Catering to the Digestively Delicate: Common Therapeutic Diets for GI Disorders and Practical Implications for Foodservice

Chef Culinary Conference
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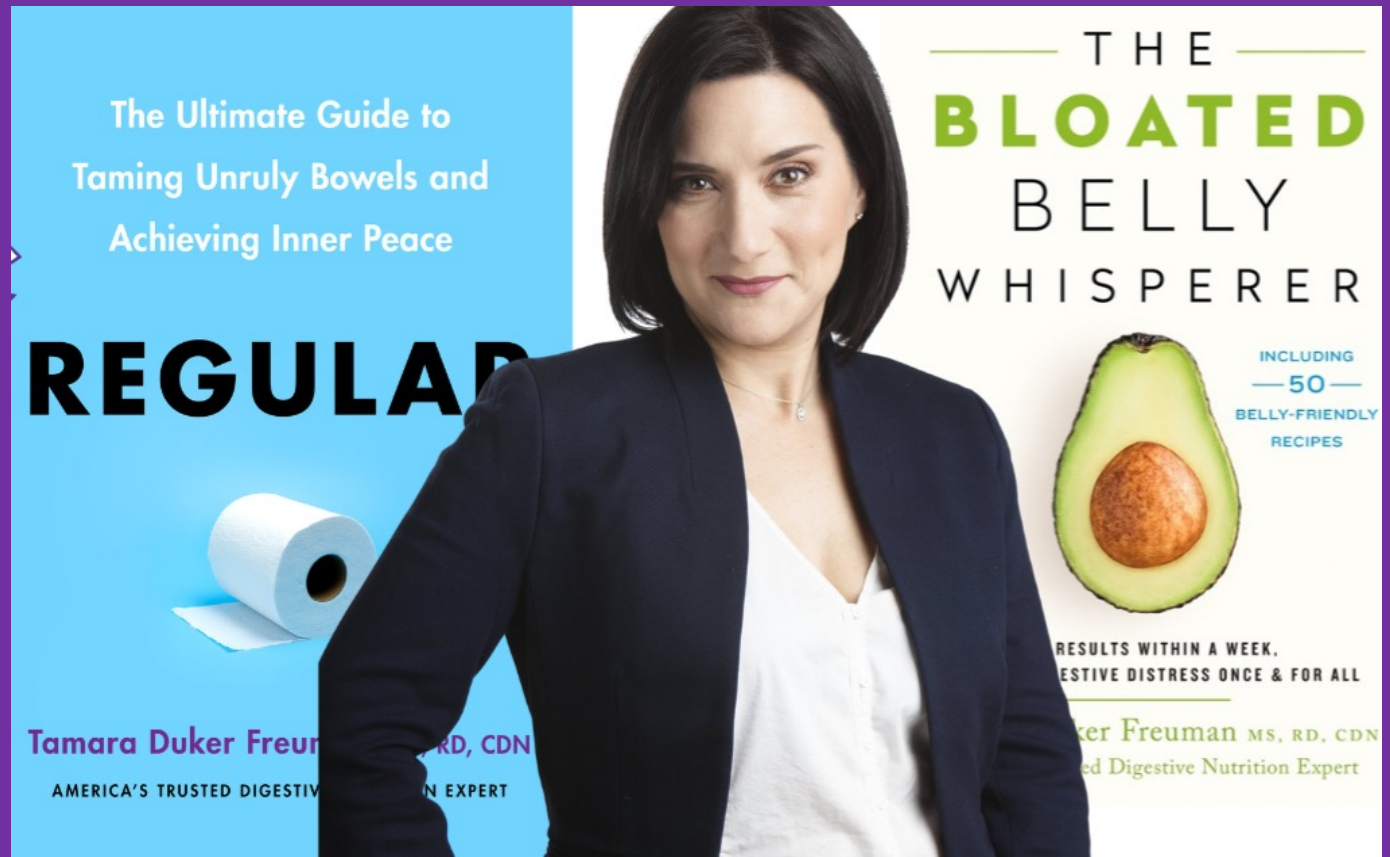


Agenda

- Common digestive disorders with dietary implications
- Common therapeutic diets for digestive conditions
- Moving toward a ‘digestively democratic’ foodservice operation
- “Food sensitivity testing” as a basis for foodservice accommodations

Burden of Digestive Disease in the US

Impact of digestive disease is substantial among US population [1]

- >126 million outpatient visits/year
- 41 million ER visits/year
- ~24% of commercially insured Americans experience a chronic digestive condition[2]

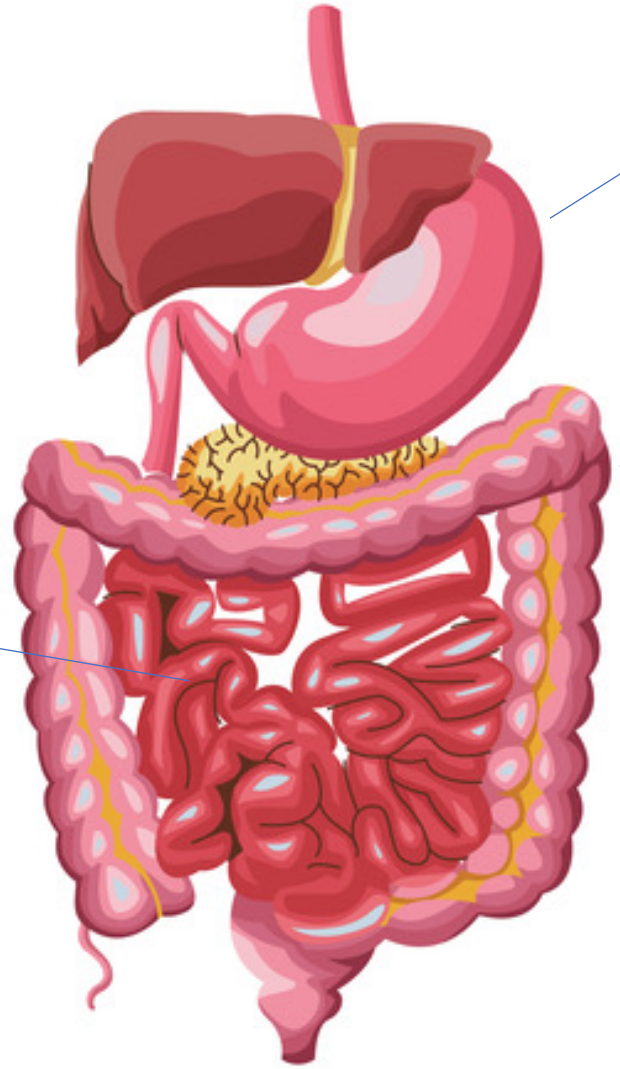
Prevalence for common GI conditions/complaints is high in the US population

- Chronic constipation: 12-19%[3]
- Chronic Diarrhea: 6.6%[4]
- Abdominal Pain: (leading symptom prompting GI care): 45% of Americans report experiencing abdominal pain bad enough in the past week so as to interfere with day-to-day activities anywhere from somewhat to very much[5]
- IBS: 25-45 million Americans[6]
- GERD: 18-28%[7]
- Bloating: 18%[8]
- Celiac disease: 1-2%[9]

GI symptoms are nearly universal among patients who have eating disorders[10]

(1) Unalp-Arida A and Ruhl CE, 2024
(2) Mathews SC and Izmailyan S et al 2022
(3) Up To Date: https://www.uptodate.com/contents/etiology-and-evaluation-of-chronic-constipation-in-adults/print
(4) Singh P, Mitsuhashi et al 2018
(5) Lakhoo K and Almario CV et al 2021
(6) International Foundation for Gastrointestinal Disorders (IFFGD) (aboutibs.org)
(7) El-Serag HB, Sweet S et al 2014
(8) Ballou S, Singh P et al 2023
(9) King JA, Jeong J et al 2020
(10) Atkins M, Burton Murray H et al 2023

Roles of the Well-Functioning Digestive System



Stomach:

- Mechanically digest food to pass into next segment of GI tract
- Start to chemically digest protein
- Produce needed co-factor for Vitamin B12 absorption

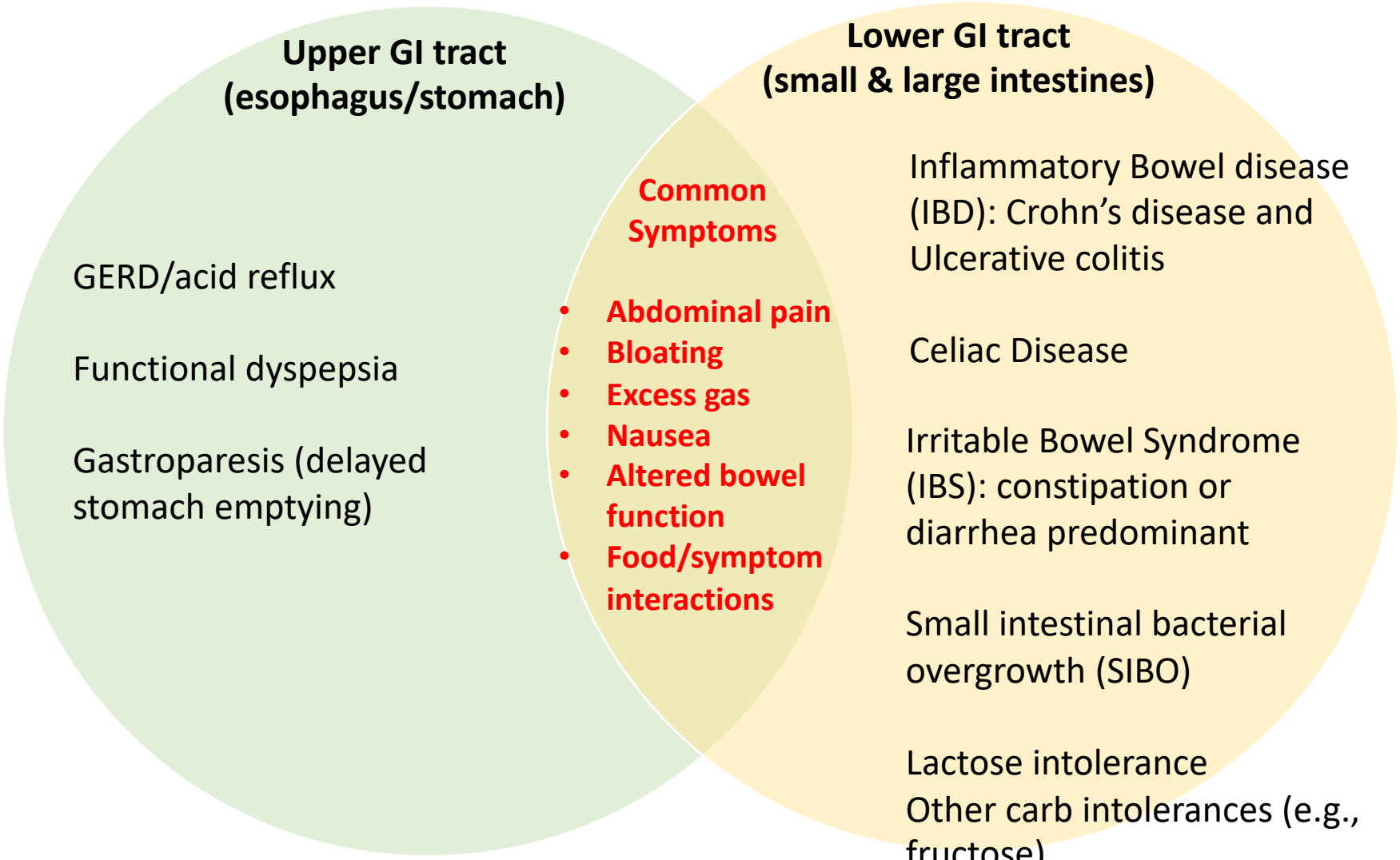
Small intestine:

- Manufacture enzymes to digest sugars
- Absorb macronutrients: protein, fat and carbs
- Absorb micronutrients: vitamins and minerals

Colon (large intestine):

- Re-absorb water and electrolytes
- Propel feces toward the rectum
- House the majority of the gut microbiome
- Produce and absorb certain vitamins/minerals

Common Conditions Affecting the GI Tract & Associated Symptoms



What about “non celiac gluten/wheat sensitivity”?

Adverse symptoms related to ingestion of wheat containing foods in absence of celiac disease/wheat allergy

- **Most common symptoms: abdominal pain and fatigue**
- Intestinal: gas, bloating, pain, diarrhea, constipation
- Extra intestinal: fatigue, headache, numbness, “brain fog,” anxiety/depression, fibromyalgia-like symptoms

Despite what many healthcare providers and direct-to-consumer testing companies may claim:
NO VALIDATED BIOMARKERS OR DIAGNOSTIC TESTS FOR THIS CONDITION EXIST!

- Condition is generally self- diagnosed/self-reported

Studies suggest majority of suspected NCGS cases in patients complaining of GI symptoms may actually be carbohydrate intolerances (fructans)→ ~70%?

- Fructans are the same carbohydrate responsible for adverse lower GI symptoms triggered by onions and garlic

NCGS as an immune-mediated entity *may* exist, but probably less common than previously believed

Sourdough bread makes a great litmus test to differentiate gluten vs. carbohydrate sensitivity

Cárdenas-Torres FI, Cabrera-Chávez F, et al. 2021
Biesiekierski JR, Peters SL, et al 2013

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Core set of therapeutic diets commonly employed in our NYC gastroenterology practice

Fiber modified, e.g.,:
- "GI gentle"/lower 'particle size' forms of fiber
- Soluble vs insoluble fiber
- High vs low

Low FODMAP

Various other carbohydrate-restricted, e.g,
- Lactose, fructose, polyols

Gluten-free

GERD diets

Mediterranean diet (anti-inflammatory)

Fiber modified diets: Soluble vs Insoluble

Properties of fiber influence how it moves through GI tract

- **SOLUBLE:** water soluble, dissolves, forms a gel
  - Viscosity SLOWS down GI transit time
- **INSOLUBLE**: not water soluble, cannot shape-shift
  - Bulkiness SPEEDS up GI transit time

Manipulating relative intake of soluble vs insoluble fiber can help manage symptoms of diarrhea, constipation, bowel urgency

Diarrhea/IBS-D prone patients may do best when skewing fiber intake to soluble rich foods

Choosing "GI GENTLE" (mechanically processed) versions of insoluble fiber rich foods may reduce stimulation of the bowel and improve tolerance

- Nut butters instead of whole nuts
- Pureed beans (hummus, refried pintos) instead of whole beans
- Smoothie-versions of fruits/veg that have more insoluble fiber (berries, kale, pineapple...)

Fiber modified diets: “GI Gentle” Diet

TEXTURE MODIFIED, moderate-to-low fiber, low fat diet that expedites gastric emptying and minimizes gastric/small intestinal stretch by focusing on soft-textured, easy-to-chew-fully, mushy-type proteins and fibers

Typically goes hand in hand with a **SMALL, FREQUENT MEAL PATTERN**

Doesn’t necessarily need to be overtly low fiber; **PARTICLE SIZE OF FIBER** affects tolerance in addition to objective amount of fiber

- Focus on cooked, skinless, non-leafy veggies (soluble fiber)
- Focus on fresh, skinless fruits (soluble fiber)
- Purees for coarser forms of insoluble fiber (nut butters, blended soups, bean purees, green smoothies…)

Low FODMAP Diet

Reduces intake of FERMENTABLE, poorly-absorbed carbohydrates to minimize intestinal gas burden

- Oligosaccharides (fructans and galacto-oligosaccharides—including/especially onions, garlic & beans/legumes)
- Disaccharides (lactose)
- Monosaccharides (fructose)
- Polyols (sorbitol, mannitol and added sugar alcohols)

Helpful in alleviating symptoms in patients with IBS, SIBO or constipation, specifically:

- excess intestinal gas and gas pain
- diarrhea

FODMAP categories

FODMAP

Oligosaccharides	Fructans & GOS - found in foods such as wheat, rye, onions, garlic and legumes/pulses.
Disaccharides	Lactose - found in dairy products like milk, soft cheeses and yogurts.
Monosaccharides	Fructose - found in honey, apples, high fructose corn syrups, etc.
Polyols	Sorbitol & Mannitol - Found in some fruit and vegetables and used as artificial sweeteners.

	Soluble-Fiber Rich	Insoluble-Fiber Rich
Higher FODMAP	(Skinless) apples, applesauce Apricots Avocados Beets Broccoli florets Cauliflower florets Jicama Mangoes Mushrooms Nectarines Onions Peaches Pears Pearled barley Plums/prunes Watermelon	Artichokes Beans (black, white, pinto) Blackberries Cabbage Celery Cherries Chickpeas/garbanzo beans Edamame (boiled soybeans) Kale Lentils Peas Pomegranate seeds Wheat bran
Lower FODMAP	Cantaloupe Carrots Chia seeds Clementines (Peeled) cucumbers Green beans (string beans) Honeydew Kiwis Oatmeal, oat bran, oat flour Oranges Papayas Quinoa (Skinless) sweet potato Tangerines Winter squash (acorn, kabocha, pumpkin) Yellow squash Zucchini	Arugula Bean sprouts Blueberries Bok choy Corn on the cob/kernels Fennel Flaxseeds (2 teaspoons max) Grapes Lettuce (all varieties) Peanuts Peppers Pineapples Popcorn Pumpkin seeds (pepitas) Sesame seeds Spinach Strawberries Sunflower seeds

As a general rule:
The most universally tolerated types of fiber are
SOLUBLE fiber predominant
and
LOW FODMAP

Source: The Bloated Belly Whisperer (2018), Tamara Duker Freuman

Managing individual FODMAP (carbohydrate/sugar) intolerances

	Lactose intolerance	Fructose intolerance
Enzyme	**Lactase** 6,000-9,000 ALU per meal	**Xylose/glucose isomerase (e.g., Fructaid, Fructase)** Take with first bite of meal
Trigger foods	• Milk (including lattes, cappuccinos) • Young/soft cheeses (ricotta, cottage, paneer, etc) • Yogurt, kefir • Ice cream, gelato, frozen yogurt • Whey protein concentrate • Puddings, custards • Condensed/evaporated milk (desserts/pumpkin pie/key lime pie/dulce de leche) • Milk powder (e.g., in milk chocolate, hot cocoa mix, chai latte mix)	• Apples • Pears • Cherries • Figs • Mangoes • Watermelon • Asparagus • Broccoli stalks • Fruit juices • Honey, agave nectar • High fructose corn syrup • Invert sugar • Candies, desserts, jams, condiments, confections, soft drinks made with these ingredients or their concentrates

Managing individual FODMAP (carbohydrate/sugar) intolerances

Avoidance as needed for symptom control

Sorbitol	Mannitol	Erythritol	Others
• Apples • Pears • Stone fruits • Avocado • Watermelon • Blackberries • Prunes/dried fruit • Chewable/sugarless/ sublingual vitamins and medications • Kids' toothpastes • Sugar-free jams, confections and treats	• Cauliflower • Snow peas • Mushrooms • Celery/celery juice • Low carb or low sugar energy/protein bars (especially chocolate coated) • Chewable/sugarless/ sublingual vitamins and medications	• Diet/low calorie soft drinks and beverages • Low cal/sugar free "eat the whole pint" 'ice creams' • Low-carb energy/protein bars • Truvia, Lakanto sweeteners	Xylitol • Sugarless gum • Sugarless sodas/soft drinks Lactitol • Low-carb/low glycemic/keto energy bars

Gluten-free diet

Diet free from gluten from wheat, barley, rye in food, supplements, beverages and medications, including:

- ingredients derived from them
- foods having cross-contact with gluten (e.g., conventionally processed oats, shared fryers)

Strict, lifelong GF diet is the only known medical TREATMENT FOR CELIAC DISEASE

- Celiac disease is an auto-inflammatory disease in which the immune system attacks the gut lining in response to presence of event trace amounts of dietary gluten
- Chronic, repeated exposure to gluten results in damage to absorptive surfaces→ malabsorption→ deficiencies (iron, folate); osteoporosis; miscarriages/infertility increased risk of small bowel cancers

To carry a "gluten-free" label claim, the FDA requires that the food NOT contain:

- An ingredient that is any type of wheat, rye, barley, or crossbreeds of these grains (e.g., farro, einkorn)
- An ingredient derived from these grains that has not been processed to remove gluten
- An ingredient derived from these grains that has been processed to remove gluten, but results in the food containing more than 20 ppm of gluten

However, despite widespread gluten contamination of conventional oats due to processing, a loophole allows ALL oat products to be labeled gluten-free, does not require testing to ensure they meet the <20ppm threshold

Sidebar: Conventional oats and products that contain them MAY be labeled gluten-free by law, but gluten content can be (very) high

The NEW ENGLAND JOURNAL of MEDICINE

Table 1. Gluten Content of Commercial Oat Products.*

Product and Lot No. or Best-by Date	Gluten		
	Extraction A	Extraction B	Mean of A and B
	ppm		
McCann's Steel Cut Irish Oats, 28-oz container			
150134	12	12	12
150934	BLD	BLD	BLD
270934	24	21	23
160634	705	745	725
Country Choice Old Fashioned Organic Oats, 18-oz container			
July 13, 2004	131	130	131
Dec. 13, 2004	200	220	210
Dec. 17, 2004	116	124	120
March 12, 2005	BLD	BLD	BLD
Quaker Old Fashioned Oats, 18-oz container			
L309; Jan. 9, 2005	326	349	338
L309; Jan. 18, 2005	997	944	971
L110; Feb. 12, 2005	1861	1752	1807
L109; March 22, 2005	375	352	364

* BLD denotes below the limit of detection. The limit of gluten detection for the assay used in this analysis was 3 ppm.

Thompson T 2004

12 containers of conventional oats (4 different lots from 3 leading brands)

Samples were homogenized and ELISA tested

9 of the 12 containers (75%) contained >20ppm gluten

All three brands had products that exceeded safe gluten levels for people with celiac disease

https://www.glutenfreewatchdog.org/product/trader-joes-gluten-free-rolled-oats-2024/1372#

October 2024:
Six bags of Trader Joe's gluten-free rolled oats representing 4 lots were homogenized and analyzed by independent ELISA testing

2 of the bags contained gluten at levels exceeding 80ppm (33%)

1 bag contained gluten in ranges 13-16ppm

3 bags tested <5ppm

BRIEF RESEARCH REPORT article

Front. Nutr., 23 March 2021
Sec. Food Chemistry
Volume 8 - 2021 | https://doi.org/10.3389/fnut.2021.652039

This article is part of the Research Topic
Recent Breakthrough in Gluten Contamination
View all 9 Articles >

Gluten-Free Foods Cooked in Shared Fryers With Wheat: A Pilot Study Assessing Gluten Cross Contact

Tricia Thompson[1*] Trisha Bury Lyons[2] Amy Keller[3] Nancee Jaffe[4] Luke Emerson-Mason[5]

20 “gluten free” French fry orders purchased at 10 different restaurants using shared fryers with gluten containing foods

All samples underwent ELISA testing

- Quantifiable gluten was found in 9/20 (45% of orders)
- These represented orders from 6 of the 10 restaurants
- **25% of samples exceeded the threshold of 20ppm of gluten (would not be considered gluten free)**

Foods & Ingredients that Contain/May Contain Gluten

Barley, Barley malt	Durum	Gluten	Malt, Malt extract, malt flavoring	Phosphated flour	Soy sauce**	Unbromated flour
Bran	Einkorn	Graham flour	Matzoh meal	Ramen	Spelt	Wheat germ
Breadcrumbs	Emmer	Hydrolyzed wheat protein	Miso (if barley-based)	Rye	Surimi (imitation crab)	Wheat starch
Bromated flour	Flour, Enriched flour	Hydrolyzed vegetable protein (HVP)	Oats/oat bran/oat milk*	Self-rising flour	Teriyaki sauce	Wheat bran
Bulgur	Farina	Kamut	Orzo	Semolina	Triticale	White flour
Couscous	Farro	Licorice	Oyster sauce	Soba noodles	Udon noodles	Whole Wheat flour

* Oats themselves do not contain gluten, but are commonly contaminated with gluten due to processing techniques. However, certified 100% gluten-free oats and oat products can be purchased and are suitable for people with Celiac disease.

** Tamari soy sauce is gluten-free

GERD (Acid reflux) diet & lifestyle recommendations

Dietary Recommendations

Avoid/limit foods that may relax pressure of the lower esophageal sphincter

- **High-fat meals**: fried/fast food, cream sauces etc
- Large portions of any meal, especially if consumed within 3 hours of bedtime
- Alcohol
- Coffee (regular or decaf)
- **Garlic and onions**
- Chocolate
- Mint
- **Spicy foods** (e.g., chili powder, black pepper)
- **Tomato** products (tomato sauce, tomato soups, tomato juice)

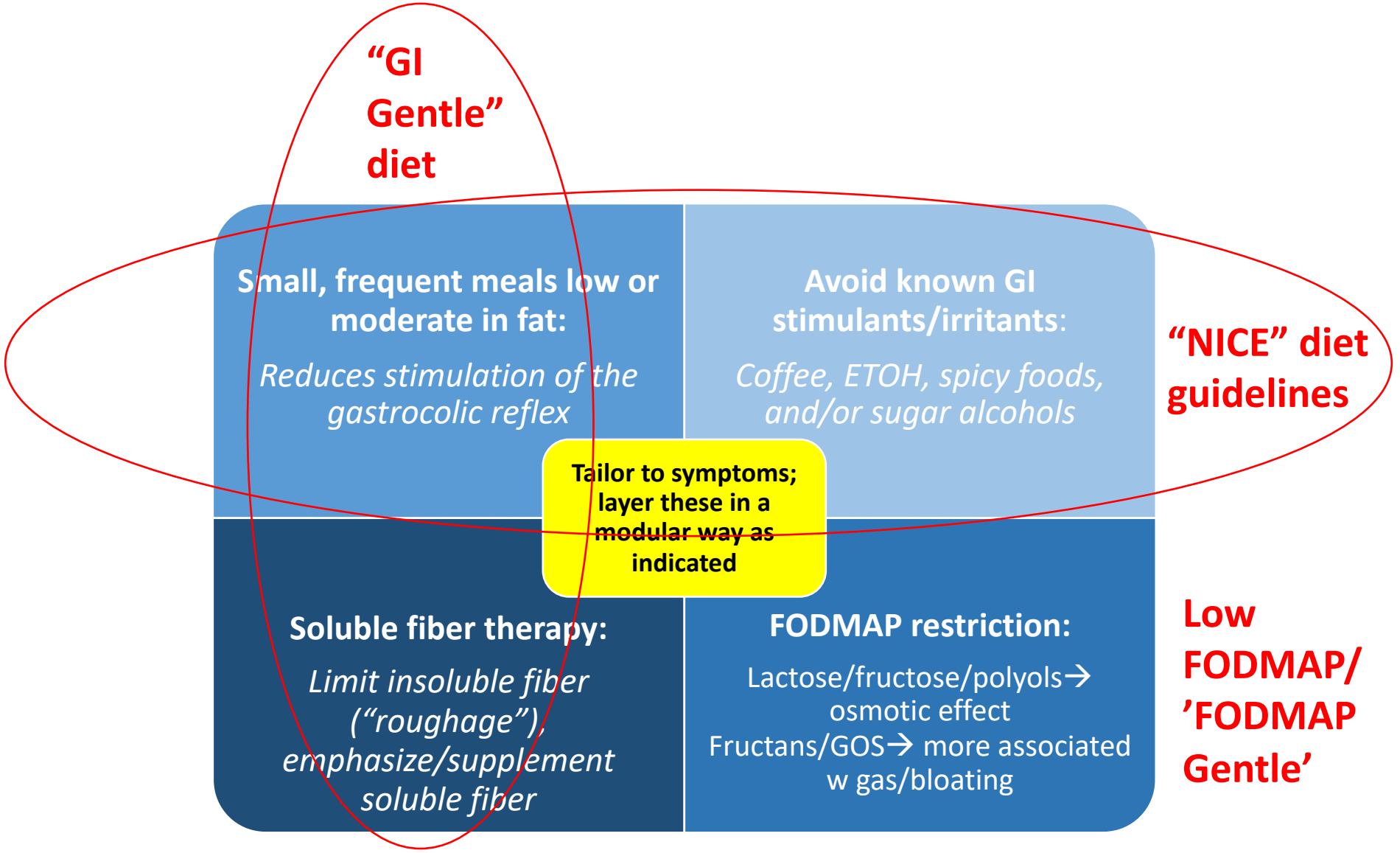
Limit acidic foods if they trigger symptoms

- Citrus/citrus juices
- Other acidic fruits (pineapple, passionfruit)
- Vinegary foods

Lifestyle/Behavioral Recommendations

- Smaller meals more frequently
- Stay upright after meals
- Stop eating within 3 hours of bedtime
- Wedge pillow/elevate head of bed
- No coffee or alcohol on an empty stomach

There is no single “IBS diet”
Diets are tailored to individual symptoms



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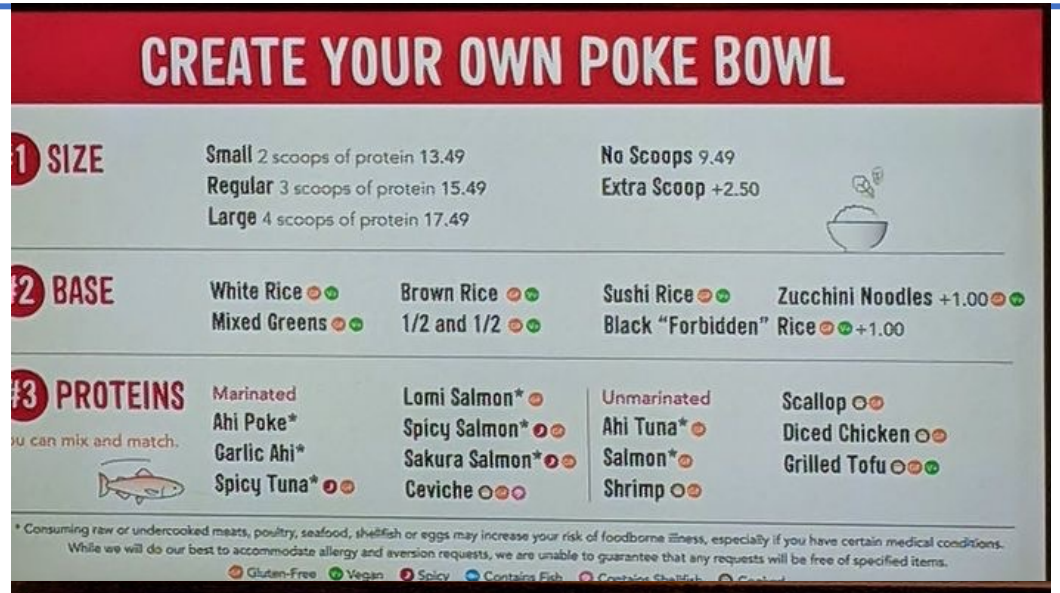
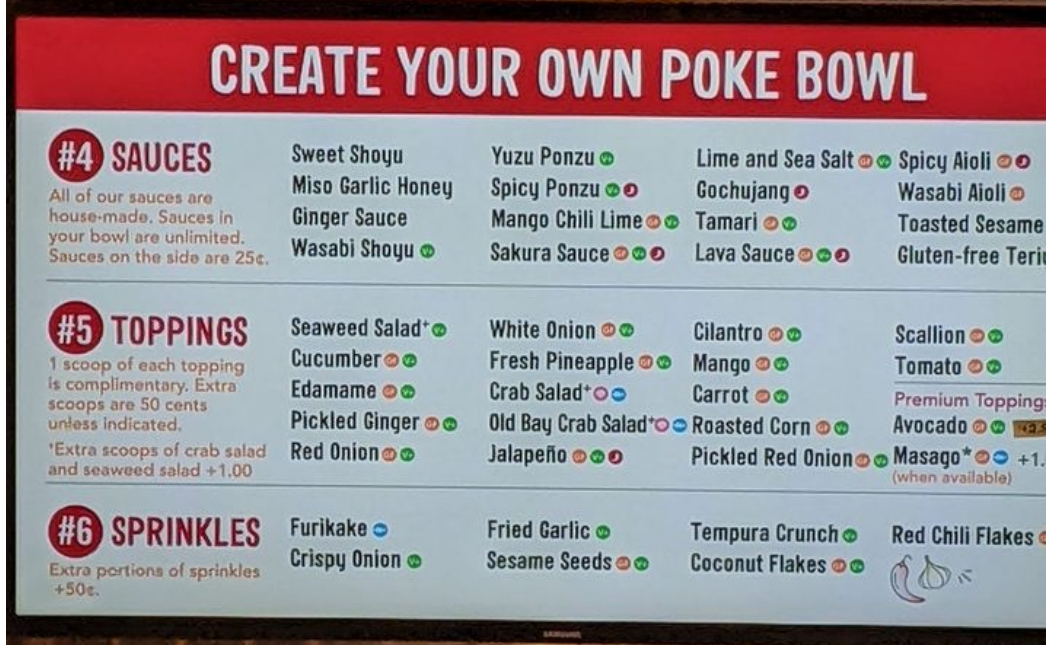
Digestively democratic menus
Food intolerance

Modular meal offerings

- **Grilled plain proteins, steamed veg, plain starches served with sauces on the side**
  - keeps gluten/dairy/excess fat out of more entrees
  - keeps garlic/onion out of the modular mains
  - offer an array of non-cream based, GF sauces/condiments on side
  - offer low FODMAP plant based proteins (firm tofu, edamame, tempeh) in heavy rotation for vegetarians who have difficulty with higher FODMAP options (beans, lentils, dairy)

- **Customizable "bars" allowing students to create their own dishes/bowls**





Poke Papa
Washington DC

Build your own bowl
Components labeled for:

Gluten-free
Vegan
Spicy
Contains Fish
Contains Shellfish
Cooked

SAUCES GF • PICK ONE (1)

Organic Ketchup v	Mayo v	Stone Ground Mustard v	Honey Mustard
Special Sauce	Wham Bam Sauce v	Smoke Sauce v	Jalapeño BBQ v
Garlic Aioli v	Spicy Mayo v	Nashville Hot v	Buffalo Sauce v
Buttermilk Ranch	Jalapeño Ranch	Spicy Green Goddess v	

SHARES & SIDES

SPREAD THE LOVE

Digestively democratic menus
Food intolerance

Default to democratic ingredients when possible

- Rice flour, cornstarch or GF all-purpose flour for flouring pan-seared items, coating fried tofu or making roux?
- GF Tamari soy sauce as default for Asian stir-fries/dressings to increase number of GF items on the menu/reduce need for customization?
- When can coconut milk be used in lieu of milk/condensed milk/cream in desserts, sauces, soups?

Offer alternative to the defaults when they can't be made democratic

Lactose-free (real) milk on offer at cafes in Montreal, Quebec (2024)

Several brands offer GF Tamari Soy sauce packets for foodservice to democratize sushi offerings

Digestively democratic menus
Gluten

Leveraging global pantry/cuisines toward naturally gluten free & exploring alternate grains

- Mexican, South Asian cuisines
- Quinoa, polenta, corn/corn tortillas, buckwheat/kasha, all manner of rices, beans/legumes…

Establish practices to reduce risk of gluten cross contact in the kitchen and expand suitability of the fuller menu to celiac students

- Dedicated GF fryer for all French fries to prevent cross-contact with breaded items?
- GF pizzas prepared in separate part of kitchen; never touch the oven surface; dedicated (color coded?) pizza wheel
- GF pastas always prepared in separate water/strainers
- Serve GF sauces/food bar items far apart from gluten-containing ones to reduce risk of swapped utensils/double dipping

Bareburger
NY/NJ/CT

French fries are fried in dedicated fryers apart from breaded items (onion rings) so they can remain gluten-free

Pre-wrapped GF ice cream cones
at gelaterias in
Rome, Italy (2019)

(upon ordering a GF cone, staff automatically swap out the ice cream scoop for a new one before scooping the cone)

Gluten-free crispbreads
Vasa Museum Cafeteria,
Stockholm, Sweden (2018)

Reducing cross-contact risks:
GF pizza from a conventional pizzeria baked in a foil pan, delivered uncut with a personal/new pizza wheel

Digestively democratic menus
Labeling

Consider expanding your labeling protocols to include more than just vegetarian/vegan, allergens, gluten/dairy, e.g.,

- Whether dishes contain onions/garlic
- Low FODMAP, which FODMAPs dishes contain
- Spiciness levels
- “GERD friendly” (low fat, not spicy, not acidic, minimal onions/garlic)
- “IBS Friendly”
- “No onions, no garlic”
- “GI Gentle” (low fat, mechanically altered fibers, low FODMAP)
- Made in a dedicated gluten-free fryer

Student surveys offering these (or other) options may yield insight into the most meaningful labeling callouts for your dining population

Rancho La Puerta
Tecate, MX

FODY Foods
“IBS Friendly”; “
No Onions, No Garlic”

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Food sensitivity testing: Is it legit?

Integrative/functional medicine provider-prescribed AND direct-to-consumer tests promising to diagnose 'food sensitivities' are increasing in circulation

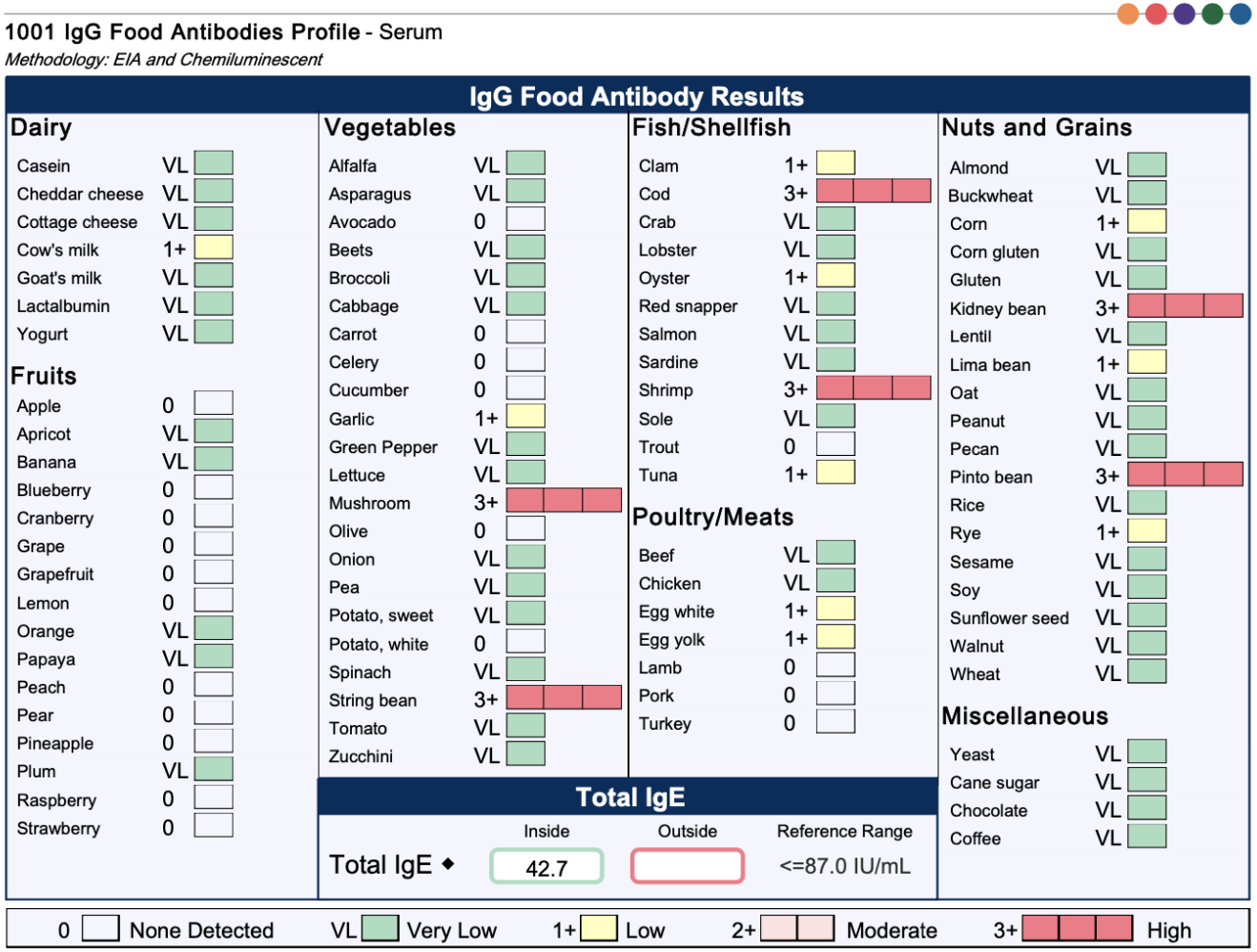
- Many/most are based on measuring levels of IgG antibodies in the blood to a large panel of common foods

These tests are not FDA approved to diagnose any medical condition, nor have they been adequately scientifically vetted for clinical use as a tool to evaluate non-allergic food reactions

Marketers of these assays use them to 'diagnose' conditions that do not have evidence-based diagnostic criteria, e.g.,

- "Food sensitivity"
- "Leaky gut"
- "Gluten intolerance"

They can return results that identify a dozen or more purported food sensitivities, with varying degrees of 'severity'



1001 IgG Food Antibodies Profile - Serum

Methodology: EIA and Chemiluminescent

IgG Food Antibody Results

Dairy

Casein	VL
Cheddar cheese	VL
Cottage cheese	VL
Cow's milk	1+
Goat's milk	VL
Lactalbumin	VL
Yogurt	VL

Fruits

Apple	0
Apricot	VL
Banana	VL
Blueberry	0
Cranberry	0
Grape	0
Grapefruit	0
Lemon	0
Orange	VL
Papaya	VL
Peach	0
Pear	0
Pineapple	0
Plum	VL
Raspberry	0
Strawberry	0

Vegetables

Alfalfa	VL
Asparagus	VL
Avocado	0
Beets	VL
Broccoli	VL
Cabbage	VL
Carrot	0
Celery	0
Cucumber	0
Garlic	1+
Green Pepper	VL
Lettuce	VL
Mushroom	3+
Olive	0
Onion	VL
Pea	VL
Potato, sweet	VL
Potato, white	0
Spinach	VL
String bean	3+
Tomato	VL
Zucchini	VL

Fish/Shellfish

Clam	1+
Cod	3+
Crab	VL
Lobster	VL
Oyster	1+
Red snapper	VL
Salmon	VL
Sardine	VL
Shrimp	3+
Sole	VL
Trout	0
Tuna	1+

Poultry/Meats

Beef	VL
Chicken	VL
Egg white	1+
Egg yolk	1+
Lamb	0
Pork	0
Turkey	0

Nuts and Grains

Almond	VL
Buckwheat	VL
Corn	1+
Corn gluten	VL
Gluten	VL
Kidney bean	3+
Lentil	VL
Lima bean	1+
Oat	VL
Peanut	VL
Pecan	VL
Pinto bean	3+
Rice	VL
Rye	1+
Sesame	VL
Soy	VL
Sunflower seed	VL
Walnut	VL
Wheat	VL

Miscellaneous

Yeast	VL
Cane sugar	VL
Chocolate	VL
Coffee	VL

Total IgE

	Inside	Outside	Reference Range
Total IgE ◆	42.7		<=87.0 IU/mL

0 None Detected VL Very Low 1+ Low 2+ Moderate 3+ High

What the experts say: AAAAI statement on food sensitivity testing

" It is important to understand that this test has never been scientifically proven to be able to accomplish what it reports to do. The scientific studies that are provided to support the use of this test are often out of date, in non-reputable journals and many have not even used the IgG test in question.

The presence of IgG is likely a normal response of the immune system to exposure to food. In fact, higher levels of IgG4 to foods may simply be associated with tolerance to those foods.

Due to the lack of evidence to support its use, many organizations, including the American Academy of Allergy, Asthma & Immunology and the Canadian Society of Allergy and Clinical Immunology have recommended against using IgG testing to diagnose food allergies or food intolerances / sensitivities."

https://www.aaaai.org/tools-for-the-public/conditions-library/allergies/igg-food-test

Parting Thoughts

The burden of chronic digestive disease is high, and the most common conditions typically require dietary modification to manage health and health-related-quality of life

A handful of therapeutic diets are frequently used and effective at mitigating post-meal digestive symptoms for a majority of GI patients

Culinarians and Food Service Directors can pull many levers to create more flexible and "digestively democratic" menus to accommodate a larger number of diners, so as to reduce the need for student-specific special accommodations

Not all special diet requests can be accommodated in a foodservice program, and some students may still require personal kitchens to follow highly individualized and highly restricted diets

The Hoxton Hotel, Chicago, IL (2024)