

the Eye, Lect 1

1. Overview of the Eye

Overview of the Eye

Description	Feature
Eye (organ of vision)	Organ
Photosensitive: converts light → electrochemical signals → cerebrum	Function
Within bony cavities called orbits	Location
3 Tunics: External (Fibrous), Middle (Vascular), Inner (Nervous)	Histological Layers

2..Layers of the Eye

Layers of the Eye

Components	Type	Layer
Cornea, Sclera	Fibrous	External
Iris, Ciliary Body, Choroid	Vascular, Muscular, Pigmented	Middle
Retina (Neural layer + Pigmented Epithelium)	Nervous	Inner

3. The Cornea

Details	Feature
Dome-shaped	Shape
Transparent (colorless)	Color
Avascular	Vascularity
Refracts light to focus on the retina	Function
Rich in sensory nerve endings	Innervation
Maintained by tarsal & lacrimal gland secretions	Wetting

4. Histological Layers of the Cornea

Description	Layer
Non-keratinized stratified squamous (5–6 layers); basal cells are mitotic; has microvilli	1. Anterior Epithelium
Thick, non-cellular collagen layer (types I & V); supports and protects subepithelial nerves	2. Bowman's Membrane
90% of thickness; parallel collagen fibers (type I) in lattice pattern; contains keratocytes	3. Stroma
Non-cellular membrane (types IV & VIII collagen); made by endothelium	4. Descemet's Membrane
Simple squamous cells; active in pumping water; maintains corneal transparency	5. Endothelium

5..Functions of Microvilli on Corneal Surface Cells

Role	Function
Enhance adherence of tear film	Increase surface area
Retain hydration & nutrient transport	Tear film stability
Absorb water, electrolytes & nutrients	Transport & absorption

6..Tear Film Layers

Function	Secreted By	Layer
Convert surface from hydrophobic → hydrophilic; lubrication	Conjunctival goblet cells	1. Mucus
Supply oxygen, maintain electrolyte composition	Lacrimal glands	2. Aqueous
Prevent evaporation, reduce blinking friction, protect from dryness	Tarsal glands (eyelids)	3. Lipid

? Why is the Cornea Transparent?

Reason

Avascular (no blood or lymphatic vessels)

Smooth, non-keratinized surface epithelium

Regular collagen fiber arrangement in stroma

Similar refractive index of cells, fibers, and matrix

Controlled hydration via endothelial active transport



LASIK Surgery

Description

Aspect

Correct vision issues (myopia, hyperopia, astigmatism)

Purpose

Epithelium displaced → stroma reshaped with laser → epithelium repositioned

Technique

Rapid regeneration restores normal corneal physiology

Healing

Sclera

Description	Feature
Thick, white, opaque	Appearance
Irregular type I collagen fibers, fibroblasts, elastic fibers	Composition
Insertion of extraocular muscles, structural support, protection	Functions
Episclera, Scleral stroma, Lamina fusca	Layers
Conjunctiva (vascular)	Covering
Tenon's capsule: attachment for ocular muscles	Surrounding fascia

Conjunctiva & Related Conditions

Description	Condition/Note
Inflammation (pink eye); conjunctiva is vascular	Conjunctivitis
Sclera absorbs bilirubin due to collagen fibers	Jaundice effect on sclera

Corneo-Scleral Junction (Limbus)

Description	Feature
Between cornea and sclera	Location
Limbal stem cells, Canal of Schlemm, Trabecular meshwork (Spaces of Fontana)	Structures
Site for cataract/glaucoma surgery	Clinical importance
Corneal epithelium → bulbar conjunctiva; Bowman's ends; stroma connects	Continuities

Aqueous Humor Drainage

Function	Structure
Drains aqueous humor into venous system	Canal of Schlemm
Uveoscleral, Corneoscleral, Juxtacanalicular tissue (JCT)	Trabecular Meshwork Layers
Passageways at irido-corneal angle aiding aqueous humor flow	Spaces of Fontana

Limbal Stem Cells

Description	Feature
Renewal of corneal epithelial cells (lifespan = 7–10 days)	Role
Chemical/thermal burns, surgery, inflammation, contact lenses	Deficiency causes

Middle (Vascular) Layer: Uvea

Description	Component
Colored disc, controls pupil size & light entry	Iris
Produces aqueous humor, accommodation, supports lens	Ciliary Body
Not detailed in this part (likely in Part II)	Choroid

Iris Structure

Description	Part
Lined with fibroblasts & melanocytes → eye color	Anterior Surface
Loose vascular CT, fibroblasts, melanocytes; contains iris muscles	Stroma
Pigmented cuboidal epithelium (prevents light scattering)	Posterior Surface

Ciliary Body

Description	Feature
Ciliary muscles + Ciliary processes	Components
1. Accommodation, 2. Produce aqueous humor, 3. Support lens zonules	Functions
Behind iris, surrounds lens	Location



Histology of Ciliary Body

Description	Component
Two cuboidal layers: outer non-pigmented & inner pigmented (secretes aqueous humor)	1. Ciliary Epithelium
Loose CT with blood vessels, elastic fibers, melanocytes	2. Stroma
Smooth muscle controlling accommodation (changes lens shape)	3. Ciliary Muscle



Accommodation

Accommodation

Vision Focus	Lens Shape	Ligament Tension	Muscle Action	Condition
Near objects	Rounded	Decreased	Ciliary muscle contracts	Near Object
Far objects	Flattened	Increased	Ciliary muscle relaxes	Distant Object



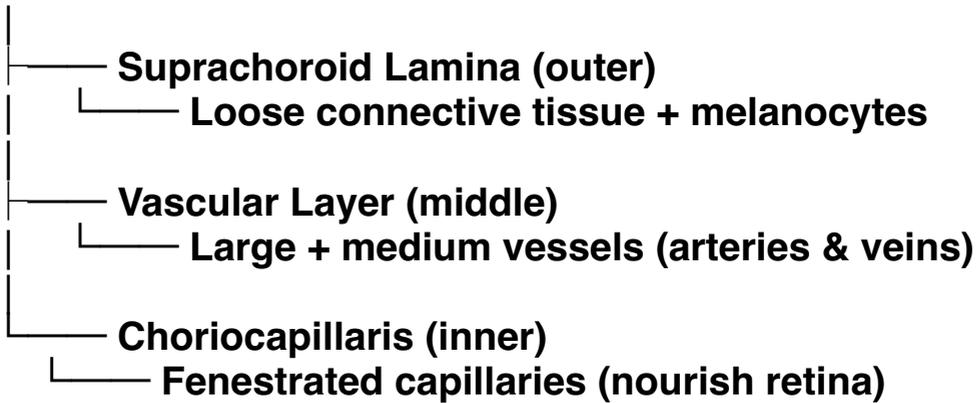
Ora Serrata

Description	Feature
Junction between retina & ciliary body	Location
Boundary between neural retina & non-visual retina	Function

the Eye, Lect 2

Choroid & Bruch's Membrane

Choroid



Bruch's Membrane

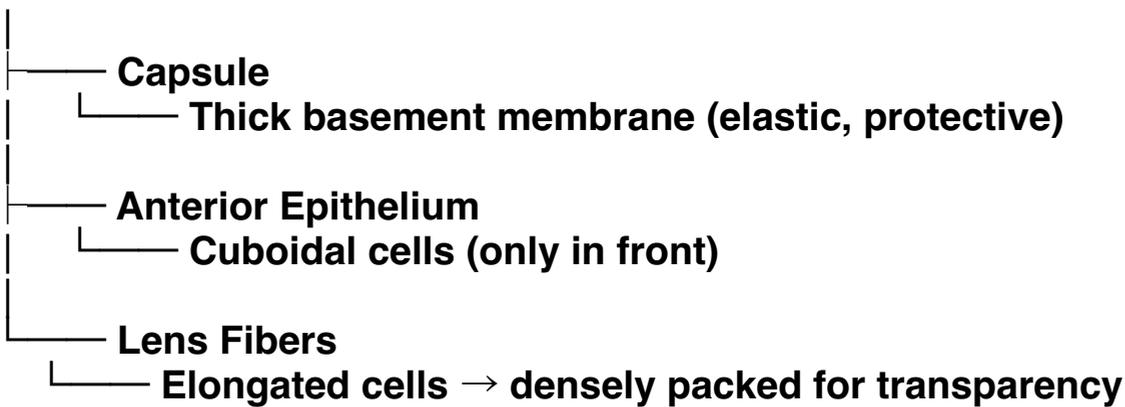
Composition & Function	Layer Name	Layer No.
Support for retinal pigment epithelium	Basement membrane of RPE	1
Strength & elasticity	Inner collagenous layer	2
Flexibility & diffusion	Elastic fiber layer	3
Structural support	Outer collagenous layer	4
Connects to choriocapillaris	Basement membrane of capillaries	5

Chambers of the Eye

Role	Content	Location	Chamber
Nourishes lens & cornea ⚠️	Aqueous humor	Between cornea & iris	Anterior
Transports aqueous humor	Aqueous humor	Between iris & lens	Posterior
Maintains eye shape ⚠️ + retinal support	Vitreous body	Behind lens to retina	Vitreous

Lens Structure

Lens



Lens Layers by

Embryonic Nucleus → **Fetal Nucleus** → **Infantile Nucleus** → **Adult Nucleus** →
 (central) (formed later) (develops postnatally) (outer)



Retina Layers (10)

Retina (from outer to inner)

1. Retinal Pigment Epithelium (RPE) ⚠
2. Photoreceptor Layer
 - Rods & Cones
3. External Limiting Membrane
4. Outer Nuclear Layer
 - Nuclei of rods & cones
5. Outer Plexiform Layer
 - Synapse: photoreceptors ↔ bipolar cells
6. Inner Nuclear Layer
 - Nuclei of bipolar, amacrine, horizontal cells
7. Inner Plexiform Layer
 - Synapse: bipolar ↔ ganglion cells
8. Ganglion Cell Layer
9. Nerve Fiber Layer
 - Axons of ganglion cells → optic nerve ⚠
10. Internal Limiting Membrane

Rods vs Cones

Cones	Rods	Feature
~6 million	~120 million 	Quantity
Low (needs bright light )	High (night vision )	Light Sensitivity
Yes (color vision )	No (black & white only)	Color
High (sharp vision )	Low (poor detail)	Resolution
Mostly central (esp. fovea) 	Mostly peripheral retina	Location

Accessory Structures –

A. Conjunctiva

Function	Epithelium Type	Part
Lines inside eyelids	Stratified columnar	Palpebral
Covers sclera	Stratified columnar	Bulbar
Transition zone (eye ↔ lid)	Loose connective junction	Fornix

Eyelids

Function	Component	Structure
Protection	Thin & elastic	Skin
Movement ⚠️	Orbicularis oculi (close), Levator (open)	Muscles
Shape + supports Meibomian glands	Dense connective tissue	Tarsal Plate
Secrete lipid → prevent evaporation ⚠️	Sebaceous glands	Meibomian Glands

Lacrimal Apparatus

Tissue Type / Epithelium



Component

Serous **tubuloalveolar**
gland

Lacrimal Gland

Stratified cuboidal
epithelium

Lacrimal Ducts

Lined by **stratified**
squamous epithelium

Lacrimal Puncta

Lined by **stratified**
squamous non-
keratinized epithelium

Canaliculi

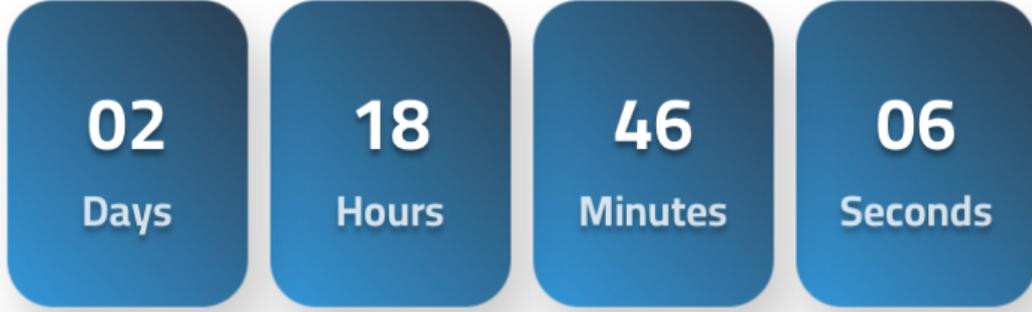
Pseudostratified
columnar epithelium with
goblet cells ⚠️

Lacrimal Sac

Pseudostratified
columnar epithelium with
goblet cells ⚠️

Nasolacrimal Duct

باقٍ من الزمن لنهاية آخر اختبار يبسك:



أبارك في الناس أهل الطموح
ومن يستلذ ركوب الخطر

وأعلن في الكون أن الطموح
لهيب الحياة وروح الظفر.

Done by :- Rama Al bustanji💙💙

