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IMMUNOFLUORESCENCE STUDIES IN PUSTULOSIS PALMOPLANTARIS

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Abstract. Deposition of immunoglobulins and of the complement fraction of C3 was found by the direct immune fluorescence method in 7 cases of pustulosis palmoplantaris as well as in 4 out of 5 patients with generalized pustular psoriasis, investigated as controls. The relevance of these findings is discussed.

Regarding pustulosis palmoplantaris, several clinical facts are known and therapeutic recommendations have been made. Its etiology, however, remains to be elucidated. The condition may therefore be classified under various headings and groupings of dermatoses. The relation of pustulosis palmoplantaris to psoriasis is not clear, but combinations of these two dermatoses often occur (2, 3, 11). The local accumulation of leukocytes is not clearly understood, but our findings of decreased phagocytosis of polynuclear leukocytes may have some relevance here (7).

Another aspect of the pathogenetic problems in pustulosis palmoplantaris is the possibility that local deposits of immunoglobulins and/or immune complexes are implicated in this disease. In order to investigate this possibility, immunofluorescence tests on skin biopsies have been performed. For comparison, patients with generalized pustular psoriasis were also studied.

MATERIALS AND METHODS

The pustules of 7 patients with pustulosis palmoplantaris and 5 patients with generalized pustular psoriasis were investigated. The biopsies were taken from the hands. The diagnoses were verified by conventional histological techniques (Fig. 1).

The following immunological methods were used:

A) Direct immunofluorescence tests (DIF) according to usual techniques (8) for the localization of immunoglobulins, and the complement fraction C3 using FITC-conjugated rabbit antisera against human IgG, IgA, IgM and C3. The specificity of the conjugates was checked by immunodiffusion and haemagglutination tests, and by direct immunofluorescence on myeloma bone marrow cells.

B) Indirect immunofluorescence technique (IIF) using guinea pig lip for detection in sera of antibodies against normal skin components, as previously described by Beutner & Jordan (1).

C) In some cases, quantitation of immunoglobulins and C3 in the sera of the patients was determined by means of radial immunodiffusion (5).

RESULTS

Deposition of immunoglobulins in the pustular areas was seen in all cases of pustulosis palmoplantaris (Table I). IgG, as well as IgM, and in most cases IgA, could be demonstrated as diffusely spread deposits within the pustules. In some cases, a linear intercellular fluorescence in the surrounding epidermis was also seen (Fig. 2). No staining could be detected in unaffected skin. The findings in generalized pustular psoriasis were similar except in one case, where immunoglobulins could not be detected in the sections. C3 was also often seen in the pustular areas. In one case, granular fluorescence was found at the junction (Fig. 3). No complement could be seen in macroscopically intact skin. In generalized pustular psoriasis, complement was demonstrated at the junction area in 2 cases.

In all cases, fluorescence was completely prevented by treatment of the sections with the corresponding unlabelled antiserum prior to application of the conjugate. Normal rabbit serum did not, however, inhibit the specific fluorescence. The indirect immunofluorescence technique (Table I) revealed no antibodies against skin antigens in the sera of the investigated patients.

In case H. A. (pustulosis palmoplantaris) the serum concentration of IgG was slightly elevated (18.7 mg/ml, normal upper limit being 15 mg/

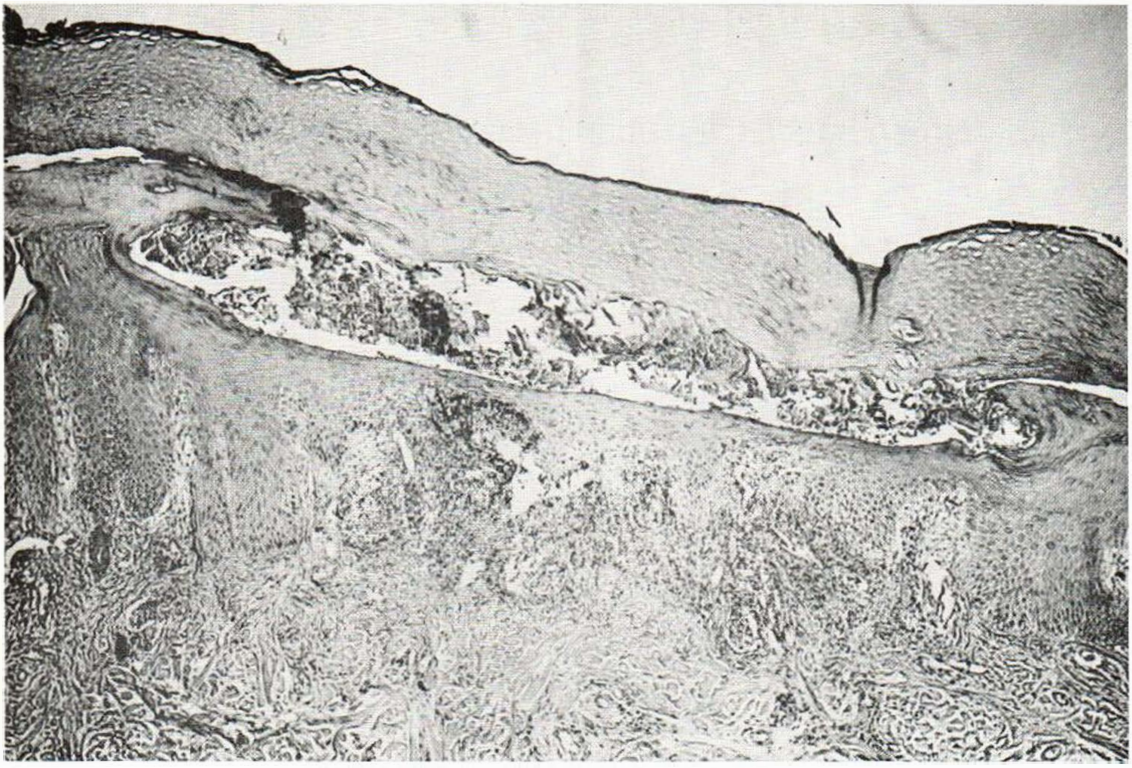

Fig. 1. Histologic picture of pustule from patient K. L. × 90.

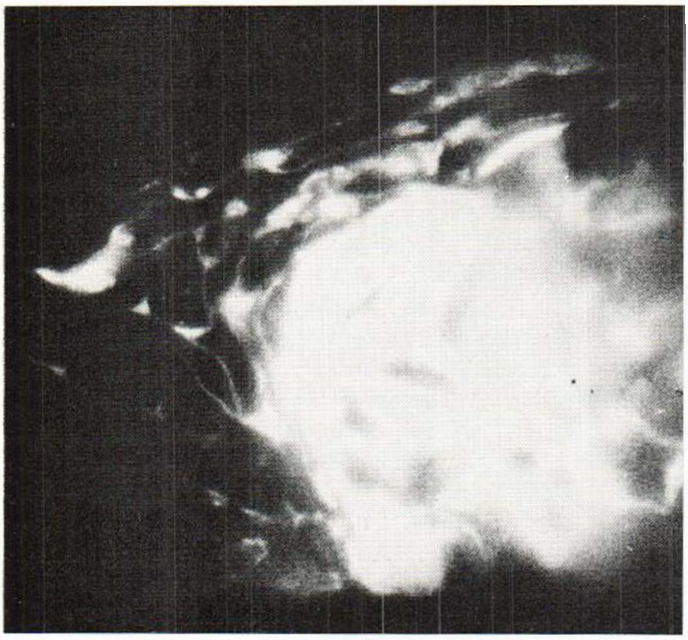

Fig. 2. Direct immunofluorescence of a pustule from patient K. L. (Fig. 1) stained with FITC-labelled anti-IgG, showing large amounts of IgG in the pustule. × 800.

Table I. *Results of immunofluorescence tests*

Pat.	Sex	Age (y.)	Direct tests[a] IgG	IgA	IgM	C3	Indirect tests[b]
PPP patients							
H. A.	♂	68	+	+	+	+	0
J. O.	♂	61	+	+	+	+	0
O. J.	♀	42	+	+	+	+	0
H. B.	♀	39	+	+	+	+	0
K. L.	♀	45	+	+	+	+	0
H. B.	♀	38	+	0	+	+	0
E. B.	♀	54	+	+	+	+	0
GPP patients							
B. P.	♂	53	+	+	+	+	0
A. A.	♂	56	+	+	+	0	0
J. J.	♂	66	+	+	+	+	0
H. A.	♀	40	0	0	0	0	0
M. J.	♀	45	+	0	+	+	0

[a] Skin biopsies.
[b] Detection of skin antibodies in serum.

ml). In the generalized pustular psoriasis patient M. J., both IgG and IgM were elevated, 24 mg/ml and 3 mg/ml respectively. The concentration of IgA was, however, within normal value limits.

DISCUSSION

The direct immunofluorescence technique showed a certain immunological activity in the relevant epidermal site in pustulosis palmoplantaris. In addition, we detected granular deposits of C3 at the junction area in one case, similar to what is seen in lupus erythematosus (10) and dermatitis herpetiformis (6). However, immunoglobulins were not found in the junction area in our material.

Although the findings described may be of pathogenetic significance, similar findings were also made in another representative of epidermal pustulous diseases, namely generalized pustular psoriasis. This may be best explained by suggesting that the immunopathological activity in pustulosis palmoplantaris is not specifically different from other pustular epidermal lesions. In other words, the findings of the present work seem to be more "pustule-specific" than "disease-specific". A possible analogy are the results of Krogh & Tønder (4), who, using the immune adherence test, demonstrated an in vivo formation of antigen-antibody/complement complexes in the stratum corneum of lesions of patients with psoriasis pustulosa, pemphigus foliaceus and subcorneal pustular dermatosis. Another explanation may be that pustulosis palmoplantaris is not distinct from (pustular) psoriasis (see discussion in 11).

Based on the results of the present work and on the report quoted it seems possible that a common mechanism exists in the formation of epidermal

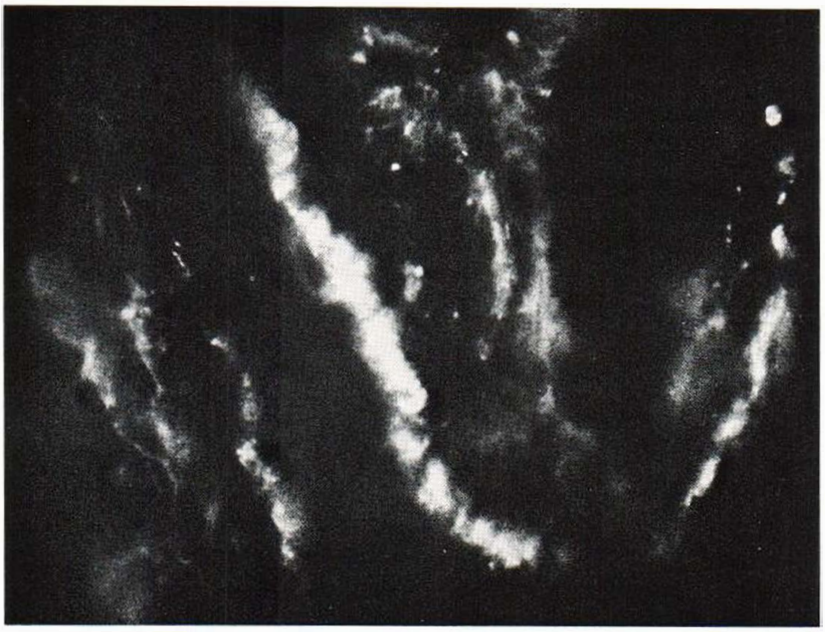

Fig. 3. Direct immunofluorescence. Section from patient E. B. stained with FITC-labelled anti-C3. Granular deposits of C3 are seen in the junction area. × 780.

pustules in certain skin diseases. It may be speculated that, as a result of an initiating trauma, immune complexes are formed with subsequent binding of complement chemotactic for neutrophil granulocytes. These events are then followed by the later phases of local epidermal pustule formation. However, in this work, only the role of complement-binding immune complexes as possible mediators was investigated. It should be considered that the initial cause of transepidermal leukocyte migration in psoriasiform lesions (9) is not clear. In addition to immunopathological activity, several other factors (differences in vascular permeability, the survival time of cells, chemotactic influences, cellular metabolism, enzyme and tissue factors etc.) (11) may be involved in such processes.

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