

# The Tongue

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Most muscles serve to attach one bone, usually via a tendon, to another. There are a few places where that is not entirely true: the [ocular muscles](#), the [scapulothoracic joint](#), the [diaphragm](#) and [perineum](#) are all good exceptions. However, the tongue is extraordinary. A boneless mass that you can protrude at will, fold, invert, lay flat or fill the mouth. In this article, we shall look at the structure of the tongue, its vasculature and innervation.

## 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](#) (CNXII).

## Extrinsic Muscles

The **extrinsic** muscles are as follows:

### Genioglossus

Attachments: Arises from the mandibular symphysis. 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](#) (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](#) (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](#) (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](#) (CNX).

All of the intrinsic and extrinsic muscles are innervated by the [hypoglossal nerve](#) (CN XII), except palatoglossus, which has [vagal](#) innervation (CN X).

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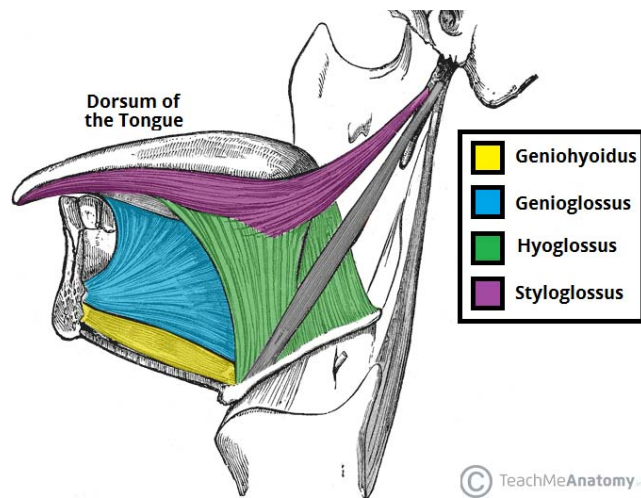


Fig 1 – The extrinsic muscles of the tongue. Note the palatoglossus muscle is not included in this illustration.

## 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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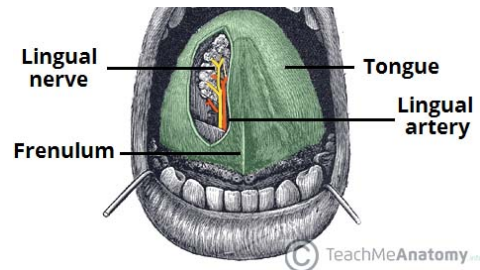


Fig 1.2 – The lingual nerve provides sensory innervation to the to the 2/3 of the tongue.

In the anterior 2/3, general sensation is supplied by the [trigeminal nerve](#) (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](#) (CNVII). In the petrous part of the [temporal bone](#), the [facial nerve](#) gives off three branches, one of which is [chorda tympani](#). This travels through the [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](#) (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](#) nerve, the second by the [facial](#), the third by the [glossopharyngeal](#), and the fourth and sixth by the [vagus](#).

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](#) (CN V) and the [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?

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.

Klaus D. Peter, Wiehl, Germany  
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Fig 1,1 – Tongue tied