

**MATRIC NO.: 17/MHS01/302**

**ASSIGNMENT TITLE: NOSE AND ORAL CAVITY**

**COURSE TITLE: GROSS ANATOMY OF THE HEAD AND NECK**

**DATE: 26<sup>TH</sup> APRIL 2020**

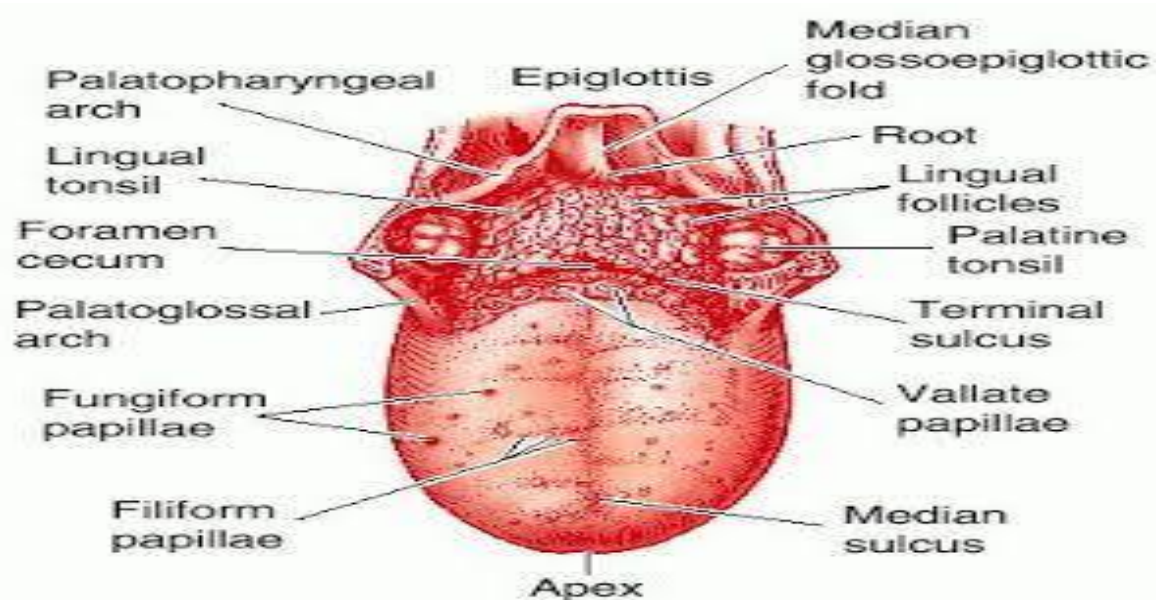
### **QUESTION 1**

Discuss the anatomy of the tongue, and comment on its applied anatomy

### **ANSWER**

#### **TONGUE:**

The tongue is a mobile muscular organ covered with mucous membrane. It can assume a variety of shapes and positions. It is partly in the oral cavity and partly in the oropharynx. The tongue's main functions are articulation (forming words during speaking) and squeezing food into the oropharynx as part of deglutition (swallowing). The tongue is also involved with mastication, taste, and oral cleansing. It has importance in the digestive system and is the primary organ of taste in the gustatory system. The human tongue is divided into two parts; an oral part at the front and a pharyngeal part at the back. The left and right sides of the tongue are separated by a fibrous tissue called the **lingual septum** that results in a groove, the median sulcus on the tongue's surface.



## PARTS OF THE TONGUE

The tongue has a root, body, and apex. The root of the tongue is the attached posterior portion, extending between the mandible, hyoid, and the nearly vertical posterior surface of the tongue. The body of the tongue is the anterior, approximately two thirds of the tongue between root and apex. The apex (tip) of the tongue is the anterior end of the body, which rests against the incisor teeth. The body and apex of the tongue are extremely mobile. A midline groove divides the anterior part of the tongue into right and left parts. The mucosa of the anterior part of the tongue is relatively thin and closely attached to the underlying muscle. It has a rough texture because of numerous small **lingual papillae**.

- **Vallate papillae:** large and flat topped, lie directly anterior to the terminal sulcus and are arranged in a V-shaped row. They are surrounded by deep circular trenches, the walls of which are studded with taste buds. The ducts of the serous glands of the tongue open into the trenches.

- **Foliate papillae:** small lateral folds of the lingual mucosa. They are poorly developed in humans

- **Filiform papillae:** long and numerous, contain afferent nerve endings that are sensitive to touch. These scaly, conical projections are pinkish gray and are arranged in V-shaped rows that are parallel to the terminal sulcus, except at the apex, where they tend to be arranged transversely.

- **Fungiform papillae:** mushroom shaped pink or red spots scattered among the filiform papillae but most numerous at the apex and margins of the tongue.

The Vallate, foliate, and most of the fungiform papillae contain taste receptors in the taste buds. The mucosa of the posterior part of the tongue is thick and freely movable. It has no lingual papillae, but the underlying lymphoid nodules give this part of the tongue an irregular, cobblestone appearance. The lymphoid nodules are known collectively as the lingual tonsil. The pharyngeal part of the tongue constitutes the anterior wall of the oropharynx and can be inspected only with a mirror or downward pressure on the tongue with a tongue depressor.

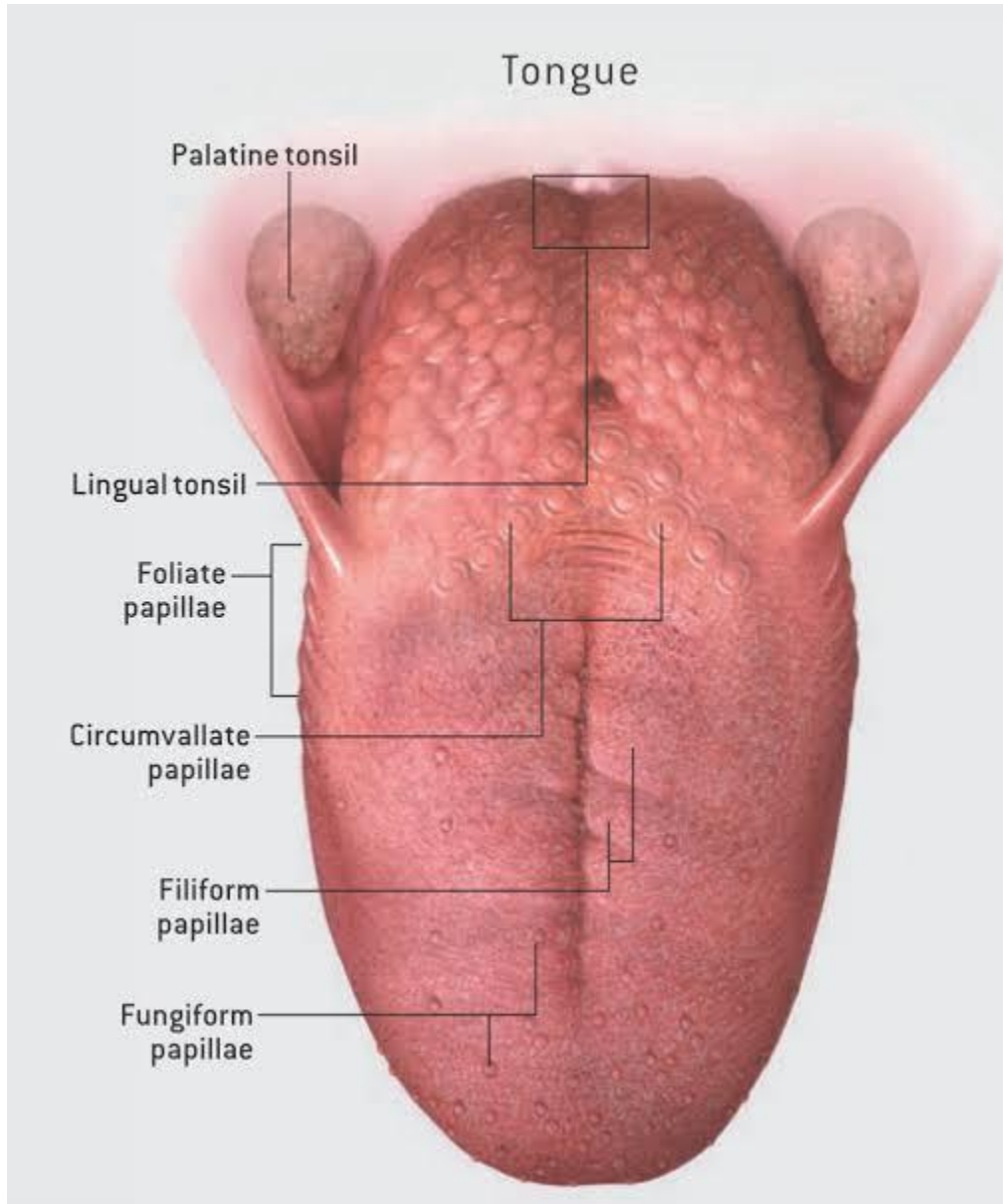
## SURFACES OF THE TONGUE

The tongue has two surfaces. They include:

1. **SUPERIOR AND POSTERIOR SURFACE:** The more extensive, superior and posterior surface is the dorsum of the tongue (commonly referred to as the “top” of the tongue). The inferior surface of the tongue (commonly referred to as its “underside”) usually rests against the floor of the mouth. The margin of the tongue separating the two surfaces is related on each side to the lingual gingivae and lateral teeth. The dorsum of the tongue is characterized by a V-shaped groove, the terminal sulcus of the tongue, the angle which points posteriorly to the foramen cecum. This small pit, frequently absent, is the non-functional remnant of the proximal part of the embryonic thyroglossal duct from which the thyroid gland developed. The terminal sulcus divides the dorsum of the tongue

transversely into a presulcal anterior part in the oral cavity proper and a postsulcal posterior part in the oropharynx.

2. **INFERIOR SURFACE:** The inferior surface of the tongue is covered with a thin, transparent mucous membrane. This surface is connected to the floor of the mouth by a midline fold called the frenulum of the tongue. The frenulum allows the anterior part of the tongue to move freely. On each side of the frenulum, a deep lingual vein is visible through the thin mucous membrane. A sublingual caruncle (papilla) is present on each side of the base of the lingual frenulum that includes the opening of the submandibular duct from the submandibular salivary gland.



## MUSCLES OF THE TONGUE

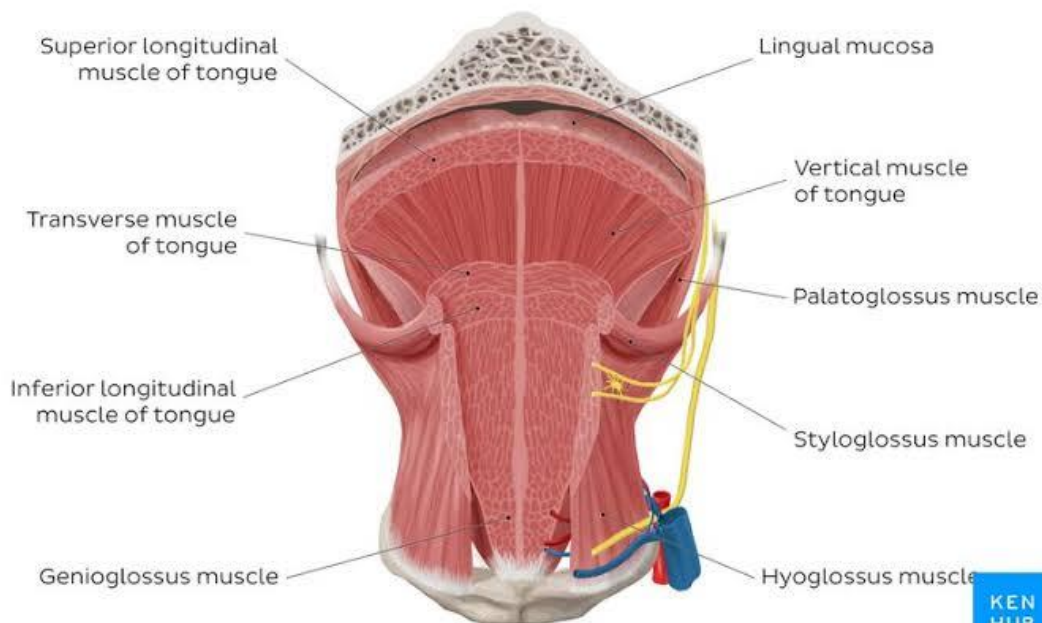
There are two groups of muscles of the tongue. They include:

1. **INTRINSIC MUSCLES:** There are four intrinsic muscles, and what this muscle do, is to alter the shape of the tongue and are not attached to bone they have their attachments entirely within the tongue. The four intrinsic muscles of the tongue include:
  - a) Superior longitudinal muscle
  - b) Inferior longitudinal muscle
  - c) Transverse muscle
  - d) Vertical muscle

The **superior and inferior longitudinal muscles** act together to make the tongue short and thick and to retract the protruded tongue.

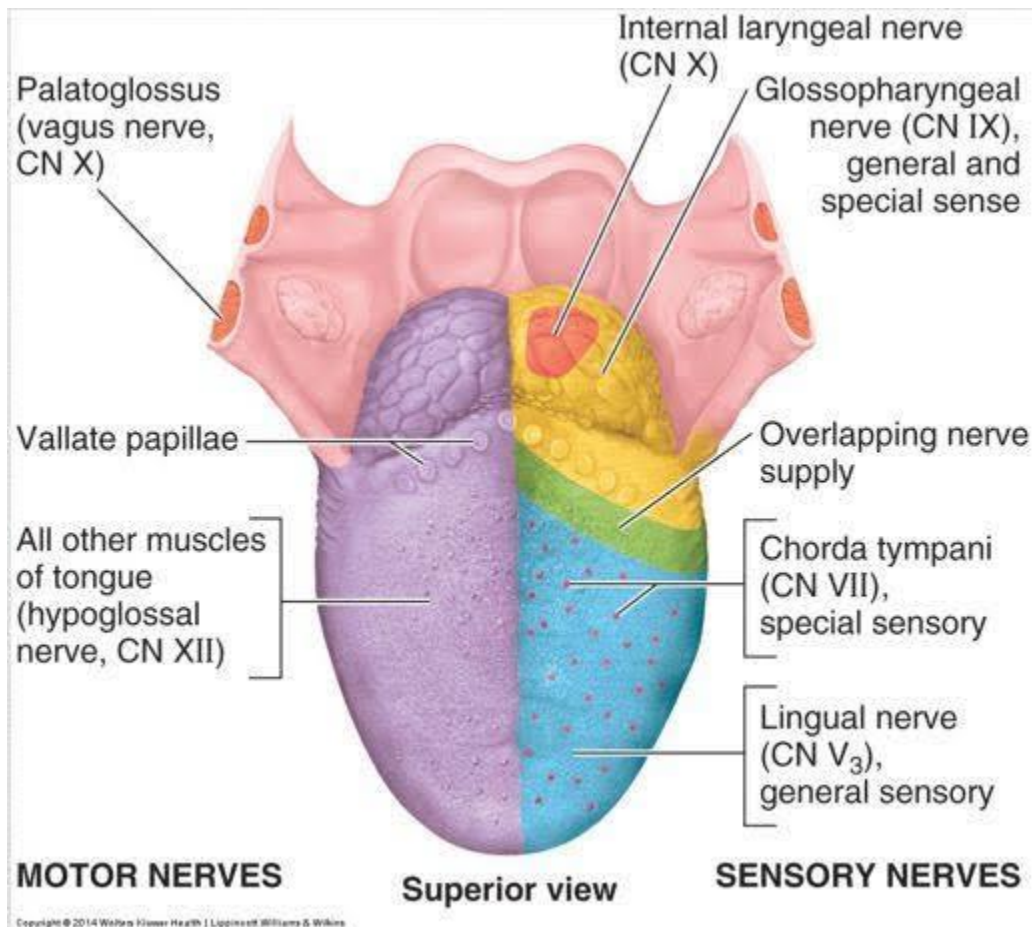
The **transverse and vertical muscles** act simultaneously to make the tongue long and narrow, which may push the tongue against the incisor teeth or protrude the tongue from the open mouth (especially when acting with the posterior inferior part of the genioglossus).

2. **EXTRINSIC MUSCLES:** The four paired extrinsic muscles change the position of the tongue and are anchored to bone, and there mainly move the tongue. The four extrinsic muscles of the tongue include:
  - a) Genioglossus muscle
  - b) Hyoglossus muscle
  - c) Styloglossus muscle
  - d) Palatoglossus muscle



## INNERVATION OF TONGUE

All muscles of the tongue, except the palatoglossus, receive motor innervation from CN XII, the hypoglossal nerve. Palatoglossus is a palatine muscle supplied by the pharyngeal plexus. For general sensation (touch and temperature), the mucosa of the anterior two thirds of the tongue is supplied by the lingual nerve, a branch of CN V<sub>3</sub>. For special sensation (taste), this part of the tongue, except for the vallate papillae, is supplied the chorda tympani nerve, a branch of CN VII. The chorda tympani joins the lingual nerve in the infratemporal fossa and runs anteriorly in its sheath. The mucosa of the posterior third of the tongue and the vallate papillae are supplied by the lingual branch of the glossopharyngeal nerve (CN IX) for both general and special sensation. Twigs of the internal laryngeal nerve, a branch of the vagus nerve (CN X), supply mostly general but some special sensation to a small area of the tongue just anterior to the epiglottis. These mostly sensory nerves also carry parasympathetic secretomotor fibers to serous glands in the tongue.

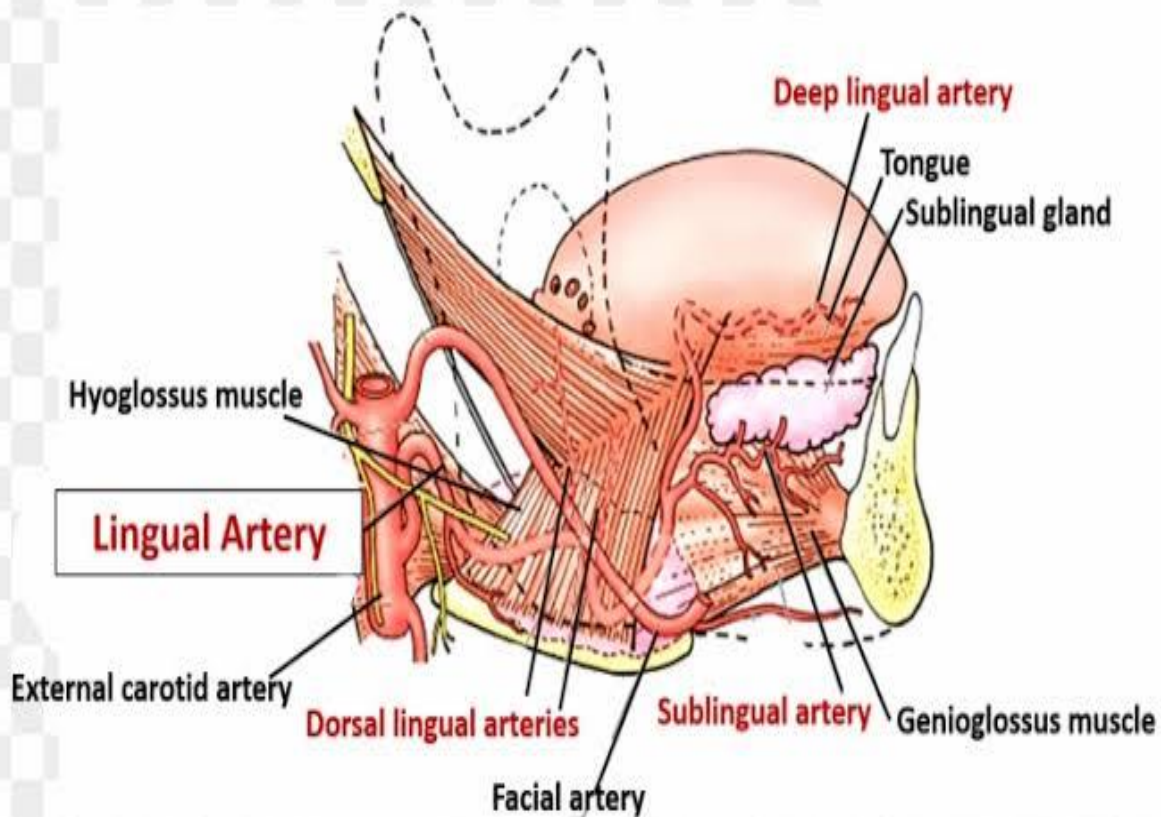


There are four basic taste sensations: **sweet**, **salty**, **sour**, and **bitter**. **Sweetness** is detected at the apex, **saltiness** at the lateral margins, and **sourness and bitterness** at the posterior part of the tongue. All other “tastes” expressed by gourmets are olfactory (smell and aroma).



## ARTERIES OF THE TONGUE

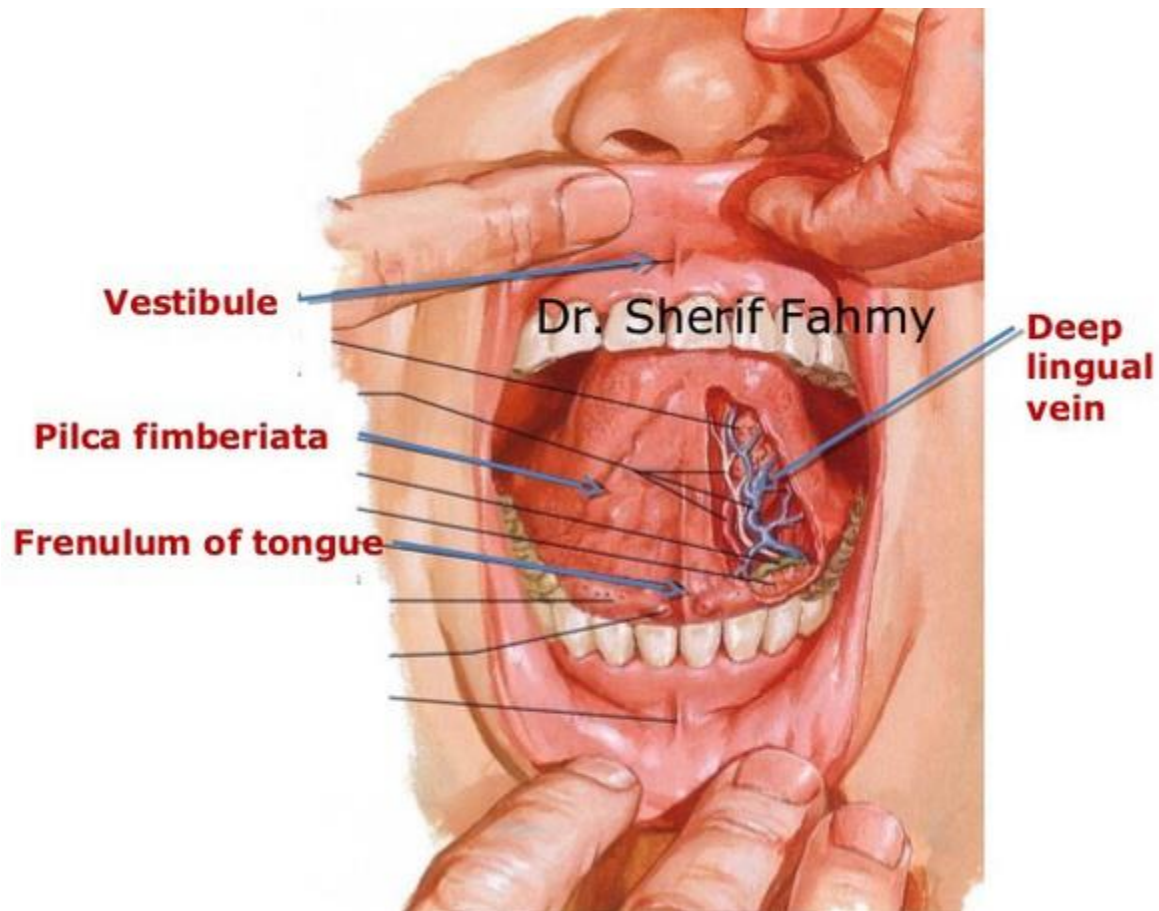
The arteries of the tongue are derived from the **lingual artery**, which arises from the external carotid artery. On entering the tongue, the lingual artery passes deep to the hyoglossus muscle. The **dorsal lingual arteries** supply the root of the tongue; the **deep lingual arteries** supply the lingual body. The deep lingual arteries communicate with each other near the apex of the tongue. The dorsal lingual arteries are prevented from communicating by the lingual septum.



## VEINS OF THE TONGUE

The veins of the tongue are the **dorsal lingual veins**, which accompany the **lingual artery**; the **deep lingual veins**, which begin at the apex of the tongue, run posteriorly beside the lingual frenulum to join the sublingual vein.

The **sublingual veins** in elderly people are often varicose (enlarged and tortuous). Some or all of them may drain into the **internal jugular vein**, or they may do so indirectly, joining first to form a lingual vein that accompanies the initial part of the lingual artery.

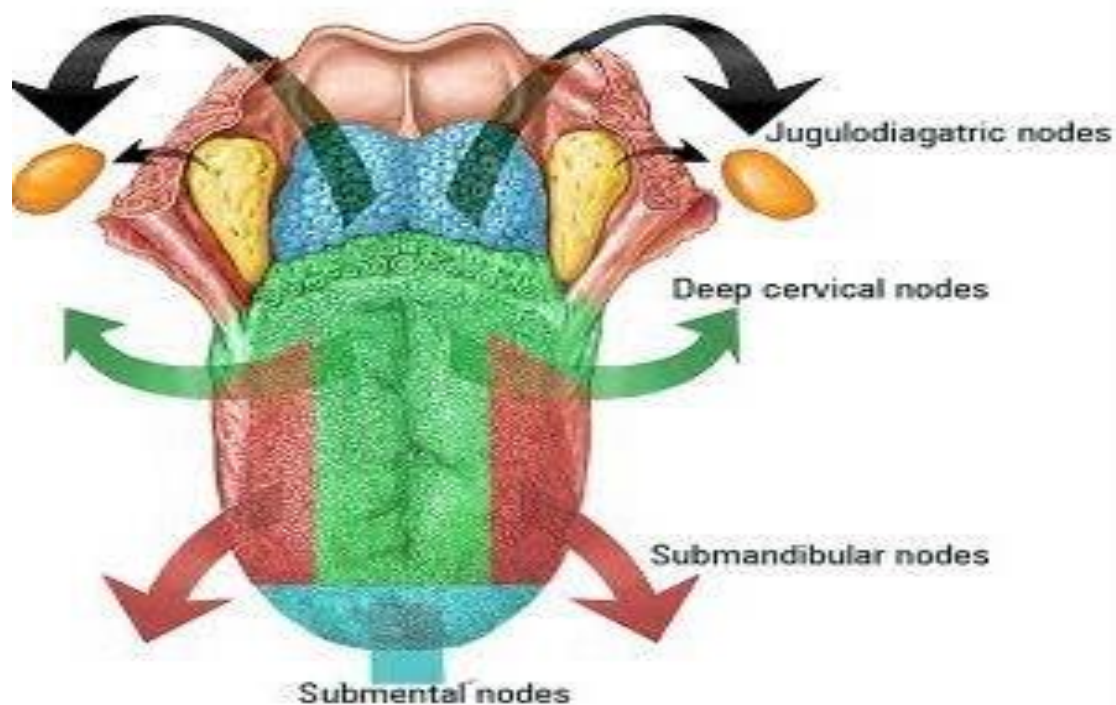


### **LYMPHATIC DRAINAGE OF THE TONGUE**

The lymphatic drainage of the tongue is exceptional. Most of the lymphatic drainage converges toward and follows the venous drainage; however, lymph from the tip of the tongue, frenulum, and central lower lip runs an independent course. Lymph from the tongue takes four routes:

1. Lymph from the root drains bilaterally into the **superior deep cervical lymph nodes**.
2. Lymph from the medial part of the body drains bilaterally and directly to the **inferior deep cervical lymph nodes**.
3. Lymph from the right and left lateral parts of body drains to the **submandibular lymph nodes** on the ipsilateral side.
4. The apex and frenulum drain to the **submental lymph nodes**, the medial portion draining bilaterally.

All lymph from the tongue ultimately drains to the deep cervical nodes, and passes via the jugular venous trunks into the venous system at the right and left venous angles.



## APPLIED ANATOMY

- 1. PARALYSIS OF GENIOGLOSSUS:** When the genioglossus muscle is paralyzed, the tongue has a tendency to fall posteriorly, obstructing the airway and presenting the risk of suffocation. Total relaxation of the genioglossus muscles occurs during general anesthesia; therefore, an airway is inserted in an anesthetized person to prevent the tongue from relapsing.
- 2. INJURY TO HYPOGLOSSAL NERVE:** Trauma, such as a fractured mandible, may injure the hypoglossal nerve (CN XII), resulting in paralysis and eventual atrophy of one side of the tongue. The tongue deviates to the paralyzed side during protrusion because of the action of the unaffected genioglossus muscle on the other side.
- 3. LINGUAL CARCINOMA:** A lingual carcinoma in the posterior part of the tongue metastasizes to the superior deep cervical lymph nodes on both sides, whereas a tumor in the anterior part usually does not metastasize to the inferior deep cervical lymph nodes until late in the disease. Because the nodes are closely related to the internal jugular vein, metastases from the tongue may be distributed through the submental and submandibular regions and along the internal jugular vein in the neck.



4. **FRENECTOMY:** An overly large frenulum of the tongue (tongue-tie) interferes with tongue movements and may affect speech. In unusual cases, a frenectomy (cutting the frenulum) in infants may be necessary to free the tongue for normal movements and speech.

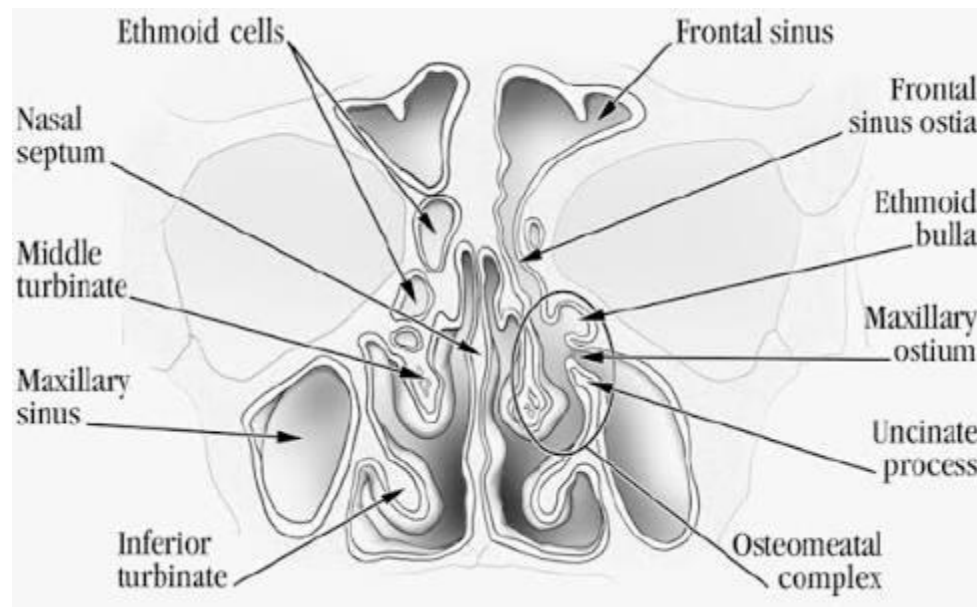
## QUESTION 2

Write an essay on the air sinuses.

## ANSWER

### AIR / PARANASAL SINUSES:

The paranasal sinuses are air-filled extensions of the respiratory part of the nasal cavity into the following cranial bones: frontal, ethmoid, sphenoid, and maxilla. They are named according to the bones in which they are located. The sinuses continue to invade the surrounding bone, and marked extensions are common in the crania of older individuals.



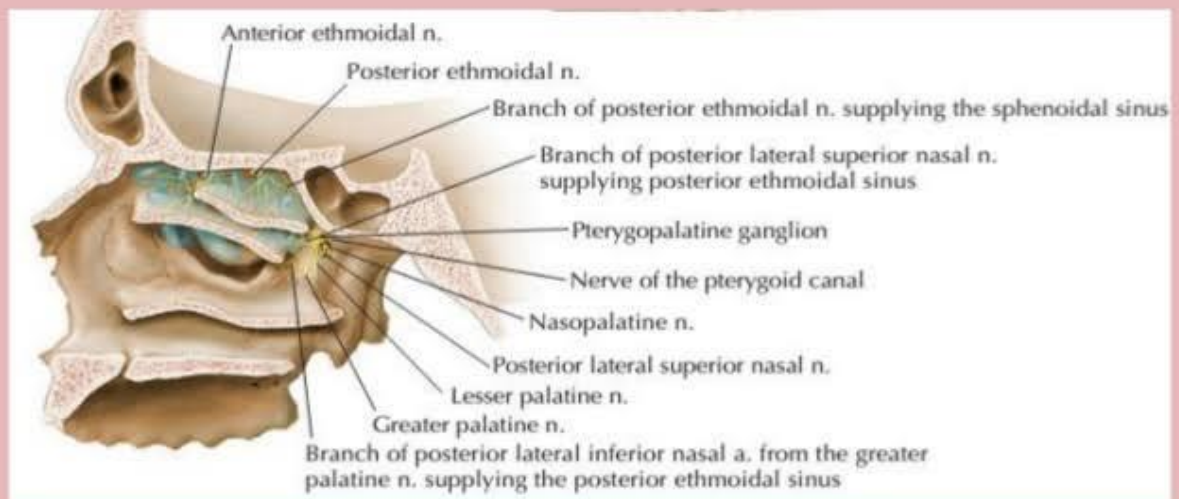
Humans possess four paired paranasal sinuses. There include:

1. **FRONTAL SINUSES:** The right and left frontal sinuses are between the outer and inner tables of the frontal bone, posterior to the superciliary arches and the root of the nose. Frontal sinuses are usually detectable in children by 7 years of age. The right and left sinuses each drain through a frontonasal duct into the ethmoidal infundibulum, which opens into the semilunar hiatus of the middle nasal meatus. The frontal sinuses are innervated by branches of the supra-orbital nerves (CN V1). The right and left frontal sinuses are rarely of equal size, and the septum between them is not usually situated

entirely in the median plane. The frontal sinuses vary in size from approximately 5 mm to large spaces extending laterally into the greater wings of the sphenoid. Often a frontal sinus has two parts: a vertical part in the squamous part of the frontal bone, and a horizontal part in the orbital part of the frontal bone. One or both parts may be large or small. When the supra-orbital part is large, its roof forms the floor of the anterior cranial fossa and its floor forms the roof of the orbit.

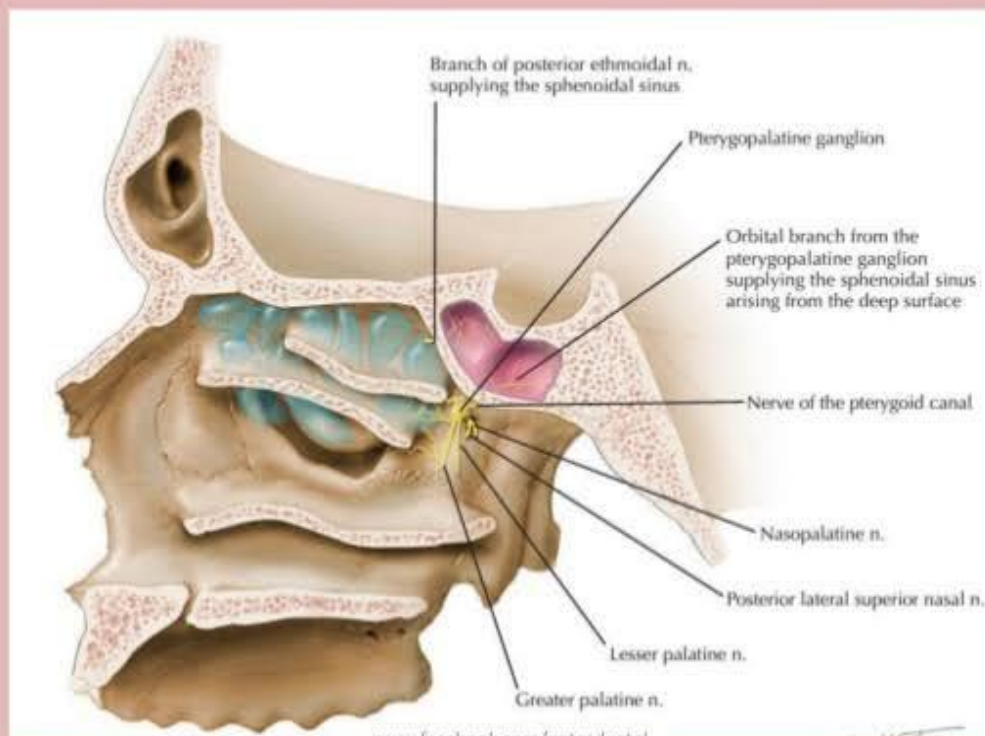
2. **ETHMOIDAL CELLS:** The ethmoidal cells (sinuses) are small invaginations of the mucous membrane of the middle and superior nasal meatus into the ethmoid bone between the nasal cavity and the orbit. The ethmoidal cells usually are not visible in plain radiographs before 2 years of age but are recognizable in CT scans. The anterior ethmoidal cells drain directly or indirectly into the middle nasal meatus through the ethmoidal infundibulum. The middle ethmoidal cells open directly into the middle meatus and are sometimes called “bullar cells” because they form the ethmoidal bulla, a swelling on the superior border of the semilunar hiatus. The posterior ethmoidal cells open directly into the superior meatus. The ethmoidal cells are supplied by the anterior and posterior ethmoidal branches of the nasociliary nerves (CN V1).

## Ethmoid Sinus : Nerve Supply



3. **SPHENOIDAL SINUSES:** The sphenoidal sinuses are located in the body of the sphenoid, but they may extend into the wings of this bone. They are unevenly divided and separated by a bony septum. Because of this extensive pneumatization (formation of air cells), the body of the sphenoid is fragile. Only thin plates of bone separate the sinuses from several important structures: the optic nerves and optic chiasm, the pituitary gland, the internal carotid arteries, and the cavernous sinuses. The sphenoidal sinuses are derived from a posterior ethmoidal cell that begins to invade the sphenoid at approximately 2 years of age. In some people, several posterior ethmoidal cells invade the sphenoid, giving rise to multiple sphenoidal sinuses that open separately into the sphenothymoidal recess. The posterior ethmoidal arteries and the posterior ethmoidal nerves that accompany the arteries supply the sphenoidal sinuses.

## Sphenoidal sinuses: Nerve Supply

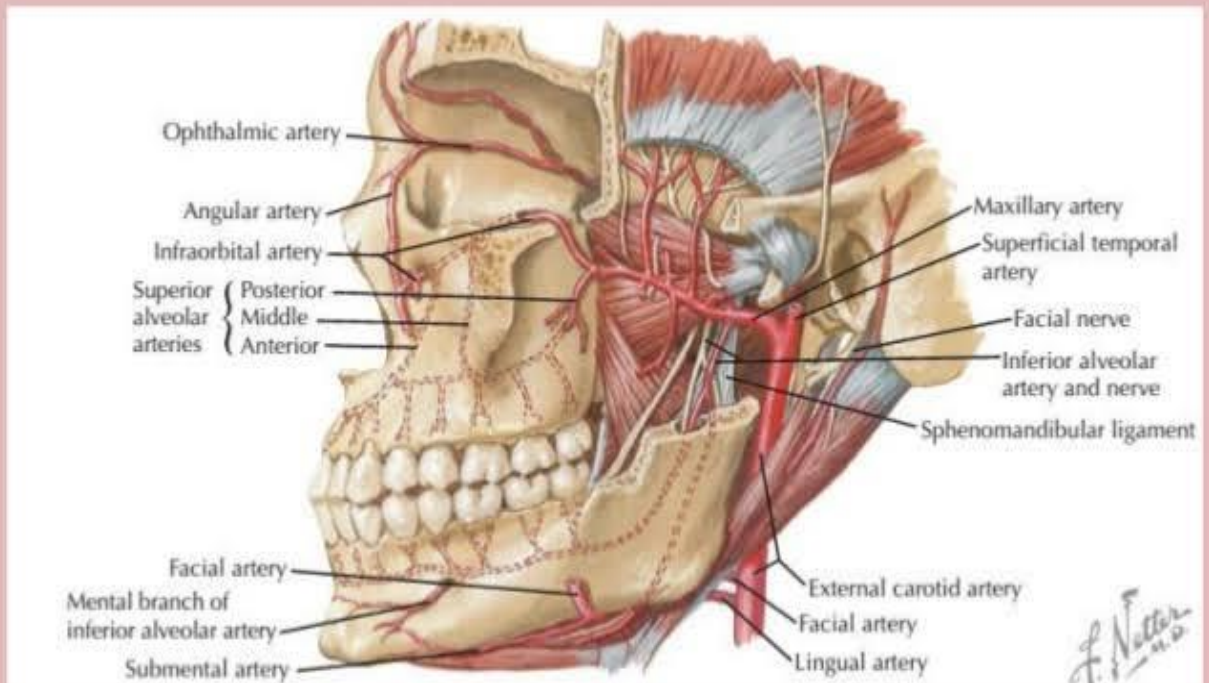


4. **MAXILLARY SINUSES:** The maxillary sinuses are the largest of the paranasal sinuses. They occupy the bodies of the maxillae and communicate with the middle nasal meatus.
- The apex of the maxillary sinus extends toward and often into the zygomatic bone.
  - The base of the maxillary sinus forms the inferior part of the lateral wall of the nasal cavity.

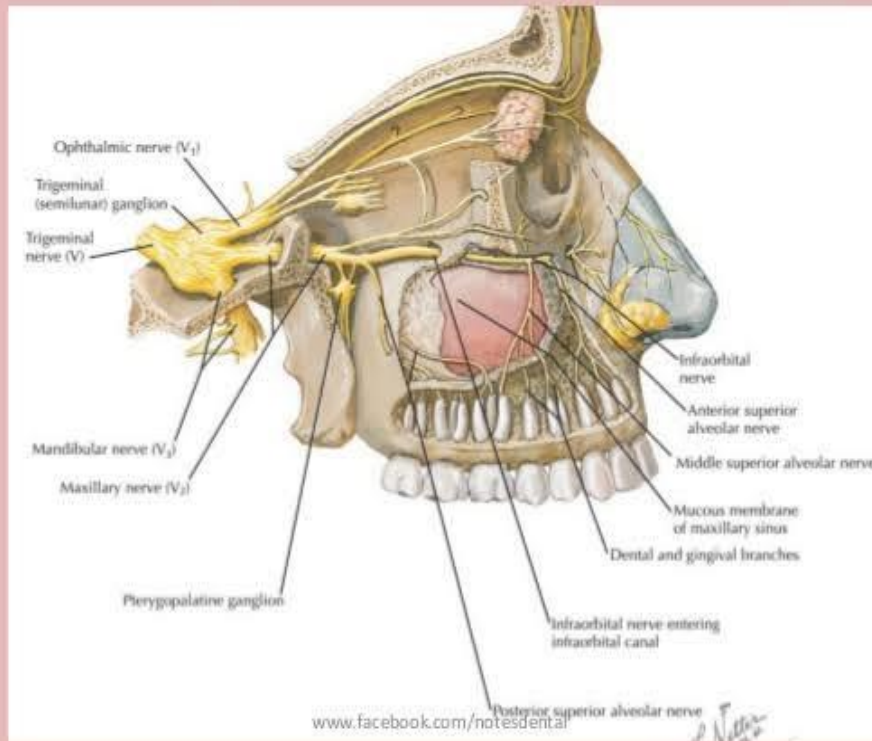
- The roof of the maxillary sinus is formed by the floor of the orbit.
- The floor of the maxillary sinus is formed by the alveolar part of the maxilla. The roots of the maxillary teeth, particularly the first two molars, often produce conical elevations in the floor of the sinus. Each maxillary sinus drains by one or more openings, the maxillary ostium (ostia), into the middle nasal meatus of the nasal cavity by way of the semilunar hiatus.

The arterial supply of the maxillary sinus is mainly from superior alveolar branches of the maxillary artery; however, branches of the descending and greater palatine arteries supply the floor of the sinus. Innervation of the maxillary sinus is from the anterior, middle, and posterior superior alveolar nerves, which are branches of the maxillary nerve.

## Maxillary sinuses: Blood Supply



# Maxillary sinuses : Nerve Supply



## APPLIED ANATOMY

1. **SINUSITIS:** Because the paranasal sinuses are continuous with the nasal cavities through apertures that open into them, infection may spread from the nasal cavities, producing inflammation and swelling of the mucosa of the sinuses (sinusitis) and local pain. Sometimes several sinuses are inflamed (pansinusitis), and the swelling of the mucosa may block one or more openings of the sinuses into the nasal cavities.
2. **INFECTION OF ETHMOIDAL CELLS:** If nasal drainage is blocked, infections of the ethmoidal cells may break through the fragile medial wall of the orbit. Severe infections from this source may cause blindness because some posterior ethmoidal cells lie close to the optic canal, which gives passage to the optic nerve and ophthalmic artery. Spread of infection from these cells could also affect the dural sheath of the optic nerve, causing optic neuritis.
3. **TRANSILLUMINATION OF SINUSES:** Transillumination of the maxillary sinuses is performed in a darkened room. A bright light is placed in the patient's mouth on one side of the hard palate or firmly against the cheek. The light passes through the maxillary sinus and appears as a crescent-shaped, dull glow inferior to the orbit. If a sinus contains excess



fluid, a mass, or a thickened mucosa, the glow is decreased. The frontal sinuses can also be transilluminated by directing the light superiorly under the medial aspect of the eyebrow, normally producing a glow superior to the orbit. Because of the great variation in the development of the sinuses, the pattern and extent of sinus illumination differs from person to person.

4. **INFECTION OF MAXILLARY SINUSES:** The maxillary sinuses are the most commonly infected, probably because their ostia (openings) are commonly small and are located high on their superomedial walls. When the mucous membrane of the sinus is congested, the maxillary ostia are often obstructed. Because of the high location of the ostia, when the head is erect it is impossible for the sinuses to drain until they are full. Because the ostia of the right and left sinuses lie on the medial sides (i.e., are directed toward each other), when lying on one's side only the upper sinus (e.g., the right sinus if lying on the left side) drains. A cold or allergy involving both sinuses can result in nights of rolling from side to side in an attempt to keep the sinuses drained. A maxillary sinus can be cannulated and drained by passing a cannula from the naris through the maxillary ostium into the sinus.
5. **RELATIONSHIP OF TEETH TO MAXILLARY SINUS:** The close proximity of the three maxillary molar teeth to the floor of the maxillary sinus poses potentially serious problems. During removal of a maxillary molar tooth, a fracture of a root of the tooth may occur. If proper retrieval methods are not used, a piece of the root may be driven superiorly into the maxillary sinus. A communication may be created between the oral cavity and the maxillary sinus as a result, and an infection may occur. Because the superior alveolar nerves (branches of the maxillary nerve) supply both the maxillary teeth and the mucous membrane of the maxillary sinuses, inflammation of the mucosa of the sinus is frequently accompanied by a sensation of toothache in the molar teeth.