



MISPERCEPTIONS REGARDING DAIRY FOODS: A REVIEW OF THE EVIDENCE



SUMMARY

Consumers' increasing awareness of the link between nutrition and health, their interest in taking responsibility for improving their diets, and the explosion of food and nutrition information of varied accuracy from many venues can contribute to misperceptions about food, including dairy foods. Low-fat and fat-free milk, cheese, and yogurt are nutrient-rich foods. Together they provide calcium, potassium, phosphorus, protein, vitamins A, D, and B₁₂, riboflavin, and niacin (niacin equivalents). Studies show that dairy foods, when consumed as part of a healthful diet, improve overall diet quality and may help to reduce the risk of major chronic diseases such as osteoporosis, among others.

Misperceptions about dairy foods can result in the unnecessary elimination of these foods from the diet, which in turn often leads to nutritional shortcomings and increased risk of some chronic diseases. For this reason, it is important for health professionals to understand the rationale used by people harboring misperceptions about dairy foods and effectively communicate science-based information about dairy foods' nutritional value, health benefits, and quality.

A common misperception is that low-fat or fat-free flavored milk, because of its sugar content, is an unhealthy beverage choice for children. On the contrary, even though low-fat/fat-free flavored milk contains some added sugar, scientific studies show that children who drink flavored milk consume more milk overall, meet more of their nutrient needs, do not consume more added sugar or fat, and are not heavier than non-milk drinkers. Studies show that flavored milk is the most popular milk choice among school children.

The 2005 Dietary Guidelines for Americans, the Institute of Medicine, and leading health professional organizations including the American Academy of Pediatrics, the American Dietetic Association, and the American Heart Association support the inclusion of low-fat/fat-free flavored milk in children's and adolescents' diets.

Scientific evidence fails to support other misperceptions such as milk consumption causes early puberty in girls, acne, autism, or mucus formation in the respiratory tract. Although multiple genetic and environmental factors are implicated in these conditions, there is little, if any, scientific grounds for reducing or eliminating milk intake.

The perception that raw (unpasteurized) milk is more nutritious and healthful than pasteurized milk is incorrect and potentially has serious health consequences. Consuming raw milk and raw milk products is responsible for life-threatening disease outbreaks from harmful bacteria. Pasteurization of milk, which is widely supported by the federal government and health professional organizations, is the most effective means of reducing the risk of milkborne microbiological illnesses. There is no meaningful change in the nutritional quality of milk as a result of pasteurization. Moreover, unlike raw milk, most pasteurized milk is fortified with vitamin D, which plays a beneficial role in bone health.

Health professionals can help consumers identify and understand science-based information and encourage consumption of three servings every day of low-fat and fat-free milk, cheese, or yogurt as part of a healthful diet.



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INTRODUCTION

Although the beneficial role of dairy foods in a healthful diet is well established by the nutrition and science community (1,2), misperceptions about these foods continue to arise. Today's multi-media environment increases opportunities for misinformation leading to misperceptions about food in general to flourish (3). Consumers' increasing awareness of the link between nutrition and health and their interest in assuming more responsibility for their eating habits can increase their vulnerability to misperceptions about foods (3). The Internet can contribute to consumer confusion and misperceptions about food, including dairy foods, because sites with science-based information co-exist with those containing questionable or inaccurate information from unqualified sources (3).

Misperceptions about dairy foods can result in the needless omission of these foods from the diet, which in turn can lead to inadequate nutrient intake, increased risk of some chronic diseases, and erosion of dairy foods' healthful image. Dairy foods such as low-fat and fat-free milk, cheese, and yogurt are nutrient-rich foods, together providing calcium, potassium, other minerals and vitamins, and protein essential for growth and development (4,5). The 2005 Dietary Guidelines for Americans recognizes dairy foods as a "Food Group to Encourage" (5). Studies in children and adults indicate that consumption of dairy foods improves the overall nutritional quality of the diet (5-8).

This *Digest* identifies some current misperceptions regarding dairy foods and provides findings from science-based nutrition research dispelling these misperceptions. Persons who unnecessarily limit or avoid consuming dairy foods because of the misperceptions discussed below may negatively impact the nutritional quality of their diets and overall health.



Studies show that children who drink flavored milk consume more milk overall, meet more of their nutrient needs, do not consume more added sugar or fat, and are not heavier than non-milk drinkers.

DAIRY FOOD MISPERCEPTIONS VERSUS SCIENTIFIC EVIDENCE

Misperception: *Flavored milk, because of its sugar content, is an unhealthy beverage choice for children.*

The Science: Even though flavored milk has some added sugar, studies show that children who drink flavored milk consume more milk overall, meet more of their nutrient needs, do not consume more added sugar or fat, and are not heavier than non-milk drinkers (9-11). Like unflavored milk, flavored milk provides nine essential nutrients – calcium, potassium, phosphorus, protein, vitamins A, D, and B₁₂, riboflavin, and niacin (niacin equivalents) (4). Moreover, flavored and unflavored milk supply three of the five nutrients that fall short in children's diets (i.e., calcium, potassium, magnesium) (4,5).

Children who drink flavored milk tend to drink more milk overall than those who do not drink flavored milk (9). Flavored milk, the majority of which is low-fat or fat-free, is the most popular milk choice among school children, consumed by 66% of milk drinkers in schools during lunch (12,13). A recent study found that removal of flavored milk from a school district in Connecticut resulted in a decrease in milk consumption by 37% to 63%, depending on the grade level (14), which may have a consequent deterioration in diet quality (7).

Low-fat and fat-free flavored milks have less added sugar and more nutrients than sugar sweetened soft drinks. On average, an 8-ounce serving of low-fat chocolate milk contains about 4 teaspoons of added sugar, while an equivalent amount of soft drinks contains about 7 teaspoons. Some natural (mostly in the form of lactose) and added sugars, either nutritive (e.g., sucrose, high fructose corn syrup [HFCS]) or non-nutritive depending on the brand, are found in flavored milk. The composition of HFCS is about 55% fructose and 45% glucose, which is very similar to sucrose, commonly known as table sugar (50% glucose, 50% fructose) (15,16). Both sugars have the same number of calories, the same sweetness, and are metabolically similar (15). Despite some allegations linking HFCS with obesity, a scientific review conducted

by the American Medical Association indicates that HFCS does not appear to lead to obesity or other conditions any more than calories from other nutritive (caloric) sweeteners (17).

Although sugar can contribute to the risk of dental caries, several factors (e.g., amount of time sugar remains on the teeth) influence the degree of caries risk for a food or beverage. There is no scientific evidence indicating that flavored milk consumption causes tooth decay (18). The American Academy of Pediatric Dentistry states that “chocolate milk is OK for children’s teeth” (19). Nor is there scientific evidence that added sugars in flavored milk cause hyperactivity, other behavioral disorders, or interfere with children’s academic performance (20-22).

The 2005 Dietary Guidelines for Americans (5), the Institute of Medicine (23), and leading health professional organizations such as the American Academy of Pediatrics (24,25), the American Dietetic Association (20) and the American Heart Association (AHA) (26) support the inclusion of low-fat and fat-free flavored milks in children’s and adolescents’ diets. The AHA states, “when sugars are added to otherwise nutrient-rich foods, such as sugar-sweetened dairy products like flavored milk and yogurt. . . the quality of children’s and adolescents’ diet improves, and in the case of flavored milks, no adverse effects on weight status were found” (26).

Misperception: Milk consumption causes early puberty in girls.

The Science: There is no conclusive scientific evidence to support the suggestion that consumption of milk causes early puberty in girls. Although recent studies suggest a decrease in the age of onset of puberty in girls over the past several decades (27,28), the reason(s) behind this trend is unknown. Multiple factors – socioeconomic conditions, psychological factors (e.g., stress), nutritional status, dietary quality, chronic diseases, birth weight, and early postnatal growth – have been examined for their effect on puberty timing (29-32). Several studies link higher body mass index or increased body fatness in girls with earlier initiation or progression of pubertal development (27,28,33-35).

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There is no scientific evidence to back up the theory that hormones in milk or milk from cows treated with the synthetic hormone, recombinant bovine somatotropin (rbST), play a role in early onset puberty in girls. All milk, including human milk, naturally contains minute amounts of hormones (36). Although some dairy farmers may treat cows with rbST to boost their herd’s milk production, this synthetic hormone is not added to milk and the composition of milk from treated and untreated cows is the same (37). The U.S. Food and Drug Administration (37), based on a review of the scientific evidence, states that milk from cows treated with rbST is safe for human consumption (37).

An observation arguing against the milk-early puberty theory is that children’s milk consumption has decreased (not increased) in recent decades, a time coinciding with the earlier age of onset of puberty in girls (28,38). Consuming two to four servings, depending on age, of fat-free or low-fat milk or equivalent milk products every day is especially important for children and adolescents who are building peak bone mass (5,25).

Misperception: Milk intake causes acne.

The Science: According to the American Academy of Dermatology, research to date does not prove that diet causes acne (39). Acne is the most common skin disorder in the United States, affecting 70 to 87% of adolescents, although it can affect all age groups (39-41). Multiple interrelated genetic and environmental factors (e.g., psychological stress, exposure to environmental pollutants, diet) have been implicated in the development of acne (40).

Some recent observational studies have found an association between milk consumption, particularly skim milk, and increased risk of teenage acne (42-44). These studies only suggest a correlation, not a cause-and-effect relationship (41,45). Moreover, these studies have several limitations including selection bias, failure to consider a number of confounding factors, self-reporting of acne, and, in the case of one study (42), potentially imprecise recollection of food consumption nine years earlier (39,41,42,44,46). More research,

particularly well-controlled randomized trials, is needed to confirm whether particular foods and/or dietary constituents have a direct effect on acne risk and severity (39,41,45). Individuals concerned about acne should consult a dermatologist for appropriate treatment (40). Because nutrient-rich dairy foods are particularly important for adolescents' bone and overall health, consumption of three servings of low-fat or fat-free milk, cheese, or yogurt every day should be encouraged (5).

Misperception: *Children with autism should avoid dairy foods.*

The Science: To date, there is no clear scientific evidence regarding the cause or cure of autism or the effectiveness of dietary interventions (47-51). Autism (often referred to as Autism Spectrum Disorder or ASD) is a complex developmental disorder of brain function that typically appears during the first three years of life (47,52). Main symptoms include impaired social interaction, problems with verbal and nonverbal communication, and unusual or severely limited activities and interests (47,52). Once a rare condition, the number of children diagnosed with autism is increasing at a rate of 10 to 17 percent per year (53).

Although there is no known single cause of autism, both genetic and environmental factors are thought to play a role in its etiology (47,52). Treatment for specific symptoms usually consists of educational/behavioral and medical interventions (47,49,50). One of the most popular, yet unproven, nutritional strategies for autism is the gluten-free, casein-free (GFCF) diet. It is hypothesized that some autistic symptoms may be the result of opioid peptides formed from the incomplete breakdown of foods containing gluten (wheat, rye, barley) and casein (in dairy foods) (49,50).

Although some proponents believe that a GFCF diet improves symptoms of autism, there is little, if any, scientific proof of the efficacy of this dietary



Science-based research dispels several misperceptions related to dairy foods such as those related to early puberty, acne, autism, and increased mucus production in the respiratory tract.

intervention (48,49,51). A recent randomized, double-blind clinical trial in 13 children with autism found no significant differences in behavioral data or urinary peptide levels between children treated with a GFCF diet and a control group (49). Moreover, there can be drawbacks of the GFCF diet, especially if self-prescribed (48,54,55). Some data suggest that children following this diet may be at risk of essential amino acid deficiencies (54) and bone loss (55). Removing foods from two major food groups (i.e., grain and dairy) makes it difficult to achieve a nutritionally balanced diet, particularly for autistic children, many of whom already consume self-restricted diets because of their aversion to texture, temperature, or other characteristics of food (56).

A recent multidisciplinary expert panel concluded that available data do not support the use of special diets such as a casein-free diet, a gluten-free diet, or the GFCF diet for patients with autism (51). Because many autistic children are at risk for nutritional deficiencies due to dietary aversions and/or intake of controversial, restrictive therapeutic diets (57), health professionals, especially registered dietitians, have an important role to play in helping to ensure the nutritional health of those with autism (50,51,58).

Misperception: *Consuming milk increases mucus formation in the respiratory tract.*

The Science: According to a recent review, there is no conclusive evidence for the belief that consuming milk increases mucus production and aggravates the congestion of colds, allergies, or asthma (a chronic inflammatory disease of the lower respiratory tract) (59). However, the milk-mucus believers were more likely than non-believers to report sensory perceptions related to mucus following milk intake. A likely explanation for this perception is that it is an acute phenomenon with the milk emulsion temporarily adhering to the thin layer of mucus always coating the throat mucous membrane.

Misperception: Raw (unpasteurized) milk is a more nutritious and healthful beverage than pasteurized milk.

The Science: Raw milk consumption is responsible for life-threatening illnesses caused by harmful bacteria such as *E.coli* O157:H7, *Salmonella*, *Campylobacter* spp, and *L. monocytogenes* (60-62). Although proponents of raw (unpasteurized) milk and raw milk products believe that these products possess enhanced nutritional qualities, taste, and health benefits, science-based data do not substantiate these beliefs (60-62). In fact, consuming raw milk and raw milk products is a continued public health threat.

Pasteurization of milk is the most effective means of reducing the risk of microbiological hazard (60,61,63). Pasteurization involves heating raw milk for a very brief time at a predetermined temperature as defined in the Food and Drug Administration's Pasteurized Milk Ordinance (63). Lower morbidity and mortality associated with consumption of pasteurized milk attest to the benefit of pasteurizing raw milk (60). During pasteurization, there is no meaningful change in the nutritional quality of milk (61). Moreover, unlike raw milk, most pasteurized milk as marketed is fortified with vitamin D, a nutrient which enhances the intestinal absorption of calcium and phosphorus and plays a beneficial role in bone health (64). The addition of vitamin D makes pasteurized milk an excellent source of this nutrient, providing 25% of the Daily Value in one 8-ounce serving. Vitamin D insufficiency and deficiency is common among many U.S. children and adults, especially those of Hispanic and African American descent (65-67).

In an effort to protect human health, a number of organizations have published guidelines and statements supporting the pasteurization of milk and restriction of raw milk and milk products made from raw milk (60,61). These organizations include the U.S. Food and Drug Administration, the U.S. Centers for Disease Control, the American Medical Association, the American Academy of Pediatrics, the American Public Health



Unpasteurized (raw) milk is responsible for life-threatening illnesses caused by harmful bacteria. For this reason, numerous health professional and government organizations recommend that only pasteurized milk be consumed.

Association, the American Veterinary Medical Association, the U.S. Department of Agriculture, the International Association for Food Protection, and the World Health Organization, among others (60).

In the U.S., it is illegal to sell raw milk packaged for consumer use across state lines (60,61). However, the sale of raw milk by some means (e.g., direct purchase, cow-share, or leasing programs) within states is allowed. Despite the documented health hazards of consuming raw milk or raw milk products, 29 states allow the sale of these foods (60). Therefore, it is important to increase public awareness of the microbiological safety hazards of raw milk and certain dairy products manufactured using raw milk and recommend that only pasteurized milk be consumed (60). Strict government regulations and the dairy industry's commitment to providing safe, high quality milk helps to assure that pasteurized milk and milk products are safe and nutritious. Visit www.dairyfarmingtoday.org for more information about the steps America's dairy farmers and milk processors take to protect the safety and quality of cow's milk and other dairy foods.

CONCLUSION

Misperceptions regarding dairy foods can lead to their unnecessary elimination from the diet, which almost always lowers the total dietary intake of milk's essential nutrients, such as calcium, and potentially jeopardizes health. Health professionals can positively shape their clients' food choices by understanding the rationale used by people who harbor misperceptions regarding dairy foods and effectively communicating science-based information about dairy foods' nutritional value, health benefits, and quality. The American Dietetic Association (3) has listed strategies for communicating accurate nutrition information to consumers and questions to ask when evaluating research reports and the credibility of nutrition information on websites.

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