



## Discussion Points:

- How would you describe *Myopia* to a patient and parent?
- Is *Myopia* a disease?
- Would describing *Myopia* as a disease to patients or parents be the best approach to talking about *Myopia*?
- Does defining *Myopia* as a disease alter how you approach treatment?



“a disorder of structure or function  
in a human, animal, or plant,  
especially one that produces  
specific signs or symptoms or that  
affects a specific location and is not  
simply a direct result of physical  
injury.”

Oxford Dictionary definition of a ‘disease’ is:



**Myopia is a mismatch between the optics and length of the eye, so it is a disorder of structure**

**Myopia occurs in humans**

**Myopia produces distance blur (symptom)**

**We didn't fall down and suddenly become myopic, so it isn't the direct result of physical injury**



“Myopia is etiologically heterogeneous because both environmental and genetic factors play important roles in myopia development” (Morgan et al., 2012).



## Discussion Points:

- What treatment options are available for *Myopia Management*?
- What kind of efficacy should be expected with intervention?
- What would be expected in the future with no intervention?



# Spectacle Lenses

Cheng et al's study investigated a standard bifocal with a +1.50 Add, and the same add with the 3BI prism in each eye. After three years of wear, they found a moderate myopia control effect – around 35% for axial length and 50% for refractive change

Progressive addition lens (PAL) studies for myopia control show negligible results when single adds are applied to all children, however when applied to children with esophoria and accommodative lag, the results become more impressive at 30-40% efficacy

## Myopia Management Treatment Options



# Peripheral Aspheric Design – MyoVision Pro Zeiss

Efficacy (one year study): Around 20% refractive efficacy in Chinese children aged 6–12 with a family history of myopia, being 0.29D lower refraction, but no difference in axial length change.

This design adheres to the peripheral defocus theory, whereby the peripheral retina receives myopic defocus as a slow-down or stop signal for eye growth.

Myopia Management Treatment Options







## Defocus Incorporated Multiple Segments – MyoSmart – Hoya

The description of the multiple zones creating retinal defocus aligns with the theory of creating simultaneous myopic retinal defocus during both distance and near viewing – one plane on the retina due to the single vision zone(s) of the lens, and one plane creating myopic defocus due to the +3.50D defocus lenslets.

Efficacy (two year study): Around 50% refractive and 60% axial length efficacy in Hong Kong Chinese children, with an absolute effect of 0.44D lower refraction and 0.34mm less axial elongation in DIMS wearers.

## Myopia Management Treatment Options



# Highly Aspherical Lenslet Targett – Stellest – Essilor

H.ALT technology uses aspheric lenslets, and "creates a three-dimensional quantity of light in front of the retina, which we call volume of myopic defocus (VoMD)" Each lenslet is 1.1mm in diameter and "11 concentric rings are formed [across the lens] by contiguous aspherical lenslets."

Efficacy (two year study): Myopia control efficacy increased in children who wore HAL lenses full time ( $\geq 12$  hours/day) every day, to 0.99D (67%) slowdown in myopia progression and 0.41mm (60%) axial length efficacy on average, when compared to SVL

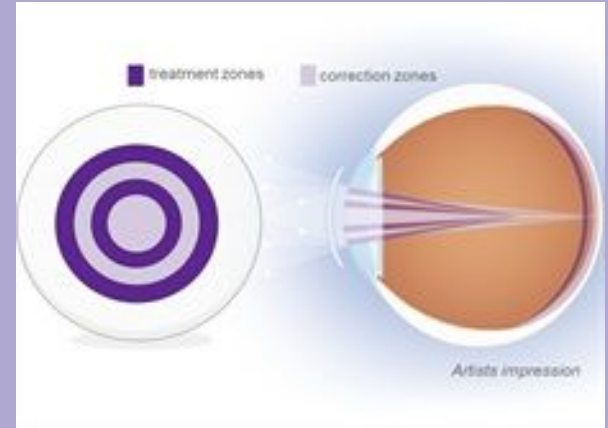
## Myopia Management Treatment Options

# Contact Lens Options – MiSight Vs Ortho K



## MiSight – Coopervision

- Designed for children who have a myopic prescription from  $-0.25D$  to  $-6.00D$
- Features unique ActivControl™ technology to reduce myopia progression
- Proven to reduce myopia by up to 59% after three years' wear in children

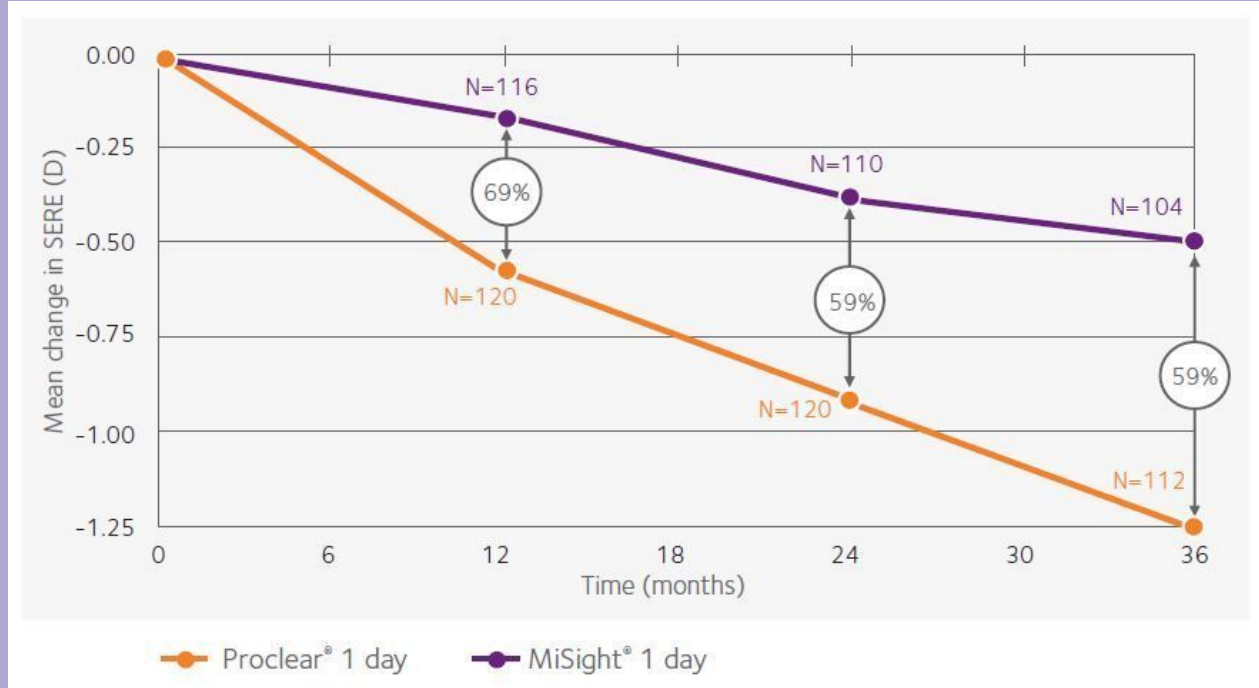


## Myopia Management Treatment Options

# Contact Lens Options - MiSight Vs Ortho K



Children wearing MiSight® 1 day had 59% less myopic progression on average compared to the control group (0.54D)

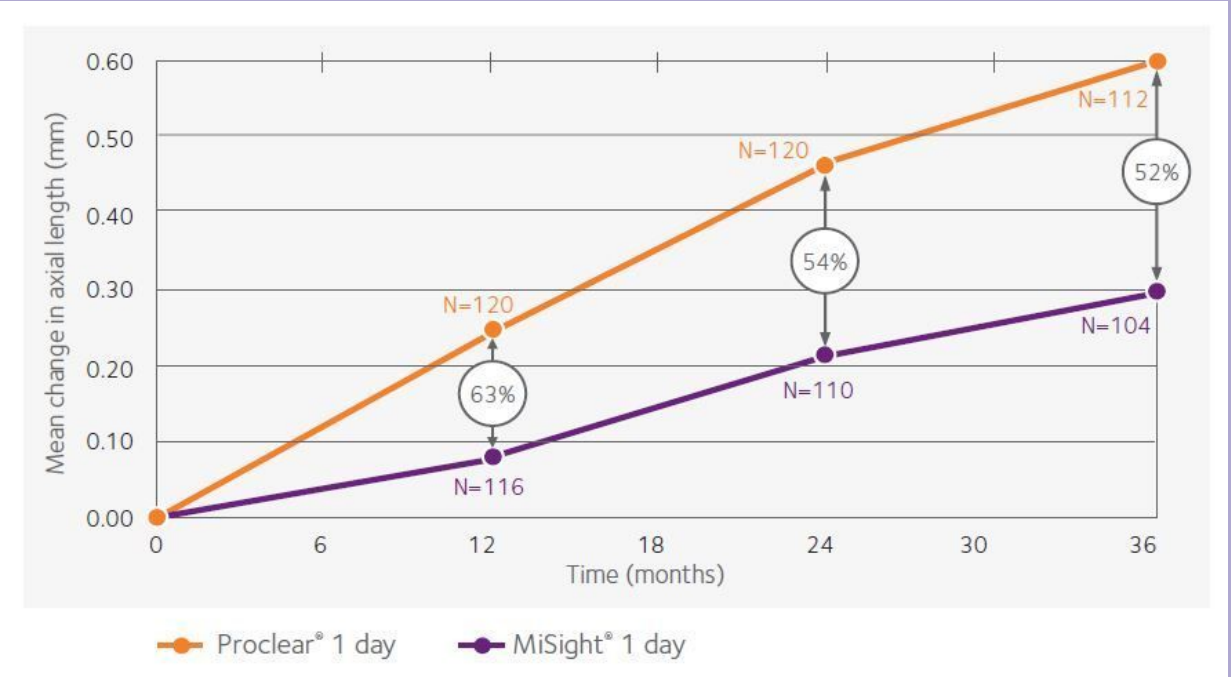


Myopia Management Treatment Options



# Contact Lens Options - MiSight Vs Ortho K

Children wearing MiSight® 1 day had 52% less axial eye growth on average compared to the control group (0.24mm). Changes in refractive error are highly correlated with changes in eyes' axial lengths



## Myopia Management Treatment Options

# Contact Lens Options – MiSight Vs Ortho K



Arguably the intervention with the most research evidence for myopia control, with multiple studies indicating a consistent effect in slowing axial elongation by around 0.26mm – representing about 50% less growth – over two years.

OK works consistently well for myopia control – including for toric corrections up to 3.50DC2 and for partial correction in myopes over 6D.

## Myopia Management Treatment Options

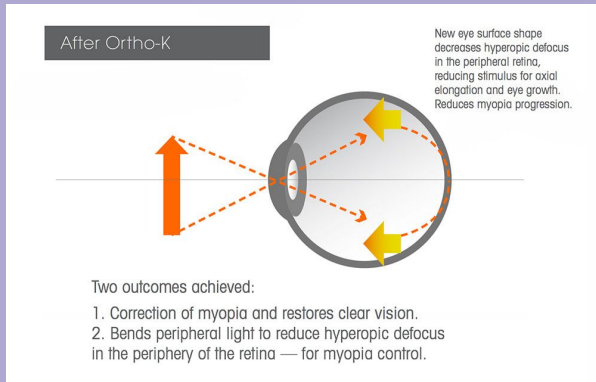
# Contact Lens Options – MiSight Vs Ortho K



Ortho-K lens treatment effectively refocuses peripheral light rays from beyond the retina to the surface of the retina, reducing the hyperopic defocus and peripheral blur.

Ortho-K lens achieves this by creating a circular 'multifocal' shape effect on the cornea. When Ortho-K restores vision by flattening the central zone of the cornea, a redistribution of cells causes the peripheral areas of the cornea to become thicker.

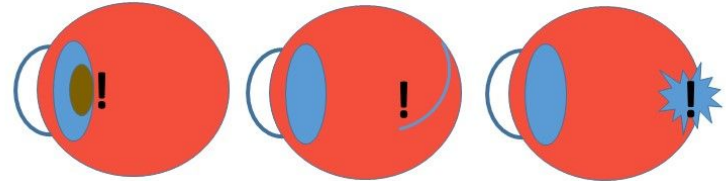
The thickened peripheral cornea bends light more, reducing the hyperopic peripheral defocus.



## Myopia Management Treatment Options

Myopia is associated with higher incidences of retinal detachment, glaucoma and myopic maculopathy

	Cataract (PSCC)	Retinal detachment	Myopic Maculopathy
-1.00 to -3.00	2.1	3.1	2.2
-3.00 to -6.00	3.1	9.0	9.7
-6.00 to -8.00	5.5	21.5	40.6



“Every 1D increase in myopia increases risk of myopic maculopathy by 67%”



## Discussion Points:

- What factors would you consider for a patient to be considered a “pre-myope”?
- Having identified the patient as a “pre-myope” what management options should be considered?
- What kind of binocular vision assessments should also take place?

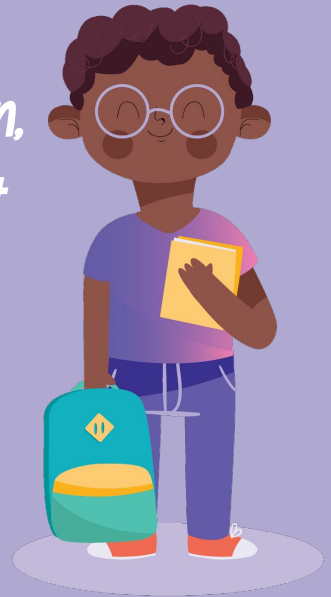


# Managing the “Pre-Myope”

EYECARE

International Myopia Institute – Defining and Classifying Myopia

*“Pre-myopia – a refractive state of an eye of  $\leq 0.75 D$  and  $> 0.50 D$  in children where a combination of baseline refraction, age, and other quantifiable risk factors provide a sufficient likelihood of the future development of myopia to merit preventative interventions.”*



# Risk Factors:

There are four key principles for assessing risk of myopia onset:

- Family history – one myopic parent increases risk by three-fold, while two myopic parents doubles this risk again
- Visual environment – less than 90 minutes a day spent outdoors increases risk, especially if combined with more than 3 hours a day spent on near work activities (outside of school time)



# Risk Factors:

- Binocular vision – Children with higher accommodative convergence (AC/A) ratios, typically seen with esophoria, have an increased risk of myopia development within one year of over 20 times.
- Accommodative lag may also be a risk factor.
- Intermittent exotropia has also been associated with onset of myopia.
- Current refraction – the most significant risk factor for future myopia is if a child exhibits +0.50D or less of manifest hyperopia at age 6–7. This risk is independent of family history and visual environment.



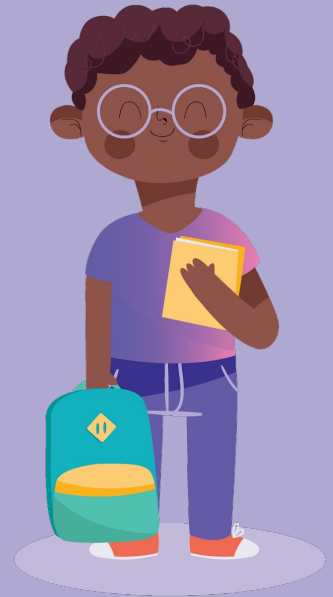
# Risk Factors:

*“The most significant risk factor for future myopia is if a child is +0.50D or less at age 6–7, independent of all other factors. Also watch closely for the child who loses hyperopia quickly between visits, as the fastest refractive shift in myopes occurs in the year just prior to myopia onset.”*

# Management Options:

# EYECARE

- Arguably more challenging than managing the myope – as the child does not yet require vision correction, this can take optical treatments off the table.
- Minimal research on interventions for pre-myopia, despite the International Myopia Institute stating that preventing myopia is an "even more valuable target".
- Increased outdoor time – Children who spend less time outdoors, are far more likely to develop myopia This is especially the case when two hours or less a day of outdoor time is combined with more than 3 hours of near work outside of school time



# Management Options:

## Treating binocular vision disorders

It would make logical sense that if a child presents with a binocular vision disorder linked to myopia onset, that managing the disorder may reduce risk. These specific disorders are:

- Higher accommodative convergence (AC/A) ratios, typically seen with esophoria, have an increased risk of myopia development within one year of over 20 times.
- Accommodative lag may also be a risk factor but there is conjecture.
- Intermittent exotropia (IXT) has also been associated with onset of myopia – 50% of children with IXT are myopic by age 10, and 90% by age 20.

