

The Development of the Tongue

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The tongue is the sensory organ for taste. The development of the tongue occurs between 4th and 8th week of the embryonic period of life. The first four pharyngeal arches contribute to its formation.



Development of the Tongue

A small nodule is the first evidence of the developing tongue in the floor of the pharynx. The **fusion of the first pharyngeal arch** creates a protuberance in the midline known as the **tuberculum impar** (labeled as 'b' in the figure below). It is located on the lower edge of the first pharyngeal arch.

Later, two swellings develop on either side of the tuberculum impar. These swellings are known as the **lateral lingual swellings or prominences**. The tuberculum impar and the two lateral swellings extend to form the anterior 2/3 of the tongue. A **medial lingual sulcus** is formed. These fuse in the midline to form the definitive anterior two-thirds of the tongue supplied by V and reinforced by chorda tympani. Posteriorly, this mass meets the copula (or hypobranchial eminence), a central swelling in the pharyngeal floor which represents the 2nd, 3rd and 4th arches and which forms the posterior one-third of the tongue (nerve supply IX and X).

The sensory feeling of touch in the anterior 2/3 of the tongue is carried by the **mandibular branch of the trigeminal nerve** (CN V), while the taste sensation is carried by the **chorda tympani branch of the facial nerve** (CN VII). This part of the

tongue has both **endodermic** and **ectodermic** origin.

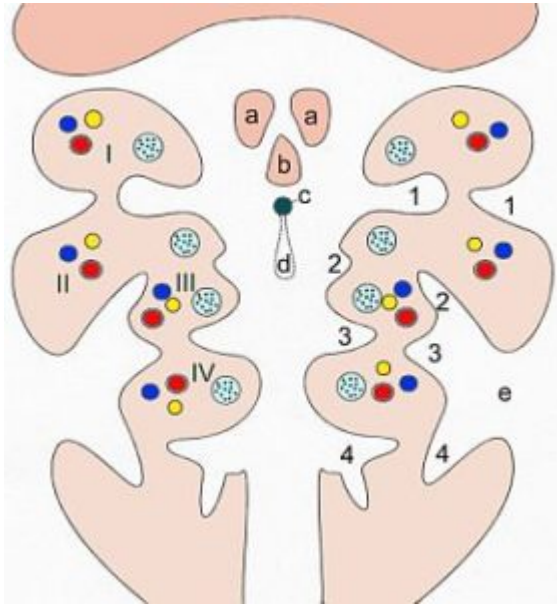


Image: "Pattern of the branchial arches. I-IV - branchial arches, 1-4 - pharyngeal pouches (inside) and/or pharyngeal grooves (outside), a - tuberculum laterale, b - tuberculum impar, c - foramen cecum, d - ductus thyroglossus, e - sinus cervicalis," by User:Uwe Gille - Own work. License: [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/)

The posterior 1/3 of the tongue is formed mainly by the **third pharyngeal arch**, with little contribution of the second and fourth pharyngeal arches. The second pharyngeal pouch is, however, overgrown by the third pharyngeal arch. The fusion of these arches forms the **copula**, which is the posterior 1/3 of the tongue. The touch and taste sensation of this part of the tongue is carried by a **branch of the glossopharyngeal nerve** (CN IX).

The **base of the tongue** is formed by the **fourth pharyngeal arch** and is innervated by a **branch of the vagus nerve** (CN X) for the touch and taste sensation.

The **foramen cecum**, labeled as 'c' in the diagram, is basically a remnant of the unpaired endodermic bud, which was the **primordium of the thyroid gland**. The **thyroglossal duct** regresses and is not present in an adult. In some cases, where it does not regress, a patent tract is present—called the thyroglossal tract—which often leads to the **formation of a cyst** or a fistula.

The **entire musculature of the tongue** is supplied by the **hypoglossal nerve** (CN XII). The tongue muscles derive from the occipital myotomes which migrate forward dragging with them their nerve supply (XII, the hypoglossal nerve).

Major Developmental Anomalies of the Tongue

Aglossia is the complete absence of development of the tongue.

Microglossia is a small or rudimentary tongue. It is a rare congenital condition, in which the sufferers have difficulty in eating and swallowing. Relative microglossia is when the tongue is smaller in structure compared to the jaw bones.

Macroglossia is an enlarged tongue, which can be either congenital or acquired. It is often associated with [Down's syndrome](https://www.ncbi.nlm.nih.gov/termsets/ts101001/) and Hunter's syndrome. Acquired macroglossia

may be seen in lingual tumors, myxedema, amyloidosis, and angioedema.

Ankyloglossia is a condition characterized by fixation of the tongue to the floor of the mouth. Partial ankyloglossia is also known as tongue tie. Patients have difficulty in speech and swallowing. It may be resolved by surgical intervention.

Cleft tongue results due to lack of fusion of the lateral lingual swellings.

Lingual thyroid nodule occurs when the remnants of the thyroid primordium fail to migrate to its normal position. This results in the formation of a thyroid nodule in the substance of the tongue. It leads to dysphagia, dysphonia and breathing difficulties.

Lingual anomalies. these includes:

- Median rhomboid glossitis: smooth red rhomboidal zone of the tongue in front of foramen cecum due to persistence of tuberculum impar
- Bifid tongue: due to failure in the fusion of the 2 lateral lingual prominences
- Thyroid gland may persist at the base of the tongue
- Part of the thyroglossal duct may persist at the base of the tongue & lead to cyst formation

Developmental Cysts

They originated from epithelial rests in the line of union of facial or oral prominences, or from epithelial organs, such as:

- Brachial cleft (cervical cysts) may arise from the rest of epithelium in the visceral arch area, they are usually laterally disposed on the neck.
- Thyroglossal duct cyst may occur at any place along the course of the duct usually at or near the midline.
- Globulomaxillary cysts: these cysts arise from epithelial rests after the fusion of medial, maxillary & lateral nasal prominences, they may have developed as primordial cysts from supernumerary tooth germ.
- Anterior palatine cyst: are situated in the midline of maxillary alveolar prominence & they believed to be from remnants of the fusion between two prominences, they may be a primordial cyst of odontogenic origin.
- Nasolabial cysts: originated in the base of the wing of the nose & bulging into the nasal & oral vestibule & the root of the upper lip. They may have developed at the line of the cleft or due to excessive epithelial proliferation.

References

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