

The Neck Plexuses and Salivary Glands

Cervical Plexus

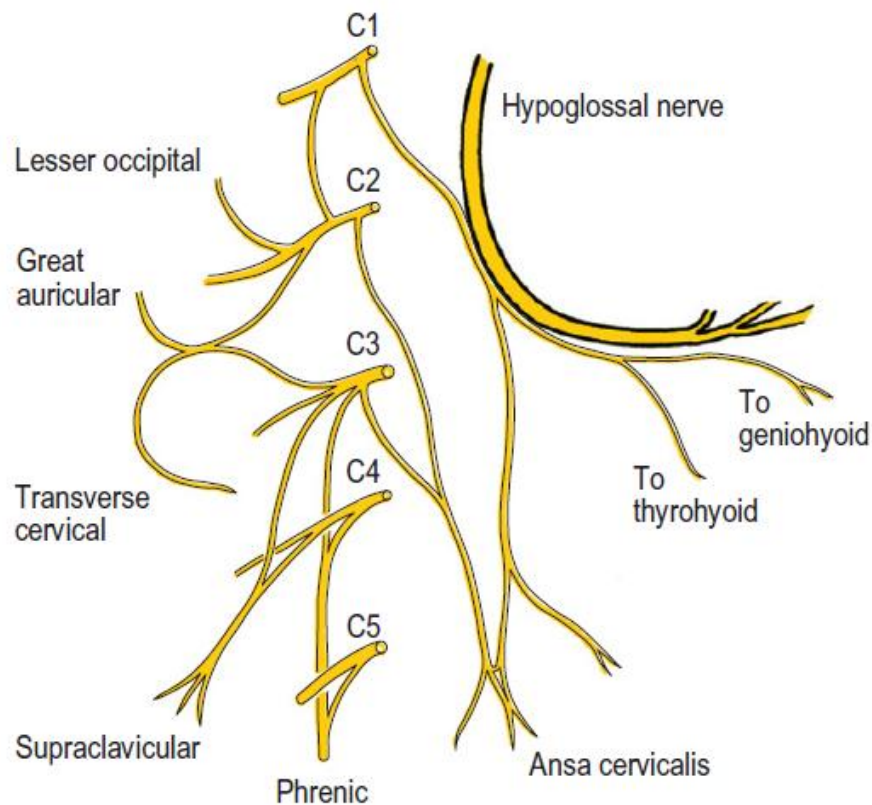
The anterior (ventral) rami of the first four cervical nerves join to form the cervical plexus. The rami join by connecting branches, which form loops that lie in series with the brachial plexus, on the scalenus medius muscle, behind the prevertebral fascia.

The cervical plexus supplies skin and muscles of the head, neck, and shoulder, plus the diaphragm and other thoracic structures.

❖ Muscular branches:

The plexus supplies the prevertebral muscles, sternocleidomastoid, levator scapulae, and trapezius. The plexus branches to the sternocleidomastoid and trapezius are proprioceptive.

- A branch from C1 joins the hypoglossal nerve. Some of these C1 fibers later leave the hypoglossal as the descending branch, which unites with the descending cervical branches (C2 and 3), to form the ansa cervicalis. The ansa cervicalis supplies the omohyoid, sternohyoid, and sternothyroid muscles. Other C1 fibers within the hypoglossal nerve leave it as the nerves to the thyrohyoid and geniohyoid.
- Branches from C2 and 3 to sternocleidomastoid, and from C3 and 4 to trapezius. These fibres are mainly proprioceptive, but occasionally the whole of trapezius is not paralysed when the accessory nerve is damaged, as some of the cervical fibres may be motor.
- The phrenic nerve is formed mainly from C4 with contributions from C3 and C5 and runs down vertically over the obliquity of the scalenus anterior muscle, passing from lateral to medial borders, beneath the prevertebral fascia. It passes behind the subclavian vein into the mediastinum. The phrenic nerve is one of the most important in the body, being the sole motor supply to its own half of the diaphragm.



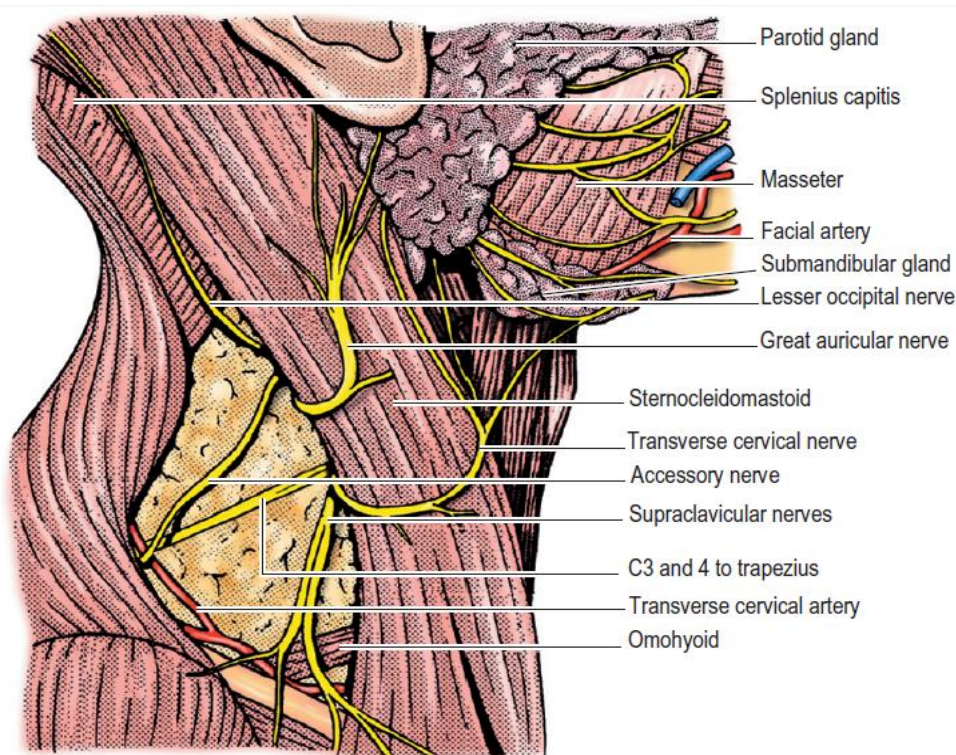
Right cervical plexus

✓ **Clinical Notes**

The phrenic nerve is of considerable clinical importance because it is the sole nerve supply to the muscle of the diaphragm. Each phrenic nerve supplies the corresponding half of the diaphragm. Penetrating wounds in the neck can injure the phrenic nerve. If that occurs, the paralyzed half of the diaphragm relaxes and is pushed up into the thorax by the positive abdominal pressure. Consequently, the lower lobe of the lung on that side may collapse.

❖ **Cutaneous branches:**

Four cutaneous nerves (lesser occipital, great auricular, transverse cervical, and supraclavicular) branch off the cervical plexus and supply the skin over the lower head and the front and sides of the neck. These nerves emerge at a common point at the posterior margin of the sternocleidomastoid muscle, at about the midpoint of the muscle, and distribute from there.

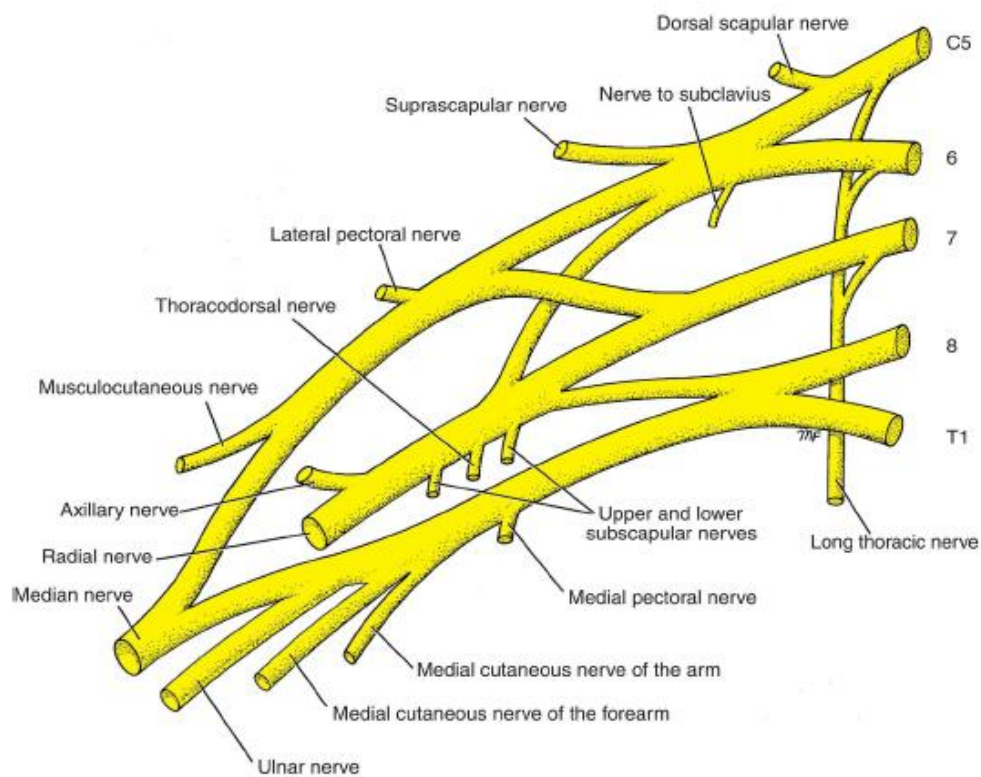


- **The lesser occipital nerve (C2)** is a slender branch supplies the back of the scalp and the auricle.
- **The great auricular nerve (C2 and 3)** is a large trunk passing almost vertically upwards over sternocleidomastoid, it supplies the skin over auricle, the angle of the mandible and over the mastoid.
- **The transverse cervical nerve (C2 and 3)** supplies the skin over the front of the neck from chin to sternum.
- **The supraclavicular nerves (C3 and 4)** have medial, intermediate, and lateral branches that supply the skin over the shoulder region. These nerves are important clinically, because pain may be referred along them from the phrenic nerve (e.g., in gallbladder disease).

In addition to the cutaneous branches of the cervical plexus described above, which supply the anterior and lateral skin of the neck, the greater occipital and third occipital nerves from posterior (dorsal) rami of C2 and C3 respectively provide sensory fibres for the back of the neck, extending into the occipital region of the scalp and forwards to the auricle and the face over the parotid gland.

Brachial Plexus

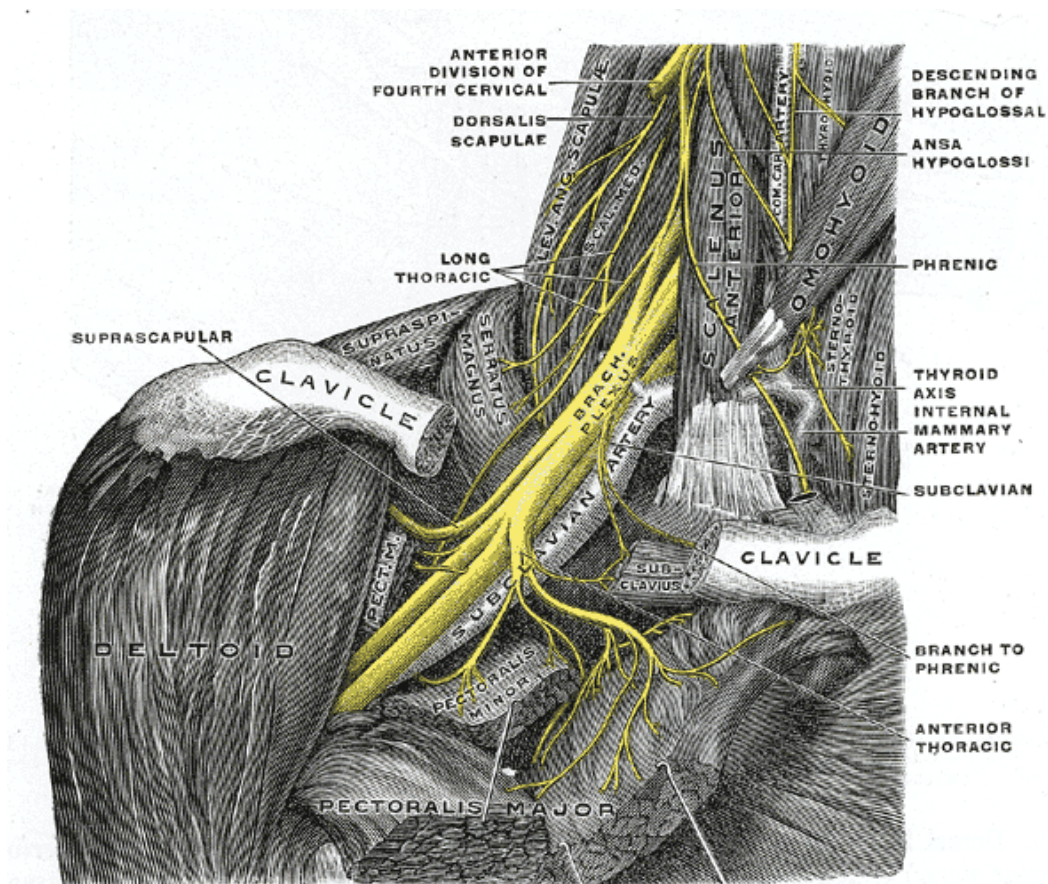
- The brachial plexus forms in the posterior triangle of the neck by the union of the anterior (ventral) rami of the fifth, sixth, seventh, and eighth cervical and the first thoracic spinal nerves.
- This plexus extends through the neck, over the first rib, and into the [armpit](#).
- It supplies the chest, shoulder, arm and hand. This plexus is divided into roots, trunks, divisions, and cords.



Brachial plexus and its branches.

- The brachial [plexus](#) is responsible for [cutaneous](#) and muscular innervations of the entire upper limb, with two exceptions: the [trapezius](#) muscle innervated by the [spinal accessory nerve \(CN XI\)](#) and an area of skin near the axilla
- Some of the terminal branches with sensory and muscular innervations:
 - Musculocutaneous nerve

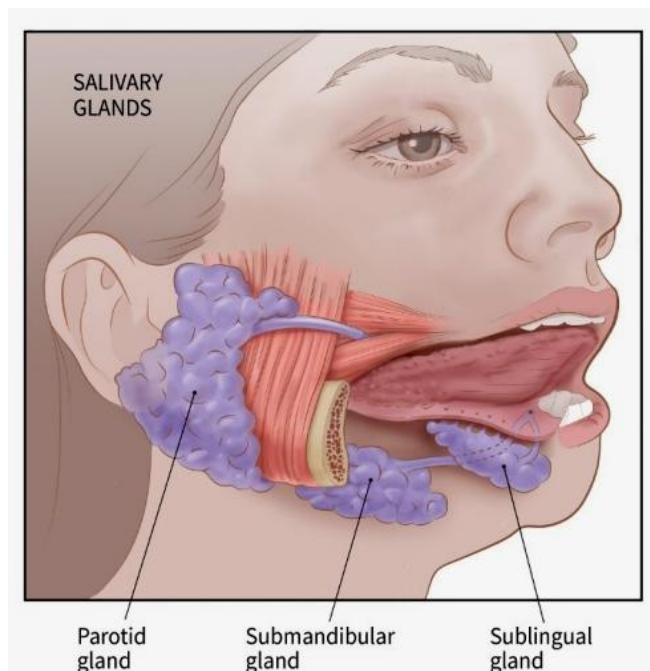
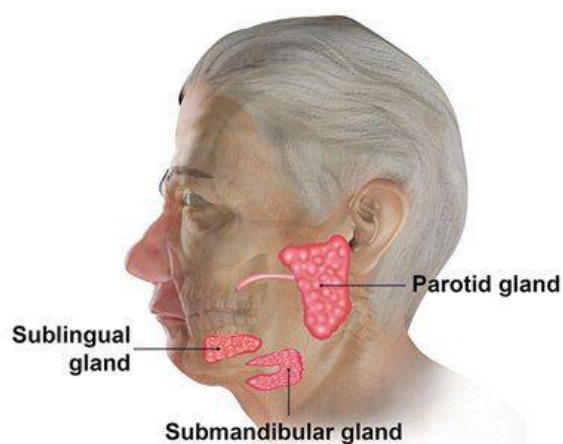
- Axillary nerve
- Radial nerve
- Median nerve
- Ulnar nerve



Salivary Glands

The salivary gland system is composed of three pairs of large aggregations of exocrine glandular tissue, known as the major Salivary glands and numerous small aggregations of glands distributed in the mucosa of the oral cavity and oropharynx known as the minor salivary glands.

The major salivary glands consist of the parotid, submandibular, and sublingual glands.



On average about (0.5- 1.5) liters of saliva is produced each day from the salivary glands, but the rate of secretion varies throughout the day between rest and function (meal time).

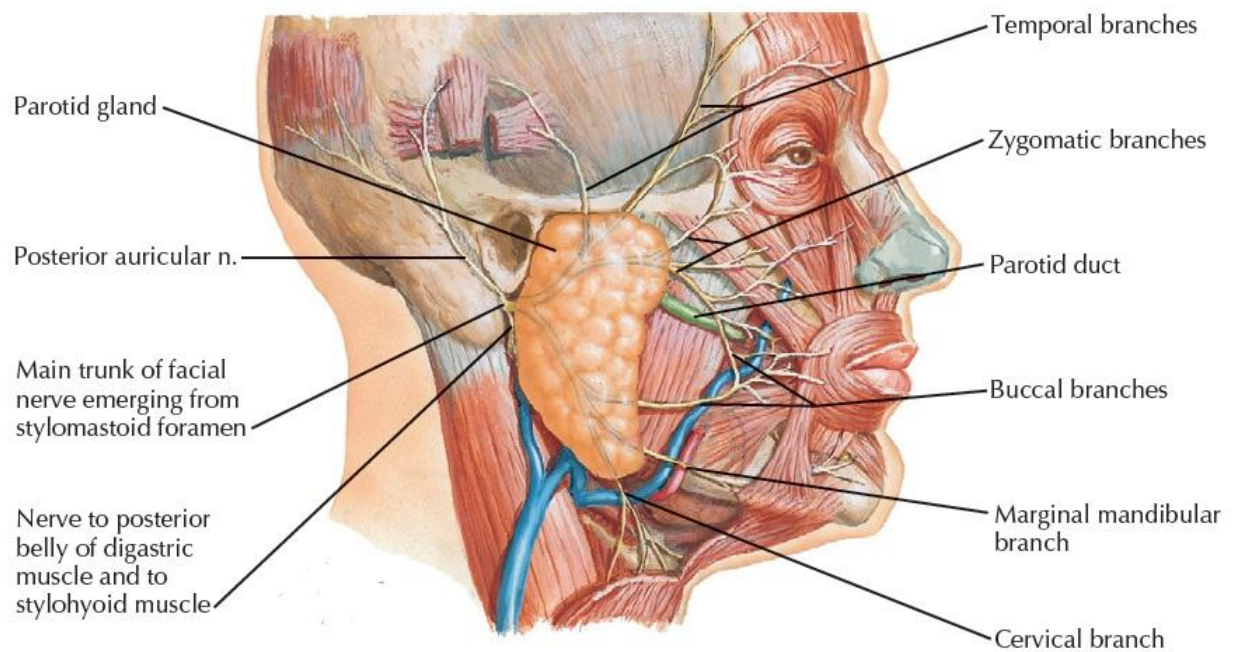
The functional secretory units of the salivary glands are the acini. The single acinus is either serous (which produce serous watery secretion) or mucous (which produce mucous viscous secretion); that's why the salivary glands are either serous or mucous or mixed secretions.

The parotid and submandibular glands are surrounded completely by fibrous capsule unlike sublingual and minor salivary glands that are lacking for the capsule or incomplete encapsulation.

Parotid Gland

Parotid gland is roughly triangular in shape with an apex just inferior to the angle of the mandible and the superior base along the zygomatic arch; it is the largest salivary gland and is composed mostly of serous acini. It lies in a deep hollow below the external auditory meatus, behind the ramus of the mandible and in front of the sternocleidomastoid muscle. The facial nerve divides the gland into superficial and deep lobes.

The superficial part is located within the triangle surrounded superiorly by the zygomatic arch, anteriorly by the masseter muscle, and posteriorly by the sternocleidomastoid muscle. The inferior pole (the tail) is confined to the angle of the mandible and extends inferiorly to the upper part of sternocleidomastoid muscle. The deep lobe of the gland extends into the parapharyngeal area and is confined by the styloid process (with its attachments), digastric muscles and carotid sheath.



Approximately 75% or more of the parotid gland overlies the masseter muscle; the rest lies in retromandibular area

The parotid gland is surrounded by a thick capsule derived from the investing layer of deep cervical fascia. Parotid lymph nodes are found within the parotid parenchyma.

The main parotid duct is about (5-6) cm long, 3 mm diameter, known as Stensen's duct which extends forward from the superficial part of the parotid gland, superficial to the masseter muscle, a finger breadth inferior to the zygomatic arch then follow a sharp turn at the anterior border of the masseter muscle medially piercing through the buccinator muscle. It courses between the buccinator and buccal mucosa before opening into a small papilla opposite the upper second molar tooth. The intraoral course provides a valve-like mechanism preventing reflux.

Nerve Supply: Parasympathetic secretomotor postganglionic fibers from otic ganglion which are carried by auriculotemporal nerve.

Blood Supply: The blood supply to the parotid gland is from branches of the external carotid artery; the superficial temporal artery runs superiorly from the superior portion of the parotid gland to the scalp and the maxillary artery which leaves the medial portion of the parotid gland to supply the infratemporal fossa and the pterygopalatine fossa.

The transverse facial artery (branch of the superficial temporal artery) also supply the parotid gland.

Submandibular Gland

The submandibular gland consists of a mixture of serous and mucous acini. It lies beneath the lower border of the body of the mandible and is divided into superficial and deep parts by the mylohyoid muscle. The larger superficial lobe is lying within the digastric triangle in the neck while the smaller deep lobe is lying within the floor of the mouth posteriorly. The two lobes are continuous with each other around the posterior border of the mylohyoid muscle.

The Submandibular gland is invested in its own capsule, which is also continuous with the superficial layer of deep cervical fascia.

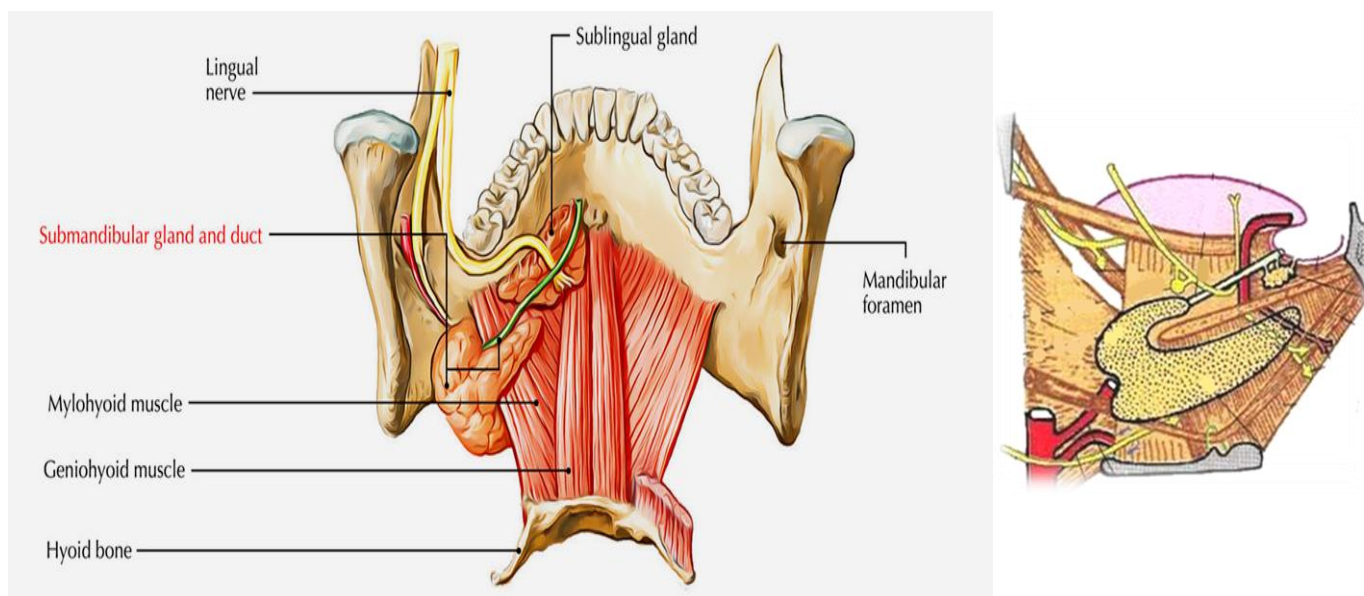
The submandibular duct (Wharton's duct) is about 5 cm long and 2-4 mm in diameter. It emerges from the anterior end of the deep part of the gland and runs forward beneath the mucous membrane of the mouth. It opens into the mouth on a small papilla lateral to the lingual frenum. The Lingual nerve wraps around Wharton's duct, starting lateral and ending medial to the duct.

The facial artery, the tortuous branch of the external carotid artery, is the main arterial blood supply of the submandibular gland. It runs medial to the posterior belly of the digastric muscle and then hooks over to course superiorly deep to the gland.

The artery exits at the superior border of the gland and the inferior aspect of the mandible known as the facial notch. It then runs superiorly and adjacent to the inferior branches of the facial nerve into the face. During submandibular gland resection, the artery must be sacrificed.

Nerve Supply: Parasympathetic secretomotor postganglionic fibers from submandibular ganglion pass directly to the gland.

Blood Supply: Both the submandibular and sublingual glands are supplied by the submental and sublingual arteries, branches of the lingual and facial arteries.



Left: Posterior view of the mandible, floor of the mouth (mylohyoid) and the lobes of submandibular gland. **Right:** sagittal view showing the C shape of submandibular gland lobes around the mylohyoid muscle

The Sublingual Gland

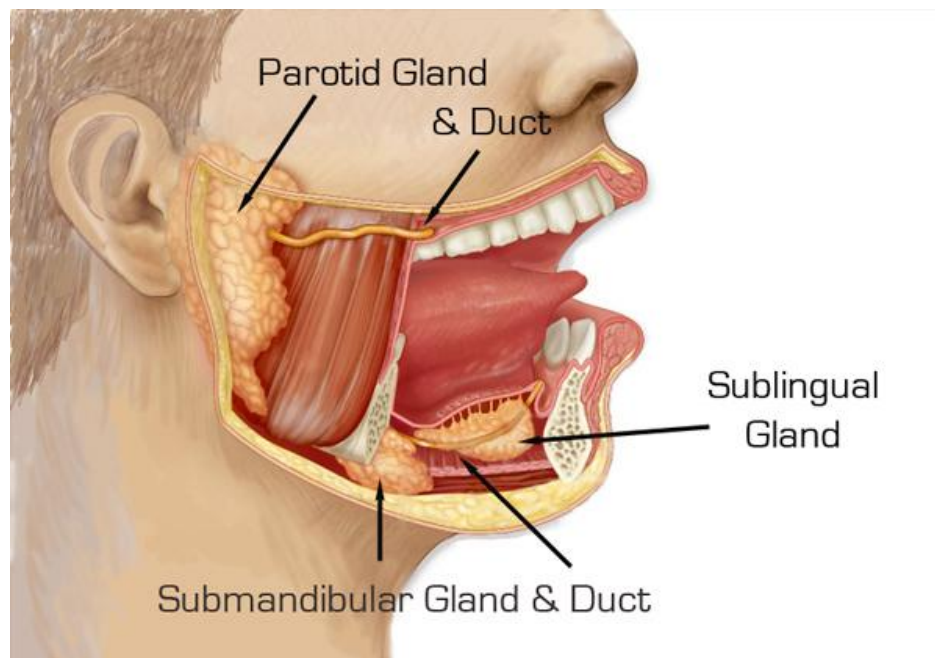
The smallest of the major salivary glands is the sublingual gland, it has mixed serous and mucous acini but mostly mucous in secretion.

The gland lies as a flat structure in a submucosal plane within the anterior part of the floor of the mouth, it is located between the mucosa of the floor of the mouth and the mylohyoid muscle in the sublingual space.

There is no true fascial capsule surrounding the gland, which is instead covered by oral mucosa on its superior aspect.

The sublingual gland actually consists of 15 to 30 smaller glands, each secreting through a short duct of Rivinus to the sublingual plica. Some individuals have a greater sublingual gland with an excretory duct known as Bartholin duct; that either joins with Wharton duct or opens next to it at the sublingual caruncle.

Nerve Supply: Parasympathetic secretomotor Postganglionic fibers pass directly to the gland from submandibular ganglion. The preganglionic fibers for submandibular ganglion are carried by chorda tympani nerve (branch of facial nerve)

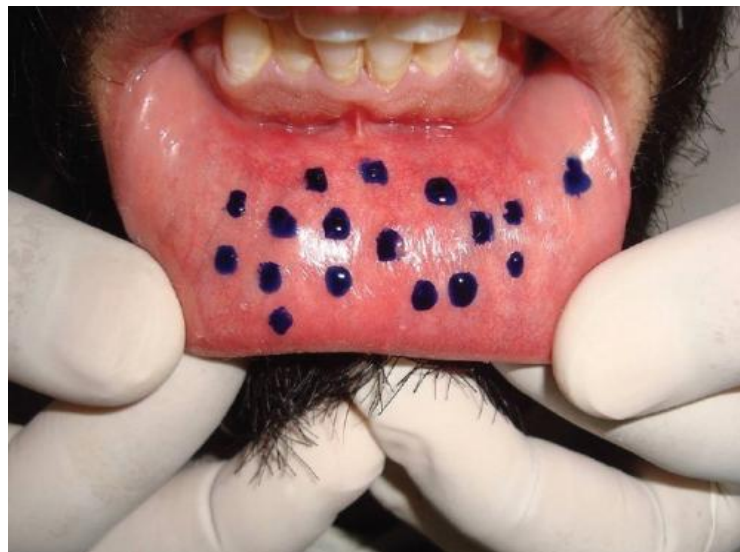


The Minor Salivary Glands

The submucosa of the oral cavity and oropharynx is lined extensively by groups of minor salivary glands, which are distinguished from major salivary glands, not only by their reduced size and embryonic development, but also by their abbreviated duct systems and capsular tissues.

It is estimated that there are approximately 500 to 1000 lobules of minor salivary gland tissue dispersed throughout the oropharyngeal mucosa.

The largest aggregation of minor salivary glands are found in the palate mainly at the posterolateral aspect of hard and soft palate junction, followed by the labial mucosa then the buccal mucosa.



Sites of minor salivary glands secretions in the lip
(detected by toluidine blue stain)