

Saturated Fats and risk of Cardiovascular Disease

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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)

Current dietary guidelines, fat/SFA

Advisory committee	Year	Total fat	SFA
Canadian Dietary reference intakes (DRI) ¹	2010	20-35% of total calories	As low as possible
Dietary Guidelines for Americans (DGAC/USDA) ²	2010	20-35% of total calories	< 10% of kcal
AHA/ACC Lifestyle Management Guideline ³	2013	none	< 7% of kcal
European Food Safety Agency (EFSA) ⁴	2010	20-35% of total calories	As low as possible
World Health Organization (WHO) ⁵	2008	15-35% of total calories	< 10% of kcal
ANSES, France ⁶	2011	35-40% of total calories	<12% (<8%)

¹ <http://www.hc-sc.gc.ca/fn-an/nutrition/reference/table/index-eng.php#rvm>

² <http://www.cnpp.usda.gov/DGAs2010-DGACReport.htm>

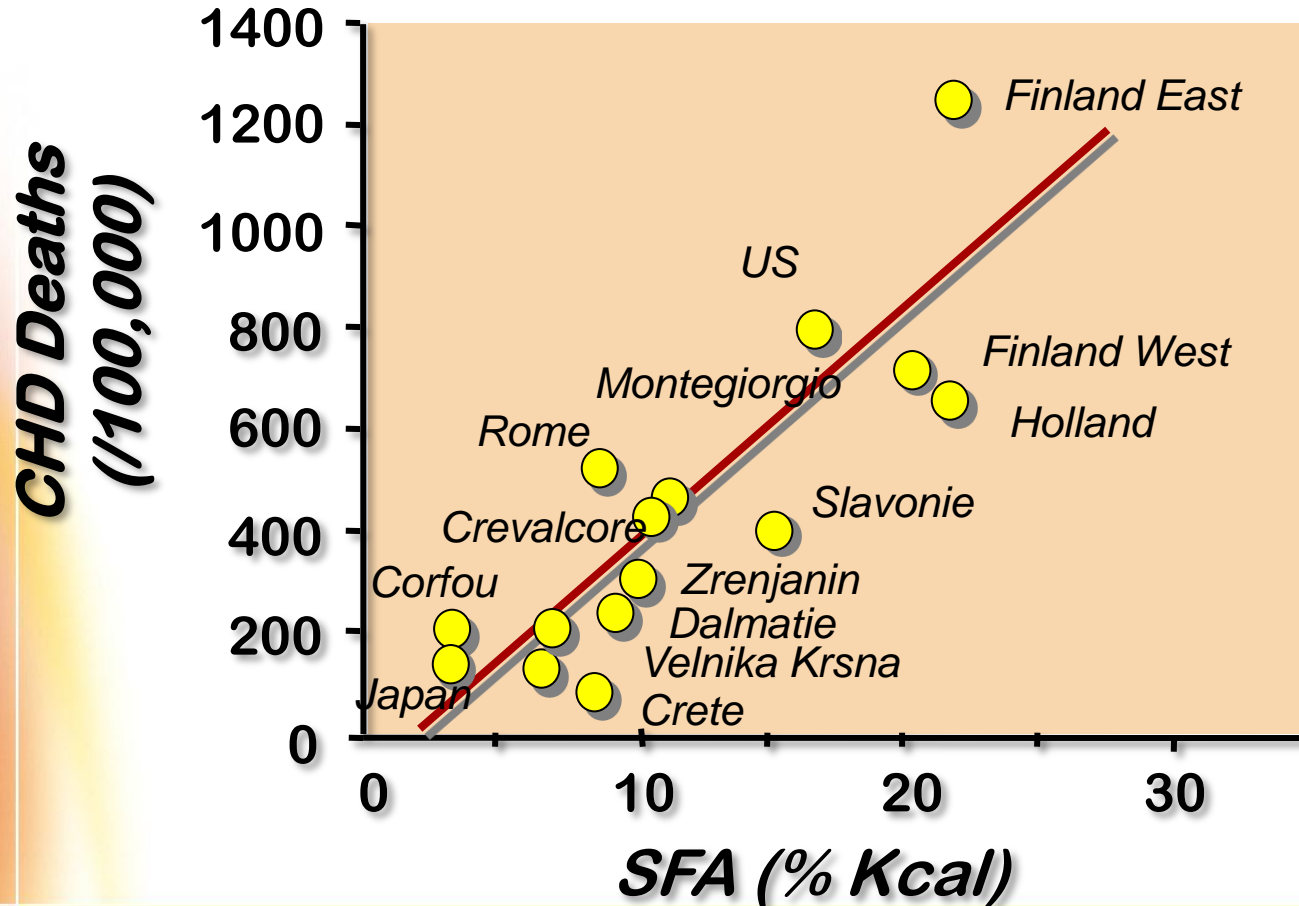
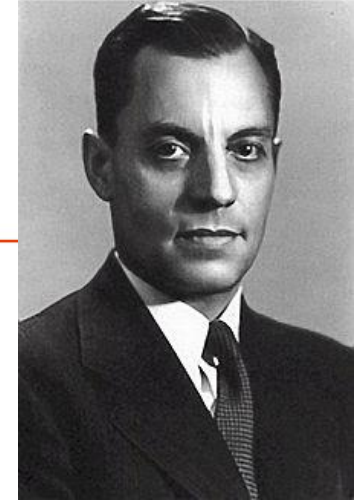
³ *J Am Coll Cardiol* **63**: 2960-84.

⁴ *EFSA Journal* **8**: 1461-1568.

⁵ *Ann Nutr Metab* **55**: 56-75.

⁶ <https://www.anses.fr/sites/default/files/documents/NUT2006sa0359Ra.pdf>

Seven Countries Study



The Good



“PUFA”

The Bad



“SFA”

the Ugly



“TFA”

2010: SFA vs CHD risk...?

IS SATURATED FAT
HEALTHY?

Find out why avoiding saturated fat
can actually cause health problems!

MAMA.COM

8 REASONS

SATURATED FAT

IS GOOD
FOR YOU!

healthylivinghowto.com



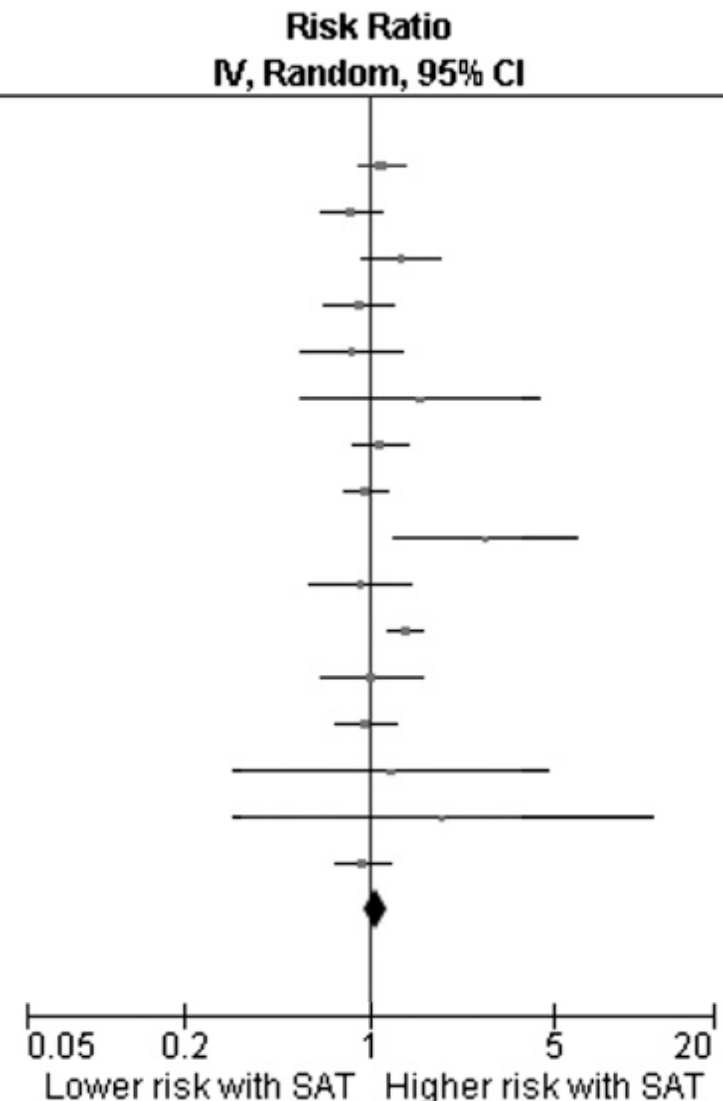
Meta-analysis- Prospective cohort studies on SFA vs CVD

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) [†]	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) [†]	0.86 [0.56, 1.35]	1993
Fehily et al(28)	1.57 [0.56, 4.42]	1994
Ascherio et al(4) [†]	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) [†]	1.37 [1.17, 1.60]	2002
Jakobsen et al(8) [†]	1.03 [0.66, 1.60]	2004
Oh et al(33)	0.97 [0.74, 1.27]	2005
Tucker et al(18) [†]	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: $\tau^2 = 0.02$; $\chi^2 = 25.54$, $df = 15$ ($P = 0.04$); $I^2 = 41\%$

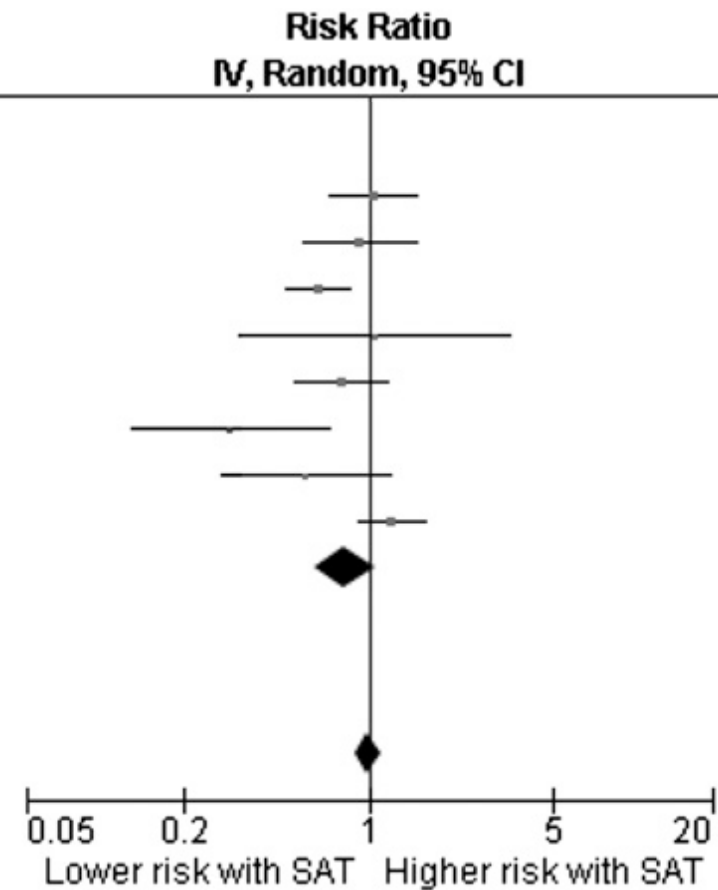
Test for overall effect: $Z = 1.22$ ($P = 0.22$)



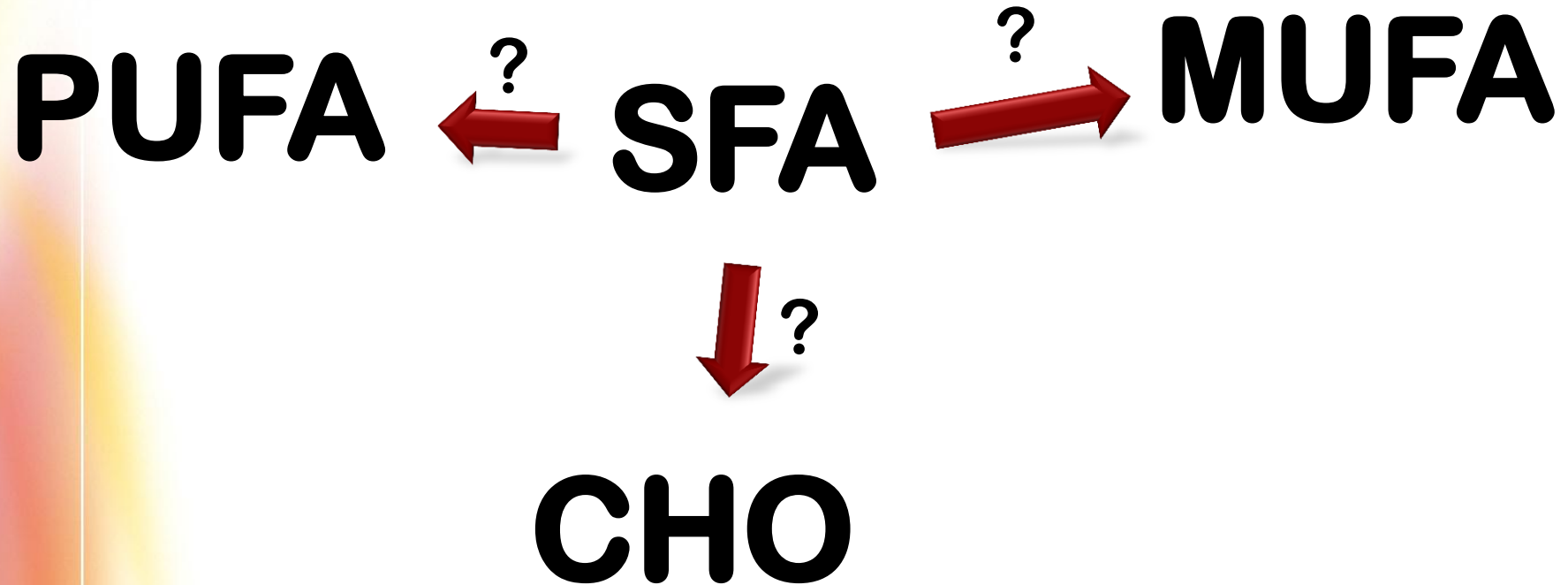
Meta-analysis- Prospective cohort studies on SFA vs CVD

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: Tau ² = 0.08; Chi ² = 18.03, df = 7 (P = 0.01); I ² = 61 %		
Test for overall effect: Z = 1.58 (P = 0.11)		
Total (95% CI)	1.00 [0.89, 1.11]	
Heterogeneity: Tau ² = 0.03; Chi ² = 52.63, df = 23 (P = 0.0004); I ² = 56 %		
Test for overall effect: Z = 0.06 (P = 0.95)		

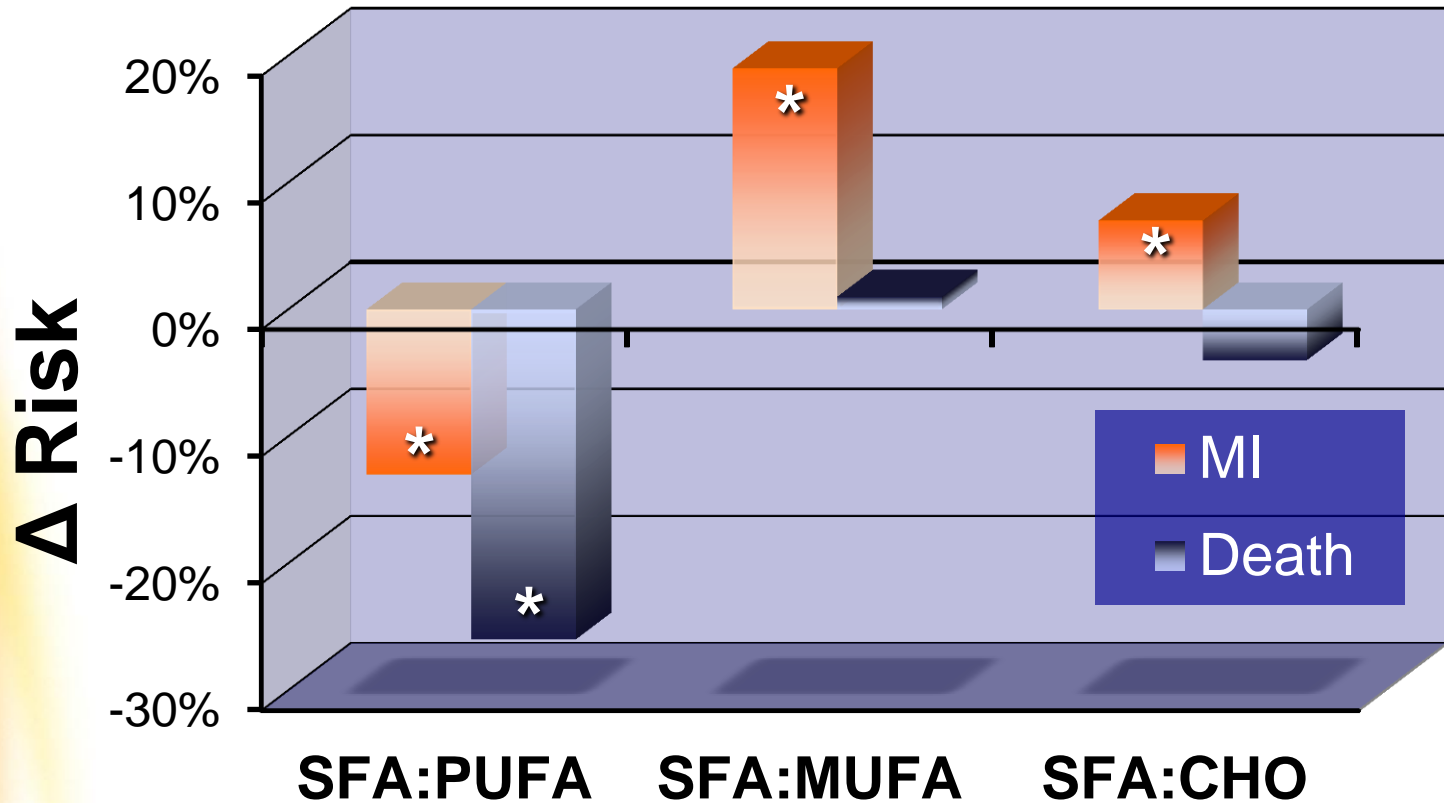


Replacement factor



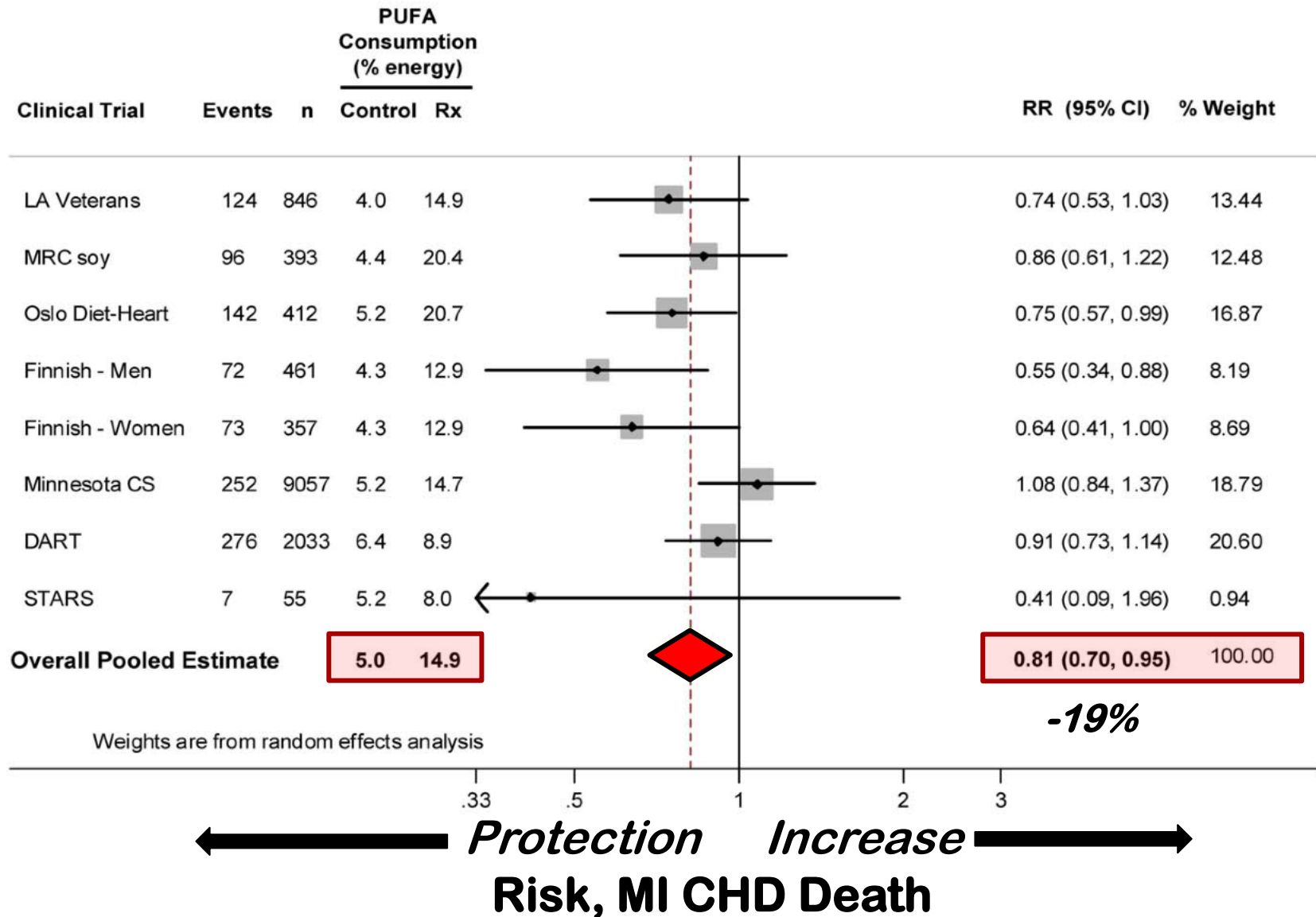
PUFA, MUFA, CHO vs. SFA and CVD

Meta-analysis of 11 cohort studies, 340 000 men and women



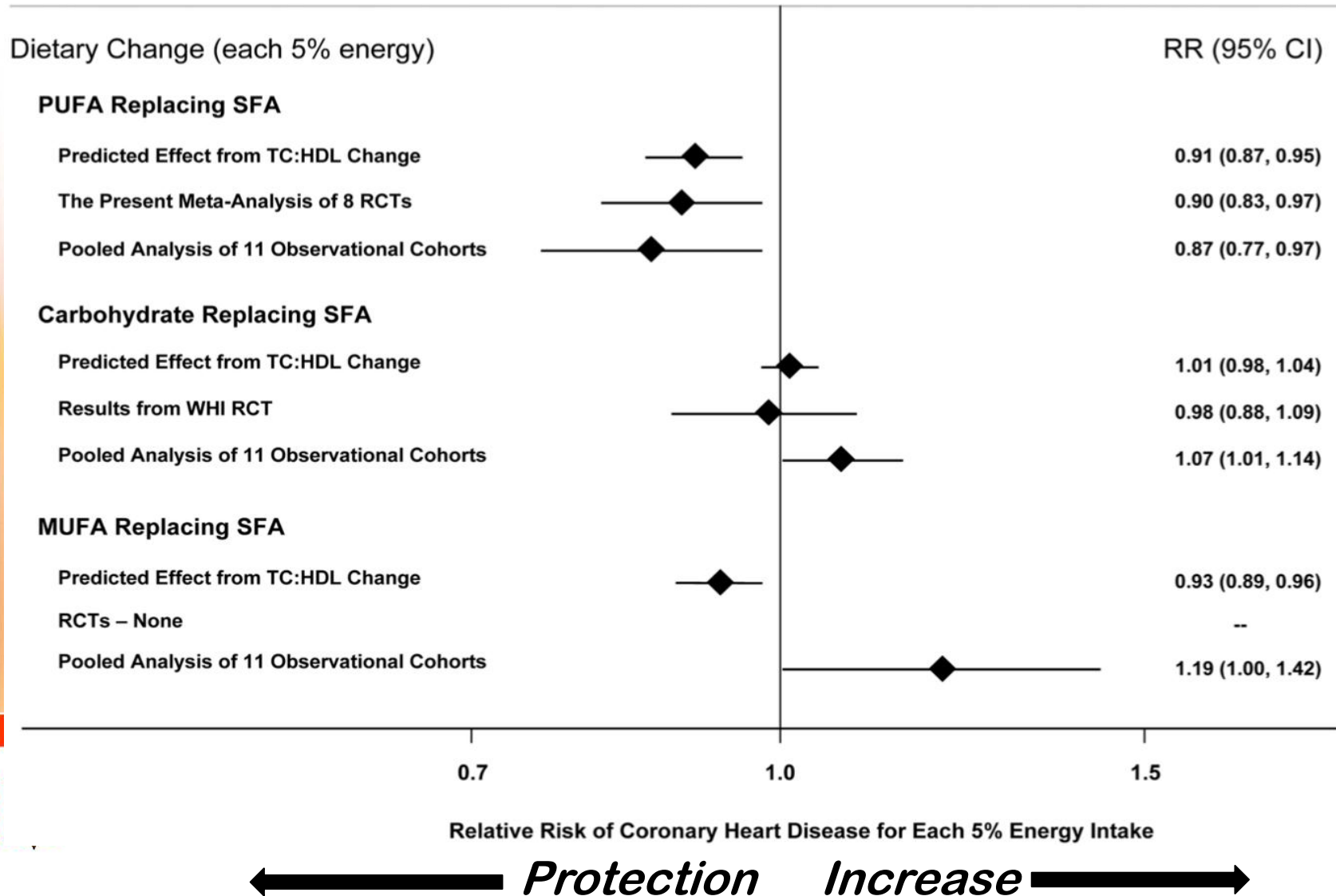
Meta-analysis of RCTs evaluating effects of increasing PUFA consumption in place of SFA and CHD events

Mozaffarian D et al, PLoS 2010; 7:e10002522011



Meta-analysis of RCTs evaluating effects of increasing PUFA consumption in place of SFA and CHD events

Mozaffarian D et al, PLoS 2010; 7:e10002522011



SFA Compared With PUFA, MUFA and Sources of CHO in Relation to Risk of CHD, A Prospective Cohort Study

Li et al, JACC 2015;66:1538-48

Isocaloric substitution of SFAs by equivalent energy from

Trans fat (2%)

MUFAs (5%)

PUFAs (5%)

Carbohydrates from refined starches/added sugars (5%)

Carbohydrates from whole grains (5%)

Isocaloric substitution of carbohydrates from refined starches/added sugars by equivalent energy from

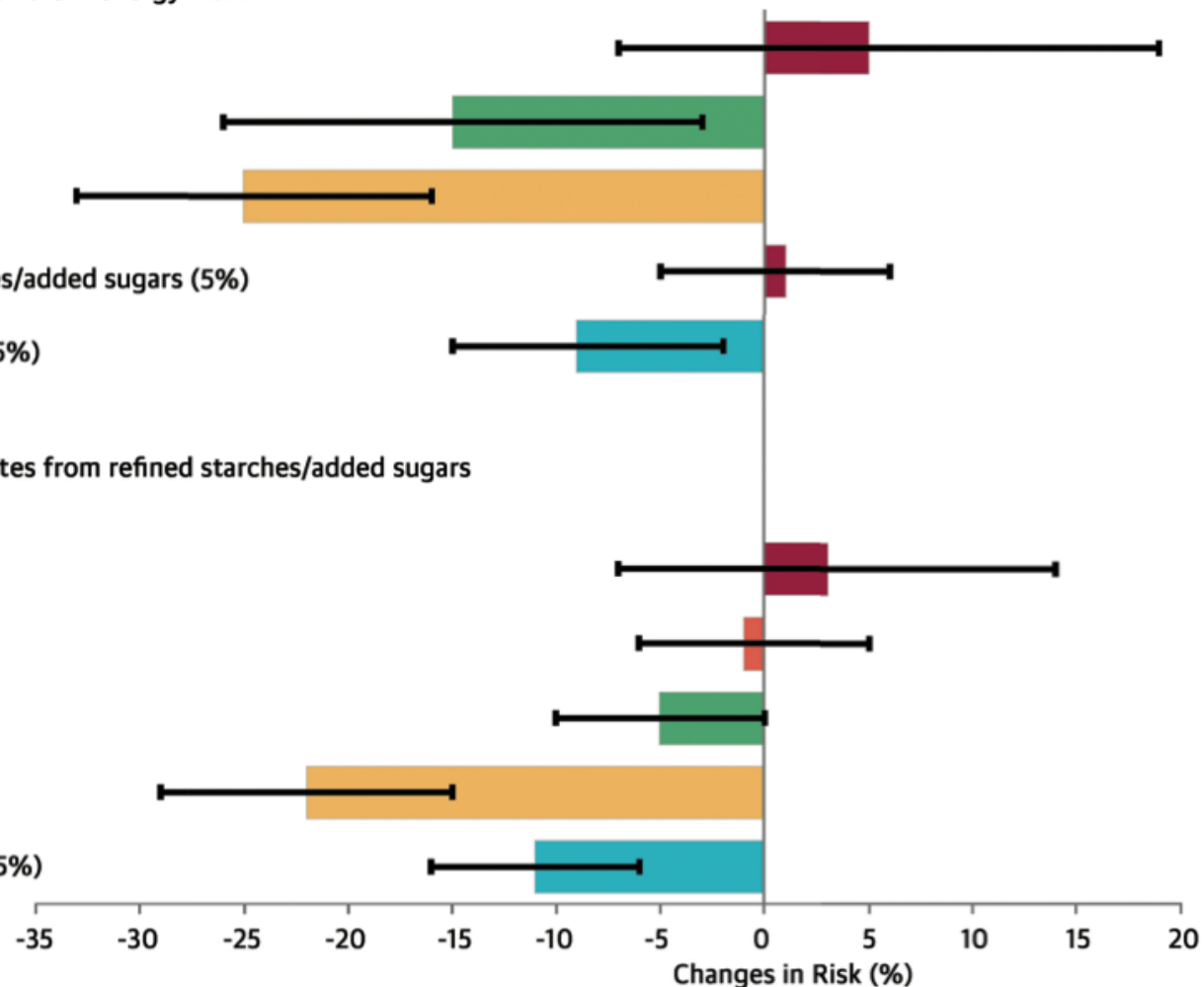
Trans fat (2%)

SFAs (5%)

MUFAs (5%)

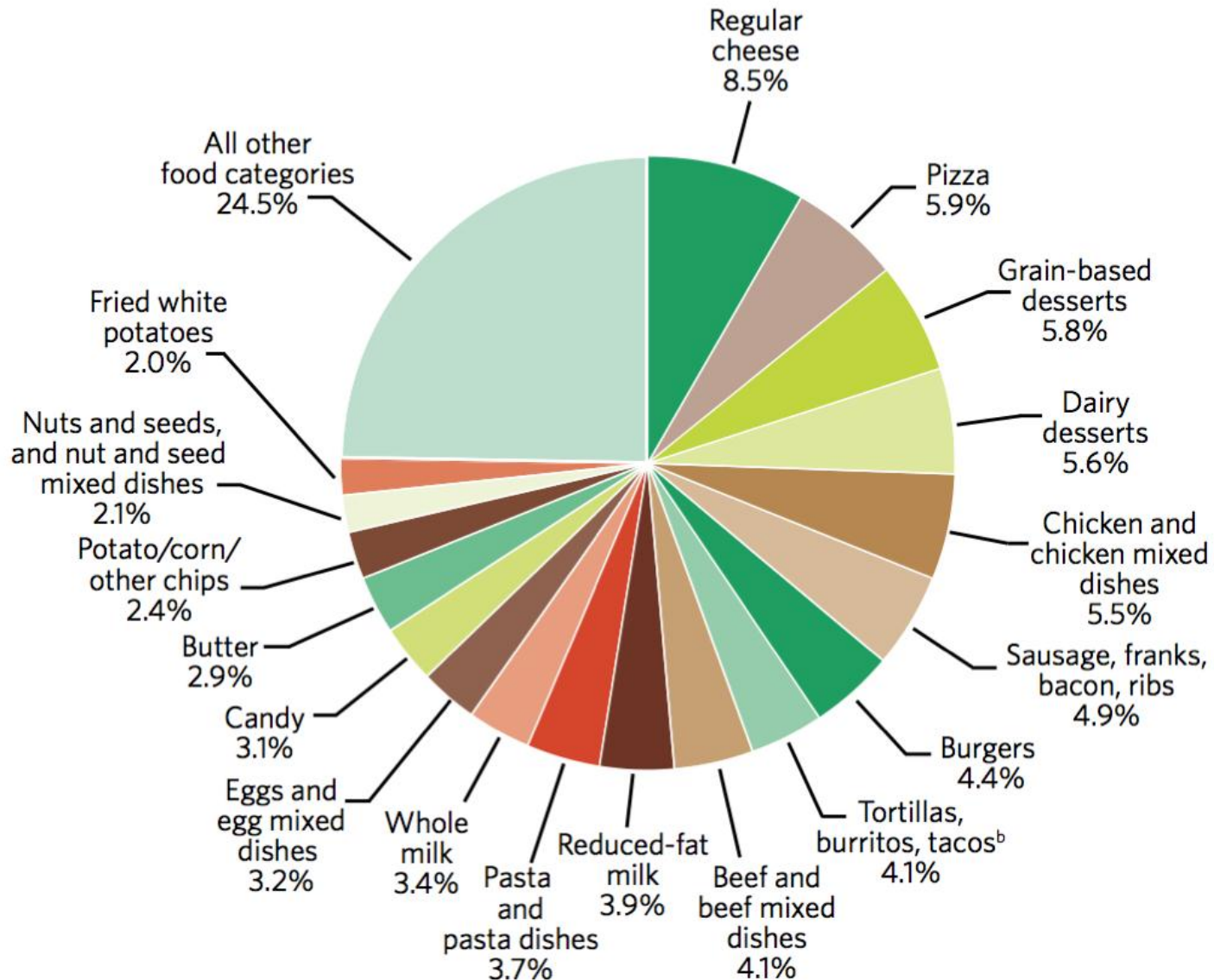
PUFAs (5%)

Carbohydrates from whole grains (5%)

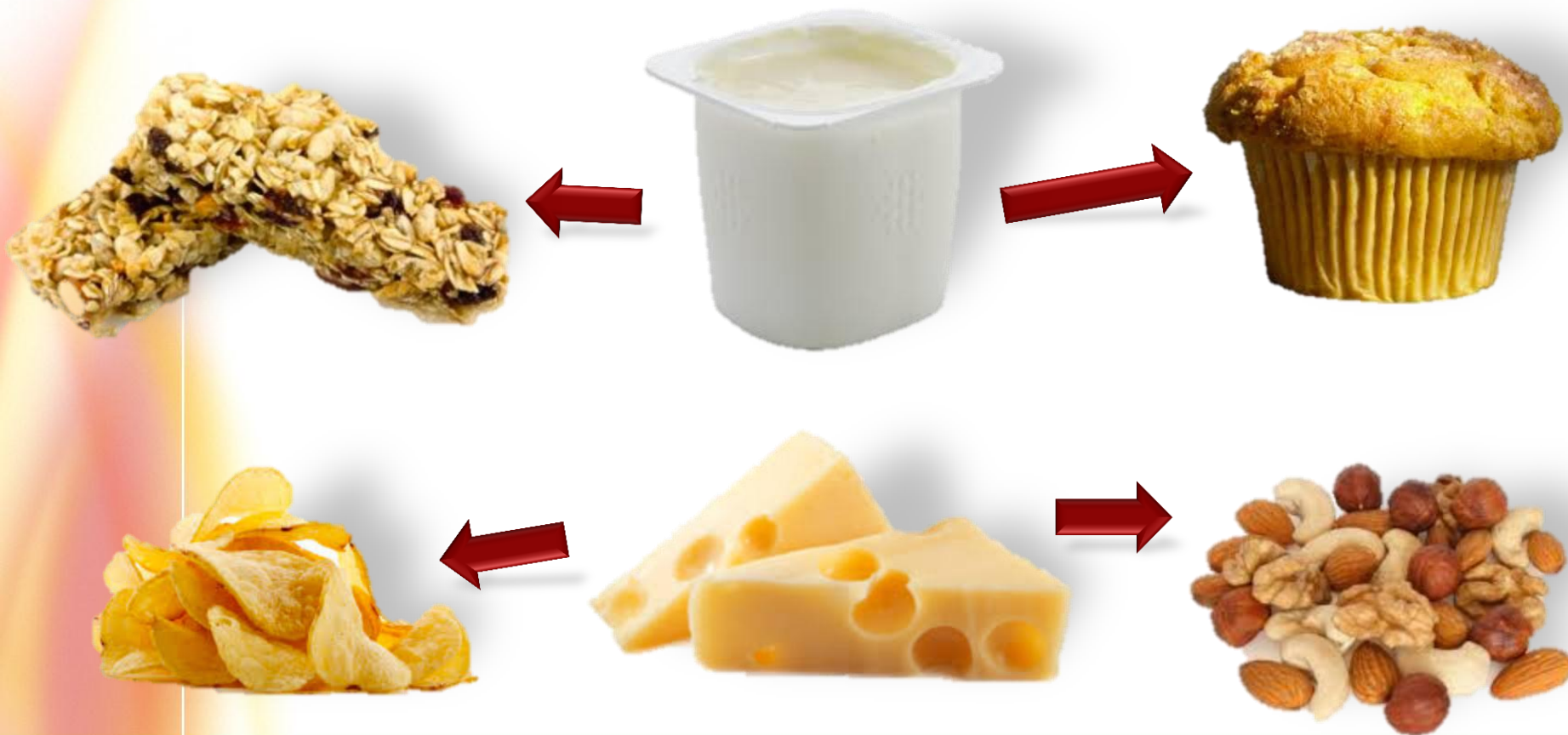


← **Protection** **Increase** →

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

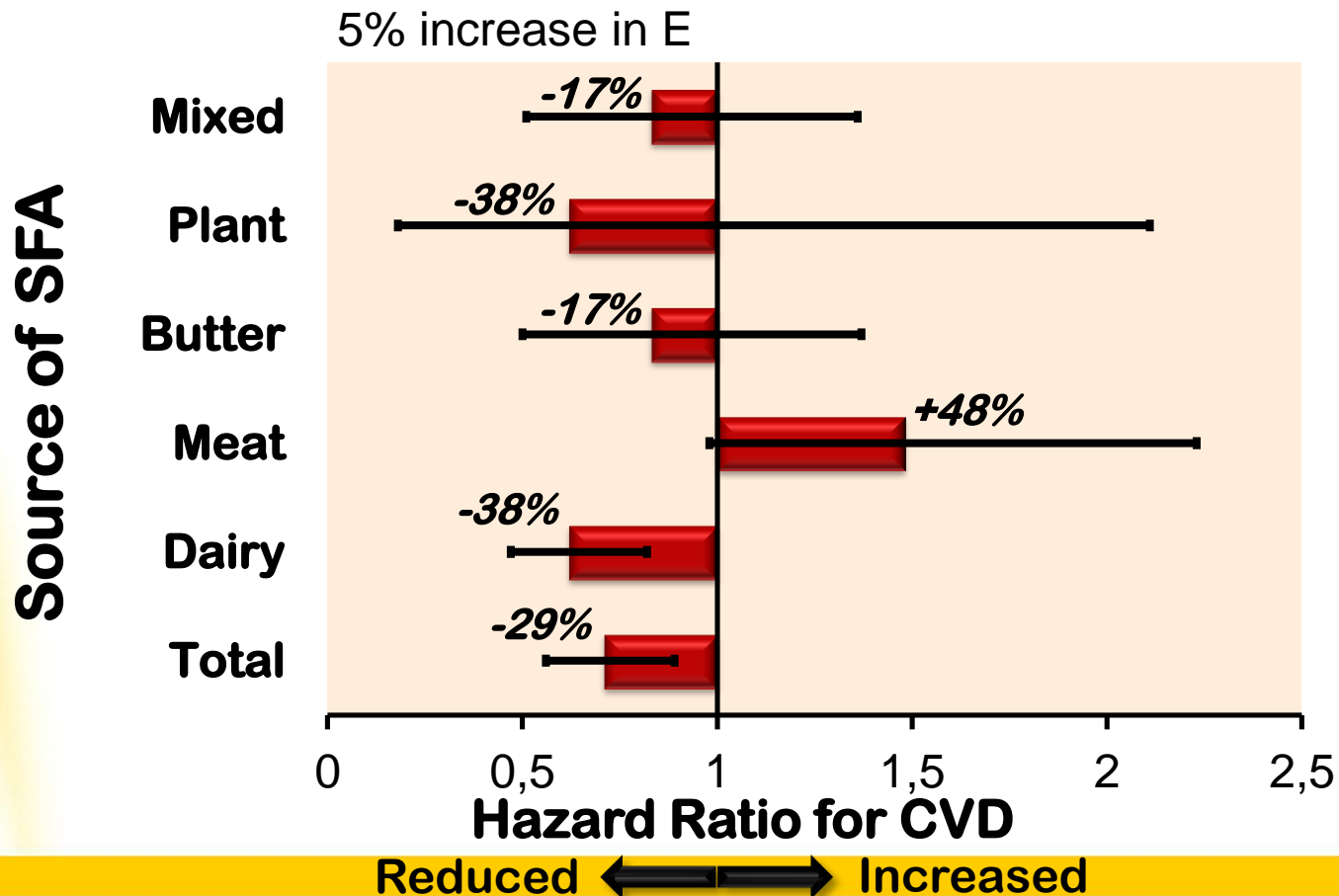


Replacement factor



FOOD-SPECIFIC SFA AND CVD

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



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

A Systematic Review and Meta-analysis

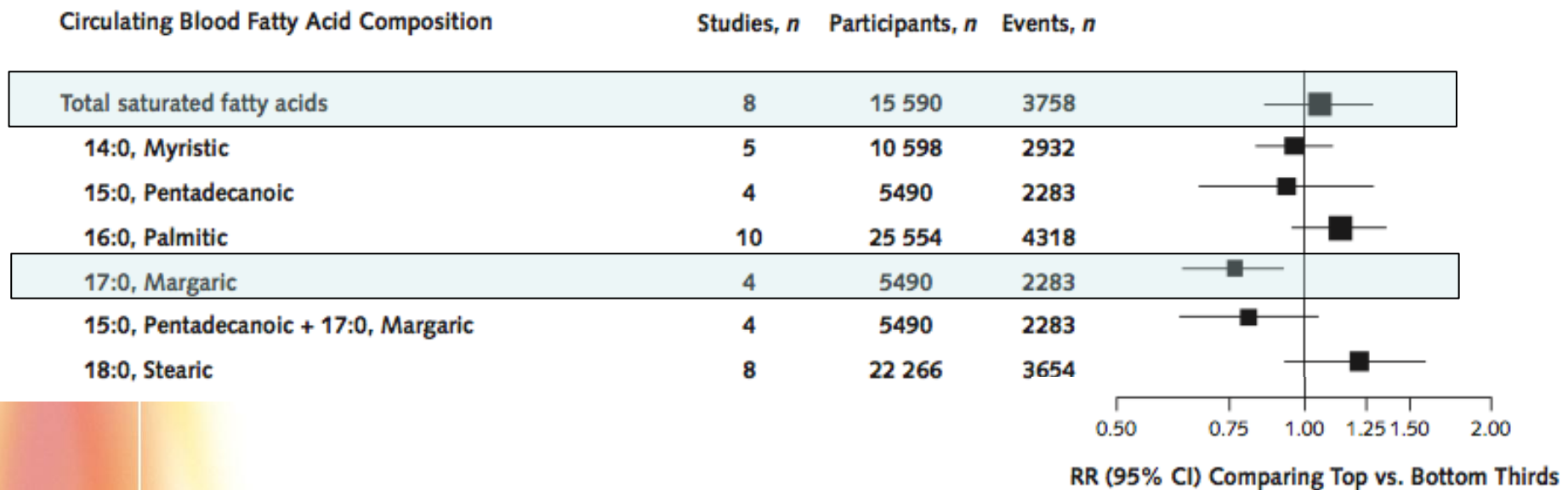
Rajiv Chowdhury, MD, PhD; Samantha Warnakula, MPhil*; Setor Kunutsor, MD, MSt*; Francesca Crowe, PhD; Heather A. Ward, PhD; Laura Johnson, PhD; Oscar H. Franco, MD, PhD; Adam S. Butterworth, PhD; Nita G. Forouhi, MRCP, PhD; Simon G. Thompson, FMedSci; Kay-Tee Khaw, FMedSci; Dariush Mozaffarian, MD, DrPH;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

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

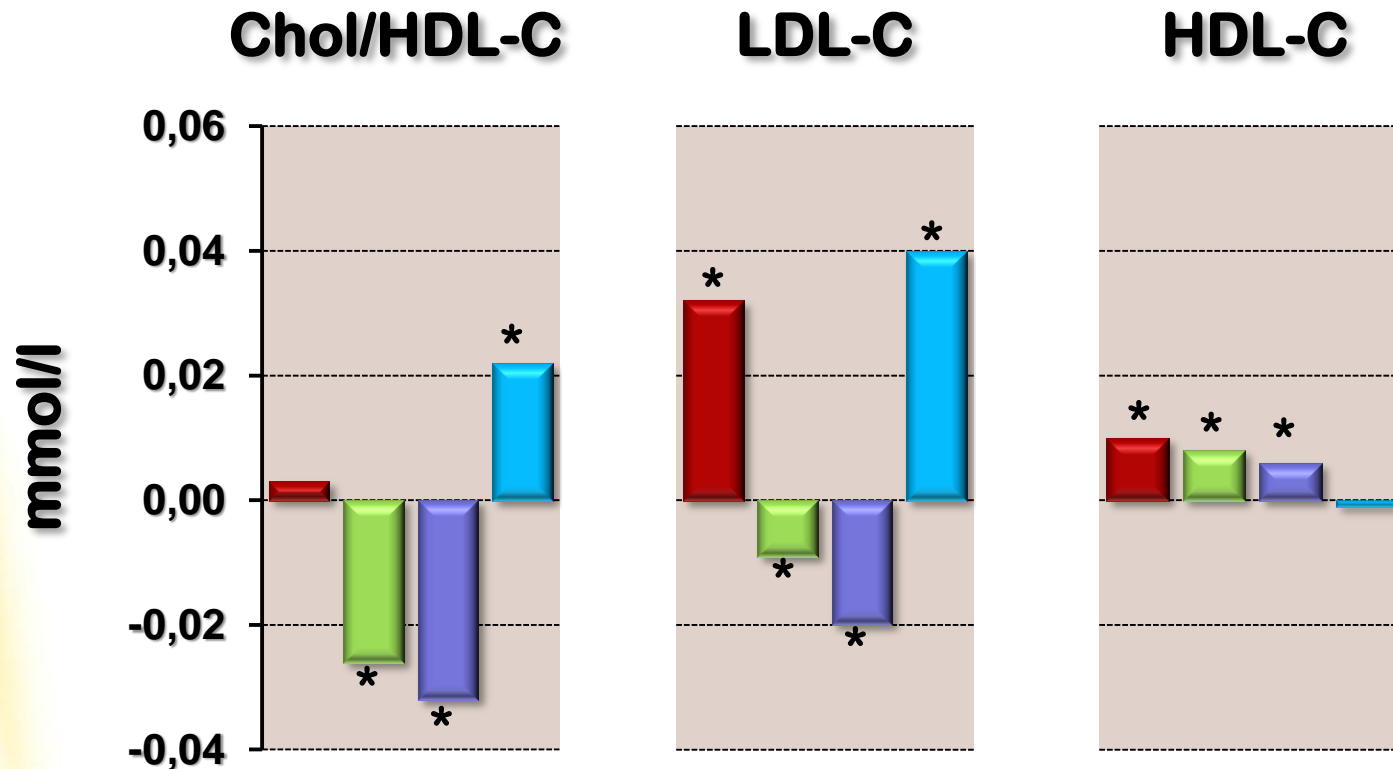
A Systematic Review and Meta-analysis

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

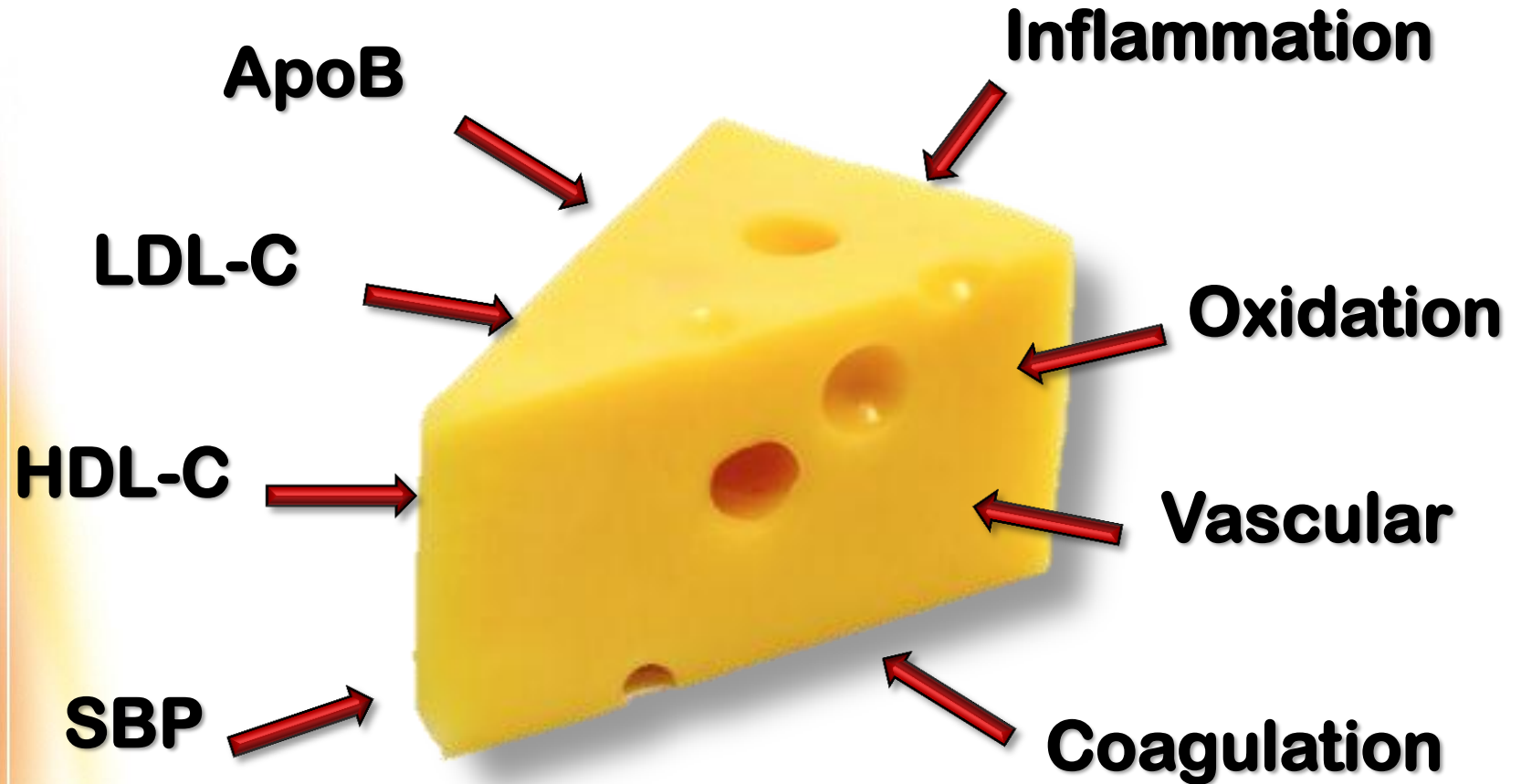


Change in plasma lipids: CHO (1% energy) replaced by SFA, *cis*MUFA, *cis*PUFA, *trans*

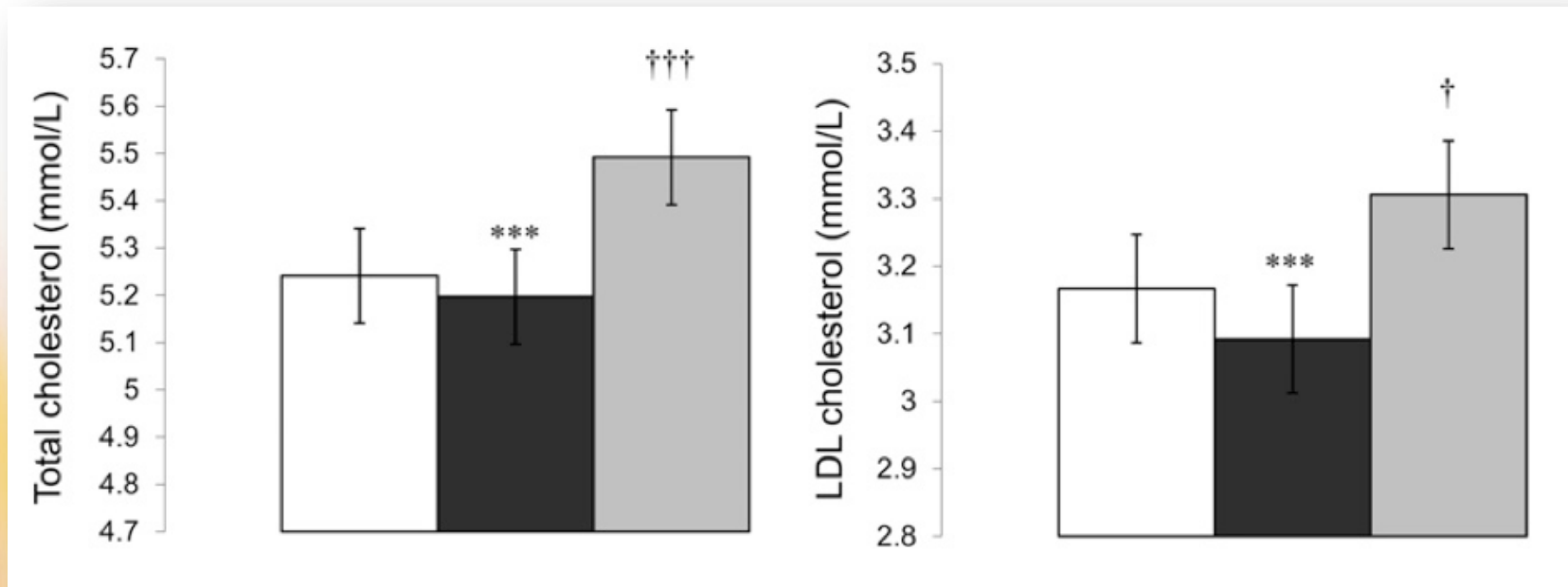
Mensink, R. P et al. Am J Clin Nutr 2003;77:1146-1155



Cardiometabolic risk



Cheese vs. butter lowers LDL-C



Run-in Cheese Butter

13% of energy from cheese or butter

Systematic review: Dairy and health

Title

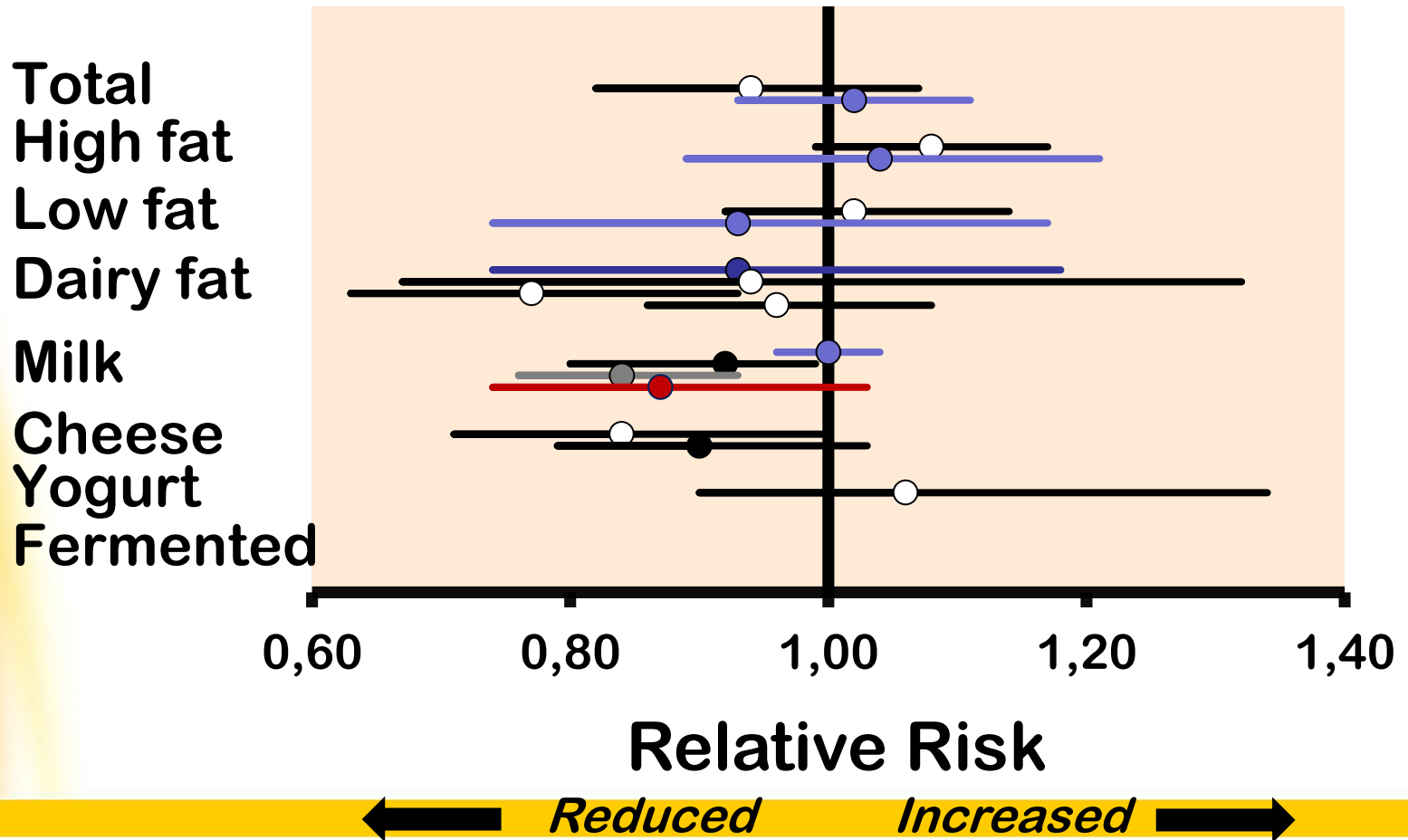
Impact of dairy consumption on clinical outcomes and cardiometabolic risk: A comprehensive review

Authors

Jean-Philippe Drouin-Chartier, Julie-Anne Côté, Marie-Ève Labonté,
Sophie Desroches, Patrick Couture, Benoît Lamarche

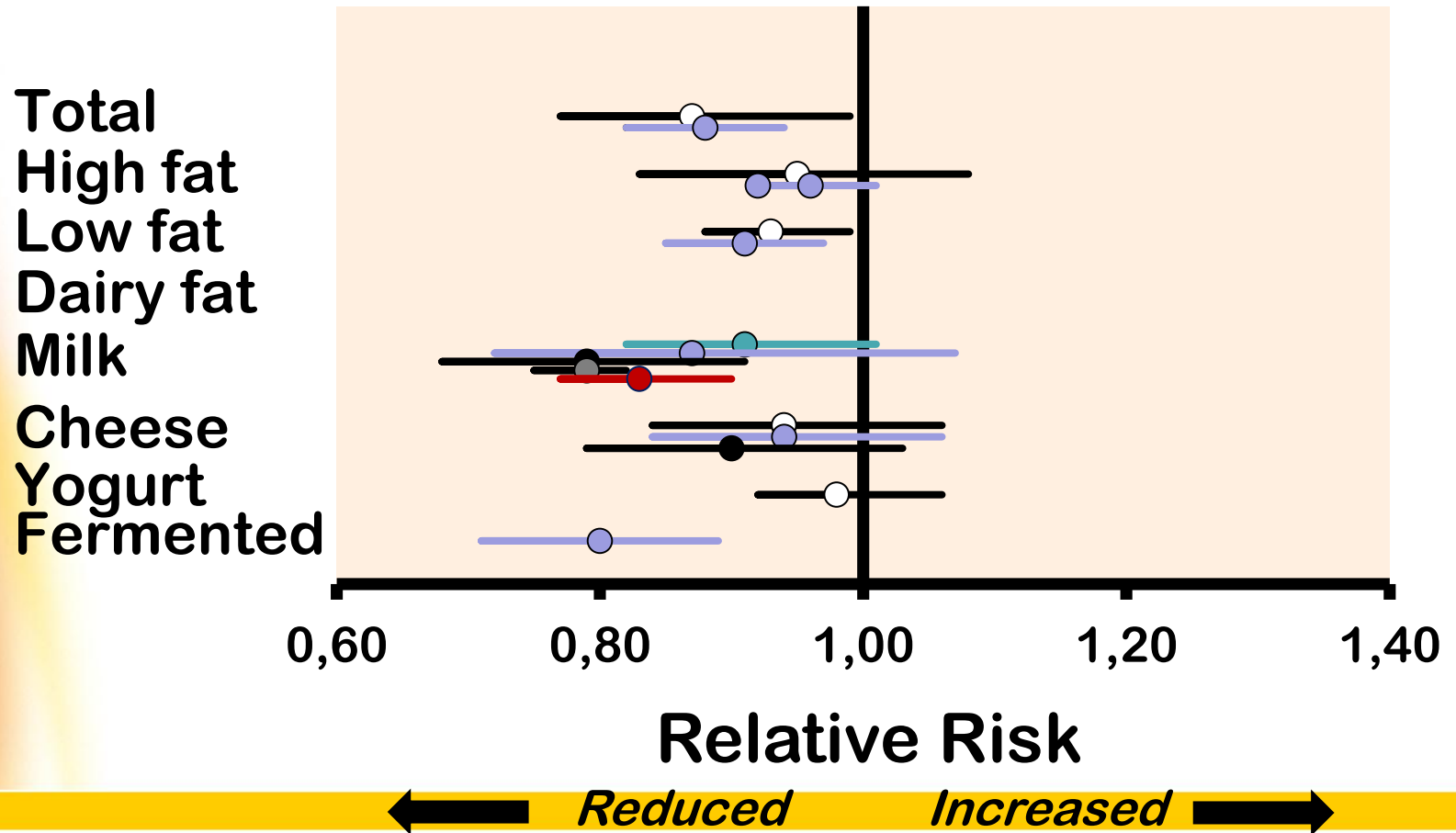
Dairy and risk of CHD

Systematic review - meta-analyses



Dairy and risk of stroke

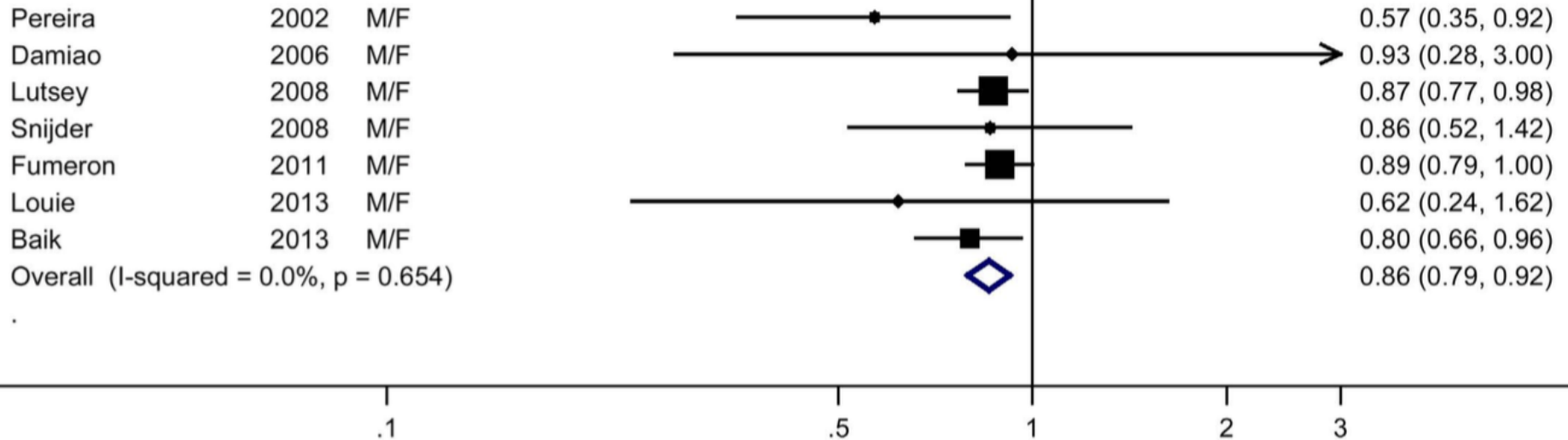
Systematic review - meta-analyses



Dairy and risk of MetS

Systematic review - meta-analyses

B



Relative Risk

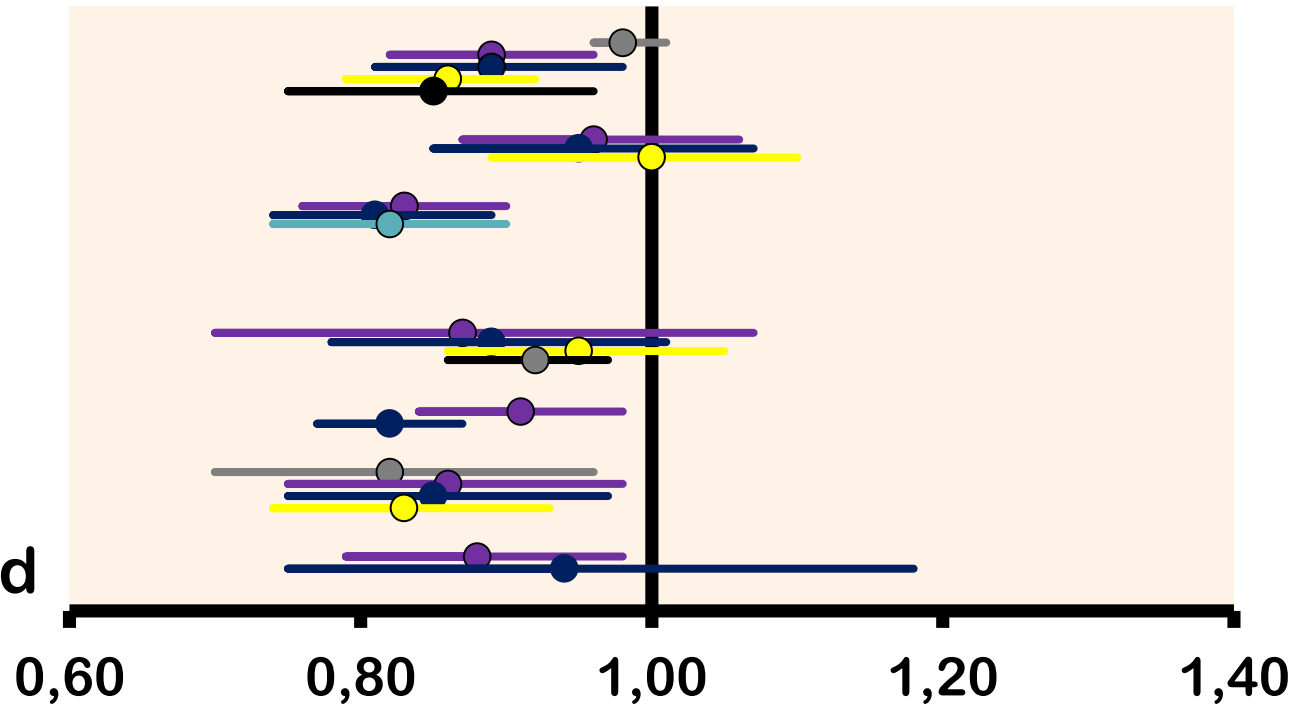
Reduced

Increased

Dairy and risk of type 2 diabetes

Systematic review - meta-analyses

Total
High fat
Low fat
Dairy fat
Milk
Cheese
Yogurt
Fermented



Relative Risk

← Reduced Increased →

Conclusions

Convincing evidence:

- SFA increases LDL-C? Not always...
 - *SFA from dairy may have neutral effects*
- SFA increases the risk of clinical outcomes?
Not always...
 - *May depend on source of SFA...*
 - *Dairy fat (SFA) is not associated with increased risk of clinical outcomes (CVD, hypertension, T2D)*

Conclusions

FUTURE?

- **Importance to identify the source of dietary SFA with regards to risk management**
- **Consider the impact of SFA (from all sources) on other cardiometabolic risk factors**
- **Disentangle the public health recommendations to population targets...**
- **Adapt the message on SFA (population vs. health professionals, vs. public health)**

Should we have a target for SFA?

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