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Comment and Controversy

The pathophysiology of pityriasis alba: Time-dependent histologic changes

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Abstract Although pityriasis alba is a common dermatologic condition, its pathogenesis is poorly understood, and there are many discrepancies in the literature. To assess the effect of the duration of disease on the histologic findings, a search of cases labeled “pityriasis alba” was performed on any cases submitted to our dermatopathology laboratory. Of 179 cases of pityriasis alba, five cases identified the duration of the disease, when the biopsy was taken. A biopsy for a lesion of only 1-month duration demonstrated groups of large, prominent melanocytes heaped up upon one another. Compared with biopsies from patients who had the lesions for increasingly longer periods of time, it was apparent that the melanocytes became progressively less abundant and smaller with less prominent dendritic processes. The time that the biopsy is taken may affect the histologic findings of pityriasis alba. Additionally, an abundance of melanosomes was observed between the melanocytes in all sections examined which may reflect a problem with the transfer of melanosomes into keratinocytes in this condition.

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Introduction

Pityriasis alba (PA) is a dermatologic condition that begins with erythematous areas which subsequently scale and form hypopigmented spots. PA is a common disease, particularly in children with atopic dermatitis; however, in reading several recent textbooks and the literature, we found that the etiology and histopathologic changes of PA are poorly understood and not well-defined.^{1,2} Nondiagnostic and nonspecific findings,

including spongiosis and atrophic sebaceous glands, have been described; early lesions are reported to have follicular dilatation, follicular plugging, spongiosis, dermal edema, and lymphocytic infiltrates, whereas late lesions have hyperkeratosis, parakeratosis, and spongiosis.^{3,4} Some sources report reduced melanin pigment in the basal layer and no change in the number of melanocytes.^{2,3} Others have described a decrease in the number of active melanocytes and both the number and size of melanosomes.^{5,6} One group attributes the hypopigmentation to a problem in the transfer of melanosomes to keratinocytes,^{7,8} whereas others have found that there is no problem with melanosome transfer.⁶ We have discovered that much of the information written about the etiopathogenesis of PA is incompatible and contradictory.

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Table 1 Pityriasis alba case information

Case	Age/ sex	Location	Underlying diagnosis	Duration of lesion of pityriasis alba
1	11 M	arm	atopic dermatitis	1 mo
2	14 M	arm	atopic dermatitis	4 mo
3	7 M	arm	atopic dermatitis	8 mo
4	10 F	arm	atopic dermatitis	12 mo
5	9 M	arm	atopic dermatitis	18 mo

F, female; M, male.

Histologic findings

These discrepancies prompted us to carry out a review of cases diagnosed in our referral dermatopathology laboratory, in which the clinical diagnosis associated with the submitted specimen was “pityriasis alba.” We limited our review to cases in which the duration of the lesion biopsied was provided by the clinician. To ascertain the accuracy of the clinical diagnosis, we also limited our sample to cases submitted by a board-certified dermatologist. Among 138,861 total cases read over a 3-year period, 179 cases diagnosed clinically as PA had associated histories, and, of those, five cases noted the duration of the lesion at the time of biopsy (Table 1). All five of these patients had atopic dermatitis on the face and subsequently developed a hypopigmented lesion on their arms which was biopsied to rule out fungal disease. The patients ranged from 7 to 14 years, and the duration of the lesion ranged from 1 to 18 months (Table 1).

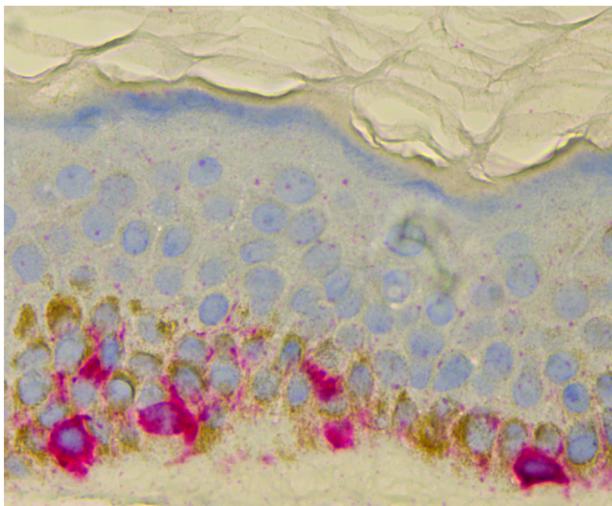


Fig. 1 Pityriasis alba 1 month after onset (case 1). Note large, grouped melanocytes. Note also individual melanosomes situated between melanocytes (Melan A [Mart 1] immunohistochemical stain, magnification $\times 960$).

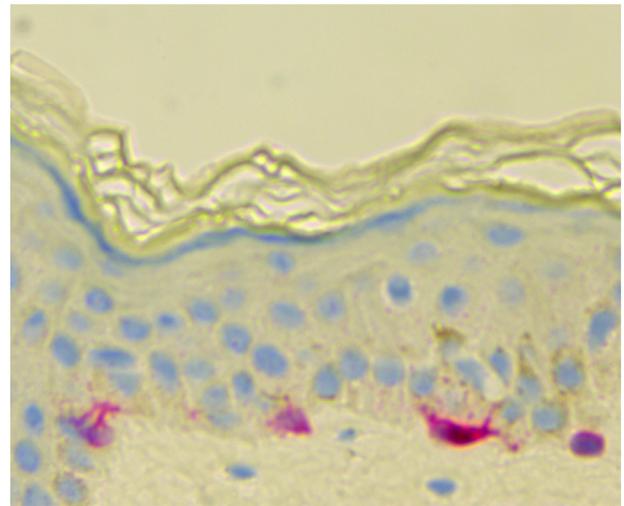


Fig. 2 Pityriasis alba of 18 months' duration (case 5). Note small, single melanocytes. Note also individual melanosomes situated between melanocytes (Melan A [Mart 2] immunohistochemical stain, magnification $\times 960$).

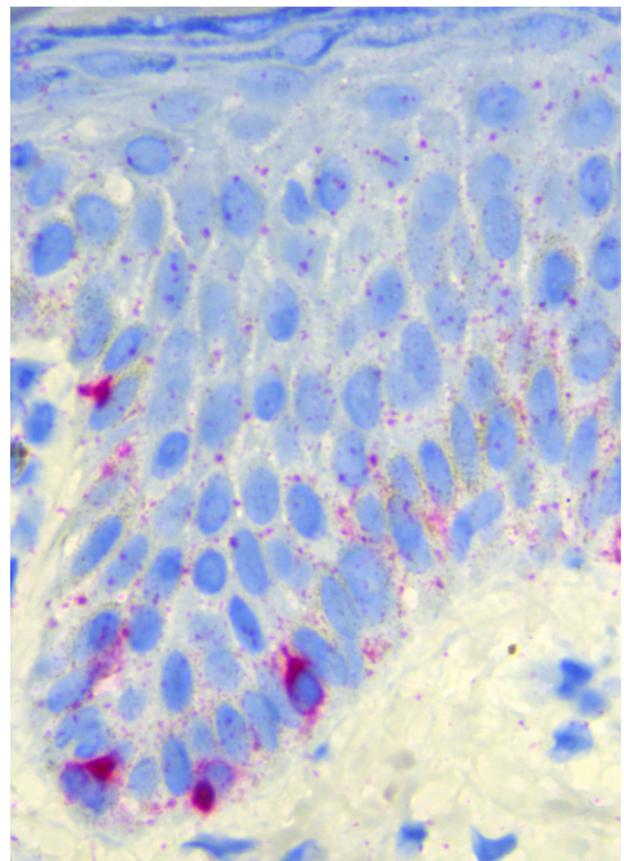


Fig. 3 Pityriasis alba of 8 months' duration (case 3). Note individual melanocytes situated between melanocytes (Melan A [Mart 1] immunohistochemical stain, magnification $\times 960$).

Figure 1 shows a Melan A (Mart 1) immunohistochemical stain of a section from case 1, 1 month after onset of the hypopigmented lesion. The melanocytes are large, prominent, and are heaped upon one another. Figure 2 shows case 5 that was biopsied 18 months after the onset of the lesion, revealing smaller melanocytes with barely visible dendritic processes. The melanocytes are present singly and placed far apart. The remaining three cases, present for intermediate time intervals, showed correspondingly intermediate results. These results suggest that the histologic findings of PA depend on when the biopsy is taken. An independent observation, best seen in Figure 3 but present in Figures 1 and 2 as well, is that melanosomes (seen as small, red structures) are present in abundance between keratinocytes but fail to enter the cells. This suggests that the normal process of melanosome transfer from melanocytes to keratinocytes is disrupted in PA.

Conclusions

The current literature on the etiology of PA is unclear, and there is no consensus on the histopathologic changes of PA. In agreement with previous literature, we found striking heterogeneity in the morphology of associated melanocytes in terms of their size, prominence, and distribution.⁸ Based on our findings, this seems to be dependent on the duration of the disease. Melanocytes decrease in size and number as the duration of the lesion increases. This is in contrast to studies that have found no difference in melanocytes^{2,3}; however, their conclusions may be due to lack of consideration of the duration of the lesions before biopsy. Additionally, in agreement with another study,⁷ we found that every case displayed marked spongiotic edema among keratinocytes and a disruption in the transfer of melanosomes. Based on these observations, we suspect that melanocyte morphology in PA is altered by the inability to

transfer pigment-bearing melanosomes to surrounding keratinocytes.

Both findings are of diagnostic and biologic significance in understanding the pathogenesis of PA. In the future, prospective studies should be performed with a larger number of cases to further elucidate the effect of the duration of PA on the histologic changes and to increase the total number of cases examined. Clinicians should be sure to document the duration of the lesion on their biopsy request, as it may affect the pathologist's reading of the case.

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