A Strange Disorder: Atopy

The term atopy is derived from the Greek, atopos or atopia, meaning out of (a) place (topos), or, in other words, strange, unusual, or odd. The term was coined by Edward D. Perry, professor of Greek at Columbia University, for Arthur Coca and Robert Cooke, who used atopy to differentiate patients with hay fever and asthma as a subset of patients with allergic reactions. A word meaning strangeness was an apt choice for this puzzling condition, which now indicates a disease mediated by immunoglobulin E (IgE) but that can also manifest with atopic dermatitis (also called atopic eczema)—a skin condition that clinically appears indistinguishable from T cell-mediated contact dermatitis. Strange, indeed.

In 1923 when Coca and Cooke introduced the concept of atopy, they considered it an “inherited human hypersensitiveness.” About a decade later, Hill and Suzlberger suggested that “atopic dermatitis” be applied to the itching eczema common in childhood and the chronic dry skin and lichenified lesions typically found in adults. In the 1970s researchers found an association between atopic disorders and allergen-specific IgE. As a result, atopy came to be considered almost synonymously as a hereditary IgE-mediated disease with a classic triad of symptoms: allergic rhinitis (hay fever), asthma, and eczema. Although atopy is typically associated with heightened immune responses to common allergens, especially inhaled allergens and food allergens, not all individuals with this constellation of symptoms have a familial history or high circulating levels of IgE—another strange aspect of the disease.

With the advent of molecular biology and advanced immunological tools, much has been learned about atopy. Nonetheless, many major questions remain. The exact pathogenesis has yet to be delineated. The relationship between genetic predisposition and how environmental factors affect the expression of atopy is far from clear. And how do genetic and environmental factors interact with immunologic factors? What differentiates atopic dermatitis from other eczematous dermatoses? What role do allergens play in eliciting and maintaining the eczema associated with atopic dermatitis?

Atopy is a condition that cuts across disciplines—allergists, dermatologists, pediatricians, general practitioners, and gastroenterologists are just a few of the clinical professionals who need to be aware of this strange disorder. Atopic dermatitis, the associated chronic inflammatory skin disease, is characterized by intense recurrent pruritis. In some cases patch testing may be used to help differentiate atopic dermatitis from allergic contact dermatitis or to exclude other skin conditions. Read on to learn about the current guidelines for patch testing in relation to atopy and some of the related challenges.
Food Allergens – Atopy and Beyond

A topic dermatitis, a chronic and intensely itchy inflammatory skin disease, is the most common skin disease. Its lifetime prevalence in adults has been estimated to be 1-3%. Atopic dermatitis is especially common in children, for whom the lifetime prevalence has been estimated at 10-20%.

Interestingly, as many as 80% of affected children may also have food sensitivities. The association is anything but straightforward, and considerable confusion surrounds the concept of food allergy as a result. Does any reaction to food qualify? Or just anaphylaxis? The National Institute of Allergy and Infectious Disease (NIAID), a division of the National Institutes of Health, convened a panel of 34 professional organizations, federal agencies, and patient advocacy groups to answer these questions. The resulting definition of food allergy, an “adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food,” includes both IgE-mediated (immediate) and non-IgE-mediated (delayed) reactions as well those in between (mixed)! Atopic dermatitis may well fall into the latter category.

Of course, reactions to food do not only arise in the context of atopy—T cell-mediated allergic contact dermatitis can be the culprit underlying skin reactions as can irritant dermatitis. The North American Contact Dermatitis Group (NACDG) performed a retrospective cross-sectional analysis of more than 10,000 patients patch tested to food and found that 1.1% had positive reactions. About a third of these patients were atopic and two-thirds were female. Based on patch testing with standard NACDG allergens, the most common allergens attributed to food were nickel (48.7%), Myroxylon pereirae (25.6%), and propylene glycol (6.4%). Testing was also conducted with nonstandard substances—actual or commercial food—and most reactions were to unspecified food or to fruit, nuts, and vegetables. Not surprisingly, individuals such as cooks, bakers, and butchers, whose occupations involve food processing, have an increased risk of developing irritant or allergic contact dermatitis. Eosinophilic esophagitis is a T helper 2-type inflammatory disorder associated with a high prevalence of concurrent allergic diseases, including atopic dermatitis and IgE-mediated food allergy.

For the diagnosis of IgE-mediated food allergies, the expert panel sponsored by the NIAID in 2010 suggested that atopy patch testing not be used for the routine evaluation of noncontact food allergies. Instead, they recommended using the gold standard of a double-blind placebo-controlled food challenge. Not surprisingly, the panel recommended using a patient’s medical history, absence of symptoms while avoiding a suspected food, and positive patch tests to diagnose allergic and systemic contact dermatitis.

For the diagnosis of other non-IgE-mediated immunologic adverse reactions to food, such as eosinophilic esophagitis, the panel suggested that patch testing, along with skin prick testing or measuring specific serum IgE, may be considered to help identify causative foods. They also noted that these tests alone were not sufficient to make the diagnosis. In 2011 an updated consensus on eosinophilic esophagitis then recommended further standardization and validation of atopic patch testing in adults and children and noted the need for evidence that patch testing induces a local immune response in patients with eosinophilic esophagitis.

In 2014 the American Academy of Dermatology published its own guidelines for the diagnosis and management of atopic dermatitis. Their essential features for diagnosis included a chronic or relapsing history of pruritus and eczema associated with typical and age-specific patterns (facial, neck, extensor involvement in infants and children) and flexural lesions (past or current) in any age group with sparing of the groin and axillary regions. Other important features include an early age of onset—typically before 2 years old. Individuals are usually atopic with a personal or familial history of asthma or hay fever. A common physical finding is xerosis.
Food Allergens – Atopy and Beyond…continued

Other clinical findings may suggest the diagnosis of atopic dermatitis but are too nonspecific to rely on entirely. Such conditions include atypical vascular responses, which include facial pallor, white dermographism, or a delayed blanch response. Keratosis pilaris, pityriasis alba, hyperlinear palms, and ichthyosis are poorly defined minor criteria. Regional findings may include ocular, perioral, or periauricular lesions. Perifollicular accentuation, lichenification, and prurigo lesions also may be encountered. On occasion additional tests, including patch testing, may be helpful to rule out other skin conditions such as scabies, seborrheic dermatitis, contact dermatitis, and psoriasis, among others.

None of the guidelines, however, can be interpreted as standards of care. Too much remains unknown and considerable research is needed. In the meantime, clinicians must exercise their best judgment on how to apply the guidelines to individual patients. How does one proceed when patch testing with food is deemed an appropriate approach to diagnosis? The final article in this issue offers some suggestions.

References

How to Patch Test with Food

Regardless of whether patch testing with food is pursued for atopic, irritant, or contact dermatitis, many variables can affect the outcome: techniques, allergens used for testing and their concentration, vehicles, use of controls, site of application, chamber material and size, age, occlusion and reading time, and interpretation of reactions. The lack of standardization of allergens and methodology used to perform patch testing with food makes it challenging to generalize across studies, but some guidelines are available.

In preparation for the patch test, patients may need to discontinue medications if the prescribing physician has no objections. It has been recommended that patients stop taking oral steroids or immunosuppressants 1 to 4 weeks before the food patch test and that they stop applying topical medications such as tacrolimus and pimecrolimus or steroids to the test site area 7 days before testing. Two days before testing, they should stop applying moisturizers to the test area. However, use of antihistamines (e.g., loratadine, cetirizine, fexofenadine, diphenhydramine), inhaled steroids (e.g., fluticasone, fluticasone propionate, budesonide, or budesonide and formoterol fumarate dehydrate), and montelukast sodium can be continued.

Patch testing with food can be performed with any type of patch test system, but
historically Finn Chambers® seem to have been used most often. Because in some cases allergens such as nickel, balsam of Peru, and common food additives can be the culprit, standardized commercial allergens can be used. Supplemental food allergy and atopy test protocols may involve the use of glycerinated allergen extracts (e.g., dust mites) or fresh food preparations (e.g., cow's milk). Fresh food, which is preferred to commercial food extracts, must be processed to the smooth consistency of a paste similar to that of cake frosting. The lack of standardization in the preparation of fresh food is one of the factors that contributes to the considerable variability across clinics. For powders (e.g., powdered milk), it has been suggested that 2 gm be mixed with 2 ml of sterile water. Baby foods are another option but may need to be drained on a paper towel to eliminate excess water.

The prepared food can be transferred via a stir straw or tongue depressor to a syringe (3 ml) for dispensing. The food should only be dispensed into the chambers immediately before testing so that the substances do not dehydrate. The syringes can be labeled, capped, and stored for short periods but should be changed regularly (at least once a month). The chambers should not be overfilled. In one study, large chambers (12 mm) were associated with higher sensitivity (true positives) and specificity (true negatives) and with higher positive predictive (proportion of symptomatic individuals among those with positive tests) and negative predictive (proportion of nonsymptomatic individuals among those with negative tests) values than small chambers (6 mm) when patch testing with food. As a result it has been recommended that 12-mm chambers should be used for atopic patch testing with food. This recommendation also applies to infants and children despite the limited space on their back. Good correlation between the results of patch testing for atopy and challenge tests has been reported.

As in conventional patch testing, the food-filled chambers are placed on the patient’s back and worn for 48 hours. Most patients typically tolerate patch testing with food. The most common side effect, redness and/or irritation caused by the tape, usually disappears 1 or 2 days after the patches are removed. Occasionally, patients may experience burning, itching, or discomfort from a reaction to a test food. After 48 hours have elapsed, the patch test panels are removed. Residue can be removed gently with a washcloth. Many physicians will read and interpret the results the next day (72 hours after placement). Scoring of reactions follows the key for conventional patch testing as recommended by the International Contact Dermatitis Research Group.

Individuals diagnosed with contact dermatitis related to food should be instructed in allergen avoidance or the use of appropriate personal protective equipment if strict avoidance is not possible. Individuals diagnosed with a food allergy need to eliminate the food from their diet and may require appropriate dietary guidance. Patients with atopic dermatitis are often treated with a corticosteroid mixed with neomycin. However, such individuals should be monitored for failure to improve or worsening of their dermatitis since both neomycin and steroids are common sensitizers.

Work continues on atopic patch testing and on food allergies but the questions of optimum allergen concentrations, vehicles, and chamber size remain. To help standardize the practice of patch testing with food, the SmartPractice Allergen Bank recently introduced atopic and food allergen panels. By providing standardized and ready-to-use preparations, we hope to facilitate patch testing with these challenging allergens when clinicians are confronted with appropriate candidates.

References