Mosaic Phenomenon of ABH and Lewis Antigen Expression in Minor Salivary Glands - an Immunohistochemical Demonstration of the Transferase Activity

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Introduction

Immunohistochemical investigations of ABH and Lewis antigens in salivary glands, skin and hair, often showed a mosaic phenomenon (Takahasi and Kamijama, 1985; Lötterle and Heine, 1986, 1987; Nishi et al. 1989): in certain areas of the tissue, antigens exhibited by the individual could not be detected, whereas in other areas the antigens could be stained according to the blood group (Fig. 3). Furthermore, using serial sections, Takahasi and Kamijama (1985) and Lötterle and Heine (1986) demonstrated that in salivary glands of A-secretors certain areas exhibited either only A or only H but not both antigens at the same time.

The structure of the salivary glands, which can be either purely serous, serous and mucous or purely mucous, is given in Fig. 1. Fig. 2 shows a schematic representation of the electron microscopic structure of a mucous salivary gland cell (Schiebler et al. 1986). In the basal area of the cell around the nucleus the coarse endoplasmatic reticulum is located in which protein synthesis takes place. Further to the top is the Golgi apparatus, which is involved in the production of the secretory granulas. The mucoids produced in the cell are generally stored in granulas in the apical part of the cells and then transferred from there into the extrusion channel.

In order to obtain more information on the staining of the salivary glands, the identification of antigens in not yet investigated gland groups needed to be studied. The salivary glands of the tongue seemed appropriate for this study.

Material and Methods

Formalin-fixed and paraffin-embedded specimens taken from the minor glands of the tongue during dissection were serial sectioned and stained with a peroxidase-anti-peroxidase technique. A monoclonal anti-A (Dako, Code A 581, Lot 097, dilution 1:20), a monoclonal anti-B (Dako, Code A 582, Lot 018, dilution 1:20), a monoclonal anti-H (Dako, Code A 583, Lot 078, dilution 1:20), a monoclonal anti-Le a (Biotest, Ch 111055, dilution 1:15) and a monoclonal anti-Le b (Biotest, Ch 111055, dilution 1:15) served as primary antibodies. A peroxidase-conjugated rabbit antibody to mouse immunoglobulin (Dako, Code P 161, Lot 054, dilution 1:80) was taken as secondary antibody. The next reaction steps used a test kit from Ortho (Code 580000, Lot 56057: sheep antibody to rabbit immunoglobulin and PAP-complex of rabbit, stained with 3-9 AEC).

Results

The antigens A, B and H could be detected in secretors according to the blood group in all glands investigated, although in many cases not all the antigens

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were stained in all areas of the gland. Le a could be detected well in non-secretors, but usually only with weak activity in secretors. Le b was always detected in secretors, but Le a only very weakly or not at all. In many cases the well-known phenomenon occurred, whereby in glands of A and B blood groups, either A or H, or B or H expression was observed; in AB glands this phenomenon occurred primarily between A and B (Fig. 5a and 5b). This staining behavior can be described as a vice-versa phenomenon.

In many sections a distinct granular antigen expression was seen at the base of the cells, whereas other cell parts did not react (Fig. 4). This phenomenon was first described by Pedal and Schmidt (1988) in tracheal glands of Le-negative individuals. It was particularly evident that from the 30 tongue glands studied, this granular antigen expression never occurred in the identification of A, B and Le a.

Discussion

The studies allow to conclude that the formation of glycosyltransferase is localized in the coarse endoplasmatic reticulum (Fig. 5). Depending on the blood group and the activity of the various glycosyltransferases, either the blood group substance formed first (e.g. H) remains predominant or a large amount of the blood group substance is further glycosylyzed. The mosaic phenomenon and the vice-versa phenomenon arise from a competition between the glycosyltransferases (Fig. 4a and 4b): in one part of the gland practically only A is formed, and in another only B.

The results of the ABH and Le reactivity in minor salivary glands appear to be significant to get further information on the synthesis of these antigens.

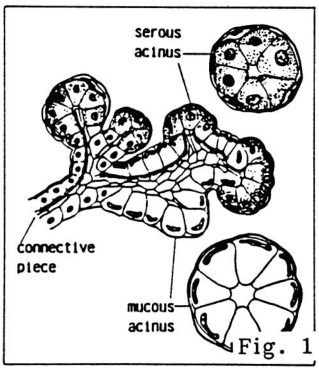


Fig. 1

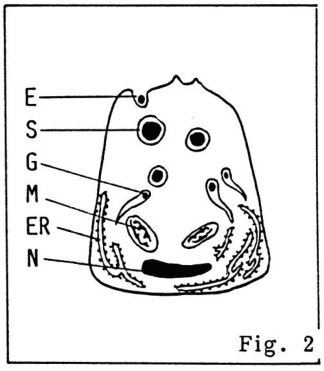
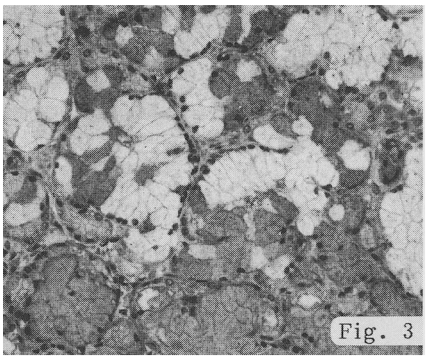
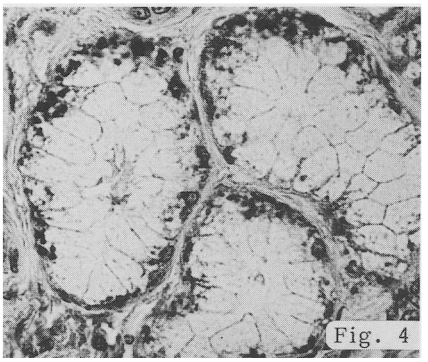


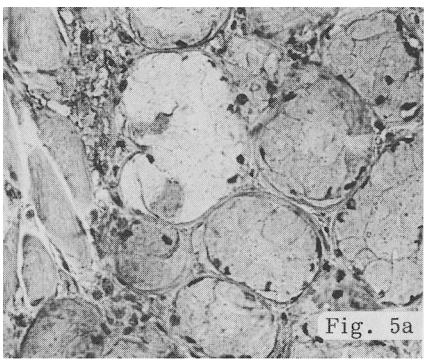
Fig. 2

Fig. 1 Light microscopic structure of a seromucous gland

Fig. 2 Electron microscopic structure of a mucous gland cell (N: cell nucleus, G: Golgi apparatus, ER: coarse endoplasmatic reticulum, M: mitochondrion, S: secretory granula, E: extrusion)







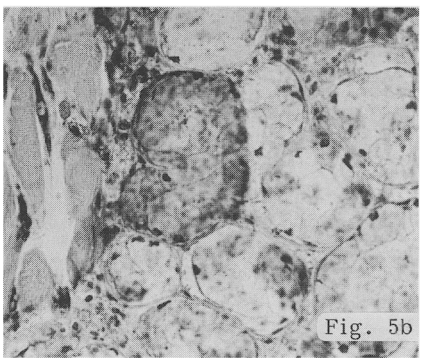


Fig. 3 Antigen A expression in an A-secretor sublingualis. Distinct mosaic phenomenon.

Fig. 4 Basal granular antigen expression in an A-secretor tongue gland. Primary antibody: anti-H.

Fig. 5a,b Vice-versa phenomenon in an AB-secretor tongue gland

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