

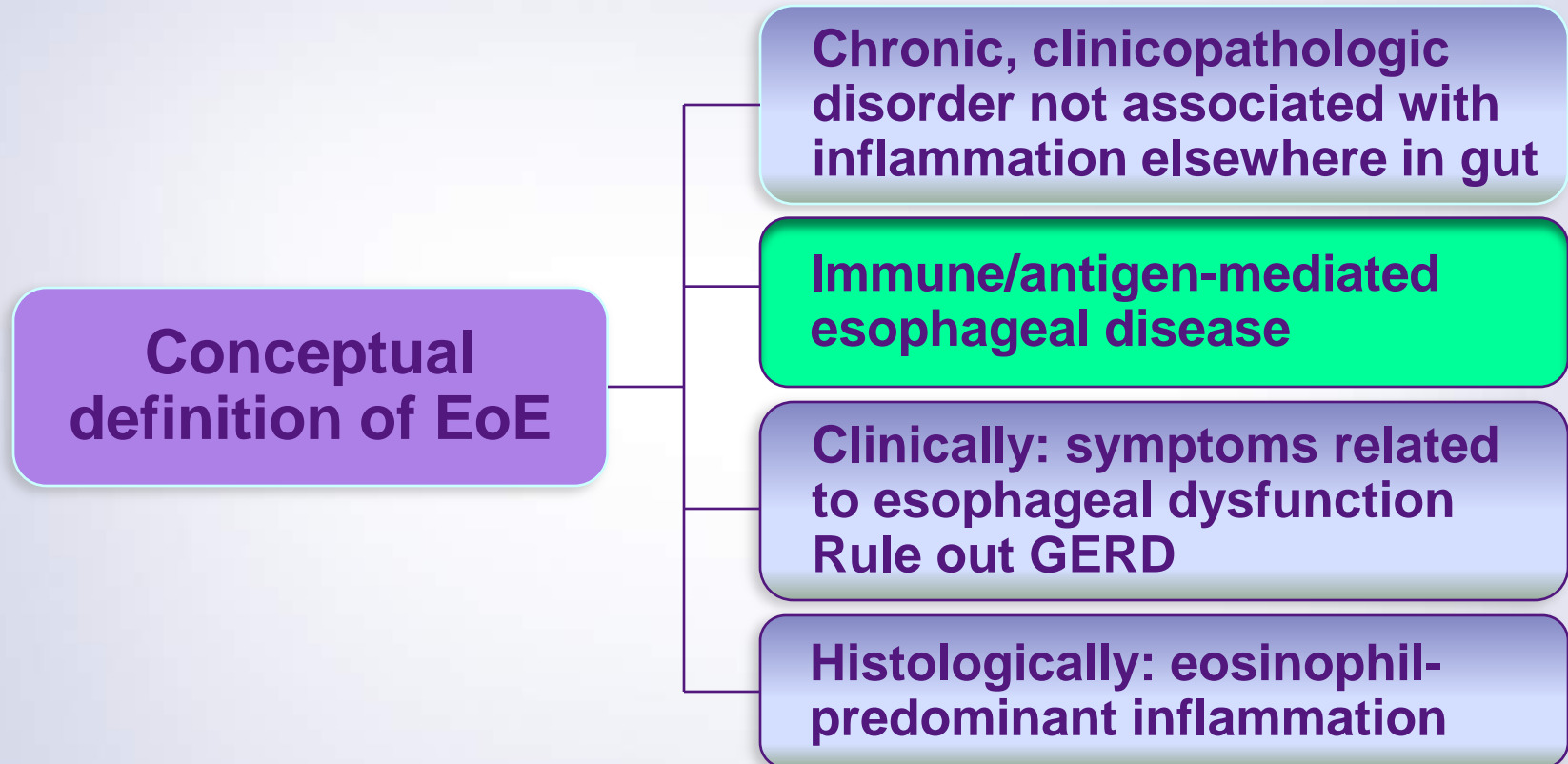
# Exploring Dietary Elimination Efficacy in EoE

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1.22.15

# **Disclosure:**

**Medical Advisor, Nutricia North America**

# 2011 Updated Consensus Report: Eosinophilic Esophagitis (EoE) Definition



<sup>1</sup>Liacouras CA, Furuta GT, Hirano I, et al. Eosinophilic esophagitis: Updated consensus recommendations for children and adults. *J Allergy Clin Immunol.* 2011;128(1):3-20.

# 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<sup>2</sup>
  - EoE resolves in >95% of cases when diet is replaced by elemental formula<sup>3-8</sup>
  - EoE recurs with offending foods are reintroduced<sup>9-11</sup>
  - <10% of the population develop tolerance to their food allergy<sup>12</sup>
- Environmental antigen exposure may contribute to symptoms in a minority (or seasonal variation)<sup>13</sup>

# 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

<sup>14</sup>Pentiuk S et al. *J Pediatr Gastroenterol Nutr.* Feb;48(2):152-6.

# Symptoms and Associated Behaviors

## 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<sup>2-8</sup>
- 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

# Dietary Management Principles

## 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

<sup>13</sup>Pentiuk et al. *J Pediatr Gastroenterol Nutr.* 2009 Feb;48(2):152-60.

# Dietary Management Principles- cont.

- 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).**

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

<sup>§</sup>Henderson et al. *J Allergy Clin Immunol.* 2012 129(6):1570-78.

# 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



# Elemental Diet

## ADVANTAGES

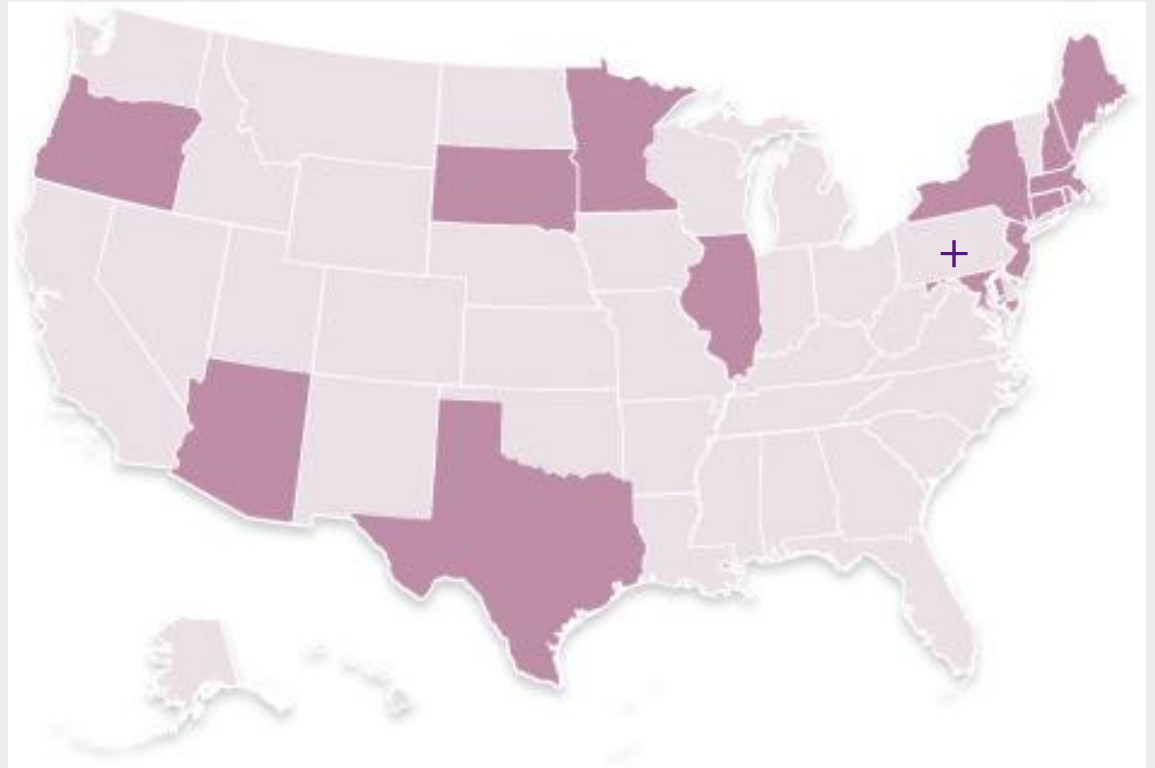
- ~95+% effective (histologic remission)
- Nutritionally complete
- Typical 2-3 month trial may achieve histologic remission in 3-4 weeks
- Quick resolution of symptoms
- Extended time to maximize diet

## DISADVANTAGES

- Formula intake fatigue
- Requires taste acclimation
- Expensive/limited insurance coverage
- Constipation
- May require administration using a tube

# U.S. Elemental Formula Coverage

Arizona  
Connecticut  
Illinois  
Maine  
Maryland  
Massachusetts  
Minnesota  
New Hampshire  
New Jersey  
New York  
Oregon  
Pennsylvania<sup>+</sup>  
Rhode Island  
South Dakota  
Texas



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/>

# Neocate Nutra™



## Neocate® Nutra

A semi-solid medical food

6 months & older



1-800-Neocate  
(1-800-636-2283)  
[www.Neocate.com](http://www.Neocate.com)

## What is Neocate® Nutra?

The first 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.

For a collection of tasty Neocate Nutra recipes, visit [www.neocate.com/help-for-parents/guides/download-guides](http://www.neocate.com/help-for-parents/guides/download-guides) and download the Neocate Nutra Recipe Guide.

## To Order Neocate Nutra:

- Visit [www.neocate.com](http://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 respules.  
(Do not use the 1 mg/2 mL respules 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 respules (1 mg total) of budesonide and mix it into a slurry.

**2 mg for patients > 10 years old**

Use budesonide 0.5 mg/2 mL respules.  
(Do not use the 1 mg/2 mL respules 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 respules (2 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.

Reference: Hatt EJ, Lee J, Fried A, Ngo P, McDonald D, Rubinstein E. Neocate® Nutra is as effective as sucralose as a delivery vehicle for oral viscous budesonide to treat eosinophilic esophagitis in children. North American Society for Pediatric Gastroenterology Hepatology and Nutrition Annual meeting, Chicago, IL, October 2013.

These recipes were developed at Boston Children's Hospital.

# Allowable Candies and Drinks for Elemental Diets

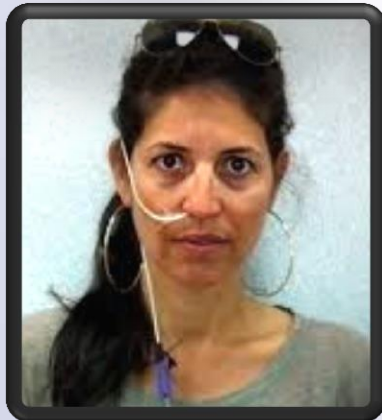
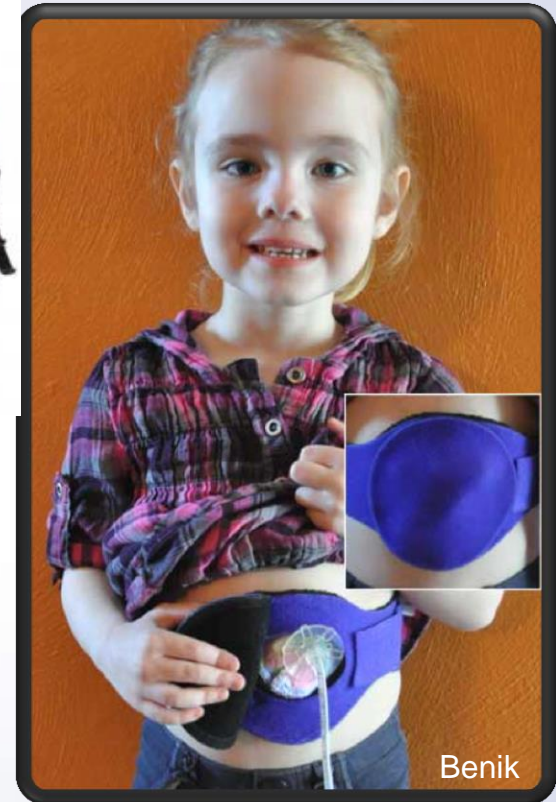
- Candies and drinks should contain only sugar and **ARTIFICIAL** flavors and colors.
- Check the label on every product, every time it is purchased. Manufacturers can change product formulations any time without notice. Also, online product information can differ from ingredient list on food label.
- **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>

**Neocate® DRI Calculator - For Healthcare Professionals**

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1) **For which Nutricia product would you like to view nutrient content?**

**Neocate Junior, Unflavored**

*Click in green cell : Use drop-down list to select Product*

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.



**NUTRICIA**  
**neocate**

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

**600 calories**

*Click in green cell: Type in value, Press [enter]*

= 2516 kJ

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	AI 500 mcg RE	72%
Vitamin D <sub>3</sub>	11.9 mcg 477 IU	AI 10 mcg 400 IU	119%
Vitamin E	8.4 mg α-TE	AI 5 mg	168%
Vitamin K	24.1 mcg	AI 2.5 mcg	964%
Thiamin (B <sub>1</sub> ) <sup>†</sup>	0.77 mg	AI 300 mcg	255%
Riboflavin (B <sub>2</sub> )	1.2 mg	AI 400 mcg	301%
Vitamin B <sub>6</sub>	0.60 mg	AI 300 mcg	201%
Vitamin B <sub>12</sub>	2.4 mcg	AI 0.5 mcg	477%
Niacin (B <sub>3</sub> )	5.4 mg	AI 4000 mcg	135%
Folic Acid	179 mcg	AI 80 mcg	224%
Pantothenic Acid (B <sub>5</sub> )	2.4 mg	AI 1800 mcg	132%
Biotin	18.1 mcg	AI 6 mcg	301%
Vitamin C	56.0 mg	AI 50 mg	112%
Choline	179 mg	AI 150 mg	120%
Inositol	132 mg	-	-



# Scenarios for Elemental Formula Use

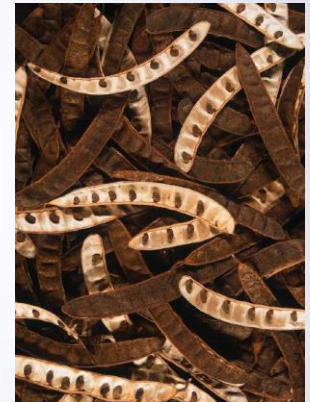
- ◆ **Supplemental formula use:**

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

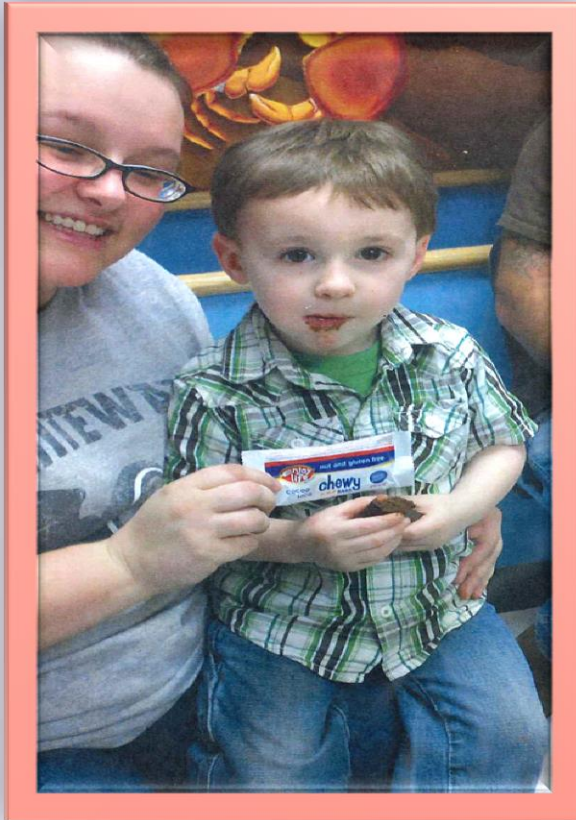
- ◆ Eliminate foods that causes most food allergies – designated by the 2004 FALCPA

- 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

<sup>16</sup>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:

Antigen	Percent (%)
Milk	75
Wheat	26
Egg	17
Soy	10
Peanut	6

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

<sup>17</sup>Kagawalla et al. *J Pediatr Gastroenterol Nutr.* 2011 Aug;53(2):145-9

# 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

**Skin Prick Test (SPT)**



<sup>6</sup>Henderson CJ et al. *J Allergy Clin Immunol.* 2012 Jun;129(6):1570-8.

# 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= ½ 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?

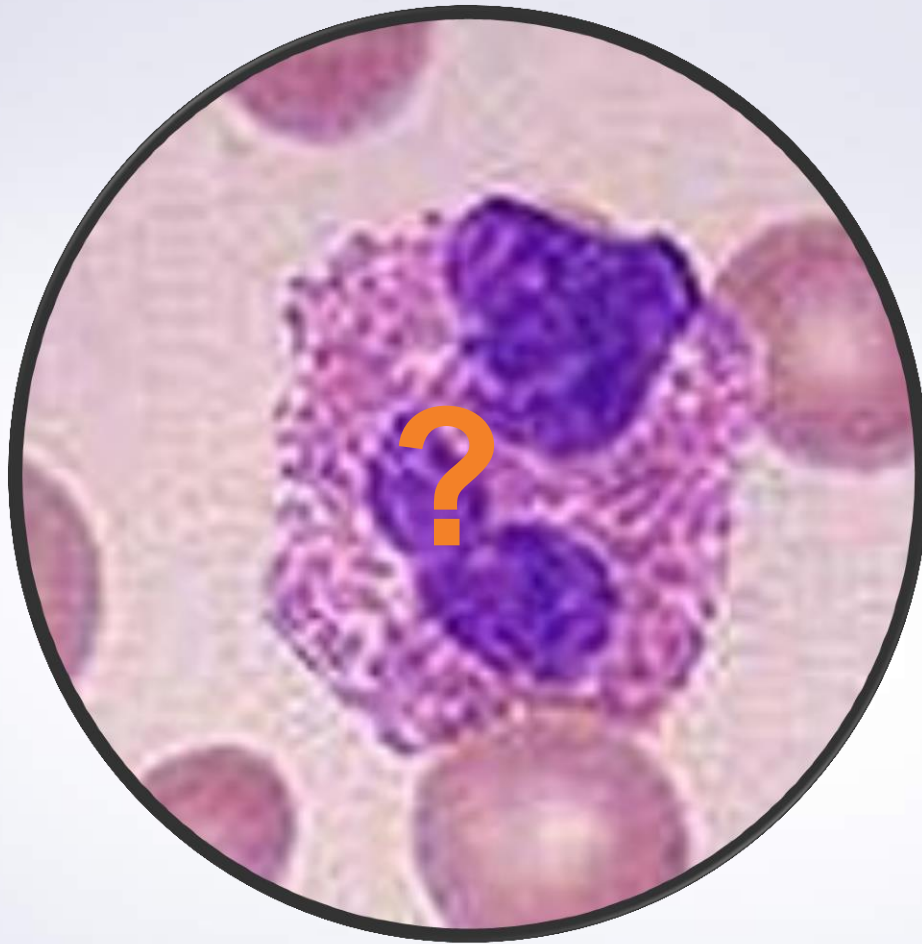
- ◆ Achieve least restrictive diet possible
- ◆ Nutritionally complete to foster growth
- ◆ Adaptation and social integration of diet with lifestyle
- ◆ Maintain histologic remission



# Food Hypersensitivity Listserv

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

[Alexia.Beauregard@choa.org](mailto:Alexia.Beauregard@choa.org)



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