Face, scalp & trigeminal nerve.

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objects

1-Describe general features of the major openings of facial skeleton.

2-Discuss briefly how the face is developed.-Review the trigeminal nerve and describe nerve supply of the face.

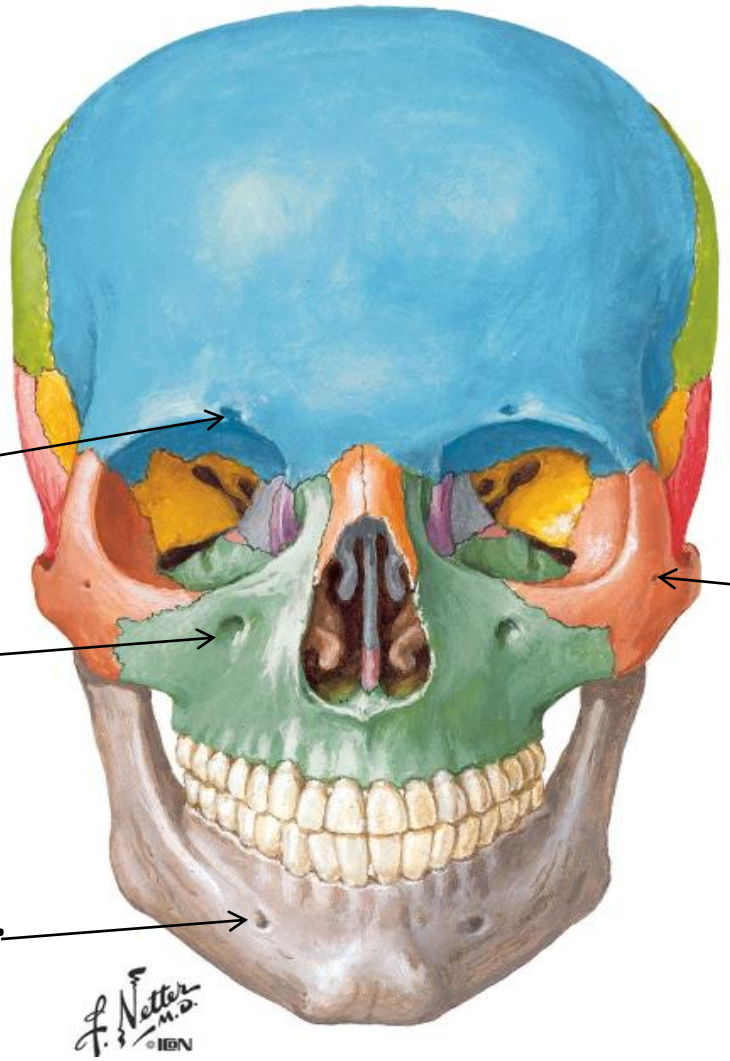
3-Explain the importance of blood supply and lymph drainage of the face.

4-Follow up the course of facial nerve from its point of central connections, exit and down to its target areas. Make a list of types of nerve fibers it contains.

5-Describe the basic structure of the scalp. Make a list of its layers.

6-Describe briefly the muscles, nerve supply and spaces between layers.

7-Make special note of the venous drainage of face and scalp.


supraorbital foramen.
Zygomaticofacial foramen.
Infraorbital foramen.
Mental foramen.

Layers of the face:

- Skin: has rich blood supply (rapid healing)
- Superficial fascia : contains muscles, vessels and nerves of the face
- No deep fascia in most of the face (to allow for facial expressions)

Muscles of the face (muscles of facial expression)

are characterized by :

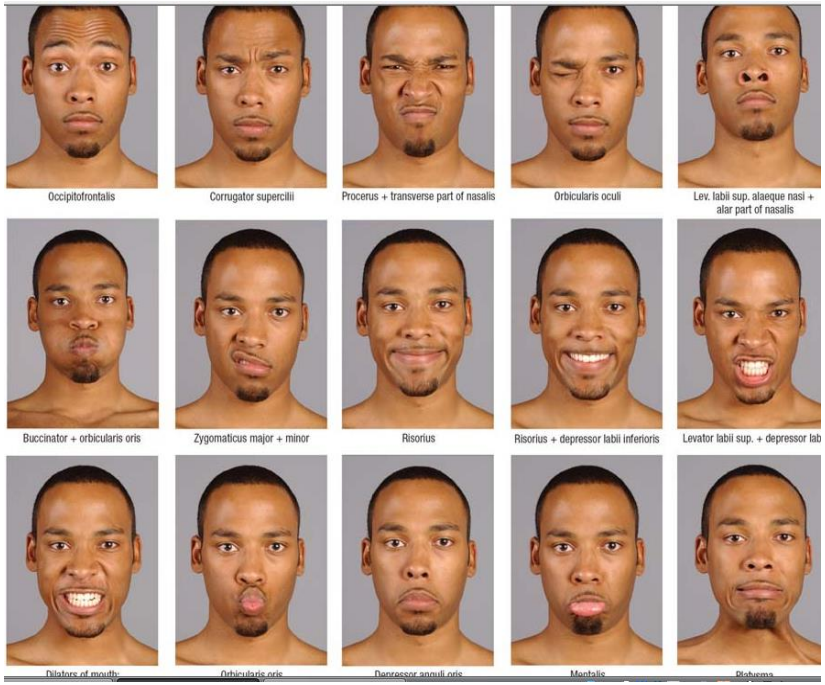
1- Present in the superficial fascia

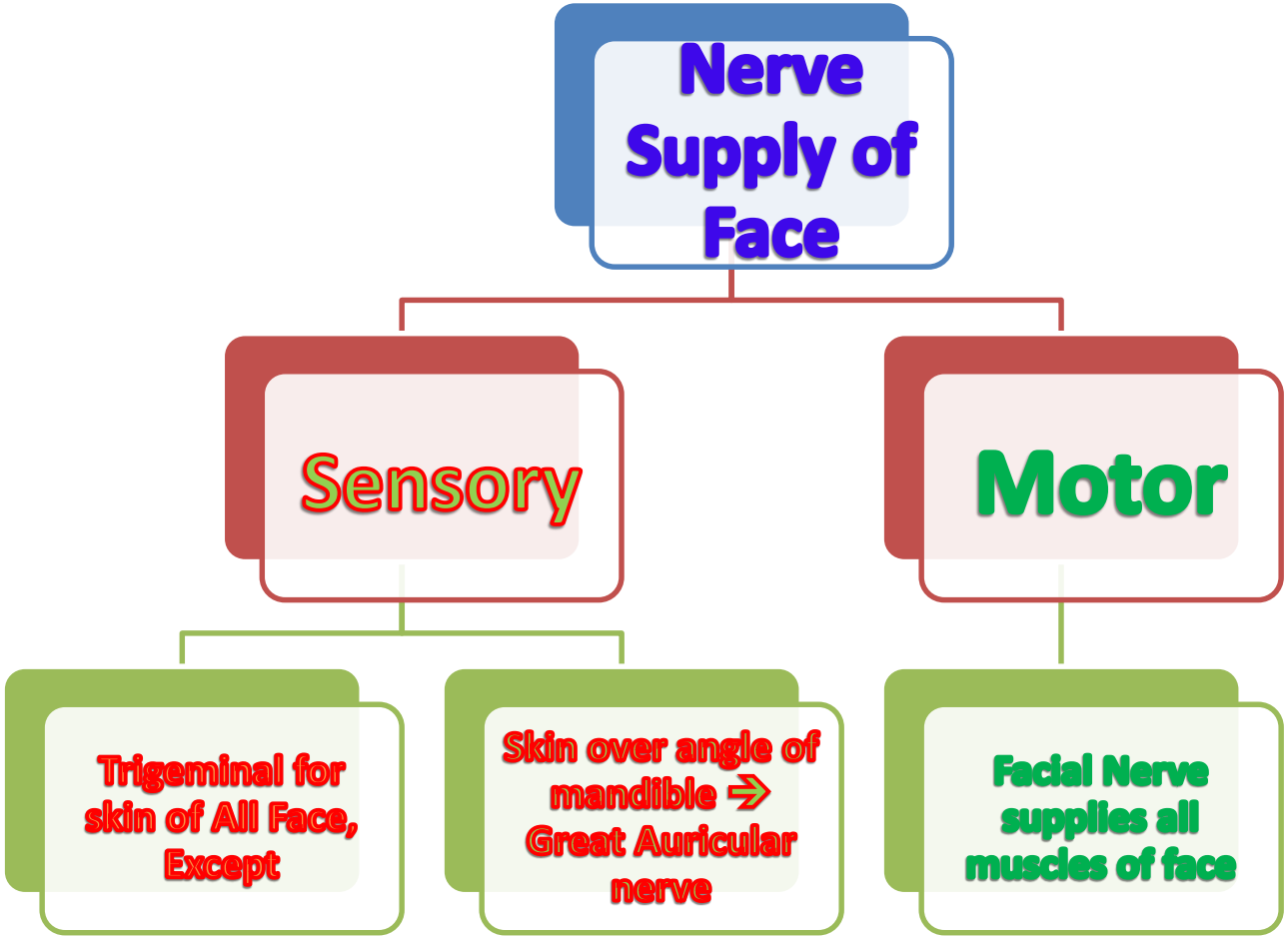
2- Arranged around orifices (openings)

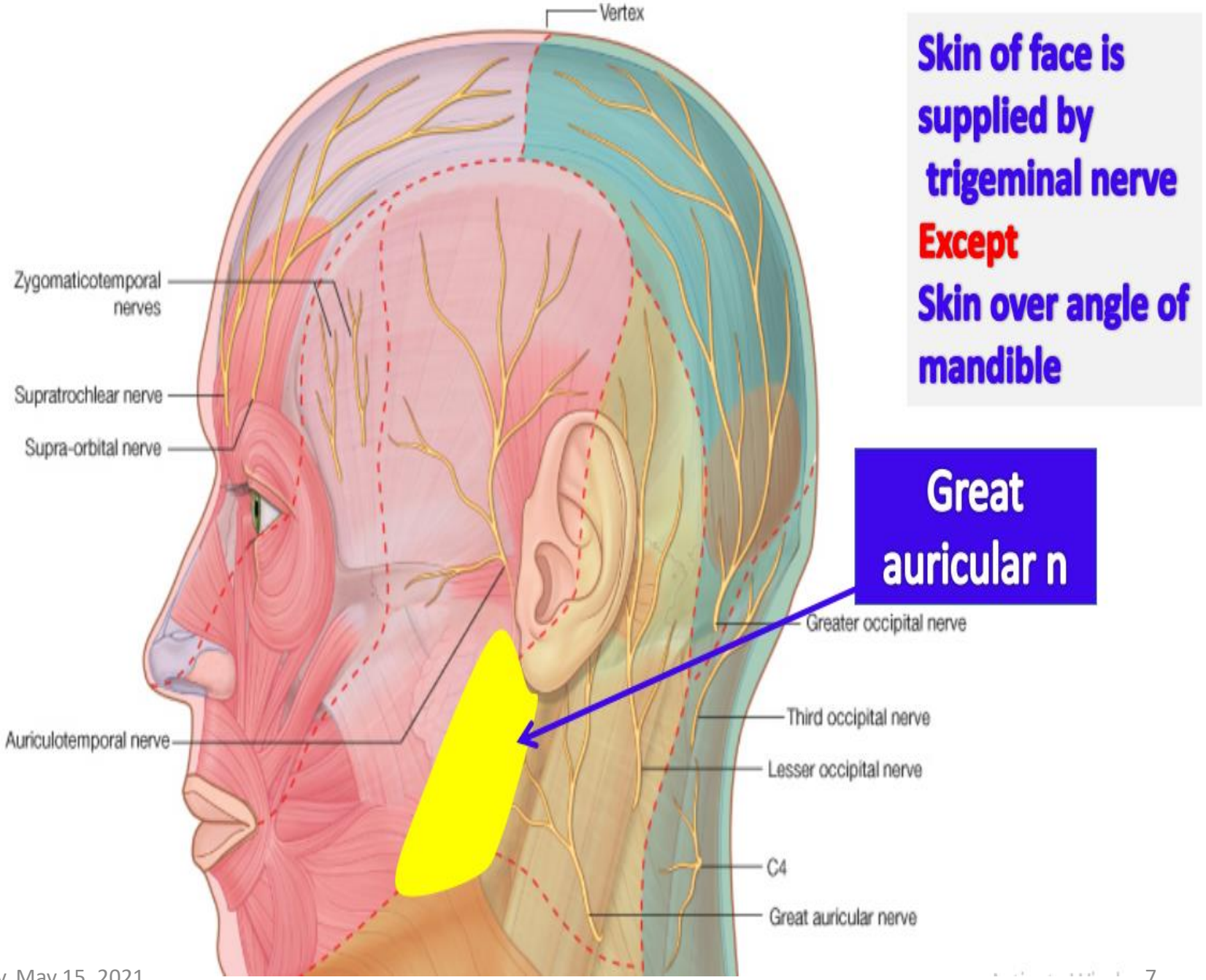
3- May have bony origin ,but **insert into skin**

4- Supplied by **facial nerve**

5- Produce the different facial expressions




Nerve Supply of Face
Sensory
Motor
Trigeminal for skin of All Face, Except
Skin over angle of mandible ⇒ Great Auricular nerve
Facial Nerve supplies all muscles of face



Skin of face is supplied by trigeminal nerve

Except

Skin over angle of mandible

Great auricular n

Sensory nerve supply of face

By branches of trigeminal

Ophthalmic division

- supratrochlear
- supraorbital
- palpebral br. of lacrimal
- infratrochlear
- external nasal

Maxillary division

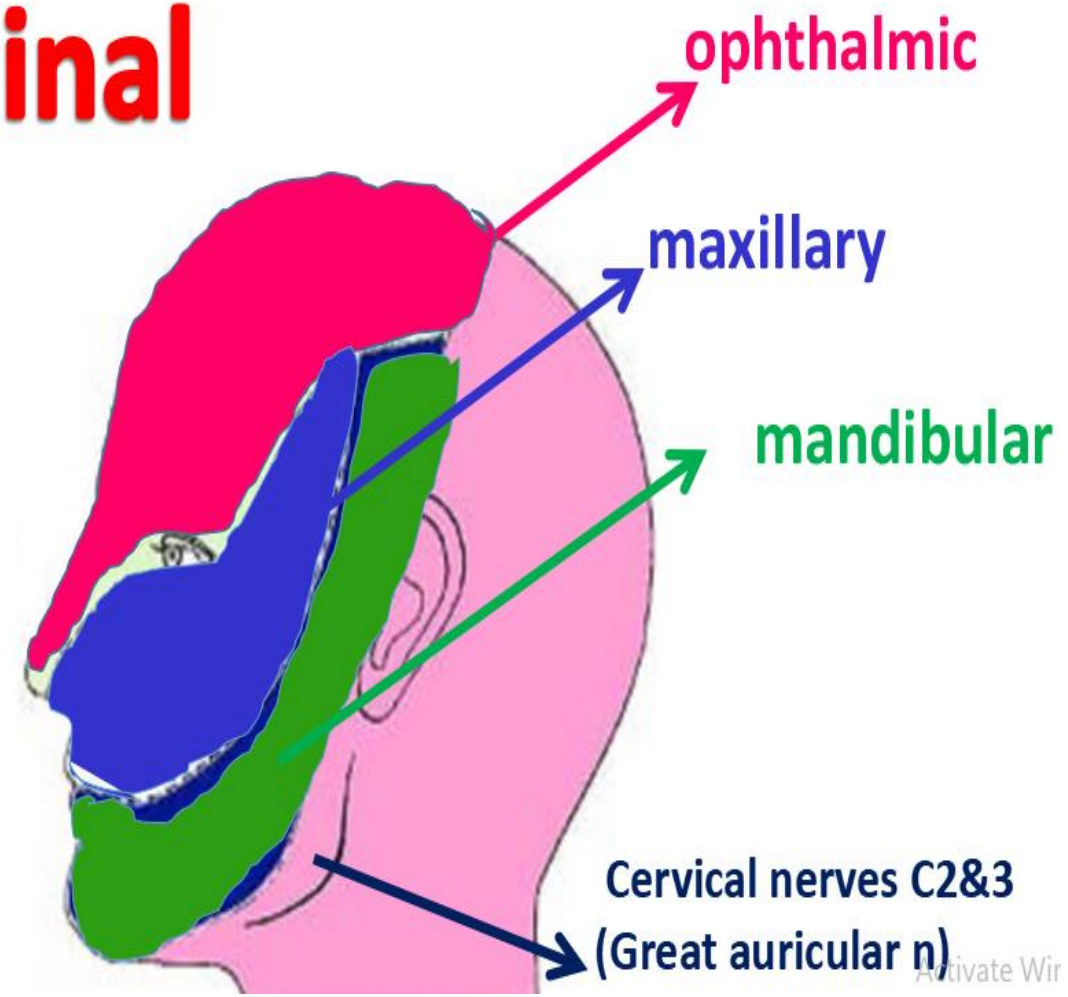
- zygomaticofacial
- zygomaticotemporal
- infraorbital

Mandibular division

- mental
- buccal
- auriculo-temporal

Sensory nerve supply of face

Trigeminal



Ophthalmic division

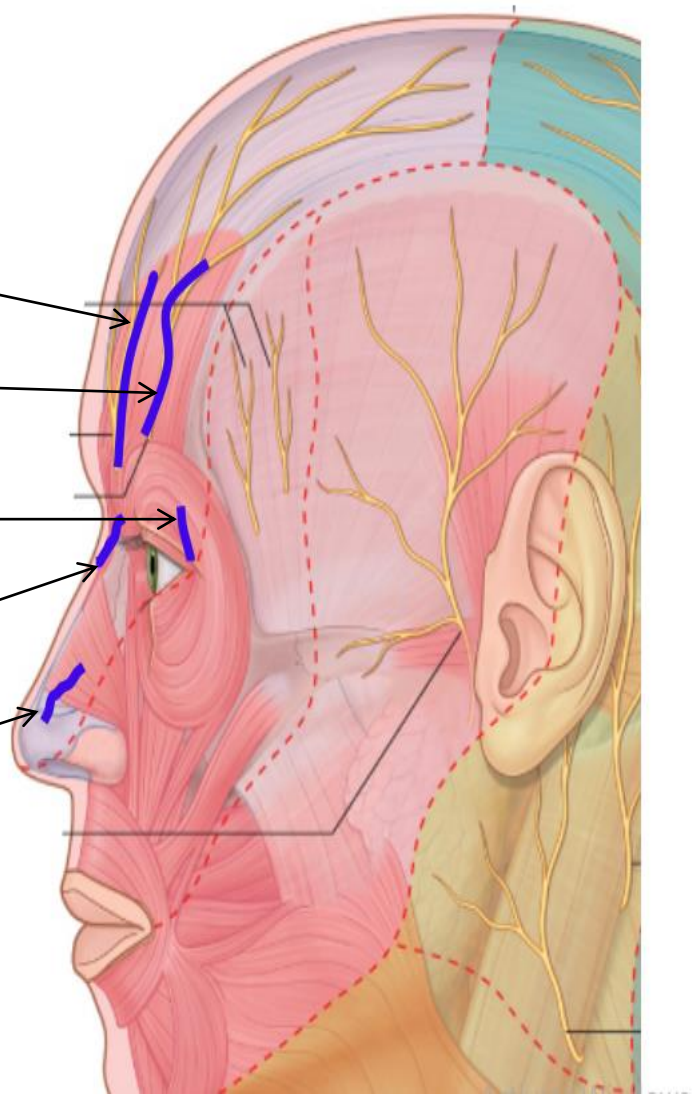
1-supratrochlear

2-supraorbital

3-palpebral br of lacrimal

4-infratrochlear

5-external nasal

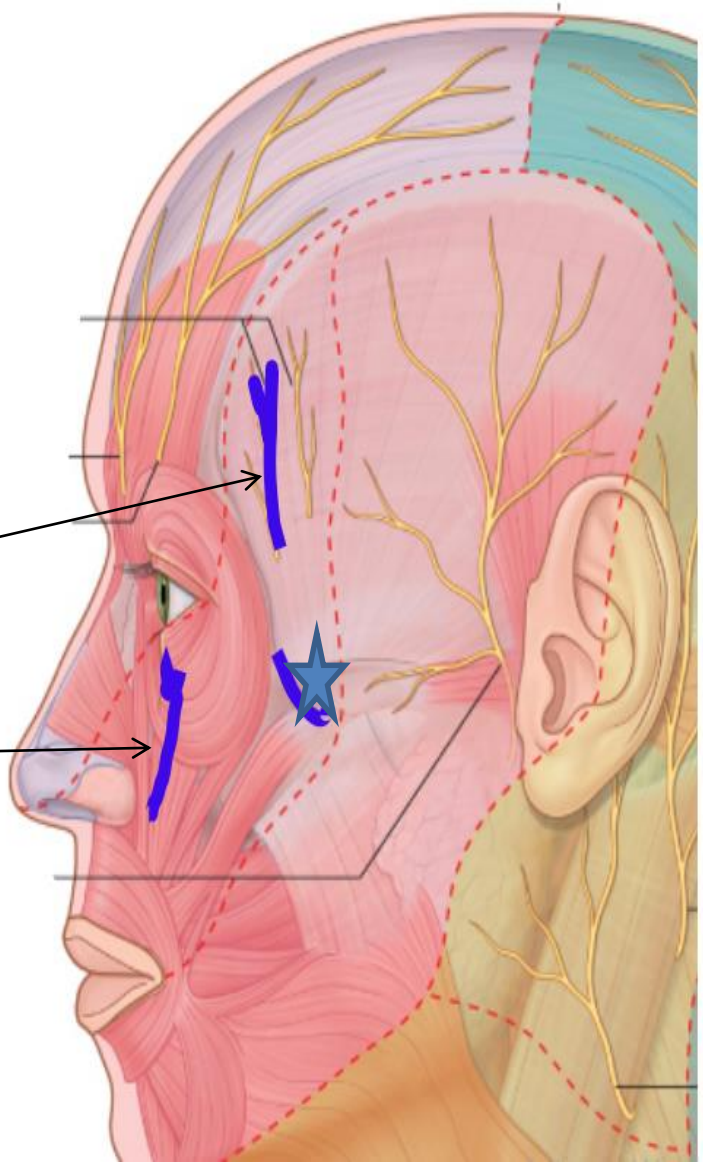


Maxillary division

1-zygomaticofacial

2-zygomaticotemporal

3-infraorbital

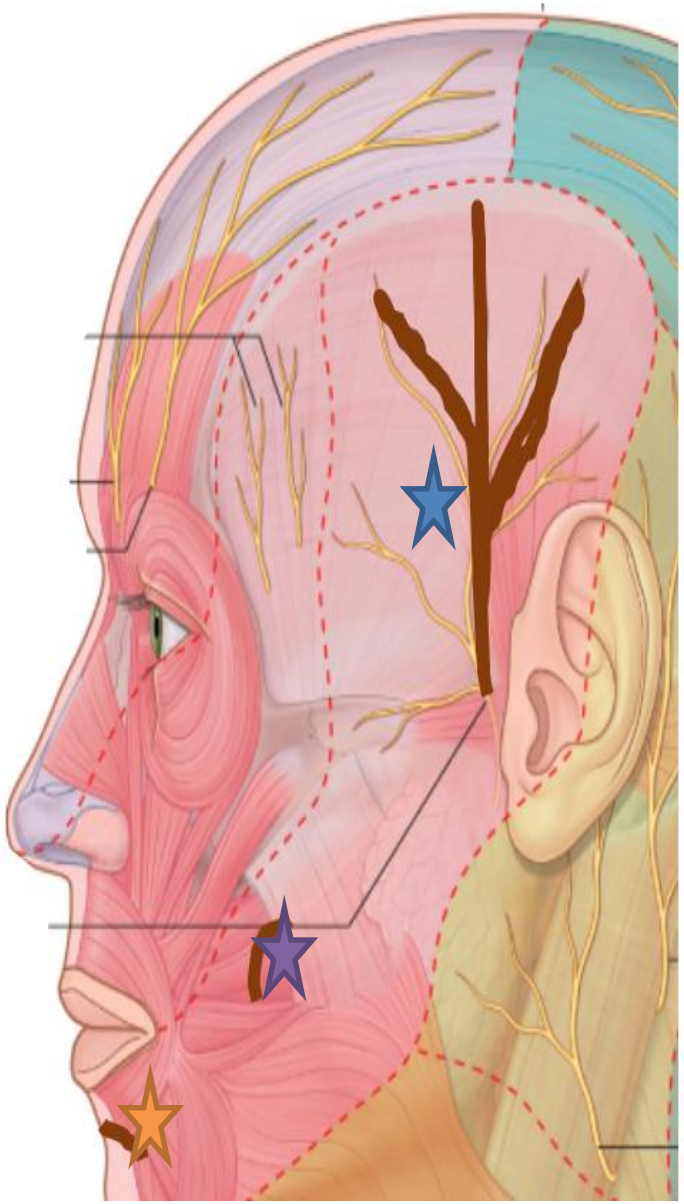


Mandibular division

1-mental

2-buccal

3-auriculotemporal



Arterial supply of face

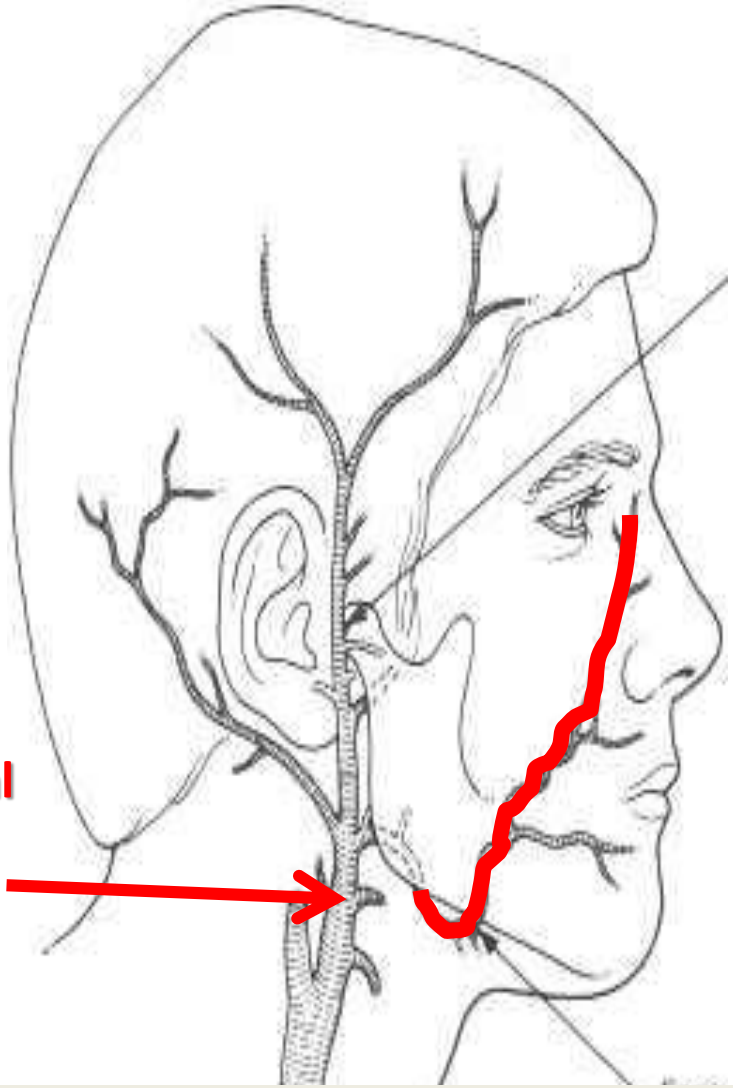
Mainly by :

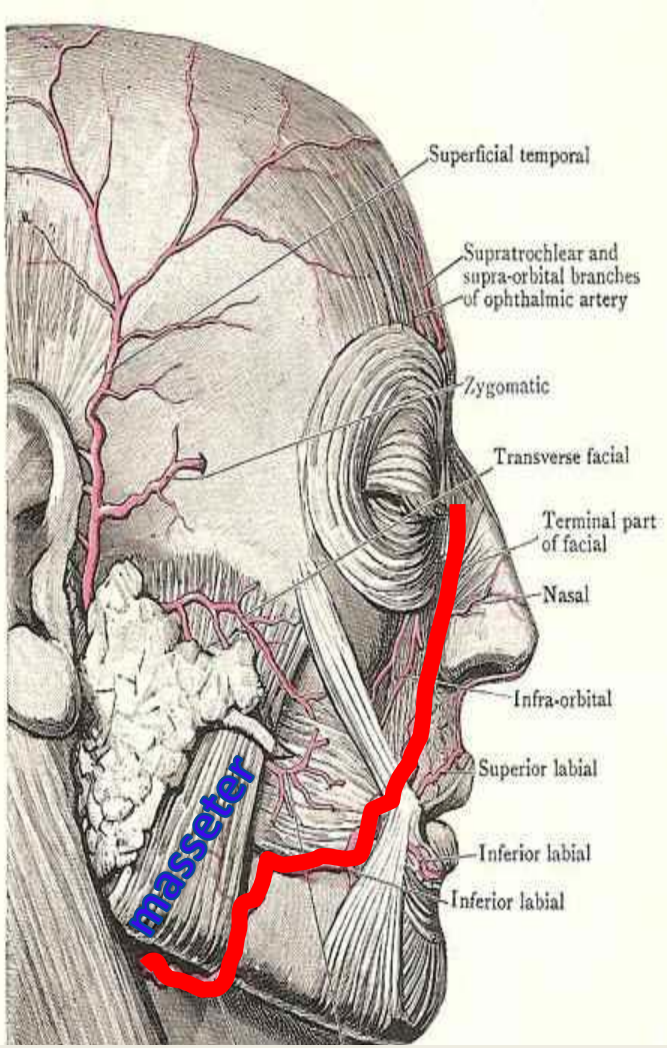
1) Facial artery

2) Superficial temporal artery & Its transverse facial branch

Superficial temporal is one of the two terminal branches of External Carotid artery

Facial artery is branch of extenal carotid artery

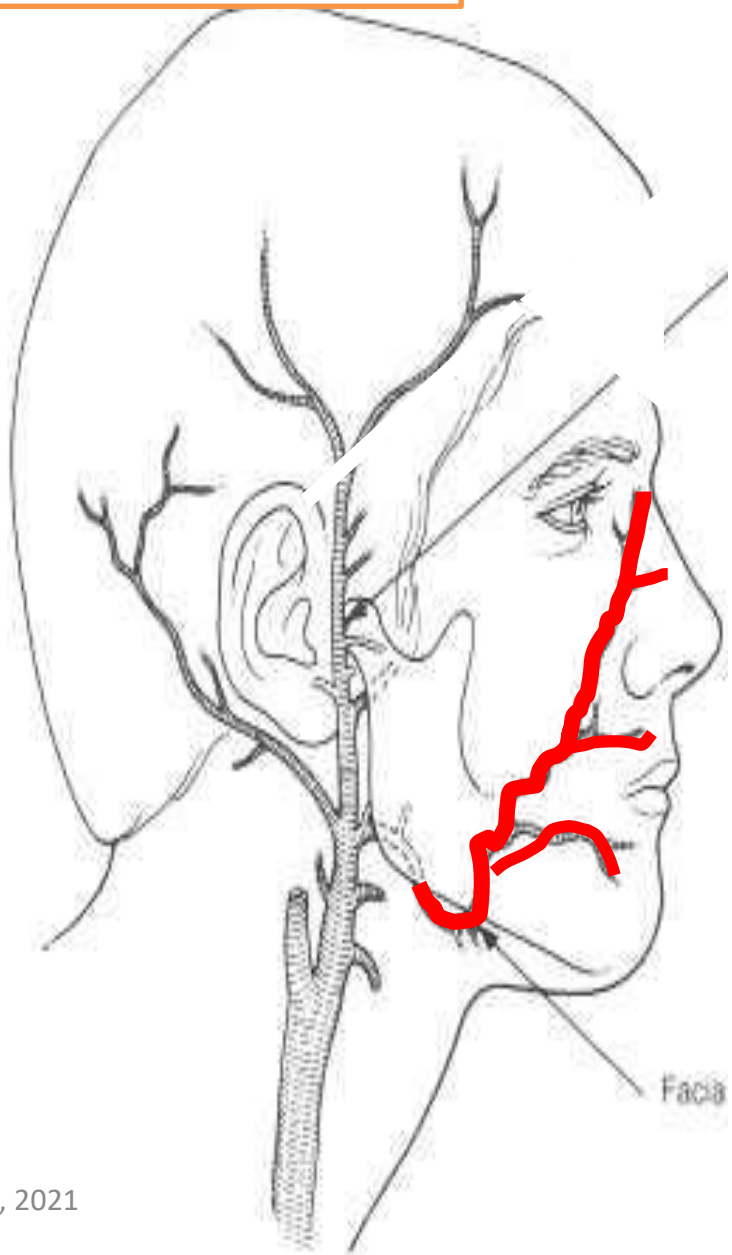




Enters face by winding around lower border of mandible at antero- inferior angle of masseter muscle

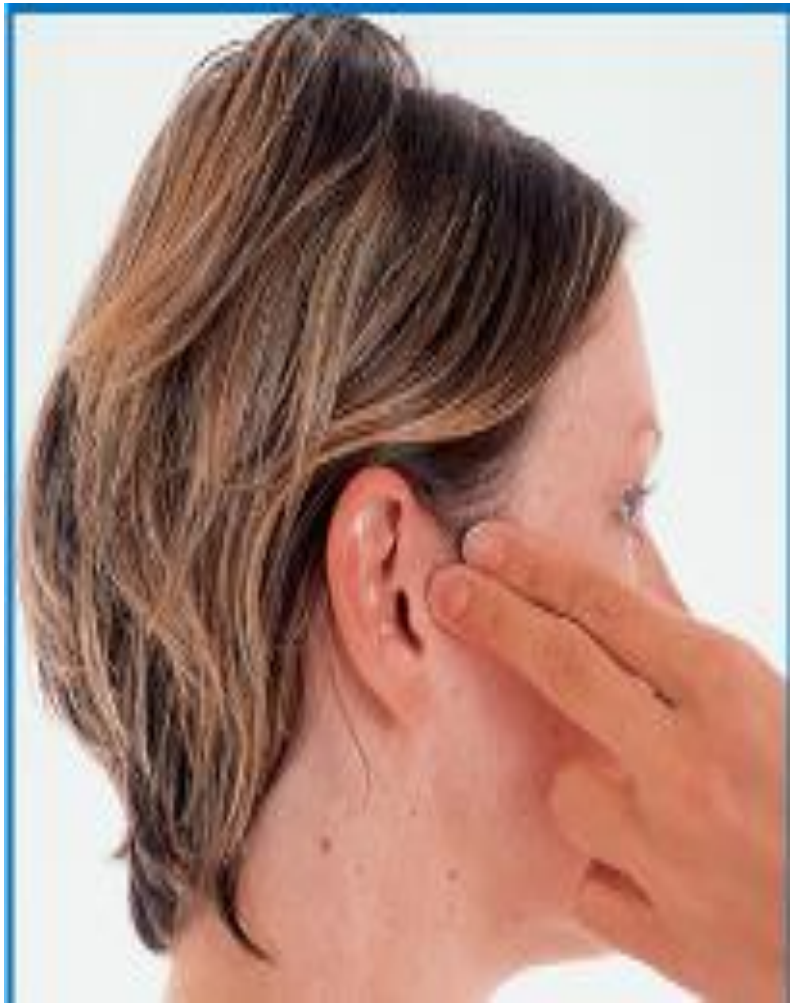
Facial artery

Ascends in a tortuous course to the medial angle of eye.



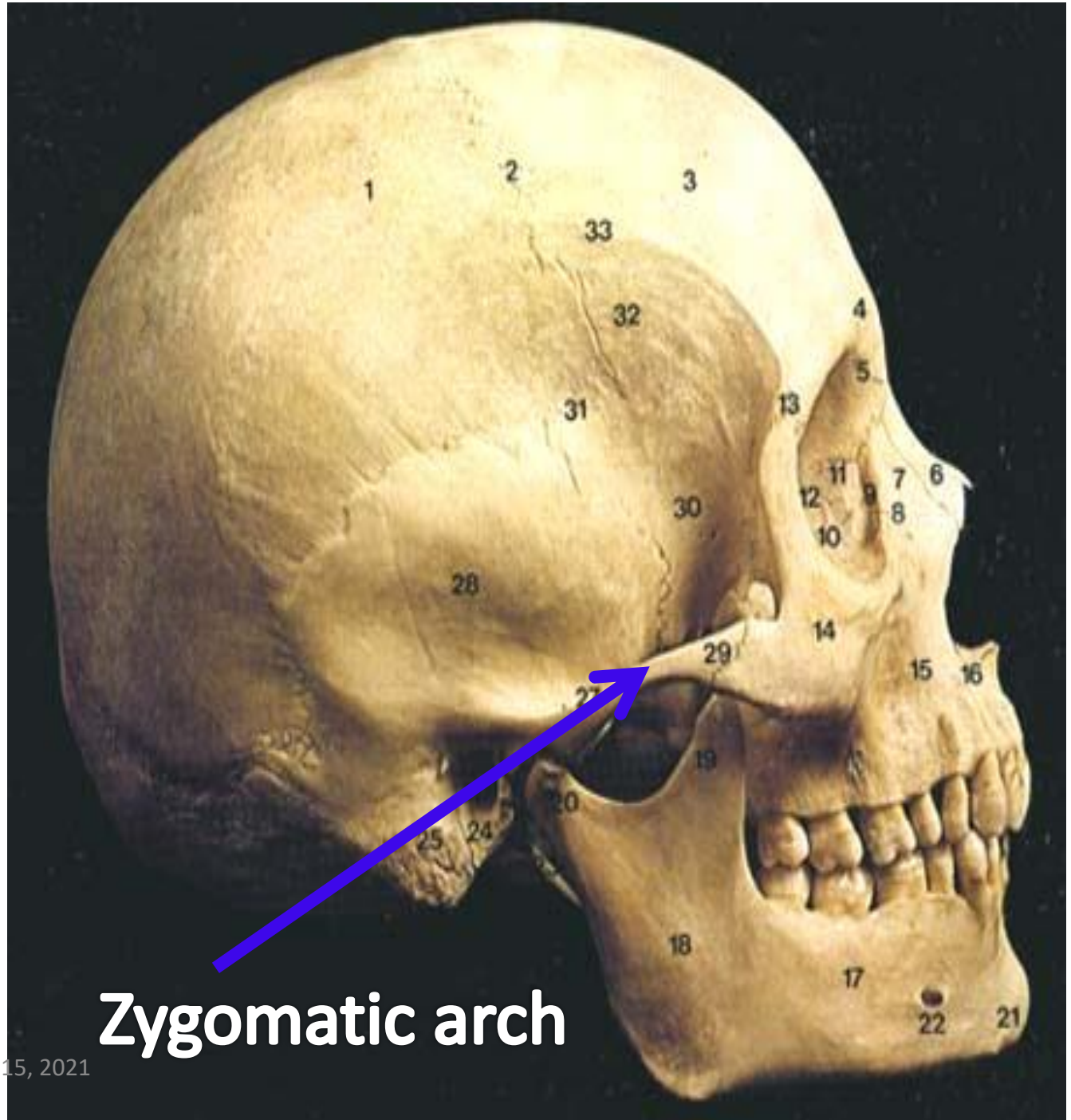
Branches :

1. **Inferior labial**
2. **Superior labial**
3. **Lateral nasal**



Superficial temporal artery pulse is felt against zygomatic arch in front of tragus of ear.

Facial artery pulse is felt against lower border of mandible at antero-inferior angle of masseter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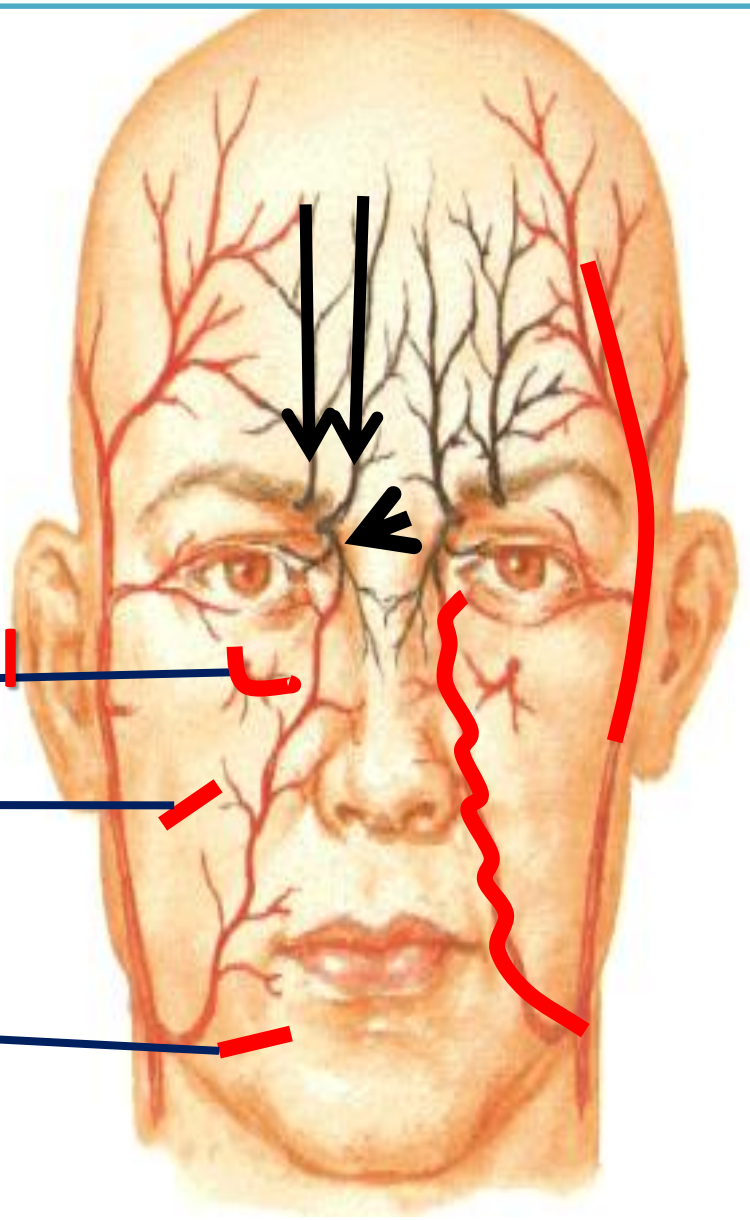
Zygomatic arch

Main arteries supplying the face are:
Facial artery & superficial temporal artery branches from external carotid

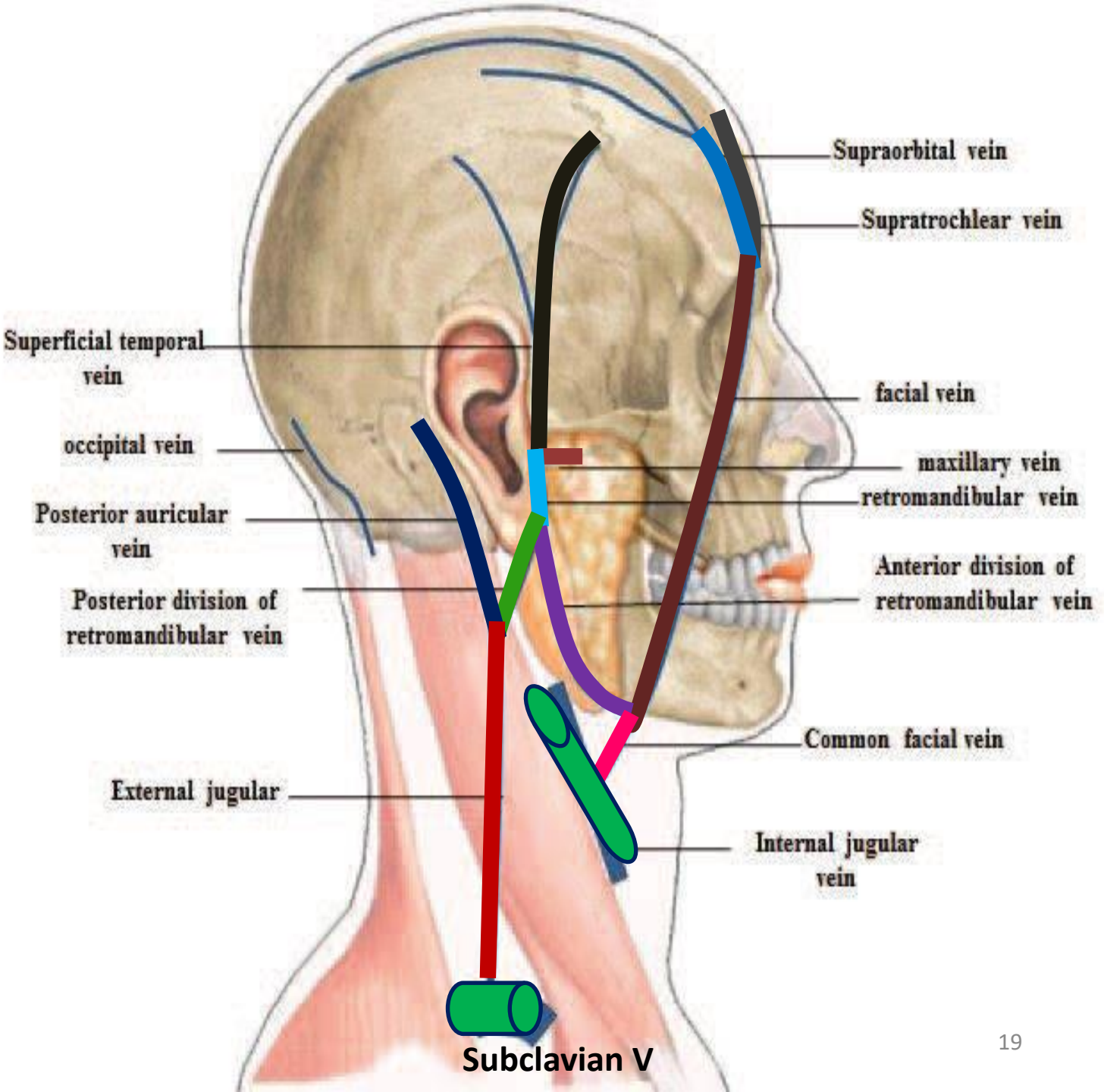
Small arteries accompany the cutaneous nerves of face:

1) From ophthalmic artery of internal carotid➔ supratrochlear, supraorbital & dorsal nasal

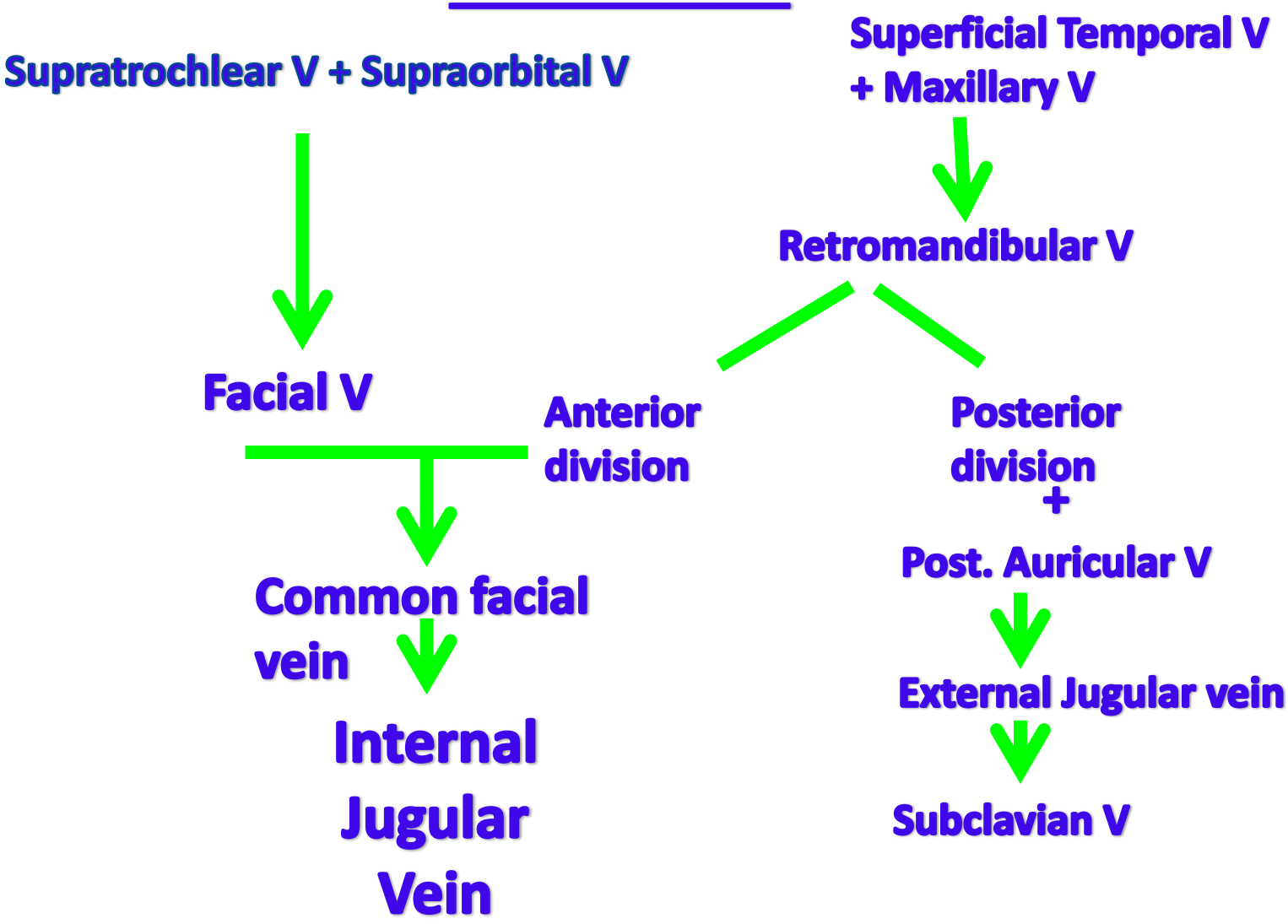
2) from maxillary artery ➔ infraorbital, buccal & mental



Venous drainage of the face



Venous drainage of scalp and face



Facial vein

It is connected with cavernous sinus via 2 routes:

- **Facial vein is connected to superior ophthalmic vein which drains in the cavernous sinus.**
- **Facial vein is connected to pterygoid venous plexus via the deep facial vein.**

Pterygoid venous plexus is connected to cavernous sinus via 3 emissary veins.

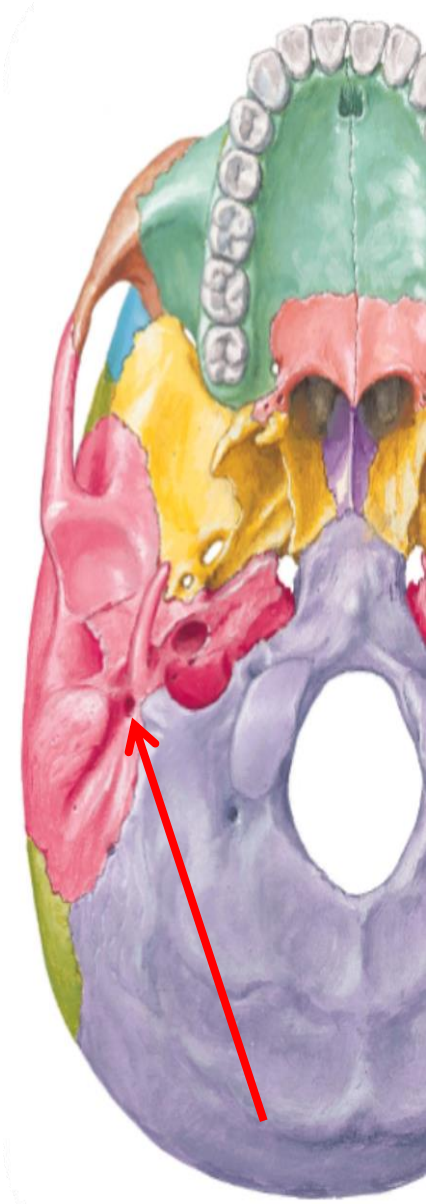
Dangerous area of face includes:

1) Upper lip
2) Nose
3) Medial angles of eyes

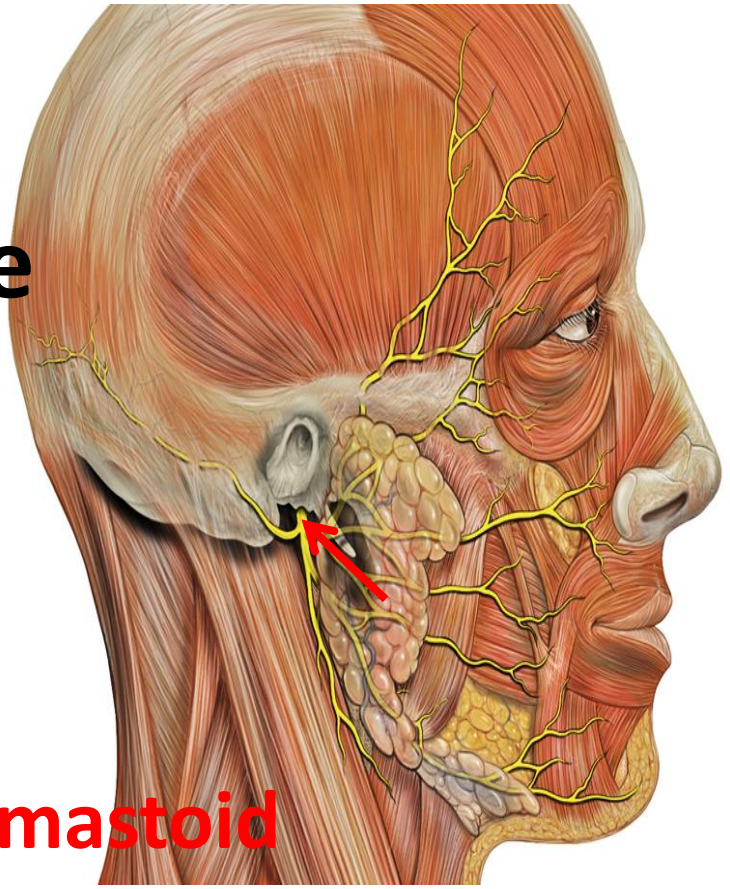
If this area becomes infected → infection can spread to the cavernous sinus

Dangerous area of face

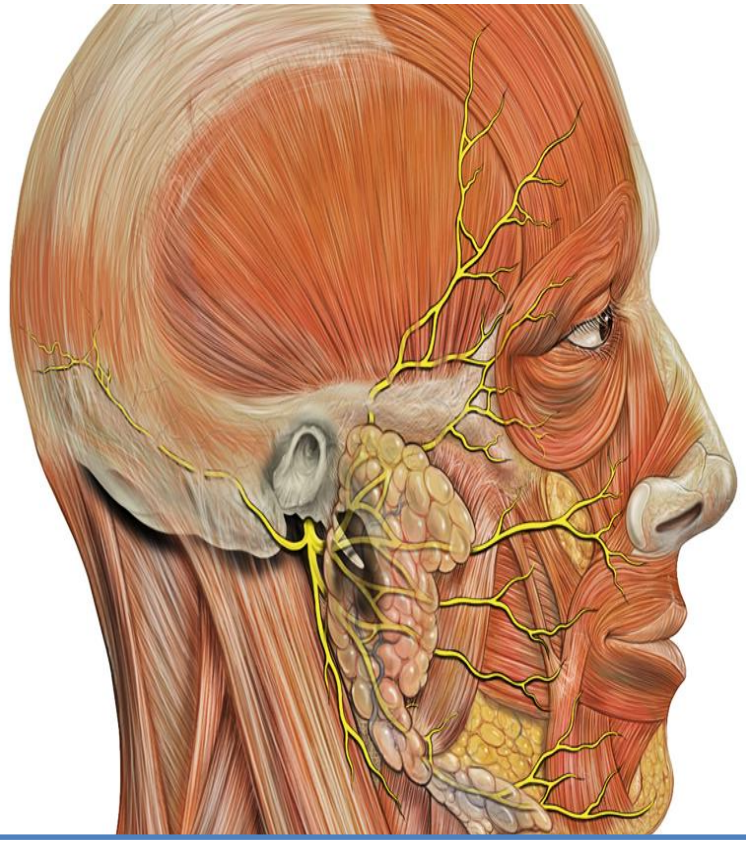
Never squeeze an abcess in the dangerous area of the face



Facial nerve

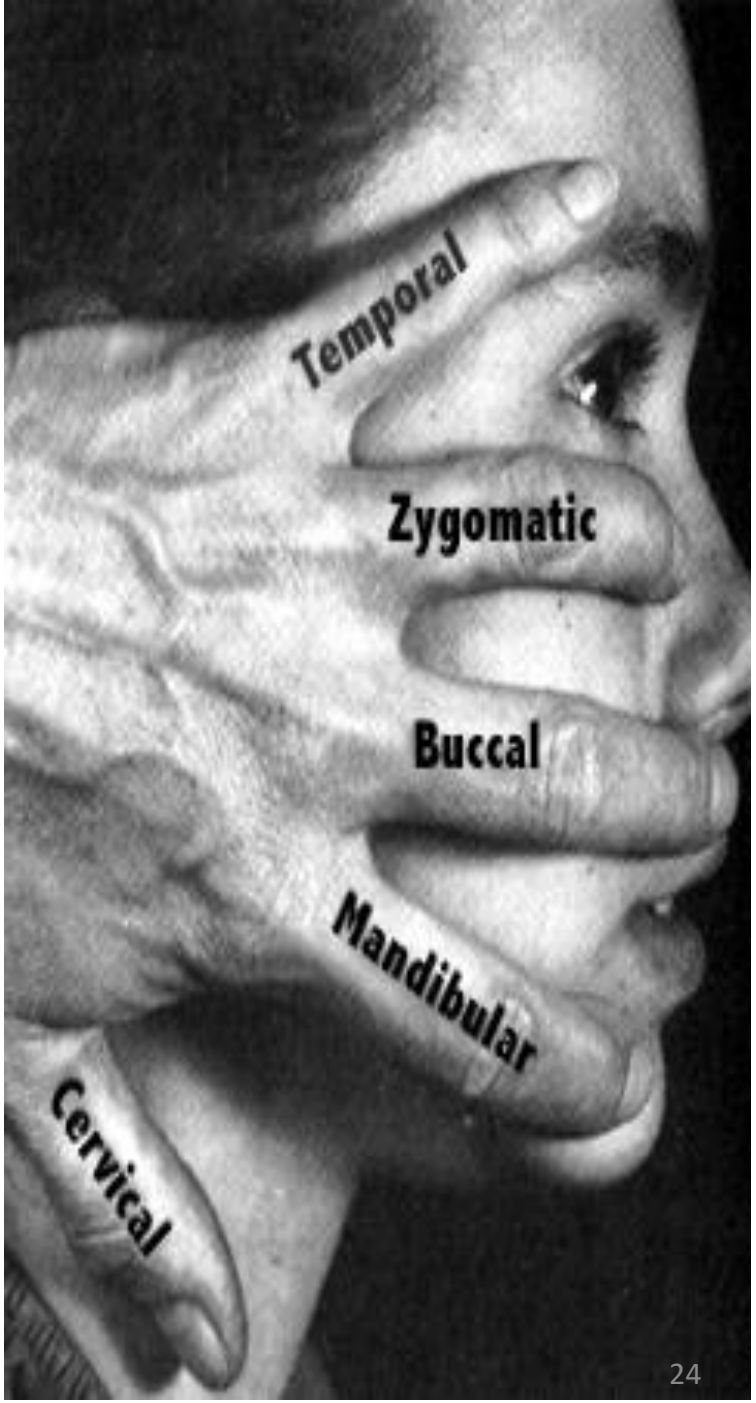


leaves the skull through the stylomastoid foramen.

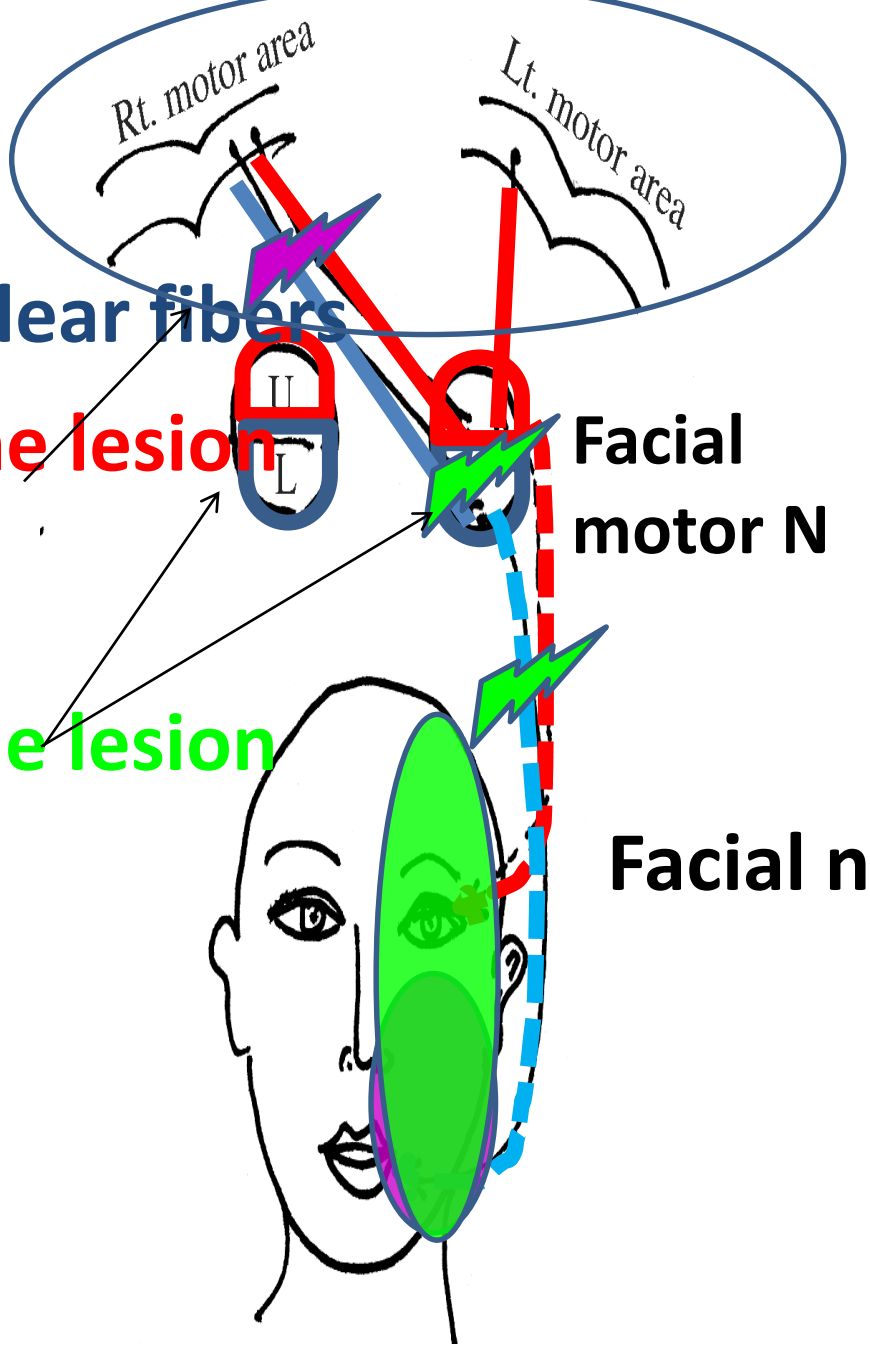


Facial n enters parotid gland and divides into

its 5 terminal branches which emerge from anterior border of parotid to supply muscles of facial expression



Facial Nerve VII Lesions



Lesions of Facial Nerve

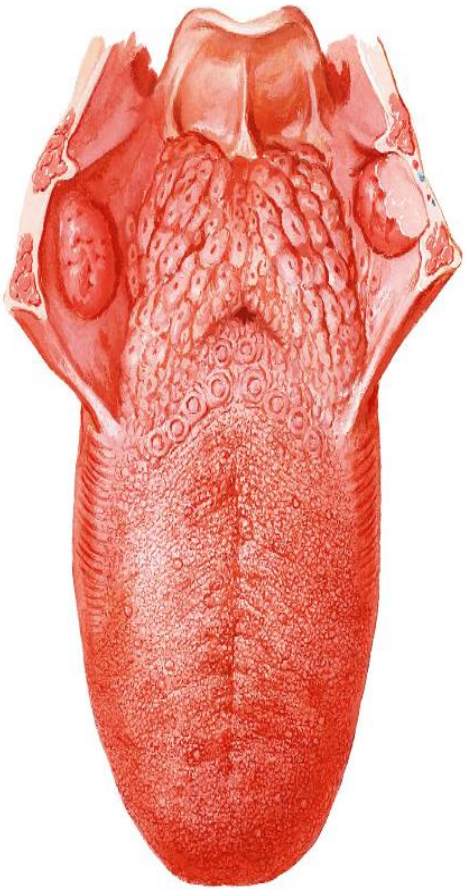
Supra nuclear lesion:

- **It is UMNL**
- **Only the lower part of face of contralateral (opposite side) is paralyzed**

Nuclear and infranuclear:

- **All muscles upper & lower face ipsilateral (on same side) are paralyzed**
- **If lesion is at stylomastoid foramen: only motor paralysis ipsilateral**

How to test for integrity of Facial Nerve?

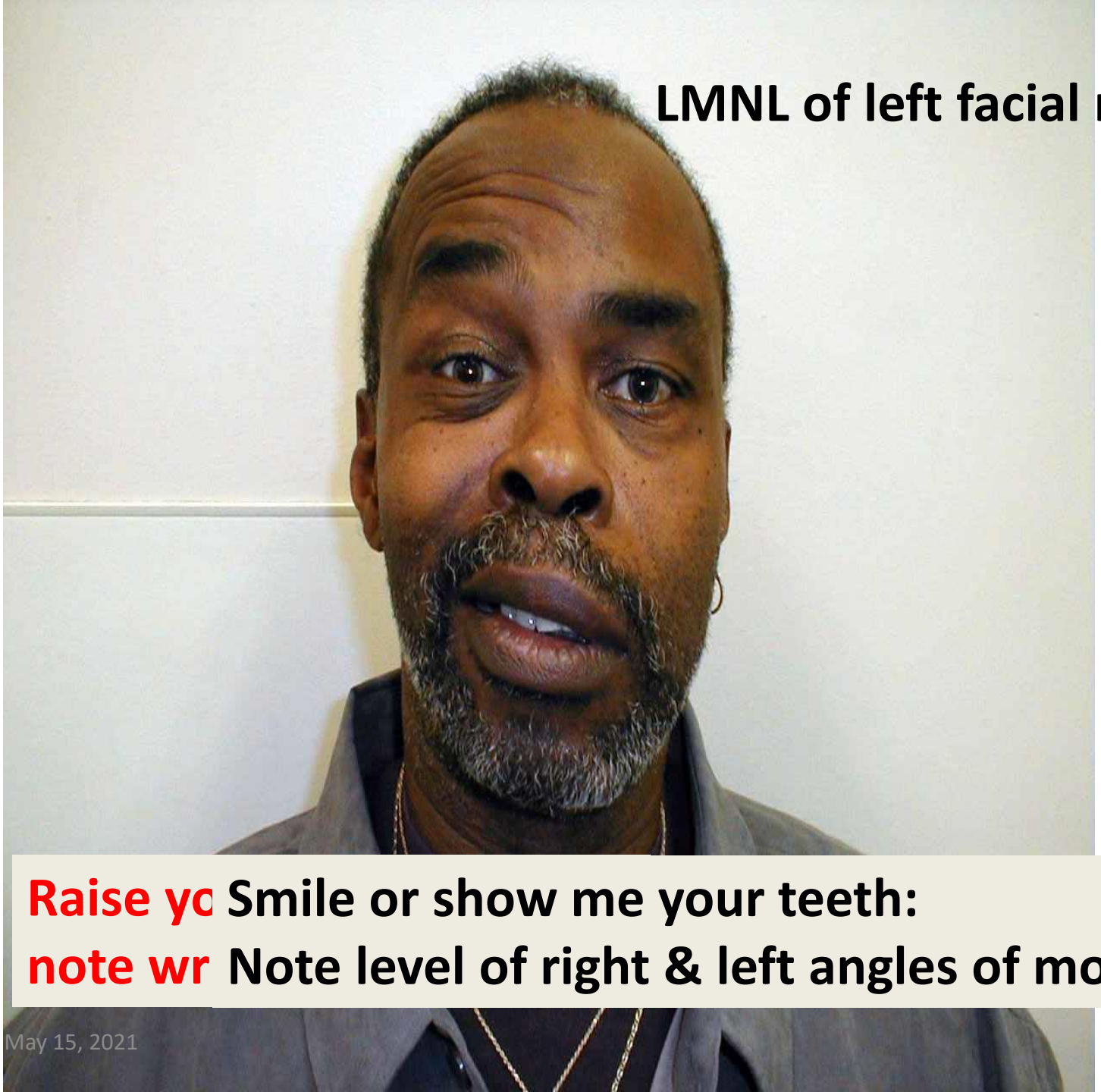


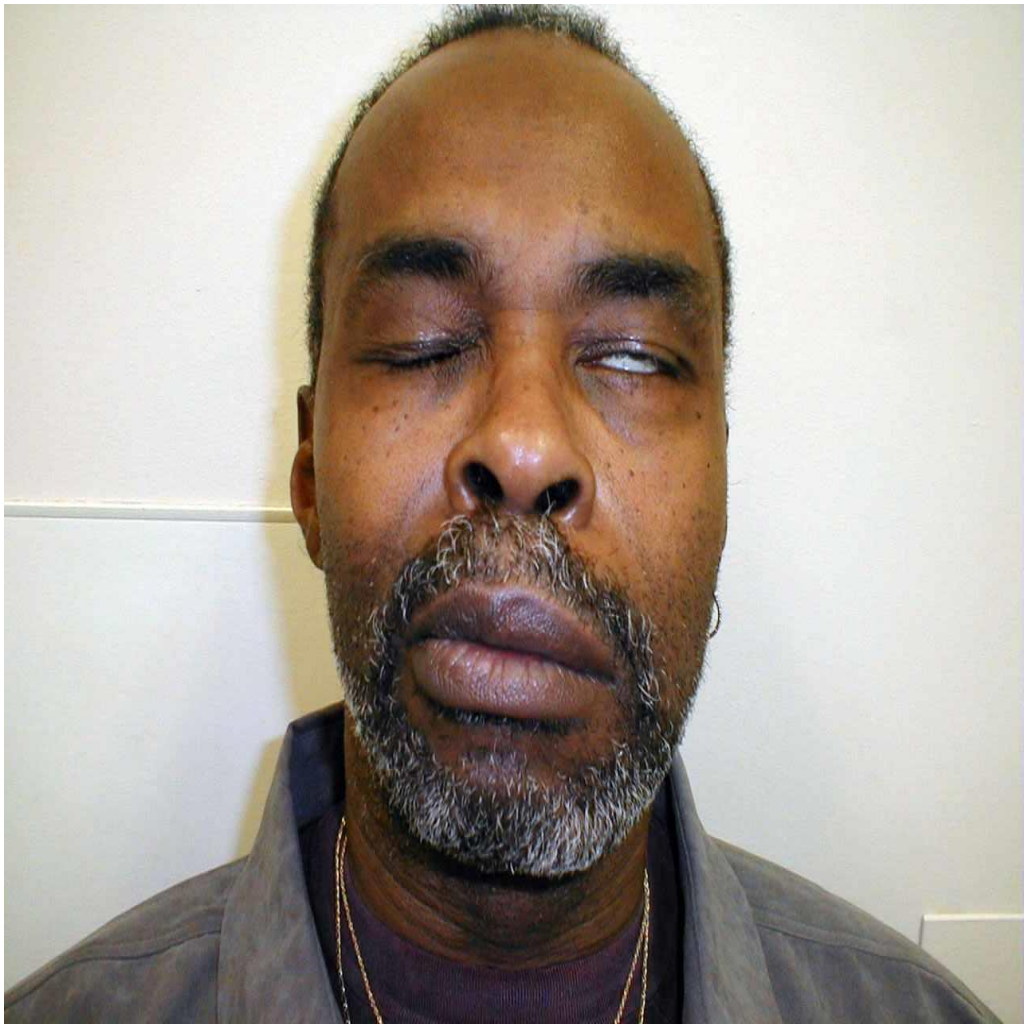
Raise the eyebrows.

Close the eyes tightly

Smile & show the teeth

Taste ➔ by putting salt /sugar/vinegar on ant. 2/3 of tongue

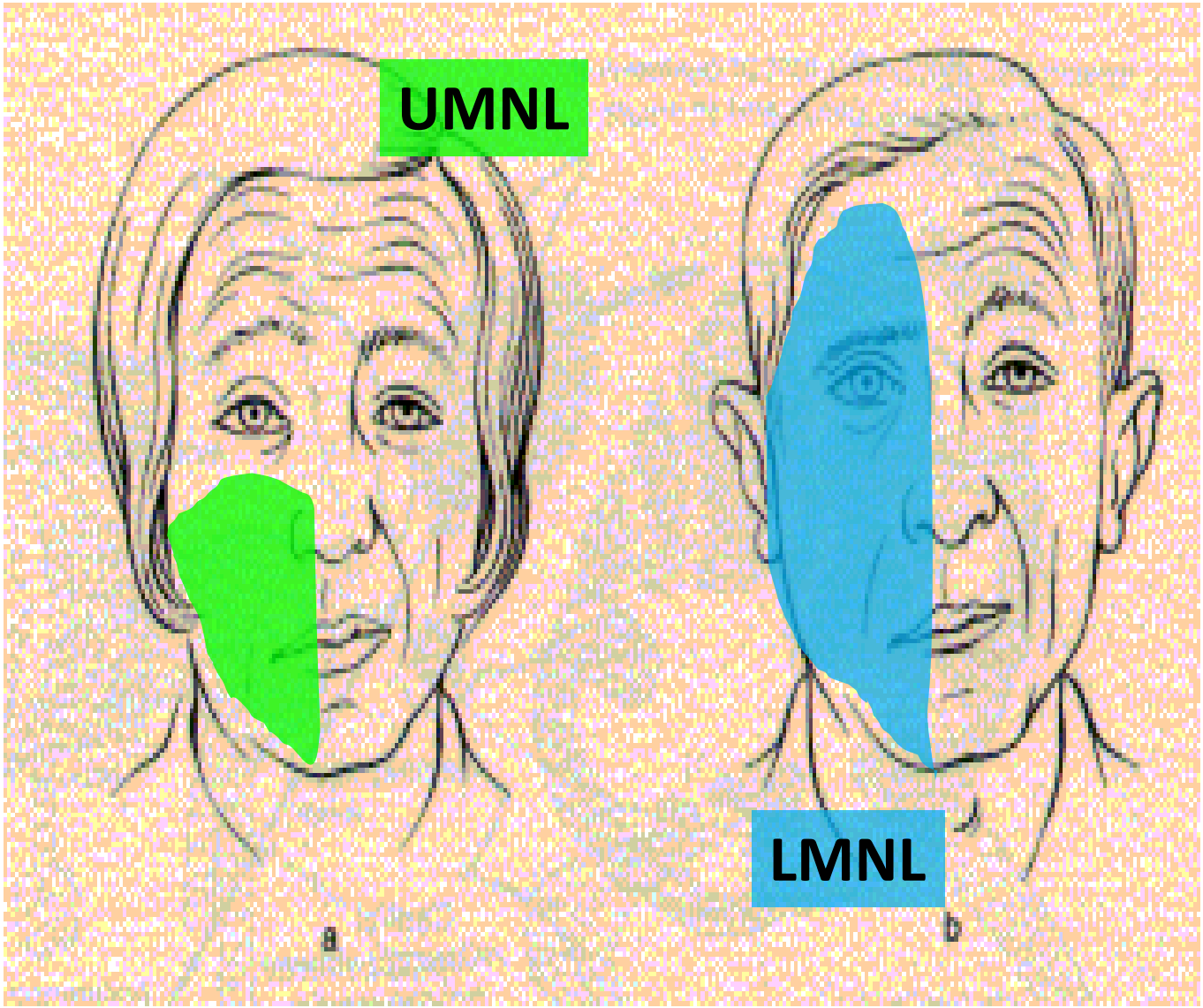

LMNL of left facial nerve
Raise yo Smile or show me your teeth:
note wr Note level of right & left angles of mouth



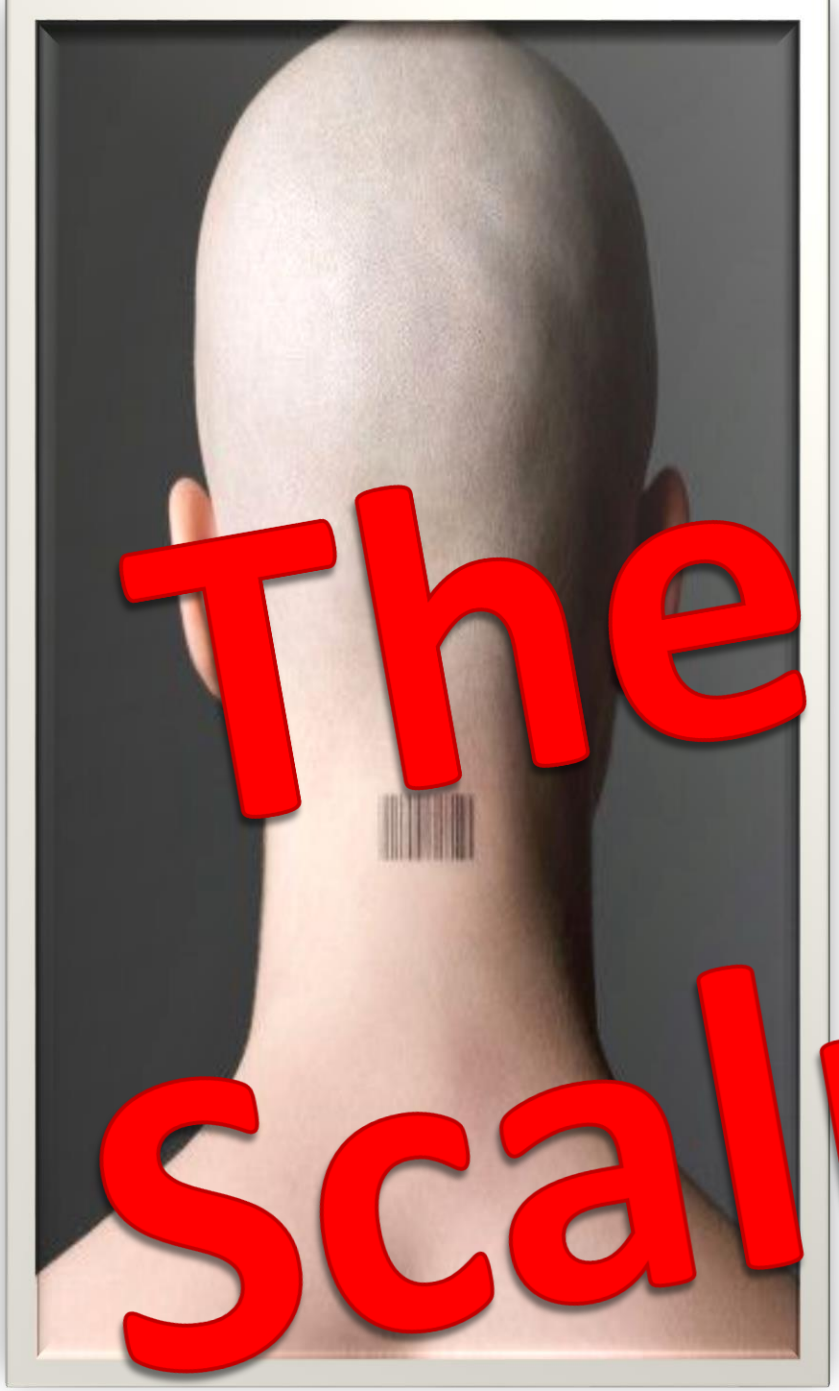
Close your eyes

Close your eyes & smile to show me your teeth

LMNL of left facial nerve


UMNL
LMNL
a
b

The scalp


The
Scalp

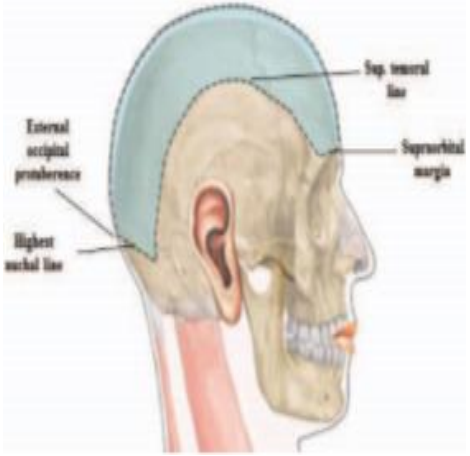
DEFINITION: **It is the soft tissue that covers the vault of the skull.**

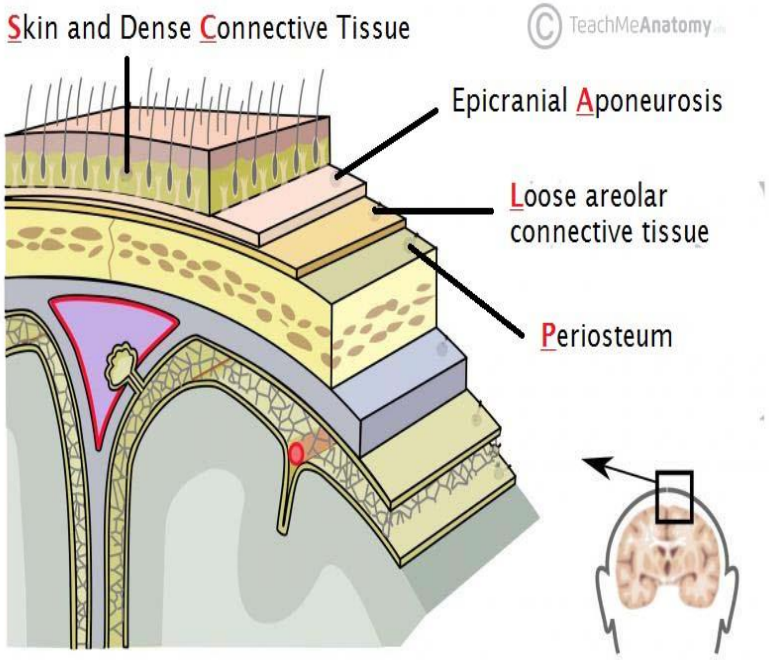
Extension

Anteriorly: Supra- orbital margin.

Posteriorly: External occipital protuberance and highest nuchal line.

Laterally: Superior temporal line.

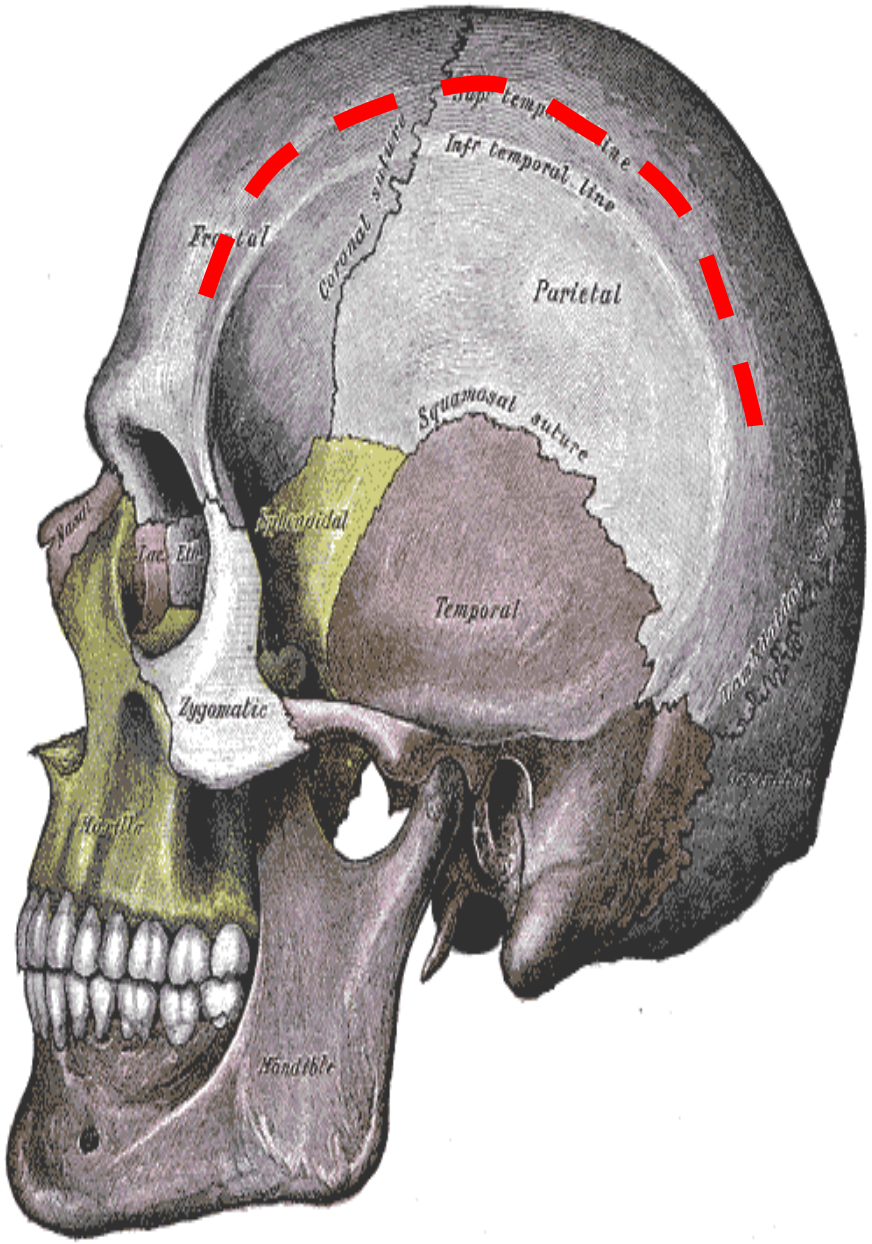




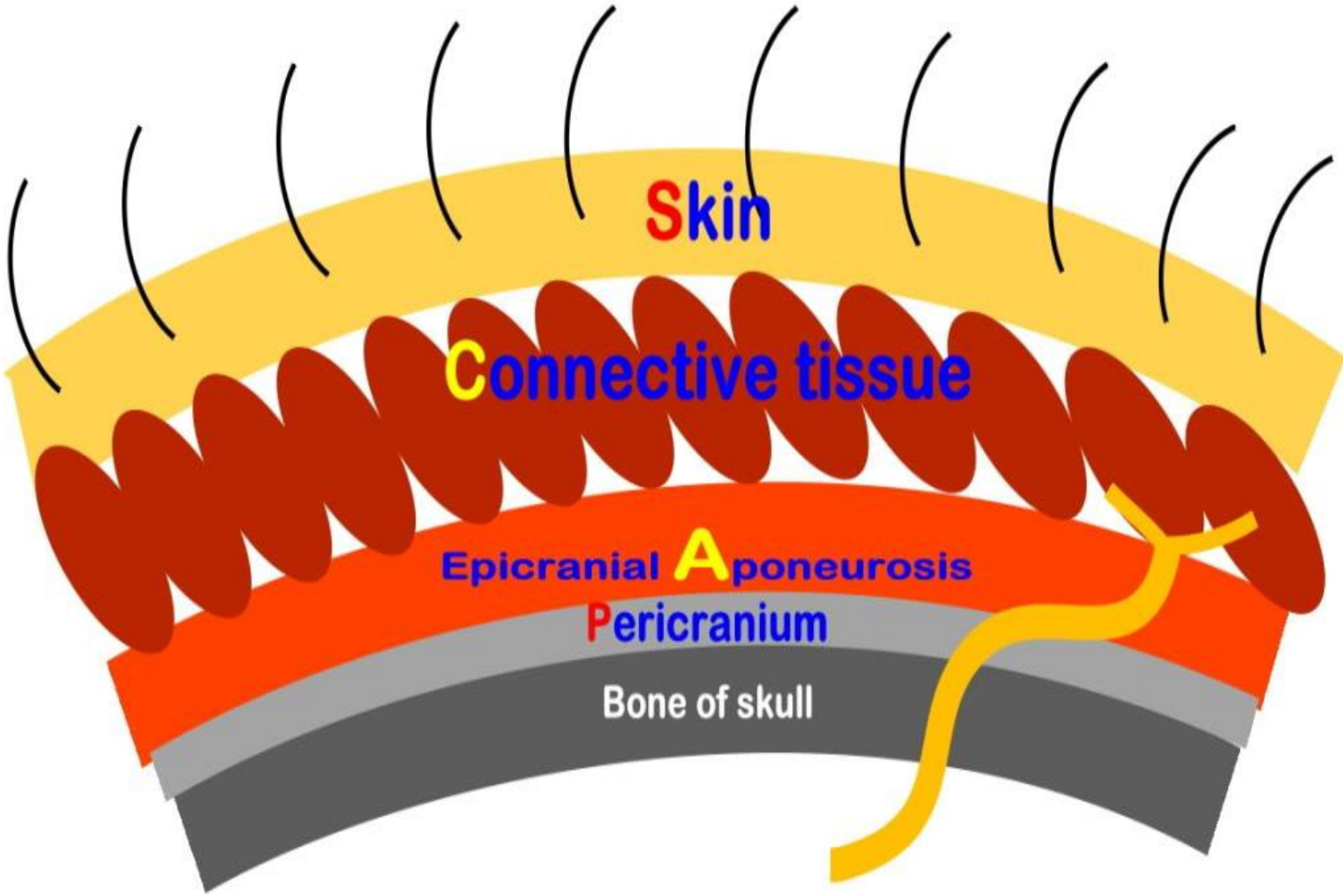
The scalp is the soft tissue that covers the vault of skull (skull cap)

It extends from superior orbital margin to highest nuchal line

Scalp is attached laterally to the superior temporal lines



LAYERS OF SCALP



1-Skin

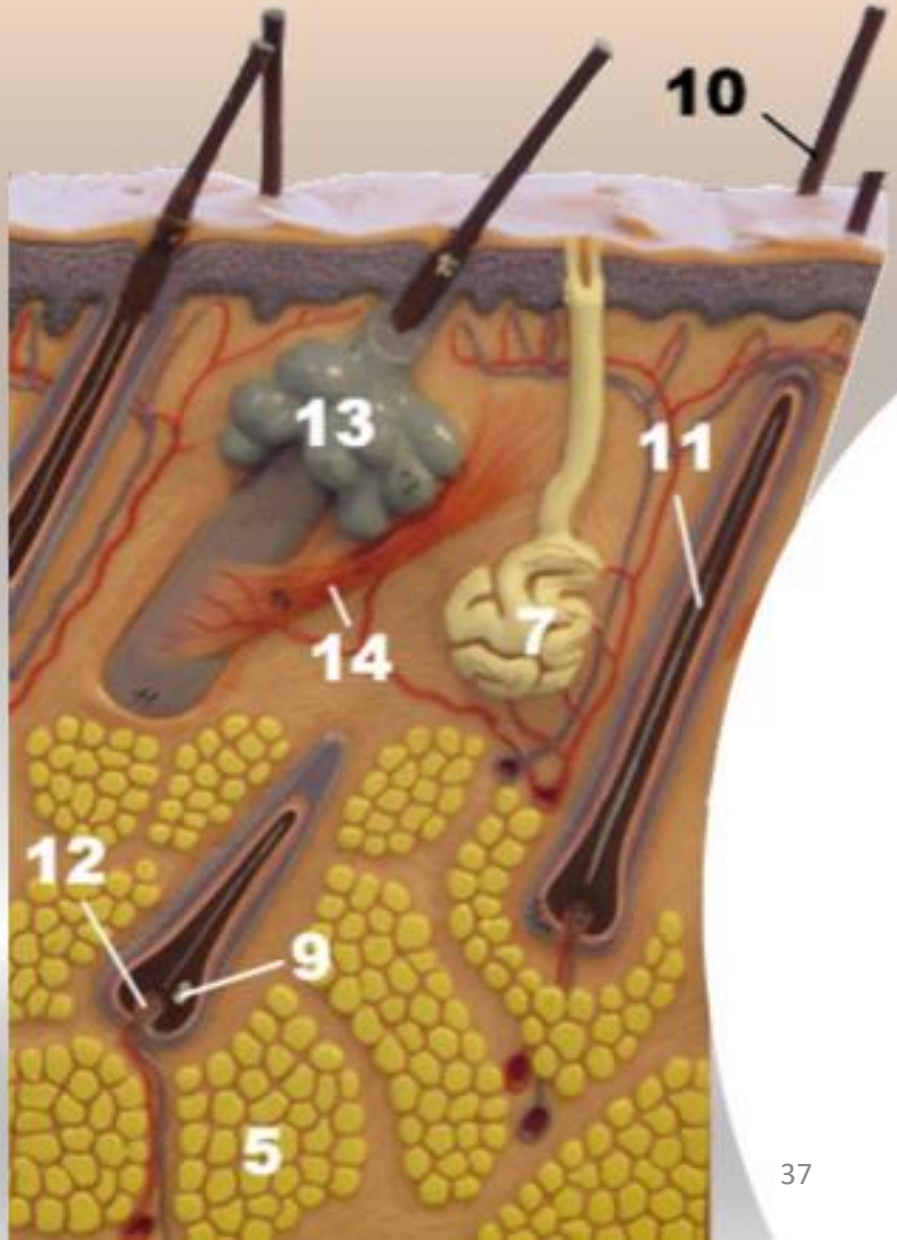
Hairy

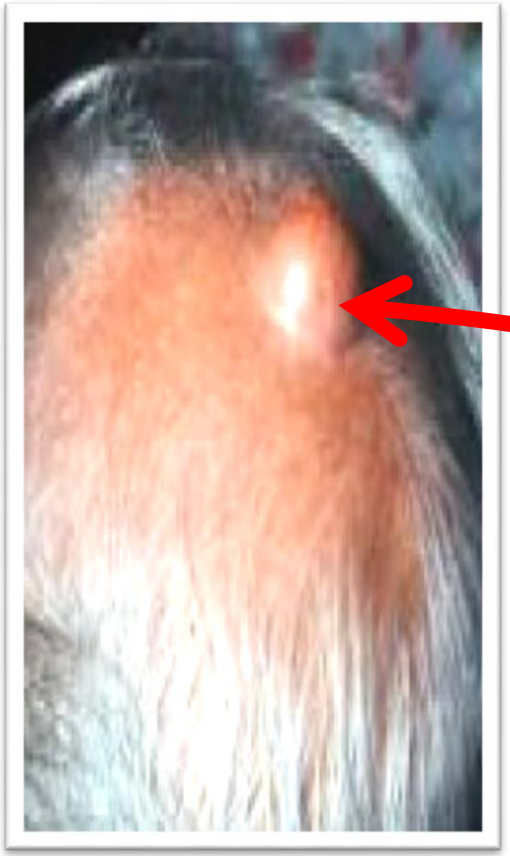
Vascular

Sweat glands

Sebaceous glands

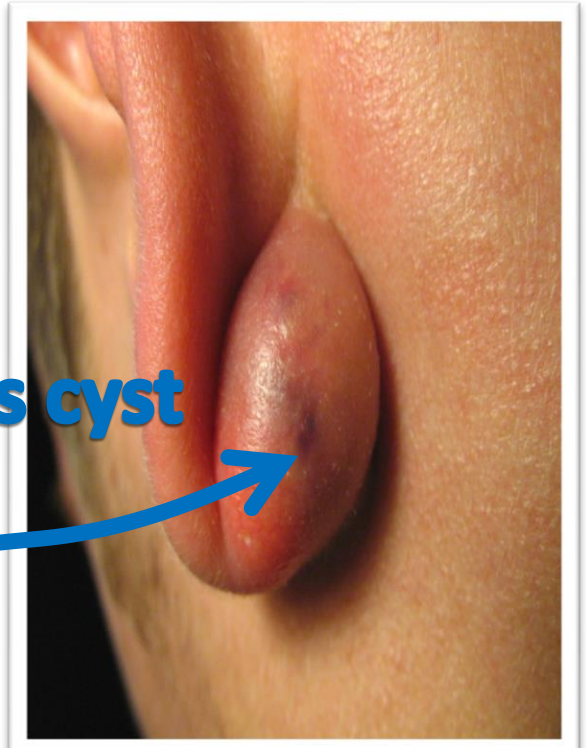
Clinical correlates





a sebaceous cyst of the scalp

an infected sebaceous cyst behind the ear



2- Connective tissue

- Dense
- Rich vascular and nerve supply
- Connects layer 1 (.....) and 3 (.....) through septa

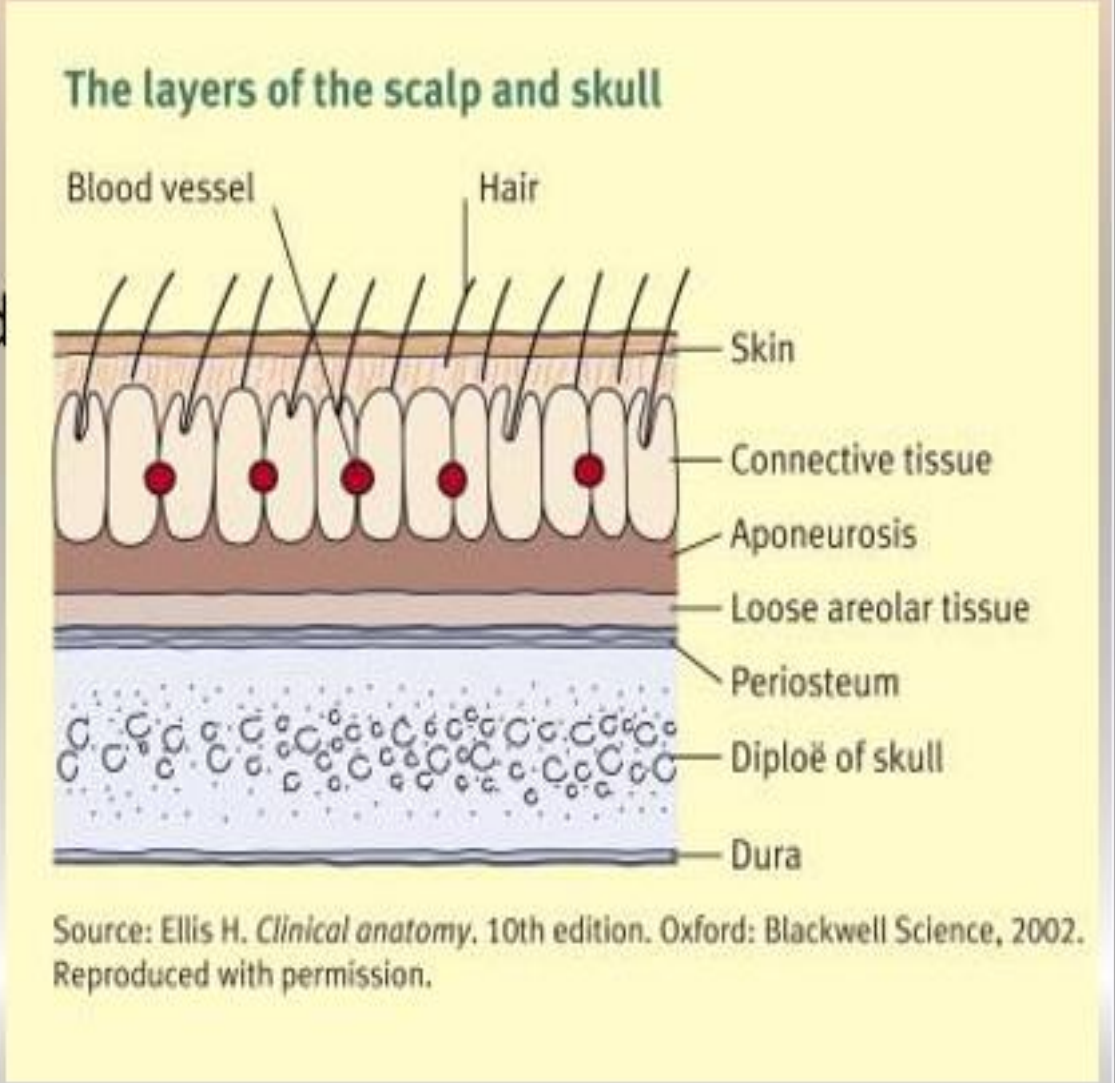
Clinical correlates:

- Wounds:

Profuse bleeding, No gapping

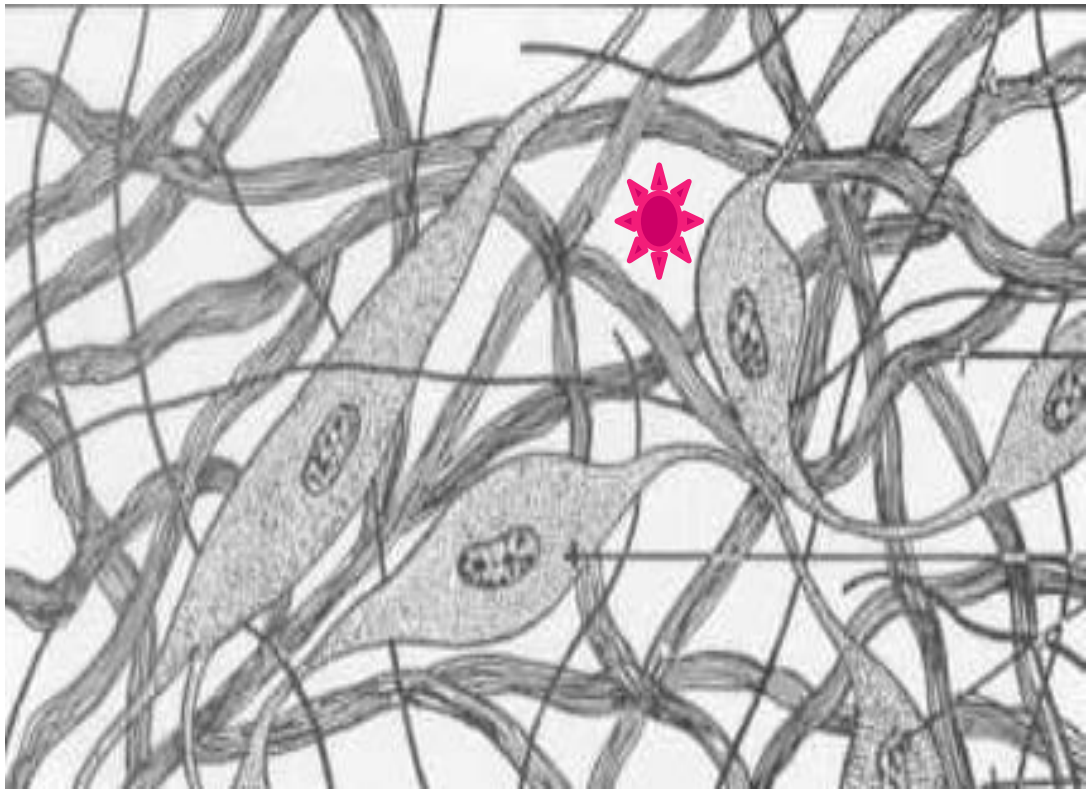
- Infection:

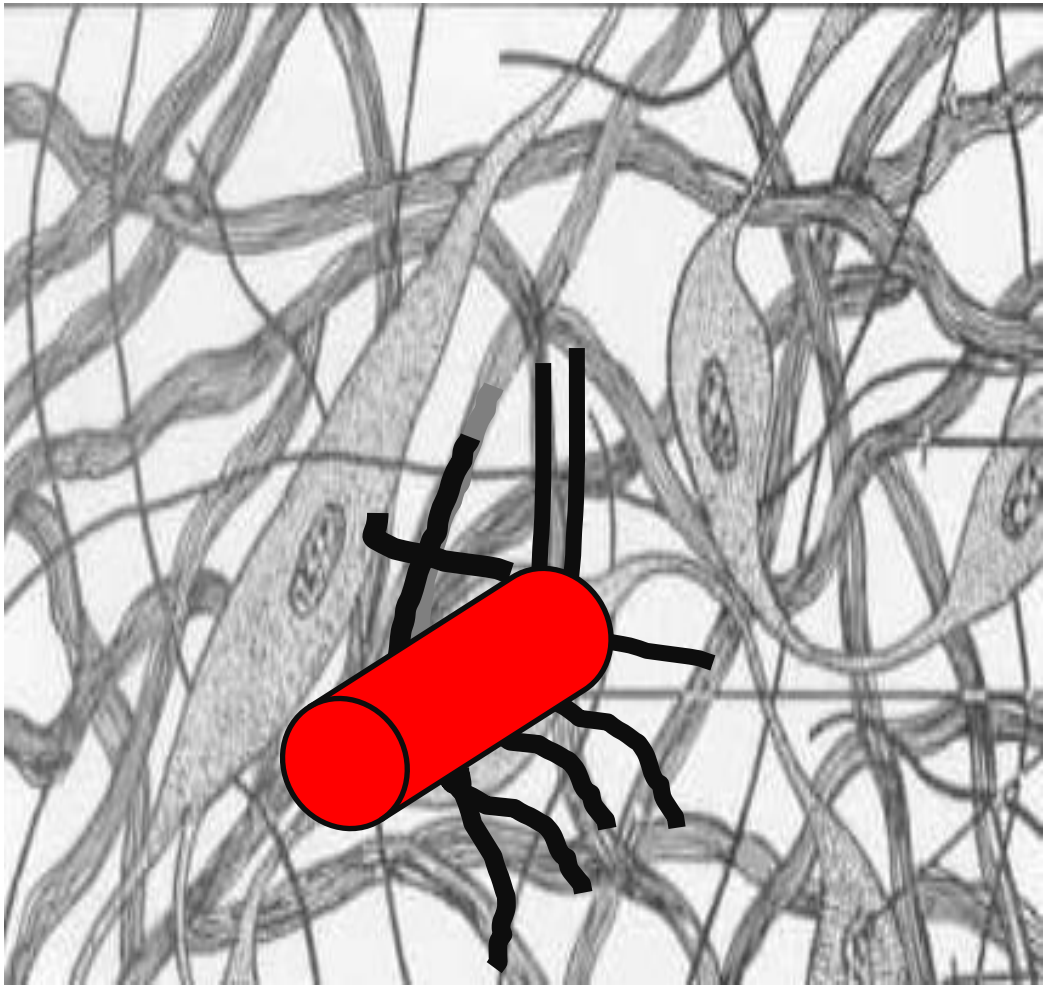
Localized, Painful



Infection in this layer remains localised

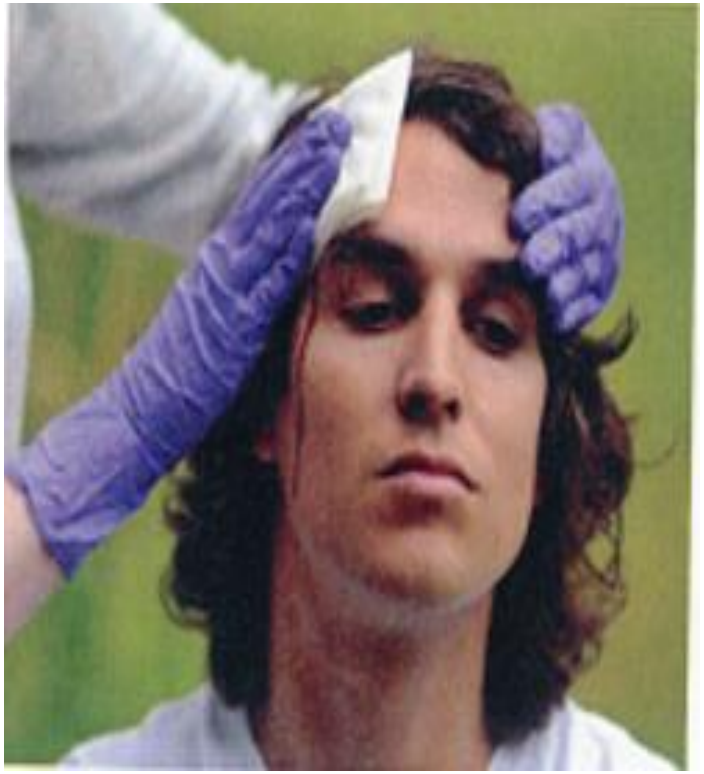
because of the dense connective tissue





Dense CT is adherent to the walls of arteries so if an artery is cut, it bleeds profusely (sooo much) as the dense CT prevents the artery from contraction or retraction.

Control bleeding from scalp by direct pressure on the wound



3- Aponeurosis

Occipito-frontalis muscle

Origin

Frontal bellies:

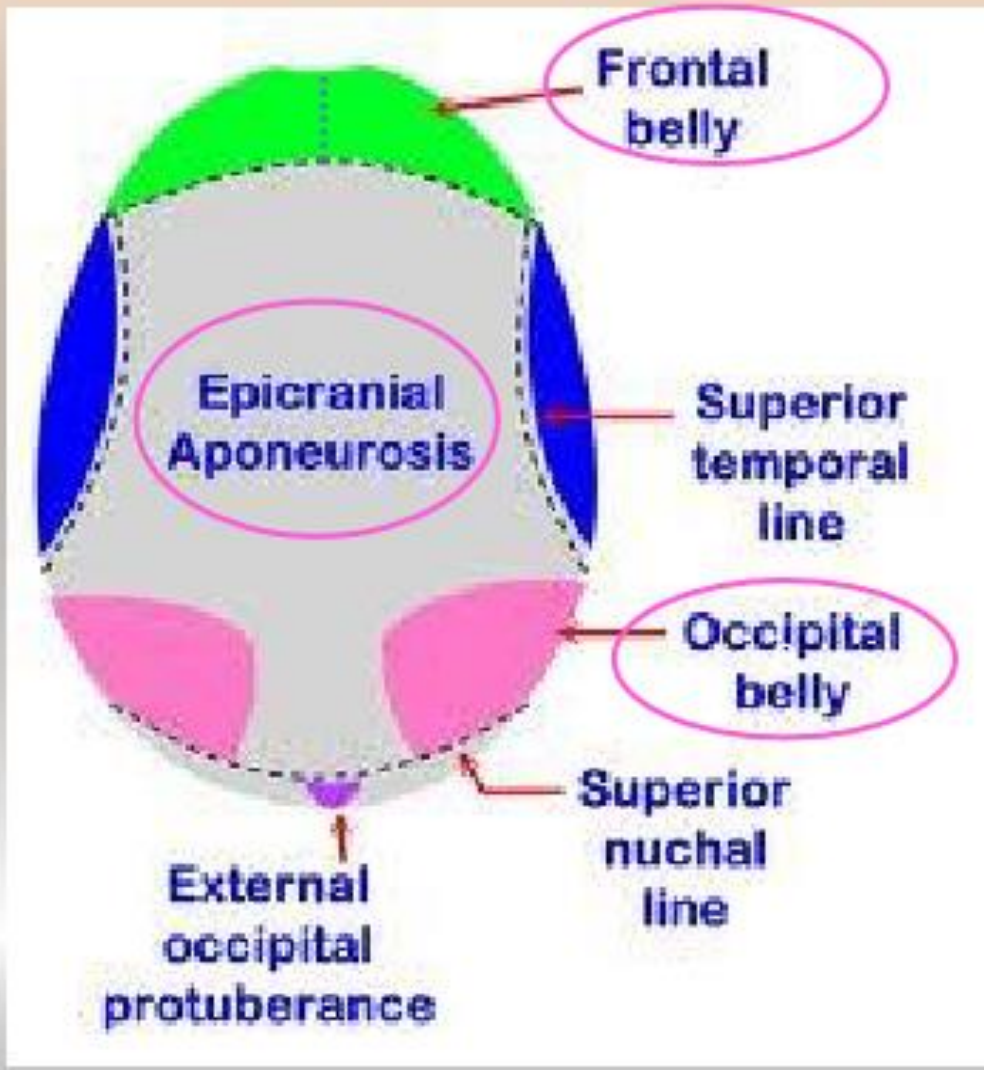
Wide, United, Skin of eye brows

Occipital bellies:

Narrow, Separate, Highest nuchal line

Insertion

Epicranial aponeurosis (*Attachments*)

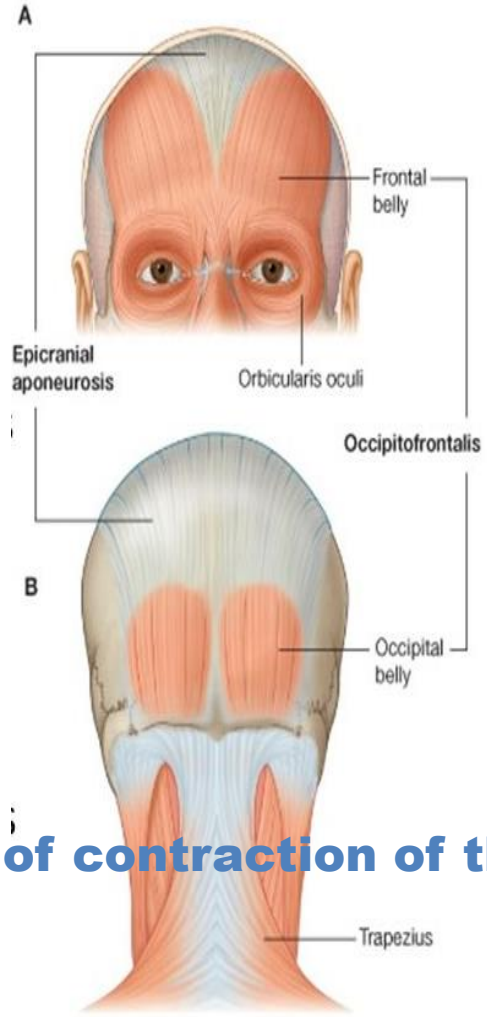


Occipito-frontalis muscle

Origin:

Frontal bellies: are wider, partly united in midline, each arises from the skin of eyebrow.

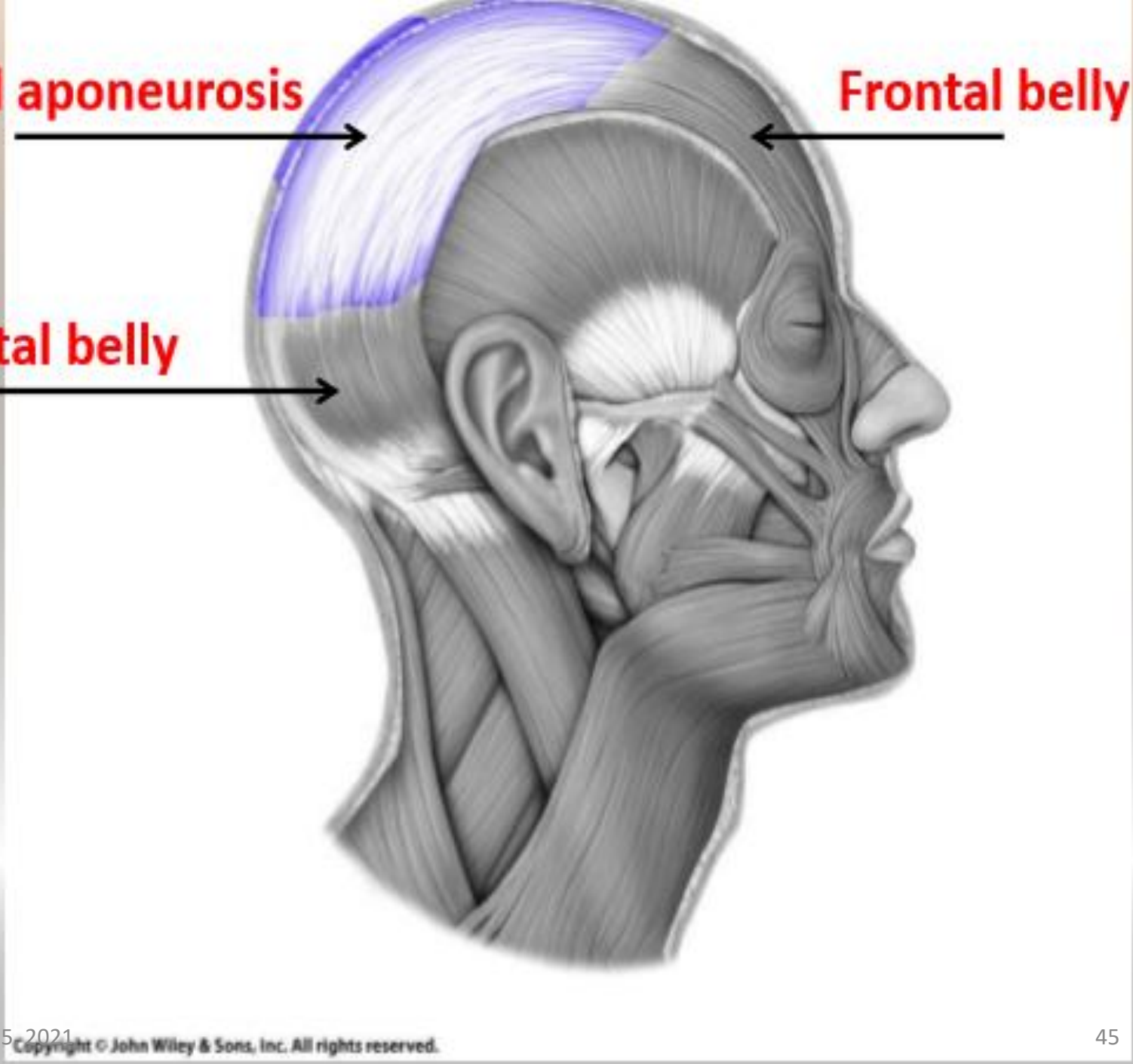
Occipital bellies: are narrower separated from each other by an extension of epicranial aponeurosis, each arises from lateral 2/3 of the highest nuchal line.

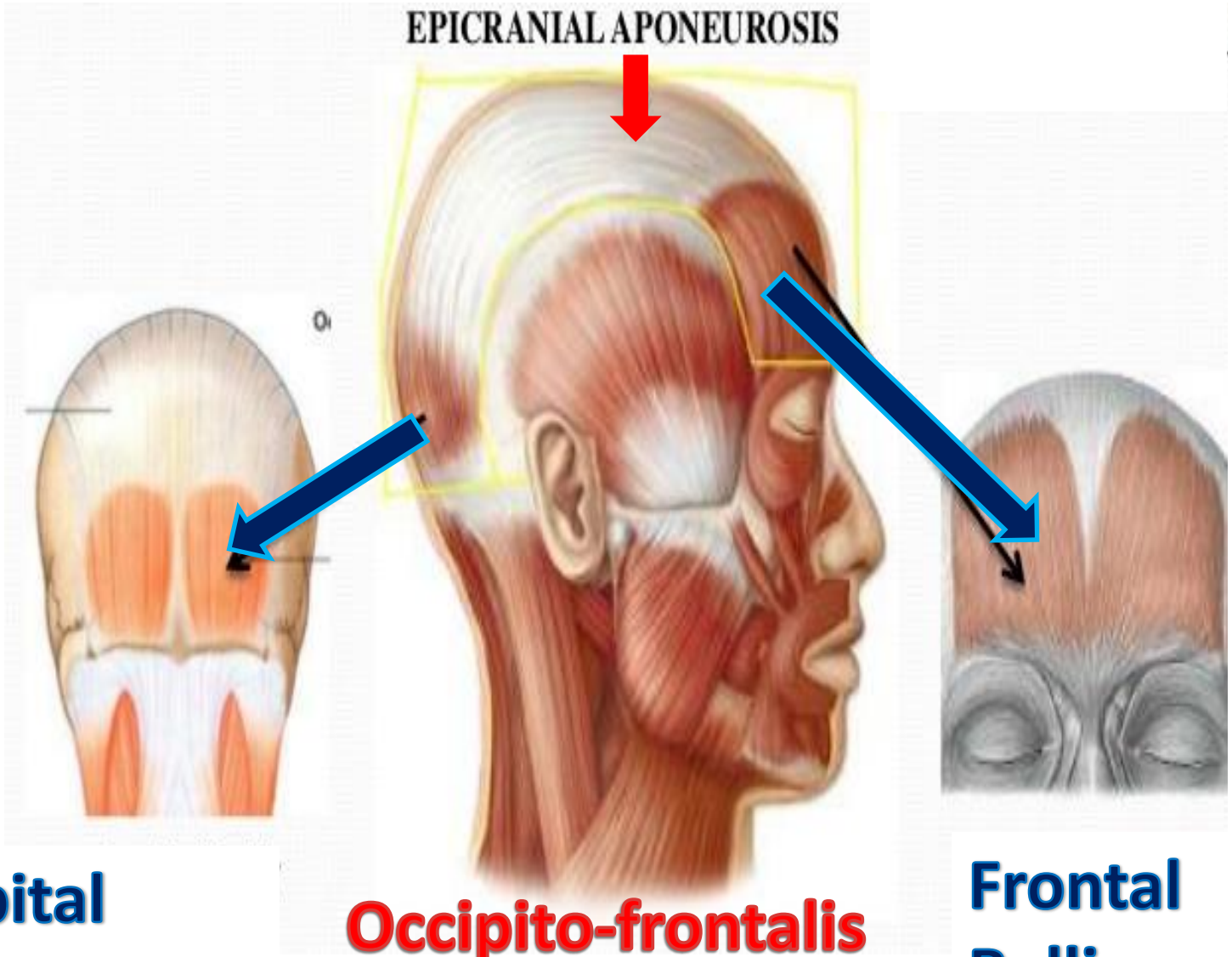


Insertion:

Epicranial aponeurosis

A wound reaching this layer gaps because of contraction of the muscle





Occipital Bellies

Occipito-frontalis muscle

Frontal Bellies

Nerve supply

Frontal bellies by temporal br. of facial nerve.

Occipital bellies by post auricular br. of facial nerve.

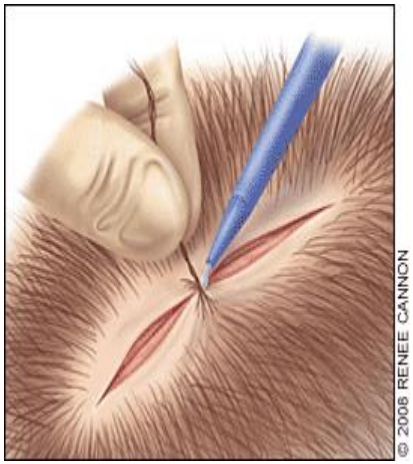
Action:

a) Frontal bellies: pull the scalp forward and raise the eyebrows producing transverse wrinkles in the forehead skin.

b) Occipital bellies: pull the scalp backwards

- A wound reaching this layer gaps because of contraction of the muscle

Wound gaping



4- Loose connective tissue

- Continous anteriorly with skin of eye lid

- ***Clinical correlates:***

1- Loose: Spread of blood or pus (Direction??)

Black Eye

2- Contains emissary veins : Dangerous layer. *Why??*

This is where the scalp is mobile (so it is the site of de-scalping!)

ite of collection of

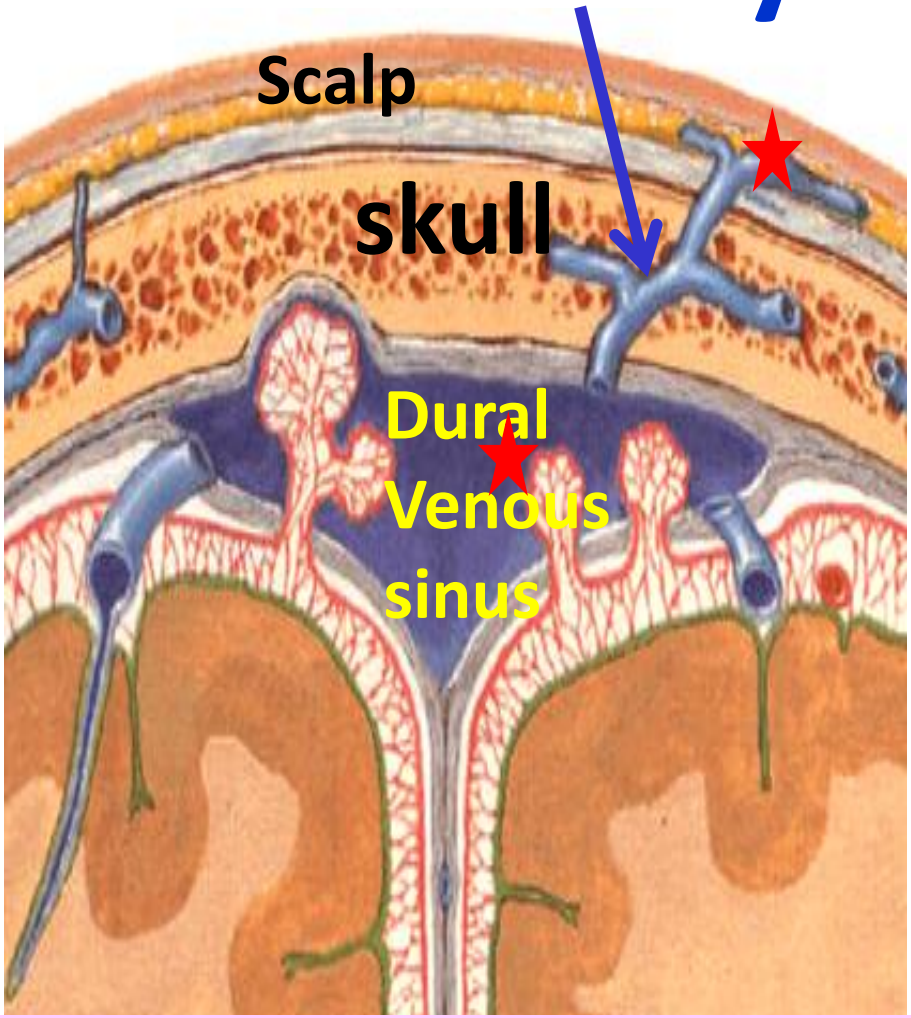
s and blood, which can

o the eyelids ➔ black

eye

Contains emissary veins (so infection ma extend to intracranial v sinuses)

Emissary Vein



Emissary veins connect **veins outside the skull** with **dural venous sinuses inside the skull .**

Function of Emissary Veins

Emissary veins have NO valves .

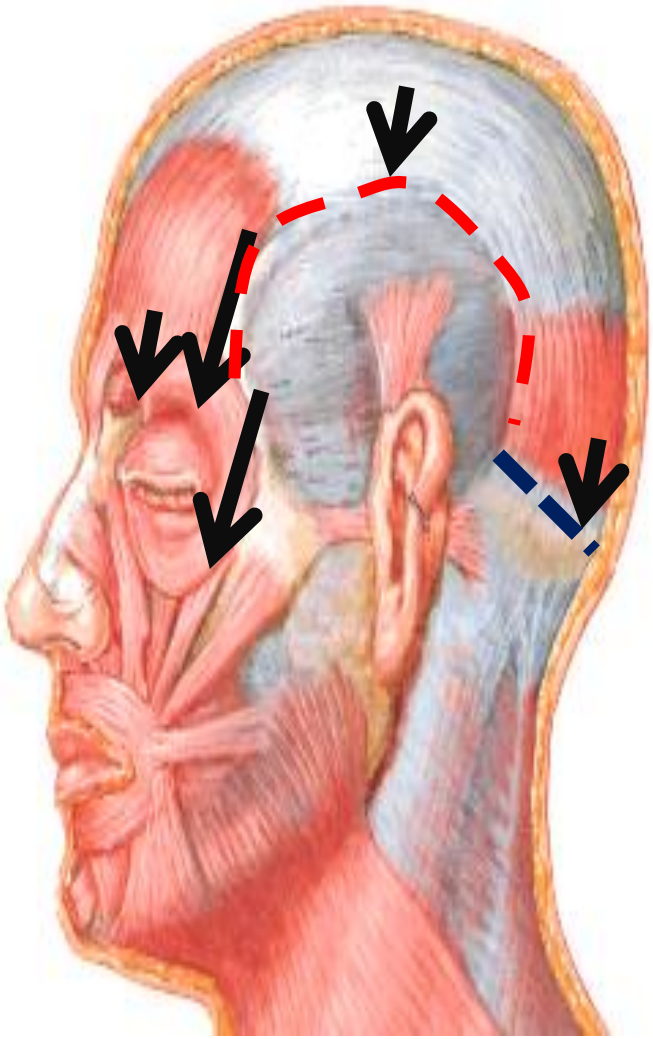
They help to keep intracranial pressure constant.

Danger of Emissary Veins

They transmit infection from outside the skull to the inside.

Why is loose CT layer considered the dangerous area of scalp?

- **Allows spread of infection from outside to inside of skull due to presence of emissary veins .**
- **Allows collection of blood & pus .**



Blood or pus collected in the loose areolar CT layer
cannot pass to back of neck because of attachment of occipital bellies of occipito-frontalis to the highest nuchal line , but can pass anteriorly since frontal bellies are not attached to bone (but to skin of eyebrows) therefore blood can enter the eyelids resulting in

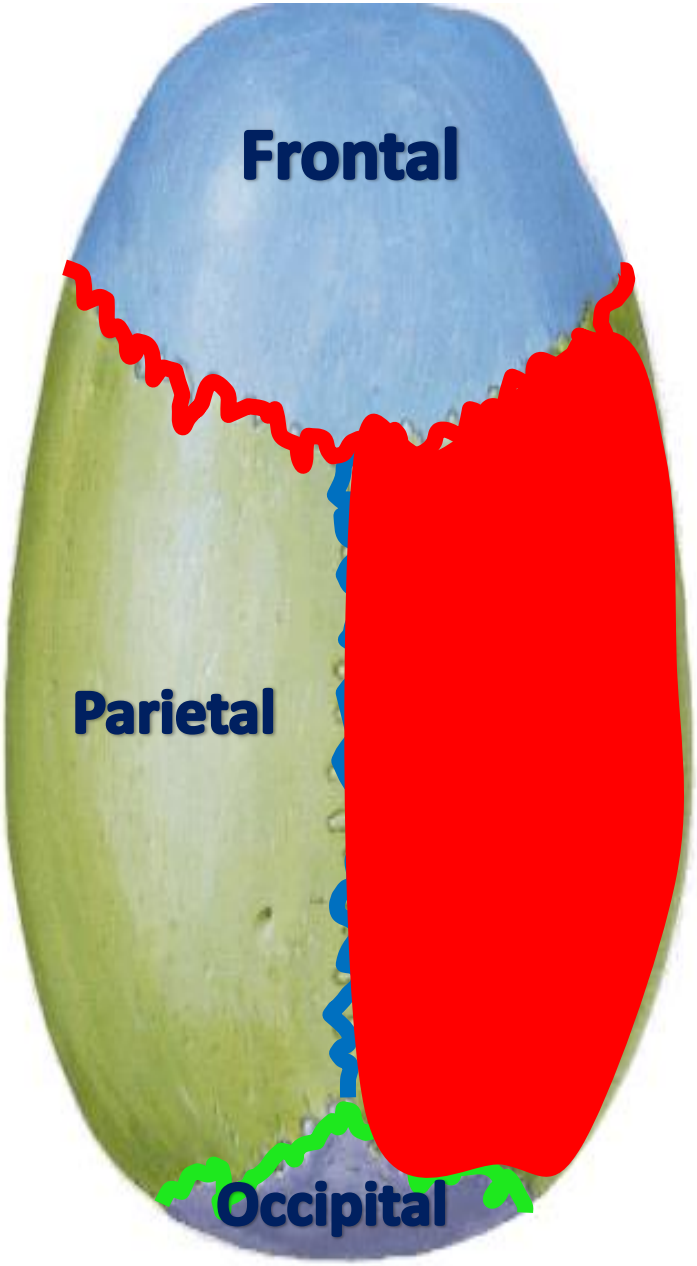
"Black eye"

The 5th layer: Pericranium

It is the periosteum of the skull bones; at the sutures it is continuous with the sutural ligaments and it is continues with the inner perioesteum at skull foramina.

Hemorrhage beneath this layer leads to a collection of blood (hematoma) that takes the shape of the underlying skull bone

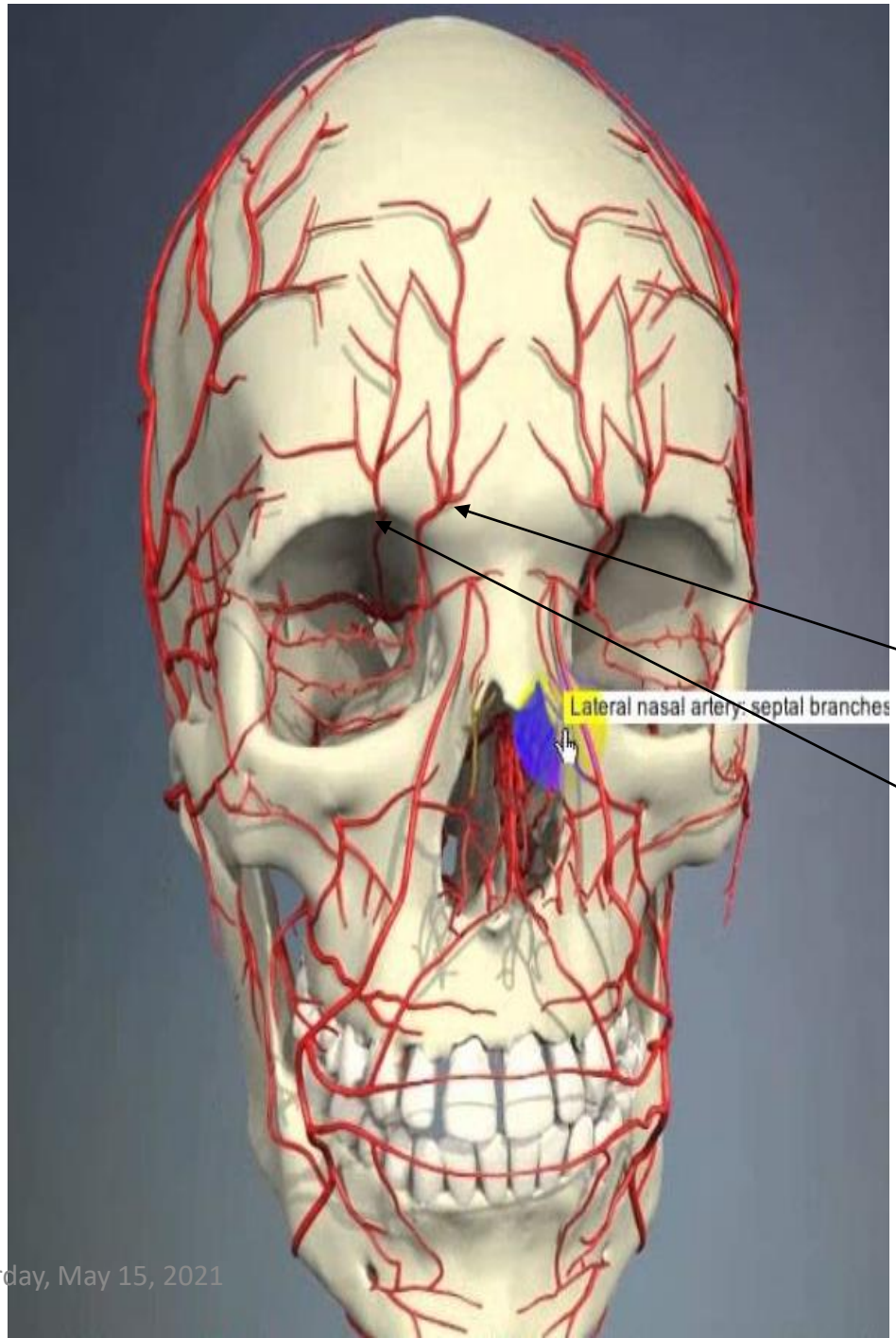
Subperiosteal bleeding takes the shape of the underlying bone



BLOOD SUPPLY:

The scalp has rich blood supply.

The arteries anastomose freely with each other. They are branches of either the **external carotid** artery (ECA) or **internal carotid artery (ICA).**

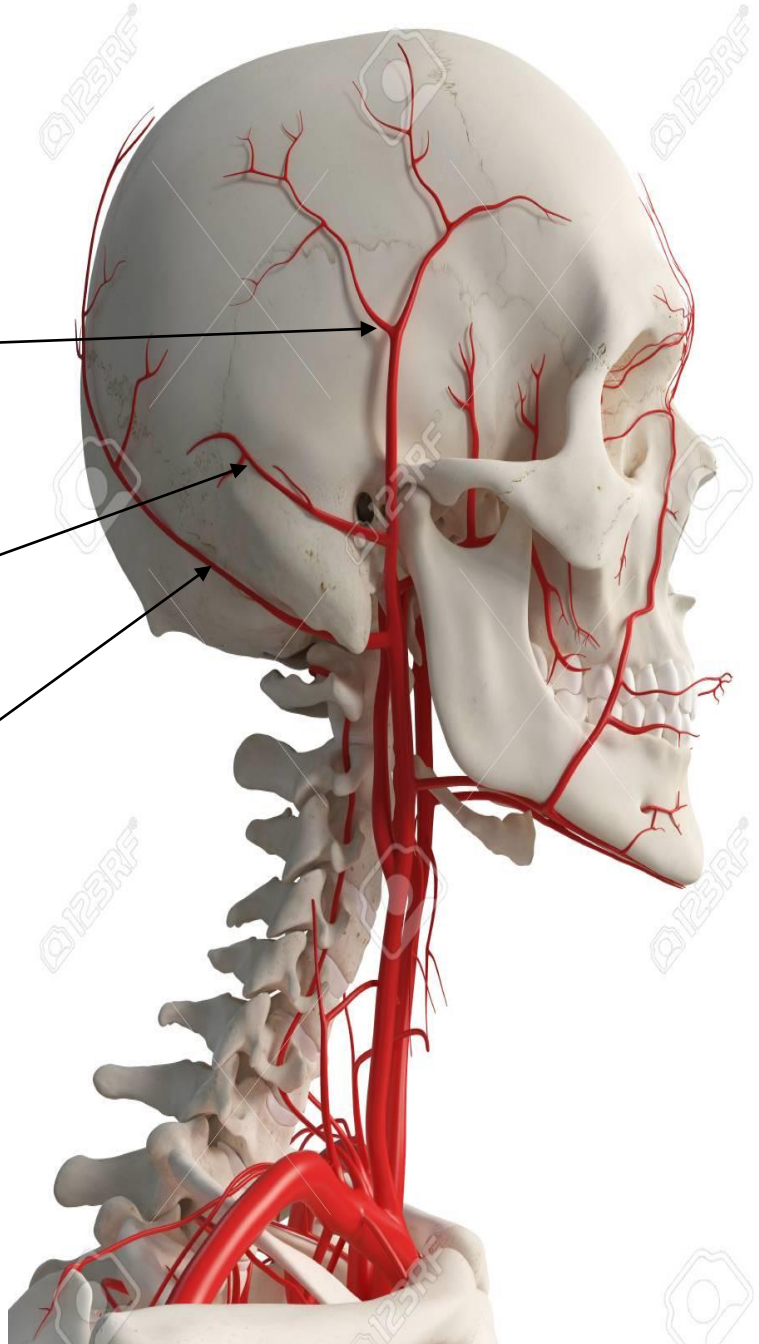


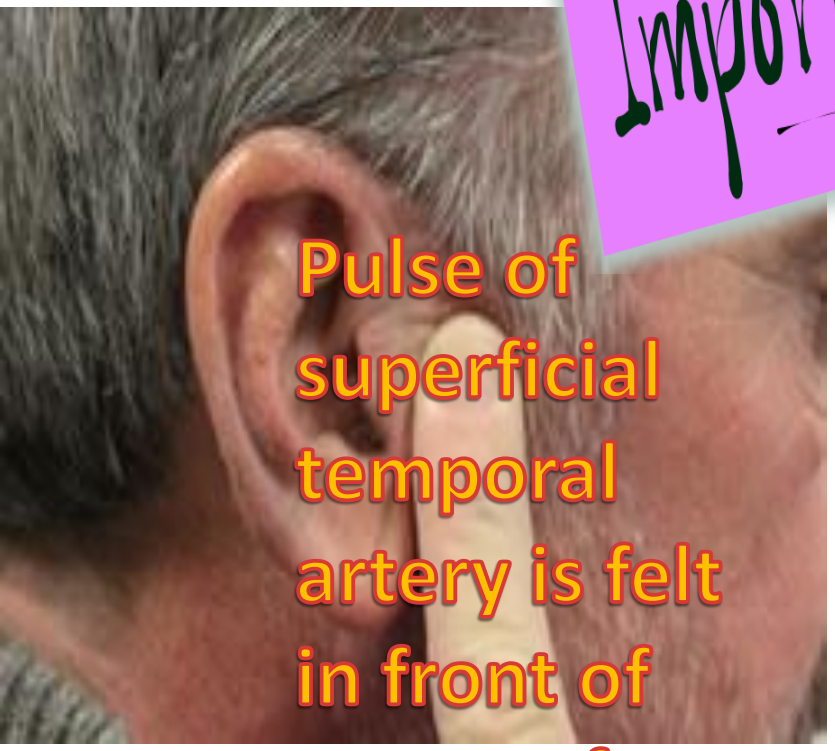
From the ophthalmic artery which is a branch of internal carotid artery

supratrochlear

supraorbital

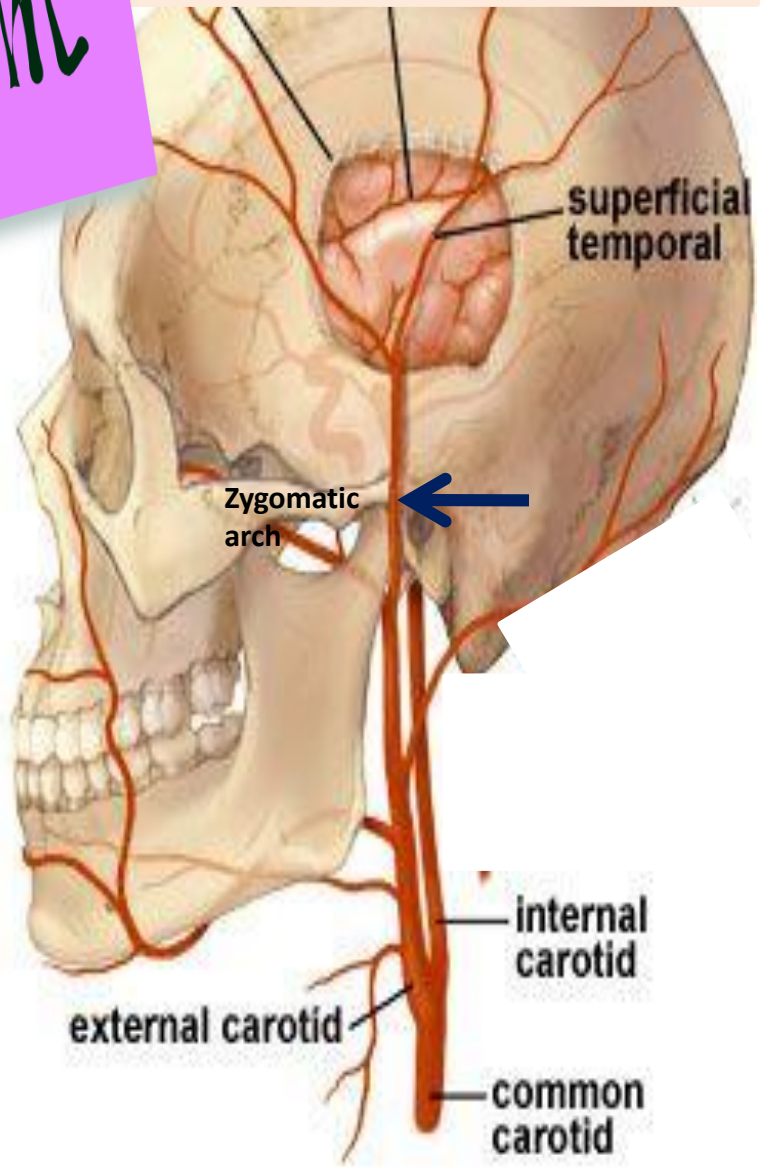
From the external carotid artery



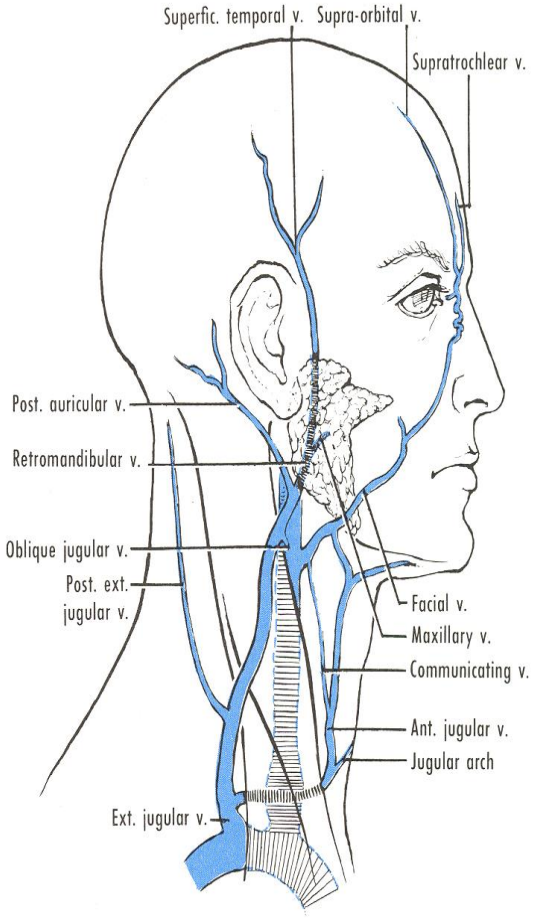


Important

Pulse of superficial temporal artery is felt in front of tragus of ear against the zygomatic arch.



Veins of the scalp



Veins of the scalp accompany the arteries and have similar names.

Veins of the scalp anastomose freely with one another and are connected to diploic veins of the skull bone and intracranial venous sinuses by "emissary veins".

NERVE SUPPLY

By 10 nerves (5 pre-auricular & 5 are retro-auricular: 4 sensory & 1 motor)

NERVE SUPPLY

By *10* nerves *(5 pre-auricular & 5 are retro- auricular: 4 sensory & 1 motor)*

In Front of the auricle

4 Sensory nerves: (branches of *trigeminal* nerve)

1. Supratrochlear n. (from *ophthalmic* n.) supplies skin of fore head

2. Supraorbital n. (from *ophthalmic* n.) supplies skin of forehead up to the vertex

3. Zygomaticotemporal n. (from *maxillary* n.) supplies non-hairy part of temporal region

4. Auriculotemporal n. (from *mandibular* n.) supplies the hairy

1 Motor nerve:

Temporal branch of facial nerve supplies frontal belly of occipito-frontalis.

Behind the auricle

4 Sensory nerves: (branches of *cervical* spinal nerves)

1. Great auricular n. *(C 2,3)* supplies skin of scalp behind auricle.

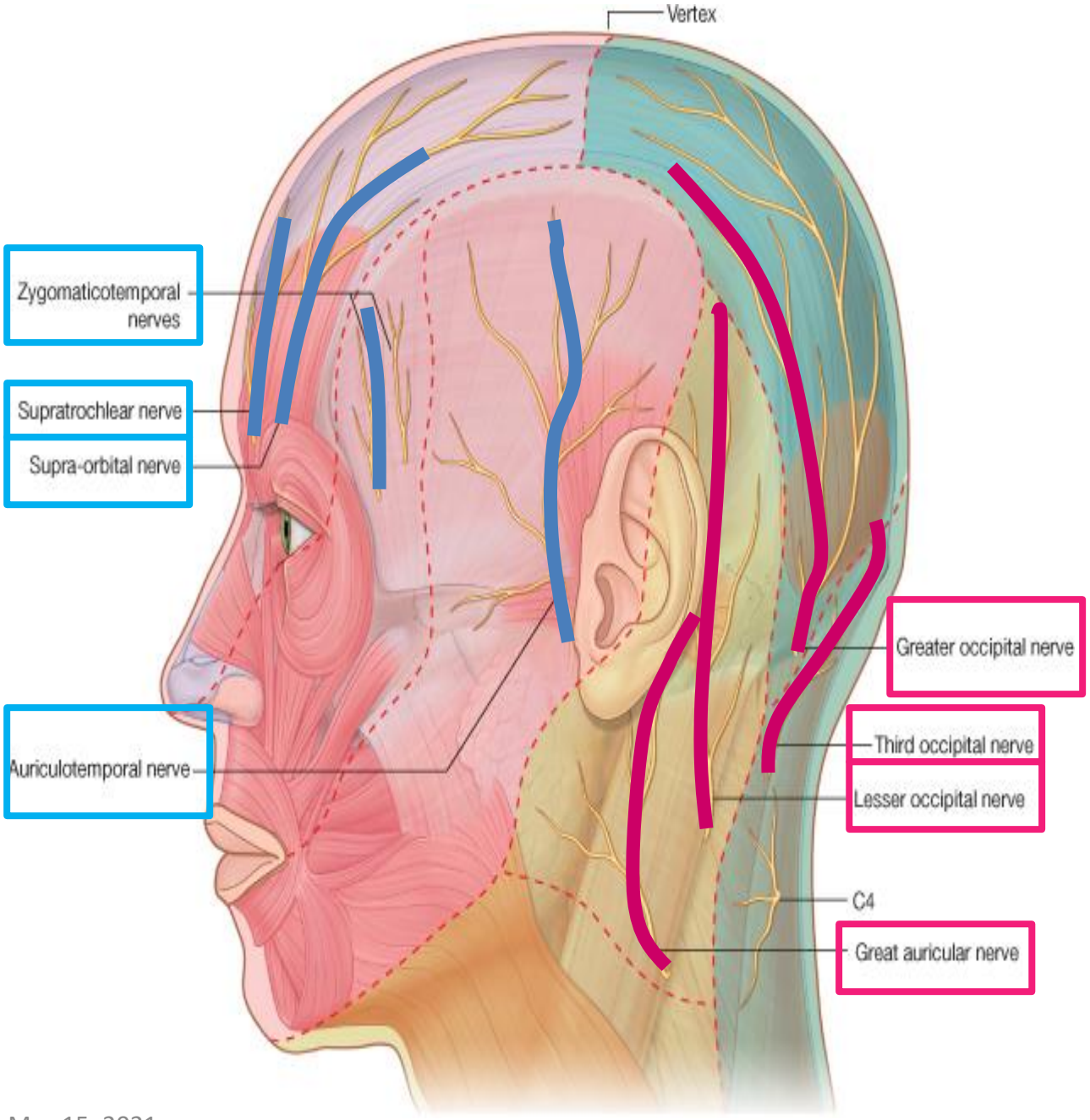
2. Lesser occipital n. *(C 2)* supplies skin of scalp behind auricle.

3. Greater occipital n. *(C 2)* supplies skin of scalp up to vertex.

4. Third occipital n. *(C 2)* supplies skin of lower part of occiput.

1 Motor nerve:

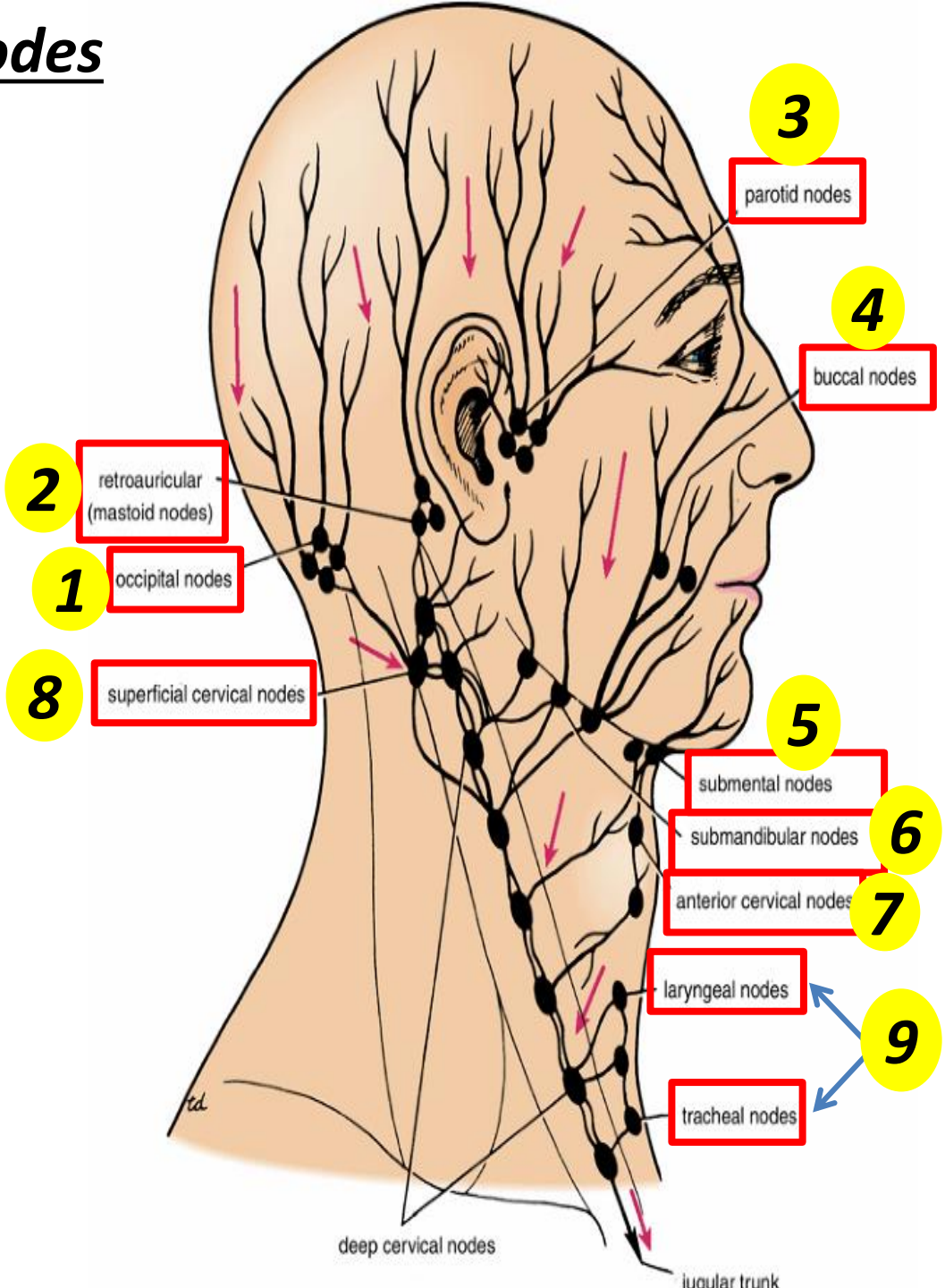
Posterior auricular branch of facial nerve supplies occipital belly of occipitofrontalis.


Vertex
Zygomaticotemporal nerves
Supratrochlear nerve
Supra-orbital nerve
Auriculotemporal nerve
Greater occipital nerve
Third occipital nerve
Lesser occipital nerve
C4
Great auricular nerve

Regional group of nodes

1-occipital
2-retro-auricular
3-parotid

4-buccal
5-submental
6-Submandibular



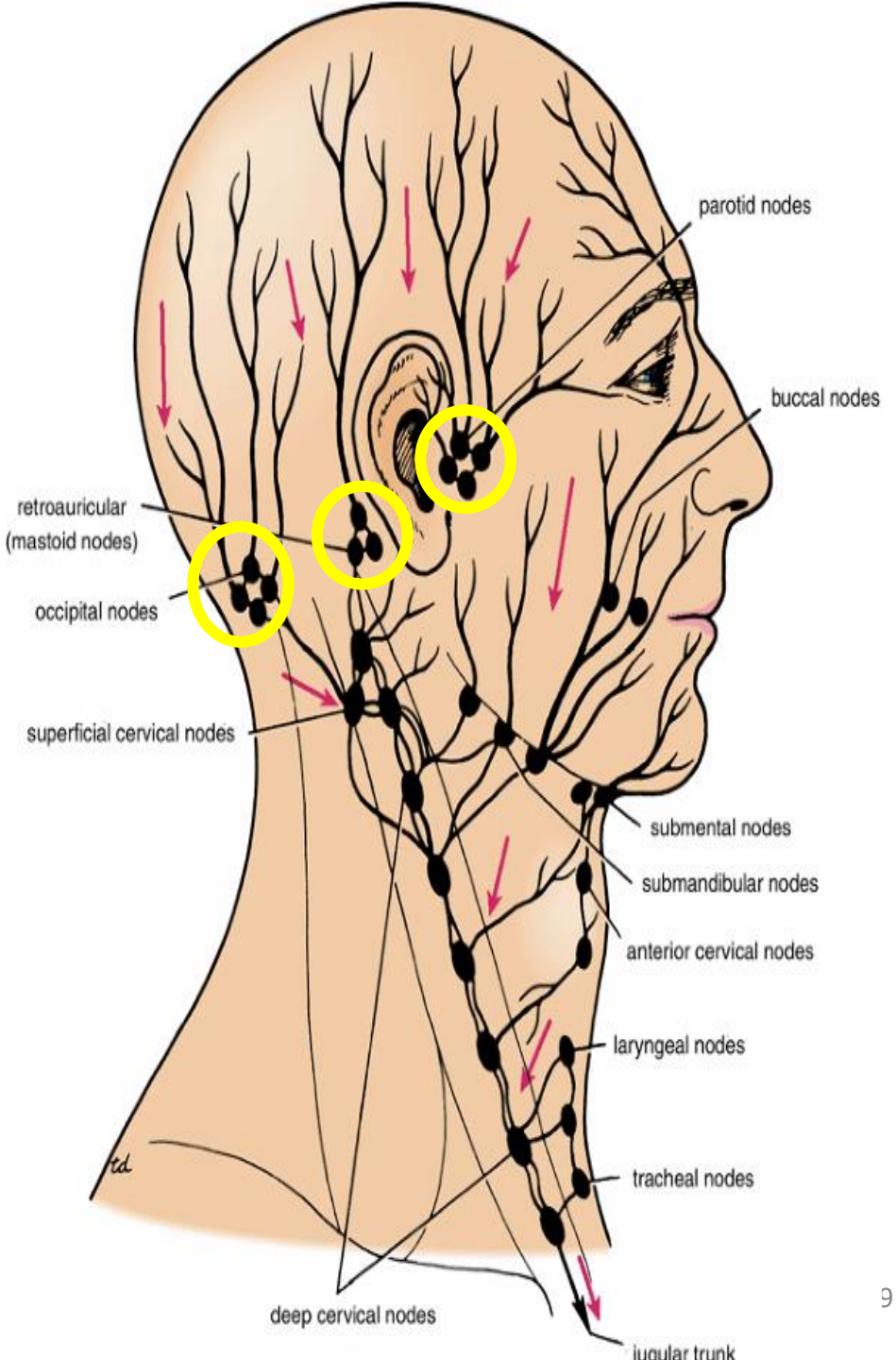
Regional group of nodes

Occipital L.N.

Back of scalp

Retro auricular L.N. & Parotid L.N.

Scalp, parotid, auricle & external auditory meatus



Regional group of nodes

Buccal L.N.

↓

Sub-mandibular L.N.

Scalp (front)

Upper lip

Lower lip except…….

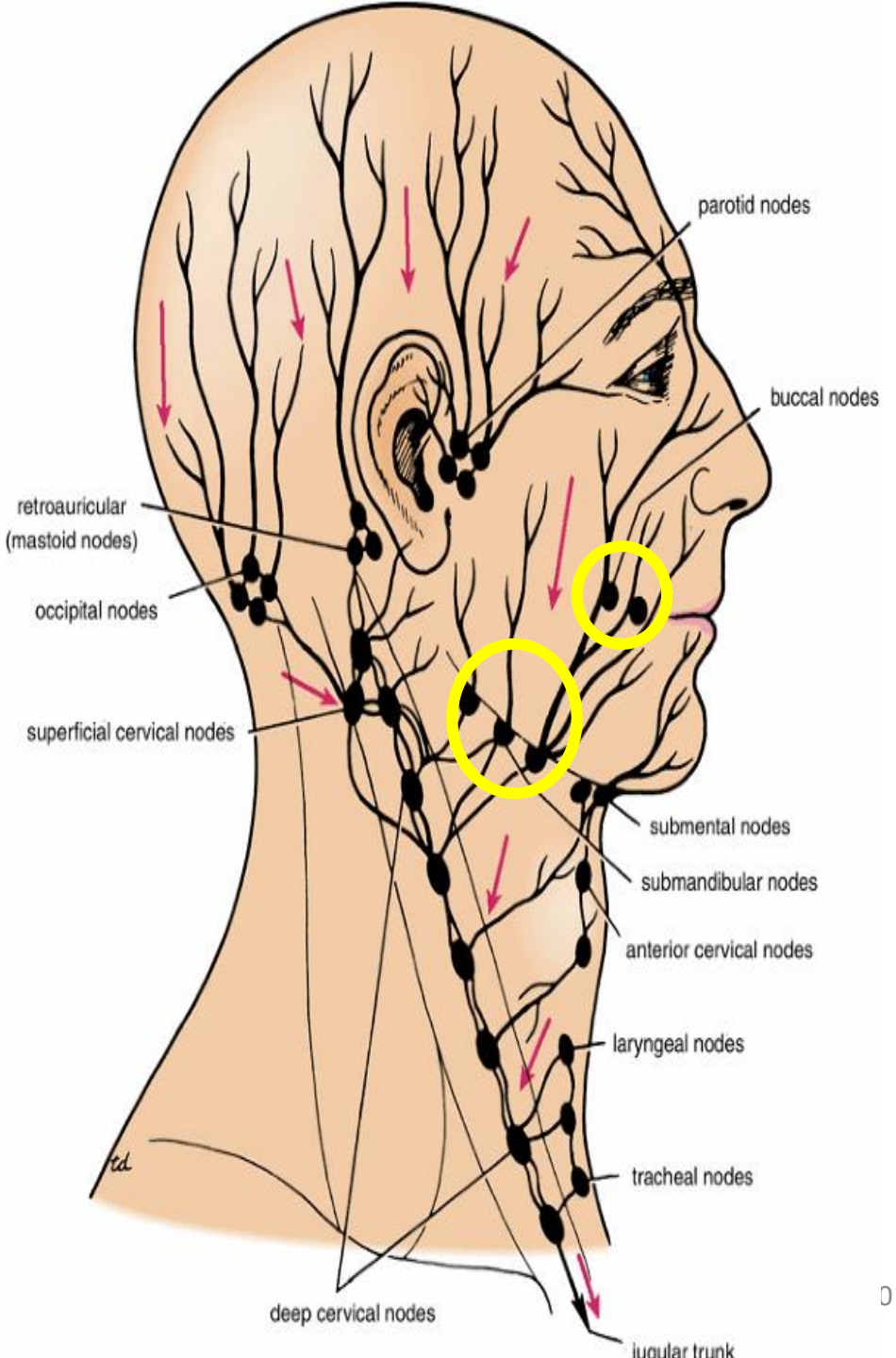
Tongue except……

Teeth except……

Floor of mouth

Nose

Para-nasal sinuses



Regional group of nodes

Sub-mental L.N.

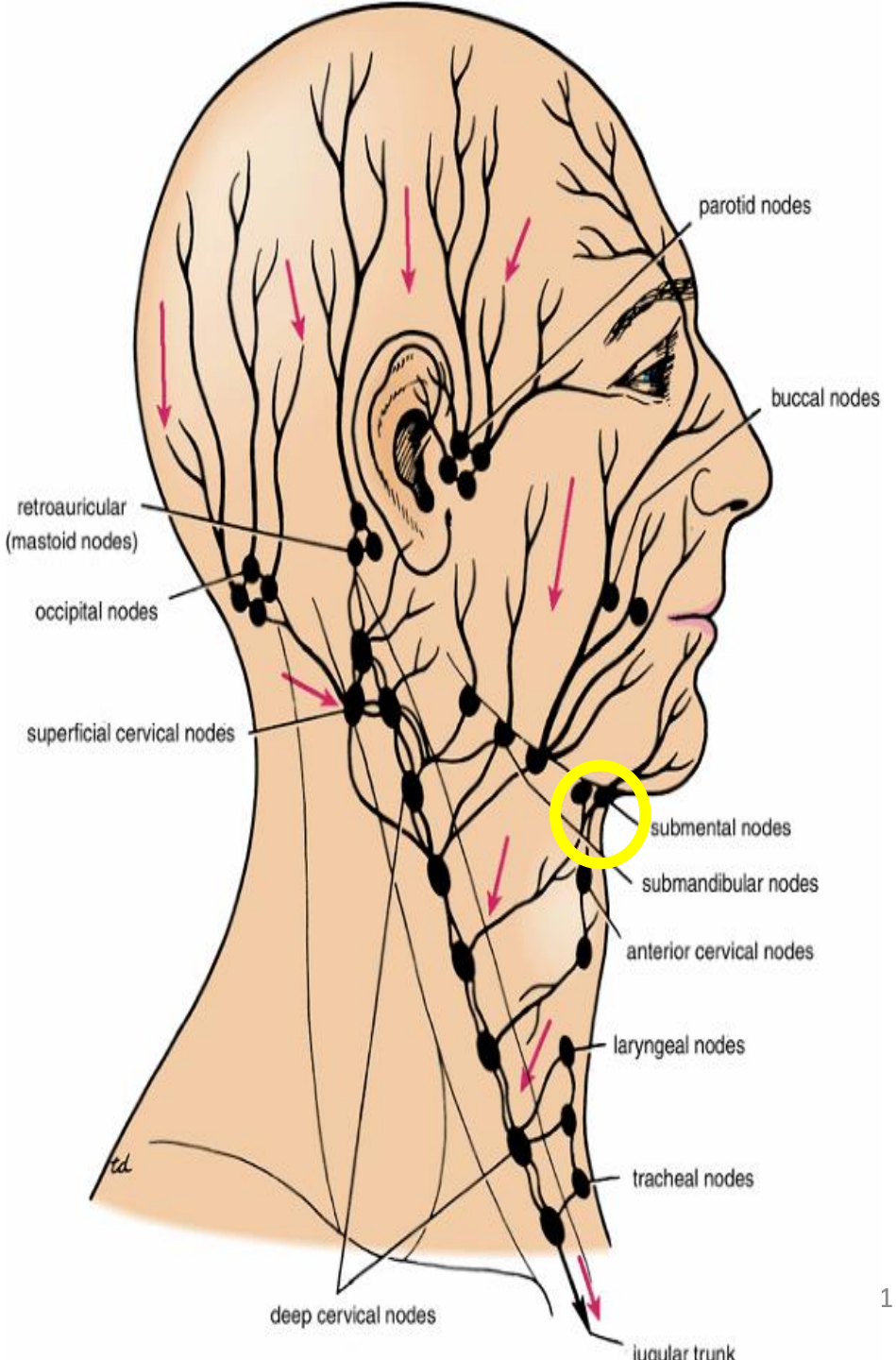
Central part of lower lip

Tip of tongue

Lower incisor teeth

Floor of mouth

Skin of chin



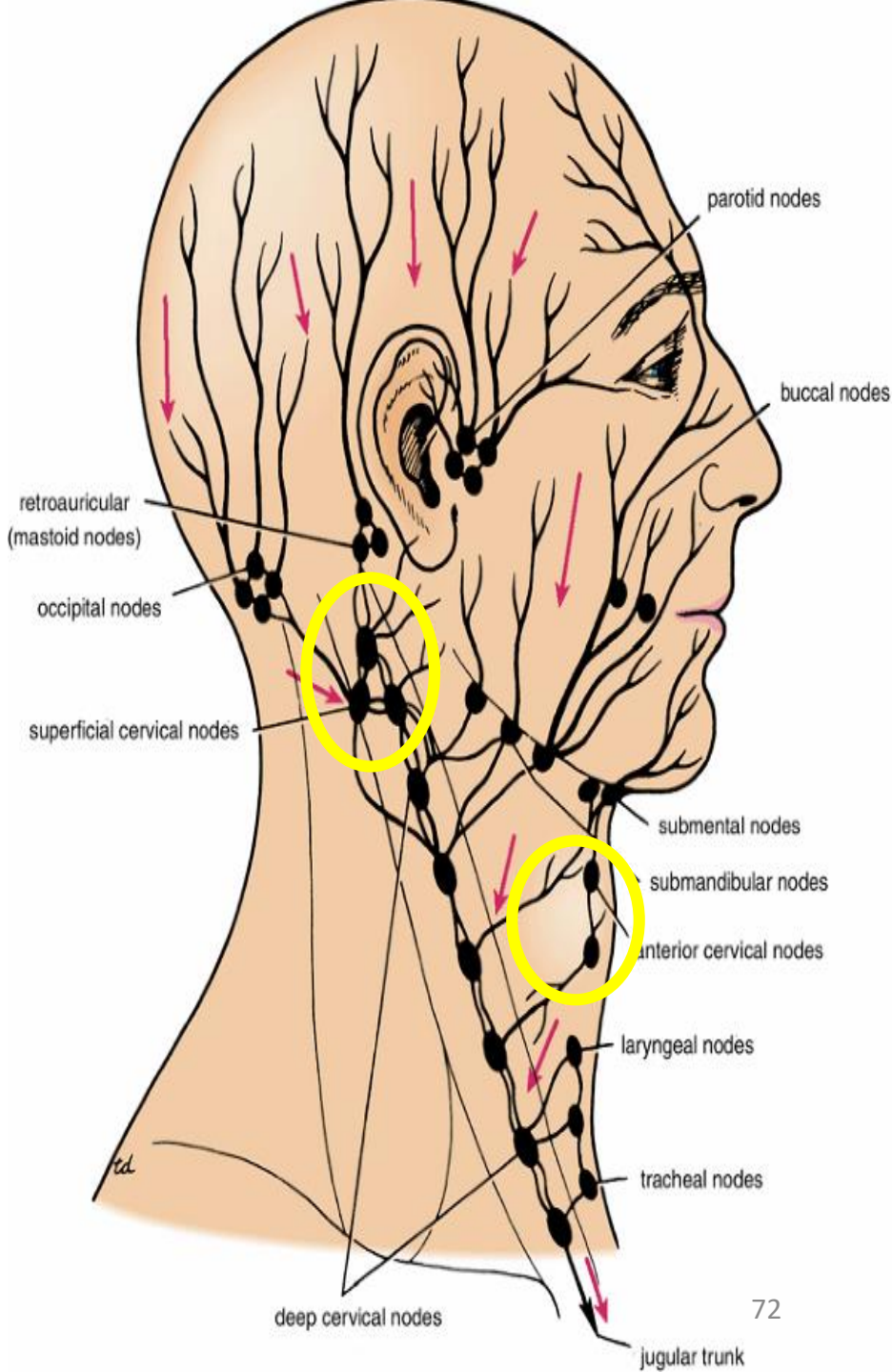
Anterior cervical L.N.

Skin & superficial tissues of front of neck

Superficial cervical L.N.

Skin over angle of mandibule

Lobule of ear



Face Development

Under the inductive effect of 2 mesodermal organizing centers; (located ventral to the forebrain & hindbrain), 5 facial prominences (primordia) appear around the stomodeum (primitive mouth) during the 4th week.

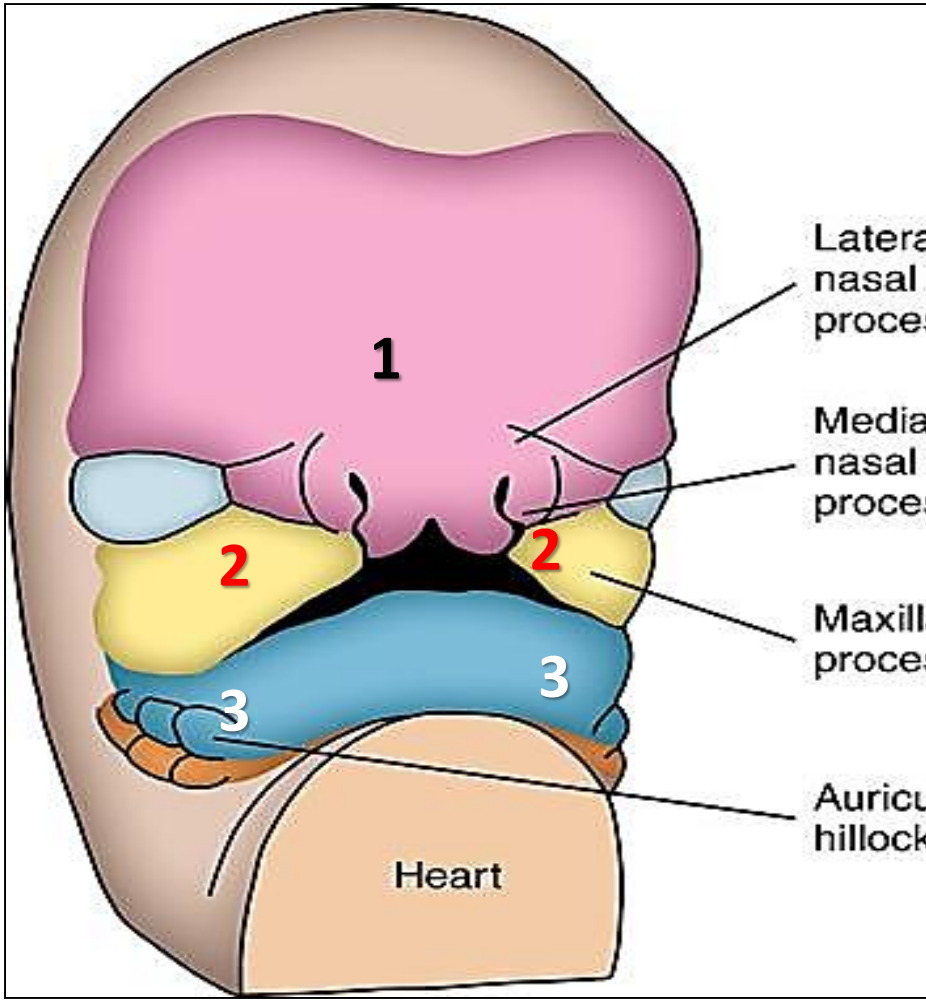
- **These 5 facial prominences or primordia include:**

1.A single frontonasal prominence (FNP). *Ventral to forebrain*

2.Paired maxillary prominences.

3.Paired mandibular prominences.

-Both maxillary & mandibular prominences are derived from the 1st pharyngeal arches.



All the 5 prominences are produced by neural crest cells that migrate into the pharyngeal arches during 4th week of development.

Note that:

- The 5 facial prominences surround the stomodeum as follows:

1)Frontonasal prominence:

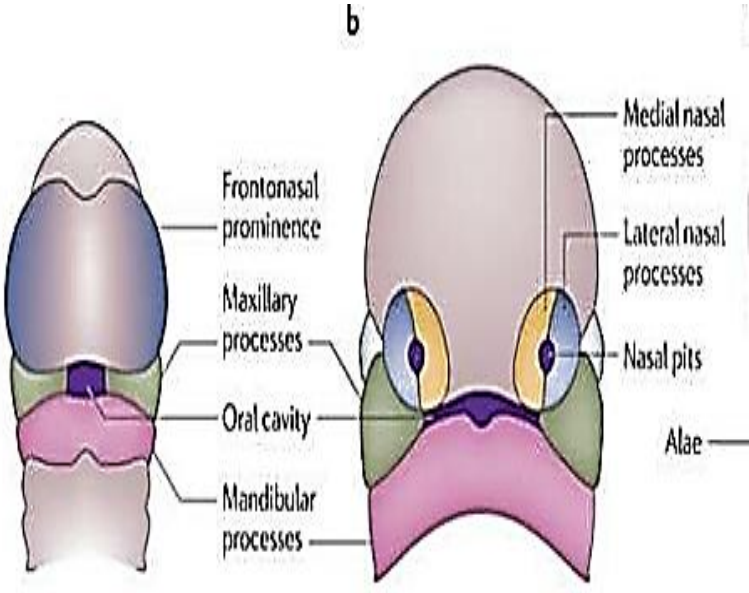
-Its frontal part forms the forehead.

-Its nasal part forms the rostral (cranial) boundary of the stomodeum & the nose.

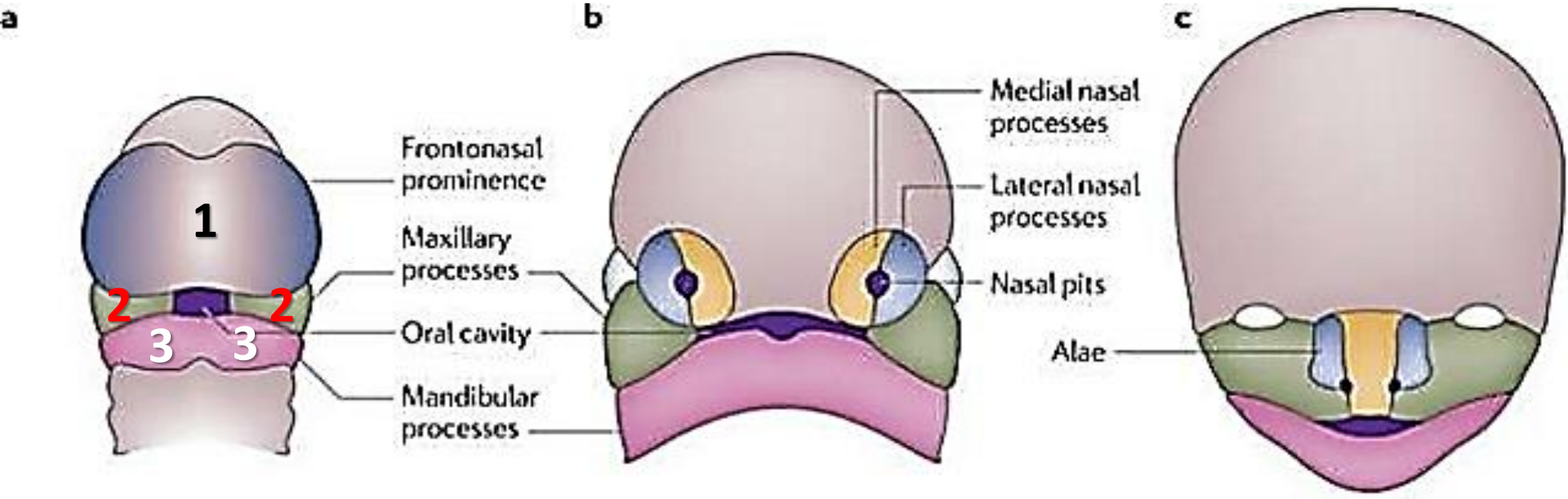
2)Maxillary prominences form the latera boundaries of the stomodeum.

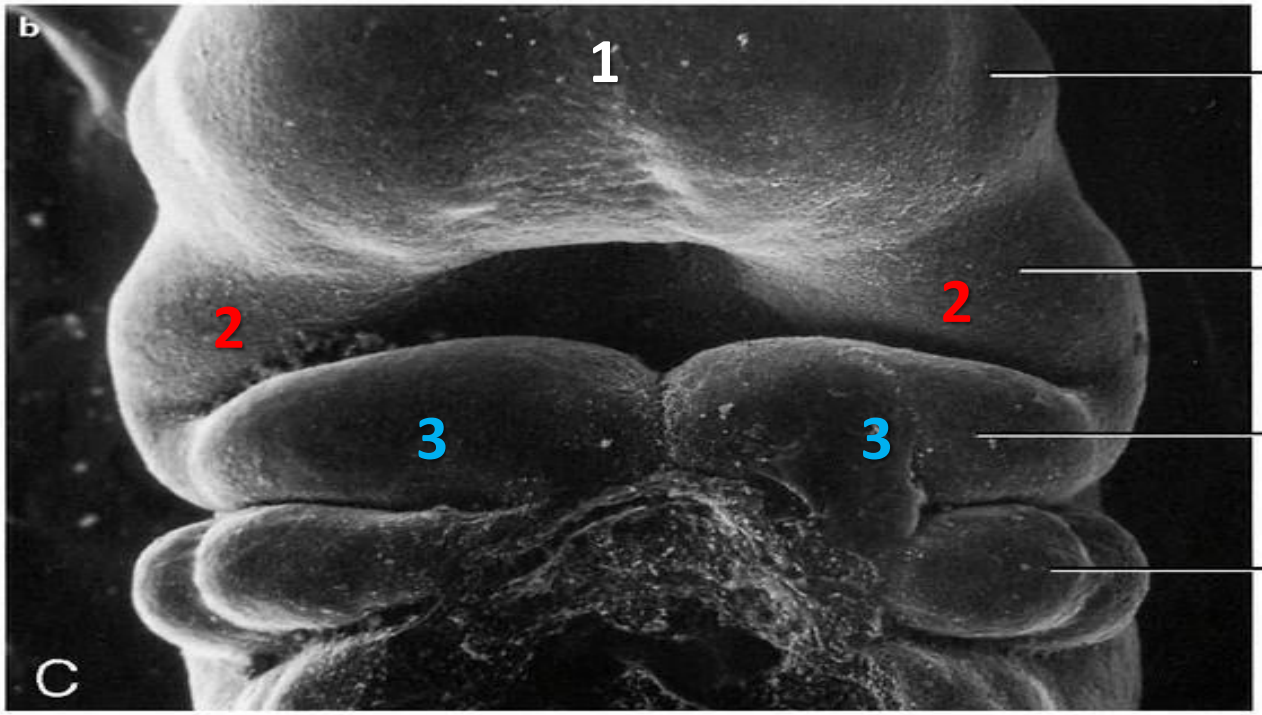
3)Mandibular prominences constitute the caudal boundary of the stomodeum.

- **The lower jaw & lower lip are the first parts of the face to form by fusion of the medial ends of the 2 mandibular prominences.**

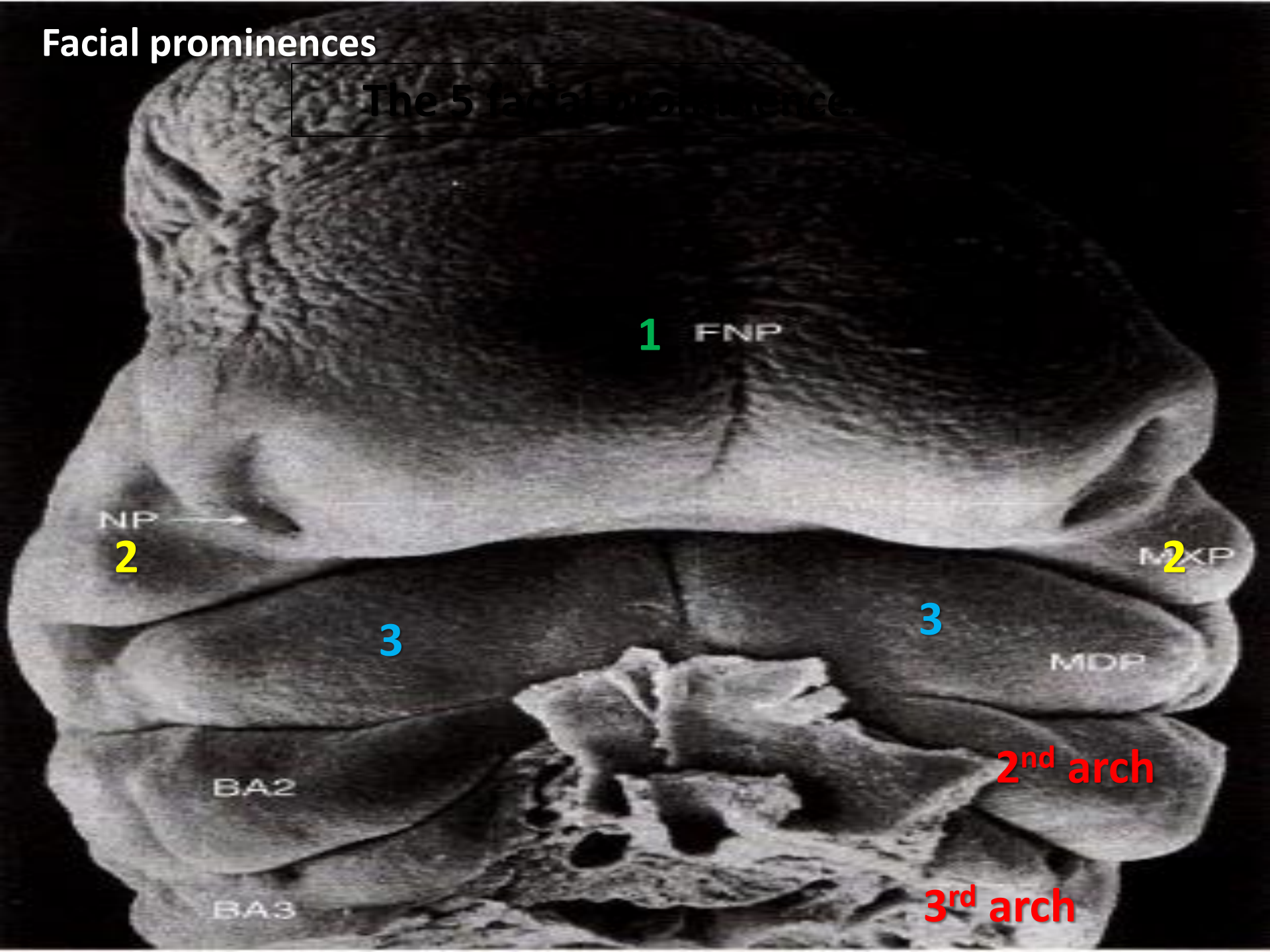


Facial prominences





Facial prominences



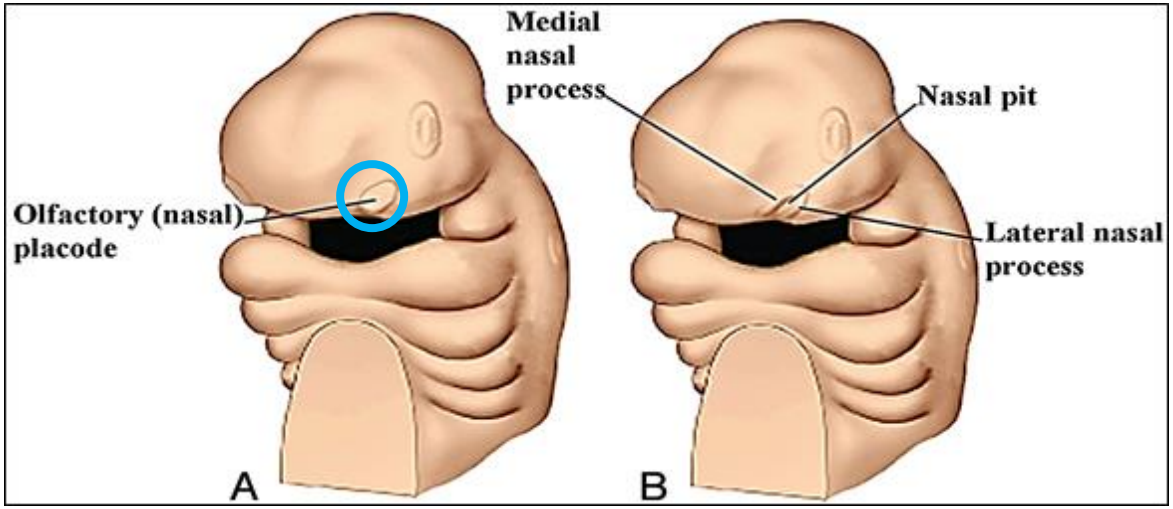
A]Changes in the frontonasal prominence (FNP):

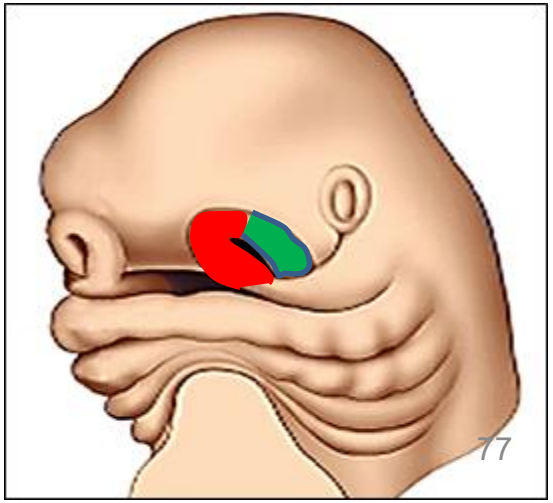
.By the end of 4th week, bilateral oval thickenings of the surface ectoderm (nasal placodes) appear on inferolateral parts of FNP.

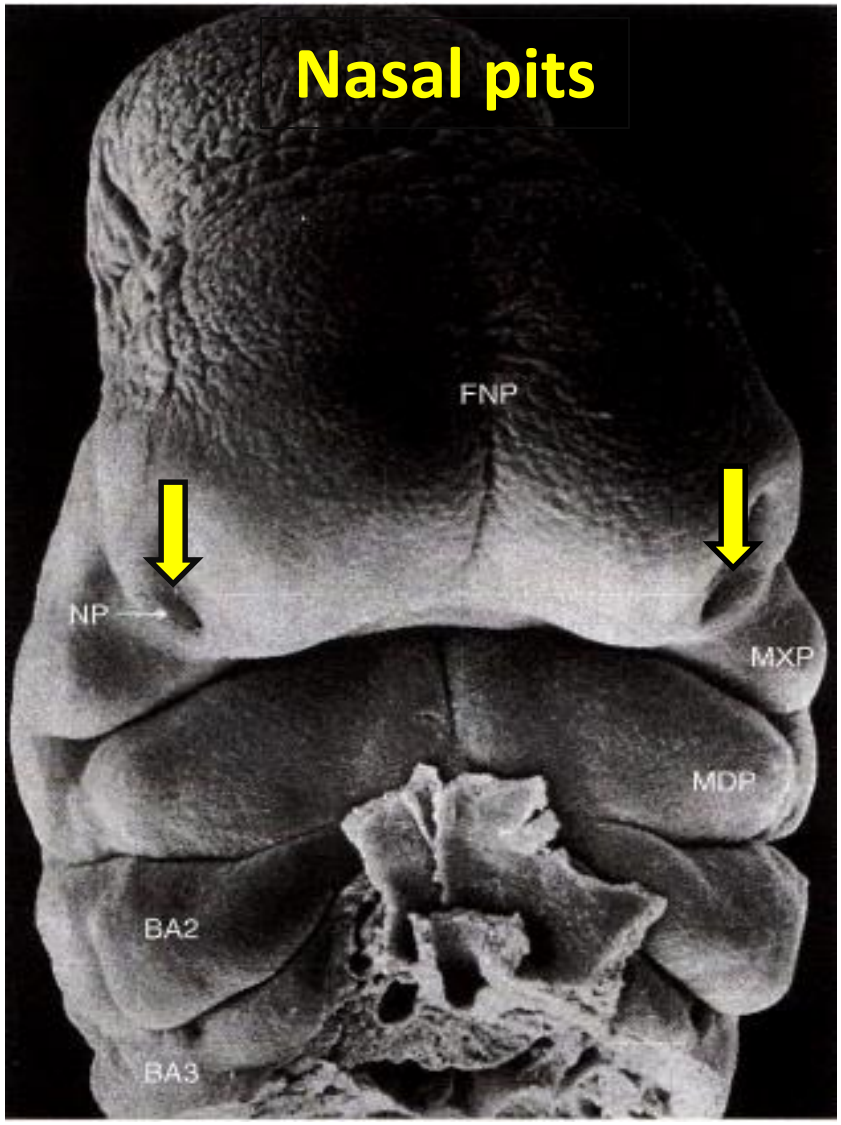
.Nasal placodes are depressed to form nasal pits ⇒ Nasal sacs.

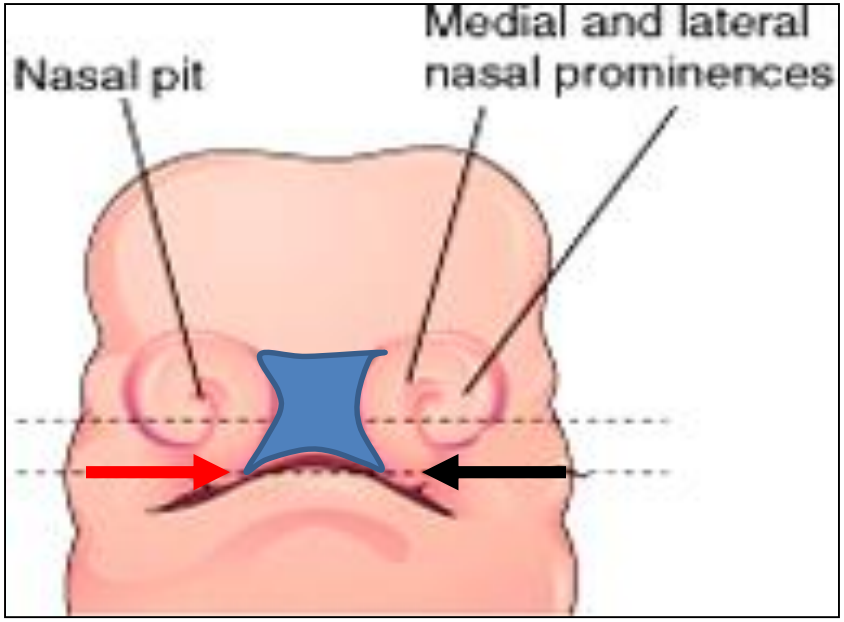
.The mesenchyme in the margins of nasal placodes proliferates, producing horseshoe-shaped elevations (medial & lateral nasal prominences) which surround the nasal pits.

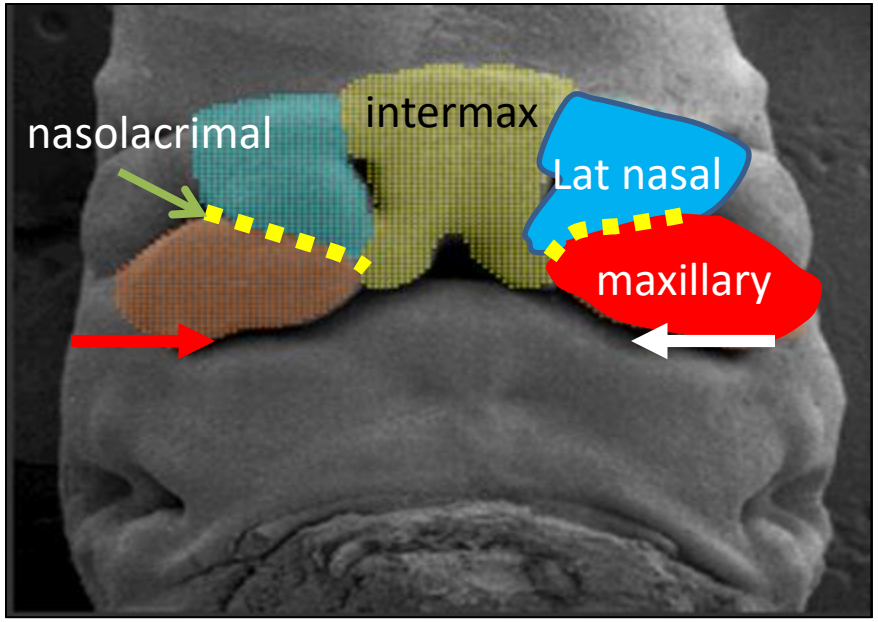
.Nasal pits are the primordia of the anterior nares (nostrils) & nasal cavities.






Nasal pits
FNP
NP
MXP
MDP
BA2
BA3





Maxillary prominences enlarge & grow medially toward each other ⇒ Push medial nasal prominences toward the median plane & each other.

The 2 medial nasal prominences fuse together in median plane to form a median nasal prominence (intermaxillary segment).

.Each lateral nasal prominence fuse with the ipsilateral side of median nasal prominence ⇒ Formation of anterior nares.

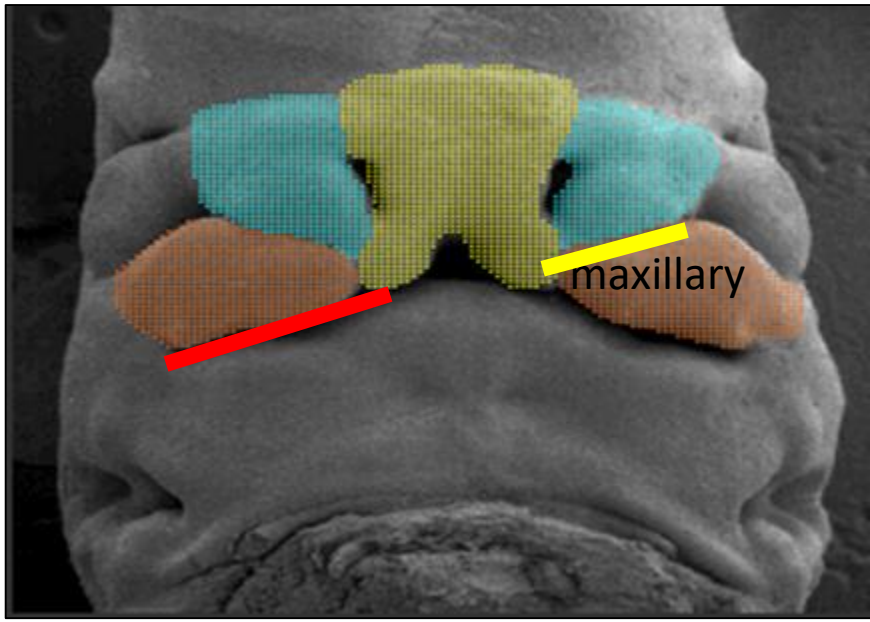
-Laterally, each lateral nasal prominence is separated from the maxillary prominence by the nasolacrimal groove.

By the end of 6th week, each maxillary prominence fuses (merges) with 3 adjacent prominences:

Merging with medial nasal prominence ⇒ Continuity of the upper jaw & lip and separation of the nasal pits from the stomodeum.

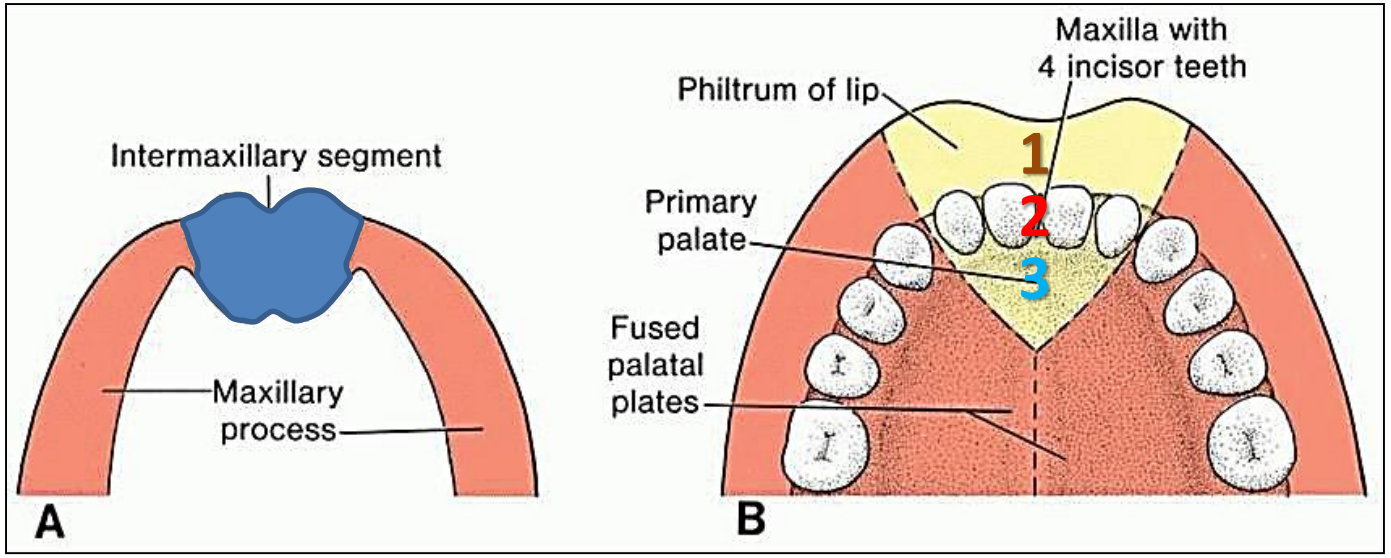
Merging with lateral nasal prominence along the nasolacrimal groove.

-This establishes continuity between the side of the nose (formed by the lateral nasal prominence) & the cheek (formed by the maxillary prominence).



Intermaxillary segment (Median nasal prominence) gives:

1. **Deep middle part of the upper lip.**
2. **Premaxillary part of the upper jaw (carries upper 4 incisors) & its associated gum.**
3. **Δ primary palate.**



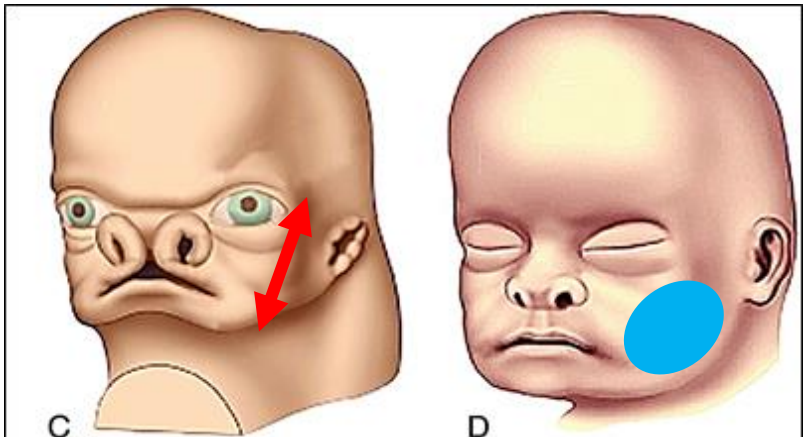
Merging with mandibular prominence to form the cheek & thus ↓ the width of the stomodeum.

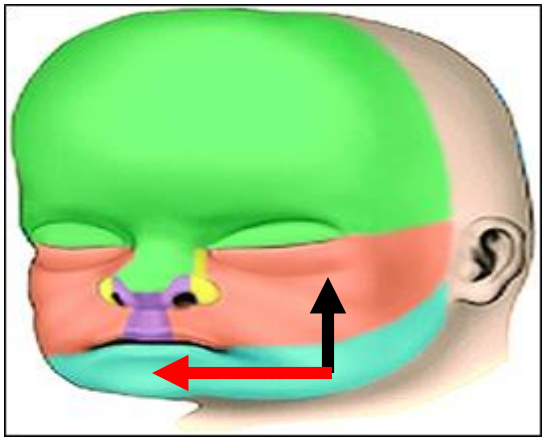
]Changes in the mandibular prominence:

.Each mandibular prominence merges with 2 adjacent prominences:

1.Ipsilateral maxillary prominence → Cheek.

2.Contralateral mandibular prominence, caudal to stomodeum → Lower lip & jaw.



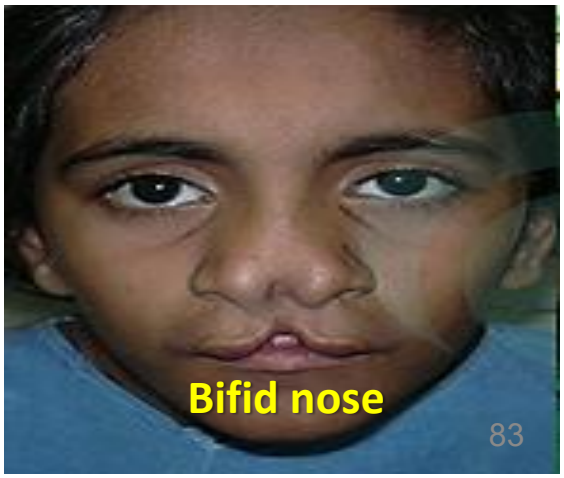


facial anomalies:

1. **Macrostomia**: Wide mouth opening due to underfusion of the maxillary & mandibular prominences of 1st arch.
2. **Microstomia**: An abnormally small mouth opening due to excessive merging of the maxillary & mandibular prominences.
3. **Absence of the nose**: A very rare condition which occurs when no nasal placodes form.
4. **Bifid nose**: This results when the medial nasal prominences do not merge completely. D


Macrostomia


Microstomia

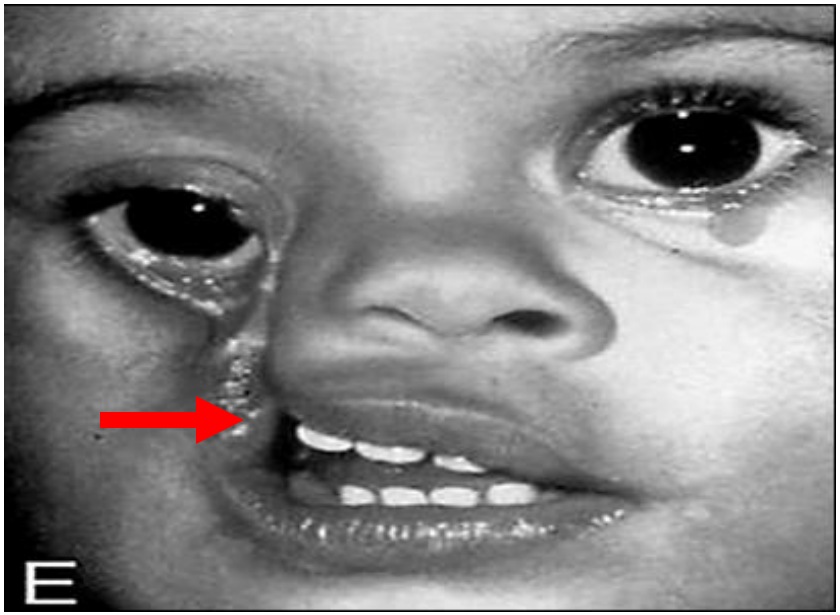

Bifid nose

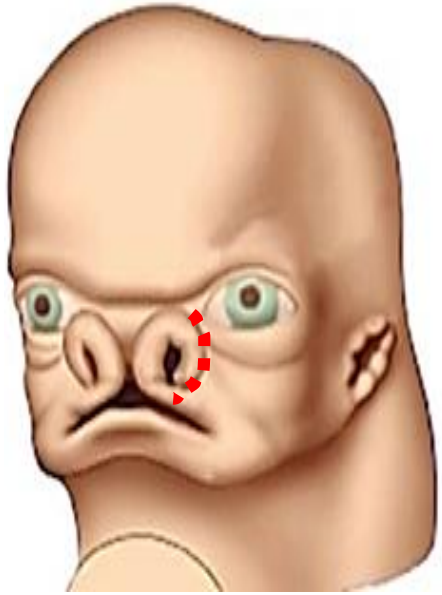
5-Oblique facial cleft (orbito-facial fissure): Rare condition which may be unilateral or bilateral. *Along nasolacrimal groove*

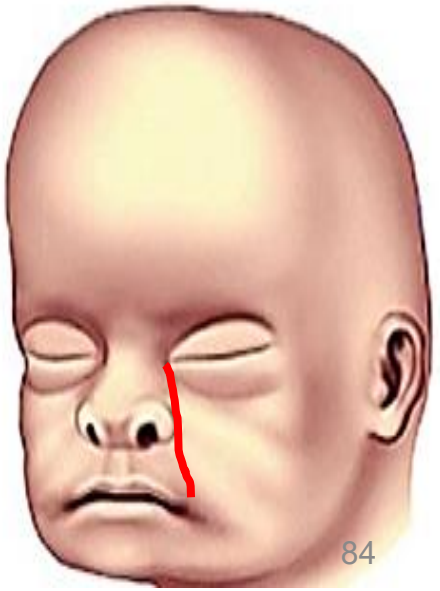
-The cleft extends from upper lip to medial margin of the orbit.

-It results from failure of fusion of maxillary prominence with lateral nasal prominence on one or both sides.

.The nasolacrimal duct fails to develop on the affected side (persistent nasolacrimal groove).







- A 53-year-old banker develops paralysis on the right side of his face, which produces an expressionless and drooping appearance. He is unable to close the right
- eye and also has difficulty chewing and drinking. Examination shows loss of the blink reflex in the right eye to stimulation of either right or left cornea. Lacrimation
- appears normal on the right side, but salivation is diminished and taste is absent on the anterior right side of the tongue. There is no complaint of hyperacusis.
- Audition and balance appear to be normal. Where is the lesion located?
- a. In the brain and involves the nucleus of the facial nerve and superior salivatory nucleus
- b. Within the internal auditory meatus
- c. At the geniculate ganglion
- d. In the facial canal just distal to the gems of the facial nerve
- e. Just proximal to the stylomastoid foramen

A 23-year-old woman presents with concern over a hyperpigmentation spot that has enlarged after her weeklong vacation in Cancun, Mexico. The woman is

blond with fair skin. The pigmented spot is on her cheek, below the medial portion of her eye and lateral to the dorsal surface of the nose, but just above her labial

malar (nasolabial) skin fold. The spot has grown to about 6 mm laterally and 4 mm cranially/caudally with irregular borders and two tones of brown pigmentation.

What two regional lymph nodes should specifically be palpated during her physical examination?

a. Buccal and submandibular nodes

b. Buccal and submental nodes

c. Jugulodigastric and juguloomohyoid nodes

d. Parotid and mastoid nodes

e. Submental and submandibular nodes

A 44-year-old attorney presents to a family practice office with a hat on her head and wearing dark sunglasses even though it is an overcast January day. Upon taking off her glasses and hat a series of vesicles are visible above her left eye continuing to her hairline. The vesicles stop at the midline of her forehead, but extend onto the dorsal surface of her nose and onto her left upper eyelid. There are no vesicles around or above her ears. She reports that she had pain in a similar pattern for a couple of days before the vesicles suddenly appeared. She can think of no change in habits or travel to account for the vesicles; she has infrequently left her home and office during the past 2 weeks since she is preparing for a case before the Cailfiornia Supreme Court. She had both chickenpox and mumps as a child. What is the working diagnosis and explanation for the unique pattern of the vesicles?

a. Herpes zoster affecting the mandibular division of the trigeminal cranial nerve

b. Herpes zoster affecting the ophthalmic division of the trigeminal cranial nerve

c. Herpes zoster affecting the zygomatic branch facial cranial nerve

d. Mumps affecting the maxillary division of the facial cranial nerve

e. Mumps affecting her parotid salivary gland

Thank you