

IBD: Diet and Nutrition



Slide 1. Title slide

Kelly Issokson:

Hello and welcome to the Crohn's and Colitis Foundation's program on **IBD: Diet and Nutrition**. Please note that this program was made possible through an independent medical education grant from Nestle Health Science.

Slide 2. Faculty Disclosures

I'm Kelly Issokson from Cedars-Sinai Medical Center and I'll be talking today for the first part of this program.

Slide 3. Objectives

During this presentation, we will review the importance of maintaining proper nutrition, describe the impact that IBD (inflammatory bowel disease) can have on digestion, as well as the body's ability to maintain proper nutrition, discuss healthy eating recommendations while in a flare and while in remission, and describe the impact that diet has on IBD, looking at the possible role diet has on developing IBD, relieving symptoms and as a therapy for IBD, specifically looking at diet-related research that has taken place and is currently ongoing.

Slide 4. Importance of Nutrition

We will begin the presentation by reviewing the importance of maintaining proper nutrition.

Slide 5. What's the Difference Between Diet and Nutrition?

But first, let's discuss the difference between diet and nutrition. Diet refers to the foods we eat and drink. For example, vegetables, fruits, meat, etcetera. Nutrition refers to how your body uses the nutrients from the foods you eat to maintain proper health and growth.

Slide 6. Critical Role of Nutrition

Good nutrition is one of the ways the body restores itself to health, therefore every effort must be made to avoid becoming malnourished. Restoring and maintaining good nutrition is a key principle in the management of IBD for several reasons. Medications tend to be absorbed more effectively in people with good nutritional status and can promote GI healing. Maintaining good nutrition helps improve overall wellness, promotes healing and immunity, and increases energy levels and may even alleviate some GI (gastrointestinal) symptoms. However, for those living with IBD, it can be difficult to



eat enough calories and to obtain sufficient nutrients from their diets. This can put those living with IBD at risk for malnourishment.

Slide 7. Impact of IBD on Digestion and Nutrition

So, why and how does IBD impact nutrition? People with IBD may have difficulty maintaining healthy nutrition for a variety of reasons.

Slide 8. Gastrointestinal Tract

Let's start with a basic anatomy lesson of the digestive system, also known as the gastrointestinal tract or GI tract for short.

The intestines are where the majority of vitamins, minerals, and water are taken from the foods we eat and absorbed into the body. The intestines are made up of 2 parts, the small intestine and the large intestine. And, each part plays a significant different role.

The small intestine is where the majority of vitamins, minerals, and nutrients are absorbed from the foods we drink and consume. The large intestine is mostly responsible for absorbing water from fluids we drink.

Slide 9. How Can IBD Affect Digestion?

For those living with IBD, the walls of the intestine become red, swollen, and inflamed. This inflammation can prevent the intestines from doing their job. Crohn's disease can occur anywhere along the digestive tract, from the mouth to the anus. However, it usually affects the small intestine, preventing it from properly digesting and absorbing nutrients. This puts people with Crohn's disease, involving the small intestine, at risk of developing vitamin and mineral deficiencies. Because food is not completely digested in the small intestine, it can travel through the large intestine and interfere with proper water absorption, causing diarrhea. Ulcerative colitis only affects the large intestine, preventing it from properly absorbing water. Water that does not get absorbed by the body stays in the large intestine, resulting in watery stool, also known as diarrhea. Inflammation also causes ulcers and blood loss. Since ulcerative colitis does not impact the small intestine, most vitamins and minerals are absorbed properly. However, those with ulcerative colitis may experience other issues or complications, such as anemia and weight loss, which we will cover in the next slide.

Slide 10. Patients with IBD at Risk of Malnutrition

During times of disease flares, diarrhea, urgency to have a bowel movement, abdominal pain, nausea, vomiting, blood in the stool, constipation, loss of appetite, fatigue, and weight loss can have a negative impact on nutrition. Severe diarrhea can cause dehydration, robbing the body of fluids, nutrients, and electrolytes. The need to have numerous bowel movements in a day may cause a person with IBD to shy away from eating too much to avoid symptoms, which can cause weight loss. People with IBD may have a reduced appetite as a result of nausea, abdominal pain or altered taste sensation, making it difficult for them to consume enough calories and obtain sufficient nutrients.

Inflammation in the small intestine of a person with Crohn's disease can interfere with the absorption of nutrients, also called malabsorption. When parts of the small intestine are removed during surgery, it can also impact the absorption of nutrients. Since ulcerative colitis is limited to the large intestine, that is, it does not affect the small intestine where most nutrients are absorbed, ulcerative colitis patients may have less significant nutrient deficiencies. However, weight loss and anemia



can be prominent due to severe diarrhea and blood loss. Patients with ostomies may experience nutrient losses and must be cautious about dehydration, if daily output exceeds 1 liter every day. It is important to get self-care education with an ostomy nurse and dietitian.

Slide 11. Common Nutrient Deficiencies in Crohn's Disease

Common nutrient deficiencies in those living with Crohn's disease include Vitamin B12. Those with inflammation or removal of the ileum are at increased risk for deficiency of Vitamin B12. Folate, if you're on sulfasalazine or methotrexate, or if there is inflammation or removal of the duodenum, you can have increased risk for deficiency of folate. Fat soluble vitamins, such as Vitamin A, D, E, and K can be lost if there is small bowel inflammation or resection. Magnesium can be low in those with inflammation or removal of large portions of the jejunum and ileum, if there are fistula losses or chronic diarrhea. Inflammation or removal of the distal duodenum or proximal jejunum can result in zinc deficiency. In those avoiding dairy products or in those with fat malabsorption, on prednisone, or those with inflammation throughout the small intestine, calcium can be malabsorbed. Potassium can be lost with chronic diarrhea, vomiting, and prednisone use. And, Vitamin D is commonly low in those with chronic prednisone use.

Slide 12. Common Nutrient Deficiencies in Ulcerative Colitis

Common nutrient deficiencies in those diagnosed with ulcerative colitis include folate, especially in those on sulfasalazine or methotrexate, magnesium, or zinc in those with chronic diarrhea, iron can be low in those with gastrointestinal bleeding, potassium and sodium can be low in those with chronic diarrhea, vomiting and on chronic prednisone, and Vitamin D and calcium can be low with chronic prednisone use.

Slide 13. Food Sources That May Prevent Deficiencies

Food sources that may help prevent deficiencies include meat, fish, eggs, dairy products, and fortified breakfast cereals. These can be rich in Vitamin B12. Fortified cereals, breads, grains, dark leafy greens, and avocados can be a rich source of folate. Vitamin A is commonly found in yellow or orange fruits and vegetables, fortified dairy products, eggs, and liver. Magnesium can be found in dark leafy greens, bananas, avocados, peas, beans, soy products, and grains. Zinc is commonly found in fortified breakfast cereals, chicken, pork, and yogurt. Calcium can be found in dairy products and fortified nut milks, soy milk, or milk alternatives. Potassium is commonly found in most fruits and vegetables, especially oranges, bananas, and tomatoes. And, Vitamin D is commonly found in fortified milks or soy milk, tuna, and salmon.

Slide 14. Dietary Supplements

It is very important that before taking any vitamin or dietary supplements, that you first discuss it with your doctor or dietitian. Those with IBD may consider taking a daily multivitamin/mineral supplement or a calcium and Vitamin D supplement. You may also need B12 injections, folate if you're on certain medications, or zinc.

Slide 15. Diet and Healthy Eating

Since malnutrition and vitamin deficiencies can be problematic, let's talk about making good food choices, healthy eating when in a flare and when in remission, and highlight certain diets that some patients have found to be helpful.

Slide 16. Challenges with Food Choices

Deciding what to eat and recommending what to eat are challenging for those with IBD. Since everyone's IBD is different, there is no one single diet or eating plan that will work for everyone with Crohn's disease or ulcerative colitis. Dietary recommendations must be tailored for you, depending on what part of your intestine is affected, what symptoms you have, the status of your disease, whether you're in remission or having a flare, as well as the presence of any nutrient, vitamin, or mineral deficiencies.

The diet that is recommended should also take your overall health into consideration. IBD varies from person-to-person and even changes over time. What worked for your friend may not work for you and what worked for you last year may not work for you now.

Slide 17. General Recommendations

We will first start off with some general recommendations and get into more specifics in the next several slides.

It's very important to see a dietitian with expertise in IBD. Eat a well-balanced diet or as close as you possibly can with limitations of your diagnosis. Get tested for vitamin and mineral deficiencies, drink plenty of fluids, especially when experiencing diarrhea, keep a food journal, and slowly reintroduce new foods.

Slide 18. Recommendations During a Flare

For many people with IBD who are experiencing a flare, it is very difficult to know what to eat. This slide reviews some recommendations that seem to work well for most of those experiencing a disease flare.

Avoid certain foods which can trigger your IBD symptoms. Again, this may be very different for everyone. Foods high in insoluble fiber are potential problem foods.

A note about fiber. There are 2 types of fiber, soluble and insoluble fiber. Soluble fiber helps absorb water in the gut, while insoluble fiber does not, is more difficult to digest because it pulls water into the gut and makes food move more quickly through the gut. It's harder, more coarse, and some people find that it may aggravate their symptoms. It's found in the skins of fruits and vegetables and in seeds. Most foods contain a combination of both fibers, so it's important to cook, peel, and remove seeds to reduce the intake of insoluble fiber.

Other recommendations include eating smaller, more frequent meals throughout the day, sticking with blander, softer foods, and increasing protein intake during this time, or adding an oral nutrition supplement, if needed.

Slide 19. Sugar

Let's highlight one of these problem foods, sugar. Consuming too much sugar can cause an imbalance of gut bacteria and can contribute to digestive upset. Added sugar includes sugars and syrups added to foods during processing, preparation, or at the table. Examples include ice cream, brownies, cookies, soft drinks, fruit drinks, candies, jams, and syrups. Too much added sugar can worsen GI symptoms during both active and inactive IBD, and can further dehydrate the body. Try alternatives to hydrate yourself like fruit-infused water or plain fruits.

Slide 20. Potential Foods to Include During/After Flare (If Well Tolerated)

Potential foods to include during and after a flare, but only if well tolerated, include diluted juices, fruit and vegetable smoothies, pureed vegetable soup, applesauce, canned fruit without added sugar, banana, pumpkin, oatmeal or cream of wheat, plain chicken, turkey or fish, cooked eggs or egg substitute, mashed potatoes, rice or noodles, white bread, and, when needed, oral nutrition supplements.

Slide 21. Drink Plenty of Fluids

It is very important for those with IBD to drink plenty of fluids, especially when experiencing diarrhea, as you may be at risk for dehydration. Some beverages to try include; water, low sugar sports drinks, fruit juices diluted with water, or during severe diarrhea you can try rehydration drinks, such as Pedialyte or diluted Gatorade.

Slide 22. Recommendations for Healthy Diet

Over the next few slides, we'll discuss some diet guidelines to follow when you're feeling well. A well-balanced diet with an adequate intake of protein, carbohydrates, and fat, as well as vitamins and minerals, is necessary for proper nutrition. This can be achieved by eating a variety of foods from all the food groups. Some general recommendations to maintain a healthy diet include, eating enough calories to maintain a healthy weight or adding extra calories if you need to gain weight.

For protein, divide your weight in pounds in half. Aim for that amount of protein in grams per day. For example, if you weigh 100 pounds, aim to eat 50 grams of protein per day. Note that your protein needs will increase with active inflammation, steroid use or surgery, so always check with your provider first. And, for fluids and electrolytes, divide your weight in pounds by half. Aim for this amount of fluid every day. And, know that you will need increased fluids with diarrhea or after exercise.

Slide 23. Whole Grains

Grains include wheat, rice, oats, corn meal, barley, and others. These grains are used to make products, such as bread, pasta, oatmeal, and breakfast cereal. Grains are important sources of fiber, vitamins, minerals, and energy. Potato bread, French bread, and sourdough bread are all good choices.

Slide 24. Fruits & Vegetables

A diet rich in fruits and vegetables is associated with many positive health outcomes, including a reduced risk for heart disease, diabetes, and obesity. Fruits and vegetables are important sources of many nutrients essential to a healthy diet, including potassium, magnesium, folate, Vitamin A, and Vitamin C. However, tolerance for fruits and veggies varies among people with IBD. Try to avoid fruits with added sugar and vegetables that are gas-producing, especially if you're symptomatic.

Slide 25. Calcium

Some people with IBD experience calcium deficiency. Calcium is important for bone health, reducing the risk for osteoporosis, and it's important for proper muscle functioning. Foods that contain calcium are usually high in other vitamins and nutrients, including Vitamin D, phosphorus, potassium, and protein. It's recommended that you have 3 servings of calcium per day. One serving is equivalent



to 1 cup of milk or yogurt. Besides milk and yogurt, other foods that are high in calcium include dark leafy greens, sardines with bones, hard cheeses, yogurt and kefir, and the alternative milk options, such as, soy milk, almond milk, and rice milk.

Slide 26. Protein

Meat, seafood, beans, eggs, nuts, and seeds are excellent sources of protein. They also provide B vitamins, such as niacin, thiamine, riboflavin, and B6. Other sources of protein include, soy-based products, legumes, and grains. Try to eat a variety of protein sources to ensure that you consume all of the required amino acids for health. People with IBD may need to eat increased amounts of protein when experiencing inflammation or when recovering from surgery.

Slide 27. Unsaturated Fats

In general, it's best to choose lean or low-fat cuts of meat and poultry. This is especially important during disease flares. This is because excess fat can lead to poor absorption and may worsen symptoms. Before cooking meat, trim away any visible fat. Eat fish, especially oily fish, that contains omega-3 fatty acids, like tuna or salmon, and try some smooth nut butters.

Our body does need a small amount of fat to provide essential fatty acids and help digest fat soluble vitamins, such as vitamins A, D, E, and K. It's recommended to switch to eating more foods with unsaturated fats rather than foods with saturated fats, which can sometimes cause a negative effect on IBD symptoms. Healthy fats, higher in omega-3 fatty acids, have anti-inflammatory properties, rather than omega-6 fatty acids, which are pro-inflammatory.

Slide 28. Helpful Eating Tips

A lot of social activities involve eating, so here are some helpful hints and recommendations.

Knowing that you have to go out to dinner or to a social event involving food can be a source of worry for some people with IBD. There's no IBD safe menu, but there are techniques and strategies to use to make dining out a positive experience. Some tips to keep in mind include being prepared. Don't go out feeling too hungry. You may not make the best food choices as you'll be driven by hunger and the desire to feel full. Call the restaurant ahead of time if you have specific questions or review the menu, if you can, online. This way you can identify potential food problems and avoid feeling hurried by the server when reviewing your options. When you're eating out, don't be afraid to make special requests. Many restaurants will alter how a dish is prepared. Eating smaller portions can help you to feel better after a meal. Perhaps an appetizer or a half size portion. When in doubt, keep it simple. Go for boiled, grilled, broiled, steamed, or poached options. And, try to limit sauces and spices.

Slide 29. Holidays & Celebrations

The holidays can be especially difficult for those with IBD. Some helpful recommendations for eating during the holidays include, knowing your limits, sticking to normal eating habits as much as possible, and avoiding overeating. Eating smaller, more frequent meals, bringing a dish that you know is safe for you to eat, and inform your family and friends of any possible dietary restrictions you may have.

Slide 30. Specific Diets – What to Consider

Many people with IBD have reported benefitting from a particular diet, however, there are some things you should consider before adopting a specific diet. Most diets have not been scientifically proven to prevent or control IBD. There's a lot of debate in the medical community regarding the benefits of these diets. Many options exist, but few are well controlled, published studies. Diet can be complicated and difficult to follow. Some diets may be risky to your health and increase the risk of malnourishment because they involve avoiding certain food groups that provide valuable nutrients or can be restrictive, which may lead to poor growth, poor healing, and nutritional deficiencies.

A diet should not replace medical treatment and always speak with your doctor or dietitian before starting any particular diet. The best diet is the one that meets your individual needs while helping you feel better and manage your IBD symptoms.

Slide 31. Examples of Popular Diets

Some examples of popular diets include the following: a specific carbohydrate diet, the low FODMAP diet, and the gluten-free diet.

The specific carbohydrate diet is a grain-free, soy-free, sugar-free diet. But, this diet can be restrictive and can lead to malnutrition if not followed appropriately.

The low FODMAP diet is a low-carbohydrate diet and it limits certain sugars. FODMAP stands for fermentable oligo, disaccharides, monosaccharides, and polyols. It requires careful label reading and its usually short term. It can be hard to follow, so it's important to talk to a dietitian if starting a low FODMAP diet.

Gluten-free, which eliminates the protein found in grains including wheat, rye, and barley. Some people with IBD may be sensitive to gluten and have gluten intolerance. A food diary can help determine the effect of gluten-containing products.

Slide 32. Examples of Popular Diets

Additional popular diets include the Paleo diet and the Mediterranean diet. The Paleo diet has no formal study at this time, but is often popular among patients. It can limit nutrient-dense foods. And, a Mediterranean diet is a fiber-rich, plant-based diet, rich in olive oil, low-fat dairy, herbs, and spices.

Slide 33. 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 blood work to check when on elimination diets can include Vitamin B12, iron stores or ferritin, and zinc. When following restrictive diets, consider taking a multivitamin. And, before starting any elimination diet, be sure and consult with your healthcare team.

Now that we have reviewed healthy eating principles and recommendations, let's discuss the impact that diet can have on a person's Crohn's disease or ulcerative colitis through past, current and ongoing research studies.

Slide 34: Impact of Diet on IBD

Dr. Caroline Hwang:

Thank you, Kelly, for that great presentation.

Now that Kelly has reviewed healthy eating principles and recommendations, let's move on to discuss the impact that diet can have on the development and course of IBD by reviewing past, current and ongoing research studies.

My name is Caroline Hwang and I'm a gastroenterologist specializing in inflammatory bowel disease at the University of Southern California in Los Angeles.

Slide 35: Faculty Disclosure

These are my disclosures. I do have research funding with Nestle Health Science.

Slide 36: Diet & IBD Research Studies

To date there has been limited research on the impact that diet has on IBD (inflammatory bowel disease). Most studies that have been conducted have been small, meaning they only looked at a small number of patients, and this does limit the types of conclusions we can take away from these studies. That's because there are many variables that can be involved when you're looking at the effect of diet in IBD. For instance, whether or not you have Crohn's or ulcerative colitis, the location of your bowel inflammation, whether it's in the small bowel or large bowel, and your disease activity, mild, moderate, or severe. All of these factors may influence how you may respond to certain diets.

Furthermore, it's important that a diet is doing more than helping with gastrointestinal symptoms and that they are targeting an underlying cause of the disease, such as the intestinal immune system, or by modifying the microbiome.

Slide 37: Microbiome

So, just to spend a few minutes discussing the microbiome because this is a very important area of research currently within inflammatory bowel disease.

The microbiome refers to the trillions of microorganisms that live in the human gut and play a critical role in maintaining health. Imbalances or so-called dysbiosis of the microbiome may also be connected to certain autoimmune and inflammatory conditions, such as IBD. One of the major functions of the microbiome is to help us break down and absorb nutrients from the food that we eat. In turn, it appears that diet can make a direct impact on the composition of the microbiome. For instance, in recent microbiome research it has been shown that vegetarians, for instance, have a dramatically different bacterial flora compared to individuals who eat a large amount of animal protein and fat.

Now, the significance of these differences are not yet totally understood in regards to human health. However, by studying the link between diet and the microbiome, we are hoping to identify the critical changes that may lead to the development of diseases, such as IBD, as well as potential new ways to treat these diseases.

Slide 38: Microbiome Differences: Healthy Individual vs IBD Patient

There have been several studies showing major differences in the composition of the microbiome in patients with IBD compared to so-called healthy individuals. This graphic on the left shows the



proportions of the 6 major species of bacteria that are present in the gut of healthy individuals, with the top of the panel showing the proportions in the small intestine, and then moving downward in the panel it shows the transition into the large intestine, and at the bottom the bacteria found in stool.

On the right-hand side of the panel, you can see that the pattern is quite different in IBD patients. For instance, there is much higher amounts of proteobacteria, illustrated in yellow, and less of the bacteroidetes, colored in purple, in IBD patients compared to healthy individuals.

By studying differences like this in the microbiome more carefully, the goal is that researchers may be able to find ways or treatments, including potentially diets, that can make the microbiome of IBD patients look more like that of healthy individuals to hopefully decrease bowel inflammation and control the disease. However, we are still in the early stages of this type of research and as of yet, we have not yet identified the specific bacterial classes we want to target in IBD by diet or other means.

Slide 39: Diet and Risk of Developing IBD

So, what do we know about diet and the risk of developing IBD? There have been several studies looking at this question. These studies fall into 2 major types. The first type are those in which patients were asked to recall the type of diet they were eating before their diagnosis. The second type of study are those in which large groups of healthy people are followed over time and things like diet were recorded regularly. Some of the group developed IBD and others did not. From these studies, the general trends that were seen regarding diet and IBD were that there seem to be an increased risk of ulcerative colitis that was associated with a higher intake of sugar and soft drinks, a lower intake of vegetables, a higher intake of animal protein and processed beef, as well as high intake of omega-6 polyunsaturated fatty acids, which are found in fats, such as red meat, certain cooking oils including corn and sunflower, as well as margarine.

A lower risk of Crohn's disease has been associated with an increased intake of fiber, such as fruits and vegetables.

In addition, food additives is another interesting area, mainly from animal studies. It appears that additives, particularly emulsifiers, which are found in many processed foods to make them stay cohesive and have a longer shelf life, it appears that these may increase risk of IBD, so further research in humans is warranted.

Slide 40: Diet and Risk of Ulcerative Colitis (UC) Relapses

Several studies have also associated intake of higher animal protein with a risk of ulcerative colitis relapses or flares. In at least one study of over 190 ulcerative colitis patients, those in remission were followed for 1 year. Fifty-two percent of the study participants had a disease relapse or flare over that year. The study showed that eating meat, particularly red meat, such as beef, and processed meat, such as bacon, ham, or sausages, increased the likelihood of disease relapse.

Slide 41: Diet Research and IBD Symptoms

So, let's move on and discuss what the research tells us about how diet could be used to control IBD symptoms.

Slide 42: Diet and IBD Symptoms

As we have discussed, IBD patients often say there are certain foods that cause an increase in their IBD symptoms. This slide shows the results of a study of over 200 IBD patients in the United Kingdom. As part of the study, patients were given a survey and asked about their current diet.

Seventy-five percent of patients reported following a restricted diet due to food intolerances or perceived worsening of symptoms.

As you can see here, the major categories of food associated with a worsening of IBD symptoms included spicy food, fatty food, alcohol, raw fruits and vegetables, dairy products, carbonated beverages, coffee and tea, and sugary food.

Slide 43: Diet and IBD Symptoms

The Crohn's and Colitis Foundation conducted a larger study, called IBD Partners, which some of you listening today may have been involved with. This involved an internet survey and included over 7000 IBD patients. Patients were asked in the survey about diet and their IBD symptoms. First off, patients were much more likely to name foods that worsened rather than improved their symptoms. Yogurt, rice, and bananas were most often reported to help improve symptoms. The foods that were most frequently reported to worsen symptoms were very similar to those reported in the UK study. As you can see here, fruits and vegetables, spicy foods, fried foods, dairy products, red meat, and soda were all named as the most frequently reported to worsen symptoms.

Slide 44: Fiber and IBD Symptoms: Helpful or Harmful?

A controversial issue in IBD is how fiber affects symptoms. Is it helpful or harmful? For a very long time it's been recommended that IBD patients in an active flare should follow a diet low in fiber in order to decrease symptoms of diarrhea and bloating and also prevent obstruction. However, there's growing evidence that fiber may not need to be restricted in all IBD patients.

In 2014, the results of 23 different trials over the last 10+ years were put together so that a greater body of evidence could be looked at. And, what was found was that in greater than 50% of the studies, in 12 of the studies, Crohn's disease patients reported dietary fiber had no effect on their symptoms. Furthermore, in 3 of 10 studies, fiber supplementation actually seemed to benefit disease outcomes, including number and severity of flares. Taken together, the evidence suggests that the classic advice that dietary fiber needs to be limited in all IBD patients has been challenged and this may need to be re-evaluated on an individual patient-by-patient basis.

Slide 45: Diet and IBD Symptoms: Low FODMAP Diet

Another diet that may help symptoms of diarrhea and bloating is the low FODMAP diet. FODMAP stands for fermentable, oligo-, di-, monosaccharides and polyols. These are short chain carbohydrates and include fructo-oligosaccharides, such as wheat, onions and legumes, lactose, fructose found in apples and honey and other fruits, galactans, such as legumes, and sorbitol. The FODMAP carbohydrates are poorly absorbed in the small intestine and thus may be broken down and fermented by your microbiome, producing excess fluid and gas. Hence, high FODMAP foods may cause symptoms of abdominal pain, bloating, increased gas, and diarrhea.

The low FODMAP diet is actually one that has been primarily studied in irritable bowel syndrome or IBS, which is different than IBD. However, there have been 2 small studies that suggested that some IBD patients may have improved symptoms on the diet. It is important to note, however, that both



of these studies looked at IBD patients with inactive disease, so the impact of the low FODMAP diet for patients with flares is not known. However, in these studies, the IBD patients in remission who followed a low FODMAP diet did report a reduction in their symptoms of abdominal pain, bloating, and gas. In one of the studies, patients who were rechallenged with fructans, which are found in wheat, onions, and garlic, reported that there was also an increase in symptoms with rechallenge.

Slide 46: Diet and IBD: Gluten-free Diet (GFD)

Another common diet that is promoted for IBD is a gluten-free diet. So, is there any evidence for this in IBD? Well, in the Crohn's and Colitis Foundation Partners study, again of over 1600 patients, about 19% reported having tried a gluten-free diet and 8% were currently on a gluten-free diet. Sixty-five percent of these patients felt that a gluten-free diet did result in improvement in their symptoms, while 38% reported fewer or less severe flares. In addition, some patients reported that a gluten-free diet seemed to improve their fatigue.

Slide 47: Diet as Therapy for IBD

So, now let's move on to the topic of using diet as therapy or treatment to treat bowel inflammation and not just symptoms.

Slide 48: Diet as Therapy for IBD: Nutritional Support Therapy

Enteral nutrition is the only dietary therapy that has been really rigorously tested and shown to be effective in IBD. Enteral therapy is the use of liquid nutritional formulas, sometimes taken by mouth, but more often taken through a tube through the nose or stomach. These formulas are often high calorie and contain all necessary macro and micro nutrients. Examples of formulas include Boost, Ensure, Vital, or Peptamen.

Exclusive enteral nutrition means you are getting 100% of your calories from the formula for a defined period of time, typically 4 to 12 weeks, as this is obviously a very difficult thing to follow long term.

Partial enteral therapy is when only 30 to 50% of calories are obtained from the formula, while the remainder of calories are obtained from solid food or regular diet.

There have been multiple studies that showed that exclusive enteral nutrition is effective in decreasing inflammation in Crohn's disease in pediatric patients. It should be said that the studies are mixed or inconclusive in adults with Crohn's disease and in patients with ulcerative colitis.

The other type of nutritional support therapy is parenteral nutrition or feeding through intravenous catheters or IVs. Parenteral nutrition has not been shown to benefit inflammatory bowel disease and is primarily used as supplement when patients are unable to obtain their calories from food or from enteral therapy. Generally parenteral therapy is used in the short-term situation of severe IBD flares, fistulas, or before or after surgery.

Slide 49: Partial Enteral Nutrition (PEN) Study in Crohn's Disease

Partial enteral therapy has been less rigorously studied than exclusive enteral therapy for Crohn's disease. However, in at least 1 study, partial enteral therapy over a 2-year period resulted in fewer flares, about 35% compared to 64% of patients in the regular diet group. It is important to note, however, that this study did not include any laboratory testing or colonoscopies to confirm flares,

which is often thought to be necessary to really prove that treatment worked in IBD. Therefore, at this time, partial enteral therapy still needs further research before it can be recommended in adult patients with IBD.

Slide 50: Nutritional Supplements: Probiotics

Moving on to probiotics. Probiotics are live microorganisms that may improve the balance of good versus bad bacteria. The probiotics that have been studied in IBD, primarily in animal studies, include the E. coli strain Nissle 1917, lactobacillus, bifidobacterium longum, and VSL #3. The probiotic that has been best studied in IBD is VSL #3. Several studies have shown that VSL #3 is moderately effective in treating and preventing relapses of a condition called pouchitis, which afflicts patients who have had surgery for ulcerative colitis and have inflammation of their surgical pouch. In addition, there have been several small studies that suggest that VSL #3 may also help treat mildly active ulcerative colitis and may actually prevent relapses. To date, there have been no convincing studies to show that VSL #3 or any probiotic have a significant impact on Crohn's disease, although some patients may feel that probiotics can help with their symptoms.

Slide 51: Diet as Therapy for IBD: Elimination Diets

There have been several elimination diets that have been proposed as potentially helpful in IBD. These include the Specific Carbohydrate Diet, the Crohn's Disease Exclusion Diet, the Anti-Inflammatory Diet, the Allergen Elimination Diet, the Semivegetarian Diet, the Low FODMAP Diet, and the Mediterranean Diet. Of these diets, only the Specific Carbohydrate Diet and the Crohn's Disease Exclusion Diet have been studied and met criteria that they both improve patient symptoms, as well as reduce markers of inflammation, such as laboratory testing or colonoscopy.

Slide 52: Diet as Therapy for IBD: SCD Diet

The Specific Carbohydrate Diet is a diet that is based on the premise that malabsorption of complex carbohydrates, lactose and sucrose, causes bacterial overgrowth and intestinal injury. In this table, you can see that the Specific Carbohydrate Diet eliminates many types of vegetables, including potatoes and legumes, most grains, and dairy.

Small studies, again primarily in pediatric IBD patients, have shown that the Specific Carbohydrate Diet can result in improvement in symptoms, as well as in colonoscopy findings.

Slide 53: Diet as Therapy for IBD: Crohn's Disease Exclusion Diet (CDED)

The Crohn's Disease Exclusion Diet is another diet that has been studied in IBD. On this diet, patients are to eat only whole foods and avoid gluten, gluten-free baked goods, dairy, animal fats, processed meats, and products containing emulsifiers, as well as canned goods and packaged products. The theory is that these foods can cause intestinal inflammation, change the microbiome, alter the mucus layer in the gut, and change intestinal permeability.

There was 1 recent study in which 47 patients were put on the Crohn's Disease Exclusion Diet. Some of these patients were also put on partial enteral therapy with 50% of their calories from liquid formula. Of the patients who were on the Crohn's Disease Exclusion Diet, as well as partial enteral therapy, clinical remission was achieved in 70% of children and 69% of adults. In addition to improvement in symptoms, a reduction in an inflammatory blood test called C-reactive protein or CRP, results were seen in 70% of the patients who had symptom relief.

Slide 54: Semivegetarian Diet in Crohn's Disease

There was a recent study out of Japan which asked, can a Semivegetarian Diet prevent relapse of Crohn's disease? The authors defined a Semivegetarian Diet as meat once every 2 weeks and fish once a week, but primarily an over-lacto vegetarian diet. What was found was that after 2 years, the patients on this Semivegetarian Diet were less likely to relapse. However, this was a very small study with only 22 patients and again no laboratory values or colonoscopies were performed for the study.

Slide 55: DINE-CD Research Study

So, moving on to ongoing research studies centered on diet in IBD. The Crohn's and Colitis Foundation is currently conducting a study called DINE-CD. This study is examining the role of the Specific Carbohydrate Diet versus the Mediterranean Diet. The study will compare the effectiveness of these diets on IBD symptoms and also in reducing intestinal inflammation on laboratory values and colonoscopies.

Slide 56: Food and Resulting Microbial Metabolites (FARMM) Study

The FARMM Study is a 3-year study comparing the effects of different diets on the gut bacterial and bacterial products. In the FARMM Study, healthy volunteers will follow a defined Western diet, a vegan diet, or a formula diet for 2 weeks. The researchers will look at how the 3 diets affect the microbiome. The findings will be an important first step toward understanding how a formula diet works to induce remission in patients with Crohn's disease. The hope is that these discoveries will help provide a launch pad for developing new interventions aimed at manipulating microbial targets with a goal of treating or even preventing IBD without suppressing the immune system.

Slide 57: Importance of GI/Dietitian Team

So, switching gears from research and how we can apply all of these findings to the care today of IBD patients. Overall, the evidence is still murky enough that nutritional advice still needs to be individualized and tailored to your disease subtype, your symptoms, and your nutritional status. Taking all these factors into consideration requires collaboration with your doctor and a dietitian.

Slide 58: IBD Management: Overall Picture

However, optimized nutrition can likely improve symptoms, promote healing, especially after surgery, and may make medicines work better.

Diet and nutrition do not seem to be able to replace conventional medicine and surgical therapies for IBD yet. Complementary approaches can help with symptom relief, but please talk to your doctor before taking any alternative therapies.

Slide 59: Closing Slide

Thank you very much for your time and if you have any questions, please refer to the Crohn's and Colitis Foundation website.

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