Navigating the Terrain of Therapeutic Diets for GI Disorders

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Disclosures

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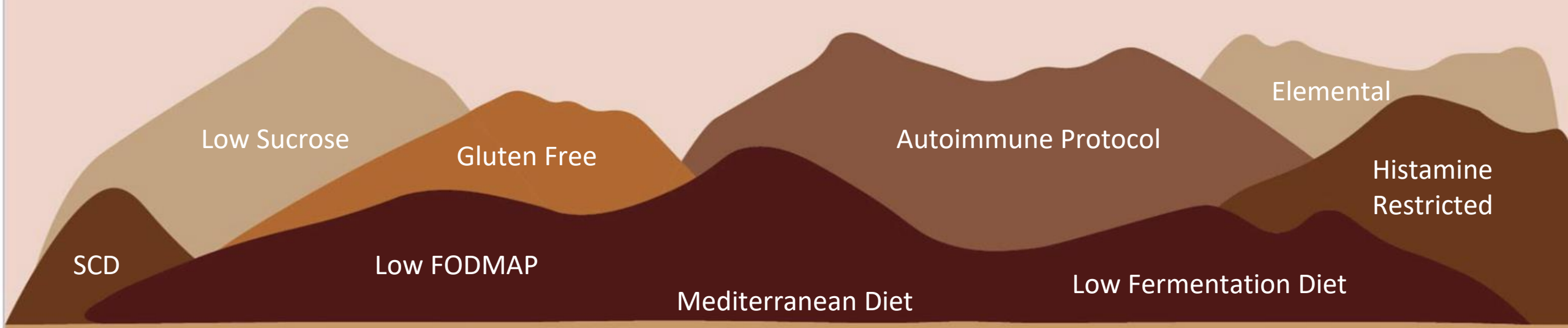
Integrative Healthcare SYMPOSIUM



IBS Overlap Conditions

SIBO, SIFO, IMO

Allergy and Intolerances (ex. histamine, nickel, etc)

Sucrase isomaltase deficiency

Pelvic floor disorders

BAM/BAD

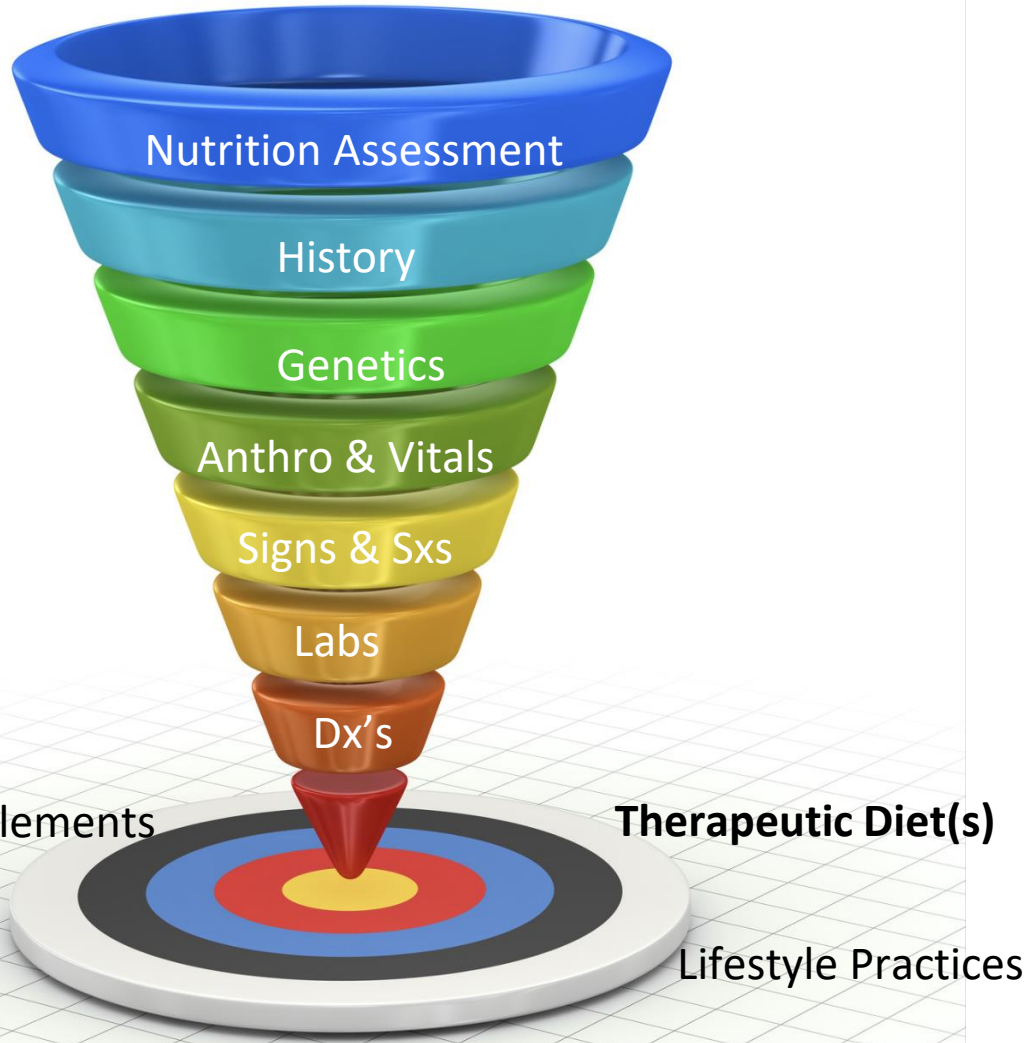
IBS-IBD

Motility
Visceral sensation
Brain-gut interactions
Microbiome
Permeability
Immune activation

Review **2024**

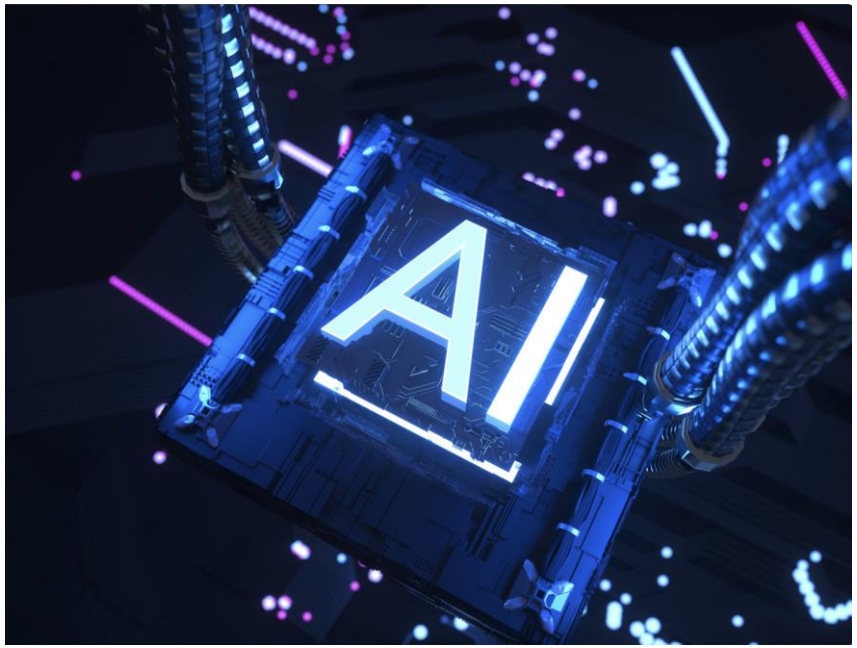
Food Intolerances, Food Allergies and IBS: Lights and Shadows

Andrea Pasta [1], Elena Formisano [2,3], Francesco Calabrese [1,3], Maria Corina Plaz Torres [1,3], Giorgia Bodini [1,3], Elisa Marabotto [1,3], Livia Pisciotta [2,3], Edoardo Giovanni Giannini [1,3] and Manuele Furnari [1,3,*]



Personalized Nutrition Care Plan

Integrative Healthcare SYMPOSIUM



Artificial Intelligence Applied to Gastrointestinal Diagnostics: A Review

Vatsal Patel, MD[1,§], Marium N. Khan, MD[2,§], Aman Shrivastava, MS[3], Kamran Sadiq, MD[4], S. Asad Ali, MD, MPH[4], Sean R. Moore, MD, MS[2], Donald E. Brown, PhD[3,5], Sana Syed, MD, MS[2,4,*]

J Pediatr Gastroenterol Nutr. Author manuscript; available in PMC 2021 January 01.

OPEN

Artificial intelligence in (gastrointestinal) healthcare: patients' and physicians' perspectives

Quirine E. W. van der Zander[1,2✉], Mirjam C. M. van der Ende - van Loon[3], Janneke M. M. Janssen[2], Bjorn Winkens[4,5], Fons van der Sommen[6], Ad. A. M. Masclee[1] & Erik J. Schoon[2,3]

Scientific Reports | (2022) 12:16779

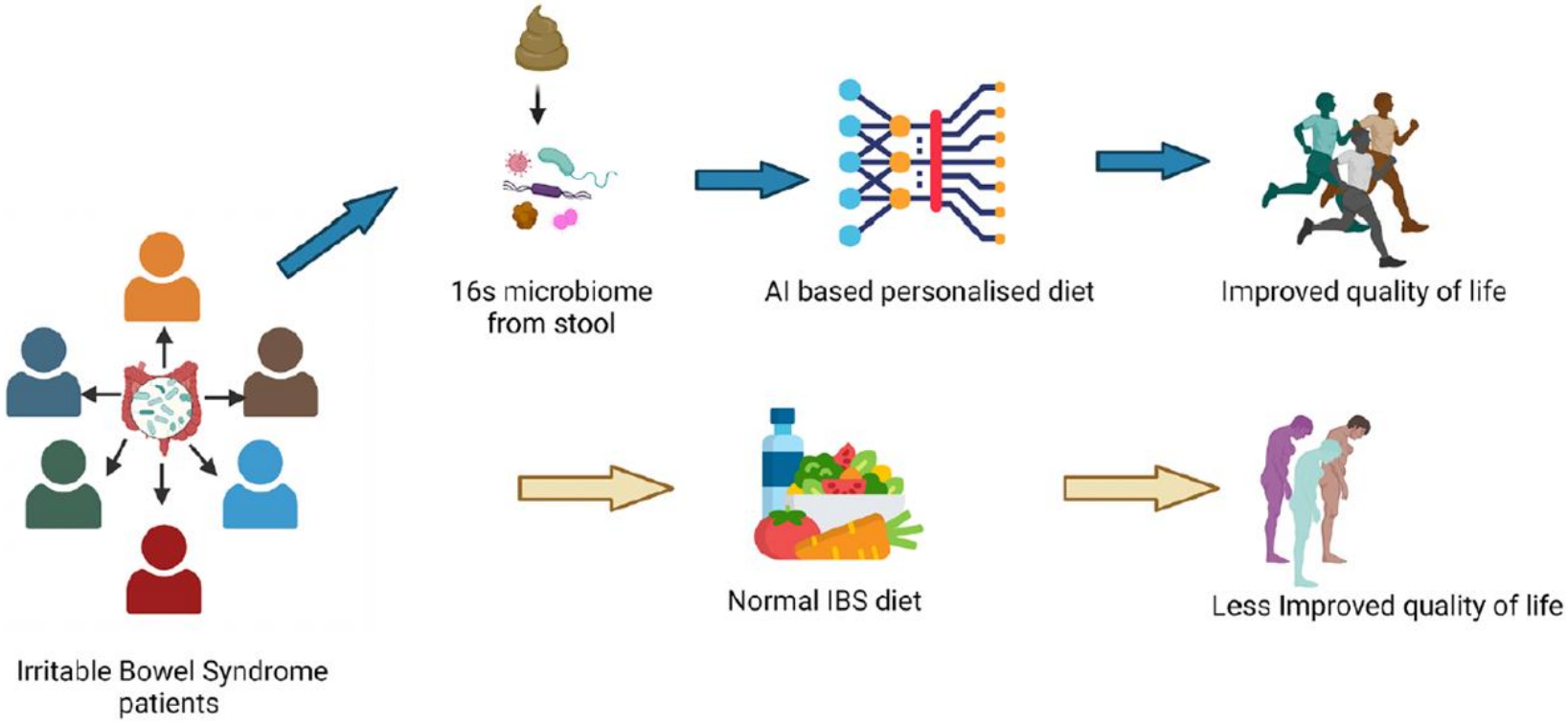
Artificial intelligence-based personalized diet: A pilot clinical study for irritable bowel syndrome

Tarkan Karakan[a], Aycan Gundogdu[b,c,d], Hakan Alagözlü[e], Nergiz Ekmen[a], Seckin Ozgul[a], Varol Tunali[f], Mehmet Hora[d,g], Damla Beyazgul[d], and O. Ufuk Nalbantoglu[d,g,h]

Gut Microbes 2022, VOL. 14, NO. 1, e2138672 (13 pages)

Artificial intelligence-based personalized nutrition and prediction of irritable bowel syndrome patients

Animesh Acharjee and Saptamita Paul Choudhury



Acharjee A, Choudhury SP. Artificial intelligence based personalized nutrition and prediction of irritable bowel syndrome patients. Ther Adv Gastroenterol 2022, Vol. 15: 1–3

IBS Background

- May affect up to 23% of the U.S. population
- Abdominal pain/discomfort
- Altered bowel habits
  - Constipation to diarrhea
  - Increased urgency
  - Incomplete evacuation
- Increased gas and bloating
- Mucus in the stool
- Motility alteration
- Commonly co-occurring with anxiety and depression
- IBS-C, IBS-D, IBS-Mixed, IBS-U

Oka P, et al., Global prevalence of irritable bowel syndrome according to Rome III or IV criteria: a systematic review and meta-analysis. Lancet Gastroenterol Hepatol. 2020 Oct;5(10):908-917. doi: 10.1016/S2468-1253(20)30217-X.

IBS Pathophysiology

- Altered GI motility
- Visceral hypersensitivity
- Post-infectious reactivity
- Gut-brain axis dysfunction
- Altered gut microbiome
- Increased intestinal permeability
- Intestinal and systemic inflammation
- Immune dysfunction: Celiac and IBD should be ruled out in those with IBS-D (Lacy, B. et al. *American Journal of Gastroenterology, 2021* Clinical Guideline: IBS)
- Bacterial overgrowth (SIBO)
- Fungal overgrowth (SIFO)
- Food sensitivity
- Carbohydrate malabsorption
- Serotonin dysregulation
- Overlap between functional dyspepsia (FD) and IBS
  - FD and IBS-D = abdominal pain, bloating, and diarrhea
  - FD and IBS-C = abdominal fullness and constipation

Huang, K. Y., et al (2023). Irritable bowel syndrome: Epidemiology, overlap disorders, pathophysiology and treatment. World journal of gastroenterology, 29(26), 4120–4135. https://doi.org/10.3748/wjg.v29.i26.4120

SIBO

- Movement of colonic bacteria into the small intestine
- Production of hydrogen after carbohydrate consumption
- Most often the result of increased LPS permeability resulting in chronic inflammation
- Classic symptoms:
  - Abdominal pain
  - Bloating
  - Gas
  - Diarrhea
  - Irregular bowel movements
- Co-occurrence of SIBO and IBS is common
- Bacterial overgrowths may be more common in IBS-C

Banaszak, M., et al., (2023). Association between Gut Dysbiosis and the Occurrence of SIBO, LIBO, SIFO and IMO. *Microorganisms*, *11*(3), 573. https://doi.org/10.3390/microorganisms11030573

SIFO

- Dysbiosis of fungi in the small intestine
- Fungal dysbiosis may be more important in the development of IBS than bacteria
- Significant alteration in the intestinal fungi of patients with IBS
  - If *Mycosphaerella*, *Aspergillus*, *Sporidiobolus*, and *Pandora* are present, may strongly predict IBS
- Fungi affect IBS development by immune activation, increased intestinal permeability, harmful metabolites, visceral hypersensitivity, altered fungi-bacteria connection
- Symptoms often overlap with other conditions
  - >25% of pts with unexplained GI symptoms may have SIFO

Banaszak, M., et al. (2023). Association between Gut Dysbiosis and the Occurrence of SIBO, LIBO, SIFO and IMO. *Microorganisms*, *11*(3), 573. https://doi.org/10.3390/microorganisms11030573

Liu A,. Toxins (Basel). 2022 Aug 29;14(9):596.
doi: 10.3390/toxins14090596. PMID: 36136534; PMCID: PMC9503233

Symptom Overlap

SIBO	SIFO	IBS
• Abdominal pain • Bloating • Gas • Diarrhea • Belching • Irregular bowel movements • Nutritional deficiencies	• Abdominal pain • Bloating • Gas • Diarrhea • Increased urgency • Mucus in the stool • Belching • Chest pain • Indigestion	• Abdominal pain • Bloating • Gas • Diarrhea to constipation • Increased urgency • Mucus in the stool

Banaszak, M., et al. (2023). Association between Gut Dysbiosis and the Occurrence of SIBO, LIBO, SIFO and IMO. *Microorganisms*, *11*(3), 573. https://doi.org/10.3390/microorganisms11030573

IBS Nutrition Therapy Goals

- Reduce Inflammation
- Reduce Immune System Burden
- Reduce Microbial Fuel

IBS Diet Therapy

Low FODMAP/FODMAP GENTLE	Mediterranean	Gluten/Dairy Free	Elemental
• Most clinical evidence • Reduces substrate for intestinal bacteria • Anti-inflammatory • Immune system protective	• Anti-inflammatory • Polyphenol-rich • Immune system protective	• Eliminates only gluten and dairy-containing foods • May be anti-inflammatory • May reduce immune system activation	• Fully or partially digested liquid formula • Anti-inflammatory • Reduces substrate for intestinal bacteria • Immune system protective

Regardless of diet type: avoid lactose, sorbitol, fructose, xylitol, mannitol, excess fat, alcohol, insoluble fibers, and carbonated drinks

Huang, K. Y., et al (2023). Irritable bowel syndrome: Epidemiology, overlap disorders, pathophysiology and treatment. World journal of gastroenterology, 29(26), 4120–4135. https://doi.org/10.3748/wjg.v29.i26.4120

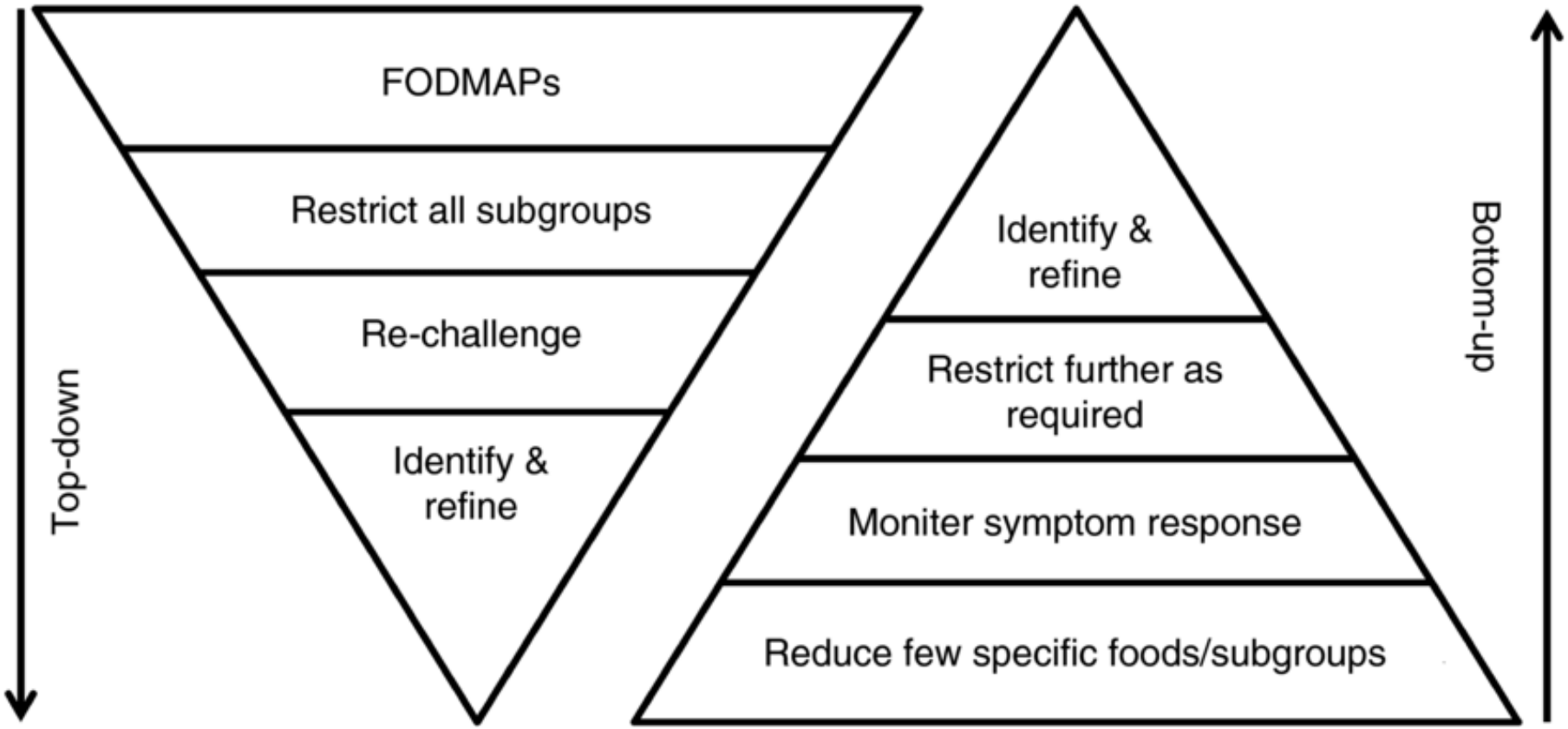
Low FODMAP Diet: The Research

Date/Type of Trial	Evidence	Reference
2018 SR/MA LFD compared to standard diets for IBS	LFD improved GI symptoms, health-related QOL, and abdominal pain	Shuman, D. et al *Nutrition*. 2018;45:24-31
2018 SR/MA GFD and LFD in IBS	GFD reduced IBS symptoms but not statistically significant LFD improved GI symptoms, abdominal pain, and health-related QOL	Dionne, J et al, *Am J Gastroenterol*. 2018;113(9):1290-1300
2020 Literature Review	LFD has the greatest efficacy among dietary interventions for IBS. Benefits similar to yoga and hypnotherapy	Bellini, M. et. Al *Nutrients*. 2020;12(1):148. Published 2020 Jan 4
2021 SR/MA	LFD reduces IBS severity by a “moderate to large extent” without substantial nutritional deficiencies or overall microbial diversity	van Lanen, SA, de Bree, A, Greyling, A *European Journal of Nutrition* 2021; 60(6) 3505-3522

Low FODMAP Diet: The Research

Date/Type of Trial	Evidence	Reference
2022 RCT	LFD for 6 weeks– 66.1% of patients had no IBS symptoms after the intervention LFD is effective (regardless of bacterial overgrowth) for reducing gas and diarrhea, no effect on constipation	Wiecek, M et al, 2022
2022 Prospective Trial	Kids with functional abdominal pain – IBS LFD improved pain intensity and QOL with no adverse outcome on body weight	El Gendy, YGA et al, 2022

Top-Down v/s Bottom-Up Approach



Wang, Xiao Jing et al. (2019) *Alimentary Pharmacology & Therapeutics*. 50. 10.1111/apt.15419

Mediterranean Diet: The Research

Date/Type of Trial	Evidence	Reference
2022 Case Control Study in kids ages 12-18	Mediterranean diet led to significant improvement in IBS symptom scores over a regular diet	Al-Biltagi, M. et al., *World journal of clinical pediatrics*, *2022; 11*(4), 330–340
2022 Literature Review	Combining the LFD (anti-symptom) with Mediterranean diet (anti-inflammatory) may improve outcomes	Kasti, A. et al., *Microorganisms*, 2022; *10*(4), 751

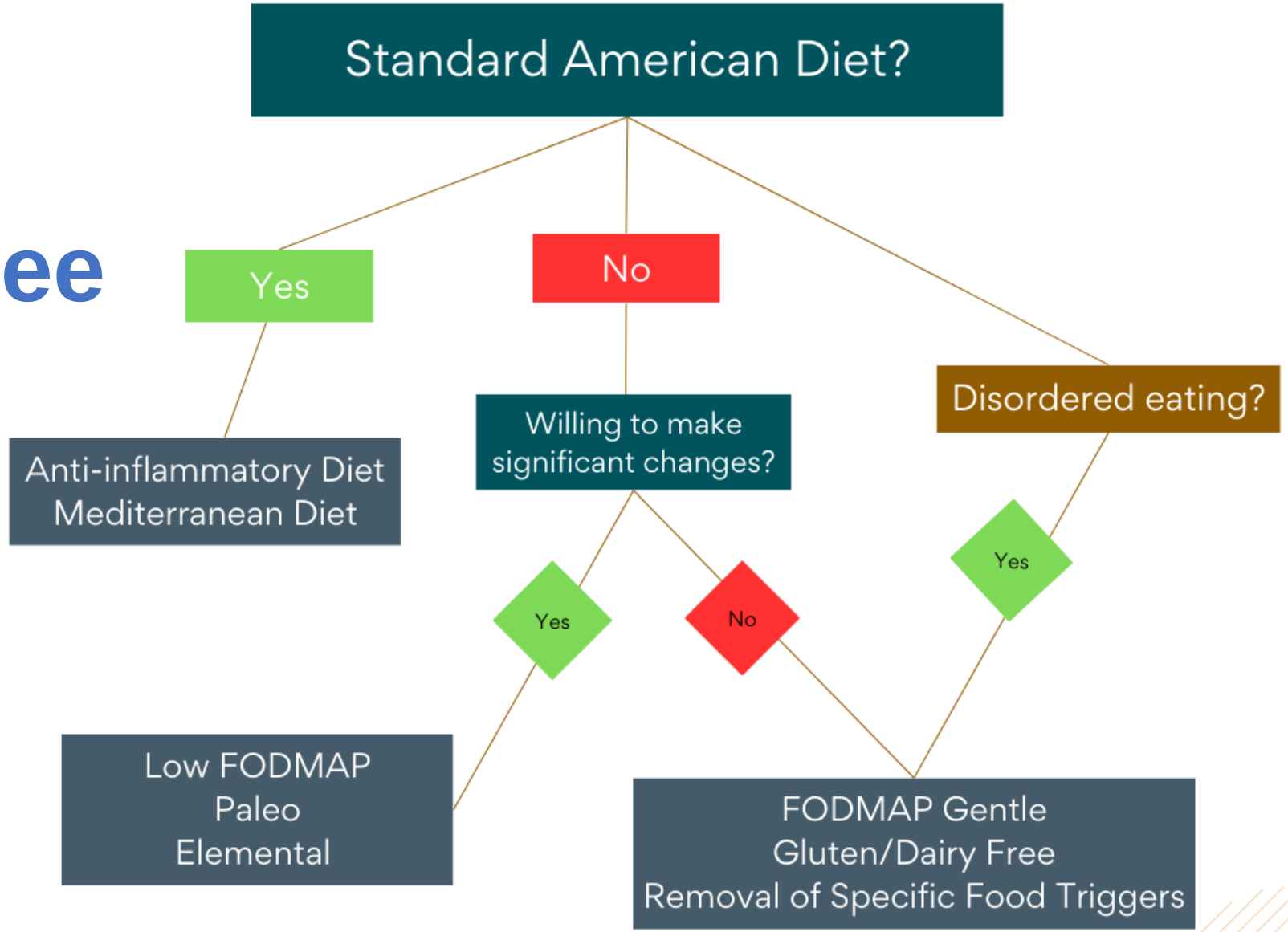
Gluten Free Diet: The Research

Date/Type of Study	Evidence	Reference
2018 SR/MA	GFD improves IBS symptoms but not statistically significant	Dionne, J et al, *Am J Gastroenterol*. 2018;113(9):1290-1300
2022 RCT Compared traditional dietary advice, GFD, and LFD in non-constipated IBS pts	All diets led to significant improvement in IBS symptoms	Rej, A. et al., *Clinical gastroenterology and hepatology. 2022; 20*(12), 2876–2887.e15.

Elemental Diet: The Research

Date/Type of Study	Evidence	Reference
2004 trial – 2 week exclusive elemental diet in IBS patients with an abnormal lactulose breath test (LBT)	• 80% had normal LBT at day 15 • 85% had normal LBT at day 21 • IBS symptom scores improved significantly for those who normalized the LBT	Pimentel, M., et.al., *Digestive diseases and sciences*, *49*(1), 73–77.
2015 SR and MA Elemental diet v/s no intervention for Crohn's disease	• Limited evidence suggests a benefit of elemental diet for maintaining remission and prevention of relapse in adult Crohn's disease patients	Tsertsvadze, A., et al., *Health technology assessment (Winchester, England)*, *19*(26), 1–138.
2017 – review Exclusive enteral nutrition (elemental or polymeric) in pediatric Crohn's	• Reduces microbial overgrowths • Supports healthier gut microbiome balance and intestinal homeostasis • Induces remission in up to 80% of pediatric Crohn's patients	MacLellan, A., et al., *Nutrients*, *9*(5), 447.

IBS Diet Decision Tree



GI Diet Considerations

- **Talk to patients about practical ways to improve digestion:**
  - Chewing food well
  - Hydration
  - Deep breathing before meals
  - Trauma therapy
  - Managing stress
  - Allowing 4-5 hours between meals
- **Therapeutic tools for exploration**
- **Consider pre-screening for disordered eating behaviors/history (EAT-26 or SCOFF)**
  - 2022 Study: participants on a LFD had highest prevalence of orthorexia compared to those on traditional or vegetarian diets
- **It's not always just about what you're eliminating, it's important to consider what needs to be added**
- **If diet therapy is unsuccessful:**
  - Re-evaluate the diagnosis
  - How is adherence?
  - Nocebo effect?

Gwioździk W, *Nutrients*. 2022;14(19):4125. Published 2022 Oct 4. doi:10.3390/nu14194125

Case Study: Kathy - IBS

- 64-year-old female with hair loss, chronic diarrhea, and weight loss
- Down 12 lbs. over 6 months (weight of 92 lbs.) since her favorite brother had passed away
- Had to stop daily 4 mile walks due to diarrhea and weight loss
- Unable to sleep longer than 4 hours per night
- Dx of Hashimoto’s thyroiditis
- Initial labs:
  - Elevated serum cortisol, high blood sugar, low lipids, low WBC count, optimal vitamin D
  - Symptom score of 128 - severe

Case Study: Kathy

- Diet recall: Avoided carbonated beverages and greasy foods due to acid reflux, low intake of vegetables, high intake of refined CHO and sugar
- Numerous physicians, many tests, but no organic cause of her symptoms was determined and she was diagnosed with IBS
- Taking aspirin daily for 40 years
- She reported one physician recommended a powerful antibiotic to “wipe out” all gut bacteria, but she sought nutrition therapy instead

Food

- **In**
  - 60 ounces of water per day
  - High protein green smoothie for breakfast with L-glutamine powder for four weeks
  - Low FODMAP foods
- **Out/Minimal**
  - High FODMAP foods

Supplements	Tests/Labs	Lifestyle/Referrals
• **Vitamin B complex** once per day in the morning – increased demand from stress • **Vitamin C** 1000 milligrams per day – increased demand from stress • **Omega-3** 2000 milligrams per day – inflammation • **Magnesium glycinate** 400 milligrams before bed • **Pancreatic enzymes** and **DGL** before meals • **L-glutamine powder** in morning smoothie	**GI-Map Stool Test:** • Reduced mucosal health • High zonulin • Decreased digestive function • Low pancreatic elastase • Low microbial diversity • High beta-glucuronidase	• Meditation for 10 minutes BID • Strength training twice per week (muscle mass, weight, and stress) • Speak with provider about discontinuing daily aspirin • Consider grief counseling

Outcome

- **After 4 weeks:** My Symptom Score down from 128 to 30.
- Aspirin was discontinued by physician
- **At 7 weeks:**
  - Gained 8 pounds
  - No further diarrhea with one normal BM every morning
  - *“For the first time in two years I can lay on my left side without pain. The doctors thought I was a flake.”*
- Sleep improved to >6 hours per night
- Hair stopped falling out
- FODMAPs reintroduced and she follows a nutrient-dense meal plan
- Encouraged to increase vegetable consumption but avoid any varieties that trigger symptoms.
- Encouraged to continue with her stress-management techniques and to maintain a healthy sleep

Case Study: Karen – IBS Symptoms

- 55 y/o female with:
  - ✓Excessive gas and bloating after meals or if she didn't eat routinely
  - ✓Stress headaches
  - ✓Anxiety
  - ✓Bulimia
  - ✓Heartburn
  - ✓Lower abdominal pain
  - ✓Diarrhea and constipation
  - ✓Initial symptom score of 93 – severe symptoms

History

Medications	Supplements	Lifestyle
• Venlafaxine • Buspirone • Trazodone • Baby aspirin	• Fish oil • Magnesium	• Bulimia since age 18, currently 1-2 times per month • No routine exercise • Trazodone nightly for sleep • High stress level • Hx of abuse relationship (alcoholic husband) s/p divorce • Kids had recently moved to college

Food

FODMAP gentle diet x 4 weeks

Grains	Wheat and rye-based products
Vegetables	Onion, garlic, leek, cauliflower and mushrooms
Fruit	Apple, pear, dried fruit, stone fruit, watermelon
Dairy	Milk and yogurt
Meat/alternatives	Legumes

https://www.monashfodmap.com/blog/gentle-fodmap-diet/

Supplements	Labs/Tests	Lifestyle
• Lacto-bifido blend probiotic daily • Magnesium glycinate (200mg) before bed	• Comprehensive stool test (declined) • SIBO breath testing (declined) • At-home stomach acid testing (WNL)	• Stress management technique upon waking and at mid-day • Create a relaxing sleep routine • Discuss trial off of trazodone with MD • Exercise: daily walk and work up to three days per week of cross-training • Consider limbic retraining program or resume counseling for bulimia

Outcome: 4 Weeks

- Symptom score down from 93 to 34
- Gas much improved but still some bad days
- Still some upper stomach pain but not as bad
- Practicing meditation before bed
- Exercise: Nothing formal but walking dogs more
- Felt quite restricted on the meal plan but was following it, missed milk in her tea
- No bulimic episodes
- Taking the probiotic, not the magnesium
- Sleep seemed a little better

Goals

- Continue FODMAP gentle for 4 more weeks
- Add back cow's milk (2 oz) with coffee and tea and monitor for symptoms
- Consider adding in different probiotic categories: *Saccharomyces boulardii* and soil-based
- Consider adding the magnesium and discussing trial off of trazodone with provider
- Add in treadmill time and work on being more active overall
- Work on meal planning and prep – provided resources

Outcome: 12 Weeks

- Symptom score down from 34 to 3
- Bowel movements more regular
- Gas and bloating nonexistent
- She learned how to meal prep and found additional vegetables she likes
- Spending time in nature with dogs and meditating at night
- Wanted to add foods back but felt nervous about recurring symptoms
- No bulimic episodes
- She was eating the same foods over and over
- Taking mag citrate, Lacto-bifido probiotic, MVI, B12, and fish oil
- Exercising 2-3 days per week and walking dogs every day

Goals

- Begin the reintroduction of eliminated foods
  - Found blackberries, ice cream, and wheat bread to exacerbate symptoms
  - Noted gas and bloating were worse on high stress days
- Consider adding in the other categories of probiotics
- Continue all lifestyle strategies
- Meet with provider to discuss weaning off of some medications
- Consider long-term ED counseling, and make daily stress management techniques non-negotiable

Case Study: Cathy – Fungal Overgrowth

- 40y/o with Recurrent Vulvovaginal Candidiasis
- Cathy complained of:
  - ✓Vaginal itching and burning
  - ✓Headaches
  - ✓Fatigue
  - ✓Brain fog
  - ✓Acne
  - ✓Significant premenstrual syndrome symptoms despite having her uterus and cervix removed
  - ✓She “felt terrible” for nine days every month with significant vaginal and GI symptoms and broke out into hives

History

Lifestyle	Treatment History
• Very busy mom of four and nutrition history revealed she was eating out frequently (50-75% of meals each week, fast food) in between her kid's activities • Reported eating sweets, processed foods and drinking soda daily. • Cathy wanted to learn how to incorporate healthy eating into her busy lifestyle to improve her symptoms and for the health of her family.	• Self-medicated with OTC antifungal medications and a peroxide and water solution. • Her OBGYN then ordered numerous rounds of Diflucan with no significant relief and finally started on Diflucan twice daily for several months. • She reported staying on the oral medication as prescribed but eventually discontinued use due to GI pain. • Cathy sought nutrition therapy as a last resort

Food

- **In**
  - Meal prep meals and snacks
  - Whole foods, focus on vegetables, high-quality protein, and healthy fat

- **Out/Minimal**
  - Gluten, Dairy, Corn, Soy, Shellfish, Red Meat, Peanuts, Caffeine, Chocolate, Eggs, Sugar, Soda

Supplements	Labs/Tests	Lifestyle
• Probiotic (forgot to take, so focused on food sources)	• Comprehensive Stool Analysis (declined due to cost) • Urine organic acids (declined due to cost)	• Meditation daily for 5 minutes • Normalize sleep schedule • 10-minute walk after meals

Outcome: 4 Weeks

- Significant improvement in all symptoms
- Started the reintroduction of eliminated foods and she determined caffeine, gluten, and dairy caused vaginal symptoms to flare
- **Follow-up plan:** continue to avoid trigger foods and follow a lower carbohydrate maintenance plan with very limited simple sugar
- **Symptom-free for 5 months:** Drank a sugar-sweetened beverage and ate sushi and had a significant vaginal symptoms exacerbation

Outcome: 11 Months

- “I didn’t realize how many symptoms I had until they were gone! I mean I knew the obvious ones like the stomach and the vaginal itching, but I didn’t realize I had so many more. My skin broke out all the time, I always had heartburn, my joints ached, my teeth hurt, I had some sinus issues, and I had sticky eyelids. I always felt heavy and fatigued! ALL GONE! Now that they aren’t happening, I realize how long I had little issues that just seemed like no big deal, but add up to be a very big deal. And bonus, I’m back to pre-first baby weight.”
- She also said her mood had improved and her family has a much happier wife and mom.

What other diagnoses are potential masqueraders?

Food hypersensitivity

- **immune-mediated**
  - food allergy with immunological response
  - 6–10% for children and 2–5% for adults
- **non-immune-mediated**
  - food intolerance without immunologic mechanisms involved
  - lack of metabolizing enzymes, toxic or pharmacological factors

- IgE
- mixed and non-IgE food allergy food intolerance
- eosinophilic gastrointestinal disorders
- mast cell activation syndrome
- carbohydrate intolerance
- non-celiac gluten sensitivity
- additives hypersensitivity

Food hypersensitivity

IgE-Mediated Food Allergy

- Elimination diet
  - Processing & heat
- Antihistaminic drugs
- Probiotics and influence on the gut microbiome
- Immunotherapy
- GI S/S: abdominal pain, vomiting, diarrhea, bloating, heartburn, constipation
- Food-dependent, exercise-induced anaphylaxis (FDEIA)
- Oral allergy syndrome (OAS)

Non-IgE-Mediated or Mixed Allergy

- 3 types of elimination diets
  - Empiric diet (6FED), IgE-based diet, and elemental diet
- Pharmaceuticals
- GI S/S: Symptoms: dysphagia, heartburn, lack of appetite, food impaction (often meat), diarrhea, vomiting, symptoms of malabsorption
- Eosinophilic esophagitis (EE), gastroenteritis (GE) or colitis (EC)

Food hypersensitivity

Mast cell activation Syndrome - MCAS

- Primary, secondary and idiopathic
- POTS, hEDS, SIBO
- GI S/S: abdominal pain, bloating, constipation, diarrhea, nausea, gastric hypersecretion, dyspepsia, heartburn

- H1-receptor antagonists, H2-receptor antagonists, anti-leukotriene medications or MC stabilizing agents
- Most effective dietary intervention remains the identification and avoidance of triggers
- Histamine, gluten, and dairy-protein-free diets

POTS, MCAS, hEDS

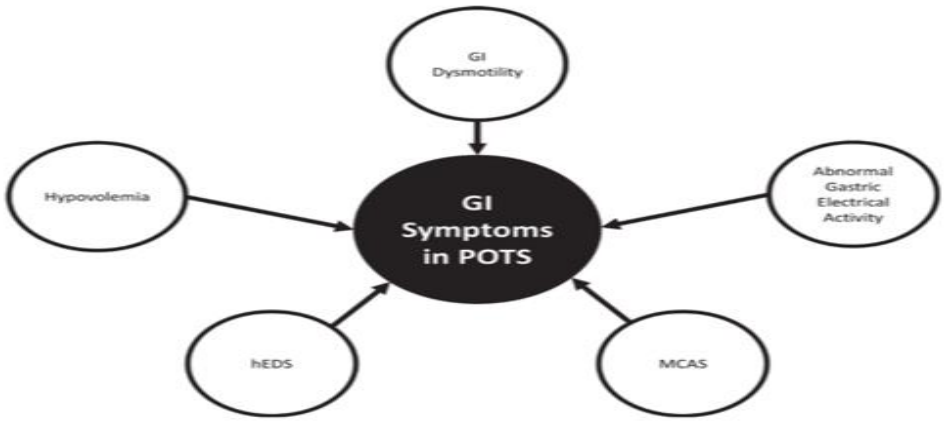


FIGURE 1 Possible mechanisms of GI symptoms in POTS. hEDS, Hypermobile Ehlers-Danlos Syndrome; MCAS, Mast Cell Activation Syndrome; POTS, Postural Orthostatic Tachycardia Syndrome.

Tu, Y., Abell, T. L., Raj, S. R., & Mar, P. L. (2020). Mechanisms and management of gastrointestinal symptoms in postural orthostatic tachycardia syndrome. *Neurogastroenterology and Motility*, *32*(12), 1–10. https://doi.org/10.1111/nmo.14031

Non-Immune-Mediated Adverse Food Reactions (Food Intolerances)

CHO Intolerance

- Lactose
- Fructose
- FODMAPs
- NCGS

Table 7. Carbohydrate intolerances: diagnostic tools and treatment [67,68].

Type of Intolerance	Diagnostic Tool	Treatment
Lactose	Hydrogen breath test with lactose	Low-lactose diet
Fructose	Hydrogen breath test with fructose	Low-fructose diet
FODMAPs	Elimination diet, OFC, hydrogen breath test	Low-FODMAPs diet
NCGS	Exclusion of celiac disease and wheat allergy, the Salerno Experts' recommendations	Gluten-free/Wheat free diet/ Low-FODMAPs

FODMAPs—fermentable oligo-, di-, monosaccharides and polyols, NCGS—non-celiac gluten sensitivity, OFC—oral food challenge.

Kanikowska, A., Janisz, S., Mańkowska-Wierzbicka, D., Gabryel, M., Dobrowolska, A., & Eder, P. (2022). Management of Adult Patients with Gastrointestinal Symptoms from Food Hypersensitivity—Narrative Review. *Journal of Clinical Medicine*, *11*(24). https://doi.org/10.3390/jcm11247326

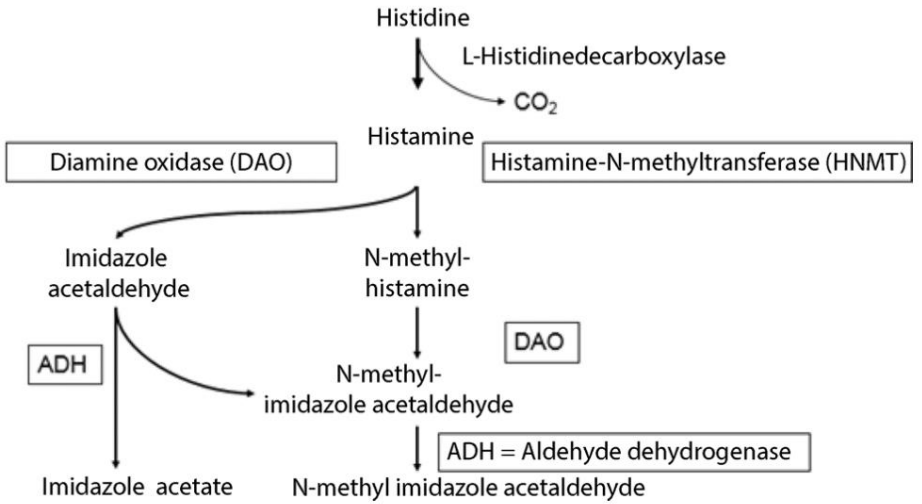
Mixed reactions - additives

- immune and non-immune-mediated types
- flushing, urticarial, angioedema, rhinorrhea, abdominal pain, diarrhea, depressed mood and fatigue
- asthma, allergies

- sulfites, benzoates, monosodium glutamate, salicylates and colorants
- FAILSAFE/RPAH diet
  - three restriction levels: strict, moderate and simple
  - avoids salicylates, amines, monosodium glutamate, preservatives benzoates, propionate, sulfites, nitrites, sorbic acid, colorings, flavorings and, in some cases, gluten, dairy and soy
  - FIG app - Food is Good

Could it be Histamine Intolerance?

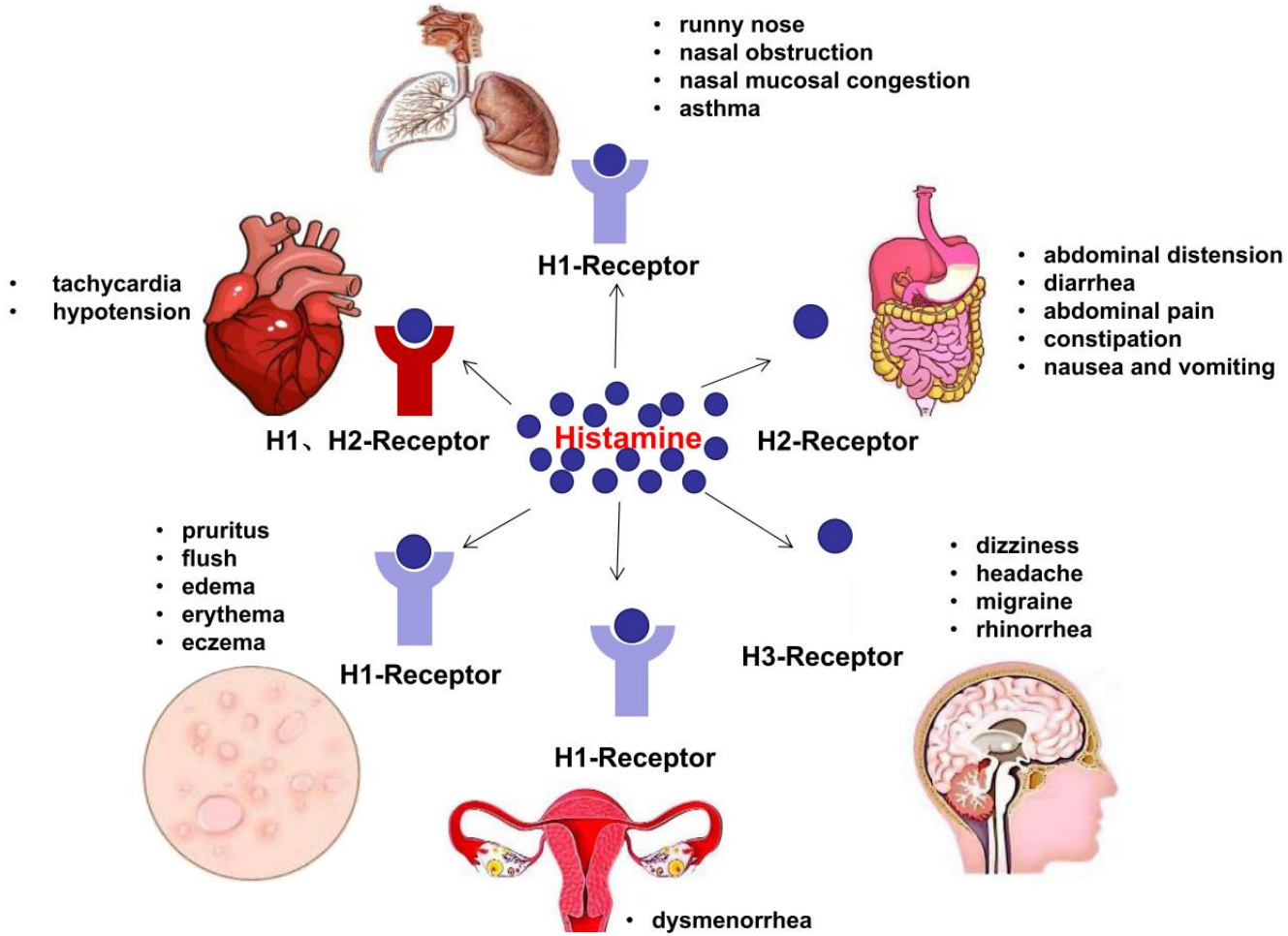
- The body metabolizes histamine via two known degradation pathways
- Methylation by histamine-N-methyltransferase (HNMT),
- Oxidative degradation by diamine oxidase (DAO).



Reese, I., Ballmer-Weber, B., Beyer, K., Fuchs, T., Kleine-Tebbe, J., Klimek, L., Lepp, U., Niggemann, B., Saloga, J., Schäfer, C., Werfel, T., Zuberbier, T., & Worm, M. (2017). German guideline for the management of adverse reactions to ingested histamine: Guideline of the German Society for Allergology and Clinical Immunology (DGAKI), the German Society for Pediatric Allergology and Environmental Medicine (GPA), the German Asso. *Allergo Journal International: Interdisciplinary Journal of Allergy, Clinical Immunology and Environmental Medicine*, *26*(2), 72–79. https://doi.org/10.1007/s40629-017-0011-5

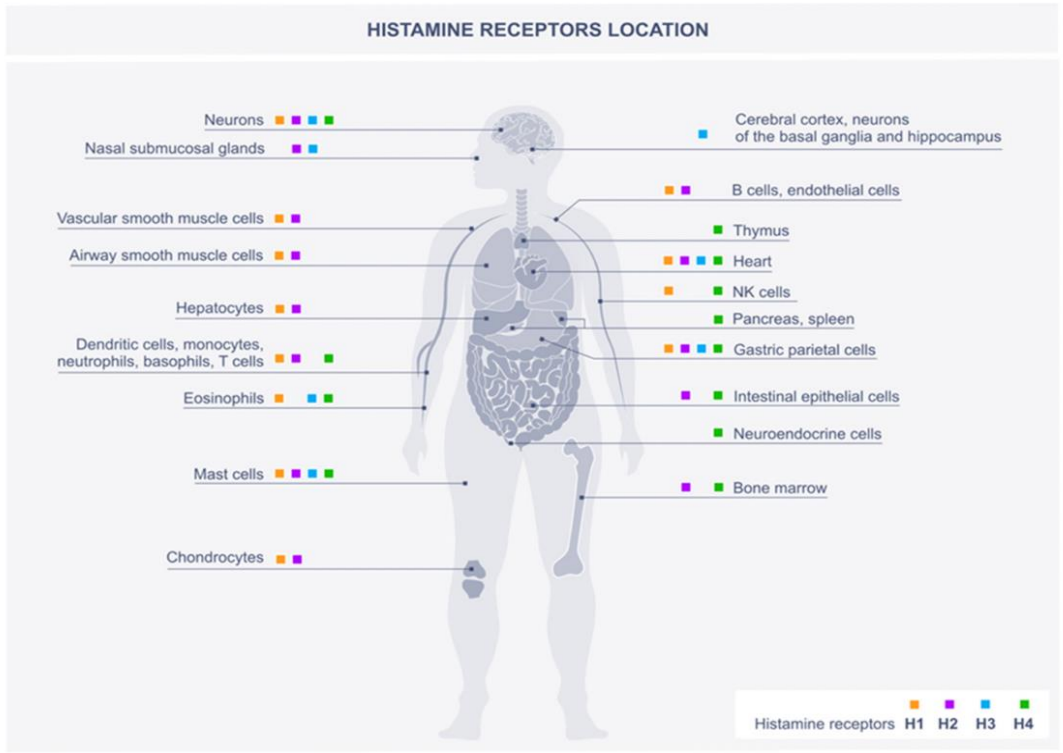
Histamine?

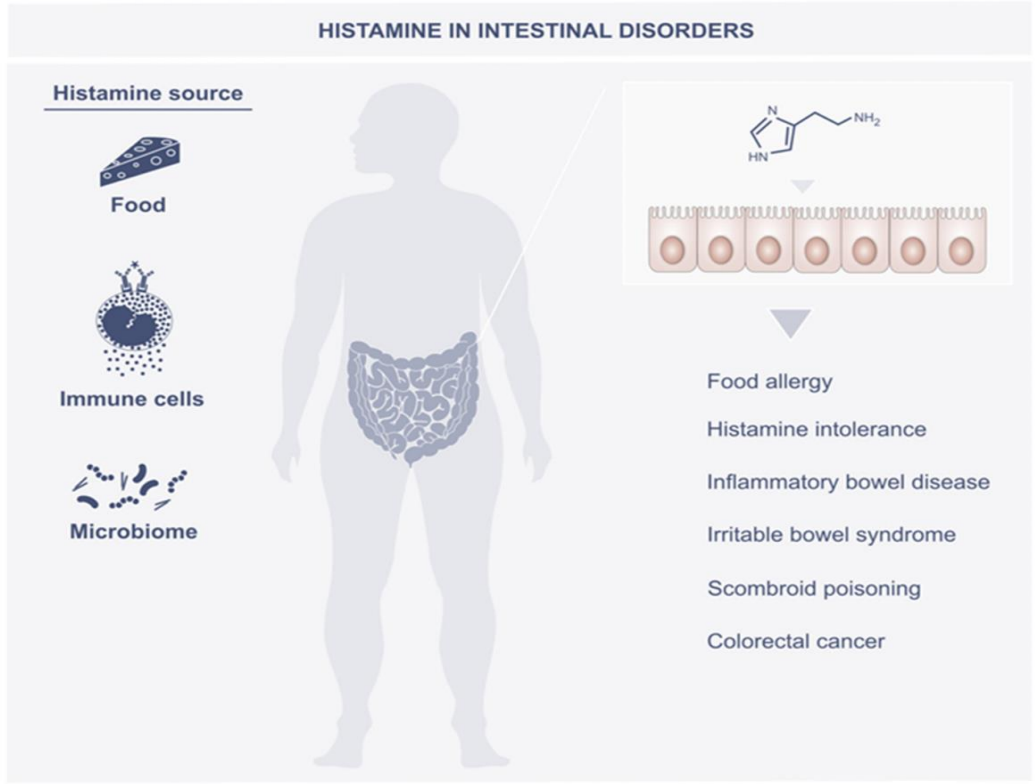
Histamine in the intestine is degraded not only by diamine oxidase, but possibly also by histamine N-methyl-transferase (HNMT)



Zhao, Y., Zhang, X., Jin, H., Chen, L., Ji, J., & Zhang, Z. (2022). Histamine Intolerance—A Kind of Pseudoallergic Reaction. *Biomolecules (2218-273X)*, *12*(3), 454. http://10.0.13.62/biom12030454

Identifying this possible masquerader





Smolinska, S., Winiarska, E., Globinska, A., & Jutel, M. (2022). Histamine: A Mediator of Intestinal Disorders—A Review. *Metabolites (2218-1989)*, *12*(10), 895-N.PAG. http://10.0.13.62/metabo12100895

Differential diagnosis

1. **Food allergy**
   - Food allergy is caused by an allergic reaction.
   - Patients with food allergy may have elevated IgE.
   - The gold standard of food allergy is the oral food challenge test.
2. **Irritable bowel syndrome**
   - Food antigens (including but not limited to histamine) are responsible for approximately 80% of GI symptoms in patients wit -h IBS.
   - IBS seems more appropriate to be defined as a comprehensive term for GI-related disorders
3. **Other food intolerances**
   - Patients with lactose and fructose intolerance showed a positive H_2 breath test.
   - Identification can be made based on the type of food consumed and serum DAO level.
4. **Celiac disease**
   - CD was confirmed histologically by serological examination (antibodies against tissue transglutaminase with IgA ELISA) and duodenal biopsy.
   - Refractory CD may be combined with HIT.
5. ***Helicobacter pylori* infection**
   - HP infection can be confirmed by a C^{13} breath test, serological antibody test, and gastrointestinal endoscopy combined with GI mucosal histological evaluation.
   - Hp infection can be cured by the specific antibiotic.
6. **Eosinophilic Gastroenteritis**
   - EGE is mainly caused by eosinophils infiltrating into the GI mucosa.
   - ECE can be alleviated by the administration of corticosteroids.
   - Clinical diagnosis can also be made by measuring the levels of serum trypsin and DAO.
7. **Urticaria**
   - In laboratory examination, the DAO concentration is decreased in HIT.
   - Patients with HIT often have a history of eating foods rich in histamine.
8. **Systemic mastocytosis**
   - HIT is associated with a decrease in DAO and changes in serum trypsin, which are absent in systemic mastocytosis.

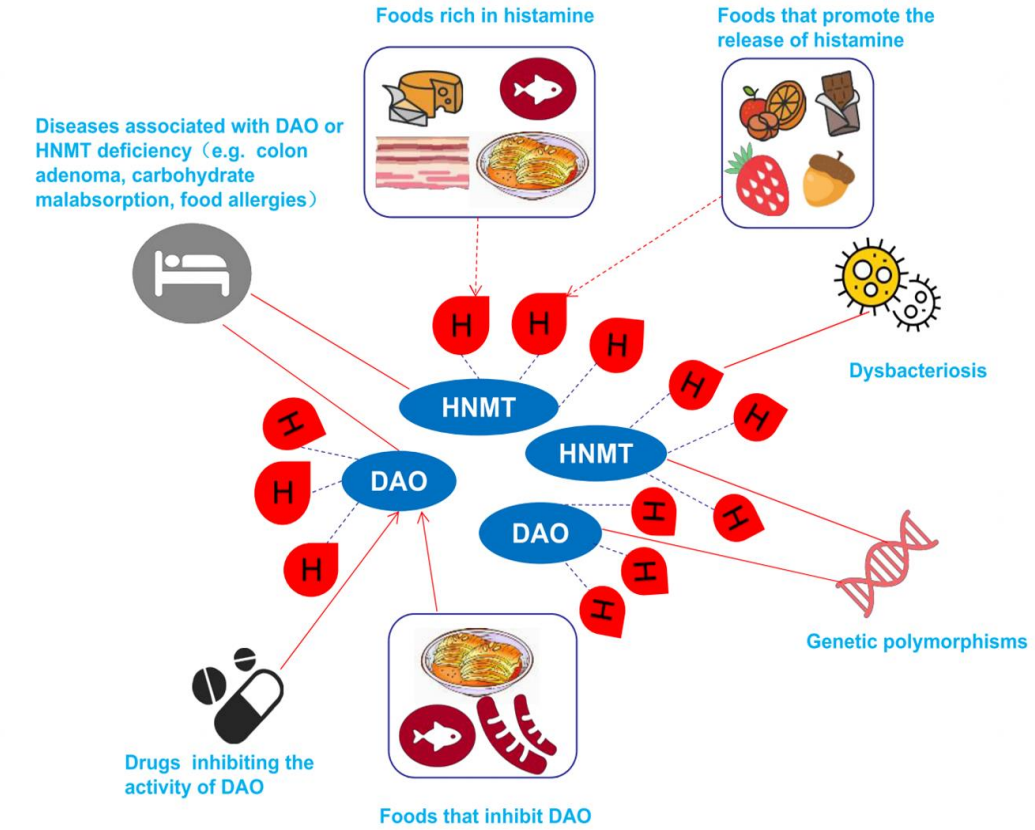
Zhao, Y., Zhang, X., Jin, H., Chen, L., Ji, J., & Zhang, Z. (2022). Histamine Intolerance—A Kind of Pseudoallergic Reaction. *Biomolecules (2218-273X)*, *12*(3), 454. http://10.0.13.62/biom12030454

Potential Causes of HIT

Table 2. Medications which may influence diamine oxidase and/or histamine.

Medications	Generic Name
Analgesics	Acetylsalicylic acid, Metamizole, Morphines, Nonsteroidal anti-inflammatory drugs, Pethidine
Antiarrhythmics	Propafenon
Antibiotics	Cefuroxime, Cefotiam, Isoniazid, Pentamidine, Clavulanic acid, Chloroquine
Antidepressants	Amitriptylline
Antifungal	Pentamidine
Antihypertensives	Verapamil, Alprenolol, Dihydralazine
Antihypotensives	Dobutamine
Antimalarial	Chloroquine
Broncholytics	Aminophylline
Cytostatics	Cyclophosphamide
Diuretics	Amiloride
H2 receptor antagonists	Cimetidine
Local anesthetics	Prilocaine
Motility agents	Metoclopramide
Mucolytics	Acetylcysteine, Ambroxol
Muscle relaxants	Pancuronium, Alcuronium, D-Tubocurarin
Narcotics	Thiopental
Radiological contrast media	
Vitamines	Ascorbic acid, Thiamine

Schnedl, W. J., & Enko, D. (2021). Histamine Intolerance Originates in the Gut. *Nutrients*, *13*(4). https://doi.org/10.3390/nu13041262



Zhao, Y., Zhang, X., Jin, H., Chen, L., Ji, J., & Zhang, Z. (2022). Histamine Intolerance—A Kind of Pseudoallergic Reaction. *Biomolecules (2218-273X)*, *12*(3), 454. http://10.0.13.62/biom12030454

Low Histamine Diet

Phase	Aim	Recommendation	Duration
• Phase 1 - avoidance	• To reduce symptoms to the greatest possible extent	• Mixed diet with emphasis on vegetables and reduced biogenic amine intake, in particular histamine intake • Nutrient optimization • Changes in meal composition • Focus on balanced diet	• 10-14 days
• Phase 2 – test phase	• To expand the choice of food while taking individual risk factors into accounts such as stress menstruation medication use etc..	• Targeted re-introduction of suspected foods while taking the patient's individual dietary preferences into consideration. • Determination of individual histamine tolerance	• Up to six weeks
• Phase 3 – long term diet	• Continuous balanced supply of nutrients. High quality of life	• Individual nutritional recommendations guided by the individual histamine tolerance, taking exogenous wrist factors into consideration	• Ongoing

Adapted from: Reese, I., Ballmer-Weber, B., Beyer, K., Fuchs, T., Kleine-Tebbe, J., Klimek, L., Lepp, U., Niggemann, B., Saloga, J., Schäfer, C., Werfel, T., Zuberbier, T., & Worm, M. (2017). German guideline for the management of adverse reactions to ingested histamine: Guideline of the German Society for Allergology and Clinical Immunology (DGAKI), the German Society for Pediatric Allergology and Environmental Medicine (GPA), the German Asso. *Allergo Journal International: Interdisciplinary Journal of Allergy, Clinical Immunology and Environmental Medicine*, *26*(2), 72–79. https://doi.org/10.1007/s40629-017-0011-5

HIT Dietary Approaches

Find food you CAN eat with the Fig app

- Scan barcodes to check for non-compliant ingredients
- Works with ANY allergen or diet
- Find compliant food at 100+ grocery stores & restaurants

Include

- **Fruit:** blueberries, apricots, cranberries, apples, mango, peaches
- **Vegetables:** Onion, sweet potatoes, asparagus, broccoli, squash, cucumbers, beets
- **Dairy:** Butter, cream cheese, pasteurized milk. Eggs are safe in small amounts. The whites may release histamine. Yolks are safe
- **Meats:** Freshly cooked meat and poultry. Fish that is fresh or frozen
- **Grains:** Potatoes, corn, rice, oats
- **Fats and Oils:** animal fats

Avoid

- **Fruit:** Citrus fruits, strawberries, bananas, pineapple, pears
- **Vegetables:** Eggplant, avocado, tomatoes, olives, beans
- **Dairy:** Cheese, yogurt, processed cheese
- **Protein:** Canned, smoked, dried meats/fish. Tuna, mackerel, anchovies, shellfish. Sausage, lunchmeat, liver. Avoid eggs except in small amounts baked in products.
- **Grains:** avoid bleached wheat flour
- **Flavor:** vinegar, soy sauce, hot spices.
- **Fermented Foods**: Beer, Wine, Pickled foods, kombucha,sauerkraut, kimchi

Comas-Basté, O., Sánchez-Pérez, S., Veciana-Nogués, M. T., Latorre-Moratalla, M., & Vidal-Carou, M. D. C. (2020). Histamine intolerance: The current state of the art. *Biomolecules*, *10*(8), 1–26. https://doi.org/10.3390/biom10081181

SNAS - Systemic Nickel Allergy Syndrome

- Most studied allergenic agent among metals
- Can absorbed from the intestine via the respiratory route but also via skin contact

Symptoms

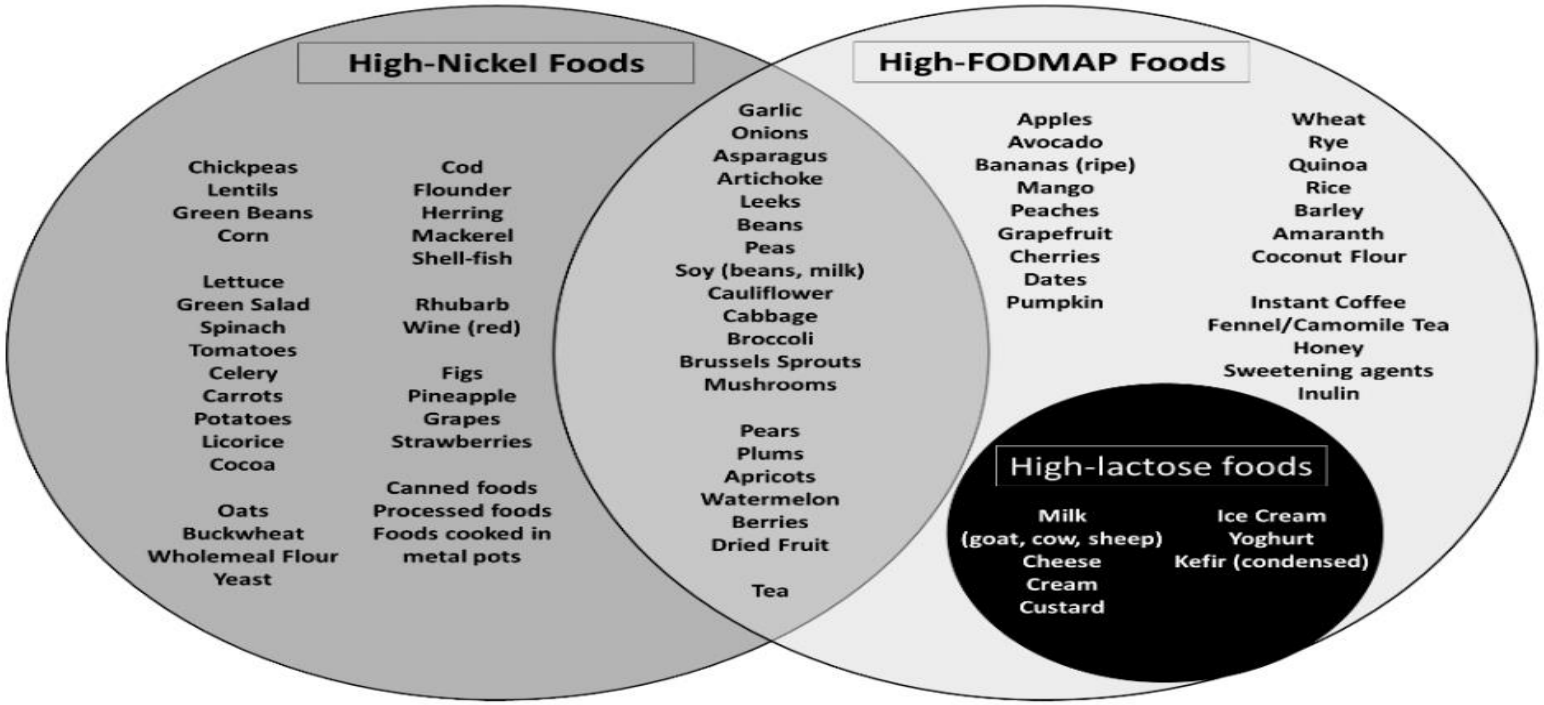
- contact dermatitis, nausea, heartburn, gaseous distension, abdominal pain, diarrhea, and constipation

Higher prevalence with:

- IBS, CD, NCGS, UC, Endometriosis

Greco, N., Pisano, A., Mezzatesta, L., Pettinelli, M., Meacci, A., Pignataro, M. G., Giordano, C., & Picarelli, A. (2023). *Gluten Sensitivity and Nickel Allergic Contact Mucositis*. 1–13.

Complicating factors - overlap



Borghini, R., De Amicis, N., Bella, A., Greco, N., Donato, G., & Picarelli, A. (2020). Beneficial effects of a low-nickel diet on relapsing IBS-like and extraintestinal symptoms of celiac patients during a proper gluten-free diet: Nickel allergic contact mucositis in suspected non-responsive celiac disease. *Nutrients*, *12*(8), 1–14. https://doi.org/10.3390/nu12082277

SNAS Diet & Lifestyle Approaches

- Low Nickel Diet – yes there's an app for that
- Nickel Navigator

- Alter cooking utensils
  - Avoid stainless steel
- Avoid canned foods
- Seasonal and locale changes in content
- Substances that interfere with nickel absorption
  - Vitamin C, orange juice, tea, coffee, milk

Sharma A. D. (2013). Low nickel diet in dermatology. *Indian journal of dermatology*, *58*(3), 240. https://doi.org/10.4103/0019-5154.110846
Darsow, U., Fedorov, M., Schwegler, U., Twardella, D., Schaller, K.-H., Habernegg, R., Fromme, H., Ring, J., & Behrendt, H. (2012). Influence of dietary factors, age and nickel contact dermatitis on nickel excretion. *Contact Dermatitis (01051873)*, *67*(6), 351–358. http://10.0.4.87/j.1600-0536.2012.02153.x

BAM/BAD – Bile Acid Malabsorption/Diarrhea

There are four types of BAD:

- type I in patients with ileal disease or resection
- type II, also called idiopathic BAD, in patients with functional diarrhea or diarrhea-predominant irritable bowel syndrome (IBS-D)
- type III in patients with gastrointestinal conditions with no evidence of ileal disease
- type IV with hypertriglyceridemia and metformin treatment.

- BAs exert a prokinetic effect on colonic motility
- BAs have been shown to increase fluid and electrolyte secretion in the colon through
- Patients with BAD appear to have increased intestinal permeability and lower alpha diversity and a significantly different stool bacterial composition

BouSaba, J., & Camilleri, M. (2023). Bile acid diarrhea - as bad as it gets? *Current Opinion in Gastroenterology*, *39*(3), 184–191. https://doi.org/10.1097/MOG.0000000000000916

BAM/BAD - Identifying this possible masquerader

- explosive, offensive smelling, or watery diarrhea
- urgency
- abdominal bloating or swelling
- occasional stool incontinence or accidents,
- the need to always be close to a toilet
- Significant QOL impact

Interventions

- Low fat diet
- Digestive enzymes
  - Ox bile
- BA sequestrants
  - colesevelam, colestipol, and cholestyramine
- Newer options
  - Eluxadoline
  - Liraglutide
  - Tropifexor

BouSaba, J., & Camilleri, M. (2023). Bile acid diarrhea - as bad as it gets? *Current Opinion in Gastroenterology*, *39*(3), 184–191. https://doi.org/10.1097/MOG.0000000000000916

Congenital Sucrase-Isomaltase Deficiency (CSID)

- Genetic disorder - affects ability to digest certain sugars
- Polysaccharides – **starch**, glycogen
- Disaccharides – **sucrose**, **maltose**, lactose
- Monosaccharides – glucose, fructose, galactose
- Digestive enzymes break down poly and disaccharides to monosaccharides

Digestive Enzyme Activity

Sucrase-isomaltase (SI) is a disaccharidase on the brush border membrane of the small intestines

- Sucrase
  - Breaks down sucrose and maltose
  - Sucrose = fructose + glucose
- Isomaltase
  - Breaks down isomaltose and maltose
  - Maltose = glucose + glucose

In CSID, activity of the SI enzyme is absent or reduced

CSID Symptoms

When disaccharides are not broken down:

Bacteria feed off the sugar in the colon causing fermentation

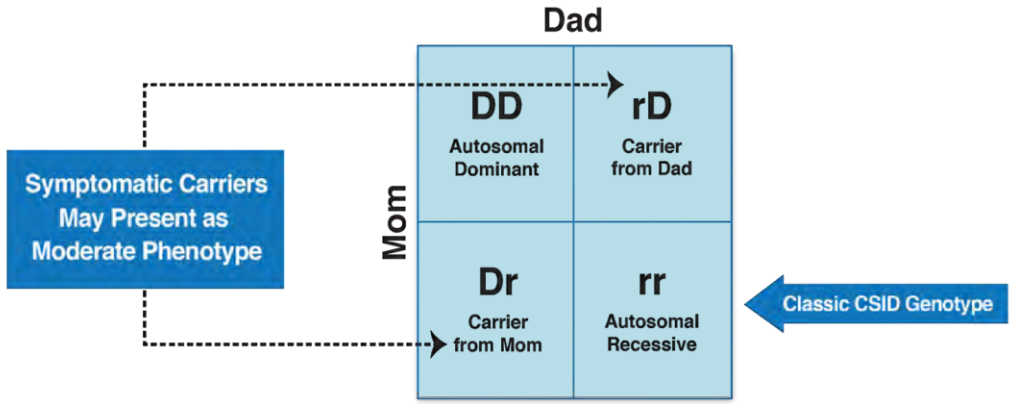
Undigested sugars retain water causing osmotic diarrhea

- Common symptoms:
- Watery diarrhea
- Bloating/gas
- Abdominal pain
- Severe symptoms may lead to malnutrition or failure to thrive

CSID Testing

- Genetic testing
- Other testing methods
  - Intestinal biopsy: disaccharidase assay
  - Breath tests

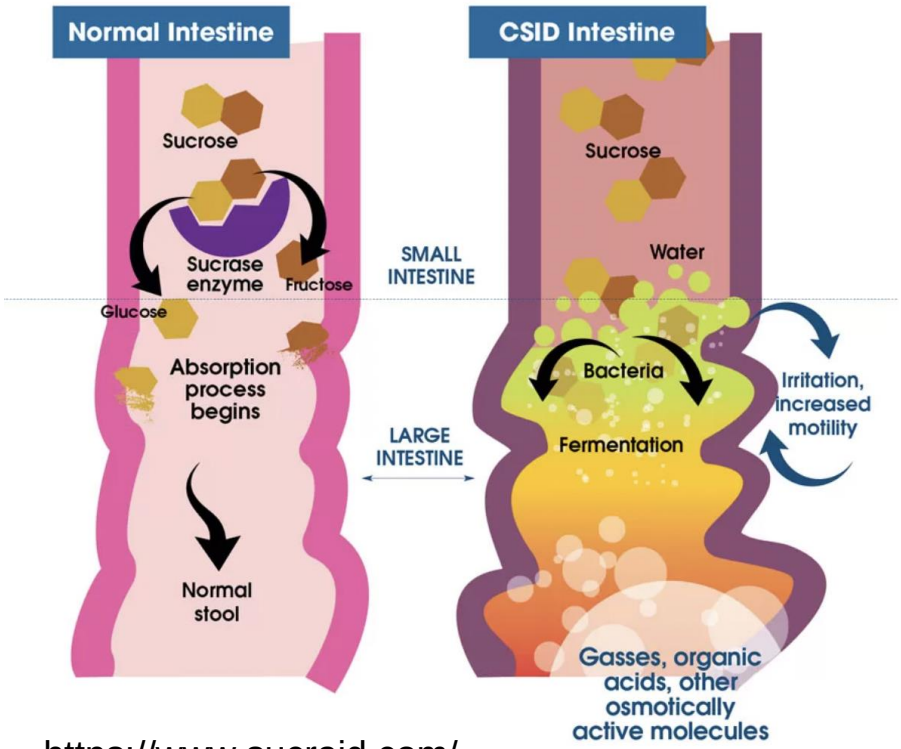
CSID Genotypes and Phenotypes



- CSID originally assumed to be an autosomal recessive disease
  - Sucrase activity is very low (<15 µM/min/g); most severe symptoms
- Recent studies also found symptomatic disease in heterozygotes
  - Sucrase activity low (<25 µM/min/g)
  - Correlations between CSID phenotype and heterozygous genotype

Uhrich, S., Wu, Z., Huang, J. Y., & Scott, C. R. (2012). Four mutations in the SI gene are responsible for the majority of clinical symptoms of CSID. *Journal of pediatric gastroenterology and nutrition*, *55 Suppl 2*, S34–S35. https://doi.org/10.1097/01.mpg.0000421408.65257.b5

CSID Management



https://www.sucraid.com/

Goals:

- Minimize symptoms
- Improve quality of life
- Promote physical growth for infants and children
- **Modify diet – Low Sucrose diet**
  - Personalize!!
  - Avoid or limit foods high in sucrose and starch

Fruits Tolerated by *Most* GSID Patients	Fruits Tolerated by *Some* GSID Patients	Fruits Tolerated by *Few* GSID Patients
avocado blackberries blueberries boysenberries cherries cranberries, fresh currants figs, raw gooseberries grapes kiwifruit lemons limes loganberries olives papaya pears pomegranates prunes raspberries rhubarb strawberries	persimmon plumes raisins watermelon	apples apricots bananas cantaloupe (rockmelon) dates grapefruit guava honeydew melon mango nectarine oranges passion fruit peaches pineapple tangelos tangerines (mandarin oranges, clementines)

Vegetables

Vegetables & Legumes Tolerated by *Most* GSID Patients	Vegetables & Legumes Tolerated by *Some* GSID Patients	Vegetables & Legumes Tolerated by *Few* GSID Patients
alfafa sprouts *artichoke, globe arugula *asparagus bamboo shoots bok choy *broccoli *brussel sprouts	edamame soybeans jicama leek okra pumpki n snow peas tempeh	beets black beans black-eyed peas (cowpeas) butternut/buttercup squash carrots cassava (yuca) chickpeas (garbanzo beans) corn

https://www.csidcares.org/treatment/diet/

Vegetables & Legumes Tolerated by *Most* GSID Patients	Vegetables & Legumes Tolerated by *Some* GSID Patients	Vegetables & Legumes Tolerated by *Few* GSID Patients
*cabbage *cauliflower celery chard chicory chives collard greens cress cucumber eggplant endive green beans kale lettuce mung bean sprouts mushrooms mustard greens peppers (red, yellow, and green) radishes spaghetti squash spinach tomatoes turnips yellow squash (summer) zucchini (courgette)	tofu yellow wax beans	garlic green peas lentils kidney beans lima beans navy beans onions parsnips pinto beans potatoes soybeans split peas sweet potatoes yams

https://www.csidcares.org/treatment/diet/

Nutrition and CSID

Protein

- Most animal protein sources are tolerated
- Starchy plant based proteins such as beans/lentils/nuts may not be tolerated

Starches

- Individual tolerance varies
- Processed foods often contain sucrose and starch
  - Read ingredient labels

CSID Management and Tolerance

Will not “outgrow” disorder but tolerances may change as the GI tract lengthens

Food tolerances are different for every person

- Determine individual tolerances
  - Introduce 1 new food at a time and track symptoms

Prescription Medication

- Sacrosidase (Brand name: Sucraid®) - is an enzyme replacement therapy for the treatment of genetically determined sucrase deficiency, which is part of Congenital Sucrase-Isomaltase Deficiency (CSID).
  - Dosage weight dependent
    - Taken with every meal/snack that contains sucrose
  - Requires refrigeration
  - Does not help with starch digestion

Sucrose Breath Test Report

Aerodiagnostics LLC
Live A Full Life

Sucrose Intolerance Report

561 Virginia Rd, Ste 100, Concord, MA 01742
Tel (617) 608-3832 | Fax (617) 860-6617
Toll Free (844) 681-9449
Kathleen O'Neil-Smith, M.D., Medical Director

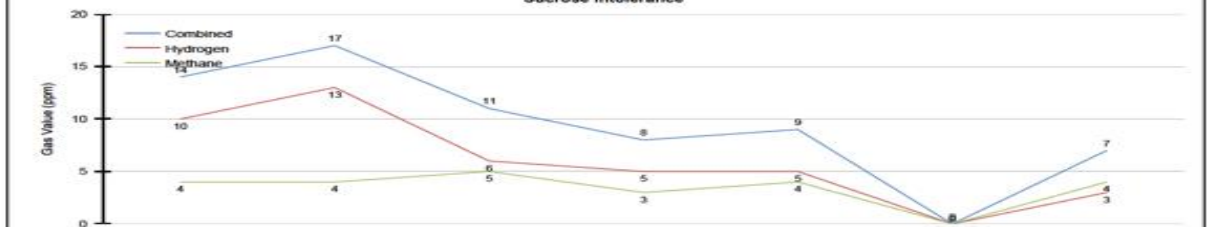
[redacted]
5/14/2000
[redacted]
Date Ordered:
8/7/2019
12/30/2019
1/2/2020
1/3/2020

Summary Report of Hydrogen & Methane Breath Analysis with Carbon Dioxide Correction

Gasses Analyzed	Patient Result	Expected
Increase in Hydrogen (H_2)	3 ppm (normal)	< 20 ppm
Increase in Methane (CH_4)	1 ppm (normal)	< 12 ppm
Increase in combined H_2 & CH_4	4 ppm (normal)	< 15 ppm[3]
Analysis of the data suggests	Sucrose intolerance is not suspected	

Number	Collection Interval	ppm H2	ppm CH4	Combined	Sample Normalization[1] ppm CO2	fCO2
1	Baseline	10	4	14	3.9	1.41
2	30 Min.	13	4	17	5.1	1.07
3	60 Min.	6	5	11	3.5	1.57
4	90 Min.	5	3	8	3.2	1.71
5	120 Min.	5	4	9	4.4	1.25
6	150 Min.	0	0	0	0.1	Too High[4]
7	180 Min.	3	4	7	4.3	1.27

Sucrose Intolerance



	Baseline	30 Min	60 Min	90 Min	120 Min	150 Min	180 Min
Hydrogen	10	13	6	5	5	0	3
Methane	4	4	5	3	4	0	4
Combined	14	17	11	8	9	0	7

Important Information - Please Read:
Breath analysis standards for abnormal tests are suggested if an increase of 20ppm for Hydrogen (H_2), 12ppm for Methane (CH_4), or a combined 15ppm for Hydrogen (H_2) & Methane (CH_4) is detected. Only the treating clinician is able to determine if there are additional factors that could have a material impact on the results of this analysis.
A diagnosis can only be obtained from a medical professional that combines clinical information with the results of this breath analysis.
The results of this Hydrogen (H_2) & Methane (CH_4) breath test should be utilized as a guideline only.

Aerodiagnostics LLC does not have access to patient clinical information that is critical for a diagnosis determination.

Elevated H_2 and/or CH_4 levels >120 minutes can indicate intolerance. Metz, G. et al. Breath hydrogen as a diagnostic. Lancet 1975 (May 24); 1(7917):1155-7. If the baseline H_2 level is elevated and the one-hour sample is elevated even more, there is a strong suspicion that the patient has bacterial overgrowth. Even with overgrowth, a later increase in H_2 and/or CH_4 can be interpreted as a positive test for intolerance.
Douwes, AC, Schaap, C and van der Kleivan Moorsel, JM. Hydrogen breath test in school children. Arch Dis Child. 1985 (Apr);60(4):333-7

Quality Control:
Aerodiagnostics performs quality control analysis on specimens processed using rigorous standard operating procedures, established in conjuction with Clinical Laboratory Improvement Amendments (CLIA). Hydrogen (H_2) & Methane (CH_4) breath test values are corrected by Aerodiagnostics state-of-the-art solid state sensor technology & scientific algorithm for Carbon Dioxide (CO_2) content in the samples.

[1] The correction factor, f(CO_2) is used to determine if each sample is valid for analysis. A f(CO_2) close to 1.00 is indicative of a good alveolar sample, while a factor in excess of 4.00 is indicative of a poor sample.
[3] A combined H_2 + CH_4 increase of 15 ppm or more may be suggestive of Sucrose intolerance.
[4] Test tube specimen registered CO_2 values too high to be consistent with alveolar air.

CSID Resources

- CSID Cares: http://csidcares.org/
- CSID Cares Food Composition Database: https://www.csidcares.org/treatment/food-composition-database/
- Sucraid®: http://sucraid.com

Inflammatory Bowel Disease

Diet	Premise	Conclusions
Low FODMAP	Elimination of partially digested oligosaccharides causing digestive symptoms	Improvement of symptoms, but not of inflammation
Gluten Free	Elimination of gluten as a cause of digestive symptoms ± implicit elimination of FODMAP	Not Recommended
SCD	Elimination of all carbohydrates except monosaccharides since polysaccharides are not fully digested, causing bacterial fermentation, bacterial overgrowth, increased gas and mucus	Possible improvement of symptoms
Paleo	From a genetic and metabolic point of view, the diet of our Paleolithic ancestors is the one that our body tolerates. The manufactured, refined and processed foods that our society consumes are the cause of chronic diseases, and therefore should be avoided	Not recommended due to lack of evidence
Lactose free	Elimination of dairy as the main cause of digestive symptoms in IBD	Only if documented intolerance or improve symptoms
Low Fiber	The increased fecal mass produced by fiber intake may have a deleterious effect regarding IBD symptoms.	Only if structural disease
High Fiber	The anti-inflammatory and immunomodulatory role of fiber in the intestine may decrease inflammation and promote favorable changes in the microbiota	Normalization of fiber intake if IBD in remission. Not recommended if structural disease

Serrano-Moreno, C., Brox-Torrecilla, N., Arhip, L., Romero, I., Morales, Á., Carrascal, M. L., Cuerda, C., Motilla, M., Camblor, M., Velasco, C., & Bretón, I. (2022). Diets for inflammatory bowel disease: What do we know so far? *European Journal of Clinical Nutrition*, *76*(9), 1222–1233. https://doi.org/10.1038/s41430-021-01051-9

Inflammatory Bowel Disease

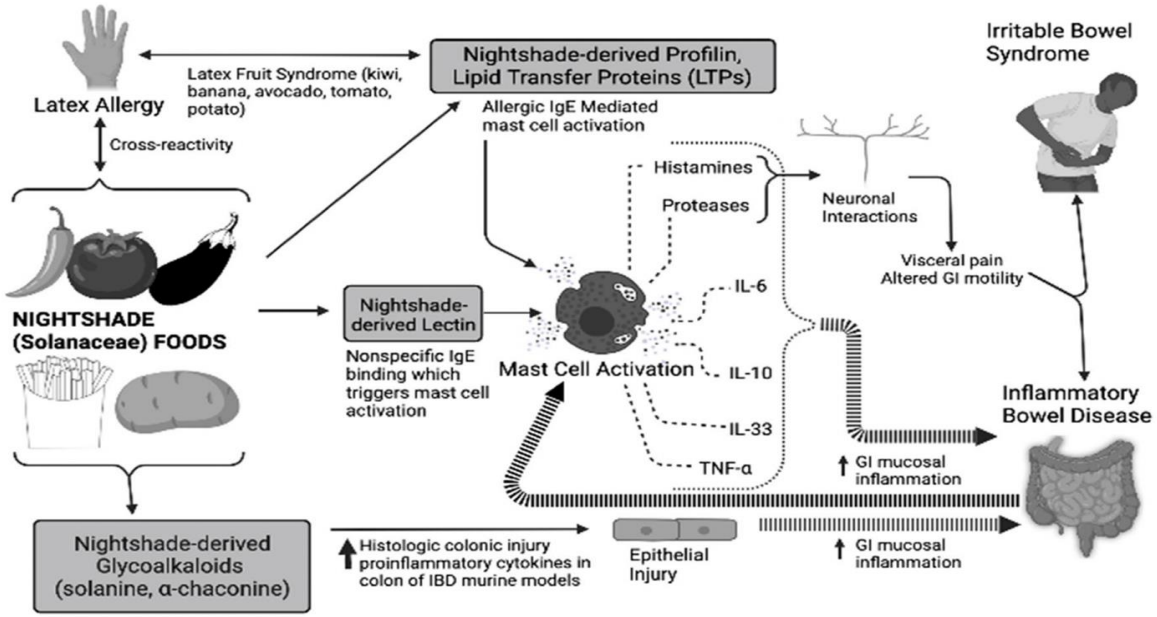
Diet	Premise	Conclusions
High Fiber	The anti-inflammatory and immunomodulatory role of fiber in the intestine may decrease inflammation and promote favorable changes in the microbiota	Normalization of fiber intake if IBD in remission. Not recommended if structural disease
Anti-Inflammatory	Elimination of foods considered proinflammatory and causing the dysbiosis, which leads to IBD. Increase consumption of foods considered anti-inflammatory.	Not recommended due to lack of evidence
IgG4 exclusion diet	Elimination of those foods that increase IgG4 antibody production that causes inflammation	Not recommended
Plant-based, Semi-vegetarian	Keeping a diet opposite to the western diet can have beneficial effects. The high-fiber diet improves the intestinal microbiota and increases the production of butyrate, controlling symptoms and improving the course of IBD	Not recommended due to lack of evidence
Mediterranean	A diet rich in fibre and omega-3, avoiding processed foods, sugars and red meat, may have an anti-inflammatory role.	Recommended if remission phase

Serrano-Moreno, C., Brox-Torrecilla, N., Arhip, L., Romero, I., Morales, Á., Carrascal, M. L., Cuerda, C., Motilla, M., Camblor, M., Velasco, C., & Bretón, I. (2022). Diets for inflammatory bowel disease: What do we know so far? *European Journal of Clinical Nutrition*, *76*(9), 1222–1233. https://doi.org/10.1038/s41430-021-01051-9

Inflammatory Bowel Disease

Common Edible Nightshades

Raw Ingredient	Tomato based products	Potato based products
Tomato	Tomato sauce	Potato Chips
Tomatillo	Hot sauce	French Fries
Potato	Ketchup	Gluten free foods containing
Eggplant	Salsa	Potato starch
Chili Pepper	Pizza	
Sweet Pepper		
Bell Pepper	**Eggplant based products**	**Pepper based products**
Ground Cherry	Baba Ganoush	Spices (paprika, cayenne)
Pepino	Eggplant Parmesan	Kimchi
Huckleberry		Hot sauce
Goji Berries		



Kuang, R., Levinthal, D. J., Ghaffari, A. A., del Aguila de Rivers, C. R., Tansel, A., & Binion, D. G. (2023). Nightshade Vegetables: A Dietary Trigger for Worsening Inflammatory Bowel Disease and Irritable Bowel Syndrome? *Digestive Diseases and Sciences*, *68*(7), 2853–2860. https://doi.org/10.1007/s10620-023-07955-9

Key Takeaways

Rule out the other masqueraders…

- Celiac Disease
- BAM/BAD
- CHO Intolerance
- Food allergy
- IBD
- SIBO/SIFO
- Abdominal Migraine

- Ehlers-Danlos syndrome
- POTS
- Gastroparesis
- EPI
- CVS
- Pelvic floor disorders
- MCAS
- etc……..

Moshiree, B., Heidelbaugh, J. J., & Sayuk, G. S. (2022). A Narrative Review of Irritable Bowel Syndrome with Diarrhea: A Primer for Primary Care Providers. *Advances in Therapy*, *39*(9), 4003–4020. https://doi.org/10.1007/s12325-022-02224-z

Key takeaways

Non-responders require a deeper dive to identify the root cause.

- Critical thinking and clinical reasoning to assess potential for masqueraders
- Clinical decision making to apply personalized nutrition care planning interventions
  - Diet & lifestyle modifications
    - Elimination, FODMAP, High Fiber
  - Need for supportive supplementation
    - Probiotics, Prebiotics, and Synbiotics
    - Digestive Enzymes, Herbal Therapies
  - Symptom journals
  - Rate of response
  - Indications for referral

Moshiree, B., Heidelbaugh, J. J., & Sayuk, G. S. (2022). A Narrative Review of Irritable Bowel Syndrome with Diarrhea: A Primer for Primary Care Providers. *Advances in Therapy*, *39*(9), 4003–4020. https://doi.org/10.1007/s12325-022-02224-z

Integrative Healthcare SYMPOSIUM

NAVIGATING THE TERRAIN OF THERAPEUTIC DIETS FOR GI DISORDERS

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Integrative Healthcare SYMPOSIUM

Saturday 10:00am – 11:00am

Navigating the Terrain of Therapeutic Diets for GI Disorders

Please scan this QR code on you mobile

or tablet device to access the session feedback survey

Navigating the Terrain of Therapeutic D
iets for GI Disorders

NAVIGATING THE TERRAIN OF THERAPEUTIC DIETS FOR GI DISORDERS

Kellie Blake, RDN, LD, IFNCP
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	Low FODMAP	Mediterranean	Gluten & Dairy Free	Elemental
Key Components	**Restricts:** Oligosaccharides (fructans and GOS) Disaccharides (lactose) Monosaccharides (fructose) Polyols (sorbitol and mannitol)	**Removes:** ● Ultra-processed foods ● Inflammatory oils ● Sugar-sweetened beverages **Encourages:** ● Fruits ● Vegetables ● Whole grains ● Legumes ● Nuts ● Extra-virgin olive oil ● Seafood **Limits:** ● Red meat ● Poultry ● Eggs ● Wine ● Cheese ● Yogurt ● Added and natural sugar	**Removes:** All gluten-containing grains (wheat, rye, barley) and products that contain them (breads, cereals, cookies, cakes and baked goods, crackers, croutons, flour, pasta, stuffing, dressing) All dairy products (milk, yogurt, pudding, cheese, ice cream, buttermilk, baked goods with dairy, sour cream, cottage cheese, non-fat dry milk)	Fully or partially digested liquid formula Often high in simple sugar May contain whey protein Can be used in combination with a therapeutic meal plan as a meal substitute
Restricts Major Allergens	No	No	No	Yes
Anti-Inflammatory	Possibly	Yes	Possibly	Yes
Restricts Microbial Fuel	Yes	No	No	Yes
Reduces Immune System Burden	Possibly	Yes	Possibly	Yes
Published Research	https://pubmed.ncbi.nlm.nih.gov/29129233/ https://pubmed.ncbi.nlm.nih.gov/30046155/ https://pubmed.ncbi.nlm.nih.gov/31947991/	https://www.wjgnet.com/2219-2808/full/v11/i4/330.htm	https://pubmed.ncbi.nlm.nih.gov/30046155/ https://pubmed.ncbi.nlm.nih.gov/35240330/	https://pubmed.ncbi.nlm.nih.gov/14992438/ https://pubmed.ncbi.nlm.nih.gov/25831484/ https://pubmed.ncbi.nlm.nih.gov/28468301/

	https://pubmed.ncbi.nlm.nih.gov/33585949/ https://pubmed.ncbi.nlm.nih.gov/36364824/ https://pubmed.ncbi.nl	https://pubmed.ncbi.nlm.nih.gov/35456802/		https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8325492/
Resource Links	About FODMAPs and IBS | Monash FODMAP - Monash Fodmap Gentle FODMAP approach |Monash FODMAP |The experts in IBS & FODMAPs - Monash Fodmap Low FODMAP Diet App | Monash FODMAP - Monash Fodmap	Mediterranean Diet (va.gov) ll-mediterranean-diet.ashx (clevelandclinic.org) The Mediterranean Diet - MC6815 (mayo.edu)	Microsoft Word - Gluten Free Diet Revised 2 .doc (massgeneral.org) GFDF-Product-List-081517.pdf (ultrawellnesscenter.com)	What to Expect When Starting an Elemental Diet – Integrative Therapeutics® (integrativepro.com) Elemental Formula - SIBO - Small Intestinal Bacterial Overgrowth (siboinfo.com)

	HIT Histamine Intolerance	SNAS Systemic Nickel Allergy Syndrome	BAM/BAD Bile acid malabsorption/ Bile acid diarrhea	CSID Congenital Sucrase Isomaltase Deficiency
Description	HIT and the impairment of GI histamine degradation cause functional, nonspecific, non-allergic GI complaints and extra-intestinal complaints. DAO has a reduced ability to metabolize and degrade histamine.	Dietary nickel ingestion causes nickel conjugation to intestinal proteins Low-grade intestinal inflammation and related symptomatology mediated by a local adaptive response following the ingestion of Ni-containing foods Note: correlation between Nickel sensitive patients, gut microbiota composition, and obesity has been identified	Common gastrointestinal disorder with a pathophysiology that involves multiple mechanisms Malabsorption of bile acids in the ileum, which then promotes colonic fluid secretion and motility, causing bile acid diarrhea (BAD) Can be primary or secondary to medications (metformin), resections of the terminal ileum (>100cm), or cholecystectomy BAs exert a prokinetic effect on colonic motility BAs have been shown to increase fluid and	A genetic disorder that results in the inability to digest some polysaccharides, disaccharides, and monosaccharides. These individuals have a deficiency of the sucrase-isomaltase enzyme complex within the brush border membrane of the small intestine. These individuals have an insufficiency to split the alpha-glycosidic bonds in sucrose and maltose, and symptoms will range in severity from patient to patient. More than 40 genetic variants are currently identified with congenital sucrase-isomaltase deficiency (CSID). It is an autosomal recessive disease with dysfunction of the S1 gene CSID is often undiagnosed or misdiagnosed as another gastrointestinal condition, Therefore, it is speculated that the prevalence of this condition is higher than reported.

			electro-secretion in the colon Patients with BAD appear to have increased intestinal permeability lower alpha diversity and a significantly different stool bacterial composition	
Signs/symptoms	May share some key S/S of IBS: Defecation urgency, during/after a meal Abdominal pain/cramping, often relieved with defecation Bloating Diarrhea Additional s/s: Rhinorrhea, rhinitis, nasal congestion, dyspnea, sneezing tachycardia, hypotonia, postprandial fullness, constipation, nausea, vomiting menstrual cramps, dysmenorrhea	Contact dermatitis, nausea, heartburn, gaseous distension, abdominal pain, diarrhea, and constipation Possible extra-cutaneous s/s: rhinitis, asthma, headache, fever, fibromyalgia, joint pain, chronic fatigue syndrome. Note: Higher prevalence with: IBS, CD, NCGS, UC, Endometriosis	Frequent, severe, and watery bowel movements, often worse hours later/the day after high fat intake Chronic gas/bloating Defecation urgency	Abdominal distension, cramping, pain, excessive flatulence, sensitivity to processed foods, changes in gastric motility, and osmotic diarrhea. Diarrhea is often the most common symptom due to the malabsorption of disaccharides. For pediatric patients, chronic watery diarrhea and failure to thrive

	pruritus, flushing, urticarial, dermatitis, swelling headache/migraine, dizziness, chronic inappropriate fatigue, nervousness, sleep disturbances anxiety, panic disorder, depression			
Diagnostic criteria and lab options	Currently there is no reliable procedure for the diagnosis of adverse reactions to ingested histamine. The diagnosis of histamine intolerance can be made only after excluding other causes that may produce similar symptoms. Diagnosis usually requires the presence of at least two clinical symptoms in less than four hours	Gold standard for SNAS diagnosis is based on an Oral Provocation Test (OPT), also called Nickel "Oral Challenge" (NOC) that can be performed only after 4-6 weeks of a Nickel-free diet Skin patch testing, note that reactivity grade to Nickel patch test is not directly correlated to symptoms intensity Low nickel diet trial	Fasting BA serum and stool tests 4 types of BAD/BAM: Type I in patients with ileal disease or resection Type II, also called idiopathic BAD, in patients with functional diarrhea or diarrhea-predominant irritable bowel syndrome (IBS-D) Type III in patients with gastrointestinal conditions with no evidence of ileal disease Type IV with hypertriglyceridemia	Gold standard is a small bowel biopsy, specifically looking for disaccharidase activity. Breath hydrogen or sucrose tests can also be used, which are less invasive than a biopsy. Genetic sequencing is another tool.

	after food intake and their improvement or remission after a low-histamine diet		and metformin treatment.	
Standard of allopathic care for treatment of the diagnosis	The gold standard of treatment is a low-histamine diet. In severe conditions where a low-histamine diet is insufficient, H1R antihistamines can be used for a short time.	Low Nickel diet	BA sequestrants Low fat diet Other medications: Eluxadoline Liraglutide Tropifexor	Combined treatment of prescription oral Sacrosidase, an enzyme replacement therapy, and sucrose and starch restricted diet
Functional interventions for the diagnosis	DAO supplementation is also recommended as a complementary treatment in people with intestinal DAO deficiency. supplementation with DAO enzyme cofactors such as vitamin C, copper, and vitamin B6 may be useful as an adjunctive therapy	Low Nickel diet BraMa-Ni diet Oral iron supplementation Vitamin C Supplementation Chelates Probiotics supplementation with *Lactobacillus reuteri*	Low fat diet Digestive enzymes • Ox bile BA sequestrants: • Colesevelam, Colestipol and Cholestyramine Newer Rx option: • Eluxadoline • Liraglutide • Tropifexor	*Saccharomyces boulardii* may increase both specific and total sucrase-isomaltase activity when 250 mg is taken four times a day at 1,000 mg for 8 days.

	Supplementation with *Bifidobacterium*			
Therapeutic diet(s) to be considered for patients with this condition and decision-making process among the diets	Low-histamine diet, 3 phases – avoidance, reintroduction, and maintenance diet. Patients reporting a good response to 4–8 weeks of such a diet is considered to confirm the diagnosis of histamine intolerance	Low Nickel diet Many high nickel foods that trigger SNAS symptoms are typically tolerated well in IBS Quantity of nickel contained in food depends on many factors – seasonal, locale, substances that interfere with nickel absorption, etc.	Minimal role of diet in managing bile acid diarrhea Does not respond to fiber or FODMAP manipulation or any IBS meds	Low-sucrose, low-starch diet -Individuals with CSID should avoid consuming sucrose and starch-rich foods: Fruit, fruit and vegetable juice, grains FODMAP has been commonly used to treat GSID, or at least limit the symptoms of malabsorption seen with GSID. Tolerance to foods may change over growth. 25% of CSID patients also display lactose intolerance.
Educational Resources for Clinicians	https://www.histamineintolerance.org.uk/about/the-food-diary/the-food-list/ https://www.histaminintoleranz.ch/downloads/SIGHI-Leaflet_HistamineEliminationDiet.pdf https://www.ifm.org/news-insights/migraine-mast-cell	https://www.ncbi.nlm.nih.gov/books/NBK557638/ https://www.eatrightpro.org/news-center/practice-trends/diet-in-the-management-of-nickel-allergy https://www.jandonline.org/article/S2212-2672(17)30001-1/pdf Low Nickel Diet app	https://www.mayoclinic.org/medical-professionals/digestive-diseases/news/identifying-diarrhea-caused-by-bile-acid-malabsorption/mac-20430098 https://med.virginia.edu/ginutrition/wp-content/uploads/sites/199/2020/05/Bile-Acid-Malabsorption-May-2020.pdf	Adult care guide for CSID eating in conjunction with Sucraid (therapeutic for CSID symptoms). A user-friendly manual for patient care. https://www.sucraid.com/wp-content/uploads/2017/08/SUC-2015.107_Adult_Diet_Guide.pdf GI for Kids, Sucrose intolerance page: https://www.giforkids.com/sucrose-intolerance/ National Library of Medicine Sucrase-isomaltase deficiency MedGen

	s-a-low-histamine-diet/ https://patient.uwhealth.org/healthfacts/8114	Nickel Navigator app		page: https://www.ncbi.nlm.nih.gov/medgen/220924 MedlinePlus CSID page: https://medlineplus.gov/genetics/condition/congenital-sucrase-isomaltase-deficiency/ NORD Rare Disease CSID page: https://rarediseases.org/rare-diseases/disaccharide-intolerance-i/ CSID Cares: http://csidcares.org/ GI for Kids, Sucrose intolerance page: https://www.giforkids.com/sucrose-intolerance/
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