



Understanding
**Myopia
Control**
& your options

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Myopia Control Options

Myopia, or nearsightedness, is reaching epidemic proportions.

In a single generation the incidence of myopia has doubled. What is more startling is that researchers predict the incidence will increase an additional 40% over today's numbers by the year 2050.

Although genetics play a role in myopia development, studies are showing more evidence of behavioral and environmental factors contributing to the increase. The most prominent of them being less outdoor play during a child's developmental years and more screen time both at home and at school/work.

While there is no outright cure for myopia, there are treatment options now available. We are able to slow down or even halt its progression instead of giving our children thicker glasses or stronger contacts every year, ensuring better vision for life. At the same time, we can reduce their future risks

for serious eye diseases that are associated with high myopia such as retinal detachments, early cataracts and glaucoma.

The chart below details these health risks associated with myopic progression.¹

There are different treatment options available that we provide which have proven through research to be most effective in myopia control. These include specialized 1-day soft contact lenses, customized hybrid contact lens correction for high astigmatism, orthokeratology, and compounded low dose atropine eyedrops.

While the efficacy of each method has proven to be essentially equal, there are advantages and disadvantages to each method when it comes to lifestyle for the child. Treatment options can also be combined if a child still shows myopic progression on a single method.

Myopia Increases the Risk of Serious Sight-Threatening Complications

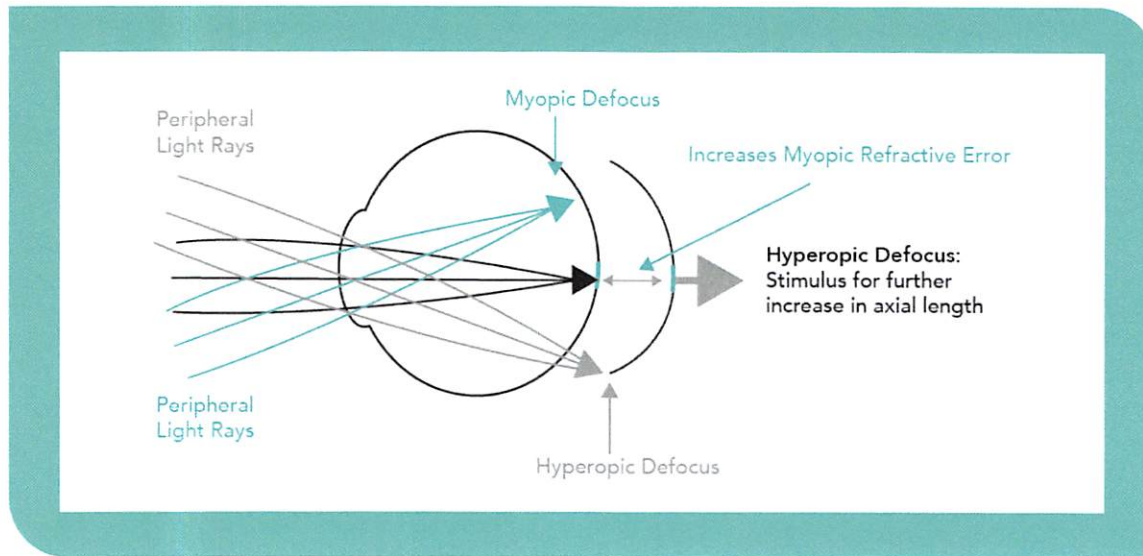
Condition	Relative Risk of Ocular Disease Secondary to Myopia Compared to Emmetropia:		
	-2.00 D	-5.00 D	-8.00 D
Myopic Macular Degeneration	2.2 x higher	40.6 x higher	126.8 x higher
Retinal Detachment	3.1 x higher	9.0 x higher	21.5 x higher
Cataract	2.1 x higher	3.1 x higher	5.5 x higher

¹Flitcroft, D. I. (2012). The complex interactions of retinal, optical and environmental factors in myopia etiology. *Progress in retinal and eye research*, 31(6), 622-660.

How do these methods work to slow down my child's myopia?

While atropine is believed to work by relaxing accommodation or eye focusing, all methods involving contact lenses work by manipulating the optics in the periphery of the eye to achieve "myopic defocus".

This concept is illustrated below:



In the myopic eye, traditional spectacle or contact lens correction pushes the image back to the central retina to allow us to see. However, it does so in a single focal plane. Due to the fact that the eye is curved, this causes the peripheral light rays to be focused behind the retina. This leads to an area of hyperopic defocus as illustrated above by the blue line.

The theory is this area of hyperopic defocus acts as a stimulus for the eye to grow longer, causing it to become more myopic, due to the fact the eye wants to "catch up" to that peripheral image.

Using glasses or traditional contact lenses for correction actually enables the eye to grow longer over time causing health risks as well as the vision to decline, requiring thicker glasses.

With the customized contact lens corrections and Ortho-K, we are able to incorporate optical treatment zones which make the peripheral light rays bend to land in front of the retina causing an area of myopic defocus as illustrated by the red lines in the diagram above.

Research has shown that while hyperopic defocus of the peripheral retina acts as a stimulus for progression of prescription, myopic defocus of the peripheral retina does the opposite. It acts to slow down the stimulus for eye growth since the eye no longer needs to "catch up" to that peripheral image.

MiSight® 1-Day Soft Contact Lenses*

This is the first and only contact lens to obtain FDA-approved to slow the progression of myopia in children age 8 to 12. This contact lens uses ActivControl technology to create the myopic defocus of the peripheral retina to slow the elongation of the eyes and therefore slow the progression of the myopia. Most children notice no difference in vision when wearing this lens as compared to a normal contact lens.

Advantages

Ease of Use

The lens is a soft daily disposable lens so there is very little maintenance required. The child wears the lens for the day and throws them away at the end of the day. No cleaning or storing is required.

Comfort

The lenses are very comfortable on the eye unlike Ortho-K where the child will likely feel the lenses for the first few days.

Disadvantages

Requirement for glasses/daytime contact lenses

Unlike Ortho-K where the child maintains constant vision, with the MiSight® 1-Day lens, they will need to wear their glasses when their contacts are removed. Also, the myopic defocus or myopic control will only occur when wearing the lenses.

Program Cost

The program fee for the first year is \$ and includes the following:

- All office visits related to the program. The child is seen more frequently the first few months of the program and then is generally seen every 6 months once established.
- All additional testing required including biometry to track the axial length of the eye.
- An annual supply of MiSight® 1-Day disposable soft contact lenses (8boxes of 90 lenses/box).
- Free shipping and returns per prescription changes as determined by the Doctor.

MiSight® 1-Day Year 2 and beyond: The global fee is \$ and includes the following:

- All office visits related to the program. The child is seen more frequently the first few months of the program and then is generally seen every 6 months once established.
- All additional testing required including biometry to track the axial length of the eye.
- An annual supply of MiSight® 1-Day disposable soft contact lenses (8boxes of 90 lenses/box).
- Free shipping and returns per prescription changes as determined by the Doctor.

The fee is lower due to the fact the child does not require initial lens training and does not require more frequent office visits.

*A child may be a good candidate for the MiSight® lenses but his or her nearsighted prescription may fall outside of the available parameters. In these situations, we are able to utilize the Natural Vue lens design. Although the company which produces the lenses chose not to seek FDA approval for myopia control, the lens does utilize myopic defocus technology in its optical design. It has been shown to slow progression at a similar rate to MiSight® in clinical studies and is available in a wider range of parameters. It actually preceded the MiSight® in the market place. The price structure is identical to MiSight®.

Hybrid Contact Lens Correction for High Astigmatism

Children with high astigmatism correction can create a unique challenge as they fall outside of the parameters for both MiSight® and Natural Vue contact lenses, and most times orthokeratology as well.

Luckily, we are able to utilize customized technology incorporating precise astigmatism correction with a gas permeable material center combined with the comfort of a soft contact lens skirt. In addition, we are able to manipulate the optics of the lens to create the peripheral “myopic defocus” to achieve slowing of the eye growth and thus slowing of myopic progression.

The program cost is identical to the MiSight® program and is as listed below:

Program Cost

The program fee for the first year is \$ and includes the following:

- All office visits related to the program. The child is seen more frequently the first few months of the program and then is generally seen every 6 months once established.
- All additional testing required including biometry to track the axial length of the eye.
- An annual supply of hybrid lenses. This is 4 lenses in total. The lenses are replaced every 6 months.

Year 2 and beyond: The global fee is \$ and includes the following:

- All office visits related to the program. The child is seen more frequently the first few months of the program and then is generally seen every 6 months once established.
- All additional testing required including biometry to track the axial length of the eye.
- An annual supply of hybrid lenses. This is 4 lenses in total. The lenses are replaced every 6 months.

*Please note that an annual exam is not included in this fee. All participants in the MiSight/NaturalVue or Hybrid Program must have a yearly comprehensive exam that is combined with the renewal of the program. If you have vision insurance we accept, that exam will be billed to your insurance and co-pays will be collected as applicable. If not, a courtesy discount will be provided for this fee.

Orthokeratology

Orthokeratology or Ortho-K is a method of myopia control where a special variation of a gas permeable contact or mold is placed on the eye before sleep.

It harnesses the tear film to apply a gentle pressure causing a measured amount of flattening to the central cornea. This flattening allows the image to be aligned on the retina providing clear vision in much the same way LASIK does. This allows the patient to see clearly during the day without glasses or contacts. However, the effect of Ortho-K is reversible. The molds must be worn nightly to maintain the effective result of the molds much like a retainer for the eyes. Once the patient stops wearing the molds, the eye returns to its pretreatment level within a few days or weeks depending on how long the lenses have been worn.

This technique has been around for decades. Improvements in mold design and material, as well as its ability to control myopic progression, have caused a rise in its usage. Even so, Ortho-K treatment remains a specialty practice due to the time and skill level required to properly design and fit the molds.

Control of myopic progression through Ortho-K is achieved through a process known as "Myopic Defocus" as illustrated in the diagram seen on page 2.

Advantages

Constant Vision Correction

The biggest advantage of Ortho-K is that after a few nights of wearing the molds, the child achieves full time vision correction much like LASIK. The child is able to see clearly with the molds on as well as off.

Freedom from daytime glasses and contacts

The molds only need to be worn at night allowing the child freedom from any type of vision correction during the day. This can be especially helpful for swimmers or other athletes as they do not have to worry about losing a contact or breaking their glasses.

Constant State of Myopic Defocus of the Peripheral Retina

Because of the consistency of Ortho-K, the area of myopic defocus of the peripheral retina is maintained around the clock contributing to myopia control.

Small Lens Diameter

The Ortho-K molds are smaller than regular soft contacts. This can make them easier for children to handle, insert and remove.

Disadvantages

Time Commitment

This is the most time-consuming method on the side of the doctor and patient in the beginning. Each Ortho-K mold is custom designed for the eye and requires multiple follow up visits initially to ensure it is molding the eye appropriately.

Sleep Dependent

For the process to be effective the lenses need to be worn during a normal sleep cycle, ideally for 8 or more hours per night. This can be difficult for some patients, especially during the teenage years.

Orthokeratology (continued)

Program Cost

Ortho-K Year 1

The global fee for the first year of the program ranges from \$2550 to \$3550 depending on the level of prescription when starting the program. The initial year is the costliest due to the work of initial mold design and refinement along with patient education and training. This fee includes the following:

All office visits related to Orthokeratology including all imaging, biometry measurements, lens adjustments and other required testing. The child is seen often during the first 6 weeks of treatment. As the fit is established, the child is seen at least every 6 months.

Ortho-K Year 2 and beyond

Fees are lower and broken out by professional fees and material fees after the first year. This is due to the fact the child is more established in the lenses and fewer office visits are required.

Professional Fees*

Starting in year two, the professional fees are also on a graduated scale based on the age of the child. Younger children need more frequent office visits. They are growing rapidly and their cornea changes shape more often, thus their myopia requires additional monitoring and office visits. Also, younger children need more refitting as their eyes are growing larger. The risk of myopia progression lessens over time as the child passes beyond the rapid growth years. Older children require less office visits and their molds need updating for age and not change in shape.

The fees based on age are as follows:

Age 6 to 8:	Age 8 to 11:
Age 11 to 14:	Age 14 to 18:

Material Fees*

The need for new molds varies on the age of the child and the age of the molds. Molds are generally updated every 18 months for age if no other changes are required. The materials charge for the lenses is \$ per lens or \$ per set. This fee remains consistent if a lens needs to be replaced due to breakage or loss. If you have a vision benefit for materials available for which we are providers, the benefit may be applied toward this cost.

*Please note that an annual exam is not included in this fee. All participants in the Ortho-K program must have a yearly comprehensive exam that is combined with the renewal of the program. If you have vision insurance we accept, that exam will be billed to your insurance and co-pays will be collected as applicable. If not, a courtesy discount will be provided for this fee.

Low Dose Compounded Atropine Eyedrops

Atropine drops have been used for many years, especially in other countries, to slow myopia progression.

Atropine works on relaxing the accommodative or focusing mechanism of the eye. There is belief that progression occurs due to "focusing fatigue" from all the sustained near work children do. The problem with commercially available full-strength atropine is that it has the undesirable side effects of pupil dilation as well as too much relaxation of the eye's ability to focus. These side effects leave children with light sensitivity and difficulties reading without bifocals or reading glasses, leading researchers to study diluted or compounded atropine.

Multiple clinical studies have shown low dose atropine to be as effective in controlling myopic progression as full-strength atropine without giving children the negative side effects. In fact, it was found that low strength atropine provided better sustained control of myopic progression. There was also no evidence of a rebound effect after stopping atropine treatment with the low dosage as found in some studies with the full-strength atropine.

Advantages

Ease of Use

The process does not require a lot of time. It only involves putting one drop in each eye at night and can easily be done by the parent or child. This can be a good entry point of myopia control for children who are not ready for contact lens correction.

Disadvantages

Full time vision correction still required

Children will still need full time glasses or contacts. The drops do not correct vision but work to slow down or possibly halt further vision deterioration.

Atropine is a pharmaceutical

Clinical research has found no short-term harmful effects from atropine drops, especially in the diluted form. It is a topical drug and therefore systemic absorption is highly limited. However, there are currently no studies available related to long term effects of compounded atropine.

Program Cost

\$ fee paid to our office

This covers all additional refractive testing required as well as all office visits related to Atropine treatment. Typically, the child is seen every 3 to 6 months.

Around \$ per month paid directly to the pharmacy

This covers the cost of the drops themselves. (Pricing is set & adjusted by the pharmacy, IMPRIMIS Rx.)

*Please note that an annual exam is not included in this fee. All participants in the LDCAtropine Program must have a yearly comprehensive exam that is combined with the renewal of the program. If you have vision insurance we accept, that exam will be billed to your insurance and co-pays will be collected as applicable. If not, a courtesy discount will be provided for this fee.

Summary & Insurance Coverage

All three methods of Myopia Control have their advantages and disadvantages.

There is no one correct or incorrect option, it just depends on what you feel would best fit your lifestyle and the lifestyle of your child. Most importantly, by choosing one of them you are doing something to help stop your child's eyes from getting worse and to help decrease their future risk for eye health diseases.

Despite mounting research to support its efficacy, all methods of Myopia Control are currently not covered by insurance. Insurance allowances are accepted for specific items as noted previously.

The Next Step

Prior to starting one of the programs, we see each child for a Myopia Control consult outside of their yearly vision examination. The consultation fee is \$, \$ of which will be applied as a credit to whichever program is chosen. This visit will vary from about 30 to 60 minutes and allows us to do the following:

- Discuss in depth the nature and progression of myopia for your child.
- Perform additional testing required prior to starting one of the programs.
- Dedicate time to answer any questions related to myopia control and address each child's specific needs to determine what method may work best for your child.

Additional Resources

The American Academy of Orthokeratology and Myopia Control website is an excellent source: www.aaomc.org. On the patient site there is a wealth of information to explore including videos and research based articles.

Certainly, any specific questions are welcomed by emailing them directly to:

drlewis@cvoeyecare.com

– Dr. Jenna Lewis



CHAGRIN VALLEY

· OPTOMETRISTS ·

Ronald K. Jurcak, O.D.
Patrick Shepard, O.D.
Jenna Lewis, O.D.

16706 Chillicothe Rd, Suite
500, Chagrin Falls, OH 44023

www.cvoeyecare.com
Phone (440) 708-0020
Fax (440) 708-0302