



# Lactose Intolerance

## Lactose Intolerance Overview

Lactose is a natural sugar found in milk and dairy products such as cheese and yogurt. After eating this sugar, a digestive enzyme called lactase helps to breakdown lactose into two simple sugars, glucose and galactose for digestion. These simple sugars are then absorbed in the small intestine and ultimately reach the blood stream where they act as nutrients. The enzyme lactase is in the lining of the small intestine known as the intestinal villi.

In addition to milk and dairy products such as cream, ice cream, yogurt and cheese, lactose can be found in bread and baked goods, processed breakfast cereals, instant potatoes, some soups and non-kosher lunch meats, candies, dressings and mixes for pancakes and biscuits. Lactose is also the sugar found in breast milk and standard infant formulas and serves as their primary dietary sugar.

## Symptoms

In those who are lactose intolerant, lactose is not able to be properly digested in the small intestine. Instead, it passes undigested into the colon (large intestine). Upon reaching the colon, it is broken down by the normal colon bacteria in a process called fermentation. This breakdown results in the production of carbon dioxide and hydrogen gases, organic acids, and other molecules leading to the following common symptoms:

- Abdominal distension called bloating
- Abdominal cramping or pain
- Excess burping
- Loud bowel sounds
- Excess gas
- Diarrhea with watery or explosive bowel movements
- Sudden urge to have a bowel movement

The symptoms of lactose intolerance can start during childhood or adolescence and tend to get worse with age, though many people do not develop symptoms until later in life. The severity of symptoms is usually proportional to the amount of the milk sugar ingested with more symptoms following a meal with higher milk sugar content.

Although eating lactose-containing products will result in discomfort for someone who is lactose intolerant, they are not at risk of developing more serious intestinal disease because of long-term lactose malabsorption. The only exception to this would be for babies who are born with primary lactase deficiency or children with secondary lactase deficiency as discussed below.

## Causes

**Primary Lactase Deficiency:** This condition is very rare and occurs when babies are born with a deficiency or absence of the enzyme lactase. Babies inherit this condition by getting one gene that causes this problem from each of their parents, even though both parents may be lactose tolerant. These babies require a specialized formula with another type of sugar such as sucrose (present in table sugar), which they can digest.

**Secondary Lactase Deficiency:** The most common cause of temporary lactose intolerance in infants and young children is by an infection that affects the gastrointestinal tract and can damage the lining of the small intestine.

Rotavirus and Giardia are two common organisms that cause damage to the surface of the small intestine resulting in temporary lactose intolerance. Older infants and young children will commonly be infected by a rotavirus. The symptoms of rotavirus infection include vomiting, diarrhea (frequent watery stools), and fever. Giardia is a parasite that is found in well water and fresh water from lakes and streams. Treatment of giardia infection with antibiotics will resolve the lactose intolerance.

Secondary lactase deficiency can also be due to Celiac disease, which is an intolerance or allergy to gluten, the protein found in wheat, rye, barley, and other grains. Crohn's disease is an inflammatory condition that can affect any part of the gastrointestinal tract can lead to secondary lactase deficiency as well. Once each of these conditions is treated, the lactase deficiency will typically resolve. The lactose intolerance usually resolves within three to four weeks when the lining of the intestines returns to normal.

**Acquired Lactase Deficiency:** Many individuals acquire lactose intolerance as they get older. It is estimated that approximately one half of adults in the United States have acquired lactase deficiency. This condition is due to a normal decline in the amount of the enzyme lactase present in the small intestine as we age. Although lactose is an important part of the diet in infants and young children it represents only 10% of the carbohydrate (sugar) intake in adults. However, individuals who are lactose intolerant may not be able to tolerate even small amounts of this sugar in their diet.

Lactose intolerance occurs more frequently in certain families. One of the most important factors affecting the rate of developing lactose intolerance is an individual's ethnic background. Approximately 15% of adult Caucasians, and 85% of adult African Americans in the United States are lactose intolerant. The rate of lactose intolerance is also very high in individuals of Asian descent, Hispanic descent, Native Americans and Jewish individuals.

## Diagnosis

Lactose intolerance is diagnosed by a simple test called a hydrogen breath test. After an overnight fast before the test, an individual breathes into a bag and then drinks a specified amount of the milk sugar as a syrup. In adults this corresponds to the amount of milk sugar in a quart of milk. Subsequent breath samples are taken for up to three hours. The breath that they exhale into the bag is analyzed to determine its hydrogen content. During the test individuals who are lactose intolerant will have an increase in the amount of hydrogen that they exhale. If the values for hydrogen increase above a certain value, the diagnosis of lactose intolerance is made. Patients who are lactose intolerant may also develop their typical symptoms during the test.

In those who cannot undergo testing, removal of lactose from the diet and possible supplementation with lactase can be done for 2 weeks to see if this improves the symptoms and see if symptoms return if lactose is added back to the diet..

## Treatment

The best treatment of lactose intolerance is a combination of dietary modification to avoid lactose containing foods, and if eating foods with lactose taking a supplement to aid in digestion of lactose. Individuals who are lactose intolerant should meet with a dietician to review the sources of lactose in their diet. Some reduction in the daily lactose consumption is usually required. When an individual is going to be eating a food that contains lactose they should take a commercially available non-prescription lactase supplement at the time of lactose ingestion. This type of supplement can be taken throughout the day whenever lactose is ingested. Some individuals will be less lactose intolerant and therefore will be able to tolerate comparatively larger amounts of lactose. Alternatives to milk for lactose intolerant individuals include products such as soy milk. If an individual is restricting their milk/ dairy intake it is important to ensure adequate supplementation of calcium and Vitamin D in the diet. This is especially important for pediatric patients and women.

Recommended daily calcium intakes:

1-3 years of age	500 mg
4-8 years of age	800 mg
9-24 years of age	1300 mg
Age 25 and above	800-1000 mg
Pregnant and nursing women	1200 mg

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