Allergy Elimination Diets

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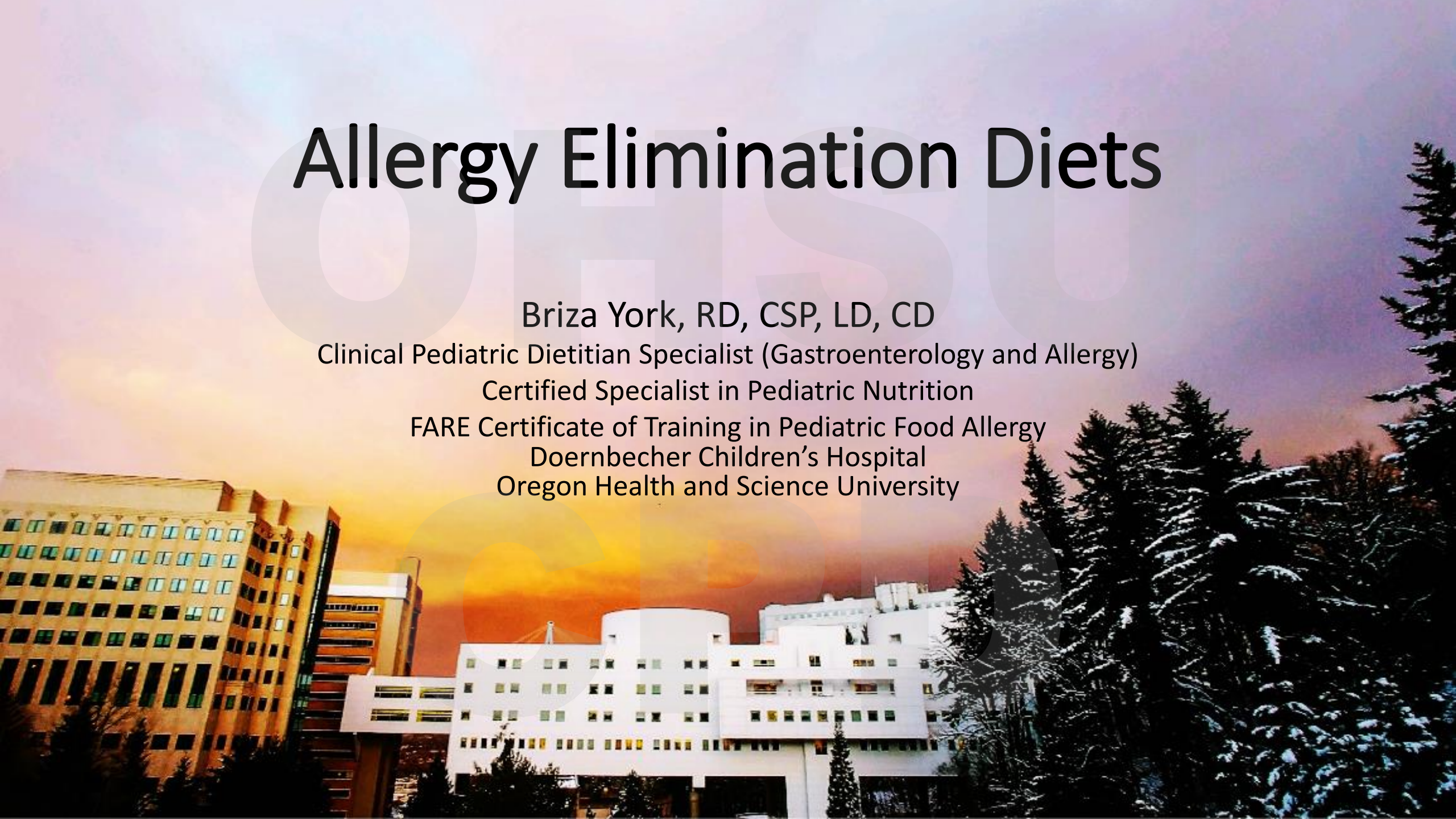
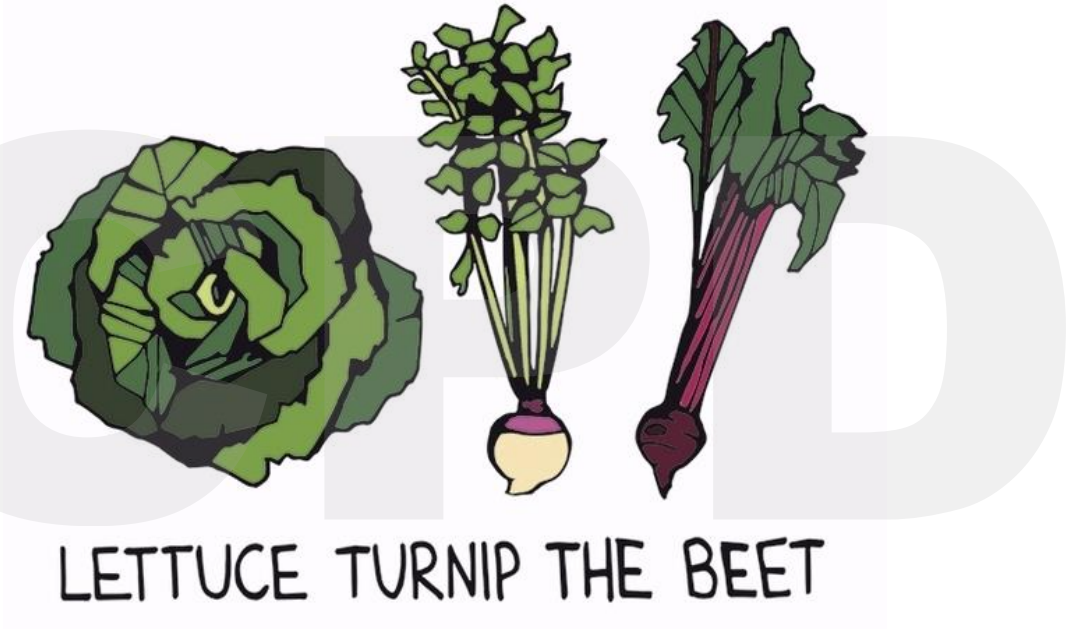


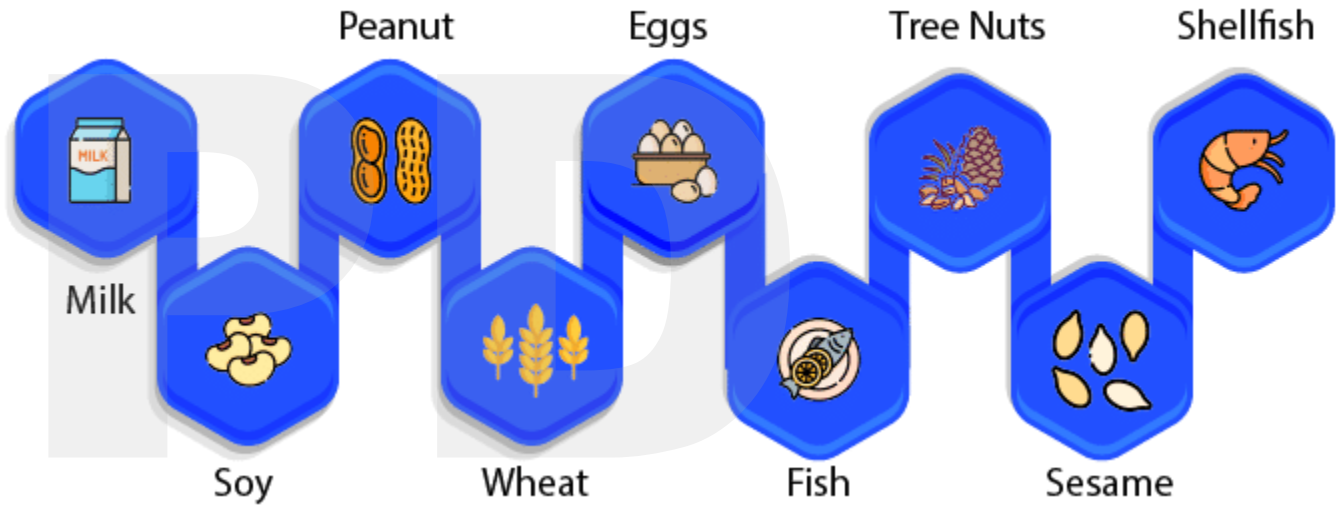
Objectives

- To review dietary avoidance of major allergens for both classic food allergy and gastroenterological conditions
- Highlight nutritional implications of allergy avoidance and solutions



Food Allergies

- The **9** Major Allergens in the United States that cause the majority of allergic reactions
  - Milk, soy, wheat, eggs, peanuts, tree nuts, fish, crustacean shellfish, sesame
- Most common in children:
  - Milk, egg, and peanut



https://www.delveinsight.com/blog/most-common-food-allergies

Boyce et al, 2010

Food Allergy Management

- Nearly no curative treatment of food allergy
  - Palforzia: FDA approved in 2020 as first drug treatment for children with peanut allergy
- Requires strict avoidance of allergy and prompt treatment if ingestion occurs
- Nutritional counseling focuses on strict avoidance, reading labels, avoiding cross contact, and nutritional adequacy of diet
- Teens and young adults are high risk for fatal reactions due to risky behavior and slow treatment
- Increased financial costs and emotional effects

Financial Costs

$5.99

$6.99

$0.16/ounce

$0.44/ounce

$1.08/ounce

$1.99

$2.69

Food Allergy Management – Label Reading

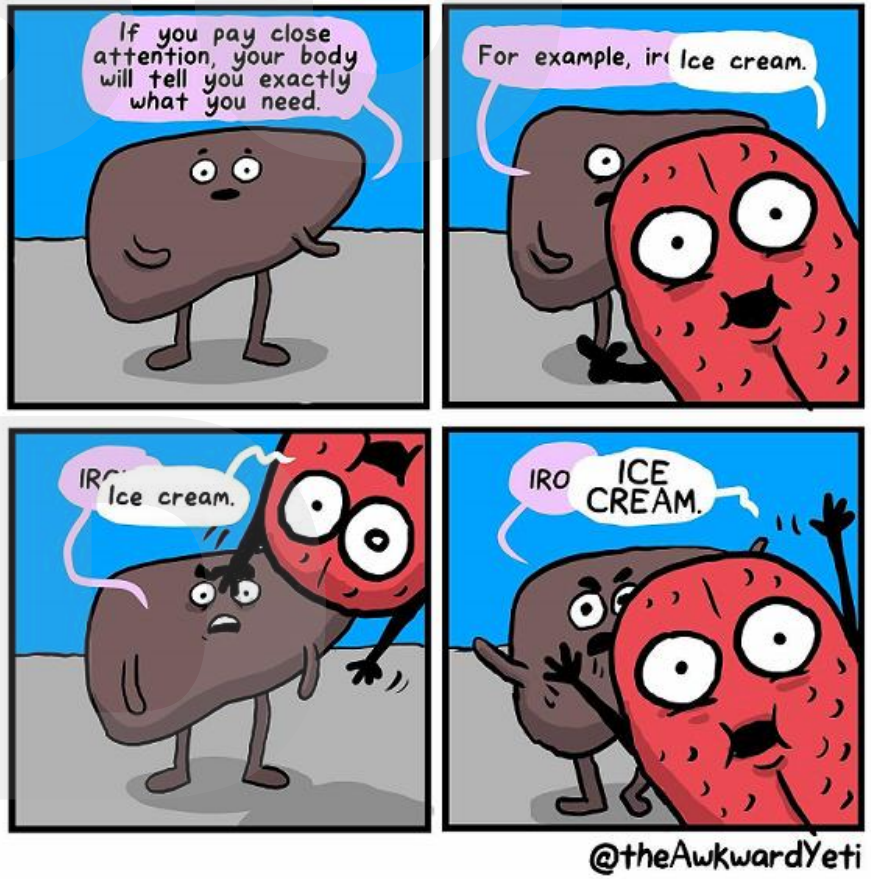
- Food Allergen Labeling and Consumer Protection Act (FALCPA) mandates the 9 major US allergens be labeled clearly on the food label
  - Highly refined oils exempt
  - Crustacean shellfish does NOT include mollusks (mollusks are clams, oysters, mussels, scallops, conch, abalone, octopus, and squid)
- Parents/patients should read the label EVERY TIME for allergens

Food Allergy Management – Label Reading

- Precautionary Labeling (PAL) is doctor and allergy dependent
  - “May contain”, “Made in the same facility as”, “Made on shared equipment as”
  - Difficult to interpret
- In general, for those with anaphylaxis we recommend avoiding products with precautionary labeling
- Dark chocolate has a high likelihood of being contaminated with milk if there is a precautionary allergy label, so consider avoiding

Breastfeeding infants with food allergy

- "The GA^{2}LEN Task Force suggests that most breastfeeding mothers whose infants have a food allergy do not need to avoid the offending food themselves, though in rare cases this might be considered"
  - Global Allergy and Asthma European Network (GA^{2}LEN)



What do the guidelines recommend regarding formula choice for specific presentations of food allergies?

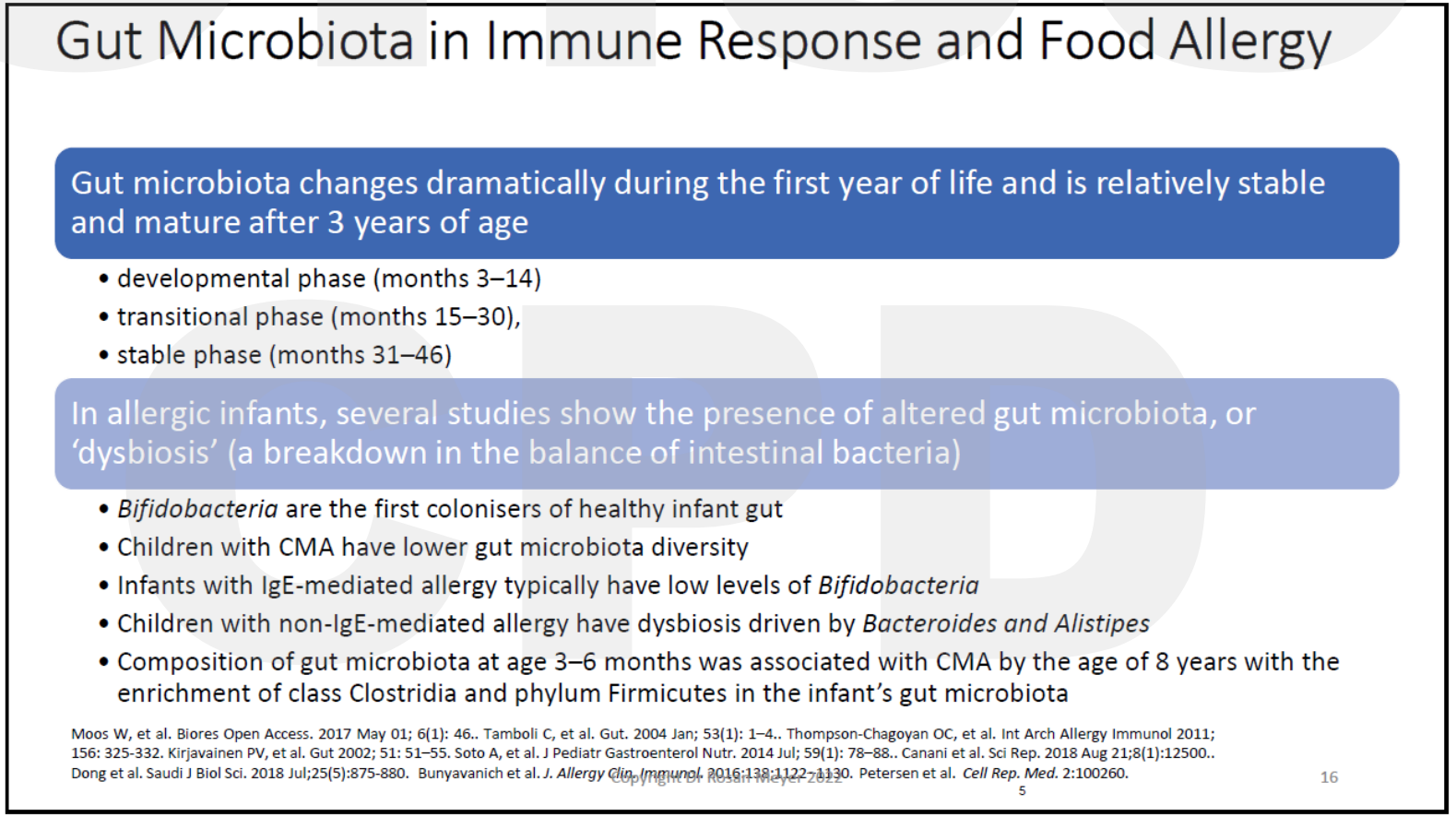
Clinical Presentation	DRACMA [1]	BSACI Guidelines[2]	NIAID US Guidelines[3]	ESPGHAN[4]
Anaphylaxis	AAF	AAF	No specific recommendation	AAF
Acute urticaria or angioedema	EHF	EHF	No specific recommendation	EHF
Atopic eczema/dermatitis	EHF	EHF	No specific recommendation	EHF
Eosinophilic esophagitis (EoE)	AAF	AAF	The NIAID guidelines acknowledge that trials in EoE have shown symptom relief and endoscopic improvement in almost all children on AAF/elemental diet, though no specific recommendation on formula choice is made.	AAF (as specified by current ESPGHAN guidelines on EoE)
Gastroesophageal reflux disease	EHF	EHF	No specific recommendation	EHF
Cow's milk protein-induced enteropathy	EHF	EHF unless severe in which case AAF	No specific recommendation	EHF but AAF if complicated by faltering growth
Food protein-induced enterocolitis syndrome (FPIES)	EHF	AAF	Hypoallergenic formulas are recommended	EHF
Proctocolitis	EHF	EHF	No specific recommendation	EHF
Breastfeeding with ongoing symptoms (already on maternal elimination diet) or requiring a top-up formula	No recommendation	AAF	No specific recommendation	With severe symptoms that are complicated by growth faltering, a hypoallergenic formula up to 2 weeks may be warranted. In many countries, AAF is used for diagnostic elimination in extremely sick exclusively breast-fed infants. Although this is not evidence based, it is aimed at stabilizing symptoms.

AAF, amino-acid formula; EHF, Extensively hydrolyzed formula; ESPGHAN, European Society for Paediatric Gastroenterology, Hepatology and Nutrition.

References: 1. Fiocchi et al. J Allergy Clin Immunol. 2010;126(6):1119-28 e12. 2. Luyt et al. Clin Exp Allergy. 2014;44(5):642-72. 3. Boyce et al. J Allergy Clin Immunol. 2010 Dec;126(6):1105-18. 4. Koletzko et al. J Pediatr Gastroenterol Nutr. 2012;55(2):221-229.

A nice transition to the GI system

- Presented at Nutricia Food Allergy Conference: “Are Children with Cow’s Milk Allergy More Prone to Illness? A Look at the Latest Information” Dr. Rosan Meyer, PhD, RD



Gut Microbiota in Immune Response and Food Allergy

Gut microbiota changes dramatically during the first year of life and is relatively stable and mature after 3 years of age

- developmental phase (months 3–14)
- transitional phase (months 15–30),
- stable phase (months 31–46)

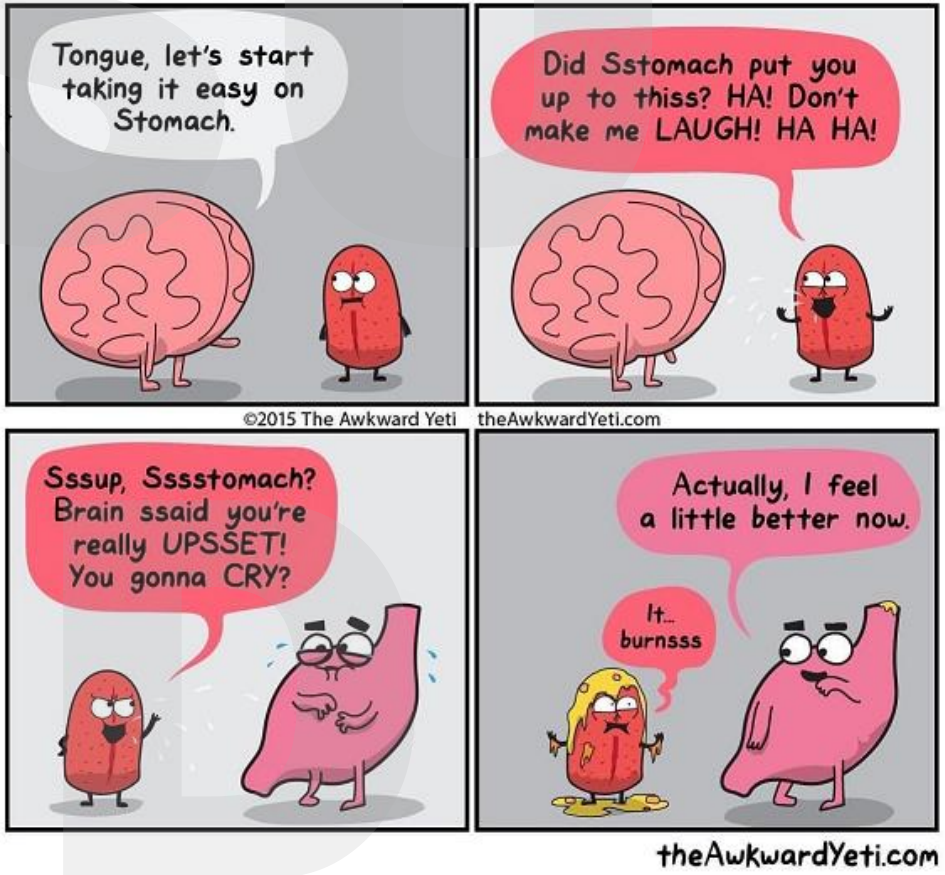
In allergic infants, several studies show the presence of altered gut microbiota, or ‘dysbiosis’ (a breakdown in the balance of intestinal bacteria)

- *Bifidobacteria* are the first colonisers of healthy infant gut
- Children with CMA have lower gut microbiota diversity
- Infants with IgE-mediated allergy typically have low levels of *Bifidobacteria*
- Children with non-IgE-mediated allergy have dysbiosis driven by *Bacteroides and Alistipes*
- Composition of gut microbiota at age 3–6 months was associated with CMA by the age of 8 years with the enrichment of class Clostridia and phylum Firmicutes in the infant’s gut microbiota

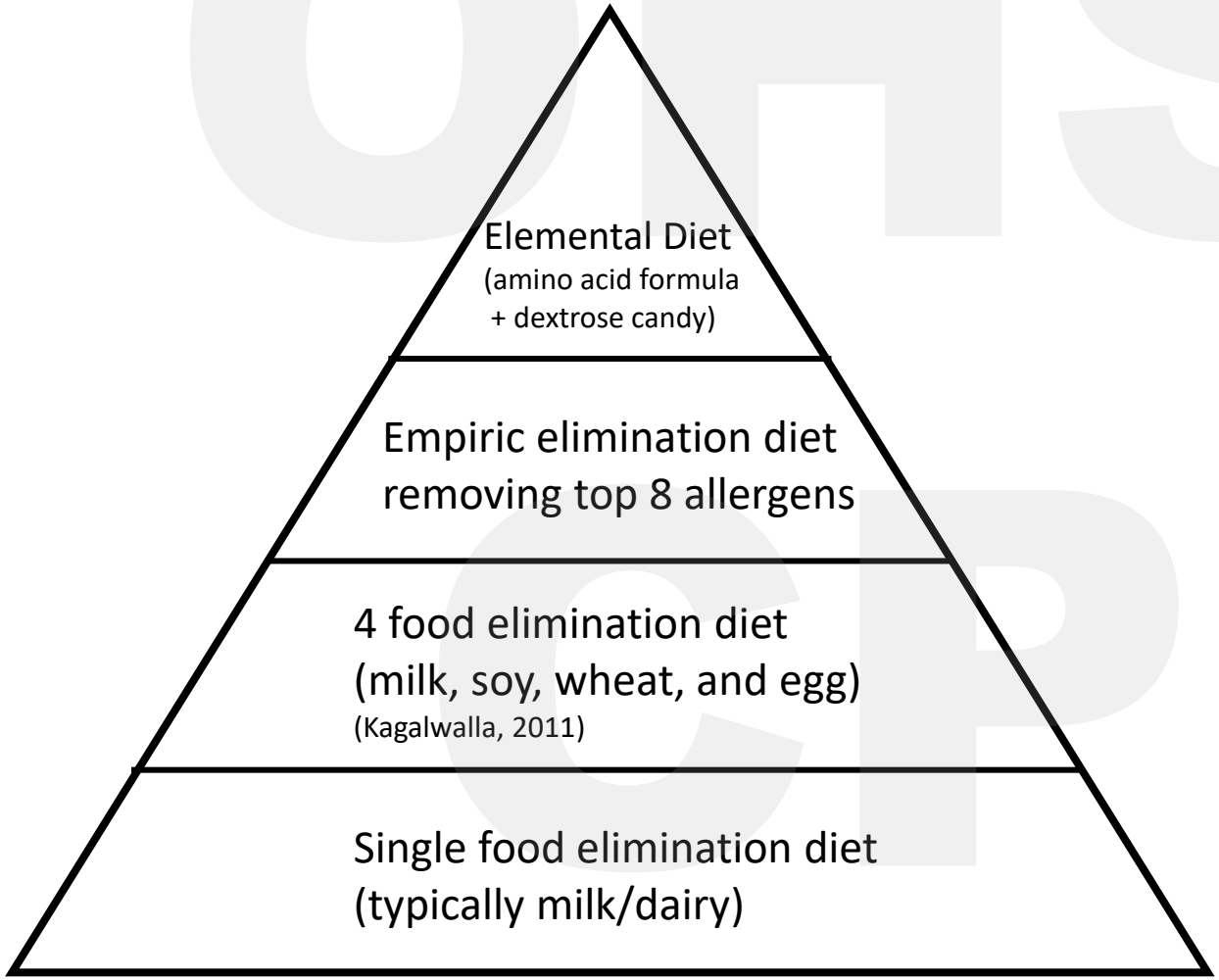
Moos W, et al. Biores Open Access. 2017 May 01; 6(1): 46.. Tamboli C, et al. Gut. 2004 Jan; 53(1): 1–4.. Thompson-Chagoyan OC, et al. Int Arch Allergy Immunol 2011; 156: 325-332. Kirjavainen PV, et al. Gut 2002; 51: 51–55. Soto A, et al. J Pediatr Gastroenterol Nutr. 2014 Jul; 59(1): 78–88.. Canani et al. Sci Rep. 2018 Aug 21;8(1):12500.. Dong et al. Saudi J Biol Sci. 2018 Jul;25(5):875-880. Bunyavanich et al. *J. Allergy Clin. Immunol.* 2016;138:1122–1130. Petersen et al. *Cell Rep. Med.* 2:100260.

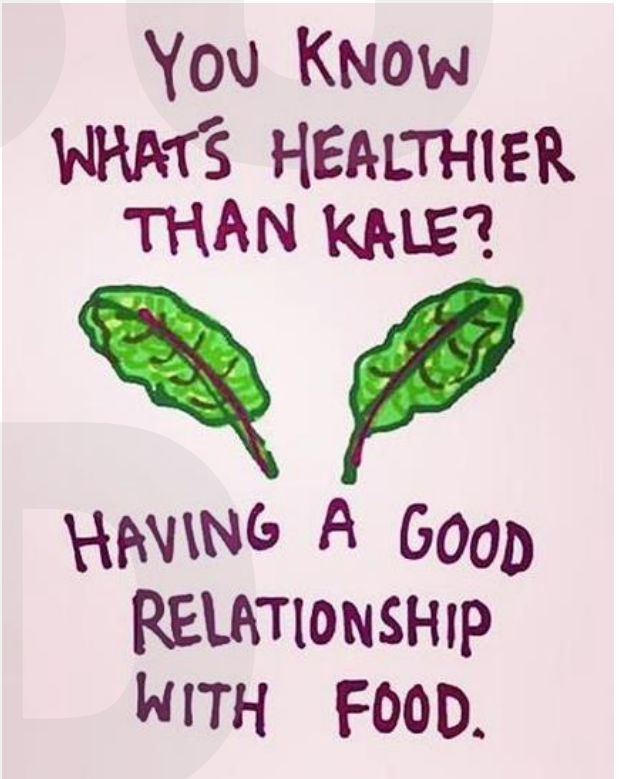
Eosinophilic Esophagitis (EoE)

- Chronic immune-antigen mediated disease with localized eosinophilic inflammation in the esophagus causing esophageal dysfunction
- Dietary therapy can be effective to normalize histopathology
- No diagnostic test to know which foods to eliminate



Eosinophilic Esophagitis (EoE): Dietary Treatment Options





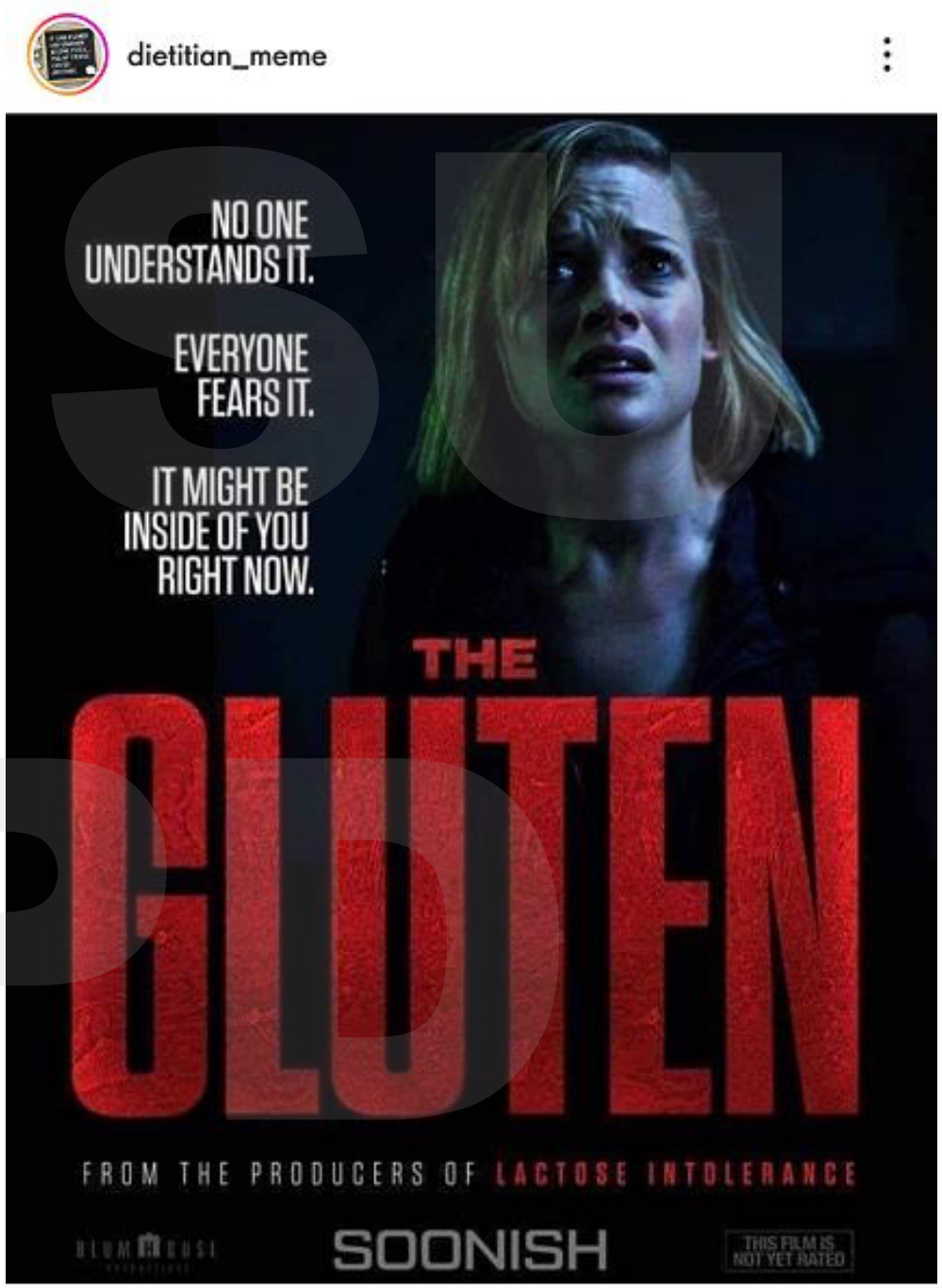
Celiac Disease

- Immune-mediated response within GI system to the ingestion of gluten
- Blood tests: Tissue transglutaminase IgA (tTG-IgA) and total IgA
- If tTG-IgA is elevated with normal IgA or IgA deficient with normal tTG IgA, refer to GI
- Genetic susceptibility of having human leukocyte antigen (HLA)-DQ2 and/or HLA-DQ8 haplotypes
- Upper endoscopy with intestinal biopsies of the duodenum to confirm diagnosis
  - Microscopic features of epithelial lymphocyte infiltration, increased density and depth of crypts, and flattening of villi

Hill et al, 2016

Celiac Disease

- Treatment: It is not “just go gluten free”
- 90min appointment with me (the length of Monsters Inc.)

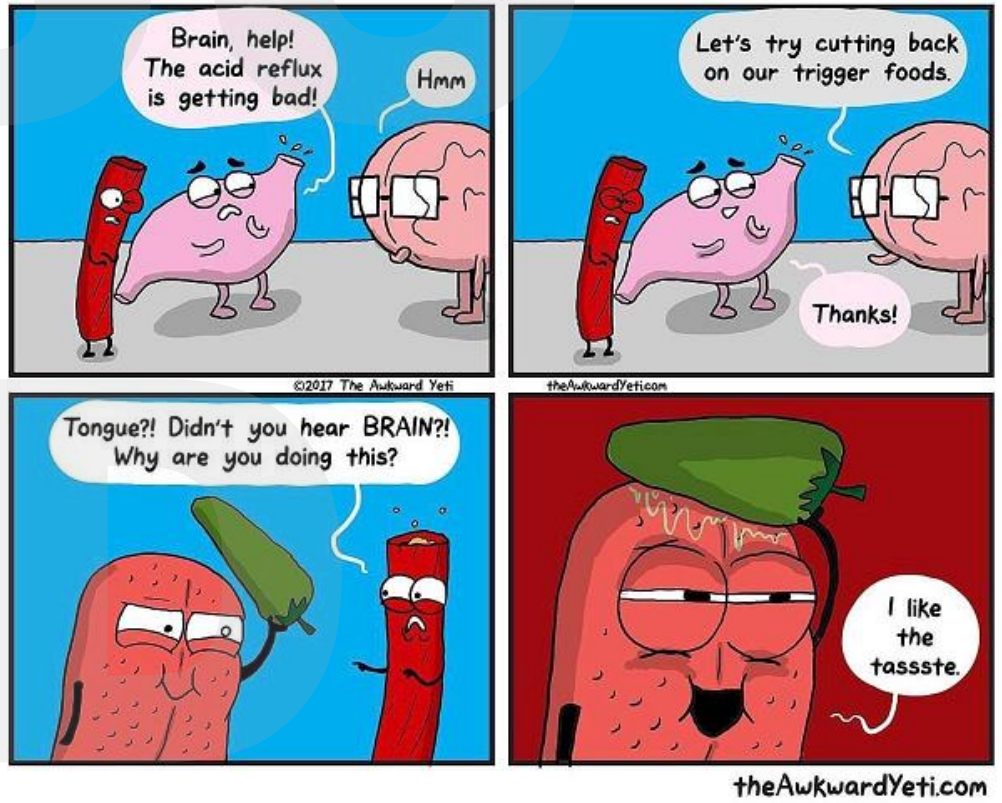


Celiac Disease

- Treatment: lifelong strict adherence to a gluten free diet
- Avoid:
  - Wheat: graham, durum, semolina, farro, emmer, spelt, farina, kamut, and einkorn
  - Rye
  - Barley: malt and Brewer's yeast
  - Triticale
  - Oats unless gluten free

Celiac Disease

- Can eat: rice, corn, potato, soy, sorghum, quinoa, millet, buckwheat, arrowroot, amaranth, teff, tapioca, nut flours, bean flours
- Must avoid cross contact
- Cumbersome diet, expensive, possible nutrient deficiencies



DIETETIC ROLE(S) IN COELIAC DISEASE?

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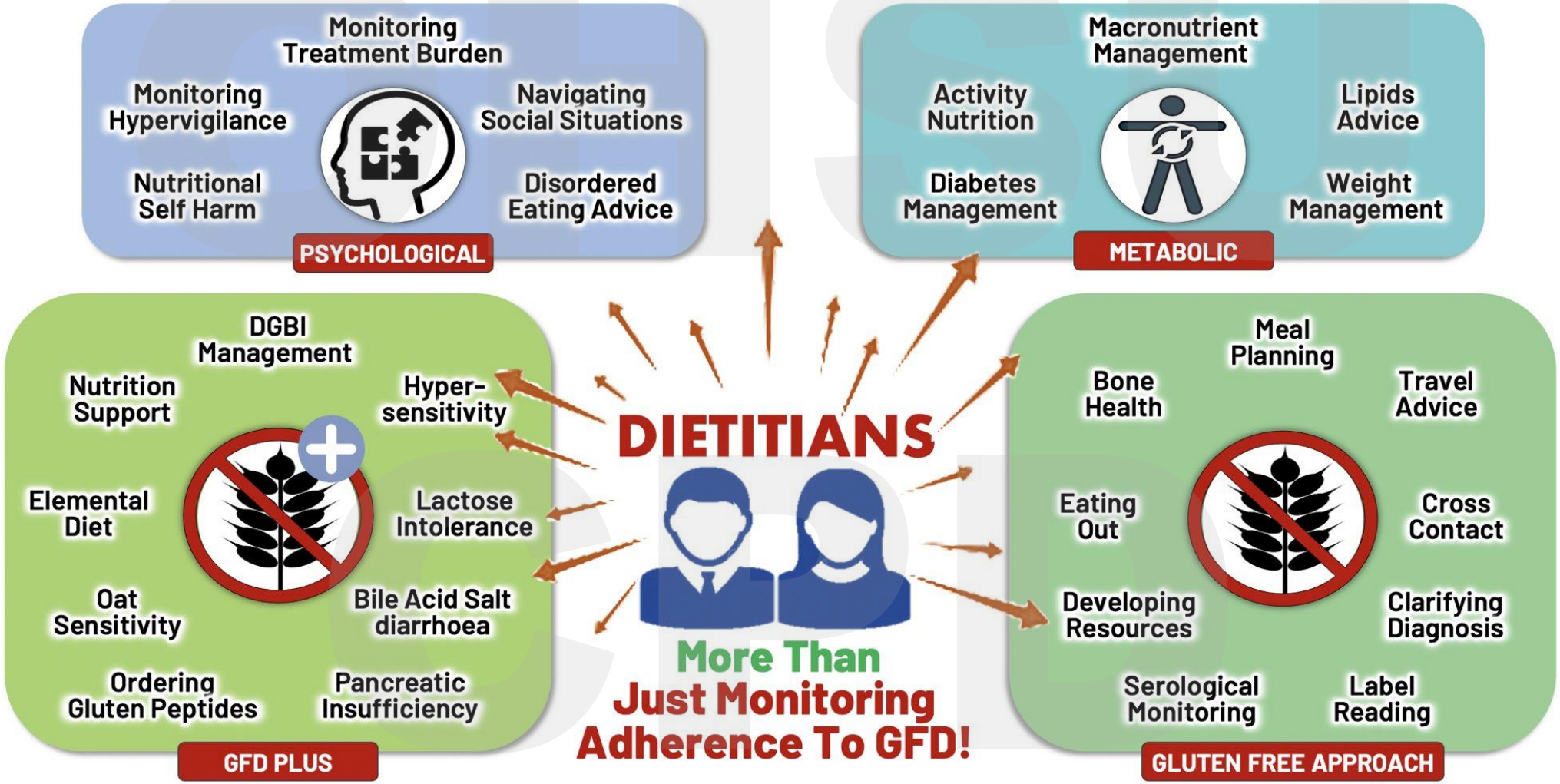


Nutrients of Concern

Foods	Nutrients
Cow's milk	Protein, calcium, magnesium, phosphorus, vitamins A, B6, B12, D, riboflavin, pantothenic acid (iodine in some countries)
Soy	Protein, calcium, phosphorus, magnesium, iron, zinc, thiamin, riboflavin, vitamin B6, folate
Eggs	Protein, iron, selenium, biotin, vitamin A, B12, pantothenic acid, folate, riboflavin
Wheat	Carbohydrate, zinc, selenium, thiamin, niacin, riboflavin, folic acid, iron, magnesium, dietary fiber
Peanut/tree nut	Protein, selenium, zinc, manganese, magnesium, niacin, phosphorus, vitamins E, B12, alpha linolenic acid, linoleic acid
Fish/shellfish	Protein, iodine, zinc, phosphorus, selenium, niacin Fatty fish: vitamins A, D, omega-3 fatty acids

Groetch et al, 2017

Nutrient	Common allergen sources	Good alternative sources
Protein	Milk/milk products, fish, egg, nuts, soy	Meat, poultry, seeds, legumes, supplemental formula
Calcium	Milk/milk products, calcium-set tofu, salmon/sardines with bones, enriched soy, almonds	Dark green leafy veggies, hummus, tahini, sesame seeds, supplemental formula, enriched milk substitutes, enriched orange juice
Zinc	Shellfish, fortified wheat cereals, soy, tree nuts	Beef, poultry, fortified cereals, sesame seeds, beans
Iron	Fortified wheat bread and cereals, oysters, soy, egg	Liver, beef, lamb, white beans, lentils, chickpea, pumpkin and squash seeds, fortified cereals
Selenium	Peanuts, tree nuts, fish, egg, whole wheat	Meat, poultry, seeds (sunflower, pumpkin, squash, and sesame)

Groetch et al, 2017

Nutrient	Common allergen sources	Good alternative sources
Vitamin A	Fortified milk/milk products	Liver, sweet potato, carrots, butternut squash, pumpkin, cantaloupe, dark leafy greens, plant oils (sunflower, grape seed, olive, canola)
Vitamin D	Fortified milk/milk products, fortified wheat cereal, fatty fish (salmon, swordfish, tuna, cod liver oil), egg yolk	Fortified cereals, enriched milk substitutes
Vitamin E	Wheat germ, wheat germ oil, peanut, tree nuts	Plant oils (sunflower, grape seed, olive, canola), sunflower seeds
Vitamin B12	Milk/milk products, fish, shellfish, eggs, fortified wheat cereals	Liver, meat, poultry, fortified cereals, enriched milk substitutes, fortified nutritional yeast
Thiamin (B1)	Enriched wheat cereals	Pork, nutritional yeast, fortified cereals
Riboflavin	Milk/milk products, enriched wheat cereals, egg	Liver, nutritional yeast, red meat, fortified cereals

Groetch et al, 2017

DRACMA

Plant-Based Milk – Buying Guide

- For toddlers who are eating well, children and adults, a suitable plant-based alternative is recommended.
- These milks should ideally only be used in children under 2 years of age following a dietary assessment.
- It should also not be used as a main drink in children under 1 year of age.

Factors to consider that may indicate a toddler is ready to transition to a plant-based beverage are:

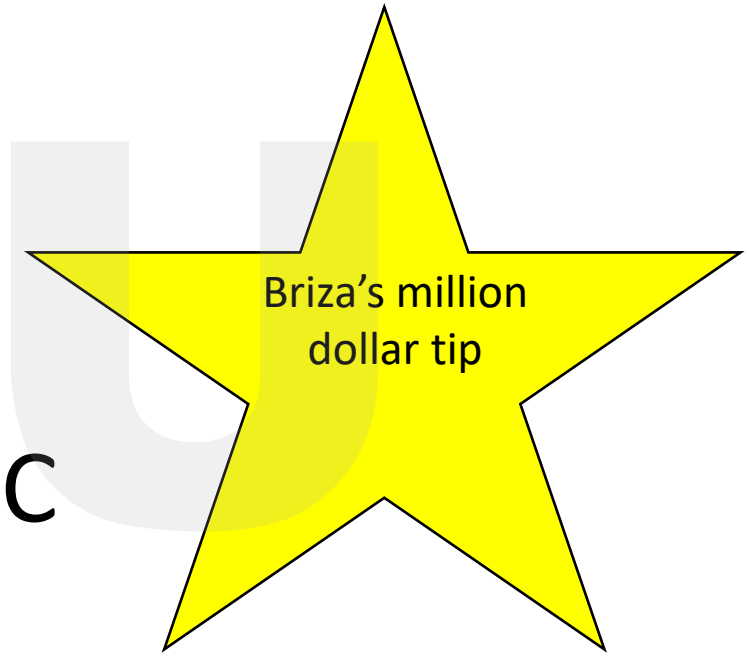
- Child is at least one year of age
- Eats a varied solid food diet with a variety of foods from each food group;
- Gets at least 2/3 of their energy from the varied solid food diet;
- Consumes no more than 16 fluid ounces/500 ml of milk substitute per day (this includes breast milk, formula, and other dairy substitutes like yogurt);
- Eats age-appropriate textures; AND
- Gets enough protein and fat and micronutrients in the diet from the solid foods and the available milk substitute
- No feeding difficulties that may reduce food variety
- No known micronutrient deficiencies
- No religious/cultural dietary requirements that reduces the variety of foods consumed

Durban et al. Immunol Allergy Clin North Am. 2021;41(2):233-270.
Groetch and Venter. Journal of Food Allergy. 2020;2:11.

Specific Nutrient Labs

- Vitamin D
  - Lab: 25HD vitamin D
  - Low <30
  - Replete with vitamin D3 (amt depends on age)
- Zinc
  - Lab: serum zinc
  - Strict vegetarians and vegans at risk for deficiency
  - Be careful with over-supplementation (interferes with copper)

Specific Nutrient Labs



- Iron
  - Labs: Iron panel, ferritin, and CBC
    - Iron panel includes:
      - serum iron- amt of iron circulating This is your checking account
      - TIBC- capacity to bind iron with transferrin
      - trans sat- ratio of serum iron to TIBC
    - Ferritin is total body iron stores This is your savings account

	Iron Deficiency	Anemia of chronic illness	Iron deficiency and inflammation	Acute phase response	Iron overload
Serum Iron	Low	Low	Low	Low	High
TIBC	High	Low	Low/Normal	Low	Low/Normal
Transferrin saturation	Low	Low	Low/Normal	Low	High
Ferritin	Low	Normal	Normal	High	High

Specific Nutrient Labs

- Vitamin B12
  - Lab test: methylmalonic acid (MMA)
  - Elevated MMA level = vitamin B12 def
    - Vitamin B12 breaks down MMA, which our body makes. If there is not enough vitamin B12, MMA won't get broken down and the MMA level will be high
  - Long term use of PPIs decreases absorption
  - Strict vegetarians/vegans at risk for deficiency

Foods before one are just for fun… And food allergy prevention!

Thank you!