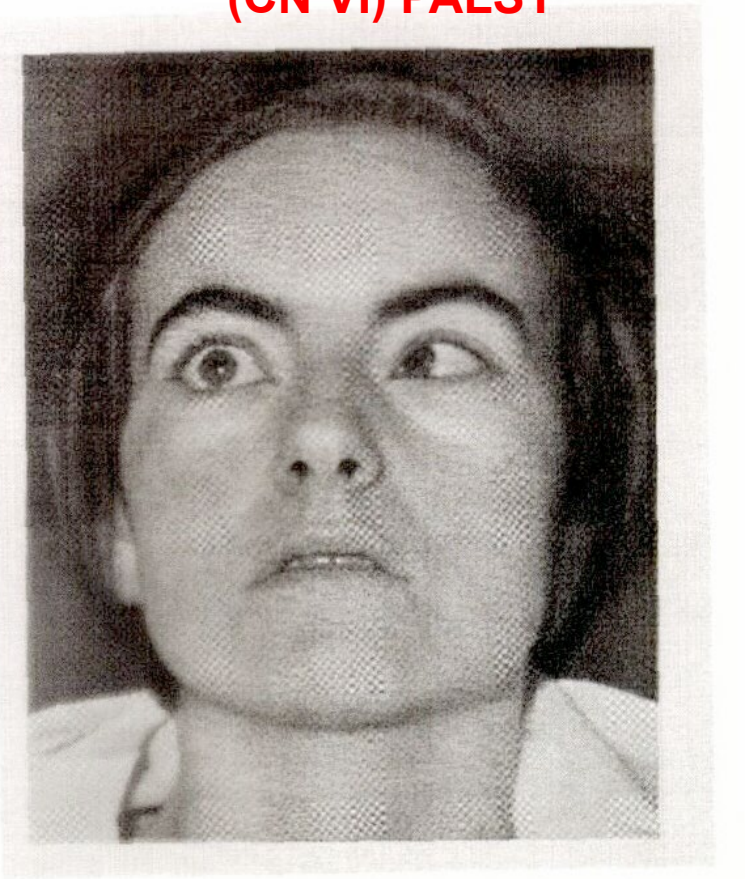
ORBIT

ABDUCENS NERVE
(CN VI) PALSY

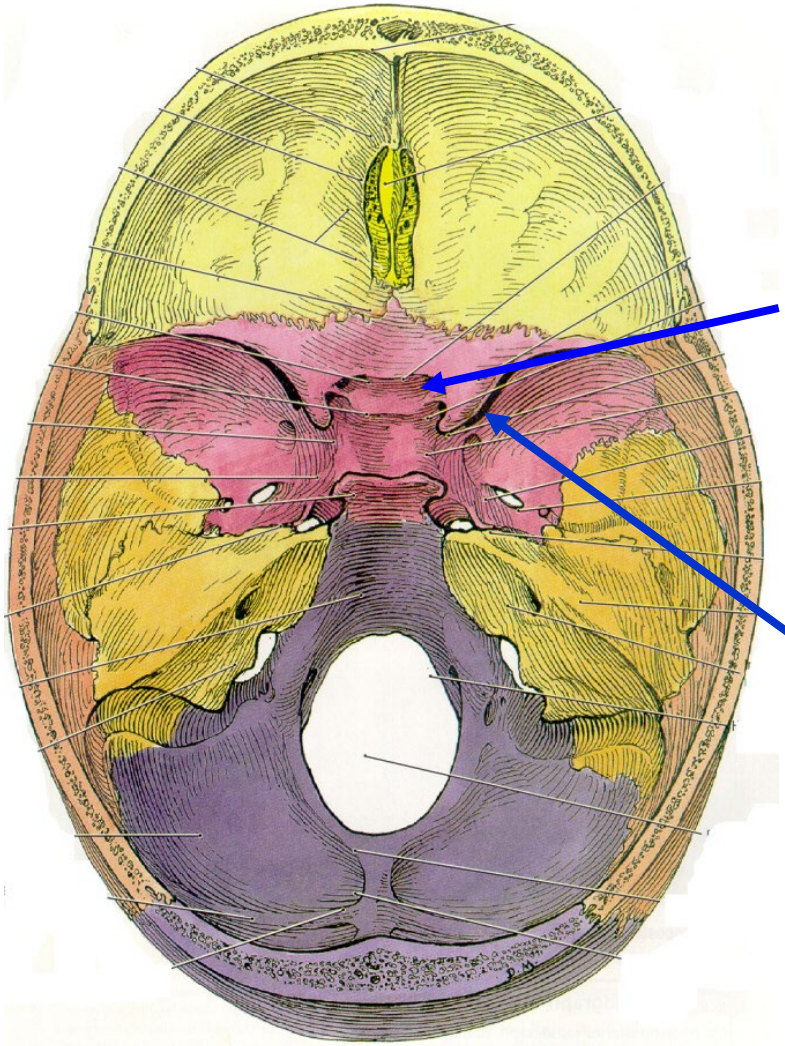


OUTLINE

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

I. FORAMINA OF ORBIT – structures entering orbit
TWO MAJOR OPENINGS:

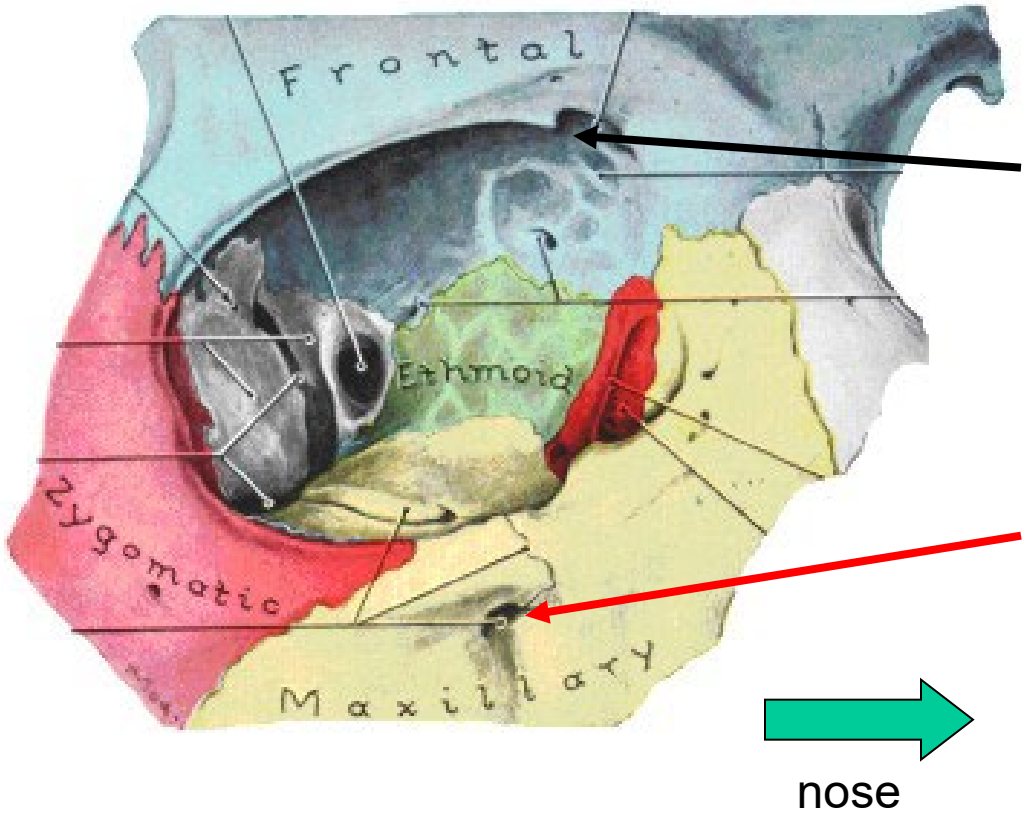


FORAMINA- MOST STRUCTURES ENTER ORBIT FROM MIDDLE CRANIAL FOSSA

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 leading orbit

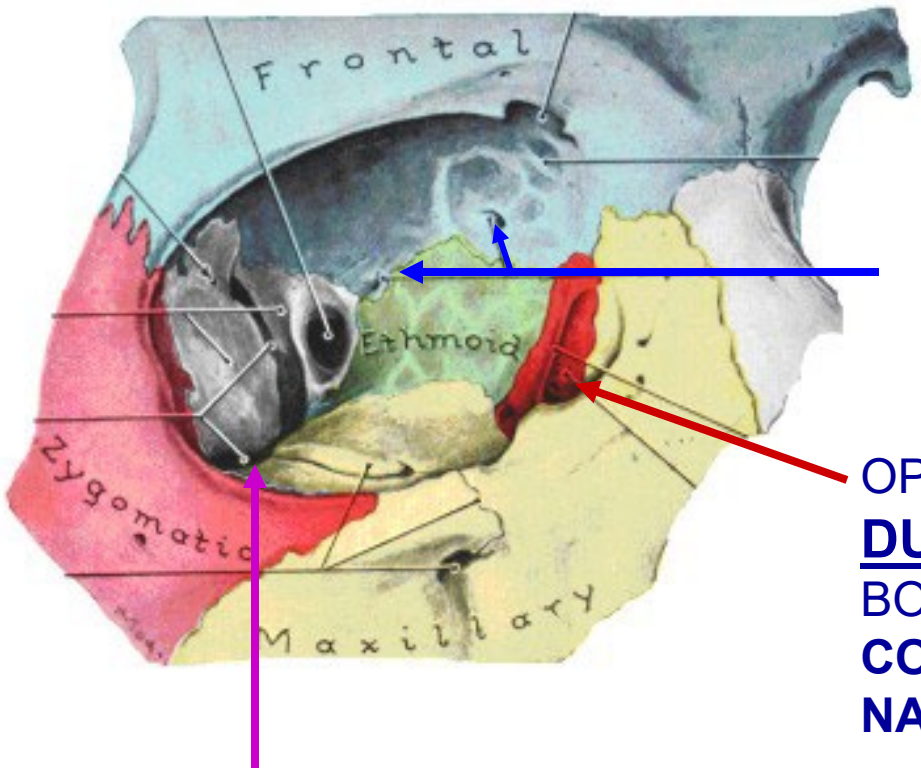


TO FACE, SCALP:

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



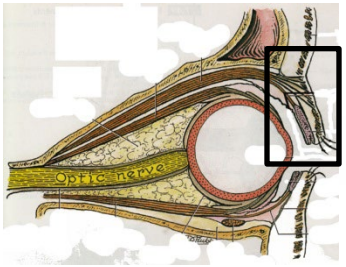
2) ANT. AND POST. ETHMOIDAL FORAMINA- BETWEEN ETHMOID AND FRONTAL BONES; CONNECT ORBIT AND NASAL CAVITIES
CONTAINS: ANT. AND POST. ETHMOIDAL N., A. and V. (br. Of V1 and OPHTHALMIC artery, vein)

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

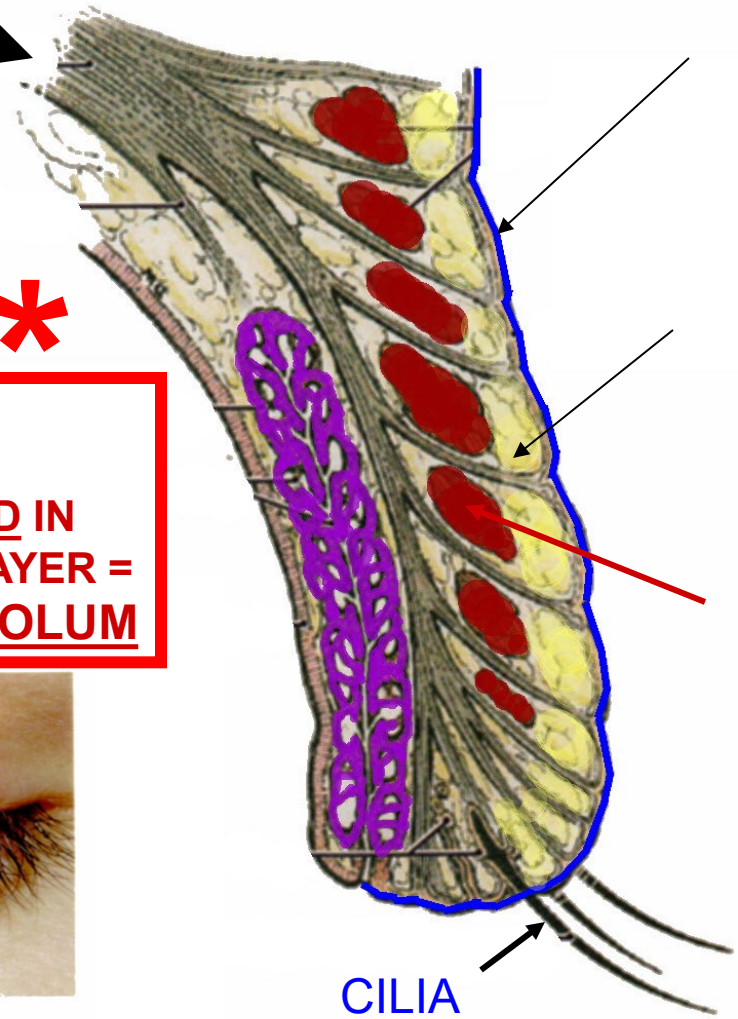
NOTE: INFERIOR ORBITAL FISSURE - KNOW LATER

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

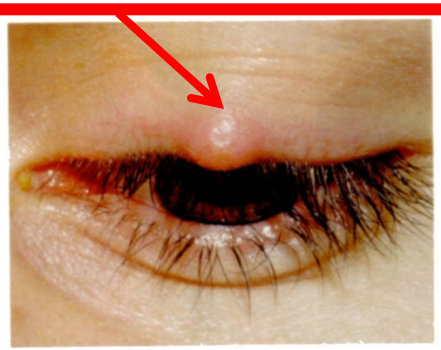


FIGURE 10-10
Acute hordeolum of upper eyelid.
From Palay, Krachmer, 1997.

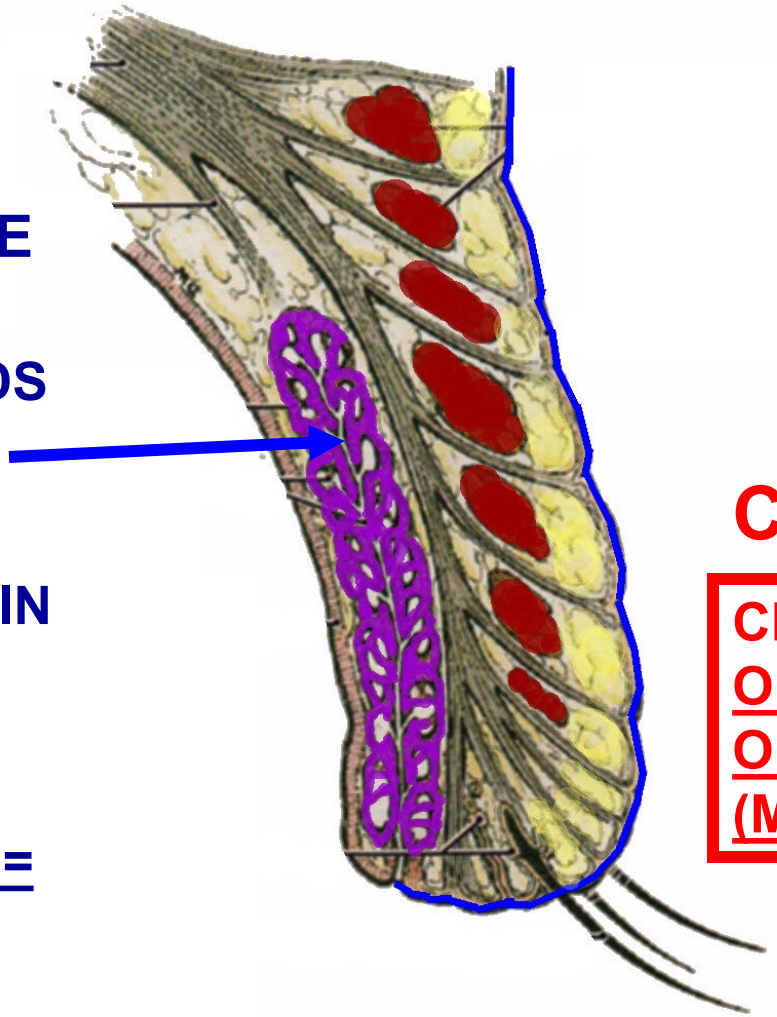
EYELIDS - LAYERS

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

TARSAL PLATE

- CONTAINS TARSAL GLANDS (Meibomian glands)

- KEEP TEARS IN EYE, PREVENT EVAPORATION OF TEARS - <u>OBSTRUCTION = CHALAZION</u>



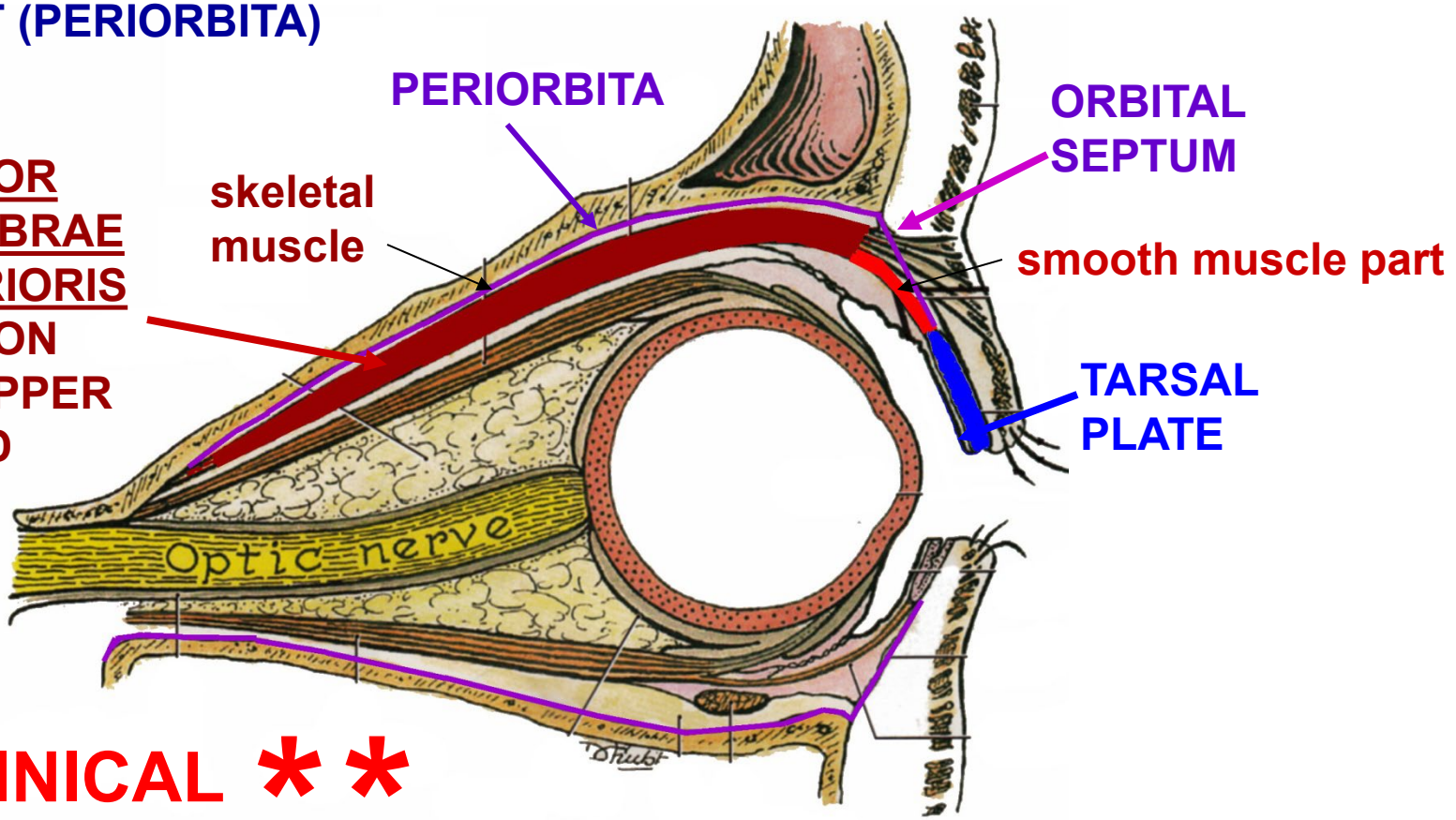
CHALAZION

CLINICAL *

CHALAZION: <u>OBSTRUCTION OF TARSAL (MEIBOMIAN) GLAND</u>

EYELIDS - LAYERS

4A. <u>ORBITAL SEPTUM</u> - CT LAYER CONTINUOUS WITH **PERIOSTEUM OF ORBIT (PERIORBITA)**



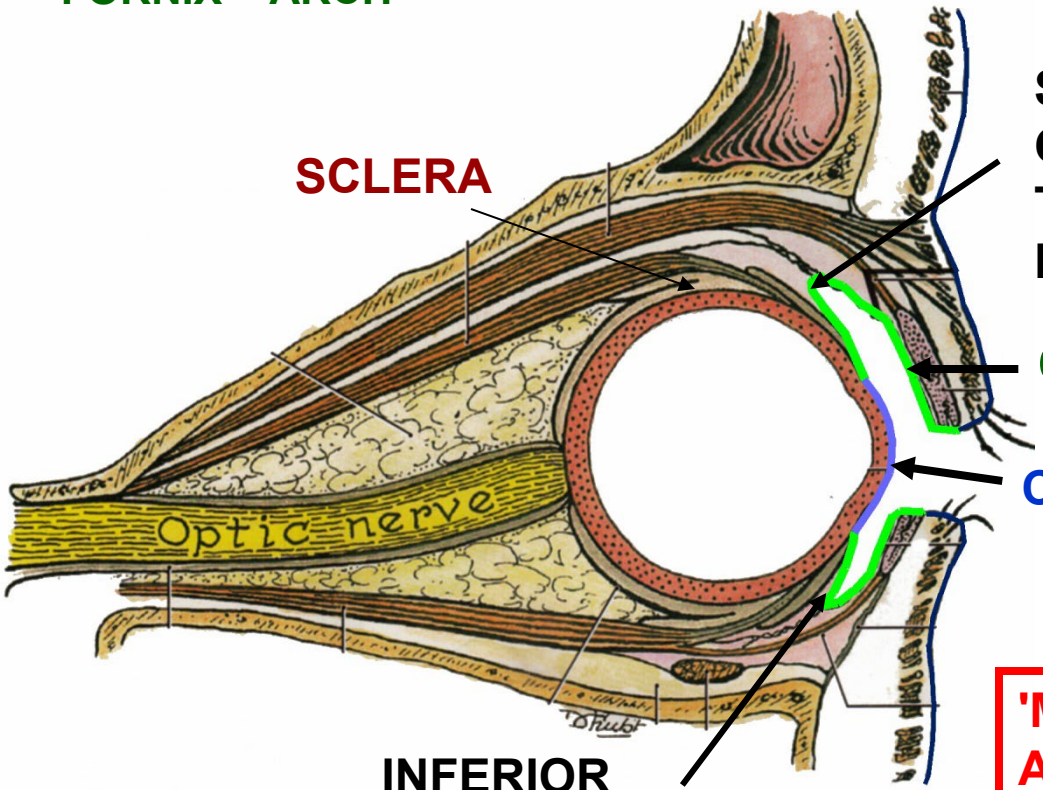
<u>LEVATOR PALPEBRAE SUPERIORIS</u> – ACTION LIFT UPPER EYELID

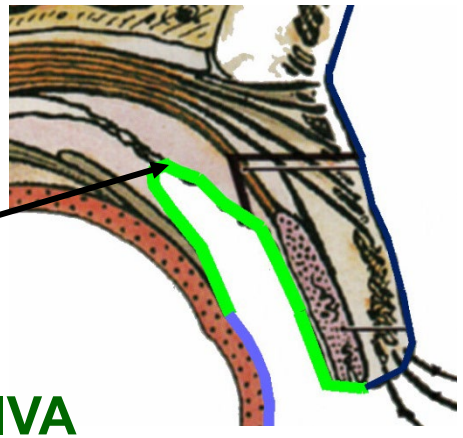
CLINICAL **

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

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

FORNIX = ARCH





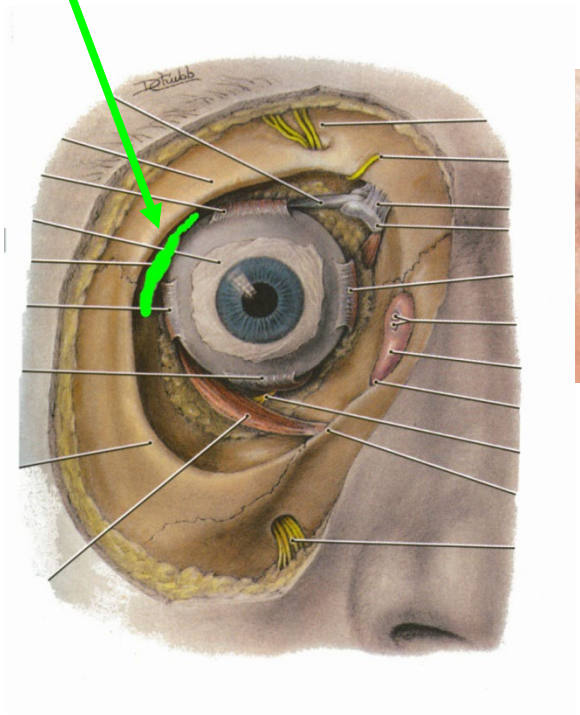
'MORNING AFTER' VIEW

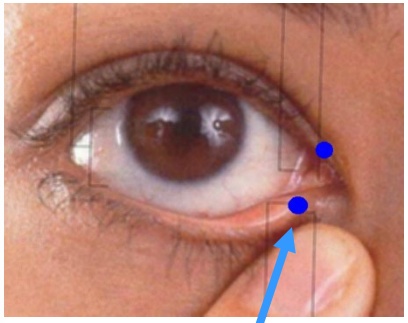
FORNIX = LATIN FOR ARCH, VAULT

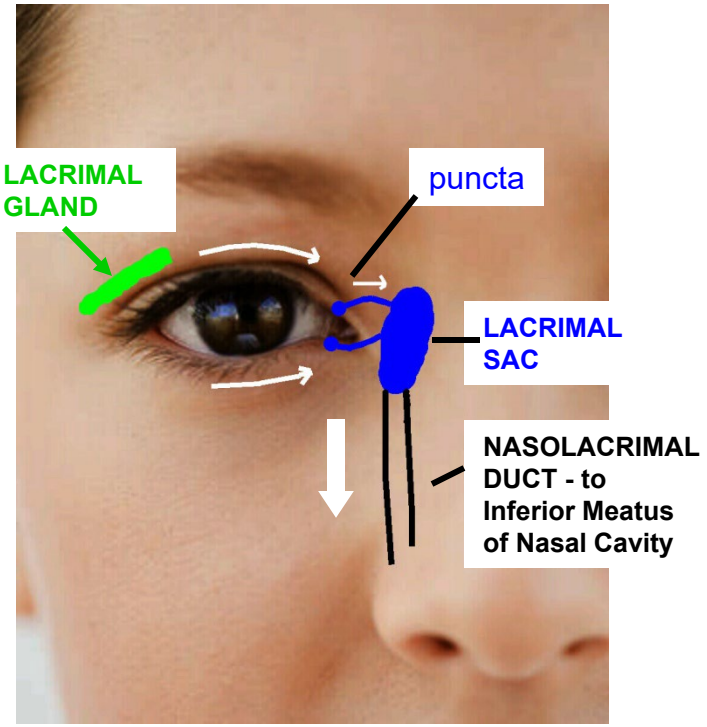
Conjuctivitis (Pinkeye) - inflammation of conjunctiva

III. LACRIMAL APPARATUS

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

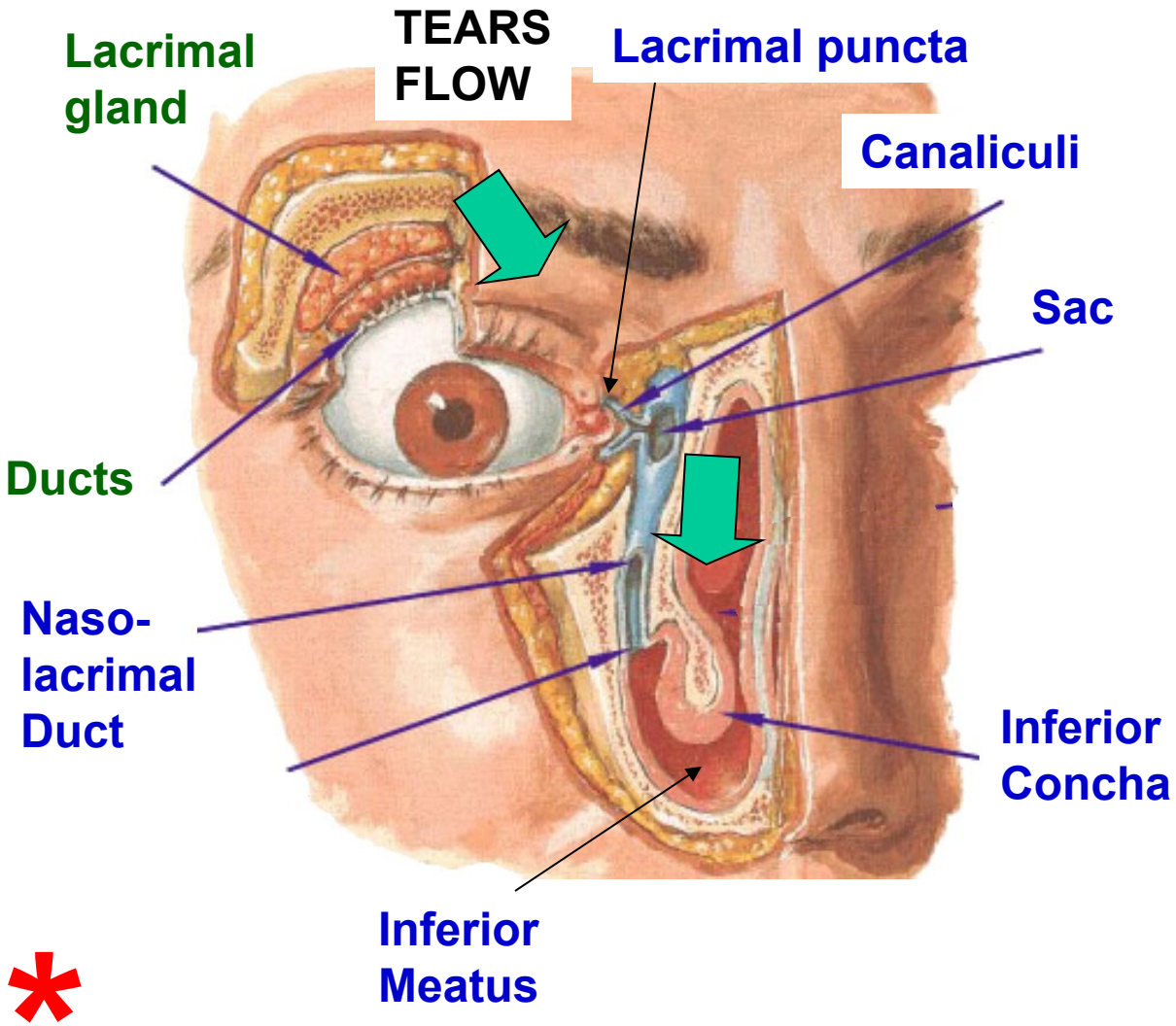






- TEARS DRAIN THROUGH LACRIMAL PUNCTA TO LACRIMAL SAC TO NASOLACRIMAL DUCT TO INFERIOR MEATUS OF NASAL CAVITY B. LAC. GLAND INNERVATED BY VII - COMPLEX PATHWAY

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;

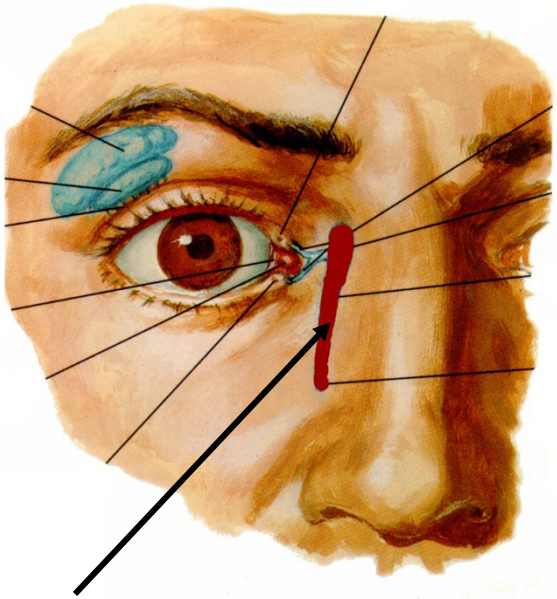
- SAC CONNECTS TO NASOLACRIMAL DUCT WHICH DRAINS TO <u>INFERIOR MEATUS</u> OF NASAL CAVITY

*

LACRIMAL GLAND IS INNERVATED BY VII - FACIAL NERVE;

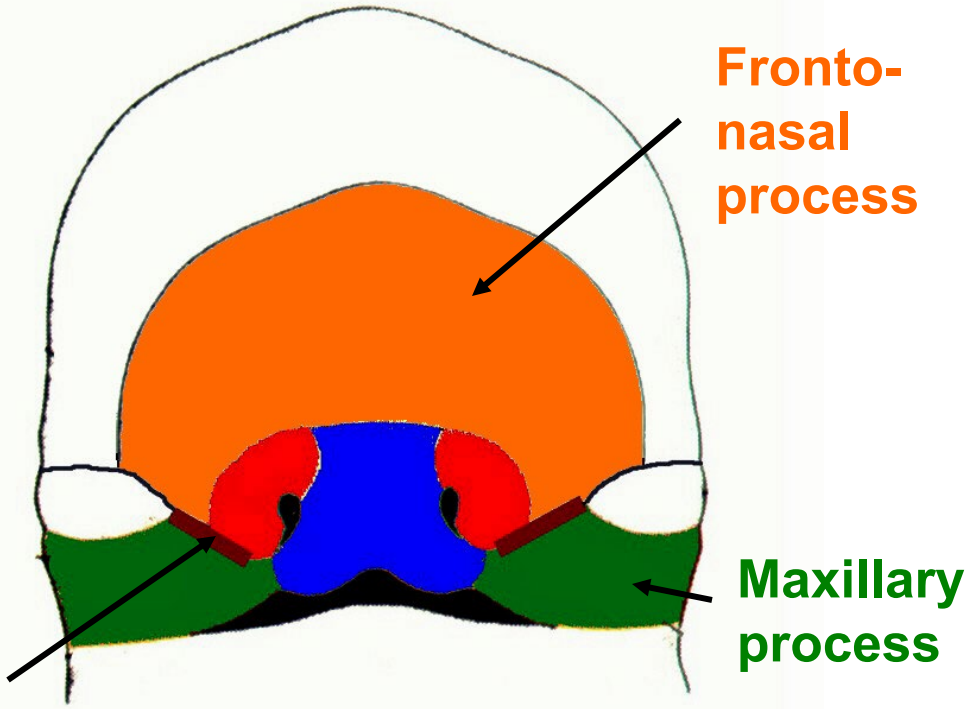
BLOCK VII - DECREASE TEARS; PRESSURE/IRRITATION VII - EXCESSIVE TEARS

DEVELOPMENT:OBSTRUCTED NASOLACRIMAL DUCT



NASOLACRIMAL DUCT

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

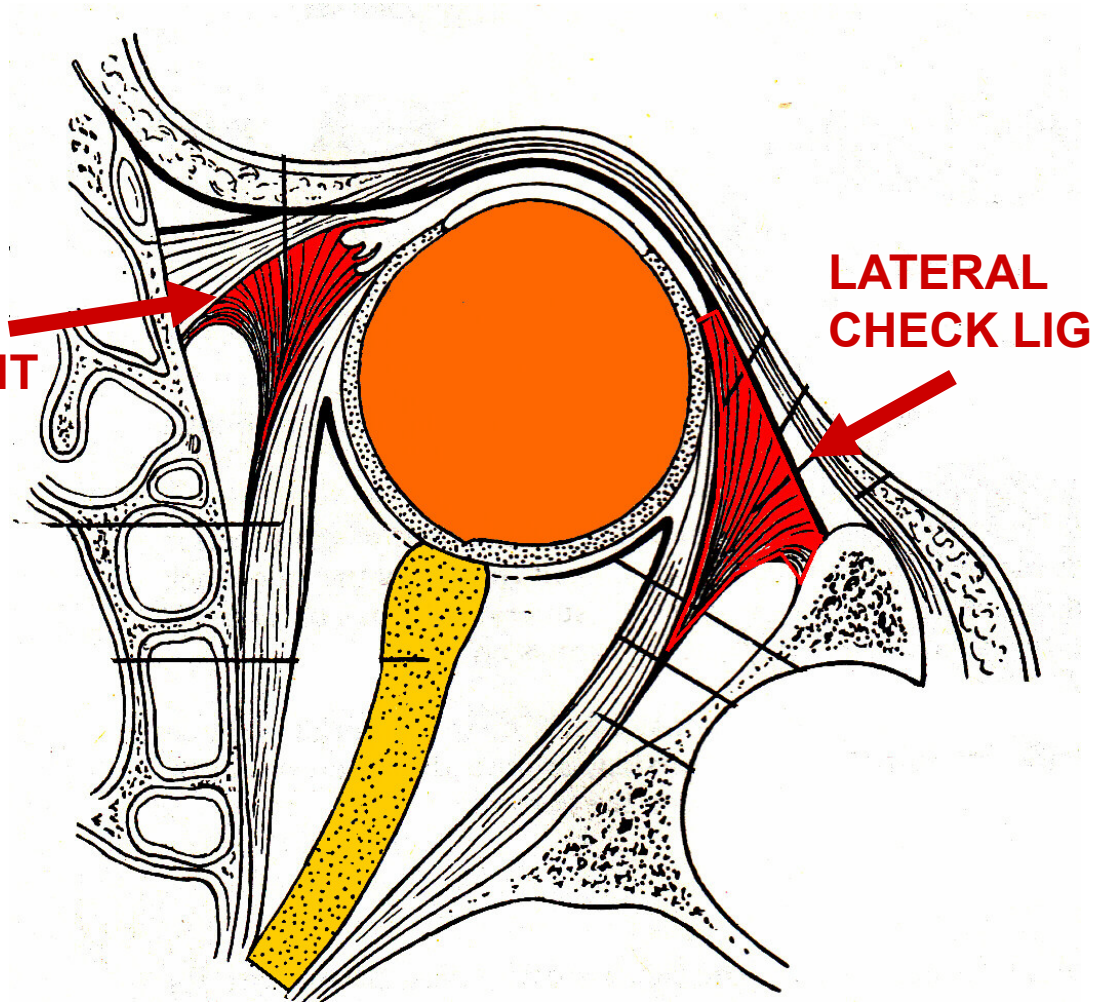


- Develops as a fold between maxillary process and frontonasal process
- then forms a solid cord that becomes canalized.

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

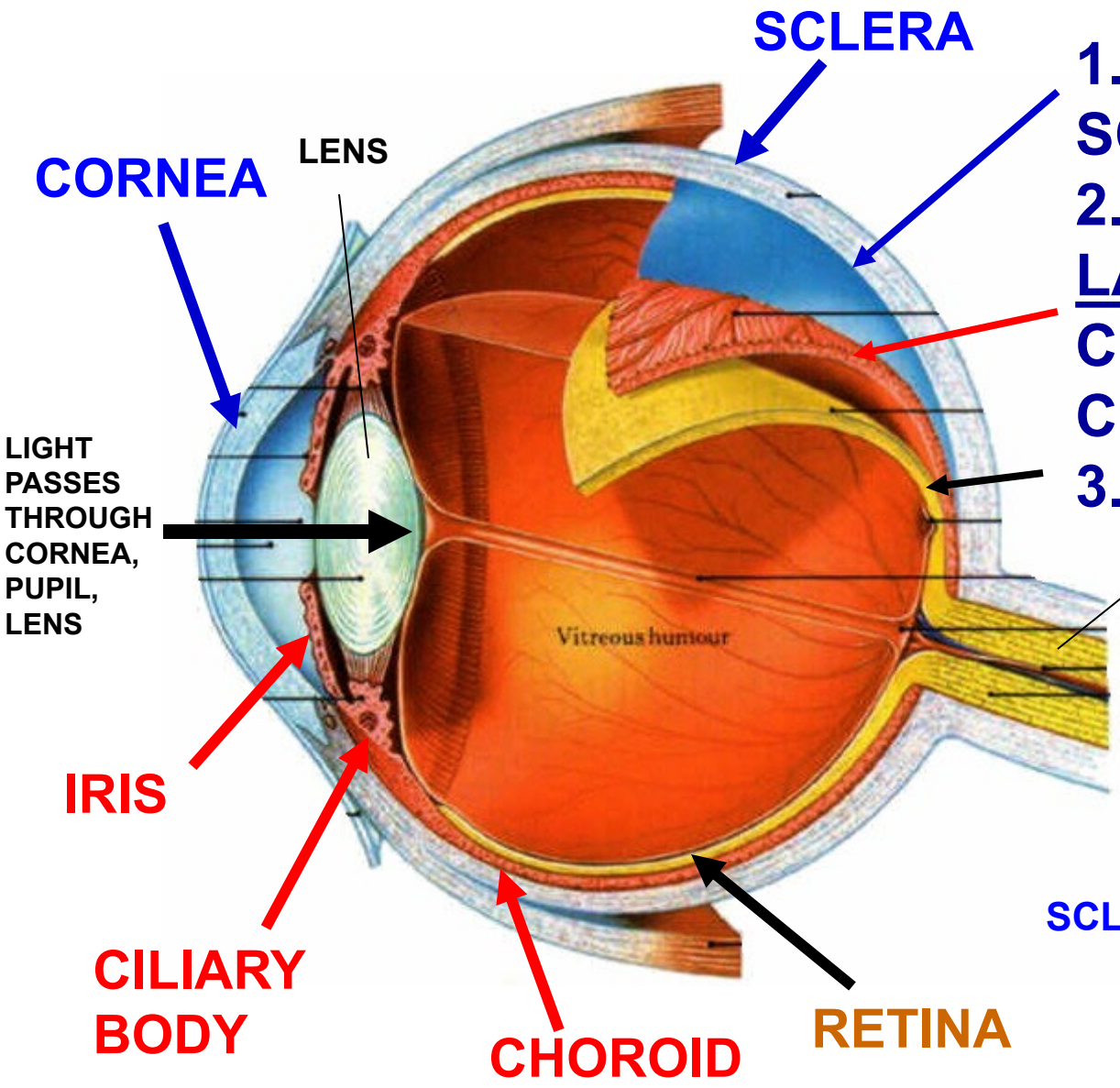
IV. FASCIAL SHEATH OF EYE

NOSE

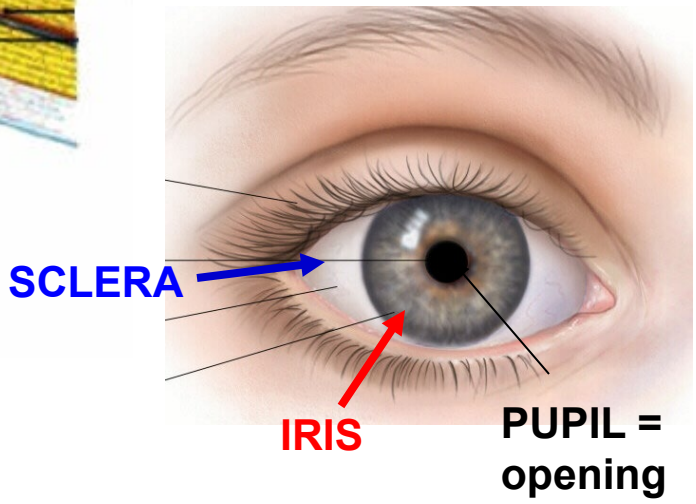


= TENON'S CAPSULE -THIN MEMBRANE SURROUNDS BACK OF EYE- THICKENINGS - **MEDIAL AND LATERAL CHECK LIGAMENTS - PREVENT EXCESSIVE ROTATION**

V. STRUCTURE OF EYE - 3 LAYERS



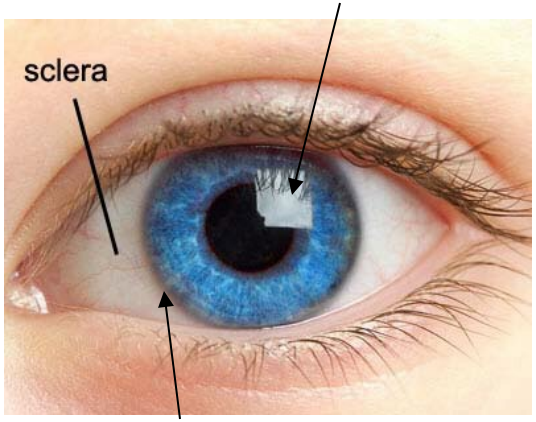
1. FIBROUS LAYER - SCLERA, CORNEA
2. VASCULAR LAYER (UVEA) - IRIS, CILIARY BODY, CHOROID
3. RETINA



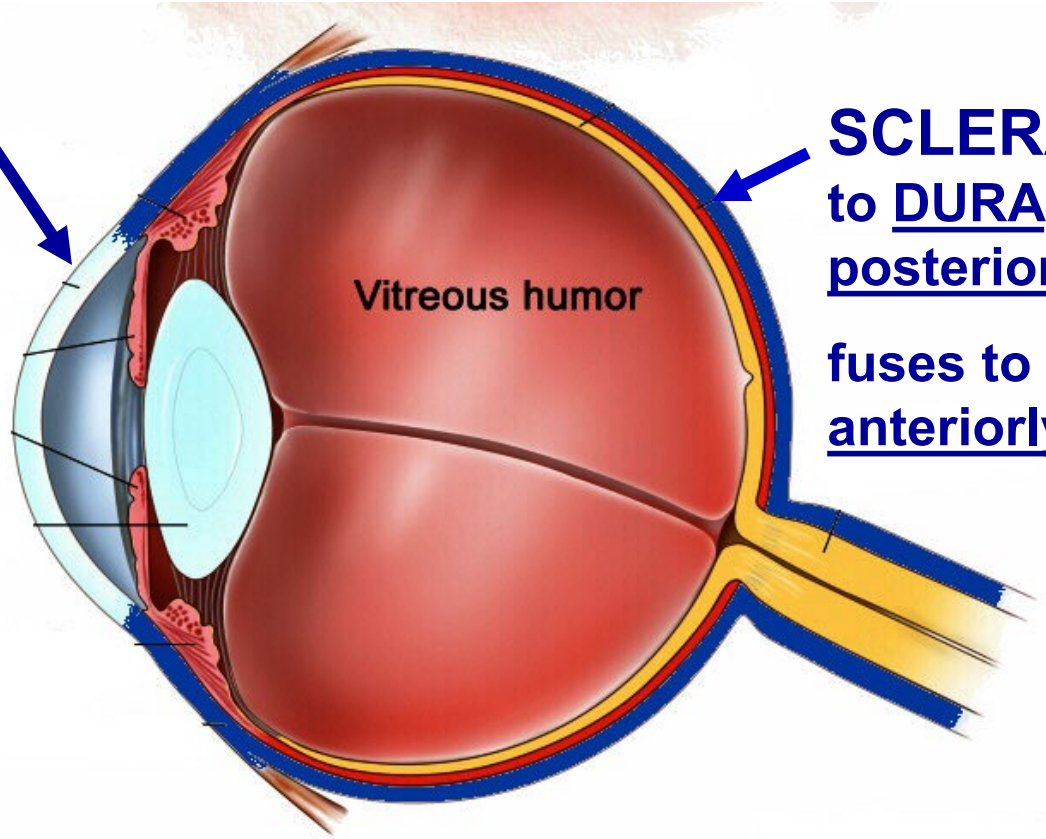
EYE- STRUCTURE OF EYEBALL- FIBROUS LAYER

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

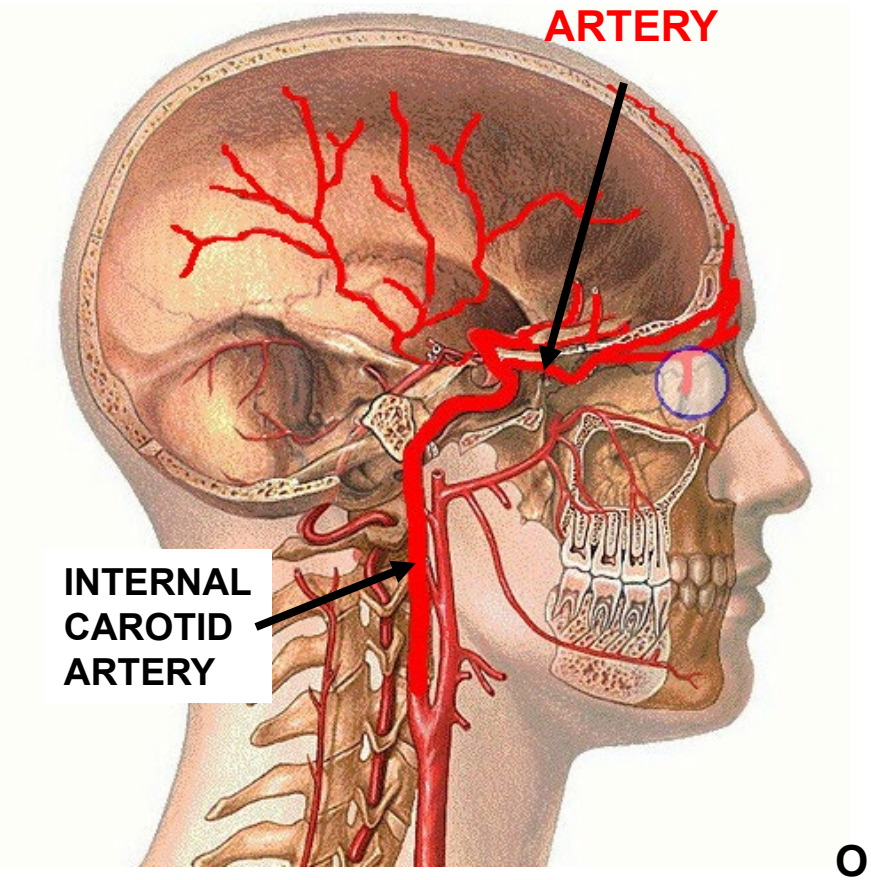


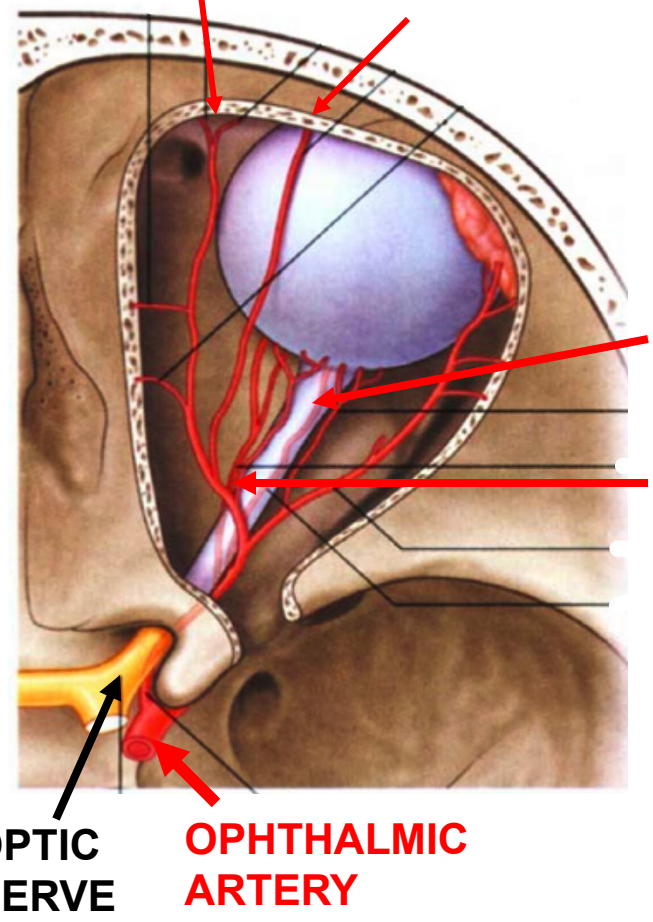
SCLERA - fuses to DURA posteriorly,

fuses to CORNEA anteriorly

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

BLOOD SUPPLY TO ORBIT: OPHTHALMIC ARTERY





MAJOR BRANCHES TO EYE:

2) CENTRAL ARTERY OF RETINA

1) POSTERIOR CILIARY ARTERIES (Long and Short)

(ANT. CILIARY ARTERIES - small, derived from branches to muscles)

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

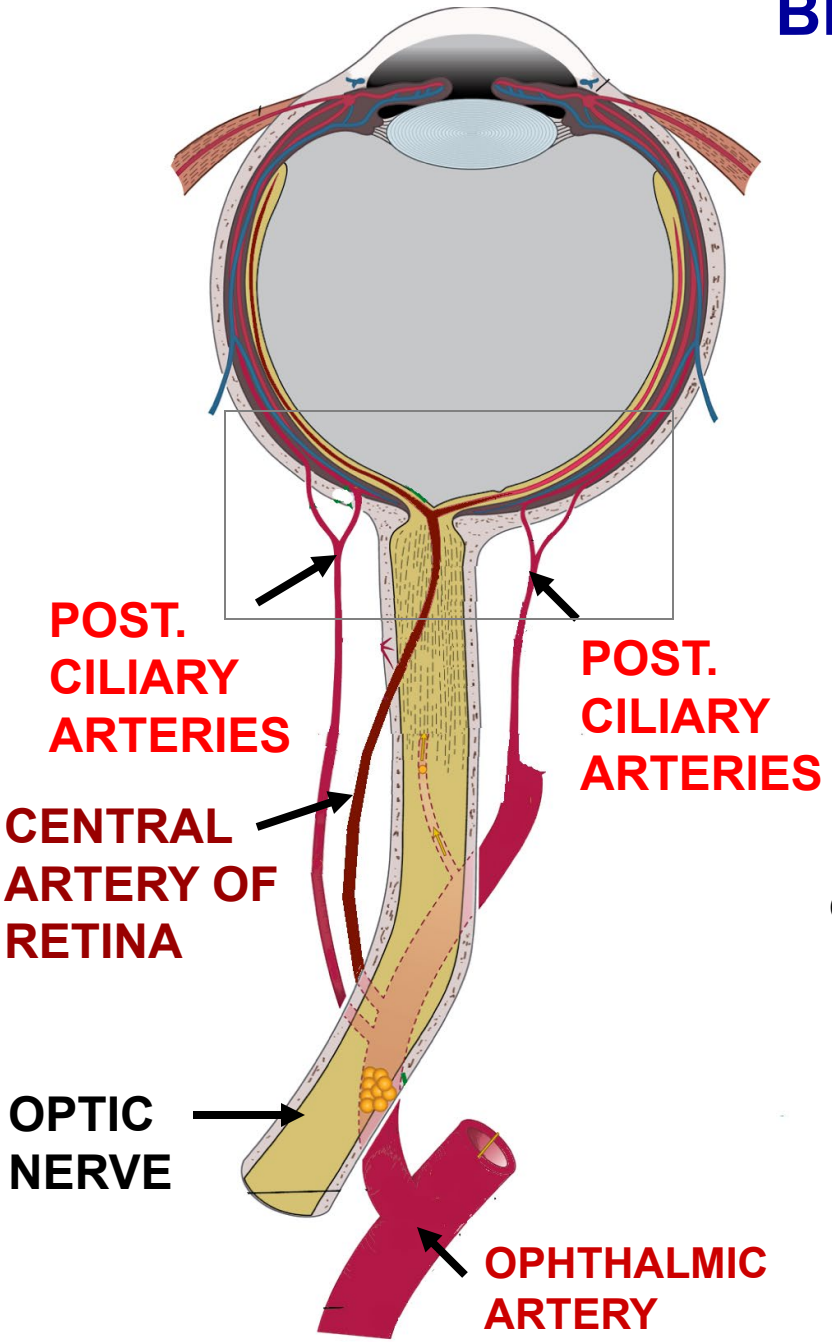
BLOOD SUPPLY TO EYE

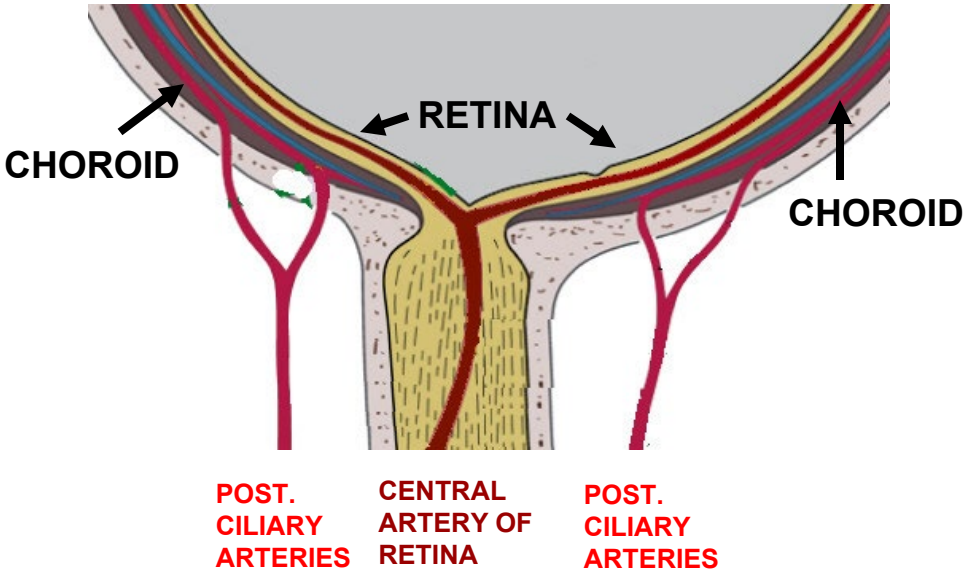
BRANCHES TO EYE:

1) POSTERIOR CILIARY ARTERIES - pierce sclera; blood to choroid, photoreceptors

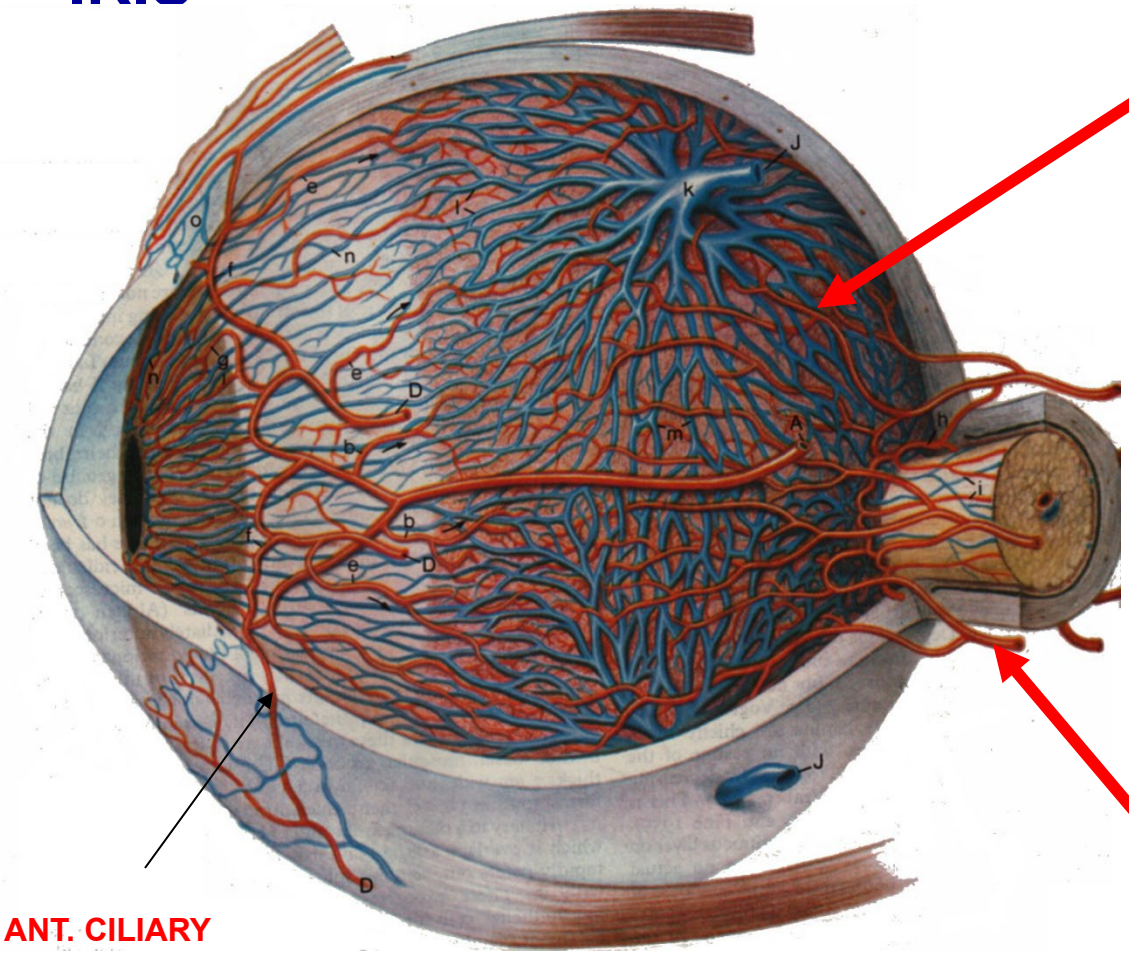
2) CENTRAL ARTERY OF RETINA - pierces Optic nerve; blood to neural retina

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 -

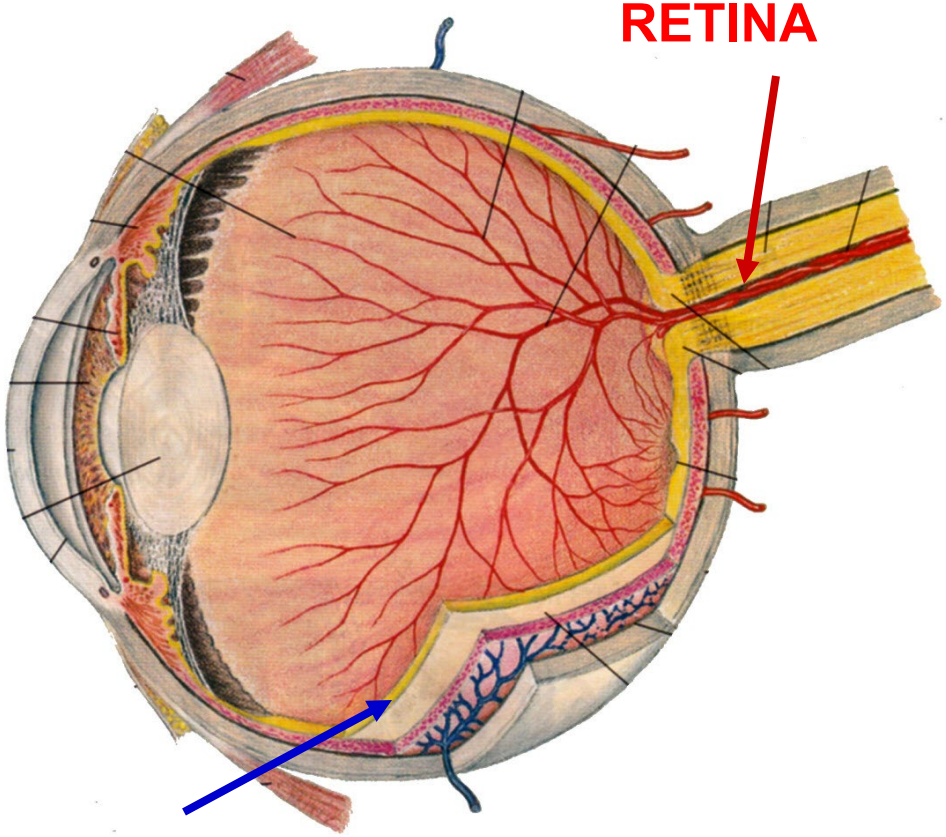
HIGHLY VASCULAR, PIGMENTED:
FUNCTIONS:
PROVIDE O2, NUTRIENTS TO PHOTORECEPTORS.

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

CENTRAL ARTERY OF RETINA

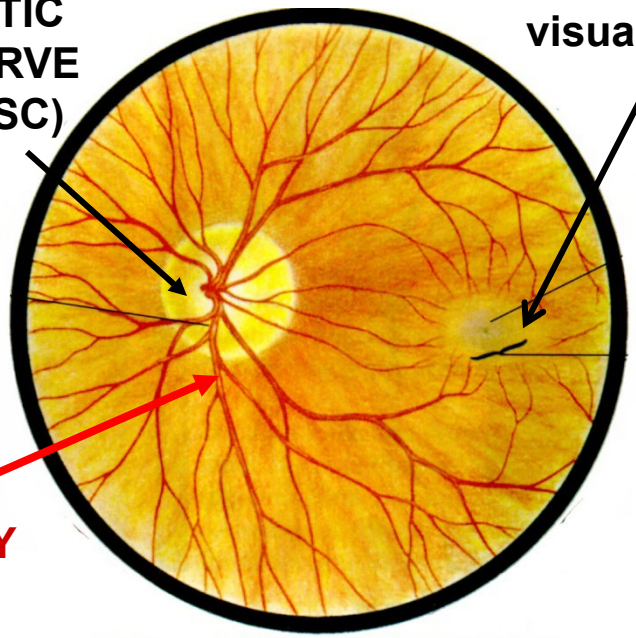


RETINA

CONTAINS RODS AND CONES (PHOTOSENSITIVE)
CENTRAL ARTERY OF RETINA- BRANCH OF OPHTHALMIC ART.
NO ANASTOMOSES; OCCLUSION RESULTS IN BLINDNESS

OPTIC NERVE (DISC)

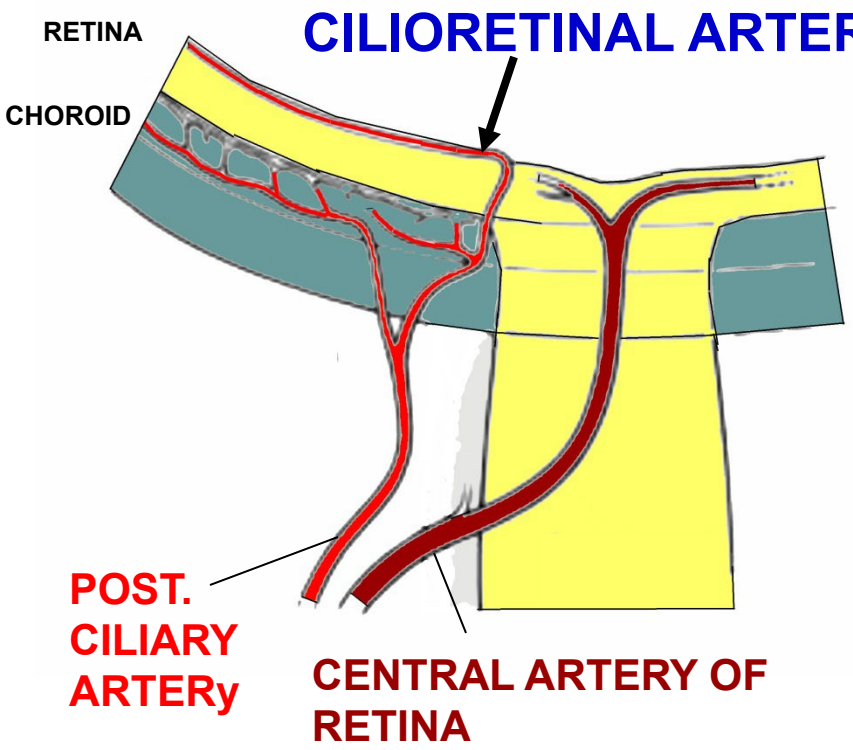
MACULA = visual acuity

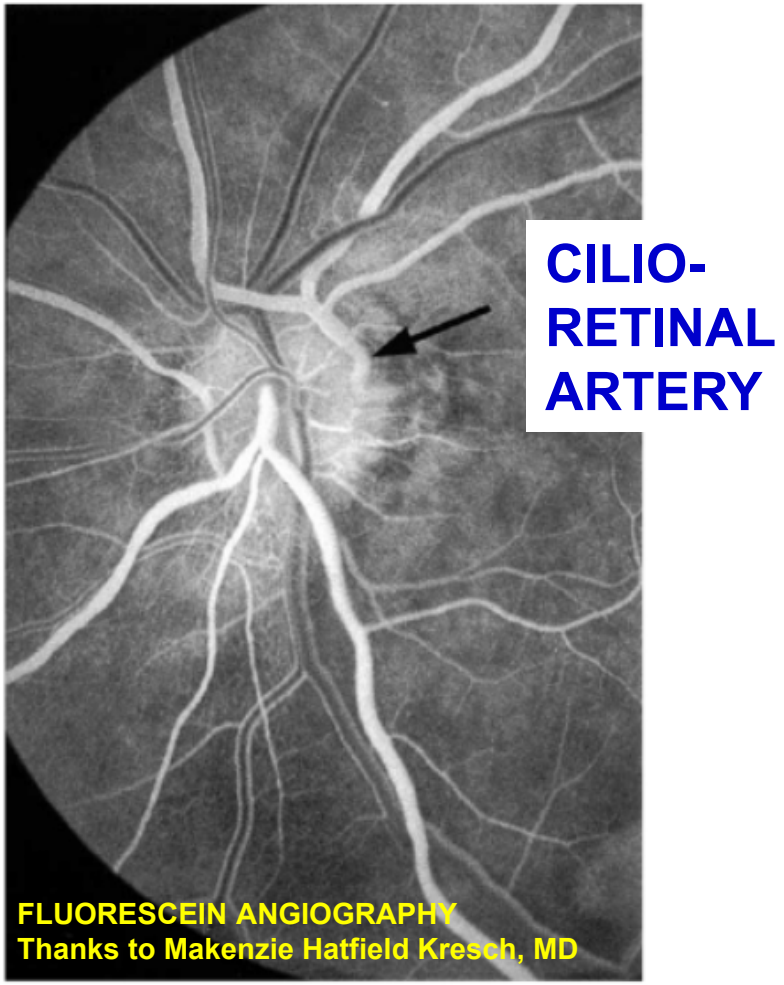


BRANCHES OF CENTRAL ARTERY AND VEIN OF RETINA

OPHTHALMOSCOPE VIEW

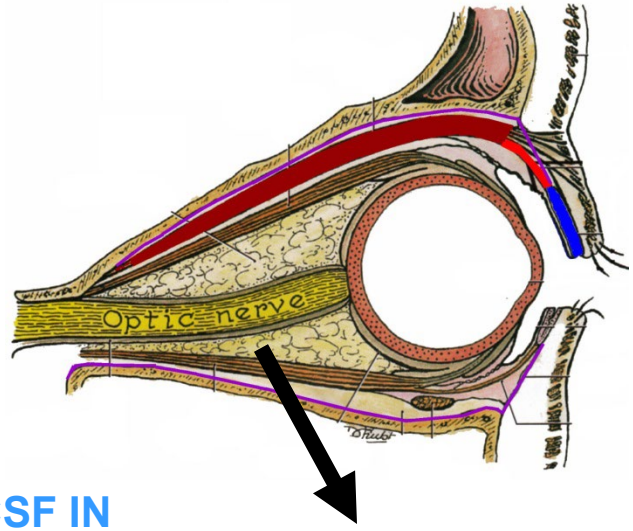
CRAO - CENTRAL RETINAL ARTERY OCCLUSION - most common cause, Carotid Artery atherosclerosis; if complete: blind in one eye

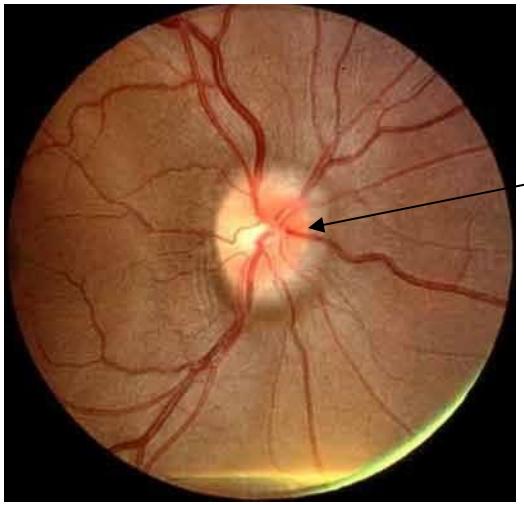




New Anatomy: imaging has shown that branches of Ciliary Arteries (Cilioretinal arteries) can supply retina (20% of people); can provide partial sparing of retina in cases of Central Retinal Artery Occlusion

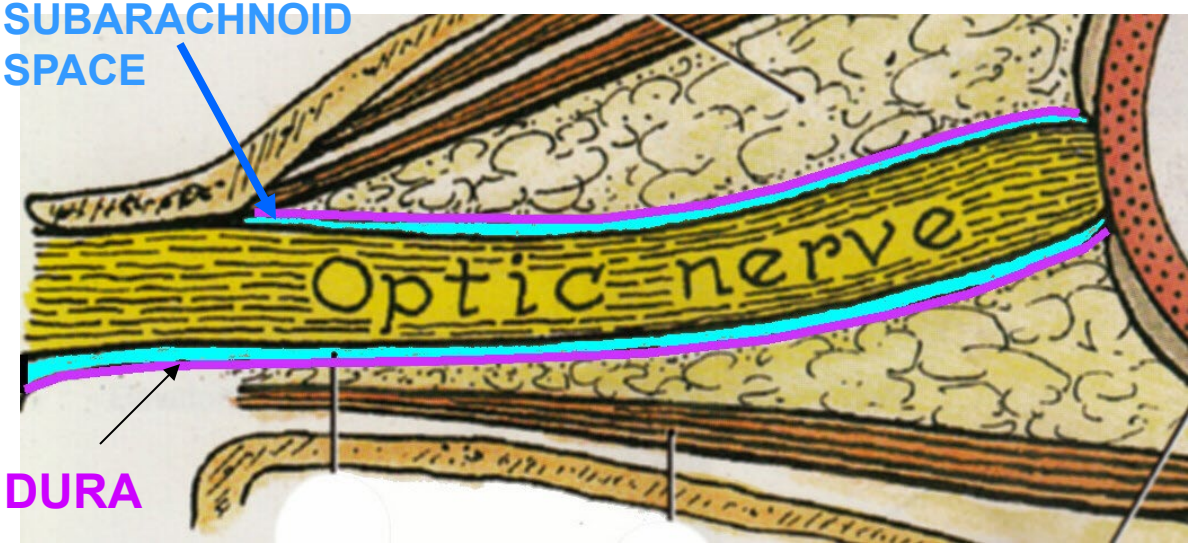
SUBARACHNOID SPACE EXTENDS TO BACK OF EYEBALL





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

CSF IN SUBARACHNOID SPACE



DURA

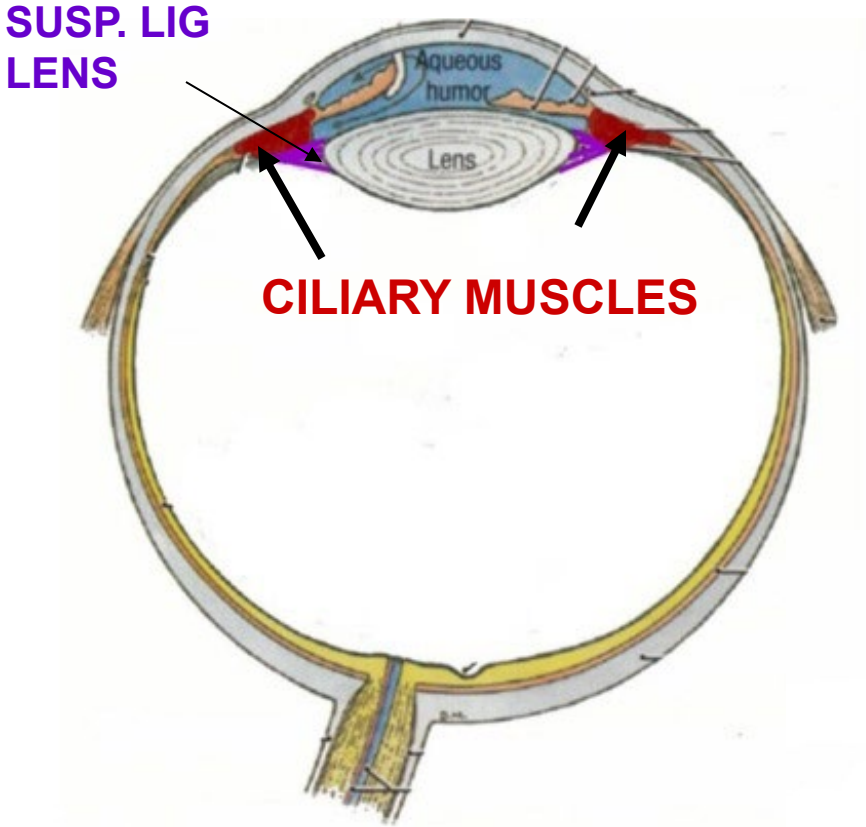
CLINICAL**

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

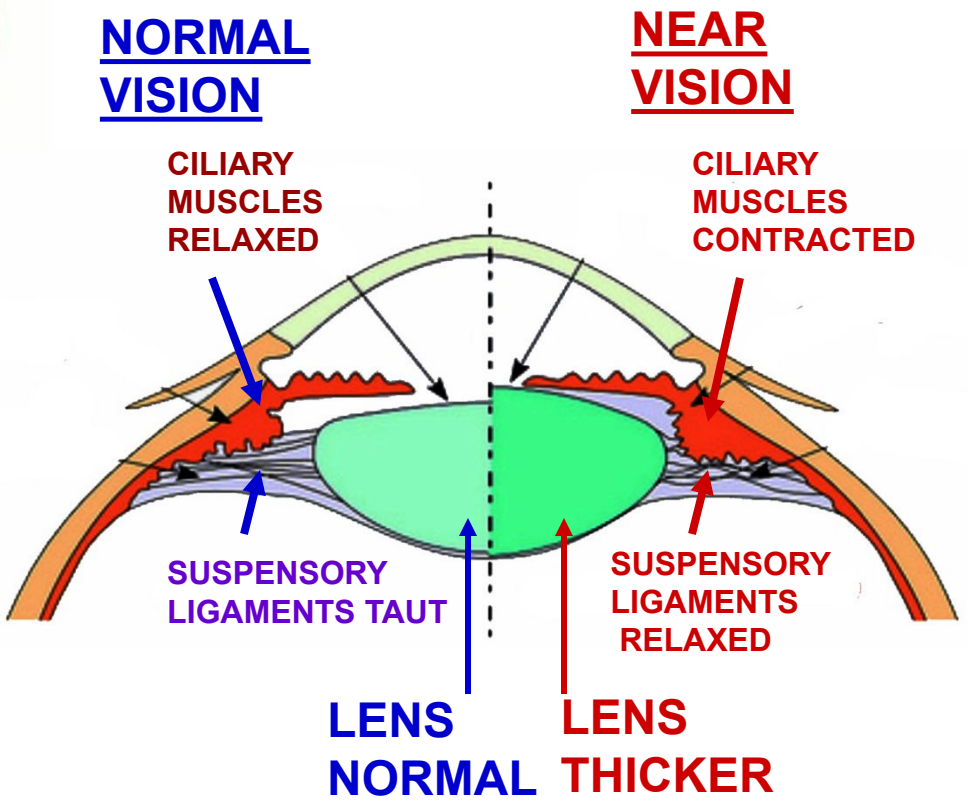
PAPILLEDEMA = swelling of optic disc

Clinical - slow onset; headaches

EYE- STRUCTURE OF EYEBALL- VASCULAR LAYER



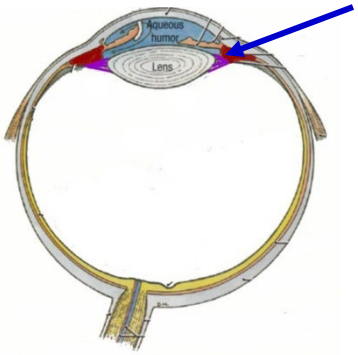
B. CILIARY BODY- CILIARY MUSCLES- SMOOTH MUSCLES AT ATTACHMENTS OF SUSPENSORY LIGAMENTS OF LENS CONTROL THICKNESS OF LENS



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

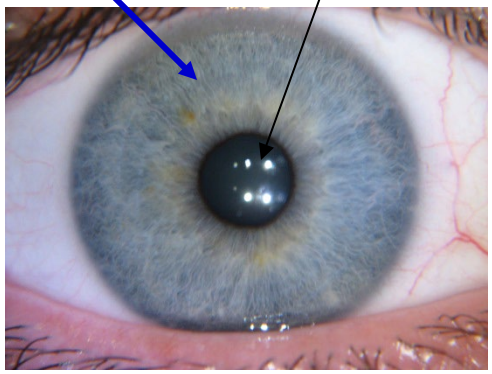
CILIARY MUSCLES CONTRACT - LENS THICKER

EYE - STRUCTURE OF EYEBALL- VASCULAR LAYER



IRIS

PUPIL



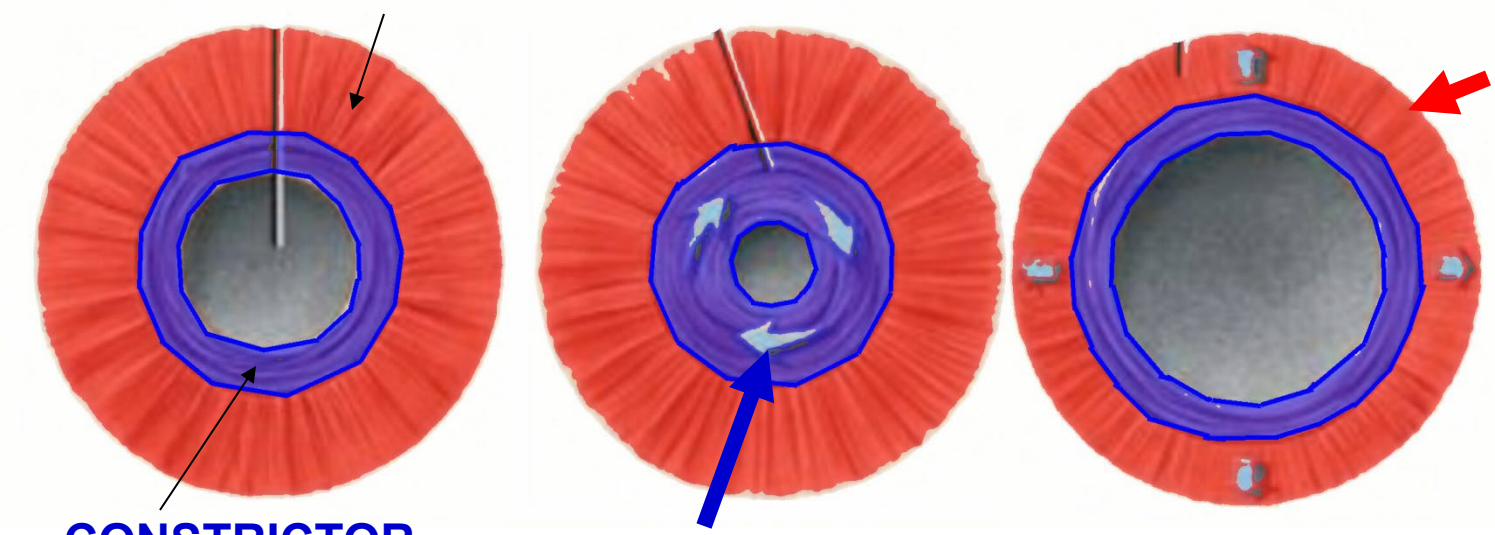
C. IRIS - PIGMENTED, CONTRACTILE LAYER WITH SMOOTH MUSCLES SURROUNDING PUPIL

NORMAL

DILATOR

BRIGHT LIGHT - PUPIL CONSTRICTED

DIM LIGHT - PUPIL DILATED



CONSTRICTOR

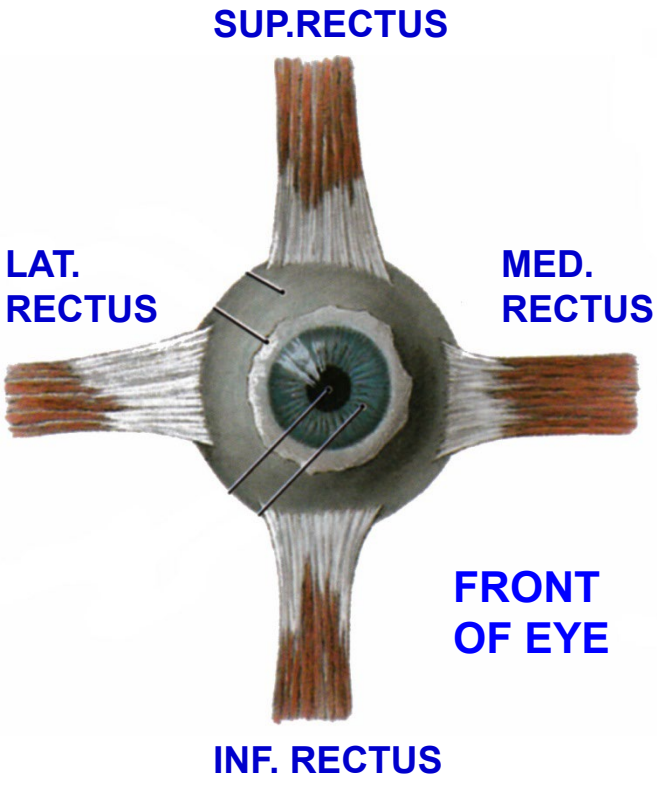
DILATOR PUPIL- RADIAL SMOOTH MUSCLE; SYMPA-THETICS

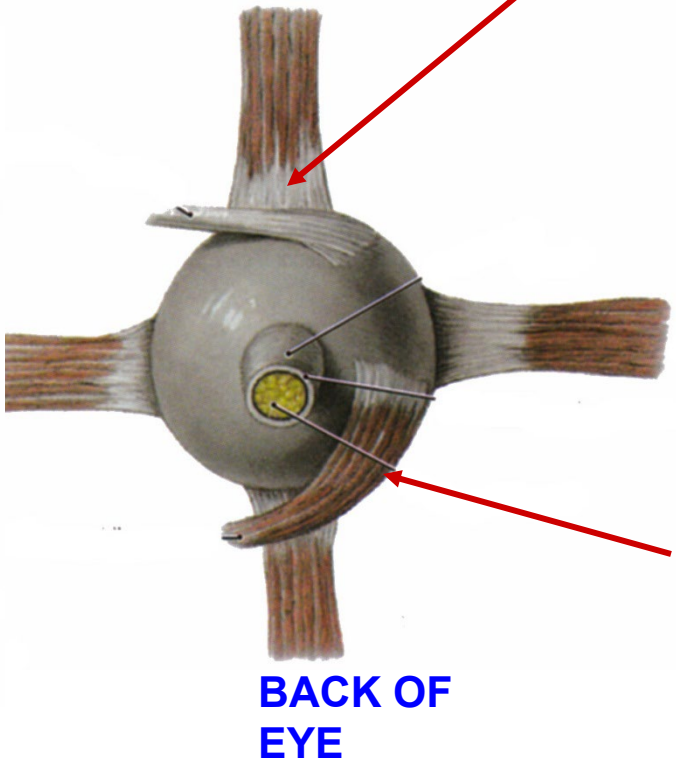
CONSTRICTOR PUPIL- CIRCULAR SMOOTH MUSCLE; PARASYMPATHETICS (CN III)

V. EXTRAOCULAR MUSCLES

- VOLUNTARY SKELETAL MUSCLES WHICH MOVE EYEBALL

RECTI = STRAIGHT, NAMED FOR SIDES ON WHICH THEY ATTACH



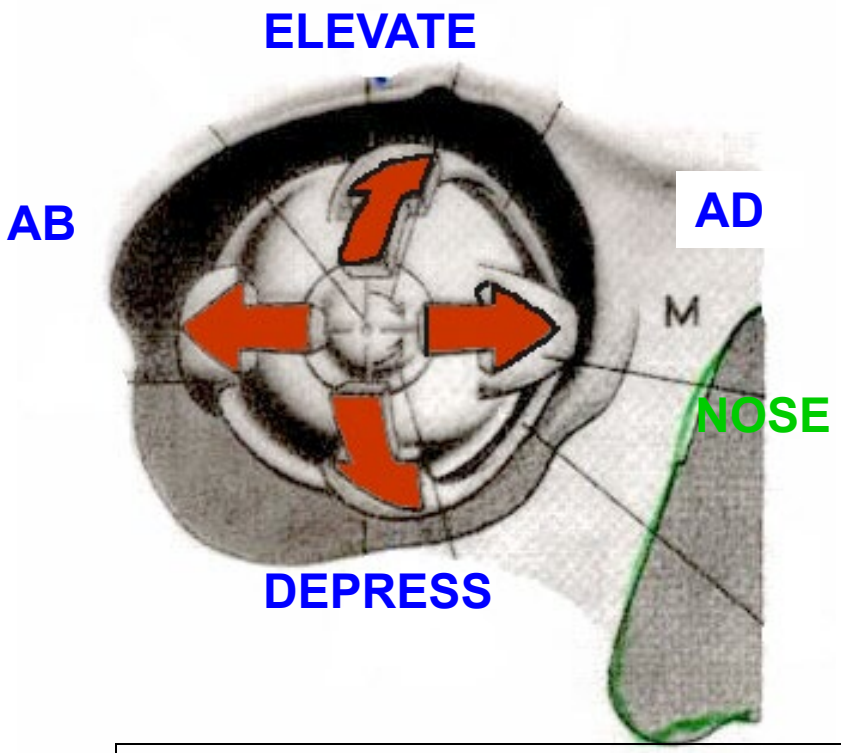


OBLIQUES - MORE COMPLICATD DEVIOUS SUPERIOR OBLIQUE - ACTS THROUGH PULLEY (TROCHLEA); INFERIOR OBLIQUE - TO FLOOR OF ORBIT

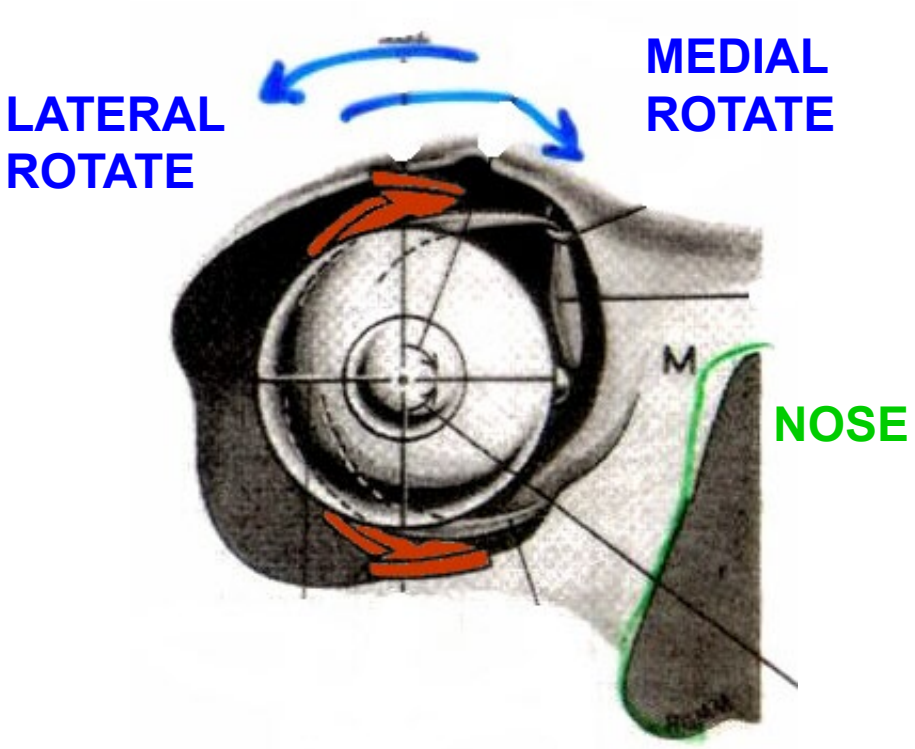
EYE MOVEMENTS

VOLUNTARY

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

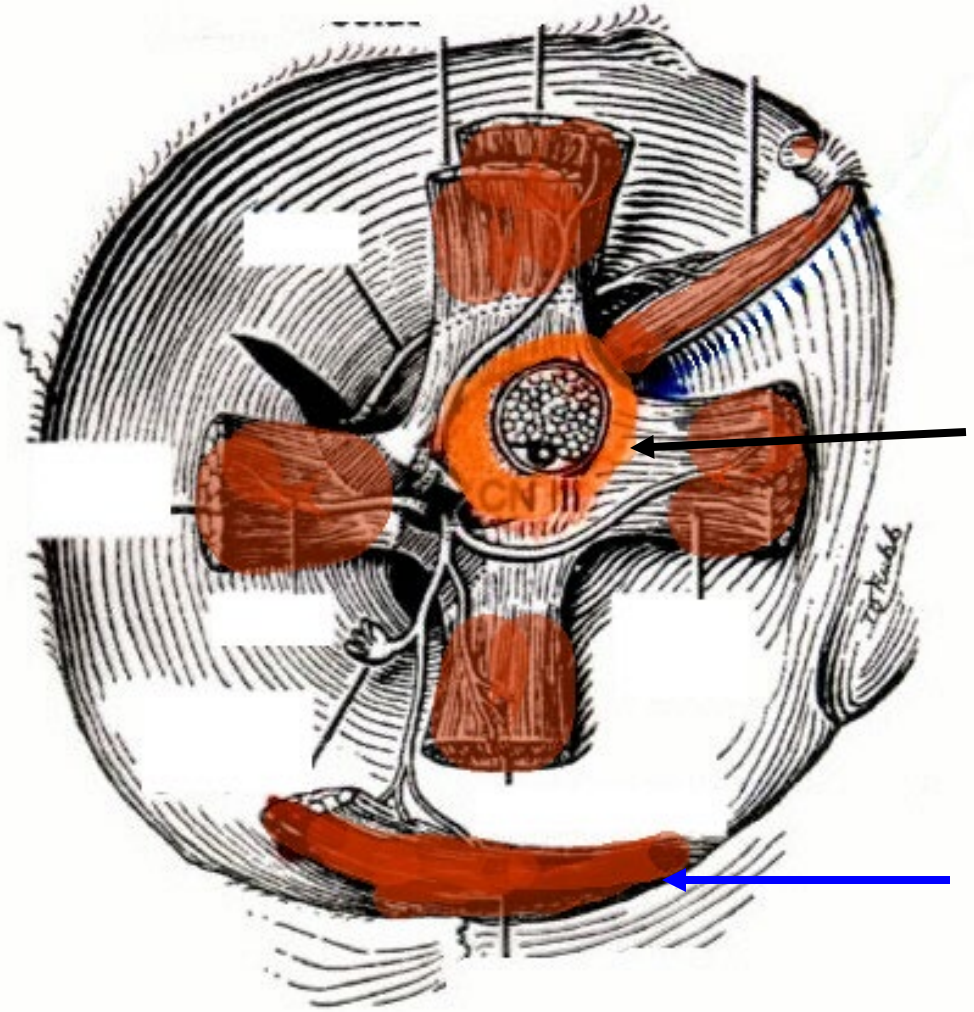


ROTATE- INVOLUNTARY WHEN TILT HEAD : MEDIAL ROTATE - INTORSION LATERAL ROTATE - EXTORSION



ROTATIONAL MOVEMENTS – COMPENSATE FOR HEAD TILT

A. ORIGINS OF EXTRAOCULAR MUSCLES



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

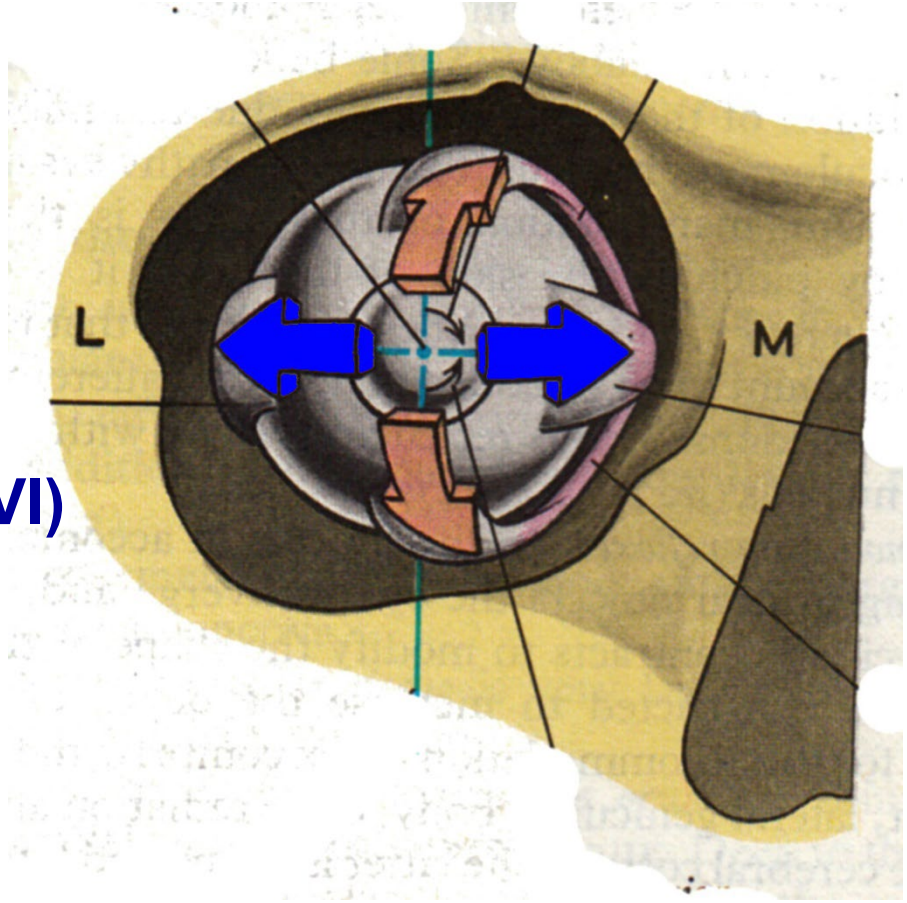
TENDINOUS RING- RING OF CT SURROUNDING OPTIC CANAL AND SUPERIOR ORBITAL FISSURE

NOTE: NOT INFERIOR OBLIQUE - FROM FLOOR OF ORBIT

B. ACTIONS - EYE MOVEMENTS

ACTIONS - MEDIAL RECTUS AND LATERAL RECTUS STRAIGHTFORWARD

LATERAL RECTUS ABDUCT (VI)

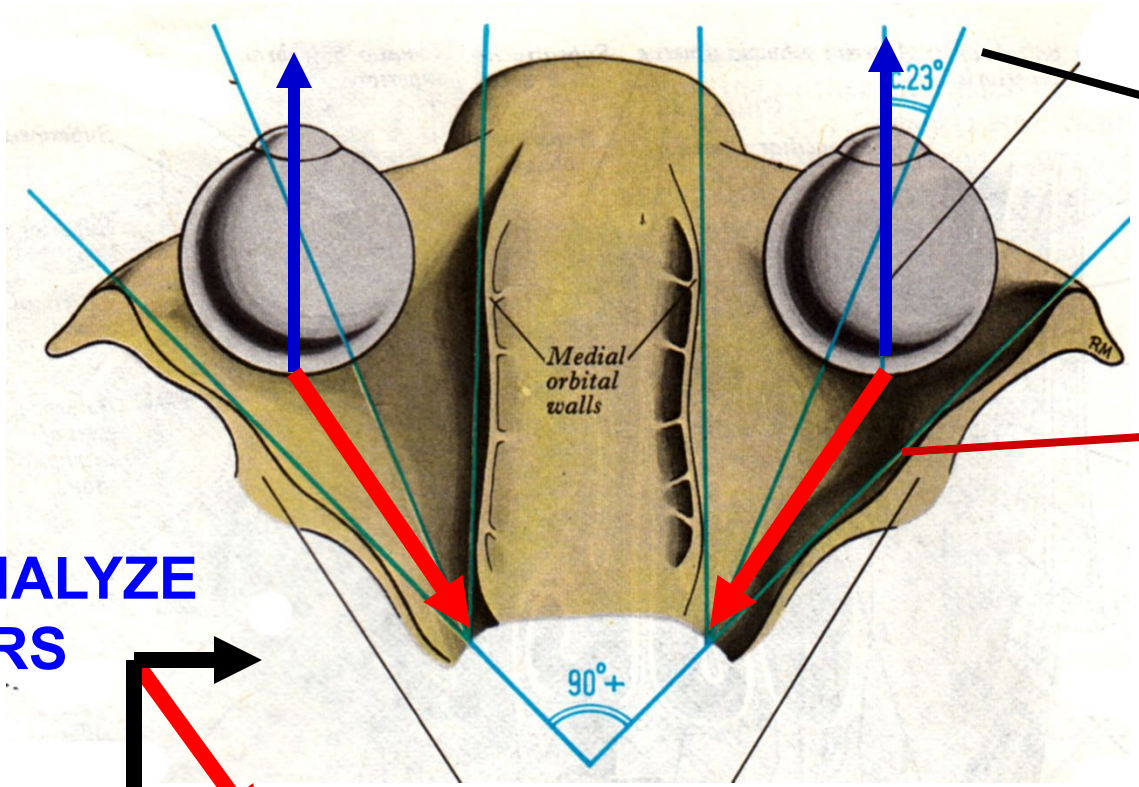


MEDIAL RECTUS-ADDUCT EYE (III)

EYE MOVEMENTS

- ACTIONS OF OTHER MUSCLES COMPLEX

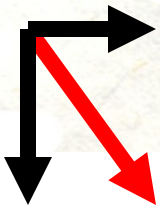
- PULL OF SUP. AND INF. RECTUS AT ANGLE WITH LINE OF SIGHT



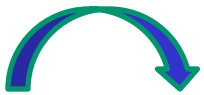
LINE OF SIGHT

ACTION OF MUSCLE

CAN ANALYZE VECTORS



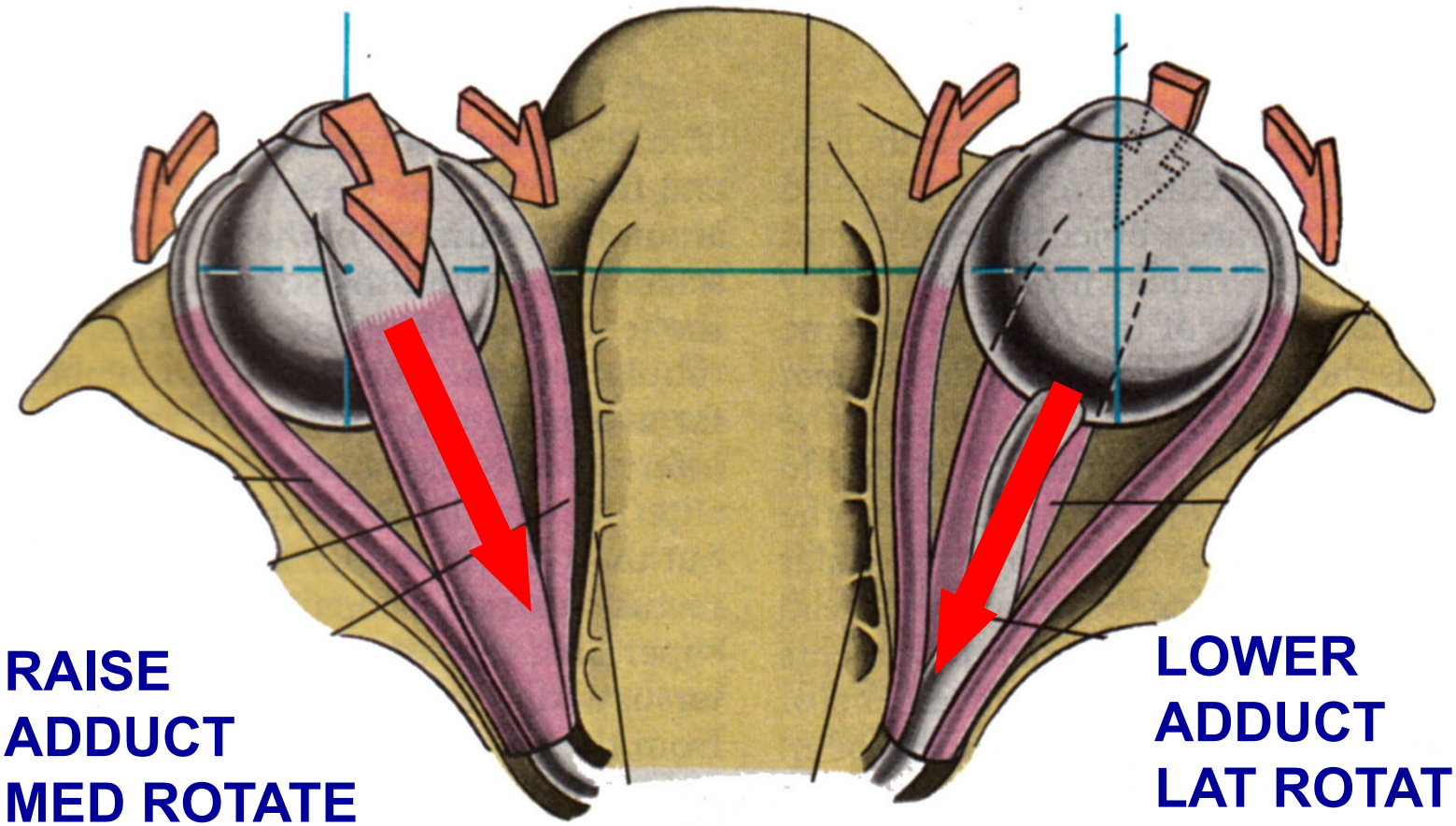
ALSO ROTATIONAL MOVEMENTS



EYE MOVEMENTS

SUP RECTUS (III)

INF RECTUS (III)



RAISE
ADDUCT
MED ROTATE

LOWER
ADDUCT
LAT ROTATE

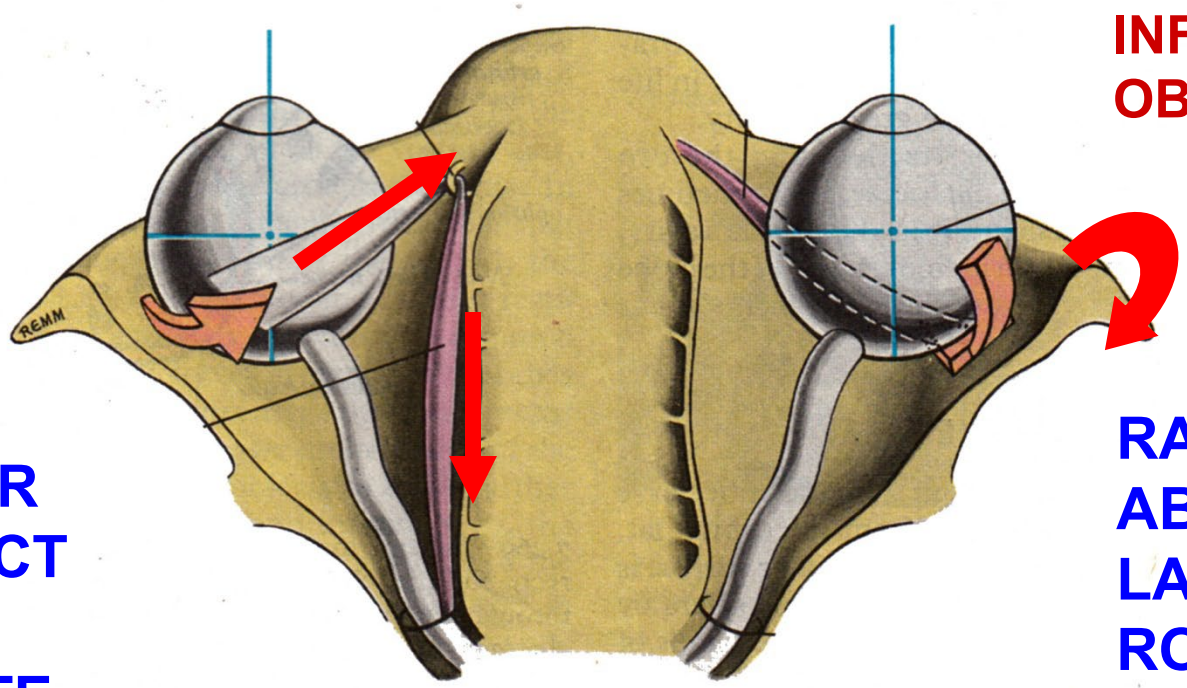
EYE MOVEMENTS

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

SUP OBLIQUE

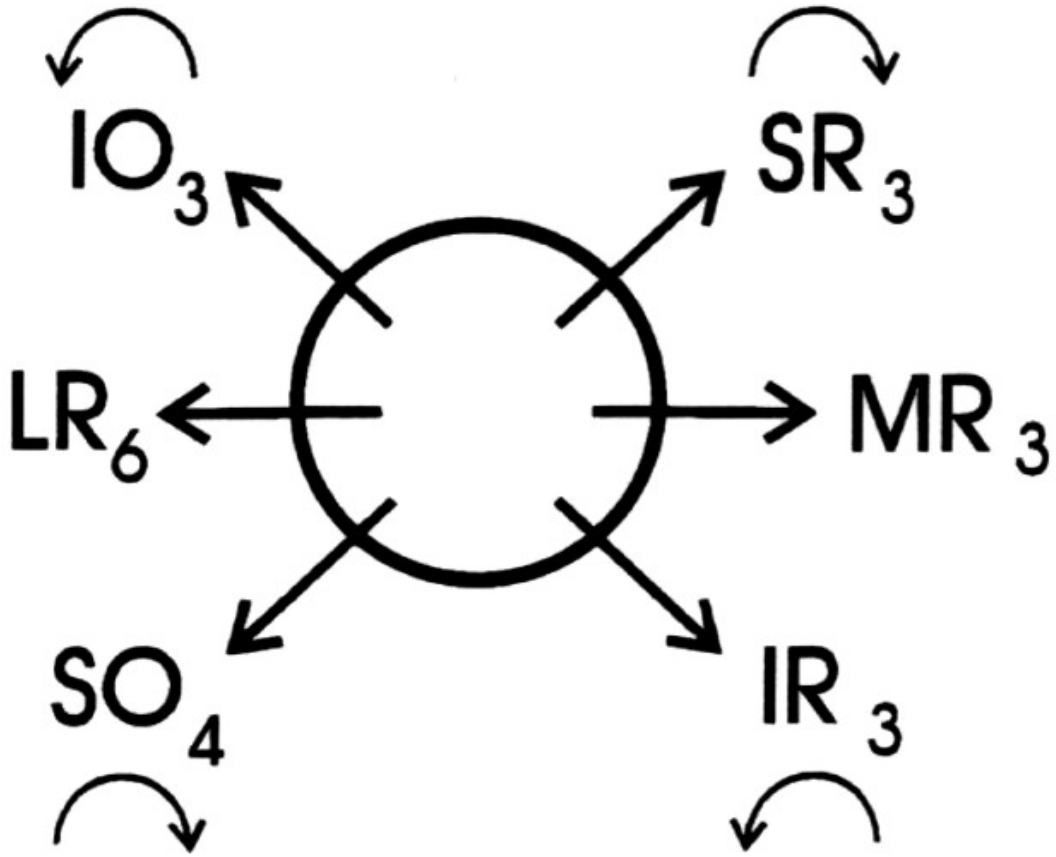


INF OBLIQUE

LOWER
ABDUCT
MED
ROTATE

RAISE
ABDUCT
LAT
ROTATE

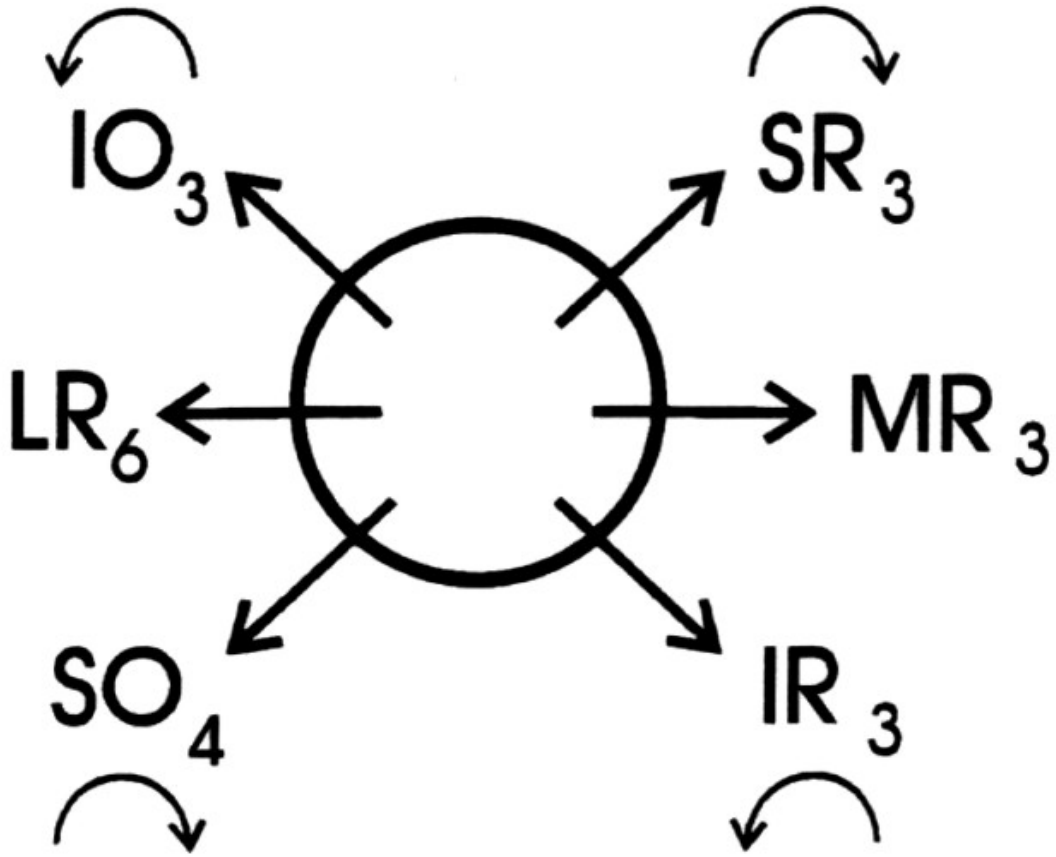
EYE MOVEMENTS DIAGRAM



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.

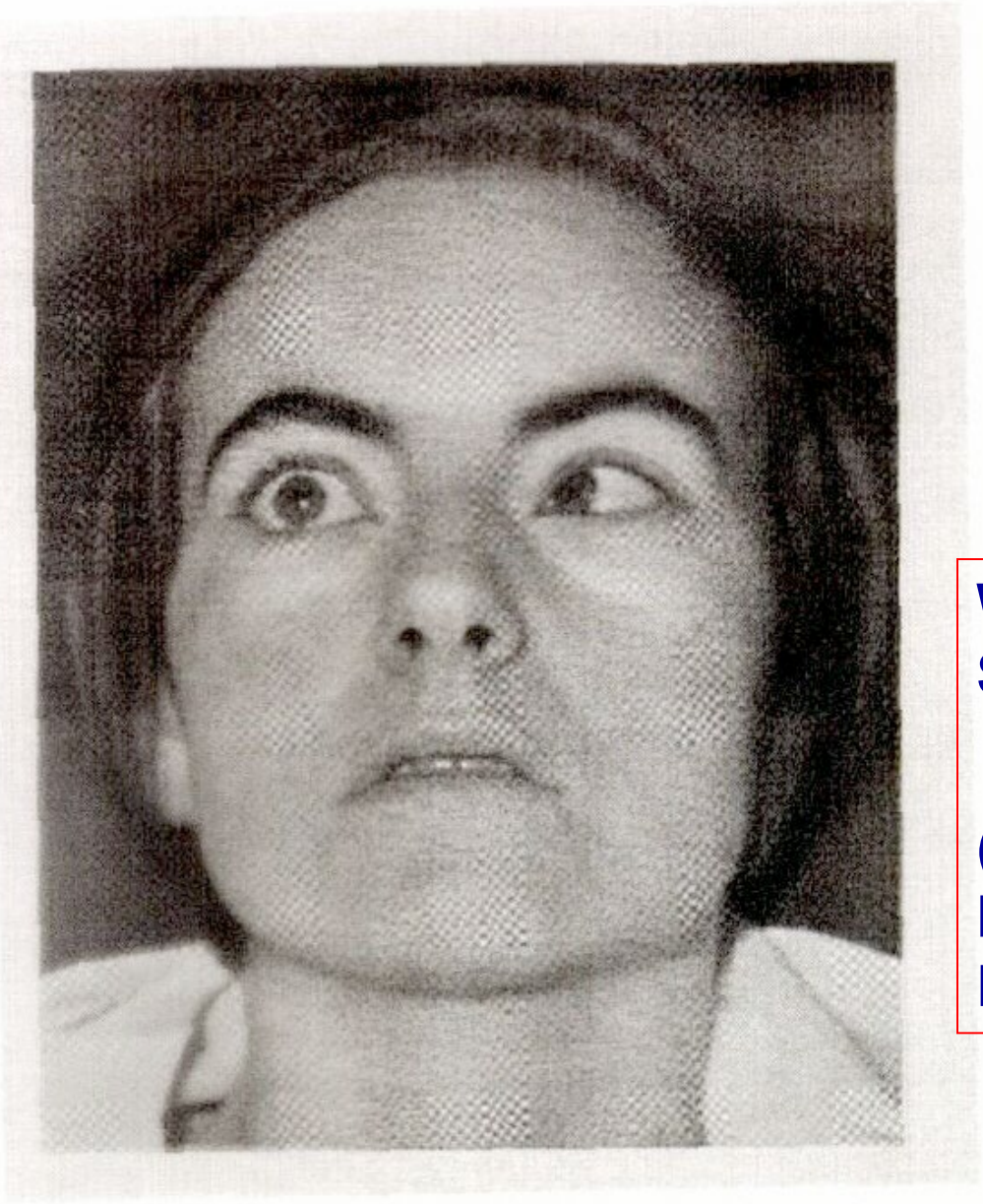
EYE MOVEMENTS DIAGRAM



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



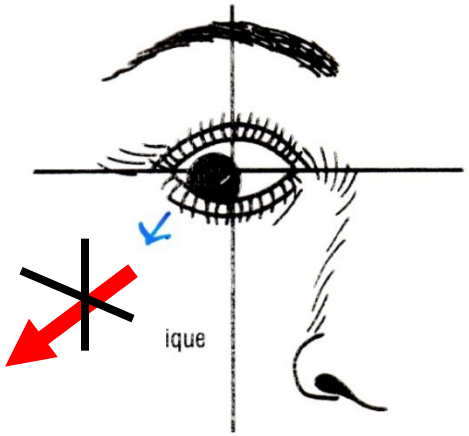
A. ABDUCENS (VI) NERVE DAMAGE

**

WHEN PATIENT LOOKS STRAIGHT AHEAD:

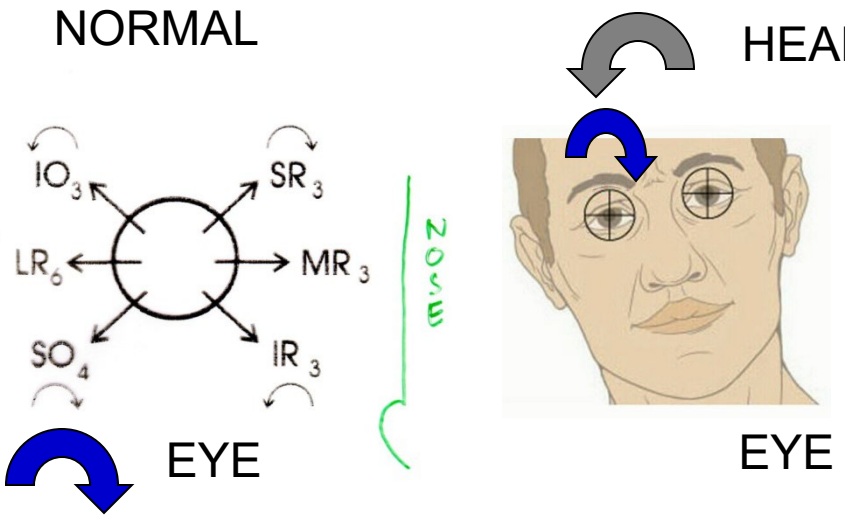
MEDIAL STRABISMUS (CROSS-EYED) DUE TO DAMAGE/PARALYZE LATERAL RECTUS

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

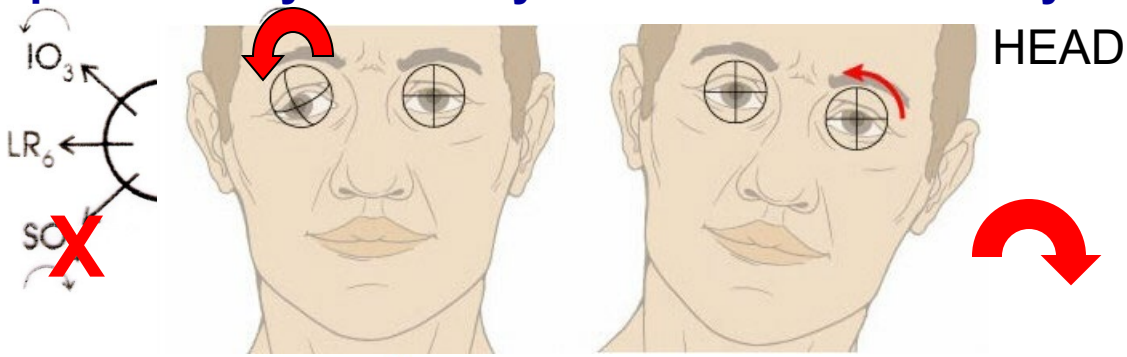


PATIENT CANNOT LOOK DOWN AND OUT

Symptoms - Difficulty walking down stairs; HEAD TILTED



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



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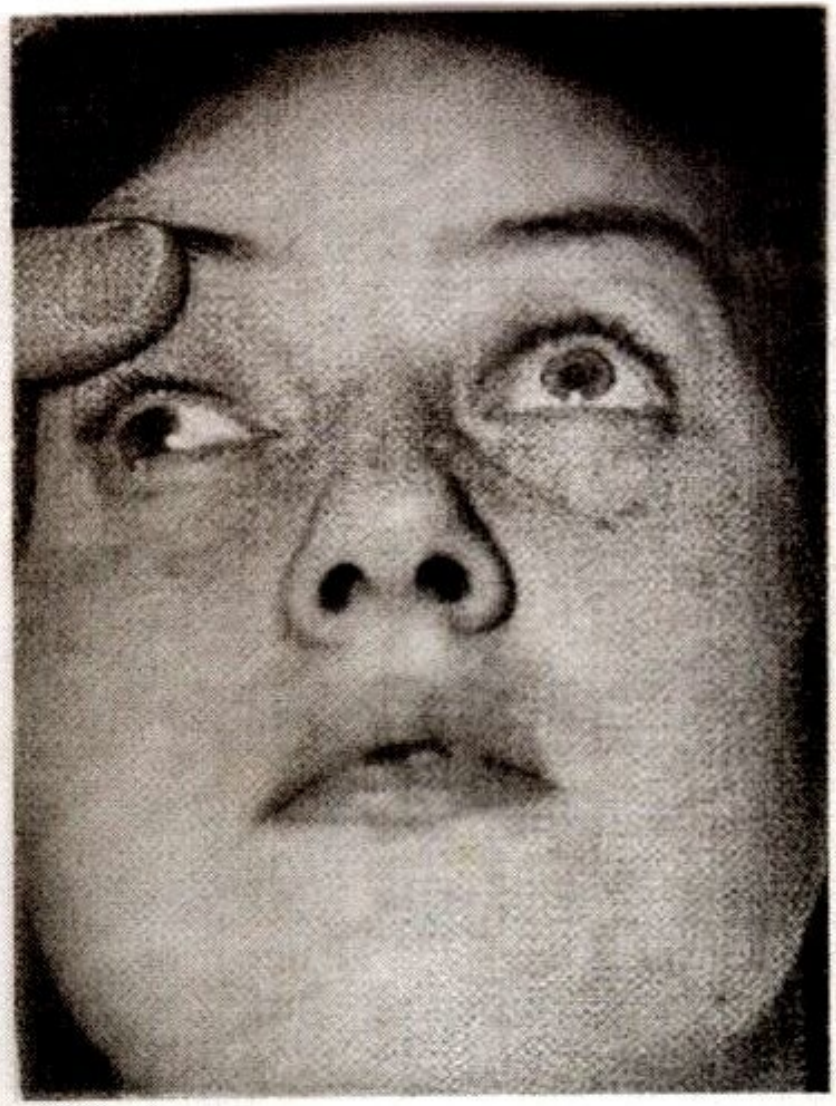
<u>AFTER IV DAMAGE</u> - eye rotated laterally; <u>PATIENT TILTS HEAD TO OPPOSITE SIDE</u> so both eyes rotated

C. OCULOMOTOR (III) NERVE DAMAGE



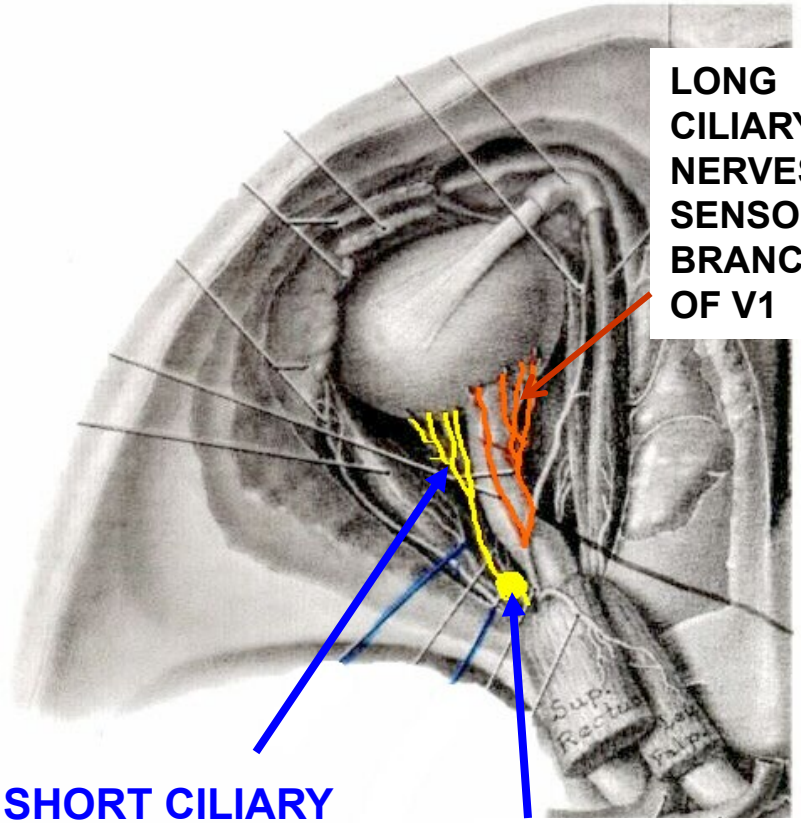
AT REST

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)

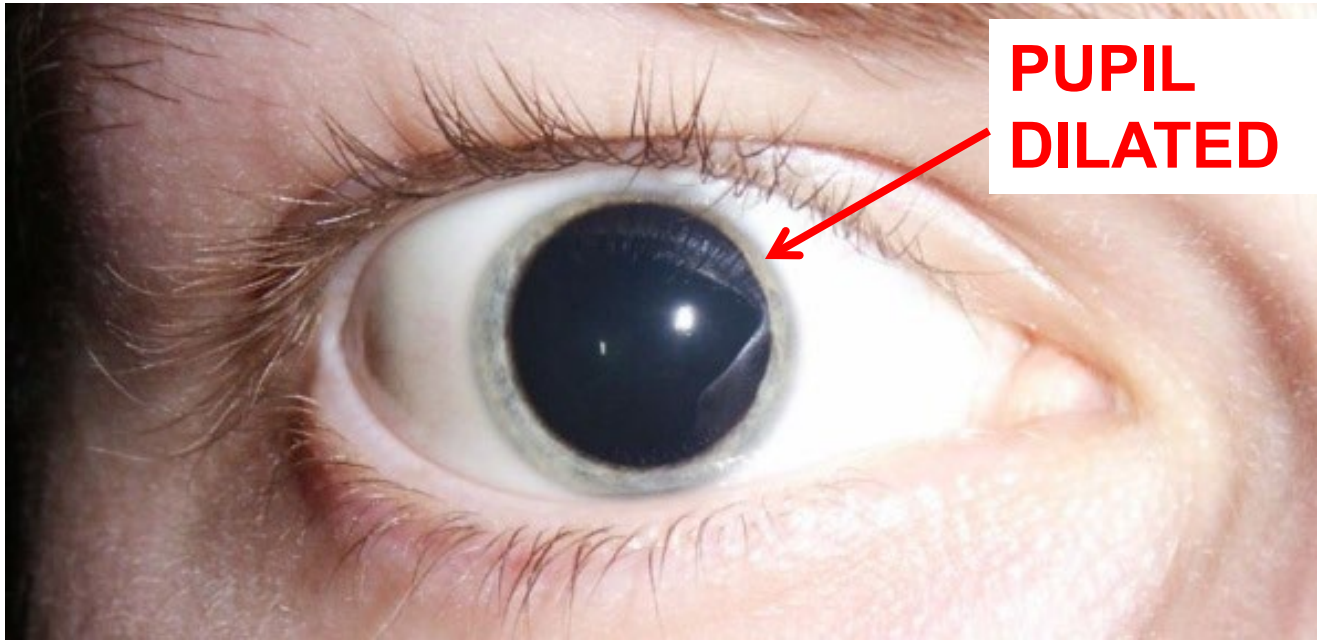
INNERVATE: 1) CILIARY MUSCLES 2) SPHINCTER (CONSTRICTOR) PUPILLAE

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**

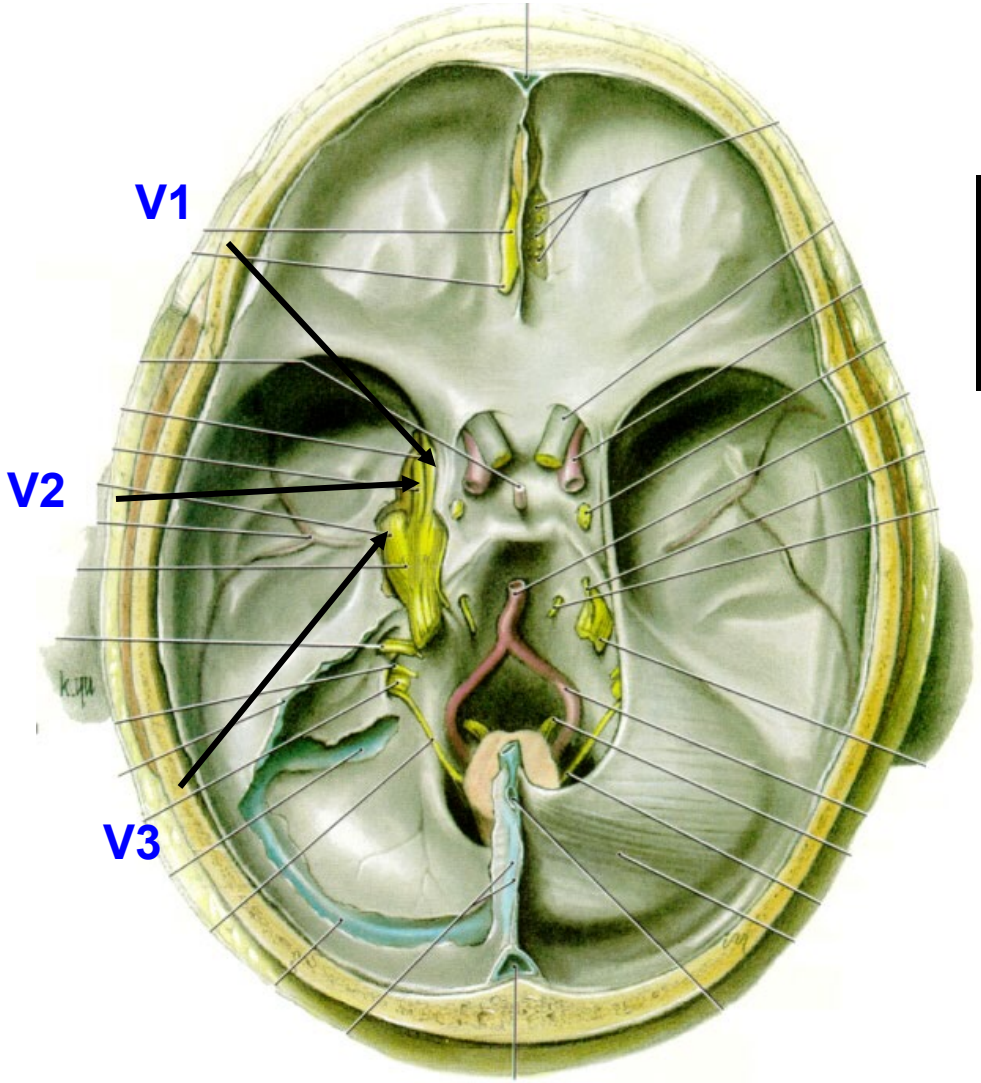
'BLOWN PUPIL' = MYDRIASIS (muh-dry'-a-sis)



'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