Original

Morphological Features of the Posterior Lingual Glands in the Gray Short-Tailed Opossums (Monodelphis domestica)

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Abstract: The posterior area of the mammalian tongue includes two sets of minor salivary glands, namely von Ebner’s glands and Weber’s glands. There have been morphological studies of the minor salivary glands, including reports on the posterior lingual glands of humans, monkeys and rats. However, there has been no report on the minor salivary glands of opossums. The present study was a histological investigation into the morphology of the posterior lingual glands in the gray short-tailed opossum. Lingual tissues were obtained from three opossums. All specimens were fixed in 10% neutral formalin solution, and paraffin sections were made by usual methods. They were stained with hematoxylin and eosin, PAS-alcian blue pH 2.5 and mucicarmine. Weber’s glands were located from the filiform papillae to the back of the circumvallate papilla, and they consisted of seromucous secretory cells showing mucous-rich mixed glands. These mucous cells were stained with alcian blue and/or PAS. The von Ebner’s glands were located from the fungiform papillae to the around of the circumvallate papilla, and they were typically PAS positive serous glands. Conclusively, the present study demonstrated characteristic features of the posterior lingual (Weber’s and von Ebner’s) glands of the gray short-tailed opossum, and it revealed histological data both in accordance with and different from that for the posterior lingual glands of other mammalians.

Key words: Morphology, Histology, Posterior lingual gland, Gray short-tailed opossum, Monodelphis domestica

Introduction

Salivary glands have important role in animals, providing lubrication for eating and vocalization, aiding digestion and taste and acting as a pH buffer. In vertebrates, there are two major paired salivary glands, named the submandibular and sublingual glands. Furthermore, in mammalians, the parotid glands appear and the major salivary glands consist of three sets. In addition to these major salivary glands, a large number of minor salivary glands also develop and exist in the mouth. The posterior area of the mammalian tongue includes two sets of posterior lingual glands. One of the posterior lingual glands, well known as von Ebner’s glands, is a group of tubuloacinar serous glands located beneath the circumvallate and foliate papillae of the tongue and their ducts open into the through at the base of the papillae. On the other hand, another of the posterior lingual glands, sometimes known as Weber’s glands, is located on the lateral margin at the level of the foliate papillae and in the root of the tongue behind the circumvallate papillae, and their ducts of Weber’s glands open into the crypts of lingual tonsils. There have been some histological reports on the posterior lingual glands of humans, monkeys and rats. Three have been only a few researches on the oromaxillofacial region of the opossum. However, there has been no report on the minor salivary glands of the opossums as far as we know.

The aim of the present study was to investigate the histological features of the posterior lingual glands in the gray short-tailed opossum.

Materials and Methods

Samples of the posterior lingual glands were obtained from three gray short-tailed opossums (Monodelphis domestica)
(female, 46 months old). The experimental protocol was approved by Nihon University Animal Care and Use Committee (Nos. AP09MD023, AP12MD015).

Light microscopy: Following fixation with 10% neutral formalin, the specimen was cut into several pieces and routine paraffin sections of sagittal direction at the midline and cross direction at other areas were made. The sections were stained with hematoxylin and eosin (HE), combine periodic acid-Schiff reaction (PAS)-alcian blue (AB) at pH 2.5 and mucicarmine by the usual methods.

Results

Gross finding

Macroscopically, the size of the tongue was 30 (length) × 8 (width) × 10 (thickness) mm (The size of width and thickness was that of the base of the tongue) (Fig. 1).

Microscopic findings

Posterior lingual glands consisted of two sets of the minor salivary glands (Fig. 2). One of the posterior lingual glands was named Weber’s glands. These Weber’s glands were located from the filiform papillae to the back of the circumvallate papilla and mainly existed in the upper and middle muscular layer, and they were the tubuloacinar glands consisting of seromucous secretory cells and were mucous-rich mixed glands (Fig. 3). These mucous acinar cells were composed of two kinds of cells, and one has basophilic cytoplasm but another hardly showed basophilia. Another of the posterior lingual glands was called von Ebner’s glands. These von Ebner’s glands were located from the fungiform
Weber’s glands were also mucous glands. On the other hand, mucous glands. Furthermore, Suzuki et al. present study revealed that Weber’s glands were mucous-rich present study and this finding was as same as others previously Ebner’s glands and another was Weber’s glands as reported composed of two sets of minor salivary glands and one was von far as we know.

The minor salivary glands are important components of the oral cavity, present in most parts of the mouth, and their secretions directly bathe the tissue\(^i\). Individual glands are usually in the submucosa or between muscles, and consist of groups of secretory endpieces make up of mucous acinar cells and serous or seromucous demilunes cells\(^i\). Lingual glands, one of the minor salivary glands, are divided into two groups based on property and function. It is told that von Ebner’s glands of the human is located beneath the circumvallate papillae and is purely mucous, but Weber’s glands of the human is located on the lateral margin and in the root of the tongue and is purely mucous in character\(^i\). It is summarized previous papers related and described that human von Ebner’s glands are serous and human Weber’s glands are mucous and seromucous\(^i\). On the other hand, Field et al.\(^i\) described that rat von Ebner’s glands are also serous. Nagato et al.\(^i\) reported that rat Weber’s glands are mixed glands, consisting of mucous tubules that often are capped by serous demilunes. There have been only a few reports on submandibular glands or sublingual glands of other kinds of opossums\(^i\). In these reports, it was reported that the submandibular glands and sublingual glands were composed of serous and mucous tubules and seromucous demilunes, revealing mixed glands\(^i\). However, there has been no report of the minor salivary glands of not only the same or other kinds of opossums but also other marsupials as far as we know.

In the present study, the posterior lingual glands were composed of two sets of minor salivary glands and one was von Ebner’s glands and another was Weber’s glands as reported previously\(^i\). von Ebner’s glands showed typical serous in the present study and this finding was as same as others\(^i\). The present study revealed that Weber’s glands were mucous-rich mixed glands. Yuzawa et al.\(^i\) told that human Weber’s glands were mucous glands. Furthermore, Suzuki et al.\(^i\) revealed that monkey Weber’s glands were also mucous glands. On the other hand, Nagato et al.\(^i\) reported that rat Weber’s glands were mixed glands. Thus, the histological features of Weber’s glands on the gray short-tailed opossum are basically in accordance with rat previous report\(^i\).

In conclusion, the present study clearly demonstrated the characteristic morphological features of the posterior lingual glands (Weber’s glands and von Ebner’s glands) of the gray short-tailed opossum and revealed histological accordance and difference of Weber’s glands among opossums, rats, monkeys and humans, suggesting there might be a difference of the composition of Weber’s glands between primates and others.

## Discussion

Salivary glands are identified in the most of vertebrate, and divided into three types of major salivary glands (parotid, submandibular and sublingual glands) and some minor salivary glands\(^i\). The minor salivary glands are important components of the oral cavity, present in most parts of the mouth, and their secretions directly bathe the tissue\(^i\). Individual glands are usually in the submucosa or between muscles, and consist of groups of secretory endpieces make up of mucous acinar cells and serous or seromucous demilunes cells\(^i\). Lingual glands, one of the minor salivary glands, are divided into two groups based on property and function. It is told that von Ebner’s glands of the human is located beneath the circumvallate papillae and is purely mucous, but Weber’s glands of the human is located on the lateral margin and in the root of the tongue and is purely mucous in character\(^i\). It is summarized previous papers related and described that human von Ebner’s glands are serous and human Weber’s glands are mucous and seromucous\(^i\). On the other hand, Field et al.\(^i\) described that rat von Ebner’s glands are also serous. Nagato et al.\(^i\) reported that rat Weber’s glands are mixed glands, consisting of mucous tubules that often are capped by serous demilunes. There have been only a few reports on submandibular glands or sublingual glands of other kinds of opossums\(^i\). In these reports, it was reported that the submandibular glands and sublingual glands were composed of serous and mucous tubules and seromucous demilunes, revealing mixed glands\(^i\). However, there has been no report of the minor salivary glands of not only the same or other kinds of opossums but also other marsupials as far as we know.

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## References


