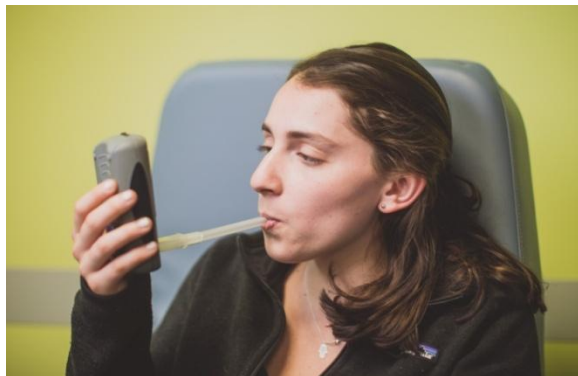


HOW IS FRUCTAN INTOLERANCE DIAGNOSED?

A fructan hydrogen breath test with simultaneous symptom assessment is often used in clinical practice to definitively confirm or rule out fructan intolerance. The hydrogen breath test is simple to perform, noninvasive, and is the closest the field has to a gold standard for assessing fructan intolerance (Rezaie; Am Jour of Gastro, 2016). It has largely replaced expensive and/or invasive tests such as jejunal biopsy for assessment of fructan enzyme activity or genetic testing. The breath test is developed based on the fact that undigested and unabsorbed fructan is fermented by the bacteria in the colon, producing hydrogen gas which can be measured in exhaled air.

HOW DO I PREPARE FOR HYDROGEN BREATH TESTING?

- **4 weeks prior:** no antibiotics
- **1 week prior:** avoid laxatives, stool softeners, stool bulking agents; no bowel cleansing procedures (ex: colonoscopy)
- **24 hours prior:** eat only plain white rice or potatoes, baked/broiled fish or chicken, water and non-flavored coffee/tea. Only salt may be used for flavoring. Consuming anything outside of this could yield false results.
- **12 hours prior:** no further eating/drinking, other than a small amount of water with medication
- **The morning of:** no eating/drinking besides water with medications, and brush teeth at least 2 hours prior to your appointment. No chewing gum, smoking, or eating mints prior as well.
- **During:** only small amounts of water can be consumed



drjohnleung@bfac.org

John Leung, MD is the founding physician and CEO of Boston Food Allergy Center, director of Center for Food Related Diseases at Tufts Medical Center and director of the Pediatric Food Allergy Center at Floating Hospital for Children. He is the first US-trained physician dual board-certified in both Allergy/ Immunology and Gastroenterology.

Dr. Leung is the site principal investigator for multiple NIH-funded and pharmaceutical sponsored studies. He is an attending physician in both the Department of Medicine and Department of Pediatrics at Tufts Medical Center, a clinical assistant professor at Friedman School of Nutrition Science and Policy at Tufts University, an adjunct faculty Tufts University Immunology graduate program, and an affiliated faculty of Tufts Institute for Innovation. He is also an investigator for NIH-funded Consortium of Eosinophilic Gastrointestinal Disease Researchers (CEGIR), funded by the National Institutes of Health.

HELPFUL RESOURCES:



MONASH UNIVERSITY LOW FODMAP DIET APP

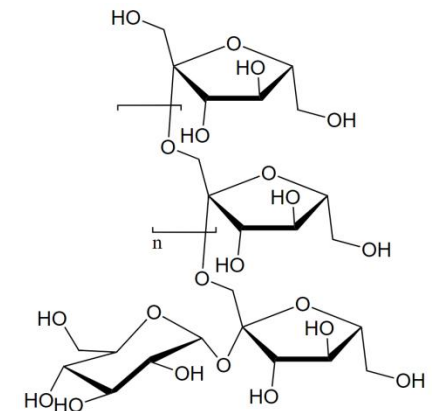


For more information, please see our website at

<http://www.bfac.org/hydrogen>



Fructan Intolerance



Boston Food Allergy Center

65 Harrison Ave, Suite 201, Boston, MA 02111

Email: admin@bfac.org

Phone: (617) 804-6767; Fax: (877) 726-8492

Schedule an appt: www.bfac.org

FRUCTAN INTOLERANCE

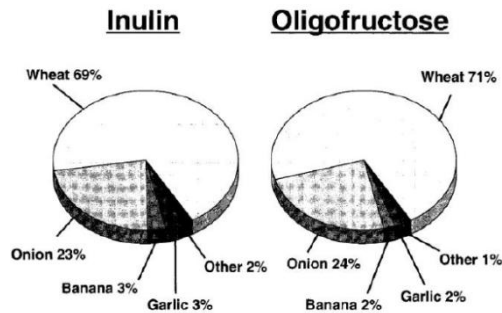
WHAT ARE FRUCTANS?

Fructans are naturally occurring carbohydrates in the form of linear or branched fructose polymers. These fructose polymers come in shorter chain lengths (2-9 units), which are called oligofructose, or longer chain lengths (> 10 units), which are called inulins.

WHAT TYPES OF FOODS ARE FRUCTANS FOUND IN?

Foods that are high in fructans may include wheat products—such as bread and pasta—onions, shallots, garlic, barley, cabbage, broccoli, pistachio, artichoke, chicory root, and asparagus. Each food containing fructan will have a different amount depending on the serving.

Wheat and onions comprise about 95% of fructans in the American diet, but there are many others as well.



Contribution of food sources of fructan in American diets. Data obtained from United States Department of Agriculture

WHAT CAUSES FRUCTAN INTOLERANCE?

The body is not perfect at breaking down all parts of food, and not all humans have enough of the essential enzyme necessary to break apart the linkages that connect the fructose polymers chain. As a result, these long chains of fructose polymers are only partially broken down and absorbed in the small bowel. The remaining fructans continue on to the large bowel, where they are fermented by naturally occurring bacteria flora. As they ferment, the fructans may also pull in large amounts of water into the colon, which can cause bloating and diarrhea.

During your visit, we will do a thorough evaluation to rule out secondary causes of fructan intolerance before proceeding with fructan intolerance testing.

WHY CHOOSE BFAC?

As a gastroenterologist and allergist, Dr. Leung diagnoses patients with food intolerance (or IBS) only after carefully evaluating and ruling out all the other potentially “dangerous” GI and/or allergy causes of the presenting symptoms. Our team has successfully treated many IBS patients with dietary treatment. We are well equipped with state-of-the-art diagnostic tools and have a licensed dietitian on staff to provide in-person or virtual counseling.

WHICH FOODS CONTAIN FRUCTANS?

Plants use fructans to store carbohydrates, so most sources of fructans are plant based. Foods with >0.2g of fructans per serving have the potential to induce fructan intolerance symptoms (Gibson et al., 2010). Foods containing fructan that most commonly cause symptoms of intolerance include wheat, onions, and garlic. The following table is a more comprehensive list of foods that contain more versus less fructans per serving, separated by food group.

EXAMPLES OF FRUCTAN CONTENT OF FOODS BY CATEGORY:

Category	Low Fructan	High Fructan
FRUITS	Blueberries, cantaloupe, kiwi, raspberries, oranges, grapes	Grapefruit, nectarines, ripe bananas, watermelon, plum, pomegranate
VEGETABLES	Bell peppers, cauliflower, celery, carrots, cucumber, spinach, green onion tops	Artichokes, brussel sprouts, cabbage, fennel, garlic, peas, shallots, beetroot, garlic, leek, onion
BREADS/GRAINS	Oats, rice, buckwheat, quinoa, arrowroot	Barley, rye, wheat, spelt, pumpernickel bread, kamut
NUTS/SEEDS	Walnuts, peanuts, chia seeds	Almonds, cashews, pistachios
LEGUMES	Chickpeas (canned), beans (canned)	Chickpea (dried), lentils (dried), beans (dried), soybeans
OTHER	Regular tea, regular coffee	Instant coffee, chamomile tea, fiber-enriched foods or foods containing inulin

Some sweeteners can also contain fructans. These include sorbitol, mannitol, xylitol, malitol, and others ending in ‘-ol.’

As a rule of thumb, it is advised to stick to the lower fructan foods on a day to day basis, and include in the higher fructan foods on a less frequent basis.

HOW IS FRUCTAN INTOLERANCE MANAGED?

Reduce intake of fructan-containing products. There are varying degrees of tolerance to fructan, most symptoms are exacerbated when large amounts of these items are consumed. It is important to pay attention to your symptoms and figure out your own tolerable limit. One way to do this is by food logging or journaling to keep track of what you eat and the resulting symptoms. Another way to reduce fructan is by using garlic or onion oils instead of the raw foods. Steeping the ingredients in oil will leach out the flavor, but the fructan content won’t transfer, so you won’t inherit the negative symptoms associated with the fructan intolerance.

HOW DOES FRUCTAN INTOLERANCE RELATE TO IRRITABLE BOWEL SYNDROME (IBS)?

IBS is a disorder that affects the large intestine, and has similar symptoms as fructan intolerance. The cause of IBS is unknown, but may be triggered by food intolerance, stress, hormonal changes, or other illnesses affecting the gastrointestinal tract. Patients who have food intolerance IBS may experience difficulty tolerating fructans as well as other fermentable short-chain carbohydrates. Although some individuals with IBS can eat various foods containing fructans, it is important to understand that the two conditions may be related in some people.

FRUCTANS VERSUS GLUTEN

Non-celiac gluten sensitivity (NCGS) is seen in individuals who do not have celiac disease but have relieved gastrointestinal symptoms when following a gluten-free diet. Gluten is a protein found in grains, including wheat, barley, and rye. Therefore, when an individual follows a gluten-free diet, they are eliminating about 70% of the major source of fructans in the American diet: wheat.

A randomized, double-blind, placebo-controlled crossover study from 2018 showed that individuals with self-reported gluten sensitivity (NCGS) had symptoms more commonly in response to consumption of fructans (Skodje et al., 2018). The result suggested that patients who have been diagnosed with NCGS might actually have fructan intolerance.

ARE THERE LONG TERM CONSEQUENCES?

Although fructan intolerance can give patients symptoms of abdominal pain, bloating, and diarrhea, it does not cause any inflammation or damage to the gut. As long as you are getting sufficient fiber, B vitamins, and minerals from other sources as mentioned above, you can avoid any nutritional deficiencies.

TIPS FOR MANAGING FRUCTAN INTOLERANCE:

- The process of drying concentrates the sugar in the dry fruit and can increase fructan levels. Therefore, it is ideal to consume fresh or frozen fruit, instead of dried. The same concept applies to legumes, such as beans, as well.
- Individuals with IBS that have issues tolerating fructans, more often than not have intolerances to other fermentable short-chain carbohydrates as well. Hydrogen breath test is helpful in pinpointing other sugar intolerances.