

Fructose Intolerance (*fructose malabsorption*)

What is Fructose?

Fructose is a sugar found in fruit and is a basic component of table sugar called sucrose. If you have fructose intolerance you should avoid foods that contain fructose and sucrose. Sorbitol, a sugar-alcohol, is converted to fructose during digestion, should be avoided as well.

It is important to understand that there are two types of fructose intolerance. *Hereditary fructose intolerance* is a rare genetic disorder in which a person does not have the enzyme to break down fructose in the digestive system. This is a more serious disorder and can lead to liver and kidney disease.

A second, less serious disorder is *fructose malabsorption* or *dietary fructose intolerance*. People with fructose malabsorption have difficulty digesting fructose. This disorder does not cause liver and kidney damage but can result in a variety of symptoms.

What are the symptoms of fructose malabsorption?

Symptoms vary from person to person in severity but in general include bloating, abdominal pain, diarrhea, headache, weight loss and fatigue.

How is fructose malabsorption diagnosed?

Fructose intolerance is diagnosed with a simple breath test. After some fasting requirements and medication and dietary restrictions the patient is given a substance to drink. Occasionally, patients may be intolerant to more than one substance so your doctor may order more than one test. The substance used to test for small bowel bacterial overgrowth is glucose; lactose is used to test for intolerance of milk products; and fructose for fructose intolerance. Glucose, lactose and fructose are all sugars and intolerance to any can result in the same type of symptoms.

What causes fructose intolerance?

Unfortunately there are only theories as to why people are intolerant to fructose. Some ideas are abnormalities in GLUT5, a fructose transporter; bacterial in the bowel; Celiac disease; chemotherapy; familial tendency; injury to the intestinal lining; overuse of high fructose corn syrup; radiation; or motility problems.

What sweeteners should I avoid?

- Agave syrup
- Brown sugar (made with molasses)
- Caramel
- Fructose
- High Fructose Corn Syrup (HFCS)
- Honey
- Karo® corn syrup
- Molasses
- Maple syrup
- Palm sugar
- Sorbitol
- Splenda® (sucralose)

What sweeteners are OK to use?

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Sucrose (table sugar—made from beet or sugar cane)

Raw sugar or Turbinado sugar

Corn syrup or corn syrup solids (be sure it's not High Fructose containing)

Dextrin

Glucose or glucose syrups

Lactose

Maltose, Isomaltose

Barley Malt Syrup (contains about 2% fructose, so may not be as well tolerated)

Brown Rice Syrup (check label to make sure HFCS wasn't added)

Sugar substitutes: Aspartame (NutraSweet® or Equal®), Sugar Twin®, Sweet One®

Dextrose—available in specialty stores and online (binds free fructose in gut to absorb as sucrose)

*Always read labels to be sure the companies aren't adding additional sweeteners, like high fructose corn syrup.

Breads/Starches to Avoid

Commercial cookies, cakes, or breads and products with dried fruits, fruits, honey or added sugars not allowed. Avoid instant flavored cereals and granola. Limit whole wheat breads, whole grain products and graham crackers.

Fruits to Avoid

All fruit drinks, juices, jams, and jellies. Avoid most fruits for the first 1-2 weeks and then gradually add 1-2 fruits weekly. Choose fruits that have a low fructose content (see table 1). If you start to have side effects return, decrease the amount of fruit in your diet.

Table 1. Fructose content of common fruits (fructose per 100 grams of food)

Dates	32	Plums	3
Raisins	30	Honeydew	3
Figs	23	Grapefruit	3
Prunes	12	Strawberry	3
Grapes	8	Blackberry	2
Pears	6	Raspberry	2
Cherries	6	Orange	2
Apples	6	Pineapple	2
Blueberries	5	Cataloupe	2
Banana	5	Peach	2
Kiwi	4	Nectarine	1.5
Watermelon	3	Apricot	1

Vegetables to Avoid

Beets	Carrots
Corn	Eggplant
Onions	Peas
Sweet potatoes	Tomatoes
Tomato based sauces	Turnips
Winter squash	

Gas forming vegetables may need to be limited or avoided (but can be eaten if tolerated)

Broccoli	Brussels sprouts
Cucumbers (raw)	Cabbage (raw)
Cauliflower	Leeks
Peppers (raw)	Radishes (raw)
Scallions	

Recommended vegetables

Celery	Chives
Spinach	Potatoes, baked, mashed, fried
Shallots	Kohlrabi
Water chestnuts	Asparagus
Snap beans	Summer squash
Zucchini	Lettuce greens (endive, dandelion greens, mustard, turnip, Swiss chard)

**Cooked vegetables have less fructose.*

Dairy Products to Avoid

Avoid flavored or sweetened milks (chocolate and others).
Sweetened yogurts.
Sweetened condensed milk

Beverages to Avoid

Milkshakes, malts, and carbonated sweetened beverages, like sodas.
Fruit and vegetable juices
Lemonade and other sweetened drinks made from dry mix or frozen concentrate.

Other foods to Avoid

Candy sweetened with fructose containing sweeteners.
Chewing gum (both sugar and sugar-free).
Chocolate and most other desserts.
Condiments sweetened with fructose containing sweeteners and soy sauce.

Helpful Hints

- Eat foods with fructose in small amounts and spread them over the day.
- Your body may be able to digest foods with fructose when eaten with other foods.
- Check medicines and vitamin for hidden fructose.
- Dextrose can be used for sucrose in some recipes.

Some people who limit the amount of fructose that they eat, will find relief of their symptoms quickly, while others may need to stay on this diet for up to a month. After your symptoms have improved you will be able to add foods back into you diet. You will want to add only one food at a time and then wait a few days before trying another new food.