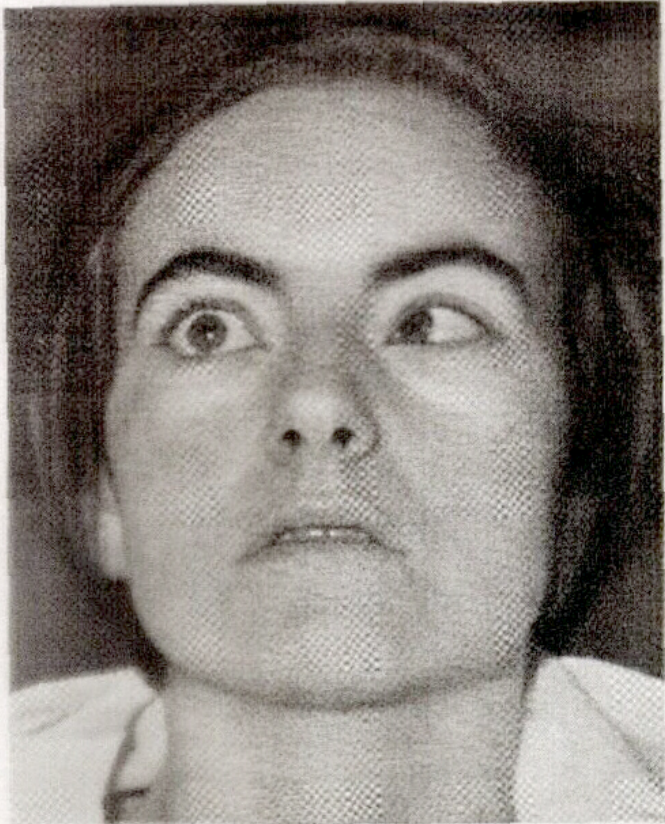


**ABDUCENS NERVE
(CN VI) PALSY**



ORBIT

OUTLINE

- I. FORAMINA (OPENINGS) OF ORBIT
- II. EYELIDS
- III. LACRIMAL APPARATUS
- IV. FASCIAL SHEATH
OF EYEBALL
- V. STRUCTURE OF EYE
- VI. EXTRAOCULAR MUSCLES/
EYE MOVEMENTS
- VII. CILIARY GANGLION
- VIII. NERVE DAMAGE

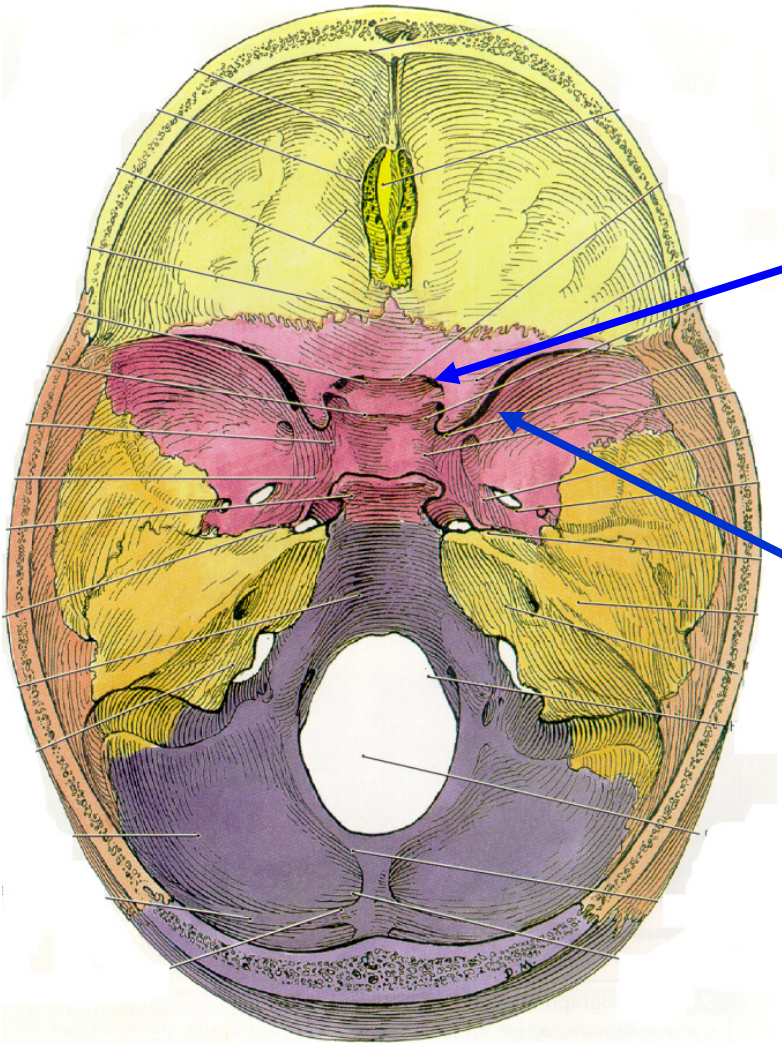
- **VISION REQUIRES COORDINATED MOVEMENTS
OF TWO EYES**
- **EYES/EYE MOVEMENTS USED DIAGNOSTICALLY**

B. FORAMINA OF ORBIT – structures entering orbit

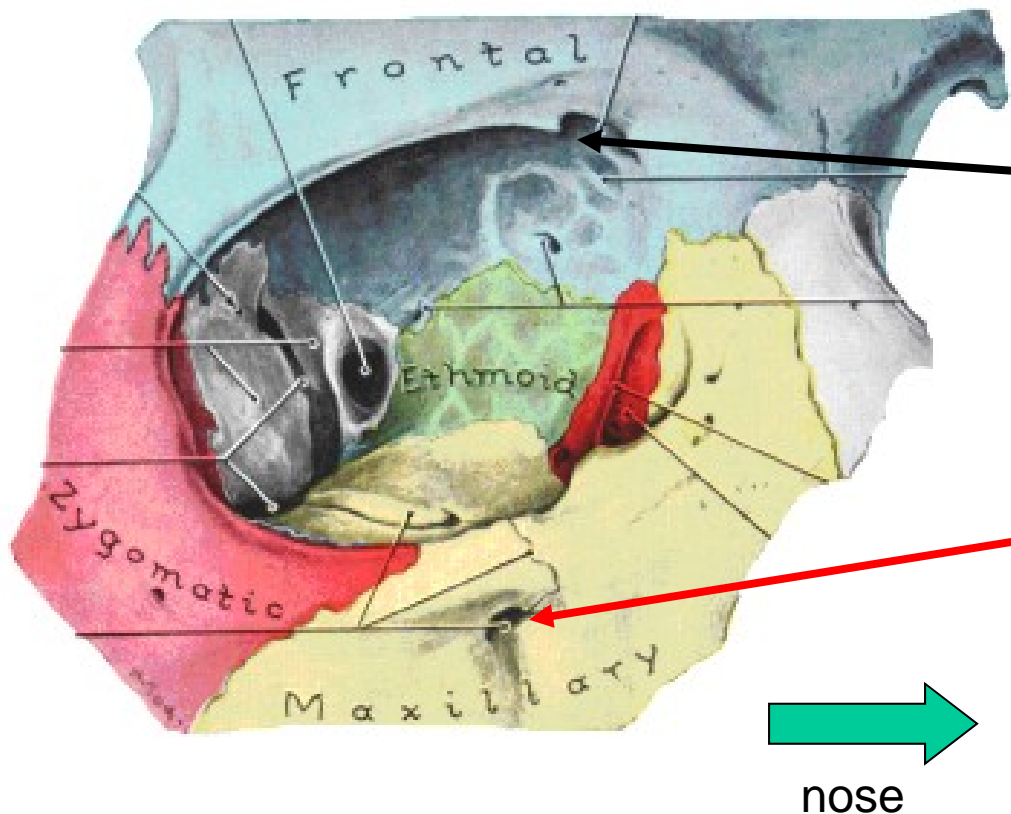
FORAMINA- MOST STRUCTURES ENTER ORBIT FROM MIDDLE CRANIAL FOSSA

1) OPTIC CANAL- IN BASE OF LESSER WING OF SPHENOID BONE, CONTAINS OPTIC NERVE (II) and OPHTHALMIC ARTERY

2) SUPERIOR ORBITAL FISSURE - BETWEEN GREATER AND LESSER WINGS OF SPHENOID, CONTAINS III, IV, V1, VI, OPHTHALMIC VEINS



B. FORAMINA OF ORBIT – pathways leaving orbit

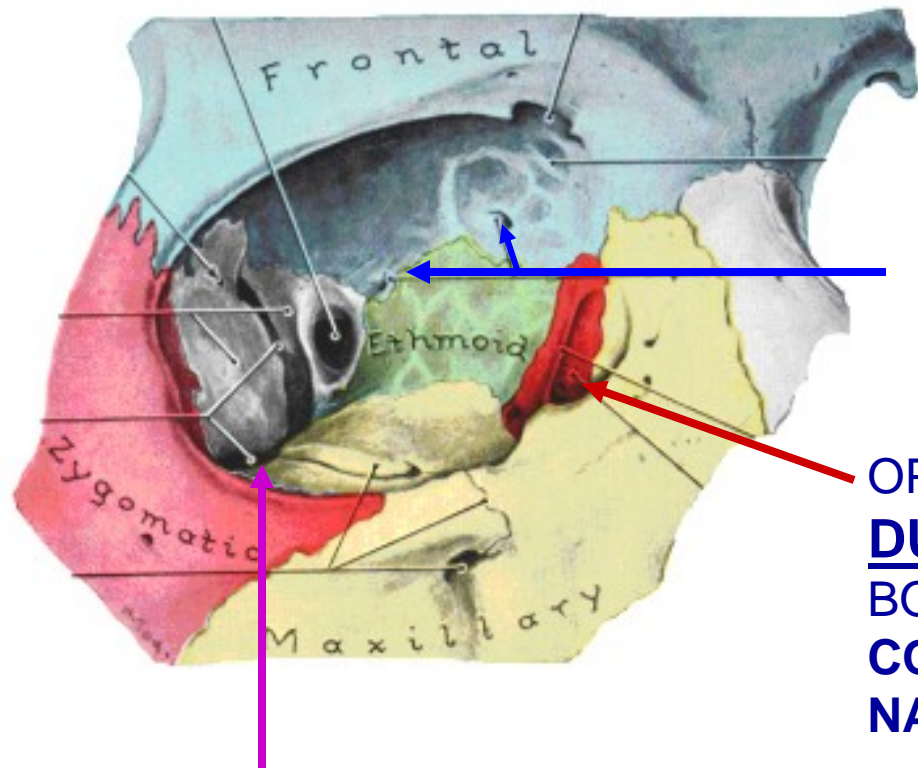


TO FACE, SCALP:

1) **SUPRAORBITAL NOTCH OR FORAMEN** - IN FRONTAL BONE CONTAINS SUPRAORBITAL N., A. and V. FROM V1, OPHTHALMIC artery and vein.

2) **INFRAORBITAL FORAMEN** - IN MAXILLARY BONE CONTAINS INFRAORBITAL N., A. and V. FROM V2 AND MAXILLARY artery.

C. FORAMINA OF ORBIT - pathways to Nasal Cavity



2) ANT. AND POST. ETHMOIDAL FORAMINA- BETWEEN ETHMOID AND FRONTAL BONES; CONNECT ORBIT AND NASAL CAVITIES
CONTAINS: ANT. AND POST. ETHMOIDAL N., A. and V. (br. Of V1 and OPHTHALMIC artery, vein)

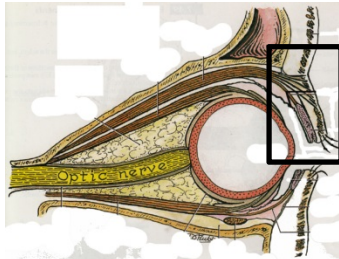
OPENING OF **3) NASOLACRIMAL DUCT**- IN MAXILLARY, LACRIMAL BONES AND INF. NASAL CONCHA;
CONTAINS: MEMBRANEOUS NASOLACRIMAL DUCT AND TEARS

NOTE: INFERIOR ORBITAL FISSURE - KNOW FOR NEXT BLOCK IN JANUARY

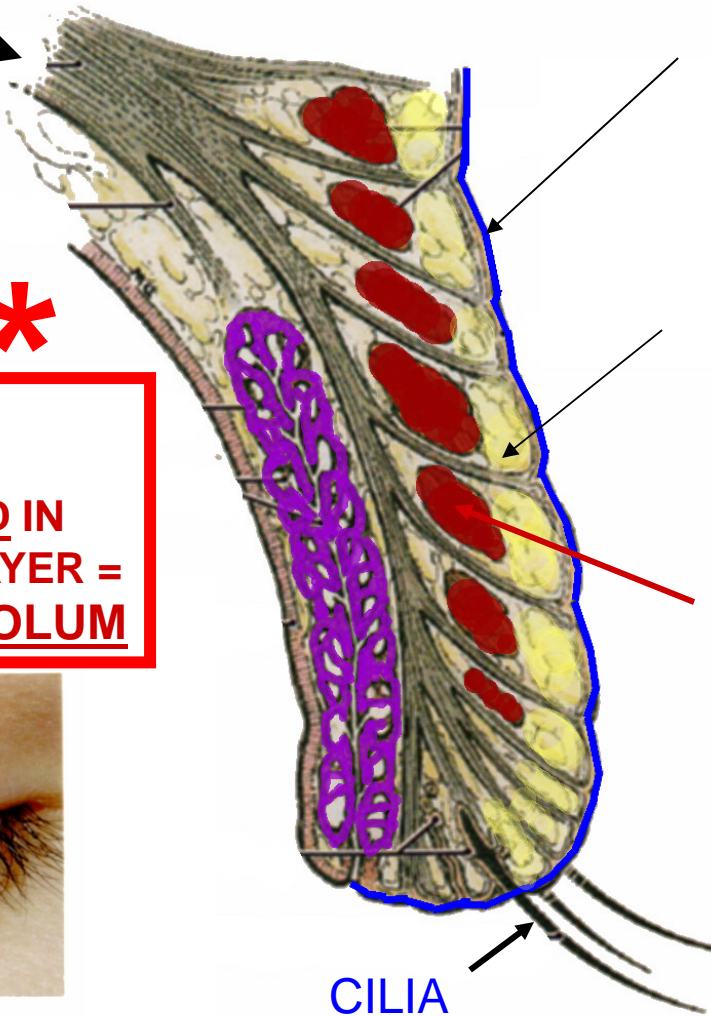


II. EYELIDS = PALPEBRAE - LAYERED

EYELIDS PROTECT EYE, MOVEABLE, KEEP CORNEA MOIST



ORIENT - EYELID
PARASAGITTAL
SECTION



1. SKIN - CONTAINS EYELASHES (CILIA) AND OPENINGS OF SEBACEOUS, SWEAT GLANDS;

2. SUBCUTANEOUS LAYER - CONNECTIVE TISSUE CONTAINS SEBACEOUS GLANDS; OBSTRUCTION = STYE OR HORDE'OLUM

3. ORBICULARIS OCULI (PALPEBRAL PART) - SKELETAL MUSCLE CLOSES EYE, INNERVATED BY VII - PARALYZE ORBICULARIS OCULI - CAN DAMAGE CORNEA

CLINICAL *

OBSTRUCTION or INFECTION OF SEBACEOUS GLAND IN SUBCUTANEOUS LAYER = STYE OR HORDE'OLUM



FIGURE 10-10
Acute hordeolum of upper eyelid.
From Palay, Krachmer, 1997.

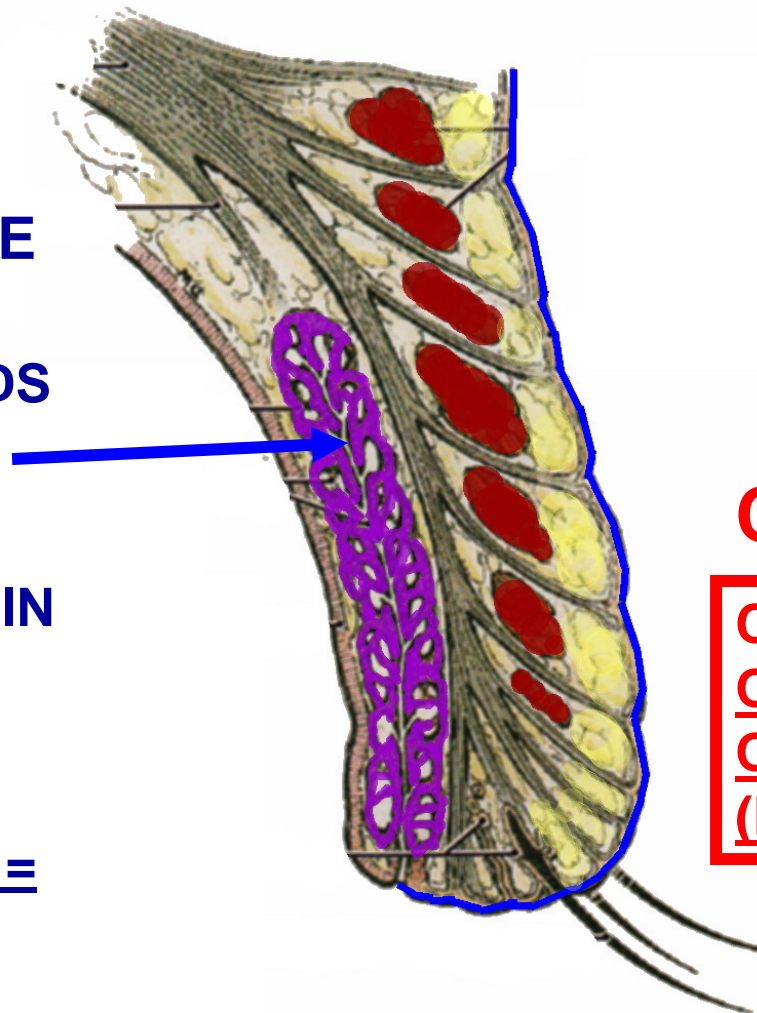
CILIA

EYELIDS - LAYERS

4B. TARSAL PLATE - FIBROUS CT 'SKELETON' OF EYELID, DEEP TO ORBITAL SEPTUM

TARSAL PLATE
- CONTAINS
TARSAL GLANDS
(Meibomian glands)

- KEEP TEARS IN EYE, PREVENT
EVAPORATION
OF TEARS -
OBSTRUCTION =
CHALAZION



CHALAZION

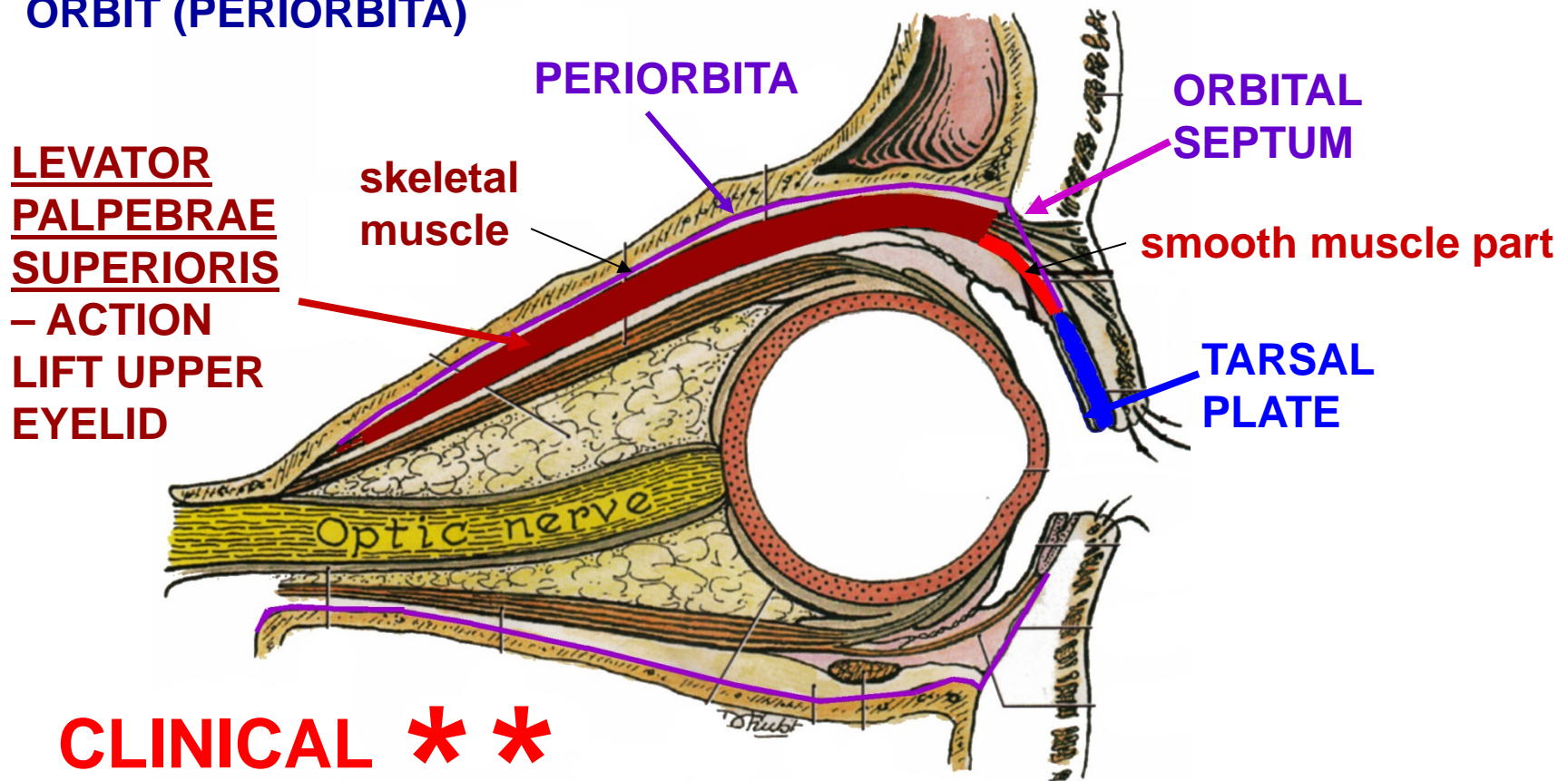


CLINICAL *

CHALAZION:
OBSTRUCTION
OF TARSAL
(MEIBOMIAN) GLAND

EYELIDS - LAYERS

4A. ORBITAL SEPTUM - CT LAYER CONTINUOUS WITH PERIOSTEUM OF ORBIT (PERIORBITA)

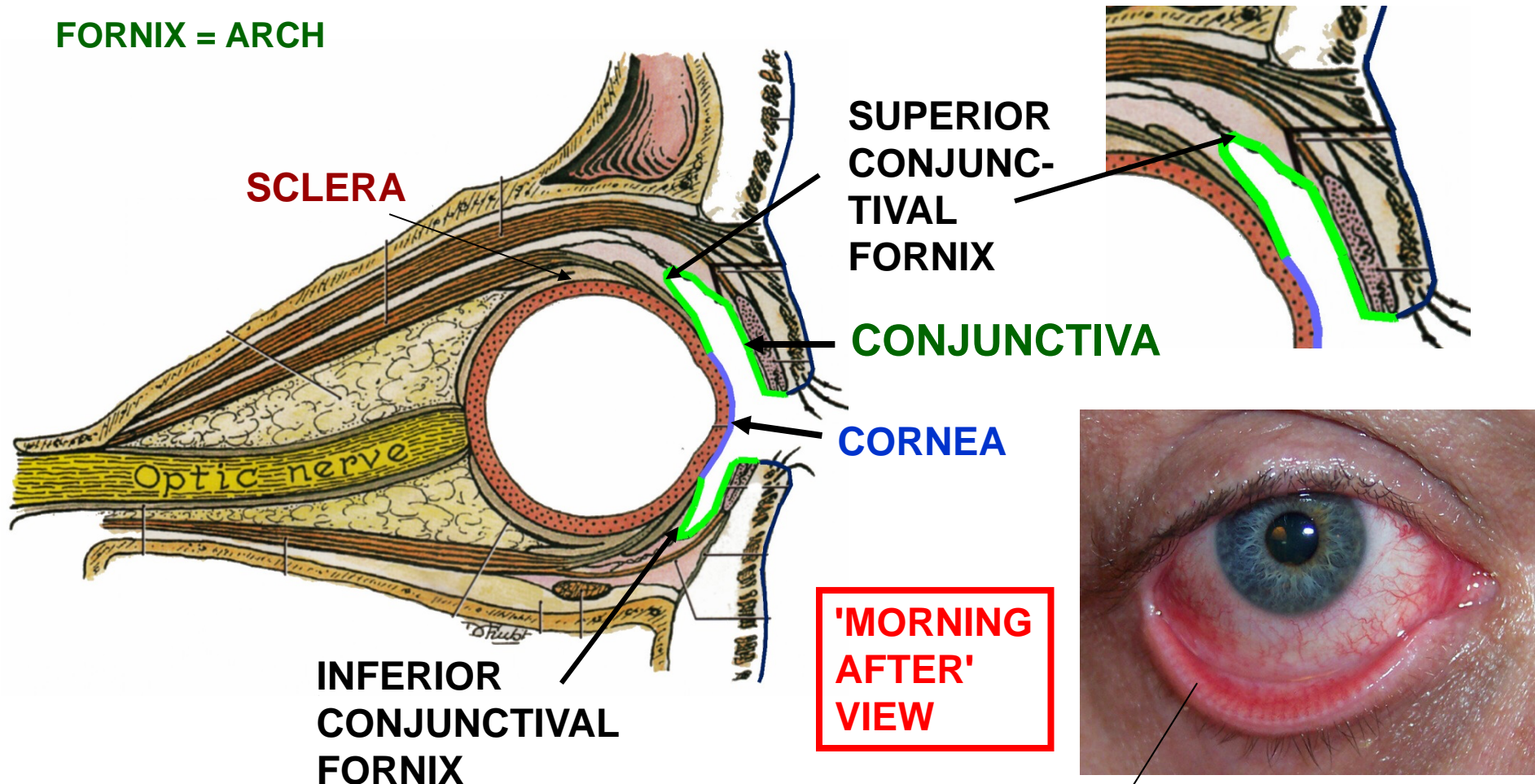


CLINICAL * *

4C. LEVATOR PALPEBRAE SUPERIORIS MUSCLE - ORIGIN FROM TENDINOUS RING - COMPOSED OF SKELETAL (CN III) AND **SMOOTH (SYMPATHETICS)** MUSCLE PARTS - damage either part: **EYELID DROOP = PTOSIS- DAMAGE III OR SYMPATHETICS**

5) CONJUNCTIVA - CLEAR MEMBRANE COVERING INSIDE OF LID - FUSES TO SCLERA - REFLECTED TO CORNEA OF EYE AT FORNICES

FORNIX = ARCH

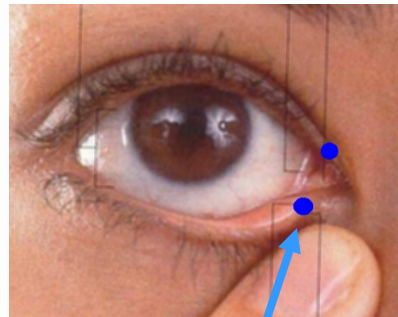
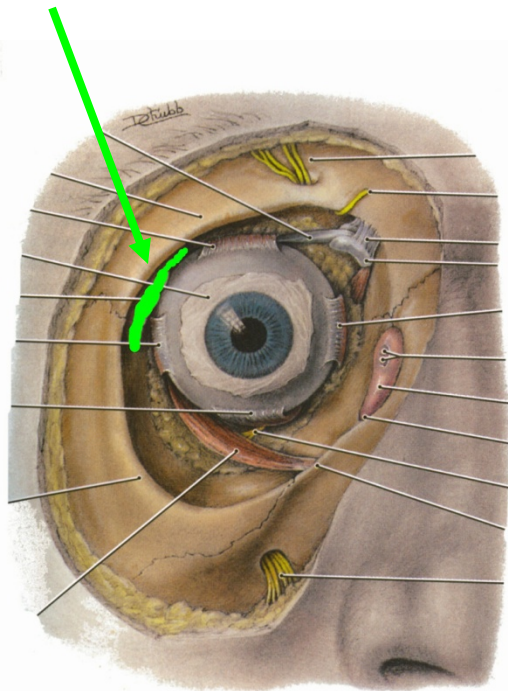


FORNIX = LATIN FOR ARCH, VAULT

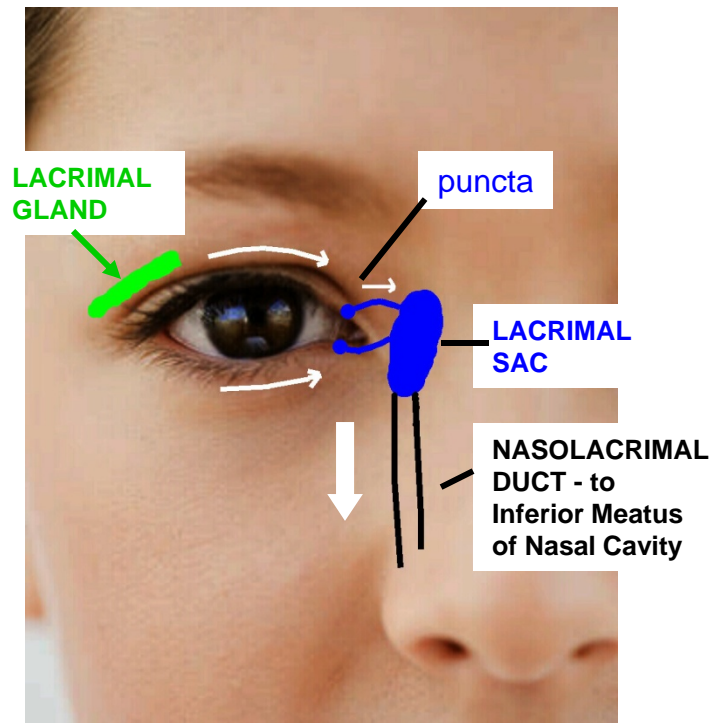
Conjunctivitis (Pinkeye) - inflammation of conjunctiva

III. LACRIMAL APPARATUS

A. LACRIMAL GLAND - LOCATED IN SUPEROLATERAL ORBIT - OPENS BY DUCTS (~12) THROUGH CONJUNCTIVA TO SUPERIOR FORNIX - TEARS CONSTANTLY PRODUCED

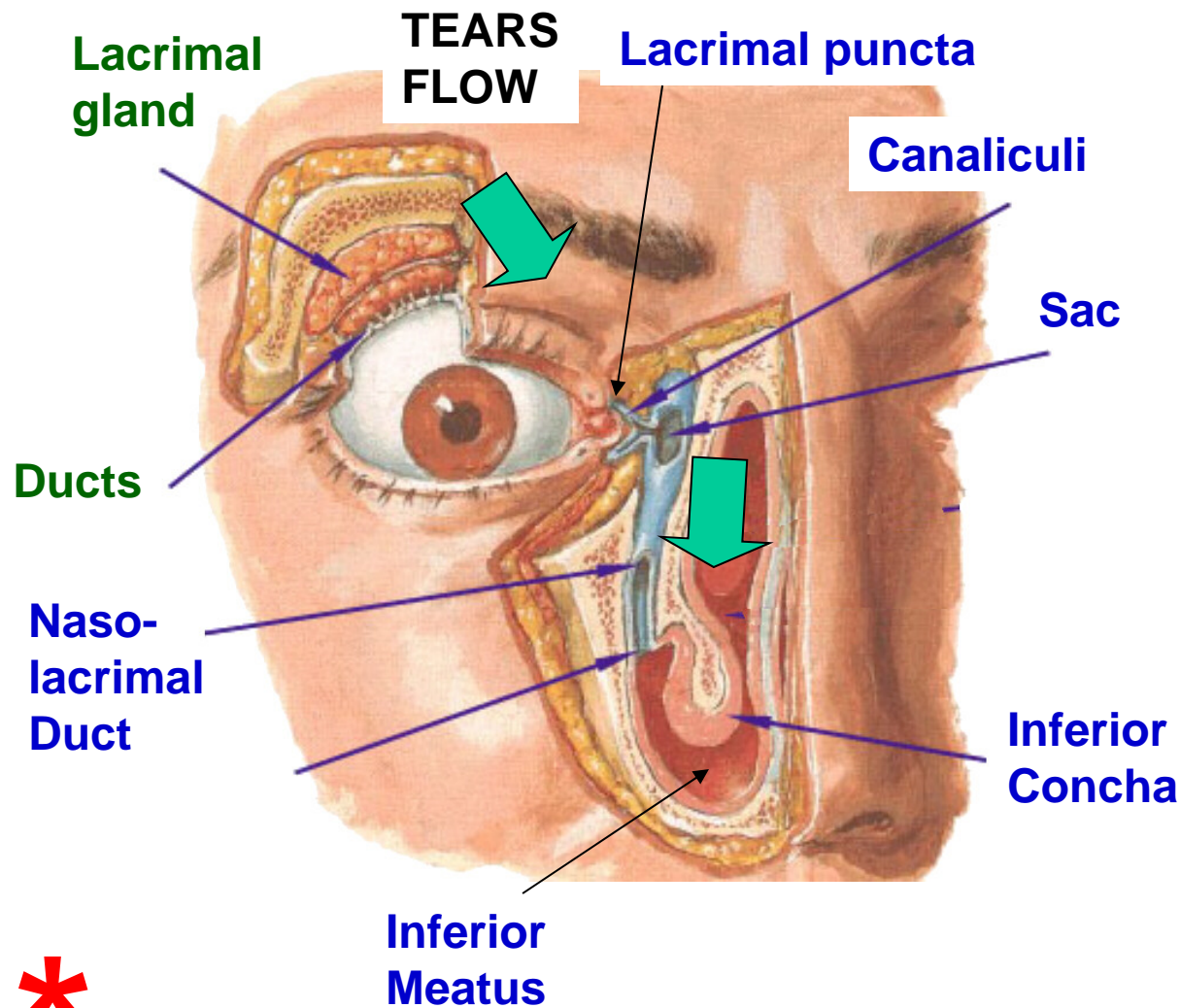


LACRIMAL PUNCTA



- TEARS DRAIN THROUGH LACRIMAL PUNCTA TO LACRIMAL SAC TO NASOLACRIMAL DUCT TO INFERIOR MEATUS OF NASAL CAVITY B. LAC. GLAND INNERVATED BY VII - COMPLEX PATHWAY

DRAINAGE OF TEARS

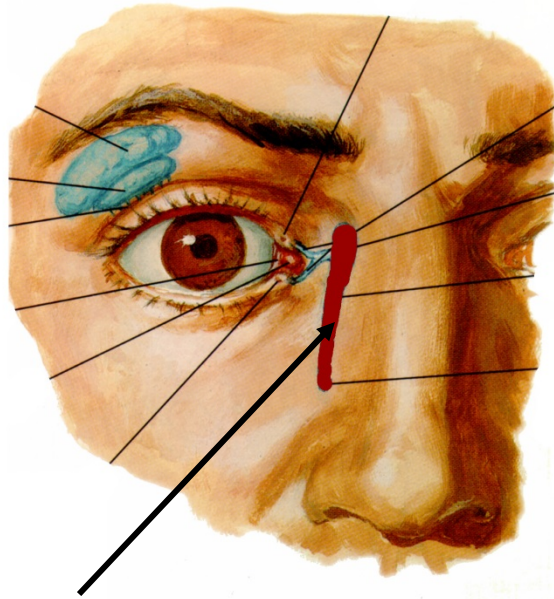


- TEARS FLOW ACROSS EYE TO LACRIMAL PUNCTA ON MEDIAL END OF EYELIDS (eyelids meet at MEDIAL CANTHUS);
- TEARS THEN PASS THROUGH LACRIMAL CANALICULI TO LACRIMAL SAC;
- SAC CONNECTS TO NASOLACRIMAL DUCT WHICH DRAINS TO INFERIOR MEATUS OF NASAL CAVITY



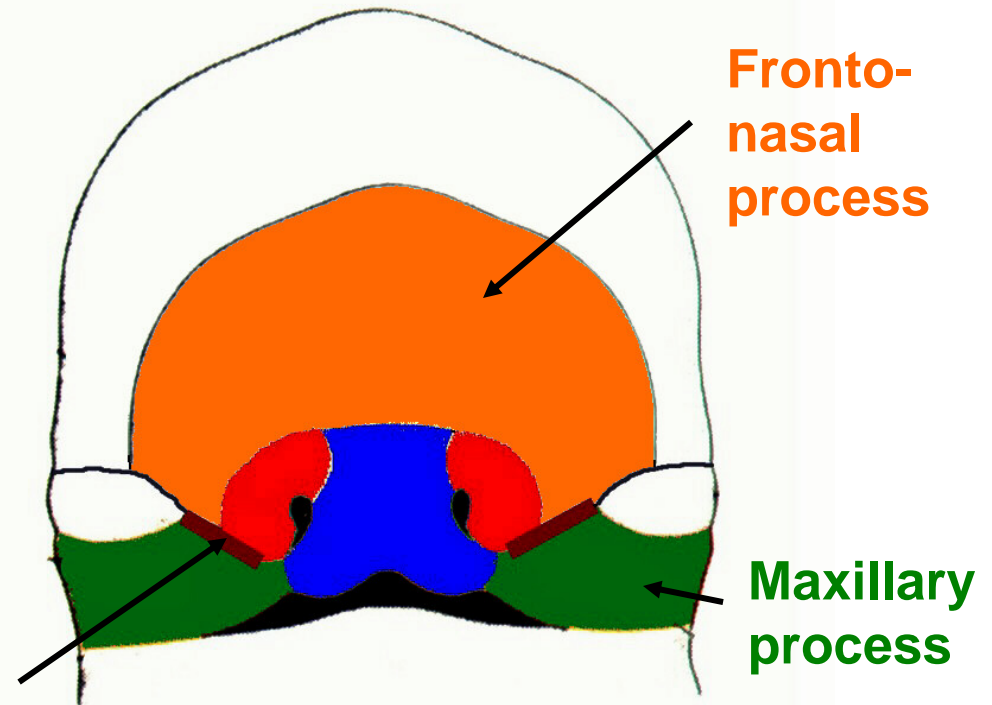
LACRIMAL GLAND IS INNERVATED BY VII - FACIAL NERVE;
BLOCK VII - DECREASE TEARS; PRESSURE/IRRITATION VII - EXCESSIVE TEARS

DEVELOPMENT: OBSTRUCTED NASOLACRIMAL DUCT



NASOLACRIMAL DUCT

- extends from Medial Canthus of eye to Inferior Meatus of nasal cavity

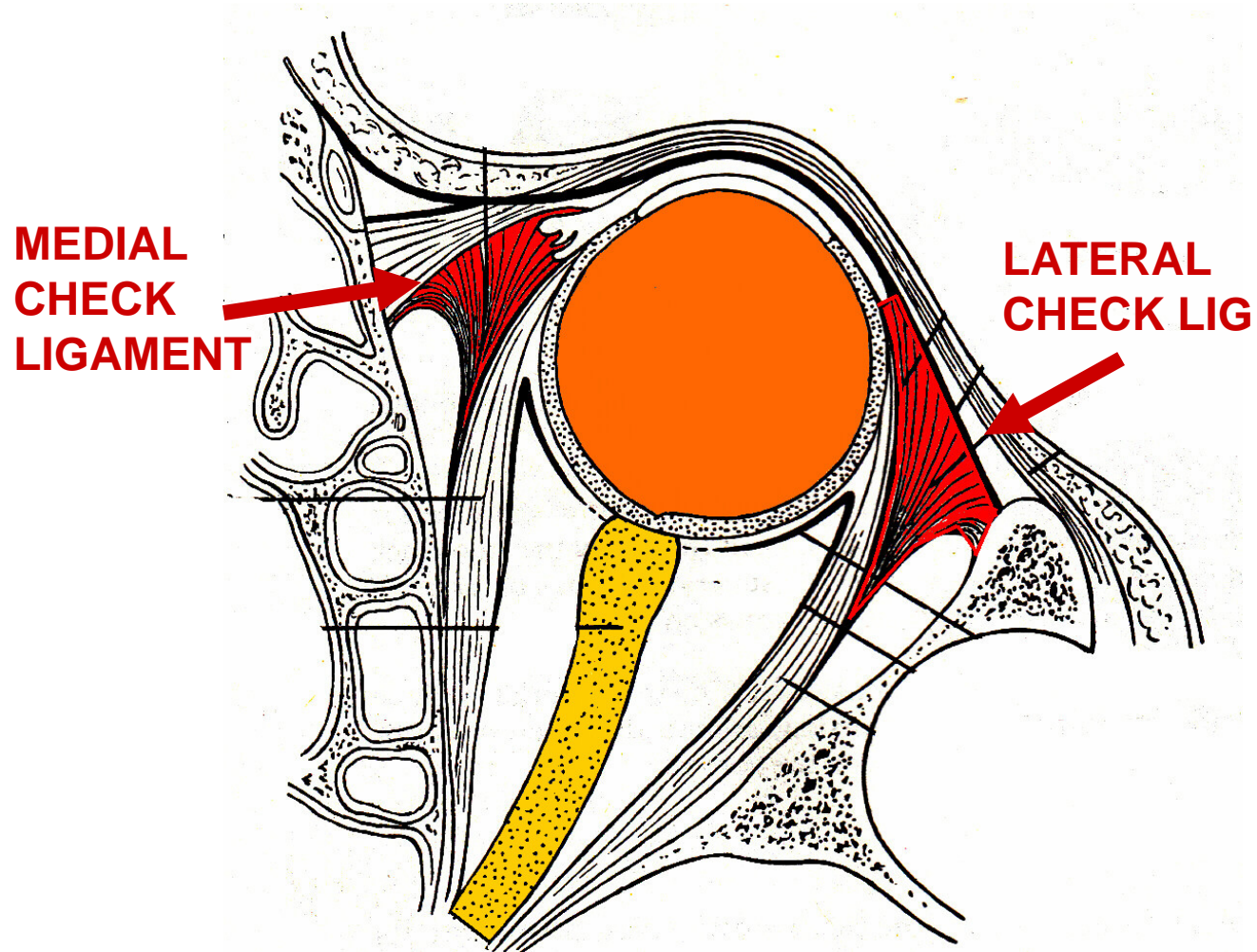


- Develops as a fold between maxillary process and frontonasal process
- then forms a solid cord that becomes canalized.

Obstructed Duct - failure of duct to canalize; tears drain over lower eyelid to face; opened surgically for tears to drain to nasal cavity

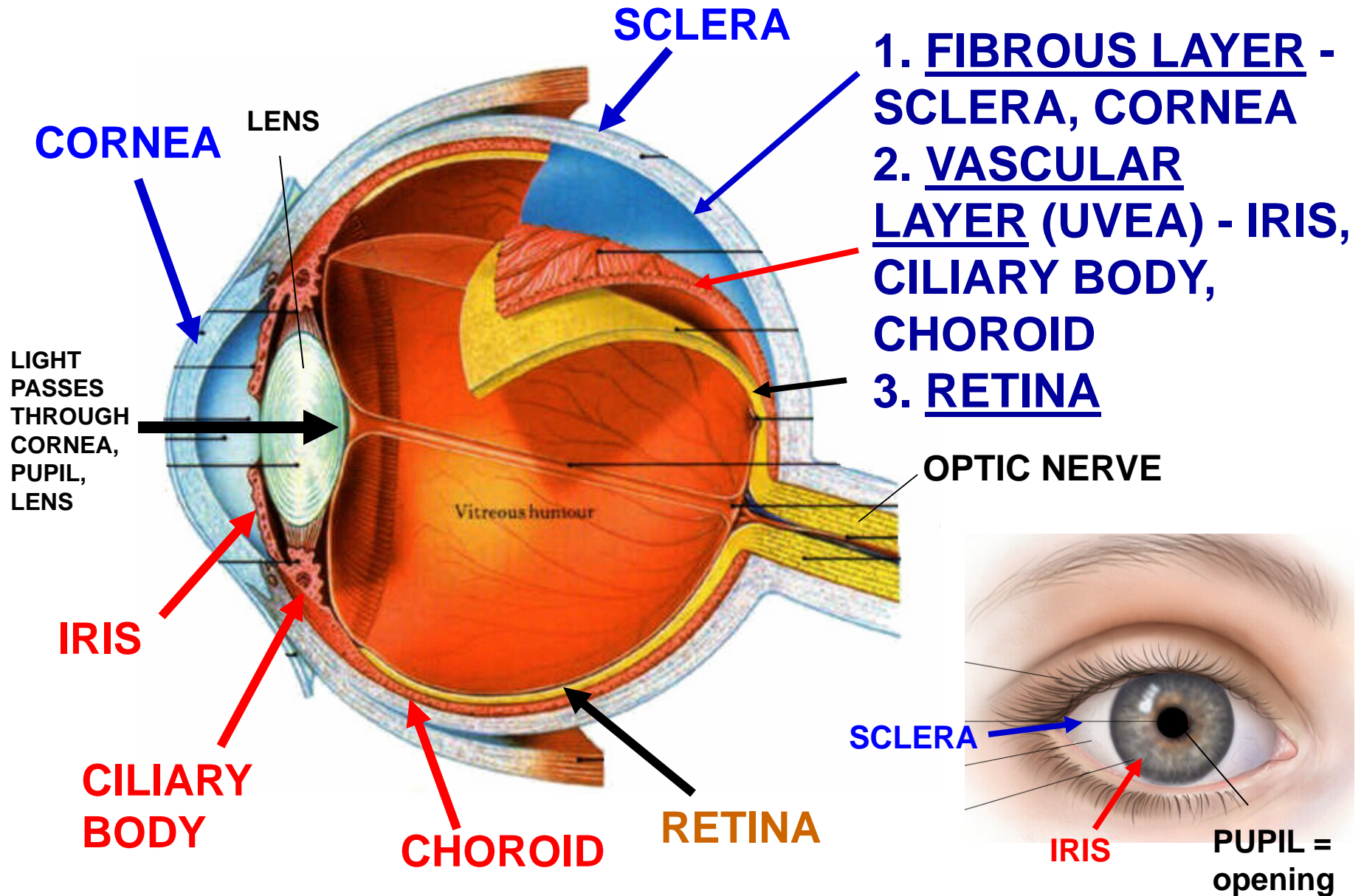
IV. FASCIAL SHEATH OF EYE

NOSE



= TENON'S
CAPSULE - THIN
MEMBRANE
SURROUNDS
BACK OF EYE -
THICKENINGS -
MEDIAL AND
LATERAL
CHECK
LIGAMENTS -
PREVENT
EXCESSIVE
ROTATION

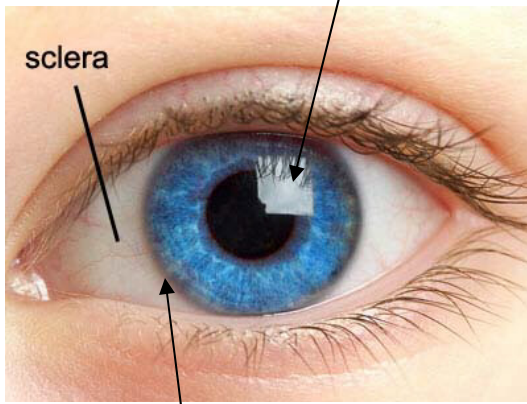
V. STRUCTURE OF EYE - 3 LAYERS



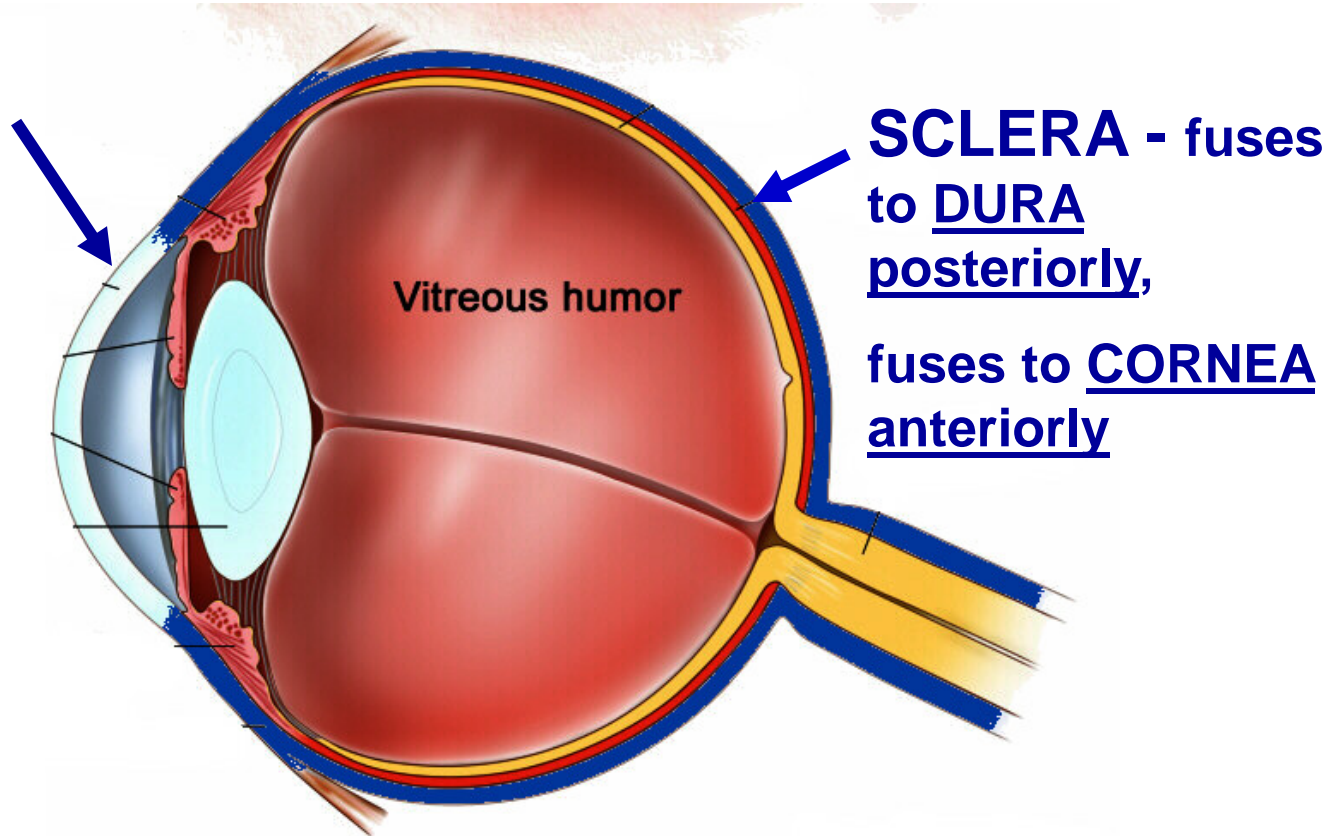
EYE- STRUCTURE OF EYEBALL- FIBROUS LAYER

A) SCLERA - TOUGH, SMOOTH WHITE FIBROELASTIC CT LAYER;
SURROUNDS EYE; PIERCED BY VESSELS AND NERVES;
FUNCTIONS- MAINTAIN EYE SHAPE, ATTACHMENT OF MUSCLES

**CORNEA -
clear layer**

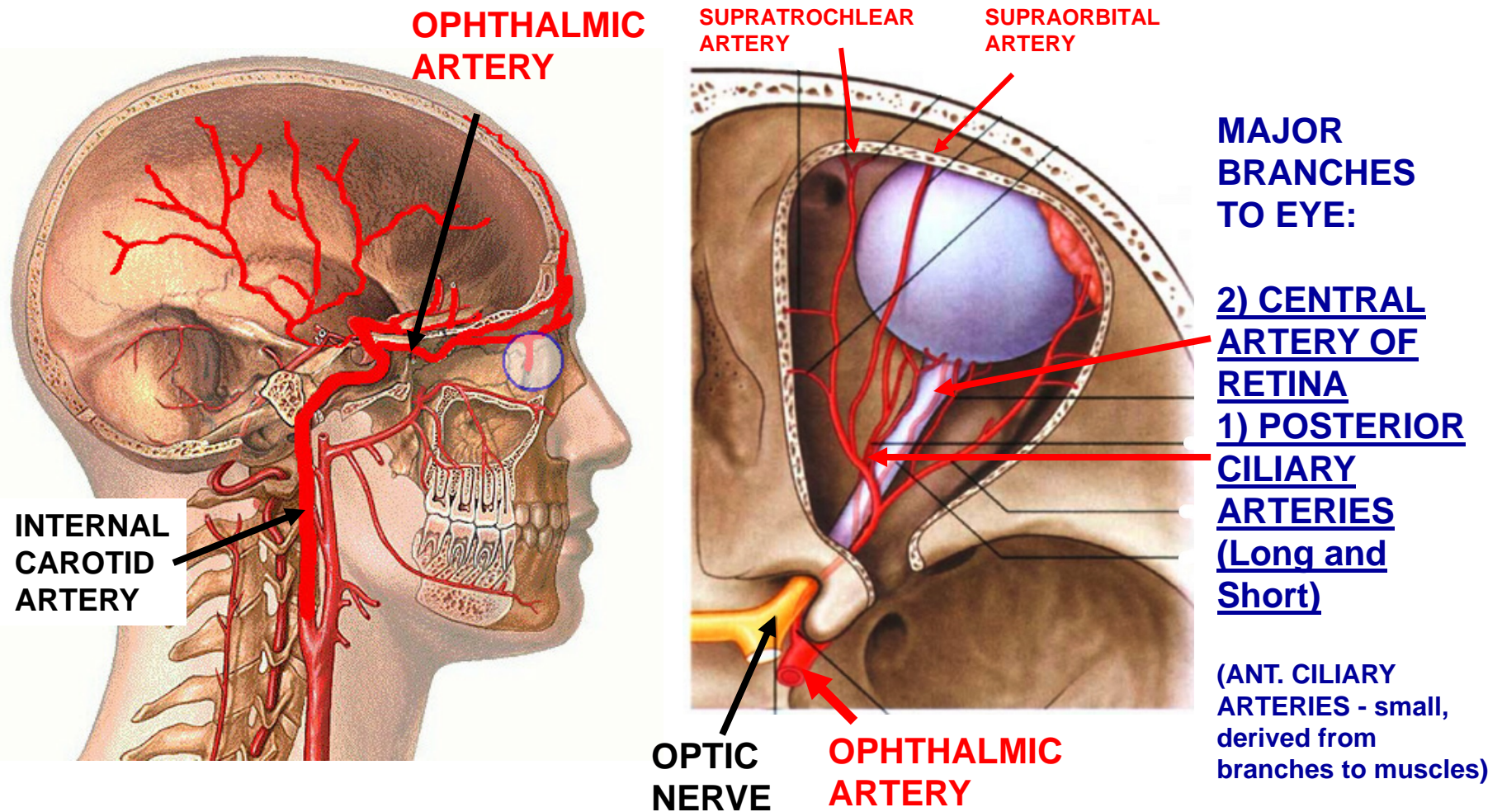


**LIMBUS - junction of
sclera and cornea**



B) CORNEA - AVASCULAR, TRANSPARENT LAYER OVER ANTERIOR
EYE - AIDS IN FOCUSSING LIGHT; **IRREGULARITIES - ASTIGMATISM**

BLOOD SUPPLY TO ORBIT: OPHTHALMIC ARTERY



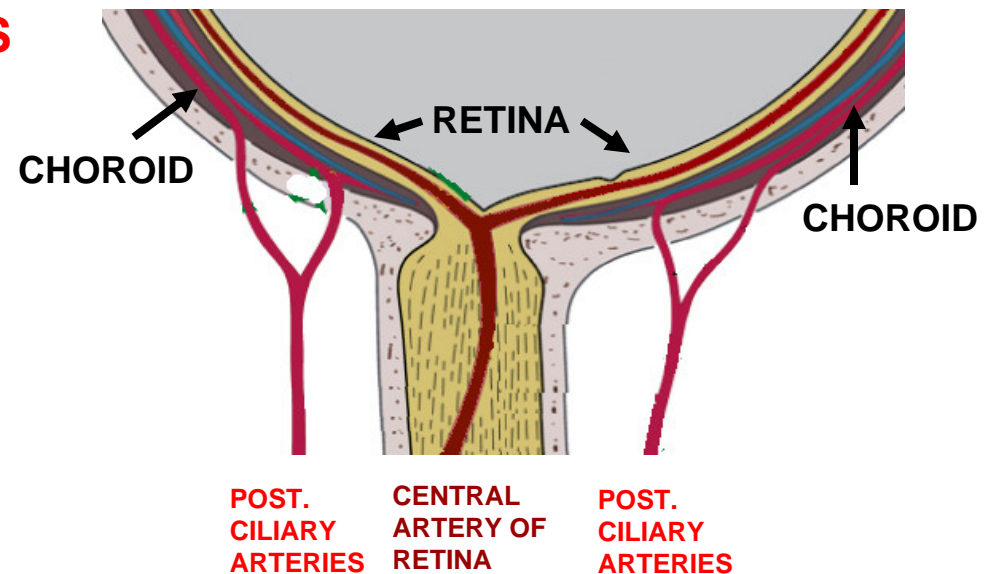
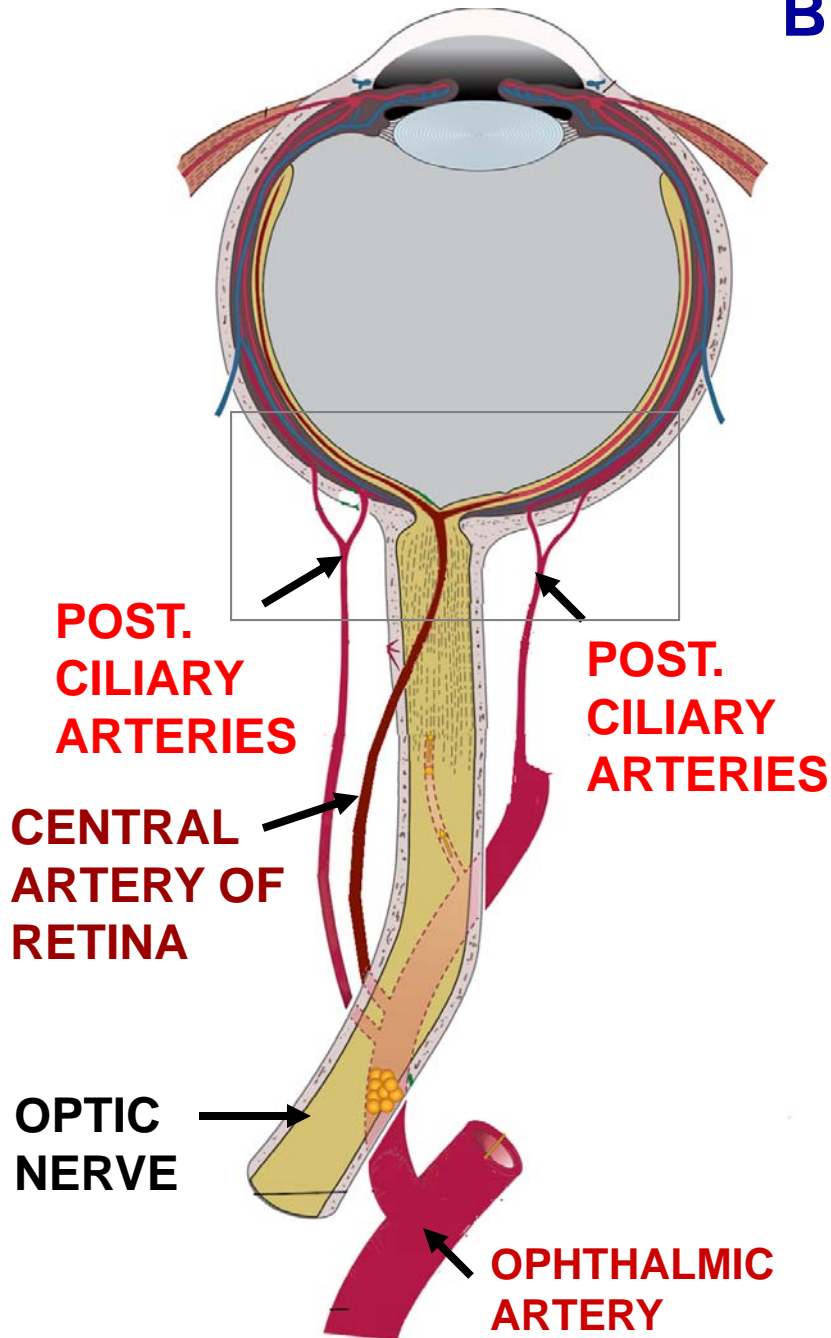
Note: Branches of Ophthalmic Artery supply eye: Posterior Ciliary Arteries and Central Artery of Retina enter posterior side of Eyeball

BLOOD SUPPLY TO EYE

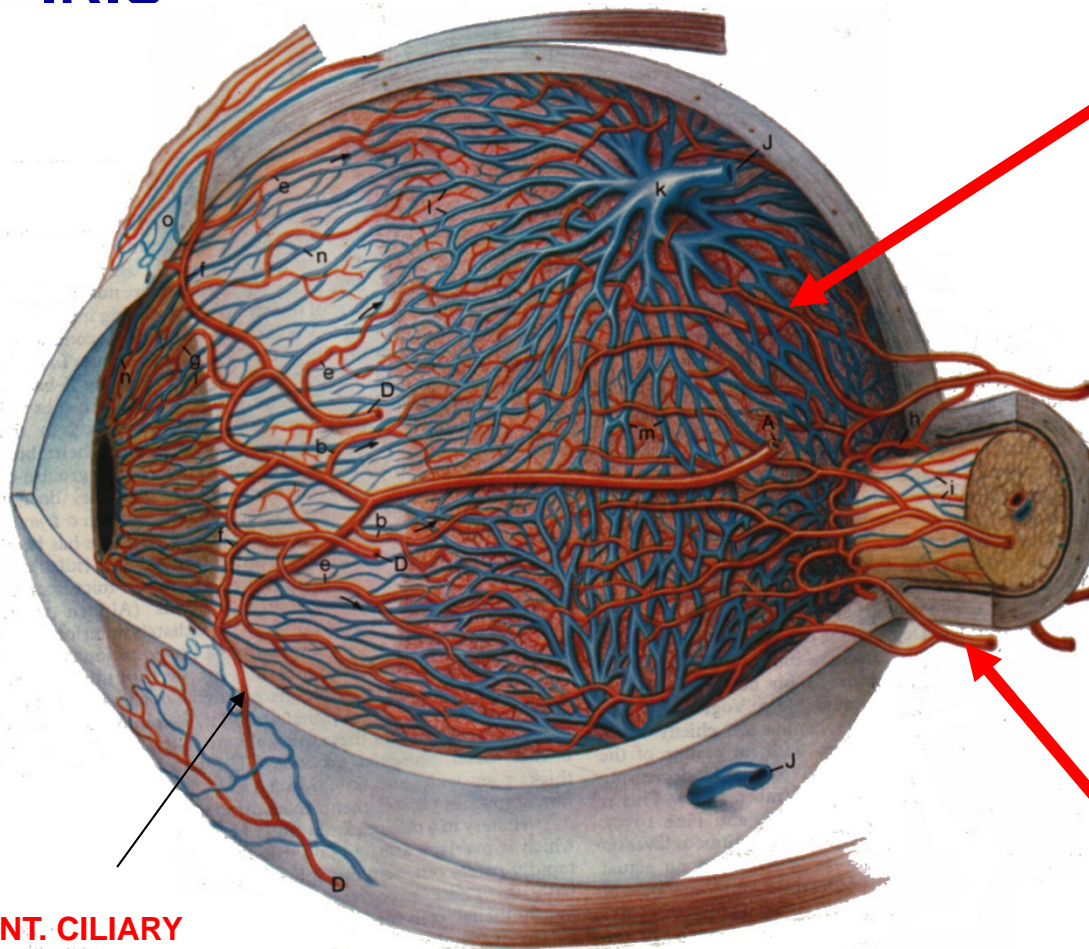
BRANCHES TO EYE:

- 1) POSTERIOR CILIARY ARTERIES - pierce sclera; blood to choroid, photoreceptors
- 2) CENTRAL ARTERY OF RETINA - pierces Optic nerve; blood to neural retina

CENTRAL ARTERY OF RETINA - end artery (no anastomosis)



EYE - STRUCTURE OF EYEBALL - VASCULAR LAYER = UVEAL TRACT (UVEA) = CHOROID, CILIARY BODY, IRIS



ANT. CILIARY
ARTERIES - small

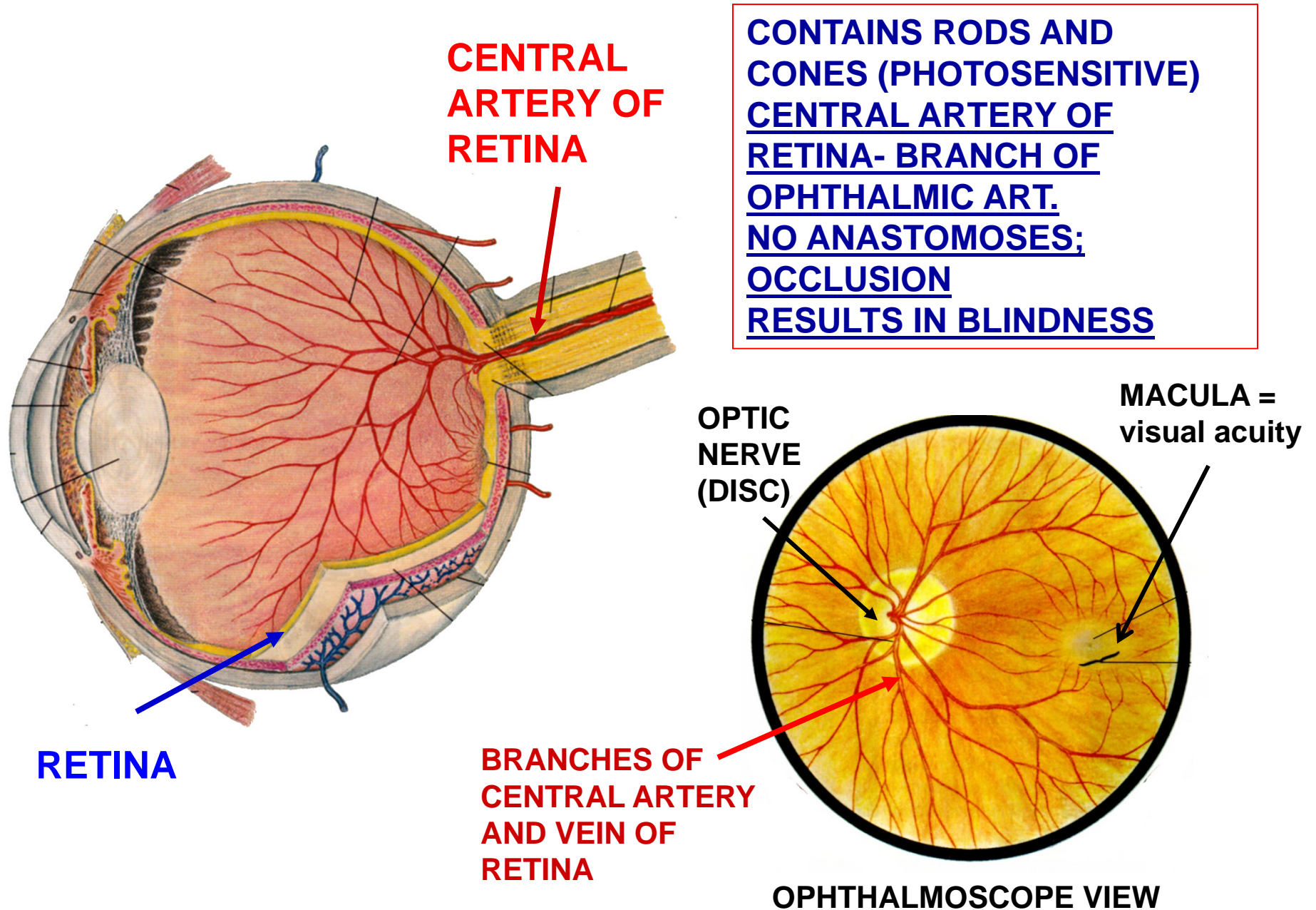
uva = L. grape

A. CHOROID -
HIGHLY VASCULAR,
PIGMENTED:
FUNCTIONS:
PROVIDE O₂,
NUTRIENTS TO
PHOTORECEPTORS.

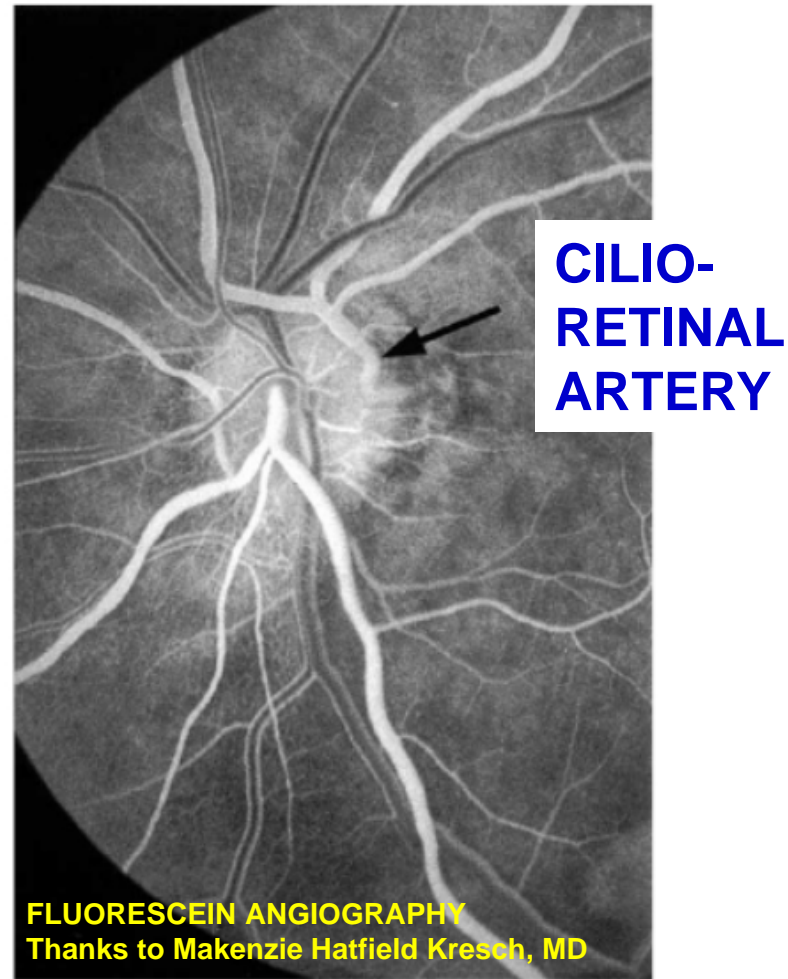
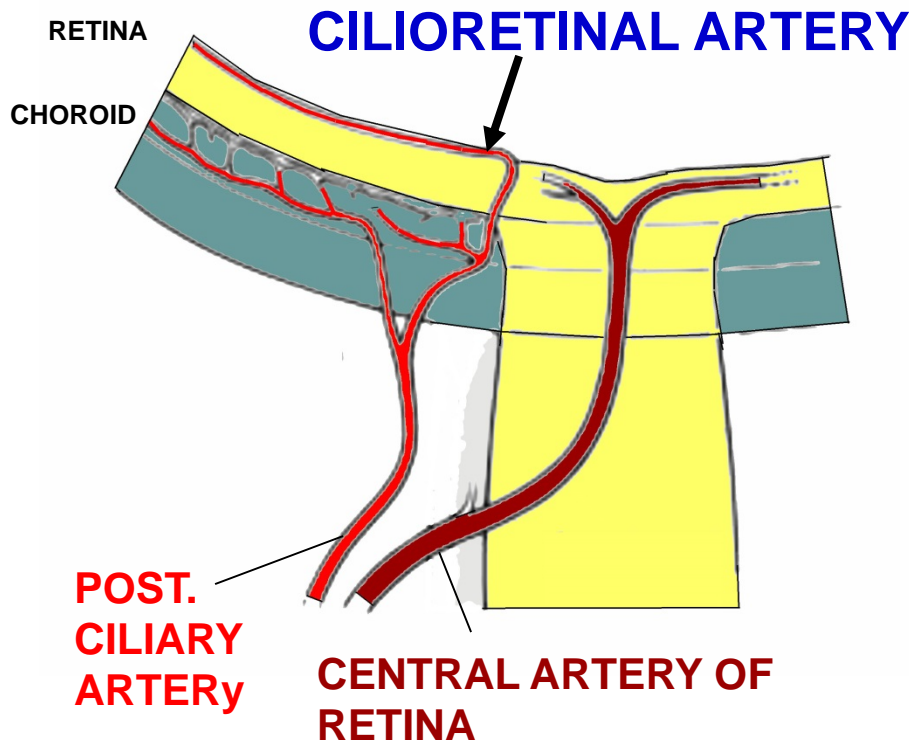
BUT NORMALLY
DOES NOT SUPPLY
GANGLION CELLS
OF RETINA (THAT
FORM OPTIC NERVE)

POSTERIOR CILIARY
ARTERIES (LONG AND
SHORT) -
branches of
Ophthalmic Artery

EYE- STRUCTURE OF EYEBALL- RETINA

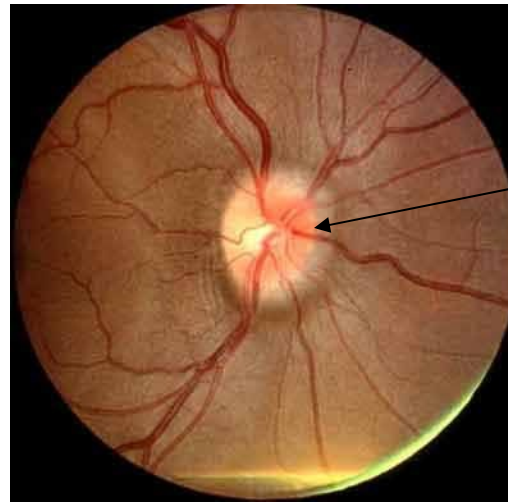
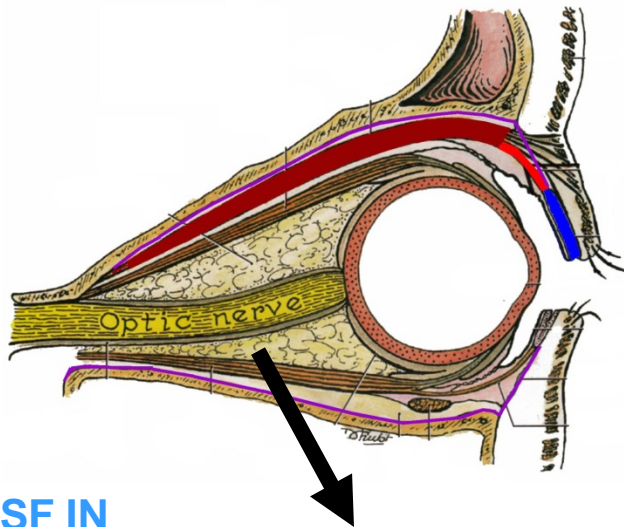


**CRAO - CENTRAL RETINAL ARTERY OCCLUSION -
most common cause, Carotid Artery atherosclerosis;
if complete: blind in one eye**



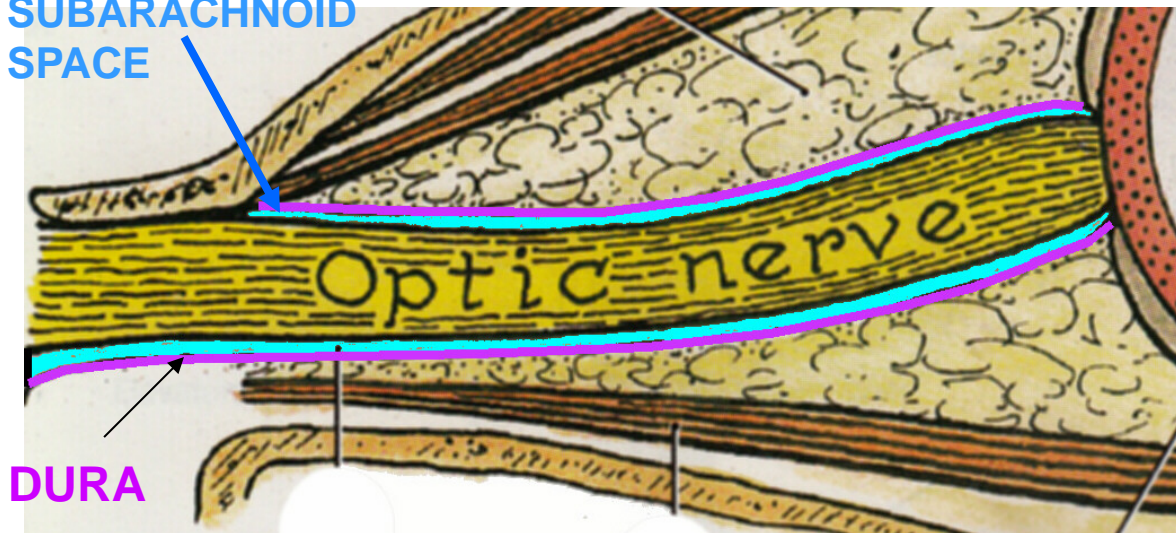
New Anatomy: imaging has shown that branches of Ciliary Arteries (Cilioretinal arteries) can supply retina (20% of people); can provide partial sparing of retina in cases of Central Retinal Artery Occlusion

SUBARACHNOID SPACE EXTENDS TO BACK OF EYEBALL



PAPILLEDEMA
- engorgement of retinal veins (correspond to branches of central artery)

CSF IN SUBARACHNOID SPACE



CLINICAL**

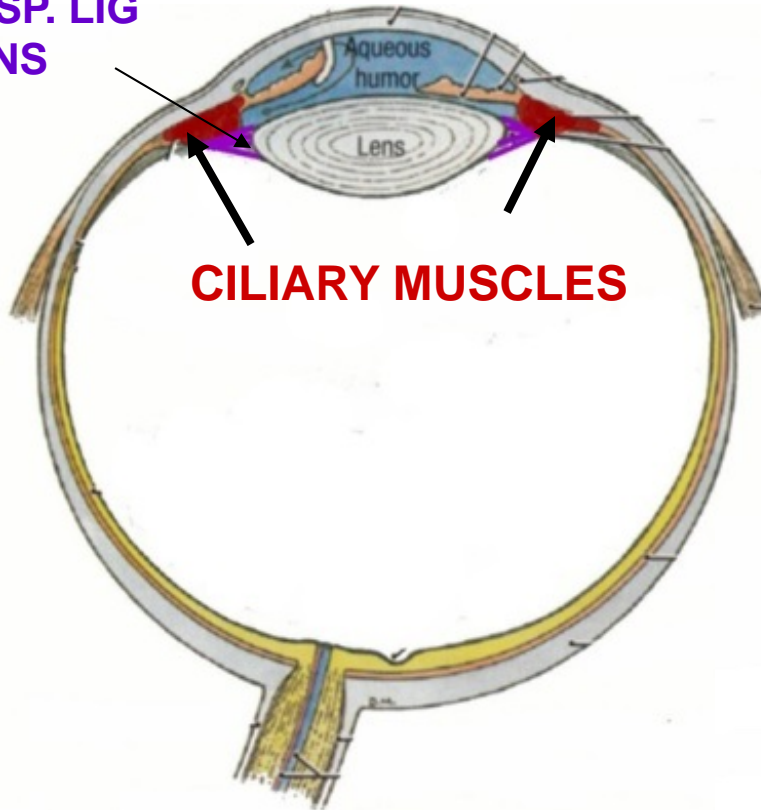
DURA AND SUBARACHNOID SPACE (CSF) EXTEND AROUND OPTIC NERVE; INCREASE IN CSF (PRESSURE) CAN AFFECT VISION

PAPILLEDEMA = swelling of optic disc

Clinical - slow onset; headaches

EYE- STRUCTURE OF EYEBALL- VASCULAR LAYER

SUSP. LIG
LENS

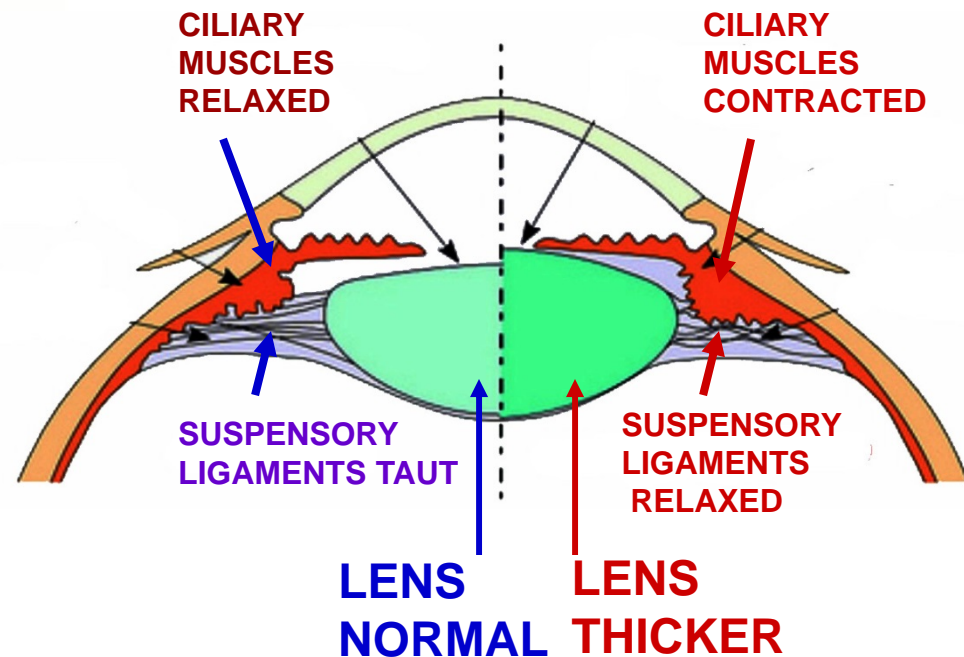


CILIARY MUSCLES

B. CILIARY BODY- CILIARY MUSCLES- SMOOTH MUSCLES AT ATTACHMENTS OF SUSPENSORY LIGAMENTS OF LENS CONTROL THICKNESS OF LENS

NORMAL VISION

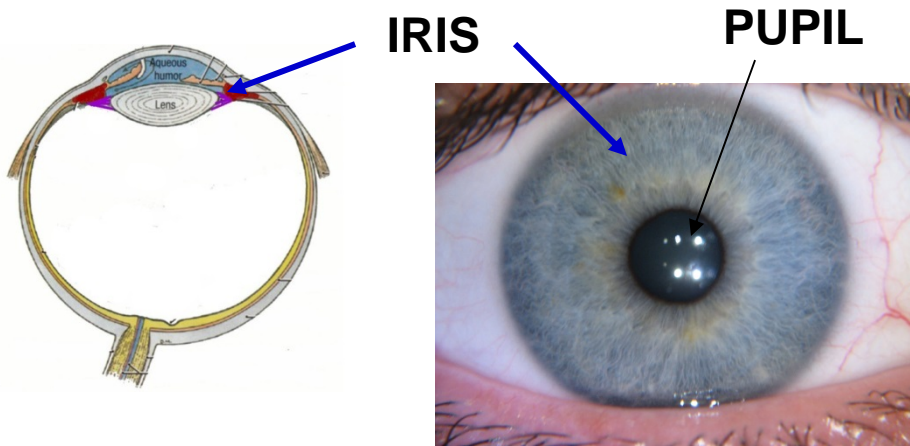
NEAR VISION



ACCOMMODATION - THICKEN LENS FOR NEAR VISION (VIEWING OBJECTS CLOSE UP)
PARASYMPATHETIC CONTROL- III (Short ciliary nerves)

CILIARY MUSCLES CONTRACT - LENS THICKER

EYE - STRUCTURE OF EYEBALL- VASCULAR LAYER



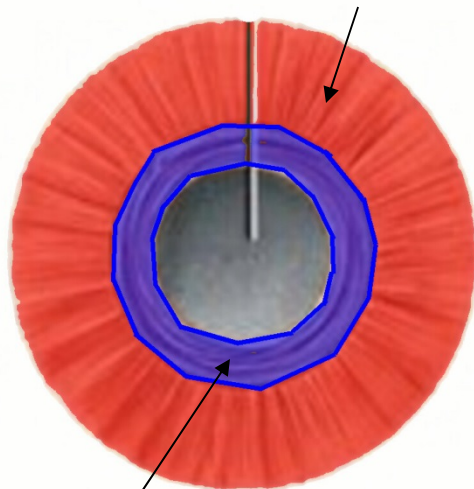
C. IRIS - PIGMENTED, CONTRACTILE LAYER WITH SMOOTH MUSCLES SURROUNDING PUPIL

NORMAL

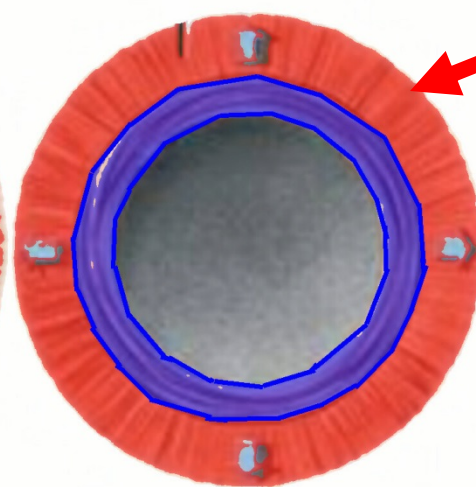
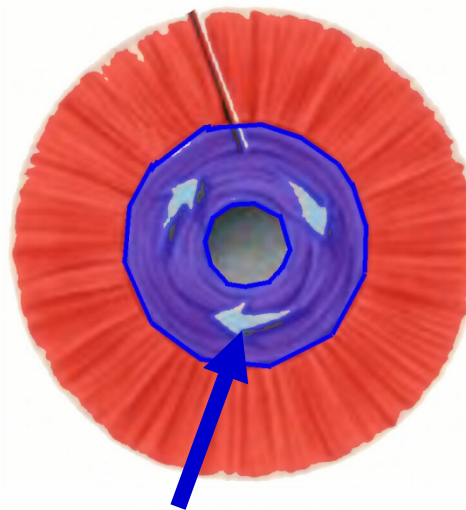
DILATOR

BRIGHT LIGHT - PUPIL CONSTRICTED

DIM LIGHT - PUPIL DILATED



CONSTRICTOR



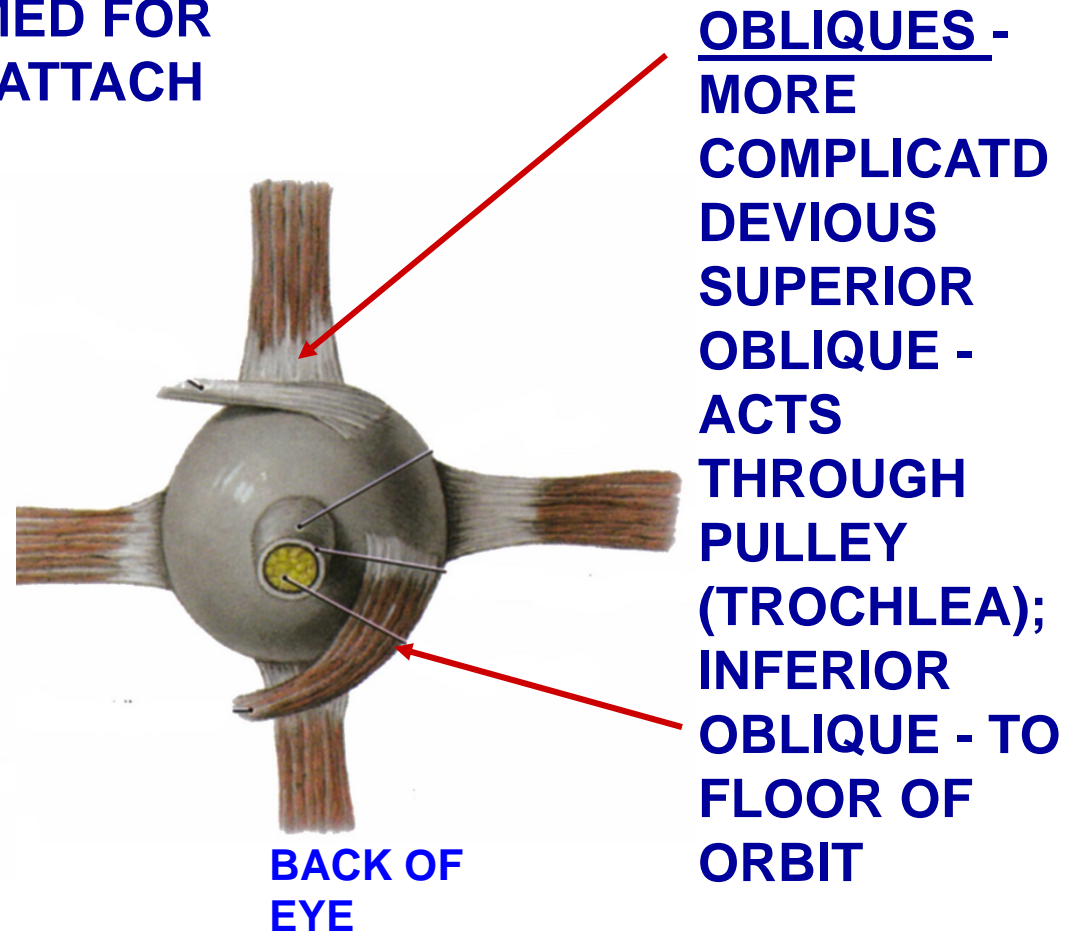
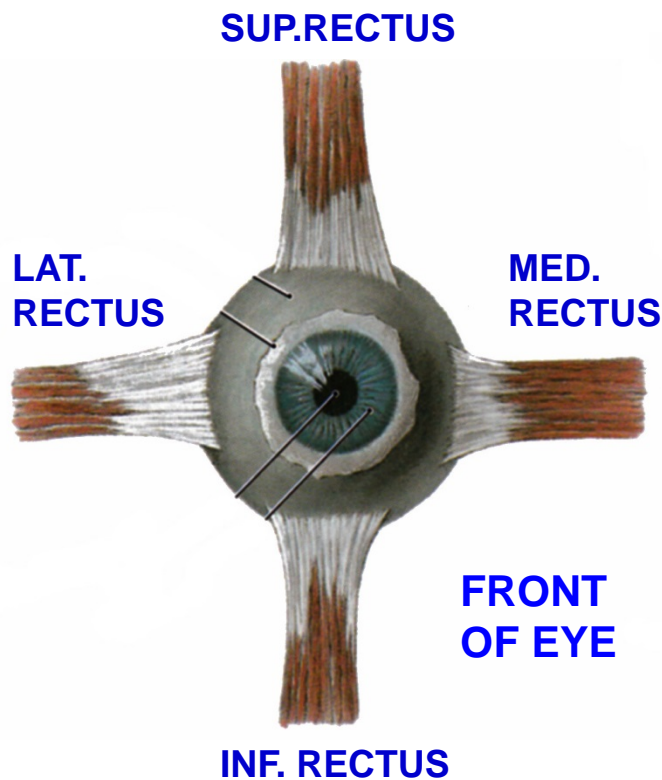
DILATOR PUPIL- RADIAL SMOOTH MUSCLE; SYMPATHETICS

CONSTRICTOR PUPIL- CIRCULAR SMOOTH MUSCLE; PARASYMPATHETICS (CN III)

V. EXTRAOCULAR MUSCLES

- VOLUNTARY SKELETAL MUSCLES WHICH MOVE EYEBALL

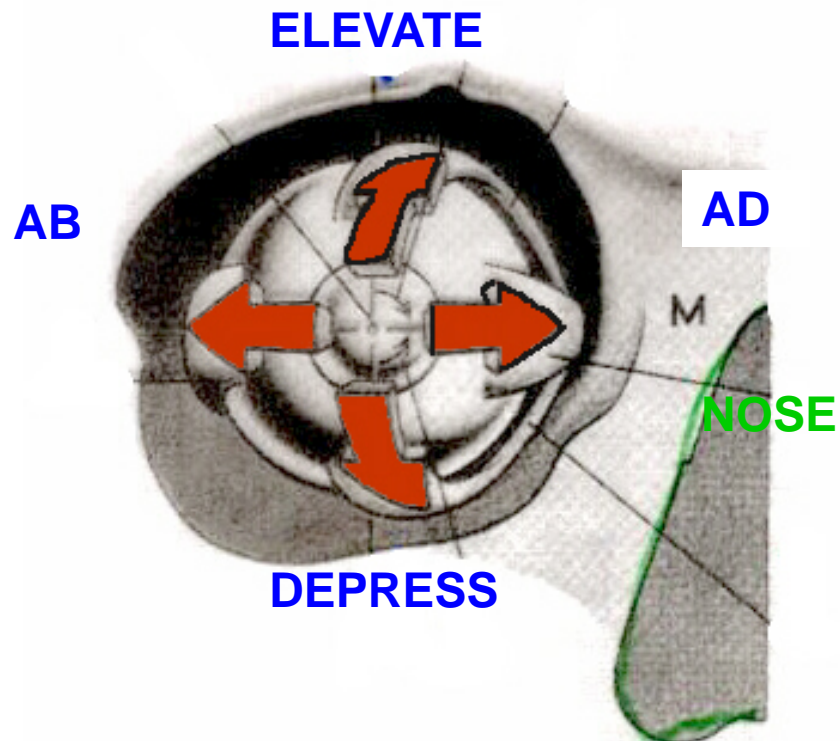
RECTI = STRAIGHT, NAMED FOR SIDES ON WHICH THEY ATTACH



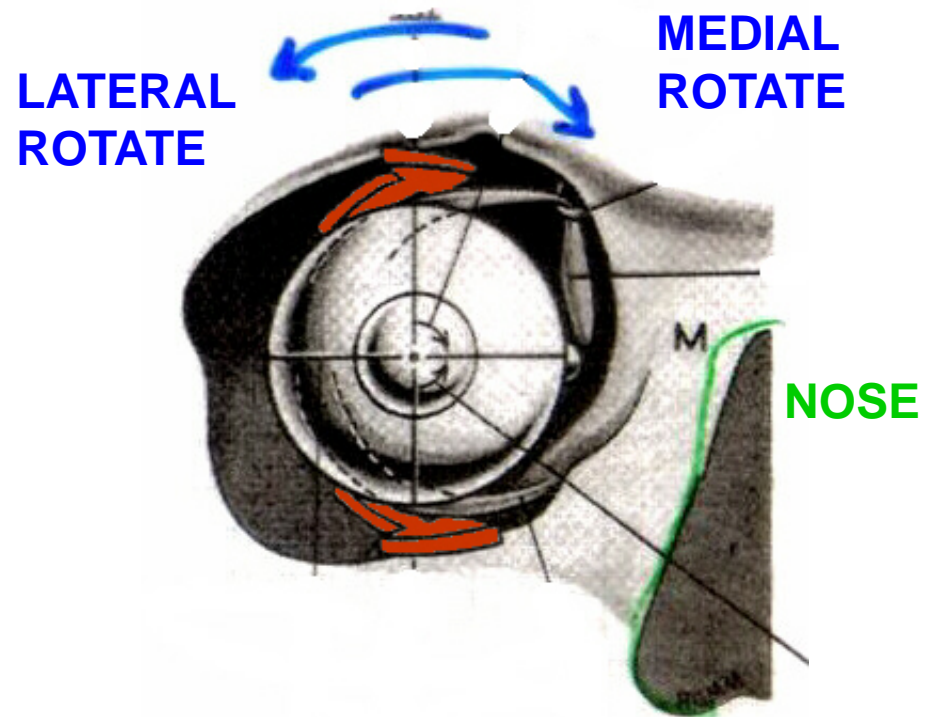
EYE MOVEMENTS

VOLUNTARY

ADDUCT - MOVE MEDIANLY
ABDUCT - LATERALLY
ELEVATE OR RAISE - SUPERIORLY
DEPRESS OR LOWER - INFERIORLY

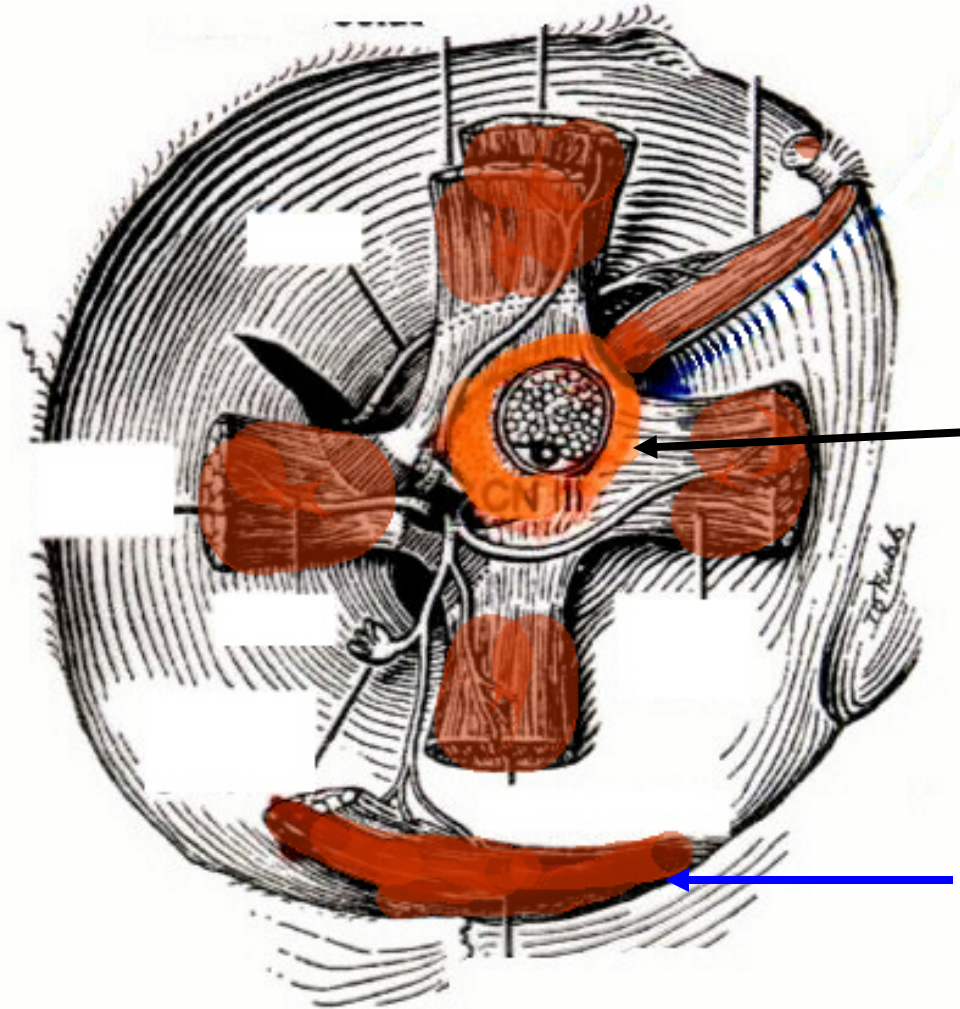


ROTATE- INVOLUNTARY WHEN TILT HEAD : MEDIAL ROTATE - INTORSION
LATERAL ROTATE - EXTORSION



ROTATIONAL MOVEMENTS – COMPENSATE FOR HEAD TILT

A. ORIGINS OF EXTRAOCULAR MUSCLES



VIEW OF ENUCLEATED ORBIT- EYEBALL REMOVED; MOST MUSCLES TAKE ORIGIN FROM

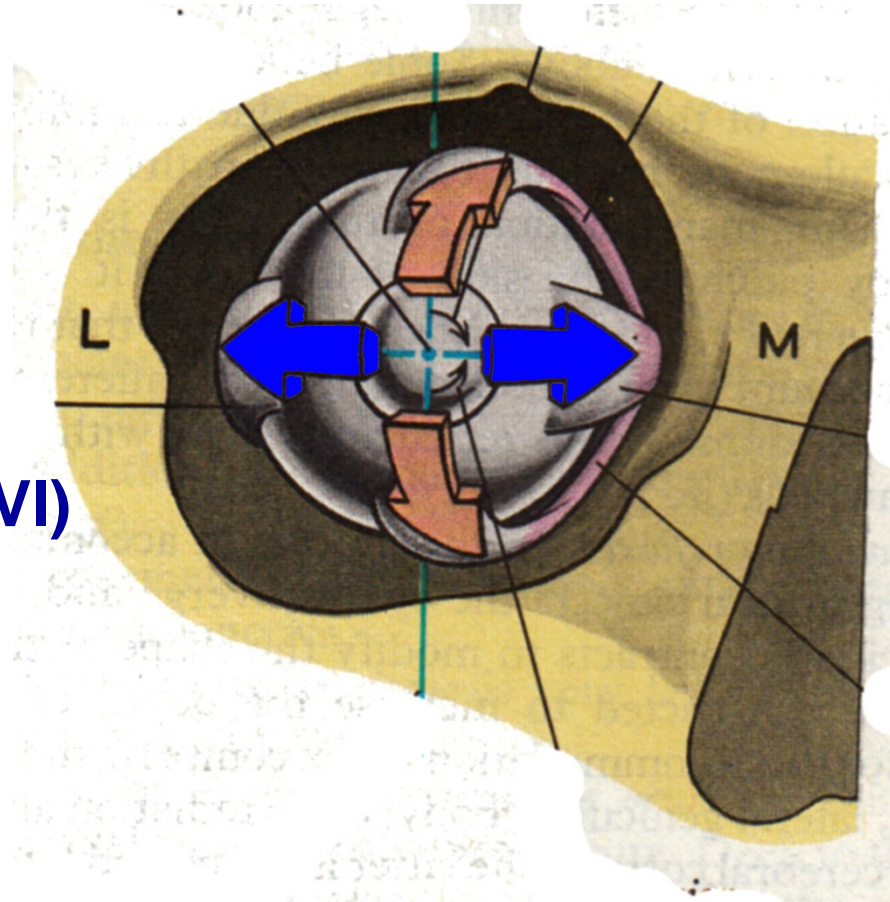
TENDINOUS RING- RING OF CT SURROUNDING OPTIC CANAL AND SUPERIOR ORBITAL FISSURE

NOTE: NOT INFERIOR OBLIQUE - FROM FLOOR OF ORBIT

B. ACTIONS - EYE MOVEMENTS

ACTIONS - MEDIAL RECTUS AND LATERAL RECTUS STRAIGHTFORWARD

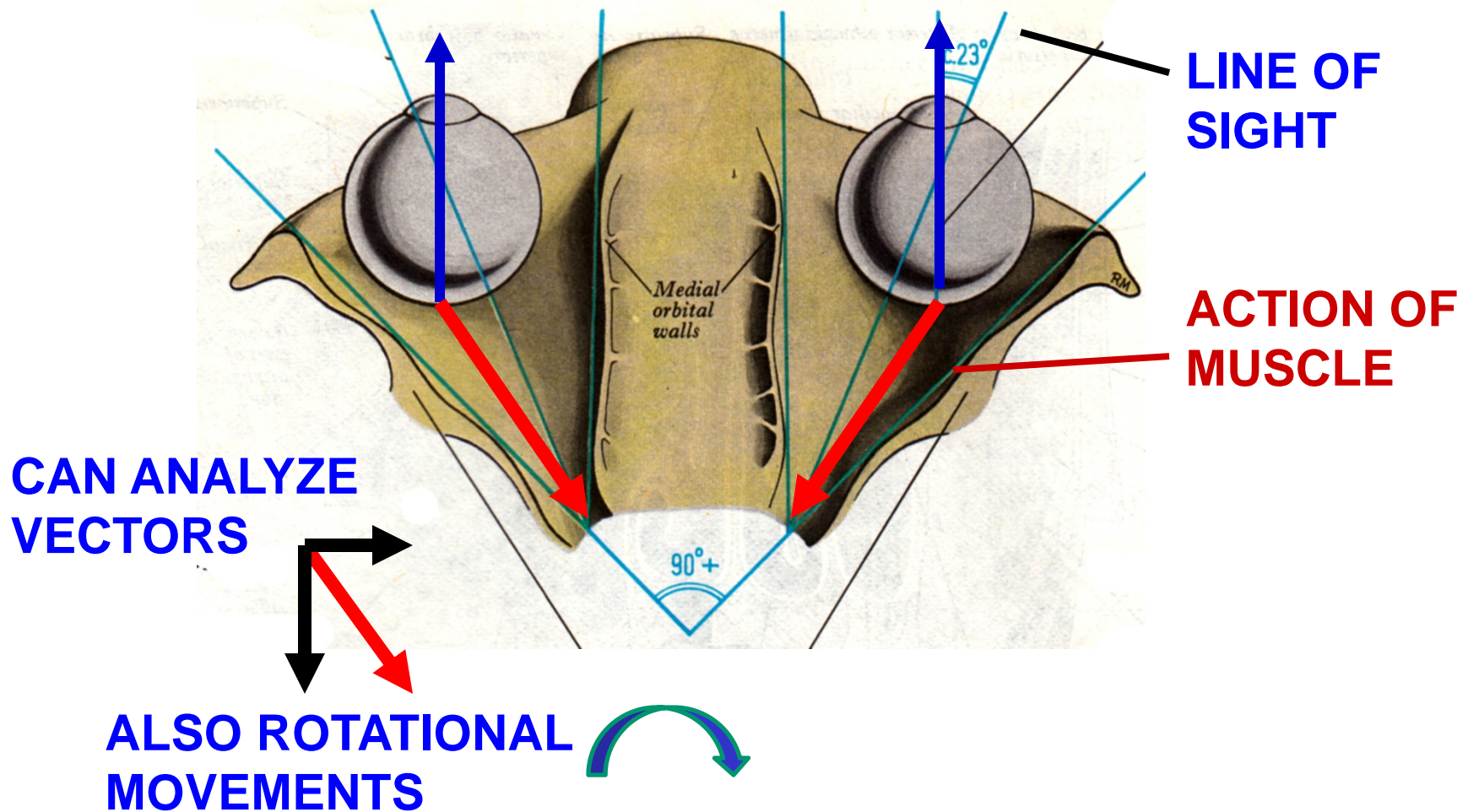
LATERAL
RECTUS
ABDUCT (VI)



MEDIAL
RECTUS-
ADDUCT
EYE (III)

EYE MOVEMENTS

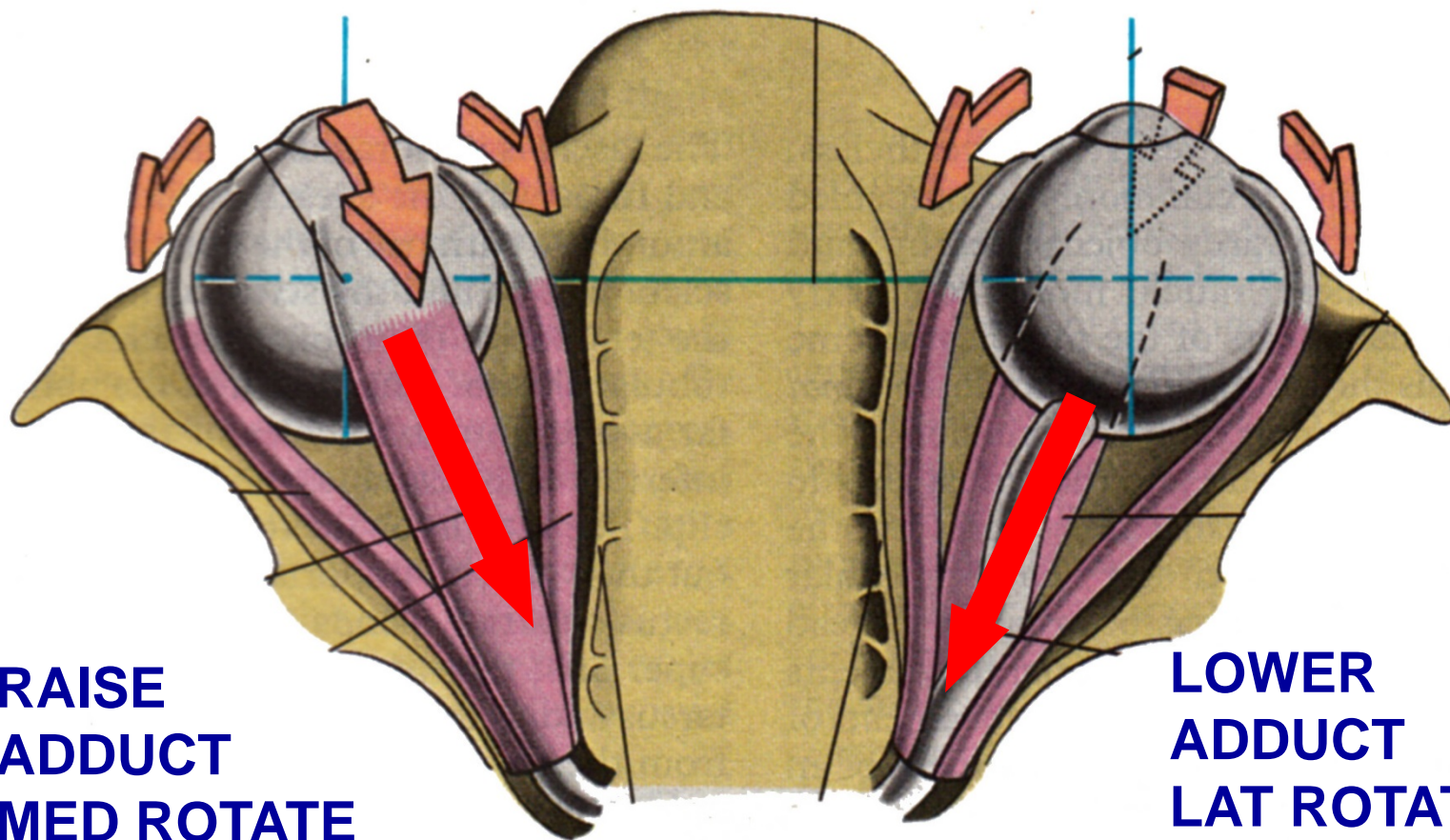
- ACTIONS OF OTHER MUSCLES COMPLEX
- PULL OF SUP. AND INF. RECTUS AT ANGLE WITH LINE OF SIGHT



EYE MOVEMENTS

SUP RECTUS (III)

INF RECTUS (III)



**RAISE
ADDUCT
MED ROTATE**

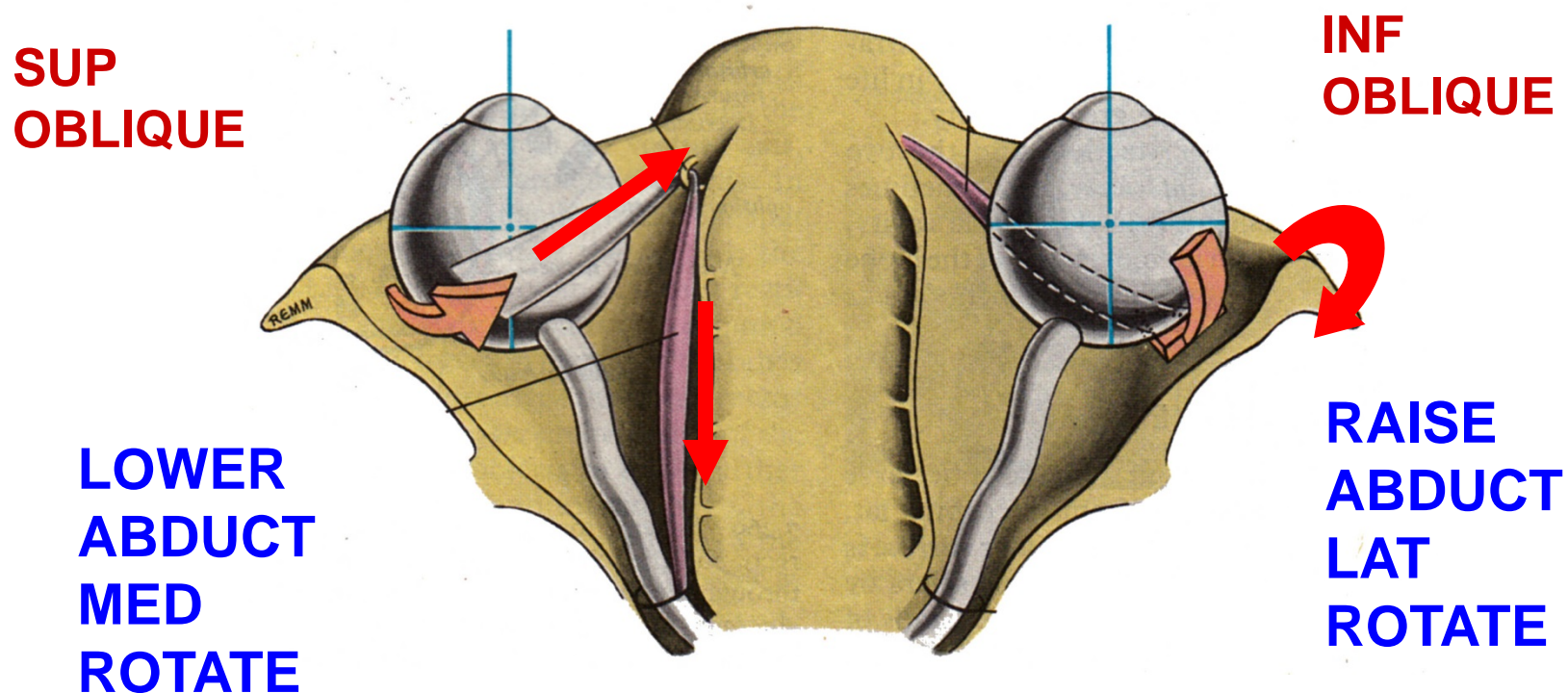
**LOWER
ADDUCT
LAT ROTATE**

EYE MOVEMENTS

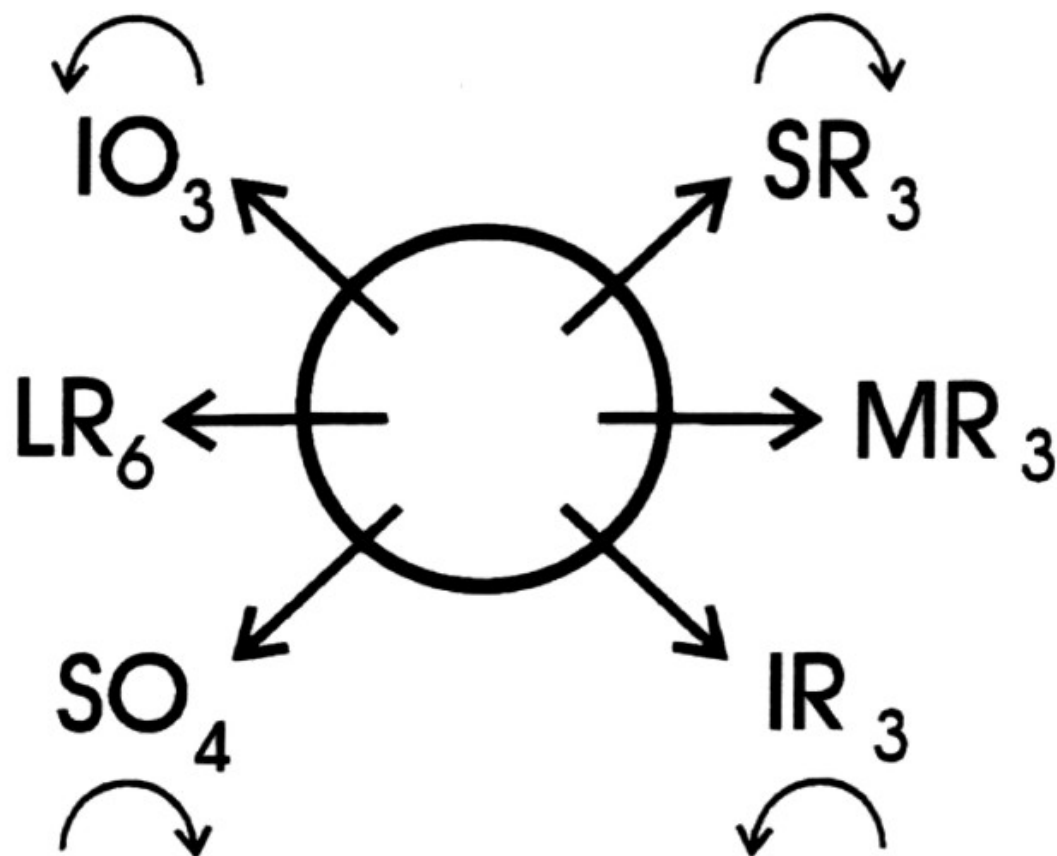
ACTION OF OBLIQUE MUSCLES COMPLEX (COUNTERINTUITIVE)

SUP OBLIQUE (IV) - ACTS THROUGH PULLEY (TROCHLEA) LIKE MUSCLE ON NOSE

INF OBLIQUE (III) - ORIGIN FROM FLOOR OF ORBIT- LIKE MUSCLE ON EAR



EYE MOVEMENTS DIAGRAM

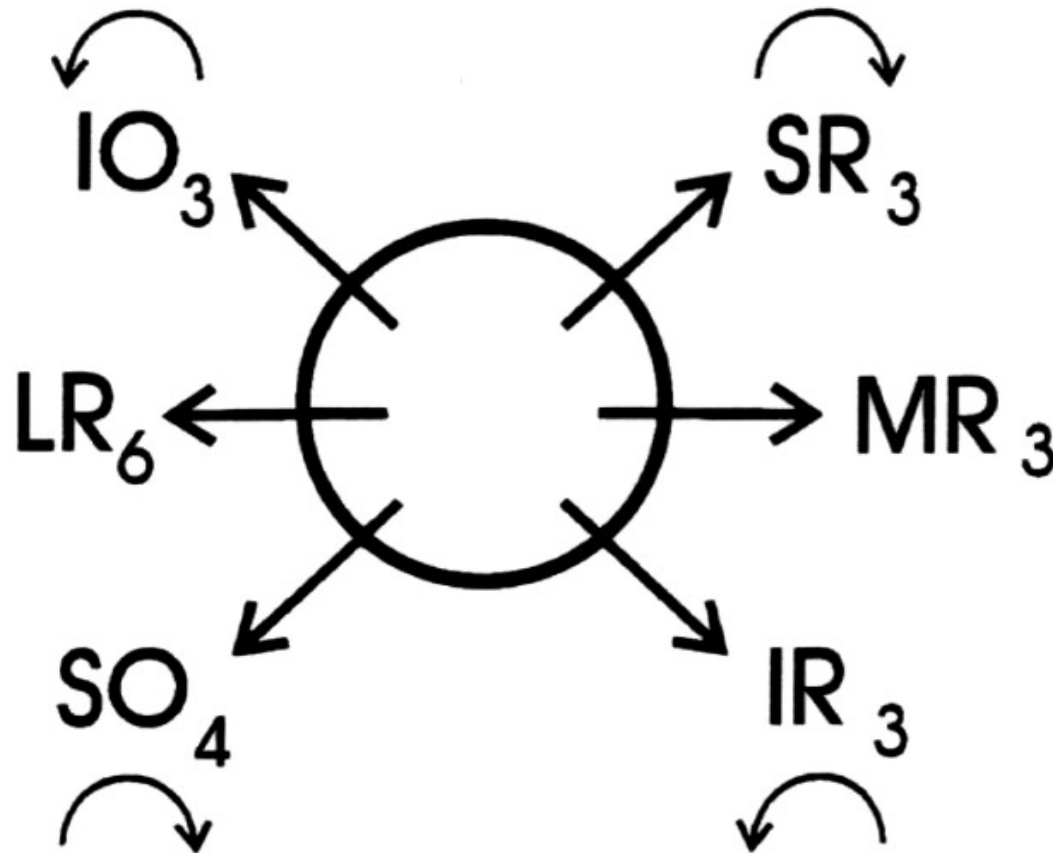


NOSE



- 1- Resting position of eye depends upon tonic activities in muscles.
- 2- Damage to any one muscle does not entirely eliminate abduction, adduction, elevation or depression; only get weakness.

EYE MOVEMENTS DIAGRAM

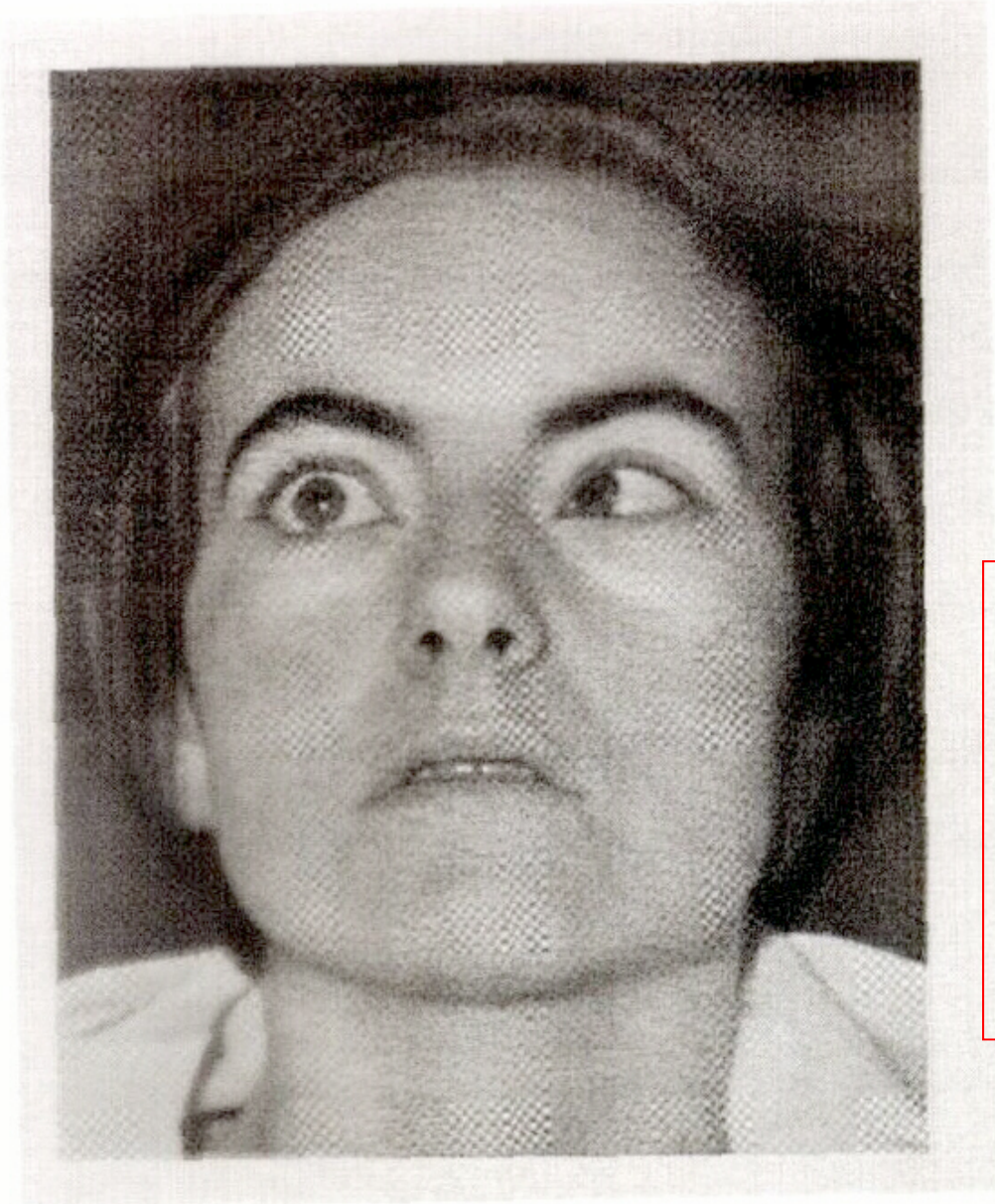


NOSE



**SAMPLE QUESTIONS: 1- WHAT ARE ACTIONS OF INFERIOR OBLIQUE?
2- WHAT ARE ACTIONS OF SUPERIOR OBLIQUE?
2- WHAT IS SYMPTOM OF DAMAGE TO ABDUCENS NERVE?**

VIII. NERVE DAMAGE - all clinically important



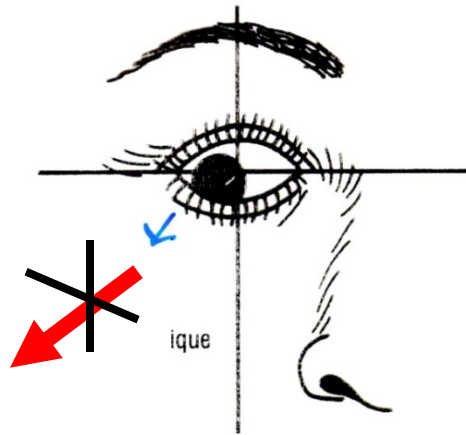
A. ABDUCENS (VI) NERVE DAMAGE



WHEN PATIENT LOOKS
STRAIGHT AHEAD:

MEDIAL STRABISMUS
(CROSS-EYED) DUE TO
DAMAGE/PARALYZE
LATERAL RECTUS

B. TROCHLEAR (IV) NERVE DAMAGE: INABILITY TO TURN EYE DOWN AND OUT; ALSO HEAD TILT

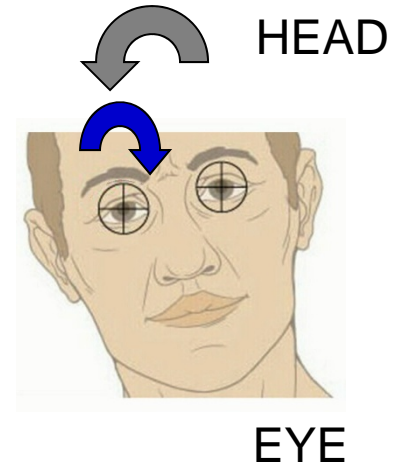
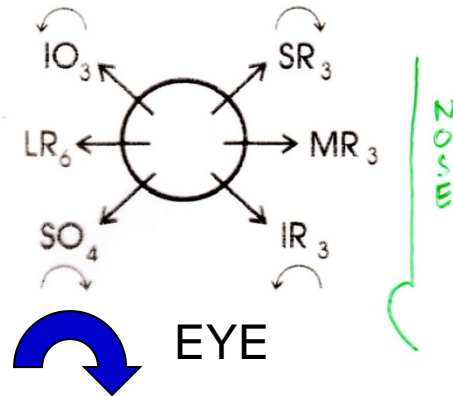


PATIENT CANNOT LOOK DOWN AND OUT

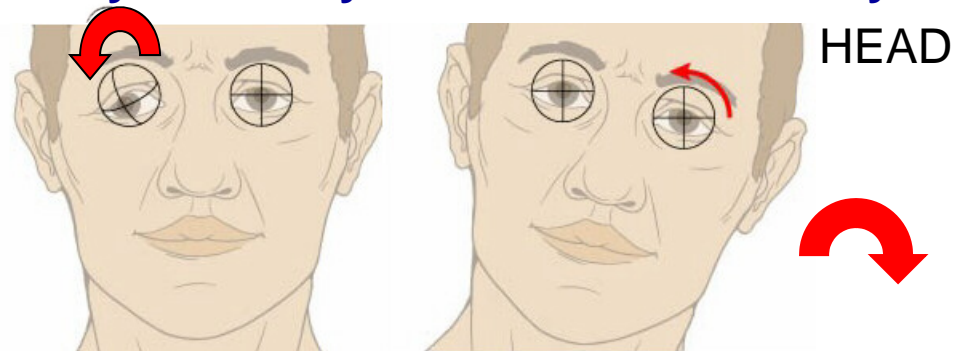
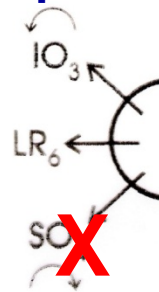
Symptoms - Difficulty walking down stairs; HEAD TILTED

AFTER IV DAMAGE - eye rotated laterally; PATIENT TILTS HEAD TO OPPOSITE SIDE so both eyes rotated

NORMAL



NORMAL Rotation - occurs when tilt head; rotate ipsilateral eye medially when tilt head laterally



C. OCULOMOTOR (III) NERVE DAMAGE



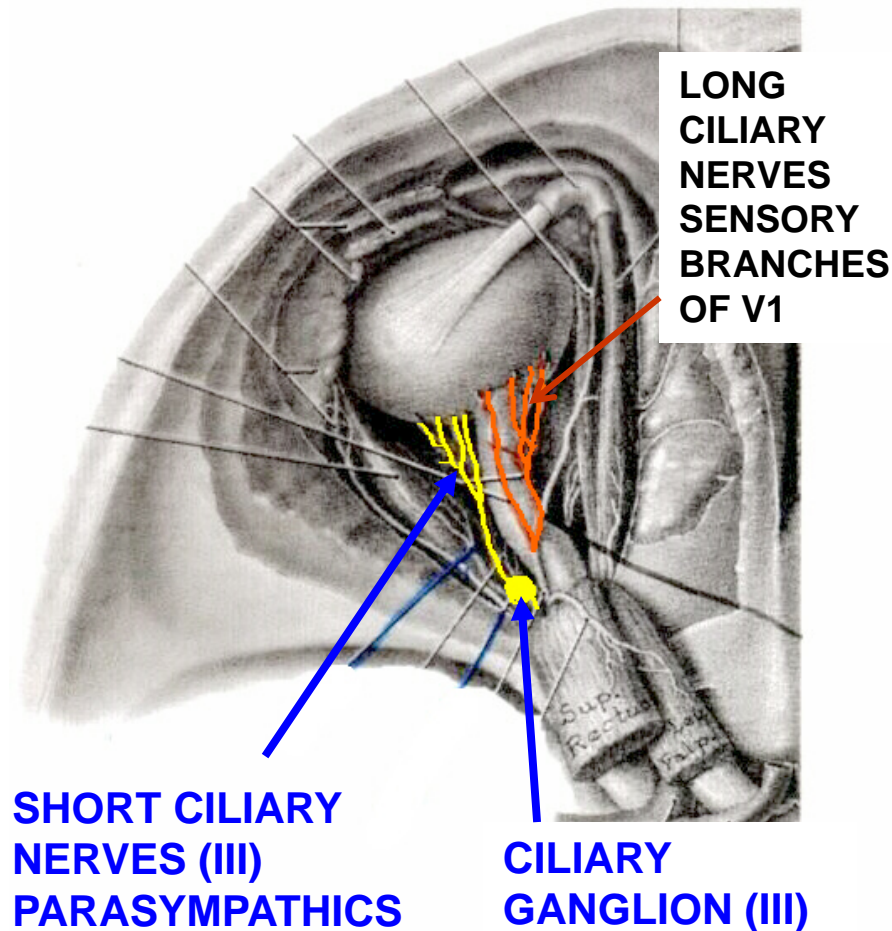
AT REST

1) LATERAL STRABISMUS (WALL-EYED) DUE TO PARALYZE MEDIAL RECTUS

2) PTOSIS - DROOPING EYELID PARALYZE LEV. PALPEBRAE SUPERIORIS

3) DILATED PUPIL - (MYDRIASIS) PARALYZE PUPILLARY CONSTRICTOR

VII. CILIARY GANGLION - PARASYMPATHETIC



CILIARY GANGLION-
PARASYMPATHETICS OF
OCULOMOTOR N (III); TRAVEL IN
SHORT CILIARY NERVES - (FOUND
LATERAL AND DORSAL TO OPTIC
NERVE)

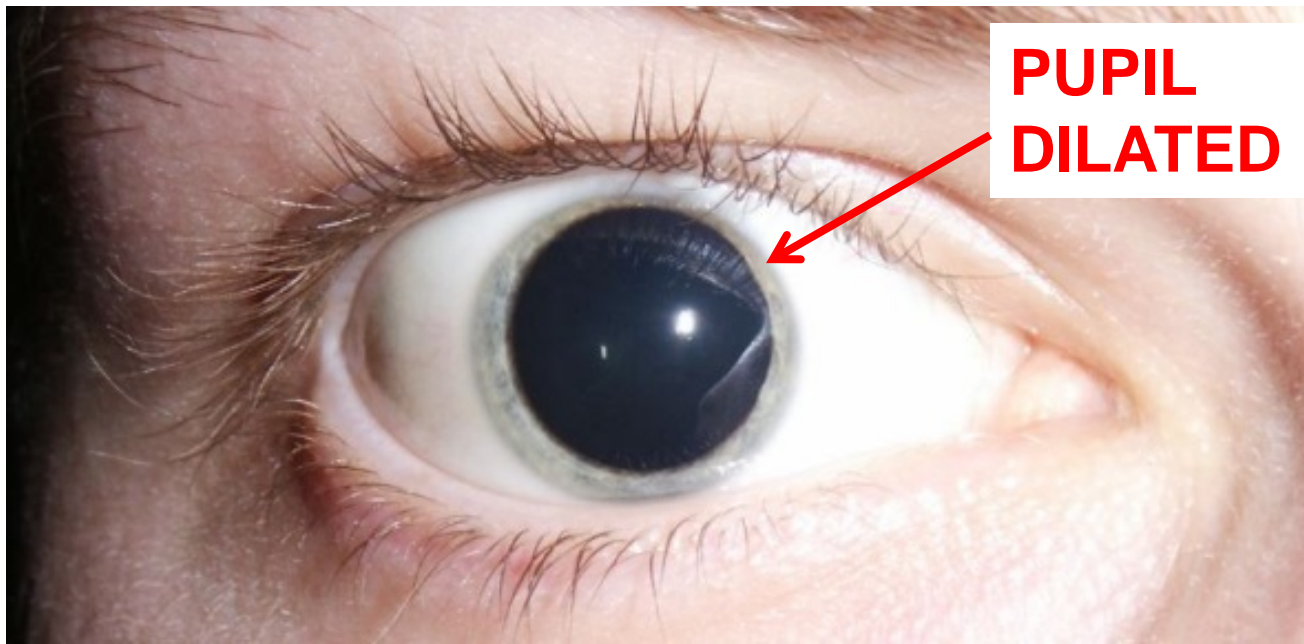
INNERVATE: 1) CILIARY MUSCLES
2) SPHINCTER (CONSTRICTOR)
PUPILLAE

NOTE: LONG CILIARY NERVES
BRANCHES OF V1 (OPHTHALMIC) -
SENSORY TO CORNEA - (FOUND
MEDIAL AND DORSAL TO OPTIC
NERVE)

CLINICAL **

**DAMAGE SHORT CILIARY NERVES (ONLY) - MAIN
SYMPTOM: PUPIL IS DILATED = MYDRIASIS**

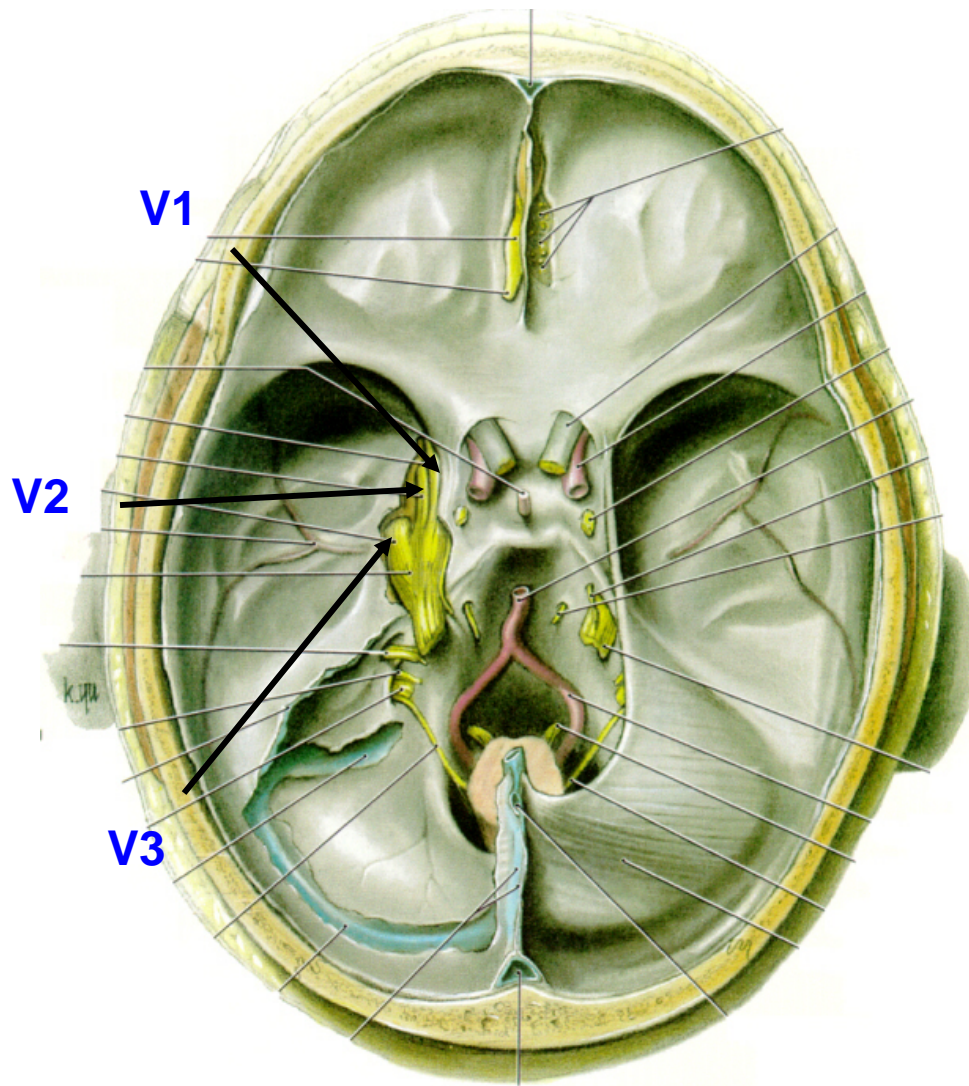
'BLOWN PUPIL' = MYDRIASIS (muh-dry'-a-sis)



'BLOWN PUPIL' = MYDRIASIS - PUPIL DILATED, UNABLE TO CONSTRICT IN RESPONSE TO LIGHT - INDICATES CATASTROPHE - STROKE, HERNIATION, ETC.

Note; Anisocoria – pupils of unequal size (normal or abnormal)

TRIGEMINAL NERVE - V



**V1 – OPHTHALMIC -Sup.
Orbital fissure – SOMATIC
SENSORY**

**V2 - MAXILLARY - Foramen
rotundum – SOMATIC
SENSORY**

**V3 – MANDIBULAR - -
Foramen ovale – SOMATIC
SENSOR AND
BRANCHIOMOTOR**