Immunoglobulin-Containing Cells in Normal Human Labial Salivary Glands

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Abstract

The distribution of immunoglobulin-containing cells within 8 normal human labial salivary glands was studied using an immunoperoxidase technique. Cell counts revealed that IgA-containing cells predominated in all specimens and that the mean percentage class ratios for IgG:IgA:IgM:IgD cells were 4:92:3:1. IgE cells were rare and only detected in one gland. The density of IgA cells (191 cells/mm² of labial gland section) was greater than those previously reported for the parotid and submandibular glands. These results support the view that minor salivary glands play an important role in the synthesis and secretion of salivary antibody.

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Whole saliva is a mixture of secretions produced by three pairs of major salivary glands (parotid, submandibular and sublingual) and a large number of minor glands distributed throughout most oral soft tissues [1]. Studies on individual glandular secretions have indicated that the minor glands, which produce 5–10% of whole saliva by volume, may contribute significantly to the total pool of salivary IgA [2]. Although tissue culture of buccal explants and qualitative immunohistochemical studies [3–5] have indicated that the majority of stromal plasma cells within minor glands produce IgA, there have been no reported quantitative immunohistochemical studies comparable with those already published for parotid and submandibular glands [6]. The present work describes a quantitative immunoperoxidase study of immunoglobulin-containing cells within normal human labial salivary glands in order to provide information comparable with that reported for the major glands and to obtain baseline values for further studies of labial glands from diseased individuals.

Labial salivary gland biopsies were performed under local anaesthesia on 8 normal healthy individuals (mean age 30.5 years). Glands (2–3 lobules) were fixed in neutral formalin (24 h) and routinely processed to paraffin wax. Preparation of sections, immunoperoxidase staining methods, histomorphometry and enu-

meration of immunoglobulin-containing cells were performed as previously described [7]. Cell counts were performed systematically throughout the whole of each section which contained at least two lobules of salivary gland.

The labial glands from all eight individuals were histologically normal and showed no evidence of focal lymphocytic infiltration, acinar atrophy, fibrosis or fatty replacement. This was confirmed by the morphometric study (table I) which yielded results consistent with those of Drummond and Chisholm [8] for normal labial glands obtained post-mortem. All immunocyte classes, except for IgE, were detected in every specimen. Only two IgE cells were present in a single lobule from one individual and were therefore not included in the calculation of

immunocyte density or percentage class distribution. IgA cells predominated in all specimens (table II) and although the cell density varied considerably between specimens the percentage class distribution was relatively constant. This finding was also true when comparison was made between different lobules of salivary gland obtained from the same individual. Immunocytes, present in unevenly distributed clusters, were particularly numerous around intercalated and interlobular ducts and at the periphery of the lobules (fig. 1) with only a few cells scattered between acinar elements.

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Fig. 1. A collection of IgA-containing plasma cells beneath the fibrous capsule (arrows) of a labial gland. $\times 520$.

Table I. Morphometry of labial salivary glands (n = 8)

a Ducts and acini.

b Fibrous tissue, blood vessels, etc. Not including the fibrous capsule surrounding lobules.

Our results confirm the predominance of IgA immunocytes (92%) in normal human labial glands and accord with similar findings at other secretory sites [6, 9]. IgG, IgM and IgD immunocytes were also regularly detected in labial glands as reported for parotid and submandibular glands [6]. In addition, the percentage class distribution of immunocytes was similar apart from the proportion of IgM cells (3%) which was somewhat lower than in parotid (5.9%) and submandibular (7.9%) glands. Direct comparison of our data with that of Korsrud and Brandtzaeg [6] reveals a significantly higher IgA cell density in the minor glands which is also reflected in the total immunocyte density (table II). Interestingly, the ratio of IgA cell densities in labial and parotid glands (3.3:1) is in good agreement with a previous study showing that the mean secretory IgA concentration in labial gland saliva (194 $\mu\text{g/ml}$) is approximately three times that of the parotid gland secretion (62 $\mu\text{g/ml}$) [2]. It has been suggested that differences in total immunocyte densities in different salivary glands are related to the distance between the gland and adjacent mucosal surface [6]. This is explained by possible local retention

or proliferation of B cells as a result of intraglandular antigen challenge. This higher immunocyte density in labial glands compared with those of the parotid and submandibular glands supports this view especially in the light of recent evidence in monkeys that the ducts of minor salivary glands may provide a pathway for local presentation of oral antigen [10]. In conclusion, our immunoperoxidase studies support the idea that the minor glands synthesise and secrete significant amounts of salivary IgA and play an important role in the immunological protection of oral mucosal surfaces.

Table II. Immunoglobulin-containing cells in normal labial salivary glands compared with reported data for parotid and submandibular glands [6]

Statistically significant by the two-sample t test: a $p < 0.05$; b $p < 0.01$; c $p < 0.001$. Number of cells/mm² of tissue section.

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