Microscopical Aspects Concerning the Presence and Distribution of Mitochondria in Intralobular and Interlobular Ducts from Rat Parotid Gland

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Abstract

Saliva secreted by acini from parotid gland is concentrated in the excretory ducts. This study aims to highlight certain microscopical aspects concerning the presence, density and disposition of mitochondria in intralobular and interlobular ducts from parotid parenchyma in rats. In the intralobular ducts' segment lined by cuboidal cells, mitochondria are present throughout the whole cytoplasm, without a regular arrangement. In the area where cells are columnar, mitochondria become more numerous and most of them are disposed in the basal half and have a regular disposition (perpendicular to the basal pole). In the interlobular ducts, mitochondria are somehow less, but their disposition is similar to the one in the previous segment. In intralobular ducts with a thin wall, mitochondria have an irregular disposition and are present throughout the whole cytoplasm, while in striated and interlobular ducts, they have a regular disposition, perpendicularly on the basal pole of the cell and most of them are concentrated in the basal half of the cell.

Keywords: ducts, mitochondria, parotid, rat

INTRODUCTION

Parotid gland is formed out of sustaining tissue and parenchyma. Parenchyma is represented by glandular acini and excretory ducts (Miclăuș, 2012). In human and rodent parotid gland, it contains serous acini (Amano *et al.*, 2012). Saliva secreted by acini ends up in the intralobular ducts, which in turn continue with the interlobular ones. The latter type of ducts merge and form Stenon's duct. The first segment is represented by intercalated ducts, which continue with the striated ones (Gal and Miclăuș, 2013). Saliva secreted by acini is concentrated in striated ducts (Aughey and Frye, 2001) by changing the electrolyte composition (Evans *et al.*, 1993), reabsorption of sodium, probably mediated by Na⁺-K⁺ ATP-ase (Tandler *et*

al., 2001). Organization of the basal cytoplasm of the ductal cells reflects their involvement in water and electrolytes transport (Raica *et al.*, 2004), thus the main function of striated ducts is to transform saliva from isotonic to hypotonic (Tandler *et al.*, 2001). In the subnuclear region of striated ducts, there are numerous striations, perpendicular on the basement membrane, due to the presence of mitochondria, with a parallel arrangement among them and to the long axis of the cell (Diculescu *et al.*, 1971; Lantini *et al.*, 1990). This study aims to highlight certain microscopical aspects concerning the presence, density and disposition of mitochondria in intralobular and interlobular ducts from parotid parenchyma in rats.

MATERIAL AND METHODS

We harvested 3 mm thick samples from the parotid of five male Wistar rats, weighing about 180 g. The fragments were fixed in Orth's solution for 24 hours long. After fixation, the samples were washed with distilled water and subsequently postchromized in 3% potassium dichromate solution for 7 days long, changing the solution daily. The samples were washed 24 hours under tap water, dehydrated with ethanol, clarified with butanol and embedded in 56°C paraffin. We sectioned 4 µm slices from the paraffin blocks. For tissue contrasting, we stained the slides with Heidenhain's iron hematoxylin.

RESULTS AND DISCUSSIONS

In the intralobular ducts' segment lined by cuboidal cells, mitochondria have a medium density and dispose throughout the whole cytoplasm without significant density differences among the basal and apical pole of the cell. Upon their appearance on the section surface, mitochondria have an irregular arrangement, being oriented in all directions throughout the cytoplasm (Fig. 1).

In the part where the intralobular ducts' wall becomes columnar (striated ducts), mitochondria appear to be more numerous in comparison to

the anterior segment. Most of the mitochondria are disposed in the basal half of the cell and have an arranged disposition, parallel one to another and perpendicularly on the basement membrane. In the apical half of the cells, mitochondria are fewer, with a less arranged disposition. Moreover, mitochondria present in the apical half seem to be somehow shorter than the ones present in the basal half (Fig. 2).

In the interlobular ducts, mitochondria's density is somehow lower in comparison to the previous segment, without any differences regarding their disposition (Fig. 3).

The presence of mitochondria in relatively large numbers in intralobular ducts sustains the fact that cells utilize a large quantity of energy, aspect also signaled by other authors (Evans *et al.*, 1993; Aughey and Frye, 2001; Tandler *et al.*, 2001).

Regarding the disposition of mitochondria in striated ducts, the obtained results are similar to the ones described by other authors (Diculescu *et al.*, 1971; Lantini *et al.*, 1990), except that they do not signal the presence of mitochondria in the apical half of the cells. The presence of mitochondria in interlobular ducts in relatively large numbers, with the same disposition as in striated ducts, suggests the fact that the electrolyte reabsorption process continues up to this segment.

Fig. 1. Intralobular duct lined by cuboidal cells
Heidenhain's iron hematoxylin, red arrow – basal pole

CONCLUSIONS

In intralobular ducts lined by cuboidal cells, mitochondria dispose in all directions and are present in both basal and apical half, without density differences. In intralobular ducts, whose walls are formed out of columnar cells, most of the mitochondria are disposed in the basal half and

are parallel among them and perpendicularly on the basal membrane, while the apical part contains less mitochondria, oriented in all directions. In interlobular ducts, mitochondria have a similar disposition to the one in the striated ducts, but they are less numerous.

Fig. 2. Intralobular duct lined by columnar cells
Heidenhain's iron hematoxylin, red arrow – basal pole

Fig. 3. Interlobular duct
Heidenhain's iron hematoxylin, red arrow – basal pole

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