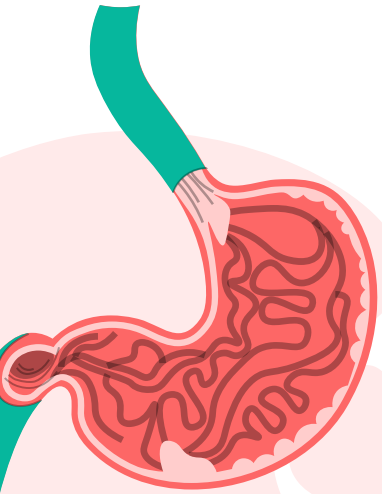

Anatomy Lab – mid

By Hind Shaker Suhwail

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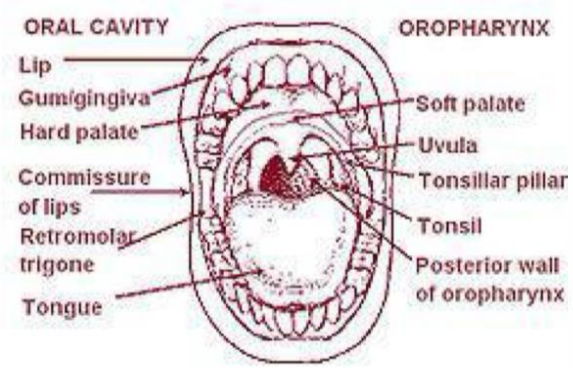
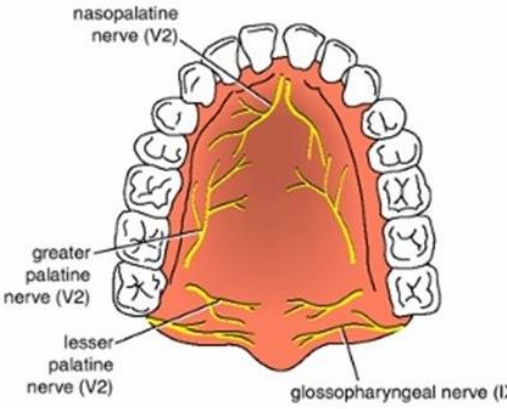
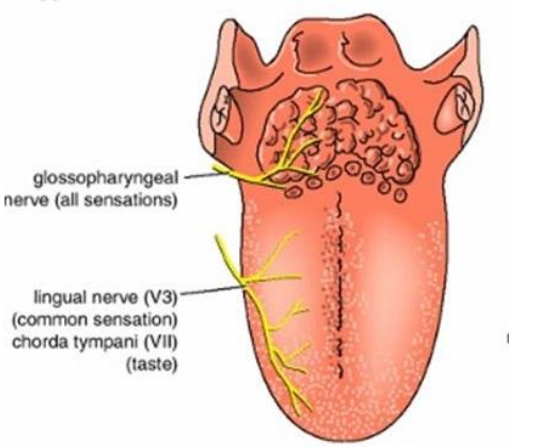
سُبْحَانَ اللَّهِ الْعَظِيمِ

Oral cavity





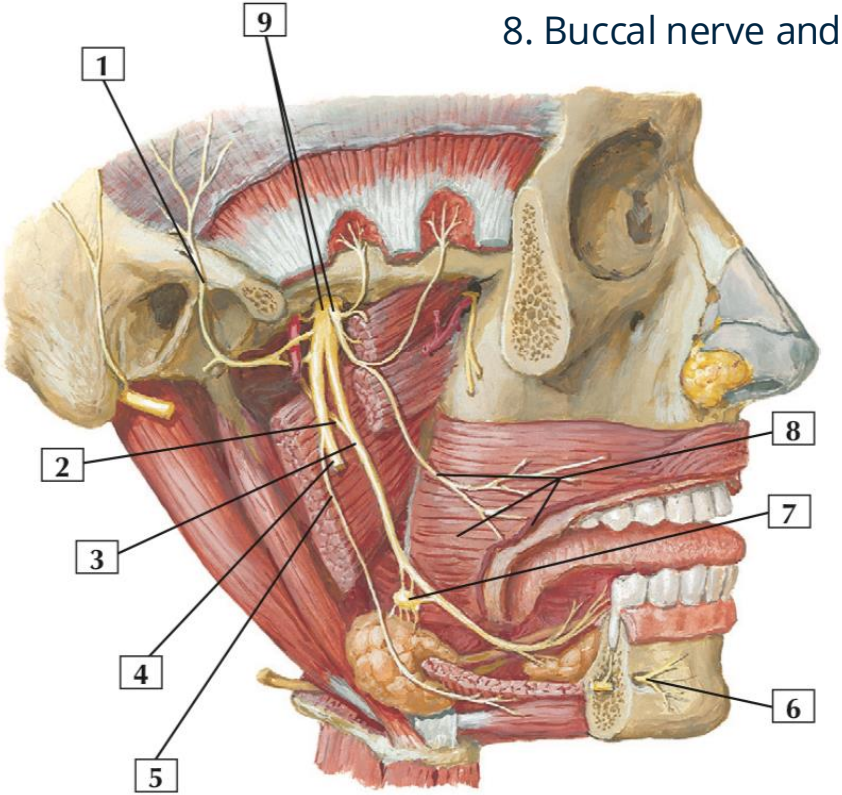
- <u>Sensory innervation of the mouth :</u>
- **Roof (hard palate):**
- Supplied by the greater palatine and nasopalatine nerves, branches of the maxillary division of the trigeminal nerve (CN V2).
- **Floor of the mouth:**
- General sensation (touch, temperature, pain): Lingual nerve (branch of the mandibular division of CN V3).
- Taste sensation: Chorda tympani nerve (branch of the facial nerve, CN VII).
- **Cheek:**
- Skin and mucosa: Buccal nerve (sensory branch of CN V3).
- Buccinator muscle: Buccal branch of the facial nerve (CN VII).

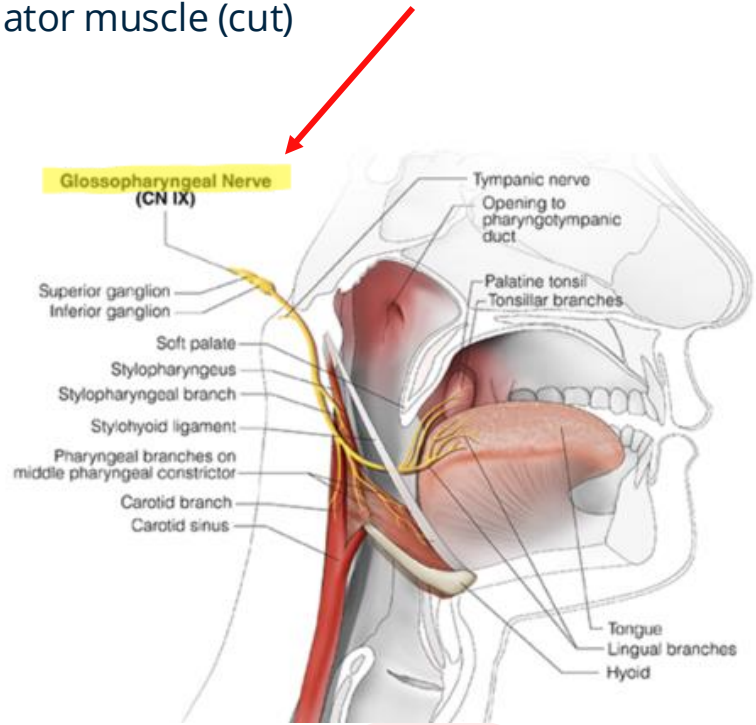


2. Chorda tympani nerve

3. Lingual nerve

8. Buccal nerve and buccinator muscle (cut)





- Blood supply of the mouth
- **Cheek:**
- Supplied by branches of the facial artery and lingual artery.

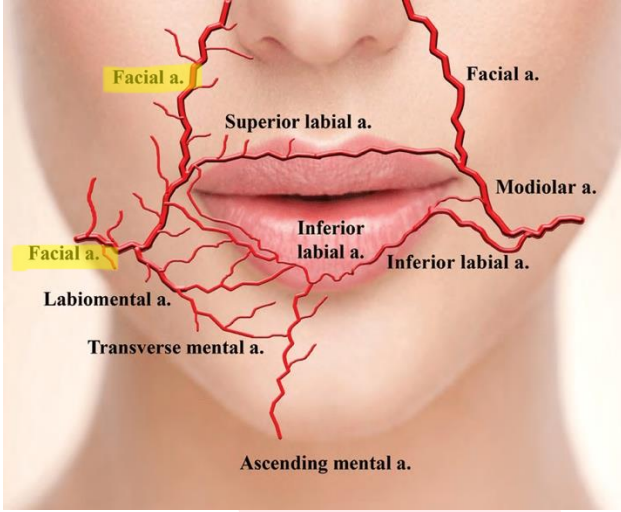
- **Tongue and Floor of the Mouth:**
- Supplied by:

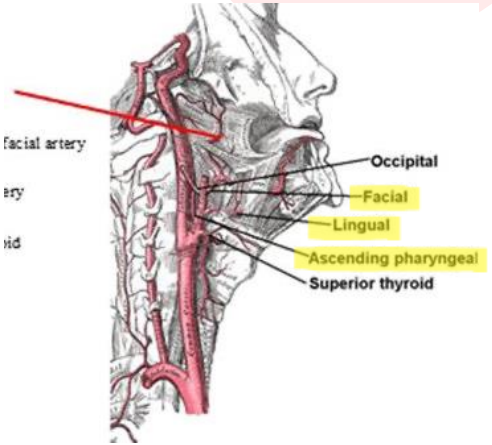
- Lingual artery

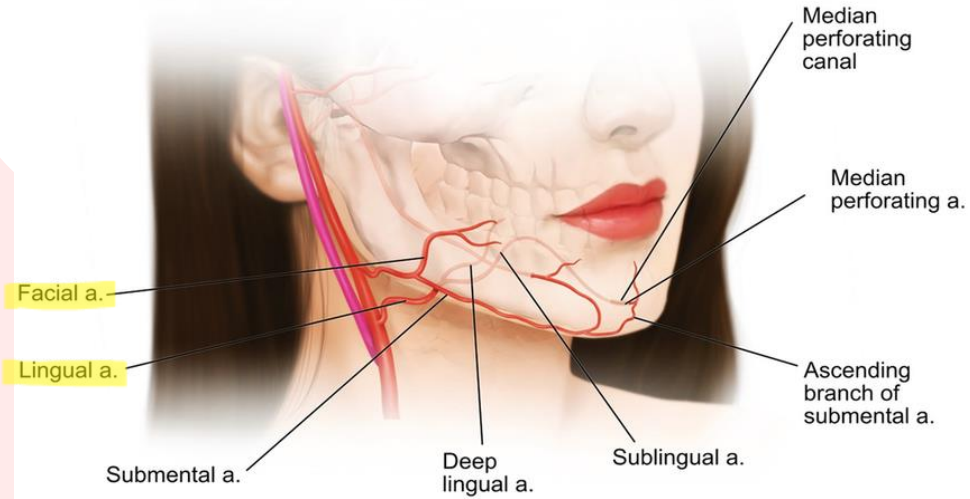
- Tonsillar branch of the facial artery

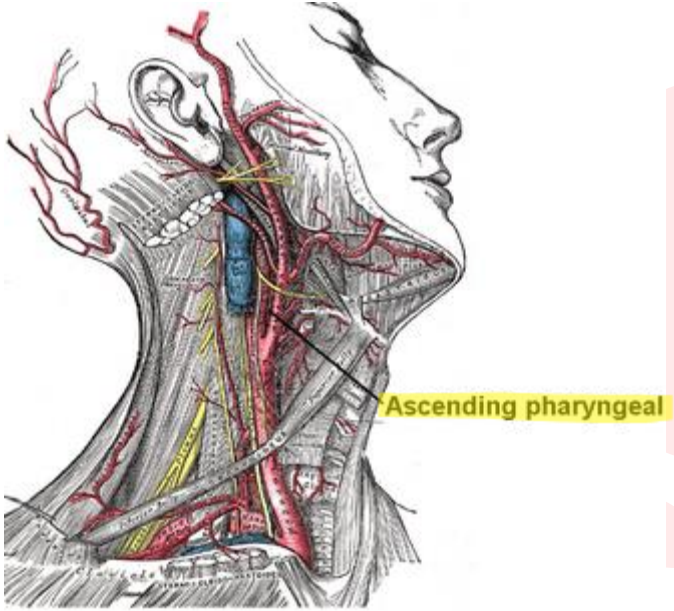
- Ascending pharyngeal artery

- (All of these are branches of the external carotid artery)






Median perforating canal
Median perforating a.
Facial a.
Lingual a.
Ascending branch of submental a.
Submental a.
Deep lingual a.
Sublingual a.


Ascending pharyngeal

Teeth

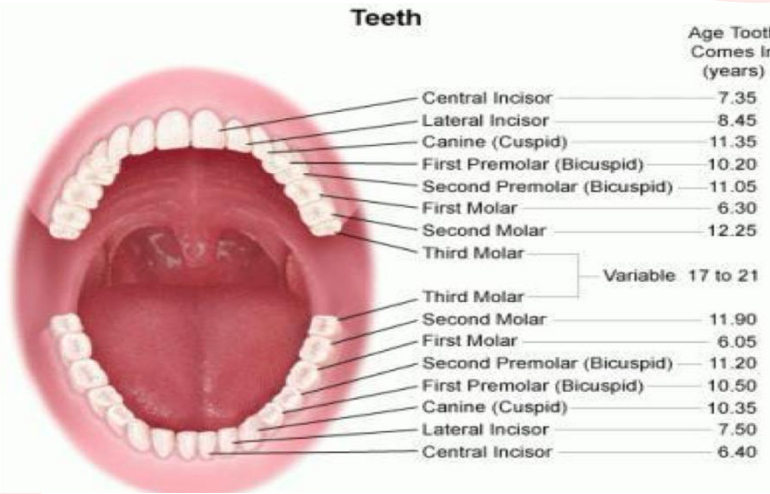
There are **20 deciduous teeth:** four incisors, two canines, and four molars in each jaw• They begin to erupt about **6 months** after birth and have all erupted by the end of **2 years**.

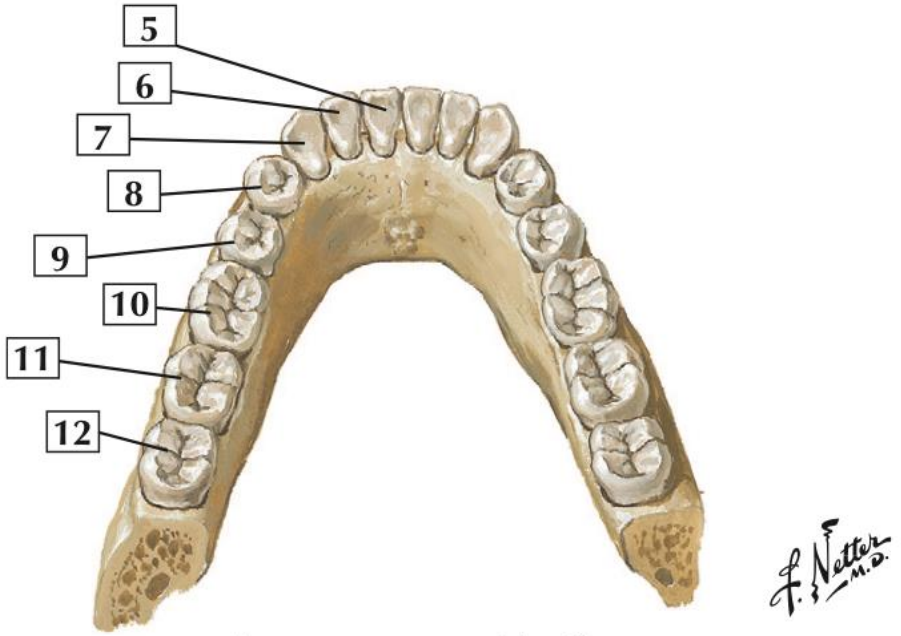
• The teeth of the lower jaw usually appear before those of the upper jaw

•**There are 32 permanent teeth**: four incisors, two canines, four premolars, andsix molars in each jaw

•They begin to erupt at **6 years of age**

•The last tooth to erupt is the **third molar**, which may happen between the ages 17 and 30





Lower permanent teeth

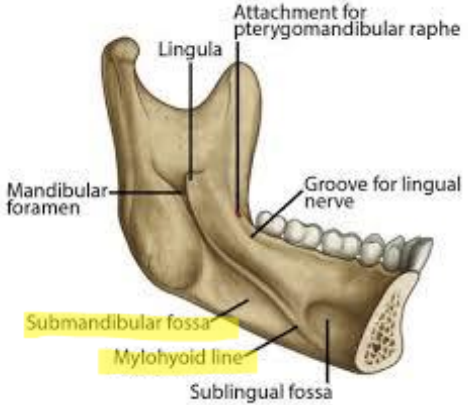
5. Central incisor
6. Lateral incisor
7. Canine
8. 1st premolar
9. 2nd premolar
10. 1st molar
11. 2nd molar
12. 3rd molar

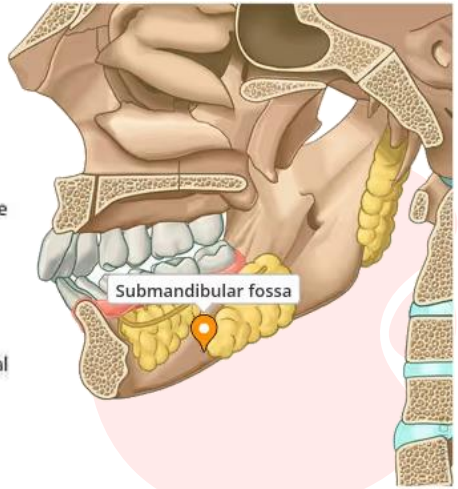
Mandible (Muscle of mastication)

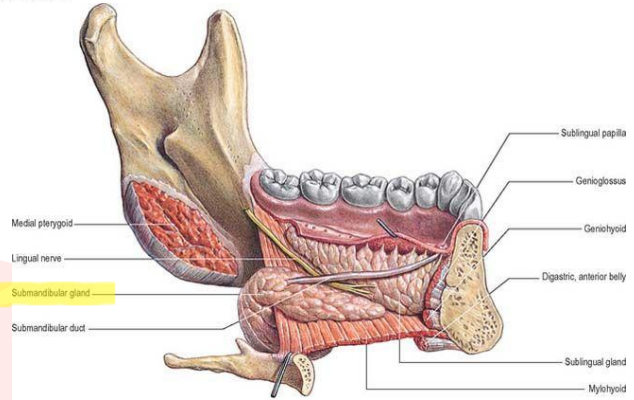
- (The student should study the parts of the mandible and its relation to gland and muscle attachment)

- **1. Submandibular Fossa** (medial side of mandible)

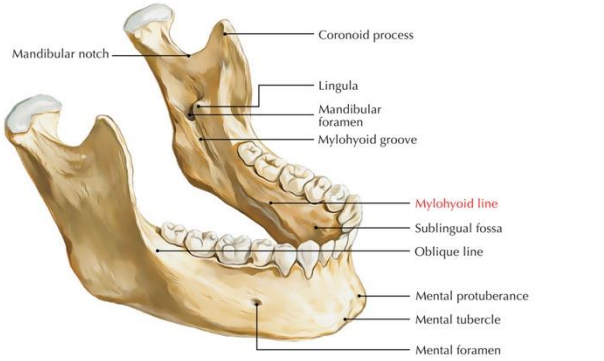
- Location: Below the mylohyoid line on the medial surface of the mandible.
- Related Structure:
- Lodges the superficial part of the submandibular gland.
- This area is in contact with the larger arm of the submandibular gland that lies outside the oral cavity.

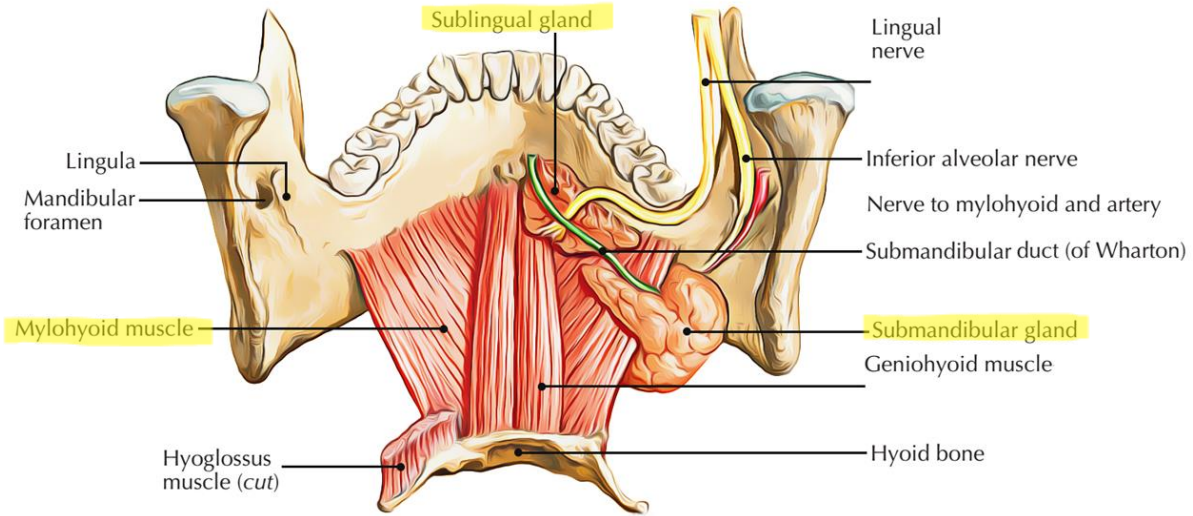


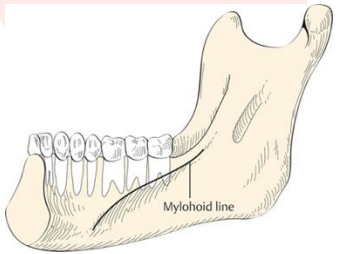




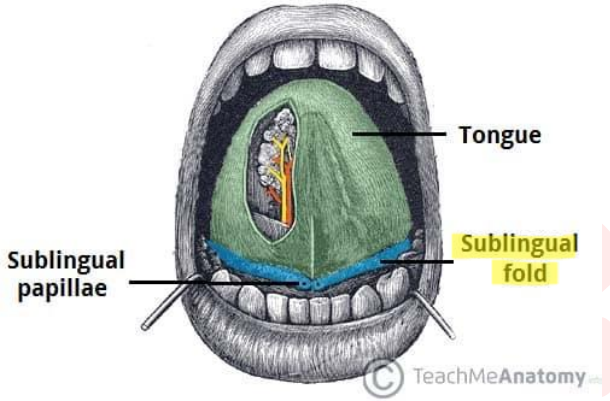
- **2. Mylohyoid Line**
- Location: On the medial surface of the mandible.
- Function:
- Serves as the origin of the mylohyoid muscle, which forms the floor of the mouth.
- Separates the submandibular gland (below) from the sublingual gland (above).

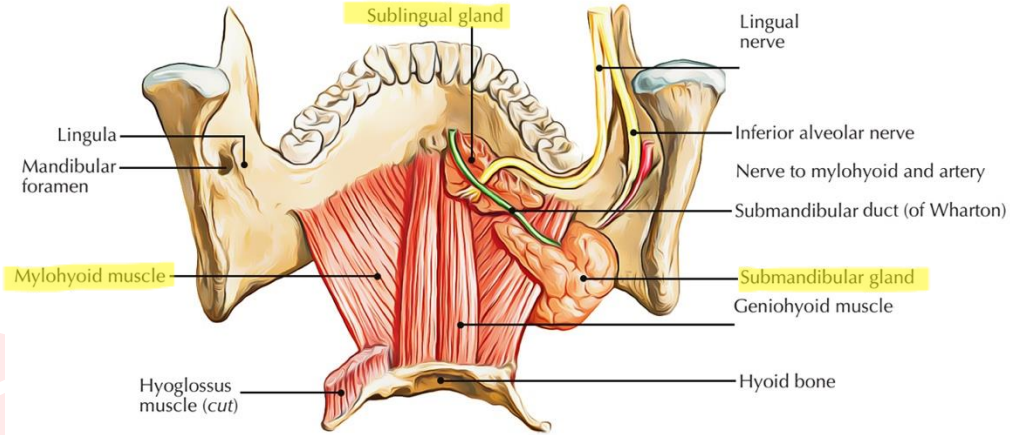


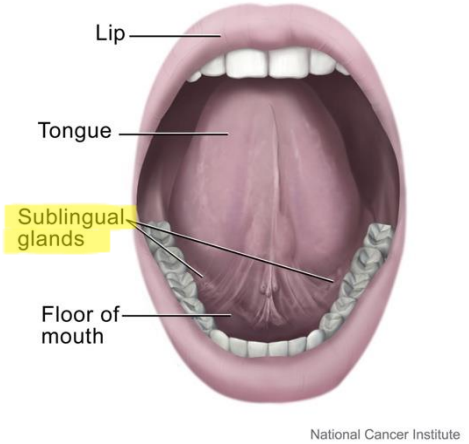




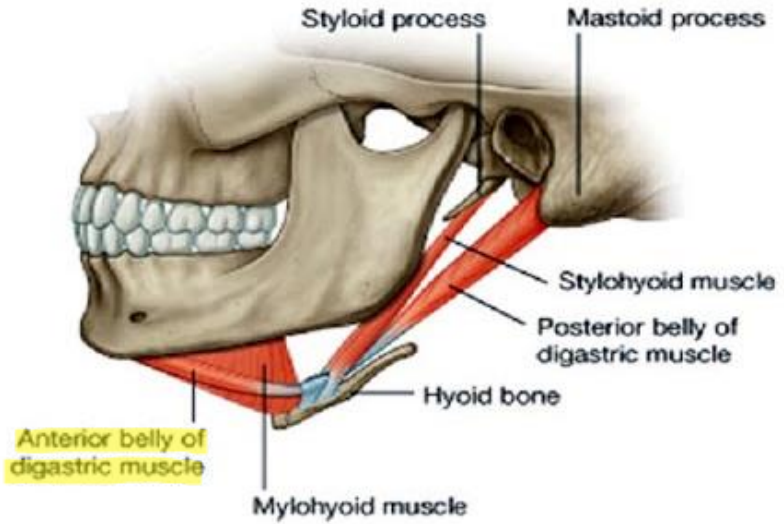
- **3. Mandibular Body**
- Relation to Glands and Muscles:
- The deep part of the submandibular gland curves around the posterior border of the mylohyoid muscle to enter the floor of the mouth.
- Sublingual gland lies superior to the mylohyoid line and pushes up the mucosa of the floor of the mouth (sublingual fold).

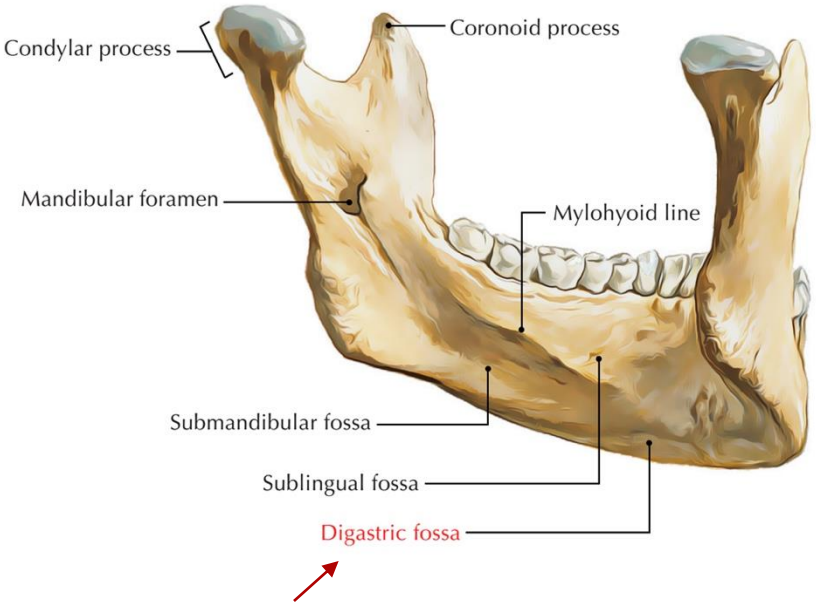


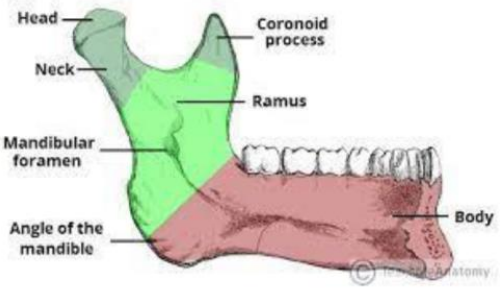


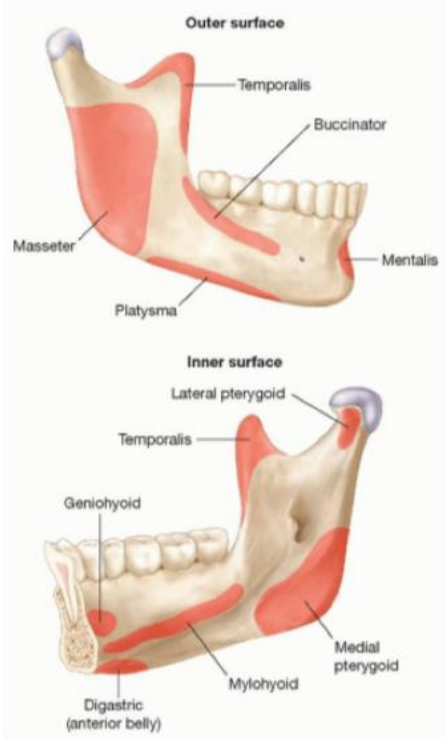


- **4. Digastric Fossa**
- Location: Inferior border of the mandible near the midline (inner surface).
- Muscle Attachment:
- Origin of the anterior belly of the digastric muscle.



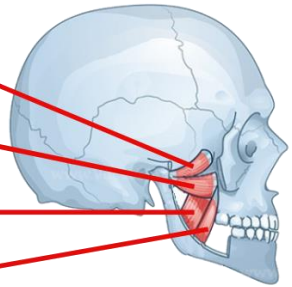


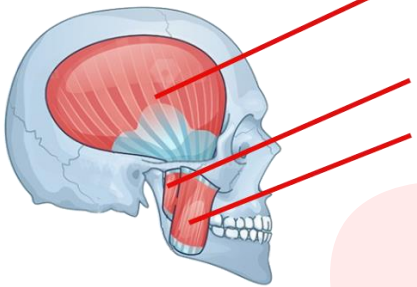




Medial Pterygoid

- Superior head of pterygoid muscle
- Inferior head of pterygoid muscle
- Deep head of medial pterygoid muscle
- Superficial head of medial pterygoid muscle





Temporalis muscle

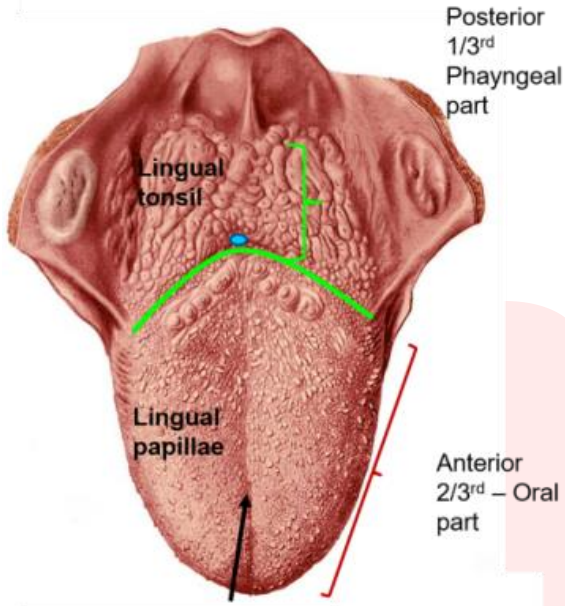
Masseter muscle

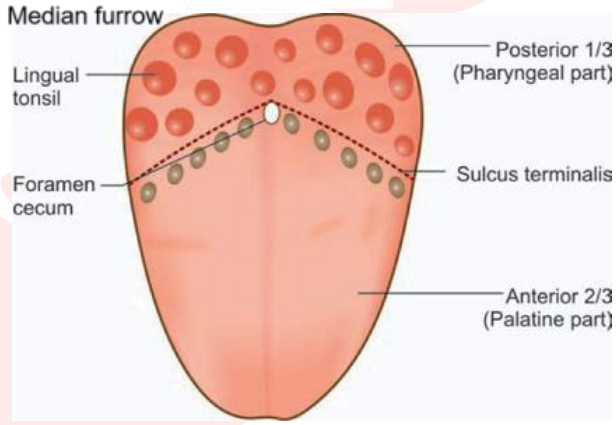
- Deep part of Masseter muscle
- Superficial part of Masseter muscle

The tongue

- A muscular organ made of striated muscle covered with mucous membrane.
- Divided into:
- **Anterior 2/3 (oral part)**: from first pharyngeal arch
- **Posterior 1/3 (pharyngeal part)**: from third pharyngeal arch
- Divided by sulcus terminalis and foramen cecum.

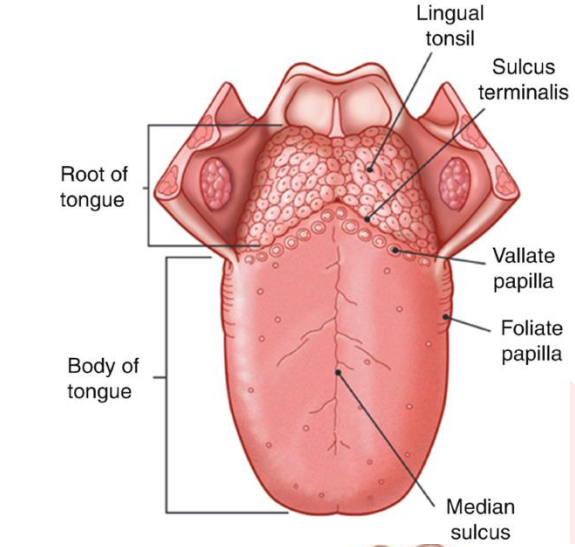
- **Foramen Cecum**
- A small pit at the apex of the V-shaped sulcus terminalis.
- Embryological remnant of the thyroglossal duct, the origin site of the thyroid gland.

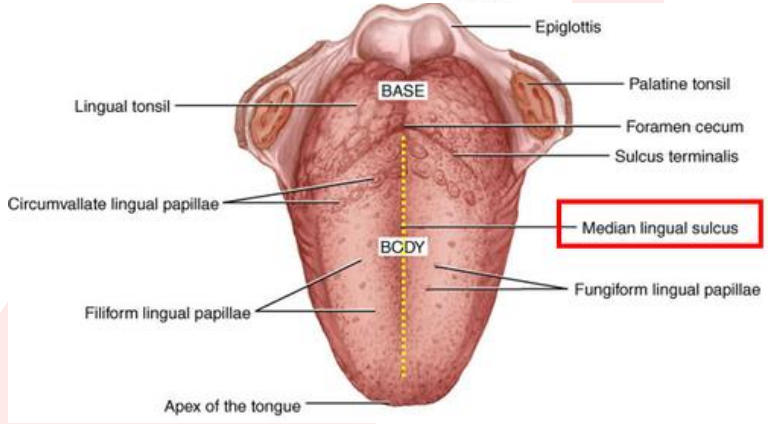




- **Sulcus Terminalis**
- A V-shaped groove dividing the anterior 2/3 from the posterior 1/3.
- Apex of the sulcus points posteriorly to the foramen cecum.

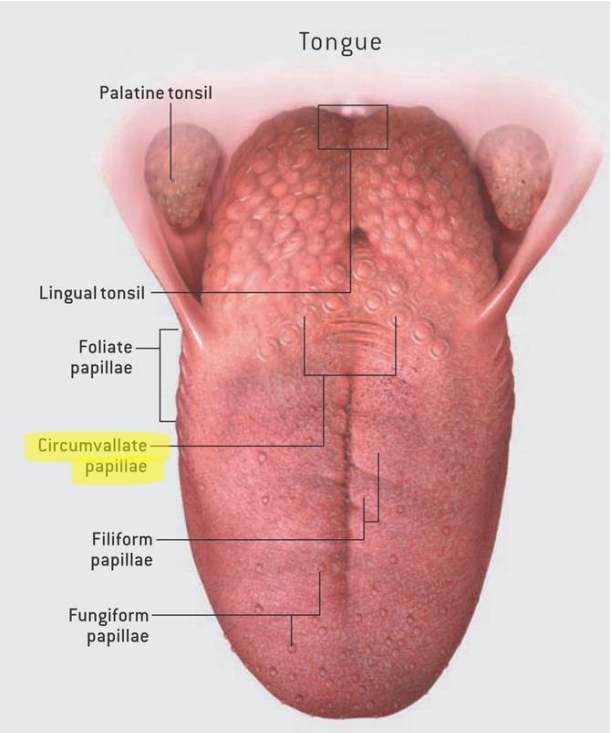
- **Median Sulcus**
- A shallow vertical groove along the midline of the dorsum of the tongue.
- Indicates the position of the fibrous median septum, which separates the tongue into right and left halves.

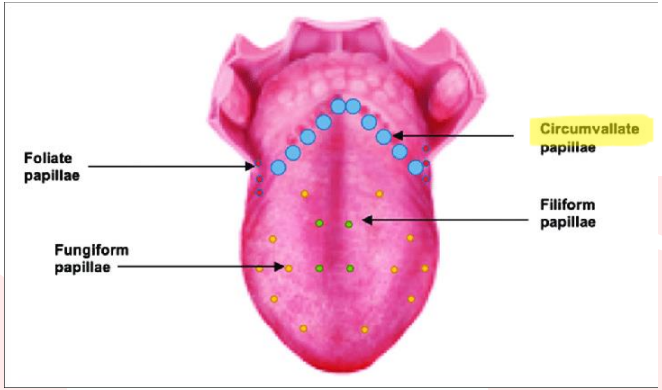




Circumvallate Papillae

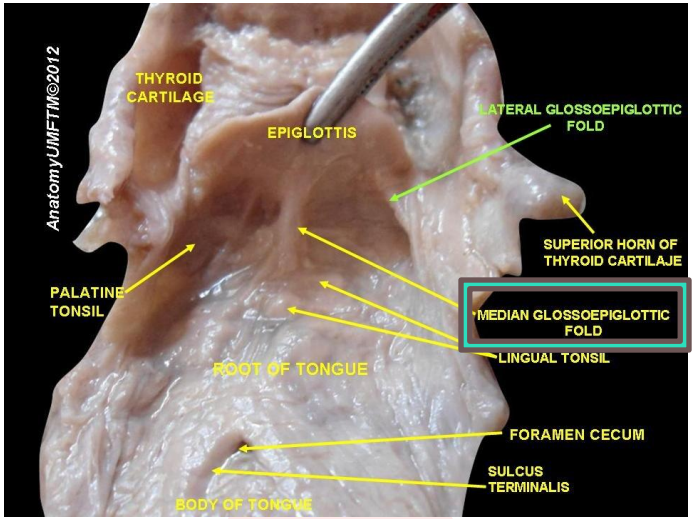
- Located just anterior to the sulcus terminalis.
- Contain taste buds (especially for bitter taste).
- Though anatomically in the anterior 2/3, they are embryologically part of the posterior 1/3, hence innervated by glossopharyngeal nerve (CN IX).

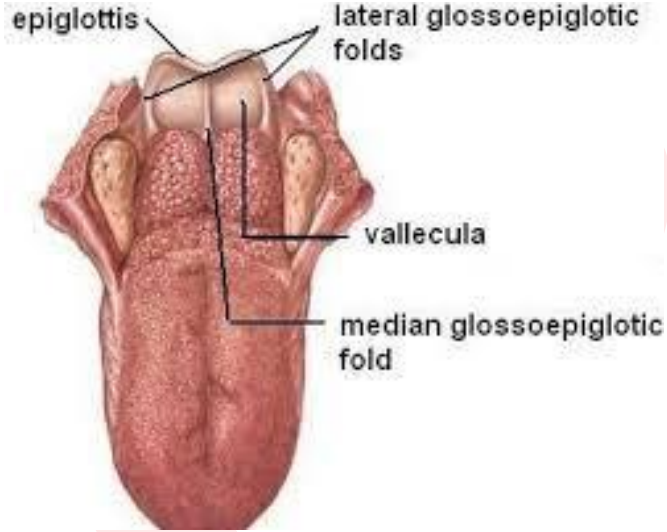




Glossoepiglottic Folds

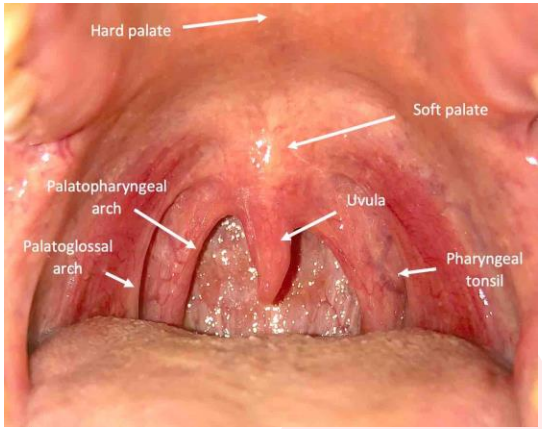
- These are mucosal folds from the posterior tongue to the epiglottis.
- They form valleculae between the folds, which trap saliva

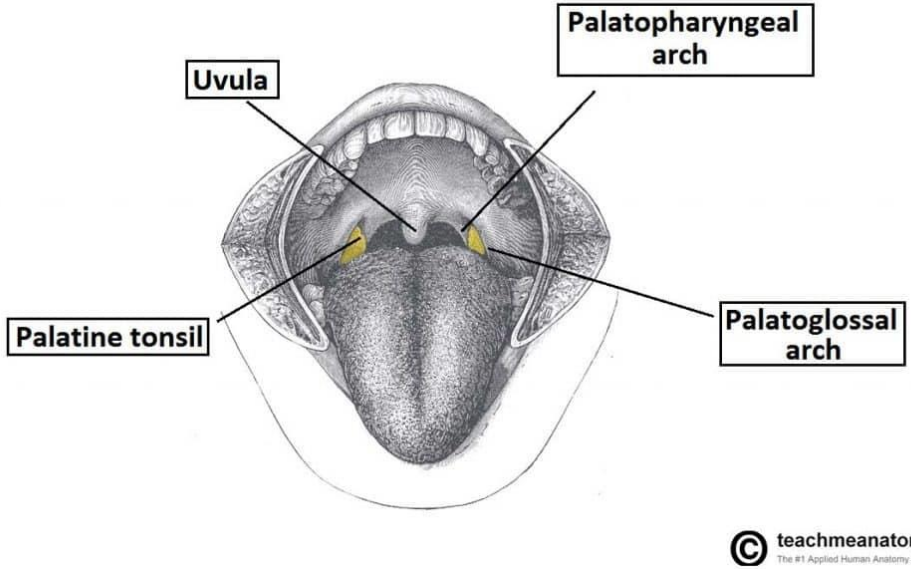




Palatoglossal & Palatopharyngeal Arches

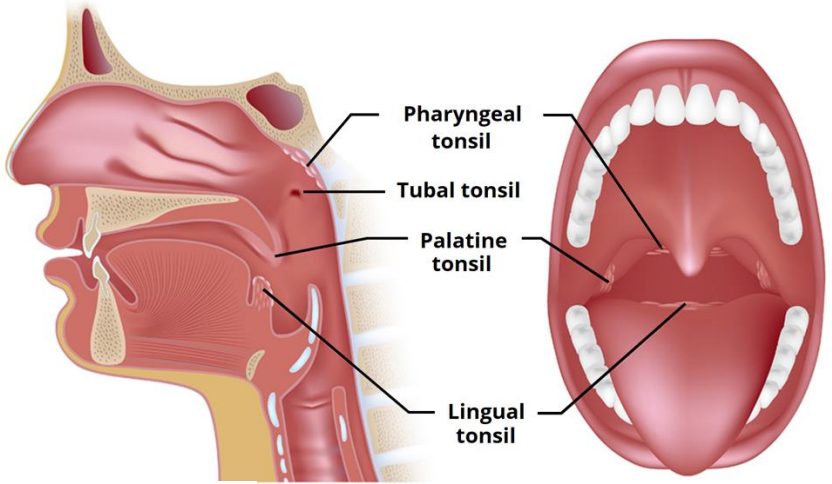
- **Palatoglossal Arch (Anterior Pillar):**
- Contains palatoglossus muscle
- Separates oral cavity from oropharynx
- **Palatopharyngeal Arch (Posterior Pillar):**
- Contains palatopharyngeus muscle
- The palatine tonsil lies in the tonsillar sinus between these two arches.

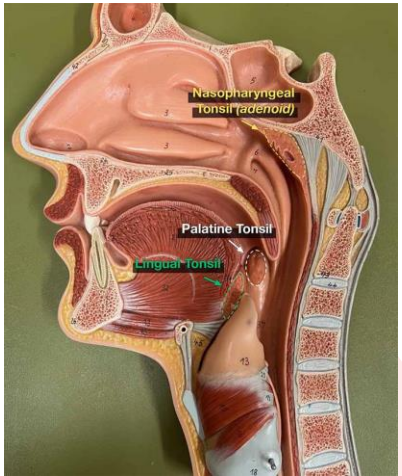


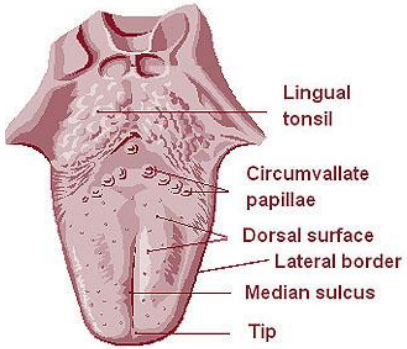


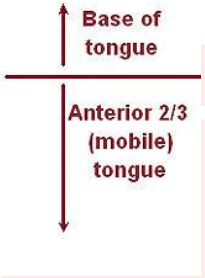
Lingual Tonsils & Palatine Tonsils

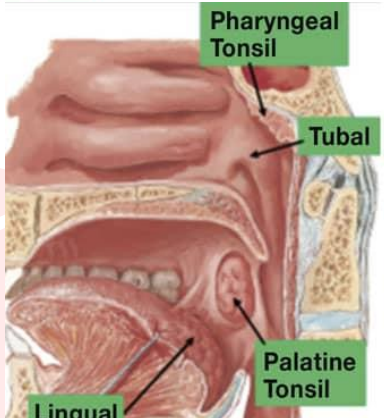
- **Lingual Tonsils:**
- Found on the posterior 1/3 of the tongue.
- Composed of lymphoid tissue, no taste buds
- **Palatine Tonsils:**
- Located between the palatoglossal and palatopharyngeal folds.
- Receive blood supply mainly from the facial artery.
  Innervation : lesser palatine & glossopharyngeal





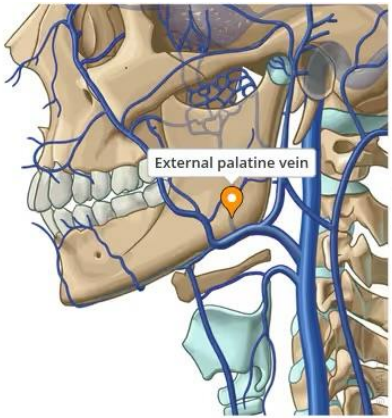


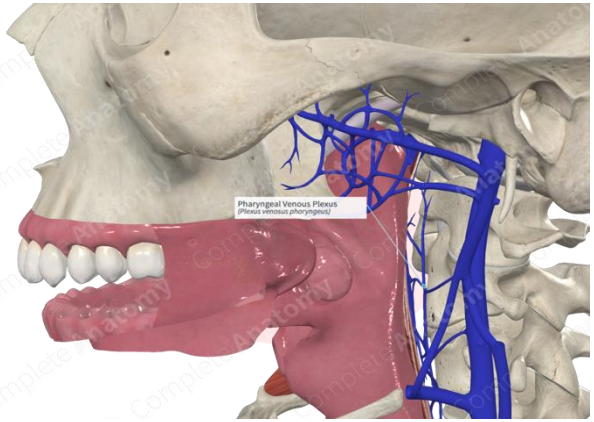




Venous Drainage of the Palatine Tonsils

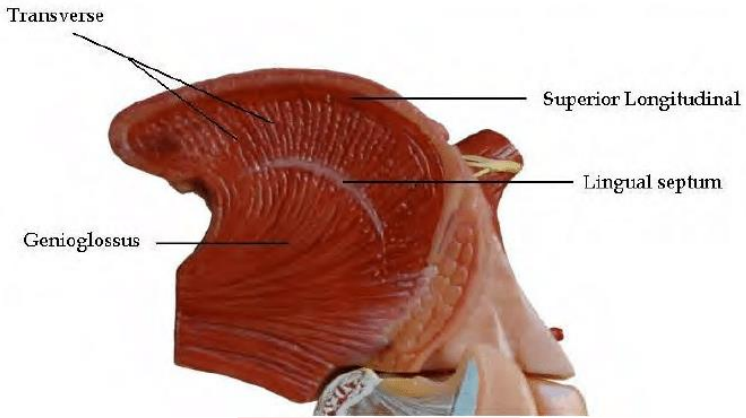
- Venous drainage of palatine tonsils goes to:
- External palatine vein (passes through superior constrictor)
- Pharyngeal venous plexus
- Facial vein

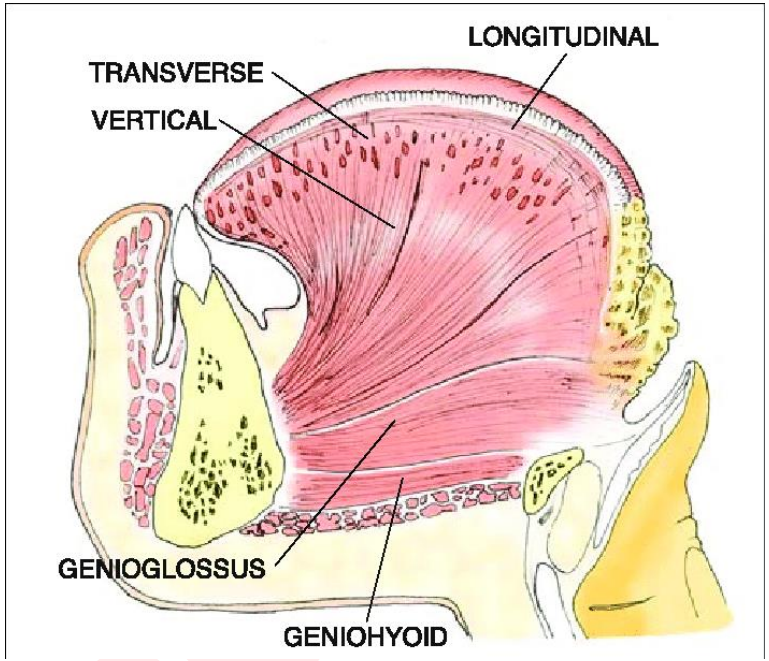




Intrinsic & Extrinsic Muscles of the Tongue

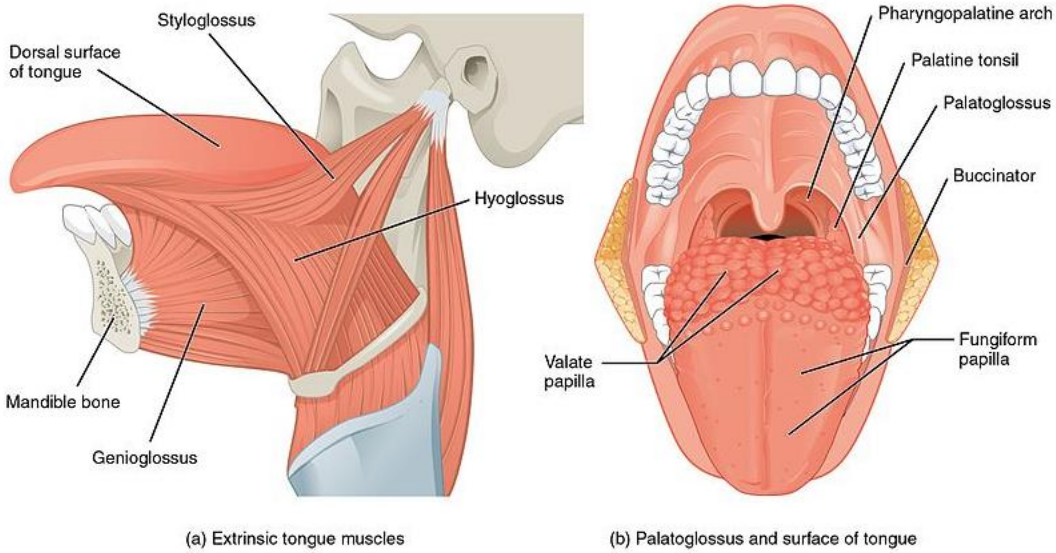
- **Intrinsic Muscles**
- Confined within the tongue, no bony attachment.
- Fibers: Longitudinal, transverse, vertical.
- Function: Alter shape of the tongue.
- Innervation: Hypoglossal nerve (CN XII)





Extrinsic Muscles

- Genioglossus
- Hyoglossus
- Styloglossus
- Palatoglossus



(a) Extrinsic tongue muscles

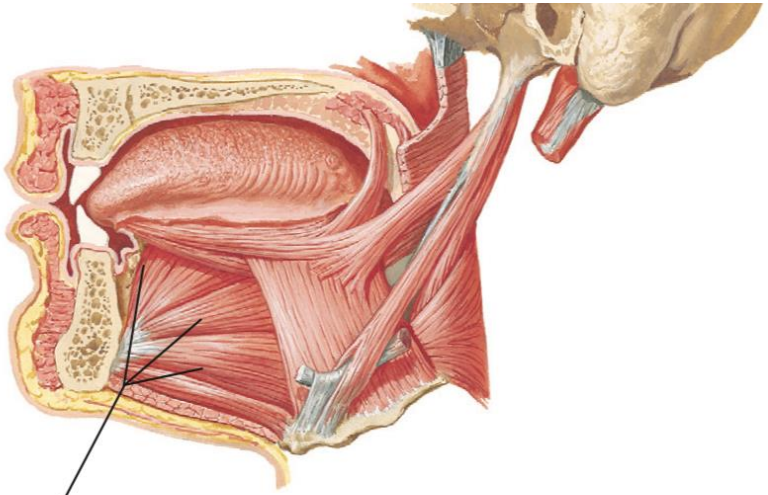
(b) Palatoglossus and surface of tongue

Blood Supply

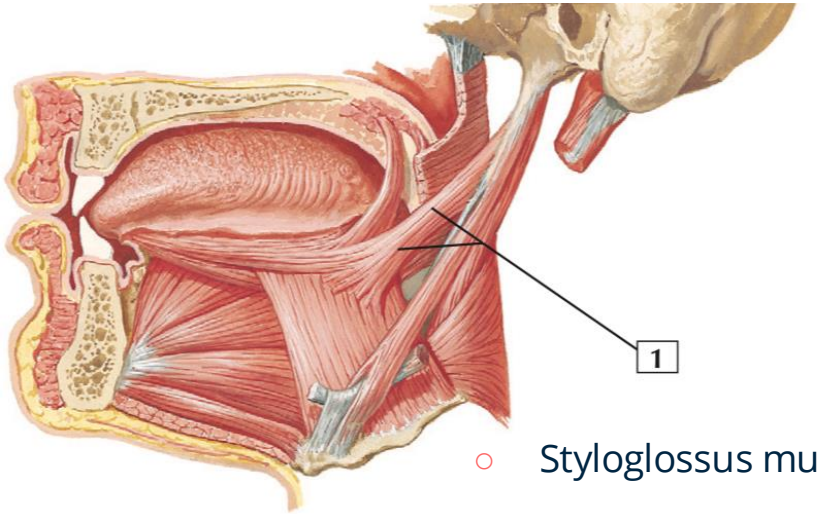
The lingual artery, the tonsillar branch of the facial artery, and the ascending pharyngeal artery supply the tongue. The veins drain into the internal jugular vein.

Lymph Drainage

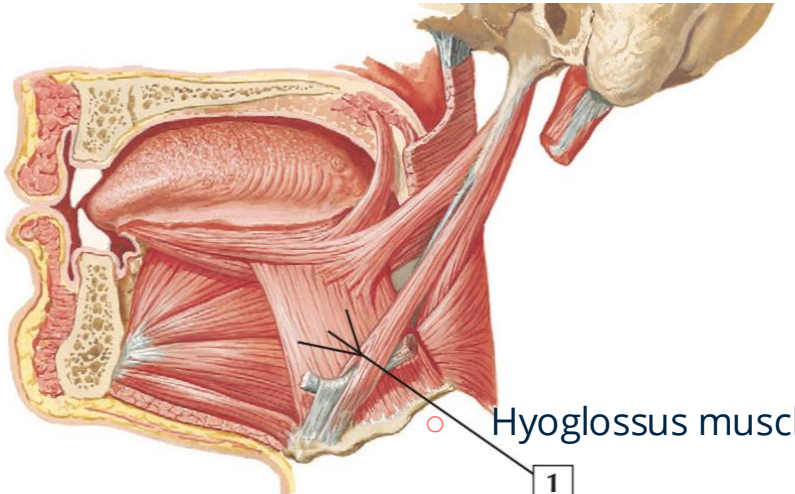
Tip: Submental lymph nodes
Sides of the anterior two thirds: Submandibular and deep cervical lymph nodes
Posterior third: Deep cervical lymph nodes



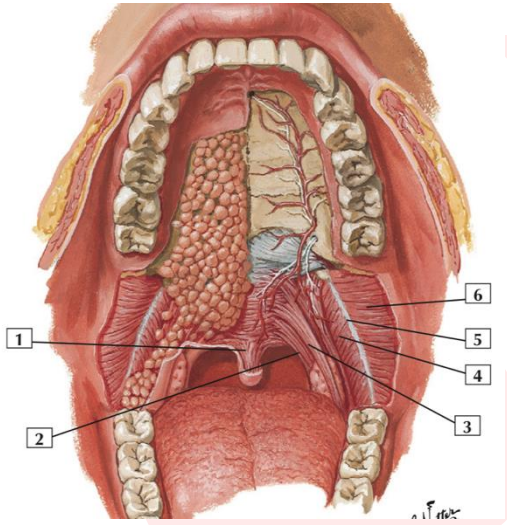
- 1 Genioglossus muscle



- Styloglossus muscle



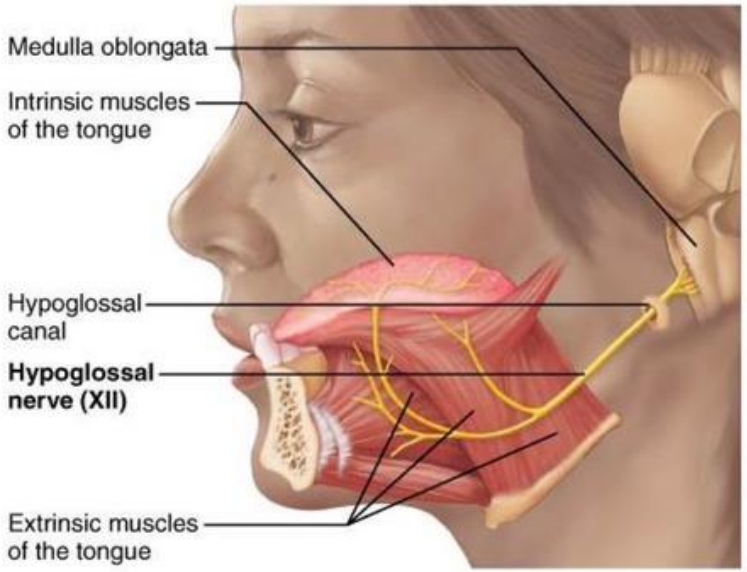
- Hyoglossus muscle



- 3. Palatoglossus muscle

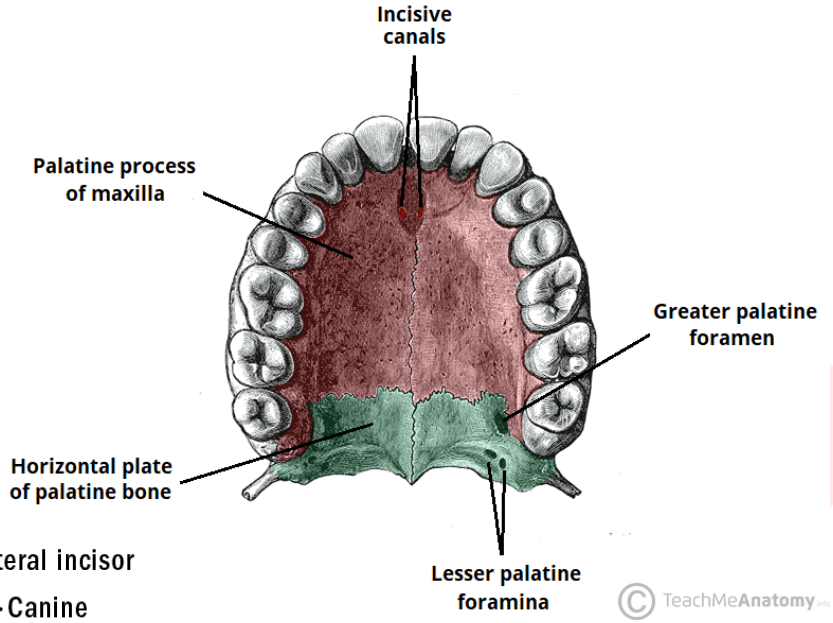
Hypoglossal Nerve (CN XII)

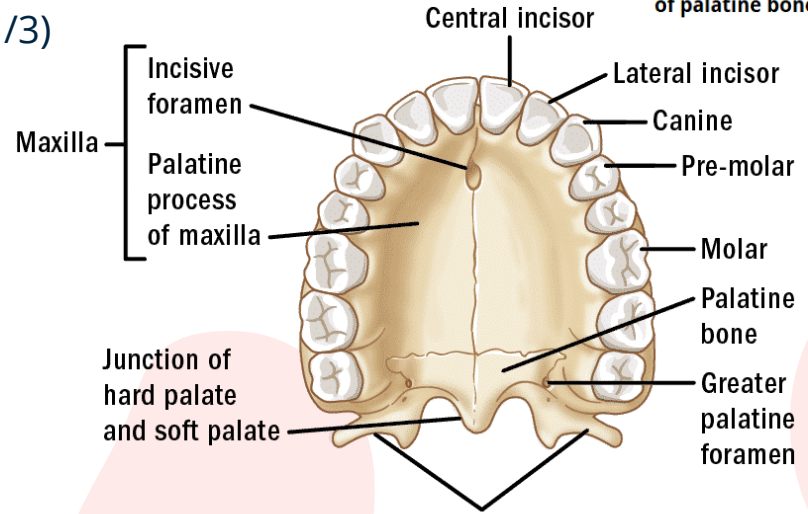
- Supplies all intrinsic and extrinsic muscles of the tongue except palatoglossus.
- Passes between mylohyoid and hyoglossus.
- Clinical note: Injury causes deviation of tongue toward paralyzed side due to genioglossus paralysis.



Hard Palate

- The hard palate forms the anterior portion of the roof of the mouth.
- Composed of:
- Palatine process of the maxilla (anterior 2/3)
- Horizontal plate of the palatine bone (posterior 1/3)





Foramina of the Hard Palate:

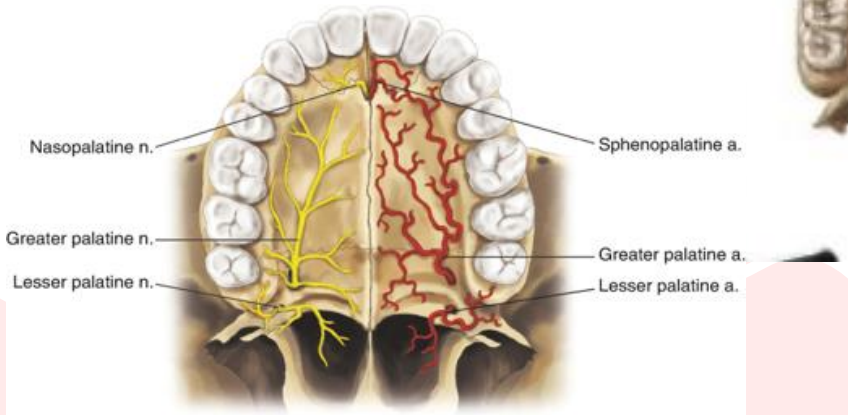
- what passes through each

- **Incisive foramen:**
- → Nasopalatine nerve

- **Greater palatine foramen:**
- → Greater palatine nerve and artery

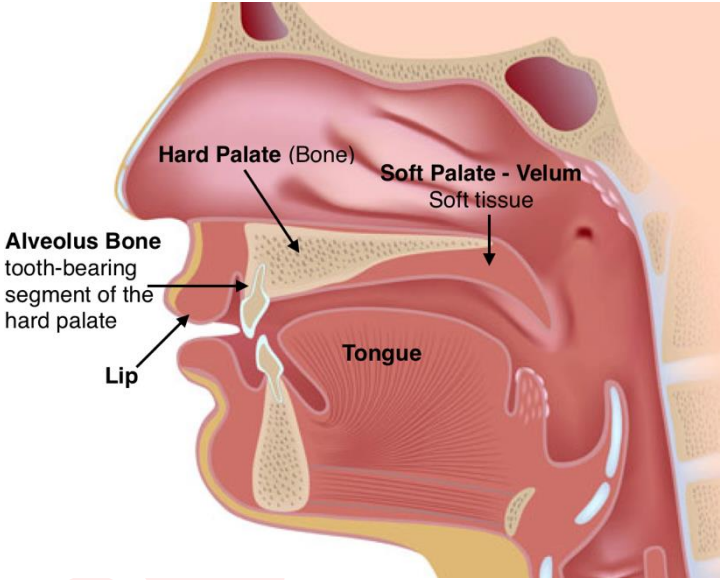
- **Lesser palatine foramen:**
- → Lesser palatine nerve and artery

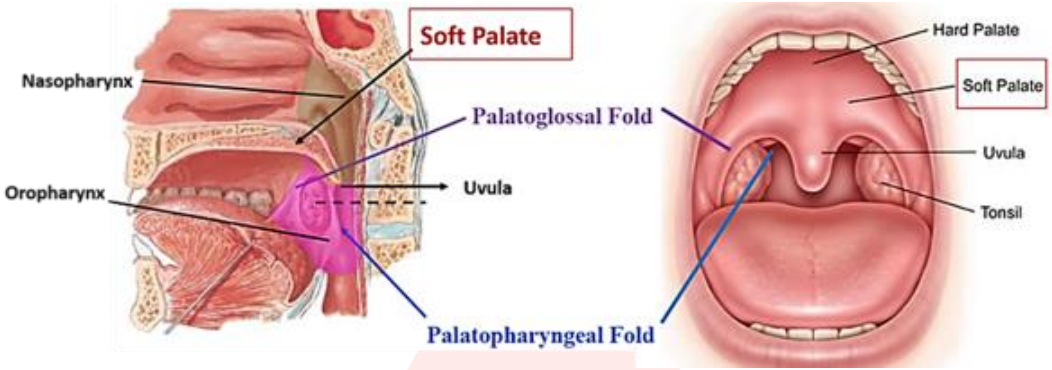
- These nerves are branches of the maxillary division of the trigeminal nerve (CN V2) and supply the mucosa of the hard and soft palate.



Soft palate

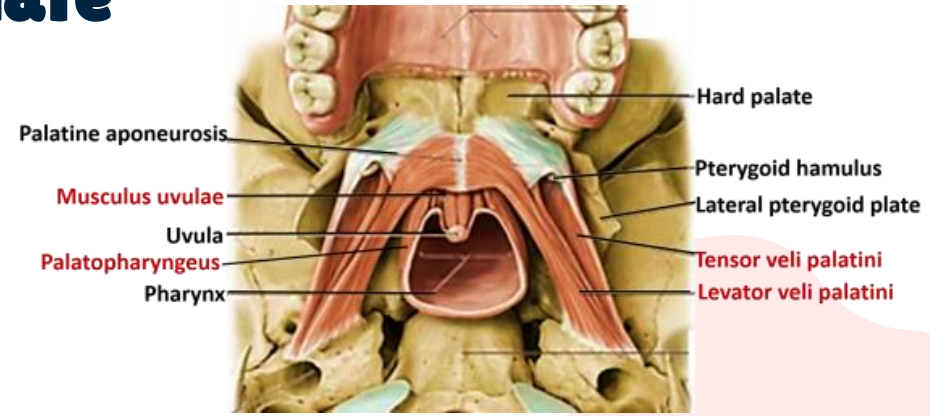
- The soft palate forms the posterior portion of the roof of the mouth.
- It is a muscular fold covered by mucous membrane.
- Separates the nasopharynx (above) from the oropharynx (below) during swallowing and speech.



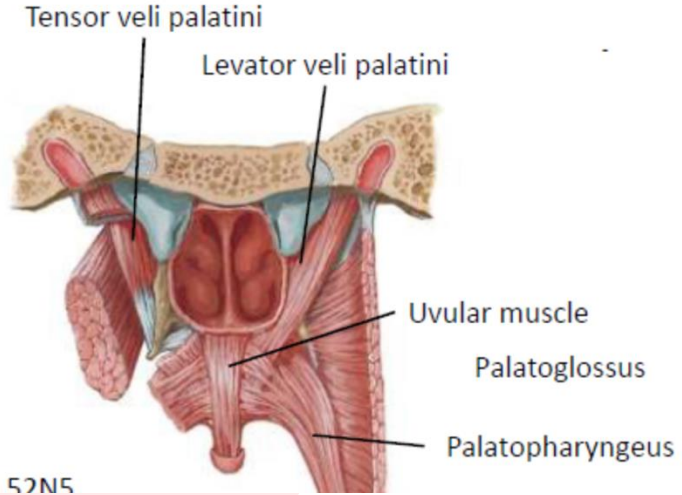


Muscles of the Soft Palate

- Tensor veli palatini
- Levator veli palatini
- Musculus uvulae
- Palatoglossus
- Palatopharyngeus

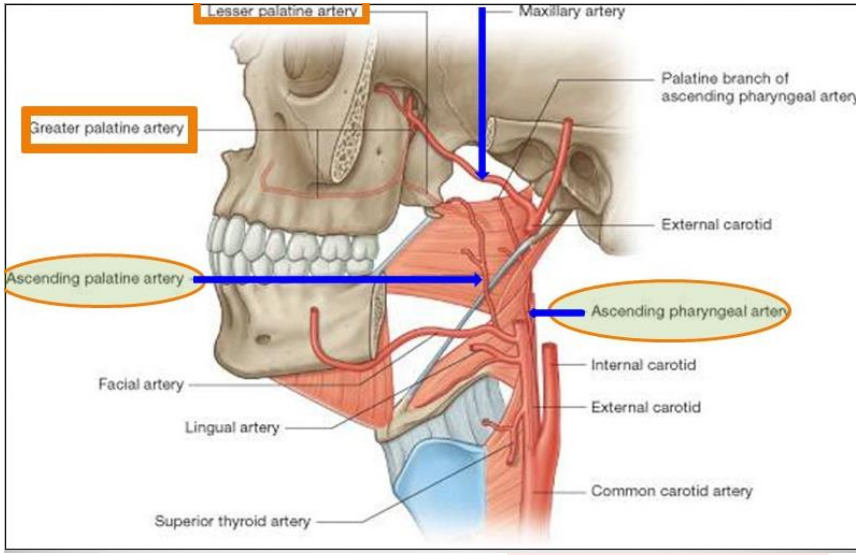


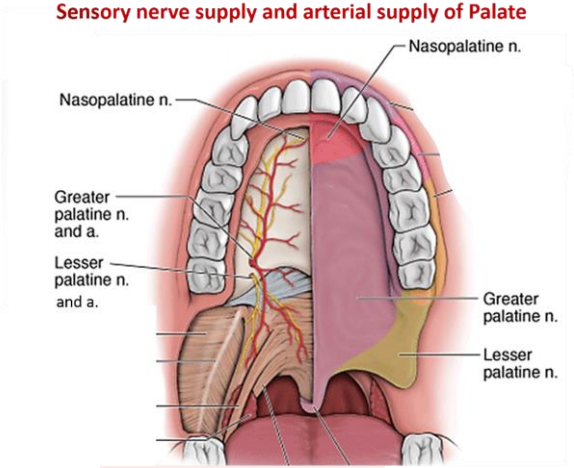
- Innervation :
- Motor:
- All muscles by pharyngeal plexus (CN X via cranial accessory),
- except tensor veli palatini (supplied by mandibular nerve, CN V3)
- Sensory:
- Mainly by lesser palatine nerve (branch of CN V2)



Blood Supply

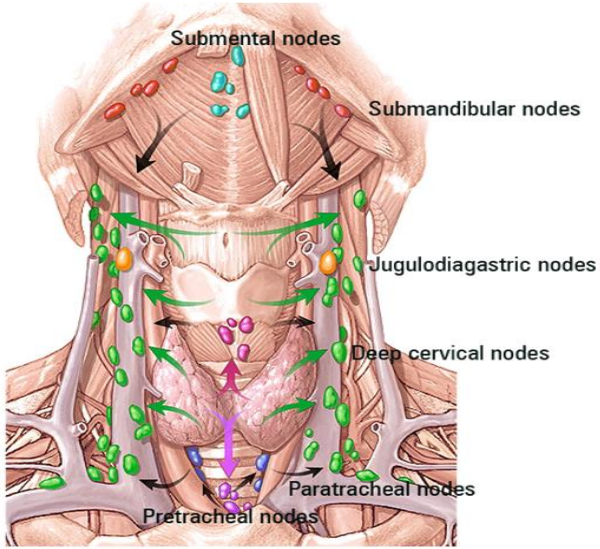
- Greater palatine artery (from descending palatine artery)
- Lesser palatine artery
- Ascending palatine artery (from facial artery)
- Ascending pharyngeal artery

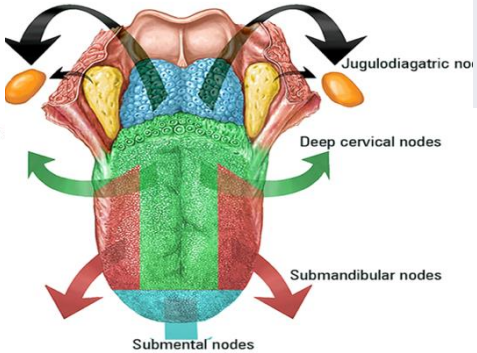




Lymph drainage

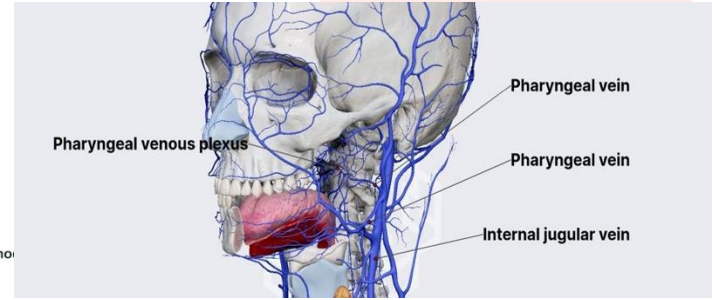
- The soft palate drains into the deep cervical lymph nodes directly.
- These nodes lie along the internal jugular vein, deep to the sternocleidomastoid muscle.





Venous Drainage

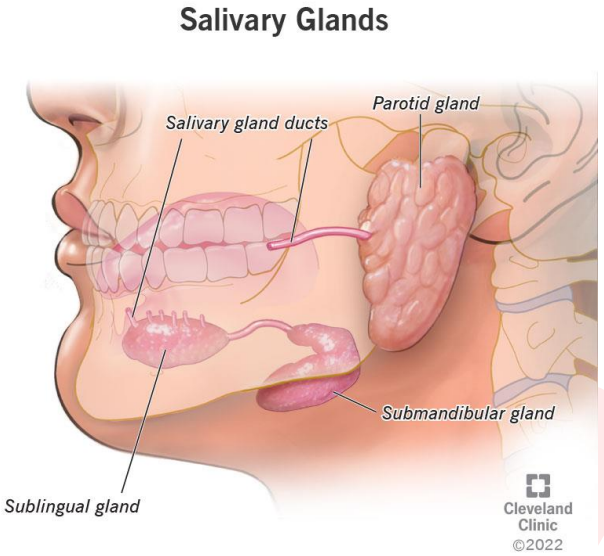
- The veins pierce the superior constrictor muscle and join the external palatine vein, pharyngeal venous plexus, or the facial veins



Salivary glands – parotid

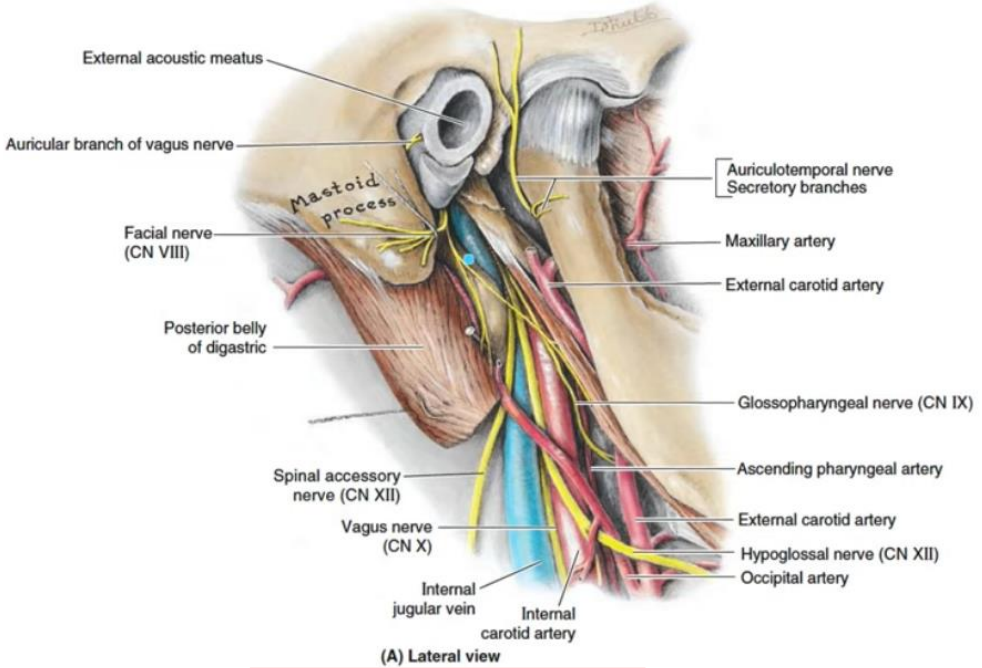
- Largest salivary gland
- Purely serous secretion
- Two capsules: an outer capsule (from deep cervical fascia) and an inner capsule that divides the gland into lobes and lobules

- **Located in the parotid bed:**
- **Anterior** to the external ear
- **Below** the external acoustic meatus
- **Behind** the ramus of mandible
- **In front of** the sternocleidomastoid muscle
- **Superiorly**: under zygomatic arch



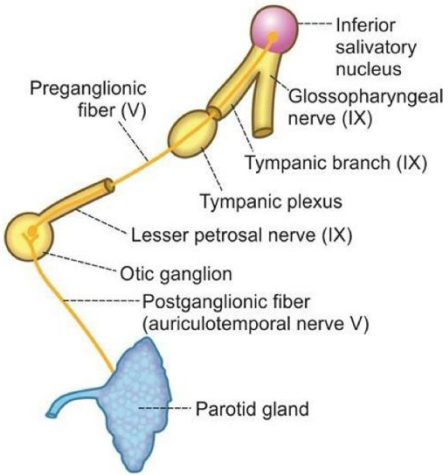
Parotid bed contents

- Styloid process
- Posterior belly of digastric
- Stylohyoid muscle
- Last 4 cranial nerves
- Fascia
- Blood vessels: internal jugular vein and common carotid artery

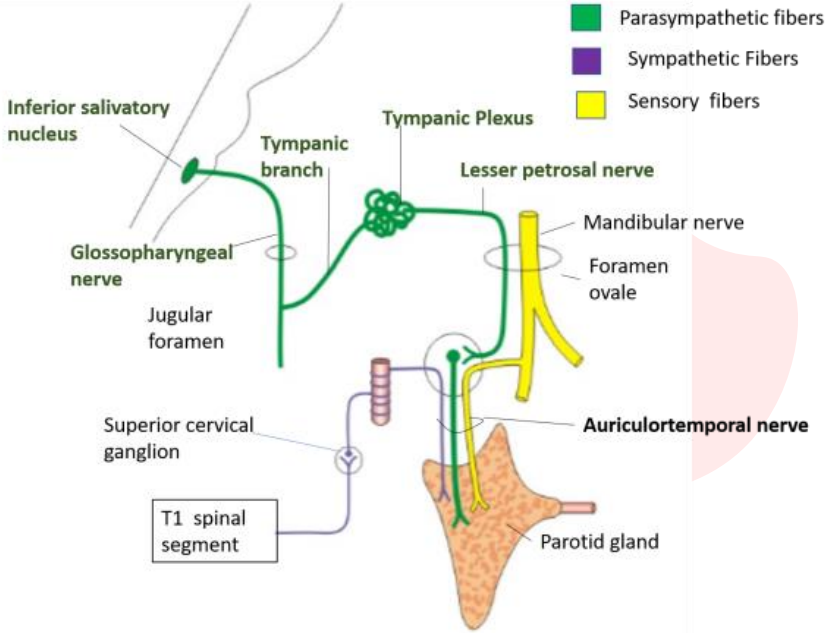


Innervation

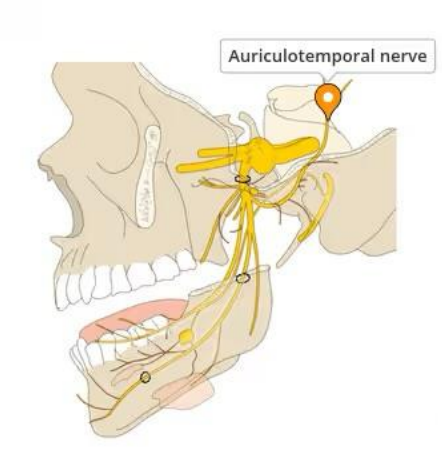
- **Parasympathetic (Secretomotor) Innervation**
- Originates from the inferior salivatory nucleus in the medulla oblongata.
- Passes through the glossopharyngeal nerve (cranial nerve IX).
- Gives off the tympanic branch, which forms the tympanic plexus.
- From there arises the lesser petrosal nerve.
- The lesser petrosal nerve carries preganglionic parasympathet fibers to the otic ganglion, where they synapse.
- Postganglionic parasympathetic fibers then travel via the auriculotemporal nerve (a branch of the mandibular nerve, V3) to innervate the parotid gland and stimulate secretion.

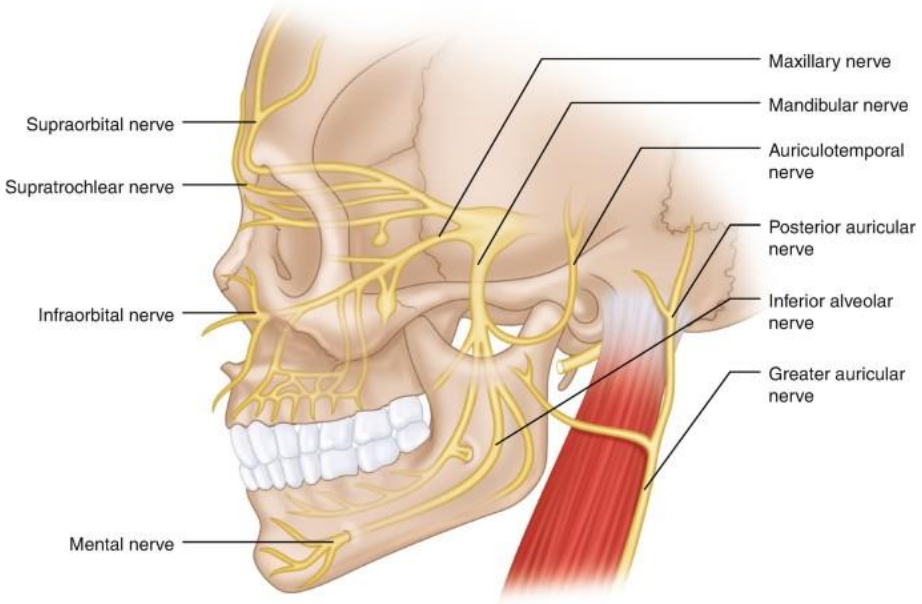


- **Sympathetic Innervation**
- Postganglionic sympathetic fibers arise from the superior cervical sympathetic ganglion.
- They travel along the external carotid artery and its branches to reach the gland.
- Function: causes vasoconstriction, indirectly affecting secretion by reducing blood flow.



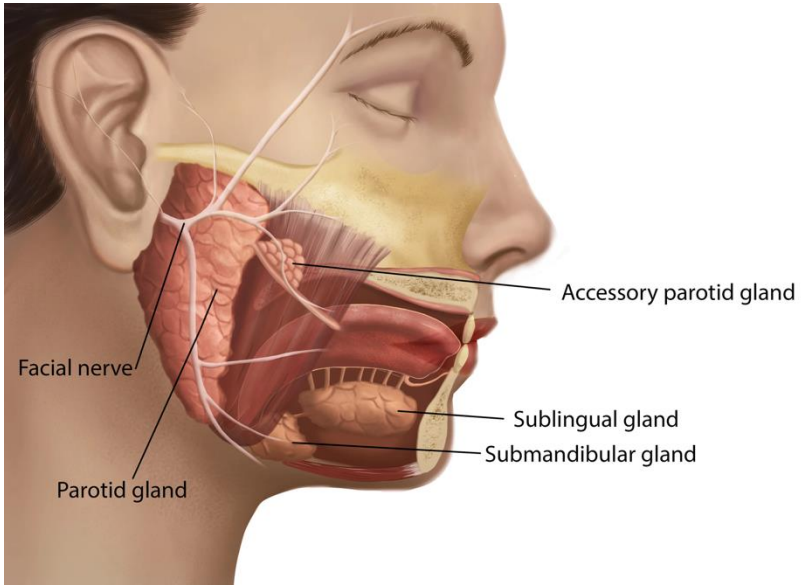
- **Sensory Innervation**
- Provided by the auriculotemporal nerve (a branch of the mandibular division of the trigeminal nerve, CN V3).
- Carries sensory fibers and also the postganglionic parasympathetic fibers from the otic ganglion.

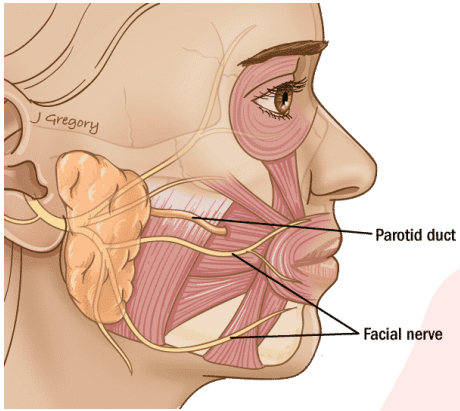


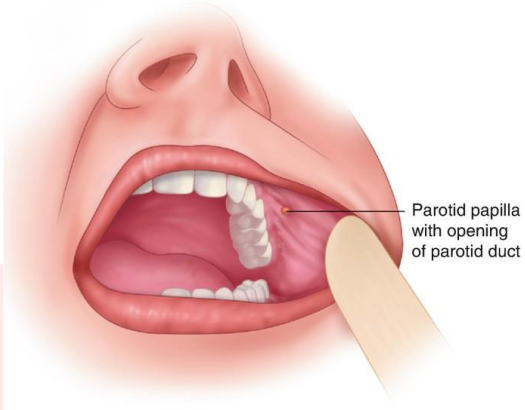


Parotid Duct (Stensen's Duct)

- Emerges from anterior border of the gland
- Passes over masseter muscle, pierces buccinator muscle
- Opens into oral vestibule opposite upper second molar
- ~4 cm long, located 1 finger breadth below the zygomatic arch





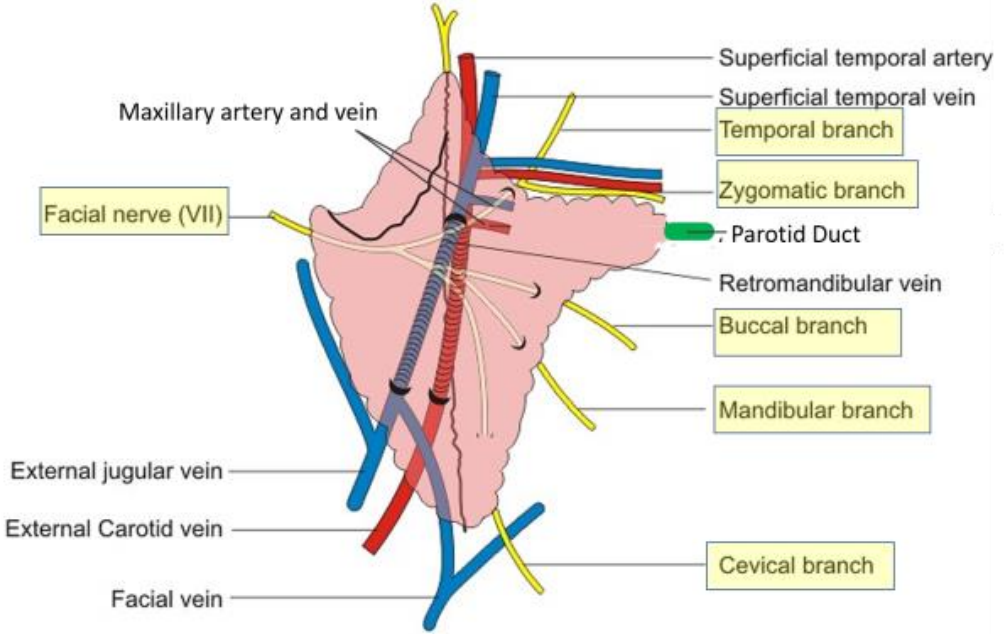


Structures Passing Through the Gland (Superficial to Deep)

- **Facial nerve (CN VII) and its 5 terminal branches:**
- Temporal (to orbicularis oculi)
- Zygomatic
- Buccal
- Mandibular
- Cervical (to platysma)

- **Retromandibular vein**
- Formed from the superficial temporal + maxillary veins

- **External carotid artery**
- Gives terminal branches: superficial temporal and maxillary artery

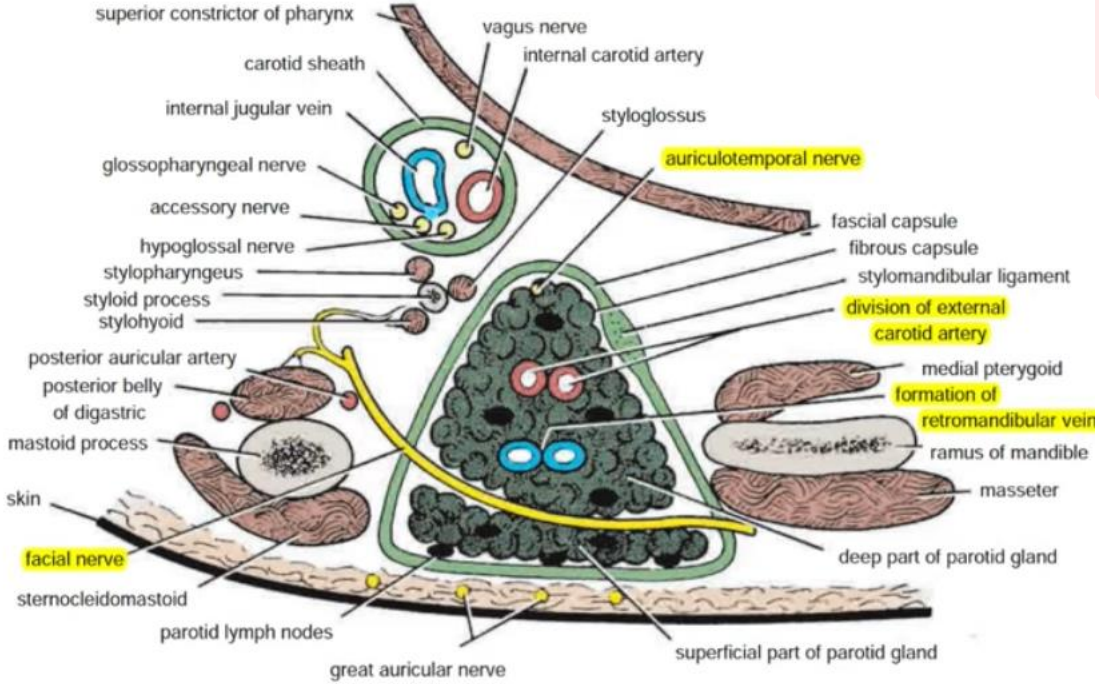


Deep

- Auriculotemporal nerve
- External carotid artery
- Retromandibular vein

Superficial

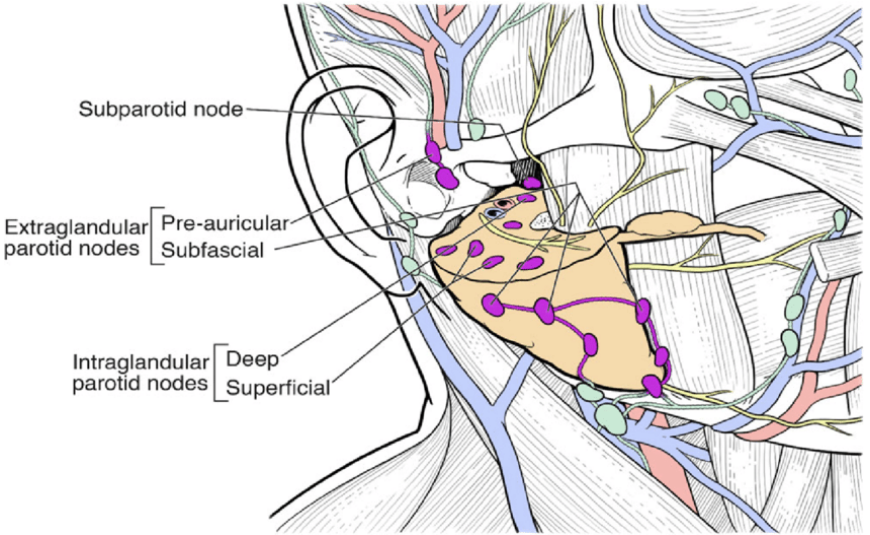
- Facial nerve



Lymphatics & Clinical Relevance

- Contains parotid lymph nodes (intraglandular)
- Mumps virus infects this gland — painful due to tight capsule
- Tight capsule → swelling = severe pain

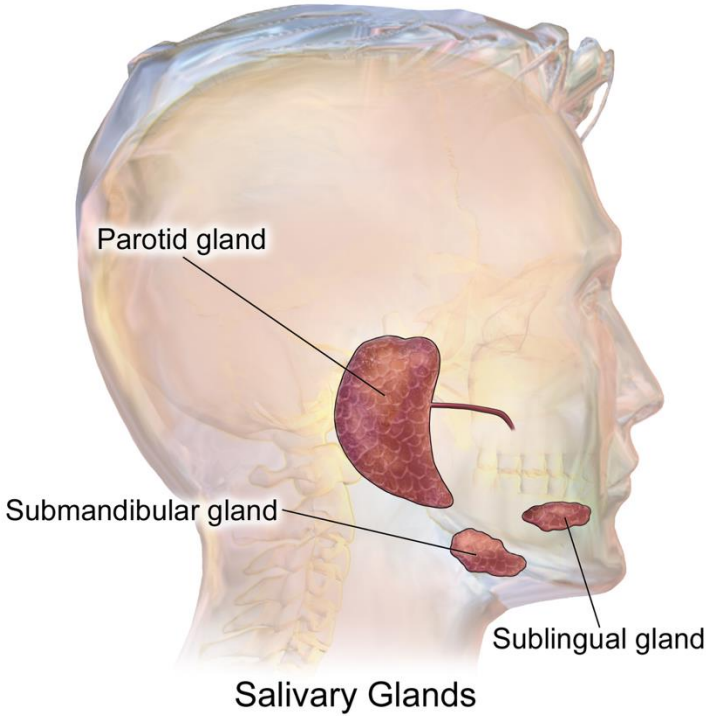
- Surgical concern: Facial nerve is the first structure encountered, thus facial expression muscles are checked postoperatively



Sublingual

- Has 8–20 minor ducts (ducts of Rivinus), which: - Open directly into the oral cavity on the sublingual fold - Or drain into the submandibular duct

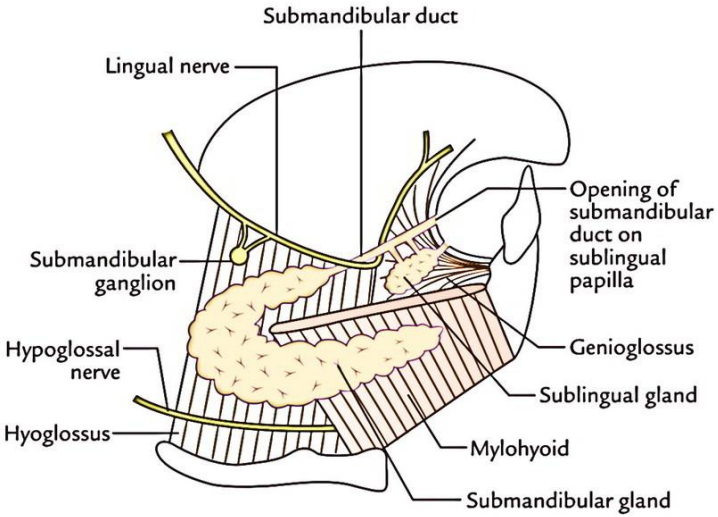
- Lies under the mucous membrane of the floor of the mouth - Close to the frenulum of the tongue - Lies medial to the mandible, superior to the mylohyoid, and lateral to the genioglossus muscle

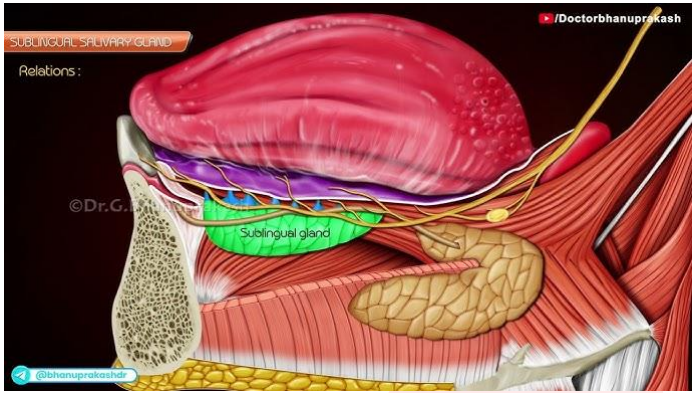


Salivary Glands

Relations

- Medial: lingual nerve , submandibular duct, genioglossus
- Lateral: mandible
- Superior: mucosa of the floor of mouth





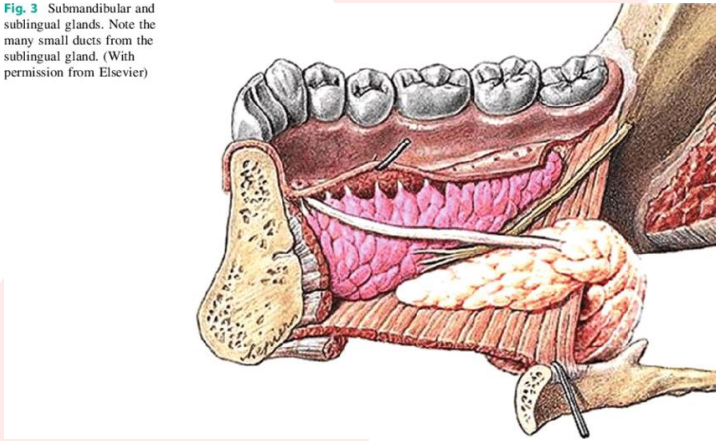


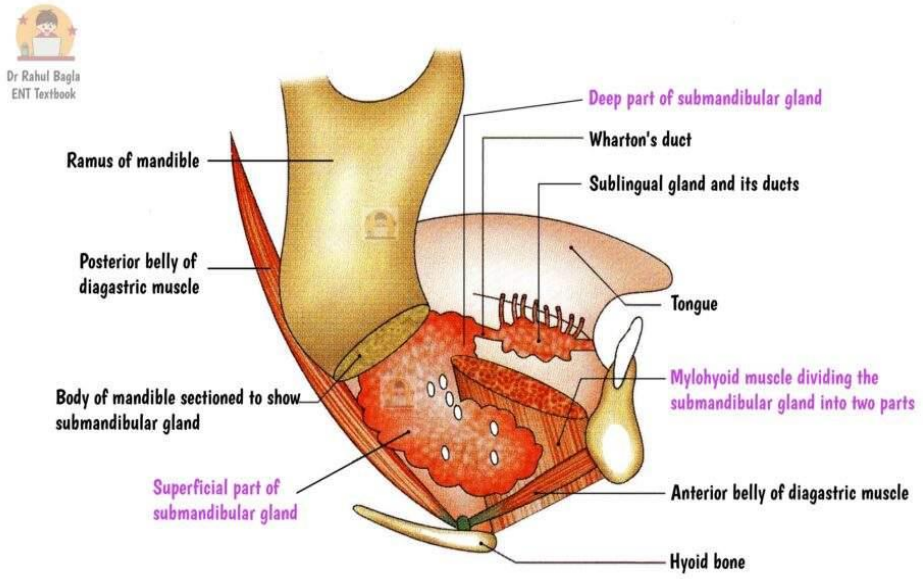
Fig. 3 Submandibular and sublingual glands. Note the many small ducts from the sublingual gland. (With permission from Elsevier)

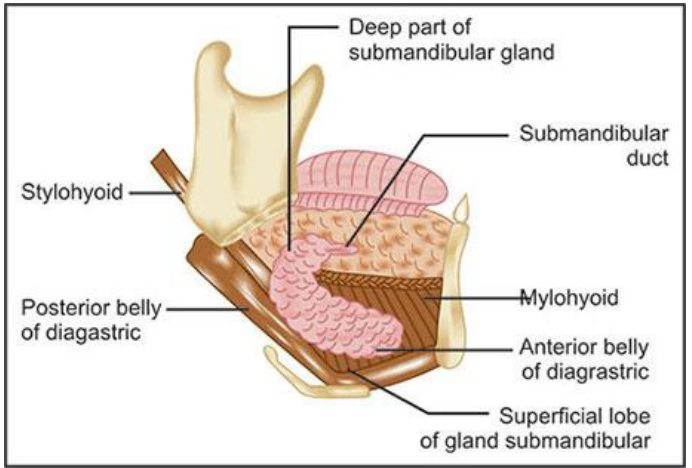
Submandibular

- Divided into:
- - Superficial part (larger): lies below the mylohyoid in the submandibular triangle
- - Deep part: loops around the posterior edge of mylohyoid and lies in the floor of the mouth

Lies beneath the lower border of the mandible

Located in the digastric triangle, between:
Anterior and posterior bellies of digastric

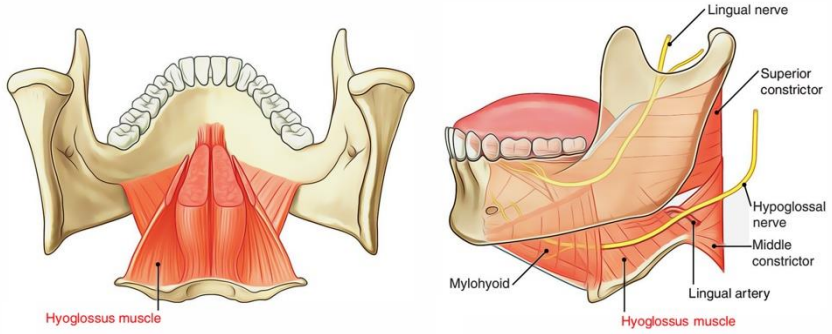


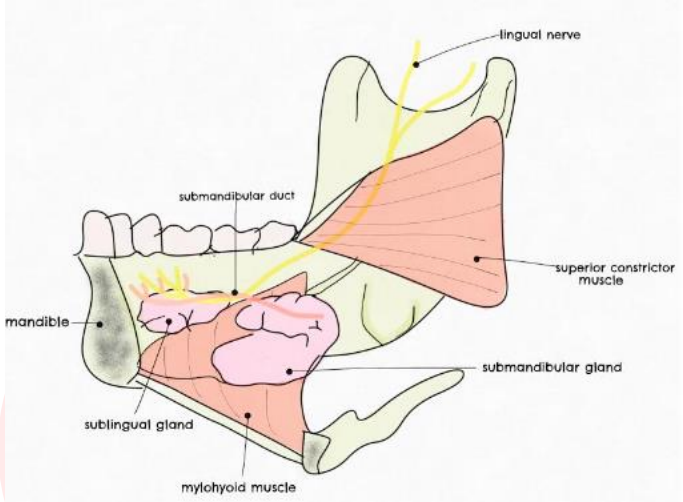


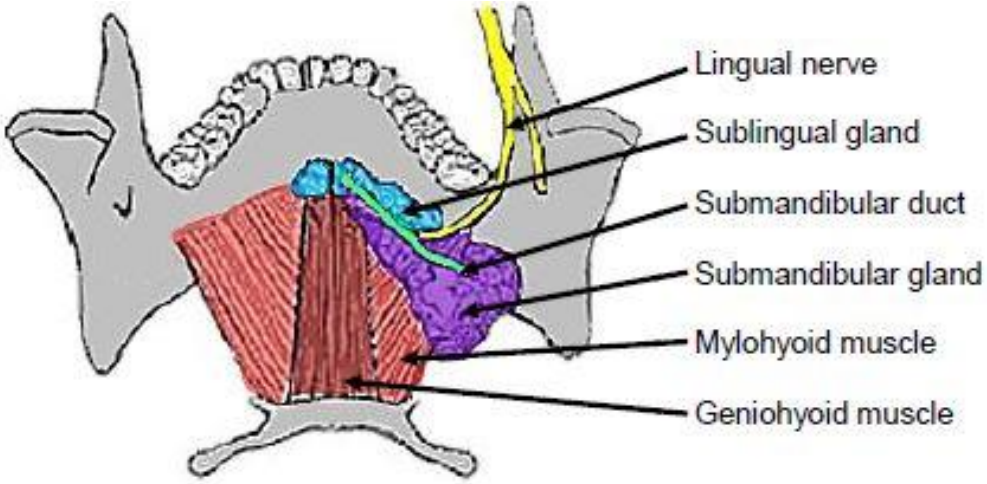
Structures Between Hyoglossus and Mylohyoid Muscles

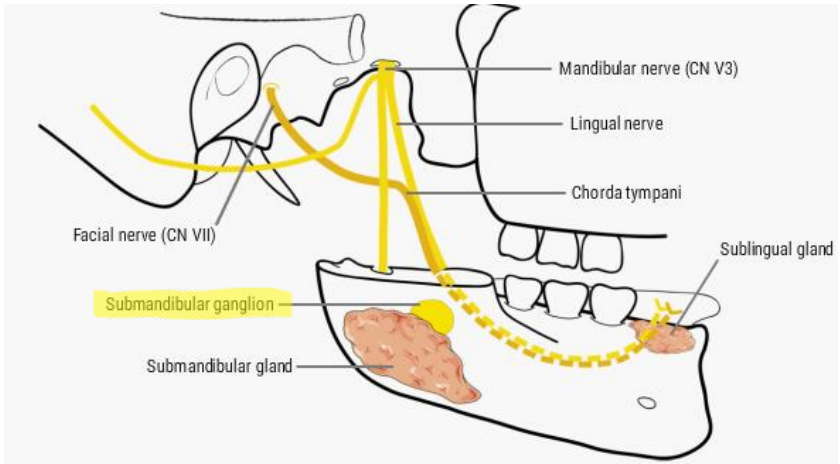
- "There are 5 structures between mylohyoid and hyoglossus muscle: • 3 submandibular (deep part, ganglion, duct) • 2 nerves (lingual & hypoglossal)"

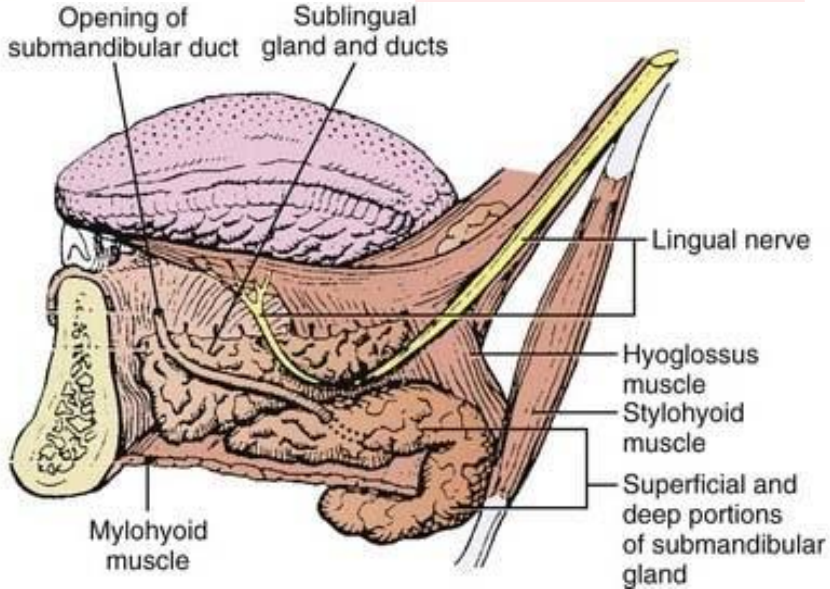
- **Deep part of the submandibular gland**
- **Submandibular ganglion**
- **Submandibular duct**
- **Lingual nerve**
- **Hypoglossal nerve**
-





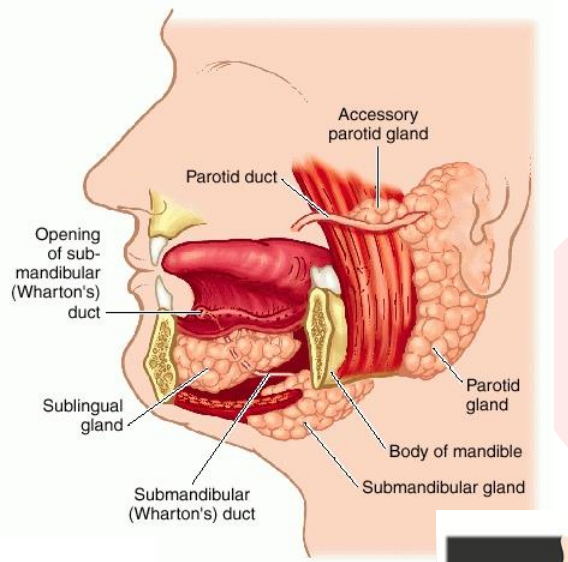

Lingual nerve
Sublingual gland
Submandibular duct
Submandibular gland
Mylohyoid muscle
Geniohyoid muscle

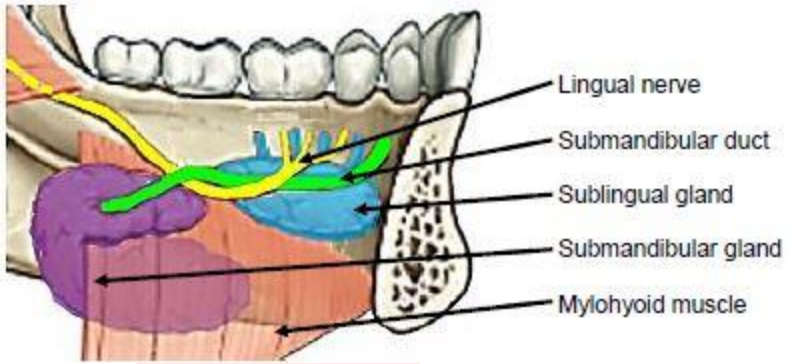

Mandibular nerve (CN V3)
Lingual nerve
Chorda tympani
Facial nerve (CN VII)
Sublingual gland
Submandibular ganglion
Submandibular gland

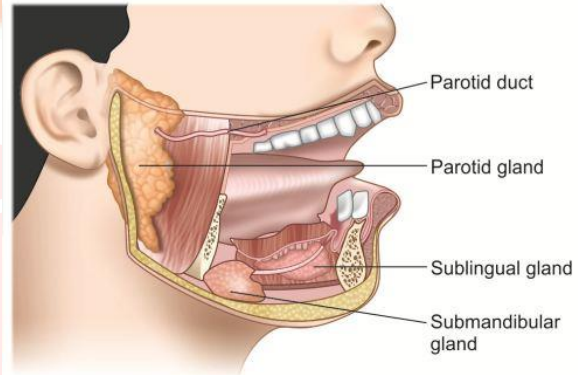

Opening of submandibular duct
Sublingual gland and ducts
Lingual nerve
Hyoglossus muscle
Stylohyoid muscle
Superficial and deep portions of submandibular gland
Mylohyoid muscle

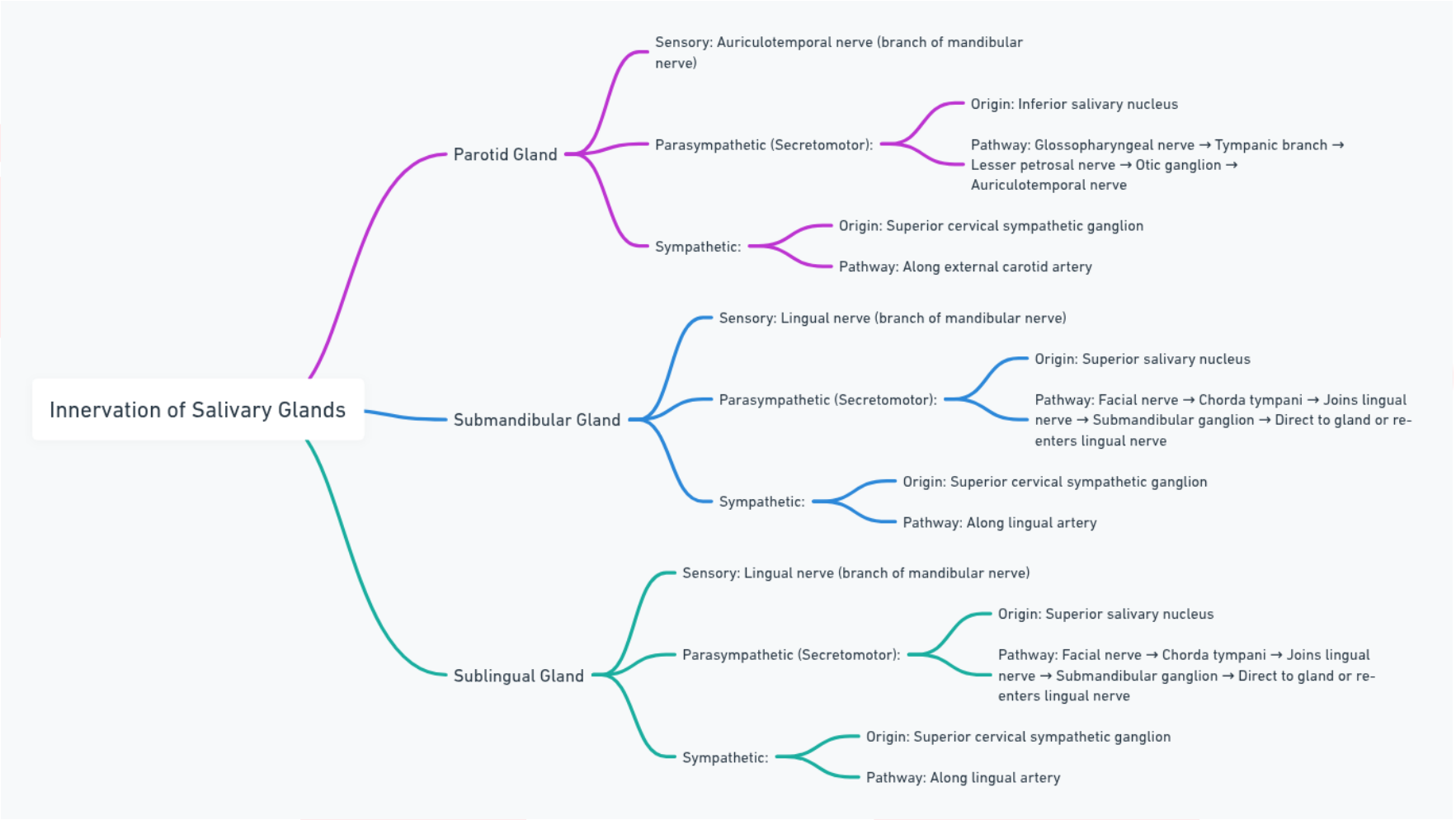
Submandibular Duct (Wharton's duct)

- Arises from the deep part of the gland
- Runs forward under the mucosa of the mouth floor
- Opens on a small papilla beside the frenulum of the tongue
- Related closely to lingual nerve, which:
- Loops lateral → under → medial to the duct



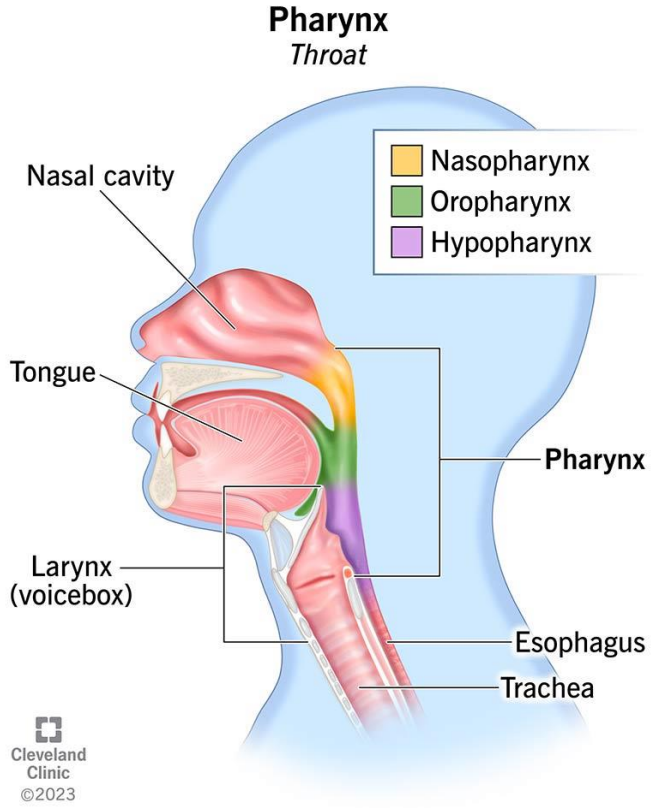





Innervation of Salivary Glands
Parotid Gland
Sensory: Auriculotemporal nerve (branch of mandibular nerve)
Parasympathetic (Secretomotor):
Origin: Inferior salivary nucleus
Pathway: Glossopharyngeal nerve → Tympanic branch → Lesser petrosal nerve → Otic ganglion → Auriculotemporal nerve
Sympathetic:
Origin: Superior cervical sympathetic ganglion
Pathway: Along external carotid artery
Submandibular Gland
Sensory: Lingual nerve (branch of mandibular nerve)
Parasympathetic (Secretomotor):
Origin: Superior salivary nucleus
Pathway: Facial nerve → Chorda tympani → Joins lingual nerve → Submandibular ganglion → Direct to gland or re-enters lingual nerve
Sympathetic:
Origin: Superior cervical sympathetic ganglion
Pathway: Along lingual artery
Sublingual Gland
Sensory: Lingual nerve (branch of mandibular nerve)
Parasympathetic (Secretomotor):
Origin: Superior salivary nucleus
Pathway: Facial nerve → Chorda tympani → Joins lingual nerve → Submandibular ganglion → Direct to gland or re-enters lingual nerve
Sympathetic:
Origin: Superior cervical sympathetic ganglion
Pathway: Along lingual artery

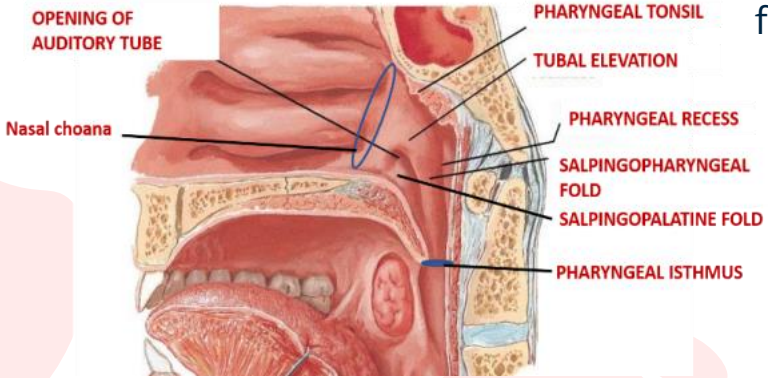
Pharynx

- A musculomembranous tube that connects the nasal and oral cavities to the larynx and esophagus.
- From base of the skull to the level of the 6th cervical vertebra, where it becomes continuous with the esophagus



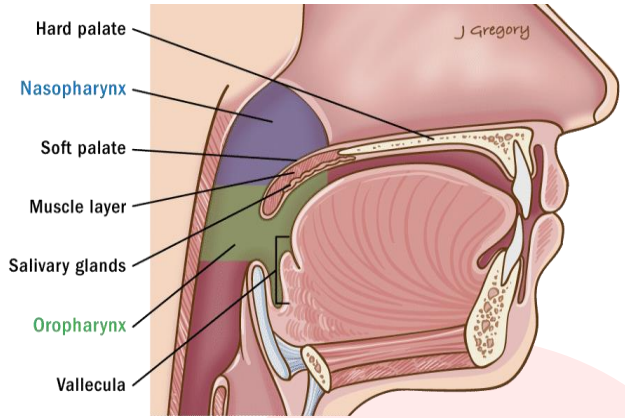
Nasopharynx

- It lies above the soft palate and behind the nasal cavity. It contains pharyngeal tonsils and salpinopharyngeal fold



Oropharynx

- It lies behind the oral cavity. The floor is formed by the posterior 1/3 of the tongue and the interval between the tongue and the epiglottis. It contains vallecula & medial and lateral glossoepiglottic folds

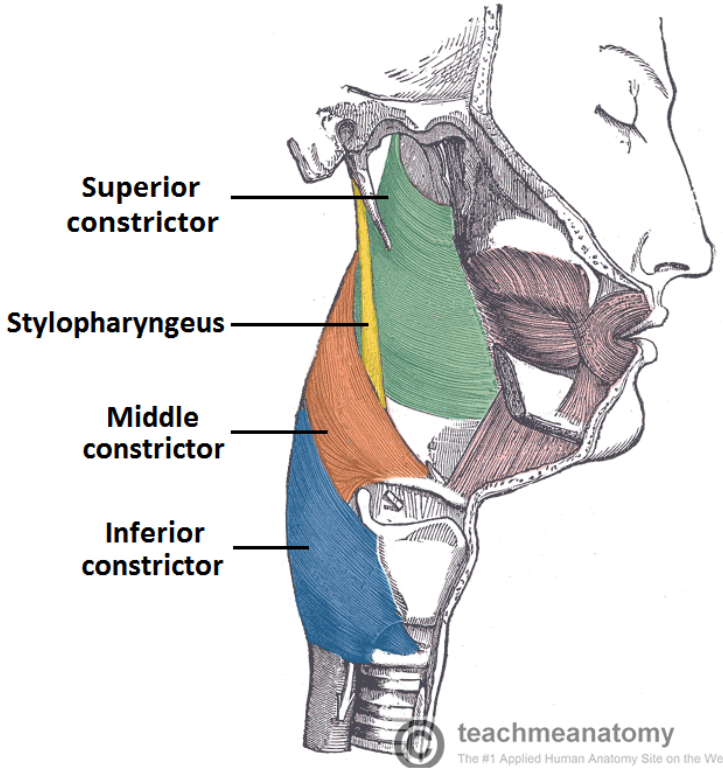


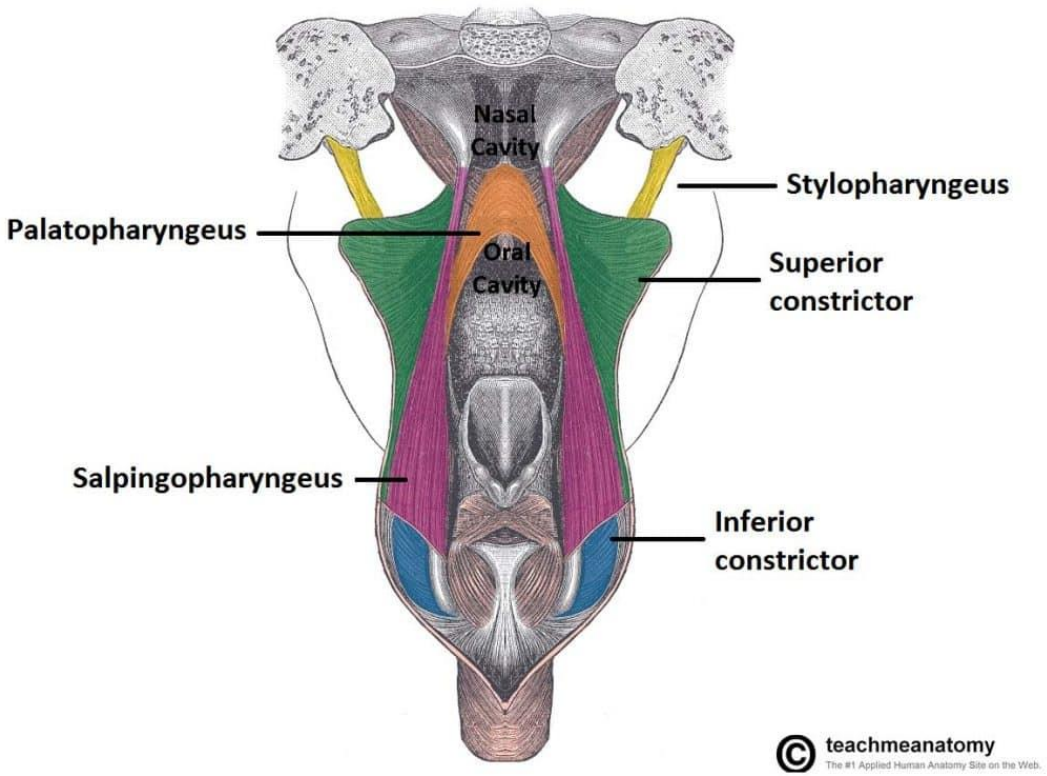
Laryngopharynx

- It lies behind the opening of the larynx. It contains piriform fossa

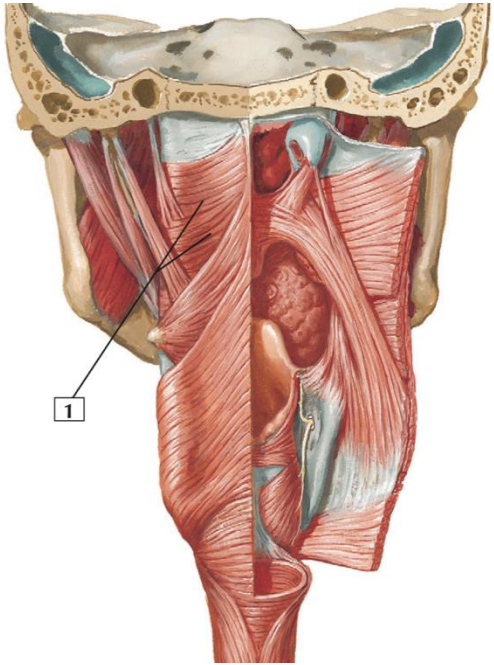
TABLE 11.10 Muscles of the Pharynx

Muscle	Origin	Insertion	Nerve Supply	Action
Superior constrictor	Medial pterygoid plate, pterygoid hamulus, pterygomandibular ligament, mylohyoid line of mandible	Pharyngeal tubercle of occipital bone, raphe in midline posteriorly	Pharyngeal plexus	Aids soft palate in closing off nasal pharynx, propels bolus downward
Middle constrictor	Lower part of stylohyoid ligament, lesser and greater cornu of hyoid bone	Pharyngeal raphe	Pharyngeal plexus	Propels bolus downward
Inferior constrictor	Lamina of thyroid cartilage, cricoid cartilage	Pharyngeal raphe	Pharyngeal plexus	Propels bolus downward
Cricopharyngeus	Lowest fibers of inferior constrictor muscle			Sphincter at lower end of pharynx
Stylopharyngeus	Styloid process of temporal bone	Posterior border of thyroid cartilage	Glossopharyngeal nerve	Elevates larynx during swallowing
Salpingopharyngeus	Auditory tube	Blends with palatopharyngeus	Pharyngeal plexus	Elevates pharynx
Palatopharyngeus	Palatine aponeurosis	Posterior border of thyroid cartilage	Pharyngeal plexus	Elevates wall of pharynx, pulls palatopharyngeal arch medially

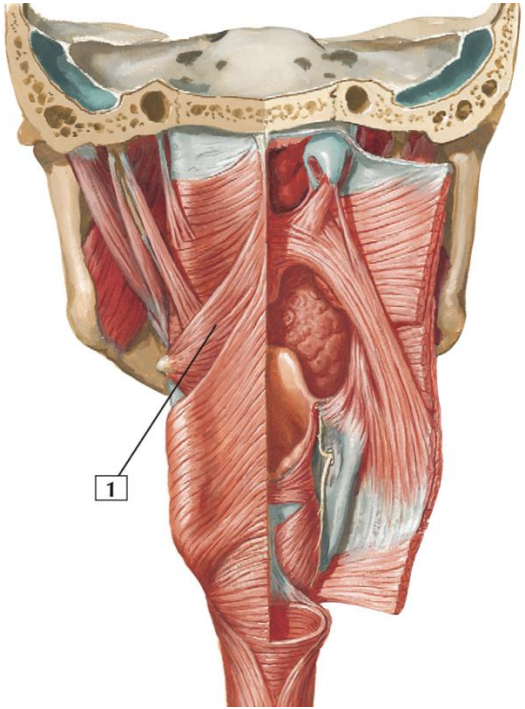




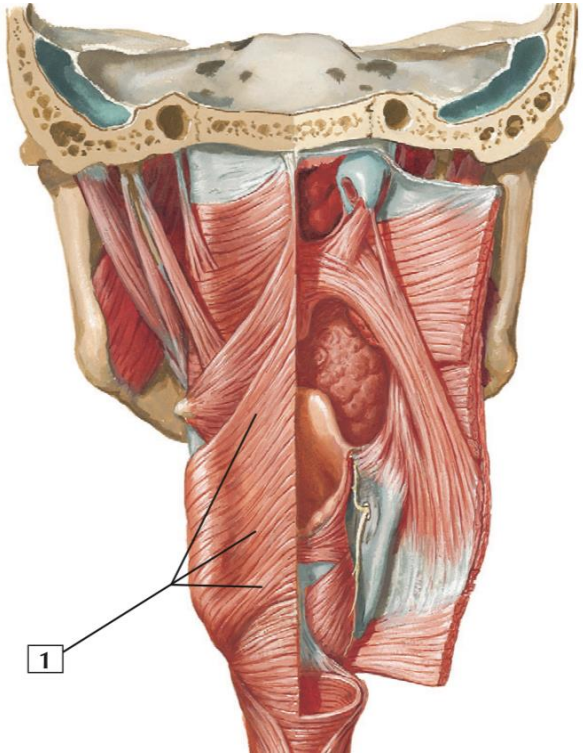
- ⚠ Cricopharyngeus (lower part of inferior constrictor) acts as a sphincter, normally closed, opens when food bolus arrives.



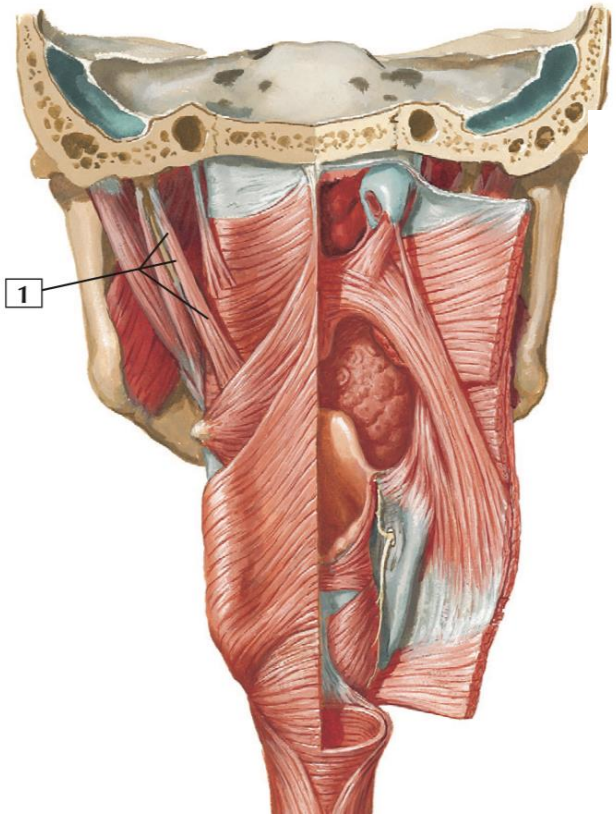
- Superior pharyngeal constrictor muscle

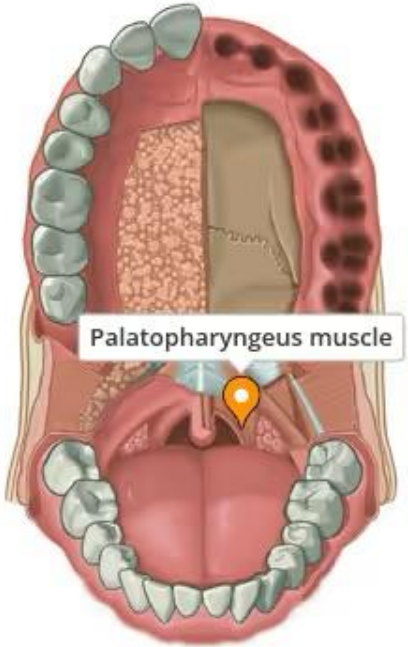


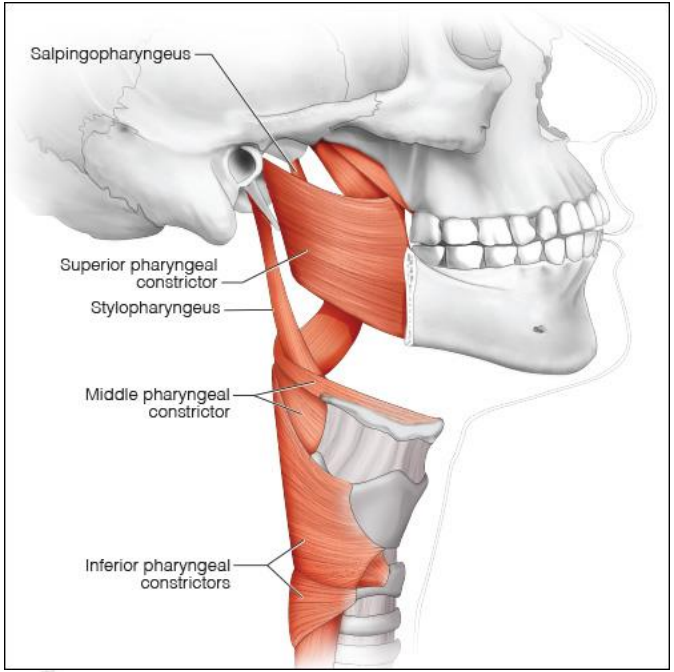
- Middle pharyngeal constrictor muscle



- Inferior pharyngeal constrictor muscle

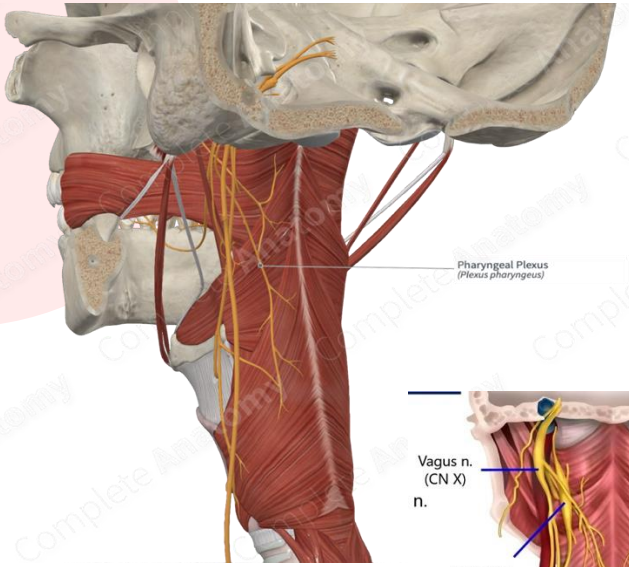


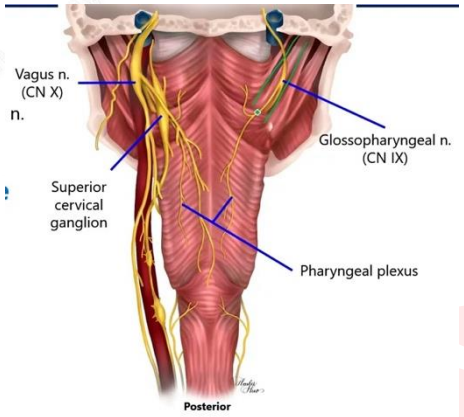




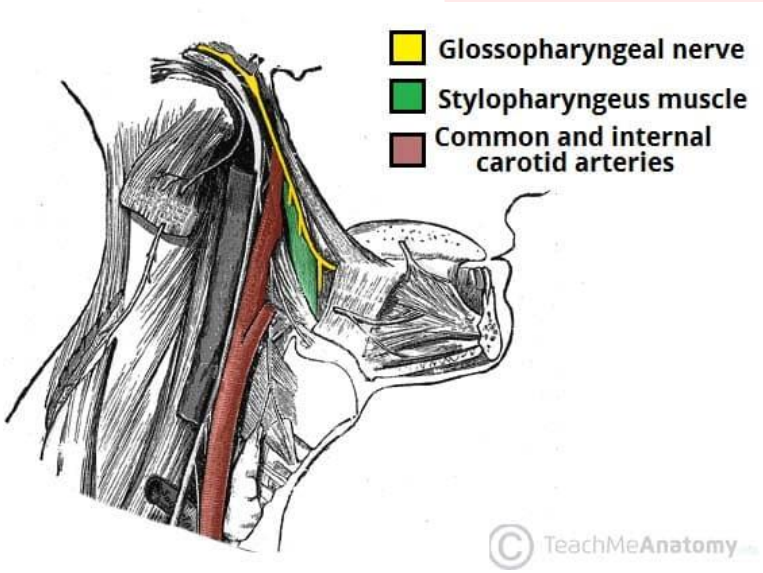
- Stylopharyngeus muscle

Pharyngeal plexus



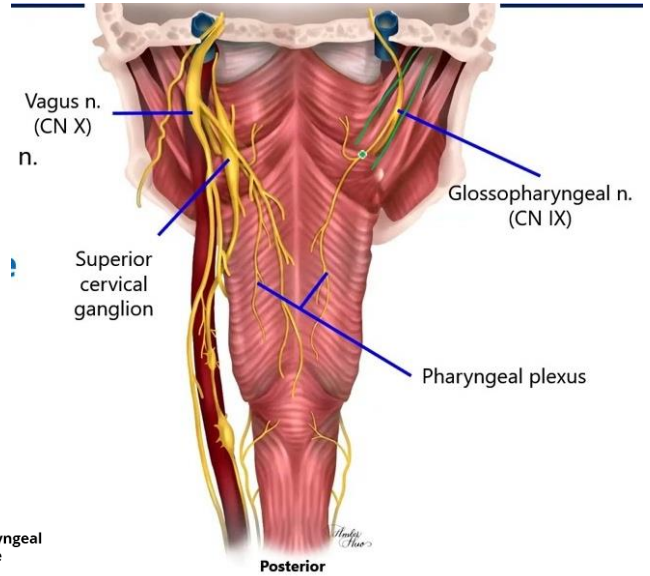


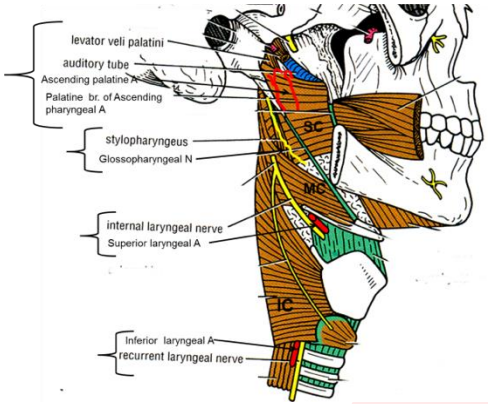
Glossopharyngeal nerve

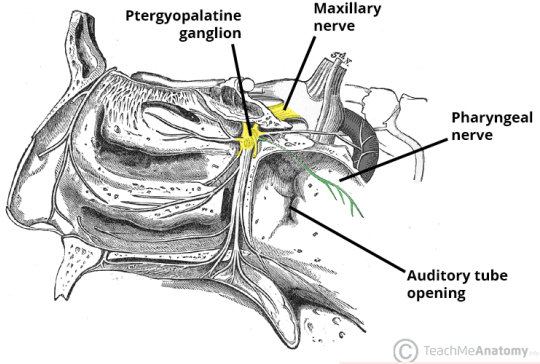


Innervation of pharyngeal mucosa

- Nasopharynx : Maxillary nerve (CN V2)
- Oropharynx : Glossopharyngeal nerve (CN IX)
- Laryngopharynx : Internal laryngeal branch of vagus (CN X)
- **Internal laryngeal nerve enters between middle and inferior constrictors**

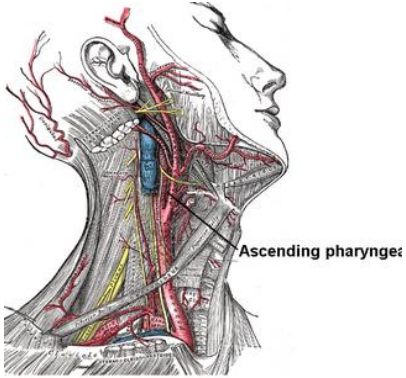


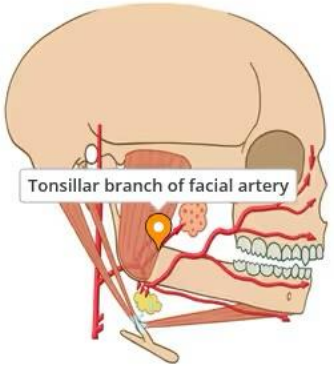


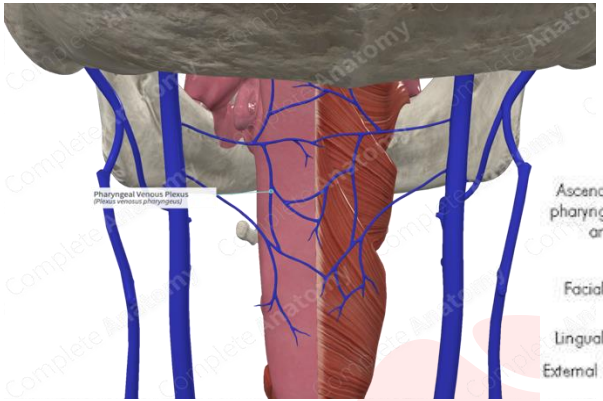


Blood Supply

- **Arteries:**
- Ascending pharyngeal (from external carotid)
- Tonsillar branch of facial artery
- Branches from maxillary and lingual arteries
- **Veins:**
- Drain into pharyngeal venous plexus
- Then into facial vein, internal jugular, or pharyngeal vein







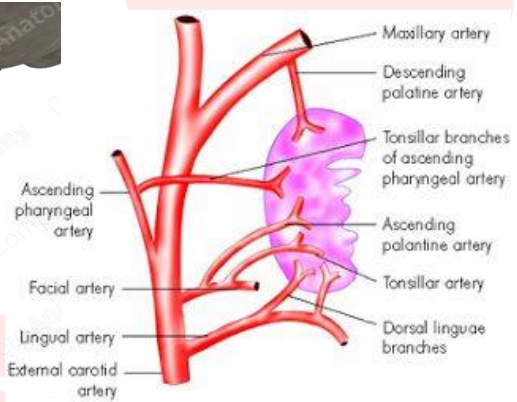
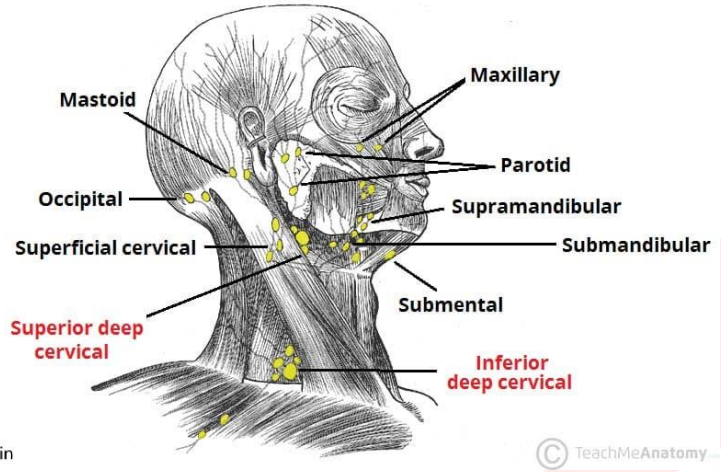
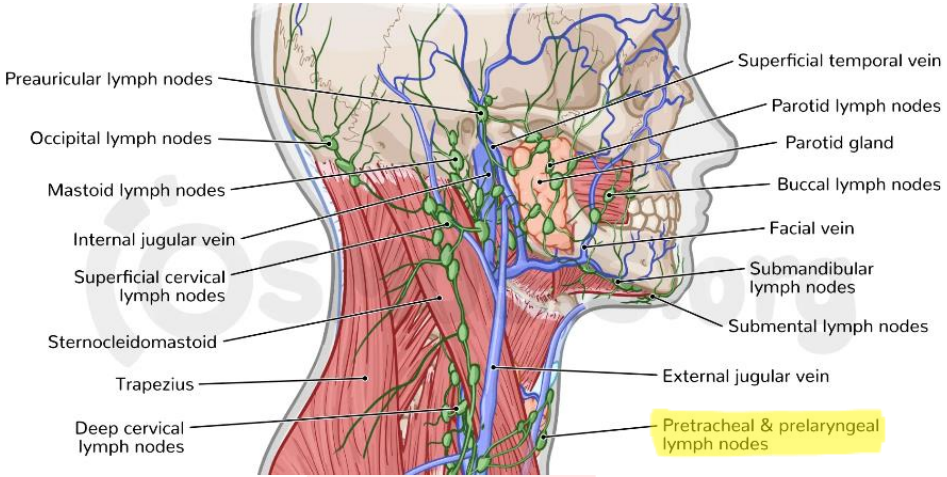


Fig. 50.3 Arterial supply of tonsil.

Lymph Drainage:

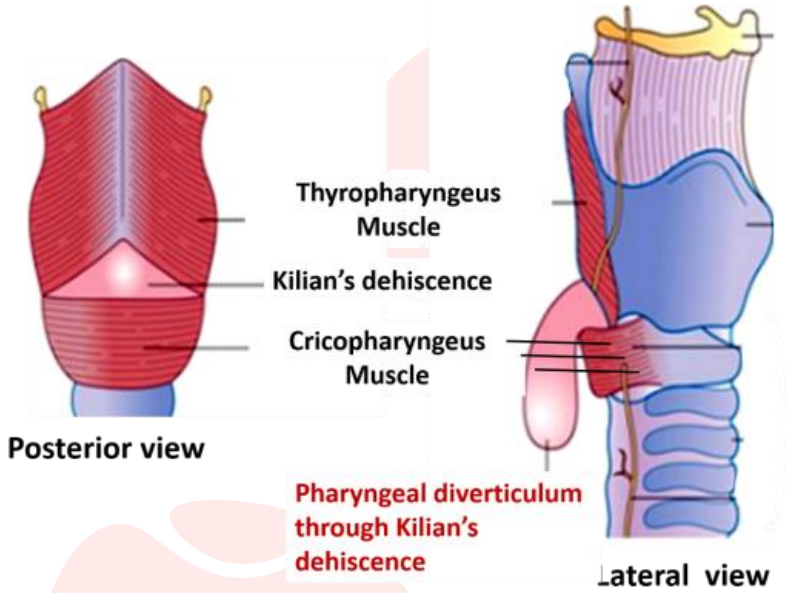
- Mostly into deep cervical lymph nodes
- Can also drain via retropharyngeal or paratracheal nodes





Killian's Dehiscence

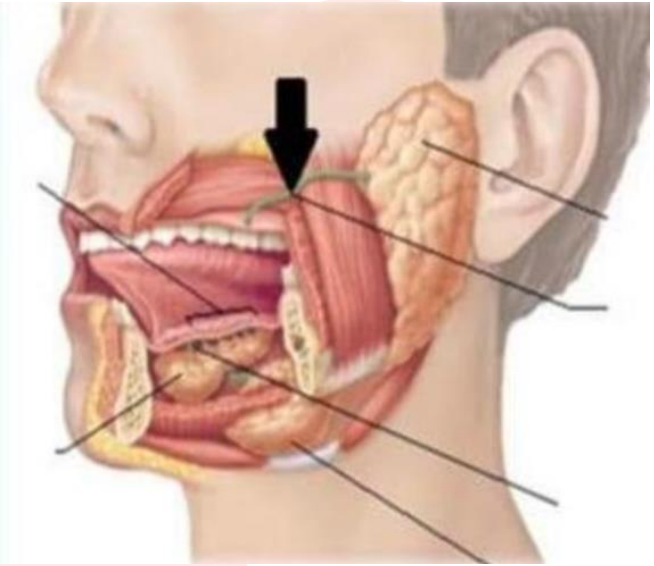
- A weak area between the upper and lower parts of the inferior constrictor
- Common site for pharyngeal pouch (Zenker's diverticulum)



Past Questions

Q1. The pointed structure piercing which one of the following muscles:

A) Lateral pterygoid.
B) Buccinator.
C) Myelohyoid.
D) Medial pterygoid.
E) Masseter.



Ans :B

Q2. The nerve supply of the pointed structure is :

A. Lesser palatine.
B. Greater palatine.
C. Autonomic.
D. Short sphenopalatine.
E. Long sphenopalatine.

Ans :A

Q3. Identify the pointed structure:

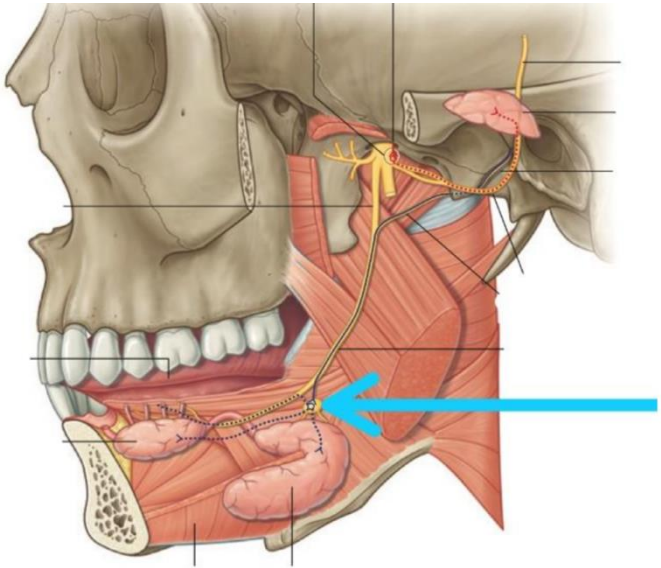
A. Otic ganglia.

B. Submandibular ganglia.

C. Pterygopalatine ganglion.

D. Sublingual ganglia.

E. Ciliary ganglion.



Ans :B

Q4. Which of the following muscles is not inserted on the highlighted bone?

A. Genioglossus
B. Temporalis
C. Medial pterygoid
D. Lateral pterygoid
E. Masseter

Ans :A

بردًا وسلامًا على أهل غزة، اللّٰهُمَّ أربط على قلوبهم
وآمن روعاتهم، اللّٰهُمَّ الطف بهم وخفف عنهم،
وارحم موتاهم واشفِ جرحاهم، اللّٰهُمَّ انصر
إخواننا في فلسطين، وثبت اقدامهم وسدد رميهم
ووحِّد صفوفهم وأكتب لهم نصرًا مؤزراً يا رحيم