Myopia Control:
A Science and Evidence based approach

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Visual Edge
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Myopia Control
The epidemic of Myopia

Myopia prevalence varies somewhat between studies on similar populations

Europe & USA a prevalence of at least 30% (Pan et al. 2012), with an increase over time shown in adults (Vitale et al. 2009).

South-East Asian adult populations the prevalence of myopia is much greater, at over 70% (Pan et al. 2012; Sun et al. 2015),

In 19-year-old South Korean males reaching 90+% (Jung et al. 2012).
Myopia update
(think eye length not Dioptres)
Sequelae of High Myopia

Noel A. Brennan OD PhD.

High myopia > -5.00 D is associated with increased risk of Sight threatening conditions such as choroidal neovascularization, glaucoma, cataract, retinal detachment myopic maculopathy.

Life-style restrictions & emotional sequelae.
Does Orthokeratology ↓ Myopia?
Topographic Profile
Ortho K vrs. Soft Bifocal

Corneal reshaping

Soft bifocal
Soft Bifocal

• Aller, Tom

• Controlling Myopia Progression – Why not Try Something That Works for a Change?
  • Abstract from International Myopia Meeting 2008

<table>
<thead>
<tr>
<th></th>
<th>Single Vision Soft CL</th>
<th>Bifocal Soft CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refractive Error (D)</td>
<td>-0.75 ± 0.50</td>
<td>-0.10 ± 0.36</td>
</tr>
<tr>
<td>Axial Length (mm)</td>
<td>0.24 ± 0.17</td>
<td>0.05 ± 0.14</td>
</tr>
</tbody>
</table>
BLIMP Study
Soft Bifocal

How Do OK and SBCL ↓ Myopia?
Why does Ortho K control myopia progression?

Earl.L. Smith Houston  GOS 05

The rays hitting the peripheral retina control axial length growth.
Why does Ortho K control myopia progression?

How should we correct progressing myopes?

By increasing the effective curvature of field it would be possible to correct central errors and either correct peripheral errors or induced peripheral myopic defocus.
How Hyperopic is the Peripheral Retina at 30 Degrees??

+1.00 D., +2.00 D., +3.00 D. or +4.00 D.

Blur Circle and Myopia Control

The size of the blur circle increases with the distance of the image from the retina.

Therefore, if there is spatial summation of signals from the myopic center and the hyperopic periphery, the peripheral signal will dominate the eye growth.
### Table 1
Technical details of the lenses used as reported by the manufacturer

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Omafilcon A</td>
</tr>
<tr>
<td>Equilibrium Water Content</td>
<td>62%</td>
</tr>
<tr>
<td>Base Curve Radius</td>
<td>8.6 mm</td>
</tr>
<tr>
<td>Overall Diameter</td>
<td>14.2 mm</td>
</tr>
<tr>
<td>Distance Power</td>
<td>Plano</td>
</tr>
<tr>
<td>Near Add Power</td>
<td>+1.00, +2.00, +3.00, +4.00 D</td>
</tr>
<tr>
<td>Spherical Distance Zone Diameter</td>
<td>2.3 mm</td>
</tr>
<tr>
<td>Aspheric Multifocal Zone Width/Diameter</td>
<td>1.35 mm/5.0 mm</td>
</tr>
<tr>
<td>Spherical Near Zone Width/Diameter</td>
<td>1.75 mm/8.5 mm</td>
</tr>
</tbody>
</table>
Biofinity D Lens
+2.00 (higher adds available)

D lens
Distance vision
Spherical central zone
Intermediate vision
Progressive zone
Near vision
Spherical zone
Lens edge

Average Pupil Size Change with Age

- Photopic Pupil Diameter (mm)
- Scotopic Pupil Diameter (mm)
• Other Multifocal Soft
• Multi Zone Designs
Daily Disposable Contact Lens for Myopia Control
Numerous Patents in Myopia Control
All Myopia Control Lenses (soft MF or rigid OrthoK) create a focus of peripheral rays in-front of the retina.
Questions we need to ask ourselves

- Why?
- When?
- What?
WHEN?

What are the predictors of Myopia?

Family History, or “As soon as”?

What age is it safe to start CLs?
Getting Started in Practice and Case Studies
Reducing myopia in practice.

Practice based experiences of managing patient's expectations.
The Story of
Rosie & Lottie
Practice protocols for Myopia Control

Guidelines in Myopia Control: Confidential Document and not for Reproduction

Patient Selection

Entry Requirements
- Parent with greater than -5.00 in any meridian
- Myopia > -1.00DS
- Progression of > -0.50 in 12 months
- Age 8-13 years
- Sibling with greater -4.00 with history of progression > -0.75 in 12 months

Contra-Indications
- Evidence of active Pathology
- Family history of Corneal Ectasia
- Topography > 46.00D in any meridian
- Increasing astigmatic error > 0.50 in 6/12
- Pachymetry < 510 microns

Informed consent (practice letter head and contact/emergency details being retained by the patient & guardian)
- Parents (Discussion with responsible guardian or guardians where possible)
- Discussing & documenting

Lens selection
Discussion of rigid or soft options, with a evidence based approach to the preferred lens selection. Parent and child to be included.

Rigid OrthoK if < -3.00 and suitable for this modality of lens wear, advantages, to include parental handling and control of lens and when worn, potentially less risk of infection.

Soft MF (distance centre MF) advantages, stability of vision throughout the wearing day disadvantages, less control of environment and potentially greater risk of infection. Child must be competent of lens handling and matters of hygiene.

Required commitment of patient and clinician

Patient commitment to aftercare.
- Initial fitting fee reflects the advanced equipment and continual professional development of the practice and clinicians
- £150.00 is not refunded in the event of discontinuation for any reason.

Clinician must provide appropriate level of care.
- Including emergency care opportunities within 10 days for non urgent or 72 hour if emergency cover (Arrangements for emergency may include out of hours telephone number and/or recommended reporting to an appropriately qualified professional in primary care)

Clinicians should
- Have ongoing commitment to Continued Education and Development in the field of Contact Lenses, Children Eye Care and more specifically Annual updates in Myopia Control amounting to at least 4 CET points.

This facilitates the clinician to express his 'professional judgement' in fitting.

Set a realistic fitting fee to include lens replacement and professional fees. This need to be communicated to patients.
- Illustration and amount will be defined by the clinic.
- Initial fitting fee of £150.00
- Ongoing direct debit £50 per month to include lens replacement and refitting. This fee should reflect the specialist nature, frequent patient visits during the treatment and the additional investment in technology and education. The fee may well be greater than other fees in adults.
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The “Controversial Nature of Myopia Control” albeit ‘evidence based approach’ offers an opportunity, but not guaranteed, slowing of the rate of progression of myopia and the sequelae in terms of reduced unaided vision and pathological consequences of high short-sightedness (Myopia).

Short-sightedness will not be reduced, only the rate of change slowed. The aim is a 50% slowing of progression in myopia and it is not realistic to expect complete cessation in progression.
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What Can we tell our Patients?

• Bifocal specs, GP contact lenses, under-correction, special spectacles don’t work well enough
• Atropine works well, but doesn’t accrue after 1 year, and maybe not permanent. Living in CylcoWorld could affect education?
• Kids like OrthoK and soft bifocals and they may control myopia in significant number, if not all, children. But does not cure or reverse, it just slows progression.
• Do nothing, chase myopia and the sight threatening consequences
• What is ‘best clinical practice’?
Myopia Control
What does it mean to you in your clinics?
Myopia Control
What does it mean to me in my clinic?

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

Any Myopia 18

Odds Ratio
Myopia Control

What does it mean for you in your clinics?

Thank you