Exploring Dietary Elimination Efficacy in EoE

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Disclosure:

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2011 Updated Consensus Report: Eosinophilic Esophagitis (EoE) Definition

Conceptual definition of EoE

- Chronic, clinicopathologic disorder not associated with inflammation elsewhere in gut
- Immune/antigen-mediated esophageal disease
- Clinically: symptoms related to esophageal dysfunction
  Rule out GERD
- Histologically: eosinophil-predominant inflammation

EoE: “Immune-mediated”

- Immune-mediated implies:
  - Activation of immune response by exposure to particular antigens

- Food antigen-induced EoE accounts for >90% of pediatric and adult EoE cases
  - EoE resolves in >95% of cases when diet is replaced by elemental formula
  - EoE recurs with offending foods are reintroduced
  - <10% of the population develop tolerance to their food allergy

- Environmental antigen exposure may contribute to symptoms in a minority (or seasonal variation)
EoE Medical Management Principles

- EoE is a chronic disease requires chronic, consistent, effective therapy

**GOALS:**

- Symptom improvement
- Maintain histologic remission
- Mucosal healing
- Prevention of complications
  - Lamina propria fibrosis
  - Small caliber esophagus
  - Esophageal stricture

Complications:
- Chronic dysphagia
- Food impaction
EoE: Range of Symptoms

- Feeding disorders
  - Gagging, choking
- Vomiting
- Dysphagia
  - Food goes down slowly
  - Food gets stuck transiently, or
  - Food becomes impacted
- Pain
  - Chest
  - Epigastric
  - Periumbilical
Symptoms

- Symptoms correlate poorly with histology
  - Some patients with active inflammation have no symptoms
  - Some patients with no inflammation still complain of pain

- The absence of symptoms does not imply the absence of inflammation

YOU HAVE TO ASK THE RIGHT QUESTIONS.

- Ask older children about compensatory behaviors during eating/swallowing
  - Eat slowly?
  - Chew excessively?
  - Drink excessively?
  - Avoid certain food textures?
Dietary Treatment Principles

- Antigen elimination avoids the inflammatory response to that antigen
- Long-term avoidance is likely necessary
- The nature of the antigen(s) and impact of antigen elimination on nutritional quality of diet varies
Dietary Treatment Principles-cont.

- The ultimate goal is to use the diet that . . .
  - least restrictive
  - meets child’s nutritional needs for growth
  - allows child to adapt and socially integrate diet with their lifestyle
  - achieves symptom improvement and maintains histologic remission

There is no “one-size-fits all” approach
Rationale for Dietary Therapy in EoE

- Is an effective therapy for children and adults with EoE\(^2\)-8
- Can determine causative offending foods
- Avoids the need for chronic topical corticosteroid use and possible development of long-term side effects
  - Candidiasis
  - Theoretical risk of bone mineral loss
How to decide if dietary therapy is a fit?

- Discussion with HCP who diagnosed EoE (e.g., gastroenterologist)
- RDN – provide preliminary education on diet therapy options
- Decision should be made based on patient/family preference and available resources
THE PROBLEM

- Identification of the offending antigen(s) is difficult using current testing
- So, we generally start with the elimination of a group of antigens to reduce esophageal eosinophilia
  - If effective, then reintroduce antigen(s) to identify what works
Dietary Management Principles –cont.

- When antigens are eliminated in groups, the effect of a given antigen cannot be determined.

- Symptomatic improvement is desirable, but not sufficient:
  - Histologic recovery = mucosal healing; is not required to prevent complications.

- Therefore, biopsy confirmation of the impact of any diet change is necessary.

Biopsies obtained on a given diet are a reflection of a response to what is being eaten, not necessarily the avoided foods

- Normal biopsies indicate that the current antigens are all good and that the offenders must be in the avoided group
- Abnormal biopsies only indicate that there are offending foods among those being eaten

Avoided foods may or may not be offenders
Initial Dietary Therapy Options

- Elemental diet
- 6-food elimination diet (Empiric; SFED)
- Allergy test directed elimination diet
Table 2. Comparison of pre- and post- diet therapy peak eosinophil counts/HPF and remission status among diet therapies (n = 98).

<table>
<thead>
<tr>
<th>Diet Therapy</th>
<th>Elemental (n = 49)</th>
<th>SFED (n = 26)</th>
<th>Directed (n = 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-diet Therapy:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak eosinophil count/HPF</td>
<td>51.0</td>
<td>76.5*</td>
<td>38.0*</td>
</tr>
<tr>
<td>Median</td>
<td>28.0 – 90.0</td>
<td>48.0 – 101.0</td>
<td>23.0 – 87.0</td>
</tr>
<tr>
<td>Interquartile range</td>
<td>28.0 – 90.0</td>
<td>48.0 – 101.0</td>
<td>23.0 – 87.0</td>
</tr>
<tr>
<td>Post-diet Therapy:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak eosinophil count/HPF</td>
<td>1.0†</td>
<td>2.5</td>
<td>7.0†</td>
</tr>
<tr>
<td>Median</td>
<td>0 – 3.5</td>
<td>0 – 10.3</td>
<td>0 – 25.0</td>
</tr>
<tr>
<td>Interquartile range</td>
<td>0 – 3.5</td>
<td>0 – 10.3</td>
<td>0 – 25.0</td>
</tr>
<tr>
<td>Remission Types‖:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remission, n (%)</td>
<td>47 (96)‡</td>
<td>21 (81)</td>
<td>15 (65)‡</td>
</tr>
<tr>
<td>Complete remission, n (%)</td>
<td>29 (59)§</td>
<td>10 (39)</td>
<td>7 (30)§</td>
</tr>
<tr>
<td>Partial remission, n (%)</td>
<td>13 (27)</td>
<td>6 (23)</td>
<td>2 (9)</td>
</tr>
<tr>
<td>Partial resolution, n (%)</td>
<td>5 (10)</td>
<td>5 (19)</td>
<td>6 (26)</td>
</tr>
<tr>
<td>Non-remission, n (%)</td>
<td>2 (4)‡</td>
<td>5 (19)</td>
<td>8 (35)‡</td>
</tr>
</tbody>
</table>

Elemental Diet

... avoidance of all dietary antigens

- **Elemental formula** - provides nutritionally complete diet; protein is in the form of amino acids rather than whole, intact protein. Allergic reactions can develop against intact or partially broken down protein, but not against amino acids.

- **Neocate Nutra™** – amino acid-based semi-solid medical food

- Allowable substances: sugar, artificially-flavored candies

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# Elemental Diet

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ~95(^+)% effective (histologic remission)</td>
<td>• Formula intake fatigue</td>
</tr>
<tr>
<td>• Nutritionally complete</td>
<td>• Requires taste acclimation</td>
</tr>
<tr>
<td>• Typical 2-3 month trial may achieve histologic remission in 3-4 weeks</td>
<td>• Expensive/limited insurance coverage</td>
</tr>
<tr>
<td>• Quick resolution of symptoms</td>
<td>• Constipation</td>
</tr>
<tr>
<td>• Extended time to maximize diet</td>
<td>• May require administration using a tube</td>
</tr>
</tbody>
</table>
Insurers in 15 states provide some form of reimbursement to families for medical foods and exempt infant formulas like Neocate™.

http://www.neocate.com/reimbursement/insurance-coverage-map/
What is Neocate® Nutra?
The fast and only hypoallergenic, amino acid-based semi-solid medical food. It contains essential vitamins and minerals to promote balanced nutrition in children and infants over 6 months of age with cow milk allergy, multiple food protein intolerance, eosinophilic esophagitis (EoE), short bowel syndrome (SBS) and other gastrointestinal conditions.

When mixed with water, Neocate Nutra forms a smooth, consistent texture ideal for spoon feeding. It is meant for oral use only and is not intended to be bottle or tube fed.

Neocate Nutra should not be used as a sole source of nutrition but as a supplement to other foods as directed by your doctor or dietitian.


To Order Neocate Nutra:
- Visit www.neocate.com and click ‘Buy Neocate from the Source’
- Call 1-800-Neocate (1-800-636-2283)
- Contact your insurance company to check coverage and suppliers in your area

Swallowed Viscous Budesonide
Please select the appropriate recipe for your patient:

- 1 mg for patients < 10 years old
  Use budesonide 0.5 mg/2 mL resuples. (Do not use the 1 mg/2 mL resuples as there is not enough liquid to coat the esophagus.)
  Fill a medicine cup to the ~2.5 cc (2.5 mL) line with Neocate® Nutra powder.
  Add in 2 resuples (1 mg total) of budesonide and mix it into a slurry.
  - Take by mouth once or twice daily as directed by your physician.
  - Do not eat or drink for 30 minutes after taking the medicine.
  - Rinse and spit or brush your teeth after taking the medicine. Make sure not to swallow any water as this can rinse off the medication from the esophagus.
  - Contact your doctor immediately if you develop a severe sore throat as this may be a sign of a yeast infection.

- 2 mg for patients > 10 years old
  Use budesonide 0.5 mg/2 mL resuples. (Do not use the 1 mg/2 mL resuples as there is not enough liquid to coat the esophagus.)
  Fill a medicine cup to the 5 cc (5 mL) line with Neocate® Nutra powder.
  Add in 4 resuples (2 mg total) of budesonide and mix it into a slurry.

Allowable Candies and Drinks for Elemental Diets

- Candies and drinks should contain only sugar and **ARTIFICIAL** flavors and colors.

- Check the label on every product, every time it is purchased. Manufacturers can change product formulations any time without notice. Also, online product information can differ from ingredient list on food label.

- **Adhere to ingredient list on food label.**
Scenarios for Element Formula Use

- **Sole source of nutrition:**
  1. Infant fails initial introduction to solid foods
  2. Many consecutive food trial failures
  3. Fail SFED with glucocorticoid steroids
  4. Relapse off glucocorticoid steroids-patients with EGID
Tube feeding routes of administration
Zac’s tube feeding video–self intubation

https://www.youtube.com/watch?v=4xwRrezN9Qw
Tools for RDNs

Neocate® DRI Calculator - For Healthcare Professionals

1) For which Nutricia product would you like to view nutrient content?
   Neocate Junior, Unflavored

   Neocate Junior is a nutritionally complete, powdered amino acid-based medical food for individuals over the age of 1. This product is available in the United States and Canada.

2) For how many calories of Neocate Junior, Unflavored would you like to view nutrient content?
   600 calories

   = 2516 kcal

3) Select the demographic group of DRI values beside which you would like to view the nutrients provided by that much Neocate Junior, Unflavored
   7-12 months, Female DRI

Product needed to provide 600 kcal = 126 grams

Vitamins in Neocate 7-12 months, Female DRI % DRI
Vitamin A 360 mcg RE Al 500 mcg RE 72%
Vitamin D<sub>3</sub> 12.9 mcg Al 16 mcg 119%
Vitamin E 8.4 mg α-TE Al 5 mg 168%
Vitamin K 24.1 mcg Al 25 mcg 964%
Thiamin (B<sub>1</sub>) 0.77 mg Al 300 mcg 255%
Riboflavin (B<sub>2</sub>) 1.2 mg Al 400 mcg 301%
Vitamin B<sub>6</sub> 0.60 mg Al 300 mg 201%
Vitamin B<sub>12</sub> 2.4 mcg Al 0.5 mcg 477%
Niacin (B<sub>3</sub>) 5.4 mg Al 4000 mcg 133%
Folic Acid 1.79 mcg Al 80 mcg 224%
Pantothenic Acid (B<sub>5</sub>) 2.4 mcg Al 1800 mcg 132%
Biotin 18.1 mcg Al 6 mcg 501%
Vitamin C 56.0 mg Al 50 mg 112%
Choline 179 mg Al 150 mg 120%
Inositol 112 mg - -
Scenarios for Elemental Formula Use

**Supplemental formula use:**

1. On very restricted elimination diet
2. Younger children: Feeding difficulties/delayed feeding skills
3. Early satiety, food volume intolerance-used to support growth
4. Food trial “burnout” or excess anxiety
SFED-Empiric Elimination Dietary Therapy

- Eliminate foods that causes most food allergies – designated by the 2004 FALCPA
  - Milk
  - Eggs
  - Wheat
  - Soy
  - Fish/Shellfish
  - Tree Nuts/Peanuts

- Advantage: can maximize diet more quickly compared to the elemental diet
- Resolution in ~75% of individuals

\[16\text{Kagalwalla AF et al. Clin Gastroenterol Hepatol. 2006 Sep;4(9):1097-102.}\]
SFED Success in 2.5 yo
6-Food “Reintroduction” Results

Recurrent esophagitis:

<table>
<thead>
<tr>
<th>Antigen</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>75</td>
</tr>
<tr>
<td>Wheat</td>
<td>26</td>
</tr>
<tr>
<td>Egg</td>
<td>17</td>
</tr>
<tr>
<td>Soy</td>
<td>10</td>
</tr>
<tr>
<td>Peanut</td>
<td>6</td>
</tr>
</tbody>
</table>

- 70% to one antigen
- 16% to 2 or more antigens

Allergy Test Directed Elimination Diet

- Eliminate foods directed by allergy testing
- Eliminate foods that produce a reaction (symptoms)
- Food trials started only after EGD/biopsies are clear of all eosinophils (histologic remission)
- Resolution in ~65% of patients

Food Reintroduction Trials

- Periodic reintroduction of foods followed by clinical assessment and biopsies

Possible Outcomes:
- Symptom recurrence (stop food trialed)
- Apparent “tolerance” requires EDG with biopsies due to high likelihood of asymptomatic recurrence after early exposure
- Child doesn’t like or eat “enough” of food, so trial is stopped
Food Trial “Rules”: An Example

- Must achieve histologic remission prior to food reintroduction
- Single-ingredient food “Apple, not apple pie”

**DURATION**
- Trial period (minimum 3 months)
- Up to 4 new foods per trial
  - *Exception*: Major antigens (top 6) trialed alone
    - Typically after many successful previous food trials

**FREQUENCY**
- Each food must be consumed 5-7 days/week

**VOLUME**
- One age-appropriate serving size daily
  - Example: Fruits= $\frac{1}{2}$ cup daily for a school-aged child
  - Special considerations for spices, flavorings, additives, etc.
“Waffle Fry Hall of Fame”
Have dietary management goals been met?

- Achieve least restrictive diet possible
- Nutritionally complete to foster growth
- Adaptation and social integration of diet with lifestyle
- Maintain histologic remission
Food Hypersensitivity Listserv

- Contact Alexia Beauregard, MS, RD
- Children’s Healthcare of Atlanta

Alexia.Beauregard@choa.org
References


References–cont.


