Secrets to Success with Contemporary Multifocal Contact Lenses
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Disclosures
Alcon
Aklen
Bausch & Lomb
Dyopsys
Cooper
Oculus
Paragon
Special Eyes
SynergEyes
Visionary
EyeVis Technologies*
National Keratoconus Institute*

A current global overview of presbyopic patients
• 1.04 billion people have presbyopia
• Over 40% of patients in today’s eye care practices are presbyopic

Percentage of patients with presbyopia

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>68%</td>
</tr>
<tr>
<td>Japan</td>
<td>56%</td>
</tr>
<tr>
<td>UK</td>
<td>54%</td>
</tr>
<tr>
<td>US</td>
<td>49%</td>
</tr>
<tr>
<td>Global</td>
<td>51%</td>
</tr>
</tbody>
</table>

By 2020, 25% more people are expected to become presbyopic
By 2050, the number of presbyopic patients is expected to nearly double

Global Presbyopic Trends

THERE’S AN EXPLOSION IN THE NUMBER OF PATIENTS BEING FIT IN MULTIFOCALS!
2009 – 10%
2013 – 46%

References:

Not All Presbyopes Are Alike
Contemporary Vision Demands

- Computer use (desk top, lap top, smartphones)
- Variable working distances & directions of gaze
- Complex and variable lifestyle demands

The Role Of Monovision

Advantages

- Ease of fit
- Lens design options
- Cost
- Immediate evaluation
- Reasonable “success” (65-75%*)

*Survey of Ophthal. May-June 1996

Disadvantages

- Requires good “alternate suppression”
- Potential reduced binocularity
- Loss of intermediate range w/ high add powers
- Patient reluctance to concept

The Role Of Monovision Fitting Methods

- “Sighting” (motor) dominance*
- “Sensory” dominance* (aniso blur test)
- Habitually better DV eye for DV
- Environmental vision demands
- “Try the right first, then try the left”

*Ooi, Zijiang, J Am Optom Assoc, 72/3, 3/01

Monovision: The numbers don’t lie*

- Reduced stereopsis:
  30 to 150 second decrease
- Reduced contrast sensitivity:
  #1 GPMFL, #2 SCLMFL, last MonoV
- Decrease in binocular task performance:
  2-6%
- *Patient preference for Mfl CL vs. MonoV:
  Ave. >70% of subjects preferred Mfl CL’s

*References available on request

Why Use Multifocal C.L.’s Vs. Monovision?

- Maintains binocularity (stereopsis, binoc. task performance, high spatial freq. CSF, and binoc. summation)
- Potentially avoids “intermediate gap”
- Specialty lens fitting (practice differentiation & fee structures)
Best monovision patient is Emmetrope
- Consider: Supplemental Specs (NV or DV)

"Modified Monovision":
- DV CL + MFL CL
- DV/IV MFL + NV/IV MFL ("Biased MFL")

Awareness of multi-focal lenses among 40-55 year old current contact lens wearers is relatively low:
- Fewer than half familiar with multi-focal lens availability

Top 2 Box - Very Familiar With Multi-Focal Contact Lenses
Middle Box - Somewhat Familiar With Multi-Focal Contact Lenses
Bottom Box - Not Familiar With Multi-Focal Contact Lenses

Are Contact Lens Wearers Interested in Trying Multi-Focal Lenses?
CLOSE TO THREE QUARTERS INTERESTED

Multifocal Misconceptions
“Prescription of bifocal CL is generally considered to be difficult and the success rate is low.”

MFL CL Rules
Three Rules:
- Communicate
- Communicate
- Communicate

4 Things Re - Multifocal CL’s:
- They exist
- They cost more
- They work
- They work really well in the right hands!
It’s all about vision

- Intermediate VA better for MF
- Near stereopsis better for MF
- MF vision rated by patients higher than monovision


Multifocal Myth:

- “Multifocal CL’s Take Too Much Chair Time!”

Multifocal Facts:

"Fitting a first time presbyopic correction with...MF lens required the same chair time as fitting...monovision"

Woods J, Woods CA, Fonn D. Comparison of the simplicity of completing an initial fit of symptomatic early presbyopes with monovision and an aspheric multifocal silicone hydrogel #80089 AAOpt 2008

Multifocal Facts:

Monovision: 3.3 ± 1.0 lenses
Multifocal: 3.3 ± 0.8 lenses

Woods J, Woods CA, Fonn D. Comparison of the simplicity of completing an initial fit of symptomatic early presbyopes with monovision and an aspheric multifocal silicone hydrogel #80089 AAOpt 2008

Eiden’s approach
To multifocal CL fitting:

***Maintain binocularity as long as possible
***Evaluate monoc. performance to determine what lens to modify and how.
*Most cases don’t compromise DV
*Understand the optics of the lenses you fit
- Set realistic performance expectations
  - Understand your patient’s specific visual demands
  - “Have the tools!”

**Fitting Multifocals**

**STEP #1 – PATIENT SELECTION**

- Identify patient’s expectation
- Match visual needs and personal disposition
- Occupation / Avocation / Vision Demands
- Refractive Error considerations
- Systemic and ocular health & medications
- Ocular Surface & Tear film status

**WHY CONSIDER EXPECTATIONS?**

- Vision requirements – hairsplitter?
- Comfort requirements – “whiner”?
- Convenience requirements
- Cost requirements – “I want it all for nothing”
  20/... happy: “It’s not perfect but it works for me”

**“PSYCHO-PREPARATION”**

- Explain presbyopic condition
  Need informed and cooperative subject
- Explain the fitting procedures
  Need patient to be prepared for the experience
- Explain fees, options, and policies
  Need to get adequately paid for efforts

**LENS SELECTION**

Categorize lenses by how they perform in your hands:

- Get experience with each
- You can’t take the rep’s word for it
- Be prepared to improvise... There are no textbook cases
LENS SELECTION

Match lens performance to patient requirements

- Options for > distance requirements:
  - Use lenses with larger distance zones
  - Dominant eye Lower add, other Higher add
  - Both eyes fitted with “D” lenses
  - Cut add in dominant eye
  - SV distance lens in dominant eye

- Options for > near requirements:
  - Maximum distance plus and add both lenses
  - High Add both eyes
  - Full add D lens + full add N lens
  - Full add D lens + push distance plus N lens
  - Both eyes fitted with N lenses
  - Full add dominant eye + SV mono NV
  - Best mixed balance M/F + low near glasses over

*Always Try To Maintain Binocular Equality at Distance and Near if at all Possible:

- Equal Adds
- Same Design/version OD/OS (eg. 2 “D”, 2 L.A., etc.)
- Same Zone Sizes OD/OS
- Etc.
- However often this is not possible…….

Establish “Bias” if needed:
“Mono-Plus/Mono-Minus”
(one eye bias distance one eye bias near)

Often you have to: Establish Dominance

- “Sighting” dominance
- “Sensory” dominance
- Near point of convergence
- Occupational demands
Sighting dominance

(“Swinging-plus test”):
Hold +1.50 D (or the likely add) trial lens alternately over each eye Walk around room
Most comfortable = near eye

VA is typically not improved when eye dominance is used...for selection

Robboy MW, Cox IA, Erickson P. Effects of sighting and sensory dominance on monovision high-and-low contrast acuity. ICLC 1990;17:298-301.
Gromacki S. Monovision and bifocal CL. In: M. Horne, Bruce eds. Manual CL Prescribing and Fitting 3e 2006;Elsevier

“Switching eye function can relieve...even the vaguest of symptoms”

Gromacki S. Monovision and bifocal CL. In: M. Horne, Bruce eds. Manual CL Prescribing and Fitting 3e 2006;Elsevier

“Optical Mixture Pyramid”
Successful MFL fitting often is: Mixture of monovision, simultaneous and alternating vision


Rules of MFL CL’s: “Give Them Some Time”
81 presbyopes 4 multifocals (Acuvue BF, Focus Progressives, Proclear MF, SofLens MF) 4 days Re-evaluation

Rules of MFL CL’s:
“Give Them Some Time”
At 4 days:
- > Stereopsis and near range of clear vision
- > Satisfaction, comfort, visual quality
- < Ghosting, halos
- Va’s unchanged & researchers felt they were not indicator of satisfaction!


MFL Adaptation vs. Monov.
At 15 days (Biof. MFL vs. Monov.):
- NV improved in Dom. Eye
- DV improved in Non-Dom. Eye
- No adaptation in Monov.


Pupils

“Pupil sizes are important, especially in the relative extremes”

Davis RL. Eiden SB. A rational approach to fitting multifocal lenses. CL Spectrum 2010 Feb 36-43,47.

Large pupils:
Distance compromise in center distance
Near compromise in center near

Small pupils:
Distance compromise in center near
Near compromise in center distance

Davis RL. Eiden SB. A rational approach to fitting multifocal lenses. CL Spectrum 2010 Feb 36-43,47.

Predicting Success with Multifocals

- Study MFL: Air Optix MFL (near center front aspheric)
- Looked at pupil size and ocular spherical aberration
- Results:
  - Near Va and depth of focus > w/ smaller pupils
  - Higher ocular S.A. had poorer Near Va
  - No correlations for pupil or S.A. for Dist. Va

Line of Sight (re: Angle Kappa) may influence vision performance in distance vs. near center simultaneous multifocals

Lighting conditions

- Low contrast, Normal light: 3 letter loss
- High contrast, Low light: 3.32 letter loss
- Low contrast, Low light: 6.1 letter loss

Sanders E. Wagner H. Reich LN. Binocular distance visual acuity in “balanced progressive” simultaneous vision bifocal contact lenses #075165 AAOpt 2007

Spectacles vs. MFL CLs

27 subjects
PAL (Varilux Comfort) vs MF CL
11% preferred PAL
11% preferred MF
78% preferred both

Neadle SW. Ivanova V. Hickson-Curran SB. Situational vision correction preference in presbyopes #95858 AAOpt 2009

Spectacles

PAL: stationary precise vision
MFCL: social and active activities

Neadle SW. Ivanova V. Hickson-Curran SB. Situational vision correction preference in presbyopes #95858 AAOpt 2009

Spectacles

“Benefits of PALs and MF...are] complimentary”

Neadle SW. Ivanova V. Hickson-Curran SB. Situational vision correction preference in presbyopes #95858 AAOpt 2009

Spectacles

“Clinicians can better satisfy their presbyopic patients’ needs by prescribing both PALs and MF”

Neadle SW. Ivanova V. Hickson-Curran SB. Situational vision correction preference in presbyopes #95858 AAOpt 2009
Primary Multifocal Design Options:
- Disposable Multifocal Soft
- Custom Multifocal Soft
- Custom Multifocal GP (proprietary vs. full custom)
- Hybrid Multifocals
- Tandem and Recessed Multifocal Systems

PureVision 2 Multifocal

Front Surface Aspheric Design
(near center - 3-Zone Progressive™)
8.6mm/14.0mm/ CT 0.07*
+6.00 to -10.00 in 0.25D steps
Adds:
Low up to +1.50D
High +1.75 to +2.50D

Power Consistency from Lens to Lens*
PureVision2 For Presbyopia compared to PureVision® Multi-Focal have:
- Less variance at near*
- Less variance at distance
- Wider intermediate zone where Add power gradually transitions to an accurate distance power

Fitting Recommendation Guide
To Refine Near Vision

If patient is wearing two Low Add lenses:

- INITIAL LENS
  - DOMINANT EYE: Low Add
  - NON-DOMINANT EYE: PureVision® for Presbyopia High Add

- REFINEMENT 1
  - Low Add

If patient is wearing two High Add lenses:

- INITIAL LENS
  - DOMINANT EYE: High Add
  - NON-DOMINANT EYE: PureVision® for Presbyopia High Add

- REFINEMENT 1
  - High Add add +0.25D to the non-dominant eye
Fitting Recommendation Guide

To Refine Distance Vision

Refinement 2: If vision is still unsatisfactory, make small changes by adding -0.25D at a time to the dominant eye using PureVision®2 single vision lenses using handheld lenses, and continue evaluating patient 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 the dominant eye using Low Add lenses using handheld lenses, and continue evaluating patient binocularly in normal room illumination. Adjust contact lens power when vision is satisfactory.

Air Optix Aqua Multifocal

• Center near front surface (low e)
• Aspheric back surface (low e)
• 3 add powers

Low Add
High Add

Air Optix Aqua Multifocal Contact Lens Design

An adaptive minus power profile

-0.25 Sphere of Rx +1.00 to +1.25 to +2.00
6.75 Cylinder Power

• Near Add Powers:
  - Low: 0.30D
  - Med: 1.30D
  - High: 1.44D

• Distance Power Location:
  - Low: 1.5mm
  - Med & High: 1.8mm

* Small pupils shift power profile to more +


Nimo TR1504 contact lens power mapper and wavefront analyzer (Lambda-X S.A., Nivelles, Belgium)
Air Optix Aqua Multifocal (Ciba Fitting Nomogram)

86% success
In early presbyopes

Air Optix Aqua Multifocal

Poor Distance
1. Add minus (Bilaterally)
2. Reduce Add (Unilaterally: dom eye up to +1.5 A, non dom > +1.5 A)

Air Optix Aqua Multifocal

Poor Near
1. Add Plus (Bilaterally)
2. Reduce Add (Non-dom) >= 1.75 A
3. Increase Add (Non-dom) < 1.75 A

Oasys for Presbyopia

“Multizone Aspheric Design”

- Material: senofilcon A (OASYS™)
- Base Curve: 8.4mm
- Diameter: 14.3mm
- Dk/t: 147

Cooper Vision Multifocals

“Balanced Progressive Technologies”

- Proclear EP
- Proclear Multifocal and XR Multifocal
- Proclear Toric Multifocal
- ProClear Daily Multifocal (not “BPT”)
- Biofinity Multifocal +++ More Coming!

Balanced Progressive Technology

'D' lens provides Distance, Intermediate, and Near Vision

'N' lens provides Near, Intermediate and Distance vision

Found in Proclear & XR MFL, Proclear Toric MFL, Biofinity MFL and EP (D only)
Proclear EP
• +1.00 Add
• Center distance
• Excellent for early presbyopia
• Excellent for modified monovision (“enhanced mono”)

Proclear Multifocal
D = Distance center lens
N = Near center lens

Proclear MF + XR

<table>
<thead>
<tr>
<th>Water Content</th>
<th>BC</th>
<th>DIA</th>
<th>Sphere</th>
<th>ADD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proclear Multifocal</td>
<td>62%</td>
<td>8.7</td>
<td>14.4</td>
<td>+0.00 to -8.00 (0.50 steps after -6.50)</td>
</tr>
<tr>
<td>Proclear Multifocal XR</td>
<td>59%</td>
<td>8.4</td>
<td>14.4</td>
<td>+4.25 to +20.00, -6.25 to -20.00 (0.50 steps after +/- 6.50)</td>
</tr>
</tbody>
</table>

Proclear MF Toric
The lens is a double slab off back toric with markings at 3 & 9 o’clock

<table>
<thead>
<tr>
<th>Material</th>
<th>Omafilicon A</th>
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</thead>
<tbody>
<tr>
<td>Wearing Schedule</td>
<td>Monthly DW</td>
</tr>
<tr>
<td>Water content</td>
<td>59%</td>
</tr>
<tr>
<td>Base Curves</td>
<td>8.4, 8.8</td>
</tr>
<tr>
<td>Diameter</td>
<td>14.4</td>
</tr>
<tr>
<td>Spheres Powers</td>
<td>+20.00 to -20.00, (-0.50 steps after +/- 6.00)</td>
</tr>
<tr>
<td>Cylinder Powers</td>
<td>-7.5 to -5.75</td>
</tr>
<tr>
<td>Axis</td>
<td>5º around the clock</td>
</tr>
<tr>
<td>Add powers</td>
<td>+1.00 to +4.00 (0.50 steps)</td>
</tr>
<tr>
<td>Lens Design</td>
<td>N lens, D lens</td>
</tr>
</tbody>
</table>

Biofinity Multifocal
• Balanced Progressive
• Built upon Biofinity lens material (omafilicon A)
• Enhanced optic zones

Product specifications

- Balanced Progressive
- Built upon Biofinity lens material (omafilicon A)
- Enhanced optic zones
Biofinity® multifocal lens

• Simple steps to increase success at the initial multifocal lens fitting visit

Initial visit:

Step 1: Start with a new refraction and verification of eye dominance (fogging technique).

Step 2: Select the distance prescription based on spherical equivalent corrected for the vertex distance. Choose D or N design based on needed ADD power:

<table>
<thead>
<tr>
<th>ADD</th>
<th>Dominant eye</th>
<th>Non-Dominant eye</th>
</tr>
</thead>
<tbody>
<tr>
<td>+0.00</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>+0.50</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>+1.00</td>
<td>D</td>
<td>N</td>
</tr>
<tr>
<td>+1.50</td>
<td>D</td>
<td>N</td>
</tr>
</tbody>
</table>

Step 3: Allow patients to adapt to lenses for 15 minutes before assessing vision. To improve distance vision add –0.25 D to the dominant eye. To improve near vision add +0.25 D to non-dominant eye.

Clinical tips:

- Prescribe maximum plus power for distance vision.
- Choose the lower ADD power when possible; not necessary to overprescribe the ADD power.
- Test patient’s near functional vision with their cell phone.
- Check visual acuity with room lights on.

Comparison of SiHy Multifocals (water content vs. Dk)

Comparison of SiHy Multifocals (Modulus vs. Dk)

Proclear 1 Day Multifocal

- Center-near aspheric design
  - +6 to -10 (0.50 steps above -6)
  - BC: 8.7, TD: 14.2

Designed with a single add power profile

Why?

Binocular summation with blur

The effect of monocular defocus on binocular contrast sensitivity

References:

References:

Proclear 1 day multifocal lens selection process

Step 1: Confirm refraction and determine eye dominance.

Step 2: Choose lenses with appropriate distance Rx.

Step 3: Allow lenses to soften before wearing, if patient is satisfied with vision, dispose.
Cooper Multifocals
Coming Soon:

• Biofinity Toric
  Multifocal

Custom Hydrogel Multifocals

- Sphere, Cyl. (+/- 0.12D), Axis (1 degree)
- BC, TD, PC, CT, OZ
  (fitting nomograms based on corneal sagittal height)
- Designs: Aspheric (ant vs. post), Concentric
  (distance vs. near center), Translating,
  Combination designs, control over “zone sizes”
- Materials: hydrogels and now SiHy’s

Lens Diameter Selection

1. Soft Lens 3.0 mm Larger than the
   Corneal Diameter
2. Average Corneal Diameter= 11.8 mm*
   (M. Andre/P. Caroline)

“Effective K”

- Effective K adjustment:
  - For every 2mm larger than 12.0mm:
    add 1 diopter
  - For every 2mm smaller than 11.6mm:
    subtract 1 diopter
- Incorporating HVID and adjusted Ks we
  can better estimate the true sagittal height
  of the cornea for appropriate lens to
  cornea fitting relationship

Corneal Diameter K-Compensation

<table>
<thead>
<tr>
<th>Corneal Diameter</th>
<th>Add to K</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0 mm</td>
<td>-8.00 D</td>
</tr>
<tr>
<td>10.2 mm</td>
<td>-7.00 D</td>
</tr>
<tr>
<td>10.4 mm</td>
<td>-6.00 D</td>
</tr>
<tr>
<td>10.6 mm</td>
<td>-5.00 D</td>
</tr>
<tr>
<td>10.8 mm</td>
<td>-4.00 D</td>
</tr>
<tr>
<td>11.0 mm</td>
<td>-3.00 D</td>
</tr>
<tr>
<td>11.2 mm</td>
<td>-2.00 D</td>
</tr>
<tr>
<td>11.4 mm</td>
<td>-1.00 D</td>
</tr>
<tr>
<td>11.6 mm</td>
<td>0.00 D</td>
</tr>
<tr>
<td>11.8 mm</td>
<td>0.00 D</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>0.00 D</td>
</tr>
<tr>
<td>12.2 mm</td>
<td>0.50 D</td>
</tr>
<tr>
<td>12.4 mm</td>
<td>1.00 D</td>
</tr>
<tr>
<td>12.6 mm</td>
<td>1.50 D</td>
</tr>
<tr>
<td>12.8 mm</td>
<td>2.00 D</td>
</tr>
<tr>
<td>13.0 mm</td>
<td>2.50 D</td>
</tr>
</tbody>
</table>

“Rule of 3’s”

- Add 3.0 mm to corneal diameter for lens diameter
- Adjust “Effective-K” for corneal diameter in diopters
- Convert to mm
- Add 0.3mm to “Effective-K” to
determine lens Base Curve
Fitting Nomogram
8/2005 CL Spectrum

Custom Hydrogel Multifocals
- Alden
- Art
- Special Eyes
- Visionary
- Unilens
- United
- Blanchard
- Metro
- Gelflex
- Westcon
- Poyvue
- +++

Eg. Astera MFL (Alden)

Gas Permeable Multifocal CL’s
- Premier Optics
- Proprietary and Custom Designs
- Aspheric (anti/post), Concentric, Translating*, Combination designs
- Ability to fit on irregular corneas (keratoconus, post surgical, etc.)

Gas Permeable Multifocal CL’s
- Reclaim (Blanchard)
- Renovation (Art)
- Essential (Blanchard)
- Boston MultiVision (Polymer Tech.)
- Tangent Streak series (Fused)
- Solution & Essential Solution (X-Cel)
- Bi-Expert (Polymer Tech.)
- Rose K + front add
- RSS + Reclaim Mfl.
- +++

Multifocal GP Options
- Alternating - Translating
- Concentric
- Aspheric
- Combination

Aspheric
Executive
Crescent
Concentric
Fused Flat-top Multi-aspheric
Alternating – Translating CL Designs

Ocular Evaluation

1. Lid position
2. Corneal diameter
3. Pupil size and dynamics
4. Fissure width
5. Lower lid to inferior pupil edge

Alternating – Translating
Multifocal CL Designs

Advantages
- Clearest vision D & N (when fits)
- Traditional concept to patients
- High add power options
  (without sacrificing DV)

Disadvantages
- Complex fitting
  (multiple parameters)
- Rotation & translation px’s
- Dependence on lid anatomy
- Gaze dependent***
- Intermediate loss w/
  higher adds***

Alternating - Translating
Multifocal CL Designs

Patient Selection
- Lower lid @ or above inf. limbus
- Adequate lid tension
- Habitual lenses Not High Riders *****
- No primary gaze near demands
- High vision demander
- High add requirement

Trouble Shooting
- Low Positioning (flatten BC, reduce TD)
- High Positioning (steep BC, larger or smaller TD, thin
  superior edge, increase prism)
- Segment Position & Rotation
  (increase prism or adjust
  prism axis if possible. Adj. sag height relative to pupil inferior
  position)
- Translation Issues
  (increase by flattening BC. Comfort: avoid
  thick edge designs, avoid truncation, consider piggy back/RPLS)
- Intermediate Issues
  (use combo designs with aspheric back
  surface, or those with intermediate areas)
Alternating - Translating Designs

Egs. of Design Availability’s:
Presbylite
Tangent Streak (bifocal/trifocal)
X-Cel Solution
Bi-Expert
+++++ GP designs
Triton Soft Bifocal (Gelflex)

Concentric / Annular Multifocal CL Designs

Advantages
• Easier fitting
• Independence of gaze direction
• RGP and hydrogel options

Concentric Multifocal CL Designs

Disadvantages
• Image rivalry D vs. N  
  (3-D, ghosting, haze, blur)
• Centration is critical
• Highly pupil size dependent
• Intermediate vision loss with higher adds

Patient Selection
- Ave. pupil size (3-5mm)
- Patients who are not as visually critical
- Patients with lower adds
- Patients with limited intermediate vision demands

Trouble Shooting
• Centration Issues (modify BC and TD)
• Ghosting (D, N, both) & 3D (modify zone size)
• Inadequate Near, Distance, Intermediate
  - Use of different center zone sizes OD vs. OS to 
    accentuate pt. needs (DV vs. IV)
  - Use of “D” and “N” centered designs
  - Use of “combination” designs

Egs. of Design Availability’s
* Menicon Bifocal (Menicon) - RGP
* SynergEyes A Bif. and Duette Bif.
  - +++ numerous GP and custom SCL
Aspheric Multifocal CL Designs

**Advantages**
- Full range multifocal function
- Gaze independence
- Ease of fit
- Relative ease of adaptation from conventional c.l. designs

Aspheric Multifocal Designs

**Basic Aspheric Concepts**
- Eccentricity
- Prolate vs. Oblate surfaces
- Mechanisms of action in multifocals

Aspheric Surfaces...

**Basic Principles**

**Eccentricity**
("e-value")
The mathematical description of the rate of change of curvature of a surface. The higher the eccentricity value, the greater is the rate of change of surface curvature.

**Basic Principles**
- **Prolate** - surface flattens away from the apex
- **Oblate** - surface steepens away from the apex
- **Spherical** - consistent curvature along the surface

**Basic Principles**

- **Ellipse** - e-value < 1, >0
- **Parabola** - e-value = 1
- **Hyperbola** - e-value > 1
- **Circle** - e-value = 0

Fit significantly "steeper than K" for multifocal effect (up to 3D depending on e-value)
Aspheric Multifocal CL Designs

Disadvantages
- Limited add effect (esp. with front aspheric GP’s and all hydrogels)
- Aspheric image degradation (simultaneous vision)
- Px’s with extreme pupil sizes
- Corneal Molding with posterior Aspheric RGP’s

Posterior Surface Aspherics
- Center DV with progressive NV towards periphery of optic zone
- RGP’s: Boston Multivision, Unilens/Unilens plus GP, VFL-3, Essential GP, VX, +++ / Customs

Anterior Surface Aspherics
- Center NV with progressive DV towards periphery of optic zone
- RGP’s: CV4, Unilens Anterior RGP Multifocal ++ Others

Combination Ant./Post. Aspherics: Eg. Boston MV +2 add

Trouble Shooting
- Centration (modify BC/TD)
- Limited Add Effect (modify E-value, steeper BC > .25A*, high index materials > .25-.50A)
- Corneal Molding * (lower E-value post surface, piggyback or RPLS)

*post surface GP MFL

Combination Design
- GP Multifocal CL’s (concentric/aspheric)
- Reclaim GP (Blanchard)
- Renovation & Ren-E GP (Art Optical)
For patients with special near-point needs with up to +3.00 add

**“Cool”GPMultifocals!!**

- Reverse Geom. GP MFLs
  - Eg. RSS MFL
- Scleral Multifocals
  - Eg. Onefit MFL
- Keratoconus MFLs
  - Eg. Dyna-Z Cone w/ front surface aspheric MFL

**Clinical Cases**

60 yoF S/P PRK OD, PRK/AK OS in 1997

- Wearing no CL OD, Rev. Geom. GP OS
- Using +2 OTC “readers”
- M OD +0.50-1.25x15 20/20+
  OS +2.25-1.00x105 20/20
- Bilateral Add +2.25 20/20
“I’m sick of readers!”

- 2mm central flat curves:
  - OD 41.25D
  - OS 35.25D
- 4mm lateral/peripheral flat curves:
  - OD 43.25
  - OS 43.25
- Diagnostic #1 OD 41/43: flat central/periph -1
  OS 35/43: flat central -2, otherwise good fit
- Final RSS SV: OD 42D/43.5D/10.5/-2D 20/20
  OS 38D/43D/10.5/-0.50 20/20

Case 2: OneFit Scleral MFL  
“Stop Moving!” (Blanchard Labs)

- 61yoF “golfer” - C/O fluctuation of vision with her currently well fit GP aspheric MFLs
- Initially Fit pt. in OneFit P+A scleral (14.4mm “mini-scleral design”)
  - Central vault w/ settling apx. 150 microns, limbal vault and scleral alignment
- Ordered “D” design for both eyes, but inadequate NV, then ordered “N” for non-dom. left eye
  - DV: OU 20/20+ (OD 20/20+, OS 20/25)
  - NV: OU 20/20- (OD 20/25-, OS 20/20-)

Onefit Multifocal Terminology

- Center near design
- “D” Lens – Dominate Eye
- “N” Lens – Non-Dominate Eye
- Transition Zone
- One add power (+2.25D)
- Only need to specify the “Dominate Eye” when ordering. (“D” Lens)
Onefit Multifocal
“N” Lens Power Profile

Case 3: Dyna-Z Cone MFL
(Lens Dynamics Lab)
“I’m Getting Old and Irregular!”

- 53 yom – bilateral keratoconus Dx age 33 progressive until age 50. Wearing GP lenses since original Dx (initially “McGuire Cone” design).
- Presented age 45 with flat fitting apical bearing lenses:
  OD 7.10/8.6, OS 7.20/8.6 “Oval” McGuire OU
- Slit Lamp: bilateral central scar (+2-3) with associated epithelial staining (+2) OU

Treatments:
- NV spectacles over CL’s
- Monovision CL powers
- Multifocal Options
Multifocal GP Options in Keratoconus:
- Posterior Aspheric (good for central cones)
- Anterior Concentric Custom (or combination designs) (with posterior keratoconus design configuration)
- Anterior Aspheric Custom (with posterior keratoconus design configuration):
  - Dyna Z Cone with Front Aspheric Multifocal
    - Same keratoconus configuration (Quad specific)
    - Front Aspheric (e = 0.90) effective 1.25 add
    - No change DVA, now NVA 20/20- (IVA 20/20)

Order the Initial Lens Empirically
- Based on K’s and Refraction/Add
- Empirical ordering made possible through:
  - The consistent centration of the lens enabling alignment fitting for all patients
  - The ability to calculate the power needs

Ordering the Initial Lens Empirically

Hybrid & Combination Multifocals
- SynergEyes M & Duette M
- Duette Progressive Mfl.
- Piggyback GP/disposable systems
- Recessed Pillow Lens Systems ("RPLS" – Fusion and EyeVis Technologies)

How the Empirical Order is Calculated
- Base curve aligned as closely as possible to flat K
- 8.4 (Flat) skirt
- Lens power based on spherical component of the spectacle Rx
  - Account for tear lens (either + or -) created by GP center
  - Do not use the spherical equivalent
How the Add Power is Chosen

<table>
<thead>
<tr>
<th>Age</th>
<th>Spectacle Add</th>
<th>Duette Progressive Add</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 – 45</td>
<td>+1.00 to +1.50</td>
<td>+1.00</td>
</tr>
<tr>
<td>46 – 55</td>
<td>+1.75 to +2.25</td>
<td>+1.75</td>
</tr>
<tr>
<td>56+</td>
<td>+2.50 and above</td>
<td>+2.50</td>
</tr>
</tbody>
</table>

Improving Comfort & Movement

- Follow the recommendations in the order they are provided
  1. Check and treat any dry eye condition before continuing.
  2. Flatten the skirt curve to increase movement and tear exchange.
    - If wearing the flattest skirt curve (8.7), flatten base curve to no more than 0.50D flatter than K.
  3. Steepen the skirt curve to reduce movement.
  4. Add a drop of preservative-free lubrication in the bowl of the lens prior to insertion.

Putting in Duette Lenses

- Like putting in a soft lens
- Lens may be balanced on one finger
- Pull down on the lower lid and gently place the lens on the eye
- Release the eyelid and blink several times

Taking Out Duette Lenses

- Dry fingers are key!
- Pinch bottom of soft skirt at the 5 & 7 o'clock position – keeping the pads of the fingers together as you pinch
- Hold the pinch for a count of two and lift the lens away from the eye
- Dry your fingers before removing the next lens

Recessed Pillow Lens System ("RPLS")

- In development
- Materials: ocufilcon, methafilcon, hioxifilcon – future SiHy & molded
- Recessed anterior surface
- Advantages: centering and comfort
- Indications:
  - Irregular corneas
  - Multifocal GP (aspheric, concentric, and translating)
  - Regular corneas (spherical and toric)
MFL CL’s: Tips

- CLMFL’s work for >80% of the time (*depends on who is doing the fitting!)
- Over glasses sometimes needed (D or N)
- 0.25 D change can be significant
- Use mixed adds if needed

Quinn T. Pearls to success with presbyopic contact lenses.

Davis RL. Eiden SB. A rational approach to fitting multifocal lenses. CLS Spectrum 2010 Feb;36:43-47.

Keys To Success With Multifocal Contact Lenses

- “Have the tools”
  - Lenses to maximize vision
  - Lenses to maximize “comfort”
- Patient selection - motivation and realistic expectations
- Stay as Binocular as you can for as long as you can!

Keys To Success With Multifocal Contact Lenses

- Design combinations & unilateral fits
- Bias if needed:
  “Mono-plus” & “Mono-minus” (modified “stereovision”)
- Evaluate monocularly, but determine function binocularly
- Experience counts

Thank you!