Myopia Management: The Past, the Present and the FUTURE

ASHLEY WALLACE-TUCKER, OD, FAAO, FSLS, ABO DIPLOMATE

Disclosures

- CooperVision
- Bausch & Lomb
- SightGlass
- Topcon
- VTI

All relevant financial relationships have been mitigated. The content of this COPE-accredited CE activity was planned and prepared independently by** ASHLEY WALLACE-TUCKER, OD, FAAO, FSLS, ABO DIPLOMATE **without input from members of an ineligible company.


Do the best you can
until you know better.
Then when you know better,
do better.
Maya Angelou

CHANGE is HARD!

1 in 3 people would avoid change if they could.

Also, 1 in 3 people report that if they don't see immediate results from their efforts, they give up and do something else.

You may have to have the same conversation year after year…

In April 2021, the World Council of Optometry passed a resolution that declares support for myopia management as standard of care[1]

WORLD COUNCIL OF OPTOMETRY

Evidence-based standard of care combines three main components:

MITIGATION

MEASUREMENT

MANAGEMENT

1. World Council of Optometry. Resolution: The standard of care for Myopia Management by Optometrists. https://worldcouncilofoptometry.info/resolution-the-standard-of-care-for-myopia-management-by-optometrists. Accessed 2nd March 2022.

Mitigation

- Optometrists educating and counseling parents and children, during early and regular eye exams, on lifestyle/dietary/other factors to prevent/delay onset of myopia.

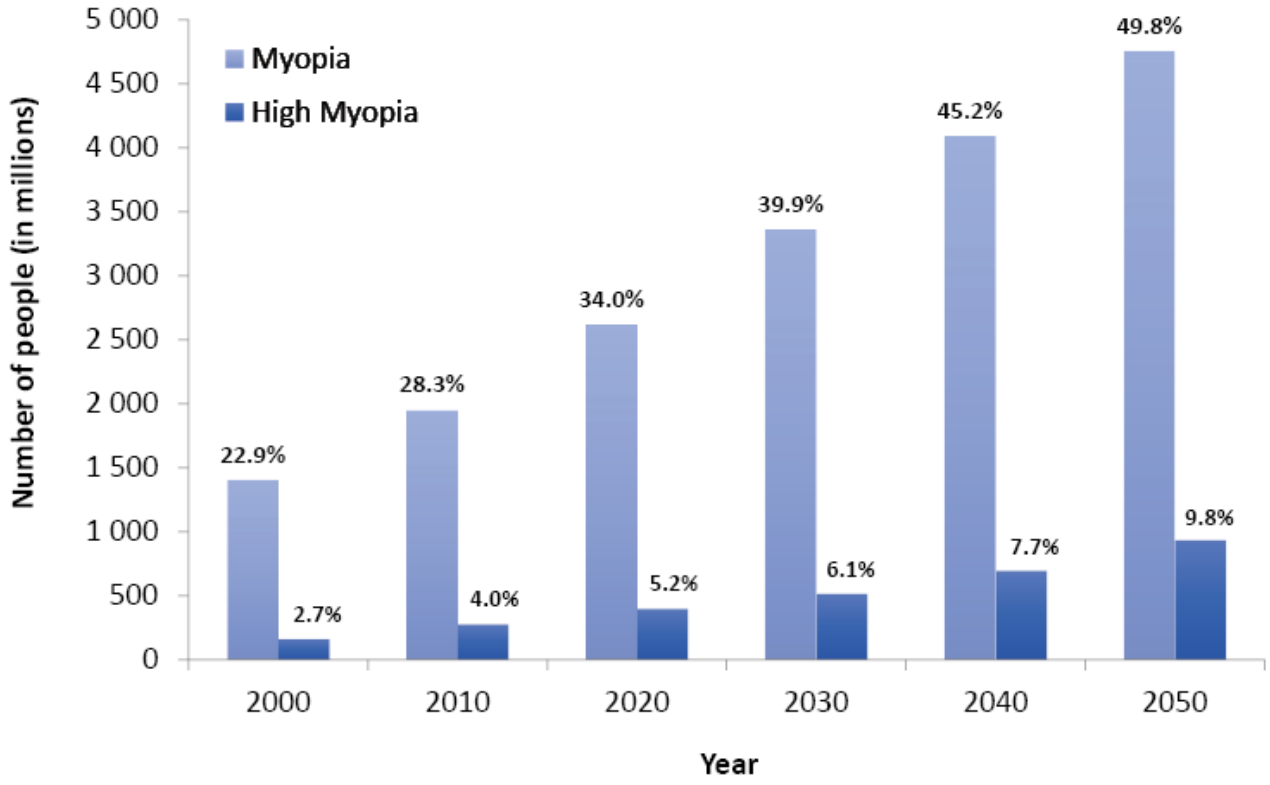
Measurement

- Optometrists evaluating the status of a patient during regular comprehensive vision and eye health exams, (e.g. refractive error and axial length whenever possible)

Management

- Optometrists addressing patients' needs of today by correcting myopia, while also providing evidence-based interventions (e.g., contact lenses, spectacles, pharmaceuticals) that slow the progression of myopia, for improved quality of life and better eye health today and into the future.

Why are we SO concerned?



Holden BA, Fricke TR, Wilson DA, et al. Global Prevalence of Myopia and High Myopia and Temporal Trends from 2000 through 2050. Ophthalmology 2016

By 2030

50% of North America is predicted to have myopia[1]

[1]Holden BA, Fricke TR, Wilson DA, Jong M, Naidoo KS, Sankaridurg P, Wong TY, Naduvilath TJ, Resnikoff S, Global Prevalence of Myopia and High Myopia and Temporal Trends from 2000 through 2050, Ophthalmology, May 2016 Volume 123, Issue 5, Pages 1036–1042.

Myopia Classification

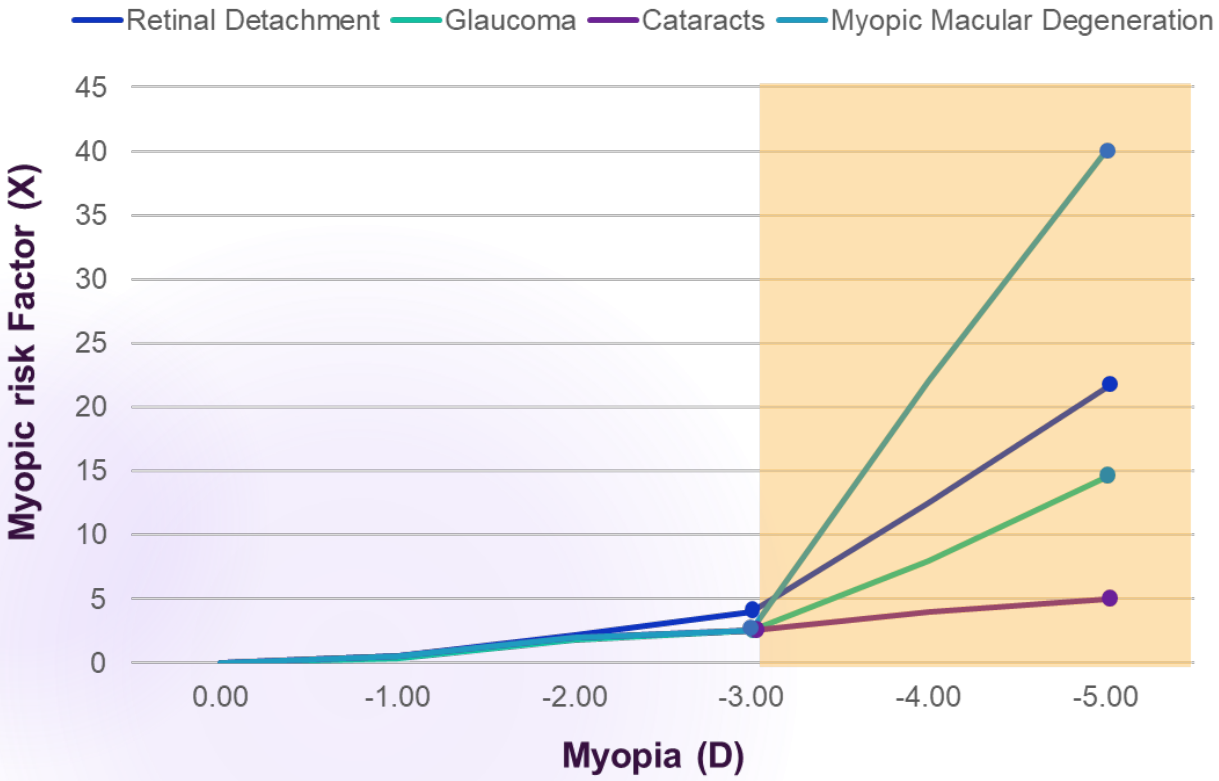
- Mild myopia: -0.25 to -3.00D
- Moderate myopia: -3.25 to -6.00 D
- High myopia: greater than -6.00 D

** There is no “safe” level of myopia.**

OCULAR DISEASE RISK

EACH DIOPTER MATTERS!

The importance of managing myopia..

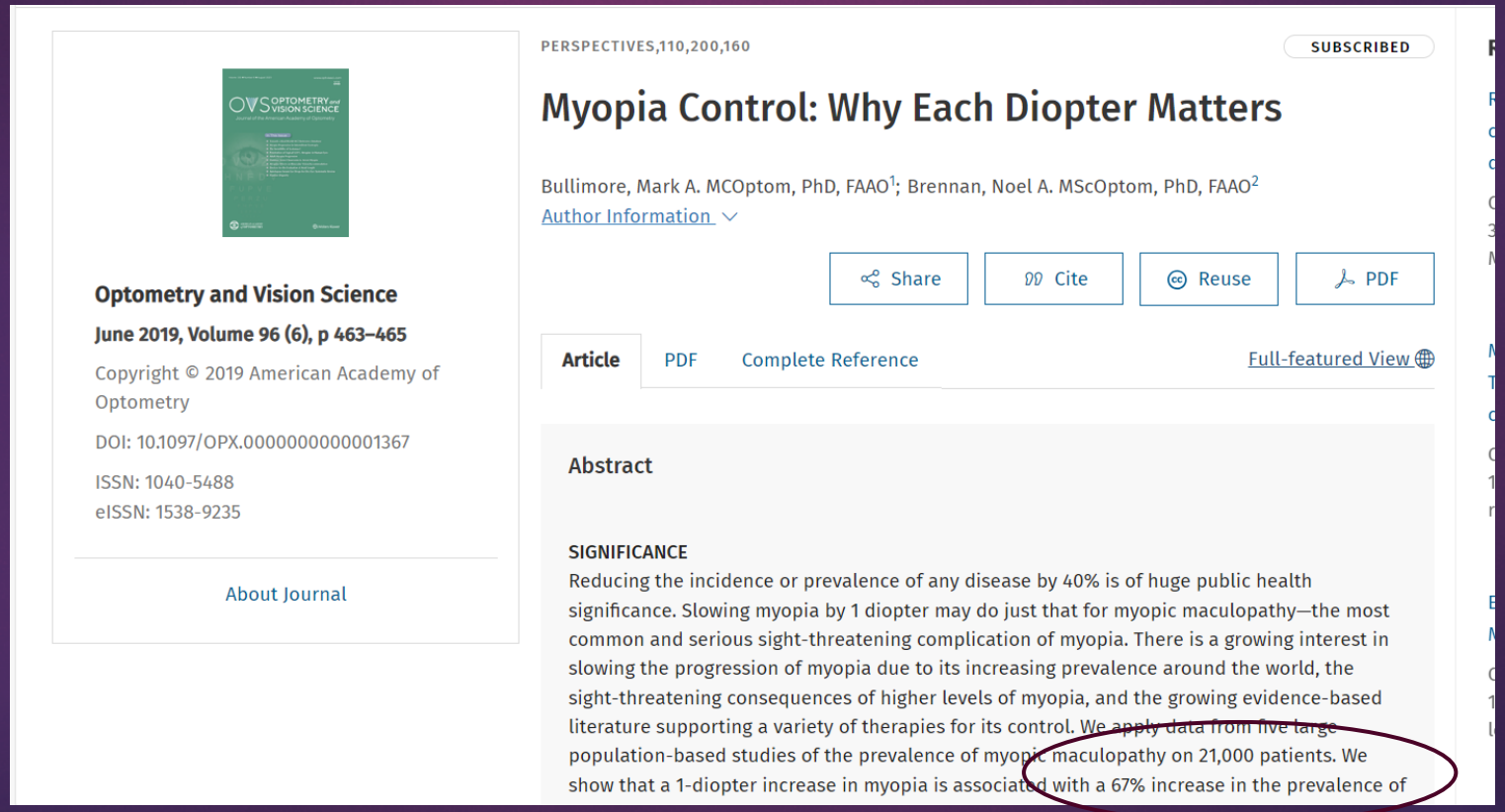


Slowing myopia progression by 1 diopter:

- Reduces risk of myopic maculopathy by **40%**
- Reduces risk of open-angle glaucoma by **20%**
- Reduces risk of visual impairment by **20%**

Flitcroft DI. The complex interactions of retinal, optical and environmental factors in myopia aetiology. Prog Retin Eye Res. 2012 Nov;31(6):622-60.
Bullimore MA, Brennan NA. Myopia Control: Why Each Diopter Matters. Optom Vis Sci. 2019 Jun;96(6):463-465.

One more time: Why does each diopter matter?



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ISSN: 1040-5488
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About Journal

PERSPECTIVES,110,200,160

SUBSCRIBED

Myopia Control: Why Each Diopter Matters

Bullimore, Mark A. MCOptom, PhD, FAAO[1]; Brennan, Noel A. MScOptom, PhD, FAAO[2]
Author Information

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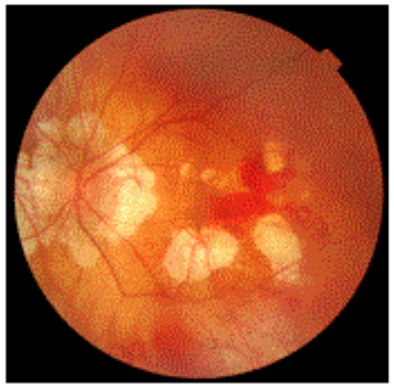
Abstract

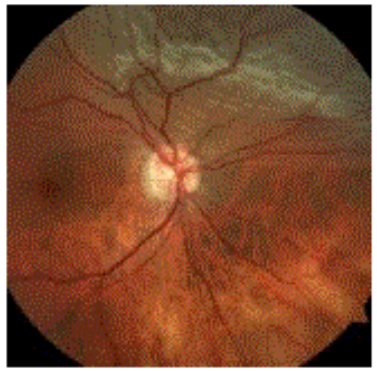
SIGNIFICANCE
Reducing the incidence or prevalence of any disease by 40% is of huge public health significance. Slowing myopia by 1 diopter may do just that for myopic maculopathy—the most common and serious sight-threatening complication of myopia. There is a growing interest in slowing the progression of myopia due to its increasing prevalence around the world, the sight-threatening consequences of higher levels of myopia, and the growing evidence-based literature supporting a variety of therapies for its control. We apply data from five large population-based studies of the prevalence of myopic maculopathy on 21,000 patients. We show that a 1-diopter increase in myopia is associated with a 67% increase in the prevalence of

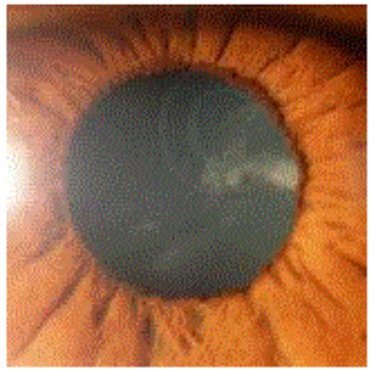
Why does each diopter matter?

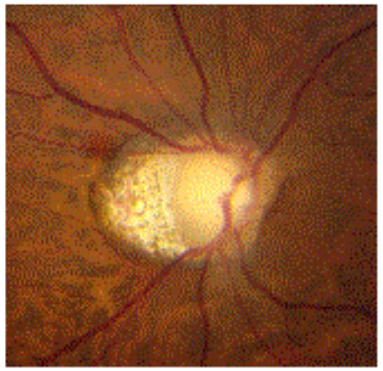
1 diopter increase in myopia is associated with a 67% increase in the prevalence of myopic maculopathy.

Prescription	1 Myopic Macular Degeneration [1]	2 Retinal Detachment [2]	3 Cataract PSC [3]	4 Glaucoma [4]
-1.00 to -3.00	2.2	3.1	2.1	1.65
-3.00 to -6.00	9.7	9.0	3.1	2.46
-6.00 to -9.00	40.6 x risk	21.5	5.5	2.46









1. Vongphanit 2002 2. Ogawa & Tanaka 1988 3. Lim et al 1999 4. Marcus et al 2011

Myopia ≠ nearsightedness

- Myopia is MORE than just being nearsighted
  - Increased risk of retinal detachment
  - Increased risk of myopic macular degeneration
  - Increased risk of POAG
  - Increased risk of PSC
- Equates myopia to just blurred vision that can be easily fixed with traditional glasses and/or contact lenses

When is the BEST time to start MM?

- The best time to start myopia management is at the time of ONSET
- WHY?
  - There is NO safe level of myopia
  - Every diopter matters!
  - **The benefits of MM far outweigh the risks of allowing myopia to progress**

“Myopia management should be initiated when myopia is apparent regardless of prior progression, rather than waiting to assess the progression rate.”

ORIGINAL INVESTIGATION

The Limited Value of Prior Change in Predicting Future Progression of Juvenile-onset Myopia

Donald O. Mutti, OD, PhD, FAAO,[1]* Loraine T. Sinnott, PhD,[1] Noel A. Brennan, MScOptom, PhD, FAAO,[2] Xu Cheng, MD, PhD,[1] and Karla Zadnik, OD, PhD, FAAO,[1] for the Collaborative Longitudinal Evaluation of Ethnicity and Refractive Error (CLEERE) Study Group

SIGNIFICANCE: Identifying children at highest risk for rapid myopia progression and/or rapid axial elongation could help prioritize who should receive clinical treatment or be enrolled in randomized clinical trials. Our models suggest that these goals are difficult to accomplish.

PURPOSE: This study aimed to develop models predicting future refractive error and axial length using children's baseline data and history of myopia progression and axial elongation.

METHODS: Models predicting refractive error and axial length were created using randomly assigned training and test data sets from 916 myopic participants in the Collaborative Longitudinal Evaluation of Ethnicity and Refractive Error Study. Subjects were 7 to 14 years of age at study entry with three consecutive annual visits that included cycloplegic A-scan ultrasound and autorefraction. The effect of adding prior change in axial length and refractive error was evaluated for each model.

RESULTS: Age, ethnicity, and greater myopia were significant predictors of future refractive error and axial length, whereas prior progression or elongation, near work, time outdoors, and parental myopia were not. The 95% limits for the difference between actual and predicted change were ±0.22 D and ±0.14 mm without prior change data compared with ±0.26 D and ±0.16 mm with prior change data. Sensitivity and specificity for identifying fast progressors were between 60.8 and 63.2%, respectively, when the cut points were close to the sample average. Positive predictive value and sample yield were even lower when the cut points were more extreme.

CONCLUSIONS: Young, more myopic Asian American children in the Collaborative Longitudinal Evaluation of Ethnicity and Refractive Error Study were the most likely to progress rapidly. Clinical trials should expect average progression rates that reflect sample demographics and may have difficulty recruiting generalizable samples that progress faster than that average. Knowing progression or elongation history does not seem to help the clinical decision regarding initiating myopia control.

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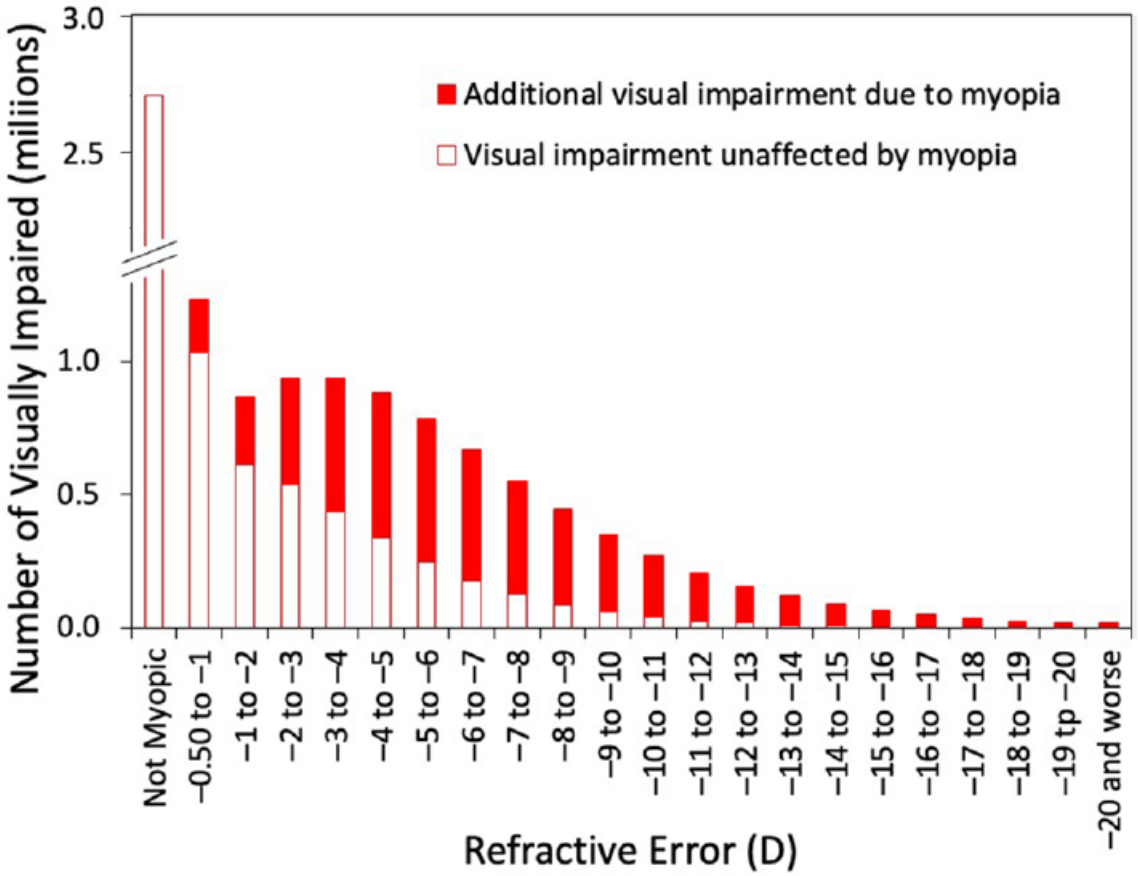
Optom Vis Sci 2022;99:424–433. doi:10.1097/OPX.0000000000001883

Myopia Profile

CLEERE Study Group

Figure 1 The predicted distribution of uncorrectable visual impairment in 2050 as a function of myopia level. The red portion of the bars represent the visual impairment attributable to myopia.[1]

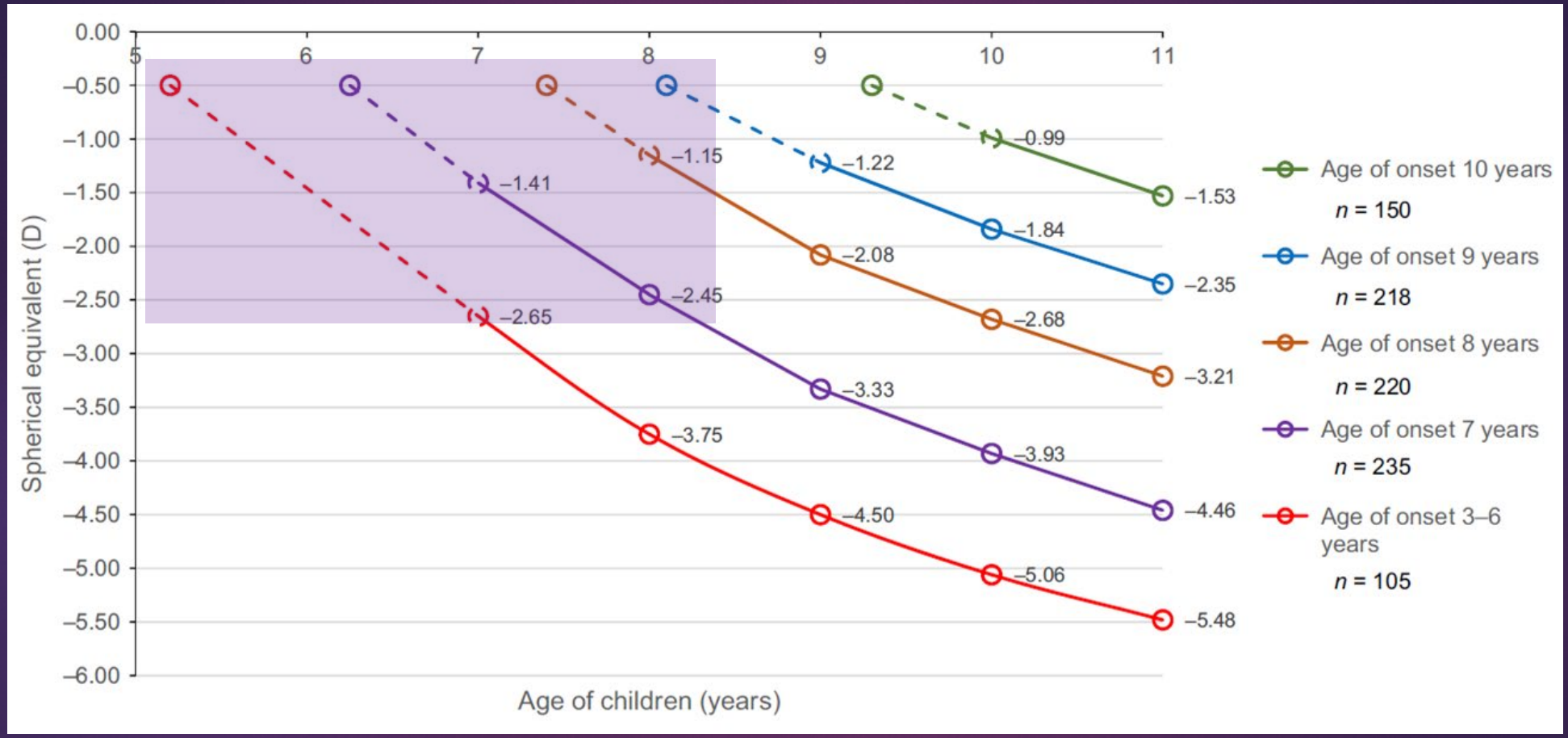


“There is no safe level of myopia.”

- Ian Flitcroft

[1] Bullimore MA, Brennan NA. The underestimated role of myopia in uncorrectable visual impairment in the United States. Sci Rep. 2023 Sep 15;13(1):15283.

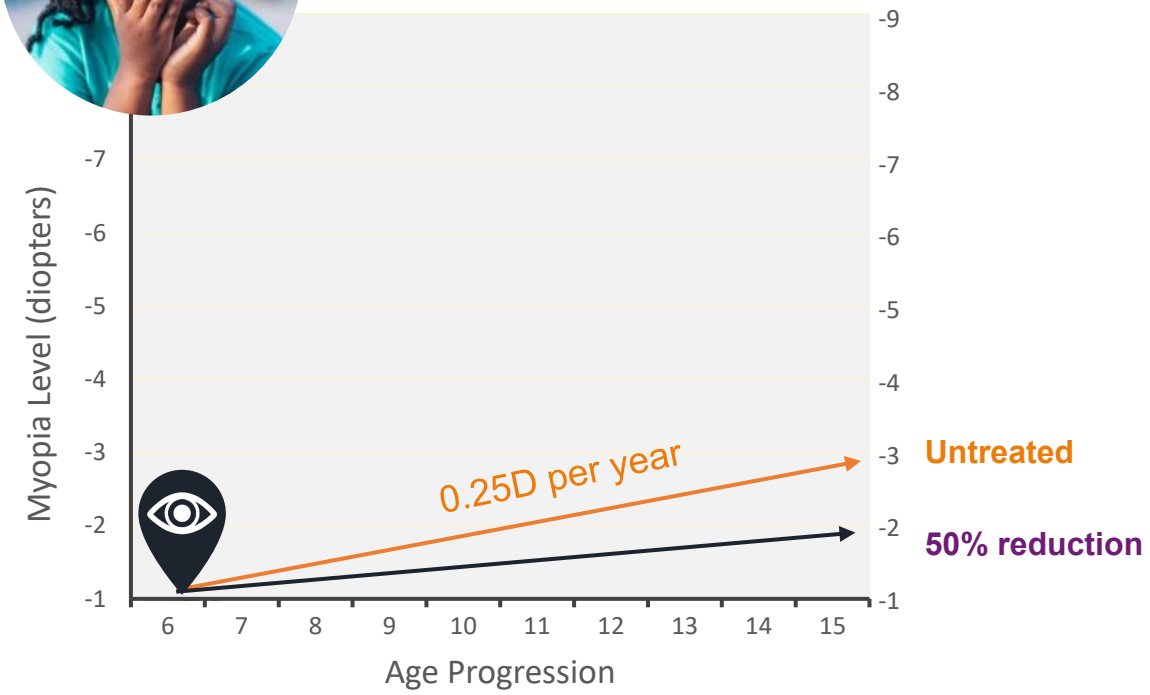
Age of onset impacts level of final myopia…



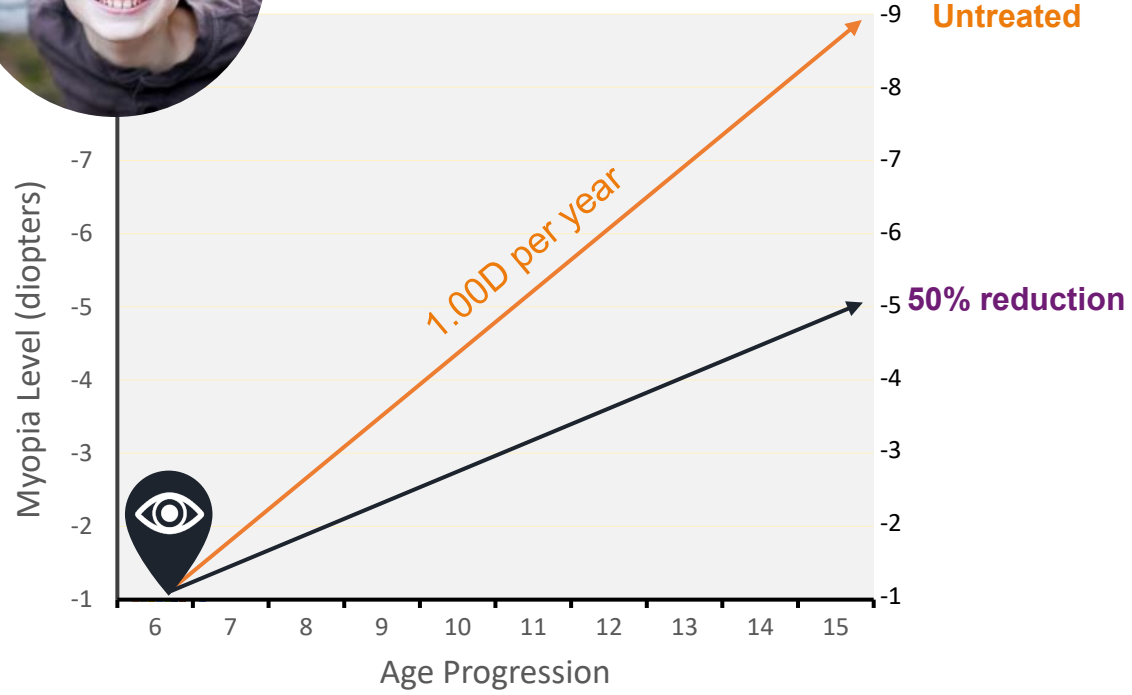
Chua SY, Sabanayagam C, Cheung YB, Chia A, Valenzuela RK, Tan D, Wong TY, Cheng CY, Saw SM. Age of onset of myopia predicts risk of high myopia in later childhood in myopic Singapore children. Ophthalmic Physiol Opt. 2016 Jul;36(4):388-94.

Younger and faster-progressing children receive maximum benefit!!

Maria 6
Slow progressor



Milo 6
Fast progressor



Should we be talking to HYPEROPES…about MYOPIA management?

The CLEERE Study

Collaborative Longitudinal Evaluation of Ethnicity and Refractive Error, (CLEERE) Study, K. Zadnik et al, 2015

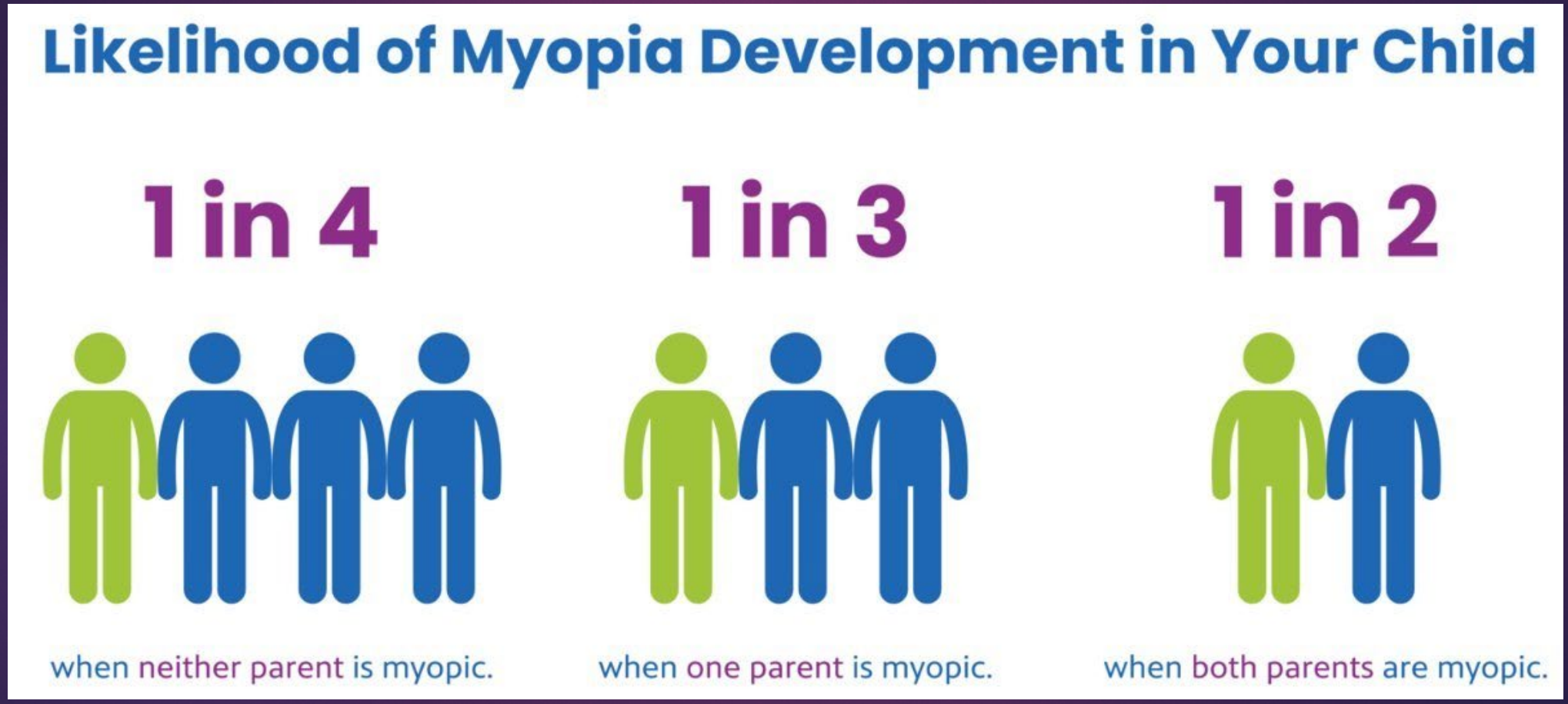
Determined ONE simple test that can predict whether a child will become myopic…

The CLEERE Study

Early Refractive Error

Exhibiting less than 0.50D of manifest hyperopia at age 6 to 7 years is the most significant risk factor for future myopia.

Deeper Dive: Family History



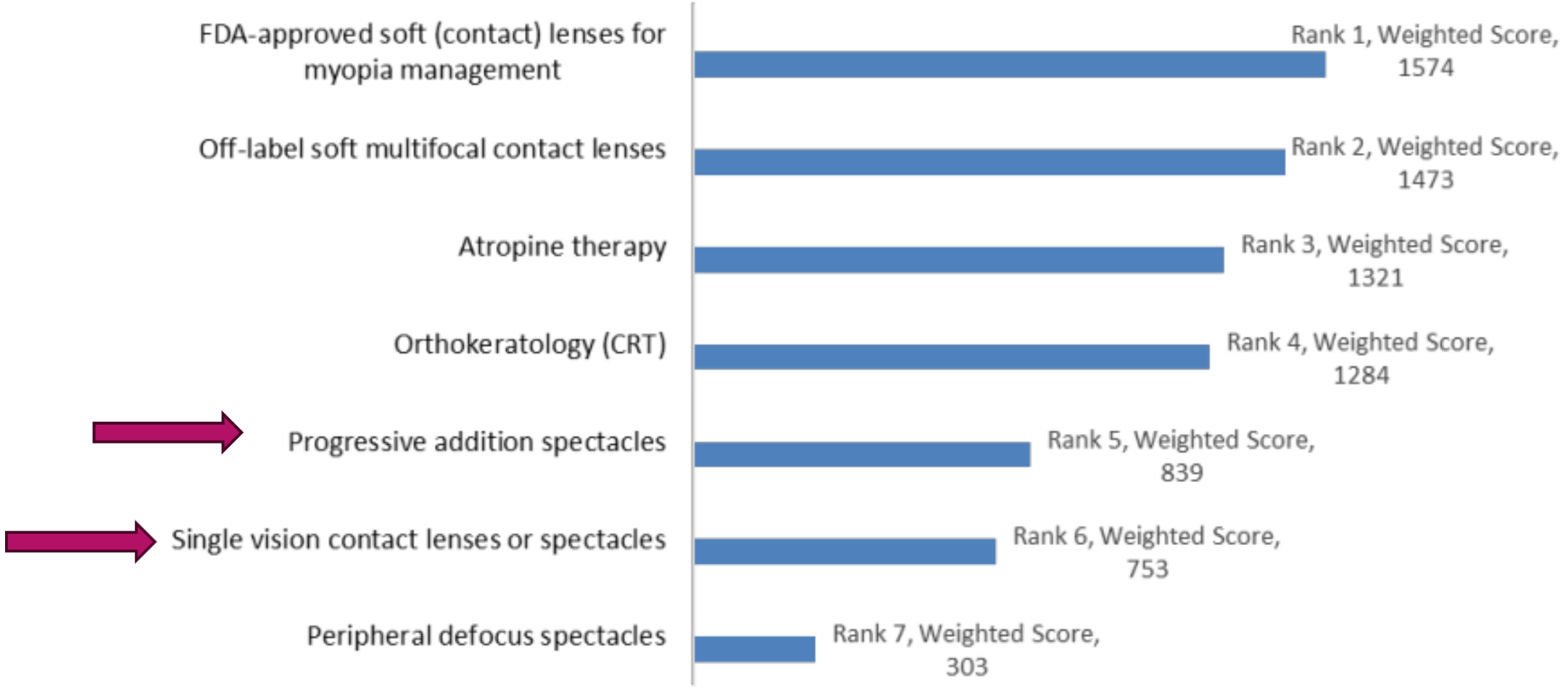

Let’s take a walk down memory lane…

Under-Correction

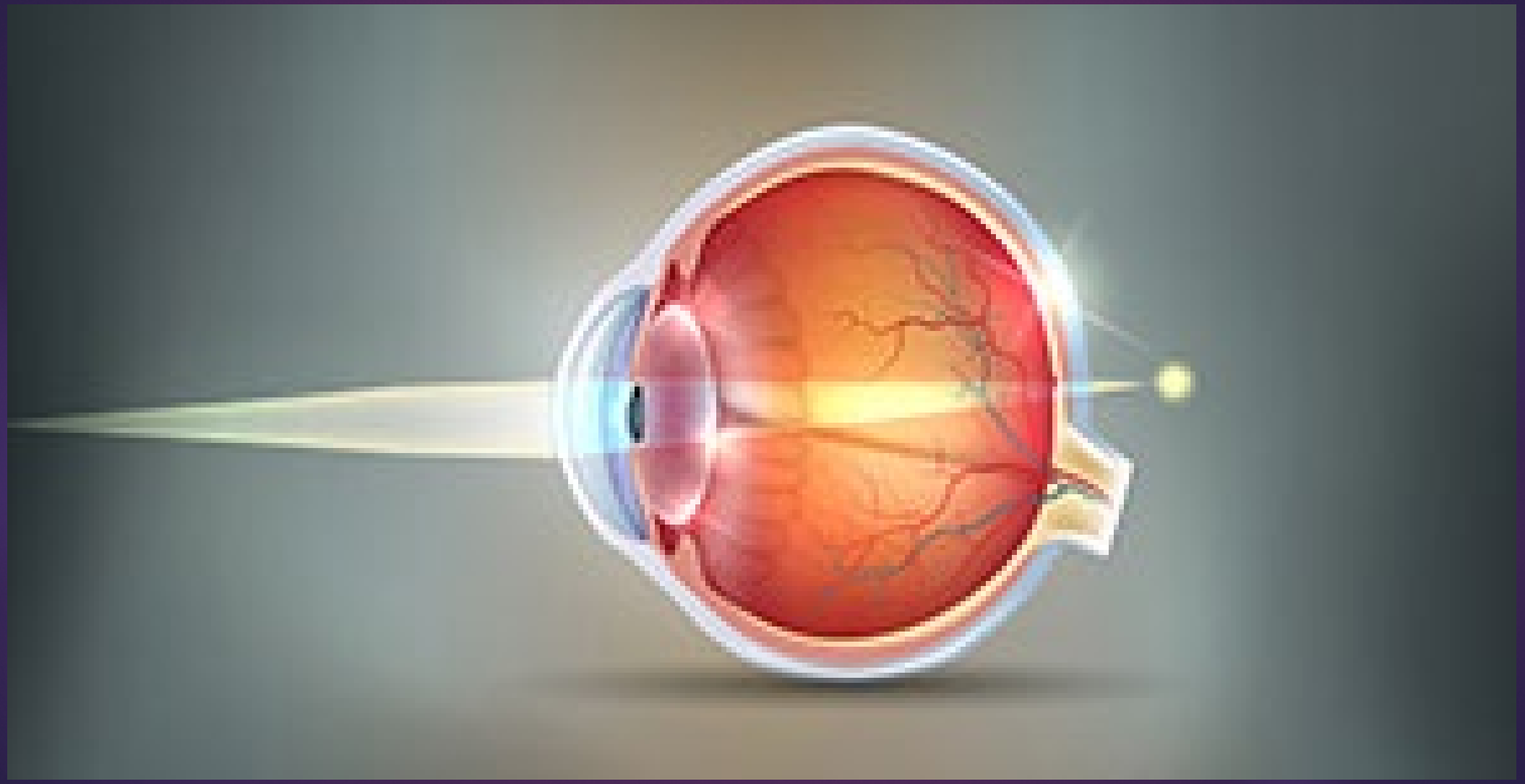
Bifocal Spectacles

Progressive Addition Lenses

Figure 4: Myopia Management Methods Currently Utilized by Doctors of Optometry in Order of Preference



Under-correction



Under-Correction

- Adler and Millodot found that under-correction of myopia by approximately 0.50 D **did not significantly affect myopia progression** in 6- to 15-year-old myopic children over 18 months. (2006)
- Chung et al. found that myopia progressed an average of -1.00 D for 9- to 14-year-old myopes under-corrected by approximately 0.75 D, compared with only -0.77 D for fully corrected myopes of the same age range. (2002)

Bifocal Spectacles

- The largest randomized clinical trial reported that children wearing bifocal spectacles **progressed 0.20 D less** than children wearing single vision spectacles over a 3-year period. (Gwiazda J. et al, 2003)
- A clinical trial randomly assigned children to wear single vision, executive bifocal, or executive bifocal with 3D base-in prism spectacles. **The prism had no effect on myopia progression, but the executive bifocal slowed myopia progression from -2.06 D for single vision wearers to -1.25 D for the executive bifocal group over three years (39% reduction).** (Cheng et al, 2014)

Bifocal Spectacles

- Truth:
  - Studies vary from 20% reduction to up to 45% reduction in myopia progression.
  - These results are more favorable than under-correction or single vision lenses.
  - May be most beneficial for esophoric myopes (~30%).
  - An executive bifocal **MAY** be the most effective lens design.

Although these results are statistically significant, they are not considered CLINICALLY significant.

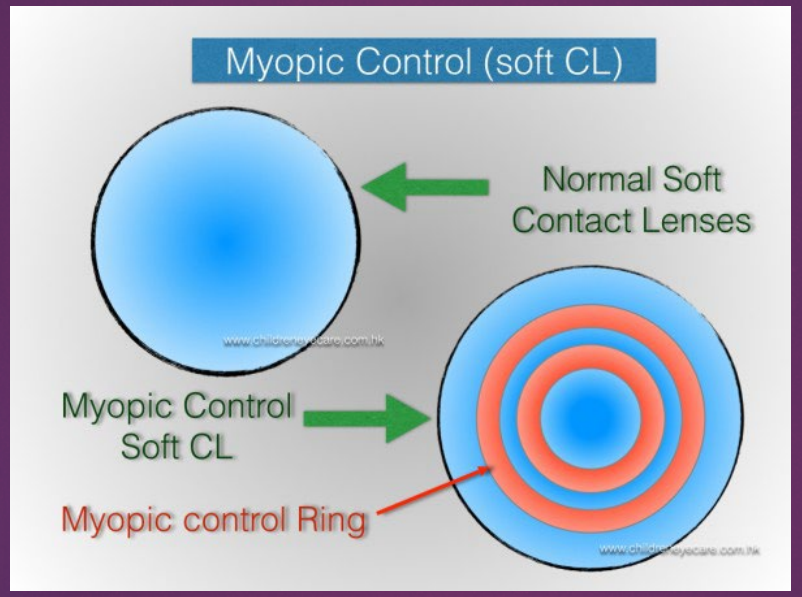
Progressive Addition Lenses (PALs)

- Most studies found **minimal** myopia control.
- COMET (2001) study concluded that the significant increased cost of PALs doesn't warrant usage of them over single vision distance spectacles.

What are the ***best*** options currently???

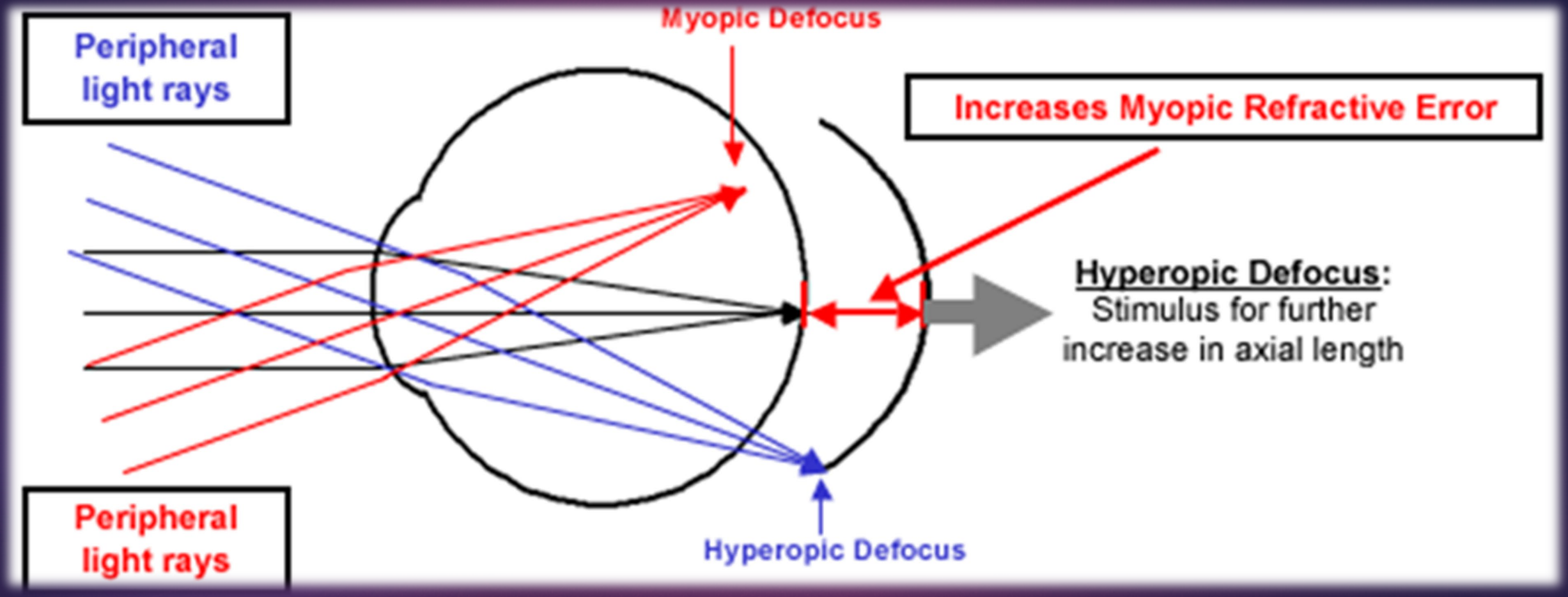
Three ***evidence***-based myopia management strategies

Atropine



Orthokeratology

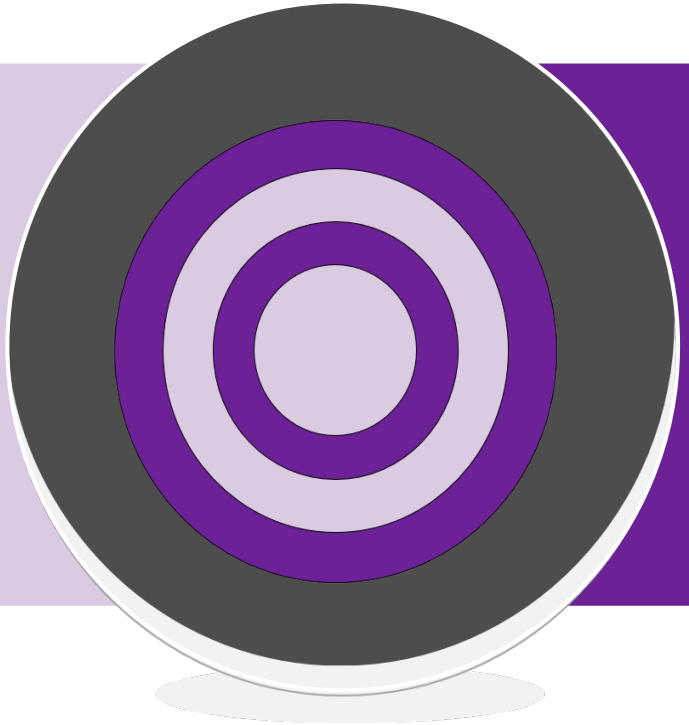
Dual Focus or Center Distance Soft MFs


Peripheral light rays
Myopic Defocus
Increases Myopic Refractive Error
Hyperopic Defocus:
Stimulus for further increase in axial length
Peripheral light rays
Hyperopic Defocus

FDA Approved Option:

- CooperVision's MiSight 1 Day:
  - First and only FDA-approved soft lens for myopia CONTROL
  - Clinically proven to slow the progression of myopia when initially prescribed for children 8-12 years old

Two correction zones to correct myopia so children enjoy clear, spectacle-free vision

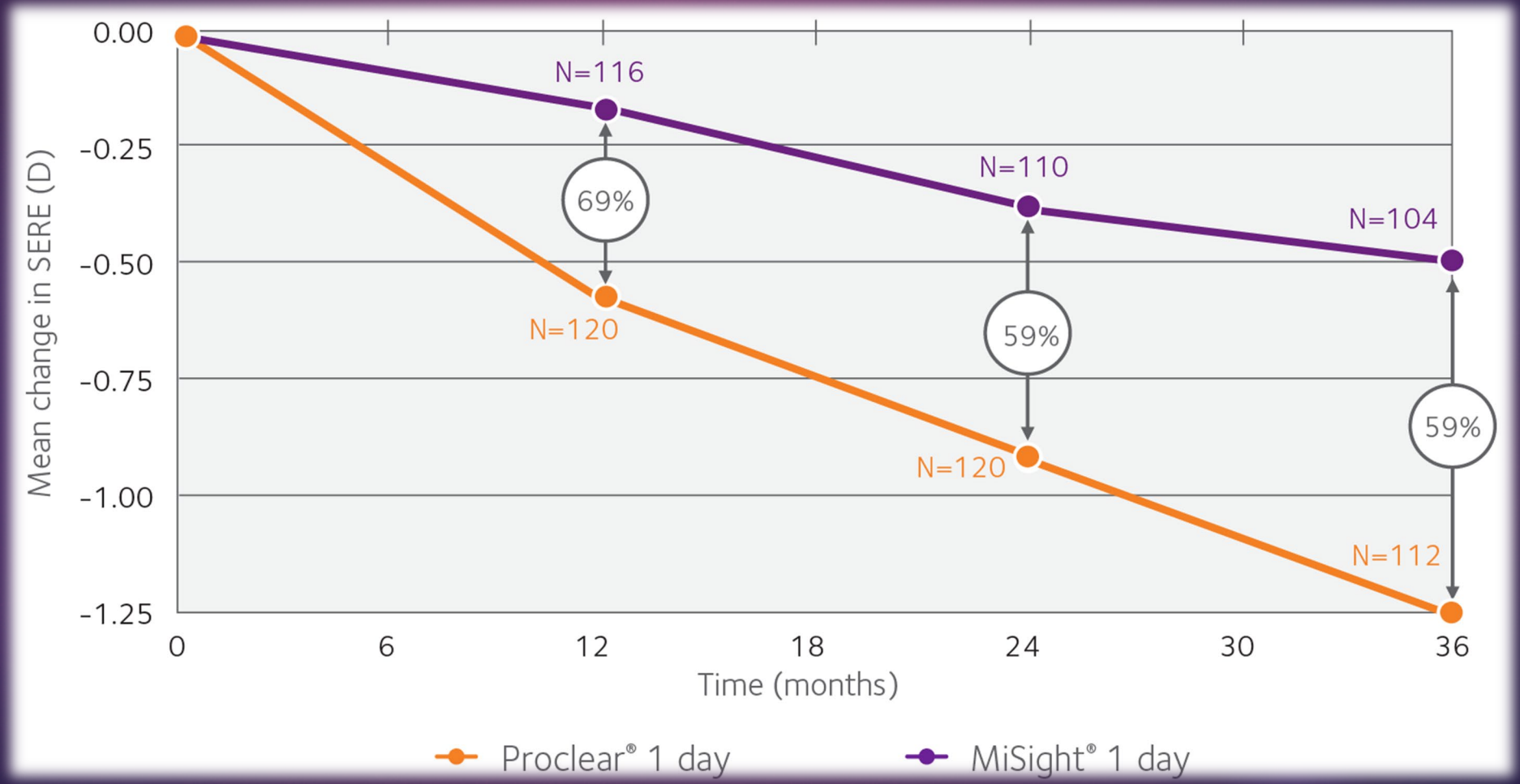


Two treatment zones (2.00D myopic defocus) to place the treatment zone image in front of the retina

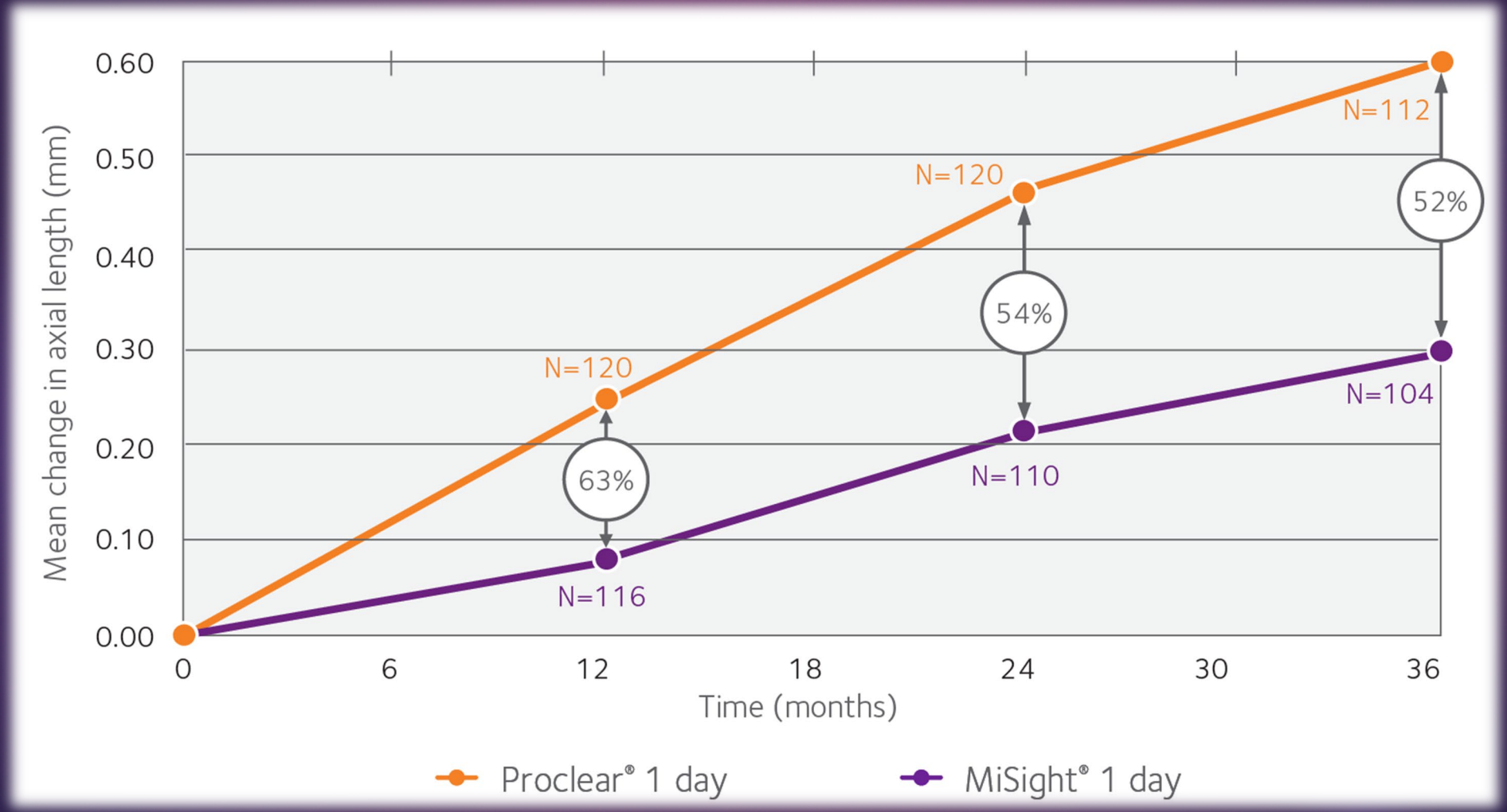
treatment zones creating myopic defocus

correction zones

Over three years, MiSight reduced myopia progression by an average of 59%, versus a single vision 1 day lens.



Over three years, MiSight reduced axial lengthening by an average of 52%, versus a single vision 1 day lens.



Additional Findings…

- After 6 years, 23% of patients showed less than 0.25D of myopic progression.
- No rebound effect after cessation of lens wear.

Soft Multi-focals

Randomized Controlled Trial > JAMA. 2020 Aug 11;324(6):571-580.
doi: 10.1001/jama.2020.10834.

Effect of High Add Power, Medium Add Power, or Single-Vision Contact Lenses on Myopia Progression in Children: The BLINK Randomized Clinical Trial

Jeffrey J Walline [1], Maria K Walker [2], Donald O Mutti [1], Lisa A Jones-Jordan [1], Loraine T Sinnott [1], Amber Gaume Giannoni [2], Katherine M Bickle [1], Krystal L Schulle [2 3], Alex Nixon [1 4], Gilbert E Pierce [1], David A Berntsen [2]; BLINK Study Group

Affiliations + expand

PMID: 32780139 PMCID: PMC7420158 DOI: 10.1001/jama.2020.10834
Free PMC article

Abstract

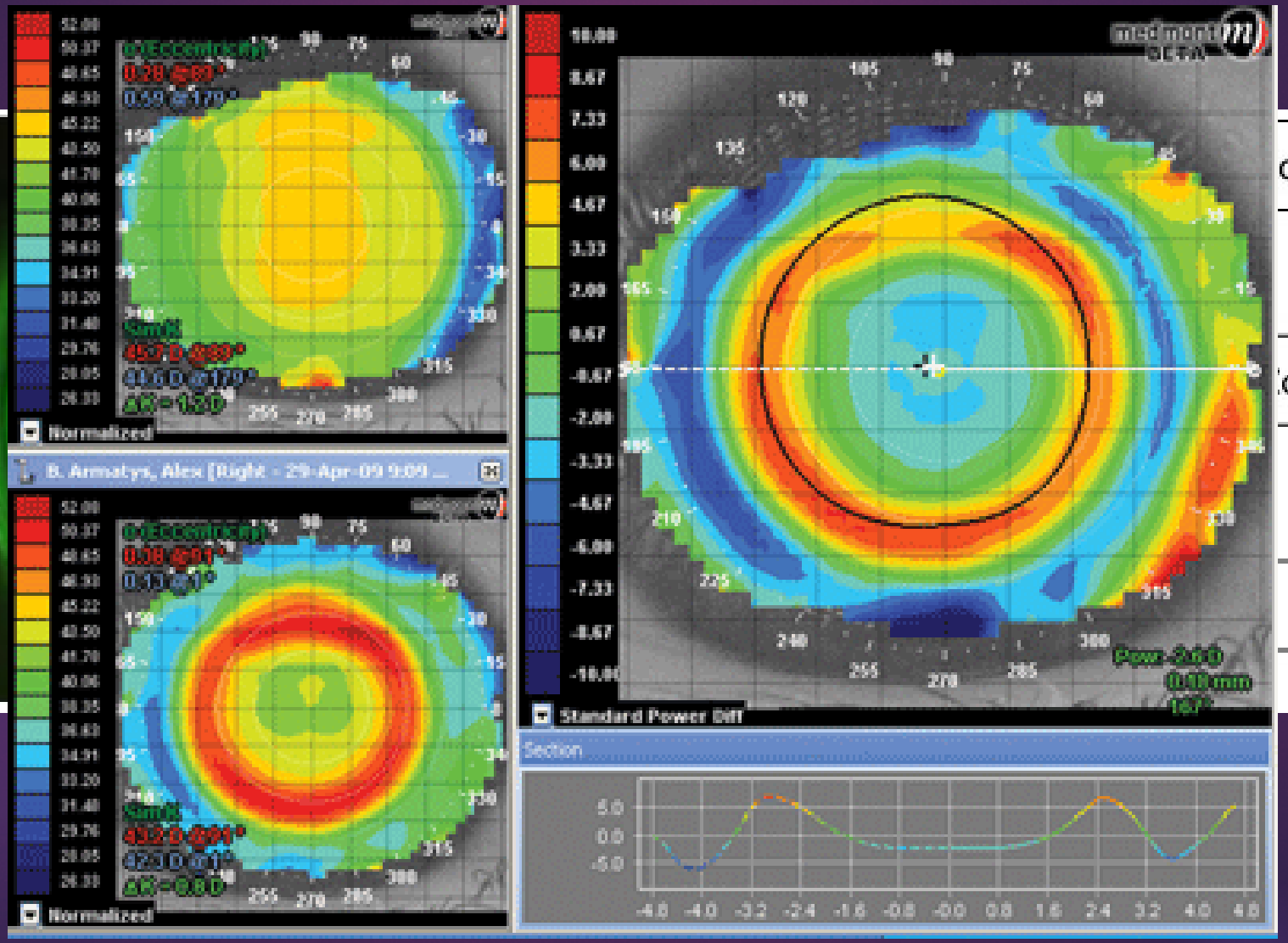
Importance: Slowing myopia progression could decrease the risk of sight-threatening complications.

Objective: To determine whether soft multifocal contact lenses slow myopia progression in children, and whether high add power (+2.50 D) slows myopia progression more than medium (+1.50 D) add power lenses.

Design, setting, and participants: A double-masked randomized clinical trial that took place at 2 optometry schools located in Columbus, Ohio, and Houston, Texas. A total of 294 consecutive eligible

- Center Distance Design ONLY – highest add child will tolerate (usually +2.50 D)
- Daily, Monthly and Quarterly Disposable options available
- Many more prescription options available including torics

Orthokeratology



Orthokeratology

- Ortho-k has been shown to reduce myopia progression by slowing axial length elongation by slightly less than 50%.

Review > Eye Contact Lens. 2016 Jan;42(1):3-8. doi: 10.1097/ICL.0000000000000207.

Myopia Control: A Review

Jeffrey J

Affiliatic

PMID: 2

Abstr

Slowing
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iovs investigative ophthalmology & visual science an ARVO journal

ISSUES TOPICS FOR AUTHORS ABOUT

June 2012
Volume 53, Issue
ISSUE

Jump To...
Introduction
Materials and Metho
Results

Randomized Controlled Trial > Ophthalmology. 2015 Mar;122(3):620-30.
doi: 10.1016/j.ophtha.2014.09.028. Epub 2014 Nov 6.

Myopia control during orthokeratology lens wear in children using a novel study design

Helen A Swarbrick [1], Ahmed Alharbi [2], Kathleen Watt [3], Edward Lum [3], Pauline Kang [3]

Affiliations + expand

PMID: 25439432 DOI: 10.1016/j.ophtha.2014.09.028

Abstract

Purpose: To investigate the effect of overnight orthokeratology (OK) contact lens wear on axial length growth in East Asian children with progressive myopia.

Design: A prospective, randomized, contralateral-eye crossover study conducted over a 1-year period.

Participants: We enrolled 26 myopic children (age range, 10.8-17.0 years) of East Asian ethnicity.

Methods: Subjects were fitted with overnight OK in 1 eye, chosen at random, and conventional rigid gas-permeable (GP) lenses for daytime wear in the contralateral eye. Lenses were worn for 6 months. After a 2-week recovery period without lens wear, lens-eye combinations were reversed and lens wear was continued for a further 6 months, followed by another 2-week recovery period without lens wear. Axial eye length was monitored at baseline and every 3 months using an IOLMaster biometer. Corneal

Atropine

Randomized Controlled Trial > JAMA. 2023 Feb 14;329(6):472-481.
doi: 10.1001/jama.2022.24162.

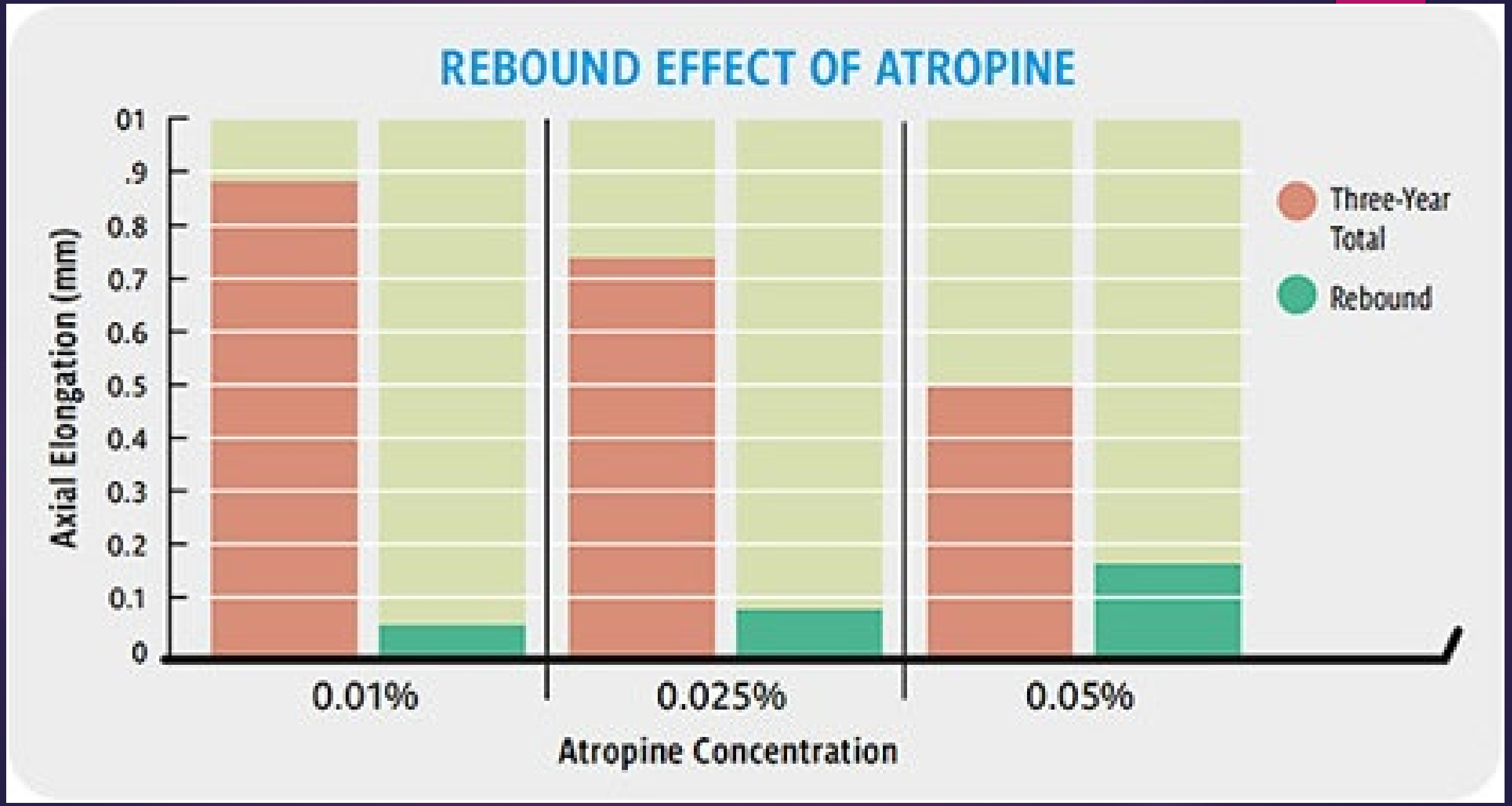
Effect of Low-Concentration Atropine Eyedrops vs Placebo on Myopia Incidence in Children: The LAMP2 Randomized Clinical Trial

Jason C Yam [1 2 3 4 5 6], Xiu Juan Zhang [1 6], Yuzhou Zhang [1], Benjamin H K Yip [7], Fangyao Tang [1], Emily S Wong [1 2 5], Christine H T Bui [1], Ka Wai Kam [1 3], Mandy P H Ng [1], Simon T Ko [1 5], Wilson W K Yip [1 3], Alvin L Young [1 3], Clement C Tham [1 2 3 4 5 6], Li Jia Chen [1 3 4 6], Chi Pui Pang [1 4 6]

Affiliations + expand

PMID: 36786791 PMCID: PMC9929709 DOI: 10.1001/jama.2022.24162

- Non-selective anti-muscarinic agent
- UNKNOWN mechanism of action in myopia control
- Must be specially compounded
  - 0.01%, 0.025%, **0.05%**
- Typically dosed 1 drop qhs OU


REBOUND EFFECT OF ATROPINE
Axial Elongation (mm)
01
.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Three-Year Total
Rebound
0.01%
0.025%
0.05%
Atropine Concentration

Conclusions…

- For every year older children are when they discontinue, the rebound effect is expected to be 0.05mm less eye growth.
- This indicates that children should maintain treatment for as long as possible to minimize the potential for the rebound effect after discontinuation.
- However, this does not provide any evidence that reducing the concentration of the drop prior to discontinuation will reduce the rebound effect.

Contact Lens Spectrum | PentaVision (clspectrum.com)

Atropine: Where do I get it?

- Low dose NOT commercially available
- Establish a relationship with a local compounding pharmacy
- Refer to online compounding pharmacy
- Should be no more than $50-$80 for 1 month supply

Online Pharmacies

- OSRXpharmaceuticals.com
- ImprimisRx.com

TABLE 1. VARIABILITY IN COMPOUNDED ATROPINE DROPS[21]

From a recent survey of 26 suppliers on product characteristics.

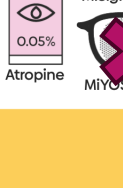
BOTTLE SIZE	
<3mL	12%
3ml TO 3.5mL	23%
5ml	35%
10ml	23%
15ml	8%
REFRIGERATION RECOMMENDED	
YES	38%
NO	62%
BEYOND-USE DATE (DAYS)	
≤14	15%
28 OR 30	12%
45	12%
60 OR 70	15%
90	19%
180	27%
COST PER 10mL	
$45 TO $75	19%
$76 TO $100	42%
$101 TO $150	19%
$151 TO $229	19%

What Are My Options?

These categories are based on total treatment effects compared across multiple studies.

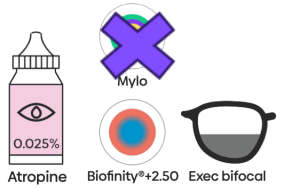
The best treatment for your child will depend on their eyes, suitability and other individual factors.

Be aware that your myopia control option may involve off-label use.



Best

Slow myopia progression by at least half



Next-best

Slow myopia progression by about a third

Less effective

Minimal effects on slowing myopia progression

Not effective

No effect on slowing myopia progression

Full-time wear matters for maximum treatment. Children using atropine eye drops still need spectacles or contact lenses to see clearly.

MyKidsVision

Scan to learn more

Can I fit this child with an effective spectacle or contact lens treatment?

YES

Are you considering a combination treatment?

Current evidence only supports orthokeratology

NO

0.05%

0.025%

0.01%

Is the child tolerating 0.05% well?

YES

NO

Lens type					 CD MFCL +2.50 Add
Study duration	**2 years** Retrospective	**2 years** Prospective, randomized controlled trial	**1 year** Prospective, randomized controlled trial	**2 years** Retrospective	**2 weeks** Prospective, historical control
Atropine concentration	**0.025% and 0.125%** *Presumably diluted, not described*	**0.01%** *Diluted from BAK-preserved 1% atropine*	**0.01%** *Preservative free, single use*	**0.01%** *Diluted from 0.05% with sodium hyaluronate drops with BAK preservative*	**0.01%** *Compounded, with BAK preservative*
Study location	Taiwan	Japan	Hong Kong China	China	USA
Participant details	Age 7-17 years 1.50 to 7.50D myopia AOK n=84, OK n=95	Age 8-12 years 1.00 to 6.00D myopia AOK n=38, OK n=35	Age 6-11 years 1.00 to 4.00D myopia AOK n=29, OK n=30	Age under 12 0.75 to 5.75D myopia AOK n=37, OK n=36	no significant additive effect of combining 0.01% atropine with a centre distance soft multifocal contact lens (SMCL) with a +2.50 Add
Outcomes	**0.025% effective** 0.18mm less axial elongation in all myopes **0.125% not effective** 0.03/0.07mm less axial elongation in low (up to 6D) and high (6D+) myopes respectively	**0.01% effective** 0.18mm less axial elongation in low (1-3D) myopes, and no effect in 3-6D myopes. Stronger combined effect found in first 12 months only	**0.01% effective** 0.09mm less axial elongation in all myopes Stronger combined effect found in first six months only	**0.01% not effective** 0.06mm less but not statistically significant. All had progressed 0.3mm or more in first year of OK monotherapy treatment, being termed 'poor responders'	
For whom was it most effective?	The effect of age was not investigated, and both low and high myopes had the similar benefit from 0.025%.	**Myopes 1-3D.** No influence of age on effect. Lower baseline myopia was correlated with faster progression in OK group only.	No influence of age or baseline refraction on effect. Larger pupils had better myopia control in the AOK group, but not OK group.	No influence of baseline age or refraction on effect. Higher baseline myopia was correlated with faster progression in both groups.	No data available yet
Did it change pupil size, accommodation amplitude or acuity?	Photopic pupil size increased by around 2.5mm 0.025% and 3mm in 0.125%. Accommodation amplitude reduced by **11-12D** in both groups. Distance and near acuity was reportedly not affected.	Pupil size and accommodation not measured. Distance and near unaided acuity not different between groups.	Photopic pupil size increased around 0.3mm and 1D reduction in accommodative amplitude. Distance acuity was unaffected.	Not reported.	No change to pupil size or accommodative lag. High contrast distance and near acuity not affected; low contrast distance acuity reduced by 3-4 letters (0.07 logMAR).
Reference	*Wan et al 2018*	*Kinoshita et al 2020*	*Tan et al 2020*	*Chen et al 2020*	*Huang et al 2019*

Combination atropine treatments: when more is more | Myopia Profile

Bottomline…

Combining atropine 0.01% with orthokeratology appears to increase myopia control efficacy with minimal side effects on pupil size or acuity.

Even though 0.01% atropine doesn't have much impact as a monotherapy, at least in current formulations, it appears to provide benefit in a combination treatment with orthokeratology.

The greatest effect seems to be achieved within the first 6-12 months.

Always Recommend….

Outdoor Time

- The current recommendation is at least 2 hours per day but the more time outdoors the better to delay/prevent the onset.
  - This decreased the risk of myopia even if the child performs significant near work and has 2 myopic parents
- Children who spend less than 13 hours/week outdoors had significantly higher odds of incident myopia.
- Once a child becomes myopic, outdoor has NOT been linked to SLOWING myopia progression.

Rose KA, Morgan IG, Ip J, et al. Outdoor activity reduces the prevalence of myopia in children. Ophthalmology. 2008;115(8):1279-85.

Outdoor Time: How does it work?

The leading hypothesis is that outdoor light stimulates the release of dopamine in the retina, which retards axial elongation

SCREEN TIME FOR KIDS:
new recommendations

The longtime "no screen time before 2" rule is out. Here are the latest recommendations from the American Academy of Pediatrics.

18 months or younger

No screens are still best.

The exception is live video chat with family and friends.

18 months to 2 years

Limit screen time and avoid solo use.

Choose high-quality educational programming, and watch with kids to ensure understanding.

2 to 5 years

Limit screen time to an hour a day.

Parents should watch as well to ensure understanding and application to their world.

6 or older

Place consistent limits on the time spent and types of media.

Don't let screen time affect sleep, exercise or other behaviors.

Lifestyle: Sleep

- There is an increased risk of myopia in children who sleep less than 5 to 7 hours per night compared to those who sleep more than 9 hours per night.
- Children who have a bedtime of 9:30pm or later were much more likely to be myopic at baseline, develop myopia during the two-year trial, and have more significant myopic progression.

Ostrin LA, Read SA, Vincent SJ, Collins MJ. Sleep in Myopic and Non-Myopic Children. Transl Vis Sci Technol. 2020 Aug 12;9(9):22. doi: 10.1167/tvst.9.9.22. PMID: 32879778; PMCID: PMC7442863.


Let’s take a look into the future…

Could there be a shortcut to outdoor time?

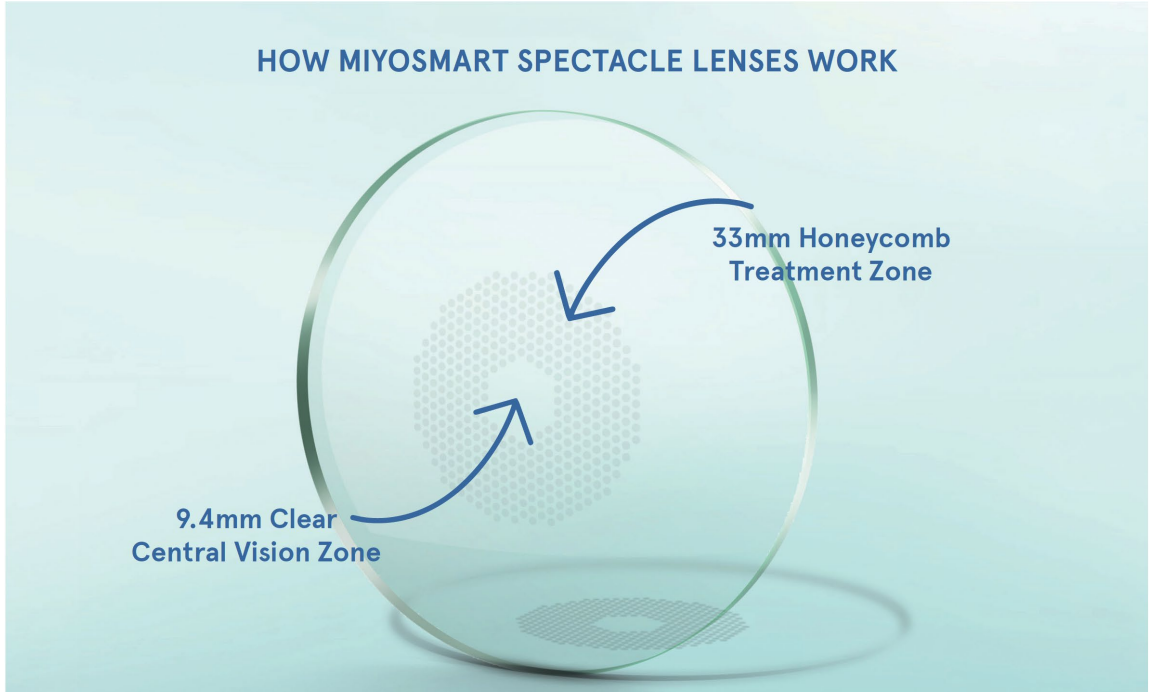
RLRL Therapy: What is it?

- Visible light with a wavelength of 600-700nm
- Stimulates production of dopamine
- Two 3-minute sessions separated by at least 4 hours
- MAY reduce myopia progression and axial elongation without significant AEs
- BOTTOMLINE: Long-term, more rigorous studies needed.

Myopia Management Spectacles – Are they available??

NO!

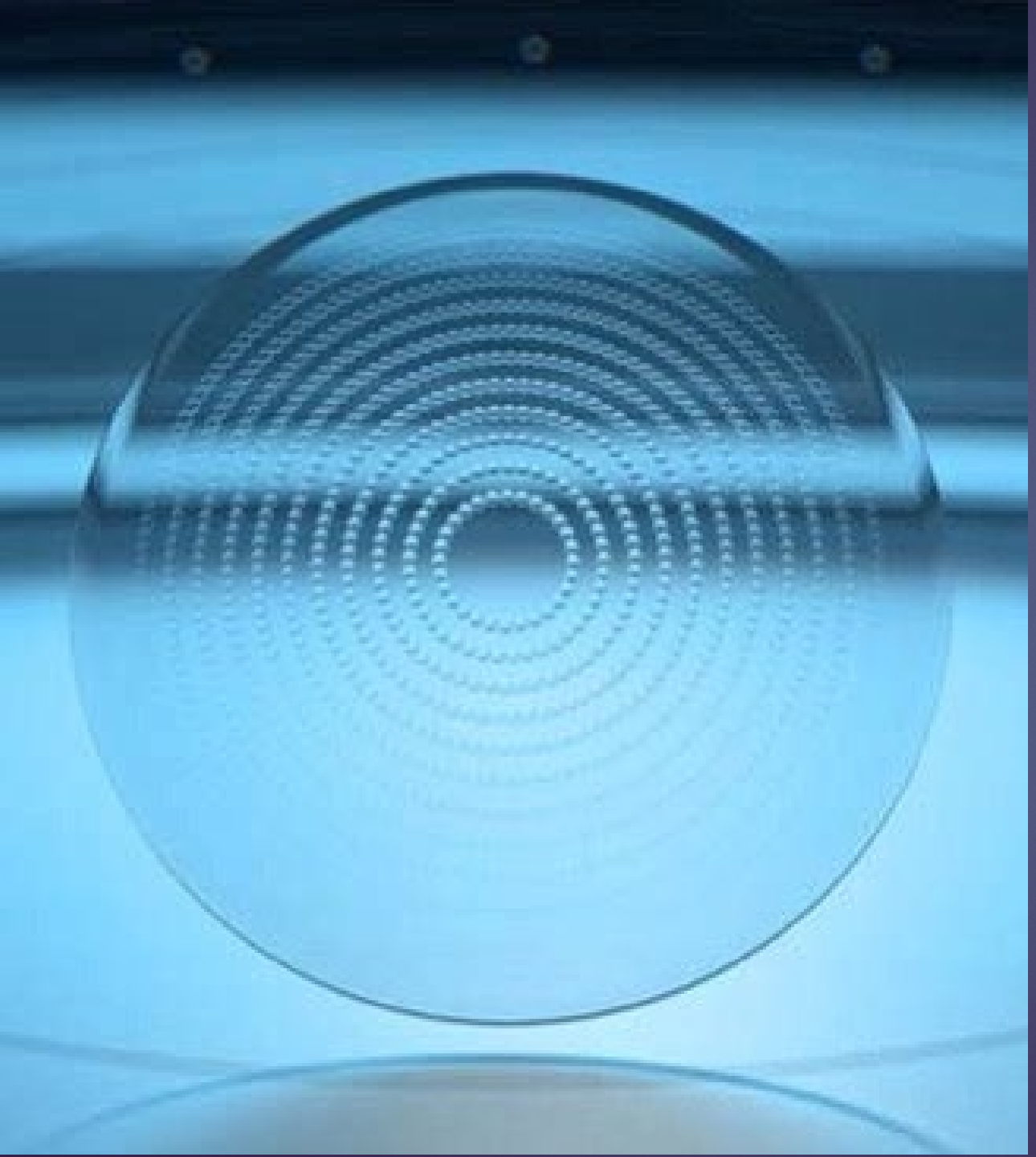
MiyoSmart (HOYA)



- Defocus Incorporated Multiple Segments (D.I.M.S.)
- Considered a dual focus design
- Consists of a central optical zone for distance correction with approximately 400 plus powered (+3.50) lenslets equally distributed in a honeycomb pattern throughout the midperipheral zone
- Now also available in photochromics.

MiyoSmart (HOYA)

- The two-year data:
  - On average, a 59% reduction in myopia progression and a 60% reduction in axial elongation when compared to single vision lenses
- The 6-year data:
  - Maintenance of the myopia control effect throughout the duration of the study
  - Suggests no significant rebound effect after cessation of treatment



Stellest (Essilor)

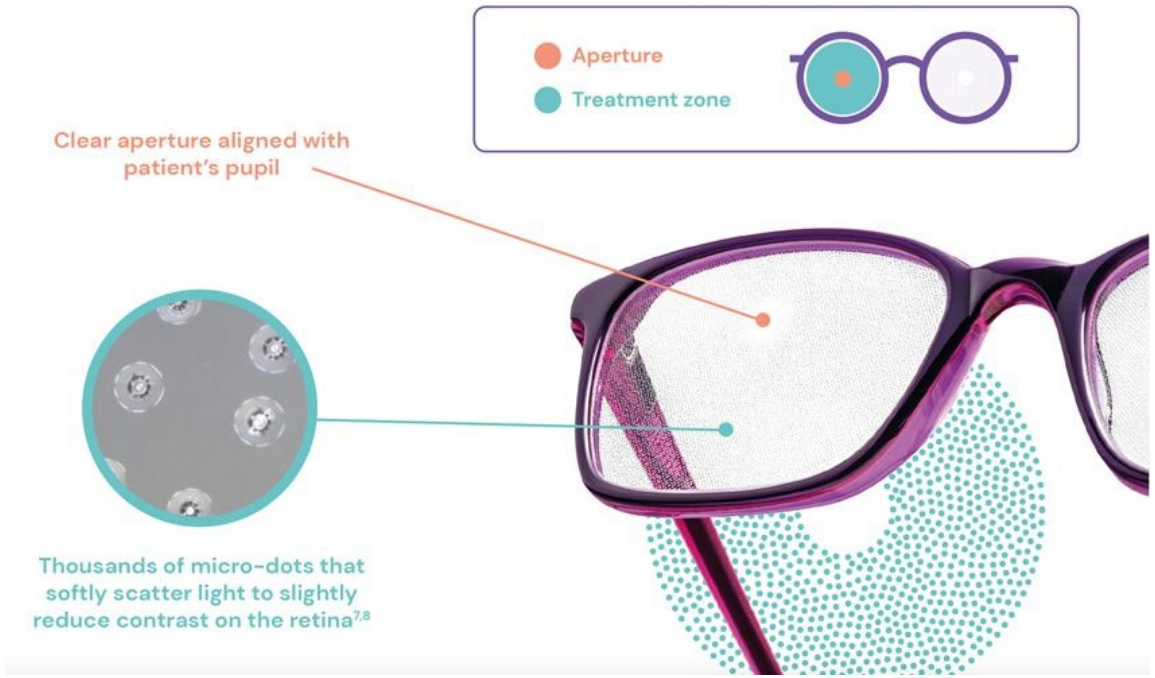
- Highly Aspherical Lenslet Target (HALT) technology
- Consists of a single vision optical zone surrounded by 1021 aspherical lenslets arranged in 11 strategically placed rings
- Lenslets are of varying powers creating a volume of myopic defocus

Stellest (Essilor)

- The two-year clinical trial data showed a reduction in myopia progression and axial elongation by approximately 67% and 60%, respectively when compared to single vision.

SightGlass (CooperVision)

- Diffusion Optics Technology (DOT)
- Based on the theory that high levels of contrast on the retina especially when created from computers and digital devices overstimulates the retina and causes axial elongation
- Low level contrast more similar to natural environments slows elongation
- Consists of a clear central aperture surrounded by thousands of light scattering microdots reducing peripheral retina contrast by at least 30% when compared to central contrast



SightGlass (CooperVision)

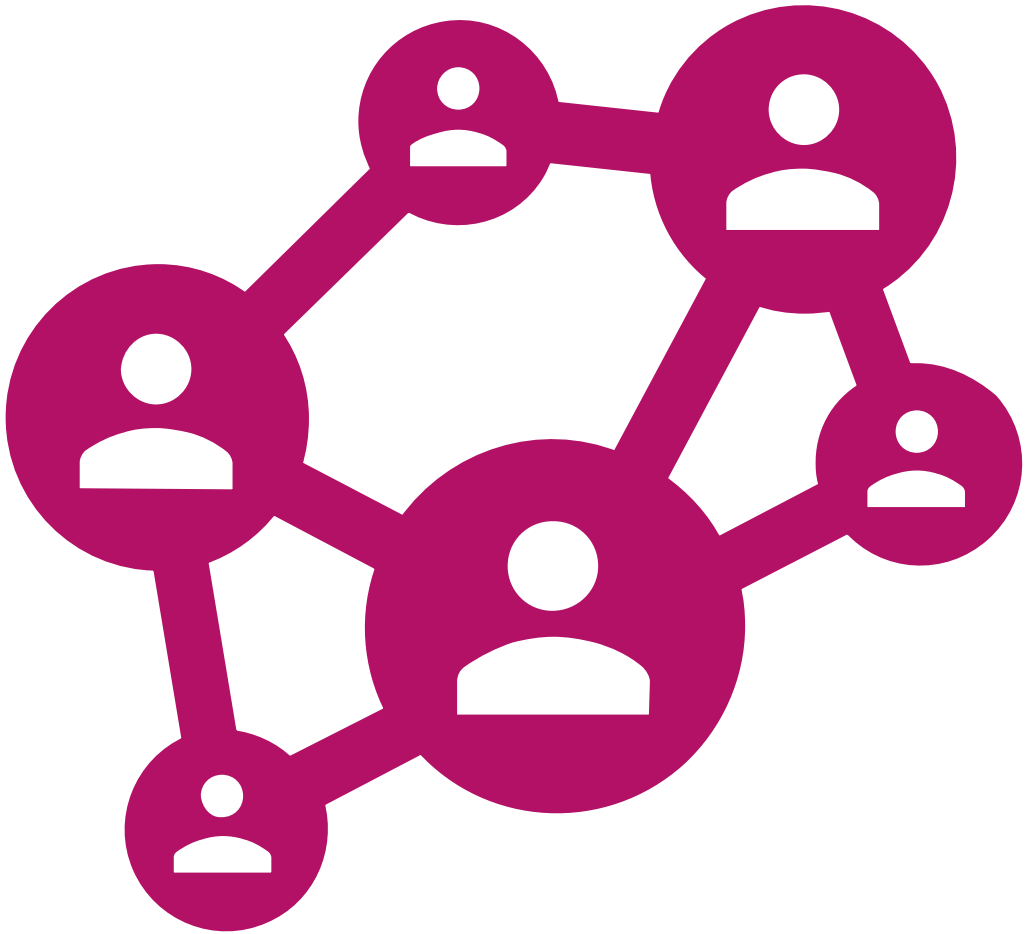
- Initial results of two test lenses with varying dot density:
  - 59% and 74% reduction in myopia progression and 33% and 50% reduction in axial elongation over a 2-year period when compared to single vision.


We're creating the Future

Clinical Pearls For Successful Implementation

Consumers value staff members who:

- Are knowledgeable in products and services.
- Engage with patients in an authentic way.
- Are in alignment with the message the doctor delivers.



A positive experience with staff drastically improves customer satisfaction!!

Team Myopia Management

- All team members need to be well versed in myopia management
  - Front Desk
  - Technicians
  - Optical

Everyone must understand: THE BASICS

- What IS myopia?
- Why myopia management is important?
- What are ALL the treatment options for myopia?
- What is the price of the myopia management program?
- Where can patients go to get more detailed information?

Definitely don't want these answers:

- I am not sure…
- Let me ask…
- Can I call you back?
- No, I don't think we offer that in our office.

What has worked for me…

- Attend CE events with doctor
- Center monthly/quarterly staff meetings around myopia and myopia management
- Provide written scripts or FAQs
- **Allow team members in exam room**
- Incentivize departments/entire team?

Myopia FAQs

What is myopia? Myopia is also known as nearsightedness. Patients who are nearsighted typically have trouble seeing at distance but see well at near.

What causes myopia? Myopia occurs when the eyeball is too long or when the cornea and/or intraocular lens is too curved for the length of the eyeball.

Is myopia genetic? Children who have parents that also have myopia are much more likely to become myopic. There are also environmental factors that cause myopia which include increased amount of near work and lack of outdoor time.

What are the implications of being myopic? Patients who are myopic are at a significantly higher risk of developing glaucoma, a retinal detachment, and a specific type of visually debilitating cataract. In addition, patients who are highly myopic are at risk of developing a potentially blinding condition called myopic macular degeneration.

What can be done to PREVENT myopia? Several studies have shown that children who spend more time outdoors are less likely to become myopic.

What can be done to CONTROL myopia? In our office, we offer several different contact lens options that have been proven to slow down myopia.

MiSight 1 day – This is the first and only contact lens that is FDA approved to reduce myopia progression. The clinical study of MiSight 1 day soft contact lenses was the first to demonstrate sustained reduction in myopia progression with a soft contact lens over a three-year period. The study found the lens reduced myopia progression by 59% when compared to a single vision 1 day lens.

Soft Bifocal Contact Lenses – Soft bifocal contact lenses are typically used in adults over 40 years of age to read clearly as well as see far away. This process also bends light in a way that is beneficial to the eye and has been shown to reduce myopia progression in children by an average of 50%.

Corneal Reshaping Contact Lenses – These lenses are worn overnight and removed in the morning. They temporarily change the shape of the cornea so the wearer can see clearly during waking hours without the use of daytime contact lenses or glasses. This process been shown to reduce myopia progression by an average of 50%.

Hybrid Bifocal Contact Lenses – These lenses are reserved for patients who not only have myopia but also have a significant amount of astigmatism that cannot be corrected in other contact lens designs. These lenses are equally as effective as most other contact lens options.

Which option should I choose for my child? This depends on several different factors. Soft lenses (including MiSight 1 day and soft bifocal lenses) tend to have less initial adaptation time and are ideal for patients who may not be able to adapt to a rigid lens design. Most pediatric prescriptions can be accommodated with either of these options. Hybrid lenses are ideal for patients who have higher myopic and astigmatic prescriptions. Overnight contact lenses provide freedom from daytime contact lens wear and allow for the parents of younger children to have complete involvement in their child's contact lens experience. These lenses are ideal for athletes and for any patient who desire great vision without the use of typical day time correction.

What is the ideal age for starting myopia control? The best time to start myopia control is at the onset of myopia which is typically between the age of 8 and 16. However, it is never too late to implement myopia control. Keep in mind that the earlier the intervention, the less myopic the child will become and the less likely he/she will be at risk for glaucoma, retinal detachment, cataracts, and myopic macular degeneration.

Is my child ready for contact lenses? Studies have confirmed that children as young as 8 can safely and comfortably wear contact lenses. However, we will carefully evaluate and discuss with you whether your child is ready for contact lenses. We have many children who are younger than 8 years old who have been successful in soft, hybrid and overnight contact lenses.

What are the risks of wearing contact lenses? We will teach each child how to properly wear and care for their contact lenses. As long as he/she practices proper hygiene during contact lens wear, the risks of infection is minimal. In addition, patients who wear overnight myopia control contact lenses are at no greater risk of infection than patients who wear daytime myopia control lenses.

How effective are the contact lenses at controlling myopia? All of the contact lens options are effective at controlling myopia. These lenses prevent progression of myopia by approximately 40 to 80%. Results vary from patient to patient and the success rate is unpredictable. However, preventing any amount of myopia is beneficial to the patient.

What if my child tries contact lenses, but cannot adapt to them? There are several "tricks" we can try to help your child be successful in any contact lens design. So, please let us know early in the fitting process so that we can help. If your child still has difficulty after we attempt to ease his/her struggle, we have a back-up plan! And the good news is that the back-up plan is at no additional cost to you.

If your child has difficulty with the overnight design, we will be happy to try the soft lens design. Most children that cannot adapt to the overnight lens have a much easier time adapting to the soft lens design.

If your child has difficulty with the soft lens design, we will design your child a pair of bifocal spectacles. Although spectacles are not as effective as contact lenses for myopia control, they are better than prescribing single vision spectacles.

Can my child just wear glasses to control their myopia? Single vision spectacles have been shown to have NO effect on controlling myopia. Bifocal spectacles have been shown to slightly control myopia, but not nearly as significantly as soft multifocal contact lenses or overnight contact lenses.

Is there a drop that can help control my child's myopia? Actually, there is! We prescribe a very low dose of atropine for myopia control. This drop is traditionally used to dilate our patients but many studies have shown that it has an anti-myopia effect on the retina.

Myopia Control Packages

Soft bifocals (monthly): $$$

Soft bifocals (daily): $$$

Hybrid Bifocals: $$$

Corneal Refractive Therapy: $$$

MiSight Program: $$$

All Myopia Control packages include the following: initial fitting and all follow-ups for the first 90 days, 1 year supply of contact lenses, and one 6 month follow-up. If

Educational opportunities

- Myopia Management Meetings
  - Global Specialty Lens Symposium (January)
  - THE Myopia Meeting (May/June)
  - Vision By Design (September)
  - Global Myopia Symposium (September)
  - International Myopia Conference (September)

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MANAGING MYOPIA: TOOLS FOR YOUR TEAM

MyopiaProfile

Knowledge Centre Courses Resources About Us Practice Sign in

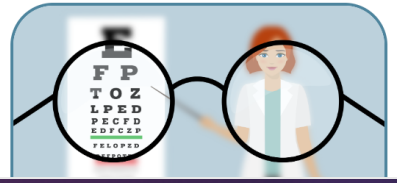
Courses

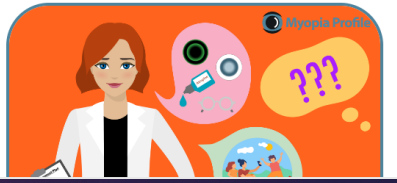
Our engaging, online, on-demand courses with continuing education accreditation are designed to improve your skills and confidence in childhood vision care and myopia management.

Explore our cutting-edge professional eye care courses developed with a strong focus on translating the latest research and knowledge into clinical practice. Delivering accelerated learning and professional development, our innovative curriculum spans fundamentals of childhood eye care practice as well as myopia-specific topics.

Myopia Profile Courses

Myopia Action





Other ideas:

Provide complimentary myopia management to team member's children or perhaps one close family member

Ortho-k for eligible staff regardless of age

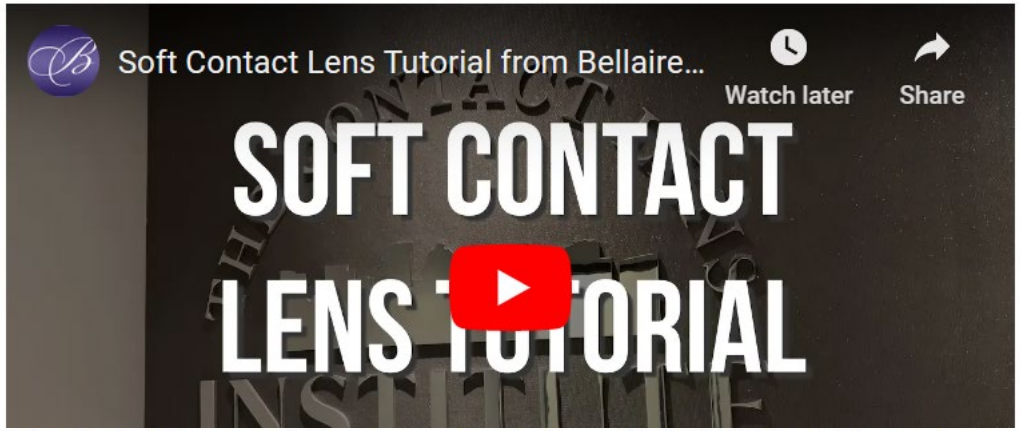
Technician Team

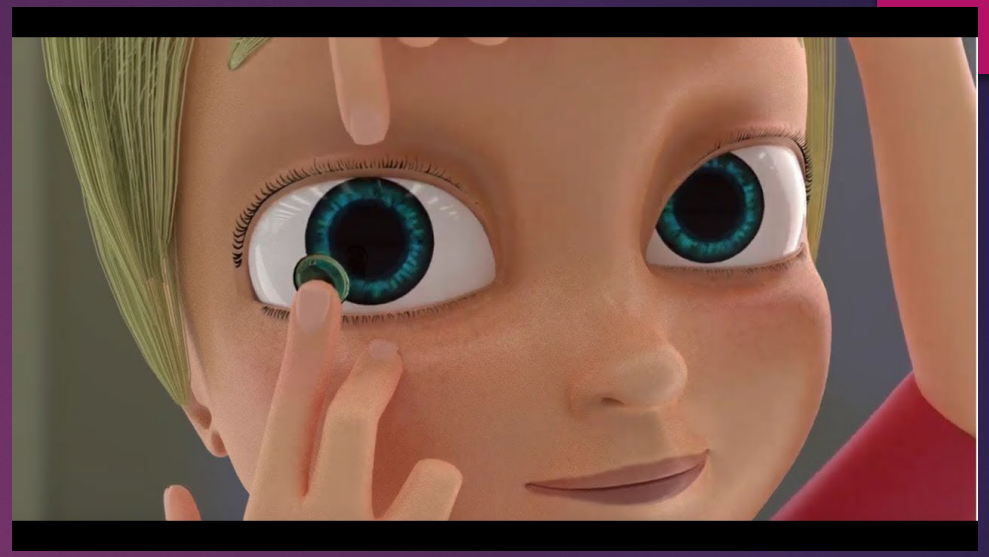
- Enthusiastic and comfortable with children
- Specific I & R training
  - SCLs
  - Ortho-k
- Teach how to put in atropine
- Technicians will need training in using new instrumentation and in the specifics of pediatric eye exams.

Insertion & Removal Tips for Kids

- Maximum of 30 minutes per session
- Plan on having more than one training
- Send home with resources/training videos
- Practice by putting eye drops in
- Make it fun!

Soft Contact Lens Tutorial





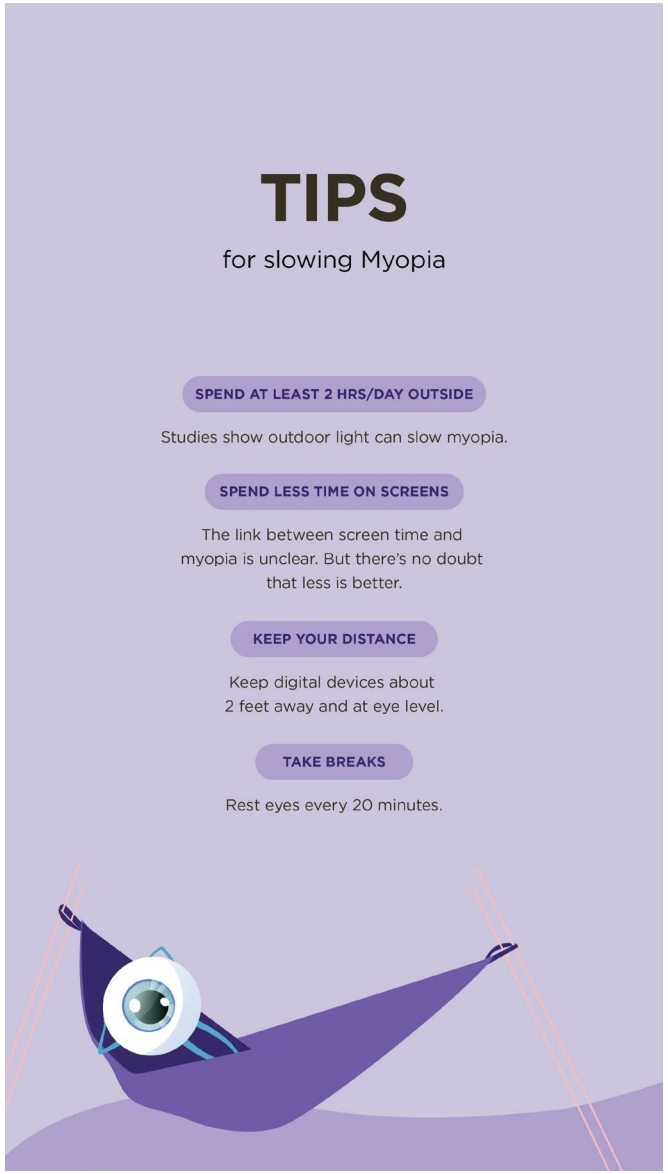
Rigid Gas Permeable (RGP) Contact

Myopia Management Advocate

- Liaison between doctor and patient - baton toss
- Answer phone calls/emails
- Marketing
- Discusses Fees

In house marketing ideas

- Posters on inside of exam room door
- Custom “On-Hold” messages
- Waiting room and exam room videos
- Myopia Management Wall of Fame



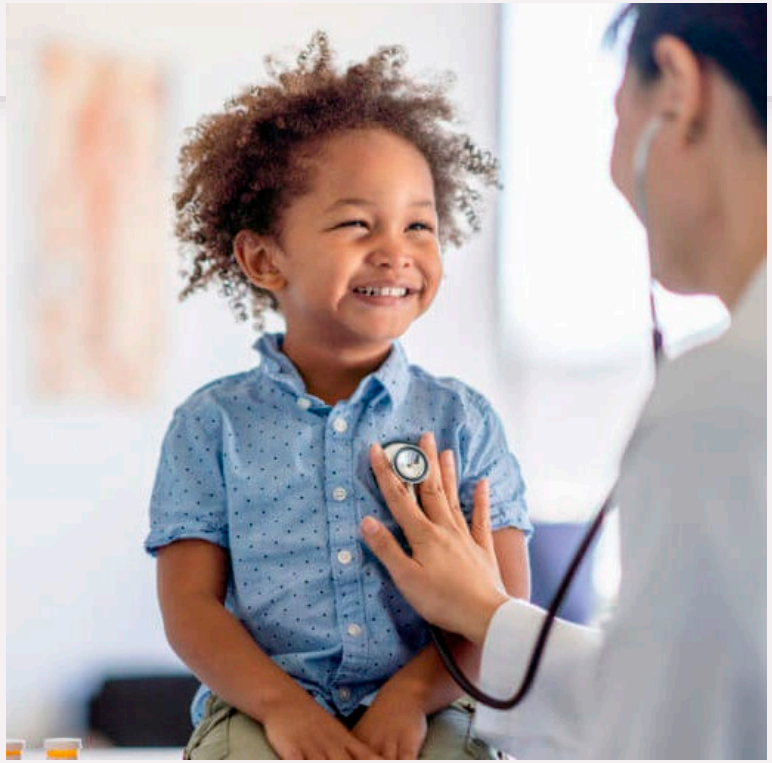

WALL OF FAME

External Marketing Ideas

- Newsletters
- Schools
- Sports clubs
- Pediatricians

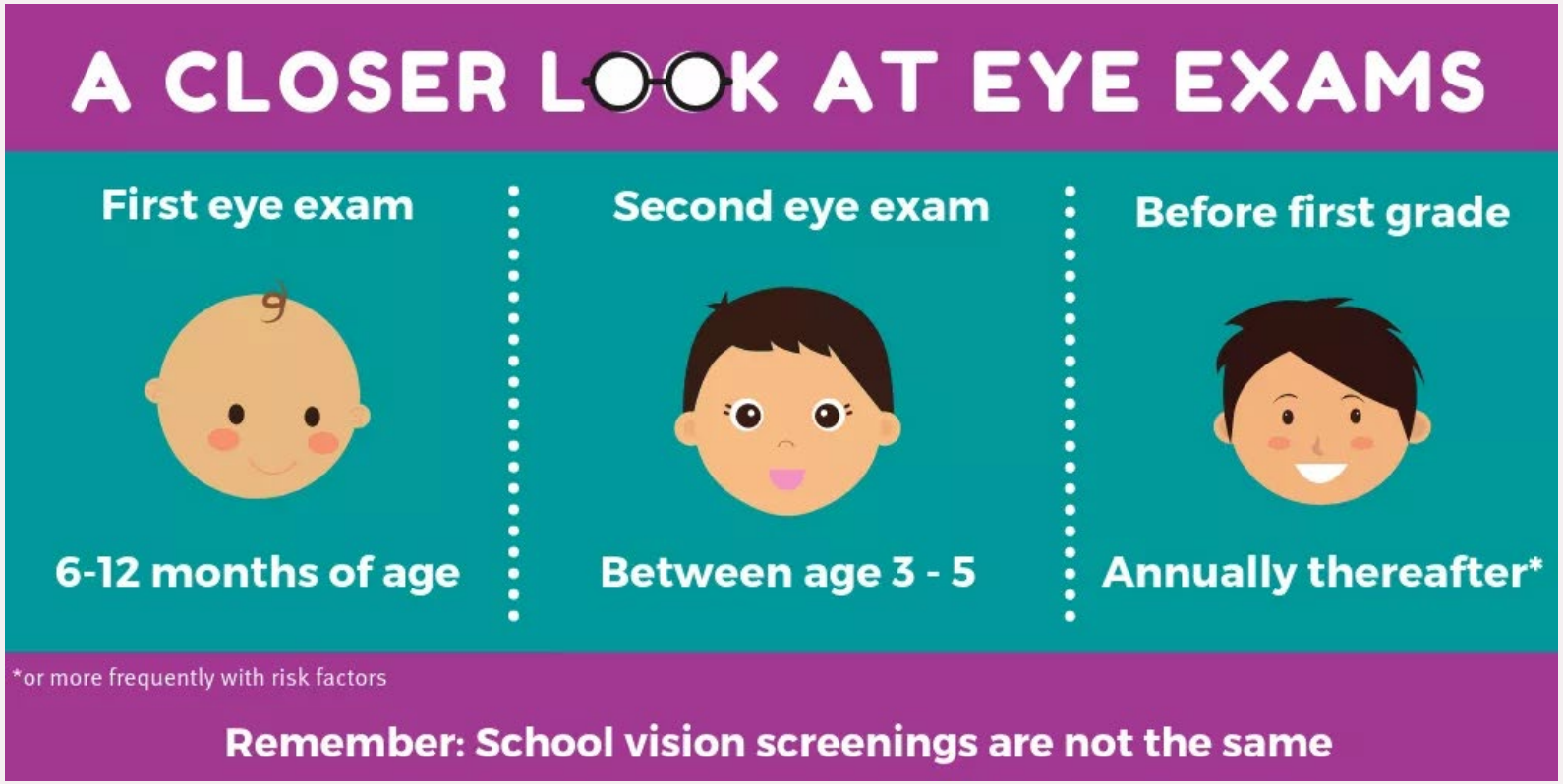
Pediatricians: Valuable Relationship

- Recommendation from Pediatrician to an Optometrist = VERY IMPACTFUL
- Shared interest for overall health (including eye health) for your mutual patients
- Consider sending a follow-up letter back to the Pediatrician after each annual visit




Your child might think
that this is normal vision.

Alignment in messaging

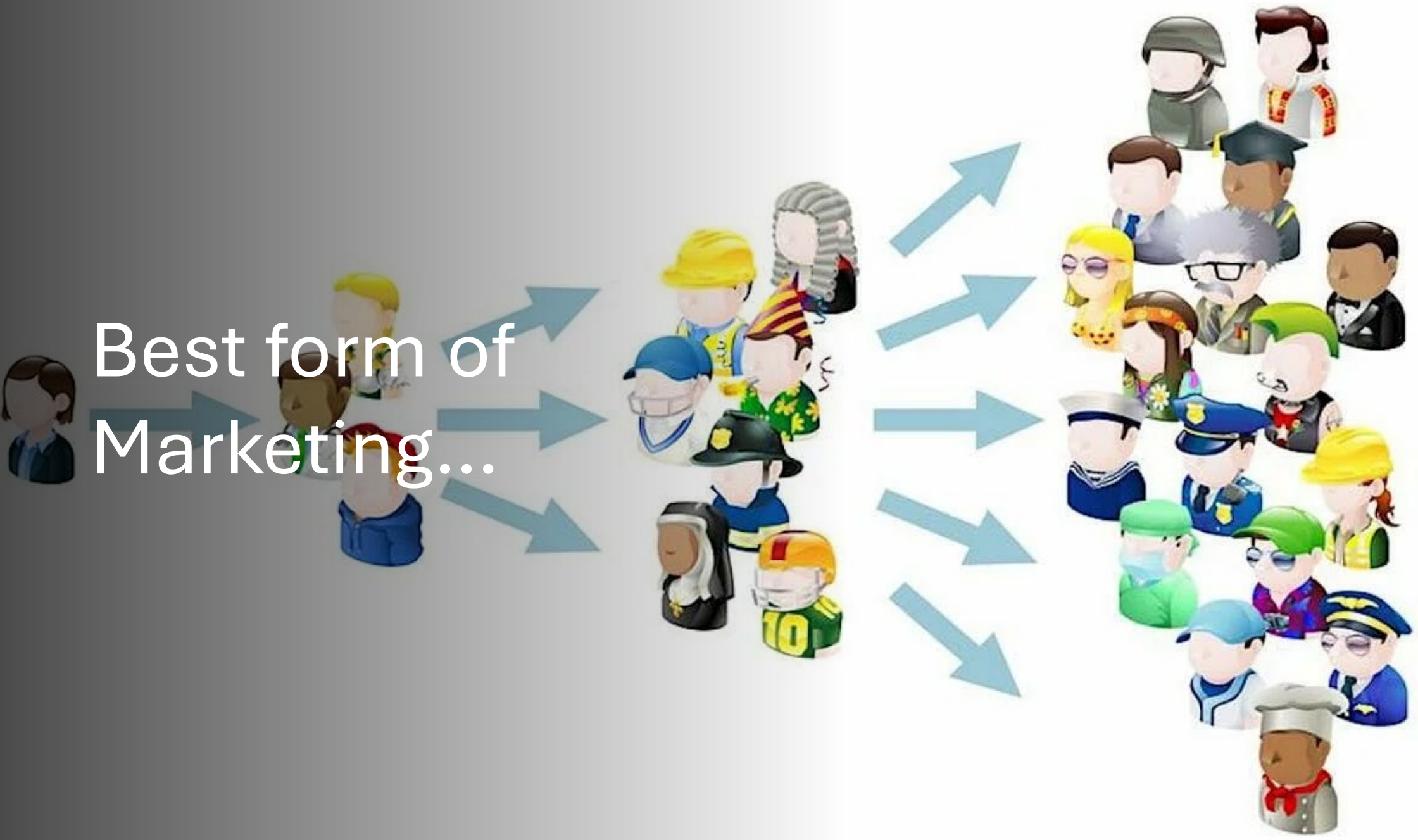


School Nurses

- Least informed of all health care providers but may be easiest relationship to forge
  - Offer to help with vision screenings
  - Provide seamless referral source for failed screenings
  - Offer to speak at PTO meetings, health fairs, etc

Social Media

Best form of Marketing...

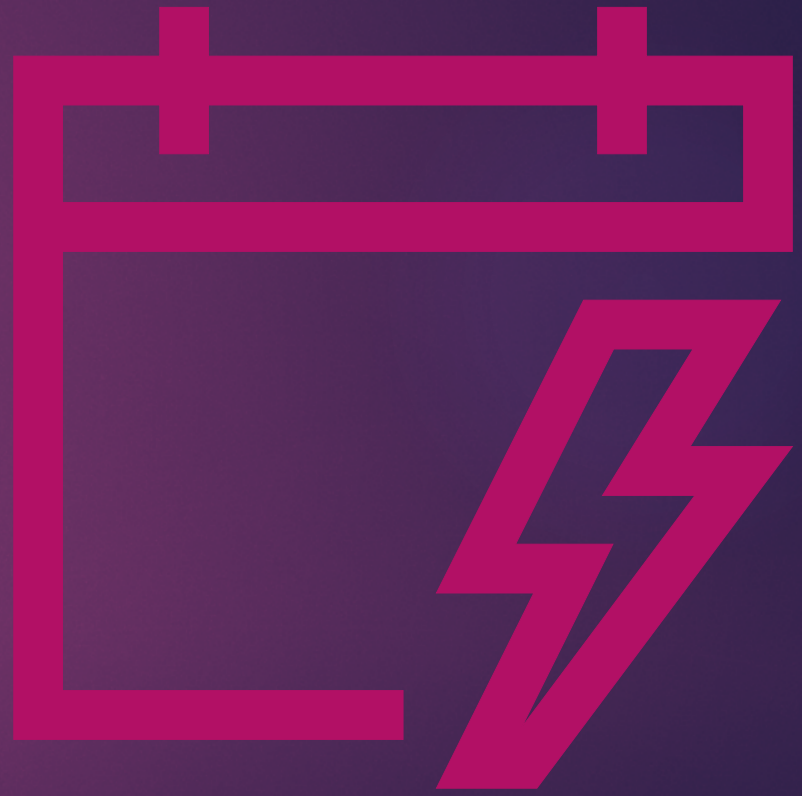



Bottomline: Everyone must
BELIEVE in what you are doing!

Establish a myopia management protocol: A strategy that promotes YOUR success

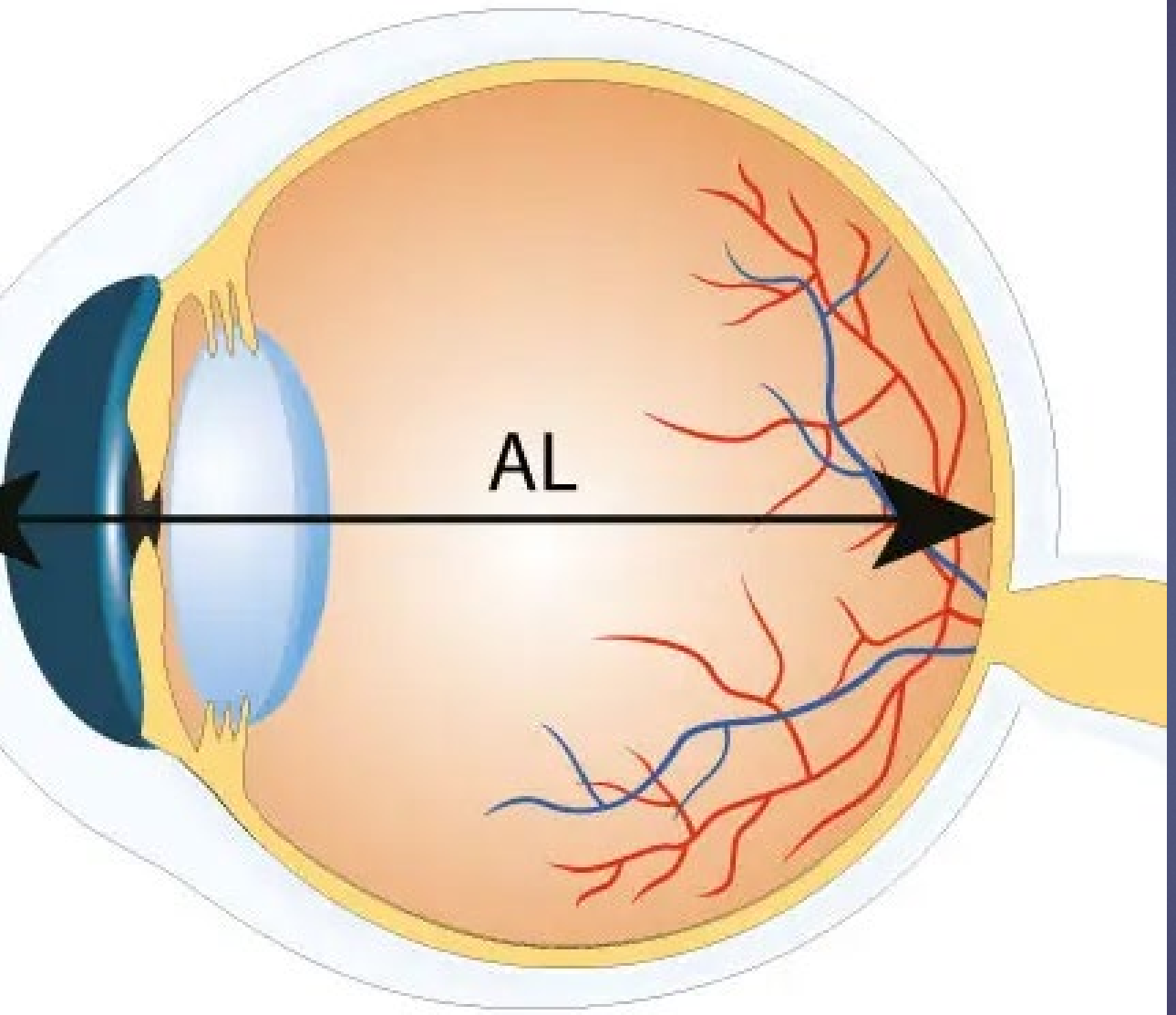
SCHEDULING

- How much time is required?
- Consultation vs. Comprehensive Eye Examination
- Follow-up schedule



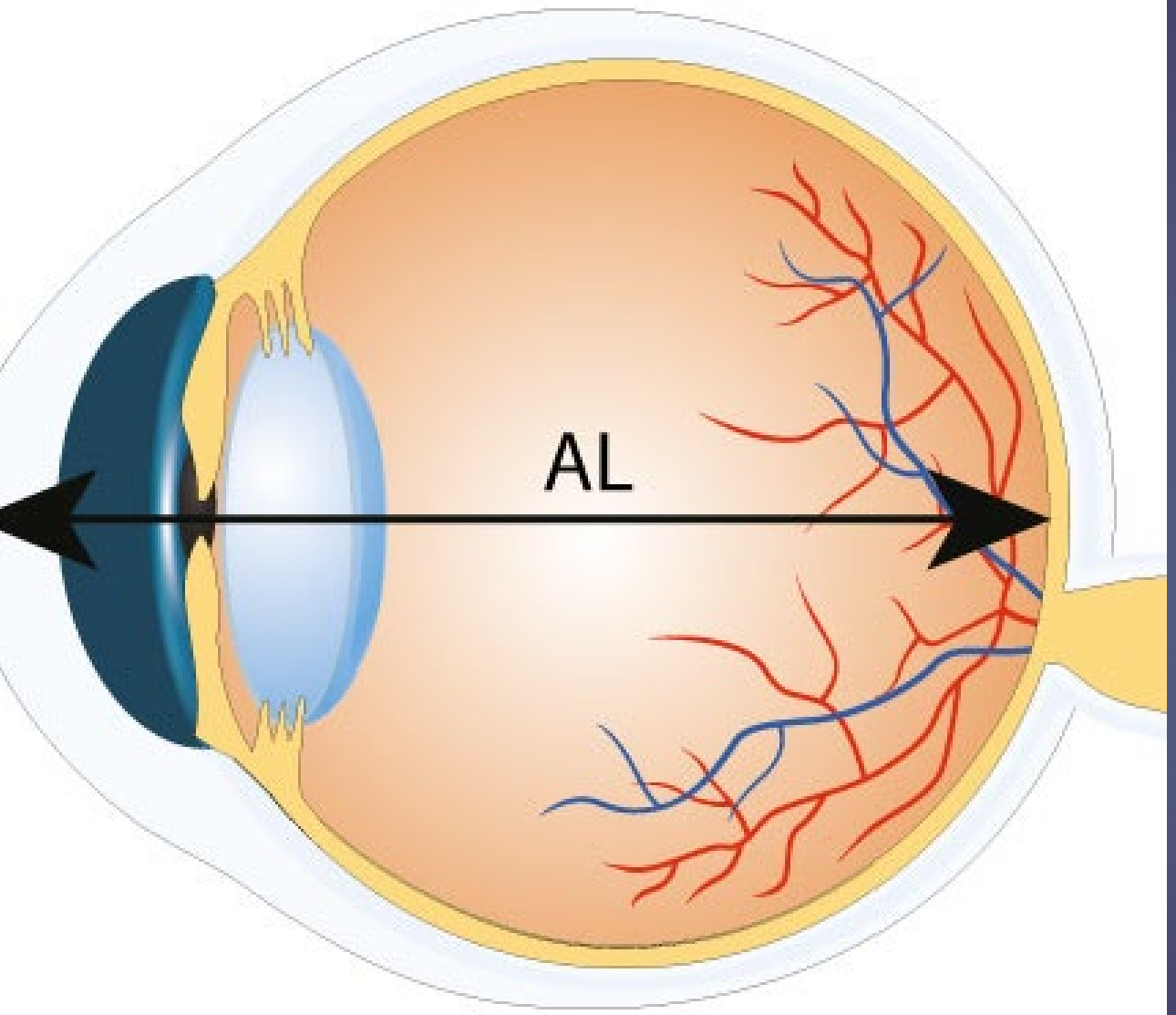
Clinical examination Protocol

- History
  - Onset of myopia
  - Contact lens history
  - Lifestyle
  - Family History
- Refraction/Retinoscopy: cycloplegic as indicated
- Binocular vision and accommodative tests
- Pupil assessment
- IOP
- Anterior and posterior eye health evaluation (DFE annually)
- Topography
- Axial length



Is it necessary to measure AL?

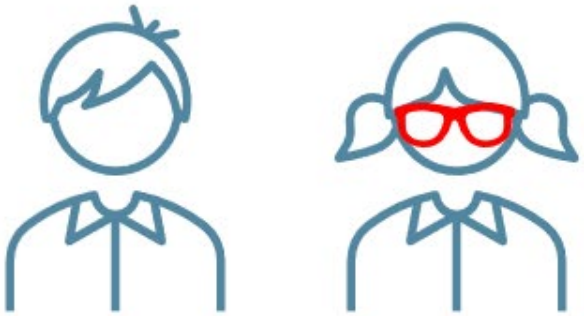
- NOT required to practice myopia management
- Provides a comprehensive look at myopia along with refractive error
- More parents are knowledgeable about it and are requesting it



Axial Length

- CLEERE Study
  - Axial length growth in children who remained emmetropic was steady from ages 6 through to the early teenage years, at approximately **0.1mm per year**
  - The fastest axial growth occurred in the year before myopia onset, where **future myopes grew by 0.33mm, with 0.20mm growth or more per year after the initial myopia onset**

7-10 years

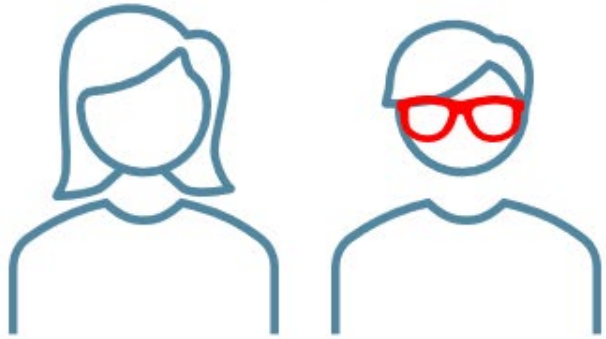


Emmetropes
0.1-0.2mm/year

Myopes
0.3mm+/year

Males around 0.5mm longer axial length than females, in both emmetropia and myopia

11-16 years



Emmetropes
0.1mm/year,
ceasing by teens

Myopes
0.2mm/year,
reducing in teens

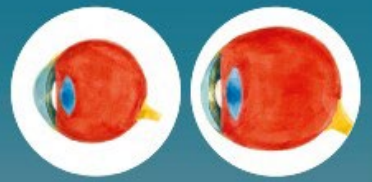
Average myopia stabilization at 16.3 years, 25mm for females and 25.5mm for males

MYOPIA MANAGEMENT:
Axial Length or Refractive Error?

1. DIAGNOSING MYOPIA

Refractive state is the balance of the optical and axial components, i.e., variation in axial length exists between eyes but is compensated by corneal and lens power. Thus, axial length alone is not a good diagnostic for myopia.

Presence of any myopia = eye length > intended eye length.



A B

Two emmetropic (+0.50) eyes. B has a longer axial length but flatter corneal curvature.

CAUTION: Failure to cycloplege for refractive error in young children may result in falsely identifying an eye as myopic and may result in unwarranted treatment.

The best way to **DIAGNOSE** myopia is with **refractive error**.

2. MONITORING PROGRESSION

Sensitive measures are required to assess progression. Subjective refraction is only ± 0.50D accurate. Axial length measurements are more sensitive with optical biometers delivering reliable accuracy (0.04mm or 0.12D).

An optical biometer

CAUTION: Axial length measurements can be influenced by diurnal and seasonal variations. Failure to consider these may lead to false conclusions about treatment efficacy and may result in unwarranted variation in treatment.

The best way to **MONITOR** progression is to measure **axial length**.

3. MYOPIA MANAGEMENT

Every young myope can be helped with some degree of myopia management.

BHVI

ACKNOWLEDGEMENTS:
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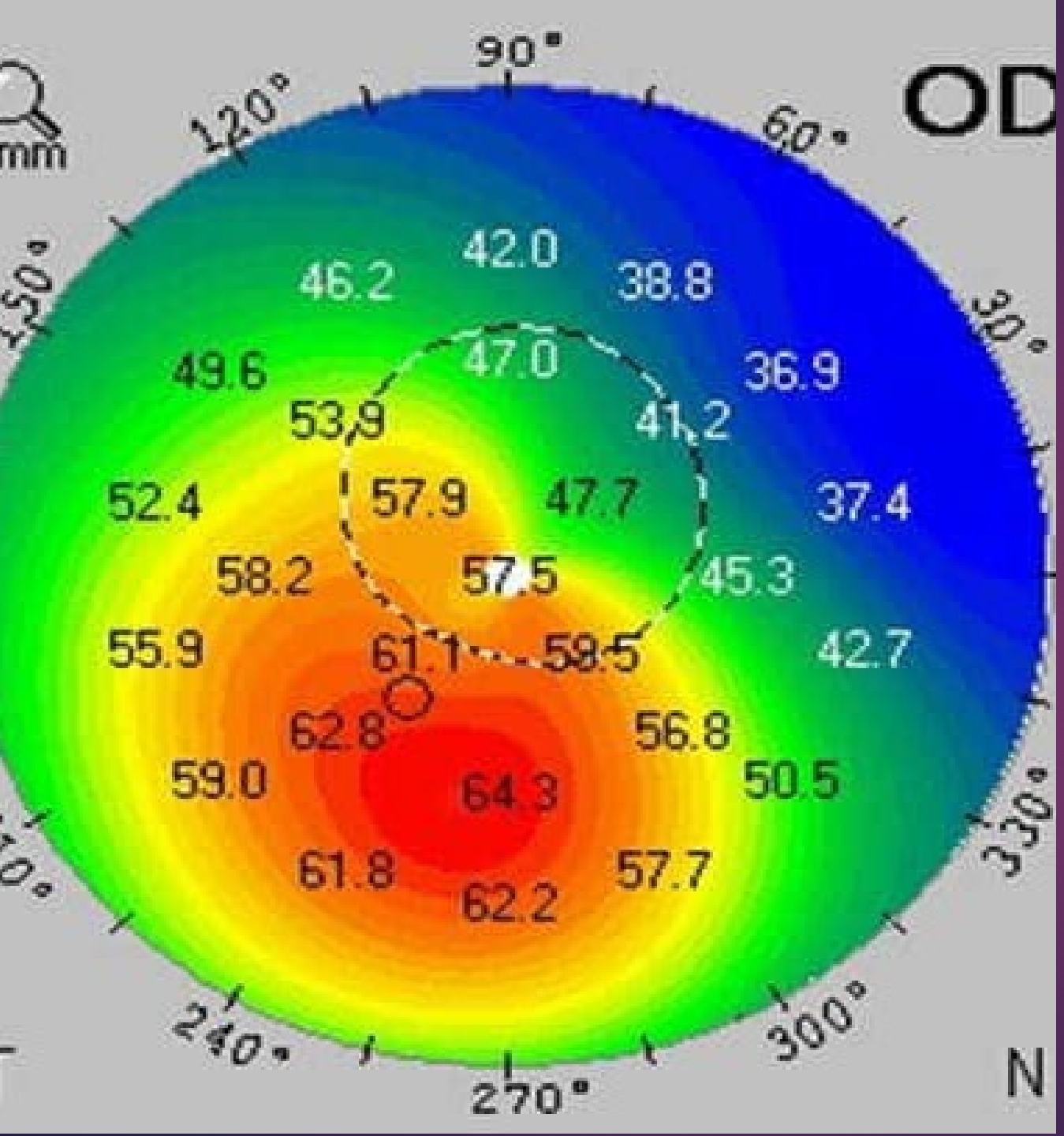
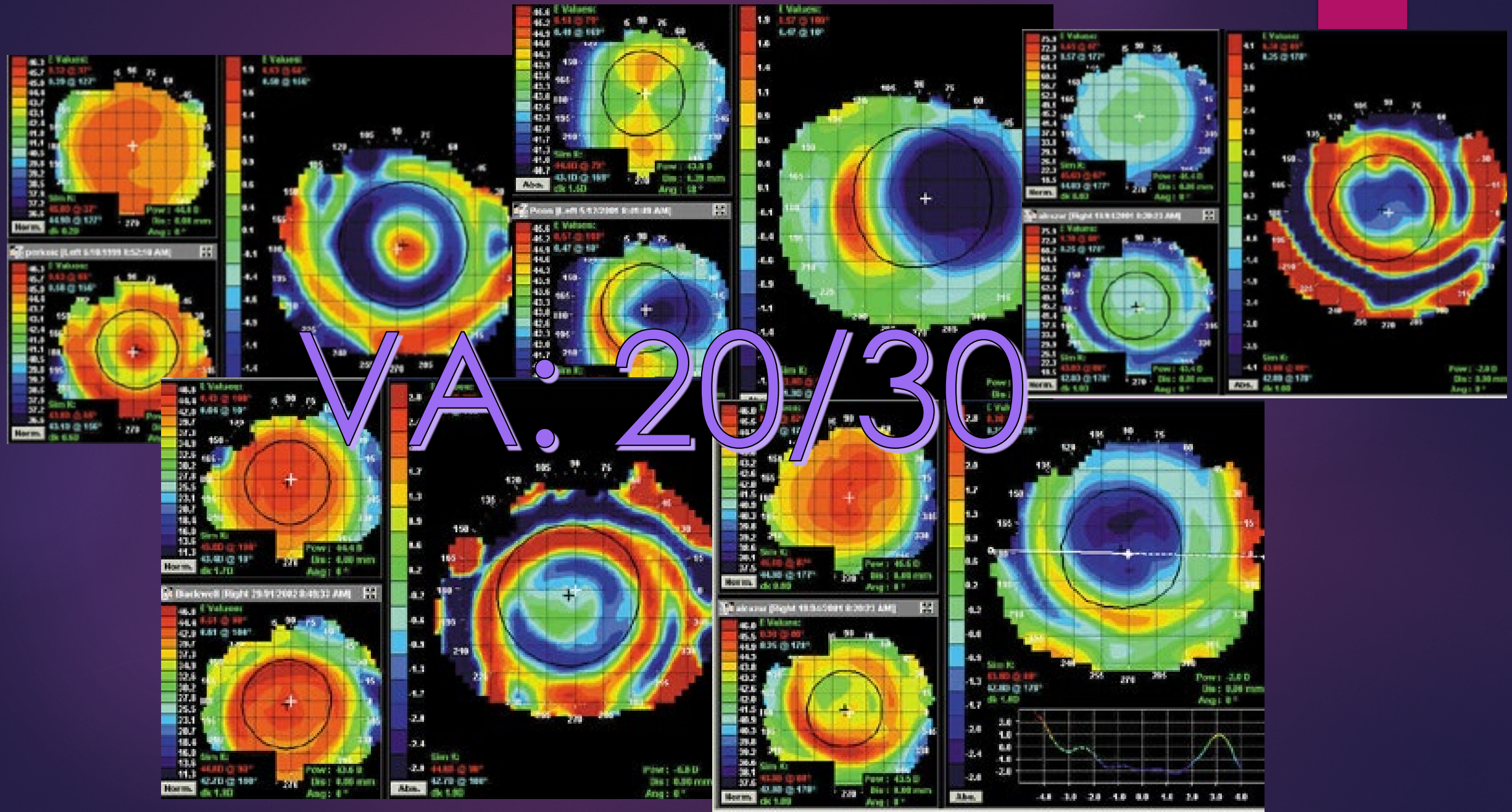


Topography: Is it necessary?

- Yes!
- May not need to order orthokeratology lenses but is considered the standard of care to manage and troubleshoot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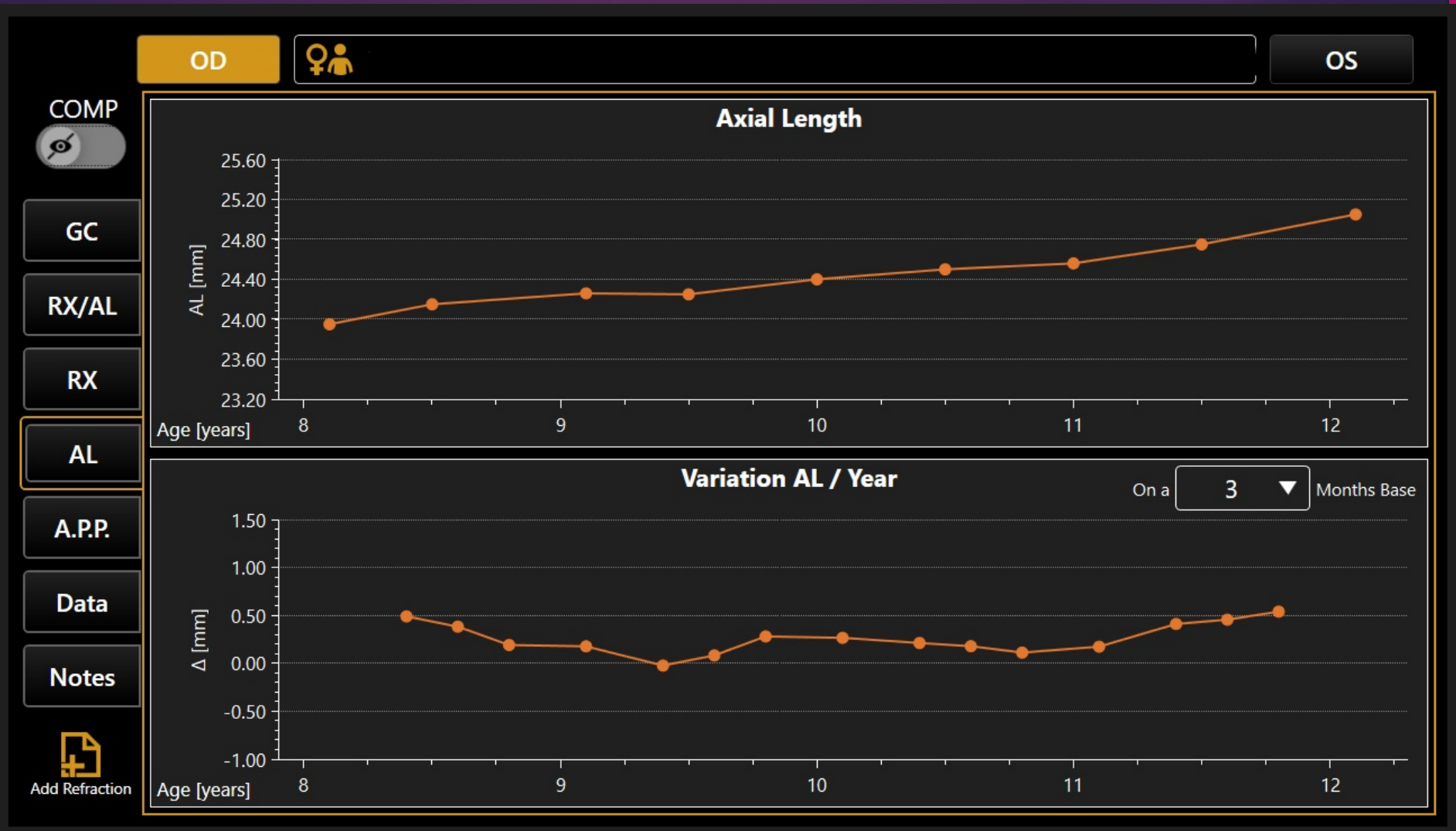
On that note…

- To get the most BANG for your BUCK:
  - Consider a combination piece of equipment!
  - Saves time, space, and MONEY.


OD
OS
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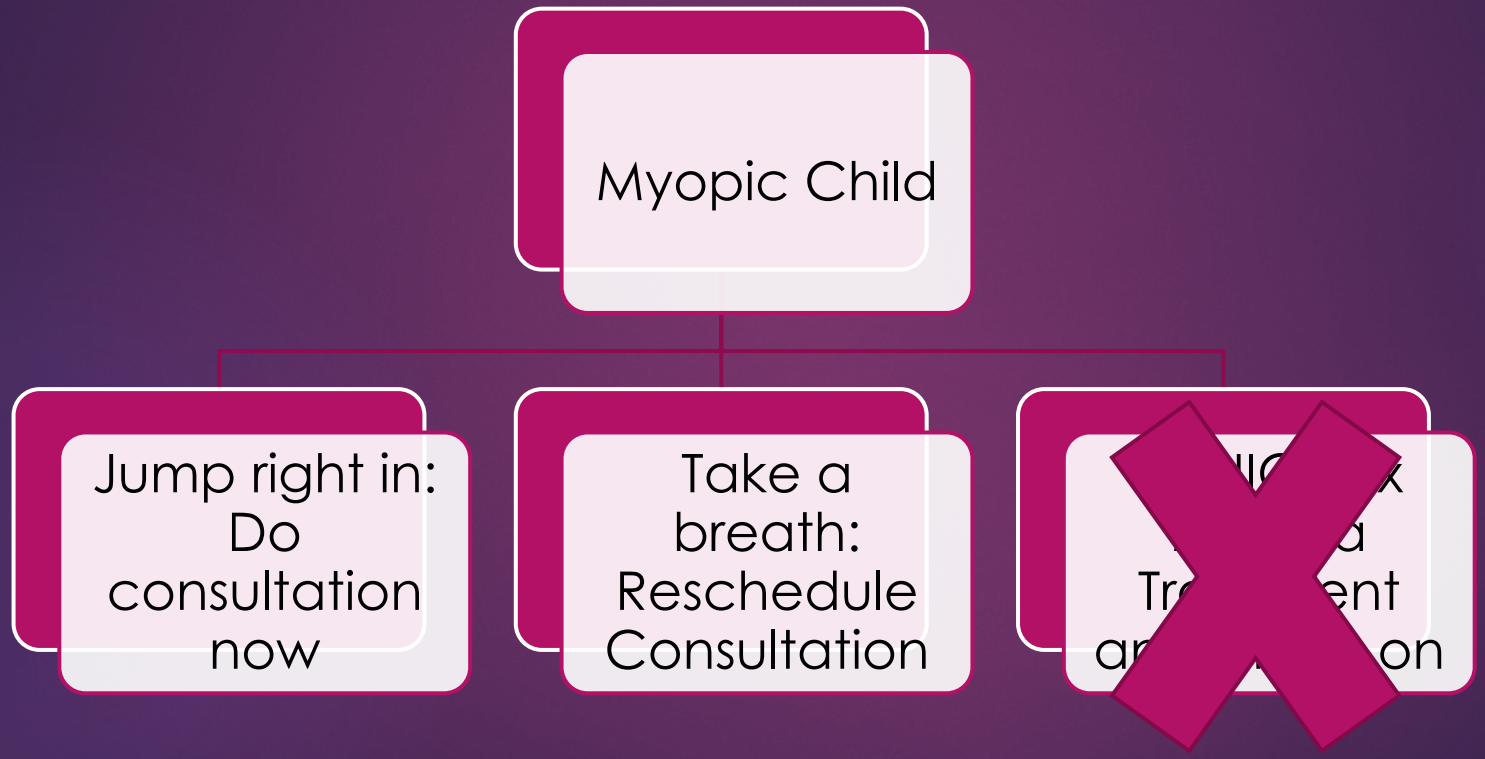
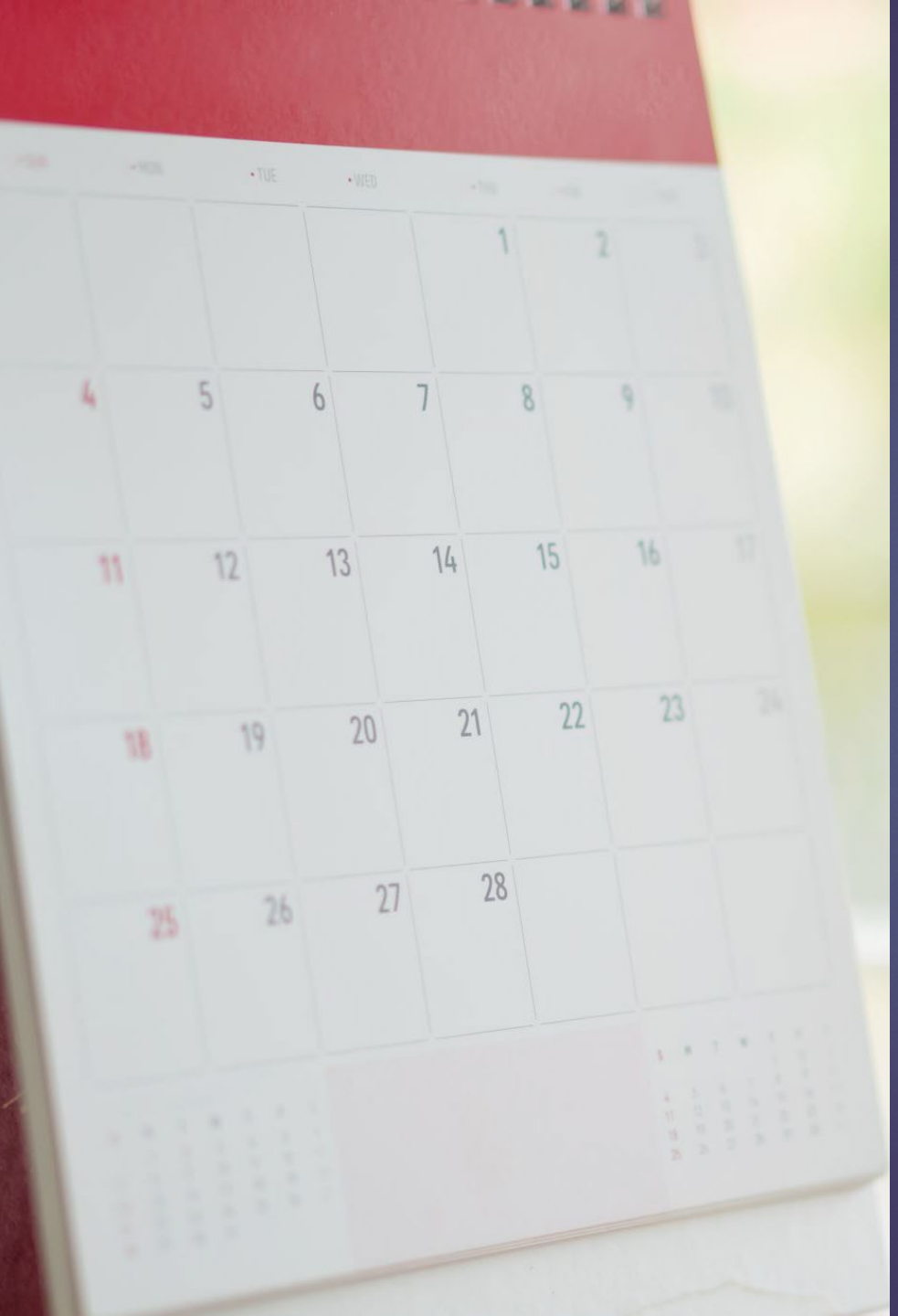
RX/AL
RX
AL
A.P.P.
Data
Notes
Add Refraction
Axial Length
AL [mm]
25.60
25.20
24.80
24.40
24.00
23.60
23.20
Age [years]
8
9
10
11
12
Variation AL / Year
On a
3
Months Base
Δ [mm]
1.50
1.00
0.50
0.00
-0.50
-1.00
Age [years]
8
9
10
11
12

Decision Time…





Advantages of Same-Day Consultation

Captures the parent(s) while in office

Could save time in the future

Works best when the doctor knows ahead of time that this is a potential myopia management patient.

May need to baton toss to a trained staff member.

If all goes well…

- Relayed the importance of myopia management to the child's family
- Discussed management options and decided on a specific strategy
- Scheduled follow-up visit or contact lens fitting

Disadvantages of Same-Day Consultation

- May have to repeat exact same conversation to other parent
- May feel rushed
- Potentially get behind on schedule

Value of a scheduled CONSULTATION Visit

- Allows time for:
  - Reasons for management vs. treatment
  - Detailed discussion of all options
- Go over financial and clinical expectations
  - Can be done by the doctor, designated staff member or both
- Myopia management contract
- Speak directly to the child (if present)
- CANNOT be rushed
- Charge vs. NO charge
- Could be done virtually if needed

Be upfront about expected and potential outcomes

- Discuss what will likely happen with NO myopia management
- Discuss expectation of **50%** reduction
- Be sure to discuss chance of NO reduction at all
- Be clear that myopia management must be consistent to get desired results

No matter what…

Make a recommendation.
Do NOT leave it up to the parent
or, even worse, the child!

Suggested Follow-up Schedule

Contact Lenses

- 1 day (ortho-k only)
- 1 week
- 1 month (ortho-k only)
- 6 months
- 12 months (CEE)

Atropine

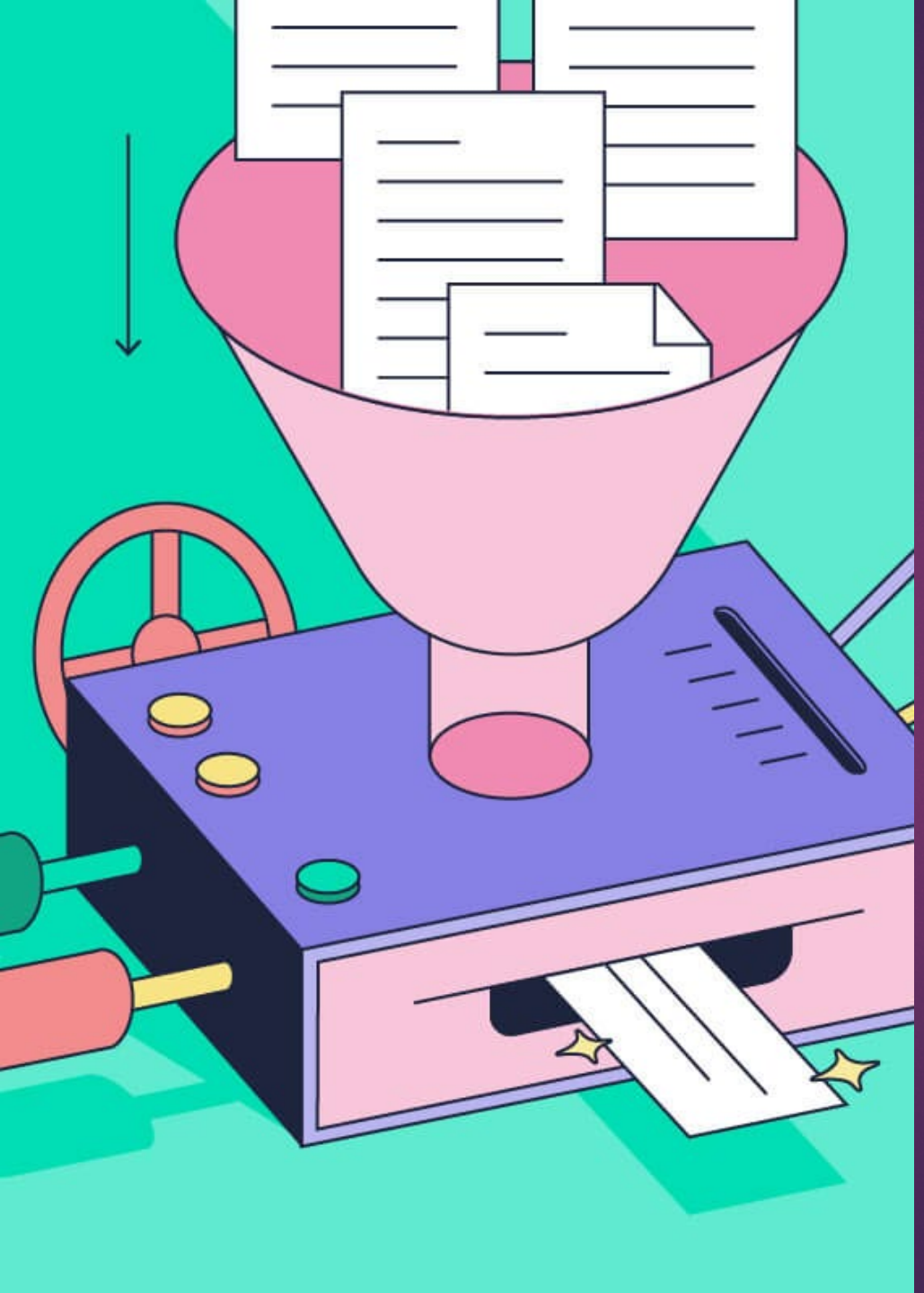
- 1 month
- 6 months
- 12 months (CEE)

On average, how much of a conversation do you think a person retains?

17-25%

Myopia Management Contract/ Agreement

- Outlines all topics covered in consultation
  - Fees
  - Follow-up Schedule
- Addresses that only one myopia management option is FDA approved
- Lens warranty
- Should also address:
  - Refund Policy
  - Drop-out Policy



Written Materials

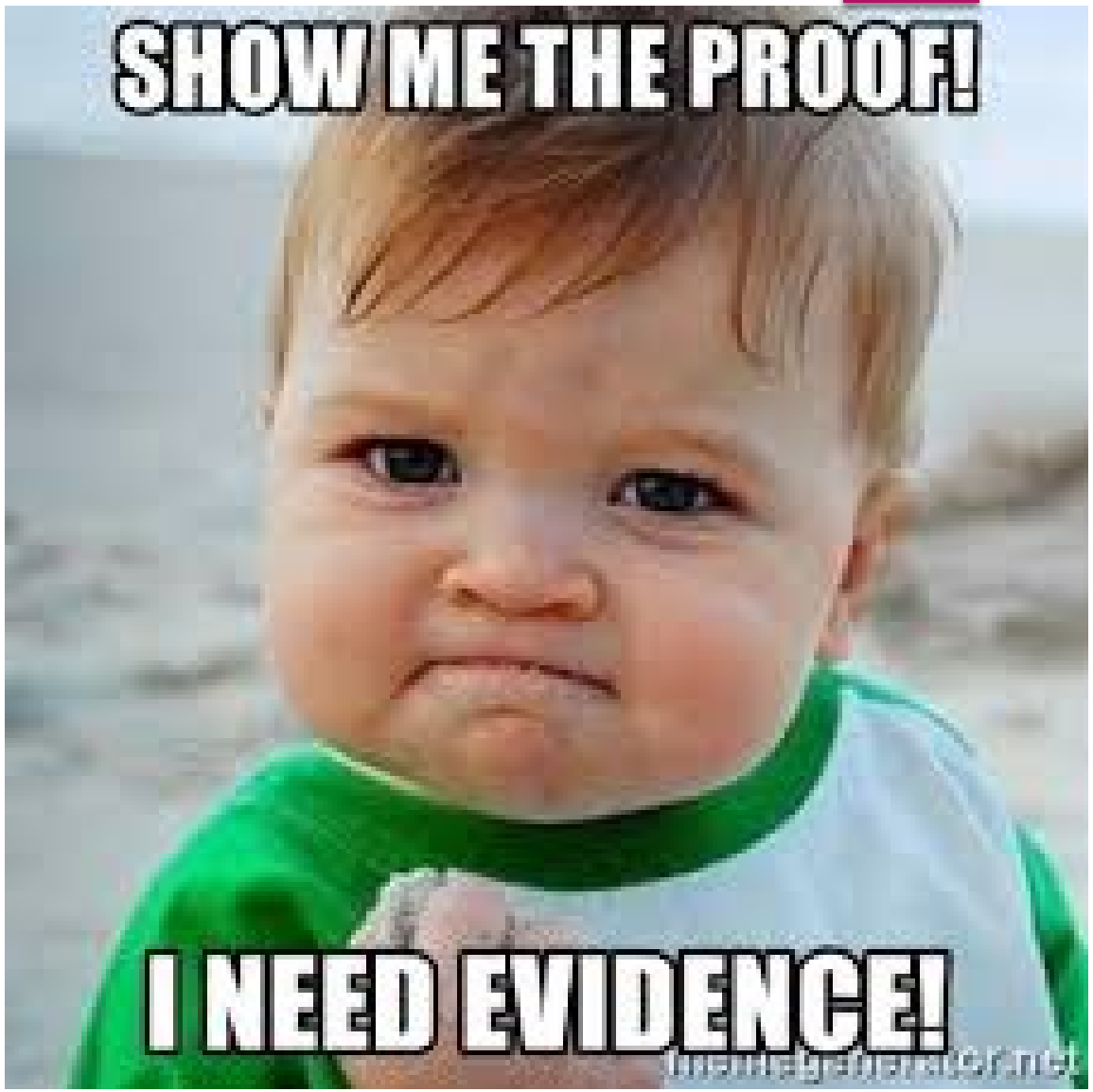
- Every potential myopia management patient should leave with written materials summarizing their options
- May want to consider adding journal articles
- Consider providing written materials PRIOR to first visit or consultation

Practice Pearl: FREE brochures

www,gpli.info

Be prepared…

- Some parents will trust you wholeheartedly
- Others will want PROOF
  - Provide written summary of all topics discussed
  - Include journal articles to back up everything you discuss



Do NOT be apologetic about your fees

- Think of myopia management like:
  - Inevitability of teenagers needing braces
  - Presbyopes needing PALs

More than JUST an eye exam…

- 1 year program with doctor specializing in MM
- Application and Removal training/support
- 1 year supply of contact lenses
- 6-month follow-up
- *Axial length monitoring*

Does insurance cover Myopia Management?

NO!

How to maximize insurance plans…

- Can apply allowance to myopia package
  - CL exam allowance + Materials allowance
  - CL exam copay + Materials allowance
  - **OR – can use benefits for back-up pair of glasses**

Medically Necessary Contact Lenses: High Myopia

- What exactly is HIGH Myopia??
  - Not subjective!!
  - Varies with each vision insurance
- Another angle to consider…
  - Anisometropia

Other things to consider…

- Rebates
- Care Credit
- HSA/FSA
- Include a pair of glasses in the package?

Key to Success

The simplest way is to NOT accept insurance for myopia management.

Setting up pricing structure

Global FEE Model

- Collect all money up front
- Easier to manage but parents may shy away from lump sum
- May be tricky at time of renewal

Subscription model

- Collect deposit then breakdown remaining amount into palatable monthly payments
- May require more admin time
- Better for families with multiple children

THE TALK

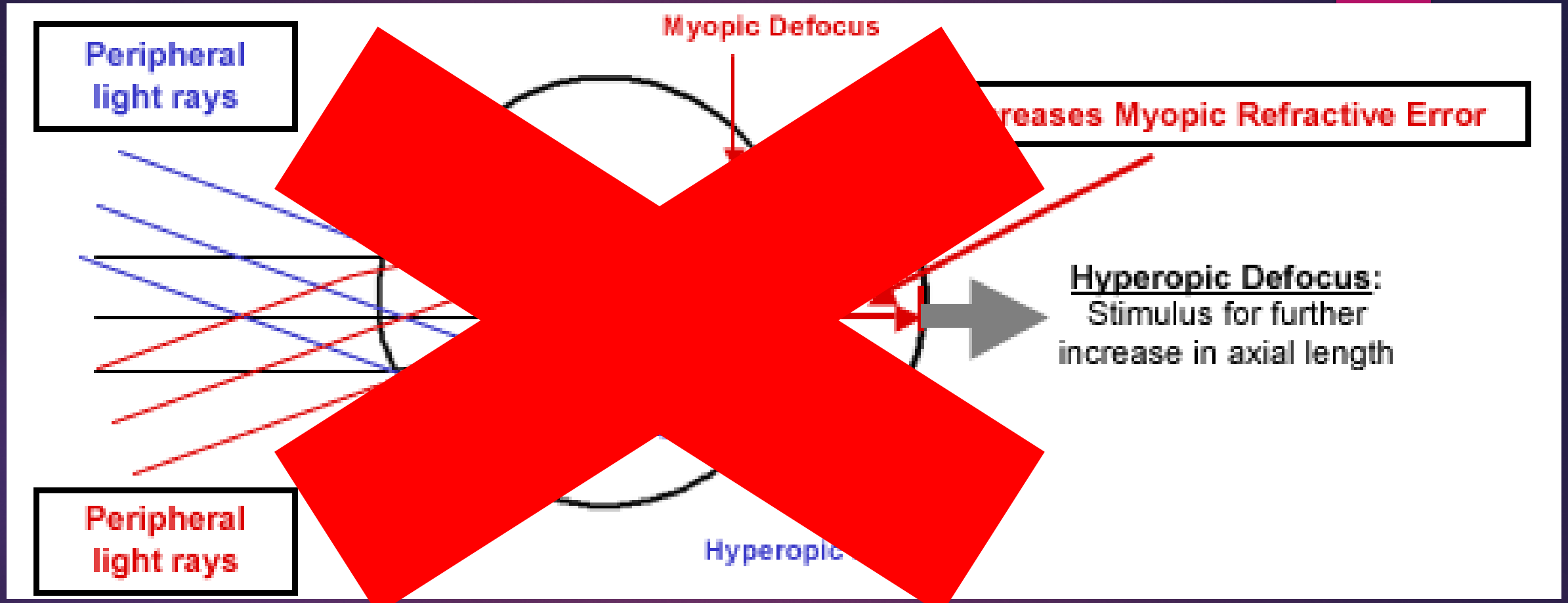
Avoid over-explaining

Parents will feel overwhelmed

Parents will feel paralyzed.

That leads to indecision.

Confused people don’t buy anything.


Peripheral light rays
Myopic Defocus
reases Myopic Refractive Error
Hyperopic Defocus:
Stimulus for further increase in axial length
Peripheral light rays
Hyperopic

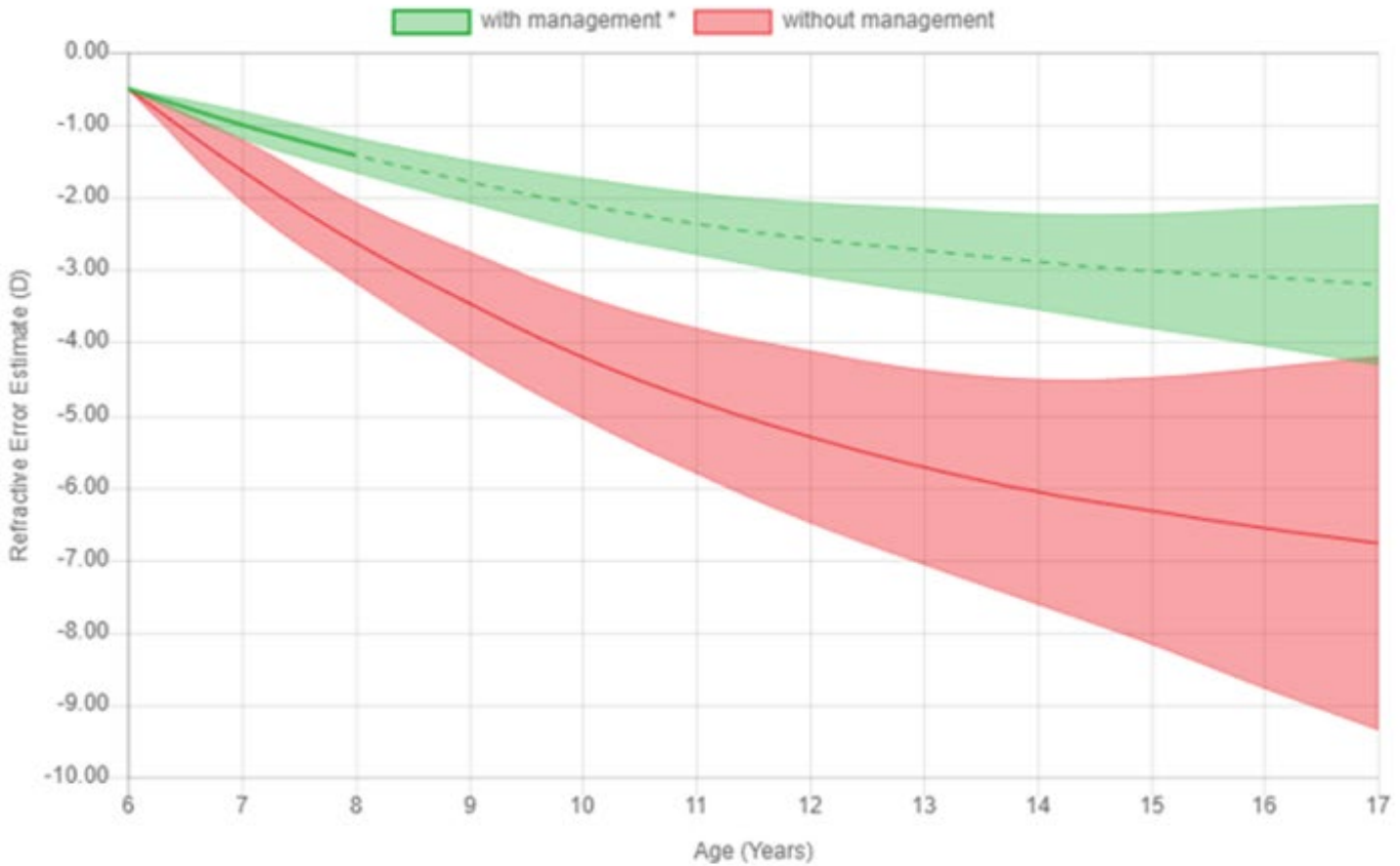
The Problem with Myopia

TOO LONG

TOO FAST

GETTING WEAKER

[1]Flitcroft DI, He M, Jonas JB, Jong M, Naidoo K, Ohno-Matsui K, Rahi J, Resnikoff S, Vitale S, Yannuzzi L. IMI - Defining and Classifying Myopia: A Proposed Set of Standards for Clinical and Epidemiologic Studies. Invest Ophthalmol Vis Sci. 2019 Feb 28;60(3):M20-M30.



Myopia Management Option:

Multi segment/lenslet spectacles

Percentage reduction in progression of myopia compared to standard correction e.g. single vision spectacles.

57%

If treated with **Multi segment/lenslet spectacles** that provides **57%** control, then the level of myopia at **17** may be:

-3.19D

If myopia control treatment is not commenced immediately, the final level of your child's myopia at **17** may be:

-6.76D

*
——— based on published evidence
- - - - - projected

https://bhvi.org/myopia-calculator-resources/

Age at measurement

14 years old

Length of the Right eye in mm

23.60

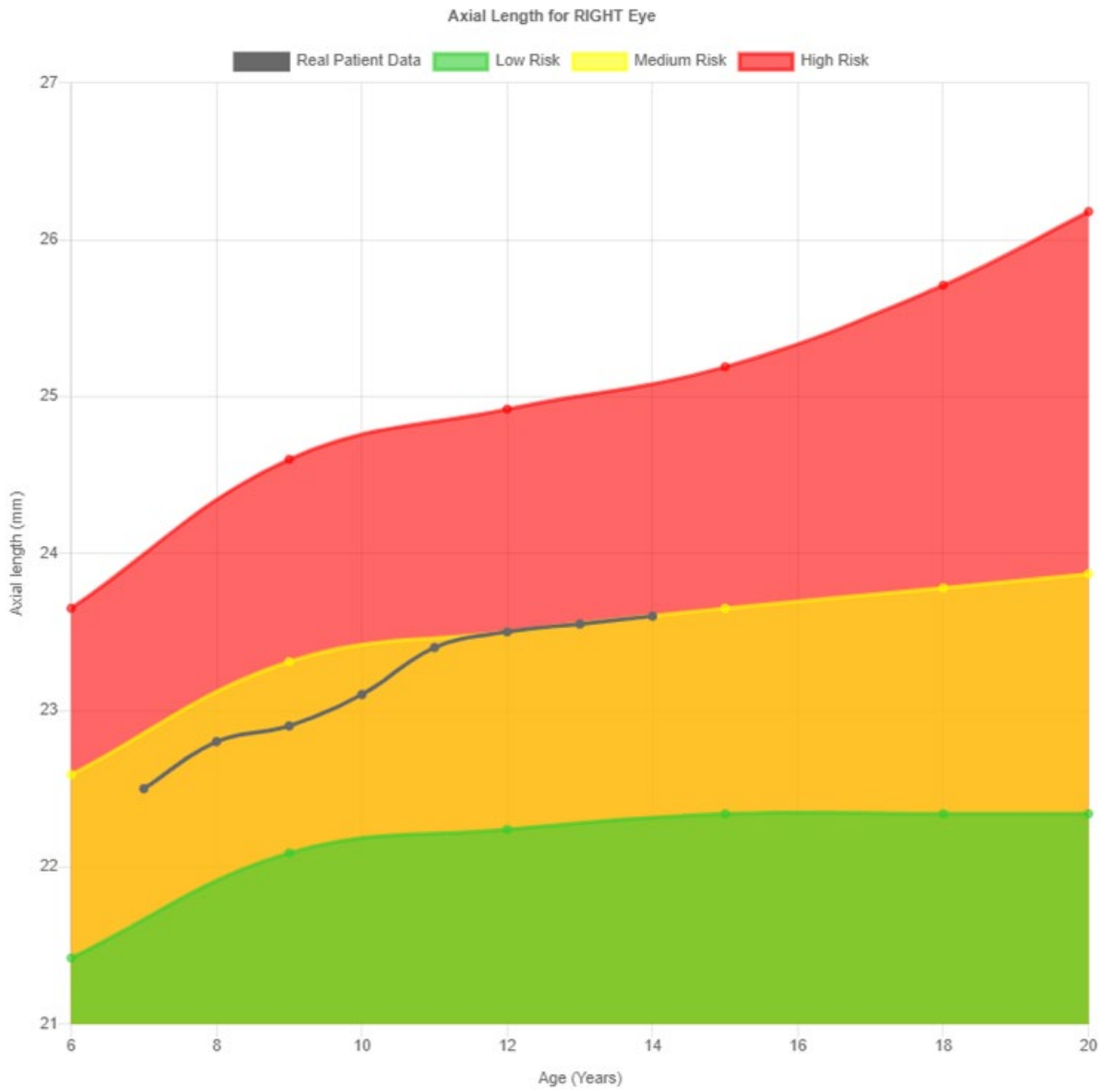
Length of the Left eye in mm

23.60

Add to Graph

Restart

Axial Length Growth Curve - you can add your current and previous values

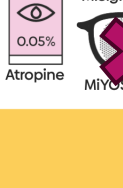


What Are My Options?

These categories are based on total treatment effects compared across multiple studies.

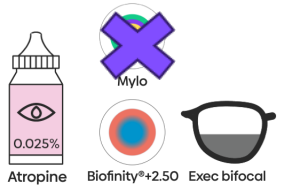
The best treatment for your child will depend on their eyes, suitability and other individual factors.

Be aware that your myopia control option may involve off-label use.



Best

Slow myopia progression by at least half



Next-best

Slow myopia progression by about a third

Less effective

Minimal effects on slowing myopia progression

Not effective

No effect on slowing myopia progression

Full-time wear matters for maximum treatment. Children using atropine eye drops still need spectacles or contact lenses to see clearly.

MyKidsVision

Scan to learn more

WORLD COUNCIL OF OPTOMETRY

STANDARD OF CARE | MYOPIA NAVIGATOR | MYOPIA PLEDGE | MULTIMEDIA RESOURCES | NEWS

CHILDREN WHO ARE PHYSICALLY ACTIVE

CONSIDER

FAMILIES WHERE PARENTS OR CHILDREN DON'T FEEL READY FOR OR UNABLE TO COMMIT TO CONTACT LENSES

CONSIDER

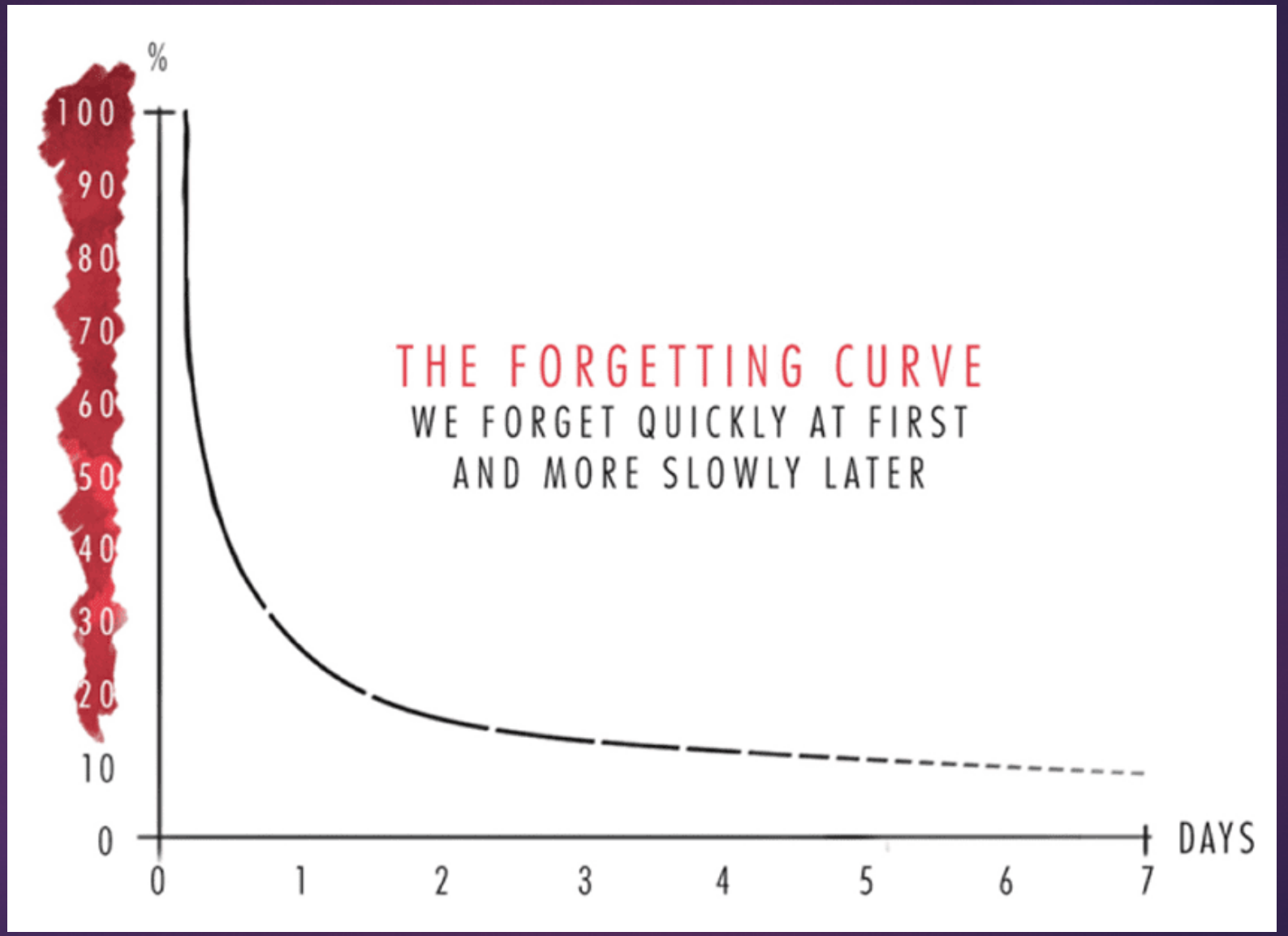
CHILDREN WHO DO NOT LIKE WEARING GLASSES AND/ OR MAY LACK CONFIDENCE

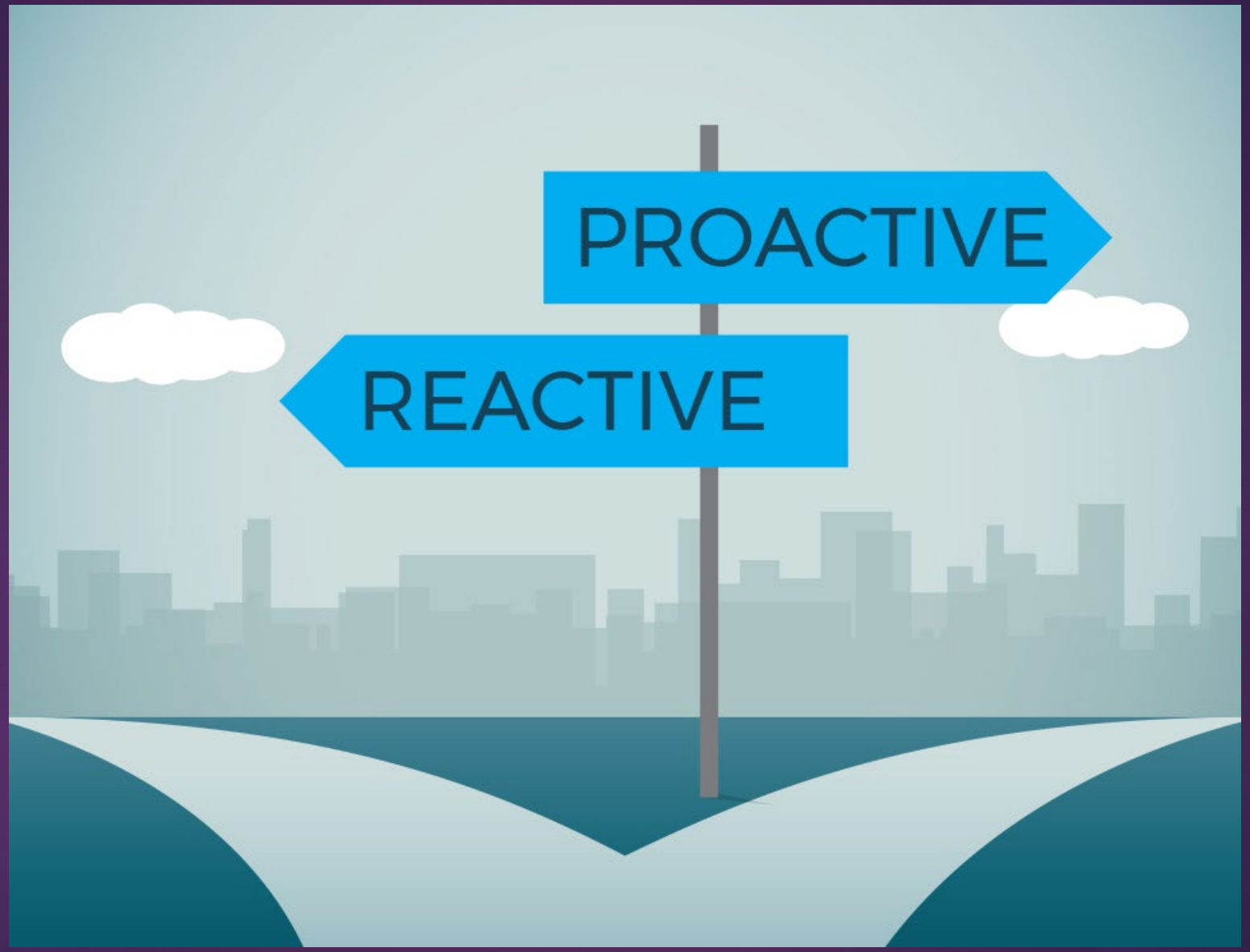
CONSIDER

CHILDREN WHO ENJOY WEARING THEIR SPECTACLES FULL TIME

CONSIDER

You may have to have the same conversation year after year…


%
100
90
80
70
60
50
40
30
20
10
0
THE FORGETTING CURVE
WE FORGET QUICKLY AT FIRST
AND MORE SLOWLY LATER
0
1
2
3
4
5
6
7
DAYS


PROACTIVE
REACTIVE

ESTABLISHED PATIENTS

PRIMARY PATIENT SELECTION

Age appropriate children in practice with myopia using:

Single vision contact lenses

Single vision glasses

Off-label treatments

START TODAY – search EHR for children with myopia, ages 8-12, within the practice

ESTABLISHED FAMILIES

SECONDARY PATIENT SELECTION

Children of adult patients in practices with myopia

Siblings of pediatric patients in practice with myopia

Starting here drives pediatric comprehensive exams and overall practice growth

Encourage established families to schedule eye exams for their children!

1. Fortin P, Kwan J. The myopia management opportunity in the United States using the 2020 Census. Poster presented at: Association for Research in Vision and Ophthalmology 2022 Annual Meeting; May 1-5 2022; Denver, CO.

278 Children

with Myopia between the Ages 5 and 17

for every 1 Eye Care Professional in the U.S.*

Honestly, it takes just one patient to get started.

MiSight 1 day since 2020

My VERY first MiSight Patient

Has only progressed 0.25D OU in 4 years!

Thank you!!

ashley.w.tucker@gmail.com