

## GASTROINTESTINAL COMPLAINTS IN FOOD ALLERGY:

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## Conflict of Interest Statement

- Consultant for Sunovion
- Research Support: Astra Zeneca

## Learning Objective

- Discuss the symptoms and signs associated with IgE-mediated, non-IgE-mediated and mixed IgE- and non-IgE-mediated food allergy involving the gastrointestinal tract

## ADVERSE FOOD REACTION

**FOOD AVERSION**

**IMMUNE MEDIATED  
(FOOD ALLERGY)**

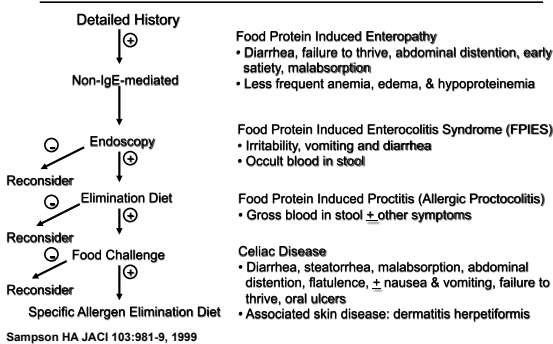
- IgE
- Non-IgE
- Mixed IgE & non IgE
- Cell Mediated

**NON-IMMUNE MEDIATED  
(FOOD INTOLERANCE)**

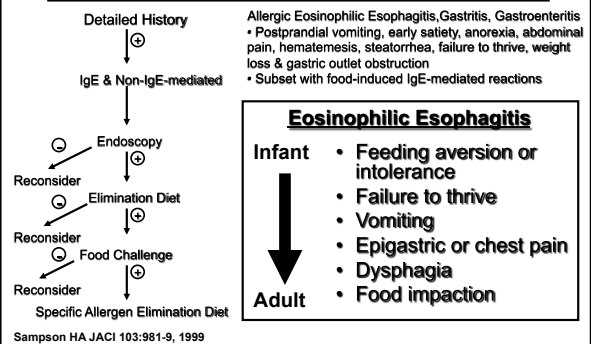
- Toxic
- Metabolic
- Pharmacologic
- Idiosyncratic
- Other

J ALLERGY CLIN IMMUNOL 2010;126:S1-S58

### DIAGNOSTIC APPROACH TO THE EVALUATION OF FOOD ALLERGY



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### "Normal" numbers of eosinophils in gastrointestinal tract

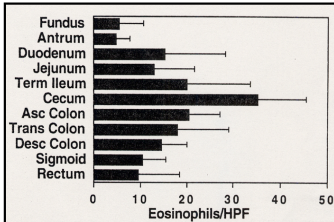


Figure 1. Mean mucosal eosinophil count/HPF and standard deviation for 11 medical examiner autopsy cases (mean age 5.6 yrs) according to anatomic site. The number of cases examined varied slightly between sites, as occasional sites were too autolyzed to count (n = 8, cecum; n = 9, duodenum; n = 10, jejunum, terminal ileum, ascending colon, descending colon; n = 11, gastric fundus and antrum; transverse colon, sigmoid colon, rectum). Mean and median eosinophil counts were similar.

Lowichik A, Weinberg AG. *Mod Path* 1996;9:110

### Eosinophilic Esophagitis in Children and Adults: A Systematic Review and Consensus Recommendations for Diagnosis and Treatment

GLENN T. FURUTA,<sup>1</sup> CHRIS A. LIACOURAS,<sup>2</sup> MARGARET H. COLLINS,<sup>3</sup> SANDEEP K. GUPTA,<sup>1</sup> CHRIS JUSTINICH,<sup>4</sup> PHIL E. PUTNAM,<sup>5</sup> PETER BONIS,<sup>6</sup> ERIC HASSALL,<sup>11</sup> ALEX STRAUMANN,<sup>10</sup> MARC E. ROTHENBERG,<sup>11</sup> and Members of the First International Gastrointestinal Eosinophil Research Symposium (FIGERS) Subcommittees

#### Diagnostic Guidelines

- Clinical symptoms of esophageal dysfunction
- $\geq 15$  Eosinophils in 1 high-power field
- Lack of responsiveness to high-dose proton pump inhibition (up to 2 mg/kg/day)

or

- Normal pH monitoring of the distal esophagus

Gastroenterology 2007;133:1342-1363

### Eosinophilic esophagitis: Updated consensus recommendations for children and adults

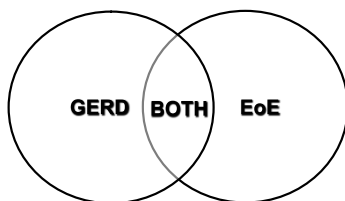
Chris A. Liacouras, MD, Glenn T. Furuta, MD, Ikuo Hirano, MD, Dan Atkins, MD, Stephen E. Attwood, MD, FRCS, FRCSI, MCh, Peter A. Bonis, MD, A. Wesley Burks, MD, Mima Chehade, MD, Margaret H. Collins, MD, Evan S. Dellon, MD, MPH, Ranjan Dohil, MD, Gary W. Falk, MD, MS, Nirmala Gonsalves, MD, Sandeep K. Gupta, MD, David A. Katzka, MD, Alfredo J. Lucendo, MD, PhD, Jonathan E. Markovitz, MD, MSCE, Richard J. Noel, MD, Robert D. Odze, MD, FRCP, Philip E. Putnam, MD, FAAP, Axel E. Richter, MD, FACP, MACC, Yvonne Romero, MD, Eduardo Ruchelli, MD, Hugh A. Sampson, MD, Alain Schoeffer, MD, Nicholas J. Shaheen, MD, MPH, Scott H. Sicherer, MD, Stuart Spechler, MD, Jonathan M. Spergel, MD, PhD, Alex Straumann, MD, Barry K. Wershil, MD, Marc E. Rothenberg, MD, PhD,\* and Seema S. Aceves, MD, PhD\* *Astoria and Denver, Colo; Milwaukee, Wis; Cincinnati, Ohio; Rochester, Minn; Philadelphia, Pa; Basel and Lausanne, Switzerland; Chapel Hill and Durham, NC; Boston, Mass; Chicago, Ill; San Diego, Calif; New York, NY; Indianapolis, Ind; Tomelloso, Spain; Greenville, SC; and North Shields, United Kingdom*

J Allergy Clin Immunol. 2011 Jul;128(1):3-20.e6; quiz 21-2. Epub 2011 Apr 7. Review

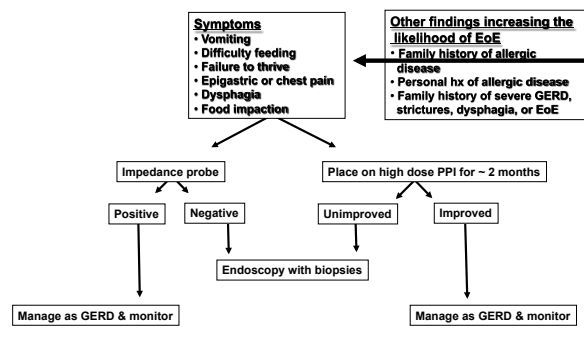
### EoE: General Features

- Can present at any age
- Similar genotypic abnormalities are noted in children and adults
- Predominantly occurs in males (>70%)
- More common in Caucasians, but not restricted by race
- Presentation often more dramatic in children than adults
- No pathognomonic features have been identified
- Symptoms may not correlate with histology

### GERD, EoE OR BOTH?



### Algorithm for the Diagnosis and Management of Eosinophilic Esophagitis



## Endoscopic Findings in EoE

Linear furrowing, vertical lines of the esophageal mucosa

White exudates, white specks, nodules, granularity

Circular rings, transient or fixed

Fox V et al. *Gastrointest Endo* 2003;57:30-36  
 Desai T et al. *Gastrointest Endo* 2005;61:795  
 Straumann A et al. *Gastrointest Endo* 2003; 57:407  
 Gonsalves N, et al. *Gastrointest Endosc* 2006;64:313-9

## Endoscopic Findings in EoE

### Impaction

- Common in untreated adult patients (1/3 require bolus removal)
- » 30-54% of adults presenting for food impaction had EoE

Desai et al, *Gastrointest Endosc* 2005

### Other concerns

#### Small caliber esophagus

Linear shearing/crepe paper mucosa with passage of endoscope or dilator

Gonsalves N, et al. *Gastrointest Endosc* 2006;64:313-9

## Histology

### Normal Esophagus

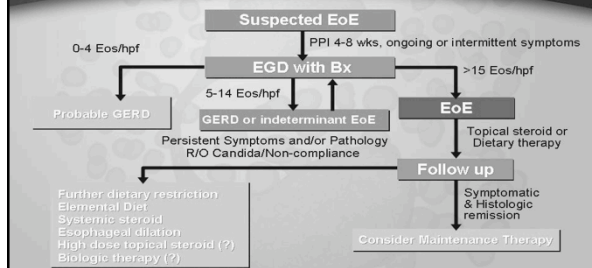
- Stratified squamous epithelium
- Rete papillae
- Basal zone

### EoE

- Basilar hyperplasia
- Rete peg elongation
- Eosinophilic infiltration with degranulation
- Eosinophilic abscesses

Fox VL et al. *Gastrointest Endosc* 2002; 56: 260

## Suggested Algorithm for Management of Eosinophilic Esophagitis



Gonsalves N, Ditto A, Hirano I. Eosinophilic Esophagitis. In: Leslie Grammar and Paul Greenberger. *Patterson's Allergic Diseases* 7th edition. Philadelphia: Lippincott, Williams and Wilkins 2008.

## IMMEDIATE HYPERSENSITIVITY

### Symptoms

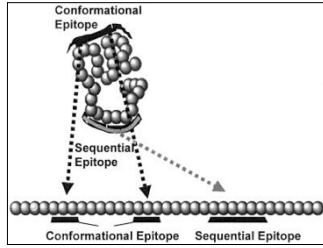
- Cutaneous
  - Flushing, hives, angioedema, eczema
- GI
  - Oropharyngeal pruritus and edema, abdominal cramping, nausea, vomiting, diarrhea
- Pulmonary
  - Rhinitis, laryngeal edema, wheezing, coughing & shortness of breath
- Cardiovascular
  - Hypotension, tachycardia, arrhythmias
- Neurological
  - Loss of consciousness
- Behavioral
  - Irritability (preceding or in combination with other symptoms)

## FOOD ALLERGEN CHARACTERISTICS

### CLASS 1 FOOD ALLERGENS

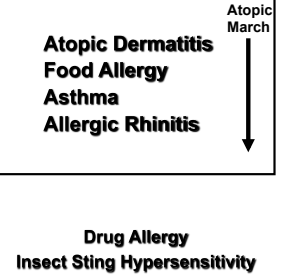
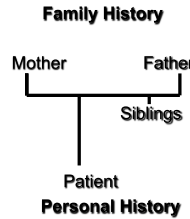
- Water-soluble glycoproteins
- Molecular weights ranging from 10,000-70,000 daltons
- Resistant to
  - Heat
  - Changes in pH
  - Proteases
- Several have been identified, isolated, sequenced and cloned
- Linear and/or conformational epitopes identified

## LINEAR VS CONFORMATIONAL EPITOPES

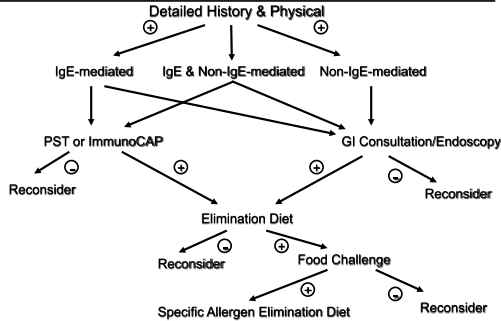


Sampson HA. JACI 113:805-19, 2004

## HISTORY OF ALLERGIC DISEASE



## DIAGNOSTIC APPROACH TO THE EVALUATION OF FOOD ALLERGY



Sampson HA JACI 103:981-9, 1999

## SUSPECTED FOODS

- **Route of exposure**
  - Ingestion | Contact | Inhalation | Injection
- **Amount ingested**
  - Minute | Small | Medium | Large
- **Manner of preparation**
  - Raw | Cooked | Both
  - Plain | Spices | Mixed with other foods | Preservatives | Dyes
- **Simultaneously ingested foods**
  - None | Few | Multiple
- **Illness in others ingesting the same food**
- **Review of current diet**
  - Which of the simultaneously ingested foods have been eaten again without reaction?
  - Patients are sometimes eating the food to which they think they are allergic as an ingredient in another food.

## COMMON FOOD ALLERGENS

- Young children to food ingestion
  - Milk
  - Egg
  - Soy
  - Wheat
  - Peanut
- Adolescents/Adults
  - Peanut
  - Tree nuts
  - Fish/Shellfish

## DESCRIPTION OF REACTIONS

- Timing of onset in relation to food ingestion
- Symptoms
- Severity
- Duration of reaction
- Treatment of reaction
- Reproducibility of reaction after ingestion of suspected food
- Most recent reaction

### Duration of Reactions

- Dose, emesis, treatment
- Mild to moderate reactions are usually hours long
- Biphasic reactions are rare, but concerning
- Prolonged reactions are extremely rare
  - Hives lasting for days are rarely food-driven without other evidence to suggest food as the cause

### Reasons for lack of reproducibility

- Not IgE-mediated food allergy
- Focused on wrong food as cause
- Cross contamination with another food
- Food allergen denatured by cooking
- Added spice rather than the food
- Need another trigger such as exercise

## Clinical Relevance of Food Cross-reactivity

If Allergic to:	Risk of Reaction to at Least One:	Risk:
A legume*	Other legumes	5%
A tree nut	Other tree nuts	37%
A fish*	Other fish	50%
A shellfish	Other shellfish	75%
A grain*	Other grains	20%
Cow's milk*	Beef	10%
Cow's milk*	Goat's milk	92%
Cow's milk*	Mare's milk	4%
Pollen*	Fresh vegetables	55%
Peach*	Other Rosaceae	55%
Melon*	Other fruits	92%
Latex*	Fruits	35%
Fruits	Latex	11%

Sicherer SH. JACI 2001;108:881

## Pollen-Food (Oral Allergy) Syndrome

### Patients

- Occurs in certain pollen allergic patients

### Mechanism

- Primary sensitization to pollen with subsequent reaction to cross-reacting allergens in fruits and vegetables

### Symptoms

- Symptom onset during or soon after food ingestion
- Pruritus & edema of lips, tongue and palate
- Systemic symptoms can occur

### Laboratory

- Prick to prick skin tests or skin tests with fresh extracts of implicated foods are positive

### Treatment

- Avoidance with severe symptoms
- Patients usually tolerate same fruit or vegetable when cooked

## FOOD-DEPENDENT EXERCISE- INDUCED ANAPHYLAXIS

- Anaphylaxis with exercise following specific food ingestion
  - Ingestion of food without exercise → no reaction
  - Exercise without ingestion of the specific food → no reaction
  - Specific food ingestion followed by exercise → ANAPHYLAXIS
- In rare cases occurs with exercise following the ingestion of any meal
- Variety of foods implicated: shellfish, fish, wheat, celery, fruit, mushroom
- Patients
  - Typical age adolescence through late 30's
  - Females outnumber males
- Mechanism unclear

## SOMETIMES IT'S NOT THE FOOD

### OTHER CAUSES

- Viral illness
- Medications
- Contaminant
  - Toxin
  - Other food
  - Spice
  - Preservative
  - Mites
  - Latex
  - Antibiotic
- Other allergen exposure
- Psychological factors

### Patient factors

- Complicating medical issues
  - Asthmatic
  - On medication that might interfere with response to treatment
    - $\beta$ -blocker
- Food allergy
  - Peanut or tree nut sensitive
- Level of sensitivity
  - Previous reaction patterns
    - Target organ
    - Life-threatening
- Maturity/psychosocial issues

+

### Event factors

- Food involved
  - Peanuts, tree nuts
- Route of exposure
  - Contact, inhalation, ingestion, injection
- Dose
- Target organ system
  - Pulmonary, cardiovascular, GI, cutaneous
- Treatment
- Response to treatment

Severity of reaction

## FATALITIES DUE TO ANAPHYLACTIC REACTIONS TO FOODS

Bock SA, et al. JACI 2001;107:191-3 (update JACI 2007;119:1016-18)

- Analyzed 32 cases reported to national registry
- Identified food
  - Peanut: 20 cases
  - Tree nuts: 10 cases
  - Milk & fish: 1 case each
- Both sexes equally affected (16 F/16M)
- Most were adolescents or young adults (r: 2-32 years)
- Previous knowledge of food allergy- all, but one
- Most reactions occurred outside of the home (27/32)
- Asthmatics at higher risk
  - 24 of 25 with complete data had asthma
- Lack of availability of epinephrine at the time of the reaction (4/32 had epinephrine available)
  - 4 who received epinephrine in a timely fashion still died



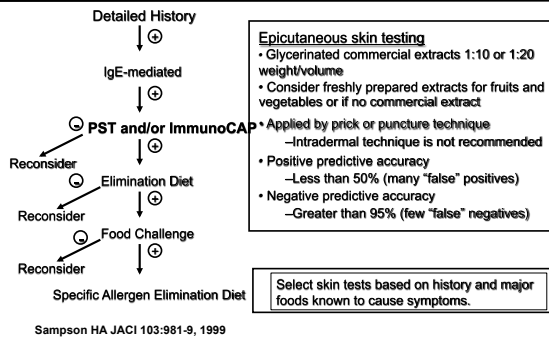
## HISTORY: SUMMARY

- Correlates poorly with the outcome of food challenges
  - Certain features of the history can likely significantly improve the correlation (family and personal history of allergic disease, timing of onset, symptoms, reproducibility, etc)
- Unreliable predictor of severity of subsequent reactions
  - Those at high risk of severe reactions
    - Asthmatics
    - Patients with previous history of severe reaction
    - Adolescents and young adults
- May aid in prediction of tolerance, particularly when combined with other information
  - Recent significant exposure without a reaction

## Sensitization versus Clinical Reactivity

- **Sensitization**
  - Presence of food-specific IgE detected by skin testing or *in vitro* testing (FEIA)
  - Overestimates prevalence
- **Clinical reactivity**
  - Evidence of symptoms upon exposure to a food
    - History
    - Challenge

## DIAGNOSTIC APPROACH TO THE EVALUATION OF FOOD ALLERGY



## RATIONALE FOR PRICK SKIN TESTING WITH FRESHLY PREPARED EXTRACTS

- Instability of selected fruit and vegetable allergens
- Lack of available commercial extract
- Check negative results obtained with a commercial extract in a patient with highly suggestive history
- Detection of unexpected ingredient
- Direction for further evaluation
- Caution: not standardized

## PRICK SKIN TESTING

Spork R, et al, Clin Exp Allergy 2000; 30: 1540-6

- 467 infants and children (median age 3 yrs) referred to center over 9 yrs (1989-98)
- Prick skin testing to milk, egg, peanut
- 555 open food challenges

### Results

- Positive challenge was always seen when STP was above a certain size
  - Milk & Peanut > 8 mm
  - Egg > 7 mm
- In children < 2 yrs SPT sizes were smaller
  - Milk > 6 mm
  - Egg > 5 mm
  - Peanut > 4 mm

## Spork R, et al, Clin Exp Allergy 2000; 30:1540-6

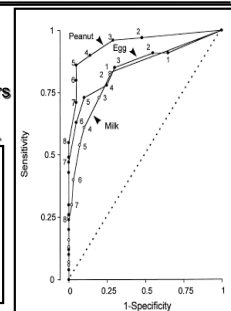
Receiver operating characteristic (ROC) curves for skin wheal diameter in predicting a positive food challenge for milk, egg, and peanut. The numbers on the curves represent the corresponding skin wheal diameters in mm.

Sampson JACI 1988;82:718-26

3 mm diameter skin test

	Sensitivity	Specificity
Milk	96% 74	51% 79
Egg	98% 84	53% 70
Peanut	90% 96	29% 71

Spork Study



**Guidelines for the Diagnosis and Management of Food Allergy in the United States: Report of the NIAID-Sponsored Expert Panel**

J ALLERGY CLIN IMMUNOL  
VOLUME 124, NUMBER 6

**Skin prick testing (SPT)**

- Safe and useful for diagnosis of IgE-mediated food allergy
- Reagents and methods are not standardized
- Intradermal testing not indicated
- Positive SPT correlates with the presence of allergen-specific-IgE bound to the surface of cutaneous mast cells.
- Compared with oral food challenges they have low specificity and low positive predictive value for making an initial diagnosis of FA.
- The larger the mean wheal provoked, the more likely that a food allergen will be of clinical relevance

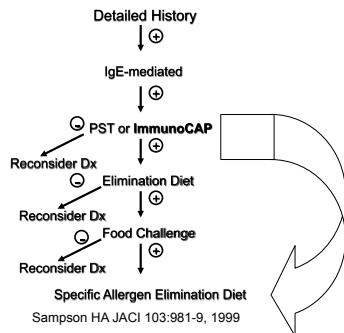
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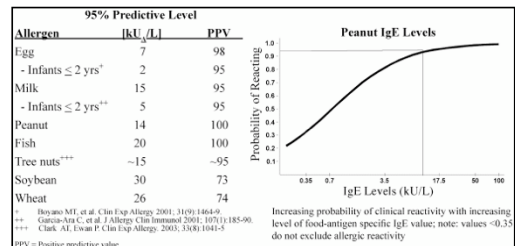
**SPT (continued)**

- When diagnosing OAS, or in cases where SPT with commercial extracts do not correlate with the clinical histories, the SPT technique with fresh or native foods, especially fruits and vegetables, may prove more sensitive.
- Negative skin test in face of highly suggestive history- consider medically supervised food challenge
- Quality of evidence : Moderate
- Contribution of expert opinion: Significant

**DIAGNOSTIC APPROACH TO THE EVALUATION OF FOOD ALLERGY**



**IMMUNOCAP  
PROBABILITY OF REACTING TO A FOOD AT A GIVEN IGE VALUE**



Sampson HA. JACI 113:805-19, 2004

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**Allergen-specific serum IgE**

- Useful for diagnosis of IgE-mediated food allergy, but not diagnostic
- "Cutoff" levels, defined at 95% predictive values may be more predictive than SPTs of clinical reactivity in certain populations
- Fluorescence-labeled antibody assays have comparable sensitivity to that of SPT
- Different assays yield variable results
- Absolute levels of sIgE may directly correlate with the likelihood of clinical reactivity when compared with OFC

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**Allergen-specific serum IgE**

- Predictive values vary among studies
  - Patient selection (patients' ages)
  - Clinical disorder studied
  - Length of food avoidance
- Negative test in face of highly suggestive history- consider medically supervised food challenge
- Quality of evidence: Moderate
- Contribution of expert opinion: Significant

## TYPES OF ELIMINATION DIETS

### Basic Concepts

- Remove food
  - Symptoms resolve if food-related
  - Symptoms remain if not food-related
- Monitor diet for nutritional adequacy
- Duration of diet depends upon disease and nutritional adequacy of diet
- Diets

- Limited elimination diet
  - High suspicion foods
  - Skin test or ImmunoCAP positive foods
- Oligoantigenic diets
  - Foods for diet selected on basis of low likelihood of allergenicity
  - Useful when large number of foods are suspected
- Elemental diet
  - Hypoallergenic formula (amino acid based formula)
  - May add few "safe" foods
  - Useful when large number of foods suspected or for infants on no solids
  - Poor compliance outside of infancy

## FOOD CHALLENGES

- Types
  - Open
  - Single-blind
  - Double-blind placebo-controlled- "gold standard"
- Must be performed in appropriate setting with adequate medical support
- Selection of patients
  - Decide question to be answered
- Selection of initial dose
  - Based on history
  - Final dose (if no reaction) is open ingestion of normal portion of the food
- Time interval between challenge doses
  - Based on history
- Goal
  - Document sensitivity or lack thereof



## FOOD CHALLENGES

- Perry, TT, et al. Risk of oral food challenges. JACI 2004; 114:1164-8.
  - Retrospective chart review of children challenged to milk, egg, wheat, soy and peanut over 7 year period
  - Risk is reasonable when performed by experienced physician in a properly equipped medical setting
- Cafarelli C, Petroccione T. False-negative food challenges in children with suspected food allergy. Lancet 2001 358:1871
  - False negative ~3%
  - False positive < 1%

## TREATMENT: PATIENTS AND CARETAKERS

- Recognition of early signs and symptoms
- How and when to give epinephrine (written plan)
- Administration of liquid or chewable antihistamine
- Ambulance to emergency room

## ANAPHYLAXIS ACTION PLAN

<b>Food Allergy Action Plan</b> Student's Name: _____ Teacher: _____ ALLERGENY TO: _____ Additional: Yes <input type="checkbox"/> No <input type="checkbox"/> *Highly risk for severe reaction		Place Child's Name Here																											
<b>STEP 1: TREATMENT</b> Symptoms: <table border="0" style="width: 100%;"> <tr> <td>• If a food allergen has been ingested, but no symptoms:</td> <td><input type="checkbox"/> Epipen</td> <td><input type="checkbox"/> Antihistamine</td> </tr> <tr> <td>• Mouth: Swelling, tingling, or soreness of lips, tongue, mouth</td> <td><input type="checkbox"/> Epipen</td> <td><input type="checkbox"/> Antihistamine</td> </tr> <tr> <td>• Skin: Hives, itching, swelling of the face or extremities</td> <td><input type="checkbox"/> Epipen</td> <td><input type="checkbox"/> Antihistamine</td> </tr> <tr> <td>• Gut: Nausea, abdominal cramps, vomiting, diarrhea</td> <td><input type="checkbox"/> Epipen</td> <td><input type="checkbox"/> Antihistamine</td> </tr> <tr> <td>• Throat: Tightening of throat, hoarseness, hoarse cough</td> <td><input type="checkbox"/> Epipen</td> <td><input type="checkbox"/> Antihistamine</td> </tr> <tr> <td>• Lungs: Shortness of breath, wheezing, coughing, wheezing</td> <td><input type="checkbox"/> Epipen</td> <td><input type="checkbox"/> Antihistamine</td> </tr> <tr> <td>• Heart: Throbbing pulse, low blood pressure, dizziness, fainting</td> <td><input type="checkbox"/> Epipen</td> <td><input type="checkbox"/> Antihistamine</td> </tr> <tr> <td>• Other: _____</td> <td><input type="checkbox"/> Epipen</td> <td><input type="checkbox"/> Antihistamine</td> </tr> <tr> <td>• If reaction is progressing toward the above uses of epipen, give _____</td> <td><input type="checkbox"/> Epipen</td> <td><input type="checkbox"/> Antihistamine</td> </tr> </table> *Amount of epinephrine can quickly change if necessary (to emergency). Epipen: _____ Antihistamine: _____ Other: give _____			• If a food allergen has been ingested, but no symptoms:	<input type="checkbox"/> Epipen	<input type="checkbox"/> Antihistamine	• Mouth: Swelling, tingling, or soreness of lips, tongue, mouth	<input type="checkbox"/> Epipen	<input type="checkbox"/> Antihistamine	• Skin: Hives, itching, swelling of the face or extremities	<input type="checkbox"/> Epipen	<input type="checkbox"/> Antihistamine	• Gut: Nausea, abdominal cramps, vomiting, diarrhea	<input type="checkbox"/> Epipen	<input type="checkbox"/> Antihistamine	• Throat: Tightening of throat, hoarseness, hoarse cough	<input type="checkbox"/> Epipen	<input type="checkbox"/> Antihistamine	• Lungs: Shortness of breath, wheezing, coughing, wheezing	<input type="checkbox"/> Epipen	<input type="checkbox"/> Antihistamine	• Heart: Throbbing pulse, low blood pressure, dizziness, fainting	<input type="checkbox"/> Epipen	<input type="checkbox"/> Antihistamine	• Other: _____	<input type="checkbox"/> Epipen	<input type="checkbox"/> Antihistamine	• If reaction is progressing toward the above uses of epipen, give _____	<input type="checkbox"/> Epipen	<input type="checkbox"/> Antihistamine
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<b>STEP 2: EMERGENCY CALLS</b> 1. Call 911 (or Rescue Squad) _____ Note that an allergy reaction has been treated, and additional instructions may be needed. 2. In _____ 3. Emergency contacts: Name (Number) _____ 4. _____ ( ) _____ 5. _____ ( ) _____ 6. _____ ( ) _____																													
IF ANY PARENTS/CAREGIVERS CANNOT BE REACHED, DO NOT HESITATE TO MEDICATE OR TAKE CHILD TO MEDICAL FACILITY. Parent/Caregiver Signature: _____ Date: _____ Doctor's Signature: _____ Date: _____																													
<b>TRAINED STAFF MEMBERS</b> 1. _____ Room: _____ 2. _____ Room: _____ 3. _____ Room: _____																													
<b>EPIPEN AND EPIPEN-JR. DIRECTIONS</b> • Pull off gray activation cap.  • Hold black tip near outer thigh (always apply to thigh).  • Swing and jab firmly into outer thigh until Auto-Injector mechanism functions. Hold in place and count to 10. Remove the Epipen unit and massage the injection area for 10 seconds. • Once Epipen is used, call the Rescue Squad. Some additional epinephrine may be needed. Take the used unit with you to the Emergency Room. Plan to stay for observation at the Emergency Room for at least 4 hours. For children with multiple food allergies, consider providing separate action plans for different foods. <small>*Epinephrine should be kept from the Administration of Emergency Treatment Area provided to the Home Care Center of Children, Food and Nutrition.</small>																													

## TREATMENT: MEDICAL PERSONNEL

- Assess rapidly and provide supportive care
- Medications:
  - Oxygen
  - Epinephrine
  - IV Fluids
  - Antihistamines
  - Bronchodilators
  - Steroids
- Pay attention to factors that might inhibit response to treatment
- Observe for relapse
- Provide prescription for auto-injectable epinephrine device
- Arrange follow-up care



### **TREATMENT: FOLLOW-UP VISIT AFTER ALLERGIC REACTION**

- Monitor response to treatment
- Review circumstances surrounding the reaction
- Review effectiveness of Food Allergy Action Plan
  - Make necessary alterations
- Provide emotional support

### **LONG TERM MANAGEMENT**

- Follow-up visits at appropriate intervals
- History
  - Determine frequency & specifics of reactions
  - Exposure to offending foods without a reaction?
  - Review current diet
  - Development of allergies to other foods?
  - Routinely carrying treatment medications?
  - Impact of food allergy on quality of life?
  - Development of other allergic disease (asthma)?

### **LONG TERM MANAGEMENT**

- Physical examination
  - Appropriate weight gain
  - Findings suggestive of new allergic disease or other disease
- Laboratory data
  - Skin testing?
  - ImmunoCAP?
  - Other testing suggested by history?

### **LONG TERM MANAGEMENT**

- Management
  - Reinforce need to carry medications at all times and review use of medical devices (epinephrine auto-injector, inhaler if asthmatic)
  - Food challenge indicated by history and/or lab results?
  - Aid in interactions with school and community
  - Answer questions
  - Suggestions regarding impact on quality of life
  - Is referral indicated
    - Allergist
    - Gastroenterologist
    - Dietician
    - Psychosocial clinician