Skin Manifestations of Food Allergy

Wesley Burks, MD

ABSTRACT. The pediatrician is faced with evaluating a panoply of skin rashes, a subset of which may be induced by food allergy. Acute urticaria is a common manifestation of an allergic skin response to food, but food is rarely a cause of chronic urticaria. Approximately one third of infants/children with moderate to severe atopic dermatitis have food allergy. Although diagnosis of acute urticaria provoked by a food may be evident from a straightforward history and confirmed by diagnostic tests to detect food-specific IgE antibody, determination of the role of food allergy in patients with atopic dermatitis is more difficult and may require additional diagnostic maneuvers, including elimination diets and oral food challenges. The immunopathologic basis of food-allergic disorders that affect the skin and a rational approach to diagnosis and treatment are discussed. Additional disorders that are caused by or mimic ones caused by food allergy are reviewed. *Pediatrics* 2003;111: 1617–1624; *atopic dermatitis, urticaria, angioedema, dermatitis herpetiformis, auriculotemporal syndrome (Frey syndrome).*

ABBREVIATIONS. AD, atopic dermatitis; IgE, immunoglobulin E; SBHR, spontaneous basophil histamine release; DBPCFC, double-blind, placebo-controlled food challenge; RAST, radioallergosorbent test; PST, prick skin test.

The skin is one of the target organs that is most often involved in food hypersensitivity reactions. Clinical manifestations of food hypersensitivity in the skin range from symptoms of atopic dermatitis, to urticaria and angioedema, dermatitis herpetiformis, and a masquerader of food allergy, Frey's syndrome. All present with typical skin manifestations of their food-allergic reactions. For most skin manifestations provoked by food hypersensitivity, pruritus is a hallmark of the disease. With this review, the above diseases are discussed, as well as the laboratory and clinical investigations that demonstrate how food hypersensitivity plays a pathogenic role in the skin manifestations of allergic reactions.

ATOPIC DERMATITIS

Pathophysiology

In the early 20th century, studies by Schloss[1] and Talbot and Blackfan[2,3] reported on cases of patients who had improvement in their atopic dermatitis (AD) after avoiding specific foods in their diet. Other reports that followed were in conflict, and this led to the controversy on the role of specific food allergens in AD.[4] This controversy has continued into the 21st century, although there now are numerous laboratory and clinical studies that suggest that the debate no longer needs to continue. The most recent studies have shown that the immunoglobulin E (IgE) response after allergen-induced mast cell activation has as its end product hypersensitivity reactions that are characterized by infiltration of monocytes and lymphocytes.[5,6] The pattern of cytokine expression in lymphocytes infiltrating acute atopic dermatitis lesions is predominantly that of the Th_2 type (interleukin-4, -5, and -13).[7,8] In addition, these cytokines promote eosinophil influx and activated eosinophils and eosinophil products.[7–10] IgE-bearing Langerhans cells that are upregulated by these cytokines are highly efficient at presenting allergens to T cells, primarily activating a Th_2 profile (Fig 1). Thus, it seems that IgE antibody and the Th_2 cytokine milieu do play a major role in the pathogenesis of these lesions. Certainly, AD is an inherited genetic disorder with an allergic diathesis.

Laboratory Investigation

Several studies in the laboratory investigation support a role for food-specific IgE antibody in the pathogenesis of AD. Patients have been shown to have elevated concentrations of total IgE and food-specific IgE antibodies.[11,12] More than 50 years ago, Walzer[13,14] demonstrated that the ingestion of foods would allow food antigens to penetrate the gastrointestinal barrier, which are then transported in the circulation to IgE-bearing mast cells in the skin. Additional studies have shown that in patients who had food-specific IgE antibodies and underwent oral food challenges, positive challenges were accompanied by increases in plasma histamine concentration,[15] elaboration of eosinophil products,[16] and activation of plasma eosinophils.[17]

Children who had AD and were chronically ingesting foods to which they were allergic were found to have increased "spontaneous" basophil histamine release (SBHR) from peripheral blood basophils in vitro compared with children without food allergy or normal subjects.[18] After placement on the appropriate elimination diet, they had significant clearing of their skin and significant fall in their SBHR. Other studies have shown that peripheral blood mononuclear cells from food-allergic patients with high SBHR elaborate specific cytokines termed histamine
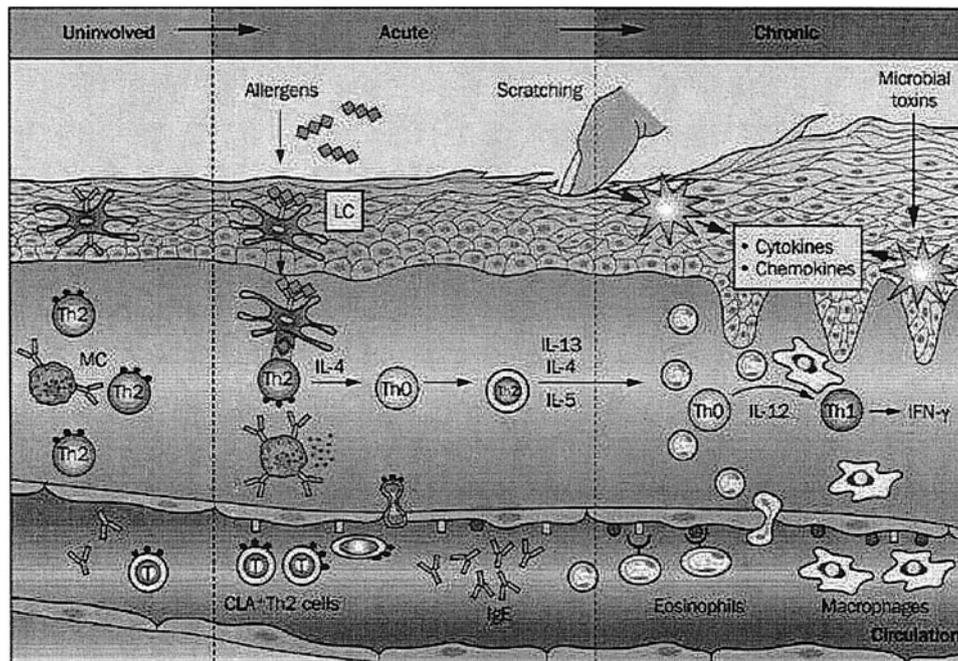
Fig 1. Immunologic progression of AD.

releasing factors that would activate basophils from food-sensitive but not food-insensitive patients. Furthermore, passive sensitization experiments in vitro with basophils from nonatopic donors and IgE from patients allergic to certain foods showed that basophils could be rendered sensitive to histamine releasing factors.[18]

Food allergen-specific T cells have been cloned from normal skin and active skin lesions in patients with AD.[19,20] Cutaneous lymphocyte-associated antigen is a homing molecule that interacts with E-selectin and directs T cells to the skin. In 1 study, patients with milk-induced AD were compared with control subjects with milk-induced gastrointestinal reactions without AD and with nonatopic control subjects.[19] Casein-reactive T cells from children with milk-induced AD had a significantly higher expression of cutaneous lymphocyte-associated antigen than *Candida albicans*-reactive T cells from the same patients and either casein or *C albicans*-reactive T cells from the control groups.

Clinical Studies

Multiple clinical studies have addressed the role of food allergy in AD and have shown that elimination of relevant food allergens can lead to improvement in skin symptoms, that repeat challenge can lead to redevelopment of symptoms, and that the disease can be partially prevented by prophylactically eliminating highly allergenic foods from the diets of infants and possibly breastfeeding mothers.

A number of studies have addressed the therapeutic effect of dietary elimination in the treatment of AD. Atherton et al[21] showed that two thirds of children with AD between the ages of 2 and 8 years showed marked improvement during a double-blind crossover trial of milk and egg exclusion. Another trial by Neild et al[22] demonstrated improvement in some patients during the milk and egg exclusion phase, but no significant difference was seen in 40 patients who completed the crossover trial. A study by Juto et al[23] indicated that approximately one third of the patients with AD had resolution of their rash and one half improved on a highly restricted diet. The cumulative results of these studies supported the role for food allergy in the exacerbation of AD, but most of them failed to control other trigger factors, as well as controlling for placebo effect or observer bias.

In 1 of the original prospective follow-up studies, Sampson et al[24] studied 34 patients with AD, 17 of whom had food allergy, who were appropriately diagnosed by double-blind, placebo-controlled oral food challenges (DBPCFCs). These patients had been placed on an appropriate allergen elimination and experienced significant improvement in their clinical symptomatology. They were followed up at a 1- to 2- and a 3- to 4-year time frame. They were compared with control subjects who did not have food allergy and children with food allergy who did not adhere to their diet. These patients in follow-up did have improvement in their AD compared with the control groups, and their time frame for outgrowing their food sensitivity was lessened. Lever et al[25] performed a randomized, controlled trial of egg elimination in young children who had AD and positive radioallergosorbent test (RAST) to egg and were examined at a dermatology clinic. At the end of this study, egg allergy was confirmed by oral challenge, and 55 children who were allergic to egg were ultimately identified. There was a significant decrease in the skin area affected, as well as symptom scores in the children who avoided eggs compared with control subjects.

Oral food challenges have been used to demonstrate that challenge with a food allergen can induce

symptoms of rash and pruritus in children with food allergy-related AD. Sampson et al[24,26–28] have published a number of articles that have used DBPCFCs to identify causal food proteins that are involved as trigger factors of AD. In studies during the past 20 years, they have conducted >2000 oral food challenges in >700 patients with >40% of the challenges resulting in reactions. In their studies, as well as others to follow, they showed that cutaneous reactions occurred in 75% of the positive challenges and generally consisted of pruritic, morbilliform, or macular eruptions in the predilection sites for AD. Isolated skin symptoms were seen in only 30% of the reactions; gastrointestinal (50%) and respiratory (45%) reactions also occurred. Almost all reactions occurred within the first hour of beginning the oral challenges. Clinical reactions to egg, milk, wheat, and soy accounted for almost 75% of the reactions. Some patients had repeated reactions during a series of daily challenges and had increasingly severe AD, further showing that ingestion of the causal food protein can trigger itching and scratch with recrudescence of typical lesions of AD.

Additional studies have been done to show that patients with AD could have their disease ameliorated through elimination of causal food proteins and that reintroduction of these proteins would elicit symptoms. Dietary intervention has been attempted during pregnancy, lactation, and early feeding in "at-risk" infants. Various studies differ in the definition of at-risk infants. Some investigators think at-risk means only 1 other affected immediate family member, whereas other investigators believe that 2 immediate family members must be affected for the newborn to be considered at-risk. In 2 series, infants from atopic families whose mother excluded eggs, milk, and fish from her diet during lactation (prophylaxis group) had significantly less AD and food allergy compared at 18 months with infants whose mother's diet was unrestricted.[29,30] Follow-up at 4 years showed that the prophylaxis group had less AD, but there was no difference in food allergy or respiratory allergy.[30] In a comprehensive, prospective, randomized allergy prevention trial, Zeiger et al[31–34] compared the benefits of maternal and infant food allergen avoidance on the prevention of allergic disease in infants at high risk for allergic disease. Breastfeeding was encouraged in both prophylaxis and control groups. In the prophylaxis group, lactating mothers excluded all egg, cow milk, and peanut from their diet; a casein hydrolysate formula was used for supplementation or weaning, and solid food introduction was delayed. The control infants received cow milk formula for supplementation, and the American Academy of Pediatrics recommendations for infant feeding were followed (peanuts, nuts, and fish are not recommended in the first 3 years). Although the results show that the prevalence of AD in food allergy in the prophylaxis group are reduced significantly in the first 2 years compared with the control group, the period prevalence of AD was no longer significant beyond 2 years. These studies also failed to show that treatment of at-risk infants could modify allergic disease after 2 years of age. A meta-analysis of controlled trials comparing breastfeeding with formula feeding demonstrated a significant reduction in AD in the infants who received breast milk.[35] Most experts would agree now that infants with 1 other member of the immediate family having significant allergic disease would be considered at risk for the development of allergic disease. These families should follow the American Academy of Pediatrics guidelines by delaying the introduction of solid foods until 6 months of age; milk until 12 months of age; eggs until 24 months of age; and peanuts, tree nuts, fish, and shellfish until 36 months of age.

Epidemiology of Food Allergy in AD

The prevalence of food allergy in patients with AD varies with the age of the patient and severity of AD. Burks et al[36,37] diagnosed food allergy in approximately 35% of ~165 patients with AD referred to both the allergy and dermatology clinic. Because many of the patients were referred to an allergist, it is possible that ascertainment bias may have favored recruitment of patients with AD and food allergy. Eigenmann et al[28] carried out a similar study in children who were referred to a university dermatology clinic to address this potential bias. After an evaluation with oral food challenges, 37% of these patients received a diagnosis of having food allergy. In another study, by Guillet and Guillet,[38] which evaluating >250 children with AD, they noted that increased severity of AD in the younger patients was directly correlated with the presence of food allergy. Additional studies in adults with severe AD are relatively limited and have not shown a significant role for food allergy[39] or success in reducing symptoms during trials of elimination diets.[40]

Diagnosis

General Approach

The diagnosis of food allergy in AD is complicated by several factors related to the disease: 1) the immediate response to ingestion of causal foods is downregulated with repetitive ingestion, making obvious "cause and effect" relations by history difficult to establish; 2) other environmental trigger factors (other allergens, irritants, infection) may play a role in the waxing and waning of the disease, obscuring the effect of dietary changes; and 3) patients have the ability to generate IgE to multiple allergens, making diagnosis based solely on laboratory testing impossible.

A general approach would begin with a complete medical history needed to obtain not only the general medical history but also any pertinent details concerning the dietary history and any acute reactions (hives, asthma, exacerbation of AD, etc) to particular food ingestion (Table 1). For breastfed infants, a maternal dietary history is also helpful. As indicated by the history and information currently available in the literature, selected foods are evaluated by tests for specific IgE antibodies. A small number of foods account for >90% of the reactions (Table 2).[26,37,41] In children, the most common foods that cause reac-

TABLE 1. Approach to the Patient With AD and Possible Food Allergy

Consider evaluation
  Moderate to severe AD in infant/child
  History of AD exacerbated by particular foods
  Severe AD in teen/adult
Initial screening
  History, physical
  Skin/RAST to implicated foods
  Extra suspicion for "history positive" foods
  Extra suspicion for common food allergens (milk, eggs, wheat, soy, peanut, tree nuts, fish, shellfish)
  CAP-FEIA if PST positive to milk, egg, peanuts, wheat, or soy
If CAP-FEIA >95% positive predictive value, then eliminate food from diet
Eliminate IgE+ foods from diet (and consider elimination of other highly suspected foods)
  No resolution: food allergy not a cause
  Resolution: food allergy potential cause
Physician-supervised oral food challenges for suspected foods (unless previous severe reaction)
  Open, single-blind or double-blind, placebo controlled challenges
  Add back foods as indicated from challenge results
Periodic repeat challenge to monitor resolution of allergy

Adapted from Sicherer and Sampson.[76]

tions are eggs, milk, peanut, soy, wheat, tree nuts, and fish. In children with AD and food allergy, two thirds are reactive to eggs.[42] A general approach is to screen children with moderate to severe AD for possible allergy to eggs, milk, peanut, soy, and wheat and, if indicated, fish and tree nuts (walnut, cashew, pecan) by using prick skin tests (PSTs) or RAST (Table 2).[28,37] Other foods suggested by history may also be tested. If there is a significant history of food-related symptoms and the tests for specific IgE to that food are positive, then the best initial treatment would be elimination of that suspected food from the diet. No additional testing may be necessary in cases of severe acute reactions or if dramatic improvement in skin disease occurs. Because symptoms are chronic in AD and often a large number of foods are implicated, it is often necessary to perform diagnostic oral food challenges. Food additives have been documented to cause flaring of AD, but this is rare.[43–45] For patients with multiple food-allergic reactions, it would be helpful to use an allergist in the care of the patients and in the interpretation of the laboratory studies.

In Vivo and In Vitro Laboratory Testing

Several methods are available to detect food-specific IgE. PSTs are most informative when they are negative because the negative predictive value of the tests is very high (>95%).[46,47] Unfortunately, the positive predictive value is generally between 30% and 50%.[46,47] In interpreting these studies, the positive PST result in isolation cannot be considered proof of a clinically relevant food reaction. Conversely, a negative food-specific test virtually rules out IgE-mediated food allergy. It may be necessary in some cases to use fresh fruits and vegetables in a prick-by-prick method because the fresh extracts of these foods are more reliable than the commercially available skin test material.

Although slightly less sensitive than PSTs, in vitro tests for specific IgE antibodies (RAST) are practical in the screening of food allergy in most office settings. In an initial retrospective study by Sampson et al[48] and a later prospective study,[49] the results of DBPCFCs in several hundred patients was compared with the levels of food-specific IgE antibody obtained by using a specific type of RAST, the Pharmacia CAP system (FEIA; results in kU/L). As shown in Table 3, for eggs, milk, peanut, and fish, there are levels that correlate very highly with clinical reactivity. Patients with concentrations of food-specific IgE above these values would likely react on ingestion of the food and would not necessarily need additional evaluation. Unless indicated by previous history, an oral challenge may be needed to confirm reactivity for children with levels falling below the 90% or 95% positive predictive value. Again, a general approach is to screen children with moderate to severe AD for possible allergy to eggs, milk, peanut, soy, and wheat and, if indicated, fish and tree nuts (walnut, cashew, pecan) by using RAST.[28,37] Either the pediatrician or the allergist may use the RAST to diagnosis patients with food allergy.

Patients with AD will not infrequently have positive skin tests and or RASTs to several members of the botanical family or animal species, more likely indicating immunologic cross-reactivity but not systematic intrabotanical or intraspecies cross-reactivity. In an initial study, the legume cross-reactivity was evaluated in 69 children with AD by use of PSTs, RASTs, and immunoblot analyses.[50,51] Immunologic reactivity was demonstrated in most patients; however, only 2 patients were symptomatic to >1 legume when challenged. Both of the patients had a history of severe allergic reaction to peanut and mild reactions to soy challenge. Similar studies with cereal grains have shown significant IgE cross-reactivity but very little (~20%) clinical cross-reactivity.[52] Approximately 50% of children who are allergic to eggs have IgE antibodies to chicken meat, but few (~5%) have clinical reactivity. In addition, ~50% of children who are allergic to milk have a positive skin test or RAST to beef, but only 10% of these exhibit clinical symptoms. The practice of avoiding all foods within a botanical family when 1 member is suspected of provoking allergic symptoms generally seems to be unwarranted.

TABLE 2. Foods Responsible for Majority of Food-Allergic Reactions

Infants	Children	Older Children/ Adults
Cow milk	Cow milk	Peanut
Eggs	Eggs	Tree nuts
Peanut	Peanut	Fish
Soy	Soy	Shellfish
	Wheat	
	Tree nuts (walnut, cashew, etc)	
	Fish	
	Shellfish	

Sicherer and Sampson.[76]

TABLE 3. PPV and NPV of Food-Specific IgE Concentrations (kU/L) for Predicting Reactions Upon Oral Challenge by Using the Pharmacia CAP-RAST System FEIA

Allergen	Decision Point	Sensitivity	Specificity	Efficiency	PPV	NPV
Egg	7	61	95	68	98	38
Milk	15	57	94	69	95	53
Peanut	14	57	100	84	100	36
Fish	3	63	91	87	56	93
Soybean	30	44	94	81	73	82
Wheat	26	61	92	84	74	87

PPV indicates positive predictive value; *NPV*, negative predictive value.
As seen, the PPVs for egg, milk, and peanut on the basis of the 90% specificity values are excellent (98%–100%) but are less predictive for fish, wheat, and soy (56%, 73%, and 74%, respectively).
Sampson.[49]

Oral Food Challenges

Oral food challenges are invaluable in the appropriate diagnosis and management of patients with AD and possible food allergy. Oral challenges will also be necessary to evaluate the resolution of the specific food allergy. No one would suggest that oral challenges should be performed when there is a clear, recent history of food-induced airway reactivity or if there is a history of a severe reaction of a positive test for IgE antibody to that specific food. In addition, patients should not be instructed to perform home food challenges because potentially severe reactions may result.[53] DBPCFCs are considered the gold standard for diagnosing food allergy.[41,46,54] Certainly in evaluating any scientific literature, DB-PCFCs should be part of any major contribution to this literature. If allergic reactions to only a few foods are suspected, then single-blind or open challenges may be used to screen for reactivity. One caveat in this is that these challenges are subject to observer and patient bias and may overestimate the reactivity. In blinded food challenges, the patient must have both the food antigen that is blinded and a material to mask the taste and smell of the food, as well as on completing the blinded portion take the food openly to confirm the negative blinding portion of the challenge. Oral food challenges for patients may be done by the pediatrician or referred to an allergist. The person and office doing the challenge must be prepared and be able to treat any allergic reactions that occur with positive food challenges.

Management

When an allergy is properly diagnosed, the elimination of an offending food allergen should be added to medical management of AD for best results. The elimination of food proteins is often a difficult task, and incomplete elimination of the offending food can lead to confusions during an open trial or dietary elimination. As an example, in a milk-free diet, patients must be instructed not only to avoid all milk products but also read labels that would indicate the presence of cow milk protein. As discussed in other sections of this supplement, the terms on labels may include words that are not easily recognizable, such as casein, whey, lactalbumin, caramel color, and nougat, which indicate the presence of cow milk. Recent studies[55,56] indicate that it is difficult even for patients with nutritional counseling always to understand the food label. Patients and parents must be aware that the food protein, as opposed to sugar or fat, is the primary reason for the allergic reaction and is the substance that needs to be avoided in the diet. When patients have been doing well for extended periods of time on appropriate diet, flares of AD may be attributable to a food previously identified as causing an accidental ingestion hidden in another food substance rather than reaction to a new food.

Accidental ingestion, despite good nutritional counseling is relatively common. The Food Allergy & Anaphylaxis Network (Fairfax, VA; 800-929-4040; foodallergy.org) can provide valuable educational materials to assist families, physicians, and schools in the difficult task of eliminating allergenic foods and in approaching the treatment of accidental ingestions. Equally important when multiple foods are eliminated from the diet, it is prudent to enlist the help of a dietitian in formulating a nutritionally balanced diet.[57]

As with any food-allergic patient at risk for anaphylaxis, an emergency plan must be in place to treat severe reactions (respiratory reactions, anaphylaxis) caused by accidental ingestion to these foods. Injectable epinephrine (an appropriate dose) and oral antihistamines should be readily available to treat these patients at all times.

Natural History

Most children outgrow their allergies to milk, eggs, wheat, and soy.[58] Patients who are allergic to peanuts, tree nuts, fish, and shellfish are much less likely to lose their clinical reactivity.[59] It does seem that ~20% of patients who have a reaction to peanuts early in life may outgrow their sensitivity. Approximately one third of children with AD and food allergy lost or outgrew their clinical reactivity over 1 to 3 years with strict adherence to dietary allergen elimination, which was believed to have aided in a more timely recovery.[24] Clinical reactivity is lost over time more quickly than the loss of food-specific IgE measured either by PST or RAST testing. Children with food allergy and atopic dermatitis need to be followed up at regular intervals with appropriate oral challenges to determine when they outgrow their food sensitivity.

URTICARIA

Urticaria is a common skin reaction that occurs at some time in the life of approximately 15% to 20% of the population.[60] It is characterized by transient erythematous, well-demarcated, raised skin lesions that may exhibit central clearing and that are usually intensely pruritic. The lesions typically result from an inflammatory reaction that induces localized transudation of fluid from dilated small blood vessels and capillaries in the superficial dermis. By definition, urticaria of <6 weeks' duration is arbitrarily considered "acute," whereas urticaria recurring frequently for longer than 6 weeks is referred to as "chronic." It seems that ~25% of patients with urticaria at some point will develop chronic urticaria.[61] Acute urticaria tends to occur more commonly in younger patients[62] and more often in atopic patients. In addition, the cause is most often more apparent in acute urticaria than in chronic urticaria.[63] Generally, 80% to 90% of patients with chronic urticaria do not have a cause that is well-described.

Acute urticaria is much more likely to be caused by food allergy than is chronic urticaria. In general, most studies[63–66] suggest that foods provoke chronic urticaria in <1% to 2% of all patients who have chronic urticaria.

Foods induce urticarial reactions through food protein-specific IgE. The foods that most often cause acute urticaria, including egg, milk, peanut, tree nuts, soy, wheat, fish, and shellfish, are those that are also implicated in other IgE-mediated food reactions. Numerous food dyes, additives, and other ingredients such as tartrazine, other azo and nonazo dyes, natural salicylates, benzoic acid derivatives, and metabisulfites have been reported to provoke urticaria through mechanisms that are not well-described.[67–71]

Diagnosis

The diagnostic tools available to determine whether foods play a role in the production of urticaria in a patient include the history, physical examination, laboratory testing (PST, RAST), symptom diaries, elimination diets, and food challenges. The diagnostic approach to the patient should parallel those used in diagnosis of other adverse reactions to foods.

History and Physical Examination

Before evaluating a patient for food-induced urticaria, other potential causes of urticaria such as physical causes, infectious agents, drugs, inhalant allergens, insect stings, systemic diseases, and psychogenic factors should be effectively eliminated.

The severity of reported food-induced reactions that include urticaria ranges from mild to life-threatening.[26,72] In some cases, urticaria alone is noted; however, other cutaneous symptoms such as angioedema may be observed as well. Urticaria often is accompanied by gastrointestinal and respiratory symptoms seen in a typical IgE-mediated food reaction.

The food suspected of causing acute urticaria is most often identified by the temporal relationship of ingestion to the development of urticarial lesions. Generally, symptoms begin within minutes to 2 hours after ingestion of the suspected food. After several ingestions occur, typically the patient and/or family will note the relationship. Urticaria may be provoked by exposure to food other than through ingestion.[61] Patients have developed urticaria after inhaling certain fumes from foods. Foods most commonly implicated by challenges as causing urticaria include the typical list of egg, peanut, milk, tree nuts, soy wheat, fish, and shellfish, although there are reports of virtually any protein-containing food that can cause urticaria.[54]

After a physical examination, the patient with a history suggestive of food-induced urticaria should be evaluated for signs and symptoms associated with other systemic diseases known to cause urticaria. The appearance and distribution of any urticarial diseases should be noted.

Laboratory Testing

Unless information obtained by the history and physical examination leads to suspicion of foods as a causal factor, an extensive laboratory evaluation of patients with apparent food-induced acute urticaria would not be indicated. Extensive testing of patients with chronic urticaria is not warranted unless indicated by the initial evaluation.

Skin Testing and RAST

For most food-related disorders, the PST is an optimal way to screen for patients who might have food as the cause of their urticaria. A negative skin test, if properly performed, virtually excludes that food as the responsible agent. However, the positive predictive accuracy of PST does not approach 100% even in patients who have acute urticaria. RASTs may be helpful at times in patients who are unable to stop their antihistamines, but positive RASTS have the same limitations as those of PSTs.

Diet/Symptom Diary

The purpose of the diet/symptom diary in evaluation of patients with food-induced urticaria is to provide detailed information about the patient's regular diet. An accurate record of the frequency, timing, and duration of the urticarial lesions in relationship to specific food ingestion would be important. The information is reviewed to look for a temporal relationship between food ingestion and the onset of urticaria. Most often, the information obtained from the diet/symptom diary reveals that the ingestion of a previously suspected food is not reproducibly associated with the onset of urticaria.

Elimination Diet

The elimination diet ideally would be used only in patients who already have a diagnosis of food-induced allergic reactions or for a trial period to determine whether the urticaria is caused by the offending food to be eliminated. If a patient suspects certain foods as the cause of his or her acute urticaria and the diagnostic test (PST or RAST) is positive, then it is

reasonable to avoid those foods from the diet if it involves a very limited number of foods. With a large number of foods involved, food challenges may be necessary to determine which of the positive food-specific IgE tests are truly valid. In general, most patients are sensitive to only 1 or 2 foods; allergic reactions to 3 or more foods are unusual.

The reported success of elimination diets combined with oral challenges in the diagnosis of food allergy as a cause of chronic urticaria varies greatly.[73,74] In general, food additives that cause chronic urticaria are unusual.

Treatment

The treatment of food-induced urticaria consists of eliminating the offending food or substance from the diet. Avoidance of the offending food is typically accomplished by educating the patient and his or her family about the potential sources of the food. If the physician and patient are convinced that urticaria is caused by a certain food and the patient is eliminating that food from his or her diet and the urticaria continues, then the patient's diet should be reviewed for unrecognized sources of exposure. The physician and the patient must consider other foods that could cause urticaria or, in this case, foods that are not part of the cause of this urticaria. In patients with chronic urticaria, some reports in the literature suggest that removal of the offending food may lead to a reduction in frequency of the episodes rather than complete remission.

Other than elimination of responsible food allergens, pharmacologic management of unexpected episodes may be helpful. H_1 antihistamines such as diphenhydramine hydrochloride or hydroxyzine can be used for acute episodes. For patients with chronic urticaria, daily doses of nonsedating antihistamines may be augmented by the use of more sedating antihistamines.

A proven method for the prevention of food-induced urticaria other than avoidance of the offending food and pharmacological management is currently not available. In the future, other medications may be tried or immunotherapy may be a viable option.

DERMATITIS HERPETIFORMIS

Dermatitis herpetiformis is a chronic papulovesicular skin disorder frequently associated with asymptomatic gluten-sensitive enteropathy. The histologic appearance of skin lesions includes a granulocytic infiltration at the dermoepidermal junction associated with edema and blister formation. The histology of intestinal lesions is similar to celiac disease, although it is generally less severe. In general, the treatment of dermatitis herpetiformis consists of removal of gluten from the diet and the use of pharmacologic agents for treatment of this disorder. A recent study reported a linear IgA bullous dermatosis that has been responsive to a gluten-free diet.[75]

AURICULOTEMPORAL SYNDROME

Auriculotemporal syndrome (Frey syndrome) is manifested as immediate unilateral or rarely bilateral facial flushing, sweating, or both, localized to the distribution of the auriculotemporal nerve, in response to gustatory and occasionally tactile stimuli.[76,77] It is not uncommon in adults and occurs as a result of surgical injury or trauma to the parotid gland. The flushing typically begins in children a few seconds after eating and resolves approximately 30 to 60 minutes later. In children, it is unlikely that sweating or bilateral involvement will be apparent in the diagnosis. It is not uncommon for the auriculotemporal syndrome to be misdiagnosed as a food allergy. Children usually have a good prognosis with spontaneous resolution, and therefore no treatment is needed.[78]

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