

Lactose Intolerance

This report provides a short, but comprehensive overview of the condition known as lactose intolerance, including its underlying physiology, prevalence, diagnosis, and dietary management. Important terms are defined, such as the difference between lactose intolerance and lactose maldigestion. The report reviews clinical trials showing that those with lactose intolerance can manage the condition without cutting dairy foods from their diet, and discusses the most effective dietary management strategies. Statements by several government and health organizations support the use of dairy foods for those with lactose intolerance.

Scientific Status Report

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Introduction

Lactose ("milk sugar") is a disaccharide found naturally in milk and other dairy foods and added in very small amounts to some prepared foods such as breads, dry cereals, and salad dressings.¹ During digestion, the intestinal enzyme, lactase, breaks down lactose into the simple sugars, glucose and galactose, for absorption into the bloodstream. Most people produce sufficient amounts of lactase at birth and during childhood to digest normal amounts of dietary lactose.^{1,2} However, sometime after two years of age, intestinal lactase activity begins to decline in some individuals.³

Insufficient amounts of lactase may result in large amounts of undigested lactose in the colon after consuming lactose-containing foods. This lactose is fermented by naturally occurring bacteria potentially resulting in symptoms of flatulence, abdominal bloating, diarrhea, and stomach cramps.^{2,3} The severity of symptoms varies with the amount of lactose consumed and the ability of the individual to tolerate lactose.

Defining Lactose Intolerance and Maldigestion

The distinction between lactose intolerance and lactose malabsorption needs to be made. Lactose malabsorption is the reduced digestion of lactose due to a genetically determined decline in the activity of the lactase enzyme.² Lactose intolerance is the occurrence of gastrointestinal symptoms that may result after persons with lactose malabsorption consume a greater amount of lactose than the body's ability to digest and absorb it.² It is important to note that not everyone who maldigests lactose will experience intolerance symptoms. Also, many individuals who think they are lactose intolerant are not lactose malabsorbers.¹⁻⁵

According to the National Institutes of Health (NIH) consensus report on lactose intolerance and health, lactose intolerance is a real and important clinical condition, but its true prevalence in the general U.S. population is unknown.² Although there is insufficient evidence to determine the true prevalence of lactose intolerance and lactose malabsorption, reported occurrences vary across racial and ethnic groups.^{2,3} In general, European Americans have the lowest reported occurrence, while African Americans, Hispanic Americans, Asian Americans, and Native Americans have higher, albeit variable, prevalence rates.² In a national multiethnic sample of 1,084 adults, the overall prevalence rate of age-adjusted, self-reported lactose intolerance was 12% - about 8% of European Americans, 10% of Hispanic Americans, and 19.5% of African Americans.⁶ These self-reported rates of lactose intolerance⁶, as well as recent others^{7,8}, are much lower than earlier estimates based on lactose maldigestion reported by Nicklas and coworkers.⁶

Lactose maldigestion can be diagnosed on an outpatient basis by the breath hydrogen test (i.e., measurement of the amount of hydrogen in the breath), which is the "gold standard," or the stool acidity test (i.e., measurement of the amount of acid in the stool).¹⁻³ Diagnosis can also be based on intestinal biopsy and genetic tests. In individuals with lactose maldigestion, estimates of the incidence of lactose intolerance (symptoms) in real-life settings may be exaggerated if diagnostic tests involve the administration of very large doses of lactose (e.g., 50 g of lactose, the amount in one quart or 4 cups of milk) which are not representative of the typical intake in a single meal.^{2,6}

Lactose intolerance is far less common than lactose maldigestion.^{2,9} Many individuals who think they are lactose intolerant actually are not.^{4,5,9-13} In a study involving 30 adults who described themselves as severely lactose intolerant, 30% (nine) were able to absorb lactose (10). Moreover, both lactose digesters and maldigesters were able to tolerate one cup (8 ounces) of reduced-fat milk consumed with

breakfast with minimal, if any, symptoms.¹⁰ In fact, well-controlled studies indicate that the vast majority of lactose maldigesters report no significant difference in symptoms experienced after drinking one cup of regular milk compared to lactose-free milk.¹¹ A meta-analysis of 21 studies found that “lactose is not a major cause of symptoms for lactose maldigesters following usual intakes of dairy foods, that is, 1 cup.”⁹ Some lactose maldigesters who self-report lactose intolerance symptoms can consume two cups of milk/day, one with breakfast and another several hours later with dinner without considerable symptoms.¹² A study demonstrated that women with lactose maldigestion could consume a dairy-rich diet (i.e., 2 cups of milk, 1 cup of yogurt, and 56 grams of cheese) providing about 1,500 mg calcium/day without developing symptoms of lactose intolerance resulting from lactose maldigestion.¹³ Consequently, a positive diagnosis of lactose maldigestion does not mean that milk and other dairy foods that contain lactose need to be eliminated from the diet.^{1,2,14}

Avoiding milk and other dairy foods due to concerns about lactose intolerance may not only be unnecessary, but also could lead to nutrient shortcomings which may predispose individuals to negative health outcomes.^{2,8,15} The dairy food group (milk, cheese, yogurt) is a substantial contributor of essential nutrients to the U.S. diet such as calcium, potassium, phosphorus, magnesium, zinc, high-quality protein, vitamin A, vitamin D, vitamin B12, and riboflavin.¹⁶ A dairy-poor diet can lead to shortcomings in several of these nutrients such as calcium, vitamin D, and potassium, which are identified as nutrients of concern by the 2010 Dietary Guidelines for Americans.^{14,15}

Lactose malabsorption per se is not a risk factor for osteoporosis if intakes of calcium and other bone-building nutrients are adequate.^{2,17} However, lactose intolerance may be partly to blame for decreased intake of calcium-rich dairy foods which may contribute to low calcium intake^{7,8,18-24}, a risk factor for reduced bone density and osteoporosis.²⁵ A study found that adolescent girls aged 10 to 13 years who perceived themselves to be milk intolerant consumed less calcium and had lower bone mineral content in the spine than girls who did not think they were milk intolerant.²⁰ In some minority groups, culturally determined food preferences and dietary practices learned early in life may contribute to low dairy food intake^{7,23,26,27}. Adults who perceived themselves to be lactose intolerant reported significantly lower calcium intakes from dairy foods and significantly more cases of physician-diagnosed diabetes and hypertension, according to a recent cross-sectional study.⁸

Strategies for Consuming Dairy Foods

Individuals differ in their ability to handle lactose and several strategies are available to allow consumption of adequate amounts of dairy foods in the diet.^{1-3,14} Consumption of milk in smaller portions more often throughout the day generally is well tolerated.² In addition, consuming milk with meals or solid food improves tolerance to lactose.^{2,28} Also, whole milk may be better tolerated than skim milk²⁹, although this finding is disputed.³⁰ Chocolate milk may be better tolerated than unflavored milk by lactose maldigesters.^{29,31} Most natural cheeses (e.g., Cheddar, Swiss) contain low amounts of lactose.³²

Many fermented and culture-containing milk products such as yogurt with live and active cultures may be well tolerated by adults and children with lactose maldigestion.^{2,33-37} The ability to tolerate the lactose in yogurt may be explained by the slower emptying of yogurt than milk from the stomach and the release of lactase from the bacterial cultures used to make yogurt.^{1,33-35} The lactase in these bacterial cultures survives passage through the acid environment of the stomach and then is released in the intestine where it aids in the digestion of yogurt's lactose.¹ Lactase in yogurt does not appear to improve the digestion of lactose in other dairy foods consumed at the same time as yogurt.³⁸

Because the lactase enzyme becomes inactive by very high or low temperatures, yogurt pasteurized after the addition of cultures and frozen yogurt are less likely than fresh yogurt (cultures added to pasteurized milk) to improve lactose digestion.^{36,39} Pasteurized yogurt, cultured buttermilk, and sweet acidophilus milk may result in varying tolerability⁴⁰, further stressing the importance of individual management strategies. Also, kefir, a fermented milk beverage, has been shown to improve lactose digestion similar to yogurt as compared to milk.⁴¹ One study found that lactose digestion and tolerance were similar for frozen yogurt, ice milk, and ice cream.³⁹ Because of their high solids and/or fat content, which slow gastric emptying time, these foods may be better tolerated by lactose maldigesters.³⁹

For individuals who have difficulty tolerating even small amounts of lactose, a wide variety of lactose-free dairy foods (e.g., reduced-fat, low-fat, fat-free, chocolate, and whole milk, ice cream, cottage cheese) are available. These lactose-free dairy products contain the same nutrients as their regular counterparts, just without the lactose. A large-scale study assessing the taste acceptance of 893 Caucasian, African American, and Hispanic adults with self-reported lactose intolerance found that lactose-free cow's milk scored significantly higher for overall liking than tested soy-based products among study participants, which included both lactose tolerant and lactose intolerant individuals.⁴² Similarly, school-aged children with lactose intolerance have been shown to like lactose-free milk more than milk substitutes such as fortified soy beverages.⁴³

Preliminary data indicate that gradually increasing lactose intake over time may be helpful for some individuals.^{2,44,45} When African American adolescent girls diagnosed as lactose maldigesters consumed a dairy-rich diet for 21 days, tolerance to lactose improved. In fact, the teens were able to tolerate approximately 1,100 mg calcium/day from dairy products with minimal symptoms.⁴⁴

Lactose intolerance does not mean dairy avoidance as most individuals can still consume dairy foods with appropriate modifications in the types and amounts of dairy foods consumed.² In fact, accumulating research findings indicate that most self-described "lactose intolerant" individuals and/or lactose maldigesters can meet dairy food intake recommendations by consuming milk and other dairy foods without experiencing symptoms.^{13,44}

Organizational Support for Consuming Dairy Foods

The National Medical Association (NMA), the nation's oldest and largest organization representing African American physicians, recommends that African Americans and others with lactose intolerance make efforts to keep dairy foods in their diets to help meet nutrient recommendations.^{26,27} The NMA recognizes that dietary strategies are available to help African Americans comfortably consume dairy foods, and that their low calcium and dairy food intake are associated with several diseases (e.g., hypertension) disproportionately affecting this population group.^{26,27} In its most recent statement, the NMA suggests strategies that health professionals can use to educate their lactose intolerant patients and help them increase their intake of dairy-based nutrients.²⁷ The 2010 Dietary Guidelines for Americans recommends low-lactose and lactose-free dairy foods as an option for individuals who are lactose intolerant.¹⁴

The American Academy of Pediatrics (AAP), in its reports on lactose intolerance⁴⁶ and bone health⁴⁷, encourages children and adolescents with lactose intolerance to continue to consume dairy foods to help meet calcium, vitamin D, protein, and other nutrient needs for bone health and overall growth. The AAP cautions that lactose intolerance usually does not require avoidance of dairy foods.⁴⁶ Many

children sensitive to lactose can drink small amounts of milk, especially with other foods, natural cheeses (e.g., Cheddar, Swiss), yogurt with live and active cultures, or lactose-free milk.⁴⁶ In an article by two members of the AAP Committee on Nutrition, the authors state that “perceived lactose intolerance sometimes can lead parents to avoid offering milk and other dairy products to infants and children. Such food myths can lead to needless dietary omissions as well as nutritional deficiencies.”⁴⁸ The U.S. Department of Agriculture’s Food and Nutrition Service, in its interim rule revising regulations governing the WIC (Special Supplemental Nutrition Program for Women, Infants and Children) food packages, recommends lactose-reduced or lactose-free dairy products as an important first option before non-dairy choices for those with lactose intolerance and allows amounts of cheese that exceed the maximum substitution amounts for those who obtain medical documentation.⁴⁹

For more information about lactose intolerance, refer to a recent issue of the Dairy Council Digest, as well as the Lactose Intolerance Health Education Kit.^{50,51}

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