Allergic contact dermatitis

Patient diagnosis and evaluation

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Learning objectives

After completing this learning activity participants should be able to identify patients suspected of allergic contact dermatitis who may benefit from patch testing and describe the appropriate patch testing technique and testing materials in order to fully evaluate patients suspected of allergic contact dermatitis.

Disclosures

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Allergic contact dermatitis resulting from exposure to a chemical or chemicals is a common diagnosis in the dermatologist's office. We are exposed to hundreds of potential allergens daily. Patch testing is the criterion standard for diagnosing the causative allergens responsible for allergic contact dermatitis. Patch testing beyond standard trays is often needed to fully diagnose patients, but not all dermatology practices have access to this testing procedure or these allergens. In order to adequately evaluate patients, physicians must understand the pathophysiology of the disease process and be well versed in the proper evaluation of patients, indications for patch testing, proper testing procedure, and other diagnostic tools available and be aware of new and emerging allergens. (J Am Acad Dermatol 2016;74:1029-40.)

Key words: allergens; allergic contact dermatitis; atophy patch test; delayed-type hypersensitivity; dermatitis; patch testing.

Contact dermatitis, both irritant and allergic, is a common entity in the dermatologist's office. Contact dermatitis is caused by contact with 1 of the hundreds of chemicals to which individuals are exposed on a daily basis. Management of patients with contact dermatitis can be challenging but rewarding for both patients and physicians alike—most notably when a chemical or chemicals can be identified and removed from the patient's environment resulting in clearing of a dermatitis that may have been present for years.

Abbreviations used:

ACD:	allergic contact dermatitis
AD:	atopic dermatitis
APT:	atopy patch test
LTT:	lymphocyte transformation test
MCI:	methylchloroisothiazolinone
MI:	methylisothiazolinone
NACDG:	North American Contact Dermatitis Group
ROAT:	repeat open application test
SCD:	systemic contact dermatitis
T.R.U.E.:	Thin-layer Rapid Use Epicutaneous

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Persistence, consideration of contact dermatitis as a diagnosis, and a detective-like approach is often needed to identify the causative chemical(s). Allergic contact dermatitis (ACD) is common, but the actual incidence of ACD is difficult to capture because patients often self-diagnose or enter the medical system at various points, such as the emergency room, primary care offices, and urgent care clinics. ACD should be considered in patients with ongoing dermatitis. Identifying the causative allergen(s) is crucial to the resolution of this process. The criterion standard for diagnosing ACD is patch testing; patients suspected of having ACD should undergo this testing to elucidate the allergen(s) responsible for the dermatitis. We present an ACD update herein, including the tools used to evaluate and diagnose patients.

Numerous groups have grown out of the specialty of contact dermatitis. The North American Contact Dermatitis Group (NACDG), founded in 1970, helped arrange the 20-allergen kit sold in the United States after the US Food and Drug Administration (FDA) reclassified allergens in the United States, dramatically changing allergen availability at the time. They continue to publish on allergens in North America. The International Contact Dermatitis Research Group, European Environmental and Contact Dermatitis Research Group, and the European Society of Contact Dermatitis are some of the many international groups dedicated to furthering the professional exchange and knowledge in the field. The American Contact Dermatitis Society is an active group, holding an annual meeting and having >850 members. This group has developed a core allergen series, allergen narratives in both English and Spanish describing >70 allergens to be used as patient education tools, and a database called the Contact Allergen Management Program (CAMP) that provides patients with products that are safe to use given their known allergens.[1]

The history of patch testing and contact dermatitis is too rich to be adequately outlined in this review, but several detailed accounts have been published.[2-4]

PATHOPHYSIOLOGY: BASIC SCIENCE

ACD is a type IV, delayed-type reaction that is caused by skin contact with allergens that activate antigen-specific T cells in a sensitized individual. The sensitized T cells are primarily T-helper 1 (T_H1) type. In the sensitization phase, innate immunity is activated through keratinocyte release of interleukin (IL)-1α, IL-1β, tumor necrosis factor–alpha, granulocyte-macrophage colony-stimulating factor, and ILs-8 and -18. Langerhans and dermal dendritic cells uptake the allergen and migrate to the regional lymph nodes to activate antigen-specific T cells (ie, T_H1, T_H2, T_H17, and regulatory T [Treg] cells). These T cells then proliferate and enter the circulation and site of exposure. When reexposed to the allergen, antigen-specific T cells are activated through the release of cytokines and induce an inflammatory process. We now also recognize that patients with atopic dermatitis (AD) have barrier dysfunction that contributes to ACD in that population.[5]

Dermal dendritic cells, as opposed to epidermal Langerhans cells, play an important role in educating naïve T cells in the lymph node to become antigen-specific effector cells during cutaneous sensitization.[6] The recognition of skin resident T cells has enlightened our understanding of the role of Langerhans cells. Langerhans cells have now been shown to interact with skin resident T cells and generally promote tolerance when encountering antigens by stimulating Treg cells. However, in the presence of pathogens, such as *Candida albicans*, Langerhans cells stimulate T effector memory cells and promote inflammation.[7]

An increased appreciation of epidermal immunology increases our understanding of known therapies and may lead to innovative treatments and diagnostic tests. Systemic corticosteroids were recently shown to encourage Treg cell proliferation in patch test sites of patients with ACD to nickel.[8] Topical 1,25-dihydroxyvitamin D also induces Treg cells, probably by primarily affecting antigen-presenting cells.[9]

PATCH TESTING

Indication for patch testing

Patch testing is the criterion standard in the diagnosis of ACD. Patch testing attempts to recreate, in vivo, an allergic reaction to nonirritating concentrations of an allergen that is suspended in a vehicle. The decision to perform patch testing and which allergens to test depends on many factors.

Some common indications for patch testing include: (1) distributions that are highly suggestive of ACD—for example, ACD of the hands, feet, face, and eyelid, as well as unilateral presentations; (2) a clinical history that is highly suggestive of ACD; (3) high-risk occupations for ACD—for example, health care workers, cosmetologists, and florists, etc; (4) dermatitis of unknown etiology; (5) worsening of a previously stable dermatitis; and (6) dermatitis that is unresponsive to treatment.

Patch testing is also indicated if ACD is thought to develop secondarily in the course of another endogenous inflammatory disease. This typically occurs because of sensitization from topical