Gross Anatomy of Head and Neck in Dentistry
DTIP 203 & DTAN 211

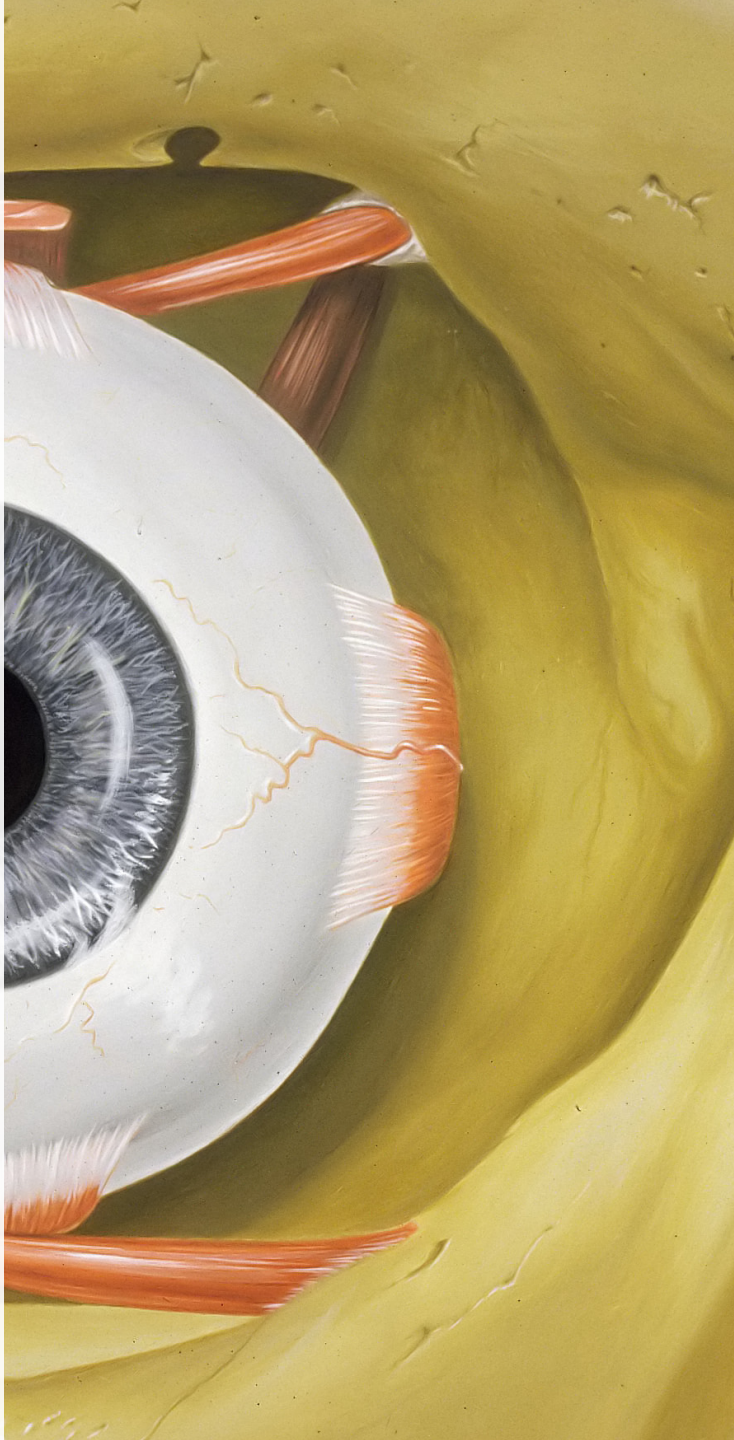
ORGANS OF VISION



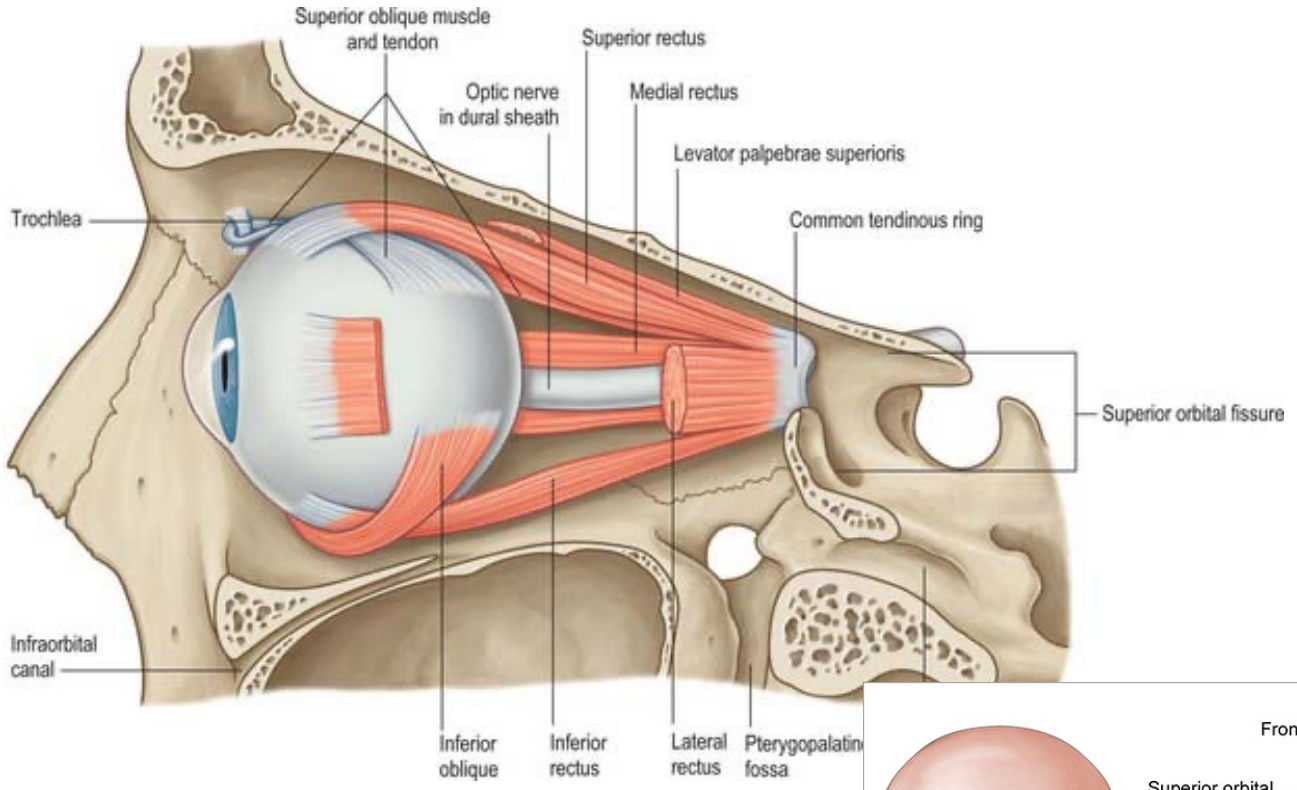
Assist. Prof . Dr. Jirattikarn Kaewmuangmoon
Department of Anatomy, Faculty of Dentistry, Mahidol University

OUTLINES

- Wall of orbit
- Opening of orbit
- Coat of eyeball
- Muscle of orbit
- Nerve of orbit
- Blood supply of orbit
- Eyelid
- Lacrimal apparatus

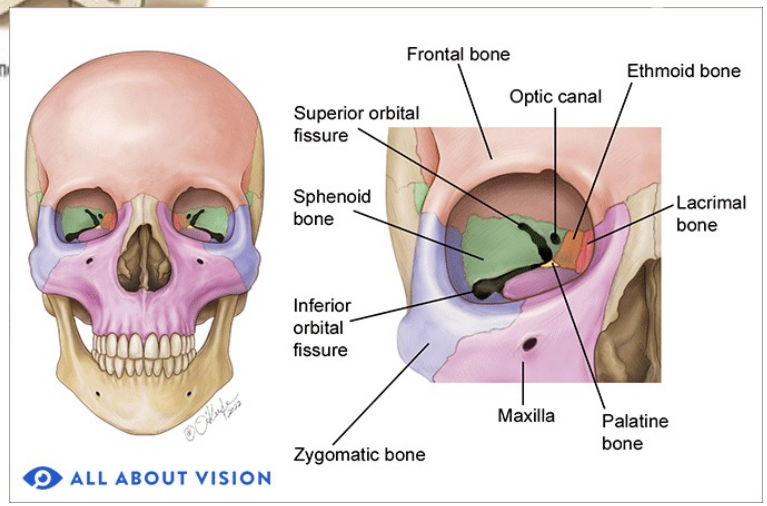


ORBIT (ORBITAL CAVITY)

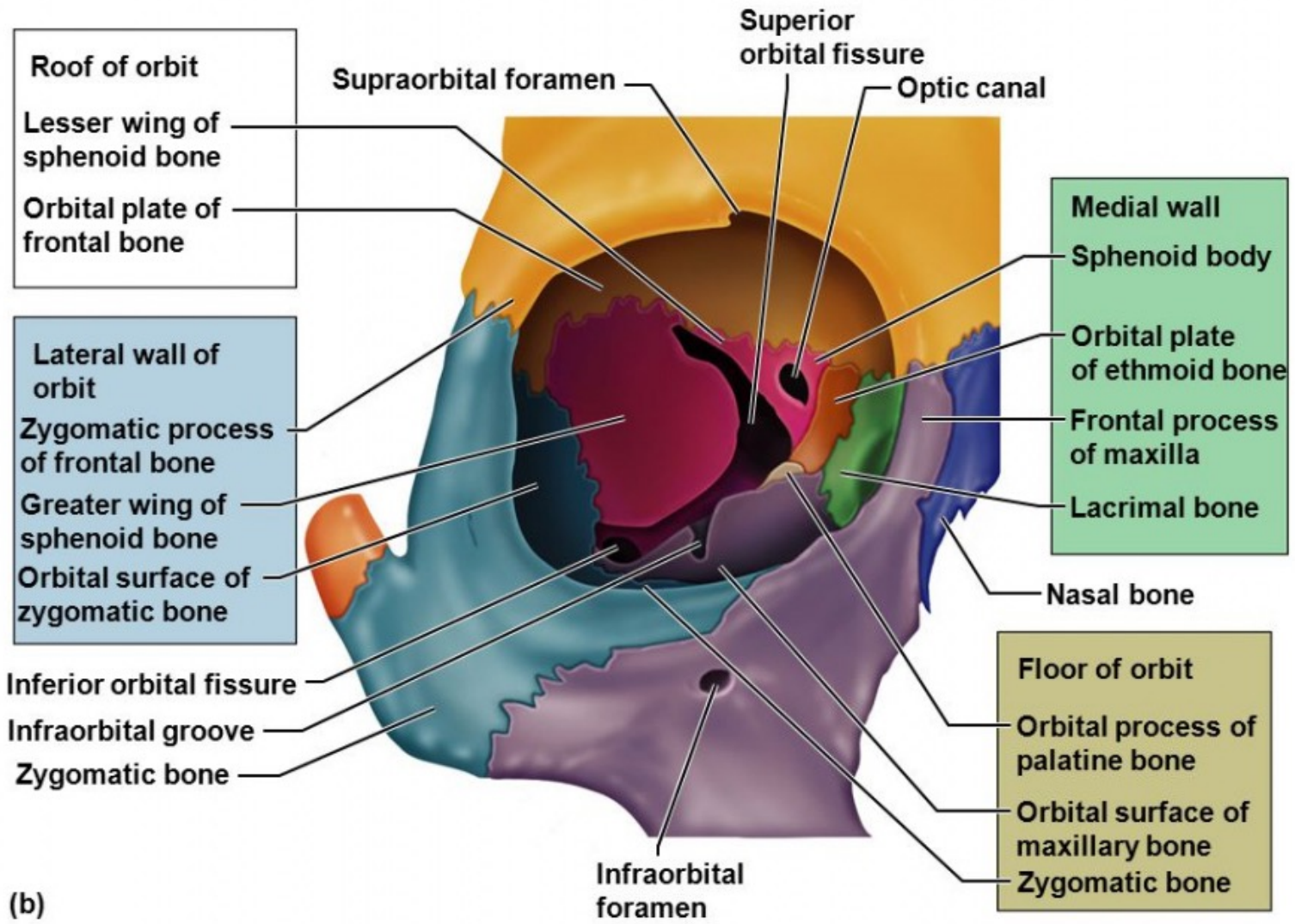


Orbit ➡ pyramidal bony cavity

- Apex: at optic canal
- Base: **4** orbital margins
- **4** walls of orbit



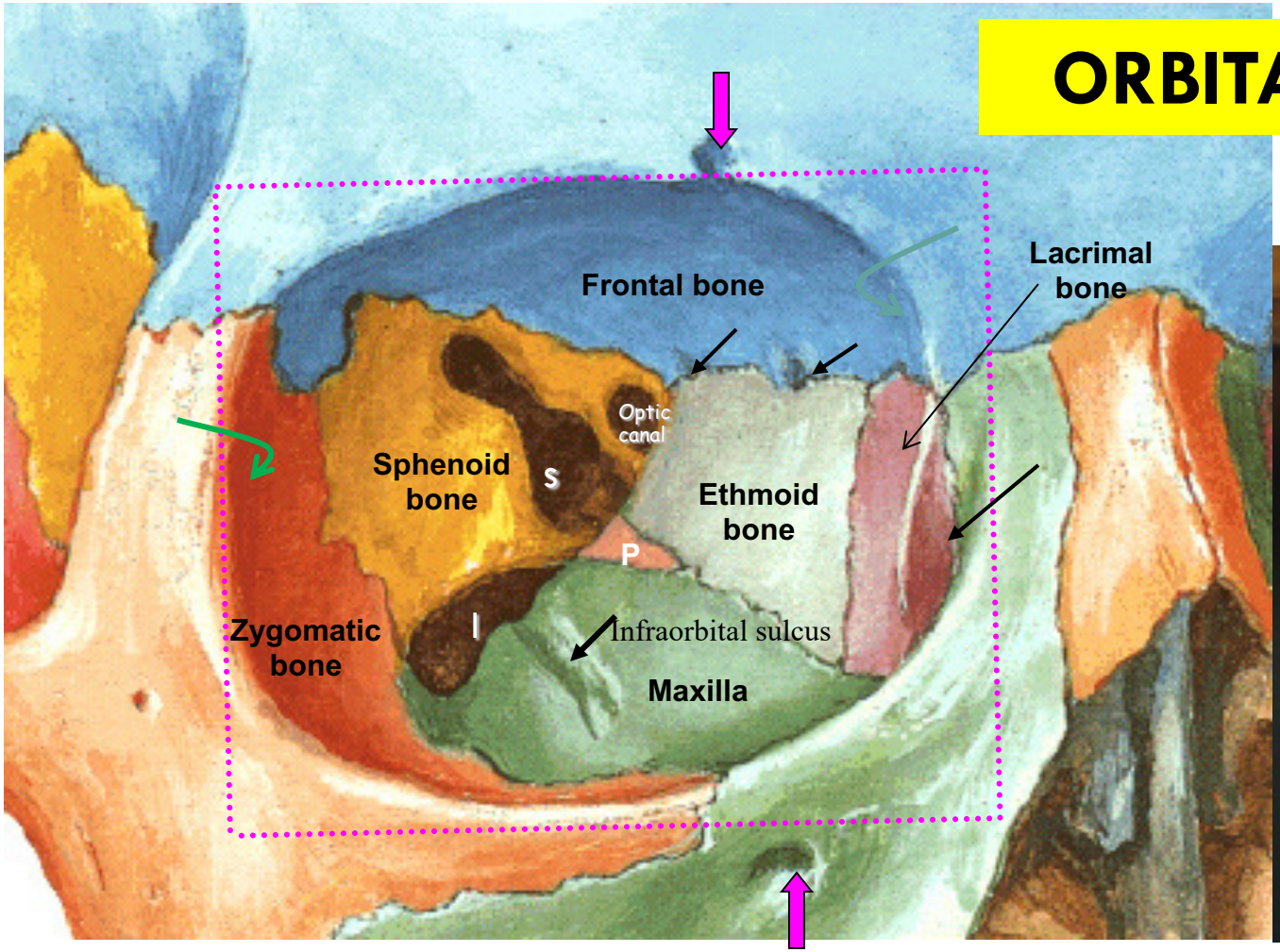
WALL OF ORBIT

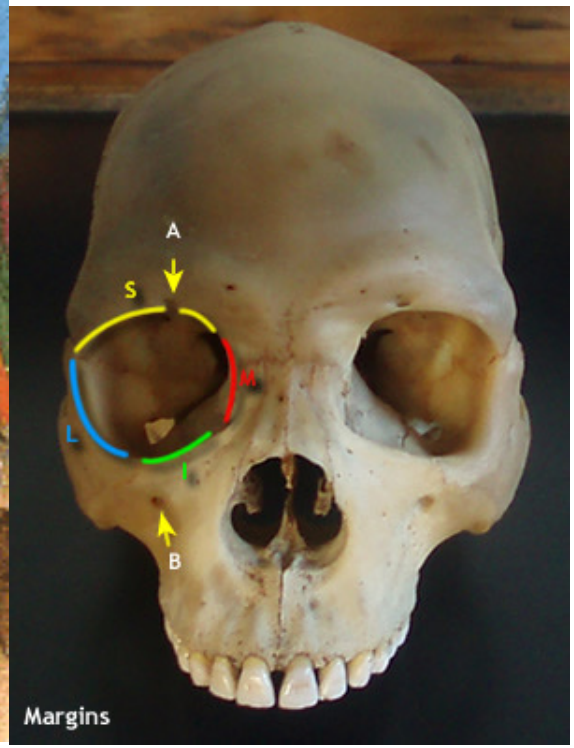


Human Anatomy and Physiology, 7e
by Elaine Marieb & Katja Hoehn

Copyright © 2007 Pearson Education, Inc., publishing as Benjamin Cummings.

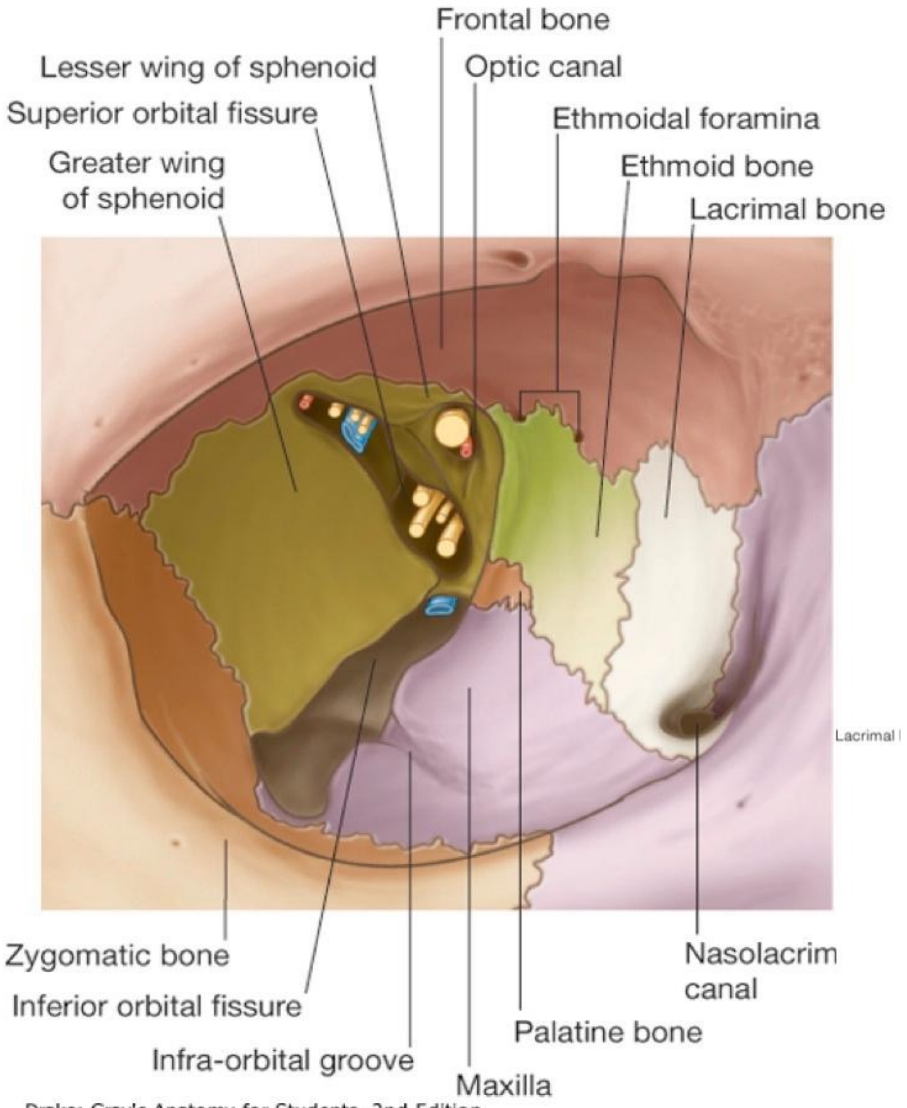
ORBITAL MARGIN





- **Superior margin** : Supraorbital foramen/ notch, Ethmoidal foramens
- **Inferior margin** : Infraorbital foramen (0.5-1 cm below)
- **Medial margin** : Lacrimal fossa, anterior & posterior lacrimal crests
- **Lateral margin** : Orbital tubercle for lateral palpebral ligament

OPENING OF ORBIT



Drake: Gray's Anatomy for Students, 2nd Edition.
Copyright © 2009 by Churchill Livingstone, an imprint of Elsevier, Inc. All rights reserved.

Superior orbital fissure

- Between greater & lesser wing of sphenoid bone
- Connect with middle cranial fossa
- CN 3, 4, 6, V1, ophthalmic vein

Inferior orbital fissure

- Between greater wing of spheroid bone, maxilla and palatine bones
- Connect with infratemporal fossa & pterygopalatine fossa
- Infraorbital n., Zygomatic n., Infraorbital artery

Optic canal

- Connect with middle cranial fossa
- Optic n., Ophthalmic artery

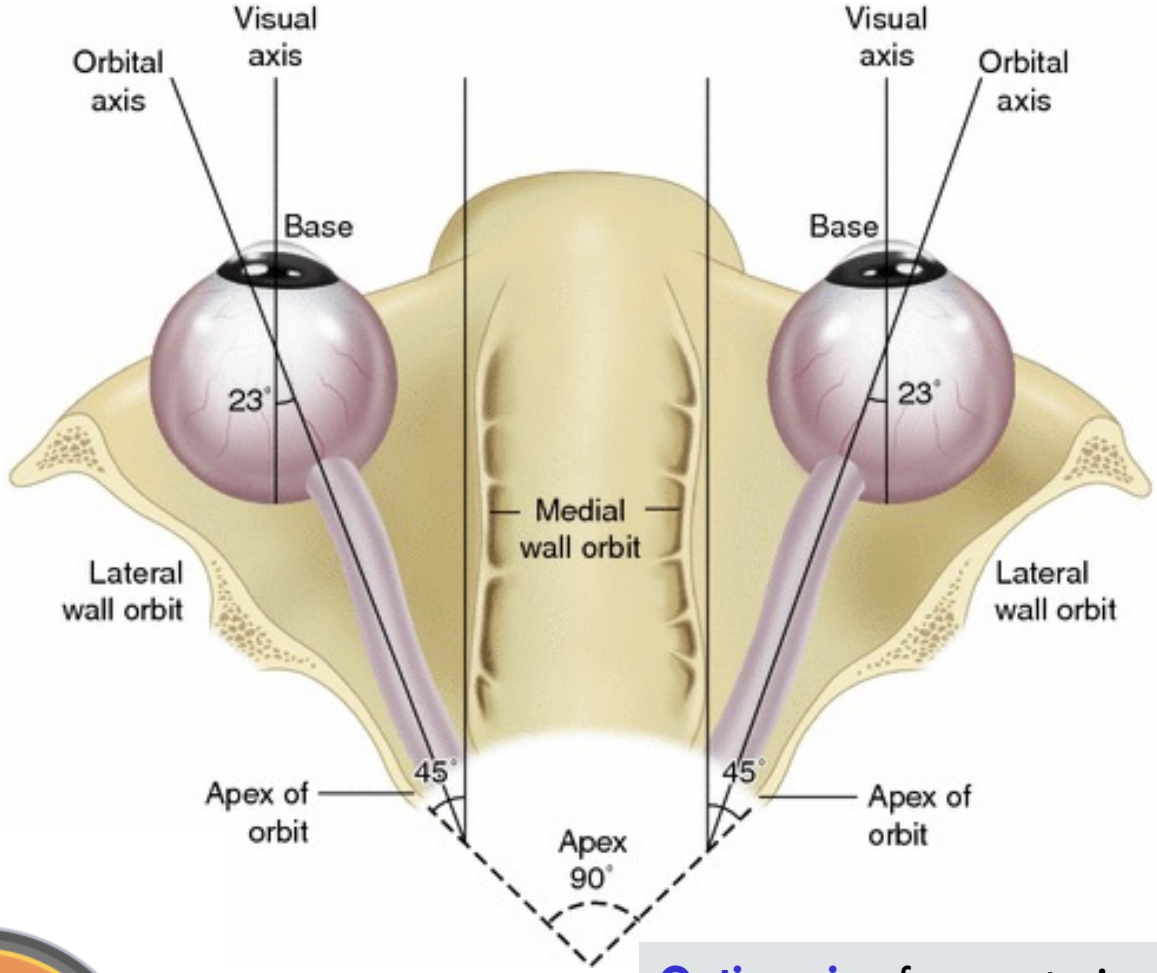
Anterior and posterior ethmoidal foramen

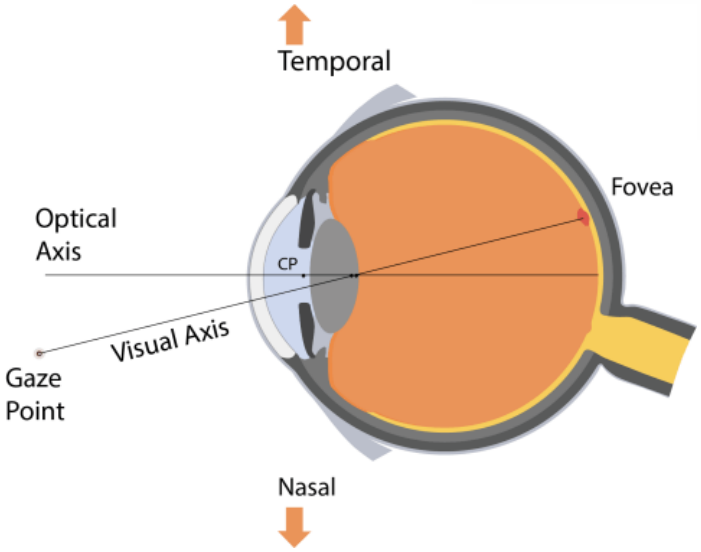
- Connect with anterior cranial fossa
- Anterior and posterior ethmoidal artery and nerves.

Nasolacrimal duct

- Connect with nasal cavity

EYEBALL



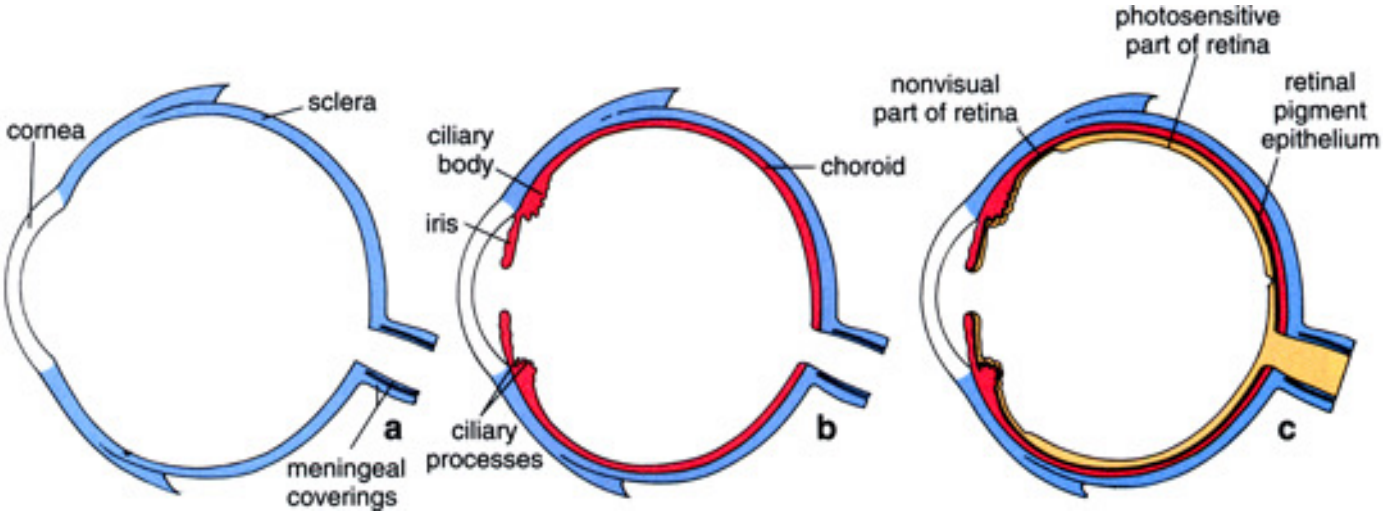


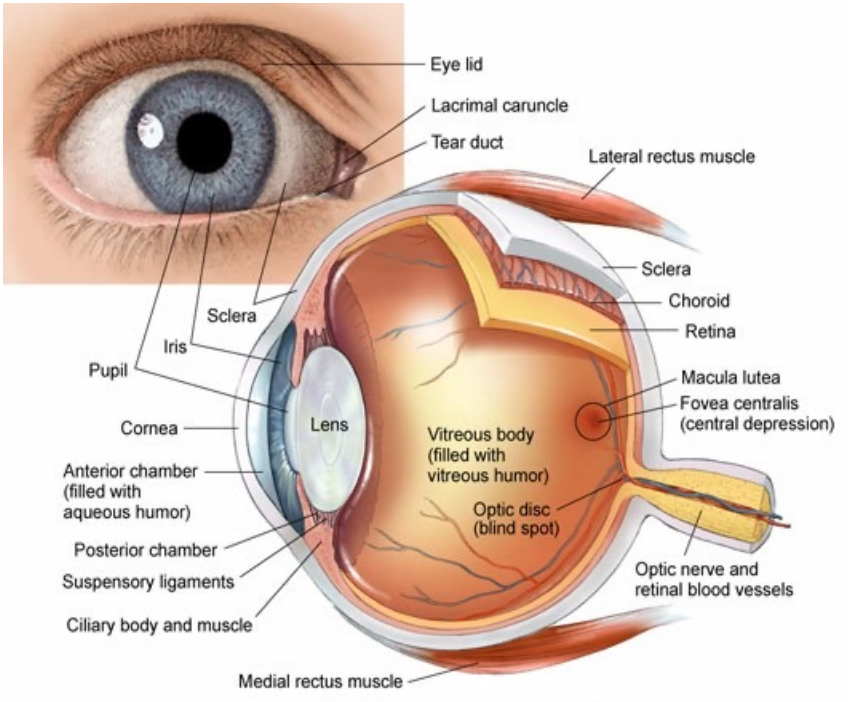
Optic axis : from anterior pole to posterior pole of eyeball

Visual axis : from midpoint of visual field to fovea centralis

Orbital axis : axis of orbit, is directed slightly laterally from back to front.

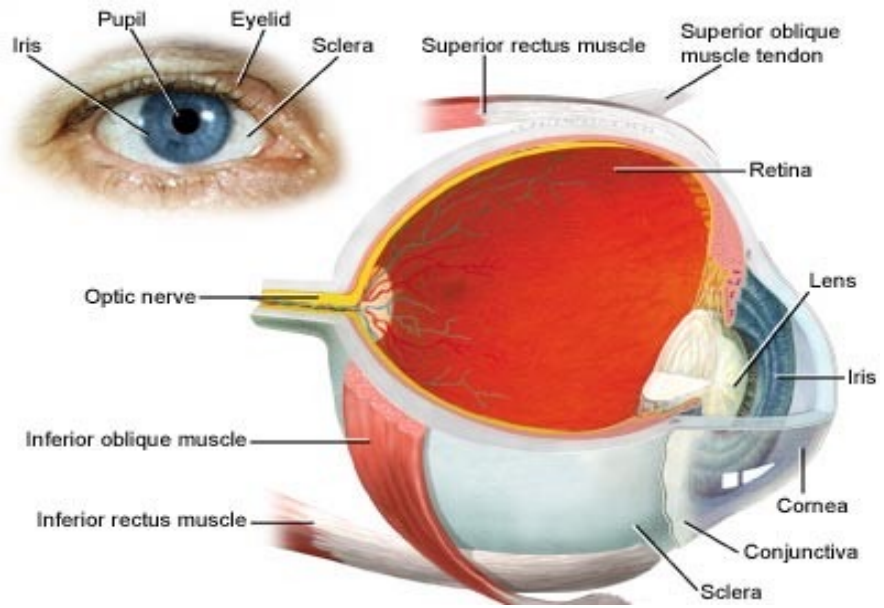
COAT OF EYEBALL

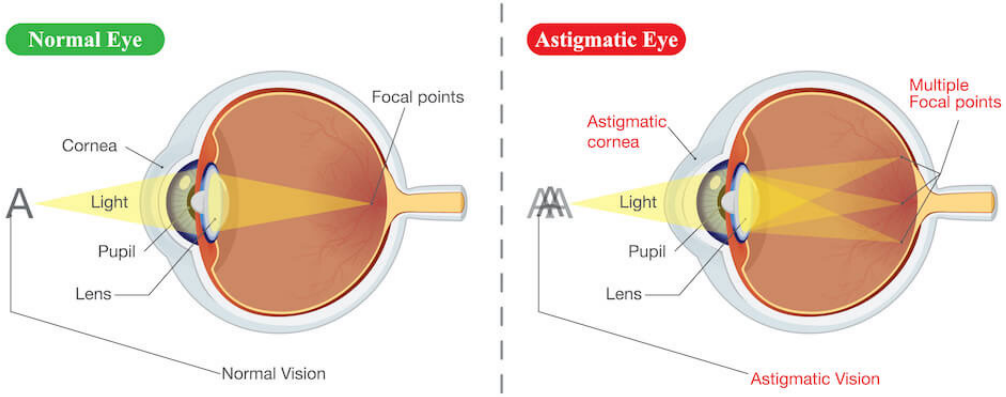


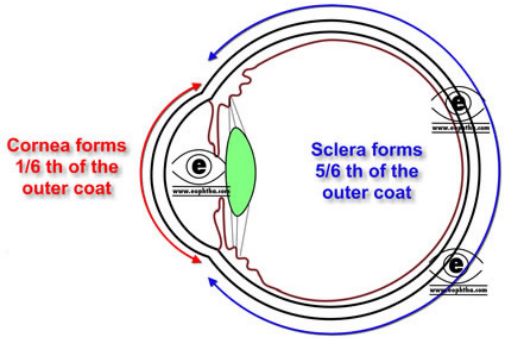


- **Fibrous coat**
  - **cornea, sclera**
- **Vascular coat (uvea)**
  - **iris, ciliary body, choroid**
- **Nervous coat**
  - **visual part, nonvisual part**

FIBROUS COAT







Cornea

- No blood & lymph vessels
- Being transparent, allow the light to enter the eyeball
- Stratified squamous epithelium (anterior), endothelium (posterior)
- Abnormal: **astigmatism**

Sclera

- White layer of the eye
- Is pierced by numerous vessels and nerve, including optic nerve
- Attachment for the various muscle involved the eyeball movement

VASCULAR COAT

Choroid

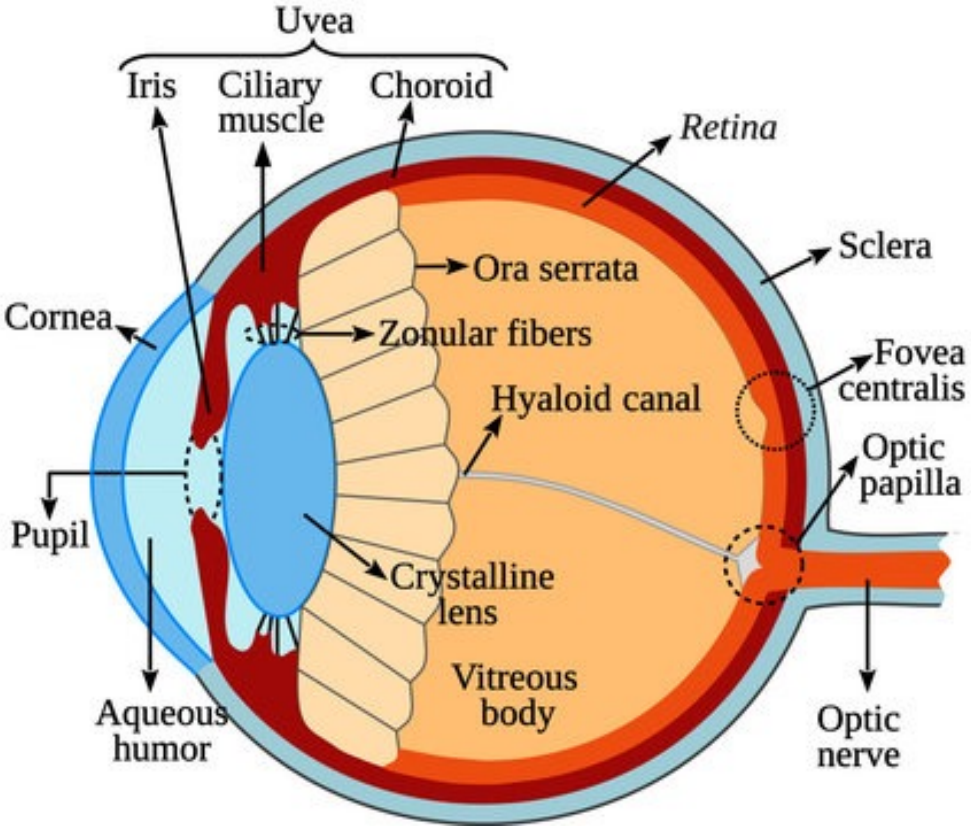
- 2/3 of vascular layer, thin, highly vascular, pigmented layer.
- Posterior to ora serata
- Continued with pia-arachnoid mater of optic nerve.

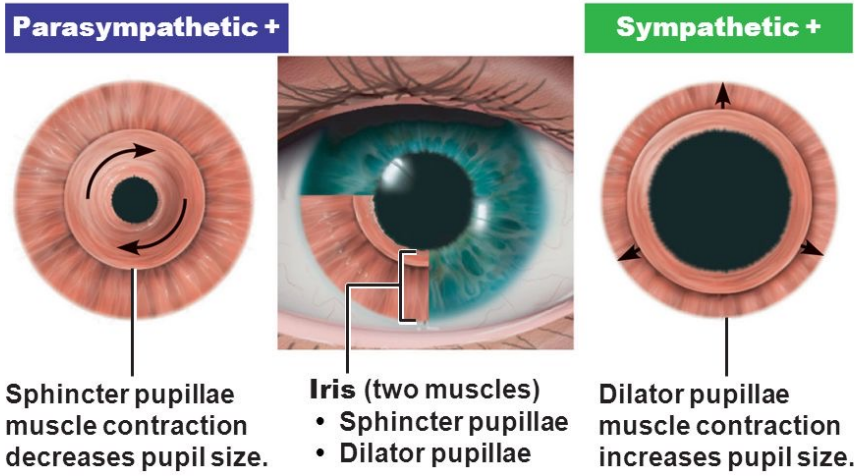
Ciliary body

- Ora serata to corneoscleral junction
- Triangular-shaped structure
- Consists of ciliary process and ciliary muscle.

Iris

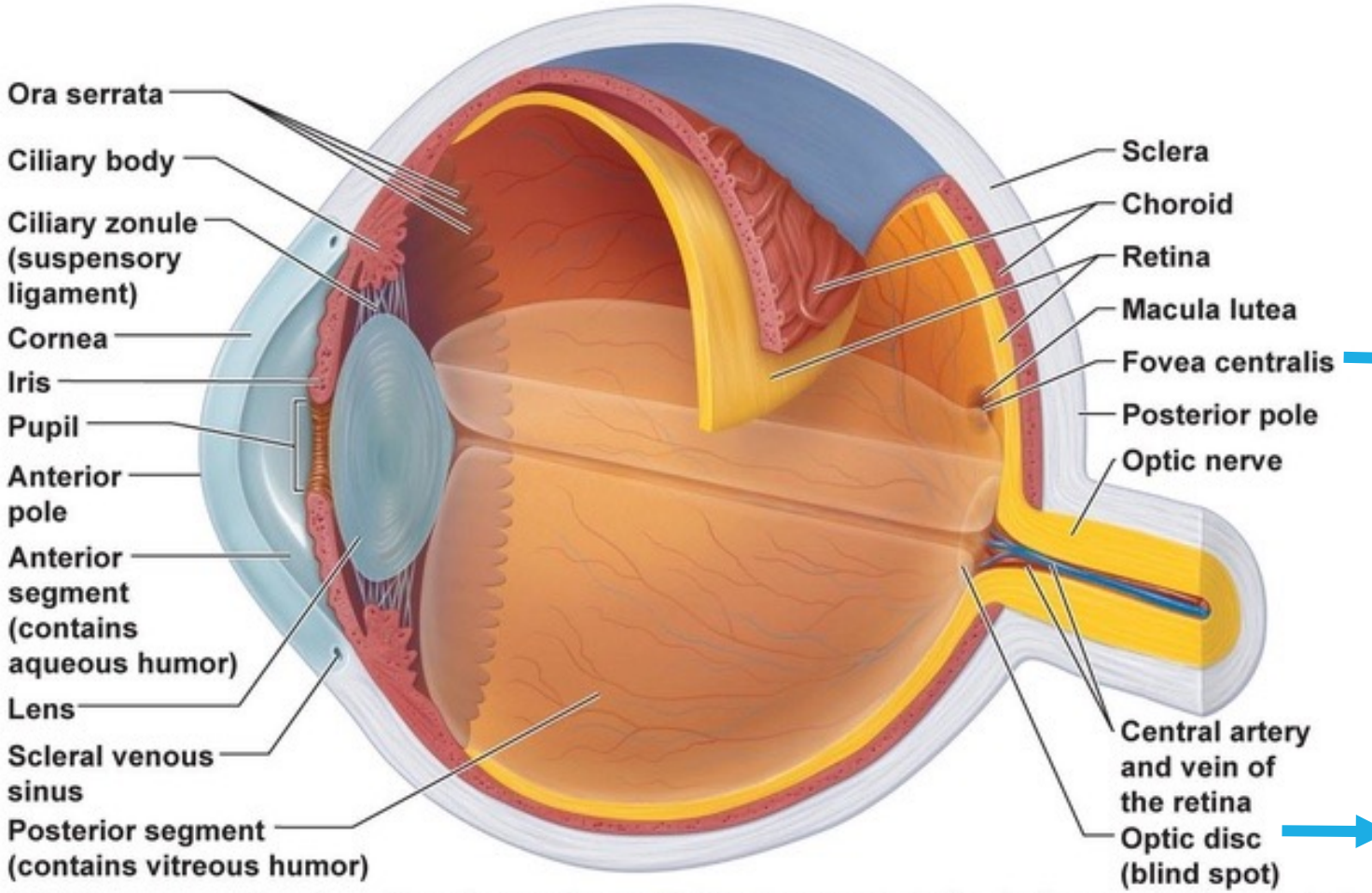
- Between cornea and lens
- Colored part of the eye
- Sphincter pupillae & dilator pupillae muscle





NERVOUS COAT (RETINA)

- **Visual/optic part of retina (posteriorly and laterally)**
- **Nonvisual part (internal surface of ciliary body and iris)**



(a) Diagrammatic view. The vitreous humor is illustrated only in the bottom part of the eyeball.

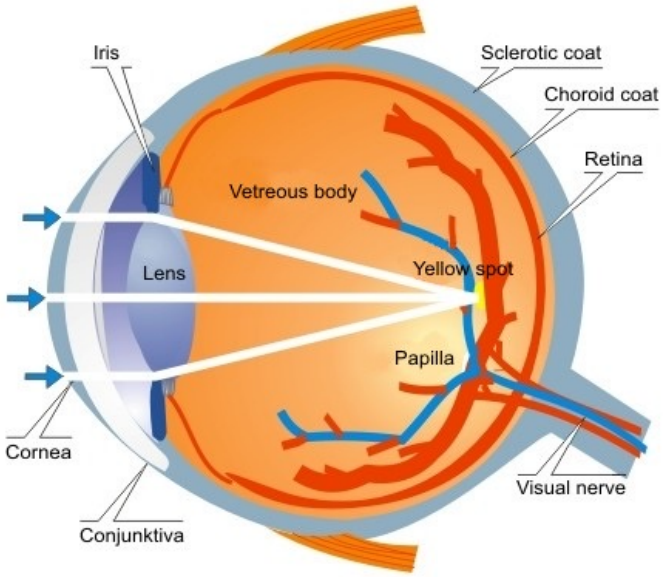
© 2011 Pearson Education, Inc.

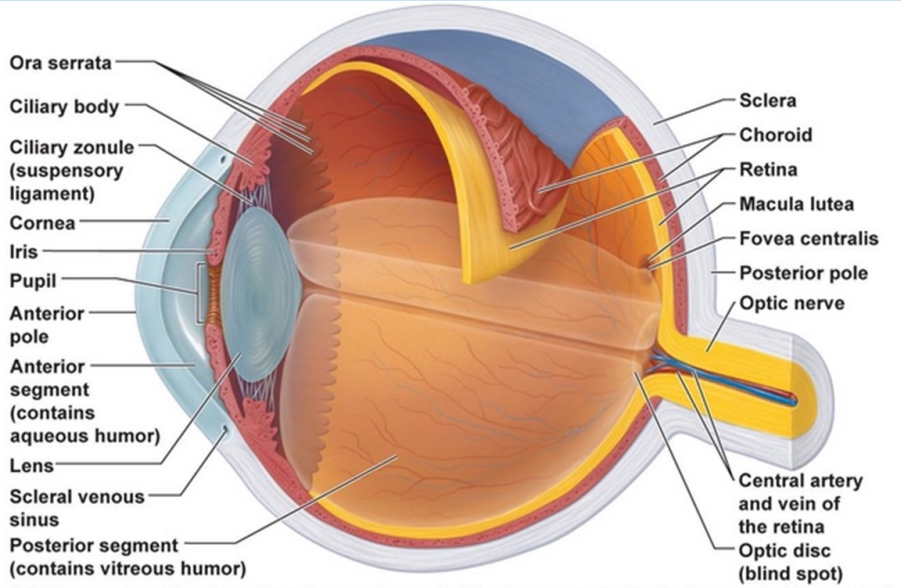
Responsible for central vision. Fewer rod cells, more cone cells (respond to bright light and are sensitive to color)

Where the optic never leave the retina, lack of photoreceptor

Refracting apparatus of eyeball

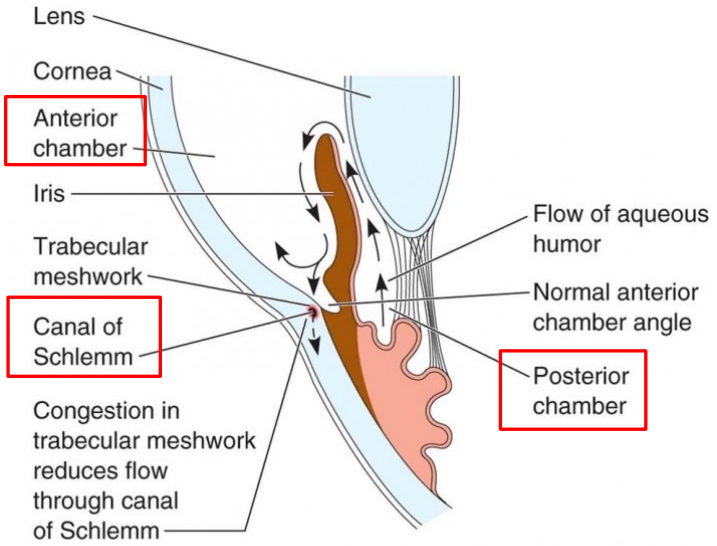
- **Cornea**
- **Aqueous humour**
  - Anterior chamber (cornea-iris)/ Posterior chamber (iris-lens)
  - **Scleral Venous Sinus** (Canal of Schlemm): Drains aqueous humor from the interior of the eye.
- **Lens**
  - Responsible for refracting light entering the eye.
- **Vitreous humour**
  - Filled with a transparent gelatinous substance.
  - **Hyaloid canal**: Transparent canal running through the vitreous from the optic nerve to the lens.





(a) Diagrammatic view. The vitreous humor is illustrated only in the bottom part of the eyeball.

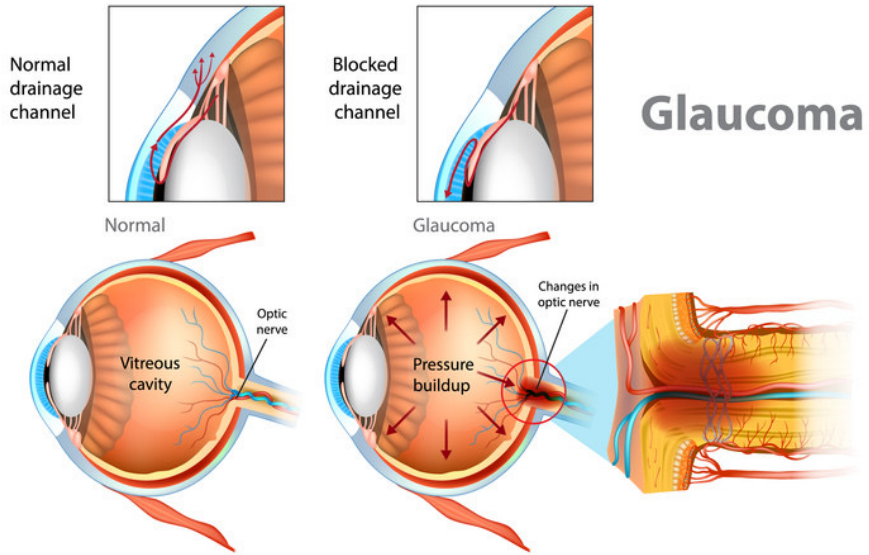
© 2011 Pearson Education, Inc.

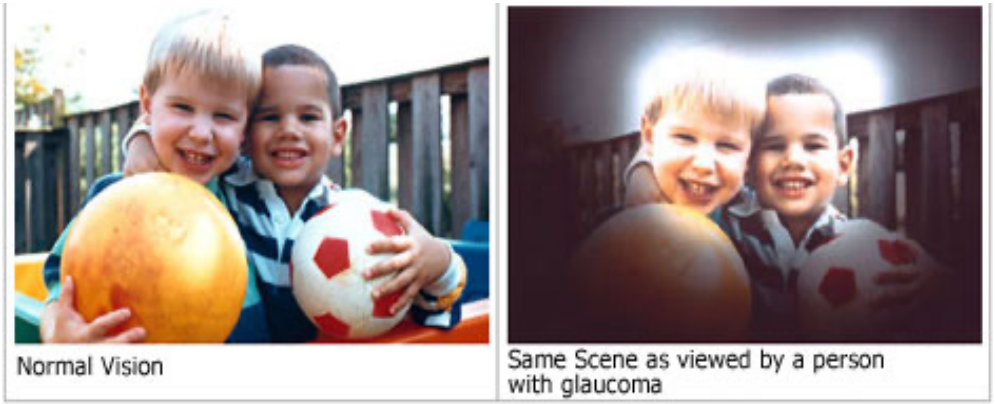


(a)

Glaucoma

- Intraocular pressure will rise due to abnormal cycle of aqueous humor fluid.
- Damaged optic nerve and blood vessels.

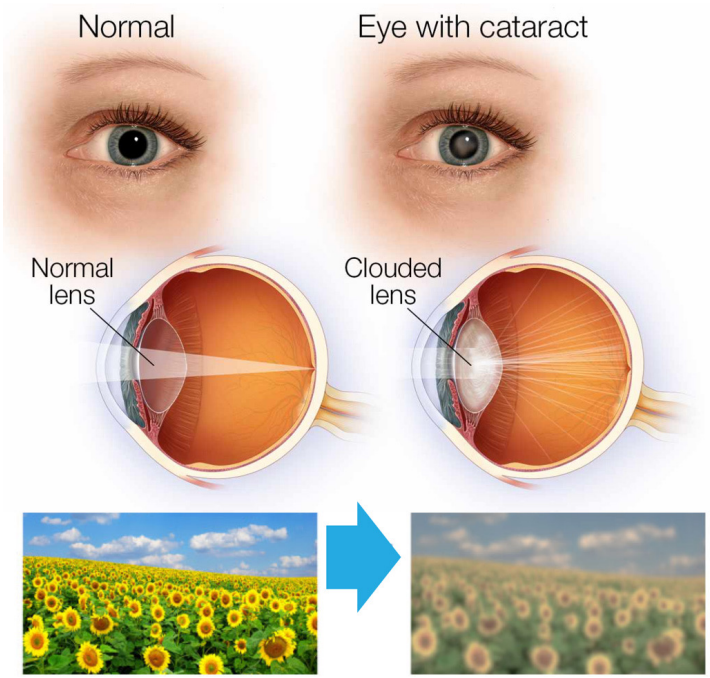




Cataracts

- Increasing age
- The lens of the eye becomes opacity (cloud formation).





VITREOUS FLOATER



floaters may look like squiggly lines or worms within your field of vision

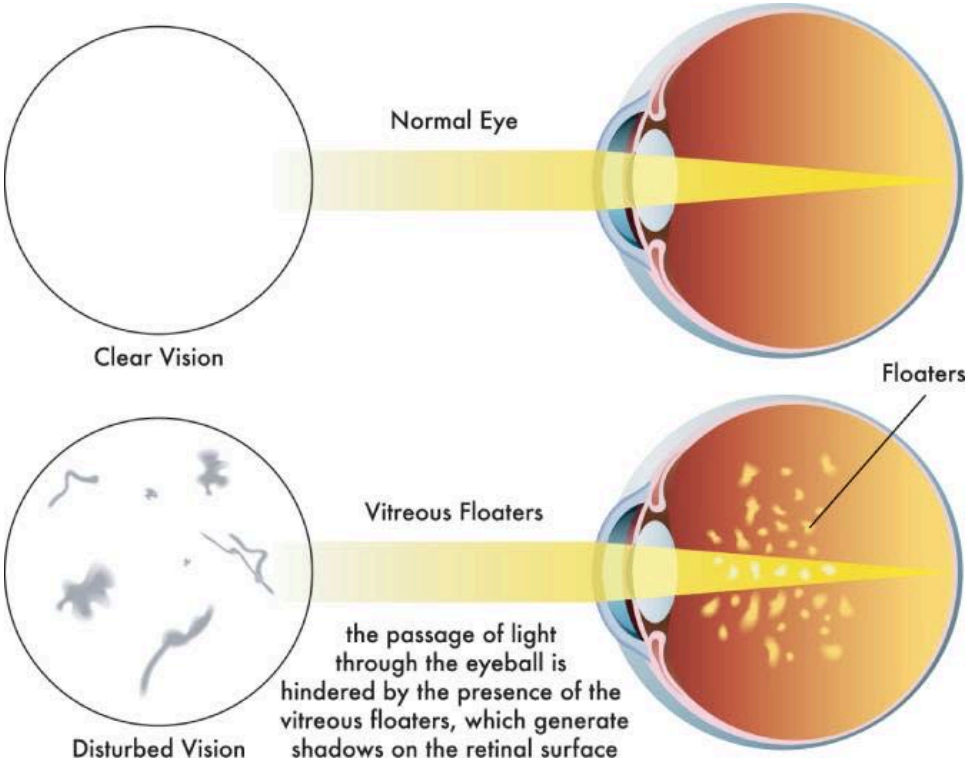


Normal Vision

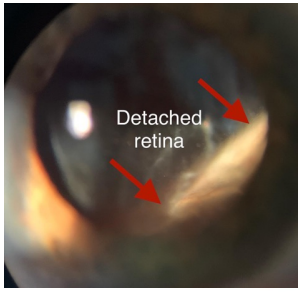


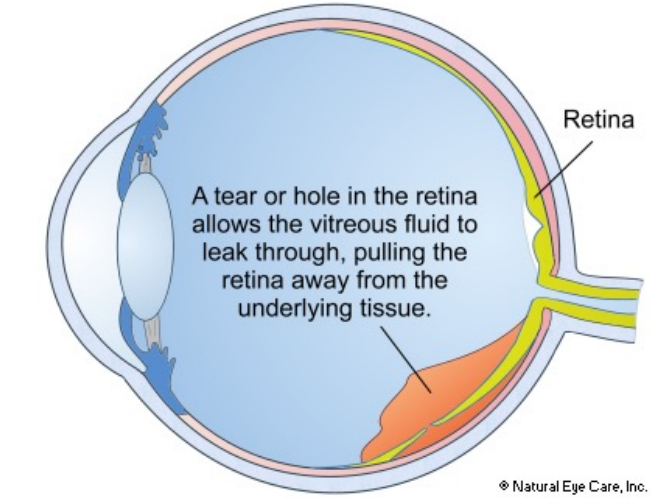
Vision with Floaters

Most eye floaters are caused by age-related changes that occur as the jelly-like substance (vitreous) inside your eyes liquifies and contracts. Scattered clumps of collagen fibers form within the vitreous and can cast tiny shadows on your retina.



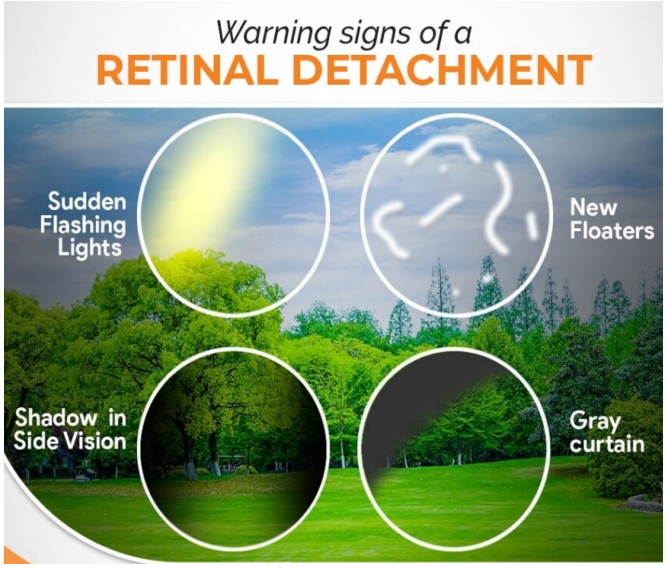
RETINAL DETACHMENT





The following factors increase your risk of retinal detachment:

- Aging — retinal detachment is more common in people over age 50
- Previous retinal detachment in one eye
- Family history of retinal detachment
- Extreme nearsightedness (myopia)
- Previous eye surgery, such as cataract removal





MUSCLE OF ORBIT

Extrinsic muscle of eyeball

(extra-ocular muscles)

Involved in movement of the eyeball or raising upper eyelids

Example:

- **Levator palpebrae superioris**
- **Rectus muscle groups**
- **Oblique muscle groups**

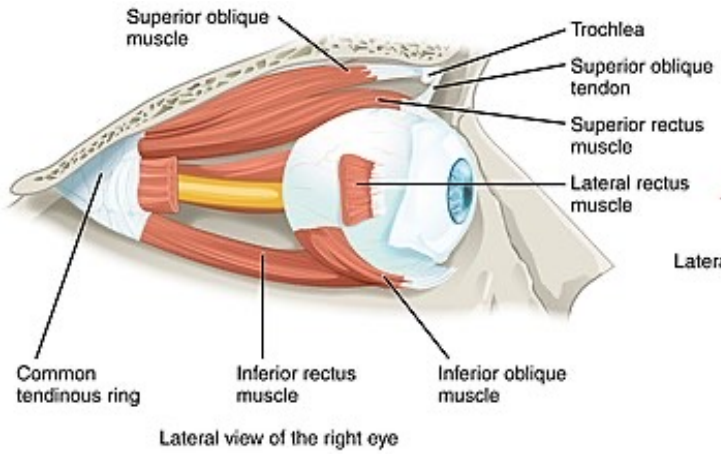
Intrinsic muscle of eyeball

Within the eyeball

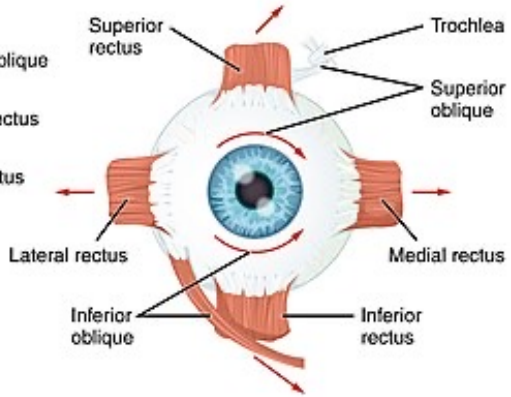
Control the shape of the lens and size of the pupil.

Example:

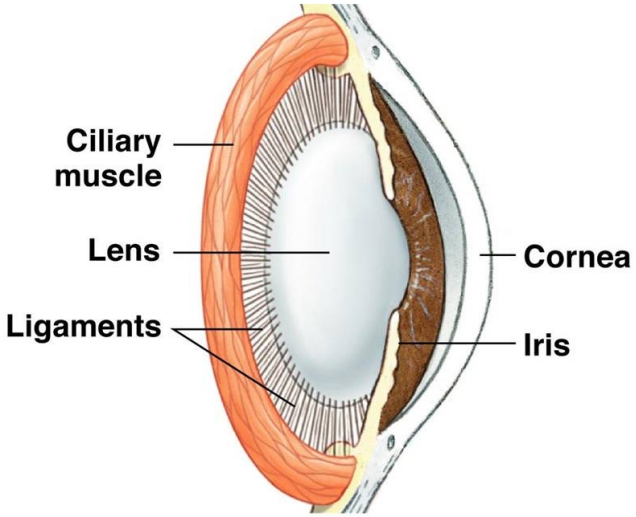
- **Ciliary muscle**
- **Sphincter pupillae muscle**
- **Dilator pupillae muscle**



Lateral view of the right eye

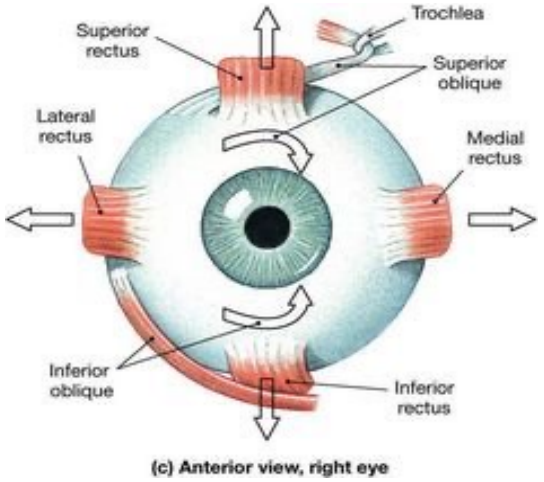


Anterior view of the right eye



EXTRINSIC MUSCLE OF ORBIT

- Levator palpebrae superioris (1)
- Rectus muscles (4)
- Oblique muscles (2)



Superior Oblique Muscle
Depresses and Rotates Eyeball inward (Intorsion) on its axis

Medial Rectus Muscle
Moves Eyeball Nasally (Adduction)

Levator Palpebrae Superious
Raises the Upper Eye Lid

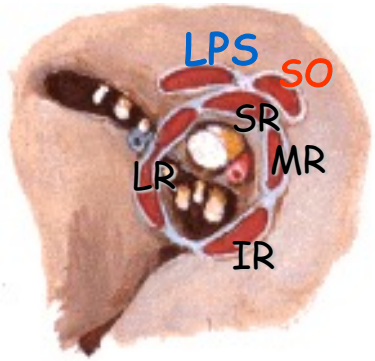
Superior Rectus Muscle
Moves Eyeball Upward (Supraduction)

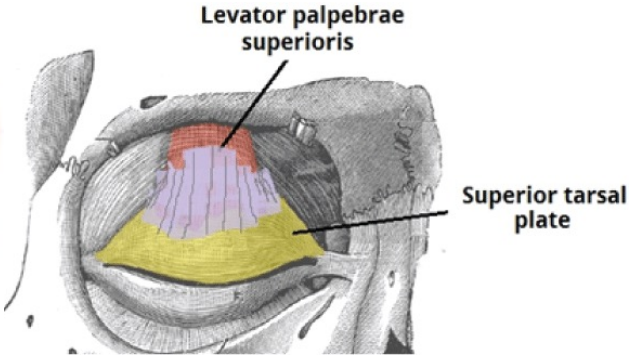
Lateral Rectus Muscle
Moves Eyeball Laterally (Abduction)

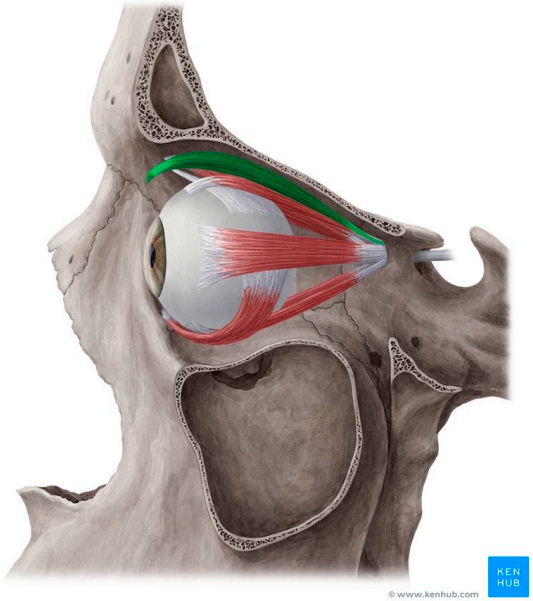
Inferior Oblique Muscle
Elevates and Rotates Eyeball outward (Extorsion) on its axis

Inferior Rectus Muscle
Moves Eyeball Downward (Infraduction)

LEVATOR PALPEBRAE SUPERIORIS MUSCLE







Origin

- Orbital surface of lesser wing of sphenoid bone, anterosuperior to optic canal.

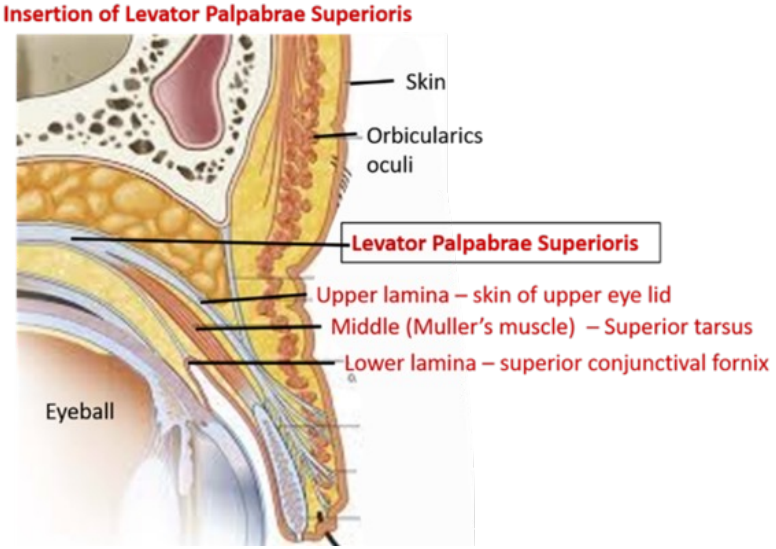
Insertion

- Skin of upper eyelid ,
- Anterior surface of superior tarsal plate (tarsus),
- Superior fornix of conjunctivum

Nerve supply

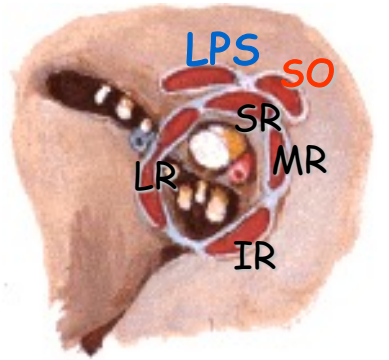
- Superior branch of CN III (voluntary part)
- Sympathetic (involuntary part)-tarsal muscle

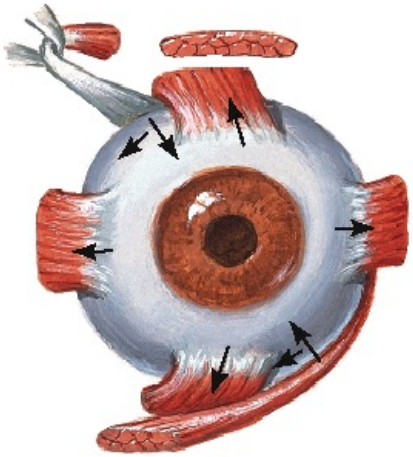
Action : Raises the upper eyelid.



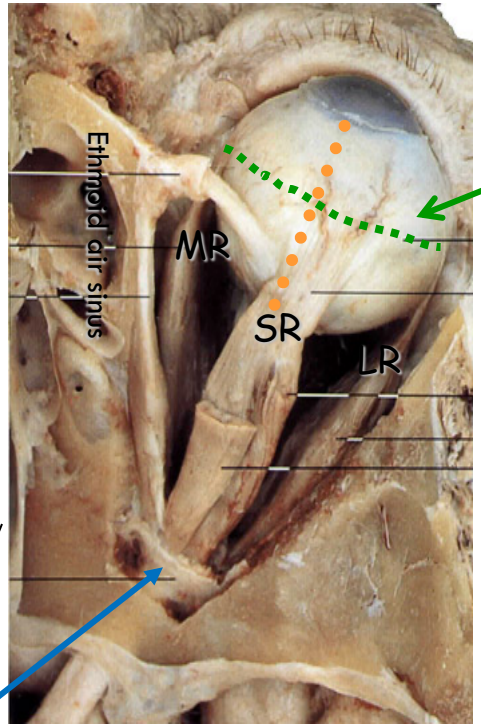
4 RECTUS MUSCLES OF ORBIT

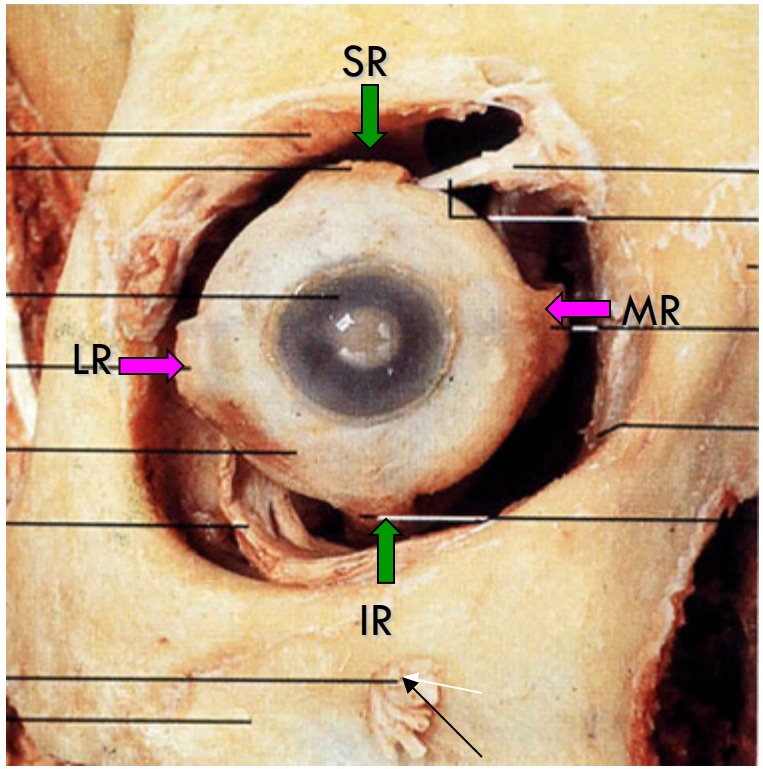
SR= superior rectus muscle
IR = inferior rectus muscle
MR = medial rectus muscle
LR = lateral rectus muscle





Equator of eyeball

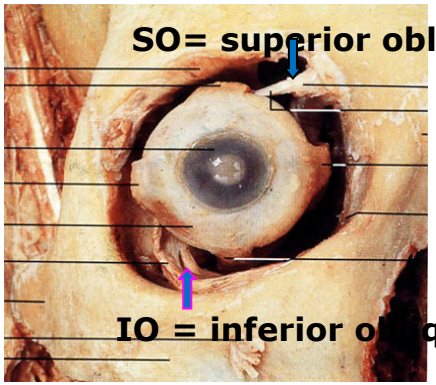


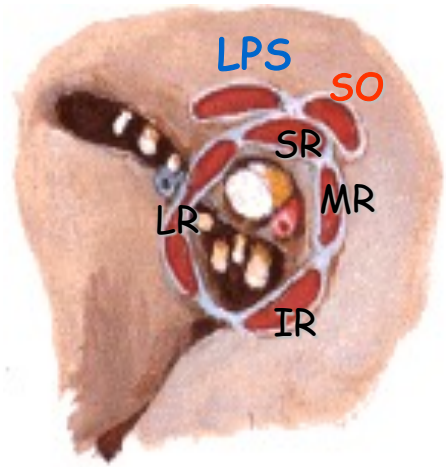


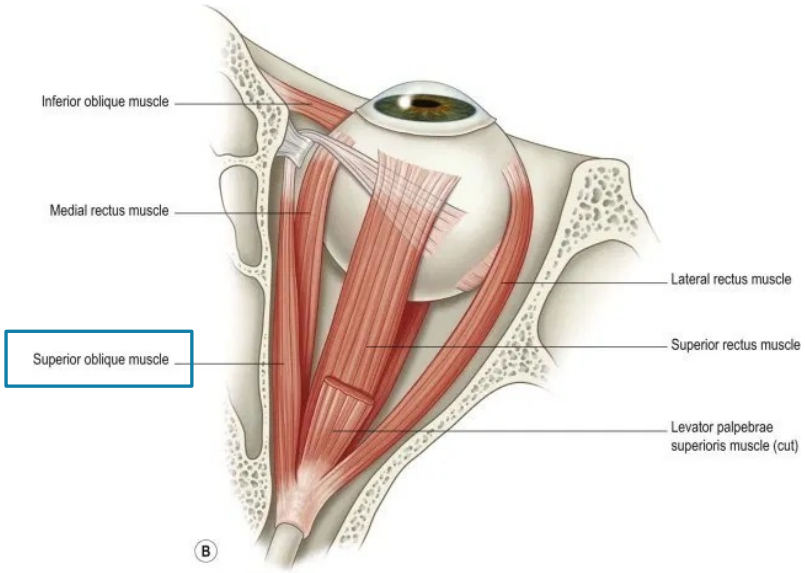
Infraorbital nerve

Origin : Common tendinous ring
Insertion : Anterior half of eyeball

2 OBLIQUE MUSCLES OF ORBIT







ORIGIN:

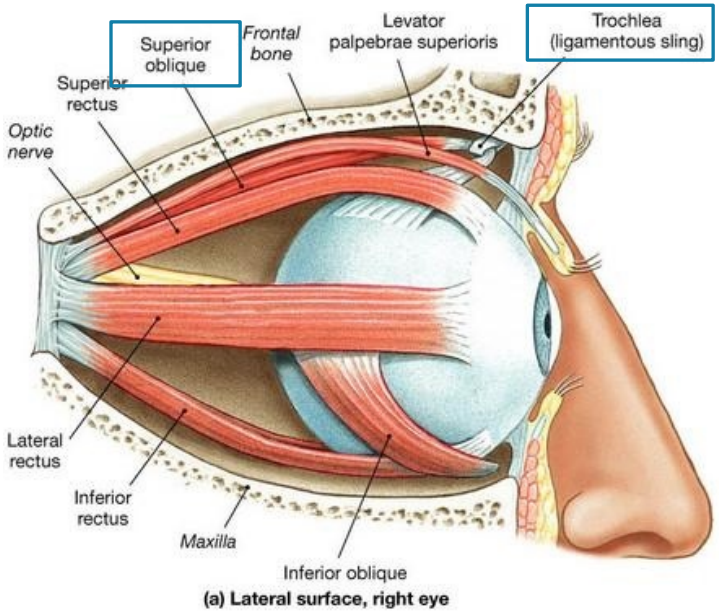
SO- arises from the body of the sphenoid, superior and medial to the optic canal → Trochlea

IO - medial side of the floor of orbit (anterior)

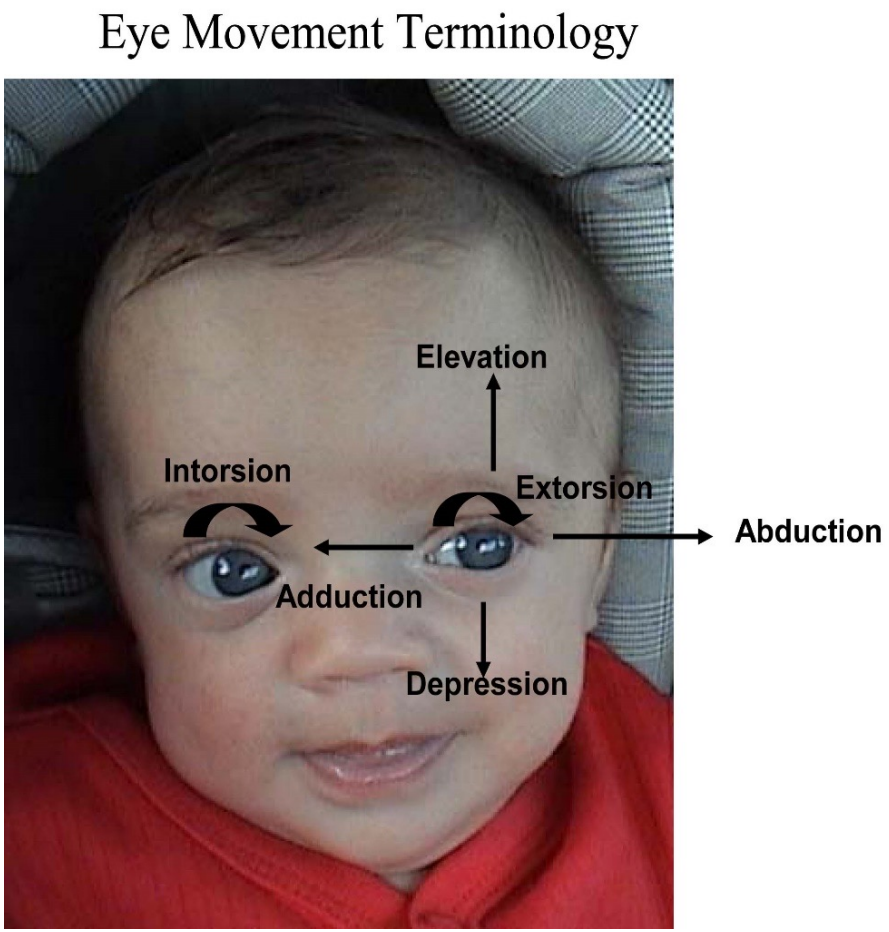
INSERTION:

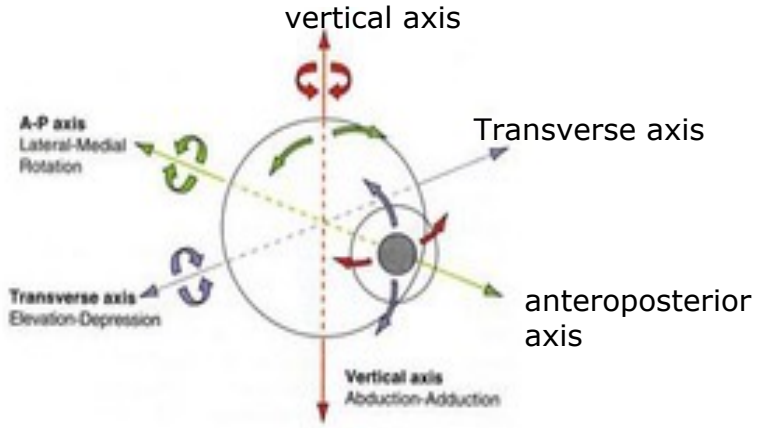
SO – superior posterolateral quadrant

IO – inferior posterolateral quadrant



MOVEMENT OF EYEBALL



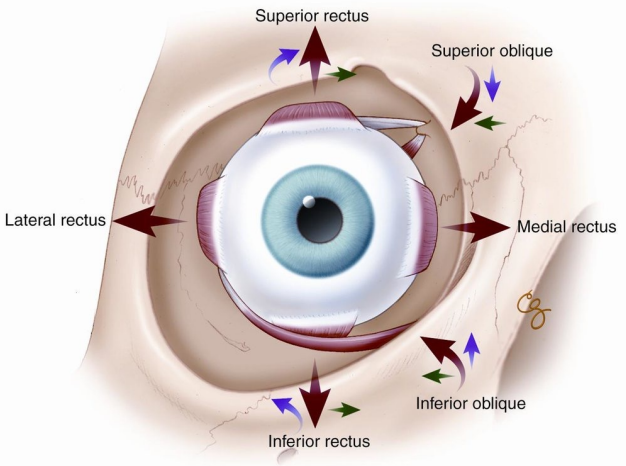


Vertical axis :
- **Adduct** -moving pupil toward the nose
- **Abduct** -moving pupil laterally

Transverse axis :
- **Elevate** -moving pupil superiorly
- **Depress** -moving pupil inferiorly

Anteroposterior axis :
- **Intorsion** - rotating the upper part of pupil medially (toward the nose)
- **Extorsion** - rotating the upper part of pupil laterally (toward the laterally)

Muscle	Innervation	Primary action	Secondary action	Tertiary action
Medial rectus	CN III	Adduction	--	--
Superior rectus	CN III	Elevation	Intortion	Adduction
Inferior rectus	CN III	Depression	Extortion	Adduction
Inferior oblique	CN III	Extorsion	Elevation	Abduction
Superior oblique	CN IV	Intorsion	Depression	Abduction
Lateral rectus	CN VI	Abduction	--	--



Muscle	Primary	Secondary	Tertiary
Medial rectus	Adduction		
Lateral rectus	Abduction		
Inferior rectus	Depression	Excyclotorsion	Adduction
Superior rectus	Elevation	Incyclotorsion	Adduction
Inferior oblique	Excyclotorsion	Elevation	Abduction
Superior oblique	Incyclotorsion	Depression	Abduction

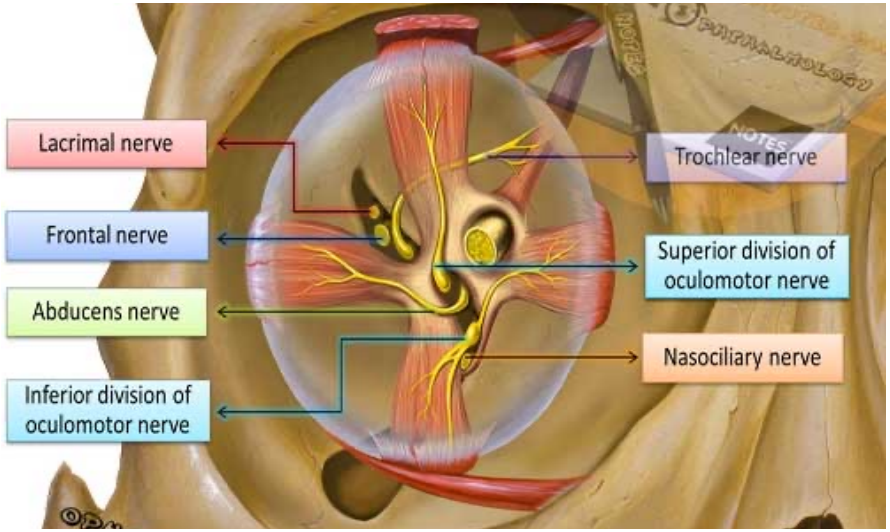
ACTIONS OF EACH MUSCLE OF EYEBALL

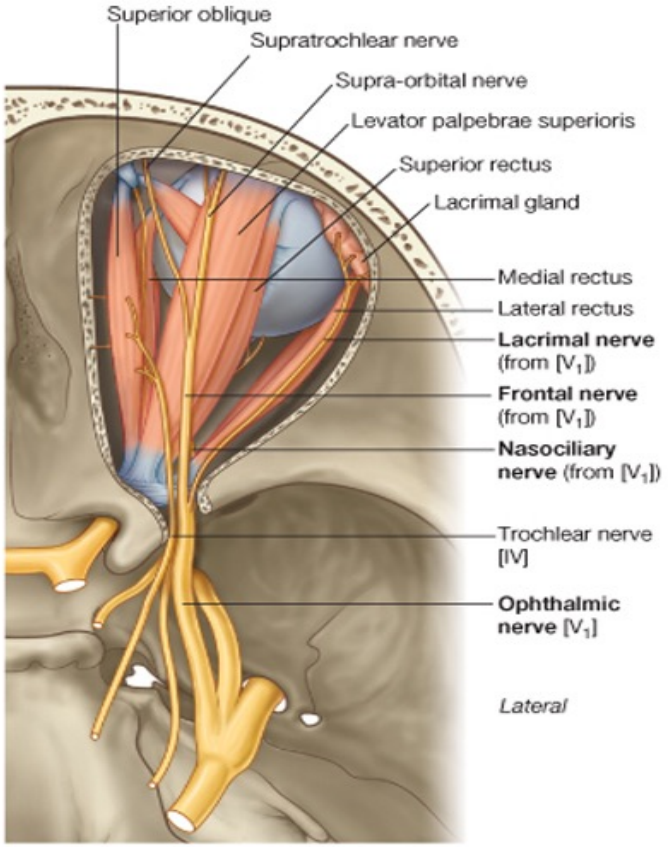
NERVE OF ORBIT

- Optic never (CN II)
  - Carrying afferent fiber (vision, SSA) from the retina to the brain.
- Oculomotor nerve (CN III)
  - Levator palpebrae superioris
  - Superior rectus

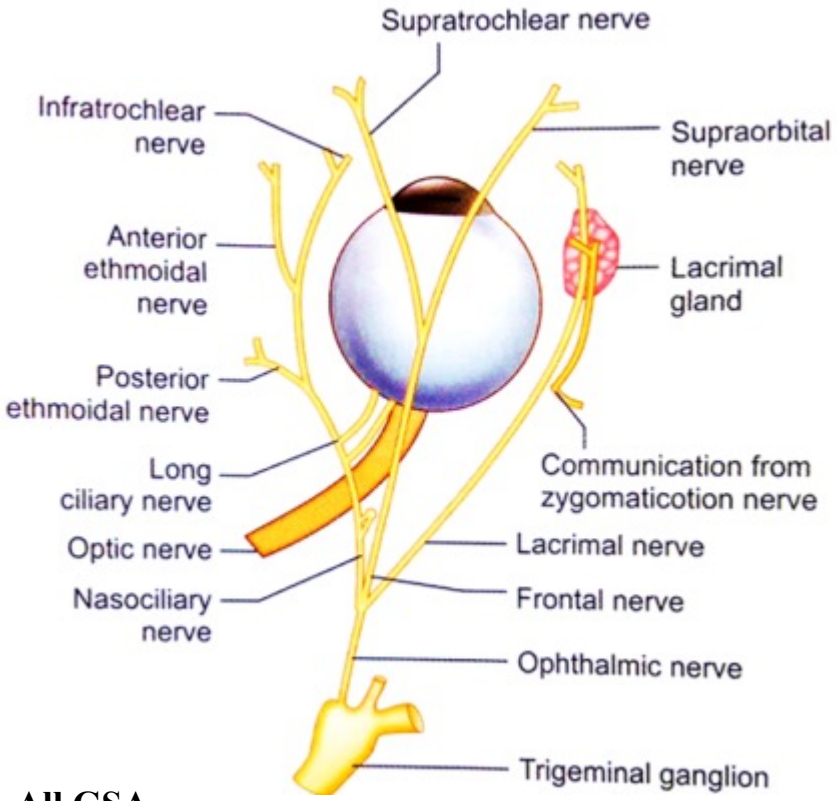
  } superior division
  - Inferior rectus
  - Medial rectus
  - Inferior oblique

  } inferior division
- Trochlear nerve (CN IV)
  - Superior oblique, **SO4**
- Abducent nerve (CN VI)
  - Lateral rectus, **LR6**
- Ophthalmic nerve of CN.V
- Autonomic nerve & ciliary ganglion

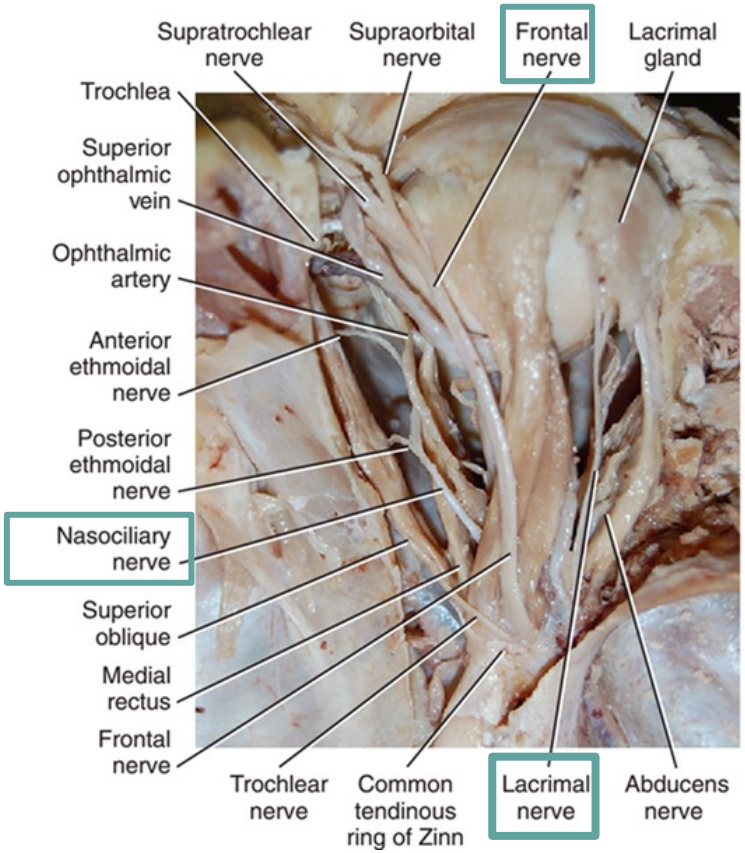




OPTHALMIC NERVE –V1



All GSA



Frontal nerve

- **Supraorbital N.**
- **Supratrochlear N.**
  - **Supply forehead, upper eyelid**

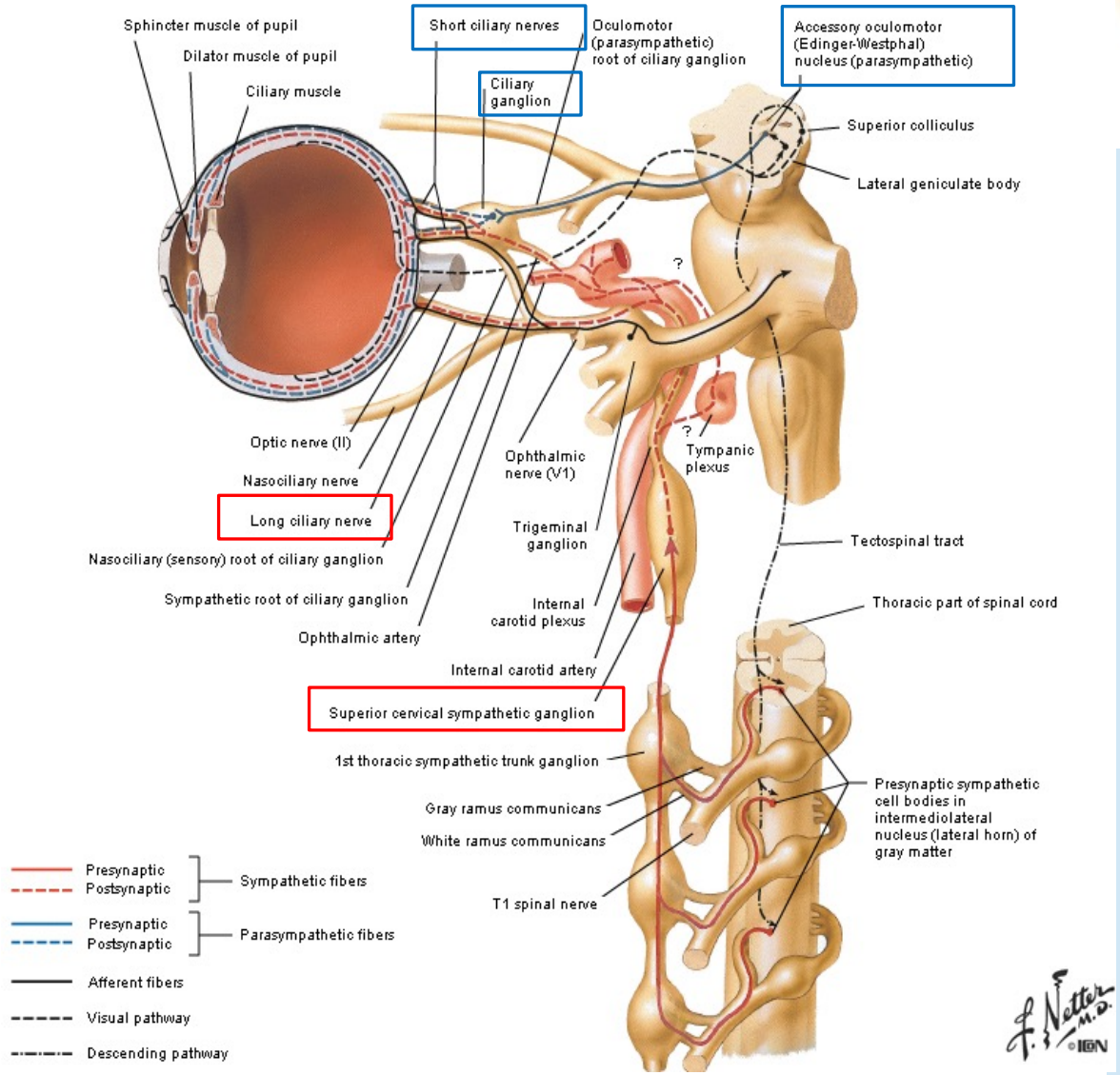
Lacrimal nerve

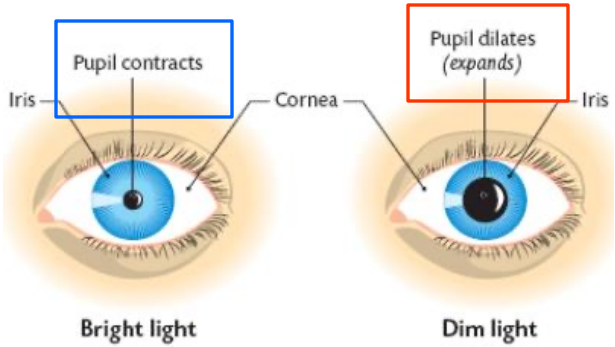
- **Supply upper eyelid**

Nasociliary nerve

- **Ant. And Post. Ethmoidal N.**
  Supply nasal cavity, ethmoid sinus, tip of nose
- **Long Ciliary N.**
  Sensory to cornea
- **Infratrochlear N.**
  Supply upper eyelid, nose

AUTONOMIC NERVES



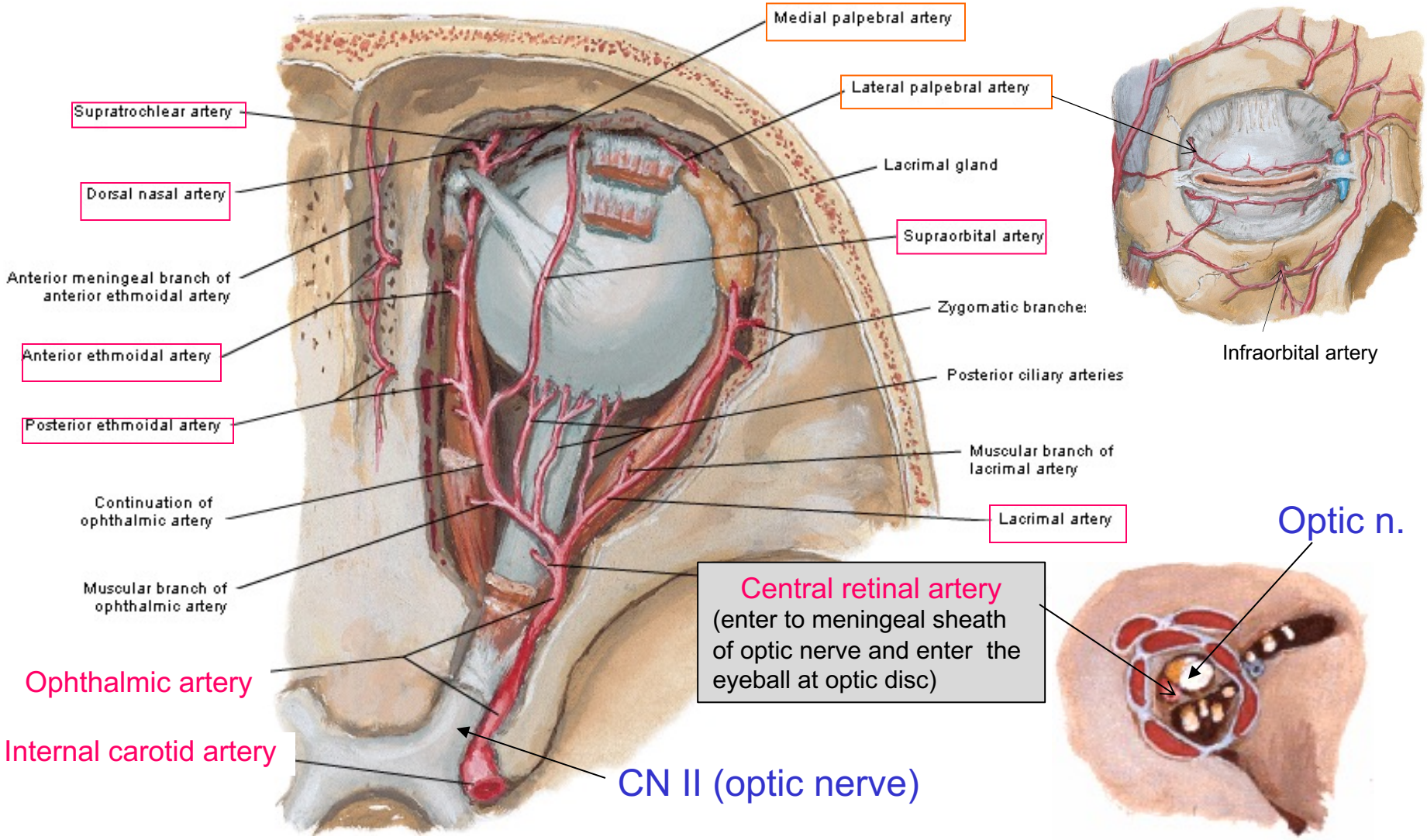


- **Sympathetic NS**
  - **Superior cervical ganglion**
  - **Long ciliary nerve**
  - **Supply dilator papilla & tarsus muscle**

  (lesion of sympathetic nerve causes **ptosis**)
- **Parasympathetic NS**
  - **Edinger's Westphal nucleus & CN III**
  - **Ciliary ganglion**
  - **Shot ciliary nerve**
  - **Supply ciliary muscle & sphincter pupillae of iris**

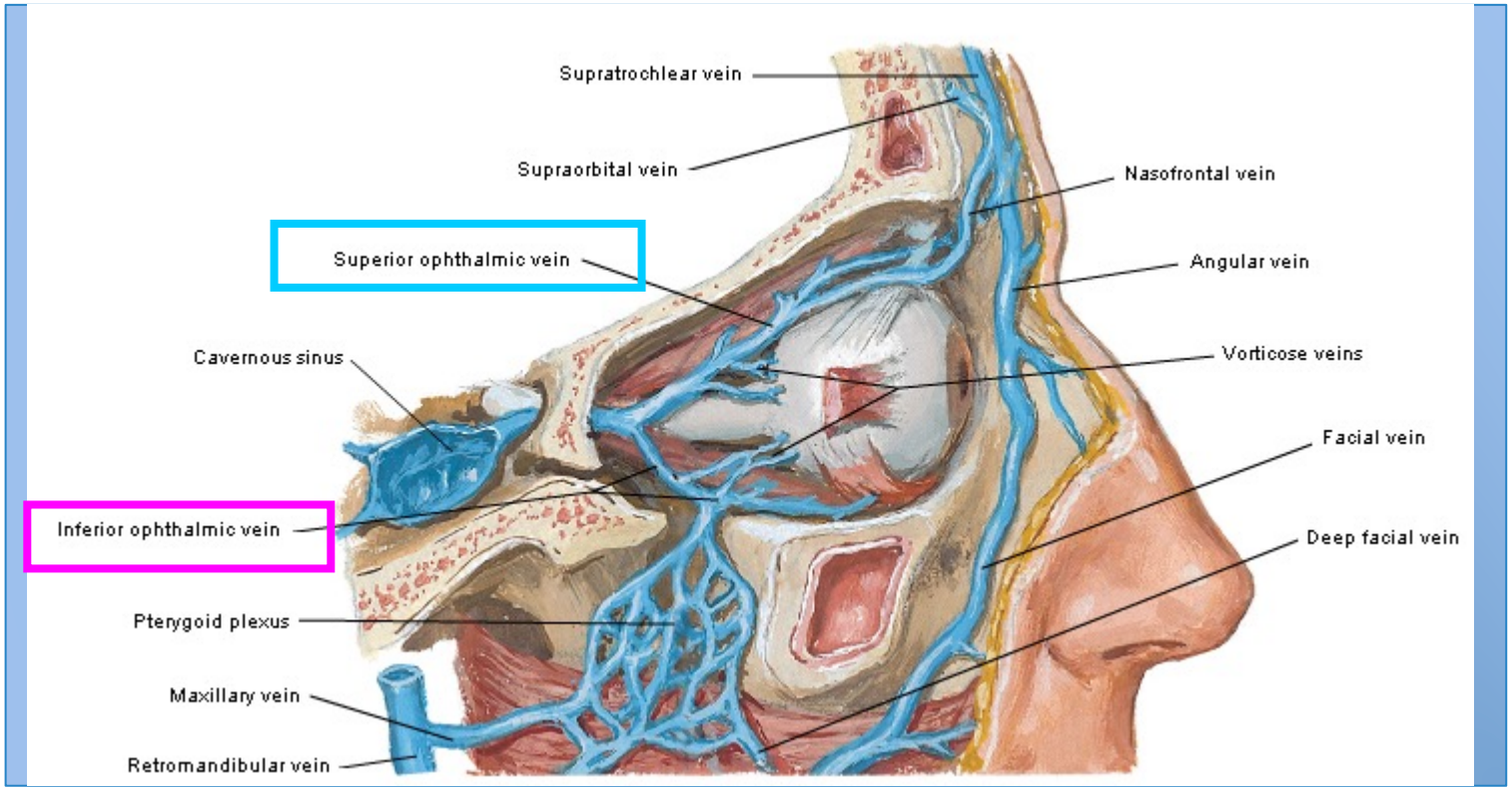
OPHTHALMIC ARTERY

(Branch of internal carotid artery)

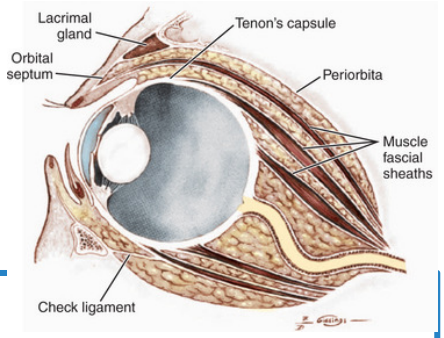


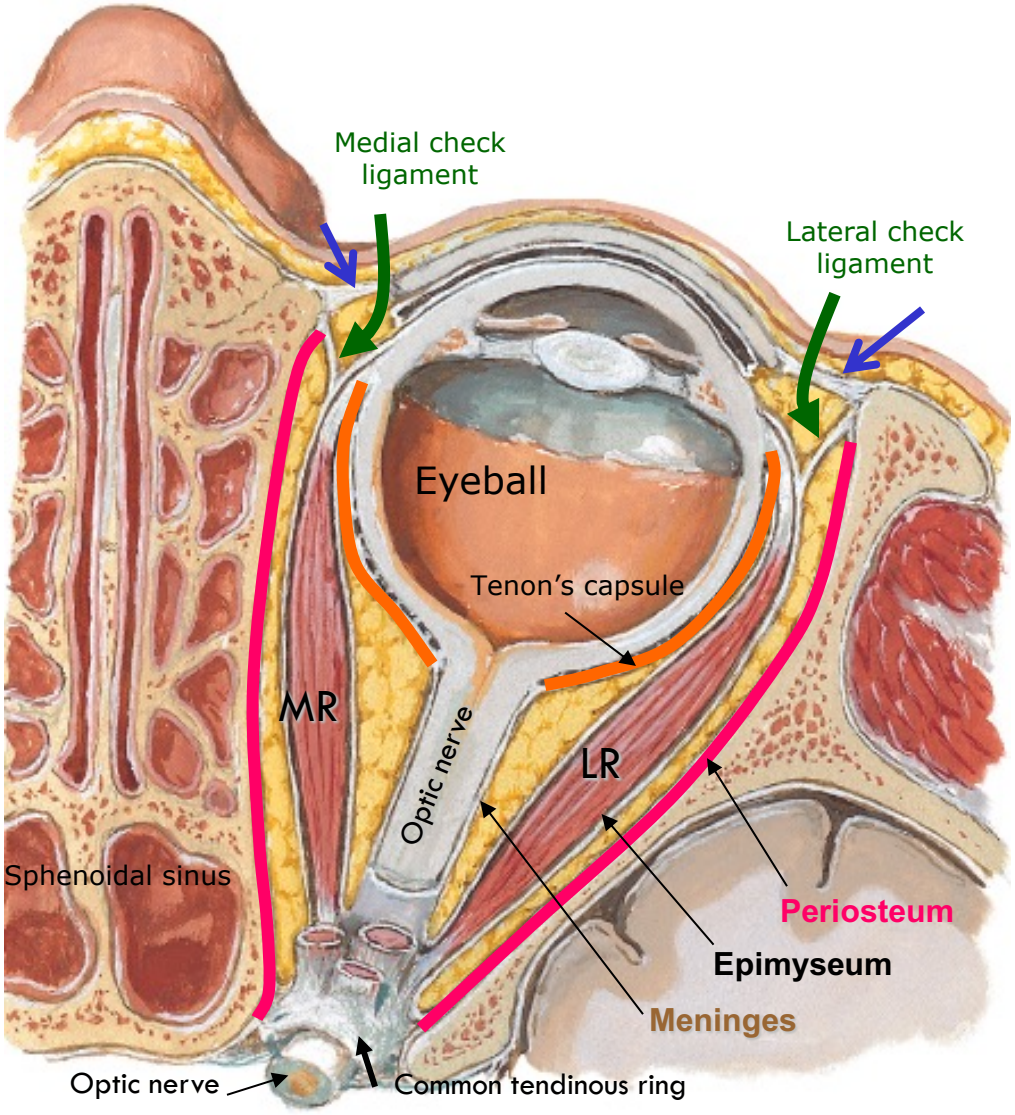
OPHTHALMIC VEIN

- **Superior ophthalmic vein**
  - Communicated with facial vein and supraorbital vein
  - Drain to carvenous sinus
- **Inferior ophthalmic vein**
  - Communicated with pterygoid plexus
  - Drain to carvernous sinus or pterygoid plexus



FASCIAL SHEATHS OF EYEBALL AND ORBIT



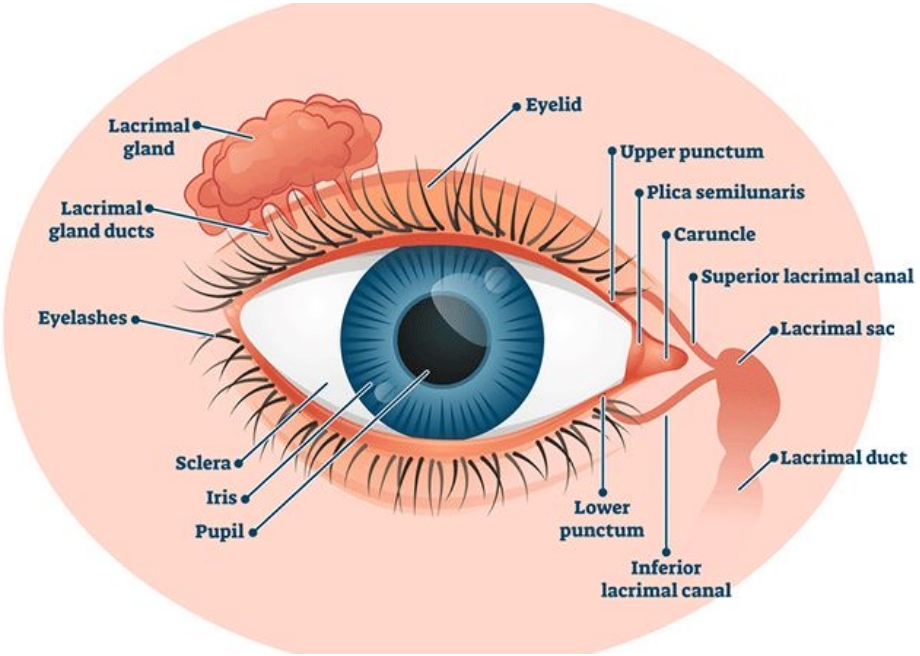


- **Periorbita**
  - Periosteum lining the bones that form the orbit, continued with periosteal layer of dura mater.
- **Tenon's capsule/ fascial bulbi**
  - Posteriorly, attached to sclera around the point of entrance of optic nerve.
  - Continued with sheath of optic nerve (meninges)
- **Suspensory ligament**
  - The specialized **lower part of the fascial sheath**, which supports the eyeball.
- **Muscular fascia & its extension**
  - **Medial check ligament**

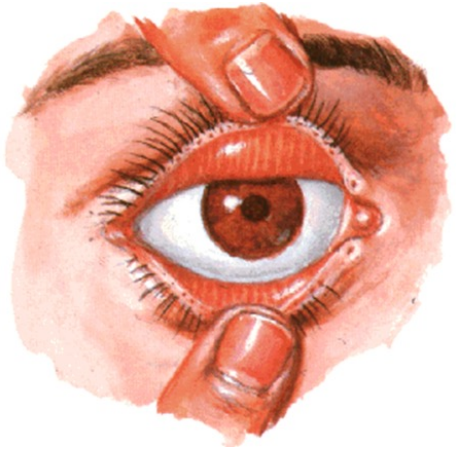
    (Attached to posterior lacrimal crest of lacrimal bone)
  - **Lateral check ligament**

    (Attached to orbital tubercle of zygomatic bone)

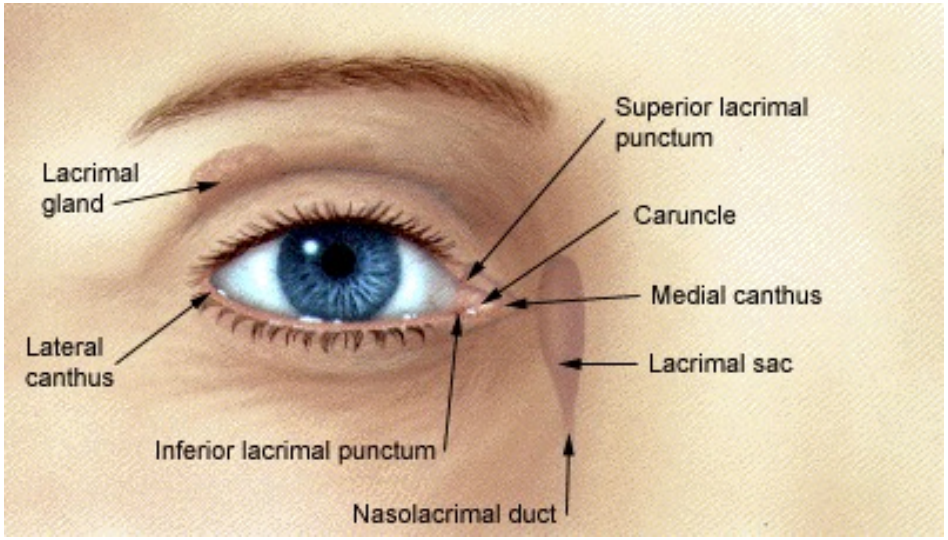
ACCESSORY STRUCTURE OF THE EYE



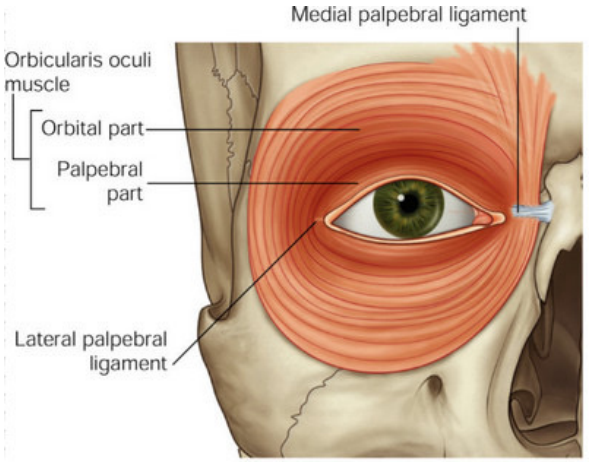
- Protect the surface of the eyeball.

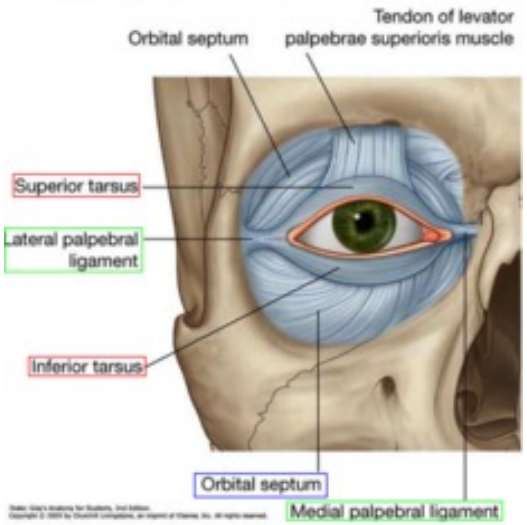


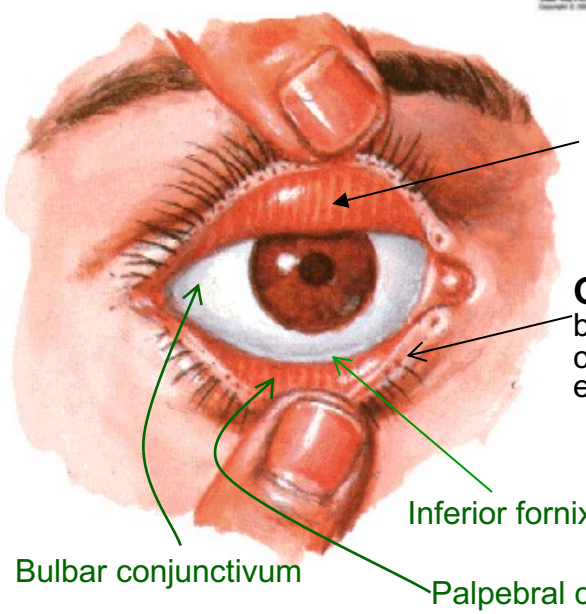
- **Upper & lower eyelids**
- **Eyelash**
- **Medial & lateral angle / canthus**
- **Upper & lower lacrimal punctum**



THE LAYER OF EYELID

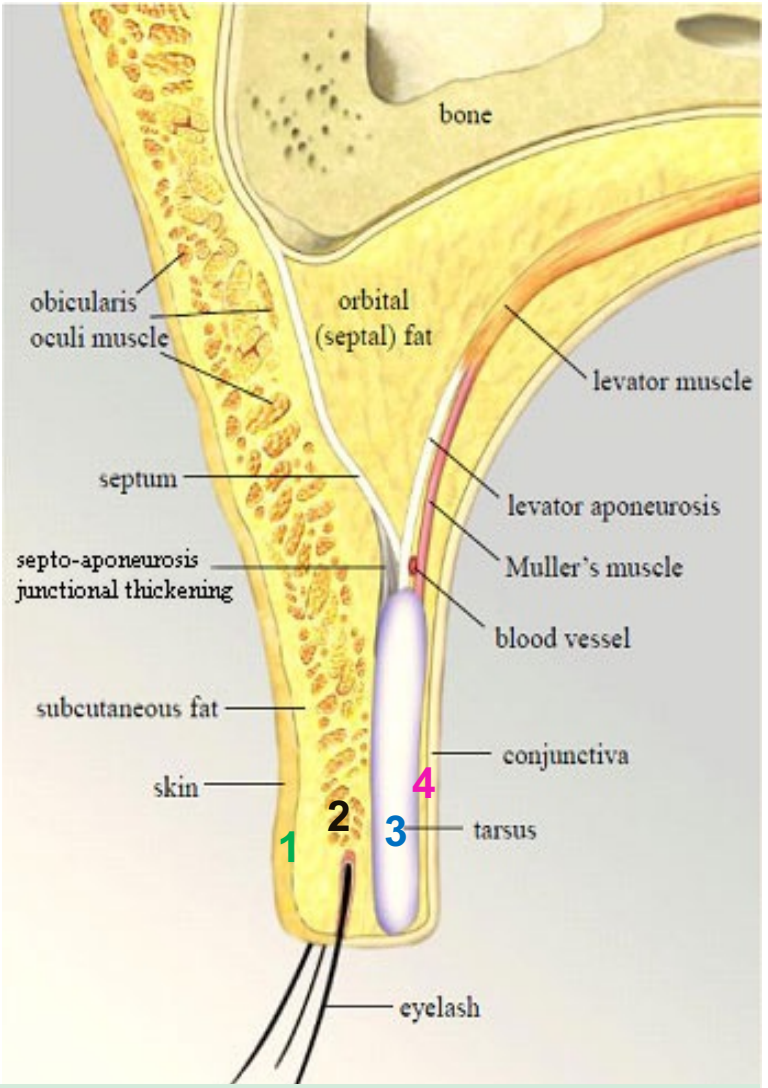






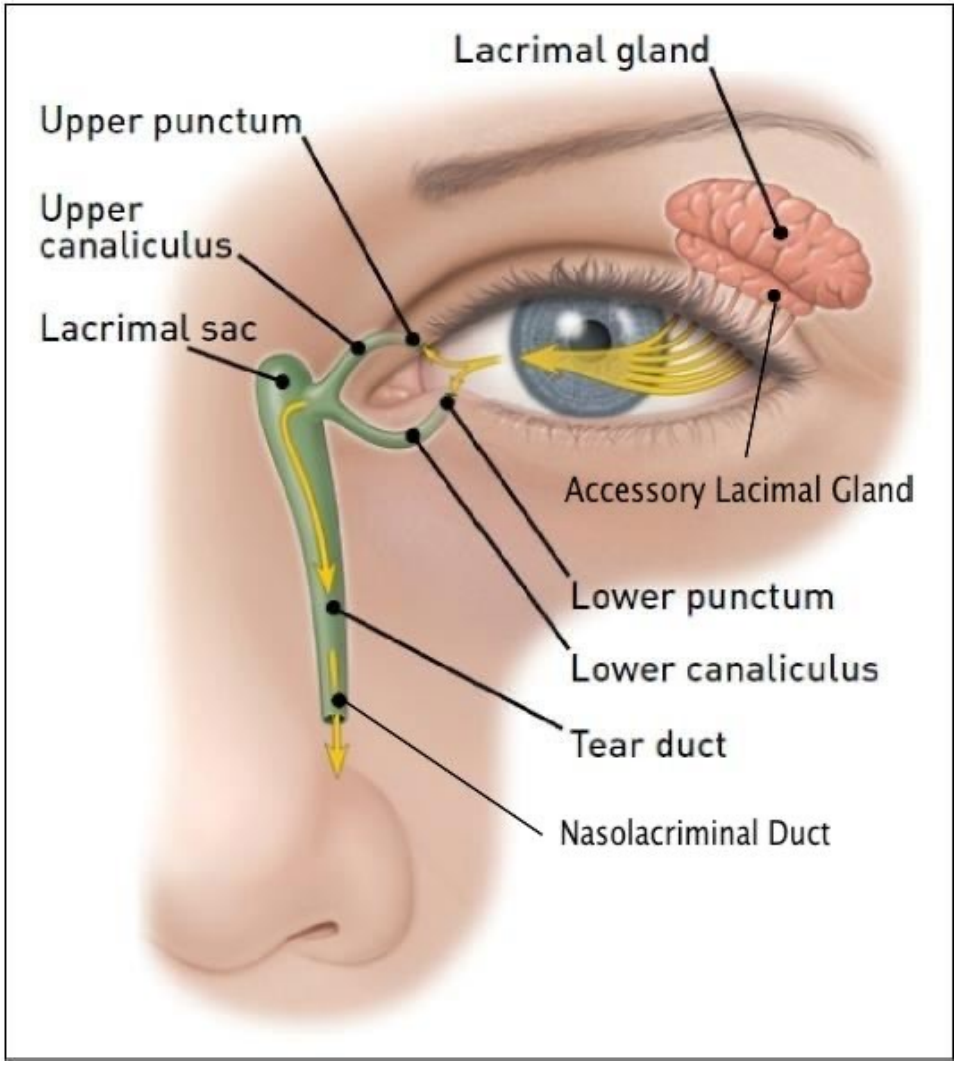
Palpebral conjunctivum
(thin membrane cover posterior of eyelid)

Gray line - demarcated between conjunctiva and cutaneous portions of eyelid



1-skin & subcutaneous tissue
2-muscular layer
3-tarsofascial layer
(tarsus & orbital septum)
4-palpebral conjunctivum

LACRIMAL APPARATUS



FLOW OF TEARS

Lacrimal gland

↓

Lacrimal ducts

↓

Sup. or inf. lacrimal canal

↓

Lacrimal sac

↓

Nasolacrimal duct

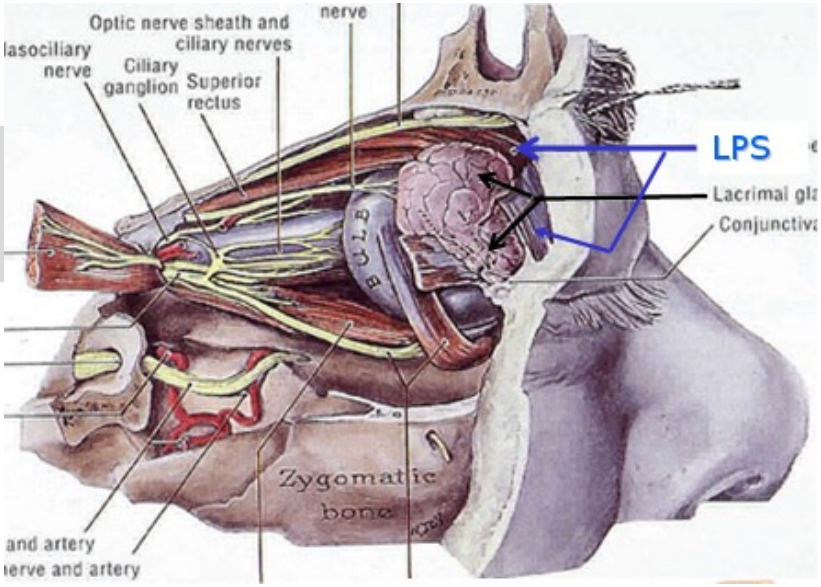
↓

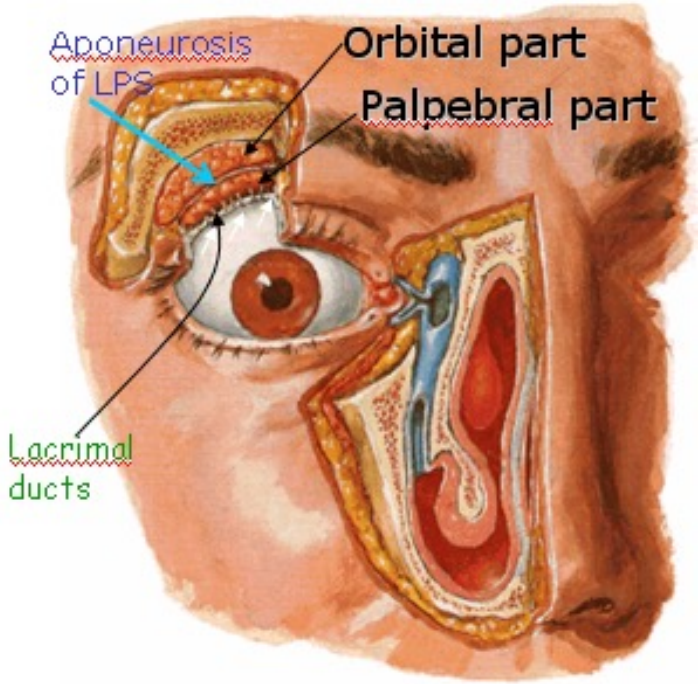
Nasal cavity

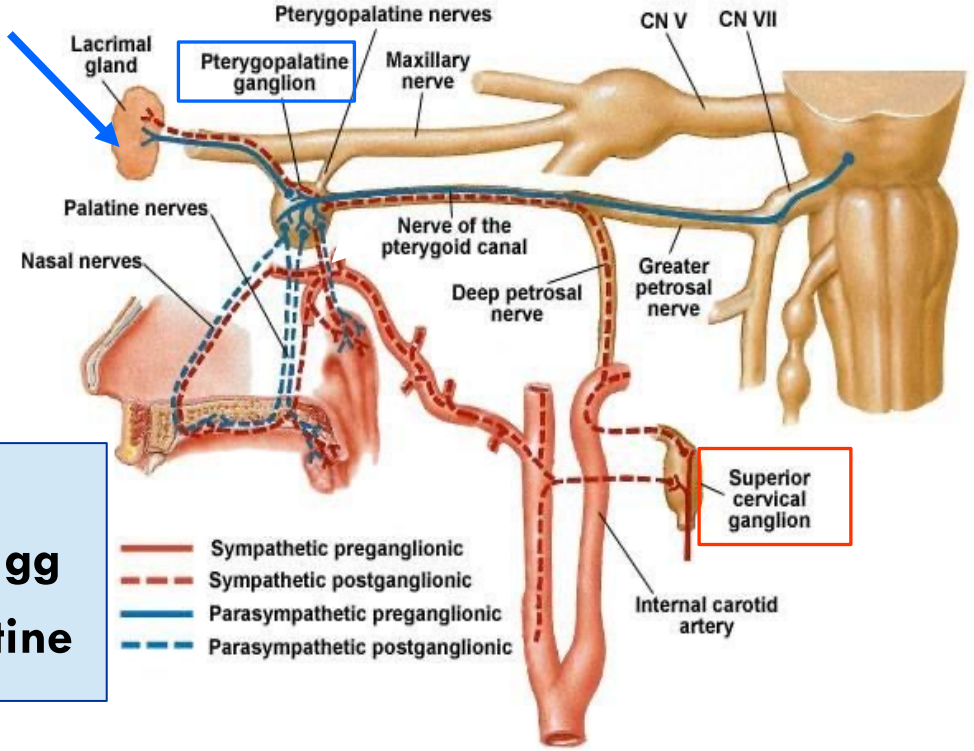
LACRIMAL GLAND

- ORBITAL PART
- PALPEBRAL PART

Separate by aponeurosis of levator palpebral superioris muscle (LPS)



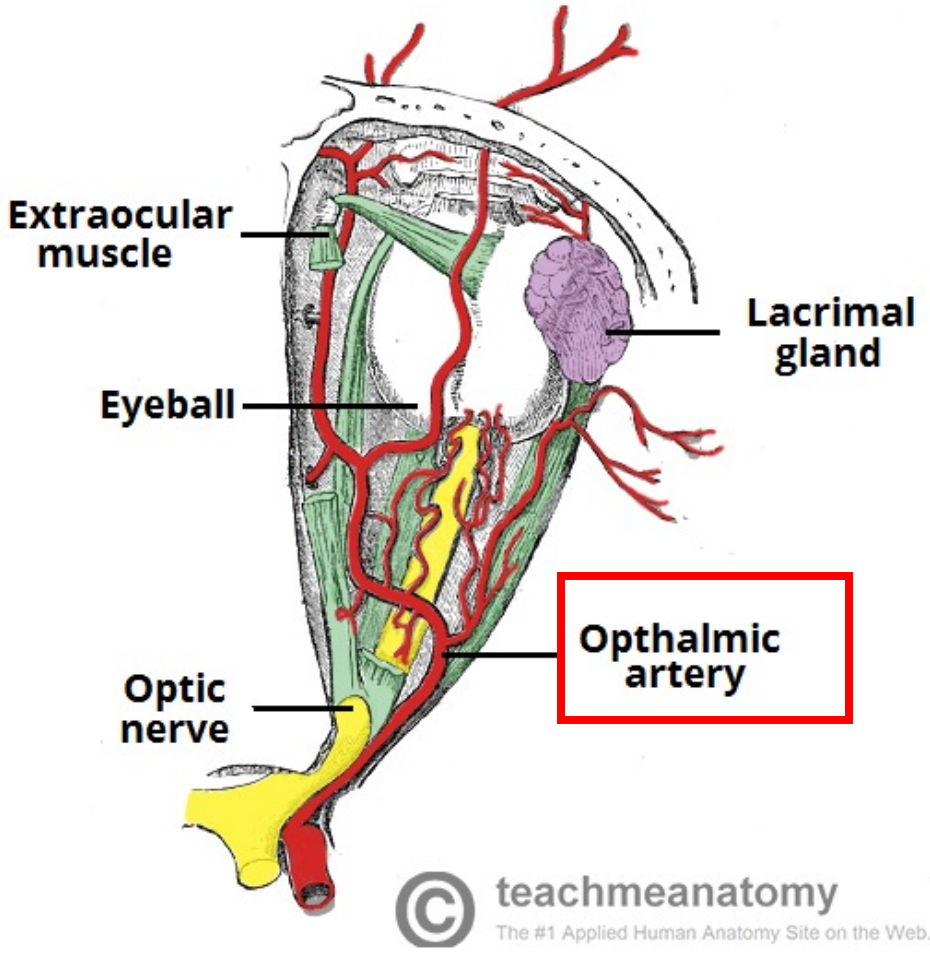




Nerve supply

- **Sympathetic nerve : superior cervical gg**
- **Parasympathetic nerve : pterygopalatine gg**

BLOOD VESSELS OF LACRIMAL GLAND

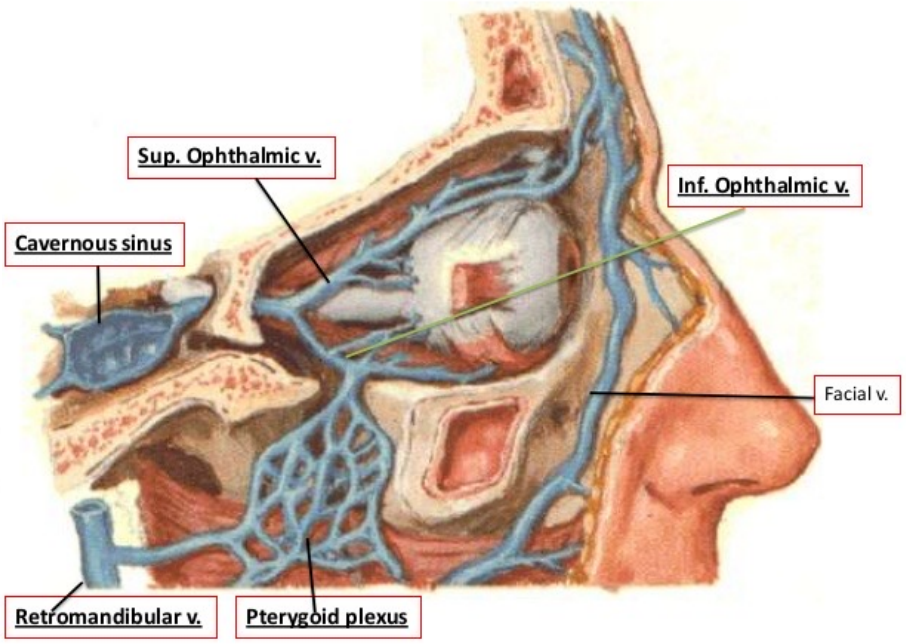


Artery supply

- Branches from the ophthalmic artery

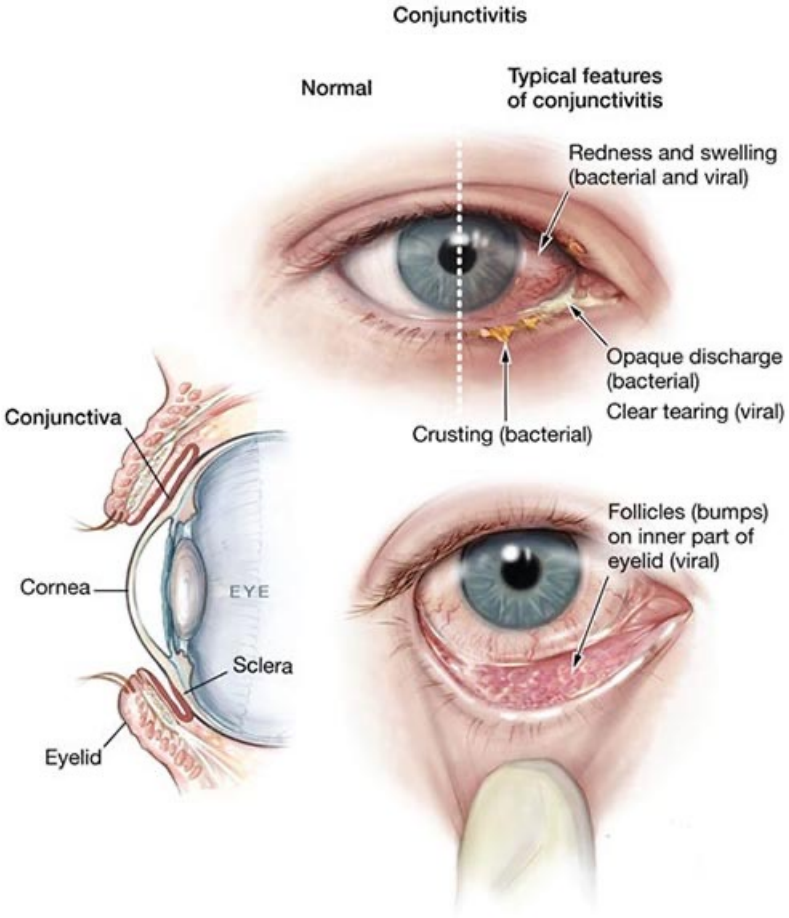
Venous drainage

- Through the ophthalmic vein



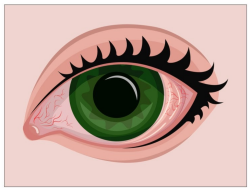
CONJUNCTIVITIS

Is the inflammation or infection of the transparent membrane that lines your eyelid and eyeball.



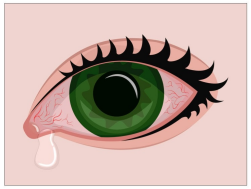
Types of conjunctivitis

Allergic conjunctivitis



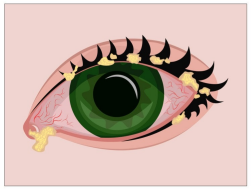
- there is itching and redness of the eye, swelling of the conjunctiva and the eyelid

Viral conjunctivitis



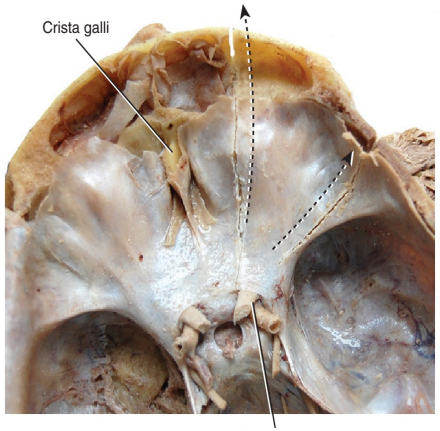
- redness of the eyes and periodic itching, increased lacrimation

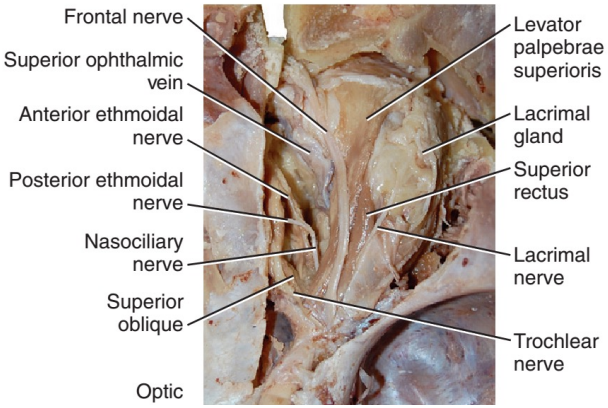
Bacterial conjunctivitis

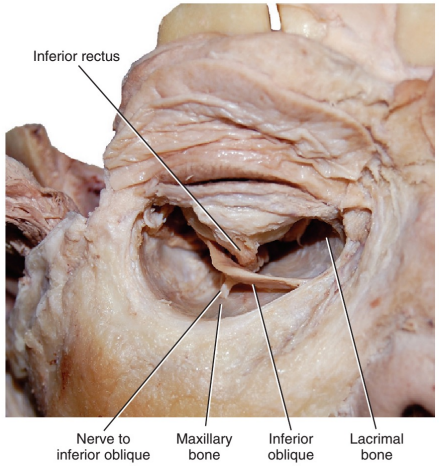


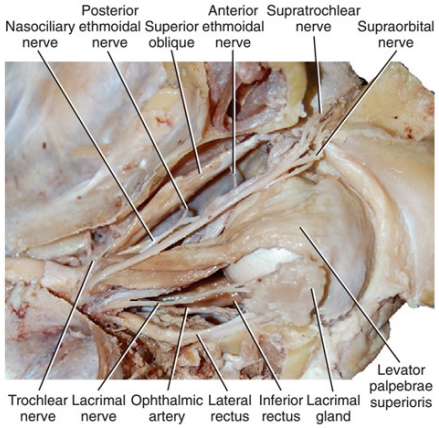
- redness, dryness of the eyes and the skin around them, mucopurulent discharge

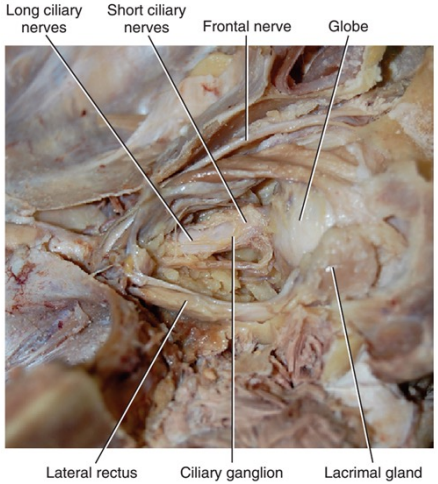


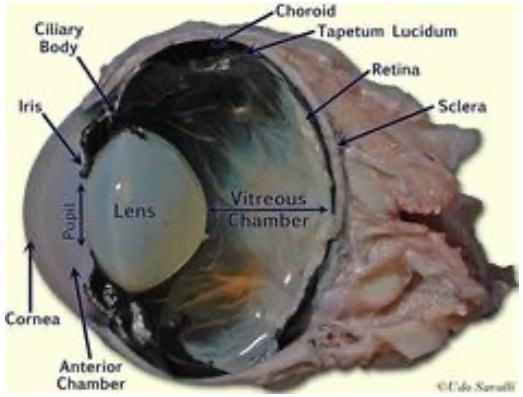












THE END

Jirattikarn.kae@mahidol.ac.th