



Medical Nutrition Therapy in Lower Gastrointestinal Diseases: Inflammatory Bowel Disease

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فوق دکترا و متخصص تغذیه ورژیم درمانی

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Outline

- ❖ Intestine Structure & function
- ❖ Gut Microbiome & dysbiosis
- ❖ Celiac disease & gluten related disorders
- ❖ Inflammatory bowel disease
 - Ulcerative Colitis
 - Crohn's disease
- ❖ Irritable Bowel Disease
- ❖ Diverticular Diseases
 - Diverticulosis
 - Diverticulitis

Inflammatory bowel disease (IBD)

- Inflammatory bowel disease (IBD):
 - Crohn's disease (CD)
 - Ulcerative Colitis (UC)
- Both produce inflammation of the intestine
- Both tend to cause nutrient malabsorption
- Both can cause life-threatening complications
- Affects ~ 6.8 million people worldwide *(Peppercorn & Chieftetz 2023)*.

Share Clinical Characteristics of IBD

- Diarrhea
- Fever
- Weight loss
- Anemia
- Food intolerances
- Malnutrition (a life-threatening concern in CD)
- Growth failure
- Extra intestinal manifestations (arthritic, dermatologic, and hepatic)

Pathogenesis of IBD

- Development of IBD is influenced by:
 - Genetic predisposition (>200 genes)
 - Dysregulation of the immune system (Several immune pathways)
 - Gut microbiome and dysbiosis
 - Environmental triggers: (diet, antibiotics, infectious organisms, aseptic environments, medications)

IBD & Dysbiosis

- The intestinal mucous layer acts as a barrier preventing bacteria from crossing the epithelium.
- In both CD and UC, increased permeability & high bacterial translocation have been reported.
- Bacteria can cross the epithelium with disrupted barrier function and activate the immune system
- The effect of diet on both composition & function of the gut microbiome leading to the potential use of diet in IBD management. *(Levine et al., 2018)*

Crohn's disease

- ❖ Mostly in the terminal ileum: severe nutritional problems due to malabsorption
- ❖ All intestinal tissue layers may be affected
- ❖ Complications: Fissure, fistula, obstructions, abscesses, fibrosis, submucosal thickening, localized strictures, narrowed segments of bowel

- ❖ Severe diarrhea, steatorrhea (fat malabsorption related to ileal involvement)

- ❖ Abdominal pain and GI symptoms

- ❖ Reduced appetite & fear of eating

Nutritional Treatment Goals

- Phase of disease
- Severity during a flare
- Alleviating symptoms
 - Inflammation
 - Pain
 - Diarrhea
- Nutrition-related problems
- Drug-nutrition interaction

Ulcerative Colitis

- ❖ Sigmoid segment of the colon (with involvement of rectum NOT small intestine)
- ❖ Only mucosa & submucosa are affected
- ❖ Complications:
 - Toxic colitis: The organ begins to dilate (toxic megacolon & perforation)
 - Rectal bleeding
 - Nutrition-related problems (protein loss, electrolyte disturbances, dehydration, anorexia, weight loss)

Diagnosis & disease severity: Colonoscopy

Nutritional Treatment Goals

- Phase of disease
- Severity during a flare
 - Countering the inflammation
 - Alleviating symptoms
- Nutrition-related problems
- Drug-nutrition interaction

Differentiation Between CD and UC

Parameter	UC	CD
Typical age of onset	15-30	Same
Organ involved	Colon only	GIT anywhere
Tissue involved	Surface only	All layers
Distribution	Continuous	Segments
Cancer risk	10 years	probably
Rectal bleeding	Common	Occasional
Steatorrhea	No	Common
Diarrhea	Frequent	Frequent
Vomiting	Yes	Yes
Oral Contraceptives	No effect on risk	Increases risk
Hormone replacement therapy	Increases risk	No effect on risk

Nutrition Problems in IBD

Nutrition	UC	CD
Protein	Yes, Inflammation, Intake, diarrhea	Same
Fat	No	Yes, Malabsorption
B12	No	Yes, Malabsorption & ileal involvement
Vitamins A, D, E, & K	Yes, Medications	Yes, Malabsorption and medication
Fe	Yes, Bleeding	Yes, Bleeding and malabsorption, & ileal involvement
Cu, Zn, Se	Yes, Diarrhea	Yes, Malabsorption and diarrhea

Nutrition Implications of Medications Used in IBD

Drug class	Drugs	Potential Nutrition problems
5-Aminosalicylic acid derivative agents	Mesalamine rectal, Sulfasalazine, Balsalazide	Nausea, vomiting, reflux, diarrhea, folate depletion
Corticosteroids	Prednisone, methylprednisolone, budesonide, hydrocortisone, prednisolone	Fluid retention, increased appetite, increased blood glucose, nausea, weight gain, may need to reduce sodium, increase protein, potassium & calcium
Immunosuppressive agent	Mercaptopurine, methotrexate, tacrolimus	Anorexia, nausea, vomiting, mouth sore
Monoclonal antibodies	Infliximab, adalimumab, certolizumab pegol	Abdominal pain, nausea, vomiting, irritation of mouth or tongue
Alpha 4 integrin inhibitors	Natalizumab, vedolizumab	Diarrhea, stomach pain
Antibiotics	Metronidazole, ciprofloxacin	Anorexia, nausea, vomiting
Antidiarrheal agents	Loperamide, diphenoxylate-atropine	Anorexia, bloating, constipation, stomach pain with nausea and vomiting
Bile acid sequestrants	Cholestyramine, colestipol	Acid reflux, constipation, nausea, vomiting, stomach pain
Anticholinergic agents	Dicyclomine, hyoscyamine, propantheline	Dry mouth, nausea

In acute exacerbation

Depending on the severity:

- Enteral feeding or parenteral feeding
- Progress to low-fat, low-fiber, high protein, high kilocalorie (weight loss), small, frequent meals as tolerated
- Avoid nuts, seeds, legumes, and coarse grains.
- Avoid lactose, wheat, and gluten if needed
- Vitamin/ mineral supplements: vitamin D, B12, folate, iron, zinc, calcium, magnesium
- If taking corticosteroids, limit sodium intake
- If fat malabsorption, consider the use of MCT
- Maintain good hydration

In remission

- Eat a nutrient-dense diet, with **adequate protein (high)** & energy
- Gradually increase dietary fiber to the recommended level; fruits, and vegetables may be protective
- Avoid food high in oxalate
- Avoid lactose, wheat, and gluten if not tolerated
- Increase food high in antioxidants
- Consider supplementation with n-3 fatty acids and glutamine
- Consider the use of probiotics/ prebiotics mixtures

The best diet for IBD

- ❖ Meets individual nutritional needs
- ❖ Manage IBD symptoms
- ❖ Personalized

Exclusive enteral nutrition (EEN)

Meta-analysis: EEN with nutrient-rich formula *(Olendzki BC 2014)*

- Induce remission
- Improve surgical outcomes
- **EEN Prior to surgery:** Improve nutritional status, reduced length of surgery, & lower rate of complications such as infection *(Hirai F, 2020, Abdalla S, 2021, Meade S, 2022, Heerasing N, 2017)*

Parenteral Nutrition

- **Peripheral & total parenteral nutrition (PPN & TPN)**
- An extremely severe flare
- Bowel perforation or fistula
- Your nutrition needs to improve before surgery
- If a patient developed short bowel syndrome after multiple surgeries to remove portions of small intestine

Crohn's Disease Exclusion Diet (CDED)

- ❖ Excludes wheat, dairy, animal fat, additives, processed foods, and red meat.
- ❖ Includes readily available foods such as fruits, vegetables, rice, potatoes, lean meats, and eggs.
- ❖ Supplement of protein, calcium, and vitamin D
- ❖ Combined with a variable amount of a formula as partial enteral nutrition (PEN).
- ❖ CDED + PEN is as effective as EEN standard in achieving remission
(Levine, 2019, Szczubelek, 2021, Yanai, 2022, Matuszczyk 2022, Agrawal, 2021)
- ❖ 70% of patients on CDED demonstrated a significant drop in ESR and CRP *(Levine et al., 2019)*

Specific Carbohydrate Diet™ (SCD)

Limited or totally excludes grains, fiber, sugars (except for honey), all milk products (except for hard cheeses and yogurt fermented 24 hours)

- A very restrictive diet
- Eliminated all refined and processed foods (e.g. processed meats, artificial sweeteners), along with soy, lactose, sucrose, and grains.
- Limited certain vegetables, including potatoes, okra, and corn.
- Recommended B vitamins, calcium, vitamin D, and vitamin E supplement *(Lewis JD, 2021, Suskind DL, 2020, Suskind DL, 2018)*

Dietary recommendations

- Eat small meals or snacks every 3 or 4 hours. Do not skip meals. **(No Fasting diet)**
- When you have symptoms, or if you are taking prednisone or budesonide, eat the foods in the Recommended Foods chart. These **foods are lower in fiber.**
- Eat a **protein food** or dairy product at every meal or snack if your body can tolerate it.
- Drink a lot of **fluids**, at least 8 cups each day.
- Limit caffeinated, sugary drinks and beverages made with sugar substitutes.
- Eat foods that have **probiotics** (yogurt, kefir) and **prebiotics** (bananas).
- If you are taking **methotrexate or sulfasalazine**, take one multivitamin with minerals and a supplement with 1 milligram of folic acid daily.
- Take a chewable calcium supplement with vitamin D if you are not getting enough **calcium** from your diet.

Dietary recommendations

- ❖ Add **whole grains and a variety of fruits and vegetables** in your diet.
 - No symptoms (no blood in your stools)
 - No longer taking prednisone or budesonide,
 - Inflammation is mild

- ❖ Only add **one to two new foods** to the diet each week in small amounts and monitor symptoms.
- ❖ Stop eating the new food if you develop abdominal pain or diarrhea.
- ❖ You can try it again after a few weeks.

Low Fiber

Take when you have diarrhea & abdominal pain.

Food Group	Notes	Foods Recommended
Grains	<ul style="list-style-type: none"> Choose grain foods with less than 2 grams of fiber per serving. The grams of fiber in a serving are listed on the Nutrition Facts label of packaged foods. Any containing milk may contain lactose. 	Bread, bagels, rolls, crackers, cereals, and pasta made from white or refined flour White rice Cream of wheat or rice Grits, refined Cereals made from refined grains without added fiber, and low in sugar
Protein Foods	<ul style="list-style-type: none"> Use broth or water to cook meats at a lower temperature or cover the dish when baked in the oven, so the food cooks in its own juices. Crockpots work well with low heat and slow cooking to make meats tender. Or marinate meats first with an acidic ingredient, such as vinegar and oil, lemon juice, wine, or by using chopped raw pineapple and then pour it off before cooking. Cook protein foods well to reduce bacteria. 	Tender, well-cooked meats, prepared without added fat: poultry, fish, lean beef and pork Deli meats—tender, thinly sliced; heat to steaming Eggs, well-cooked Tofu Smooth nut and seed butters: Peanut, almond, and sunflower seed
Dairy	<ul style="list-style-type: none"> Choose lactose-free products if you have lactose intolerance. Symptoms of lactose intolerance occur after drinking regular milk or eating foods made from milk (milk solids, whey, cream, butter, or products with “may contain milk” on the label). Symptoms include diarrhea, nausea, abdominal pain, and bloating. Choose yogurt with live active cultures (check labels). Foods marked with an asterisk (*) have lactose. 	Buttermilk* Evaporated, fat-free, 1%, and 2% milk* Lactose-free milk Fortified non-dairy milks: almond, cashew, coconut, or rice (be aware that these options are not good sources of protein so you will need to eat an additional protein food) Fortified pea milk and soymilk (may cause gas and bloating) Yogurt*/lactose-free yogurt Low-fat cheese* (aged and hard cheeses such as cheddar, swiss, or parmesan may have less lactose and result in less symptoms; limit to 1 to 2 ounces per serving to decrease lactose intake) Cottage cheese*/lactose-free cottage cheese Low-fat ice cream*/lactose-free ice cream Sherbet

Low Fiber

Food Group	Notes	Foods Recommended
Vegetables	<ul style="list-style-type: none"> See the Foods Not Recommended table for vegetables you should avoid when you have diarrhea or abdominal pain. 	Well-cooked vegetables without seeds or skins, such as green beans or carrots Potatoes (white, red, or yellow) without skin Sweet potatoes contain more fiber; remove skin and do not eat more than half at one meal Strained vegetable juice Summer squash: yellow or zucchini without skins or seeds
Fruit	<ul style="list-style-type: none"> See the Foods Not Recommended table of fruits you should avoid when you have diarrhea or abdominal pain. <ul style="list-style-type: none"> Fruit juices diluted by half with water may be tolerated better. 	Apple, peeled Banana, ripe Melons: cantaloupe, honeydew, watermelon Canned, soft fruits or fruit cups (in juice); avoid pineapple
Oils	<ul style="list-style-type: none"> Limit fats and oils to less than 8 teaspoons per day. Choose oils more often than solid fats 	Vegetable oils: canola, olive, peanut Mayonnaise
Beverages		Water Decaffeinated coffee Caffeine-free tea Rehydration beverages

High Fiber & Fat Food

Food Group	Notes	Foods Not Recommended
Grains	<ul style="list-style-type: none"> Do not eat grains foods with 2 or more grams of fiber per serving. 	Whole wheat or whole grain breads, rolls, crackers, or pasta Brown or wild rice Quinoa Cereals made from whole grains; oatmeal, bran or shredded wheat Any grain foods made with seeds or nuts Popcorn
Protein Foods		Fried eggs and meats, including sausage and bacon Lunch meats, such as bologna or salami Hot dogs Tough or chewy cuts of meat (grilled steak or pork chops) All dried beans and peas; hummus Nuts and coconut Chunky nut butters
Dairy	<ul style="list-style-type: none"> Avoid higher fiber or higher fat foods that may not be tolerated as well. 	Fruited yogurt or yogurt with granola or mix-ins Whole milk Half-and-half, cream, sour cream Ice cream (unless it is low-fat or fat-free)

- Should not be eaten when you have diarrhea and abdominal pain.
- Not have symptoms and your inflammation is low

High Fiber & Fat Food

Food Group	Notes	Foods Not Recommended
Fruit	<ul style="list-style-type: none"><li data-bbox="479 491 1039 686">Canned fruit in heavy syrup and sweetened juices have a lot of sugar, which may make diarrhea worse.	All raw fruits except for ones on Foods Recommended table Berries, canned cherries Dried fruits, including raisins and prunes Prune juice and sweetened fruit juices
Beverages	<ul style="list-style-type: none"><li data-bbox="479 762 963 901">Drinking beverages with sugar or corn syrup may make diarrhea worse.	Drinks with caffeine, such as coffee, tea, cola, some sport drinks Sugar-free drinks with sugar substitutes (aspartame, sucralose, sorbitol) Sugary drinks: sweet tea, drink packets added to water Alcoholic drinks Soda or other beverages made with sugar or corn syrup if they make diarrhea worse.
Other	<ul style="list-style-type: none"><li data-bbox="479 1105 988 1186">Sugar alcohols may cause diarrhea.	Sugar alcohols (erythritol, mannitol, sorbitol, xylitol), which are often found in sugar-free gum and candy, as well as some medications.

Inflammatory Bowel Disease Sample 1-Day Menu

Breakfast	2 scrambled eggs 1 slice white toast 1 teaspoon margarine, soft, tub 1 ripe banana
Morning Snack	1 cup lactose-free nutrition supplement 6 saltine crackers 1 tablespoon smooth peanut butter
Lunch	2 slices white bread 3 ounces tuna 1 tablespoon mayonnaise 10 wedges baked potato without skin
Afternoon Snack	1 cup puffed rice cereal ½ cup lactose-free milk
Evening Meal	3 ounces baked chicken 1 cup white rice ½ cup cooked carrots 1 white dinner roll
Evening Snack	1 cup lactose-free nutrition supplement

Inflammatory Bowel Disease Vegan Sample 1-Day Menu

Breakfast	½ cup grits 1 slice white toast 2 teaspoons margarine, soft, tub ½ small banana
Morning Snack	½ scoop soy protein powder ½ cup almond milk fortified with calcium, vitamin B12, and vitamin D
Lunch	Stir fry made with: 1/3 cup tofu scramble 1 cup rice noodles ½ cup cooked green beans 2 teaspoons olive oil 1 cup soymilk fortified with calcium, vitamin B12, and vitamin D
Afternoon Snack	5 saltine crackers
Evening Meal	Stir fry made with: 2/3 cup white rice ½ cup tofu ½ cup cooked carrots 2 teaspoons peanut oil ¾ cup ripe watermelon
Evening Snack	1 rice cake 6 ounces plain soy yogurt

ADIME At-A-Glance: IBD

Assessment

- UW, decreased appetite and intake
- Abdominal pain, nausea, diarrhea (UC), steatorrhea (Crohn's)
- Diet Hx, avoidance of specific foods
- Lab: H/H, serum proteins, specific nutrients

ADIME At-A-Glance: IBD

Nutrition Diagnosis

- Inadequate oral intake R/T abdominal pain from UC, AEB UW of 7.5% x 3 months, and diet Hx
- Impaired nutrient utilization R/T malabsorption (Crhon's), AEB steatorrhea, 7.5% UW x 3 months

ADIME At-A-Glance: IBD

Intervention

Acute:

- Enteral feedings (glutamine, short-chain fatty acids) or parenteral nutrition, if severe
- Progress to low-fat, low-fiber, high-protein, high-kilocalorie (if weight loss), small, frequent meals
- Avoid nuts, seeds, legumes, Coarse grains, lactose, wheat, and gluten, if not tolerated
- Supplement of Vitamin D and B12, folate, Fe, Zn, Ca, Mg
- Limit Na, if corticosteroids
- Consider the use of MCT if CD

ADIME At-A-Glance: IBD

Monitoring and Evaluation

- Weight
- Diarrhea, Steatorrhea
- PO intake (esp protein)
- Lab values for specific nutrients
- Control of GI symptoms



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