Food Allergy and Eosinophilic Esophagitis

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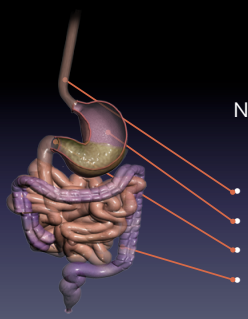
Eosinophilic Esophagitis (EoE)

- *Eosinophilic esophagitis represents a chronic, immune / antigen mediated, esophageal disease characterized clinically by symptoms related to esophageal dysfunction and histologically by eosinophil-predominant inflammation."*
- Diagnosed is based on clinical-pathologic findings on biopsy with greater than 15 eosinophils/HPF
  - Exclude other causes of esophageal eosinophilia
    - GERD, Celiac, IBD, Allergic Rhinitis
- EoE is a lifelong chronic condition

Liacouras, JACI 2011; Spergel et al *J Pediatr Gastroenterol Nutr* 2009

Gastrointestinal Eosinophils

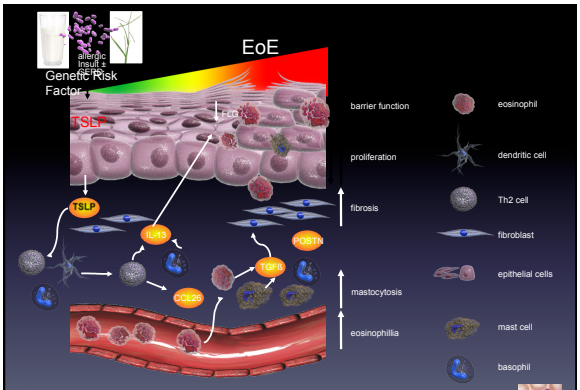


Normal values, per 400x microscopic field:

- Esophagus (0)
- Gastric antrum (2-20)
- Duodenum (2-20)
- Colon (10- 50)

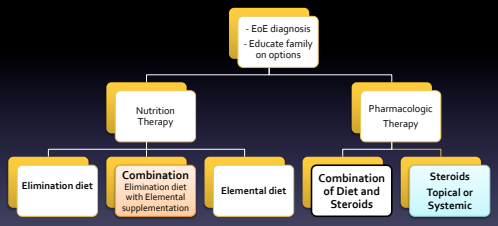
Other Causes of Eosinophilia

- GERD
- Celiac
- IBD
- Fungal Infection
- Allergic Rhinitis
- Drug Allergy



The role of Atopy in EoE

Treatment Options



Pharmacologic Therapy

Systemic Steroids – effective at improving symptoms and histology of EoE in 95% of pts

- Upon discontinuation, 90% had recurrence of symptoms
- *(Long term use) Side effects*: bone abnormalities, poor growth, adrenal suppression
- May be needed short term for extreme cases

Topical/swallowed Steroids – less toxic to pt while still 50-85% effective

- A mainstay of EoE treatment in adults and children.
- Upon discontinuation almost all patients have a recurrence of symptoms
- Often, large doses needed
- *Side effects*: esophageal candidiasis

Liacouras et al, *Clin Gastroenterol Hepatol* 2005
Furuta et al, *Gastroenterology* 2007

Food Avoidance Therapy

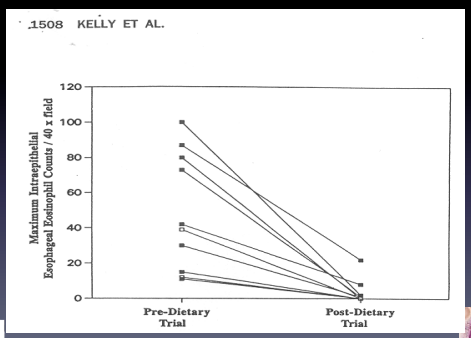
Link Between Food Allergy and EoE

- Dobbins (1977): 51 yo with GERD, food allergy and esophageal eosinophilia
- Kelly and Sampson (1995)
  - 10 patients (5 yr range: 8 mo-12.5 yr)
  - Given amino-acid based formula (> 6 weeks)
    - Neocate® or Neocate 1+®
  - 6 prior Nissen fundoplication
  - Endoscopy pre- & post-trial

Dobbins et al. *Gastroenterology.* 1977;72:1312-1316.
Kelly et al., *Gastroenterology.* 1995; 109: 1503-12
Van Rosendal et al. *Am J Gastroenterol.* 1997;92:1054-1056.

Kelly, 1995

Results



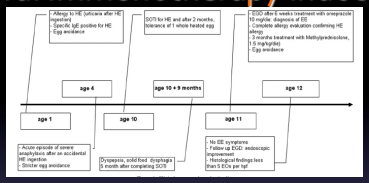
Dietary Management
Amino Acid-Based Formula

160 Patients	Pre-Diet	Post-Diet	P value
Eosinophils/ HPF	38.7 ± 10.3	1.1 ± 0.6	<0.001
Dysphagia	30	1	<0.01
GERD Symptoms	134	3	<0.01

- 172 patients (128 nasogastric tubes, 32 oral, 4 failed, 8 noncompliant)
- Patients evaluated 4-6 weeks after starting diet

Liacouras et al, Clin. Gastroenterol Hepatol 2005

Oral Immunotherapy induces EoE



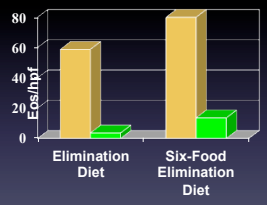
- Seen after egg, milk and peanut OIT
- Incidence about 5-20%
- Indicates foods causes EoE and it is not TH2 mechanism

Ridolo et al, Annals of Asthma Allergy Immunology 2011: Abstracts: 83 , 87, 91, 94, 103

How to Select the foods?

Selective Diet: Guess

- 60 children
  - 35 children on elimination diet of milk, soy, wheat, egg, peanut and seafood
  - 25 children on elemental diet
- Repeat endoscopy-6 weeks later
- 74% of six-food diet had < 10 eos/hpf
- 88% of elemental diet had <10 eos/hpf



Kagalawa et al. Clin Gastro Hepatol 2006

SFED follow-up

- Single Food Reintroduction in 36 children
- 74% to milk
- 26% to wheat
- 17% to egg
- 10% to soy
- 6% to peanut
- Single food in 72%, 2 foods in 8% and 3 foods in 8%

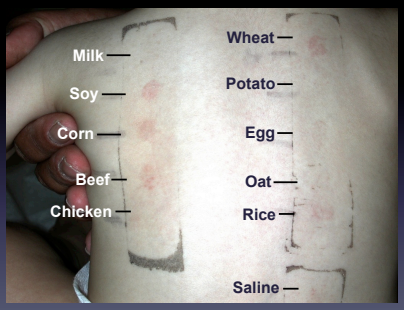
Kagalwalla et al. JPGN 2011

Most Common Foods in EoE

Food	EoE by Bx	IgE Reactions	EoE by Symptoms	Total
Milk	168	25	145	338
Egg	43	44	81	168
Soy	41	10	74	125
Wheat	55	2	64	121
Peanuts	16	44	42	102
Beef	27	0	61	88
Corn	31	0	51	82
Chicken	25	1	51	72
Potato	19	0	33	52
Pork	16	0	30	46

Food Allergy Testing: Skin Test

Finn Chambers® Used in Patch Testing



Food Testing in EoE

- 74% Atopic (asthma, ARC, or AD)
- 1/3 have negative skin tests
- Most common foods were
  - Egg, soy,milk, peanuts, beef, chicken, wheat, corn, peas, and potato
- 1/4 have negative APT

  -1/8 have both negative SPT and APT
  - Wheat, corn, soy, milk, beef, rice, chicken, egg, rye, oat, and potato

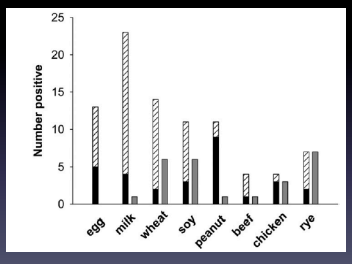
Predictive Values: Combination of SPT and APT

Food	Combined SPT and APT			
	PPV	NPV	Specificity	Sensitivity
Milk (n = 99)	93.0%	32.4%	84.6%	52.9%
Egg (n = 38)	65.5%	86.6%	86.7%	85.7%
Wheat (n=37)	73.7%	99.1%	80.8%	85.7%
Soy (n = 25)	43.2%	92.6%	75.9%	67.9%
Beef (n=21)	48.4%	96.2%	84.9%	65.2%
Chicken (n=20)	46.3%	99.0%	83.3%	84.0%
Corn (n=17)	62.5%	98.6%	81.7%	95.0%
Potato (n=12)	47.4%	98.2%	91.5%	81.8%
Rice (n=11)	32.3%	99.0%	82.5%	90.9%
Pork (n = 11)	38.5%	97.5%	93.1%	62.5%

Spergel et al, JACI 2007 and unpublished data

Specific IgE

- 53 adult patients
- 80% had positive sIgE to food or aeroallergens
- sIgE was most sensitive



Hatched (sIgE), Black (SPT), APT (Gray)

Erwin et al, J Allergy Clin Immunol 2010

What method is best?

Method	SPT/APT	MILK	Milk, Egg, Wheat	SFED	SPT/APT + Milk
Rate of Resolution	57%	30%	48%	60%	77%

- Retrospectively examined all patients with defined food identified
- Excluded patients on ICS or anti-IL5
- Examined which diet method lead to normalization of histology

Nutrition Therapy

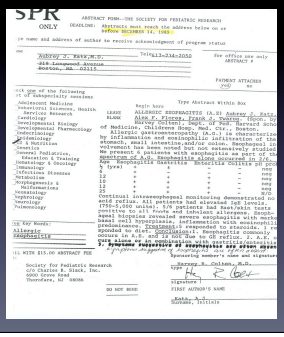
Common Challenge - Diet Adherence
Nutritional Balance

Nutrition Therapy

Chalen et al. JAMA, 2010

Nutrition Therapy	Challenges/Barriers
6 Food Elimination	•May remove unnessecary foods •Increases risk of nutritional deficiencies •Potential growth problems •Symptoms may persist •Diet compliance •QOL •Cost
Tailored Elimination	•Increased risk of nutritional deficiencies •Potential growth problems •Lack of reliable allergen tests •Extensive allergy testing done on pt •Diet compliance •QOL •Cost
Elemental	•Diet compliance •QOL •Psychosocial developmental •Volume – NG or PEG tubes often needed •Cost

What have we learned in 28 years? Katz, Flores, Twarog SPR 1983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ABSTRACT FORM—THE SOCIETY FOR PEDIATRIC RESEARCH

- Positive on Skin tests; highly atopic
- Response to Diet and Steroids
- pH probe negative
- Basal cell hyperplasia

Summary: Treatment in EoE

•**Pharmacologic therapy** has been shown effective but long term use and possible side effects must be considered

•**Elimination diet** is effective - keeping in mind nutrient deficiencies may occur

•**Elemental diet** is the most effective nutrition therapy. Compliance/cost may be an issue for some patients

•**Combination of diet and steroids** for difficult to treat patient

•**Combination of elimination diet with elemental supplementation may be the best fit for patients and families dealing with EoE.**

"Dietary therapy should be considered as an effective therapy in all children diagnosed with EoE"

Furuta et al, *Gastroenterology* 2007
Feuling & Noel, *Nutr Clin Pract* 2010

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