

Science Summary

Whole- and Reduced-fat Dairy Foods and Cardiovascular Disease



Overview



The 2020–2025 Dietary Guidelines for Americans (DGA) recommends choosing low-fat or fat-free milk, yogurt and cheese as part of healthy eating patterns. Dairy foods such as milk, yogurt and cheese make significant nutrient contributions to the diets of Americans. Recommendations to reduce saturated fat consumption are intended to lower rates of cardiovascular disease (CVD), including coronary heart disease (CHD; commonly resulting in a heart attack) and cerebrovascular disease

(commonly resulting in a stroke). Current evidence indicates dairy food consumption, regardless of fat content, is not associated with risk for CVD. The growing evidence base supports reassessing the role of full- and reduced-fat dairy foods in healthy eating patterns to inform future nutrition guidance regarding CVD and other cardiometabolic diseases.

Dietary guidelines recommend dairy foods as part of healthy eating patterns to lower risk for cardiovascular disease

The 2020-2025 DGA states, “the dietary pattern may better predict overall health status and disease risk than individual foods or nutrients” and is based on evidence that demonstrates a healthy eating pattern is associated with beneficial outcomes for CVD.¹ Low-fat or fat-free dairy foods are included in healthy eating patterns in the DGA, as well as in recommended eating patterns from other authoritative bodies in the United States (U.S.) and around the world.¹⁻³ The unique nutrient package of dairy foods helps meet nutrient recommendations and may help contribute to overall diet quality.⁴

Recommendations are to replace saturated fat with unsaturated fat to reduce cardiovascular risk

Current recommendations from the DGA and the American College of Cardiology/American Heart Association Guidelines are to limit saturated fat consumption and replace saturated fat with unsaturated fats in the diet.^{1,5} Strategies offered by the DGA and American Heart Association to meet current recommendations include switching to low-fat and fat-free dairy foods and choosing fat-free or low-fat milk instead of 2% or whole milk and lower fat cheese in place of regular cheese.^{1,6} Heart disease is the leading cause of death in the U.S.,⁷ and the link

between saturated fat consumption and low-density lipoprotein (LDL) cholesterol (an established risk factor for CVD)⁸ has been a primary rationale for recommending low-fat or fat-free dairy foods. However, research evaluating the link between dairy food consumption and health outcomes like heart attack and stroke has yielded different conclusions than research on the impact of saturated fat consumption on biomarkers of disease, such as LDL-cholesterol. Current evidence indicates that dairy food consumption is not linked to risk of CVD, and in some cases is linked to reduced risk.⁹

Dairy food consumption, regardless of fat content, does not increase risk for cardiovascular disease: systematic reviews and meta-analyses

Authoritative guidance advises reducing saturated fat consumption in general. At the same time, a large body of evidence published over the last two decades indicates that total dairy consumption, whether full-fat or low-fat, does not increase risk for CVD.^{9,10} A systematic review published in 2016, based on meta-analyses of prospective cohort studies, concluded total dairy consumption was not associated with risk for CVD (based on moderate-quality evidence).⁹ In 2017, a meta-analysis of 29 cohort studies with 938,465 participants reported no association between total dairy consumption, including high- and low-fat varieties, and CHD or CVD.¹¹ Three other recent meta-analyses of prospective cohort studies also reported dairy consumption had an inverse association with CVD risk¹² and CVD mortality¹³ or a neutral association with CHD risk.¹⁴ A 2021 French prospective study found no association between dairy consumption and CVD or CHD risk.¹⁵ A 2021 meta-analysis of 55 prospective cohort studies found that total dairy consumption was associated with lower risk for CHD, stroke and hypertension.¹⁶ Similarly, a 2021 systematic review and meta-analysis reported consumption of total dairy, low-fat dairy (including milk and yogurt with fat content lower than full-fat equivalents and low-fat cheese) and full-fat dairy (including full-fat milk and yogurt and high-fat cheese) had no association with CHD or ischemic stroke.¹⁷

Potential underlying mechanisms behind the relationship between dairy fat consumption and CVD risk: randomized controlled trials

Blood lipids

Randomized controlled trials (RCTs) have been designed to test the potential mechanisms underlying the observed benefits of total and full-fat dairy consumption on risk for CVD. In 2021, one meta-analysis of RCTs found that dairy consumption had no significant effect on lipids, including total, LDL and high-density lipoprotein (HDL) cholesterol, and triglycerides (TG).¹⁸ A year prior, another meta-analysis of RCTs found that probiotic yogurt consumption significantly reduced total and LDL-cholesterol in subjects with mild to moderate hypercholesterolemia without significant effects on HDL cholesterol and TG.¹⁹ Recent RCTs have similarly indicated that full-fat dairy consumption does not adversely affect blood lipids.²⁰⁻²² For instance, Engel et al. demonstrated that when healthy adults consumed 0.5 liters of full-fat or fat-free milk per day for three weeks as part of their habitual diet, there were no significant differences in effects on total and LDL-cholesterol or TG concentrations.²³ When comparing reduced- or full-fat versus low-fat dairy consumption, Mitri et al. demonstrated no differences in lipid parameters in subjects with type 2 diabetes after six months.²⁴ Lastly, Schmidt et al. showed that over three servings of full-fat milk, cheese and yogurt daily for twelve weeks did not affect blood lipids, including total, LDL and HDL cholesterol or TG when compared with a low-dairy and low-fat dairy diet in men and women with metabolic syndrome.²⁵

Blood pressure

RCTs indicate a neutral^{20,22,24-26} or beneficial^{27,28} effect of dairy fat consumption on blood pressure. For example, compared with no dairy consumption, consuming full-fat dairy for four weeks did not significantly affect blood pressure or vascular function.²⁶ When researchers compared a high-dairy diet with a low-dairy diet for six weeks, the high-dairy diet (composed of reduced-fat dairy foods) resulted in lower systolic and diastolic blood pressure in overweight men and women.²⁷ McDonald et al. showed that milk consumption, regardless of fat content, attenuated impairments in vascular endothelial function by limiting oxidative stress in individuals with prediabetes.²⁹ A trial conducted in adolescent boys who were regular soda drinkers showed that consuming reduced-fat milk instead of soda for three weeks resulted in significantly lower systolic blood pressure.²⁸

Milk is a complex food: The unique role of dairy fat and the dairy food matrix in health

The fat in milk is the most complex of all naturally occurring fats.^{30,31} Bovine milk fat contains over 400 types of fatty acids, including short-, medium- and long-chain fatty acids ranging in length from four to 24 carbons.³⁰ Only about 15 of the identified fatty acids are present at levels of 1 percent or higher which underscores the intricate complexity of the lipid composition of milk.³⁰ The unique composition of milk fat in whole-fat dairy foods is a topic of ongoing research investigation.

Evidence indicates that the food matrix of dairy foods may modulate the effects of dairy fat on CVD biomarkers and associated risk.^{32,33} A case-cohort study across nine European countries observed that CHD incidence was higher per 1% increase in energy consumption of saturated fat from red meat and butter, whereas it was lower per 1% increase in energy consumption of saturated fat from yogurt and cheese.³⁴ Other research has reported that consumption of saturated fats from dairy foods is associated with differential effects on cardiometabolic risk factors,³⁵ including favorable effects on CVD³⁶ and ischemic heart disease³⁷ risk. In addition, emerging evidence suggests that milk polar lipids, a class of fats unique to dairy, play a beneficial role on cardiometabolic health through mechanisms that modulate lipid metabolism, gut health and systemic inflammation.³⁸ Thus, the complexity of dairy fat, which is part of the total food matrix of milk, yogurt and cheese, might help explain why the link between dairy food consumption and neutral or lower CVD risk is independent of saturated fat content. Research in this area is ongoing, and there is not yet a precise understanding of the mechanisms involved.

Conclusion

The current body of evidence indicates dairy foods, regardless of fat content, contribute beneficial nutrients to the diet and are not associated with increased risk for CVD. As Drouin-Chartier et al. concluded, “although there are still key research gaps to address, evidence suggests either a neutral or a favorable association between dairy intake and cardiovascular-related outcomes. These data are consistent with current dietary guidelines, which place dairy as one of the pillars of healthy eating. However, the review also emphasized that the recommendation to focus on low-fat in place of regular- and high-fat dairy is currently not evidence-based. Further research is needed to specifically address this key research gap.”⁹

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