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Professional Education Series

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Identifying and Preventing Nutrient Deficiencies in Patients Following Therapeutic Diets for Gut Health

TODAY'S AGENDA:

- Introduction Housekeeing
- Speaker Introduction
- Presentation
- Q&A
- Closing

WEBINAR HOST:

Keith Hine, MS, RD
VP of Healthcare, Sports & Professional Education
Orgain, LLC

WEBINAR PRESENTER:

Colleen Webb, MS, RDN
Gut Health Dietitian and Expert

Criteria for Optimal Gut Health

Five major criteria for a healthy GI system	Specific signs of GI health
Effective digestion and absorption of food	Normal nutritional status and effective absorption of food, water and minerals Regular bowel movement, normal transit time and no abdominal pain Normal stool consistency and rare nausea, vomiting, diarrhoea, constipation and bloating
Absence of GI illness	No acid peptic disease, gastroesophageal reflux disease or other gastric inflammatory disease No enzyme deficiencies or carbohydrate intolerances No IBD, coeliac disease or other inflammatory state No colorectal or other GI cancer
Normal and stable intestinal microbiota	No bacterial overgrowth Normal composition and vitality of the gut microbiome No GI infections or antibiotic-associated diarrhoea
Effective immune status	Effective GI barrier function, normal mucus production and no enhanced bacterial translocation Normal levels of IgA, normal numbers and normal activity of immune cells Immune tolerance and no allergy or mucosal hypersensitivity
Status of well-being	Normal quality of life 'Qi (ch'i)', or positive gut feeling Balanced serotonin production and normal function of the enteric nervous system

Bischoff SC. BMC Med. 2011.

Corsello A, Pugliese D, Gasbarrini A, Armuzzi A. Diet and Nutrients in Gastrointestinal Chronic Diseases. Nutrients. 2020;12(9):2693. Published 2020 Sep 3. doi:10.3390/nu12092693

Common Dietary Recommendations for GI Conditions

GI Condition	Dietary Options
Celiac disease	Strict lifelong gluten-free diet
Irritable bowel syndrome (IBS)	Low FODMAP (1st phase) Specific Carbohydrate Diet (SCD)
Inflammatory bowel disease (IBD)	Exclusive Enteral Nutrition (EEN) Crohn's Disease Exclusion Diet (CDED) SCD Low FODMAP Gluten-free Dairy-free
Eosinophilic esophagitis (EoE)	6 Food Elimination Diet 4 Food Elimination Diet
Small intestinal bacterial overgrowth (SIBO)	Low FODMAP SCD Elemental Diet
Sucrase Isomaltase Deficiency	Low sucrose and starch diet

What is an exclusion diet?

- Also known as an elimination diet, it involves removing specific foods or food groups from one's diet to identify food triggers and/or alleviate adverse reactions

Types of exclusion diets

Patient Directed Elimination Diets	Highly individualized
Food Based Elimination Diets	Low FODMAP diet
Defined Diets	Specific Carbohydrate Diet
Exclusive Enteral Nutrition (EEN)	100% Formula Based Diet

Outline

General risks & benefits of exclusion diets

Micronutrient Deficiencies and Popular GI Diets

Alternatives to exclusion diets in the GI population

Excluding Foods as a Means to Feel Better

Bohn et al. Am J Gastroenterol. 2013.

84% (n=197) of IBS patients reported symptoms from at least 1 of 56 foods surveyed

Pasta et al. Nutrients. 2024.

85-90% of IBS patients report worsening symptoms with specific foods

De Vries et al. Dig Dis. 2019.

Out of 160 Crohn's patients, 76.5% reported omitting specific foods to improve symptoms

Limdi et al. Inflamm Bowel Dis. 2016

66% of IBD patients (n=400) avoided favorite foods to reduce relapse

Commonly reported food triggers in patients with GI issues

Common GI Complaints	Frequently Reported Food Triggers
Diarrhea Constipation Tenesmus Abdominal pain Bloating / distension Flatulence Eructation Nausea/Vomiting GERD/heartburn	Salads Raw vegetables Nuts / seeds Beans/lentils Popcorn / corn Whole grains Spicy foods Caffeine Alcohol Wheat/gluten Dairy/lactose Apples Onions Garlic

Haller E, Scarlata K. 2021./ de Vries et al. 2018 / Cohen et al. 2013.

Two KEY Reasons GI Patients Turn to Exclusion Diets diets…

Potential **Pros** of Exclusion Style Diets

Symptom relief

Healing of the GI tract

Empowerment

Improved quality of life

Avoidance of medications

Identification of food triggers

Leads to diagnosis

Transition to more nutritious dietary pattern

Potential **Cons** of Exclusion Style Diets

Risk for disordered eating / eating disorders

Social isolation

Reduced quality of life

Harmful beliefs about food

Negative changes in the gut microbiome

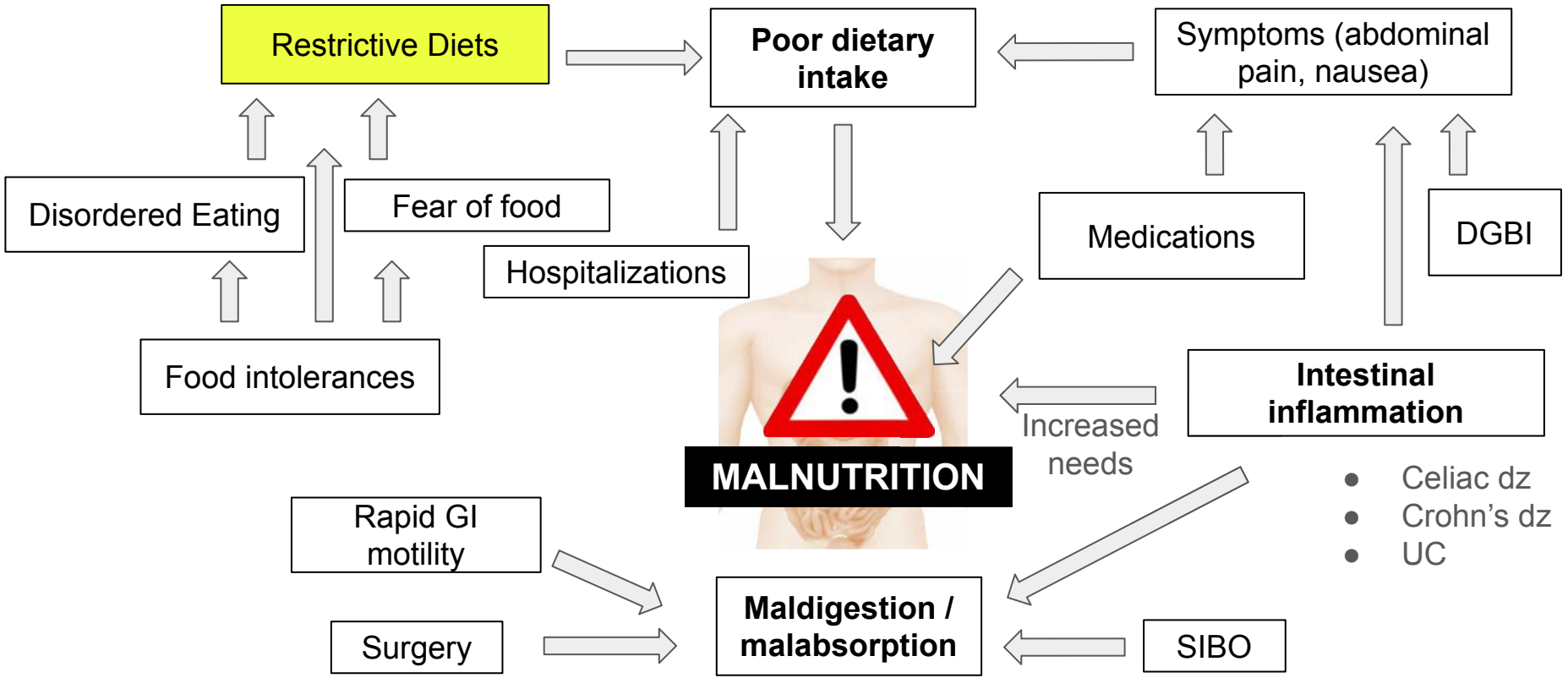
Reduced energy intake

Time commitment

Increased cost of food

Nutrient deficiencies

GI Patients at Increased Risk for Malnutrition & Nutrient Deficiencies



Nutrient Deficiencies in Select GI Conditions

IBD	• >50% of IBD patients have had 1 or more micronutrient deficiencies • Commonly deficient in vitamins B1, B9, B12, C, D, selenium, zinc, iron et al.	Gold et al. 2023.
Celiac	• Untreated celiac dz at risk for deficiencies in iron, vitamins A, B6, B9, B12, D, E, K, copper and zinc • Nutritional deficiencies persist in ~30% of CD patients on gluten-free diet	Alkalay et al. 2021.
SIBO	• Many factors → B12 deficiency • Malabsorption of fat and fat-soluble vitamins → FSV deficiencies • Low thiamine and niacin due to bacterial utilization of these vitamins	Quigley et al. 2022.
IBS	• Lower baseline intake of vitamins B1, B2, B9, D, calcium, iron, selenium, magnesium and zinc compared to dietary recommendations • Lower baseline intakes of vitamins A, B2, B9, B12, calcium and zinc vs. healthy controls • Abnormal lab reference values for vitamin B12, B9, ferritin, iron, and vitamin D	Bek et al. 2022. Roth et al. 2022.

Inflammatory Bowel Diseases, 2023, 29, 487–501
https://doi.org/10.1093/ibd/izac223
Advance access publication 26 October 2022
Invited Commentary

Micronutrients and Their Role in Inflammatory Bowel Disease: Function, Assessment, Supplementation, and Impact on Clinical Outcomes Including Muscle Health

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Key Words: nutrition, malnutrition, inflammatory bowel disease, nutrient deficiencies

Introduction

The incidence of inflammatory bowel disease (IBD) continues to rise worldwide, and patients with IBD are at increased risk for malnutrition and micronutrient deficiencies.[1] The etiology of malnutrition and micronutrient deficiencies in IBD is multifactorial and includes reduced oral intake, increased intestinal loss, malabsorption, increased nutritional needs in the setting of a hyper catabolic state, medication effects, and altered anatomy after luminal surgery. Malnutrition can lead to deficiencies in both macronutrients (protein-energy malnutrition) and micronutrients (vitamin and mineral loss) and is estimated to affect up to 80% of patients at any point during their disease course. Micronutrient absorption occurs mostly across the epithelium of the small bowel, which is likely why patients with Crohn's disease (CD) have a higher prevalence of nutritional deficiencies compared with those with ulcerative colitis (UC).[2] Despite common misconception, malnutrition has been identified in patients with both active IBD and in those with quiescent disease.[3] In all patients with IBD, malnutrition has been associated with poor clinical outcomes including poor response to biologic therapy, higher rates of hospitalization, increased postoperative complications, and reduced quality of life.[4]

Micronutrients play many roles in the human body: acting as cofactors in metabolism, antioxidants to reduce free radicals and oxidative stress, coenzymes in metabolism, and gene regulators.[5,6] There are numerous studies evaluating micronutrient deficiencies in patients with IBD, and the current literature suggests that over 50% of patients with IBD have had at least 1 vitamin or mineral deficiency.[1,2,7] The majority of these studies focus on deficiencies in vitamin B12, vitamin D, and iron, which are more commonly seen in patients with active inflammation and specifically ileal disease.[1] However, other nutrients, such as vitamin C, vitamin B1, folic acid, selenium, and zinc can become deficient in IBD and are often overlooked.[1,2] These deficiencies can contribute to clinically significant symptoms as well as disease-related complications; therefore, it is crucial to identify these deficiencies and intervene early in the disease course.[1]

It is important to highlight the importance of these less well-studied micronutrients and to provide concrete guidelines on assessment and supplementation. A recent study evaluating a nutrition care pathway in IBD identified that the majority of IBD providers did not have access to expert nutrition care in the clinic, and even with access to nutrition care, provider knowledge about nutrition testing and supplementation was limited.[8] Therefore, the goal of this article is to review the literature on micronutrient deficiencies in IBD including the prevalence, risk factors, and supplementation strategies, as well as the impact of these deficiencies on IBD-related outcomes including sarcopenia.

Micronutrient Deficiencies In IBD

Although micronutrient deficiencies are commonly associated with undernutrition (protein calorie malnutrition), these deficiencies can similarly occur in patients who are otherwise well nourished. The term *hidden hunger* has been proposed to describe micronutrient deficiencies that occur without a deficit in calories or other macronutrients.[9] This phenomenon is quite common, especially in Western countries, in which the diet can be energy rich but nutrient poor, and in patients with malabsorption in which vitamin and mineral absorption is impaired.[9] The majority of the literature on micronutrient deficiencies in IBD centers around deficiencies in vitamin B12, vitamin D, vitamin B9 (folate), and iron. There is a significant body of literature describing the etiology and prevalence of these deficiencies as well as guidance on supplementation. Therefore, this review will instead focus on the commonly overlooked vitamins and minerals that may be deficient in patients with IBD and can contribute to clinically significant symptomatology (Tables 1 and 2, Figure 1).

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Table 4. Micronutrient testing strategies

Micronutrient	Available Testing Strategies	Advantages and Disadvantages of Current Testing Strategy	Additional Notes
Vitamin A	Retinol (plasma) Carotenoid (plasma)	Retinol and carotenoid levels are not always reliable and only decline once liver stores are depleted.	Researchers are studying techniques to evaluate liver stores of vitamin A (isotope dilution or dose response).
Vitamin B1	Serum Transketolase enzyme Urine	Serum levels are not clearly reliable measures of total body thiamine stores. Urine evaluates thiamine intake but not stores.	Unsaturated transketolase (>25%) is indicative of thiamine deficiency.
Vitamin B2	Serum Urine EGRAC	EGRAC >1.4 is indicative of riboflavin deficiency; however, the degree of elevation does not reflect severity of riboflavin deficiency. Urine reflects recent dietary intake.	EGRAC cannot be used in patients with known G6PD deficiency.
Vitamin B3	Serum Urine (N1MN and N1M2P5C) NAD/NADPH ratio	Serum levels are not reliable measures of niacin body stores. NAD levels decline with niacin deficiency, while NADPH levels remain constant.	Urinary excretion of either metabolite of <5.8 μmol/d is indicative of deficiency.
Vitamin B6	Plasma Erythrocytes Urine PLP (plasma)	Plasma vitamin B6 and PLP levels are thought to be reliable (most commonly assessed).	PLP level <30 nmol/L indicates vitamin B6 deficiency.
Vitamin B7	Serum Urine Biotinylated MCC (WBC) p-CoA carboxylase (WBC)	Most accurate measures of biotin levels in the body are biotinylated MSS and p-CoA carboxylase in white blood cells. Serum levels are not accurate in borderline deficiency.	
Vitamin B9	Serum Erythrocyte	Serum folate levels can be used to assess dietary intake and possibly body stores.	Erythrocyte levels may evaluate long-term folate levels.
Vitamin C	Plasma Leukocyte	Plasma vitamin C is commonly used and thought to be accurate.	Leukocyte levels have unclear accuracy.
Vitamin D	Serum	Serum concentrations of 25(OH)D is the best indicator of vitamin D status.	Serum levels of 1,25(OH)2D are not accurate measures of vitamin D status.
Vitamin E	Serum/plasma	Alpha tocopherol levels (serum or plasma) reflect body stores of vitamin E.	
Vitamin K	Prothrombin time Phylloquinone (plasma)	Prothrombin time is the only accurate measure of vitamin K status.	
Copper	Plasma Cuproenzyme (plasma) Hair/nails	No clear marker to assess copper status.	Copper status is influenced by hormones, infection, and inflammation.
Magnesium	Serum/plasma Urine Magnesium loading test Hair/nails	Serum is most commonly checked. Unclear if it correlates with total body magnesium.	Novel testing strategies include erythrocyte levels and saliva testing.
Phosphorus	Serum/plasma Hair/nails	Most commonly measured in serum. Unclear if blood reflects phosphorus body stores.	
Selenium	Serum/plasma Selenoproteins (serum) Urine Hair/nails	Serum and plasma are most commonly used—likely reflect recent intake.	Hair/nail specimens can inform about intake over months to years.
Zinc	Serum/plasma Hair/nails	Diurnal variation with serum and plasma levels and variation by sex. Also influenced by inflammation, infection, and hormones.	

Information obtained from the National Institutes of Health, Office of Dietary Supplements, Health Professional Dietary Supplement Fact Sheets.
Abbreviations: EGRAC, erythrocyte glutathione reductase activity coefficient, MCC, methylcrotonyl-CoA carboxylase, p-CoA: propionyl-CoA; WBC, white blood cell.

Gluten-Free Diet

Gluten is a protein complex found in wheat, barley, and rye that provides texture and structure to foods.

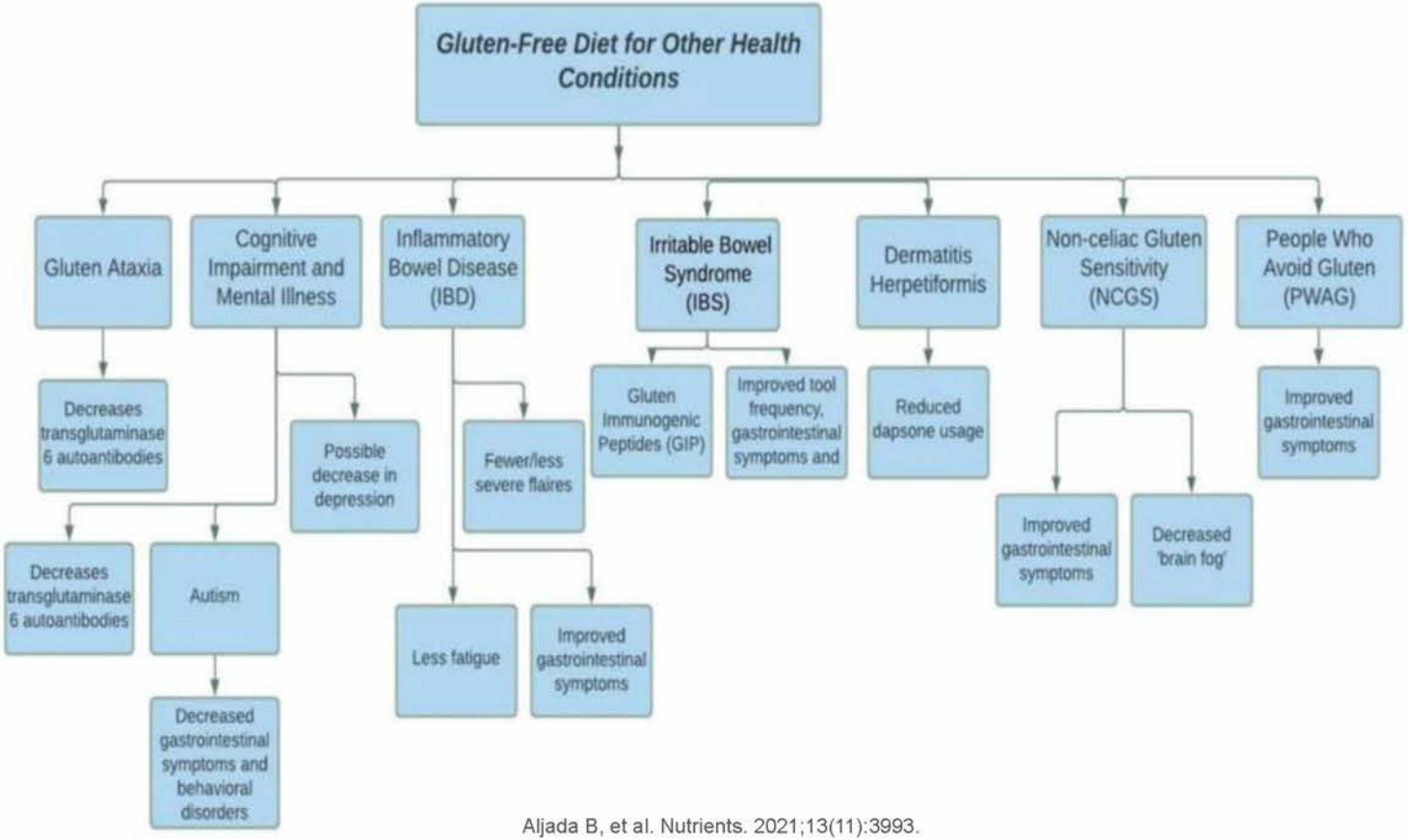
About 20% of Americans report following a strict gluten-free diet

Nearly 1/3rd of Americans report having tried to eliminate or reduce total gluten consumption

1% of Americans live with **celiac disease** and require a strict lifelong GFD

Lerner A, O'Bryan T, Matthias T. Navigating the Gluten-Free Boom: The Dark Side of Gluten Free Diet. Front Pediatr. 2019;7:414. Published 2019 Oct 15. doi:10.3389/fped.2019.00414

Gluten-Free for Other Health Conditions



Aljada B, et al. Nutrients. 2021;13(11):3993.

Looking Beyond Gluten in Wheat

Table 1
The complexity of wheat and GI symptom induction in IBS

Component of Wheat	Definition	Pathomechanism for GI Symptom Induction in IBS
Gluten	A family of proteins found in wheat, as well as other grains including rye and barley. Gluten is composed of gliadins and glutenins in wheat, secalins in rye and hordeins in barley.	Alters bowel barrier function and/or leads to increased stool frequency, particularly in HLA-DQ2/8–positive patients.[15–17]
Fructan	A polymer of fructose molecules found in wheat, as well as other grains including rye and barely.	Microbial fermentation of fructans gives rise to gas in the colon, contributing to luminal distention. Although the gas production is normal, those with IBS may experience an exaggerated symptom response of discomfort, pain, bloating due to visceral hypersensitivity.[11]
Amylase trypsin inhibitors	Proteins found in wheat as well as other grains including rye and barely.	Increases intestinal inflammation via activating toll-like receptor 4 (TLR4) on myeloid cells in the intestine of mice.[15] Studies lacking in humans.
Wheat-germ agglutinin	A protein found in wheat.	May initiate an inflammatory immune reaction in the gut.[16]
Wheat bran	An insoluble fiber found in wheat.	Large particle wheat bran mechanically stimulates/irritates the gut mucosa which increases fecal mass and colonic transit rate. Fermentable fiber. Shown to be ineffective at normalizing bowel habits in patients with IBS as well as increase bloating, gas, and pain.[3]
Wheat protein	Four classes of proteins found in wheat (albumin, globulin, gliadin, glutenin).	IGE allergy or atypical allergy noted via CLE in patients with IBS.[13,14]

Abbreviations: CLE, confocal laser endomicroscopy; GI, gastrointestinal; IBS, irritable bowel syndrome; IGE, Immunoglobulin E.

Haller E, Scarlata K. 2021;50(3):565-579. doi:10.1016/j.gtc.2021.03.005

Gluten Free Does Not = More Nutritious

- When compared to gluten-containing diets, gluten-free diets have been shown to be …

Higher in…	**Lower in…**
Arsenic Heavy metals (e.g. lead, mercury) Higher total fat	Dietary fiber PUFAs Folate & other B vitamins Total protein Vitamin E Magnesium Potassium Iron Zinc

Raehsler et al. Clin Gastroenterol Hepatol. 2018.
Taetzsch et al. Nutrients. 2018.

Analysis of Healthy GF Diet vs. Gluten Containing Diet

GF menu significantly lower in …

- Dietary fiber
- Total protein
- Vitamin E
- Folate
- Magnesium
- Potassium

Meal	Gluten Containing	Gluten Free
Breakfast	1 whole wheat English muffin	*1 GF brown rice English muffin*
	1 tbsp all-fruit preserves	1 tbsp all-fruit preserves
	1 hard-cooked egg	1 hard-cooked egg
	Beverage: 1 cup water, coffee, or tea	Beverage: 1 cup water, coffee, or tea
Lunch	White bean-vegetable soup:	White bean-vegetable soup:
	1 ¼ cup chunky vegetable soup with pasta	*1 ¼ cup GF vegetable noodle soup*
	½ cup white beans	½ cup white beans
	6 saltine crackers	*6 GF table crackers*
	½ cup celery sticks	½ cup celery sticks
	Beverage: 1 cup fat-free milk	Beverage: 1 cup fat-free milk
Dinner	Rigatoni with meat sauce:	Rigatoni with meat sauce:
	1 cup rigatoni pasta (2 oz dry)	*1 cup GF fusilli (2 oz dry)*
	2 ounces cooked ground beef	2 ounces cooked ground beef
	(95% lean)	(95% lean)
	2 tsp corn/canola oil (to cook beef)	2 tsp corn/canola oil (to cook beef)
	½ cup tomato sauce	½ cup tomato sauce
	3 tbsp grated parmesan cheese Spinach salad:	3 tbsp grated parmesan cheese Spinach salad:
	1 cup raw spinach leaves	1 cup raw spinach leaves
	½ cup tangerine sections	½ cup tangerine sections
	½ ounce chopped walnuts	½ ounce chopped walnuts
	4 tsp oil and vinegar dressing	4 tsp oil and vinegar dressing

Taetzsch et al. Nutrients. 2018.

Gluten-free Grains/Pseudograins: **Quinoa**

NUTRITIONAL HIGHLIGHTS	HOW TO ENJOY	GF QUINOA PRODUCTS
Excellent source of… • Magnesium • Folate • Iron Good source of … • Protein • Fiber • Vitamins B1, B2, B6, E • Copper	• Warm quinoa salad • Quinoa porridge with fruit and nuts • As a base for roasted vegetables • In place of rice as a cremier and nuttier side dish	• Quinoa pasta, such as Andean Dream • Quinoa flakes hot cereal, such as Ancient Harvest • Pre-made quinoa bowls/pouches, such as Kitchen and Love's GF quinoa cups

Gluten-free Grains/Pseudograins: **Amaranth**

NUTRITIONAL HIGHLIGHTS	HOW TO ENJOY	BASIC PILAF RECIP
Excellent source of… • Magnesium • Zinc • Folate Good source of… • Protein • Fiber • Iron • Vitamins B6, B9 • Selenium	• Simmer to make amaranth porridge • Pop in a skillet like popcorn • Add to rice for earthier flavor, like in this recipe for **Spring Vegetable Braise w/ Amaranth & Brown Rice**	Bring 1 ½ cups water and ¼ teaspoon salt to a boil in a medium pot. Add 1 cup amaranth, reduce heat and simmer, covered, until liquid is absorbed, about 20 minutes.

Gluten-free Grains/Pseudograins: **Buckwheat**

NUTRITIONAL HIGHLIGHTS	HOW TO ENJOY	GF BUCKWHEAT PRODUCTS
Excellent source of… • Magnesium • Copper Good source of … • Protein • Fiber • Vitamins B1, B3	• Warm buckwheat salad • Great substitute for bulgur in a tabouli recipe • Kasha with fruit and nuts OR with vegetables • Soba noodles • In a granola	• 100% buckwheat soba noodles, such as King Soba • Cream of buckwheat hot cereal, such as Pocono's • Pacha's sprouted buckwheat bread • Sprouted buckwheat granola, such as Clusterbucks

Gluten-free Grains/Pseudograins: **Millet & Teff**

NUTRITIONAL HIGHLIGHTS	HOW TO ENJOY	MORE ON TEFF
Excellent source of… • **Teff**, a form of millet, is an excellent source of calcium, iron and resistant starch All types of millet are good sources of… • Protein • Fiber • Magnesium • Copper	• As a pilaf, such as this Pilaf Recipe With Turmeric Vegetables • In a sweet or savory millet porridge (millet & coconut are especially delicious) • Millet salad with vegetables	• Teff is a staple food of Ethiopian cuisine–if you've had injera, you've had teff • Teffco is an excellent resource for recipes using teff • Female athletes improved their iron status by subbing in teff bread for regular bread • A serving of teff has as much calcium as 4 oz yogurt

Gluten-free Grains/Pseudograins: **Sorghum**

NUTRITIONAL HIGHLIGHTS	HOW TO ENJOY	WHERE TO BUY
Excellent source of … • Fiber • Iron Good source of … • Protein • Magnesium • Vitamin B3	• A sorghum grain bowl • Popped like popcorn • Excellent gluten-free substitute for farro and barley, like in this recipe: "I can't believe it's not barley and beef soup"	• Popped Sorghum, such as Nature Nate's • Bob's Red Mill Sorghum Grain

Dairy-Free Diet

- Cow's milk allergy
- Cow's milk intolerance
- EoE
- Part of more restrictive diet (e.g. Whole 30)
- Lactose intolerance

Dairy products are major sources of Ca, K+, zinc, Mg and vitamins A, B2, B12, and D

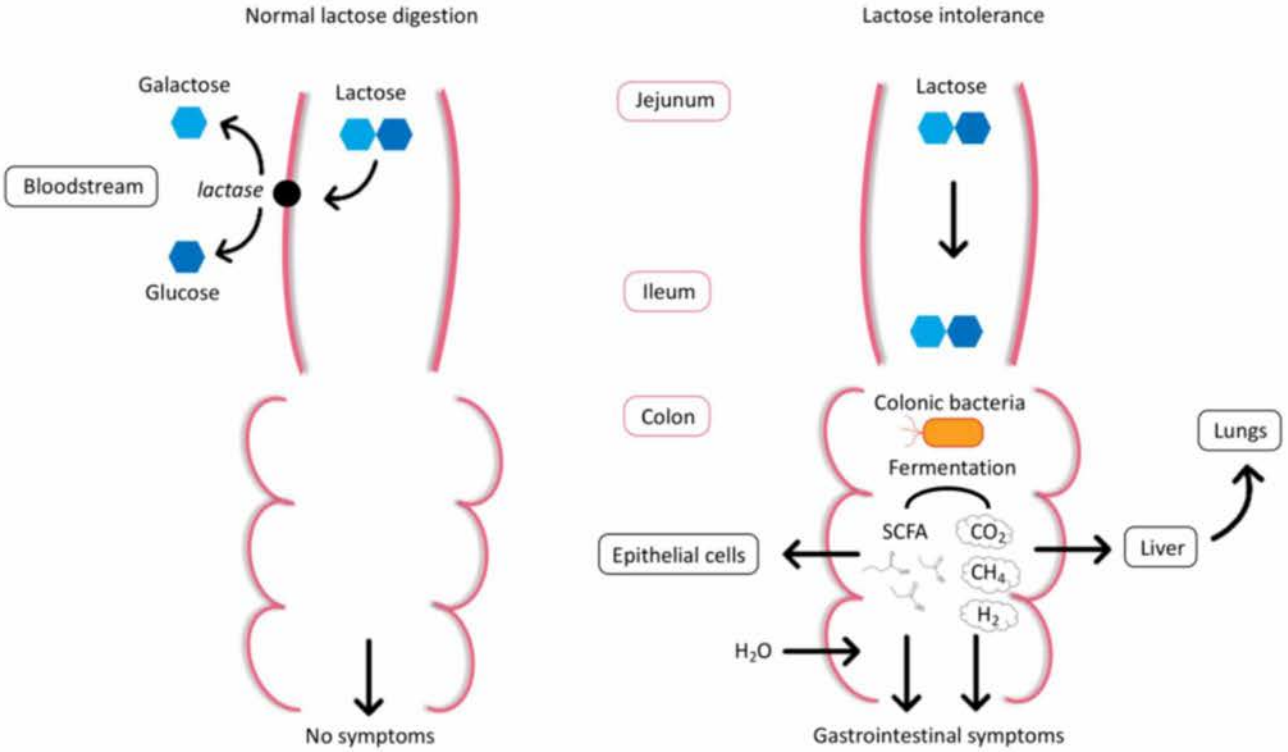
People with milk allergy have been shown to have lower intake of Ca, Zn and vitamin B2

Kim et al. Nutr Res Pract. 2013

Observational studies show that people who avoid milk have lower BMD compared to those who don't

Hodges et al. Nutrients. 2019.

Lactose Intolerance



- *Primary lactase deficiency* / lactase non-persistence
- *Secondary lactase deficiency*, such as celiac disease, Crohn's dz & medications

Porzi et al. Nutrients. 2021.

Lactose Intolerance Doesn’t Require Dairy-Free Diet

- Choose lactose-free dairy, such as lactose-free milk and yogurt
- Encourage aged cheese, which are essentially lactose free
- Yogurt with live active cultures can aid in lactose digestion
- Probiotic strains Limosilactobacillus reuteri DSM 17938 and Lactobacillus acidophilus DDS-1 may help manage LI symptoms
- Combine lactose-containing dairy with other foods can slow down gastric emptying
- Take OTC lactase enzymes (9,000 ALU) with meals

Calcium on a Dairy-Free Diet

Estimated Absorption Rates:

- Oxalate-rich veggies (spinach, chard) ~5%
- Beans, almonds, tahini, figs ~20-25%
- Dairy, soy ~32%
- Low oxalate veggies (right) ~50-60%

Other food sources:

- Fish with bones, chia seeds

Craig et al. Nutrients. 2021.

Table 1: Calcium Content of Selected Vegan Foods Vrg.org

Food	Amount	Calcium (mg)
Blackstrap molasses	2 Tbsp	400
Plant milks, calcium-fortified	8 ounces	100-450
Tofu, processed with calcium sulfate*	4 ounces	200-434
Tofu, processed with nigari*	4 ounces	130-400
Calcium-fortified orange juice	8 ounces	350
Commercial soy yogurt, plain	6 ounces	300
Collard greens, cooked	1 cup	268
Turnip greens, cooked	1 cup	197
Tempeh	1 cup	184
Kale, cooked	1 cup	177
Soybeans, cooked	1 cup	175
Mustard greens, cooked	1 cup	165
Bok choy, cooked	1 cup	158
Tahini	2 Tbsp	128
Navy beans, cooked	1 cup	126
Okra, cooked	1 cup	124
Almond butter	2 Tbsp	111
Almonds, whole	1/4 cup	94
Broccoli, cooked	1 cup	62

The Low FODMAP Diet

F **ermentable**

O **ligosaccharides:** GOS, fructans

D **isaccharides**: lactose

M **onosaccharides:** fructose

A **nd**

P **olyols**: mannitol sorbitol

- Certain sugars and fibers that worsen symptoms in some people with IBS
- FODMAPs are highly and rapidly fermented in the presence of bacteria
- FODMAPs are poorly absorbed so they draw water into the bowel
- FODMAP effect is cumulative
- Portion size is key because there is a load effect

Examples of High and Low FODMAP Foods

	HIGH FODMAP FOODS AND	LOW FODMAP ALTERNATIVES
Vegetables	Artichoke, asparagus, cauliflower, garlic, green peas, mushrooms, onion, sugar snap peas	Aubergine/eggplant, bean (green), bok choy, green capsicum (bell pepper), carrot, cucumber, lettuce, potato, bean shoots, zucchini (1/5 cup or 65g)
Fruits	Apples, apple juice, cherries, dried fruit, mango, nectarines, peaches, pears, plums, watermelon	Cantaloupe (3/4 cup or 120g), kiwi fruit (green), mandarin, orange, pineapple, strawberries (5 mediums)
Dairy and alternatives	Cow's milk, custard, evaporated milk, ice cream, soy milk (made from whole soybeans), sweetened condensed milk, yoghurt	Almond milk, brie/camembert cheese, feta cheese, hard cheeses, lactose-free milk, soy milk (made from soy protein)
Protein sources	Most legumes/pulses, some marinated meats/poultry/seafood, some processed meats	Eggs, firm tofu, plain cooked meats/poultry/seafood, tempeh
Breads and cereal products	Wheat/rye/barley based breads, breakfast cereals, biscuits and snack products	Gluten free corn flakes, oats, quinoa flakes, quinoa/rice/corn pasta, rice cakes (plain), sourdough spelt bread, wheat/rye/barley free breads
Sugars/ sweeteners & confectionery	High fructose corn syrup, honey, sugar free confectionery	Dark chocolate, maple syrup, rice malt syrup, table sugar
Nuts and seeds	Cashews, pistachios	Macadamias, peanuts, pumpkin seeds, walnuts

https://www.monashfodmap.com/3_step_fodmap_diet/

The 3 Phases of the Low FODMAP Diet

STEP 1

Low FODMAP Diet

Follow a low FODMAP diet by swapping high FODMAP foods for low FODMAP alternatives. Aim is to induce symptom control.

STEP 2

FODMAP Reintroduction Diet

A low FODMAP diet continued. Food challenges (using foods high in only 1 FODMAP group) are used to determine which FODMAPs are tolerated, and which are not. Aim is to identify individual FODMAP sensitivities.

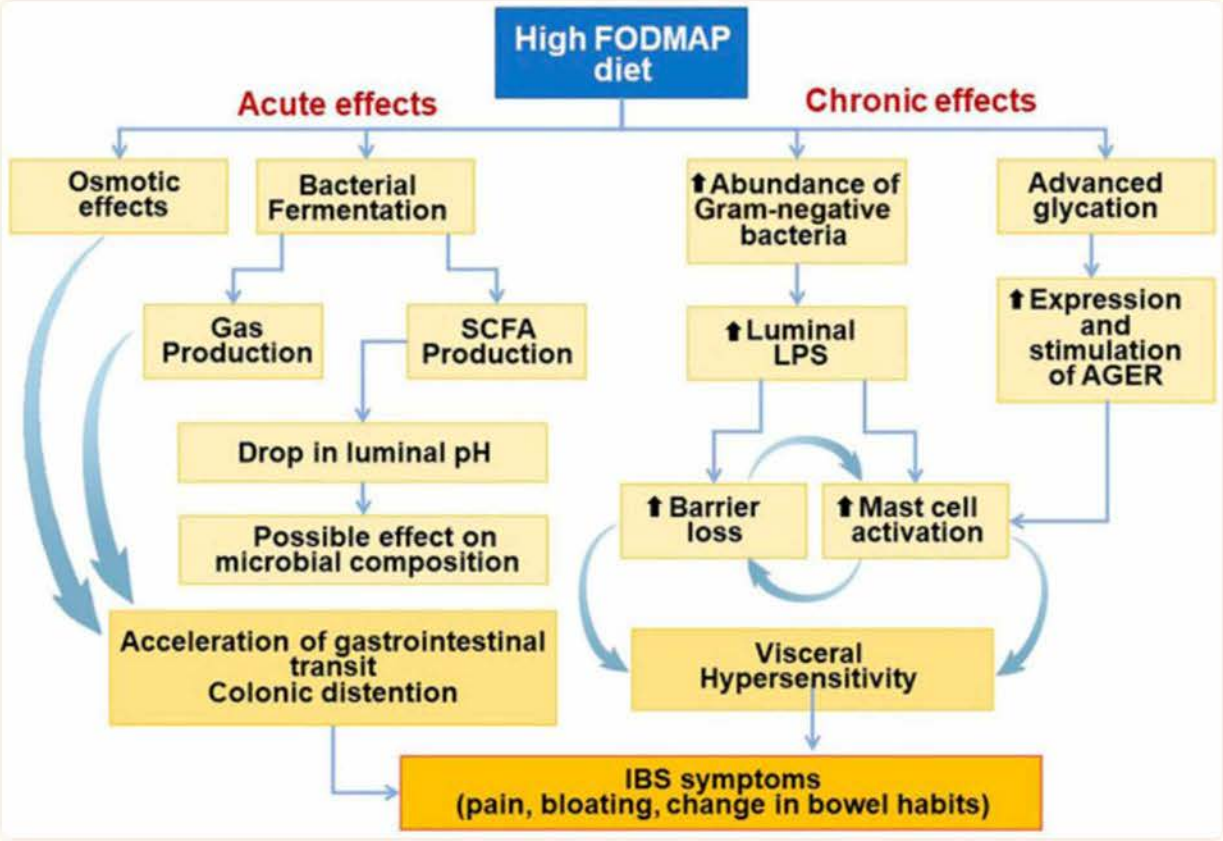
STEP 3

FODMAP Personalization Diet

Well tolerated FODMAPs are included, while poorly tolerated FODMAPs restricted, but only to a level that provides adequate symptom relief. Aim is establish a minimally restrictive, 'personalised FODMAP diet' for the long term.

Image from https://www.monashfodmap.com/3_step_fodmap_diet/

The Effects of FODMAPs on the GI Tract



Is the Low FODMAP Diet Nutritionally Adequate?

Staudacher et al. J Acad Nutri Diet. 2020.

4-wk FODMAP restriction did not lower intake of most nutrients compared w/ controls

Eswaran et al. J Acad Nutri Diet. 2020.

4-wk FODMAP restriction → reduced intake of energy, CHO, B1, B2, Ca and Na (sig only for B2 after adjusting for total energy)

Staudacher et al. J Nutr. 2012

4-wk FODMAP restriction → lower calcium intake compared to those on habitual diet

Jatkowska et al. Crohns Colitis 360. 2024.

A 6-wk RD-led low FODMAP diet in adults >65 y/o with IBS-D (n-20) showed no significant changes in macro- or micronutrient intakes

O'Keeffe et al. Neurogastroenterol Motil. 2018.

Those following a personalized low FODMAP diet (Phase 3) did not have lower intakes of key nutrients compared to those who returned to usual diet

Calcium-Rich Low FODMAP Foods

With DAIRY	Without Dairy
• Hard cheeses: Swiss, Parmesan, cheddar • Some soft cheeses: Brie, feta, semi-soft goat cheese • Lactose-free yogurt: Green Valley™, Fage® BestSelf® • Lactose-free cottage cheese and sour cream: Lactaid™ • Lactose-free milk: Organic Valley™ • Unsweetened almond milk: Silk™	Collard greens Kale Bok choy, 1 cup per serving Broccoli florets, <¾ cup per serving Chia seeds Canned salmon with bones Quinoa

FODMAP Gentle Approach

- **Beans and pulses**, including **lentils**, dried and most canned beans, soybeans and hummus
- **Fruits** (and fructose-rich foods): **apples**, dried fruit, fruit juices, mango, pears, stone fruits, watermelon. Also: agave, **honey**.
- **Grains**: wheat, barley, rye
- **Lactose-rich products:** dairy milk, some yogurts, some soft **cheeses**
- **Vegetables**: cauliflower, **garlic**, **leek**, mushrooms, onion

Candidates for Gentle Low FODMAP Diet

Possible contraindication	Associated negative impact from diet	FODMAP gentle or no dietary therapy?
Active eating disorder	Psychological health and nutritional status	No therapy
Malnutrition	Nutritional status	FODMAP-gentle
Other dietary restrictions in place	Nutritional status	FODMAP-gentle
Children	Nutritional adequacy and establishing good eating habits	FODMAP-gentle
Comorbidity with negative risk associated with altered diet (e.g. IBD and pregnancy)	Altered microbiota and nutritional adequacy	FODMAP-gentle
Unwillingness to apply diet	Non-adherence	FODMAP-gentle or no therapy
Poor capability to understand and/or apply diet	Non-adherence	FODMAP-gentle or no therapy

Halmos EP, Gibson PR. Controversies and reality of the FODMAP diet for patients with irritable bowel syndrome. J Gastroenterol Hepatol. 2019;34(7):1134-1142. doi:10.1111/jgh.14650

FODZYME Digestive Enzymes

FODZYME® CLINICAL SUPPORT TOOL

for patients with intermittent bloating, diarrhea, constipation & gas

NUTRITION HISTORY
Has implemented the low FODMAP diet (LFD) to identify GI triggers?

NO → **FODMAP TRIGGERS?**
Known or suspected GI triggers include high FODMAP foods (garlic, onion, wheat, legume, dairy)?

Symptom onset 4-8 hours after consuming suspected triggers?

NO → Other Intervention

YES → **LOW FODMAP DIET CONTRAINDICATIONS?**
Eg. History of disordered eating/ eating disorder, or already on a restrictive diet, lack of interest or ability to implement LFD.

NO → **FODMAP Elimination and Reintroduction**

YES → **FODMAP Gentle Approach**

YES → **FODZYME TRIAL**
Trial FODZYME when eating food with fructan, GOS and/or lactose, such as garlic, onion, wheat, legumes, dairy. Do symptoms improve?

NO → Other Intervention

YES → **FODZYME USE**
Use FODZYME when consuming food triggers with fructan, GOS, and/or lactose to expand diet and increase food freedom.

YES → **LOW FODMAP PHASE**
Has patient finished FODMAP challenges and identified personal triggers?

NO → **FODMAP Elimination and Reintroduction**

YES → **TRIGGER IDENTIFICATION**
Are fructan, GOS, and lactose among the FODMAP triggers?

YES → **FODZYME USE**

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How do I help a patient trial FODZYME?

The standard dose of FODZYME (1 stick pack or 1/4 tsp) is designed based on common FODMAP tolerance thresholds and the typical amounts of FODMAPs in a meal.

If a patient sees partial benefit from a single dose of FODZYME, trial again with increased dosage. Increase by 0.5 or 1 dose each time when adjusting dosage.

What are good foods for a first trial?

FRUCTAN	GOS	LACTOSE
Spaghetti squash with olive oil, 1/4 clove garlic & fresh basil	Chickpeas (1/2 cup), diced zucchini & red pepper, & olives	Puffed rice with strawberries & 1/4 cup cow's milk
Western omelette (1/8 onion, ham, red or green pepper)	Smoothie : 1/4 cup silken tofu, spinach, pineapple & ginger	Carrots & tzatziki (3 oz plain yogurt, cucumber, dill)
Quinoa with chicken, carrots & 3 brussels sprouts	Frittata made with 1/8 cup green peas, kale & fresh herbs	Rice cake with 2 oz ricotta & smoked salmon
Wheat bread with peanut butter	Salted popcorn & 15 almonds	1/2 cup pineapple & 1 kiwi with 3 oz plain yogurt & cinnamon

ol Hepatol. 2019;34(7):1134-1142. doi:10.1111/jgh.14650

Poopedia.org By The IBS Dietitian JESSIE WONG | FODZYME BY RIMI BIOSCIENCES

Specific Carbohydrate Diet (SCD)

Overview: Diet limits carbohydrates to monosaccharides. Disaccharides and polysaccharides are excluded.

Rationale: Poor digestion + absorption of complex carbohydrates → CHO fermentation and inflammatory microbiota → mucosal damage

Table 2. Foods Not Allowed on the Specific Carbohydrate Diet

- Sugar, molasses, maple syrup, sucrose, processed fructose including high-fructose corn syrup or any processed sugar, Stevia, agave nectar, and most artificial sweeteners such as Splenda and Equal
- All grain including corn, wheat, wheat germ, barley, oats, rice and others (this includes bread, pasta and baked goods made with grain-based flour)
- Canned fruits/vegetables
- Some legumes
- Seaweed and seaweed byproducts such as carrageenan
- Starchy tubers such as potatoes, sweet potatoes, and turnips
- Canned and most processed meats
- Canola oil and most commercial mayonnaise
- All milk and milk products high in lactose such as mild cheddar, commercial yogurt, cream, sour cream, and ice cream
- Candy, chocolate and products that contain FOS (fructooligosaccharides)

Table 2: Braly KL, Chitnavis MV. The Specific Carbohydrate Diet in Inflammatory Bowel Disease:The Evidence and Execution. Practical Gastroenterology. 2019.

SCD Key Findings in IBD

Cohen *et al.* [44]	CD	Prospective clinical trial		9	Children	52 weeks	Clinical and mucosal improvements possible with SCD
Obih *et al.* [41]	IBD	Retrospective review		26 (20 CD and 6 UC)	Children	6 months	SCD can improve clinical and laboratory parameters
Burgis *et al.* [40]	CD	Retrospective analysis		11	Children	variable	Disease control is possible with the SCD
Suskind *et al.* [45]	IBD	Multicentre, prospective study		12 (CD 9 and 3 UC)	Children	12 weeks	SCD improves clinical findings, laboratory results, and alters the fecal microbiome.
Wahbeh *et al.* [84]	CD	Retrospective analysis		7	Children	26 months	mSCD does not induce mucosal healing
Suskind *et al.* [39]	CD	Retrospective analysis		7	Children	30 months	SCD is a good therapeutic option for CD
Kakodkar *et al.* [42]	IBD	Retrospective analysis		50 (36 CD and 9 UC and 5 ID)	Children, adults	Variable	SCD may be effective for colonic and ileocolonic CD
Suskind *et al.* [38]	IBD	Survey		417 (196 CD and 179 UC 42 ID)	Children, adults	12 months	The SCD can be either a primary or adjunct therapy
Chutkan *et al.* [43]	IBD	Retrospective analysis, abstract		8 (5 CD and 3 UC)	Adults	66 months	SCD can improve symptoms, mucosal healing.
Suskind *et al.* [46▪▪]	CD	Randomized Controlled Trial	SCD vs. mSCD vs. whole foods	10	Children	12 weeks	SCD, mSCD and WF diets have positive effect on symptoms and inflammatory burden

Cusimano FA, et al. 2022.

SCD: Potential for Micronutrient Deficiencies

- Single center analysis (Seattle Children's Hospital) of nutrient intake in 8 children with mild or moderate IBD (CD and UC)
- Participants followed the SCD x 12 weeks
- Aim: to evaluate nutritional adequacy of the SCD via 3-day food records

KEY FINDINGS

- Mean intake of vitamins B1, B9, D, calcium, and phosphorus were <100% of the RDA/AI
- Some patients met RDA for remaining B vitamins, Zn and Mg, while others did not
- Nutrient intake on SCD was comparable to that of similarly aged healthy children

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Author manuscript
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Nutritional Adequacy of the Specific Carbohydrate Diet in Pediatric Inflammatory Bowel Disease

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Abstract

Introduction—The Specific Carbohydrate Diet (SCD) is an exclusion diet used as a therapy in inflammatory bowel disease (IBD). The aim of this study was to evaluate the nutritional adequacy of the SCD.

Methods—Prospective dietary data over 12 weeks were analyzed for pediatric patients on the SCD. Intake of 20 key nutrients was compared to Dietary Recommended Intake (DRI) levels and nutrient intake data from similarly aged children from The National Health and Nutrition Examination Survey (NHANES) National Youth Fitness Survey (NNYFS) in 2012.

Results—9 patients enrolled, with 8 patients completing the study. 6/8 individuals completing the study had gained weight, 1 individual had weight loss, and 1 had no change in weight. Energy intake was significantly greater than 100% of the Recommended Daily Allowance (RDA)/ Adequate Intake (AI) for 64% of daily intakes completed for this study. The majority of participants' daily intakes met or exceeded the RDA for vitamins B2, B3, B5, B6, B7, B12, C, A, and E. One hundred percent of participants' intakes were below the RDA for vitamin D. Seventy-five percent of daily intakes were less than the RDA for calcium. The upper limit was met or exceeded for magnesium in 42% of daily intakes. Average Vitamin A intake was significantly greater than the upper limit ($p=0.01$).

Discussion—Nutrient intake of pediatric IBD patients on the SCD was adequate when compared to a healthy peer reference population, but adequacy was variable when compared to the DRIs. Close monitoring with a multi-disciplinary team for patients using the SCD as an alternative or adjunct therapy is recommend to ensure positive outcomes for overall patient health.

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Conflicts of Interest: None of the authors have a conflict of interest in regards to this article except for David Suskind who has written/ published Nutrition in Immune Balance (NIMBAL).

KB, NW, DL, and DLS had substantial contributions to the conception or design of the work; KB, NW, DL, MS, GW, JK, MG and DLS contributed to the acquisition, analysis, or interpretation of data for the work; All authors were involved in drafting the work or revising it critically for important intellectual content; All all authors gave final approval of the version to be published; All authors gave agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

SCD: Potential for Micronutrient Deficiencies

- Aim: To evaluate the efficacy of a 3-month low FODMAP diet and a SCD on symptoms and to evaluate the deficiencies of vitamin D and folic acid
- Blinded RCT, n=73, assigned to SCD or low FODMAP

KEY FINDINGS

- Vit D mean value dropped from 38 ng/mL at time of enrollment to 32 ng/mL in low FODMAP group and 22 ng/mL in SCD group
- Folic acid mean value dropped from 18 mg/dL to 15 mg/dL in low FODMAP group and 8 mg/dL in SCD

Original Article

DE GRUYTER OPEN

Effects of a low FODMAP diet and specific carbohydrate diet on symptoms and nutritional adequacy of patients with irritable bowel syndrome: Preliminary results of a single-blinded randomized trial

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ABSTRACT

Background and Objectives: IBS is the most common functional disease of the low gastrointestinal tract. Recently, the interest towards a diet approach has increased, for example, a diet with low content of fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs). The aim of the present study is to evaluate the efficacy of a low FODMAP diet and a specific carbohydrate diet (SCD) conducted for 3 months on symptoms and to evaluate the deficiencies of vitamin D and folic acid in patients affected by IBS, matching the Rome IV criteria. **Methods:** We evaluated 73 patients divided into 2 groups: one submitted to low FODMAP diet and one to SCD, for 3 months. Patients were assigned to one of the 2 groups randomly and blinded. All the patients filled a visual analogue scale (VAS) to evaluate the severity of symptoms and a diary to evaluate the number of days with symptoms, and this was repeated after 3 months. Final evaluation was made by a blinded investigator. **Results:** In the end, the patients with low FODMAP diet had a significant improvement in bloating and distension ($P = 0.000$); the group with SCD instead had a low but not a significant improvement. One way ANOVA showed comparable severity of symptoms in the 2 groups pre-diet ($P = 0.215$), but a difference in the same symptoms after 12 days ($P = 0.000$). Tukey test showed a significant improvement in the low FODMAP diet group and only a trend of improvement in the second group of SCD. The vitamin D mean value in both groups at the time of enrollment was 38 ng/mL; in the end, the mean value in the low FODMAP diet group was 32 ng/mL and in the SCD group was 22 ng/mL, with a statistically significant difference. The folic acid mean value at the time of enrollment was 18 mg/dL; in the end, the mean value in the low FODMAP diet group was 15 mg/dL and in the SCD group was 8 mg/dL, with a statistically significant difference. **Conclusion:** Patients affected by IBS seem to have benefitted from a low FODMAP diet but not from an SCD, and a low FODMAP diet doesn't seem to cause vitamin D and folic acid deficiencies.

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Quick Response Code:

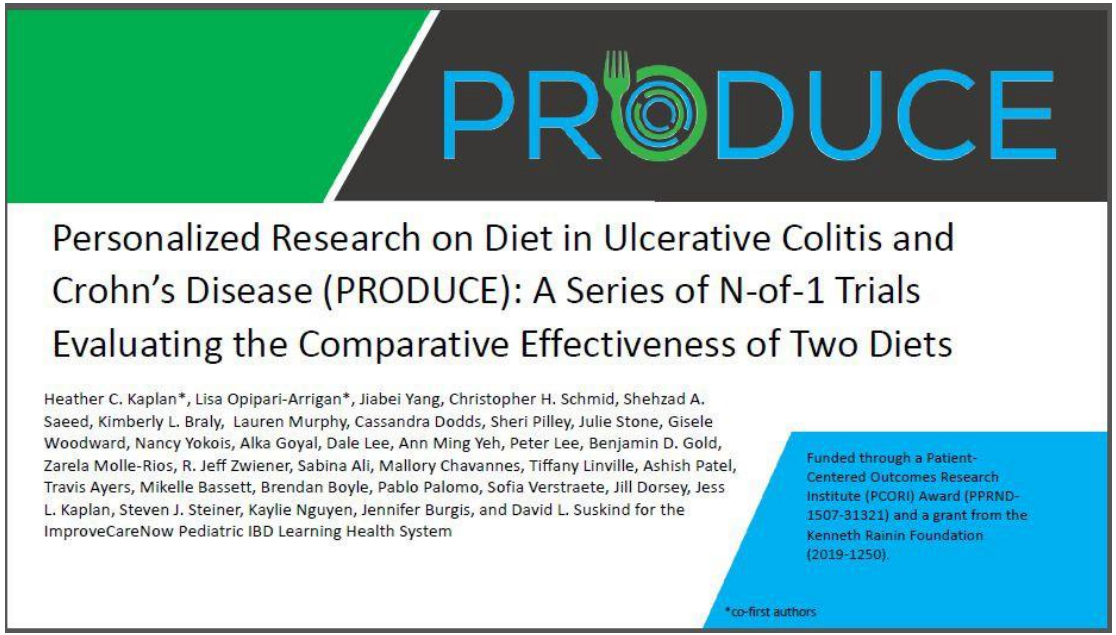
Key words: FODMAP, irritable bowel syndrome, diet, specific carbohydrate diet, bloating

INTRODUCTION

Irritable bowel syndrome (IBS) is a chronic functional gastrointestinal disorder with a pathophysiology only partially understood. It is characterized by abdominal discomfort or pain in combination with altered bowel habit, without any pathological abnormality of the gut wall.[1]

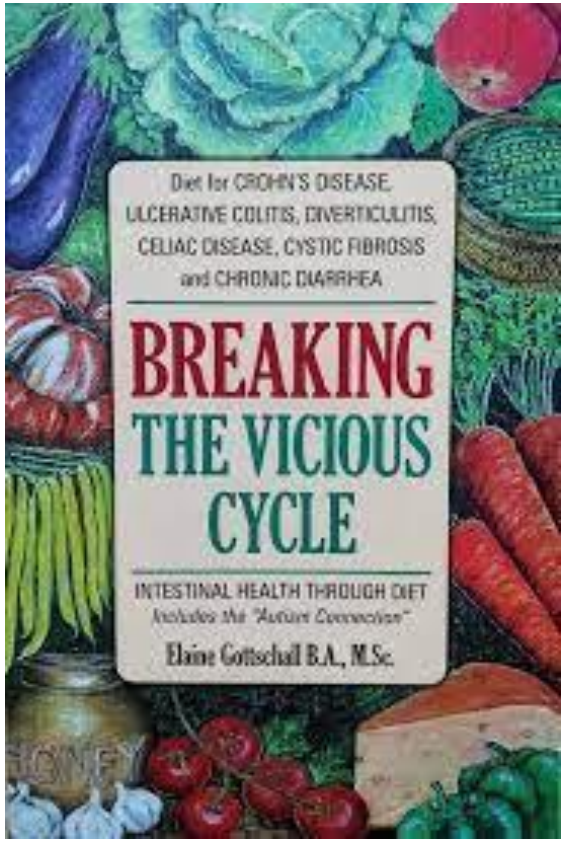
Abdominal pain and bloating are the main symptoms of IBS and they often improve after evacuation. Abdominal pain is associated with altered bowel habit, ranging

Is a modified SCD as effective as a strict SCD?



- Study assessing SCD vs modified SCD (MSCD) vs usual diet
- Population of IBD patients 7-18 yo (total 21 completed study)
- **MSCD includes: rice, oats, sweet potatoes, maple syrup, unsweetened cocoa**
- Results: reduction in fecal calprotectin in SCD and MSCD vs usual diet
- Low probability that SCD>MSCD

SCD: Resources



The Specific Carbohydrate Diet (SCD)

Patient Resources

BOOKS

- *Breaking the Vicious Cycle: Intestinal Health Through Diet* by Elaine Gottschall
- *Cooking for the Specific Carbohydrate Diet: Over 125 Easy, Healthy, and Delicious Recipes that are Sugar-Free, Gluten-Free, and Grain-Free* by Erica Kerwien
- *Eat Well, Feel Well* by Kendall Conrad
- *NIMBAL Therapy: Using Diet to Treat IBD* by Dr. David Suskind
- *Two Steps Forward One Step Back* by Tucker Sweeney and Carol Thompson
- *Lucy's Specific Carbohydrate Diet Cookbook* by Lucy Rosset

WEBSITES & RECIPE BLOGS

- Nutrition in Immune Balance: Using Diet to Treat IBD
- Breaking the Vicious Cycle
- Pecanbread: The Best Best Method for Healing with IBD
- Nutritional Therapy for IBD

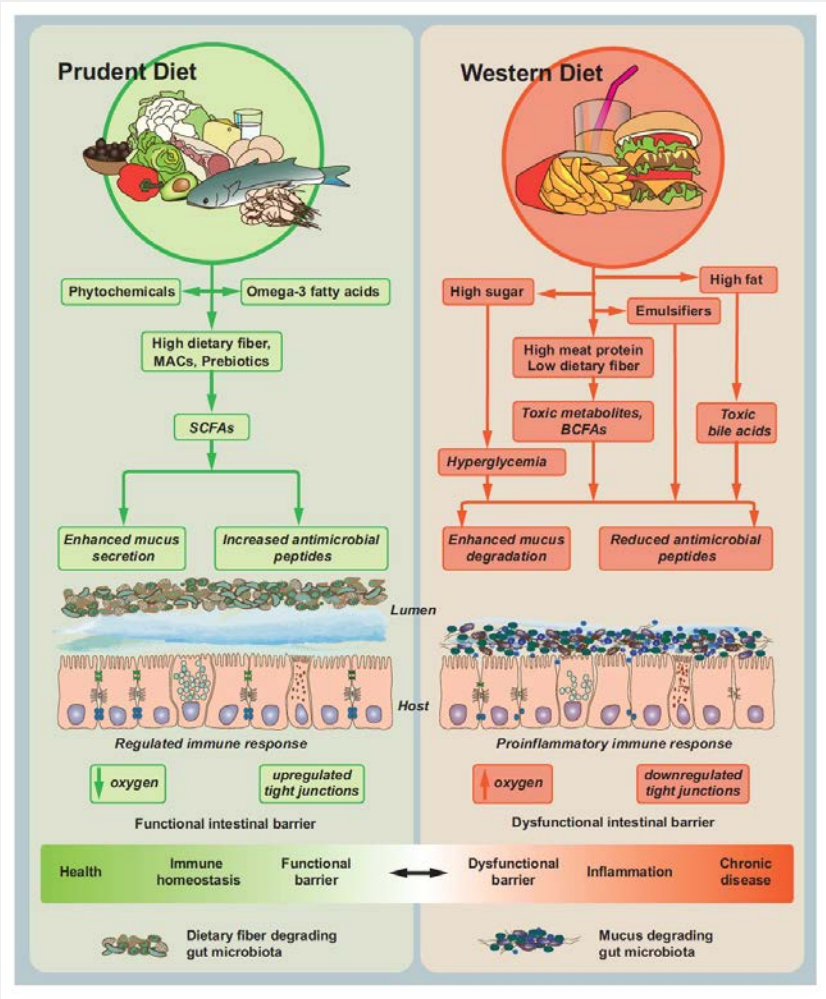
Recipe blogs

- Against All grain
- Comfy Belly
- SCD Recipe

SUPPORT GROUPS

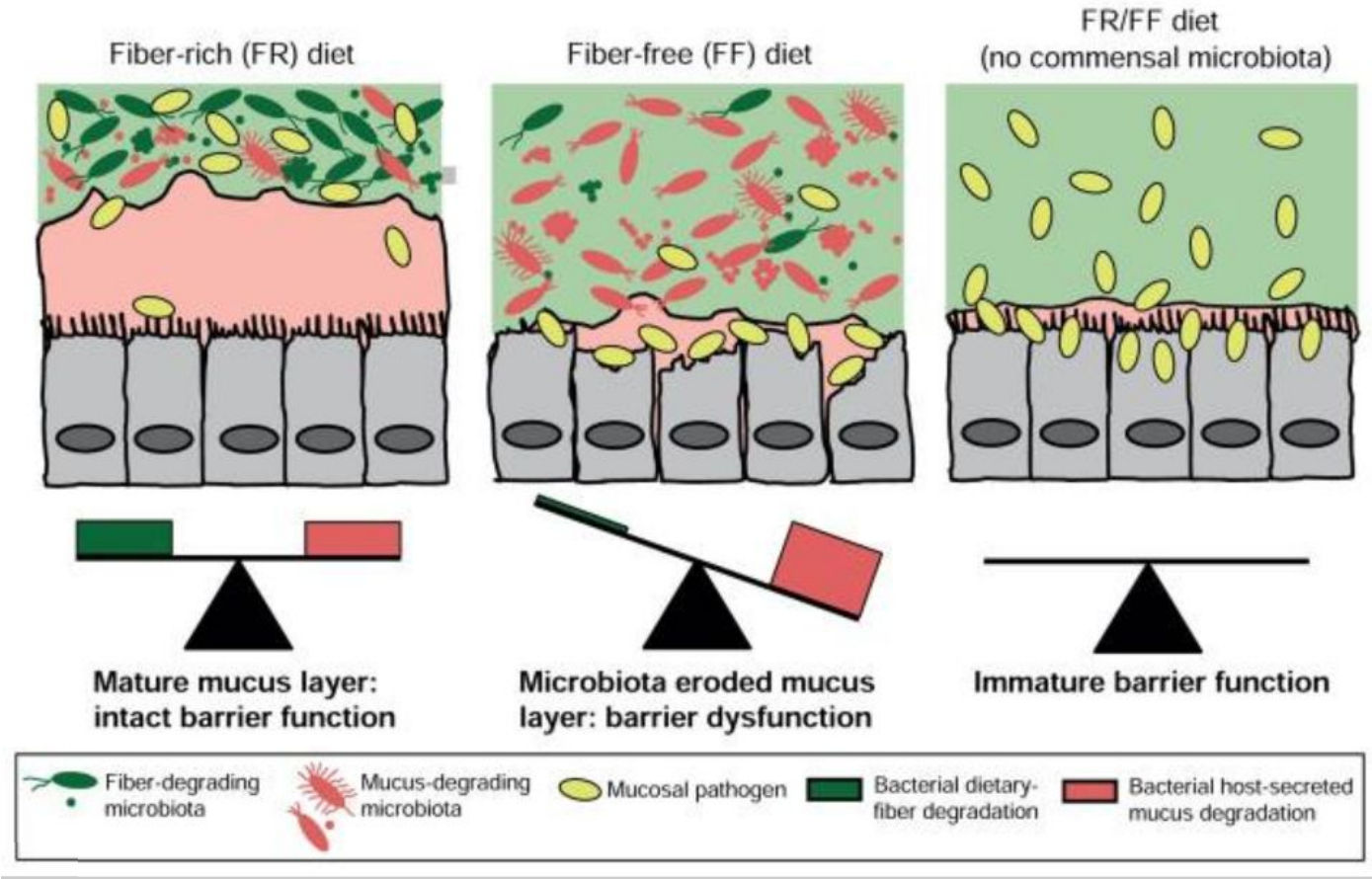
- Breaking the Vicious Cycle. SCD Community on Facebook
- SCD Group on Facebook
- SCD Families on Facebook

Effect of High Fiber Diet on Gut Microbiota Composition, Diversity, and Function in Host Physiology



Makki K. 2018.

What's to Eat if Fiber Not Available?



Desai et al. Cell. 2016.

Specific Dietary Tips to Help Patients Eat more Plants

Follow the 1-2-3 Rule

Eat at least **1 vegetable at breakfast** (e.g. smoothie with baby spinach, scrambled eggs with veggies), **2 others at lunch**, and **3 new ones at dinner**.

Aim for 30+ Per Week

Eat **30+ *unique*** plants per week. Choose from vegetables, fruits, legumes, whole grains, nuts, seeds and fresh herbs. Get the whole family involved!

Specific Food Goals

- **Follow the 1-2-3 rule.** Eat at least one vegetable at breakfast, two at lunch, and three at dinner. Prioritize leafy greens.
- **Avoid artificial sweeteners.** Check labels for aspartame, saccharin, sucralose, acesulfame K, neotame, and advantame.
- **Eat 5 or more high-fiber foods**. Choose from whole grains, beans, nuts/nut butters, seeds/seed butters, and fruit.
- **Keep *added sugar* <25 grams.** Flavored yogurts, cereal, granola bars and condiments are less obvious sources. See nutrition label.
- **Take 1 step towards cooking a meal.** This might include meal planning, grocery shopping, finding a recipe, or prepping a meal.

Specific Lifestyle Goals

- **Move for 30 minutes.** Dance, run, walk, clean, etc. Your choice. Just move. And don't sit for more than 60 minutes at a time.
- **Meditate for 5 minutes.** Take a break to stop, rest and focus on your breath. Need help? Find a free guided meditation online.
- **Get outside for 10 minutes.** Connect with nature, play in the dirt, breathe in some fresh air. At minimum, open a window.

Recommendation: Aim for 30 Unique Plants Per Week

List of plant-based whole foods to help you reach 30 unique plants/week	
FOOD GROUPS	**EXAMPLES**
Allium vegetables	Garlic Leek Onion, white, red, yellow, Ramps Scallion, green onions Shallots
Green vegetables	Arugula / Rocket Beet greens Bok choy Broccoli Broccolini Broccoli rabe Brussel sprouts Cabbage Carrot tops Chard Chicory Collard greens Dandelion greens Endive Escarole Frisee Green lettuce (e.g. Romaine, Boston, Bibb) Kale (e.g. Lacinato, Green, Red) Mache Mustard greens Radicchio Red lettuce Spinach Swiss chard Watercress
Roots / Tubers / Squash	Butternut squash Carrots Cassava / yuka Celery Root Daikon radish Delicata squash Horseradish Kabocha Parsnips Potatoes, all Pumpkin Radishes Rutabagas Spaghetti squash Summer squash (yellow) Sunchokes / Jerusalem Artichokes Sweet potatoes Turnips Zucchini
Other vegetables	Artichoke Asparagus (e.g. green, purple, white) Bamboo shoots Bell peppers Cauliflower Celery Celery root Chile peppers Cucumber Eggplant, all Fennel Fiddleheads Green beans / haricots verts Green peas Hearts of Palm Kohlrabi Mushrooms, all Okra Rhubarb Snow peas Sugar snap peas Tomatoes, all Water chestnuts
Fruit	Acai berries Apple, all Apricot Avocado Banana Blackberries Blueberries Cantaloupe Cherry Coconut, fresh or dried unsweetened Cranberries Dragonfruit Durian Figs Goji berries Gooseberries

Recommendation: Aim for 30 Unique Plants Per Week

	Grapes Grapefruit Guava Honeydew Huckleberries Jackfruit Kiwi Kumquat Lemon Lime Lychee Mango Medjool dates Mulberries Olives, all Orange (mandarin orange, blood orange, tangerine, clementine) Papaya Passionfruit Peach/nectarine Pear Persimmon Pineapple Plantain Plum Pomegranate Raspberries Red currants Starfruit Strawberries Tamarind Watermelon
Whole grains / potato	Amaranth Barley Brown rice, all Buckwheat Corn, whole or air-popped popcorn Farro Kamut Millet Oats, all Quinoa Sorghum Spelt Whole wheat / wheat berry Wild rice

	Black-eyed peas Broad beans Cannellini beans (white beans) Cranberry beans Chickpeas / garbanzo beans Flageolet beans Green beans / haricots verts Green peas Kidney beans Lentils Lima beans Mung beans Pinto beans Romano beans Soybeans (edamame) Tofu Tempeh Wax beans
Nuts, peanuts and seeds (includes unsweetend nut and seed butters)	**Nuts:** Almonds Brazil nuts Cashews Hazelnut Macadamia Peanuts Pecans Pinenuts Pistachios Tiger nuts Walnuts **Seeds** Chia Flax Hemp Poppy Pumpkin Sesame Sunflower

Med-Style Diet (MSD) Supports Gut Health

Guasch-Ferré M, Willett WC. 2021;290(3):549-566. doi:10.1111/joim.13333

Gut-Specific Health Benefits

A MSD is associated with…

- Increase levels of fecal short chain fatty acids and beneficial bacteria (Khavandegar et al 2024)
- Reduced risk of developing Crohn's dz (Godny 2023)
- Improved inflammatory markers and QOL in people with Crohn's and UC (Godny et al 2022, Sigall et al 2023)
- Fewer symptoms in patients with inactive UC (Haskey 2022)
- Improved mental QOL, abdominal bloating, and abdominal pain in people with IBS (Paduano D. 2019)
- Absence of functional GI symptoms in IBS (Zito FP et al. 2016)

Med Diet improves GI & pysch symptoms in IBS

Aim: RCT assessing feasibility of MD (n=24) in IBS + its impact on GI & psych symptoms compared to habitual diet (n=24) x 6 weeks

Findings:

- MD is feasible/acceptable
- 83% of MD group reported improvement in global GI symptoms vs. 37% control, including abd pain, bloating and bowel satisfaction
- 62% reported improvement in depressive symptoms vs. 23% controls

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APT Alimentary Pharmacology & Therapeutics WILEY

Clinical trial: A Mediterranean diet is feasible and improves gastrointestinal and psychological symptoms in irritable bowel syndrome

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Summary

Background: Diet is fundamental to the care of irritable bowel syndrome (IBS). However, some approaches are not appropriate for individuals experiencing psychological symptoms.

Aims: To assess feasibility of a Mediterranean diet in IBS and its impact on gastrointestinal and psychological symptoms.

Methods: We recruited adults with Rome IV IBS and mild or moderate anxiety and/or depressive symptoms to an unblinded 6-week randomised controlled trial. Patients were randomised to Mediterranean diet counselling or habitual diet. We collected gastrointestinal and psychological symptom data, dietary data and stool samples for metagenomic sequencing.

Results: We randomised 59 individuals (29 Mediterranean diet, 30 control); 48 completed the study. The Mediterranean Diet Adherence Screener score was higher in the Mediterranean diet group than controls at week 6 (7.5 [95% CI: 6.9–8.0] vs. 5.7 [5.2–6.3], $p<0.001$), and there was a greater score increase than controls (2.1 [95% CI: 1.3–2.9] vs. 0.5 [95% CI: 0.1–1.0], $p=0.004$), demonstrating Mediterranean diet feasibility. There was a greater proportion of gastrointestinal symptom responders in the Mediterranean diet group than controls (24/29, 83% vs. 11/30, 37%, $p<0.001$) and depression responders (15/29, 52% vs. 6/30 20%, $p=0.015$). There was no difference in FODMAP intake at week 6 ($p=0.51$). Gastrointestinal adverse events were similar ($p=0.588$). There were no differences in change in microbiome parameters between groups.

Conclusions: A Mediterranean diet is feasible in IBS and leads to improvement in gastrointestinal and psychological symptoms. Although this study was unblinded, these findings together with the broader benefits of the Mediterranean diet, provide strong impetus for future research in IBS.

Australia New Zealand Clinical Trials Registry: ACTRN12620001362987.

The Handling Editor for this article was Professor Alexander Ford, and it was accepted for publication after full peer-review.

Daily Recommendations for the MD Intervention Group

Food group	Serve size	Daily recommendation
Wholegrains	½ cup cooked grains or 1 slice bread or 2/3 cup cereal	5-8 serves
Fruit	150g fruit or 1 medium (e.g. apple) 2 small fruit (e.g. kiwifruit)	3 serves
Vegetables	75g vegetables or ½ cup cooked vegetables or 1 cup salad or raw vegetables or ½ medium potato or sweet potato	6 serves
Olive Oil	20ml (3 tbsp)	60 ml/d
Dairy products	1 cup milk or yoghurt 30g cheese 120g soft cheese	2 serves

Weekly Recos for the MD Intervention Group

Food group	Serve size	Weekly recommendation
Legumes	½ cup cooked or tinned legumes	≥6 serves
Eggs	1 egg	≤6 serves
Poultry	100-150g cooked poultry	4 serves
Nuts and seeds	30g nuts or seeds	≥3 serves
Fish	100-150g cooked fish or 4-5 units (e.g. prawns) or 200g shellfish	≥3 serves
Sofrito	A meal with a sofrito base (e.g. pasta sauce)	≥2 serves
Extras	Examples include: 2 sweet biscuits or 1 slice of cake or 25g chocolate or 2 slices processed meat or 1 tbsp butter	<2 serves
Red meat	100-150g cooked red meat	1 serve
Red wine*	100 ml	7-10 serves

*optional for habitual drinkers

First Line Dietary Therapy +/or Alternative Therapy

Dietary Therapy	Non-Dietary Therapy

• Limit / avoid
  ○ Alcohol
  ○ Caffeine
  ○ Spicy foods
  ○ Greasy foods
  ○ Artificial sweeteners
• Encourage
  ○ Hydration
  ○ Mindful eating / chewing food well
  ○ Regular meal times
	• GI Behavioral Therapy: GI CBT, gut-directed hypotherapy
	• Pelvic floor therapy: constipation
	• Exercise
	• Deep breathing exercises
	• Yoga
	• Meds
	• Additional testing

Implementing Elimination Diets: Key Takeaways

Always …

- Consider non-dietary approaches or a modified version of the diet
- Go with least restrictive approach possible
- Consider your candidate (no active ED/disordered eating)
- Provide personalized resources (e.g. meal ideas, product images)
- Be specific with timelines
- Set realistic expectations
- Schedule frequent follow-ups
- Monitor dietary intake and labs to assess for potential micronutrient deficiencies

Maybe…

- Establish culinary medicine program

References

- Alkalay MJ. Nutrition in Patients with Lactose Malabsorption, Celiac Disease, and Related Disorders. Nutrients. 2021;14(1):2. Published 2021 Dec 21. doi:10.3390/nu14010002
- Aljada B, Zohni A, El-Matary W. The Gluten-Free Diet for Celiac Disease and Beyond. Nutrients. 2021;13(11):3993. Published 2021 Nov 9. doi:10.3390/nu13113993
- Bek S, Teo YN, Tan XH, Fan KHR, Siah KTH. Association between irritable bowel syndrome and micronutrients: A systematic review. J Gastroenterol Hepatol. 2022;37(8):1485-1497. doi:10.1111/jgh.15891
- Bischoff SC. 'Gut health': a new objective in medicine?. BMC Med. 2011;9:24. Published 2011 Mar 14. doi:10.1186/1741-7015-9-24
- Gold SL, Manning L, Kohler D, Ungaro R, Sands B, Raman M. Micronutrients and Their Role in Inflammatory Bowel Disease: Function, Assessment, Supplementation, and Impact on Clinical Outcomes Including Muscle Health. Inflamm Bowel Dis. 2023;29(3):487-501. doi:10.1093/ibd/izac223
- Guasch-Ferré M, Willett WC. The Mediterranean diet and health: a comprehensive overview. J Intern Med. 2021;290(3):549-566. doi:10.1111/joim.13333
- Haller E, Scarlata K. Diet Interventions for Irritable Bowel Syndrome: Separating the Wheat from the Chafe. *Gastroenterol Clin North Am*. 2021;50(3):565-579. doi:10.1016/j.gtc.2021.03.005
- Khavandegar A, Heidarzadeh A, Angoorani P, et al. Adherence to the Mediterranean diet can beneficially affect the gut microbiota composition: a systematic review. BMC Med Genomics. 2024;17(1):91. Published 2024 Apr 17. doi:10.1186/s12920-024-01861-3
- Quigley EMM, Murray JA, Pimentel M. AGA Clinical Practice Update on Small Intestinal Bacterial Overgrowth: Expert Review. Gastroenterology. 2020;159(4):1526-1532. doi:10.1053/j.gastro.2020.06.090
- Roth B, Larsson E, Ohlsson B. Poor intake of vitamins and minerals is associated with symptoms among patients with irritable bowel syndrome. J Gastroenterol Hepatol. 2022;37(7):1253-1262. doi:10.1111/jgh.15830
- Zito FP, Polese B, Vozzella L, et al. Good adherence to mediterranean diet can prevent gastrointestinal symptoms: A survey from Southern Italy. World J Gastrointest Pharmacol Ther. 2016;7(4):564-571. doi:10.4292/wjgpt.v7.i4.564

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