



## Overview

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Dairy foods such as milk, cheese and yogurt are foundational foods in healthy eating patterns. They contribute important shortfall nutrients, including calcium, vitamin D and potassium. Low-fat and fat-free dairy foods are part of the Dietary Guidelines for Americans (DGA) and American Heart Association (AHA) dietary recommendations. A growing body of research indicates that dairy food consumption is associated with multiple health benefits, including a lower risk for cardiovascular disease (CVD). This summary reviews studies about dairy food consumption and CVD published between 2009 and 2015, building on the scientific review conducted for the 2010 DGA. This research provides further support for consuming low-fat or fat-free dairy foods as recommended in the 2015 DGA.

## Healthy eating patterns can help lower risk for CVD and decrease public health costs

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CVD is the leading cause of death in the U.S., accounting for 31% of all deaths in recent years (1). In 2010, annual estimated costs of health care, medications and lost productivity due to CVD totaled more than \$270 billion in the U.S. (2). Healthy eating patterns affect CVD development and may assist with prevention. The 2013 AHA/American College of Cardiology Guideline on Lifestyle Management to Reduce Cardiovascular Risk includes low-fat dairy foods in recommended dietary patterns (3). The 2015 DGA states that healthy eating patterns are associated with reduced risk for several chronic diseases, including cardiovascular disease (strong evidence) and type 2 diabetes (moderate evidence) (4). The DGA recommends three daily servings of low-fat or fat-free dairy foods for those 9 years and older, 2½ for children 4-8 years, and two for children 2-3 years, in the Healthy U.S.-Style Eating Pattern (4).

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**The 2015 DGA indicates that strong evidence shows healthy eating patterns are associated with a reduced risk for cardiovascular disease (4).**

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## Accumulating evidence finds dairy food consumption is neutral or linked to lower CVD risk

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The 2010 Dietary Guidelines, based on evidence published through mid-2009, stated: “Moderate evidence...indicates that intake of milk and milk products is associated with a reduced risk of cardiovascular disease and type 2 diabetes and with lower blood pressure in adults” (5). Since 2009, the body of evidence on the association between dairy foods and cardiovascular disease has continued to grow.

Research published between 2009 and 2015 has explored the effects of dairy food consumption on CVD in three meta-analyses (6-8) and 15 prospective cohort studies, 12 of which are about the association between dairy foods and CVD (9-20) and three of which relate to dairy fat (21-23). One systematic review of trials on the effects of cheese consumption on blood lipids is also included here (24). Results from the majority of these studies support the association between higher dairy food consumption and a reduced risk for CVD in a range of population groups.

This summary includes research that found beneficial associations for low-fat, fat-free, and higher fat dairy foods. While saturated fat intakes have been linked to higher LDL cholesterol (LDL-C), which is a risk factor for CVD, a causal relationship between saturated fat and CVD has not been established (25, 26). Investigations of dairy food consumption and CVD that examine outcomes such as heart attack and stroke—not simply LDL-C—have found primarily beneficial or neutral effects, not increased risk, for CVD (27). Taken together, these studies indicate that dairy food consumption is not linked to increased risk for CVD, CHD and stroke, and in some cases it is linked to

# SCIENCE SUMMARY: Cardiovascular Disease

Dairy food consumption is associated with lower risk for cardiovascular



decreased risk. Because most of the research is observational, however, research is needed to understand the mechanisms underlying the observations.

## Meta-analyses find milk consumption is linked to lower risk for CVD

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A dose-response meta-analysis of 17 prospective cohort studies found a moderate benefit of total milk consumption on CVD risk based on four of these studies (6). The relative risk was reduced by 6% with each increase in 200 ml per day of milk consumed (one 8 ounce cup = 240 ml). The authors noted that milk consumption was not associated with total mortality and may be associated with reduced overall CVD risk. A meta-analysis of 15 prospective cohort studies in adults found total dairy foods were associated with a lower risk for stroke, with a stronger association for stroke mortality than incidence (7). Another meta-analysis of 22 prospective cohort studies in adults found consumption of low-fat dairy products and cheese were associated with a lower risk for stroke, and total dairy consumption was linked to lower risk for CVD overall (8).

## Prospective cohort studies find dairy consumption does not increase, or lowers, CVD risk

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Dairy food consumption and risk for stroke, CVD and coronary heart disease (CHD) have been investigated in four large adult European cohorts followed for at least 10 years. Findings include: low-fat dairy food consumption was associated with reduced risk of stroke, while other dairy foods did not change stroke risk (9); total dairy foods and total cheese were associated with reduced risk of heart attack (10); total dairy product intake was not associated with risk for CVD, but fermented milk was associated with decreased risk for incident CVD (11); and dairy food intake was not associated with risk of CHD or stroke (12). In a smaller cohort study in an older Dutch population, total dairy food intake was not associated with CVD risk, but high-fat dairy foods were associated with reduced risk for fatal stroke (13). Studies in several smaller adult cohorts examined the effects of consuming dairy foods (14-18), and overall, found no association for total dairy consumption and CVD mortality or all-cause mortality risk. In two studies, consumption of specific dairy products was not associated with mortality in men and had mixed results in women (19, 20).

## Prospective cohort studies find dairy fatty acids are linked to lower risk for CVD

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The association between CVD and dairy fat intakes, and fatty acids that are biomarkers of dairy food intake, have been studied in four prospective cohort studies. One of the first studies to explore this link was conducted over 10 years in a multiethnic cohort of U.S. adults, and it found saturated fat sources may differ in their effect on CVD risk (21). Higher intake of saturated fat from dairy foods was associated with reduced risk for CVD, while higher intake of saturated fat from meat increased CVD risk. For each 5 gram increase in dairy saturated fat per day, CVD risk dropped by 21%, and for each 5% increase in energy from dairy saturated fat, risk dropped by 38% (21). Other prospective studies have found that specific fatty acids in milk are associated with lower risk for CVD and CHD (22) and first heart attack in women (23). In the latter study, cheese (in men and women) and fermented dairy products (in men) were associated with lower risk for first heart attack. Taken together, these studies indicate that the unique fatty acid profile of dairy fat may be contributing to the link between dairy foods and lower risk for CVD in some groups; however, more research is needed to understand this link in the context of other nutrients in dairy foods.

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***Studies of dairy food consumption and CVD examining outcomes such as heart attack and stroke have found primarily beneficial or neutral effects, not increased risk, for CVD (26).***

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## Cheese does not raise low-density lipoprotein cholesterol (LDL-C) compared to butter

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A systematic review of clinical trials about cheese consumption and blood lipids found that hard cheese consumption lowers blood levels of LDL-C, a biomarker linked to increased CVD risk, in trials that compare cheese to butter (24)—raising questions about the effect of cheese and saturated fat on CVD risk. Characteristics of cheese that may contribute to this finding include the calcium content, specific fatty acids or the food matrix of cheese (24).

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