

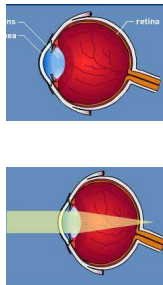
## Hyperopia

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## hyperopia

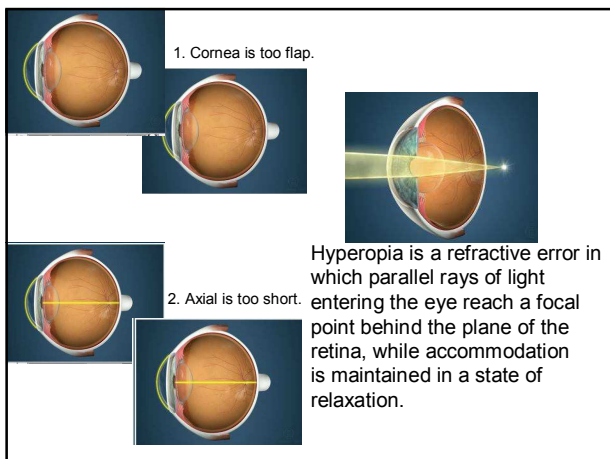
- Farsightedness, or **hyperopia**, as it is medically termed, is a vision condition in which distant objects are usually seen clearly, but close ones do not come into proper focus.
- Approximately 25% of the general population is hyperopic (a person having hyperopia).



By [Judith Lee](#) and [Gretchn Bailey](#); reviewed by [Dr. Vance Thompson](#);  
Flash illustration by [Stephen Bagl](#)

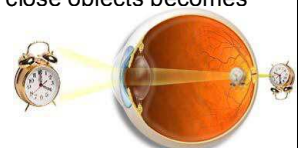
## hyperopia

- Farsightedness occurs if your eyeball is **too short** or the cornea has **too little curvature**, so light entering your eye is not focused correctly.
- Its effect varies greatly, depending on the magnitude of hyperopia, the age of the individual, the status of **the accommodative and convergence system**, and the demands placed on the visual system.



## hyperopia

- In theory, hyperopia is the inability to focus and see the close objects clearly, but in practice many young hyperopics can compensate the weakness of their focusing ability by excessive use of the accommodation functions of their eyes.
- But older hyperopics are not as lucky as them. By aging, accommodation range diminishes and for older hyperopics seeing close objects becomes an impossible mission.



## Amplitude of Accommodation

- Maximum Amplitude=  $25 - 0.4(\text{age})$
- Probable Amplitude=  $18.5 - .3(\text{age})$
- Minimum Amplitude=  $15 - 0.25(\text{age})$

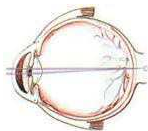
Age	AMP of ACCOM	Age	AMP of ACCOM
10	11.00	35	6.50
15	10.25	40	5.50
20	9.50	45	3.50
25	8.50	60	1.25
30	7.50	70	1.00

## hyperopia

- An emmetropic eye for reading and other near work, at distance of 16 in (40cm), the required amount of acc. is 2.50D.
- If an eye that has 1.00D of acc for distance vision and 3.50D of acc. For 40cm.
- The additional acc. is automatically accompanied by a large amount of acc convergence, which can cause severe headaches and other symptoms of eyestrain.

## hyperopia

- Also for people with advanced hyperopia, including young people, the accommodation mechanism is not sufficient and they need spectacles, or a laser vision correction procedure.
- Unfortunately, people with advanced hyperopia may even suffer from both close and distant vision problems.



## Common Signs, Symptoms, and Complications

- difficulty in concentrating and maintaining a clear focus on near objects
- eye strain
- fatigue
- headaches after close work (pulling sensation, burning)
- aching or burning eyes
- irritability or nervousness after sustained concentration

## Common Signs, Symptoms, and Complications

- Young persons with hyperopia generally have sufficient accommodative reserve to maintain clear retinal images without producing asthenopia.
- When the level of hyperopia is too great or the accommodative reserves insufficient due to age or fatigue, blurred vision and asthenopia develop.
- The influence of accommodation on the vergence system also plays a role in the presence or absence of symptoms in patients with hyperopia.

## What Causes Hyperopia?

- This vision problem occurs when light rays entering the eye focus behind the retina, rather than directly on it. The eyeball of a farsighted person is shorter than normal.
- Many children are born with hyperopia, and some of them "outgrow" it as the eyeball lengthens with normal growth.
- The prevalence of hyperopia-unlike that of myopia-changes very slowly with the years, and because once hyperopia is present, it progresses slowly or not at all, the conventional wisdom is that hyperopia occurs as a result of genetic influences.

**TABLE 4-2 Spherical Ametropia as a Function of Age**

Age (years)	Hyperopia	Emmetropia	Myopia
45-49	16.3%	77.2%	6.7%
50-54	23.5	70.4	6.2
55-59	35.4	59.3	5.0
60-64	40.1	52.3	7.4
65-69	43.9	43.9	12.3
70-74	47.7	43.8	8.8
75 and over	47.9	36.9	15.3

Data from M. J. Hirsch. Changes in Refractive State after the Age of 45. *Amer. J. Optom.*, Vol. 35, pp. 229-237, 1958.

### Individuals with uncorrected hyperopia may experience:

- Blurred vision
- Asthenopia
- Accommodative dysfunction
- Binocular dysfunction
- Amblyopia
- Strabismus

- When an excessive amount of acc. is required in uncorrected hyperopia, the visual system has three choices:
  1. The visual system can let the letters go out of focus, making reading impossible.
  2. One eye may turn inward, toward the nose, relieving the eyestrain but causing double vision.
  3. Single vision may be maintained, but at the cost of large amount of stress due to the continual unconscious effort to keep the eye from overconverging, and thus avoid double vision.

- Early detection of hyperopia may help to prevent the complications of strabismus and amblyopia in young children.
- In older children, uncorrected hyperopia may affect learning ability.
- The precise mechanism of this relationship is unclear, but optical blur, accommodative and binocular dysfunction, and fatigue all appear to play roles.
- In individuals of any age, it can contribute to ocular discomfort and visual inefficiency.

### Clinical Background of Hyperopia

- Most newborn infants have mild hyperopia, with only a small number of cases falling within the moderate to high range.
- Infants with moderate to high hyperopia (+3.50 D) are up to 13 times more likely to develop strabismus by 4 years of age, and they are 6 times more likely to have reduced visual acuity than infants with low hyperopia or emmetropia.

### Clinical Background of Hyperopia

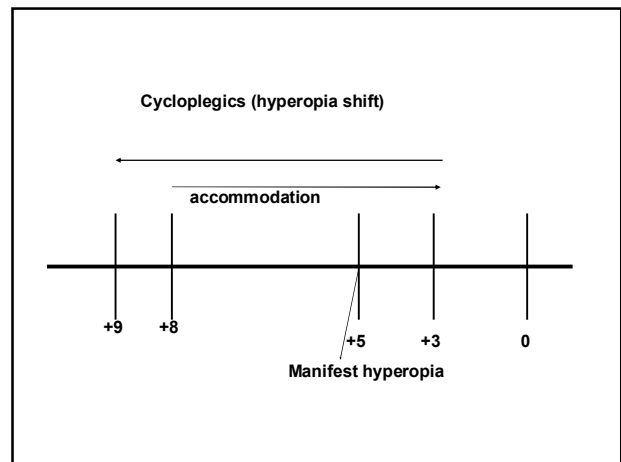
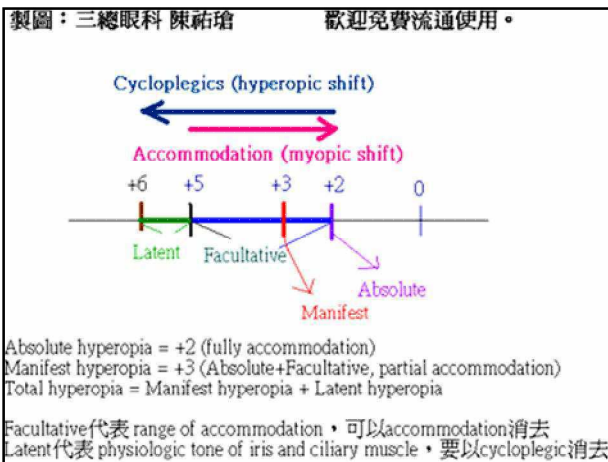
- There is also a strong (almost 90%) association of at least modest degrees of hyperopia with infantile esotropia.
- Anisometropic hyperopia persisting beyond 3 years of age is also a risk factor for the development of strabismus (crossed eyes) and amblyopia (lazy eye).

## the role of accommodation to visual functioning

- **Facultative hyperopia** is that which can be overcome by accommodation.
- **Absolute hyperopia** cannot be compensated with accommodation

## based upon the outcome of noncycloplegic and cycloplegic refractions:

- **Manifest hyperopia**, determined by noncycloplegic refraction, may be either facultative or absolute.
- **Latent hyperopia**, detected only by cycloplegia, can be overcome by accommodation.



## Clinical Background of Hyperopia

- As presbyopia develops, latent hyperopia may become manifest, requiring the use of correction for both distance and near vision in persons with hyperopia who formerly did not require correction.
- There is evidence of an increase in hyperopia in middle-aged and older adults, due to increases in thickness and refractive indices in the crystalline lens, and, possibly, to a decrease in axial length.

## three categories:

- **Simple hyperopia**  
 -normal biological variation, can be of axial or refractive etiology.
- **Pathological hyperopia**  
 – caused by abnormal ocular anatomy due to maldevelopment, ocular disease, or trauma.
- **Functional hyperopia**  
 – results from paralysis of accommodation.

categorized by degree of refractive error:

- **Low hyperopia** consists of an error of +2.00 diopters (D) or less.
- **Moderate hyperopia** includes a range of error from +2.25 to +5.00 D.
- **High hyperopia** consists of an error over +5.00 D.

## Physiologic Hyperopia

- From the perspective of physiologic optics, hyperopia occurs when the axial length of the eye is shorter than the refracting components the eye requires for light to focus precisely on the photoreceptor layer of the retina.
- Hyperopia may result in combination with or isolation from a relatively flat corneal curvature, insufficient crystalline lens power, increased lens thickness, short axial length, or variance of the normal separation of the optical components of the eye relative to each other.

## Physiologic Hyperopia

- Facultative and latent hyperopia are typically overcome in the young patient by the action of accommodation, which may not be sustainable for long periods of time under conditions of visual stress.
- In general, younger individuals with lower degrees of hyperopia and moderate visual demands are less adversely affected than older individuals, who have higher degrees of hyperopia and more demanding visual needs.

## Pathologic Hyperopia

- Pathologic hyperopia may be due to maldevelopment of the eye during the prenatal or early postnatal period, a variety of corneal or lenticular changes, chorioretinal or orbital inflammation or neoplasms, or to neurologic- or pharmacologic-based etiologies.
- It is rare in comparison with physiologic hyperopia.
- Because of the relationship of pathologic hyperopia to potentially serious ocular and systemic disorders, proper diagnosis and treatment of the underlying cause may prove critical to the patient's overall health.

## Pathologic Hyperopia

- Microphthalmia (with or without congenital or early acquired cataracts and persistent hyperplastic primary vitreous) and this condition's often hereditary form, nanophthalmia, may produce hyperopia in excess of +20D.
- Anterior segment malformations such as corneal plana, sclerocornea, anterior chamber cleavage syndrome, and limbal dermoids are associated with high hyperopia.
- Acquired disorders that can cause a hyperopic shift result from corneal distortion or trauma, chalazion, chemical or thermal burn, retinal vascular problems, diabetes mellitus, developing or transient cataract or contact lenswear.

## Pathologic Hyperopia

- Conditions that cause the photoreceptor layer of the retina to project anteriorly (idiopathic central serous choroidopathy and choroidal hemangioma from Sturge-Weber disease) also induce hyperopia.
- Orbital tumors, idiopathic choroidal folds, and edema can mechanically distort the globe and press the retina anteriorly, thereby causing hyperopia.
- Cycloplegic agents may induce hyperopia by affecting accommodation, and a variety of other drugs can produce transient hyperopia.

## Treatment and correction

- The treatment for hyperopia depends on several factors such as the patient's age, activities, and occupation.
- Young patients may or may not require glasses or contact lenses, depending on their ability to compensate for their farsightedness with accommodation.
- Glasses or contact lenses are required for older patients.
- Refractive surgery is an option for adults who wish to see clearly without glasses. LASIK, Clear Lens Extraction And Replacement and intraocular contact lenses are all procedures that can be performed to correct hyperopia.