Food Allergy Masqueraders

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Presenter Disclosures
• none

Learning Objectives
• Understand Definition/Background
• Recognize Immune mediated food reactions
  – IGE
  – Non-IGE
  – Mixed
• Recognize Non-immune mediated food reactions
  – Metabolic
  – Pharmacologic
  – Toxic
  – Other
Objectives

- Definition/Background
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Adverse Reactions to Foods

Definition

“Any abnormal clinical response attributed to ingestion, contact or inhalation of any food, a food derivative or a food additive.”
Background Information

Adverse reactions to foods have both non-immunologic and immunologic causes:

Food Reactions

Immune Mechanisms
Figure 1
Spectrum of food allergy disorders according to pathophysiology [3, 4, 7]

IgE-mediated:
- Oral allergy syndrome
- Urticaria
- Angioedema
- Anaphylaxis

Mixed IgE-cell-mediated:
- Atopic dermatitis
- Eosinophilic gastroenteropathy (e.g., eosinophilic esophagitis)

Cell-mediated (non-IgE-mediated):
- Dietary-protein enterocolitis
- Dietary-protein enteropathy
- Dietary-protein peptic
- Celiac disease
- Dermatitis herpetiformis

Case 1

- 10 yo girl presents at your office with itching in her mouth and swelling of her lips when she eats apples. She recently had an episode when she ate an apple right off a tree during an apple picking day trip with her family. At lunch she ate apple bread and apple pie from the orchard and did not have the same symptoms.
- PMHx - allergic rhinitis, atopic dermatitis
- SPT results from previous testing 2 years ago showed sensitivity to trees, weeds, grasses, and dustmites.

What is the most likely cause of her symptoms?
A. Food allergy
B. Food intolerance by pesticide
C. Oral allergy syndrome
D. Idiopathic urticaria

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Immune Mediated: IGE

• Oral allergy syndrome/Pollen-Food Allergy Syndrome
  – reactions caused by pollen-related foods that are limited to the oropharynx.
  – Sensitization to pollen is the primary event
  – Non-plant foods, such as cow's milk, egg, or seafood, do not cause OAS
  – 2 to 10 percent may experience systemic symptoms

Immune Mediated: IGE

• Food Allergy
  – Abnormal IGE mediated response to food
  – Symptoms may be mild to severe including itchiness/hives, swelling of the tongue, vomiting, diarrhea, trouble breathing, or low blood pressure
  – Typically occurs within minutes to 2 hours (alpha gal exception)
  – Peak prevalence of 6-8% at age 1-2 yrs
Foods Frequently Implicated in IgE Mediated Food Hypersensitivity

**Children**
- Cow's milk
- Egg
- Fish
- Shell-fish
- Peanut
- Tree-nuts
- Wheat
- Soy

**Adults**
- Fish
- Shellfish
- Peanuts
- Tree-nuts

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**Case 2**

- A 2-year-old girl ate a cashew nut-containing candy and had an immediate hives and lip swelling which resolved with 1 dose of Benadryl. She tolerates peanut protein, milk, egg, wheat, soy, fish, and shellfish. She has not tried other tree nuts.
- Skin allergy testing showed +sensitivity to cashew, pistachio, hazelnut, pecan, walnut

What would you recommend?
A. Food challenge
B. Strictly avoid tree nuts
C. Send serum IGE panel for other foods
D. Order IGG food panel

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Case 3
A male patient was initially breast-fed with no maternal dietary restriction. He had mild reflux symptoms, and at age 5 months, an H-2 blocker was prescribed, and rice was added to breast milk on occasion to thicken the feedings. At 6 months of age, he developed repetitive vomiting and lethargy and was admitted to the hospital for a sepsis evaluation. During the hospitalization, he had several mucous, bloody stools. With intravenous hydration, he improved clinically, and all cultures were negative. He was discharged with a diagnosis of viral gastroenteritis, tolerating breast milk.

One week later, he developed a similar constellation of symptoms and was treated similarly. At that time, his mother indicated that both episodes developed approximately 2 hours after oat cereal was given (mixed with expressed breast milk). The pediatrician performed a serum test for oat-specific IgE that was negative. Another diagnosis of viral gastroenteritis was entertained, and the mother was instructed to add oat to the diet. She insisted on doing this in the pediatric office. Ninety minutes after the feeding, recurrent vomiting and lethargy developed that was treated with intravenous hydration.

What is the most likely cause?
A. Food allergy to oat
B. FPIES
C. Food protein-induced proctitis/proctocolitis
D. Celiac disease

Immune Mediated: Non-IGE

• FPIES (Food Protein-induced Enterocolitis Syndrome)
  – manifests as profuse, repetitive vomiting, often with diarrhea, leading to dehydration and lethargy in the acute setting, or weight loss and failure to thrive in a chronic form
  – Primarily affect infants
  – Most common causes are cow’s milk or soy, but can be caused by solid food protein (MC=rice)
  – Usually IGE mediated food testing is negative

Immune Mediated: Non-IGE

• Food protein-induced proctitis/proctocolitis
  – inflammation of the distal colon in response to specific food proteins
  – blood-tinged stools in an otherwise healthy infant
  – triggered by proteins from cow’s milk, occasionally soy or other foods, ingested through breast milk (~60%) or standard infant formulas
  – resolves by one year of age in almost all infants
Immune Mediated: Non-IGE

- Protein-induced enteropathy
  - small bowel injury, leading to malabsorption, intermittent vomiting, diarrhea, failure to thrive, and, rarely, bloody stools
  - cow’s milk protein and is most likely to occur in infants fed unmodified (nonformula) cow’s milk prior to nine months of age
  - Resolves spontaneously by 2 yr of age

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**Case 4**

A 3 mo male presents to your office with diarrhea and blood in the stools. The blood was not in all of the stools 2 weeks ago and a diagnosis of anal fissure was made at that time. Now mom reports streaks of blood in most stools. She has been breastfeeding only. The infant appears healthy and is gaining weight appropriately.

What is your next step?
A. GI referral for endoscopy
B. Serum IGE to milk
C. Reassurance that this is an anal fissure
D. Have mom remove milk protein from her diet

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**Case 5**

- 7 yo female presents to her pediatrician with complaints of fatigue, abdominal cramping, and diarrhea. Her growth and development have been appropriate.
- PMx: not significant
- Immunizations: up to date
- A diagnosis of viral gastritis is made. The pediatrician advises a bland diet.
- Until symptoms improve, the patient rests and consumes chicken broth and gelatin. After three days, she is feeling better and ready to return to school. At school the next day, lunch is at 11:30 a.m., and the patient eats all of her tomato soup and fruit, but only a few bites of her grilled cheese sandwich. Around 1:00 p.m., the patient complains to her teacher that she has had three episodes of diarrhea that day. Once home, the patient consumes nothing but gelatin and ginger ale and spends the rest of the day in bed. For the next 2 weeks, the patient stays on a diet of soups and liquids to allow her stomach time to recover. When the patient appears to be improving, other foods are slowly introduced back into her diet.
- At the patient’s follow-up appointment she has lost one pound in body weight and her stomach is tender to palpation.

What is the most likely cause?
A. Food allergy
B. FPIES
C. Gastroenteritis
D. Celiac disease
**Immune Mediated: Non-IGE**

- **Celiac Disease**
  - immune-mediated inflammatory disease of the small intestine
  - caused by sensitivity to dietary gluten and related proteins in genetically predisposed individuals
  - occurs in 0.5 to 1 percent of the general population in most countries

**Immune Mediated: Non-IGE**

- **Dermatitis Herpetiformis (DH)**
  - uncommon autoimmune cutaneous eruption associated with gluten sensitivity.
  - patients typically develop intensely pruritic inflammatory papules and vesicles on the forearms, knees, scalp, or buttocks
  - majority of patients with DH have an associated gluten-sensitive enteropathy (celiac disease). The enteropathy is usually asymptomatic.
  - DH usually responds well to treatment: Dapsone and a gluten-free diet are the primary interventions for the management

**Case 6**

- A 17-year-old male presents to your clinic for evaluation of skin rash, maculopapular and pruritic which affects both hands, forearms, and the lower portion of his neck. He has had the rash for four months.
  
  He works as a manual laborer at a parcel courier service, moving boxes. Apart from the rash, he does not report any other symptoms. He is not on any medications and does not have any significant past medical history.

  - What is the likely underlying cause of the rash?
    - A. Food allergy
    - B. Contact Dermatitis
    - C. Psoriasis
    - D. Eosinophilic Esophagitis
Immune Mediated: Non-IGE

- Contact Dermatitis
  - Inflammation of the dermis and epidermis as a result of direct contact between a substance and the surface of the skin
  - Types: irritant (diaper) and allergic (poison ivy)

Immune Mediated: Non-IGE

- Heiners syndrome
  - (food-induced pulmonary hemosiderosis) is a pulmonary disease that is caused by food hypersensitivity, primarily to cow's milk
  - mainly affects infants
  - Symptoms: cough, recurrent fever, wheezing, nasal congestion, recurrent otitis media, hemoptysis, failure to thrive, dyspnea, colic, anorexia, vomiting, diarrhea, and hematochezia
  - Patients have precipitating antibodies (immunoglobulin G [IgG]) to cow's milk proteins and may also have milk-specific IgE
  - Radiologic evidence of pulmonary infiltrates was a universal finding in one study

Case 7

- An 8-year-old boy is seen by his pediatrician for follow-up of abdominal pain. He had already visited the ER last week for RLQ abdominal pain and acute appendicitis had been ruled out. He complained of abdominal pain radiating to RLQ, nausea, vomiting, lack of appetite and weight loss for 6 months. Mom reports he eats slowly stating he feels like food is stuck in his throat.
  - PMHx: Allergic rhinitis and conjunctivitis for 3 years, skin prick testing positive for house dust mite (2 years ago)
  - FHx: Allergic Rhinitis—mother
  - Medication: Prevacid (lansoprazole) daily
  - PE: Diffuse abdominal tenderness, no rebound, normal BS, otherwise normal.
  - He saw the gastroenterologist last week with these findings on endoscopy.

- What is most likely causing these symptoms?
  - A. Ruptured appendicitis
  - B. Gastroenteritis
  - C. Eosinophilic esophagitis
  - D. Food allergy
Objectives

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Immune Mediated: Mixed IGE and Non-IGE

• Eosinophilic Gastrointestinal Disorders (EGID)
  • inflammatory disorder characterized by eosinophilic infiltration of the stomach and duodenum, and, in some cases, the esophagus and colon without any known cause of eosinophilia.

• Eosinophilic Esophagitis (EOE)
  • chronic, immune/antigen-mediated, esophageal disease characterized clinically by symptoms related to esophageal dysfunction and histologically by eosinophil-predominant inflammation
Immune Mediated: Mixed IGE and Non-IGE

- Atopic Dermatitis
- chronic, pruritic, inflammatory skin disease
- most frequently in children, but also adults
- Sxs: skin dryness, erythema, oozing and crusting, lichenification. Pruritus is a hallmark.

Case 8

- 7-month-old boy, is brought to your office by his mother, who is concerned about her son’s intermittent, pruritic rashes. She reports that the rashes started when the patient was about 4 months old and were initially concentrated on his cheeks and around his mouth. She thinks they might be worse with eggs. The rashes come and go and now also intermittently affect his trunk and extremities. The areas covered by his diaper are not involved. She has treated the condition with various “baby lotions” and is uncertain whether these help. No one else in the family has similar issues. The patient’s father has a history of asthma.
- Cutaneous examination reveals symmetric, ill-defined, brightly erythematous, scaling, pink patches on his cheeks and similar, although milder, patches on his trunk and extremities.
- What is the most likely cause of his symptoms?
  A. Psoriasis
  B. Atopic Dermatitis
  C. Food allergy
  D. Scabies

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Case 9

- A 15-year old Korean female presents to clinic with concern for food allergy. She complains of nausea and headache within minutes of eating Chinese food. Symptoms occur every time she eats this type of food (every 3-4 months). Symptoms resolve on their own.
- PMHx: allergic rhinoconjunctivitis.
- Medications: cetirizine prn
- FHx: non-contributory
- SHx: +pet
- What the cause of these symptoms?
  - A. Celiac disease
  - B. Monosodium Glutamate allergy
  - C. Monosodium Glutamate intolerance
  - D. Food allergy

Non-Immune Mediated: Metabolic

- Lactose intolerance

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Non-Immune Mediated:
Pharmacologic

• Caffeine
• Histamine like compounds—wine, sauerkraut
• Theobromine—tea, chocolate
• Tryptamine—tomato, plum
• Serotonin—banana, tomato
• Phenylethylamine—chocolate
• Glycosidal alkaloid—solaneine—potato
• Monosodium glutamate (MSG)

Case scromboid

• Over a 10-min period, five patients were brought by ambulance an emergency department. All the patients had been to a conference at a hotel and had taken ill within a short time of eating a buffet meal that contained fresh tuna. All patients had a normal temperature and a normal blood pressure. Three of them had a tachycardia

Case 10

• 6-year-old boy was admitted to the hospital with generalized itching and rash for 2 days shortly after eating tuna from a buffet. Additional symptoms included abdominal pain, painful and swollen hands, and swollen eyes. Symptoms improved with ibuprofen and antihistamines but continued to relapse and remit. Examination showed edematous, urticarial plaques intermixed with diffuse flushing. The airway was not compromised but similar symptoms were reported in other customers at the buffet. Supportive care was continued, with sustained improvement of his symptoms overnight. The patient was discharged the next day without further episodes.

• What is the most likely cause of these symptoms?
  A. Food allergy
  B. Scromboid poisoning
  C. Ciguatera poisoning
  D. Atopic dermatitis
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<td>• Seafood-Scromboid poisoning (fresh tuna, mackerel)</td>
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<td>• Ciguatera poisoning (grouper, snapper)</td>
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<td>• Saxitoxin (shellfish)</td>
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<td>• Other food poisoning - clostridium botulinum, staphylococcus aureus</td>
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<td>• Fungal toxins</td>
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Non-Immune Mediated: Other

- Sulfites

- Table of differences
• Key take-home messages
• Food allergy is defined as an adverse immunologic response to a dietary protein.
• Referral to an allergist is important for appropriate diagnosis and treatment.
• Diagnosis of a food allergy requires a detailed history, diagnostic tests such as skin prick tests (SPT) and/or serum-specific IgE testing to foods and, in some cases, oral food challenges.

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• Referral to an allergist is important for appropriate diagnosis and treatment.
• Diagnosis of a food allergy requires a detailed history, diagnostic tests such as skin prick tests (SPT) and/or serum-specific IgE testing to foods and, in some cases, oral food challenges.
• Treatment of food allergy involves avoidance of the responsible food(s) and injectable epinephrine.
• For patients with significant systemic symptoms, the treatment of choice is epinephrine administered by intramuscular injection into the lateral thigh.
• Most children “outgrow” allergies to milk, egg, soy and wheat by school age; allergy to peanut, tree nuts, fish, and shellfish are usually lifelong, although some patients may outgrow peanut allergy.

Thank you!
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