



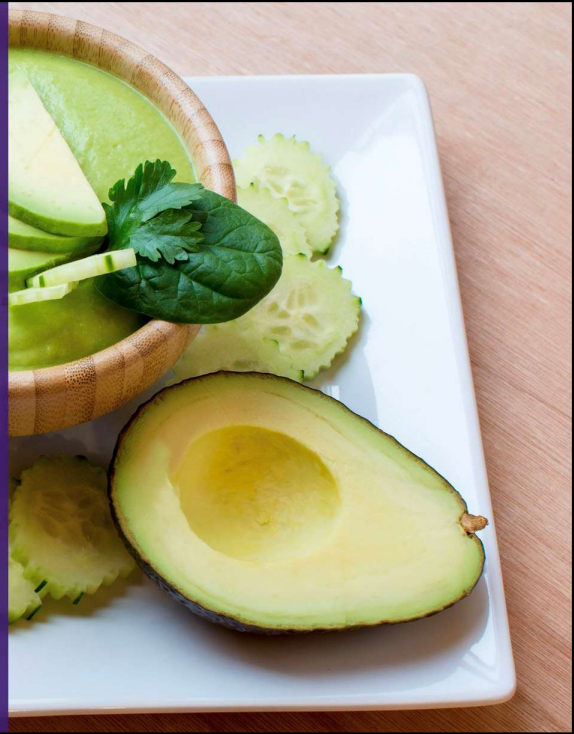
## Advocating for Diet as First-Line Management in Eosinophilic Esophagitis (EoE)

**Sally Schwartz, RD, LDN**

Ann and Robert H. Lurie Children's Hospital of Chicago

**Bethany Doerfler, MS, RDN**

Digestive Health Center, Northwestern Medicine  
June 18, 2020



## Disclosures



- Honorarium provided by Nutricia
- Nutricia speakers bureau

*The opinions reflected in this presentation are those of the speaker and independent of Nutricia North America*

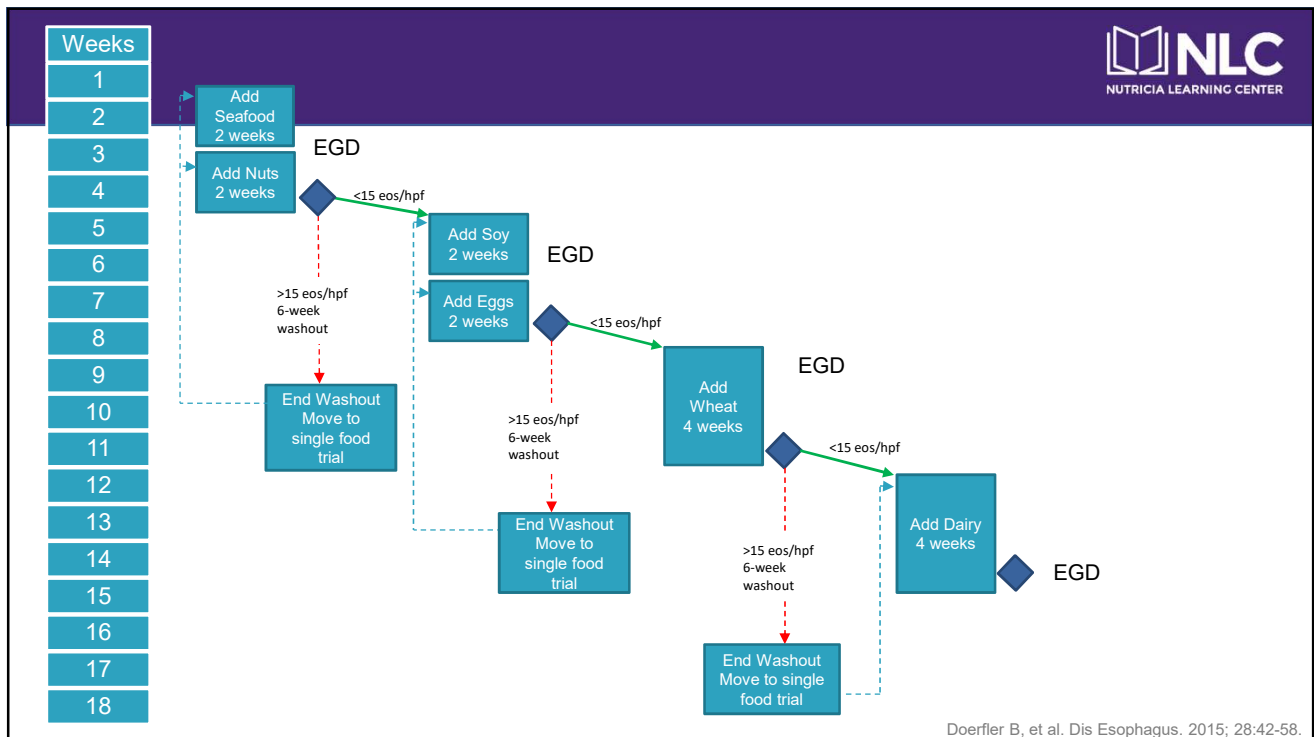
## Learning Objectives



- Implement effective nutritional and anthropometric assessments across the lifespan in patients with EoE.
- Interpret guidelines for management of eosinophilic gastrointestinal diseases (EGIDs) and the role of amino acid-based formulas (AAFs) in managing allergic bowel disorders in both pediatrics and adults.
- Identify strategies to promote successful initiation, adherence and maintenance in nutritional management among patients with EoE.

## Goals of Diet Management





## 2-4-6 Approach



Eliminate top 2 allergens: Wheat and Dairy

Four Food Elimination Diet (4FED)

Build to 6FED

Less EGD

65%-85% patients allergic to 1-2 foods

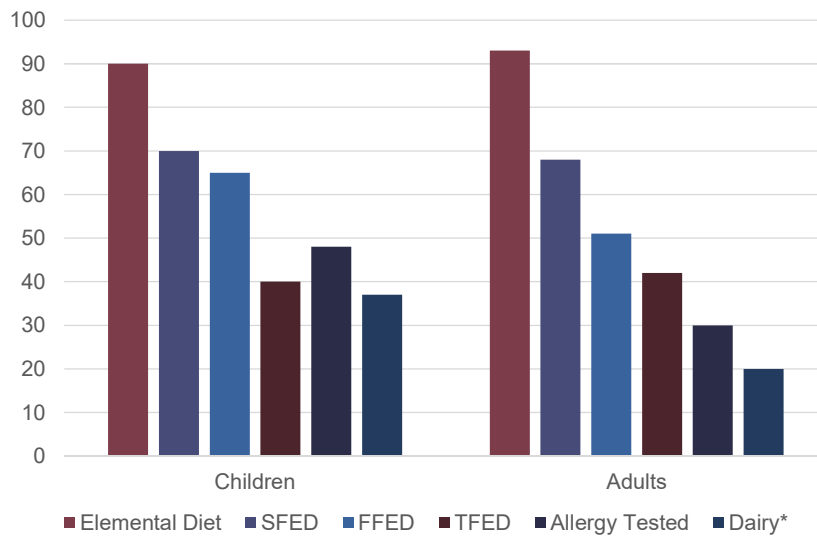
QOL?

Molina-Infante J, et al. J Allergy Clin Immunol. 2014; 5:1093-99. Lucendo AJ, et al. United European Gastroenterol J. 2017;5:335-58.

## Elimination Diets - Efficacy



Histologic remission rates broken down by age group and shown by different modalities of dietary management



\*Indirect data from prospective studies on 4-FEDs and 2-FEDs. Efficacy of milk elimination diets in children ranges from 33% to 56%.  
 Molina-Infante J, et al. J Allergy Clin Immunol. 2018;142:41-7.

## Nutritional Assessment: EGIDs



**Nutritional history:** usual intake/diet history/food preferences, supplementation, feeding environment

**Nutritional status:** anthropometric data - growth assessment (in pediatrics), nutrition-focused physical exam (NFPE)

**Feeding history:** assess for symptoms of pediatric feeding disorders and Avoidant/Restrictive Food Intake Disorder (ARFID)

- Vomiting, gagging, aversion/refusal, dysphagia/food impaction with eating
- Learned feeding difficulty: self selecting foods or textures, reducing volume/variety of foods, drinking fluids between bites

**Medical/family history:** history of EoE/allergy/atopic disease

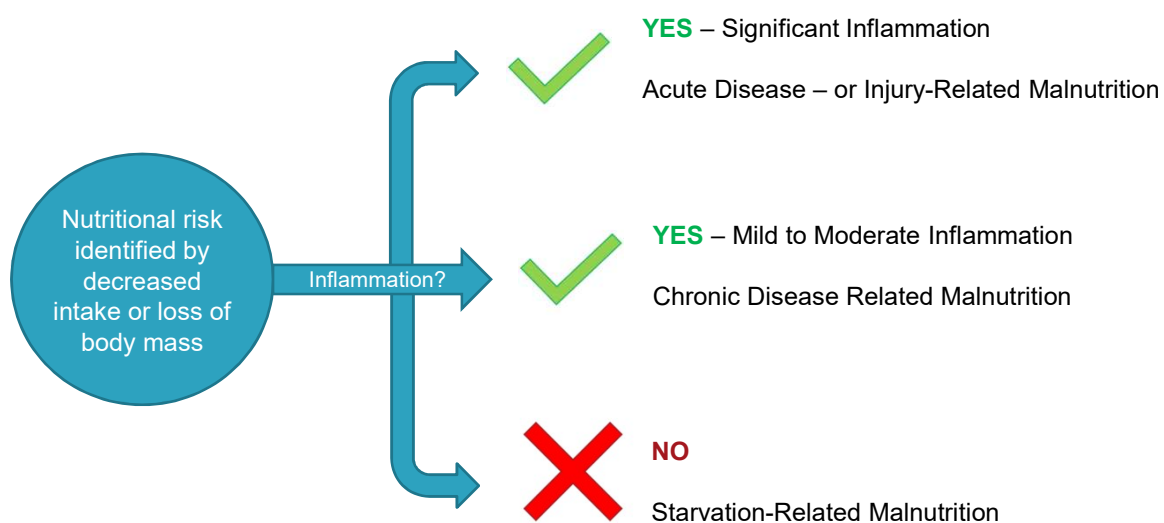
**Clinical data:** symptoms, laboratory evaluation, medications

**Psychosocial history:**

- Family eating patterns, access to food/supplemental feeding programs (WIC, food stamps)
- Lifestyle/activities, readiness of child/family for diet management, social support

Noel, et al. N Eng J Med. 2004;351:940-1. Liacouras, et al. Clin reviews in Allergy and Immunol 2011. Haas A, et al. Immunol Allergy Clin N Am. 2009; 29:67-75. Mukkada, et al. Pediatrics. 2010;126:e672-6

## Nutrition-Focused Clinical Exam: Adults AND-ASPEN Recommendations



Jensen GL, et al. JPEN J Parenter Enteral Nutr. 2019;43:32-40.

## Growth in EoE



### Growth assessment:

- More than **15% of children** with EoE were malnourished at diagnosis
- Weight, length/height, head circumference, plot on correct growth charts

### Limited research on growth needs of children with EoE

- **Jensen** - No significant difference in height z-scores between management approaches (12 mos)
  - Elemental/steroid group (exception)
- **Meyer** - Improved weight after elimination with RD support

### Extrapolate data from children with food allergies

- **Pelz** – 2 or more food allergies: reduced height for age compared to non-allergic children
- **Christie** – Cow milk allergy: decreased calcium intake

### Food avoidance in EoE has the potential for significant impact on nutritional status

- Macronutrient and micronutrient levels
- Inherent to the **extent of dietary elimination**

Pelz BJ, et al. Clin Exp Allergy. 2016;46:1431-40. Jensen T, et al. J Pediatr Gastroenterol Nutr. 2018;67:549-50. Christie L, et al. J Am Diet Assoc. 2002;102:1648-51. Meyer et al. Clin Transl Allergy. 2016;6:25.

## Picky Eater vs. Pediatric Feeding Disorders or ARFID in EGIDs?



### Feeding issues occur frequently in patients with EoE/EGID

**Picky Eating:** *Persistence of behavioral feeding patterns which result in problematic feeding situations*

**Pediatric Feeding Disorders (PFD):** *Impaired oral intake that is not age-appropriate, and is associated with medical, nutritional, feeding skill, and/or psychosocial dysfunction*

**ARFID:** *An eating or feeding disturbance as manifested by persistent failure to meet appropriate nutritional and/or energy needs*

- *The eating disturbance is not attributable to a concurrent medical condition*

### Screen for signs of disordered feedings - some symptoms age dependent

- ✓ Maladaptive feeding behaviors: self-selecting foods or textures
- ✓ Reducing volume/variety of foods
- ✓ Drinking excessively between bites
- ✓ Spitting foods from mouth
- ✓ Crying/turning away from food
- ✓ Extended mealtimes

### Referral for feeding evaluation:

- Feeding Team: Pediatric Feeding Therapist (Occupational Therapist, Speech Language Pathologist)
- Developmental psychologist
- Registered dietitian

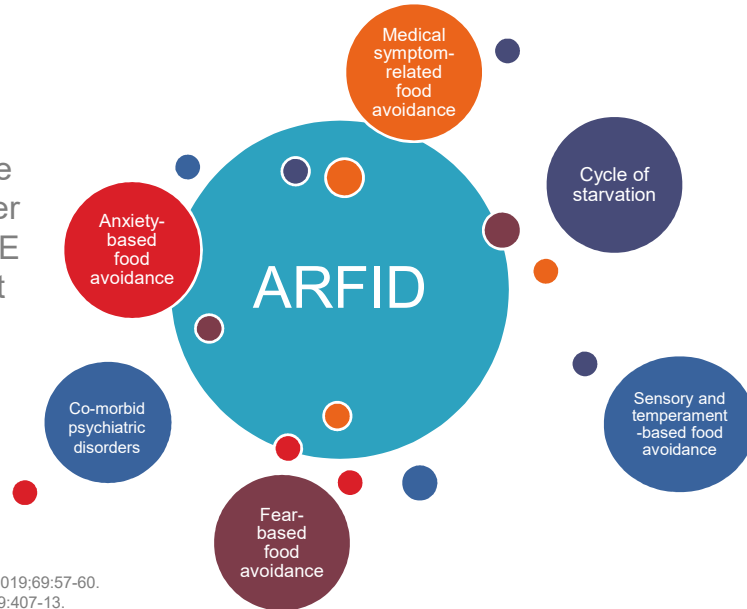
**Once GI disorder has been medically managed, feeding disorder frequently persist.**

Goday PS, et al. J Pediatr Gastroenterol Nutr. 2019;68:124-29. Illingworth, et al. J Pediatr. 1984. Haas AM, et al. Immunol Allergy Clin North Am. 2009.

## ARFID in children with EoE on elimination diets



A multifactorial model for the development of avoidant/restrictive food intake disorder in patients with EoE prescribed a strict food protein elimination diet.



Robson, et al. J Pediatr Gastroenterol Nutr. 2019;69:57-60.  
Mammel KA, et al. Curr Opin Pediatr. 2017;29:407-13.

## 2020 Clinical Guidelines for Management of EoE



### AGA Institute and the Joint Task Force on Allergy- Immunology Practice Parameters

Should an Elemental Diet Be Used in the Management of Eosinophilic Esophagitis?

Should an Empiric Food Elimination Diet Be Used in Patients With Eosinophilic Esophagitis?

Should Allergy-Based Testing Be Used for the Purpose of Identifying Food Triggers in Patients With Eosinophilic Esophagitis?

Hirano, et al. Gastroenterology. 2020;158:1776-86.



# Elemental Diet

## Strategies and Tool Box

# Elemental Diet Management



- ❑ 100% free amino acid-based formulas (AAF)
  - ❑ Several infant & child formulas (1 YO and older) available
  - ❑ Unflavored, flavored, ready-to-feed, semi-solid foods
  - ❑ Hydrolyzed formulas are NOT appropriate
  
- ❑ Formula is used to provide 100% estimated nutrition need
  - ❑ Often single food is allowed for oral stimulation
  
- ❑ Calculate all macro- and micronutrient needs (including water) and compare to how much formula the patient is actually getting on a daily basis

Groetch M, et al. J Allergy Clin Immunol Pract. 2017;5:312-324.e29.



## Elemental Diet Ins and Outs



- Remission stage: AAF is sole source of nutrition
  - During initial remission stage, may allow 1 low allergenicity food for oral stimulation
- Rapid improvement – as soon as 4 weeks to clean EGD, generally 8-12 weeks for initial trial
- Primary form of nutrition (providing >75% of nutritional needs)
  - For minimum of 9 months (varies per patient)
- Food Reintroduction Stage: varies center to center
  - Lurie Children's experience: individualized
  - Start with low allergenicity foods (3-4 foods/trial)

## Elemental Diet Challenges



- Formula is expensive, unpalatable → NG, G-tube
  - Insurance coverage: state dependent, reimbursement services offered by formula companies
  - Flavor profile improved, recipes with allowed ingredients
- Formula-only diet:
  - Young children: may deter development of oral-motor function
- Significant number of endoscopies needed to reintroduce all foods
  - Takes a very long time (years): 6-12 weeks between endoscopies
    - If inflammation is found, newest foods must be removed and added one-by-one with endoscopy to identify trigger food
- Minimum 9-12 months for significant dietary variety

Kelly K.J. et al. Gastroenterology. 1995;109:1503-12. Liacouras CA. et al. Clin Gastroenterol Hepatol. 2005;3:1198-206.

# Elemental Diet Strategies



## Tips for serving AAFs:

- ✓ Serve chilled in covered sports/straw bottle
- ✓ Trial all flavors available of AAFs
- ✓ Flavoring AAFs with allowed ingredients

## Tips for foods:

- ✓ Provide list of allowed ingredients to help prepare allowed foods
- ✓ Provide ideas on how to serve allowed foods

## Mealtime:

- ✓ Structured meals & locations for formula and foods
- ✓ Start with familiar food prep, try different forms  
 (apple slices, applesauce, baked apples)

### Flavoring AAFs

- Crystal Light™ powder: 1 tsp/8 fl oz formula
- Coffee flavoring syrups
- Vanilla/other flavoring extracts - juice (100%), fruit nectar
- 100% cocoa powder (blend it in)
- Kool-Aid® powder + sugar to taste if needed, (particularly the citrus flavors helps mask the amino acid taste)
- Sweet Leaf® Sweet Drops®



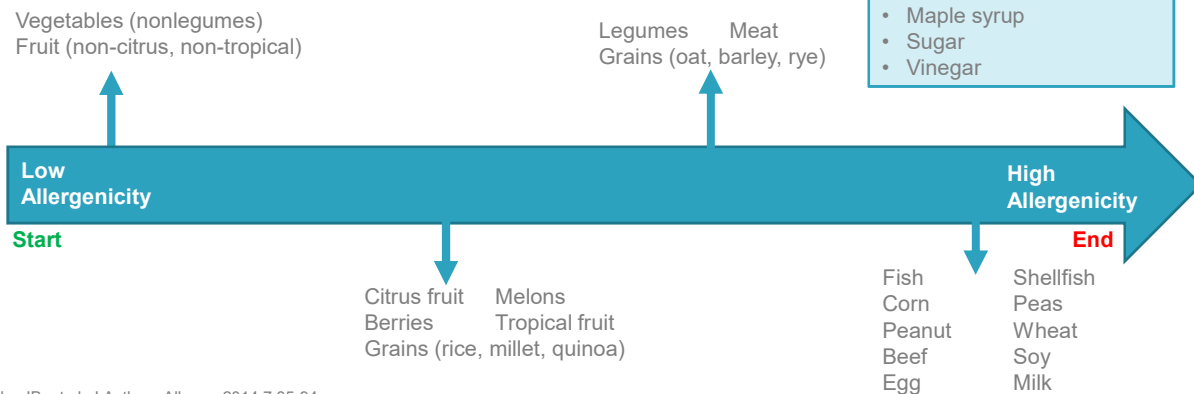
Crystal Light™ is a trademark of Kraft Foods  
 Kool-Aid® is a registered trademark of Kraft Foods  
 Sweet Leaf® Sweet Drops® is a registered trademark of Wisdom Natural Brands

# Food Reintroduction



- Allowed “freebie” foods/food additives
- Allow 1 low allergenicity food – grape, apple
- Slowly reintroduce foods based on allergenicity

- ### “Freebies”
- Artificial flavors, colors, sweeteners
  - Baking soda and powder
  - Corn syrup or starch
  - Dextrose
  - Maltodextrin
  - Molasses
  - Maple syrup
  - Sugar
  - Vinegar



Wechsler JB, et al. J Asthma Allergy. 2014;7:85-94.



# Elimination Diet

## Strategies and Tool Box

### Elimination Diet Ins & Outs



- ❑ Remission Stage: ~ 8-12 weeks
- ❑ Reintroduction stage: foods eliminated are added back one at a time
  - ❑ Monitoring symptoms, repeat endoscopies
- ❑ High risk of nutritional deficiencies & malnutrition with any elimination diet
  - ❑ Assess for deficiencies
  - ❑ Recommend AAF, multivitamins
- ❑ Education: Initial and ongoing
  - ❑ Label reading, appropriate substitutes, cross contamination
  - ❑ Back to basics of healthy meals

## EoE Elimination Diets: Nutrition Implications

**Six food elimination diet (6FED):** Cow milk, soy, egg, wheat, peanut, tree nut, fish and shell fish:

- Risk of protein, calcium, vitamin D, iron, fiber, zinc, B vitamins, selenium and essential fatty acid deficiencies

**Four food elimination diet (4FED):** Cow milk, soy, egg, wheat

- Risk of protein, calcium, vitamin D, iron, zinc, fiber, selenium and B vitamin deficiencies

**Two food elimination diet (2FED):** Cow milk and wheat

- Risk of protein, calcium, vitamin D, iron, fiber and B vitamin deficiencies

**Single food elimination (1FED):** Cow milk

- Risk of protein, calcium and vitamin D deficiencies

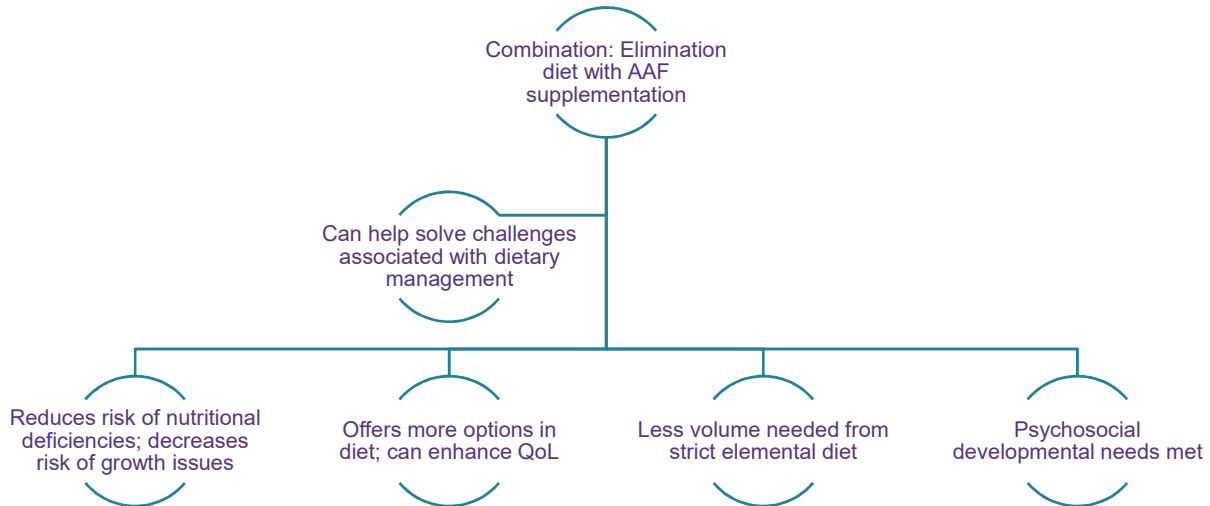
## Managing Diet to Ensure Nutrient Adequacy

- ▣ Individualize education to meet needs of patient
- ▣ Focus on nutrient-rich whole foods and guidance on balanced diet
- ▣ AAF should be considered for supplementation:
  - For younger patients (< 2 yrs.)
  - Patients that are malnourished
  - Patients that have limited intake
- ▣ Vitamin/mineral supplementation - may need B vitamins, calcium, vitamin D, fiber, zinc, iron, selenium



Wechsler JB, et al. J Asthma Allergy. 2014;7:85-94. Groetch M, et al. J Allergy Clin Immunol Pract. 2017;5:312-24.e29.

## Initiate Elimination Diet With AAF Supplementation to Help Ensure Nutrients Are Not Lacking From Diet



Feuling, et al. Nutr Clin Pract. 2010;25:166-74. Spergel JM, et al. Gastrointest Endosc Clin N Am. 2008;18:179-94.

## Focus on What CAN be Eaten





- ❑ Often patients are overly restrictive, focusing on “safe foods”
- ❑ Focus nutritional counseling on **what can be eaten** rather than what is being excluded
  - Nutritionally appropriate alternatives
- ❑ ChooseMyPlate.gov
  - Lists of foods to fill common food groups
  - Meal Proportions:
    - 1/2 vegetable, 1/4 grain, 1/4 protein
    - Allowed milk substitute or formula
    - Healthy fats, moderate added sugars




<https://www.choosemyplate.gov/>

WHAT TO EAT CHECKLIST







Seeds




100% wheat-free whole grains




Beans & pulses




Red & purple fruits & veggies




Olive oil & vegetable fats




Lean protein



Orange & yellow fruit & veggies




Non-dairy yogurt




Homemade foods

Comparing Milk and Allowed Substitutes



1 cup liquid 240ml	Cow's Milk				Non- Dairy Milk beverage*									Elemental formulas		
	Whole	2%	1%	skim	Almond	Cashew	Coconut	Flax-Seed	Hemp	Oat	Pea	Rice	Soy	30kcal/oz Powder	30kcal/oz RTF unfl	30kcal flavor
Calories	150	120	110	90	30-100	25-80	45-90	55	70- 170	130	115	110	90	240	240	240
Protein (g)	8	8	8	8	1-5	0-1	0-1	0	2-4	4	8	1	6	8.2	7.1	6
Fat (g)	8	5	2.5	0	3	2-3.5	5	2.5	5-6	2.5	5	2.5	3.5	11	12	8
Carbs (g)	13	12	13	12	9-22	1-20	8-13	9	1-35	24	11	20	15	25	25	35
Sugar (g)	12	12	8	12	7-20	0-18	0-9	9	0-23	19	10	13	9	2.2	12.3	11.5
Calcium (mg)	300	300	300	300	300	100-450	100-450	300	400	350	450	300	400	283	280	147
Vitamin D (IU)	120	120	120	120	110	125	125	00	150	120	150	120	120	191	190	74

\*There may be slight variations with non-dairy milk nutrients, this is an average



- ✓ Label reading is imperative: caution for possible contamination
- ✓ Rice milk should not be given as primary beverage to children <4 YO because of arsenic content
- ✓ Always choose calcium & vitamin D enriched

## Getting Enough Protein



<u>PROTEIN FOODS</u>	<u>GRAMS PROTEIN</u>
3 oz fish, chicken, beef or pork (3 oz = size of a deck of cards)	21
1 cup cooked rice/quinoa/oats	6-8
1 cup hemp, soy or pea milk	6-8
1 scoop of vegan protein powder	16-20
6 scoops of AAF	~8
1/2 cup cooked beans or legumes	7

## Safe and healthy snacks



### Sweet



- Homemade rice cereal treats & berries
- Fruit: fresh or canned
- GF oatmeal with cinnamon and apples
- Trail mix: dairy free chocolate chips, freeze-dried fruit, seeds, GF cereal
- Sorbet
- Smoothie: pureed fruits, veggies and coconut milk or AAF
- Coconut yogurt parfait: cereal and berries
- Power balls: GF oats, seed butter, dried apricots or dates

### Savory



- Corn or rice chips & salsa
- Brown rice cake: avocado and tomato slices
- Popcorn (add nutritional yeast for cheesy flavor)
- Lentil chips
- Roasted chick peas
- Hummus or bean dips & veggies
- Pureed tomato or squash soup & rice crackers

## Supplements



- Consider daily complete multivitamin
- Add additional supplements as indicated by diet and stage of life
  - Calcium, vitamin D, iron
- Be mindful of additional medication use and interactions
- Check labels for allowed ingredients based on elimination diet

Proton Pump Inhibitors	Anti-Epileptic Medications
Decrease gastric pH	Alter vitamin D metabolism
Calcium citrate vs calcium carbonate	Consider increased supplementation

## Nutritional Monitoring Elimination Diets



- ✓ Physical assessment:
  - ✓ Growth parameters – weight, height, BMI or weight/length ratio
  - ✓ NFPE - malnourished, or gaps in diet
- ✓ Assessment of patients dietary intake (3-day food record, food frequency questionnaire, 24 hr. recall)
- ✓ Biochemical monitoring:
  - ✓ If nutrient deficiencies are suspected: CBC, CMP, pre-albumin, vitamin D, CBC, iron (ferritin, iron, and total iron binding capacity), zinc, vitamin B12, selenium, and folate
  - ✓ Follow up monitoring determined individually



Wechsler JB, et al. J Asthma Allergy. 2014;7:85-94. Groetch M, et al. J Allergy Clin Immunol Pract. 2017;5:312-24.e29.



## RDN Education Checklist



### Education: Individualized to each patient and family

- ✓ Appropriate substitutes: shopping lists, meal planning, recipes
- ✓ Correcting any micronutrient deficiencies
- ✓ Cross – contact
- ✓ Label reading
- ✓ Realistic diet plan: focus on balanced nutrition and whole foods
- ✓ Resource identification: websites, formula information, specialty food products, EGIDs support groups, parent mentor programs, EoE family sharing tips

## Resources



**AAAAI:** American Academy of Allergy, Asthma, and Immunology  
[www.aaaai.org](http://www.aaaai.org)

**APFED:** American Partnership for Eosinophilic Disorders:  
[www.apfed.org](http://www.apfed.org)  
- EGIDs support for families, and healthcare providers

**CoFAR:** Consortium of Food Allergy Research  
<http://www.cofargroup.org>  
- Food allergy education program

**CURED:** Campaign Urging Research for Eosinophilic Disease  
[www.curedfoundation.org](http://www.curedfoundation.org)  
- EoE research and education

**FARE:** Food Allergy Research & Education  
[www.fare.org](http://www.fare.org)  
– Allergy education/research

**Kids with Food Allergies**  
[www.kidswithfoodallergies.org](http://www.kidswithfoodallergies.org)  
– Family supported website, food allergy alerts, recipes database, new food reviews

**NASPGHAN:** North American Society of Gastroenterology, Hepatology & Nutrition  
[www.naspghan.org](http://www.naspghan.org) & [www.gikids.org](http://www.gikids.org)  
– Parent education webpage

**Project Allergy**  
[www.Projectallergy.com](http://www.Projectallergy.com)  
- Food allergy resource

**Snack Safely**  
[www.snacksafely.com](http://www.snacksafely.com)  
– Food allergy resource

**Spokin**  
[www.spokin.com](http://www.spokin.com)  
– Web page and app managing resources

Bashaw H, et al. JPEN J Parenter Enteral Nutr. 2020;44:600-9.

Doerfler B, et al. Dis Esophagus. 2015; 28:42-58.

Groetch M et al. J Allergy Clin Immunol Pract. 2017;5:312-24.e29.

Kagalwalla, et al. Clin Gastroenterol H. 2017;15:1698-1707.e7.



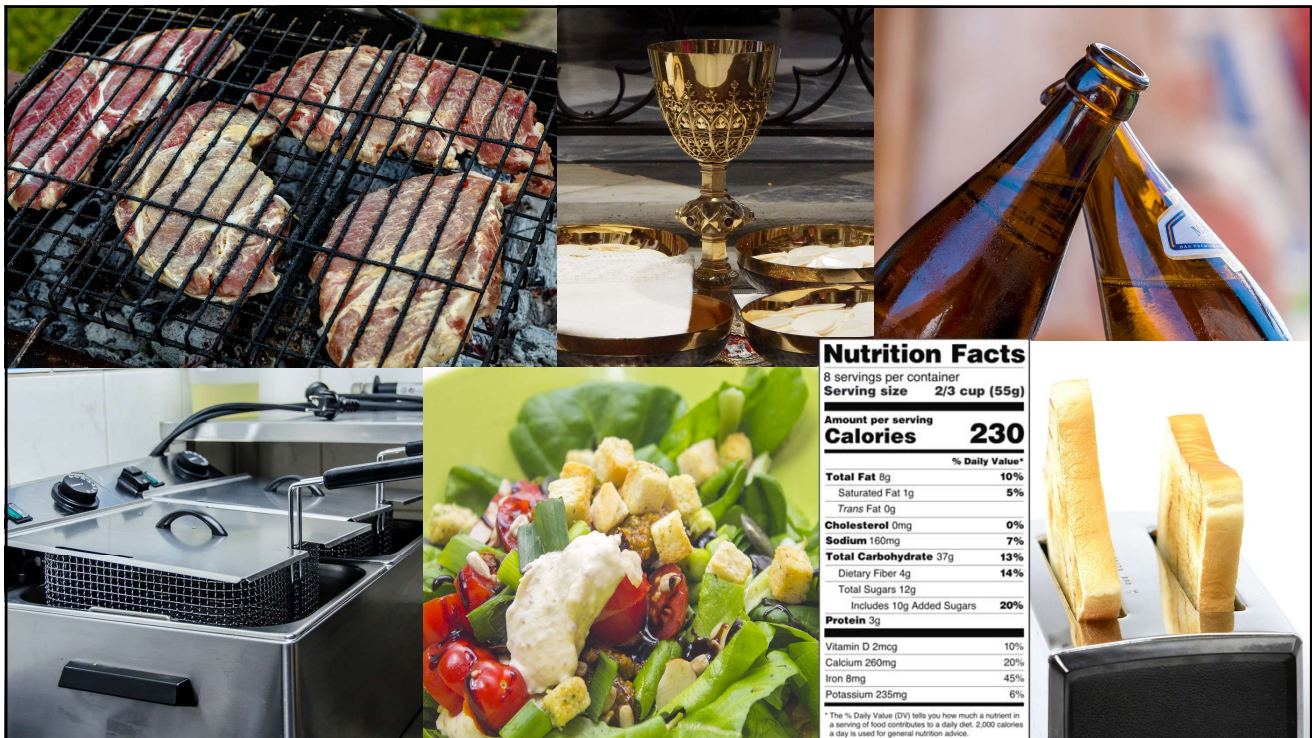
## Tool Box: Strategies

### Challenges

- Shopping
- Cooking
- Restaurant dining
- Social events
- Food preferences
- Travel
- Work events

### Solutions

- Shopping list, label reading guides
- Allergy-friendly cookbooks, websites, blogs
- “Chef” cards
- Asking for a specific meal
- Working with HR & event planners
- Advocacy and support groups
- Bringing AAFs when traveling



## Can Avoiding Cross Contact Be Simplified?



Cooking GF pasta in shared water transferred unsafe levels of wheat

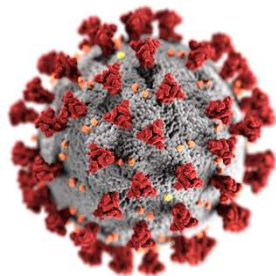
Stand up toaster did not exceed unsafe levels of wheat

Cleaning pots & pans with regular water or soap and water were equally effective

EoE studies needed to determine threshold

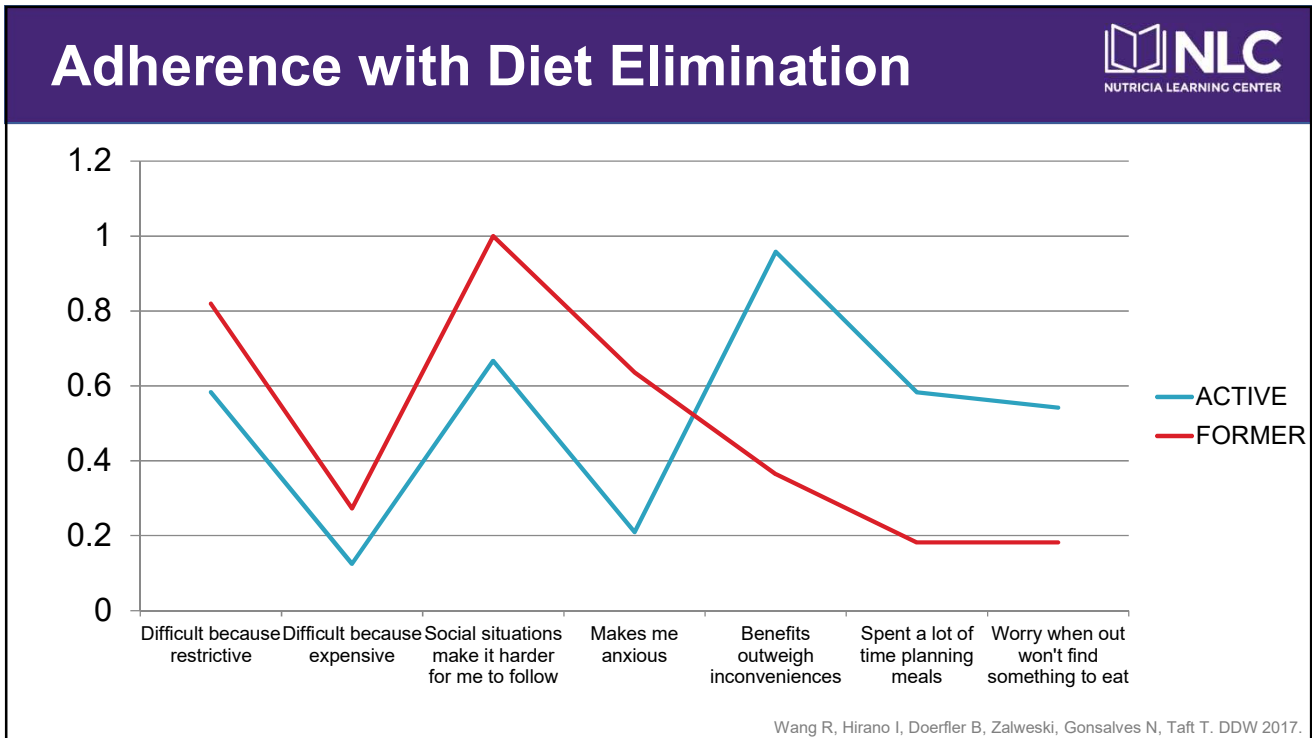
Weisbard VM. Gastroenterology. 2019.

## FDA Relaxes Labeling Adherence



- Higher risk of contamination
- Can apply to vending machines
- Substitute ingredients to avoid supply chain disruption

<https://www.fda.gov/regulatory-information/search-fda-guidance-documents/temporary-policy-regarding-certain-food-labeling-requirements-during-covid-19-public-health>



## Adherence with Diet Maintenance

Social and Emotional	Active 6FED (N=24)	Former 6FED (N=11)	Z- Score
Socializing with friends and family is difficulty	66%	100%	-2.18*
Following the elimination diet makes me anxious	20.8%	63.6%	-2.48**
When I am feeling well I stop following the diet more than usual	33.3%	36.4%	-0.43
I find the elimination diet harder to follow than I expected	8.3%	63.6%	3.14**

\*p>0.05; \*\* p> 0.001

Wang R, et al. Dig Dis Sci. 2018;63:1756-62.

## Algorithm for EoE Dietary Management and Referral to RD



### Refer to a Registered Dietitian if...

Patient is unable to adhere to prescribed diet	Patient (adult or child) experiences excessive unplanned weight change	Patient has poor quality of nutritional intake	Patient has low social support or limited access to substitute foods	Patient is experiencing social isolation related to diet
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Groetch M, et al. Allergy Clin Immunol Pract. 2017;5:312-24.e29.

## Case Study: DW



**2 YO male presents with poor weight gain, diarrhea and abdominal distension.**

Work up:

Celiac panel	Folic acid	Pre-albumin
Serum IgA	Vitamin B12	Stool studies
CBC	CMP	Sweat test
Fecal fat		

EGD: Duodenum villous atrophy, Esophagus: 75-90 Eos/HPF

- Plan: Gluten free diet (GFD) and PPI 2x/day for 3 months

Next EGD: Duodenum normal villi, Esophagus: 275-300 Eos/HPF

Symptoms reported at EGD: Anorexia, aversion to solids.

- Plan: Start 6FED in additional to GFD. Provide samples of AAFs.

Follow-up visit 1 month later: Poor compliance with 6FED and poor caloric intake.

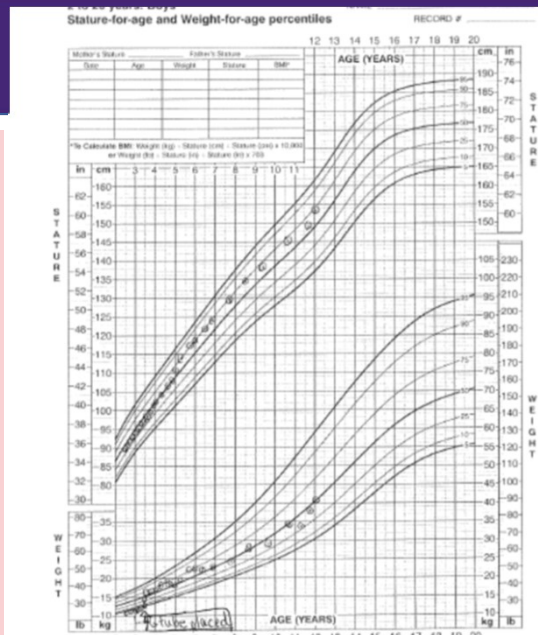
- Plan: G-tube placed and AAF only

## Case Study: DW

- AAF to provide 100% nutrition needs + apples for oral stimulation
- Repeat EGD: 5 Eos/HPF

### Plan:

- Start food reintroduction with low allergenicity fruits and vegetables, continued elemental diet
- ARFID primary problem → Referral to psychologist
- AAF providing ~70% calorie needs
- Even though histology improves, symptoms of feeding dysfunction remain



G-tube placed

## Case Study: BD



### BD 19 YO male who recently transitioned GI care to adult EoE GI clinic.

- History of IgE fin fish- first identified by age 5.
- Food avoidance and vomiting developed requiring GI evaluation.
- EoE diagnosed and subsequently completed 6FED and regular use of AAF. Cow milk and fish were identified as triggers.
- Concern over avoidant behaviors throughout teen years.
- Ultimately switched to medical management in teens.

## Case Study: BD Typical Foods Consumed



- ❑ Pork, poultry, eggs and beef
- ❑ Strawberries, blueberries & bananas
- ❑ Wheat/rice/corn/potatoes
- ❑ Soda/dairy free sweets
- ❑ Popcorn/pretzels/chips
- ❑ Fried foods
- ❑ Special K® with berries and soy milk
- ❑ Pulled pork sandwich with fries
- ❑ Banana, pretzels, nuts
- ❑ Meat, potato, vegetable or pasta with chicken

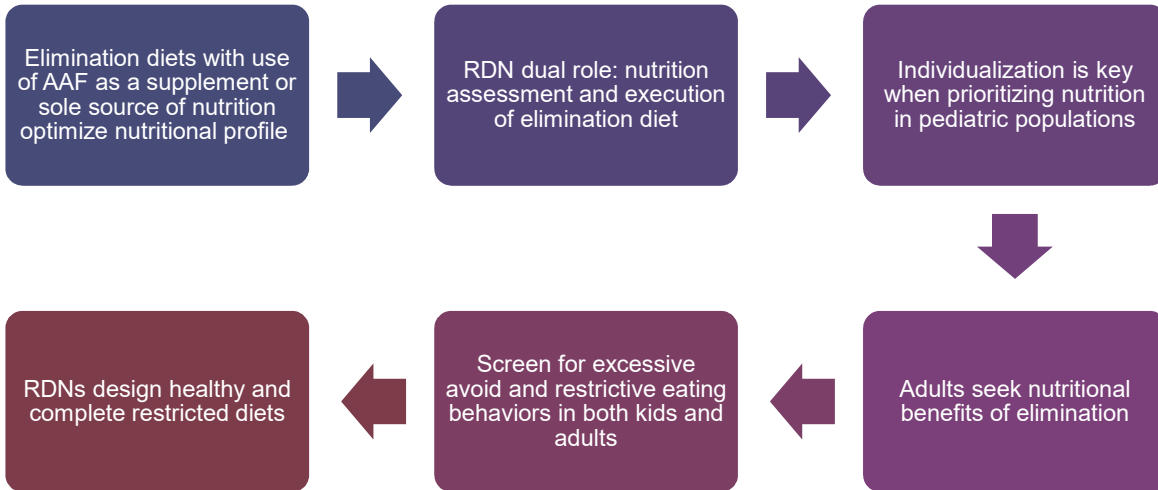
Special K® is a registered trademark of Kellogg's.

## Case Study: BD



- ❑ Utilized AAF after chronic contamination episode and flare of symptoms.
- ❑ Seen in transition clinic March 2020 desiring a better diet overall. Plan to test fish at home and follow up with EGD for new baseline.
- ❑ Family asked for Rx for AAF to supplement intake and prepare for college.
- ❑ April accidental consumption of cow milk leading to increased symptoms. Stopped eating and relied on AAF only.
- ❑ GI team developed plan to overcome eating behaviors with psychologist, RD, RN, Allergy & GI.

## Summary



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