Multifocal Contact Lenses New Thoughts New Understandings
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Disclosure Statement:
• Alcon
• Bausch + Lomb
• SpecialEyes
• Valley Contax
• Vistakon

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Multifocal Soft Contact Lenses

Near and Intermediate Vision


Simultaneous Image Designs

• Distance, intermediate and near images of equal intensity are simultaneously presented to the retina.
• At a given distance, the brain selects the appropriate image.

Soft Multifocal Lens Designs
Prefitting Considerations

- Visual needs
- Anatomical considerations
- Patient expectations

The Balancing Act

- Distance and near vision often conflict
- Practitioner must break with spectacle prescribing habits
- Unequal adds
- Lower adds
- Goal - CL should work for 75% of tasks
- SV Readers or SV Distance over-Specs

General Tips

- Start with the fitting guide
- Allow all lenses to settle 10-15 minutes
- Be prepared to utilize a modified monovision approach

Soft Multifocal Lenses

Outcome influenced by:

- Centration
- Pupil size
- Amount of refractive astigmatism
- Patients age and their ability to interpret blurred images if the lenses are fitted with Modified Monovision

Determining the Near Eye

- Non-dominant eye
- Specific occupational requirements
- Specific recreational requirements
- Sighting vs. sensory dominance – “Swinging plus test” & “Hole in Hand”

Soft Multifocal Lens Designs

- Aspheric Center Near Design
- Aspheric Center Distance Design
- Multizone Design
Concentric Multifocals

- Available in center/near or center/distance

Simultaneous Image CL’s

- Simulated near vision
- Distance
- Near
- Intermediate

Power distribution

Pupil Size and Age

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Daylight Diameter</th>
<th>Nighttime Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>5.0</td>
<td>8.0</td>
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<tr>
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<td>4.0</td>
<td>6.0</td>
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<tr>
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<td>3.5</td>
<td>5.5</td>
</tr>
<tr>
<td>60</td>
<td>3.0</td>
<td>4.25</td>
</tr>
<tr>
<td>70</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>80</td>
<td>2.0</td>
<td>2.5</td>
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</tbody>
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The Effect of Sagittal Height

- 10.2 mm
- 13.0 mm
Vision Evaluation

- Acuity
  - Snellen
  - Near
  - Snellen
  - Real world
- Over Refraction
  - Unilateral
  - Bilateral
  - Demonstration

Corneal Mapping over the Contact Lens

Corneal Mapping over Air Optix MF 8.6/14.2 -3.00 (High Add)

Corneal Mapping over Purevision MF 8.6/14.0 -3.00 (High Add)

Corneal Mapping over Acuvue Oasys MF 8.4/14.3 -3.00 (High Add)

Corneal Mapping over Proclear MF 8.7/14.4 -3.00 (+2.50 Add)
Proclear MF 8.7/14.4 -3.00 (+2.50 Add)

Corneal Mapping over
Proclear MF 8.4/14.4 -3.00 (+2.50 Add)

Further Investigation

Proclear MF 8.4/14.4 -3.00 (+2.50 Add)

Angle Lambda and Multifocals

- Fovea is decentered temporal
- Visual axis passes through the lens 1 to 9 degrees nasal to center
Corneal Mapping over
Air Optix Aqua 8.6/14.2 -3.00 (High Add)

Corneal Mapping over
Purevision MF 8.6/14.0 -3.00 (High Add)

Corneal Mapping over
Acuvue Oasys MF 8.4/14.3 -3.00 (High Add)

Corneal Mapping over
Biofinity MF 8.7/14.4 -3.00 (+2.50 Add) D

Corneal Mapping over
Biofinity MF 8.7/14.4 -3.00 (+2.50 Add) N

Study – What is Normal?

- Subjects = 18
- Enrolled based on:
  - Central K 43.00 D
  - <1.00 D corneal toricity
  - Visible Iris Diameter 11.8mm +/- 0.2mm
- 5 Commercially available multifocals chosen
- Lenses allowed to settle centration verified
- Over topography performed
Study
- Mismatch always temporal
- Mismatch range = 0 – 1.25mm
- Mismatch average = 0.50mm

Multifocals
- Centration is critical (over line of sight)
- Alter base curve or diameter
- Consider other lens design
- Consider custom multifocal
- Consider monovision

Observation
Why do soft contact lenses frequently decenter temporally???

Observation
Scleral lenses frequently decenter temporally
Clinical Observations

“Vision is clear, but seems a bit off”

“My eyes feel strained with the lenses on”

“I can’t explain...something just doesn’t seem right”

Right Eye Scleral Height

Horizontal 15.0 mm Chord N = 18
*OD Average 173 um* Higher Nasally

Horizontal 20.0 mm Chord N = 18
*OD Average 838 um* Higher Nasally

Left Eye Scleral Height

Horizontal 15.0 mm Chord N = 18
*OS Average 2 um* Higher Nasally

Horizontal 20.0 mm Chord N = 18
*OS Average 659 um* Higher Nasally
Nasal – Temporal Comparative Results

Average Height Difference Between Nasal & Temporal Sclera

<table>
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<th>OD</th>
<th>OS</th>
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<tr>
<td>15 mm</td>
<td>173 um</td>
<td>2 um</td>
</tr>
<tr>
<td>20 mm</td>
<td>838 um</td>
<td>659 um</td>
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</table>

Right Eye

At 15.0 mm: nasal higher by 210 um
At 20.0 mm: nasal higher by 1,060 um

Left Eye

At 15.0 mm: temporal higher by 50 um
At 20.0 mm: nasal higher by 490 um

SA Right Eye 3,650 um
Applications

• Scleral lenses
  –

• Soft contact lenses
  – Toric
  – Specialty soft for irregular corneas
  – Higher order aberration correction

Translating Soft Contact Lenses
Lower Lid Control

SCL Translation
Traditional Ballasted Design
The Tear Film Surface Quality (TFSQ) Index

Medmont Corneal Topographer

The topographer captures and analyzes a placido image every second for 30 seconds.

The height of the tear film is measured and recorded as the Tear Film Surface Quality (TFSQ)

Dry Eye Patient
0 Seconds

TFSQ Index 0.025

5 Seconds Post Blink

TFSQ Index 0.103
On-Eye Material Surface Wetting Properties

Three Different Brands -3.00 D. SCL’s
Same Patient, Same Eye