Distribution of CD1a-positive Cells in Psoriatic Skin during the Evolution of the Lesions

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Normal skin and psoriatic lesions from 35 patients were investigated immunohistochemically with regard to the CD1a+ cell population (Langerhans' cells and indeterminate cells) in the epidermis as well as in the dermal infiltrate. In the normal-appearing skin, we found the regularly typical pattern of CD1a+ dendritic cells in suprabasal position, but in lesional skin of chronic psoriasis the CD1a+ cells were scattered in the acanthotic epidermis. In initial lesions, CD1a+ cells represent up to 50–60 % of the infiltrating cells of the dermal compartment, in several cases being preferentially localized in the upper part of the papillar dermis close up to the epidermal CD1a+ cells in basal position, whereas in chronic psoriasis they represent less than 10 %. These results suggest that in psoriasis vulgaris, CD1a+ cells actively migrate between the epidermis and the dermal vessels.

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Langerhans' cells (LC) are dendritic cells within the epidermis, where they act as highly specialized antigen-presenting cells (1). Since it became evident that these cells play an important role in immunological reactions of the skin and possibly also in the regulation of epidermal proliferation (2), it was evident that, in view of these properties, LC could have a certain role in the pathogenesis of psoriasis.

Many reported studies using the ATPase technique (3) or with monoclonal antibodies have shown abnormalities in the number and distribution of LC in psoriatic lesions before and after different treatment modalities (4–8). Attention has been focused on the LC in the epidermal compartment and on lymphocytes in the dermal infiltrate (9, 10), but little interest has been reported regarding the possible participation of LC or CD1a+ related cells in the dermal compartment.

In this study, we investigated the qualitative and quantitative distribution of CD1a+ cells in the epidermis and the dermis of initial psoriatic lesions, untreated chronic psoriatic lesions and in chronic psoriatic lesions treated with glucocorticosteroids. Clinically uninvolved skin of each patient was used as his own control.

MATERIAL AND METHODS

Patients and immunolabelling procedure

Six-mm punch biopsies from clinically uninvolved skin (NIS) and from psoriatic skin of 35 patients in different stages of the disease (untreated initial lesion = UIL, untreated chronic psoriatic plaques = UCL, treated chronic psoriatic lesions = TCL) were obtained under local anesthesia (1 % lidocain). The treatment consisted of one week of topical corticosteroid therapy. The biopsies were performed on the same area in each patient and divided into two parts: one was prepared for routine histopathology and the other was frozen for immunochemistry. The uninvolved skin was used as the control for each patient.

Single immunolabelling was performed using the monoclonal anti-CD1a antibody OKT6 (Ortho Immunobiology Ltd, Raritan, New Jersey) (final dilution: 1/200) which has previously been shown to react with 70 % of human intrathymic lymphocytes, epidermal LC and IC (11, 12) and the alkaline phosphatase anti-alkaline phosphatase (APAAP) method, as previously described (13).

Counting of stained cells on cryosections

Three sections of each skin biopsy were examined and only cells exhibiting a dendritic pattern with brightly stained cytoplasm were counted. CD1a+ cell density in the epidermis was then calculated as stained cells per mm^2 epidermal section surface, measured by morphometry as previously reported (13).

Evaluation of CD1a+ cells in the dermal infiltrate was performed by counting stained cells and calculating them as a percentage of total infiltrating cells in defined areas.

Statistical analysis was performed with the Student's *t*-test.

RESULTS

1. *Uninvolved skin (NIS)(n = 35)*

Epidermis: In normal-appearing skin, CD1a+ cells were regularly distributed in supra-basal localization. Counting showed 88 ± 19 cells/mm^2 epidermal section surface.

Dermis: Rare CD1a+ cells (0–3 %) were seen around the vessels in the dermal compartment.

2. *Untreated initial psoriatic lesion (UIL)(n = 10)*

Epidermis: CD1a+ cells showed an irregular distribution and the cells were scattered in the slightly acan-

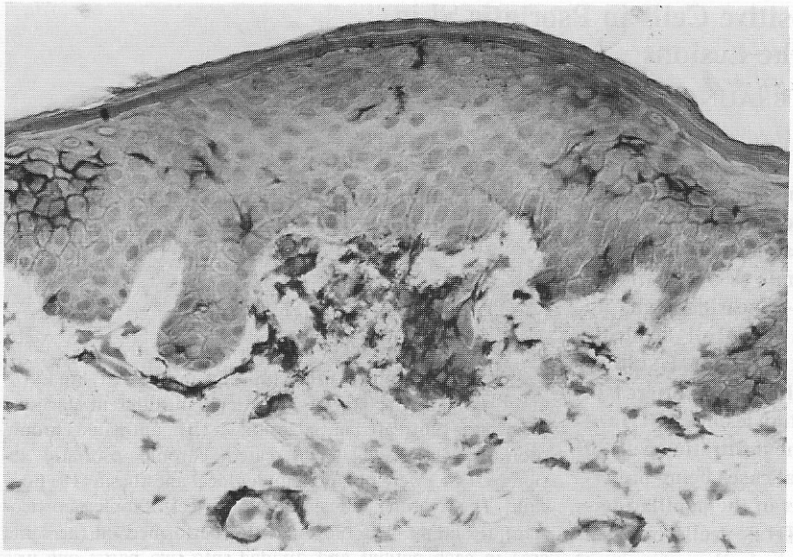

Fig. 1. Initial psoriatic lesion: Note the numerous dermal CD1a+ cells beneath an epidermal area almost depleted of LC.

thotic epidermis. Positive cells were distributed near the basal membrane zone. Counting revealed a statistically significant reduction ($p<0.001$) of the cells (59.4 ± 22) when compared with normal skin.

Dermis: Numerous CD1a+ cells (40–70%) were found in the upper part of the dermis and in the dermal papillae close to the epidermal CD1a+ cells. These cells represented a great proportion of the perivascular cells (Fig. 1).

3. *Untreated chronic psoriatic lesions (UCL)(n=10)*

Epidermis: CD1a+ cells were grouped near the upper papillar dermis and their cell body appeared much greater than in normal skin. Counting showed significantly fewer (45 ± 20; $p<0.001$) cells than in normal skin and than in initial lesions ($p<0.01$). In some areas, CD1a+ cells were completely absent, though their distribution in appendages seemed to be conserved.

Dermis: Some CD1a+ cells were preferentially localized in the upper dermis around the vessels (Fig. 2), as in initial lesions, close to the epidermal CD1a+ cells, which seem concentrated around these areas. However, fewer CD1a+ dermal cells were found (10–30%) than in initial lesions.

4. *Treated chronic psoriatic lesions (TCL)(n=15)*

Epidermis: CD1a+ cells were scattered in the epidermis and found in a lower (statistically not significant)

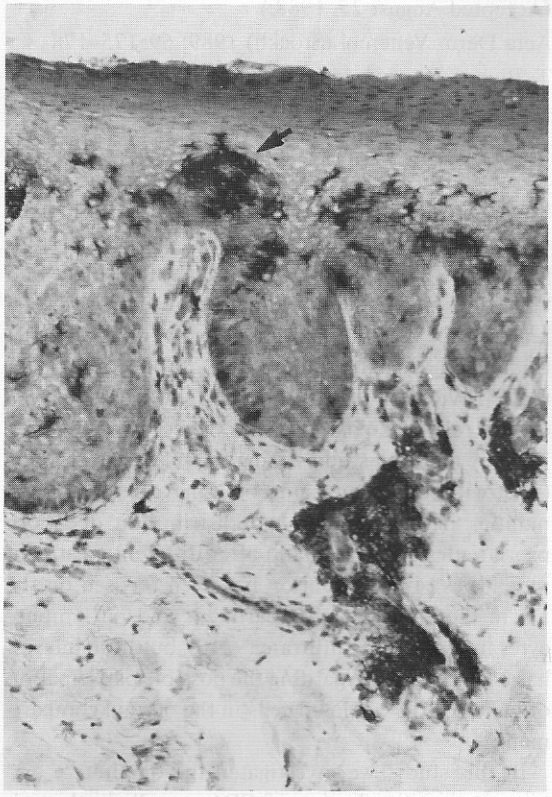

Fig. 2. Untreated chronic psoriatic lesions: Numerous CD1a+ cells are mostly localized around the vessels in the upper dermis, whereas epidermal cells are clustered around the upper part of the dermal papillae (*arrow*).

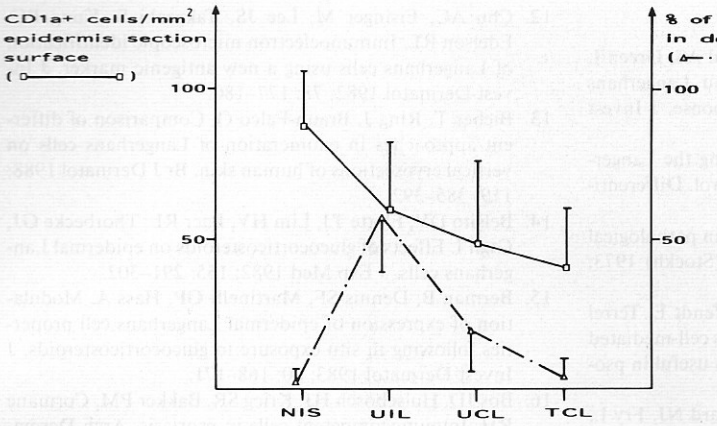

Fig. 3. Variation in CD1a+ cells in dermal and epidermal compartments during the evolution of the psoriatic lesions. Note the marked decrease in the epidermal pool of CD1a+ cells associated with an increase in these cells in the dermal compartment in the initial lesions.

mean number (40±18) than in untreated lesions. Their cell bodies were similar to those in untreated lesions.

Dermis: Very few CD1a+ cells (0–10%) were seen in the dermal compartment.

The results of enumeration are summarized in Fig. 3.

DISCUSSION

Several immunohistochemical studies have been reported on the localization and the variation of the epidermal population of CD1a+ cells (LC and IC) in psoriatic lesions, but little interest has been shown for these cells in the dermal infiltrate. The decrease in epidermal CD1a+ cells in psoriatic lesions is well documented. The purpose of this work was to study not only abnormalities in these cells in the epidermis, but also in the dermal cellular infiltrate.

This chronological study showed a statistically significant decrease of the epidermal CD1a+ cells during the evolution of the lesions. On the other hand, morphological changes, i.e. enlarged cell body with fewer dendrites suggest that these cells may be altered or, on the contrary, activated in a still unclear manner during the development of the psoriatic lesion. In other inflammatory diseases with acanthosis, such as atopic eczema, we could not observe similar morphological modifications.

The fact that our observations did not show a significant decrease in epidermal CD1a+ cells during treatment could suggest that either the therapeutic effect of glucocorticosteroids in psoriasis is not related to quantitative variation of the CD1a+ population or that this treatment rather affects the immunological function of the cells (4, 14, 15) which is not detectable by *in situ* immunohistochemical methods.

The composition of the dermal infiltrate in psoriatic lesions with regard to the different T cell subsets has already been thoroughly studied (9, 10, 16). The results of the present study has shown the presence of CD1a+ cells around the vessels in the dermal infiltrate during the evolution, and a correlation in the variation of the epidermal and dermal CD1a+ populations. The real identity of the dermal CD1a+ cells remains unclear, since histochemical studies (17) and several electron microscopic studies of psoriatic lesions have reported the presence of numerous macrophages (18, 19) but never mentioned the presence of LC in the dermal infiltrate or only after treatment with aromatic retinoids (20). However, an identical feature has been observed in the early lesions of allergic contact dermatitis and electron microscopic investigations of the dermal infiltrate in this condition (21) revealed CD1a+ cells lacking Birbeck granules. The migration of LC through the basal membrane zone and the phenotypic transformation of macrophages to LC has been clearly demonstrated (22, 23). In view of our observations, no clear explanation can be proposed for this presumed migration of CD1a+ from the epidermis to the dermis, and/or vice versa, and further immunoelectron microscopic investigations will be needed to characterize the nature of the dermal CD1a+ cells and their relation to LC or IC.

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