

Differentiation of the Basal Cell Epithelioma-like Changes Overlying Dermatofibroma

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Epidermis overlying dermatofibroma rarely displays basal cell epithelioma-like changes (BCE-like changes). Based on the histopathological findings, whether BCE-like changes are induced by dermal lesion or adnexal regression secondary to the solid fibrotic growth remains to be explored. From the standpoint of differentiation, we examined the BCE-like changes overlying dermatofibroma, normal epidermis, and hair follicles. PNA and two kinds of anti-keratin monoclonal antibodies were used to detect markers for epidermal differentiation. When PNA and anti-keratin monoclonal antibody (34betaB4) were used, no difference was observed in the staining patterns among BCE-like changes, hair follicles or normal basal cells. With the other anti-keratin antibody (34betaE12), BCE-like changes and normal basal cells were recognized, though the hair matrix was not. Thus the results obtained indicate that normal basal cells show the most similar differentiation to BCE-like changes. *Key words: Keratin; PNA.*

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Various epidermal changes can be observed in dermatofibroma. Basal cell epithelioma-like changes (BCE-like changes) are relatively rare epidermal changes. Although many investigators have written about BCE-like changes (1–6), the question as to whether or not these changes are induced by dermal lesions (3–5) or adnexal regression secondary to the solid fibrotic growth in the dermis (6) remains to be explored. The first theory focuses on the pluripotential of the epidermal cell and the second theory on the histopathological findings which are indicative of regressive changes of pre-existing cutaneous adnexa. We cannot obtain a more persuasive conclusion in regard to the origin of BCE-like changes from histopathological examination. Thus, in order to elucidate the origin of BCE-like changes, another method was necessary.

It was thought that it might be useful to investigate the differentiation of BCE-like changes. A kind of lectin, peanut agglutinin (PNA, Vector Laboratories, Burlingame, Calif.) and two kinds of anti-keratin monoclonal antibodies were used to detect markers for differentiation. One recognizes 68 K dalton (kD) keratin peptides (34betaB4, Enzo Biochem), the other recognizes 56, 56.5, 58 and 68 kD keratin peptides (34betaE12, Enzo Biochem). Differentiation of BCE-like changes was examined and compared with that of the follicular apparatus and normal epidermis.

MATERIAL AND METHODS

A 61-year-old woman with a tender bluish firm lesion 11-mm in diameter on her right arm for approximately 2 years came to our hospital for treatment. The lesion was excised and a hematoxylin-eosin stained section showed a dermatofibroma whose overlying epidermis showed BCE-like changes.

Sections 5 µm in thickness were made from the specimen, fixed with formalin and embedded in paraffin wax. Sections were deparaffinized in the usual way. Three normal skin samples containing hair follicles were used as controls.

Staining with PNA

After normal goat serum was instilled, sections were allowed to stand for 30 min at room temperature and reacted with biotinylated lectin (25 µg/ml) at room temperature for 30 min. They were washed with phosphate-buffered saline (PBS) and reacted with avidin-biotin-peroxidase complex (ABC, Vector Laboratories) at room temperature for 30 min and stained with 3,3'-diaminobenzidine (DAB, Sigma Chemicals). The section was counterstained with hematoxylin.

Staining with anti-keratin monoclonal antibody

The section was incubated in 0.1% trypsin for 30 min. After washing with PBS, it was reacted with 34betaB4 or 34betaE12 which was diluted to 1:1000 for 12 h at 4°C. After washing with PBS, it was reacted with biotinylated rat monoclonal antibody to mouse IgG₁ (Zymed Laboratories). It was diluted to 1:1000, at room temperature for 1 h. The subsequent procedures were the same as for staining with PNA.

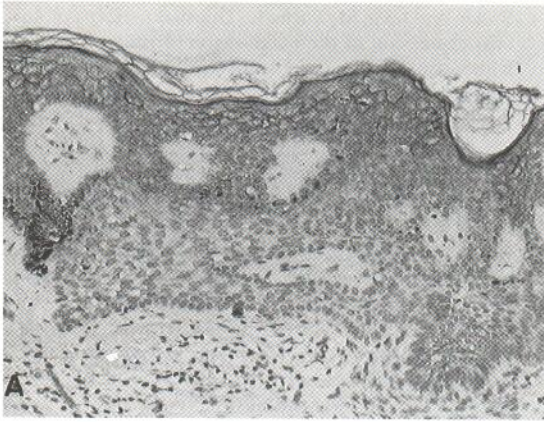


Fig. 1. A, B and C show BCE-like changes overlying dermatofibroma stained with PNA and two anti-keratin antibodies (34betaB4 and 34betaE12). (A). PNA staining. The lower part of the epidermis consisting of BCE-like changes is not stained. (B). 34betaB4 staining. The area which is not stained with 34betaB4 is almost the same as it is with PNA. (C). 34betaE12 staining. The whole epidermis containing BCE-like changes is not stained by either PNA or 34betaB4, but stained with 34betaE12.

RESULTS

The staining patterns of BCE-like changes with PNA, 34betaB4 and 34betaE12 were examined. With PNA, the plasma membrane was stained in the upper part, except in BCE-like changes. The staining area was almost the same as it was with 34betaB4 (Fig. 1A). With 34betaB4, the lower part of the epidermis, consisting of BCE-like changes, was not stained, while the cytoplasm of the upper part of the epidermis did stain (Fig. 1B). With 34betaE12, the cytoplasm of the whole epidermis which contained BCE-like changes was stained (Fig. 1C).

PNA recognized neither the hair matrix nor the lower part of the cells of the inner layers which consist of hair medulla, cortex, cuticles and inner root sheaths in the anagen stage. The lower part of the outer root sheath either did not stain or was faintly stained. 34betaB4 did not recognize the lower portion of the hair follicle. 34betaE12 recognized neither the hair matrix nor the lower parts of cells of the inner layers. The cytoplasm of the outer root

sheath in the lower part was either not recognized or only faintly recognized. The staining intensity of the cytoplasm of the outer root sheath increased toward the upper part.

DISCUSSION

In the normal epidermis, PNA bound to the plasma membrane of the epidermis, except for the basal layer, 34betaB4 recognized the cytoplasm of the suprabasal epidermal cells, while 34betaE12 recognized the cytoplasm of the whole epidermis. These results concur with those of other studies (7-10).

Our results showed that BCE-like changes indicate negative stains with PNA and 34betaB4 and positive stains with 34betaE12. On the other hand, the hair matrix in the anagen stage was recognized by neither PNA nor by the two kinds of anti-keratin monoclonal antibodies. Thus the staining pattern of BCE-like changes was more similar to the normal basal layer than was the hair matrix. From the viewpoint of differentiation, we can indicate the possibil-

ity that BCE-like changes are indeed an extension of the basal cells of the epidermis, as long as three markers are used. However, it was observed that in the telogen stage of hair, the staining area of 34betaE12 spread and the non-staining area in the hair follicles almost disappeared (data unpublished). BCE-like changes showed the same staining patterns as the hair follicles in the telogen stage. We cannot deny the hypothesis that BCE-like changes are adnexal regression secondary to fibrotic growth in the dermis (6). We feel that if this is true, then the regressive hair is in the telogen stage.

REFERENCES

1. Schoenfeld RJ. Epidermal proliferations overlying histiocytomas. *Arch Dermatol* 1964; 90: 266-270.
2. Caron G, Clink H. Clinical association of basal cell pithelioma with histiocytomas. *Arch Dermatol* 1964; 90: 271-273.
3. Goette DK, Helwig EB. Basal cell carcinomas and basal cell carcinoma-like changes overlying dermatofibromas. *Arch Dermatol* 1975; 111: 589-592.
4. Stoler A, Duvic M, Fuchs E. Unusual patterns of keratin expression in the overlying epidermis of patients with dermatofibromas: Biochemical alterations in the epidermis as a consequence of dermal tumors. *J Invest Dermatol* 1989; 93: 728-738.
5. Komiya TA. A study on basal cell proliferation from epidermis in epidermal nevus, sebaceous nevus, dermatofibroma and calcifying epithelioma. *Jpn J Dermatol* 1967; 78: 53-69.
6. Rahbari H, Mehregan H. Adnexal displacement and regression in association with histiocytoma (dermatofibroma). *J Cutan Pathol* 1985; 12: 94-102.
7. Morrison AI, Keeble S, Watt FM. The peanut lectin-binding glycoproteins of human epidermal keratinocytes. *Exp Cell Res* 1988; 117: 247-256.
8. Reano A, Faure M, Jacques Y, Reichert U. Use of lectin for the study of human epidermal differentiation. *Br J Dermatol* 1982; 107: 143-146.
9. Yoneda K. Immunohistochemical staining properties of keratin type intermediate filaments in mammary and extra-mammary Paget's disease. *J Dermatol (Tokyo)* 1989; 16: 47-53.
10. Watt FM, Stella K, Fisher C, Hadson DL, Codd J, Salisbury JR. Onset of expression of peanut lectin-binding glycoprotein is correlated with stratification of keratinocytes during human epidermal development in vivo and in vitro. *J Cell Science* 1989; 355-359.