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CYTOLYTIC DEGENERATION OF KERATINOCYTES ADJACENT TO LANGERHANS CELLS IN PITYRIASIS ROSEA (GIBERT)

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Abstract. Unique cytolytic degeneration of keratinocytes adjacent to Langerhans cells was observed in five cases of pityriasis rosea (Gibert). In the cytolytic area, the normal keratinocyte structures were absent except for free ribosomes. In addition, a similar cytolytic part of a keratinocyte was enveloped by the elongated dendrites of the Langerhans cell and was detected within its cytoplasm. The significance of these findings is discussed with respect to anticytoplasmic antibodies in the sera of patients with pityriasis rosea.

Key words: Pityriasis rosea; Langerhans cell; Keratinocyte-Langerhans cell interaction

Recent interpretations concerning the function of the Langerhans cell (LC) (5, 6, 8, 10) suggest that the LC represents an intra-epidermal phagocyte or macrophage concerned with antigen processing, though its exact function in the epidermis is still obscure.

Breathnach (1) demonstrated partial cytolytic changes in the cytoplasm of a keratinocyte immediately adjacent to a LC in normal human skin. Though Breathnach's findings appear important in elucidating the possible function of the LC, no other reports have been presented on the morphological changes in normal or pathological skin.

While studying the morphological changes in the herald lesions of pityriasis rosea with the aid of the electron microscope, we have frequently found similar cytolytic changes in keratinocytes immediately adjacent to Langerhans cells, just as Breathnach mentioned.

In this communication we describe keratinocyte–LC relations and discuss their significance in pityriasis rosea.

MATERIALS AND METHODS

Biopsy specimens were removed from herald lesions of 5 patients with pityriasis rosea. The specimens were fixed in 1% OsO_4 for 2 hours at 4°C, then dehydrated in graded ethanol series and embedded in Epon 812. Ultrathin sections, stained with uranyl acetate and lead citrate, were examined in a Hitachi HU-11A electron microscope.

RESULTS

During the course of the study, cytolytic changes in a keratinocyte immediately adjacent to a Langerhans cell (LC) were frequently observed in the epidermis of all 5 patients with pityriasis rosea. Fig. 1 shows a swelling of a part of the cytoplasm of the keratinocyte closely adjacent to a LC. This cytolytic area of the keratinocyte seems to be enveloped by the LC. The cytolytic area of the cytoplasm shows fine granularity, free ribosomes, but the normal structure of a keratinocyte is absent. There are no cytolytic changes in two keratinocytes on the opposite side, while the cytolytic appearance of the keratinocyte is noted at the site enveloped by the LC dendrite.

Fig. 2 shows a similar phenomenon. The LC closely attached to the budding area of a keratinocyte shows a fine granularity, free ribosomes and that which is evidently part of the keratinocyte cytoplasm. Usually the plasma membranes of each cell appear preserved and are not fused. Occasionally, as seen in Fig. 3, the residual organelles of the keratinocyte are seen in the lytic area. That portion of the plasma membranes which is in contact with the LC is partially indistinct. However, the organelles of a LC are not seen in such a cytolytic area. In addition, similar cytolytic

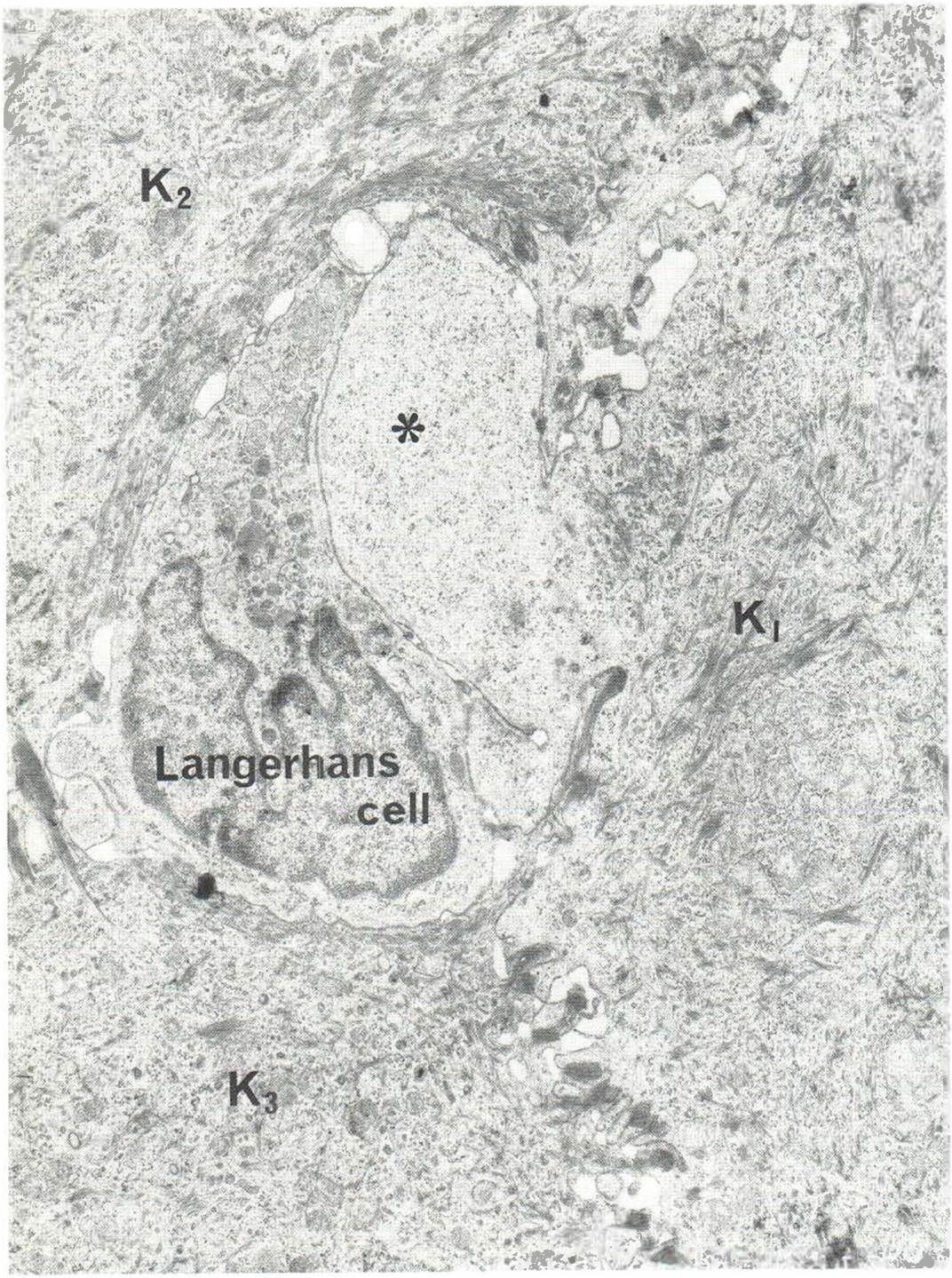

Fig. 1. The cytolytic area (*) of a keratinocyte (K_1) closely adjacent to a Langerhans cell, showing a fine granularity. There are no cytolytic changes in two keratinocytes (K_2, K_3) on the opposite side. ×13900.

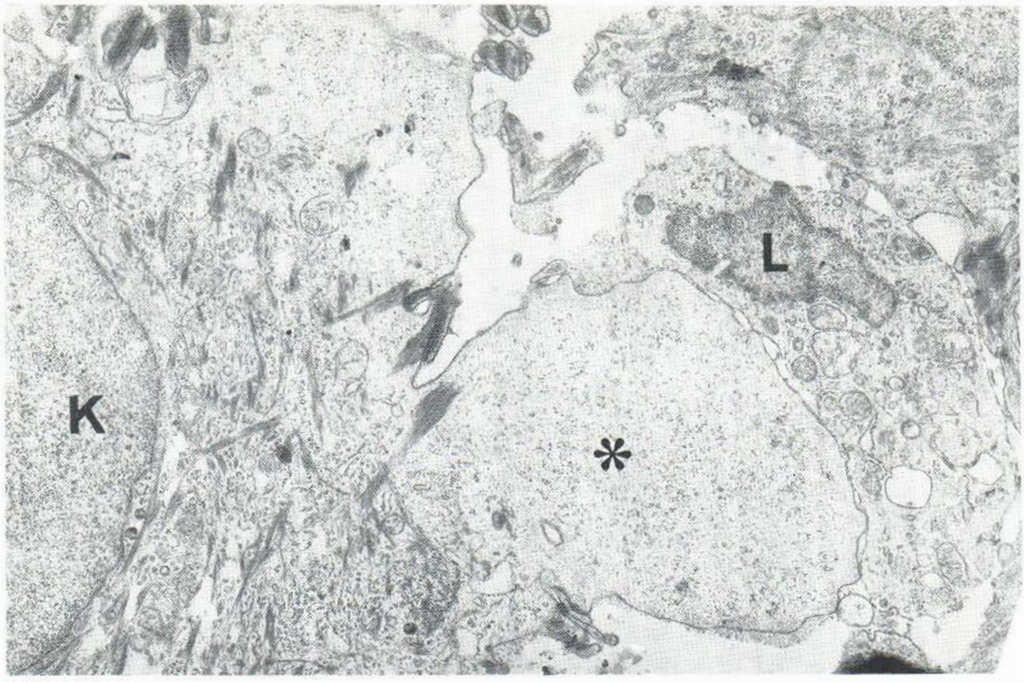

Fig. 2. The budding area of a keratinocyte (*K*) closely attached to the Langerhans cell (*L*), showing a fine granularity (*). ×10700.

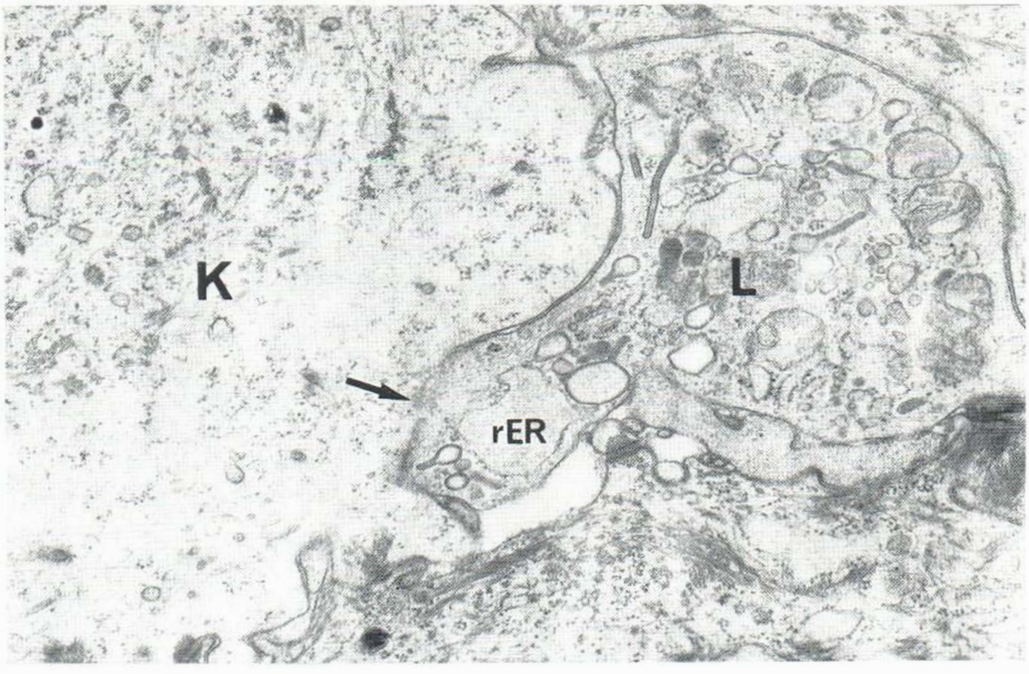

Fig. 3. The residual organelles of a keratinocyte (*K*) observed in the cytolytic area. The portion of the plasma membrane in contact with the Langerhans cell (*L*) appears partially indistinct (*arrow*). *rER:* rough surfaced endoplasmic reticulum. ×24200.

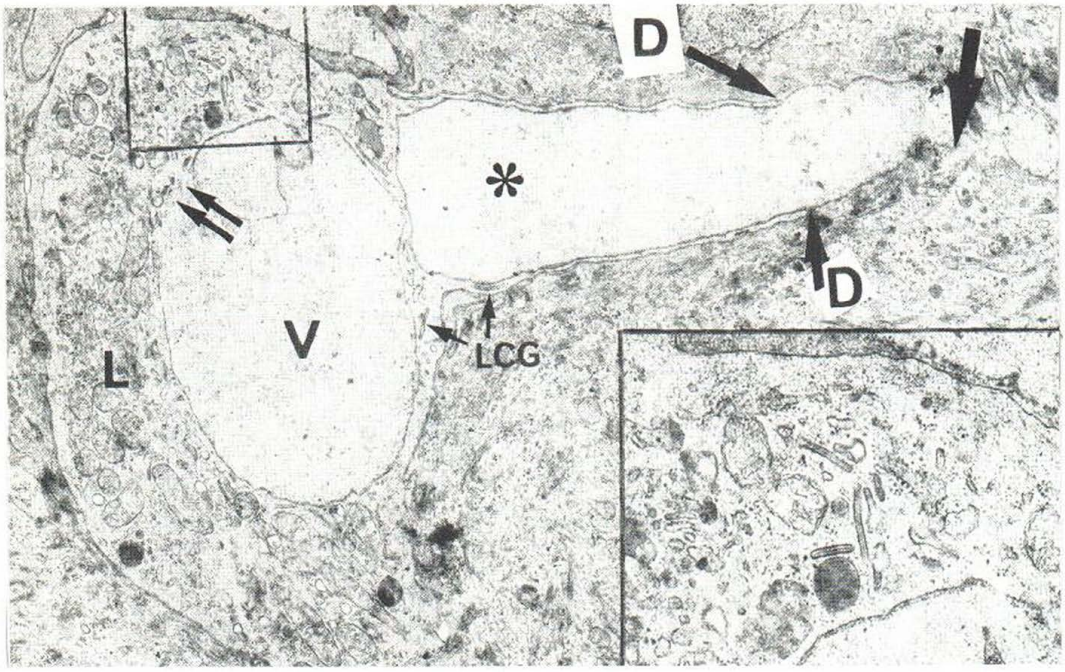

Fig. 4. The large cytolytic area is contiguous with the small part of the keratinocyte (bold-faced arrow) and enveloped by the elongated dendrites (*D* arrow) of the Langerhans cell (*L*). The membrane of the ingested vacuole (*V*) within the Langerhans cell appears somewhat indistinct (*double arrows*). *Inset:* higher magnification of Langerhans cell granules demarcated by lines (top left). *LCG:* Langerhans cell granules. ×10700; inset, ×26000.

cytoplasm of the keratinocyte is seen within the LC cytoplasm (Fig. 4). This cytolytic area is contiguous with a small portion of the keratinocyte and is enveloped by the elongated dendrites of the LC. The membrane of the ingested vacuole within the LC is somewhat indistinct. It seems possible that the LC may ingest the degenerate cytoplasm of the keratinocyte. These Langerhans cells demonstrate a prominently enlarged endoplasmic reticulum containing amorphous materials, Golgi complexes, ribosomes, lysosome-like dense bodies, vacuoles and LC granules. There was no evidence of LC granules being attached to plasma membrane in those areas.

DISCUSSION

In this study, the partial cytolysis of the keratinocyte just adjacent to a Langerhans cell has been demonstrated. The LC envelopes the cytolytic part of the keratinocyte, and occasionally seems to ingest the cytolytic portion within its cytoplasm.

Previously, Breathnach (1) reported a similar cytolytic phenomenon of the keratinocyte adjacent to a LC in normal human skin and suggested that the LC might function as an intra-epidermal macrophage or phagocyte. However, he stated that these reported phenomena were found by chance and that they are extremely rare in normal skin and have never been found in pathological skin (2). It is therefore worth noting that these phenomena have commonly been observed in the epidermis of herald lesions in pityriasis rosea.

Though the exact function of the LC is uncertain, several recent studies indicate that it may be involved in immune mechanisms. Kuwahara (6) stated that the LC may be an immunological memory cell, possibly taking part in immune formation. Hashimoto (5) suggested, on the basis of an experiment in which intradermally injected horseradish peroxidase was detected in LC granules, that the LC may be a specialized phagocyte related to primary antigen processing and to the transfer of the processed antigen by cell-to-cell fusion with the lymphoid cell. In fact, Silberberg (10) reported the apposition of mononuclear cells to LCs in con-

tact allergic reactions. Subsequently, Masutani (8) reported a similar phenomenon in DNCB-sensitized hairless mouse epidermis. In addition he stated that the indeterminate dendritic cells developed into LCs during DNCB sensitization. From these results he agreed with Hashimoto concerning the function of the LC.

Pityriasis rosea is a relatively common disease of unknown etiology. Many epidemiological and clinical features suggest that virus or micro-organism infection may be implicated, but no supportive evidence has been demonstrated to date (3, 4, 7, 9, 12).

Recently, however, we have detected the presence of anti-cytoplasmic IgM antibody in the patients' sera (11). From recently published opinions held with respect to the function of the LC, it seems possible that this cytoplasmic antibody may be produced as a result of partial cytolytic degeneration of the keratinocytes adjacent to the Langerhans cell, as described above.

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