

Multifocal Lens Design and Fitting Update

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Discussion Topics

- Preparation for Fitting
- Soft multifocal lens design
- Multifocal lens design
- Hybrid lens design
- Scleral lens design



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Preparation for Fitting

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

Patient Selection

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

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Eye Dominance



Right handed or Left handed

Sensory dominance: +1.50D



Sight Dominance



Set their expectations

- Longer fitting process possible-multiple visits
- Some 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

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Set their expectations

- Adaptation
- “Modifying” Lens powers
- First-hand experience makes it more credible
- Win-win situation for them

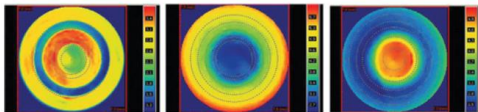


Soft Multifocal Designs

- 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



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



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

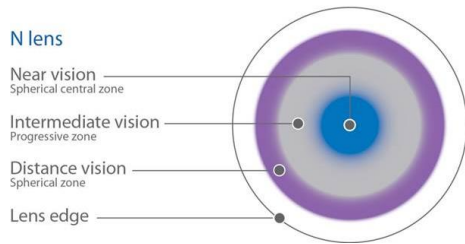


Photo courtesy of CooperVision



Soft Multifocal Design Center Near

Miru 1 month Multifocal; Decentered Optics

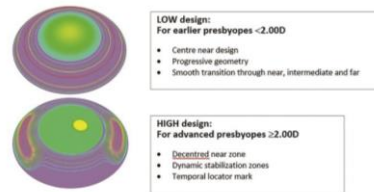


Figure 4. A closer look at Miru 1 month multifocal Dual balanced design

Photo courtesy of Menicon



Soft Multifocal Design Center Near

183 pupil optimised designs across both the ADD and refractive range

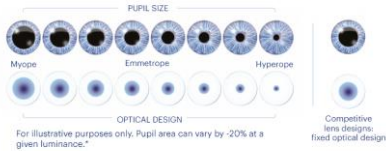


Photo courtesy of J & J

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Soft Multifocal Design Center Distance

D lens

Distance vision
Spherical central zone

Intermediate vision
Progressive zone

Near vision
Spherical zone

Lens edge

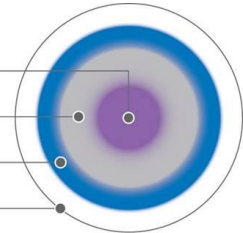


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Soft Multifocal Design



Simulated images of a wearer viewing at distance through a simultaneous vision lens in which (a) 70%, (b) 50% and (c) 30% of the pupil is covered by the near refractive lens power.

<https://www.dspectrum.com/supplements/2010/march-2010/presbyopia-opportunity/simultaneous-vision-the-science-behind-the-art>

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Design Selection Examples

- Patient has complaints of blur at distance
 - Fit in Monovision 4 months prior
 - Previously wore distance only CL with readers
 - Hunter and wants sharp distance vision
 - Better distance vision with:
 - Multifocals – start with center distance OU OR
 - Distance Sphere dominant eye and multifocal nonD eye

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Design selection examples

- Emmetropes with +1.50D add
 - Initial Lens Selection
 - Center Distance design lens OU with +1.50D add
 - Poor Distance Vision (not surprising)
 - Remove lens from dominant eye, only wear on non-D
 - Decrease add power in dominant eye
 - Poor Near Vision
 - Change non-D eye to center near design
 - Increase add power in non-dominant eye

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Design selection examples

- -2.00D Myope with +2.00D add
 - Current distance only CL wearer
 - Works on CPU 8+ hours/5 days week; spends time outdoors, activity on weekends.
- Initial Lens Selection
 - Monovision? One lens for distance dominant eye
 - What lens material does the patient current wear?
 - Center Near OU -2.00/ +2.00D add OU or
 - Center Distance Dom/Center Near Non-D same powers

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Soft Multifocal Design Center Near

- **Alcon**
 - Air Optix Multifocal
 - Dailies AC+ Multifocal
 - Dailies Total 1 Multifocal
 - Total 30 Multifocal
- **CooperVision**
 - Proclear 1 day Multifocal
 - Clariti 1 day Multifocal
 - MyDay Multifocal
- **Bausch and Lomb**
 - Biotrue 1 day for Presbyopia
 - Infuse MF
 - Ultra for Presbyopia; **MF Toric**
- **Johnson & Johnson Vision Care**
 - 1 day Moist for Presbyopia
 - 1 day Oasys MAX MF
 - Oasys Multifocal



Soft Multifocal Design Center Distance

- **Johnson & Johnson Vision Care**
 - Oasys for Presbyopia
- **Visioneering Technology**
 - NaturalVue Multifocal 1 day
- **CooperVision-Combination**
 - Biofinity MF; Biofinity **MF Toric**
 - Proclear MF; Proclear **MF Toric**



Soft Multifocal Design Toric

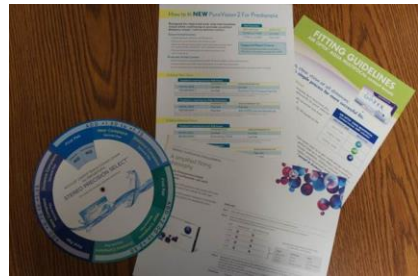
- **Bausch and Lomb – center near design**
 - Ultra Multifocal for Astigmatism



- **CooperVision-Combination design**
 - Biofinity MF Toric
 - Proclear MF Toric



Soft Multifocal Fitting



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



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



Clariti 1 day MF vs Myday MF

Lens selection
Starting with Best Sphere for distance vision use the table below to select the initial trial lens:

Ocular Dominance	Spectacle ADD	Spectacle ADD	Spectacle ADD
	+0.75 to +1.75	+2.00 to +2.25	+2.50 and over
Hypopes	Dominant Eye: BS LOW Non-Dominant Eye: BS +0.25 LOW	BS +0.25 LOW BS +0.25 LOW	BS +0.25 LOW BS +0.25 HIGH
Myopes	Dominant Eye: BS LOW Non-Dominant Eye: BS LOW	BS +0.25 LOW BS +0.25 LOW	BS +0.25 LOW BS +0.25 HIGH

Fitting guidelines for initial lens selection for clariti® 1 day multifocal
BS = Best Sphere LOW = Low ADD HIGH = High ADD

Clariti 1 Fitting Guide

INITIAL CONTACT LENS SELECTION

Spectacle Rx ADD Dominant Eye Non-Dominant Eye

+0.75D to +1.25D LOW LOW

+1.50D to +1.75D LOW MED

+2.00D to +2.50D HIGH HIGH

MyDay Fitting Guide

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.

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

1 day Moist/Oasys MF vs DT1

1 day Moist

Dailies Total 1 MF

• 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

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Comparison of Initial Lenses:

OD -1.50
OS -2.00-0.50 X180
Add +1.75

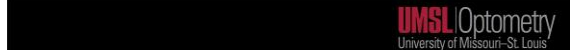
Lens	OD (dominant eye)	OS
DT1 MF	-1.25 Med	-2.00 Med
Ultra for Presb.	-1.50 High	-2.25 High
My Day MF	-1.50 Low	-2.25 Med
1 day AV Moist for Presb.	-1.50 Mid	-2.25 Mid

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
- Troubleshooting



Patient Henry

56yo long time SCL wearer; did not need bifocal until late 40s.

- Refraction OD -2.50 Add +2.00
OS -2.50 Add +2.00
Right handed; Dominant eye OD
– CPU work is significant, also has critical distance needs

- Presents with complaints at near with current MF lens.
- Air Optix MF

OD: -2.50 LOW
OS: -2.50 MED

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



Patient Henry

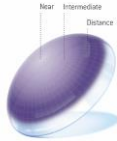
- Refit: -2.25 MED/-2.25 MED
- In-office:
 - 20/20 OU distance; 20/20 OU near
 - 2 week follow-up: near vision still not quite good enough.
 - -2.25 MED/-2.00 MED
- 1 year follow-up
 - Near vision not great (again), willing to sacrifice distance vision for improved near.
 - Also wants daily disposable lenses for traveling

Initial CL Add	Spectacle Add
Lo	Up to +1.25
Med	+1.50 to +2.00
Hi	+2.25 to +2.50



Patient Henry

- Dailies Aquacomfort Plus Multifocal
 - Dailies Total 1 Multifocal
 - Both are the same design as the Air Optix multifocal
- Continued near blur complaint...



Patient Henry

- Patient needs a great deal of additional plus for better near vision
- Modified Multifocal
- OD: -2.25 / MED
- OS: -1.25 / HIGH
 - Wears both the Air Optix MF and DT1 MF



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 Optix MF OD -2.50 / Med add
 - Biofinity MF OS -2.50 / +2.50 N lens

Manufacturer	Name	Type	BC1	BC2	DIA	Sphere	Cyl	Axis	Add
Cooper Vision	Proclear 1dayMF	Disp Daily	8.70	14.2	+1.50	0.00	0	Med	
Cooper Vision	Clarity1d MF	Disp Daily	8.60	14.1	+0.50	0.00	0	High	

Manufacturer	Name	Type	BC1	BC2	DIA	Sphere	Cyl	Axis	Add Desc	Seg	Color
Bausch&Lomb	Purevision 1MP		8.2	14	+2.25			Med	N	D	
Cooper Vision	Biotruly MF N		8.4	14	+4.25			2.25	N	D	

Patient Max

- 58 yo Engineer, CEO of electric company
 - History of lens wear 25+ years previous
 - Interested in contact lenses; open to any type; wants freedom from glasses.
- MR:
 - OD -1.50 -1.75 x 180 +2.00 20/20
 - OS -1.50 -1.75 x 175 +2.00 20/20
 - Exact same Rx for 10+ years.....OD dominant eye



Patient Max

- Options:
 - GP MF
 - Soft Multifocal Toric
 - Scleral MF
- Patient want to have the freedom to wear glasses for carpentry work.
 - Fit in soft multifocal Toric



Patient Max

Soft Multifocal Toric Options

- Proclear Multifocal Toric
- Specialty Design
 - Special eyes
 - Intelliwave (Art Optical)

Other Options Today:
Biofinity MF Toric
Ultra MF Toric

OD -1.50 -1.75 x 180 +2.00 D
OS -1.50 -1.75 x 175 +2.00 N



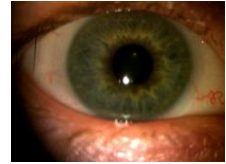
Patient Max

- Patient follow-up:
 - Good comfort and vision at distance
 - Near vision could be better
 - Slight dryness with lenses
 - *Change to Clear Care solution*
 - OD -1.50 -1.75 x 180 +2.00D
 - OS -1.50 -1.75 x 175 **+2.50N**
- Wore this lens for 7 years; upgraded to Biofinity MF T.*



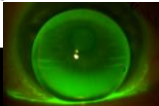
A quick word about Multifocal Toric Lenses

- Ultra fit set is great!
- If patient is in a Biofinity lens – should transition to Biofinity MF Toric
- If selected lens design is unstable, try the other design.

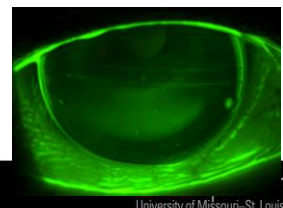
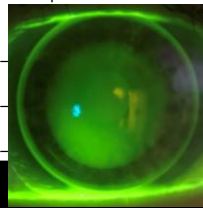


GP Multifocals

- Aspheric MF Lens Design
 - Fit steeper than K
 - Desire Good Centration
 - Trial lens over-refraction
 - Use fitting guide Consultation
- Translating MF Design
 - Prism ballasted
 - Sits on lower lid or near lid
 - Near Seg
 - Near portion moves up in front of pupil with downgaze



GP Multifocals – Patient Selection



Patient Bobby

- 62 yo
- OD -3.00-1.00 x 046 43.75 @15/44.62 @ 105
- OS -2.25 -0.50 x 138 43.75 @ 150/44.50 @ 060
- Lens options:
 - GP spherical with glasses
 - GP MF



GP Multifocals

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



Renovation MF Aspheric Design

- Front surface simultaneous vision GP MF
- Adjustable distance zone diameter
 - Accommodate patient with various pupil sizes
- Minimal base curve eccentricity
- Lens thickness control for maximum comfort

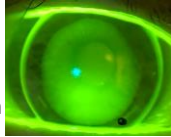


Patient Bobby

- Renovations (7.71 / 9.5)
 - OD: -3.00 / +2.75 add 20/25- OU DIST
 - OS: -3.00 / +2.75 add 20/40 OU Near
 - Needs better near vision
- 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
- HAPPY!
- Other options: change design, adjust center zone size



Hybrid Multifocal Options

SynergEyes Empirical Lens Calculator

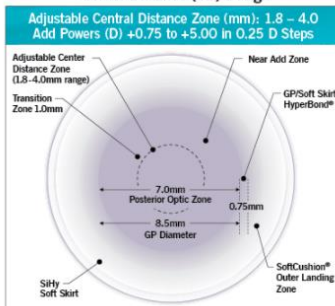
Just provide these three measurements and we'll take care of the rest.

Ks	HVID	Rx								
Keratometry Readings from keratometer, topographer, autorefractor or aberrometer	HVID measured to 0.1mm from autorefractor, 10x magnifier, slit lamp reticle, aberrometer, topographer or ruler	Manifest Refraction and Add*								
		<table border="1"> <tr> <th>Spectacle Add</th> <th>MF Add Profile</th> </tr> <tr> <td>+1.25 or below</td> <td>Low</td> </tr> <tr> <td>+1.50 to +2.00</td> <td>Medium</td> </tr> <tr> <td>+2.25 and above</td> <td>High</td> </tr> </table>	Spectacle Add	MF Add Profile	+1.25 or below	Low	+1.50 to +2.00	Medium	+2.25 and above	High
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



Center Distance (CD) Design



Hybrid Multifocal

*Duette Progressive Design

Image Courtesy of SynergEyes

Hybrid Multifocal

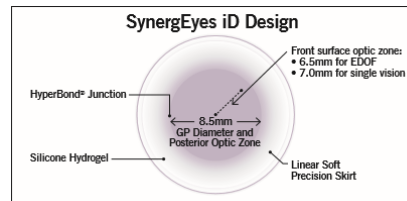
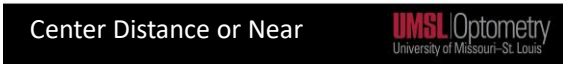


Image Courtesy of SynergEyes

Center Distance or Near

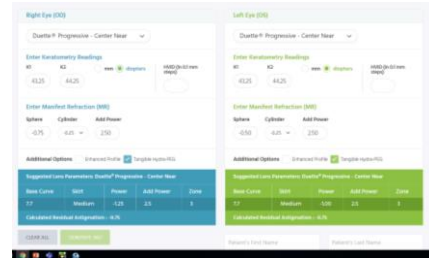


Patient Gus

- 61 year old, new contact lens wearer
 - OD -0.75 DS +2.50add
 - OS -0.50DS +2.50add
 - OD dominant
- Initially fit in Biofinity MF in both eye
 - Patient reports dryness and poor night vision with Biofinity MF
- Re-fit Duette Progressive



Patient Gus Re-fit Duette Progressive



Empirical Calculator for Progressive MF

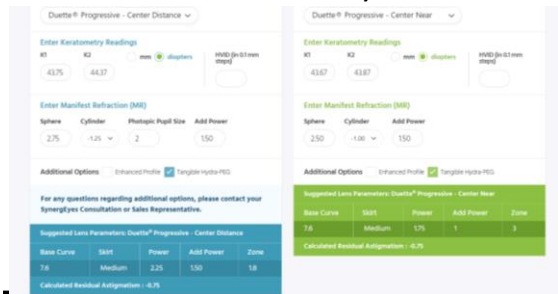


Patient Mary

- 64 Female, previous Duette Monovision Pt
- Has worn for 1 year, is uphappy with vision at distance and near; loves comfort.
- MR
 - OD +2.75 -1.25 x 095 20/20 add +1.50 dominant
 - OS +2.50 -1.00 x 087 20/20 add +1.50



Patient Mary



20/20 OU at Distance and Near



Duette Progressive Contact Lens

- Troubleshooting:
 - Lens centration – ghosting or halos if decentered
 - Reorder with the steeper radius skirt to center lens
 - Lens Movement – Tight lens <0.50mm movement
 - Reorder with the flatter radius skirt to increase movement
 - Over-refraction with +/-0.25D trial lenses
 - Same over-refraction rules apply to previously mentioned multifocal lenses



Synergeyes ID EDof MF

- 46 yoF
- Presents with complaints of near blur.
- Interested in SMF
 - Tried Ultra MF Toric
 - Lens rotated 90 degrees and unstable
 - Tried Biofinity Toric
 - Lens unstable with variable rotation
- Discussed a hybrid – ordered empirically



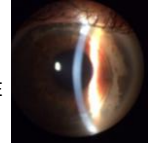
Synergeyes ID EDOF MF

- 46 yoF
- 41 degree skirt OU
- 20/20- OU at distance
- 20/20- OU at near
 - At three month follow-up appointment



Hybrid MF Notes

- *Lenticular Cylinder*
 - 1.00D or greater NOT A CANDIDATE
- *Recommended Solutions*
 - Clear Care, Biotrue
- *White Deposit Ring on soft skirt*
 - Tear chemistry of some patients may react with the peroxide to cause a permanent white ring at the junction of the GP lens/soft skirt



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



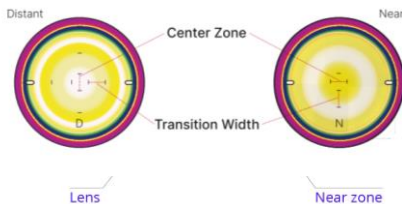
Scleral lens Multifocal

- 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



Basic Design Features

- Multifocal Scleral lens design

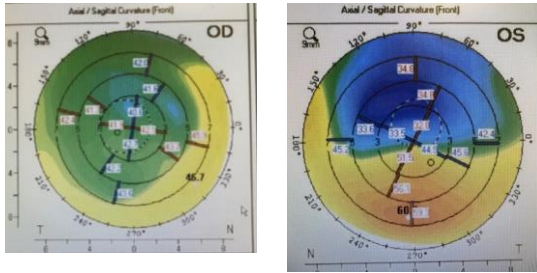


Patient CN

- New Patient
- Present with complaints of blur and double vision in the left eye only
 - History of LASIK OU 2002; cataract sx OS 2016
 - History of GP lens wear
- “I need lenses that will get rid of my double vision and I need to see well to work”
 - Intermediate vision important



Patient CN



Patient CN

- Vacc: 20/20- OD 20/50 OS
- SLE: LASIK flap OU, PCIOL OS
- MR:
 - OD: +2.50 OD OS: +3.75 -3.75 x 075
- Lens options:
 - OD – all lenses
 - OS – gas permeable material lens
 - Concerns: LASIK history.....



Patient CN

- Fitting:
 - OD – Biofinity +2.50 20/20 distance
 - OS –Jupiter Scleral
 - BC 7.50 / Diam 15.6 / -5.00 -0.75 x 090 20/20 intermediate distance; no doubling
 - Why not MF scleral OS?
 - Monovision was best option due to issues with double vision



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
- Questions?

