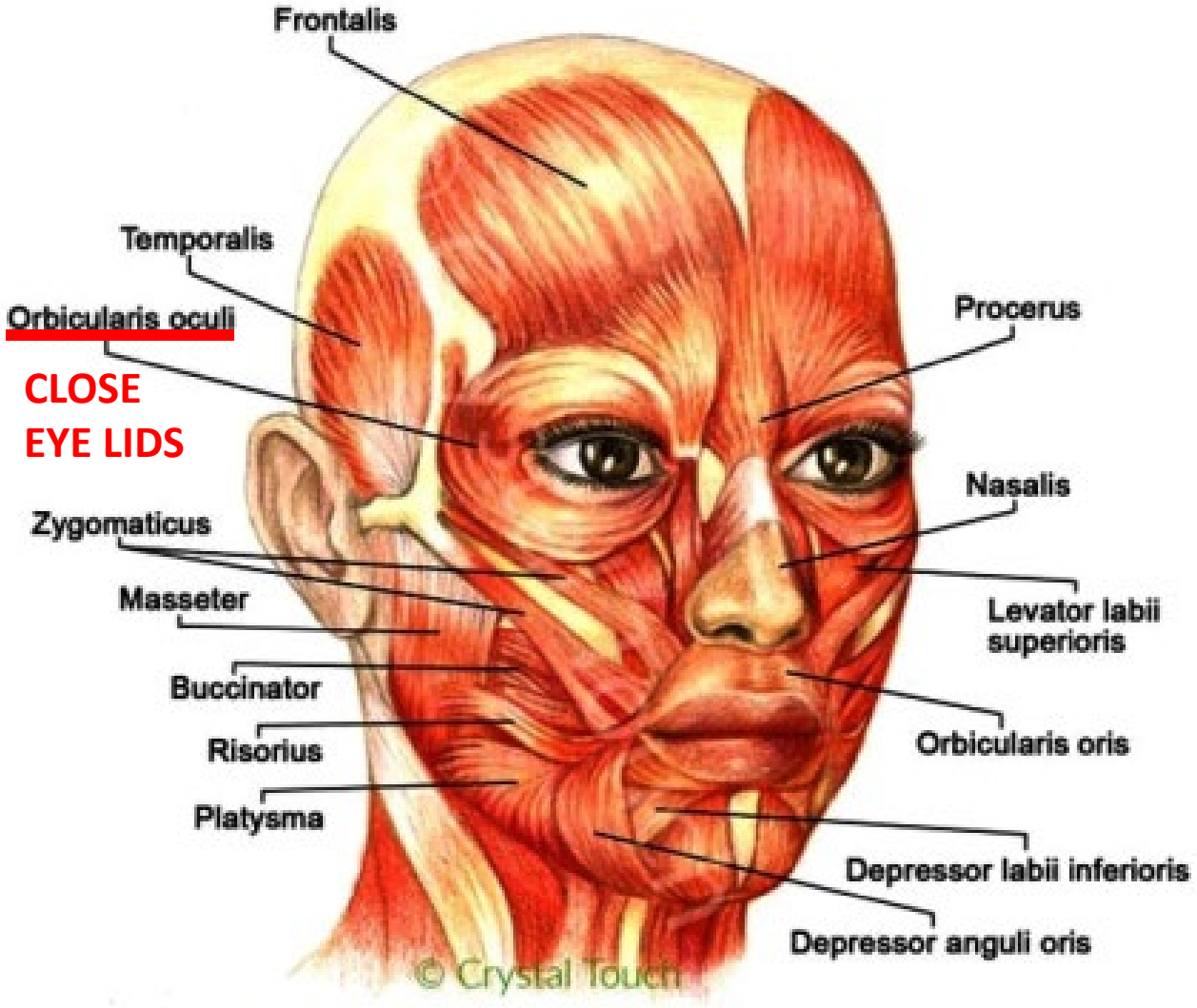
DISCUSSION SESSION 2: GROSS ANATOMY

NN BLOCK

Discuss Face (Bell's palsy), Embryology (Cleft Lip, Palate), Meninges (Hematomas), CSF resorption (Hydrocephalus)

MUSCLES OF FACIAL EXPRESSION

FACE



Skeletal muscles - under voluntary control (CN VII Facial) and 'emotional' control (ex. amygdala inputs)

Insert to skin - repair limited to facial transplants (skin and muscles)

No muscle (or very few) spindles. Monitoring thought to occur by stretch of skin.

FACIAL EXPRESSIONS CAN CONVEY EMOTIONS

'NEUTRAL?'

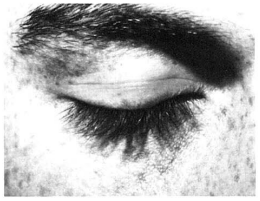
CONTRACTIONS OF MUSCLES OF FACIAL EXPRESSION CAN BE 'READ' TO INDICATE THE EMOTIONAL STATE OF A PERSON

ANGER

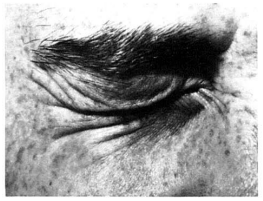
JOY

FEAR

PRACTICE USING FACIAL MUSCLES SELECTIVELY IN FRONT OF MIRROR



Palpebral Part



Orbital Part

Orbicularis Oculi

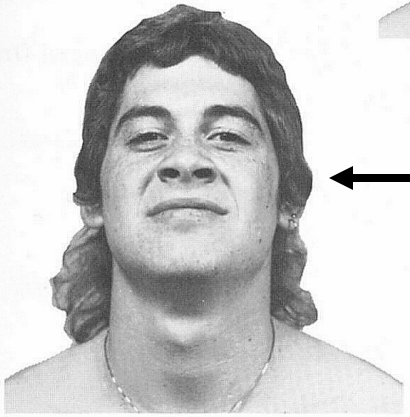
Sneering – Procerus

Procerus

Frontalis

Corrugator Supercilii

Procerus



Nasalis

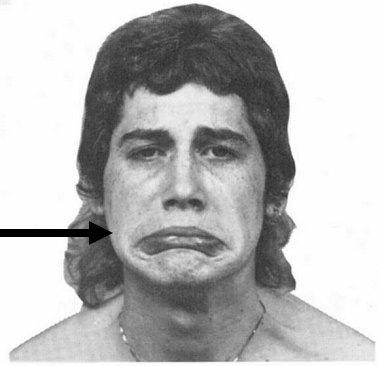
Contempt – Dilator Naris

Nasalis

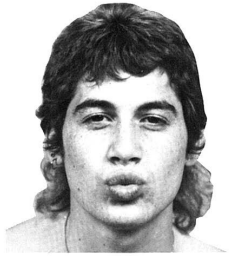
Risorius

Depressor Anguli Oris

Grading Policy - Depressor Anguli Oris



Depressor Anguli Oris



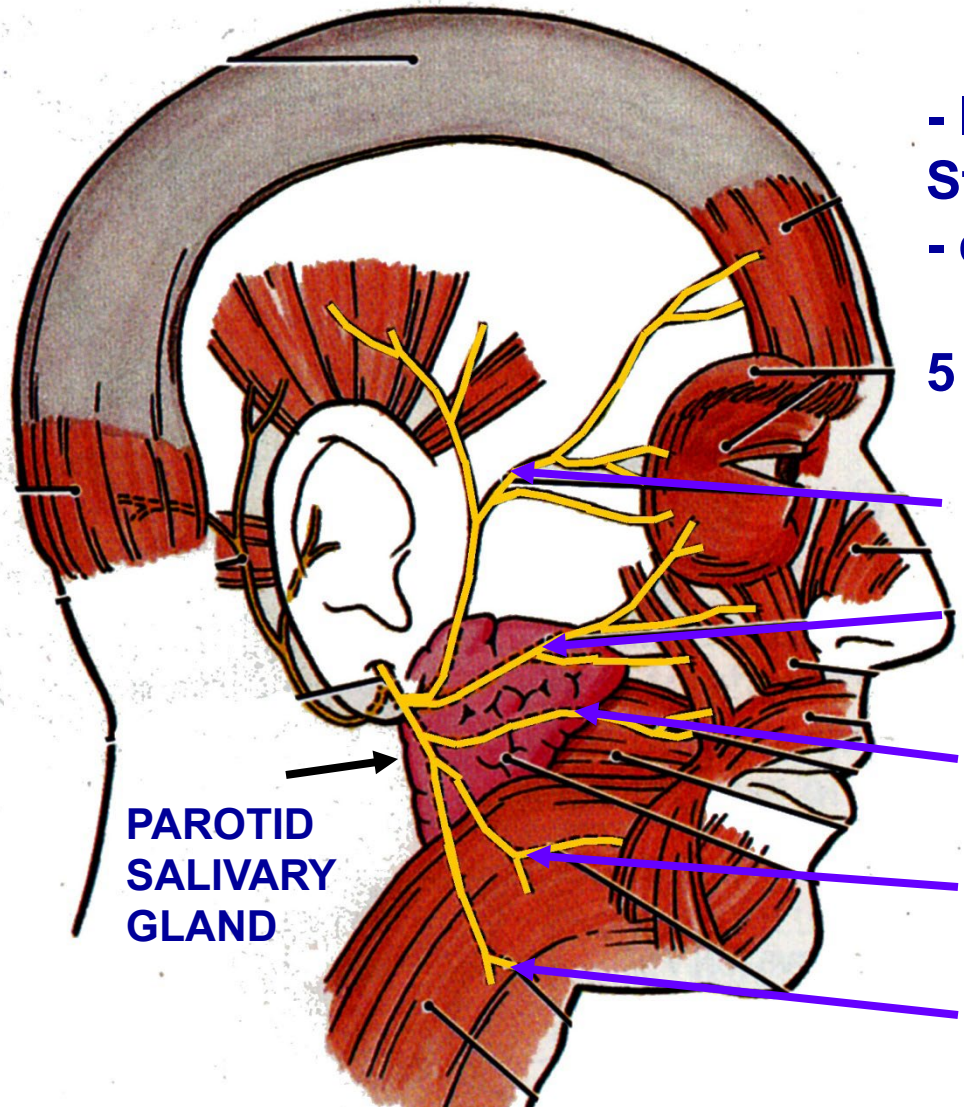
Orbicularis Oris

Zygomaticus Major

Mentalis

7-15B MUSCLES OF EXPRESSION IN ACTION

MOTOR INNERVATION TO MUSCLES OF FACIAL EXPRESSION - FACIAL NERVE (CRANIAL NERVE VII)



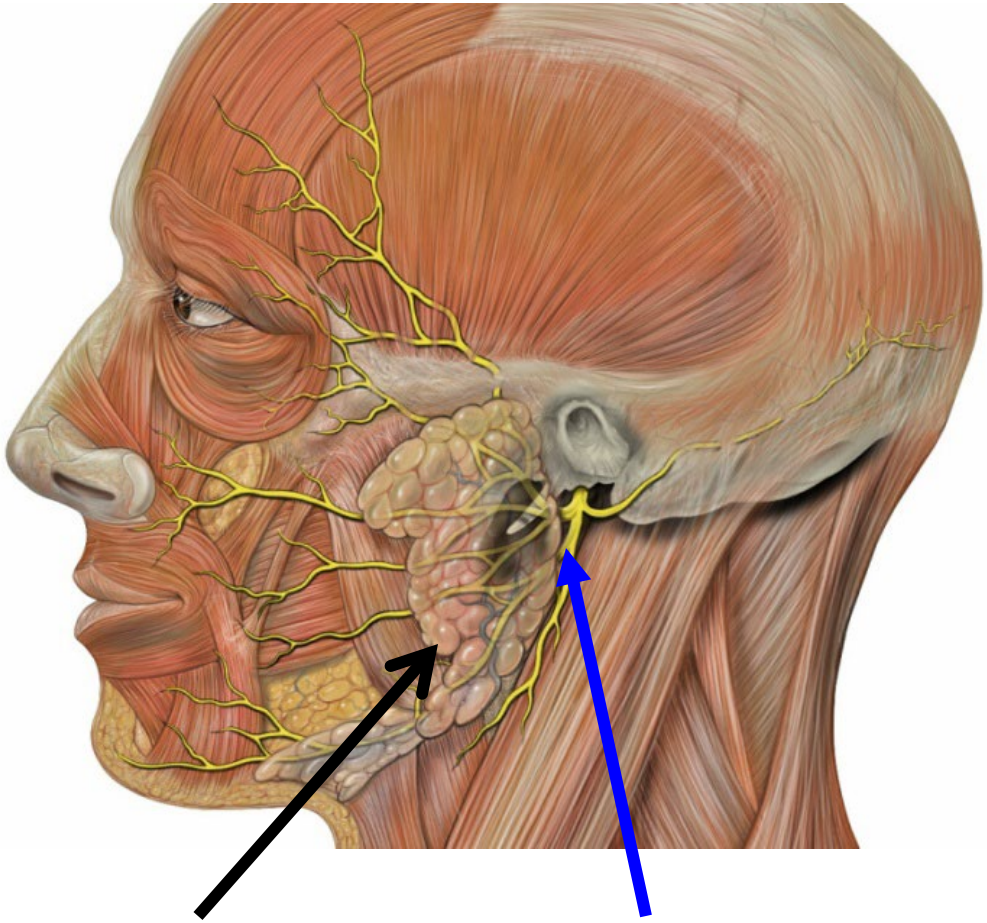
- leaves skull via Stylomastoid foramen
- divides in parotid gland into

5 terminal branches

1. TEMPORAL
2. ZYGOMATIC
3. BUCCAL
4. MANDIBULAR
5. CERVICAL

Note: Buccal Br. VII = Motor; Buccal Br. V =Sensory

FACIAL NERVE DAMAGE



Parotid Salivary gland

FACIAL NERVE (Cranial Nerve VII)

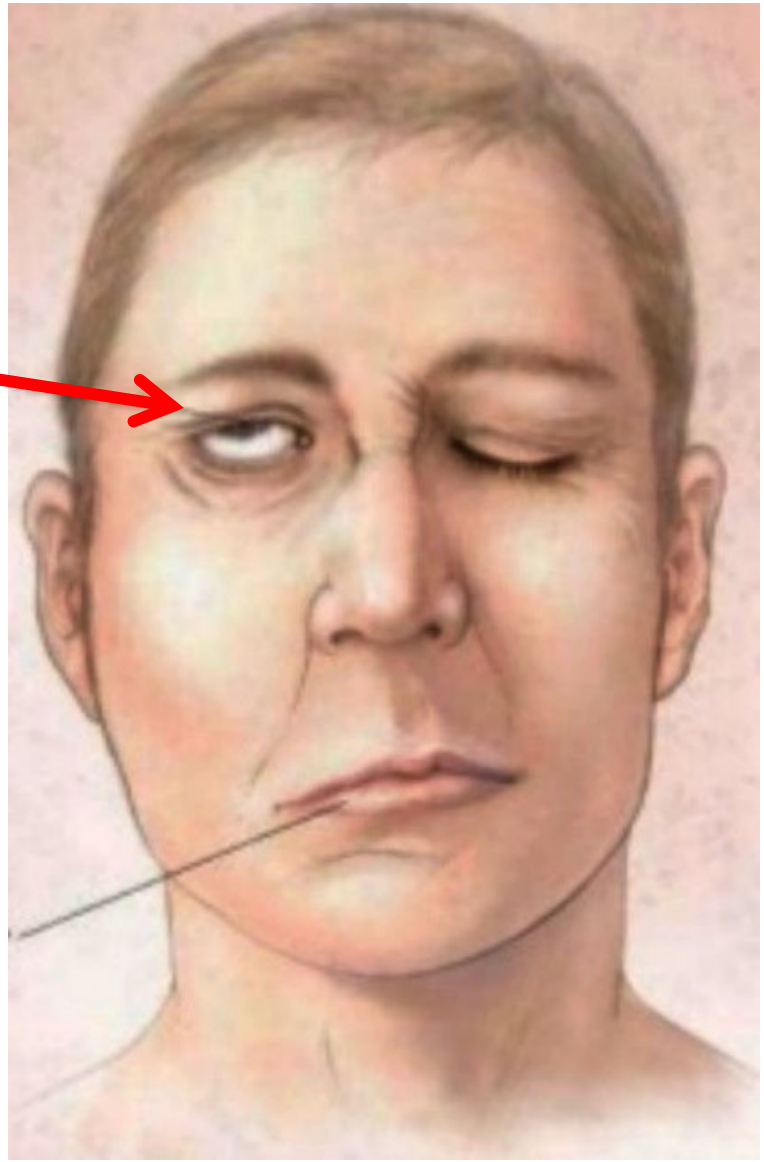
- Facial nerve exits skull via Stylomastoid foramen (base of skull)
- Facial nerve passes through and branches in Parotid salivary gland
- can be damaged by Parotid tumors.
- more common, may be associated with viral infections:

Bell's palsy - loss of function of Facial nerve

others - ex. Ramsay-Hunt syndrome

BELL'S PALSY - SYMPTOMS REFLECT ANATOMY OF FACIAL NERVE

UNABLE TO CLOSE EYE DUE TO PARALYSIS OF ORBICULARIS OCULI MUSCLE



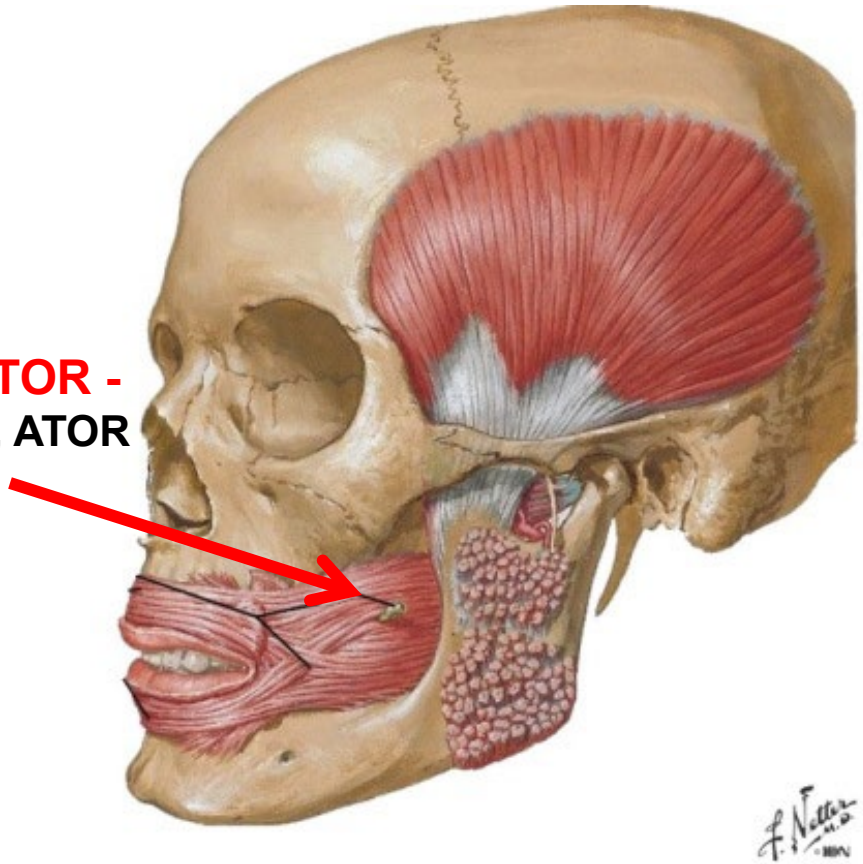
NOTE: CONTROL OF EYELIDS
1) CLOSE EYELIDS = CRANIAL NERVE VII (FACIAL N.)
2) OPEN EYELIDS - CRANIAL NERVE III (OCULOMOTOR) + SYMPATHETICS

**

FACIAL PARALYSIS (as in Bell's Palsy) can paralyze ORBICULARIS OCULI MUSCLE
- patient is unable to close eye
- can damage cornea of eye
- in newborns, can sew eyelid shut to prevent corneal damage

PARALYSIS OF BUCCINATOR MUSCLE

BUCCINATOR -
BUCK, SIN, ATOR



CLINICAL **

FACIAL PARALYSIS can paralyze BUCCINATOR

- patient is unable to hold food between teeth

- DIFFICULTY IN CHEWING FOOD

BUCCINATOR FORMS WALL OF MOUTH - PARALYZE UNABLE TO HOLD FOOD BETWEEN TEETH

FRONTALIS - muscle in scalp attached to Epicranial Aponeurosis; raises eyebrows (used in clinical test of Facial nerve)

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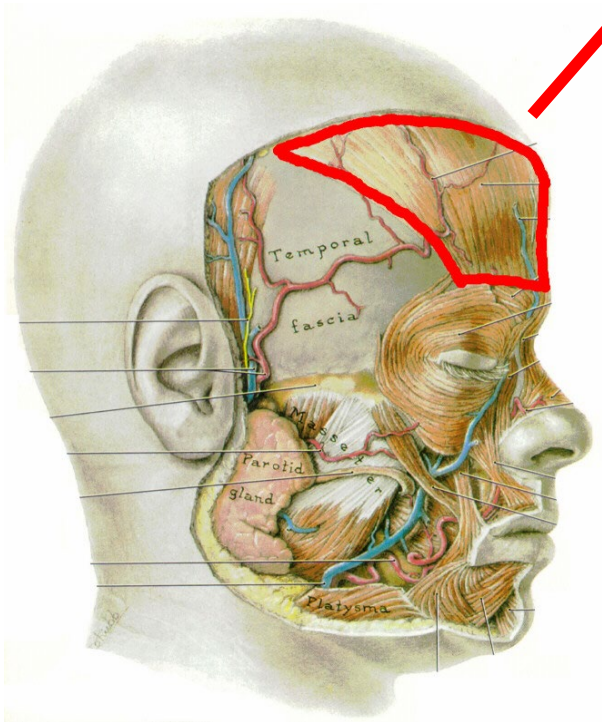
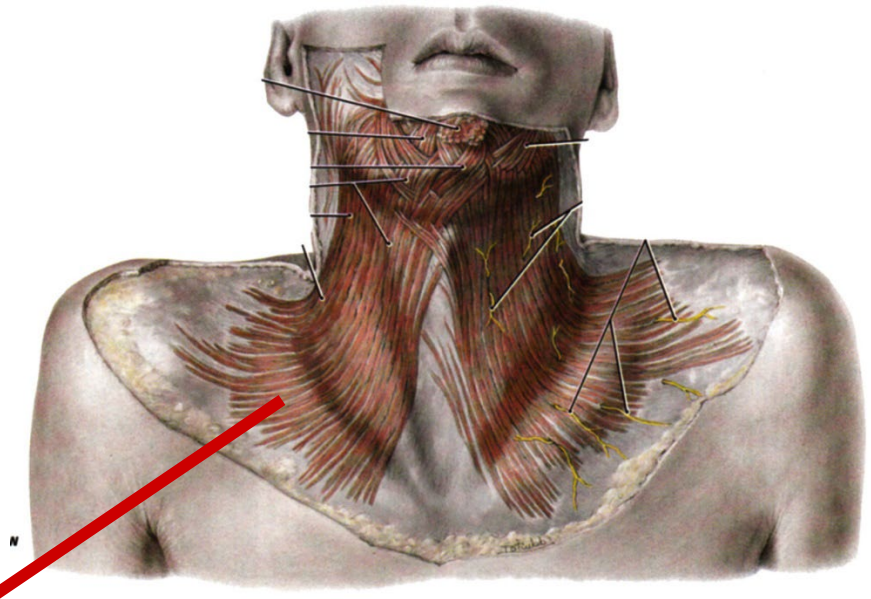
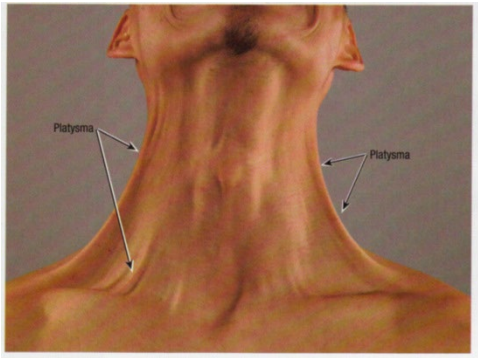


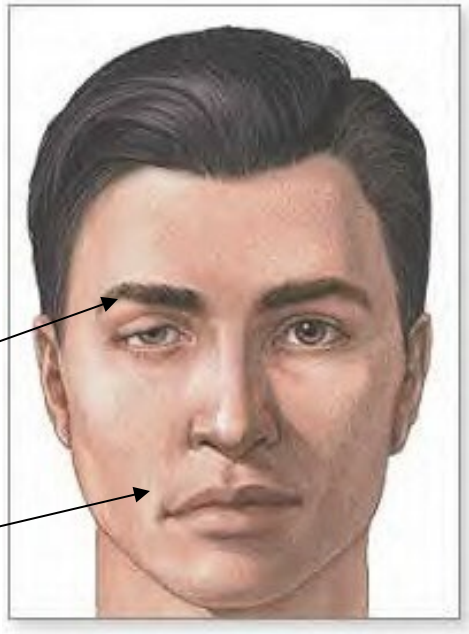


PLATYSMA - extends from mandible to fascia over Pectoralis Major; tenses, moves skin of neck



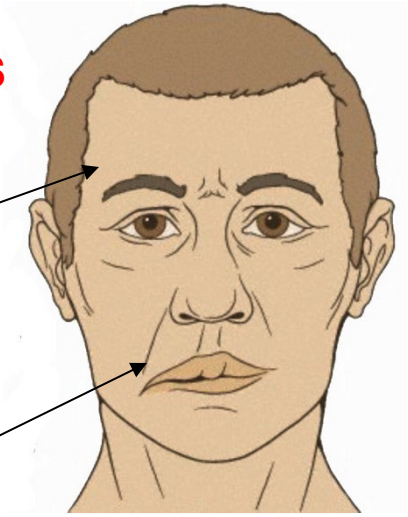
OVERVIEW OF FACIAL MUSCLES: FACIAL PARALYSIS

FACIAL PARALYSIS - BELL'S PALSY - CN VII



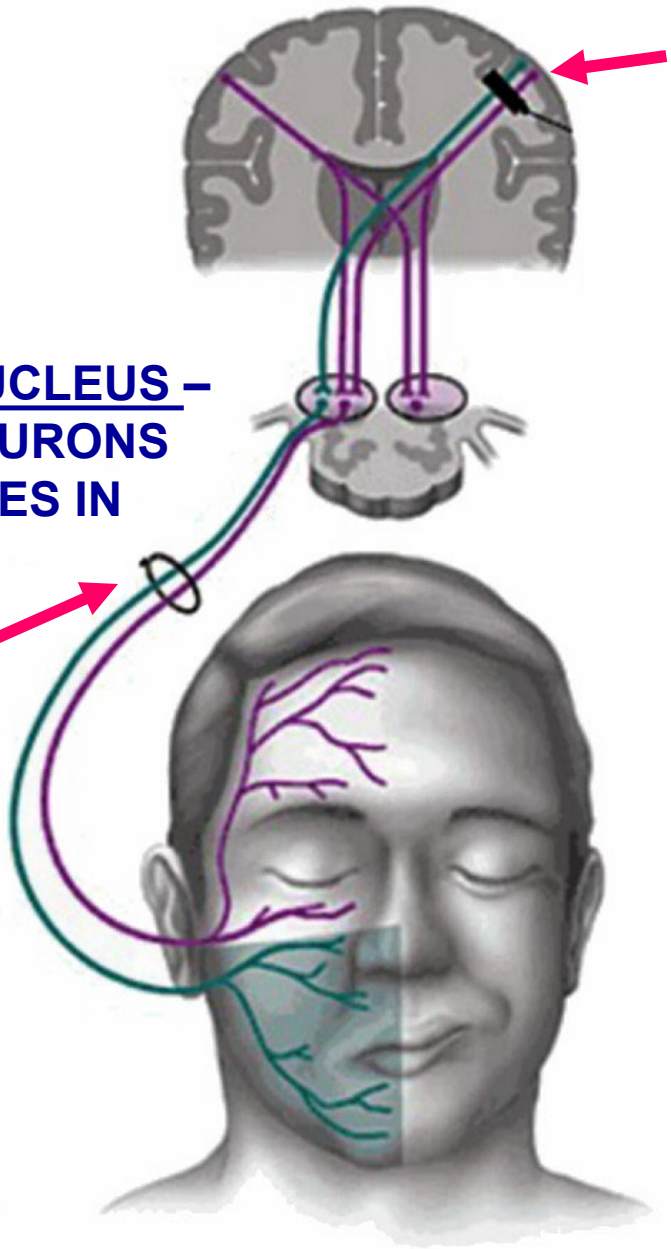
BELL'S PALSY- Lower Motor Neuron (Alpha motor neuron) disorder of Facial Nerve (CN VII): associated with viral infection (herpes simplex); Symptoms unilateral: sudden onset paralysis of all facial muscles on one side; SYMPTOMS: drooling; inability to close eye; loss of taste to anterior tongue; pain in or behind ear; hyperacousia

UPPER MOTOR NEURON LESIONS



UPPER MOTOR NEURONS DISORDERS OF VII - 'sparing' of upper face - After cortical strokes, often only muscle of lower face are paralyzed on one side, muscles of upper face are not paralyzed (ex. brow, orbicularis oculi); cortical projections are bilateral to upper face.

CONTROL OF MUSCLES OF FACIAL EXPRESSION



UPPER MOTOR NEURON LESION - ex. CORTICAL STROKE (vascular occlusion)

AFFECTS ONLY MUSCLES OF LOWER FACE (**'SPARING OF UPPER FACE'**)

FACIAL MOTOR NUCLEUS – ALPHA MOTOR NEURONS TO FACIAL MUSCLES IN BRAINSTEM

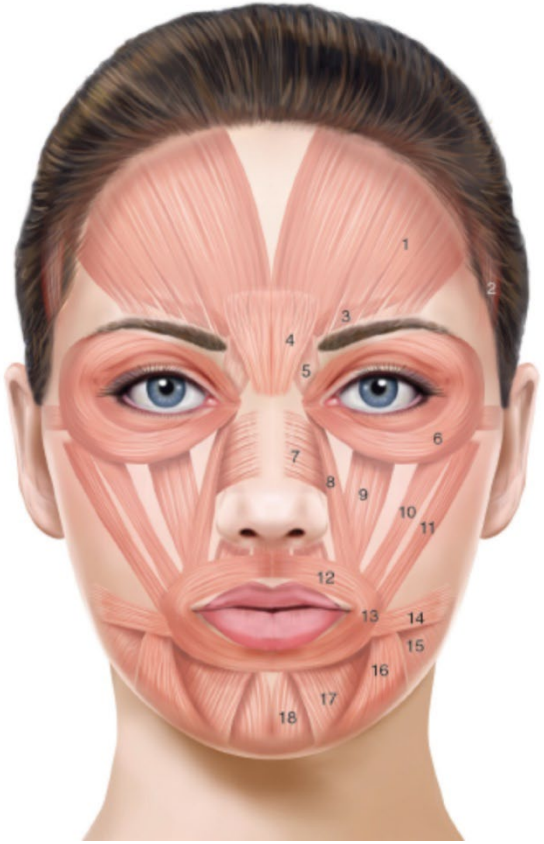
LOWER MOTOR NEURON LESION - ex. BELL'S PALSY -

AFFECTS ALL MUSCLES OF FACIAL EXPRESSION

UPPER FACE CONTROL IS BILATERAL (both sides of Cortex)

LOWER FACE CONTROL IS UNILATERAL (ONLY CONTRALATERAL CORTEX)

MUSCLES OF FACIAL EXPRESSION CONTRIBUTE TO WRINKLES AND FACE LINES



Tonic activation of muscles of face can contribute to formation of wrinkles and skin lines. Can be treated by injection of botox (botulinum toxin) which blocks transmittor release from endings of Facial nerve producing relaxation of muscles

ARTERIAL SUPPLY TO FACE: CAROTID ARTERY

FACE

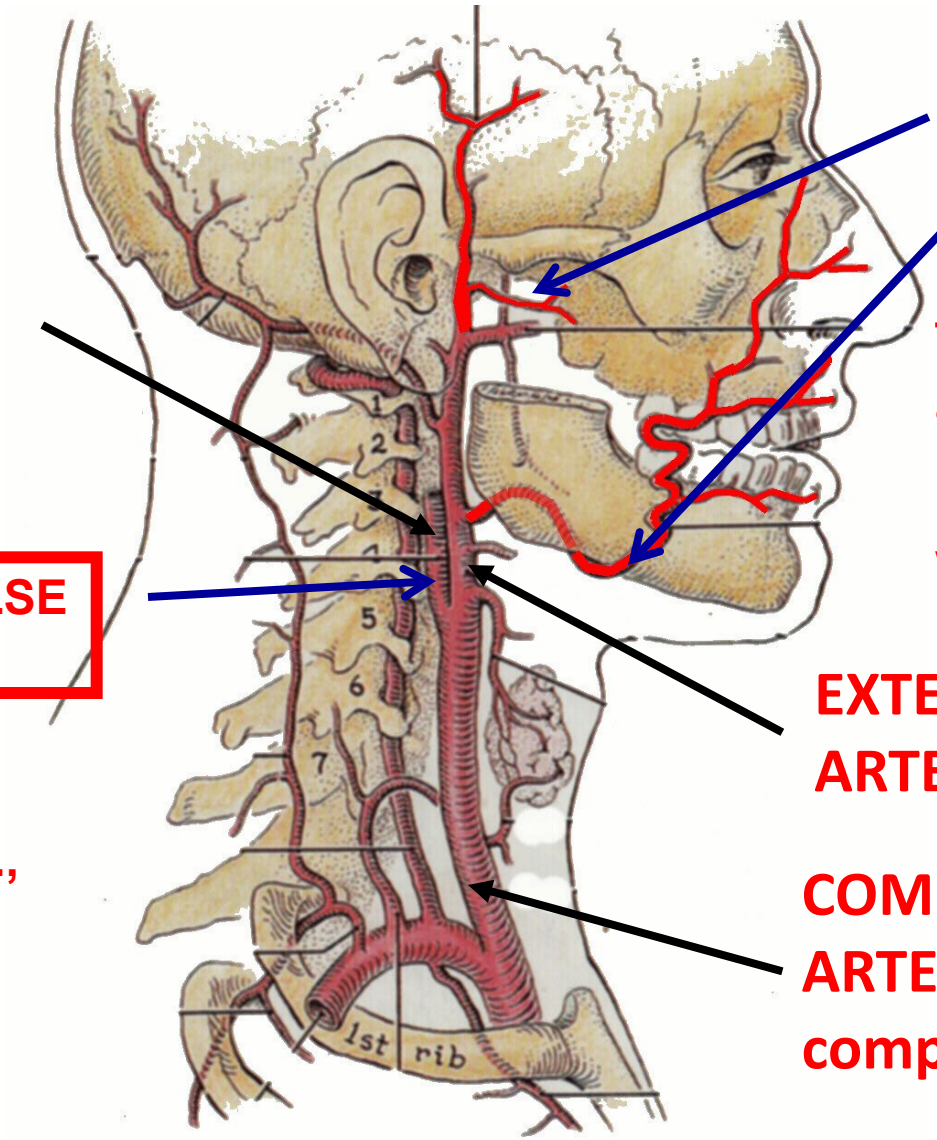
SUPERFICIAL TEMPORAL ARTERY

TAKE PULSE HERE

INTERNAL CAROTID ARTERY

FACIAL ARTERY
- extremely winding and tortuous course (skin moves) – DESCRIPTIVE TERM – wiggle, wiggle, wiggle

TAKE PULSE HERE



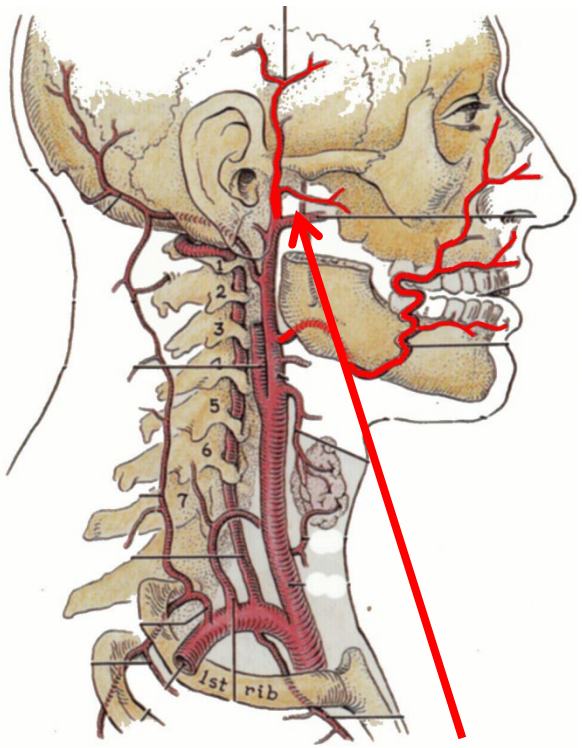
EXTERNAL CAROTID ARTERY

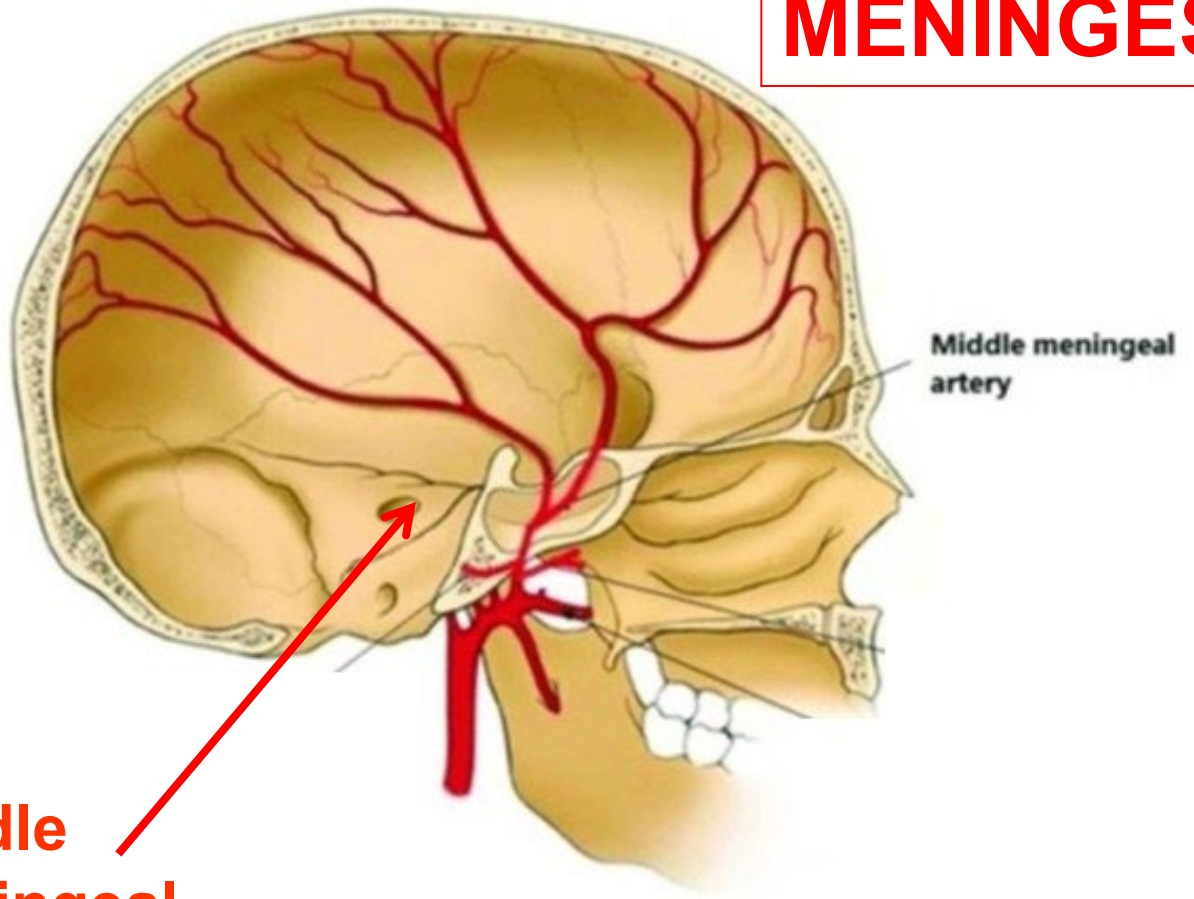
CAROTID = Gk., STUPEFY

COMMON CAROTID ARTERY - can compress at C6

Middle Meningeal Artery – branch of External Carotid artery courses inside skull, outside dura – supplies calvarium (bones of skull 'cap')

MENINGES

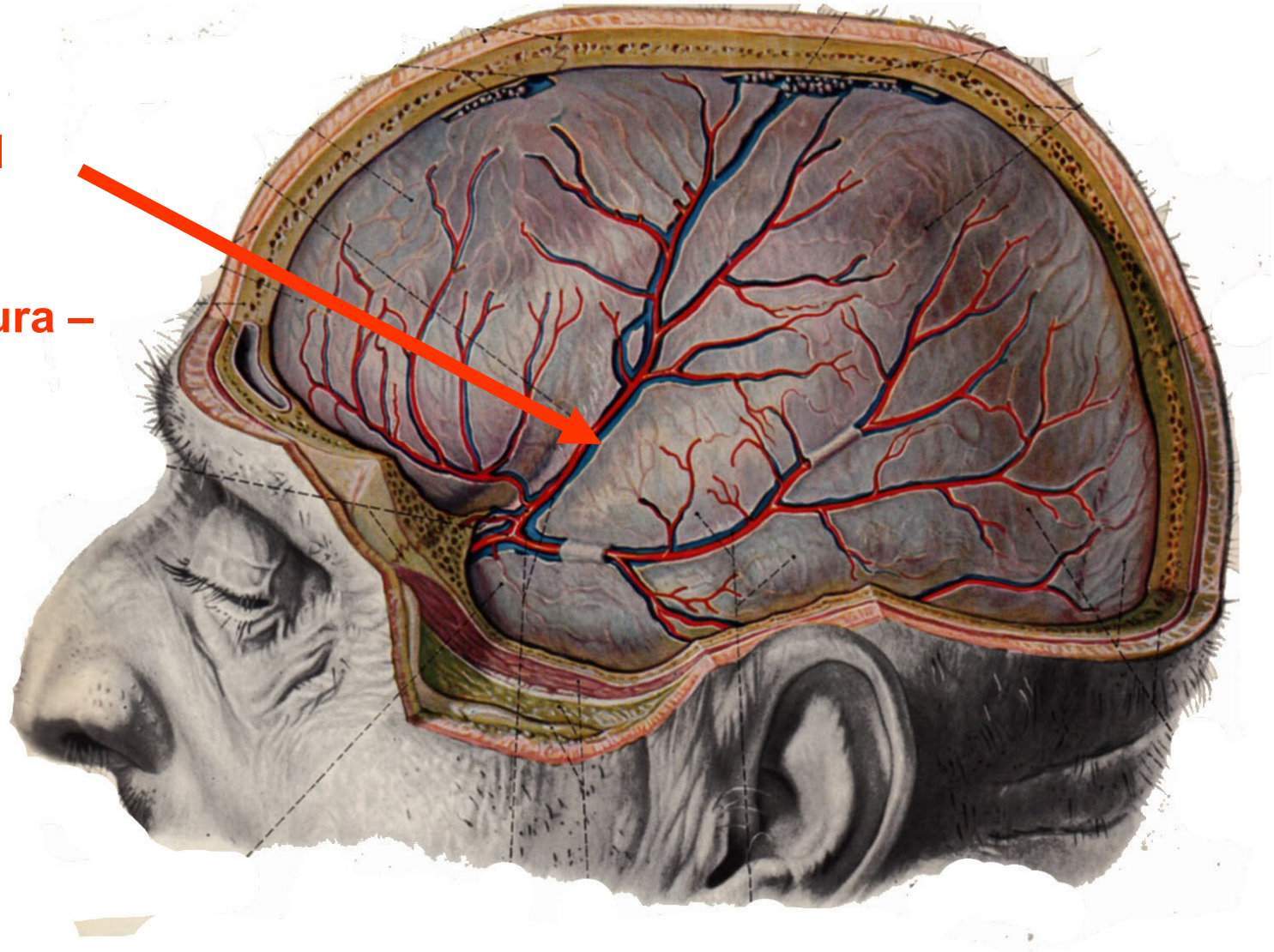




Middle Meningeal Artery

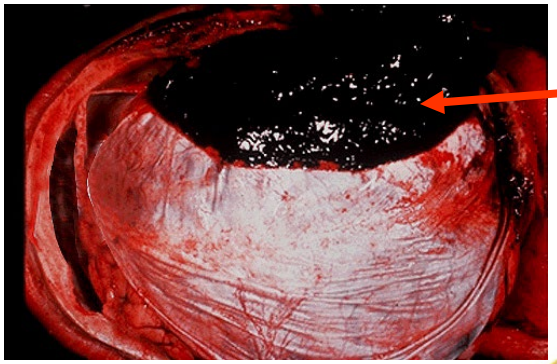
HEMATOMAS - INTERNAL BLEEDS

Middle Meningeal Artery – courses outside dura – supplies calvarium

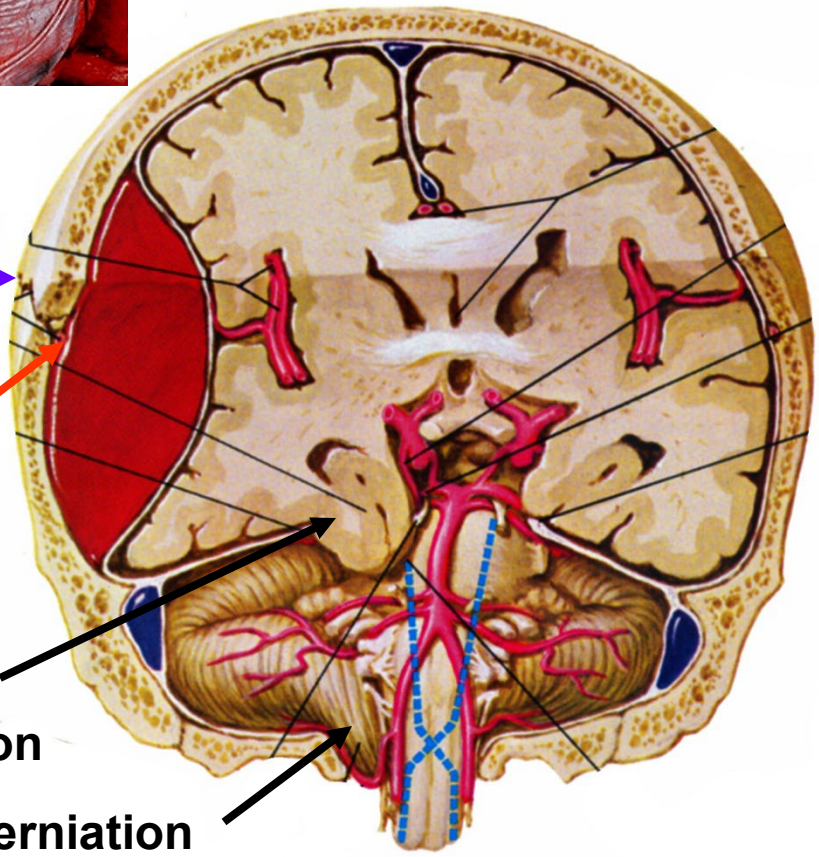


HEMATOMA = abnormal mass of blood outside blood vessel

A. <u>EPIDURAL HEMATOMA</u> - bleeding between dura and bone



EPIDURAL HEMATOMA



1) Skull fracture near Pterion
2) Tear Middle Meningeal Artery
3) Blood 'peels' dura from bone
4) Lens shaped (biconvex) mass on CT

EPIDURAL HEMATOMA – **
1) ARTERIAL – often MIDDLE MENINGEAL ARTERY
2) 'LENS' SHAPED MASS
3) RAPID

Clinical - bleeding is arterial; can be profuse and rapid (ex, car accident); patient lucid at first; can be fatal within hours if herniation occurs

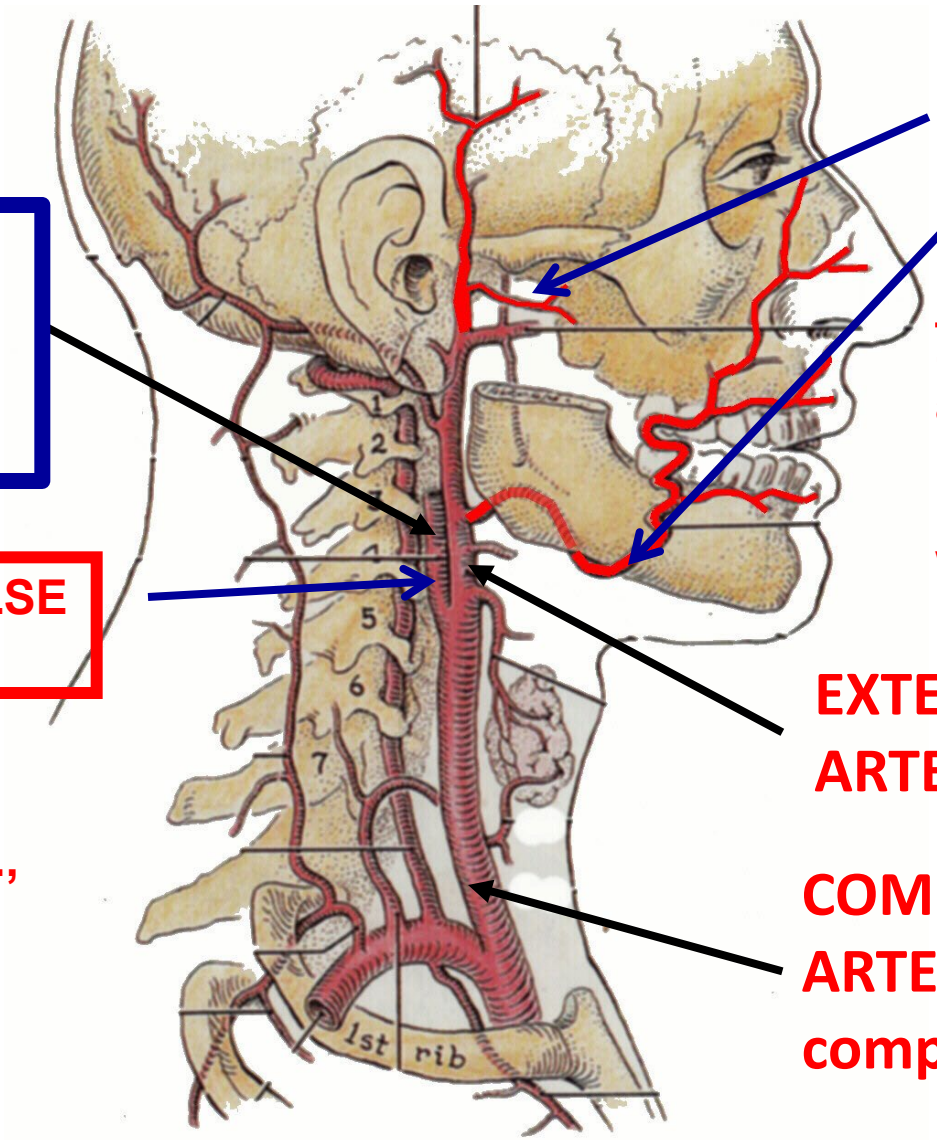
EPIDURAL HEMATOMA

'LENS' SHAPED

ARTERIAL SUPPLY TO FACE: CAROTID ARTERY

SUPERFICIAL TEMPORAL ARTERY

FACE



INTERNAL CAROTID ARTERY

TAKE PULSE HERE

TAKE PULSE HERE

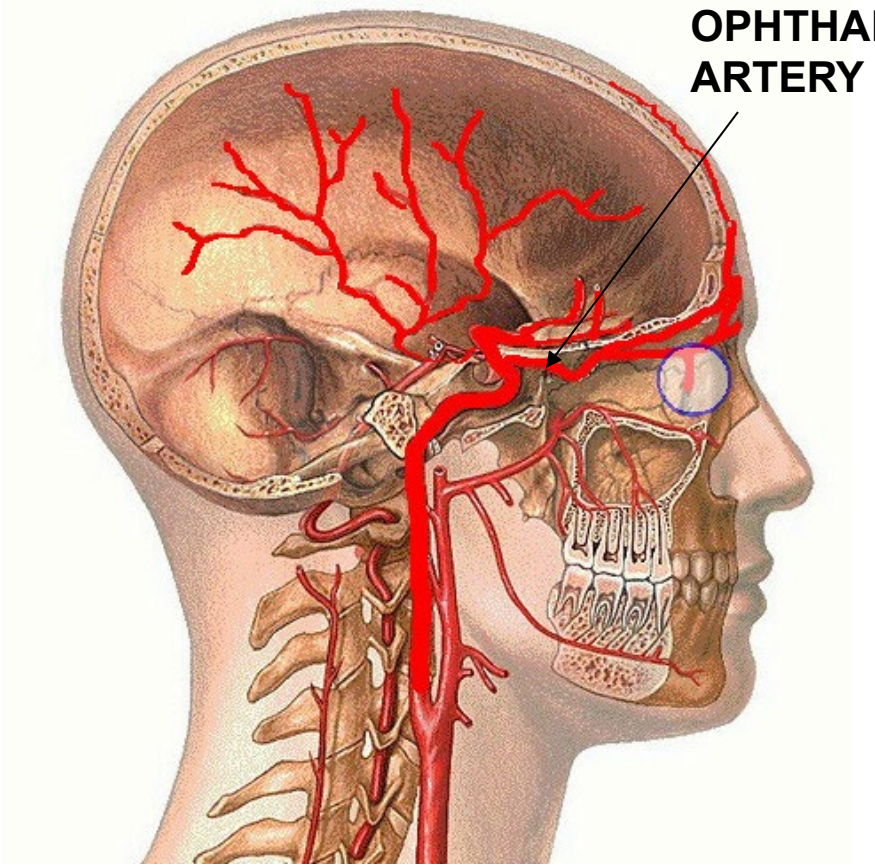
FACIAL ARTERY
- extremely winding and tortuous course (skin moves) – DESCRIPTIVE TERM – wiggle, wiggle, wiggle

EXTERNAL CAROTID ARTERY

COMMON CAROTID ARTERY - can compress at C6

CAROTID = Gk., STUPEFY

INTERNAL CAROTID ARTERY



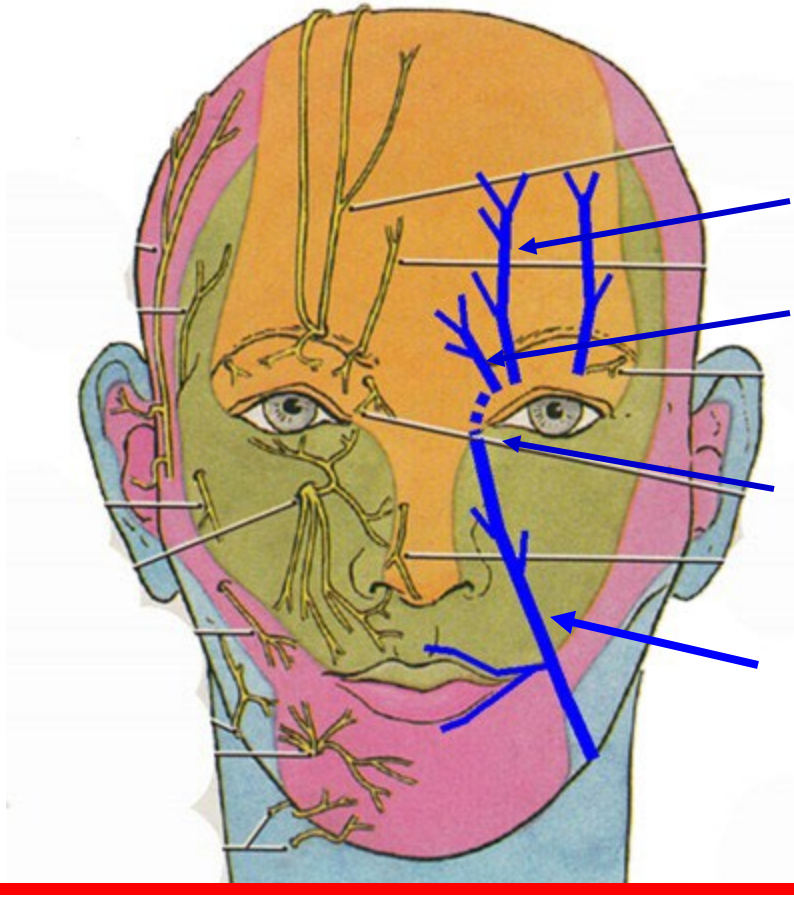
Note: Carotid = Karatikos in Greek = stupor; Named by Galen; Compression causes black out

Enters skull without Branching

Branches to:
A. Brain
B. Ophthalmic Artery-
Major blood supply
To eye (orbit)

Note: Branches of Ophthalmic artery leave orbit to supply Face, Forehead, Nasal cavity

VENOUS DRAINAGE OF FACE - branches follow arteries



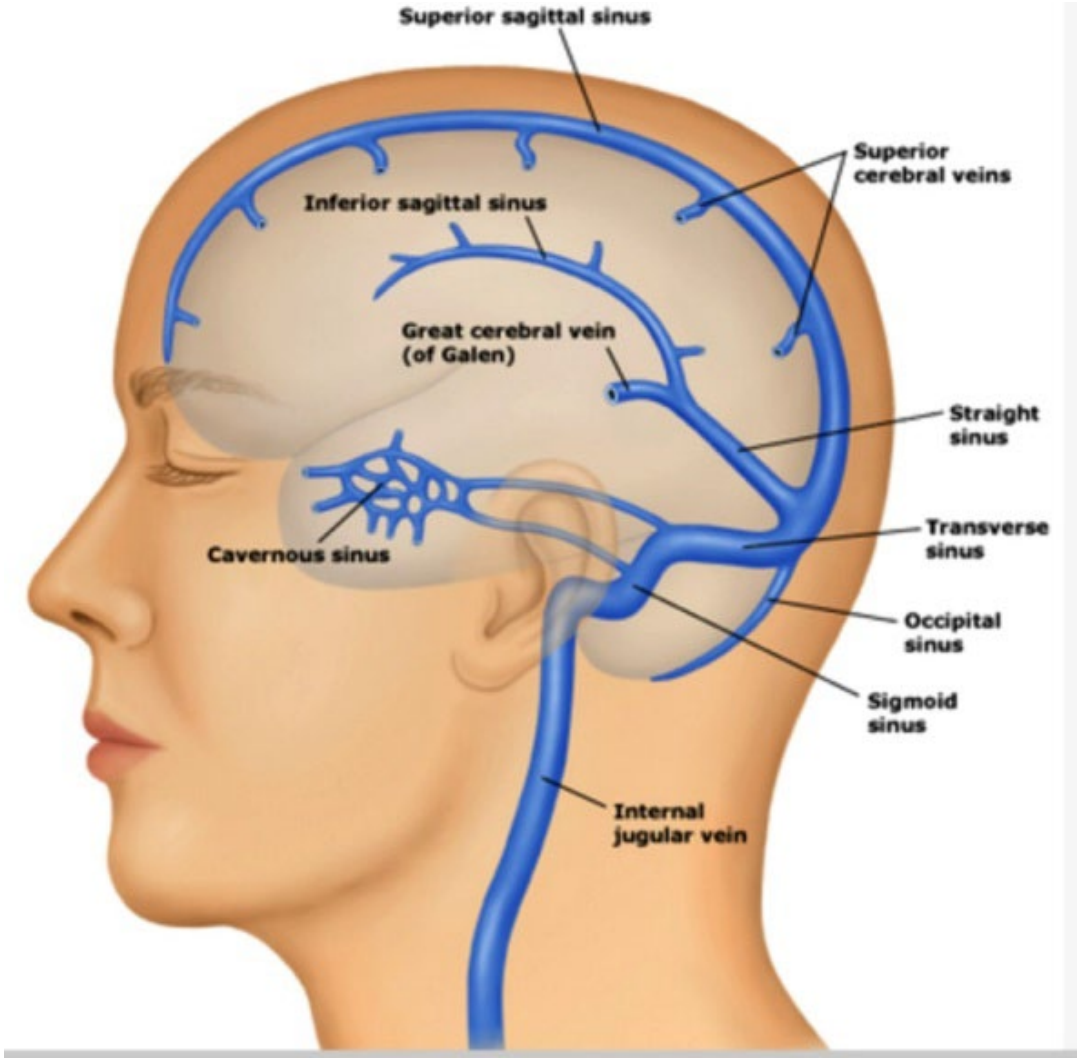
to Ophthalmic veins -
1) Supraorbital Vein
2) Supratrochlear Vein

1) Facial Vein - straight course ANASTOMOSE WITH OPHTHALMIC VEINS

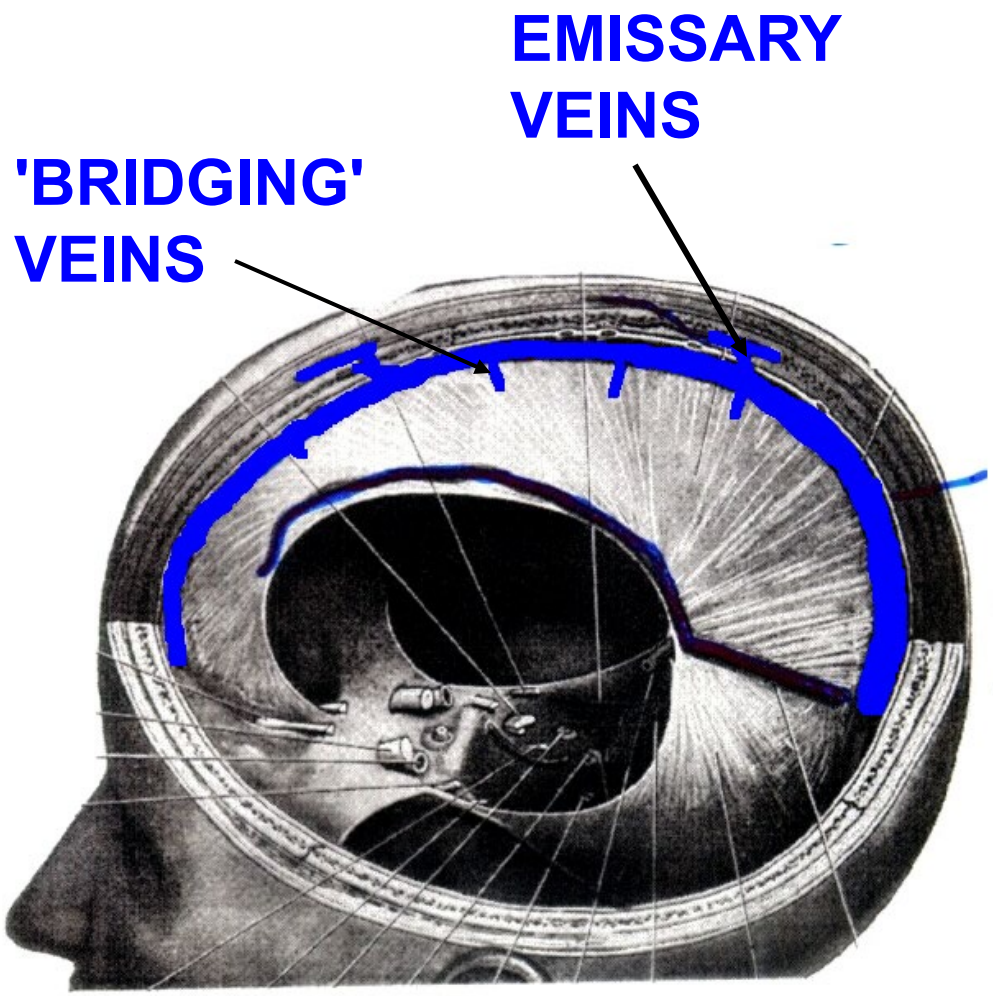
*

- NOTE: Veins of Face have no (OR FEW AND VARIABLE) valves; drain to neck and into skull; Extensive anastomoses between branches of Facial AND Ophthalmic Veins

VENOUS DRAINAGE OF BRAIN IS DIFFERENT - VENOUS SINUSES - inside cranial cavity



III. VENOUS SINUSES – BETWEEN 2 LAYERS OF DURA



Brain removed

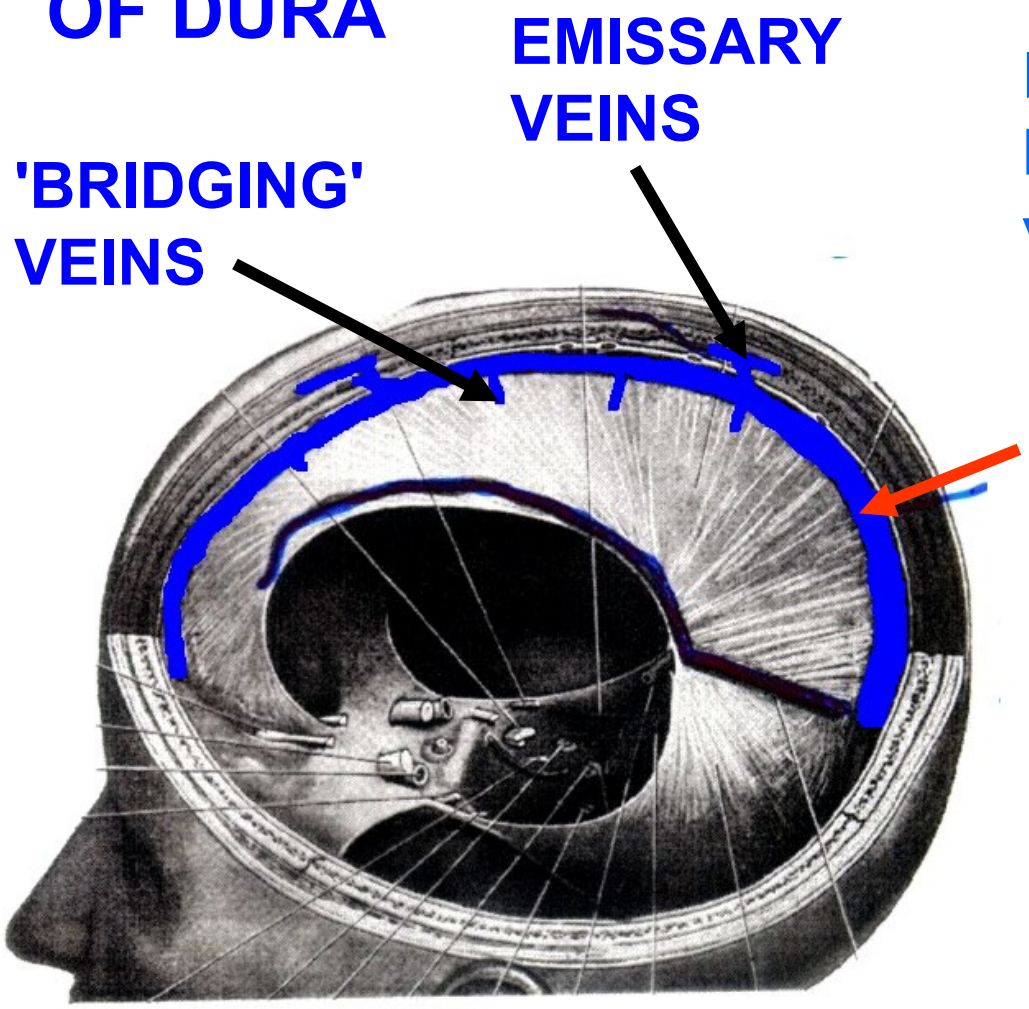
Receive blood from brain, orbit, emissary veins

1. VEINS from brain (inside) -
   a. 'BRIDGING' VEINS - inside cranial cavity - drain blood from surface of brain

   b. named veins - ex. GREAT CEREBRAL VEIN OF GALEN

2. VEINS from outside (ex. scalp)
   a. EMISSARY VEINS - drain blood from scalp, to venous sinuses
   b. named veins - OPHTHALMIC VEINS from eye (orbit)

III. VENOUS SINUSES – BETWEEN 2 LAYERS OF DURA



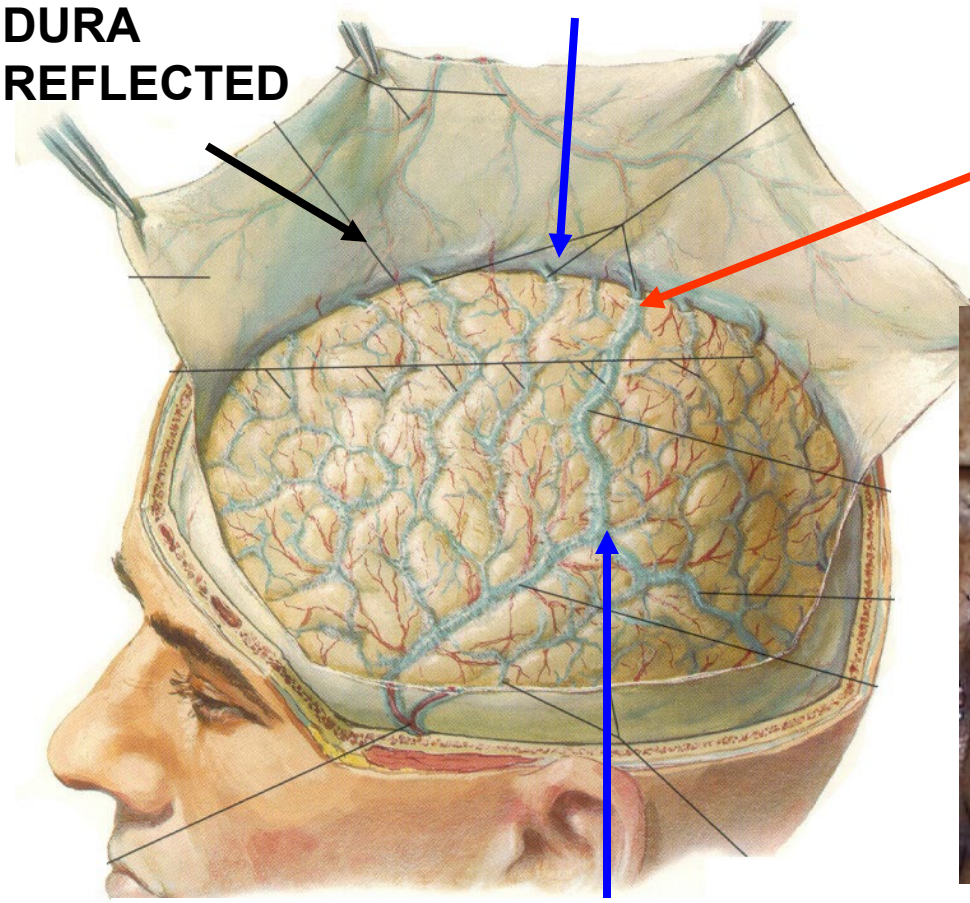
Brain removed

Receive blood from brain, orbit, emissary veins

1. Superior Sagittal Sinus – in upper border of falx cerebri; ant. - foramen cecum; post- transverse sinus; - communicates laterally with venous lacunae; blood from Superior Cerebral veins through 'bridging veins'; blood also from emissary veins

NOTE: Venous sinuses are like large veins – only have endothelial lining

SUPERIOR SAGITTAL SINUS receives blood from Superior Cerebral veins through 'BRIDGING' VEINS



'BRIDGING' VEINS

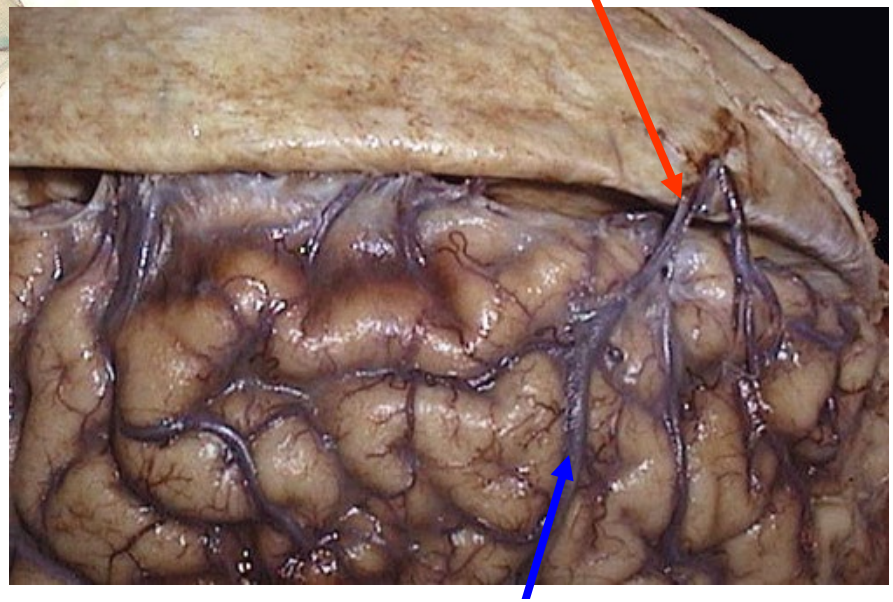
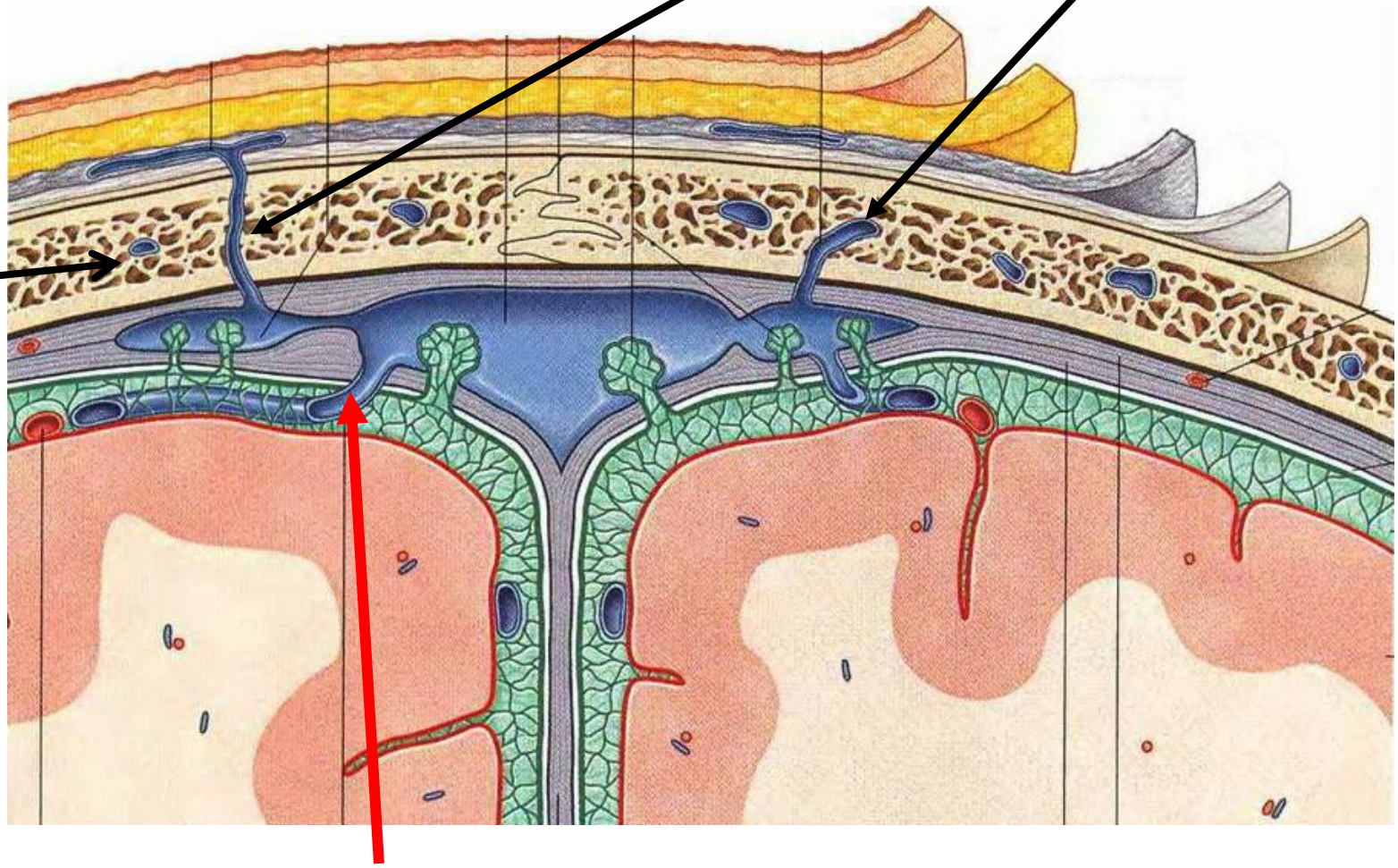


Photo from lecture of Dr. Nancy Norton

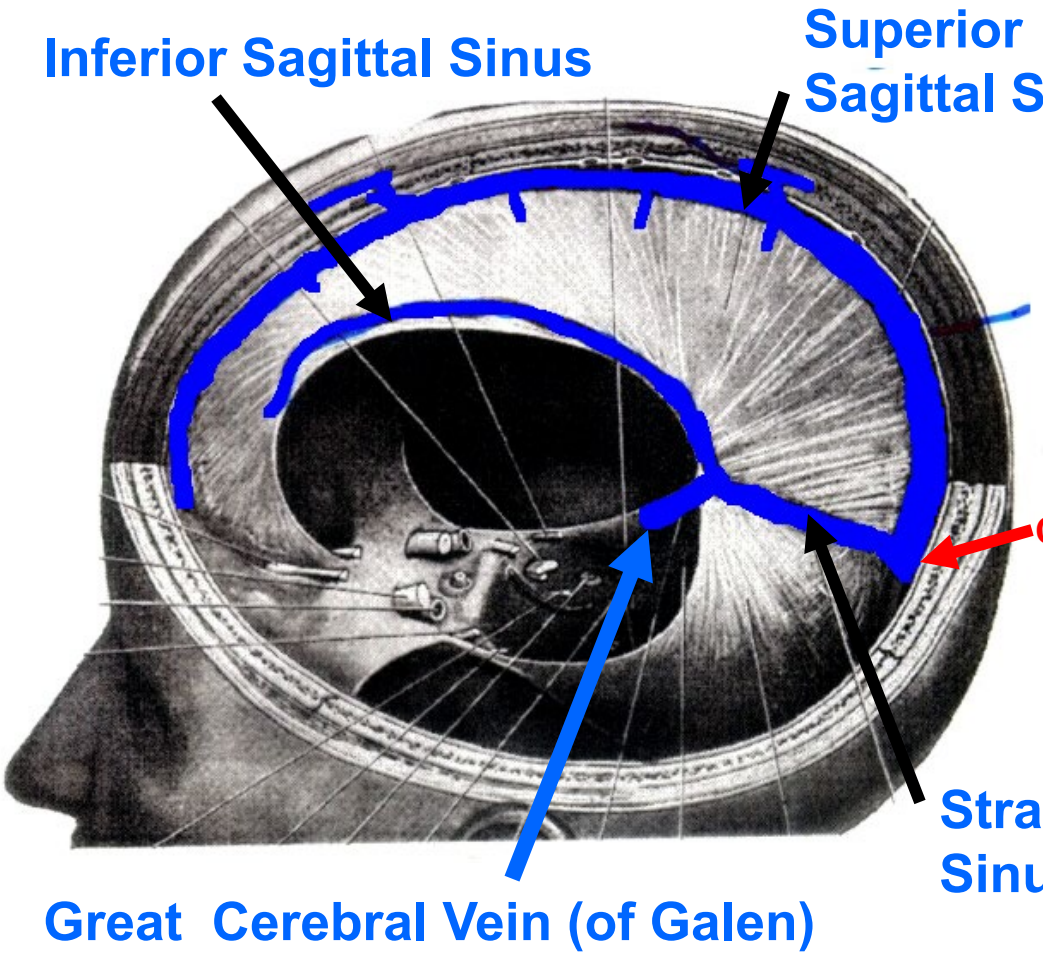
EMISSARY VEINS VS BRIDGING VEINS

EMISSARY VEIN - SCALP TO SINUS, SCALP TO DIPLOE, DIPLOE TO SINUS



BRIDGING VEIN - CEREBRAL VEIN (BRAIN) TO SINUS

VENOUS SINUSES



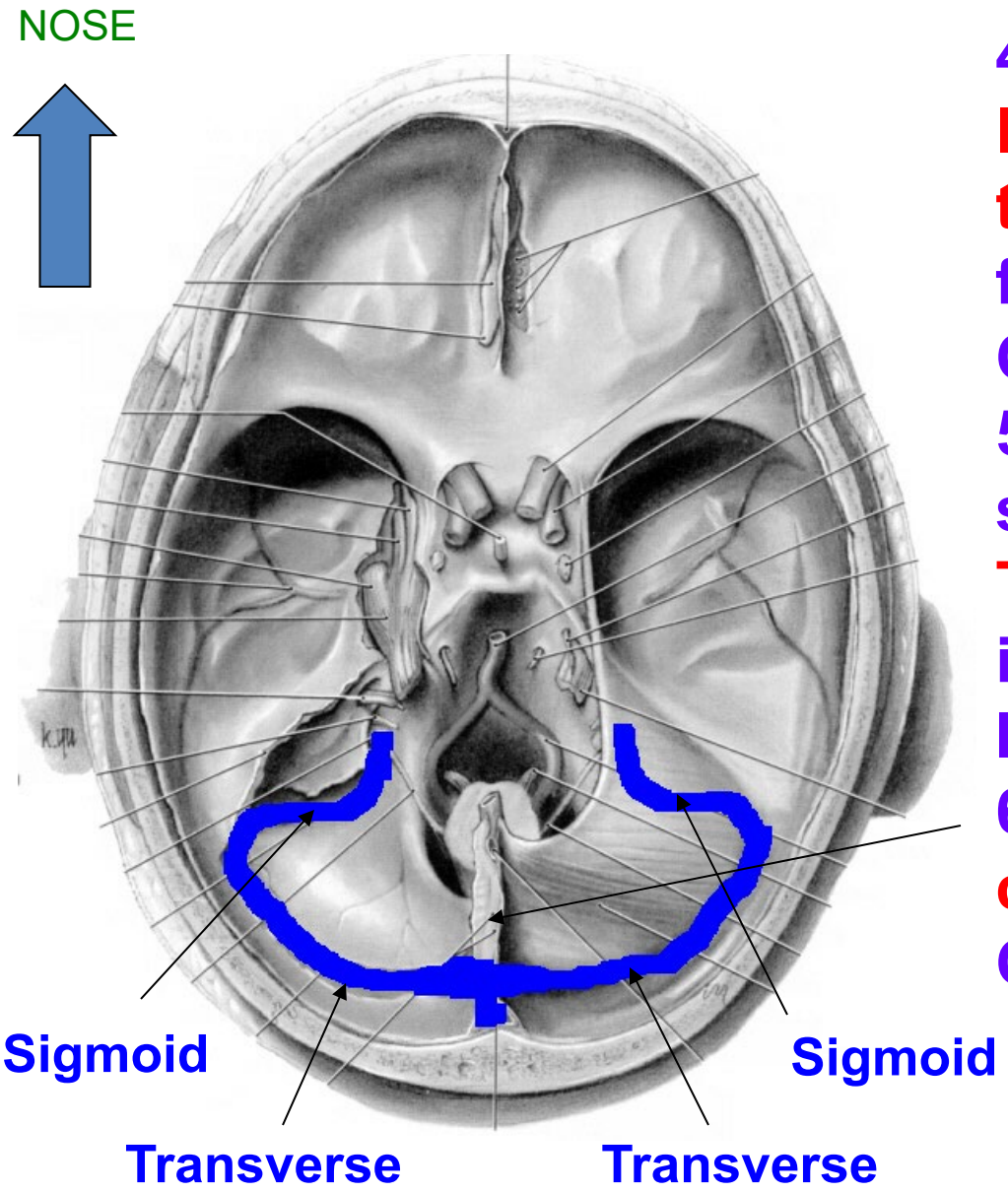
2. Inferior Sagittal Sinus - in lower (free) border of falx cerebri; - joins Great Cerebral V. form Straight Sinus

3. Straight sinus - at junction of falx cerebri and tentorium

NOTE: INFERIOR SAGITTAL SINUS DOES NOT DIRECTLY JOIN SUPERIOR SAGITTAL SINUS **

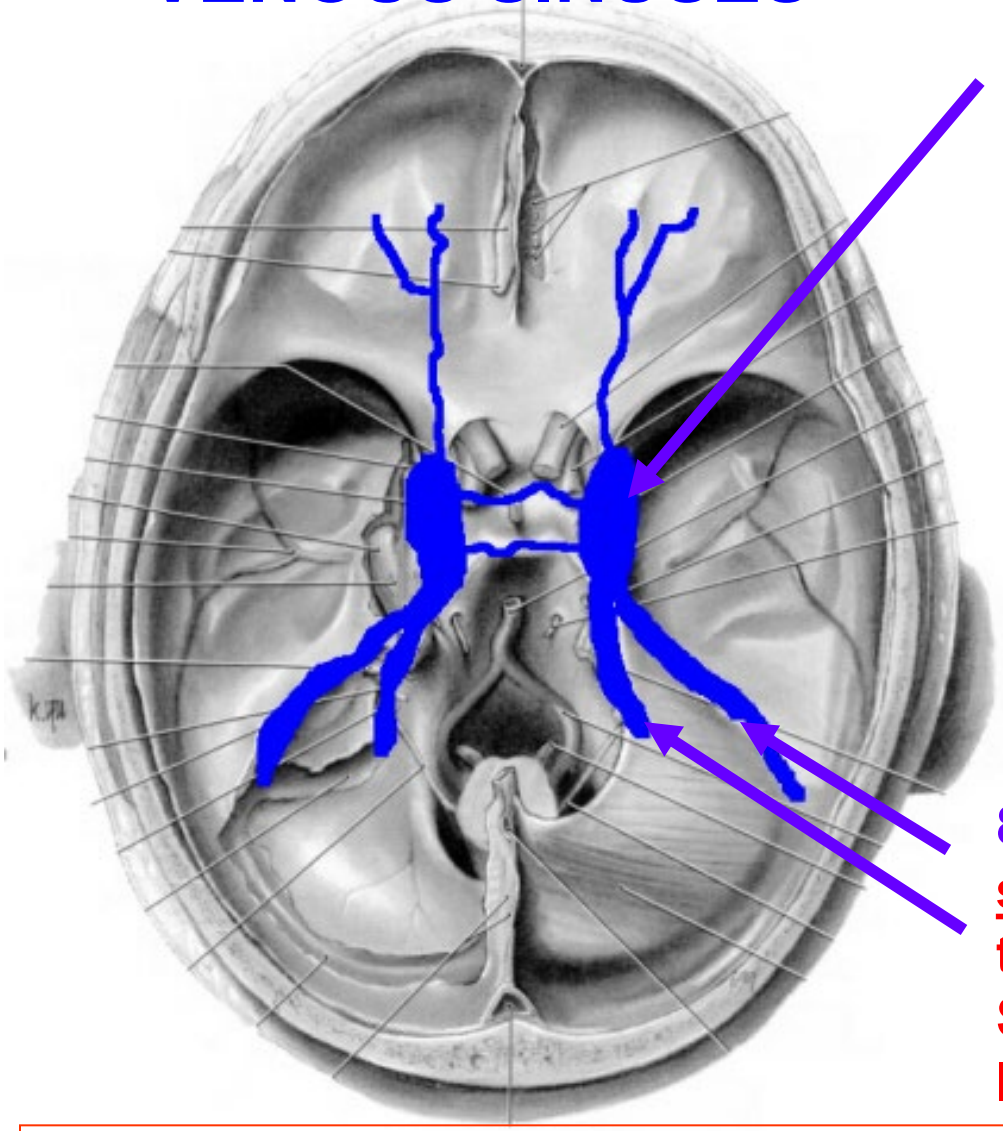
Straight Sinus can join Superior Sagittal Sinus at Confluens of Sinuses or turn left

VENOUS SINUSES



4. Transverse sinuses - in lateral fixed part of tentorium; receives blood from Sup. Sagittal or Confluens
5. Sigmoid sinuses - S-shaped continuation of Transverse; end in Jugular Foramen; form Internal Jugular Vein
6. Occipital Sinus - in Falx cerebelli; drain to Confluens

VENOUS SINUSES



7. Cavernous sinuses - in middle cranial fossa; on side of the body of the sphenoid bone; connected by Intercavernous sinus; receive blood from Sup. and Inf. Ophthalmic veins, Cerebral veins; drain to Sup. and Inf. Petrosal sinuses

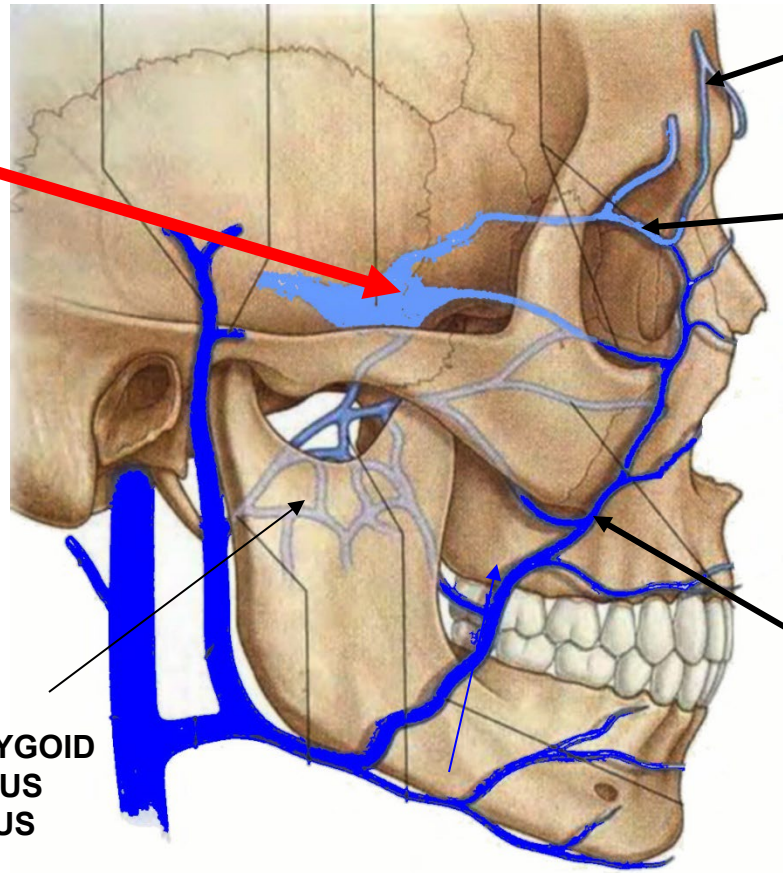
8. Sup. and Inf. Petrosal sinuses - on petrous part of temporal bone
Sup. drains to Transverse
Inf. Drains to Internal Jugular

Infection can spread from Face to Cavernous sinus via anastomoses of Ophthalmic veins and Facial veins

SPREAD OF INFECTION FROM FACE TO BRAIN

CAVERNOUS SINUS

Anastomoses of Facial and Ophthalmic Veins
- Ophthalmic veins drain to cavernous sinus (venous sinus inside skull)



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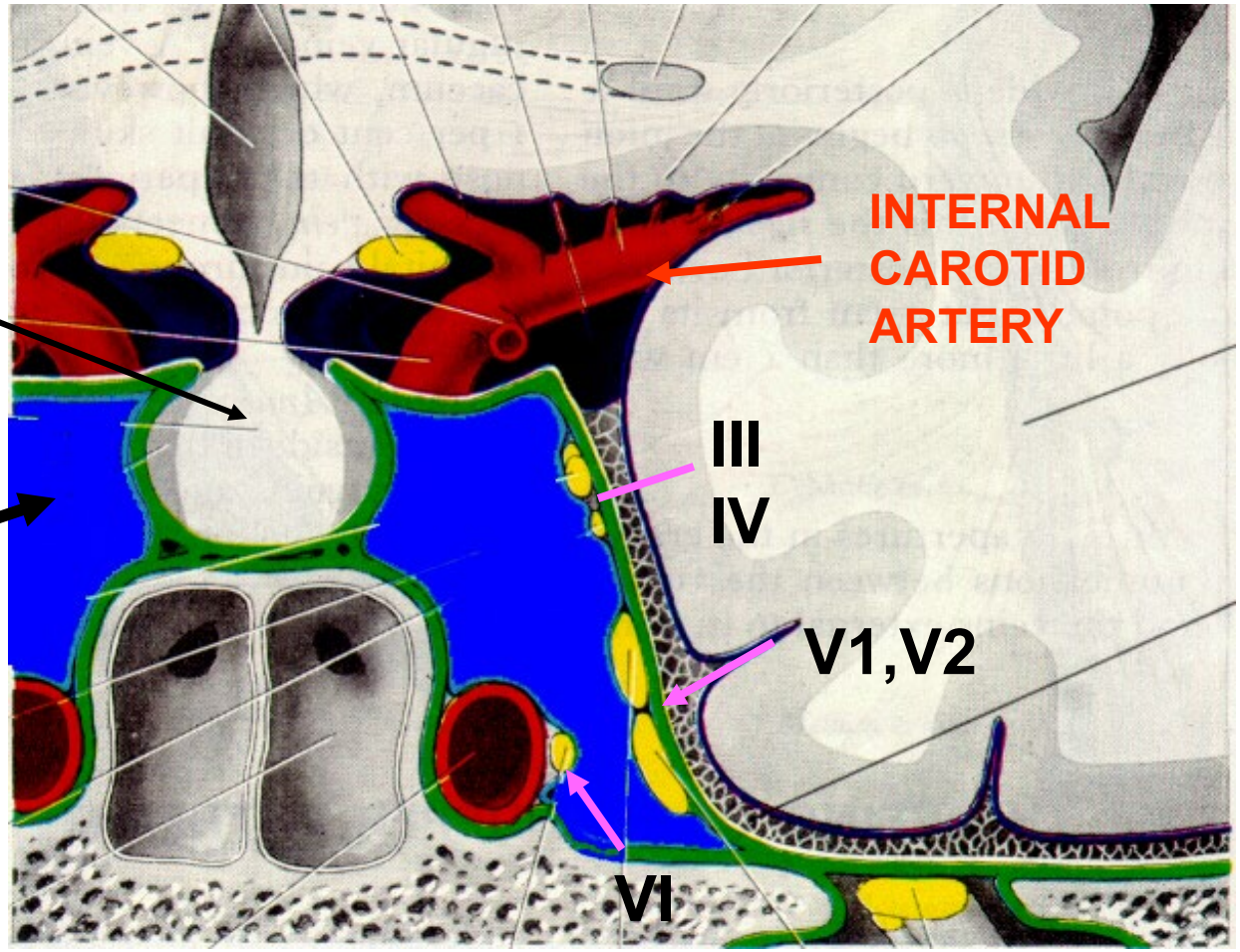
- Prolonged infections spread via veins (pressure low, no valves)
- Pass through orbit to Cavernous Sinus - CAVERNOUS SINUS THROMBOSIS; infections lateral to nose particularly dangerous
- Clinical sign: 'Blurred' vision (actually DIPLOPIA) (cranial nerves to eye muscles pass through Cavernous sinus)

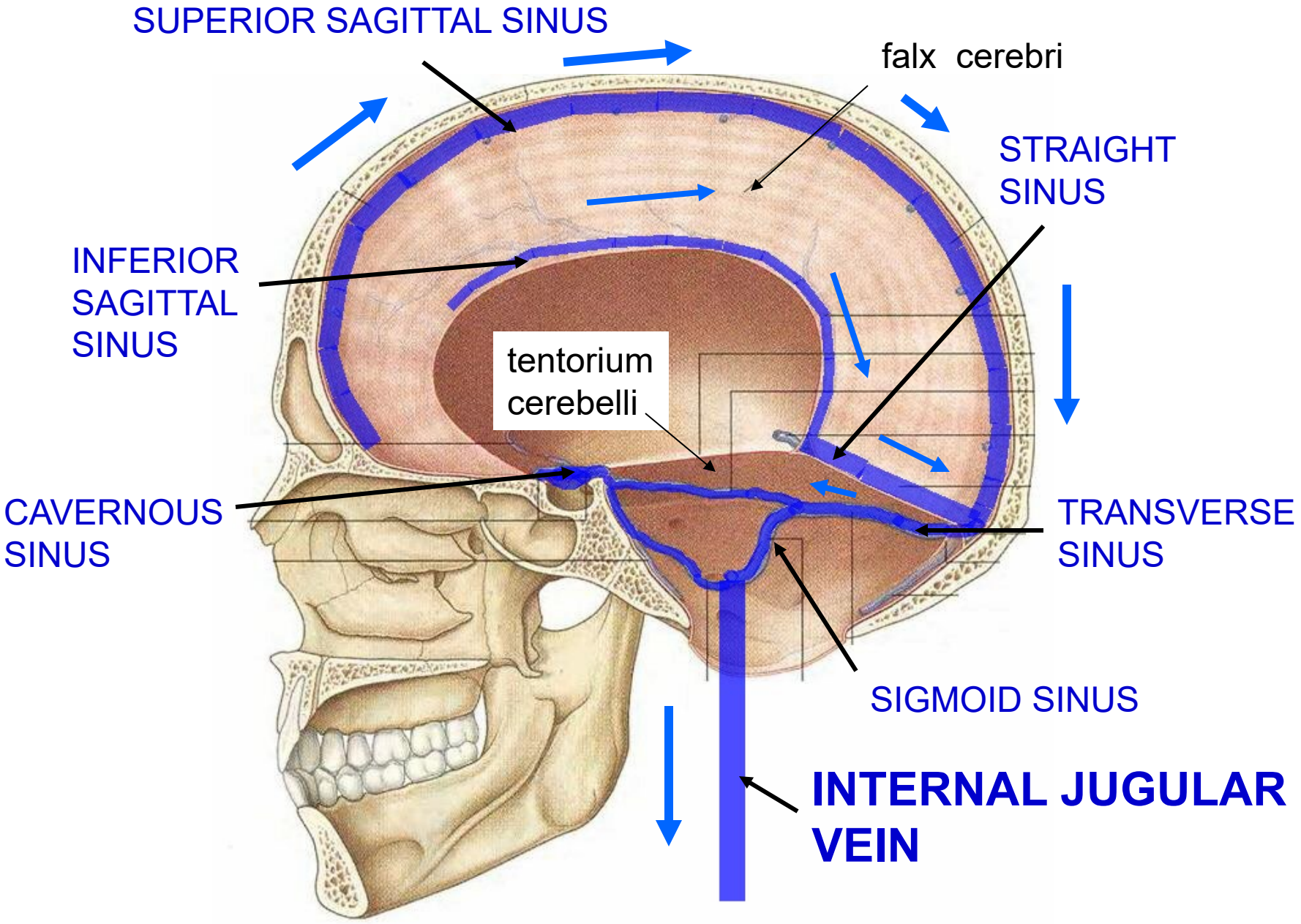
NERVES TO EYE MUSCLES PASS IN WALL OF CAVERNOUS SINUS

STRUCTURES PASSING THROUGH WALL OF CAVERNOUS SINUS - Int. Carotid A., Cranial N.'s III, IV, V1, V2, VI;
Clinical sign of Infection in Sinus – 'BLURRED' VISION (Diplopia)

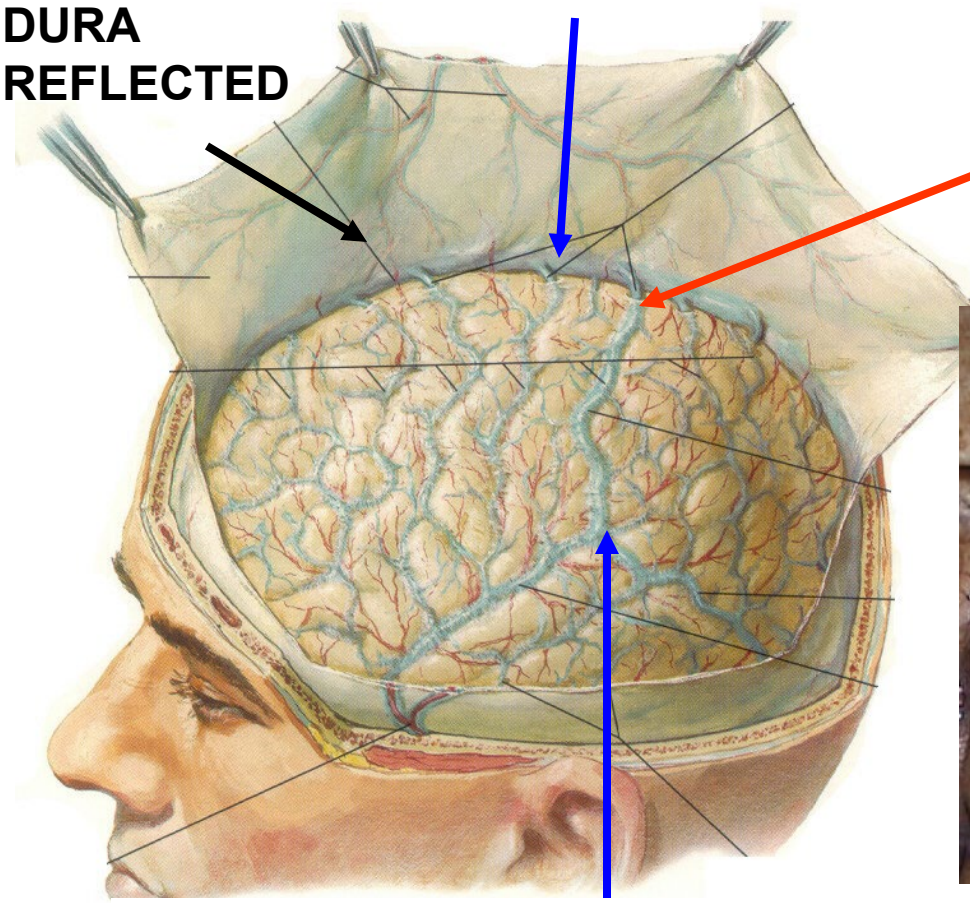


CN III, IV, VI – EYE MOVEMENTS

VENOUS SINUSES OF BRAIN



SUPERIOR SAGITTAL SINUS receives blood from Superior Cerebral veins through 'BRIDGING' VEINS



'BRIDGING' VEINS

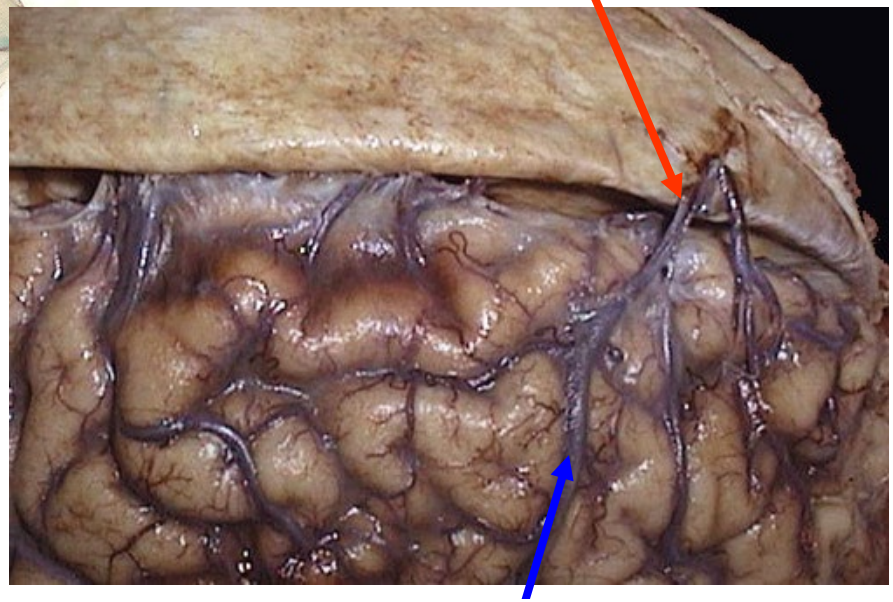
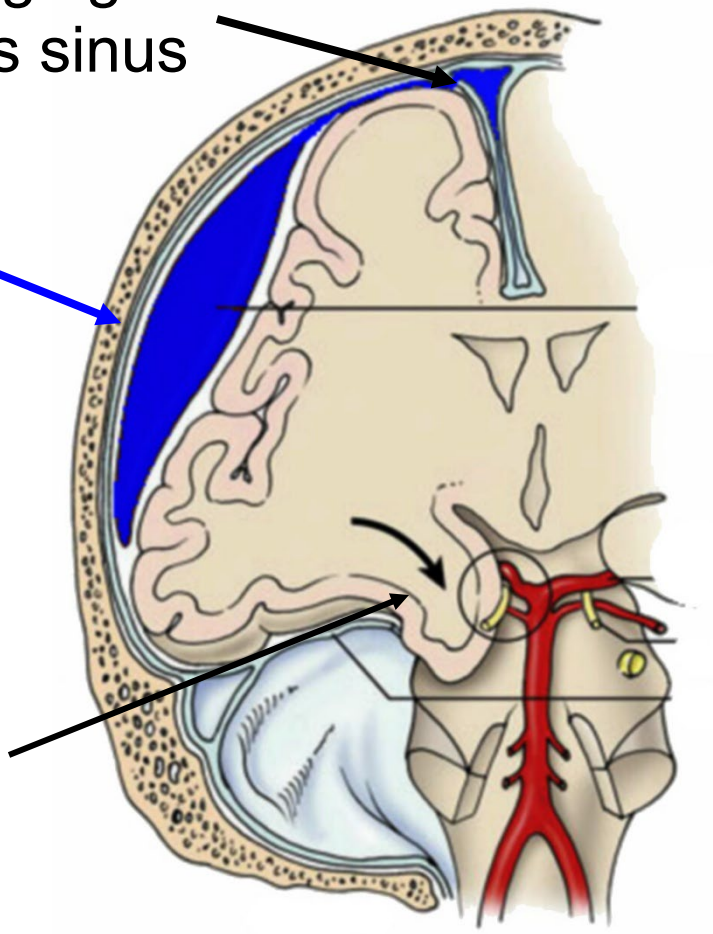


Photo from lecture of Dr. Nancy Norton

SUBDURAL HEMATOMA

Tear 'bridging' vein
or venous sinus

Crescent shaped hematoma on CT/MRI



Herniation of uncus (L. hook) of temporal lobe through Tentorial notch

SUBDURAL HEMATOMA - TABLE 5 - 2025

SUBDURAL HEMATOMA – **

1) VENOUS – often BRIDGING VEIN

2) CRESCENT SHAPED MASS

3) SLOW

Clinical: bleeding slow (venous); Chronic Subdural Hematomas can remain undetected; can result in herniation if untreated

CAVERNOUS SINUS SYNDROME

SPREAD OF INFECTION TO CAVERNOUS SINUS

CAUSES

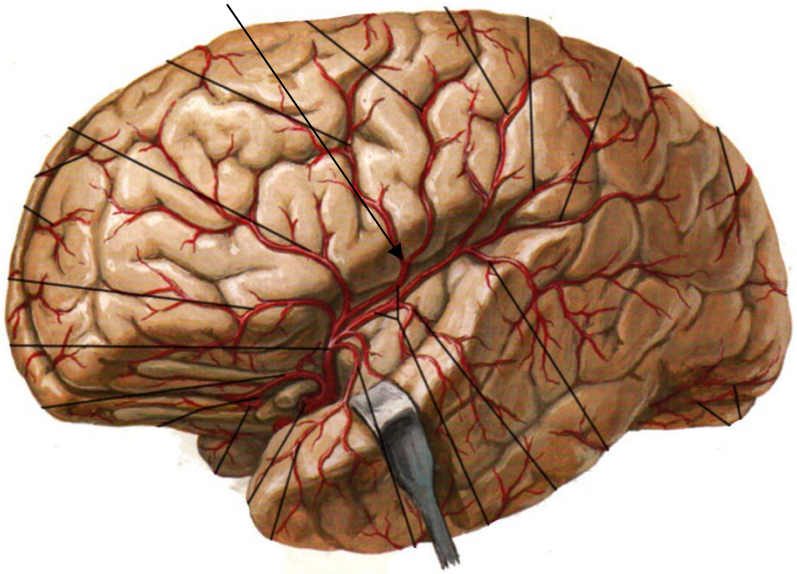
1) an aneurysm of the internal carotid artery in the cavernous sinus,
2) infection or venous thrombus (blood clot) in cavernous sinus, or by
3) pituitary tumor encroaching into sinus.

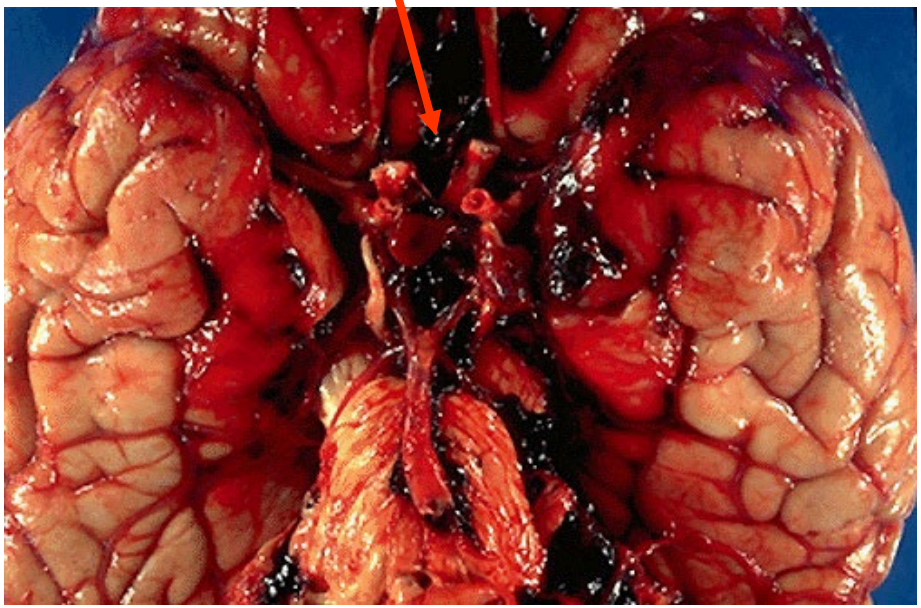
NERVES EFFECTED

III, IV, V1, V2, and VI and Sympathetic fibers to orbit (travel on Internal Carotid)

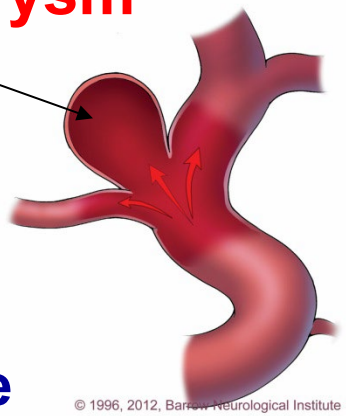
C. SUBARACHNOID HEMATOMA

Cerebral artery





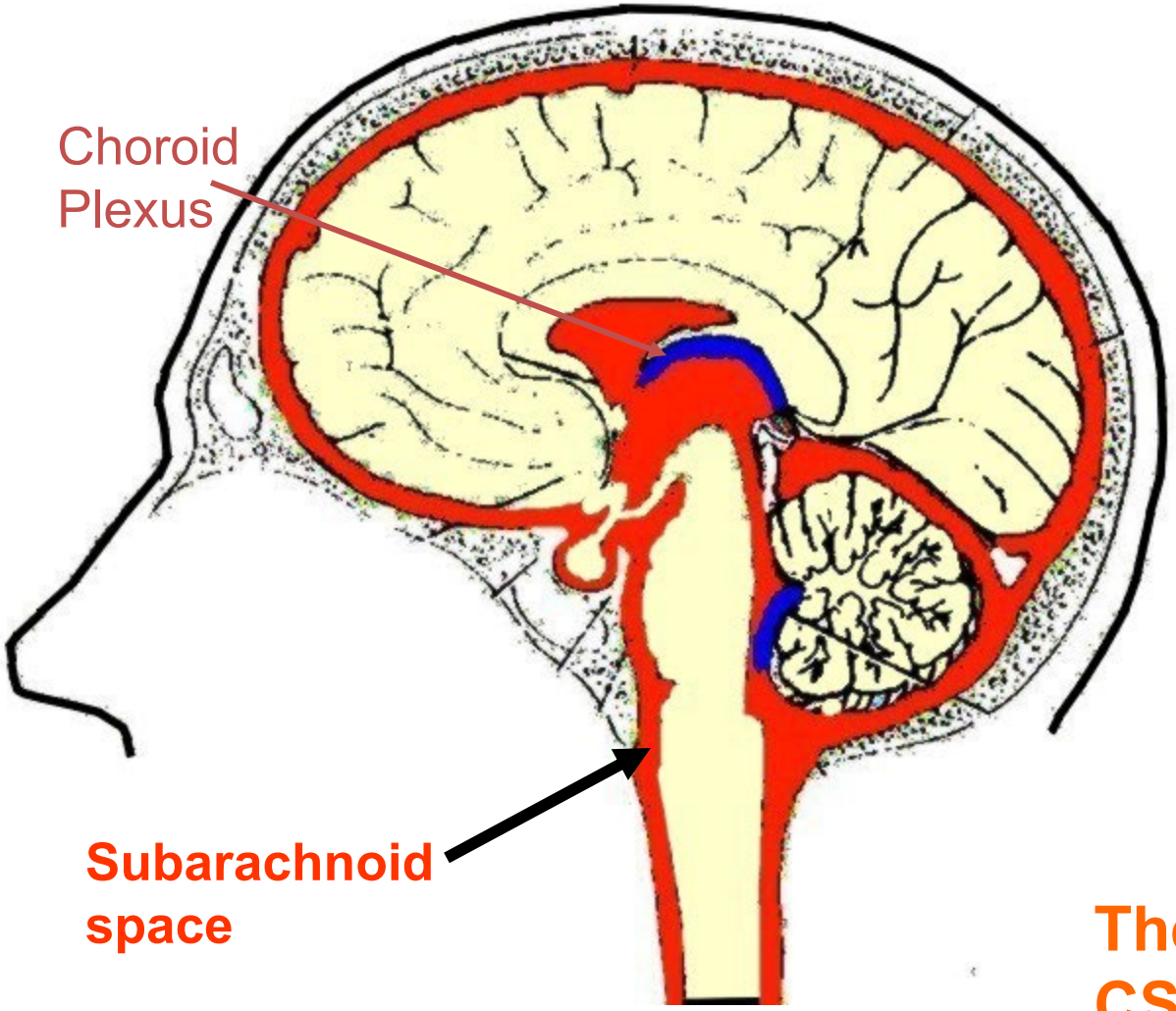
Berry aneurysm



Tearing cerebral artery or aneurysm (ex, berry aneurysma = swelling of vessel wall) or cerebral vein; If arterial can be rapid and fatal

Thunderclap headache - Worst headache of my life
Sudden death 12%; 30 day mortality 45% (reported)

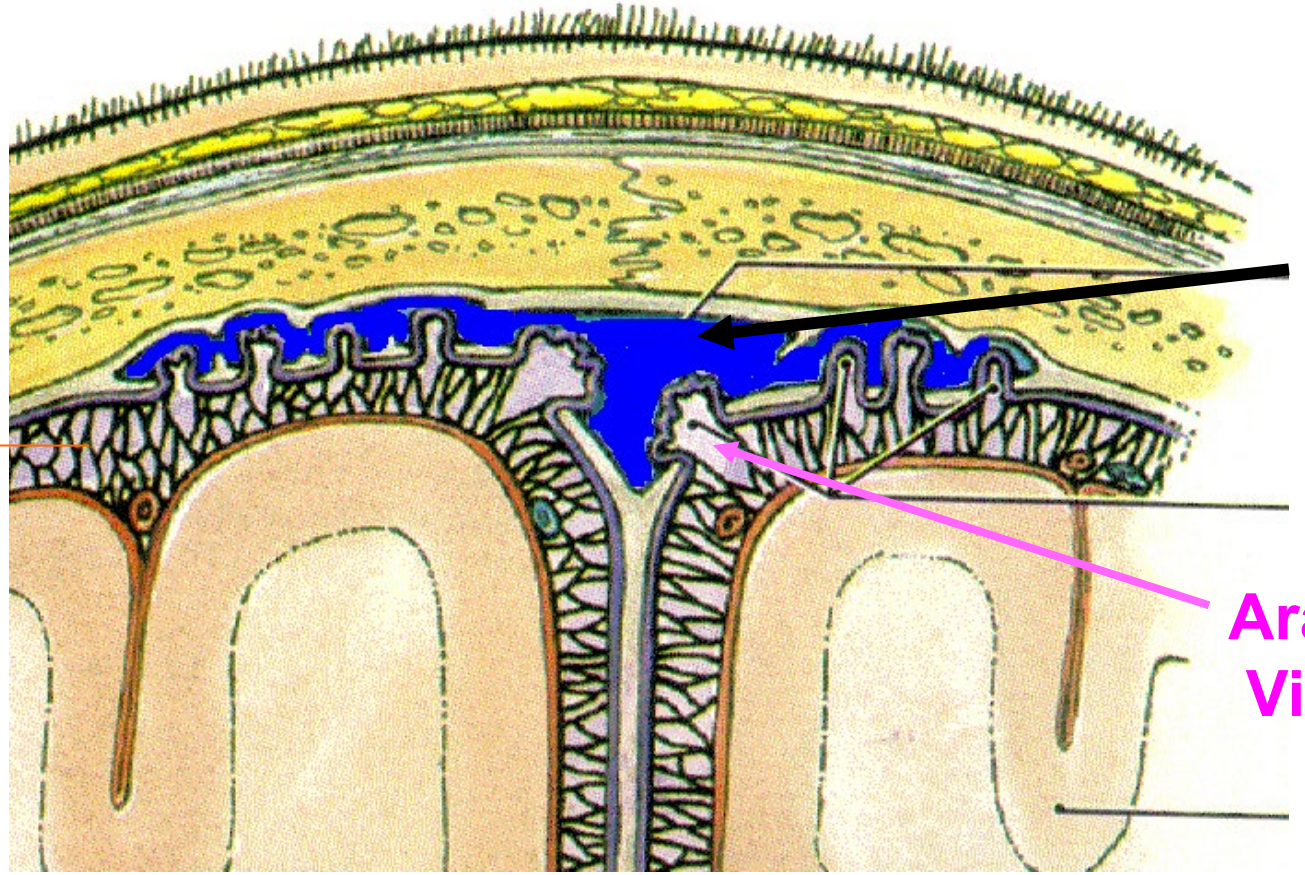
IV. CEREBRO-SPINAL FLUID (CSF)



made inside brain in Choroid Plexus; flows out of brain to Subarachnoid Space

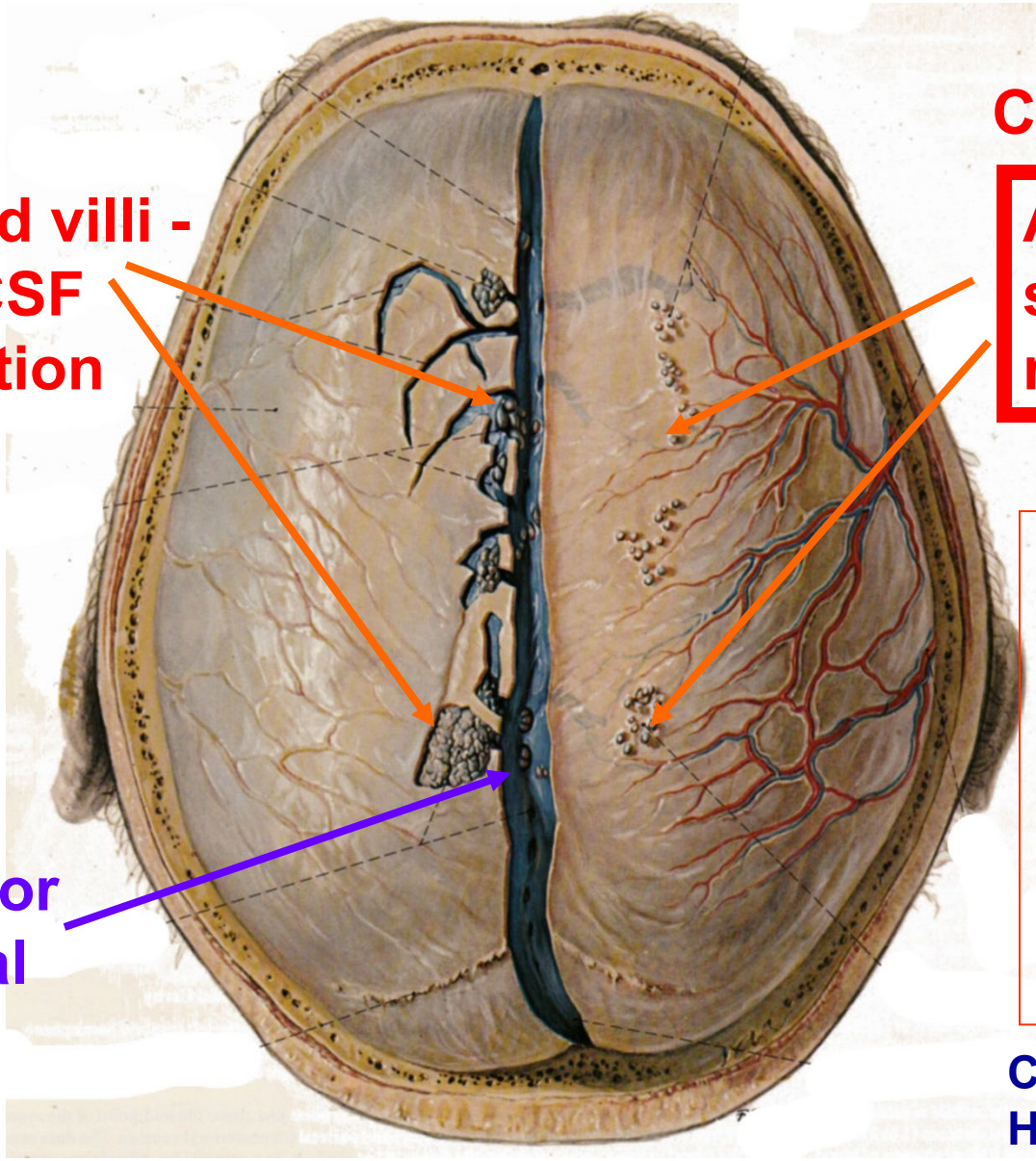
The brain floats in CSF - Shock Absorber

CSF REABSORBED INTO VENOUS SINUSES



CSF reabsorbs into venous sinuses at Arachnoid Villi; - In elderly arachnoid villi can become calcified- Arachnoid Granulations; Reduced Re-Absorption can produce Communicating Hydrocephalus **

CSF REABSORBED INTO VENOUS SINUSES



Arachnoid villi - sites of CSF reabsorption

Superior Sagittal Sinus

CLINICAL **

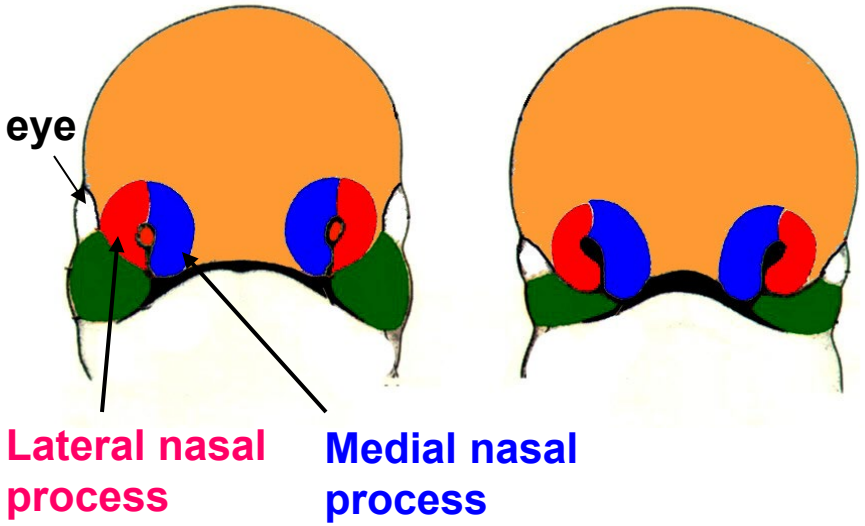
Arachnoid villi - sites of CSF reabsorption

Calcification of Arachnoid Villi is common in elderly; can cause hydrocephalus due to decreased reabsorption of CSF

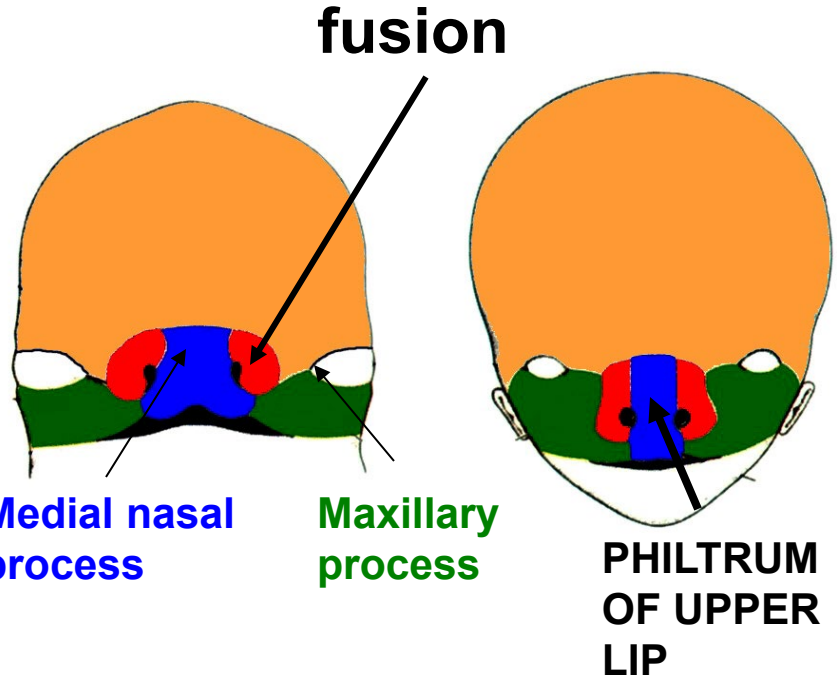
COMMUNICATING HYDROCEPHALUS

DEVELOPMENT OF FACE

2. Medial and Lateral Nasal Processes - form at margins of nasal placodes



3. Medial nasal process and Maxillary Process - fuse to form upper lip



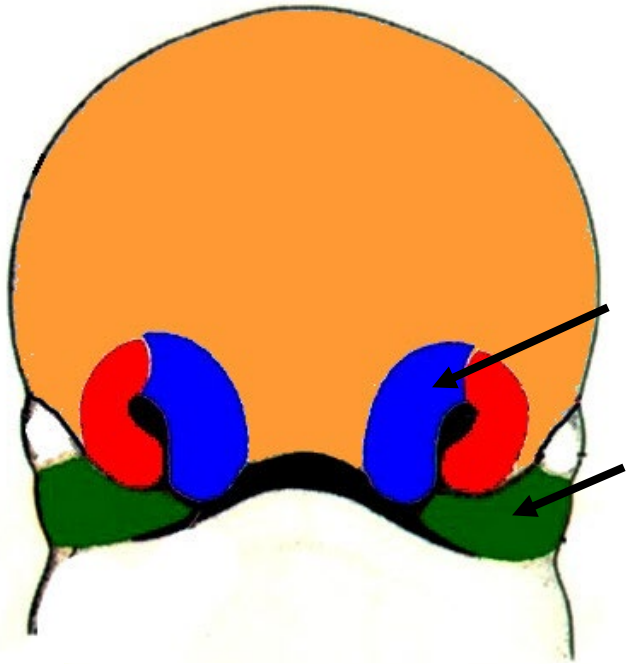
Terminology: process = prominence

Weeks 10-12

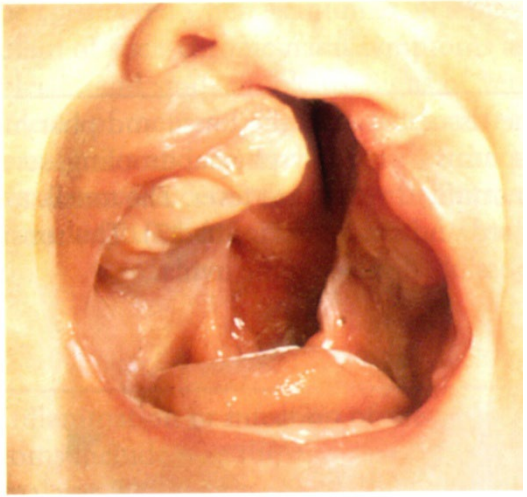
CLEFT LIP = CHEILOSCHISIS

*

– failure of fusion of Medial Nasal Process and Maxillary process



- 1/1000 Births, can be unilateral or bilateral
- At philtrum of lip

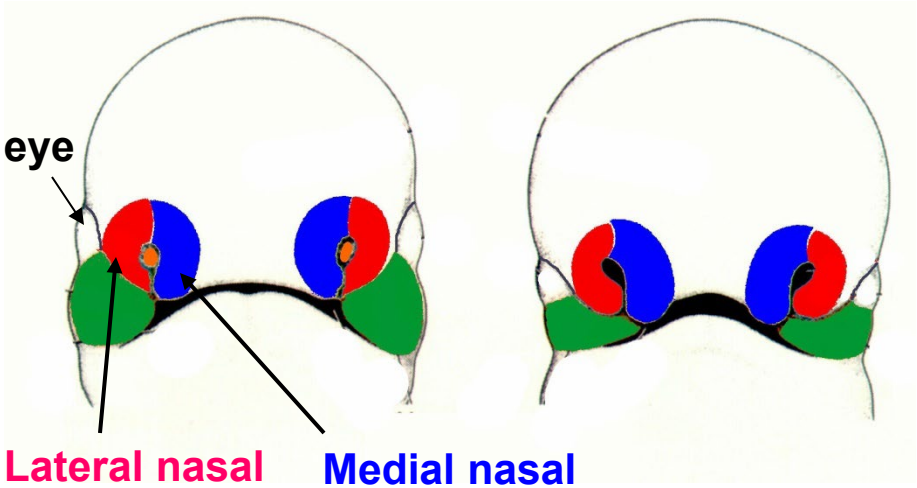


CLEFT LIP (cheiloschisis) CAN OCCUR IN COMBINATION WITH CLEFT PALATE (palatoschisis)

Gk. Cheilos, Lip;
Pronounce - KAI-LOS'-KESIS

DEVELOPMENT OF FACE

2. Medial and Lateral Nasal Processes – form at margins of nasal placodes



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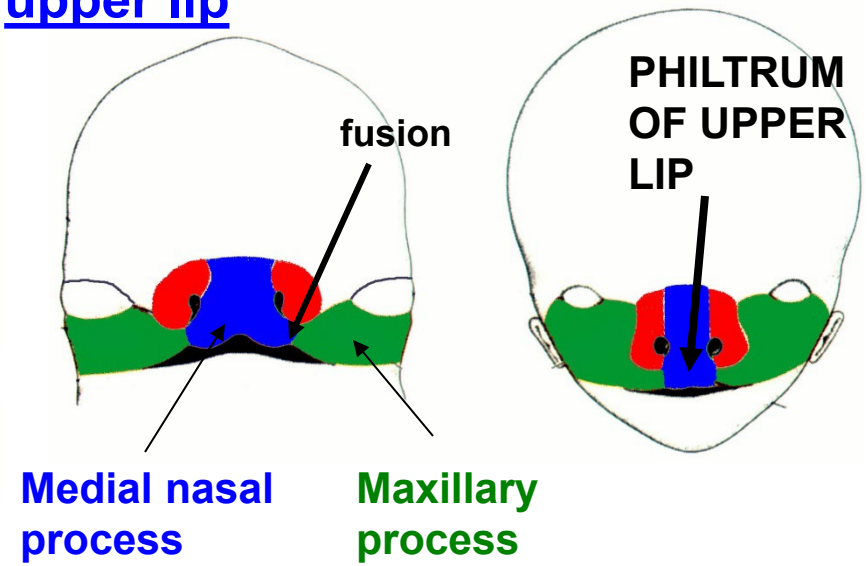
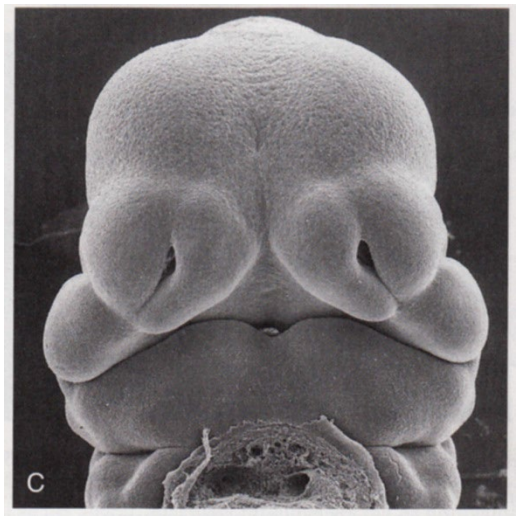


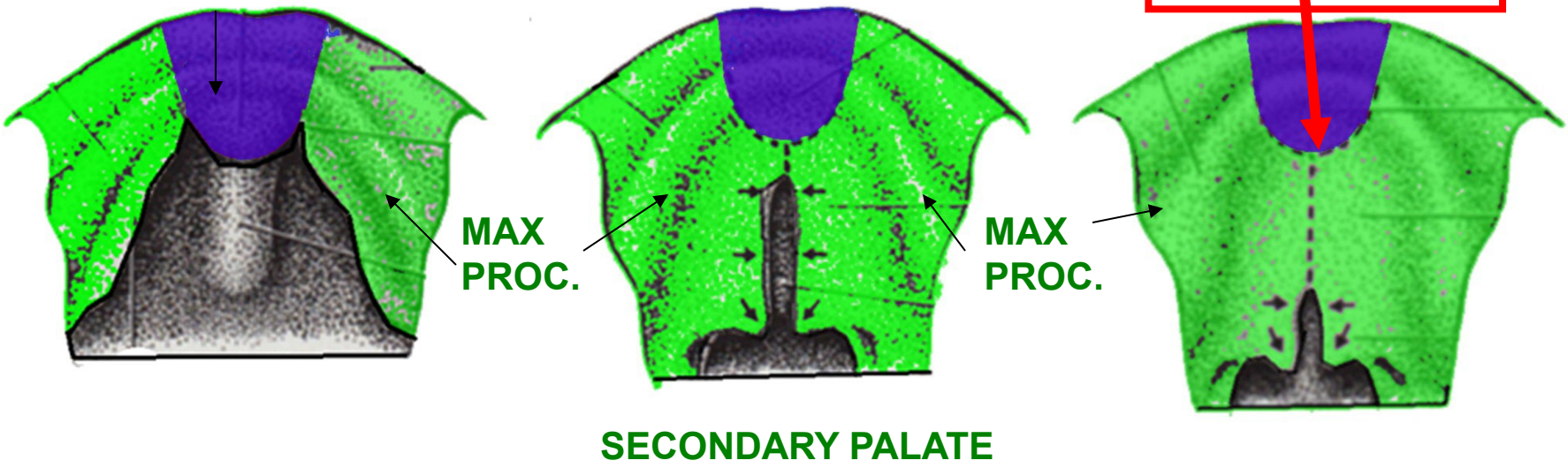


A. PALATE DEVELOPMENT

a. Primary Palate – Anterior to Incisive Foramen formed by union Medial Nasal Processes

LANDMARK *

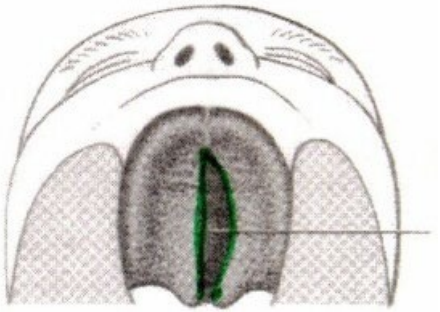
INCISIVE FORAMEN



b. Secondary Palate – Posterior to Incisive Foramen- formed by fusion of Maxillary processes

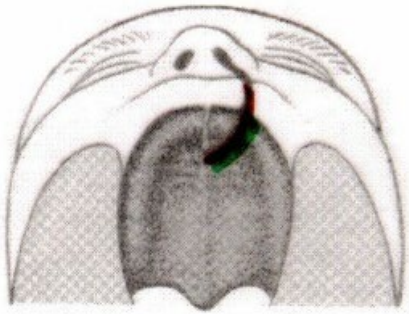
MALFORMATIONS: CLEFT PALATE

2) Posterior Cleft Palate - Not fuse Secondary palate (not fuse Maxillary Processes each side) *



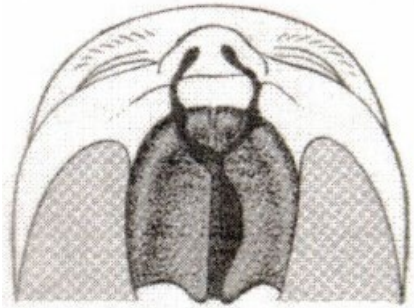
1:2500 births

1) Anterior Cleft Palate - Not fuse Medial Nasal Process and Maxillary Process *



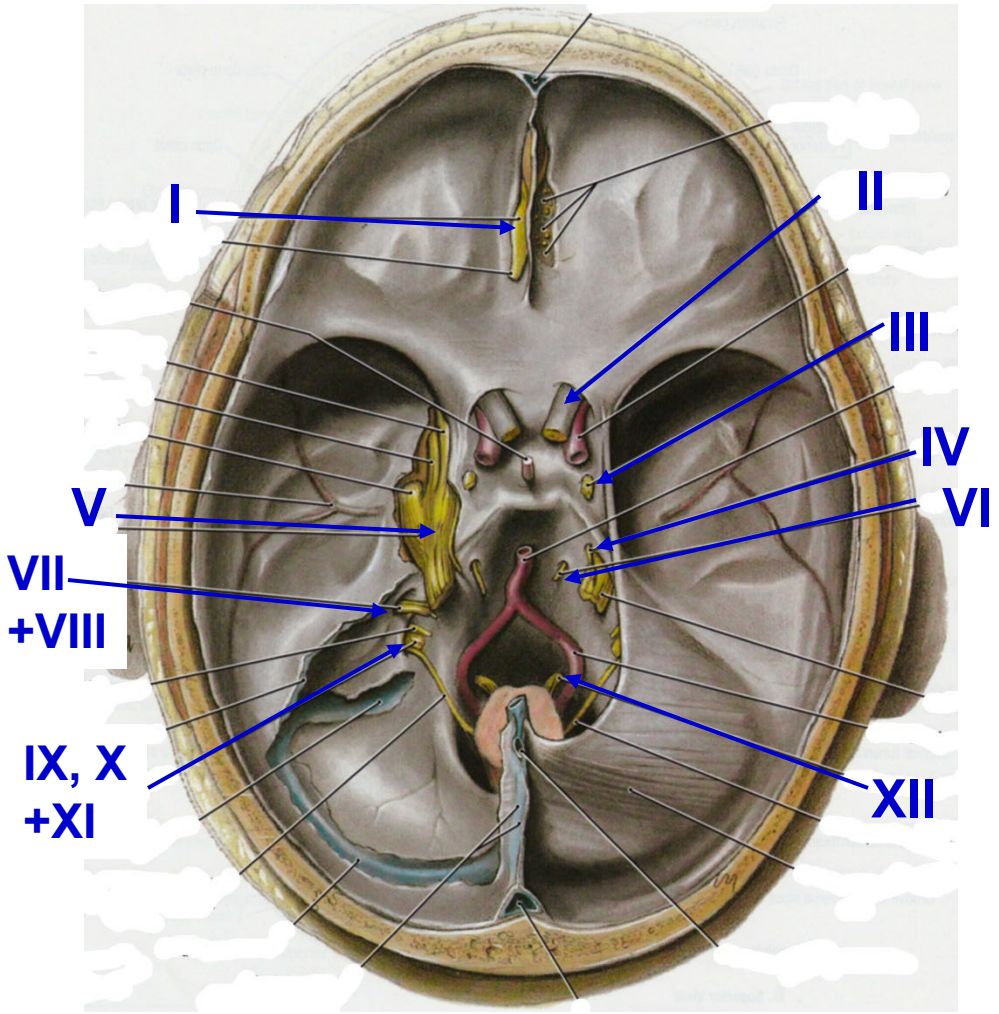
1:1000 Births

Can be unilateral or bilateral



Note: Ant. Cleft Palate is same as Cleft Lip

LEARN NAMES AND NUMBERS OF CRANIAL NERVES



I. OLFACTORY - sense of smell
II. OPTIC - vision
III. OCULOMOTOR - eye movement
IV. TROCHLEAR - eye movement
V. TRIGEMINAL - touch, general sensation to skin, oral cavity, nasal cavity + more
VI. ABDUCENS - eye movement
VII. FACIAL - muscles of facial expression + lots more
VIII. VESTIBULO-COCHLEAR - hearing and balance
IX. GLOSSOPHARYNGEAL - sensory to pharynx +more
X. VAGUS - larynx, pharynx + rest of body
XI. ACCESSORY - sternocleidomastoid, trapezius
XII. HYPOGLOSSAL - muscles of tongue