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Adverse Food Reactions and Their Role in Atopic Dermatitis

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Background

- Controversy remains over the role of food allergens as causative or aggravating stimuli in atopic dermatitis (AD), although food allergy (FA) and AD are strongly associated.
- Many patients and families seeking a root cause for AD focus on dietary triggers.
- The prevalent belief of FA as causative of AD leads to confusion, inappropriate elimination diets, excessive specialist consultation and testing, and disregard for the AD treatment cornerstones.
- Recent evidence suggests that the inflammatory state and disrupted skin barrier in AD may actually lead to FA.

Objective

- To identify the different adverse food reactions and evaluate the relationship between FA and AD.

Methods

- We reviewed recent research and guidelines to consolidate relevant and updated findings and recommendations.

Results

- The term “food allergy” is frequently misused.
- The exact definition of FA is narrow and specific, and should be differentiated from IgE-mediated sensitivity.
- Many tests exist for food allergies, which must be interpreted in the context of patient history (**Figure 1**).
- Types of food reactions can be classified as allergy, intolerance, delayed-type, irritant contact dermatitis, celiac/dermatitis herpetiformis, and eosinophilic esophagitis (**Table 1**).
- The gut and skin are two major sites of environmental immune exposure during development, with differing immune pathways.
- Many factors associated with FA relate to reduced skin barrier function, seemingly independent of AD.
  - Ex: transepidermal water loss, loss-of-function skin barrier genes, cutaneous dysbiosis, and *Staphylococcus aureus* colonization.

Table 1: Types of adverse food reactions

Condition:	Allergy	Intolerance	Delayed-type	Irritant contact dermatitis to foods	Celiac/DH	Eosinophilic esophagitis
Definition	An IgE-mediated clinical response to a food in someone who is sensitized	Non-immune mediated food reaction	T-cell-mediated inflammatory reaction (with or without involvement of IgE)	Nonspecific response of the skin to direct chemical damage, does not involve antigen/allergen-specific T cells	Autoimmune response to gluten molecule	Multifactorial inflammatory disorder with deficient mucosal barrier of the esophagus
Timing	Immediate, within 2 hours	Varies	Delayed, 24-48 hours after exposure	Minutes-to-hours after exposure to irritant	Median time to reaction is 1 hour, but can be delayed for 12+ hours	Delayed, days to weeks
Severity	Often life-threatening, very severe	Varies	Less severe than immediate reactions	Varies	Serious, permanent condition that can be life-threatening	Serious, though not usually life-threatening
Diagnosis	IgE antibodies to allergen or positive skin-prick test + clinical symptoms	Clinical symptoms without IgE antibodies to allergen or positive skin-prick test	Atopy patch test	Diagnosed by exclusion	IgA anti-tissue transglutaminase antibodies (tTGA), duodenal biopsy is gold standard	Endoscopy with esophageal biopsies
Clinical manifestations	Urticaria, angioedema, flush, pruritus, oral allergy syndrome, hoarseness, cough, anaphylaxis	Varies- may include Itching, flushing, nausea, vomiting, diarrhea	Atopic dermatitis, protein contact dermatitis, late-phase oral allergy syndrome	Well-demarcated lesions, typically confined to the area of contact with the irritant, burning more prominent than itch	Abdominal pain, diarrhea, fatigue, headache, and irritability	Reflux, abdominal pain, and food impaction
Examples	Milk, egg, peanut, shellfish	Lactose intolerance, histamine reactions, MSG, food additives, gluten outside of celiac, irritable bowel disease	Dairy, soy, rice, and wheat	General food products, acidic or spicy foods, bakery products, fruits/nuts/vegetables, meat/poultry	Wheat, rye, barley, spelt, and kamut	Milk, egg, wheat, soy

IgE = immunoglobulin E, MSG = monosodium glutamate, DH = dermatitis herpetiformis.

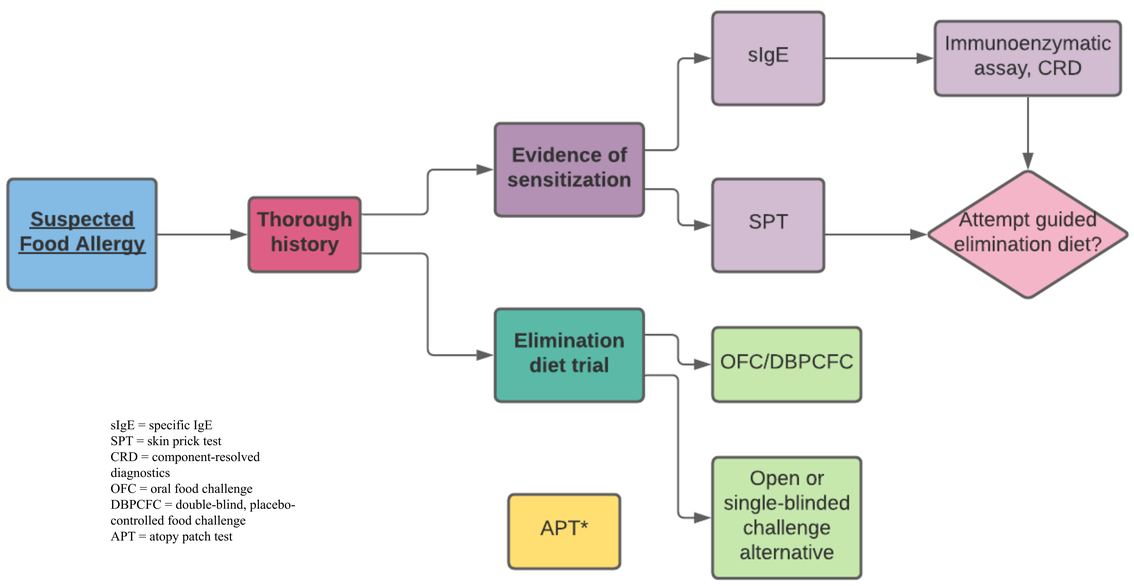

Figure 1: Testing for IgE-mediated FA in patients with AD. Children with an immediate reaction or AD refractory to optimal skin care should be considered. *APT is an option for delayed-type reactions, which are more difficult to test.

Conclusion

- A maladaptive skin barrier likely underlies the etiology of food sensitization and allergy, linking FA and AD.
- The “dual-allergen exposure hypothesis” suggests that allergens trigger opposing immune responses.
  - Loss of skin barrier integrity, with concurrent lack of oral tolerance development, progresses towards FA.
  - Both aspects can be targeted by:
    1) promoting dietary tolerance through early introduction and avoidance of inappropriate elimination diets
    2) preventing transcutaneous sensitization through reducing cutaneous allergen exposure
    3) restoring and strengthening the skin barrier
- Given FA anaphylaxis risk and increasing prevalence, concurrent FA and AD warrants strong research emphasis.
- Clinician considering dietary changes should maintain awareness of inappropriate food restriction consequences.
- Studies should consider early moisturization and skin improvement potential as not only ameliorative for AD, but also as FA preventive or management tools.

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