Dr. Aller has 25 years of experience researching the clinical control of myopia progression, is an inventor with multiple US and International patents, and consultant to various companies. He is a recipient of the Award of Excellence by the GSLS 2018 and a member of the Myopia Workshop – International Myopia Institute. He is the editor of managemyopia.org, a practitioner directed myopia website and the developer of Myappia, a myopia progression and control projection app.

draller.com
managemyopia.org
Financial Disclosures

- I have several patents in the field related to myopia control and they are licensed to or shared with Brien Holden Vision Institute.
- Honoraria, consulting fees, clinical trial support, equity and/or travel expenses have been recently received from Essilor AMERA Pte Ltd, Pentavision, Visioneering, Reopia, Nevakar, Specialeyes, and TreeHouse Eyes.
“Myopia control with contact lenses is certainly a growing practice in the contact lens community.”

“In 2014, 24% of *Contact Lens Spectrum* Reader Profile respondents indicated that they actively practice myopia control with contact lenses. This has increased to 44% by 2017. Of those who are, most do so with a soft multifocal contact lens (41%), followed by orthokeratology (56%), and GP multifocals (5%).”

“With the prevalence of myopia increasing worldwide and the well-known risks associated with higher levels of myopia, it is bordering on unethical to not do whatever we can to slow its progression in our young patients.”

Nichols, J. Contact Lens Spectrum, Jan 2018
Background

- Myopia is increasing in prevalence around the world and major risks to vision associated with it.
  - By 2050 there will be almost billion myopes and 1 billion high myopes.
- Major media coverage on TV, radio, newspapers and online about “the myopia boom”.
- WHO is about to publish the WHO–BHVI Global Scientific Report on Myopia.
A Snapshot of Myopia Prevalence

USA (42%) 12-54 years; 1994-2004

UK (23%) 12-13 yrs; 2006-2008

China (47%) Shunyi, Beijing, Guangzhou 15 yrs; 1988-1998, 2002-2003

India (36%) 15 yrs; 2010

USA (42%) 12-54 years; 1994-2004

South Africa (10%) 15 yrs; 2002

Singapore (53%) 9 yrs; 1991-2001

Japan (46%) 40-79 yrs; 2002

S Korea (97%) 19 yr old male soldiers; 2010

Taiwan ROC (83%) 15 yrs; 2000

Hong Kong SAR (62%) 15 yrs; 2000-2010

Australia (31%) 17 yrs; 2009-2011

Chile (17%) 15 yrs, 1998

South Africa (10%) 15 yrs; 2002

Singapore (53%) 9 yrs; 1991-2001

Results: Prevalence

- Rapid increase in prevalence of myopia
- Approx 2 billion myopes in 2010 increasing to nearly 5 billion myopes in 2050

* Lower and upper limits of uncertainty
**Increased Risks associated with Myopia**

**Retinal Detachment**
- The retina pulls away from the eye’s supportive tissue
- Can cause permanent vision loss

**Cataracts**
- Typically associated with the aging process
- Tend to develop sooner in nearsighted eyes

**Glaucoma**
- Due to higher pressure in the eye
- Damages the optic nerve and causes vision loss

**Myopic Maculopathy (macular degeneration)**
- The **most common** complication of high myopia
- A **slowly progressive and sight threatening condition** in which visual loss develops from atrophy of the retinal pigment epithelium and/or secondary complications such as sub-retinal neovascularization
- The only disease amongst the top five causes of blindness that remains **entirely treatable**
Myopic macular degeneration— a leading cause of blindness

Causes of new blindness, 2007-2009:

1. Myopic macular degeneration 26%
2. Glaucoma 18%
3. Age related macular degeneration 11%
4. Corneal opacity 5%

Prevalence and causes of low vision and blindness in a Japanese adult population: the Tajimi Study.

Department of Ophthalmology, Tajimi Municipal Hospital, Tajimi, Japan.

Abstract

OBJECTIVE: To determine the prevalence and causes of low vision and blindness in a Japanese adult population.

DESIGN: Population-based cross-sectional study.

PARTICIPANTS: Randomly selected residents (n = 3870) of Tajimi City, Japan, who were 40 years of age or older.

CONCLUSIONS: The prevalence of low vision and blindness in Japanese adults was one of the lowest among those reported. The major causes of low vision were cataract and glaucoma, and the leading cause of monocular blindness was myopic macular degeneration.
Prevalence of blindness and vision impairment will increase from approximately
0.25% (6 million) of the population affected in 2000 to
1.0% (90 million) of the population affected in 2050.
Risk of Maculopathy

<table>
<thead>
<tr>
<th>Myopic Maculopathy Vonghanit et al.</th>
<th>OR</th>
<th>CI (95%) (lower)</th>
<th>CI (95%) (upper)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.0 to -2.99D</td>
<td>2.2</td>
<td>0.47</td>
<td>9.9</td>
</tr>
<tr>
<td>-3.0 to -4.99D</td>
<td>9.7</td>
<td>2.63</td>
<td>35.8</td>
</tr>
<tr>
<td>-5.0 to -6.99D</td>
<td>40.6</td>
<td>13.27</td>
<td>124.4</td>
</tr>
<tr>
<td>-7.0 to -8.99D</td>
<td>126.8</td>
<td>34.02</td>
<td>472.3</td>
</tr>
<tr>
<td>&lt;=-9.0D</td>
<td>348.6</td>
<td>121.05</td>
<td>1003.9</td>
</tr>
</tbody>
</table>

- Sig. increased risk even for low myopia
- Higher prevalence w. higher myopia, however 43% of cases from low (<5D) myopia

Flitcroft C. The complex interactions of retinal, visual and environmental factors in myopia aetiology Progress in Retinal and Eye Research 31 (2012) 622-660
Risk for Retinal Detachment

Retinal Detachment Risks
Ogawa & Tanaka

<table>
<thead>
<tr>
<th>Strength of Myopia (D)</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.75 to -2.75D</td>
<td>3.1</td>
<td>2.6-3.8</td>
</tr>
<tr>
<td>-3 to -5.75D</td>
<td>9.0</td>
<td>7.5-10.8</td>
</tr>
<tr>
<td>-6 to -8.75D</td>
<td>21.5</td>
<td>17.3-26.7</td>
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<tr>
<td>-9 to -14.75D</td>
<td>44.2</td>
<td>34.2-57.2</td>
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<tr>
<td>&lt;= -15.0D</td>
<td>88.2</td>
<td>56.1-138.9</td>
</tr>
</tbody>
</table>

Eye Disease Control Study

<table>
<thead>
<tr>
<th>Strength of Myopia (D)</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1 to -2.99D</td>
<td>4.4</td>
<td>2.9-6.6</td>
</tr>
<tr>
<td>-3 to -8D</td>
<td>9.9</td>
<td>6.6-14.8</td>
</tr>
</tbody>
</table>

• ~50% non-traumatic RD cases attributable to myopia
## Risk of Glaucoma & Cataract

<table>
<thead>
<tr>
<th>Condition</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PSC Cataract</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue Mountains Eye Study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1 to -3.5D</td>
<td>2.1</td>
<td>1.4-3.5</td>
</tr>
<tr>
<td>-3.5 to -6D</td>
<td>3.1</td>
<td>1.6-5.7</td>
</tr>
<tr>
<td>&lt; -6D</td>
<td>5.5</td>
<td>2.8-10.9</td>
</tr>
<tr>
<td><strong>Glaucoma Risk</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue Mountains Eye Study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1 to -3.0D</td>
<td>2.3</td>
<td>1.3-4.1</td>
</tr>
<tr>
<td>&lt; -3.0D</td>
<td>3.3</td>
<td>1.7-6.4</td>
</tr>
<tr>
<td><strong>Glaucoma Risk</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meta-analysis, Marcus et al.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1 to -3.0D</td>
<td>1.6</td>
<td>1.3-2.2</td>
</tr>
<tr>
<td>&lt; -3.0D</td>
<td>2.5</td>
<td>1.9-3.1</td>
</tr>
</tbody>
</table>
And, when we correct the myopic eye...
If You Like Reducing Peripheral Hyperopic Defocus…

There’s an App for That!
You Like Reducing Axial Hyperopic Defocus?

Myopes Convert from Lag to Lead with BSCL – Tarrant 2007

There’s an App for That!
You like imposing myopic defocus to confuse the growth mechanisms or to provide a stop signal?

There are a Couple of Apps for That!
You like providing a meridional stop signal?

Maybe don’t rush to correct a myopic meridian?
META-ANALYSIS OF 16 INTERVENTIONS FOR MYOPIC CONTROL: HUANG ET AL, 2016

<table>
<thead>
<tr>
<th>Intervention compared to SV Spectacle (at least 1 yr duration)</th>
<th>RE Diff to Control (D/yr)</th>
<th>AL Diff to Control (mm/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Dose Atropine (0.5-1.0%)</td>
<td>0.68</td>
<td>0.21</td>
</tr>
<tr>
<td>Moderate Dose Atropine (0.1%)</td>
<td>0.53</td>
<td>0.21</td>
</tr>
<tr>
<td>Low Dose Atropine (0.01%)</td>
<td>0.53</td>
<td>0.15</td>
</tr>
<tr>
<td>Pirenzipine</td>
<td>0.29</td>
<td>0.09</td>
</tr>
<tr>
<td>Orthokeratology</td>
<td>-----</td>
<td>0.15</td>
</tr>
<tr>
<td>Peripheral Defocus Modifying CLs</td>
<td>0.12</td>
<td>0.11</td>
</tr>
<tr>
<td>PAL Spectacles</td>
<td>0.14</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Conclusion: Most effective were pharmacologic. Only clinically practical options are low dose atropine, pirenzipine (not available), orthokeratology and soft contact lenses with myopia control features as viable options for active management of myopia progression.
What might contribute to myopia?

1. Genetics:
   - Myopic parents, ethnicity

2. Environment:
   - Sunlight, vitamin D, dopamine levels, time spent outdoors

3. Near work:
   - Extended reading, use of electronic devices

Peripheral Hyperopia:
- Routine correction constantly moves images behind the retina which may continually signal the eye to grow.

---


2. Peripheral Hyperopia explanation summarized from:

Single Vision -6.00 D: Mean of 5 samples

Absoute Power (D) vs Half Chord (mm)

- Acuvue Oasys -6
- Air Optix Aqua -6
- Biofinity -6
- Clariti -6
- Night and Day -6
- Proclear -6

Sandra Wagner
Power variation across the optic

~37% reduction over 3 years

~18% reduction over 3 years

Standard SCL: Myopia progression of -0.75D per year
It has been said by many that there is a Tsunami of Myopia coming our way. Finally, it seems as though with a number of pending developments, it could be the perfect time to surf that wave.

Why the Perfect Time to Start is Now.
Both MiSight and NaturalVue have earned CE marks for the control of myopia progression. Also on the market, BHVI EDOF designs in Japan with SEED and in Europe with Mark’Ennovy.

Hoya’s MyoSmart multi-lenslet spectacle lens has shown 60% control of myopia and has been launched in various Asian markets and maybe coming here?

Clinical trials have started with another spectacle approach from SightGlass and Reopia, LLC is investigating novel spectacle approaches.

The PEDIG group has started a multi-site low dose atropine study as has Nevakar and Ophthalmology has more or less endorsed low dose atropine for myopia.

Pineles S, et al Ophthalmology 2017
NO, It’s Really the PERFECT Time

- BHVI established the International Myopia Institute.
- Close to 100 international researchers, MDs, ODs and a few clinicians have joined committees which are tasked with producing white papers in the areas of definitions and classifications, experimental models, genetics, interventions, guidelines for clinical trials, industry, and clinical practice.
- 2019 will be the year for publishing these white papers, and guidelines in a special open access issue of IOVS and the efforts of the members of the IMI are hoped to be as influential in the treatment of myopia as the DEWS panels were for dry eye.
IMI – Clinical Management Guidelines Report

1. Identifying the myopia management patient
   1.1 Risk factors
   1.2 Identifying and managing the pre-myope

2. Discussing myopia and associated risks with parent and patient
   2.1 Lay terminology discussion of causes
   2.2 Lay terminology discussion of eye health risk

3. Myopia control treatments: risks, benefits, and expectations
   3.1 Lay terminology discussion of options
   3.2 Lay terminology discussion of efficacy and additional correction benefits
   3.3 Lay terminology discussion of safety and other risks and challenges
   3.4 Informed consent and prescribing off-label treatments

4. Key elements of the baseline exam for myopia control
   4.1 Standard procedure for examination
   4.2 Visual habits and environment evaluation
   4.3 Binocular Vision evaluation
   4.4 Dry eye evaluation
   4.5 Exploratory tests

5. Selecting a treatment strategy
   5.1 Predicting progression rate
   5.2 Selecting a treatment
   5.3 Add powers in MF5CL
   5.4 Clinical spectacle myopia control

6. Guidelines for advice and clinical care
   6.1 Refractive correction and wearing time
   6.2 Indoor and near work activity
   6.3 Outdoor activity and lighting
   6.4 Nutritional advice
   6.5 Advice to patients on minimizing risk
   6.6 Back up corrections for CL wear
   6.7 Review schedule and clinical considerations
   6.8 Treatment duration
   6.9 When to change treatment
   6.10 Long-term efficacy and rebound effects
   6.11 When to end treatment
   6.12 Late onset myopia
   6.13 High myopia: special considerations

7. Future research directions on intervention and treatment
   7.1 OK and MF5CL optimization
   7.2-7-MX, scleral reinforcement, circadian rhythms and other future treatments

8. Clinical references, education and communication
   8.1 Key papers, websites and courses for practitioner reference
   8.2 Recommendations for communication tools
   8.3 Continuing education and accreditation of practitioners

Clinical Management Guidelines Committee

Kate Gifford – Chair
Australia

Kathryn Richdale
USA

Pauline Kang
Australia

Thomas Allen
USA

Carly Lam
Hong Kong

Langis Michaud
Canada

Jeroen Mulder
Netherlands

Maria Liu
USA

Janis Orr
UK

Kathryn Rose
Australia

Kathryn Saunders
UK

Dirk Seidel
UK

Willem Tideman
Netherlands

Final review: Padmaja Sankaridurg, Australia

IMI Process

2017
May
Seven committees formed

September
Report drafting

2018
January
Comprehensive peer review and harmonisation

May
Chair meeting at ARVO; first drafts completed

August
Reports finalised and submitted to IOVS

September
Meetings at International Myopia Conference

November
Reports presented at AAO
Effective Myopia Control
BSCL Prospective Twin Study

Axial length decreased slightly in 2\textsuperscript{nd} year (-0.05, -0.09)
CONTROL Study

- 12 month double blind randomized clinical trial
- Acuvue 2 vs Acuvue Bifocals, JNJ Sponsor
- 78 Subjects, Age 8–18, −0.25 to −6.00, low astigmatism, low anisometropia, progressing
- Manifest and cycloplegic subjective and autorefraction and axial lengths by Zeiss IOLMaster used to track subjects
- 41 subjects continued with or switched to BCLs and followed 3 more years

(Aller, Liu & Wildsoet, Optom Vis Sci 2016)
CONTROL Study – Changes in Cycloplegic Refraction

87% less myopia progression with bifocal contact lenses
CONTROL Study – Changes in Axial Length

80% slower axial elongation with bifocal contact lenses.

+0.05 mm +/- 0.14 mm

+0.24 mm +/- 0.17 mm
Percentage of Subjects with No Myopic Progression

<table>
<thead>
<tr>
<th>BFSCL 6m</th>
<th>SVSCL 6m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>![Graph BFSCL 6m]</td>
<td>![Graph SVSCL 6m]</td>
</tr>
<tr>
<td>29%</td>
<td>5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BFSCL 12m</th>
<th>SVSCL 12m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>![Graph BFSCL 12m]</td>
<td>![Graph SVSCL 12m]</td>
</tr>
<tr>
<td>26%</td>
<td>5%</td>
</tr>
</tbody>
</table>
## Six Month Analyses

### Changes in Cyclo Subjective Spherical Equivalent Rx OU

<table>
<thead>
<tr>
<th>Lens</th>
<th>Baseline</th>
<th>6 Mo Chg</th>
<th>6–12 Mo</th>
<th>One Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCL</td>
<td>−2.75 (1.35)</td>
<td>−0.05 (0.30)</td>
<td>−0.05 (0.24)</td>
<td>−0.10 (0.36)</td>
</tr>
<tr>
<td>SVCL</td>
<td>−3.01 (1.44)</td>
<td>−0.48 (0.34)</td>
<td>−0.27 (0.32)</td>
<td>−0.75 (0.52)</td>
</tr>
</tbody>
</table>

### Changes in Cyclo AR Spherical Equivalent Rx OU

<table>
<thead>
<tr>
<th>Lens</th>
<th>Baseline</th>
<th>6 Mo Chg</th>
<th>6–12 Mo</th>
<th>One Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCL</td>
<td>−2.58 (1.34)</td>
<td>−0.17 (0.30)</td>
<td>−0.06 (0.21)</td>
<td>−0.23 (0.34)</td>
</tr>
<tr>
<td>SVCL</td>
<td>−2.81 (1.46)</td>
<td>−0.48 (0.32)</td>
<td>−0.31 (0.30)</td>
<td>−0.79 (0.46)</td>
</tr>
</tbody>
</table>

### Changes in AL OU

<table>
<thead>
<tr>
<th>Lens</th>
<th>Baseline</th>
<th>6 Mo Chg</th>
<th>6–12 Mo</th>
<th>One Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCL</td>
<td>24.68 (0.91)</td>
<td>0.03 (0.10)</td>
<td>0.03 (0.07)</td>
<td>0.05 (0.14)</td>
</tr>
<tr>
<td>SVCL</td>
<td>24.63 (0.68)</td>
<td>0.14 (0.11)</td>
<td>0.10 (0.08)</td>
<td>0.24 (0.17)</td>
</tr>
</tbody>
</table>
Refraction and Axial Change by Treatment Groups

-72% at 6m

-80% at 12m

*** p<0.001
Continued Myopia Control after 12 Months?

D/Yr

YR 1 Cyclo
Yr 2 MR
Yr 3 MR
Yr 4 MR

BCL
SVSCL

-0.1
-0.03
-0.13
-0.1
-0.75
Continued Control: \( \Delta \) Axial Lengths Over 4 Years

![Graph showing axial lengths over 4 years with blue and red bars, indicating changes in BCL and SVCL respectively.](chart.png)
Charts were reviewed for all patients 16 years and younger at the time they were prescribed myopia control treatments. Treatments included multifocal soft contact lenses, MF RGP, MF Hybrid lenses, Distance center, Near Center, Custom designs, standard orthokeratology designs (CRT, B&L VST Family) as well as custom lenses, (EyeSpace Forge), large segment bifocal glasses and PALs and alone or in combination low dose atropine, usually 0.02%. Intent is to provide a real world example of what type of myopia control efficacy can be achieved in clinical practice and if there are differences in control provided by these various methods. Today’s presentation is limited to the pre and post experience of children wearing either distance center or near center multifocals and rates relative to add powers.
## Retrospective Case Series

<table>
<thead>
<tr>
<th>Add</th>
<th>Pre Yr 1</th>
<th>Post Yr 1 N=81</th>
<th>%</th>
<th>Post Yr 1</th>
<th>Post Yr 2 N=63</th>
<th>%</th>
<th>Post Yr 1</th>
<th>Post Yr 3 N=41</th>
<th>%</th>
<th>Post Yr 1</th>
<th>Post Yr 4 N=33</th>
<th>%</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤2.5</td>
<td>-0.70 ± 0.46</td>
<td>-0.40 ± 0.45</td>
<td>43%</td>
<td>-0.64 ± 0.45</td>
<td>-0.26 ± 0.28</td>
<td>59%</td>
<td>-0.52 ± 0.44</td>
<td>-0.13 ± 0.20</td>
<td>74%</td>
<td>-0.43 ± 0.33</td>
<td>-0.08 ± 0.22</td>
<td>81%</td>
<td></td>
</tr>
<tr>
<td>2.25 to 2.5</td>
<td>-1.04 ± 0.61</td>
<td>-0.19 ± 0.36</td>
<td>81%</td>
<td>-0.97 ± 0.57</td>
<td>-0.32 ± 0.37</td>
<td>66%</td>
<td>-0.87 ± 0.46</td>
<td>-0.21 ± 0.31</td>
<td>76%</td>
<td>-0.90 ± 0.51</td>
<td>-0.08 ± 0.18</td>
<td>92%</td>
<td></td>
</tr>
<tr>
<td>&gt; 2.50</td>
<td>-0.86 ± 0.61</td>
<td>-0.04 ± 0.28</td>
<td>95%</td>
<td>-1.10± 0.73</td>
<td>+0.05 ± 0.45</td>
<td>104%</td>
<td>-1.10± 0.68</td>
<td>-0.25 ± 0.30</td>
<td>77%</td>
<td>-1.03± 0.64</td>
<td>-0.20 ± 0.37</td>
<td>81%</td>
<td></td>
</tr>
</tbody>
</table>
## Retrospective Case Series

<table>
<thead>
<tr>
<th>Add</th>
<th>Pre Yr 1</th>
<th>Post Combined 4 Years</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤2.00</td>
<td>-0.58 ± 0.41</td>
<td>-0.28 ± 0.35</td>
<td>54%</td>
</tr>
<tr>
<td>2.25 to 2.5</td>
<td>-0.97 ± 0.56</td>
<td>-0.22 ± 0.35</td>
<td>77%</td>
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<td>&gt; 2.50</td>
<td>-1.15 ± 0.74</td>
<td>-0.12 ± 0.37</td>
<td>90%</td>
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# Retrospective Case Series

<table>
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<td>&gt; 2.50</td>
<td>-1.15± 0.74</td>
<td>-0.12 ± 0.37</td>
<td>90%</td>
</tr>
</tbody>
</table>
The Air Optix Multifocal Aqua has a three-add system in order to accommodate the different degrees of presbyopia.
Ciba Daily Progressive Power

Peak Add +4.62D

NZD 1.8 mm
## Baseline Profile by Treatment Groups

<table>
<thead>
<tr>
<th>(M±SD)</th>
<th>Age (yr)</th>
<th>SE (D)</th>
<th>AL (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC (n=81)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n= 25)</td>
<td>10.52 ± 1.95</td>
<td>-3.05 ± 1.62</td>
<td>24.78 ±1.03</td>
</tr>
<tr>
<td>Female (n=46)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC (n=27)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n=12)</td>
<td>11.50 ± 2.80</td>
<td>-3.09 ± 2.01</td>
<td>24.17± 1.15</td>
</tr>
<tr>
<td>Female (n=15)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pre and Post Progression Rates

SE OU, Pre and Post All Lens Types

Pre  Post  DC  NC

All

-1.00  -0.50  0.00  0.50  1.00

-2.50  -2.00  -1.50  -1.00  -0.50  0.00  0.50  1.00
Pre and Post Progression and ALM

Progression Rates and Axial Lengths Pre and Post
Near Center Bifocal Contacts – Case Series

<table>
<thead>
<tr>
<th>Pre BFSCL Lens Type</th>
<th>SV Specs</th>
<th>SV SCL</th>
<th>PALs</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre BFSCL</td>
<td>-0.88</td>
<td>-0.75</td>
<td>-0.63</td>
<td>-0.50</td>
</tr>
<tr>
<td>Post BFSCL</td>
<td>-0.88</td>
<td>-0.75</td>
<td>-0.63</td>
<td>-0.50</td>
</tr>
</tbody>
</table>
“Virtual Aperture” Extended Depth of Focus (Center Distance) Technology
3 Simple Steps to Success:

Remember:
- Starting with the optimal powers will require fewer enhancements
  - Faster time to a successful fit
- To get precise vision, you must be precise with your refraction

Use the best corrected spectacle refraction (BCSR) using the full cylinder component. Use the Red/Green (Duochrome) Test for a binocular check that the patient is not overplussed (one click into the Green for best starting point). Refract to 20/15. Then enter the full spectacle refraction into the NaturalVue® Multifocal QuickStart Calculator.
Remember:
Starting with the optimal powers will require fewer enhancements – Faster time to a successful fit

Use the best corrected spectacle refraction (BCSR) using the full cylinder component.

Use the Red/Green (Duochrome) Test for a binocular check that the patient is not overplussed (one click into the Green for best starting point).

Refract to 20/15 Then enter the full spectacle refraction into the NaturalVue® Multifocal QuickStart Calculator.
NaturalVue® Multifocal QuickStart Calculator

<table>
<thead>
<tr>
<th>Vertex Distance (mm)</th>
<th>OD</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dominant Eye:

- OD

Best Corrected Spectacle Refraction (Enter 0 for Plano)

<table>
<thead>
<tr>
<th>SPHERE</th>
<th>CYLINDER</th>
<th>AXIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD</td>
<td>0.00</td>
<td>000</td>
</tr>
<tr>
<td>OS</td>
<td>0.00</td>
<td>000</td>
</tr>
</tbody>
</table>

NATURALVUE MULTIFOCAL STARTING DIAGNOSTIC LENS POWERS:

- OD: 0.00
- OS: 0.00

To improve distance, change diagnostic lens power on eye to:

- OD: -0.25

To improve near, change diagnostic lens power on eye to:

- OD: +0.25

- OS: +0.25

RESET

www.naturalvuecalculator.com
In animal (chick) studies, the lens design was shown to halt the development of up to \(-10.00\)D of myopia, both in terms of refractive error and axial length.\(^1\)\(^-\)\(^3\)

In a second animal (chick), the lens design reversed \(10.00\)D of myopia in terms of refractive error and produced no axial length growth\(^4\)

In humans, the lens design:

- Corrected peripheral hyperopia so that both meridians were focused inside the retina\(^5\)\(^,\)\(^6\)
- Improved the amplitude of accommodation by \(1.00\)D\(^7\)
- Improved the lag of accommodation by \(0.50\)D\(^7\)
- Was rated on the Walline PREP Quality of Life survey as highly as a single vision spherical contact lens\(^7\)

References
Case Series Analysis: NaturalVue Multifocal and Myopia (N=49)

- **Age**: Average: 12.2 ± 3.4 years
  - Range: 5-22 years

- **Gender**
  - Female: 30 (61%)
  - Male: 19 (39%)

- **Race**
  - Caucasian: 10 (20%)
  - Asian/Mixed: 24 (49%)
  - Indian/Mixed: 9 (18%)
  - Other: 6 (12%)

- **Follow up time**: Average 0.53 ± 0.09 years
Case Series Analysis: NaturalVue Multifocal and Myopia (N=49)

What children were wearing prior to NaturalVue MF

- No Cx: 12%
- FT BF/PAL: 12%
- SV: 29%
- MFCL: 35%
- OK: 8%
- Atropine: 2%
- MF & Atr: 4%
Six Month Refractive Error Change (D)

Case Series Analysis: NaturalVue Multifocal and Myopia (N=49)

- All prior treatments: -0.42 ± 0.35
- Prior Correction None or SV: -0.10 ± 0.30
- NaturalVue Multifocal: -0.05 ± 0.33

76% Decrease

93% Decrease
Case Series Analysis: NaturalVue Multifocal and Myopia (N=49)

Six Month Axial Length Change (mm)

- **0.23 ± 0.20 Rx Derived**
  - **56% Decrease**

- **0.34 ± 0.22 Rx Derived**
  - **74% Decrease**

Prior Correction
- None or SV

NaturalVue Multifocal
Cooper MiSight 3 Year Outcomes

- 3 year, prospective, double masked, randomized, multi-center.
- 144 children, ages 8–12 with 80% retention and only one discontinuation for visual complaints
- 59% less myopia progression by cycloplegic AR
- 52% less axial elongation by IOLMaster
- 0.73D less myopia at three years
Plausible alternative to MiSight if unavailable?
<table>
<thead>
<tr>
<th></th>
<th>MiSight or Acuvue?</th>
<th>Acuvue or MiSight?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance Center Zone</td>
<td>3.36 mm</td>
<td>1.94 mm</td>
</tr>
<tr>
<td>Plus #1</td>
<td>4.78 mm</td>
<td>3.20 mm</td>
</tr>
<tr>
<td>Distance #2</td>
<td>6.75 mm</td>
<td>5.80 mm</td>
</tr>
<tr>
<td>Plus #2</td>
<td>8.31 mm</td>
<td>7.00 mm</td>
</tr>
<tr>
<td>Distance #3</td>
<td>11.66 mm</td>
<td>8.00 mm</td>
</tr>
<tr>
<td>OAD</td>
<td>14.20 mm</td>
<td>14.20 mm</td>
</tr>
<tr>
<td></td>
<td>MiSight or Acuvue?</td>
<td>Acuvue or MiSight?</td>
</tr>
<tr>
<td>----------------------</td>
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<td>14.20 mm</td>
<td>14.20 mm</td>
</tr>
</tbody>
</table>

Kollbaum et. al. OVS March 2013 Modified
Do MFCLs Have to be Over-minused?

- In the CONTROL study, the average contact lens Rx was less than the vertex corrected spherical equivalent Rx.
- In a case series (in prep) of 119 consecutive progressing myopes fitted with MFCLs, the average difference between the contact lens power and the SE Rx for the right eye was +0.11 D with no patients exceeding −0.50 D.
- In this case series the rate of progression in the right eye prior to MFCLs was −1.06 D/yr and after −0.13 D/yr.
In the absence of significant uncorrected astigmatism, binocular visual acuity is usually 20/25 or better.

OSU study found that quality of life measures increased equally among pediatric wearers of bifocal soft contact lenses and standard SCLs, after switching from spectacles. In addition, distance vision rated higher than with spectacles.

### VA with BCL vs SVCL – Baseline vs One Year Control Study

<table>
<thead>
<tr>
<th>Lens</th>
<th>Baseline</th>
<th>One Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCL</td>
<td>20/20.26 (1.12)</td>
<td>20/22.10 (3.42)</td>
</tr>
<tr>
<td>SVCL</td>
<td>20/18.75 (2.19)</td>
<td>20/33.89 (16.93)</td>
</tr>
</tbody>
</table>
Myopia Control Scenarios

- Standard Rx
- 33% Slowing at Low Myopia
- 33% Slowing at Low Hyperopia then 50% at First Myopia
- 80% Slowing at First Myopia
- 33% Slowing at Low Hyperopia then 80% at First Myopia

Aller T A Eye 2014
How to Market for Myopia Control

- WHO: Who is our target patient or health decision maker? What do we know about them? Be as specific as possible.
- WHERE: Where can we reach that target effectively with our message so it will be memorable?
- WHAT: What is our message that will motivate them? How do we phase our message over time to go from awareness to interest to adoption to advocate?
Define Your Target

- Your target for treatment might be 7 to 13 year old children, but your marketing has to be to the family decision maker.
- The US Department of Labor estimates that over 80% of health care decisions are made by the mother.
- Your target might be, moms aged 35 to 50 with an average of 40, affluent, educated, Asians or others with heavy academic influence.
- Consider the psychographic of the target, busy, depends on social network for advice, wants best for children, feels guilty if not providing it.

Oerding, M. CL Exec, TreeHouse Eyes
Does Axial Length Control Reduce Retinal Pathology?

Area of PPCA vs Refractive Change

- Area 1034 pixels
- Area 14810 pixels

Graph showing changes in area over refractive change.
Myopia Calculators

![Graph showing the relationship between age and refractive error estimate (D). The graph compares 'with management' and 'without management' scenarios.](image)
Myopia Control Resources

- Managemyopia.org
- Myopiaprevention.org
- Myopiacontrol.org
- Myopiacare.org
- Myopia control academy at BHVI: https://academy.brienholdenvision.org/browse/listings/courses/myopia
- http://wildsoetlab.berkeley.edu/
- http://www.caleyecare.org/myopia-control-clinic
- http://www.myopiaprofile.com/
- https://mykidsvision.org/
- http://treehouseeyes.com/
- drthomasaller@gmail.com