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# Write a short note on two eye defect

## Astigmatism

**Astigmatism** is a type of refractive error in which the eye does not focus light evenly on the retina. This results in distorted or blurred vision at any distance. Other symptoms can include eyestrain, headaches, and trouble driving at night. If it occurs in early life, it can later result in amblyopia.

The cause of astigmatism is unclear, however it is believed to be partly related to genetic factors. The underlying mechanism involves an irregular curvature of the cornea or abnormalities in the lens of the eye. Diagnosis is by an eye examination.

Three treatment options are available: glasses, contact lenses, and surgery. Glasses are the simplest. Contact lenses can provide a wider field of vision. Refractive surgery permanently changes the shape of the eye.

# Signs and symptoms

Although astigmatism may be asymptomatic, higher degrees of astigmatism may cause symptoms such as blurred vision, double vision, squinting, eye strain, fatigue, or headaches. Some research has pointed to the link between astigmatism and higher prevalence of migraine headaches.

## Causes

The cause of astigmatism is unclear, however it is believed to be partly related to genetic factors.

## Diagnosis

A number of tests are used during eye examinations to determine the presence of astigmatism and to quantify its amount and axis. A Snellen chart or other eye charts may initially reveal reduced visual acuity. A keratometer may be used to measure the curvature of the steepest and flattest meridians in the cornea's front surface. Corneal topography may also be used to obtain a more accurate representation of the cornea's shape. An autorefractor or retinoscopy may provide an objective estimate of the eye's refractive error and the use of Jackson cross cylinders in a phoropter or trial frame may be used to subjectively refine those measurements. An alternative technique with the phoropter requires the use of a "clock dial" or "sunburst" chart to determine the astigmatic axis and power. A keratometer may also be used to estimate astigmatism by finding the difference in power between the two primary meridians of the cornea. Javal's rule can then be used to compute the estimate of astigmatism.

A method of astigmatism analysis by Alpins may be used to determine both how much surgical change of the cornea is needed and after surgery to determine how close treatment was to the goal.

Another rarely used refraction technique involves the use of a stenopaeic slit (a thin slit aperture) where the refraction is determined in specific meridians – this technique is particularly useful in cases where the patient has a high degree of astigmatism or in refracting patients with irregular astigmatism.

## Classification

There are three primary types of astigmatism: myopic astigmatism, hyperopic astigmatism, and mixed astigmatism. Cases can be classified further, such as regular or irregular and lenticular or corneal.

## Treatment

Astigmatism may be corrected with eyeglasses, contact lenses, or refractive surgery. Glasses are the simplest and safest, although contact lenses can provide a wider field of vision. Refractive surgery can eliminate the need to wear corrective lenses altogether by permanently changing the shape of the eye but, like all elective surgery, comes with both greater risk and expense than the non-invasive options. Various considerations involving eye health, refractive status, and lifestyle determine whether one option may be better than another. In those with keratoconus, certain contact lenses often enable patients to achieve better visual acuity than eyeglasses. Once only available in a rigid, gas-permeable form, toric lenses are now also available as soft lenses.

In older people, astigmatism can also be corrected during cataract surgery. This can either be done by inserting a toric intraocular lens or by performing special incisions (limbal relaxing incisions). Toric intraocular lenses probably provide a better outcome with respect to astigmatism in these cases than limbal relaxing incisions.

# Myopia – near sightedness

**Near-sightedness**, also known as **short-sightedness** and **myopia**, is an eye disorder where light focuses in front of, instead of on, the retina. This causes distant objects to be blurry while close objects appear normal. Other symptoms may include headaches and eye strain. Severe near-sightedness is associated with an increased risk of retinal detachment, cataracts, and glaucoma.

The underlying cause is believed to be a combination of genetic and environmental factors. Risk factors include doing work that involves focusing on close objects, greater time spent indoors, and a family history of the condition. It is also associated with a high socioeconomic class. The underlying mechanism involves the length of the eyeball growing too long or less commonly the lens being too strong. It is a type of refractive error. Diagnosis is by eye examination.

Tentative evidence indicates that the risk of near-sightedness can be decreased by having young children spend more time outside. This may be related to natural light exposure. Near-sightedness can be corrected with eyeglasses, contact lenses, or surgery. Eyeglasses are the easiest and safest method of correction. Contact lenses can provide a wider field of vision, but are associated with a risk of infection. Refractive surgery permanently changes the shape of the cornea.

## Signs and symptoms

Near-sighted vision (top/left), normal vision (bottom/right)

A myopic individual can see clearly out to a certain distance (called far point), but everything further becomes blurry. If the extent of the myopia is great enough, even standard reading distances can be affected. Upon routine examination of the eyes, the vast majority of myopic eyes appear structurally identical to nonmyopic eyes.

Onset is often in school children, with worsening between the ages of 8 and 15.

## Causes

The underlying cause is believed to be a combination of genetic and environmental factors. Risk factors include doing work that involves focusing on close objects, greater time spent indoors, and a family history of the condition. It is also associated with a high socioeconomic class.

A 2012 review could not find strong evidence for any single cause, although many theories have been discredited. Identical twins are more likely to be affected than non identical twins which indicates at least some genetic factors are involved. Myopia has been increasing rapidly throughout the developed world, suggesting environmental factors are involved.

Genetics

A risk for myopia may be inherited from one's parents. Genetic linkage studies have identified 18 possible loci on 15 different chromosomes that are associated with myopia, but none of these loci is part of the candidate genes that cause myopia. Instead of a simple one-gene locus controlling the onset of myopia, a complex interaction of many mutated proteins acting in concert may be the cause. Instead of myopia being caused by a defect in a structural protein, defects in the control of these structural proteins might be the actual cause of myopia. A collaboration of all myopia studies worldwide identified 16 new loci for refractive error in individuals of European ancestry, of which 8 were shared with Asians. The new loci include candidate genes with functions in neurotransmission, ion transport, retinoic acid metabolism, extracellular matrix remodeling and eye development. The carriers of the high-risk genes have a tenfold increased risk of myopia.

Human population studies suggest that contribution of genetic factors accounts for 60–90% of variance in refraction. However, the currently identified variants account for only a small fraction of myopia cases, suggesting the existence of a large number of yet unidentified low-frequency or small-effect variants, which underlie the majority of myopia cases.

## Environmental factors

Environmental factors which increase the risk of nearsightedness include insufficient light exposure, low physical activity, near work, and increased year of education.

One hypothesis is that a lack of normal visual stimuli causes improper development of the eyeball. Under this hypothesis, "normal" refers to the environmental stimuli that the eyeball evolved to. Modern humans who spend most of their time indoors, in dimly or fluorescently lit buildings which may contribute to the development of myopia.

People, and children especially, who spend more time doing physical exercise and outdoor play have lower rates of myopia, suggesting the increased magnitude and complexity of the visual stimuli encountered during these types of activities decrease myopic progression. There is preliminary evidence that the protective effect of outdoor activities on the development of myopia is due, at least in part, to the effect of long hours of exposure to daylight on the production and the release of retinal dopamine.

The near work hypothesis, also referred to as the "use-abuse theory" states that spending time involved in near work strains the intraocular and extraocular muscles. Some studies support the hypothesis, while other studies do not. While an association is present, it is not clearly causal. Nearsightedness is also more common in children with diabetes, Childhood arthritis, uveitis, and systemic lupus erythematosus.

## Diagnosis

A diagnosis of myopia is typically made by an eye care professional, usually an optometrist or ophthalmologist. During a refraction, an autorefractor or retinoscope is used to give an initial objective assessment of the refractive status of each eye, then a phoropter is used to subjectively refine the patient's eyeglass prescription. Other types of refractive error are hyperopia, astigmatism, and presbyopia.

## Types

Various forms of myopia have been described by their clinical appearance:

Simple myopia: Myopia in an otherwise normal eye, typically less than 4.00 to 6.00 diopters. This is the most common form of myopia.

Degenerative myopia: also known as malignant, pathological, or progressive myopia, is characterized by marked fundus changes, such as posterior staphyloma, and associated with a high refractive error and subnormal visual acuity after correction. This form of myopia gets progressively worse over time. Degenerative myopia has been reported as one of the main causes of visual impairment.

Pseudomyopia: is the blurring of distance vision brought about by spasm of the accommodation system.

Nocturnal myopia: Without adequate stimulus for accurate accommodation, the accommodation system partially engages, pushing distance objects out of focus.

Nearwork-induced transient myopia (NITM): short-term myopic far point shift immediately following a sustained near visual task. Some authors argue for a link between NITM and the development of permanent myopia.

## Treatment

Glasses are commonly used to address near-sightedness.

The National Institutes of Health says there is no known way of preventing myopia, and the use of glasses or contact lenses does not affect its progression. There is no universally accepted method of preventing myopia and proposed methods need additional study to determine their effectiveness.[38] Optical correction using glasses or contact lenses is the most common treatment; other approaches include orthokeratology, and refractive surgery. :21–26 Medications (mostly atropine) and vision therapy can be effective in addressing the various forms of pseudomyopia.

**Compensating for myopia using a corrective lens.**

## Glasses and contacts

Prismatic color distortion shown with a camera set for near-sighted focus, and using -9.5-diopter eyeglasses to correct the camera's myopia (left). Close-up of color shifting through corner of eyeglasses. The light and dark borders visible between color swatches do not exist (right).

Corrective lenses bend the light entering the eye in a way that places a focused image accurately onto the retina. The power of any lens system can be expressed in diopters, the reciprocal of its focal length in meters. Corrective lenses for myopia have negative powers because a divergent lens is required to move the far point of focus out to the distance. More severe myopia needs lens powers further from zero (more negative). However, strong eyeglass prescriptions create distortions such as prismatic movement and chromatic aberration. Strongly near-sighted wearers of contact lenses do not experience these distortions because the lens moves with the cornea, keeping the optic axis in line with the visual axis and because the vertex distance has been reduced to zero.

## Surgery

Refractive surgery includes procedures which alter the corneal curvature of some structure of the eye or which add additional refractive means inside the eye.