Financial Disclosures

FINANCIAL INTERESTS
I have disclosed below information about all organizations and commercial interests, other than my employer, from which I or a member of my immediate family or household receive remuneration in any amount (including consulting fees, grants, honoraria, investments, etc.) or invest money which may create or be perceived as a conflict of interest.

Name of Organization   Nature of Relationship
Nutricia               Speaker

It is my obligation to disclose to you (the audience) that I am on the Speakers Bureau for Nutricia, however, I acknowledge that there is a conflict of interest as I am receiving a speaking fee and this must be transparent. I have a duty to present data that are relevant and supported by the best available evidence to support my conclusions and recommendations.

RESEARCH INTERESTS
I have disclosed below information about all organizations which support research projects for which I or a member of my immediate family or household serve as an investigator.

Name of Organization   Nature of Relationship
Food Allergy Initiative  Grantee
DBV Technologies       Grantee

Objectives

At the conclusion of the presentation the participant should be able to:

• Discuss key elements of food allergy diagnosis.
• Appropriately interpret relevant tests for the diagnosis of food allergy.
• Appropriately manage a patient with a life-threatening food allergy.
• Develop a comprehensive approach to caring for atopic dermatitis.
• Be familiar with ongoing food allergy research efforts.

Scenario 1

• 12 m/o boy develops vomiting, rhinorrhea and urticaria on face, trunk and arms within minutes of eating first piece of birthday cake.
• Parents gave Benadryl and called pediatrician.
• Taken to ER. Symptoms resolved within 45 minutes. No further problems.

WHAT IS FOOD ALLERGY?
Diagnosis and Management of Food Allergies

3.1

Adverse Food Reaction

FOOD INTOLERANCE
non-immunologic

FOOD ALLERGY
immunologic

Spectrum of Food Allergy

IgE-Mediated
• Oral Allergy Syndrome
• Anaphylaxis
• Acute Urticaria

Non-IgE-Mediated
• Eosinophilic esophagitis
• Eosinophilic gastroenteritis
• Atopic dermatitis

• Food protein induced enterocolitis syndrome
• Celiac disease

Prevalence

Prevalence of Food Allergy in U.S.

1 in 13 children in the U.S. has a food allergy

<table>
<thead>
<tr>
<th>Food</th>
<th>Children (%)</th>
<th>Adults (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>2.2 – 3%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Egg</td>
<td>0.8 – 1.5%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Peanut</td>
<td>0.6 – 2%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Tree nuts</td>
<td>0.4 – 1%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Fish</td>
<td>0.2 – 0.5%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Shrimp</td>
<td>0.5 – 1.4%</td>
<td>2%</td>
</tr>
<tr>
<td>Wheat</td>
<td>0.4%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Soy</td>
<td>0.4%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>


Natural History

Persistent Allergy (%)

Age (years)

Prevalence Allergy (%)
WHY IS THE PREVALENCE INCREASING?

Previous AAP Recommendation

• Breastfeed for the first year of life.
• Solid foods should not be introduced into the diet of a high-risk infant until 6 months
  – Dairy products at 1 year
  – Egg at 2 years
  – Peanuts, tree nuts, and fish at 3 years


Factors Affecting Development of Allergy vs. Tolerance

AAP Recommendations

• “Exclusive breastfeeding is sufficient to support optimal growth and development for the first 6 months of life.”
• “Little evidence that delaying the timing of the introduction of complementary foods beyond 4 to 6 months of age prevents atopic disease... Potentially allergic foods may be introduced at this time as well.”


Prevention

Original articles

Early consumption of peanuts in infancy is associated with a low prevalence of peanut allergy

George Du Toit, FRCPCH,† Yehoshua Katz, MB, BS, MSc, Peter Sustaci, PhD, ‡ David Mevorach, MSc, § Seredee J. Wearle, PhD, §
Mehran R. Fazel, BSc, † Adam E. Fox, FRCPCH, † Victor Fass, MB, BS, † Tal Avos, † Gada Zalewitch-Meir, MB, BS
† Sick Children’s Hospital, 250 Commercial St, Toronto, Ontario, Canada; ‡ Tel Aviv Sourasky Tel Aviv University Medical Center, Pd, H and Hebra University, Israel; § University of Edmonton, Edmonton, Alberta, Canada. †Allergy Clin Immunol 2008; 122: 984-91.

• Prevalence of PNA = 1.85% in UK vs 0.17% in Israel

% of Infants fed solids by 8 weeks of age in UK

HOW SHOULD WE DIAGNOSE FOOD ALLERGY?

Pathophysiology

Approach to Diagnosis

History: Important Information

- Food suspected to have provoked the reaction
- Quantity of the suspected food
- Time between ingestion and development of symptoms

Approach to Diagnosis

History: Important Information

- Description of symptoms provoked – GI, respiratory and skin
- Similar symptoms when food was eaten on other occasions
- Other factors (e.g. exercise) necessary to provoke reaction
- Time since last reaction

NOT Food Allergy

- Chronic rhinitis
- Behavior or mood changes (e.g. ADD, ADHD)
- Autism
- Headaches
- Chronic urticaria
- RCM sensitivity and shellfish allergy

Signs and Symptoms

- Sneezing
- Nasal Congestion
- Rhinorrhea
- Sneezing Voice
- Dyspnea
- Cough
- Wheeze
- Flushing
- Urticaria
- Angioedema
- Nausea
- Vomiting
- Abdominal Cramping
- Diarrhea
Diagnosis and Management of Food Allergies

3.1

Diagnostic Strategies: IgE-Mediated Food Allergy

• Skin prick tests

• In vitro tests for food-specific IgE
  – Panels/broad screening should NOT be done without supporting history because of high rate of false positives

• Gold standard - DBPCFC

Interpreting ImmunoCAP Levels

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Food</th>
<th>Serum IgE (kU/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child</td>
<td>Egg</td>
<td>≥ 7</td>
</tr>
<tr>
<td>≤ 2 years</td>
<td>Milk</td>
<td>≥ 2</td>
</tr>
<tr>
<td>Child</td>
<td>Peanut</td>
<td>≥ 15</td>
</tr>
<tr>
<td>≤ 2 years</td>
<td>Peanut</td>
<td>≥ 5</td>
</tr>
<tr>
<td>Child</td>
<td>Fish</td>
<td>≥ 14</td>
</tr>
</tbody>
</table>

Age Group Food Serum IgE (kU/L)

~95% react

Interpreting ImmunoCAP Levels


Nonstandardized and Unproven Procedures

• Basophil histamine release/activation
• Lymphocyte stimulation
• Facial thermography
• Gastric juice analysis
• Endoscopic allergen provocation
• Hair analysis
• Applied kinesiology
• Provocation neutralization
• Allergen-specific IgG4
• Cytotoxicity assays
• Electrodervation test (Vega)
• Mediator release assay (LEAP diet)

Management: Current Standard of Care

• Avoidance of food allergen
• Education regarding potential cross-contamination or cross-reacting foods.
• Treatment of accidental ingestion with auto-injectable epinephrine if needed.


Management: Current Standard of Care

• Nutrition consult
  – Ensure nutritional needs are met
• Food Allergy Action Plan (www.foodallergy.org)
• Medic alert bracelet
• Quality of life issues
  – Healthy respect for the allergy
  – Anticipate but not expect reactions

Food-induced Anaphylaxis Fatalities

Who needs auto-injectable epinephrine?
- Any patient with a history of a prior systemic allergic reaction.
- Any patient with both food allergy and asthma.
- Patients with a known food allergy to peanut, tree nuts, fish and crustacean shellfish.

Peanut Allergy Guidance
- Must ingest for severe reaction
- Touch - may cause localized allergic reactions
- Not generally aerosolized
- Smell - not life-threatening symptoms

Scenario 2
- 22 m/o male with a history of severe atopic dermatitis
- Specific IgE testing positive to almost every tested food
- Currently on restricted diet eating only sweet potatoes, squash and brown rice and drinking rice milk.
Diagnosis and Management of Food Allergies

3.1

Atopic Dermatitis


Management


Management


Exacerbating Factors in AD


Role of Food Allergy

- ~35% of children with moderate to severe AD have IgE-mediated food allergy.¹
  - Most common food allergens:
    • Peanut
    • Egg
    • Milk
    • Wheat
    • Soy

**Management**

- Eczema Action Plan to include:
  - Intensify control with cream-based moisturizers and aggressive use of topical steroids.
  - Minimize bacterial colonization with bleach baths and topical mupirocin.
    - www.eczemacenter.org
  - Refer to allergy for evaluation of potential allergen and food triggers.

**Scenario 3**

- 15 m/o with h/o emesis after cow’s milk based formula presents with worsening rash, alopecia and diarrhea
  - 6 w/o tried Alimentum
  - 6 m/o tried goat’s milk
  - 8 m/o started coconut milk with rice syrup

**LABS**

- LFTs unremarkable
- Chem 7 unremarkable
- Hgb: 7.7 g/dl
- MCV: 74.9
- Albumin: 2.0 (3.5 – 4.8 g/dl)
- Zinc: 29 (60 – 120 mcg/dl)

**Milk Comparison per 8 ozs**
Diagnosis and Management of Food Allergies

3.1

Nonstandardized and Unproven Procedures

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- Lymphocyte stimulation
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Diagnostic Strategies: IgE-Mediated Food Allergy

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- Gold standard - DBPCFC

Scenario 4

- 32 y/o mother of a 5 y/o with an egg allergy comes into your office.
- Should her daughter receive the flu vaccine this year?

Influenza Vaccine

- Vaccine is prepared by inoculation of virus into chicken eggs.
- Egg allergy is considered a contraindication.
- Ovalbumin content reported up to 1.4 µg/ml has been tolerated without serious reactions.1-7

Influenza Vaccine

Recommendations from ACIP

1. If only hives after exposure to egg:
   a) Administered by a health-care provider familiar with manifestations of egg allergy
   b) Should be observed for 30 minutes
   c) Dividing dose and skin testing are not necessary

2. If history of angioedema, respiratory distress, lightheadedness, recurrent emesis, or required epinephrine after egg ingestion should be referred to an allergist.

Vaccinations for Egg-allergic Individuals

- MMR and MMRV are safe in all egg-allergic
- Yellow fever – not recommended
- Rabies vaccine – not recommended (except Imovax ®)

Conclusions

- Food allergy testing should be directed by the patient’s history.
- Food allergy panels are rarely indicated.
- Skin care management is the most important aspect of eczema care. Once maximized, consider allergen triggers.
- The majority of egg-allergic individuals may safely receive the flu vaccine.