

In summary, topical atropine can slow down nearsightedness progression in children. However, its application has to be considered on individual basis. Regular monitoring is needed when using the eyedrops.

### Can glasses reduce nearsightedness progression?

One of the hypotheses of preventing nearsightedness progression is to control accommodation. However, the evidence for arresting or preventing nearsightedness progression by progressive lens is very weak and not well established. Newer type of lenses with defocus technology may help to slow down nearsightedness progression. More and longer term studies are warranted to determine the effectiveness.

### Can contact lens reduce nearsightedness progression?

Some studies found that there was no difference in nearsightedness progression between children wearing Rigid Gas Permeable (RGP) lens and those wearing spectacles.

Orthokeratology (Ortho-K, OK lens), which was introduced in the 70s, uses flat, rigid contact lenses to decrease the curvature and refractive power of the cornea. Lenses are changed to flatter ones progressively. After the cornea has been sufficiently flattened, retainer lenses are usually worn at night to preserve the modified shape, otherwise the eye will revert back to the original corneal curvature and refraction. Parents must be aware that there are potential risks associated with contact lens wearing, such as corneal abrasion, ulcer and infection, leading to permanent loss of vision.



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## Refractive Error in Children

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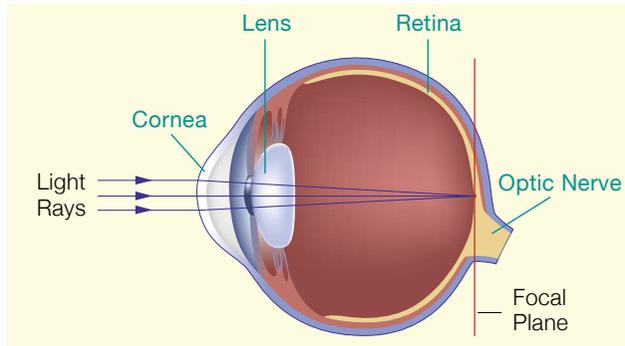
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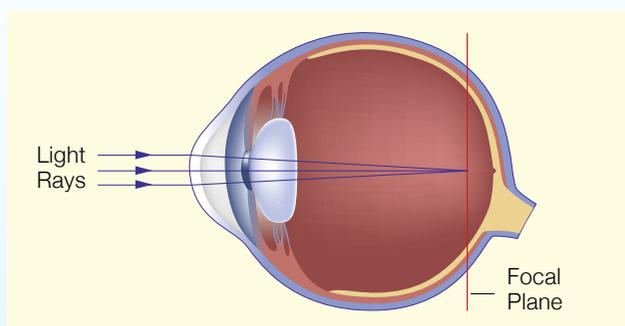
## Normal Vision



## Nearsightedness

Nearsightedness (myopia) is the most common eye problem in the world. This phenomenon is even more prevalent in Hong Kong. Studies show that 50% of primary school children in Hong Kong suffer from nearsightedness.

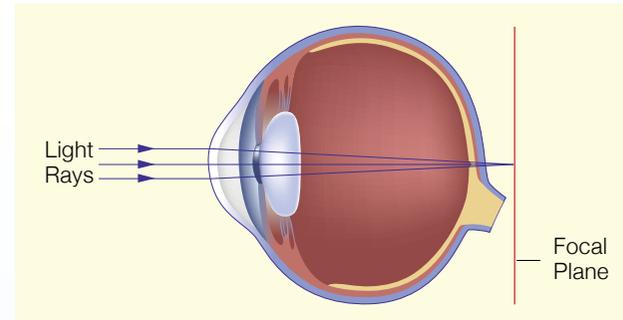
Nearsightedness is usually due to elongation of the eyeball. Thus, the object is focused in front of the retina. A child with nearsightedness typically complains of blurry vision for distant objects, but is less so when seeing near objects. The child will have difficulty in reading the blackboard and may also squint his/her eyes when looking at distant objects.



## Farsightedness

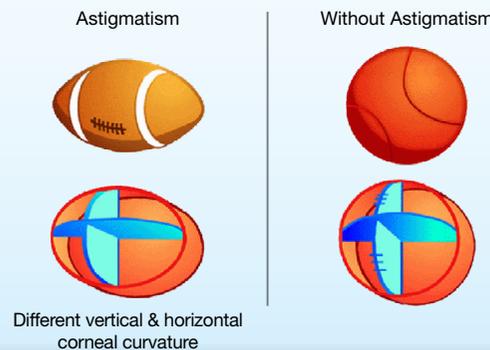
Farsightedness (hypermetropia or hyperopia) is less common than nearsightedness amongst Hong Kong children and it is due to relatively short eyeball.

The symptoms of farsightedness are less obvious than nearsightedness. If a child only has mild farsightedness (less than 2D or 200 degrees), the elasticity of his/her lens helps to keep things in focus and he/she can see rather clearly. However, if the child has severe farsightedness, he/she will have difficulty in focusing and thus will see poorly. The child may even develop squint (strabismus) and lazy eye. Under these circumstances, the child must wear glasses.



## Astigmatism

In astigmatism, the curvature of the cornea is different along different axes. As a result, light rays entering the eye are focused at different points instead of a single point. This will create a blurry image. The child may suffer from eyestrain and may squint his/her eyes or adopt a head tilt. A child with high astigmatism requires glasses.



## Prevention of Progression of Nearsightedness

The causes of nearsightedness and its progression are still unknown. Both genetic and environmental factors, including lack of outdoor activities, play a role. Nearsightedness progression is more significant in children between 6-12 years old.

While wearing spectacles or contact lenses can improve vision for children with nearsightedness, both methods may cause inconvenience and wearing contact lens may even give rise to complications.

High myopia is associated with higher chance of eye diseases, such as retinal detachment, macula haemorrhage, cataract and glaucoma etc.

## Atropine eye drops

Studies on the effectiveness of atropine eye drops (0.5 to 1.0%) in reducing nearsightedness progression started as early as in the 70s. Atropine is a non-selective antimuscarinic blocker. It can inhibit excessive growth of sclera and thus reduce or arrest nearsightedness progression. Studies showed that 0.5% and 1.0% atropine eye drops can slow nearsightedness progression by 75% and 80% respectively. However, atropine will cause pupil dilation and inhibit accommodation (zooming of lens to see near things), causing photophobia (light sensitivity) or blurry vision when seeing near objects. Photochromatic and progressive lenses may hence be required in children using atropine eye drops.

There were studies which showed that using lower concentration of atropine eyedrops (0.01%, 0.05%, 0.1%) can slow nearsightedness progression with less side effects. Atropine (0.01%) can reduce progression by 60%, but the average increase in pupil diameter or size is only about 1mm and 95% of children do not require progressive lenses for near vision.

In recent studies, 0.01%, 0.025% and 0.05% atropine eye drops reduced nearsightedness progression along a concentration-dependent response. All were well tolerated without adverse effect on vision-related quality of life.