

Elemental, Empiric or Directed for EoE: Oh My!

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Disclosure

I have the following financial relationship to disclose:

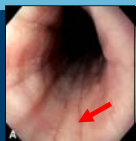
- Consultant for: None
- Grant/Research support from: NIH, FDA, APFED, RFED, Buckeye Foundation, Takeda Foundation, Meritage Pharma, Inc.
- Honoraria from: Speaker's Bureau for Nutricia

I will not discuss off label use and/or investigational use of any pharmaceutical in my presentation.

Objectives

1. Natural history of EoE
2. Different Dietary approaches
3. Efficacy of different diets

Remodeling of the esophagus in eosinophilic esophagitis



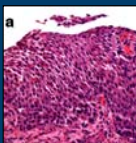
Furrowing



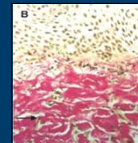
Stricture



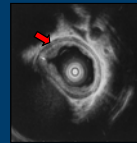
Trachealization



Basal cell hyperplasia

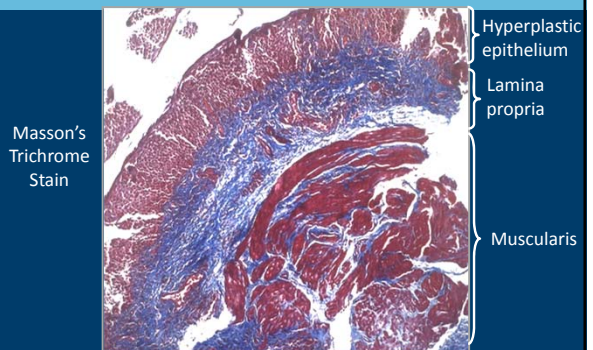


Subepithelial fibrosis



Muscularis propria

Fibrosis in the lamina propria extending into the muscularis of mid-esophagus in a child with EoE



Masson's Trichrome Stain

Hyperplastic epithelium
Lamina propria

Muscularis

Natural History of EoE

Alan & Robert H. Laine
Children's Hospital of Chicago

- For every 10-year increase in age the odds of developing fibrostenotic EoE more than doubled.¹

1. Dellon E et al. *Gastrointestinal Endosc* 2014; 79:577-85.
2. Schoenfer A et al. *Gastroenterology* 2013; 145: 1230-36.

Conceptual model of consequences of remodeling

Alan & Robert H. Laine
Children's Hospital of Chicago

Hirano I, Aceves S. *Gastro Clin North Am* 2014;43(2):297-316.

Eosinophilic Esophagitis Historical

Alan & Robert H. Laine
Children's Hospital of Chicago

1995 Kelly & Sampson

- A dense accumulation of eosinophils in the esophagus of 10 children with intractable GERD unresponsive to anti-reflux medical therapies
- Symptoms and histology improved with elimination of intact protein from their diet and controlled reintroduction of standard foods resulted in recurrence of symptoms
- On subsequent challenge specific foods responsible for symptoms identified in 9/10:
 - Cow's milk (7), soy (4), wheat (2), peanut (2) & egg (1)

What are the different types of dietary treatment?

Empiric diet

- Elemental diet**- An exclusive amino acid based formulation
- SFED**- Exclusion of selected foods: cow's milk, wheat, egg, soy, peanuts/tree-nuts and fish/shellfish
- 4-FED**- Exclusion of the four most common trigger foods of EoE: cow's milk, wheat, egg and soy
- Milk Elimination**- Exclusion of the most common trigger food of EoE: cow's milk

Directed elimination diet
Exclusion of food proteins based on the results of allergy testing

- Skin Prick Testing
- Skin Prick & Patch Testing
- Patch Testing Only
- PPT

Amino acid diet is highly efficacious in children and adults

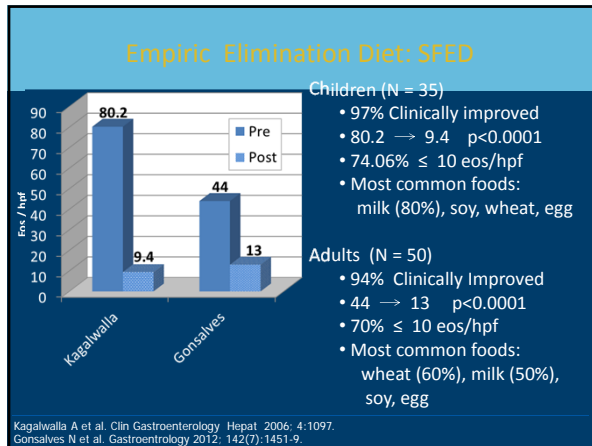
Study	Pre (eos/hpf)	Post (eos/hpf)
Kelly	41	0.5
Liacouras	38.7	1.1
Kagalwalla	58.8	3.7
Peterson	54	10

- Kelly (n=10)**
 - 10/10 Clinically Improved
 - 41 → 0.5 p=0.005
- Liacouras (n=164)**
 - 160/164 Clinically resolved
 - 38.7 → 1.1 p<0.001
- Kagalwalla (n=25)**
 - 25/25 Clinically Improved
 - 58.8 → 3.7 p<0.001
- Peterson (n=18)**
 - No clinical improvement
 - 54 → 10 p=0.0006

Kelly K et al. *Gastroenterology* 1995; 109: 1503-1512.
Liacouras C et al. *Clin Gastroenterology Hepat* 2005; 3: 1198.
Kagalwalla A et al. *Clin Gastroenterology Hepat* 2006; 4: 1097.
Peterson K et al. *American J of Gastroenterology* 2013. Online.

Limitations of Elemental Diet

- Poor taste and palatability ✓
- NG or PEG requirement to deliver required volume and calories ✓
- Monotonous
- Compliance ✓
- Cost
- Food reintroduction process is long & requires multiple endoscopies often over months & years.



Limitations of SFED

- Simultaneous elimination of multiple foods, if even for a limited time, is difficult.
- Multiple endoscopies to identify the incriminating food trigger(s).

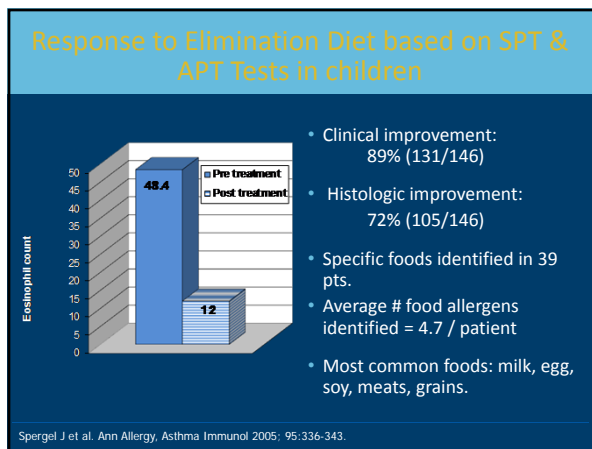
Types of Allergy testing performed in EoE

- Serum food specific IgE
- Skin prick tests ✓
- Atopy patch testing ✓

Diets based only on skin prick test (SPT)?

- Teitelbaum
All 8 children failed to demonstrate clinical improvement with elimination of foods that tested positive to SPT.
- Noel
All 10 children failed to respond to dietary elimination of food antigens identified by SPT.
- Gonsalves
SPT accurately predicted the causal foods in only 13%.
- Lucendo
SPT sensitivity 22.8% and specificity 78.9%

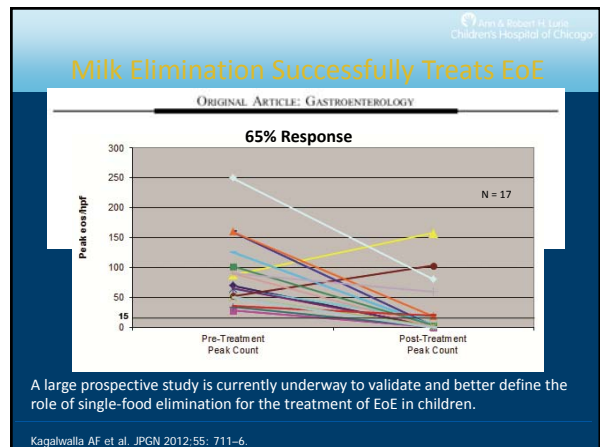
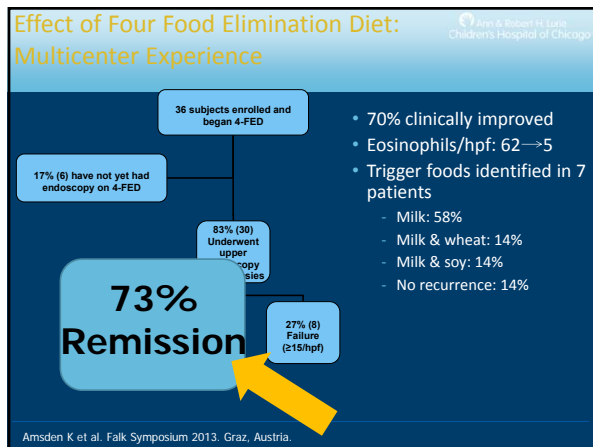
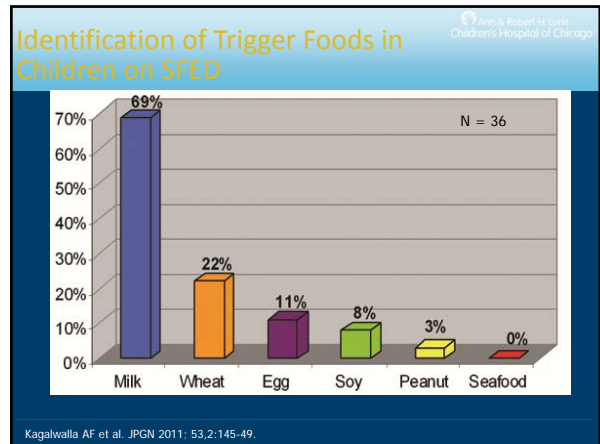
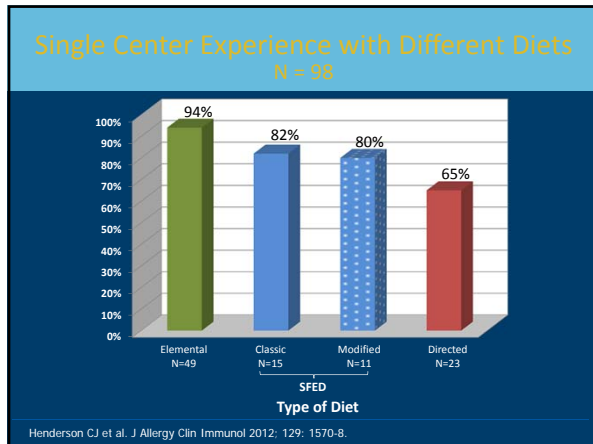
Teitelbaum JE et al. Gastroenterology 2002; 122:1216-1225.
Noel RJ et al. Clin Gastroenterol Nutr 2004; 2: 568-575.
Gonsalves N et al. Gastroenterology 2012; 142: 1451-1459.
Lucendo AJ et al. J Allergy Clin Immunol 2013; 131: 797-804.



APT in adults & children is not uniformly reproducible in different centers

Author	APT Positive	Histological Remission
Spergel	85% (130/146 children)	72%
Molina-Infante	23% (5/21 adults)	33% (5/15)
Rizo Pascual	12% (2/17 children)	42% (5/12)
Paquet B	14% (8/57 children)	N/A
Assad A	37% (14/38 children)	N/A
Peterson K	11% (2/18 adults)	N/A

Spergel JM et al. Ann Allergy Immunol 2005;95:336-43.
Molina-Infante J et al. J Allergy Clin Immunol 2012; 130: 1200-2.
Rizo Pascual JM et al. J Investig Allergol Clin Immunol 2011;21: 59-65.
Paquet B et al. J Allergy Clin Immunol 2013; 131(2):613.
Assad AH et al. J Allergy Clin Immunol 2007;119: 731-8.
Peterson K et al. Am J Gastroenterol 2013; 108(5):759-66.



Case study

JF a 12 year old small for age. Caucasian male presented with a six month intermittent history of food impaction and antecedent history of slow eating, requiring fluids to wash down solids.

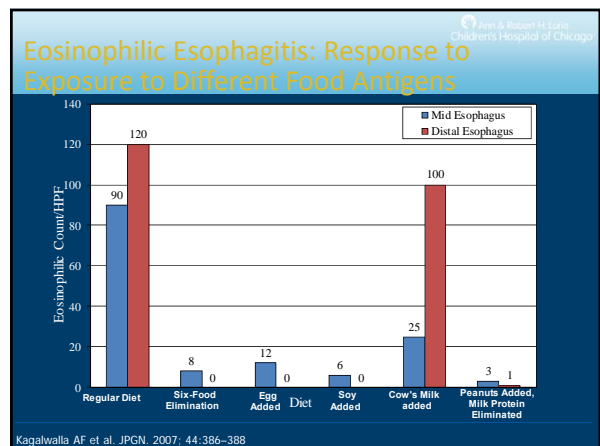
EGD after 8 weeks of twice daily PPI demonstrated isolated esophageal eosinophilia.

Different treatment options including topical steroids and elimination diets; the efficacy of different approaches and their potential drawbacks discussed with family.

Family indicated preference for empiric six food elimination diet.

Dietitian met with the family and educated and familiarized the family on the elimination diet.

EGD repeated six weeks after the SFED.



Elimination food antigens from the diet results in endoscopic improvement

Pre Diet Post Diet Reintroduction of Wheat

Gonsalves, Yang, Doerfler, Ritz, Ditto, Hirano. Gastroenterol 2008;134(4) A727.

Resolution of Esophageal EMT in Subjects with EoE Correlates with Eosinophil Load

Pre Post

All Steroid SFED Elemental

EMT Score/hpf

Post-Rx Pre-Rx

EMT Score/hpf

Eosinophils/hpf

$r = 0.827 (p < 0.001)$

Kagalwalla AF et al. J Allergy Clin Immunol 2012;129:1387-96.

Potential nutritional pitfalls of elimination diets

- Impaired growth
- Kwashiorkor
- Rickets

Christie et al. J Am Diet Assoc 2002; 102: 1648-51.
Liu T et al. Arch Dermatol 2001; 137:630-636.
Bierman CW et al. J Allergy Clin Immunol 1978;61:119-127.

Determinants of Success with Dietary Rx

- Motivated and resourceful parents
- Participation of dietitian skilled in food elimination (i.e. cross contamination)
- Acceptance of nasogastric/gastrostomy tubes for elemental diet
- Acceptance of the need for multiple endoscopies.

Different Dietary Interventions in Children & Adults: A Meta analysis

Intervention	Children (n)	Children Response (%)	Adults (n)	Adults Response (%)
Elemental Diet	429	90.8%	-	-
Six Food Elimination Diet	197	72.1%	-	-
Allergy Test Directed Elimination Diet	626	45.5%	-	-

Arias A et al. Gastroenterology 2014; 146:1639-48.