Food Allergy

Definitions:
- Food Allergy: an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food.
- Food allergens: specific components of food recognized by allergen-specific cells and elicit specific immune reactions resulting in characteristic symptoms.
Food Allergies and Anaphylaxis

- Food allergy affects 8% of US children and prevalence is increasing
- Peanut allergy has more than tripled in the past 2 decades
- Food reactions have become more severe and are the leading cause of emergency visits for anaphylaxis (a life-threatening condition)
- 1:13 school-age children have food allergies requiring care plans and action plans
- 16-18% of school-aged children experience food allergic reactions in schools
- 25% of anaphylaxis in schools occur in students/staff with no prior history of allergy

Food Allergy Presentation

Cutaneous
- Flushing, hives, angioedema, eczema

Gastrointestinal
- Abdominal cramping, nausea, vomiting, diarrhea

Respiratory
- Rhinitis, laryngeal edema, wheezing, coughing

Cardiovascular
- Hypotension, tachycardia, arrhythmias

Central Nervous System
- Lightheadedness, syncope

Food Allergens

Children
- Milk
- Egg
- Peanut
- Soybean
- Wheat
- Tree nuts
- Fish
- Shellfish

Adults
- Peanut
- Tree nuts
- Fish
- Shellfish
Natural History

- Milk, egg, wheat, and soy allergy
  - Majority resolve by school age
  - Many milk/egg allergy lasting longer into second decade—some do not develop tolerance
  - Declining/low levels of specific IgE predictive of tolerance
  - High likelihood of developing further allergic disease: other foods
    - >35%; allergic rhinitis; >90%; asthma 50 – 90%
- Peanut, tree nuts, fish, shellfish
  - Usually lifelong
  - 20% of young children outgrow peanut
  - 9% of tree nuts outgrown

Prevention

- In response to outcome studies, the AAP recommended in 2000 that parents refrain from feeding peanuts to infants at risk for atopic disease until age 3
- Number of cases of peanut allergy continued to rise—researchers/clinicians questioned this advice
- In 2008, the AAP retracted its recommendation due to insufficient evidence to call for early avoidance
  - Du Toit et al. reported that prevalence of peanut allergy in Jewish children in London was 10 times higher as among Jewish children in Israel who had consumed peanut products before their 1st birthday

LEAP (Learning Early About Peanut Allergy)

- Hypothesized that early introduction of peanut products would lead to prevention of peanut allergy
- 640 infants age 4-11 months at high risk for peanut allergy (eczema and/or egg allergy) randomized to receive peanut products or avoidance until 5 yrs. of age
- Cohorts: consumption and avoidance groups, skin test negative and skin test positive patients
- Consumption group fed 6 gms peanut protein/week (2 gms 3x/weekly)
- Overall prevalence of peanut allergy in avoidance group was 17.2% compared to only 3.2% in consumption groups (near 80% decrease in risk)
Questions Raised

- Does the results of LEAP apply to all societies and cultures?
- Do the protective effects of feeding peanuts early persist (tolerance)
- Should other high allergen foods be introduced early to ALL infants?
- What infants/children should see an allergist before early introduction?

Recent NIAID Addendum Guidelines

- Guideline 1: Severe eczema, egg allergy or both - strongly consider eval, peanut by blood and/or skin prick test and if necessary oral challenge, based upon test results introduce peanut containing foods at 4-6 months
- Guideline 2: Mild-to-moderate eczema - introduce peanut containing foods around 6 months
- Guideline 3: No eczema or any food allergy - introduce peanut containing foods - age appropriate and in accordance with family preferences/cultural practices
  
  Togias et al. J Allergy Clin Immunol, January 2017

Feeding Options: Home introduction of peanut protein

- Two gms of peanut protein/serving (3x weekly)
- Thinned smooth peanut butter - measure 2 tsp peanut butter = 2 gm, add 2-3 tsp. hot water, stir until dissolved, let cool
- Peanut butter puree - 2 tsp peanut butter, add 2-3 tsp pureed tolerated fruit or vegetable
- Bamba (Israel) - 21 pieces = 2 gm of peanut protein - infants < 6 months soften w/ 4-6 tsp water, for older infants unmodified Bamba can be fed
Management: Emergency Treatment of Anaphylaxis

- Epinephrine: drug of choice
- Have 2 doses of self-injectable epinephrine available as 12% of children, 17% of adults require >1 dose
- Emergency transport to hospital to monitor for possible biphasic (late phase) anaphylaxis
- Antihistamines: WILL NOT STOP ANAPHYLAXIS
- Written Anaphylaxis Emergency Action Plan
- Emergency identification bracelet

Avoidance Management Strategy (AMS)

- Food allergy guidelines-recommendations: strict avoidance and treatment of systemic reactions with injectable epinephrine (AMS)
- AMS creates burdens for many affected children and their families
- Difficulty of implementing AMS in schools and social environments
- Despite present management, many families have suboptimal knowledge of how to avoid and treat food allergy emergencies

Realistic concerns over AMS

- Accidental exposure to PN occurs in many allergic children in 5 year period (hidden allergens or cross-contamination)
- >70% resulted in moderate to severe reactions
- Auto-injectors not carried when prescribed
- Available epinephrine auto-injectors often not used when indicated
- Highest risk population: teenagers and young adults (refusal to carry and unsafe behavior)

Current/Future Therapies for Food Allergy

- Oral immunotherapy (OIT) for milk, egg, peanut, multiple food combinations
- Sublingual immunotherapy (SLIT)
- Epicutaneous (patch) immunotherapy for milk, peanut
- OIT with baked milk, egg for milk and egg allergy
- Chinese Herbal Formula (FAHF-2)


Oral Immunotherapy (OIT) to Foods

- Alexander the Great would desensitize by ingesting small amounts of poisons before going into battle
- First report of successful oral desensitization was published in 1908 (to egg)
- Over past two decades 200 articles and many clinical studies have been published on OIT
- More and more allergists (50+) performing OIT in their practice
- Gaining wider acceptance in US and worldwide as a safe and highly effective treatment
**OIT Process**

- Mixing the allergenic food in a vehicle and ingesting in gradually increasing doses
- Protocols vary considerably – both in terms of dosing, frequency, duration of therapy and type of food used
- Materials can be purchased at local food stores/online, while those performing clinical research with OIT often obtain investigational new drug (IND) approval with FDA oversight
- OIT protocols typical have a dose escalation, build-up and home-maintenance phase

**Peanut Protocol: Escalation, Build-up and Maintenance**

- Initial escalation day – Beginning with 0.1 mg of PN protein consumed, dose increases every 30 min (maximum 6 mg)
- Patients take tolerated dose at home once daily
- Build-up phase: return every 2 weeks for updosing
- Current maintenance dose: 5-10 peanuts (1-2 gm of PN protein) or 8-12 peanut M&M’s
- Maintain top dose for 6 months and return for retesting and, if indicated, a peanut challenge

**OIT: Experience to date**

**New England Food Allergy Treatment Center**

- Treatment period: 2010-2018, ongoing
- > 1000 peanut allergic patients treated
- Treatment with tree nuts, individual and multi-nut, milk, egg, sesame
- Age 4-45 yrs, median age 9 yrs, now treating children age 2-4 based upon data on safety/efficacy/tolerated unresponsiveness (tolerance)
- Safety issues addressed and acceptable adverse affect profile
- ~90% successfully desensitized – consuming 3-10 (600-2000 mg) peanuts daily
**Patient Commitment**

- Duration of visits (initial day 6 hours, subsequent 1 hour visits)
- Daily diaries to be completed by parent/patient
- Each visit: baseline vital signs, patients are examined, interval history obtained, diary information reviewed
- Doses prepared and sent home in parfait cups and storage containers
- Duration of desensitizing process 10-12 months

**Quality of Life Study**

- 100 patients 5-18 years of age enrolled in open IRB approved trial of PN OIT
- Measures of food-allergy specific quality of life using surveys pre- and post-treatment (maintenance)
- Parameters studied included emotional impact, food-related anxiety, social and dietary limitations and risk of accidental exposure


**QOL Study Results**

- First published study showing statistically significant benefit of PN OIT on food allergy quality of life
- Improvement seen in all parameters where parents assessed children 5-12 years old
- Teenager self-assessment included and their quality of life greatly improved as well
- 90% patients achieved maintenance dose of 2½ peanuts (3 peanut M and M)
Adverse Reactions

- Side effects not uncommon, GI in 62%, cutaneous in 22% and respiratory in 10%
- Systemic reactions ~ 10% of patients, epinephrine has been required
- Most common symptoms - itchy mouth and throat, abdominal pain/hiccup/heartburn complaints
- Similar findings during build-up and maintenance phases
- < 1% of patients developed eosinophilic esophagitis, a uncommon complication of OIT

EPIT (The 'Patch')

- Epicutaneous immunotherapy application of an allergen containing patch designed to activate skin Langerhan cells resulting in systemic down-regulation
- Viaskin device produced by DBV Technologies
- Adverse effects not uncommon occurring in majority of actively treated - local erythema/eczema
- Recent clinical trial with peanut EPIT showed modest efficacy (46%) in younger children (4-11yrs), not that effective in older children
OIT Summary

- OIT to PN and to other foods can be performed safely and successfully outside research setting
- OIT improves quality of life
- Recommend dedicated treatment facility
- Very low risk of eosinophilic esophagitis
- Acceptable rate of local and systemic reactions and a high efficacy rate
- Long-term data on safety/efficacy not known

Food Allergies in Schools: Topics for Discussion

- How do we keep students safe and included throughout their educational experience?
- Peanuts in schools: To ban or not to ban? If not, are peanuts, tree nuts served at your schools?
- Are your classrooms peanut tree-free?
- Is bullying a common occurrence in your school?
- What is the role, if any, of antihistamines (e.g., benadryl) in the management of anaphylaxis?
- How many of your schools routinely do 504 Plans for students with food allergies?
### Key Developments in US for Management of Food Allergies in Schools

- Food Allergy & Anaphylaxis Management Act 1/4/2011 - requires US Secretary of Health and Human Services to develop and make available to schools a policy to manage the risk of food allergies/anaphylaxis in schools.
- Voluntary Guidelines for Managing Food Allergies in Schools and Early Care and Educational Programs 10/30/2013 (CDC).

### Voluntary Guidelines for Managing Food Allergies in Schools and Early Care and Educational Programs CDC 2013

- Daily management plan for individuals with food allergies (IHP - Individualized Healthcare Plan).
- Emergency action plan (EAP) for treatment of allergic reactions in the school setting.
- Provide professional development on food allergies.
- Education of students and families on food allergies.
- Create and maintain a safe educational environment.

### Individualized Health Care Plans (IHP)

- IHP is a collaborative effort of school nurse, family, school staff and physician.
- Nursing care plan based on physician documentation of diagnosis, management and treatment plans, specific accommodations and medical orders.
- Proactive management.
- Increased supervision during meals, snacks, no food sharing, clean hands, tables, toys, equipment.
- Substitutions: meals, classroom (crafts, projects).
- Allergy friendly seating.
- School bus.
School Access to Emergency Epinephrine Act 2013

- 20-25% of anaphylaxis in school settings occurs in children with no prior history of anaphylaxis.
- 27% of California school nurses treating anaphylaxis with another student’s epinephrine.
- The law incentivizes states to require schools to have ‘stock’ epinephrine for use in event of a reaction.
- Issues with implementation: Liability, lack of having a physician order, cost of devices.

Myths vs Reality

- Myth: The smell of peanut peanut butter can cause severe allergic reactions/anaphylaxis.
- Reality: Peanut anaphylaxis requires ingestion of peanut protein, not inhalation of peanut butter, which is a lipid, not protein.
- Myth: Skin contact can result in anaphylaxis.
- Reality: Has been shown in studies not to be true.
- Myth: Routine cleaning methods-soap and water are not effective in allergen removal.
- Reality: Cleaning with soap and water are effective, and better than sanitizers.

Impact of School Peanut-Free Guidelines on Epinephrine Administration

- Peanut free schools had higher rates of epinephrine administration than schools that were not.
- Schools with peanut-free tables had lower rates of epinephrine than schools that didn’t.
- Peanut-free policies were variable: 24% allowed peanut brought from home, 4% of those schools had no peanut-free tables.
- Peanut allergic reactions occur despite school policies for peanut restriction.
Food Allergy Bullying in Schools

- What has been your experience?
- How do you handle these occurrences?
- Data indicates it is quite prevalent, but children are reluctant to report it for fear of retribution or out of embarrassment
- Adults are just as much responsible for bullying as other students

Antihistamines and 504 Plans

- Are antihistamines part of most/all EAPs?
- Do many health providers advise give Benadryl first, second or not at all?
- Giving antihistamines is the major reason that treatment for anaphylaxis may not be successful (delay in administering Epinephrine)
- Do some/all of your students have 504 Plans?
- Comments/questions