Novel perspectives on the association between dairy, dairy fat and cardiometabolic health

Benoît Lamarche, PhD
Chair of Nutrition

School of Nutrition,
INAF, Université Laval
Québec, Canada

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Disclosures

Funding (last 5 years)

- CIHR, NSERC, FRQ-NT, FRQ-S
- Dairy Farmers of Canada/Agriculture Agri-Food Canada
- Canola Council of Canada/Agriculture Agri-Food Canada
- Atrium Innovations
- Danone Institute
- Merck Frosst

Other (advisory, honoraria, last 5 years)

- Dairy Farmers of Canada
- Unilever
- Danone Canada
- Canadian Nutrition Society
- Centre Européen pour la Nutrition & la Santé (CENS)

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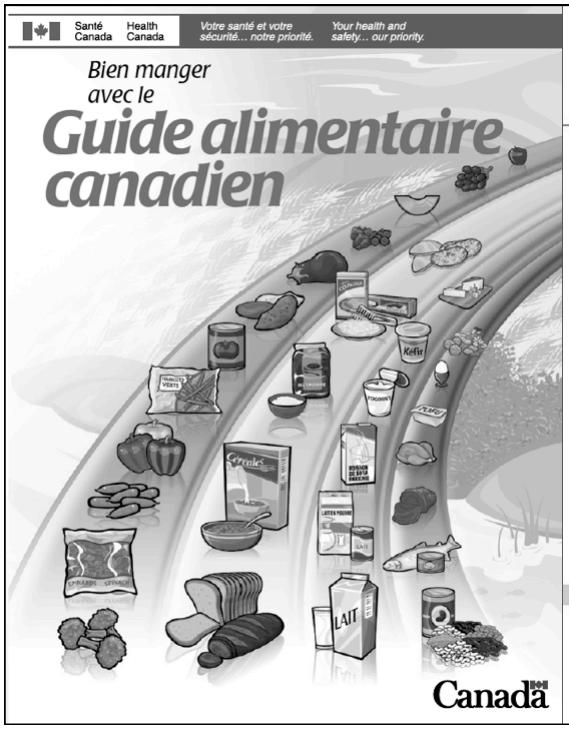
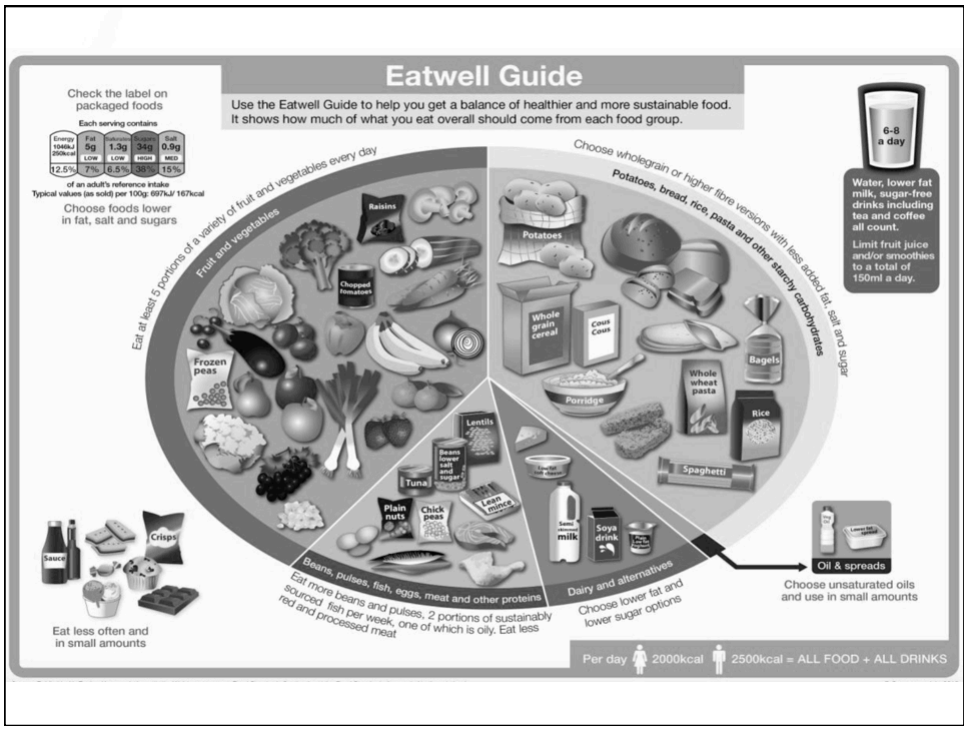


Recommendations regarding dairy:

Low fat dairy.



Dairy: good or bad ?

ARTICLE IN PRESS

ELSEVIER

Canadian Journal of Cardiology ■ (2016) 1–7

Review

Does Milk Consumption Contribute to Cardiometabolic Health and Overall Diet Quality?

Benoît Lamarche, PhD, Ian Givens, PhD, Sabita Soedamah-Muthu, PhD, Ronald M. Krauss, MD, Marianne Uhre Jakobsen, PhD, Heike A. Bischoff-Ferrari, MD, DrPH, An Pan, PhD, and Jean-Pierre Després, PhD

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Can J Cardiol in press 2016

Dairy: good or bad ?

+	-
• High quality protein • Calcium • Vit D • Other Vit, minerals • Displacement effect	• SFA intake • Allergies, intolerance • Environmental issues

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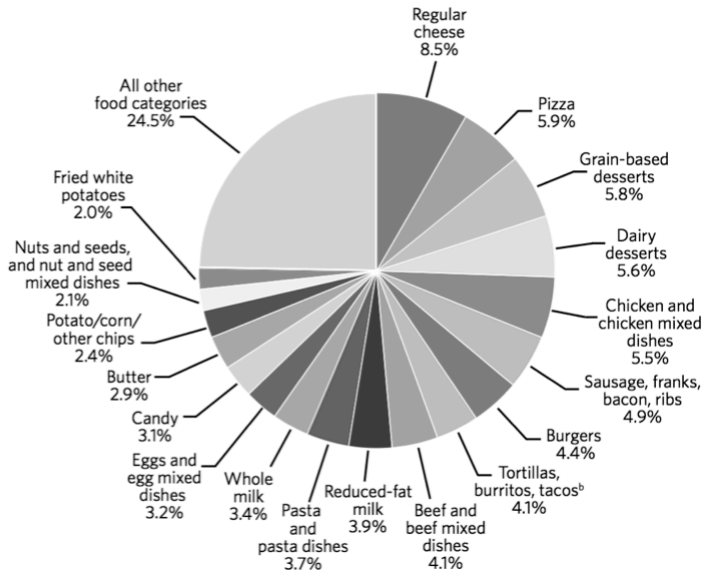
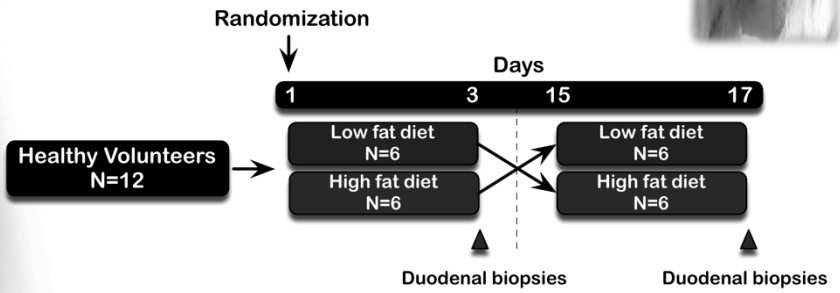
Sources of SFA, US Population age > 2 yrs NHANES 2005–2006



Dietary fat (SFA/trans) and (intestinal) lipids



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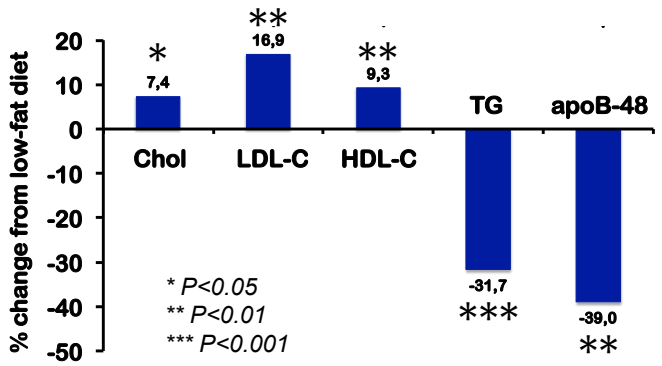
Guay *et al*. Metabolism 2012*; 61(1):76–83*

Dietary fat (SFA/trans) and (intestinal) lipids



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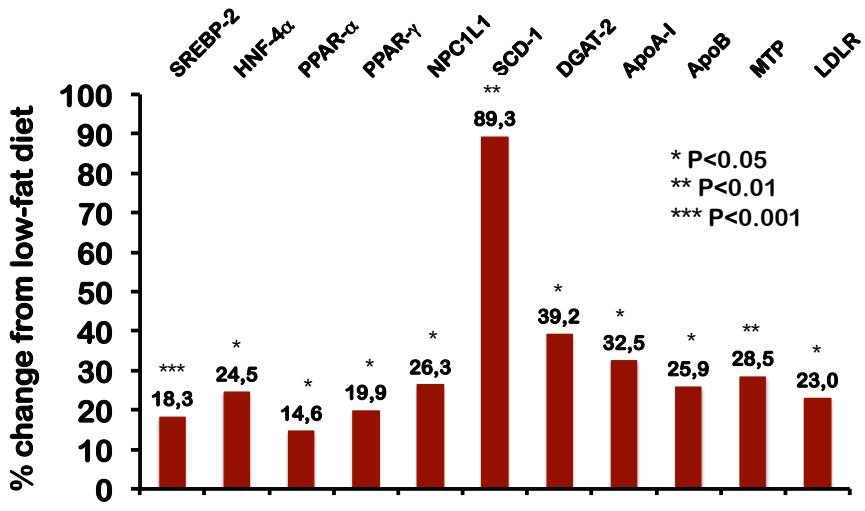
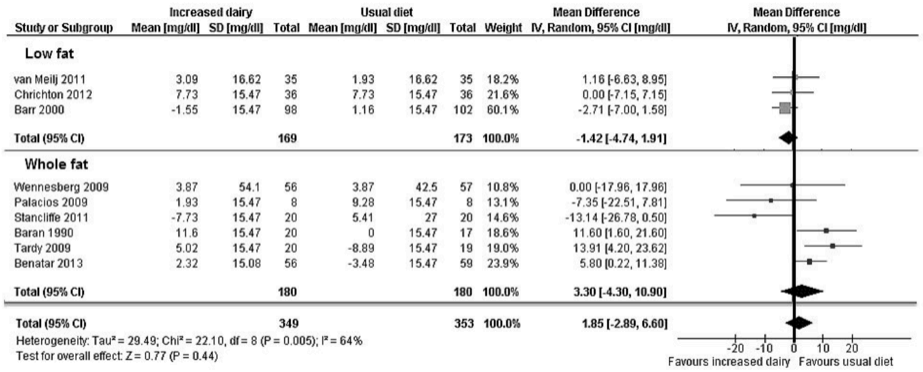
Guay *et al.* Metabolism 2012*; 61(1):76–83*

Dietary fat (SFA/trans) and (intestinal) lipids



Tremblay *et al. Am J Clin Nutr* 2014

High, Low fat dairy and LDL-C



*Total numbers=702, 70% female, mean baseline LDL cholesterol 124.9 (SD 13.14) mg/dl, median study duration 12 (IQR 4-26) weeks

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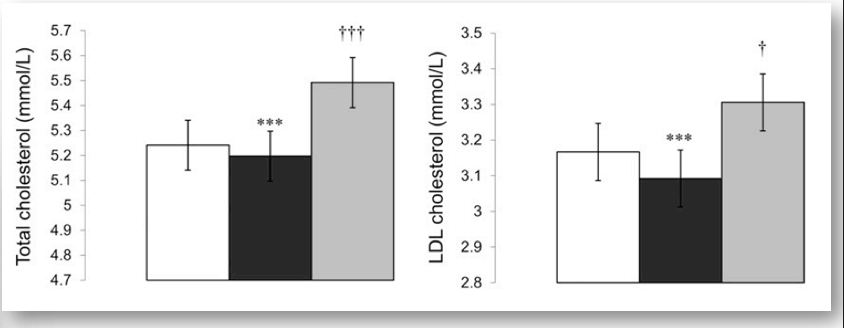
Benatar et al, PLoS ONE 8(10): e76480

Cheese vs. butter lowers LDL-C



Run-in Cheese Butter

13% of energy from cheese or butter

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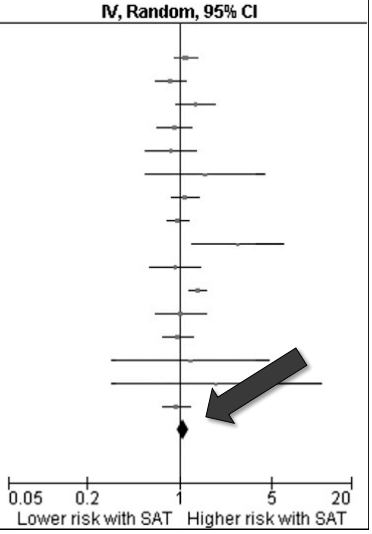
Hjerpsted, Am J Clin Nutr 2011;94:1479–84.

Meta-analysis- Prospective cohort studies on SFA vs CVD

Siri-Tarino et al Am J Clin Nutr 2010

Study or Subgroup	Risk Ratio IV, Random, 95% CI	Year
Coronary Heart Disease		
Shekelle et al(17)	1.11 [0.91, 1.36]	1981
McGee et al(9)[1]	0.86 [0.67, 1.12]	1984
Kushi et al(13)	1.33 [0.95, 1.87]	1985
Posner et al(16)	0.92 [0.68, 1.24]	1991
Goldbourt et al(35)[1]	0.86 [0.56, 1.35]	1993
Fehily et al(28)	1.57 [0.56, 4.42]	1994
Ascherio et al(4)[1]	1.11 [0.87, 1.42]	1996
Esrey et al(6)	0.97 [0.80, 1.18]	1996
Mann et al(32)	2.77 [1.25, 6.13]	1997
Pietinen et al(15)	0.93 [0.60, 1.44]	1997
Boniface et al(5)[1]	1.37 [1.17, 1.60]	2002
Jakobsen et al(8)[1]	1.03 [0.66, 1.60]	2004
Oh et al(33)	0.97 [0.74, 1.27]	2005
Tucker et al(18)[1]	1.22 [0.31, 4.77]	2005
Xu et al(10)	1.91 [0.31, 11.84]	2006
Leosdottir et al(14)	0.95 [0.74, 1.21]	2007
Subtotal (95% CI)	**1.07 [0.96, 1.19]**	

Heterogeneity: Tau² = 0.02; Chi² = 25.54, df = 15 (P = 0.04); I² = 41%
Test for overall effect: Z = 1.22 (P = 0.22)



Meta-analysis- Prospective cohort studies on SFA vs CVD

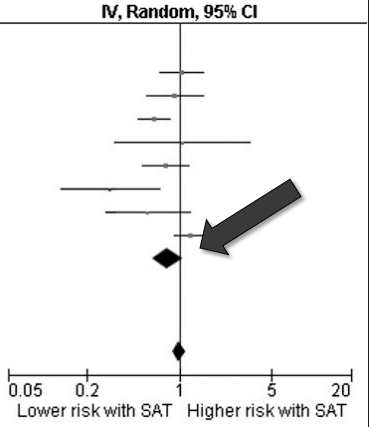
Siri-Tarino et al Am J Clin Nutr 2010

Study or Subgroup	Risk Ratio IV, Random, 95% CI	Year
Stroke		
McGee et al(9)[1]	1.04 [0.72, 1.50]	1984
Goldbourt et al(35)[1]	0.92 [0.56, 1.51]	1993
Gillman et al(11)	0.64 [0.49, 0.84]	1997
Iso et al(31)	1.05 [0.33, 3.39]	2001
He et al(29)[1]	0.79 [0.52, 1.19]	2003
Iso et al(30)	0.30 [0.13, 0.71]	2003
Sauvaget et al(34)	0.58 [0.28, 1.20]	2004
Leosdottir et al(14)	1.22 [0.91, 1.64]	2007
Subtotal (95% CI)	**0.81 [0.62, 1.05]**	

Heterogeneity: Tau² = 0.08; Chi² = 18.03, df = 7 (P = 0.01); I² = 61%
Test for overall effect: Z = 1.58 (P = 0.11)

Total (95% CI)	**1.00 [0.89, 1.11]**	

Heterogeneity: Tau² = 0.03; Chi² = 52.63, df = 23 (P = 0.0004); I² = 56%
Test for overall effect: Z = 0.06 (P = 0.95)



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REVIEW | Annals of Internal Medicine

Association of Dietary, Circulating, and Supplement Fatty Acids With Coronary Risk

A Systematic Review and Meta-analysis

Rajiv Chowdhury, MD, PhD; Samantha Warnakula, MPhil*; Setor Kunutsor, MD, MSt*; Francesca Crowe, PhD; Heather A. Ward, PhD; Laura Johnson, PhD; Oscar H. Franco, MD, PhD; Adam S. Butterworth, PhD; Nita G. Forouhi, MRCP, PhD; Simon G. Thompson, FMedSci; Kay-Tee Khaw, FMedSci; Dariush Mozaffarian, MD, DrPH; John Danesh, FRCP*; and Emanuele Di Angelantonio, MD, PhD*

- 32 observational studies (N=530,525), diet records
- 17 observational studies (N=25,721), biomarkers
- 27 RCTs (N=103,052) fatty acid supplementation.

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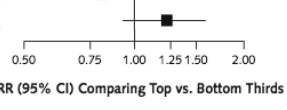
Chowdhury et al Ann Intern Med 2014;160:398-406

Association of Dietary, Circulating, and Supplement Fatty Acids With Coronary Risk

A Systematic Review and Meta-analysis

Figure 2. RRs for coronary outcomes in prospective cohort studies of circulating fatty acid composition.

Circulating Blood Fatty Acid Composition	Studies, *n*	Participants, *n*	Events, *n*
Total saturated fatty acids	8	15 590	3758
14:0, Myristic	5	10 598	2932
15:0, Pentadecanoic	4	5490	2283
16:0, Palmitic	10	25 554	4318
17:0, Margaric	4	5490	2283
15:0, Pentadecanoic + 17:0, Margaric	4	5490	2283
18:0, Stearic	8	22 266	3654



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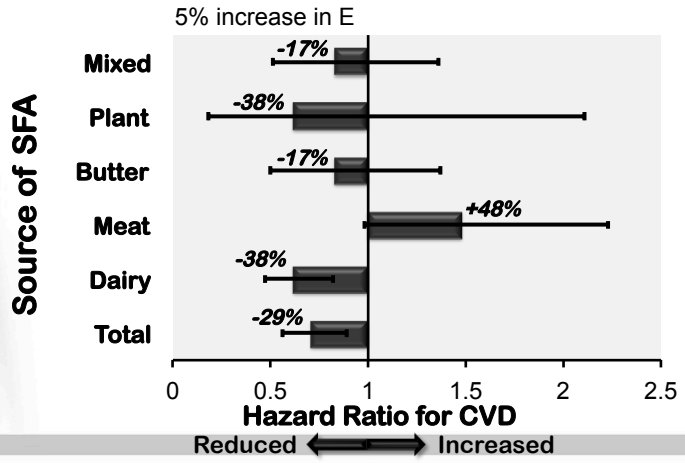
Chowdhury et al Ann Intern Med 2014;160:398-406

FOOD-SPECIFIC SFA AND CVD

De Oliviera Otto et al **Am J Clin Nutr 2012;96:397–404**



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N=5209
Follow-up 10 yrs

Dairy: good or bad ?

Systematic-review of the association between dairy product consumption and risk of cardiovascular-related clinical outcomes

Drouin-Chartier, Côté, Brassard, Tessier-Grenier, Labonté, Desroches, Couture, Lamarche

Adv Nutr 2016 (in press)

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Adv Nutr in press 2016

Dairy: good or bad ?

1. Is dairy consumption detrimentally, neutrally or beneficially associated with cardiovascular-related clinical outcomes?

2. Is the recommendation to consume low-fat, as opposed to regular/high-fat dairy, evidence-based?

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Adv Nutr in press 2016

Systematic review: Dairy and health

Meta-analyses and prospective cohort studies CHD

	MA	Incl. pop studies	N	AddIn. pop studies
Total Dairy	2	4-12	>250,000	2
Low fat	2	3-8	>240,000	2
High fat	2	4-7	>274,000	2
Milk	4	6-13	87,000-283,000	3
Cheese	2	2-7	>37,000	2
Yogurt	1	5	NA	2

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Dairy and health
Systematic review - meta-analyses

HIGH quality evidence:
- **Lower risk of:**
  - **Stroke vs. total dairy**
  - **Hypertension vs. total dairy**
  - **T2D vs. total dairy, low fat, yogurt**

MODERATE quality evidence:
- **Lower risk of:**
  - **Stroke vs. low fat**
  - **Hypertension vs. low fat, milk**
  - **T2D vs. cheese**

Adv Nutr in press 2016

Dairy and health
Systematic review - meta-analyses

HIGH quality evidence:
- **Neutral risk of:**
  - **CHD vs. total, high/low fat, milk, cheese**
  - **Stroke vs. milk**
  - **Hypertension vs. cheese**
  - **T2D vs. high fat, milk**

MODERATE quality evidence:
- **Neutral risk of:**
  - **CVD vs. total dairy, cheese**
  - **CHD vs. yogurt**
  - **Stroke vs. high fat, cheese**
  - **Hypertension vs. high fat, yogurt, fermented**
  - **T2D vs. fermented**

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Dairy and health

Three perspectives

1. Cohort data
2. RCTs
3. Other

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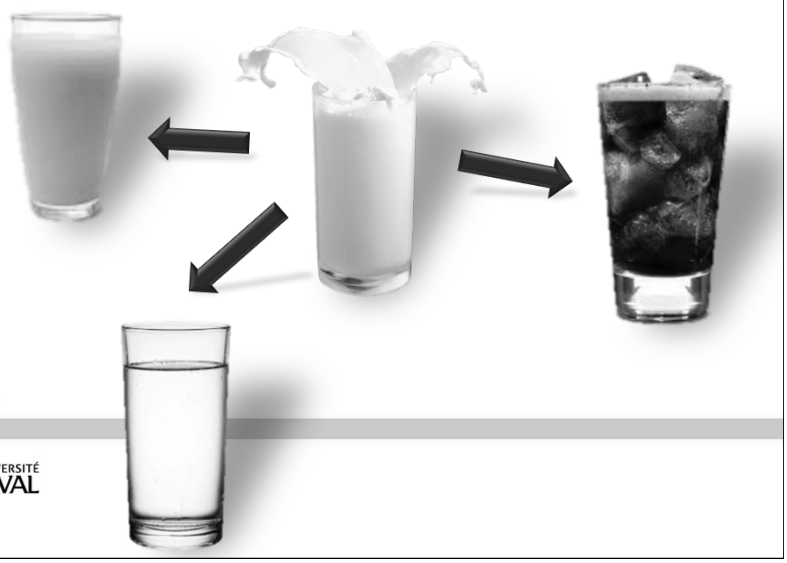
Replacement factor



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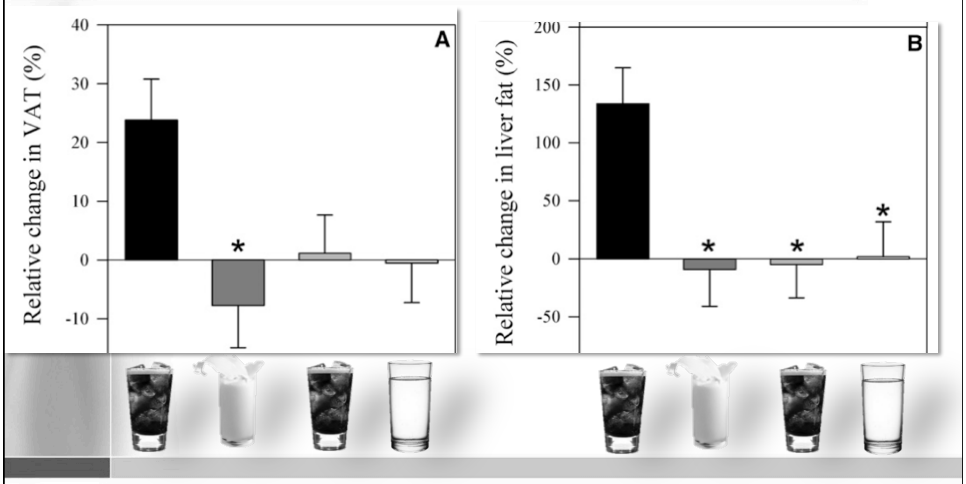
Replacement factor



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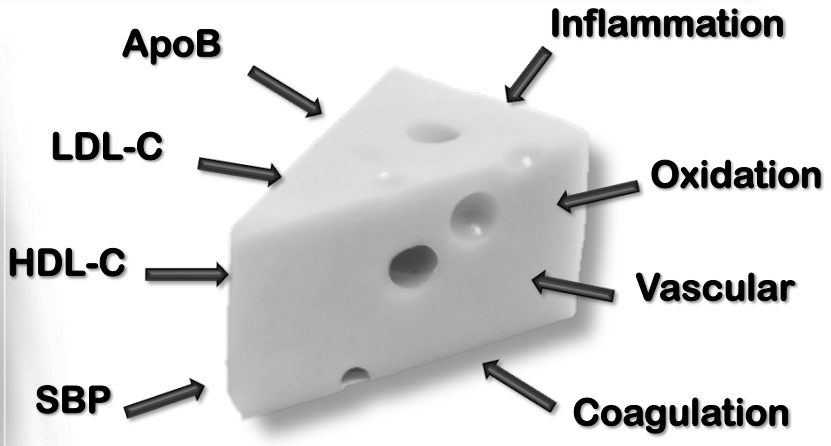
Maersk et al, *AJCN* 2012;95:283–9

Cardiometabolic risk



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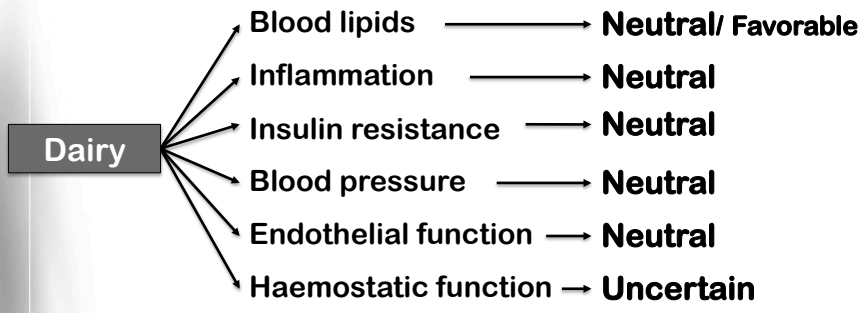
Cardiometabolic risk

Review of ~100 RCTs



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Drouin Chartier et al, Adv Nutr 2016 in press

Unresolved issues

- Do regular/full fat and reduced/non-fat milk products have similar or different effects on health outcomes?
- To what extent are potential health effects of milk consumption modulated by the foods it is replacing in the diet?
- What is the impact of milk consumption on other vascular-related disease outcomes such as peripheral arterial disease, chronic kidney disease and cognitive decline?

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Can J Cardiol (in press)

Unresolved issues

- Does milk powder have similar health properties as liquid milk?
- How do different cattle feeding practices, which modify the fatty acid profiles of dairy fat, influence the effect of milk on health?
- Do age, weight status, sex and ethnicity influence the impact of milk consumption on health?
- Is the effect of milk consumption on health outcomes similar among populations with traditionally low vs. high intakes?

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Can J Cardiol (in press)

Take home messages

- Consumption of dairy poses no health risk
  - *Could dairy simply be neutral foods?*
- Consumption of specific dairy products may have favorable health effects
  - *On their own*
  - *By replacing other foods*
  - *By contributing to specific nutrients*
- Current recommendations on low fat dairy needs to be substantiated

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