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Information resource for myopia control

What is myopia?

Myopia is blurry long-distance vision, often called 'short-sightedness' or 'near-sightedness'. A person with myopia can typically see clearly up close – when reading a book or looking at a laptop screen – but words and objects look fuzzy on a whiteboard, on television, across the room, when looking outdoors or when driving.

Why is myopia a concern?

The rate of myopia is growing across the world, increasing from 22% of the world's population in 2000 to 33% in 2020 – half of the world's population expected to be myopic by 2050.[1] Most myopia is caused by the eye length growing too quickly in childhood. The eyes are meant to grow from birth until the early teens and then cease, but in myopia the eyes grow too much and/or continue growing into the teenage years. Once a child becomes myopic, their vision typically deteriorates every 6-12 months, requiring a stronger and stronger prescription. Most myopic children tend to stabilize by the late teens and early 20's.[2] Excessive eye growth raises concern because even small amounts of stretching can lead to increased likelihood of vision threatening eye diseases in later life, such as myopic macular degeneration, retinal detachment, and cataract.[3,4]

Why manage myopia in children?

Myopia progresses fastest in younger children, especially those under age 10.[5] This means that the most important opportunity to slow eye growth is when children are younger. Myopia management aims to apply specific treatments to slow the excessive eye growth to a lesser rate. Experts agree that myopia management should be commenced for all children under age 12,[6] and typically continue into the late teens.[7]

The short-term benefit of slowing myopia progression is that a child's prescription will change less quickly, giving them clearer vision for longer between eye examinations. **The long-term benefit** is reducing the lifetime risk of eye disease and vision impairment. This risk increases as myopia does[3] with the good news being that reducing the final level of myopia by only 1 dioptre reduces the lifetime risk of myopic macular degeneration by 40% and the risk of vision impairment by 20%.[8]

Treatments for slowing myopia progression

Standard, single-focus long distance spectacles or contact lenses do not slow down the progression of childhood myopia.[8] Instead, specific types of spectacles, contact lenses and eye drops called atropine have been proven to slow myopia progression in children.[6]

350 MLK Jr Blvd.
Savannah, GA 31401
912.483.6600
912.454.6040
info@forsighteye.net
www.ForSightEye.net

The best option for your child will depend on their current prescription and other vision and eye health factors determined in their eye examination. Your eye care practitioner will discuss the options with you to determine the best option. Treatment options vary across the world due to availability, supply and regulatory reasons. **It is important to note that no treatment can promise the ability to stop myopia progression in children, only to slow it down.**

Spectacles

Standard single-focus spectacles do not slow the worsening of childhood myopia but specific designs do. Myopia controlling spectacles can both correct the blurred vision of myopia and work to slow down myopia progression. They are safe to wear and adaptation is typically easy, with the only side effects being related to the limitations spectacles pose for sport and active lifestyles.

Contact lenses

Standard single-focus contact lenses do not slow the worsening of childhood myopia but specific designs do. These specific designs can both correct the blurred vision of myopia and work to slow down myopia progression. The options include soft myopia controlling contact lenses and orthokeratology.

Risks and safety

Contact lens wear increases the risk of eye infection compared to wearing spectacles, with the risks being:

- 1 per 1,000 wearers per year for reusable soft contact lenses or overnight orthokeratology lenses[9,10]
- 1 per 5,000 wearers per year for daily disposable soft contact lenses[9]

With proper hygiene and maintenance procedures, this risk can be well managed – especially by avoiding any contact of water with contact lenses or accessories.[11] Other side effects of contact lenses to control myopia can be temporary adaptation to the different experience of vision, which typically resolves in 1-2 weeks.

Benefits

There are many benefits to children wearing contact lenses:

1. Wearing contact lenses improves children's self confidence in school and sport, and their satisfaction with their vision – as much as it does for teens[12]
2. Children aged 8-12 years appear to be safer contact lens wearers than teens and adults, with a lower risk of eye infection[13]
3. Children only take 15 minutes more to learn how to handle contact lenses than teens[14]

Orthokeratology contact lenses are worn overnight and removed upon waking, such that no spectacles or contact lenses are required for clear vision during the day. They can require more appointments for fitting than other types of myopia control treatment. Adaptation to the lens-on-eye feeling can take 1-2 weeks but shouldn't affect sleep.[17] There are significant benefits for water sports and active lifestyles, and since the contact lenses are only worn at home there is low risk of them being lost or broken during wear.

Soft myopia controlling contact lenses are worn during waking hours. They may be daily disposable, or reusable for up to a month. They typically require more appointments for fitting than spectacles but less than orthokeratology. Adaptation to the lens-on-eye feeling typically occurs in a few days. There are benefits in safety with daily disposables being the safest modality, and the number of lenses retained meaning loss or breakage is less of a practical issue.

Atropine eye drops

Atropine eye drops in strong concentrations (typically 0.5% to 1%) are used to temporarily dilate the pupil of the eye and stop the focussing muscles working in a variety of clinical applications. Atropine eye drops for myopia control, though, are a low-concentration (0.01% to 0.05%) with much fewer such side effects. Spectacles or contact lenses are still needed to correct the blurred vision from myopia, as atropine only acts to slow myopia progression.

Risks and safety

The risks and side effects of atropine are as follows:

- Potential side effects of increased sensitivity to light due to larger pupil size, which is typically resolved with light-sensitive glasses or sunglasses. One study found around a third of children requested these types of glasses, but this was the case even in the placebo (untreated) group.[15]
- Problems with close-up focussing, which is typically resolved with glasses providing a stronger power for reading. One study found this only occurred in 1-2% of children treated with low-concentration atropine.[15]
- Eye irritation or mild allergy, which can occur in 2-7%,[15] although this can depend on the formulation of the atropine.

Atropine can be toxic and even fatal to small children if it is ingested in high quantities by mouth, but high quantity absorption via the eye is unlikely.[16] Medication safety in the home is extremely important.

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Benefits

Atropine eye drops are typically used at night time, before sleep, so are only utilized in the home environment. They are also ideal if the effective spectacle or contact lens options for myopia control are not suitable or not available for your child.

For more scientifically-based, independent advice on childhood myopia and its management, go to mykidsvision.org.

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Suggested shorter reference list for parents

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