

A stylized illustration of two hands shaking, rendered in red and dark blue, positioned above the main title.

BDS2 Group & Individual Learning Anatomy

Nicholas Quirk



Commonwealth of Australia
Copyright Regulations 1969

Warning

This material has been reproduced and communicated to you by or on behalf of The University of Adelaide under Part VB of the *Copyright Act 1968* (the **Act**).

The material in this communication may be subject to copyright under the Act. Any further reproduction or communication of this material by you may be the subject of copyright protection under the Act.

The AUDSS assumes no responsibility or liability for any information, materials or other content provided by any of our student lecturers. All content is viewed and used by you at your own risk and we do not warrant the accuracy or reliability of any of the lecture material.

The views expressed are those of the individual contributors and not necessarily those of the AUDSS of Adelaide School of Dentistry.

Do not remove this notice.

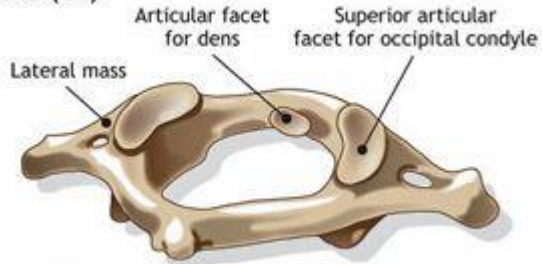
Host and Sponsors



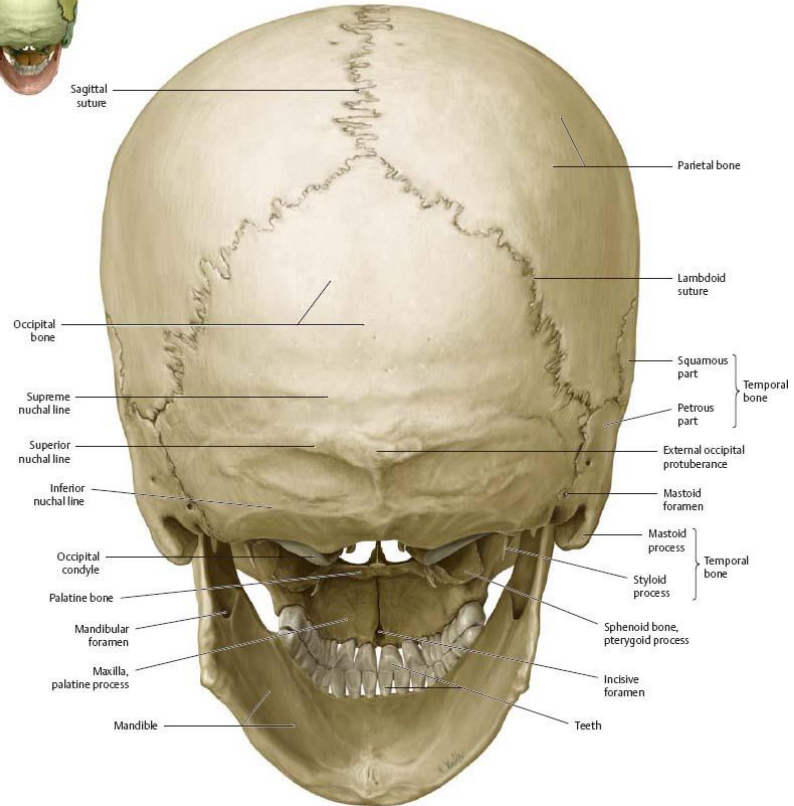
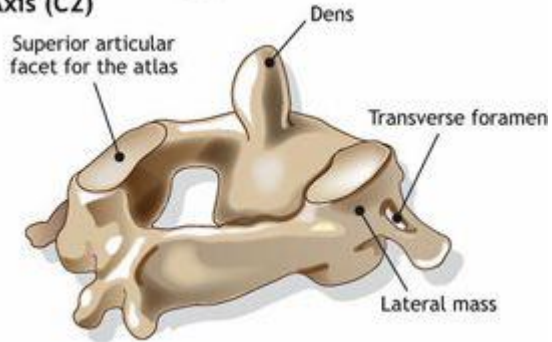
Cranium

C1 / C2 and Posterior Skull

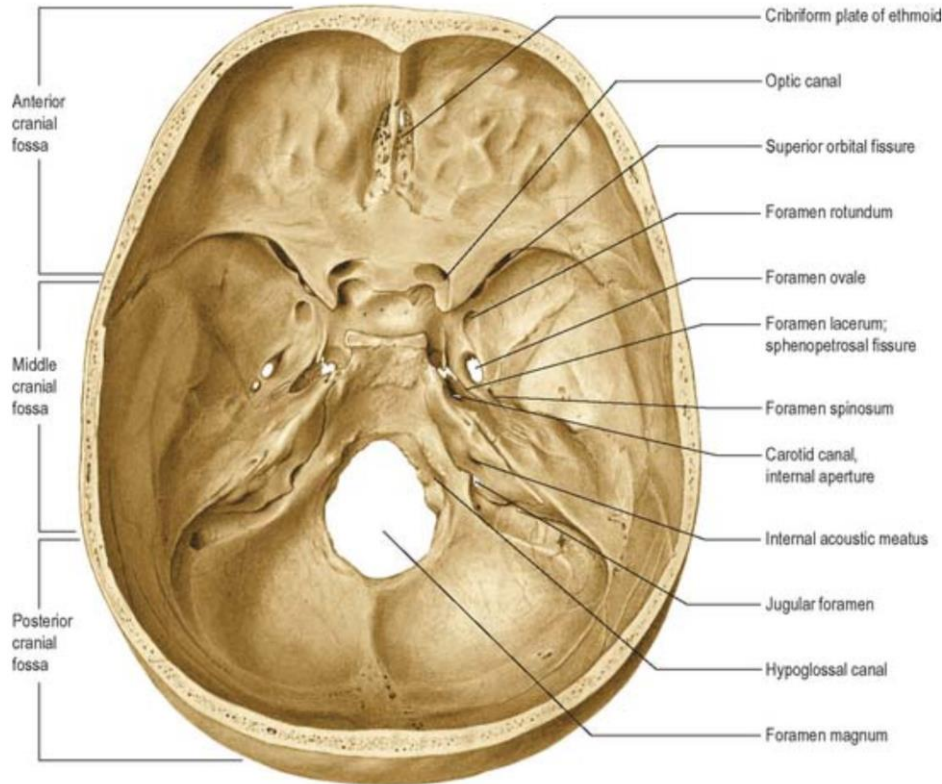
Atlas (C1)



Axis (C2)



Cranial Cavity Internal Aspect



Anterior to Posterior:

Anterior Cranial Fossa

- Cribriform Plate (Ethmoid)

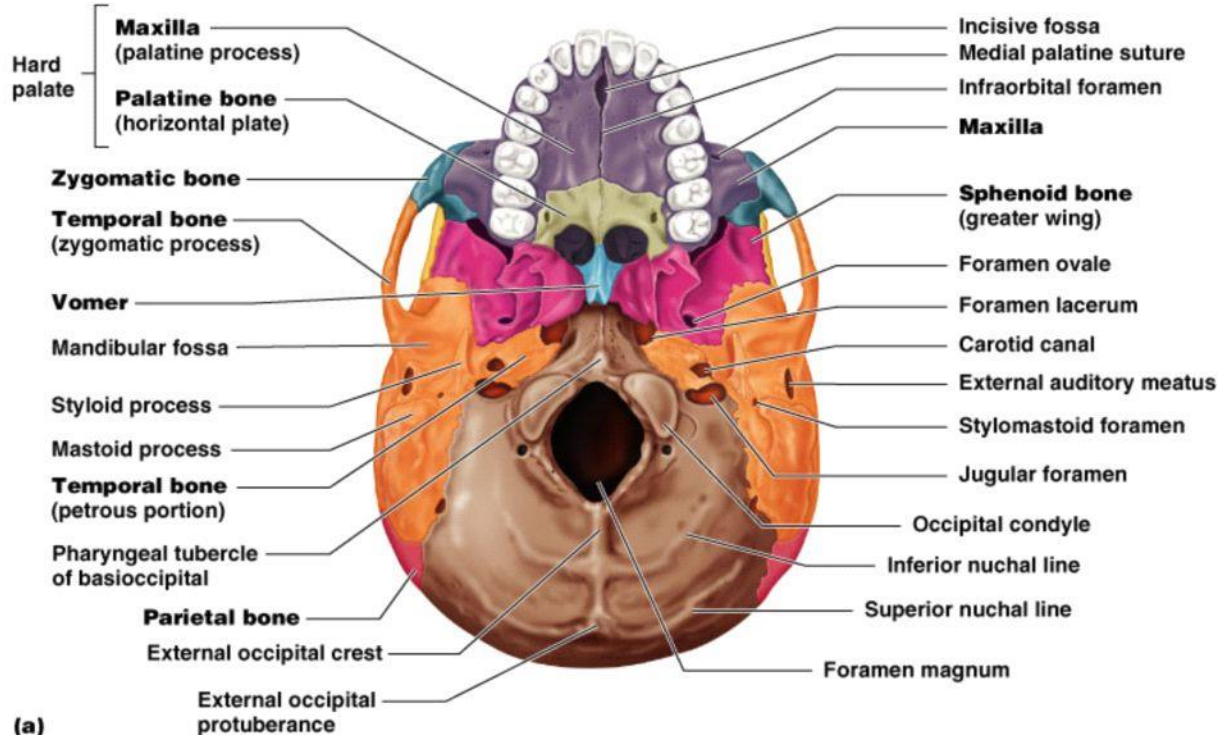
Middle Cranial Fossa

- Optic Canal (Sphenoid)
- Superior Orbital Fissure (Sphenoid)
- Inferior Orbital Fissure (Sphenoid)
- Foramen Ovale (Sphenoid)
- Foramen Rotundum (Sphenoid)
- Foramen Spinosum (Sphenoid)
- Carotid Canal (Temporal)

Posterior Cranial Fossa

- Internal Acoustic Meatus (Temporal)
- Jugular Foramen (Temporal – Occipital)
- Hypoglossal Canal (Occipital)
- Foramen Magnum (Occipital)

Cranial Cavity External Aspect



(a)

- Incisive Canal (Nasopalatine) (Maxillary)
- Greater Palatine Foramen (Maxillary – Palatine)
- Lesser Palatine Foramen (Palatine)
- Foramen Lacerum (Sphenoid – Temporal – Occipital)
- Petrotympenic Fissure (Temporal)
- Stylomastoid Foramen (Temporal)

Cranial Nerves and Associated Anatomy

CN I: Olfactory (Special - Smell)

- Cerebrum – through cribriform plate of ethmoid bone – terminates in nasal cavity

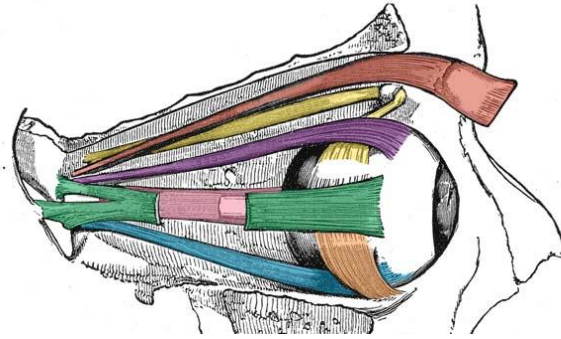
CN II: Optic (Special - Sight)

- Cerebrum – optic canal of sphenoid bone – terminates in eye

CN III: Oculomotor (Motor)

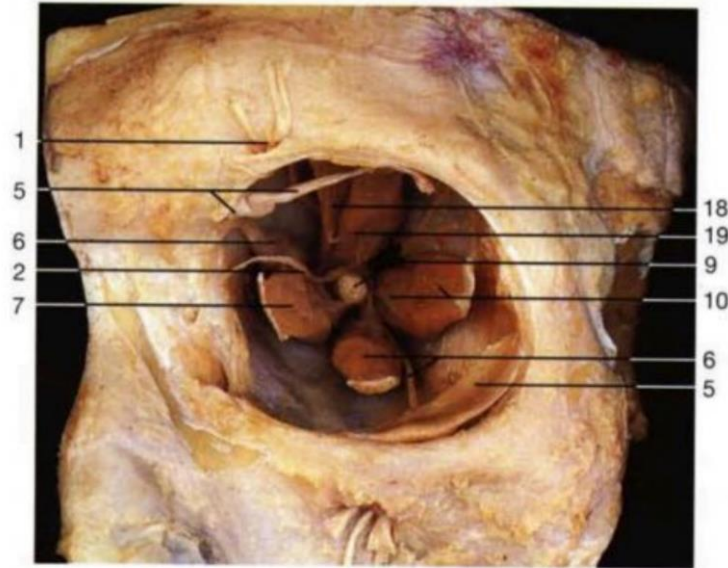
CN IV: Trochlear (Motor)

CN VI: Abducens (Motor)



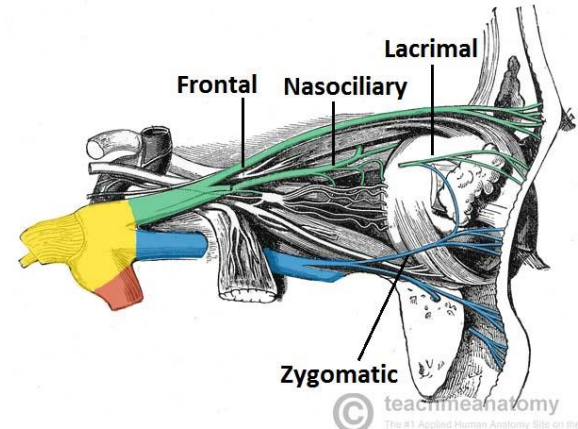
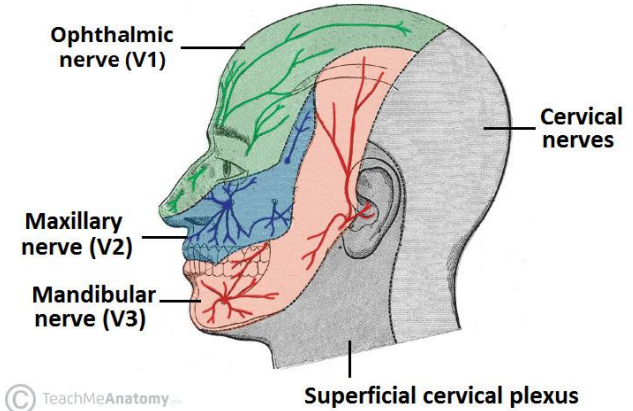
Red	Levator palpebrae superioris
Yellow	Superior oblique
Orange	Inferior oblique
Purple	Superior rectus
Pink	Medial rectus
Green	Lateral rectus
Blue	Inferior rectus

- Brainstem (midbrain) – cavernous sinus - superior orbital fissure (SOF) of sphenoid bone – terminates in orbit
- Travels through SOF with CN IV, VI & V.1
- Trochlear innervates Superior Oblique
- Abducens innervates Lateral Rectus
- Oculomotor innervates all others
- Know what muscle contraction facilitates what eye movement



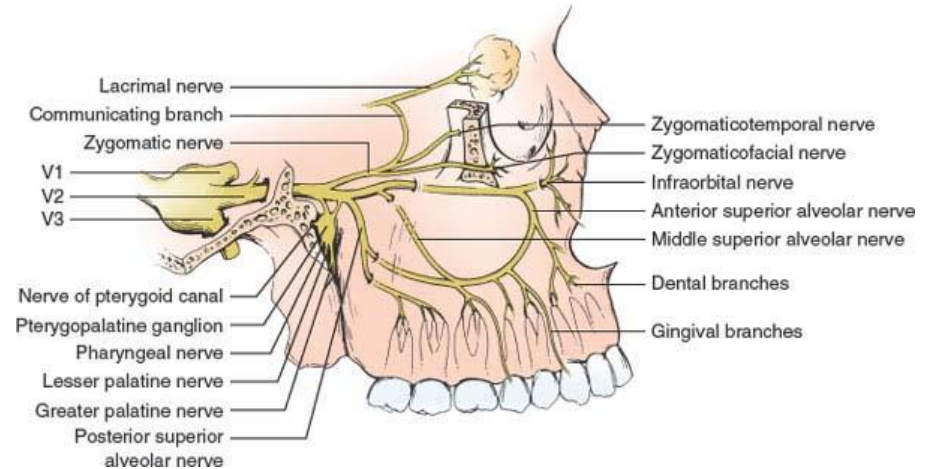
CN V: Trigeminal – V1 Ophthalmic

- Sensory – Skin and mucous membranes first 1/3 of face
- PNS: CNVII fibres from pterygopalatine ganglion travel from V2 zygomatic nerve with lacrimal nerve
- Brainstem (midbrain) – trigeminal root middle cranial cavity depression superior to petrous apex of temporal bone - cavernous sinus - superior orbital fissure (SOF) of sphenoid bone – terminates in orbit
- Terminal branches: Frontal, Nasociliary, Lacrimal*



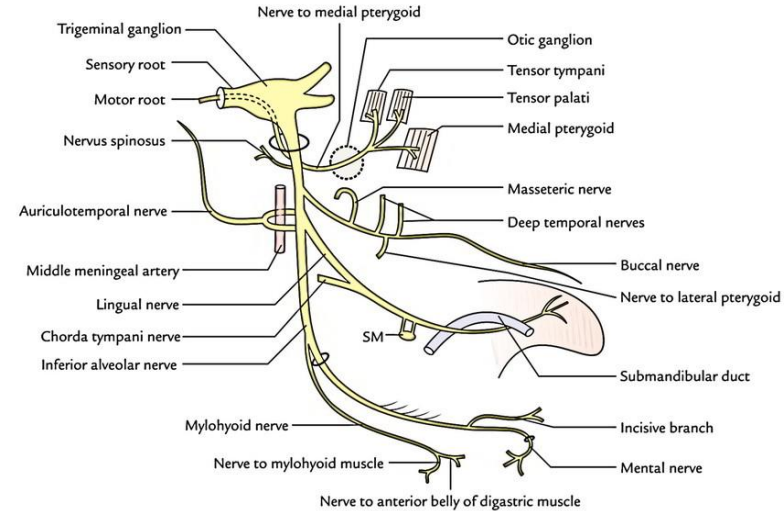
CN V: Trigeminal – V2 Maxillary

- Sensory – Skin and mucous membranes mid 1/3 of face
- PNS: CN VII fibres from pterygopalatine ganglion with zygomatic nerve to V1 lacrimal nerve and with nasopalatine / greater palatine nerves
- Brainstem (midbrain) – trigeminal root middle cranial cavity depression superior to petrous apex of temporal bone - cavernous sinus – foramen rotundum – Numerous terminal branches
- Ones to note: Infraorbital, Nasopalatine, Superior alveolar (ant, mid, pos), Greater / Lesser palatine & middle meningeal (enters back into cranial cavity to innervate dura matter)



CN V: Trigeminal – V3 Mandibular

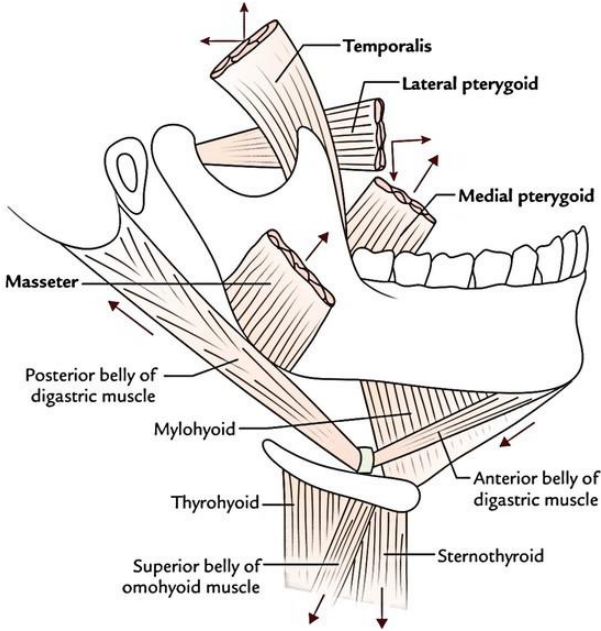
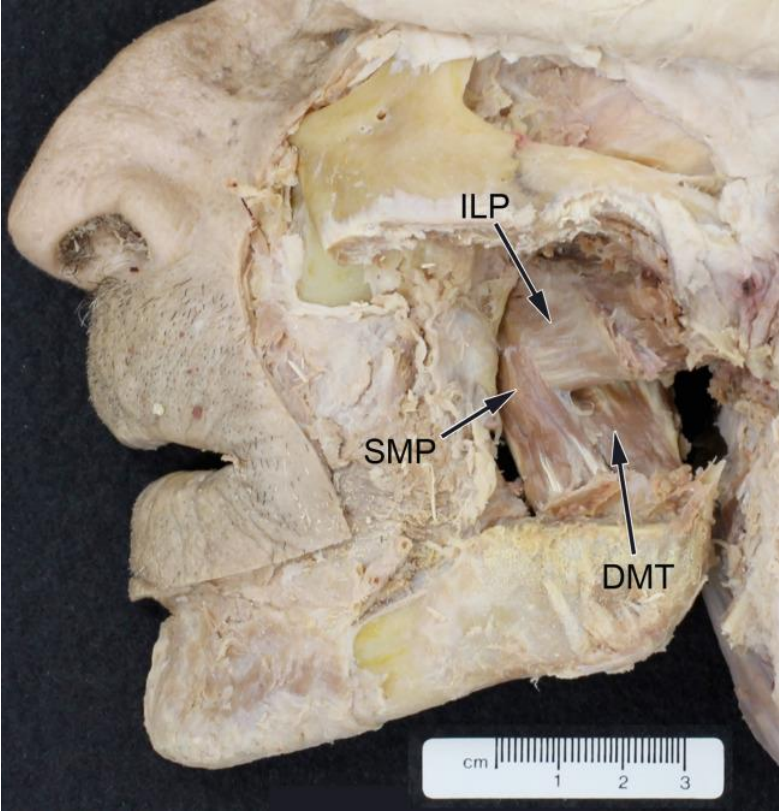
- Main Trunk:
 - Motor: medial pterygoid, tensor tympani / palati
 - Sensory: Nervous spinosus (meningeal branch – back through foramen spinosum)
- Anterior division:
 - Motor: Masseteric, anterior / posterior deep temporal nerves, lateral pterygoid
 - Sensory: Buccal
- Posterior division:
 - Motor: Mylohyoid (& Digastric anterior belly) (IAN branch)
 - Sensory: Auriculotemporal, lingual (ant 2/3 tongue), IAN (mental and incisive branch)
 - PNS: CN VII fibres from submandibular ganglion with lingual nerve
 - PNS: CN IX fibres from otic ganglion with auriculotemporal
- Brainstem (midbrain) – trigeminal root middle cranial cavity depression superior to petrous apex of temporal bone - foramen ovale – Numerous terminal branches



Muscles of Mastication

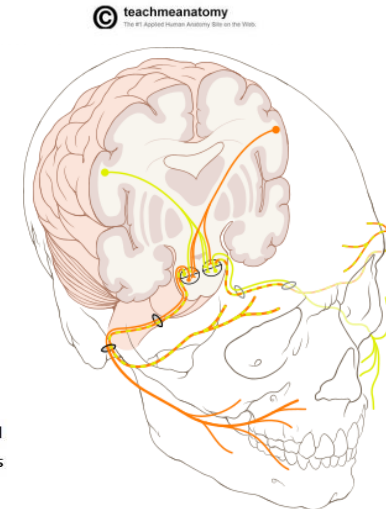
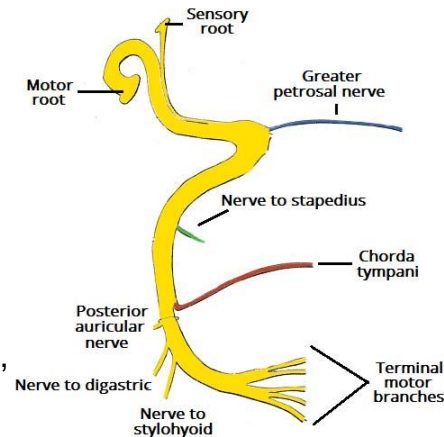
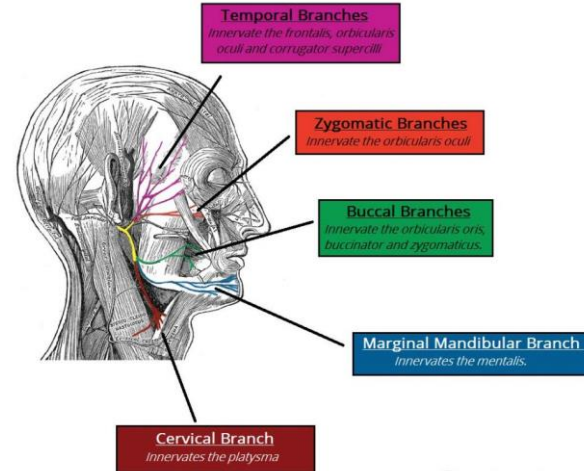
Muscle	Belly / Head	Origin	Insertion	Action
Masseter	Superficial	<ul style="list-style-type: none"> Zygomatic arch inferior / anterior 2/3 aspect 	<ul style="list-style-type: none"> Mandible angle Mandible ramus inferior 1/2 lateral surface 	<ul style="list-style-type: none"> Elevate mandible
	Deep	<ul style="list-style-type: none"> Zygomatic arch posterior 1/3 medial inferior aspect 	<ul style="list-style-type: none"> Mandible ramus superior 1/2 	
Temporalis	Anterior	<ul style="list-style-type: none"> Temporal fossa (temporal / sphenoid / parietal and frontal bone) Deep temporal fascia 	<ul style="list-style-type: none"> Mandible coronoid process 	<ul style="list-style-type: none"> Elevate Mandible
	Middle		<ul style="list-style-type: none"> Mandible retromolar fossa 	<ul style="list-style-type: none"> Elevate / retrude and unilateral mandible movement
	Posterior			<ul style="list-style-type: none"> Retrude Mandible
Medial Pterygoid	Superficial	<ul style="list-style-type: none"> Maxillary tuberosity Palatine pyramidal process 	<ul style="list-style-type: none"> Medial surface of Mandible angle Medial surface of Mandible ramus 	<ul style="list-style-type: none"> Elevate / retrude and unilateral mandible movement
	Deep	<ul style="list-style-type: none"> Medial surface lateral pterygoid plate 		
Lateral Pterygoid	Upper	<ul style="list-style-type: none"> Infratemporal crest of greater wing of sphenoid bone 	<ul style="list-style-type: none"> Capsule of TMJ and articular disc 	<ul style="list-style-type: none"> Depress / protrude and unilateral mandible movement
	Lower	<ul style="list-style-type: none"> Lateral surface of lateral pterygoid plate 	<ul style="list-style-type: none"> Pterygoid fovea on Mandible condyle anterior neck 	
Digastric	Anterior	<ul style="list-style-type: none"> Digastric fossa of mandible 	<ul style="list-style-type: none"> Intermediate tendon (hyoid bone) 	<ul style="list-style-type: none"> Depress and retrude mandible Elevates hyoid bone
	Posterior	<ul style="list-style-type: none"> Mastoid notch of temporal bone 		

Muscles of Mastication



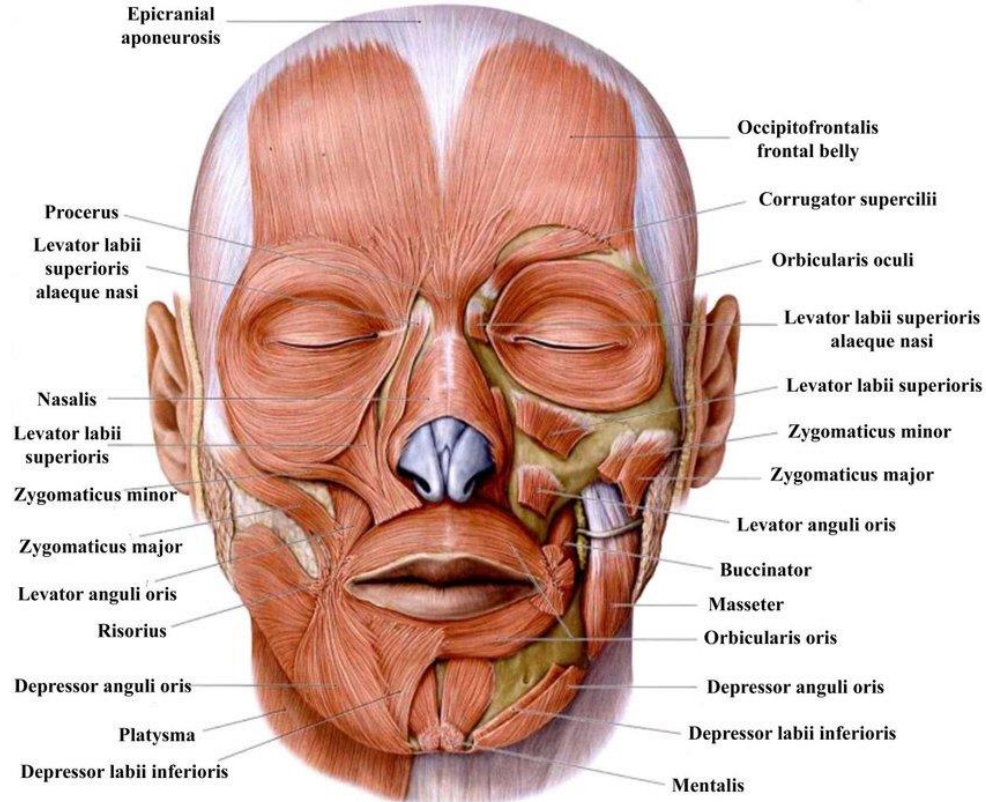
CN VII: Facial

- Motor: Muscles of facial expression, posterior digastric belly, stylohyoid and stapedius (nerve to stapedius)
- Sensory: Small area concha of auricle (ear)
- Special: Chorda tympani for taste tongue anterior 2/3
- PNS: Greater petrosal nerve from genu ganglion to pterygopalatine ganglion
- PNS: Chorda tympani to submandibular ganglion
- Brainstem (pons) – internal auditory meatus (IAM) of temporal bone with CN VIII – facial canal – Geniculate ganglion – stylomastoid foramen temporal bone – parotid gland area - terminal branches
- Extracranial nerves: Posterior auricular nerve (motor innervation around ear), digastric nerve (posterior belly), stylohyoid nerve

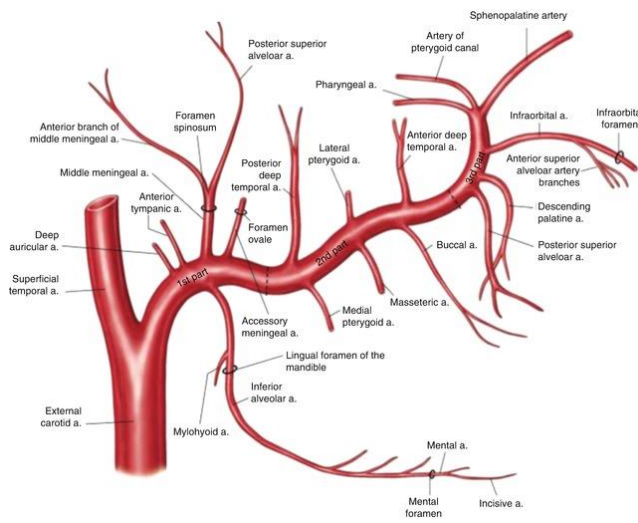
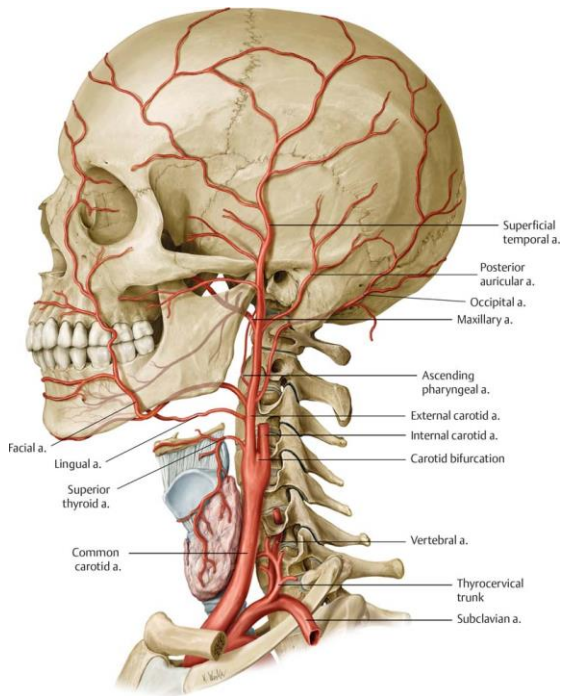
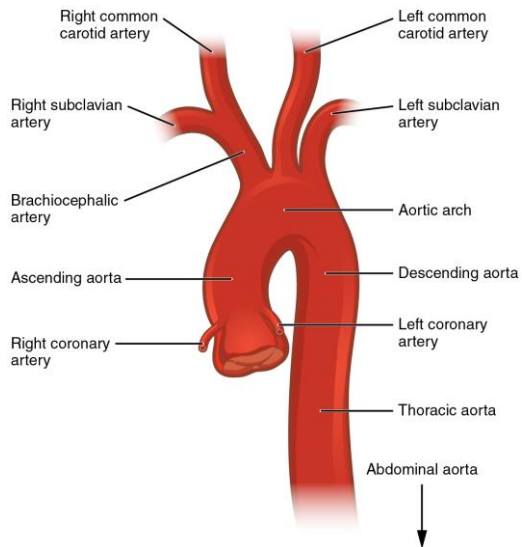


Muscles of Facial Expression

- Orbicularis oculi
- Orbicularis oris
- Occipitofrontalis
- Nose: Procerus, Nasalis, Levator labii superior alaeque nasi*
- Eyes: Corrugator supercillii
- Mouth: Oris
 - Inserts on lips – labii
 - Inserts near commissures – anguli
 - Levator / Depressor
 - Additional: Zygomaticus minor (medial) / major (lateral), buccinator, platysma, risorius



Arterial Supply



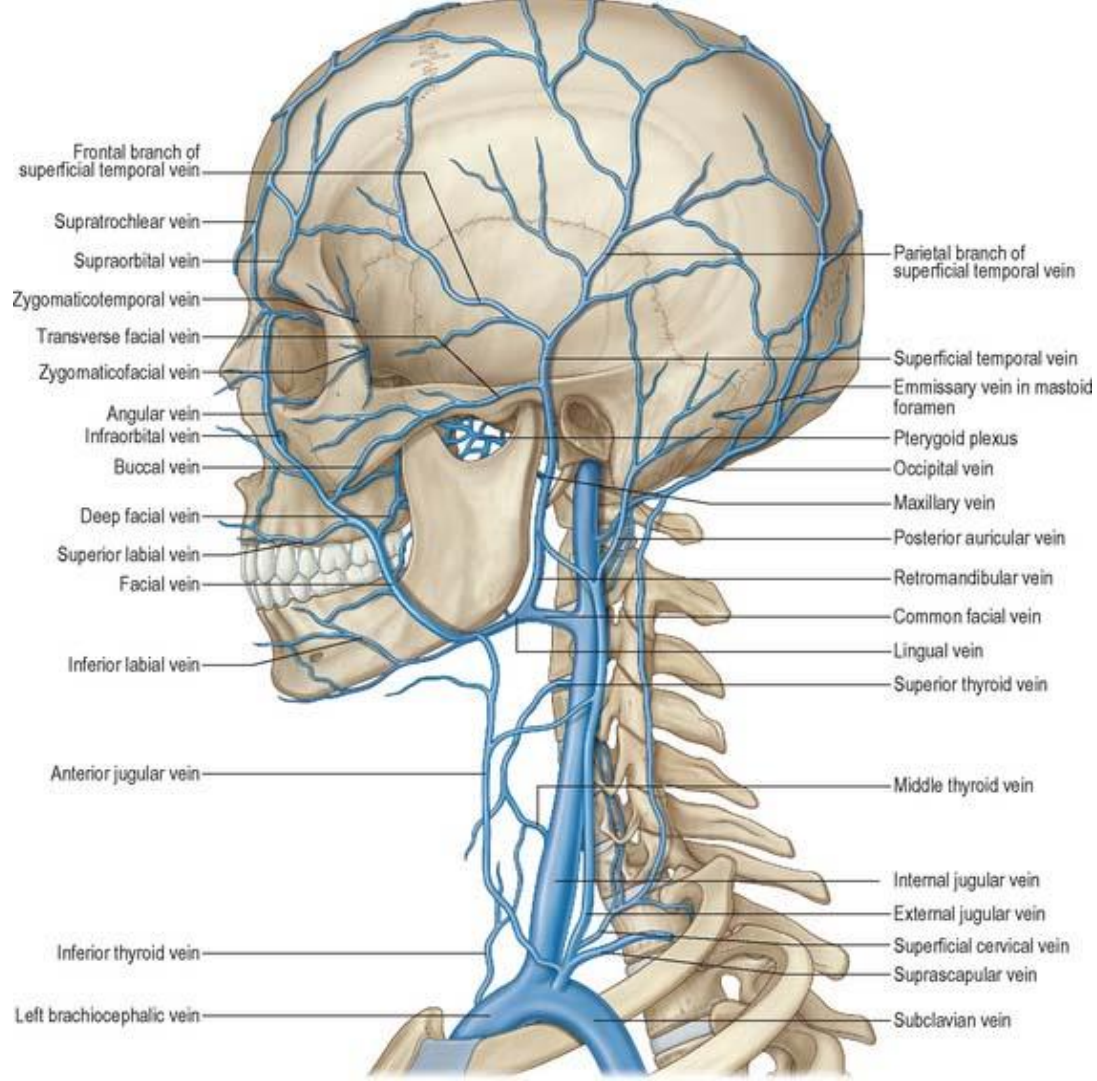
Not as complicated as it looks, follows area anatomy:

- Aorta – Brachiocephalic artery – common carotid – external / internal artery
- External branches: Superior thyroid, lingual, facial, occipital, ascending pharyngeal, maxillary, posterior auricular, superficial temporal

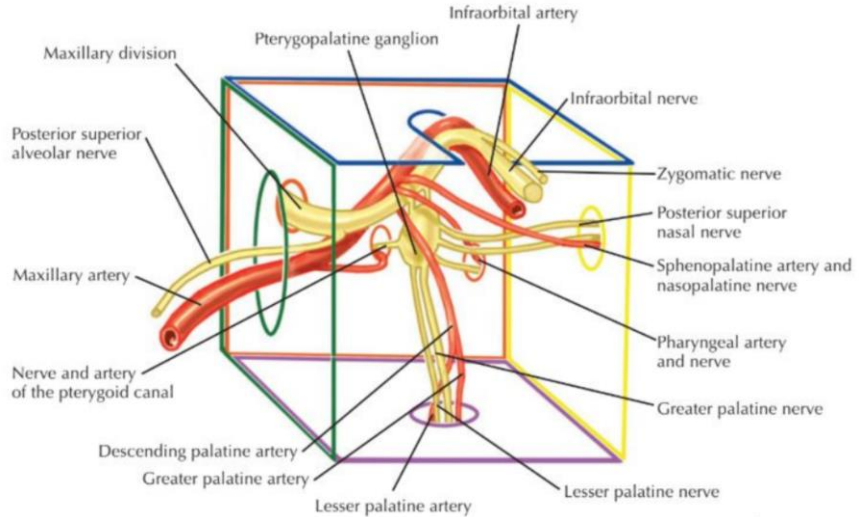
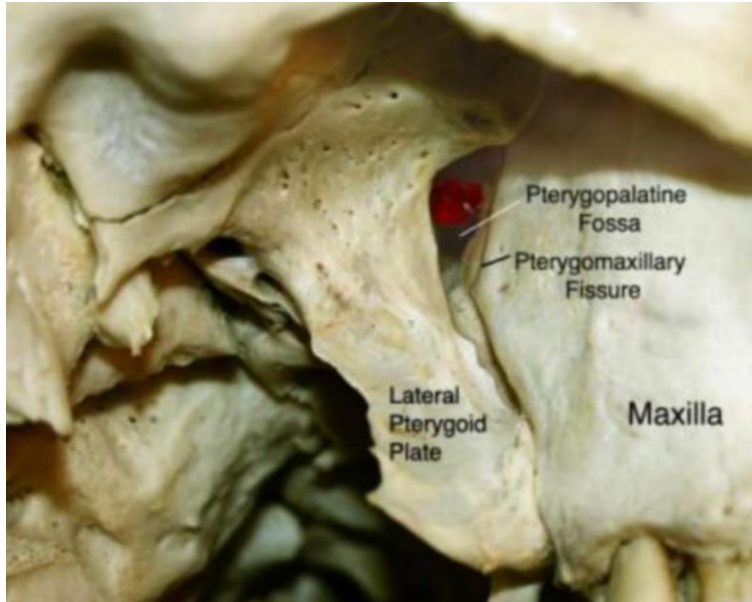
Venous Drainage

Remember Internal Jugular Vein and External Jugular Vein

- Temporal and maxillary veins from retromandibular – anterior retro + facial vein forms common facial - Drains into IJV (from internal cranium sinus complex)
- Occipital and posterior retromandibular veins drain into EJV
- EJV – subclavian vein
- IJV + subclavian forms brachiocephalic vein with RHS and LHS binding – superior vena cava



Pterygopalatine Region



Boundaries:

Anterior – Maxillary sinus

Posterior – Sphenoid bone pterygoid process

Superior – Inferior orbital fissure

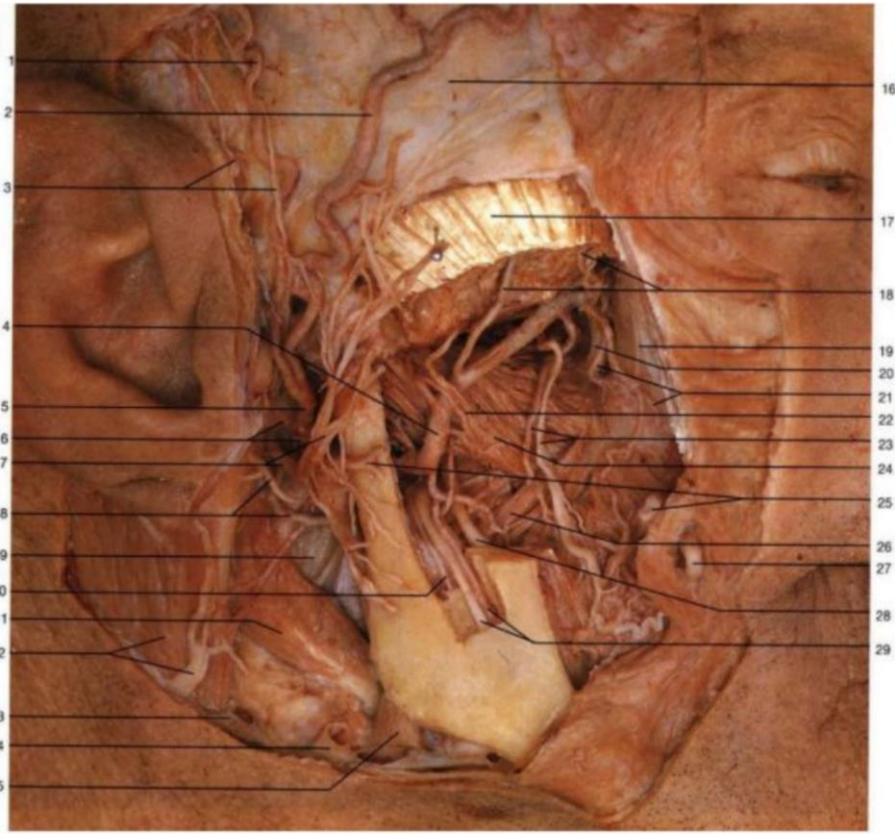
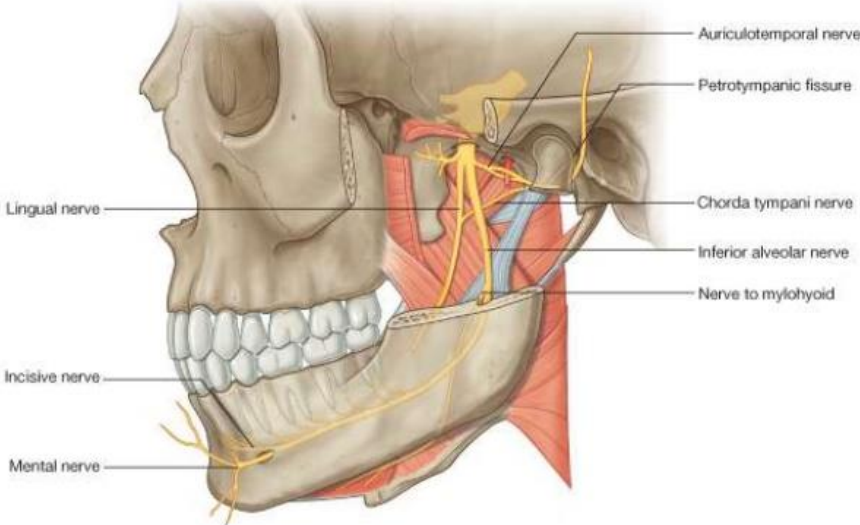
Inferior - Palatine bones / canals

Medial - Palatine bone

Lateral – Pterygomaxillary fissure

Infratemporal Region

A



Boundaries:

Anterior – Maxillary sinus

Posterior – Carotid sheath

Superior – Greater wing sphenoid bone

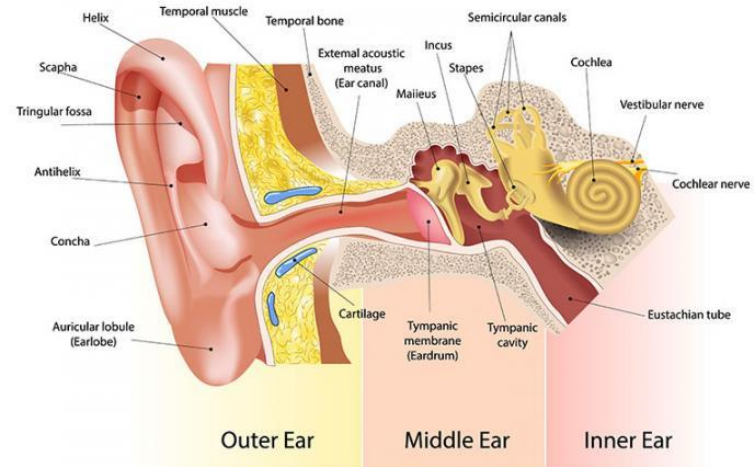
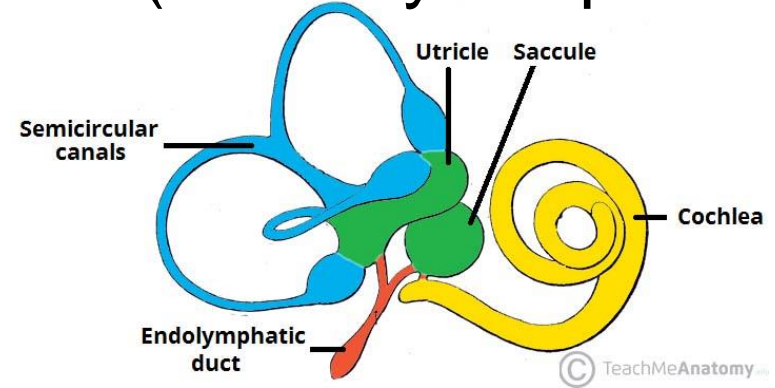
Inferior – Medial pterygoid muscle

Medial – Lateral pterygoid plate and adjacent muscles

Lateral – Mandible condylar process / ramus

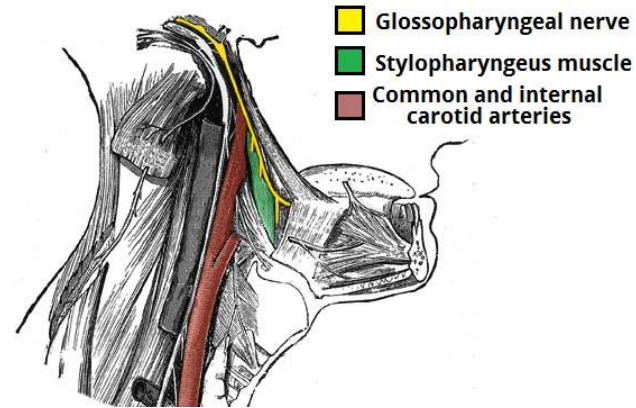
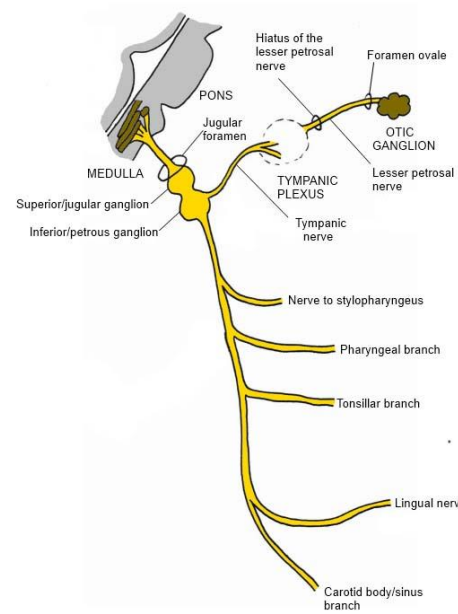
CN VIII: Vestibulocochlear Nerve (Sensory & Special)

- Brainstem (pons) – internal auditory meatus (IAM) of temporal bone with CN VII – splits into components – inner ear
- Sensory: Vestibular component - innervates vestibular system inner ear for balance detection
- Special (hearing): Cochlear component - forms spiral ganglia in inner ear cochlear

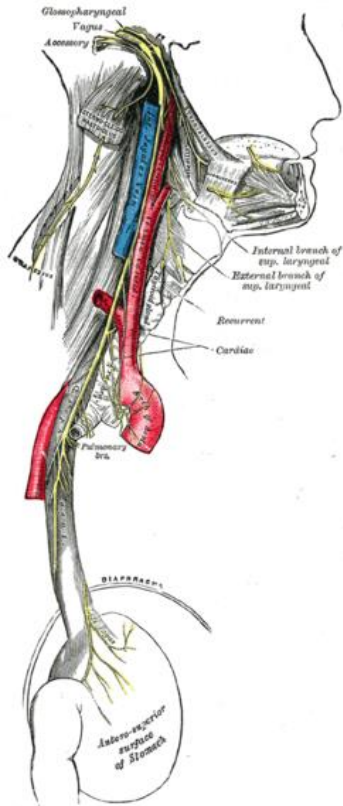


CN IX: Glossopharyngeal

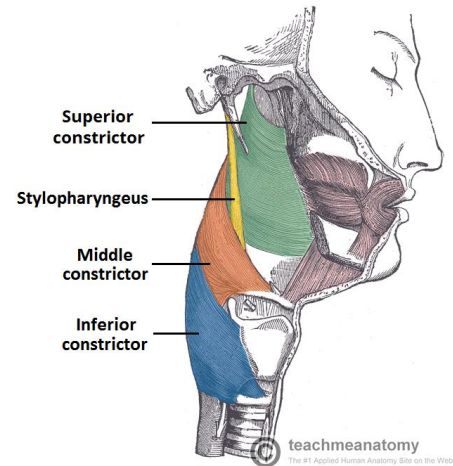
- Brainstem (medulla) – Jugular foramen (with CN X and XI)
- Motor: Pharynx stylopharyngeus muscle
- Sensory: Oropharynx, carotid body, sinus, posterior 1/3 tongue, middle ear cavity and eustachian tube
- Special: Tongue taste posterior 1/3
- PNS: Fibers to Otic ganglion and parotid gland through lesser petrosal nerve



CN X: Vagus

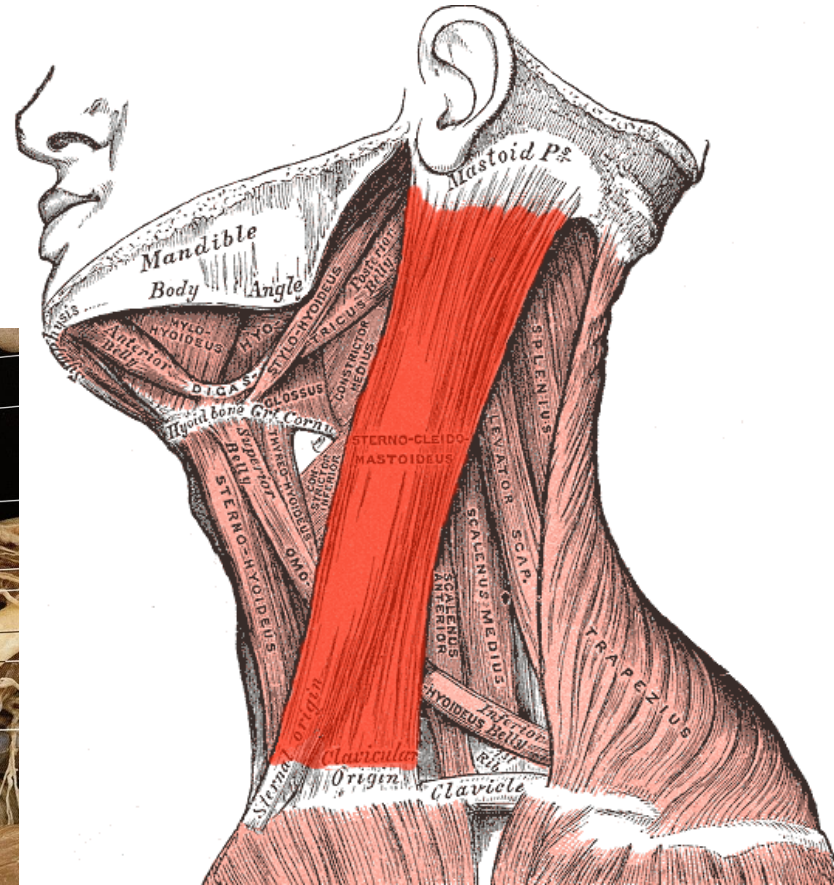
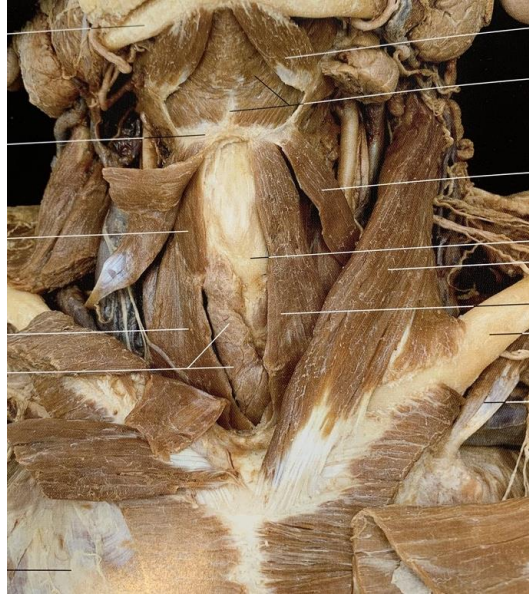


- Brainstem (medulla) – Jugular foramen (with CN IX and XI) – carotid sheath (internal carotid artery & internal jugular vein)
- PNS: Heart, lungs, digestive tract
- Motor: Muscles of pharynx, soft palate and larynx
- Sensory: External acoustic meatus skin, laryngopharynx and larynx internal surfaces
- Special: Taste or epiglottis and root of tongue



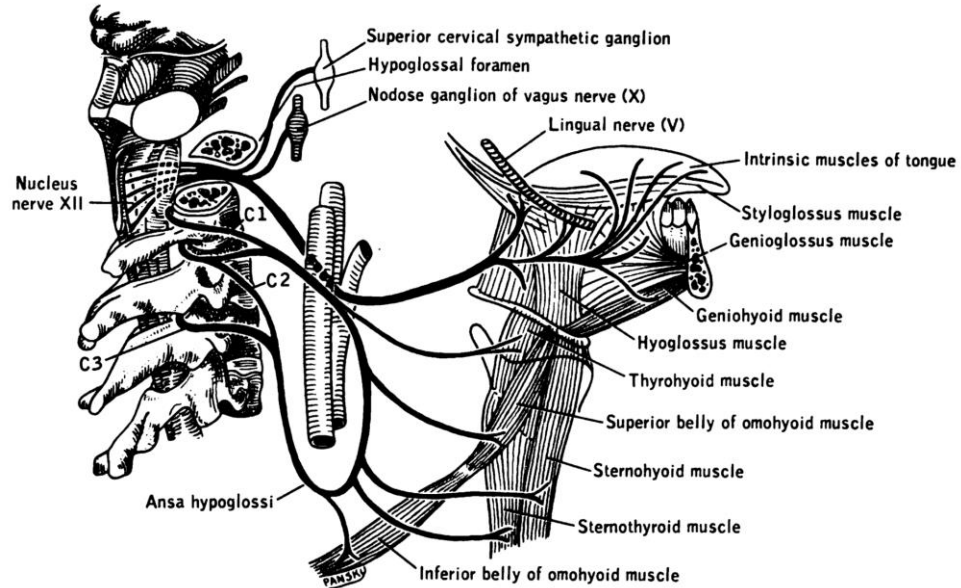
CN XI: Accessory (Motor)

- Brainstem (medulla) – Jugular foramen (with CN IX and X) –
- Motor: Sternocleidomastoid, trapezius muscles

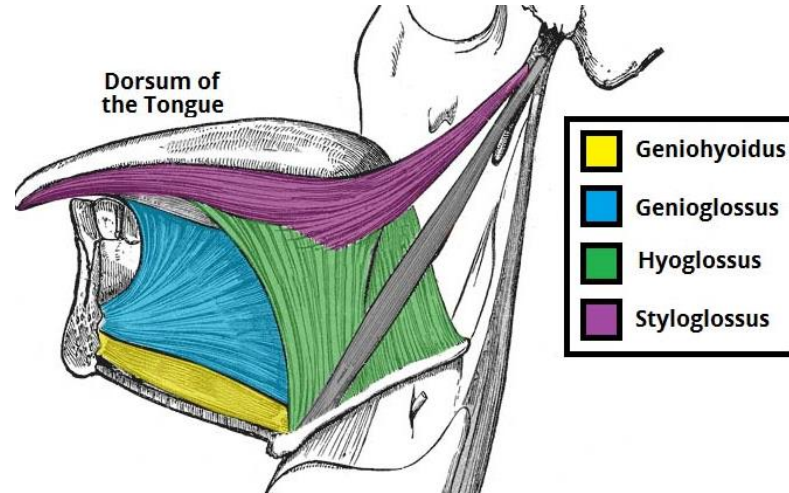
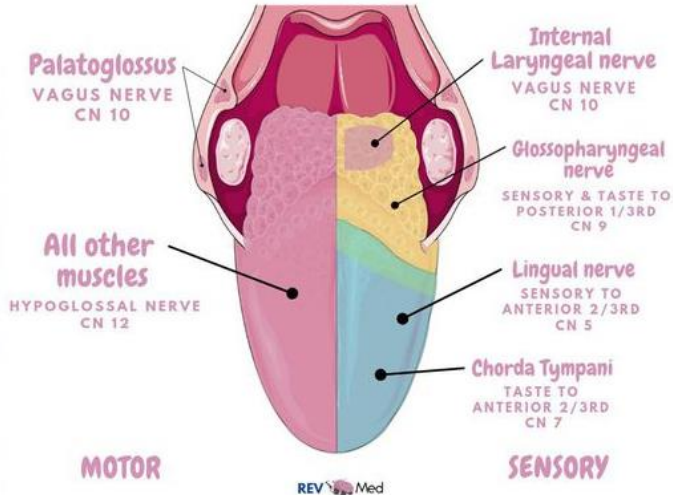
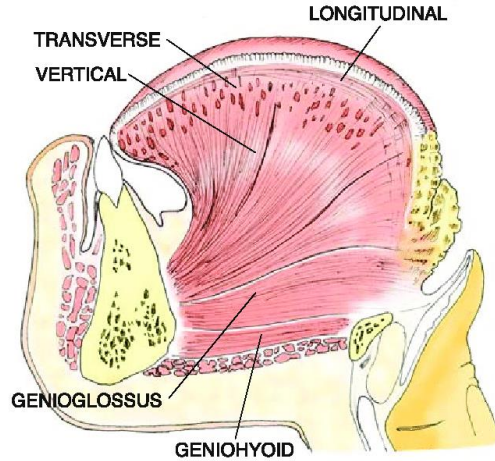


CN XII: Hypoglossal (Motor)

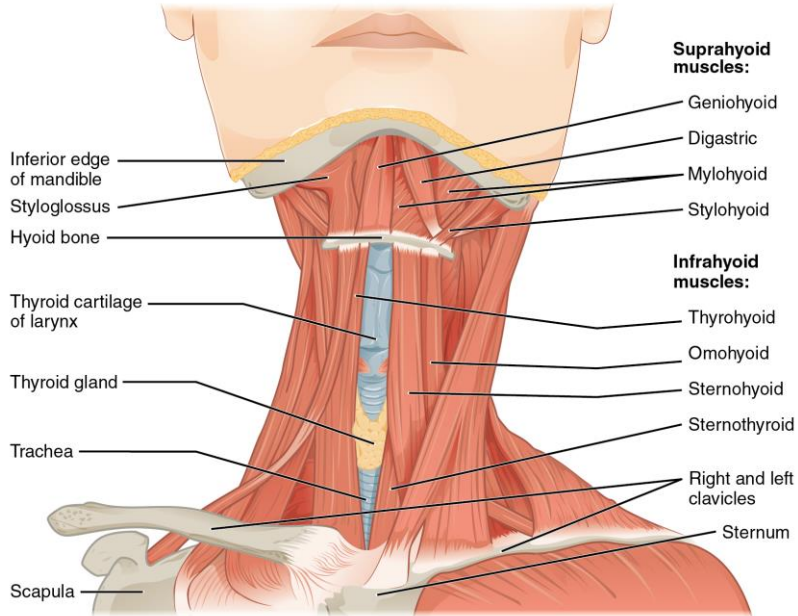
- Brainstem (medulla) – Hypoglossal canal
- Motor: Glossus muscles , geniohyoid, thyrohyoid, intrinsic tongue muscles



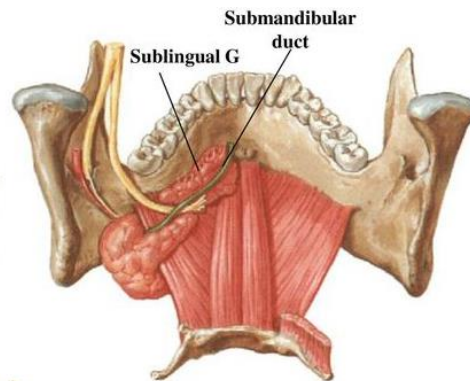
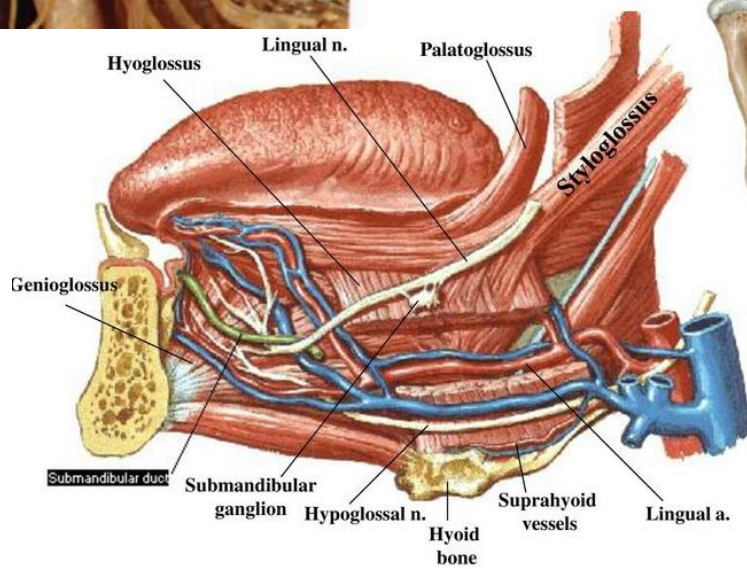
Tongue



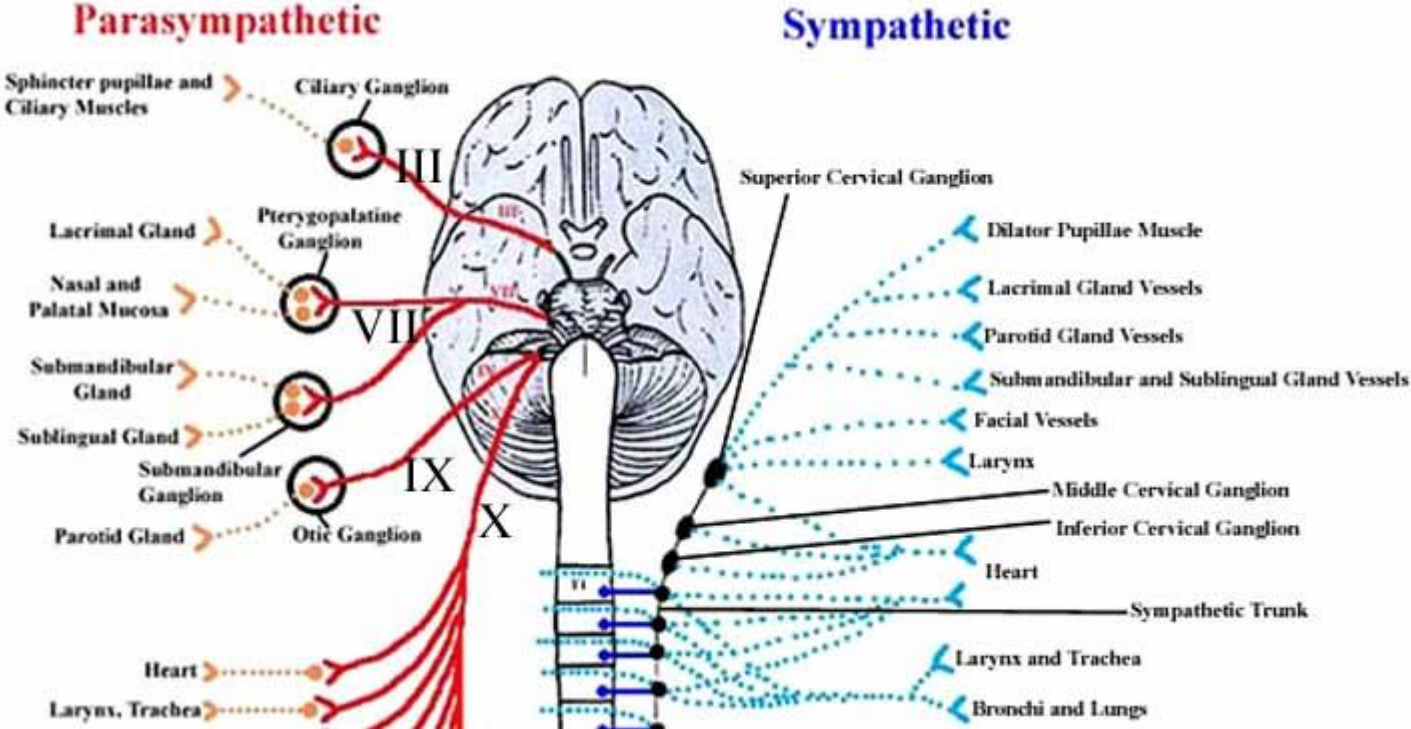
Superficial & Deep Neck Anatomy



Submandibular Region



PNS Innervation



Haven't covered today

Cranial sinus / arterial supply

Pharynx / Larynx region

Nasal Cavity

Vertebral Anatomy

Thankyou!

Questions?