

Progressively Worsening Scaly Patches and Plaques in an Infant

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A 5-month-old male with moderately brown skin that rarely burns and tans profusely presented to the emergency department with a worsening red rash of more than 4 months' duration. The patient had diffuse erythroderma and eczematous patches and plaques covering 95% of the total body surface area, including lichenified plaques on the arms and elbows, with no signs of infection. He initially presented for his 1-month appointment at the pediatric clinic with scaly patches and plaques on the face and trunk as well as diffuse xerosis. He was prescribed daily oatmeal baths and topical Minerin (Major Pharmaceuticals)—containing water, petrolatum, mineral oil, mineral wax, lanolin alcohol, methylchloroisothiazolinone, and methylisothiazolinone—to be applied to the whole body twice daily. At the patient's 2-month well visit, symptoms persisted. The patient's pediatrician increased application of Minerin to 2 to 3 times daily, and hydrocortisone cream 2.5% application 2 to 3 times daily was added.

WHAT'S THE DIAGNOSIS?

- atopic dermatitis
- chronic plaque psoriasis
- erythrodermic allergic contact dermatitis
- irritant contact dermatitis
- seborrheic dermatitis

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THE DIAGNOSIS:**Erythrodermic Allergic Contact Dermatitis**

The worsening symptoms in our patient prompted intervention rather than observation and reassurance. Contact allergy to lanolin was suspected given the worsening presentation after the addition of Minerin, which was immediately discontinued. The patient's family applied betamethasone cream 0.1% twice daily to severe plaques, pimecrolimus cream 1% to the face, and triamcinolone cream 0.1% to the rest of the body. At follow-up 1 week later, he experienced complete resolution of symptoms, which supported the diagnosis of erythrodermic allergic contact dermatitis (ACD).

The prevalence of ACD caused by lanolin varies among the general population from 1.2% to 6.9%.¹ Lanolin recently was named Allergen of the Year in 2023 by the American Contact Dermatitis Society.² It can be found in various commercial products, including creams, soaps, and ointments. Atopic dermatitis (AD) is a common pediatric inflammatory skin disorder that typically is treated with these products.³ In a study analyzing 533 products, up to 6% of skin care products for babies and children contained lanolin.⁴ Therefore, exposure to lanolin-containing products may be fairly common in the pediatric population.

Lanolin is a fatlike substance derived from sheep sebaceous gland secretions and extracted from sheep's wool. Its composition varies by sheep breed, location, and extraction and purification methods. The most common allergens involve the alcoholic fraction produced by hydrolysis of lanolin.⁴ In 1996, Wolf⁵ described the "lanolin paradox," which argued the difficulty with identifying lanolin as an allergen (similar to Fisher's "paraben paradox") based on 4 principles: (1) lanolin-containing topical medicaments tend to be more sensitizing than lanolin-containing cosmetics; (2) patients with ACD after applying lanolin-containing topical medicaments to damaged or ulcerated skin often can apply lanolin-containing cosmetics to normal or unaffected skin without a reaction; (3) false-negative patch test results often occur in lanolin-sensitive patients; and (4) patch testing with a single lanolin-containing agent (lanolin alcohol [30% in petrolatum]) is an unreliable and inadequate method of detecting lanolin allergy.^{6,7} This theory elucidates the challenge of diagnosing contact allergies, particularly lanolin contact allergies.

Clinical features of acute ACD vary by skin type. Lighter skin types may have well-demarcated, pruritic, eczematous patches and plaques affecting the flexor surfaces. Asian patients may present with psoriasiform plaques with more well-demarcated borders and increased scaling and lichenification. In patients with darker skin types, dermatitis may manifest as papulation, lichenification, and color changes (violet, gray, or darker

brown) along extensor surfaces.⁸ Chronic dermatitis manifests as lichenified scaly plaques. Given the diversity in dermatitis manifestation and the challenges of identifying erythema, especially in skin of color, clinicians may misidentify disease severity. These features aid in diagnosing and treating patients presenting with diffuse erythroderma and worsening eczematous patches and plaques despite use of typical topical treatments.

The differential diagnosis includes irritant contact dermatitis, AD, seborrheic dermatitis, and chronic plaque psoriasis. Negative patch testing suggests contact dermatitis based on exposure to a product. A thorough medication and personal history helps distinguish ACD from AD. Atopic dermatitis classically appears on the flexural areas, face, eyelids, and hands of patients with a personal or family history of atopy. Greasy scaly plaques on the central part of the face, eyelids, and scalp commonly are found in seborrheic dermatitis. In chronic plaque psoriasis, lesions typically are described as well-demarcated, inflamed plaques with notable scale located primarily in the scalp and diaper area in newborns and children until the age of 2 years. Our patient presented with scaly plaques throughout most of the body. The history of Minerin use over the course of 3 to 5 months and worsening skin eruptions involving a majority of the skin surface suggested continued exposure.

Patch testing assists in the diagnosis of ACD, with varying results due to manufacturing and processing inconsistencies in the composition of various substances used in the standard test sets, often making it difficult to diagnose lanolin as an allergen. According to Lee and Warshaw,⁶ the lack of uniformity within testing of lanolin-containing products may cause false-positive results, poor patch-test reproducibility, and loss of allergic contact response. A 2019 study utilized a combination of Amerchol L101 and lanolin alcohol to improve the diagnosis of lanolin allergy, as standard testing may not identify patients with lanolin sensitivities.¹ A study with the North American Contact Dermatitis Group from 2005 to 2012 demonstrated that positive patch testing among children was the most consistent method for diagnosing ACD, and results were clinically relevant.⁹ However, the different lanolin-containing products are not standardized in patch testing, which often causes mixed reactions and does not definitely demonstrate classic positive results, even with the use of repeated open application tests.² Although there has been an emphasis on refining the standardization of the lanolin used for patch testing, lanolin contact allergy remains a predominantly clinical diagnosis.

Both AD and ACD are common pediatric skin findings, and mixed positive and neutral associations between

AD and allergy to lanolin have been described in a few studies.^{1,3,9,10} A history of atopy is more notable in a pediatric patient vs an adult, as sensitivities tend to subside into adulthood.⁹ Further studies and more precise testing are needed to investigate the relationship between AD and ACD.

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