

**From:** Prescott Martha MPrescott@bhs1.org  
**Subject:** RE: full fat dairy and reduced cardiovascular risk  
**Date:** February 8, 2016 at 2:44 PM  
**To:** Mark Pettus mpettus@berkshire.rr.com

PM

Dr. Pettus – I have attached a few other articles regarding dairy and obesity/metabolic syndrome.

My computer will not save documents today so here is a list of additional articles, let me know if you would like copies of any of them.

1. J Nutr. 2016 Jan;146(1):81-9.

**Total and Full-Fat, but Not Low-Fat, Dairy Product Intakes are Inversely Associated with Metabolic Syndrome in Adults.**

Drehmer M, Pereira MA, Schmidt M, Alvim S, Lotufo PA, Luft VC

**BACKGROUND:** Growing evidence suggests that dairy products may have beneficial cardiometabolic effects. The current guidelines, however, limit the intake of full-fat dairy products.

**OBJECTIVE:** We investigated the association of dairy consumption, types of dairy products, and dairy fat content with metabolic syndrome (MetSyn).

**METHODS:** We analyzed baseline data of the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil), a multicenter cohort study of 15,105 adults aged 35-74 y.

We excluded participants with known diabetes, cardiovascular diseases, or other chronic diseases, and those who had extreme values of energy intake, leaving 9835 for analysis. Dairy consumption was assessed by a food-frequency questionnaire.

We computed servings per day for total and subgroups of dairy intake. We computed a metabolic risk score (MetScore) as the mean z score of waist circumference, systolic blood pressure, HDL cholesterol (negative z score), fasting triglycerides, and fasting glucose. We performed multivariable linear regression to test the association of servings per day of dairy products with MetScore.

**RESULTS:** In analyses that adjusted for demographics, menopausal status, family history of diabetes, dietary intake, nondietary lifestyle factors, and body mass index, we observed a graded inverse association for MetScore with total dairy ( $-0.044 \pm 0.01$ ,  $P = 0.009$  for each additional dairy servings per day) and full-fat dairy ( $-0.126 \pm 0.03$ ,  $P < 0.001$ ) but not with low-fat dairy intake.

Associations were no longer present after additional adjustments for dairy-derived saturated fatty acids.

**CONCLUSIONS:** Total and especially full-fat dairy food intakes are inversely and independently associated with metabolic syndrome in middle-aged and older adults, associations that seem to be mediated by dairy saturated fatty acids. Dietary recommendations to avoid full-fat dairy intake are not supported by our findings. PMID: 26511614

2. Nutr Rev. 2015 Aug;73 Suppl 1:8-14.

**Dairy products, yogurt consumption, and cardiometabolic risk in children and adolescents.**

Moreno LA, Bel-Serrat S, Santaliestra-Pasías A, Bueno G

The high prevalence of obesity in children is a global health issue. Obesity in

children and adolescents can result in hypertension, dyslipidemia, chronic inflammation, and hyperinsulinemia, increasing the risk of death, as children grow into adulthood, and raising public health concerns. Type 2 diabetes in children and adolescents is a cardiovascular disease (CVD) risk factor. Dairy consumption may have a protective effect against the development of CVD, but there is scarce evidence of this in children and adolescents. Within the Healthy Lifestyle in Europe by Nutrition in Adolescence, the objective of this study was to investigate the relationship between dairy consumption and CVD risk factors in a sample of adolescents (aged 12.5-17.5 years) from 8 European cities. Overall, dairy products emerged as the food group that best identified adolescents at low CVD risk. Higher consumption of milk and yogurt and of milk- and yogurt-based beverages was associated with lower body fat, lower risk for CVD, and higher cardiorespiratory fitness. PMID: 26175484

3. J Nutr. 2015 Oct;145(10):2308-16.

**Consumption of Yogurt, Low-Fat Milk, and Other Low-Fat Dairy Products Is Associated with Lower Risk of Metabolic Syndrome Incidence in an Elderly Mediterranean Population.**

Babio N, Becerra-Tomás N, Martínez-González MÁ, Corella D; PREDIMED Investigators.

**BACKGROUND:** The association between consumption of dairy products and the risk of developing metabolic syndrome (MetS) is unclear.

**OBJECTIVE:** The purpose of this study was to evaluate the associations between consumption of dairy products (total and different subtypes) and incident MetS in a Mediterranean population at high cardiovascular disease risk.

**METHODS:** We prospectively analyzed 1868 men and women (55-80 y old) without MetS at baseline, recruited from different PREDIMED (Prevención con Dieta Mediterránea) centers between October 2003 and June 2009 and followed up until December 2010. MetS was defined according to updated, harmonized criteria. At baseline and yearly thereafter, we determined anthropometric variables, dietary habits by a 137-item validated food-frequency questionnaire, and blood biochemistry. Multivariable-adjusted HRs of MetS or its components were estimated for each of the 2 upper tertiles (vs. the lowest one) of mean consumption of dairy products during the follow-up.

**RESULTS:** During a median follow-up of 3.2 y, we documented 930 incident MetS cases. In the multivariable-adjusted model, HRs (95% CIs) of MetS for the comparison of extreme tertiles of dairy product consumption were 0.72 (0.61, 0.86) for low-fat dairy, 0.73 (0.62, 0.86) for low-fat yogurt, 0.78 (0.66, 0.92) for whole-fat yogurt, and 0.80 (0.67, 0.95) for low-fat milk. The respective HR for cheese was 1.31 (1.10, 1.56).

**CONCLUSIONS:** Higher consumption of low-fat dairy products, yogurt (total, low-fat, and whole-fat yogurt) and low-fat milk was associated with a reduced risk of MetS in individuals at high cardiovascular disease risk from a Mediterranean population. Conversely, higher consumption of cheese was related to a higher risk of MetS. PMID: 26290009

4. Eur J Prev Cardiol. 2014 Dec;21(12):1557-67

## **Low-fat and high-fat dairy products are differently related to blood lipids and cardiovascular risk score.**

Huo Yung Kai S, Bongard V, Simon C, Ruidavets JB, Arveiler D

**BACKGROUND:** Fat content of dairy foods is diverse, potentially leading to varying effects on cardiovascular risk. We studied relationships of low- and high-fat dairy products with lipids and level of cardiovascular risk (assessed by the SCORE equation), in a cross-sectional population survey conducted in three French areas. **SUBJECTS AND METHODS:** A sample of 3078 participants aged 35-64 years underwent a standardized cardiovascular risk assessment. Subjects were asked to record the types and amounts of foods and beverages they consumed over a three-consecutive-day period. Dairy products were separated into two groups: the low-fat group comprised milk (including milk in desserts and beverages), yogurts and cottage cheese, whereas other cheeses formed the high-fat group. **RESULTS:** After adjustment (including physical activity and a diet quality score), the probability of an increased cardiovascular mortality score ( $\geq 1\%$ ) decreased from the lowest to the highest quartile (Q) of low-fat dairy intake: odds ratio (OR) ORQ1 = 1; ORQ2 = 0.89 (95% confidence interval: 0.73-1.10), ORQ3 = 0.78 (0.63-0.97) and ORQ4 = 0.68 (0.55-0.85) for the first, second, third and fourth quartile, respectively. Results were notably different for high-fat dairy intake: ORQ2 = 1.02 (0.82-1.25); ORQ3 = 0.90 (0.73-1.11); ORQ4 = 1.07 (0.86-1.32). Intake of low-fat dairy products was inversely associated with low-density lipoprotein cholesterol (LDL-C), but no significant independent relationship was found with high-density lipoprotein cholesterol (HDL-C) or triglycerides. None of the lipid parameters was significantly associated with the consumption of high-fat dairy products. **CONCLUSION:** Participants with the highest intake of low-fat dairy products had the lowest mortality risk score and exhibited the best LDL-C profile. Such favourable associations were not observed with cheese consumption. PMID: 24002126

5. Am J Clin Nutr. 2014 May;99(5 Suppl):1235S-42S.

### **Yogurt and dairy product consumption to prevent cardiometabolic diseases: epidemiologic and experimental studies.** Astrup A

Dairy products contribute important nutrients to our diet, including energy, calcium, protein, and other micro- and macronutrients. However, dairy products can be high in saturated fats, and dietary guidelines generally recommend reducing the intake of saturated fatty acids (SFAs) to reduce coronary artery disease (CAD). Recent studies question the role of SFAs in cardiovascular disease (CVD) and have found that substitution of SFAs in the diet with omega-6 (n-6) polyunsaturated fatty acids abundant in vegetable oils can, in fact, lead to an increased risk of death from CAD and CVD, unless they are balanced with n-3 polyunsaturated fat. Replacing SFAs with carbohydrates with a high glycemic index is also associated with a higher risk of CAD. Paradoxically, observational studies indicate that the consumption of milk or dairy products is inversely related to incidence of CVD. The consumption of dairy products has been suggested to ameliorate characteristics of the metabolic syndrome, which encompasses a cluster of risk factors including dyslipidemia, insulin resistance, increased

cluster of risk factors including dyslipidemia, insulin resistance, increased blood pressure, and abdominal obesity, which together markedly increase the risk of diabetes and CVD. Dairy products, such as cheese, do not exert the negative effects on blood lipids as predicted solely by the content of saturated fat. Calcium and other bioactive components may modify the effects on LDL cholesterol and triglycerides. Apart from supplying valuable dairy nutrients, yogurt may also exert beneficial probiotic effects. The consumption of yogurt, and other dairy products, in observational studies is associated with a reduced risk of weight gain and obesity as well as of CVD, and these findings are, in part, supported by randomized trials. PMID: 24695891

6. J Hum Nutr Diet. 2014 Apr;27 Suppl 2:98-108.

**Metabolic syndrome profiles, obesity measures and intake of dietary fatty acids in adults: Tehran Lipid and Glucose Study.**

Shab-Bidar S, Hosseini-Esfahani F, Mirmiran P, Hosseinpour-Niazi S, Azizi F.

**BACKGROUND:** To determine the association between fatty acid intake and the prevalence of risk factors for the metabolic syndrome.

**METHODS:** In this population-based cross-sectional study, a sample of 2750 Tehranian subjects (44% men and 56% women) aged 20-74 years, who completed a validated food frequency questionnaire, was studied. The metabolic syndrome (MetS) was defined in accordance with the modified guidelines of the National Cholesterol Education Program Adults Treatment Panel III, and waist circumference was coded according to the newly-introduced cut-off points for Iranian adults ( $\geq 95$  cm for both sexes). Metabolic risk factors across quartile categories of each type of dietary fat [total fat intake, total poly-unsaturated fatty acid (PUFA) intake, total MUFA intake, total saturated fatty acid (SFA) intake expressed as percentage of energy and quartiles of the ratio of polyunsaturated fat to saturated fat (P : S)] were compared.

**RESULTS:** The mean (SD) ages of participants were 40.8 (14.6) and 38.6 (12.9) years, respectively, for men and women. The mean contribution of fat to energy intake was approximately 26% in men and women. A positive trend over successive quartiles of SFA intake with low-density lipoprotein-cholesterol (LDL-C) and triglyceride, as well as P/S ratio intake with high-density lipoprotein-cholesterol (HDL-C), was found. An inverse association between HDL-C with SFA and PUFA intake and a positive association with MUFA and the P/S ratio was found. A significant association of fatty acid consumption and risk of the MetS in this population was observed, except for total PUFA intake.

**CONCLUSIONS:** Special dietary fatty acids are associated with metabolic risk factors among the Iranian population. Because of the high prevalence of cardiovascular disease and MetS, national nutrition policies must be developed accordingly for the modification of dietary fatty acid intake with respect to causation and prevention. PMID: 23731333

7. Nutrients. 2013 Nov 20;5(11):4665-84.

**Dairy foods and dairy protein consumption is inversely related to markers of adiposity in**

**obese men and women.** Murphy KJ, Crichton GE, Dyer KA, Coates AM, Pettman TL, Milte C, Thorp AA

A number of intervention studies have reported that the prevalence of obesity may be in part inversely related to dairy food consumption while others report no association. We sought to examine relationships between energy, protein and calcium consumption from dairy foods (milk, yoghurt, cheese, dairy spreads, ice-cream) and adiposity including body mass index (BMI), waist (WC) and hip circumference (HC), and direct measures of body composition using dual energy X-ray absorptiometry (% body fat and abdominal fat) in an opportunistic sample of 720 overweight/obese Australian men and women. Mean (SD) age, weight and BMI of the population were  $51 \pm 10$  year,  $94 \pm 18$  kg and  $32.4 \pm 5.7$  kg/m<sup>2</sup>, respectively. Reduced fat milk was the most commonly consumed dairy product ( $235 \pm 200$  g/day), followed by whole milk ( $63 \pm 128$  g/day) and yoghurt ( $53 \pm 66$  g/day). Overall dairy food consumption (g/day) was inversely associated with BMI, % body fat and WC (all  $p < 0.05$ ). Dairy protein and dairy calcium (g/day) were both inversely associated with all adiposity measures (all  $p < 0.05$ ). Yoghurt consumption (g/day) was inversely associated with % body fat, abdominal fat, WC and HC (all  $p < 0.05$ ), while reduced fat milk consumption was inversely associated with BMI, WC, HC and % body fat (all  $p < 0.05$ ). Within a sample of obese adults, consumption of dairy products, dairy protein, and calcium was associated with more favourable body composition. PMID: 24264228

8. Nutr Metab Cardiovasc Dis. 2013 Sep;23(9):816-21.

**Higher regular fat dairy consumption is associated with lower incidence of metabolic syndrome but not type 2 diabetes.** Louie JC, Flood VM, Rangan AM, Burlutsky G, Gill TP, Gopinath B, Mitchell P.

**BACKGROUND AND AIMS:** Limited evidence suggests habitual dairy consumption to be protective against metabolic syndrome (MetSyn) and type 2 diabetes among older adults. We assessed the association of baseline consumption of dairy products with the incidence of MetSyn and type 2 diabetes among a cohort of Australian adults aged 49 years and over.

**METHODS AND RESULTS:** A validated 145-item semi-quantitative food frequency questionnaire was used to assess food and nutrient intake at baseline. Ten-year incidence of MetSyn and type 2 diabetes were obtained from 1807 and 1824 subjects respectively. Odds ratios (OR) were calculated by discrete time logistic regression modelling. Compared with subjects in the lowest intake quartile of regular fat dairy products, those in the highest quartile had a 59% lower risk of MetSyn (multivariate adjusted OR: 0.41; 95% CI: 0.23-0.71;  $p(\text{trend}) = 0.004$ ), after adjustment for risk factors. Among obese subjects, an association between a high intake of regular fat dairy foods and reduced risk of type 2 diabetes was also found (age and sex adjusted OR 0.37; 95% CI: 0.16-0.88;  $p(\text{trend}) = 0.030$ ), but the association did not persist after adjustment for additional confounders. There was no association between total dairy consumption and risk of MetSyn or type 2 diabetes.

type 2 diabetes.

CONCLUSIONS: We found an inverse association between regular fat dairy consumption and risk of MetSyn among Australian older adults. Further studies are warranted to examine the association between weight status, dairy consumption and risk of type 2 diabetes. PMID: 23021710

9. Eur J Nutr. 2013 Mar;52(2):771-8.

**Low-fat dairy, but not whole-/high-fat dairy, consumption is related with higher serum adiponectin levels in apparently healthy adults.** Niu K, Kobayashi Y, Guan L, Monma H, Guo H, Cui Y, Otomo A, Chujo M,

PURPOSE: Although previous studies suggested that higher low-fat dairy consumption lower the risk of type 2 diabetes, the mediating factors are not well understood. Higher baseline adiponectin levels are related with a lower risk of type 2 diabetes. This study evaluated whether low-fat dairy is related with adiponectin in apparently healthy adults.

METHODS: We investigated a cross-sectional (n = 938) and one-year longitudinal (n = 759) relationship between low-fat and whole-/high-fat dairy (both including cow's milk and yogurt) and adiponectin. Dairy consumption was assessed with a validated food frequency questionnaire. Serum adiponectin was measured by using a specific sandwich enzyme-linked immunosorbent assay.

RESULTS: In the cross-sectional analysis, the geometric means (95 % confidence intervals [95 % CIs]) of log-transformed adiponectin related with the low-fat dairy categories were 7.27 (6.80-7.77) for the lowest category, 7.67 (7.09-8.31) for the middle category, and 8.40 (7.73-9.13) for the highest category (p < 0.001) after adjustment for potential confounders (including all lifestyle factors). In the longitudinal analysis, repeated-measures ANCOVA adjusted for confounding factors showed a significant time-by-categories (categories of low-fat dairy) interaction in the change of adiponectin. In contrast, no significant relationship was found between the whole-/high-fat dairy categories and adiponectin.

CONCLUSIONS: This study has shown that higher consumption of low-fat dairy, but not of whole-/high-fat dairy, is related with higher levels of adiponectin and with the change of adiponectin level at the one-year follow-up. These results suggest that the consumption of low-fat dairy may have a beneficial effect on serum adiponectin levels. PMID: 22648202

10. Adv Nutr. 2011 Sep;2(5):396-407.

**Dairy components and risk factors for cardiometabolic syndrome: recent evidence and opportunities for future research.** Rice BH, Cifelli CJ, Pikosky MA, Miller GD.

Cardiometabolic syndrome (CMS), a cluster of metabolic abnormalities that increases the risk of cardiovascular disease (CVD) and type 2 diabetes, affects over one-third of American adults and accounts for billions of dollars in health care costs annually. Current evidence indicates an inverse association between consumption of dairy foods and risk of CMS and its related disease outcomes.

Although the specific mechanism(s) underlying the beneficial effects of dairy consumption on the development of CMS, CVD, and type 2 diabetes have not been fully elucidated, there is evidence that specific components within dairy such as milkfat, vitamin D, calcium, magnesium, potassium, and whey proteins may be individually or collectively involved. Specifically, each of these dairy components has been implicated as having a neutral or beneficial effect on one or more elements of CMS, including the serum lipid profile, blood pressure, fasting glucose, and body composition. Although several mechanisms have been identified by which components in dairy may beneficially affect symptoms associated with CMS, further research is required to better understand how dairy and its components may contribute to metabolic health. The purpose of this review is to present the mechanisms by which specific dairy components modulate risk factors for CMS and identify opportunities for future research. PMID: 22332081

11. *Obes Rev.* 2011 May;12(5):e190-201.

**Dairy consumption and metabolic syndrome: a systematic review of findings and methodological issues.**

Crichton GE, Bryan J, Buckley J, Murphy KJ.

A growing body of observational research suggests that dairy consumption may have a beneficial effect on the metabolic syndrome (MetS). MetS is a clustering of cardiometabolic risk factors within an individual that carries with it an increased risk of developing cardiovascular disease. A systematic search of electronic databases identified cross-sectional studies (n = 10) and prospective cohort studies (n = 3) that assessed dairy intake in relation to MetS. The quality of the included studies was assessed based on study methodology, measurement and reporting of dietary intake, use of standardized MetS diagnostic criteria and statistical analysis. Dairy intake was inversely associated with incidence or prevalence of MetS in seven out of 13 studies. Three studies found no association between dairy and MetS. Three studies reported mixed relationships between specific dairy foods and MetS. The majority of studies suggested a potential benefit of dairy consumption on the risk of having MetS, but methodological differences, potential biases and other limitations in the studies conducted prevent conclusions to be drawn. Future randomized controlled trials are needed to confirm the effect of dairy consumption on MetS. PMID: 21348924

12. *J Am Coll Nutr.* 2011 Apr;30(2):92-9.

**Dairy product intake and its association with body weight and cardiovascular disease risk factors in a population in dietary transition.** Ferland A, Lamarche B, Château-Degat ML, Counil E

**OBJECTIVE:** Higher dairy product intake has shown beneficial effects on body weight, blood pressure, type 2 diabetes, and cardiovascular disease (CVD) risk factors in Caucasian populations. This study evaluated dairy product intake and its association with body weight and CVD risk profile among a population undergoing a dietary transition in Canada, the Nunavut Inuit

undergoing a dietary transition in Canada, the Nunavik Inuit.

**METHODS:** Data were collected from August 27 to October 1, 2004, in the 14 villages of Nunavik on a Canadian research icebreaker (Canadian Coast Guard ship Amundsen). Dairy product intake and calcium intake were evaluated in 543 Inuit using a food frequency questionnaire. Physiological (lipid profile, fasting glucose, and insulin) and anthropometrical measurements were also obtained.

**RESULTS:** The range of median dairy product intake extended from 120 g/d in the lowest tertile to 290 g/d in the highest tertile. The median of calcium intake was 524 mg/d. Participants in the highest tertile of dairy product consumption had higher body weight, fat-free mass, waist circumference, waist-to-hip ratio, and fasting glucose concentrations than participants in the lowest tertile (all  $p < 0.01$ ). After adjustments for potential cofactors, no significant association was observed. A higher prevalence of Inuit participants with metabolic syndrome was observed in the higher tertile compared with the first tertile (10.3% vs 1.6%;  $p < 0.001$ ).

**CONCLUSIONS:** Higher dairy product intake in Nunavik Inuit is not related to protective effects on body weight and CVD. The consumption of dairy products in Nunavik Inuit is probably not sufficient to withdraw beneficial effects on body weight or CVD risk factors, as observed in North American populations. PMID: 21730217

13. Eur J Nutr. 2009 Jun;48(4):191-203.

**A reappraisal of the impact of dairy foods and milk fat on cardiovascular disease risk.**

German JB, Gibson RA, Krauss RM, Nestel P, Lamarche B, van Staveren WA

**BACKGROUND:** This review provides a reappraisal of the potential effects of dairy foods, including dairy fats, on cardiovascular disease (CVD)/coronary heart disease (CHD) risk. Commodities and foods containing saturated fats are of particular focus as current public dietary recommendations are directed toward reducing the intake of saturated fats as a means to improve the overall health of the population. A conference of scientists from different perspectives of dietary fat and health was convened in order to consider the scientific basis for these recommendations.

**AIMS:** This review and summary of the conference focus on four key areas related to the biology of dairy foods and fats and their potential impact on human health: (a) the effect of dairy foods on CVD in prospective cohort studies; (b) the impact of dairy fat on plasma lipid risk factors for CVD; (c) the effects of dairy fat on non-lipid risk factors for CVD; and (d) the role of dairy products as essential contributors of micronutrients in reference food patterns for the elderly.

**CONCLUSIONS:** Despite the contribution of dairy products to the saturated fatty acid composition of the diet, and given the diversity of dairy foods of widely differing composition, there is no clear evidence that dairy food consumption is consistently associated with a higher risk of CVD. Thus, recommendations to reduce dairy food consumption irrespective of the nature of the dairy product should be made with caution. PMID: 19259609

From: Mark P. O'Connell [mailto:mpoc@berkshirehealth.com]

**Sent:** Sunday, February 07, 2016 5:23 PM

**To:** Prescott Martha

**Subject:** full fat dairy and reduced cardiovascular risk

Hi Martha,

Working on a presentation and interested in this reference:

Review

[European Journal of Nutrition](#)

February 2013, Volume 52, [Issue 1](#), pp 1-24

First online: 19 July 2012

The relationship between high-fat dairy consumption and obesity, cardiovascular, and metabolic disease

Mario Kratz

, Ton Baars

, Stephan Guyenet

any other recent reviews or meta analysis you come up with would be great. Thanks!

mark

**CONFIDENTIALITY NOTICE:** This e-mail communication and any attachments may contain confidential and privileged information for the use of the designated recipients named above. If you are not the intended recipient, you are hereby notified that you have received this communication in error and that any review, disclosure, dissemination, distribution or copying of it or its contents is prohibited. If you have received this communication in error, please notify Berkshire Health Systems immediately by e-mail at [postmaster@bhs1.org](mailto:postmaster@bhs1.org) and destroy all copies of this communication and any attachments.



Adv Nutr 2014 p131-  
.pdf



Sci Rep 2015 p1-.pdf



Adv Nutr 2012 p266-  
.pdf



PLOS 2013.pdf

