

Ultrastructure of Oral Mucous Membrane Lesions in Psoriasis

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The ultrahistopathology of six patients with psoriatic oral mucosal membrane lesions is described. Four of the patients had tongue lesions (geographic or fissured tongue) and two had lesions of the buccal mucosa. The same features were found in both types of lesions. The most prominent feature was the large number of neutrophils. Neutrophil pustules caused flattening of the keratinocytes, resulting in a sponge-like network of epithelial cells. Other features were the dilated fenestrated capillaries surrounded by neutrophils and oedema of the upper lamina propria, basal lamina gaps, basal spongiosis and keratinocyte activation. Psoriasis lesions of the oral mucosa belong to the group of diseases characterized by epithelial non-bacterial pustules. *Key words: Oral mucosa; Tongue; Electron microscopy; Neutrophils; Pustules.* (Received July 22, 1983.)

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Psoriasis of the oral mucous membrane is a very rare disorder. Usher (1) found two patients out of 100 psoriatic patients studied, Journé (2) found 2 out of 80, while Buchner & Begleiter (3) reported no oral psoriatic lesions in a series of 100 patients. De Gregori et al. (4) found only 15 reported cases in a survey of the literature.

We have recently examined the oral cavities of 200 consecutive psoriasis patients (5). In 20 out of the 200 cases the oral mucosa showed changes that necessitated a biopsy. Histological features typical of psoriasis were found in 4 out of these 20 cases. Two additional psoriasis patients with annular lesions of the tongue were studied. Here we report the electron microscopic findings in these six patients. To our knowledge, this is the first description of the fine structure of oral mucous membrane lesions in psoriasis. The preliminary results have been communicated at a recent conference (6).

PATIENTS AND METHODS

Biopsies for light and electron microscopy were taken from the edge of lesions of the oral mucosa of six psoriasis patients. In patient 1 (male, 39 years) psoriasis started six years earlier with tongue lesions (Fig. 1), but he later developed typical psoriatic lesions on the knees, elbows and scalp. Two circinate lesions were seen on the lateral edge of his tongue with an elevated grayish-white border surrounding erythematous glistening mucosa with atrophic filiform papillae, typical of geographic tongue (Fig. 1). At the time of the biopsy, he was hospitalized because of severe pain in the left wrist. Patient 2 (female, 41 years) had suffered from tongue lesions for three years. The dorsal part of her tongue showed three annular lesions, typical of geographic tongue. Partial relief of her symptoms had been obtained with Tigason® at standard dosage (7). Patients 3-6 were found amongst 200 consecutive patients with psoriasis, data of whom have recently been reported (5).

Punch or knife biopsy specimens were taken from the oral lesions for light and electron microscopy after local anaesthesia with 1% lidocain. For electron microscopy, blocks (1 mm³ or smaller) were fixed for 2 hours or longer in phosphate-buffered (0.1 M; pH 7.2) 1.5-2.5% glutaraldehyde at 4°C, and postfixed with 1% osmium tetroxide. The specimens were stained *en bloc* in uranyl acetate and lead citrate dehydrated in a graded series of alcohol and embedded in Epon 812. Ultrathin sections were cut with a diamond knife on an LKB ultramicrotome, stained with lead citrate, and examined with a JEOL 100 CX electron microscope operated at 60 or 80 kV.

Semithin sections were stained with toluidine blue and conventional paraffin sections with haematoxylin and eosin.

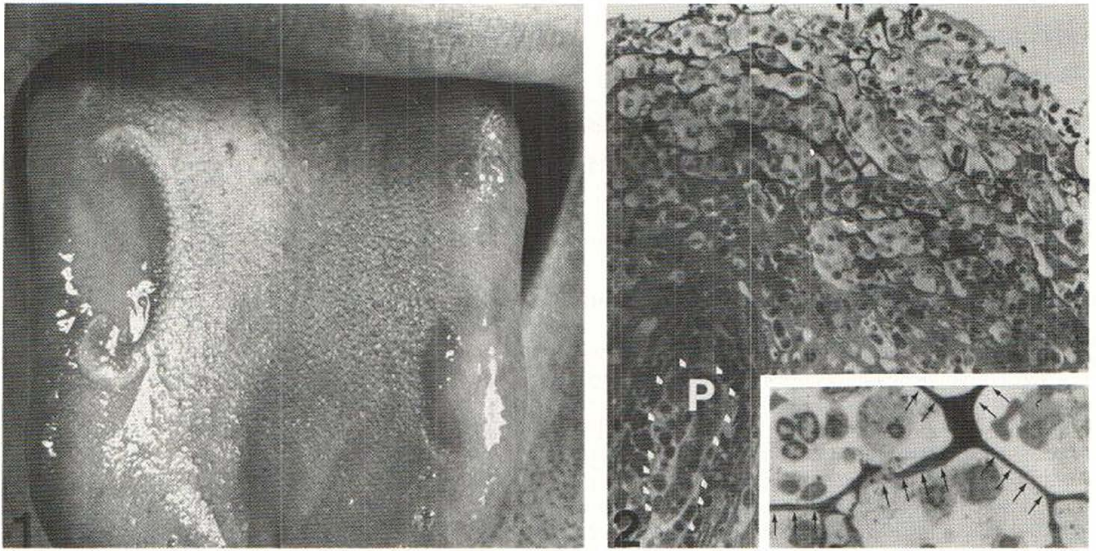


Fig. 1. Geographic tongue of patient 1.

Fig. 2. Histopathology of geographic tongue showing spongiform pustules with large numbers of neutrophils between keratinocytes. The keratinocytes form a trabecular network, which is seen at higher magnification in the inset. The dermal papilla (P) is marked by dots. Arrows show the long, slender keratinocyte processes. $\times 300$. Inset, $\times 940$.

RESULTS

Light microscopy

Tongue. The epithelium showed parakeratosis, acanthosis, enlarged intercellular spaces and elongation of the rete ridges. Groups of neutrophils were found throughout the epithelium (Fig. 2), and around and within the widened capillaries. Smaller numbers of round cells were also observed. The pustules caused flattening of the keratinocytes, resulting in a sponge-like network of epithelial cells (Fig. 2).

Buccal mucosa. The same features as above were found in the buccal mucosa. The psoriatic features were less prominent and fewer neutrophils were present. Because of the smaller number of neutrophils, the sponge-like appearance was less prominent. This parallels the milder clinical appearance of the lesions.

Electron microscopy

The description below is based mainly on the findings in the tongue, since these were more prominent. The same, less conspicuous features were found in the buccal mucosa.

Widened unfenestrated and fenestrated thin-walled capillaries (Fig. 3) occupied the upper lamina propria. Large numbers of polymorphonuclear leukocytes and mononuclear cells were present, sometimes very close to the basal lamina. Basal lamina gaps with invading leukocytes were frequently encountered (Fig. 4a). The upper connective tissue was oedematous. Fine granular protein substance derived from the capillaries was seen intermingled between the collagen fibres and extending focally into the intercellular spaces of the epithelium (Fig. 4b). Extravasated red cells were observed and sometimes the capillaries showed disruptions in the endothelial wall.

The basal and spinous epithelial cells showed a moderately increased cellular activity with numerous mitochondria, Golgi apparatus, ribosomes and polysomes and arrays of

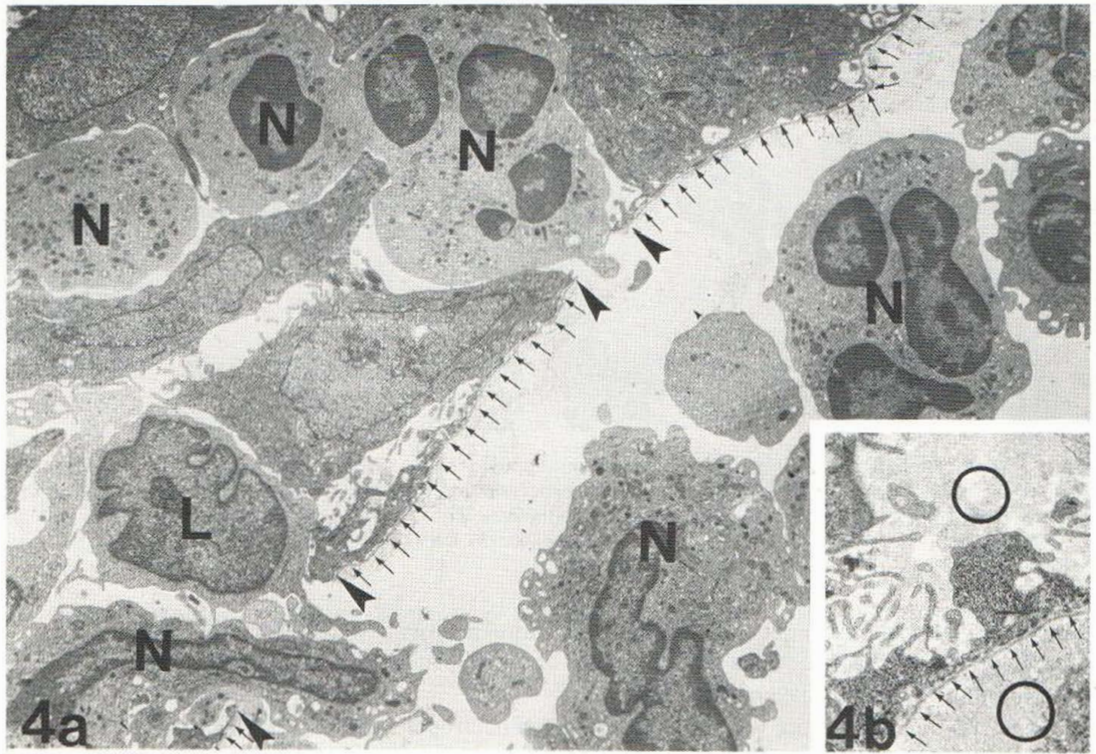
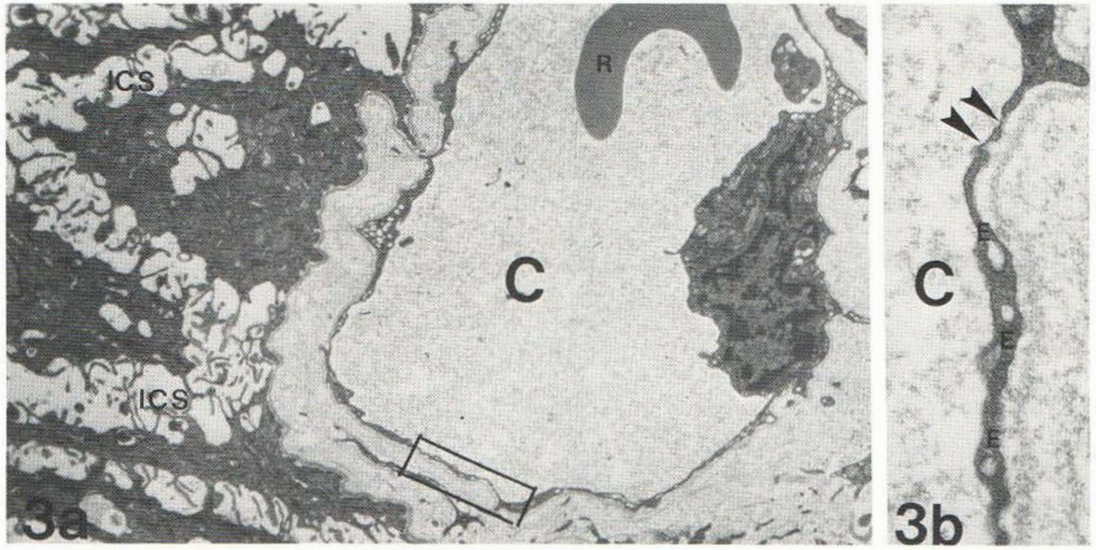


Fig. 3. Geographic tongue. Capillary (C) in papillary dermis. Note the thin endothelium and the fenestrations (arrowhead). The intercellular spaces (ICS) are widened in the basal epithelium. Boxed area in Fig. 3a is seen enlarged in Fig. 3b. R, red blood cell. (a) $\times 5000$. (b) $\times 25000$.

Fig. 4. Geographic tongue. Dermis-epithelium junction. Basal lamina (arrow) is penetrated at two locations (between arrowheads) by neutrophils (N) and a lymphoid cell (L). Several neutrophils are seen in the oedematous upper papilla. Fig. 4b shows the fine granular substance (circle) that looks identical below and above the basal lamina. (a) $\times 4300$. (b) $\times 8300$.

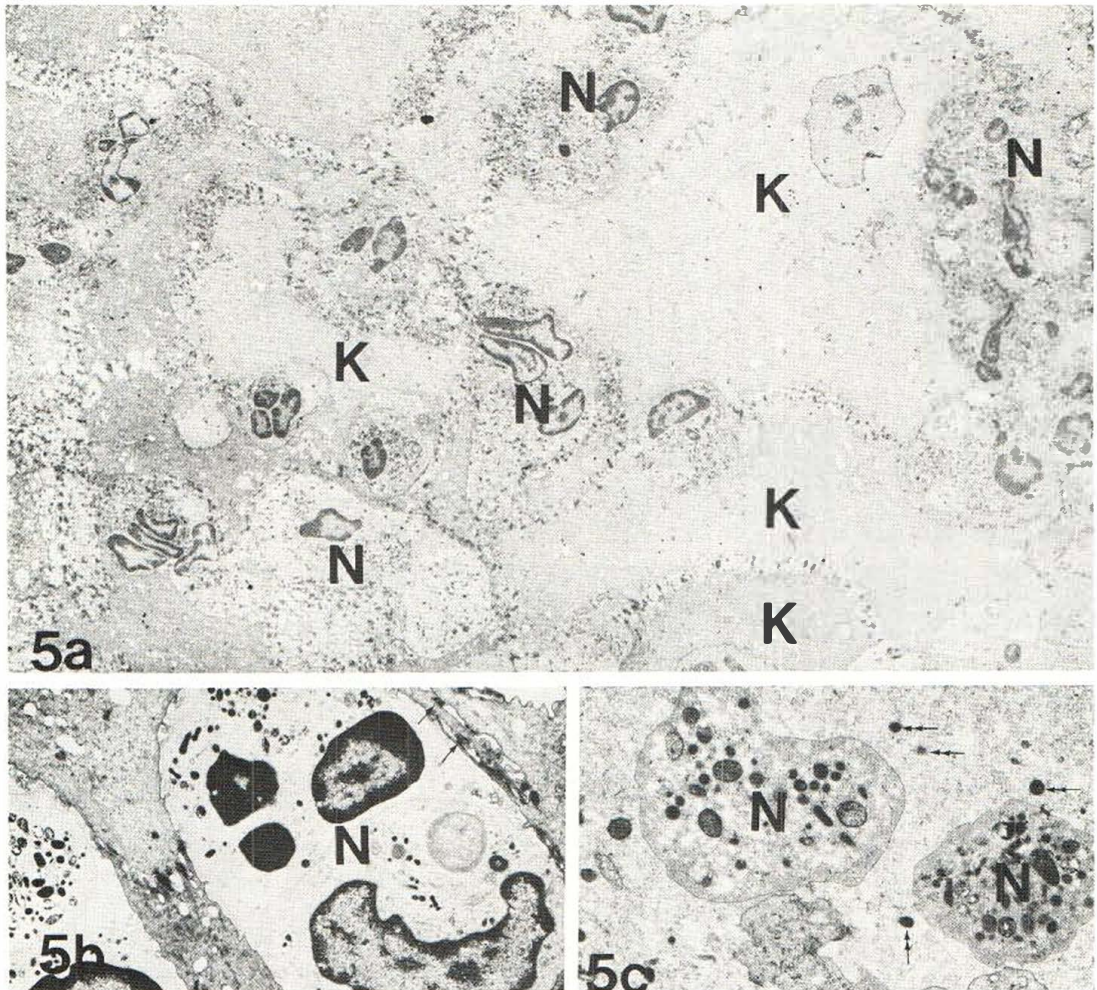


Fig. 5. Geographic tongue. Neutrophils (N) between keratinocytes (K) in the middle spinous layers. Fig. 5b depicts detail of the trabecular network with thin keratinocyte processes connected by desmosomes (arrow). Fig. 5c shows exocytic neutrophils in the intercellular space of epithelium with fine granular substance and free granules (double-headed arrow) from disrupted neutrophils. (a) $\times 1800$. (b) $\times 4500$. (c) $\times 10000$.

endoplasmic reticulum. Fewer desmosomes and more microvilli were present than in normal tongue epithelium. Areas of large, light and oedematous epithelium cells were encountered in the spinous layers (Fig. 5a).

The most prominent feature was the large number of neutrophils (Figs. 4, 5), which were seen singly or in small groups throughout the epithelium, reaching even the superficial layers. The pustules caused flattening of the keratinocytes, resulting in a sponge-like trabecular network of keratinocytes connected to each other by tiny desmosomes (Fig. 5b). Some of the neutrophils in the intercellular space seemed intact. On the other hand, large numbers of free granules from disrupted neutrophils together with granular cytoplasm-derived substance were observed in the intercellular space (Fig. 5c). Granules probably derived from neutrophils were also seen inside keratinocytes (Fig. 6), as reported in impetigo herpeticiformis (8) and in balanitis circinata (9).

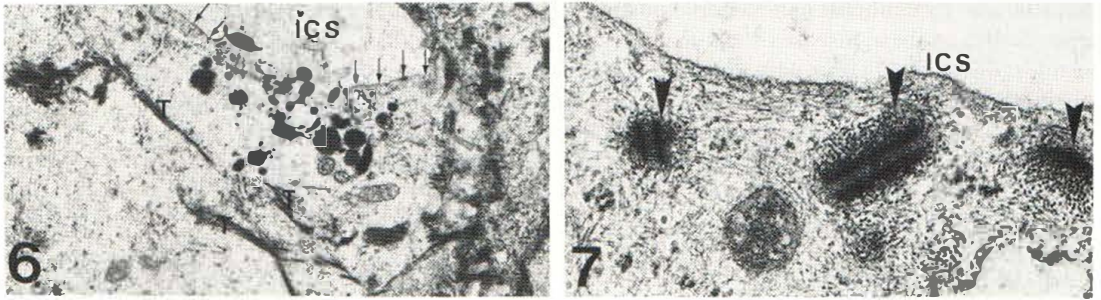


Fig. 6. Geographic tongue. Neutrophil-derived granules inside oedematous keratinocyte. Arrows show the cell membrane of the keratinocyte. ICS, intercellular space; T, tonofilaments. $\times 7900$.

Fig. 7. Geographic tongue. Three intracellular desmosomes (arrowheads) within keratinocyte. ICS, intercellular space. $\times 40\,000$.

Lymphocytes and macrophages were also found in the epithelium, although in much smaller numbers than neutrophils. The fine granular intercellular substance (Fig. 5c) seemed to be a mixture of protoplasm and cell organelles from exocytotic cells and from keratinocytes and protein substance leaking from the capillaries.

The upper epithelium showed no normal differentiation into keratinized cells. Partial keratinization occurred, but this was weaker than normal (10). The plasmalemma became thicker, corresponding to the transitional cells of the epidermis. The keratinocytes displayed more fibrous substance than in the lower layers. The keratohyalin granules were few and rounded. Intracellular and composite keratohyalin granules were sometimes observed. This is reported in detail elsewhere (11). Intracellular desmosomes were observed, sometimes in large numbers (Fig. 7). Lipid droplets were frequent. The epithelial cells were not flattened as in the normal tongue, but were enlarged and more rounded. The most superficial cells still contained many cell organelles and a nucleus, reflecting a disturbed keratinization. Neutrophil pusules occupied the upper epithelium but few were observed in the uppermost layers.

Few Langerhans cells were found throughout the epithelium and did not show any special features or particular affinity towards exocytotic cells.

DISCUSSION

The criteria for psoriasis of oral mucosa in our six patients fulfilled the criteria of Journé (2), which state that the lesions must be situated on the mucosa and not in the zone of mucocutaneous transition; the lesions must be independent and not an extension of a cutaneous lesion; the mucosal lesion must be accompanied by cutaneous psoriatic lesions; and histological study is necessary to confirm the diagnosis. Our recent study of 200 consecutive patients with psoriasis revealed four with oral lesions (=2%). This is in accordance with previous reports (1, 2). Our light microscopic observations agreed with previous ones with regard to oral mucosal involvement with psoriasis (1, 12-14). The main findings are the psoriasiform epithelium and the neutrophil pustules. Generally, the diagnosis of oral psoriasis should be made only when the lesions are found concomitantly with cutaneous lesions. However, psoriasis in patient 1 started with oral lesions, and the patient later developed typical lesions on the elbow, knees and scalp.

Several diseases such as pustular psoriasis, impetigo herpetiformis, acrodermatitis continua Hallopeau, pustulosis palmoplantaris, geographic tongue and Reiter's disease are

characterized by epithelial non-bacterial pustules. The fine structure of the epithelium and upper dermis in these diseases show many features in common (8, 9, 15–20). Neutrophil pustules, dilated capillaries with polymorphonuclear leukocytes, basal lamina gaps, basal spongiosis, and keratinocyte activation are observed. It is evident that the basic mechanisms are closely related in these diseases. The morphological features combined with other data indicate that immunological factors play an important role in pustule formation in these diseases (9, 21–22).

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