REFRACTION AND REFRACTION ERRORS Definition

A refraction is an eye exam that measures a person's prescription for eyeglasses or contact lenses.

Alternative Names

1. Eye exam - refraction;
2. Vision test - refraction;

Procedure for refraction test

1. You sit on a chair that has a special device called a phoroptor or refractor attached to it. You look through the device and focus on an eye chart 20 feet (6 meters) away. The device contains lenses of different strengths that can be moved into your view. The test is performed one eye at a time.
2. The eye doctor will then ask if the chart appears more or less clear when different lenses are in place.
3. If you wear contact lenses, ask the doctor if you need to remove them and for how long before the test

N/B: This test is performed by an ophthalmologist or optometrist

Indications for the Test

This test can be done as part of a routine eye exam. The purpose is to determine whether you have a refractive error (a need for glasses or contact lenses).

For people over age 40 who have normal distance vision but difficulty with near vision, a refraction test can determine the right power of reading glasses.

Normal Results

If your uncorrected vision (without glasses or contact lenses) is normal, then the refractive error is zero (plano) and your vision should be 20/20 (or 1.0).

A value of 20/20 (1.0) is normal vision. This means you can read 3/8-inch (1 centimetre) letters at 20 feet (6 meters). A small type size is also used to determine normal near vision.

What Abnormal Results Mean

You have a refractive error if you need a combination of lenses to see 20/20 (1.0). Glasses or contact lenses should give you good vision. If you have a refractive error, you have a "prescription." Your prescription is a series of numbers that describe the powers of the lenses needed to make you see clearly.

If your final vision is less than 20/20 (1.0), even with lenses, then there is probably another, non-optical problem with your eye.

The vision level you achieve during the refraction test is called the bestcorrected visual acuity (BCVA).

Refractive errors

Definition

Refractive errors are a type of vision problem that makes it hard to see clearly. They happen when the shape of your eye keeps light from focusing correctly on your retina (a light-sensitive layer of tissue in the back of your eye).

Types of refractive errors

1. **Nearsightedness (myopia)** makes far-away objects look blurry
2. **Farsightedness (hyperopia)** makes nearby objects look blurry

3. **Astigmatism** can make far-away and nearby objects look blurry or distorted. This can be a as a result of abnormally curved cornea causing blurred vision.
4. **Presbyopia** makes it hard for middle-aged and older adults to see things up close

Other conditions under which the test may be performed:

1. **Corneal ulcers and infections**
   Loss of sharp vision due to macular degeneration
2. **Retinal detachment** _separation of the light-sensitive membrane (retina) in the back of the eye from its supporting layers)
3. **Retinal vessel occlusion** _blockage in a small artery that carries blood to the retina
4. **Retinitis pigmentosa** _an inherited disorder of the retina)

Risks

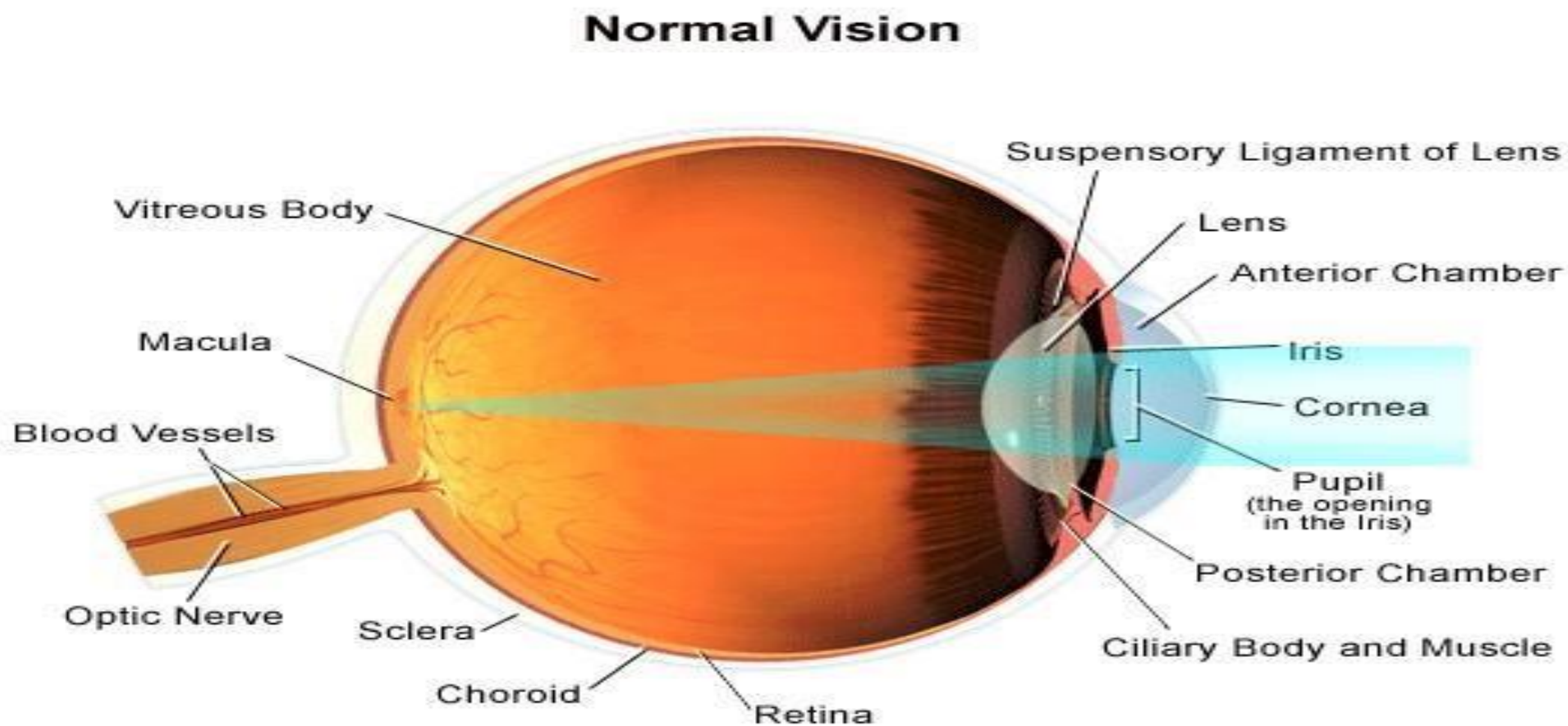
There are no risks with this test.

Considerations

- You should have a complete eye examination every 3 to 5 years if you have no problems. If your vision becomes blurry, worsens, or if there are other noticeable changes, schedule an exam right away.
- After age 40 (or for people with a family history of glaucoma), eye exams should be scheduled at least once a year to test for glaucoma. Anyone with diabetes should also have an eye exam at least once a year.
- People with a refractive error should have an eye exam every 1 to 2 years, or when their vision changes.

Refractive errors

What is normal vision



- Light enters the eye through the cornea.

- From the cornea, the light passes through the pupil. The amount of light passing through is regulated by the iris.

- From there, the light then hits the lens
- it passes through the vitreous humor
- Finally, it reaches the retina, the light-sensitive nerve layer that lines the back of the eye, where the image appears inverted.
- The optic nerve carries signals of light, dark, and colors to the visual cortex, which assembles the signals into images (our vision)

Refractive errors

✦Number 1 cause of lazy eye

✦Affects 20%b of the children

The most common refractive errors

1. Myopia
2. Hyperopia

3. Astigmatism

It is possible to have two or more types of refractive errors at the same time

1.**Astigmatism**

Astigmatism is a condition in which an abnormal curvature of the cornea can cause two focal points to fall in two different locations--making objects up close and at a distance appear blurry. Astigmatisms may cause eye strain and may be combined with nearsightedness or farsightedness. Astigmatism can start in childhood or in adulthood. Some symptoms include headache, eye strain, and/ or fatigue. Eye rubbing, lack of interest in school, and difficulty in reading are often seen in children with astigmatism. Depending on the severity, eyeglasses or contact lenses may be required.

Myopia

1. A myopic eye is longer than normal
2. cornea is too steep
3. light rays focus in front of the retina.
4. Close objects look clear.

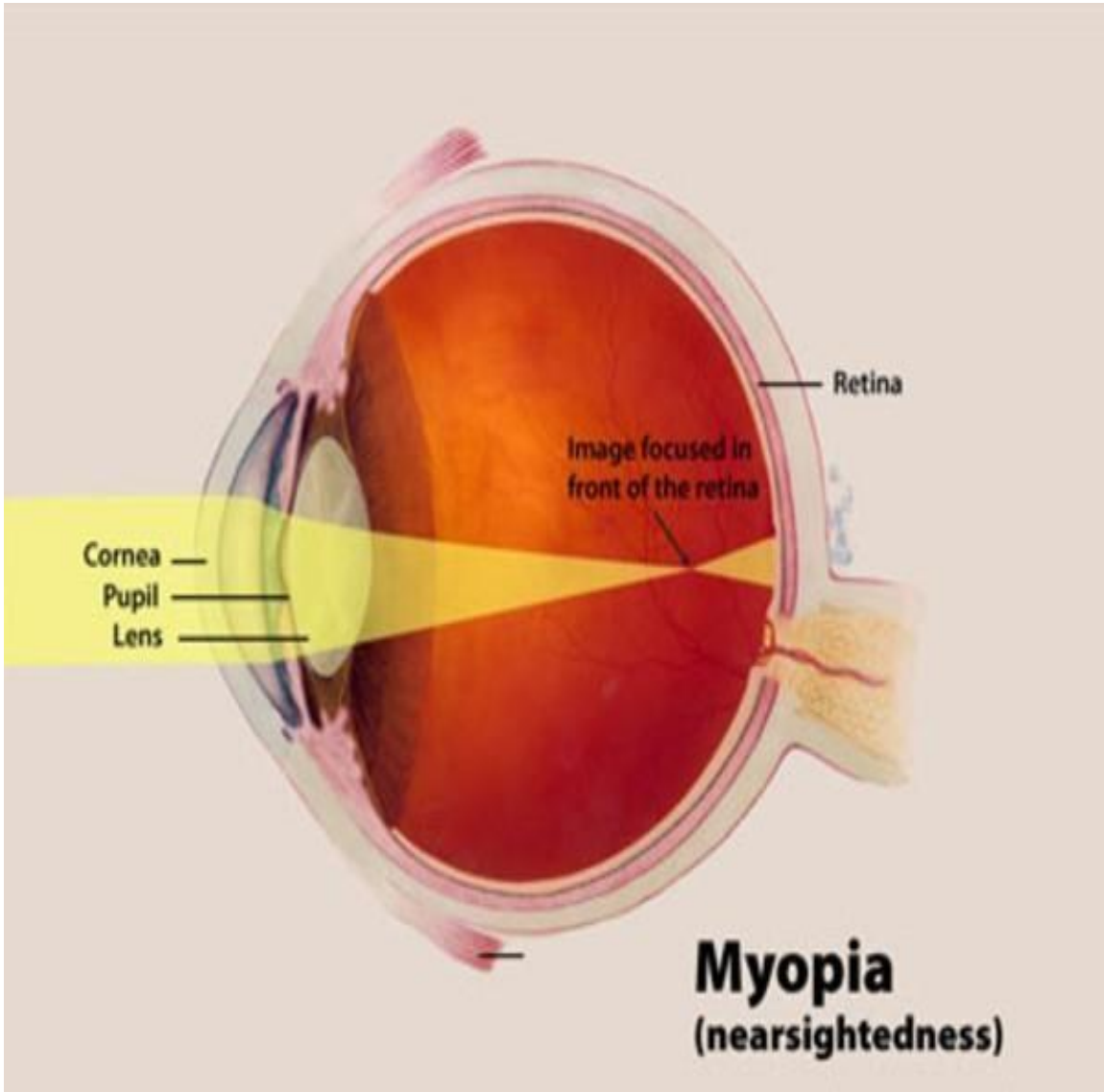
5. Distance objects appear blurred.
6. Close objects look clear

- **Signs and symptoms of myopia**
  - Blurred vision when looking at distant objects
  - Nearsightedness
  - Nausea after reading
  - Headache

management

- Myopia – concave lenses(-MINUS)
- Eye glasses-high index lenses

-lens with antireflective coating
-photochromic lens



- Contact lenses

- Refractive surgery

Most common procedures are performed with an excimer laser

- PRK- laser removes a layer of corneal tissue which flattens the cornea & allows light rays to focus more accurately on retina

- Lasik-most common refractive procedure

A thin flap is created on the surface of cornea, a laser removes some corneal tissue . The flap is returned to its original position

- Orthokeratology- non-surgical procedure where one wears special rigid special gas permeable (RGP or GP) contact lenses at night that reshape the cornea while sleeping.when lenses are removed in the morning, the cornea temporarily retains the new shape so one can see clearly during the day without glasses or contact lenses

- Phekic IOL- for correcting high myopia or thinner than normal corneas that could increase their risks of complication from lasik or other laser vision correction procedures

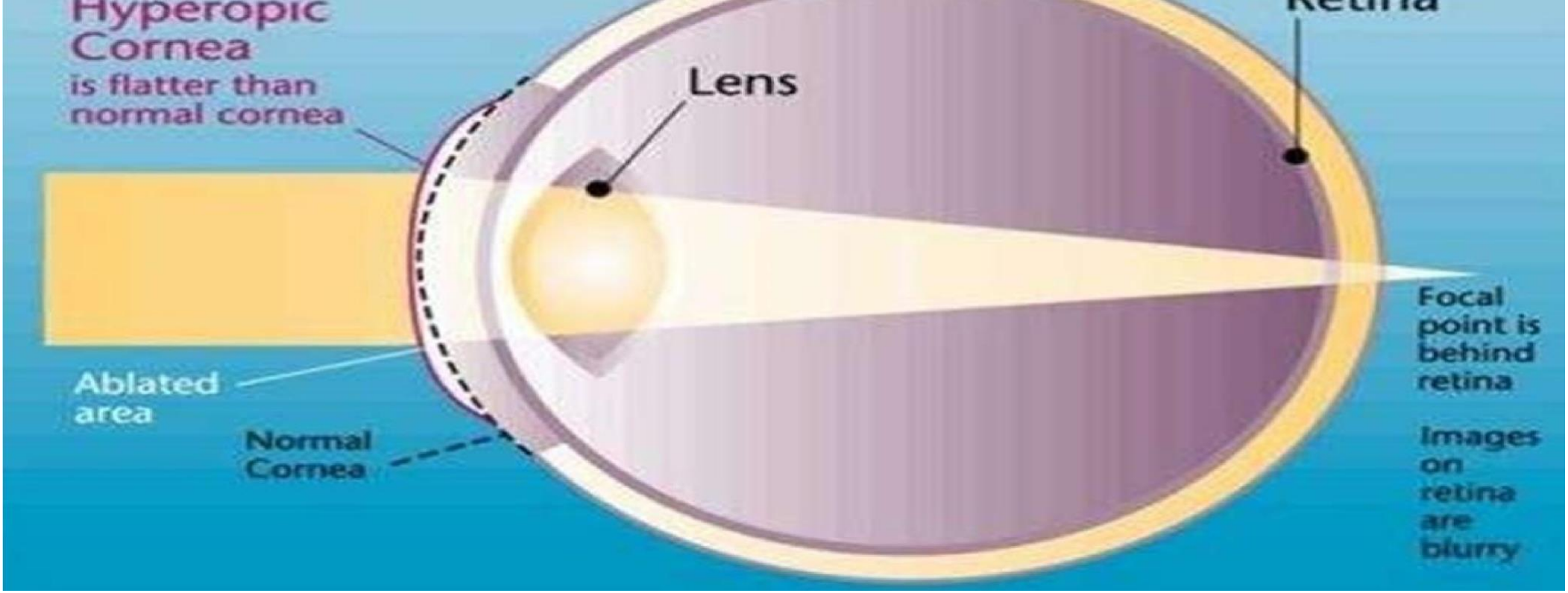
prevention

- Spend time outdoors
- Getting more exposure to sunlight shows promise for lowering the risk of nearsightedness.
- Reduce or phase out reading in dim light.

Complications

- Retinal detachment
- Macula degeneration
- Premature cataracts
- glaucoma

Hyperopia



- It occurs when a child's eye is too short and does not refract light correctly
- The image is formed behind the retina
- Its highly inheritable
- Mild hyperopia may not need treatment

Signs & Symptoms

- Mainly asymptomatic In severe cases there's
- Blurring of vision especially at night
- Diff in visualizing close objects
- Eye pain, eye strain and headache, rubbing eyes
- Loss of interest in reading
- Esotropia- occurs when one eye is trying to make up for the refractive error in the other, causing the eyes to cross. It often occurs as a child gets tired and is trying to focus on something up close; you may notice the eyes crossing inward as they do so

treatment

- Typically, farsightedness in children does not need correction, as the eyes can accommodate for the refractive error on their own.

- Essentially, the focusing muscles are able to ensure clear vision, both far and near

- can be corrected with prescription eyeglasses.

Glasses are be fitted directly to the child, and the prescription is matched accordingly.

Children may only need to wear corrective lenses when reading or focusing on close-up items.

Accommodative esotropia may be treated with bifocals • glasses should fit their faces.

They often have soft, comfortable, and flexible frames around the ears and shatterproof lenses.

- Contacts may be an option as well, but these are typically reserved for older children and usually more suited for treating myopia than hyperopia.

What is astigmatism?

- Astigmatism is a common condition that causes blurry vision.

- Typically, the cornea, the clear outer layer of the eye, is dome-shaped, like thetop of a basketball.

- But with astigmatism, the cornea is shaped more like a football. This changesthe way light enters the eye and makes objects both near and far appear blurry.

- A child can have astigmatism in one or both eyes.

- Astigmatism is common in infants and often clears up on its own by the time a child is one year old. • Children with myopia or hyperopia are more likely to have astigmatism.

Astigmatism affects Hispanic children at higher rates than other children.

- The retina is a light-sensitive area at the back of the eye that converts light into signals for the brain.

- In a healthy eye, light reaches the retina as a single focal point .

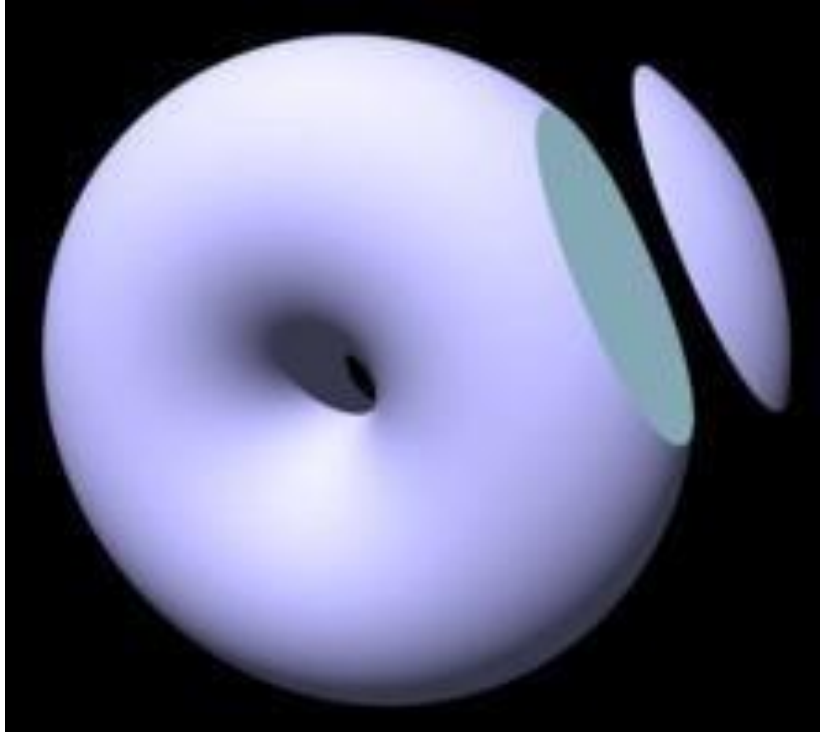
- With astigmatism, the retina receives light in multiple focal points, causingobjects up close and at a distance to appear blurry

Signs and symptoms of astigmatism

- objects close and far away may appear blurry or distorted
- squinting
- Eyestrain and discomfort
- Headache
- Kids move their head by tilting or turning so to see better
- Diff in becoming focused on what they say
- Kids have a hard time on focusing on a particular object
- Moving a way from too much light
- Constantly closing eyes

management

- In mild cases with no myopia and hyperopia treatment is not necessary.
- However, some cases of astigmatism do require corrective lenses. This basically depends on the degree of astigmatism and the presence or absence of additional eye problems.
- Generally, all the children who suffer from symptoms such as frequentheadaches, eyestrain and distorted vision are suitable candidates for the corrective lenses.
- The corrective eye lenses are Toric lenses and they contain cylinder. When a patient blinks these lenses rotate.



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