UNIVERSITY OF COPENHAGEN

Hjertesundheden og mælkematricen

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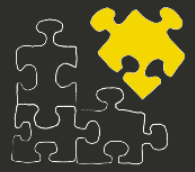
DIETARY GUIDELINES 2015-2020

efsa
European Food Safety Authority

Key Recommendations



Consume a healthy eating pattern that accounts for all foods and beverages within an appropriate calorie level.

A healthy eating pattern includes:[2]

- A variety of vegetables from all of the subgroups—dark green, red and orange, legumes (beans and peas), starchy, and other
- Fruits, especially whole fruits
- Grains, at least half of which are whole grains
- Fat-free or low-fat dairy, including milk, yogurt, cheese, and/or fortified soy beverages
- A variety of protein foods, including seafood, lean meats and poultry, eggs, legumes (beans and peas), and nuts, seeds, and soy products
- Oils

A healthy eating pattern limits:

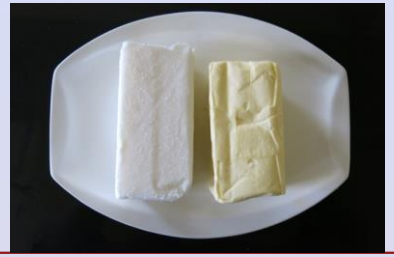
- Saturated fats and *trans* fats, added sugars, and sodium

Key Recommendations that are quantitative are provided for several components of the diet that should be limited. These components are of particular public health concern in the United States, and the specified limits can help individuals achieve healthy eating patterns within calorie limits:

- Consume less than 10 percent of calories per day from added sugars[3]

EFSA: As low as possible

- Consume less than 2,300 milligrams (mg) per day of sodium[5]
- If alcohol is consumed, it should be consumed in moderation—up to one drink per day for women and up to two drinks per day for men—and only by adults of legal drinking age.[6]



The lipid hypothesis and CHD

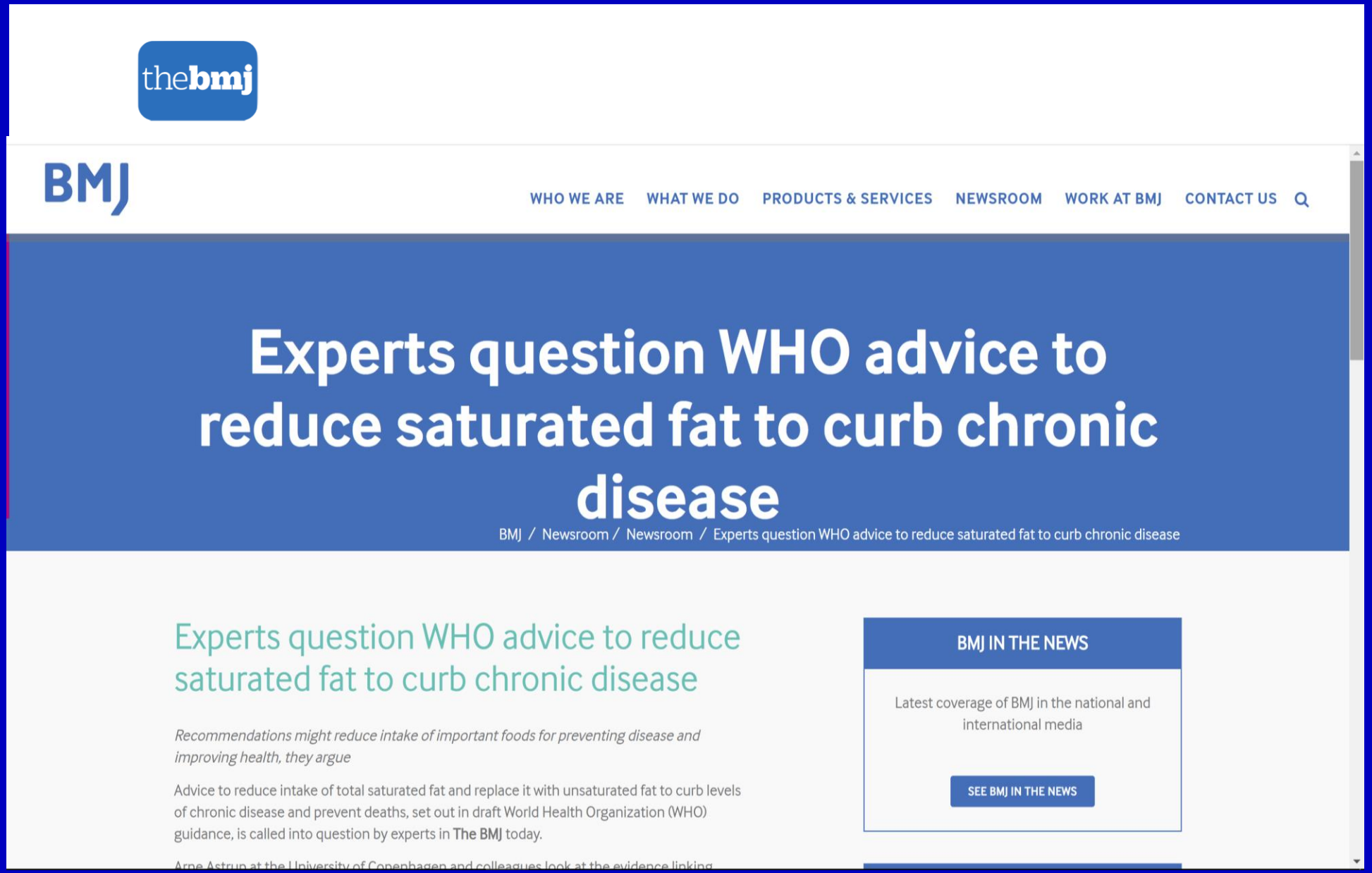
SATURATED FAT

HIGH BLOOD CHOLESTEROL

ATHEROSCLEROSIS

CHD

?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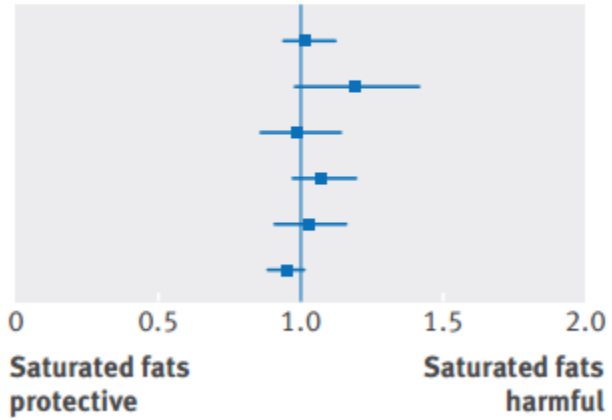
Experts question WHO advice to reduce saturated fat to curb chronic disease
BMJ / Newsroom / Newsroom / Experts question WHO advice to reduce saturated fat to curb chronic disease
Experts question WHO advice to reduce saturated fat to curb chronic disease
Recommendations might reduce intake of important foods for preventing disease and improving health, they argue
Advice to reduce intake of total saturated fat and replace it with unsaturated fat to curb levels of chronic disease and prevent deaths, set out in draft World Health Organization (WHO) guidance, is called into question by experts in The BMJ today.
BMJ IN THE NEWS
Latest coverage of BMJ in the national and international media
SEE BMJ IN THE NEWS

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

Russell J de Souza,[1,2,3,4] Andrew Mente,[1,2,5] Adriana Maroleanu,[2] Adrian I Cozma,[3,4] Vanessa Ha,[1,3,4] Teruko Kishibe,[6] Elizabeth Uleryk,[7] Patrick Budylowski,[4] Holger Schünemann,[1,8] Joseph Beyene,[1,2] Sonia S Anand[1,2,5,8]

Outcome	No of studies /comparisons	No of events /participants	Relative risk (95% CI)	P	P_{het}	I^2 (%)
All cause mortality	5/7	14 090/99 906	0.99 (0.91 to 1.09)	0.91	0.17	33
CHD mortality	11/15	2970/101 712	1.15 (0.97 to 1.36)	0.10	<0.001	70
CVD mortality	3/5	3792/90 501	0.97 (0.84 to 1.12)	0.69	0.29	19
CHD total	12/17	6383/267 416	1.06 (0.95 to 1.17)	0.29	0.02	47
Ischemic stroke	12/15	6226/339 090	1.02 (0.90 to 1.15)	0.79	0.002	59
Type 2 diabetes	8/8	8739/237 454	0.95 (0.88 to 1.03)	0.20	0.61	0

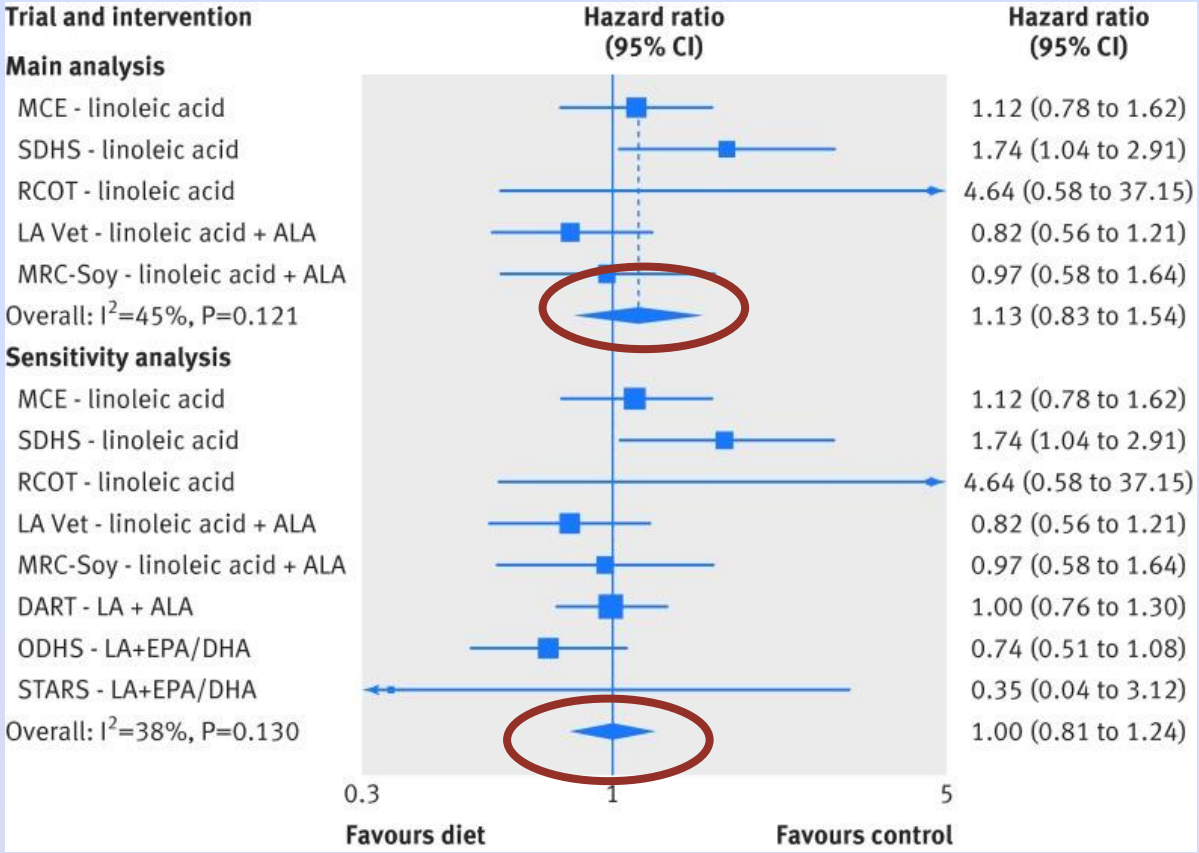


BMJ 2015;351:h3978 | doi:10.1136/bmj.h3

Similar conclusion in a previous meta-analysis of prospective cohort studies and CVD. (Siri-Tarino et al.,Am J Clin Nutr 2010;91:535–46)

Re-evaluation of the traditional diet-heart hypothesis: analysis of recovered data from Minnesota Coronary Experiment (1968-73)

Christopher E Ramsden,[1,2] Daisy Zamora,[3] Sharon Majchrzak-Hong,[1] Keturah R Faurot,[2] Steven K Broste,[4] Robert P Frantz,[5] John M Davis,[3,6] Amit Ringel,[1] Chirayath M Suchindran,[7] Joseph R Hibbeln[1]



Meta-analysis for **mortality from coronary heart disease** in trials testing replacement of saturated fat with vegetable oils rich in linoleic acid. Main analysis: trials provided replacement foods (vegetable oils) and were not confounded by any concomitant interventions.

the bmj | BMJ 2016;353:i1246 | doi: 10.1136/bmj.i1246

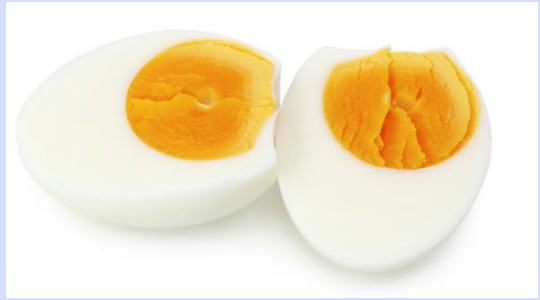
The WHO evidence: Cochrane analysis that only included data from 15 RCTs

- An association between reducing SFA intake and a reduction in the composite end-point of cardiovascular events [RR 0.83 (0.72 to 0.96)].
- However, the study showed no significant association between reducing SFA and total mortality (RR) 0.97, 95% CI 0.90 to 1.05) or
- CVD mortality (RR 0.95, 95% CI 0.80 to 1.12), or
- Fatal and non-fatal myocardial infarction (RR 0.90, 95% CI 0.80 to 1.01) or
- Non-fatal myocardial infarction (RR 0.95, 95% CI 0.80 to 1.13), or
- Stroke (RR 1.00, 95% CI 0.89 to 1.12), or
- CHD events (RR 0.87, 95% CI 0.74 to 1.03), or
- CHD mortality (RR 0.98, 95% CI 0.84 to 1.15)

Astrup et al BMJ (in press)

Can we predict the health effects of foods based on the information on the label ?

Or just by the content of saturated fat ?



From simgle nutrients to whole foods: the importance of the food matrix

Updated meta-analysis of fermented dairy and CVD and mortality

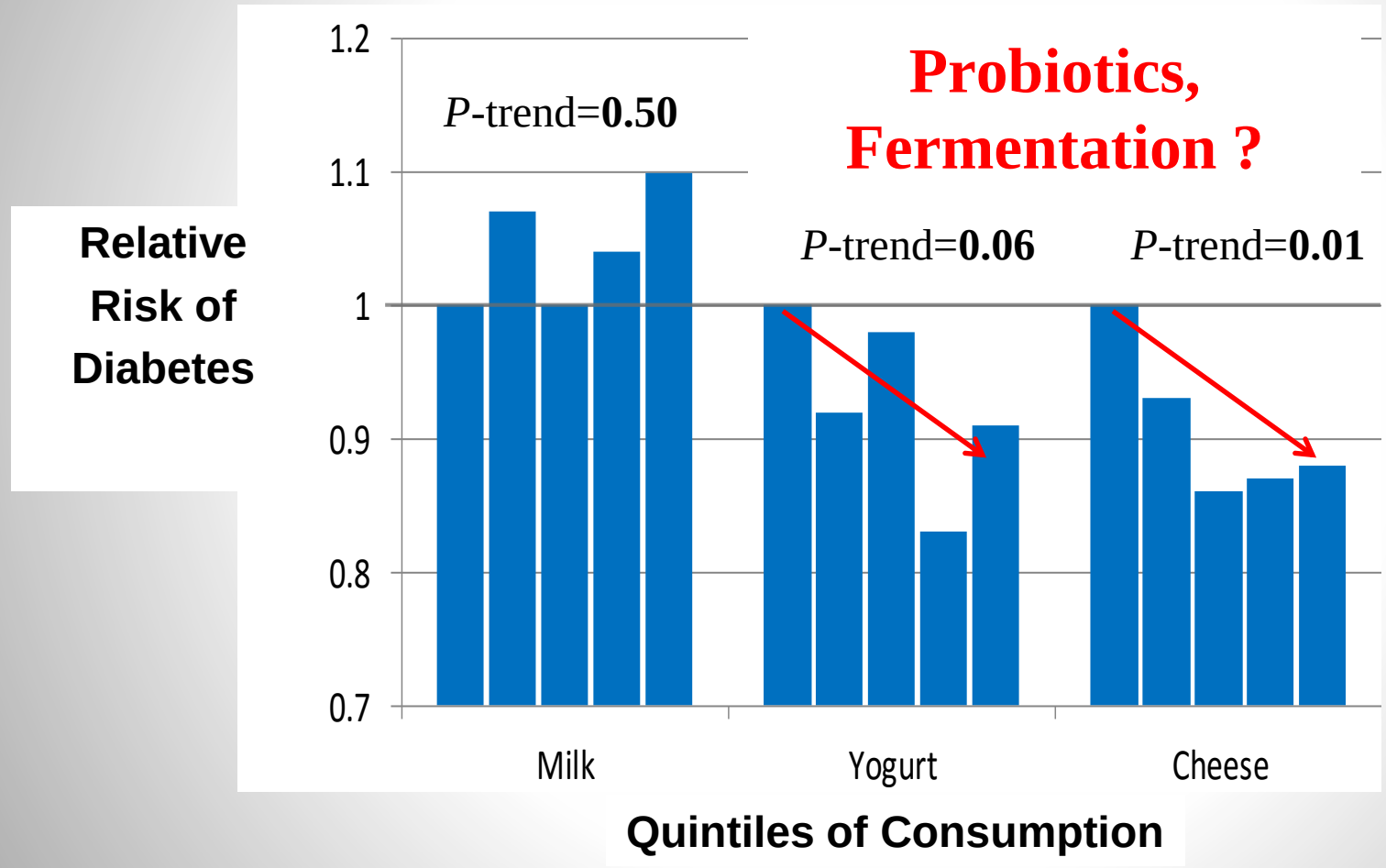
author	year	exposure	gender	Relative risk (95% CI)	% Weight
Kahn	1984	Cheese	Women/Men	0.99 (0.94, 1.04)	2.77
Mann	1997	Cheese	Women/Men	1.02 (0.90, 1.17)	0.51
Fortes	2000	Cheese	Women/Men	1.30 (0.36, 4.68)	0.01
Engberink	2009	Cheese	Women/Men	0.95 (0.90, 1.00)	2.62
Bonthuis	2010	Yoghurt	Women/Men	1.08 (0.96, 1.20)	0.73
Bonthuis	2010	High-fat cheese	Women/Men	0.93 (0.68, 1.27)	0.10
Goldbohm	2011	High-fat fermented dairy	Men	0.97 (0.95, 0.99)	6.64
Goldbohm	2011	Low-fat fermented dairy	Men	1.00 (0.99, 1.01)	8.86
Goldbohm	2011	High-fat fermented dairy	Women	0.97 (0.95, 1.00)	5.58
Goldbohm	2011	Low-fat fermented dairy	Women	1.00 (1.00, 1.01)	8.82

Total 29 cohort studies are available for meta-analysis. Inverse associations were found between total fermented (included sour milk products, yogurt or cheese) with mortality (RR 0.98, 95% CI: 0.97-0.99; I^2=94.4%) and risk of CVD (RR 0.98, 95% CI: 0.97-0.99; I^2=87.5%). Also stratified analysis of total fermented dairy of cheese shown a lower 2% lower risk of CVD (RR 0.98, 95% CI: 0.95-1.00; I^2=82.6%). No associations were found for total dairy, high-fat/ low-fat dairy or milk with the health outcomes.

Guo J, Astrup A, Lovegrove JA, et al. Milk and dairy consumption and risk of cardiovascular diseases and all-cause mortality: dose-response meta-analysis of prospective cohort studies. Eur J Epidemiol 2017;32:269-87.

Dairy Foods and Risk of Diabetes

340,234 Europeans, 8 countries, 12,403 cases

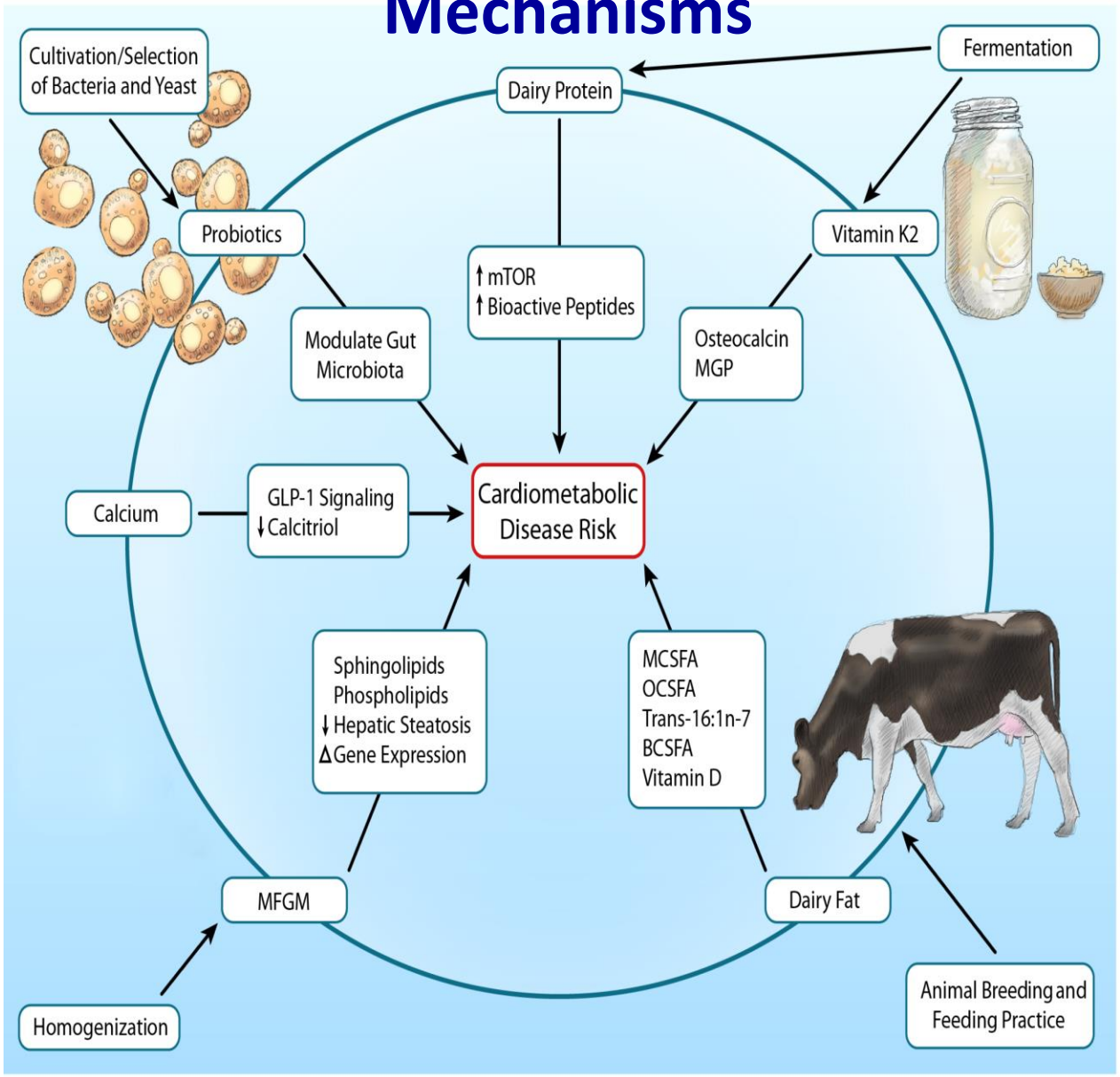


Sluijis et al., AJCN 2012

Effects of cheese on CVD risk factors & Mechanisms

The cheese food matrix and mechanisms

Dairy & Cardiometabolic Health: Potential Mechanisms

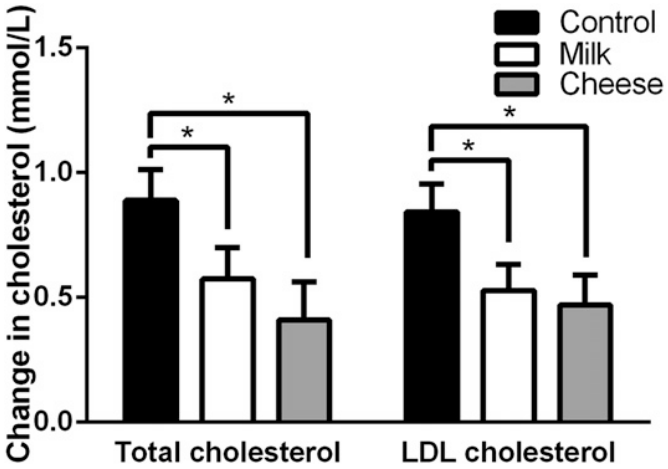


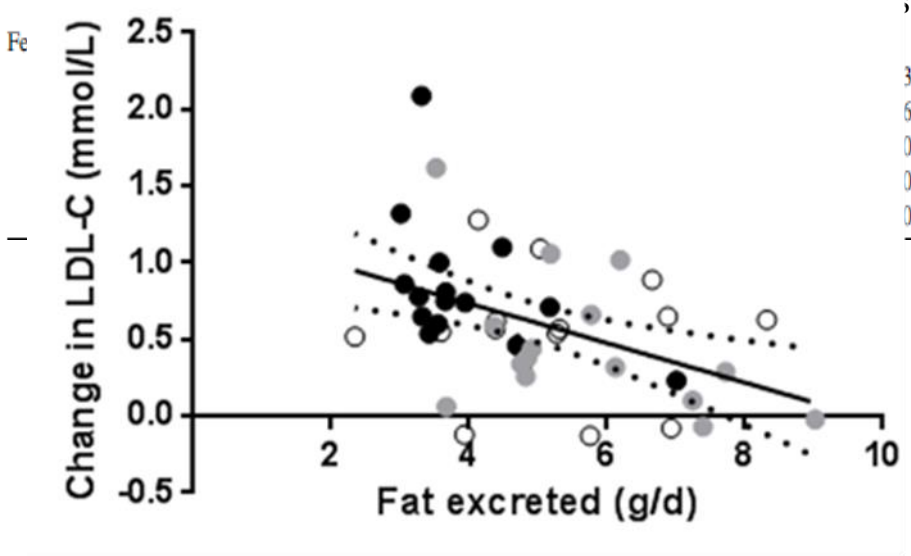
Mozaffarian & Wu, Circulation Res 2018

Calcium in cheese and lipid metabolism

Effect of dairy calcium from cheese and milk on fecal fat excretion, blood lipids, and appetite in young men[1–3]

Karina V Soerensen, Tanja K Thorning, Arne Astrup, Mette Kristensen, and Janne K Lorenzen

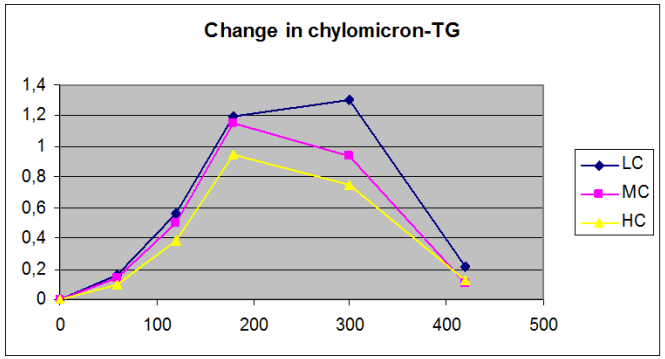




se	P diet
3.0[b]	0.002
60[a,b]	0.032
0.3	NS
0.4[b]	<0.001
0.3[b]	0.006

Suggested mechanisms

- Reduction in fat digestibility/absorption by calcium

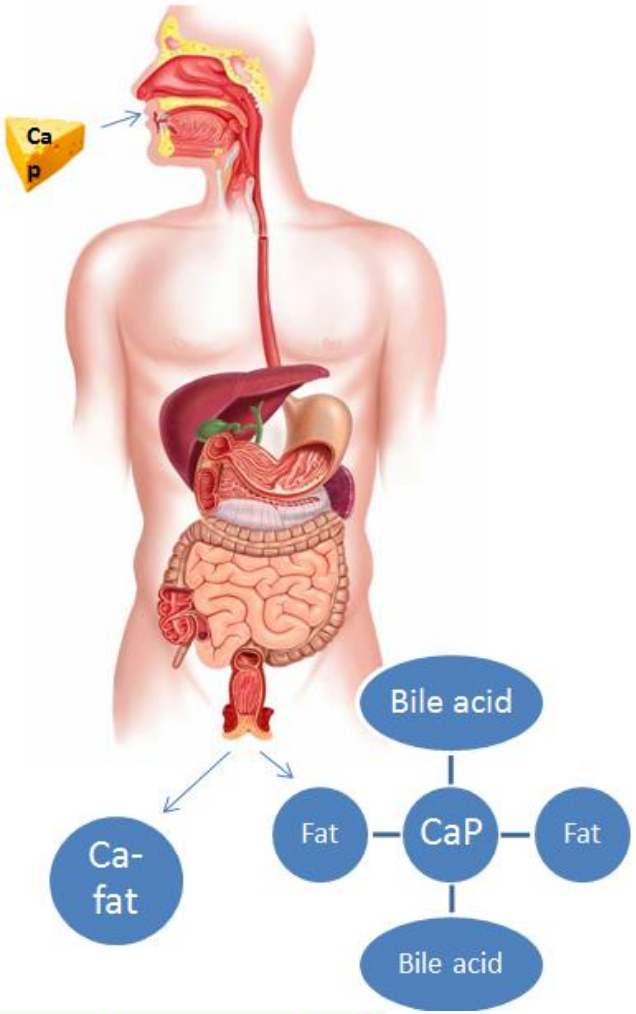


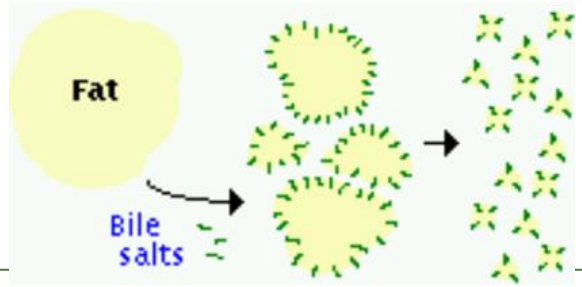
Lorenzen JK, Astrup A. Am. J. Clin. Nutr. (2007)

- Precipitation of calcium and fatty acids in insoluble fatty acid soaps

- Precipitation of calcium and phosphate in amorphous calcium phosphate

- Possibly also increased fecal excretion of bile acids



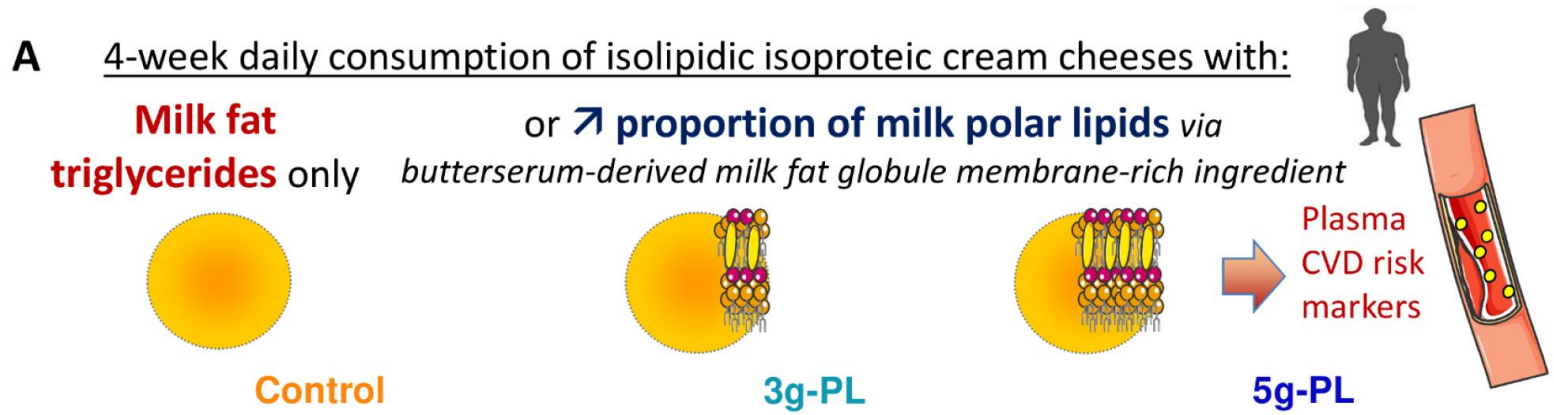


Nutrition

ORIGINAL ARTICLE

Milk polar lipids reduce lipid cardiovascular risk factors in overweight postmenopausal women: towards a gut sphingomyelin-cholesterol interplay

Cécile Vors,[1,2] Laurie Joumard-Cubizolles,[3] Manon Lecomte,[1] Emmanuel Combe,[1] Lemlih Ouchchane,[4,5] Jocelyne Drai,[1,6] Ketsia Raynal,[7] Florent Joffre,[8] Laure Meiller,[1,2] Mélanie Le Barz,[1] Patrice Gaborit,[7] Aurélie Caille,[9] Monique Sothier,[2] Carla Domingues-Faria,[3] Adeline Blot,[9] Aurélie Wauquier,[10] Emilie Blond,[1,6] Valérie Sauvinet,[1,2] Geneviève Gésan-Guiziou,[11] Jean-Pierre Bodin,[12] Philippe Moulin,[1,13] David Cheillan,[1,14] Hubert Vidal,[1] Béatrice Morio,[1] Eddy Cotte,[15,16] Françoise Morel-Laporte,[9] Martine Laville,[1,2] Annick Bernalier-Donadille,[10] Stéphanie Lambert-Porcheron,[2,17] Corinne Malpuech-Brugère,[3] Marie-Caroline Michalski[1,2]



BMJ

Vors C, *et al*. *Gut* 2019;**0**:1–15. doi:10.1136/gutjnl-2018-318155

Metabolomics investigation to shed light on cheese as a possible brick in the French paradox puzzle

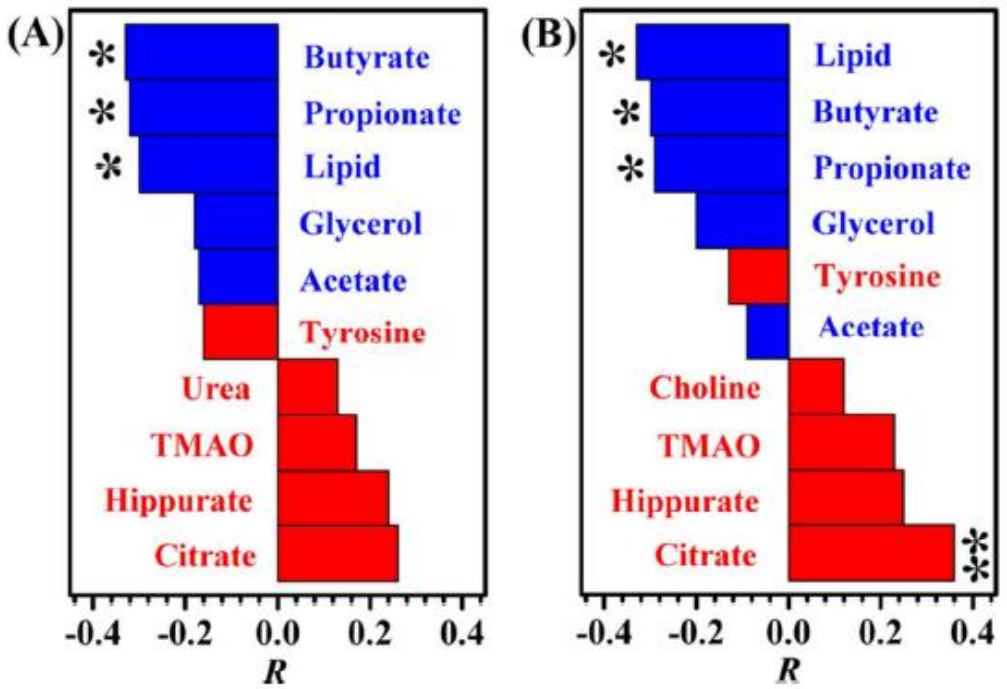


Figure 6. Top 10 metabolites correlated with the diet-induced increases in (A) total and (B) LDL cholesterol based on Pearson correlation coefficients. Red and blue bar represents urinary and fecal metabolites, respectively. *, $P < 0.05$; **, $P < 0.01$.

Effect of vegetarian and vegan diet on whole body BMD

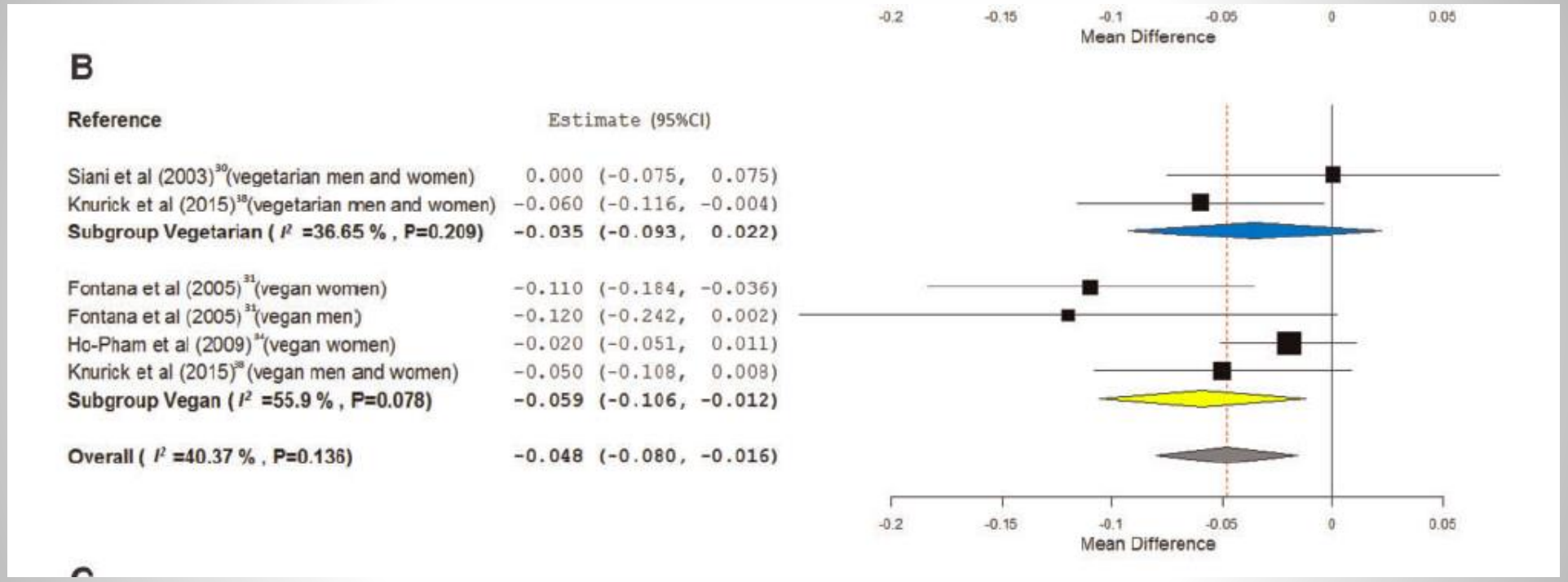
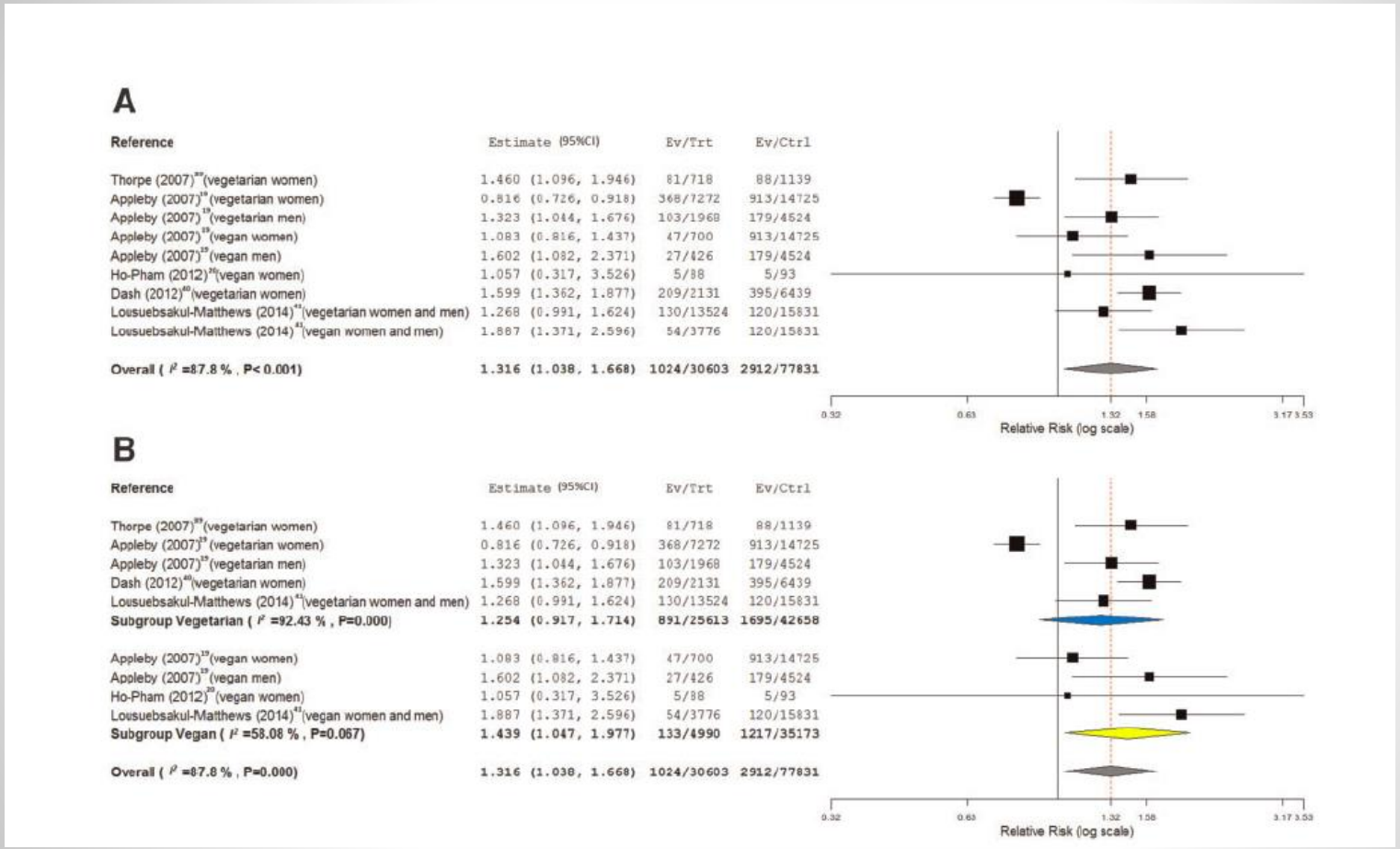


Figure 4 **Random-effects meta-analysis of the effects of vegetarian and vegan diets on bone mineral density (BMD) on the whole body (WB).** (a) BMD differences between vegetarians/vegans and omnivores. (b) Subgroup analyses by diet (vegetarians vs vegans). (c)

Effect of vegetarian and vegan diet on fractures



Random effects meta-analysis of the effects of vegetarian and vegan diets on fracture rates.

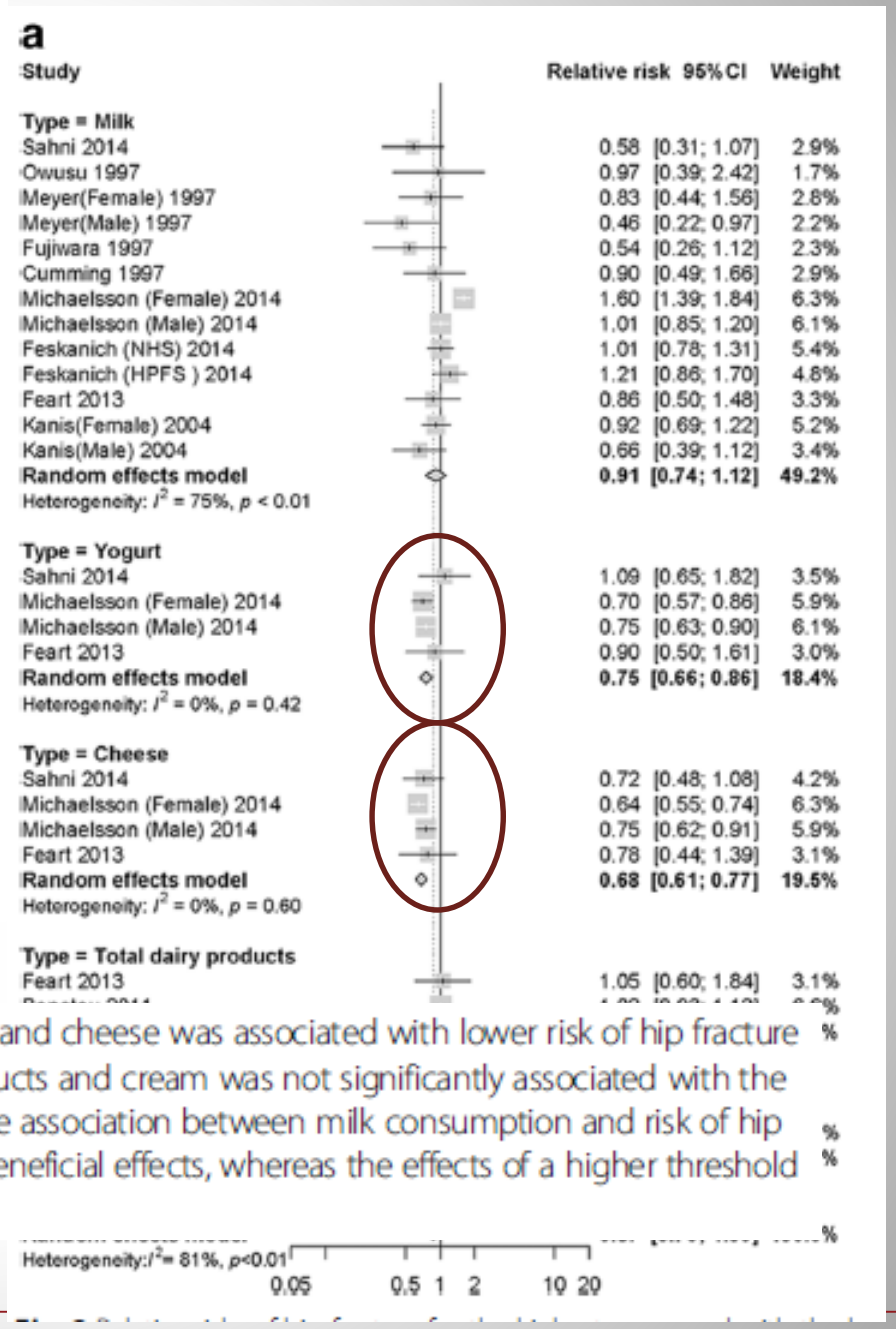
Bian *et al. BMC Public Health* (2018) 18:165
DOI 10.1186/s12889-018-5041-5

BMC Public Health

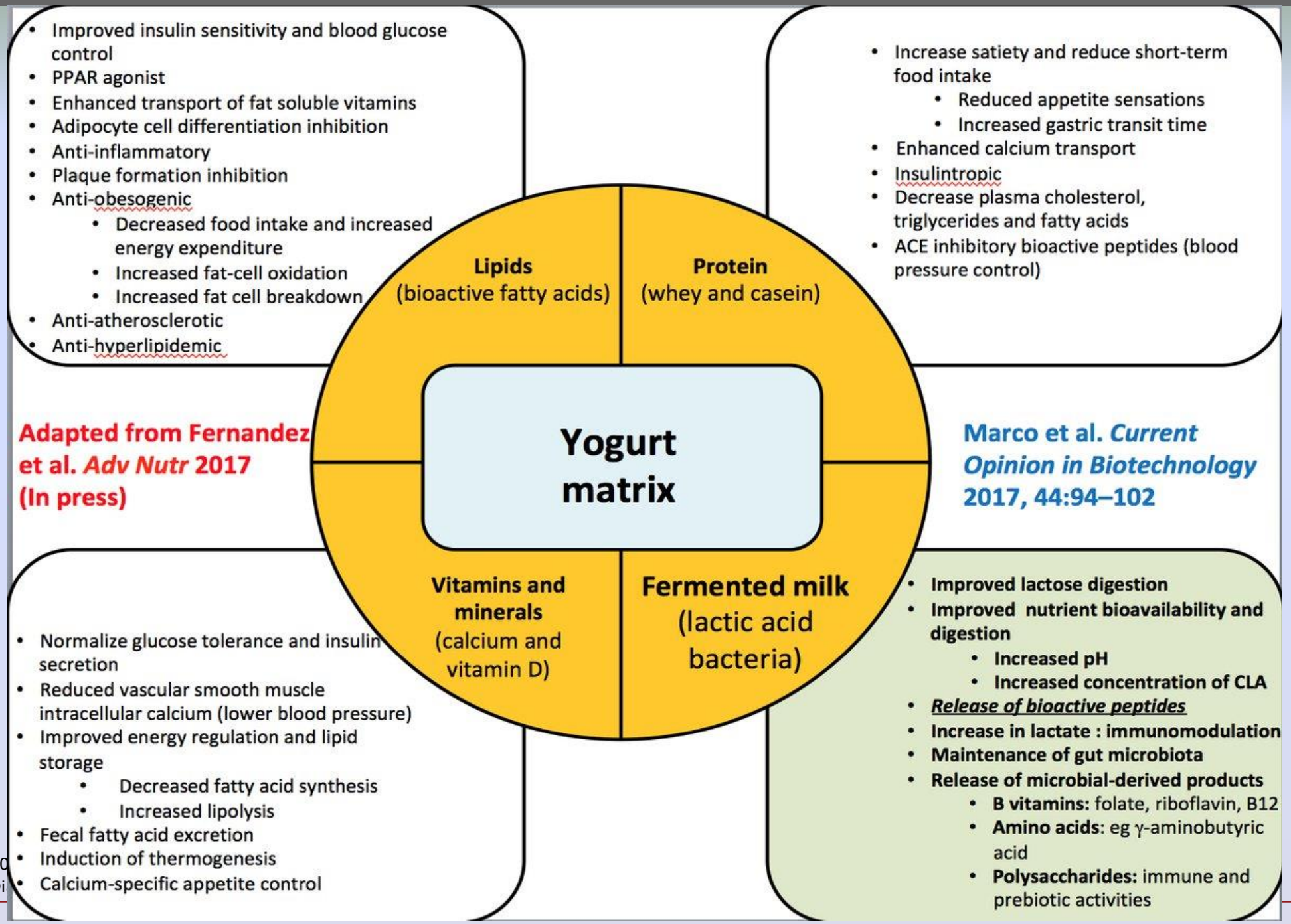
RESEARCH ARTICLE Open Access

Dairy product consumption and risk of hip fracture: a systematic review and meta-analysis

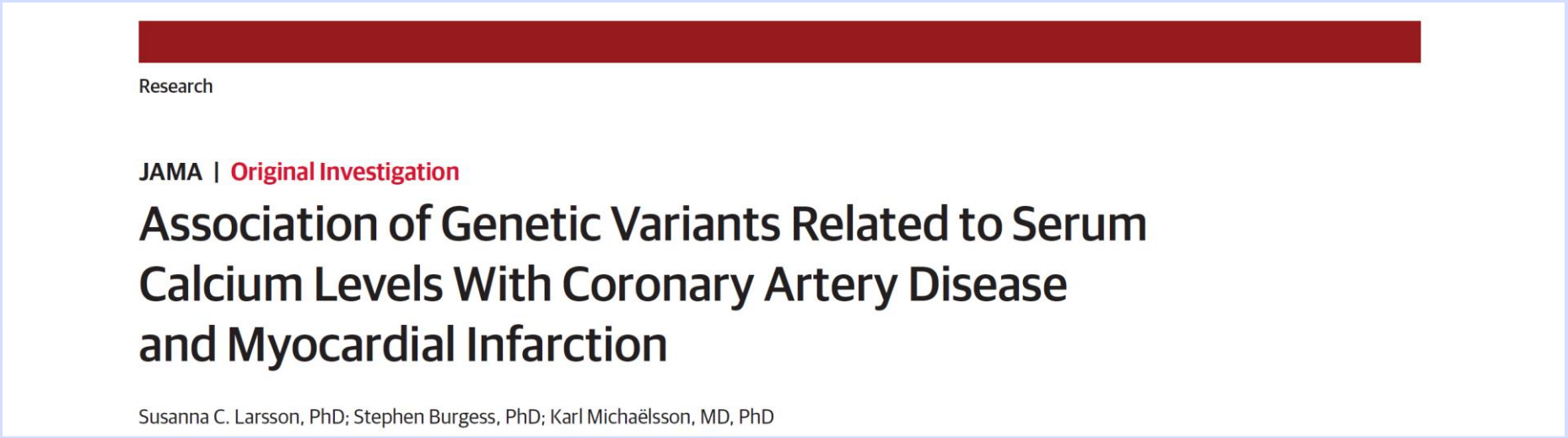
Shanshan Bian[1†], Jingmin Hu[1†], Kai Zhang[1], Yunguo Wang[2], Miaohui Yu[3] and Jie Ma[3*]



Conclusions: Our findings indicate that consumption of yogurt and cheese was associated with lower risk of hip fracture in cohort studies. However, the consumption of total dairy products and cream was not significantly associated with the risk of hip fracture. There was insufficient evidence to deduce the association between milk consumption and risk of hip fracture. A lower threshold of 200 g/day milk intake may have beneficial effects, whereas the effects of a higher threshold of milk intake are unclear.


Improved insulin sensitivity and blood glucose control
PPAR agonist
Enhanced transport of fat soluble vitamins
Adipocyte cell differentiation inhibition
Anti-inflammatory
Plaque formation inhibition
Anti-obesogenic
Decreased food intake and increased energy expenditure
Increased fat-cell oxidation
Increased fat cell breakdown
Anti-atherosclerotic
Anti-hyperlipidemic
Lipids
(bioactive fatty acids)
Protein
(whey and casein)
Increase satiety and reduce short-term food intake
Reduced appetite sensations
Increased gastric transit time
Enhanced calcium transport
Insulintropic
Decrease plasma cholesterol, triglycerides and fatty acids
ACE inhibitory bioactive peptides (blood pressure control)
Adapted from Fernandez et al. Adv Nutr 2017 (In press)
Yogurt matrix
Marco et al. Current Opinion in Biotechnology 2017, 44:94–102
Vitamins and minerals
(calcium and vitamin D)
Fermented milk
(lactic acid bacteria)
Normalize glucose tolerance and insulin secretion
Reduced vascular smooth muscle intracellular calcium (lower blood pressure)
Improved energy regulation and lipid storage
Decreased fatty acid synthesis
Increased lipolysis
Fecal fatty acid excretion
Induction of thermogenesis
Calcium-specific appetite control
Improved lactose digestion
Improved nutrient bioavailability and digestion
Increased pH
Increased concentration of CLA
Release of bioactive peptides
Increase in lactate : immunomodulation
Maintenance of gut microbiota
Release of microbial-derived products
B vitamins: folate, riboflavin, B12
Amino acids: eg γ-aminobutyric acid
Polysaccharides: immune and prebiotic activities

Kalcium fra mejeriprodukter nedsætter risiko for hjertekarsygdom, mens calcium uden mælkematricen øger risiko for blodprop I hjertet



Research

JAMA | Original Investigation

Association of Genetic Variants Related to Serum Calcium Levels With Coronary Artery Disease and Myocardial Infarction

Susanna C. Larsson, PhD; Stephen Burgess, PhD; Karl Michaëlsson, MD, PhD

- Kosttilskud med calcium er I ny meta-analyse fundet at øge risiko for blodprop I hjertet
- Det er muligt at plantebaserede drikke beriget med calcium karbonat og citrate har samme virkning
- Der er behov for mere forskning der belyser hvorledes forskellige calcium kilder & kalciumrige fødevarer påvirker serum calcium koncentrationen og hormonelle systemer.

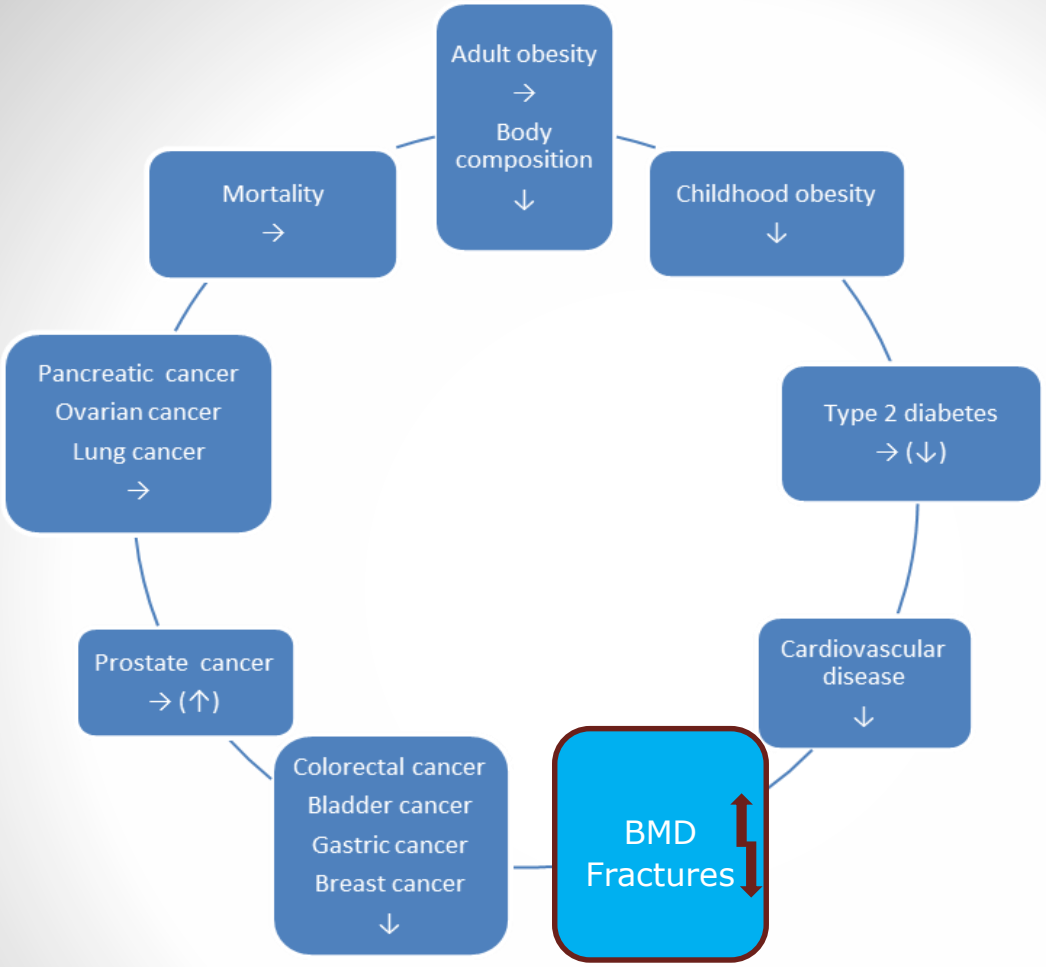


Figure 1. Overall effect/association between dairy (**cheese and yogurt**) intake and health outcomes. ↓favorable effect/association; ↑adverse effect/association; → no effect/association.

Conclusions

- The totality of evidence i.e. meta-analyses of both observational studies and RCT's cannot find any harmful effects of dairy on body fat, metabolic syndrome, type 2 diabetes, or CVD.
- Yogurt and cheese does not exert the detrimental effects on blood lipids and blood pressure as previously predicted by its sodium and saturated fat content.
- Dairy, in particular full-fat, exerts beneficial effects on LDL-cholesterol, blood pressure and postprandial triglycerides as compared to butter.
- Meta-analysis of observational studies support that full fat yogurt and cheese (and perhaps other fermented dairy) may protect from CVD and type 2 diabetes.
- The effects of yogurt and cheese on body composition, diabetes and CVD risks can be attributed to the food matrix with nutrients i.e. protein, calcium, SCFA from fermentation, and perhaps peptides, phospholipids.
- Whereas the low-fat version might by helpful for non-diabetic overweight and obese individuals, the full-fat versions are optimal for type 2 diabetics.
- A diet including dairy, particularly yogurt and cheese should be recommended for all to prevent and manage type 2 diabetes and cardiovascular disease.

“People don’t want to hear the truth because they don’t want their illusions destroyed.”

Friedrich Nietzsche