Spectrum EyeCenter

MYOPIA MANAGEMENT

ENROLL YOUR CHILD TODAY!

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What are we treating (what is myopia)?

Myopia, or nearsightedness, is an eye disease that causes poor long-distance vision. In myopic eyes, the eyeball is either longer than normal, or the cornea is too curved, or both. This causes images to be blurry.

What are the signs and symptoms of myopia that I should look for?

Myopia is often first detected during childhood & is commonly diagnosed between the early school years through the teens. A child with myopia may:

- Persistently squint
- Need to sit closer to the television, movie screen, or the front of the classroom
- Seem to be unaware of distant objects
- Blink excessively
- Rub their eyes frequently

Some kids may stop paying attention in class, with associated decline in their academic performance. Then, later, it is determined that they're myopic and can't see the board.

Why did my child get myopia?

Evidence shows that myopia, or at least the tendency to develop myopia, may be hereditary. If one or both parents are nearsighted, there is an increased chance their children will be nearsighted. **There is a 25-33% chance that a child will develop myopia if one parent is myopic. That number jumps to 50% if both are myopic.**

Environmental factors also play a role in developing myopia. They include activities like time spent doing close work on a computer or tablet or reading while not spending enough time outside.

Why can't my child just wear glasses to correct their vision?

Myopia is a diagnosed health condition, and the diagnosis and treatment of myopia is more than just "needing glasses". Conventional glasses and contact lenses can help children to see more clearly, but they do not slow down the progression of myopia. This means that as children grow, their myopia may progress, requiring stronger prescriptions, and their lifelong risk for certain other eye diseases increases.

There is a strong association between higher degrees of myopia and the risk of more serious eye conditions as your child gets older, and even into adulthood. This includes diseases like macular degeneration, retinal detachment, glaucoma, and cataracts, all of which can potentially cause blindness. **In fact, once a child's myopia goes beyond -4.00D, the risk for these conditions goes up about ten times.** So it's important to take steps to try to prevent his or her eyes from getting worse over time.

Progressing to high myopia also reduces the possibility of being a candidate for refractive surgeries such as LASIK as adults and increases the risk for complications from these treatments, causing unpredictable results. Because high myopia has risks of glaucoma and retinal detachment, many surgeons will not perform corrective surgery on highly myopic patients as the possible benefits from the surgery may not justify the risks.

How can I help my child today?

The greatest way to help is to initiate a myopia management program with your eye care provider sooner rather than later. Even if you elect not to initiate a myopia management program for your child, you can start to help your child with the following simple steps. First, practice healthy screen time habits like the 20-20-20 rule. To help prevent digital eye strain, encourage your child to take a 20 second break to view something 20 feet away every 20 minutes while they're using digital devices. Also, spending more time outside can make an impact when it comes to your child's vision health. **Increased time outdoors in children decreases the risk of new myopia onset by 50% and can slow myopia progression. Kids who spend just 40 extra minutes outdoors each day lower their risk of getting myopia or developing more severe myopia.**

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Who should be treated?

Any child who is currently myopic, or who is likely to become myopic (termed pre myopia) should consider treatment.

What are the risks and benefits of Myopia Control?

Benefits of lowering levels of myopia include better uncorrected acuity, better corrected visual acuity, improved vision related quality of life, and reduced dependence on correction.

Likewise, a person with myopia is likely to consider refractive surgery to correct their refractive error after they reach adulthood. In this regard, the lower the level of myopia, the higher the likelihood of minimal residual refractive error, leading to better postoperative vision and fewer secondary surgical enhancements. Furthermore, postoperative visual quality is poorer in patients with higher levels of preoperative myopia.

Despite these visual and refractive surgical benefits of lower levels of myopia, **the greatest benefit of lower levels of myopia is a reduced risk of blinding eye diseases such as myopic maculopathy, cataract, retinal detachment, and glaucoma.**

Each extra diopter of myopia increases the prevalence of myopic maculopathy by 58%, cataracts by 21%, and retinal detachment by 30% . Restated, controlling myopia progression such that a patient's myopia is lower by 1 one diopter should reduce the likelihood of myopic maculopathy developing by 37%. This treatment benefit is constant across a range of myopia severities.

Regardless of age, an eye with refraction of -1.00 to -3.00 has a 4x increased risk of retinal detachment vs a non nearsighted eye. An eye with refraction more than -3.00 has a 10x increased retinal detachment risk.

When to treat?

In 2021, the International Myopia Institute released a comprehensive review of risk factors of myopia and supporting studies that can be used as a guideline for parents and practitioners when considering myopia control treatment.

In the past it was not until the child was already showing signs of myopia before intervention occurred. However, as a result of newer studies, we can now determine the likelihood of the patient becoming myopic based on a combination of age, refractive error, and how quickly (or not) the childs eye is elongating (the axial length).

The Collaborative Longitudinal Evaluation of Ethnicity and Refractive Error (CLEERE) study found that normal elongation of the eye (axial elongation) was approximately 0.1 millimeter per year. If a child is progressing faster than this, they are likely to become more myopic, and myopia control treatment should be considered. At Spectrum Eye Center, we measure each child's axial length to help guide if and when treatment should be considered.

Another important aspect of the CLEERE study was to also identify the age and correlating refractive error cut-off point that would likely result in the child developing myopia. **The authors found that the younger a child was when they developed myopia, the faster they progressed. They also found that the following indicates a significant risk of high myopia...**

Age 6: refraction of +0.75 farsightedness or less
Age 7 and 8: refraction of +0.50 farsightedness or less
Age 9 and 10: refraction less than or equal to +0.25 farsightedness
Age 11: any refraction of plano (no prescription) or any myopic refraction

The CLEERE study was game-changing in the myopia field in that it was the first study to provide doctors and parents with evidence-based quantitative data that they could use to assess the risk of developing myopia BEFORE it developed. As the saying goes, an ounce of prevention is worth a pound of cure.

How to treat? (evidence-based approaches to myopia management)

There are several currently used techniques to manage myopia. This includes Misight myopia management lenses and medicated eye drops. Other treatments are on the horizon, and they include spectacles and red light therapy.

Soft multifocal contact lenses to manage myopia

The BLINK (Bifocal Lenses In Nearsighted Kids) study in 2017 was the first study to determine whether soft multifocal contact lenses could be a potential way to slow myopia progression. The authors found a **50% reduction in the progression of myopia and a 29% reduction in axial elongation over a 2-year period.** These results were significant enough to be considered a viable myopia treatment option.

MiSight contact lens to manage myopia

The Misight Lens is the first FDA-approved myopia control lens. In clinical trials, authors found that mean myopia progression and axial elongation **slowed by approximately 50% after 3 years with the MiSight lenses. Even after 6 years of follow-up, subjects did not show any clinically meaningful progression in myopia.** This is so far the longest-running soft multifocal study and therefore provides strong evidence of its long-lasting efficacy.

Atropine to manage myopia

Multiple studies have proven that atropine is effective in slowing myopia progression. The Atropine for the Treatment of Myopia (ATOM) studies were the first major studies that evaluated the effectiveness of atropine.

The **ATOM 1** study compared the use of 1% atropine in one of the subject's eyes compared to the other (non treated) eye. The 1% atropine was effective in slowing myopia control for both refractive error and axial length. However, there were significant side effects, such as blurry vision and reduced accommodation. Also, when the study authors discontinued 1% atropine after 2 years and followed subjects for another year, the eyes started to progress at the rate before atropine was started.

Due to the significant side effects of 1% atropine, the **ATOM 2** study was created to establish the safety and efficacy of various lower levels of atropine concentrations (0.01%, 0.1%, 0.5%, and 1.0%). The authors determined that lower concentrations of atropine showed nearly the same amount of progression as higher concentrations but without the side effects associated with 1% atropine.

The Low-Concentration Atropine for Myopia Progression (LAMP) study built upon the **ATOM 2** study by testing 0.01%, 0.025%, and 0.05% atropine concentrations. Interestingly, they determined that the higher concentration was the most effective concentration of slowing diopter and axial length growth with minimal side effects. This study was important since many practitioners were able to safely increase the dosage of atropine if 0.01% was not effectively reducing myopia progression in patients.

Currently, the ATOM group is working on a study that explores the effects of 0.01% atropine for pre-myopes and low myopia in order to determine if early prevention is clinically beneficial for patients.

Atropine combination therapies to manage myopia

Recent studies have been evaluating the effect of combining atropine with other myopia control treatments. Some found a synergistic effect of combined therapy that plateaued at 6 months. Some studies exhibited a significant reduction in myopia progression for children with lower myopia but not those with higher myopia. Therefore, combination therapies may become part of current myopia control treatments in the near future as more data is obtained to allow practitioners to tailor their treatments.

Spectacles to manage myopia

The jumpstart to the "myopia control wave" occurred thanks to the Correction of Myopia Evaluation Trial (COMET) study. The authors found a statistically but not clinically significant difference in myopia progression in the progressive bifocal (PAL) group vs. single vision lens (SVL) group.

After the COMET study determined that PALs were ineffective, many researchers and clinicians moved away from spectacles as a myopia control treatment option. It was not until recently (some 20 years later) that new spectacles designs were developed and tested.

Myopia-correcting spectacles from Zeiss and Essilor

Zeiss developed a lens known as Myovision. A study found a **20% reduction in refractive error change in Chinese children ages 6 to 12 years, but no significant reduction in axial length.**

Essilor designed the Myopilux Max and their research team compared single vision lenses group to executive bifocal lenses with prism. The bifocal groups showed a significant reduction in refractive error compared to the control group.

Myopia-correcting spectacles from Hoya

The MyoSmart lens has a unique design and is manufactured by Hoya. In a 2020 study, the authors found a **52% reduction in myopia progression and a 62% reduction in axial elongation** compared to control groups.

One of the most promising lenses is based on a Highly Aspherical Lens Technology (HALT) design that consists of a constellation of aspherical lenses spread over 11 rings. A 3-year study is currently underway studying the effects of this lens in myopia control. **The first-year results demonstrated a reduction of myopia progression by 60% and axial length elongation by 28%.**

Red-light therapy

Red-light therapy is a relatively new myopia control treatment that has been studied the last couple of years. Researchers theorize that exposing children to red light could have potential slowing effects on myopia.

A 2023 study investigated the safety and efficacy of red-light therapy in slowing myopia progression. The authors found that the red-light therapy at 100% power significantly reduced myopia progression over a 6-month period. Another study in 2022 found a significant reduction in refractive error and axial length after 12 months with no structural damage. Further studies with longer follow-ups are needed to determine if this is truly a clinically effective treatment.

When to monitor and adjust myopia treatment

The International Myopia Institute created a Clinical Management Guidelines Report with recommendations for management schedules depending on treatment type selected. They determined that after initiating treatment, patients should be followed approximately 1 week, 1 month, 3 months, and 6 months after treatment.

Additionally, every 6 months, dilated refractions and axial length measurements should be performed. These are generic guidelines....follow-up schedules are adjusted and customized for each individual patient.

How do we know if the treatments are actually working?

One way is to look at how long the eye is becoming (called axial length). Based on the CLEERE study, it was determined that before age 10, the normal axial length change in children who DON'T become myopic ranges from 0.1 to 0.2mm/year. After age 10, a change of 0.1 mm/year or less is normal.

Furthermore, any refractive error >0.50D change per year is considered abnormal. **Therefore, if axial length changes more than 0.2mm/year or refractive error >0.5D/year it may be time to consider another therapy or combination therapy.**

How do we know whether to switch/combine treatment modalities?

If the current treatment is not slowing progression and axial length by the desired effect, we may switch to another treatment modality or consider combination therapy.

When to discontinue myopia treatment

Unfortunately, studies have not obtained enough conclusive data as to what age is appropriate to discontinue myopia control. What we do know is that stabilization of myopia is believed to naturally occur around early to mid-20s. Under the International Myopia Institute, researchers have come to a consensus that if the patient's refractive error shows <0.25D change over a 1- to 2-year period, progression is likely minimal, we can consider discontinuing treatment.

After discontinuing treatment, it is important to monitor refractive error and axial length regularly for the first year to check for a rebound or accelerated "catch-up" rate that would offset the myopia control gains.

Myopia facts....

25% of patients with an axial length of more than 26 will develop visual impairment by age 75.

The ocular risks associated with myopia should not be underestimated

The potential benefits of myopia control outweigh the risks.

Although high myopia carries the highest risk of complications and visual impairment, low and moderate myopia also have considerable risks. These estimates should alert policy makers and healthcare professionals to make myopia a priority for prevention and treatment. - "Complications of Myopia" at nih.gov

Myopia quotes....

"It might seem, on the face of it, to just be another annoying vision problem needing glasses. But myopia isn't just a blurry vision thing."
– **Dr. Kate Gifford,** clinical optometrist, researcher, peer educator, and professional leader.

"Classically, we haven't thought of myopia as a disease, but, based on the latest science, we should."
– **Thomas Aller,** O.D.

"I am a highly myopic patient myself. I developed cataracts in my thirties. I see patients every week who suffer the devastating nature of the diseases associated with high myopia. I wish my parents would have been able to provide myopia management for me. I'm glad it's now available to my patients, my children, and any future grandchildren"
- **Keith Poindexter,** O.D.

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