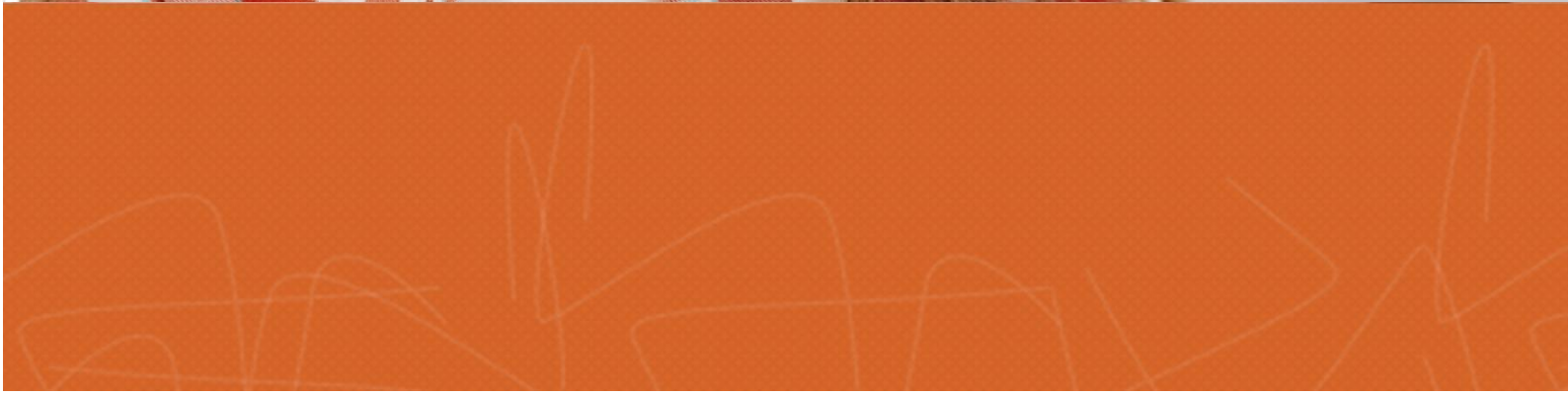


the eyepractice

Myopia Control

How do you slow or halt your child's short-sightedness?

Dr Jim Kokkinakis



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Introduction



It's official. We are in the midst of a myopia epidemic. Levels of myopia (short-sightedness) are reaching staggering levels in East Asian school-children and rising steadily in Australia.

Optometrists are continually seeking solutions to prevent, manage and control myopia. Here at The Eye Practice, we use a range of proven techniques to prevent, slow down, or even stop myopia in its tracks.

You might ask, 'Why not simply correct myopia with the appropriate glasses or contact lenses?'

The reason why is because myopia is **more than just short sight**. It affects the health of the whole eye. The more myopia you have, the higher your risk of developing several sight-threatening eye diseases, including glaucoma, macular disease and retinal detachment.

Low-dose atropine eye drops have been used for years to slow down the progression of myopia in children. The ultra-low dose not only provides more long-lasting results (compared to higher doses) but it very rarely results in side effects (such as light sensitivity, blur or headache).

Ortho-K is a special type of contact-lens treatment where hard lenses are worn at night, during sleep only, in order to mould the cornea to a normal shape for clear focus without glasses or contact lenses. With the latest lens designs and technology for mapping the shape of the eye, ortho-K has regained its rightful place in the prevention of myopia in kids and teenagers.

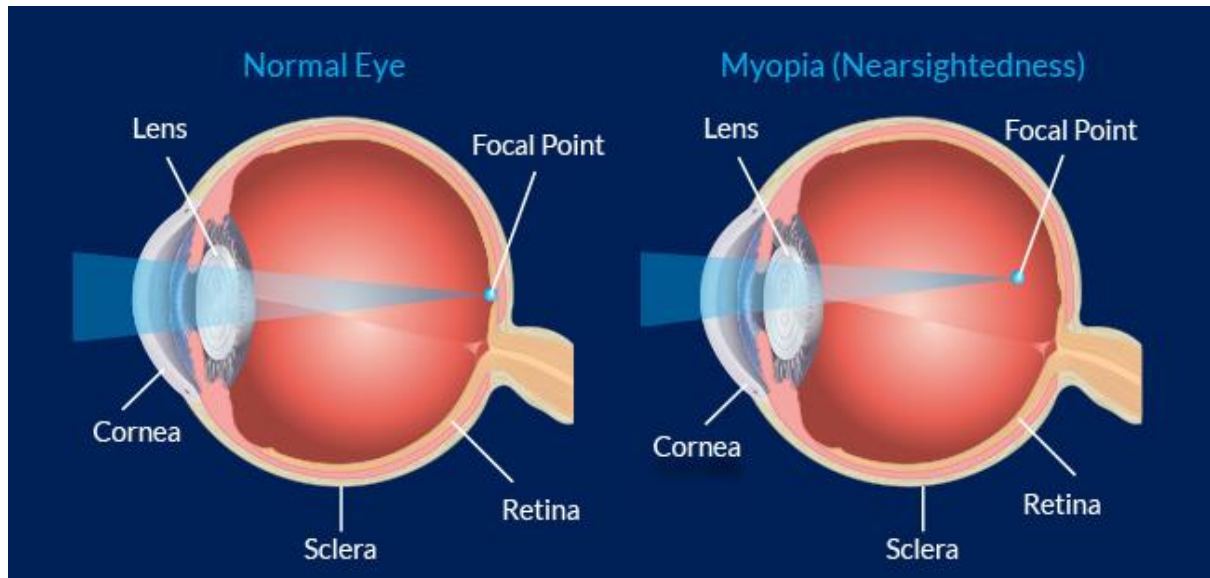
Multifocal contact lenses and glasses can also slow or halt your child's myopia. By allowing their eyes to relax for close work, multifocals reduce the progress of myopia.

Wondering if anything can be done to slow or stop your child's myopia from getting worse? Read on for the latest information that can help your child's vision.

Jim Kokkinakis

What is myopia and what causes it?

Myopia – or short-sightedness – occurs when light from distance objects is focussed before it reaches the retina at the back of the eye. By the time it reaches the retina, the image is out of focus. This happens when the front surface of the eye – the cornea – is too curved, or, the distance from the cornea to the retina is too long.



Causes

Studies show that both genes and environment play a crucial role in the [development of myopia](#) in children. These factors include having parents who are myopic, increased near-work such as reading and digital devices, and reduced time playing outdoors.ⁱ

From an evolutionary perspective, the human eye has (until very recently) been slightly long-sighted or normal (with no refractive error). A famous clinical study on Eskimo populations showed a huge difference in the occurrence of myopia between the older and younger members of this population; in the over 40's, myopia was virtually unheard of (1.5% incidence), while young Eskimos (under 40) had an incidence of myopia of about 50%.ⁱⁱ

Even though close work is an essential part of education in everyone in industrialised countries, only a certain percentage ultimately develop myopia.¹² Therefore, the development of myopia in children must also involve genetic factors. But even in these genetically susceptible kids, the modern environment is the trigger, particularly excessive near work (digital devices and reading).

The facts about myopia

Myopia today

It is currently estimated that about 90% of teenagers and young adults in East Asia are myopic (or short-sighted)ⁱⁱⁱ. In some cities, such as Seoul, over 96% of 19-year-old males are short-sighted.

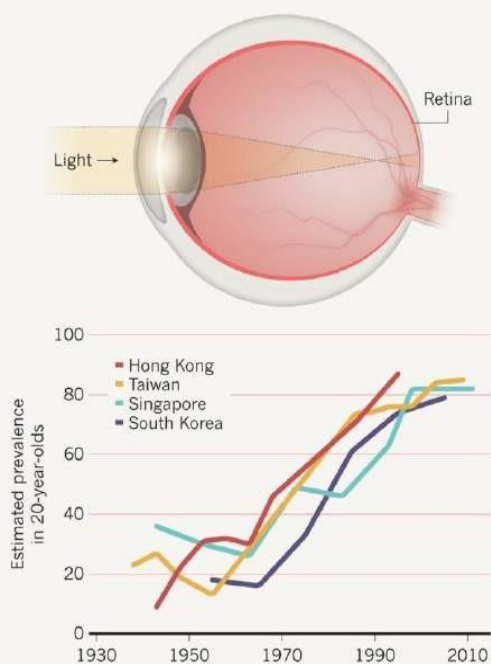
In the USA, the rate of myopia has almost doubled within the last three decades to about 42% of the population^{iv}. Myopia is also increasingly common amongst Australian school-aged children, with up to 40% of the population being affected^v. Young children who are myopic tend to become more myopic each year^{vi}. This trend continues into adulthood and is referred to as 'myopic progression'.



In Australia and New Zealand: Myopic population to increase from 5 million (2000) to 22 million (2050) – (Brien Holden, Vision Institute).

THE MARCH OF MYOPIA

East Asian countries have seen a steep rise in short-sightedness over the past 50 years. The condition is caused by a slightly elongated eyeball, which means that light is focused just in front of the retina instead of on it.



Not just glasses

As well as causing blurry distance vision, myopia (particularly high myopia) increases the risk of certain eye diseases that can threaten vision, including retinal detachment and glaucoma. This is because in the short-sighted eye, all the delicate structures are stretched – sometimes to breaking point. Because of this, there has been a huge amount of scientific research into various treatments for preventing myopia or slowing or halting it from getting worse. This is commonly referred to as 'myopia control'.

Source: Ian Morgan, Australian Natl Univ.

Myopia management versus myopia control

Myopia *management* aims at giving clear distance vision, commonly in the form of spectacles prescribed by an optometrist. Myopia *control* on the other hand aims to provide clear distance vision in addition to *slowing down or halting the progression* of myopia.

Various methods of myopia control have been studied over the years, including atropine therapy, exposure to sunlight, orthokeratology (ortho-K) contact lenses and multifocal glasses and contact lenses:

- **Atropine therapy** involves the on-going use of prescription eye drops. A recent five-year study has shown that this therapy does in fact reduce myopia progression.
- Exposure to sunlight by increasing **time outdoors** has been shown to reduce the chance of developing myopia in the first place, but does not seem to have as great an effect on progression once it has begun^{vii}. Recent studies have looked at how 'outdoor classrooms' made from glass walls can provide more exposure to light for schoolchildren.
- Several studies have shown that **ortho-K contact lenses** successfully reduce the rate of myopia progression in school aged children by about 45%^{viii}.
- **Multifocal glasses and contact lenses** have also been successfully used to prevent or slow the progress of myopia in children.

Current research seems to suggest that atropine drops and ortho-K lenses have the greatest effect at slowing down myopia, followed by the other methods. You can **compare** the effectiveness of the various methods of myopia control using the [Myopia Calculator](#) (developed by Brien Holden Vision Institute).



Consulting with an optometrist who is experienced in using these methods to reduce the progression of myopia is imperative to ensuring that your child receives a suitable, customised treatment plan.

Atropine therapy

The evidence is clear; clinical studies investigating the effects of [atropine eye drops](#) on myopia progression have overwhelmingly shown a beneficial effect of treatment^{ix}.

When used in eye drop form, the drug atropine works by temporarily blocking certain muscle receptors in the eye. In high doses, this results in a dilated pupil as well as blurry reading vision. Atropine slows down myopia progression by physically slowing down the abnormally large growth of the eyeball that occurs during myopia development. It is not yet known how this effect occurs. Atropine eye drops are also used in children with other eye conditions, such as lazy eyes.

Some limitations to the clinical studies include the fact that the children participating were predominantly of Chinese background, and a consensus has not yet been reached as to the best timing and duration of treatment.

Whilst there has been a variety of atropine dosages used in the studies, the good news is that myopic progression has been slowed quite successfully with a very low concentration of the drug. This means that the risk of any side effects is potentially greatly reduced, and the drops become much more tolerable to use^x.



The benefits of using eye drops rather than other methods to slow down myopia progression, is that treatment is simple, quick and effective, and there is no on-going hassle of wearing and looking after contact lenses. Unfortunately, there are some possible side effects of using the drops (such as stinging on instillation, the potential for blurry vision and light sensitivity) which may not be acceptable for the patient, and which make wearing contact lenses a better option.

Time spent outdoors

There has long been an association between doing lots of close-work and being short-sighted.

Children who spend more time indoors reading are more likely to develop myopia compared to children who spend most of their time outdoors.



This has been confirmed both anecdotally and by many clinical studies.

We know that encouraging our kids to play outside will hopefully lower their chances of becoming short-sighted...but what if they are already short-sighted? Will spending more time outside help to prevent the myopia from getting worse?

Historically, research has shown that outdoor activity is much more effective at *preventing* myopia rather than slowing it down once it has started. The most recent research suggests that atropine therapy and orthokeratology are two of the most effective treatments for slowing down myopic progression after it has begun.

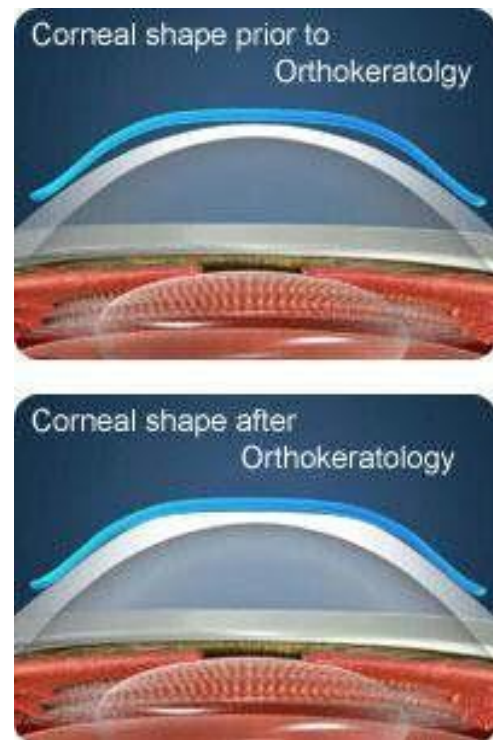
More recent studies, however, suggest that being outside may still have a role to play in helping slow down short-sightedness; Chinese myopic school aged children that spent their lunch breaks inside the classroom reportedly had more worsening of their short-sightedness over two years compared to children who were made to play outside during breaks^{xi}.

In any case, encouraging kids to spend time outside is not just helpful at preventing (and possibly slowing down) myopia, but is of course also beneficial for their overall health and well-being. Current research, however, shows that other options, such as atropine or ortho-K, should definitely be considered for myopic children as they seem to have a stronger effect as slowing down myopia once it has begun.

What is orthokeratology?

Orthokeratology – or [ortho-K](#) – is a specialised way of reversing (or reducing) myopia (or short-sightedness) through the use of rigid contact lenses at night during sleep. The lenses mould the cornea to a flatter shape, to allow clear focus with the naked eye.

In a normal eye, the light entering the eye is focussed by the front surface (or cornea) of the eye onto the retina at the back of the eye. In this way the eye acts much like an SLR camera: the cornea is like the camera lens and the retina is like the film inside the camera. The cornea needs to have just the right curvature to focus the light clearly onto the retina. If your cornea is too flat, you are long-sighted. If it is too curved, you are short-sighted. By flattening the cornea as you sleep, ortho-K lenses reverse your myopia so you can see clearly next morning when you get out of bed. Well, that's the theory anyway...



Who is suitable for ortho-K?

Patient selection is a big factor in how successful ortho-K will be. To be a candidate, your child should be at least ten years old (although we do fit kids as young as 8 if they are of the responsible, mature variety). Your child should ideally be short-sighted between about -1.00 and -6.00. Astigmatism is okay too. Their cornea also needs to be a suitable shape to allow reshaping to occur with the overnight lens wear. A special map of their cornea is produced during the initial consultation and this provides a lot of information on suitability.

As professional providers of premium eye care, we need to be confident that your child is capable of caring properly for their ortho-K lenses. They must also understand the importance of strict hygiene protocols and wearing regimens. This is why we don't have a set minimum age for ortho-K; one 8-year-old can be a much better candidate than another 15-year-old, because of compliance and maturity issues. Parental supervision and help with insertion, removal and care of the contact lenses is encouraged, especially with younger children, so we also look at availability of parents to help their children and work schedules, overseas or interstate travel commitments and so on when deciding who is suitable for ortho-K.

Orthokeratology FAQs

What will the initial consultation involve?

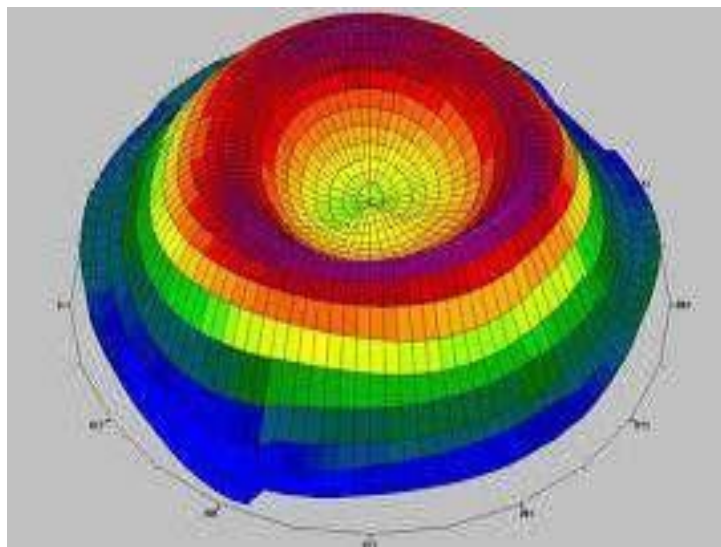
The initial consultation for ortho-K will include a thorough eye examination to confirm your child's spectacle prescription and to make sure their eyes are healthy. Following this, a scan of their cornea (clear front part of the eye) will be taken using a corneal topographer. This is a specialised machine which cannot be found in many general optometry practices. The topographer is essential for determining suitability for treatment, fitting the lenses and also assessing treatment progress over time.



Once suitability for treatment is confirmed, lenses will be fit onto the eye. Another appointment will be made for the morning after the first night of wearing the lenses, to ensure that the treatment is starting to work.

Are there any risks with ortho-K?

As ortho-K involves the use of contact lenses, there are some associated risks including the very small chance of corneal infection. With proper handling and good hygiene (such as hand washing and lens cleaning), as well as regular follow-up appointments, these risks are minimised. The health and vision of the eyes are checked at every follow-up appointment to ensure ongoing treatment success. Safety is always at the forefront of our mind when looking after the eyes of children and teenagers.



How many appointments are needed?

Following the initial consultation, an appointment will be made for the first morning after wearing the lenses to assess the effect of that first overnight wear. Following this, appointments are made on a case-by-case basis (e.g. weekly or monthly) until the treatment is seen to be going well. Any appointments or lens-parameter changes that are required during the first three months are included in the fees.

How long do ortho-K contact lenses last?

With proper care and cleaning, the lenses can last from 12 months to three years. During treatment, it may be necessary to change the lenses periodically as the eye changes shape and / or the prescription changes.

Does ortho-K really work?

Yes! Absolutely. In the hands of an experienced ortho-K practitioner, you can quickly determine if ortho-K is going to be a success for your child or teenager. It is particularly good for kids and teens who struggle with disposable contact lenses and who wish to play sports or do activities that are hampered by glasses. Ortho-K has been around for decades but practitioners often struggled with getting good results in the past. With the latest technology and specialist lens designs, a successful fit is far more likely.

Does ortho-K slow down myopia progression?

Ortho-K also works to slow down or halt the progression of short-sightedness and this is what has driven its huge popularity in places like East Asia where there is an epidemic of myopia. By flattening the cornea each night, it keeps the eye seeing clearly without glasses for longer.

What do I do next?

If you're interested in ortho-K for your child or teen, the first step is an initial consultation with one of our contact lens specialists to assess suitability. This consultation includes a comprehensive eye examination and can also form the basis of a discussion around other options for your child, such as atropine, glasses or disposable contact lenses.

Multifocal glasses and contact lenses

Decades before atropine eye drops or ortho-K therapy became successful in myopia control, many optometrists used multifocal glasses to prevent myopia or slow its progression. These options are still valid today and provide a very non-invasive option for myopia control.

Normally, the eye is relaxed when looking in the distance, but has to focus (or work) to read up close. This focussing effort can be a factor in the progression of myopia. Multifocal glasses and contact lenses slow or halt this effect by making the reading vision just as relaxed as the distance vision.

Multifocal glasses for myopia

Most optometrists are familiar with prescribing multifocal glasses to prevent or slow myopia in kids. In terms of control, evidence suggests that spectacles with bifocal or multifocal lenses can reduce the progression of myopia by 38–47% in some children.^{xii}

Multifocal contact lenses

Soft multifocal contact lenses have been shown to significantly slow the progression of myopia. Early studies have shown that soft multifocal contact lens wear in children resulted in a 50% reduction in the progression of myopia compared to a control group over a 2-year treatment period.^{xiii}



Which therapy works best?

A therapeutically-qualified optometrist with experience in myopia control will give you the best advice on which strategy for myopia control would best suit your child. They will take into consideration a number of factors including age, maturity, shape or cornea, level of myopia and rate of progression.

You can also compare the effectiveness of these methods using the [Myopia Calculator](https://calculator.brienholdenvision.org/) (developed by Brien Holden Vision Institute). <https://calculator.brienholdenvision.org/>

Simply enter your child's ethnicity, age and current prescription (also called refractive error) and it will estimate their myopia at a future age without treatment as well as with a range of myopia control treatments. The calculator gives a control-rate score to each treatment option currently available, so you can compare strategies.



Next steps

Young children usually have slightly longsighted eyes, which become normal as the eye grows. If your child is having trouble seeing in the distance, have their eyes tested. If they are even slightly short-sighted, investigate the options available to stop their myopia from getting worse. Remember – myopia is not just a pair of glasses – it's a lifetime of increased risk of eye diseases including sight-threatening conditions like retinal detachment.

Call The Eye Practice on (02) 9290 1899 for more information



About the Author

Dr Jim Kokkinakis is one of Australia's most experienced optometrists and is well known amongst his peers as an expert in contact lens fitting. Many colleagues from far and wide refer their patients to Jim's practice in the Sydney CBD. Over the past three decades he has worked alongside world-famous contact lens fitters and ophthalmic surgeons.

Over the years, Jim has seen how prevalent myopia has become, especially in the wake of the digital age. At *The Eye Practice*, Jim now has one of the best equipped contact-lens practices in the country. His recently acquired sMAP3D technology – the first in Australasia – allows him to map the entire front surface of the eye for a more successful contact lens fit. He, and his associate optometrist, Dr Alex Koutsokeras, are firm advocates of atropine therapy and ortho-K for the appropriately selected patient and are passionate about myopia control in teenagers and kids.

His commitment to excellence sets him apart.

Career Highlights

- Senior lecturer and clinical supervisor at the Optometry School (UNSW)
- Co-author of Keratoconus – A User's Manual
- One of only 40 full members of The International Society of Contact Lens Specialists
- Lectured internationally on advanced contact lens fitting, dry eye treatment and computer vision syndrome
- One of Australia's first optometrists to be qualified in Ocular Therapeutics

Call today on (02) 9290 1899 for an appointment with [Dr Jim Kokkinakis](#) or Dr [Alex Koutsokeras](#)

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