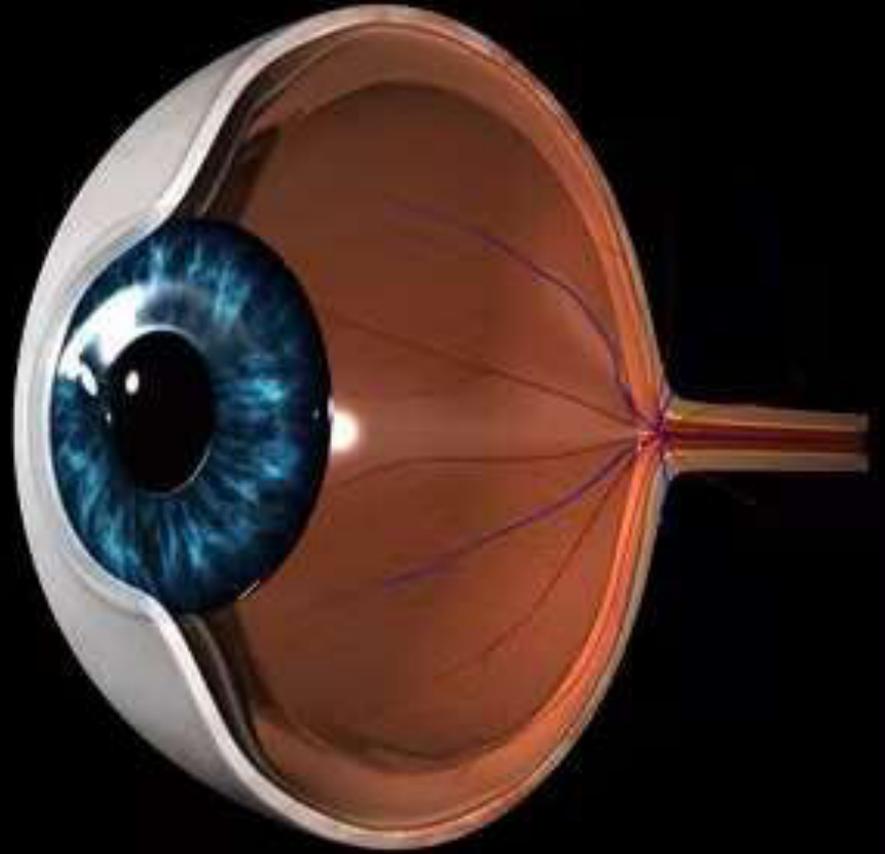


# EYE ANATOMY

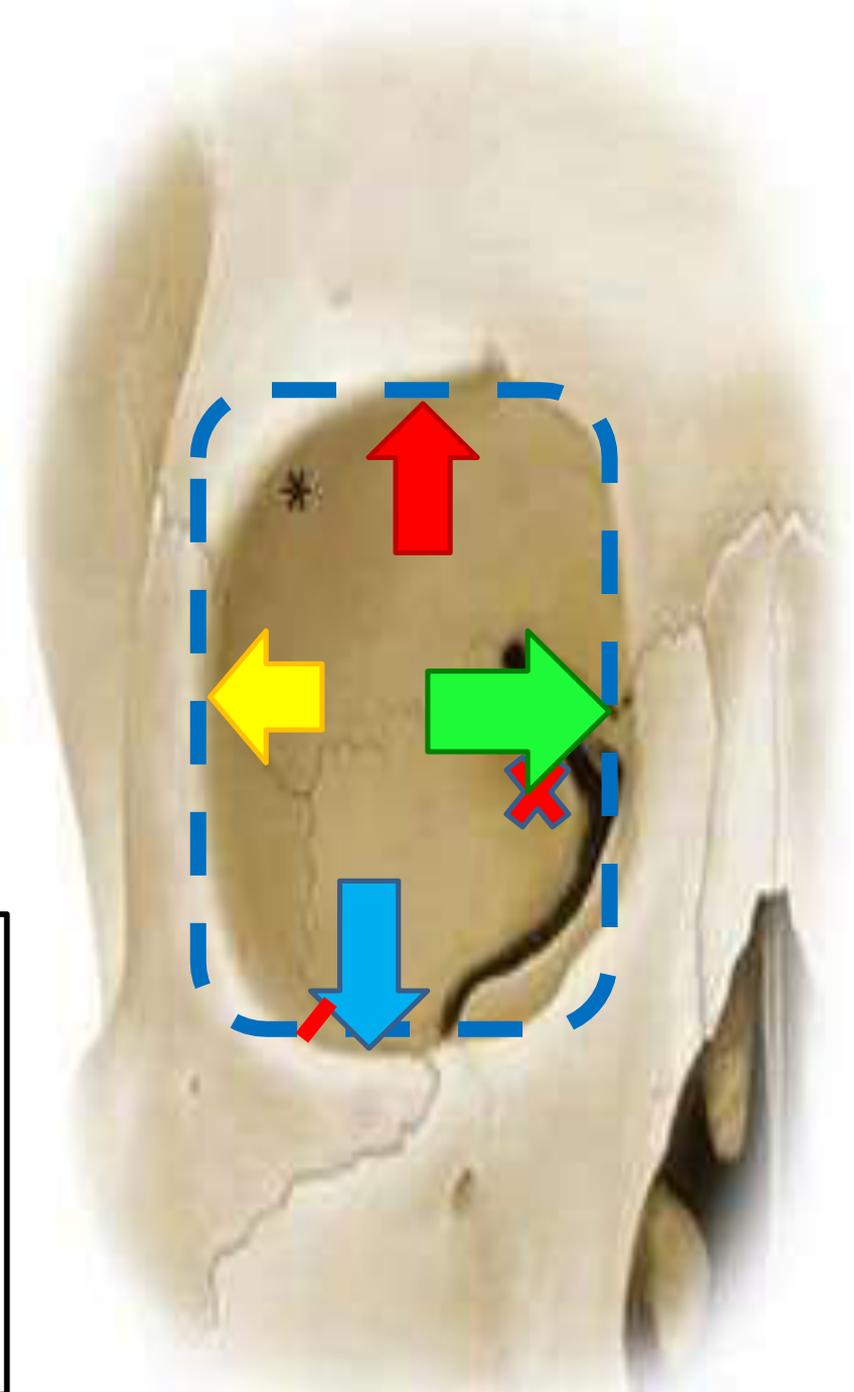


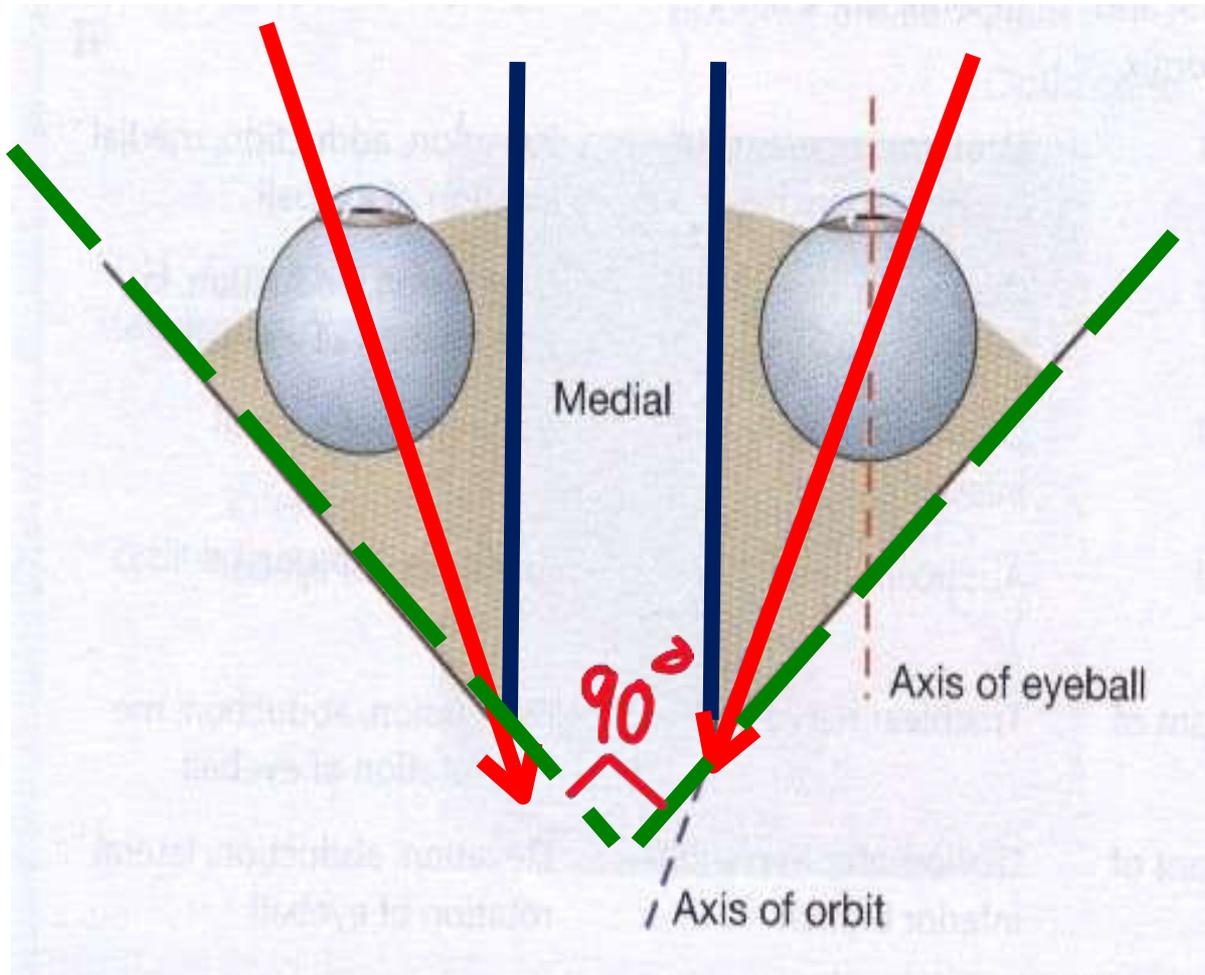
***ABDALKADER ALSHROUF***  
***NOUR ODEH***

# Bony Orbit

- 4 sided pyramid
- Apex → backwards
- Base → orbital opening on the face
- 4 walls → **roof** / **floor** / **medial** / **lateral** walls

- ❑ Long axis of each orbit is directed backwards & medially
- ❑ Medial walls of the 2 orbits are parallel to each other
- ❑ Lateral walls are set in right angles to each other





**1) Orbital opening** →  
base of the pyramid  
→ opens on the face

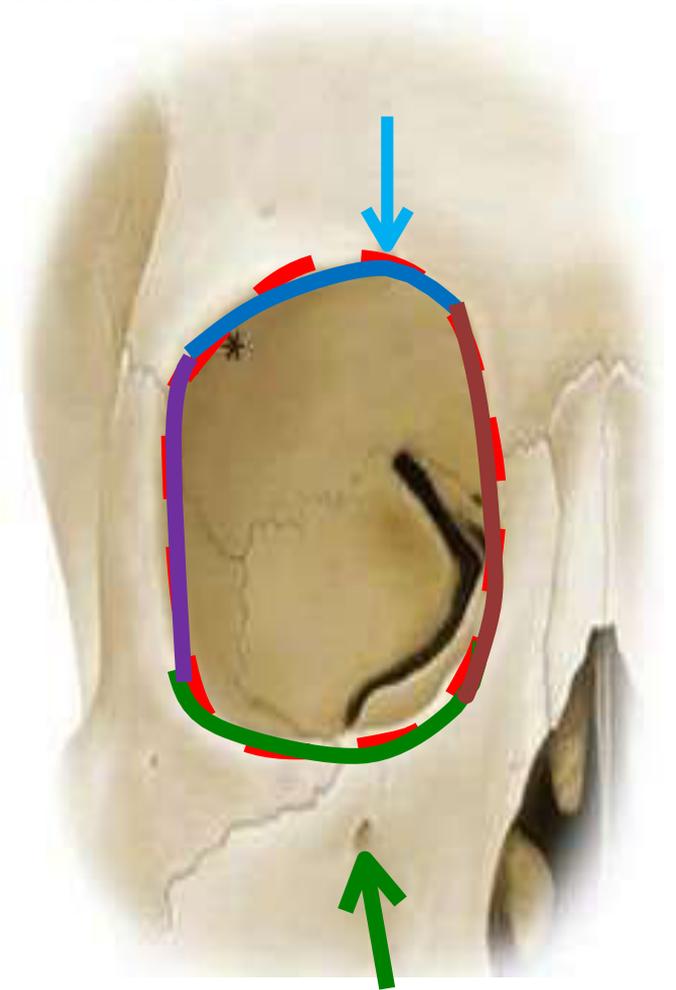
→ Has 4 margins:

a) **Supraorbital margin**  
shows the  
supraorbital  
notch(**arrow**) →  
transmits supraorbital  
nerve & vessels

a) **Infraorbital margin** →  
below it shows  
infraorbital  
foramen(**arrow**) →  
transmits infraorbital  
nerve & vessels

a) **Lateral orbital margin**  
b) **Medial orbital margin**

# Orbital opening



## Roof of orbit has:

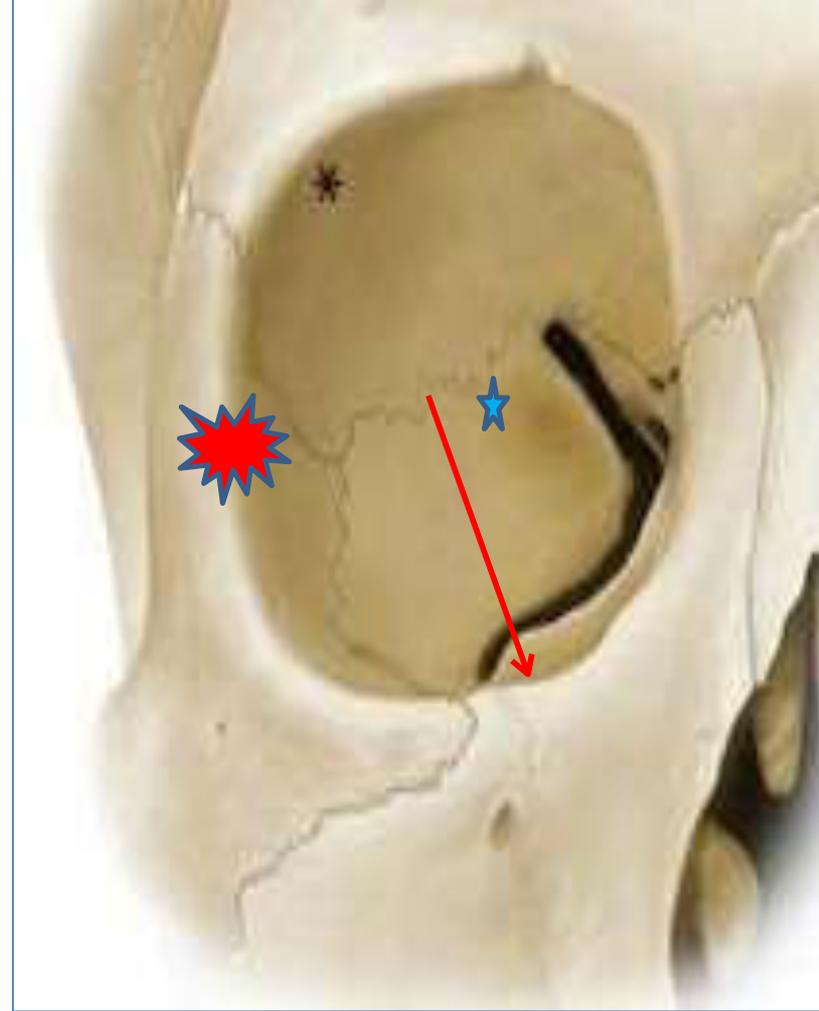
### 1) Lacrimal fossa

(anterolaterally) →  
lacrimal gland

2) **Optic canal** (posteriorly  
at junction of roof with  
medial wall) → optic  
nerve & ophthalmic  
artery

### 3) Trochlear fossa

(anteromedially) →  
trochlea for tendon of  
superior oblique muscle

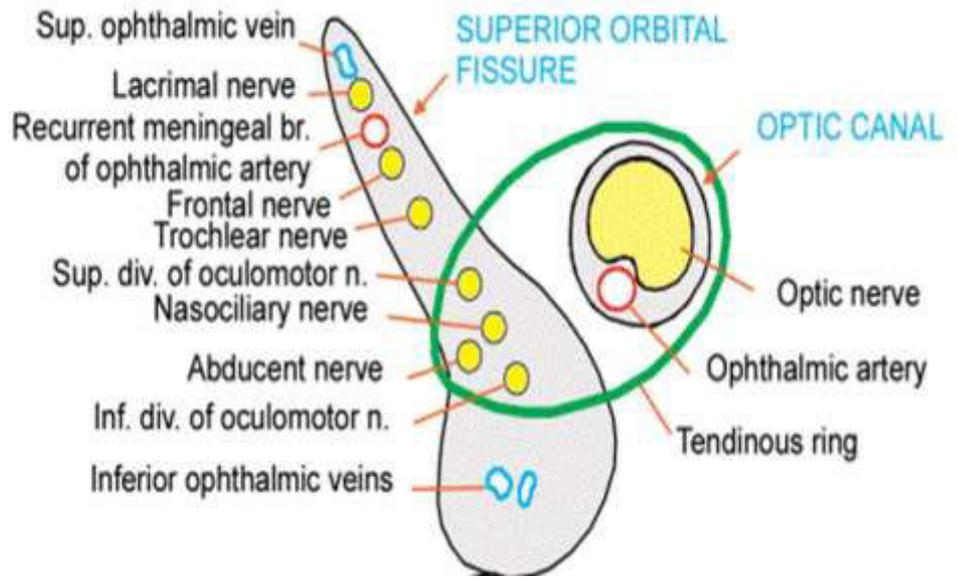


## Lateral wall:

- ❑ At junction of roof & lateral wall posteriorly  
→ **Superior orbital fissure SOF**
- ❑ Structures passing through SOF are arranged as follows from lateral to medial:

**Live Free To See No Insult At all**

**Lacrimal/ Frontal/  
Trochlear/ Superior  
division of oculomotor/  
Nasociliary/ Inferior  
division of oculomotor/  
Abducent**

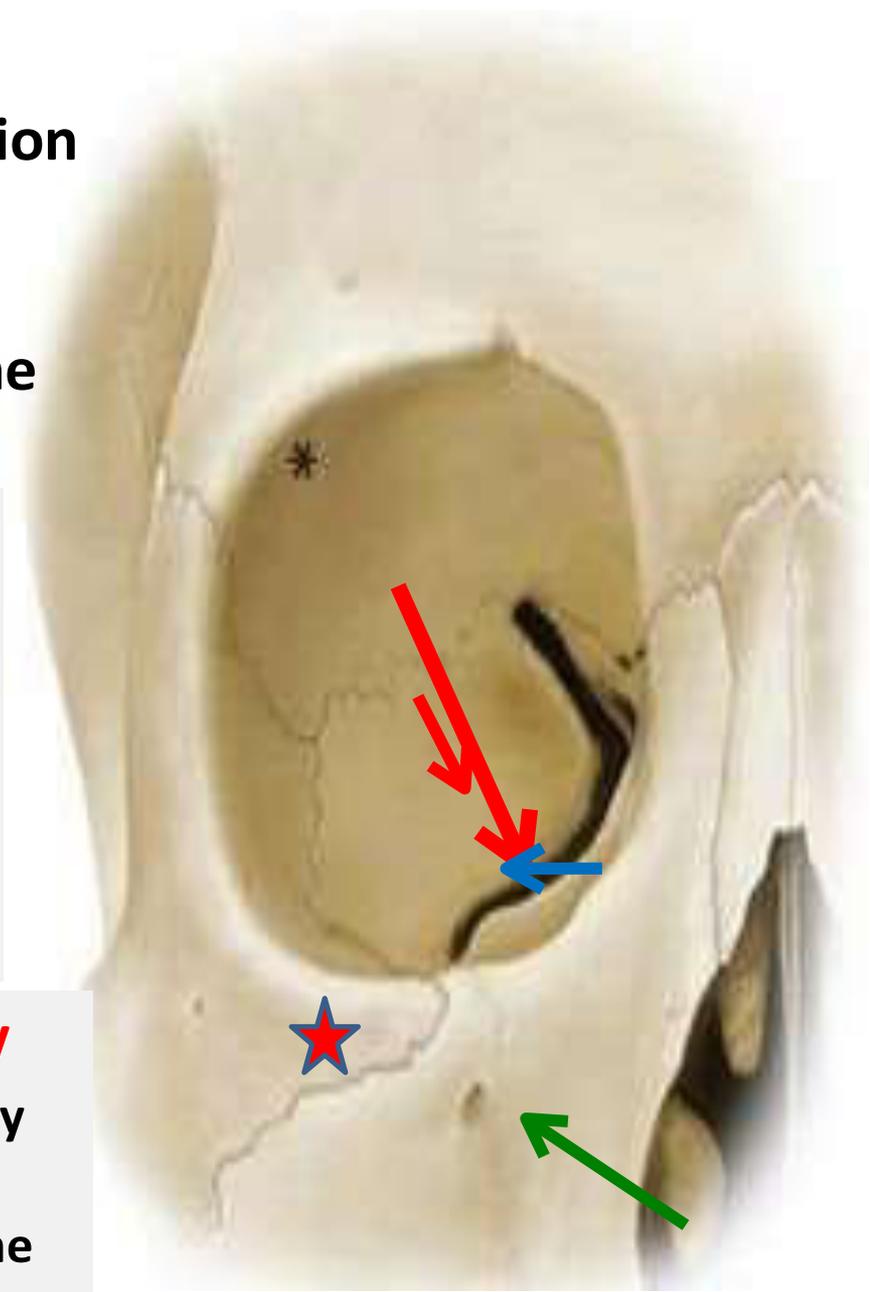


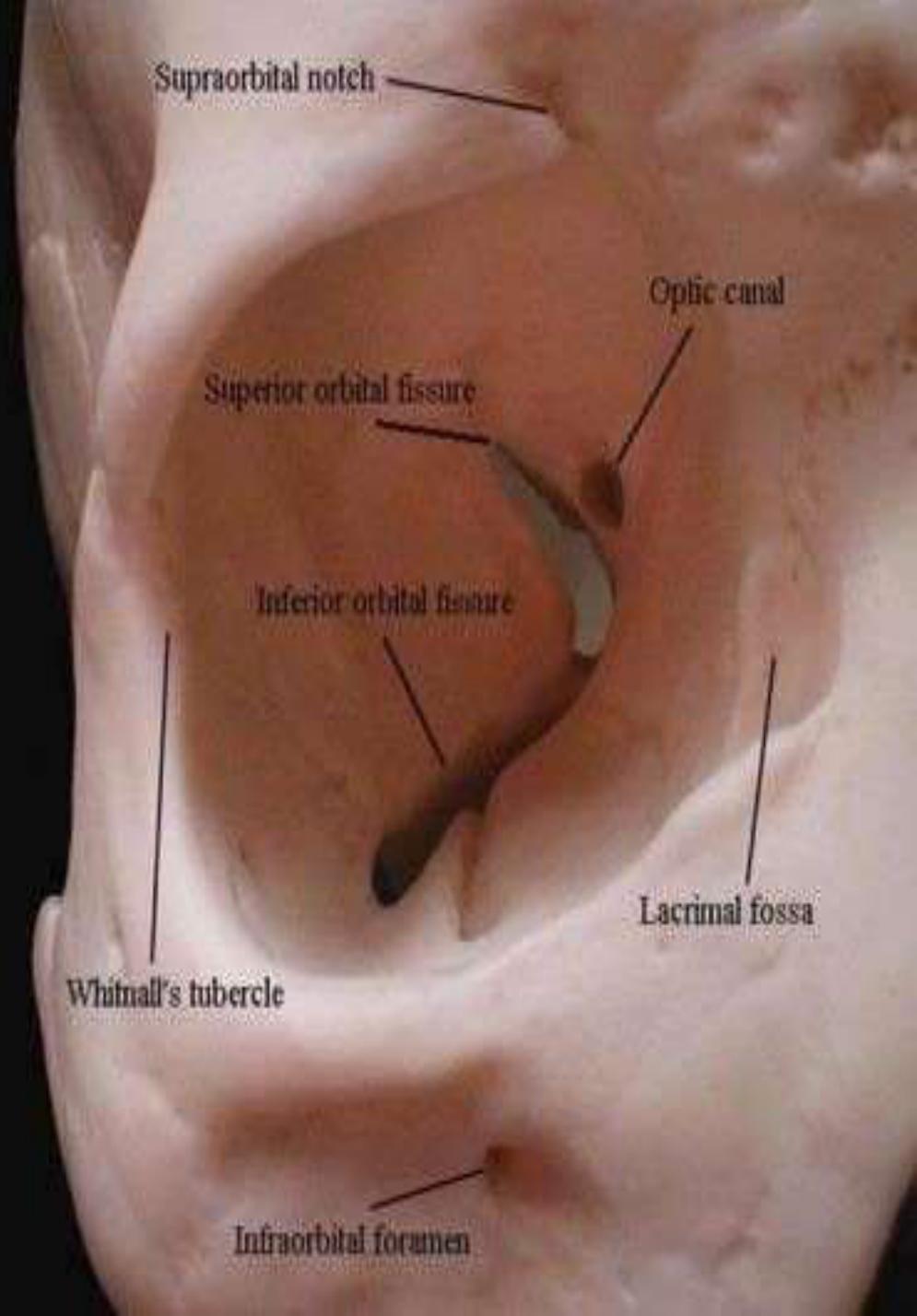
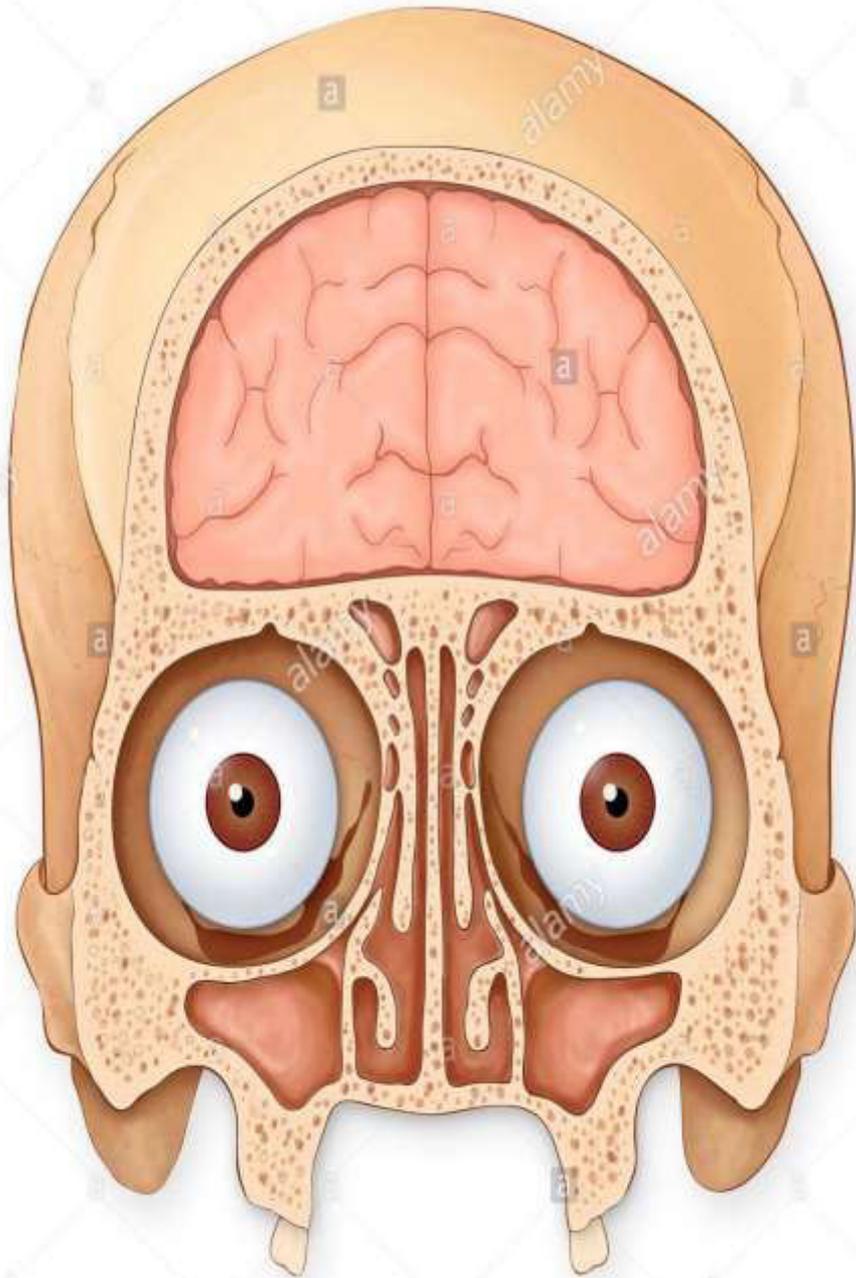
# Floor:

- ❑ Inferior orbital fissure IOF → at junction of lateral wall & floor
- ❑ Through it orbit communicates with infratemporal fossa & pterygopalatine fossa.

❑ Inferior orbital fissure →  
infraorbital groove → infraorbital canal →  
infraorbital foramen →  
transmits infraorbital nerve & vessels

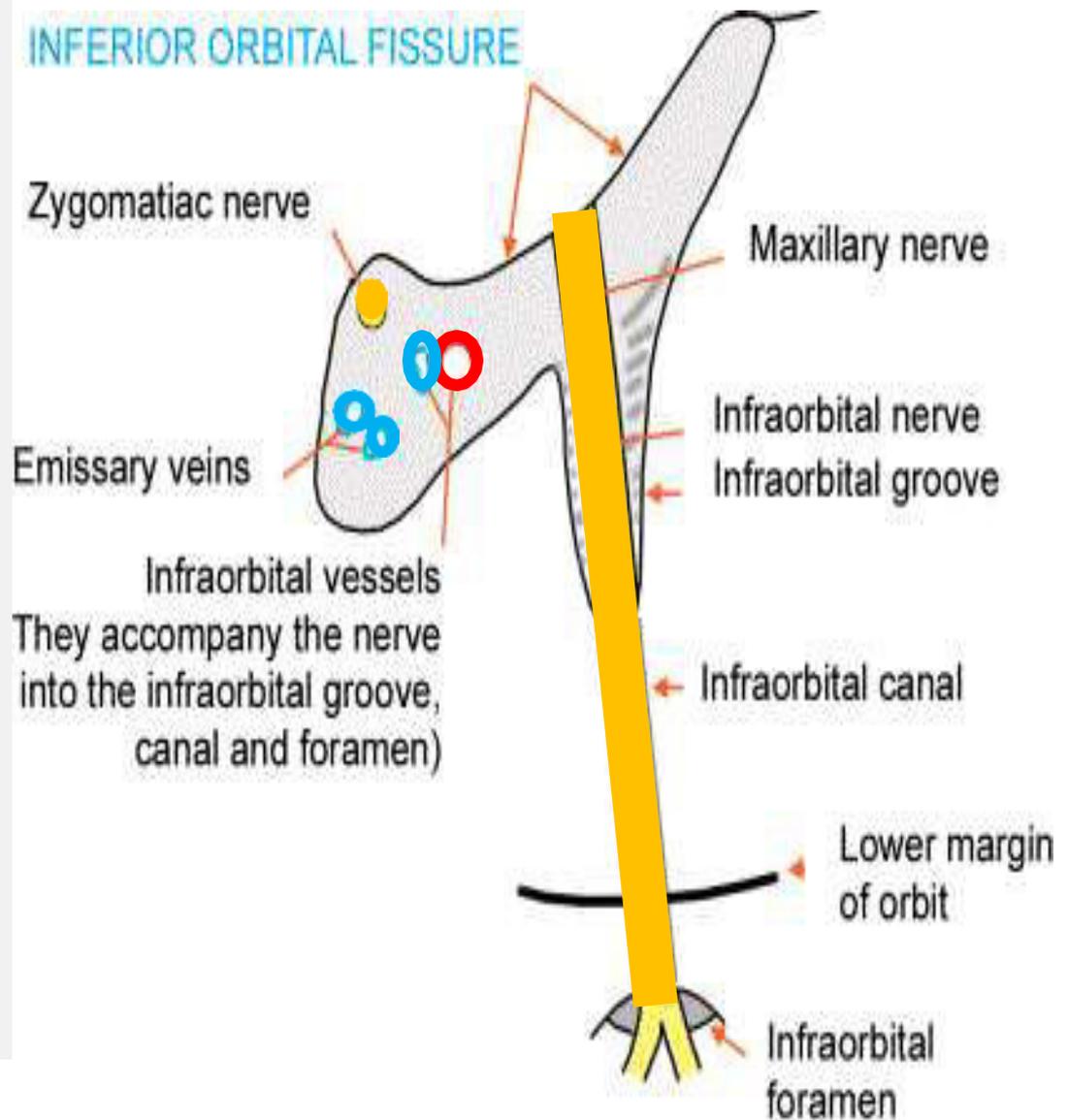
❑ Floor of orbit is related to maxillary air sinus. [A severe blow to the orbit may cause the contents of the orbital cavity to explode downward through the floor of the orbit into the maxillary sinus ]





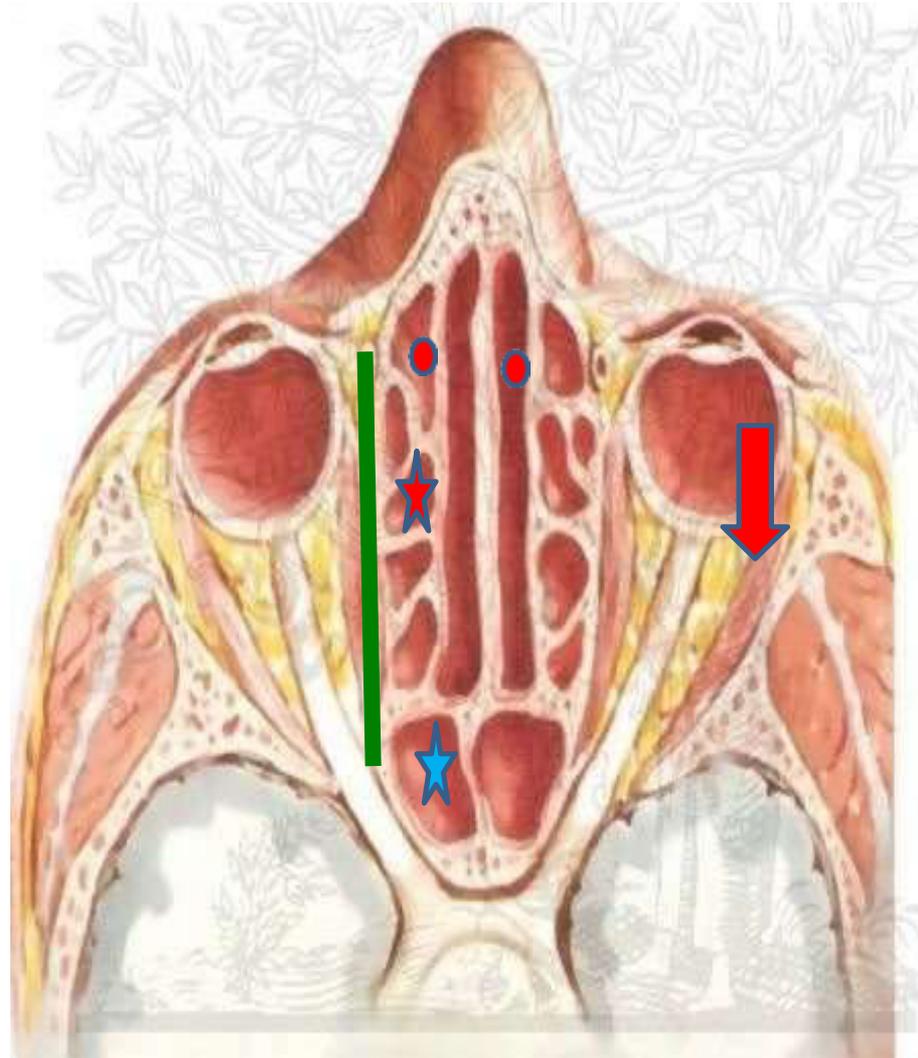
## □ IOF transmits:

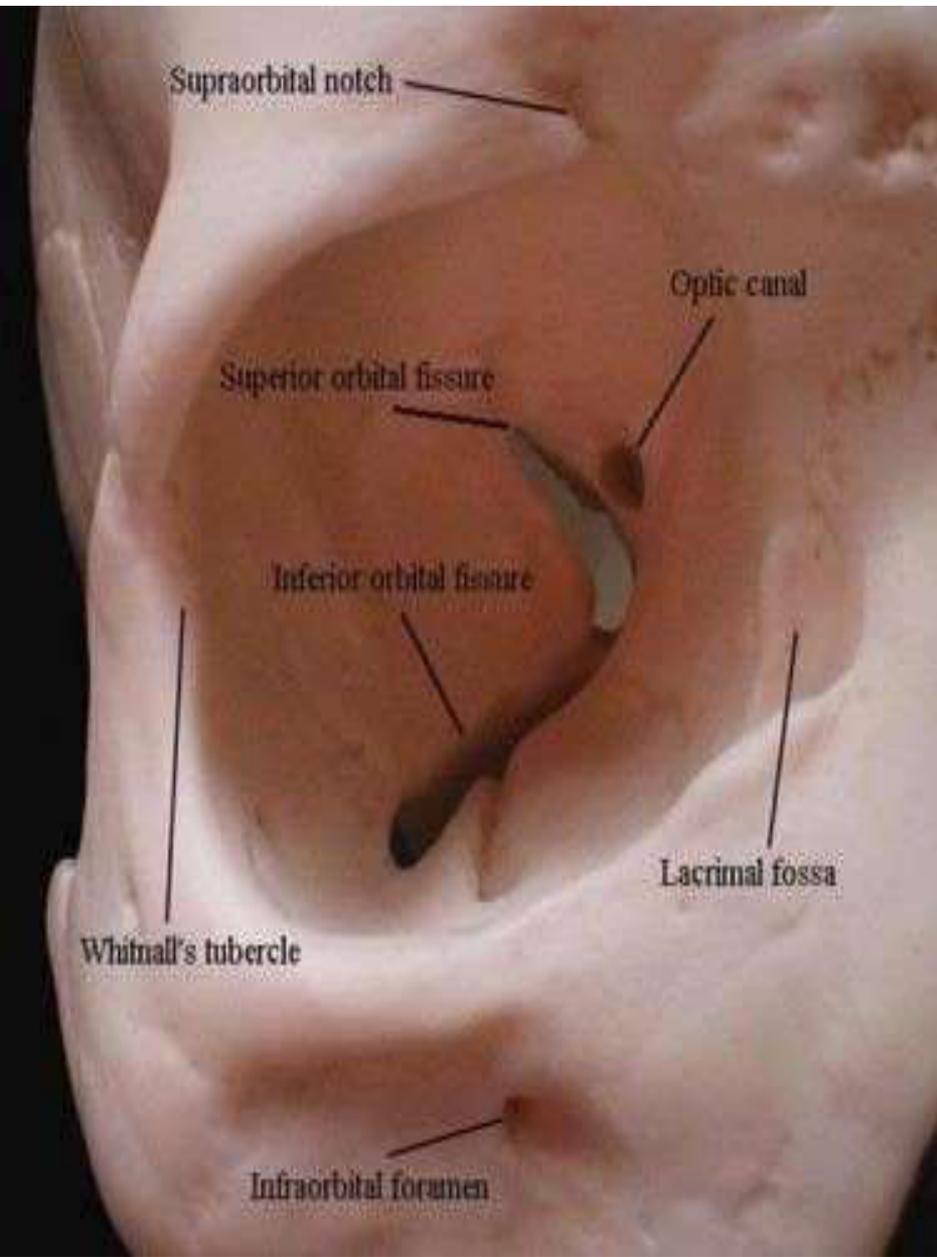
- 1) Continuation of maxillary nerve ( infraorbital n )
- 2) Zygomatic nerve
- 3) Orbital branches of pterygopalatine ganglion
- 4) Infraorbital vessels
- 5) Communications between inferior ophthalmic vein & pterygoid venous plexus.



## Medial wall:

- Separates orbit from **ethmoidal** & **sphenoidal** air sinuses
- **Lacrimal groove** anteriorly → lodges lacrimal sac
- **Anterior & posterior ethmoidal foramina** → lie at junction of medial wall & roof → transmit ant. & post. ethmoidal nerves & vessels





# CONTENTS OF ORBIT

1) Eyeball

2) Fasciae

3) **Muscles** : a) of upper eyelid → Levator palpebrae superioris

b) of eyeball : -Intrinsic → 1-constrictor pupillae

2-dilator pupillae

3-ciliary muscle

-Extrinsic → 4 recti & two

obliques

4) **Nerves**: a) Sensory → 1. Optic nerve / 2. Brs of Ophthalmic {lacrimar, frontal, nasociliary} / 3. Brs of maxillary { zygomatic, infraorbital }

b) Motor → 1. Oculomotor III 2. Trochlear IV 3. Abducent VI

c) Autonomic → 1. Ciliary ganglion / 2. Sympathetic &

parasympathetic n

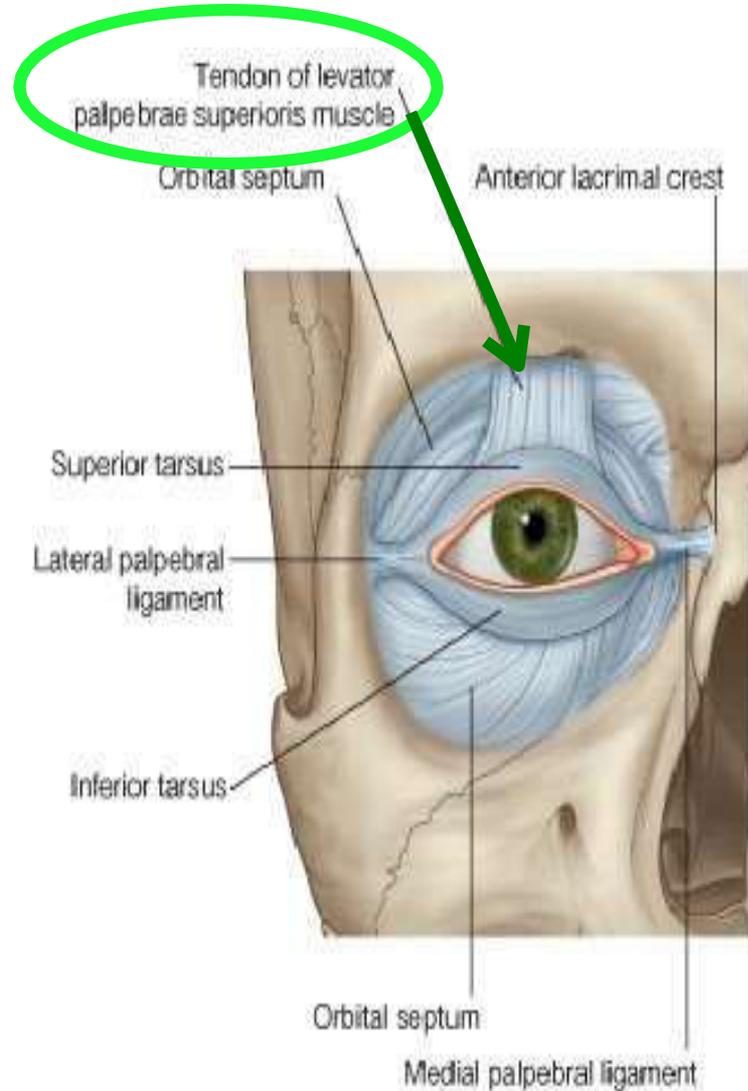
5) **Blood vessels**: ophthalmic artery / superior & inferior ophthalmic veins/ infraorbital vessels

6) **Lacrimal apparatus**: lacrimal gland/ lacrimal sac/ nasolacrimal duct

7) **Orbital fat**

# Levator Palpebrae Superioris Muscle

- ❖ Attaches from roof of orbit just above & ant. to optic canal → superior tarsus & skin of upper eyelid
- ❖ Supplied by oculomotor nerve III
- ❖ Elevates upper eyelid



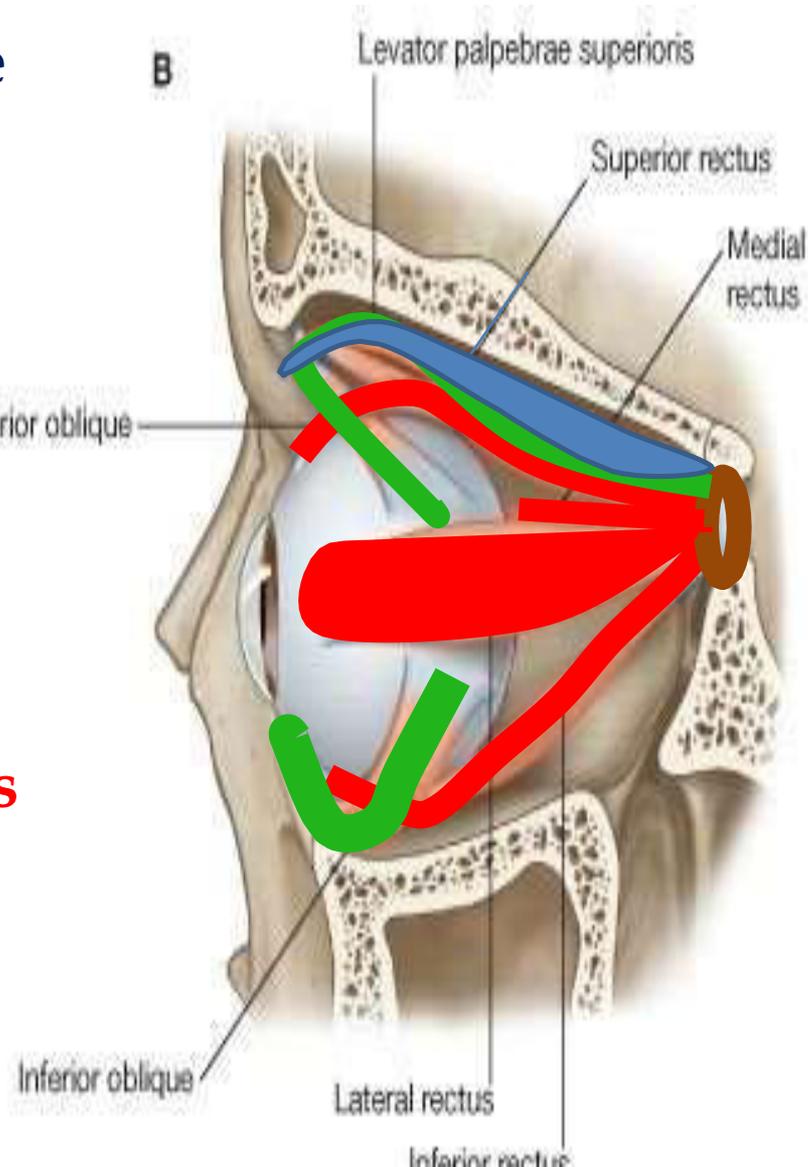
# Extraocular Muscles

1) Levator palpebrae superioris

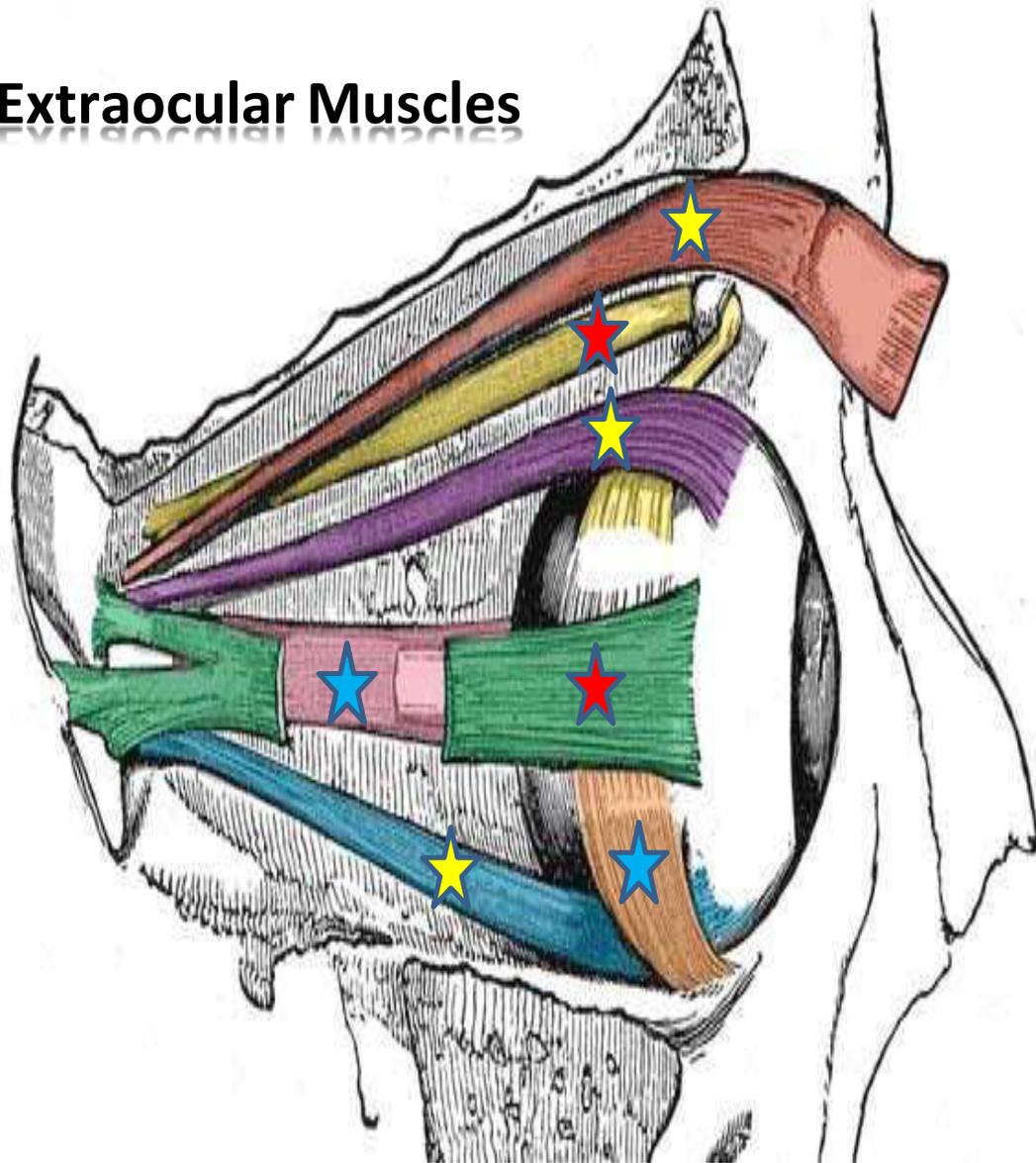
2) **4 Recti muscles**

- superior rectus
- inferior rectus
- medial rectus
- lateral rectus.

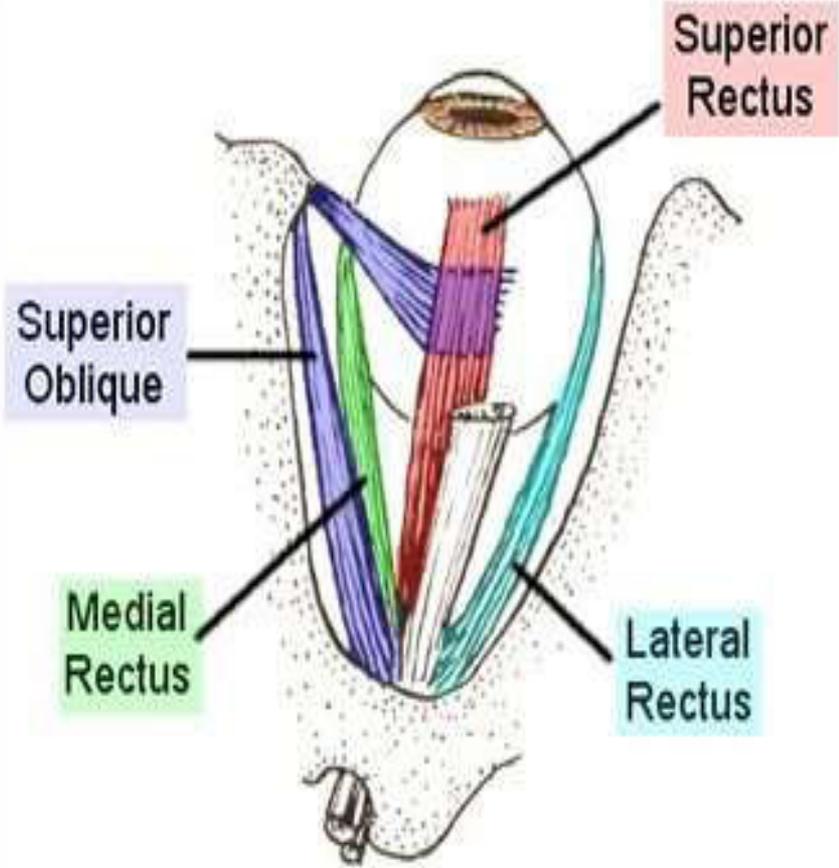
3) **2 oblique muscles**  
superior and inferior oblique



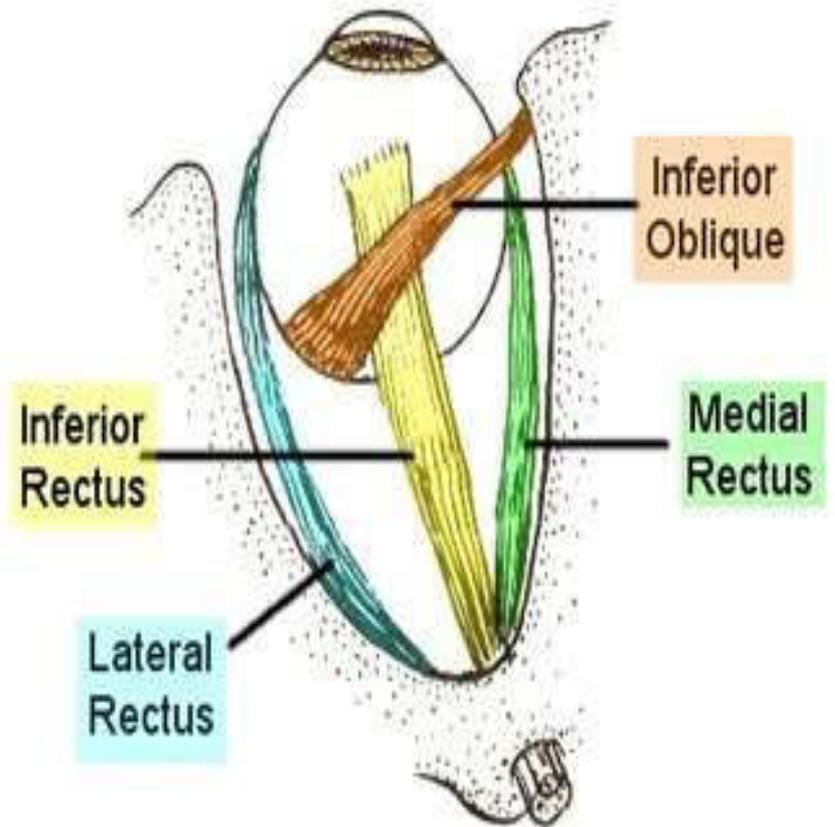
# Extraocular Muscles



- Levator palpebrae superioris
- Superior oblique
- Inferior oblique
- Superior rectus
- Medial rectus
- Lateral rectus
- Inferior rectus

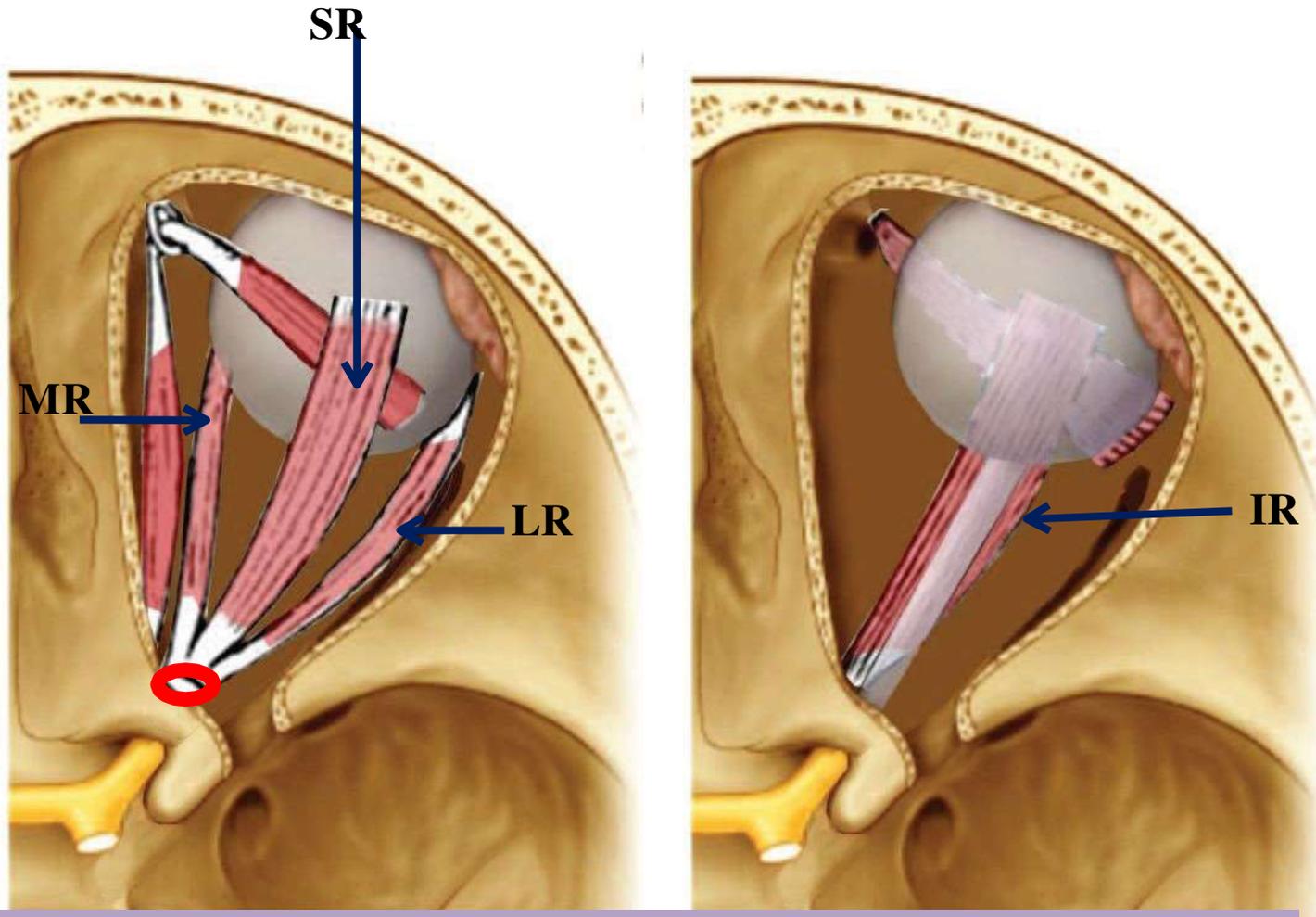


Right Eye  
Superior View



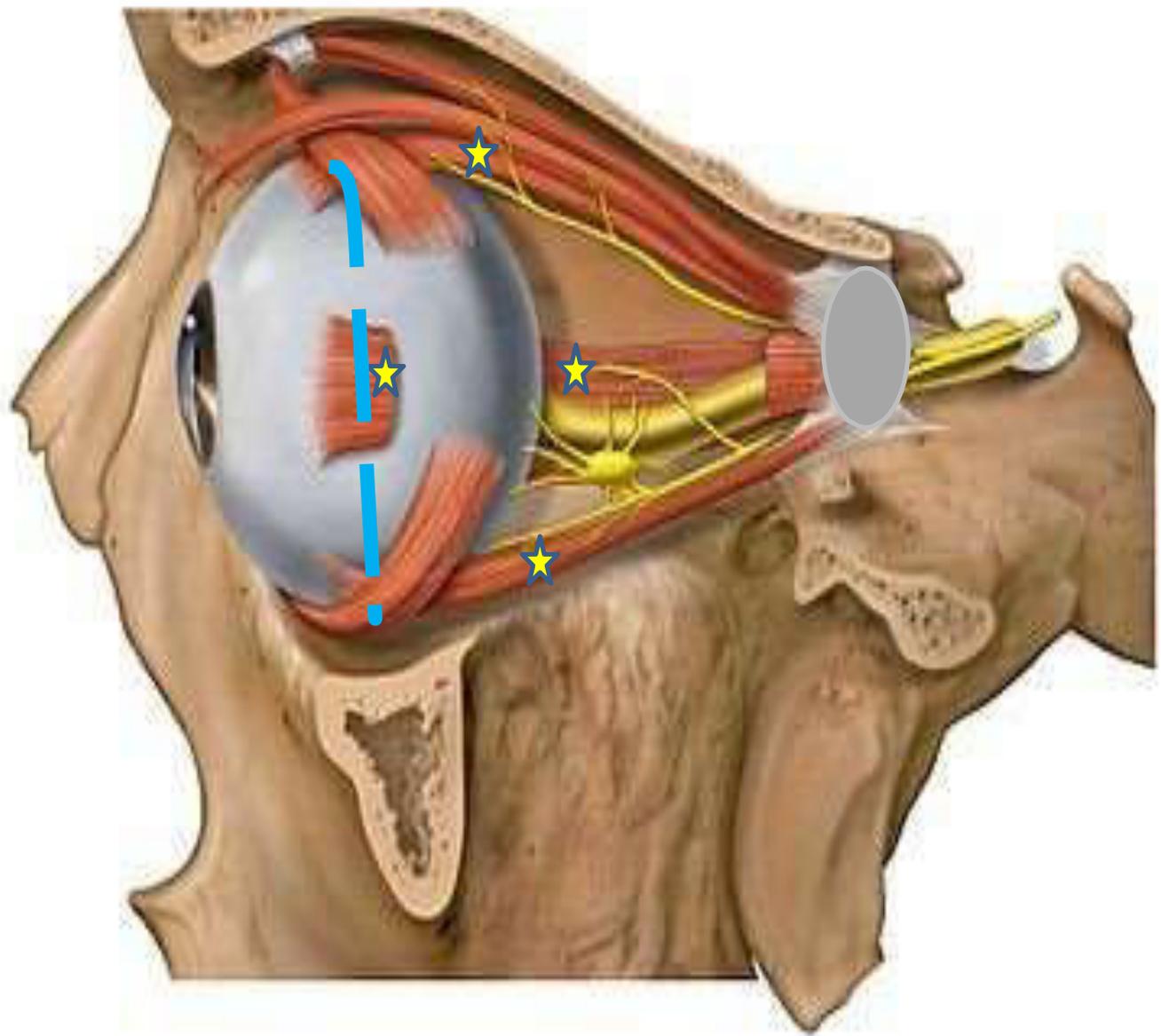
Right Eye  
Inferior View

# The 4 Recti Muscles

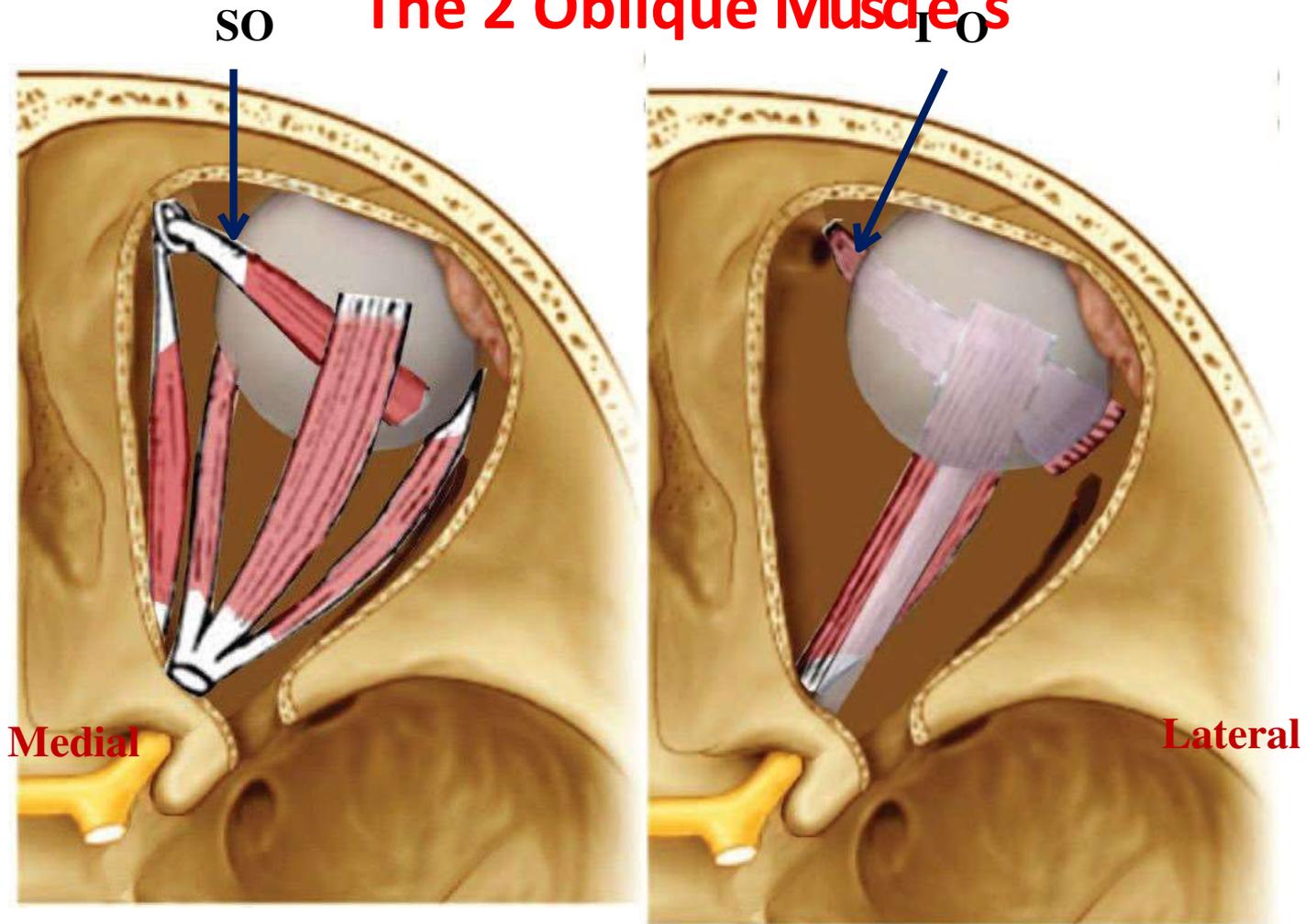


The 4 recti muscles: arise from the **common tendinous ring** and are inserted into sclera in front of the equator of the eyeball

The 4 recti muscles:  
arise from  
the **common  
tendinous  
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and are  
inserted into  
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front of the  
equator of  
the eyeball



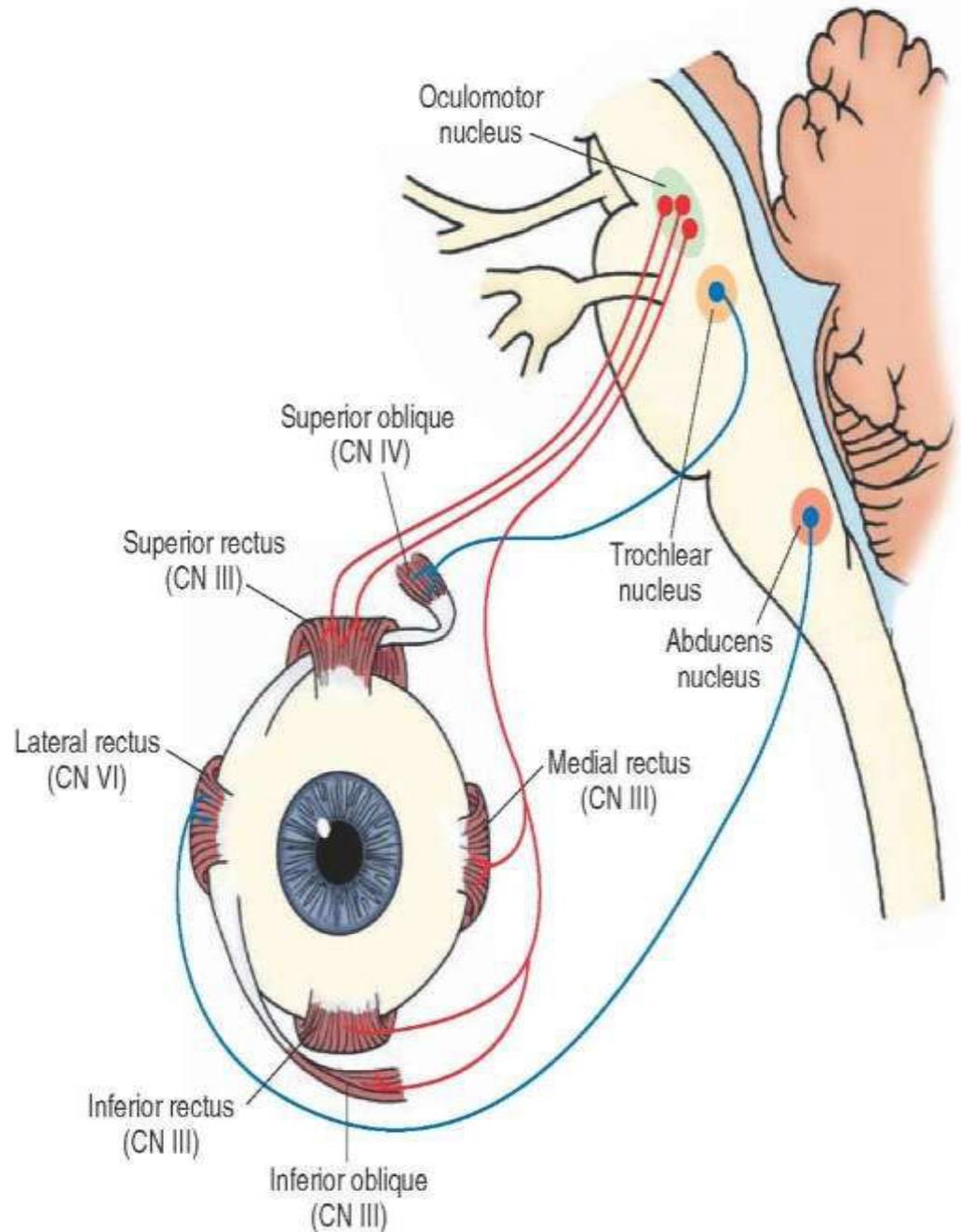
## The 2 Oblique Muscles



**Superior oblique SO arises from the roof of orbit just superomedial to optic canal  
Inferior oblique IO arises from the floor of orbit just lateral to lacrimal groove  
Both are inserted into sclera behind the equator of the eyeball**

Nerve supply  
of the extrinsic  
muscles of the  
eye:

All are  
supplied by  
oculomotor  
(III) except  
SO4  
(Trochlear) and  
LR6 (Abducent)



# VESSELS OF THE ORBIT

**Arterial Supply**



**Ophthalmic Artery**

**Venous Drainage**



**Superior Ophthalmic Vein**  
**Inferior Ophthalmic Vein**

## Branches of ophthalmic artery:

➤ They accompany brs of ophthalmic nerve.

1) **Branches to eyeball** →

a) **Central artery of retina** → **End Artery**  
(supplies optic nerve & retina). **Its occlusion** → **complete blindness**

b) **Posterior ciliary arteries** (2 long & 7 short)

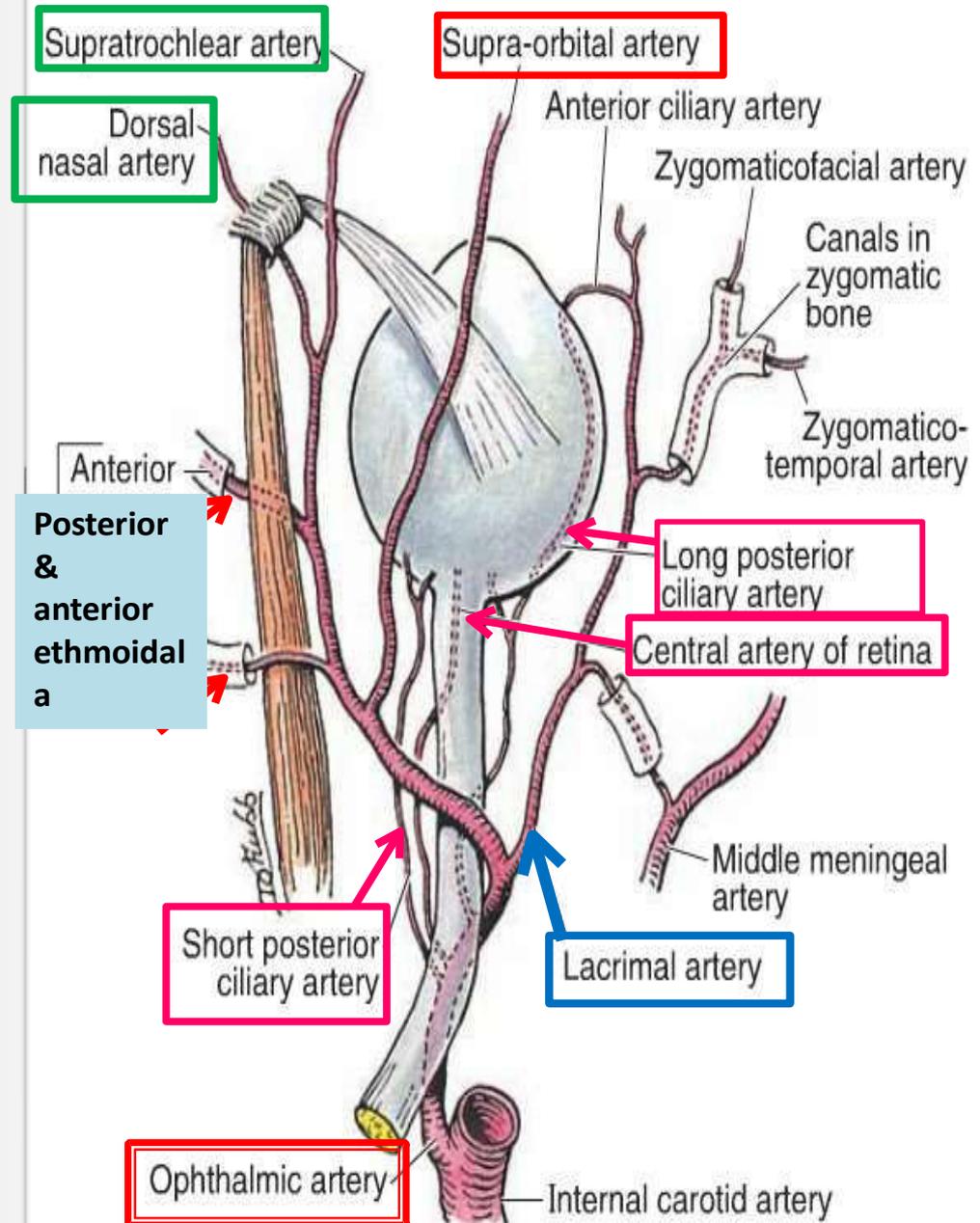
2) **Brs to orbital muscles** → muscular brs

3) **Brs along lateral part of orbit** →

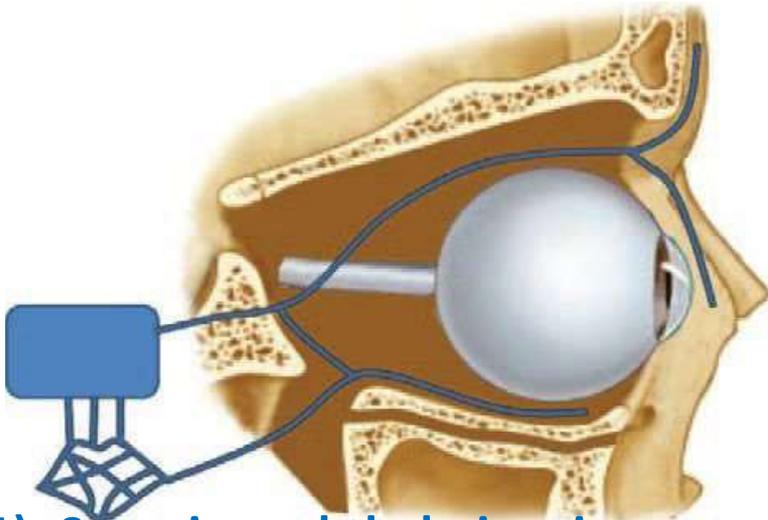
lacrimal artery to lacrimal gland

4) **Brs along medial wall of orbit** → nasal cavity/ external nose/medial part of eyelids/ forehead:

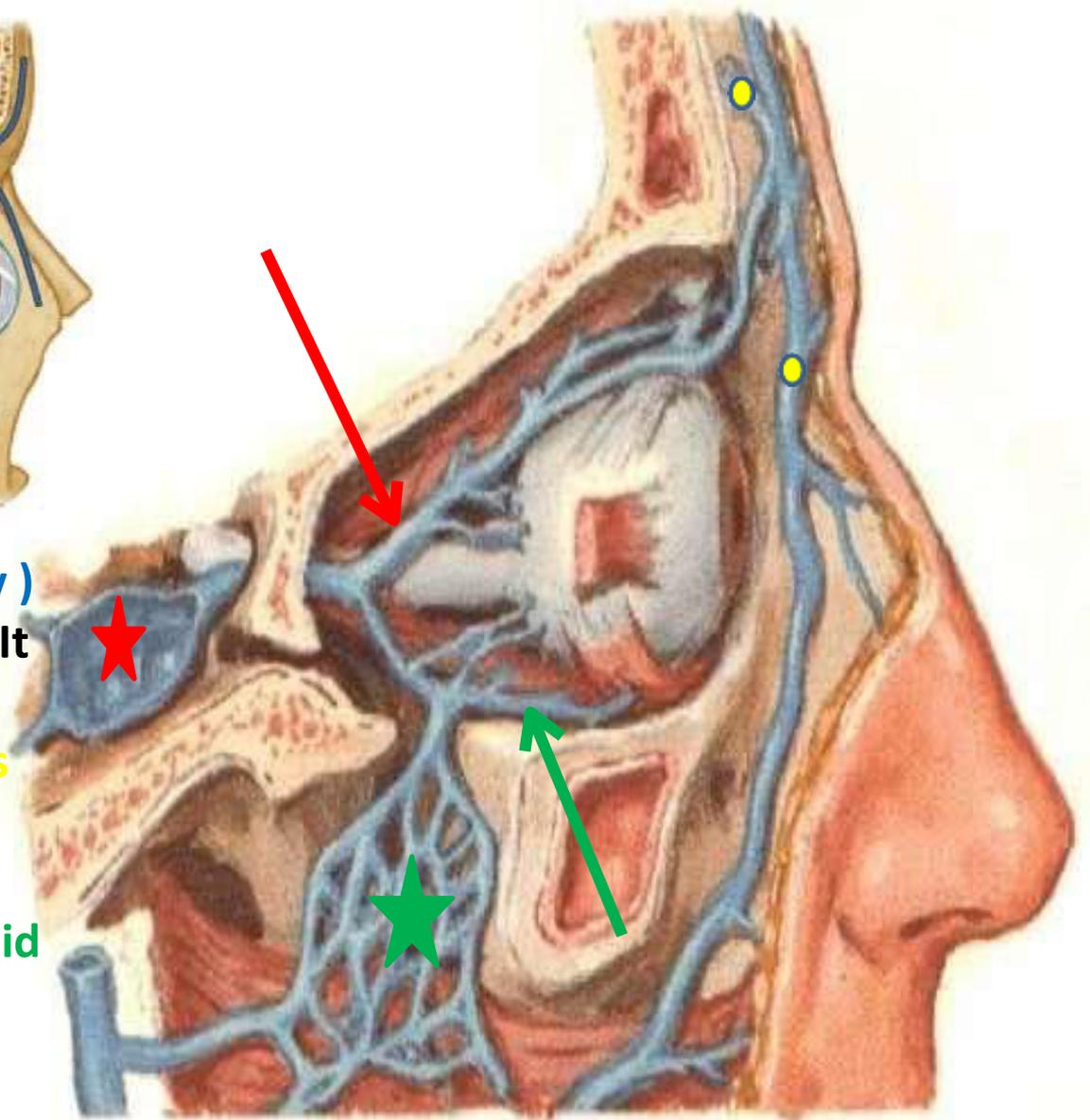
1. Post. ethmoidal
2. Ant. ethmoidal
3. Medial palpebral
4. Supraorbital
5. Supratrochlear
6. Dorsal nasal



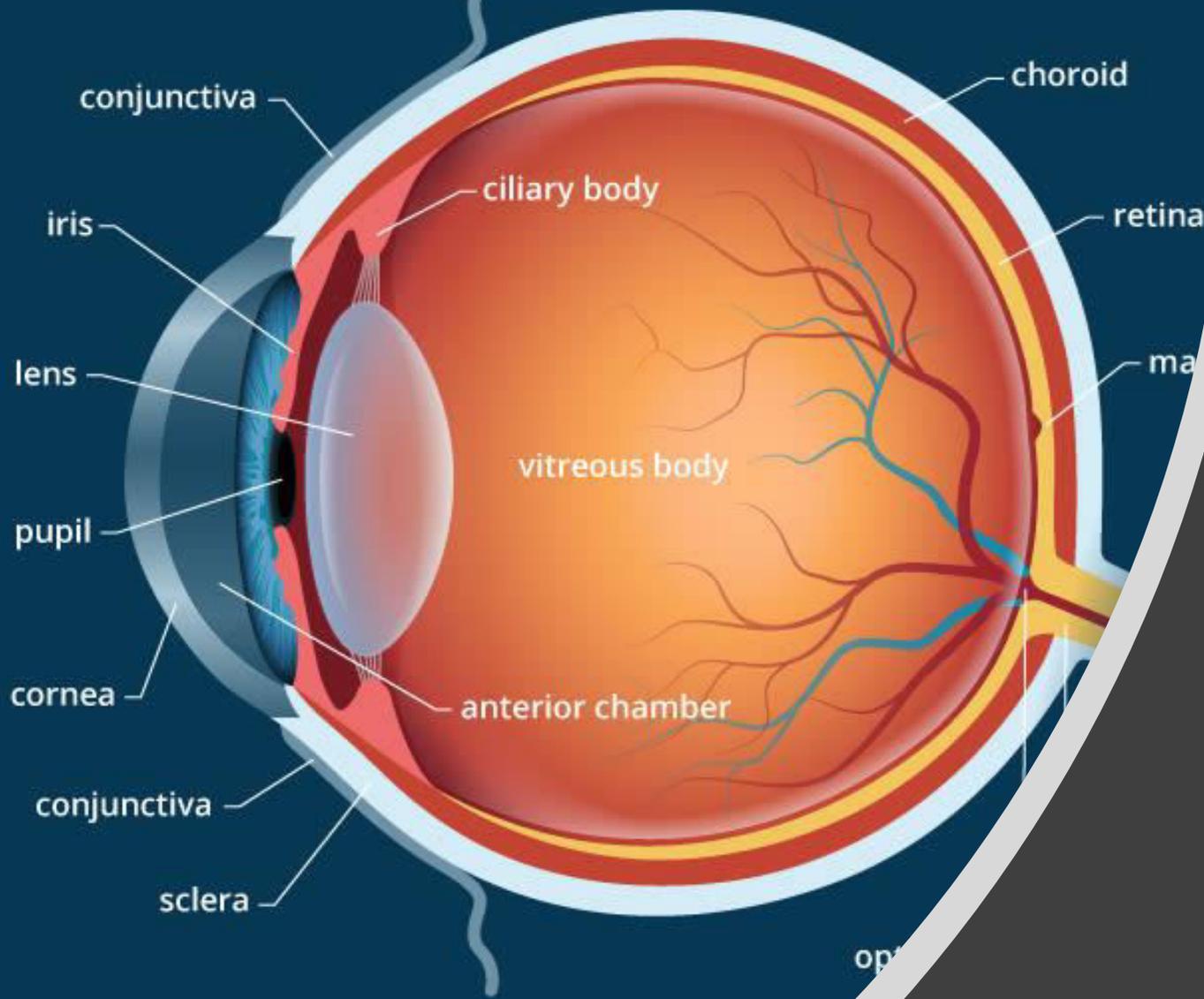
# Ophthalmic Veins



- 1) Superior ophthalmic vein  
( accompanies ophth. artery )  
→ SOF → cavernous sinus. It communicates ant. with supraorbital & angular veins
- 2) Inferior ophthalmic veins  
→ joins sup. ophth. vein & communicates with pterygoid venous plexus through IOF



# Eye Anatomy



Anatomy of  
eye

# 3 LAYERS:

## \* FIBROUS LAYER

SCLERA

CORNEA

## \* VASCULAR LAYER

IRIS

PUPIL

CILIARY BODY

CHOROID

## \* NEURAL LAYER

OUTER PIGMENTED LAYER

INNER NEURAL LAYER

RETINA

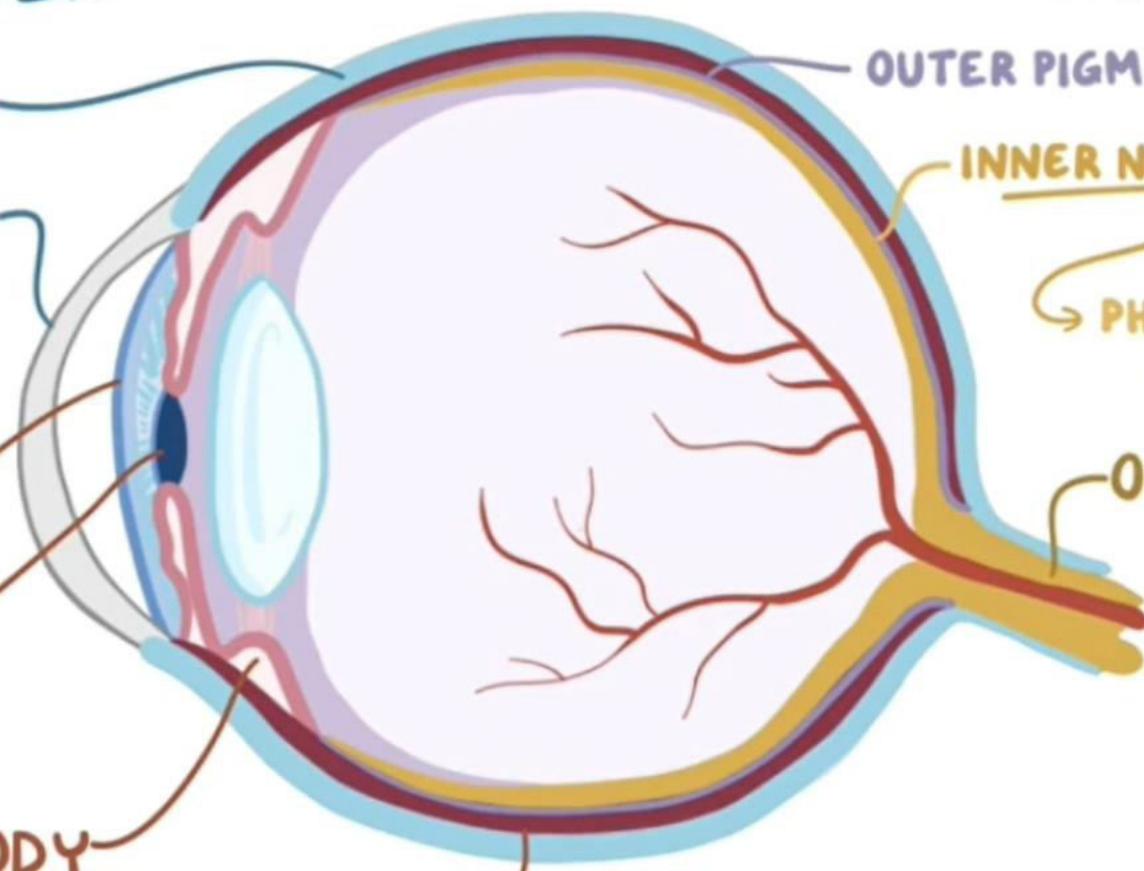
PHOTORECEPTORS

↳ LIGHT → NEURAL SIGNALS

OPTIC NERVE

BRAIN

(VISUAL PROCESSING)

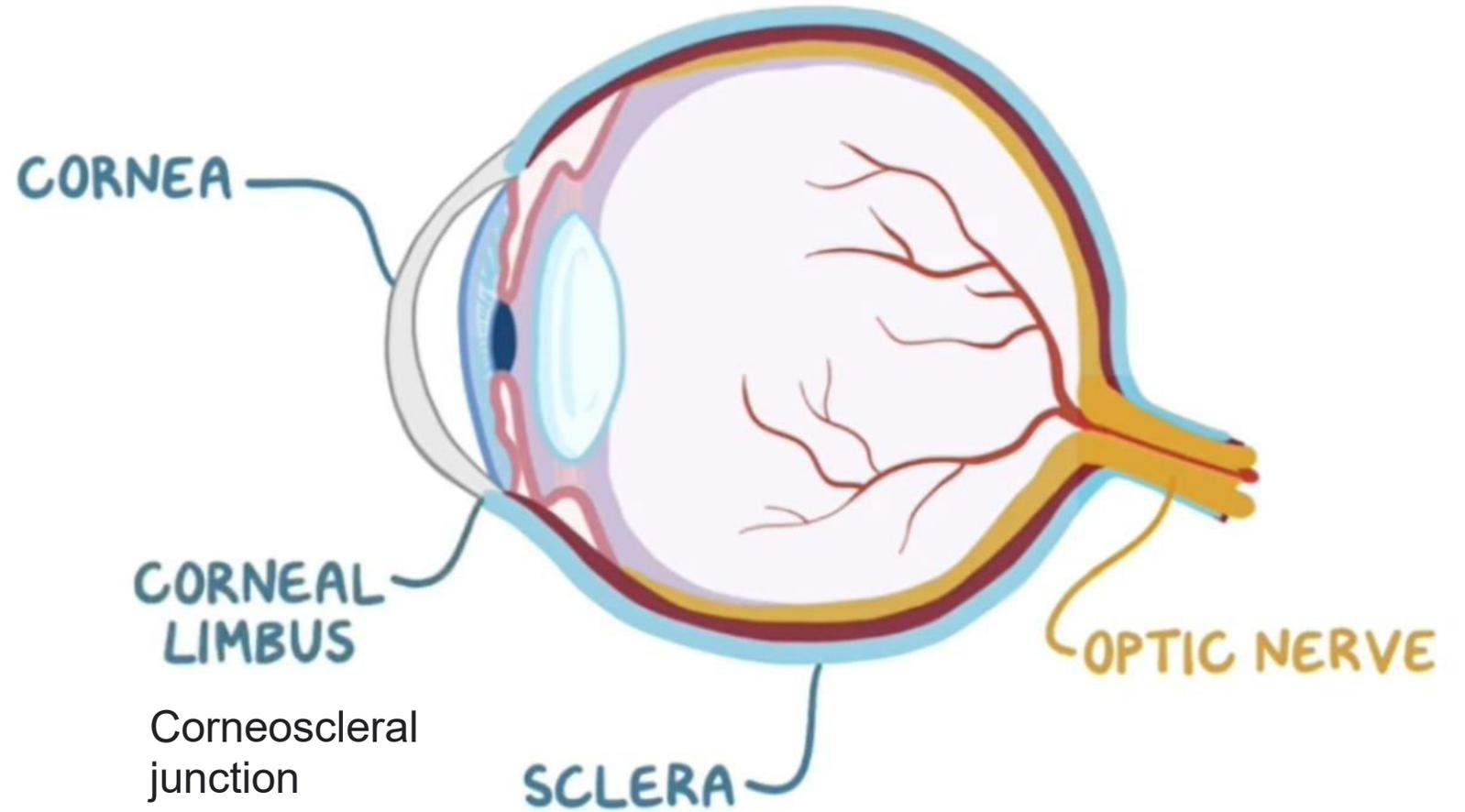


## Cornea

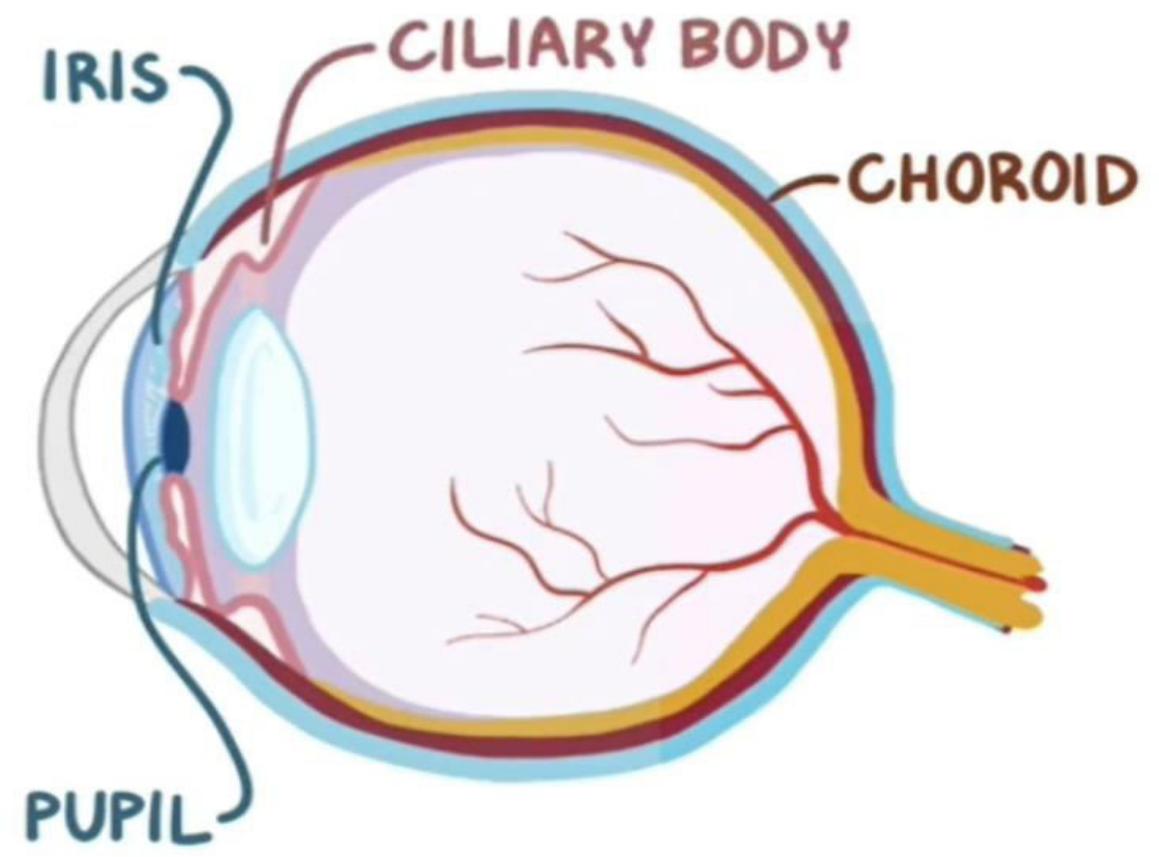
- Transparent allows for the light passage of into eye
- functions as fixed lens.
- very sensitive to pain, touch, pressure and cold-rich -> nerve supply
- Not vascularized à nourished by aqueous humor

## Sclera

- tough white tissue that covers all of eyeball except the cornea
- Supports eyeball
- provides attachment for muscles
- Contain the optic nerve

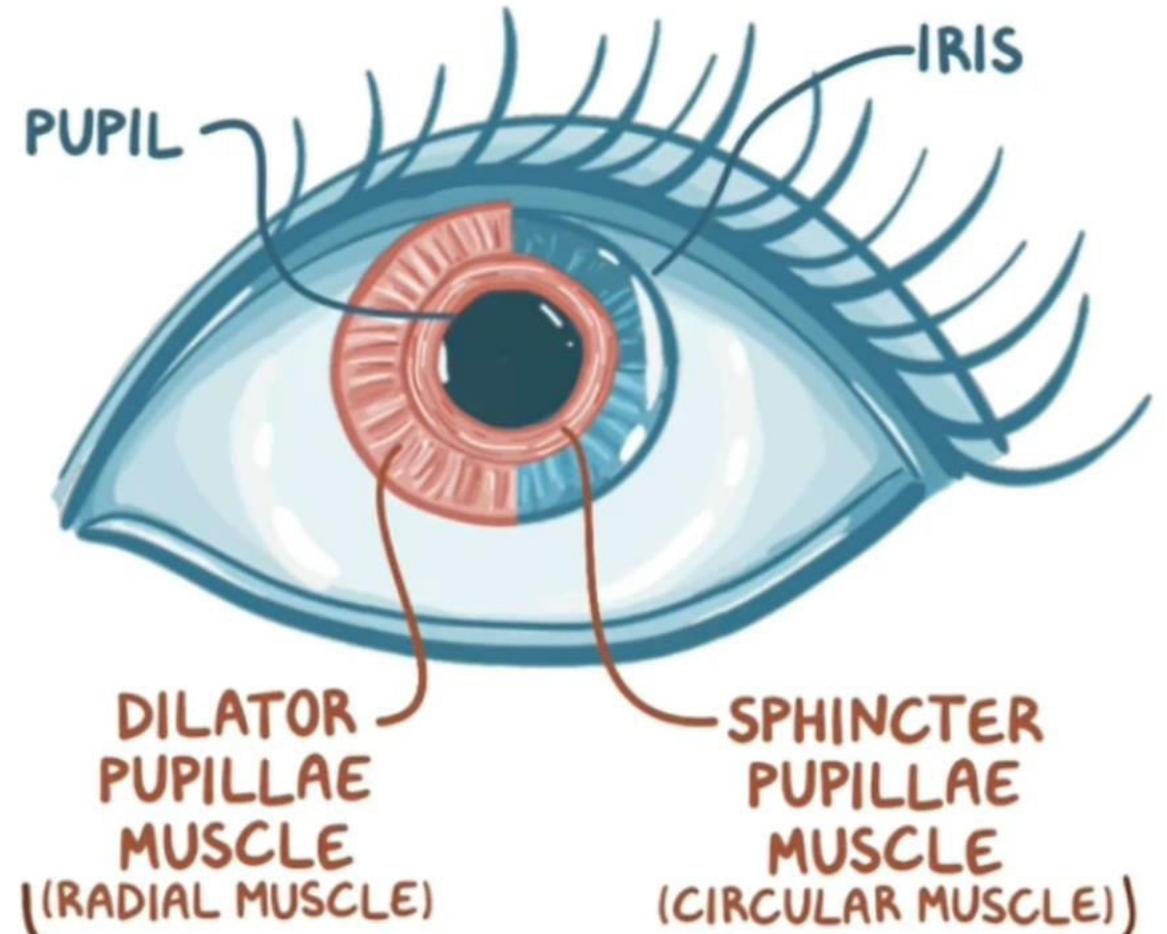


# VASCULAR LAYER (UVEA)



## Iris

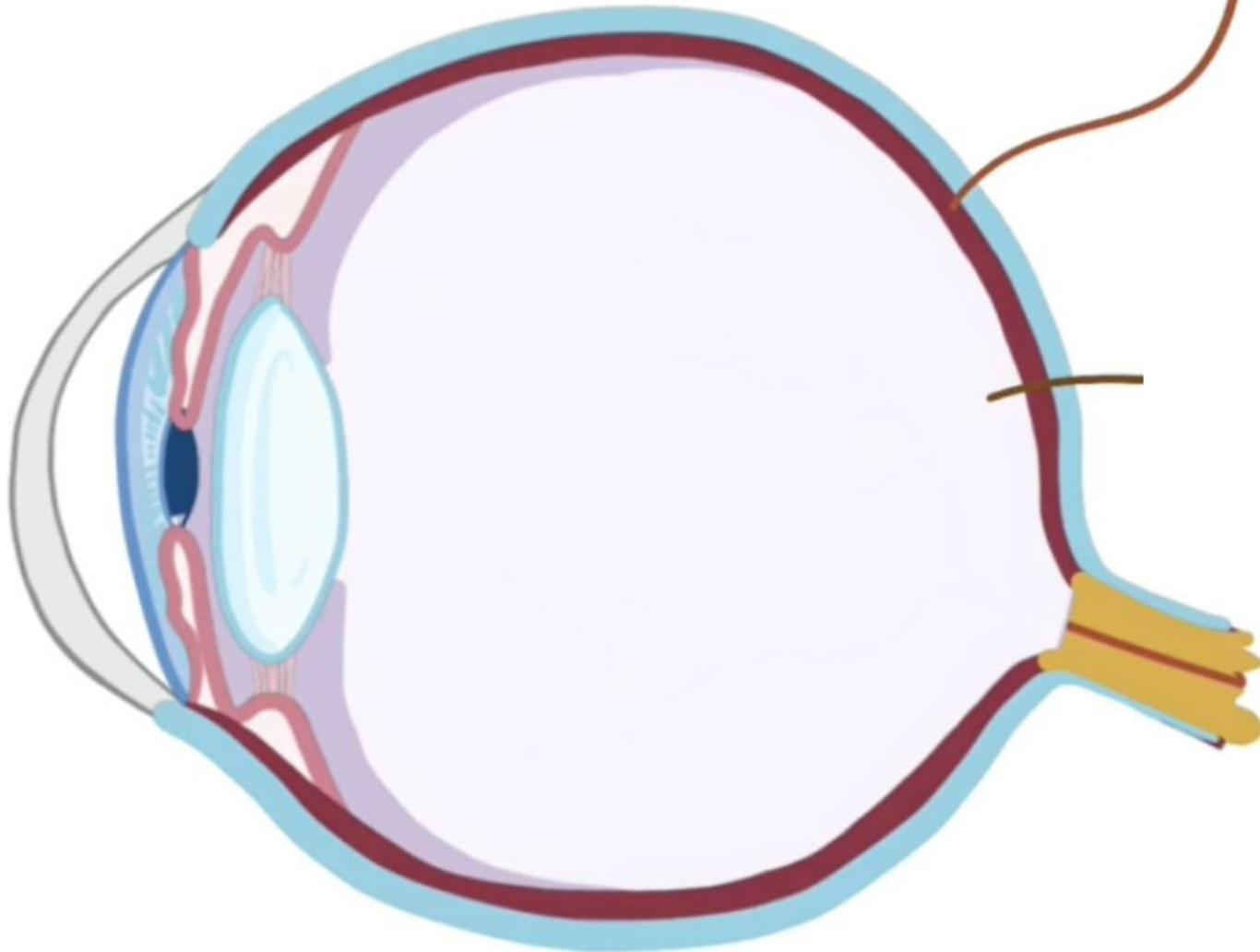
- A pigmented membrane with a central opening, the pupil, that adjusts its size in response to light
- Contains radial and circular [smooth muscle](#) fibers
  - **Iris dilator muscle**
    - Radiating muscle fibers
    - [Sympathetic](#) stimulation → dilation → [mydriasis](#)
  - **Iris sphincter muscle**
    - Circular muscle fibers
    - [Parasympathetic](#) stimulation → contraction → [miosis](#)
- Iris separates the space between the cornea and lens into anterior & posterior chambers-communicate with each other through the pupil



# VASCULAR LAYER

## CHOROID

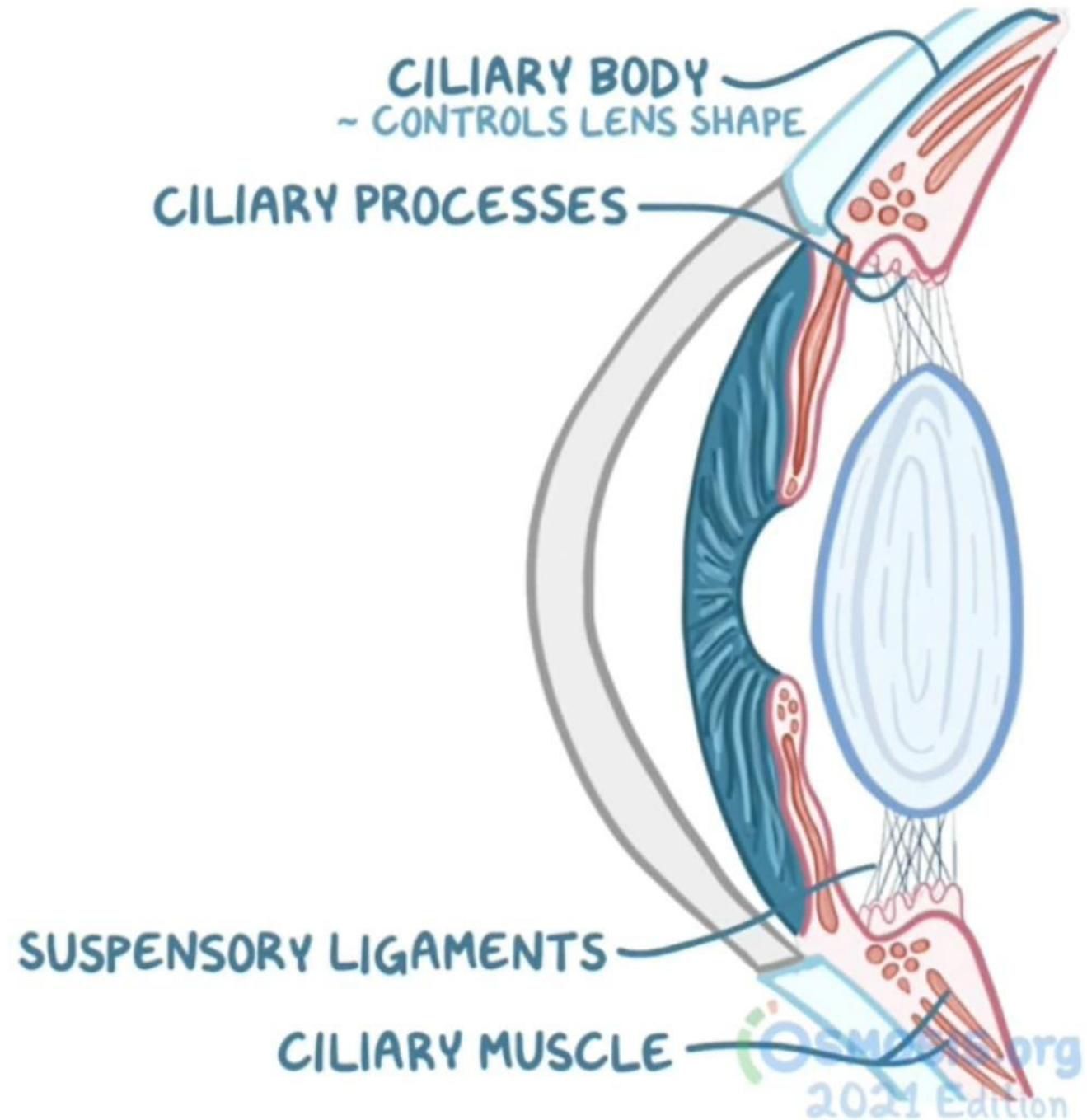
- \* CONTAINS BLOOD VESSELS
- \* PROVIDES NUTRIENTS



## Ciliary body

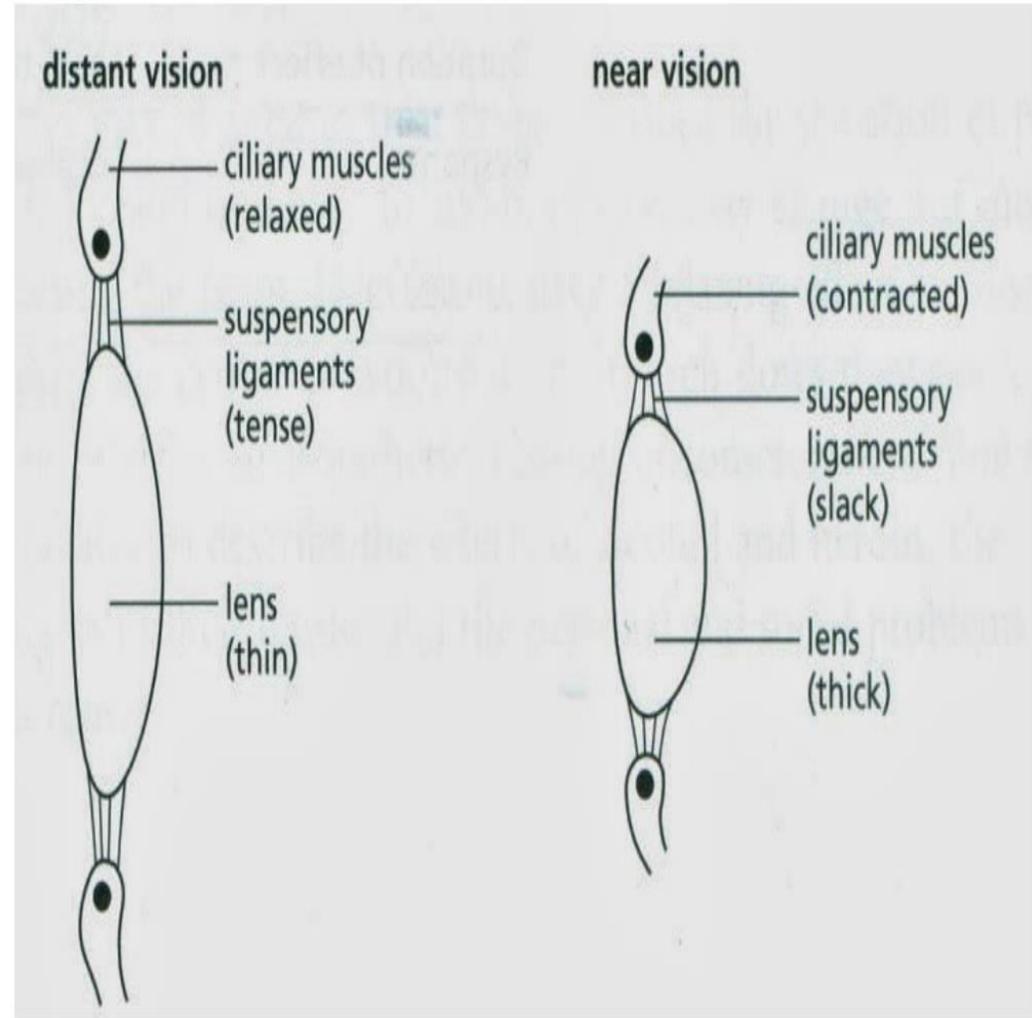
- Located [posterior](#) to the [iris](#)
- Composed of the ciliary ring, ciliary [epithelium](#) with ciliary processes, and [ciliary muscle](#)
- Ciliary [epithelium](#)
  - Outer layer: pigmented
  - Inner layer: not pigmented
  - Ciliary processes: fibers that encircle the border of the [lens](#) and form suspensory [ligaments](#)
- **Ciliary muscle**
  - Composed of [smooth muscle cells](#)
  - Innervated by [parasympathetic](#) fibers derived from the [oculomotor nerve](#) ([CN III](#))

Responsible for accommodation



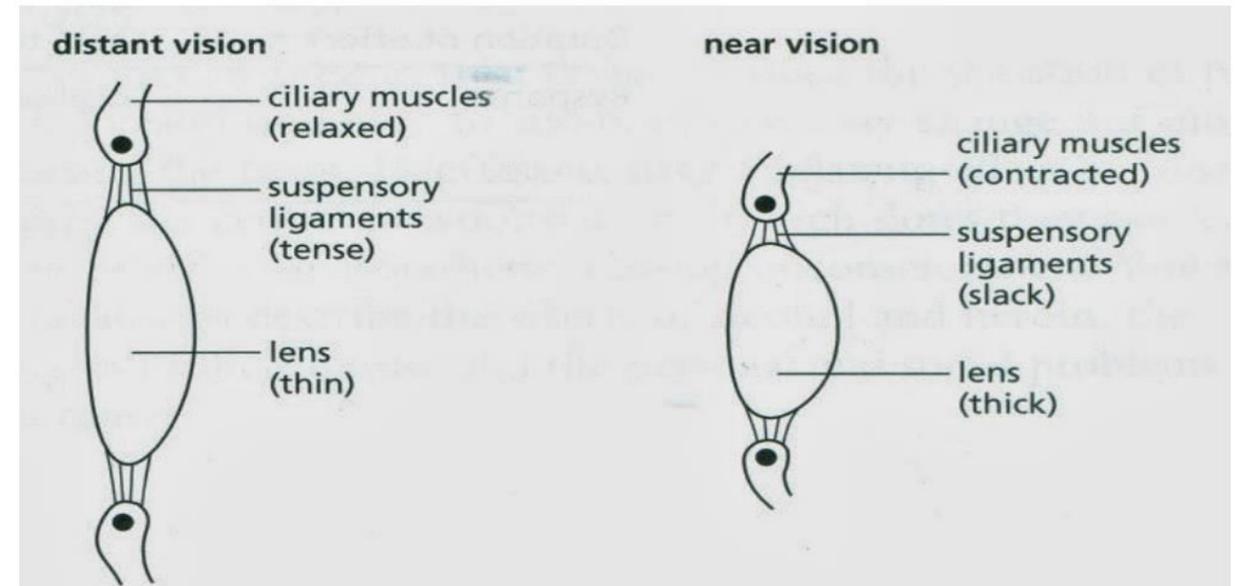
## Lens

- Biconvex and elastic
- Avascular (nutrition mainly from the aqueous humor)
- refracts light rays & helps to focus image of objects on retina.
- supported by the suspensory ligaments
- Suspensory ligaments from the lens are attached to the ciliary body.



## Mechanism of Accommodation

- Eye lens is elastic.
- contraction of the ciliary muscle → relaxes suspensory ligaments the lens capsule more convex
- When the eyes fixate on a near object, the eyes must converge → cause a mild degree of pupillary constriction
- contraction of the ciliary muscle (radial fibers) attached to suspensory ligament pulls fibers of the ligament forward and causes the lens to become very convex which increases the refractive power of the lens.
- under control of the parasympathetic nervous system (III, brain stem). [autonomic nervous system.](#)



# Neural layer

## Retina

- Contains light-receptive cells (rods and cones)
- Converts light to electrical signals

## Macula lutea

- An oval-shaped yellow spot on the [lateral](#) side of the [optic disc](#), near the center of the [posterior](#) wall of the [retina](#)
- Lacks [blood vessels](#)

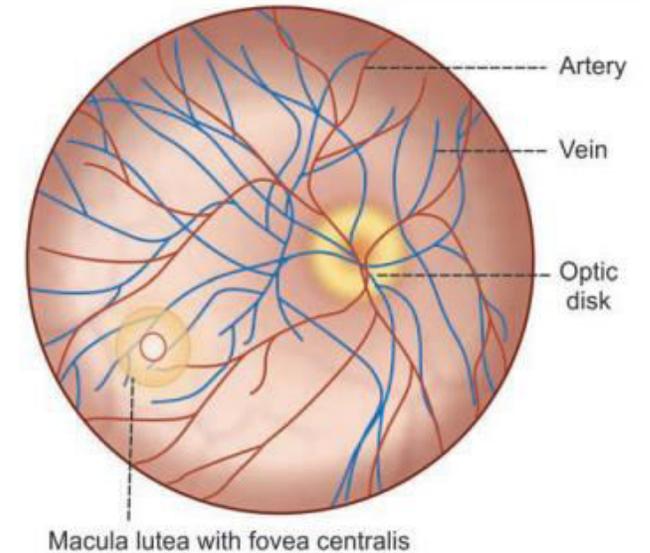
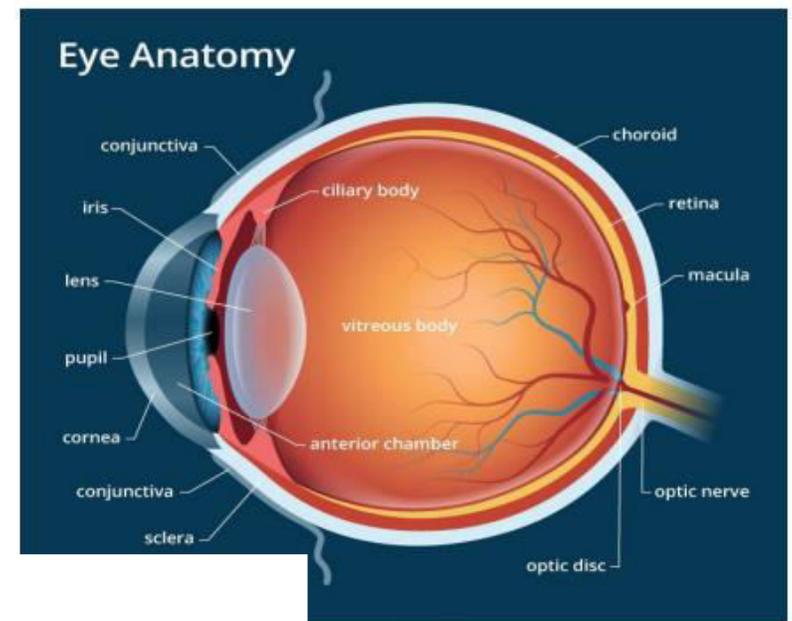
## Fovea centralis

- depression in center of macula lutea.
- 0.5 mm in diameter
- Here, all the layers of retina are very thin.
- Fovea is the region of most acute vision because it contains only cones.

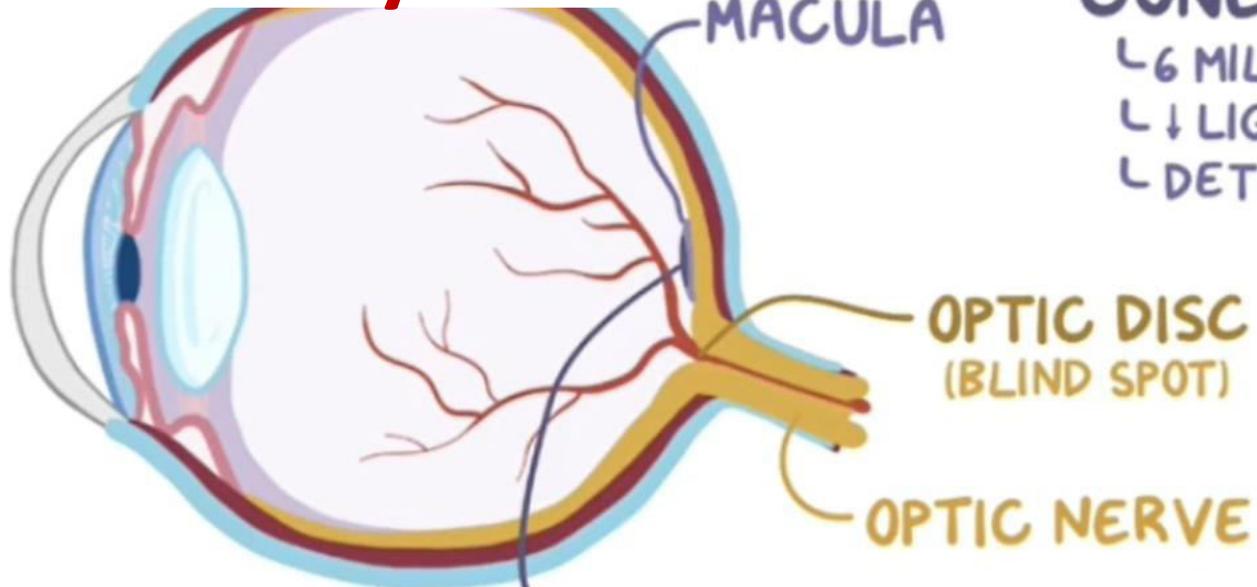
## Blind spot (Optic disk/Papilla)

- near the center of the posterior wall of eyeball
- formed by convergence of axons from ganglion cells, while forming the optic nerve.

- Located medially to the [fovea centralis](#)
- Insensitive to light due to lack of photoreceptors (physiologic [scotoma](#), i.e. [blind spot](#))
- Contains the **optic cup**
  - Central, cup-like depression in the [optic disc](#)
  - Site of transverse of retinal vessels



# Neural layer



**FOVEA**  
\* ↑ CONE CONCENTRATION  
\* ↑ VISUAL ACUITY



**RODS**  
↳ 120 MILLION / EYE  
↳ LIGHT SENSITIVE  
↳ BLACK & WHITE VISION

## CONES

↳ 6 MILLION / EYE  
↳ ↓ LIGHT SENSITIVE  
↳ DETECT RED, GREEN, OR BLUE LIGHT



**ACTIVATED**

**ACTION POTENTIAL**

↓  
**DEPOLARIZATION**

↓  
**VISUAL INFO**

↓  
**BRAIN**

FORMS  
OPTIC  
NERVE

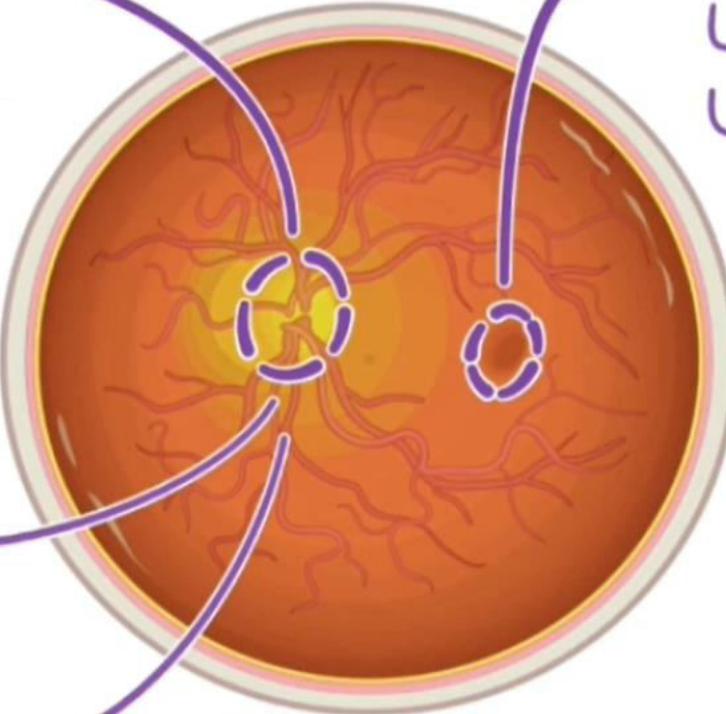
**OPTIC DISC**

**MACULA**

**ARTERIOLES**

↳ **NARROWER**

**VENULES**



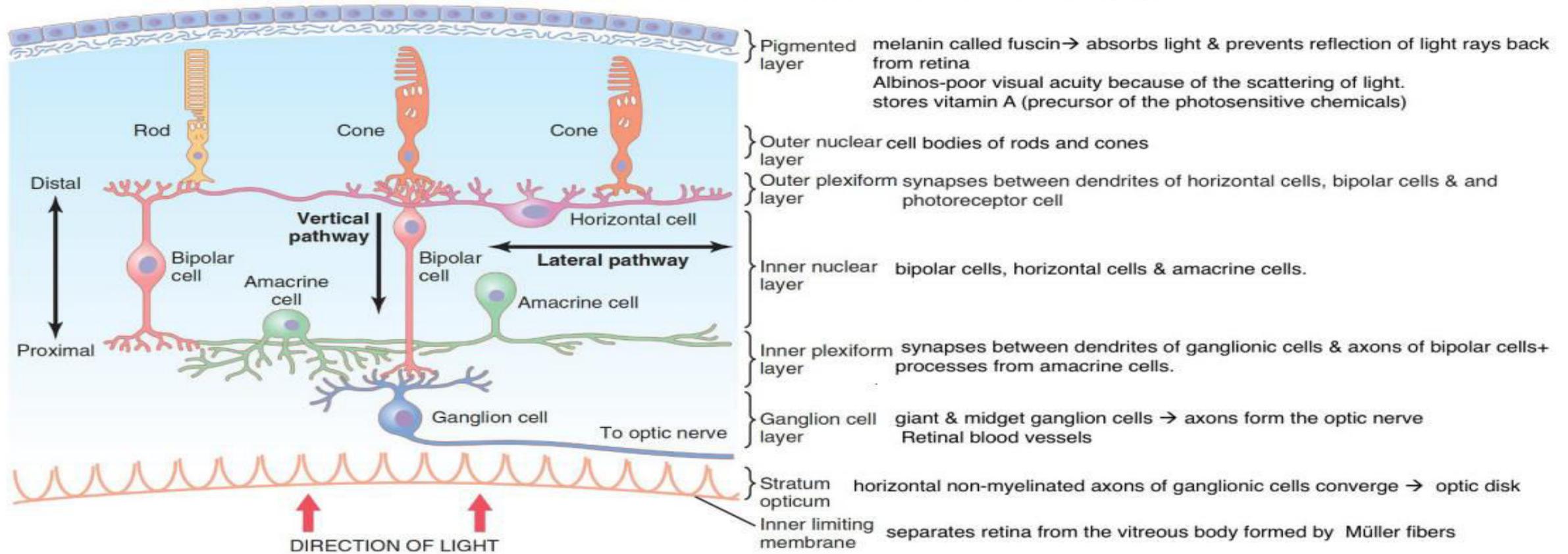
## MICROSCOPIC STRUCTURE OF RETINA

It has 10 layers:

1. Retinal pigment epithelium
2. Layer of rods and cones
3. External limiting membrane
4. Outer nuclear layer
5. Outer molecular (plexiform) layer
6. Inner nuclear layer
7. Inner molecular (plexiform) layer
8. Ganglion cell layer
9. Nerve fibre layer
10. Internal limiting membrane

# Layers of retina

outer layers of the retina → nutrition from choroid → retinal detachment → damage



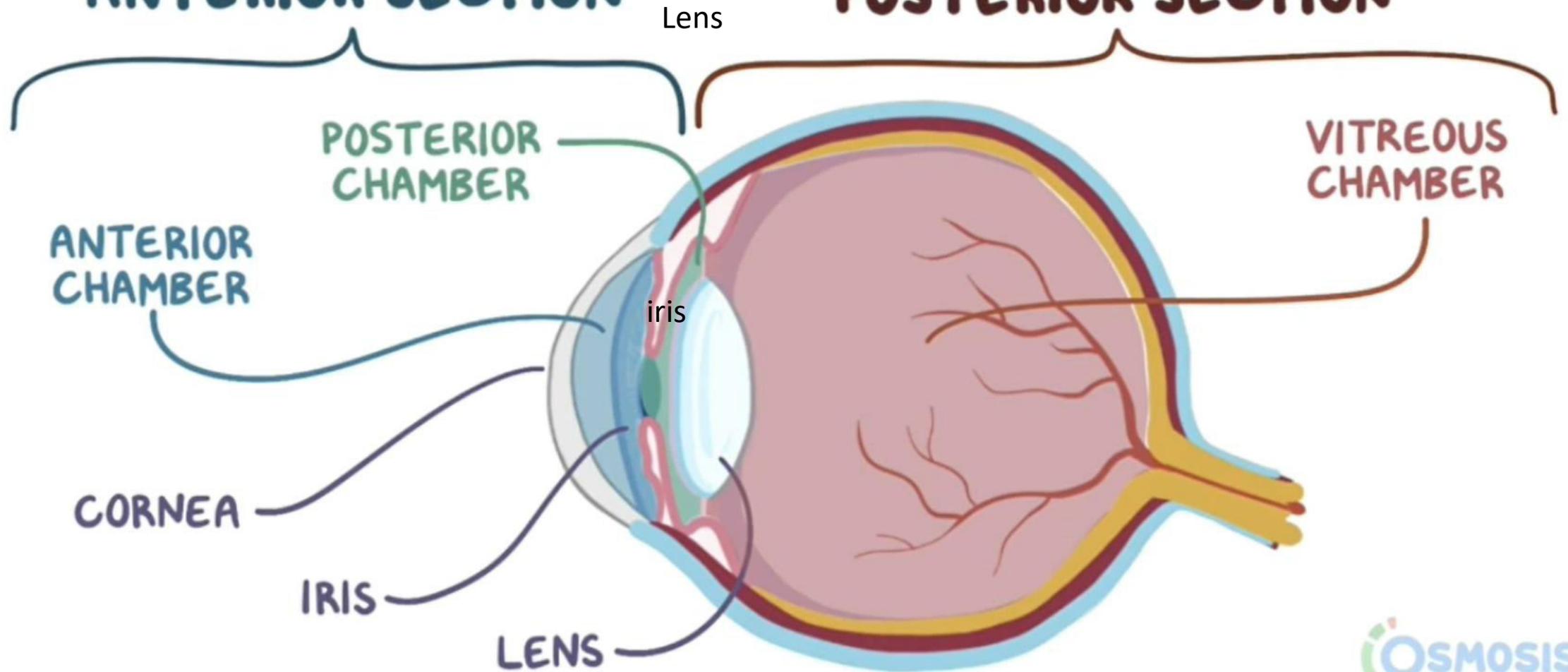
Inner layers of the retina → nutrition from central retinal artery

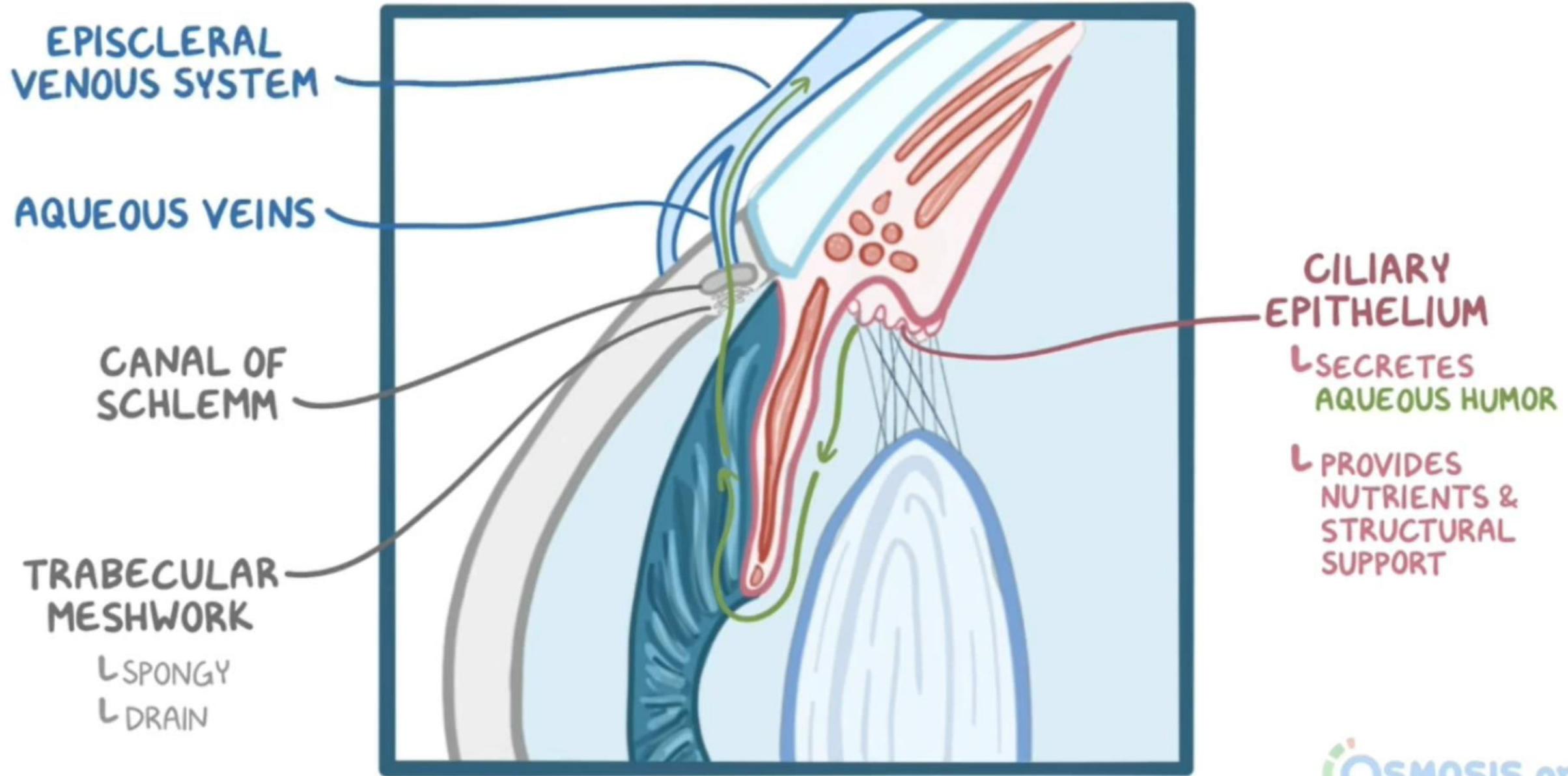
FILLED WITH  
AQUEOUS HUMOR

## ANTERIOR SECTION

FILLED WITH  
VITREOUS HUMOR

## POSTERIOR SECTION





EPISCLERAL  
VENOUS SYSTEM

AQUEOUS VEINS

CANAL OF  
SCHLEMM

TRABECULAR  
MESHWORK

- ↳ SPONGY
- ↳ DRAIN

CILIARY  
EPITHELIUM

- ↳ SECRETES  
AQUEOUS HUMOR
- ↳ PROVIDES  
NUTRIENTS &  
STRUCTURAL  
SUPPORT

# Formation and Flow of Fluid in the Eye

•Aqueous humor: watery fluid synthesized from blood plasma by the [ciliary body](#), maintains [intraocular pressure](#) and provides [nutrients](#) to the [lens](#) and [cornea](#)

## •Vitreous humor

- Transparent gelatinous substance that fills the eyeball [posterior](#) to the [lens](#)
- Provides support to the [lens](#) and holds the [retina](#) in place

