

Disaccharide-Free Diet

What is disaccharide intolerance?

Sugars, starches, and complex carbohydrates in foods are broken down into smaller and smaller sugars by enzymes until eventually single sugars are absorbed into the body. Disaccharides are two single sugars that are linked together. Disaccharide intolerance is the inability to break apart the disaccharide into two single sugars and absorb them. This often leads to uncomfortable digestive-tract symptoms.

What causes it?

There are a variety of conditions that may lead to disaccharide intolerance. Here are three common types of causes:

- **Lack of the enzyme needed to break down the disaccharide.** This is an inherited tendency. The most commonly seen case is lactose intolerance, which occurs when the individual lacks the ability to produce the enzyme lactase that breaks down the disaccharide sugar lactose found in milk. Another example is a sucrase-isomaltase deficiency, which causes sucrose and maltose intolerances.
- **Inflammatory damage to the cells of the small intestine.** Because disaccharide enzymes are made in the cells lining the small intestine, this results in disaccharide enzymes not being produced and leads to disaccharide intolerance. This can result from two different causes.
 - Infections in the digestive tract damage the cells lining the small intestines. Infections can be caused by parasites, microorganisms (bacteria), and viruses.
 - Inflammation can also be caused by a food allergy. Cow's milk and soy protein-sensitive allergy or enteropathy and gluten-sensitive enteropathy (celiac disease) are examples of this cause of disaccharide intolerance.
- **Intestinal damage caused by drugs or medications.** Use of strong drugs and medications taken by mouth, such as antibiotics, may cause damage to the intestinal cells, resulting in a disaccharide intolerance.

What are the symptoms?

Excess sugar in the large intestine leads to more fluid being drawn in to help normalize the osmotic pressure. This produces gas and an increase of microbial growth and fermentation in the bowel. Symptoms that commonly result are:

- Abdominal bloating
- Abdominal pain
- Flatulence
- Watery diarrhea or loose stool
- Occasional constipation
- Occasional nausea and vomiting

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How long does it last?

- Primary deficiency: If the disaccharide intolerance is an inherited tendency (your body doesn't make the disaccharidase enzymes), then the intolerance will be life-long.
- Secondary deficiency: If the intolerance is a result of damage to the intestinal cells caused by infection, food allergy, or strong drugs, then it is usually temporary. Once the intestinal cells start to heal; you will gradually resume production of the disaccharidase enzymes.

How can I prevent it?

- Primary deficiency: cannot be prevented because it is an inherited problem.
- Secondary deficiency can be prevented by avoiding: intestinal infections, the use of strong drugs, and consuming foods that you are allergic to.

How is it treated?

Disaccharide intolerances are treated by removing foods that contain the problem sugar from your diet. In most cases, disaccharide intolerance is dose-related. Usually the intestinal cells are producing a limited amount of disaccharidase enzyme, and small doses of foods containing disaccharides can be processed. Problems result when the amount of disaccharide in the food exceeds the capacity of the enzymes to digest it. The important thing is to determine your own body's capacity to handle disaccharide. By remaining within your personal limits, you should remain symptom-free.

The Problem Disaccharides

LACTOSE

Lactose is the sugar found in milk and is made of glucose + galactose. Lactase is the enzyme needed to break these sugars apart. Lactose occurs mostly in the whey (liquid) fraction of milk, although foods made mainly of casein (such as cheeses) may still contain a small amount of lactose. Lactose intolerance is different from a milk allergy, in which a person's immune system fights the protein in milk (not the sugars).

SUCROSE

Sucrose is a disaccharide made of glucose + fructose sugars. This sugar is broken down by the disaccharidase sucrase. Sucrose is found in table sugar and syrups, but is also present in many plants, especially fruits, grains, and vegetables.

MALTOSE

Two glucose sugars are linked together to form maltose. Maltase and isomaltase are the enzymes that break down maltose. Maltose is found mostly in grains and starchy vegetables.

STARCHES

Starches are made of long chains of glucose molecules. Enzymes must split all the linkages between the glucose molecules before the body can use them. If there is a deficiency in the enzymes, then the remaining undigested starch or sugar will be passed to the large bowel where bacteria will ferment it, resulting in the symptoms discussed earlier.

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Nutritional Supplements

For people with primary deficiencies, or those who need to follow the diet for an extended period of time, the following supplements may be necessary:

- Lactose restricted: calcium and possibly vitamin D
- Sucrose restricted: vitamin C
- Maltose restricted: vitamin B complex

The Disaccharide-free Diet




All disaccharides must be restricted initially.

Phase 1 should be followed for a minimum of four weeks to find out if an enzyme deficiency is the cause of the gastrointestinal symptoms, specifically diarrhea. When the diarrhea improves, loosening of these restrictions will determine each individual's tolerance for each disaccharide.

Phase 2 helps determine the individual's tolerance for each disaccharide. The individual introduces one food from the "restricted" lists every other day until diarrhea recurs. Lactose tolerance is determined by introducing dairy products and milk. Sucrose tolerance is determined by introducing vegetables, fruits, nuts and seeds, and finally sugars. Maltose tolerance is determined by introducing grains, especially "white" grains and flours.





FOOD GROUP	FOODS RECOMMENDED	FOODS TO AVOID
Fats 	<ul style="list-style-type: none"> • Pure vegetable oil <ul style="list-style-type: none"> – Canola – Corn – Flaxseed – Olive – Safflower – Soy – Sunflower • Margarine or diet spreads without whey or milk solids • Lard, meat drippings 	<ul style="list-style-type: none"> • Butter • Margarine with whey or milk solids
Milk and Milk Products 	<ul style="list-style-type: none"> • Cheeses <ul style="list-style-type: none"> – Brie – Camembert – Cheddar – Gruyere – Limburger – Monterey Jack – Mozzarella – Port du Salut • Non-dairy creamers 	<ul style="list-style-type: none"> • All except those listed to the left

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FOOD GROUP	FOODS RECOMMENDED	FOODS TO AVOID
<p>Fruits</p> 	<p>Fresh, frozen, canned in own juice:</p> <ul style="list-style-type: none"> • Berries: blackberry, blueberry, cranberry, gooseberry, loganberry • Cherry • Currants, red and black • Damson plums • Figs, raw • Guava • Grapes, grape juice • Kiwi fruit • Lemon • Lime • Passion fruit 	<ul style="list-style-type: none"> • Frozen or canned fruit with added sugar or syrup • Apple • Apricot • Banana • Date • Grapefruit • Mango • Melon: cantaloupe, honeydew, watermelon • Papaya • Peach • Pear • Pineapple, raw • Plum, prunes • Raspberry • Strawberry • Tangerine
<p>Vegetables</p> 	<p>Fresh, frozen, canned, without added sugar or starch:</p> <ul style="list-style-type: none"> • Avocado • Celery • Chives • Cucumber • Endive • Garlic • Green onion • Kale • Lettuce • Mushroom • Parsley • Parsnip • Peppers (green & red) • Potato: <ul style="list-style-type: none"> – French fried – Hash browns • Radish • Spinach • Swiss chard • Tomato • Tomato juice • Turnip • Watercress 	<p>Fresh, frozen, canned with additives, added sauces, or added butter or margarine:</p> <ul style="list-style-type: none"> • Asparagus • Artichokes • Broccoli • Cabbage: <ul style="list-style-type: none"> – Green – Red • Carrot • Cauliflower • Corn • Kohlrabi • Leeks • Okra • Onion • Potato: boiled • Pumpkin • Squash, all types <ul style="list-style-type: none"> – Sweet potato – Yam
<p>Grains</p> 	<ul style="list-style-type: none"> • None 	<p>All, including:</p> <ul style="list-style-type: none"> • Flours made with grains • Amaranth • Barley • Buckwheat • Bulgur • Corn • Millet • Oats • Quinoa • Rice • Rye • Spelt • Triticale • Wheat

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<p>Meat and Meat Substitutes</p> 	<p>All fresh or frozen:</p> <ul style="list-style-type: none"> • Lamb • Beef • Pork • Wild game • Poultry: chicken, duck, turkey • Fish, shellfish • Eggs (plain) 	<p>Meats that are:</p> <ul style="list-style-type: none"> • Processed • Breaded • Smoked • Cured • Canned • Corned beef • Eggs with added milk, flour, or sugar
<p>Legumes</p> 	<ul style="list-style-type: none"> • Tofu 	<p>All, including:</p> <ul style="list-style-type: none"> • Bean sprouts • Black-eyed peas • Broad beans (fava beans) • Chickpeas (garbanzo beans) • Green and wax beans • Kidney beans • Lentils • Navy beans • Peanuts • Peas • Split peas • Soybeans
<p>Nuts and Seeds</p> 	<ul style="list-style-type: none"> • None 	<p>All, including:</p> <ul style="list-style-type: none"> • Almond • Beechnut • Brazil nut • Cashew • Hazelnut • Macadamia • Pecan • Pistachio • Pumpkin seed • Sesame seed • Sunflower seed • Walnut
<p>Sugars and Sweeteners</p> 	<ul style="list-style-type: none"> • Glucose • Dextrose • Fructose (fruit sugar) • Levulose • Honey • Sugar substitutes (if lactose free, in moderation): <ul style="list-style-type: none"> – Aspartame – Cyclamate – Saccharine – Sugar twin – Equal – Sweet’N Low 	<ul style="list-style-type: none"> • Sucrose (table sugar) • Lactose (milk sugar) • Maltose (grain sugar) • Foods with added sugars • Syrups

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Spice and Herbs 	<ul style="list-style-type: none"> • Allspice • Anise seed • Basil • Bay leaf • Caraway • Cayenne • Celery • Chervil • Chili powder • Cinnamon • Cloves • Coriander • Dill • Fennel seed • Fenugreek • Garlic powder • Ginger 	<ul style="list-style-type: none"> • Mace • Marjoram • Mustard • Nutmeg • Onion powder • Oregano • Paprika • Parsley • Pepper • Poppy seed • Poultry seasoning • Rosemary • Sage • Savory • Tarragon • Thyme • Turmeric 	<ul style="list-style-type: none"> • Herb or spice mixes or seasoning packets • Curry

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