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THE GRANULAR LAYER THICKNESS IN ATOPY AND ICHTHYOSIS VULGARIS*

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ABSTRACT

Our data confirm the finding that the granular cell layer is markedly decreased in thickness in ichthyosis vulgaris. The granular layer cannot be used as an index of dry skin in the atopic state because no significant differences in granular cell layer thickness were present in skin specimens from atopic patients with normal skin or dry skin.

The deficient granular layer in ichthyosis vulgaris as confirmed by Frost and Van Scott (1) has provided fresh insight into the mechanism of the formation of dry skin. This study was designed to determine whether the granular layer also is diminished in another dry skin state. The extent of the granular layer thickness of patients with atopy, with either dry or normal skin was evaluated by means of hematoxylin and eosin stained specimens of skin.

METHODS AND MATERIALS

Fifty-six boys and girls, age 3–15, from the Outpatient Pediatric Allergy Clinic of the University of Colorado Medical Center and from the Children's Asthma Research Institute and Hospital (CARIH), Denver, Colorado, participated in the study. Thirty-five of the children were being followed because of atopic respiratory disease (asthma and hay fever). Of these, 14 also had atopic dermatitis. The patients were classified as in Table I. Twenty-one children with normal skin and no known diseases served as controls. A specimen for biopsy was taken from the skin of the left upper, outer quadrant of the buttock.

Granular layers of H and E sections were graded to the nearest 0.5 unit by the following scale:

1.0 —granular layer virtually absent
2.0 —granular layer less than one cell thick
3.0 —granular layer more than 1, but less than 2 cell layers thick
4.0 —granular layer more than 2 cell layers thick

Evaluation of the dryness of the skin of the buttocks was accomplished by subjective grading 1 through 4, where 1 was maximally dry and 4 was normal skin.

RESULTS

The differences in the number of granular cell layers are found to be highly significant ($P < 0.005$), among all classifications (Table I). The differences among observers A, B, and C, though formally significant, are unimportant for evaluation, since a relatively consistent bias, seen as low readings by observer A, is noted without statistical evidence of interaction. The remarkable closeness of rankings in atopy, whether the skin be dry or normal (3.25 versus 3.21) is very strong evidence that the thickness of the granular layer is not related to the dryness of the skin in the atopic state. An attempt to further separate atopic dermatitis into dry and normal categories reveals a tendency toward a diminished granular layer in the dry group, but this tendency is not found to be statistically significant, ($P > 0.1$).

Since approximately one-half of the patients with atopy (with or without atopic dermatitis) were taking prednisone, an attempt was made to ascertain the effect of this treatment on the thickness of the granular layer. The mean thickness of the granular layer was determined, both in patients taking prednisone and those who had not taken it for more than a month prior to the study. No effect of this

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TABLE I

Granular layer analysis

An analysis of the number of granular cell layers of the skin of 56 patients by three observers (A, B, C). Their average value for each condition is in the last column.

Classification	No. of patients	Observer			Average
		A	B	C	
Normal skin	21	3.45	3.69	3.83	3.66
Atopic dermatitis	14	2.88	3.12	3.04	3.01
Atopy (dry skin)	7	2.88	3.38	3.50	3.25
Atopy (normal skin)	7	3.21	3.21	3.21	3.21
Ichthyosis vulgaris	7	1.43	1.14	1.43	1.33
Total	56				

drug on the number of granular cell layers was shown. In atopic dermatitis, results were opposite to those in atopy without dermatitis, i.e., patients with atopic dermatitis who were taking prednisone had thicker granular layers than those not taking the drug, while those with other atopic disease who were taking prednisone had thinner granular layers than patients who were not taking the drug. In neither case was the difference considered significant.

DISCUSSION

In this study an attempt is made to ascertain if the relationship between the diminished number of granular cell layers and dryness of the skin as noted by Frost and Van Scott in ichthyosis vulgaris, is also found in another condition in which the skin is dry. Atopic patients having dry skin or normal skin are compared and found to have similar numbers of granular cells. Normal skin has more layers of granular cells than skin of atopic patients (normal or dry), and while this difference is statistically significant, it is not large enough to use as reliable guide when ascertaining individual claims about atopic skin. As a group it appears that atopics have a thinner granular layer than do normal people.

An association between atopic dermatitis and ichthyosis was first pointed out by Besnier and Brocq, 75 years ago (2). This association has also been noted more recently by Wells, *et al.* (3). Two of our subjects (one with atopic dermatitis and asthma and one with only asthma) also had ichthyosis vulgaris. The histologic sections of buttock skin of both of these children revealed virtual absence of the granular layer, similar to that seen in our other five patients with ichthyosis vulgaris who were not atopics.

Our data confirm the finding that the granular cell layer is of markedly decreased thickness in ichthyosis vulgaris. The granular layer cannot be used as an index of dry skin in the atopic state, because no significant differences in granular cell layer thickness were present in skin specimens from atopic patients with normal skin or dry skin.

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