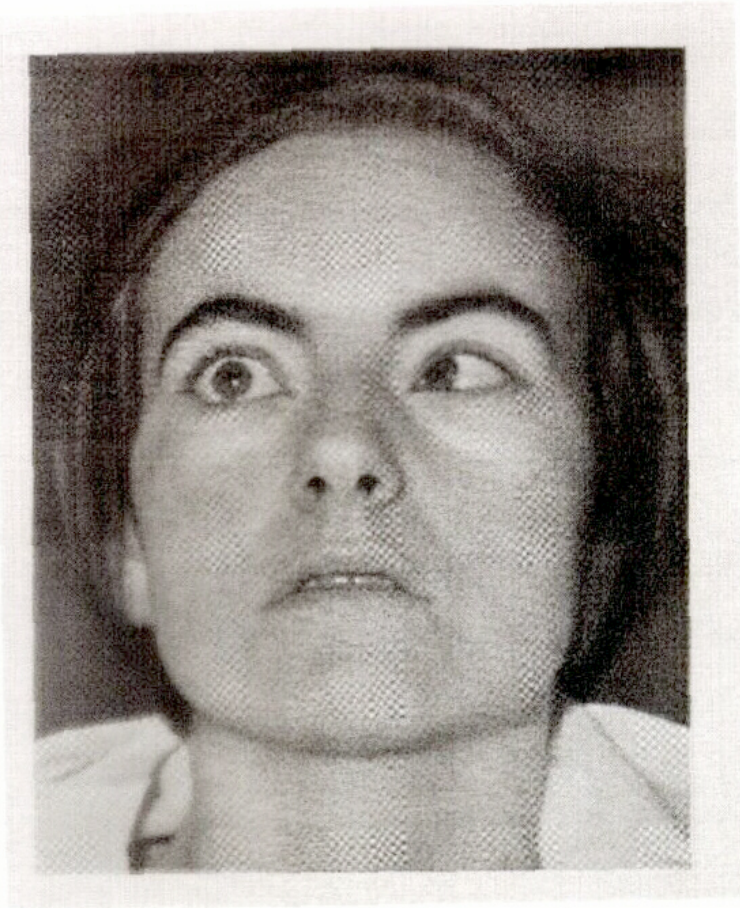


ORBIT



OUTLINE

I. BONES 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**

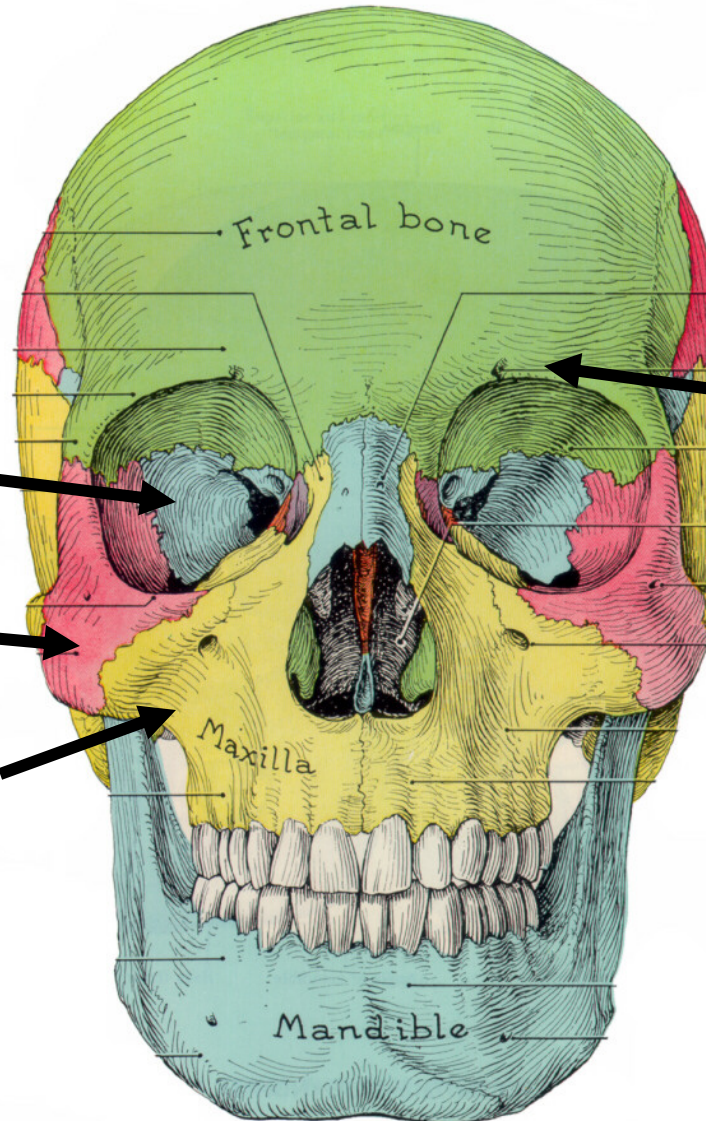
I. BONES OF ORBIT

RIGIDLY LINKED
FOR EYE
MOVEMENTS

SPHENOID

ZYGOMATIC

MAXILLARY



A. BOUNDARIES

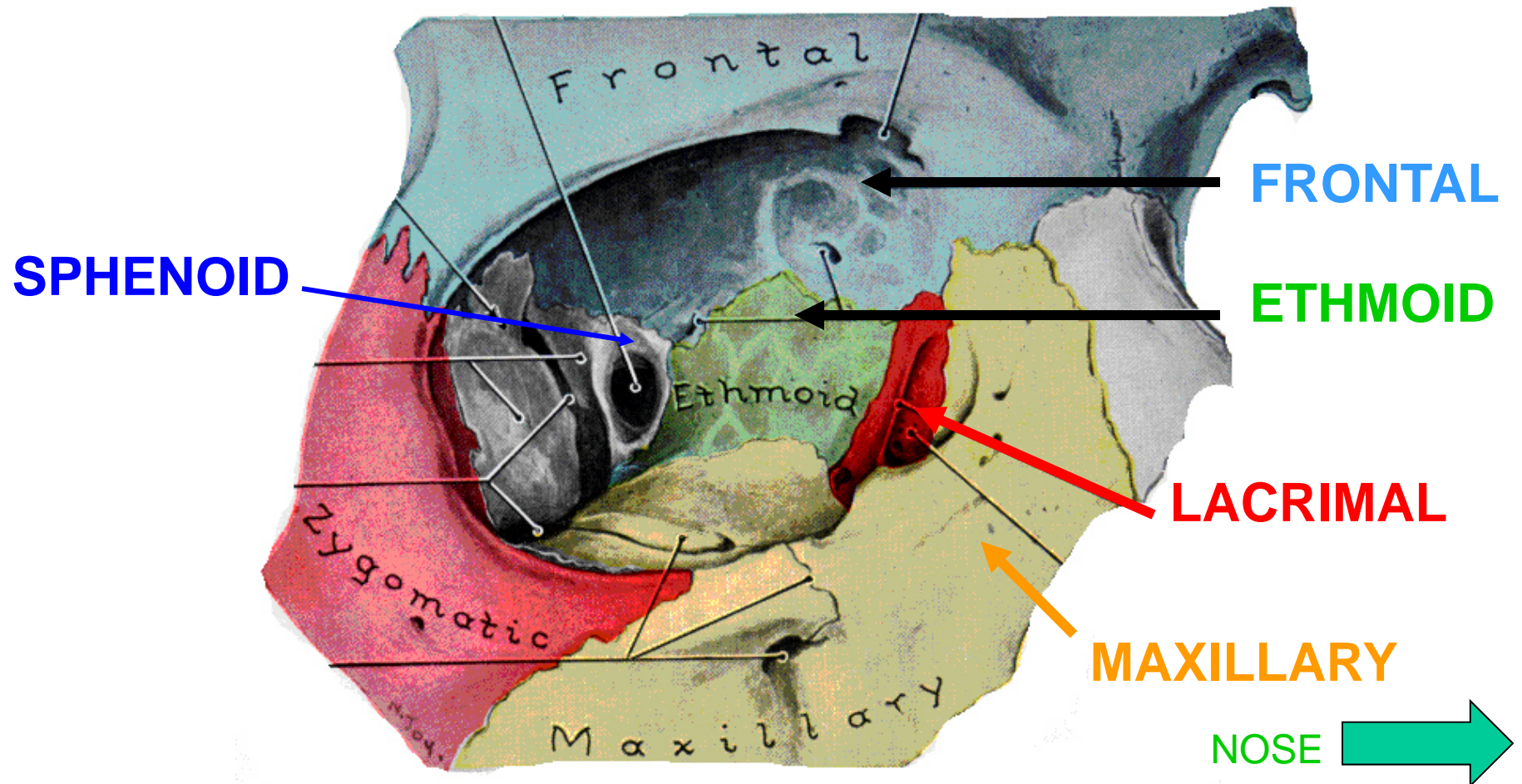
1. ROOF
FRONTAL

4. LATERAL
WALL
ZYGOMATIC
SPHENOID

2. FLOOR
MAXILLARY

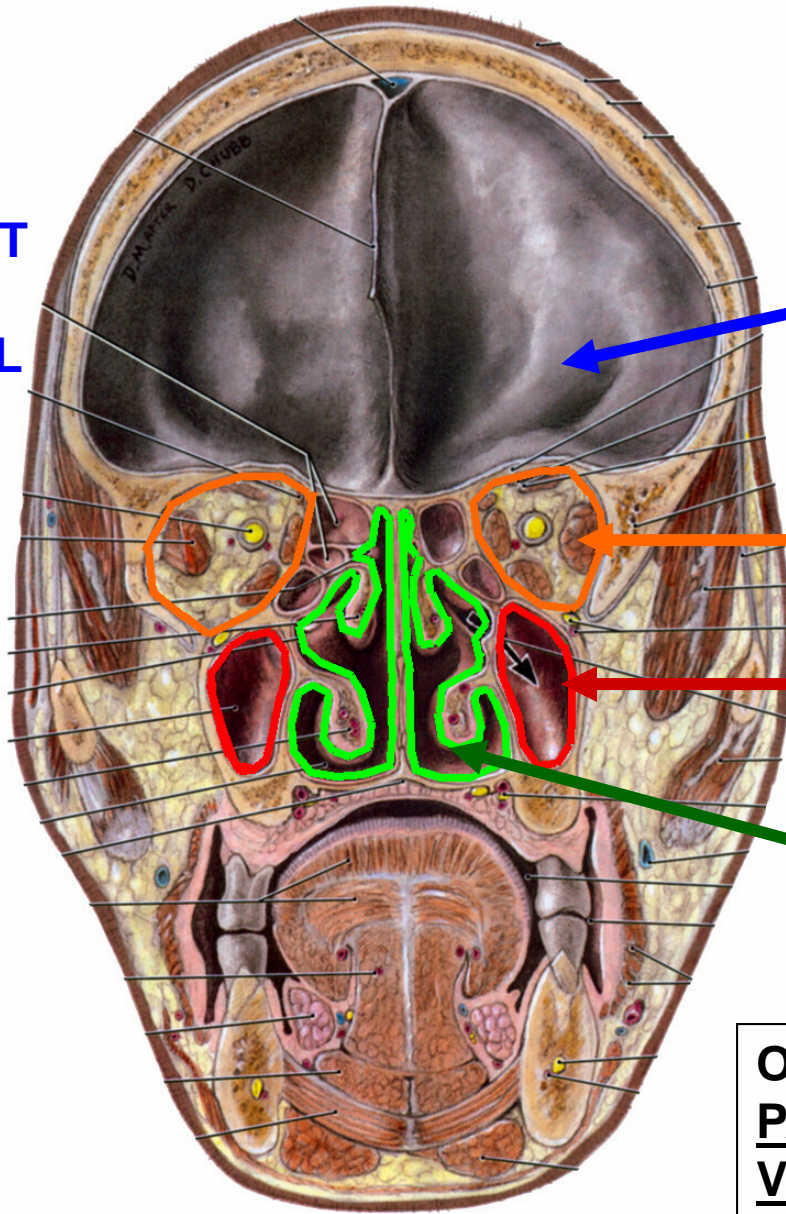
BONES OF ORBIT

3. MEDIAL WALL - INCLUDES MAXILLARY, LACRIMAL, ETHMOID, FRONTAL AND SPHENOID BONES (NASAL CAVITY IS MEDIAL TO MEDIAL WALL OF ORBIT)



BONES OF ORBIT

HEAD CUT
IN
CORONAL
PLANE



RELATIONS OF ORBIT

1) ANTERIOR CRANIAL FOSSA - SUPERIOR TO ROOF

ORBIT

2) MAXILLARY SINUS - INFERIOR TO FLOOR

3) NASAL CAVITY - MEDIAL TO MEDIAL WALL OF ORBIT

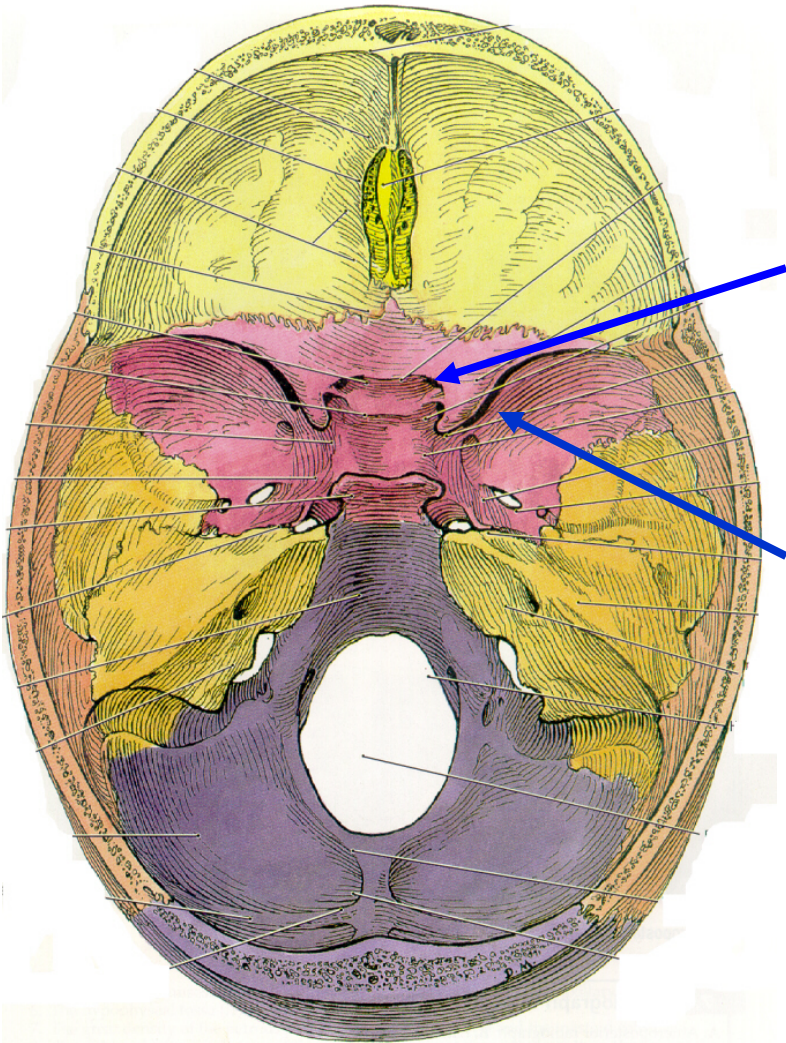
ORBIT - SERVES AS A PASSAGEWAY FOR NERVES, VESSELS TO FACE, SCALP AND NASAL CAVITY

B. FORAMINA OF ORBIT – structures entering orbit

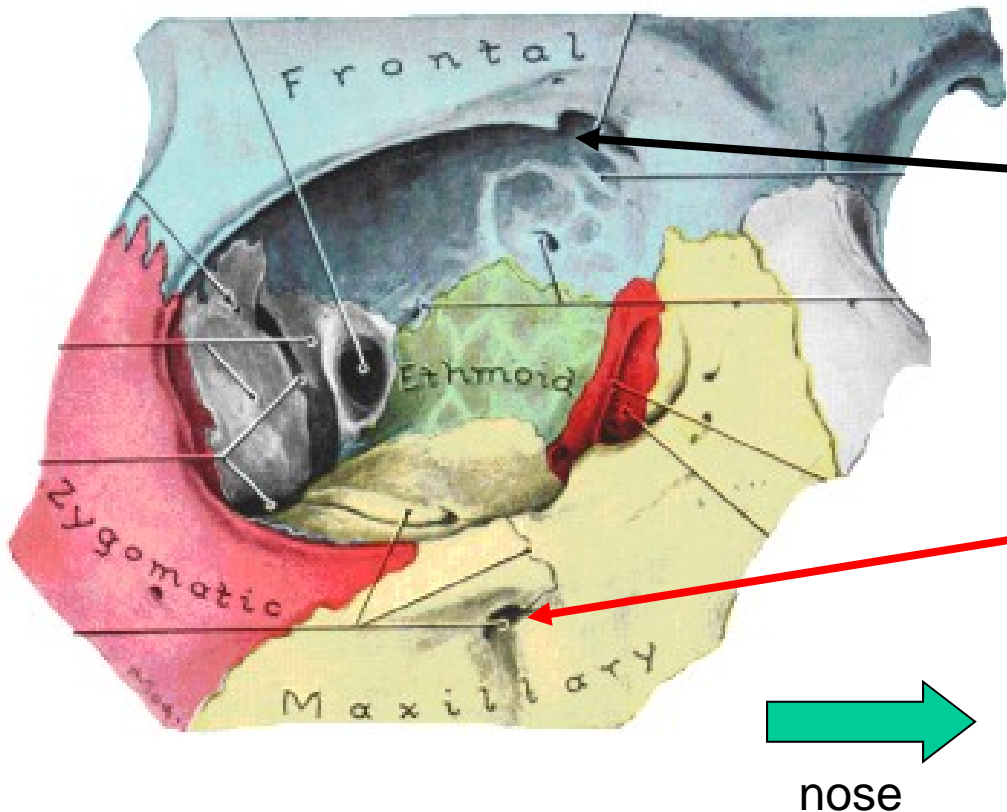
FORAMINA- MOST STRUCTURES ENTER ORBIT FROM MIDDLE CRANIAL FOSSA

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

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



B. FORAMINA OF ORBIT – pathways leaving orbit

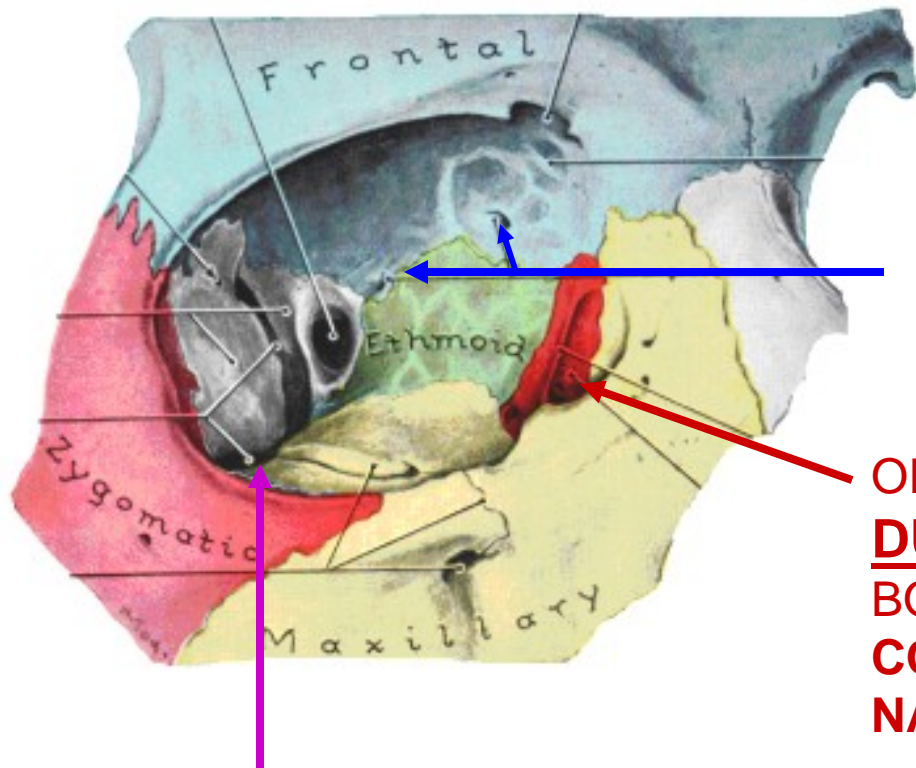


TO FACE, SCALP:

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)

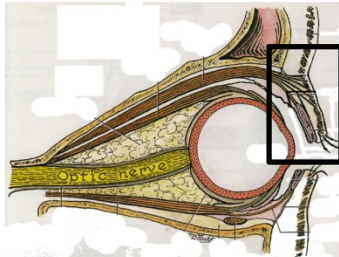
OPENING OF **3) NASOLACRIMAL DUCT**- IN MAXILLARY, LACRIMAL BONES AND INF. NASAL CONCHA;
CONTAINS: MEMBRANEOUS NASOLACRIMAL DUCT AND TEARS

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

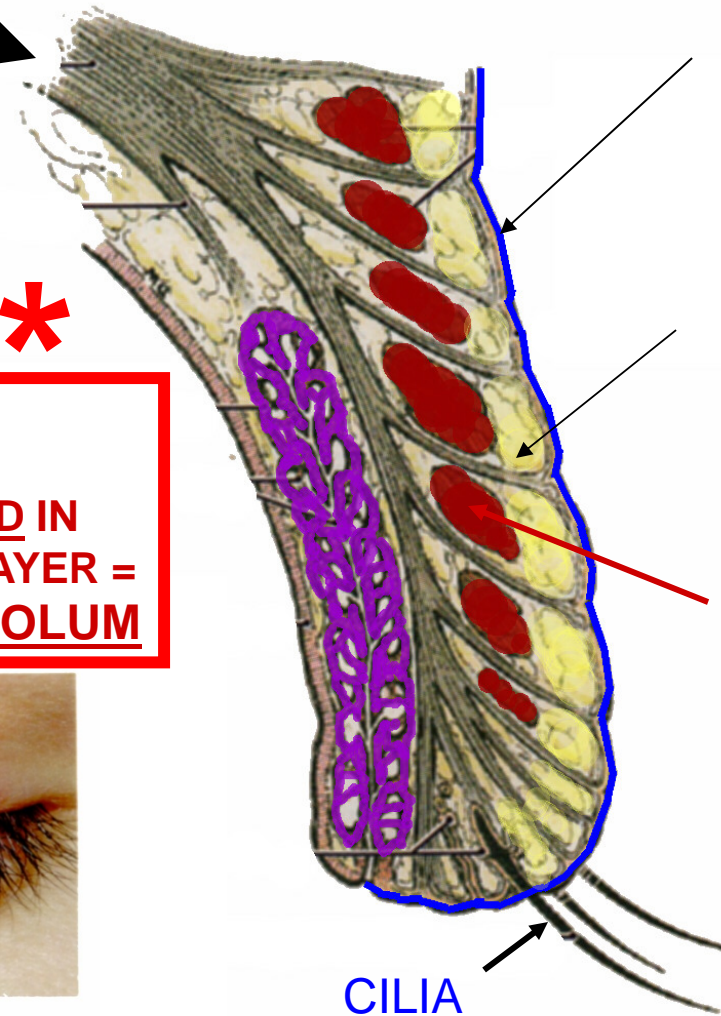


II. EYELIDS = PALPEBRAE - LAYERED

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



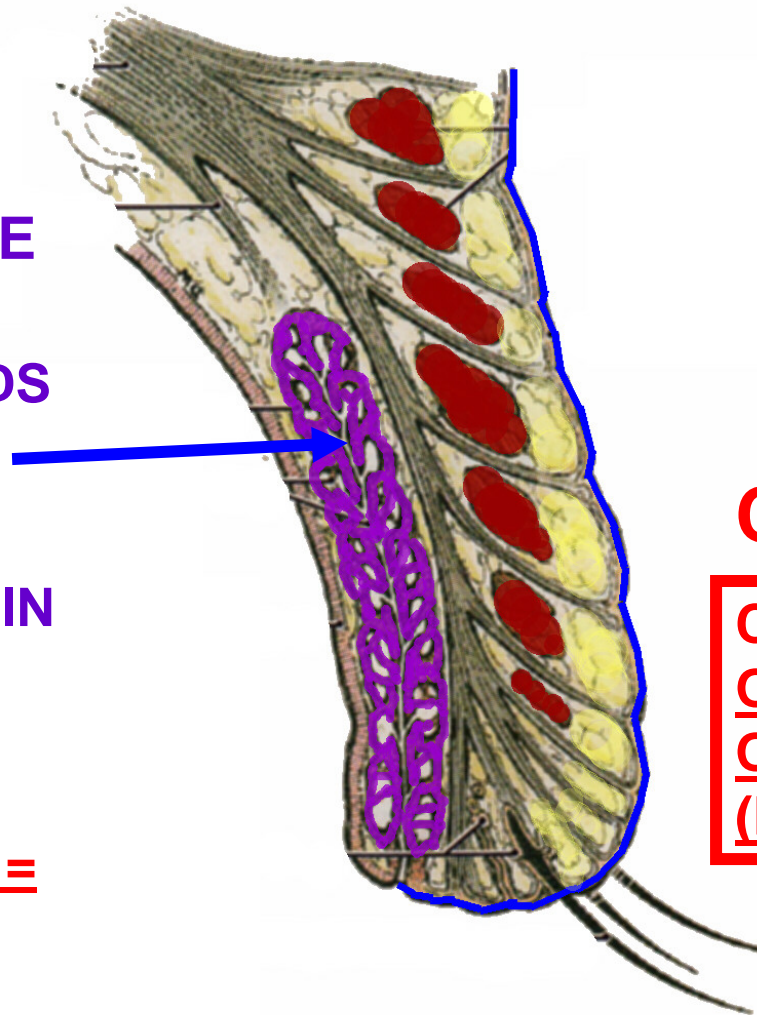
FIGURE 10-10
Acute hordeolum of upper eyelid.
From Palay, Krachmer, 1997.

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

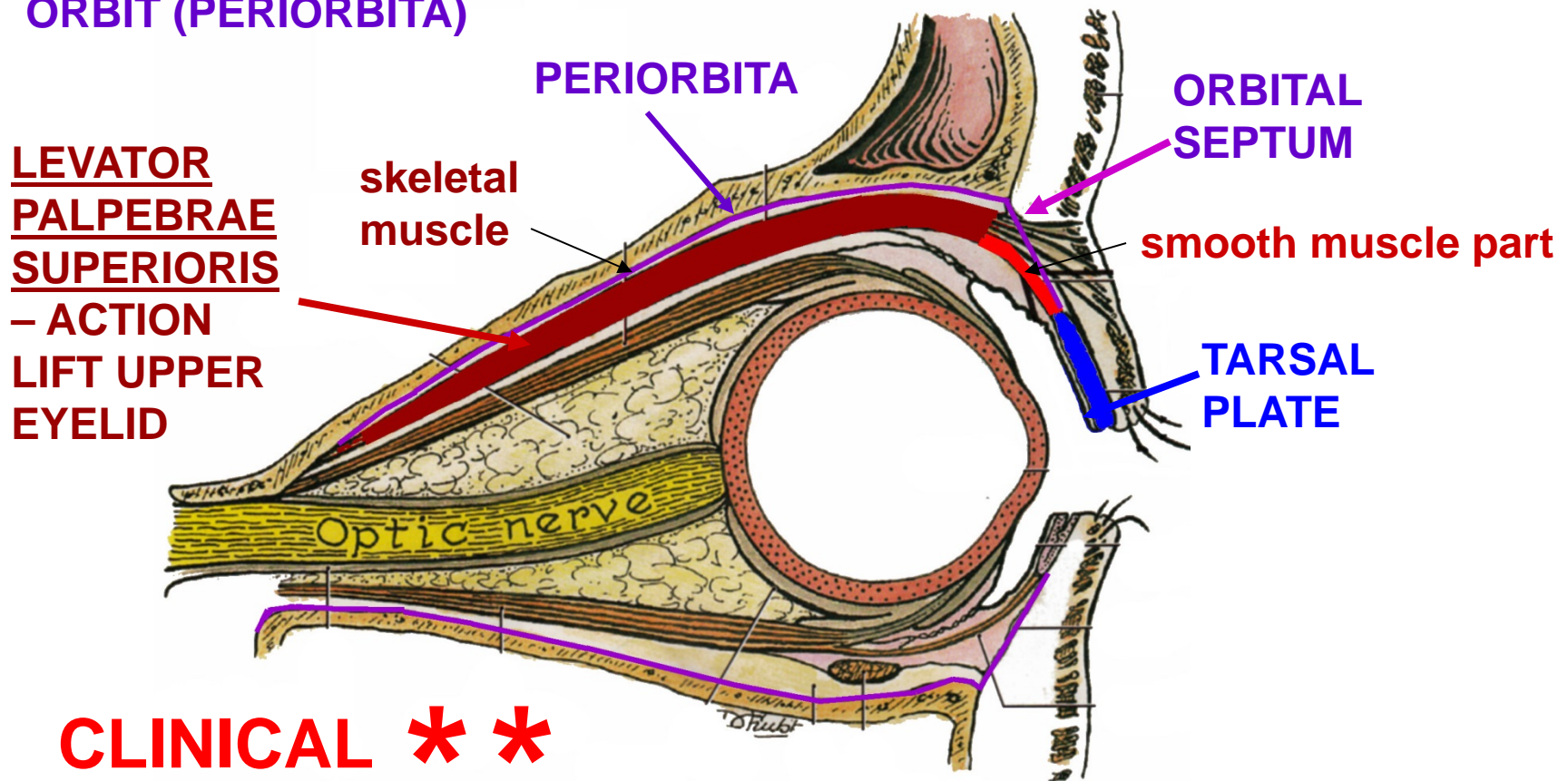


CLINICAL *

**CHALAZION:
OBSTRUCTION
OF TARSAL
(MEIBOMIAN) GLAND**

EYELIDS - LAYERS

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

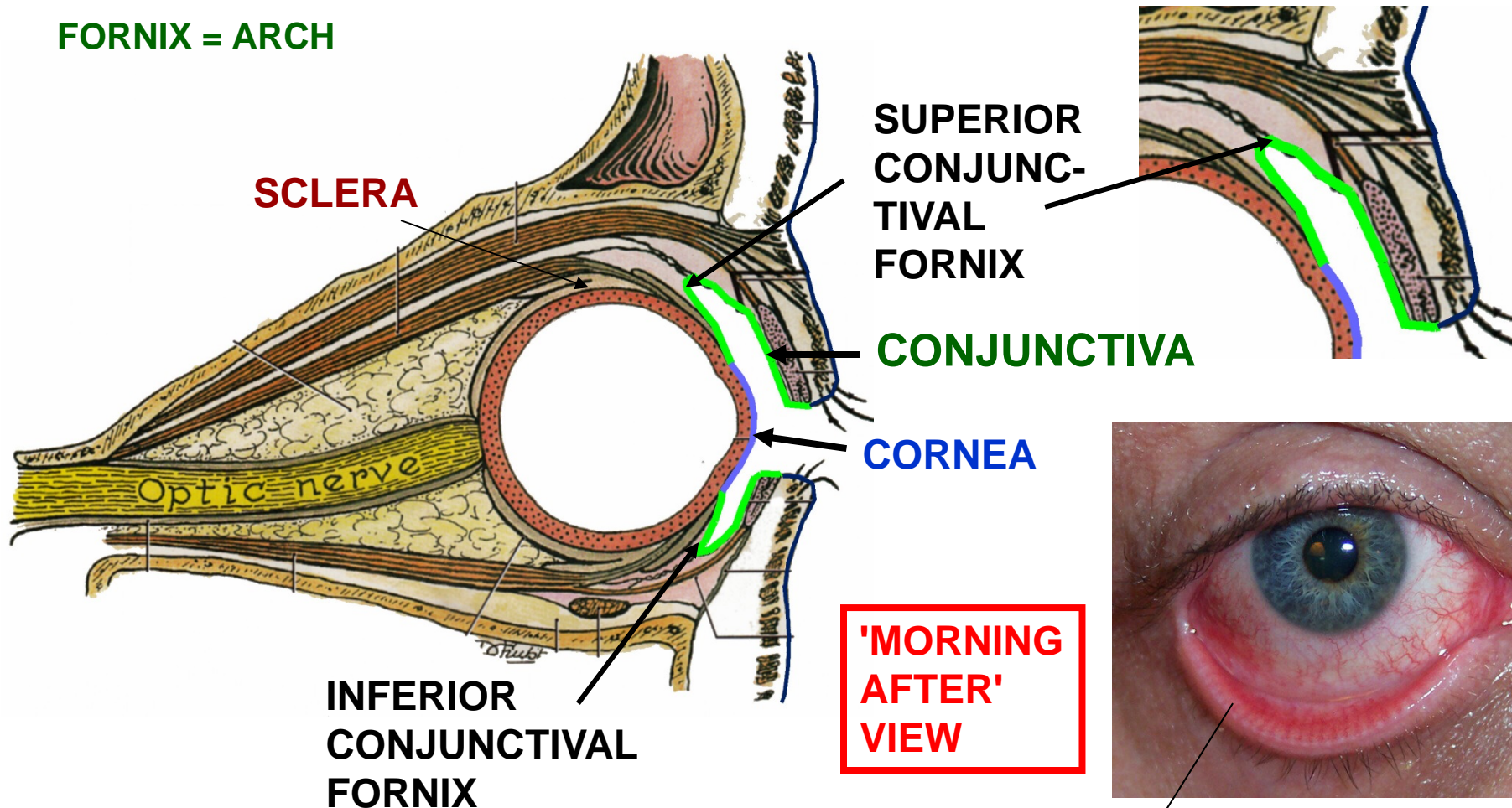


CLINICAL * *

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

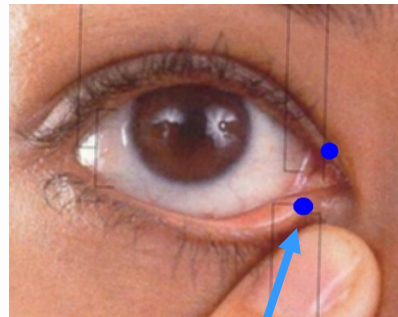
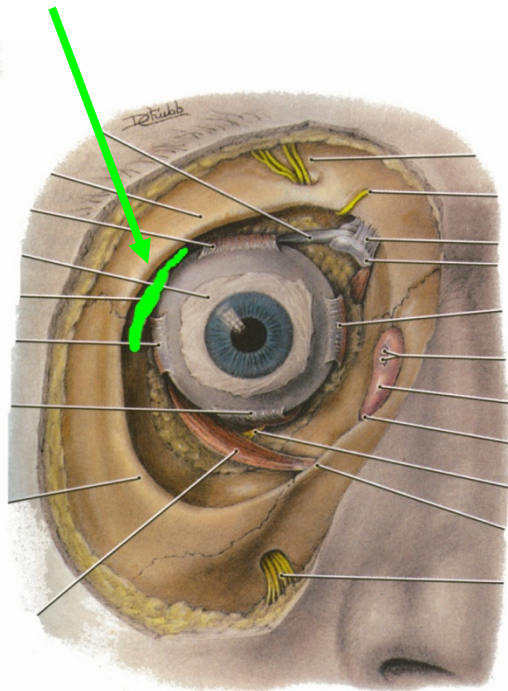


FORNIX = LATIN FOR ARCH, VAULT

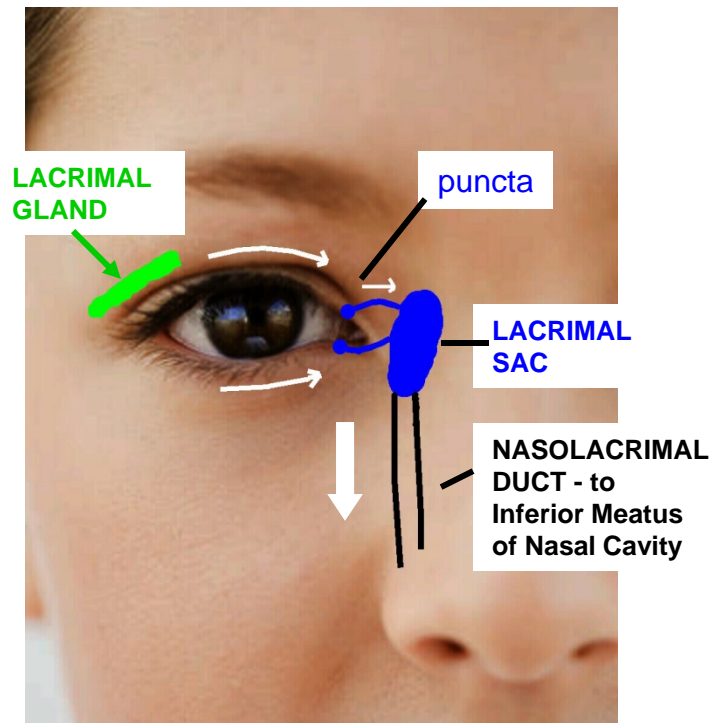
Conjunctivitis (Pinkeye) - inflammation of conjunctiva

III. LACRIMAL APPARATUS

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

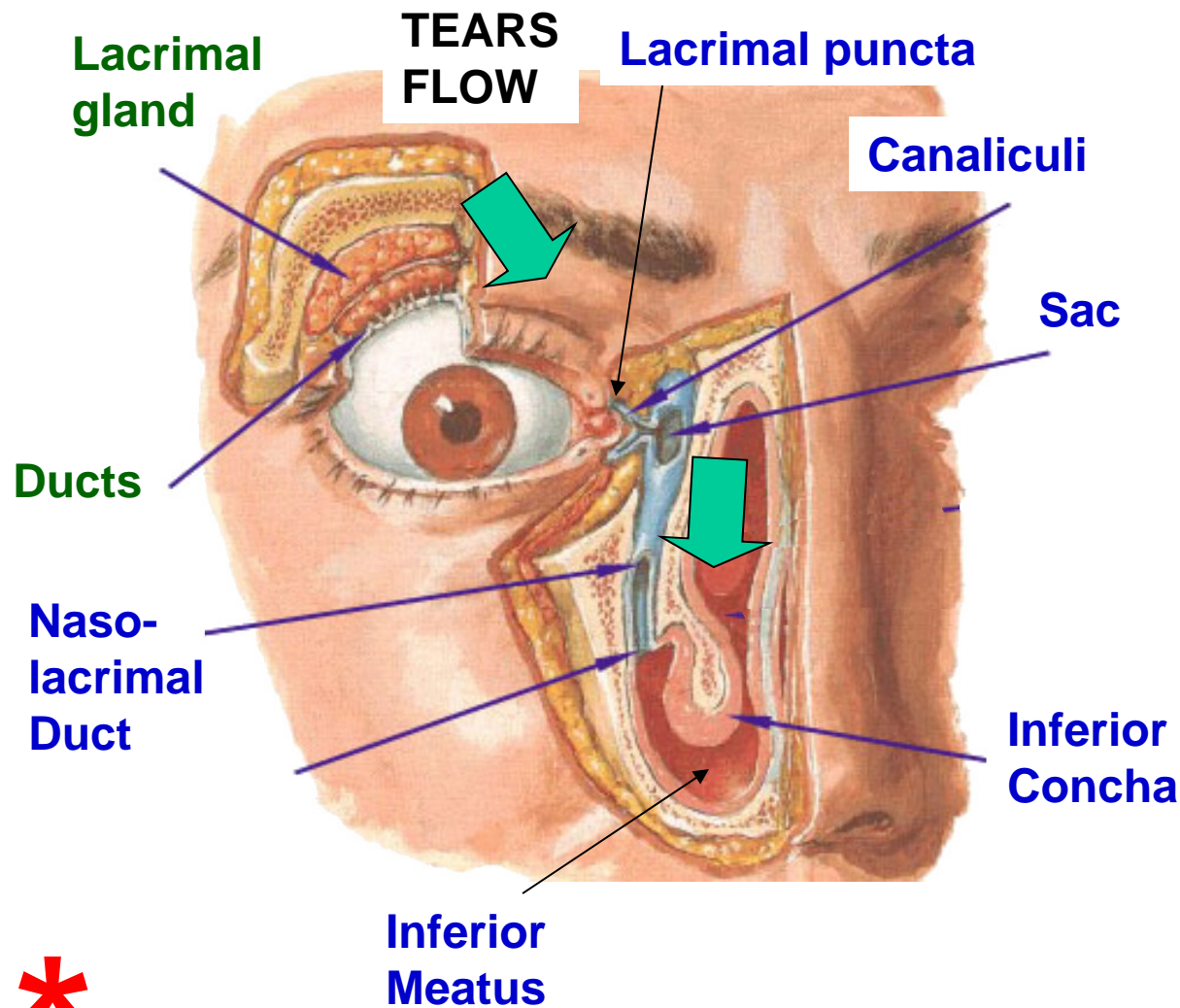


LACRIMAL PUNCTA



- 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

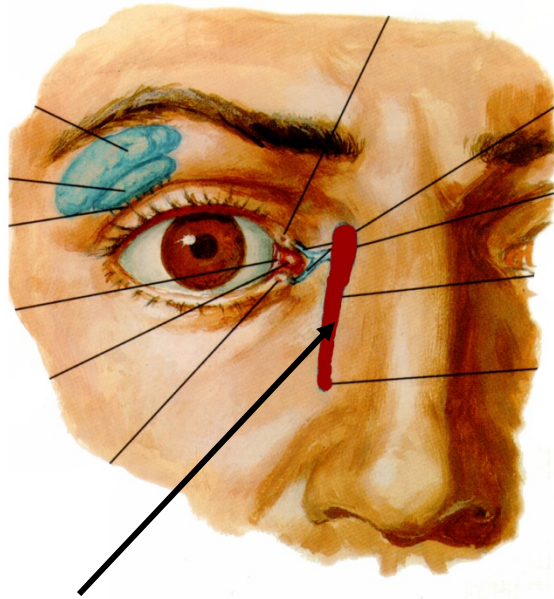


- TEARS FLOW ACROSS EYE TO LACRIMAL PUNCTA ON MEDIAL END OF EYELIDS (eyelids meet at MEDIAL CANTHUS);
- TEARS THEN PASS THROUGH LACRIMAL CANALICULI TO LACRIMAL SAC;
- SAC CONNECTS TO NASOLACRIMAL DUCT WHICH DRAINS TO INFERIOR MEATUS OF NASAL CAVITY



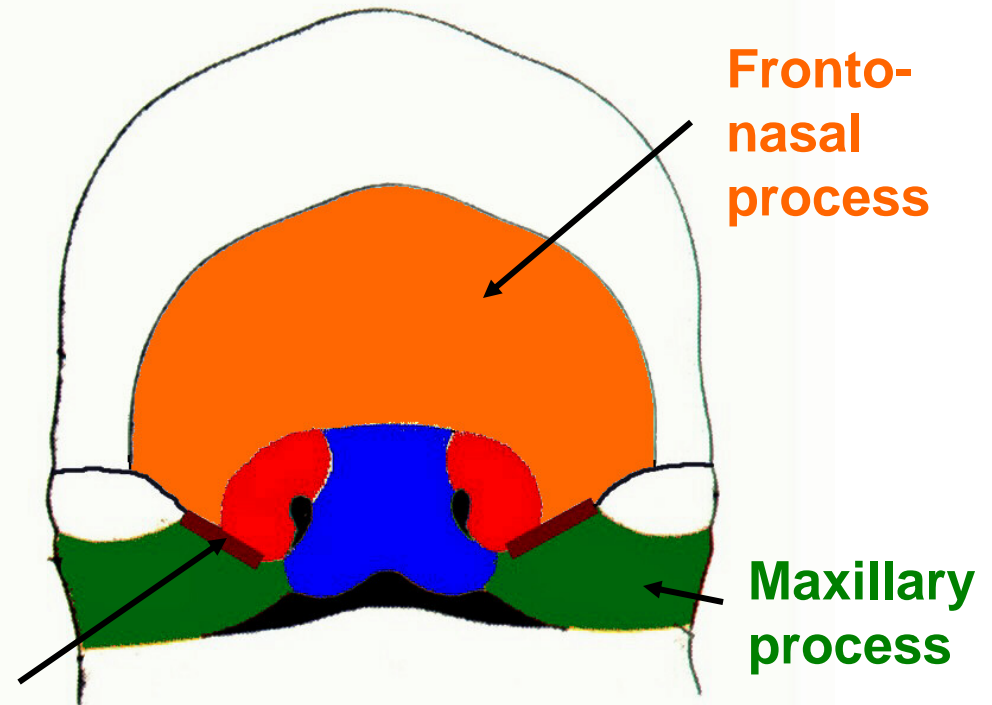
**LACRIMAL GLAND IS INNERVATED BY VII - FACIAL NERVE;
BLOCK VII - DECREASE TEARS; PRESSURE/IRRITATION VII - EXCESSIVE TEARS**

DEVELOPMENT: OBSTRUCTED NASOLACRIMAL DUCT



NASOLACRIMAL DUCT

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

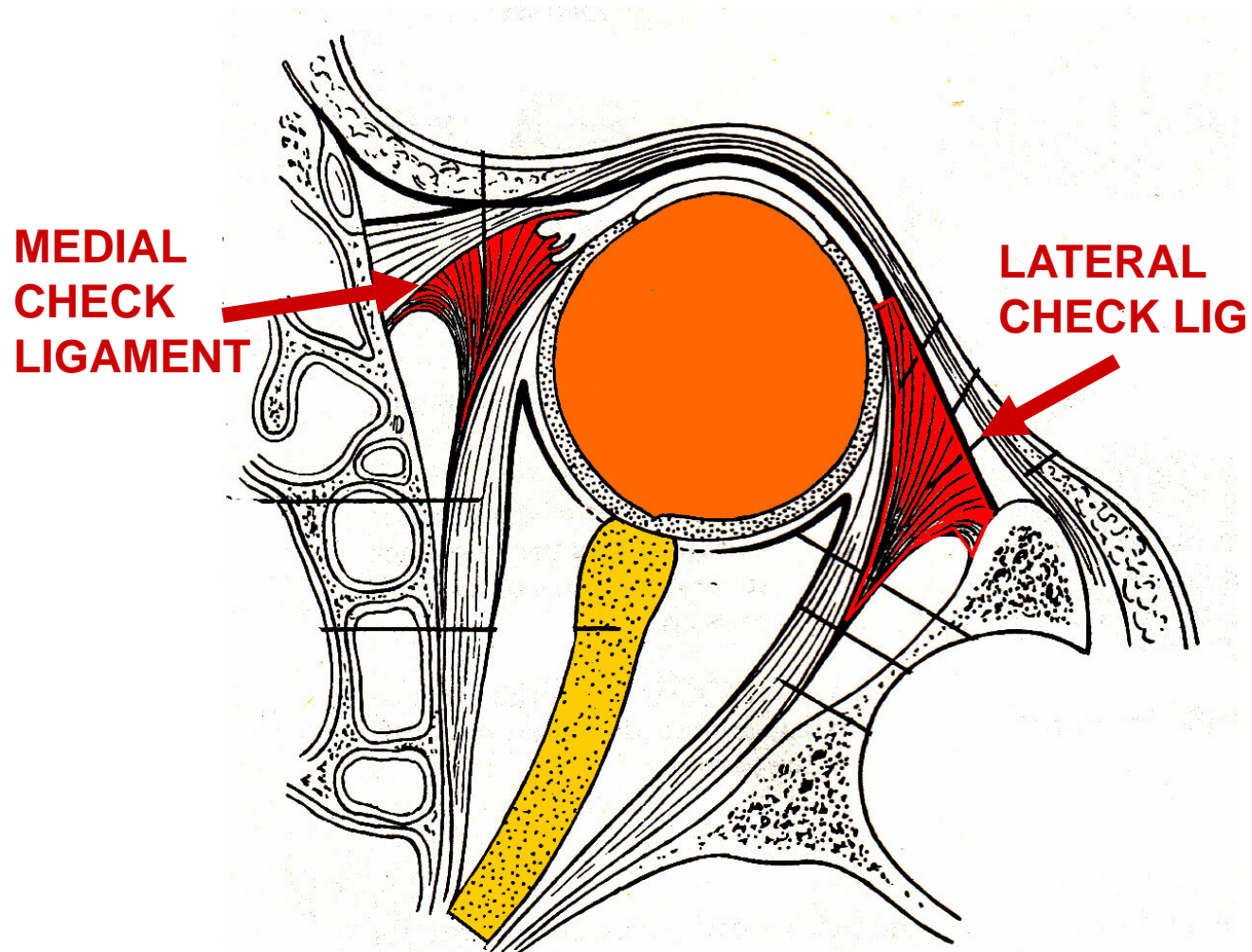


- Develops as a fold between maxillary process and frontonasal process
- then forms a solid cord that becomes canalized.

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

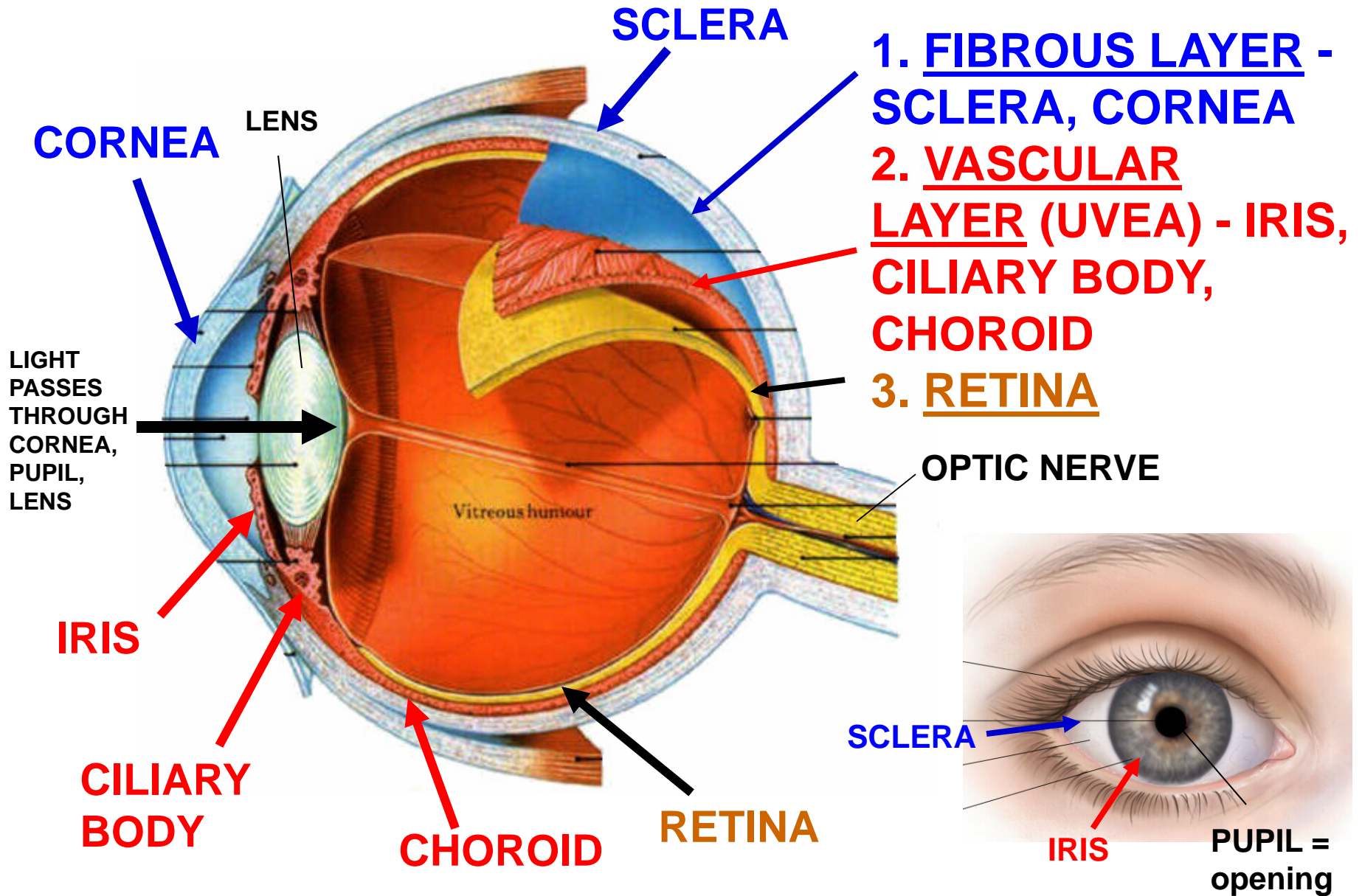
IV. FASCIAL SHEATH OF EYE

NOSE



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

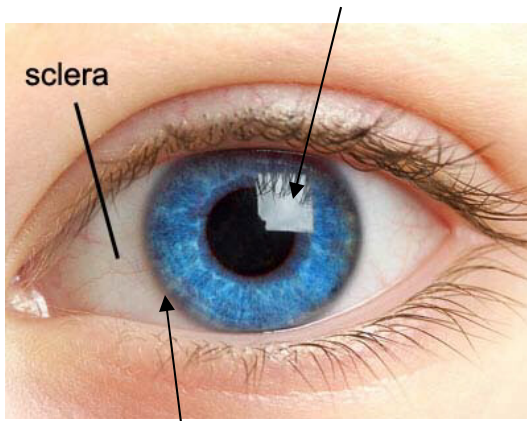
V. STRUCTURE OF EYE - 3 LAYERS



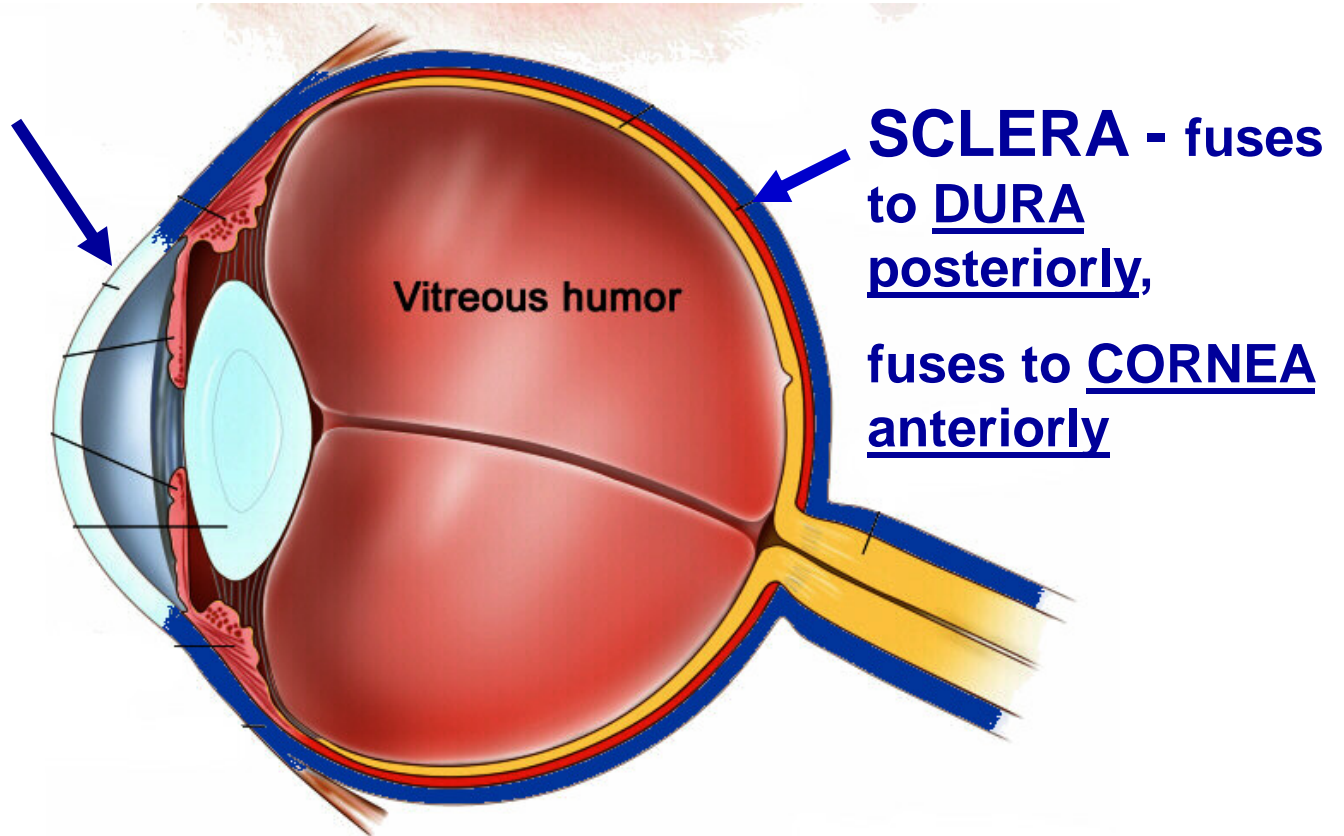
EYE- STRUCTURE OF EYEBALL- FIBROUS LAYER

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**

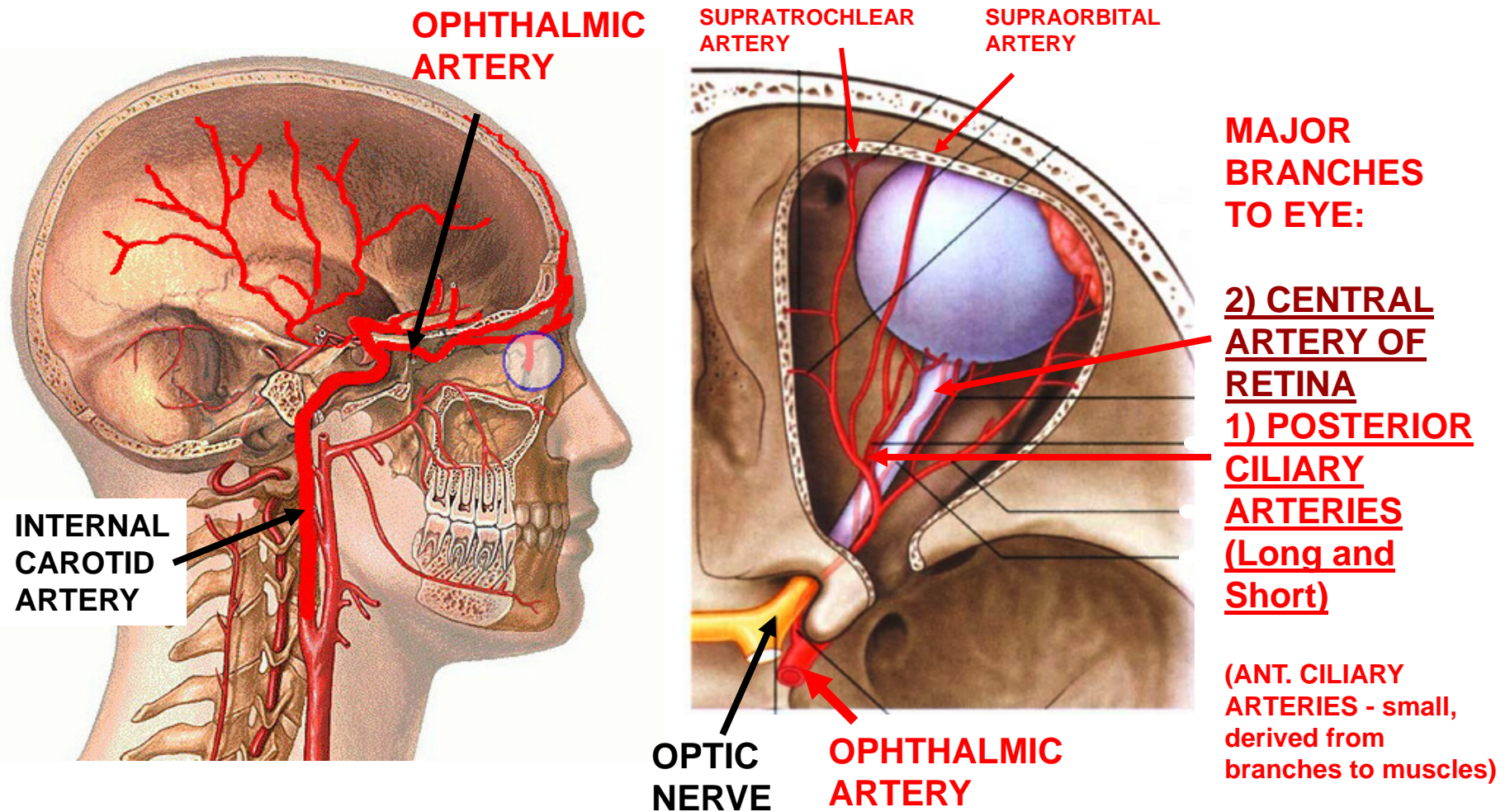


**LIMBUS - junction of
sclera and cornea**



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

BLOOD SUPPLY TO ORBIT: OPHTHALMIC ARTERY



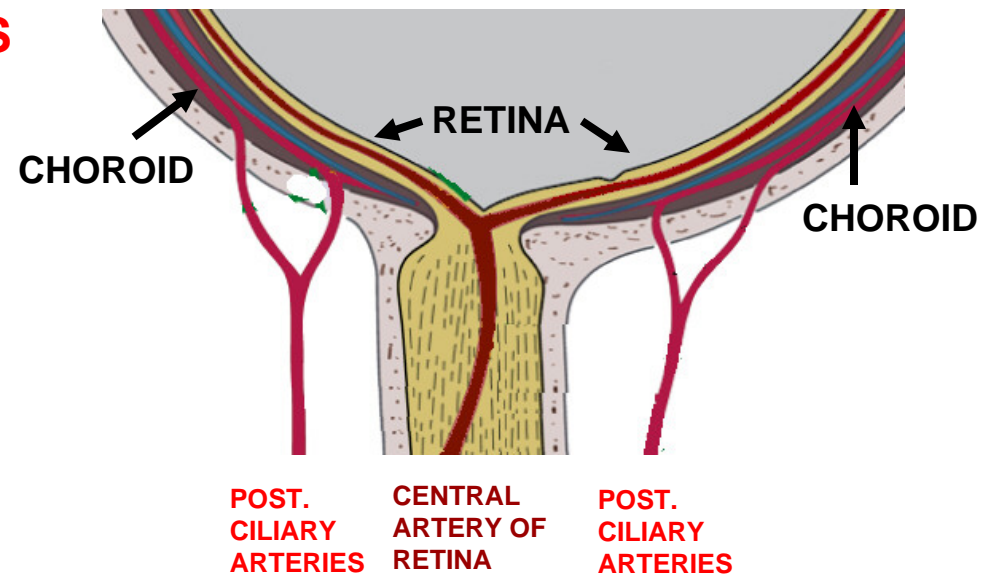
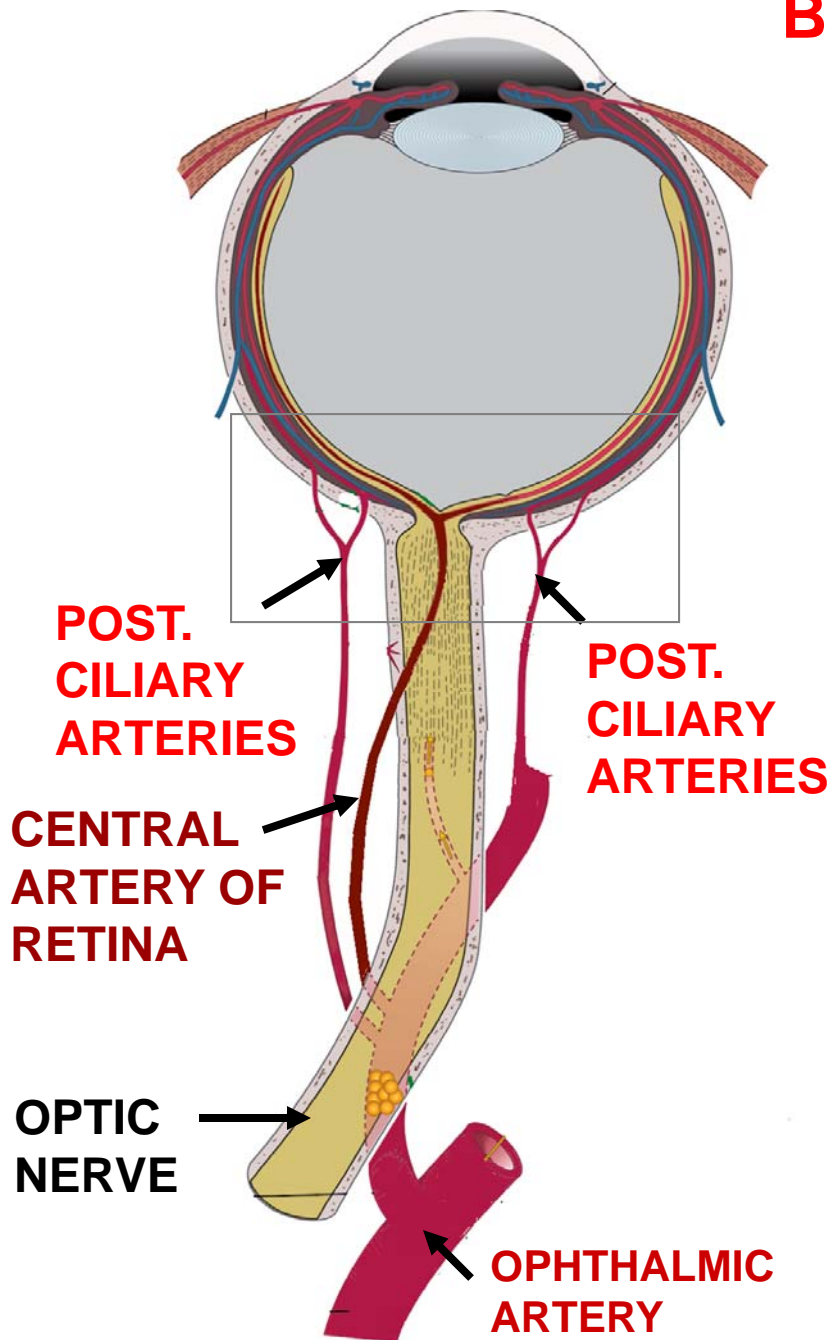
Note: Branches of Ophthalmic Artery supply eye: Posterior Ciliary Arteries and Central Artery of Retina enter posterior side of Eyeball

BLOOD SUPPLY TO EYE

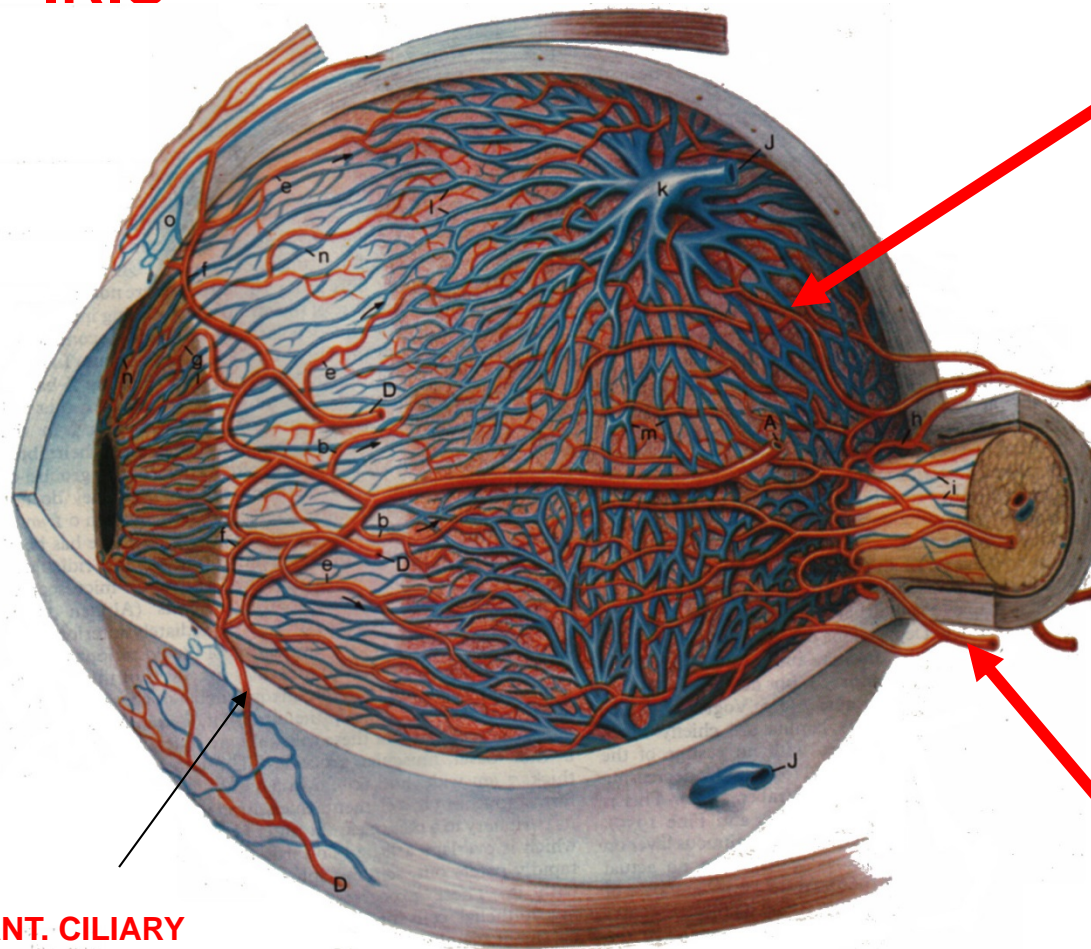
BRANCHES TO EYE:

- 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**

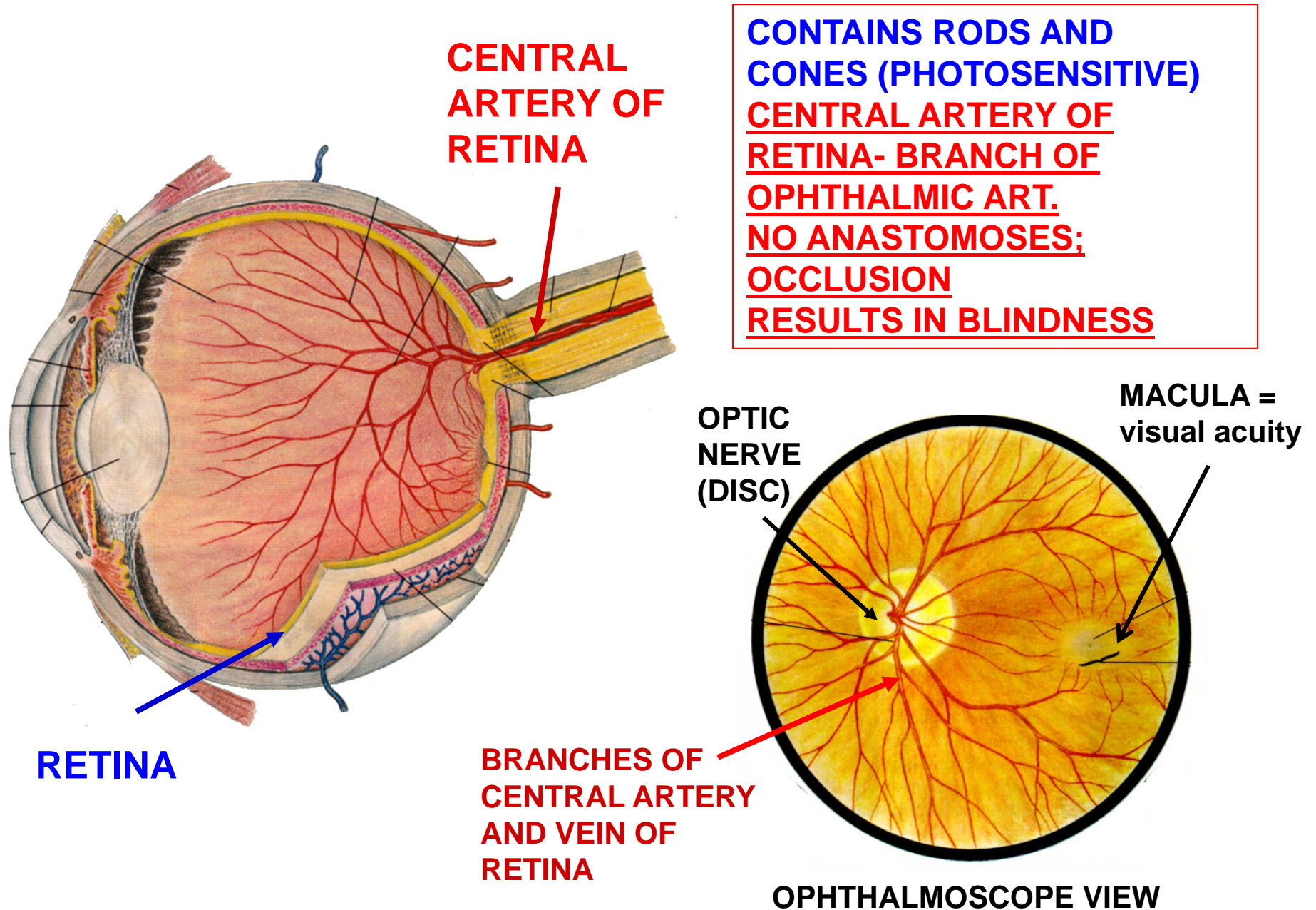
uva = L. grape

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

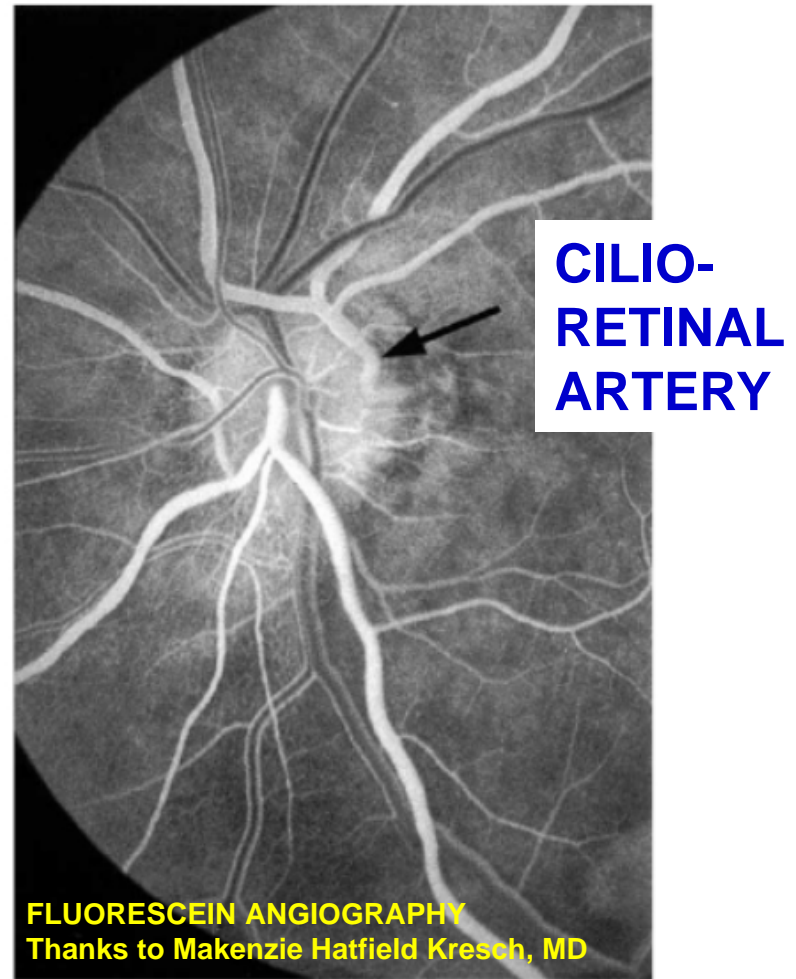
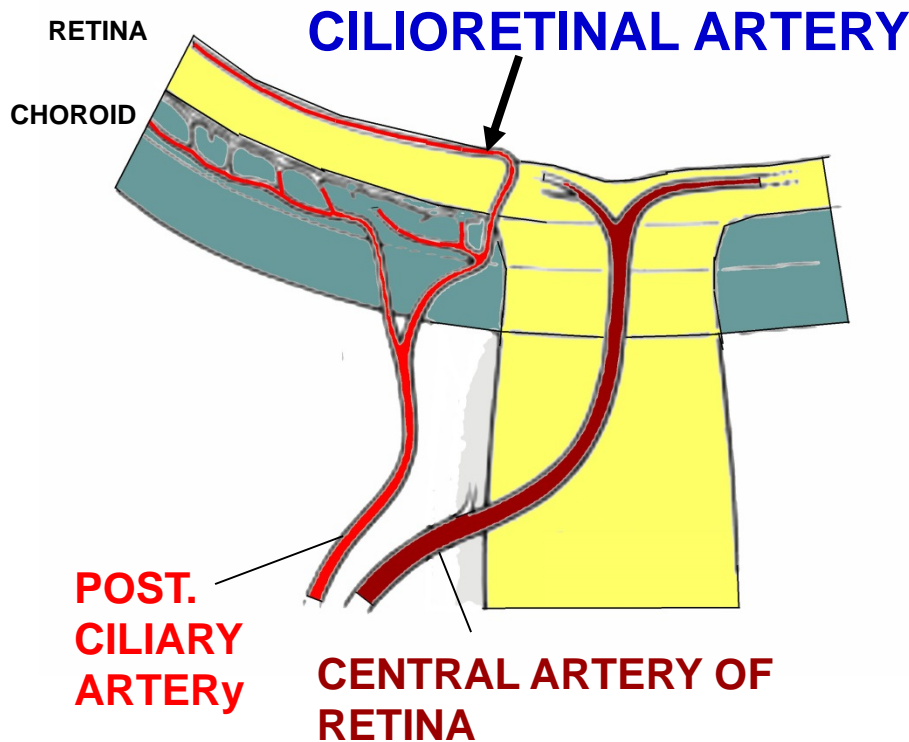
**BUT NORMALLY
DOES NOT SUPPLY
GANGLION CELLS
OF RETINA (THAT
FORM OPTIC NERVE)**

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

EYE- STRUCTURE OF EYEBALL- RETINA

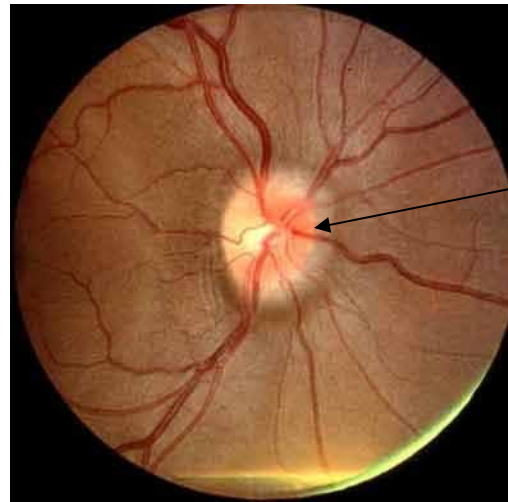
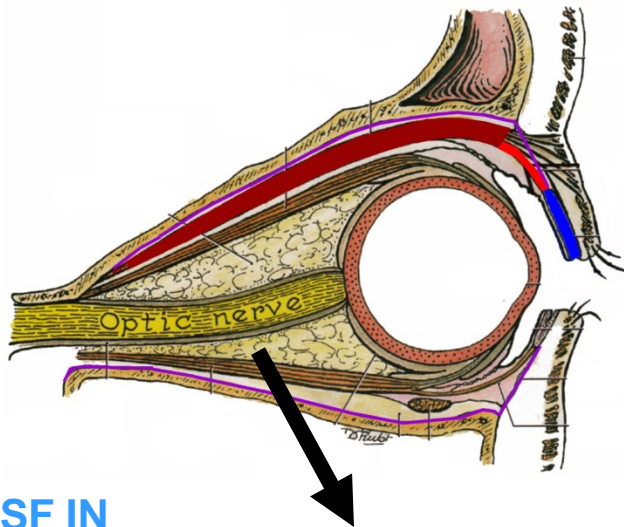


**CRAO - CENTRAL RETINAL ARTERY OCCLUSION -
most common cause, Carotid Artery atherosclerosis;
if complete: blind in one eye**



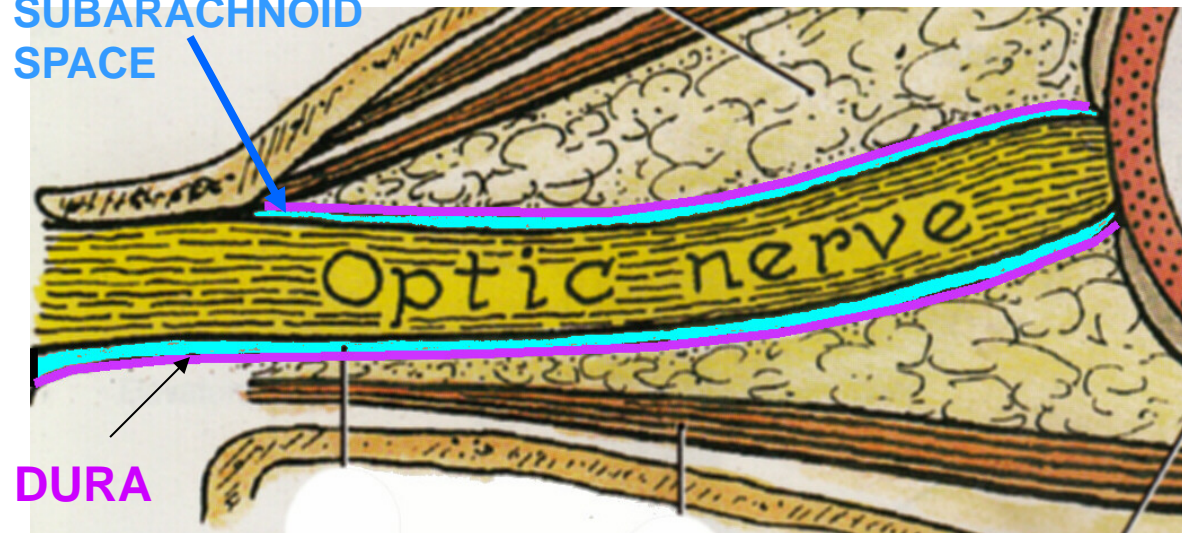
New Anatomy: imaging has shown that branches of Ciliary Arteries (Cilioretinal arteries) can supply retina (20% of people); can provide partial sparing of retina in cases of Central Retinal Artery Occlusion

SUBARACHNOID SPACE EXTENDS TO BACK OF EYEBALL



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

CSF IN SUBARACHNOID SPACE



CLINICAL**

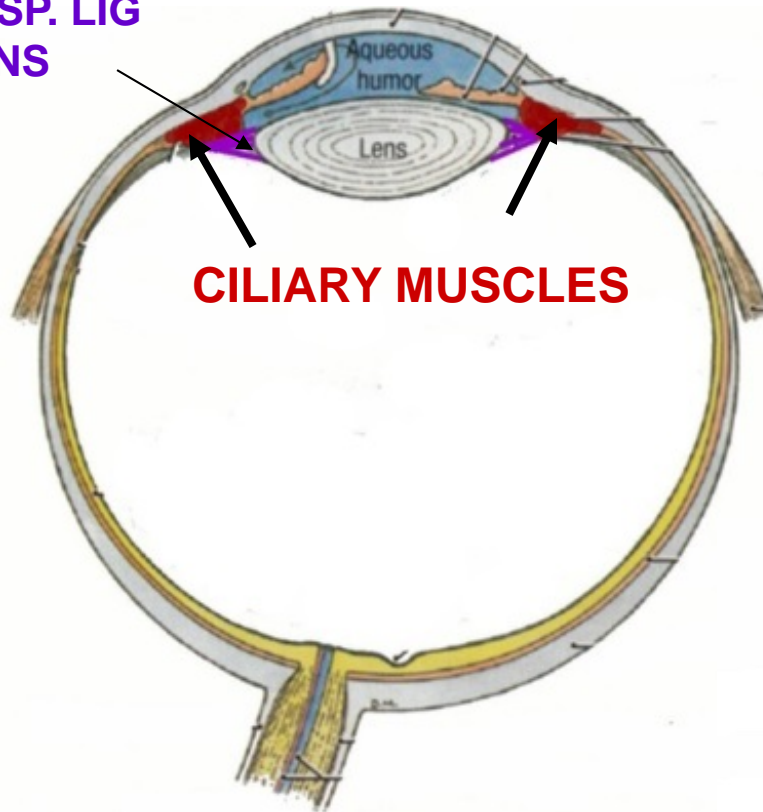
DURA AND SUBARACHNOID SPACE (CSF) EXTEND AROUND OPTIC NERVE; INCREASE IN CSF (PRESSURE) CAN AFFECT VISION

PAPILLEDEMA = swelling of optic disc

Clinical - slow onset; headaches

EYE- STRUCTURE OF EYEBALL- VASCULAR LAYER

SUSP. LIG
LENS

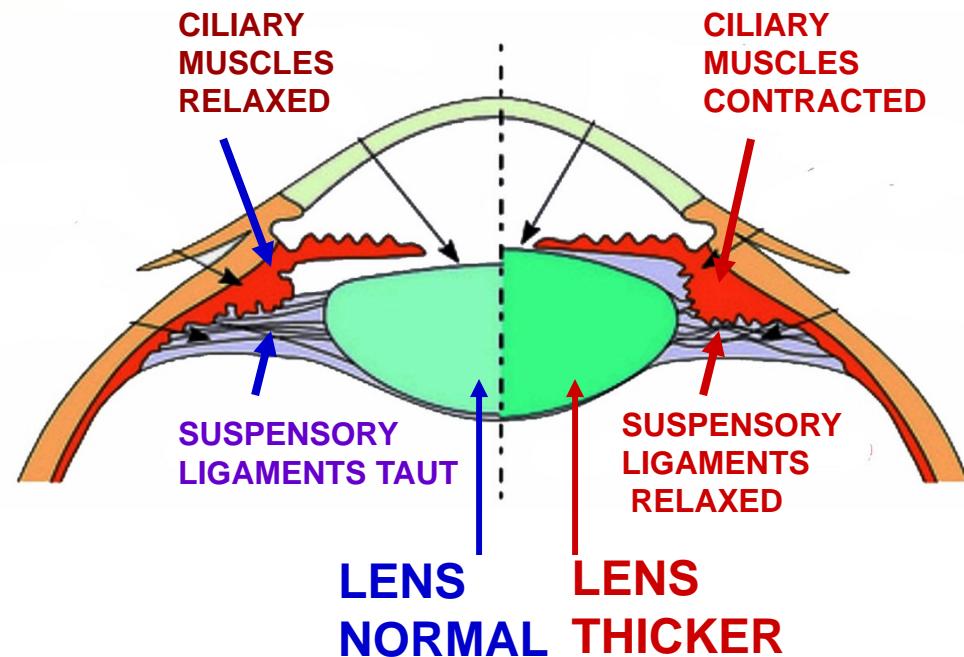


CILIARY MUSCLES

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

NORMAL VISION

NEAR VISION

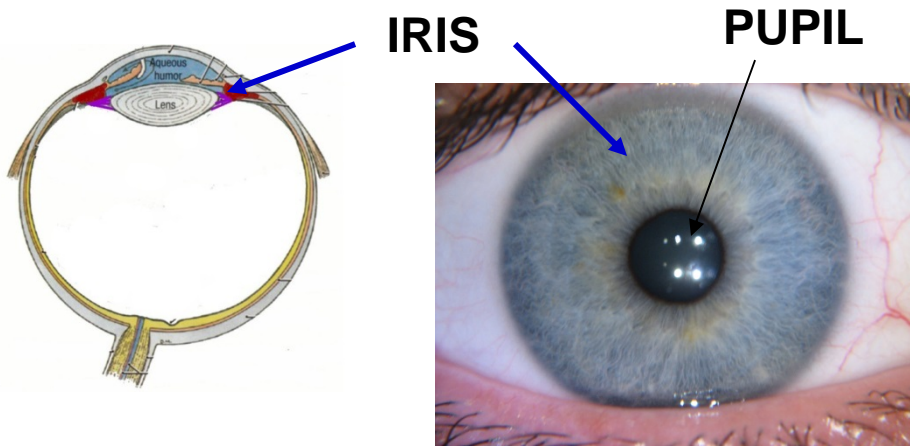


ACCOMMODATION - THICKEN LENS FOR NEAR VISION (VIEWING OBJECTS CLOSE UP)

PARASYMPATHETIC CONTROL- III (Short ciliary nerves)

CILIARY MUSCLES CONTRACT - LENS THICKER

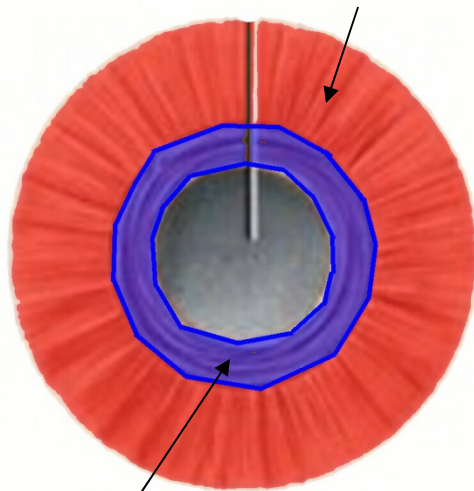
EYE - STRUCTURE OF EYEBALL- VASCULAR LAYER



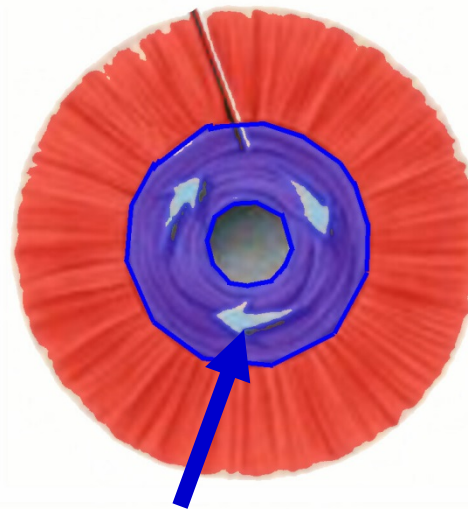
C. IRIS - PIGMENTED, CONTRACTILE LAYER WITH SMOOTH MUSCLES SURROUNDING PUPIL

NORMAL

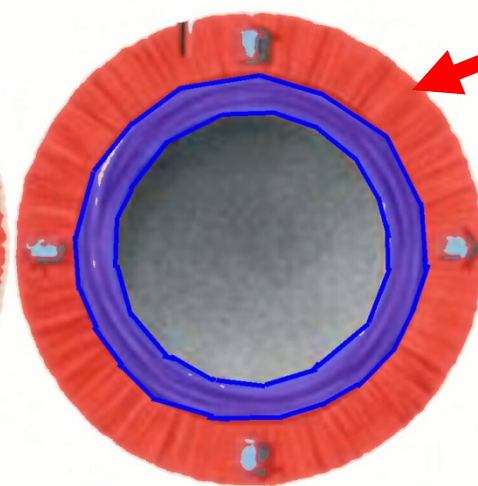
DILATOR



BRIGHT LIGHT - PUPIL CONSTRICTED



DIM LIGHT - PUPIL DILATED

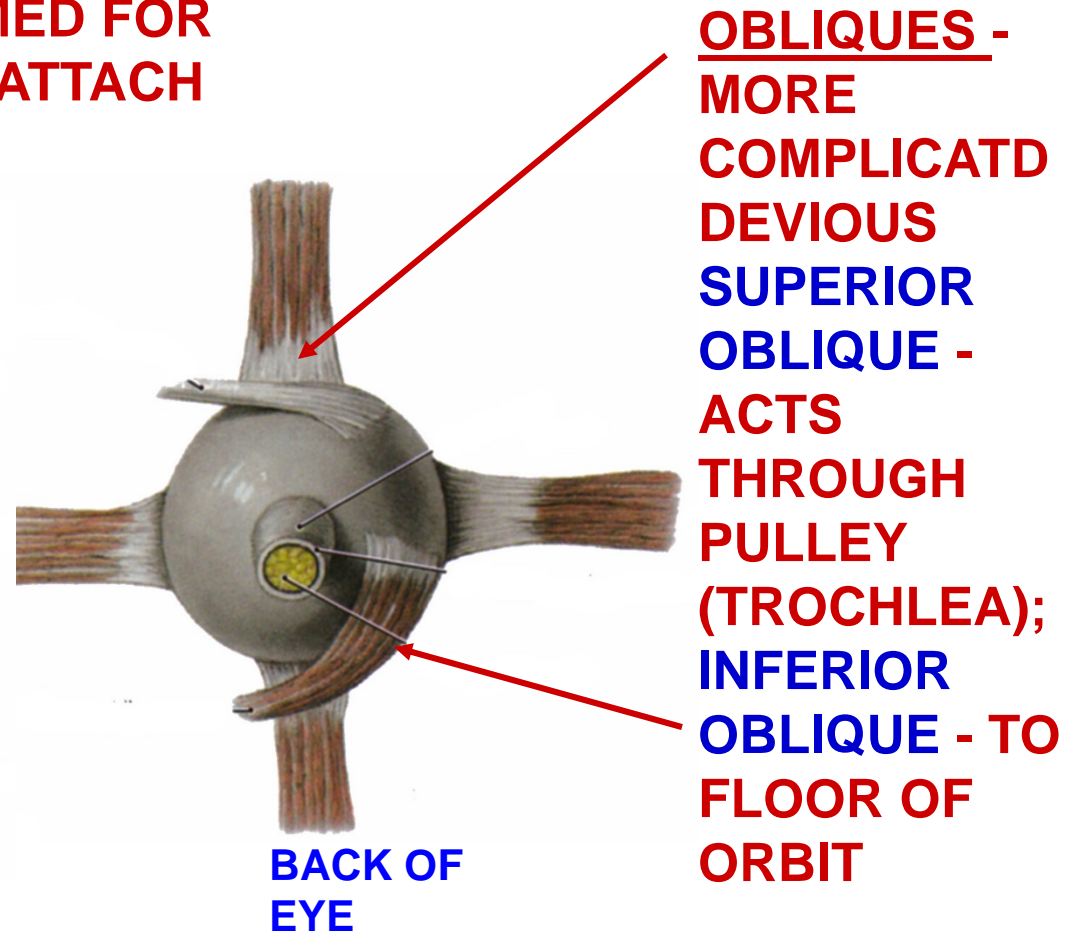
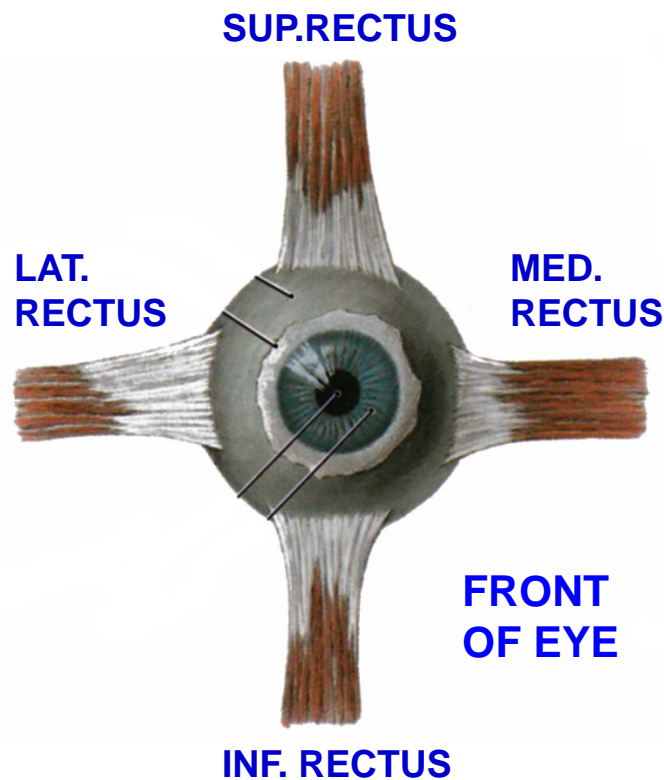


DILATOR PUPIL- RADIAL SMOOTH MUSCLE; SYMPATHETICS

V. EXTRAOCULAR MUSCLES

- VOLUNTARY SKELETAL MUSCLES WHICH MOVE EYEBALL

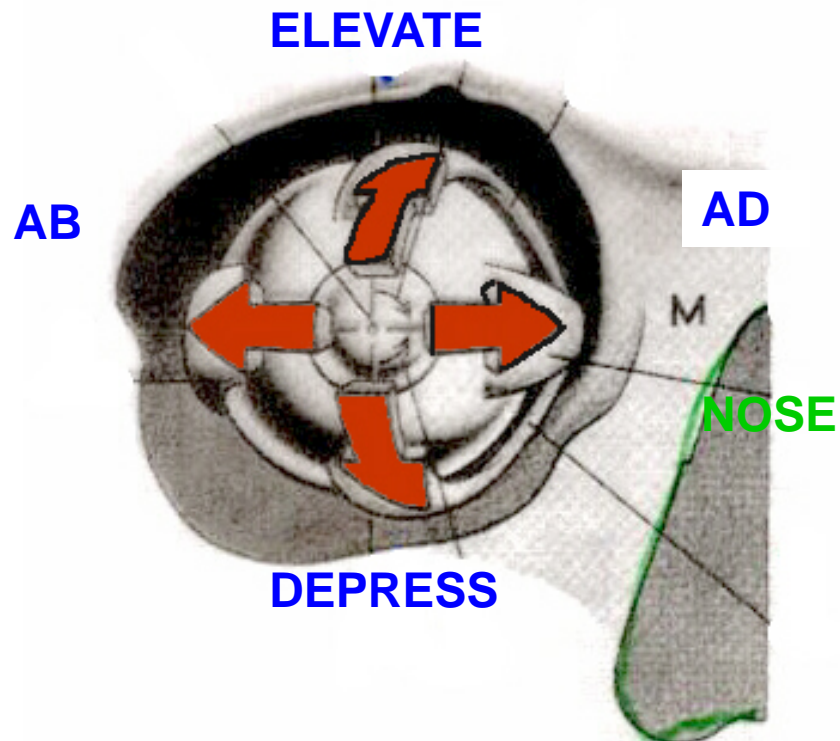
RECTI = STRAIGHT, NAMED FOR SIDES ON WHICH THEY ATTACH



EYE MOVEMENTS

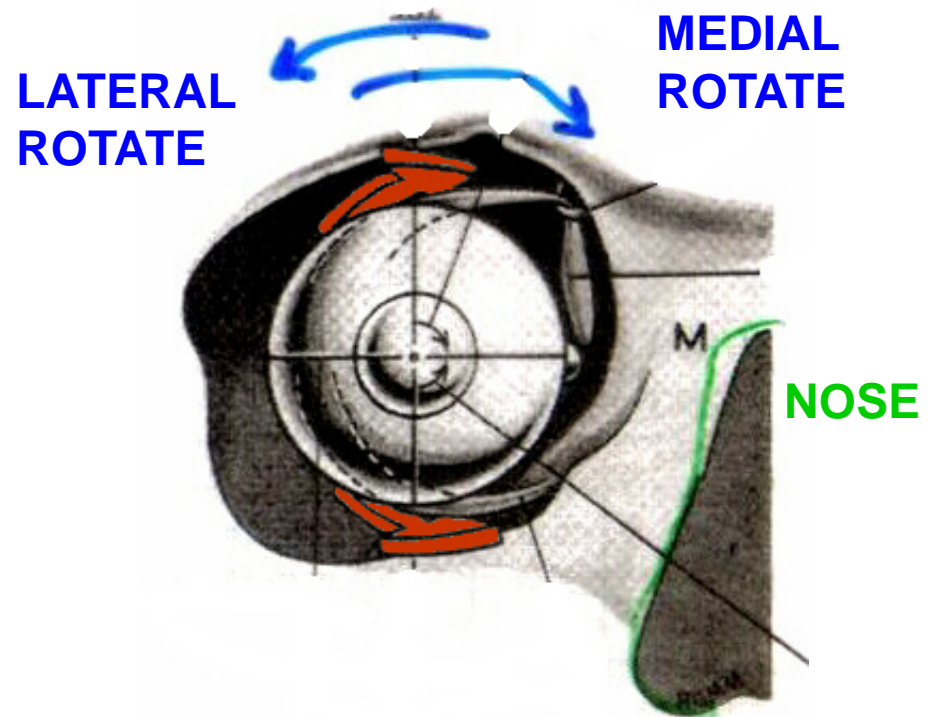
VOLUNTARY

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



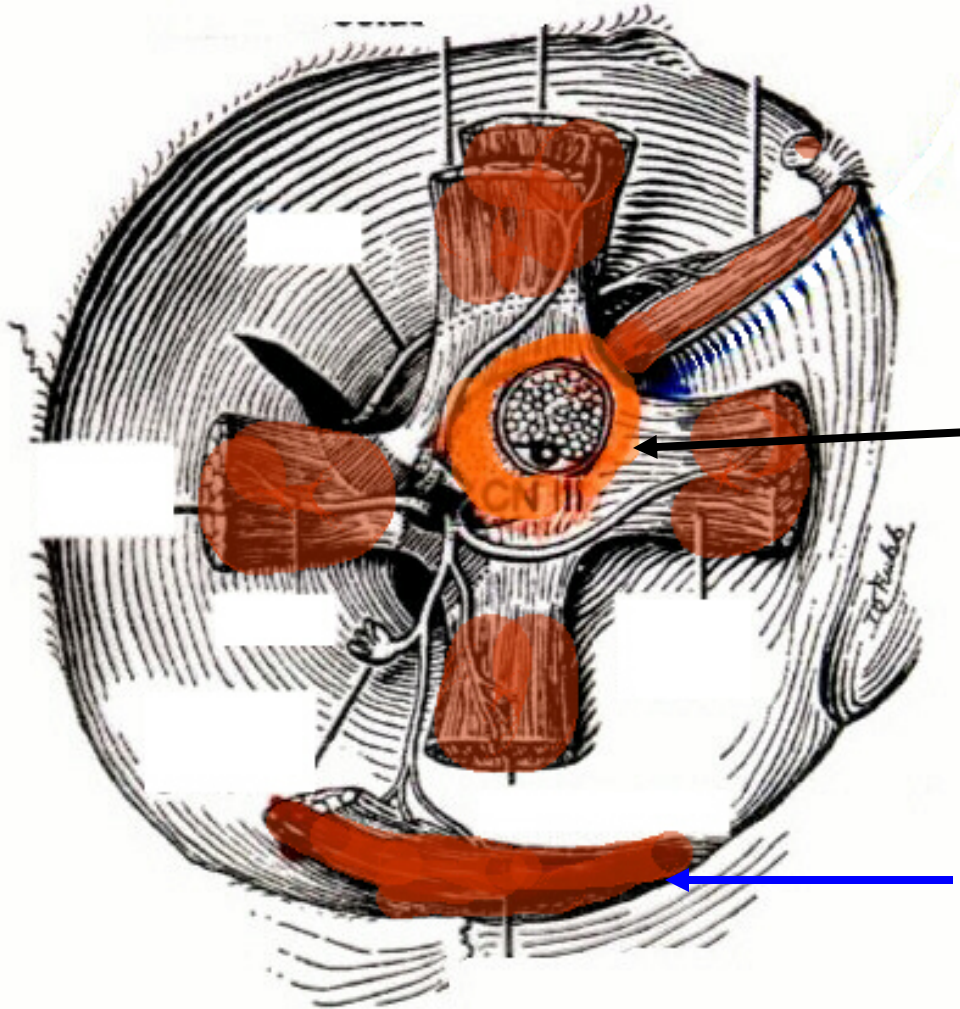
ROTATE- INVOLUNTARY WHEN TILT

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

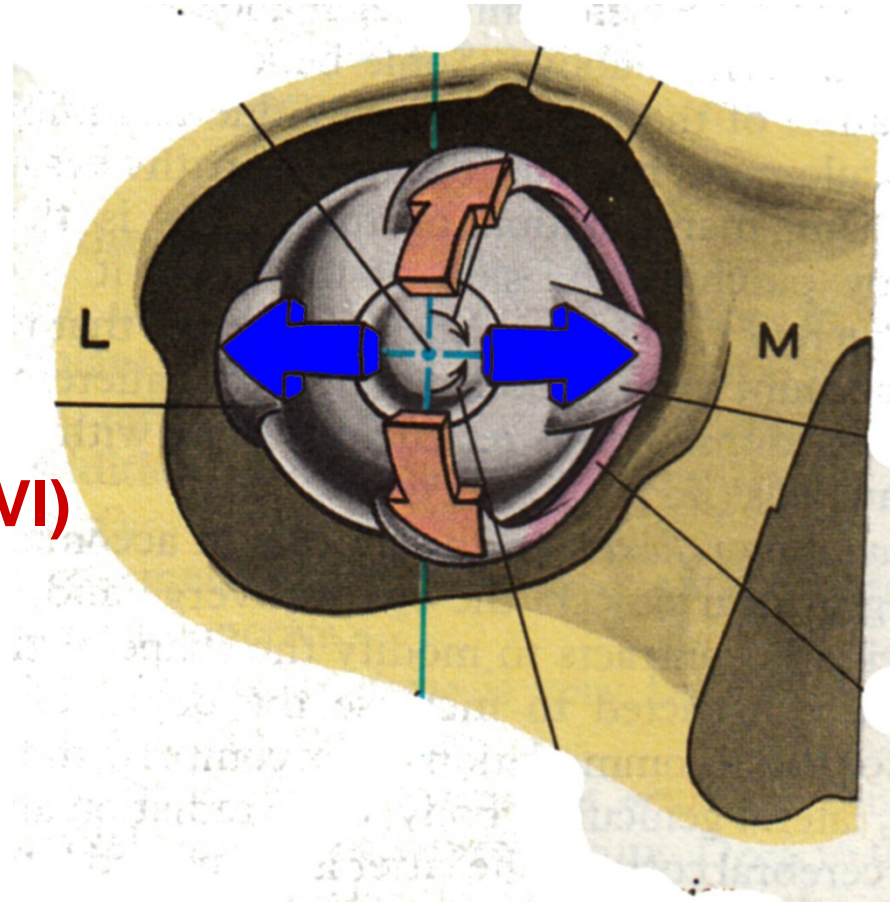
TENDINOUS RING- RING
OF CT SURROUNDING
OPTIC CANAL AND
SUPERIOR ORBITAL
FISSURE

NOTE: NOT INFERIOR
OBLIQUE - FROM FLOOR
OF ORBIT

B. ACTIONS - EYE MOVEMENTS

ACTIONS - MEDIAL RECTUS AND LATERAL RECTUS STRAIGHTFORWARD

LATERAL
RECTUS
ABDUCT (VI)

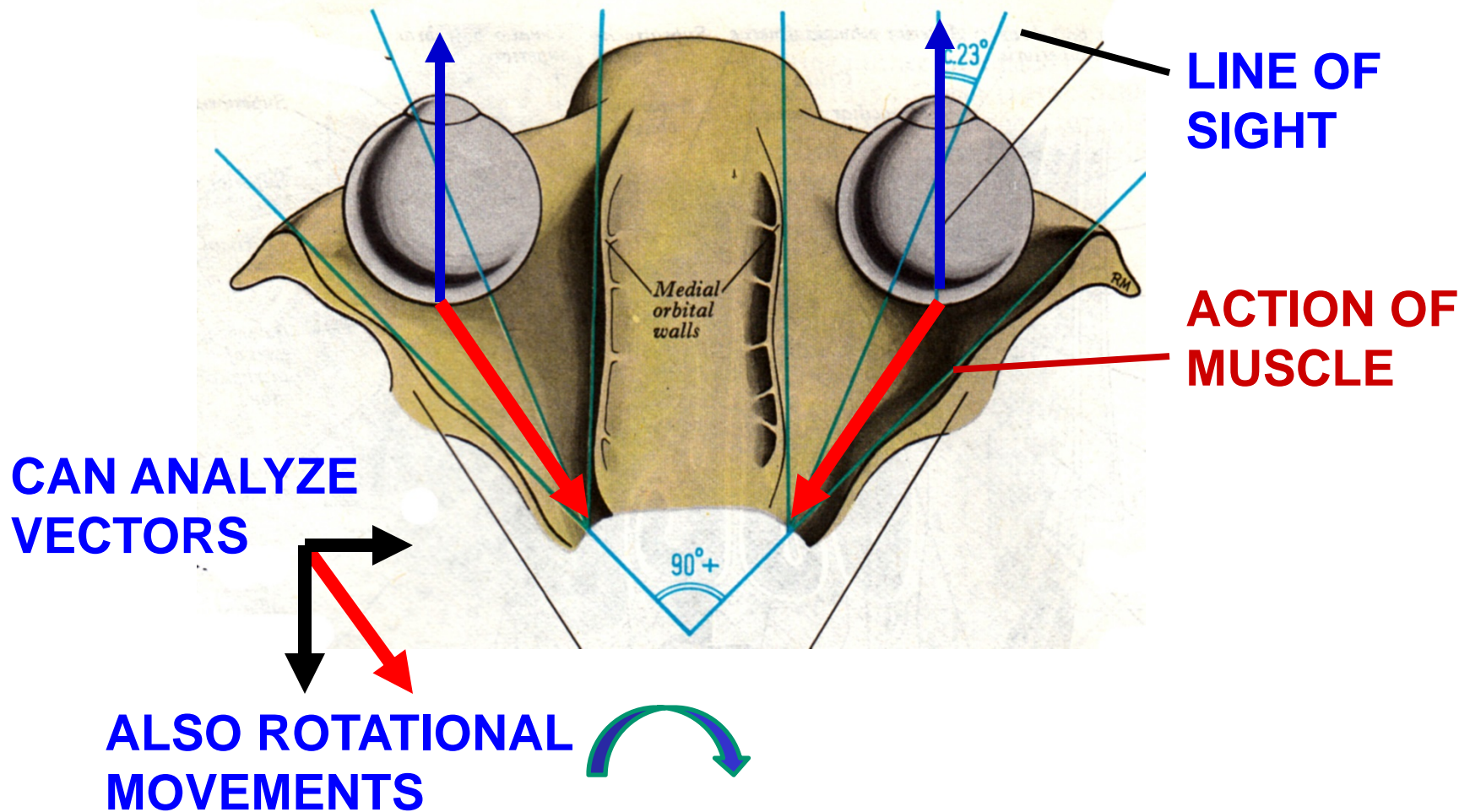


MEDIAL
RECTUS-
ADDUCT
EYE (III)

EYE MOVEMENTS

- ACTIONS OF OTHER MUSCLES COMPLEX

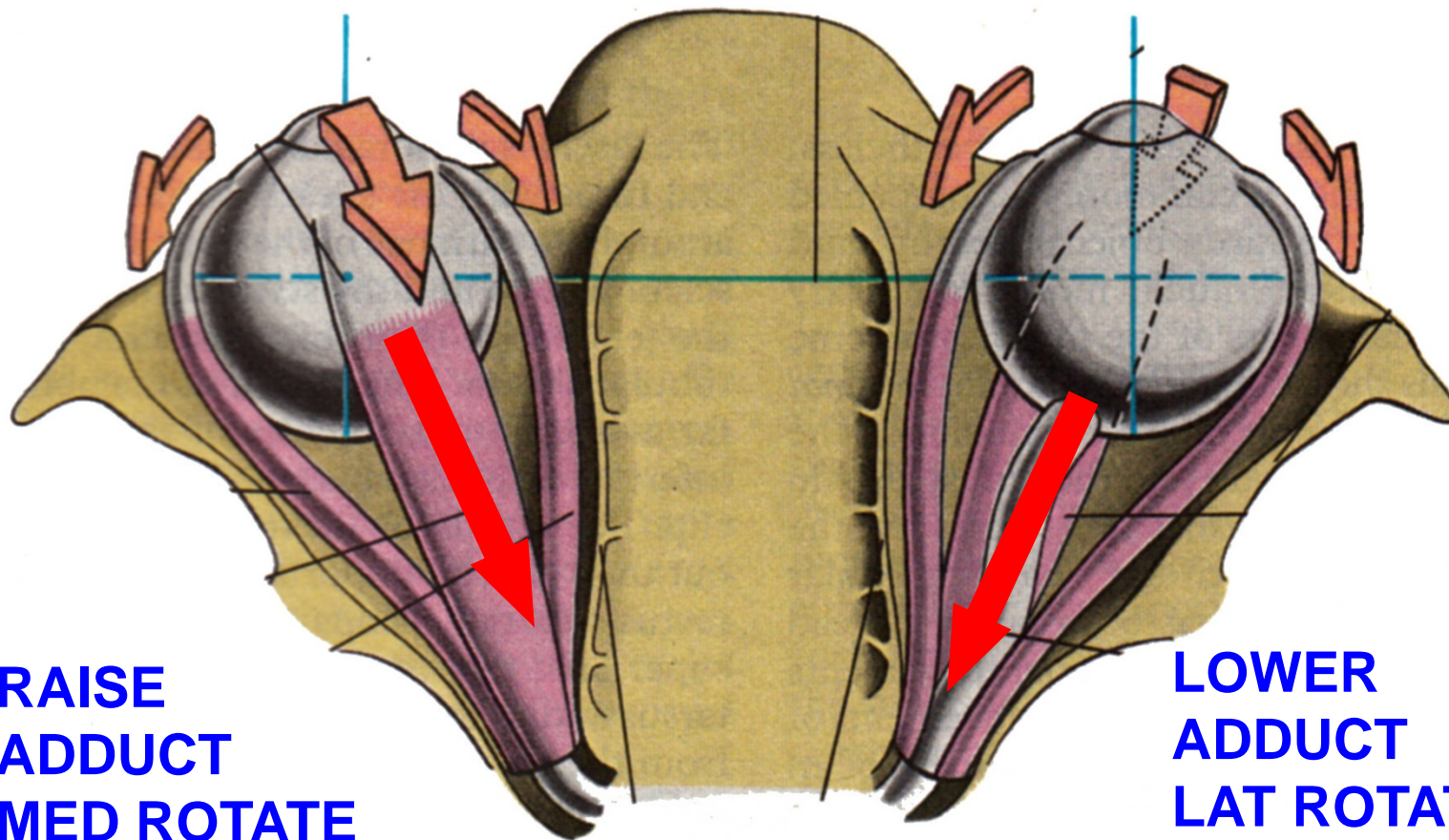
- PULL OF **SUP. AND INF. RECTUS** AT ANGLE WITH LINE OF SIGHT



EYE MOVEMENTS

SUP RECTUS (III)

INF RECTUS (III)



**RAISE
ADDUCT
MED ROTATE**

**LOWER
ADDUCT
LAT ROTATE**

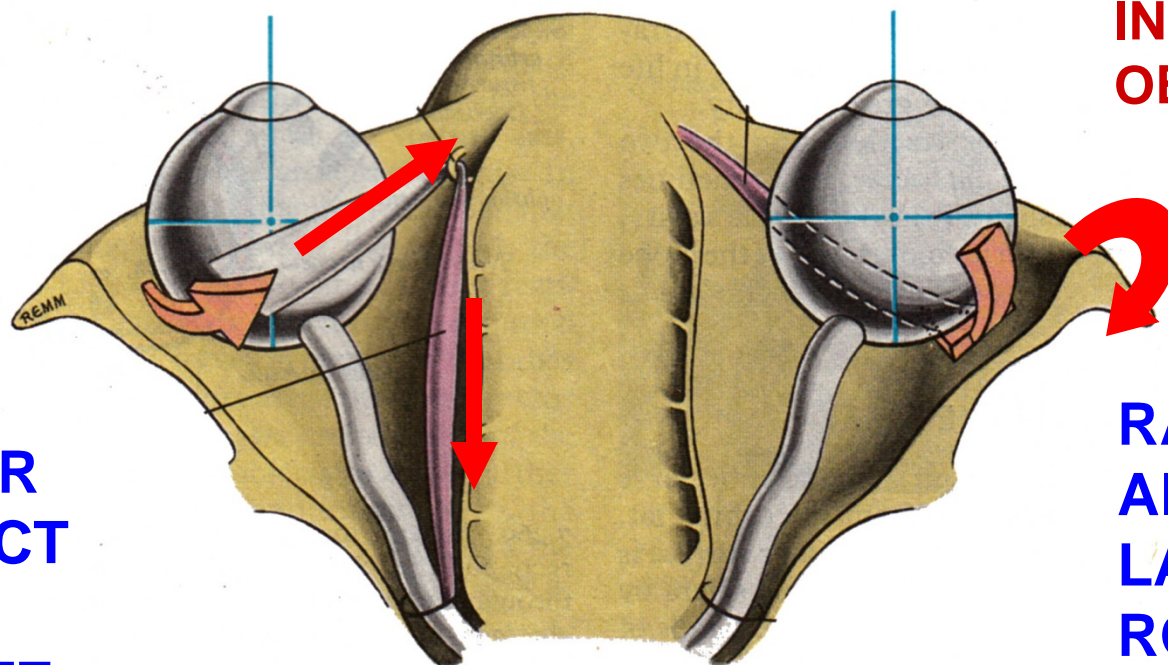
EYE MOVEMENTS

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

**SUP
OBLIQUE**

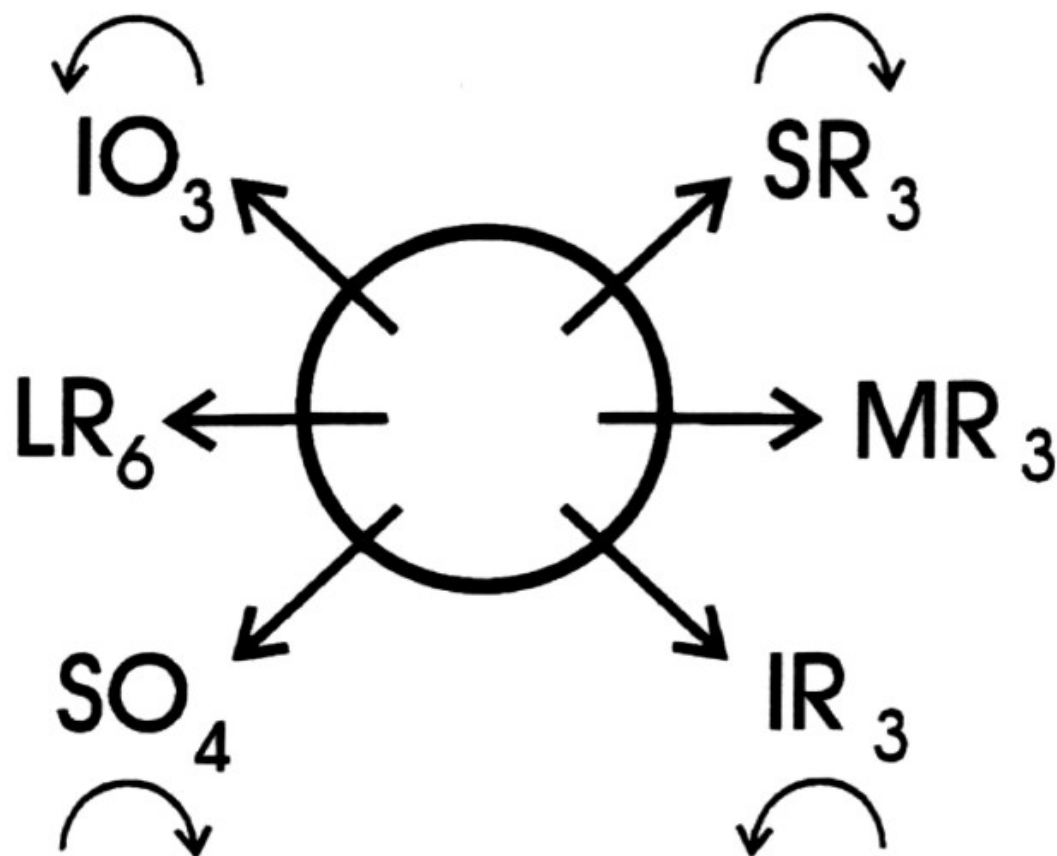


**INF
OBLIQUE**

**LOWER
ABDUCT
MED
ROTATE**

**RAISE
ABDUCT
LAT
ROTATE**

EYE MOVEMENTS DIAGRAM

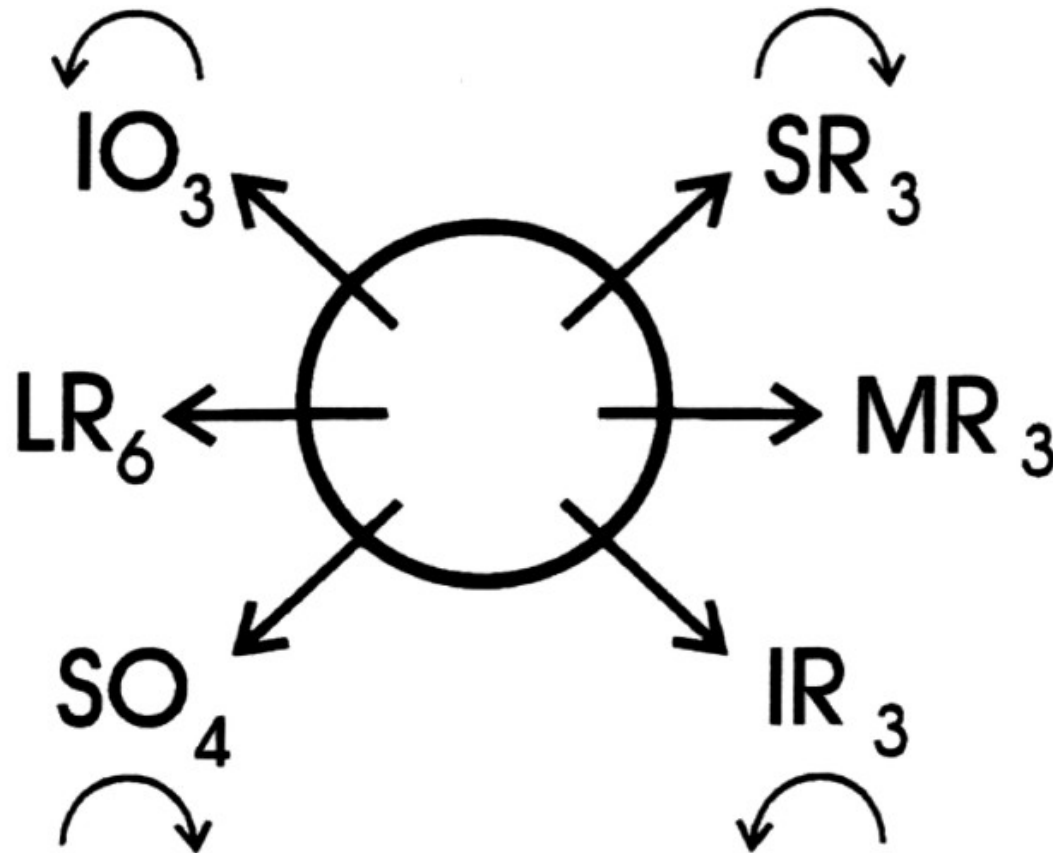


NOSE



- 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

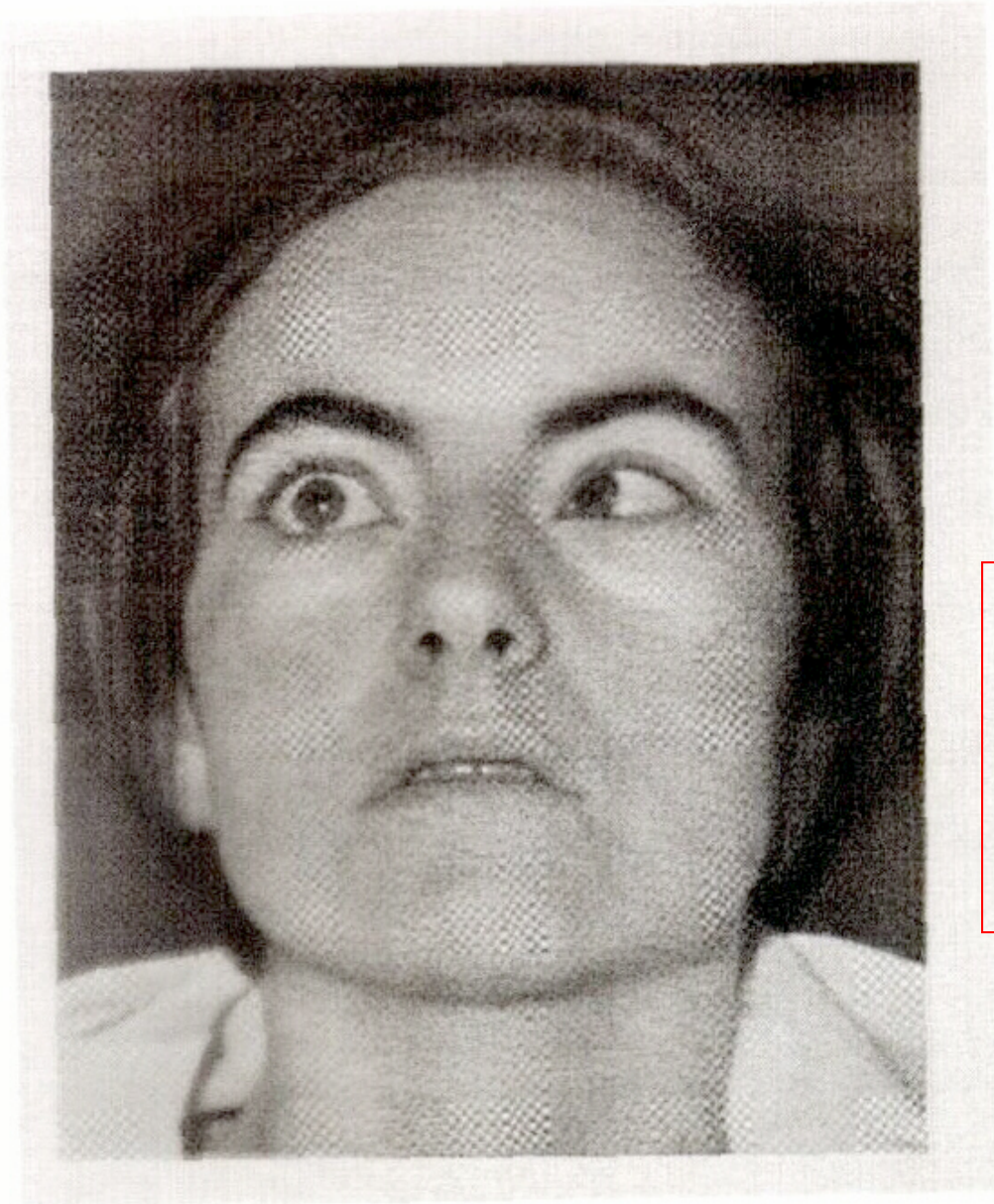


NOSE



**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

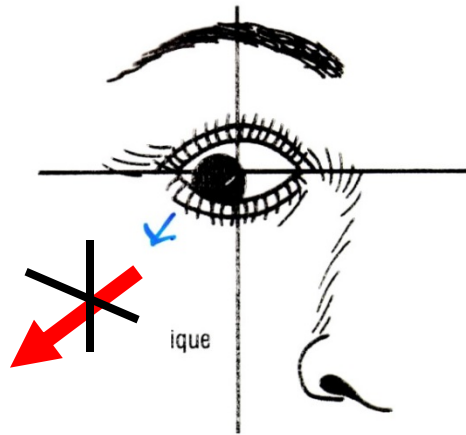


A. ABDUCENS (VI) NERVE DAMAGE



**ABDUCENS (VI): AT REST 1)
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

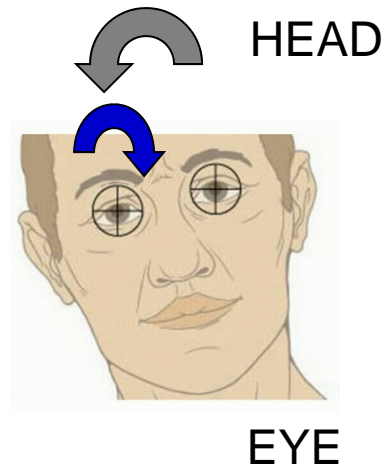
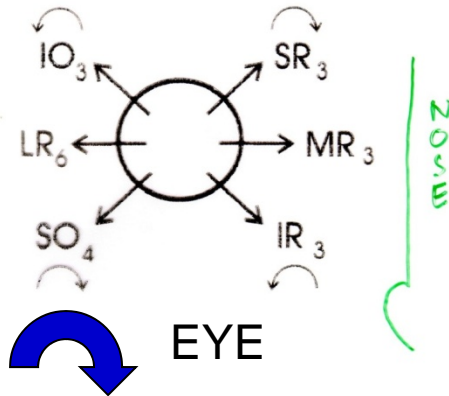


PATIENT CANNOT LOOK DOWN AND OUT

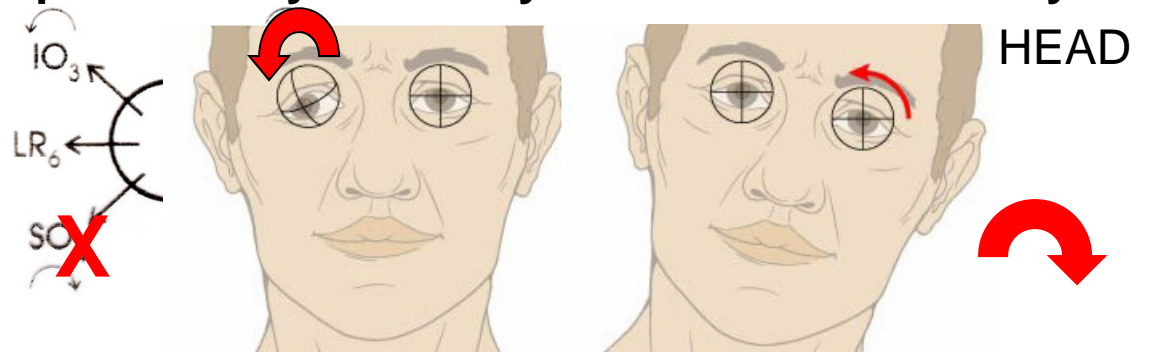
Symptoms - Difficulty walking down stairs; HEAD TILTED

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



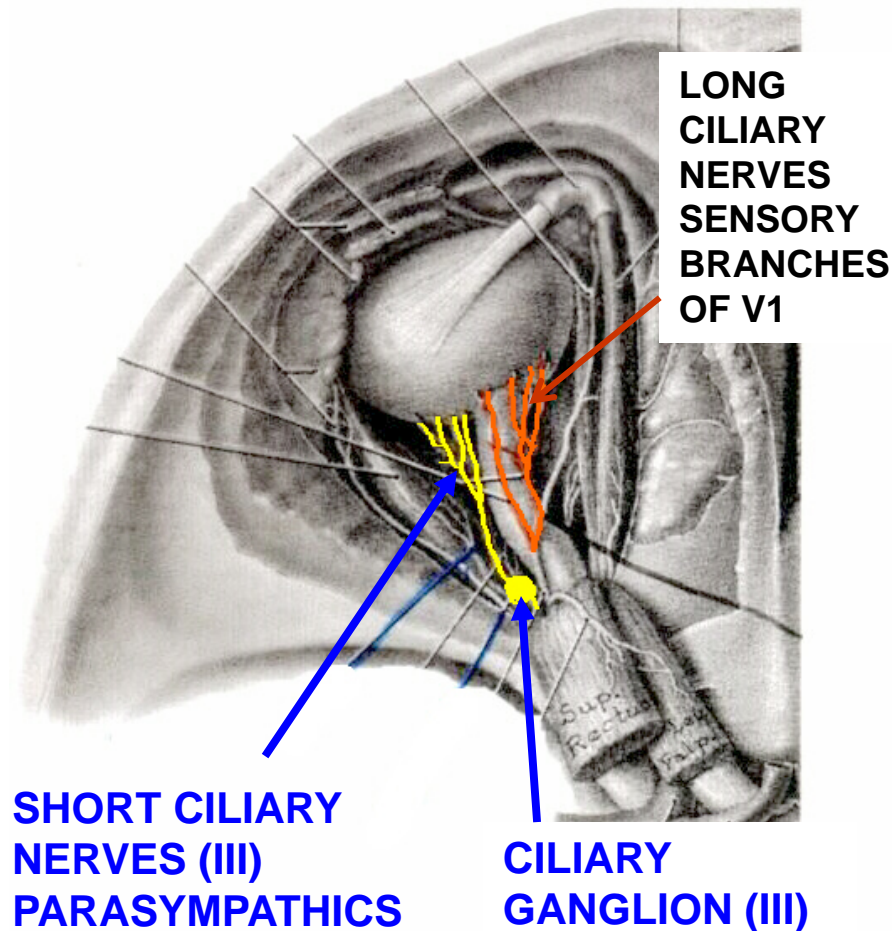
AT REST

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)

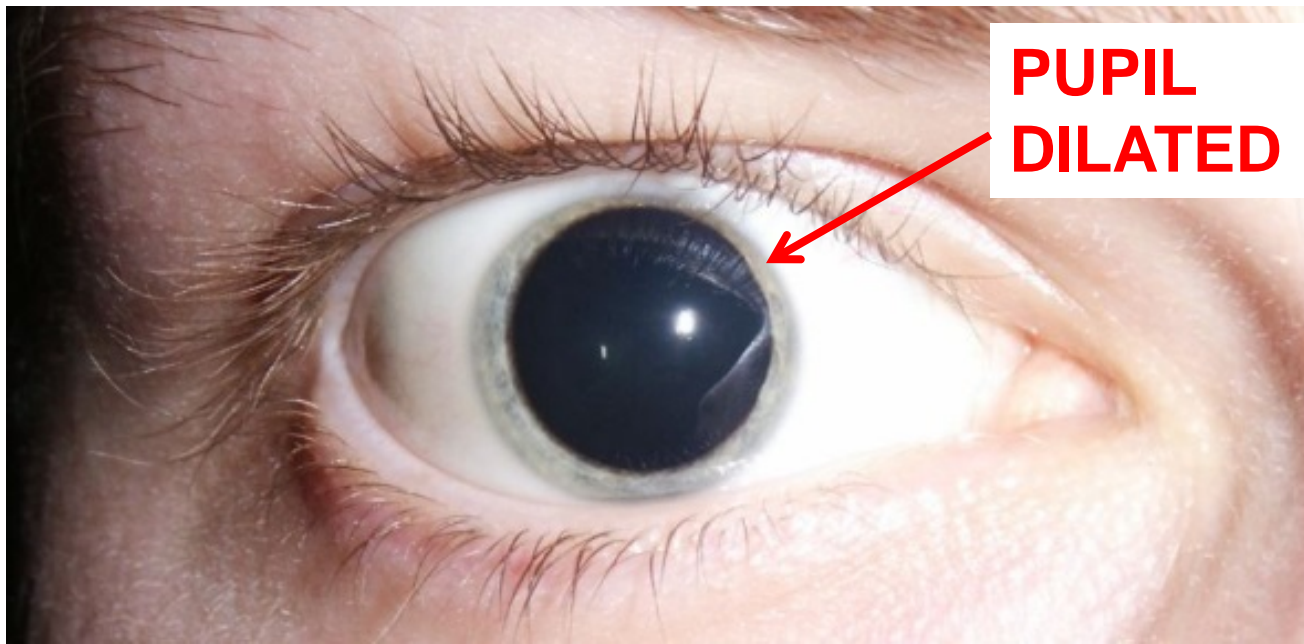
INNERVATE: 1) CILIARY MUSCLES
2) SPHINCTER (CONSTRICTOR)
PUPILLAE

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**

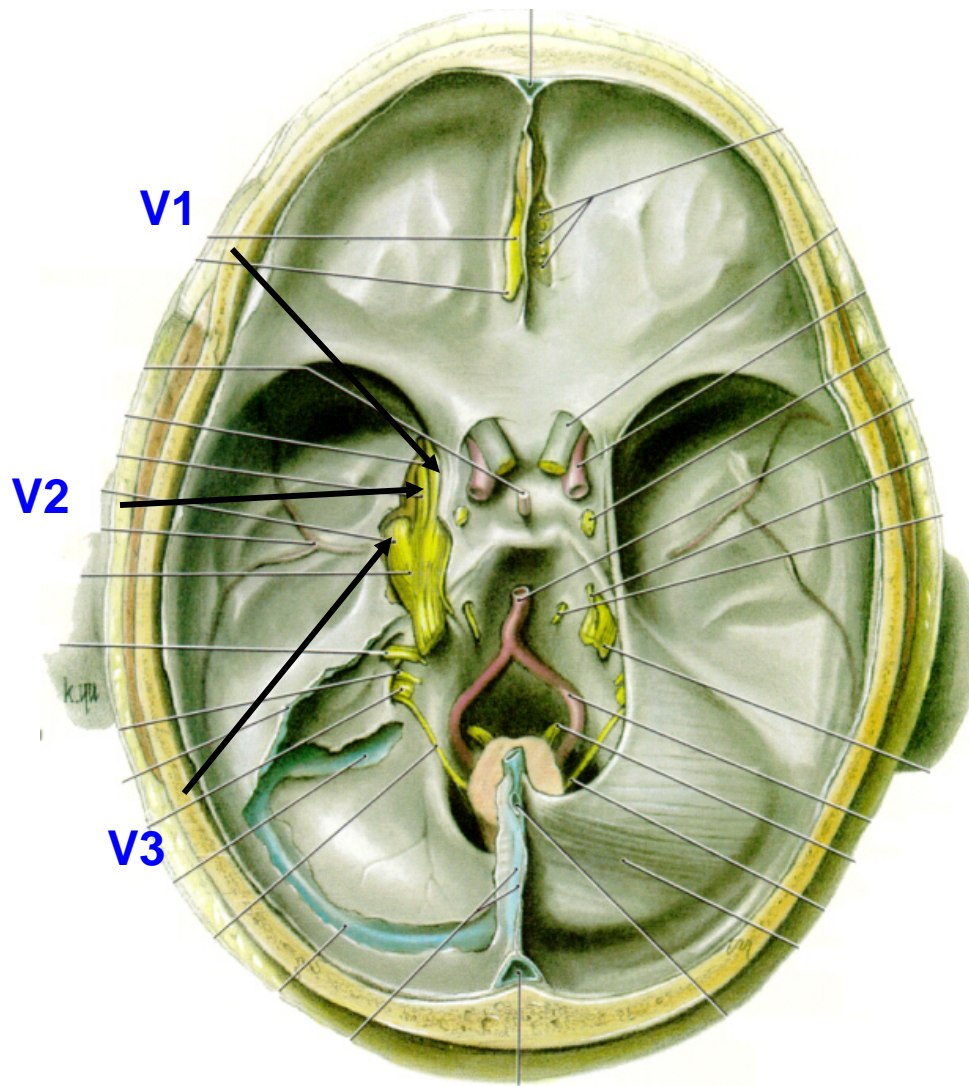
'BLOWN PUPIL' = MYDRIASIS (muh-dry'-a-sis)



'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