

A Histological and Histochemical Study of the Glands of von Ebner in the Human Tongue Additional Report: On the Staining Properties of the Mucous Cells*

Tai Sun Shin and Soo Yun Pak

*Department of Anatomy
Yonsei University College of Medicine*

ABSTRACT

Although the glands of von Ebner have been believed to be purely serous glands, they may be of the mixed type in some cases. In order to ascertain the occurrence of mucous cells in the glands and to study the staining properties of them, the authors obtained 23 vallate papillae from 7 Korean adult tongues, cut them serially and stained them with the hematoxylin and eosin, mucicarmine, mucihematein, toluidin blue or ferric mannitol technic.

Observing numerous glands of von Ebner opening into the furrows of 23 vallate papillae, the authors found 9 glandular lobules of the mixed type belonging to 8 vallate papillae (2 lobules out of 9 belonged to one papilla).

The mucous cells in the mixed glandular lobules of the glands showed mucin reactions with mucicarmine and mucihematein, and revealed a typical metachromatism by toluidin blue and safranin O.

The authors have already discussed a part of the results obtained from a histological study on the glands

of von Ebner in a previous report by Shin and Pak (1960). In that report, we confirmed the fact that the glands of von Ebner in the human tongue, contrary to the belief which had been held until very recently that they were purely serous glands, sometimes also contain mucous cells as described by Maximow and Bloom (1957).

The present paper is to study further the histological characteristics (especially, the staining properties) of the mucous cells in this mixed gland and to determine the incidence or occurrence of the mixed type of this gland.

MATERIALS AND METHOD

The human tongues studied were from 7 adult Koreans (3 male, 3 female and one adult of unknown sex) from which 23 vallate papillae were obtained. The vallate papillae thus obtained were first fixed in Zenker's or Orth's solution, then cut serially in vertical sections about 6 micra thick after embedding in paraffin. Of the 23 vallate papillae, one was stained with hematoxylin and eosin, seven were stained with Mayer's mucicarmine; five with Mayer's mucihematein, five with 0.1 per cent toluidin blue solution, and the remaining five were stained with the ferric mannitol technic (at pH 8) of Lillie and Mowry (1949), in order to determine the metachromatism of the mucous cells.

In observing the preparations, only those whose ducts opened into the furrows of the vallate papillae

* This investigation was supported by a research fund from the Research Council of the Yonsei University College of Medicine. We express our grateful appreciation for the collection of materials made available by Dr. Y. B. Lee and Mr. Sang Chul Hyun, of the Department of Clinical Pathology of the National Medical Center and we wish to thank Dr. K. D. Choi in our department for valuable suggestions

were counted as von Ebner's glands.

RESULTS OF OBSERVATION

A) H-E stain: In one of the vallate papillae, one mixed glandular lobule which opened into the furrow was observed. Among the many serous cells in the lobule, a few mucous cells and two or three demilunes were found.

B) Mucicarmine stain: In two of the seven vallate papillae stained with Mayer's mucicarmine, typical mixed glandular lobules were observed. In a lobule belonging to one of the papillae, 2 mucous cells and one demilune were found, surrounded by many serous cells. In a lobule belonging to the other papillae, several mucous alveoli and one demilune were found, mixed with serous alveoli.

The cytoplasm of the mucous cells was stained in a homogenous crimson with mucicarmine, and the nuclei were, in the majority of cases, compressed toward the base of the cells, giving an irregular and comma shape, and showed a striking contrast to those of the serous cells, being stained relatively darkly by hematoxylin.

In some of the mucous alveoli, the lumina were distinguishable, but in most other cases, they were quite indistinguishable.

C) Mucihematein stain: One mixed glandular lobule was found in one of the five papillae stained with Mayer's mucihematein. It was composed of many mucous alveoli, several demilunes and a few serous alveoli. The cytoplasm of the mucous cells was stained indigo with mucihematein, while the nuclei were stained red with carmine, and their shape and position differed little from those stained with mucicarmine.

D) Toluidin blue stain: Of the five papillae observed, mixed glandular lobules were found in two; in one papilla, one mixed lobule was found, and two mixed lobules were found in the other.

Several mucous alveoli and demilunes were found intermingled with numerous serous alveoli in the lobules. The cytoplasm of the mucous cells showed positive metachromatism, i. e., stained purple with toluidin blue, and a cytoplasmic network of metachromatic mucin was observed.

The nuclei were dark blue with toluidin blue, and

were compressed toward the base.

E) Ferric mannitol technique: Mixed glandular lobules were found in 2 of the 5 papillae stained by this technique. The mucous cells in these mixed lobules also showed a metachromatism, i. e., were stained orange by Safranin O.

DISCUSSION

The glands of von Ebner have been regarded as purely serous by some, but this study reaffirmed the view proposed by Bloom that the glands of von Ebner may also be of the mixed type.

Since the mucin reaction of the mucous alveoli in the von Ebner's glands by the staining methods of Mayer's mucicarmine and mucihematein showed little difference from that of the goblet cells of the small intestine, the two staining methods which are combined with the observation of the nuclei may be considered sufficiently effective. However the periodic acid Schiff method of the previous report may be regarded to be a better method for distinguishing the mucous cells from the serous cells.

Substantiating the reports of Hoyer et al. in 1890 that certain metachromatic dyes such as thionine, toluidin blue, and safranin O cause metachromatism in mucin, the mucous cells observed in the glands of von Ebner showed a typical metachromatism.

REFERENCES

- Bensley, R. R.: *Anat. Rec.*, 2: 105, 1908.
- Copenhaver, W. M.: *Bailey's textbook of histology, The Williams and Wilkins company, ed. 14, Baltimore, p. 315, 1958.*
- Cowdry, E. V.: *Special cytology, Paul B. Hoeber, Inc., New York, p. 92, 1928.*
- Ebner, V.: *Arch. F. Mikr. Anat.*, g, 481, 1872.
- Jordan, H. E.: *A textbook of histology, Appleton-Century-Crofts, New York, 1952.*
- Lillie, R. D.: *Histopathologic technique and Practical histochemistry, The Blakiston Co., Inc., New York and Toronto, p. 289, 1954.*
- Lillie and Mowry: *Bull. Internat. Assn. Med. Museum*, 30: 91, 1949.
- Maximow, A.A. and Bloom, W.: *A textbook of histology, W.B. Saunders Co., ed. 7, Philadelphia and London, p. 356, 1957.*
- Pearse, A.C.: *Histochemistry, Theoretical and Applied, Little Brown Co., ed. 2, Boston, p. 228, 1960.*
- Shin, T.S. and Pak, S.Y.: *Yonsei Med. J.*, 1: 6, 1960

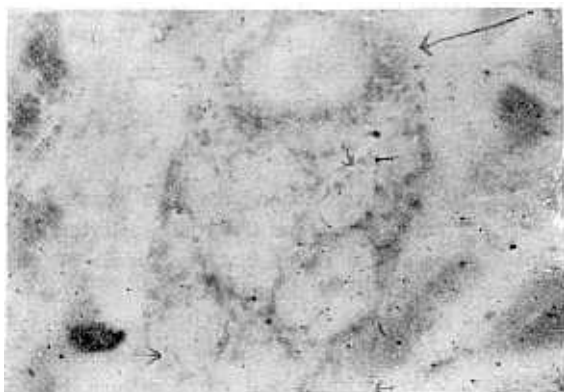


Fig. 1. Mucous cells in the mixed lobule, indicated with small arrows. A large arrow points to a duct. H. & E. stain. $\times 400$.



Fig. 2. Mucous cells near the duct. Mucicarmine stain $\times 100$

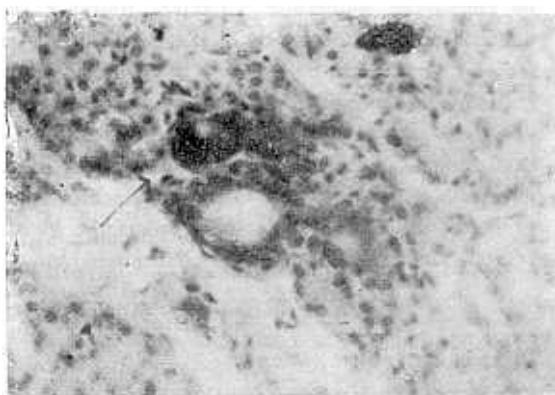


Fig. 3. The same area as figure Mucicarmine stain. $\times 400$.



Fig. 4. Many mucous cells in the mixed lobule Mucicarmine stain. $\times 100$.

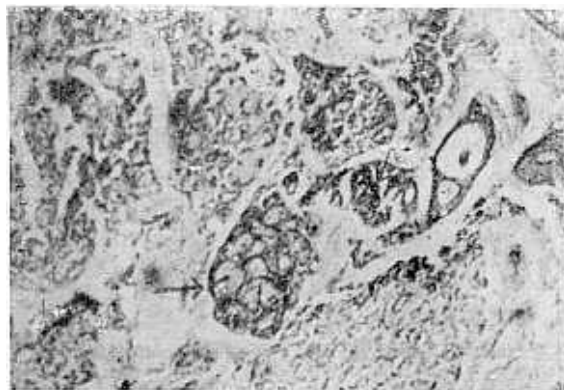


Fig. 5. Mucous cells with metachromatic cytoplasm. Toluidin blue stain. $\times 100$.

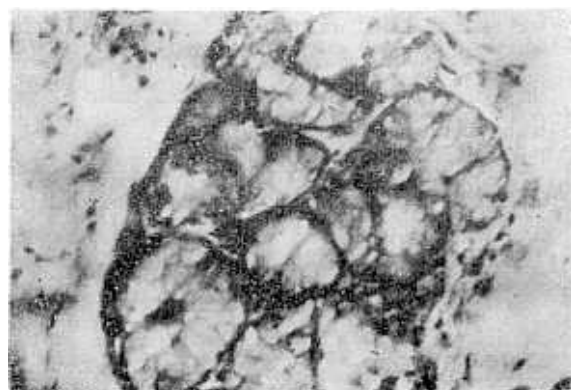


Fig. 6. The same area as Fig. 5. Toluidin blue stain. $\times 400$.

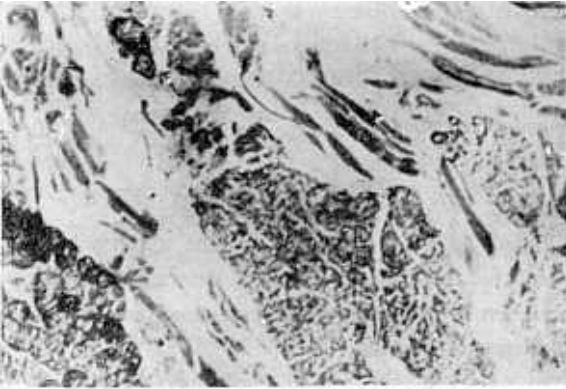


Fig. 7. Mucous cells in another lobule. The mucous lobule which is seen at the left corner belongs to another gland which is not a gland of von Ebner. Toluidin blue stain. $\times 100$.

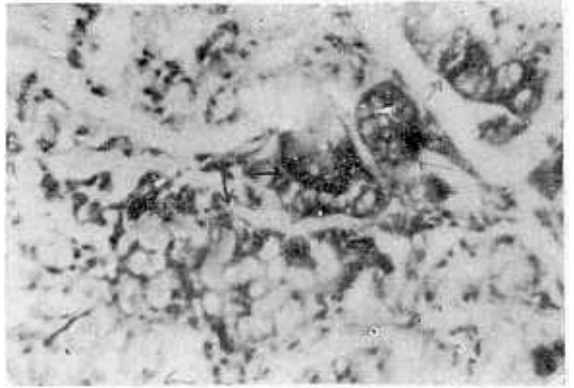


Fig. 8. The same area as Fig. 7. Toluidin blue stain. $\times 400$.