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2015 Dietary Guidelines Advisory Committee

The National Dairy Council® (NDC) appreciates the opportunity to submit comments for consideration by the 2015 Dietary Guidelines Advisory Committee (DGAC) in response to the Federal Register notice (78 FR 51727) issued August 21, 2013.

The NDC, the non-profit organization founded by U.S. dairy farmers, is committed to nutrition research and education about dairy's role in the diet and health and wellness. NDC provides science-based dairy nutrition information to, and in collaboration with, a variety of stakeholders committed to fostering a healthier nation, including health professionals, educators, school nutrition directors, academia and industry. Established in 1915, NDC comprises a staff of registered dietitians and nutrition research and communications experts across the country. NDC is committed to helping improve child health and wellness through programs such as Fuel Up to Play 60, which encourages youth to consume nutrient-rich foods and achieve at least 60 minutes of physical activity every day.

The following comments are offered regarding dairy intake and cardiovascular disease as the DGAC undertakes the work of evaluating current science on health and nutrition in support of developing national food-based dietary recommendations. During the first 2015 DGAC meeting June 13-14, 2013, Work Group 3 identified "dairy products" as a priority topic for review. The new evidence described in these comments contributes to the body of science on the relationship between dairy intake and cardiovascular disease reviewed by the 2010 DGAC, thus it is hereby submitted for the Committee's consideration for inclusion in the evidence-based review for the 2015 Dietary Guidelines for Americans (DGA).

Dairy intake and cardiovascular disease in the Dietary Guidelines for Americans

Cardiovascular disease is the leading cause of death in the United States accounting for 32.8% of all deaths in recent years (1). In 2012, it was estimated that heart disease in the United States cost \$297.7 billion in health care, medication, and lost productivity (1). Saturated fat consumption has historically been linked to higher LDL cholesterol (LDL-C), a risk factor for CVD; however, a causal relationship between intake of saturated fat and CVD remains controversial (2). Recent studies examining the impact of dairy food consumption directly on CVD outcomes, rather than LDL-C per se, have not consistently found dairy food intake to increase the risk for CVD (3). Dairy foods as a group are contributors of saturated fat and many essential nutrients (4), though milkfat contains a unique mixture of fatty acids that have differential effects on health. The growing body of research examining dairy's effect on heart health directly takes into account the unique properties of these foods.

The 2010 DGA stated that "Moderate evidence...indicates that intake of milk and milk products is associated with a reduced risk of cardiovascular disease..." (5). New research on dairy intake and CVD

published since the 2010 DGAC evidence review includes 1 meta-analysis of prospective cohort studies, 14 cohort studies and 3 trials. Overall, in agreement with previous findings, the new research finds dairy intake has a neutral or beneficial effect on risk of CVD, coronary heart disease (CHD), and stroke, in many cases regardless of fat content. Other studies found evidence of a possible beneficial effect of dairy fat on CVD risk.

One meta-analysis of prospective studies found milk intake is associated with reduced risk for CVD

A dose-response meta-analysis of 17 prospective cohort studies (6 studies were conducted in the United States, 2 in Japan, and 9 in Europe) published through February of 2010 and including over 600,000 adults, found an inverse association between milk intake and risk of overall CVD. The relative risk was reduced by 6% for each increase in 200 ml/d of milk consumption. Total milk intake, as well as intakes of low-fat and high-fat milk, were not associated with risk of CHD, stroke or total mortality in this study. The authors point out that this finding was based on a limited number of studies and needs confirmation via randomized controlled trials. This dose-response meta-analysis of prospective studies indicates that milk intake is not associated with total mortality and may be inversely associated with overall CVD risk (6).

Prospective cohorts find beneficial or neutral effects of dairy intake on CVD risk and/or mortality

Several large prospective cohort studies in European populations have been published since the 2010 DGAC review. Dairy product types and amounts consumed may differ from dairy foods consumed in the U.S., but overall the studies found either a beneficial or neutral effect of dairy intake on CVD. A large prospective cohort of nearly 75,000 Swedish adults who were free of CVD at baseline examined the associations between consumption of total, low-fat, full-fat, and individual dairy foods and risk of stroke. After 10 years of follow-up, consumption of low-fat dairy foods was inversely associated with risk of total stroke and cerebral infarction. Consumption of other dairy foods, including total dairy, full-fat dairy, milk and cheese were not associated with stroke risk (7). Another study in Sweden focused specifically on 33,636 women from the Swedish Mammography Cohort who were 48-83 years old and free from CVD at baseline. After 11.6 years of follow-up, the highest quintile of dairy intake was inversely associated with myocardial infarction (MI) risk, and those consuming the highest quintile had a 23% lower risk compared to those in the lowest quintile. Total cheese was inversely associated with MI risk (8). A study of 33,625 Dutch men and women examined the relationship between dairy intake with incident CHD and stroke. During 13 years of follow-up, no association was found between dairy intake and CHD, while fermented dairy tended to be associated with a lower risk of stroke (9). A study of 26,445 Swedish adults aged 44-74 years old, without a history of MI or stroke, were followed for 12 years to examine the association between intake of dairy and incidence of CVD. Overall consumption of dairy products was inversely associated with risk of CVD. Among the specific dairy products, fermented milk intake was inversely associated with incident CVD (10).

Studies of several smaller cohorts of men and women examined the effects of consuming dairy foods, including different fat contents, in the U.S. as well as several other countries including Britain, the Netherlands, Sweden, Japan, and Australia. In general, though somewhat mixed, results from these studies confirm earlier findings that found no increase in CVD risk and/or mortality with total dairy intake. Two studies found no increase in CVD risk or mortality with dairy food intake (11, 12). One study also found no increase in CVD mortality for total dairy intake but found an increased CVD mortality risk with higher fat dairy (15). Another study found a 69% decrease in CVD mortality, among those consuming the highest intake of full-fat dairy foods compared to the lowest intake (13). Three additional studies found a neutral effect of dairy intake on CVD mortality or risk in men, but divergent effects in women (14, 16, 17).

Cohort studies examining the effect of dairy fat or dairy fat components on CVD risk find beneficial effects

Three prospective cohort studies focused on specific aspects of dairy fat intake and CVD risk. In a prospective cohort study of 5,209 U.S. adults who were 45-84 years old at baseline and followed for 10 years, the association between saturated fat intakes from different food sources, mainly dairy and meat, and the incidence of CVD events was investigated in a multiethnic population. Higher intakes of dairy saturated fat were associated with reduced risk for CVD, while higher intakes of meat saturated fat had the opposite effect, indicating different dietary saturated fat sources may differ in their effect on CVD risk. For each 5 g increase in dairy saturated fat/day, the risk was 21% lower and for each 5% increase in energy from dairy saturated fat, it was 38% lower (18). Analysis of a subset of 2,837 adults from the same U.S. cohort investigated the relationship among plasma concentrations of phospholipid milk fatty acids, including pentadecanoic acid (15:0), myristic acid (14:0), and *trans*-palmitoleic acid (*trans*-16:1n7) and CVD and CHD risk. Higher plasma levels of 15:0 were associated with a 19% lower CVD risk and 26% lower CHD risk, while no association was found with 14:0 and *trans*-16:1n-7 (19). A study of 1,000 Swedish adults aged 30-60 years examined the association between the serum milkfat biomarkers pentadecanoic acid (15:0) and heptadecanoic acid (17:0) and incidence of first MI. These milkfat biomarkers were associated with a lower risk of first MI in women. Incremental quartiles of cheese intake (in men and women) and fermented milk products (in men) also were inversely related to risk of a first MI (20).

Studies link dairy intake to beneficial or neutral effects on CVD biomarkers

More research is needed to understand the mechanism underlying the effect of dairy intake, including individual dairy foods. Three new trials address some of these questions. In a 12-week randomized cross-over intervention in 49 22-69 year-old adults, participants replaced part of their habitual dietary fat intake with 13% of energy from either cheese or butter. Cheese lowered LDL-C compared to butter and it did not increase LDL-C compared with a habitual diet (21). A trial of 40 overweight or obese adults with metabolic syndrome found that consuming 3.5 servings of a variety of dairy products/day compared to <0.5 servings/day as part of a weight maintenance diet resulted in attenuation of oxidative and inflammatory stress markers (22). In a cross-over study in 21 adults with metabolic syndrome, acute milk consumption was found to limit vascular endothelial dysfunction in the postprandial period by limiting postprandial hyperglycemia-induced oxidative stress (23).

Conclusion

Overall, new research published since the 2010 DGAC review indicates consumption of dairy foods (including milk, cheese and yogurt) are not associated with an increased risk of CVD, coronary heart disease, and stroke, and may help reduce the risk for these diseases. Some evidence indicates a beneficial effect of milkfat or milkfat containing foods on CVD. Emerging evidence also finds dairy food intake may beneficially modulate biomarkers of CVD risk including inflammation and impaired vascular function. RCTs of dairy food intake and CVD outcomes are limited, and more research is needed to understand the underlying mechanism of dairy foods and milkfat on CVD health outcomes. These studies contribute to the body of science supporting the relationship between dairy intake and CVD and thus may warrant an update of the 2010 systematic review on dairy and CVD for the 2015 DGA.

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