SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

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Department of Biomedical Engineering

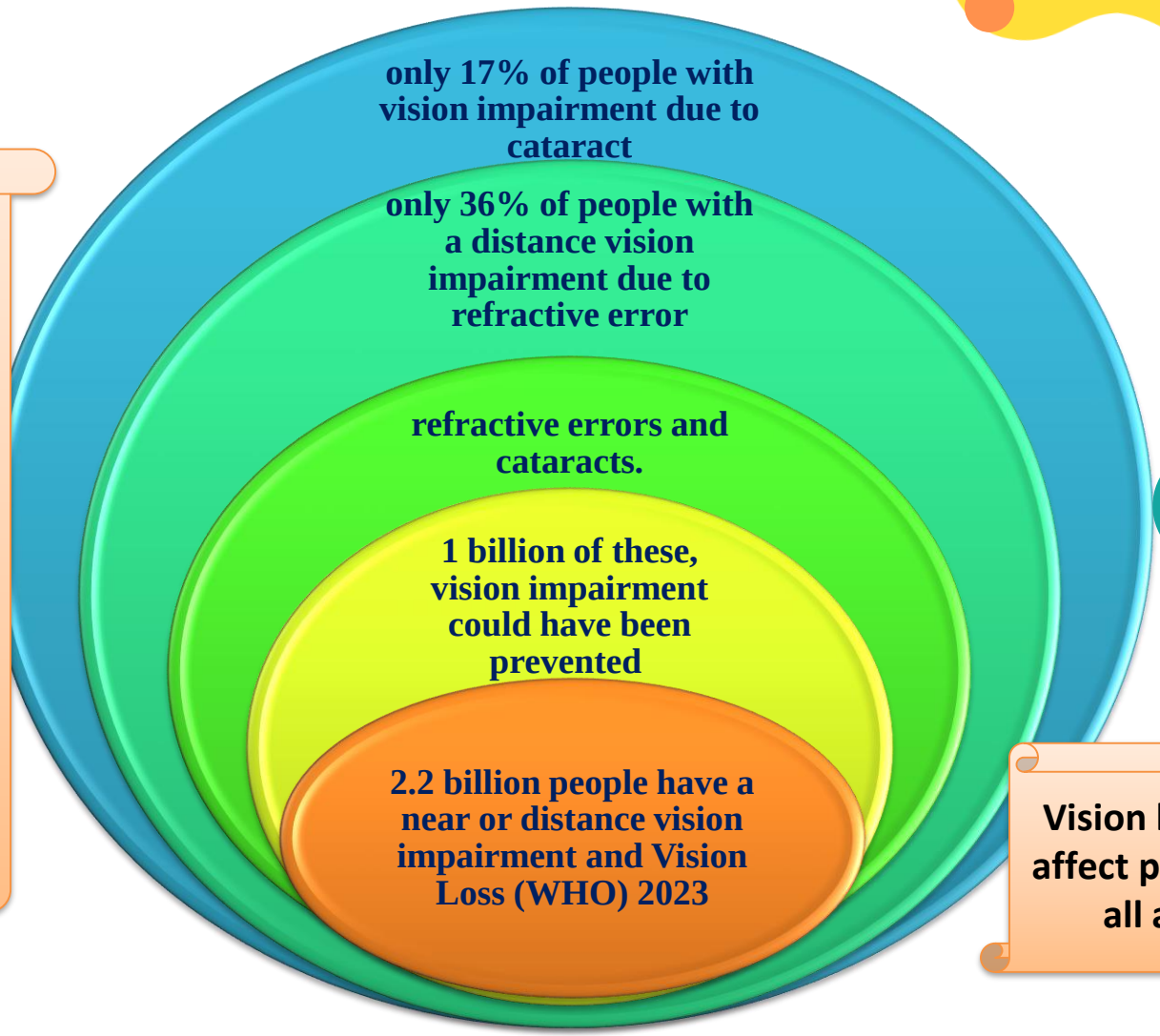
Course Name: 21BMT201 Anatomy & Physiology

I Year : II Semester

Unit V- Nervous and Special Sensory System

Topic : Special Sense - EYE

EMPATHY !!!!



Other Causes

age-related macular degeneration, glaucoma, Diabetic retinopathy, infectious diseases of the eye and trauma

Vision loss can affect people of all ages

Disease	Outward Appearance	Back of the Eye Photo	What They See	Disease Explained
NORMAL				Everythin ice and healthy. Woohoo! Be sure to check your eyes annually to ensure it remains that way.
CATARACTS				Cataracts cause the lens in your eye to yellow and thicken, which makes your vision blurry. It's blurry when we look in too, so next step is surgery!
GLAUCOMA				Glaucoma is the deepening of the optic nerve in the back of your eye, which takes away from your side vision slowly. You'll need to see the eye doctor regularly to watch it!
MACULAR DEGENERATION				This causes pigmentation changes in the macula ,which is what we use for best central vision. You'll need to be monitored closely to watch if treatment is needed!
RETINAL DETACHMENT				Retinal detachments are a rip or tear of the tissue lining the back of the eye. You'll see flashes and floaters. Be sure to see someone right away as this needs surgery ASAP!

Funds Photography

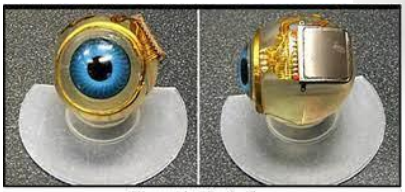
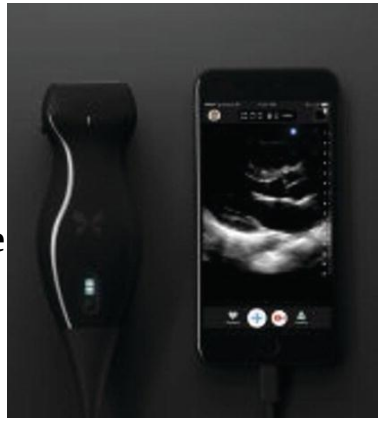


Figure 1: Bionic Eye

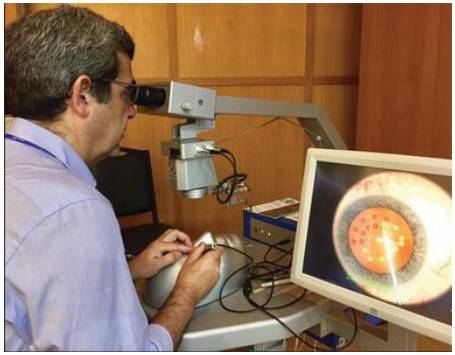
VRmagic direct ophthalmoscope



portable ultrasound probe

Self-adjustable glasses

Eye Handbook smartphone app



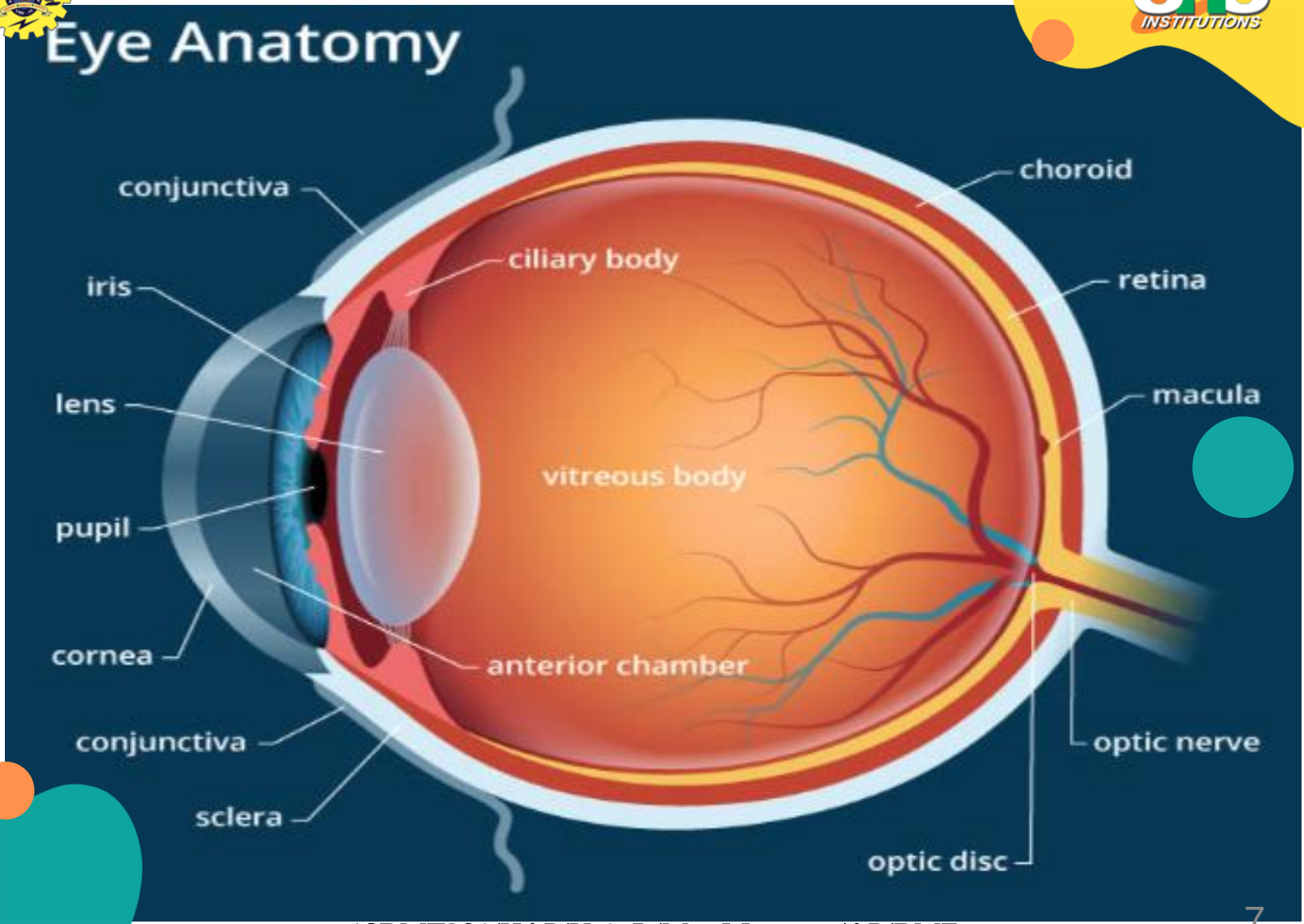
Simulations in cataract surgery

Introduction

- Eye is the organ of sight.
- It is situated in the orbital cavity and supplied by the Optic nerve (2''d cranial nerve).
- Spherical in shape and about 2.5 cm in diameter.

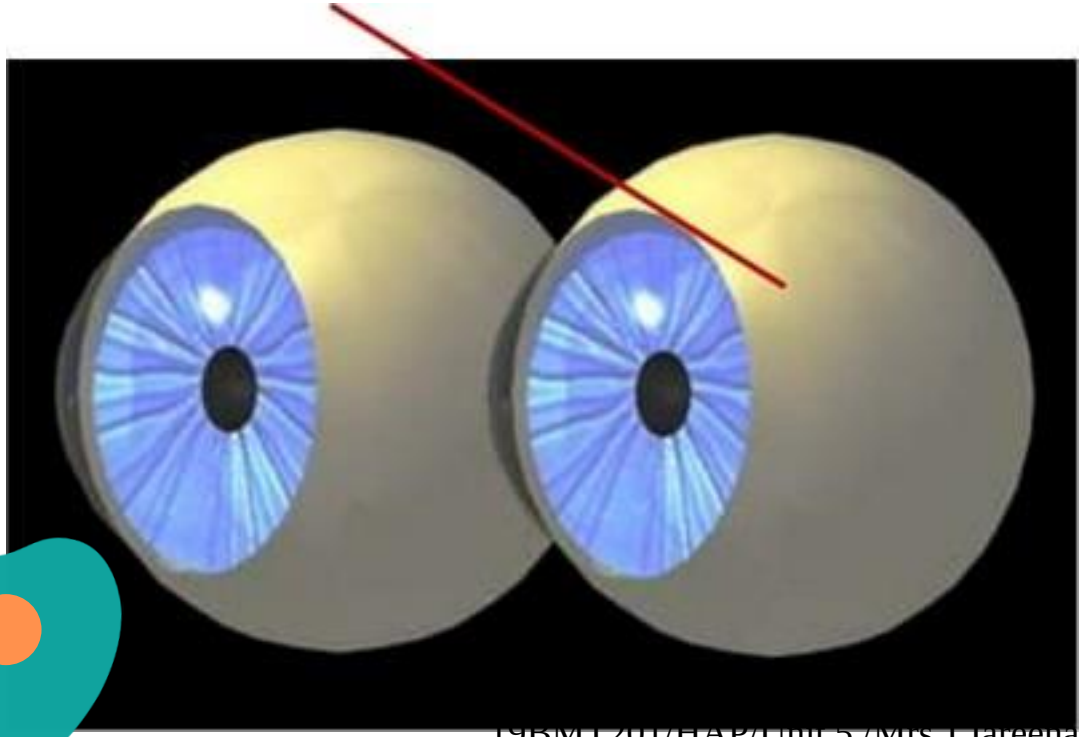
Structure of the eye

1. Outer fibrous layer: sclera and cornea.
2. Middle vascular layer or uveal tract: consisting of the choroid, ciliary body and iris.
3. Inner nervous tissue layer: retina.


Eye Anatomy
conjunctiva
iris
lens
pupil
cornea
conjunctiva
sclera
ciliary body
vitreous body
anterior chamber
choroid
retina
macula
optic nerve
optic disc

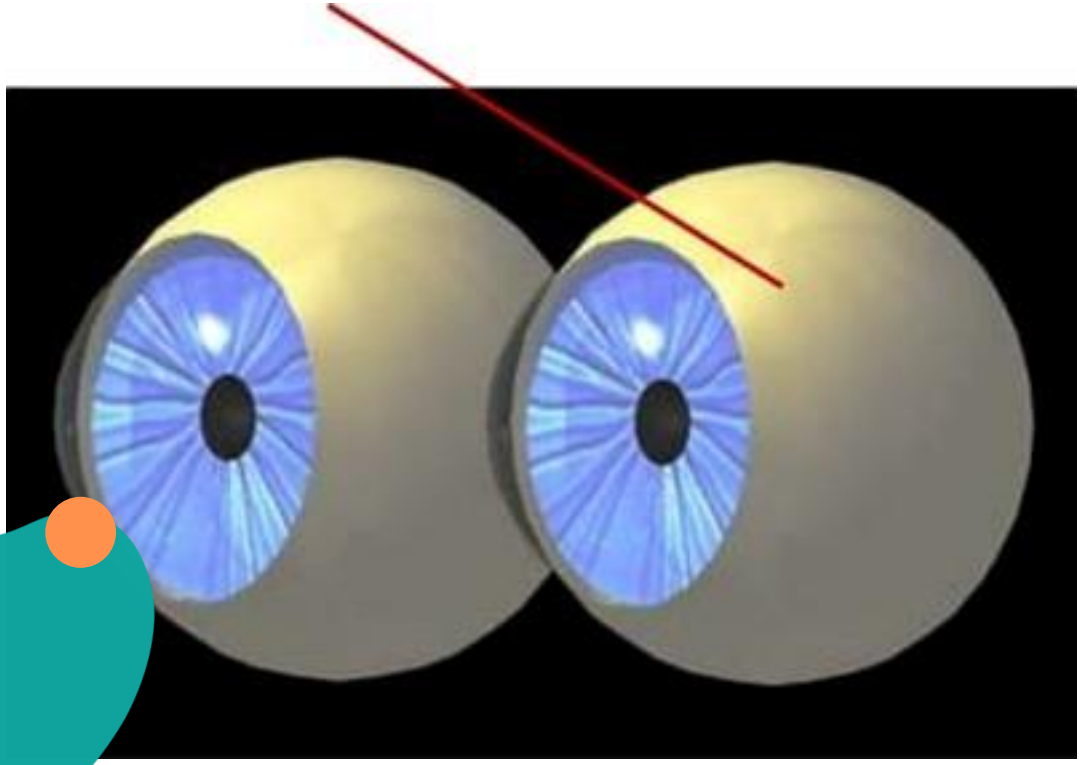
SCLERA

SCLERA —a tough white skin (made of tissue) that covers all of the eyeball except the cornea.



- whites of the eye
- supports eyeball
- provides attachment for muscles

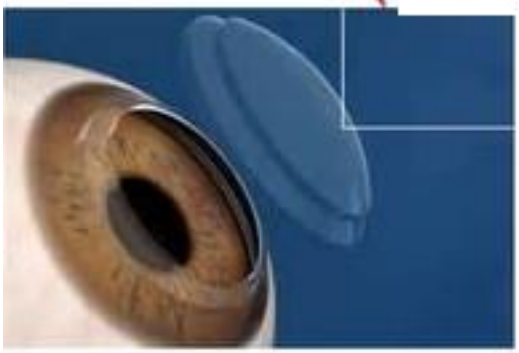
Function of sclera

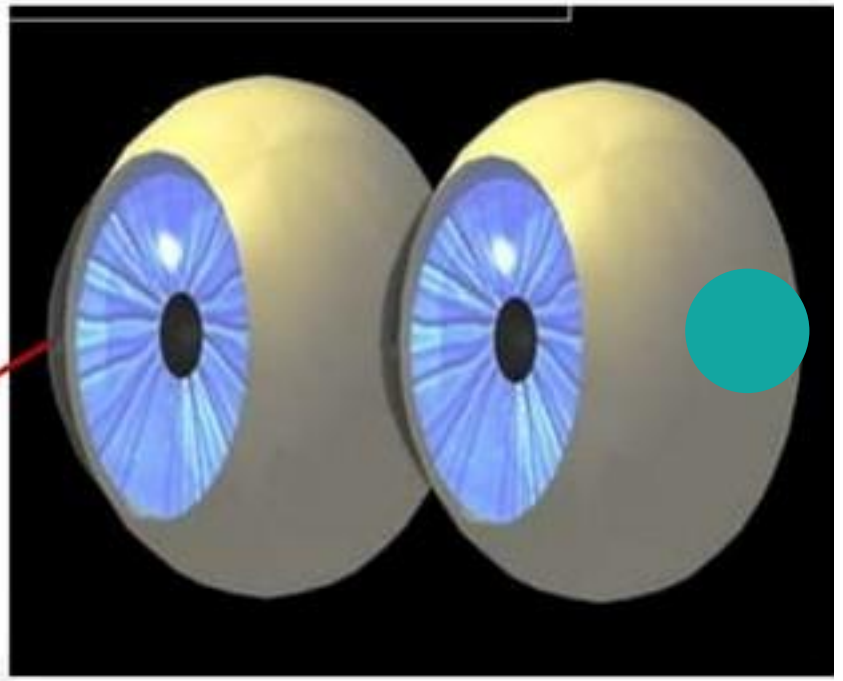


Supports eyeball and provides attachment for muscles

CORNEA

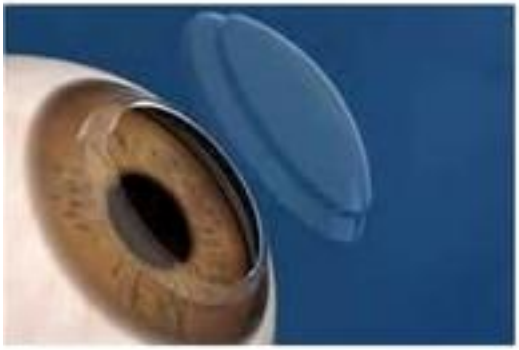
(clear lens in front of eye)

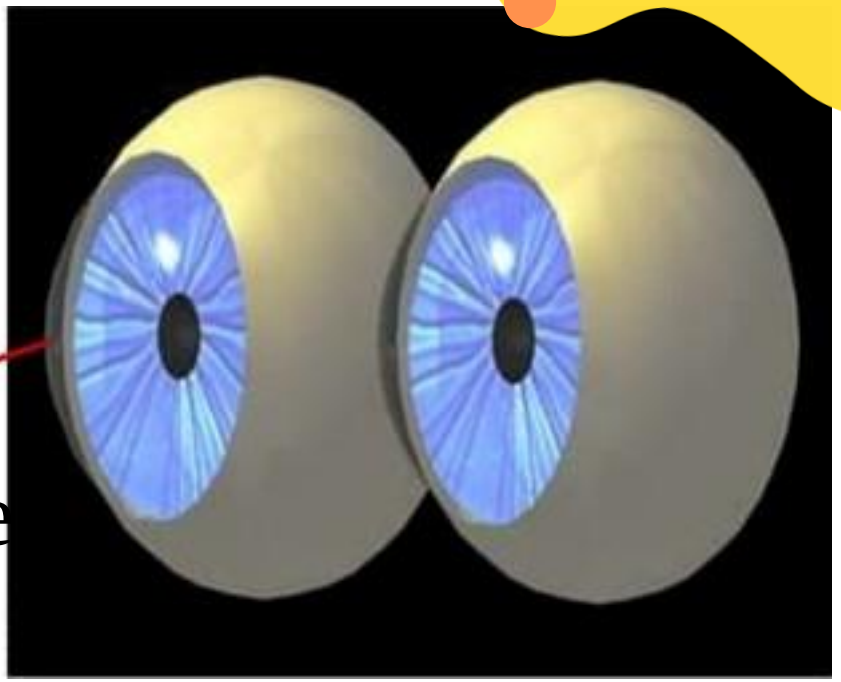




- Transparent covering of the front of the eye
- Allows for the passage of light into the eye and functions as a fixed lens

Function of Cornea



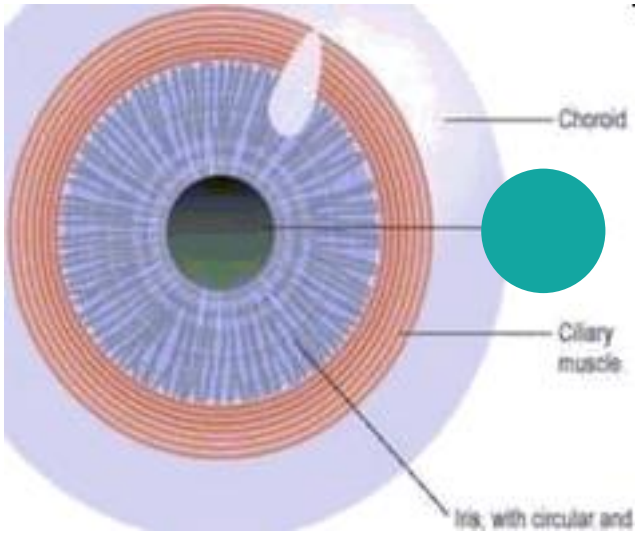


Allows for the passage of light into the eye and it also focuses the light

Choroid

chocolate brown in color)

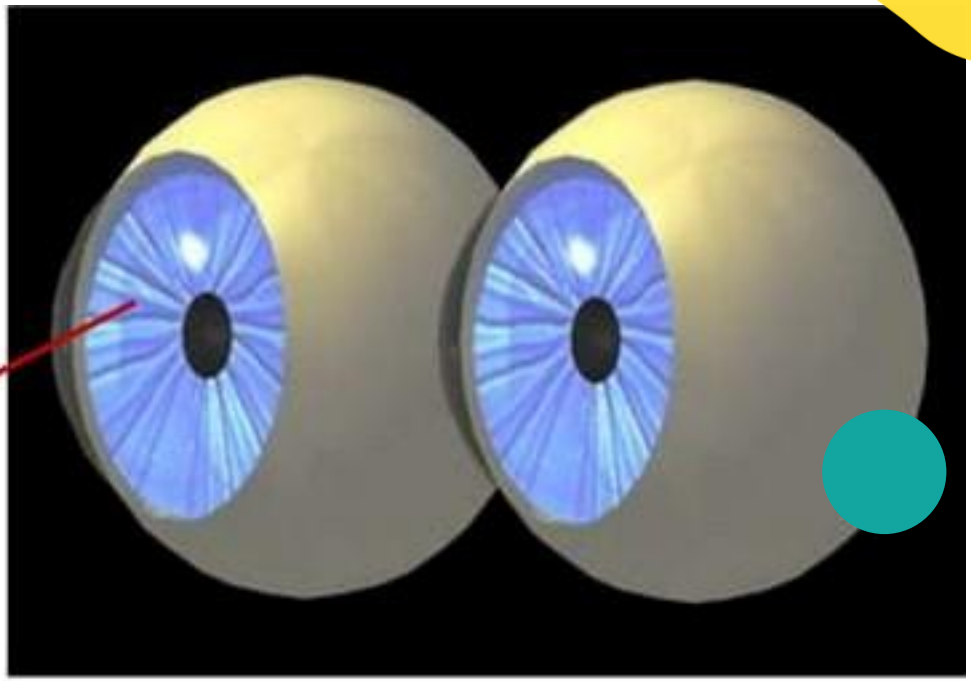
- choroid lines the posterior five-sixths of the inner surface of the sclera.
- It is very rich in blood vessels and is deep chocolate brown in colour.

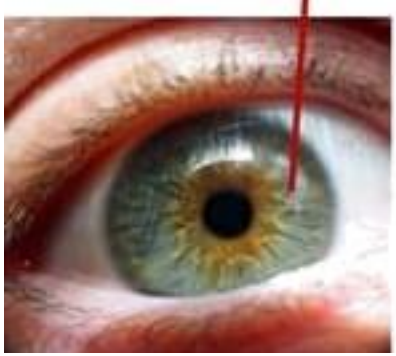


Function of Coroid

Light enters the eye through the pupil, stimulates the sensory receptors in the retina and is then absorbed by the choroid.

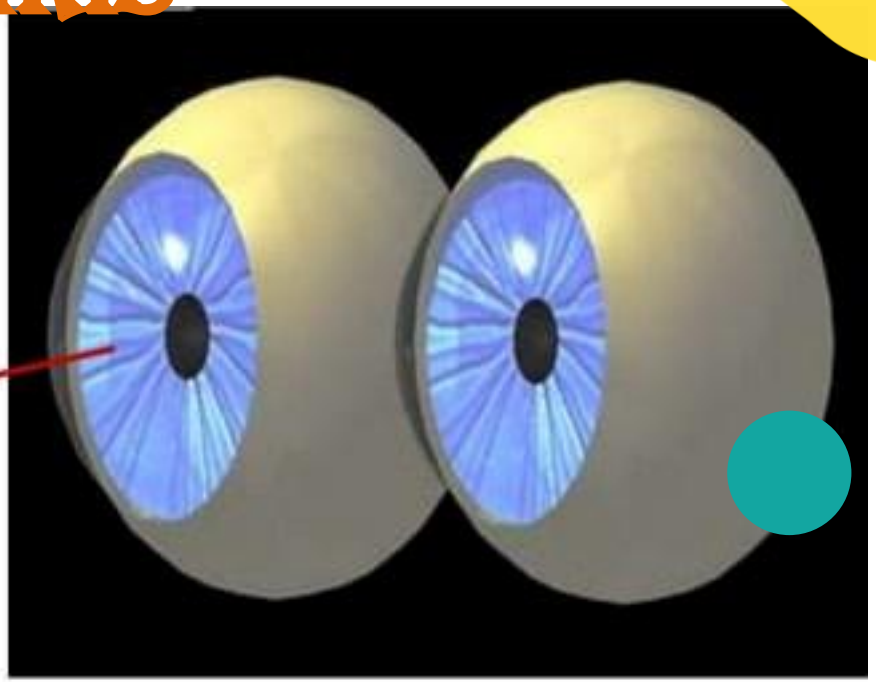
- colored part of eye
- controls light enteric





FUNCTION OF IRIS

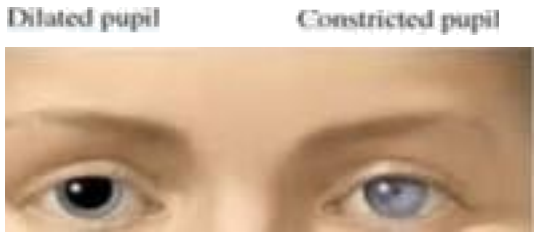
Parasympathetic stimulation constricts the pupil and sympathetic stimulation dilates it

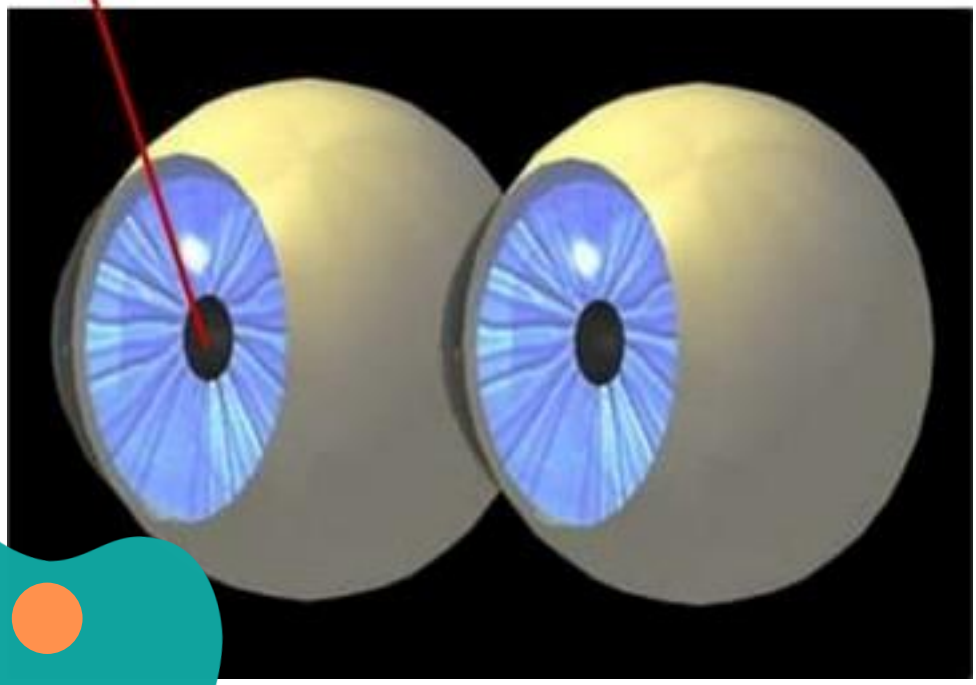


controls the amount of light entering the eye

PUPIL (*Black hole*)

- Black hole in iris
- Where light enters

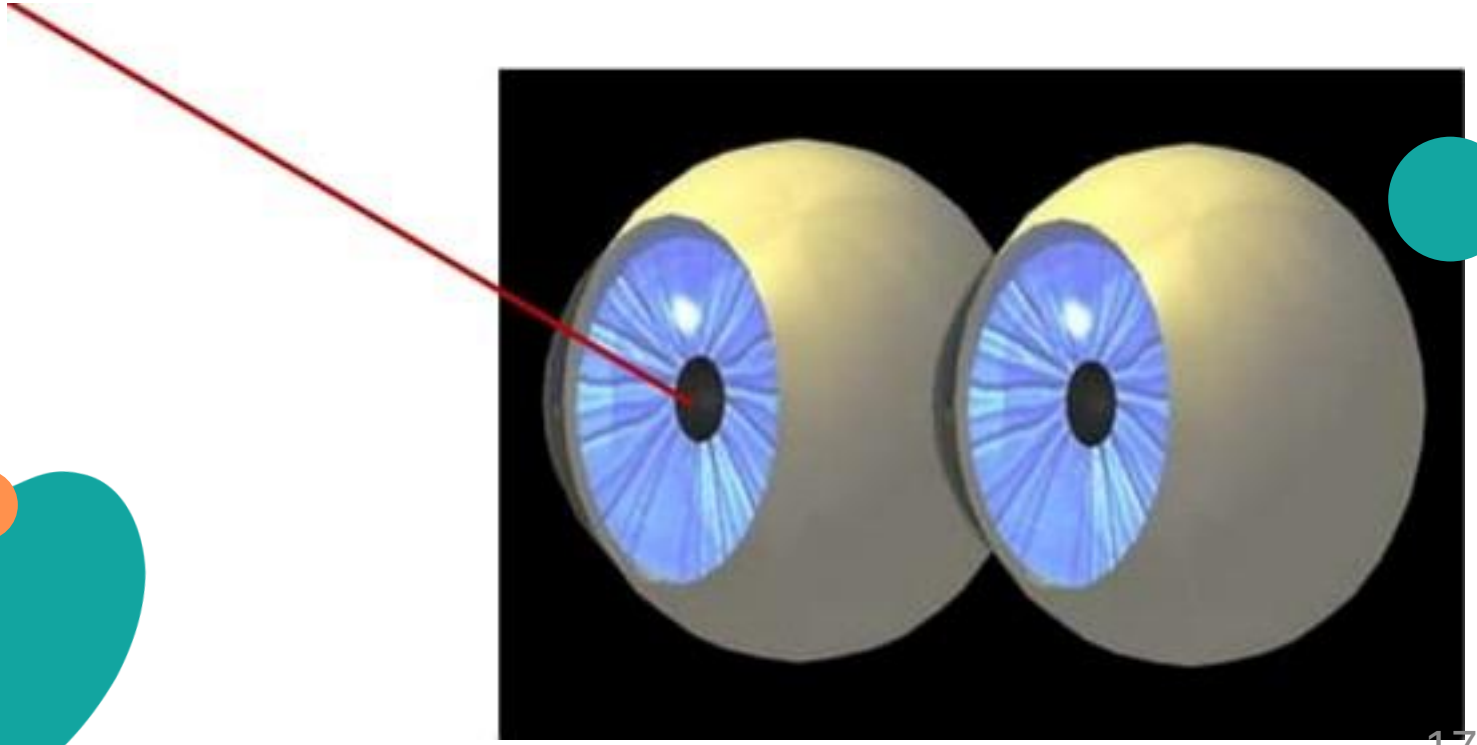




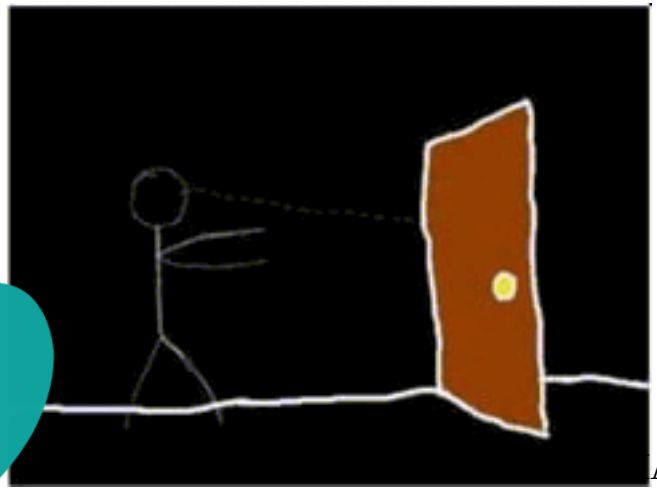
Pupil size is controlled by ciliary Muscles

Function of pupil

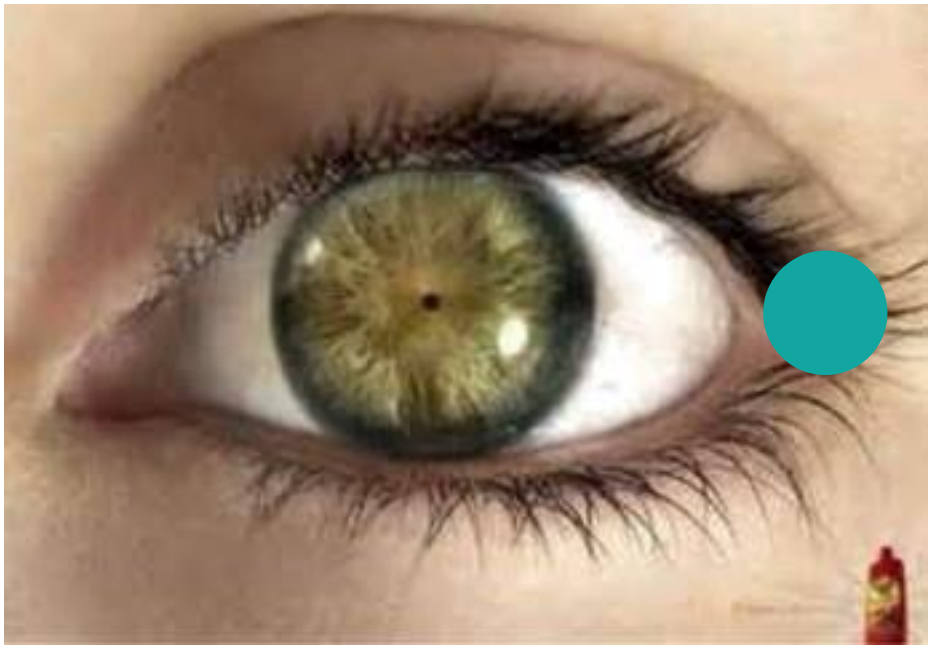
The hole where light enters into the eye



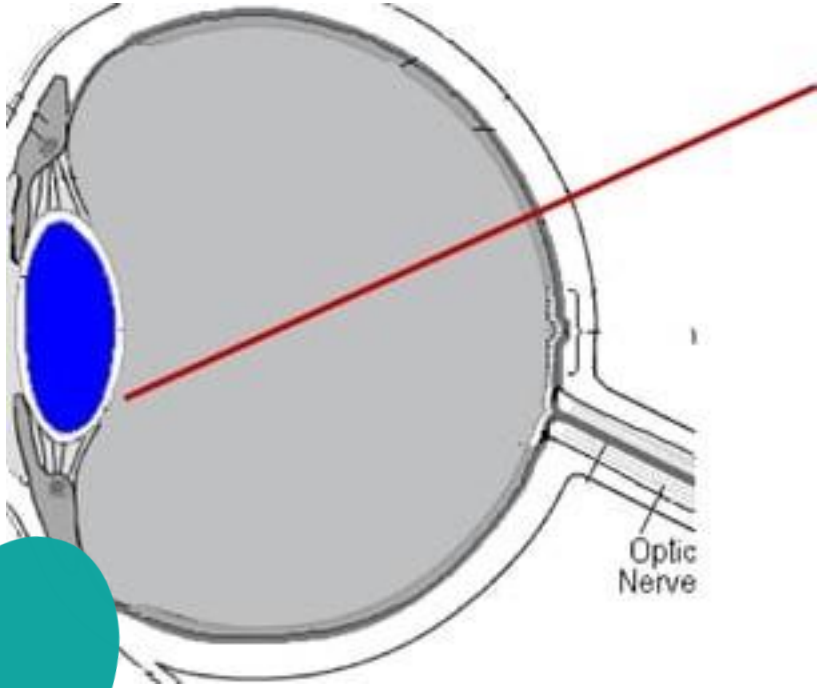
When the eye needs more light to enter' (when it is dark), the pupils get larger; allowing more light to enter the eye



When the eye needs less light to enter (when it is very bright), the pupils get smaller; allowing less light to enter it

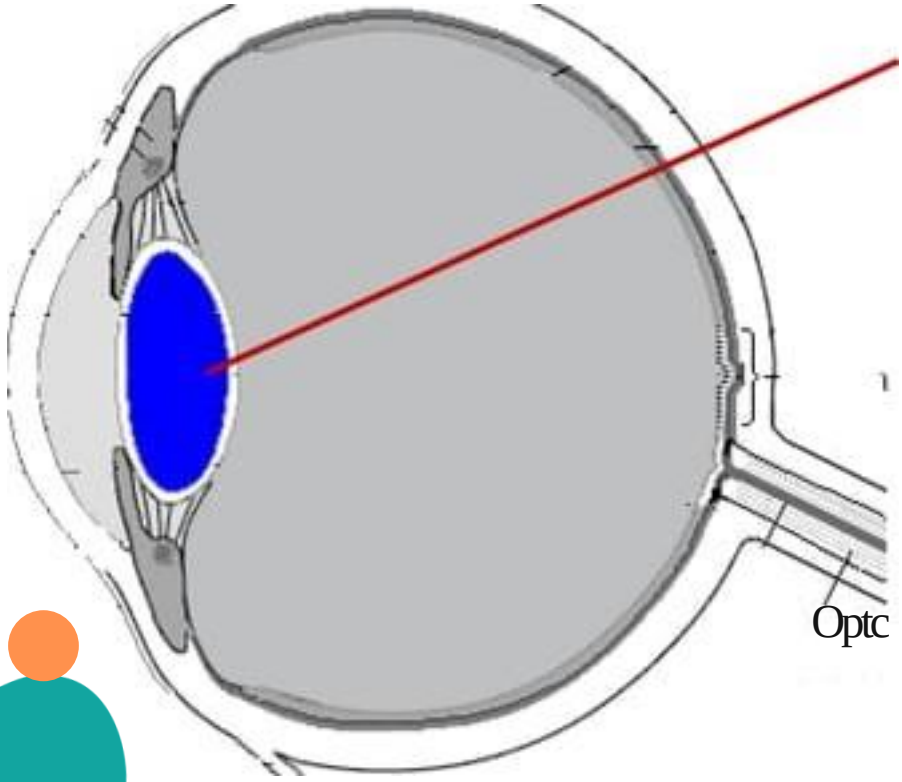


LENS
(lens behind pupil)



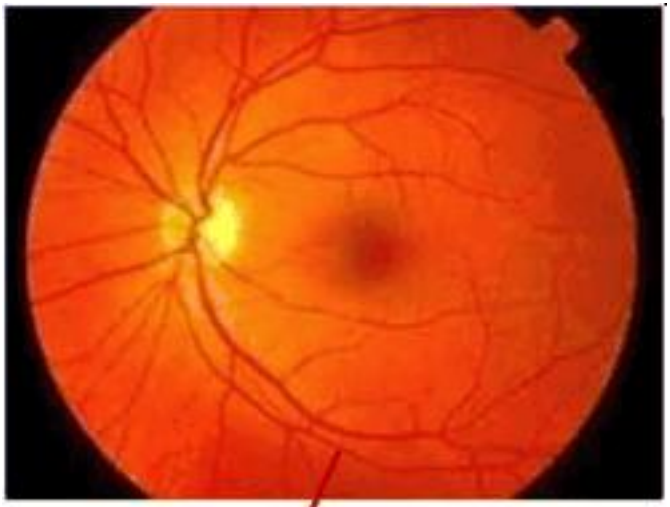
- lens is a highly elastic circular biconvex body, lying immediately behind the pupil
- allows us to see objects near and far

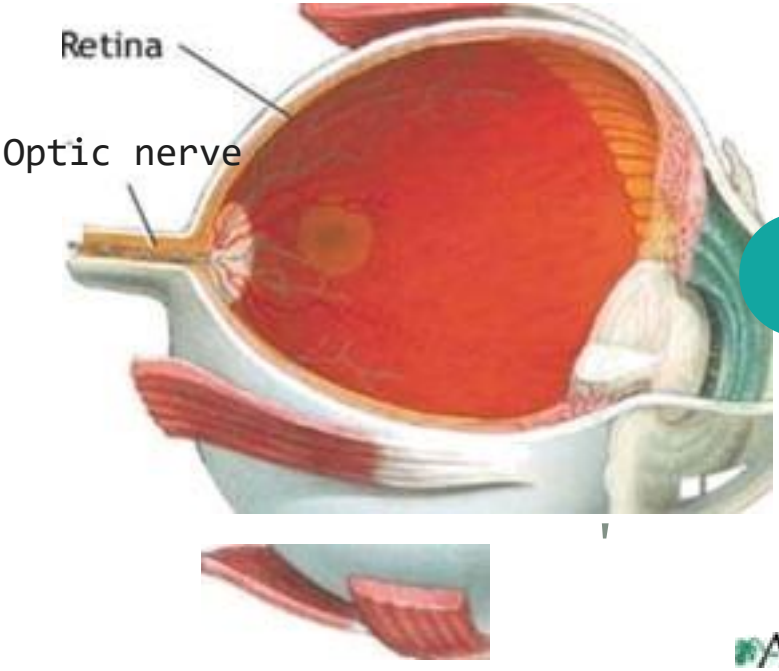
Function of lens



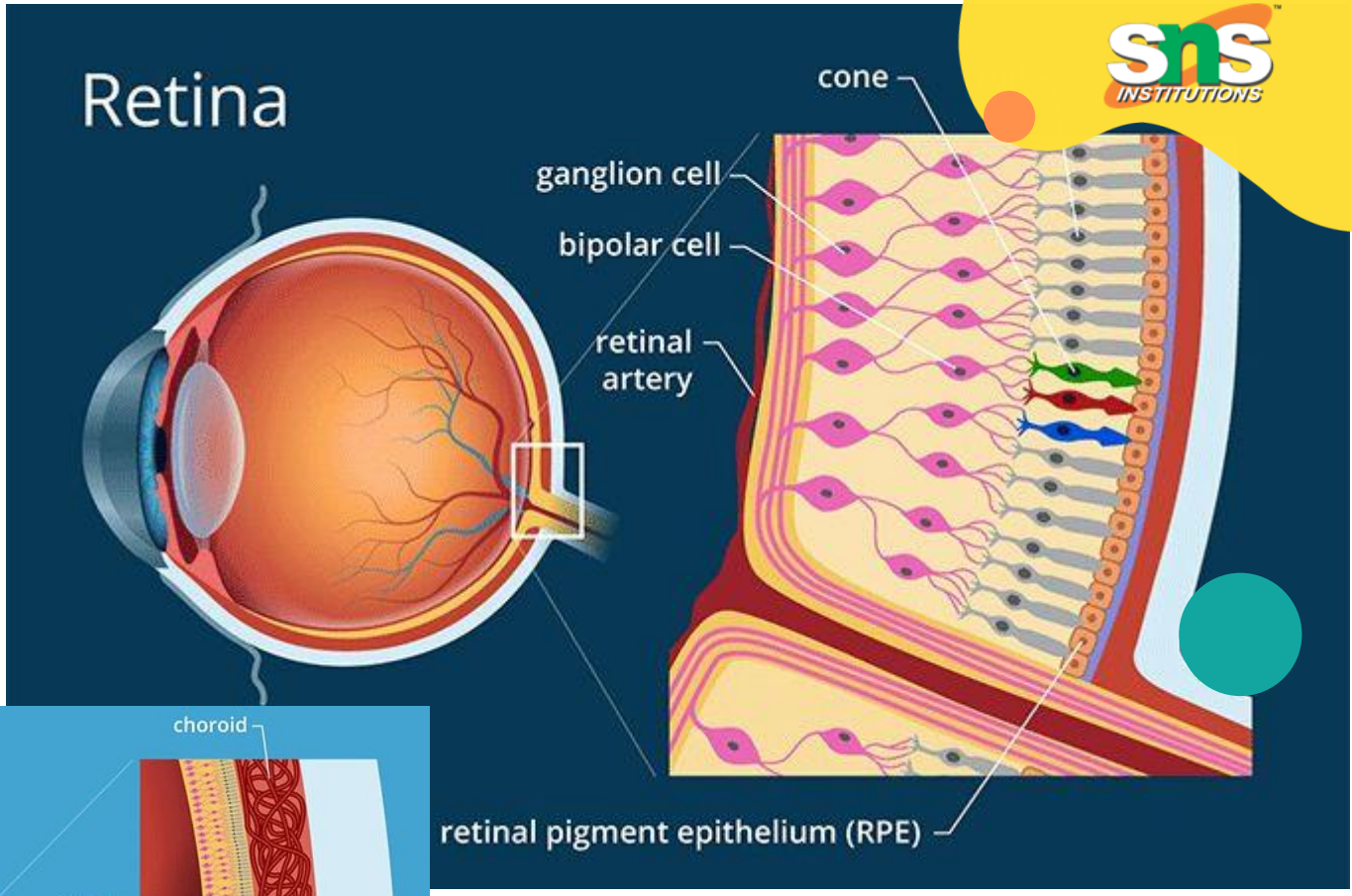
allows us to see objects near and far

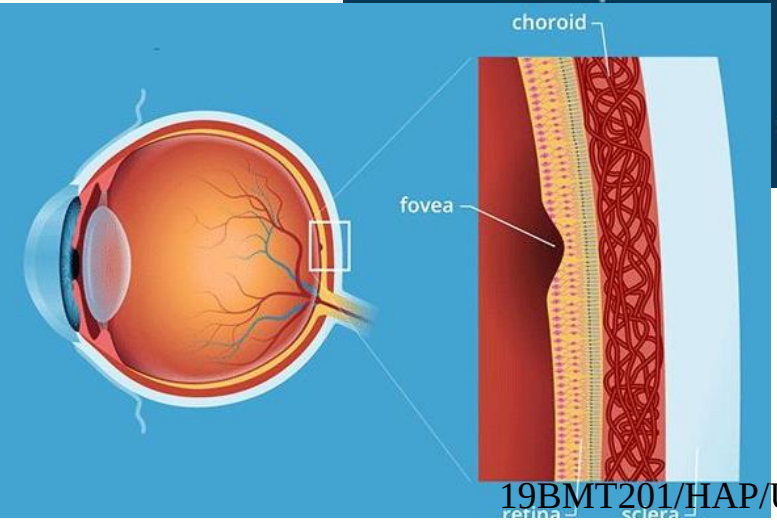
RETINA





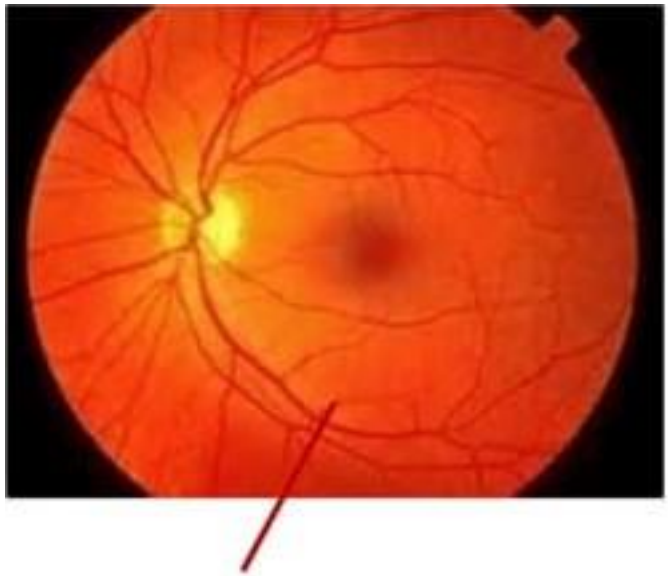
- internal membrane
- contains light-receptive cells (rods and cones)
- converts light to electrical signals


Retina
cone
ganglion cell
bipolar cell
retinal artery
retinal pigment epithelium (RPE)

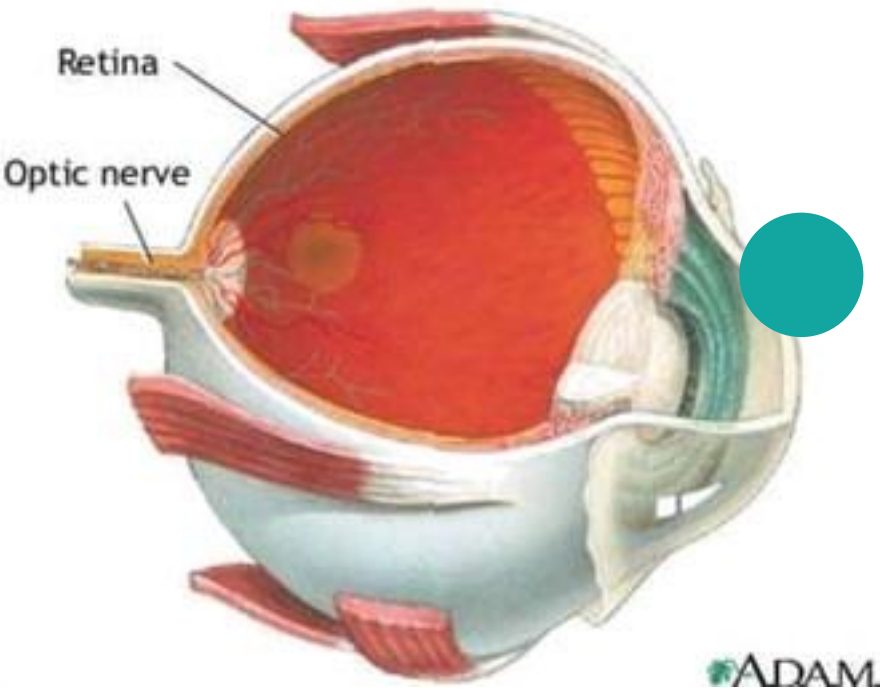

choroid
fovea

- There are two types of photoreceptor cells in the human eye — rods and cones.
- Rod photoreceptors →motion, provide black-and-white vision (in low light).
- Cones → central vision and color vision (in medium and bright light).
- Rods → the retina; cones →small central area of the retina called the macula.
- At the center of the macula is a small depression called the fovea.
- The fovea contains only cone photoreceptors and is the point in the retina responsible for maximum visual acuity and color vision.

Function of retina

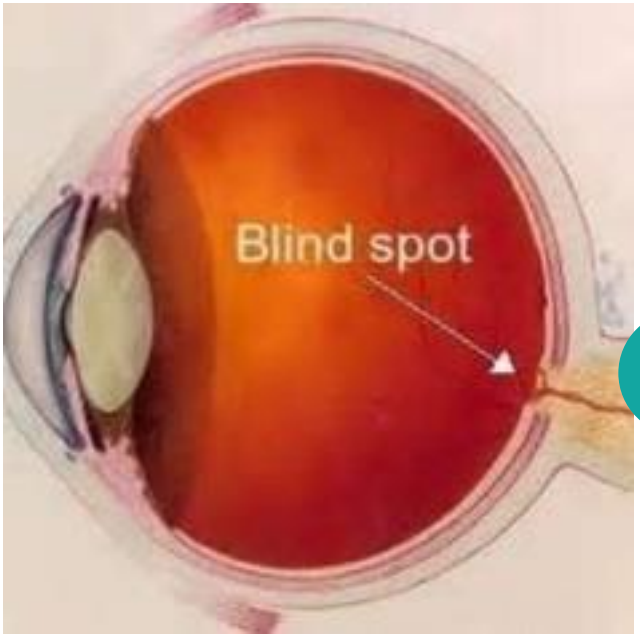


converts light waves to electrical signals



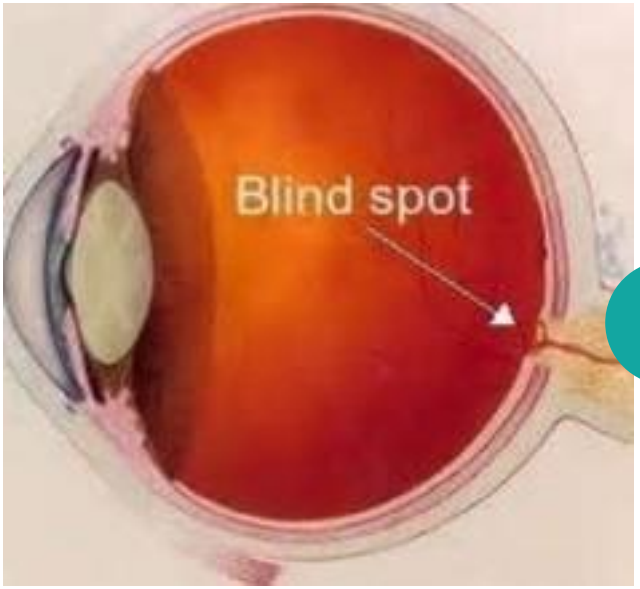
SPOT

- On retina where optic nerve leads back into the brain
- No rod or cone cells
- Other eye compensates for this area



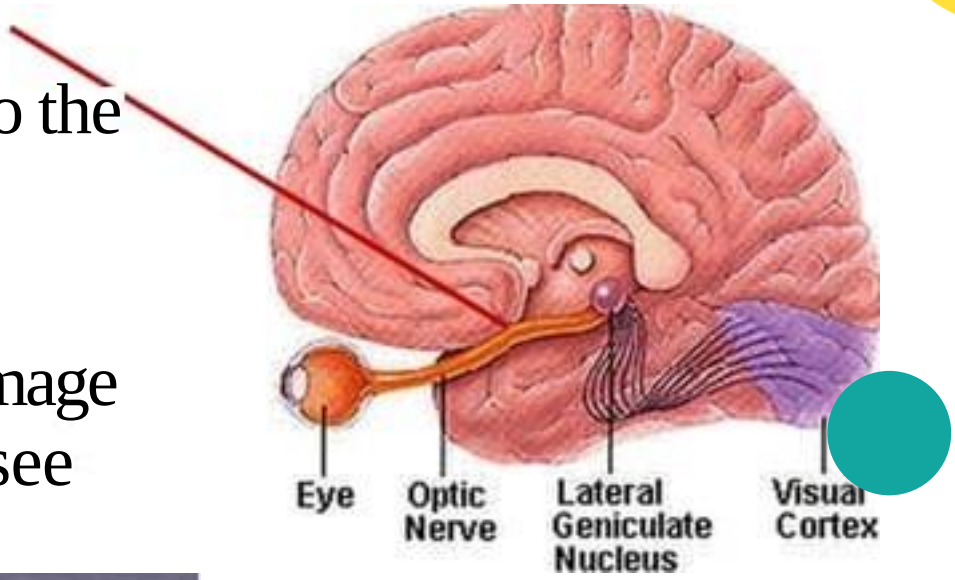
Function of blind spot

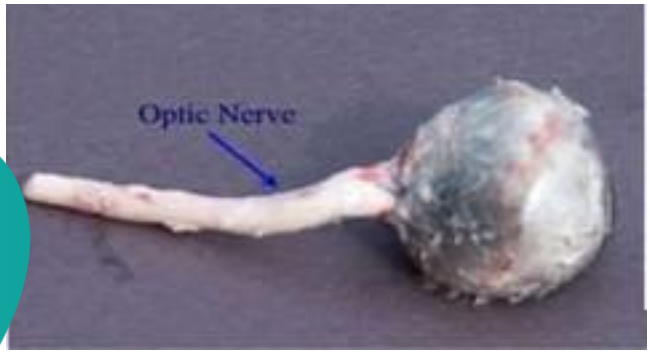
- Small spot on the back of the retina
- Other eye compensates for this area



OPTIC NERVE

- Transmits electrical impulses from retina to the brain
- Creates blind spot
- Brain takes inverted image and flips it so we can see





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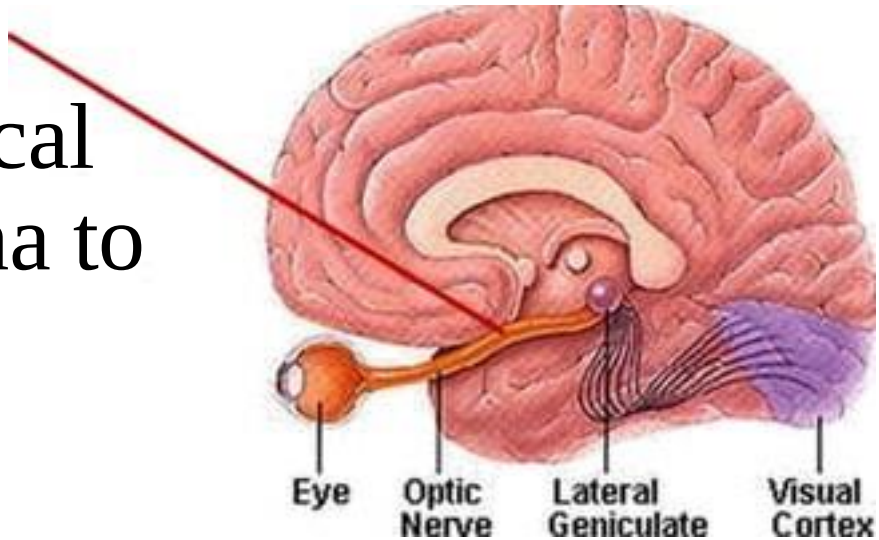
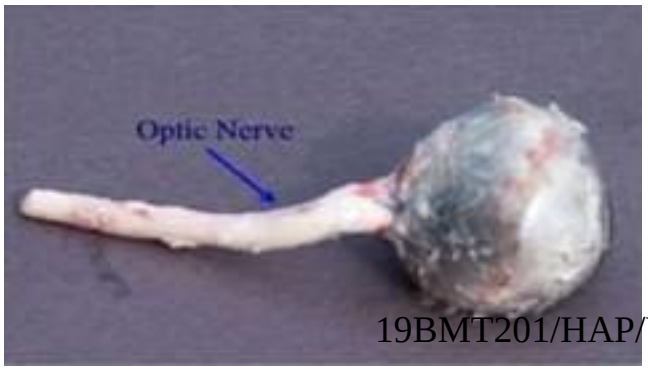
Function of optic nerve

Transmits electrical signals from retina to the brain

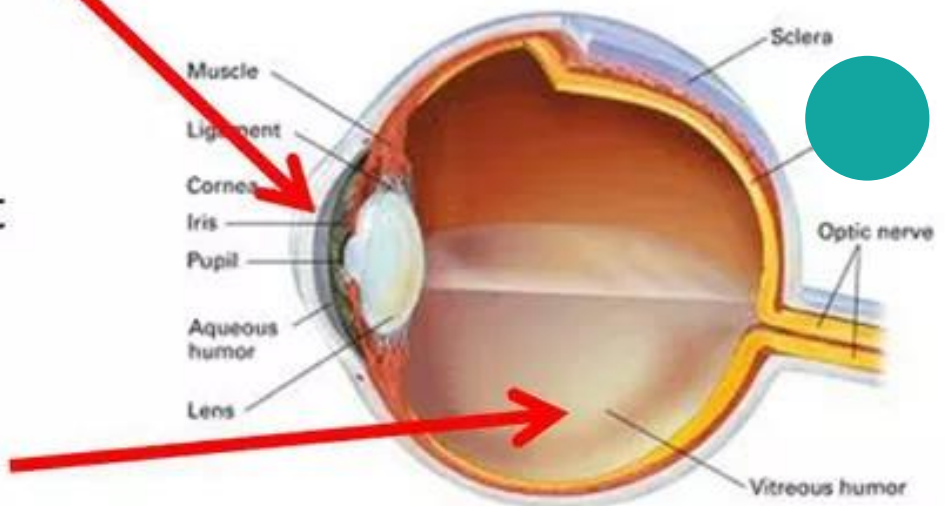




Aqueous Humour and Vitreous Humour

Aqueous Humour

- Jelly-like material at the front of the eye behind the cornea; supplies cornea with nutrients, bends light and maintains shape

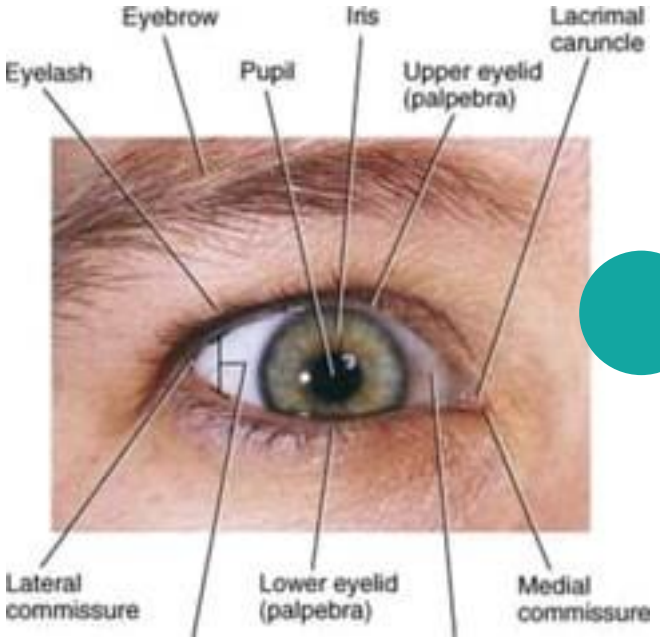


Vitreous Humour

- Bends light and gives the eye structure

Accessory Structures of Eye

- Eyelids
- Eyelashes
- Eyebrows
- Lacrimal apparatus
- Extrinsic eye muscles



Eyebrows

These are two arched ridges of the supraorbital margins of the frontal bone. Numerous hairs (eyebrows) project obliquely from the surface of the skin. They protect the eyeball from sweat, dust and other foreign bodies.

Eyelids

The eyelids are two movable folds of tissue situated above and below the front of each eye. On their free edges there are short curved hairs, the eyelashes

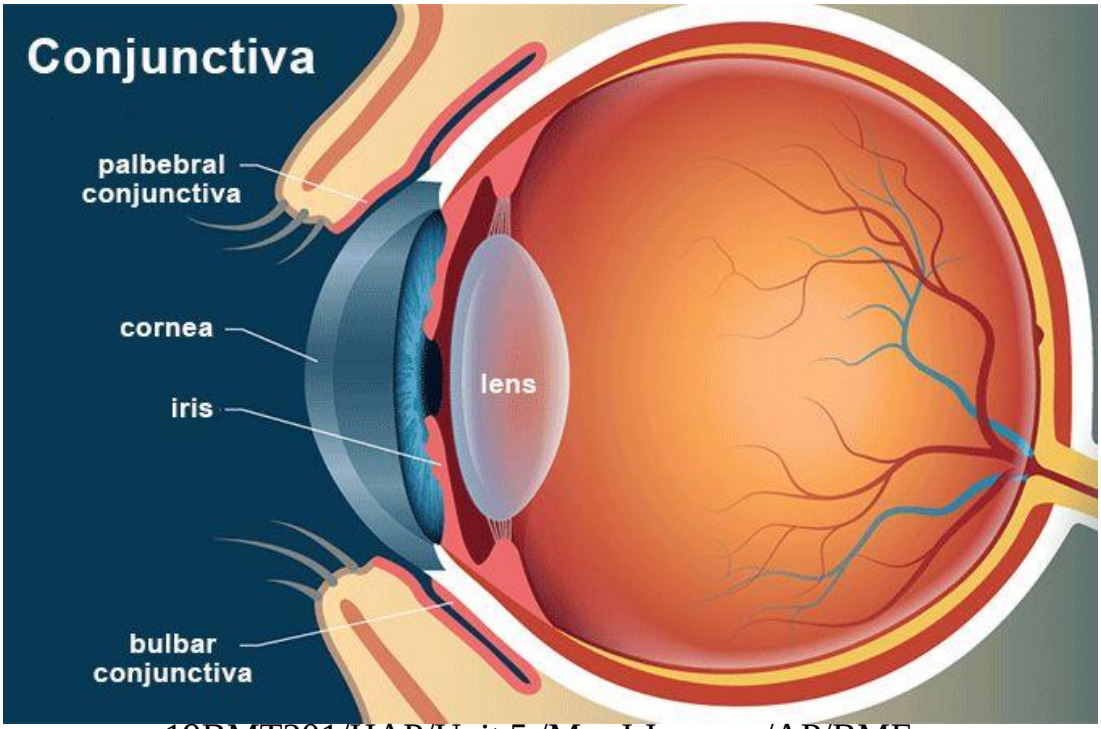
Functions of eye lids

The eyelids and eyelashes protect the eye front injury:-

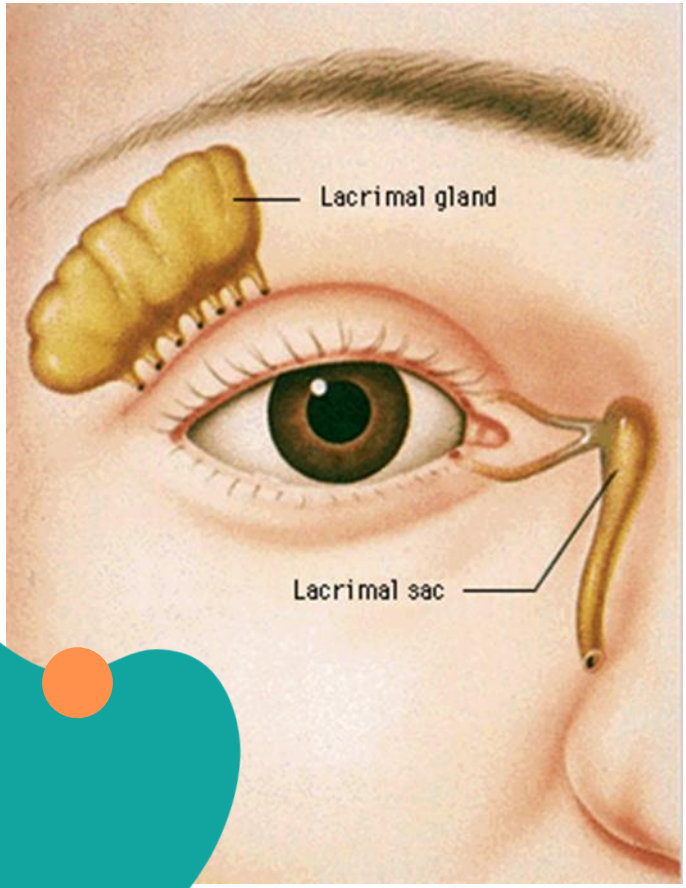
Reflex closure of the lids occurs when the conjunctiva or eyelashes are touched, when an object comes close to the eye or when a bright light shines into the eye this is called the corneal reflex blinking at about 3- to 7-second intervals spreads tears and oily secretions over the cornea, preventing drying.

Conjunctiva

This is a fine transparent membrane that lines the eyelids and the front of the eyeball. Where it lines the eyelids it consists of highly vascular columnar epithelium.



Lacrimal glands



Lacrimal glands produce tears

Tears are dilute salt solution

Contain lysozyme to kill bacteria

Drain into nasal cavity

Lacrimal apparatus

Each eye this consists of lacriinal gland and its ducts lacrirnal

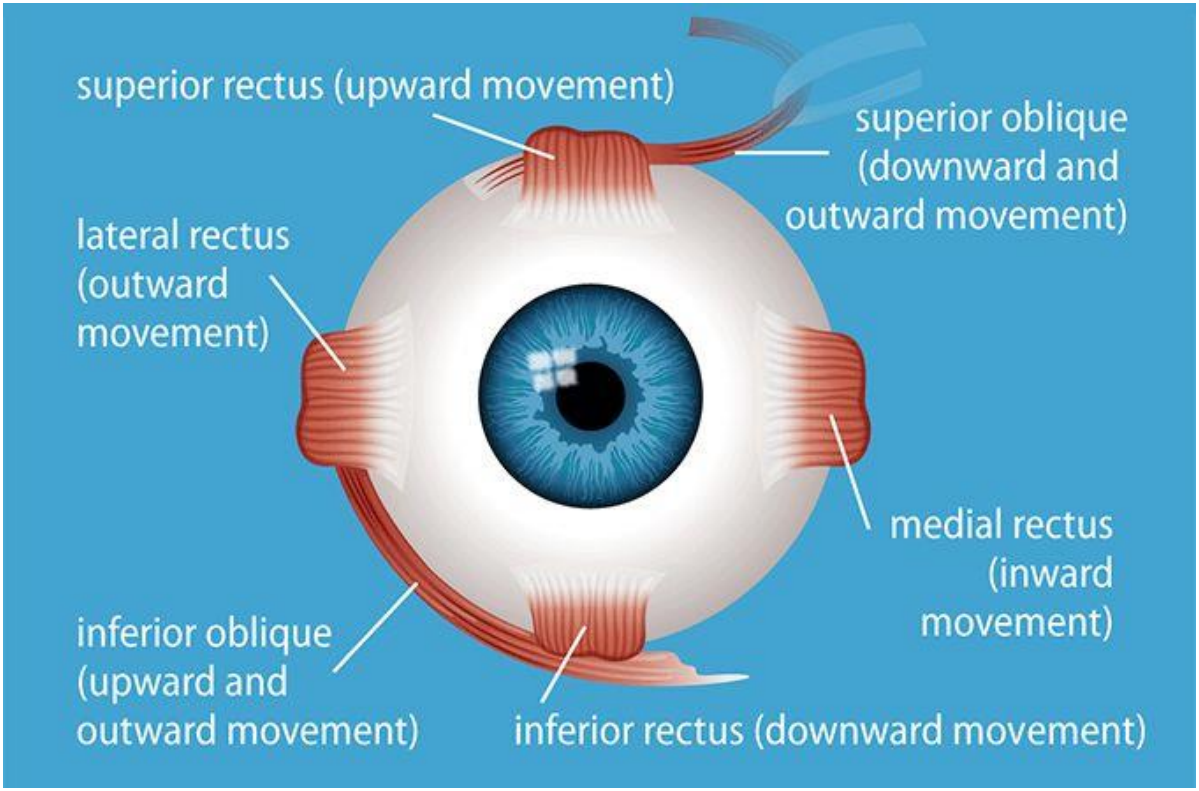
Lacrimal sac nasolacrimal duct.

The lacrimal glands are exocrine glands situated in recesses in the frontal bones on the lateral aspect of each eye just behind the supraorbital margin. Each gland is approximately the size and shape of an almond, and is composed of secretory epithelial cells. The glands secrete tears composed of water, mineral salts, antibodies (immunoglobulin), and lysozyme, a bactericidal enzyme.

Functions of lacrimal gland

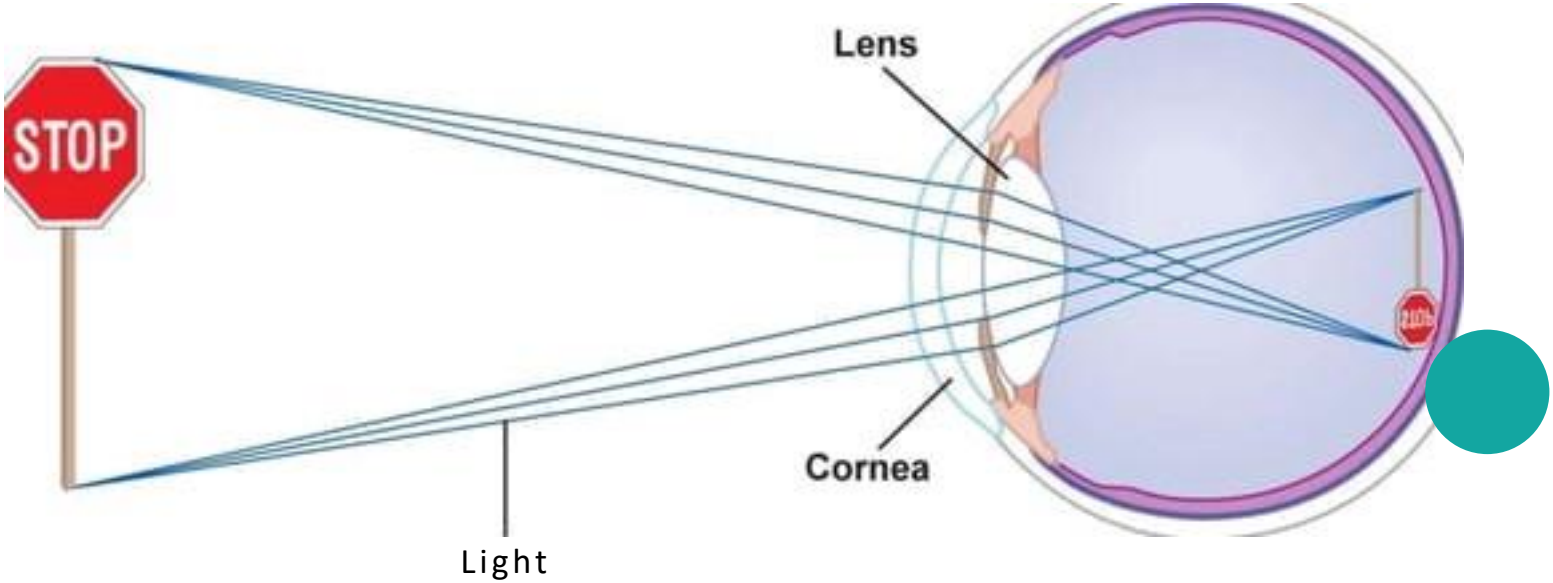
- Washing away irritating materials, e.g. dust, grit
- Bactericidal enzyme lysozyme prevents microbial infection
- Prevents drying of the conjunctiva.

Eyes Muscles



- extrinsic muscles →eye movement and position
- intrinsic muscles →focusing and how much light enters the eye

Lenses: Cornea and Le



How Your Lens Focuses

- Your Lens has a small depth of ficld
  —You can't see something close and far with both objects in focus at the same time
- Hold out your thumb about a foot away from your eye
  —Then, alternately focus on thumb and me (right abovc your' thumb)
- Note that you cannot see both me and your thumb sharply (in focus) at the same time
  – You focus on one or the other by changing the bulge of your lens

Reference

https://www.allaboutvision.com/eye-care/eye-anatomy/choroid/


THANK YOU