May contain peanuts: Nutrition for the Food Allergic Child

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Today’s Program

- Overview of food allergies
- Treatment for food allergies
- What to feed the food allergic child
- Questions & answers
Overview

- History and Prevalence of Food Allergies
- Medical Nutrition Therapy
- Nutritional Consequences
- Food Allergies & Eosinophilic Esophagitis
- Resources
History

80 years ago Carl Prausnitz (who was not allergic), injected serum from his fish allergic colleague Heinz Küstner into his own abdominal skin.

Prausnitz subsequently ate some cooked fish. After several minutes hives developed at the site of the serum injection.
History

This clarified the fundamental basis of the allergic mechanism

There was a “serum component” responsible for allergy

In 1966 Ishizaka identified this as IgE

In 2003 first published anti-IgE trial in peanut allergy
What is a Food Allergy?
Is there anyway to find clarity…?
Immunologic Reactions to Foods

**IgE-Mediated**
- Oral Allergy Syndrome
- Anaphylaxis
- Urticaria
- Eosinophilic esophagitis
- Eosinophilic gastritis
- Eosinophilic gastroenteritis
- Atopic dermatitis

**Non-IgE Mediated**
- Protein-Induced Enterocolitis
- Protein-Induced Enteropathy
- Eosinophilic proctitis
- Dermatitis herpetiformis
What is a food allergy?

- Individual’s immune system is over-reacting to what is normally a harmless food.
- Response is related to the protein component of a food.
- Different from a “food intolerance”
  - Lactose intolerance: GI symptoms from milk sugar not protein – not an immune response. Often can tolerate 8 oz milk, low lactose cheese (cheddar, colby) and yogurt with live, active culture.
- Can be life threatening.
What is a food allergy?

- Oral Allergy Syndrome
  - Onset: older children
  - Relation to hay fever
  - Symptoms
    - Oral scratchiness and redness around the lips
  - Treatment
    - Avoidance

Common pollen – food associations
(grasses = tomato; ragweed = melons, kiwi, banana)
What is a food allergy?

- Irritant Dermatitis
  - Not a food allergy
  - Acidic foods cause red patches around mouth and chin
    - Grapefruit
    - Orange
    - Tomato
Food Allergy in the United States

- 6-8% of children under age 4; 4% of adults
  - Perception of the public 20-25%
  - 1 in 17 children under 3 years of age has food allergy
- 8 foods account for 90% of all food-allergic reactions
- Estimated 30,000 anaphylactic episodes
- Approximately 150 deaths per year
- Peanut allergy is the most common cause of fatal/near-fatal anaphylaxis
- Some food allergies persist throughout life
Prevalence

Significant rise in atopic conditions in Westernized countries over the past 20 years

Prevalence of peanut / tree nut allergy:
0.7% adults, 0.4% children: NY telephone survey
(Sicherer SH et al J Allergy Clin Immunol, 1999)

Rising prevalence (U.K.):
Same geographic area evaluated 1989 & 1994
2 fold increase of reported peanut allergy
3 fold increase of peanut skin test sensitization
(Grundy J et al J Allergy Clin Immunol, 2002)
Major Food Allergens

- Egg
- Milk
- Peanut/Tree nut
- Fish/Shellfish
- Soy
- Wheat

*Eight foods cause 90% of the allergic reactions in the United States.*
Almost every major food allergen identified is a protein or glycoprotein.

Tend to resist denaturation by heat or acid.

Most common: Egg, milk, peanut, tree nuts, fish, seafood, soy, wheat.

Less common: other legumes, sesame, poppy seed, sunflower seed, pine nuts, mustard seed.
Identification of the Allergen

- Diagnosis
  - RAST
  - Scratch Tests
  - Patch Testing
  - Clinical Symptoms (lots of Questions!)
  - Food Challenge

- Clarify allergen list with family, physician and/or other caregivers
Skin prick testing

Photos with patient permission
Symptoms of Food Allergy
(when exposed)

- Hives
- Eczema (dry, itchy skin)
- Asthma
- Vomiting, diarrhea, abdominal cramping
- Red rash around mouth
- Anaphylaxis (a life-threatening reaction)
Fatalities in Anaphylaxis

- Food anaphylaxis is the leading cause of anaphylaxis treated in ED: 30,000/yr with 150-200 deaths (Sampson et al. Pediatrics 2003 111:1601-8)
- Peanut, tree nut, seafood account for most of these reactions
Fatal Food-Induced Anaphylaxis

- 32 cases of fatal anaphylaxis reviewed
- Most were adolescents or young adults
- Peanuts, tree nuts caused >90% of reactions
- 2/3 with asthma
- Most did not have epinephrine available

### Table of cross reactive foods

<table>
<thead>
<tr>
<th>If Allergic to:</th>
<th>Risk of Reaction to at Least One:</th>
<th>Risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A legume* peanut</td>
<td>Other legumes peas</td>
<td>5%</td>
</tr>
<tr>
<td>A tree nut walnut</td>
<td>Other tree nuts cashew</td>
<td>37%</td>
</tr>
<tr>
<td>A fish* salmon</td>
<td>Other fish swordfish</td>
<td>50%</td>
</tr>
<tr>
<td>A shellfish shrimp</td>
<td>Other shellfish crab</td>
<td>75%</td>
</tr>
<tr>
<td>A grain* wheat</td>
<td>Other grains barley</td>
<td>20%</td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>Beef namburger</td>
<td>10%</td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>Goat's milk goat</td>
<td>92%</td>
</tr>
<tr>
<td>Cow's milk*</td>
<td>Mare's milk horse</td>
<td>4%</td>
</tr>
<tr>
<td>Pollen birch ragweed</td>
<td>Fruits/vegetables apple peach</td>
<td>55%</td>
</tr>
<tr>
<td>Peach*</td>
<td>Other Rosaceae apple cherry</td>
<td>55%</td>
</tr>
<tr>
<td>Melon* cantaloupe</td>
<td>Other fruits watermelon banana</td>
<td>92%</td>
</tr>
<tr>
<td>Latex* latex glove</td>
<td>Fruits kiwi avocado</td>
<td>35%</td>
</tr>
<tr>
<td>Fruits banana</td>
<td>Latex</td>
<td>11%</td>
</tr>
</tbody>
</table>

*Sicherer SH: J Allergy Clin Immunol, 2001*
Food-induced Anaphylaxis: Prevention

- Learn to read product labels
- Avoid high-risk foods (e.g., baked goods)
- Avoid sharing food, utensils, or food containers
- Must always be prepared to treat a reaction
  - Have an emergency action plan
  - Keep EpiPen® or EpiPen® Jr on hand at all times
  - Train caregivers and teachers on EpiPen® use
  - Wear MedicAlert® bracelet
Treatment of Food allergies

The only treatment for food allergies at this time is to totally avoid ingestion and exposure to identified allergen.

- Careful meal planning
- Reading labels for ingredients
- Asking about food preparation
- Being prepared for emergencies
Comprehensive approach to the food allergic child: Allergist and Dietitian

- Accurate diagnosis of causative foods
- Institution of elimination/prevention diet and surviving with restrictions
- Prevention of adverse reactions
- Assessment of proper emergency treatment and development of “action plans”
- Treatment of associated atopic disorders
- Assessment of nutritional status
Goals of Medical Nutrition Therapy

- Strict avoidance of foods
- Provide recommendations for adequate nutrient intake
- Provide complete and concise education
- Set the patient/family up to succeed!
Approach to Growth and Nutrition Assessment

- Assessment of Growth
  - Weight
  - Length
  - Weight-to-length ratios
  - Head Circumference
  - BMI
  - % IBW
  - Growth Velocity
  - Failure to achieve normal growth suggests need for assessment of a child’s nutrient intake.
Growth and Nutrition Assessment

Assessment of Nutritional Intake

- Diet History
  - 24 hour recall
  - 3 day food record
  - Formula or supplement use
  - Food habits, recent changes
Food allergies in children affect nutrient intake and growth

L. Christie; R.J. Hine; J.G. Parker; W. Burks

- Compared height, weight, and BMI of children with food allergies to control subjects

- Results:
  - children with >2 FH were shorter than those with 1 FH
  - >25% children in both groups consumed <67% DRI for calcium, Vit. D, Vit. E
  - Less possibility of low calcium or vitamin D intake with nutrition counseling or if prescribed a safe infant/toddler formula or fortified soy beverage

- Conclusion
  - Children diagnosed with food allergy need an annual nutrition assessment to prevent growth problems or inadequate nutrient intake

J Am Dietetic Assoc; 2002
Value of serial measurements

Comparison of growth charts for two girls with same length & weight at 18 months.

- Normal growth rate
- Deceleration in growth rate
Using Correct Growth Chart

Weights for 18 month female with Down Syndrome plotted on CDC Growth Chart.

Suggests poor growth.
Using Correct Growth Chart

Same female infant with Down’s Syndrome plotted on Down Growth Chart

Shows acceptable growth
Nutritional Intake Standards

• **DRIs** (Dietary Reference Intakes)
  - National Academy of Sciences (NAS) began revisions in 1997
  - Revisions replace previous RDA set in 1941
  - Reflect current research and emphasize beneficial outcomes of adequate nutrition vs. prevention of deficiency
  - Calories
  - Protein
  - **Fat** (1-2 yrs: >35% total calories)
  - Vitamins, Minerals and Trace Elements
Food Elimination Diet
Bottom line……

- How many foods?
- Is it feasible to meet nutritional goals?
- Where is supplementation necessary?
  - Specialized formula
  - Vitamin and mineral supplementation
  - Oil supplementation
Questions to ask: Determination of Nutritional Risk

**How many foods need to be avoided?**
Risk increases with more foods being/needling to be avoided

**What is the impact on nutrients?**
Risk increases with more of the following nutrients being impacted or fewer nutrients being severely impacted
- Calories
- Protein
- Fat
- Micronutrients

**Are there other concerns about food intake?**
Risk increases with other medical and psychological diagnoses affecting intake
- Swallowing/chewing difficulties
- Psychological diagnoses affecting intake
- Feeding disorder
### Key micronutrients provided by the most common food allergens and alternative food sources that can serve as food substitutes for the allergenic foods

<table>
<thead>
<tr>
<th>Allergenic foods</th>
<th>Micronutrients provided</th>
<th>Appropriate food substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Milk</strong></td>
<td>vitamin A, vitamin D, riboflavin, pantothenic acid, vitamin B12, calcium, phosphorus</td>
<td>meats, legumes, whole grains, nuts, fortified foods/beverages (with B vitamins, calcium and vitamin D)</td>
</tr>
<tr>
<td><strong>Egg</strong></td>
<td>vitamin B12, riboflavin, pantothenic acid, biotin, selenium</td>
<td>meats, legumes, whole grains</td>
</tr>
<tr>
<td><strong>Soy</strong></td>
<td>thiamin, riboflavin, pyridoxine, folate, calcium, phosphorus, magnesium, iron, zinc</td>
<td>meats, legumes</td>
</tr>
<tr>
<td><strong>Wheat</strong></td>
<td>thiamin, riboflavin, niacin, iron, folate if fortified</td>
<td>alternative fortified grains (barley, rice, oat, corn, rye, quinoa, soy) and potatoes</td>
</tr>
<tr>
<td><strong>Peanut/Tree nut</strong></td>
<td>vitamin E, niacin, magnesium, manganese, chromium</td>
<td>whole grains, vegetable oils</td>
</tr>
<tr>
<td><strong>Fish/Shellfish</strong></td>
<td>vitamin B6, vitamin E, niacin, phosphorus, selenium, omega-3 fatty acids</td>
<td>whole grains, meats, oils, soybean, flaxseed, nuts</td>
</tr>
</tbody>
</table>
Impact of the Allergy Restricted Diet

- Grocery Shopping
- Cooking
- Socializing
- Travel/Vacations
- Dining away from home
- Schools, child care, and camps
- Family Relationships
- Lotions, Pet foods etc.
Education, Education, Education, Education!

- Cornerstone for compliance and a nutritionally adequate diet
Education, Education, Education, Education!

- Substitutions/alternatives for nutrient goals
- How to read food labels (every time!!)
- Forms of food/ingredients to avoid
- Foods/ingredients to include
- Meal and snack planning
- Cross-contact/cross-contamination/hidden foods
- Tips for eating out
- Recipes
- Resources and Support Groups
The Food Allergen and Consumer Protection Act (FALCPA)

Can you trust it?
The Food Allergen and Consumer Protection Act (FALCPA)

- Effective January 1, 2006
- Identify 8 major food allergens
  - Milk, Egg, Peanut, Tree Nut, Fish, Shellfish, Wheat and Soy
- Identify presence in spices, flavorings etc
- “May contain” or “processed on” - voluntary
- Gluten-free not included at this time
### Common Sources of Hidden Food Allergens

<table>
<thead>
<tr>
<th></th>
<th>Egg</th>
<th>Milk</th>
<th>Nuts</th>
<th>Soy</th>
<th>Wheat</th>
<th>Rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasta</td>
<td>Bread/bread crumbs</td>
<td>Cereals</td>
<td>Bread/Bread Crumbs</td>
<td>Cereals</td>
<td>Baby food</td>
<td></td>
</tr>
<tr>
<td>Breads</td>
<td>Cereals</td>
<td>Egg rolls</td>
<td>Waffles</td>
<td>Gluten free products</td>
<td>Breads</td>
<td></td>
</tr>
<tr>
<td>Egg Beaters</td>
<td>Candy/Chocolate</td>
<td>Cakes/cookies</td>
<td>Crackers</td>
<td>Hot dogs/low fat beef franks</td>
<td>Cake/Muffin mixes</td>
<td></td>
</tr>
<tr>
<td>Candy</td>
<td>Frozen Desserts</td>
<td>Frozen Dessert</td>
<td>Chicken hot dogs/low fat beef franks</td>
<td>Soy sauce</td>
<td>Waffles</td>
<td></td>
</tr>
<tr>
<td>Marshmallow</td>
<td>Canned Tuna</td>
<td>Nut butters</td>
<td>Cake/muffins</td>
<td>BBQ potato chip</td>
<td>Soups</td>
<td></td>
</tr>
<tr>
<td>Waffles</td>
<td>Processed meats</td>
<td>Sauces/chili</td>
<td>Bouillon cubes</td>
<td>Modified Food starch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sample Menu for 1-3 year old Child (Diet 1)

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole milk</td>
<td>Whole milk</td>
<td>Whole milk</td>
</tr>
<tr>
<td>Cereal</td>
<td>Peanut butter and jelly sandwich</td>
<td>Meatloaf</td>
</tr>
<tr>
<td>Banana</td>
<td>Cooked carrots, butter</td>
<td>Dinner roll, butter</td>
</tr>
<tr>
<td></td>
<td>Strawberries</td>
<td>Peas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mashed potatoes</td>
</tr>
<tr>
<td><strong>Snack</strong></td>
<td><strong>Snack</strong></td>
<td><strong>Snack</strong></td>
</tr>
<tr>
<td>Granola bar</td>
<td>Yogurt drink</td>
<td></td>
</tr>
<tr>
<td>Juice</td>
<td>Oatmeal cookie</td>
<td>Ice cream</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Diet 1

<table>
<thead>
<tr>
<th>Diet Analysis</th>
<th>(%Goal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>1490 (&gt;100%)</td>
</tr>
<tr>
<td>Protein</td>
<td>47 gm (360%)</td>
</tr>
<tr>
<td>Fat</td>
<td>55 gm (33% total calories)</td>
</tr>
<tr>
<td>Calcium</td>
<td>1100 mg (221%)</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>203 IU (101%)</td>
</tr>
<tr>
<td>Iron</td>
<td>9.9 mg (141%)</td>
</tr>
<tr>
<td>Zinc</td>
<td>8.9 mg (297%)</td>
</tr>
</tbody>
</table>
# Sample Menu for 1-3 year old child with milk, egg, peanut allergy (Diet 2)

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole milk</td>
<td>Whole milk</td>
<td>Whole milk</td>
</tr>
<tr>
<td>Cereal</td>
<td>Peanut butter and jelly sandwich</td>
<td>Meatloaf</td>
</tr>
<tr>
<td>Banana</td>
<td>Cooked carrots, butter</td>
<td>Dinner roll, butter</td>
</tr>
<tr>
<td></td>
<td>Strawberries</td>
<td>Peas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mashed potatoes</td>
</tr>
<tr>
<td><strong>Snack</strong></td>
<td><strong>Snack</strong></td>
<td><strong>Snack</strong></td>
</tr>
<tr>
<td>Granola bar</td>
<td>Yogurt drink</td>
<td>Ice cream</td>
</tr>
<tr>
<td>Juice</td>
<td>Oatmeal cookie</td>
<td></td>
</tr>
</tbody>
</table>

Problem Nutrients:
- Calories
- Protein
- Fat
- Calcium
- Vitamin D
- Iron
## Diet Analysis (%Goal)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>305</td>
<td>(25%)</td>
</tr>
<tr>
<td>Protein</td>
<td>5 gm</td>
<td>(41%)</td>
</tr>
<tr>
<td>Fat</td>
<td>2 gm</td>
<td>(6% total calories)</td>
</tr>
<tr>
<td>Calcium</td>
<td>98 mg</td>
<td>(20%)</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>20 IU</td>
<td>(10%)</td>
</tr>
<tr>
<td>Iron</td>
<td>4 mg</td>
<td>(59%)</td>
</tr>
<tr>
<td>Zinc</td>
<td>2.6 mg</td>
<td>(87%)</td>
</tr>
</tbody>
</table>
## Revised menu for 1-3 year old child with milk, egg, peanut allergy (Diet 3)

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enriched soy milk</strong></td>
<td><strong>Enriched soy milk</strong></td>
<td><strong>Enriched soy milk</strong></td>
</tr>
<tr>
<td>Cereal</td>
<td>Soy nut butter and jelly sandwich</td>
<td>MF/EF meatloaf with ketchup</td>
</tr>
<tr>
<td>Banana</td>
<td>Cooked carrots</td>
<td>MF Dinner roll with MF margarine</td>
</tr>
<tr>
<td></td>
<td>Strawberries</td>
<td>Peas</td>
</tr>
<tr>
<td><strong>Snack</strong></td>
<td><strong>Snack</strong></td>
<td><strong>Snack</strong></td>
</tr>
<tr>
<td>Teddy Grahams</td>
<td>Soy yogurt</td>
<td>Soy ice cream</td>
</tr>
<tr>
<td>Orange juice</td>
<td>FAAN Oatmeal cookie</td>
<td></td>
</tr>
</tbody>
</table>
## Diet Analysis

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Amount</th>
<th>(%Goal)</th>
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</thead>
<tbody>
<tr>
<td>Calories</td>
<td>1360</td>
<td>(&gt;100%)</td>
</tr>
<tr>
<td>Protein</td>
<td>42 gm</td>
<td>(321%)</td>
</tr>
<tr>
<td>Fat</td>
<td>49 gm</td>
<td>(32% total calories)</td>
</tr>
<tr>
<td>Calcium</td>
<td>754 mg</td>
<td>(151%)</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>285 IU</td>
<td>(&gt;100%)</td>
</tr>
<tr>
<td>Iron</td>
<td>10 mg</td>
<td>(147%)</td>
</tr>
<tr>
<td>Zinc</td>
<td>6 mg</td>
<td>(201%)</td>
</tr>
</tbody>
</table>
Milk Allergy

- Dairy products provide protein, vitamins and minerals (calcium, vitamins A & D, B vitamins, and phosphorus)
- Numerous milk free substitutions are available
- When choosing, look for “enriched” versions
- Don’t confuse milk free with “dairy-free”
Milk Alternatives/Formulas

- Milk Alternatives
  - Soy milk (~300 mg Calcium)
  - Rice milk (~200 mg Calcium)
  - Almond milk (~300 mg Calcium)
  - Calcium fortified fruit juice (100-300 mg Calcium)
    - Careful selection based on assessment of age, growth and intake of other nutrients. Many are inappropriate for the child under 2 years of age.

- Toddler Soy Formulas (Bright Beginnings Pediatric Soy Drink)

- Hydrolyzed Formula (Alimentum, Nutramigen, Vital Jr, Peptamin Jr)

- Amino Acid Based Formulas (Neocate, Elecare, Neocate Jr, EO28 Splash)
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Calories</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>130</td>
<td>150</td>
<td>237</td>
<td>70</td>
<td>110</td>
<td>130</td>
<td>160</td>
<td>130</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>1</td>
<td>0.4</td>
<td>1</td>
<td>7</td>
<td>8</td>
<td>7.1</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>1</td>
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<tr>
<td>Carbohydrate (g)</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>17</td>
<td>11</td>
<td>26</td>
<td>11</td>
<td>18</td>
<td>24</td>
<td>30</td>
<td>27</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>11.8</td>
<td>2.5</td>
<td>3.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Unsaturated fat (g)</td>
<td>2</td>
<td>1.6</td>
<td>2</td>
<td>3.5</td>
<td>3</td>
<td>7.4</td>
<td>2.5</td>
<td>3.5</td>
<td>2.5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Saturated fat (g)</td>
<td>0</td>
<td>0.2</td>
<td>0</td>
<td>0.5</td>
<td>5</td>
<td>3.1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>20</td>
<td>20</td>
<td>300</td>
<td>300</td>
<td>294</td>
<td>230</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>NS</td>
<td>0.2</td>
<td>NS</td>
<td>1.8</td>
<td>0.1</td>
<td>3.3</td>
<td>0.36</td>
<td>0.36</td>
<td>0.36</td>
<td>1.08</td>
<td>0</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>0.29</td>
<td>0.24</td>
<td>0.29</td>
<td>0.6</td>
<td>1</td>
<td>2.8</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Selenium (mcg)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>Unknown</td>
<td>9</td>
<td>5.4</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Thiamin-B1 (mg)</td>
<td>NS</td>
<td>NS</td>
<td>0.1</td>
<td>0.12</td>
<td>0.15</td>
<td>0.107</td>
<td>0.64</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Riboflavin-B2 (mg)</td>
<td>NS</td>
<td>NS</td>
<td>0.01</td>
<td>0.07</td>
<td>0.447</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0</td>
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<tr>
<td>Niacin-B3 (mg)</td>
<td>0.8</td>
<td>2</td>
<td>0.8</td>
<td>0.8</td>
<td>0.281</td>
<td>4</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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<tr>
<td>Pantothenic acid-B5 (mg)</td>
<td>0.1</td>
<td>0.23</td>
<td>0.4</td>
<td>0.883</td>
<td>2.4</td>
<td>NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Folate (mcg)</td>
<td>1.5</td>
<td>91</td>
<td>Unknown</td>
<td>60</td>
<td>12</td>
<td>88</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Vit B12 (mcg)</td>
<td>1.5</td>
<td>0</td>
<td>1.5</td>
<td>3</td>
<td>1.07</td>
<td>1.4</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Vit A (IU)</td>
<td>NS</td>
<td>5</td>
<td>500</td>
<td>500</td>
<td>300</td>
<td>610</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Vit D (IU)</td>
<td>NS</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>120</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
Allergen Free Multivitamins
All of these products are free of milk, soy, egg, wheat, peanut, tree nut, fish, and shellfish

• One-A-Day Scooby Do Complete
• One-A-Day Bugs Bunny Complete
• Flintstone Children's Chewable Complete
• NanoVM (1-3 yrs and 4-8 yrs)*#
• Nature's Plus Animal Parade Children's Chewable

*This product is only available online
# This is the only allergen-free vitamin that contains selenium
Note: Products can change at any time and labels should be read before use
<table>
<thead>
<tr>
<th>Age</th>
<th>Calcium Goal (RDA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 years</td>
<td>800 mg</td>
</tr>
<tr>
<td>4-8 years</td>
<td>800 mg</td>
</tr>
<tr>
<td>9-18 years</td>
<td>800 - 1200 mg</td>
</tr>
</tbody>
</table>
Adequacy of Dietary Calcium in Milk Allergic Children

J.K. Knaack, M.B. Levy

- 30 children age 12-33 months
- Diet history or 3 day recall

**Results**
- 68.9% (n=20) of patients met the DRI for calcium
- Only 31% (n=9) would have met the previous goal for calcium (RDA)

**Conclusion**
- Calcium supplementation may not be necessary for the majority of 1-3 year olds if they consume calcium fortified beverages in place of milk.
Calcium Supplements

• Tums
• Calcium tablets
• Powdered calcium
• Calcium fortified products
• MVI with calcium
Non-dairy Sources of Calcium

- **Legumes**
  - Black beans 51 mg
  - Navy beans 64 mg

- **Vegetables**
  - Bok Choy 79 mg
  - Broccoli 89 mg
  - Collard greens 178 mg

- **Fortified foods**
  - Breads, cereals, crackers, beverages
Characteristics of EE

- Esophageal inflammation with eosinophils that results in a variety of symptoms
- Not related to esophageal acidification
- Characteristic endoscopic changes
- Often associated with atopic disease
Symptoms of EE by age

Median and interquartile range, n=103

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Fraction of Pop.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding Disorder</td>
<td>13 %</td>
</tr>
<tr>
<td>Vomiting</td>
<td>26 %</td>
</tr>
<tr>
<td>Abdominal Pain</td>
<td>26 %</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>27 %</td>
</tr>
<tr>
<td>Food Impaction</td>
<td>7 %</td>
</tr>
</tbody>
</table>

Age (Years)
Treatments for EE

- **Dietary elimination of antigens**
  - Elimination diet
    - Guided or empiric
  - Elemental diet
- **Glucocorticoids**
  - Systemic
  - “Topical”
- Acid suppression
- Dilatation
- Fundoplication
<table>
<thead>
<tr>
<th></th>
<th>Elemental Diet</th>
<th>Empiric Elimination</th>
<th>Guided Elimination</th>
<th>Topical Steroids</th>
<th>Systemic Steroids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mucosal Healing</td>
<td>&gt;95%</td>
<td>≈80%</td>
<td>&lt;30%</td>
<td>&gt;65%</td>
<td>≈99%</td>
</tr>
<tr>
<td>Cost, labor</td>
<td>High</td>
<td>High</td>
<td>Low-Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Side Effects (Psychosocial)</td>
<td>High*</td>
<td>High*</td>
<td>Variable</td>
<td>Low</td>
<td>Moderate-High*</td>
</tr>
<tr>
<td>Side Effects (Medical)</td>
<td>None</td>
<td>Low*</td>
<td>Low*</td>
<td>Rare*</td>
<td>High</td>
</tr>
<tr>
<td>Acceptance by “sick” patients</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Acceptance by “well” patients</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>
Straightforward management…

- **Guided elimination** of food antigens following allergy testing
- **Food elimination** for infants and toddlers
- **Elemental diet** for patients already feeding on formula (infants, gastrostomy tube feeding)
- **Empiric elimination** diet when:
  - Guided elimination fails
  - Patient / family unwilling to take medication or elemental diet
- **Swallowed fluticasone** for older children unwilling or unable to perform elimination diet
Interdisciplinary care in EE

- Nurse
- Physician
  - Gastroenterologist
  - Allergist
- Other (psychologist, speech and language pathologist)
- Dietitian
Food Elimination Diet

- Caution
- Several reports = inadequate caloric intake and failure to thrive
- Nutritional consult and monitoring is a necessity
Before Implementation of MNT

- Assessment of Nutritional Status
- Degree of Illness
- Patient/family Resources
- Review of Food Allergy Testing with Allergist
- Bottom line….team approach with the patient involved in determining the plan that might work for them
Implementation of MNT

- Education, education, education!
- Supplementation
- Timeline for follow-up
  - Endoscopy
  - Nutritional assessment
  - Additional Allergy testing
Foods that cause EE: (most likely → least likely)

1. Milk
2. Soy
3. Wheat
4. Eggs
5. Nuts
6. Shellfish
7. Corn
8. Rice
9. Beef, Pork
10. Chicken, Turkey
11. Other Fruits
12. Other Vegetables
Long Term Management

Interdisciplinary Approach

- Evaluation of success of treatment by endoscopy (2-6 months)
- Determination of introduction of an avoided food or need for restricting additional foods
- Nutritional assessment of growth & intake (minimum every 6 months)
Food Allergy Resources

- Food Allergy & Anaphylaxis Network
  Website: [http://www.foodallergy.org](http://www.foodallergy.org)

- American Academy of Allergy, Asthma & Immunology
  Website: [http://www.aaaai.org](http://www.aaaai.org)

- American Dietetic Association
  Website: [http://www.eatright.org](http://www.eatright.org)

- Asthma and Allergy Foundation of America
  Website: [http://www.aafa.org](http://www.aafa.org)

- American Partnership For Eosinophilic Disorders
  Website: [http://www.apfed.org](http://www.apfed.org)

- American College of Allergy, Asthma & Immunology
  Website: [http://www.acaai.org](http://www.acaai.org)
Food Allergy Resources

- National Eczema Association for Science and Education
  Website: [http://nationaleczema.org](http://nationaleczema.org)

- MedicAlert Foundation International
  Website: [http://www.medicalert.org](http://www.medicalert.org)

- Food Allergy Buddy (FAB) Dinning Card
  Website: [http://www.foodallergybuddy.com](http://www.foodallergybuddy.com)

- The American Academy of Pediatrics
  Website: [http://www.aap.org](http://www.aap.org)

- National Jewish Medical and Research Center
  Website: [http://www.nationaljewish.org](http://www.nationaljewish.org)
Questions?
Appendices

- Calorie Boosters
- Increasing protein
- Increasing fat
- Increasing fluid
- Increasing fiber
- Increasing iron
- Increasing calcium
Calorie Boosters

- Carnation Instant Breakfast
- Fortified milks
- Cheese: grated, melted, shredded
- Butter, margarines, oils, gravy, sour cream, salad dressings
- Puddings, ice cream, shakes
- Avocado, guacamole, olives, nut butters
Protein Boosters

- Milk, cheese, yogurt
- Eggs
- Nut butters
- Sandwich spreads
- Meats: strained, ground
Fat Boosters

- Fat should be >30% of calorie intake
- Minimize use of low fat and “light foods”
- Additional oil added to foods
- Prevent essential fatty acid deficiency
  - Linoleic acid (ω6): 1-2.7% total calories
  - Alpha Linolenic (ω3): 0.54-1% total calories
  - Suggested vegetable oil combination: soybean or corn + canola oil
Increasing Fiber

- Fiber Goal: Individualize
  - Rule of Thumb: Age + 5 grams
- Provide adequate fluid first, then fiber
- Higher fiber foods include:
  - Bran, whole grains
  - Fruits/vegetables
  - Blenderize when needed
- Use formula with fiber
- Use fiber supplement
Increasing Fluid

- Establish Fluid Goals: 70-100% maintenance fluids
- Close monitoring of fluid status
- Increase intake of high fluid foods
- Establish fluid goals at meals/snacks
- Establish goal for water
- Use thickeners correctly
- Minimize fluid loss
Fluid Content

<table>
<thead>
<tr>
<th>Liquid/Food Item</th>
<th>% Free Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin liquids, soup, jello</td>
<td>90%</td>
</tr>
<tr>
<td>Infant formulas (20 kcal/oz)</td>
<td>90%</td>
</tr>
<tr>
<td>Pediatric formulas (30 kcal/oz)</td>
<td>84%</td>
</tr>
<tr>
<td>High Calorie formulas (45 kcal/oz)</td>
<td>76%</td>
</tr>
<tr>
<td>Fruits/vegetables</td>
<td>80-90%</td>
</tr>
<tr>
<td>Hot cereals</td>
<td>85%</td>
</tr>
<tr>
<td>Potatoes, rice, pasta</td>
<td>75%</td>
</tr>
<tr>
<td>Meats</td>
<td>65%</td>
</tr>
<tr>
<td>Fats</td>
<td>15%</td>
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</table>

As calorie density increases, fluid content decreases.
Increasing Iron

- Heme iron better absorbed than non-heme iron
- Sources of heme iron
  - Meat, chicken, fish
- Sources of non-heme iron
  - Whole grain breads and cereals, wheat germ, fortified breads & cereals
- Foods rich in Vitamin C can help improve absorption of non-heme iron
Questions?