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**NORMATIVE MORPHOLOGICAL INDICATORS OF THE SUBMANDIBULAR SALIVARY GLAND IN A 4-6-MONTH-OLD WHITE OUTBRED RAT**

**Khaydarova Nargiza Mukhiddinovna**  
**Bukhara State Medical Institute**  
[haydarova.nargiza@bsmi.uz](mailto:haydarova.nargiza@bsmi.uz)  
<https://orcid.org/0000-0002-6572-9578>

**Abstract:** The submandibular salivary gland has a complex alveolar-tubular structure and is of medium size among the three major salivary glands. In terms of secretion characteristics, it is classified as a mixed (seromucous) gland, with a predominance of the serous component. The submandibular gland plays a crucial role in maintaining the normal physiological condition of the oral cavity. Studying the morphology of this gland is important for dentistry, gastroenterology, and other fields of clinical medicine.

**Keywords:** submandibular salivary gland, salivary ducts, morphology, morphometry

**Relevance of the study.**

The major salivary glands play an important role in the human oral cavity and perform a number of functions that affect the overall health of the body. They consist of three pairs of major glands: The parotid gland is the largest salivary gland, located in front of the ear and produces mainly serous fluid. The submandibular gland is located under the lower jaw and produces mixed saliva. The sublingual gland is located under the tongue and produces mainly mucous saliva. The main functions of the major salivary glands: contain amylase and lipase enzymes, which help in the initial breakdown of starch and fats. Saliva softens food, making it easier to chew and swallow. Saliva contains lysozyme, lactoferrin and immunoglobulin A (IgA), which fight bacteria and protect the oral cavity from infections, keep the oral mucosa moist and prevent it from drying out, and in addition, taste receptors in food are activated by the action of solvents. Mineral substances (calcium, phosphorus) in saliva strengthen tooth enamel and protect against caries. Changes in the morphology of the salivary glands are observed under the influence of various pathologies. To compare these changes, accurate normative morphological and morphometric indicators are required.

**Research objective:** To study the normative morphological and morphometric indicators of the submandibular salivary gland of 5-month-old white outbred rats.

**Object of the study** For the experimental scientific study, 10 mixed-sex white outbred rats weighing 200-250 g, grown in standard vivarium conditions, were selected. Laboratory animals were kept in the vivarium of the Bukhara State Medical Institute.

**Results and analysis:**

The experimental animals were given sufficient water and fed a balanced diet. In the preparation and conduct of experimental studies, it was taken into account that proper care and feeding of laboratory animals is of great importance. The feeding regimen and diet were not violated, and hygienic rules were observed during feeding.

The bodies of animals that died before the start of the experiment were buried in the ground and disinfected with a 20% chlorine solution in accordance with the ACT on the disposal of dead laboratory animals.

Initially, white outbred rats were weighed and removed from the experiment by decapitation under ether anesthesia.

The submandibular salivary gland was removed from the oral cavity. The absolute weight of the gland was determined using a scale, a ruler and a caliper (the last two indicators are in the area of the gate of the organ). The weight index of the gland was calculated using the formula  $V_{in} = V_{bez} * 100 / V_{animal}$ , where V is weight.

For the purpose of morphological and morphometric studies of the study, the submandibular salivary gland was fixed in 10% neutralized formalin, washed in running water for 2-4 hours, dehydrated in alcohols of increasing concentration and chloroform, and paraffin blocks were prepared according to generally accepted methods. Paraffin blocks were cut 5-8  $\mu\text{m}$  thick and stained with hematoxylin-eosin. Staining with hematoxylin-eosin was carried out in the following order:

Before preparing the block, it is removed from paraffin (dewaxing). For this purpose, the preparations were successively passed through three portions of O-xylene, alcohols of decreasing strength (from 100° to 70°), and then they were placed in distilled water. The preparations prepared in this way were stained with hematoxylin and eosin. For this, the preparations were placed in hematoxylin solution for 3-5 minutes, then in tap water for washing and differentiation. After the nuclei acquire a purple color (controlled under a microscope), they are stained in eosin solution for 0.5-1.5 minutes. At the final stage, they are dehydrated, cleared and observed.

After the staining steps, we can see that the cellular components: collagen-white - pink, acidophilic cytoplasm - red, muscles - dark pink, basophilic cytoplasm - purple, erythrocytes - cherry red, nucleus - blue.

The sections were morphometrically examined using an ocular micrometer. The total volume, weight, shape and size of the gland (length, width, thickness, mm), the length and diameter of the internal secretion ducts ( $\mu\text{m}$ ), the outer diameter of the acini, the inner diameter and the height of the epithelial cells were determined. The thickness of the epithelial layer of the ducts ( $\mu\text{m}$ ) was measured. Measurements were made in five fields of view of each histological section. The fields of view were randomly selected.

To study the cytoarchitectonics of the submandibular salivary gland structures, the number of cells was counted under oil immersion under a NOVEL Model NLCD-307 (China) microscope at a magnification of 10x90. The number of cells was counted using a morphometric grid mounted on the microscope eyepiece (10x).

Mathematical processing of histo- and cytomorphometric data obtained during the study was carried out directly on a Pentium-IV personal computer, using the general matrix of the Microsoft Office software package "Excel 7.0". Using the capabilities of the "STTGRAPH 5.1" program, the standard deviation and the representative error indicator were determined.

Using the methods of variational parametric statistics, the arithmetic mean (M), the standard deviation ( ), the standard error of the mean (m), and the relative values (frequency%) were calculated. The significance of the differences in the compared values was assessed using the Student t-test. Differences were considered statistically significant at values of  $p \leq 0.05$ .

### Results and conclusions

In our experiment, the morphological parameters of the submandibular salivary gland of 5-month-old white outbred rats were studied. Macroscopically: in rats, the submandibular salivary gland is a paired organ, located on the medial side of the lower jaw, in the neck area. This gland has a soft, elastic structure, and is light pink in color. Its shape is medium-sized, slightly elongated or ovoid, and is well supplied with arteries, veins, and lymphatic vessels. Macroscopically, the structure of the submandibular salivary gland consists of the main glandular tissue and the capsule surrounding it. The blood vessels leading to the gland and the salivary ducts leading out are also clearly visible. The salivary gland is mixed (seromucinous) in terms of secretion, and contains serous and mucous cells, but serous cells predominate.

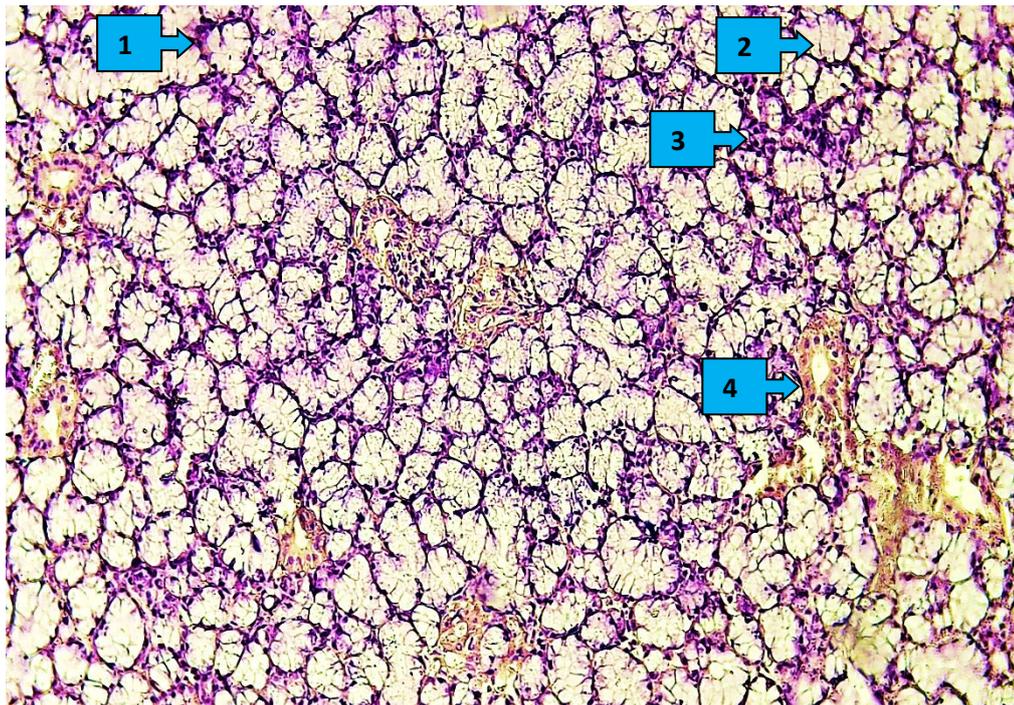


Figure 1.

**Microscopic view of the submandibular gland of a 5-month-old white outbred rat**

**G-E. Arrow 20xob 4. Connective tissue trabeculae (1) acinus (2) Interlobular duct (3) blood vessel (4)**

When examined microscopically, the gland is covered externally by a thin connective tissue capsule, which is divided into segments by tissue trabeculae. Each segment, in turn, consists of an acinus and the beginning of a secretory duct. This gland consists of two types of pure protein and mixed secretory endings. There are many pure protein-producing acini, and their structure consists of excretory ducts, like the final secretory part of the parotid gland. The acini consist of two types of cells: pyramidal cells with secretory properties and myoepithelial cells located between the acinus and the basement membrane. The upper part of the pyramidal cells contains small oxyphilic secretory granules, while the wider basal part is basophilic. At the tip of the secretory cell there are microvilli, and a large number of secretory granules are located in the apical cytoplasm. Their number varies depending on the functional state of the cell. Among the cells involved in protein secretion, there is an intercellular secretory duct, through which the cell product enters the acinus cavity. Contractile fibrils located in the cytoplasm of myoepithelial cells compress the acinar epithelium of this cell, ensuring the release of cellular secretion into the acinus cavity.

This gland consists of two types of pure and mixed secretory endings. Mixed secretory sections are larger, consisting of 2 types of protein and mucus-producing cells. Mucous cells are large, have a light cytoplasm, and occupy the central part of the acinus. The cell nucleus is very flattened and dense, located in its basal part. In the mixed acini, protein cells stand out as a kind of crescent-shaped structure next to the mucus-producing cells. The excretory ducts of the gland consist of intralobular, interlobular ducts, and the common duct of the gland. The intralobular duct, in turn, consists of the secretory and salivary ducts.

The secretory ducts are composed of low cuboidal epithelium, on the basal membrane of which myoepithelial cells are located.

The salivary ducts are lined with a single-layer cylindrical epithelium with oxyphilic cytoplasm. The interlobular ducts join the common duct, which is lined with multilayered cuboidal epithelium and opens into the mucous membrane of the lung in the area of the

upper maxillary teeth. The common excretory duct, Vartonov's duct, opens into the sublingual gland duct in the area of the lingual pedicle.

The results of the morphometric study showed that the external diameter, internal diameter, and epithelial cell height of the submandibular salivary gland acini of 5-month-old white outbred rats in the control group were  $36.27 \pm 2.17 \mu\text{m}$ ,  $9.47 \pm 0.63 \mu\text{m}$ , and  $14.18 \pm 1.05 \mu\text{m}$ , respectively.

**Conclusion:** The submandibular salivary gland is one of the important glands that participates in saliva production and oral moisture. Enzymes (e.g., amylase) contained in saliva break down carbohydrates and participate in balancing the oral microflora.

In our experiment, it was proven that its morphological characteristics are: the parenchyma consists of secretory compartments, mainly composed of mixed (serous and mucous) cells, and the excretory duct of the salivary gland is the Wharton's duct, which opens into the sublingual area.

### Referance:

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