BREATH VII
Food Allergy
Patrick Vannelli, MD
March 31, 2017

Allergy & Asthma Specialists
Educational Foundation

Continuing Medical Education (CME) Credit

• This course offers 6 AMA Category 1 CME credit(s)™

• Sign in, attendance, and completion of CME activity evaluation are required before credit is conferred.

CME Disclosure Announcement

Planning Committee members have no financial relationships to disclose.

Elizabeth Bailey, MSN, CRNP
Joanne Grzywacz, BSN, RN
Kate Wigglesworth, BSN, RN
Sue Ellen Getka, BS, RN, AE-C

Presenters have no financial relationships to disclose.

Mark Posner, MD
Nora Lin, MD
Patrick Vannelli, MD
Elizabeth Bailey, MSN, CRNP
Ann Schwartz, RN, BSN, CCRC
Karen Zur, MD
Stanley Forman, MD

DISCLOSURES
The following moderators, planners and speakers have provided disclosures. The Albert Einstein Medical Center and Pennsylvania State Nurses Association for CME and contact hours, in conjunction with Allergy and Asthma Specialists have reviewed the content of the conference and potential conflicts have been resolved per the guidelines.

Robert Anolik, MD
Speaker: Merck
Consultant: Novartis/Genentech, ALK
Principal Investigator: Circassia, Allergy Therapeutics, Merck, Aerocrine, Roche
Learning Objectives

- Describe current asthma treatments and review guidelines for therapy.
- Describe indicators for allergy referral.
- Describe treatment options for food allergy, including sublingual immunotherapy and oral immunotherapy.
- Describe the proper maneuver for performing spirometry.
- Describe treatment options for vocal cord dysfunction.
- Describe common symptoms of vocal cord dysfunction.
- Describe the different values that more formal lung functions provide versus simple spirometry.
- Describe the proper inhaler techniques for asthma inhalers.
- Define how to manage common allergic conditions, including allergen avoidance, pharmacotherapy and immunotherapy.
- Describe typical manifestations of anaphylaxis.
- Identify common symptoms of an autoimmune disease.
- Identify the more common autoimmune diseases.

Disclosures

- None

All About Food Allergies

Patrick Vannelli, MD
Allergy and Asthma Specialists
March 31, 2017
Food Allergy: Definitions

Adverse Food Reactions

**IgE-Mediated**
- Systemic (Anaphylaxis)
- Oral Allergy Syndrome
- Immediate gastrointestinal allergy
- Asthma/rhinitis
- Urticaria
- Contact urticaria

**Non-IgE Mediated**
- Eosinophilic esophagitis
- Eosinophilic gastritis
- Eosinophilic gastroenteritis
- Atopic dermatitis

**Cell-Mediated**
- Protein-Induced Enterocolitis
- Protein-Induced Enteropathy
- Eosinophilic proctitis
- Contact dermatitis
- Celiac disease

Adverse Food Reactions

**Non-immunologic**

**Toxic / Pharmacologic**
- Bacterial food poisoning
- Heavy metal poisoning
- Caffeine
- Alcohol
- Histamine

**Non-Toxic / Intolerance**
- Lactase deficiency
- Pancreatic insufficiency
- Gallbladder / liver disease
- Gustatory rhinitis
- Anorexia nervosa
- Idiosyncratic

Allergens

- Proteins or glycoproteins (not fat or carbohydrate)
  - Generally heat resistant, acid stable
- Major allergenic foods (>85% of food allergy)
  - Children: milk, egg, soy, wheat, peanut, tree nuts
  - Adults: peanut, tree nuts, shellfish, fish, fruits and vegetables
Pan-allergens

- Proteins in food, pollen or plants that possess homologous IgE binding epitopes across species
- Tropomyosins: crustacea, dust mites, cockroach, mollusks
- Parvalbumins: fish
- Lipid transfer protein: fruits (peach, apple), vegetables, peanut, tree nuts
- Profilin: fruits, vegetables
- Class 1 chitinases: fruits, wheat, latex

Amino Acid Structural Characteristics

- Allergenic proteins have been identified for common food allergens; genes have been cloned and sequenced for many of them

  - Sequential vs conformational B cell epitopes
    - IgE towards sequential epitopes are associated with persistence of allergy
    - Cross Reactivity: more likely if AA sequence homology >70%

Clinical Manifestations

<table>
<thead>
<tr>
<th></th>
<th>IgE</th>
<th>Non-IgE</th>
<th>Acute</th>
<th>Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skin</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urticaria</td>
<td>☑️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angioedema</td>
<td>☑️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atopic dermatitis</td>
<td>☑️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Respiratory</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throat tightness</td>
<td>☑️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhinitis</td>
<td>☑️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>☑️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gut</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vomit</td>
<td>☑️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diarrhea</td>
<td>☑️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>☑️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>☑️</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Anaphylaxis Syndromes

- Food-induced anaphylaxis
  - Food allergy = #1 cause of anaphylaxis in the ED
  - Rapid-onset, up to 30% biphasic
  - May be localized (single organ) or generalized
  - Potentially fatal
- Any food, highest risk:
  - peanut, tree nut, seafood (cow’s milk and egg in young children)
- Food-dependent, exercise-induced: 2 forms
  - Specific foods (wheat, celery most common)
  - Any food (post-prandial)

Fatal Food Anaphylaxis

- Frequency: ~ 150 deaths / year
- Clinical features:
  - Biphasic reaction can contribute – initially better, then recurs
  - Cutaneous symptoms may not be present
  - Respiratory symptoms prominent
- Risk factors
  - Underlying asthma – Delayed epinephrine
  - Symptom denial – Previous severe reaction
  - Adolescents, young adults
- History: known food allergen
- Key foods: peanuts and tree nuts dominate (~90% of fatalities), fish, crustaceans
- Most events occurred away from home

Cutaneous Reactions

- Acute urticaria/angioedema – common
- Contact urticaria - common
- Food allergy rarely causes chronic urticaria/angioedema
- 1/3 of children with moderate to severe atopic dermatitis may have food allergy (especially cow’s milk, egg, soy, wheat). Morbilliform rashes may be seen in these children upon food challenge.
- Contact dermatitis (food handlers)

Respiratory Responses

- Upper and lower respiratory tract symptoms may be seen (rhinoconjunctivitis, laryngeal edema, asthma)
- Rarely isolated, usually accompany skin and GI symptoms
- Inhalational exposure may cause respiratory symptoms that can be severe
  - Occupational
  - Restaurants
  - Kitchen/Home
### Pollen-Food Syndrome or Oral Allergy Syndrome

- **Clinical features:** rapid onset oral pruritus, rarely progressive
- **Epidemiology:** prior sensitization to pollens
- **Key foods:** raw fruits and vegetables
  - Heat labile (cooked food usually OK)
- **Cause:** cross reactive proteins pollen/food

<table>
<thead>
<tr>
<th>Pollen</th>
<th>Key Foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birch</td>
<td>Apple, carrot, celery, cherry, pear, hazelnut</td>
</tr>
<tr>
<td>Ragweed</td>
<td>Banana, cucumber, melons</td>
</tr>
<tr>
<td>Grass</td>
<td>Melon, tomato, orange</td>
</tr>
<tr>
<td>Mugwort</td>
<td>Melon, apple, peach, cherry</td>
</tr>
</tbody>
</table>

### Latex-Fruit Syndrome

- **30-50%** of those with latex allergy are sensitive to some fruits due to cross-reactive IgE
- **Most common fruits:** banana, avocado, kiwi, chestnut but other fruits and nuts have been reported
- Can clinically present as anaphylaxis to fruit
- Warn latex-sensitive patients of potential cross-reactivity
- Some fruit-allergic patients may be at risk for latex allergy

### Delayed Anaphylaxis to Red Meat

- **Specific IgE** for oligosaccharide in red meat (beef, pork, lamb)
- **Galactose-alpha-1,3 galactose** (alpha-gal)
- **Association with Lone Star tick exposure**
- **Delayed reaction** (3-6 hours later)

### Pediatric Gastrointestinal Syndromes

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Infant</th>
<th>Infant/Toddler</th>
<th>Newborn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterocolitis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enteropathy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proctitis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Infant/Toddler</th>
<th>Newborn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to thrive stools</td>
<td>Malabsorption</td>
<td>Bloody Diarrhea</td>
</tr>
<tr>
<td>No systemic sx Diarrhea</td>
<td>Shock Villous atrophy</td>
<td>Lethargy</td>
</tr>
<tr>
<td>Diarrhea Vomit</td>
<td>Eosinophilic</td>
<td></td>
</tr>
</tbody>
</table>

- **Non-IgE-mediated, typically milk and soy induced**
- **Spectrum may include colic, constipation and occult GI blood loss**
GI Syndromes of Children and Adults:

Celiac Disease (Gluten-sensitive enteropathy)

- In children:
  - FTT, or weight loss
  - Malabsorption, diarrhea, abdominal pain
  - May be subtle
- In adults, average 10 years of nonspecific symptoms:
  - Diarrhea, abdominal pain
  - GERD
  - Malabsorption
  - May present atypically with osteoporosis, infertility, neurologic sx

Pathophysiology: an immune-mediated enteropathy triggered by gluten peptides in genetically predisposed patients (DQ2 or DQ8)
- Lymphocytic infiltration of small bowel
- Villus atrophy

Celiac Disease (Gluten-sensitive enteropathy) Cont’d:

- Diagnosis
  - ~1/133 people in US have celiac disease – many are currently undiagnosed
  - IgA anti-tissue transglutaminase (IgG if IgA-deficient), anti-endomysial Ab
  - Upper endoscopy with biopsy; refer to gastroenterologist
- Management
  - Strict, lifelong, gluten avoidance (wheat, barley, rye)
  - Rare risk of GI lymphoma
  - Oats almost always OK
  - Link with resources: dietician, local support groups, national organizations (listed at www.celiac.nih.gov)

GI Syndromes of Children and Adults

Eosinophilic Gastrointestinal Disorders: eosinophilic esophagitis/gastritis/gastroenteritis

- Prevalence increasing, eosinophilic esophagitis is the most common syndrome, all rare in adults
- Symptoms
  - Post-prandial N/V/D/abdominal pain, weight loss
  - FTT in infants and young children, irritability, sleep disturbance
  - GER, often refractory, may be seen
  - In teens/adults: dysphagia, food impaction

Eosinophilic Gastrointestinal Disorders: eosinophilic esophagitis/gastritis/gastroenteritis cont’d:

- Diagnosis
  - Biopsy: eos infiltration (mucosa → serosa): >20/HPF
  - Presence of eos doesn’t necessarily invoke food allergy
  - May affect esophagus to rectum
- Response to specific food elimination found in a subset of patients (especially eosinophilic esophagitis): consider screening with skin testing and/or IgE specific blood work
Disorders Not Proven to be Related to Food Allergy

- Migraines
- Behavioral / Developmental disorders
- Arthritis
- Seizures
- Inflammatory bowel disease

Prevalence and Natural History

Prevalence of Food Allergy

- Perception by public: 20-25%
- Confirmed allergy (oral challenge)
  - Adults: 2-3.5%
  - Infants/young children: 6-8%
- Specific Allergens
  - Dependent upon societal eating and cooking patterns
- Prevalence higher in those with:
  - Atopic dermatitis
  - Certain pollen allergies
  - Latex allergy
- Prevalence seems to be increasing

Estimated Prevalence of Food Allergy

<table>
<thead>
<tr>
<th>Food</th>
<th>Children (%)</th>
<th>Adults (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow's milk</td>
<td>2.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Egg</td>
<td>1.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Soy</td>
<td>0.3-0.4</td>
<td>0.04</td>
</tr>
<tr>
<td>Peanut</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Tree nut</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Crustaceans</td>
<td>0.1</td>
<td>2.0</td>
</tr>
<tr>
<td>Fish</td>
<td>0.1</td>
<td>0.4</td>
</tr>
</tbody>
</table>
Prevalence of Food Allergy in Specific Disorders

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Food Allergy Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaphylaxis</td>
<td>35-55%</td>
</tr>
<tr>
<td>Oral allergy syndrome</td>
<td>25-75% in those w/pollen allergy</td>
</tr>
<tr>
<td>Atopic dermatitis</td>
<td>37% in children (rare in adults)</td>
</tr>
<tr>
<td>Urticaria</td>
<td>20% in acute (rare in chronic)</td>
</tr>
<tr>
<td>Asthma</td>
<td>5-6%</td>
</tr>
<tr>
<td>Chronic rhinitis</td>
<td>Rare</td>
</tr>
</tbody>
</table>

Prevalence of Clinical Cross Reactivity Among Food “Families”

<table>
<thead>
<tr>
<th>Food Allergy</th>
<th>Prevalence of Allergy to &gt; 1 Food in Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>30% -100%</td>
</tr>
<tr>
<td>Tree Nut</td>
<td>15% - 40%</td>
</tr>
<tr>
<td>Grain</td>
<td>25%</td>
</tr>
<tr>
<td>Legume</td>
<td>5%</td>
</tr>
<tr>
<td>Any</td>
<td>11%</td>
</tr>
</tbody>
</table>

Natural History

- Dependent on food
- Majority cases of cow milk, soy, egg and wheat allergy remit by age 6-10 years
  - Declining/low levels of specific-IgE predictive
  - Milk and egg: tolerance to extensively heated proteins precedes development of tolerance to unheated form
- Non-IgE-mediated GI allergy
  - Infant forms resolve in 1-3 years
  - Toddler / adult forms more persistent

Natural History (cont’d)

- Allergies to peanuts, tree nuts, seafood, and seeds typically persist
- ~20% of cases of peanut allergy resolve
- Prognostic factors include:
  - PST <6mm
  - History of mild reaction
  - Few other atopic diseases
  - Low levels of peanut-specific IgE
  - Relapse of allergy without ingestion possible
Evaluation

Evaluation: History & Physical Exam

- **History: most important**
  - Symptoms, timing, reproducibility, how was food prepared, treatment and outcome
  - Concurrent exercise, NSAIDs, EtOH
- **Diet details / symptom diary**
  - Subject to recall
  - “Hidden” ingredient(s) may be overlooked
- **Physical exam: assess for other allergic and alternative disorders**
- **Identify general mechanism**
  - Allergy vs intolerance
  - IgE versus non-IgE mediated

Evaluation of Food Allergy

- **Suspect IgE-mediated**
  - Panels/broad screening should NOT be done without supporting history because of high rate of false positives
  - Prick skin tests (prick-prick with fresh food if pollen-food syndrome)
  - In vitro tests for food-specific IgE
- **Suspect non-IgE-mediated**
  - Consider biopsy of gut, skin
- **Suspect non-immune, consider:**
  - Breath hydrogen
  - Endoscopy

Evaluation: Interpretation of Laboratory Tests

- **Positive prick test or specific IgE**
  - Indicates presence of IgE antibody NOT clinical reactivity
  - ~40% false positives
  - Larger skin tests/higher IgE correlates with likelihood of reaction but not severity
- **Component testing**
  - Ara h 8 in peanut and Cor a 1 in hazelnut (mild oral allergy symptoms)
- **Negative prick test or specific IgE**
  - Essentially excludes IgE antibody (>95% specific)
Specific IgE Levels Associated with 95% Risk of Reaction

<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>&lt;2 years</td>
<td>Egg</td>
<td>≥ 2</td>
</tr>
<tr>
<td>Child</td>
<td>Cow Milk</td>
<td>≥ 15</td>
</tr>
<tr>
<td>&lt;2 years</td>
<td>Cow Milk</td>
<td>≥ 5</td>
</tr>
<tr>
<td>Child</td>
<td>Peanut</td>
<td>≥ 14</td>
</tr>
<tr>
<td>Child</td>
<td>Fish</td>
<td>≥ 20</td>
</tr>
</tbody>
</table>

Unproven/Experimental Tests

- Intradermal skin test with food
  - Risk of systemic reactions
  - Not predictive (high false positive rate)
- Provocation/neutralization, hair analysis, electrodermal testing, food-specific IgG or IgG4 (IgG “RAST”)

Evaluation: Elimination Diets & Food Challenges

- Elimination diets (1 - 6 weeks) most useful for chronic disease (eg. AD, GI syndromes)
  - Eliminate suspected food(s) or
  - Prescribe limited “eat only” diet or
  - Elemental diet
- Oral challenge testing (MD supervised, emergency meds available)
  - Open
  - Single-blind
  - Double-blind, placebo-controlled (DBPCFC)

Diagnostic Approach: IgE-Mediated Allergy

- If test for specific-IgE antibody is
  - Negative: reintroduce food*
  - Positive: start elimination diet
- If elimination diet is associated with
  - No resolution: reintroduce food*
  - Resolution
    - Open / single-blind challenges to “screen”
    - DBPCFC for equivocal open challenges

* Unless convincing history warrants supervised challenge
Diagnostic Approach: Non-IgE-Mediated Disease or those with unclear mechanism

- Elimination diets (may need elemental diet)
- Oral Challenges
  - Timing/dose/approach individualized for disorder
  - Enterocolitis syndrome can induce shock
  - Eosinophilic gastroenteritis may need prolonged feedings before symptoms develop
  - DBPCFCs preferred

Management of Food Allergy

- Avoidance of specific food trigger
- Ensure nutritional needs are being met
- Education
- Anaphylaxis Emergency Action Plan if applicable
  - most accidental exposures occur away from home

Management

Management: Dietary Elimination

- **Complete avoidance** (e.g. peanut) vs. **partial avoidance** (e.g. avoid whole egg but eat baked egg products if tolerant)
- **FALPCA**¹ (effective 1/1/06) requires labeling for the 8 major food allergens *(in common language)*
- **Advisory warning labels** (May contain..., Processed in a facility...). For peanut, <10% of products had peanut.²
- **Cross contact issues:** share equipment, fried foods, bakeries, buffets
Label reading used to be very challenging!
Example: Cow’s Milk

**Contain cow’s milk:** Artificial butter flavor, butter, butter fat, buttermilk, casein, caseinates (sodium, calcium, etc.), cheese, cream, cottage cheese, curds, custard, Half&Half®, hydrolysates (casein, milk, whey), lactalbumin, lactose, milk (derivatives, protein, solids, malted, condensed, evaporated, dry, whole, low-fat, non-fat, skim), nougat, pudding, rennet casein, sour cream, sour cream solids, sour milk solids, whey (delactosed, demineralized, protein concentrate), yogurt. **MAY contain milk:** brown sugar flavoring, natural flavoring, chocolate, caramel flavoring, high protein flour, margarine, Simplesse®.

Management: Restaurants and Travel

- Always declare your food allergies to the restaurant staff.
- When traveling avoid eating airline food; bring your own food.
- Inspect seating for residual food from previous passengers; clean seat and table.
- Some airlines do provide additional accommodations when requests are made in advance of travel.
- Always have epinephrine auto-injector for quick access!

Management: Emergency Treatment of Anaphylaxis

- **Epinephrine:** drug of choice
  - Self-administered epinephrine readily available at all times
  - If administered, seek medical care IMMEDIATELY
  - Train patients, parents, contacts: indications/technique
- **Antihistamines:** secondary therapy only: WILL NOT STOP ANAPHYLAXIS
- **Written Anaphylaxis Emergency Action Plan**
  - Schools, spouses, caregivers, mature sibs / friends
- **Emergency identification bracelet**

![ANAPHYLAXIS EMERGENCY ACTION PLAN](image)
Accidents Are Never Planned

Emergency medications and a treatment plan must be immediately available and accessible at all times!

Management: Follow-Up

- Re-evaluate for tolerance periodically
- Interval and decision to re-challenge:
  - Type of food allergy (IgE vs non-IgE)
  - Severity of previous symptoms
  - Allergen/Prognosis (cow’s milk vs peanut)
- Ancillary testing
  - Skin prick test/in vitro specific IgE may remain positive
  - Decline in concentration of food specific-IgE is suggestive of development of tolerance

Hypoallergenic Infant Formulas for Cow’s Milk Allergy (CMA)

- **Soy based formulas** For IgE-CMA, soy co-allergy is 0-14%¹. For non-IgE CMA, soy co-allergy 0%² to 60%³.
- Partial hydrolysates (e.g. Good Start, Peptamin Jr, Pediasure Peptide) are not recommended for CMA
- **Extensively hydrolyzed formulas** (EHF) Alimentum, Nutramigen, Pregestimil: >90% tolerance in IgE-CMA
- **Elemental amino acid based formulas** (Neocate, Elecare, PurAmino): CMA,FPIES intolerant of EHF, EoE

Prevention

Food Allergy Prevention
• Exclusive breast feeding until 4-6 months of age
• No delay introducing highly allergenic foods (milk/dairy, egg, soy, wheat, fish/shellfish, peanut/tree nuts) beyond 4-6 months of age
• Introduce new food every 3 to 5 days; better at home and earlier in the day
• Would introduce allergenic foods after other solid foods tolerated

Peanut Introduction

Peanut Introduction Cont.
• Guideline #1: highest risk (severe eczema or egg allergy) should be tested and if appropriate introduce early
• Guideline #2: mild/moderate eczema should be introduced around 6 months of age; may do at home though evaluation may be considered
• Guideline #3: infants without eczema or food allergy; introduce freely into diet
New Therapies

- Immunotherapy (desensitization)
  - Sublingual
    - Allergen dissolved in a solution and placed under the tongue
    - Needs to be taken on a daily basis
    - Not as effective but less side effects compared to oral
    - Office visits every 2 weeks to escalate dose until maintenance dose obtained
    - Once maintenance dose obtained and on for 6 months, can consider low dose peanut challenge

- Oral
  - Allergen is administered slowly in small but steadily increasing doses until patient is desensitized (start with a few milligrams per day; 1 peanut kernel = 250mg of protein)
  - Administered in a controlled setting
  - Epicutaneous
  - Patch that is applied to skin daily
  - 250 microgram peanut patch: 50% of patients treated tolerated at least 1gm of peanut protein (4 kernels); 10x the dose that they tolerated in their entry challenge

Reasons for Allergist Involvement

- Known food allergy diagnosis for ongoing management and follow-up for possible development of tolerance
- When food-specific IgE level is undetectable in a child with a convincing history of an immediate-type food reaction
- When food-specific IgE levels indicate sensitization prior to the food being introduced
- Known diagnosis of a food allergy at risk for other food allergies e.g. egg allergy/eczema hi-risk for peanut allergy

- When an infant develops moderate to severe eczema refractory to management, or experiences an immediate reaction to a specific food
- Atopic families with, or expecting, a newborn who are interested in identifying risks for, and preventing, allergy.
- Child with peanut allergic sibling
- Evaluation of possible food allergies in eosinophilic esophagitis
My 10 year perspective

- Changing of food introduction guidelines (LEAP study)
- Introducing baked milk/egg into diet
- Component testing
- Flu vaccine with egg allergy
- New epinephrine auto-injectors/increased availability
- Sublingual/oral immunotherapy
- Patch immunotherapy developing

Summary and Conclusions

- IgE & non-IgE-mediated conditions exist
- The history is paramount
- Elimination diets, skin testing, in vitro assays, and food challenges also have roles in diagnosis
- Avoidance, education, and preparation for emergencies are the pillars of current management
- Periodic re-challenge to monitor tolerance as indicated by history, allergen, and level of food-specific IgE is an important part of ongoing follow-up

Questions?????