



Unintended Consequences of Dairy Avoidance

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Dairy consumption in the United States has been declining steadily since the end of World War II. There are significant and potentially serious health consequences of this trend. The Dietary Guidelines for Americans (DGA) (1), issued every five years, have repeatedly stressed the importance of maintaining an adequate dairy intake, and the 2010 DGA specifically cited three servings of low-fat or fat-free milk and milk products daily for all adults. By contrast, the typical U.S. diet today contains less than half of what the guidelines recommend.

REASONS FOR DAIRY AVOIDANCE

There are many reasons why people consume fewer dairy foods today, and why some actually avoid them altogether. In addition to personal choice, a common reason is simply inconvenience or reduced availability. Soft drink consumption has increased by more than 300% over the past 50 years, inevitably reducing dairy intake (2). For example, fast food meals most often come as a “package” that includes a carbonated beverage rather than milk, and milk is seldom an option in vending machines. Sometimes patients avoid dairy products on the advice of health professionals—for example, because they have had kidney stones, or have calcium deposits around their joints, or have bothersome skin conditions that are difficult to treat. Additionally, some health care professionals believe that adults do not need milk. Since they often feel that they have little else to offer a patient with some of these conditions, recommending avoidance of calcium-rich dairy seems a plausible, if misguided, treatment option.

These disease-connected reasons are almost always mistaken and may actually result in harm, both to the patient’s general nutrition and sometimes also to the condition for which the dairy avoidance was prescribed. For example, patients with kidney stones placed on low-dairy diets actually have twice the stone recurrence as those who sustain a high-dairy diet (3). Further, calcium deposits at various places in the body have no relation to dietary calcium intake or to calcium source. Reducing dairy intake will neither prevent nor alleviate such deposits.

One of the many reasons why some health professionals recommend dairy avoidance is the condition known as

lactose intolerance. Lactose, the sugar found in milk is a disaccharide that is hydrolyzed in the small intestine into two simple sugars (glucose and galactose) by the intestinal brush border enzyme lactase, resulting in complete absorption of both sugars. However, there is a progressive physiologic decline in intestinal lactase activity—which begins sometime after weaning and continues into old age—known as primary lactase deficiency, leading to a condition termed “lactase non-persistence.” This incomplete loss of enzyme activity is especially prominent in individuals of East Asian, Hispanic and African ancestry. As a result, undigested milk sugar reaches the colon where it is digested by lactase-producing colonic bacteria generating acids, methane, sulfur, and hydrogen gases as byproducts that may cause gastrointestinal distress. This situation is known as “lactose maldigestion” (4), and if it produces gastrointestinal distress, it is termed “lactose intolerance.” Lactose intolerance is a clinical syndrome, whereas lactose maldigestion is an intraluminal process that is asymptomatic in most cases.

It is important to recognize that not everyone with lactase non-persistence or lactose maldigestion has lactose intolerance. In fact, only a minority experience any sort of distress, and for them there are several good solutions (see “Solutions”) that allow the inclusion of milk in the diet of essentially every adult. A diagnosis of lactose intolerance, as defined by the 2010 National Institutes of Health Consensus Development Panel (5), requires that there be documented lactose maldigestion and reproducible symptoms following dairy food consumption.

CONSEQUENCES OF DAIRY AVOIDANCE

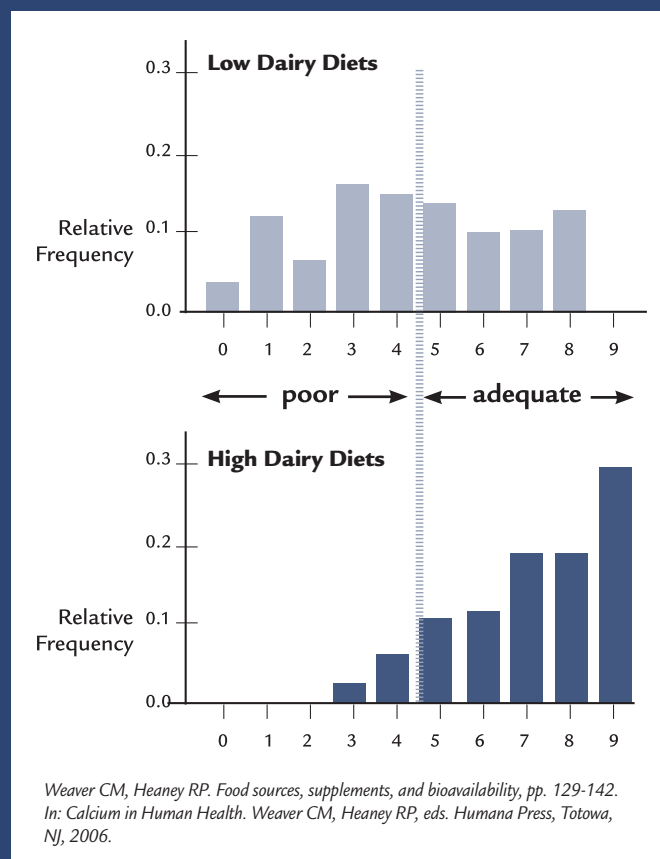
Dairy avoidance is not the solution for any of the conditions previously mentioned. Whatever the reason people avoid dairy, the result is significant and unintended health consequences. Optimal nutrition is like preventive maintenance for an automobile. Inadequate intake of one or more nutrients may have no immediately apparent effects, but ultimately it results in premature organ system breakdown, which in medicine, as we know, is recognized as chronic disease. Diet quality is the key to reducing the risk of this premature system failure.

Diet Quality. It is extremely difficult to construct a diet from today's foods that both excludes dairy and is nutritionally adequate at the same time. (That is the reason the DGA specifically included three servings per day for individuals 9 and older.)

Fig. 1 shows why this is important. It presents the results of a study of 272 healthy premenopausal women, scoring their diets on a nine-point scale, and judging diets with a quality score of four or below as "poor" (6). The top graph depicts the distribution of diet scores for those not consuming the recommended daily amount of calcium (i.e., mostly dairy avoiders), and the bottom graph is for those consuming the recommended amount of calcium (i.e., dairy consumers). The vertical axis in Fig. 1 is the decimal fraction of the women in each group falling into one of the 10 diet score groups. Note that only 10 percent of diets that met calcium intake recommendations (i.e., rich in dairy) fell below five, while more than half of the women with dairy-poor diets had poor diets overall.

The reason for these important differences between dairy-rich and dairy-poor diets is that dairy products are superior sources not only of calcium but also of protein, potassium, magnesium, niacin, vitamin B12, riboflavin, phosphorus, vitamins A and D, and the essential fatty acids—which, like the essential amino acids, cannot be synthesized by the body for itself. A dairy-poor diet has been shown repeatedly to be deficient in these and a broad array of other nutrients, not just calcium (1, 6). This is important from a public health standpoint as well, because milk provides three of the four "nutrients of concern" (calcium, vitamin D, and potassium), identified by the 2010 DGA as

FIGURE 1: Diet Quality With and Without Dairy Consumption



shortfall nutrients. **Fig. 2** shows why this is so. It lists the percent Daily Value for nine key nutrients provided by dairy, contrasting what three servings of dairy provide with the numbers of servings of other foods that would be needed to provide the same amounts. Dairy has the advantage of high nutrient-to-calorie ratios, whether one chooses the low-fat or even full-fat types. In brief, most individuals would have to consume many more calories if they depended on non-dairy sources for the nutrients easily provided by dairy.

Bone Health. As the U.S. Surgeon General's Report on bone stressed, calcium is critically important for bone health (7), and it is well established that individuals who avoid dairy have reduced bone mass and increased risk of fragility fractures (8-17), even in childhood (18). The Surgeon General stressed that calcium intake is far short of real need at essentially all ages, beginning in adolescence.

As most everyone knows, dairy is the principal source of calcium in the modern diet. As a consequence, low dairy diets will almost always be calcium-deficient. Among the unique features of dairy is the way its nutrients work together. As one example, while high calcium intake can protect against bone loss, it will not help build new bone unless the individual has an above average protein intake (as well as adequate vitamin D status). This is not surprising because bone is 50% protein by volume and to build bone you need sufficient dietary protein as well as calcium (19,20). Cow's milk, rich in all three of these nutrients, takes care of that automatically.

Unfortunately, calcium supplements are not, in themselves, adequate substitutes for dairy with its nine essential nutrients, and to some extent this is true as well for plant-based alternative beverages derived from soy, rice, or almonds, which do not provide the unique package of nutrients that are contained within

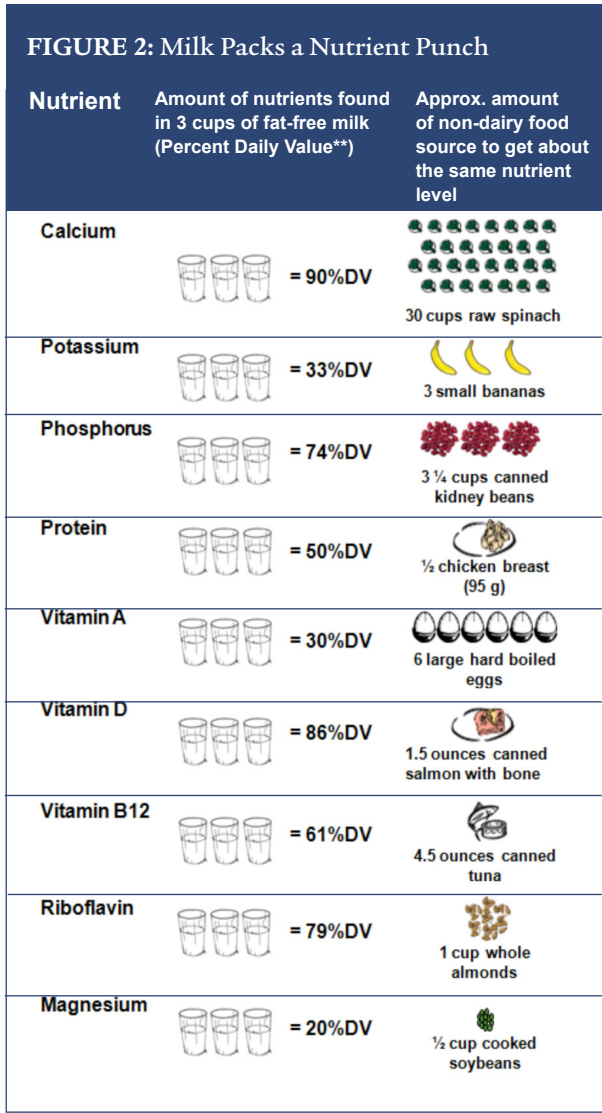
dairy milks. Moreover, the calcium in these alternative beverages may not be well absorbed. (19,21).

Weight Management. Children with low dairy intakes are also at higher risk of being overweight or obese (22,23) than their counterparts with adequate dairy intakes. And for adults, although dairy is not a cure for obesity, there is now general recognition that low-dairy intakes are associated with higher levels of body fat (24). Moreover, weight reduction diets that eliminate dairy are less successful than high-dairy, energy-restricted diets (25,26).

High dairy intakes also have been associated with lower risk of metabolic syndrome (27), hypertension (27-29), and colon and other cancers (30). The protein in dairy foods is the richest source of branched chain amino acids in the diet. These amino acids are essential (i.e., the body cannot synthesize them itself), and are thus necessary for protein replacement and turnover. More importantly in adults, these amino acids are necessary for normal muscle metabolism and insulin responsiveness as well (31,32). In weight reduction diets, these amino acids help to preserve lean muscle mass, forcing the weight loss to be predominantly from fat tissue, which is what the dieter actually wants.

Cardiovascular Disease. Dairy's role in blood pressure regulation was underscored in the Dietary Approaches to Stop Hypertension (DASH) trial, which included an eating plan high in potassium, calcium, magnesium, and protein. The full DASH eating plan included three servings of low-fat dairy each day and resulted in lower systolic and diastolic blood pressures, with the largest effect occurring in hypertensive and African-American patients (33). Experience since this initial trial has amply shown the value of the DASH diet and its role in lowering blood pressure as well as reducing other risk factors for cardiovascular disease (34-36).

The concern several years ago that dairy might increase the risk of atherosclerotic heart disease has been largely abandoned (37,38). This is because large population-based studies have shown that high dairy consumers have actually a lower risk of coronary artery disease (28,38-46). Probably because of its unique fatty acid profile, dairy fat does not produce the same serum lipid changes as other saturated fat sources (39, 47-49).



U.S. Department of Agriculture, Agricultural Research Service. 2010. USDA National Nutrient Database for Standard Reference, Release 23. Nutrient Data Laboratory Home Page

High dairy consumers live longer as well (40,41,49). This is not surprising, considering dairy's *total* nutrient package. Improved longevity is itself, tangible evidence of the long-term importance of diet quality.

Comment. As with all nutrients, there is still more to learn; however there is now a good biologic basis, reasonably well understood, for all of the foregoing benefits. For example, in addition to replacing daily excretory losses of calcium and thereby protecting the skeleton, the calcium that is not absorbed by the intestine nevertheless functions to promote health. While still in the intestinal lumen, ingested calcium complexes with irritating substances such as unabsorbed fatty acids and bile acids that serve as cancer promoters for the colon mucosa (30). This effectively neutralizes these otherwise harmful substances. Similarly, the same calcium, while still in the lumen, complexes with dietary oxalic acid, which is a principal risk factor for calcium stones in the urinary tract (3). Calcium-bound oxalate is not absorbed into the body, and hence does not have to be excreted in the urine (where it would otherwise promote stone formation). This is the primary mechanism by which high-calcium diets actually protect against kidney stones.

SOLUTIONS

The most important first step is for individuals and their healthcare professionals to recognize the health benefits of dairy foods. They should understand that dairy-poor diets will generally be deficient in many nutrients, not just calcium, and that deficient diets can lead to a broad spectrum of chronic diseases. This is a major clinical challenge for health professionals, as the African American Lactose Intolerance Understanding (50) study revealed that most of the African American participants were unaware of the health benefits of dairy foods (51). Yet, when surveyed, 81 percent of a large cohort of lactose intolerant individuals state that they would willingly consume more dairy foods if they could do so with minimal or no symptoms, highlighting the need to utilize strategies that improve tolerance (52). While these strategies have been worked out explicitly for the African American community, they apply equally to individuals of all racial and cultural backgrounds who experience lactose intolerance.

For this reason, effective education and a personal commitment to try to increase dairy intakes are needed.

There are many easy, effective ways to do this, but none of them will work if individuals do not first understand the need or want to improve their own diets and those of their families.

For lactose intolerance, for example, there are several effective strategies to increase dairy food consumption. One is to recommend that patients consume live culture yogurts, which provide the full array of dairy nutrients and which contain organisms that have their own lactase thus minimizing or avoiding entirely the symptoms of lactose intolerance. Hard cheeses, another good source of much of the dairy nutrient package, are low-lactose foods, as they have lost most of their lactose in the process of cheese-making. Another option is to recommend lactose-free dairy products (such as LACTAID® Brand Milk, Cottage Cheese, and Ice Cream) and lactase enzyme supplements, which help break down the lactose in dairy foods so that patients can easily digest and enjoy the benefits of dairy without experiencing the symptoms of lactose intolerance. (53)

Other tips for tolerance for lactose intolerant individuals are set forth in **Table 1**. One of the listed alternatives is to build up milk tolerance in lactase non-persistent individuals by starting with small volumes, consumed with meals, and increasing up to as many as two full cups per day within a matter of just a few weeks (54). This happens because the ingested milk favors an intestinal flora that has its own lactase. An important aspect of this approach is consistency. If a patient stops regular milk or dairy food consumption, then the intestinal flora revert to the low-lactase containing variants.

Table 1: Tips for Tolerance for the Lactose Intolerant Individual

| Tips | Examples |
|--|---|
| Lactose-free dairy foods are now widely available in stores | LACTAID® Brand Milk, Cottage Cheese and Ice Cream |
| Lactase enzyme supplements can be taken with the first bite or sip of dairy foods; repeat supplement if the meal lasts longer than 30-45 minutes | LACTAID® Dietary Supplements with first bite or sip of food |
| Dairy foods are best tolerated with protein and fat in the meal; this slows digestion long enough for the healthy nutrients to be absorbed | Have milk as part of breakfast, lunch, and dinner, not on an empty stomach |
| Slowly introduce dairy foods and consume with a meal; allow 2-3 weeks for the gut to adapt | Start with 1/4-1/2 cup of milk or 1/2 serving of yogurt with a meal then gradually increase. Begin with 1/4-1/2 glass of flavored milks or hot chocolate made with milk, then slowly increase |
| Add dairy to your favorite food | Try adding a small amount of milk to tomato soup or try yogurt-based fruit smoothies |
| Choose aged cheeses that naturally have less lactose | Try Cheddar, Colby, Swiss or Parmesan cheese; top a grilled turkey burger with a slice of cheese |
| Top healthy foods with shredded cheese | Salads or vegetables topped with shredded aged cheese |
| Try different flavors and types of yogurts on your favorite fruit, vegetable or cereal as a dip or dressing | Yogurt with fruit, yogurt with granola, yogurt-based salad dressing, yogurt dips |

Modified From: National Dairy Council Lactose Intolerance Health Education Toolkit.
<http://www.nationaldairycouncil.org/EducationMaterials/HealthProfessionalsEducationKits/Pages/LactoseIntoleranceHealthEducationKit.aspx>.

These solutions are so easy and so effective that the National Medical Association (NMA), the voice of African American physicians in the U.S., has twice in the last 10 years issued consensus statements (51,52) urging all African American physicians (and their patients) to consume three cups of dairy per day. NMA is not alone. **Table 2** lists some key points adapted from publications and policy statements of major professional organizations urging the inclusion of and importance of dairy in the adult diet—especially for those with lactose intolerance. In brief, while many of us are lactase non-persistent, virtually none of us has to be lactose intolerant.

But for all of us, behavioral changes are needed as well. Health professionals should advise their patients, for example, to:

- Ask for milk instead of soda when they grab a burger
- Offer milk at all family meals (breakfast, lunch, and dinner)
- Cook with milk and cheese
- Drink reduced-fat lattes instead of black coffee
- Use calcium-fortified foods when available, recognizing that while these foods can make up for the calcium missing from most diets they usually will not provide many of the other nutrients found in a dairy calcium source

If patients with lactose intolerance are unwilling or uncomfortable with trying small amounts of milk, doctors should recommend lactose-free or reduced dairy products.

Table 2. Lactose Intolerance: What Authoritative Organizations Advise

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| <p>Dietary Guidelines for Americans, 2010 General public, ages 2 years and over</p> | <ul style="list-style-type: none"> • “Those who think they have a food intolerance should be medically evaluated to avoid unnecessarily eliminating foods from their diet ... For some food intolerances, like lactose intolerance, smaller portions (e.g., 4 ounces of milk) or a modified version of the offending foods (e.g., lactose-reduced or lactose-free milk, yogurt, or cheese) may be well tolerated.” • “Increase intake of fat-free or low-fat milk and milk products, such as milk, yogurt and cheese.” <p>Source: http://www.cnpp.usda.gov/dietaryguidelines.htm.</p> |
| <p>NIH Consensus Development Conference: Lactose Intolerance and Health General public</p> | <p>“Conclusions:</p> <ul style="list-style-type: none"> • Lactose intolerance is a real and important clinical syndrome, but its true prevalence is not known. • The majority of people with lactose malabsorption do not have clinical lactose intolerance. Many individuals who think they are lactose intolerant are not lactose malabsorbers. • Many individuals with real or perceived lactose intolerance avoid dairy and ingest inadequate amounts of calcium and vitamin D, which may predispose them to decreased bone accrual, osteoporosis, and other adverse health outcomes. In most cases, individuals do not need to eliminate dairy consumption completely. • Even in persons with lactose intolerance, small amounts of milk, yogurt, hard cheeses, and reduced-lactose foods may be effective management approaches ... Lactase-treated products may be tolerated better than non-treated products, but more research is needed. • Evidence-based dietary approaches with and without dairy foods and supplementation strategies are needed to ensure appropriate consumption of calcium and other nutrients in lactose intolerant individuals. • Educational programs and behavioral approaches for individuals and their healthcare providers should be developed and validated to improve the nutrition and symptoms of individuals with lactose intolerance and dairy avoidance.” <p>Source: http://consensus.nih.gov/2010/lactosestatement.htm.</p> |
| <p>USDA Food Patterns General public, ages 2 years and over</p> | <ul style="list-style-type: none"> • Recommends two to three cups of fat-free or low-fat milk/milk equivalents per day, depending on calorie level. • The USDA food patterns define milk and milk products (also referred to as dairy products) to include all milks, lactose-free and lactose-reduced products; yogurts, frozen yogurts, dairy desserts, cheeses and fortified soy beverages. <p>Source: http://www.cnpp.usda.gov/dietaryguidelines.htm.</p> |
| <p>DASH Eating Plan General public; those with hypertension/pre-hypertension</p> | <ul style="list-style-type: none"> • Recommends two to four servings of fat-free or low-fat milk and milk products, depending on calorie level. • “For lactose intolerance, try either lactase enzyme pills with milk products or lactose-free or lactose-reduced milk.” <p>Source: http://www.nhlbi.nih.gov/health/dci/Diseases/dash/dash_follow.html.</p> |

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Table 2. Lactose Intolerance: What Authoritative Organizations Advise

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| American Academy of Pediatrics Children and teens | <ul style="list-style-type: none">• “The American Academy of Pediatrics supports use of dairy foods as an important source of calcium for bone mineral health and of other nutrients that facilitate growth in children and adolescents. If dairy products are eliminated, other dietary sources of calcium or calcium supplements need to be provided ...”• “Treatment of lactose intolerance by elimination of milk and other dairy products is not usually necessary given newer approaches to lactose intolerance, including the use of partially digested products (such as yogurts, cheeses, products containing <i>Lactobacillus acidophilus</i>, and pretreated milks). Evidence that avoidance of dairy products may lead to inadequate calcium intake and consequent suboptimal bone mineralization makes these important as alternatives to milk. Dairy products remain principal sources of protein and other nutrients that are essential for growth in children.” <p>Source: http://pediatrics.aappublications.org/cgi/content/full/pediatrics;118/3/1279 PEDIATRICS Vol. 118 No. 3 September 2006, pp. 1279-1286.</p> |
| American Dietetic Association General public | <ul style="list-style-type: none">• “Lactose intolerance isn’t an “all or nothing” condition. Instead, it’s a matter of degree. Most people with difficulty digesting lactose can still consume foods with lactose. It’s just a matter of knowing which foods contain lactose -- and knowing your personal tolerance level ... Needlessly avoiding milk and other dairy foods may pose nutritional risks.”• “Lactose intolerance is easy to manage. Most people with difficulty digesting lactose can include some dairy and other lactose-containing foods in their meals and snacks. In fact, most people with lower levels of lactase can drink a cup of milk without discomfort.” [Tips to comfortably include lactose-containing foods in meals and snacks are provided.] <p>Source: Duyff, RL. <i>The American Dietetic Association Complete Food and Nutrition Guide, Third Edition</i>. New York: John Wiley, 2006.</p> |
| Women, Infants, and Children (WIC) Food Packages WIC participants | <ul style="list-style-type: none">• The WIC Program works hard to serve a large population that has various nutritional needs, including food allergies/intolerances. However, the foods eligible for the WIC food packages must meet nutritional requirements set by Federal regulations ... If a pregnant woman on WIC is lactose-intolerant, lactose-reduced milk or soy-based beverage may be substituted. <p>Source: http://www.fns.usda.gov/wic/benefitsandservices/foodpkgquestions.htm.</p> <ul style="list-style-type: none">• Milk and milk alternatives These milks [lactose-reduced and lactose-free milk] are allowed without medical documentation.• FNS encourages state agencies to provide as much choice and variety as possible to accommodate the diverse needs of WIC participants (e.g., also offering low-fat lactose-free milk). <p>Source: http://www.fns.usda.gov/wic/policyandguidance/wicfaqs-foodpackages.htm#VI.</p> |

(Continued)

Table 2. Lactose Intolerance: What Authoritative Organizations Advise

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| American Academy of Family Physicians General public | <p>“You can make changes in your diet that will help you digest milk, or you can get your calcium from other foods ...</p> <ul style="list-style-type: none">• If you can, eat and drink smaller servings of dairy products, but have them more often. The smaller the serving, the less likely it is that you’ll have problems.• Eat food when you drink milk. This slows the digestive process, and you have less chance of having problems.• You may not have any trouble eating yogurt if it includes an active culture. Check the label to see if active culture is included.• Ice cream, milk shakes, and aged (hard) cheeses are easier to digest than milk for most people with lactose intolerance, but these foods are high in fat. If your weight and cholesterol and triglyceride levels are normal, you can try them.• [In addition to] drinking milk, eat foods that are high in calcium, like leafy greens (such as collards, kale, and mustard greens), oysters, sardines, canned salmon (if you eat the salmon bones), shrimp, broccoli, and Brussels sprouts. You can buy orange juice with added calcium.• Patients who are lactose intolerant should be encouraged to use lactose-free dairy products (or to take products such as LACTAID®) that are available in low-fat and nonfat forms.” <p>Source: <i>Am Fam Physician</i>. 2006 Dec 1;74(11):1927-1928; http://www.aafp.org/aafp/2006/1201/p1927.html/.</p> |
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