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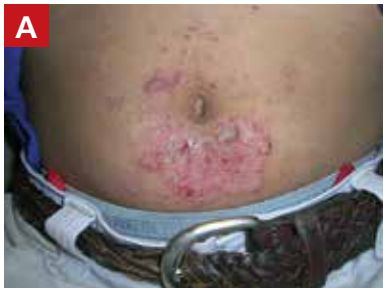
Allergic contact dermatitis



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THE COMPARISON

A An 11-year-old Hispanic boy with allergic contact dermatitis (ACD) on the abdomen. The geometric nature of the eruption and proximity to the belt buckle were highly suggestive of ACD to nickel; patch testing was not needed.

B A Black woman with ACD on the neck. A punch biopsy demonstrated spongiotic dermatitis that was typical of ACD. The diagnosis was supported by the patient's history of dermatitis that developed after new products were applied to the hair. The patient declined patch testing.

C A Hispanic man with ACD on hair-bearing areas of the face where hair dye was used. The patient's history of dermatitis following the application of hair dye was highly suggestive of ACD; patch testing confirmed the allergen was paraphenylenediamine (PPD).

Allergic contact dermatitis (ACD) is an inflammatory condition of the skin caused by an immunologic response to 1 or more identifiable allergens. A delayed-type immune response (type IV hypersensitivity reaction) occurs after the skin is re-exposed to an offending allergen.[1] Severe pruritus is the main symptom of ACD in the early stages, accompanied by erythema, vesicles, and scaling in a distinct pattern corresponding to the allergen's contact with the skin.[2] Delayed widespread dermatitis after exposure to an allergen—a phenomenon known as *autoeczematization* (id reaction)—also may occur.[3]

The gold-standard diagnostic tool for ACD is patch testing, in which the patient is re-exposed to the suspected contact allergen(s) and observed for the development of dermatitis.[4] However, ACD can be diagnosed with a detailed patient history including occupation, hobbies, personal care practices, and possible triggers with subsequent rashes. Thorough clinical examination of the skin is paramount. Indicators of possible ACD include dermatitis that persists despite use of appropriate treatment, an unexplained flare of previously quiescent dermatitis, and a diagnosis of dermatitis without a clear cause.[1]

Hairdressers, health care workers, and metal workers are at higher risk for ACD.[5] Occupational ACD has notable socioeconomic implications, as it can result in frequent sick days, inability to perform tasks at work, and in some cases job loss.[6]

Patients with atopic dermatitis have impaired barrier function of the skin, permitting the entrance of allergens and subsequent sensitization.[7] ACD is a challenge to manage, as complete avoidance of the allergen may not be possible.[8]

The underrepresentation of patients with skin of color (SOC) in educational materials as well as socioeconomic health disparities may contribute to the lower rates of diagnosis, patch testing, and treatment of ACD in this patient population.

Epidemiology

An ACD prevalence of 15.2% was reported

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in a study of 793 Danish patients who underwent skin prick and patch testing.[9] Alinaghi et al[10] conducted a meta-analysis of 20,107 patients across 28 studies who were patch tested to determine the prevalence of ACD in the general population. The researchers concluded that 20.1% (95% CI, 16.8%-23.7%) of the general population experienced ACD. They analyzed 22 studies to determine the prevalence of ACD based on specific geographic area, including 18,709 individuals from Europe with a prevalence of 19.5% (95% CI, 15.8%-23.4%), 1639 individuals from North America with a prevalence of 20.6% (95% CI, 9.2%-35.2%), and 2 studies from China (no other studies from Asia found) with a prevalence of 20.6% (95% CI, 17.4%-23.9%). Researchers did not find data from studies conducted in Africa or South America.[10]

The current available epidemiologic data on ACD are not representative of SOC populations. DeLeo et al[11] looked at patch test reaction patterns in association with race and ethnicity in a large sample size (N = 19,457); 92.9% of these patients were White and only 7.1% were Black. Large-scale, inclusive studies are needed, which can only be achieved with increased suspicion for ACD and increased access to patch testing.

ACD is more common in women, with nickel being the most frequently identified allergen (**FIGURE A**).[10] Personal care products often are linked to ACD (**FIGURE B**). An analysis of data from the North American Contact Dermatitis Group revealed that the top 5 personal care product allergens were methylisothiazolinone (a preservative), fragrance mix I, balsam of Peru, quaternium-15 (a preservative), and paraphenylenediamine (PPD; a common component of hair dye) (**FIGURE C**).[12]

There is a paucity of epidemiologic data among various ethnic groups; however, a few studies have suggested that there is no difference in the frequency rates of positive patch test results in Black vs White populations.[11,13,14] One study of patch test results from 114 Black patients and 877 White patients at the Cleveland Clinic Foundation in Ohio demonstrated a similar allergy frequency of 43.0% and 43.6%, respectively.[13] However, there were differences in the types of allergen sensitization. Black patients had higher positive patch test rates for PPD than White patients (10.6% vs 4.5%). Black men had a higher frequency of sensitivity to PPD (21.2% vs 4.2%) and imidazolidinyl urea (a formaldehyde-releasing preservative; 9.1% vs 2.6%) compared to White men.[13]

Ethnicity and cultural practices influence epidemiologic patterns of ACD. Darker hair dyes used in Black patients[14] and deeply pigmented PPD dye found in henna tattoos used in Indian and Black patients[15] may lead to increased sensitization to PPD. ACD due to formaldehyde is more common in White patients, possibly due to more frequent use of formaldehyde-containing moisturizers, shampoos, and creams.[15]

Key clinical features in people with darker skin tones

In patients with SOC, the clinical features of ACD vary, posing a diagnostic challenge. Hyperpigmentation, lichenification, and induration are more likely to be seen than the papules, vesicles, and erythematous dermatitis often described in lighter skin tones or acute ACD. Erythema can be difficult to assess on darker skin and may appear violaceous or very faint pink.[16]

Worth noting

A high index of suspicion is necessary when interpreting patch tests in patients with SOC, as patch test kits use a reading plate with graduated intensities of erythema, papulation, and vesicular reactions to determine the likelihood of ACD. The potential contact allergens are placed on the skin on Day 1 and covered. Then, on Day 3 the allergens are removed. The skin is clinically evaluated using visual assessment and skin palpation. The reactions are graded as negative, irritant reaction, equivocal, weak positive, strong positive, or extreme reaction at around Days 3 and 5 to capture both early and delayed reactions.[17] A patch test may be positive even if obvious signs of erythema are not appreciated as expected.

Adjusting the lighting in the examination room, including side lighting, or using a blue background can be helpful in identifying erythema in darker skin tones.[15,16,18] Palpation of the skin also is useful, as even slight texture changes and induration are indicators of a possible skin reaction to the test allergen.[15]

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Health disparity highlight

Clinical photographs of ACD and patch test results in patients with SOC are not commonplace in the literature. Positive patch test results in patients with darker skin tones vary from those of patients with lighter skin tones, and if the clinician reading the patch test result is not familiar with the findings in darker skin tones, the diagnosis may be delayed or missed.[15]

Furthermore, Scott et al[15] highlighted that many dermatology residency training programs have a paucity of SOC education in their curriculum. This lack of representation may contribute to the diagnostic challenges encountered by health care providers.

Timely access to health care and education as well as economic stability are essential for the successful management of patients with ACD. Some individuals with SOC have been disproportionately affected by social determinants of health. Rodriguez-Homs et al[19] demonstrated that the distance needed to travel to a clinic and the poverty rate of the county the patient lives in play a role in referral to a clinician specializing in contact dermatitis.

A retrospective registry review of 2310 patients undergoing patch testing at the Massachusetts General Hospital in Boston revealed that 2.5% were Black, 5.5% were Latinx, 8.3% were Asian, and the remaining 83.7% were White.[20] Qian et al[21] also looked at patch testing patterns among various sociodemographic groups (N = 1,107,530) and found that 69% of patients were White and 59% were female. Rates of patch testing among patients who were Black, lesser educated, male, lower income, and younger (children ages 0-12 years) were significantly lower than for other groups when ACD was suspected ($P < .0001$).[21] The lower rates of patch testing in patients with SOC may be due to low suspicion of diagnosis, low referral rates due to limited medical insurance, and financial instability, as well as other socioeconomic factors.[20]

Tamazian et al[16] reviewed pediatric populations at 13 US centers and found that Black children received patch testing less frequently than White and Hispanic children. Another review of pediatric patch testing in patients with SOC found that a less comprehensive panel of allergens was used in this population.[22]

The key to resolution of ACD is removal of the offending antigen, and if patients are not being tested, then they risk having a prolonged and complicated course of ACD with a poor prognosis. Patients with SOC also experience greater negative psychosocial impact due to ACD disease burden.[21,23]

The lower rates of patch testing in Black patients cannot solely be attributed to difficulty diagnosing ACD in darker skin tones; it is likely due to the impact of social determinants of health. Alleviating health disparities will improve patient outcomes and quality of life. JFP

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Treatment is primarily topical

Mild cases of rosacea often can be managed with topical antibiotic creams. More severe cases may require systemic antibiotics such as tetracycline or doxycycline, although these are used with caution due to the potential for antibiotic resistance.

Ivermectin 1% cream is a US Food and Drug Administration–approved medication that is applied once daily for up to a year to treat the inflammatory pustules associated with Demodex mites. Although it is costly, studies have shown better results with topical ivermectin than with other topical medications (eg, metronidazole 0.75% gel or cream). However, metronidazole 0.75% gel applied twice daily and oral tetracycline 250 mg or doxycycline 100 mg daily or twice daily for at least 2 months often are utilized when the cost of topical ivermectin is prohibitive.[10]

Our patient was treated with a combination of doxycycline 100 mg daily for 30 days and ivermectin 1% cream daily. He was also instructed to apply sunscreen daily. He improved rapidly, and the daily topical ivermectin was discontinued after 6 months. JFP

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