



FDA/NSTA Web Seminar:
Teach Science Concepts and Inquiry
with Food

Thursday, November 15, 2007

Food allergy



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Goals

- **Define “food allergy”**
- **Discuss mechanisms, prevalence and clinical presentation**
- **Discuss diagnosis and sensitivity**
- **Discuss management**
 - **Food label**
 - **Treatment**
 - **Prevention**



True or False:

Lactose intolerance is due to milk protein and is a true food allergy.

True	False

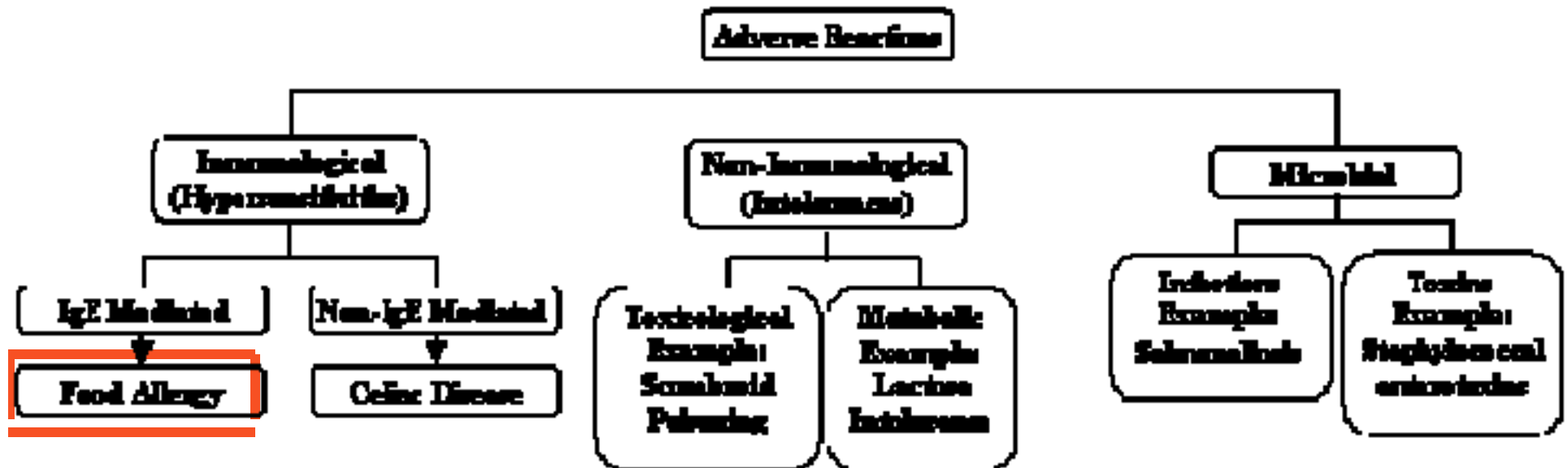


What is a “Food allergy”?

- “An immunological (IgE antibody-mediated) adverse reaction to a food”
- **Not all food reactions are allergies!**
- **1 in 5 people who claim to have a food allergy actually have one**



Adverse Reactions to Food



<http://www.cfsan.fda.gov/~dms/alrgn2.html#ii>



Celiac disease (or sprue):

- A) is a food hypersensitivity to gluten proteins from wheat, rye and/or barley
- B) involves mostly the small intestine
- C) is characterized by autoantibodies to transglutaminase proteins in the intestinal wall
- D) is the most common genetic disorder in humans
- E) All of the above



What differentiates a “Food allergy”?

- **“IgE-mediated adverse reaction to a food”**
- **Typical symptoms**
 - **Immediate (most begin w/in 1 hour)**
 - **Rapidly progressive and can be life-threatening!**
- **Foods/proteins commonly consumed in diet**
 - **US: peanut, soy, egg, milk,**
 - **Europe: ... sesame, mustard, celery**
 - **Japan: ... buckwheat**
- **Genetic AND environmental**



Food protein(1)/ pollen (2)

B cell

T cell

IgE

Antibody

Specific to food or pollen

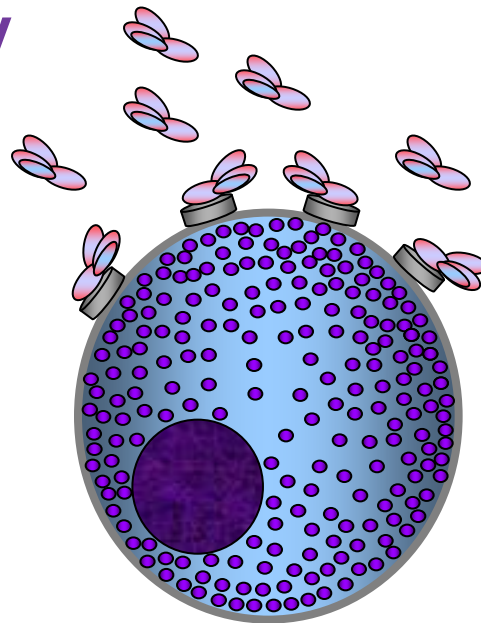
The diagram illustrates the interaction between a B cell and a T cell. The B cell is depicted as a green circle with a smaller green nucleus, while the T cell is an orange circle with a red nucleus. They are connected by a bridge of green and red wavy lines. Above them are yellow star-shaped particles representing antigens. Below the B cell, several Y-shaped pink and blue structures represent IgE antibodies. A red arrow points from the T cell towards the B cell, indicating the direction of interaction or signaling.



ALLERGY – Step 1 (Sensitization)

Priming

IgE
Antibody



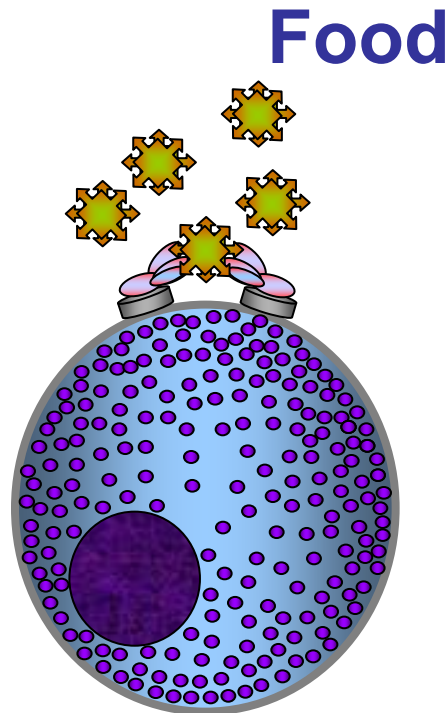
FcεR1
(IgE receptor)

Mast cell/ Basophil



ALLERGY – step 2 (Challenge)

Receptor crosslinking



Mast cell/ Basophil

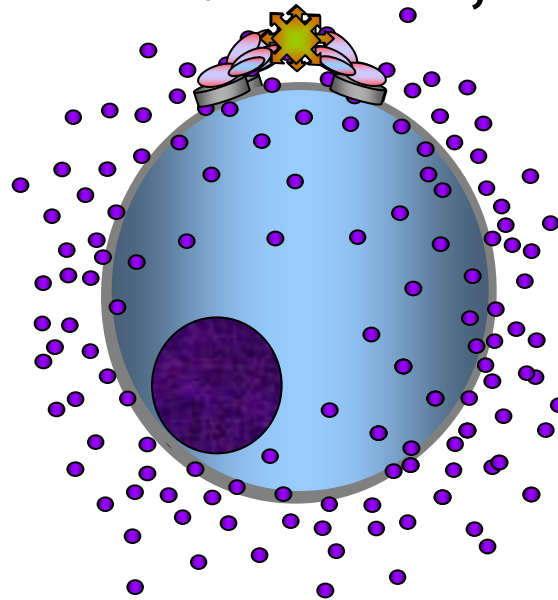


ALLERGY – step 3 (Elicitation)

Mediator release

Mediators: Histamine, leukotrienes, prostaglandins, cytokines, etc.

Effects: blood vessel leakage and dilation, smooth muscle contraction, nerve irritation, etc.



Mast cell/ Basophil



ALLERGY – step 3 (Elicitation)

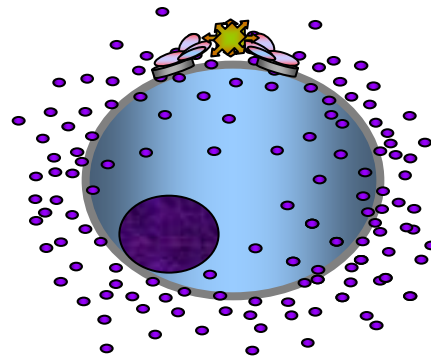
Symptoms

Skin- itchiness, flushing, hives, swelling, eczema

GI- nausea, vomiting, abdominal pain, diarrhea

Lung- runny nose, wheezing, throat closing/swelling

Circulation- dizziness, faintness, heart irregularities,
“sense of impending doom”, shock



Mast cell/ Basophil



ALLERGY – step 3 (Elicitation)

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Anaphylaxis !



Let's Pause for Two Questions.

Please type your questions on the chat



Food allergy prevalence

- Increase in prevalence over past 20 years
- 4% of total US population: Infants > adults

Food	Young children	Adults	Outgrown?
Milk	2.5%	0.3%	80%
Egg	1.3%	0.2%	60-70%
Peanut	0.8%	0.6%	20%
Tree nut	0.2%	0.5%	No
Fish	0.1%	0.4%	No
Shellfish	0.1%	2.0%	No
Other	6%	3.7%	

Sampson, J Allergy Clin Immunol 2004; 113:805-819



Food allergic reactions result in:

- A) 30,000 ER visits/ 500 hospitalizations/
10 deaths/yr**
- B) 30,000 ER visits/ 2,000 hospitalizations/
150 deaths/yr**
- C) 300,000 ER visits/ 20,000
hospitalizations/ 1,500 deaths/yr**
- D) 1,000,000 ER visits/ 50,000
hospitalizations/ 4,500 deaths/yr**

Sampson, Pediatrics 2003; 111:1601-8



Disorders associated w/ food allergy

- Crossreactivity phenomena:
 - **Pollen-food allergy syndrome**
 - Birch tree pollen \Rightarrow apple, plum, potato, carrot, hazelnut ...
 - Grass pollen \Rightarrow tomato ...
 - Ragweed pollen \Rightarrow melon ...
 - Latex allergy \Rightarrow kiwi, bananas, avocados ...
 - Insects (dust mites, cockroach) and shellfish (NOT iodine!)



Disorders associated w/ food allergy

- **Atopic dermatitis (Eczema)**
- **Occupational Asthma**
- **Chronic urticaria (hives)**
- **(Food-dependent) Exercise-induced anaphylaxis**
- **Allergic eosinophilic esophagitis/
gastroenteritis**



Disorders associated w/ food allergy

Controversial:

- **Migraine headaches**
- **Chronic fatigue**
- **Attention deficit disorder**
- **Autism**
- **Irritable bowel disease**
- **Crohn's disease**



Diagnosis and Testing

Observed history of reaction to food

AND

Positive skin prick test (SPT) or blood IgE test (RAST)* to food protein

AND/OR

☐ Positive oral food challenge



- **Other diagnostic tests:**
 - **Testing with fresh or raw food sample**
 - **Elimination diet (especially for chronic symptoms)**



True or False:

Diagnostic tests do not predict the severity of future allergic reactions.



Sensitivity and severity

- **Trace amounts of food can be harmful**
 - **Not true for most people!**
 - **Most allergic reactions are not life threatening**
- **Fatal reactions can occur in individuals with prior mild reactions**
- **H/O asthma ↑ risk for severe reaction**
- **Most US fatalities due to nuts**



What do we know about severe food allergic reactions?

- A) We can predict who is at risk**
- B) One's sensitivity to foods and reaction severity stay the same over time**
- C) Severe reactions are potentiated by exercise, alcohol and fatty foods**
- D) All of the above**

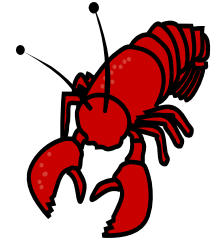


True or False:

Effective treatments are available for preventing food allergic reactions.



Management – laws and labeling



- No effective tx - Avoidance is key!

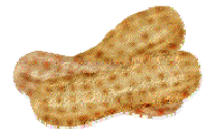
➤ Focus on food label:

Food Allergen Labeling and Consumer Protection Act of 2004 (FALCPA)



- Enacted by Congress; FDA enforces
- In effect January 1, 2006

❑ 8 major food allergens – peanut, tree nuts, fish, crustacean shellfish, egg, milk, soy, wheat



❖ These do not include all allergens!

- Also discusses “gluten-free”



FALCPA food label

- Deals only with intentionally added ingredients in packaged goods (includes flavors and processing aids)
- Does not deal with cross-contact issues in precautionary label statements (i.e. “may contain” “produced in a factory...”, etc.) or in restaurants, bakeries, etc.
- No threshold levels, so any minute amount is labeled; only exemption is highly refined oil



FALCPA food label examples:

1. Allergen following common or usual name of ingredient.

❖ “lecithin (soy),” “flour (wheat),” and “whey (milk)”

2. Allergen(s) in a “contains” statement.

❖ “**Contains Wheat, Milk, and Soy.**”

❖ For tree nuts, fish, shellfish, can list individual source, Ex: “**Contains walnut, salmon and crab**”, etc.

Note: FDA has tree nut list; currently includes 19 nuts, including coconut

<http://www.cfsan.fda.gov/~dms/alrguid4.html>



Let's Pause for Two Questions.

Please type your questions on the chat



Management- Allergic reaction

- ❖ **Initial mild symptoms may progress to severe anaphylaxis very rapidly!**

Anaphylaxis is likely w/:

- 1. Any H/O previous severe reaction**
- 2. Skin rash (e.g., hives, flushing) AND any GI, throat or respiratory uneasiness**
- 3. Isolated fainting or low blood pressure symptoms**



“Anaphylaxis” can involve:

- ✓ **Skin flushing**
- ✓ **Conjunctivitis**
- ✓ **Constricted airways in the lungs**
- ✓ **Severe lowering of blood pressure and shock**
- ✓ **Suffocation by swelling of the throat**
- **Any and all of the above**

What medical term describes this boy's lip?



- A) Eczema
- B) Angioedema
- C) Urticaria
- D) Schindler's syndrome





Management- Treating anaphylaxis

- ✓ **Epinephrine injector – May need two!**
 - **Epi-pen Jr (0.15mg): 33-66 lbs**
 - **Epi-pen (0.3mg): > 66 lbs**
- ✓ **Have patient lie down with legs raised and give fluids**
- ✓ **Antihistamines (e.g., Benadryl/ Claritin, preferably liquid)**
- ✓ **Treat asthma/wheezing with inhaler**
 - **May also give steroids (e.g., Prednisone) if available**



True or False:

Once the patient responds promptly to medications, the possibility for delayed allergic reactions (> 4 hrs) is still 10-20%.

True	False



Management -Prevention

- **Delayed introduction of allergens in infants until certain age (??)**
- **Hypoallergenic foods**
 - **Ex: Hydrolyzed milk infant formulas**
- **Probiotics or other “functional” foods (??)**



Management -Prevention

➤ School setting:

- **Education and training of personnel**
- **Identifying allergic individuals and risky food situations (e.g., class snack, birthday parties)**
- **Allergen-free schools (??)**



Helpful educational material

- **FDA Food allergen fact sheet**

<http://www.cfsan.fda.gov/~dms/ffalrgn.html>

- **Main FDA food allergen webpage**

<http://www.cfsan.fda.gov/~dms/wh-alrgy.html>

- **Anaphylaxis webpage (Academy of Allergy)**

<http://www.aaaai.org/patients/publicedmat/tips/whatisanaphylaxis.stm>

- **School Guidelines for Managing Students with Food Allergies (pdf)**

<http://www.foodallergy.org/school/SchoolGuidelines.pdf>

Thank You
FDA



<http://www.lluminate.com>

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