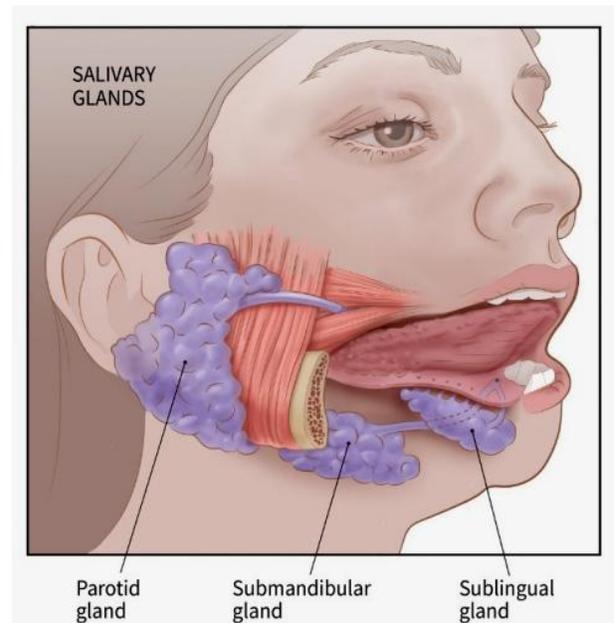
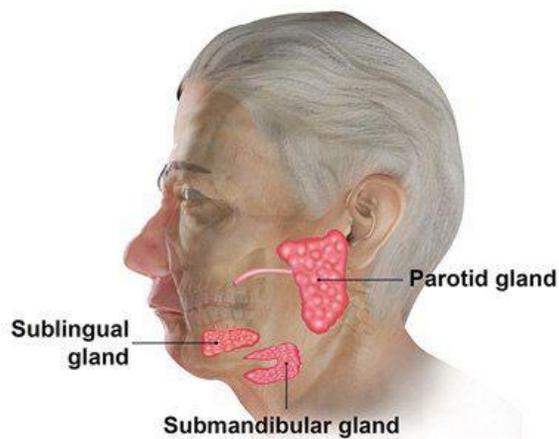


Part I/ The Salivary Glands

Introduction

The salivary glands system is composed of three pairs of large paired 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.



Some of the salivary major roles is the lubrication during speech and mastication, immune defense (IgG and IgM antibodies), and contain digestive enzymes as salivary lipase and salivary amylase (ptyalin).

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).

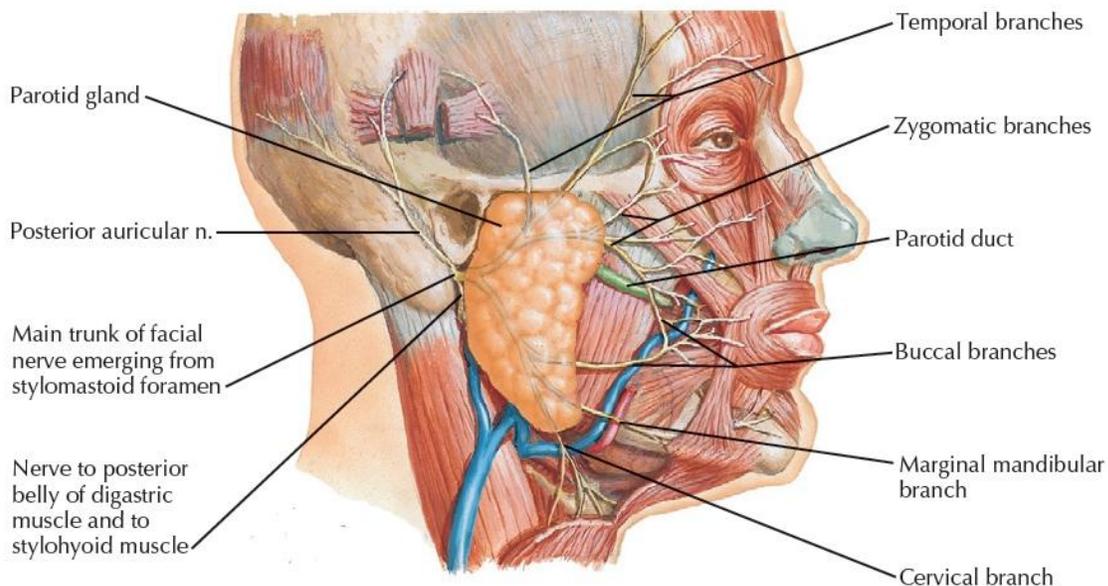
The functional secretory units of the salivary glands are the acini. The single acinus is either serous (which produce serous watery secretion) or mucous (which produce mucous viscous secretion); that's why the salivary glands are either serous or mucous or mixed secretions.

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.

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, the maxillary artery and the transverse facial artery (branch of the superficial temporal artery)

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.

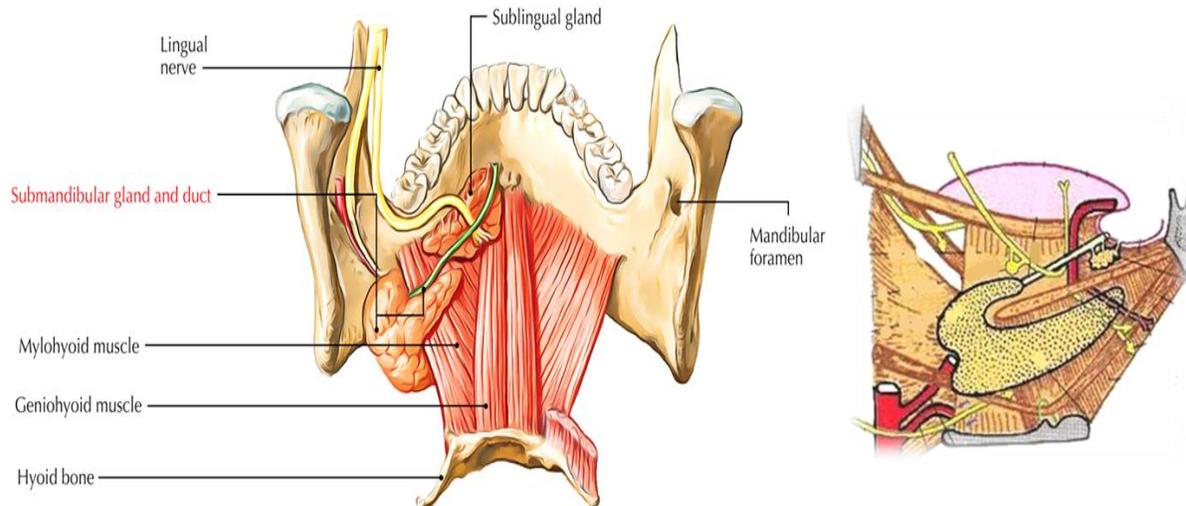
The Submandibular gland is invested in its own capsule, which is also continuous with the superficial layer of deep cervical fascia.

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. During submandibular gland resection, the artery must be sacrificed.

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

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 Postganglionic fibers from submandibular ganglion.

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 by their reduced size with 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)

Part II/ Facial Nerve

- The facial nerve is a mixed nerve (motor and sensory), it has somatic and autonomic functions, including innervating all of the muscles of facial expression, muscles of scalp, causing tearing of the eye, salivation from the salivary glands beneath the tongue and taste sensation for the anterior two thirds of the tongue.
- Damage to the facial nerve is possible in maxillofacial injuries or operations and would result in ipsilateral paralysis of the muscles of facial expression.
- Facial nerve anatomy is categorized in terms of its relationship to the cranium or temporal bone into intracranial, intratemporal, and extracranial

- **Intracranial part**

The facial nerve has two components intracranially:

- **The branchiomotor component (motor root, facial nerve proper):**

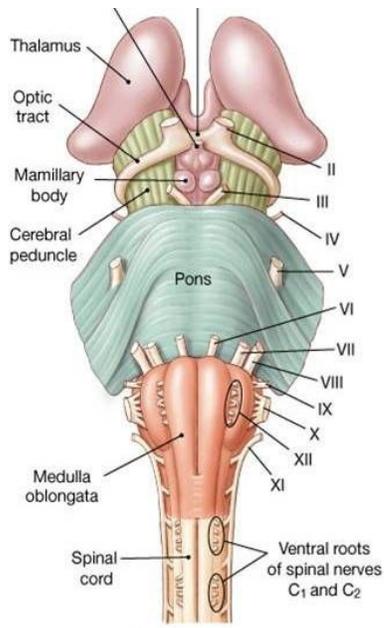
Which is responsible for innervations of all muscles derived from the same branchial arch of facial nerve (the second or hyoid arch).

It originates from the pons (from facial motor nucleus) anterior to the origin of Vestibulocochlear nerve VIII CN

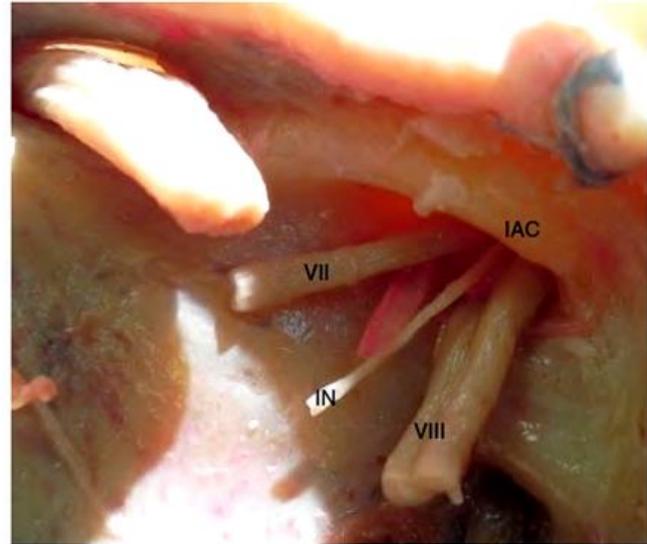
- **The nervus intermedius (sensory root):** which originates from pons (from superior salivatory nucleus) between the origins of facial nerve proper and the vestibulocochlear nerve and that's why it is known as nervus intermedius.

The nerve is responsible for the autonomic functions (to salivary glands and lacrimal glands) and special sensory function (taste sensation).

The nerve enters the internal auditory canal with the facial nerve proper and vestibulocochlear, within the canal the nerve joins the facial nerve as single nerve.



Anterior view
origins of cranial nerves



The intermediate (IN), facial (VII), and vestibulocochlear (VIII) nerves entering the internal auditory canal (IAC).

- **Intratemporal part**

The facial nerve has tortuous course in its (facial canal or fallopian canal) within the temporal bone, in this canal; it gives off the following branches

- ✓ **Greater petrosal nerve:**

The facial nerve carries preganglionic parasympathetic fibers to the pterygopalatine ganglion which is responsible for the secretion of lacrimal gland and minor salivary glands in the palate.

- ✓ **Chorda tympani:**

After its emergence from the petrotympanic fissure into the infratemporal fossa; the nerve join the lingual nerve in its course to carry preganglionic parasympathetic fibers to the submandibular ganglion which is responsible for the secretion of submandibular and sublingual salivary glands, also the nerve is responsible for the taste sensation in the anterior two thirds of the tongue.

- ✓ **Nerve to stapedius muscle** (which is responsible for movement of stapes).

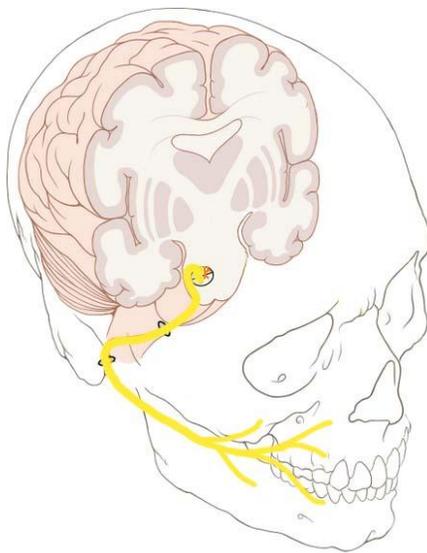
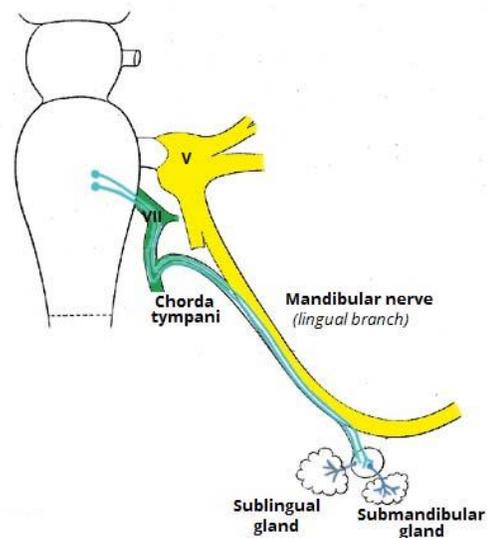


Diagram show the complete course of facial nerve



Chorda tympani joins the lingual nerve

- **Extracranial part**

The facial nerve emerges from the base of the skull through the stylomastoid foramen. It immediately gives off the posterior auricular nerve which passes upwards behind the ear to supply auricularis posterior and the occipital belly of occipitofrontalis. A muscular branch is next given off which divides to supply the posterior belly of digastric and stylohyoid. The nerve now approaches the posteromedial surface of the parotid gland. Within the gland it divides into an upper temporofacial and a lower cervicofacial division. Within the substance of the parotid gland each divides to finally emerge from the parotid gland in five main branches. This plexiform arrangement, the pes anserinus (goose foot), lies in the gland superficial to the retromandibular vein and the external carotid artery.

The pattern of branching of the facial nerve differs in different individuals and even on the two sides of the face of the same person.

The five terminal branches of facial nerve are:

1. The **temporal (frontal) branch**

It emerges from the upper border of the gland and supplies the anterior and superior auricular muscles, the frontal belly of the occipitofrontalis, the orbicularis oculi, and the corrugator supercilii.

Surgical Note: During an open approach to the TMJ, damage to the nerve is possible. Weakness is apparent by inability of patient to elevate the eyebrow on the affected side

2. The **zygomatic branch**

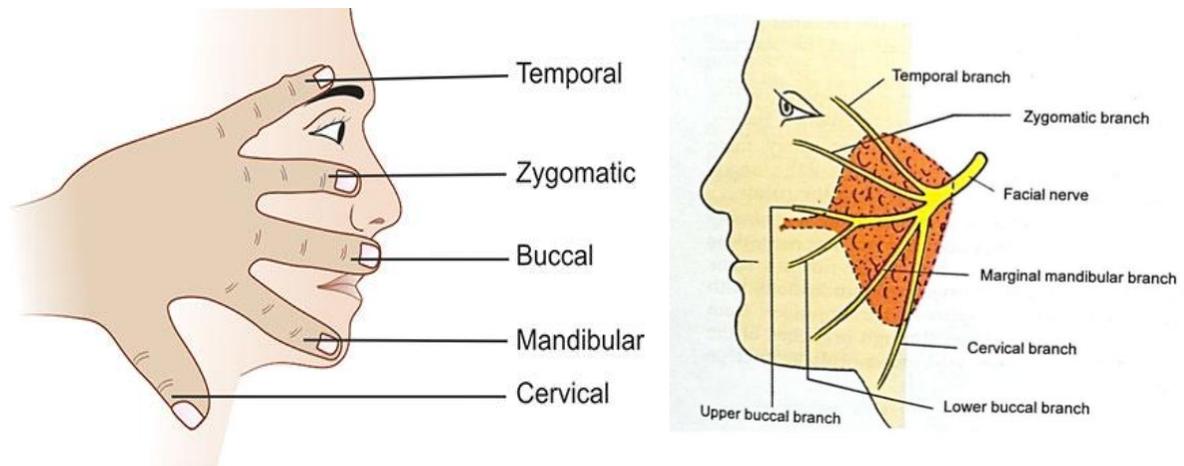
It emerges from the anterior border of the gland and crosses the zygomatic arch and zygomatic bone, lying directly on the periosteum. They may be damaged in fractures or operations in this region.

The nerve supplies orbicularis oculi. Paralysis of this muscle prevents blinking and spread of tears to lubricate the eye. The dry cornea easily ulcerates and a scar will form. The resultant scar impairs vision, this is the most serious consequence of impaired facial nerve function.

3. The **buccal branch**

It emerges from the anterior border of the gland below the parotid duct and supplies the buccinator muscle and the muscles of the upper lip and nostril.

The buccal branches (usually two) run forwards close to the parotid duct. Paralysis of the buccinator prevents emptying of the cheek pouch; the bolus lodges there and cannot be returned to the molar teeth. Chewing has to be performed on the other side.



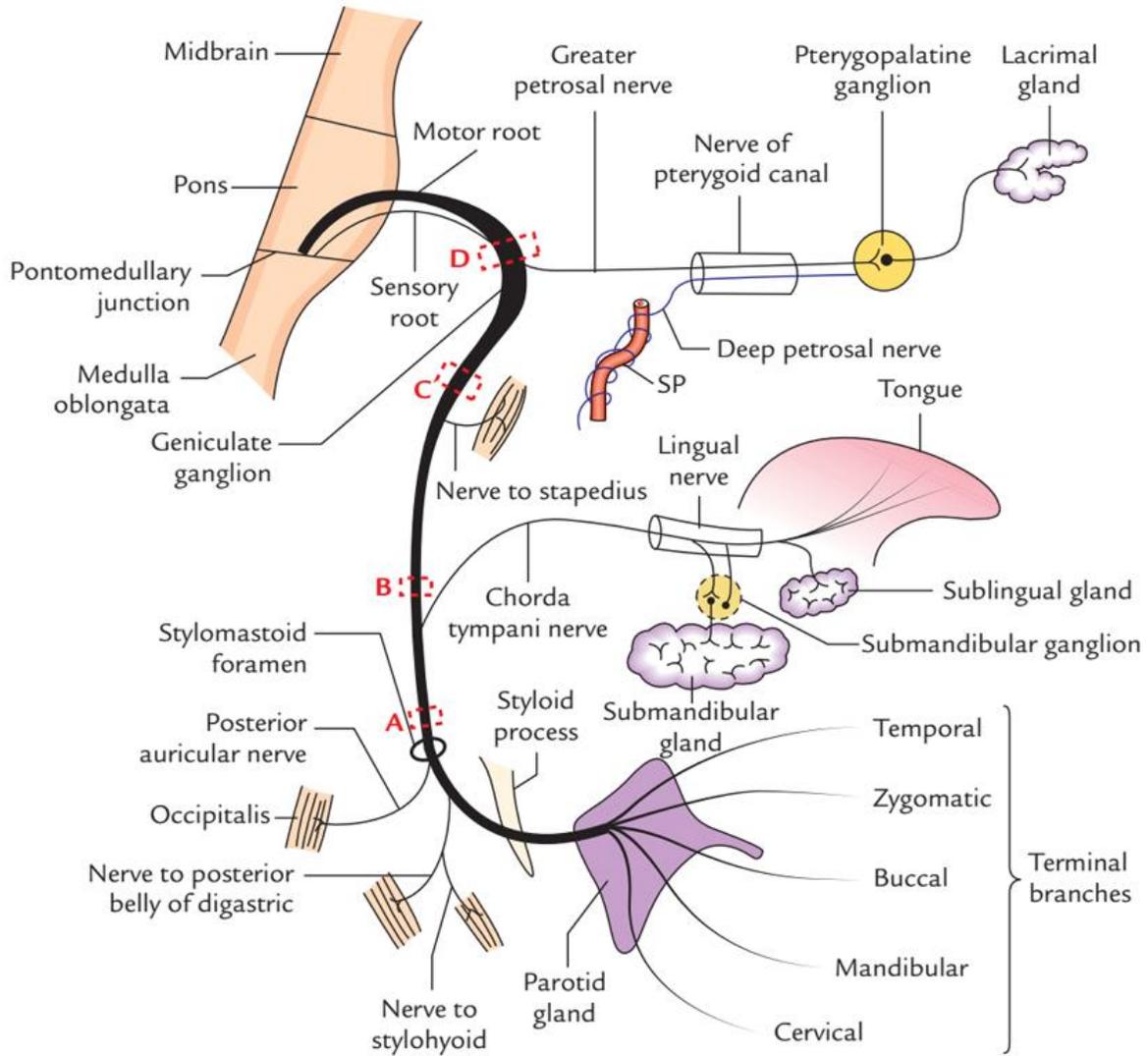
4. The mandibular branch

It emerges from the anterior border of the gland and supplies the muscles of the lower lip.

The nerve runs forwards above, along, or below the lower border of the mandible. From below the mandible it crosses the inferior border of the bone to reach the face just beyond the anterior border of the masseter muscle, passing superficial to the facial artery and vein. The nerve is in danger when an incision is made at or near the lower border of the mandible. The damage to the nerve invariably causes detectable paralysis of the depressors of the lower lip and mouth angle.

5. The cervical branch

It emerges from the lower border of the gland and passes forward in the neck below the mandible to supply the platysma muscle; it may cross the lower margin of the body of the mandible to supply the depressor anguli oris muscle.



The course of facial nerve with its branches

A: stylomastoid foramen, B: petrotympanic fissure, C: middle ear cavity, D: internal auditory canal

This is the End of the Lecture - Good Luck