# Food Sensitivity Testing and Elimination Diets in the Management of Irritable Bowel Syndrome

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Financial Disclosures: None reported.

Support: None reported.

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Submitted June 4, 2019; revision received July 22, 2019; accepted August 15, 2019.

The nonpharmacologic management of irritable bowel syndrome focuses on dietary modification through the concept of food sensitivity or intolerance. Currently, testing for food allergies is not recommended in the absence of a clinical history consistent with an immunoglobulin E–mediated reaction. Objective means of determining food sensitivity, such as individualized diets, are being studied, but testing for food sensitivity is limited to certain food groups. Diets such as the low-FODMAPs (fermentable oligosaccharides, disaccharides, monosaccharides, and polyols) diet may provide benefit.

*J Am Osteopath Assoc*. 2020;120(1):19-23
doi:10.7556/jaoa.2020.008

**Keywords:** diet, FODMAP, IBS, irritable bowel syndrome, lifestyle medicine

Irritable bowel syndrome (IBS) is a common condition that affects approximately 10% of the population[1,2] and is a frequent indication for office visits in the primary care and gastroenterology setting. Patients with a range of gastrointestinal symptoms, including abdominal discomfort, bloating, constipation, or diarrhea, may be prescribed medications that focus on symptom management[3] and then may seek nonpharmacologic alternatives if their symptoms are inadequately controlled. Many nonpharmacologic methods focus on food elimination diets that may be empirically instituted by patients or clinicians. Patients and clinicians can opt for food sensitivity testing to guide dietary choices. To develop an evidence-based understanding of the utility of testing for food sensitivity (a term often used interchangeably with food *intolerance*) in patients with IBS, we carried out an up-to-date literature search with the assistance of a medical librarian (L.A.M.), searching OVID MEDLINE, PubMed, and Cochrane Databases using the following keywords: food allergies, food hypersensitivities, food sensitivity, and irritable bowel syndrome. Findings were limited to clinical trials, randomized controlled trials, meta-analyses, and systematic reviews in the English language. On the basis of our findings, this review (1) differentiates between food allergies and food sensitivities; (2) discusses the current role of food sensitivity testing in managing IBS; and (3) provides recommendations regarding food sensitivity testing and dietary changes in patients with IBS.

## Key Points

- Food allergies and food sensitivities are a spectrum of adverse reactions to food and can be differentiated by the presence of an immunoglobulin (Ig) E response, timing of onset, duration of symptoms, and concomitant symptoms.
- Food sensitivities may contribute to symptoms in a subgroup of patients with IBS.
- Currently, there is no criterion standard test to identify patients with food sensitivity.

- Diets that exclude gas-producing and foods high in FODMAPs (fermentable oligosaccharides, disaccharides, monosaccharides, and polyols) may be more effective, and cost-efficient than food sensitivity testing and diets based on empirical elimination of patients' perceived intolerances (eg, dairy free, fructose free, gluten free).

Irritable bowel syndrome is a chronic, functional bowel syndrome, and diagnosis is currently made based on the Rome IV criteria.[4] According to the diagnostic criteria, IBS is defined as recurrent abdominal pain (1) related to defecation, (2) associated with a change in frequency, or (3) associated with a change in the appearance of stool. Two of the 3 criteria must be met to diagnose IBS. This diagnosis is made in the absence of other organic or structural gastrointestinal disease. Current theories on the pathophysiology of IBS emphasize the brain-gut feedback pathway, genetic predisposition, postinfectious and inflammatory responses, changes to the gut microbiome, psychosocial factors, and food sensitivity.[5,6] Available modalities may address 1 or more of these factors, for example, antidepressant medications for pain management and probiotics to influence gut microbiota and symptom management.[7] Because of the varying degrees of efficacy and side effect profiles of these medications, many patients and physicians desire nonpharmacologic management of their symptoms. Often, nonpharmacologic methods focus on food sensitivity testing or empiric food elimination diets based on reported intolerances by patients.

## Food Allergy, Sensitivity, and Intolerance

Food allergies and sensitivities likely reflect a spectrum of reactions to food. A food allergy is an immune-mediated reaction that can be characterized as either IgE-mediated or non-IgE-mediated.[8] Food allergies mediated by IgE (type 1 hypersensitivity reactions) cause symptoms within minutes of exposure, ranging in severity from rash to anaphylaxis. They are often diagnosed in childhood. Testing for IgE-mediated food allergies is performed using specific IgE antibodies or by the skin prick test, but clinical history is key in making this diagnosis. Classic examples of IgE-mediated food allergies in adults and children are those to shellfish, tree nuts, peanuts, eggs, or fish. These IgE-mediated allergies most commonly lead to consistently reproducible presentations involving the gastrointestinal tract, skin, or respiratory system.

In contrast, food sensitivities, also referred to as food *intolerances* or *hypersensitivity*, are considered a group of non–immune-mediated responses to food. It is thought that as many as 25% of adults with a diagnosis of IBS may have food hypersensitivity.[9] Although there are tests to evaluate for specific disorders, such as lactose and fructose intolerance or sensitivity to gluten, there are no tests to diagnose patient-reported intolerances to other foods, such as coffee, spices, and carbohydrates. Despite high self-reported incidences of specific food intolerances, studies[10,11] show that actual rates are much lower. This finding likely reflects both overreporting by the general population and inadequacies of current tests. Compared with immune-mediated food allergies, sensitivities may have similar symptoms but with a delay in onset, longer duration of symptoms, and lack of positive IgE antibodies on testing.[8] Furthermore, the symptoms of food sensitivity often overlap with other systemic complaints, such as headache, fatigue, and musculoskeletal complaints, making this diagnosis challenging.

## Dietary Management of IBS

### Food Elimination Diets

Research suggests that the human microbiome is affected by environmental factors, including stress, lifestyle, and diet.[12] The pathogenesis of IBS has been linked with dysbiosis, or diminished microbial diversity caused by the changes from commensal to pathogenic bacteria in the human gut.[13] The role of gut microbiota is supported by the knowledge that the composition and activities of *Lactobacilli* and *Bifidobacteria* are greatly

compromised in patients with IBS, and probiotics have shown favorable effects through lessoning visceral sensitivity, intestinal permeability, and inflammation in these patients.[14,15]

Diet plays a central role in IBS by modulating the normal gut microenvironment, altering colonic fermentation, and transforming gut microbiome composition.[16] Food can affect many aspects of intestinal physiology, including motility, visceral sensation, permeability, microbiome, immune regulation, and neuroendocrine function, which are all relevant to the pathogenesis of IBS.[17] It follows that a diet that has fewer "trigger" foods or that corrects the microbiota dysbiosis would be potentially beneficial to manage IBS symptoms.[18]

Based on the hypothesis that IBS symptoms arise from local inflammation in the gastrointestinal tract, multiple studies have focused on food elimination diets to ameliorate symptoms. In the literature, the concept of food elimination diets varies, and these findings are usually empirical, patient focused, or target food groups such as gluten and fermentable carbohydrates. Empirical elimination diets may restrict classic IBS trigger foods (eg, dairy, wheat, eggs) and slowly reintroduce them into the diet or restrict a diet to 3 food items and introduce new foods slowly every 3 days, which can be a lengthy and distressing process for most patients.[18]

Elevated food-specific IgG antibodies have been found in patients with IBS, presumed secondary to a delayed immune reaction or increased gut permeability, but they do not correlate with disease severity.[19] In 2005, Atkinson et al[3] evaluated patients with IBS in a randomized controlled trial for which elimination diets were created based on IgG antibodies to food. In their study, patients with high adherence to the elimination diet noted a significant decrease in IBS symptom severity scores. A similar study[20] showed an improvement in migraine headaches and IBS symptoms, specifically pain and bloating, when maintaining an elimination diet based on food-specific IgG antibodies. However, the validity of these studies is limited by poor patient compliance, small sample sizes, and high loss to follow-up and dropout rates, likely related to the difficulty in adhering to a strict diet. Similarly, elimination diets that focus on allergy testing may not account for other mechanisms by which food could contribute to IBS symptoms, and shorter study durations may not allow for delayed normalization of gut flora and architecture.[18]

Despite isolated studies suggesting that IgG elimination diets can improve symptoms in patients with IBS, the evidence supporting the use of these diets for IBS management is poor and, thus, the American Academy of Allergy and Immunology and the European Academy of Allergy and Clinical Immunology do not support the use of testing for food-specific serum antibody levels.[21, 22] In the absence of a clinical history that supports an IgE-mediated response, positive food-specific antibodies indicate an exposure to a food rather than a clinically significant food allergy or sensitivity.[22]

## Low-FODMAPs Diet

Given the lack of reliability of IgG elimination diets, focus has been placed on the exclusion of foods containing high amounts of FODMAPs, which are short-chain carbohydrates that are fermented by gut bacteria into methane and hydrogen gasses but are poorly absorbed.[23,24] High FODMAPs diets result in bloating, abdominal pain, and other IBS symptoms in about 70% of patients with IBS.[25] In addition, the osmotic effects of FODMAPs increase intraluminal fluid, which may cause abdominal distension and stimulate abnormal intestinal motility.[26]

With a low-FODMAPs diet, under the direction of a dietician, patients undergo a strict exclusion of high-FODMAPs foods for 6 to 8 weeks before slowly reintroducing foods containing specific FODMAPs to develop an individualized diet plan. Patients consuming low-FODMAPs diets report decreased gastrointestinal symptoms, including bloating and pain, compared with normal diets.[27] The quality of evidence supporting the use of FODMAPs elimination diets in patients with IBS is high.[28] Although FODMAPs diets take several

weeks to personalize, empirical elimination diets may be more cumbersome in terms of commitment and lack good data, although additional studies comparing these diets are needed.[29]

## Ongoing Research

Elimination diets can be time consuming, difficult to adhere to, and often require specialized dietician supervision; thus, ongoing research is continuing to focus on alternative methods of identifying potential food sensitivities in patients with IBS. Fecal assays targeting tryptase, eosinophil cationic protein, and calprotectin have been studied as a means of identifying patients with IBS and food sensitivity. At this time, these tests do not differentiate among food triggers and have low sensitivity and specificity in diagnosing true food sensitivity. One study[9] examined the intestinal mucosal changes to specific food antigens using confocal laser endomicroscopy. Evaluating real-time microscopic changes to the gut mucosa, investigators studied 4 food antigens and created specific food elimination diets for each participant, with dietician supervision and food diaries to evaluate adherence. Study participants who adhered to these diets had greater than 50% reduction in symptom scores. Invasive tests such as direct imaging using confocal endomicroscopy to show food-associated changes in the intestinal mucosa are experimental and are not currently used to diagnose food sensitivities, but they may have important implications in guiding future directions.

Nonceliac gluten sensitivity is a condition in which intestinal and extraintestinal symptoms occur with the ingestion of gluten-containing foods and in which symptoms resolve with exclusion of gluten from the diet in the absence of a wheat allergy or celiac disease.[30] Patients with IBS often identify gluten as a dietary trigger, and given that gluten-containing foods also have high FODMAPs, following a gluten-free diet may be an accessible option for managing symptoms in a subgroup of patients.[31] Identifying patients who would benefit from a gluten-free diet is an area that is currently under investigation, specifically to differentiate between the possibility of early celiac disease or to determine whether symptoms occur secondary to another component in wheat.[30]

## Conclusion

Food sensitivity may play a role in the symptoms of a subgroup of patients with IBS. These patients, who recognize specific foods as the cause of gastrointestinal and systemic symptoms, may seek diagnostic testing to identify and confirm food intolerances. Current evidence to support diagnostic testing for food-specific IgE and IgG antibodies is weak; thus, testing for food sensitivities using these methods is not recommended. The low-FODMAPs diet may provide the best symptomatic management approach for a subgroup of patients with IBS but can be time consuming and should be done under the supervision of a knowledgeable physician or dietician. Future areas of investigation should include a focus on noninvasive, reliable, and low-cost means of identifying which subgroup of patients with IBS would benefit from following diets with low-FODMAPs, or elimination of other foods. The modification of IBS symptoms with personalized diets promotes the notion that the body's tendency is for self-regulation. We must remember the fourth tenet of osteopathic medicine and choose a rational treatment that is based on an understanding of body unity, self-regulation, and the interrelationship of structure and function.[32]

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