

Histology of the eye

Color index:

-Main text

-important

-female slides

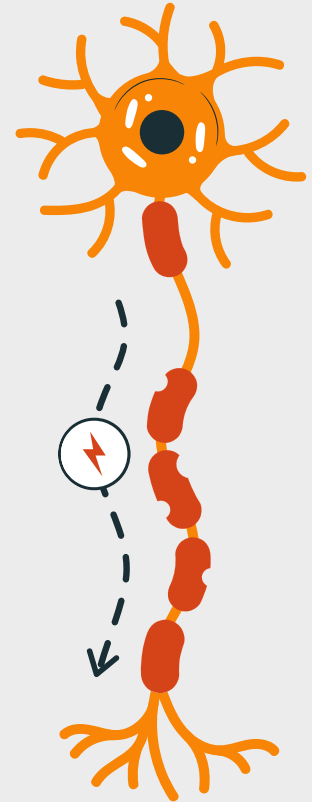
-male slides

-Dr.note

-Extra

Neuropsychiatry Block | Histology

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Objectives:

By the end of this lecture, the students should be able to :

- Describe the general structure of the eye.
- Describe the microscopic structure of the eye including:
 1. Cornea.
 2. Sclera.
 3. Choroid.
 4. Ciliary body.
 5. Ciliary processes.
 6. Iris.
 7. Retina.
 8. Conjunctiva.





Eye bulb



Three coats (3 Tunics):

1- Fibrous tunic:

-Cornea

-Sclera

2-vascular tunic:

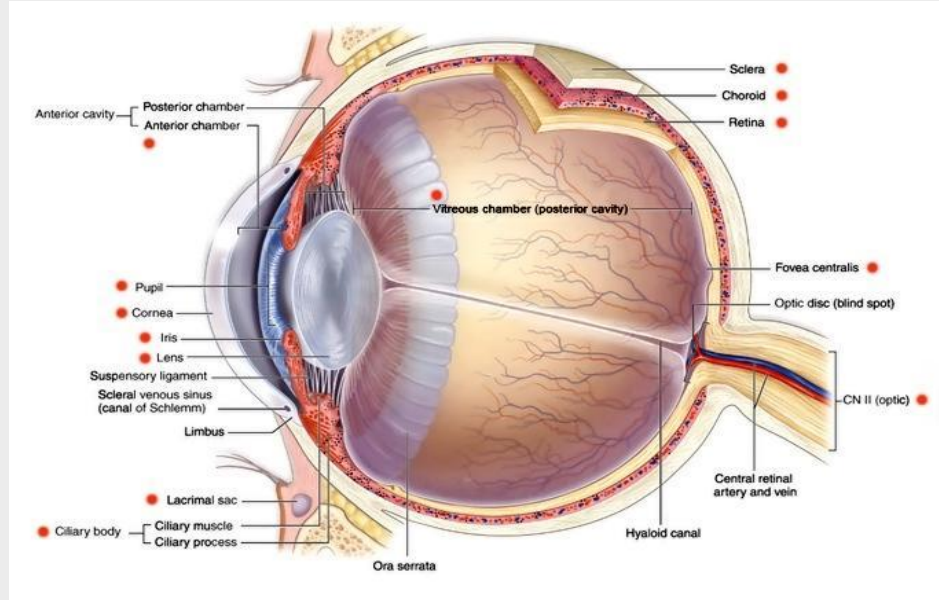
- Choroid

- Ciliary body

- Iris

3- Neural tunic:

-Retina



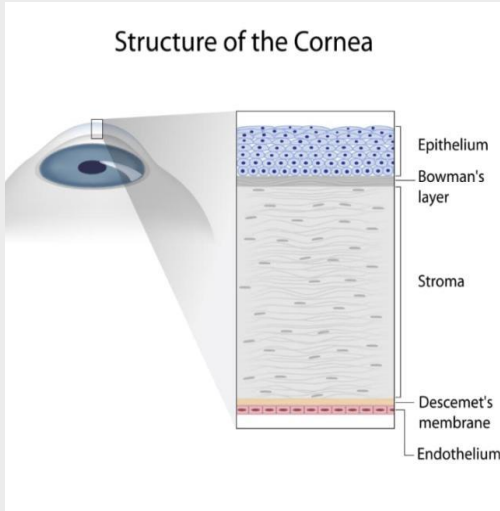


Cornea



It is the **transparent, avascular** and highly innervated anterior portion of the fibrous coat.

It is composed of 5 distinct layers :



01

Corneal epithelium

02

Bowman's membrane

03

Stroma

04

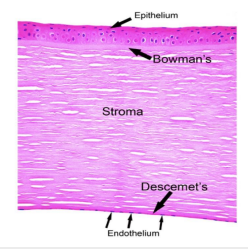
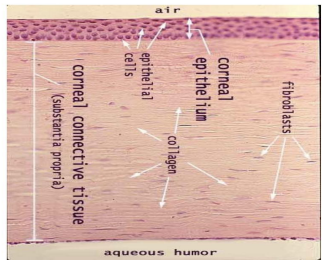
Descemet's membrane

05

Corneal(descemet's)
Endothelium



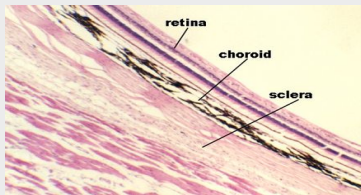
Cornea cont.

Corneal epithelium	Bowman's membrane	Stroma (Substantial propia)	Descemet's Membrane	Corneal (Descemet's) Endothelium
<p>Non-keratinized Stratified squamous epithelium.</p> <p>- Contains numerous free nerve endings.</p> 	<p>It is homogenous non-cellular layer containing type I collagen fibrils.</p> <p>bowman's membrane has collagen type 1 fibrils But Stroma has collagen type 1 of fibers</p>	<p>It is the thickest layer (about 90%).</p> <ul style="list-style-type: none"> - It is composed of parallel lamellae of dense collagenous C.T. - Each lamella is composed mainly of parallel type I collagen fibers with long fibroblasts (corneal corpuscles). 	<p>It is a thick basement membrane.</p>	<ul style="list-style-type: none"> - It is a simple squamous epithelium. <p>Functions:</p> <ol style="list-style-type: none"> 1- Formation of Descemet's membrane 2- Keeping the stroma relatively dehydrated (NA⁺ pump → water withdrawal from the stroma).

SCLERA

It covers the posterior 5/6 of the fibrous tunic.

Sclera Proper: consists of **interlacing bundles of type I collagen** (dense collagenous C.T).



LIMBUS

(Corneo scleral junction)

-It is the transition region between the cornea and sclera.

-It is about 1.5 mm width.

-It is **highly vascular**.

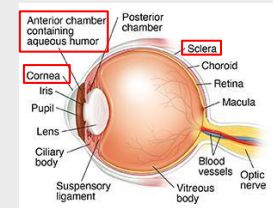
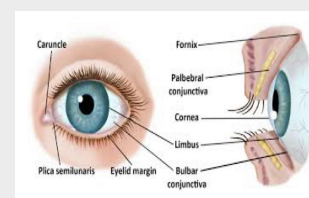
-It contains:

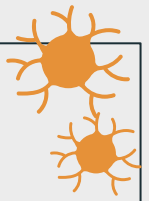
Trabecular meshwork:

Endothelium-lined spaces. It leads to canal of Schlemm.

Canal of Schlemm:

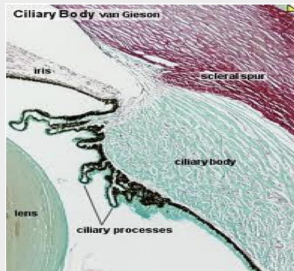
It drains the aqueous humor into the venous system





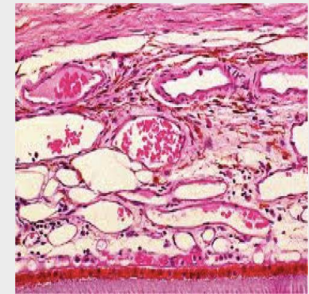
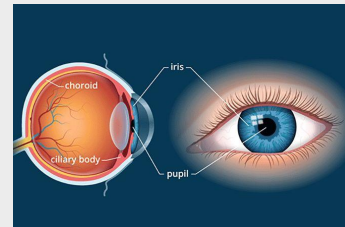
CILIARY BODY

- It is the anterior continuation of the choroid. It surrounds the lens.
- Structure:
It is formed of loose vascular and pigmented C.T. that **contains 3 bundles of smooth muscle cells (ciliary muscle).**



CHROID

- It is the **vascular, pigmented** posterior portion of the middle vascular tunic.
- Structure:
It is composed mainly of loose C.T. with melanocytes.



CILIARY PROCESS

- Processes project from the inner surface of the anterior 1/3 of the ciliary body towards the lens



IRIS

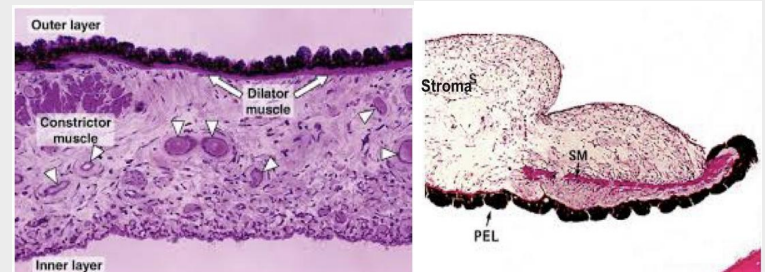
- It contains:

1. C.T. with fibroblasts and melanocytes.

2. Centrally, it contains circularly arranged **smooth muscle fibers** (sphincter pupillae muscle).

3. Radially arranged **myoepithelial cells** (dilator pupillae muscle).

4. Pigmented epithelium.



Retina

- It is composed of 10 distinct layers (from outside to inside)

10- Inner limiting layer

9- Optic nerve fiber layer

8- Ganglion cell layer

7- Inner plexiform layer

6- Inner nuclear layer

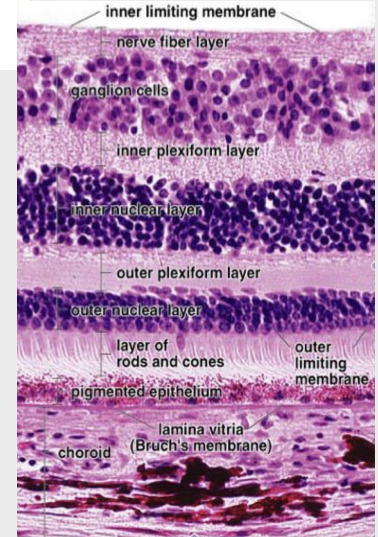
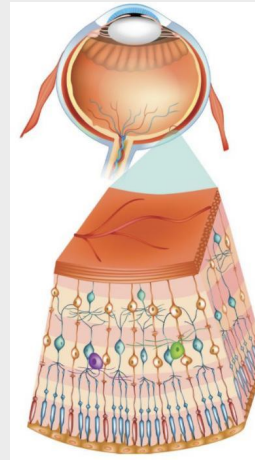
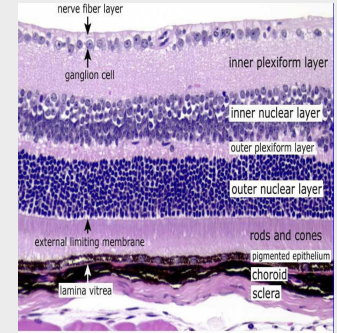
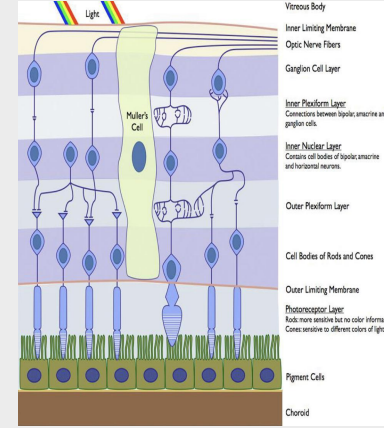
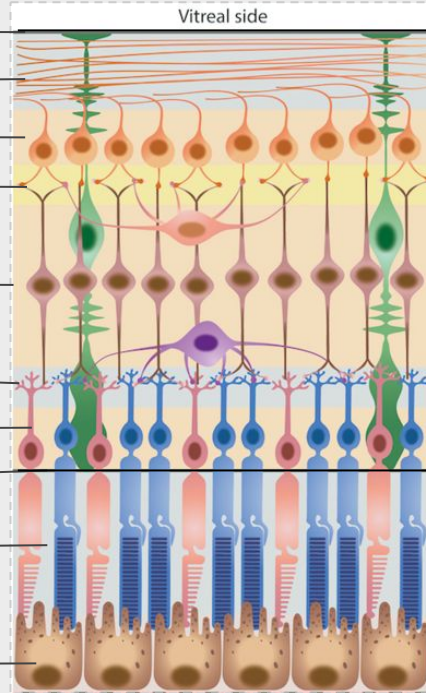
5- Outer plexiform layer

4- Outer nuclear layer


3- Outer limiting membrane

2- Rods and cones layer

1- Pigmented epithelium



Retina

Layers	Features & components	Function
Pigmented Epithelium	<ul style="list-style-type: none"> - Cuboidal to columnar cells (single layer). - Apical microvilli. - Abundance of melanin granules. 	<ul style="list-style-type: none"> ◊ Absorb light. ◊ Phagocytosis of membranous discs from tips of rods. ◊ Esterification of Vitamin A (in SER).
Rods and cones	<ul style="list-style-type: none"> - Are photoreceptor cells. (modified Bipolar neurons). - Each has: <ol style="list-style-type: none"> 1- Dendrite contain: <ul style="list-style-type: none"> • Outer segment (OS): contains membranous discs containing rhodopsin (in rods) and iodopsin (in cones). • Inner segment (IS) 2- Cell body 3- Axon: synapses with dendrite of bipolar neuron of inner nuclear layer. 	<ul style="list-style-type: none"> ◊ Rods are receptors for dim light (low intensity light) (Dark vision) (Blurred vision). ◊ Cones are receptors for; <ol style="list-style-type: none"> 1- Bright light vision (Acute sharp vision) e.g. Reading. 2- Color vision (red, green & blue). 
Outer limiting membrane	Region of Zonulae adherents junctions between Muller cells & Photoreceptors.	
Outer nuclear layer	Contains nuclei of the rods & cones.	
Outer plexiform layer	Contains axodendritic synapses between the photoreceptor cells and dendrites of bipolar cells.	
Inner nuclear layer	Contains the nuclei of: <ol style="list-style-type: none"> 1- Bipolar neurons. 2- Neuroglial cells (Muller cells). 	

Retina

Layers	Features & components
Inner plexiform layer	Contains synapses between axons of bipolar neurons and dendrites of ganglion cells.
Ganglion cell layer	Contains cell bodies of large multipolar neurons of the ganglion cells.
Optic nerve fiber layer	Contains unmyelinated axons of the ganglion cells. N.B. These axons become myelinated as the nerve pierces the sclera.
inner limiting membrane.	Formed by the basal laminae of the Muller cells

Types of cells in the retina

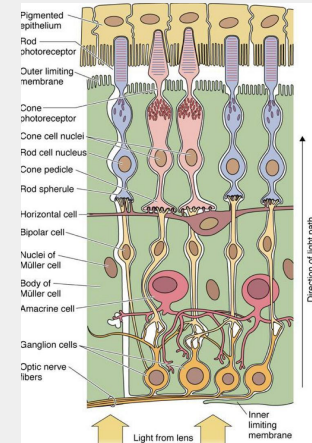
1- Pigmented epithelium.

2- Nerve cells:

- Photoreceptor cells (rods & cones)
- Bipolar Neurons
- Ganglion cells
- Association neurons

3- Neuroglial cells:

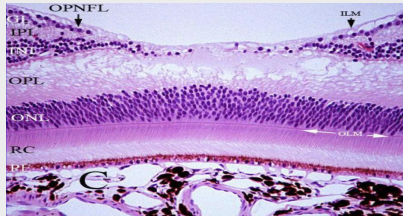
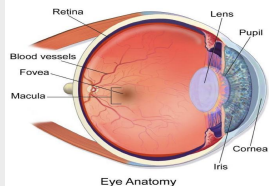
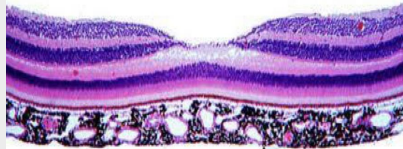
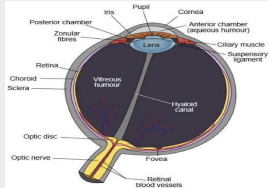
- Muller's cells
- Astrocytes



Retina

Fovea Centralis

- It lies in the Center of macula lutea.
- **Cones are highly concentrated in the fovea.**
- It is responsible for visual acuity.



Conjunctiva

- It is the transparent mucous membrane lining the inner surfaces of the eyelids (**palpebral conjunctiva**) and reflecting onto the sclera of the anterior surface of the eye (**bulbar conjunctiva**).

■ L/M:

1. Epithelium:

- **Stratified columnar epithelium with numerous goblet cells.**

1. Lamina propria:

- **Loose C.T.**



MCQs :

1. What is the shape of ganglion cells in the retina?

A. Large multipolar

B. Small multipolar

C. Bipolar

D. Unipolar

2. Which of the following is avascular structure ?

A. Retina

B. Cornea

C. Choroid

D. Limbus

3. What is responsible for the colored vision?

A. Cones

B. Rods

C. Ganglion cells

D. Both A,B

4. Which of the following structures found in cornea ?

A. Blood vessels

B. Canal of schlemm

**C. Bowman's
membrane**

D. Melanocyte

Answers: 1. A 2. B 3. A 4. C

Members Board

Team leaders

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Team members

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