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MORPHOLOGY OF THE MAJOR SALIVARY GLANDS

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Abstract
Salivary glands are crucial exocrine organs responsible for the production and secretion of saliva, which is essential for the initial stages of digestion, oral health, and antimicrobial defense. This article explores the anatomy, histology, and functional significance of the major and minor salivary glands, focusing on their cellular architecture and physiological roles in human health. Understanding the salivary glands' structure and function provides insight into various pathological conditions that can arise due to dysfunction or disease of these glands.

Keywords: Immunology, biochemistry, pH level.

Introduction

The salivary glands, located within the oral cavity and surrounding regions, are essential components of the digestive system. They secrete saliva, a fluid that contains enzymes, electrolytes, mucus, and antibacterial compounds. Saliva aids in digestion, facilitates swallowing, maintains oral moisture, and plays a vital role in protecting oral tissues from infections. This article provides a detailed examination of the anatomy and histology of the salivary glands, which will help in understanding both their normal function and potential pathological conditions. Anatomy of the Salivary Glands.The human salivary glands can be classified into major and minor glands.The major salivary glands consist of three pairs of large glands: the parotid, submandibular, and sublingual glands.Parotid Glands: The largest pair of salivary glands, located in front of the ears, these glands secrete a primarily serous (watery) secretion. The parotid glands have ducts (Stensen's ducts) that open into the oral cavity near the second upper molar.Submandibular Glands: Located beneath the jaw, the submandibular glands secrete a mixed secretion that contains both serous and mucous components. These glands have ducts (Wharton's ducts) that open under the tongue near the frenulum.Sublingual Glands: These are the smallest of the major glands and are located beneath the tongue. They secrete mostly mucous saliva and have multiple small ducts (Rivinus' ducts) that open into the floor of the mouth.

Histology of the Salivary Glands

The histological structure of the salivary glands is adapted for efficient secretion of saliva. The glands are composed of several key components, including acini, ducts, and connective tissue.

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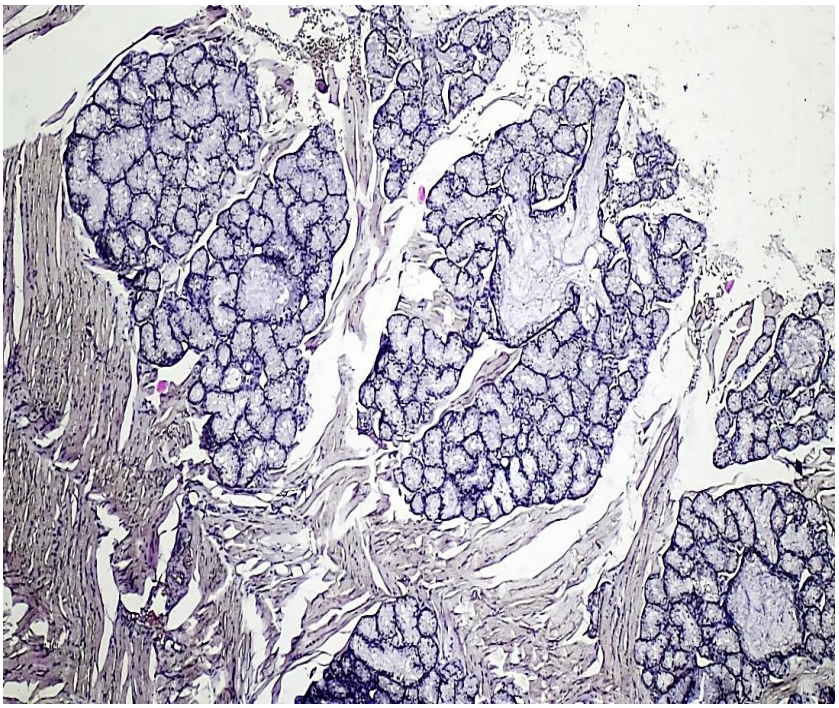
Material and Method

The objects of research were 3-6-month-old white male rats weighing 160-180 grams, their saliva, and micropreparations from the salivary glands of rats, stained with hemotoxylin and eosin, performed using the Wanginzon method.

Results and Discussion

The Vanginzon method is a well-known technique for preparing tissue samples, particularly for histological examination, and can be effectively used to prepare salivary gland tissues for analysis. The use of Hematoxylin and Eosin (H&E) staining provides clear visualization of tissue structures, including the acini, ducts, and connective tissue, allowing for detailed examination under the microscope.



Hematoxylin-eosin-stained microscopy of sublingual salivary gland

Serous Acini: These are spherical clusters of cells that secrete a watery, enzyme-rich fluid. The cells are pyramidal in shape, with a basal nucleus and granular cytoplasm that appears purple-blue under H&E staining (due to the hematoxylin stain). You may observe zymogen granules in the cytoplasm, which are involved in the secretion of enzymes like amylase.Mucous Acini: These acini secrete a thick, mucous fluid. The cells appear more columnar or cuboidal with a flattened nucleus that is typically located at the base of the cell. The cytoplasm of mucous cells appears pale or clear because of the mucin, which doesn't stain well with hematoxylin, so they are less prominent under the microscope.Mixed Acini: Many salivary glands, such as the submandibular gland, contain both serous and mucous acini. The serous cells often form a crescent shape around the mucous cells, known as "demilunes."Intercalated Ducts: These ducts are small and appear as thin, cuboidal cells. They are located closest to the acini and help transport saliva. The lumen (the central opening) is typically small.Striated Ducts: These ducts are larger and have a columnar epithelium with distinct basal striations (vertical invaginations of the plasma membrane), which

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give them a striated appearance under the microscope. The striated ducts are involved in the modification of saliva, particularly the reabsorption of sodium and secretion of potassium and bicarbonate.Excretory Ducts: These are the largest ducts, such as Stensen's duct (in the parotid gland), which transport saliva into the oral cavity. The epithelium is stratified cuboidal or columnar, and the lumen is much wider compared to the smaller ducts.Fibrous Capsule: The entire gland is enclosed by a fibrous capsule, which can be seen as a dense layer of connective tissue surrounding the gland.Septae (Lobules): Inside the gland, connective tissue septa divide the gland into smaller lobes and lobules. These septa contain blood vessels, nerves, and lymphatic vessels, which are essential for the gland's function.Interlobular Connective Tissue: Between the lobules, you may observe loose connective tissue that contains collagen fibers and fibroblasts.Blood vessels can be seen in the connective tissue septa as small capillaries and larger blood vessels.Nerves are often visible as nerve bundles running within the connective tissue. They typically appear as small, dark-staining fibers within the gland.The striated ducts have a distinctive basal striation due to the arrangement of mitochondria in the basal part of the ductal cells. This striation is important for understanding the physiological role of these ducts in modifying the ionic composition of the saliva.In pathological preparations (e.g., in cases of infection or autoimmune diseases), you may also observe lymphocytes and other inflammatory cells in the connective tissue or around the ducts and acini. These can appear as small, darkly stained nuclei scattered among the tissue.

Conclusion

The Vanginzon method, when combined with Hematoxylin-Eosin staining, offers a clear and effective way to prepare and analyze the microscopic structure of the salivary glands. The resulting tissue sections provide valuable insights into the gland's histology, which is essential for both basic biological research and clinical diagnostics.Summary of Key Observations:Serous acini: Round or spherical clusters of cells with granular cytoplasm and basal nuclei.Mucous acini: Larger, more columnar cells with a flattened nucleus and pale cytoplasm.Ducts: Vary from small, cuboidal intercalated ducts to larger, striated ducts and excretory ducts with stratified epithelium.Connective tissue: Capsules, septa, and interlobular spaces with blood vessels and nerves.Striations: In striated ducts, visible as basal invaginations in the cell membranes.

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