Low Disaccharide Diet

The information provided on this page is for general education only. It is not intended to replace personalised medical, nutrition, or dietetic advice. Individual nutrition needs vary depending on medical history, medications, growth, pregnancy, health conditions, and treatment goals. Please consult an Accredited Practising Dietitian, doctor, or other qualified health professional before making significant dietary changes.

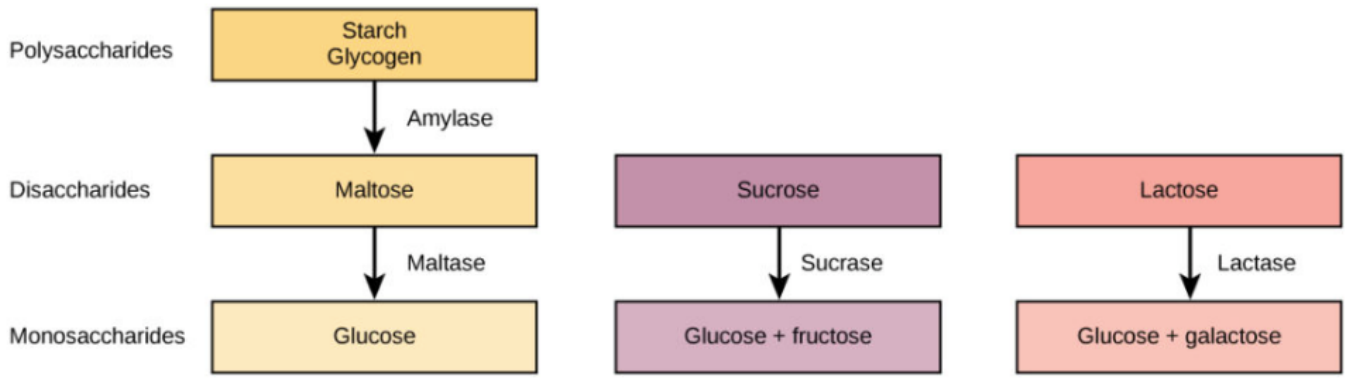
What is disaccharide intolerance?

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 two 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 [SOO-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

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
- Starch restricted: dietary fibre

Which dissacharides 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. If you're low in enzymes like **maltase**, your body can't fully break down those intermediate sugars (like maltose), so you may have trouble digesting **starchy foods** even though starch isn't a disaccharide itself.

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 bloating and 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 lists

FOOD GROUP	FOODS RECOMMENDED	FOODS TO AVOID
Fats and oils	• **Pure vegetable oil** – **Canola** – **Corn** – **Flaxseed** – **Olive** – **Safflower** – **Soy** – **Sunflower** • **Margarine or diet spreads without whey or milk solids** • **Lard, meat drippings**	• **Butter** • **Margarine with whey or milk solids**

Milk and dairy products	• Hard cheese: – Brie – Camembert – Cheddar – Gruyere – Limburger – Monterey Jack – Mozzarella • Port du Salut • Non-dairy creamers • Lactose free milk • Lactose free fetta, cottage or cream cheese	• Milk, heavy cream, dairy creamers, or half & half • Sour cream • Ice cream • Yogurt • Cottage cheese, fetta • Cream cheese • Kefir • Any others not listed at left

FOOD GROUP	FOODS RECOMMENDED	FOODS TO AVOID
Fruit	Fresh, frozen, canned in own juice: • Berries: blackberry, boysenberry, blueberry, cranberry, gooseberry, loganberry, strawberry, raspberry, gogi berry • Banana (Cavendish) • Cherry • Grapes • Currants, raisins, sultanas • Dried berries • Kiwi fruit • Lemon • Plums • Lime • Figs, raw or dried • Guava • Pomegranate • Papaya • Rhubarb stalk	• Frozen or canned fruit with added sugar or syrup • Melon: cantaloupe, honeydew, watermelon • Apple • Peach • Apricot • Pear • Banana (lady finger) • Pineapple • Coconut • Guava • Dates • Passionfruit • Grapefruit • Honeydew • Mandarin • Orange • Mango
Vegetables (fresh frozen or canned)	• Fresh, frozen, canned, without added sugar or starch: • Asparagus • Artichoke • Avocado • Bean sprouts • Bok choi (less than 1 cup) • Celery • Chard • Chives, dill, coriander, parsley • Chicory • Chili • Capsicum • Cucumber • Eggplant • Endive • Garlic	• Any vegetables with additives, sauces, butter, or margarine • Leeks • Beetroot • Okra • Onion • Potato (all others) • Broccoli • Cabbage, red and white • Pumpkin • Carrot • Sweet potato • Cauliflower • Yam • Corn

	• Green (string) beans • Green onion • Kale • Lettuce • Mushroom • Nori, seaweed • Radish • Spinach • Olive • Potato, desiree • Shalott • Silverbeet , spinach • Squash summer • Tomato, tomato juice • Watercress • Zucchini	

FOOD GROUP	FOODS RECOMMENDED	FOODS TO AVOID
Grains Note that although grains generally do not have **maltose** in them they are broken down into maltose by salivary amylase into Maltose	• No grains allowed however Shirataki (Konjac) noodles are allowed	All grains and grain products, including: • Flours made with any of the following: • Oats • Amaranth • Barley • Buckwheat • Bulgur • Corn • Millet • Quinoa • Rice • Rye • Spelt • Triticale • Wheat
Meats and meat substitutes	All fresh or frozen: • Lamb • Poultry: chicken, duck, turkey • Beef • Pork • Fish, shellfish • Eggs (plain)	Meats that are: • Processed, Cured, Breaded, Canned in sauce, Smoked • Corned (beef) • Eggs with added milk, flour, or sugar

	• Quorn micprotein	
Legumes	• Tofu	All, including: • Bean sprouts • Lentils • Black-eyed peas, chickpeas, split peas • Navybeans, broadbeans, fava beans, kidney beans, soybeans
Nuts and seeds	None	All, including: • Almond • Beechnut • Brazil nut • Cashew • Hazelnut • Macadamia • Pecan • Almond meal • Pistachio • Pepita • Sesame seed • Sunflower seed • Walnut

FOOD GROUP	FOODS RECOMMENDED	FOODS TO AVOID
Sugars and sweeteners	• Glucose • Dextrose • Fructose (fruit sugar) • Sugar substitutes (if lactose free, in moderation): – Aspartame – Saccharine – Stevia • Levulose • Honey – Equal – Sweet'N Low – Monkfruit sweetener	• Sucrose (table sugar) • Lactose (milk sugar) • Maltose (grain sugar) • Foods with added sugars • Syrups • Maple Syrup
Spices and herbs	• Allspice • Anise seed • Basil • Bay leaf • Caraway • Cayenne • Rosemary • Celery • Chervil • Chili powder • Cloves • Coriander • Dill • Fennel seed • Fenugreek • Marjoram • Mustard • Garlic powder • Nutmeg • Onion powder • Oregano • Paprika • Parsley • Pepper • Poppy seed • Poultry • Cinnamon • Sage • Savory • Tarragon • Thyme • Turmeric • Ginger • Mace • Sugar & gluten free soy sauce	• Herb or spice mixes or seasoning packets • Curry • Cocoa

FOOD GROUP	FOODS RECOMMENDED	FOODS TO AVOID
Beverages	• **Water** • **Coffee*** • **Tea*** • **Herbal tea** • **Unsweetened coconut, almond, cashew, or soy milk** • **Diet sodas**** ***Caffeine may worsen GI symptoms. Limit to 1 cup per day.** ****Some alternative sweeteners may cause GI symptoms. Limit to 1 serving per day.** *****Nippy's No added sugar / lactose free chocolate and strawberry milk is suitable**	• **All fruit juices** • **Milk** • **Rice or oat milk** • **Sodas** • **Alcoholic beverages**

Disaccharide-free meal ideas

BREAKFAST	LUNCH	DINNER
• Scrambled eggs with cheddar cheese and hash browns (Desiree potato only) • 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	• 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	• Lemon garlic salmon with sautéed mushrooms, garlic, and spinach • Stuffed capsicum (red or green with ground beef, cheese, and sugar-free tomato sauce) • Tomato soup with cheese crisps • Roast chicken (no breading) and potato, capsicum and squash

SNACKS
• **Recommended string cheese and fruit** • **Hard-boiled eggs** • **Celery and radishes dipped in guacamole** • **Olives and allowed cheese** • **Diet jelly and lactose/sugar free yoghurt with artificial sweetener or berries**

High fibre foods

It can be difficult to get adequate fibre on this diet due to the restriction on grains and cereals. You should be trying to achieve an intake of 30g per day. To prevent constipation, it is beneficial to focus on foods which are high in soluble fibre rather than those high in insoluble fibre which can cause bloating and gas. The following foods can be eating while on the GSID
diet:

- Kiwifruit
- Green beans
- Psyllium
- Raspberries
- Figs
- Dried berries
- Sundried Tomato
- Plumb
- Avocado
- Seaweed

If you are prone to suffering constipation regularly taking 2 tsp per day of psyllium. Laxatives such as polyethylene glycol may be beneficial however seek your health care professional's advice before taking.

A note on fluid intake
Be sure to aim for a minimum of 2 litres of fluid each day as this is important to keep the fibre moving smoothly along the digestive tract and result in more comfortable bowel movements.

Dr Kellie Millard
Accredited Practising Dietitian
Hills Nutrition and Dietetics
Provider number 044600DL

Food challenges

Lactose tolerance is determined by introducing dairy products and milk. Sucrose tolerance is determined by introducing fruits, nuts and seeds, and finally sugars. Maltose tolerance is determined by introducing grains, especially “white” grains and flours, legumes, and starchy vegetables. The following list describes the amount of food to try each day.

Introduce one of the foods in that group each day as described below or until symptoms occur. Remember to keep a food and symptom diary and stop when symptoms occur. Your tolerance level is the level you ate the day before. If symptoms occur wait until they fully resolve before trying the next challenge. If you find you tolerate the maximum amount, you can continue increasing the amount incrementally until symptoms occur.

Only after you have been through the challenges you can return to a somewhat normal diet. You will have to limit foods that contain the component you are intolerant to up to the level you were able to tolerate each day.

	Day 1,2	**Day 3,4**	**Day 5,6**
Week 1: Sucrose Any of the following: Honeycomb (confectionary), meringue, pure maple syrup, hard caramel (no milk), licorice	20g	40g	60g
Week 2: lactose Any of the following: Cows milk, natural yoghurt	¼ cup	½ cup	1 cup
Week 3: Maltose Any of the following: Spelt and white bread rolls, slice or baguette	¼ cup/slice	½ cup/slice	1 cup/slice

Dr Kellie Millard
Accredited Practising Dietitian
Hills Nutrition and Dietetics

Suggested Meal Plan

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Breakfast	Egg & veggie muffins Berry smoothie	Egg & veggie muffins Berry smoothie	Omelette with chives, mushroom and asparagus	Berry smoothie	Berry smoothie with baby spinach	Cheese and asparagus omelette	Scrambled eggs and chives with grilled mushrooms
Lunch	Chicken salad with honey-mustard dressing	Mince stuffed capsicum	Lettuce steak burger with tomato, cheddar cheese, baby spinach	Smoked paprika, Roast tomato, garlic and capsicum soup topped with grated cheese	Storebought cooked BBQ chicken (skin removed), deseree mashed potato (with LF milk) and steamed green and red capsicum	Grilled sliced eggplant and zucchini lasagne with tomato salsa and cheddar cheese layers	Vegetable frittata
Dinner	Chicken salad with avocado and cheddar cheese and honey mustard dressing (honey, mustard, olive oil)	Frozen salmon with dill and garlic powder, roast capsicum, zucchini and asparagus and desiree potato chips	Beef casserole with thyme and oregano using no added sugar tinned tomato	Storebought cooked BBQ chicken, deseree mashed potato (with LF milk and margarine) and steamed green and red capsicum	Chicken stir fry using spinach, zucchini bok choi, fresh herbs, garlic, onion.	Pork san choy bow	Grilled barramundi with Zoodles (zucchini) made with garlic, mushroom, capsicum topped with grated cheese
Snacks	Cucumber sticks & cheddar cheese Grapes & berries	Cucumber sticks and camembert cheese	Cucumber sticks and cheese Grapes & berries	Capsicum sticks & cheddar cheese Grapes, blueberries and strawberries	Cucumber and celery sticks, mushroom with homemade salsa (made with tinned chopped tomato and herbs)	Guava, berry, grapes fruit salad	Dried figs and currants with cheddar cheese
Symptoms							

kellie@hillsnutritiondietetics.com.au | m: 0430395129

Dr Kellie Millard
Accredited Practising Dietitian
Hills Nutrition and Dietetics

Recipes:

Egg wraps

Spray a non-stick skillet with olive or canola oil. Whisk two eggs and pour into hot pan. Cook 2-3 minutes and gently turn over or flip. When cool can be used as a wrap with fillings such as lean meat, cheese, lettuce, cucumber, mushroom, GF soy sauce

Egg & veggie muffins (1 serve)

Button mushroom, capsicum, zucchini, cherry tomatoes, 2 eggs for 2 muffins, parmesan cheese, cheddar cheese, spring onion (green part), dried dill, salt, pepper

Berry smoothie (1 serve)

1 cup of light LF milk, ½ cup LF Greek yoghurt, ¼ cup frozen blueberries, ¼ cup frozen strawberries or raspberries, Sunfibre fibre scoop, Vivomixx probiotic sachet

Mince stuffed capsicum:

Beef mince, green capsicums, mushrooms, zucchini, parmesan and cheddar cheese, 1 egg, 1T tomato paste, 1 full jar of passata, smoked paprika, salt, pepper, dried oregano

Chicken salad with honey-mustard dressing:

Cooked chicken breast, iceberg/cos lettuce, cucumber, cherry tomatoes, capsicum, avocado, dressing (honey, olive oil, lemon juice, Dijon mustard)

San choy bow:

Pork and beef mince, garlic infused olive oil, grated ginger, soy sauce (GF, no sugar), grated zucchini, diced mushrooms, pak choy, capsicum, cos lettuce, salt, pepper

Chicken stirfry:

Chicken breast, marinade (honey, garlic, no sugar Tamari sauce, ginger), baby spinach, capsicum, mushrooms, pak choy, Konjac noodles.

Creamy paprika chicken:

Chicken breast, lactose free cream, paprika, crushed garlic, desiree potatoes, zucchini, mushrooms, capsicum, squash

Blueberry frozen yoghurt:

kellie@hillsnutritiondietetics.com.au | m: 0430395129

Frozen blueberries, honey, lactose free Greek yoghurt, lemon juice

Creamy cheesy chicken:

Chicken breast, LF cream, 3x garlic gloves, ¾ cup parmesan cheese, desiree potato, zucchini, capsicum, mushroom, baby spinach (4 serves)

Homemade pizza:

Pizza base (zucchini, kale, parmesan and mozzarella cheese, garlic), tomato paste, BBQ chicken, cherry tomatoes, baby spinach, capsicum, mozzarella cheese

Homemade lasagne:

Pan fry thinly sliced eggplant and zucchini. Make a sauce using passata, garlic, chives. Place layer of eggplant, then zucchini, tomato sauch, then finish with layer of eggplant and top with parmesan and mozzarella cheese then roast.

Spinach and Ricotta Flan

Mix 200g frozen spinach (thawed and drained) with 1 tablespoon parmesan cheese, 200g cubed ricotta cheese (from deli), 4 eggs, 1 tablespoon extra virgin olive oil. Pour into a lined flan tin and bake at 200 degrees for 20 minutes or until brown.