

Low Disaccharide Diet

What is disaccharide intolerance?

Sugars, starches, and complex carbohydrates in foods are broken down into smaller sugars by enzymes. Eventually, these single sugars are absorbed into the body. Disaccharides [die-SAK-r-iedz] are 2 single sugars that are linked together. Disaccharide intolerance is when your body can't break apart the disaccharides into single sugars and absorb them. This often leads to uncomfortable digestive tract symptoms.

What causes it?

There are several conditions that may lead to disaccharide intolerance. Common causes include:

- Lack of the enzyme needed to break down the disaccharide. This is typically an inherited tendency (your body doesn't make the disaccharidase enzymes). The most common of these is **lactose intolerance**. This is when the body can't produce the enzyme **lactase**. Lactase breaks down **lactose**, a disaccharide sugar found in milk. Another example is a sucrase-isomaltase [S00-krays-eye-so-MALL-tase] deficiency, which causes sucrose and maltose intolerances.
- Inflammatory damage to the cells of the small intestine. Disaccharide enzymes are made in the cells lining the small intestine. Inflammation in these cells blocks production of disaccharide enzymes and leads to disaccharide intolerance. This can be caused by the following.
 - Infections in the digestive tract that damage the cells lining the small intestines. Infections can be caused by parasites, microorganisms (bacteria), and viruses.
 - Inflammation caused by a food allergy. Allergies to cow's milk, sensitivities to soy protein or gluten (celiac disease) that cause ongoing damage or irritation and swelling to the small intestine are examples of this type 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.



What are the symptoms?

When you have excess sugar in the large intestine, your body draws more fluid into the intestine. This produces gas and an increase of microbial growth and fermentation in the bowel. Symptoms that commonly result are:

- Abdominal (belly) bloating
- Abdominal pain
- Gas (flatulence)
- Watery diarrhea or loose stool (poop)
- Occasional constipation (can't poop)
- Occasional nausea and vomiting

Dietitian: _____

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How long does it last and how can I prevent it?

How long it lasts depends on your body.

- **Primary deficiency:** If your body doesn't make the disaccharidase enzymes, then the intolerance will be life-long. This type of deficiency cannot be prevented.
- **Secondary deficiency:** If you have 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. This type of deficiency can be prevented by avoiding intestinal infections and foods that trigger your allergies or sensitivities, and by not taking strong drugs.

How is it treated?

Disaccharide intolerances are treated by avoiding foods that contain the problem sugar. In most cases, disaccharide intolerance is dose-related. For example, the intestinal cells produce a limited amount of disaccharidase enzyme. Small doses of foods containing disaccharides can usually be tolerated. 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.

Do I need nutritional supplements?

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

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

Which disaccharides are most likely to cause problems?



- **Lactose** is the sugar found in milk and is made of glucose and galactose. Lactase is the enzyme needed to break these sugars apart. Lactose is found most often in the whey—a liquid that makes up a small fraction of milk and other dairy products. Note that 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** is a disaccharide made of glucose and 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** is formed when 2 glucose sugars are linked together. Maltase and isomaltase are the enzymes that break down maltose. Maltose is found mostly in grains and starchy vegetables.
- **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.

The disaccharide-free diet

All disaccharides must be restricted at first.

Phase 1 should be followed for a minimum of 4 weeks to find out if an enzyme deficiency is causing the gastrointestinal (GI) symptoms, specifically diarrhea. When the diarrhea improves, your body's tolerance for each disaccharide will determine whether these restrictions can be eased.

Phase 2 will help determine your tolerance for each disaccharide. You will introduce one food from the "restricted" list every other day until your diarrhea returns. 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
<p>Fats</p> 	<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
<p>Milk and milk products</p> 	<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"> • Milk, heavy cream, dairy creamers, or half & half • Sour cream • Ice cream • Yogurt • Cottage cheese • Cream cheese • Kefir • Any others not listed at 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 • Melon: cantaloupe, honeydew, watermelon • Apple • Apricot • Banana • Coconut • Date • Grapefruit • Mango • Orange • 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: french fried, hash browns • Radish • Spinach • Squash, summer • Swiss chard • Tomato • Tomato juice • Turnip • Watercress 	<ul style="list-style-type: none"> • Any vegetables canned with additives, sauces, butter, or margarine • Fresh, frozen, or canned: <ul style="list-style-type: none"> – Asparagus – Artichokes – Beans (green and wax) – Broccoli – Cabbage: Green – Red – Carrot – Cauliflower – Corn – Kohlrabi – Leeks – Okra – Onion – Potato: boiled – Pumpkin – Squash, winter – Sweet potato – Yam

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FOOD GROUP	FOODS RECOMMENDED	FOODS TO AVOID
<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
<p>Meats 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 <p>Eggs (plain)</p>	<p>Meats that are:</p> <ul style="list-style-type: none"> • Processed • Breaded • Smoked • Cured • Canned • Corned (beef) <p>Eggs with added milk, flour, or sugar</p>
<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) • Kidney beans • Lentils • Navy beans • Peanuts • Peas • Split peas • Soybeans
<p>Nuts and seeds</p> 	<p>None</p>	<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

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FOOD GROUP	FOODS RECOMMENDED	FOODS TO AVOID
<p>Sugars and sweeteners</p> 	<ul style="list-style-type: none"> • Glucose • Dextrose • Fructose (fruit sugar) • Sugar substitutes (if lactose free, in moderation): <ul style="list-style-type: none"> – Aspartame – Saccharine – Stevia – Equal – Sweet’N Low – Monkfruit • Levulose • Honey 	<ul style="list-style-type: none"> • Sucrose (table sugar) • Lactose (milk sugar) • Maltose (grain sugar) • Foods with added sugars • Syrups
<p>Spices and herbs</p> 	<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 • 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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FOOD GROUP	FOODS RECOMMENDED	FOODS TO AVOID
<p>Beverages</p> 	<ul style="list-style-type: none"> • Water • Coffee* • Tea* • Herbal tea • Unsweetened coconut, almond, cashew, or soy milk • Diet sodas** <p>*Caffeine may worsen GI symptoms. Limit to 1 cup per day.</p> <p>**Some alternative sweeteners may cause GI symptoms. Limit to 1 serving per day.</p>	<ul style="list-style-type: none"> • All fruit juices • Milk • Rice or oat milk • Sodas • Alcoholic beverages

Disaccharide-free meal ideas

BREAKFAST	LUNCH	DINNER
<ul style="list-style-type: none"> • Scrambled eggs with cheddar cheese and hash browns • Omelet with chives, garlic, mushrooms, spinach, tomato, red and green peppers, and avocado • Fruit smoothie with blackberries, blueberries, lemon or lime, baby spinach or kale, with unsweetened vanilla almond milk • Breakfast hash with hashbrowns and allowed vegetables, eggs 	<ul style="list-style-type: none"> • Chicken salad (homemade mayo or sugar-free) with grapes and celery • Steak fajita (green and red peppers, no onion, homemade fajita seasoning), lettuce wraps • Taco salad (beef with homemade taco seasoning, tomato, avocado, green onion, lettuce) • Chicken parmesan with blueberry and blackberry spinach salad and balsamic and olive oil vinaigrette 	<ul style="list-style-type: none"> • Lemon garlic salmon with sautéed mushrooms, garlic, and spinach • Stuffed peppers (red or green with ground beef, cheese, and sugar-free tomato sauce) • Tomato soup with cheese crisps • Baked chicken fingers (no breading) and fries
SNACKS		
<ul style="list-style-type: none"> • Recommended string cheese and fruit (grapes, kiwi, cherry) • Olives and recommended cheese 	<ul style="list-style-type: none"> • Hard boiled eggs and recommended fruit • Celery and radishes dipped in guacamole 	

Notes

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This handout is intended for use during an appointment with a registered dietitian only, and is not meant for use by other clinicians.

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