

OBSERVATIONS CONCERNING SEXUAL DIMORPHISM IN SUBMANDIBULAR GLAND OF THE RATS

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ABSTRACT. The submandibular glands sampled from 8 rats (4 males and 4 females) were prepared for histological exams. Aspects concerning density and diameter of the granular tubes, but also the degree of grains deposits of the cells from tubular walls were followed. Differences regarding the degree of grains deposit from the granular cells were observed, even from a tube to another or from a cell to another, both in males and females, without significantly differences between these two sexes. Based on our results, we can say that the sexual dimorphism sustained by some authors was not confirmed by our investigation.

Keywords: sexual dimorphism, submandibular gland, rat, granular tube, diameter

INTRODUCTION

In some species of mammals, particularly in rodents, the sexual dimorphism of the submandibular gland is obviously and it is reflected by quantitative differences of the secretory products of the gland (Messaoudi et al., 2004). Generally, differences refer to synthesis, hoarding and releasing of the secretions of the submandibular gland in rodents. For, the sexual dimorphism of the submandibular gland of some rodents is still a disputed subject. Thus, the sexual dimorphism of the mouse submandibular gland was good established and recognized, but in rats the evidences are less clearly and even contradictory (Lagassagne, 1940). In this context, our study allowed for principal objective the appreciation of the sexual dimorphism of the rats submandibular gland by analysing of the grained tubes, beginning from the hypothesis that there are, between these two species, differences concerning tube diameters and the degree of grains deposits of them (Grad and Leblond, 1949).

MATERIALS AND METHODS

Animals. Biologic material used in this study was represented by eight white Whistar rats, four male and four females, weighing about 160 g each.

General procedure. After a preliminary narcosis with chlorophorm, the animals was sacrificed by atlanto-occipital dislocation. Animals were fixed in dorsal recumbency, than was practiced a skin incision longways to ventral median line of the neck, beginning from xyphoidian appendix till intermandibular space, followed by another two laterally incisions back to curved mandibular branch. After skin and subcutaneous connective tissue removal the submandibular gland was exposed, pictures were taken and the gland was than sampled for histological exams.

Preparation of tissues for analysis. After submandibular gland sampling, slices by 5 mm aproximatively were obtained with a very sharped blade by transverse sections. The slices were washed and dehydrated with ethylic alcohol in increasing concentrations (70°, 95°, absolute), clarified with butilic alcohol (n-butanol) and included in paraffin. Serial sections of 5 μ thickness were practiced and they were stained by Goldner's trichrom stain.

RESULTS AND DISCUSSIONS

The examination of a very high number of sections (serial sections) from the submandibular gland sampled from the 8 animals taken in study, facilitated getting of important informations regarding to microscopic structure of the gland. Both in samples from males and from those sampled from females, the number of granular tubes is high, clearly higher than number of striated channels. The observations aimed for instance the diameter of granular tubes, but also the degree of grains accumulation of the cells from the tubes walls. Little differences were understood and in some cases these were perceptible even in samples proceeded from the same animal and sometimes in the same section. These differences were observed from a tube to another and sometimes even from a portion to another of the same tube. In the cells from the grained tubes walls were presented acidophil polymorph grains, prevalent in entire cytoplasm, without obvious tendency to group to one of cell poles. The number and dimentions of these cells vary in very large limits in the cells from different tubes, but in a lot of situations even in cells or a group of cells from the same tube. The cell with a high degree of grain deposits appear taller, so the portions of the tub which contain many cells of this type appear to have bigger diameter than those which contain cells having few granulations.

Because sometimes there are big or very big differences from one zone to another zone of the same

tub, the diameter of the tub is not always constant on all its length. In this way can be observed some differences concerning diameter of the granulated tubes, but these differences are direct dependent by activity of the cells from tubes walls, activity which appear different, sometimes very different from one cell to another, respectively from one tube to another tube. Remark that this aspects are present both in males (fig. 1, 2) and females (fig. 3, 4), so meaningful differences between the sexes are difficult to be observed, least in case of healthy animals with the same age, treated with anything.

We mention that most of authors which pointed out the existence of a sexual dimorphism in the submandibular gland of the rats, obtained results after experiments where they used substances which influenced the activity of the gland. Anyway, all of this do not prove the existence of a sexual dimorphism, but the fact that it can be caused by administration of substances which can present a different effect depending on animal sex. Thus, Hammet (1929) cited by Parhon (1957) say that the submandibular gland in male rat aging 150 days is relatively more heavy than in females. Also, he establish the absence of complete inhibition of thyroid growth hormone in females, while in males the presence of this hormone can be just late.

Tache (1994) consider that histologic aspect of granular ductus is different in adult females that is the cells are smaller and they have less grains that the males. The authors consider that this sexual dimorphism is more obviously in mouse, rats and hamsters. On the other side, Grad and Leblond (1949) relate the existence of some tubes significantly greater in diameter in males in the 39th and 150th day, the aspect not being confirmed by Arvy, cited by Jacoby and Leson (1959) or Gabe (1950).

Analysis of the sexual dimorphism mechanism show the importance of thyroid gland; injecting thyroxine or administering dehydrated thyroxin in food the growth and granulation of the contort tubes were stimulated (Gabe, 1950); thyroidectomy and thyoureea had inverse effects. Earthy and Leblond (1954) studied the effect of the thyroxine after hypophisectomy found out a poor differentiation of the granular tubes. Estrogenic hormones have a thyroxine antagonist effect while the testosterone action synergistic (Arvy and Gabe, 1950; Leblond, 1949). Lagassange (1949) observ that injection of testosterone in rats females determine increasing of granular tubes diameters (until 53 μ), while in control group (males and females) do not exist significantly differences for tubes diameter. Further, was registered the existence and intervention of a hypophysar factor.

Screebny et al., (1955) deny the existence of a sexual dimorphism of the rats submandibular gland structure, but they notice a functional sexual dimorphism: the proteolytic activity of the glandular

extract was bigger than in males. In a series of samples was measured the diameter of intralobulary striated ductus and granular tubes in males and females, observing the same technology. Until 7 weeks of age there were not differences in diameter for tubes or ductus, but in 8th week the diameter of both structures was in average with 3-4 μ larger in males. Other authors assert that they observed a lot of samples from submandibular glands of male and female rats and they did not observe significantly quantitative changes concerning the number of tubes depending by sex of the animal. But they say that the maturization of the tubes with grains from submandibular gland of the rats is conditioned by prolane and sexual hormones (Parhon et al., 1957).

We mention that the sexual dimorphism related by some authors was not confirmed by our investigation. By appreciation of the samples resulted from males and females, we concluded that the density of granular channels is not the same not even on the whole surface of a section, and the degree of deposits of the cells with grains can be very different from a zone to another zone.

We made serial sections which offer a correct appreciation of the situation. Keeping in mind the aspects observed, we consider that regarding the density of the granular tubes and the degree of the grains deposits, there are differences between animals, between a zone to another from the same animal, so is difficult to sustain with arguments that there is a sexual dimorphism of the submandibular gland in rats.

By examining a big number of sections, we found that it could be difference favorable to males, but not so much that we can say there is a significantly one. We are tempted to believe that the results which bring to some authors to sustain the existence of the sexual dimorphism were conjunctural.

CONCLUSIONS

Concerning the diameter of the granular tubes, were observed differences from a tube to another, even from a portion to another from the same tube, both in males and females

The differences are directly dependent by activity of the cells from the tube walls, where they are burdened with grains the diameter of the tube being bigger and where the grains are less the diameter being smaller.

These aspects are dependent by gland functionality and they will change often significant changes are produced in gland activity or this activity is stimulated by administration of some substances.

The sexual dimorphism of the submandibular gland in rats is not confirmed by our investigation, in both sexes being differences from a zone to another zone both regarding the granular tubes density and its diameter.

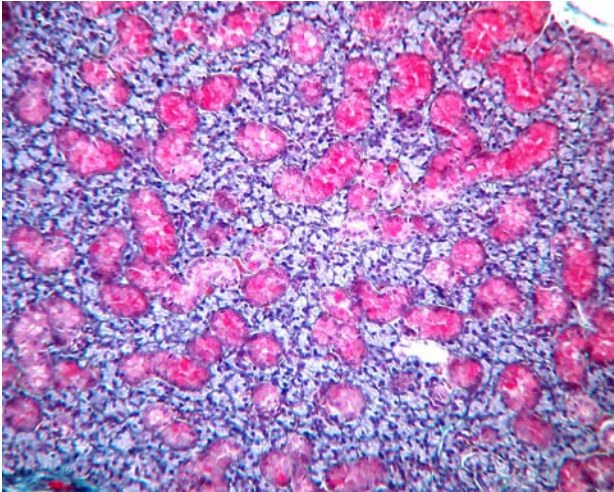


Fig. 1 High number of granular channels in male
(Goldner's trichrom stain, ob 10X)

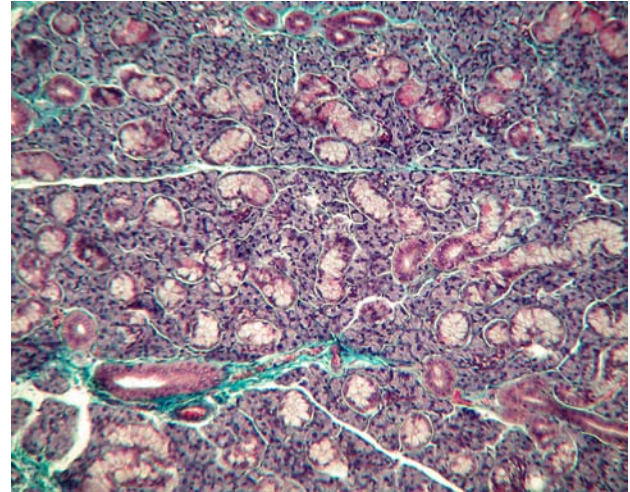


Fig. 2 Few granular channels with low degree of deposits
of secretory grains from the cells of the tubular walls in
males (Goldner's trichrom stain ob 10X)

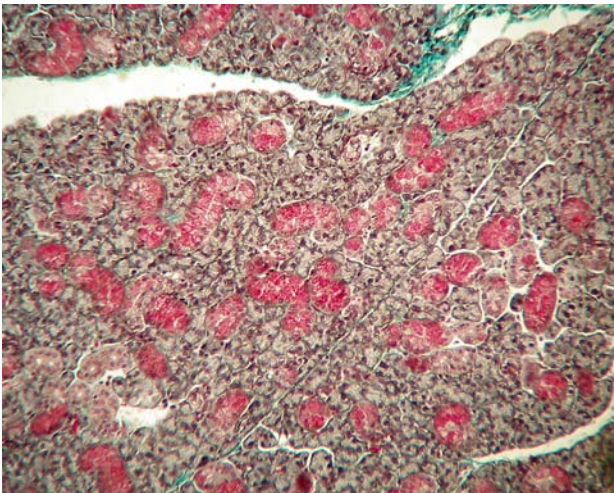


Fig. 3 Zone with many granular channels in female
(Goldner's trichrom stain, ob 10X)

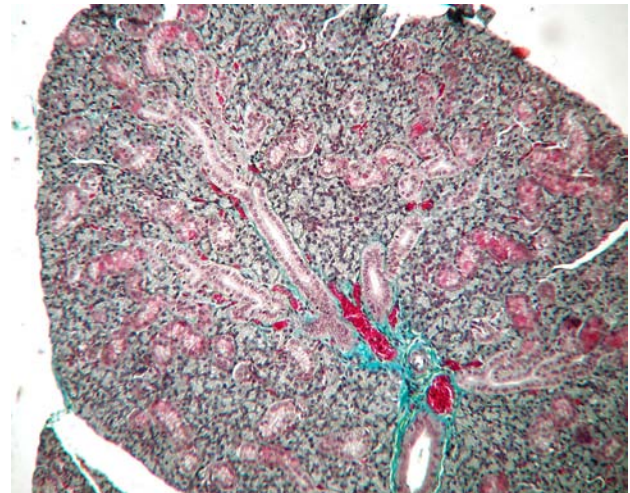


Fig. 4 Zone with few granular channels in female
(Goldner's trichrom stain, ob 10X)

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