Clinical and Optical Evidence of Controlling Myopia Progression

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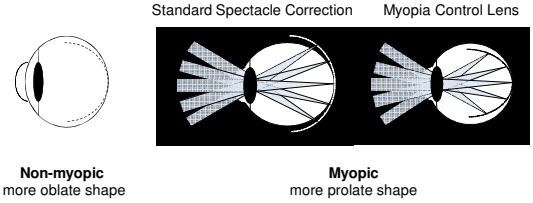
- Research Support:
  - Johnson & Johnson Vision Care, Inc
  - Bausch + Lomb
- No financial or proprietary interests in any product discussed
- Use of any lens for myopia control is considered off label

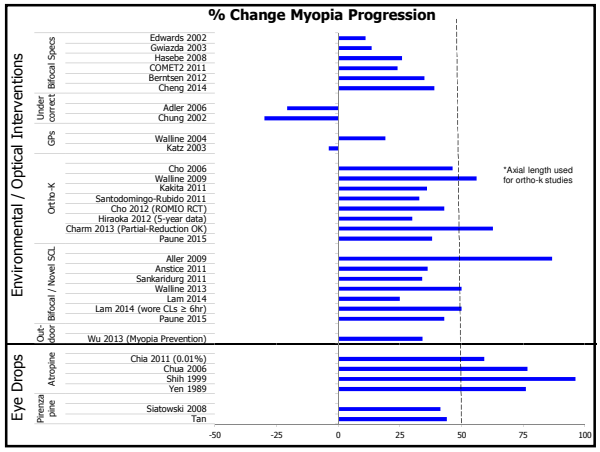
Peripheral Defocus Theory of Myopia

- Peripheral Defocus Hypothesis:
  - Retinal regions respond to local defocus signals
  - Hyperopic peripheral defocus results in axial elongation



Non-myopic
more oblate shape

Myopic
more prolate shape

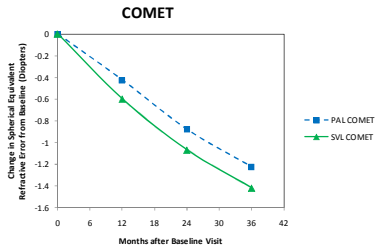


What we have learned from spectacle clinical trials

(Bifocals and PALs)

Bifocal Trials

– Progressive Addition Lenses (PALs) with +2.00 D add
- 469 children (6-11 year old myopes)



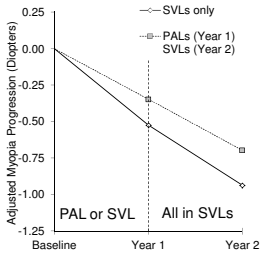
0.20 D three-year PAL treatment effect with majority during 1st year

Gwiazda et al. Invest Ophthalmol Vis Sci 2003;44:1492-500

Bifocal Trials

Is there a rebound?

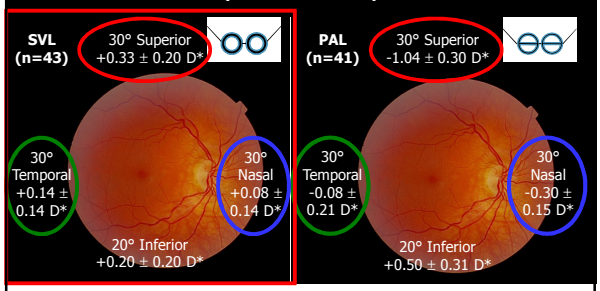
- 6 to 11 years old myopes with high lag



No evidence of treatment effect loss/rebound 1 year after stopping PAL wear.

Berntsen et al. Invest Ophthalmol Vis Sci 2012;53:640-9

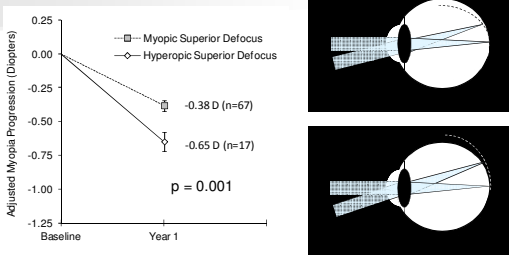
Change in Peripheral Defocus due to Specs (SVLs or PALs)



Minus power single vision lenses increase peripheral hyperopia. Progressive addition lenses cause myopic shift in three of four quadrants measured.

Berntsen et al. Invest Ophthalmol Vis Sci 2013;54:5761-70

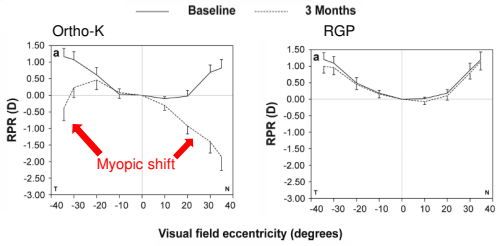
Peripheral Defocus and Myopia Progression



Myopic retinal defocus on peripheral retina was associated with slower foveal myopia progression

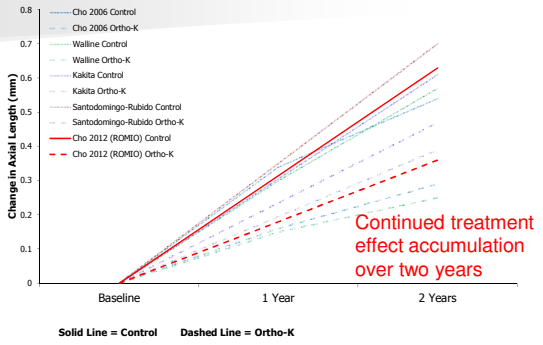
Berntsen et al. Invest Ophthalmol Vis Sci 2013;54:5761-70.

Orthokeratology & Peripheral Defocus

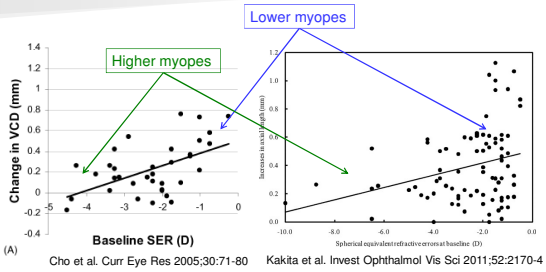


Kang & Swarbrick. Peripheral refraction in myopic children wearing orthokeratology and gas-permeable lenses. Optom Vis Sci; 88(4):476-82.

Orthokeratology and Axial Growth



Axial Growth and Baseline Myopia with Orthokeratology



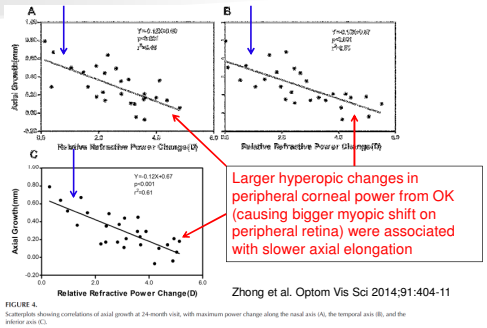
Cho et al. Curr Eye Res 2005;30:71-80

Kakita et al. Invest Ophthalmol Vis Sci 2011;52:2170-4

Kids with more initial myopia had slowest increase in myopia progression once fitted with ortho-k

Ortho-k may not be best option to slow progression in new myopes

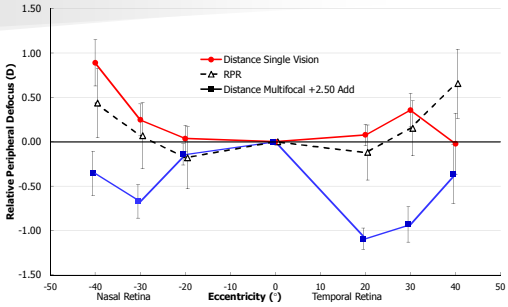
Relative Peripheral Corneal Power Change with Ortho-K and Axial Elongation



Zhong et al. Optom Vis Sci 2014;91:404-11

Relative Peripheral Defocus

Biofinity Sphere and Biofinity Multifocal "D"

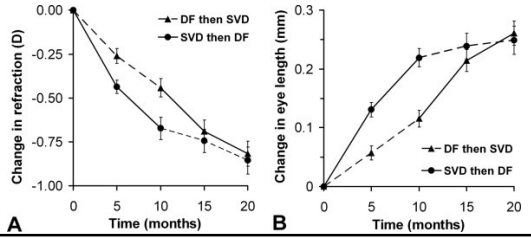


Berntsen and Kramer Optom Vis Sci 2013;90:1215-24

Soft Bifocal CL Studies

Anstice & Phillips Ophthalmology 2011;118:1152-61

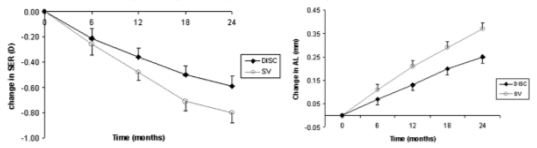
- 11-14 years old (-1.25 to -4.50 D SER)
- Dual-focus lens; concentric zones (+2.00 D)
  - 1st 10 months: One eye bifocal CL, other eye control SCL
  - 2nd 10 months: switched lens designs between eyes



Soft Bifocal CL Studies

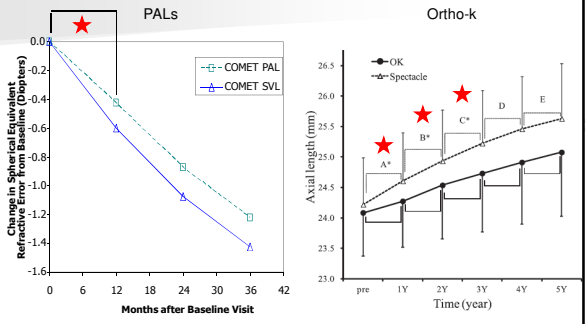
Lam et al Br J Ophthalmol 2014;98:40-5

- 2-year randomized clinical trial
  - Concentric ring bifocal (+2.50 add)
  - 221 enrolled
    - 128 (58%) completed study



25% reduction in myopia progression overall
(50% reduction if wore CLs 6+ hours/day)

Accumulation of Treatment Effect



Gwiazda et al. Invest Ophthalmol Vis Sci 2003;44:1492-500

Hiraoka et al. Invest Ophthalmol Vis Sci 2012;53:3913-9

BLINK Study

blink
Bifocal Lenses In Nearsighted Kids

- NEI-funded, 3-year, double-masked, randomized clinical trial
  - 294 children (147 children per clinical site)
  - Biofinity Sphere, Biofinity D +1.50, Biofinity D +2.50
- Determine if soft bifocal contact lenses slow myopia progression over three years
  - Is there a dose-response effect?

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BLINK Study Group

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Bifocal Lenses in Nearsighted Kids

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U10-EY023206 (LAJ)
U10-EY023208 (JJW)
U10-EY023210 (DOM)
Support: B+L (CL solution)

www.blinkstudy.org

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