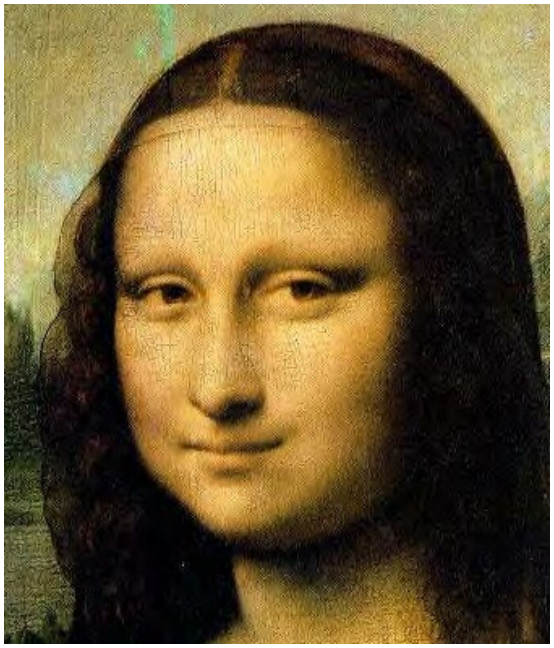
FACE: 2025

Mona Lisa's Face



FACE IS UNIQUE - skin of face is thin and moveable

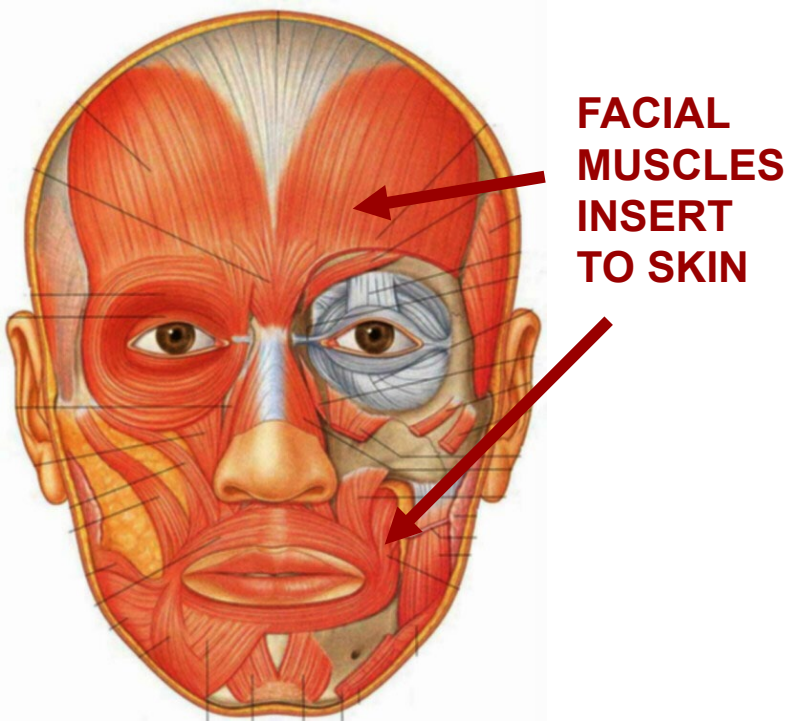
'Window of the soul' - Face has moveable skin for facial expression

Mona Lisa's Hands

Facial Paralysis - Bell's Palsy - face disfigures

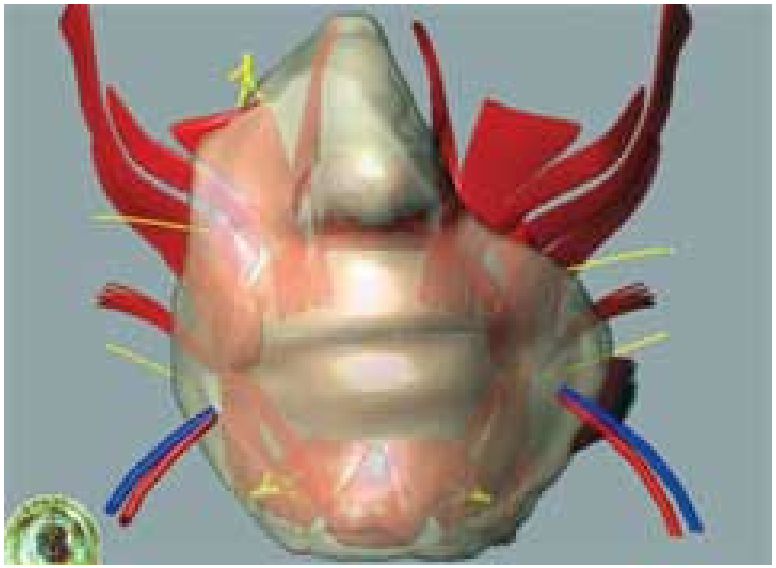
OVERVIEW OF FACIAL MUSCLES

FACIAL MUSCLES HAVE UNIQUE PROPERTIES



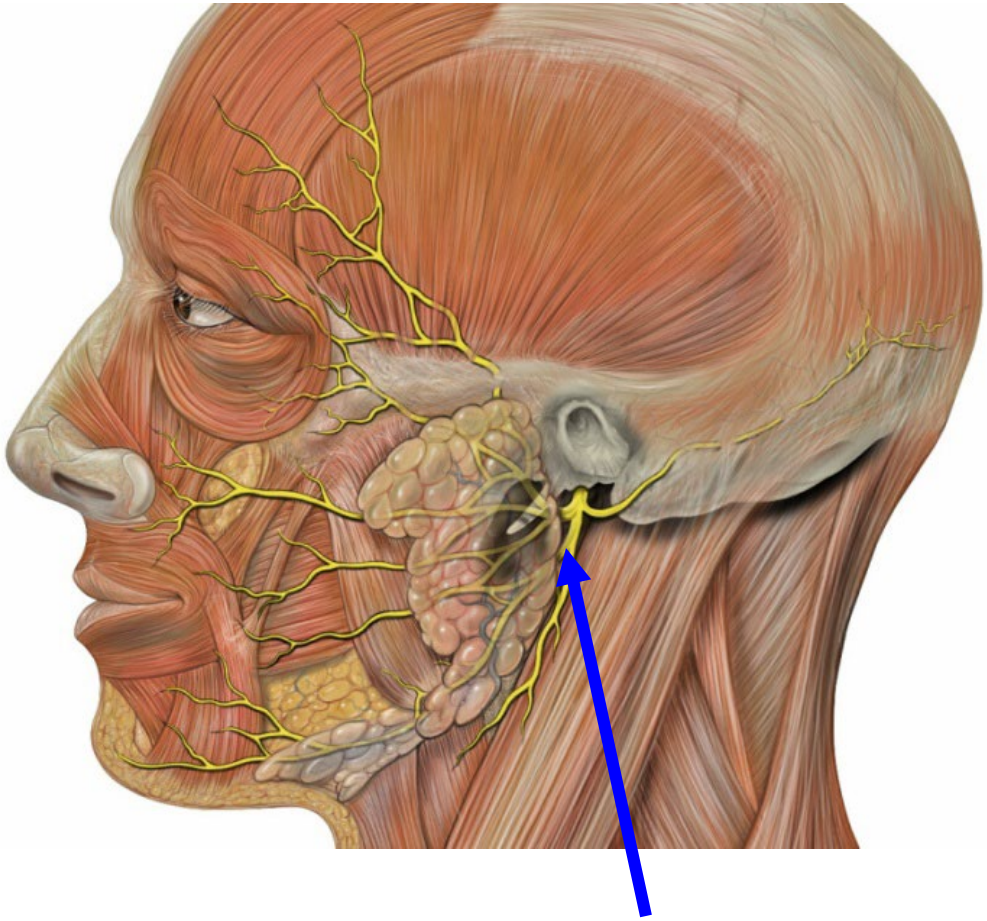
A. Facial muscles are embedded in superficial fascia - take origin from underlying bones (mostly); insert onto skin

FACIAL TRANSPLANT



Note: In severe damage to face, facial transplants are required because muscles of facial expression insert onto skin rather than tendons (therefore, cannot use grafts of other body muscles).

OVERVIEW OF FACIAL MUSCLES



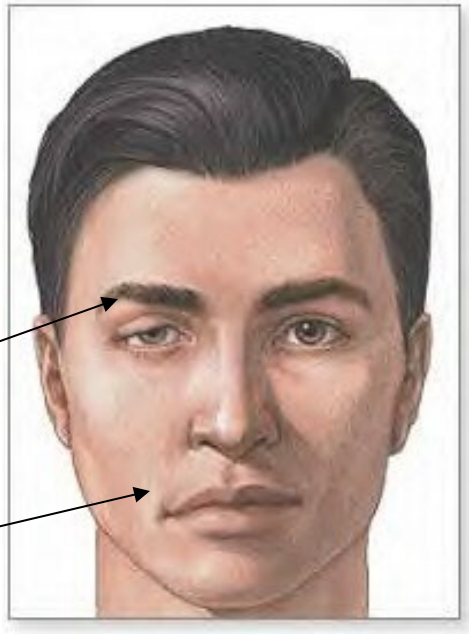
FACIAL NERVE
(Cranial Nerve VII)

B. Neural control of Facial muscles - Facial muscles are under both voluntary and emotional (involuntary) control.

C. Detecting action of Facial muscles - muscles of face have no (or very few) muscle spindles; muscle contractions are thought to be detected by stretching of skin.

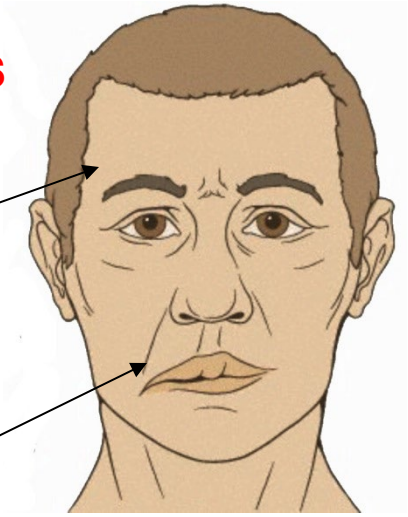
OVERVIEW OF FACIAL MUSCLES: FACIAL PARALYSIS

FACIAL PARALYSIS - BELL'S PALSY - CN VII



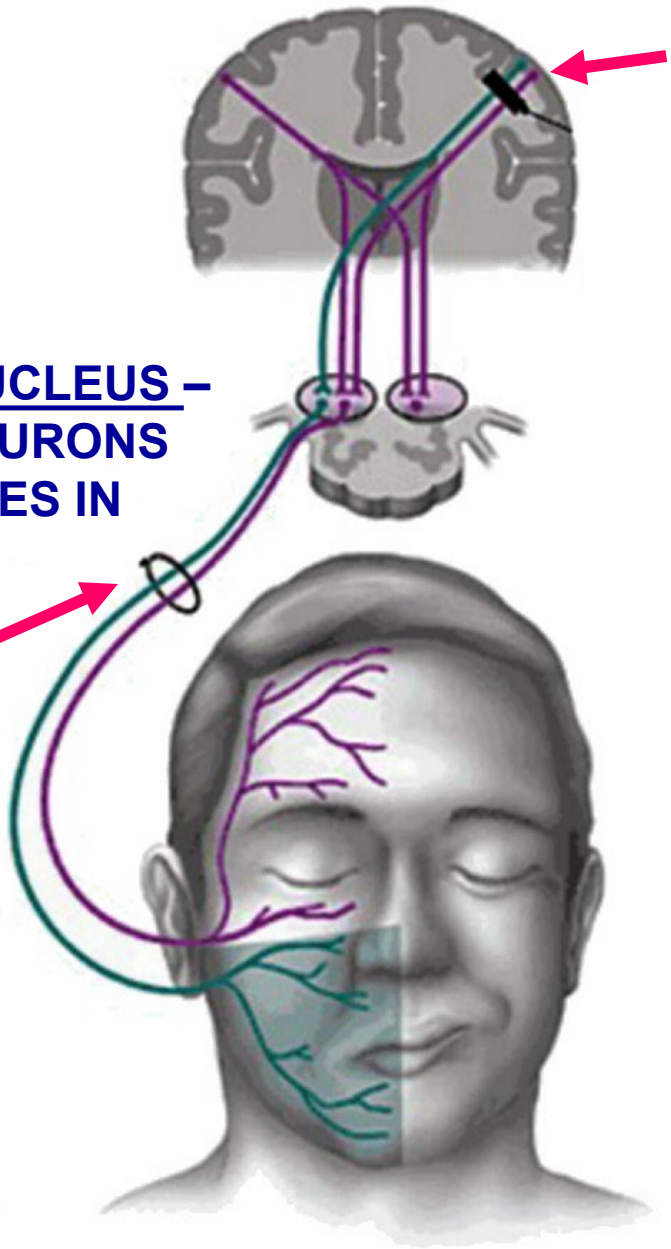
BELL'S PALSY- Lower Motor Neuron (Alpha motor neuron) disorder of Facial Nerve (CN VII): associated with viral infection (herpes simplex); Symptoms unilateral: sudden onset paralysis of all facial muscles on one side; SYMPTOMS: drooling; inability to close eye; loss of taste to anterior tongue; pain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

OVERVIEW OF BLOOD SUPPLY TO HEAD

1) COMMON CAROTID ARTERY DIVIDES TO EXTERNAL AND INTERNAL CAROTID ARTERIES

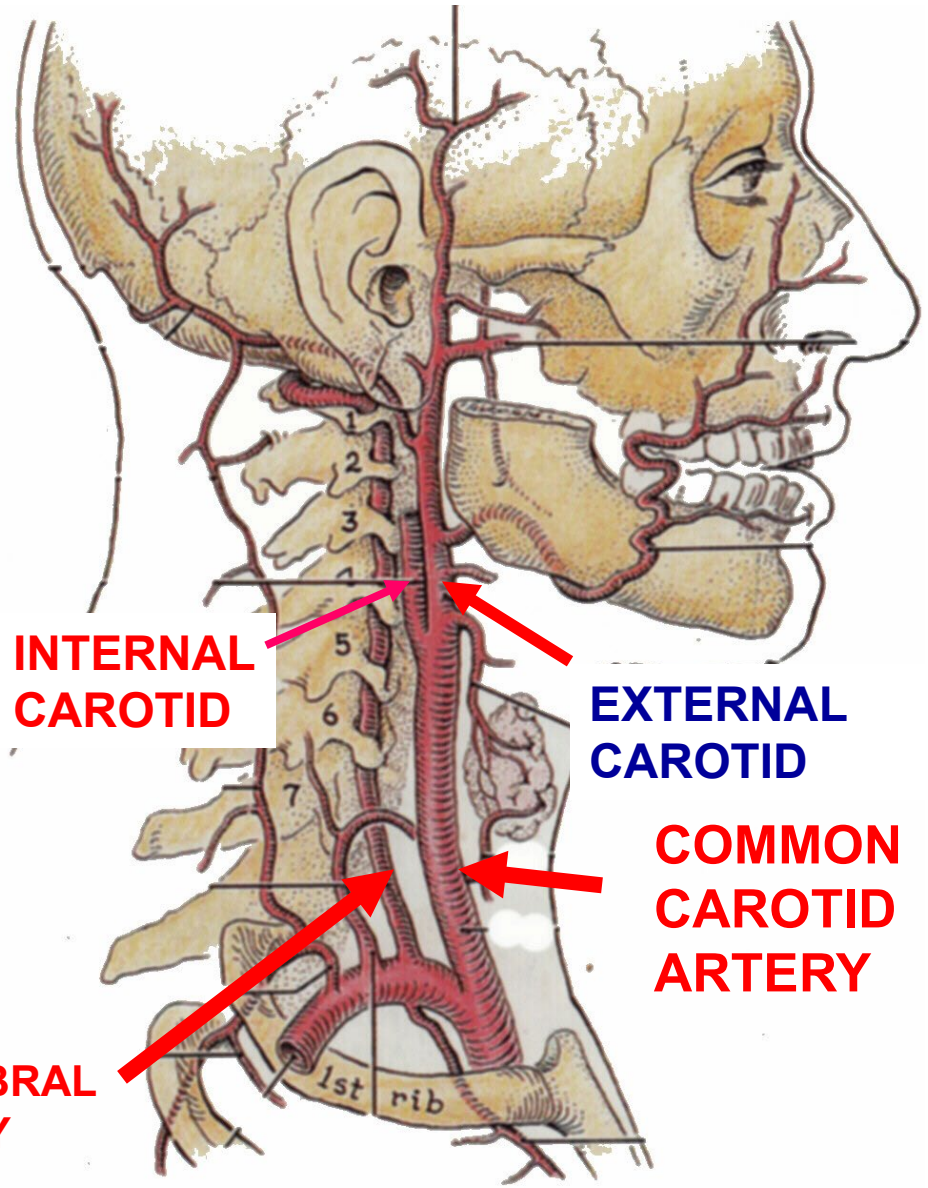
2) INTERNAL CAROTID ARTERY AND VERTEBRAL ARTERY SUPPLY BRAIN

3) EXTERNAL CAROTID ARTERY SUPPLIES FACE AND HEAD

Branches:

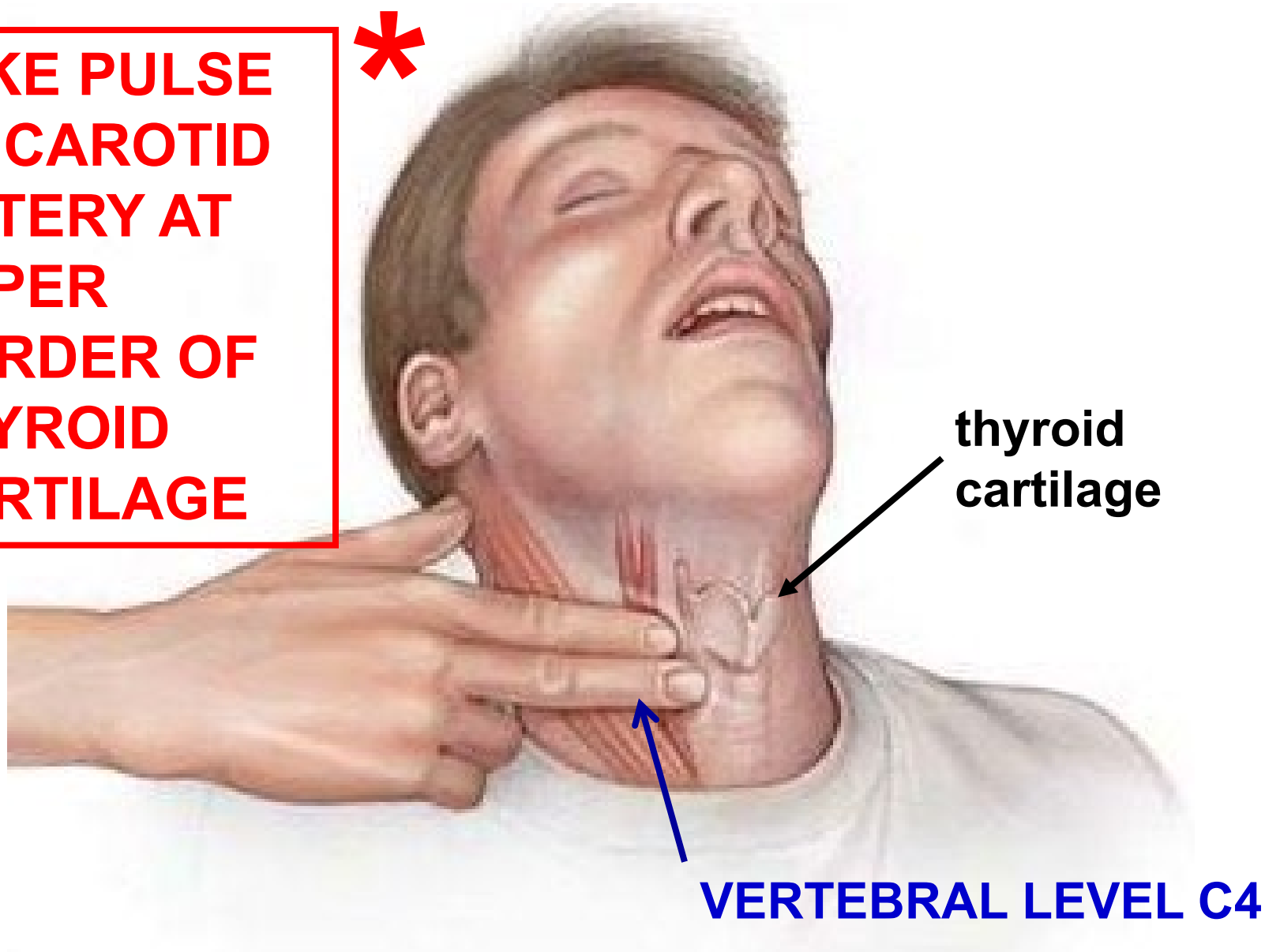
1. SUPERIOR THYROID
2. ASCENDING PHARYNGEAL
3. LINGUAL
4. FACIAL
5. OCCIPITAL
6. POSTERIOR AURICULAR
7. SUPERFICIAL TEMPORAL
8. MAXILLARY

Mnemonic - 'Some Anatomists Like Freaking Out Poor Medical Students'

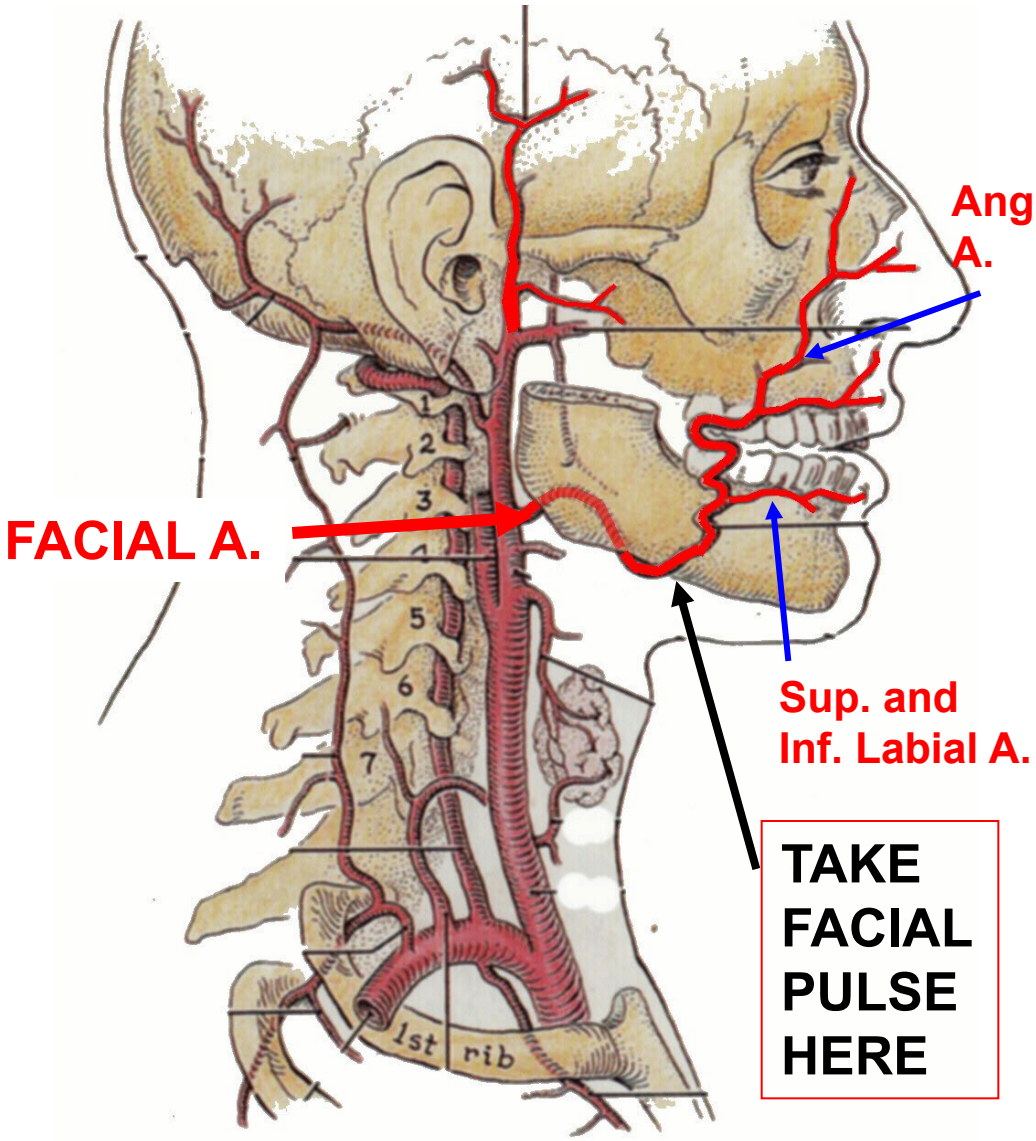


PALPATE CAROTID BIFURCATION AT UPPER BORDER OF THYROID CARTILAGE

TAKE PULSE OF CAROTID ARTERY AT UPPER BORDER OF THYROID CARTILAGE *



II. ARTERIAL SUPPLY TO FACE - mainly from Facial and Superficial Temporal Arteries

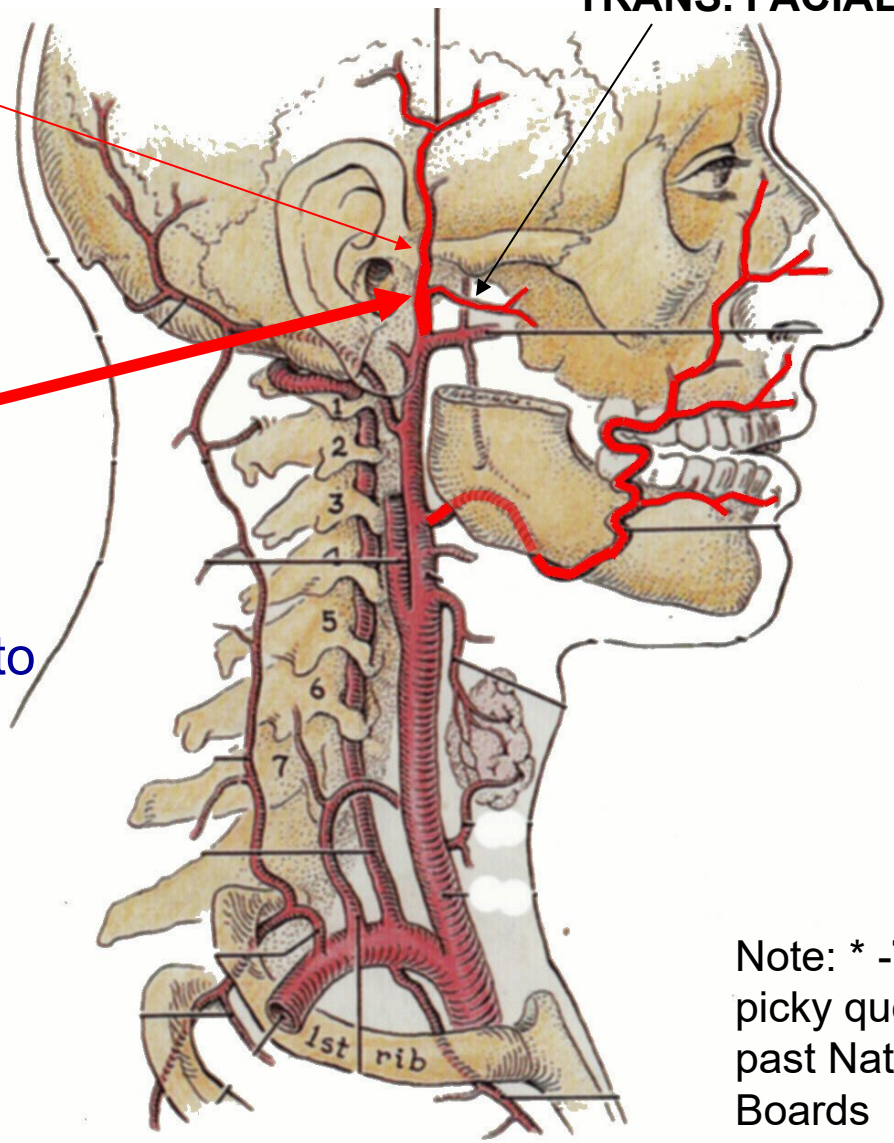


a) <u>Facial A.</u>
- extremely winding and tortuous (skin moves)
- arises from ant. side of Ext Carotid.
- courses first medial to mandible then anterior
- site of Facial Pulse

Branches:
1) <u>Sup. and Inf. Labial Arteries</u> – upper and lower lips
Note: Anastomose with opposite side (cut lip can bleed profusely)
2) <u>Angular Artery</u>
- nose, angle (corner) of eye

ARTERIAL SUPPLY TO FACE

TAKE PULSE HERE



b) <u>Superficial Temporal A.</u>

- one of terminal branches
- arises ant. to Ext. auditory meatus (opening to ear),
deep to parotid
- many branches to scalp

Small branches to face:

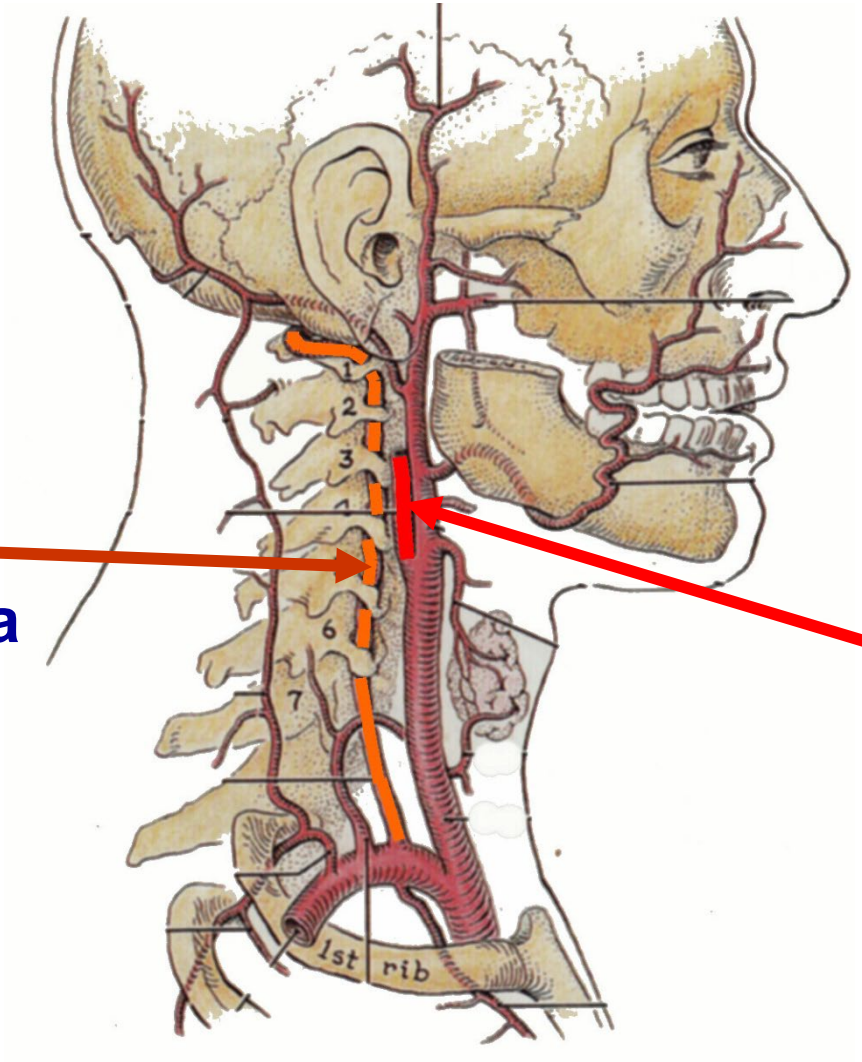
<u>note: CONFUSING AND INCONSEQUENTIAL - Transverse Facial artery</u>

Note: * -**This** was a picky question on past National Boards

OVERVIEW OF BLOOD SUPPLY TO HEAD -

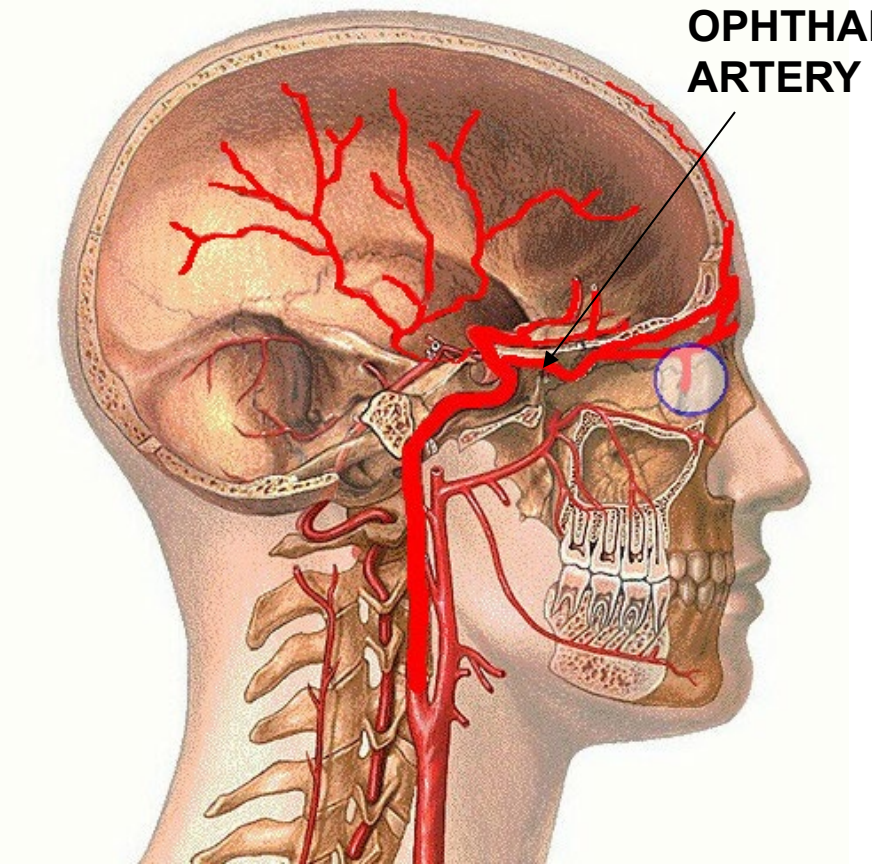
Internal Carotid supplies brain, also branches to eye, face

Vertebral A. Courses Through Foramina Transversaria C1-C6; supplies brain stem, spinal cord



Int. Carotid A. Ascends without Branching into Skull (via Carotid Canal)

INTERNAL CAROTID ARTERY



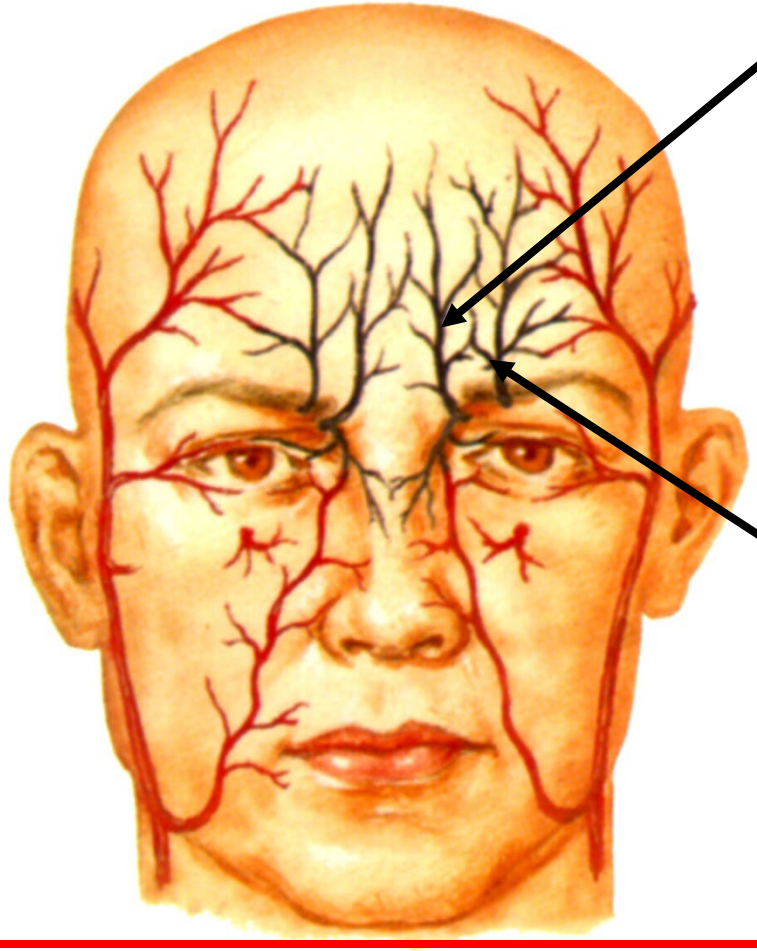
Note: Carotid = Karatikos in Greek = stupor; Named by Galen; Compression causes black out

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

2. BRANCHES OF INTERNAL CAROTID TO FACE - From Ophthalmic Artery

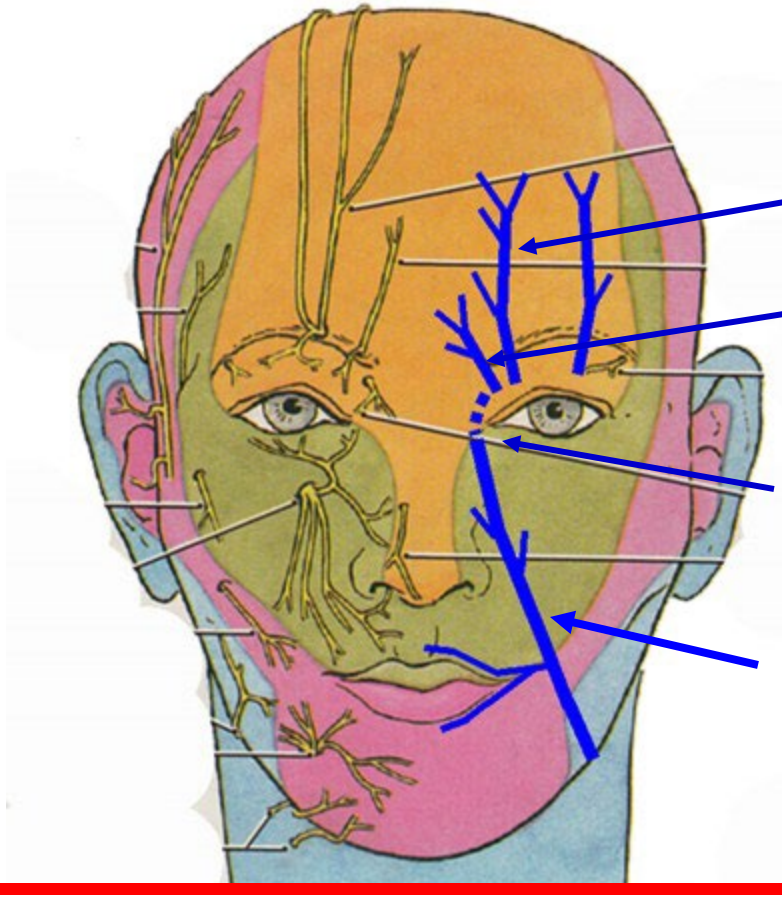


2) Supratrochlear artery-
on medial side of Supraorbital a.
(above trochlea)

1) Supraorbital artery –
to scalp above orbit

Note: Orbit (= eye socket) is major route for nerves and blood vessels to reach face and nasal cavity

III. VENOUS DRAINAGE - branches follow arteries



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

1) Facial Vein - straight course

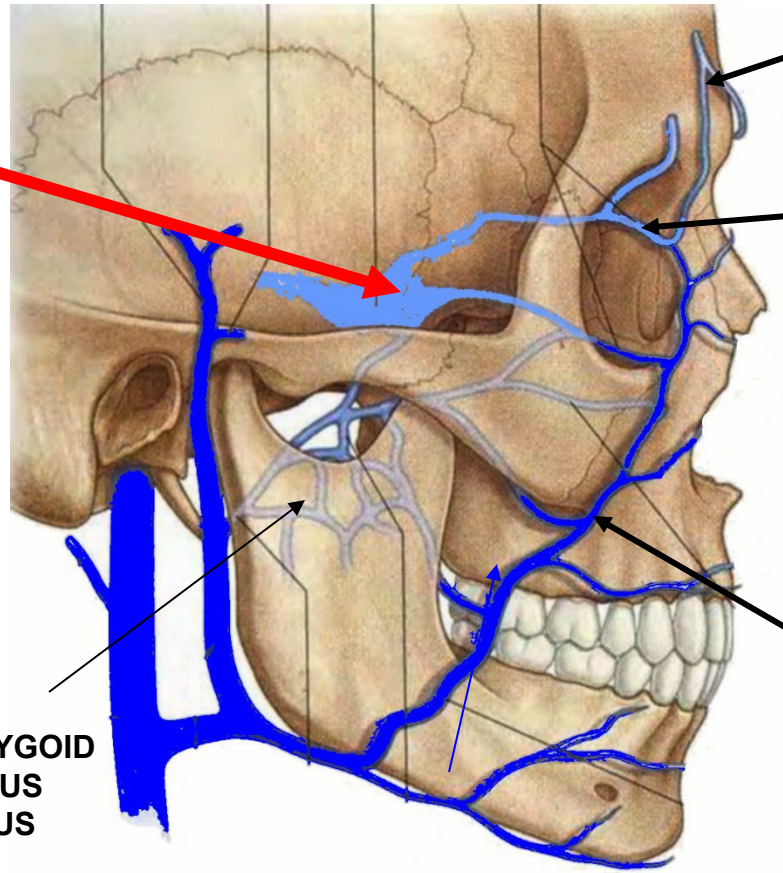
*

- 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

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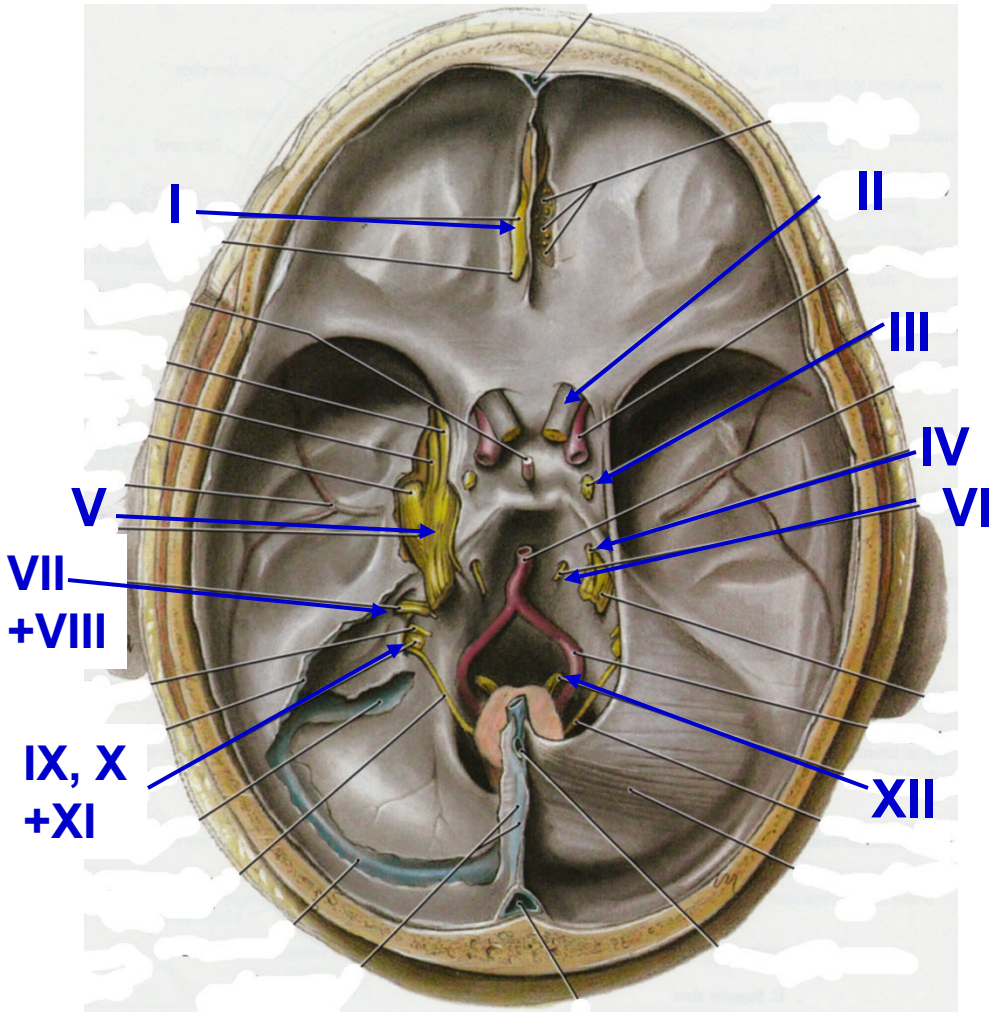
- Prolonged infections spread via veins (pressure low, no valves)
- Pass through orbit to Cavernous Sinus - CAVERNOUS SINUS THROMBOSIS; infections lateral to nose particularly dangerous
- Clinical sign: 'Blurred' vision (actually DIPLOPIA) (cranial nerves to eye muscles pass through Cavernous sinus)

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

IV. SENSORY INNERVATION - TRIGEMINAL NERVE - TO SKIN OF HEAD – 3 DIVISIONS

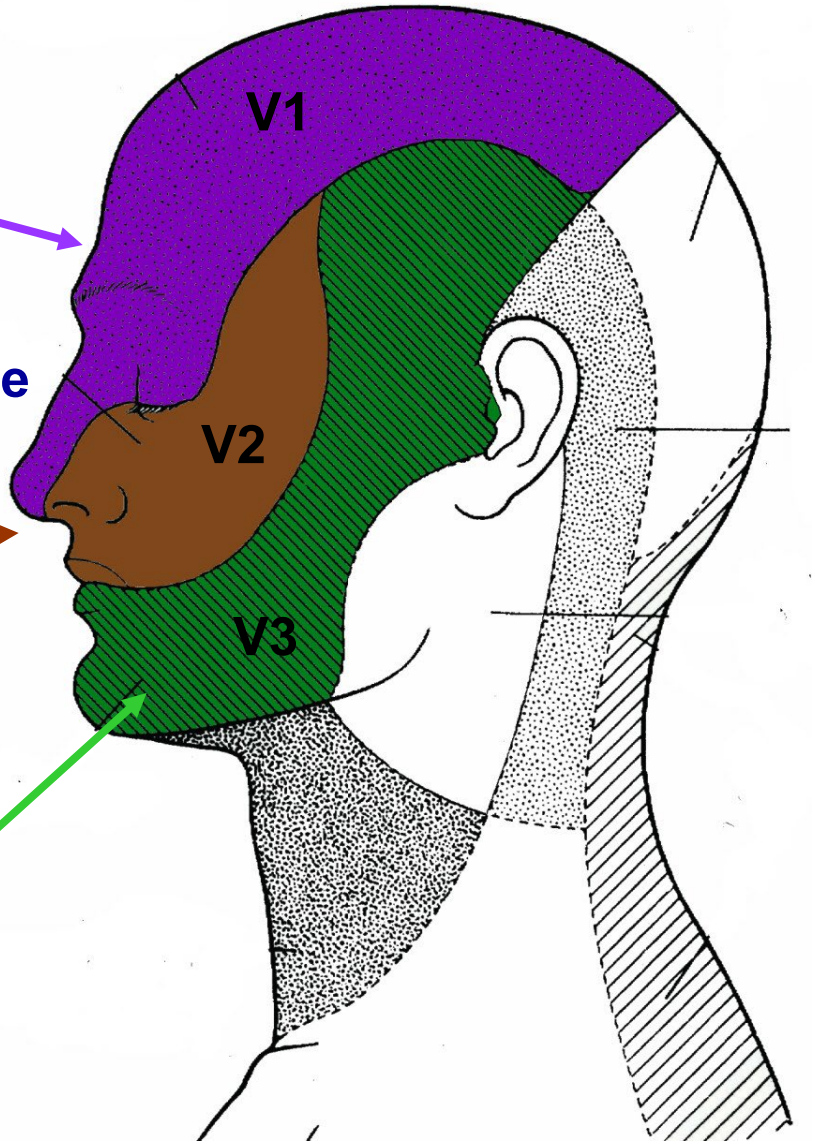
V1 – OPHTHALMIC DIVISION

V2 – MAXILLARY DIVISION

V3 – MANDIBULAR DIVISION

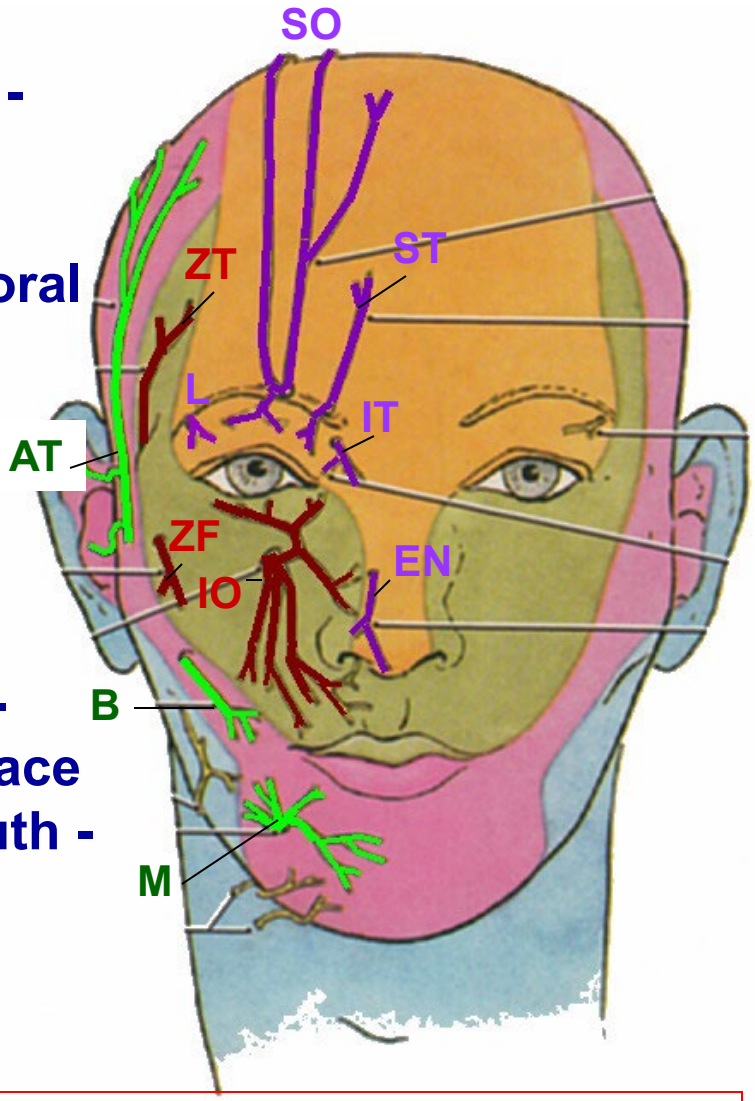
Boundary- Lateral edge of eye

Boundary Lateral edge of mouth



SENSORY SUPPLY - BRANCHES OF TRIGEMINAL NERVE TO FACE

V2 – MAXILLARY -
to skin of cheek
below orbit -
Zygomaticotemporal
Zygomaticofacial
Infraorbital



V1 – OPHTHALMIC -
to skin above orbit -
Lacrimal
Supraorbital
Supratrochlear
Infratrochlear
External Nasal Nerve

V3- MANDIBULAR -
to skin of jaw and face
below angle of mouth -
Auriculotemporal
Buccal
Mental

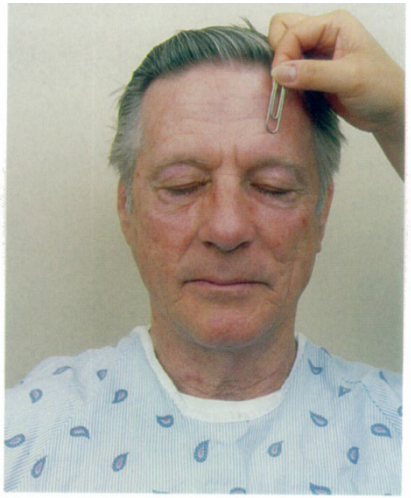


FIGURE 21-13
Examination of the trigeminal cranial nerve

NOTE: These are SOME branches of V (to face), not ALL branches of V

CLINICAL TEST OF V: SUPRAORBITAL N.

ALL BRANCHES OF TRIGEMINAL NERVE ARE LISTED IN HANDOUT

DO NOT MEMORIZE NOW BUT USE AS REFERENCE – SEE LATER

REFERENCE HANDOUT: TRIGEMINAL NERVE BRANCHES (NOT INCLUDING HITCHHIKING PATHWAYS OF VII, IX)

V1 Ophthalmic - Somatic Sensory only (GSA) - through Superior Orbital Fissure to Orbit

Nerve	Branches	Innervates
1. Frontal Nerve	a. Supraorbital Nerve	Scalp forehead, upper eyelid
	b. Supratrochlear Nerve	Scalp forehead, upper eyelid
2. Lacrimal Nerve		Upper eyelid
3. Nasociliary Nerve	a. Long Ciliary Nerve	Cornea of eye
	b. Ant. and Post. Ethmoidal Nerves	Nasal cavity, ethmoid sinus, tip of nose
	c. Infratrochlear Nerve	Upper eyelid, nose

V2 Maxillary - Somatic Sensory (GSA) only - through Foramen Rotundum to Pterygopalatine Fossa

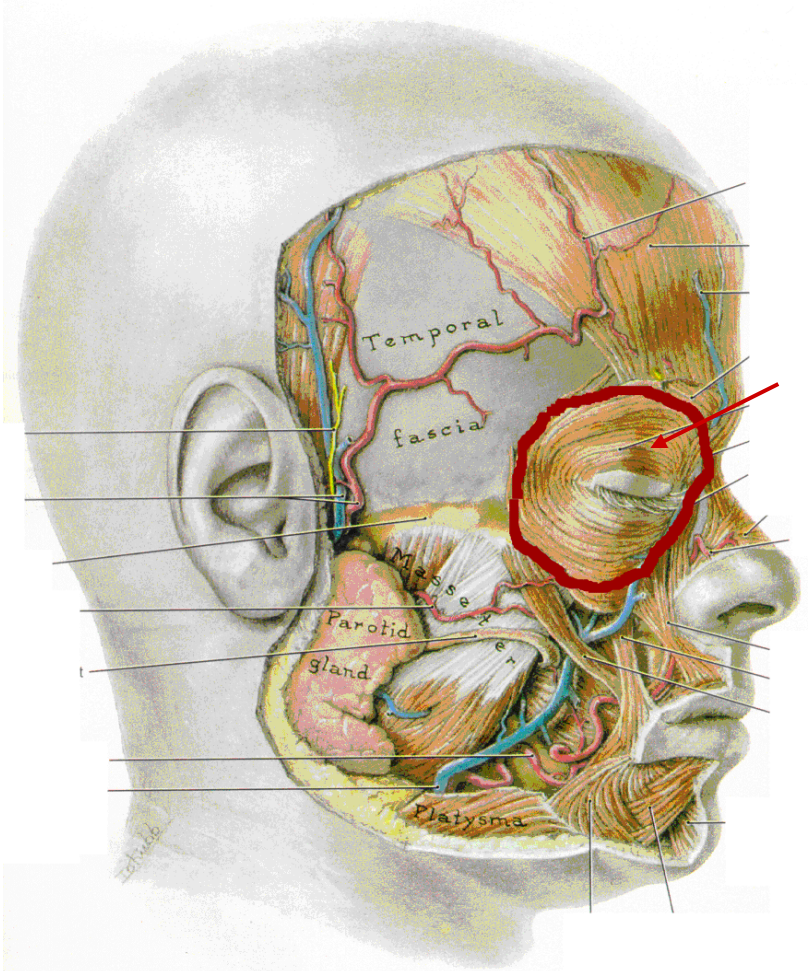
Nerve	Branches	Innervates
1. Meningeal branches		Dura of mid. Cranial fossa
2. Ganglionic branches	a. Greater Palatine Nerve	Hard Palate
	b. Lesser Palatine Nerve	Soft Palate
	c. Nasopalatine Nerve	Nasal Cavity, Hard Palate
	d. Nasal branches	Nasal Cavity
3. Post. Sup. Alveolar Nerve		Maxillary teeth
4. Infraorbital nerve		Lower eyelid, nose, upper lip
	a. Ant. Sup. Alveolar Nerve	Maxillary teeth
	b. Mid. Sup. Alveolar Nerve	Maxillary teeth
5. Zygomatic nerve	a. Zygomaticofacial Nerve	Skin of cheek
	b. Zygomaticotemporal Nerve	Skin of temporal region

V3 Mandibular - Somatic Sensory (GSA) and Branchiomotor (SVE) - Foramen Ovale to Infratemporal Fossa

Nerve	Branches	Innervates
1. Nervous spinosus		Sensory to Dura of mid Cranial fossa
2. Motor branches		Motor to Med. Pterygoid, Tens. Tympani, Tensor Palati
3. Anterior division	a. Nerve to Lateral Pterygoid	Motor to Lateral Pterygoid
	b. Masseteric Nerve	Motor to Masseter
	c. Deep Temporal Nerve	Motor to Temporalis
	d. Buccal Nerve	Sensory to Cheek
4. Posterior Division	a. Auriculotemporal Nerve	Sensory to external auditory meatus, tympanic membrane, TMJ, lateral scalp
	b. Lingual Nerve	Sensory (touch) ant. 2/3 tongue
	c. Inferior Alveolar Nerve i. Nerve to Mylohyoid ii. Mental Nerve	Sensory to Mandibular teeth Motor to Mylohyoid, ant. Digastric Sensory to Chin, Lower lip

V. MUSCLES OF FACIAL EXPRESSION

- move skin of face, close eyes, open/close mouth
- convey emotions by gestures (ex. sneering, contempt) - most origin – bones; insert - skin
- many named for action in Latin/Greek
- <u>movements elicited in test for Facial Nerve function (CN VII)</u>



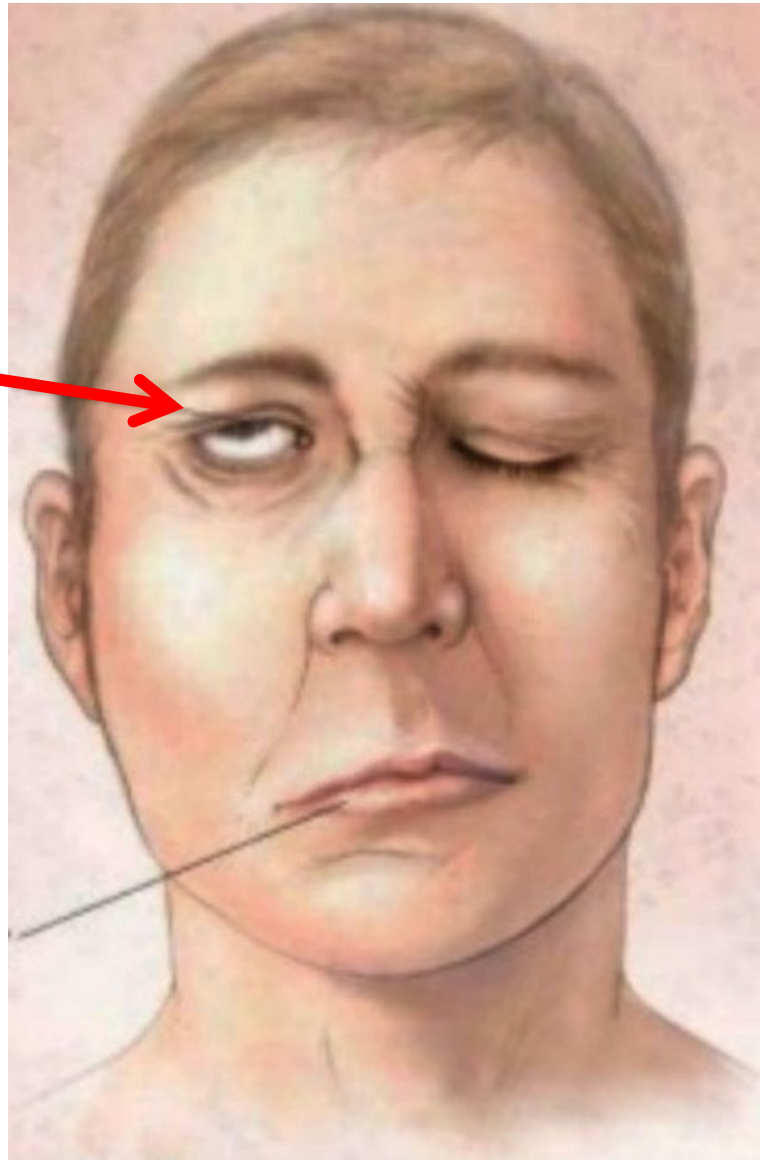
ORBICU-LARIS OCULI M.

1. <u>Orbicularis Oculi</u> - close eye

- Palpebral part – in eyelid - Close eyelids
- Orbital part – on face - Buries eyelids, Ex. sandstorm

PARALYSIS OF ORBICULARIS OCULI

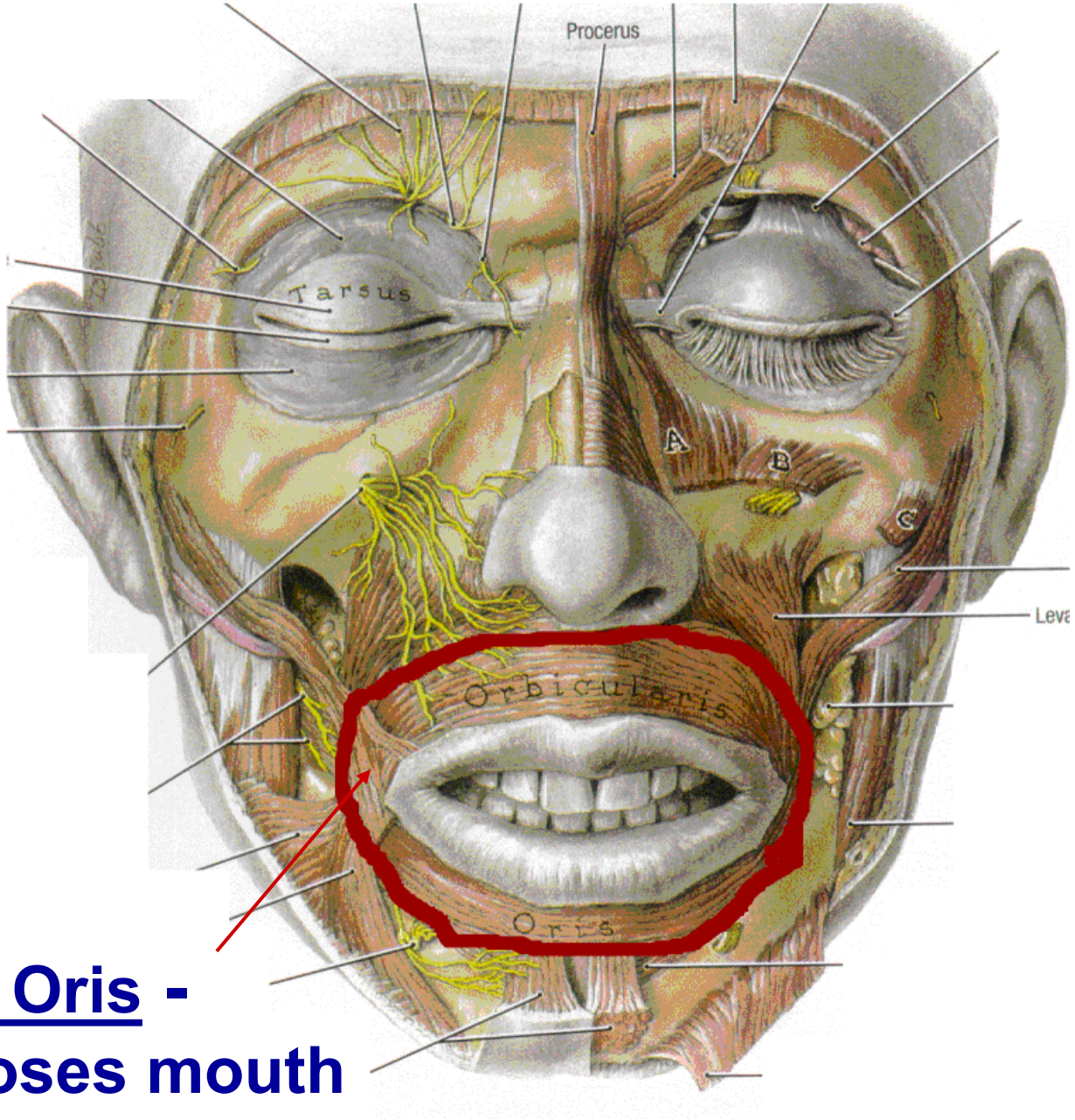
UNABLE TO CLOSE EYE DUE TO PARALYSIS OF ORBICULARIS OCULI MUSCLE



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

CLINICAL **

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**



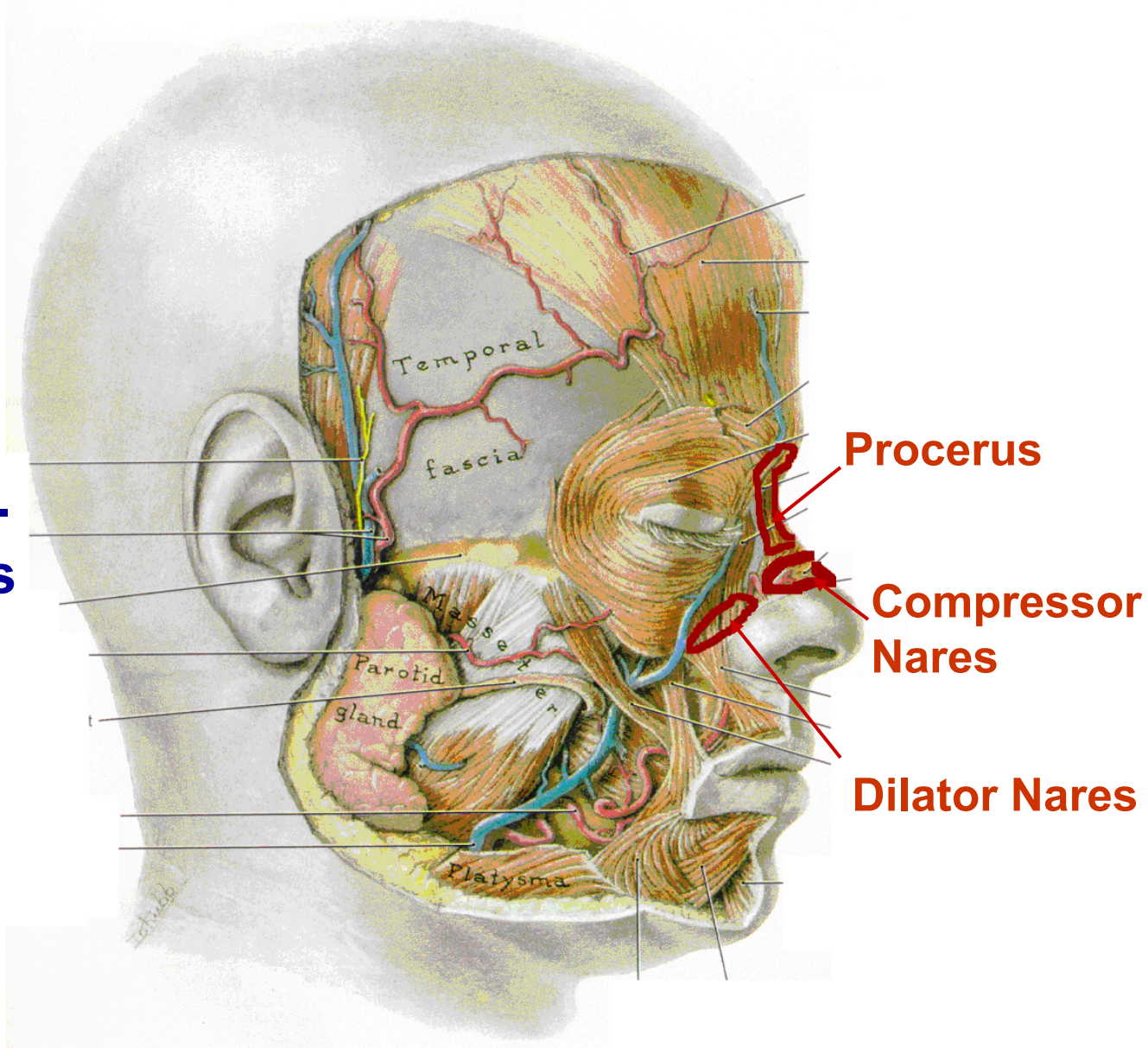
2. Orbicularis Oris - Surrounds/closes mouth

3. MUSCLES OF NOSE

a. Compressor nares - lateral to bridge of nose compresses nasal cart.

b. Dilator nares - lateral to nostrils - dilates

c. Procerus - wrinkles skin of nose



FACIAL PARALYSIS

PARALYSIS OF MUSCLES OF UPPER LIP PRODUCES DROOPING OF ANGLE OF MOUTH, LOSS OF NASO-LABIAL FOLD

4. MUSCLES OF UPPER LIP-

a) Levator Labii Superioris - lifts upper lip

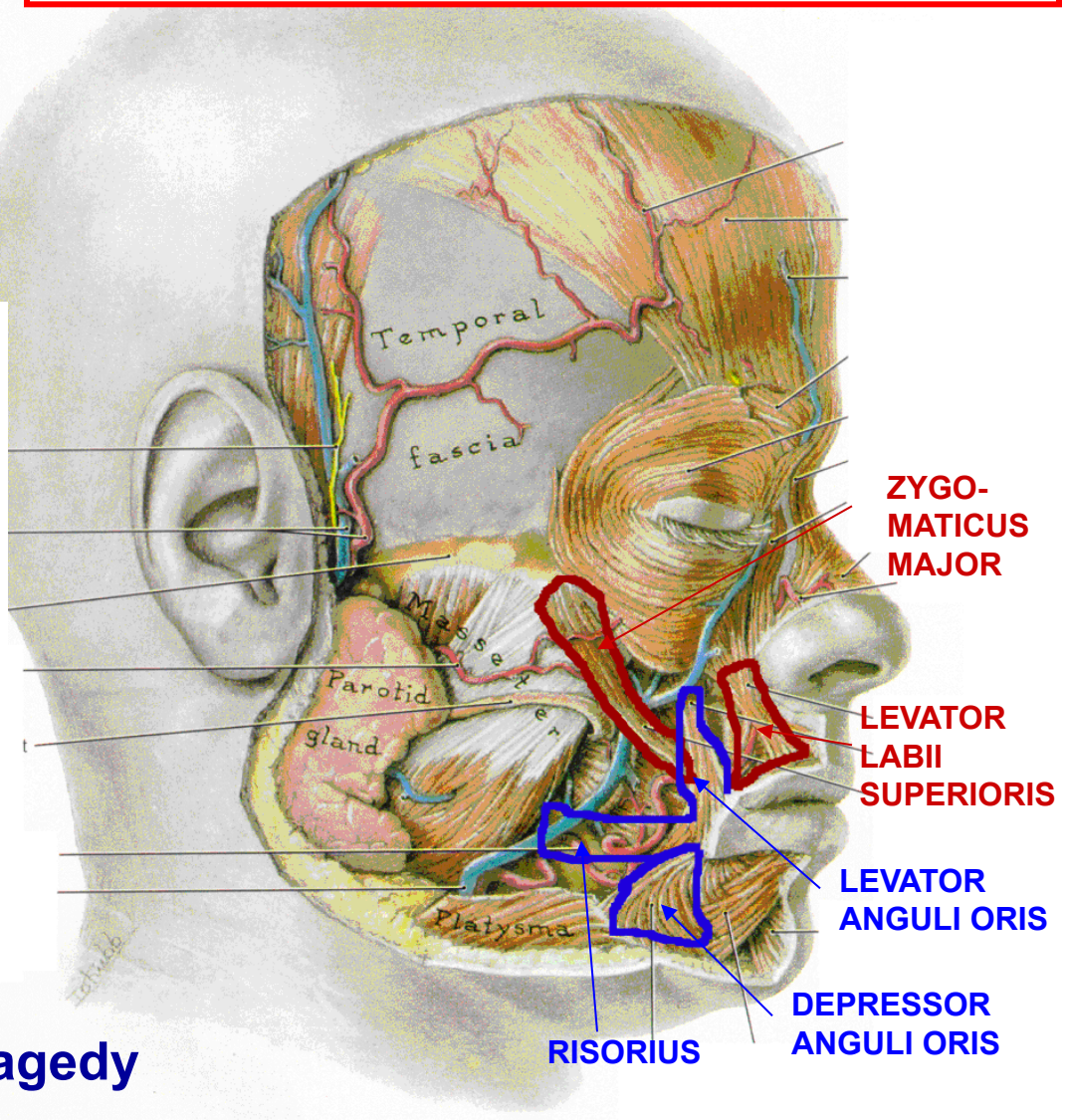
b) Zygomaticus major and minor - raise and pull upper lip laterally

5. MUSCLES AT ANGLE OF MOUTH

a) Levator Anguli Oris - Raise corner of mouth

b) Risorius - smiling

c) Depressor Anguli Oris - tragedy



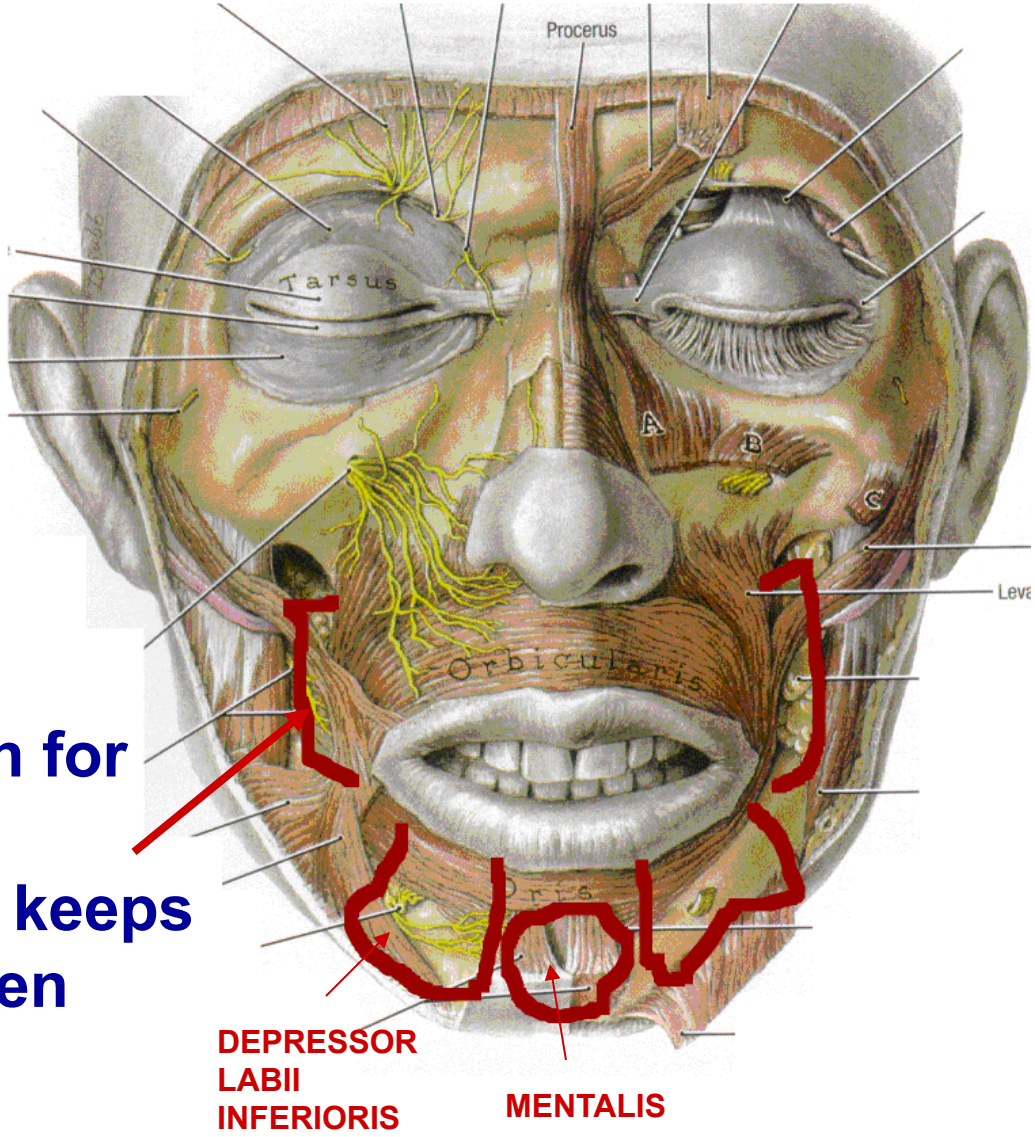
6. MUSCLES OF LOWER LIP AND CHIN-

a) Depressor Labii Inferioris - depresses low lip

b) Mentalis - wrinkles skin of chin

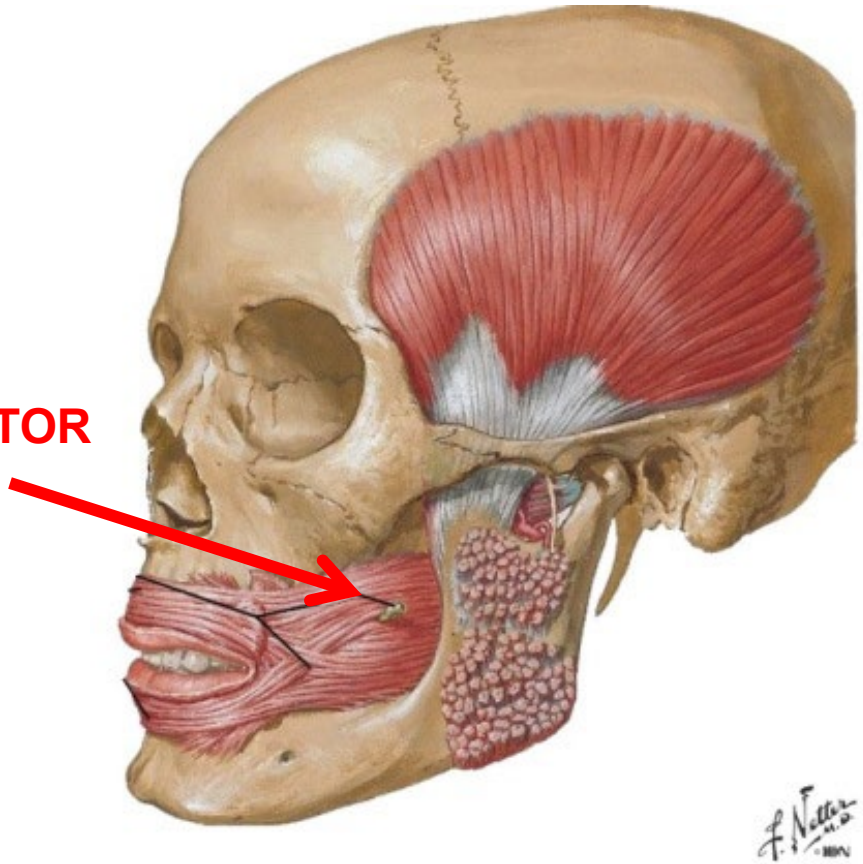
7. BUCCINATOR – Latin for trumpet player

- compresses mouth & keeps food between teeth when chewing



PARALYSIS OF BUCCINATOR MUSCLE

BUCCINATOR



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

CLINICAL **

FACIAL PARALYSIS can paralyze BUCCINATOR

- patient is unable to hold food between teeth

BOARD QUESTION

- DIFFICULTY IN CHEWING FOOD

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

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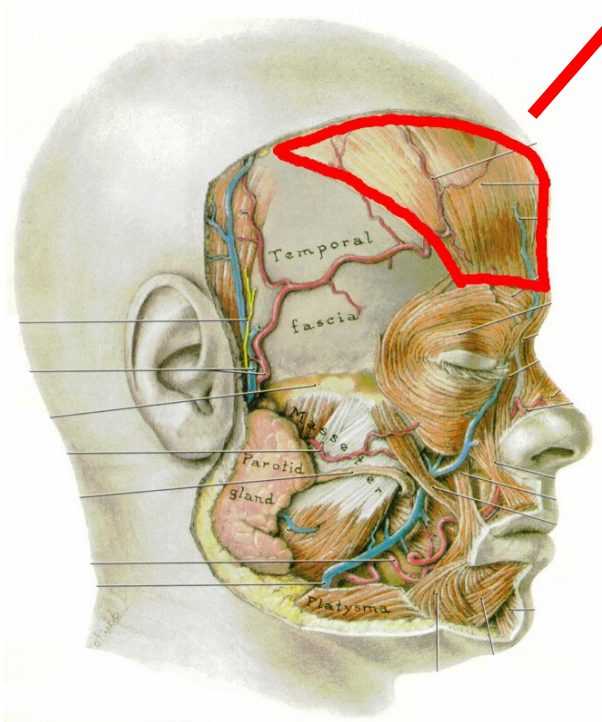
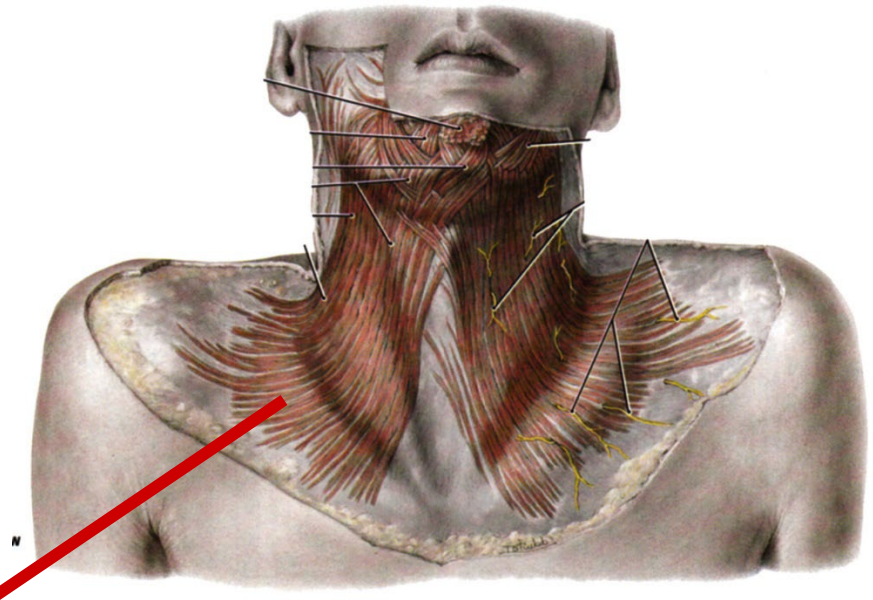
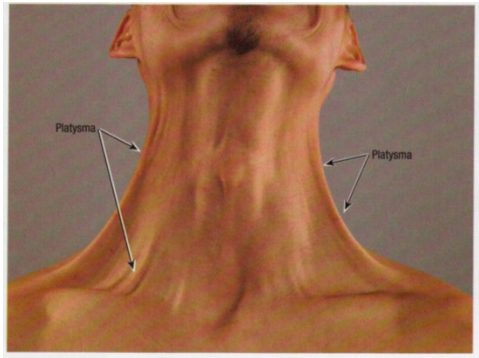
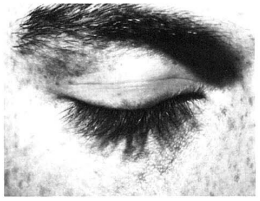




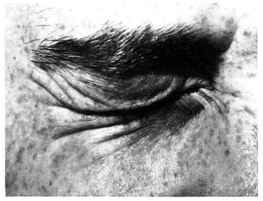
9. PLATYSMA - extends from mandible to fascia over Pectoralis Major; tenses, moves skin of neck



PRACTICE USING FACIAL MUSCLES SELECTIVELY IN FRONT OF MIRROR



Palpebral Part



Orbital Part

Orbicularis Oculi

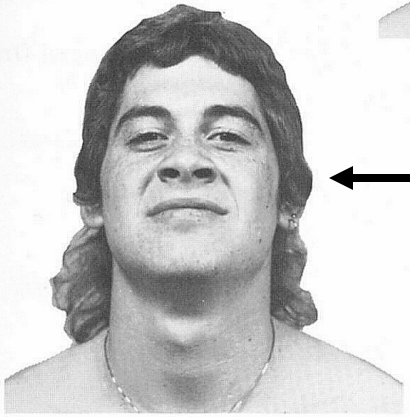
Sneering – Procerus

Procerus

Frontalis

Corrugator Supercilii

Procerus



Nasalis

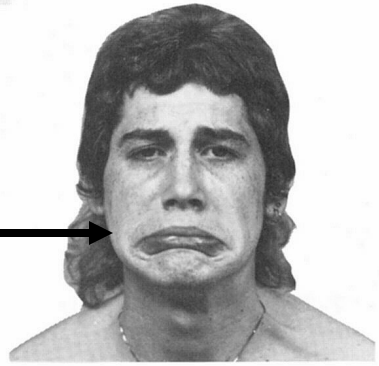
Contempt – Dilator Naris

Nasalis

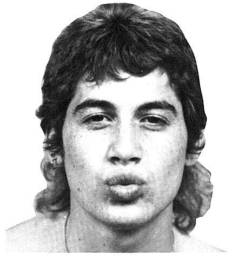
Risorius

Depressor Anguli Oris

Grading Policy - Depressor Anguli Oris



Depressor Anguli Oris



Orbicularis Oris

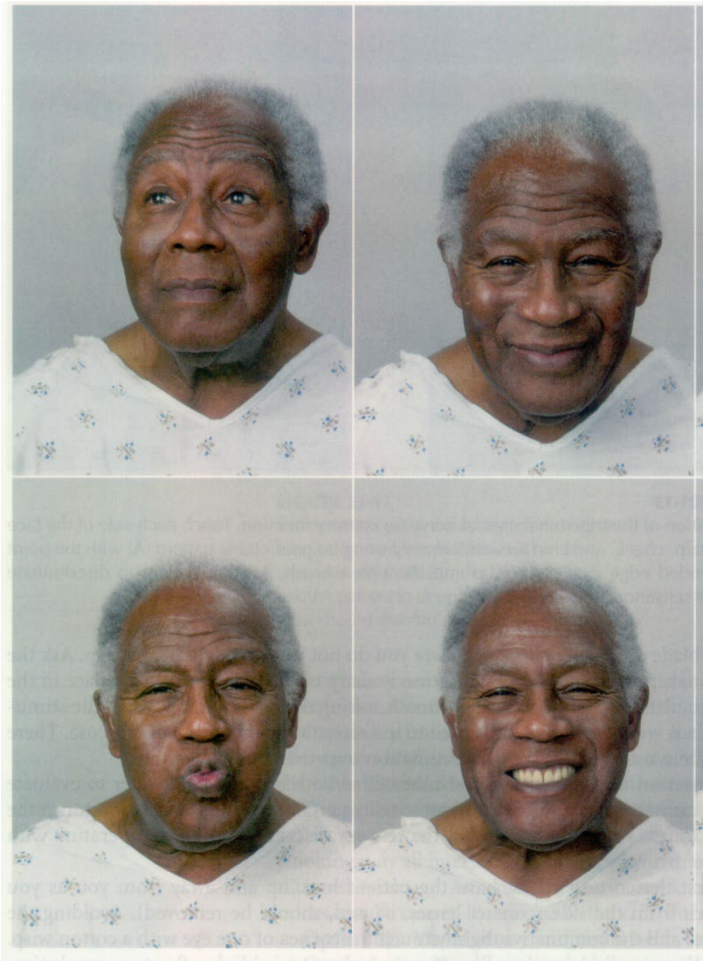
Zygomaticus Major

Mentalis

7-15B MUSCLES OF EXPRESSION IN ACTION

CLINICAL TEST FOR FACIAL NERVE FUNCTION

WRINKLE FOREHEAD BY RAISING EYEBROWS: FRONTALIS



SMILE: RISORIUS

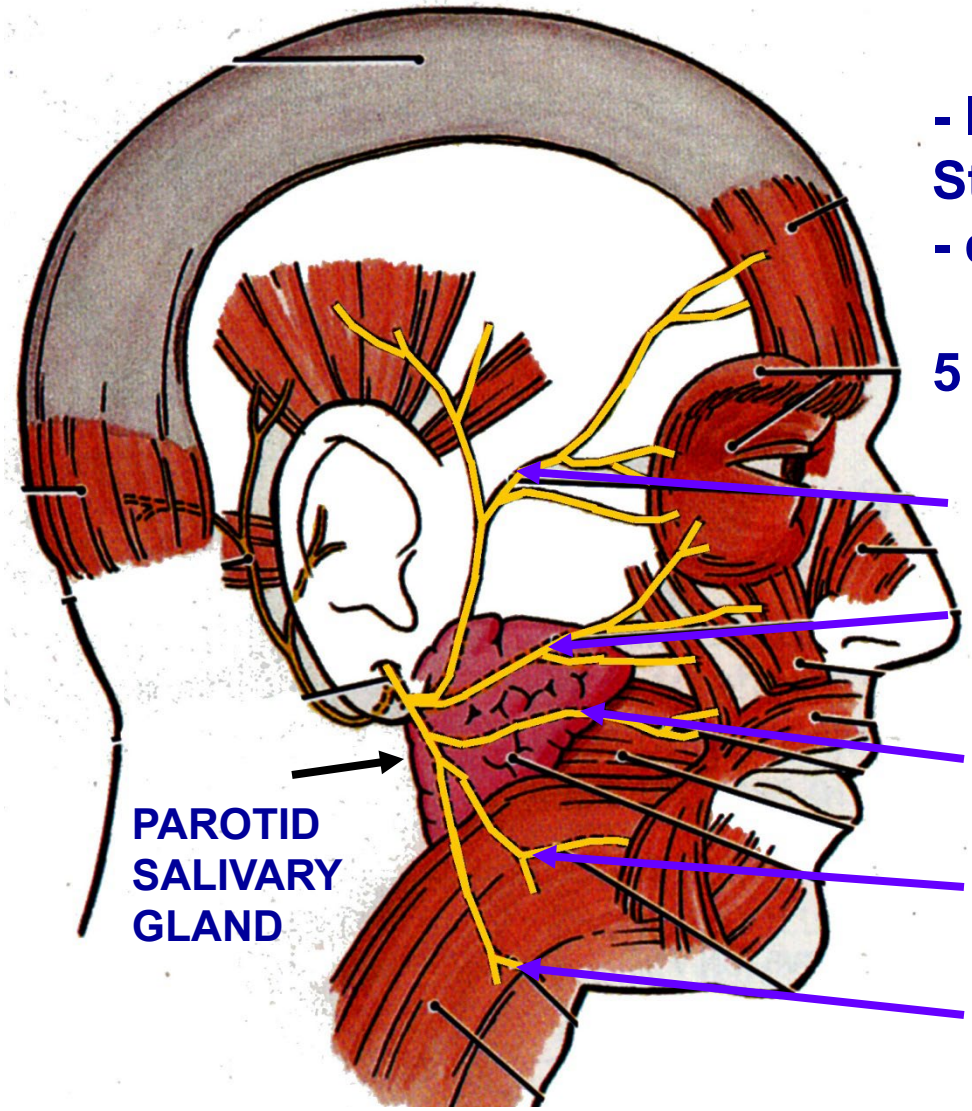
PURSE LIPS: ORBICULARIS ORIS

SHOW TEETH: LEVATOR LABII SUPERIORIS, ZYGOMATICUS MAJOR, ETC.

DR. PAUL FERGUSON: CRANIAL NERVE EXAM

- How to test:
  - First look for asymmetry before moving on to a laundry list of components:
    1. Squint eyes shut against resistance
    2. Raise eyebrows / wrinkle forehead
    3. Puff out cheeks
    4. Smile showing teeth
    5. Frown
    6. Purse lips

VI. 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

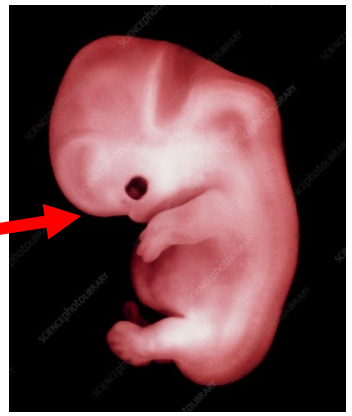
Note: Buccal Br. VII = Motor; Buccal Br. V =Sensory

VII. DEVELOPMENT OF FACE

Facial Primordia (5) form in fourth week surrounding stomodeum (= primitive mouth)

HUMAN EMBRYO

VIEW OF HEAD OF EMBRYO

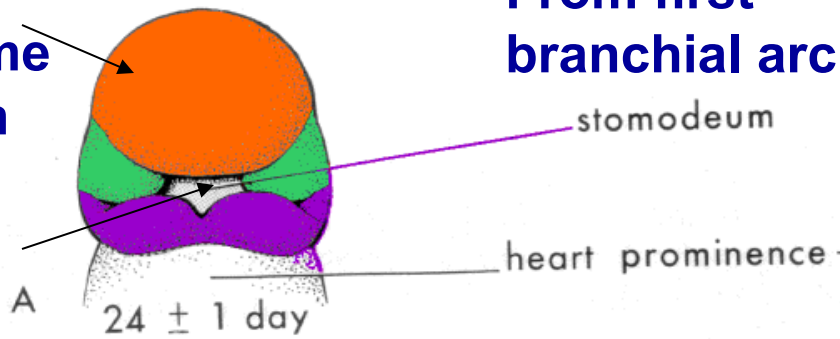


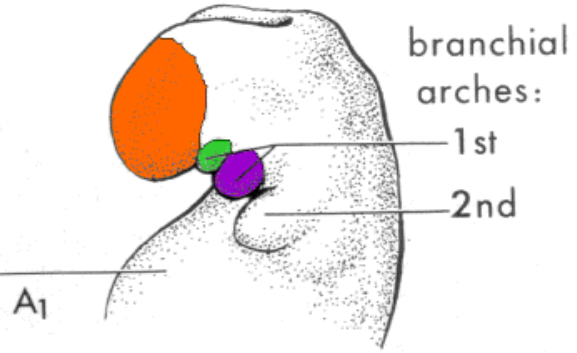
Frontonasal Process (1) - formed by mesenchyme below brain

Maxillary Process(2)

Mandibular Process (2) From first branchial arch

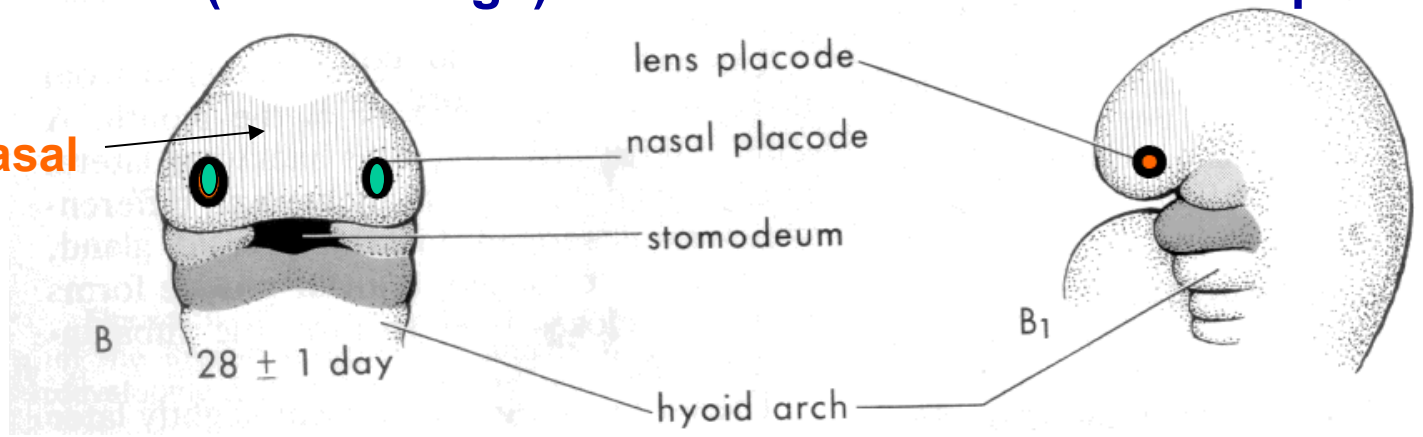
Stomodeum





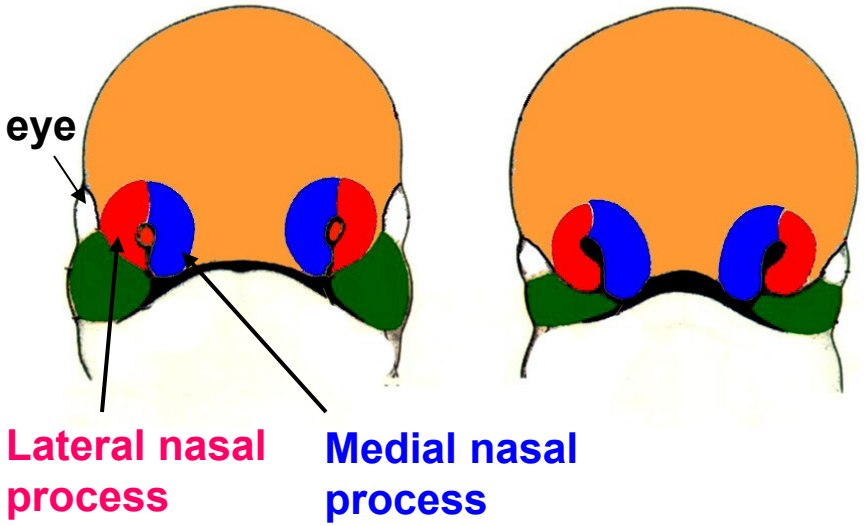
1. Nasal Placodes (Thickenings) form on side of FrontoNasal process

Frontonasal Process

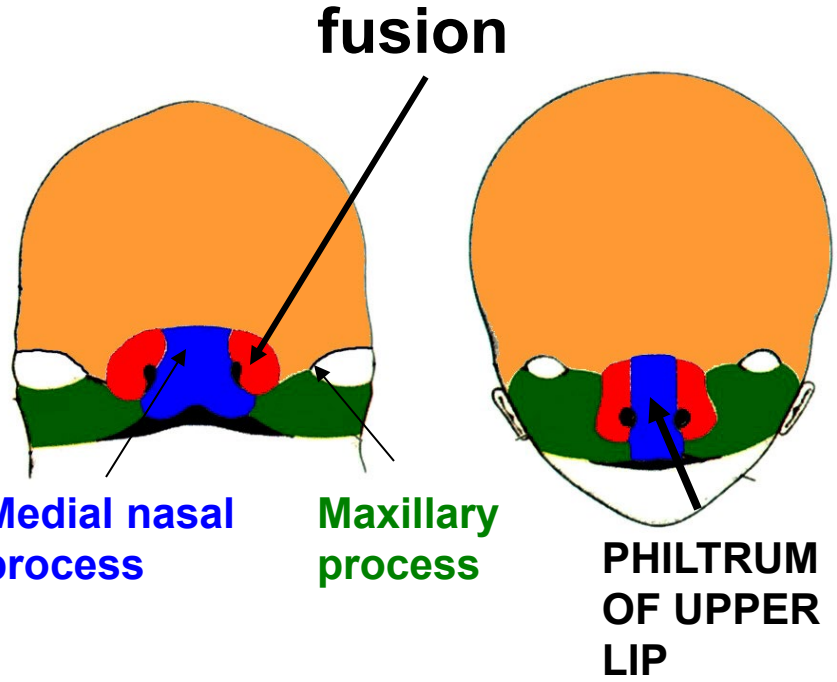


DEVELOPMENT OF FACE

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

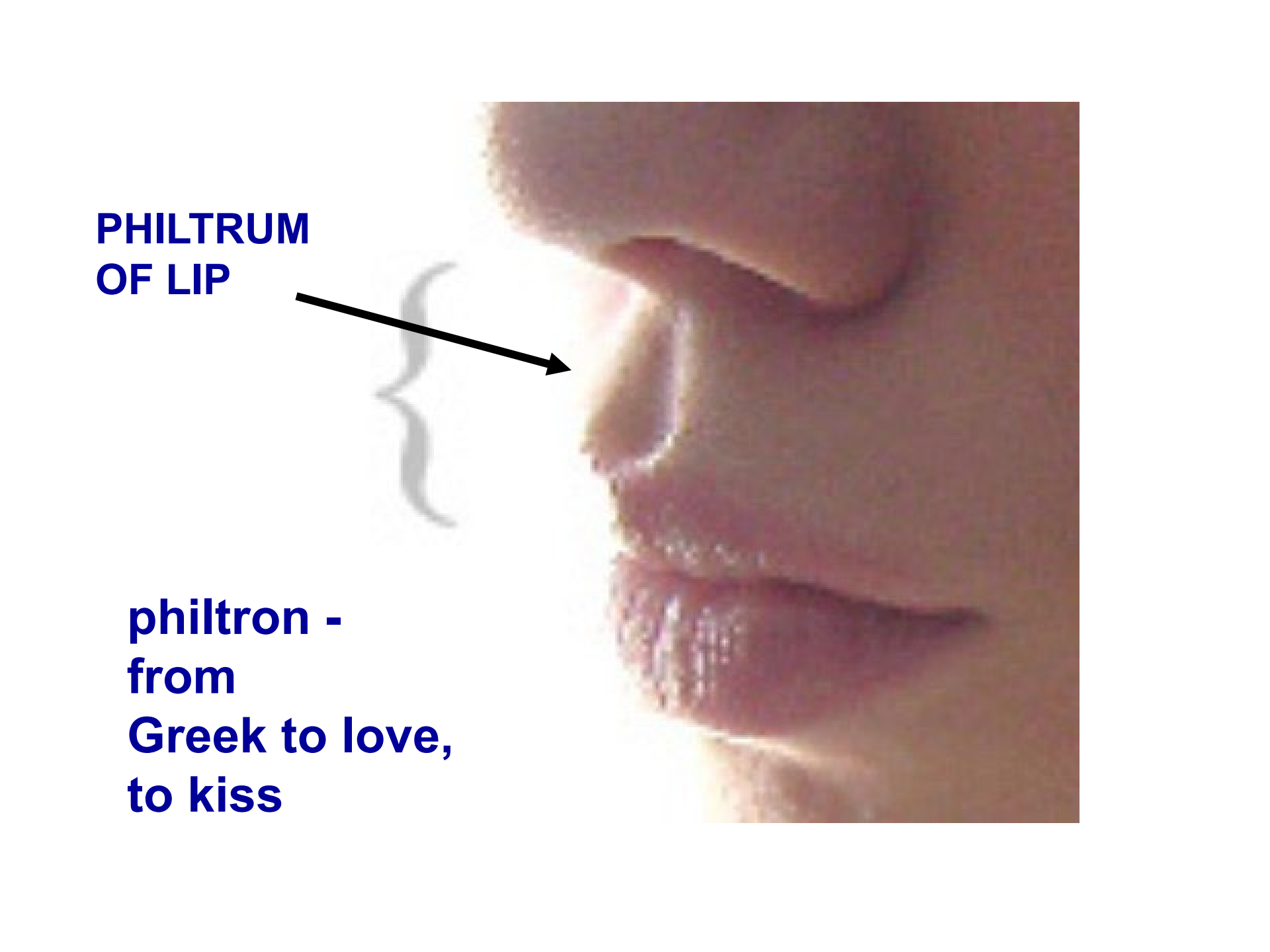


3. Medial nasal process and Maxillary Process - fuse to form upper lip



Terminology: process = prominence

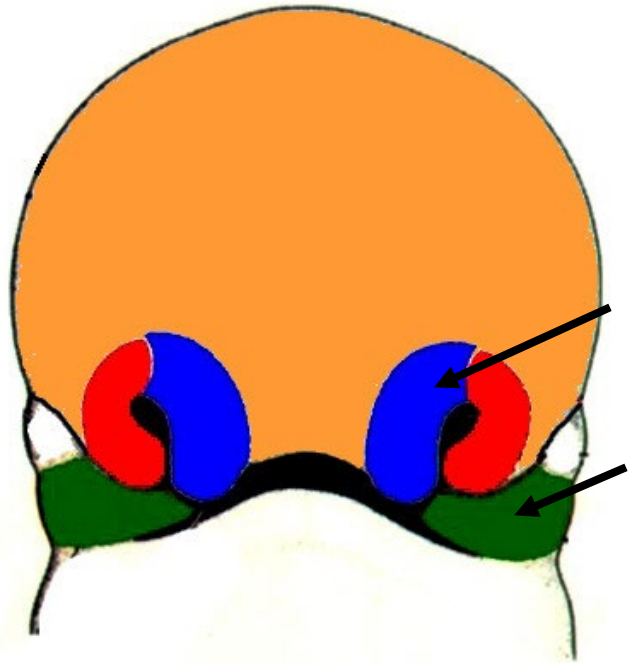
Weeks 10-12


PHILTRUM
OF LIP
philtron -
from
Greek to love,
to kiss

CLEFT LIP = CHEILOSCHISIS

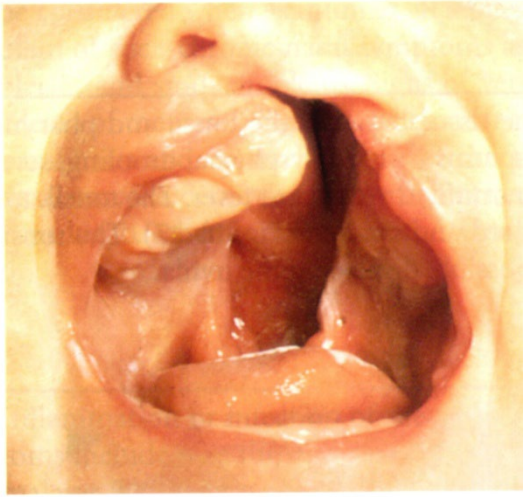
BOARD QUESTION *

– failure of fusion of Medial Nasal Process and Maxillary process



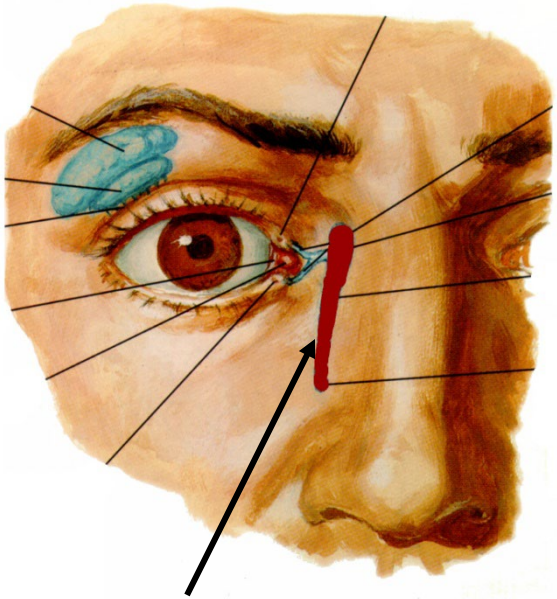
- 1/1000 Births, can be unilateral or bilateral
- At philtrum of lip

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

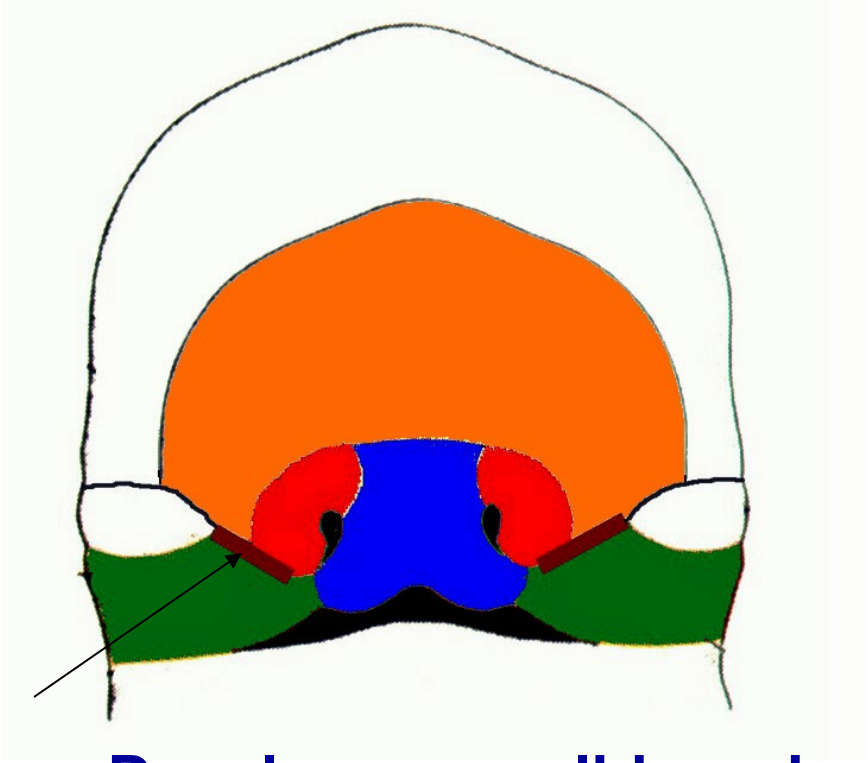


Gk. Cheilos, Lip; Pronounce - KAI-LOS'-KESIS

5. DEVELOPMENT OF NASOLACRIMAL DUCT



NASOLACRIMAL DUCT



– connects anterior eye to nasal cavity

- Develops as solid cord from medial angle of eye to nasal cavity
- becomes canalized.

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

SUMMARY: SEE CHART OF CLINICAL EMBRYOLOGY OF HEAD AND NECK

CLINICAL EMBRYOLOGY OF HEAD AND NECK

Clinical Condition	Normal development	Abnormal	Signs/ Symptoms	Treatment
Cleft Lip (cheiloschisis)	Fusion of medial nasal and maxillary processes forms upper lip	**Failure of fusion of medial nasal and maxillary processes**	Cleft at philtrum of upper lip	Surgical repair
Malformation of nasolacrimal duct (dacryostenosis)	Duct forms as cord between maxillary and frontonasal processes; extends from lacrimal sac (at medial canthus of eye) to nasal cavity (inferior meatus)	**Cord fails to canalize**	Continuous flow of tears over lower lid onto face	Surgical repair
First Arch (Treacher Collins) Syndrome	First brachial arch forms skeletal elements: 1) malleus, incus 2) contributes to mandible (Meckel's cartilage)	**Neural crest cells do not migrate into Arch 1**	1) Mandibular hypoplasia 2) Conductive hearing loss 4) Facial malformation	Some surgical repair
Thyroglossal duct cysts	Thyroid forms as evagination at foramen cecum of tongue; tissue migrates ant. to Hyoid bone in midline of neck to location below Cricoid cartilage	**Glandular tissue or cysts develop anywhere along path of migration**	Mass in **midline** of neck	Surgical removal (remove tract to tongue)
Abnormal location/ Accidental Removal of parathyroid glands	Normally posterior to thyroid gland or embedded in it; develop from branchial pouches 3 and 4 Inferior parathyroid - pouch 3 Superior parathyroid - pouch 4	**Can be located within thyroid gland or ectopic**	Normally no symptoms; calcium imbalance If accidentally remove (	Treat calcium imbalance pharmaco-logically, etc.

FACIAL MUSCLES

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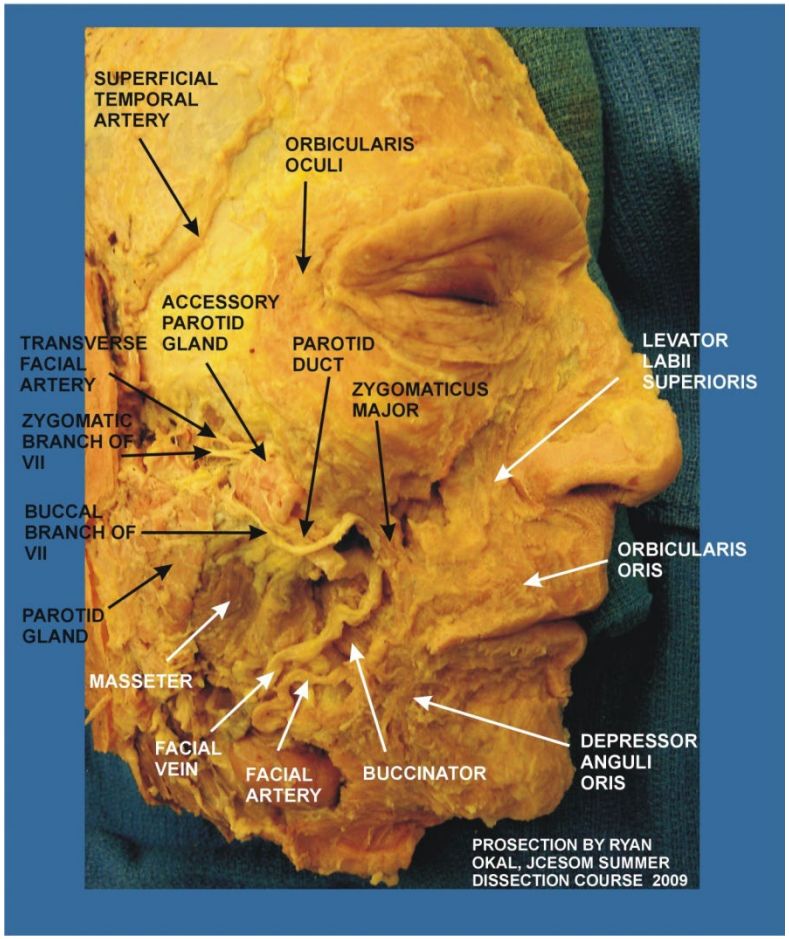

BRANCHES OF FACIAL NERVE (VII) AND SUPERFICIAL FACE

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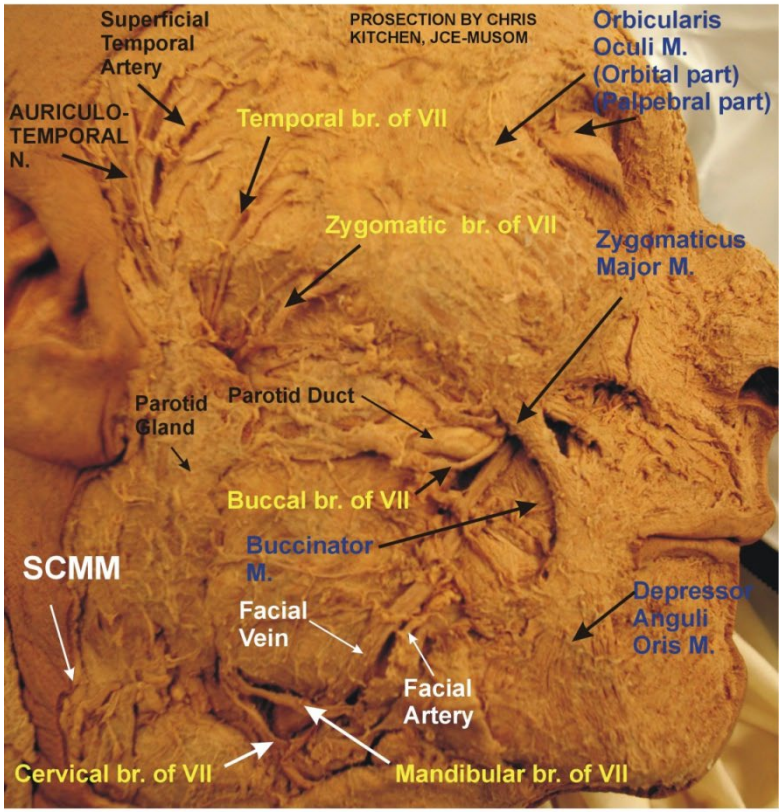

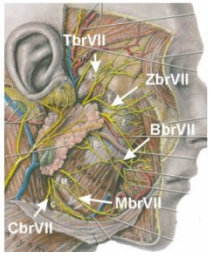

Superficial Temporal Atery
Auriculotemporal Nerve
TbrVII - Temporal branch of VII
ZbrVII - Zygomatic branch of VII
BbrVII - Buccal branch of VII
MbrVII - Mandibular branch of VII
CbrVII - Cervical branch of VII
Orbicularis oculi (orbital part)
Zygomaticus major
Levator Labi Superioris
Depressor Anguli Oris

Buccinator Muscle
Facial Vein
Facial Artery
Parotid Gland
Parotid Duct
Sternocleido-mastoid M.