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Pharmacology

200 level

Phs 212 assignment

Eye defects

Question

Discuss the defects of the eye

Defects of the eye: Myopia: (nearsightedness) This is a defect of vision in which far objects appear blurred but near objects are seen clearly. ... Hyperopia: (farsightedness) This is a defect of vision in which there is difficulty with near vision but far objects can be seen easily. Vision problems such as myopia and hyperopia can be corrected with lenses that help focus light on the retina. Myopia is corrected with a concave lens, while hyperopia is corrected with a convex lens.

A visual field defect is a loss of part of the usual field of vision, so it does not include severe visual impairment of either one eye or both. The lesion may be anywhere along the optic pathway; retina to occipital cortex

What Causes Low Vision?

* Macular Degeneration. Macular degeneration is a disorder that affects the retina, the light-sensitive lining at the back of the eye where images are focused. ...
* Cataracts. ...
* Glaucoma. ...
* Diabetic Retinopathy. ...
* Retinitis Pigmentosa. ...
* Amblyopia. ...
* Retinopathy of Prematurity (ROP). ...
* Retinal Detachment.

Eye diseases or conditions can cause visual impairment. Some of the more common causes of low vision include:

* [**Macular Degeneration**](https://www.aoa.org/patients-and-public/eye-and-vision-problems/glossary-of-eye-and-vision-conditions/macular-degeneration). Macular degeneration is a disorder that affects the retina, the light-sensitive lining at the back of the eye where images are focused. The macula-the area on the retina responsible for sharp central vision-deteriorates, causing blurred vision. This can cause difficulty reading and, for some, a blurry or blind spot in the central area of vision.

The most common form of age-related macular degeneration is known as non-exudative, or the "dry" form, in which vision loss usually progresses slowly. More rapid and severe vision loss comes from exudative, or the "wet" form, of macular degeneration. In the wet form, abnormal blood vessels develop under the macula and leak fluid and blood.

Both exudative and non-exudative forms of macular degeneration are age-related. They are the leading cause of blindness in people over 50. Recent studies estimate that over 1.6 million older Americans have age-related macular degeneration.

The exact cause is unknown. Although age is the primary contributing factor, cigarette smoking and nutrition can also play a role in the development of age-related macular degeneration. A hereditary juvenile form of macular generation called Stargardt Macular Dystrophy can also cause vision loss.
* [**Cataracts**](https://www.aoa.org/patients-and-public/eye-and-vision-problems/glossary-of-eye-and-vision-conditions/cataract). A cataract is a clouding of part or all the lens inside the eye. This clouding interferes with light reaching the retina at the back of the eye, resulting in general loss of vision. Causes include aging, long-term exposure to the sun's ultraviolet radiation, injury, disease and inherited disorders. If the eye is healthy, a cataract can be surgically removed. Usually, an intraocular lens implant is inserted in the eye, and vision is restored. Cataract surgery has a high success rate in otherwise healthy eyes. However, cataract surgery is not always possible for people who also have other eye diseases. These people may require low-vision rehabilitation to maximize their remaining vision.
* [**Glaucoma**](https://www.aoa.org/patients-and-public/eye-and-vision-problems/glossary-of-eye-and-vision-conditions/glaucoma). Glaucoma causes damage to the optic nerve. Most commonly, this occurs due to increasing internal pressure in the eye because of problems with the flow or drainage of fluid within the eye. It can also occur when the internal pressure of the eye does not increase (normal-tension glaucoma), but there is not enough blood flow to the optic nerve. There are no early symptoms in the most common form of glaucoma, but the first signs of damage are defects in side (peripheral) vision and difficulty with night vision. If diagnosed early, it can be treated with drugs, or sometimes surgery can minimize vision loss.
* [**Diabetic Retinopathy**](http://www.aoa.org/patients-and-public/eye-and-vision-problems/glossary-of-eye-and-vision-conditions/diabetic-retinopathy). People with diabetes can experience day-to-day changes in their vision and/or visual functioning because of the disease. Diabetes can cause blood vessels that nourish the retina to develop tiny, abnormal branches that leak. This can interfere with vision and, over time, may severely damage the retina. Laser procedures and surgical treatments can reduce its progression but regulating blood sugar is the most important step in treating diabetic retinopathy.
* [**Retinitis Pigmentosa**](http://www.aoa.org/patients-and-public/eye-and-vision-problems/glossary-of-eye-and-vision-conditions/retinitis-pigmentosa). Retinitis pigmentosa gradually destroys night vision, severely reduces side vision and may result in total vision impairment. An inherited disease, its first symptom-night blindness-usually occurs in childhood or adolescence.
* [**Amblyopia**](https://www.aoa.org/patients-and-public/eye-and-vision-problems/glossary-of-eye-and-vision-conditions/amblyopia). In amblyopia, the visual system fails to develop normally during childhood. The blurry vision that results in one or both eyes is not easily corrected with normal glasses or contact lenses alone.
* **Retinopathy of Prematurity (ROP)**. Retinopathy of prematurity occurs in infants born prematurely. It is caused by the high oxygen levels in incubators during the critical neonatal period.
* **Retinal Detachment**. With a retinal detachment, the retina separates from its underlying layer. It can cause total vision impairment in the affected eye. Causes include holes in the retina, eye trauma, infection, blood vessel disturbance or a tumor. If diagnosed early, most detached retinas can be surgically reattached with vision partially or completely restored.
* **Acquired (Traumatic) Brain Injury**. Vision can also be lost or damaged as a result of head injuries, brain damage and stroke. Signs and symptoms can include reduced visual acuity or visual field, contrast sensitivity, blurred vision, eye misalignment, poor judgment of depth, glare sensitivity, confusion when performing visual tasks, difficulty reading, double vision, headaches, dizziness, abnormal body posture and balance problems.

Common Eye Disorders

* Anatomy.
* Refractive Errors.
* Age-Related Macular Degeneration.
* Cataract.
* Diabetic Retinopathy.
* Glaucoma.
* Amblyopia.
* Strabismus.

### Refractive Errors



Refractive errors are the most frequent eye problems in the United States. Refractive errors include myopia (near-sightedness), hyperopia (farsightedness), astigmatism (distorted vision at all distances), and presbyopia that occurs between age 40–50 years (loss of the ability to focus up close, inability to read letters of the phone book, need to hold newspaper farther away to see clearly) can be corrected by eyeglasses, contact lenses, or in some cases surgery. The National Eye Institute states that proper refractive correction could improve vision among 150 million Americans.

### Age-Related Macular Degeneration



Macular degeneration, often called age-related macular degeneration (AMD), is an eye disorder associated with aging and results in damaging sharp and central vision. Central vision is needed for seeing objects clearly and for common daily tasks such as reading and driving. AMD affects the macula, the central part the retina that allows the eye to see fine details. There are two forms of AMD—wet and dry.

Wet AMD is when abnormal blood vessel behind the retina start to grow under the macula, ultimately leading to blood and fluid leakage. Bleeding, leaking, and scarring from these blood vessels cause damage and lead to rapid central vision loss. An early symptom of wet AMD is that straight lines appear wavy.

Dry AMD is when the macula thins overtime as part of aging process, gradually blurring central vision. The dry form is more common and accounts for 70–90% of cases of AMD and it progresses more slowly than the wet form. Over time, as less of the macula functions, central vision is gradually lost in the affected eye. Dry AMD generally affects both eyes. One of the most common early signs of dry AMD is drusen.

Drusen are tiny yellow or white deposits under the retina. They often are found in people aged 60 years and older. The presence of small drusen is normal and does not cause vision loss. However, the presence of large and more numerous drusen raises the risk of developing advanced dry AMD or wet AMD.

### Cataract



Cataract is a clouding of the eye’s lens and is the leading cause of blindness worldwide, and the leading cause of vision loss in the United States. Cataracts can occur at any age because of a variety of causes, and can be present at birth. Although treatment for the removal of cataract is widely available, access barriers such as insurance coverage, treatment costs, patient choice, or lack of awareness prevent many people from receiving the proper treatment.

### Diabetic Retinopathy



Diabetic retinopathy (DR) is a common complication of diabetes. It is the leading cause of blindness in American adults. It is characterized by progressive damage to the blood vessels of the retina, the light-sensitive tissue at the back of the eye that is necessary for good vision. DR progresses through four stages, mild nonproliferative retinopathy (microaneurysms), moderate nonproliferative retinopathy (blockage in some retinal vessels), severe nonproliferative retinopathy (more vessels are blocked leading to deprived retina from blood supply leading to growing new blood vessels), and proliferative retinopathy (most advanced stage). Diabetic retinopathy usually affects both eyes.

The risks of DR are reduced through disease management that includes good control of blood sugar, blood pressure, and lipid abnormalities. Early diagnosis of DR and timely treatment reduce the risk of vision loss; however, as many as 50% of patients are not getting their eyes examined or are diagnosed too late for treatment to be effective.

It is the leading cause of blindness among U.S. working-aged adults aged 20–74 years. An estimated 4.1 million and 899,000 Americans are affected by retinopathy and vision-threatening retinopathy, respectively.

### Glaucoma



Glaucoma is a group of diseases that can damage the eye’s optic nerve and result in vision loss and blindness. Glaucoma occurs when the normal fluid pressure inside the eyes slowly rises. However, recent findings now show that glaucoma can occur with normal eye pressure. With early treatment, you can often protect your eyes against serious vision loss.

There are two major categories “open angle” and “closed angle” glaucoma. Open angle, is a chronic condition that progress slowly over long period of time without the person noticing vision loss until the disease is very advanced, that is why it is called “sneak thief of sight.” Angle closure can appear suddenly and is painful. Visual loss can progress quickly; however, the pain and discomfort lead patients to seek medical attention before permanent damage occurs.

### Amblyopia

Amblyopia, also referred to as “lazy eye,” is the most common cause of vision impairment in children. Amblyopia is the medical term used when the vision in one of the eyes is reduced because the eye and the brain are not working together properly. The eye itself looks normal, but it is not being used normally because the brain is favoring the other eye. Conditions leading to amblyopia include strabismus, an imbalance in the positioning of the two eyes; more nearsighted, farsighted, or astigmatic in one eye than the other eye, and rarely other eye conditions such as cataract.

Unless it is successfully treated in early childhood amblyopia usually persists into adulthood, and is the most common cause of permanent one-eye vision impairment among children and young and middle-aged adults. An estimated 2%–3% of the population suffer from amblyopia.

### Strabismus

Strabismus involves an imbalance in the positioning of the two eyes. Strabismus can cause the eyes to cross in (esotropia) or turn out (exotropia). Strabismus is caused by a lack of coordination between the eyes. As a result, the eyes look in different directions and do not focus simultaneously on a single point. In most cases of strabismus in children, the cause is unknown. In more than half of these cases, the problem is present at or shortly after birth (congenital strabismus). When the two eyes fail to focus on the same image, there is reduced or absent depth perception and the brain may learn to ignore the input from one eye, causing permanent vision loss in that eye (one type of amblyopia).

Types of eye defects

#### Vision Correction

You probably know people who need eyeglasses or contact lenses to see clearly. Maybe you need them yourself. Lenses are used to correct vision problems. Two of the most common vision problems are myopia and hyperopia.

#### Myopia

**Myopia** is also called nearsightedness. It affects about one third of people. People with myopia can see nearby objects clearly, but distant objects appear blurry. The picture below shows how a person with myopia might see two boys that are a few meters away (figure below).



On the left, you can see how a person with normal vision sees two boys. The right image shows how a person with myopia sees the boys.

In myopia, the eye is too long. Below, you can see how images are focused on the retina of someone with myopia (**Figure** [below](https://www.ck12.org/book/cbse-physics-book-class-x/section/2.2/#x-ck12-TVNMUy0yMC0yMi1jb3JyZWN0aXZlLWxlbnNlcw..)). Myopia is corrected with a **concave** lens, which curves inward like the inside of a bowl. The lens changes the focus, so images fall on the retina as they should.



The eye of a person with myopia is longer than normal. As a result, images are focused in front of the retina (top left). A concave lens is used to correct myopia to help focus images on the retina (top right). Farsightedness, or hyperopia, occurs when objects are focused in back of the retina (bottom left). It is corrected with a convex lens (bottom right).

Generally, nearsightedness first occurs in school-age children. There is some evidence that myopia is inherited. If one or both of your parents need glasses, there is an increased chance that you will too. Individuals who spend a lot of time reading, working or playing at a computer, or doing other close visual work may also be more likely to develop nearsightedness. Because the eye continues to grow during childhood, myopia typically progresses until about age 20. However, nearsightedness may also develop in adults due to visual stress or health conditions such as diabetes. A common sign of nearsightedness is difficulty seeing distant objects like a movie screen or the TV, or the whiteboard or chalkboard in school. Eyeglasses or contact lenses can easily help with myopia. Depending on the amount of myopia, you may only need to wear glasses or contact lenses for certain activities, like watching a movie or driving a car. Or, if you are very nearsighted, they may need to be worn all the time.

#### Farsightedness

Farsightedness is also known as **hyperopia**. It affects about one fourth of people. People with hyperopia can see distant objects clearly, but nearby objects appear blurry. In hyperopia, the eye is too short. This results in images being focused in back of the retina (**Figure** [above](https://www.ck12.org/book/cbse-physics-book-class-x/section/2.2/#x-ck12-TVNMUy0yMC0yMi1jb3JyZWN0aXZlLWxlbnNlcw..)). Hyperopia is corrected with a **convex** lens, which curves outward like the outside of a bowl. The lens changes the focus so that images fall on the retina as they should. Common signs of farsightedness include difficulty in concentrating and maintaining a clear focus on close objects, eye strain, fatigue and headaches after close work, and aching or burning eyes, especially after intense concentration on close work. In addition to lenses, many cases of myopia and hyperopia can be corrected with surgery. For example, a procedure called LASIK (Laser-Assisted in situ Keratomileusis) uses a laser to permanently change the shape of the cornea so light is correctly focused on the retina.