

Salivary Glands

Salivary glands are compound, tubuloacinar, merocrine, exocrine glands the ducts of which open into the oral cavity.

- The term **compound** refers to the fact that salivary gland has more than one tubule entering the main duct, **tubuloacinar** describes the morphology of the secreting cells **merocrine** indicates that only the secretion of the cells is released **exocrine** describes a gland that secretes fluid on to a free surface.

Saliva composition and function

Saliva is over 99% water, yet the very small amount of additional inorganic and organic compounds (such as proteins, glycoproteins and enzymes) allows it to perform many important functions.

- 1 -A major role is related to the production of mucin, which act as a lubricant during mastication, swallowing and speech.
- 2 -The mucous film protect the mucosa and keeps it moist.
- 3 -Saliva bring substances into solution so that they can be tasted.
- 4 -Saliva limits the activity of bacteria by causing their aggregation.
- 5-Saliva contains minerals and act as a buffer; both feature help to maintain the integrity of the dental enamel.
- 6-Peptide growth factors (e.g. epidermal growth factor, nerve growth factor) are produced by the submandibular gland. Their precise functions are not known but epidermal growth factor may be involved in wound healing and (together with mucin) maintaining gastroesophageal epithelial integrity.
- 7-Saliva contains small quantities of numerous other proteins, to which many different functions have been ascribed. Among these are cystatin (inhibitors of harmful cysteine proteinases produced by bacteria and dying neutrphils), lysozyme histatin and lactoferrin (antibacterial agents), and gustin (detection of taste).
- 8-Immunoglobulins (mainly IgA) are produced by plasma cells within the stroma of the salivary glands and secreted into saliva to function as part of a widespread mucosal immune system that also includes lymphoid tissue in the gut and bronchi.

9-Apolysaccharide-hydrolysing enzyme (amylase) is present in saliva to aid digestion.

Normal Histology of Salivary Gland

*Salivary glands consist of two main elements: the glandular secretory tissue (the parenchyma) and the supporting connective tissue (the stroma). From the stroma of the capsule surrounding and protecting the gland pass septa that subdivided the gland into major lobes; lobes are further subdivided into lobules. Each lobe contains numerous secretory units consisting of clusters of grape- like structures (the acini) positional around a lumen.

A secretory acinus may be serous, mucous or mixed.

Serous acini can be distinguished from mucous acini according to the nature of the secretion produced and, in structural terms, the morphology of their secretory granules. Serous cells secrete more protein and less carbohydrate than mucous cells. The acinus, via its lumen, empties into an intercalated duct lined with cuboidal epithelium, which in turn joins a larger striated duct formed of columnar cells. Both the intercalated and striated ducts are intralobular and affect the composition of the secretion passing through them. The striated ducts empty into the collecting ducts, which are mainly interlobular. Basal cells are present and are sparsely distributed in the striated ducts and more densely distributed in the collecting ducts.

The collecting ducts join until the main duct is formed. The main duct carries the saliva to the mucosal surface and may be lined near its termination by a layer of stratified squamous epithelial cells.

The connective tissue septa carry the blood and nerve supply into the parenchyma. Plasma cells (which secrete the immunoglobulins) are found in the stroma of the gland around the intralobular ducts. With age, there is a decrease in the number of the secretory cells.

The acini of the parenchyma are responsible for the production of primary secretion. Saliva is the product of an active secretory process and is not an ultrafiltrate of blood.

The serous cells produce a watery proteinaceous fluid and are the source of amylase.

The secretory product of mucous cells contains proteins linked to a greater amount of carbohydrate, forming a more viscous, mucin-rich product. Both serous and mucous cells are arranged as acini, although groups of mucous cells may have a more tubular form. Acini may contain either serous or mucous cells or may be mixed.

Around the acini and intercalated ductal cells, contractile cells with several processes are present and represent the myoepithelial (basket) cells.

Salivary glands may be classified according to size (major and minor) and/or the types of secretion (mucous, serous or mixed).

The three paired major salivary glands are the parotid, submandibular and sublingual glands. The numerous minor salivary glands are scattered throughout the oral mucosa and include the labial, buccal, palatoglossal, palatal and lingual glands. Salivary glands are not present in the gingival or the dorsum of the anterior two-thirds of the tongue.

Parotid gland

Serous cells

The parotid gland is the largest of the salivary glands. It is enclosed within a well defined capsule, the parotid capsule. The acini of the gland are serous, although mucous cells are occasionally present. The cells have a characteristic granular appearance with routine H and E staining.

Connective tissue septa can be seen subdividing the secretory parenchyma into lobes and then further into lobules. The connective tissue contains blood vessels, nerves, and collecting ducts.

The prominent nuclei are round and located in the basal third of the cells, which is basophilic (because of the presence of rough endoplasmic reticulum). The granular appearance of the serous cells results from the numerous refractile granules in the luminal portion of the cells (adjacent to the lumen).

The appearance of serous cells will clearly vary with the level of secretory activity. Following the synthesis of secretory products resting (unstimulated) serous cells will contain numerous secretory granules in

the luminal parts of their cytoplasm. With reflex stimulation of salivary flow during mastication at meal times, the number of granules will be severely depleted after being discharged into the lumen by exocytosis.

Submandibular gland

The second largest salivary glands. This gland contains serous end pieces and mucous tubules capped with serous demilunes, thus it is a mixed gland. Although the proportion of serous and mucous secretory end pieces may vary from lobule to lobule and among individual glands, serous cells significantly outnumber the mucous cells. The serous end pieces are similar in structure to those found in the parotid gland, with abundant secretory granules, a spherical nucleus, and basophilic cytoplasm.

Sublingual Gland

The sublingual gland also is a mixed gland, but mucous secretory cells predominate. The mucous tubules and serous demilunes resemble those of the submandibular gland. Although serous end pieces may be present, they are rare, and most structure appearing as serous end pieces properly represent sections through demilune that don't include the mucous tubule.

Minor salivary gland

Minor salivary glands are found through out the oral cavity. These glands consist of aggregates of secretory end pieces and ducts, organized into small lobule-like structure located in the submucosa or between muscle fibers of the tongue. The ducts draining individual glandular aggregates usually open directly onto the mucosal surface.

Minor gland saliva typically is rich in mucine ,various antibacterial proteins, and secretory immunoglobulin. The minor glands exhibit a continuous slow secretory activity, and thus have an important role in protecting and moistening the oral mucosa, especially at night when the major salivary glands are mostly inactive.

Mucous cells

Secretory end pieces that are composed of mucous cells typically have a tubular configuration ; when cut in cross section , these tubules appear as

round profiles with mucous cells surrounding a central lumen of larger size than that of serous end pieces.

The most prominent feature of mucous cells is the accumulation in the apical cytoplasm of large amounts of secretory product (mucus), which compresses the nucleus and endoplasmic reticulum against the basal cell membrane. The secretory material appear unstained in routine histological preparation.

Myoepithelial cells

Myoepithelial cells are contractile cells associated with the secretory end pieces and intercalated ducts of the salivary glands. Myoepithelial cells have many similarities to smooth muscle cells but are derived from epithelium. Myoepithelial cells present around the secretory end pieces have a stellate shape; numerous branching processes extended from the cell body to surround and embrace the end piece.

Contraction of the myoepithelial cells is thought to provide support for the end pieces during active secretion of saliva. The cells also may help to expel the primary saliva from the end piece into the duct system.

Ducts

The ductal system of salivary gland is a varied network of tubules that progressively increased in diameter, beginning at the secretory end pieces and extending to the oral cavity. The three classes of ducts are intercalated, striated, and excretory, each with differing structure and function. The ductal system is more than just a simple conduit for the passage of saliva; it actively participates in the production and modification of saliva.

Intercalated ducts

The primary saliva produced by the secretory end pieces passes first through the intercalated ducts, the first cells of the intercalated duct are directly adjacent to the secretory cells of the end piece, and the lumen of the end piece is continuous with the lumen of the intercalated duct.

Striated ducts

These striated ducts which receive the primary saliva from the intercalated ducts, constitute the largest portion of the duct system. These ducts are the main ductal component located within the lobules of the gland, that is intralobular. Striated ducts are columnar.

Excretory ducts

The excretory ducts are located in the C.T. septa between the lobules of the gland, that is, in an extralobular or interlobular location. These ducts are larger in diameter than striated ducts and typically have a pseudostratified epithelium with columnar cells. The epithelium of the main excretory duct may become stratified near the oral opening.