IBD: Diet and Nutrition

LORI WELSTEAD, MS, RD, LDN
UNIVERSITY OF CHICAGO MEDICINE
SECTION OF GASTROENTEROLOGY, HEPATOLOGY AND NUTRITION
This talk has been adapted from original slides created by

KELLY ISSOKSON, MS, RD, CNSC
*CLINICAL DIETITIAN III, CLINICAL NUTRITION*
*IBD DIETITIAN, NUTRITION & INTEGRATIVE IBD PROGRAM*
CEDARS SINAI MEDICAL CENTER
LOS ANGELES, CA

CAROLINE HWANG, MD
*ASSISTANT PROFESSOR OF MEDICINE*
USC KECK MEDICAL CENTER
LOS ANGELES, CA
Critical Role of Nutrition

• Maintaining proper nutrition when you have IBD is very important

• Benefits of Proper Nutrition
  • Medications work more effectively
  • Improve healing, immunity, and energy levels
  • Minimize gastrointestinal symptoms

• However, IBD makes it difficult to eat enough calories and obtain sufficient nutrients… which can put patients with IBD at risk for malnourishment.
  • Why?
  • How?
Normal nutrient absorption

Stomach
- Capacity 2-50 ounces
- Gastric juices
- Mixing

Small Intestine
- ~20 feet (>610 cm)
- Bile and pancreatic enzymes
- Brush border

Colon
- ~5-6 feet
- Fluid and electrolyte absorption
- Salvage nutrient absorption
Sites of nutrient absorption

- **Esophagus**: Water, alcohol, copper, iodine, fluoride, molybdenum
- **Stomach**: Thiamine, riboflavin, niacin, biotin, folate, B₆, Vitamins C, A, D, E, K, calcium, phosphorus, magnesium, iron, zinc, chromium, manganese, molybdenum, lipids, monosaccharides, amino acids, small peptides
- **Duodenum**: Calcium, phosphorus, magnesium, iron, copper, selenium, thiamine, riboflavin, niacin, biotin, folate, Vitamins A, D, E, K
- **Jejunum**: Thiamine, riboflavin, niacin, biotin, folate, B₆, Vitamins C, A, D, E, K, calcium, phosphorus, magnesium, iron, zinc, chromium, manganese, molybdenum, lipids, monosaccharides, amino acids, small peptides
- **Ileum**: Sodium, chloride, potassium, Vitamin K, biotin, short chain fatty acids
- **Colon**: Vitamins C, D, K, B₁₂, folate, magnesium, bile salts, and acid

Courtesy of Beth Wall, RD, CNSC
How Can IBD Affect Digestion?

**Crohn’s Disease**
- **Inflamed small intestine** = does not fully digest food or absorb nutrients.
- Incompletely digested foods travel through intestines (may cause diarrhea).

**Ulcerative Colitis**
- Small intestine works normally.
- **Inflamed large intestine** = does not absorb water, which causes watery stool (diarrhea) and the urgent need to go to the bathroom. Also, causes ulcers and blood loss.
# Common Nutrient Deficiencies in Crohn’s Disease

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Risk for deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin B\textsubscript{12}</td>
<td>Inflammation or removal of the ileum</td>
</tr>
<tr>
<td>Folate</td>
<td>Sulfasalazine and methotrexate use; inflammation or removal of the duodenum</td>
</tr>
<tr>
<td>Vitamin A, D, E, K</td>
<td>Fat malabsorption; small bowel inflammation or resection can lead to malabsorption</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Inflammation or removal of large portions of the jejunum and ileum, fistula losses, chronic diarrhea</td>
</tr>
<tr>
<td>Zinc</td>
<td>Inflammation or removal of distal duodenum or proximal jejunum, diarrhea, fistula losses, prednisone use</td>
</tr>
<tr>
<td>Calcium</td>
<td>Avoidance of dairy foods, fat malabsorption, prednisone use, inflammation throughout the small intestine</td>
</tr>
<tr>
<td>Potassium</td>
<td>Chronic diarrhea, vomiting, and prednisone use</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>Prednisone use</td>
</tr>
</tbody>
</table>
# Common Nutrient Deficiencies in Ulcerative Colitis

<table>
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<tr>
<th>Nutrient</th>
<th>Risk for deficiency</th>
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<tbody>
<tr>
<td>Folate</td>
<td>Sulfasalazine and methotrexate use</td>
</tr>
<tr>
<td>Magnesium/Zinc</td>
<td>Chronic diarrhea</td>
</tr>
<tr>
<td>Iron</td>
<td>Gastrointestinal bleeding</td>
</tr>
<tr>
<td>Potassium/Sodium</td>
<td>Chronic diarrhea, vomiting, and prednisone use</td>
</tr>
<tr>
<td>Vitamin D/Calcium</td>
<td>Prednisone use</td>
</tr>
</tbody>
</table>
Dietary Supplements

• Before taking any vitamin or dietary supplements, discuss it with your doctor and/or dietitian

• Consider taking:
  • Daily multivitamin/mineral supplement
  • Calcium and vitamin D supplement
    • 1000 to 1500 mg daily (higher dose for patients on steroids)
    • 1000 to 2000 IU vitamin D daily

• You may also need:
  • Monthly B$_{12}$ injections or sublingual (if disease of the ileum or surgical resections)
  • Folate (with sulfasalazine or methotrexate use)
  • Zinc (limited course of 220 mg zinc – 2 to 4 weeks)
Challenges with Food Choices

Everyone’s IBD is different… no one single diet or eating plan will work for everyone with IBD.

Dietary recommendations must be tailored to the individual patient.

Certain foods for individual patients may make symptoms worse.
General Recommendations

- See a dietitian with expertise in IBD
- Eat a well-balanced diet (as close as you can)
- Get tested for vitamin/mineral deficiencies
- Drink plenty of fluids
- Keep a food journal
- Slowly introduce new foods
Types of fiber

Insoluble fiber

• “Roughage”: think adding bulk to stool
• Celery, ends of asparagus, apple skins

Soluble fiber

• Absorbs water: think of oats in water
• Slows transit time, gastric emptying
• Banana, oatmeal, applesauce

GRADUALLY increase fiber!
# Food Sources That May Prevent Deficiencies

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Food Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin B&lt;sub&gt;12&lt;/sub&gt;</td>
<td>Meat, fish, eggs, dairy products, and fortified breakfast cereals</td>
</tr>
<tr>
<td>Folate</td>
<td>Fortified cereals, breads and grains, dark leafy greens, avocados</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>Yellow or orange fruits/vegetables, fortified milk, cheese, eggs, liver</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Dark leafy greens, bananas, avocados, peas and beans, soy products, grains</td>
</tr>
<tr>
<td>Zinc</td>
<td>Fortified breakfast cereals, chicken, pork, yogurt</td>
</tr>
<tr>
<td>Calcium</td>
<td>Dairy products and fortified nut milks/soy milk/milk alternatives</td>
</tr>
<tr>
<td>Potassium</td>
<td>Most fruits and vegetables – especially oranges, bananas, tomatoes</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>Fortified milk/soy milk, tuna, salmon</td>
</tr>
</tbody>
</table>
## Recommendations During a Flare

### Avoid Potential Problem Foods
- Foods high in insoluble fiber
- Foods with sugar, artificial sweetener, and sugar alcohols
- Lactose rich foods
- Gassy vegetables and uncooked vegetables/fruit
- High fat/greasy/fried foods
- Caffeine
- Alcoholic and carbonated beverages

- Eat smaller, more frequent meals
- Stick with bland, soft foods (no spicy food)
- May need to eat more protein during this time
- If necessary, add oral nutrition supplement, such as Boost or Ensure
Potential Foods to Include During/After Flare (If Well Tolerated)

- Diluted juices
- Fruit/vegetable smoothies
- Pureed vegetable soups
- Applesauce
- Canned fruit without added sugar
- Banana
- Pumpkin
- Oatmeal, cream of wheat
- Plain chicken, turkey, or fish
- Cooked eggs or egg substitute
- Mashed potatoes, rice, or noodles
- White bread
- Oral nutrition supplements
Drink Plenty of Fluids

• In general:
  • Drink at least 64 ounces of water per day = eight 8-ounce glasses
  • Drink beverages slowly
  • Avoid using a straw
  • Alcohol and caffeinated drinks do not count = they dehydrate the body

• When experiencing diarrhea, you may be at risk of dehydration

Beverages to try:

- Water
- Low-sugar sports drinks
- Fruit juices diluted with water
- During severe diarrhea = rehydration drinks (eg, Pedialyte and diluted Gatorade)
- Oral Rehydration Solutions (ORS) – homemade recipes are available
Helpful Eating Tips

Prepare in Advance

• Select restaurants and menu items that you have enjoyed in the past
• Check menus online before heading out
• Bring snacks with you

While Dining Out

• Ask questions! Do not be afraid to ask about ingredients or make special requests
• Watch for hidden fats (sauces, crispy dishes) and sugars
• Try steamed or broiled seafood or grilled chicken
• Ask for sauces/dressings on the side
• Divide food on your plate in half and eat slowly
• Limit alcohol and caffeinated beverages
Specific Diets – What to Consider

Important Note about Diets

• Most diets have not been scientifically proven to prevent or control IBD
• There is a lot of debate in the medical community regarding the benefits of these diets
• Some diets may be complicated to follow
• Some diets may be risky
• A diet should not replace medical therapy
• **ALWAYS** speak with your doctor or dietitian first before starting a particular diet

• The best diet is one that meets **YOUR** nutritional needs, while helping you better manage your IBD symptoms.

• Work with your doctor or dietitian to create a diet that is right for you.
### Examples of Popular Diets

<table>
<thead>
<tr>
<th>Diet</th>
<th>Concerns/Considerations</th>
</tr>
</thead>
</table>
| **Specific Carbohydrate Diet™**   | • Restrictive – can lead to malnutrition if not followed appropriately  
  • Can eliminate dietary sources of short chain fatty acids, preferred source of colon cells.                                                                                                                   |
| **Low Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols (FODMAP)** | • Requires careful label reading.  
  • Usually short term (4 to 6 weeks)  
  • Talk to a dietician for complete nutritional needs.                                                                                                                                                           |
| **Gluten Free**                   | • Some people with IBD may be sensitive to gluten and have gluten intolerance  
  • Food diary can help determine the effect of gluten containing food products.                                                                                                                                 |
| • Eliminate protein found in grains including wheat, rye, and barley products |                                                                                                                                                                                                                     |
| • Grain free, soy free, sugar free |                                                                                                                                                                                                                     |
# Examples of Popular Diets

<table>
<thead>
<tr>
<th>Diet</th>
<th>Concerns/Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paleo Diet</strong></td>
<td>• Eliminates refined sugar, dairy, legumes, and grains</td>
</tr>
<tr>
<td></td>
<td>• Emphasizes intake of lean, non-domesticated (game) meats and non-cereal plant based foods, such as fruits and nuts</td>
</tr>
<tr>
<td></td>
<td>• Limits nutrient dense foods</td>
</tr>
<tr>
<td></td>
<td>• No formal studies on this diet and IBD</td>
</tr>
<tr>
<td><strong>Mediterranean Diet</strong></td>
<td>• Fiber rich plant-based foods, olive oil, low-fat dairy, herbs and spices</td>
</tr>
<tr>
<td></td>
<td>• Eat poultry, eggs, cheese, and yogurt in moderation</td>
</tr>
<tr>
<td></td>
<td>• Eat red meat only rarely</td>
</tr>
</tbody>
</table>
Vitamin Deficiency and Elimination Diets

• Diets that eliminate dairy or lactose may contribute to vitamin D deficiency. Vitamin D levels should be carefully followed.

• Additional bloodwork to check:
  ✓ Vitamin B$_{12}$
  ✓ Iron stores, ferritin
  ✓ Zinc

• Consider multivitamins

• Before starting any elimination diet, consult with your healthcare team
Diet Research and IBD Symptoms
Diet and IBD Symptoms

- Patients with IBD report that certain diets increased symptoms
- Up to 75% of patients with IBD say they follow a restricted diet due to food intolerances or perceived worsening of symptoms

Foods reported to worsen IBD symptoms

- Spicy food: 164
- Fatty food: 116
- Alcohol: 84
- Raw vegetables/fruits: 77
- Milk/milk products: 64
- Carbonated beverages: 46
- Coffee/tea: 43
- Sugary food: 41

Number of respondents = 238

Diet and IBD Symptoms

- IBD Partners Study: Survey 7000 patients with Crohn's disease or ulcerative colitis
- Patients were more likely to identify foods that worsened rather than symptoms
- Yogurt, rice, and bananas most often reported to improve symptoms

<table>
<thead>
<tr>
<th>Foods most frequently reported to worsen symptoms:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables</td>
<td>Popcorn</td>
</tr>
<tr>
<td>Fruit</td>
<td>Dairy</td>
</tr>
<tr>
<td>Spicy foods</td>
<td>Alcohol</td>
</tr>
<tr>
<td>Fried foods</td>
<td>High-fiber foods</td>
</tr>
<tr>
<td>Milk</td>
<td>Fatty foods</td>
</tr>
<tr>
<td>Red meat</td>
<td>Seeds</td>
</tr>
<tr>
<td>Soda</td>
<td>Coffee</td>
</tr>
</tbody>
</table>

Fiber and IBD Symptoms: Helpful or Harmful?

• Patients with IBD are often advised to reduce the amount of fiber that they eat when they have active disease.

• Growing evidence suggests that fiber may not need to be restricted:
  
  • In 2014: One study reviewed 23 trials (1296 patients)\(^1\)
    • 12 studies in Crohn’s disease showed no effect of dietary fiber
    • 3 out of 10 studies showed fiber supplementation to benefit disease outcomes

  • In 2015: the Foundation conducted a survey of 1619 patients and found that fiber was associated with reduced disease flares in Crohn’s disease but not ulcerative colitis.\(^2\)

• Therefore, recommendations to limit dietary fiber may need to be re-evaluated.
Diet and IBD Symptoms: Low FODMAP Diet

FODMAPS: Fermentable, Oligo-, Di-, Monosaccharides And Polyols.

- Fructo-oligosaccharides (wheat, onions, legumes)
- Lactose (milk, ice cream)
- Fructose (apples, honey)
- Galactans (legumes)
- Sorbitol (stone fruits, artificial sweetener)

- Poorly absorbed carbohydrates increase small intestine water and colonic gas production due to fermentation by intestinal bacteria.
  - Can cause abdominal pain, bloating, increased gas, diarrhea, or constipation.

- In a small study of patients with IBD in remission who followed a low FODMAP diet, there was a reduction in abdominal pain, bloating, and gas.

- Re-challenge with fructans (wheat, onions, garlic) associated with increased symptoms.

Diet and IBD Symptoms: Gluten-free Diet (GFD)

Crohn’s & Colitis Foundation Partners survey, 1647 patients.

• Celiac disease 10 (0.6%), nonceliac gluten sensitivity 81 (4.9%)

• 314 (19.1%) had tried gluten-free diet.
• 135 (8.2%) currently had a gluten-free diet.

• 65.6% who tried gluten-free diet reported improvement in symptoms.
• 38.3% reported fewer or less severe flares of IBD.
• Adherence to gluten-free diet was associated with improvement in fatigue.
Diet as Therapy for IBD
Diet as Therapy for IBD: Nutritional Support Therapy

**Enteral nutritional therapy** is the only diet therapy rigorously tested and proven to reduce inflammation in children with Crohn’s disease.

**Enteral Nutrition (EN):** Tube Feeding OR By Mouth

- Exclusive Enteral Nutrition (EEN) – 100% exclusive formula
- Partial Enteral Nutrition – 30 to 50% of calories from formula, remainder is from solid food or regular diet

**Parenteral Nutrition:** Intravenous (IV) Feeding

- May supplement oral or tube feeding
- May be sole source of nutrients (total parental nutrition) – rare
Partial Enteral Nutrition (PEN) Study in Crohn’s Disease

Randomized Controlled Trial evaluated use of PEN versus regular diet in maintaining remission in Crohn’s disease.

Study was stopped early due to benefit in treatment group.

Relapse rate in PEN was 35% versus 64% in regular diet group.

Nutritional Supplements: Probiotics

Live micro-organisms that may improve the balance of good versus bad bacteria

- *E. Coli* strain Nissle 1917
- *Lactobacillus*
- *Bifidobacterium longum*
- VSL#3

Based on current research:

- Some evidence that VSL#3 may improve active ulcerative colitis and pouchitis.
- No evidence that probiotics improve Crohn’s disease activity.

Diet as Therapy for IBD: Elimination Diets

Several diets have been described including:

- Specific Carbohydrate Diet (SCD)
- Crohn’s Disease Exclusion Diet (CDED)
- Anti-inflammatory Diet (IBD-AID)
- Allergen Elimination Diet
- Semivegetarian Diet
- Low Fermentable Oligosaccharides, Disaccharides, Monosaccharides and Polyols Diet (Low FODMAP Diet)
- Mediterranean Diet

Only the SCD and CDED diets have shown improvement in clinical remission and reduction in markers of inflammation.
Diet as Therapy for IBD: SCD Diet

- Based on idea that malabsorption of complex carbohydrates, lactose, and sucrose causes bacterial overgrowth and intestinal injury.

- Small studies have shown improvement in symptoms and endoscopy findings.

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Include</th>
<th>Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits</td>
<td>All</td>
<td>Canned fruits</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Most</td>
<td>Potatoes, yams, legumes, canned vegetables, seaweed</td>
</tr>
<tr>
<td>Protein</td>
<td>Nuts, fresh meats</td>
<td>Processed meats</td>
</tr>
<tr>
<td>Grains</td>
<td></td>
<td>Cereal grains (such as, wheat, barley, corn, rye, oats, rice), quinoa</td>
</tr>
<tr>
<td>Beverages/Dairy</td>
<td>Wine, lactose-free cheeses, homemade lactose free yogurt</td>
<td>Milk, instant coffee or tea, soda, fruit juices, soy milk, beer, commercial yogurts, unnatural cheeses including feta, mozzarella</td>
</tr>
<tr>
<td>Other</td>
<td>Honey, butter</td>
<td>Chocolate, corn syrup, margarine</td>
</tr>
</tbody>
</table>

Diet as Therapy for IBD: Crohn’s Disease Exclusion Diet (CDED)

- Reduce exposure to foods thought to cause intestinal inflammation, change the microbiome, alter the mucous layer in the gut, or change intestinal permeability.

- Whole food diet: fruits, vegetables, meats, complex and simple carbohydrates.
  - Avoid gluten, gluten free baked goods, dairy, animal fats, processed meats, products containing emulsifiers, canned goods, packaged products with an expiration date.

- Improvement in clinical symptoms and inflammatory markers (ESR, CRP).

- Forty-seven patients treated.
  - Remission in 70% of children and 69% of adults.
  - Reduction of CRP in 21/30 (70%) of patients with symptom remission.
  - With or without partial enteral nutrition.

Semivegetarian Diet in Crohn’s Disease

- Twenty-two adult patients with Crohn’s disease in remission
- Semivegetarian diet (16 patients) versus an omnivorous diet (6 patients)
- Patients on semivegetarian diet were less likely to relapse after 2 years
- Evaluated only based on symptoms (no endoscopy evaluation)

**Semivegetarian Diet**

- **Meat**: Once every 2 weeks
- **Fish**: Once a week
- **Milk, algae, other plant foods**: Daily
- **Egg, yogurt (plain), vegetables, fruits, legumes, potatoes**: Once a week
- **Brown rice, miso soup (fermented bean paste), pickled vegetables, green tea**: Daily

Current Diet Studies by the Crohn’s & Colitis Foundation

DINE-CD Research Study
Specific Carbohydrate Diet (SCD) vs Mediterranean Diet

- Patients with active Crohn’s disease based on symptom and CRP or calprotectin.
- Compare effectiveness of SCD and Mediterranean diet to:
  - Improve symptoms
  - Improve intestinal inflammation
  - Improve fatigue, pain, joint symptoms
- Evaluate sustainability of diet when food is no longer provided through study.

✓ All food provided over a 6-week period.
✓ Daily online survey of Crohn’s disease symptoms.
✓ Patient will follow diet on their own for an additional 6 weeks.
✓ Access to a dietician for support.
Current Diet Studies by the Crohn’s & Colitis Foundation

Food and Resulting Microbial Metabolites (FARMM) Study

• Compare Western diet, vegan diet, and enteral formula diet
• Evaluate how diet influences the intestinal microbiome composition and function

✓ 3-year study
✓ Follow diet for 2 weeks
✓ Researchers will evaluate microbial composition and function in the gut
Importance of GI/Dietitian Team

Work together to identify factors for nutrient loss and recommended replacement

Optimized nutrition can improve healing, particularly after surgery

Make healthy nutritional changes to complement medical therapies
Conclusion

• Diet & nutrition have a role in management of IBD
• Nutrition counseling empowers patients
• Further prospective studies needed