

Lactose Intolerance

and Lactase Deficiency

What is lactose?

Lactose is a sugar that naturally occurs in the milk made by all mammals, including cows, sheep and goats. It is made of two individual sugar molecules (glucose and galactose) joined together.

What are lactose intolerance and lactase deficiency?

The food we eat is broken down into small particles by the muscular action of the gut and the work of proteins, called enzymes. All food particles must be processed into simple molecules, which can then be absorbed from the bowel into the bloodstream for energy.

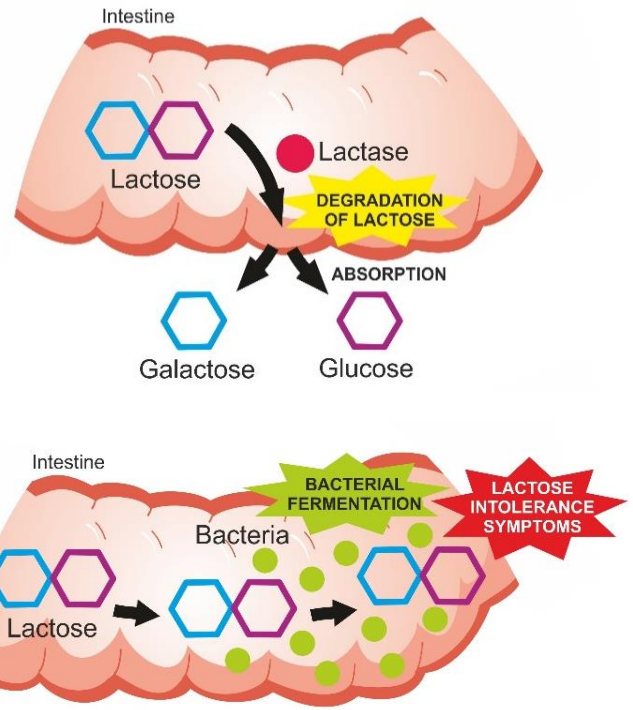
When we consume food and drink containing lactose, the lactose must be split into its two smaller sugar molecules before it can be properly absorbed. **It is the enzyme lactase, which is produced by the small bowel, that breaks down lactose into its absorbable components.**

Some people stop producing enough lactase and are unable to break down lactose – this is called **lactase deficiency**. These people may develop unpleasant gut symptoms because lactose is not being properly absorbed (malabsorption) – this is known as **lactose intolerance**. Lactase deficiency is the most common dietary enzyme deficiency and can be temporary or permanent.

What are the symptoms of lactose intolerance?

If lactose cannot be broken down and absorbed in the small bowel, the sugar passes down into the large bowel, where there are bacteria. These bacteria ferment the sugar using their own enzymes, which produces gas that may cause symptoms such as **abdominal cramps, bloating, distension (swollen belly) and diarrhoea**.

Often these symptoms can be linked to having eaten lactose-containing foods, but sometimes the effects are



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delayed by several hours and the relationship is not so obvious. Drinking as little as one cup of milk may produce symptoms in some people.

What is the cause of lactase deficiency?

The most common cause of lactase deficiency is not a disease but just the normal reduction in lactase activity that happens after infancy. Almost all babies have lactase to enable them to survive on their mother's milk. However, as we grow older, the lactase enzyme is less necessary, and some people lose the ability to produce it. Among people of European ancestry, 15% of adults have lactase deficiency, but this rises to 90% in African and Asian populations.

Any disease that affects the small bowel can also damage the body's ability to produce lactase. People who are diagnosed with coeliac disease may have a temporary lactose intolerance, likely because they have a damaged lining of the small bowel. However, most can tolerate lactose in their diet after sticking to a gluten-free diet for

3 months. People with Crohn's disease may also have temporary periods of lactose intolerance if their small bowel is affected during a flare-up of the condition. Many people have lactase deficiency after a bout of infective gastroenteritis. In this case, the enzyme deficiency is usually temporary, as the body's ability to produce lactase recovers after a few weeks.

Helpful hint

Lacteeze tablets and drops contain the enzyme lactase and can be taken before eating lactose-containing foods to prevent symptoms of lactose intolerance. They can be expensive but are useful for adding more flexibility to your diet (e.g., if you are going out to dinner and are unsure of how much lactose is in the menu). They are available over the counter at pharmacies.

How is lactose intolerance diagnosed?

Lactose intolerance is a clinical diagnosis; your doctor may suggest a lactose challenge and then a trial of a lactose-exclusion diet to see if your symptoms are associated with lactose. Tests for lactose malabsorption or lactase deficiency are sometimes used to assist the diagnosis but can be misleading as they do not prove lactose intolerance. The following tests are available in some private laboratories and hospital clinics:

- **Hydrogen breath test** – measures hydrogen in the breath before and after a dose of lactose (suggesting lactose malabsorption). Importantly, if you have lactose intolerance, you will also get symptoms from the dose of lactose.
- **Lactose tolerance test** – measures blood glucose levels at multiple time points after consuming a dose of lactose. If blood glucose levels do not rise, this suggests lactase deficiency because lactose is not being broken down to produce glucose.
- **Lactose intolerance genetic test** – looks for four genetic variations that control the production of lactase. The finding of a genetic variation should be interpreted by your doctor based on your specific circumstances.

- **Small bowel biopsy** – tests for lactase in a small piece of the small bowel lining (a biopsy) taken at endoscopy. As this is an invasive procedure, it is not commonly used.

Your doctor may also consider whether you have another condition that can mimic lactose intolerance, or overlap with it, such as coeliac disease, inflammatory bowel disease, microscopic colitis, irritable bowel syndrome, functional dyspepsia or small intestinal bacterial overgrowth.

What should I do if I am lactose intolerant?

Reducing lactose intake in your diet may help with managing symptoms. Not every trace of lactose needs to be avoided. The amount of lactose that causes symptoms varies greatly between individuals, so you may wish to experiment with your diet to see how much lactose you can tolerate. There are large amounts of lactose in milk, yoghurt, ice-cream and soft cheeses. If you usually eat a lot of these, it is recommended you choose alternative lactose-free varieties (made from cow's milk but with the lactose removed) that are available in the supermarket. Alternatively, soy and rice milks contain no lactose, but be sure to choose varieties that are fortified with calcium. Hard, ripened cheeses *do not* contain lactose, even though they are made from milk, and can therefore be enjoyed by people who have lactose intolerance.

Symptoms of lactose intolerance are often dose-related, so having smaller quantities more often during the day may be better tolerated. A guide to a low-lactose diet is shown over the page. It is recommended you visit an accredited practising dietitian to discuss how to plan your reduced-lactose diet and to ensure you still have a calcium-balanced diet. If a lactose-restricted diet does not improve your symptoms, you should speak with your doctor or dietitian, in case you have other problems or food intolerances.

What will happen if I add lactose into my diet again?

There will be no damage to the bowel if you consume lactose, but you are likely to experience symptoms if you have too much of it. **There are no long-term complications associated with lactase deficiency.**

A guide to a low-lactose diet

Lactose intolerance symptoms may occur with as little as 10 grams of lactose per day. Below is a guide to foods to consider avoiding, with suggested alternatives, and the amount of lactose contained in many foods and beverages.

Foods to avoid	Suggested alternatives
Cow's milk, goat's milk, sheep's milk, milk powder, skim milk, evaporated and condensed milk	Lactose-free cow's milk, calcium-fortified soy milk and rice milk products
Ice-cream	Lactose-free ice cream, soy or rice-based ice-cream
Cow, sheep and goat yoghurts in large amounts	Lactose-free yoghurts, calcium-fortified soy yoghurts
Soft, non-matured cheeses (e.g., cottage, ricotta, quark, mascarpone) and cheese spreads in large amounts	1–2 tablespoons are likely to be tolerated; you can also safely include block cheeses – matured, semi-matured and mild cheeses
Cream and sour cream in large amounts	1–2 tablespoons are likely to be tolerated
Margarine and butter are very low in lactose and are suitable for a lactose-free diet.	
All fruits and vegetables, plain meats, fish or chicken, breads, pasta, rice and flour are suitable.	

Product	Lactose content (grams)
Breast milk, 200 mL	14.4
Low-fat fortified milk, 200 mL	13.0
Buttermilk, 200 mL	10.8
Sheep's milk, 200 mL	10.2
Regular milk, 200 mL	9.4
Buttermilk, low-fat, 200 mL	9.4
Goat's milk, 200 mL	8.8
Yoghurt, 200 mL	7.8
Cottage cheese, low-fat, 100 g	4.3
Cream cheese, 100 g	3.2
Ice-cream, 50 g	2.8
Ricotta, reduced fat, 100 g	2.4
Cottage cheese, 100 g	1.4
Ricotta, 100 g	1.2
Cream, 30 g	0.8
Butter, 20 g	0.1
Processed cheddar, 35 g	0.1
Cheese, 35 g slice	0.1

Acknowledgements

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