

Mouth and Salivary Glands

Mouth is otherwise known as oral cavity. It is formed by cheeks, lips and palate. It encloses the teeth, tongue and salivary glands. Mouth opens anteriorly to the exterior through lips and posteriorly through fauces into the pharynx. Digestive juice present in the mouth is saliva, which is secreted by the salivary glands.

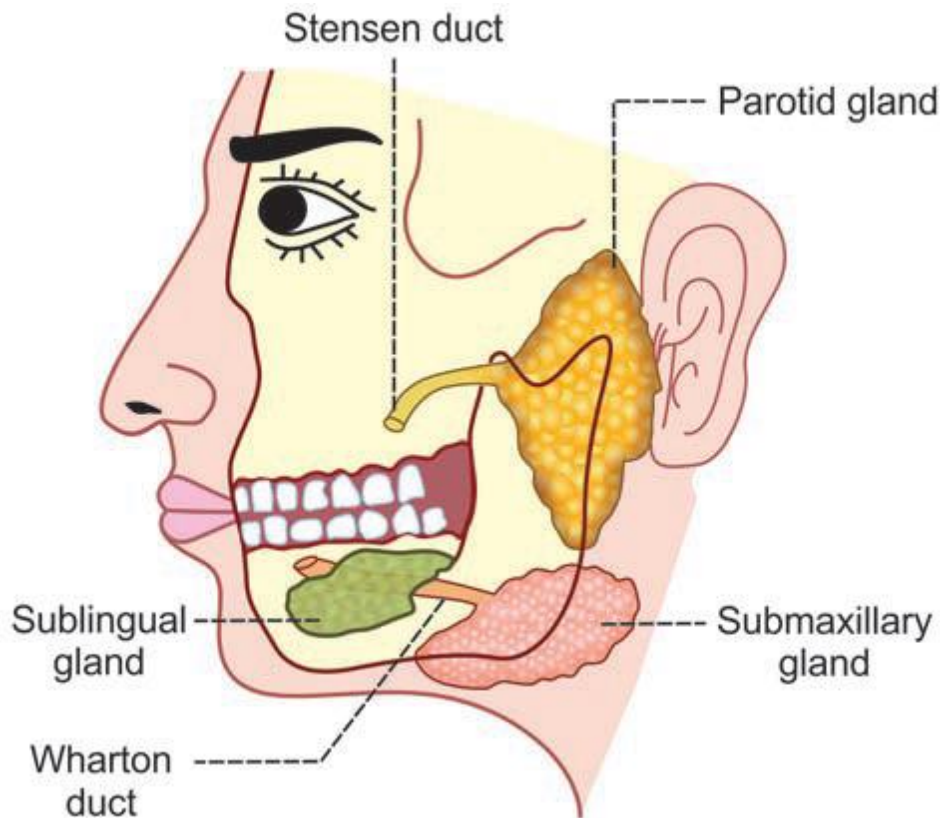


FIGURE 37.1: Major salivary glands

FUNCTIONS OF MOUTH

Primary function of mouth is eating and it has few other important functions also.

Functions of mouth include:

1. Ingestion of food materials
2. Chewing the food and mixing it with saliva
3. Appreciation of taste of the food
4. Transfer of food (bolus) to the esophagus by swallowing
5. Role in speech
6. Social functions such as smiling and other expressions.

SALIVARY GLANDS

In humans, the saliva is secreted by three pairs of major (larger) salivary glands and some minor (small) salivary glands.

„ MAJOR SALIVARY GLANDS

Major glands are:

1. Parotid glands
2. Submaxillary or submandibular glands
3. Sublingual glands.

1. Parotid Glands

Parotid glands are the largest of all salivary glands, situated at the side of the face just below and in front of the ear. Each gland weighs about 20 to 30 g in adults. Secretions from these glands are emptied into the oral cavity by Stensen duct. This duct is

about 35 mm to 40 mm long and opens inside the cheek against the upper second molar tooth

2. Sub maxillary Glands

Submaxillary glands or submandibular glands are located in submaxillary triangle, medial to mandible. Each gland weighs about 8 to 10 g. Saliva from these glands is emptied into the oral cavity by Wharton duct, which is about 40 mm long. The duct opens at the side of frenulum of tongue, by means of a small opening on the summit of papilla called caruncula sublingualis.

3. Sublingual Glands

Sublingual glands are the smallest salivary glands situated in the mucosa at the floor of the mouth. Each gland weighs about 2 to 3 g. Saliva from these glands is poured into 5 to 15 small ducts called ducts of Rivinus. These ducts open on small papillae beneath the tongue. One of the ducts is larger and it is called Bartholin duct. It drains the anterior part of the gland and opens on caruncula sublingualis near the opening of submaxillary duct.

CLASSIFICATION OF SALIVARY GLANDS

Salivary glands are classified into three types, based on the type of secretion:

1. Serous Glands

Serous glands are mainly made up of serous cells. These glands secrete thin and watery saliva. Parotid glands and lingual serous glands are the serous glands.

2. Mucus Glands

Mucus glands are mainly made up of mucus cells. These glands secrete thick, viscous saliva with high mucin content. Lingual mucus glands, buccal glands and palatal glands belong to this type.

3. Mixed Glands

Mixed glands are made up of both serous and mucus cells. Submandibular, sublingual and labial glands are the mixed glands.

„ STRUCTURE AND DUCT SYSTEM OF SALIVARY GLANDS

Salivary glands are formed by acini or alveoli. Each acinus is formed by a small group of cells which surround a central globular cavity. Central cavity of each acinus is continuous with the lumen of the duct.

The fine duct draining each acinus is called intercalated duct. Many intercalated ducts join together to form intralobular duct. Few intralobular ducts join to form interlobular ducts, which unite to form the main duct of the gland (Fig. 37.2). A gland with this type of structure and duct system is called racemose type (racemose = bunch of grapes).

„ PROPERTIES AND COMPOSITION OF SALIVA **„ PROPERTIES OF SALIVA**

1. Volume: 1000 mL to 1500 mL of saliva is secreted per day and it is approximately about 1 mL/minute.
2. Reaction: Mixed saliva from all the glands is slightly

acidic with pH of 6.35 to 6.85

3. Specific gravity: It ranges between 1.002 and 1.012

4. Tonicity: Saliva is hypotonic to plasma.

COMPOSITION OF SALIVA

Mixed saliva contains 99.5% water and 0.5% solids.

Composition of saliva is given in Figure 37.3.

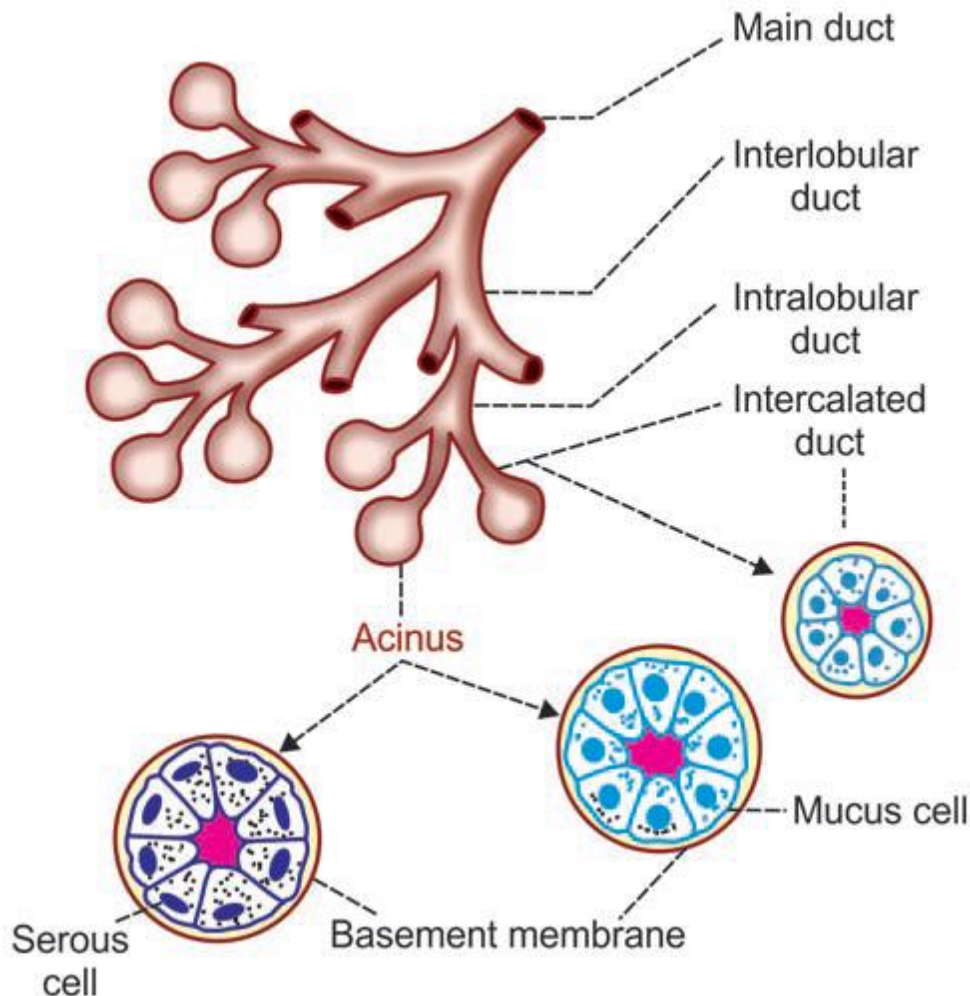
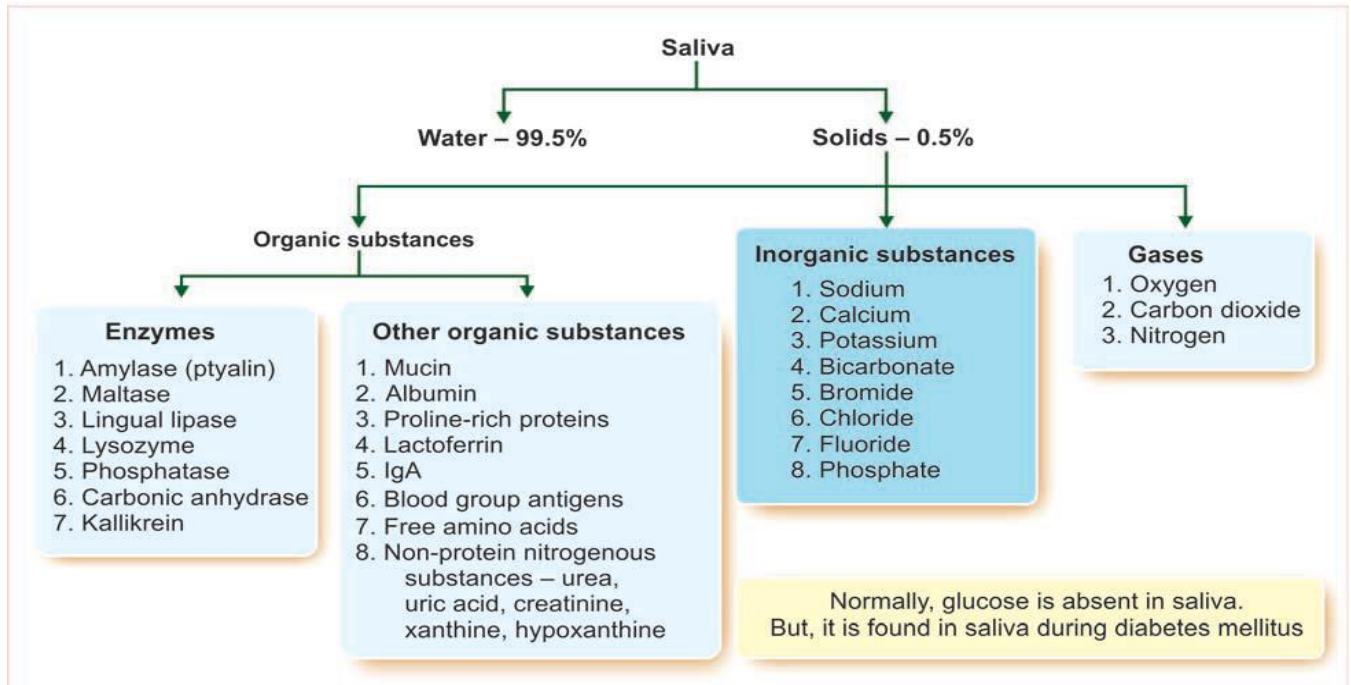


FIGURE 37.2: Diagram showing acini and duct system in salivary glands

Contribution by each major salivary gland is:

- i. Parotid glands : 25%
- ii. Submaxillary glands : 70%
- iii. Sublingual glands : 5%.



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FIGURE 37.3: Composition of saliva

FUNCTIONS OF SALIVA

Saliva is a very essential digestive juice. Since it has many functions, its absence leads to many inconveniences.

” 1. PREPARATION OF FOOD FOR SWALLOWING

When food is taken into the mouth, it is moistened and dissolved by saliva. The mucus membrane of mouth is also moistened by saliva. It facilitates chewing. By the movement of tongue, the moistened and masticated food is rolled into a bolus. Mucin of saliva lubricates the bolus and facilitates swallowing.

„ 2. APPRECIATION OF TASTE

Taste is a chemical sensation. By its solvent action, saliva dissolves the solid food substances, so that the dissolved substances can stimulate the taste buds. The stimulated taste buds recognize the taste.

„ 3. DIGESTIVE FUNCTION

Saliva has three digestive enzymes, namely salivary amylase, maltase and lingual lipase (Table 37.1).

Salivary Amylase

Salivary amylase is a carbohydrate-digesting (amylolytic) enzyme. It acts on cooked or boiled starch and converts it into dextrin and maltose. Though starch digestion starts in the mouth, major part of it occurs in stomach because, food stays only for a short time in the mouth. Optimum pH necessary for the activation of salivary amylase is 6. Salivary amylase cannot act on cellulose.

Maltase

Maltase is present only in traces in human saliva and it converts maltose into glucose.

Lingual Lipase

Lingual lipase is a lipid-digesting (lipolytic) enzyme. It is secreted from serous glands situated on the posterior aspect of tongue. It digests milk fats (pre-emulsified fats). It hydrolyzes triglycerides into fatty acids and diacylglycerol (Table 37.2).

▮ 4. CLEANSING AND PROTECTIVE FUNCTIONS

1. Due to the constant secretion of saliva, the mouth and teeth are rinsed and kept free of food debris, shed epithelial cells and foreign particles. In this way, saliva prevents bacterial growth by removing materials, which may serve as culture media for the bacterial growth.

2. Enzyme lysozyme of saliva kills some bacteria such as staphylococcus, streptococcus and brucella.

3. Proline-rich proteins present in saliva possess antimicrobial property and neutralize the toxic substances such as tannins. Tannins are present in many food substances including fruits.

4. Lactoferrin of saliva also has antimicrobial property

5. Proline-rich proteins and lactoferrin protect the teeth by stimulating enamel formation.

6. Immunoglobulin IgA in saliva also has antibacterial and antiviral actions.

7. Mucin present in the saliva protects the mouth by lubricating the mucus membrane of mouth.

TABLE 37.2: Digestive enzymes of saliva

	Source of secretion	Activator	Action
Salivary amylase	All salivary glands	Acid medium	Converts starch into maltose
Maltase	Major salivary glands	Acid medium	Converts maltose into glucose

Lingual lipase	Lingual glands	Acid medium	Converts triglycerides of milk fat into fatty acids and diacylglycerol
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▮ REGULATION OF SALIVARY SECRETION

Salivary secretion is regulated only by nervous mechanism. Autonomic nervous system is involved in the regulation of salivary secretion.

▮ NERVE SUPPLY TO SALIVARY GLANDS

Salivary glands are supplied by both parasympathetic and sympathetic divisions of autonomic nervous system.

▮ PARASYMPATHETIC FIBERS

Parasympathetic Fibers to Submandibular and Sublingual Glands

Parasympathetic preganglionic fibers to submandibular and sublingual glands arise from the superior salivatory nucleus, situated in pons. After taking origin from this nucleus, the preganglionic fibers run through nervus intermedius of Wrisberg, geniculate ganglion, the motor fibers of facial nerve, chorda tympani branch of facial nerve and lingual branch of trigeminal nerve and finally reach the submaxillary ganglion (Fig. 37.4). Postganglionic fibers arising from this ganglion supply the submaxillary and sublingual glands.

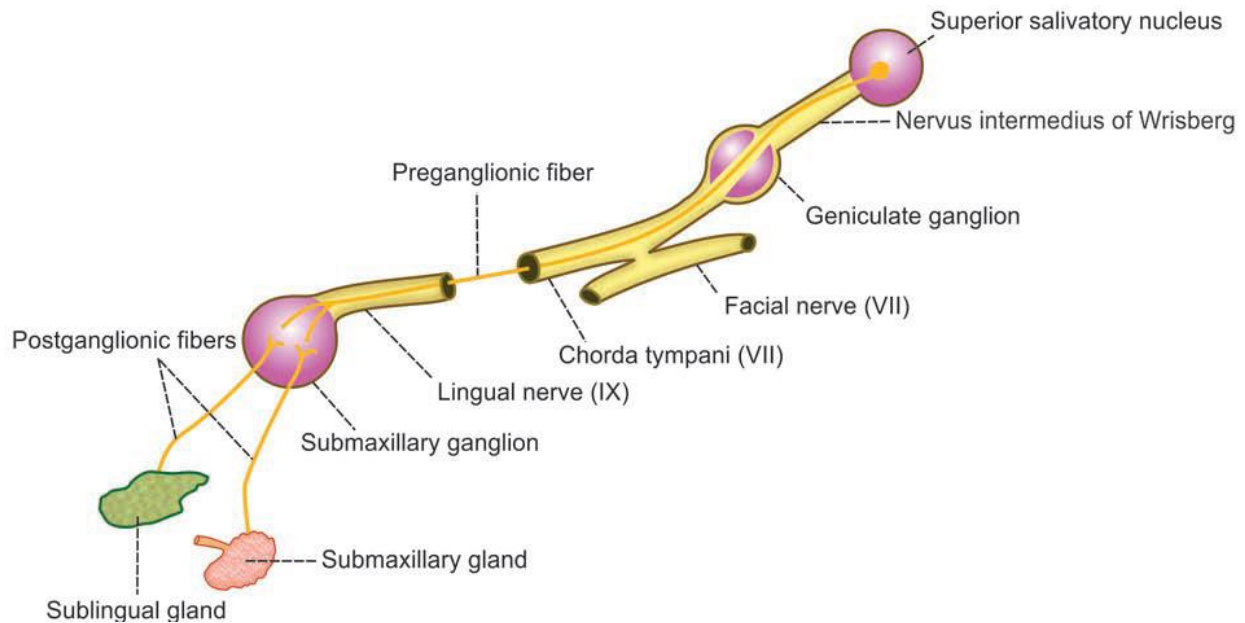


FIGURE 37.4: Parasympathetic nerve supply to submaxillary and sublingual glands

Parasympathetic Fibers to Parotid Gland

Parasympathetic preganglionic fibers to parotid gland arise from inferior salivatory nucleus situated in the upper part of medulla oblongata. From here, the fibers pass through the tympanic branch of glossopharyngeal nerve, tympanic plexus and lesser petrosal nerve and end in otic ganglion (Fig. 37.5).

Postganglionic fibers arise from this ganglion and supply the parotid gland by passing through auriculotemporal branch in mandibular division of trigeminal nerve.

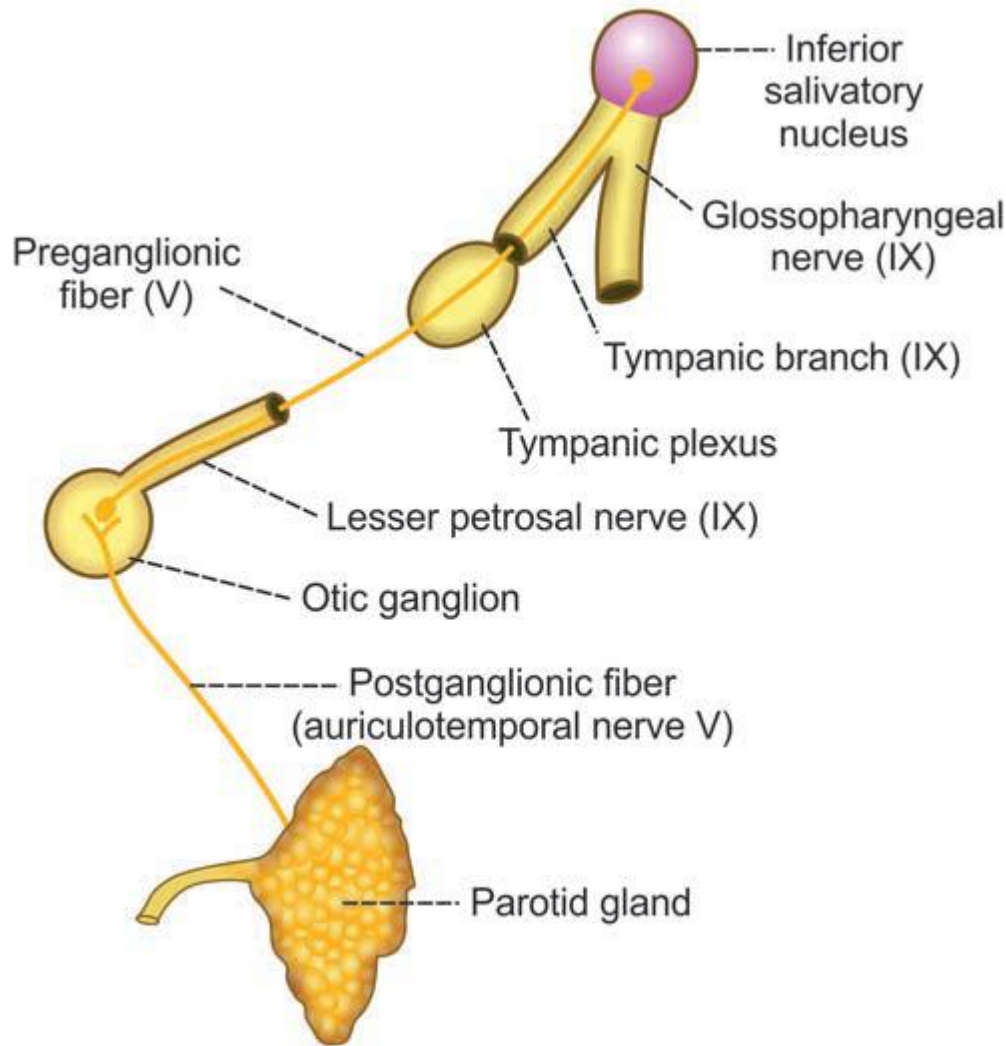


FIGURE 37.5: Parasympathetic nerve supply to parotid gland

Function of Parasympathetic Fibers

Stimulation of parasympathetic fibers of salivary glands causes secretion of saliva with large quantity of water. It is because the parasympathetic fibers activate the acinar cells and dilate the blood vessels of salivary glands. However, the amount of organic constituents in saliva is less. The neurotransmitter is acetylcholine.

„ **SYMPATHETIC FIBERS**

Sympathetic preganglionic fibers to salivary glands arise from the lateral horns of first and second thoracic segments of spinal cord. The fibers leave the cord through the anterior nerve roots and end in superior cervical ganglion of the sympathetic chain. Postganglionic fibers arise from this ganglion and are distributed to the salivary glands along the nerve plexus, around the arteries supplying the glands.

Function of Sympathetic Fibers

Stimulation of sympathetic fibers causes secretion of saliva, which is thick and rich in organic constituents such as mucus. It is because, these fibers activate the acinar cells and cause vasoconstriction. The neurotransmitter is noradrenaline.