Superficial Face & Parotid Gland

Session 3: Superficial Face

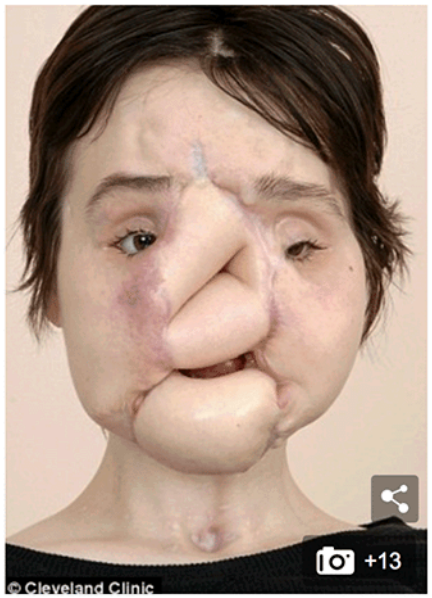
- **Objectives**
  - Learn *superficial landmarks of face & skull* for purposes of determining congenital anomalies
  - Identify the *muscles of facial expression* and their innervation to understand facial paralysis
  - Determine features of the *eyelid and lacrimal* apparatus relevant for lacrimation.
  - Identify the sensory *nerves of face* and their role in facial pain
  - Review the *vasculature of the face* for the evaluation of intracranial spread of infections
  - Understand the anatomy of *parotid gland* and its relation with contiguous facial structures.

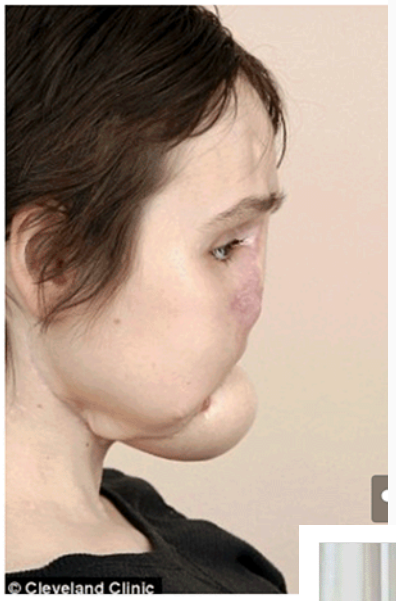
Reading

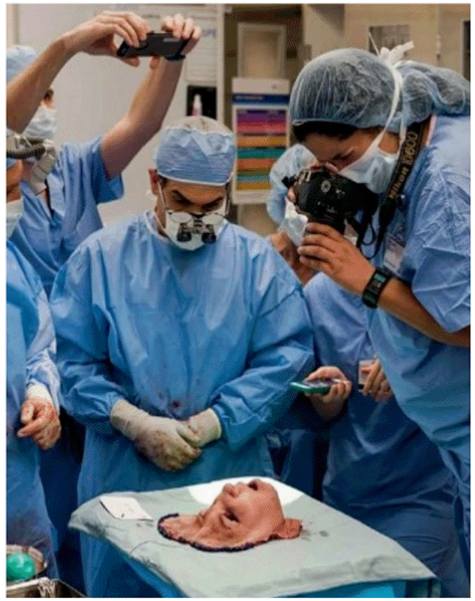
- Lecture
  - Moore's Clinical Anatomy:
    - Begin studying skull, pages 830-851,
    - Face and Scalp, pages 851 – 873.
- Laboratory
  - Detton's Grants Dissector
    - Skull and Face: Pages 244-254.

Katie Stubblefield

Face Transplant

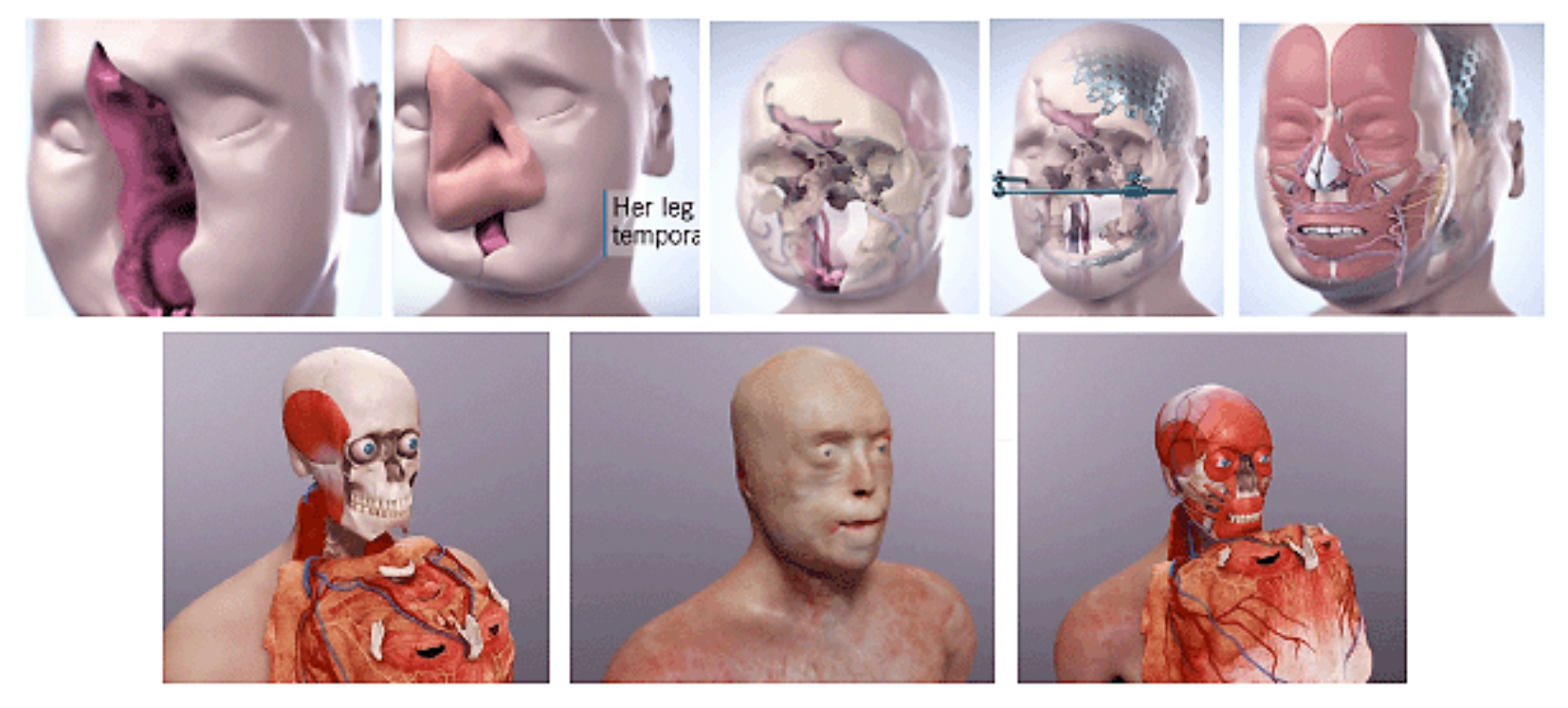




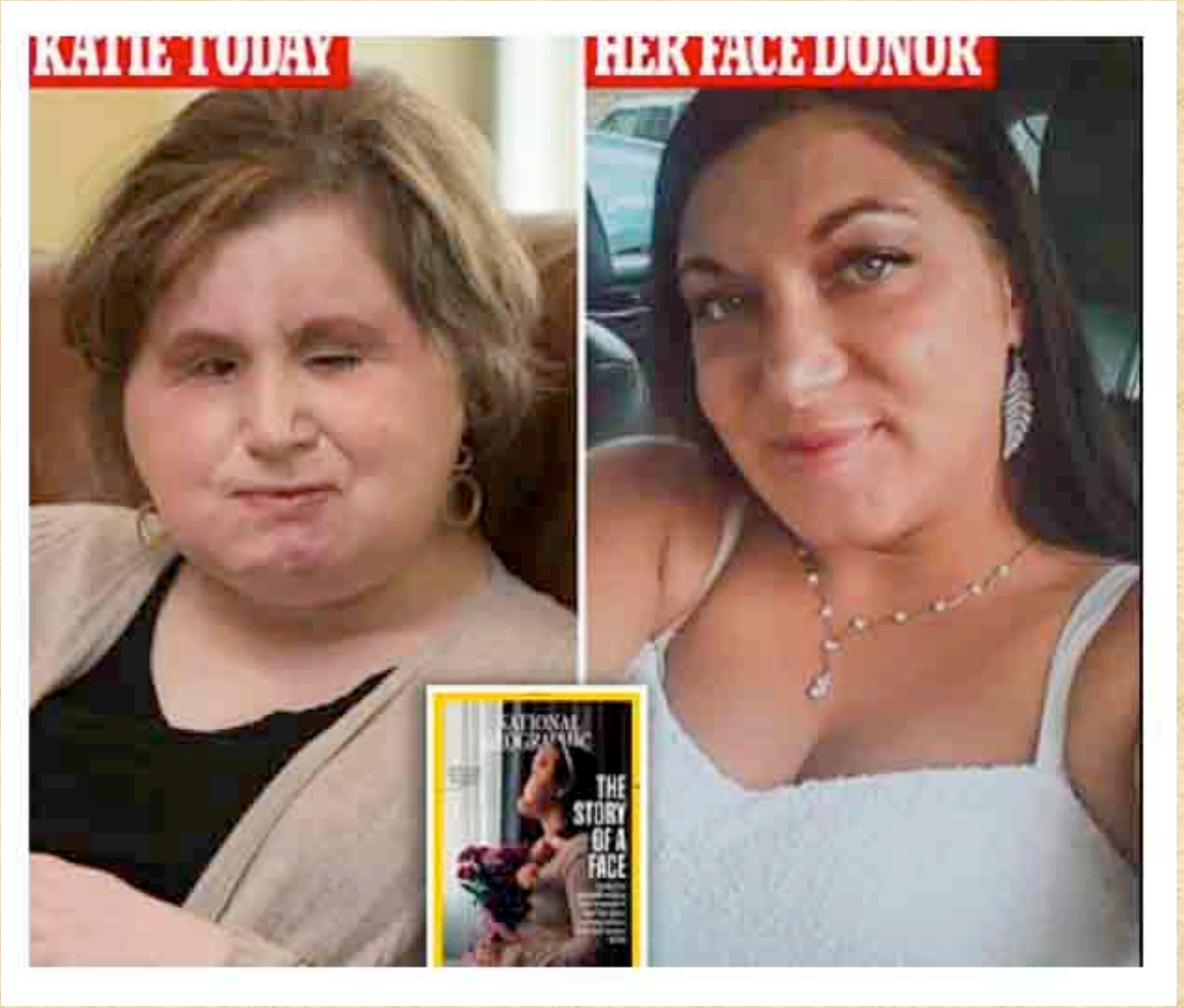


Maggie Steber and Lynn Johnson,
National Geographic, Sept 2018.

Tranplantation Steps

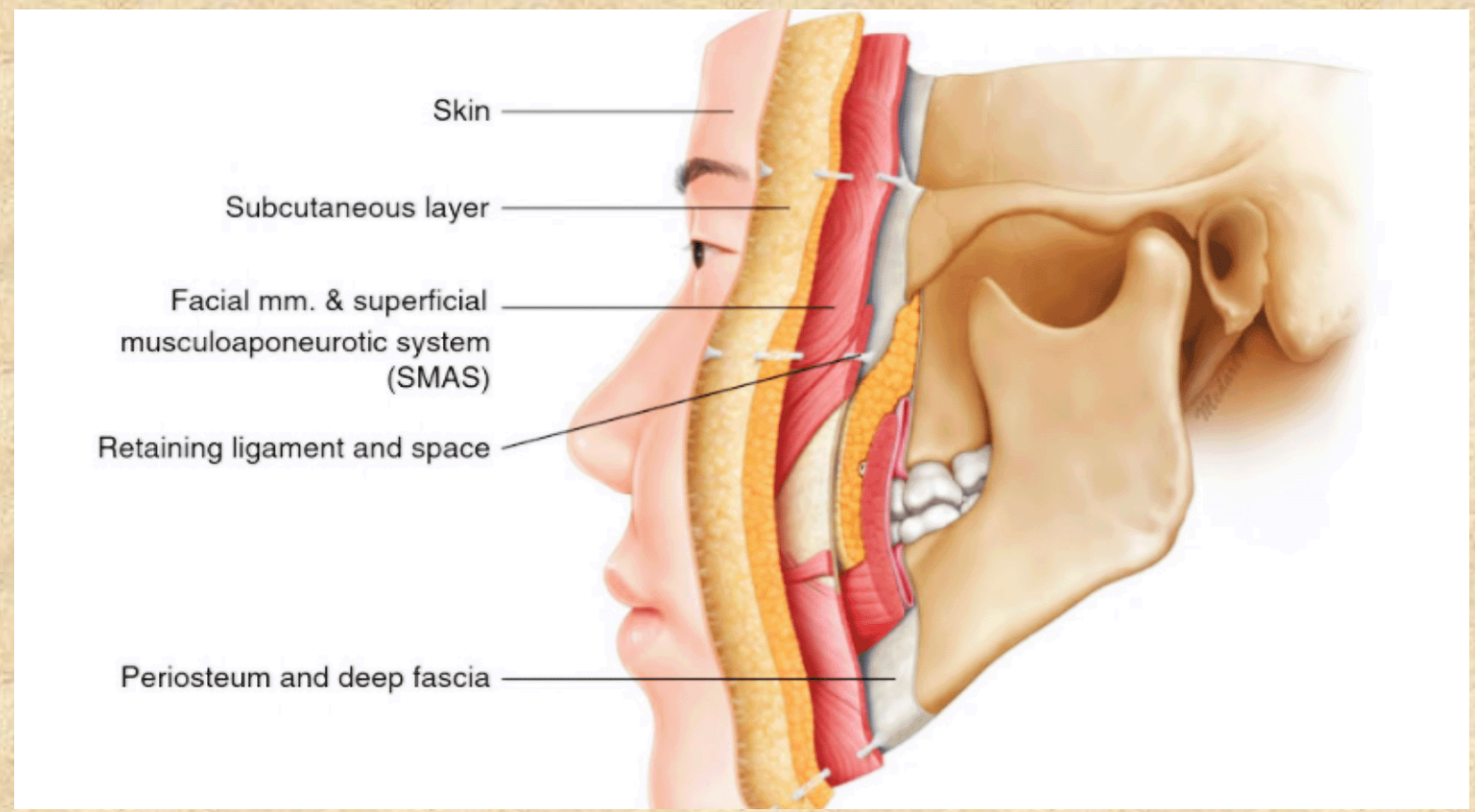


After Surgery and Donor



Patrick Hardison

Layers of Face (SMAS)
superficial muscloaponeurotic system

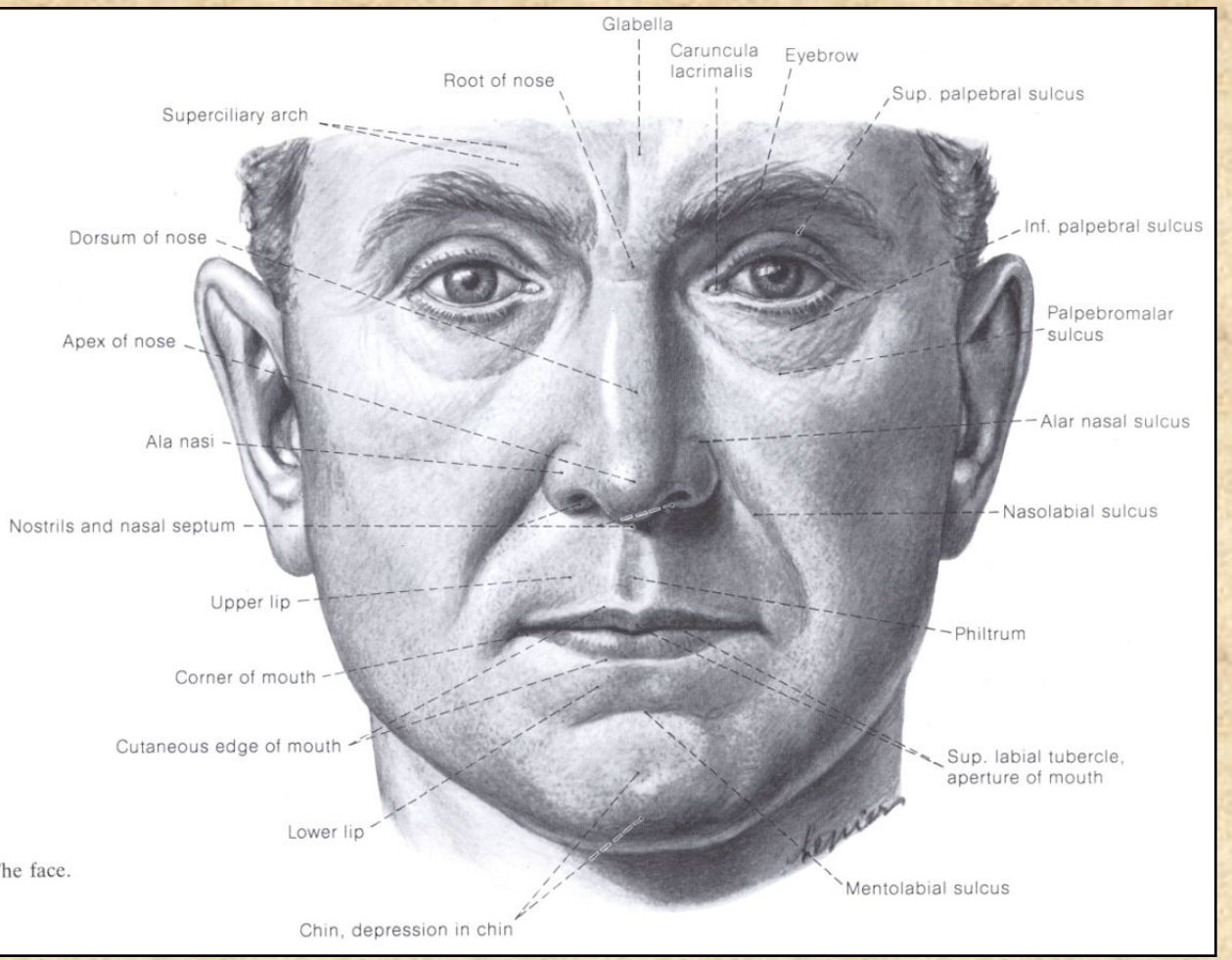


Benefits/Risks

Improved Functionality
Restoration of Appearance
Pain & Discomfort reduction

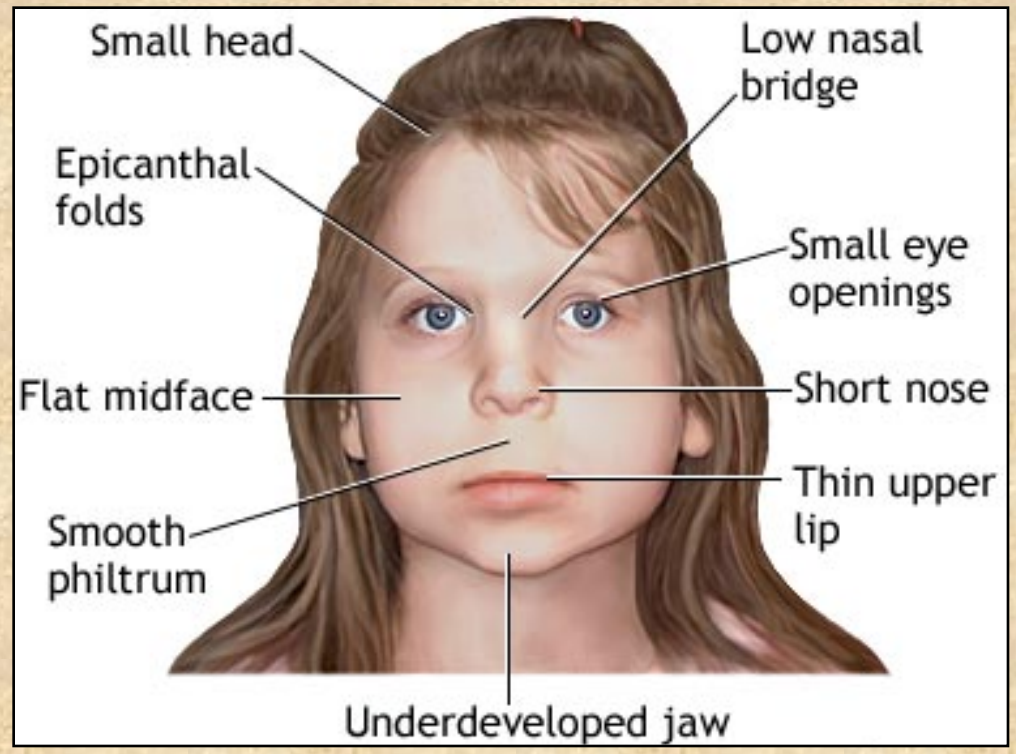
Tissue Rejection
Identity & psychological effects
Drug side effects

Landmarks of the Superficial Face



- Bregma, Glabella and Nasion
- Supraciliary arch
- Epicanthal folds
- Palpebral fissure
- Ala of nose and naris
- Nasal septum and philtrum
- Nasolabial sulcus
- Cheeks
- Oral fissure
- Lip and vermillion border
- Mentolabial sulcus
- Mentalis

Superficial Landmarks of Face

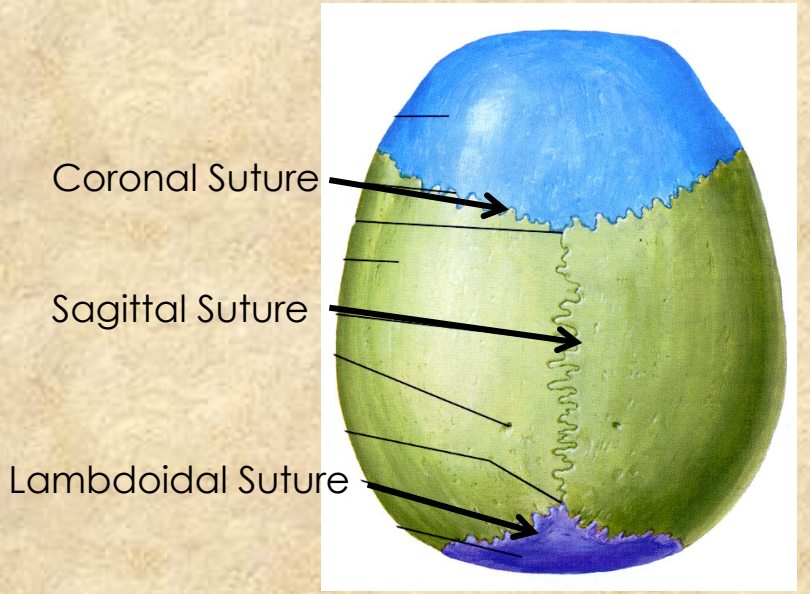


Fetal Alcohol Syndrome

Skull Osteology

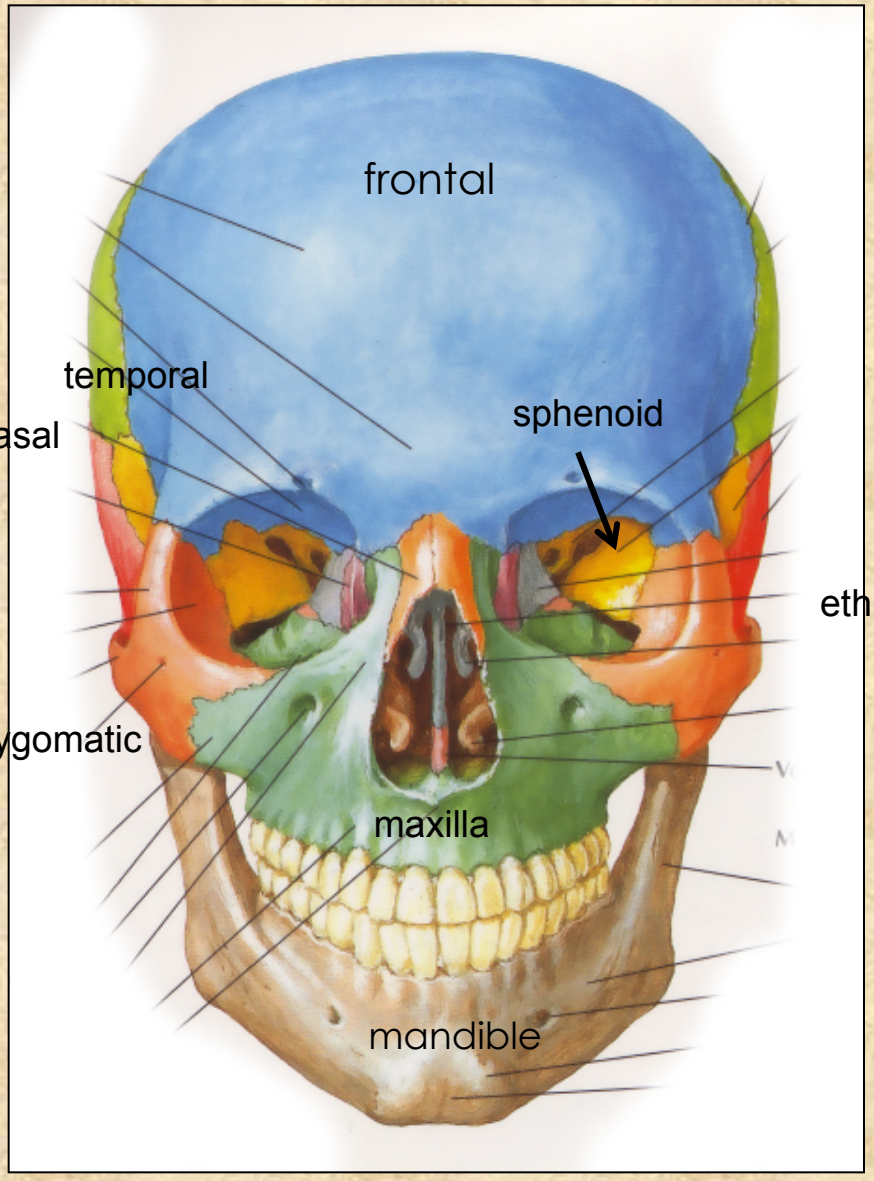
- Review Osteology of Skull
  - **Neurocranium** consists of calvaria
  - **Viscerocranium** - facial skeleton
  - Major Bones: Frontal, nasal, zygomatic, maxilla, mandible, temporal, occipital, sphenoid, basioccipit, parietals
    - Separated by sutures including sagittal, coronal, lambdoidal, temporal

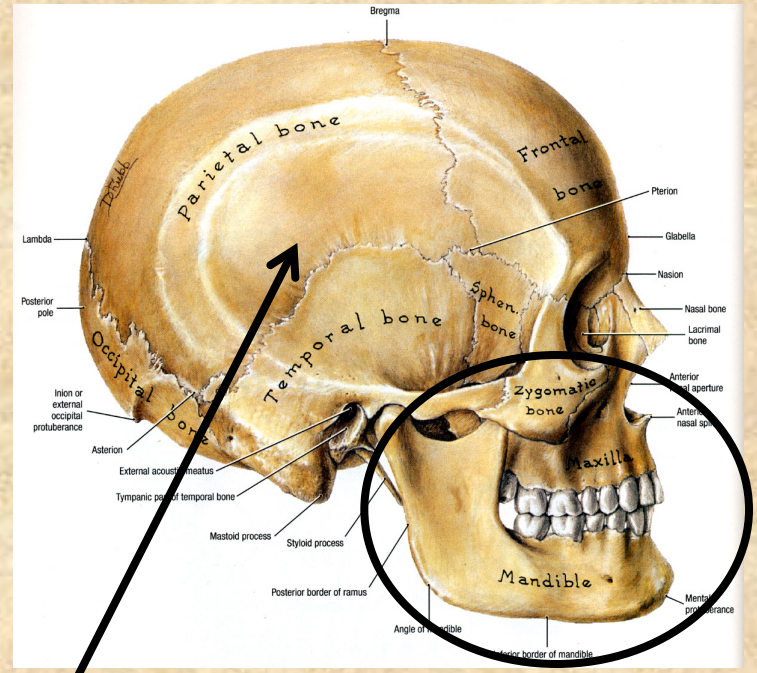
- Superficial Bony Features
  - **Foramina**
    - **Face**
      - Supraorbital
      - Infraorbital
      - Mental
    - **Cranial Base**
      - Stylomastoid f
      - Jugular f
      - F Rotundum
      - F Ovale
      - Internal auditory meatus
      - Foramen Magnum



Skull Osteology

21 fused bones + 1 mobile (mandible)





Neurocranium

Parietal(2)
Temporal (2)
Occipital
Frontal
Sphenoid
Ethmoid

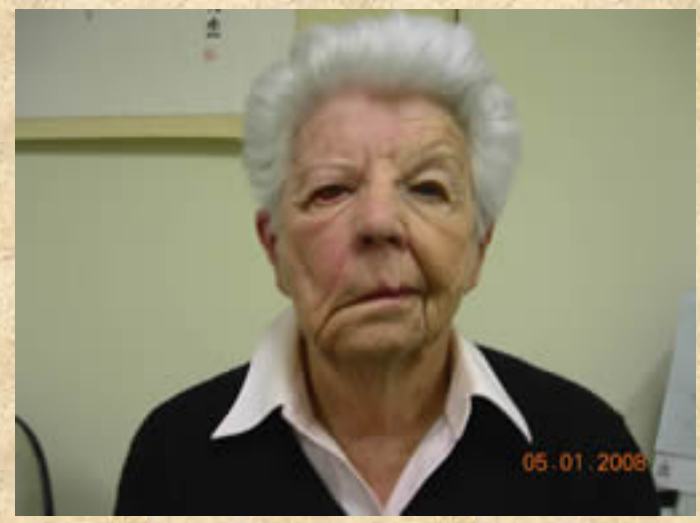
Viscerocranium

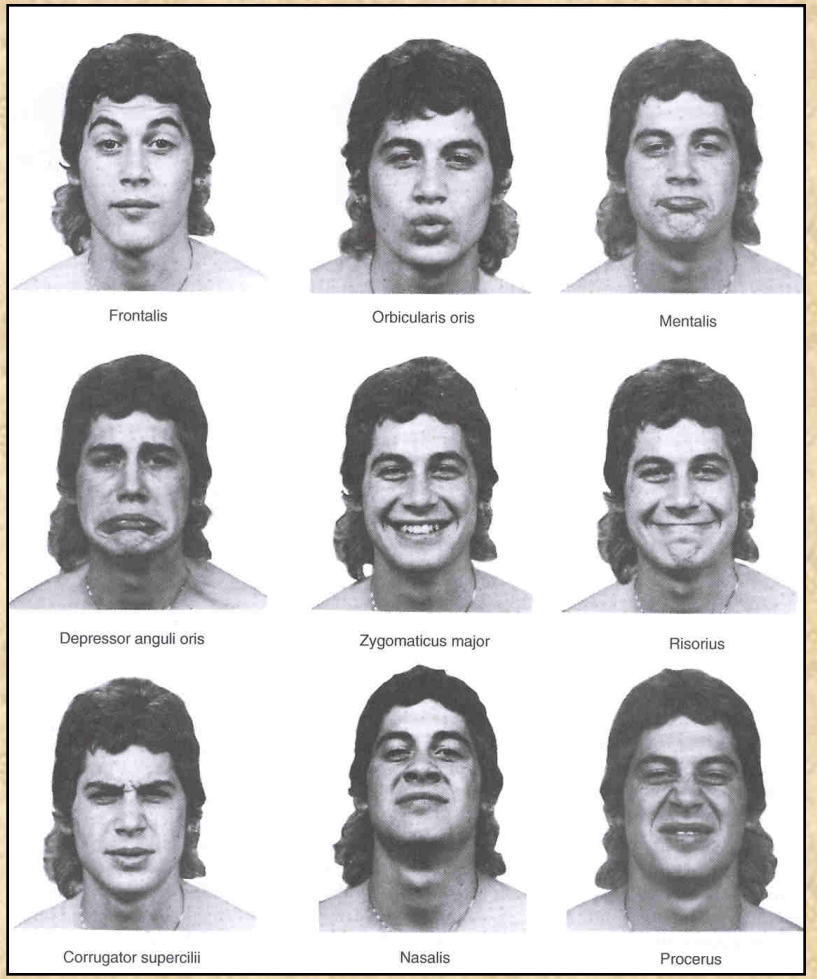
Lacrimal (2) Maxillae (2)
Nasal (2)
Zygomatic (2)
Palatine (2)
Inf. Nasal conchae (2)
Mandible
Vomer

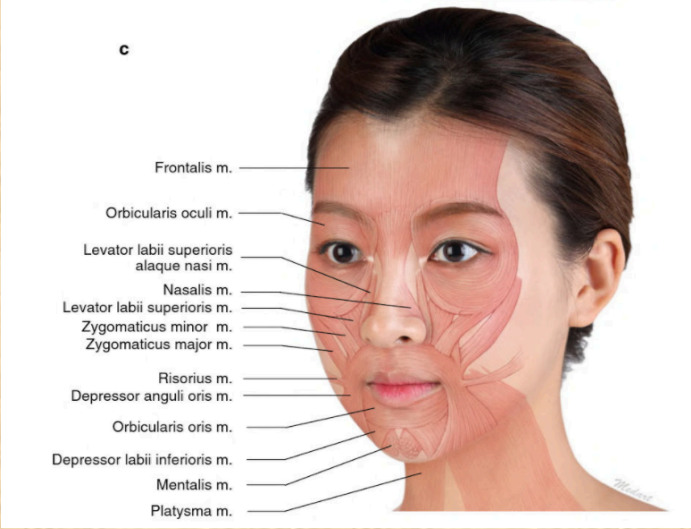
Muscles of Facial Expression

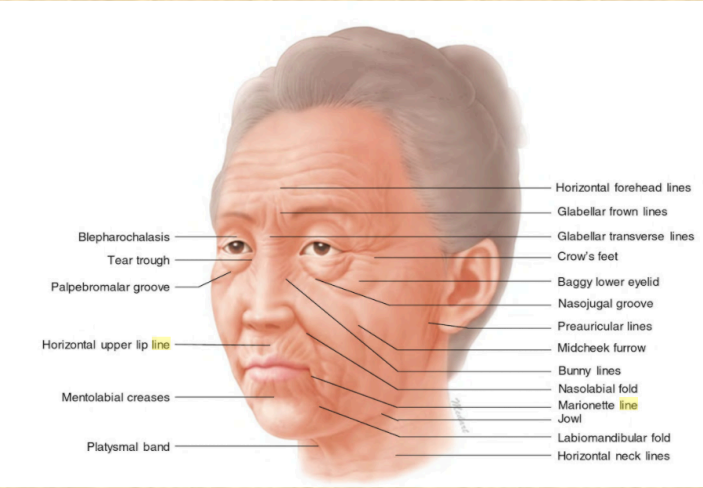
Attach the to the bone and skin
Muscular sheets from pharyngeal arch II and supplied by CN VII
- Paralysis can be seen as Bell palsy
- Tears
- Drooling around mouth

Surround and serve as sphincter or dilators of facial orifices







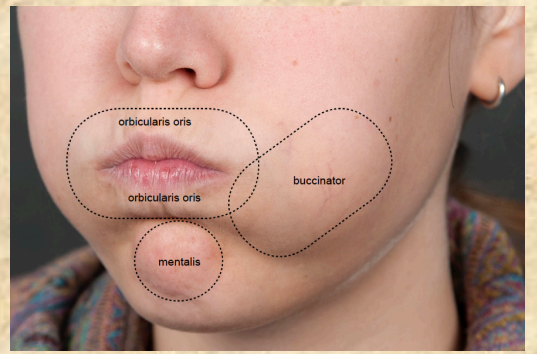


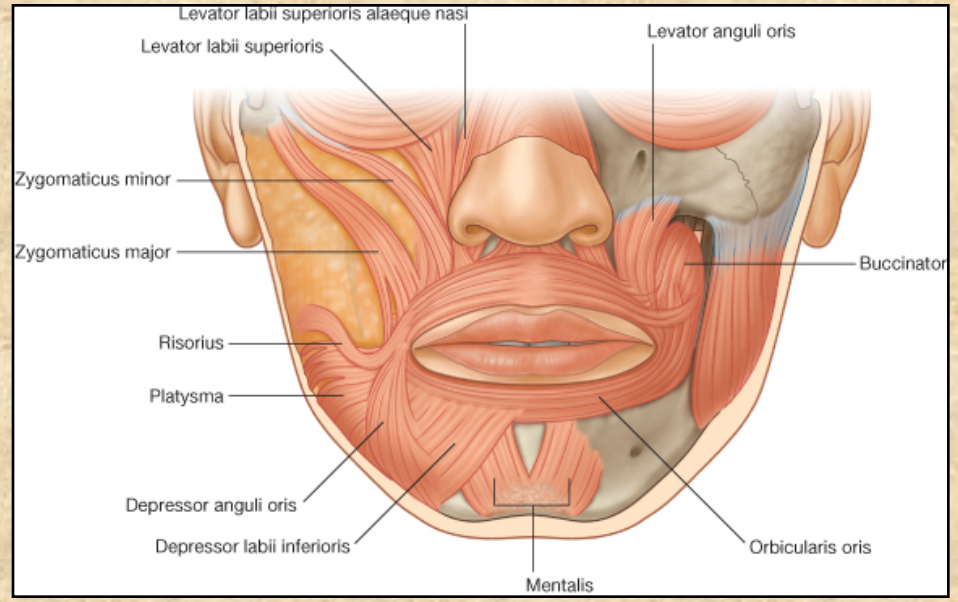
- **Forehead and eyebrows**
  - Frontalis and occipitalis joined by epicranial aponeurosis
    - Elevates eyebrows and produces transverse wrinkles
    - Expresses surprise
  - Procerus and corrugator supercilli
    - Depresses and wrinkles eyebrows

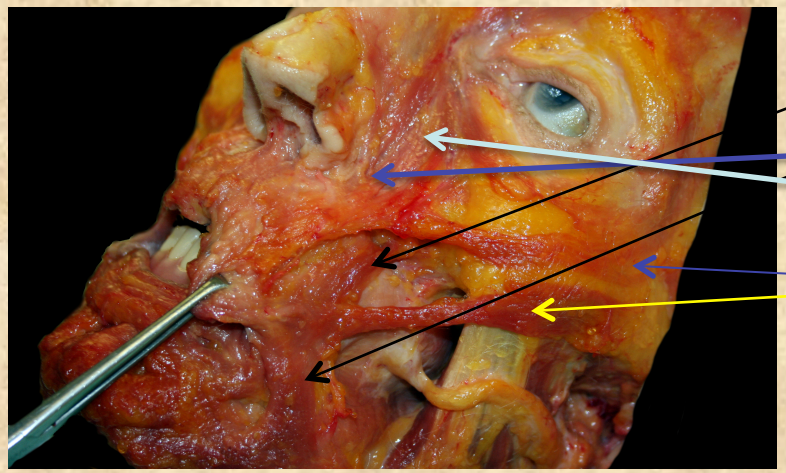
- **Nose and Ears**
  - Auricularis
    - cause ear movments
  - Nasalis, Depressor septi
    - Flaring of nostrils may indicate nasal breathing versus mouth breathing

•Mouth and cheek

- •Orbicularis oris is major sphincter of oral fissure
- •Buccinator (cheek) produces pucker (compresses checks during blowing)







•Lips

- •Levator anguli oris
- •Depressor anguli oris
- •Levator labii superioris
- •Levator labii superioris alague nasi
- •Depressor labii inferioris
- •Zygomaticus major/minor
- •Risorius

Modiolous – junction of several muscles at chelion (corner of mouth)

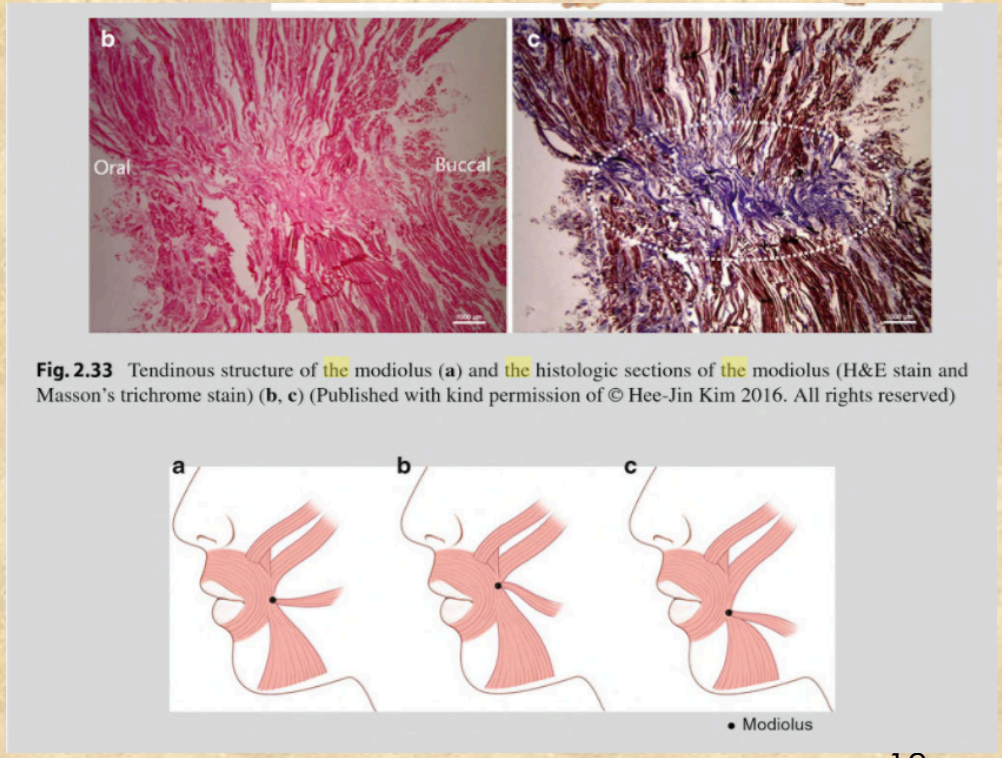
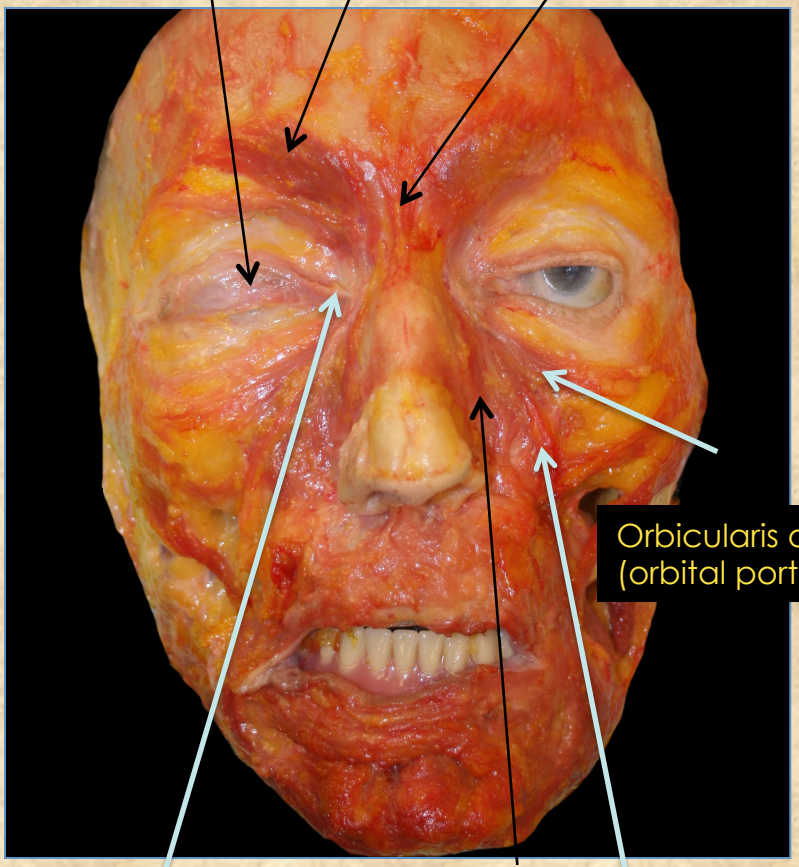


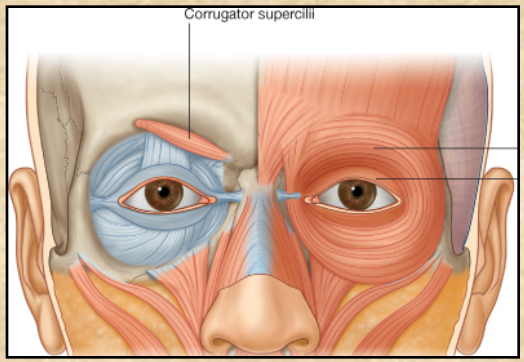
Fig. 2.33 Tendinous structure of the modiolus (**a**) and the histologic sections of the modiolus (H&E stain and Masson's trichrome stain) (**b**, **c**) (Published with kind permission of © Hee-Jin Kim 2016. All rights reserved)

Mentalis & Masseter Reductions

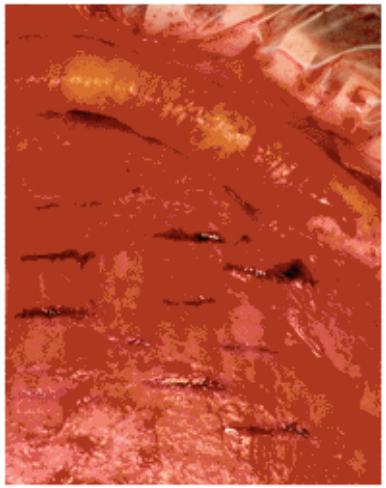
Muscles of Facial Expression

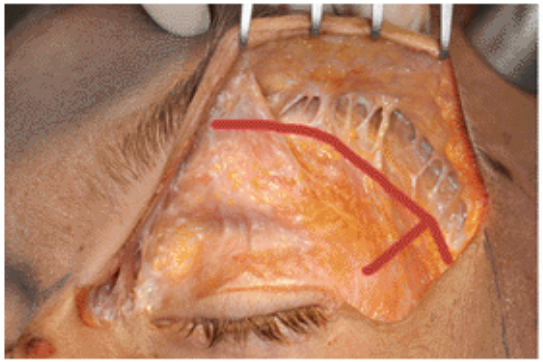


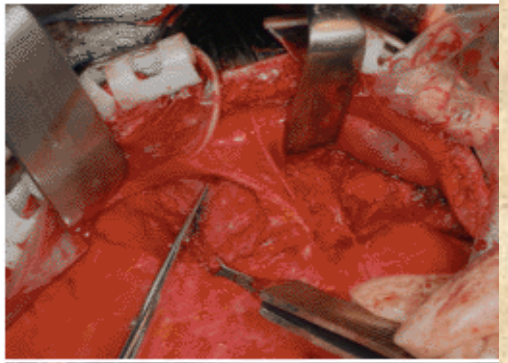
- **Orbicularis oculi**
  - **Orbital part** - sphincter of palpebral fissure, i.e., opening between eyelids; closes and protects
  - **Palpebral part** - enters eyelid for finer movements

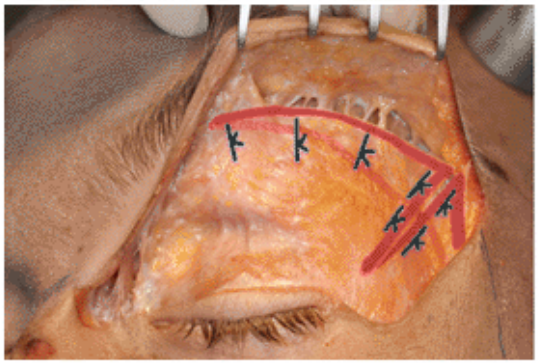


Plastic Surgery (face lift) & Orbicularis Oculi



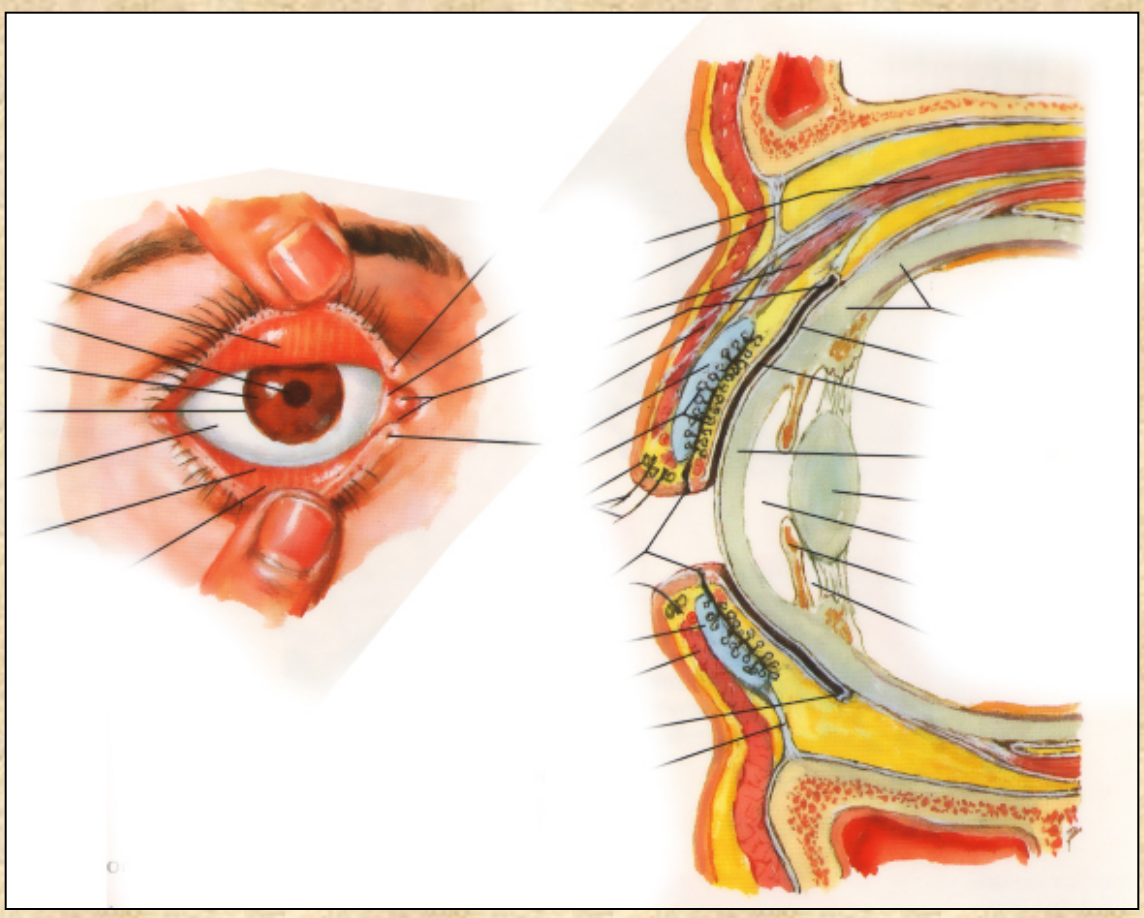




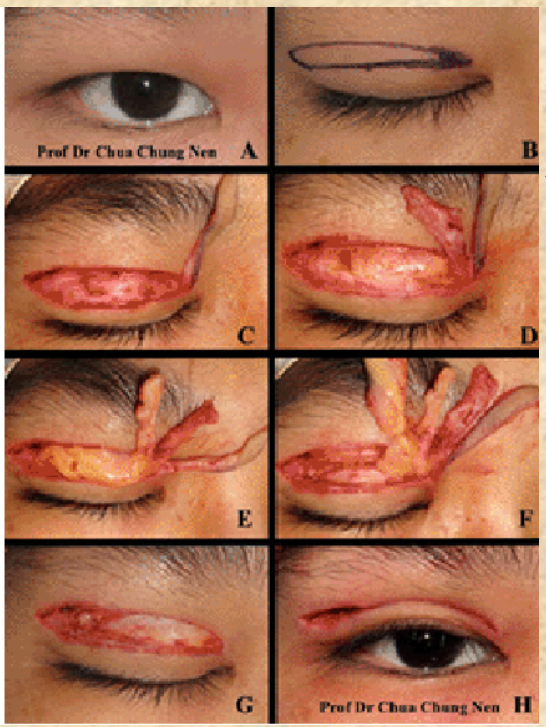


Eye Lid

- Skin
- Loose areolar tissue
  - becomes edematous easily
- Palpebral portion of orbiculuaris oculi
- Levator palpebrae superioris
- Tarsal plates
  - Thick fibrous tissue
  - Inferior and superior Tarsal glands
  - Connect to bone
- Conjunctiva



Blepharoplasty for double eyelids

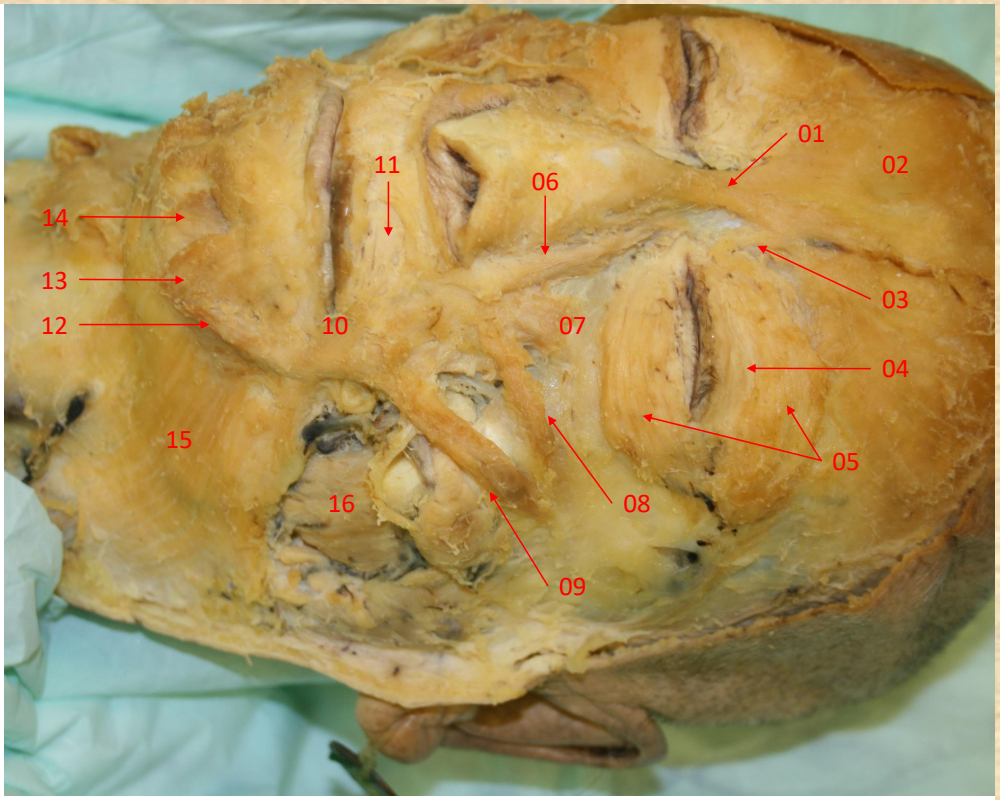


A,B Mark eyelid for transection
C Excise skin
D Excise palpebral portion of oo
E Removal of orbital septum & oo
F Removal of adipose
G Expose levator palpebrae sup (LPS)
H Suture palpebral plate to LPS

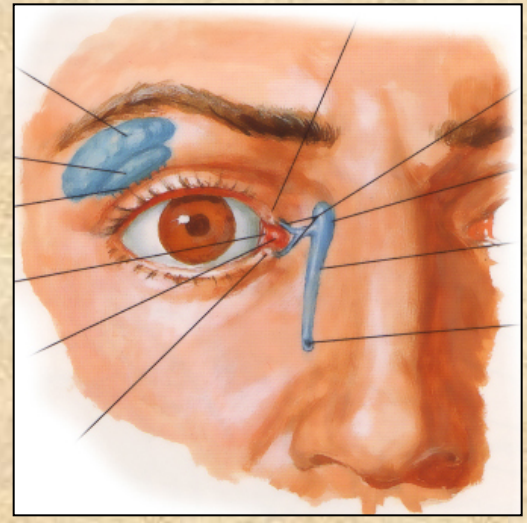
Muscles of Facial Expression Dissection

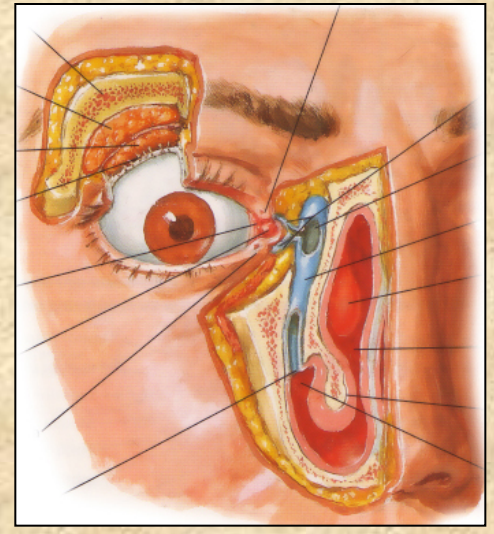
Muscles

01 Occipitofrontalis
02 Procerus
03 Corrugator supercilii
04 Orbicularis oculi (palpebral)
05 Orbicularis oculi (orbital)
06 Levator labii superioris alaeque nasi
07 Levator labii superioris?
08 Zygomaticus minor
09 Zygomaticus major
10 Modiolus
11 Orbicularis oris
12 Depressor anguli oris
13 Depressor labii inferioris
14 Mentalis
15 Platysma
16 Masseter



Lacrimal Apparatus

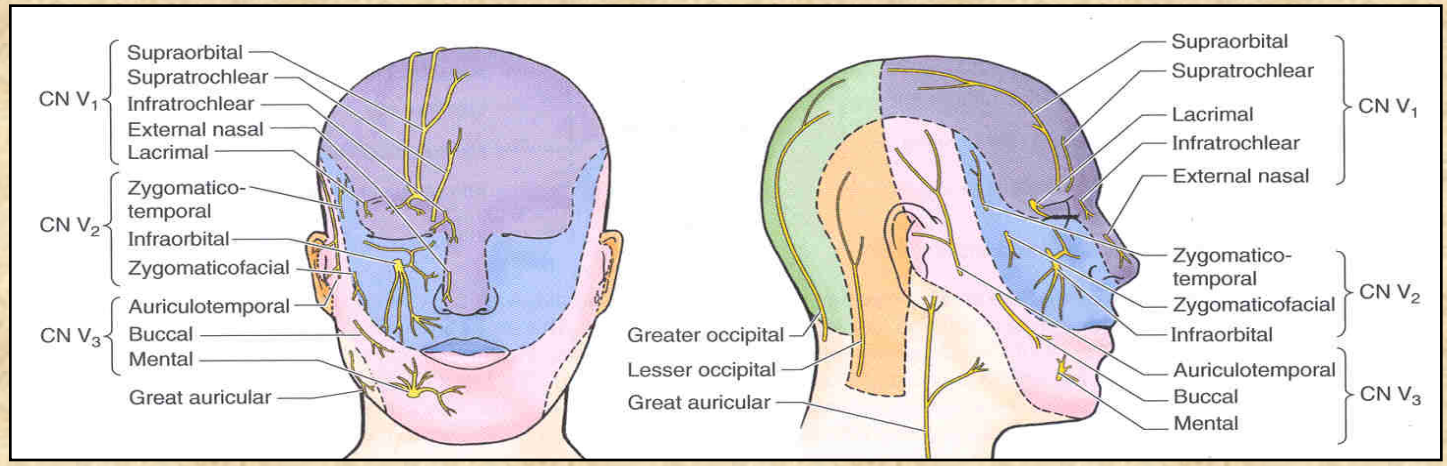


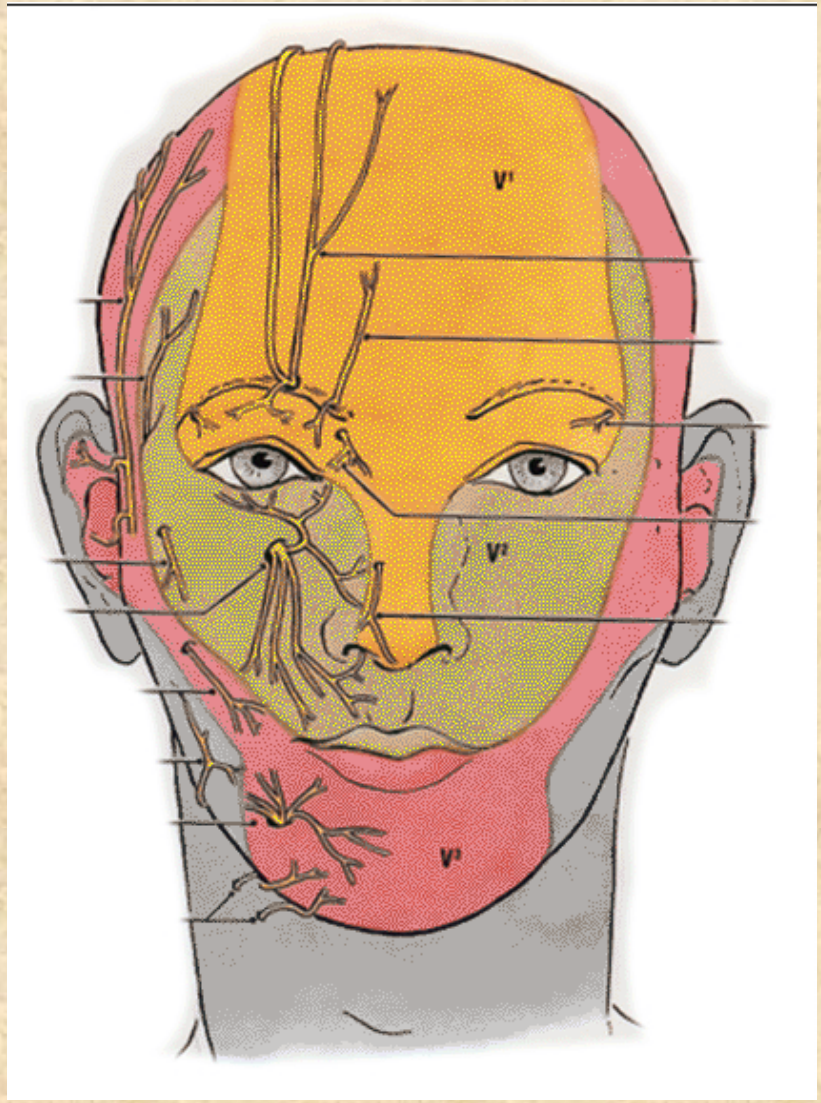


Secretes serous fluid consisting of salts and lysozymes
Innervated by via parasympathetic and sympathetic fibers
Tears are forced medial by blinking
Lacrimal lake contains lacrimal caruncle
Around caruncle are the lacrimal puncta which collects the lacrimal fluid transmitted through the lacrimal canaliculi to the lacrimal sac
Nasolacrimal duct goes to nasal cavity

Nerves of Face

- **Cutaneous Nerves**
  - Sensory from CN V
    - Overlap with cervical plexus of neck
      - Cervical plexus innervates neck and ear
      - CN V innervates face
      - Dorsal spinal nerves innervate occipital region (true back nerves from C2 and C3)
      - Trigeminal Ganglion
        - Pseudounipolar cells that form a sensory ganglion - but motor nerves from trigeminal also course through the ganglion
        - 3 Major nerves arise from the trigeminal ganglion: **V_1, V_2, V_3**





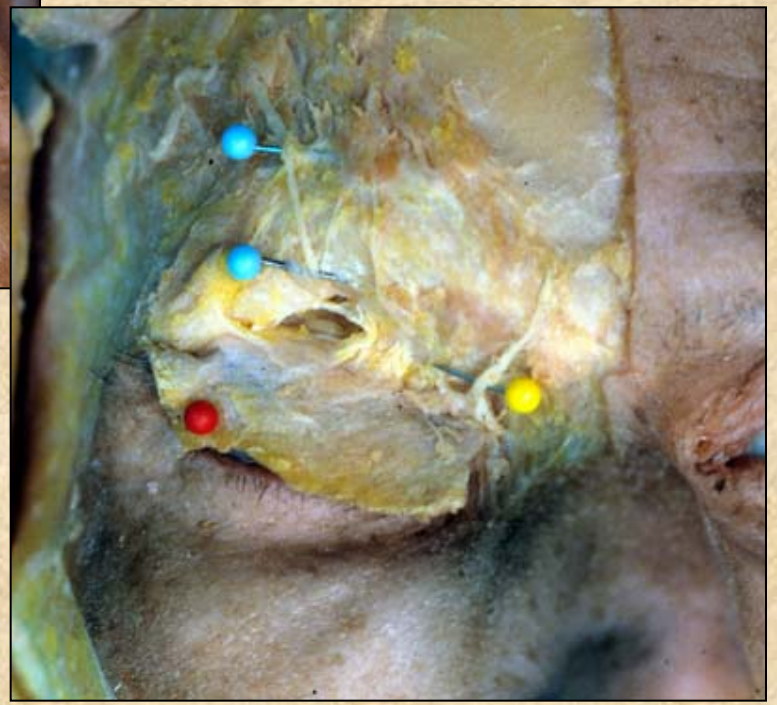
Sensory innervation of face and associated foramina

- Supraorbital
- Supratrochlear
- Infratrochlear
- infraorbital

V_1: Ophthalmic Division of CN V

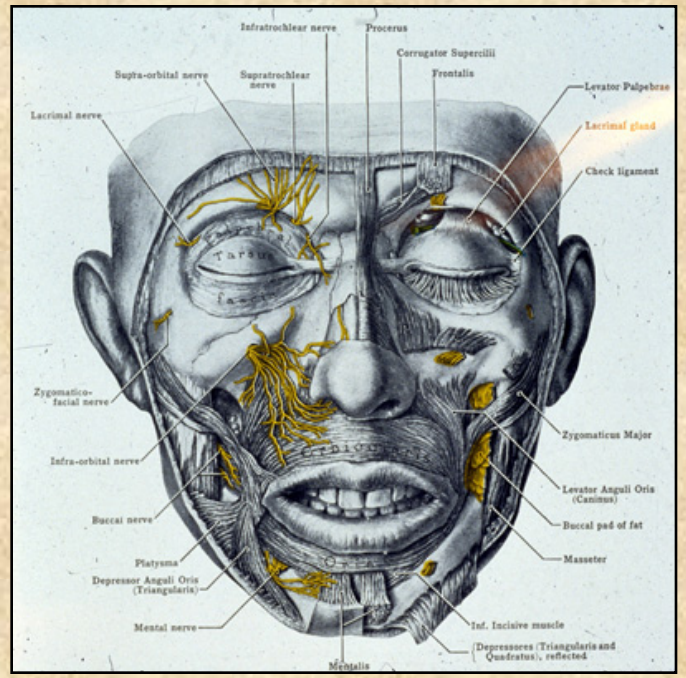
- Features
  - **All sensory**, associated with frontonasal prominence
  - Enters orbit through **superior orbital fissure**
  - Splits into several branches in the orbit
    - **Frontal**
      - Splits into **supraorbital** and **supratrochlear** nerves for forehead innervation
    - **Nasociliary**
      - Forms numerous branches that supply orbit and contiguous sinuses
    - **Lacrimal**
      - Conveys sensory but also secretomotor fibers to lacrimal gland

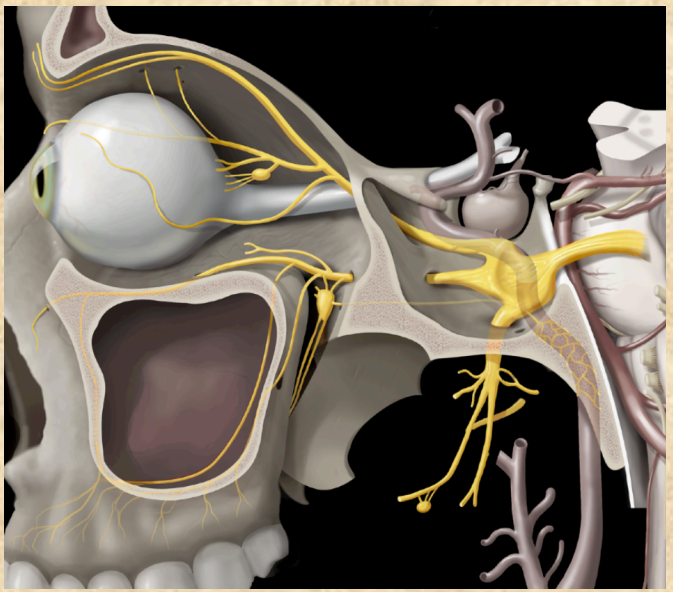
V_1: Ophthalmic Division of CN V



- Supraorbital n.
- Supratrochlear n.

V_2: Maxillary Division of CN V





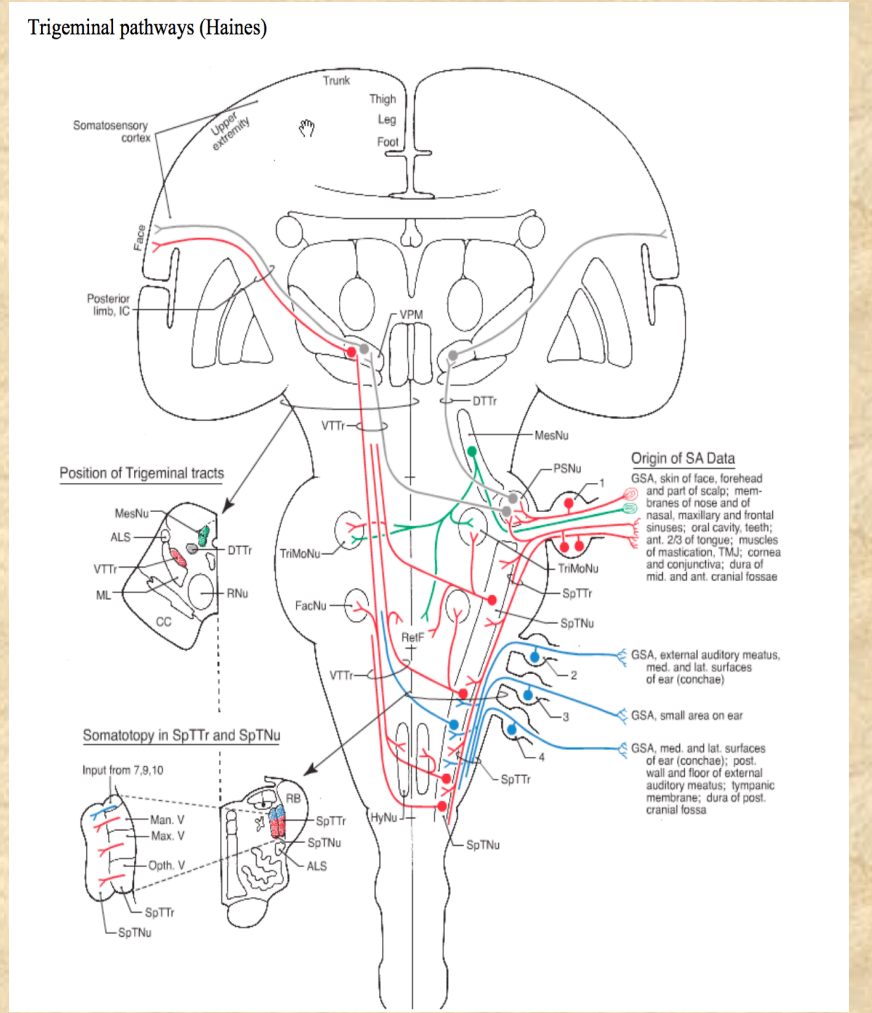
All sensory: Runs through foramen **rotundum**, enters the **pterygopalatine fossa** where it communicates with the **pterygopalatine ganglion** and then enters the orbit through the **inferior orbital fissure**

Major branches

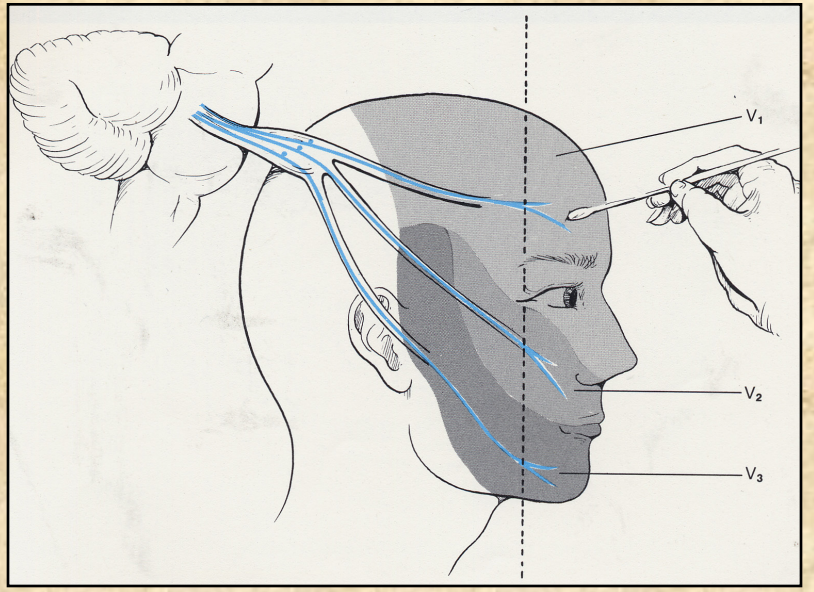
- **Zygomatic** nerve gives rise to cutaneous nerves that innervate the zygomatic arch
- **Infraorbital** nerve - the major cutaneous nerve of the midface as it exits the infraorbital foramen
- **Palatine** nerves to palate
- **Superior alveolar** nerves to maxillary teeth

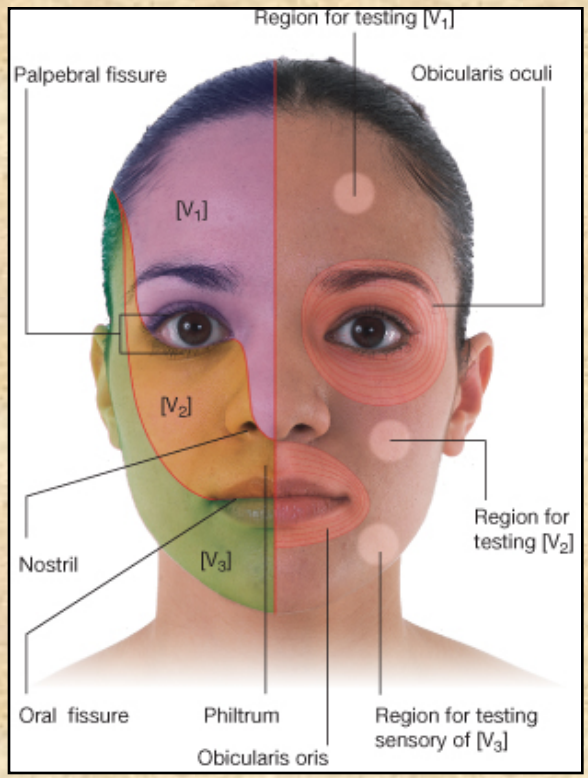
Trigeminal Nuclei (Review)

- Sensory for V
  - Mesencephlic Nuc
    - Proprioception to mandible & jaw jerk reflex
  - Principal Sensory Nuc of V
    - 2 pt discrimination
  - Spinal Trigeminal Nuc
    - Oral – touch
    - Intrapolar – pain to teeth
    - Caudal – nociception & temp
- Motor for V
  - Motor Nucleus
    - Muscles of Mastication & Associated stuctures



CN V: testing





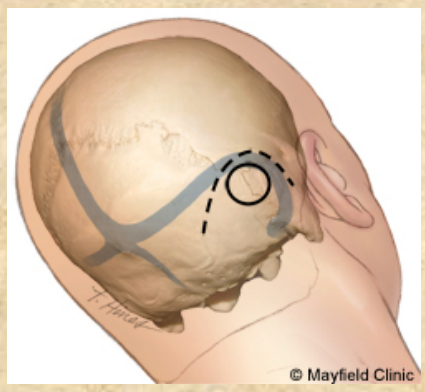
Sensory component (all general sensory with cell bodies in trigeminal ganglion with one process extending from the sense organ and the other synapsing in the sensory nucleus of the trigeminal nerve with its 3 subdivisions

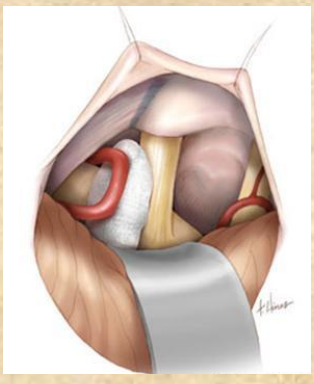
V_1 - forehead; V_2 - midface; V_3 - mandibular region

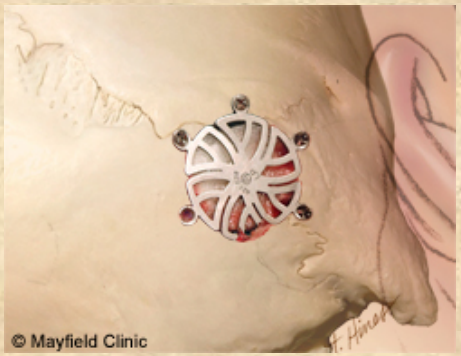
Major clinical issues include traumatic damage of branches resulting in anesthesia

Trigeminal neuralgia - excruciating pain associated with V_2 primarily

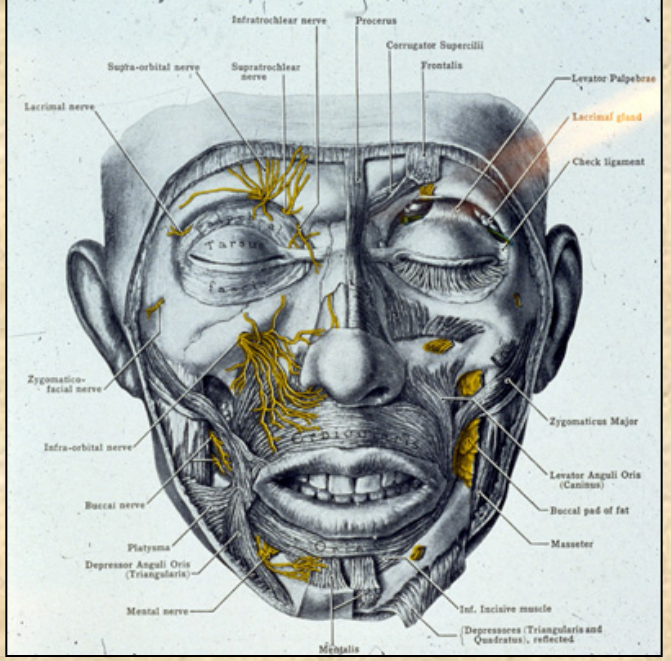
Trigeminal Neuralgia

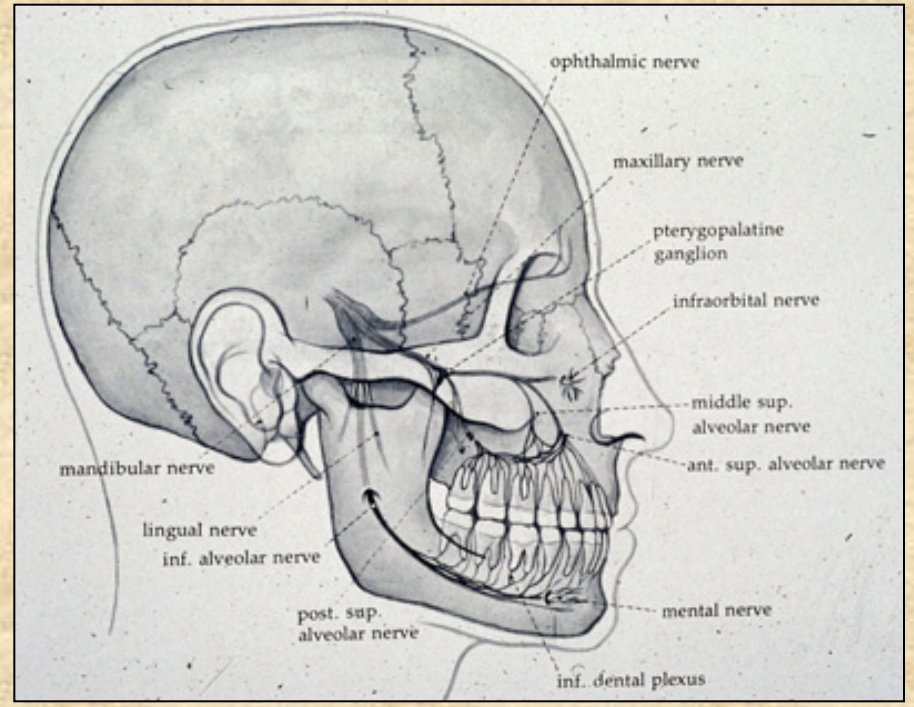






Pain associated with V2,1/15000
One of the most excruciating pains (suicide disease)
Usually occurs after 50, but as young as 3 YOA reported
More in women than men
Skull is opened, decompression of nerve by insertion of sponge between V and superior cerebellar artery



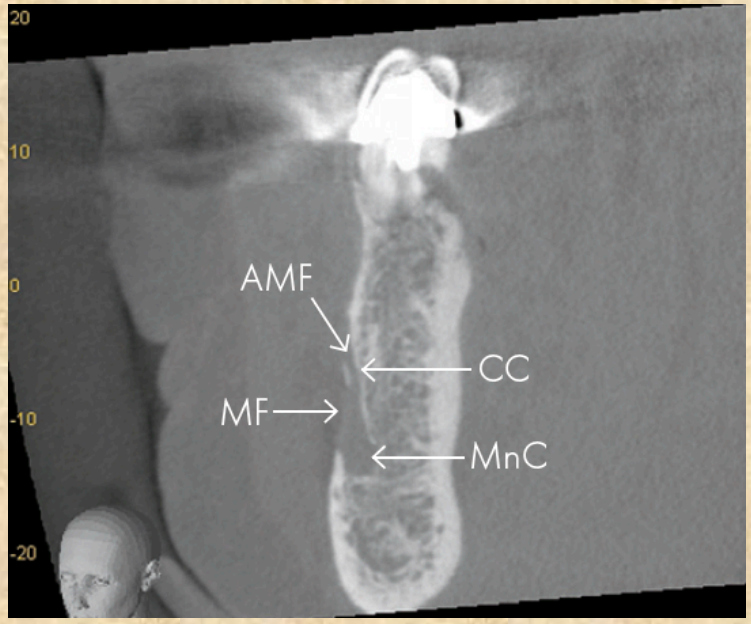


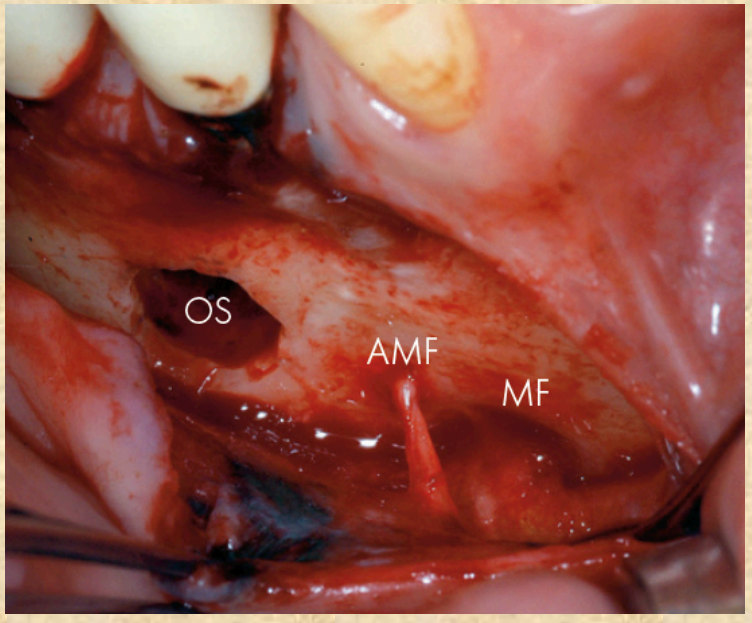
V_3: Mandibular Division of CN V

Largest division of CN V

- Route
  - From **trigeminal ganglion**, it exits **foramen ovale** into face
- Both **motor and sensory** components
- Motor to **muscles of mastication**
- Sensory from **mandibular teeth**, skin of mandible extending to ear
  - **Sensory** branches include **auriculotemporal** (to ear and TMJ), **buccal** (to cheek), **inferior alveolar nerve** (to teeth), **mental** nerve (termination of inferior alveolar) to chin

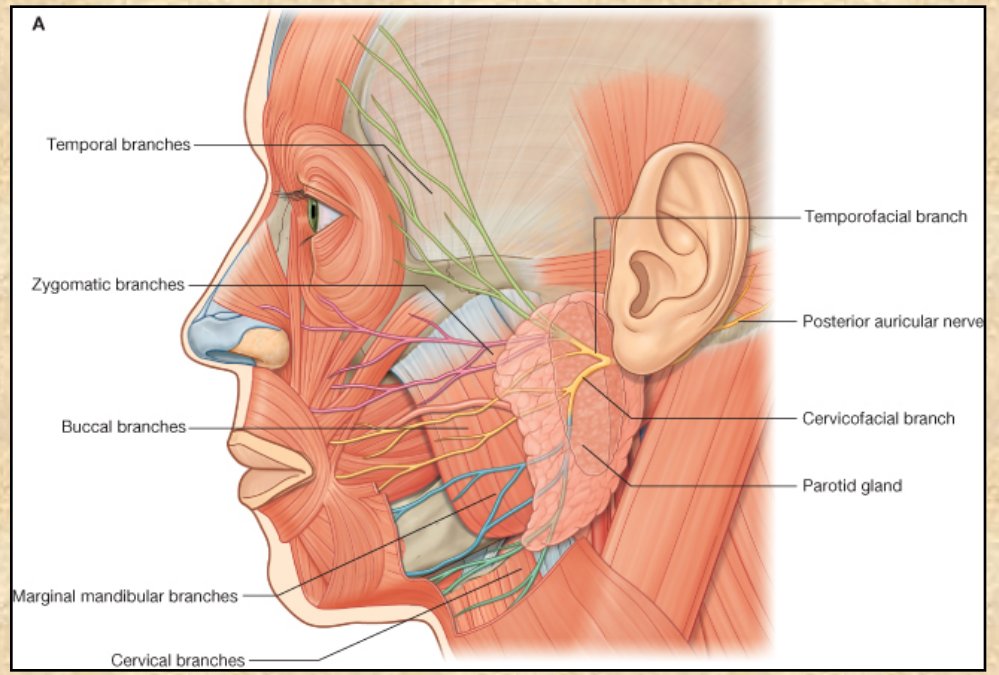
Mental Nerve (V_3)

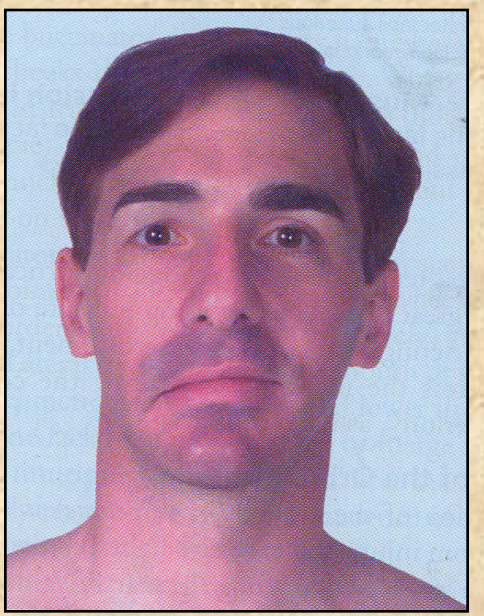


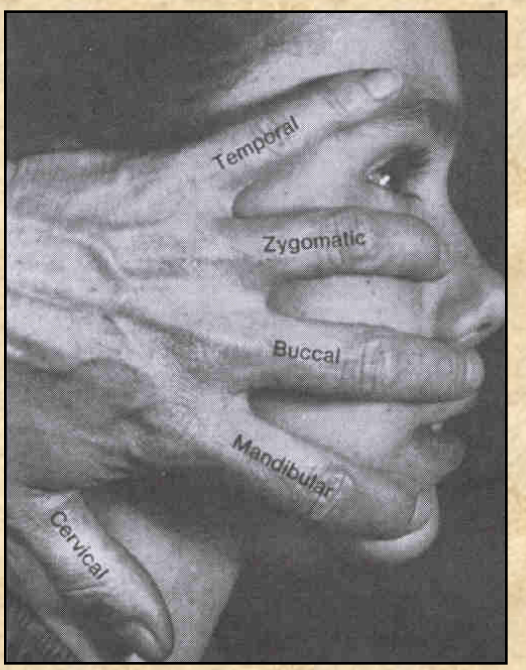


Inferior alveolar nerve runs through the mandible and supplies the teeth with sensory innervation; terminates as mental nerve

CN VII: motor to mm of facial expression



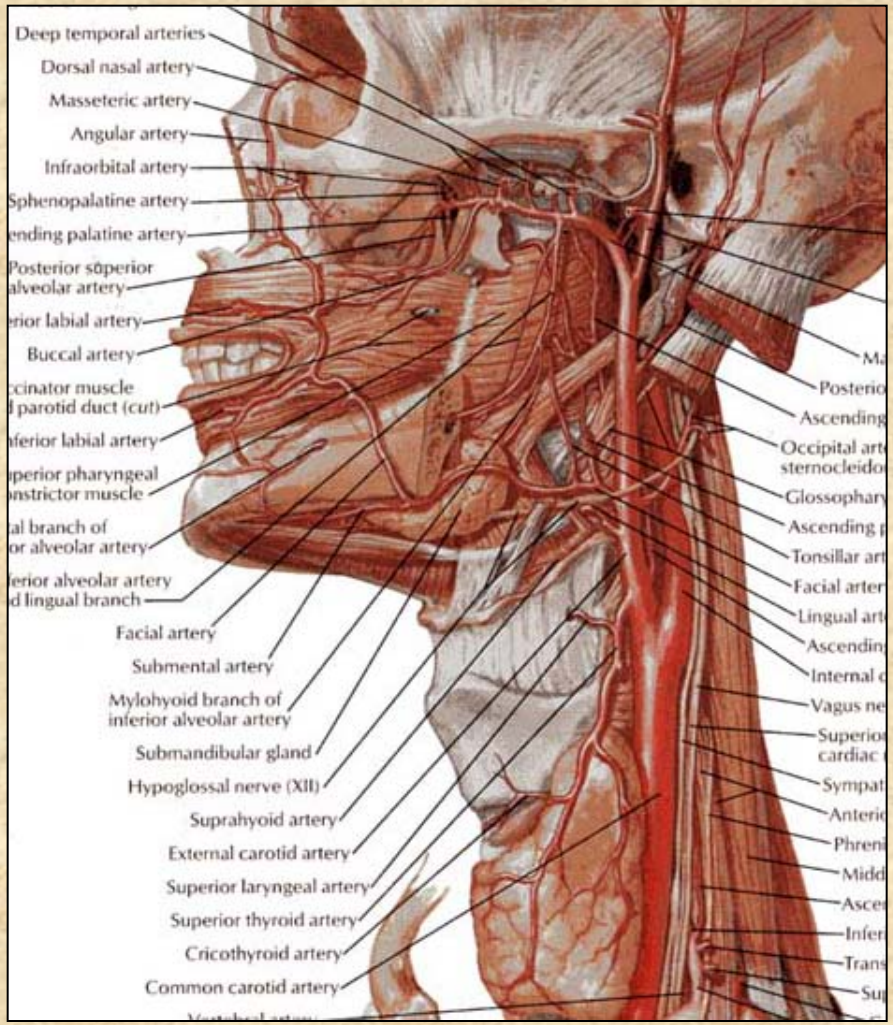


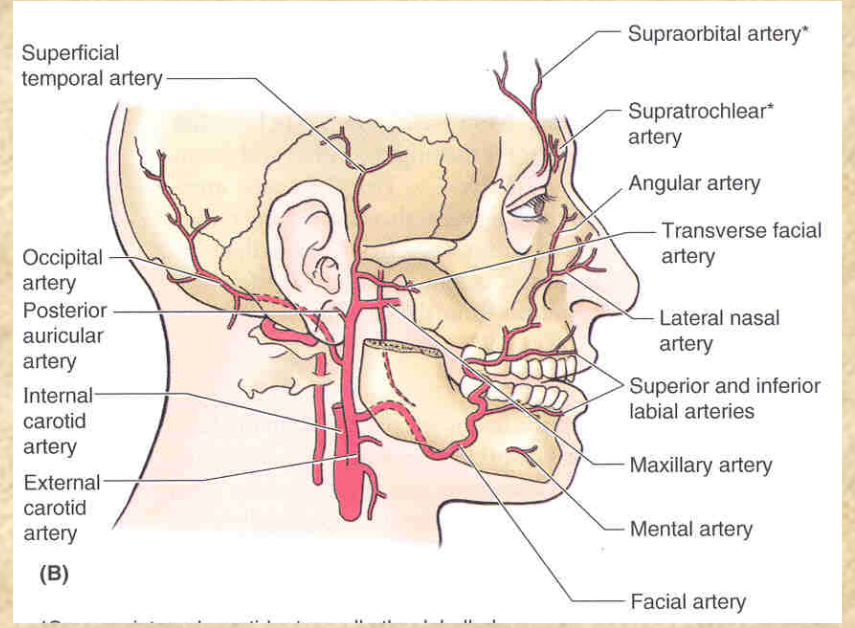


Also contains **sensory** and **parasympathetic** components

Complex route

- Exits brain stem, enters **internal auditory meatus** and travels laterally
- One portion exits the **stylomastoid** foramen
  - Immediately gives off **posterior auricular nerves** to auricularis muscles
  - Then splits into "TEN ZEBRAS BIT MY COOKIE"
    - •Temporal, zygomatic, buccal, mandibular, cervical





Facial Artery

Facial artery
- Branch of external carotid artery
  - Gives rise to superior and inferior labial arteries
  - Angular artery

Superficial temporal artery
- Transverse facial that accompanies parotid duct

Mental artery
- Branch of Inferior alveolar artery (supplies mandibular teeth) and maxillary artery upstream

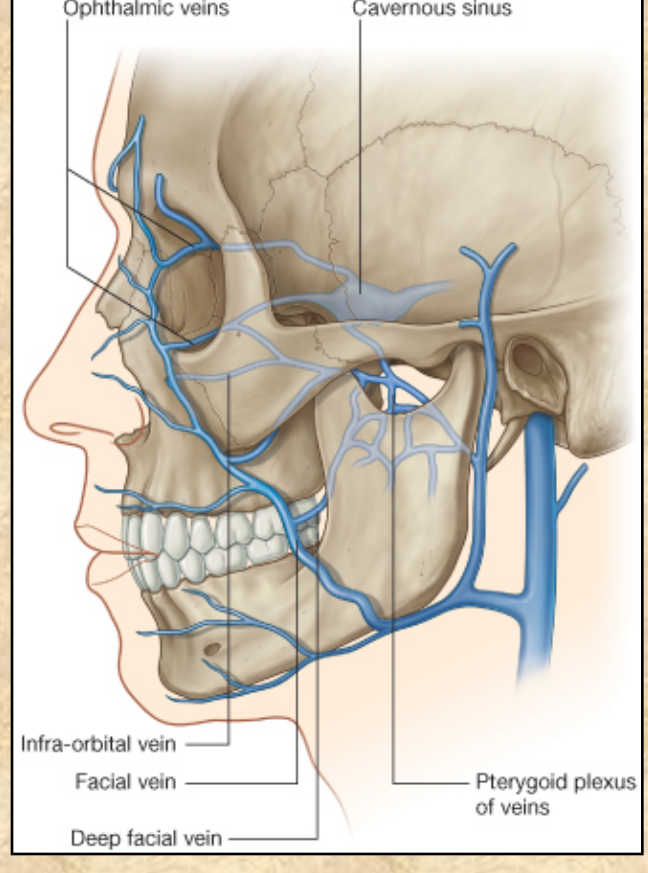
Supraorbital and **supratrochlear** arteries
- Ophthalmic (from internal carotid in cranial cavity)

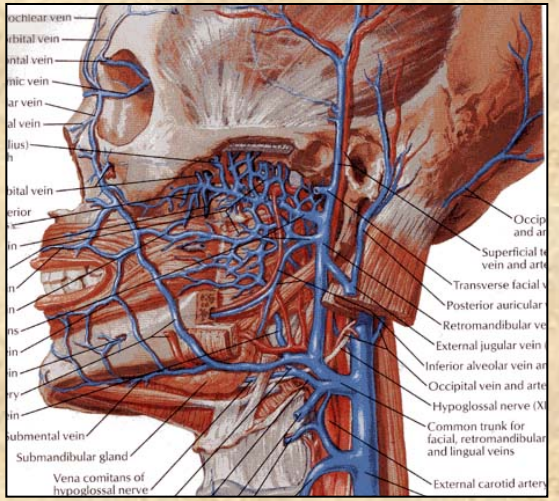
Arterial Pulses

Veins of Face and Anastomoses

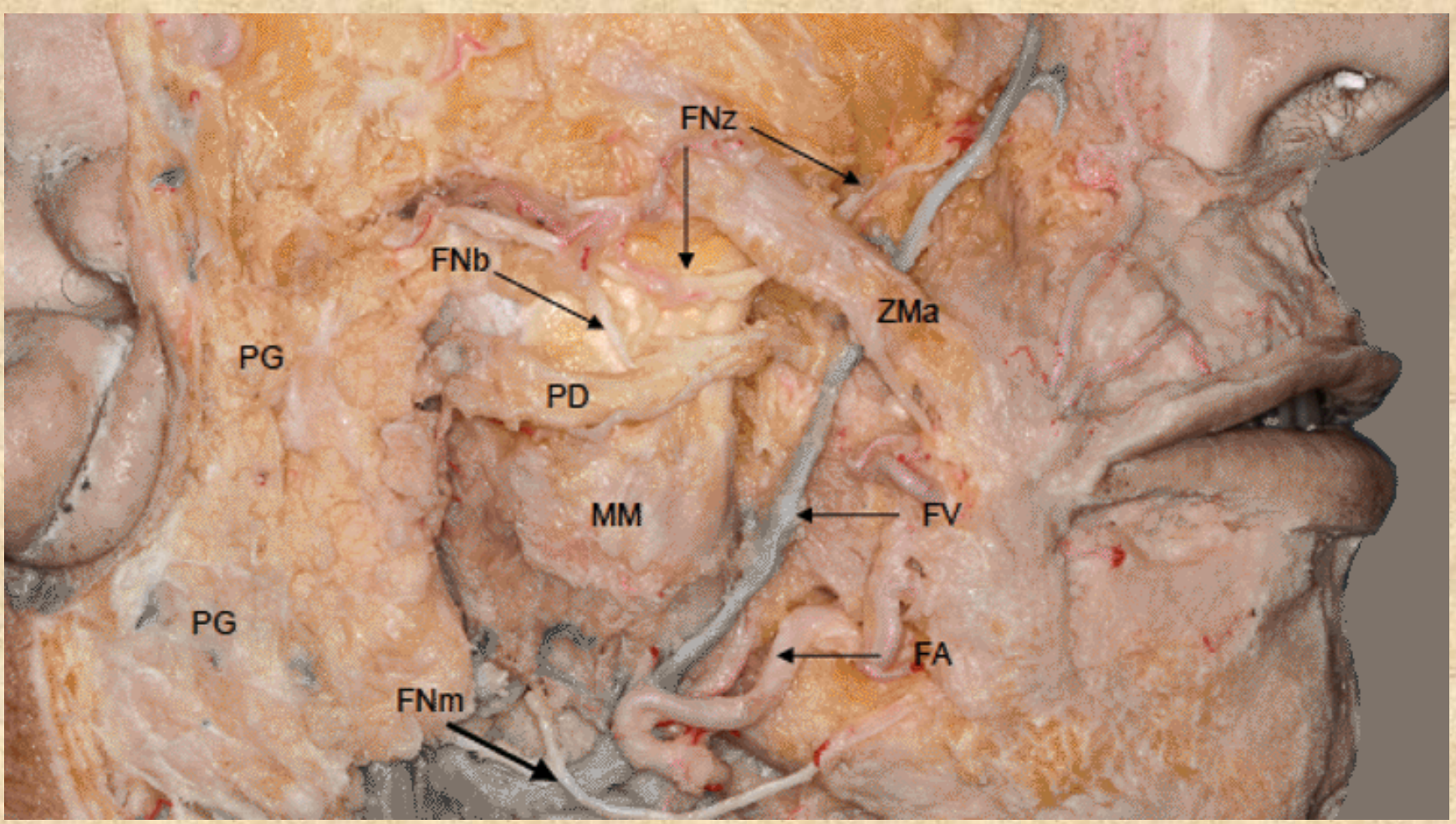
Collateral circulations
- Resulting in movement of blood from the external aspect of the cranium to the internal brain cavity

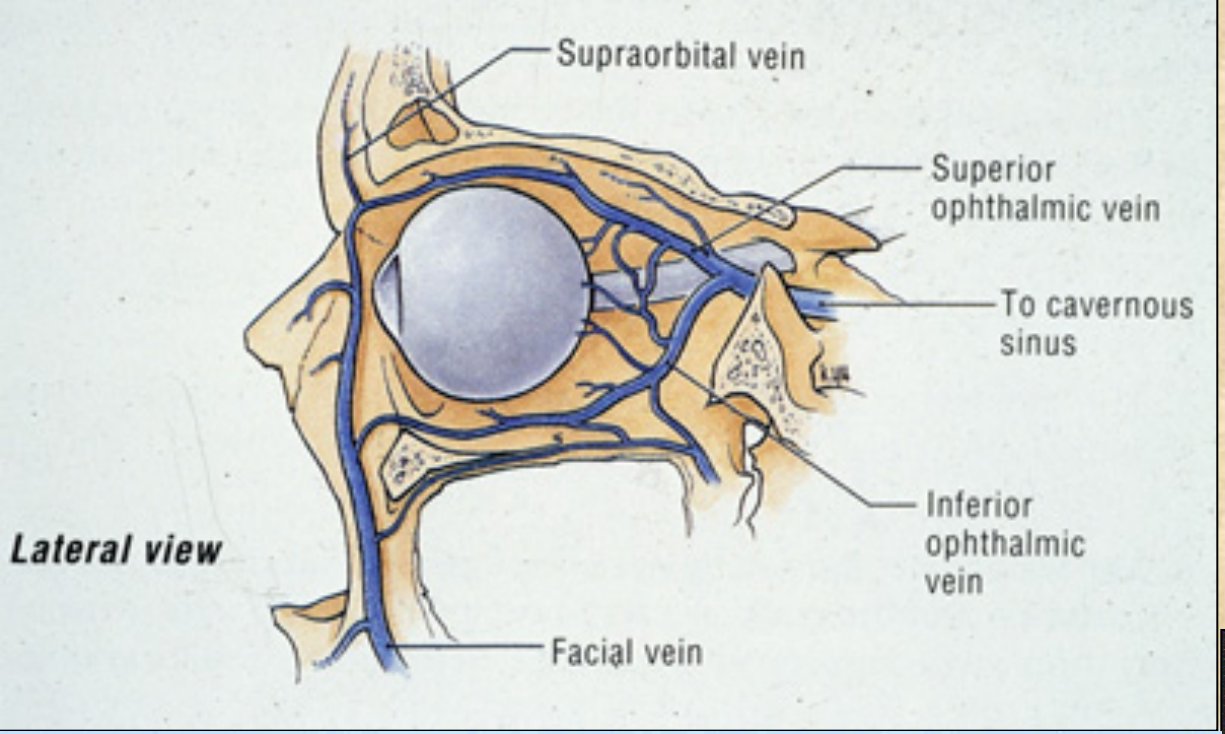
Facial vein is primary vein
- Receives **angular** vein
  - Angular vein anastamoses with **superior** and **inferior ophthalmic veins**; these veins anastomose with **cavernous sinus** inside brain cavity
- Receives **deep facial** vein that anastomose with **pterygoid plexus** of veins which in turn anastomose with **cavernous sinus**
- Terminates in **external jugular** and/ or **internal jugular** vein





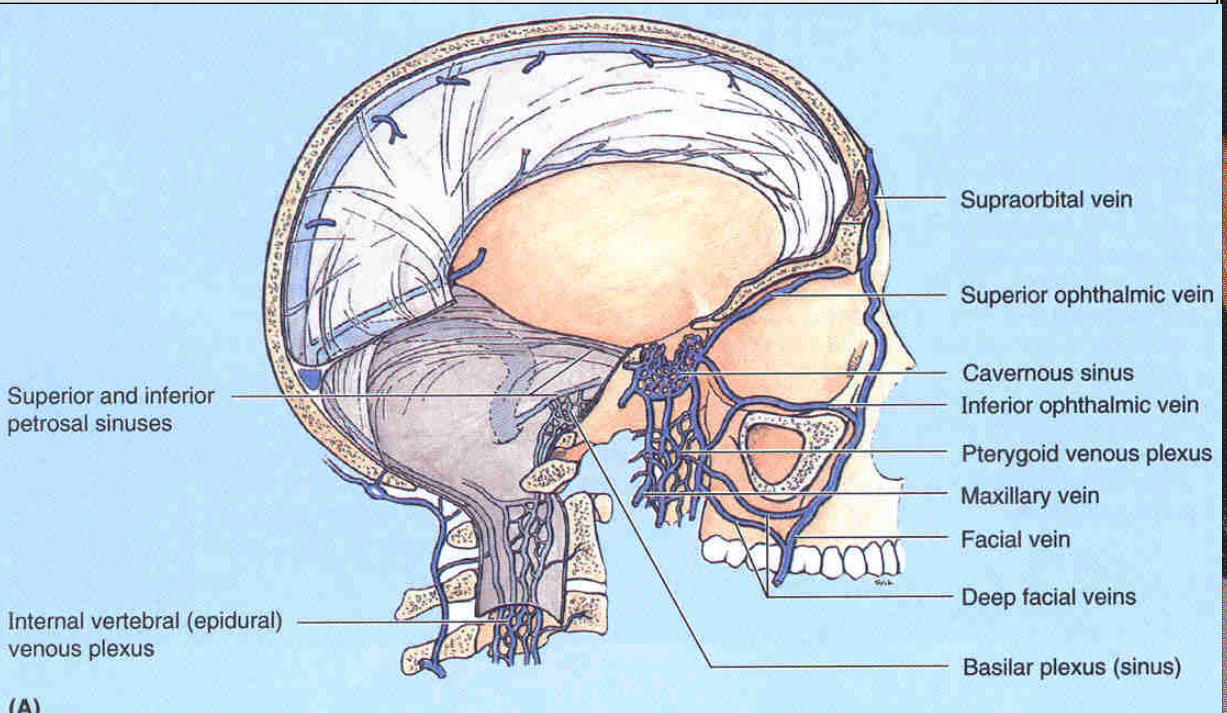
Facial Vein Dissection



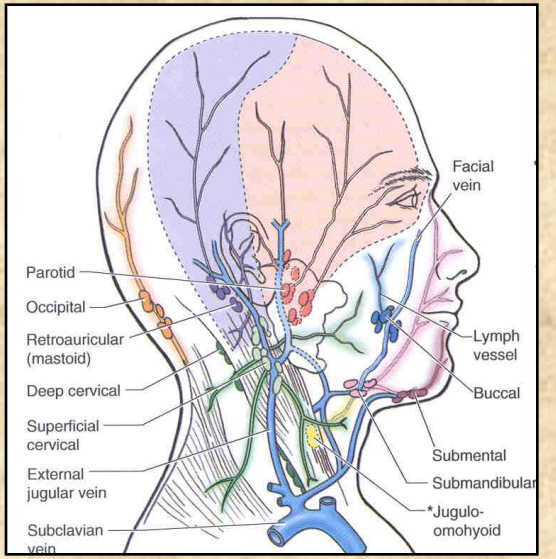


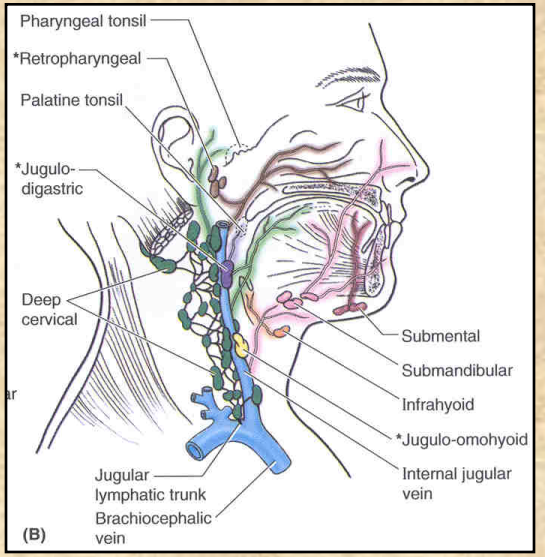
Danger zone

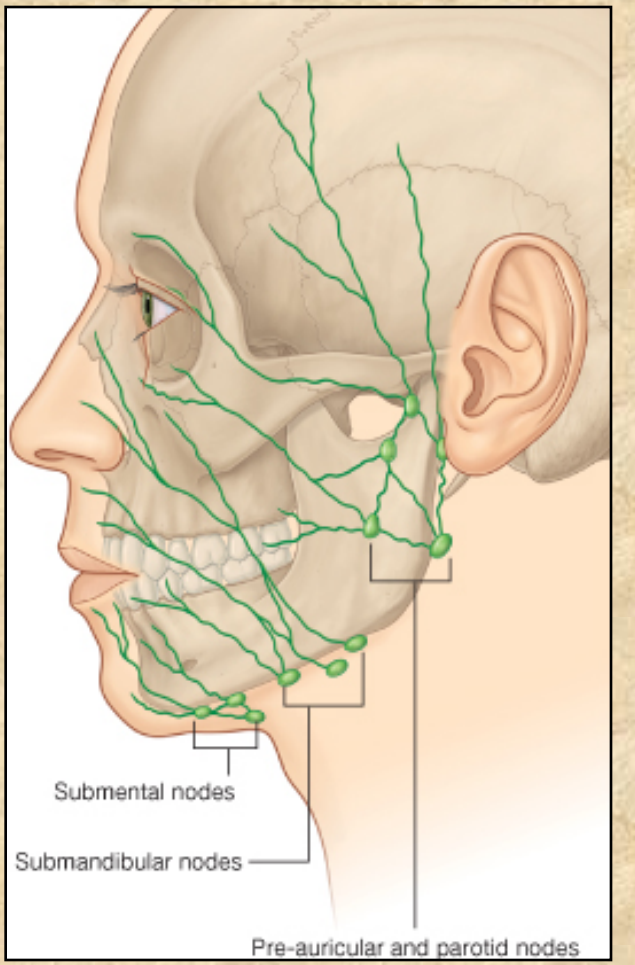
nasolacrimal sulcus to glabella: infection can spread from extracranial to intracranial sites



Lymphatics of Face





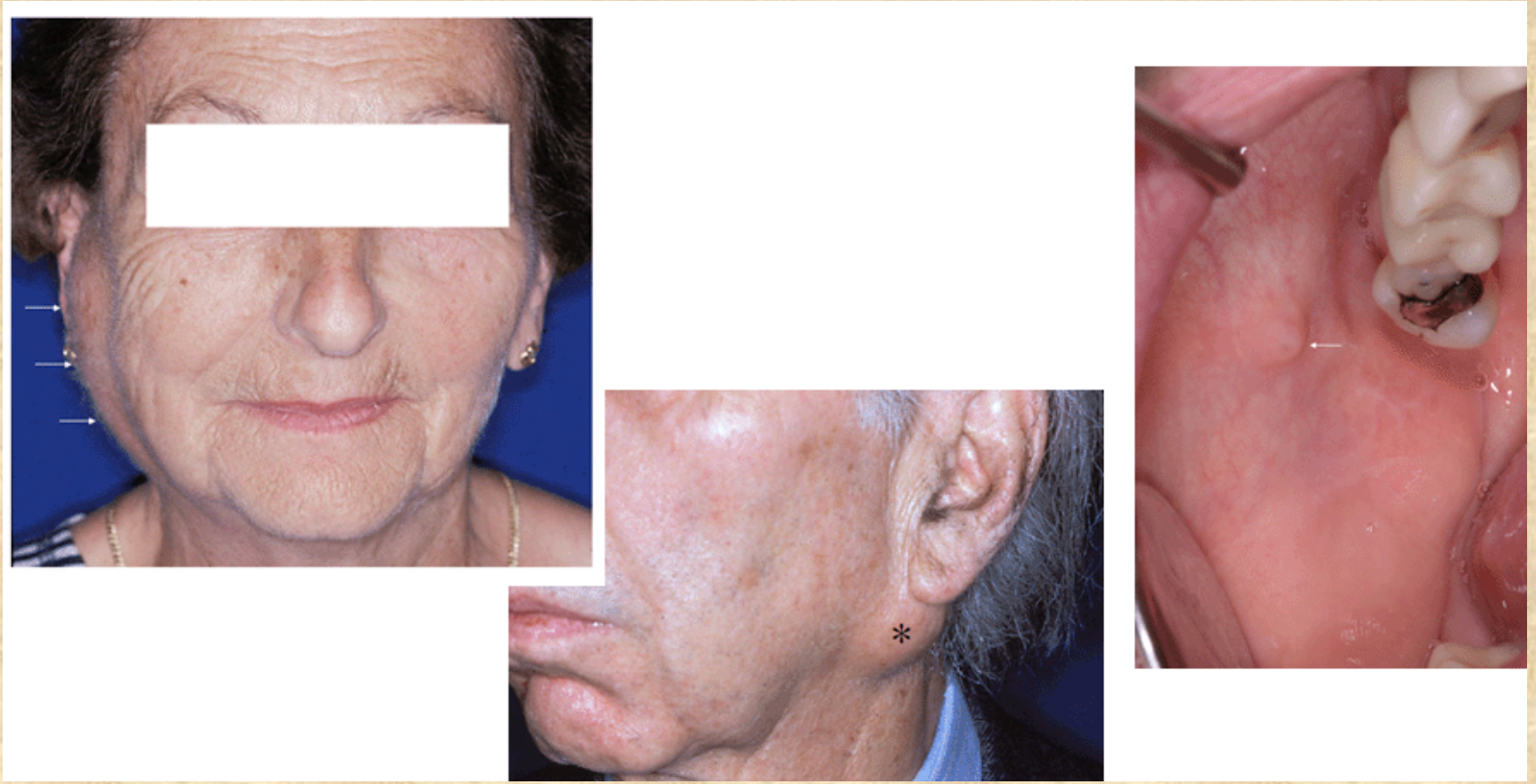


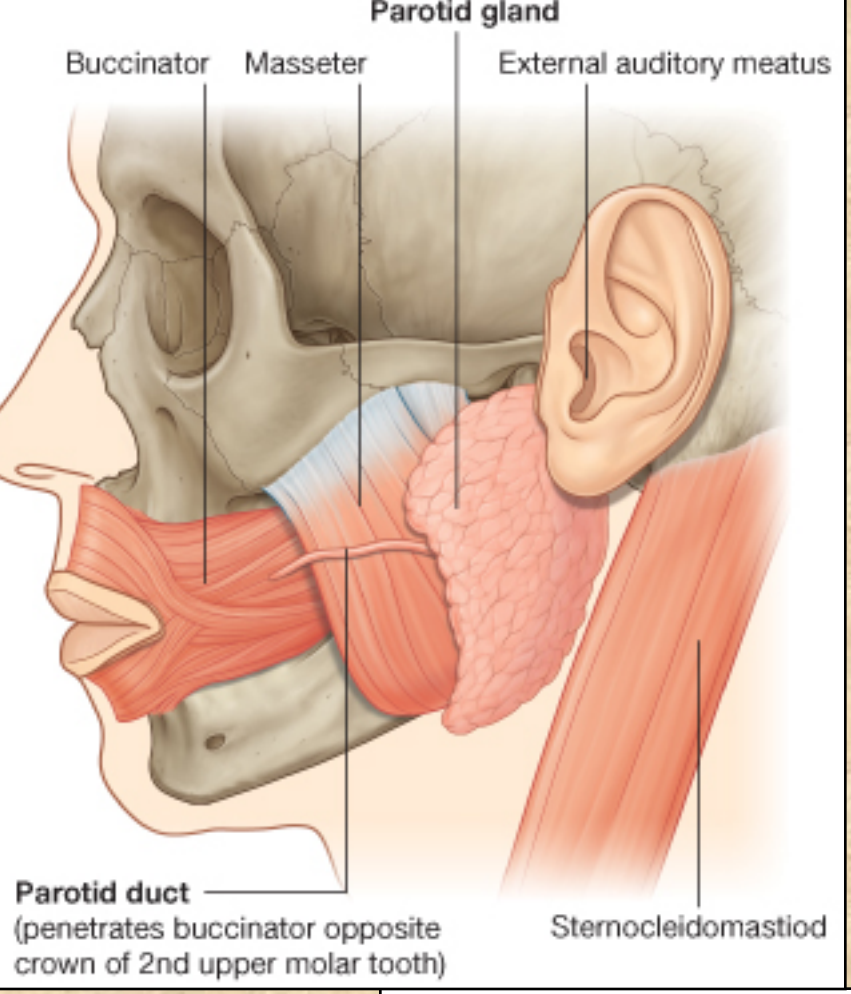
- Submandibular
- Parotid
- Superficial cervical
- Submental
- Deep cervical

Parotid Gland

- General Features
  - Largest of the 3 salivary glands
  - Encapsulated in touch parotid fascia (deep cervical fascia)
  - Parotid duct conveys saliva to M^2
  - Contiguous with buccal fat pad
- Innervation
  - **General sensation** via **Great Auricular** nerve (cervical plexus)
  - **Parasympathetic** innervation via **CN IX** (complex route)
    - Pre-ganglionics from Inferior Salivatory nucleus
    - Tympanic nerve forms after exit from jugular foramen and re-enters tympanic cavity through tympanic canaliculus
    - Lesser Petrosal nerve forms, re-enters internal cranial cavity and then exits with CN V_3 through foramen ovale
    - Synapses in otic ganglion just inferior to f. ovale
    - Post-ganglionics run with auriculotemporal nerve to parotid gland
    - Parasympathetic causes thin, watery secretion
    - Sympathetics (post-ganglionics from superior cervical ganglion and pre-ganglionics from T1-T4 causes vasomotor activation reducing secretion

Mumps (MMR virus) affecting the salivary glands





- Parotid gland
- Parotid Duct
- Tumor
- CN VII