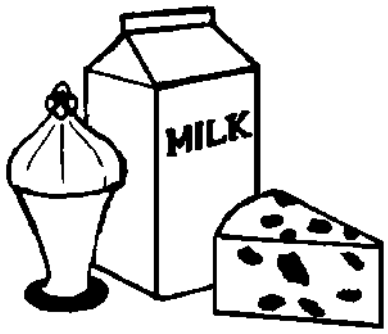
ARTICLE: Lactose Intolerance



What is Lactose Intolerance?

Lactose intolerance is the inability to digest significant amounts of lactose, the predominant sugar of milk. This inability results from a shortage of the enzyme lactase, which is normally produced by the cells that line the small intestine (see figure 1). Lactase breaks down milk sugar into simpler forms that can then be absorbed into the bloodstream. When there is not enough lactase to digest the amount of lactose consumed, the results, although not usually dangerous, may be very distressing. While not all persons deficient in lactase have symptoms, those who do are considered to be lactose intolerant.

Common symptoms include nausea, cramps, bloating, gas, and diarrhea, which begin about 30 minutes to 2 hours after eating or drinking foods containing lactose. The severity of symptoms varies depending on the amount of lactose each individual can tolerate.

Some causes of lactose intolerance are well known. For instance, certain digestive diseases and injuries to the small intestine can reduce the amount of enzymes produced. In rare cases, children are born without the ability to produce lactase. For most people, though, lactase deficiency is a condition that develops naturally over time. After about the age of 2 years, the body begins to produce less lactase. However, many people may not experience symptoms until they are much older.

Between 30 and 50 million Americans are lactose intolerant. Certain ethnic and racial populations are more widely affected than others. As many as 75 percent of all African-Americans and Native Americans and 90 percent of Asian-Americans are lactose intolerant. The condition is least common among persons of northern European descent.

How Is Lactose Intolerance Diagnosed?

The most common tests used to measure the absorption of lactose in the digestive system are the lactose tolerance test, the hydrogen breath test, and the stool acidity test. These tests are performed on an outpatient basis at a hospital, clinic, or doctor's office.

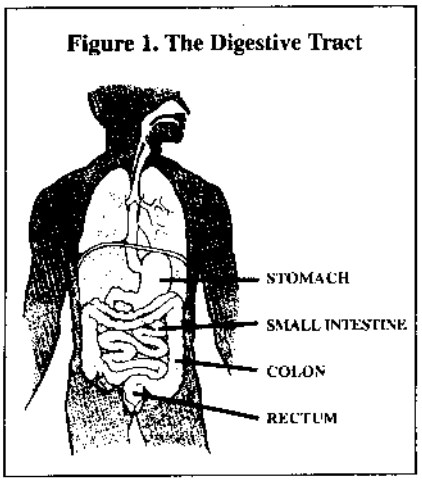
The lactose tolerance test begins with the individual fasting (not eating) before the test and then drinking a liquid that contains lactose. Several blood samples are taken over a 2-hour period to measure the person's blood glucose (blood sugar) level, which indicates how well the body is able to digest lactose.

Normally, when lactose reaches the digestive system, the lactase enzyme breaks down lactose 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 lactose is incompletely broken down the blood glucose level does not rise, and a diagnosis of lactose intolerance is confirmed.

The hydrogen breath test measures the amount of hydrogen in the breath. Normally, very little hydrogen is detectable in the breath. However, undigested lactose in the colon is fermented by bacteria, and various gases, including hydrogen, are produced. The hydrogen is absorbed from the intestines, carried through the bloodstream to the lungs, and exhaled. In the test, the patient 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 test's accuracy and should be avoided before taking the test. This test is available for children and adults.

The lactose tolerance and hydrogen breath tests are not given to infants and very young children who are suspected of having lactose intolerance. A large lactose load may be dangerous for very young individuals because they are more prone to dehydration that can result from diarrhea caused by the lactose. If a baby or young child is experiencing symptoms of lactose intolerance, many pediatricians simply recommend changing from cow's milk to soy formula and waiting for symptoms to abate.

If necessary, a stool acidity test, which measures the amount of acid in the stool, may be given to infants and young children. Undigested lactose fermented by bacteria in the colon creates lactic acid and other short-chain fatty acids that can be detected in a stool sample. In addition, glucose may be present in the sample as a result of unabsorbed lactose in the colon.



How Is Lactose Intolerance Treated?

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

Young children with lactase deficiency should not eat any foods containing lactose. Most older children and adults need not avoid lactose completely, but individuals differ in the amounts of lactose they can handle. For example, one person may suffer 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. Dietary control of lactose intolerance depends on each person's learning through trial and error how much lactose he or she can handle.

For those who react to very small amounts of lactose or have trouble limiting their intake of foods that contain lactose, lactase enzymes are available without a prescription. One form is a liquid for use with milk. A few drops are added to a quart of milk, and after 24 hours in the refrigerator, the lactose content is reduced by 70 percent. The process works faster if the milk is heated first, and adding a double amount of lactase liquid produces milk that is 90 percent lactose free. Amore recent development is a chewable lactase enzyme tablet that helps people digest solid foods that contain lactose. Three to six tablets are taken just before a meal or snack.

Lactose-reduced milk and other products are available at many 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. 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, then, for both children and adults with lactose intolerance, is getting enough calcium in a diet that includes little or no milk.

The recommended dietary allowance (RDA) for calcium, revised in 1989 by the Food and Nutrition Board of the National Academy of Sciences, varies by age group. Infants up to 5 months need 400 mg per day, and from 5 months to 1 year, 600 mg. Children 1 to 10 years need 800 mg and 11- to 24- year-olds need 1,200 mg. Pregnant and nursing women also need 1,200 mg per day, and people age 25 and older need 800 mg per day. However, the results of a 1984 conference at the National Institutes of Health (NIH) suggest that women who have not yet reached menopause and older women who are taking the hormone estrogen after menopause should consume about 1,000 mg of calcium daily (roughly the amount in a quart of milk).

In planning meals, making sure that each day's diet includes enough calcium is important, even if the diet does not contain dairy products. Many nondairy foods are high in calcium. Green vegetables, such as broccoli and kale, and fish with soft, edible bones, such as salmon and sardines, are excellent sources of calcium. To help in planning a high-calcium and low-lactose diet, figure 2 lists some common foods that are good sources of dietary calcium and shows about how much lactose the foods contain.

Recent research shows that yogurt with active cultures may be a good source of calcium for many people with lactose intolerance, even though it is fairly high in lactose. Evidence shows that the bacterial cultures used in making yogurt 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 instance) are not listed in figure 2 because the body cannot use their calcium content. They contain substances called oxalates, which stop calcium absorption. 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. Sources of vitamin D include eggs and liver. However, sunlight helps the body naturally absorb or synthesize 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 any dietary supplements are needed. Taking vitamins or minerals of the wrong kind or in the wrong amounts can be harmful. A dietitian can help in planning 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, lactose is often added to prepared foods. People with very low tolerance for lactose should know about the many food products that may contain lactose, even in small amounts. Food products that may contain lactose include:

- 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.

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

Smart shoppers learn to read food labels with care, looking not only for milk and lactose among the contents but also for such words as whey, curds, milk by-products, dry milk solids, and nonfat dry milk powder. If any of these are listed on a label, the item contains lactose.

In addition, lactose is used as the base for more than 20% percent of prescription drugs and about 6 % of over-the-counter medicines. Many types of birth control pills, for example, 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 widespread, it need not pose a serious 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 will be able to enjoy milk, ice cream, and other such products if they take them in sma11 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 special 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 and protecting future health.

Figure 2. Calcium and Lactose in Common Foods

	Calcium Content*	Lactose Content**
Vegetables		
Broccoli (cooked), 1 cup	94 - 177 mg	0
Chinese cabbage (bok choy, cooked), 1 cup	158 mg	0
Collard greens (cooked), 1 cup	148 - 357 mg	0
Kale (cooked), 1 cup	94 - 179 mg	0
Turnip greens (cooked), 1 cup	194 - 249 mg	0
Dairy Products		
Ice cream/ice milk, 8 oz	176 mg	6 - 7 g
Milk (whole, low-fat skim, buttermilk), 8 oz	291 - 316 mg	12 - 13 g
Processed cheese, 1 oz	159 - 219 mg	2 - 3 g
Sour cream, 4 oz	134 mg	4 - 5 g
Yogurt (plain), 8 oz	274 - 415 mg	12 - 13 g
Fish/Seafood		
Oysters (raw), 1 cup	226 mg	0
Salmon with bones (canned), 3 oz	167 mg	0
Sardines, 3 oz	371 mg	0
Shrimp (canned), 3 oz	98 mg	0
Other		
Molasses, 2 tbsp	274 mg	0
Tofu (processed with calcium salts), 3 oz	225 mg	0

* Nutritive Value of Foods. Values vary with methods of processing and preparation.

** Derived from *Lactose Intolerance: A Resource Including Recipes*, Food Sensitivity Series, American Dietetic Association, 1991.