

# Short Sightedness

Myopia is another word for short sightedness or near-sightedness, which is a type of uncorrected **Refractive error** and is a common cause of vision impairment. According to the **International Agency for the Prevention of Blindness (IAPB)** 28% of the world's population suffered from myopia in 2010. This number is predicted to increase to 34% by 2020 and 50% by 2050.

The prevalence of myopia in Australia is alarming, qualifying it as a public health crisis. It's been estimated that 36% of Australians will be affected by this type of refractive error by 2020, according to a study conducted by **The University of New South Wales**.

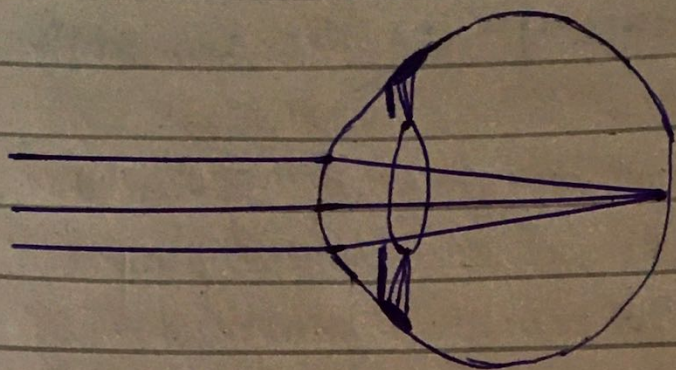
## MYOPIA =

Myopia is an eye condition where objects and images at the distance appear blurry. So ~~even~~ myopia is usually an inherited eye condition that occurs because the distance between the cornea (the clear protective outer layer) and the retina (the thin layer of tissue that ~~lines~~ lines the back of the eye on the inside) is too long. So, instead of the light focusing on the retina, it focuses in front of the retina.

The severity of myopia is measured in dioptres (D) and categorized into three stages, namely,

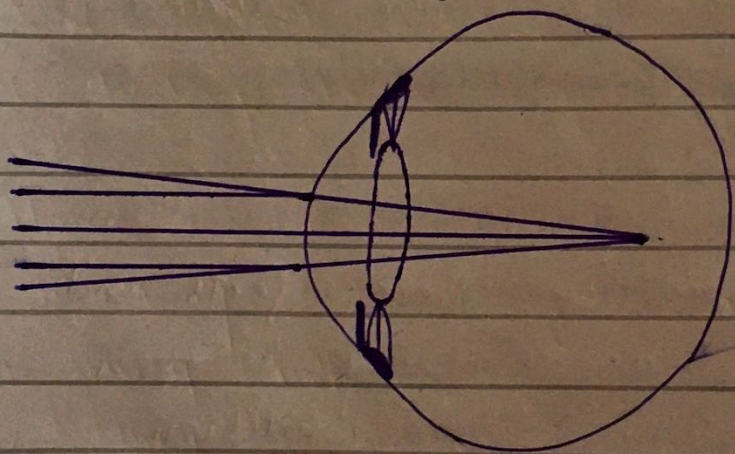


- 1- low myopia (from  $-0.5D$  to  $-2.99D$ )
- 2- Moderate myopia (from  $-3.00D$  to  $-5.99D$ )
- 3- High myopia ( $-6.00D$  and above).

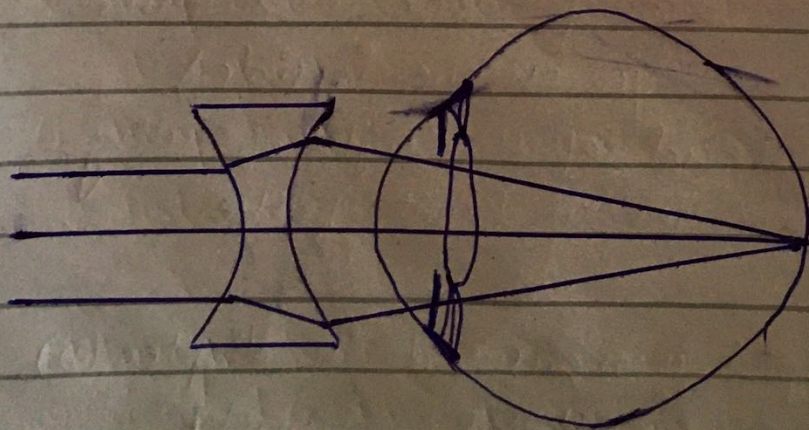


Normal eye

## Myopia



light focused in front of retina



Corrected with concave lens.



# Cause of Short-Sightedness

The causes of myopia are not far-fetched as it can be the effect of several environmental factors or genetically influenced. Here is a brief overview of these factors.

## 1- Genetic factors

Although several genes have been linked to myopia, none of them aid in explaining how myopia develops. Research finds that children born to parents with the condition were at a higher risk of developing it than those whose parents do not have myopia.

## 2- Environmental factors

The kind of lifestyle people mainly influences the environment they choose to live in. It is not a surprise that short sightedness is becoming more common since most people spend their time near work activities such as screen time and reading books.

The fact that most activities are continuously automated is not helping the situation either, especially in younger children. Children spend very little time on outdoor activities and more than time in front of a digital screen, thus putting them at a higher risk.

In a nutshell, there are two categories of people marked as high-risk groups; People who engage in



higher devices screen time per day and those exposed to digital devices at very young ages.

## Signs and Symptoms of myopia

The following symptoms may indicate that you have myopia.

- 1- Not being able to see objects and images at a distance clearly, such as: wall clock, Road signs, TV or cinema screen and words written on a white/black board at work or school.
- 2- Feeling the need to squint or partially close your eyes to see properly
- 3- Having trouble seeing while driving, especially at night.
- 4- Feeling strain in your eyes.

These are the symptoms to watch out for in kids who may be too young to convey their distress:

- 1- They blink a lot.
- 2- They are always squinting
- 3- They often rub their eyes.
- 4- They sit quite close to the TV at home.
- 5- They have trouble seeing the black/whiteboard at school.
- 6- They don't seem aware of objects or images at a distance.

## Myopia control and treatment

Although there is no cure for myopia, there are various treatment options to aid in slowing down its progression and help a short sighted person



experience a clearer vision. They include the following;

**Spectacles** - have concave lenses that correct myopia by focusing light rays into the retina. However, they do not slow down myopia progression but rather facilitate clearer vision.

**Contact lenses** - These work more or less as spectacles and are placed directly on the eye.

**Refractive surgery** - also referred to as refractive surgery, uses lasers to reshape the cornea.

**Atropine eye drops** - atropine may help to slow down myopia progression in children by dilating the pupil and suppressing the ability to shift focus from distant to near objects and vice versa.

**Orthokeratology** - wearing rigid contact lenses while sleeping to reshape the cornea.

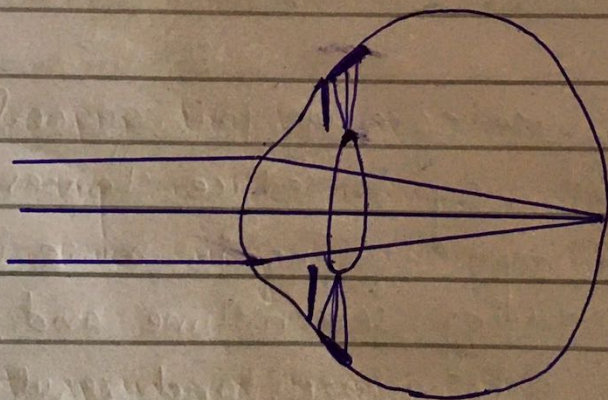
It is vital to always take care of your general eye health. The best way to reduce chances of acquiring myopia is by engaging in more outdoor activities, reducing screen time and using devices appropriately, sleeping well, and regularly going for eye checks.



# Long-sightedness

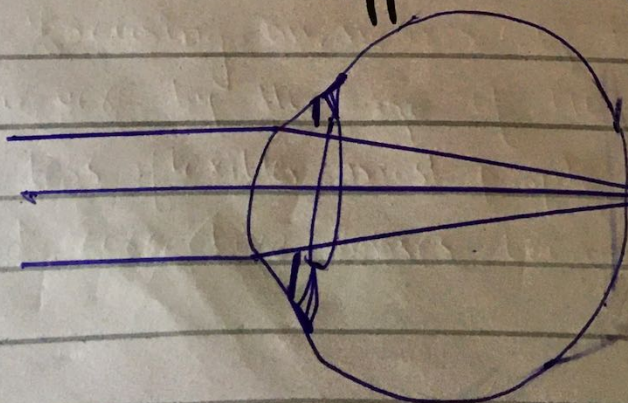
The medical name for long-sightedness is hypermetropia, sometimes called hyperopia. Eyesight problems, such as hypermetropia, are also known as refractive errors. Long-sightedness leads to problems with near vision (seeing things that are close up) and the eyes may commonly tired. Distance vision (long sight) is, in the beginning, good. Long sight can be corrected by glasses, contact lenses, or laser eye surgery. Hyperopia, or long sightedness, is a common vision problem that primarily affects children.

A recent analysis of 40 international studies found the prevalence of hyperopia ranged from 8.4 percent among 6 year old children, 2 to 3 percent among children ages 9 to 14 years, and approximately 1 percent among 15 year olds.



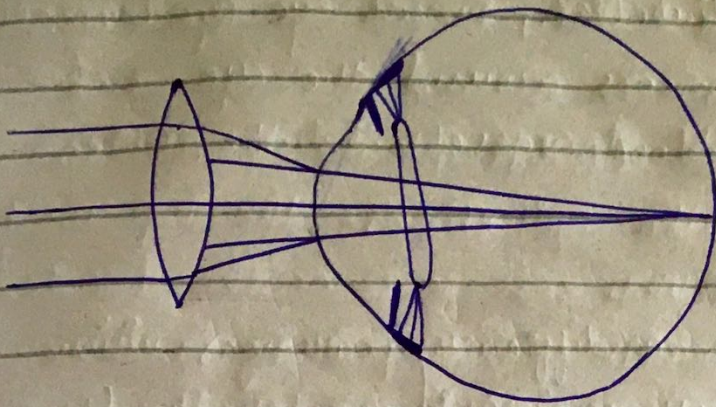
Normal eye

## Hypermetropia



light focused  
behind the  
retina





Corrected with  
convex lens.

Hypermetropia (long-sightedness) occurs when light from near objects is not quite brought to focus in time to hit the retina. The point of focus ~~would~~ would in fact be behind the retina, if the light could get that far. The lens tries hard to change its thickness (becomes fatter or more rounded) in an attempt to bring the light into focus on the retina a process called **accommodation**. However, people with long sight cannot accommodate fully and so the light does not focus on the retina and vision is blurred. This occurs because the eyeball is too short, the cornea is too flat (and so bends the light rays less), or the lens cannot become round enough (and so lacks power).

### **Causes:**

The causes of long sight are usually hereditary (genetic). Long sight can occur at any age but it tends to become more noticeable above the age of 40 years.



In some cases, long sight is caused by other conditions such as diabetes, small eye syndrome (microphthalmia), cancers around the eye and problem with the blood vessels in the retina.

## Symptoms

The main symptom is a difficulty with near vision. 'Tiring' of the eyes (asthenopia) is common and long sighted people may have headaches and uncomfortable vision.

They may have difficulties seeing with both eyes (binocular vision), as the brain will tend to ignore signals coming from the most long-sighted eye. Lazy eye (amblyopia) or squint (strabismus) can therefore also occur in long sight.

Long-sighted people may have difficulty with depth perception (3-dimensional vision), as this needs two eyes to work together, more or less equally.

## Treatment

Hyperopia treatment aims to help light focus correctly on the retina. Corrective lenses or refractive surgery may achieve this.

### 1- Corrective lenses:

Most younger people with hyperopia do not need corrective lenses because they can compensate by focusing on nearer objects.

However by the age of 40, when the lenses are less flexible, most people with longsightedness need corrective lenses because their lenses are



not able to compensate.

These are two primary types of corrective lenses:

- **Eyeglasses:** These may include bifocals, trifocals, and standard reading glasses.
- **Contact lenses:** Various types of contact lenses are available, with differing levels of softness and intended duration of wear.

## 2- Refractive Surgery:

Doctors normally use refractive surgery for nearsightedness, or myopia, but it can also treat hyperopia.

Examples:

- **Laser-assisted in situ Keratomileusis (LASIK):** A laser or microkeratome reshape the center of the cornea into a steeper dome.
- **Laser epithelial Keratomileusis (LASEK):** A laser reshapes the outer edges of the cornea into a steeper curvature.
- **Photorefractive Keratectomy (PRK):** The surgeon removes the outer layers of the cornea and a similar procedure to the LASEK is carried out. The outer layer then grows back over about 10 days.
- **Conductive Keratoplasty (CK):** Doctors reshape the cornea using a radiofrequency-emitting probe placed at its edge, which causes slight shrinkage to the peripheral collagen.



LASIK, LASEK, and PRK reshape the cornea to steepen the peripheral cornea. This increases the overall power of the cornea.

Both the LASIK and LASEK procedures create a flap made from the epithelium - the top most layer of the eye which can be covered the treated eye tissue. LASIK creates this flap using a laser or microkeratome, whereas LASEK creates the flap using alcohol. PRK removes the flap using alcohol but does not re-cover the eye tissue with the flap.

PRK and LASIK are popular surgeries, while doctors rarely use LASEK or CK.



# Color Blindness

Colour blindness (colour vision deficiency) is a fairly common condition in which you don't see colours in the traditional way. This happens when cones (a type of nerve cell in your eye retina) aren't working correctly. Cones process light and images as they enter your eye and send signals to your brain that allow you to perceive colour.

Colour blindness usually doesn't mean you can't see any colours. The vast majority of people with colour blindness see a range of colours, but they see some colours differently than others do. They may also have trouble telling the difference between certain colours or shades.

Some very rare forms of colour blindness make a person unable to see any colours.

For most people, colour blindness ~~make a person unable to see any colours~~ is inherited. That

~~For no~~ mean it's passed down from your biological parents from the mother or birthing parent is the most common red green forms of colour blindness. But you ~~do~~ can also acquire

colour vision deficiency later in life due to medical conditions or other reasons.

## Types of colour blindness

There are several types of colour blindness, defined according to which types of cones are not working well. To understand the types



of colour blindness, it helps to know a bit about cones.

Cones are nerve cells in your eye that detect colours in the visible spectrum of light. This spectrum includes all the wavelengths that human can see. These range in length from 380 nanometers (short), or nm, to 700 nanometers (long). Normally, you're born with three types of cones:

**Red sensing cones (L cones):** These cones perceive long wavelengths (around 560 nanometers).

**Green sensing cones (M cones):** These cones perceive middle wavelengths (around 530 nanometers).

**Blue sensing cones (S cones):** These cones perceive short wavelengths (around 420 nanometers).

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## Causes

Seeing colours across the light spectrum is a complex process that begins with your eyes' ability to respond to different wavelengths of light. Light, which contains all colour wavelengths, enters your eyes through the cornea and passes through the lens and transparent, jellylike tissue in your eye (vitreous humor) to wavelength sensitive cells (cones) at the back of your eye in the macular area of the retina. The cones are



sensitive to short (blue), medium (green) or long (red) wavelengths of light. Chemicals in the cones trigger a reaction and send the wavelength information through your optic nerve to your brain.

If your eyes are normal, you perceive colour. But if your cones lack one or more wavelength sensitive chemicals, you will be unable to distinguish the colour red, green or blue. Colour blindness has several causes:

### • Inherited disorder.

Inherited disorder is inherited colour deficiencies are much more common in male than in females.

The most common deficiency is red-green, with blue-yellow deficiency being much less common.

It is rare to have no colour vision at all.

You can inherit a mild, moderate or severe severe of the disorder. Inherited colour deficiencies usually affect both eyes, and the severity doesn't change over your lifetime.

### • Disease.

Some ~~disease~~ conditions that can cause colour deficits are sickle cell anemia, diabetes, macular degeneration, Alzheimer's disease, multiple sclerosis, glaucoma, Parkinson's disease, chronic alcoholism and leukemia. One eye may be more affected than the other, and the colour deficit may get if the underlying disease can be treated.



## Certain medications:

Some medications can alter colour vision, such as some drugs that treat certain autoimmune disease, heart problems, high blood pressure, erectile dysfunction, infections, nervous disorders and psychological problems.

## Aging:

Your ability to see colours deteriorates slowly as you age.

## Chemicals:

Exposure to some chemicals in the workplace, such as carbon disulfide and fertilizers, may cause loss of colour vision.

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## Symptoms:

Symptoms of this eye syndrome include:

- Rapid eye movement.
- Sensitivity towards the bright light.
- Trouble in seeing colours and the brightness of colours.
- The problem in identifying the differences between colour shades.

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## Treatment

There are no treatments for most types of colour



vision difficulties, unless the colour vision of problem is related to the use of certain medicines or eye conditions. Discontinuing the medication causing your vision problem or treating the underlying eye disease may result in better colour vision.

Wearing a coloured filter over eyeglasses or a coloured contact lens may enhance your perception of contrast between the confused colours. But such lenses won't improve your ability to see all colours.

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# Night Blindness

Night Blindness, also known as nyctalopia, is a vision problem involving the retina. It's not a disease or condition in and of itself, but a symptom. People with night blindness typically can't see well in poorly lit conditions or at night. Treatment for night blindness depends entirely on the root cause of night blindness.

Night blindness occurs when the rods (these allow you to see in the dark) in your retina are malfunctioning. These rods may not work properly or stop working entirely for a number of reasons, including underlying disease or traumatic injury.

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## Causes

Possible causes of night blindness include

- **Cataracts:** The focusing lens of the eye becomes clouded, causing vision to become blurry. Cataracts affects over 20 millions people worldwide!
- **Glaucoma:** A progressive eye disease, glaucoma causes vision loss due to nerve damage. It is the biggest cause of irreversible blindness.
- **Myopia:** Shortsightedness, or myopia, can cause night blindness. Myopia with astigmatism can also make it difficult to see at night.
- **Vitamin A deficiency:** If you have a vitamin A deficiency, it may be more difficult to see in darker environment.



• **Diabetic retinopathy:** If you have diabetes, you may experience diabetic retinopathy. It affects around 1 in 3 people with diabetes and cause progressive damage to the retina.

• **Retinitis pigmentosa:** Retinitis pigmentosa refers to a group of diseases that cause cells in the retina to break down over time. It is a genetic disorder.

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## Symptoms

Because night blindness is a symptom of an underlying eye problem, symptoms vary depending on the cause.

The most common signs and symptoms of night blindness

include:

- loss of night vision
- Blurry vision in low light
- Halos or glare around lights
- light sensitivity
- Trouble seeing distant objects in low light conditions.
- Total vision loss when entering a dark room.
- Difficulty seeing faces in a poorly illuminated environment.
- Inability to see stars in the night sky.

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Other symptoms may also occur with night blindness.

The nature of these symptoms will depend on the underlying cause but may include:

- Headaches
- eye pain
- nausea



- Vomiting
- blurry, or cloudy vision
- sensitivity to light
- difficulty seeing into the distance

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## Treatments

Treatments for night blindness will largely depend on the underlying cause.

**Nearsightedness:** Nearsightedness is most commonly treated with glasses or contact lenses. This will often improve night vision substantially.

**Medication:** If you have been prescribed pilocarpine and you notice difficulties with your night vision, ask your doctor if there's an alternative treatment you can use. If you take pilocarpine to improve your near vision, you may consider only taking it earlier in the day, so its effects are worn off by nighttime.

**Cataract:** Cataracts can cause visual fluctuations that may temporarily be managed with a change in glasses. Getting an up to date prescription for eyeglasses may help to improve vision for some time. Once the cataracts reach a certain stage, however, they will need to be treated surgically. During cataract surgery, your ophthalmologist will remove the cloudy part of the crystalline lens and replace it with a synthetic intraocular lens.



**Vitamin A deficiency.** If you have low vitamin A levels, try eating foods that are rich in this important nutrients. These include:

- Orange vegetables, such as carrots, sweet potato, pumpkin and butternut squash.
- Cantaloupe
- Milk
- Eggs
- Leafy green vegetables, such as spinach.

Don't take a supplement unless it's been advised by your doctor, as vitamin A is fat-soluble and therefore could cause toxicity at high levels.

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