

# Lactose Intolerance

*National Digestive Diseases Information Clearinghouse*



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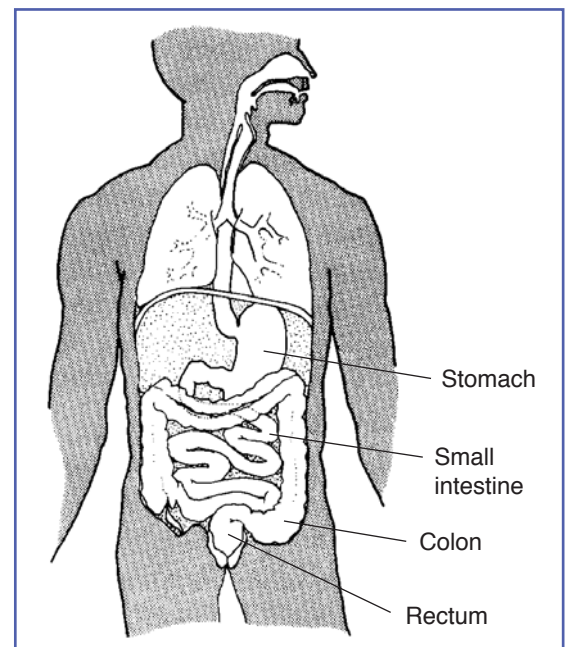
## What is lactose intolerance?

Lactose intolerance is the inability to digest significant amounts of lactose, the major sugar found in milk. Lactose intolerance is caused by a shortage of the enzyme lactase, which is produced by the cells that line the small intestine. Lactase breaks down milk sugar into two simpler forms of sugar called glucose and galactose, which are then absorbed into the bloodstream. Not all people deficient in lactase have the symptoms commonly associated with lactose intolerance, but those who do are said to have lactose intolerance.

People sometimes confuse lactose intolerance with cow's milk intolerance because the symptoms are often the same. However, lactose intolerance and cow's milk intolerance are not related. Being intolerant to cow's milk is an allergic reaction triggered by the immune system. Lactose intolerance is a problem caused by the digestive system.

## What are the symptoms of lactose intolerance?

People who do not have enough lactase to digest the amount of lactose they consume may feel very uncomfortable when they digest milk products. Common symptoms, which range from mild to severe, include nausea, cramps, bloating, gas, and diarrhea. Symptoms begin about 30 minutes to 2 hours after eating or drinking foods containing lactose. The severity of symptoms depends on many factors, including the amount of lactose a person can tolerate and a person's age, ethnicity, and digestion rate.



*The digestive tract*



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## How is lactose intolerance diagnosed?

Lactose intolerance can be hard to diagnose based on symptoms alone. People sometimes think they suffer from lactose intolerance because they have the symptoms associated with the disorder, not knowing other conditions such as irritable bowel syndrome can cause similar symptoms. A doctor can use tests to diagnose lactose intolerance but may first recommend eliminating cow's milk from the diet to see if the symptoms go away.

The most common tests used to measure the absorption of lactose in the digestive system are the lactose tolerance, hydrogen breath, and stool acidity tests.

- **The Lactose Tolerance Test.** This test requires fasting (not eating) before the test and then drinking a liquid that contains lactose. Several blood samples are then taken over a 2-hour period to measure the person's blood glucose (blood sugar) level. These measures indicate how well the body is able to digest lactose.

Normally, when lactose reaches the digestive system, the lactase enzyme breaks it down into glucose and galactose. The liver then changes the galactose into glucose, which enters the bloodstream and raises the person's blood glucose level. If, however, lactose is incompletely broken down, the blood glucose level does not rise and a diagnosis of lactose intolerance is confirmed.

- **The Hydrogen Breath Test.** This test measures the amount of hydrogen in a person's breath. Very little hydrogen is normally detectable. However, undigested lactose in the colon is fermented by bacteria and produces various gases, including hydrogen. The hydrogen is absorbed from the intestines, carried through the bloodstream to the lungs, and exhaled. In this test, the person drinks a lactose-loaded beverage and the breath is analyzed at regular intervals. Raised levels of hydrogen in the breath indicate improper digestion of lactose. Certain foods, medications, and cigarettes can affect the accuracy of the test and should be avoided before taking the test. People should check with their doctor to make sure they are not taking medications that may interfere with test results.

The lactose tolerance and hydrogen breath tests are not given to infants younger than 6 months of age. A large lactose load can be dangerous prior to this age, as infants are more likely to become dehydrated from diarrhea that can be caused by lactose intolerance.

- **Stool Acidity Test.** This test may be used for infants and young children to measure the amount of acid in their stool. Undigested lactose fermented by bacteria in the colon creates lactic acid and other fatty acids that can be detected in a stool sample. Glucose may also be present in the sample as a result of unabsorbed lactose in the colon.

## What causes lactose intolerance?

Some causes of lactose intolerance are well known. Primary lactase deficiency is a condition that develops over time. After about age 2 the body begins to produce less lactase, though most people will not notice symptoms until they are much older.

Secondary lactase deficiency occurs when injury to the small intestine or certain digestive diseases reduce the amount of lactase a person produces. These diseases include celiac disease, inflammatory bowel disease, and Crohn's disease.

Researchers have identified a genetic link for lactose intolerance. Some people are born with a likelihood of developing primary lactase deficiency because it has been passed to them genetically (inherited from their parents). This discovery may be useful in developing a diagnostic test to identify people with the condition.

## Who is at risk for lactose intolerance?

Between 30 and 50 million Americans are lactose intolerant and certain ethnic and racial populations are more affected than others. Up to 80 percent of African Americans, 80 to 100 percent of American Indians, and 90 to 100 percent of Asian Americans are lactose intolerant. The condition is least common among people of northern European descent.

Babies that are born prematurely are also more likely to be lactose intolerant, because lactase levels do not increase until the third trimester of a woman's pregnancy.

## How is lactose intolerance treated?

Lactose intolerance is easy to treat. No treatment can improve the body's ability to produce lactase, but symptoms can be controlled through diet.

Young children and infants with lactase deficiency should not consume lactose-containing formulas or foods until they are able to tolerate lactose digestion. Most older children and adults do not have to avoid lactose completely, but people differ in the amounts and types of foods they can handle. For example, one person may have symptoms after drinking a small glass of milk, while another can drink one glass but not two. Others may be able to manage ice cream and aged cheeses, such as cheddar and Swiss, but not other dairy products. People can also tolerate more lactose by having smaller amounts of it at one time. The level of dietary control needed with lactose intolerance depends on how much lactose a person's body can handle.

For those who react to very small amounts of lactose or have trouble limiting their intake of foods that contain it, the lactase enzyme is available without a prescription to help people digest foods that contain lactose. The tablets are taken with the first bite of dairy food. Lactase enzyme is also available as a liquid. Adding a few drops of the enzyme makes lactose more digestible for people with lactose intolerance.

Lactose-reduced milk and other products are available at most supermarkets. The milk contains all of the nutrients found in regular milk and remains fresh for about the same length of time, or longer if it is super-pasteurized.

## How is nutrition balanced?

Milk and other dairy products are a major source of nutrients in the American diet. One of the most important of these nutrients is calcium. Calcium is essential for the growth and repair of bones throughout life. In the middle and later years, a shortage of calcium may lead to thin, fragile bones that break easily, a condition called osteoporosis. A concern for both children and adults with lactose intolerance is getting enough calcium in a diet that includes little or no dairy products.

The Institute of Medicine released a report listing the requirements for daily calcium intake. How much calcium a person needs to maintain good health varies by age group. Recommendations from the report are shown in the following table.

| Age group    | Amount of calcium to consume daily, in milligrams (mg) |
|--------------|--|
| 0–6 months   | 400 mg   |
| 6–12 months  | 600 mg   |
| 1–5 years    | 800 mg   |
| 6–10 years   | 1,200 mg   |
| 11–24 years  | 1,200–1,500 mg   |
| 19–50 years  | 1,000 mg   |
| 51–70+ years | 1,500 mg   |

In addition, pregnant and nursing women need between 1,200 and 1,500 mg of calcium daily.

In planning meals, people with lactose intolerance should make sure that each day's diet includes enough calcium, even if dairy products are not included. Many non-dairy foods are high in calcium, including dark green vegetables such as broccoli, or fish with soft, edible bones, such as salmon and sardines. To help in planning a high-calcium, low-lactose diet, the table that follows lists some common foods that are good sources of dietary calcium and shows how much lactose they contain.

Recent research shows that yogurt with active cultures may be a good source of calcium for many people with lactose intolerance. Even though yogurt is fairly high in lactose, the bacterial cultures used to make it produce some of the lactase enzyme required for proper digestion.

Clearly, many foods can provide the calcium and other nutrients the body needs, even when intake of milk and dairy products is limited. However, factors other than calcium and lactose content should be kept in mind when planning a diet. Some vegetables that are high in calcium (Swiss chard, spinach, and rhubarb, for example) are not listed in the chart because the body cannot use the calcium they contain because these foods also contain substances called oxalates, which stop calcium absorption.

## Calcium and Lactose in Common Foods

| <b>Nondairy Products</b>                 | <b>Calcium Content</b> | <b>Lactose Content</b> |
|--|------------------------|------------------------|
| Soymilk, fortified, 1 cup                | 200–300 mg             | 0                      |
| Sardines, with edible bones, 3 oz.       | 270 mg                 | 0                      |
| Salmon, canned, with edible bones, 3 oz. | 205 mg                 | 0                      |
| Broccoli, raw, 1 cup                     | 90 mg                  | 0                      |
| Orange, 1 medium                         | 50 mg                  | 0                      |
| Pinto beans, 1/2 cup                     | 40 mg                  | 0                      |
| Tuna, canned, 3 oz.                      | 10 mg                  | 0                      |
| Lettuce greens, 1/2 cup                  | 10 mg                  | 0                      |
| <b>Dairy Products</b>                    |                        |                        |
| Yogurt, plain, low-fat, 1 cup            | 415 mg                 | 5 g                    |
| Milk, reduced fat, 1 cup                 | 295 mg                 | 11 g                   |
| Swiss cheese, 1 oz.                      | 270 mg                 | 1 g                    |
| Ice cream, 1/2 cup                       | 85 mg                  | 6 g                    |
| Cottage cheese, 1/2 cup                  | 75 mg                  | 2–3 g                  |

Adapted from *Manual of Clinical Dietetics*. 6th ed. American Dietetic Association, 2000; and Soy Dairy Alternatives. Available at: [www.soyfoods.org](http://www.soyfoods.org).

Calcium is absorbed and used only when there is enough vitamin D in the body. A balanced diet should provide an adequate supply of vitamin D from sources such as eggs and liver. Sunlight also helps the body naturally absorb vitamin D, and with enough exposure to the sun, food sources may not be necessary.

Some people with lactose intolerance may think they are not getting enough calcium and vitamin D in their diet. Consultation with a doctor or dietitian may be helpful in deciding whether dietary supplements are needed. Taking vitamins or minerals of the wrong kind or in the wrong amounts can be harmful. A dietitian can help plan meals that will provide the most nutrients with the least chance of causing discomfort.

## What is hidden lactose?

Although milk and foods made from milk are the only natural sources of lactose, it is often added to prepared foods. People with very low tolerance for lactose should know about the many food products that may contain even small amounts of lactose, such as

- bread and other baked goods
- processed breakfast cereals
- instant potatoes, soups, and breakfast drinks
- margarine
- lunch meats (other than kosher)
- salad dressings
- candies and other snacks
- mixes for pancakes, biscuits, and cookies
- powdered meal-replacement supplements

Some products labeled non-dairy, such as powdered coffee creamer and whipped toppings, may actually include ingredients that are derived from milk and therefore contain lactose.

Learn to read food labels with care, looking not only for milk and lactose, but also for words such as whey, curds, milk by-products, dry milk solids, and non-fat dry milk powder. If any of these words are listed on a label, the product contains lactose.

Lactose is also used in more than 20 percent of prescription drugs and about 6 percent of over-the-counter medicines. Many types of birth control pills contain lactose, as do some tablets for stomach acid and gas. However, these products typically affect only people with severe lactose intolerance.

## Summary

Even though lactose intolerance is common, it is not a threat to good health. People who have trouble digesting lactose can learn which dairy products and other foods they can eat without discomfort and which ones they should avoid. Many people can enjoy milk, ice cream, and other such products if they eat them in small amounts or eat other food at the same time. Others can use lactase liquid or tablets to help digest the lactose. Even older women at risk for osteoporosis and growing children who must avoid milk and foods made with milk can meet most of their dietary needs by eating greens, fish, and other calcium-rich foods that are free of lactose. A carefully chosen diet, with calcium supplements if the doctor or dietitian recommends them, is the key to reducing symptoms.

## For More Information

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