



Higher Fat and Sugar-Sweetened Milk Products Key Scientific Evidence

CONTEXT

As part their Healthy Eating Strategy, Health Canada is proposing a mandatory front-of-package (FOP) labelling for foods high in sugars, sodium and saturated fat, as well as the restriction of marketing of “unhealthy” foods to children. These “unhealthy” foods include cheese as well as flavoured milk and yogurt. Despite the fact that some types of dairy products may contain added sugars (e.g. flavoured milk and flavoured yogurt), sodium and saturated fat (e.g. cheese), they have not shown to be harmful and, in fact, research supports that they are beneficial for health and may reduce the risk of the chronic diseases that Health Canada hopes to prevent: *cardiovascular disease, type 2 diabetes and some cancers*. In addition to these aforementioned conditions, Health Canada has also identified musculoskeletal health as an important outcome in their efforts to increase fortification of vitamin D.

Milk Products and Cardiometabolic Health

Milk products, including higher fat milk products, show either a neutral or favourable (i.e. reduced risk) association with cardiometabolic health outcomes (i.e. CVD, stroke, metabolic syndrome, type 2 diabetes).

- **Drouin-Chartier, JP et al. Systematic review of the association between dairy product consumption and risk of cardiovascular-related clinical outcomes. *Adv Nutr* 2016;7:1026–1040.**

Supported by the Dairy Research Consortium. Table 1 lists the funding sources for the 21 included meta-analyses.

This study is a systematic review of the available meta-analyses of prospective cohort studies of the association of dairy consumption with cardiovascular-related clinical outcomes: cardiovascular disease (CVD), coronary artery disease (CAD), stroke, hypertension, metabolic syndrome (MetS), and type 2 diabetes (T2D).

Data from this comprehensive, systematic review, which includes 21 individual meta-analyses, indicates that the consumption of various forms of dairy products (including higher fat dairy products) shows either favorable or neutral associations with cardiovascular-related clinical outcomes. The main findings for high fat dairy, cheese and yogurt as follows:

- High fat dairy: Neutral for CHD, stroke, hypertension and T2D.
- Cheese: Neutral for CHD and hypertension; Reduced risk for stroke and T2D.

- Yogurt: Neutral for CHD, stroke and hypertension; Reduced risk for T2D.

The authors' conclude that "these data are consistent with current dietary guidelines, which place dairy as one of the pillars of healthy eating." They also emphasized that the "recommendation to focus on low-fat in place of regular- and high-fat dairy is currently not evidence-based."

Milk Products, Prediabetes and Type 2 Diabetes

Milk products, including higher fat dairy, cheese and yogurt, show either a neutral or favourable (i.e. reduced risk) association with development of prediabetes and type 2 diabetes.

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- High fat dairy: Neutral for T2D.
- Cheese: Reduced risk for T2D.
- Yogurt: Reduced risk for T2D.

The following meta-analyses of prospective cohort studies for high fat dairy, cheese and yogurt were included:

- High Fat Dairy: Tong et al 2011; Gao et al 2013; Aune et al 2013; Gjisbers et al 2016.
- Cheese: Gao et al 2013; Aune et al 2013; Gjisbers et al 2016.
- Yogurt: Tong et al 2011; Gao et al 2013; Aune et al 2013; Chen et al 2014; Gjisbers et al 2016.

NB: The funding sources of the above meta-analyses are outlined in Table 1 of the systematic review of Drouin-Chartier et al 2016.

- **Hruby A et al. Associations of dairy intake with incident prediabetes or diabetes in middle-aged adults vary by both dairy type and glycemic status. *J Nutr* 2017;147:1764-1775.**

Supported by the Dannon Company, Inc. and the USDA Agricultural Research Service.

The objective of this study was to assess associations between consumption of milk products, risk of developing prediabetes and progression to type 2 diabetes (T2D) in the Framingham Heart Study Offspring Cohort.

Only **High fat dairy and yogurt** were inversely associate with prediabetes. No association was observed for cheese and prediabetes.

Only **high-fat dairy and cheese** showed evidence of dose-response, inverse associations with T2D, with **70% and 63% lower risk**, respectively.

Milk Products and Weight

Higher fat milk products are associated with reduced risk of overweight or obesity.

- **Rautiainen S et al. Dairy consumption in association with weight change and risk of becoming overweight or obese in middle-aged and older women: a prospective cohort study. *Am J Clin Nutr* 2016;103:979-988.**

Supported by the National Institutes of Health and a COFAS 2 Marie Curie Fellowship.

This prospective study from Harvard University researchers investigated how dairy product intake was associated with weight change and the risk of becoming overweight or obese in initially normal-weight women.

Data were obtained from 18,438 women aged 45 y from the Women's Health Study who were free of cardiovascular disease, cancer, and diabetes at baseline.

Greater intake of **high-fat dairy products**, but not intake of low-fat dairy products, was associated with **less weight gain and a lower risk of becoming overweight or obese** was observed with the highest intake of high-fat dairy products.

- **Kratz M et al. The relationship between high-fat dairy consumption and obesity, cardiovascular, and metabolic disease. *Eur J Nutr* 2013;52:1-24.**

No funding.

Systematic literature review of observational studies on the relationship between dairy fat and high-fat dairy foods, obesity, and cardiometabolic disease.

In 11 of 16 studies, high-fat dairy intake was inversely associated with measures of adiposity.

"The observational evidence does not support the hypothesis that dairy fat or high-fat dairy foods contribute to obesity or cardiometabolic risk, and suggests that high-fat dairy consumption within typical dietary patterns is inversely associated with obesity risk."

Milk Products and Metabolic Syndrome

Higher fat milk products are associated with reduced risk of developing metabolic syndrome.

- **Drehmer M et al. Total and full-fat, but not low-fat, dairy product intakes are inversely associated with metabolic syndrome in adults. *J Nutr* 2016;146:81-89.**

Supported by the Brazilian Ministry of Health and the Brazilian Ministry of Science.

This prospective cohort study investigated the association of dairy consumption, types of dairy products, and dairy fat content with developing metabolic syndrome (MetSyn).

Data was derived from the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil), a multicenter cohort study of 15,105 adults aged 35–74 y.

Total and **especially full-fat dairy food** intakes were associated with a reduced risk of developing MetSyn. The authors point out that these associations seem to be mediated by dairy saturated fatty acids.

The authors concluded that: *"Dietary recommendations to avoid full-fat dairy intake are not supported by our findings"*

Milk Products and Blood Pressure

Higher fat milk products are associated with improved blood pressure.

- **Chiu S et al. Comparison of the DASH (Dietary Approaches to Stop Hypertension) diet and a higher-fat DASH diet on blood pressure and lipids and lipoproteins: a randomized controlled trial. *Am J Clin Nutr* 2016;103:341–347.**

Supported by Dairy Management Inc. and by the National Center for Research Resources and the National Center for Advancing Translational Sciences, NIH, through University of California, San Francisco Clinical & Translational Science Institute grant.

The DASH (Dietary Approaches to Stop Hypertension) dietary pattern is high in fruit, vegetables, and mainly lower-fat dairy foods and has been shown to significantly lower blood pressure.

This randomized controlled trial was designed to test the effects of substituting full-fat for low-fat dairy foods in the DASH diet on blood pressure and blood lipids in 36 healthy adults.

The study found that the **high fat dairy DASH diet** (include regular fat cheese, milk and yogurt) reduced blood pressure to a similar extent as the standard DASH diet but also had the further benefit of reducing certain blood lipids (plasma triglycerides and VLDL cholesterol) without increasing LDL cholesterol.

Milk Products and Cardiometabolic Risk Factors

Higher fat milk products are not associated with any adverse effects for several cardiometabolic risk factors.

- **Benatar JR et al. Effects of high and low fat dairy food on cardio-metabolic risk factors: a meta-analysis of randomized studies. *PLoS ONE* 8(10): e76480.**

No funding.

A meta-analysis of RCTs of 20 studies with 1677 participants indicates that high fat milk products are not associated with any adverse effects on several cardiometabolic risk factors including: waist circumference, insulin resistance, fasting blood glucose, LDL, HDL, blood pressure, c-reactive protein.

Cheese and Cardiometabolic Health

Despite its sodium and saturated fat content, cheese shows either a neutral or favourable (i.e. reduced risk) association with cardiometabolic health outcomes (i.e. CVD, stroke, metabolic syndrome, type 2 diabetes).

- **Drouin-Chartier, JP et al. Systematic review of the association between dairy product consumption and risk of cardiovascular-related clinical outcomes. *Adv Nutr* 2016;7:1026–1040.**

Supported by the Dairy Research Consortium. Table 1 lists the funding sources for the 21 included meta-analyses.

This study is a systematic review of all available meta-analyses of prospective population studies of the association of dairy consumption with cardiovascular disease (CVD), coronary artery disease (CAD), stroke, hypertension, metabolic syndrome (MetS), and type 2 diabetes (T2D).

Data from this comprehensive study which includes 21 individual meta-analyses indicates that **cheese is not associated with an increased risk of CVD** and is associated with a **reduced risk of stroke and type 2 diabetes.**

- **Tong X et al. Cheese Consumption and Risk of All-Cause Mortality: A Meta-Analysis of Prospective Studies. *Nutrients* 2017;9:63.**

Supported by grants from the National Natural Science Foundation of China.

Meta-analysis of prospective cohort studies that examined the long-term association of cheese consumption with all-cause mortality. The final analysis included nine prospective cohort studies involving 21,365 deaths.

Long-term cheese consumption was not associated with an increased risk of all-cause mortality.

- **Hruby A et al. Associations of Dairy Intake with Incident Prediabetes or Diabetes in Middle-Aged Adults Vary by Both Dairy Type and Glycemic Status. *J Nutr* 2017;147:1764-1775.**

Supported by the Dannon Company, Inc. and the USDA Agricultural Research Service.

The objective of this study was to assess associations between consumption of milk products, risk of developing prediabetes and progression to type 2 diabetes (T2D) in the Framingham Heart Study Offspring Cohort.

No association was observed for cheese and prediabetes.

Only **high-fat dairy and cheese** showed evidence of dose-response, inverse associations with T2D, with **70% and 63% lower risk**, respectively.

Food Source of Saturated Fat/Dairy Fat

The food source of saturated fat is important to consider. Saturated fat derived from dairy or dairy fat is associated with reduced CVD risk.

- **de Souza RJ, et al. Intake of saturated and *trans* unsaturated fatty acids and risk of all cause mortality, cardiovascular disease, and type 2 diabetes: systematic review and meta-analysis of observational studies. *BMJ* 2015;351:h3978.**

Supported by the WHO.

The goal of this meta-analysis, commissioned by the World Health Organization (WHO), was to systematically review associations between intake of saturated fat and *trans* unsaturated fat and all-cause mortality, cardiovascular disease (CVD) and associated mortality, coronary heart disease (CHD) and associated mortality, ischemic stroke, and type 2 diabetes.

The authors concluded that *“This systematic review and meta-analysis of evidence from large generally well designed observational studies does not support a robust association of saturated fats with all-cause mortality, CHD, CHD mortality, ischemic stroke, or diabetes in healthy individuals.”*

Moreover, a specific fatty acid found in dairy products (i.e. *trans*-palmitolic acid) was associated with reduced risk of type 2 diabetes. This finding is said to be *“quite consistent and compatible with a 26-54% reduction in risk across an estimated threefold intake range.”*

- **de Oliveira Otto MC et al. Dietary intake of saturated fat by food source and incident cardiovascular disease: the Multi-Ethnic Study of Atherosclerosis. *Am J Clin Nutr* 2012;96:397–404.**

Supported by a University of Texas Health Innovation for Cancer Prevention Research Postdoctoral Fellowship, The University of Texas School of Public Health – Cancer Prevention and Research Institute of Texas; a KO1 from the NIH, National Institute of Diabetes and Digestive and Kidney Diseases; and the National Heart, Lung, and Blood Institute.

This prospective cohort study from Harvard University investigated the association of saturated fat consumption from different food sources and the incidence of CVD events in a multiethnic population consisting of ~ 5000 adults (45- 84 y) who were followed for 10 years.

This was the first study to show that the food source of saturated fat matters. While saturated fat derived from meat was associated with increased CVD risk, saturated fat derived from dairy was associated with reduced risk. No association was found for butter or plant sources of saturated fat.

- **Chowdhury R, et al. Association of dietary, circulating, and supplement fatty acids with coronary risk: a systematic review and meta-analysis. *Ann Intern Med* 2014;160:398-406.**

Supported by the British Heart Foundation, Medical Research Council, Cambridge National Institute for Health Research Biomedical Research Centre, and Gates Cambridge.

The objective of this meta-analysis was to summarize the evidence related to different types of fat and development of heart disease (coronary disease).

This meta-analysis provided a more comprehensive approach to looking at the effect of different types of fat on development of heart disease including data from diet records and blood markers as well as looking at evidence derived from prospective cohort studies and randomized controlled trials.

Saturated fat was not associated with an increased risk of heart disease. Moreover, margaric acid, a **specific saturated fatty acid found in dairy fat**, was associated with a **23% reduction in risk** of heart disease.

The authors concluded that: *“Current evidence does not clearly support cardiovascular guidelines that encourage high consumption of polyunsaturated fatty acids and low consumption of total saturated fats.”*

- **Sievenpiper JL et al. Diabetes Canada 2018 Clinical Practice Guidelines. Nutrition Therapy. *Can J Diabetes* 2018; 42: S64-S79.**

Supported by Diabetes Canada.

These are the latest Clinical Practice Guidelines for Nutrition Therapy from Diabetes Canada based on an examination of the scientific evidence by a panel of experts.

With regards to saturated fat, the following is stated:

“The food source of the saturated fatty acids being replaced, however, is another important consideration. Whereas adverse associations have been reliably established for meat as a food source of saturated fatty acids, the same has not been shown for some other food sources of saturated fatty acids (e.g. such as dairy products and plant fats from palm and coconut).”

With regards to dairy products, the following is stated:

*“Systematic reviews and meta-analyses of prospective cohort studies inclusive of people with diabetes have also shown a protective association of **cheese** with incident CHD; low-fat dairy products with incident CHD; and total, low-fat, and **full-fat dairy products**, and total milk with incident stroke over 5 to 26 years of follow up.”*

Yogurt and Cardiometabolic Health

Despite their content of added sugar-sweetened dairy products such as flavoured yogurt show either neutral or favourable (i.e. reduced risk) associations with cardiometabolic health outcomes.

- **Sievenpiper JL. Sickeningly sweet: does sugar cause chronic disease? No. *Can J Diabetes* 2016;40:287-295.**

JLS was supported by a PSI Foundation Graham Farquharson Knowledge Translation Fellowship, a Canadian Diabetes Association Clinician Scientist Award (grant # CS-5-15-4771-JS), a Banting & Best Diabetes Centre Sun Life Financial New Investigator Award and a CIHR INMD/CNS New Investigator Partnership Prize.

This paper outlines the evidence related major food sources of sugar and various health outcomes.

While there is evidence to show that sugar-sweetened beverages (SSBs) are associated with increased risks for weight gain, metabolic syndrome, diabetes, hypertension, coronary heart disease, stroke and gout, this is not the case for other food sources of sugar. For example, **yogurt** is associated with a reduced risk of type 2 diabetes and weight gain.

- **Chen M et al. Dairy consumption and risk of type 2 diabetes: 3 cohorts of US adults and an updated meta-analysis. *BMC Med* 2014;12:215.**

Supported by the National Institutes of Health.

This pooled analysis of prospective cohort studies from Harvard University followed 41,436 men in the Health Professionals Follow-Up Study, 67,138 women in the Nurses' Health Study and 85,884 women in the Nurses' Health Study II.

The study aimed to evaluate the association between total dairy and individual types of dairy consumption and risk of developing type 2 diabetes (T2D).

Higher intake of **yogurt** (which includes sugar-sweetened yogurt) is associated with a reduced risk of T2D.

- **Johnson RK et al. Dietary sugars intake and cardiovascular health: a scientific statement from the American Heart Association. *Circulation* 2009;120:1011-1020.**

Supported by the American Heart Association.

This paper outlines the findings and recommendations of the American Heart Association with respect to dietary sugars intake and cardiovascular health based on a review of the scientific evidence.

One of the main findings is that: *“When sugars are added to otherwise nutrient-rich foods, such as sugar-sweetened dairy products like flavored milk and **yogurt** and sugar-sweetened cereals, the quality of children’s and adolescents’ diets improves, and in the case of flavored milks, no adverse effects on weight status were found.”*

- **Sievenpiper JL et al. Diabetes Canada 2018 Clinical Practice Guidelines. Nutrition Therapy. *Can J Diabetes* 2018; 42: S64-S79.**

Supported by Diabetes Canada.

These are the latest Clinical Practice Guidelines for Nutrition Therapy from Diabetes Canada based on an examination of the scientific evidence by a panel of experts. With respect to sugar, the following is outlined:

It is stated that *“food sources of sugars may be a more important consideration than the type of sugar per se.”*

No adverse relationship has been shown for total sugars, sucrose, or fructose, fructose containing sugars from fruit or **food sources of added sugars, such as whole grains and dairy products (yogurt).**

With regards to yogurt, the following is stated:

*“Large pooled analyses of the Harvard cohorts have shown that higher intakes of **yogurt** are associated with decreased body weight over 12 to 20 years of follow up in people with and without diabetes.”*

Milk Products and Bone Health

Milk products including milk, yogurt and cheese are associated with a reduced risk of hip fractures, considered the most important outcome for bone health.

- **Feskanich D et al. Milk and other dairy foods and risk of hip fracture in men and women. *Osteoporos Int* 2017; DOI/10.1007/s00198-017-4285-8.**

Supported by the National Institutes of Health.

This study examined whether higher milk and dairy food consumption is associated with risk of hip fracture in older adult men and women.

It is a prospective cohort study of postmenopausal women and men over 50 years old consisting of 80,600 postmenopausal women and 43,306 men over 50 years of age who were followed for up to 32 years.

Data was derived from two Harvard cohorts (The Nurses’ Health Study of women and the Health Professionals Follow-up Study of men).

Each serving of milk per day reduced risk of hip fractures by 8% in men and women.

Total dairy food intake (of which milk contributed half) was associated with 6% lower risk per daily serving in men and women.

- **Bian S et al. Dairy product consumption and risk of hip fracture: a systematic review and meta-analysis. *BMC Public Health* 2018;18:165.**

Supported by the National Natural Science Foundation of China.

The main aim of this meta-analysis was to examine and quantify the potential association of dairy product consumption with risk of hip fracture.

Included 10 prospective cohort studies and 8 case-control studies.

Yogurt and cheese were associated with lower risk of hip fracture while milk was associated with either no risk (cohort studies) or reduced risk (case-control studies).

Milk Products and Colorectal Cancer

Milk products reduce the risk of developing colorectal cancer.

- **World Cancer Research Fund/American Institute for Cancer Research. Diet, nutrition, physical activity and cancer: a global perspective. The third expert report. 2018.**

Findings from The Third Report from the World Cancer Research Fund International indicates that there is **Strong Evidence** that dairy products DECREASE the risk of colorectal cancer.

The evidence for dairy products includes: total dairy, milk, cheese and dietary calcium.