Expression of Endoglin in the Transition between Psoriatic Uninvolved and Involved Skin


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Endoglin is a glycoprotein which is predominantly expressed on endothelial cells. It is upregulated under inflammatory conditions as well as in skin lesions where endothelial cell proliferation occurs. Endoglin has the capacity to bind transforming growth factor beta (TGF-β) and can reduce the bioavailability of TGF-β. TGF-β has a growth-inhibiting effect on keratinocytes and a restraining influence on the extravasation of peripheral white blood cells.

In order to find out how endoglin is expressed in the margin zone of psoriatic plaques and how it correlates with the appearance of an inflammatory infiltrate, punch biopsies were taken from the margin zone of actively spreading psoriatic plaques in 8 patients. Indirect immunoperoxidase staining was performed using PAL-E (vascular endothelium), PN-E2 (anti-endoglin) and T11 (T-lymphocytes).

In all patients it was found that the appearance of parakeratosis correlated with a clear increase of PN-E2 expression. PAL-E and PN-E2 expression was assessed, using a 5-point scale. Thus a tendency to decreased PN-E2 expression in uninvolved skin compared to PAL-E expression was found within the margin zone (1.6±0.4 and 2.2±0.4, respectively), whereas in involved skin PN-E2 expression and PAL-E expression were in agreement (2.6±0.5 and 2.6±0.5 respectively), suggesting that in the overt plaque all endothelium is in a so-called activated state. Also correlating with PN-E2 expression was the appearance of a huge dermal lymphocytic infiltrate and epidermal T-lymphocytic expression.

The present study lends further support for a permissive role of endoglin expression in the development of the psoriatic lesion. (Accepted June 23, 1997.)

compound (Miles Scientific, Naperville, USA), snap-frozen in liquid nitrogen and stored at −80°C until use. Subsequently, 7-μm frozen sections were cut and fixed in acetone for 10 min.

**Immunohistochemistry**

In order to visualise the vascular endothelium, without staining the lymphatic vessels, PAL-E, a monoclonal antibody, diluted 1:25 (Department of Pathology, University Hospital Nijmegen, the Netherlands), was used (13, 14). For the assessment of endothelin expression, the monoclonal antibody PN-E2, diluted 1:25 (Department of Pathology, University Hospital Nijmegen, the Netherlands), was used. Pan T-lymphocytes were stained by the monoclonal antibody DAKO-T11, diluted 1:100 (Dakopatts, Copenhagen, Denmark).

Slides were rehydrated in phosphate-buffered saline (PBS) and then incubated with the monoclonal antibody for 60 min. After three washes in PBS they were incubated for 30 min with peroxidase-conjugated rabbit-antimouse antibody (RAMPO, Dakopatts, Copenhagen, Denmark). Three more washes preceded a pre-incubation with sodium acetate buffer (pH 4.9), after which the slides were stained with freshly prepared 3-amino-9-ethyl-carbazole 200 mg/l in sodium acetate buffer and 0.01% H2O2 (AEC solution). All slides were finally washed with demineralized water, counterstained with Mayer’s haematoxylin (Sigma, St. Louis, MO) and mounted in glycerin gelatin.

Slides were studied by light microscopy and the staining pattern was assessed at the papillary and subpapillary region of the dermis, using a 5-point scale. Staining area, but not staining intensity, was scored.

**RESULTS**

In the more central part of the margin zone ("involved") the architecture was psoriasiform with parakeratosis, acanthosis and a mixed inflammatory infiltrate. In the more distal part ("uninvolved") the architecture was that of normal skin. The transition between involved and uninvolved psoriatic skin was sharp with respect to the transition between orthokeratosis and parakeratosis but more gradual with respect to acanthosis and infiltrate formation.

The staining results of PAL-E and PN-E2 are summarized in Table I. It can be seen that in the involved part of the margin zone the density of the PN-E2-positive vascular endothelium approximated the density of vascular endothelium, as visualized by PAL-E. In contrast, PN-E2 staining was markedly reduced in the uninvolved part of the margin zone. Although the differences within the margin zone between the "involved" and "uninvolved" parts are substantial, no statistical significance was reached at the number of 8 patients. The transition between the involved and uninvolved part of the margin zone comprised only a few papillae. PN-E2 staining in the margin zone is visualized in Fig. 1. The appearance of a pronounced dermal infiltrate of T-lymphocytes and epidermal accumulation of these cells correlated with the PN-E2 expression.

**DISCUSSION**

In normal skin of healthy volunteers, and also in the psoriatic plaque, the ratio of PAL-E-positive endothelium to PN-E2-positive endothelium was 1:1 (12).

In a previous communication it has been reported that the expression of PAL-E, indicating total vascular endothelium, was reduced in the distant, clinically uninvolved skin. In addition, less endothelium expressing endoglin was demonstrated in the distant, clinically uninvolved skin as compared to normal skin (12). The relatively reduced expression of endoglin in the distant, clinically uninvolved skin proved to advance into the margin zone of the spreading lesion, showing an abrupt transition into a marked expression, in the "involved part" of the margin zone. The transition from normal into acanthotic epidermis, from orthokeratosis into parakeratosis and from low-density into high-density lymphocytic infiltration coincides with this abrupt transition of endoglin expression.

![Fig. 1](image-url)
However, a major reduction of vascular endothelium (PAL-E-positive cells) does take place in the distant, uninvolved skin as compared to the skin of normal volunteers (12). The expression of PAL-E in the uninvolved part of the margin zone approaches the markedly increased expression in the lesional skin. Increased bloodflow, increased alkaline phosphatase activity and increased tenascin expression in an annular zone around the psoriatic plaque indicate early involvement of the microvasculature and stroma in the development of the lesion (15–17).

The sharp demarcation of the psoriatic plaque is reflected in a sharp transition of endoglin expression. It is attractive to speculate that within the lesion the relatively high expression of endoglin decreases the availability of TGF-β, hence enhancing inflammation. In contrast, the decreased expression of endoglin in the distant, uninvolved skin is likely to result in increased TGF-β levels and hence might counteract inflammatory stimuli.

REFERENCES