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Matric number : 17/mhs01/126

Gross anatomy of head and neck

**Intrinsic Muscles**

The **intrinsic** muscles only attach to other structures in the tongue. There are four paired intrinsic muscles of the tongue and they are named by the direction in which they travel: the**superior longitudinal, inferior longitudinal, transverse** and **vertical** muscles of the tongue. These muscles affect the shape and size of the tongue – for example, in tongue rolling – and have a role in facilitating speech, eating and swallowing.

Motor innervation for the intrinsic muscles of the tongue is via the [hypoglossal nerve](https://teachmeanatomy.info/head/cranial-nerves/hypoglossal/) (CNXII).

**Extrinsic Muscles**

The **extrinsic** muscles are as follows:

**Genioglossus**

* Attachments: Arises from the mandibular symphsis. Inserts into the body of the hyoid bone and the entire length of the tongue.
* Function: Inferior fibres protrude the tongue, middle fibres depress the tongue, and superior fibres draw the tip back and down
* Innervation: Motor innervation via the [hypoglossal nerve](https://teachmeanatomy.info/head/cranial-nerves/hypoglossal/) (CNXII).

**Hyoglossus**

* Attachments: Arises from the hyoid bone and inserts into the side of the tongue
* Function: Depresses and retracts the tongue
* Innervation: Motor innervation via the [hypoglossal nerve](https://teachmeanatomy.info/head/cranial-nerves/hypoglossal/) (CNXII).

**Styloglossus**

* Attachments: Originates at the styloid process of the temporal bone and inserts into the side of the tongue
* Function: Retracts and elevates the tongue
* Innervation: Motor innervation via the [hypoglossal nerve](https://teachmeanatomy.info/head/cranial-nerves/hypoglossal/) (CNXII).

**Palatoglossus**

* Attachments: Arises from the palatine aponeurosis and inserts broadly across the tongue
* Function: Elevates the posterior aspect of the tongue
* Innervation: Motor innervation via the [vagus nerve](https://teachmeanatomy.info/head/cranial-nerves/vagus-nerve-cn-x/) (CNX).

All of the intrinsic and extrinsic muscles are innervated by the [hypoglossal nerve](https://teachmeanatomy.info/head/cranial-nerves/hypoglossal/) (CN XII), except palatoglossus, which has [vagal](https://teachmeanatomy.info/head/cranial-nerves/vagus-nerve-cn-x/) innervation (CN X).

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Fig 1 – The extrinsic muscles of the tongue. Note the palatoglossus muscle is not included in this illustration.

**Innervation**

Once we start examining the sensory supply of the tongue, we need to start looking at its division into an anterior 2/3, and a posterior 1/3. Later in this article, when we discuss the development of the tongue, the reason for this boundary becomes clear.

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Fig 1.2 – The lingual nerve provides sensory innervation to the to the 2/3 of the tongue.

In the anterior 2/3, general sensation is supplied by the [**trigeminal nerve**](https://teachmeanatomy.info/head/cranial-nerves/trigeminal-nerve/) (CNV). Specifically the **lingual nerve**, a branch of the **mandibular nerve**(CN V3).

On the other hand, taste in the anterior 2/3 is supplied from the [**facial nerve**](https://teachmeanatomy.info/head/cranial-nerves/facial-nerve/) (CNVII). In the petrous part of the [temporal bone](https://teachmeanatomy.info/head/osteology/temporal-bone/), the [facial nerve](https://teachmeanatomy.info/head/cranial-nerves/facial-nerve/) gives off three branches, one of which is **chorda tympani**. This travels through the [middle ear](https://teachmeanatomy.info/head/organs/ear/middle-ear/), and continues on to the tongue.

The posterior 1/3 of the tongue is slightly easier. Both touch and taste are supplied by the [**glossopharyngeal** **nerve**](https://teachmeanatomy.info/head/cranial-nerves/glossopharyngeal-nerve/) (CNIX).

**Vasculature**

The **lingual** **artery** (branch of the external carotid) does most of the supply, but there is a branch from the facial artery, called the **tonsillar artery**, which can provide some collateral circulation. Drainage is by the **lingual** **vein**.

**Lymphatic Drainage**

The lymphatic drainage of the tongue is as follows:

* **Anterior two thirds** – initially into the submental and submandibular nodes, which empty into the deep cervical lymph nodes
* **Posterior third** – directly into the deep cervical lymph nodes

**Embryological Development**

A good understanding of the tongue’s embryological development greatly simplifies the complex innervation to the structure. One of the central points is that the first branchial arch is supplied by the [**trigeminal**](https://teachmeanatomy.info/head/cranial-nerves/trigeminal-nerve/) nerve, the second by the [**facial**](https://teachmeanatomy.info/head/cranial-nerves/facial-nerve/), the third by the [**glossopharyngeal**](https://teachmeanatomy.info/head/cranial-nerves/glossopharyngeal-nerve/), and the fourth and sixth by the [**vagus**](https://teachmeanatomy.info/head/cranial-nerves/vagus-nerve-cn-x/)**.**

When the tongue is developing, it starts as a two longitudinal bulbous ridges, with contribution from the first four branchial arches. These ridges join, giving rise to the longitudinal line (**median sulcus**) down the centre of your tongue. The contribution from the second branchial arch is grown over by that of the third arch, but the nerve supply remains. Using this information, we can understand why the majority of the tongue’s innervation is by the [trigeminal nerve](https://teachmeanatomy.info/head/cranial-nerves/trigeminal-nerve/) (CN V) and the [glossopharyngeal nerve](https://teachmeanatomy.info/head/cranial-nerves/glossopharyngeal-nerve/) CN IX.

Look further towards the back of your tongue – there is a transverse line near the root of the tongue. This is called **sulcus terminalis**, and in the centre, where it meets the **median sulcus**, there is a pit. This is the now-closed top of a deep pit, the **foramen cecum** (blind window), at the end of which lies the thyroid gland. During development, this descends from the tongue down into the neck, If, on the way down, the pit (**thyroglossal duct**) doesn’t close behind the gland, midline **thyroglossal cysts** or **fistulae** may remain.

**Clinical Relevance - A Bit Tongue Tied?**

Klaus D. Peter, Wiehl, Germany [CC BY 2.0], via Wikimedia Commons



Fig 1,1 – Tongue tied

The tongue is attached anteroinferiorly by a piece of connective tissue called the **frenulum,**which lies in the midline. The process by which the frenulum is formed is the same by which your fingers are made, and is known as sculpting apoptosis. Just as some people may have webbed fingers if this process fails, it can result in excess frenulum. This is called being ‘**tongue-tied**’, and presents in children. There are varying degrees of severity of tongue-tie and in some cases it can restrict the movement of the tongue causing difficulties with breast feeding. This can be managed with simple surgery.

2] The paranasal sinuses are air-filled **extensions** of the respiratory part of the nasal cavity. There are **four** paired sinuses, named according to the bone in which they are located; maxillary, frontal, sphenoid and ethmoid.

The function of the sinuses is not clear. It is thought that they may contribute to the **humidifying**of the inspired air. They also reduce the weight of the skull.

Sinuses are formed in childhood by the nasal cavity **eroding** into surrounding bone. As they are outgrowths of the nasal cavity, they all drain back into it – **openings** to the paranasal sinuses are found on the **roof** and **lateral** walls of the nasal cavity. The inner surface is lined by a respiratory mucosa. **Ethmoidal Sinuses**: There are three ethmoidal sinuses; anterior, middle and posterior. They empty into the nasal cavity at different places:

* Anterior – Hiatus semilunaris
* Middle – Ethmoid bulla
* Posterior – Superior meatus

**Maxillary Sinuses:**The largest of the sinuses. It is located laterally and slightly **inferiorly** to the nasal cavities. It drains into the nasal cavity at the **hiatus semilunaris,** underneath the **frontal sinus** opening. This is a potential pathway for spread of infection – fluid draining from the frontal sinus can enter the maxillary sinus.By Patrick J. Lynch and Michał Komorniczak [**Frontal Sinuses**: These are the most **superior** in location, found under the forehead. The frontal sinuses are variable in size, but always triangular-shaped. They drain into the nasal cavity via the **frontonasal duct**, which opens out at the hiatus semilunaris on the lateral wall.

**Sphenoid Sinuses**:  The sphenoid sinuses also lie relatively superiorly, at the level of the spheno-ethmodial recess.  They are found more **posteriorly**, and are related superiorly and laterally to the **cranial cavity**. The sphenoid sinuses drain out onto the roof of the nasal cavity.  The relationships of this sinus are of clinical importance – the **pituitary gland** can be surgically accessed via passing through the nasal roof, into the sphenoid sinus and through the sphenoid bone.

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## Clinical Relevance: Sinusitis

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## The maxillary nerve supplies both the maxillary sinus and maxillary teeth so as inflammation of that sinus can be present with toothache.

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