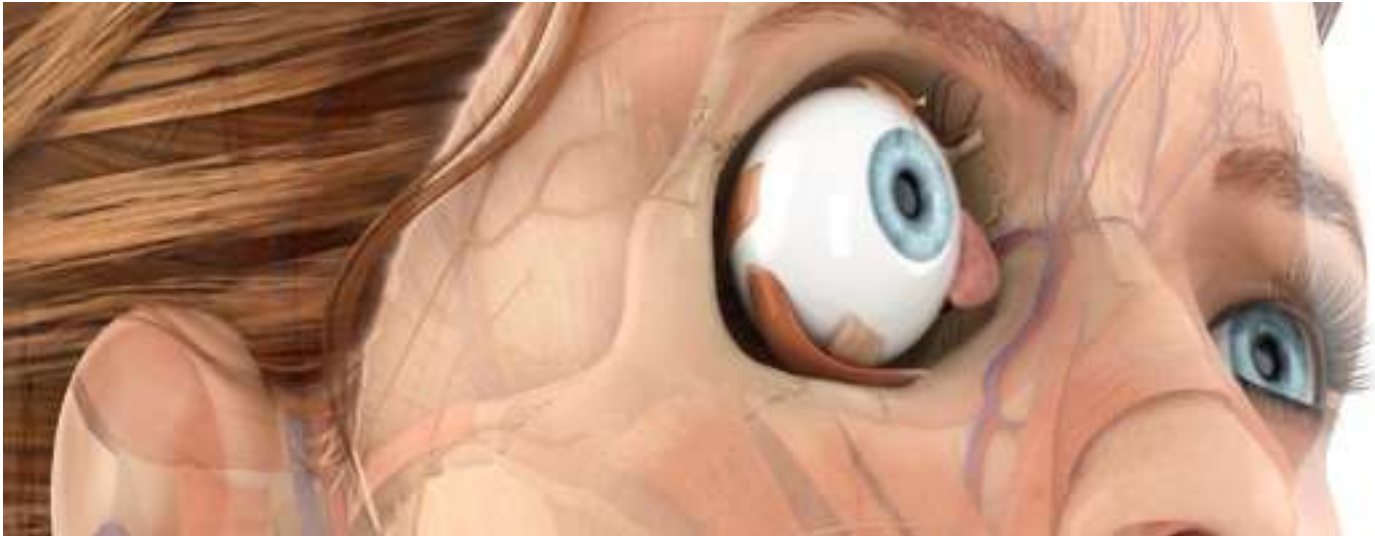




Introduction to Ophthalmology

Anatomy of the Eye

Anatomy the Eye

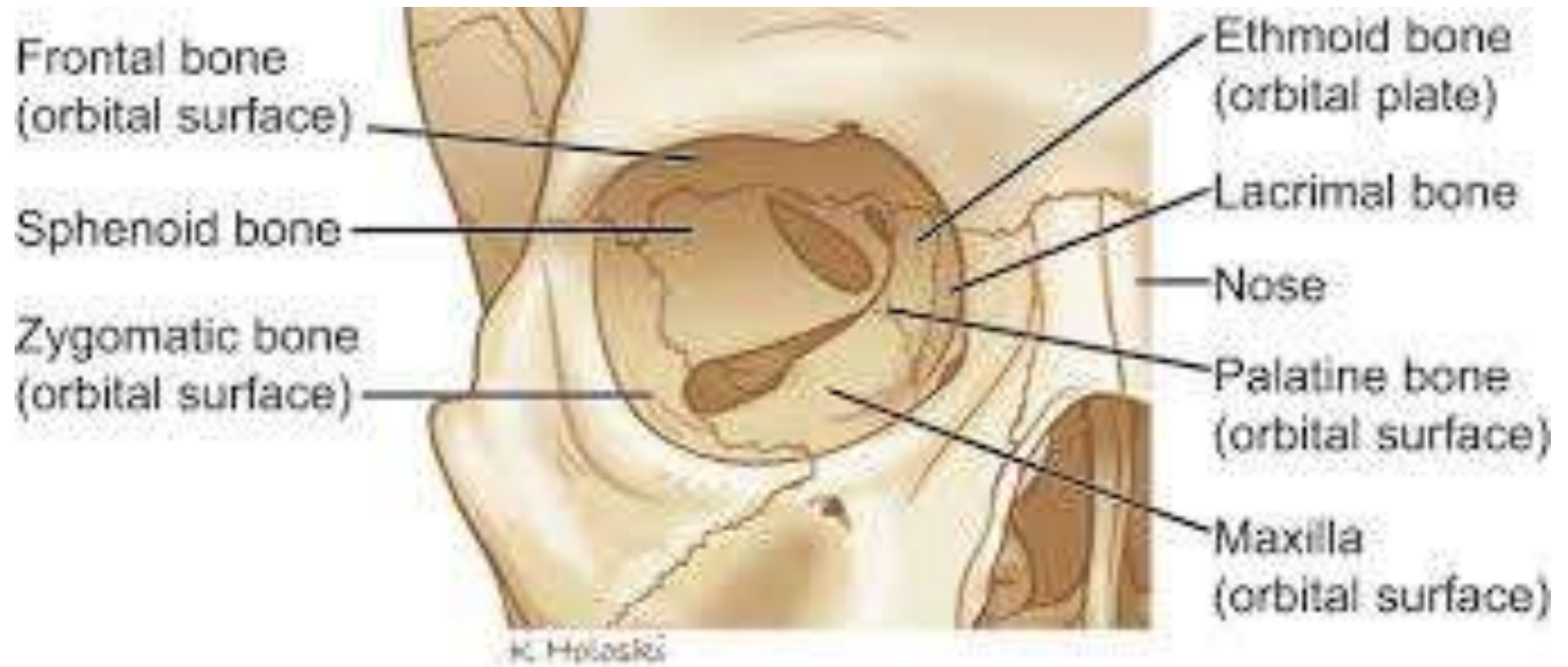


Anatomy the Eye

- The eye is a spherical structure that lies within the orbital cavity
- Also known as the **Eyeball** or **Globe**



Orbit



Orbit: Anatomy and Clinical Relevance

- **Structure:** Pear-shaped cavity with the **optic canal** as its stalk.
- **Roof:** Formed by the **lesser wing of sphenoid** and **frontal bone**; defects may cause **pulsatile proptosis**.
- **Lateral Wall:** Formed by the **greater wing of sphenoid** and **zygomatic bone**; **anterior globe vulnerable to trauma**.

- Floor:** Made of **zygomatic, maxillary, and palatine bones**; weak **posteromedial maxillary** portion prone to **blowout fractures**; maxillary carcinoma can **displace the globe**.

- Medial Wall:** Composed of **maxillary, lacrimal, ethmoid, and sphenoid bones**; **lamina papyracea** is thin, allowing **spread of infections (orbital cellulitis)** from the ethmoidal sinus.

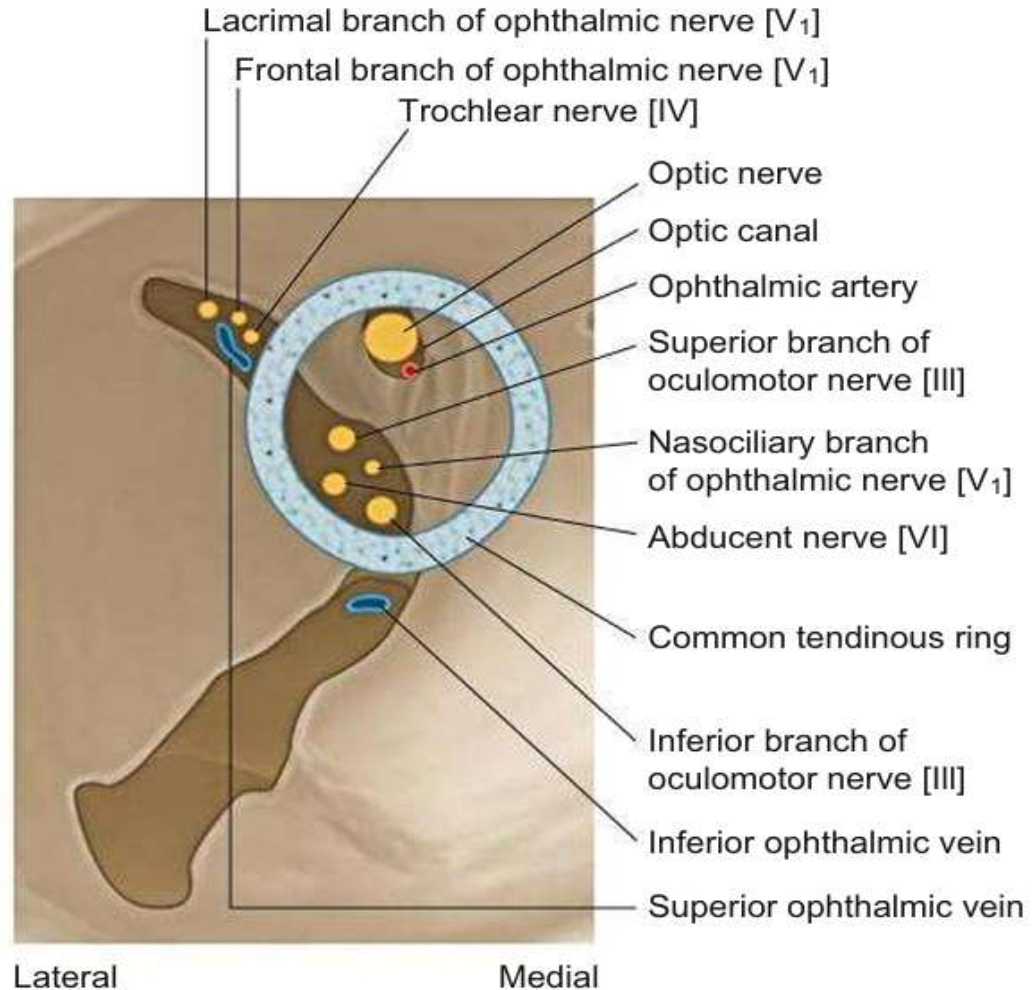
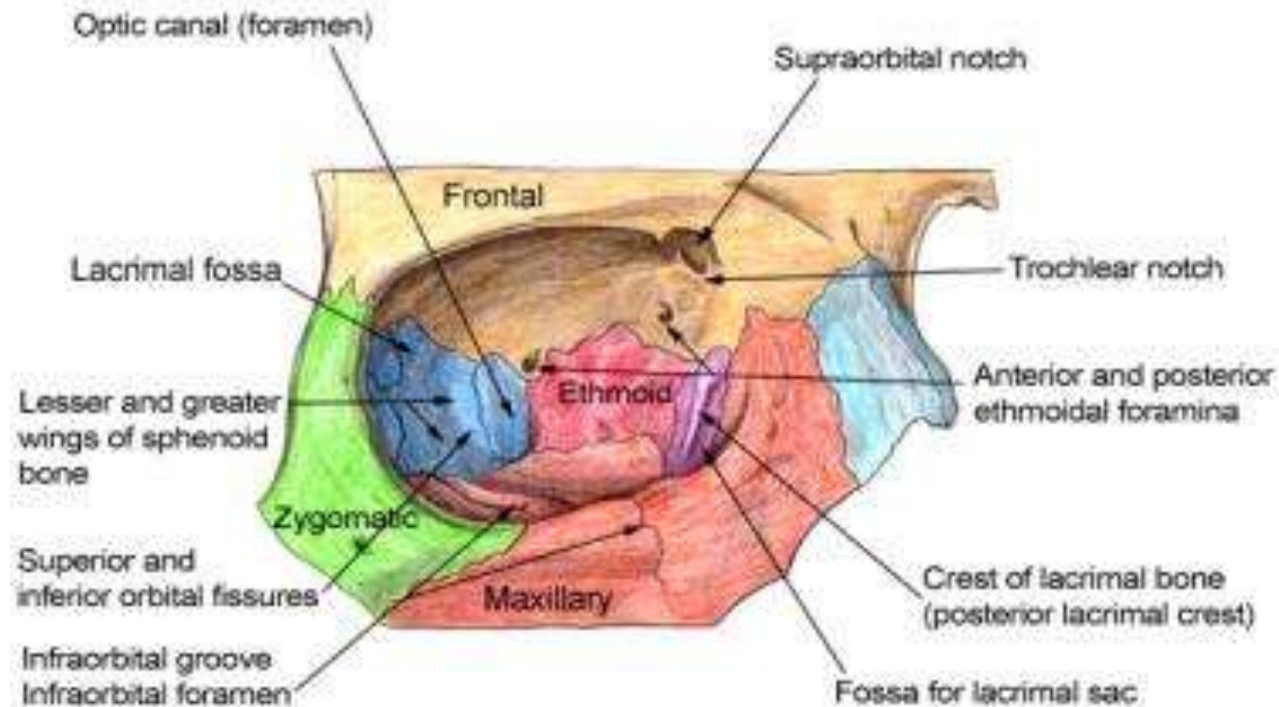


Fig. 4.2 Innervation of the orbit and eyeball.

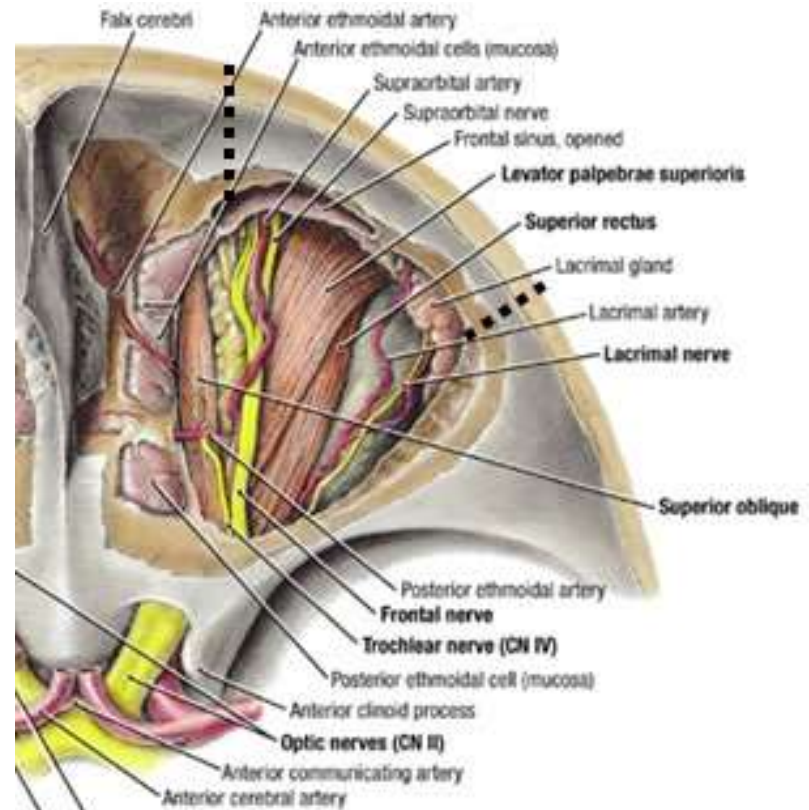
- Superior Orbital Fissure:** Connects orbit to cranium; passage for **cranial nerves & veins**.
 - Superior portion:** Lacrimal, frontal, trochlear nerves, superior ophthalmic vein.
 - Inferior portion:** Oculomotor nerve divisions, abducens nerve, nasociliary nerve, sympathetic fibers.
-
- Inferior Orbital Fissure:** Connects orbit to pterygopalatine/infratemporal fossae; contains **maxillary nerve, zygomatic nerve, pterygopalatine ganglion branches, and inferior ophthalmic vein**.

Orbit



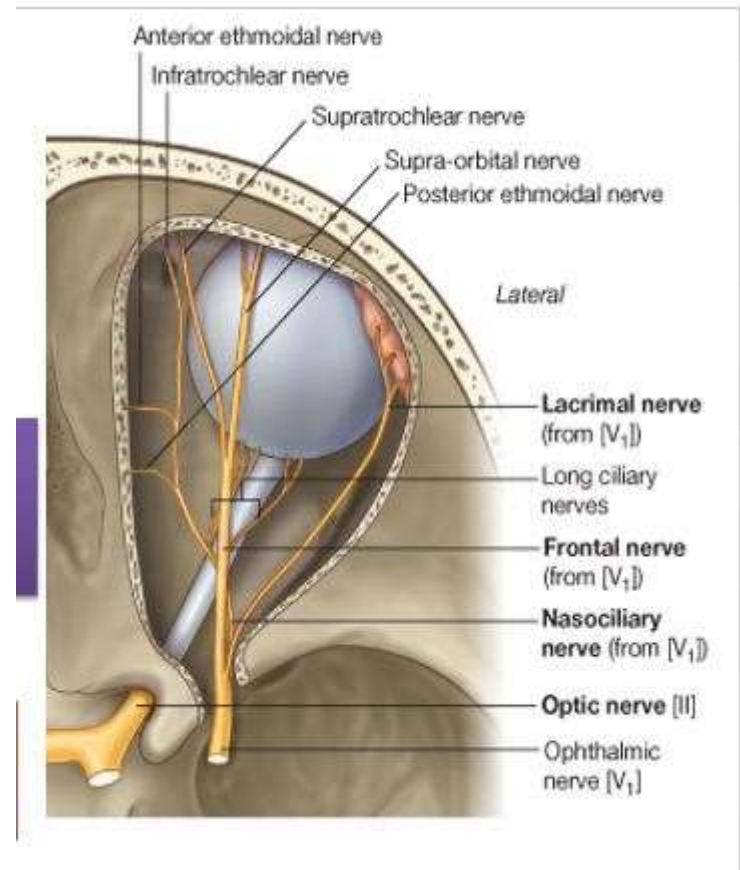
Orbital Structures

- Eyeball
- Nerves
- Muscles
- Blood Vessels
- Lacrimal Gland
- Fat



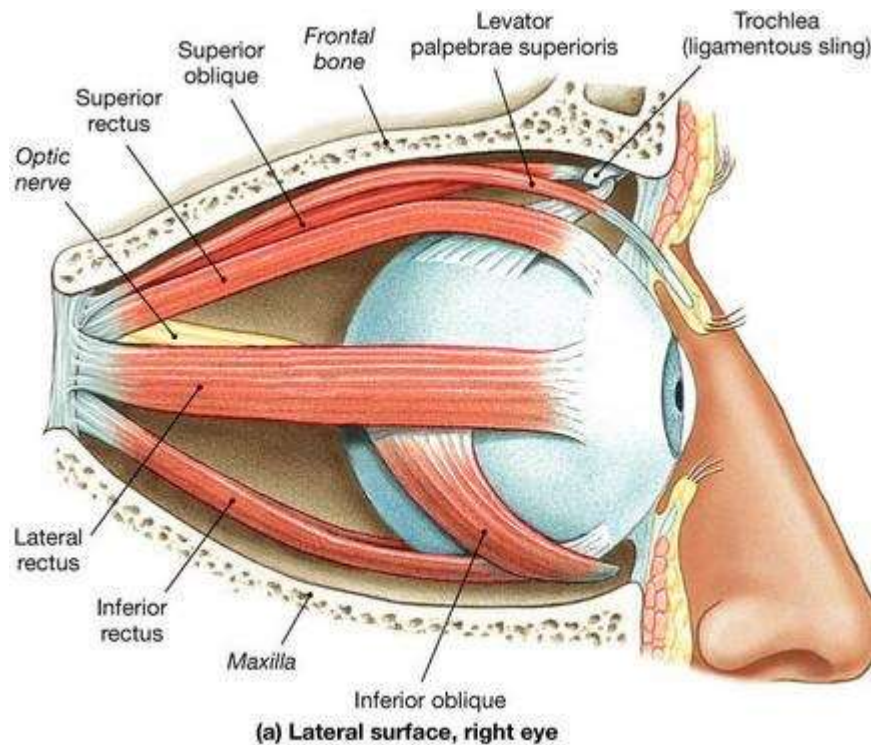
Orbital Structures- Cranial Nerves

- Optic- CN II
- Oculomotor- CN III
- Trochlear- CN IV
- Trigeminal- CN V¹ and V²
- Abducent- CN VI



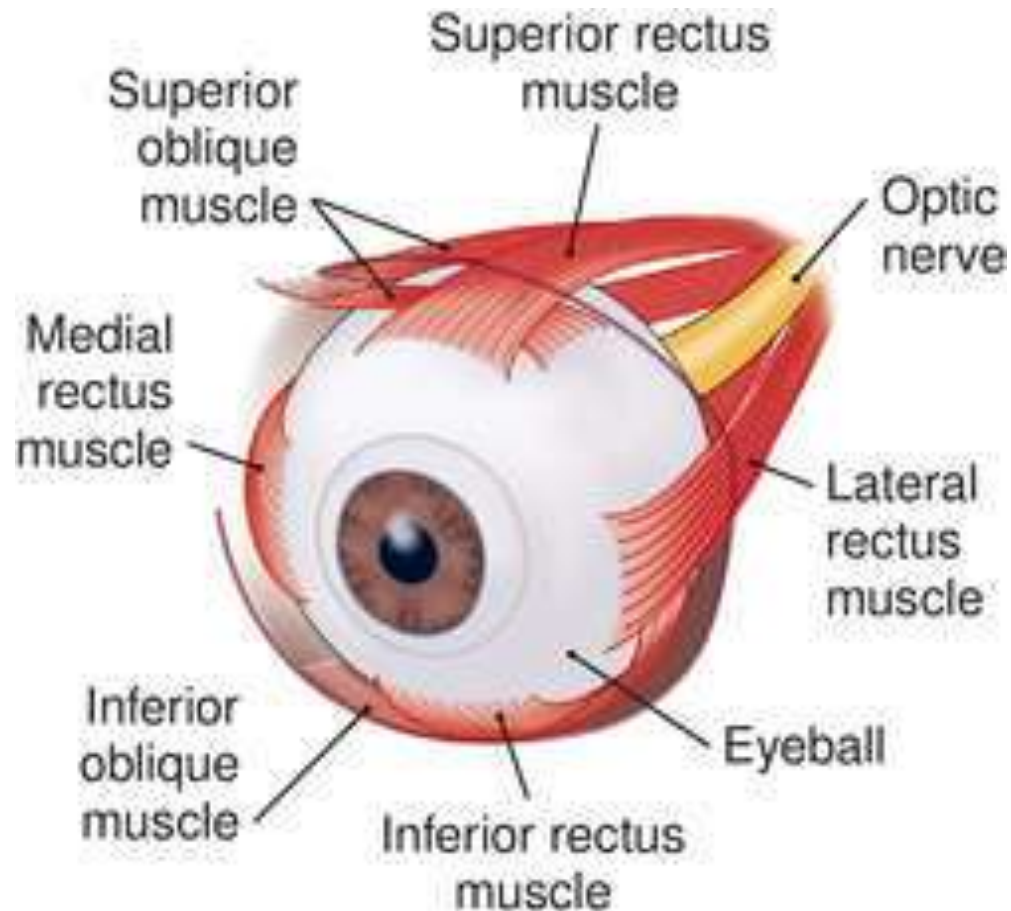
Orbital Structures- Muscles

- Extraocular Muscles- EOM
- Levator Palpebrae Superioris

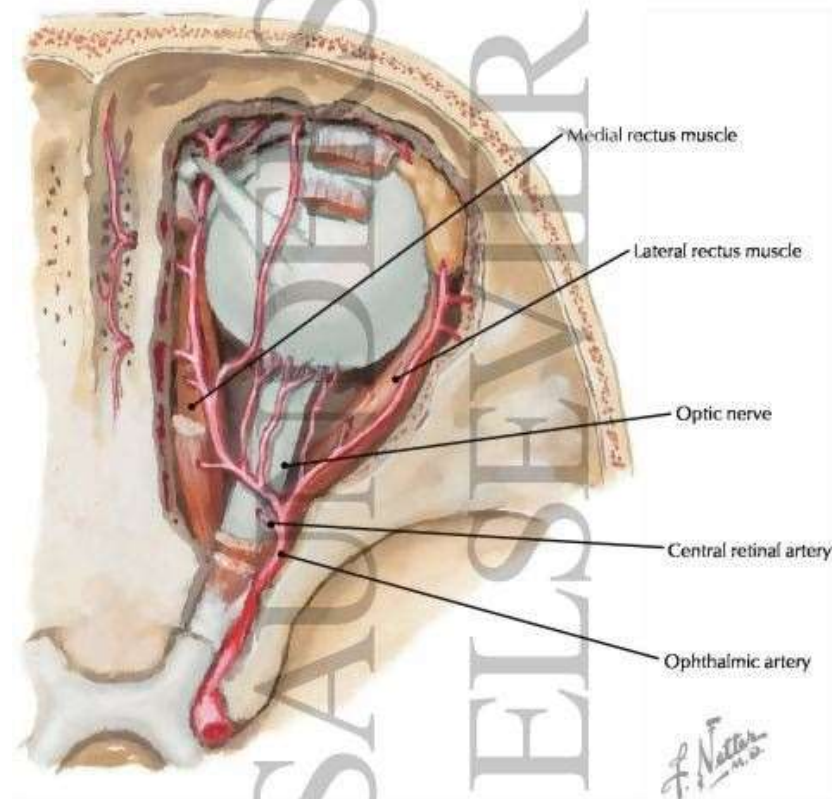


Orbital Structures- Muscles

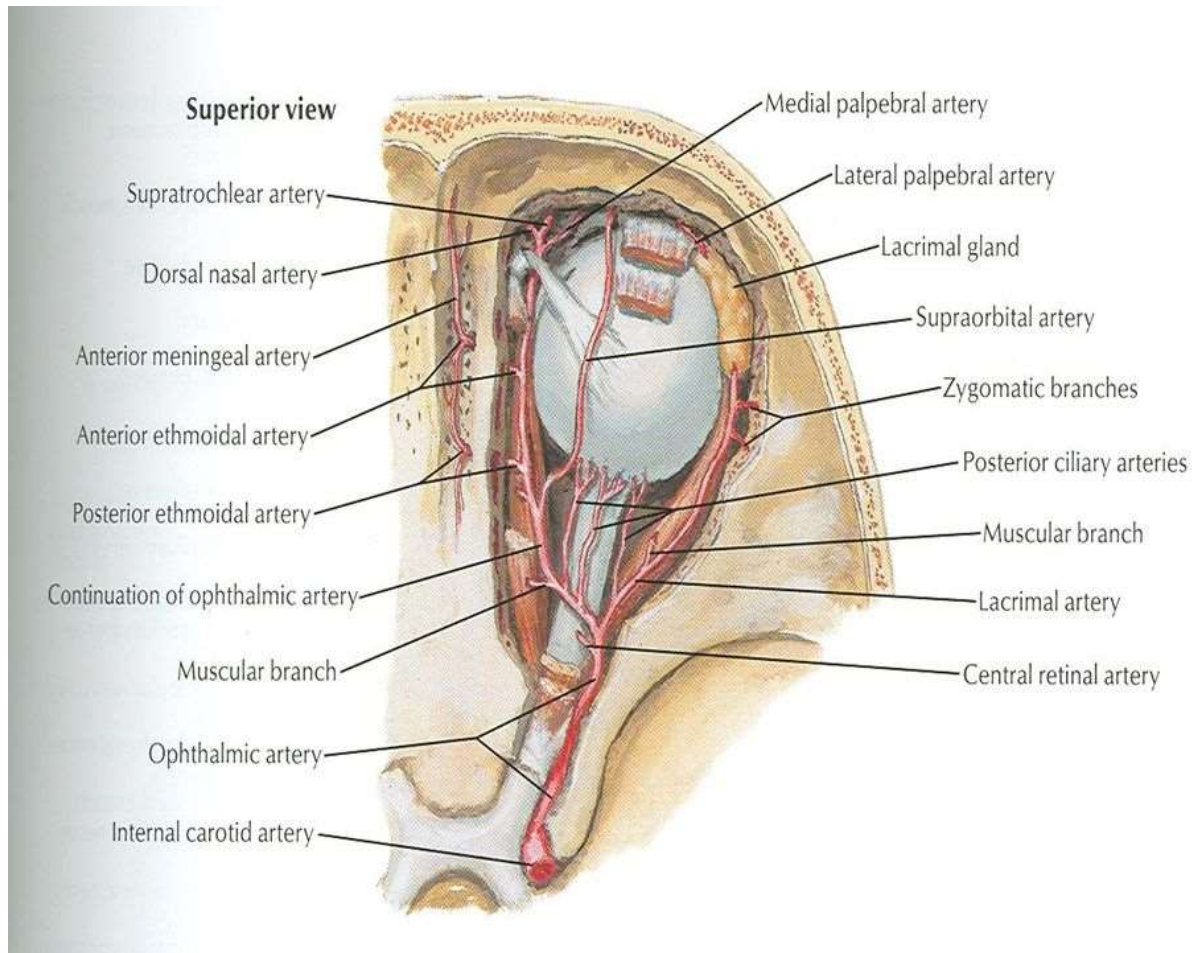
- EOM:
 - Recti : Superior
Inferior
Medial
Lateral
 - Obliques: Superior
Inferior



Orbital Structures-Blood Vessels



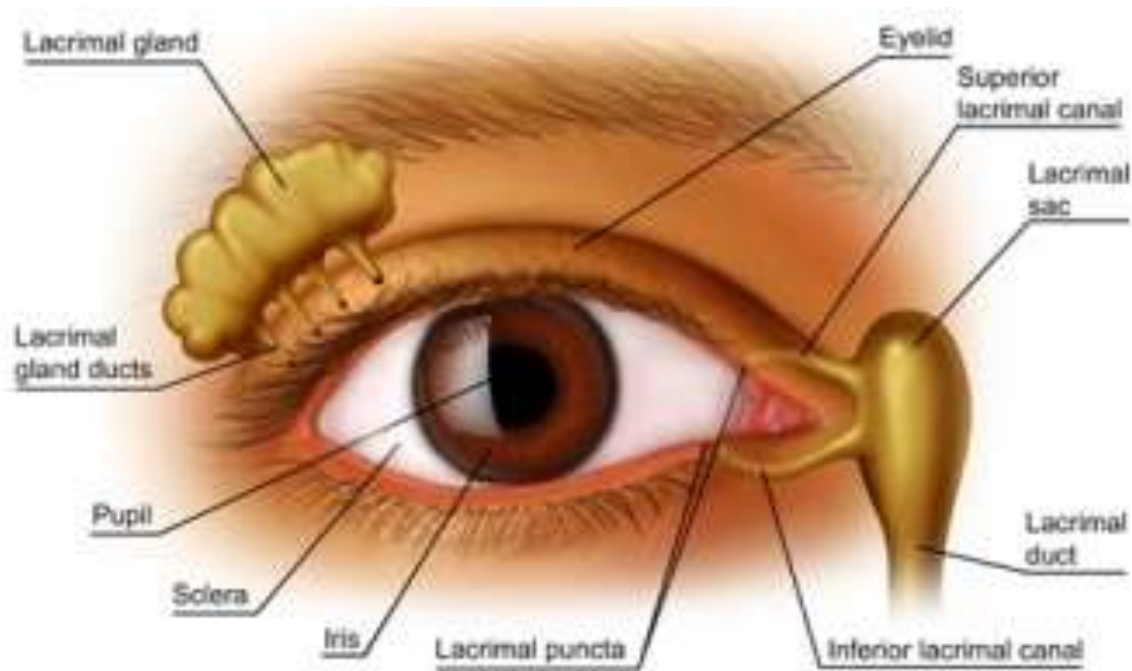
Orbital Structures-Blood Vessels



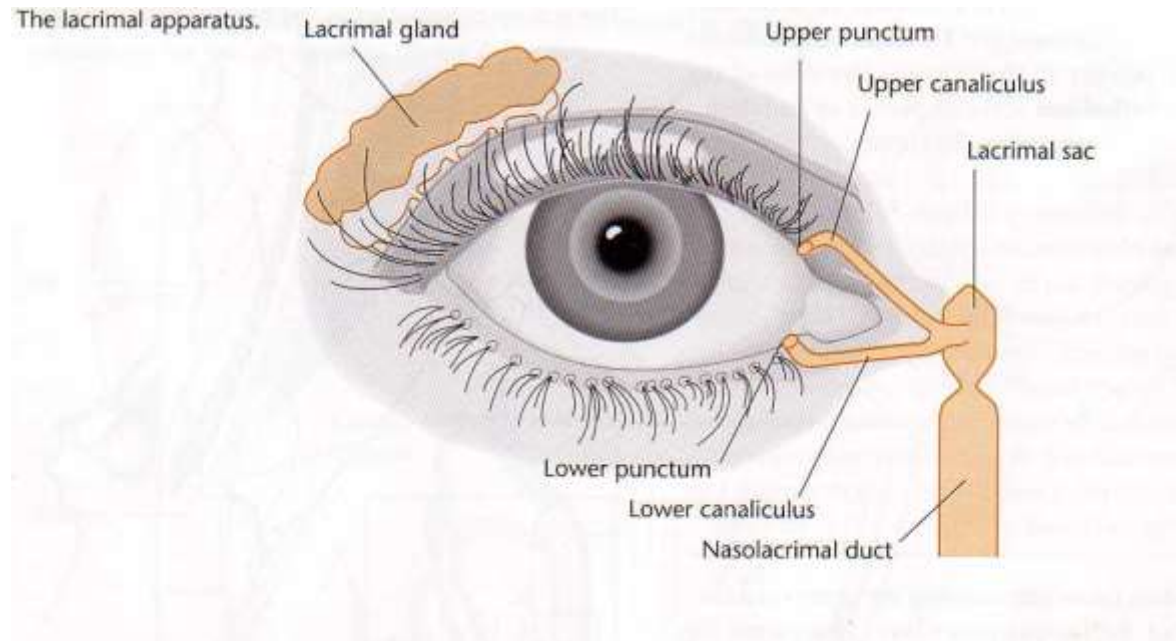
Blood Supply of the Orbit

- **1. Main Arterial Supply**
- **Ophthalmic artery** (branch of the internal carotid artery)
 - Enters through the **optic canal** alongside the optic nerve
 - Gives off multiple branches supplying the orbit and eye
- **2. Key Branches of the Ophthalmic Artery**
- **Central retinal artery** → Supplies the inner retina
- **Lacrimal artery** → Supplies lacrimal gland, eyelids, and conjunctiva
- **Ciliary arteries:**
 - **Short posterior ciliary arteries** → Supply the choroid & optic nerve head
 - **Long posterior ciliary arteries** → Supply anterior uvea
 - **Anterior ciliary arteries** → Supply the rectus muscles & anterior segment
- **Ethmoidal arteries** (anterior & posterior) → Supply ethmoidal sinuses & nasal cavity
- **Supraorbital & supratrochlear arteries** → Supply forehead and scalp
- **3. Venous Drainage**
- **Superior ophthalmic vein** → Drains into the **cavernous sinus**
- **Inferior ophthalmic vein** → Communicates with **pterygoid venous plexus**
- **Clinical Significance:** Infection from the face (danger triangle) can spread via these veins → **Cavernous sinus thrombosis**

Orbital Structures- Lacrimal Gland



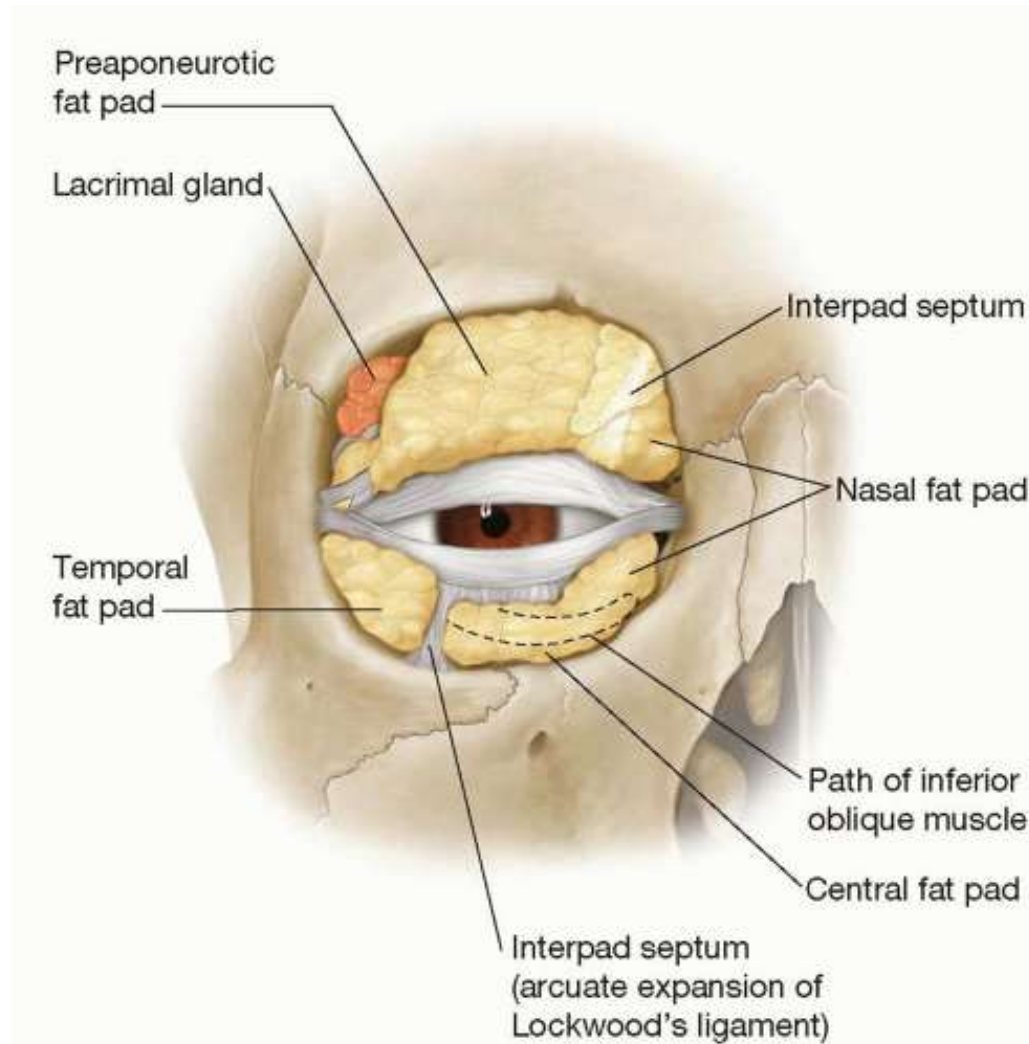
Lacrimal Apparatus



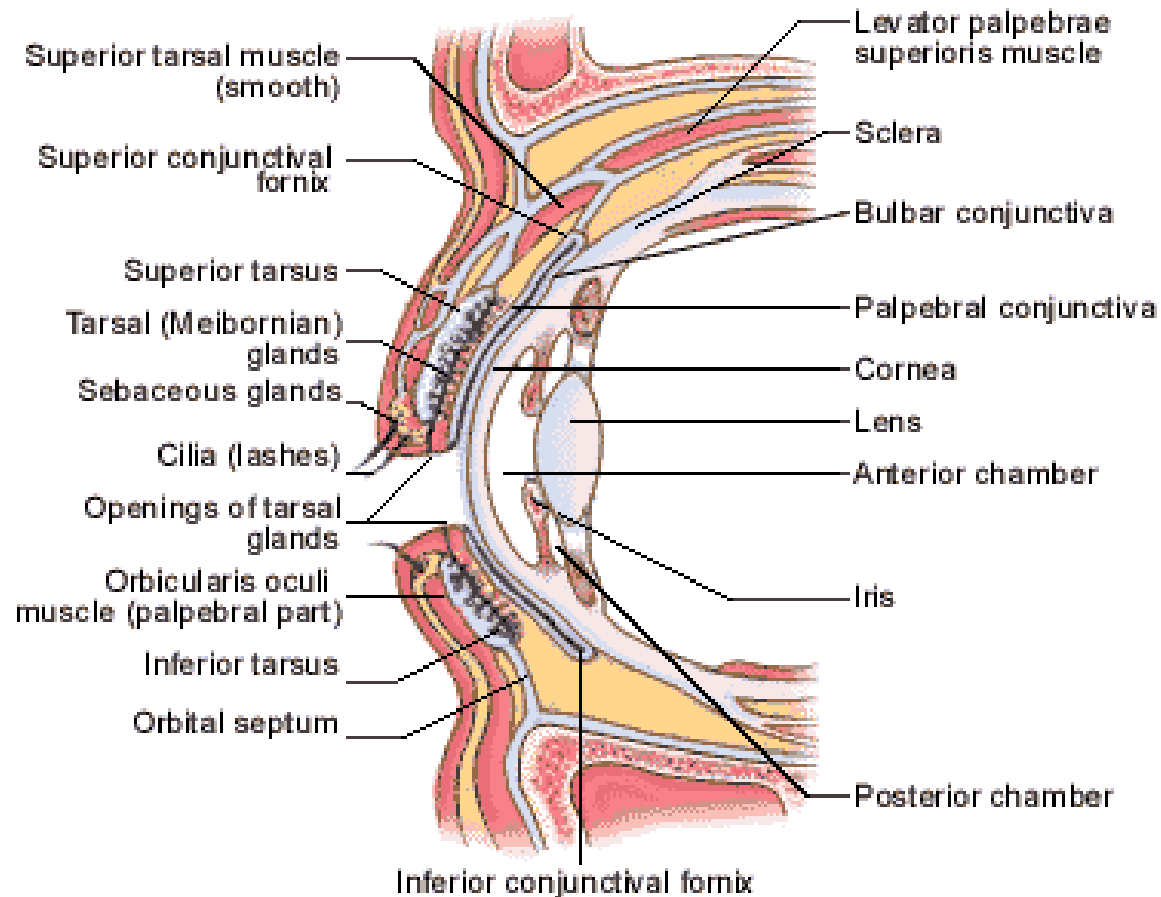
Lacrimal Gland: Key Points

- **Location:** Superolateral orbit, divided into **orbital** and **palpebral** portions.
- **Function:** Produces tears; drains via **lacrimal puncta → canaliculi → lacrimal sac → nasolacrimal duct → inferior meatus**.
- **Blood Supply:** **Lacrimal artery** (ophthalmic branch); venous drainage to **cavernous sinus**.
- **Innervation:**
 - **Parasympathetic (CN VII via pterygopalatine ganglion) → Stimulates tears.**
 - **Sympathetic (superior cervical ganglion) → Controls blood flow.**
 - **Sensory (Lacrimal nerve - V1).**
- **Clinical Relevance:**
 - **Dry Eye Syndrome → Tear deficiency.**
 - **Dacryoadenitis → Inflammation (viral/bacterial).**
 - **Lacrimal tumors → May cause proptosis & globe displacement.**

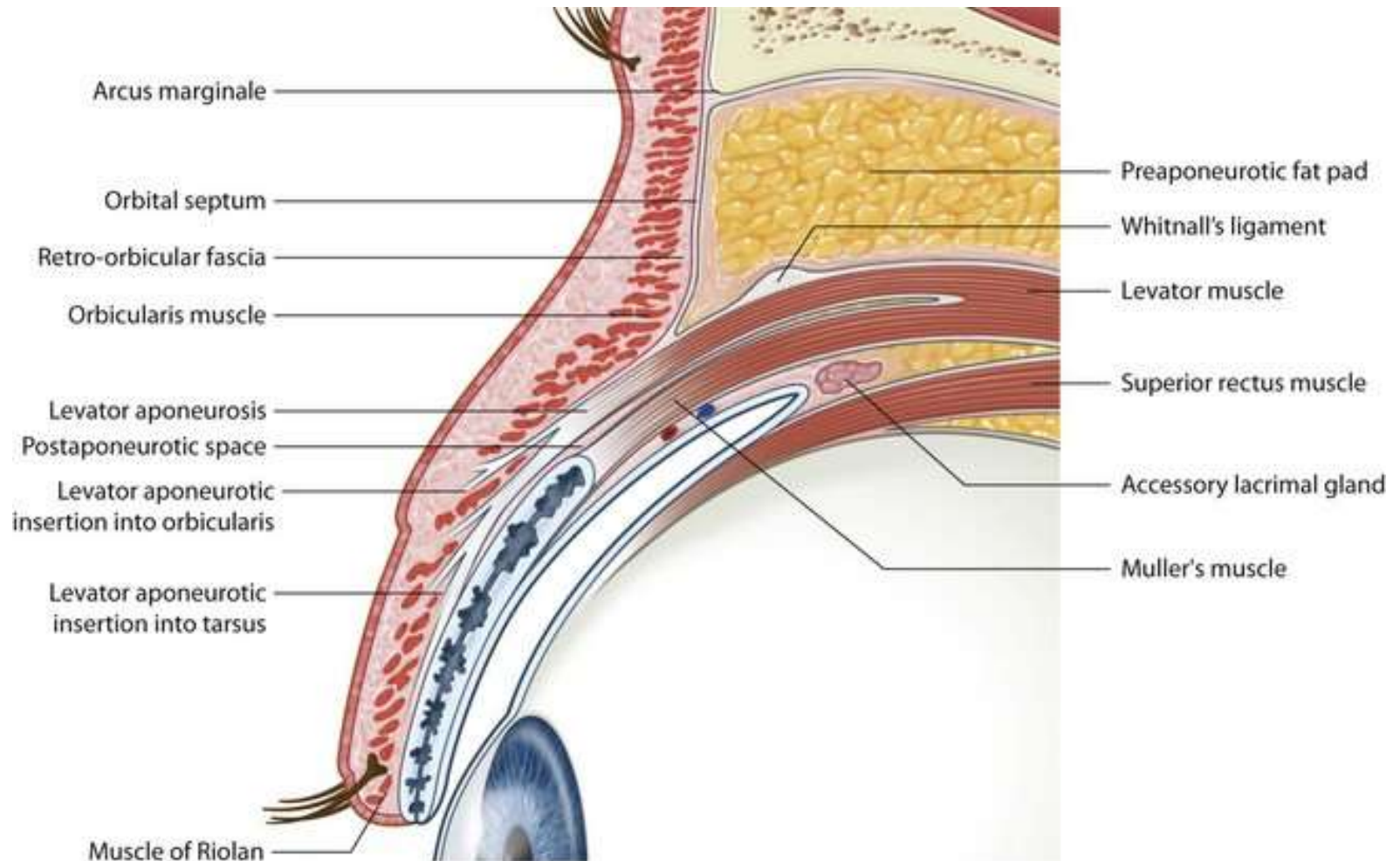
Orbital Structures- Fat



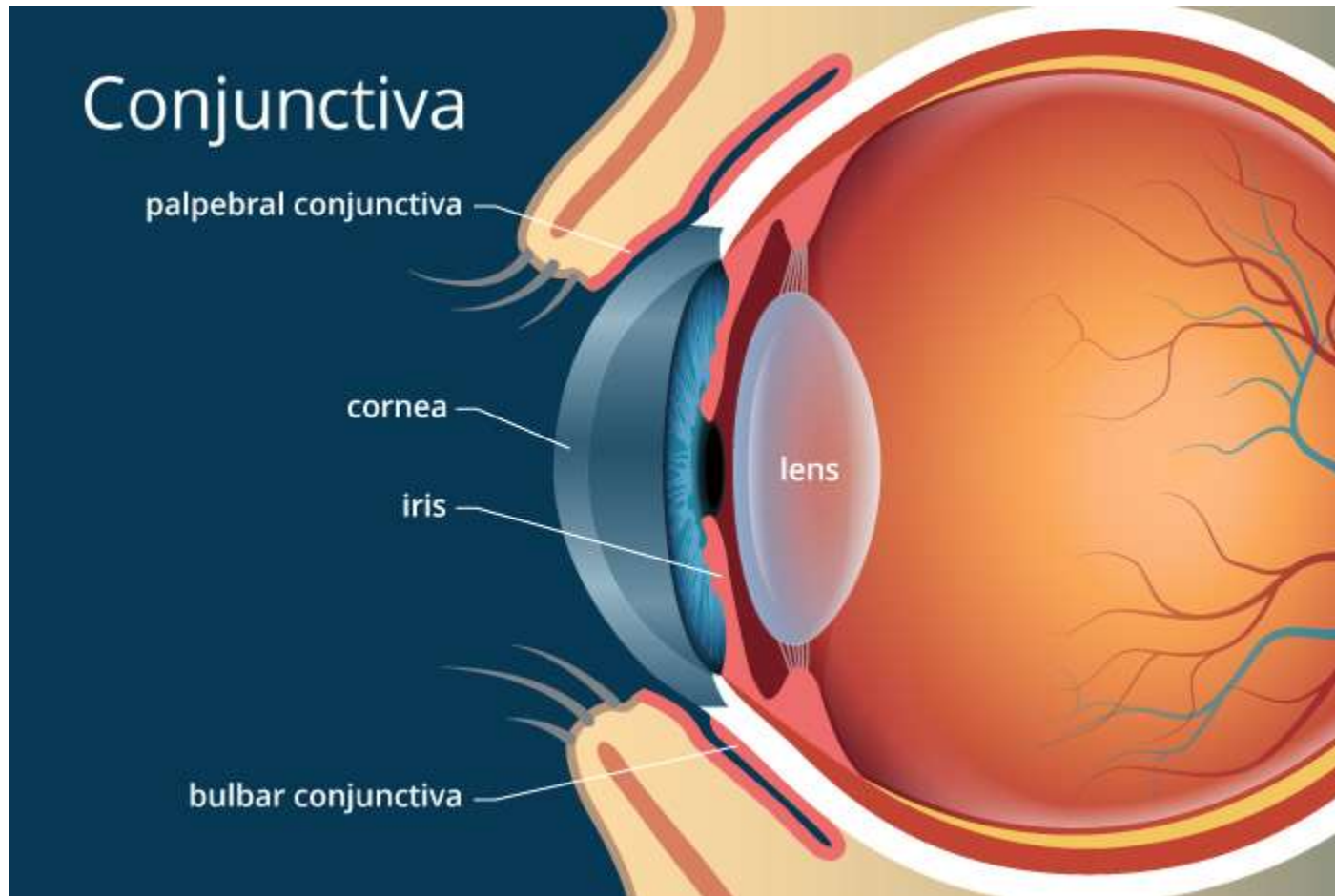
Eyelid



Eyelid



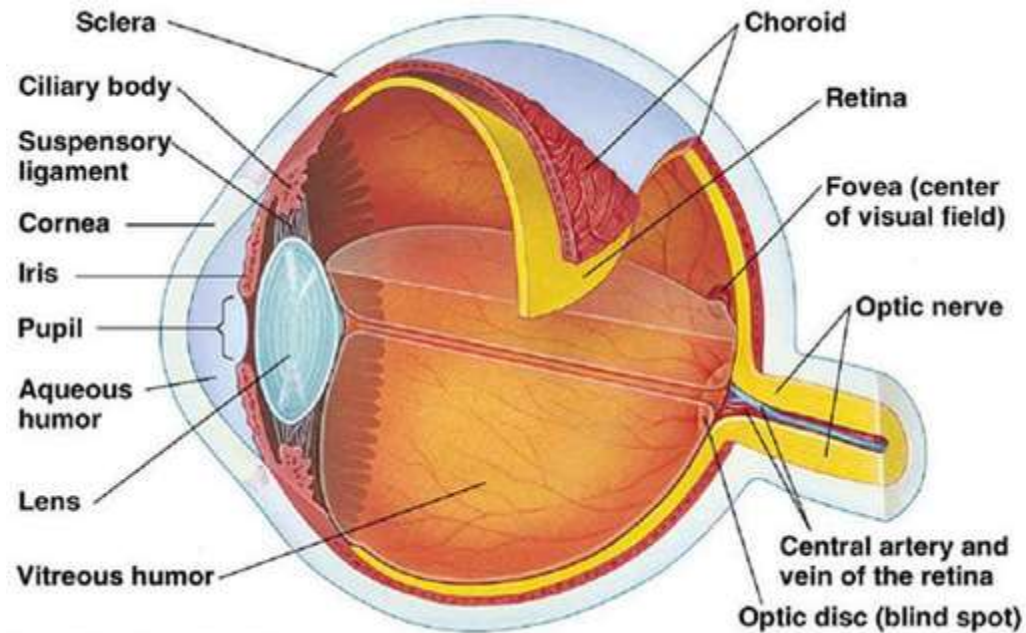
Conjunctiva

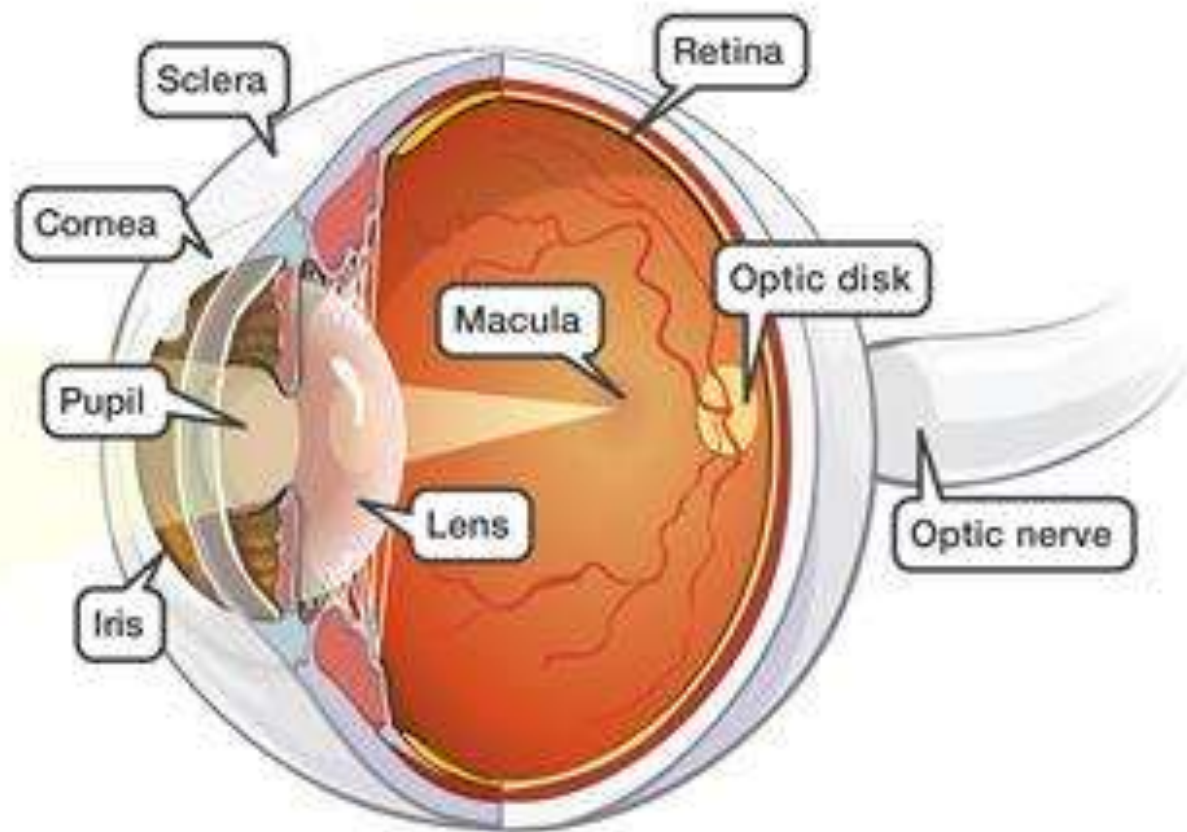


Conjunctiva: Key Points

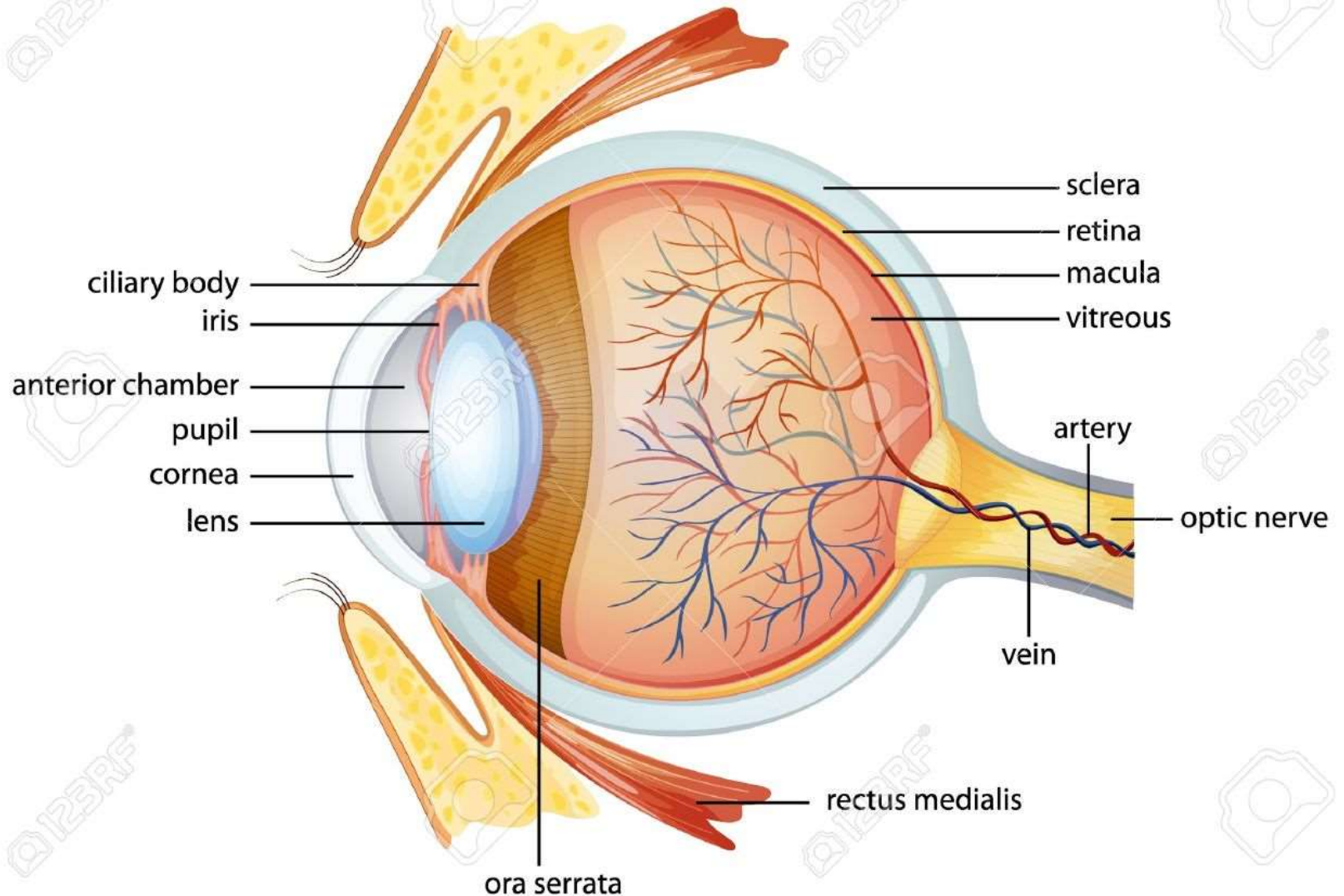
- Thin, transparent mucous membrane covering the **anterior sclera** and **inner eyelids**.
- Functions: **Lubrication, protection, and immune defense**.
- **2. Parts of the Conjunctiva**
- **Palpebral (Tarsal) Conjunctiva** → Lines the inner eyelids.
- **Bulbar Conjunctiva** → Covers the anterior sclera (not the cornea).
- **Fornix (Conjunctival Sac)** → Junction between palpebral and bulbar conjunctiva.
- It has a non-keratinized stratified squamous **epithelium** about five cell layers deep, containing mucus-secreting goblet cells, immune system Langerhans' cells, and occasional melanocytes.

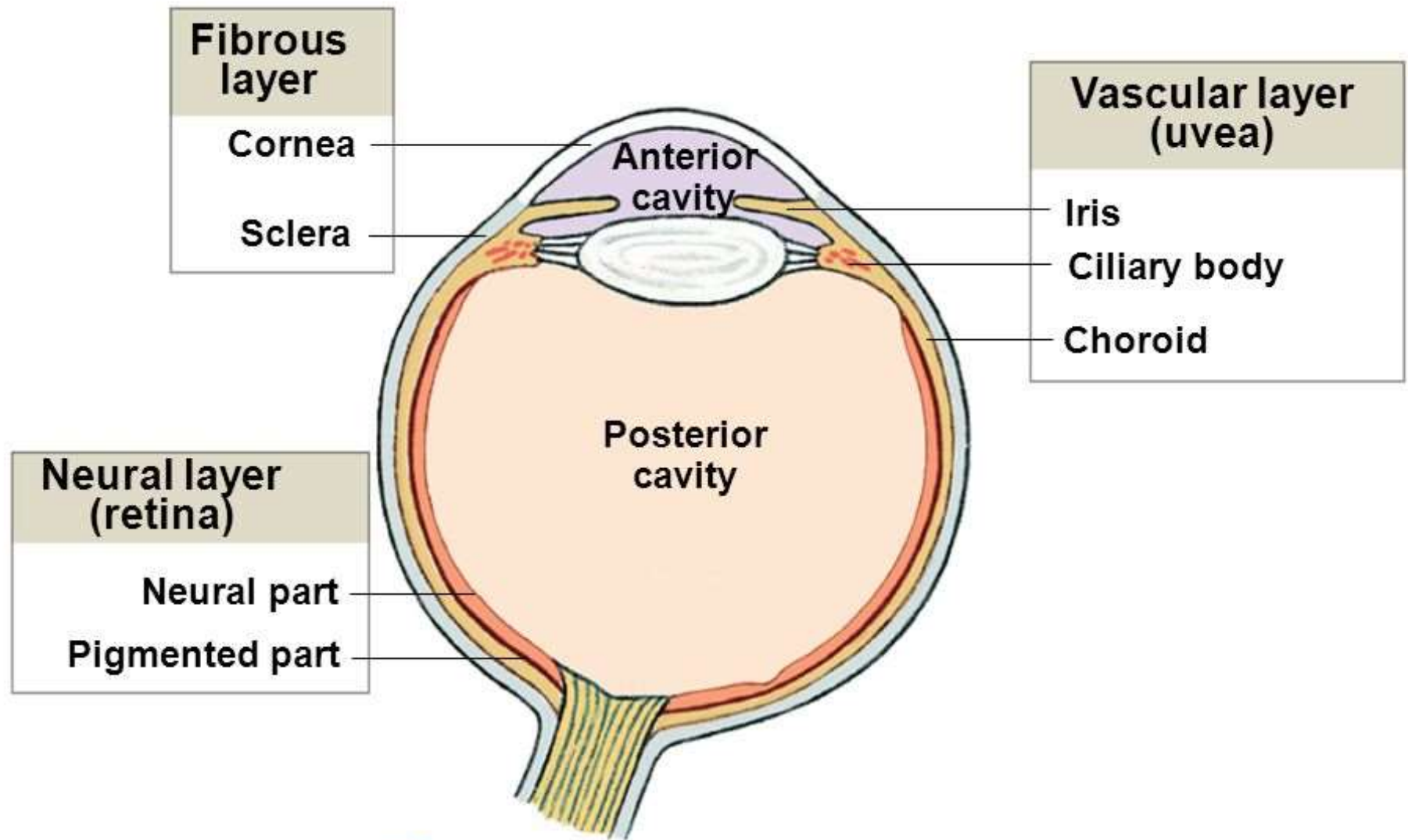
Anatomy of The Eye





Anatomy of the Human Eye

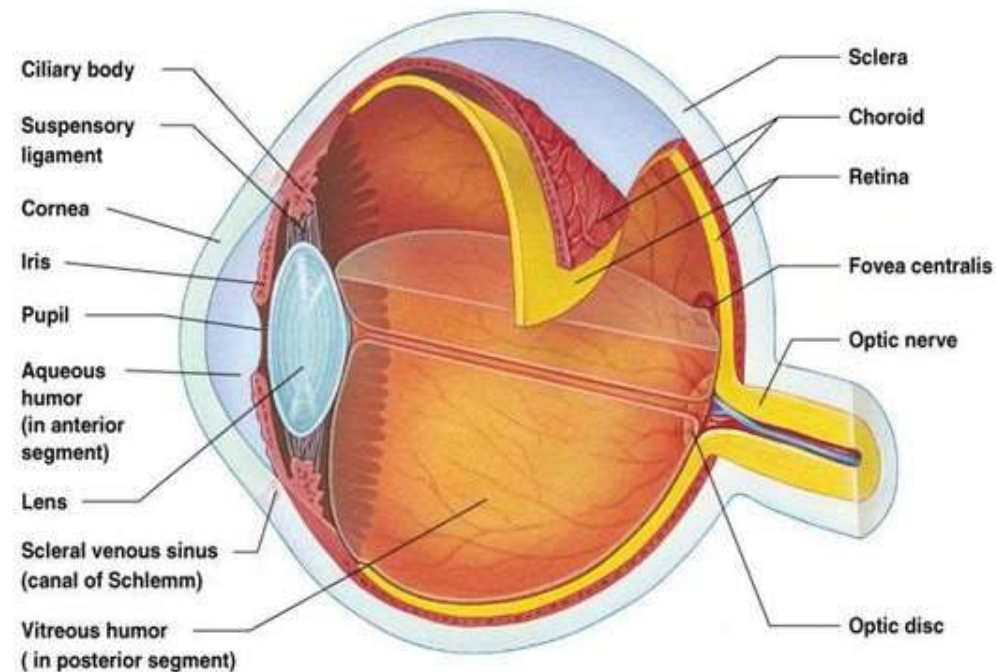




b Horizontal section of right eye

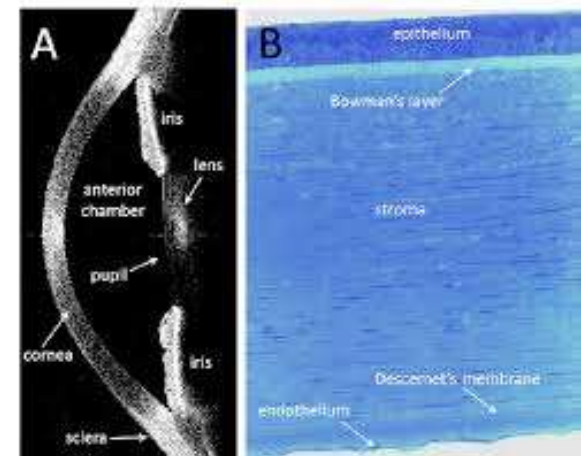
Structure of the Eye

- The wall is composed of three tunics
 - Fibrous tunic (sclera) – outside layer
 - Choroid – middle layer
 - Sensory tunic (retina) – inside layer

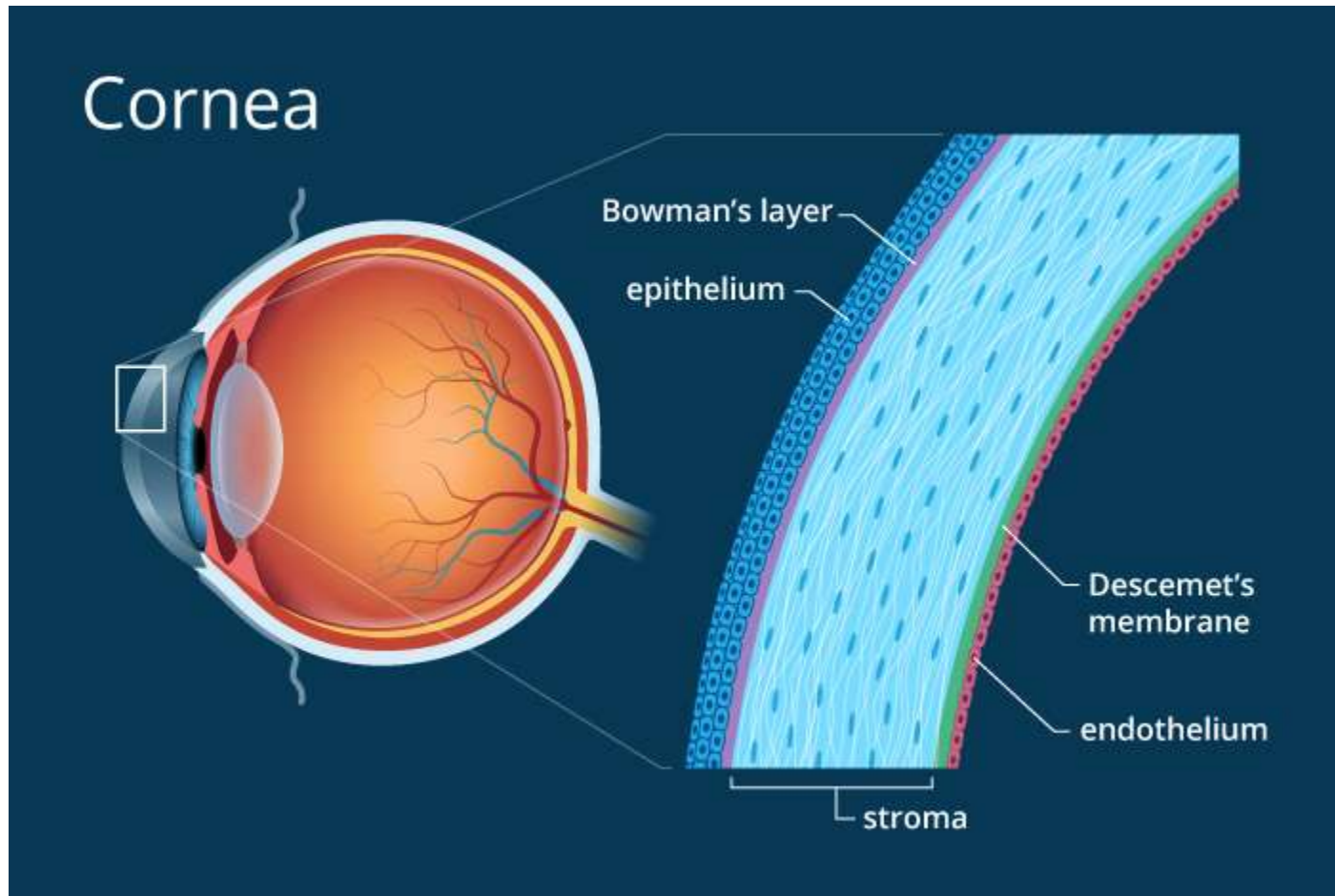


Cornea

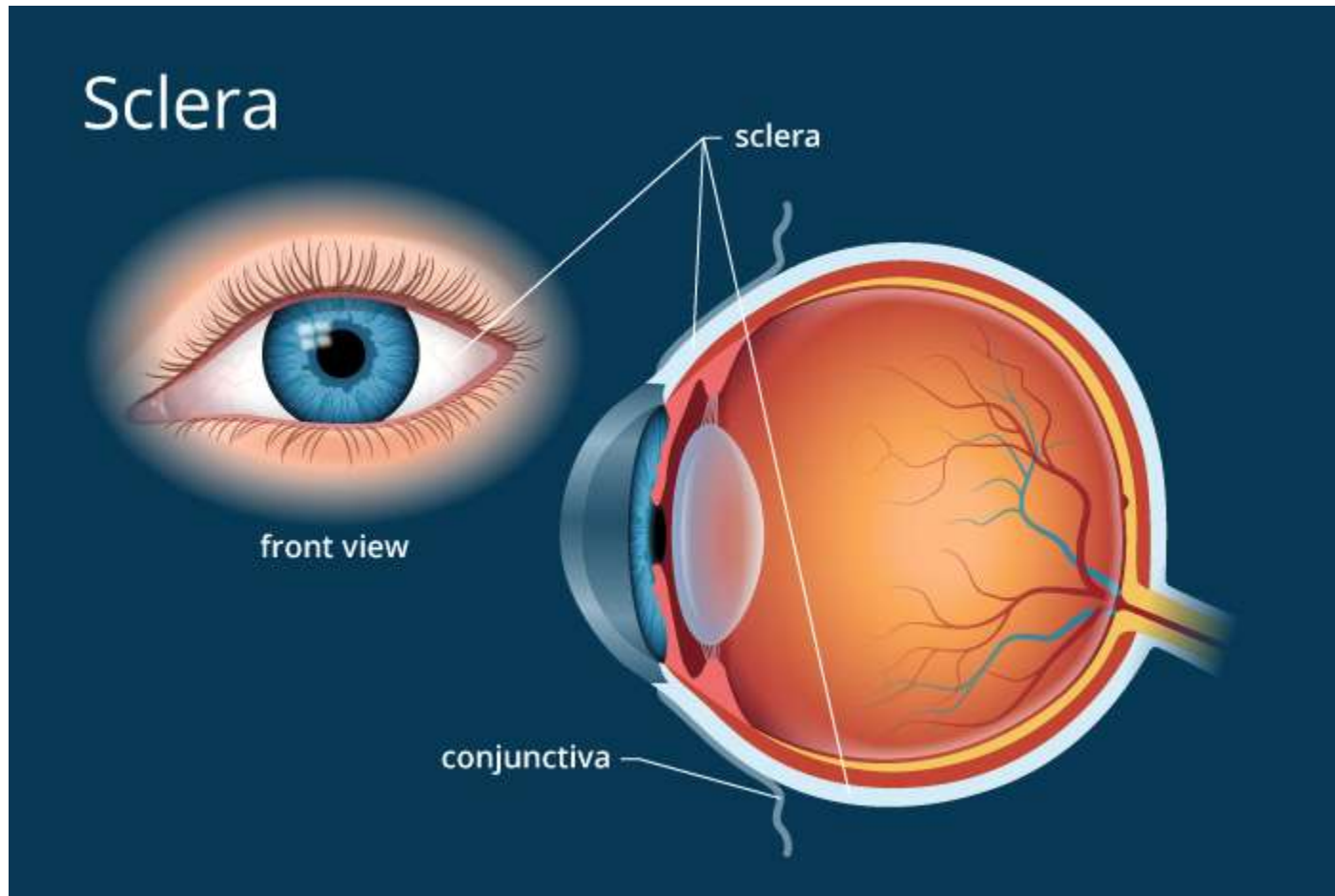
- Transparent dome shaped structure at the front of the eye
- Responsible for 2/3rds of the refractive power of the eye
- Has an important protective role
- Avascular structure
- Mainly made of collagen type 1



Cornea



Sclera

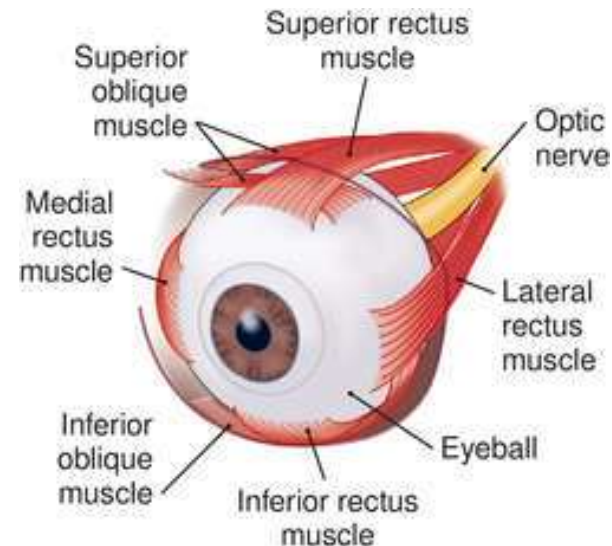


Sclera

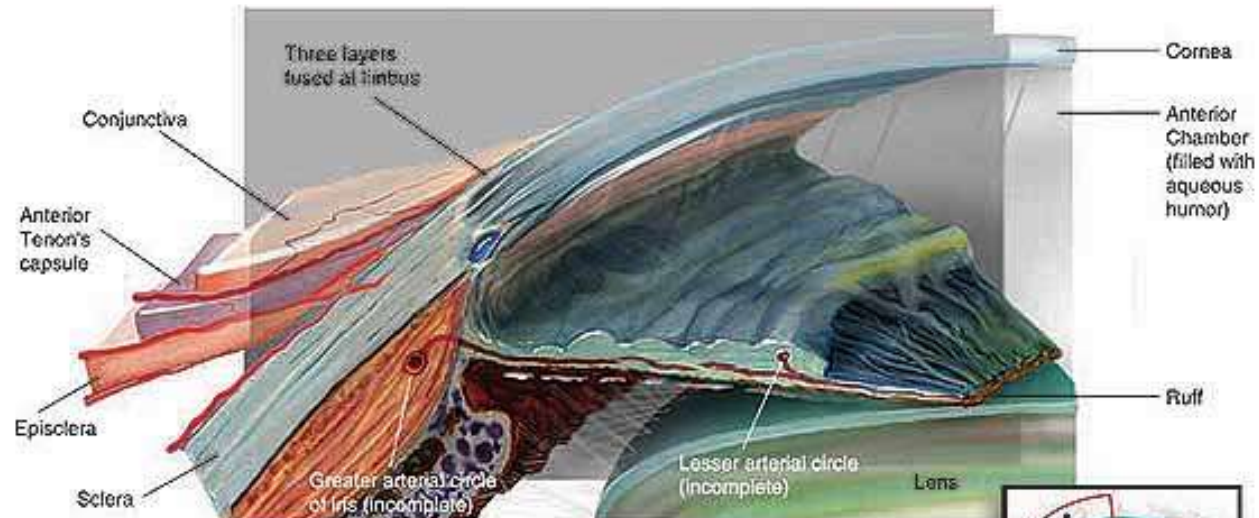
- Also known as the “white” of the eye.
- The sclera is covered by the conjunctiva anteriorly.
- It is thickest in the area surrounding the optic nerve.
- The sclera is made up of three divisions: the **episclera**, loose connective tissue, immediately beneath the conjunctiva; **sclera proper**, the dense white tissue that gives the area its color; and the **lamina fusca**, the innermost zone made up of elastic fibers.

Sclera

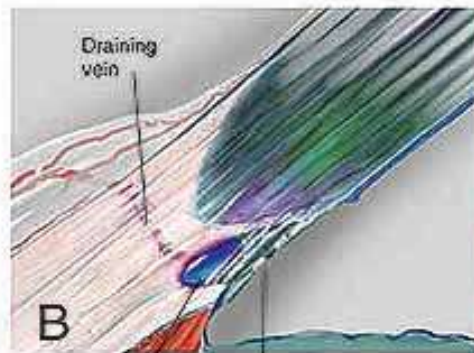
- It is the opaque, fibrous and protective outer layer of the eye containing mainly collagen
- Gives attachment to extraocular muscle
- Allows the passage of the optic nerve posteriorly



The Limbus



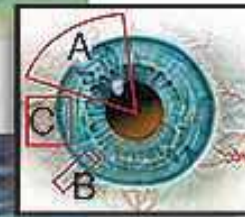
A



B

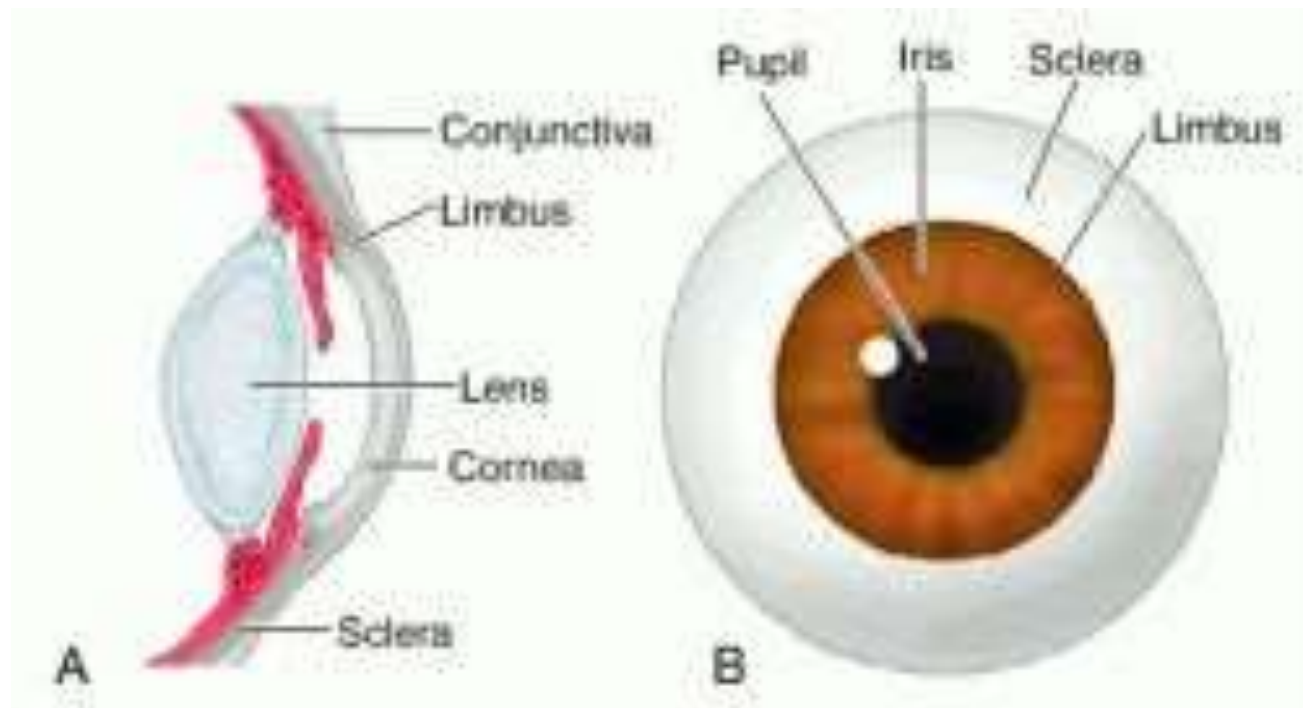


C



Limbus-Corneoscleral Junction

- Common site for surgical incisions
- Contains stem cells



Iris

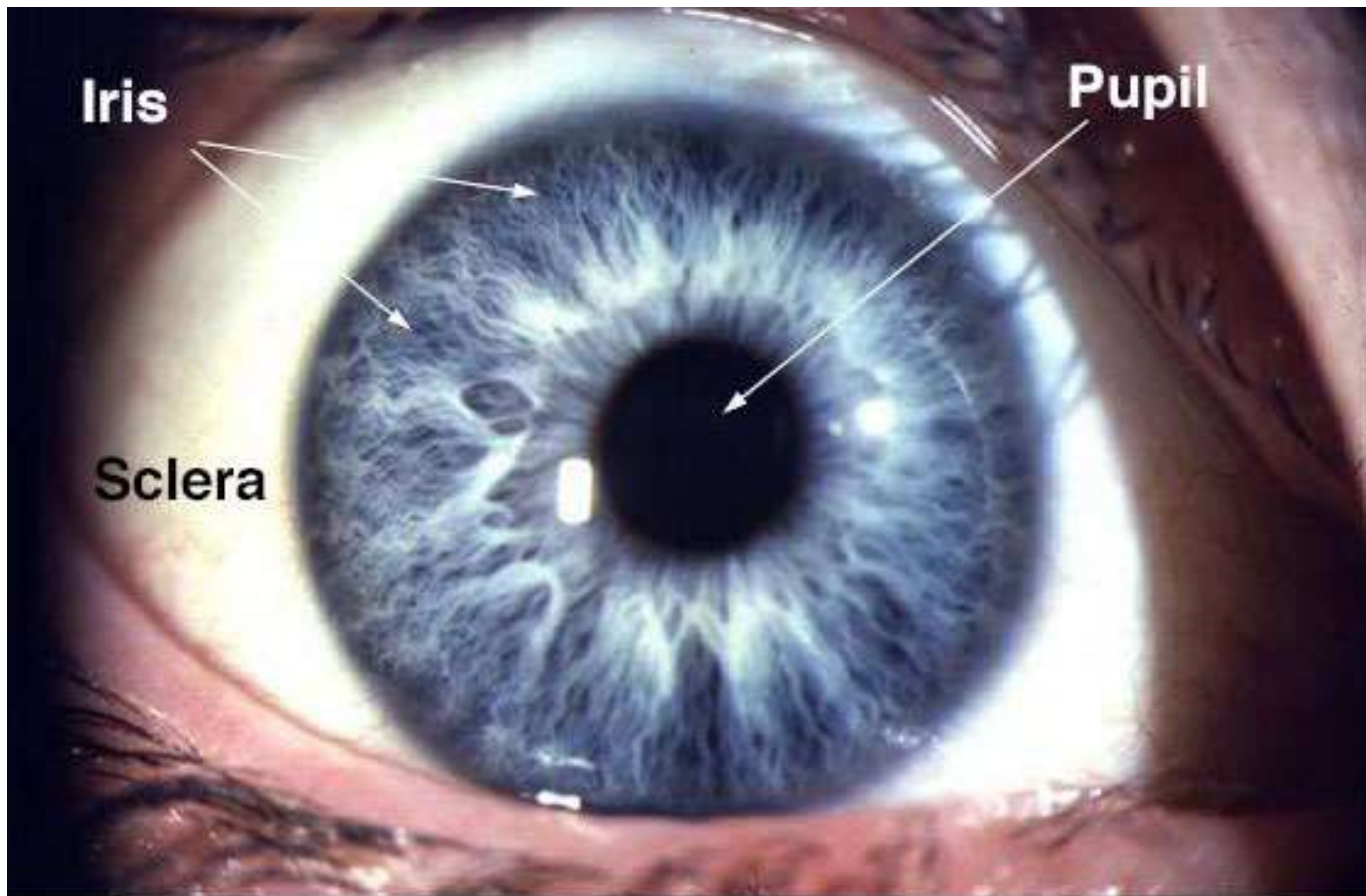


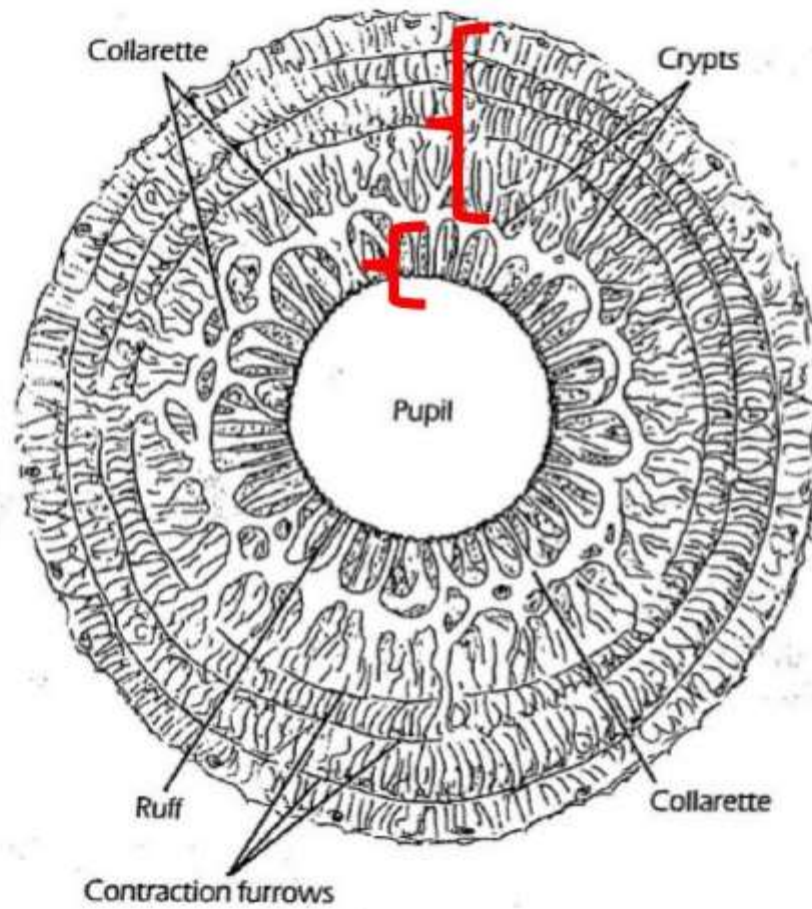
Fig. 1. View of the human eye

Iris

- Contains melanin pigment with variable density resulting in different colors



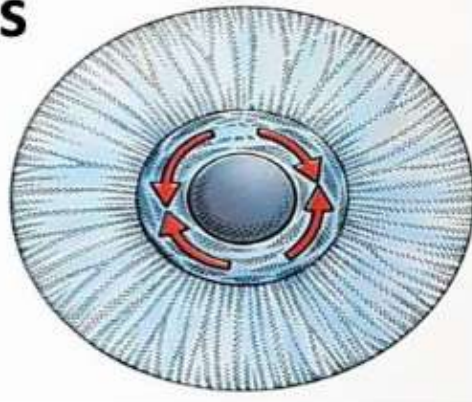
Iris



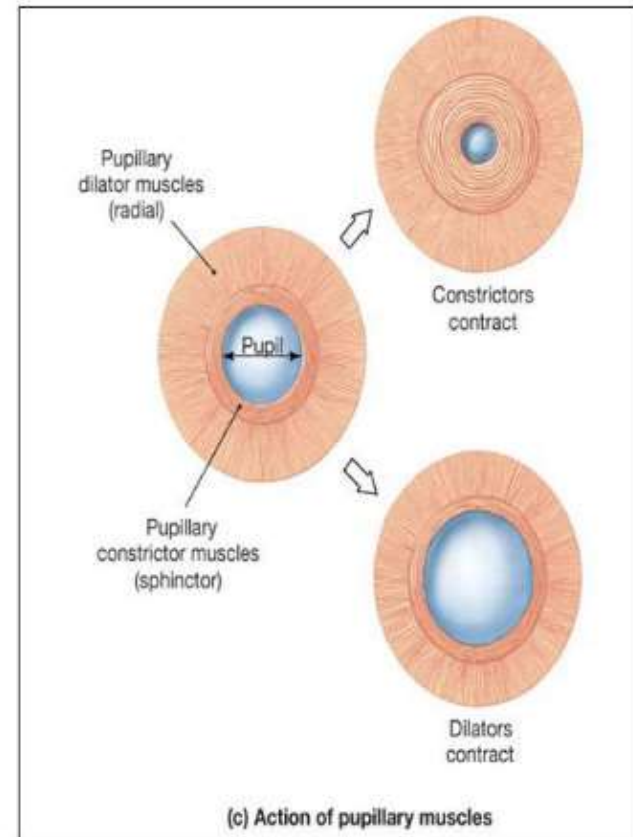
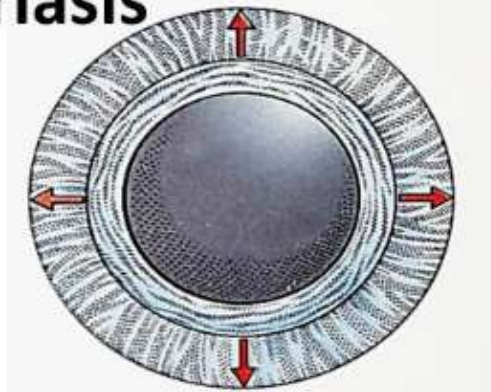
Iris

Pupillary Muscles

Miosis

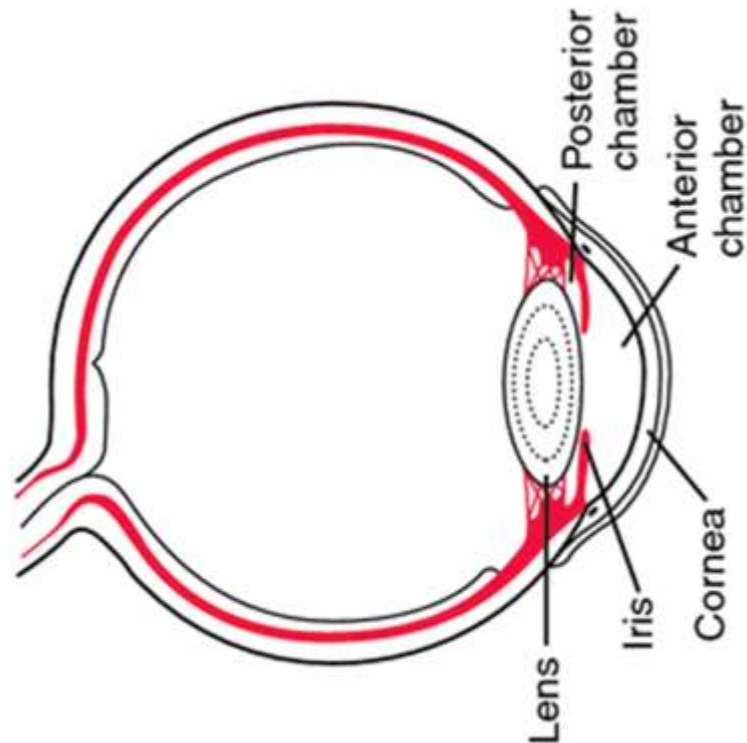


Mydriasis



Anterior Chamber

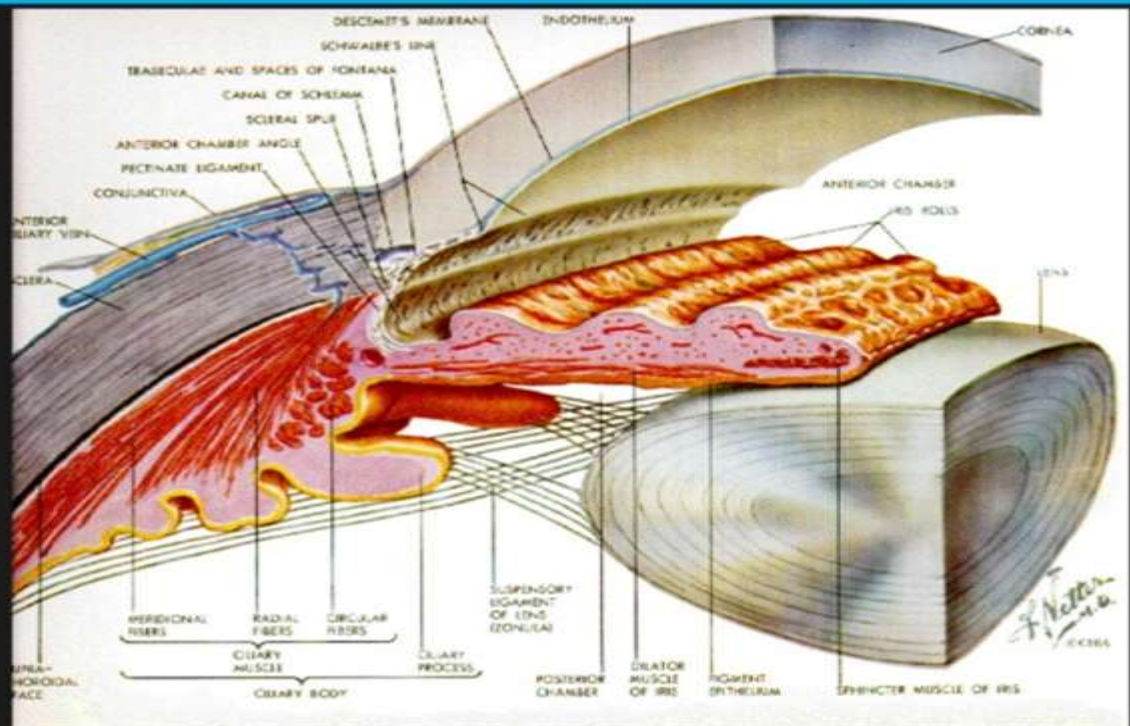
- It is the space bound anteriorly by the back surface of the cornea and posteriorly by the iris and lens
- It is filled by aqueous humor



Irido-corneal Angle

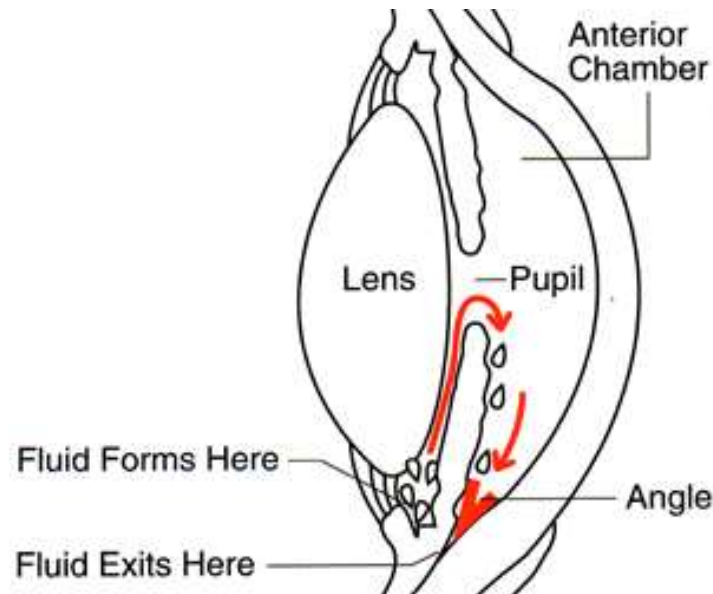
Eye Anatomy

The Angle



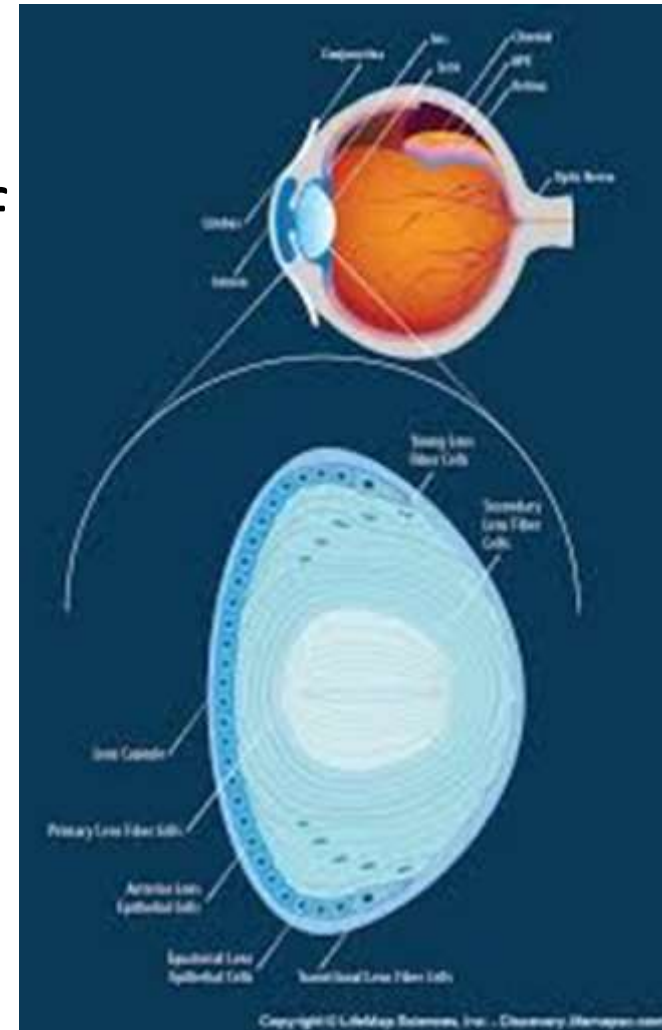
Irido-corneal Angle

- The area where the iris and the cornea meet
- Contains the trabecular meshwork and Schlem's canal. They constitute the aqueous drainage system

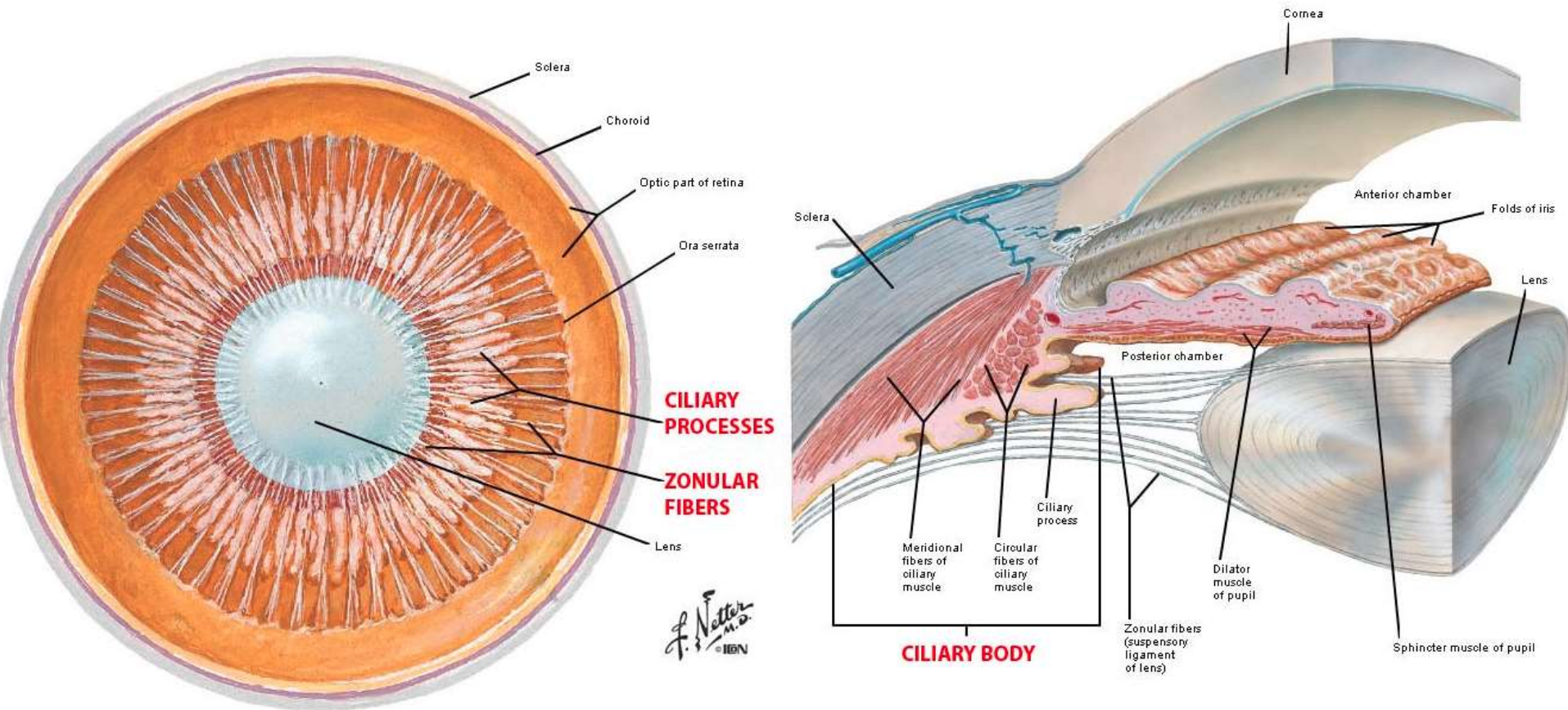


Crystalline Lens

- Responsible for the remaining 1/3 rd of the refractive power of the eye
- Fixed in place by zonules (suspensory ligaments) of the ciliary body

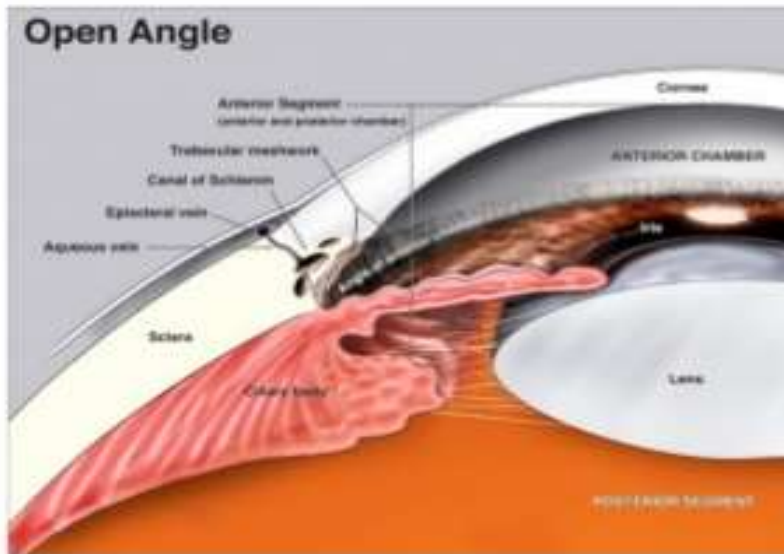


Ciliary Body



Ciliary Body

Ciliary body

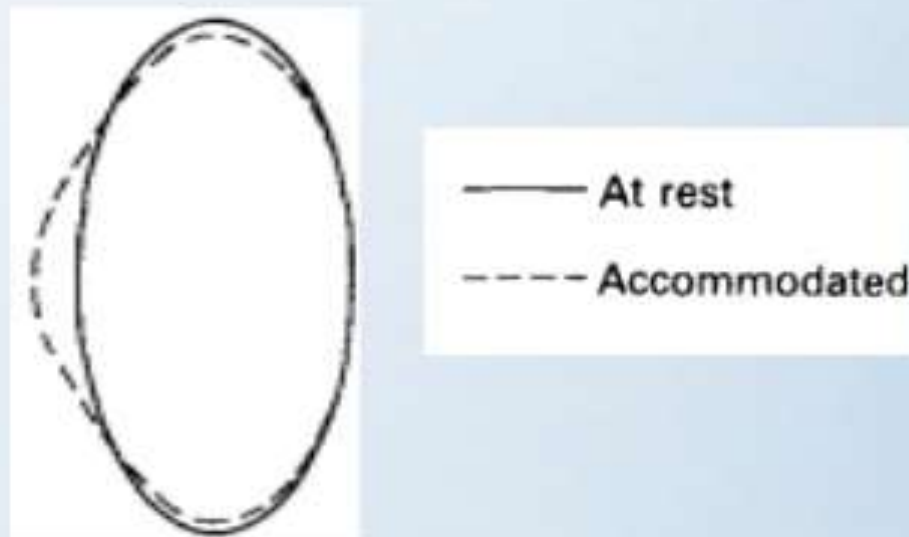


- Connects the iris and the choroid
- 2 parts:
 - Pars plicata (ciliary processes)
 - Pars plana
- Ciliary body has 3 layers:
 - Ciliary epithelium
 - Ciliary stroma
 - Ciliary muscle
- Functions:
 - Aqueous humor production
 - Suspension of lens, accommodation

Accommodation

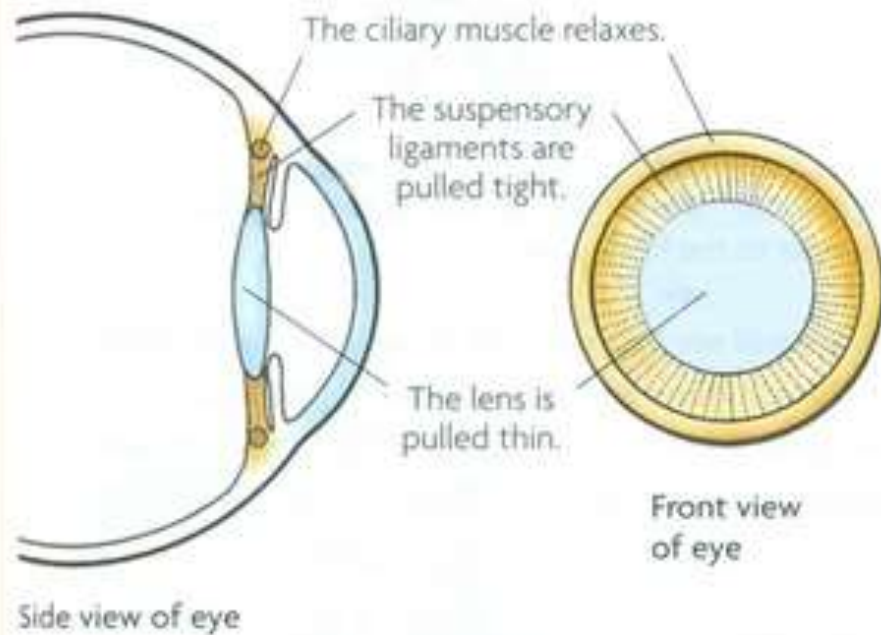
Definition

Accommodation is the mechanism by which the eye changes refractive power by altering the shape of lens in order to focus objects at variable distances

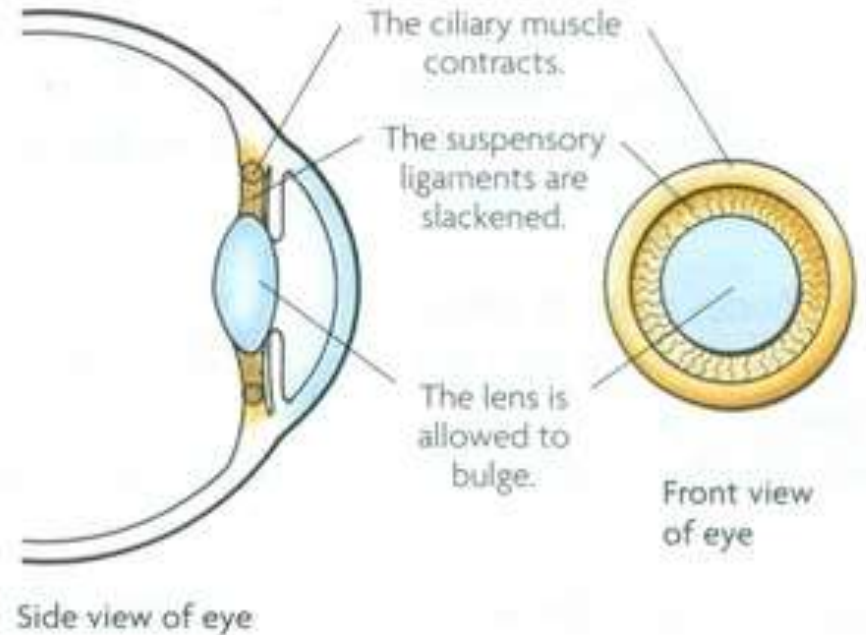


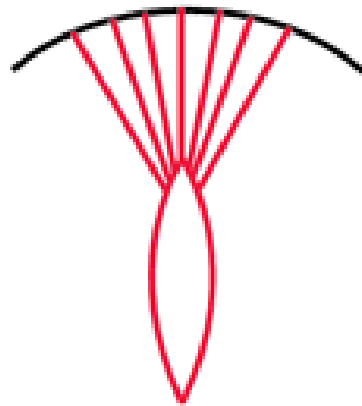
Accommodation

Distant object

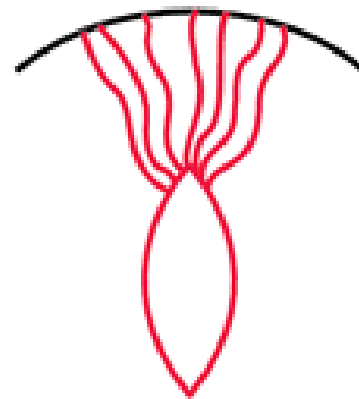


Nearby object

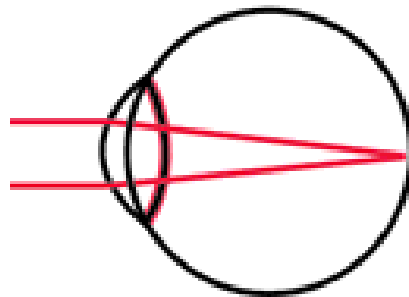




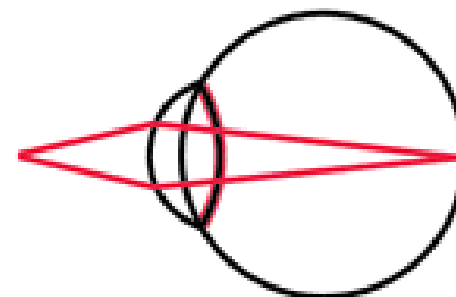
Ligaments tight—lens flattened



Ligaments relaxed—lens more rounded



Rays from a *distant* object are focused on the retina by a flattened lens

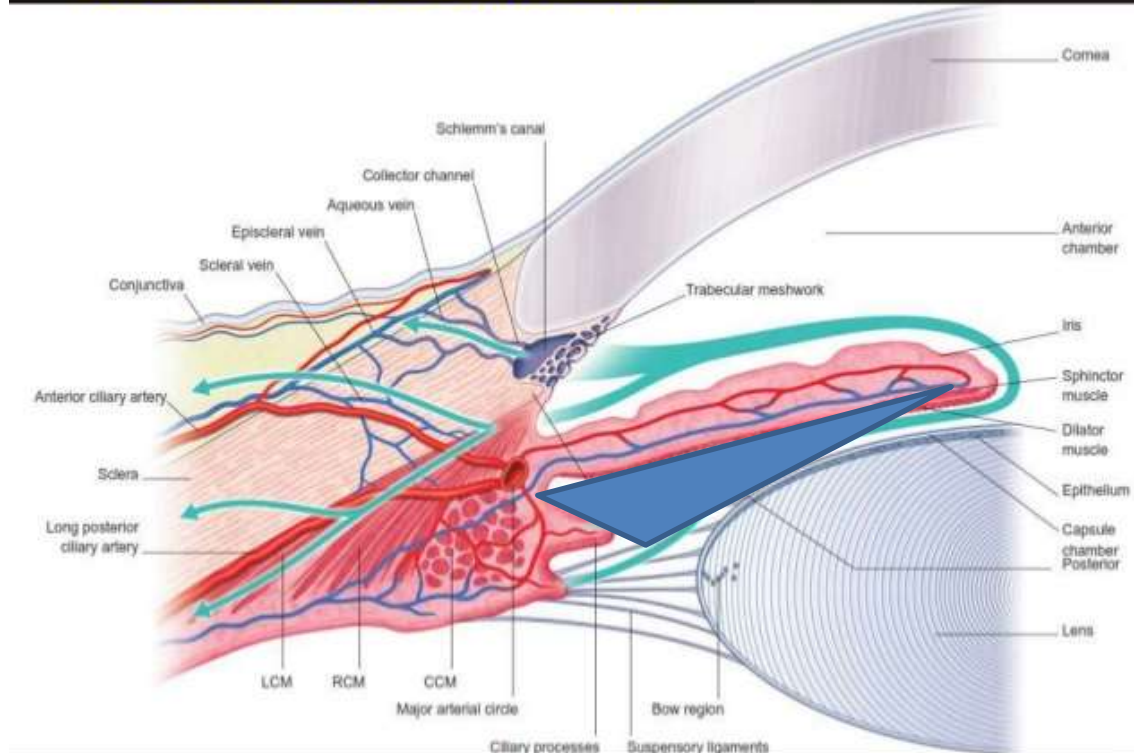


Rays from a *nearby* object are focused on the retina by a more rounded lens

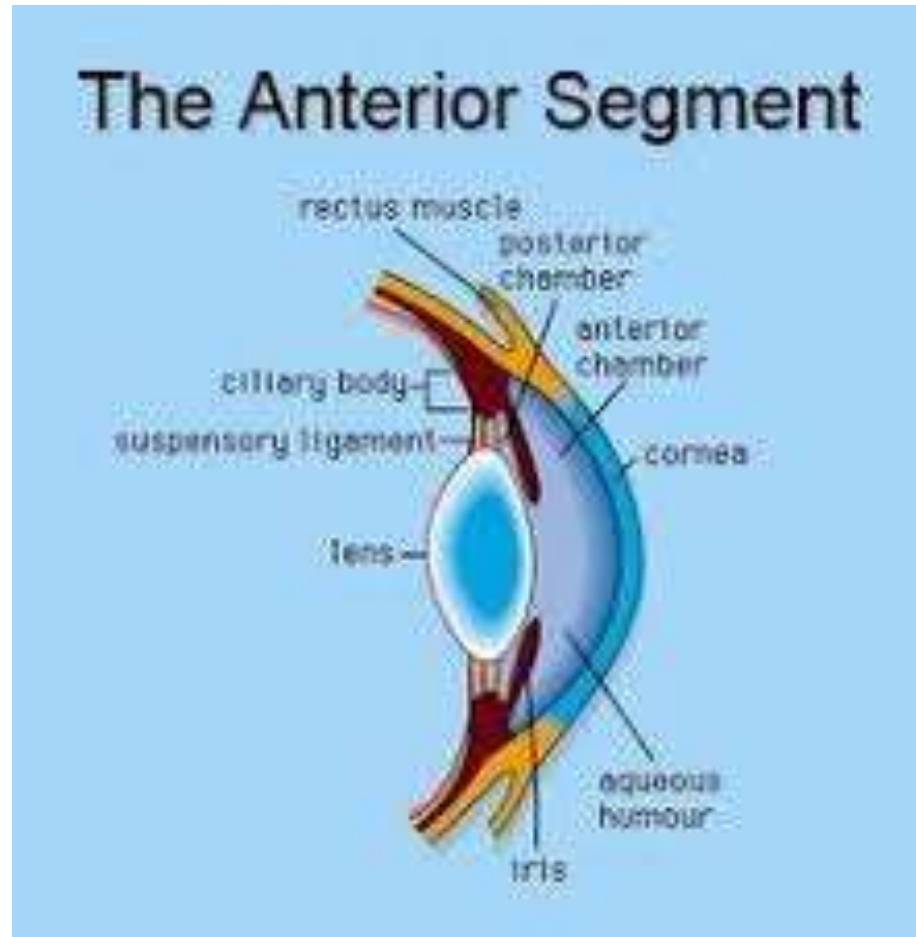
Posterior Chamber

- The space that lies between ciliary body, iris and lens

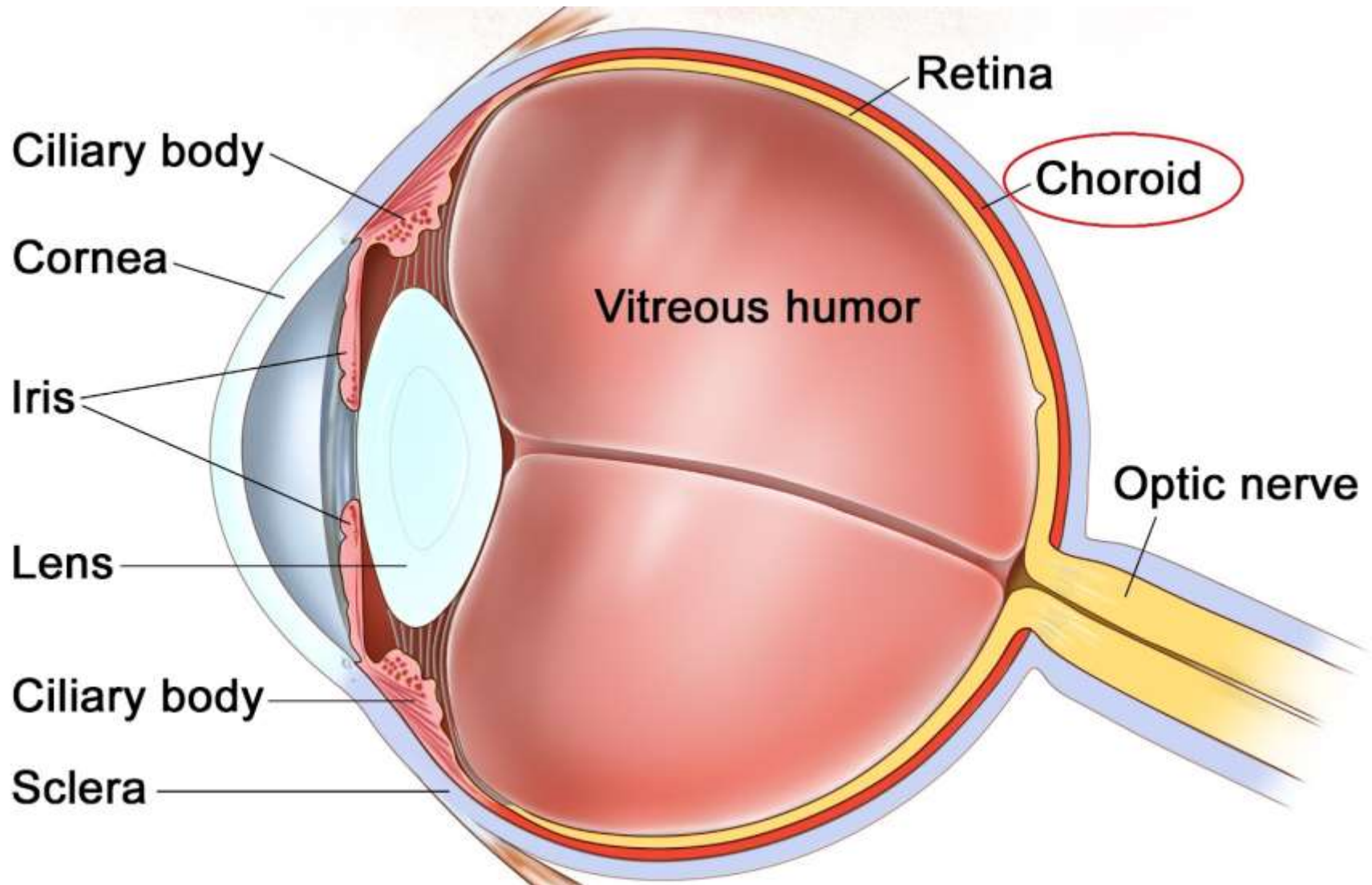
2.POSTERIOR CHAMBER 0.06ml



Anterior Segment



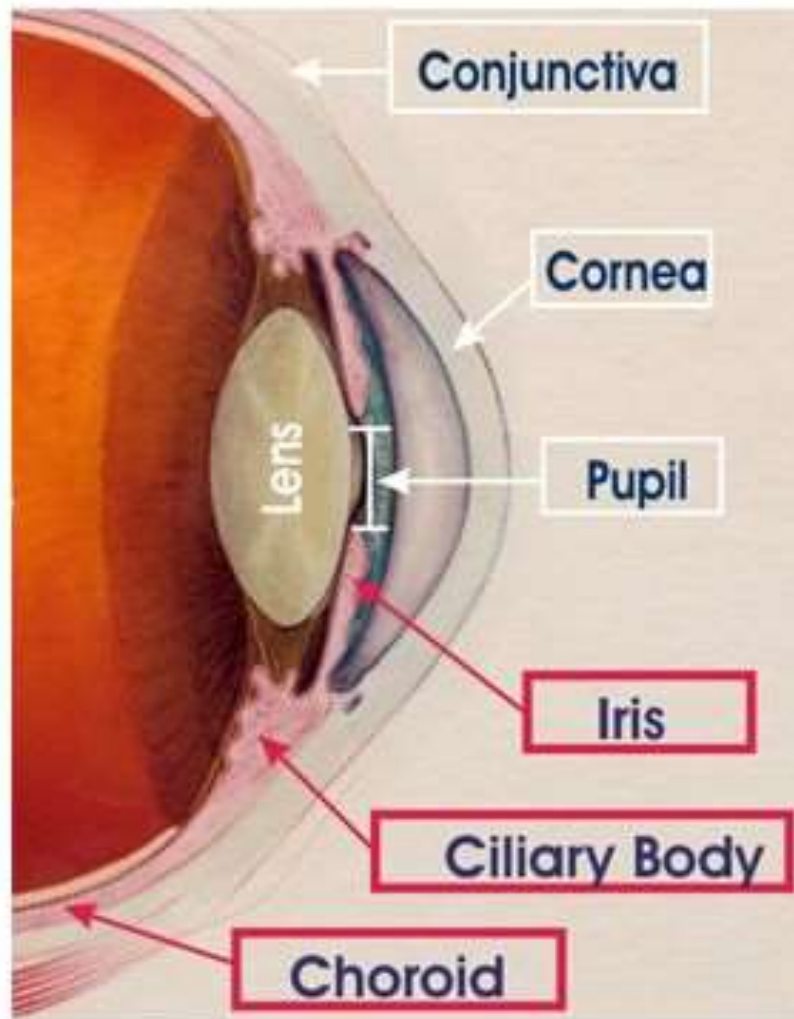
Choroid



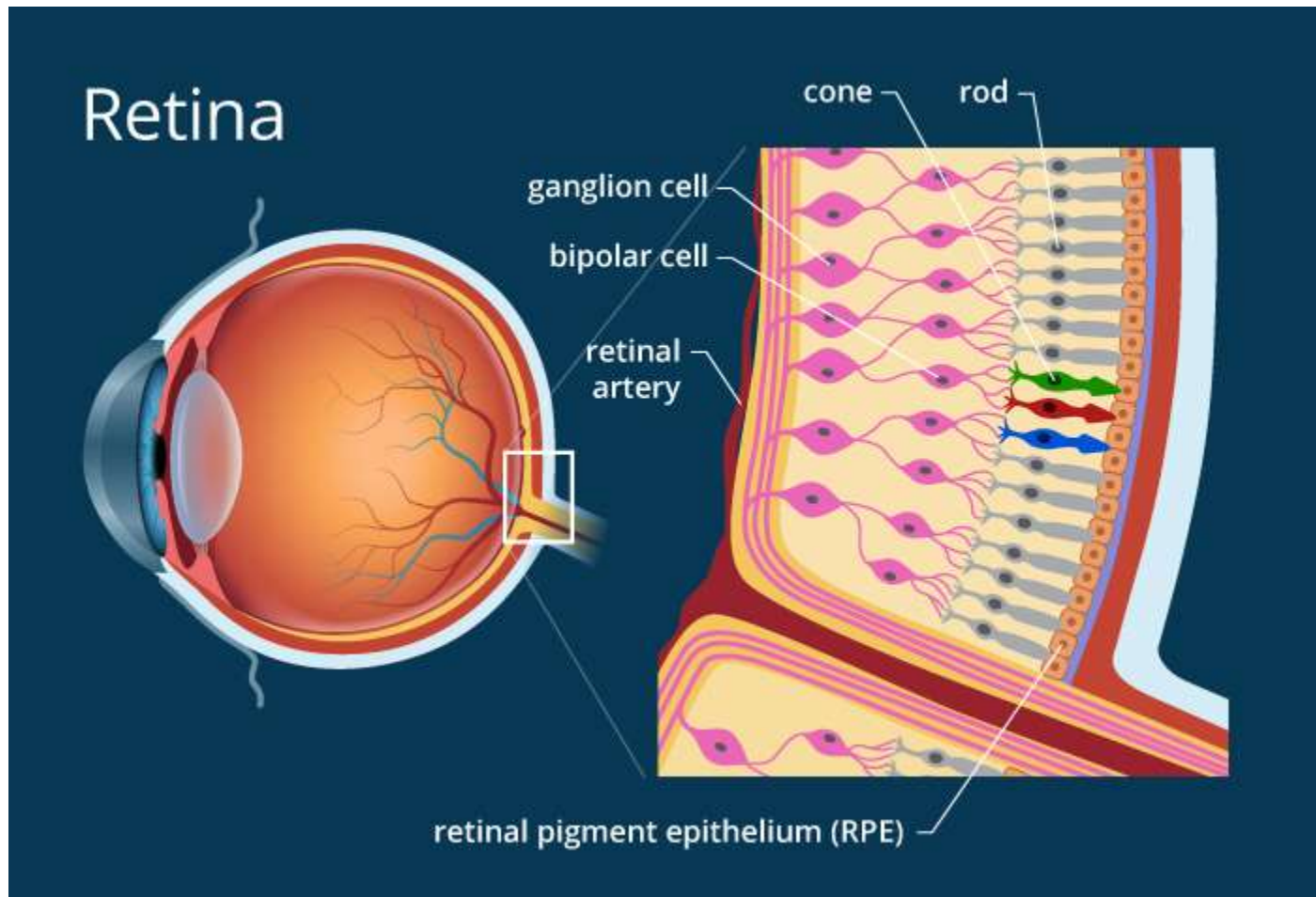
Choroid

- Thin, highly pigmented, vascular loose connective tissue
- Rich in melanocytes gives characteristic dark color
- Situated between sclera and retina
- Extends from optic nerve to ciliary body (at ora serrata)

Uveal Tract



Retina



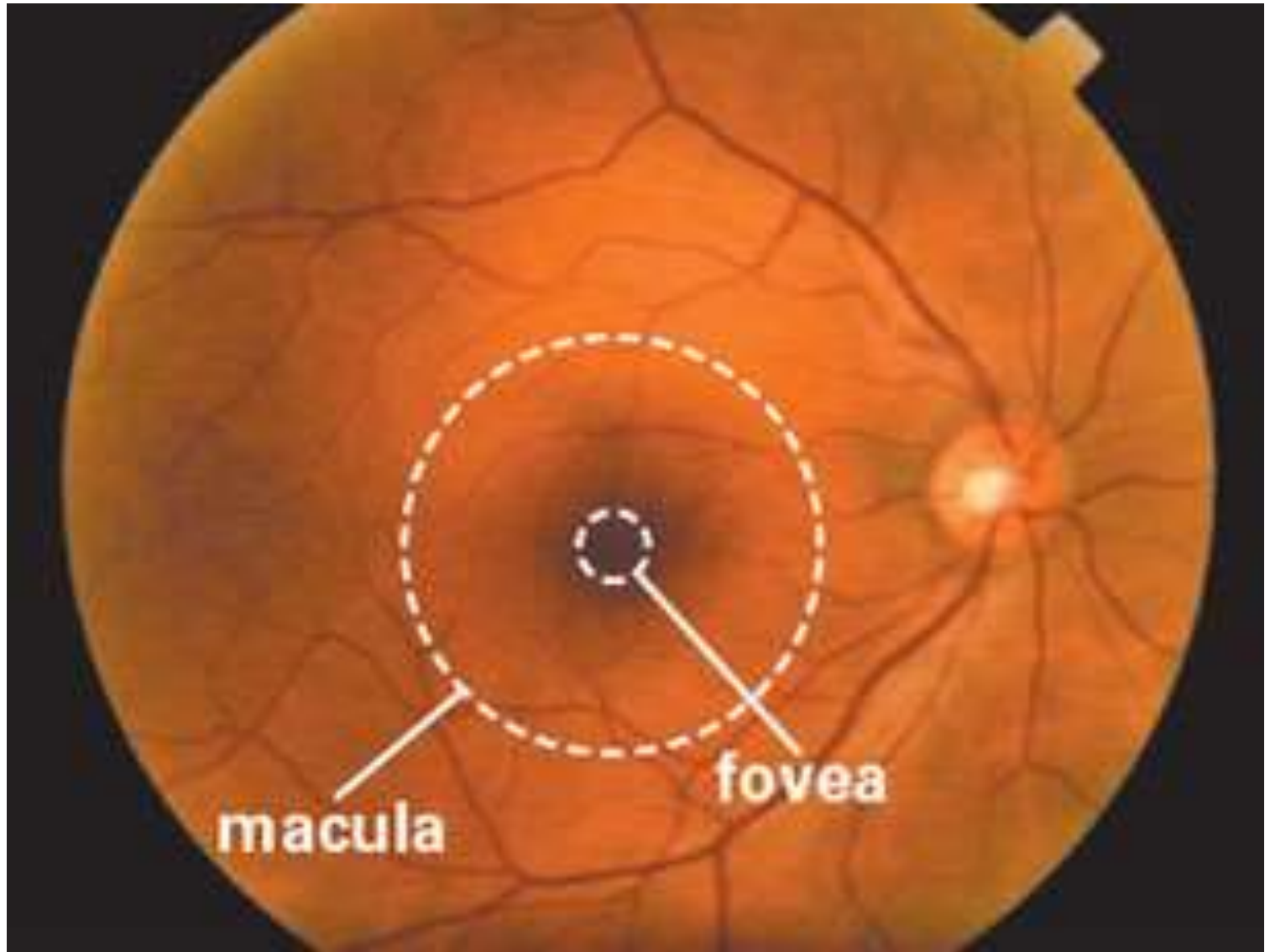
Retina

- The retina is the light-sensitive tissue that lines the inside of the eye
- Functions in a manner similar to film in a camera
- The optical elements within the eye focus an image onto the retina , initiating a series of chemical and electrical events
- Nerve fibers within the retina send electrical signals to the brain, which then interprets these signals as visual images

Retina

- The center of the retina provides the greatest resolving power of the eye
- This area, responsible for central vision, is known as the macula
- The center of the macula is called the fovea

Retina



Healthy Retina

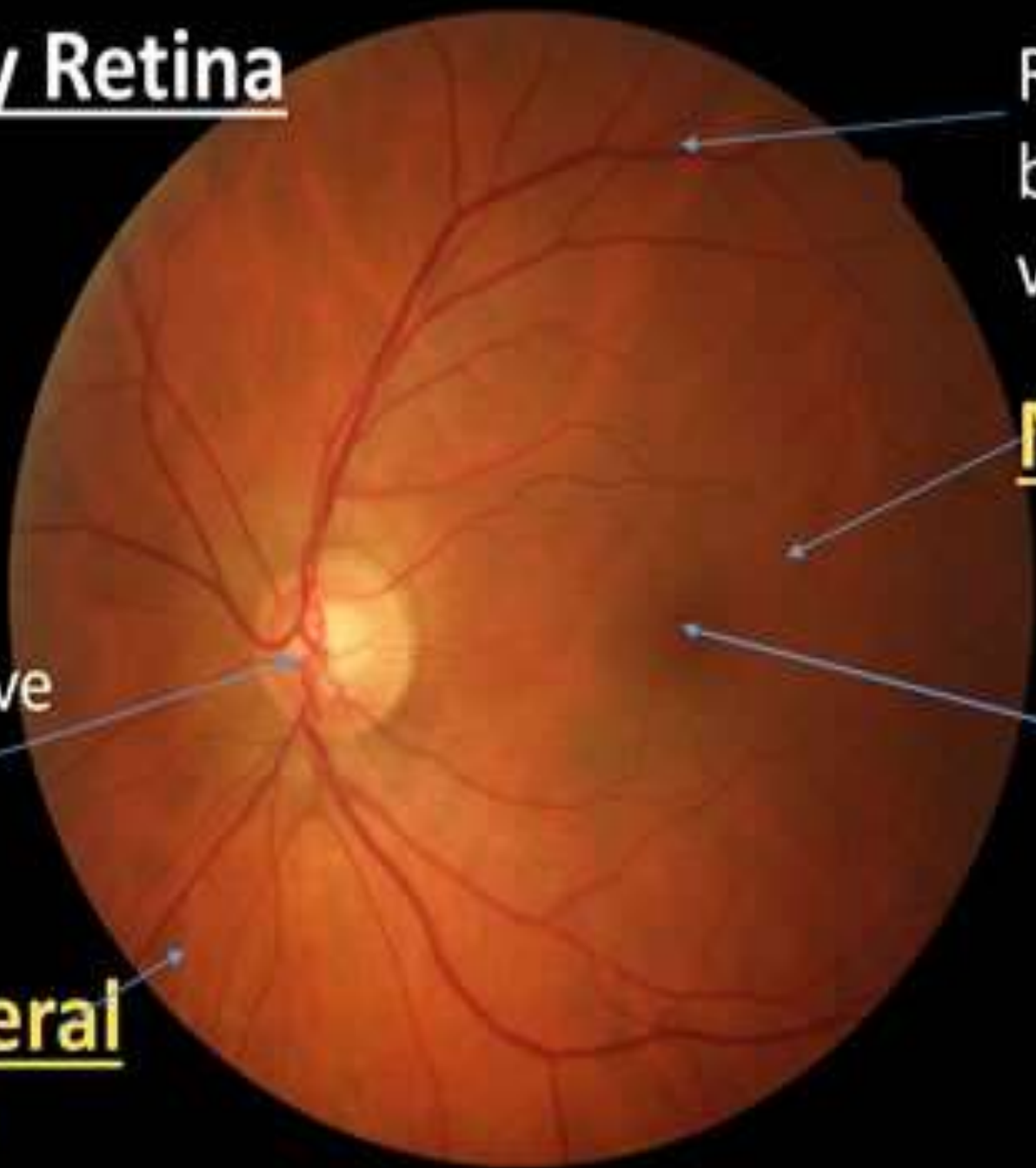
Retinal
blood
vessels

Macula

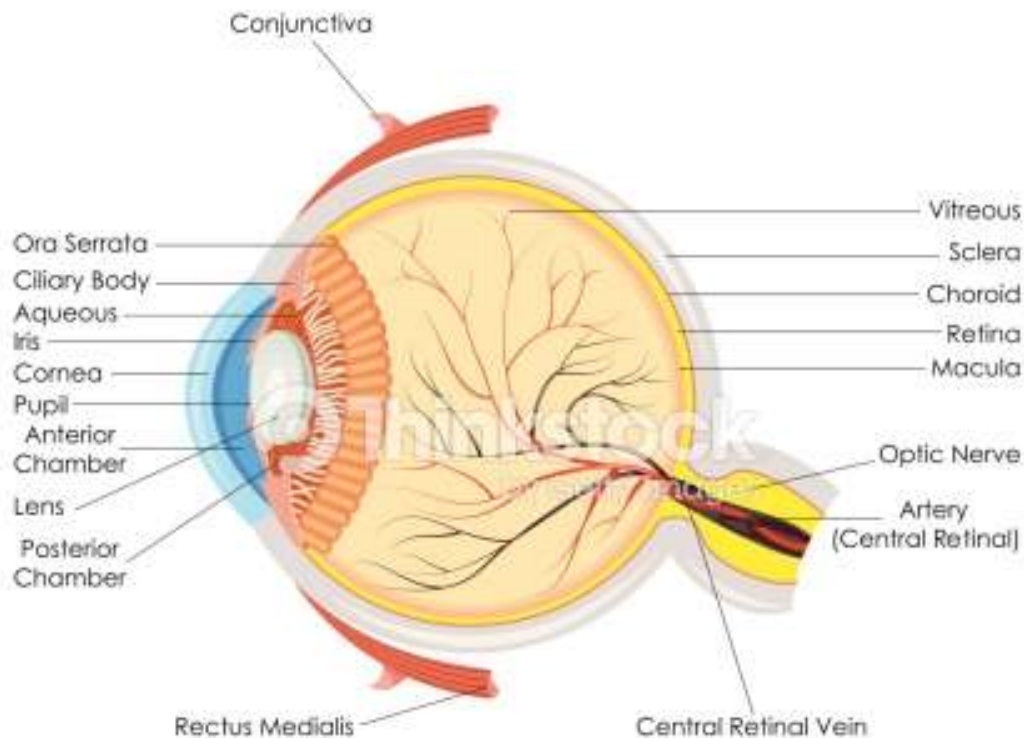
No
yellow
spots
(No
drusen)

Optic Nerve

Peripheral
Retina

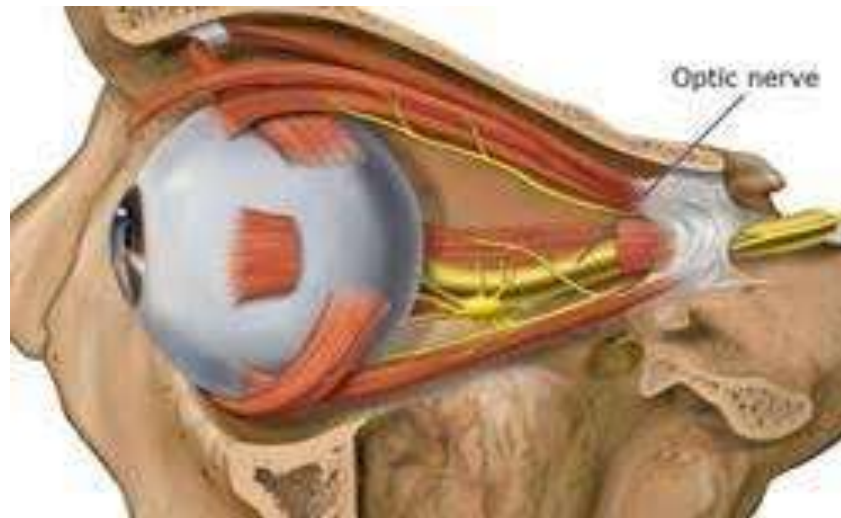


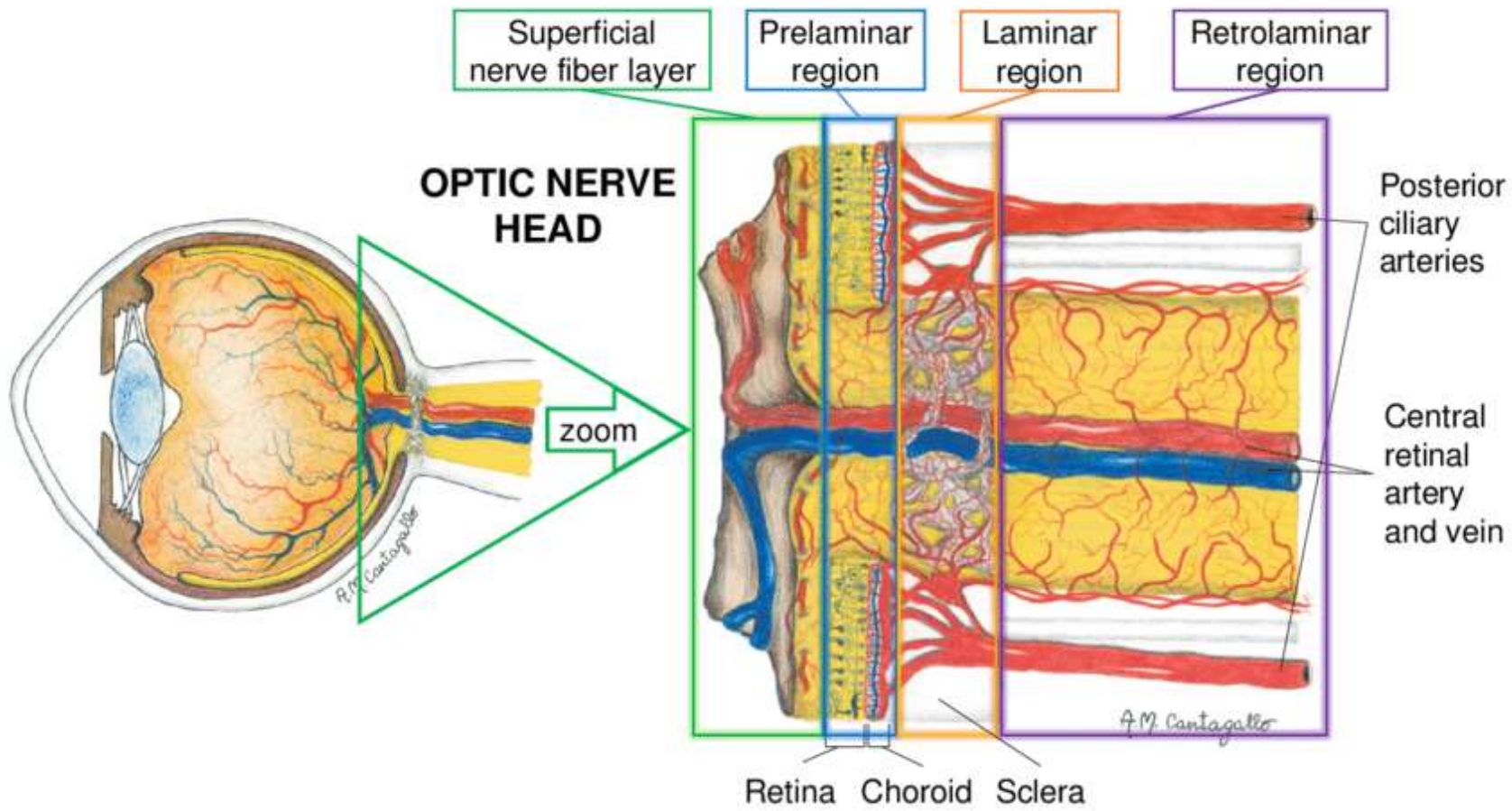
- Peripherally, retina has dentate/teeth like processes called Ora Serrata



The Optic Nerve- CN 2

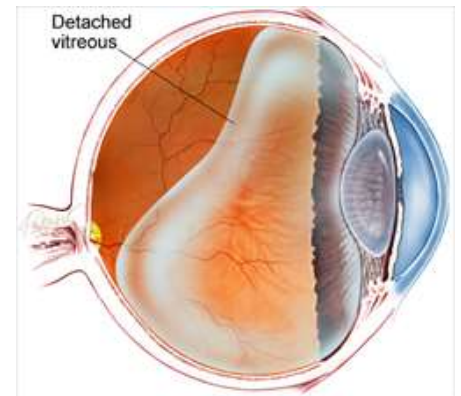
- The optic nerve is formed by the convergence of axons from the retinal ganglion cells.
- These cells in turn receive impulses from the photoreceptors of the eye (the rods and cones).

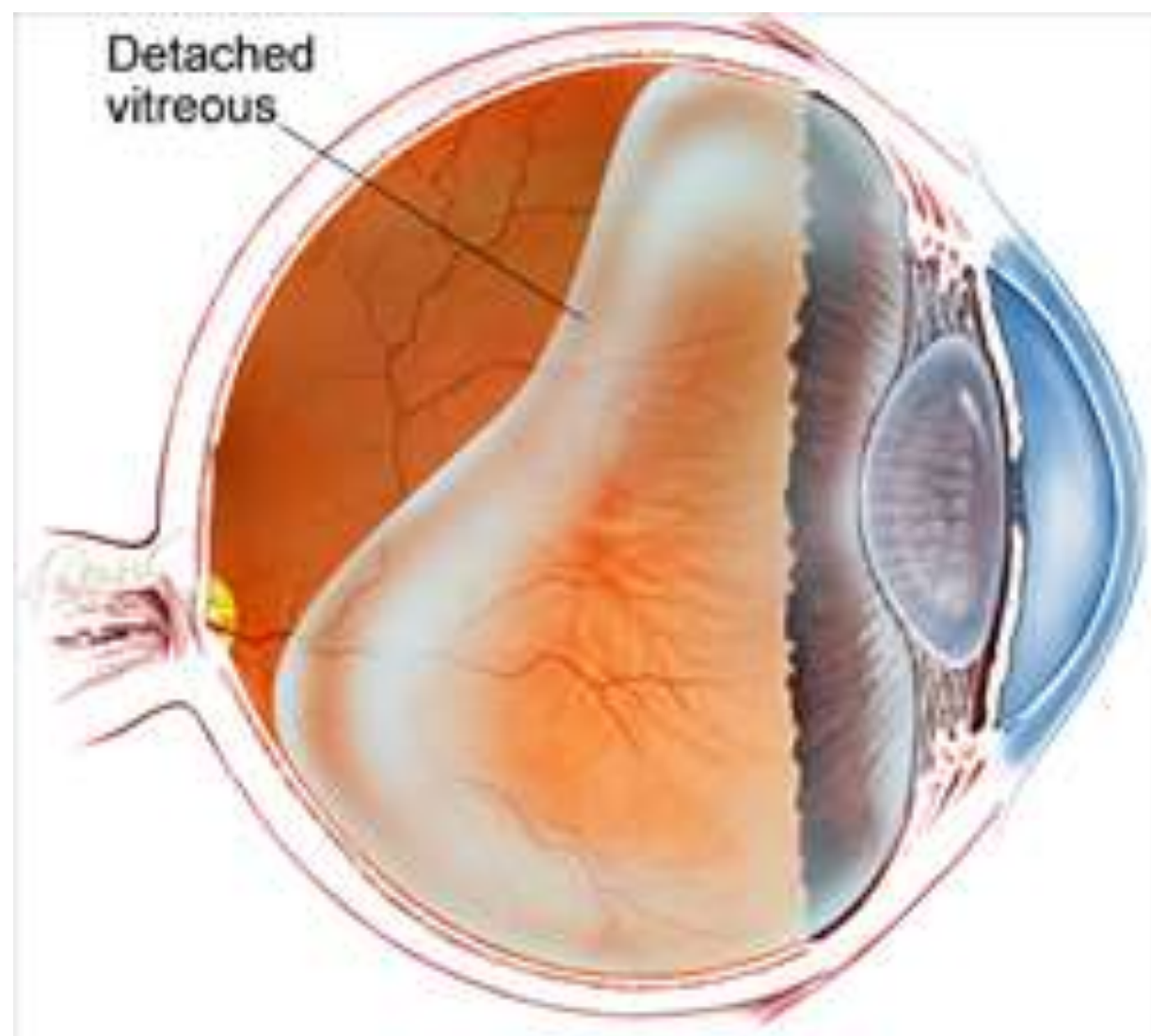




Vitreous Body

- The vitreous body is the clear gel that fills the space between the lens and the retina.
- Occupies 80% of the volume of the eye
- It is a clear matrix composed of collagen, hyaluronic acid, and water
- Often referred to as the vitreous humour or simply "the vitreous"





The End