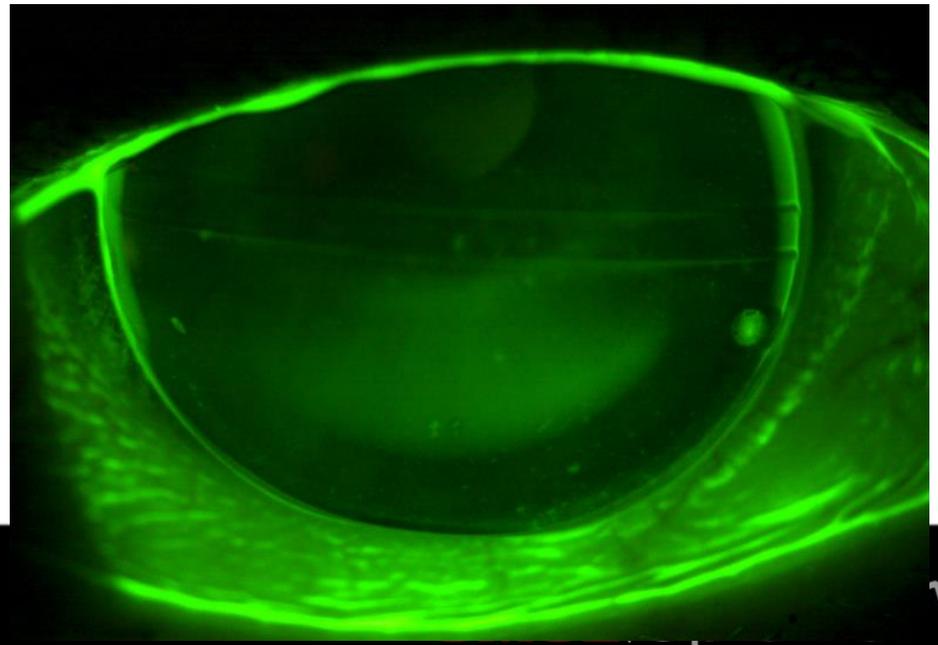
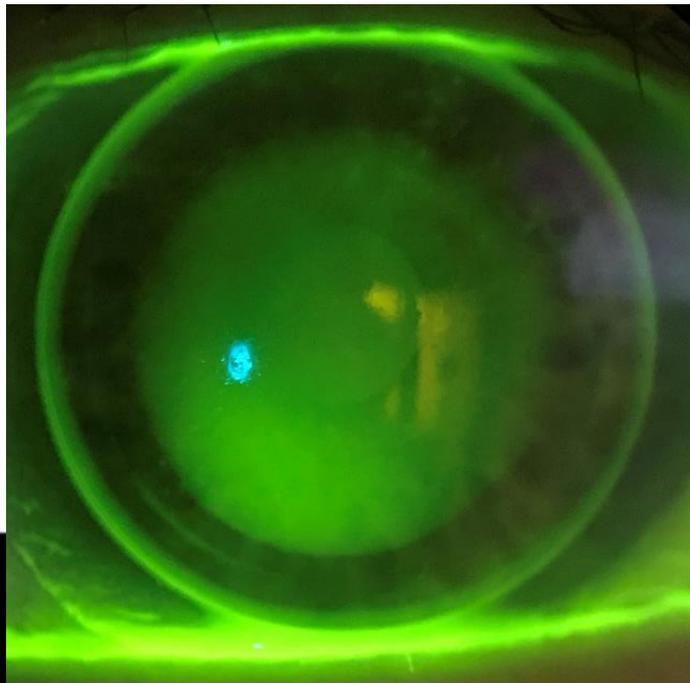
GP Multifocals

- Translating MF Design
- Fitting
 - Manifest Refraction with add power
 - Horizontal Visible Iris Diameter
 - Dominant Eye
 - Pupil Size

During slit lamp evaluation: have the patient look down, while you lift the upper lid, you are looking for lens translation upward to confirm the lens moves up with downgaze to optimal near vision

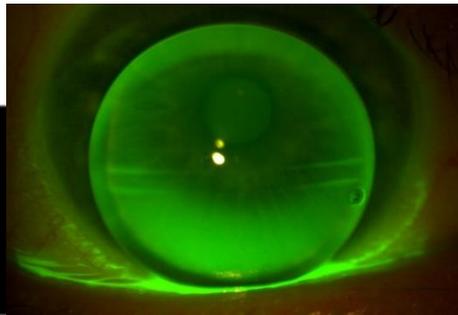


GP Multifocals – Patient Selection



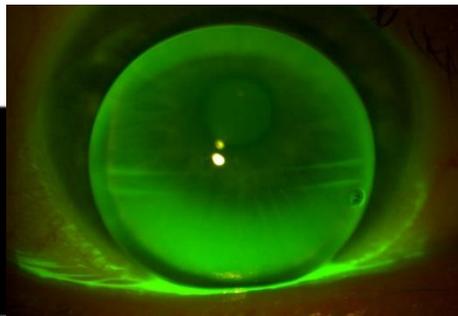
GP Multifocals

- Translating MF Design
- Troubleshooting:
 - **Excessive Lens rotation with blink**
 - Flatten the lens base curve, typically start with 0.50D flatter
 - **Lens is decentered Superiorly**
 - Increase the prism ballast (0.50Δ) or flatten the peripheral lens curve
 - **Lens is intermittently or not translating**
 - Flatten and or widen the lens edge
 - Flatten the lens base curve



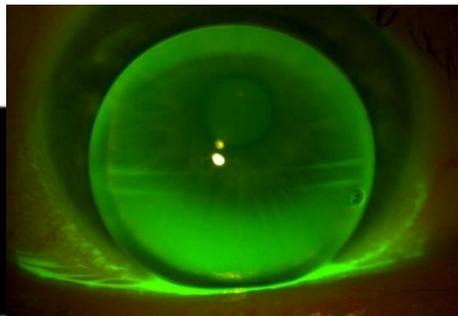
GP Multifocals

- Translating MF Design
- Troubleshooting:
 - **Poor Distance Vision**
 - If well centered lens, perform distance over-refraction
 - If lens is not well center, adjust lens fit
 - **Superior decentration**: increase prism
 - **Lens not adequately covering pupil in primary gaze**: increase lens diameter
 - **Segment height is too high** – decrease segment height (lower)
 - **Excessive rotation** – flatten lens base curve



GP Multifocals

- Translating MF Design
- Troubleshooting:
 - **Poor Near Vision**
 - If well centered lens, perform near over-refraction, while patient is looking through near segment with eyes looking downward
 - Or adjust lens fit
 - **Segment height is too low** – increase segment height (higher)
 - **Not translating** – increase edge lift, flatten the peripheral curves



Patient Bobby

- 62 yo

OD -3.00-1.00 x 046

43.75 @015/44.62 @ 105

OS -2.25 - 0.50 x 138

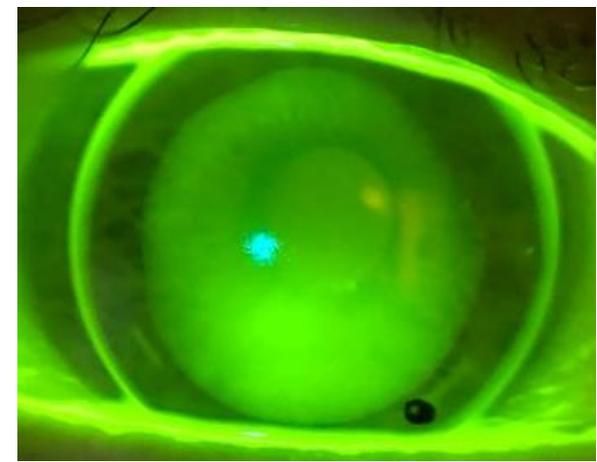
43.75 @ 150/44.50 @ 060

- HVID: 11.5; OS dominant
- lower lid slightly above inferior limbus
- Pupil dim 6 / bright 3

Patient Bobby

- Aspheric Design (44.25D/ 9.5)
 - OD: -3.00 / +2.75 add 20/20- OU DIST
 - OS: -2.25 / +2.75 add 20/40 OU Near
 - Needs better near vision
 - Lens fit was assessed as centered, slightly steep fit
- 2nd pair:
 - OD: -2.50/ +2.75 20/20- OU DIST
 - OS: -1.75 / +2.75 20/25- OU NEAR

Patient Bobby



- Needs better NEAR vision....again
- 3rd pair
 - OD: -2.50 / +3.00 add 20/20 OU DIST
 - OS: -1.75 / +3.00 add 20/25+ OU Near

Hybrid Multifocal

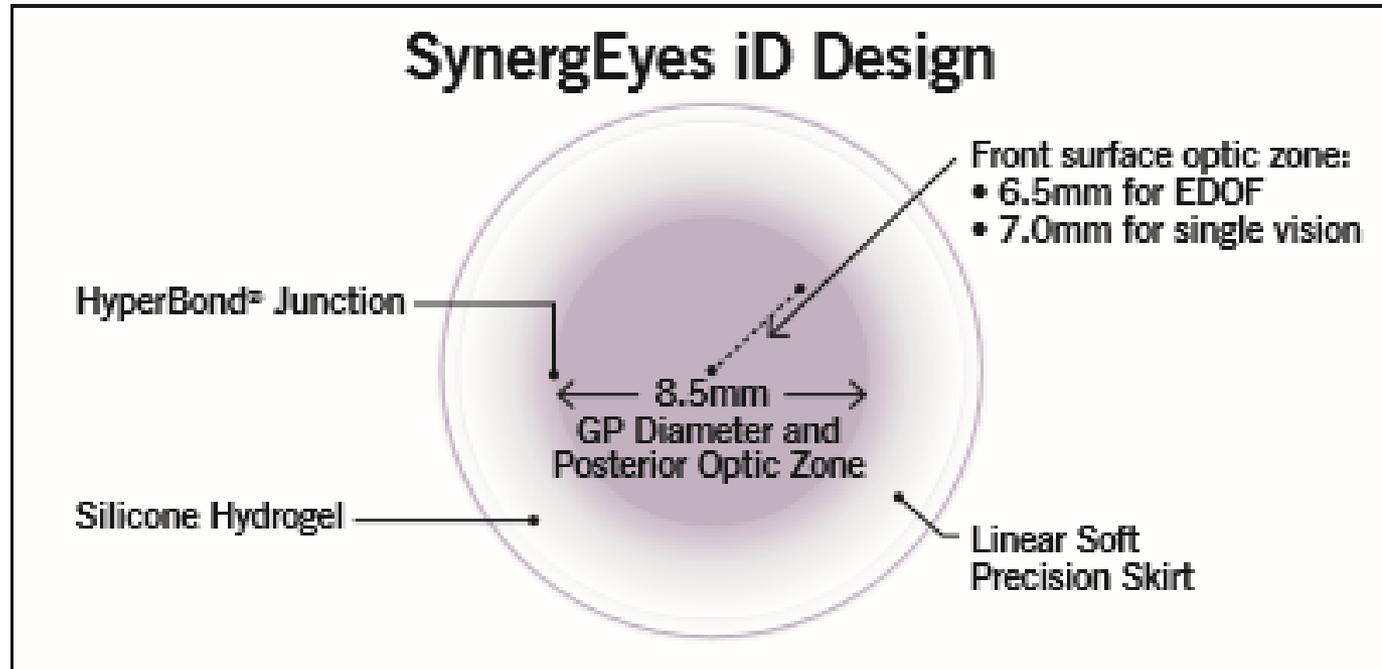


Image Courtesy of SynergEyes

Hybrid Multifocal Options



Both Eyes Right Eye (OD) Left Eye (OS)

Just provide these three measurements and we'll take care of the rest.

Ks

Keratometry Readings

from keratometer,
topographer, autorefractor
or aberrometer

HVID

HVID measured to 0.1mm

from autorefractor, 10x magnifier,
slit lamp reticle, aberrometer,
topographer or ruler

Rx

Manifest Refraction and Add*

Spectacle Add	MF Add Profile
+1.25 or below	Low
+1.50 to +2.00	Medium
+2.25 and above	High

SynergEyes® iD Single Vision

SynergEyes® iD MF EDOF

Need to confirm no or minimal residual cylinder for best visual outcome

Hybrid Multifocal Fitting

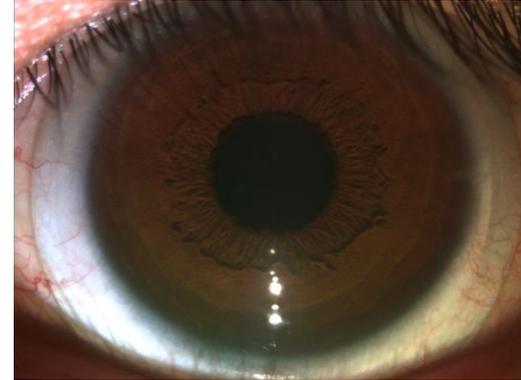
- Troubleshooting:
 - Ghosting
 - Too high an add power, reducing in dominant eye
 - Excessive lens movement
 - Adjust lens skirt, increase the skirt number to decrease lens movement and improve lens centration
 - Conjunctival Impingement
 - Lens skirts shows compression or no movement, decrease the skirt number to improve lens movement

Scleral Lens Multifocal

- Finish the scleral lens fitting process
- Determine the necessary add power
- Order a new set of lenses duplicate lenses with the multifocal optics

Scleral lens Multifocal

- Multifocal Scleral lens design
 - Simultaneous Multifocal Lens Design
 - Aspheric or concentric
 - Center Near and Center Distance Designs
 - Can adjust near powers
 - Can adjust zone size
 - Not all scleral lens designs have a MF option



Wrap Up

- Numerous options for presbyopic patients
- “My last doctor said I couldn’t wear MF”
- Don’t be afraid to think outside the box