Dairy Fat: The Cream of The Crop

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Speaker Disclosure

- **Board Member/Advisory Panel/Consultant**
- **Present**
- **Past**
  - American Heart Association Eat Well Task Force, California Raisin Marketing Board, Wonderful Pistachios, White Wave Foods, Davidson’s Safest Choice Eggs
- **Honoraria**
  - Honorarium underwritten by
Speaker Credentials
Criticisms of Dairy

Although high in nutrients, dairy has been criticized for being:

1. High in total dietary fat
2. High in cholesterol
3. High in saturated fat

• Which were all mistakenly associated with heart disease
• Why dairy fat is good for you?
1. Reduce Total Dietary Fat

Total dietary fat is no longer relevant, so don’t focus on it.
History of the Total Fat Dietary Guidelines

1980
Avoid Too Much Fat.

1985
Americans. But for the U.S. population as a whole, it is sensible to reduce daily consumption of fat. This suggestion is based on the assumption that a diet low in fat makes it easier for you to include the variety of foods you need for nutrients without exceeding your calorie needs because fat contains over twice the calories of an equal amount of carbohydrates or protein.

1990
A diet low in fat makes it easier for you to include the variety of foods you need for nutrients without exceeding your calorie needs because fat contains over twice the calories of an equal amount of carbohydrates or protein.

1995
Foods high in fat should be used sparingly.

2000
Keep total fat intake moderate.

2005
Keep total fat intake between 20 to 35 percent of calories, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils.

2010
The types of fatty acids consumed are more important in influencing the risk of cardiovascular disease than is the total amount of fat in the diet. Animal fats, such as meats and dairy products, are associated with an increased risk of heart disease.

2015
Reducing total fat (replacing total fat with overall carbohydrates) does not lower CVD risk.
Where Fat Went Wrong

Dr. Ancel Keys, Seven Countries Study

• 1961 - Keys persuaded AHA to release the first set of guidelines targeting saturated fat.

• 1970 - Congressional hearings based on low-fat, anti-saturated fat campaign.

• Many scientists opposed it.
Keys’s 1952 Chart:
Fat Calories vs. Deaths from Degenerative Heart Disease

Degenerative Heart Disease
1948–49, Men

Deaths per 1000

 FAT CAL. as % of Total

British physician Malcolm Kendrick used the same data available to Keys and discovered that by choosing different countries, you can prove an inverse relationship.
Yerushalmy and Hilleboe: Data from Twenty-Two Countries

Mortality from Arteriosclerotic and Degenerative Heart Disease and Percent of Total Calories from Fat – Males age 55-59, 1950

Country
1. Australia
2. Austria
3. Canada
4. Ceylon
5. Chile
6. Denmark
7. Finland
8. France
10. Ireland
11. Israel
12. Italy
13. Japan
14. Mexico
15. Netherlands
16. New Zealand
17. Norway
18. Portugal
19. Sweden
20. Switzerland
21. United Kingdom
22. United States

Fat Calories as % of Total Calories

The Snackwell’s Phenomenon

Food companies rushed to create low-fat versions of all foods and market them as heart-healthy.
Dietary fats and coronary heart disease

W. C. Willett

From the Department of Nutrition, Harvard School of Public Health, Boston, MA, USA


The relation of dietary fats to coronary heart disease (CHD) remains controversial. Recent meta-analyses from large randomized controlled feeding trials have suggested that dietary fat, including saturated fat, should be limited in the diet. Other studies, however, have focused on the role of specific fatty acids. The evidence indicates that the type of fat is more important than the amount of fat in the diet. A high intake of saturated fat, and the decrease in polyunsaturated fat, is associated with an increased risk of CHD. In contrast, a diet rich in unsaturated fat, especially monounsaturated fat, and the decrease in trans-fat intake, is associated with a decreased risk of CHD. The type of fat in the diet will in part depend on the form of fat and the form of carbohydrate. Because both N-6 and N-3 polyunsaturated fatty acids are essential and reduce the risk of heart disease, the ratio of N-6 to N-3 is not useful and can be misleading. In practice, reducing red meat and dairy products in a food supply and increasing intakes of nuts, fish, soy products and nonhydrogenated vegetable oils will improve the mix of fatty acids and have a markedly beneficial effect on rates of CHD.

Keywords: coronary heart disease, trans fat, saturated fat, polyunsaturated fat, monounsaturated fat, blood cholesterol.

But total fat as a percent of energy is unimportant....
At 12 months

Low-carbohydrate diet
42% calories from fat

Low-fat diet
30.8% calories from fat
Primary Prevention of Cardiovascular Disease with a Mediterranean Diet

Ramón Estruch, M.D., Ph.D., Emilio Ros, M.D., Ph.D., Jordi Salas-Salvadó, M.D., Ph.D., Maria-Isabel Covas, D.Pharm., Ph.D., Dolores Corella, D.Pharm., Ph.D., Fernando Arós, M.D., Ph.D., Enrique Gómez-Gracia, M.D., Ph.D., Valentina Ruiz-Gutiérrez, Ph.D., Miquel Fiol, M.D., Ph.D., José Lapetra, M.D., Ph.D., Rosa Maria Lamuela-Raventos, D.Pharm., Ph.D., Lluís Serra-Majem, M.D., Ph.D., Xavier Pintó, M.D., Ph.D., Josep Basora, M.D., Ph.D., Miguel Angel Muñoz, M.D., Ph.D., José V. Sorlí, M.D., Ph.D., José Alfredo Martínez, D.Pharm, M.D., Ph.D., and Miguel Angel Martínez-González, M.D., Ph.D., for the PREDIMED Study Investigators*
American Heart Association Heart Health Recommendation:

• Follow a Mediterranean-style diet
• Limit total fat to 20-35% of total calories
Intake of Energy

- MeDiet + EVOO: Baseline 39.2, End of Trial 41.2
- MedDiet + Nuts: Baseline 39.4, End of Trial 41.5
- Control Diet: Baseline 39, End of Trial 37

Legend:
- Baseline
- End of Trial
Primary End Point (Acute Myocardial Infarction, Stroke, or Death from Cardiovascular Causes)
2015 Heart Disease Risk Factors Perceptions - Total Dietary Fat

Dietary Fat as a Major Contributor of Heart Disease

Consumers (n=39)  Students (n=40)  Faculty (n=17)

Reduce Total Dietary Fat – Conclusions

• Total Fat is not associated with Heart Disease
  • Full-fat dairy may be enjoyed with low-fat dairy.

• The type of fat is still relevant.
  • Cream sauces are back when made with whole milk.
  • Whole fatty foods, like nuts, and avocado are in.
  • Cheese is no longer a guilty-pleasure
2. Reduce Dietary Cholesterol

Dietary cholesterol is not as important as once thought and should not be the focus in reducing risk for CVD.
Cholesterol. Previously, the Dietary Guidelines for Americans recommended that cholesterol intake be limited to no more than 300 mg/day. The 2015 DGAC will not bring forward this recommendation because available evidence shows no appreciable relationship between consumption of dietary cholesterol and serum cholesterol, consistent with the conclusions of the AHA/ACC report. Cholesterol is not a nutrient of concern for overconsumption.
2015-2020 DGAs for Americans

Dietary Cholesterol

The body uses cholesterol for physiological and structural functions but makes more than enough for these purposes. Therefore, people do not need to obtain cholesterol through foods.

The Key Recommendation from the 2010 Dietary Guidelines to limit consumption of dietary cholesterol to 300 mg per day is not included in the 2015 edition, but this change does not suggest that dietary cholesterol is no longer important to consider when building healthy eating patterns. As recommended by the IOM,\textsuperscript{[24]} individuals should eat as little dietary cholesterol as possible while consuming a healthy eating pattern. In general, foods that are higher in dietary cholesterol, such as fatty meats and high-fat dairy products, are also higher in saturated fats. The USDA Food Patterns are limited in saturated fats, and because of the commonality of food sources of saturated fats and dietary cholesterol, the Patterns are also low in dietary cholesterol. For example, the Healthy U.S.-Style Eating Pattern contains approximately 100 to 300 mg of cholesterol across the 12 calorie levels. Current average intake of dietary cholesterol among those 1 year and older in the United States is approximately 270 mg per day.
### Dietary Reference Intakes (DRIs): Additional Macronutrient Recommendations

Food and Nutrition Board, Institute of Medicine, National Academies

<table>
<thead>
<tr>
<th>Macronutrient</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>Dietary cholesterol</td>
<td>As low as possible while consuming a nutritionally adequate diet</td>
</tr>
<tr>
<td>Trans fatty acids</td>
<td>As low as possible while consuming a nutritionally adequate diet</td>
</tr>
<tr>
<td>Saturated fatty acids</td>
<td>As low as possible while consuming a nutritionally adequate diet</td>
</tr>
<tr>
<td>Added sugars</td>
<td>Limit to no more than 25% of total energy</td>
</tr>
</tbody>
</table>

The 3 Deciding Opinions

1. American Heart Association – 2014
2. USDA Dietary Guidelines – 2015
3. Most recent meta analysis – Berger, 2015

All 3 agree there is not enough evidence to make a recommendation against cholesterol.

Where Did Cholesterol Recommendations Come From?

Studies performed were:

1. Based on flawed animal studies
2. Provided excessive amounts of dietary cholesterol
Cholesterol and Animal Studies

In 1912, Anichkov discovered that feeding cholesterol to rabbits led to atherosclerosis.

Note that:

• Rabbits are herbivores
• They metabolize cholesterol differently

Rabbit Digestion

Figure 4.6 In the stomach of the rabbit ingested food is located in the pyloric part (left), which contains digestive glands. Reingested fecal pellets are located in the large fundus (right), where they remain separate from the food material while fermentation continues. [Grassé 1955]
Revisiting Dietary Cholesterol Recommendations: Does the Evidence Support a Limit of 300 mg/d?

Maria Luz Fernandez • Mariana Calle

Published online: 4 August 2010
© Springer Science+Business Media, LLC 2010

Abstract The perceived association between dietary cholesterol (DC) and risk for coronary heart disease (CHD) has resulted in recommendations of no more than 300 mg/d for healthy persons in the United States. These dietary recommendations proposed in the 1960s had little scientific evidence other than the known association between saturated fat and cholesterol and animal studies where cholesterol was fed in amounts far exceeding normal intakes. In contrast, European countries, Asian countries, and Canada do not have an upper limit for DC. Further, current epidemiologic data have clearly demonstrated that

Introduction

The American Heart Association (AHA) recommends no more than 300 mg/d of dietary cholesterol (DC) for healthy persons to prevent increased risk for coronary heart disease (CHD) [1]. These recommendations are mostly based on the presence of both saturated fat and cholesterol in many foods and on data derived from animal studies where supraphysiologic doses of cholesterol, ranging from the equivalent of 1,000 mg to 20,000 mg/d for humans, were fed in order to produce atherosclerosis [2].
2. Reduce Dietary Cholesterol - Conclusion

- Cholesterol is not the culprit
- Full-fat milk and dairy is back
- Cream sauces made with eggs like, Hollandaise and Alfredo sauce, should no longer be avoided like the plague.
3. Reduce Dietary Saturated Fat

- The mix of fatty acids is relevant, but don’t focus on that.
- Instead pay attention to the sources of saturated fat.
ABSTRACT: Cardiovascular disease (CVD) is the leading global cause of death, accounting for 17.3 million deaths per year. Preventive treatment that reduces CVD by even a small percentage can substantially reduce, nationally and globally, the number of people who develop CVD and the costs of caring for them. This American Heart Association presidential
“Taking into consideration the totality of the scientific evidence, satisfying rigorous criteria for causality, we conclude strongly that lowering intake of saturated fat and replacing it with unsaturated fats, especially polyunsaturated fats, will lower the incidence of CVD.”
The main sources of saturated fat to be decreased are dairy fat (butter), lard (pork), beef tallow, palm oil, palm kernel oil, and coconut oil.
Effects of dietary fatty acids and carbohydrates on the ratio of serum total to HDL cholesterol and on serum lipids and apolipoproteins: a meta-analysis of 60 controlled trials\textsuperscript{1-3}

Ronald P Mensink, Peter L Zock, Arnold DM Kester, and Martijn B Katan

2003

Bad Cholesterol: LDL
Good Cholesterol: HDL
Closer Look: Total/HDL Cholesterol ratio
Saturated Fat and Cardiometabolic Risk Factors, Coronary Heart Disease, Stroke, and Diabetes: a Fresh Look at the Evidence

Renata Micha · Dariush Mozaffarian

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Changes in Total Cholesterol: HDL-Ratio for Consumption of SFA, MUFA, PUFA, and TFA

Fig. 2 Changes in blood lipid levels for consumption of saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA), or trans fatty acids (TFA) as an isocaloric replacement for carbohydrate (CHO) as a reference, based on two meta-analyses of randomized controlled feeding trials [5, 6]. β reflects the change for each 1% energy isocaloric replacement; *P < 0.05
“More Data are needed to elucidate whether CVD risks are likely to be influenced by the specific nutrients used to replace saturated fat.”

In conclusion, our meta-analysis showed that there is insufficient evidence from prospective epidemiologic studies to conclude that dietary saturated fat is associated with an increased risk of CHD, stroke, or CVD. However, the available data were not adequate for determining whether there are CHD or stroke...
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 Hibbeln¹
Linoleic Acid and Saturated Fat Composition of MCE Control and Intervention Group Diets

**Saturated fat (% kcals)**

- **Base**: 18
- **Control**: 16
- **Low SF**: 10

**Linoleic acid (% kcal)**

- **Base**: 4
- **Control**: 4
- **Low SF**: 16

The graphs illustrate the comparison ofLinoleic acid and Saturated fat composition between the Base, Control, and Low SF groups. The Bar charts show the percentage of each component in the kcals for each group.
## Changes in Serum Cholesterol in Intervention and Control

<table>
<thead>
<tr>
<th></th>
<th>Observed dietary changes*</th>
<th>Serum cholesterol % changes</th>
<th>Observed in MCE (n=2355)‡</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LA (% change)</td>
<td>SFA (% change)</td>
<td>Predicted based on Keys equation†</td>
</tr>
<tr>
<td>Intervention diet</td>
<td>288</td>
<td>−51</td>
<td>−18.1%</td>
</tr>
<tr>
<td>Control diet</td>
<td>38</td>
<td>−1</td>
<td>−1.1%</td>
</tr>
</tbody>
</table>

LA=linoleic acid; SFA=saturated fat.

*Changes from baseline hospital diet calculated from 1975 abstract, with LA estimated by multiplying total polyunsaturated fatty acids by 0.9.

†\[\Delta \text{Chol}=1.3(2\Delta S−\Delta P)\] where S and P are percentage of calories from saturated and polyunsaturated fatty acids, respectively.

‡Percent change in serum cholesterol concentration calculated for each individual in cohort that received diet for one year or more. P values from paired t test comparing concentrations before and after randomization.
Fig 5 | Risk of death from any cause by diet assignment in full MCE cohort and prespecified subgroups (Kaplan Meier life table graphs of cumulative mortality). Graphical depiction of cumulative mortality in full MCE cohort (n=9423) and prespecified subgroups in 1981 Broste thesis showed no indication of benefit and suggested possibility of unfavorable effects of serum cholesterol lowering intervention among participants aged ≥65. Patient level data needed to repeat this analysis were not recovered.
### Main analysis
- MCE - linoleic acid: 1.12 (0.78 to 1.62)
- SDHS - linoleic acid: 1.74 (1.04 to 2.91)
- RCOT - linoleic acid: 4.64 (0.58 to 37.15)
- LA Vet - linoleic acid + ALA: 0.82 (0.56 to 1.21)
- MRC-Soy - linoleic acid + ALA: 0.97 (0.58 to 1.64)
Overall: $I^2=45\%$, $P=0.121$

### Sensitivity analysis
- MCE - linoleic acid: 1.12 (0.78 to 1.62)
- SDHS - linoleic acid: 1.74 (1.04 to 2.91)
- RCOT - linoleic acid: 4.64 (0.58 to 37.15)
- LA Vet - linoleic acid + ALA: 0.82 (0.56 to 1.21)
- MRC-Soy - linoleic acid + ALA: 0.97 (0.58 to 1.64)
- DART - LA + ALA: 1.00 (0.76 to 1.30)
- ODHS - LA+EPA/DHA: 0.74 (0.51 to 1.08)
- STARS - LA+EPA/DHA: 0.35 (0.04 to 3.12)
Overall: $I^2=38\%$, $P=0.130$
3. Reduce Saturated Fat – Conclusion

• Full-fat milk should not be avoided
  • Consumers can enjoy full-fat along side low fat dairy

• Consumers can enjoy full-fat varieties of cheese.

• When consuming saturated fats, consumers should focus on reducing processed high sugar foods
  • Eat more whole foods.
Dairy Fat
Conclusion: There is growing evidence that saturated fatty acids in the context of dairy foods, particularly fermented dairy products, have neutral or inverse associations with CVD.
Dairy Foods and Milk Fat on Heart Disease

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.
Conclusion: Milk fat biomarkers were associated with a lower risk of developing a first MI, especially in women.
Conclusion: This dose-response meta-analysis of prospective studies indicates that milk intake is not associated with total mortality but may be inversely associated with overall CVD risk; however, these findings are based on limited numbers.

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Symposia of:

- Eurofed Lipids Congress (2014 – France)
- Dairy Nutrition Annual Symposium (2014 – Canada)
- American Society for Nutrition (2015 – USA)
- Experimental Biology (2015 – USA)
- Federation of European Nutrition Societies (2015 – Germany)

“The emerging scientific evidence indicates that the consumption of regular fat dairy foods is not associated with an increased risk of cardiovascular disease”
Conclusion: A high daily intake of regular-fat cheese for 12 wk did not alter LDL cholesterol or MetS risk factors differently than an equal intake of reduced-fat cheese or an isocaloric amount of carbohydrate-rich foods.
Total and Full-Fat, but Not Low-Fat, Dairy Product Intakes are Inversely Associated with Metabolic Syndrome in Adults

Michele Drehmer, Mark A Pereira, Maria Inês Schmidt, Sheila Alvim, Paulo A Lotufo, Vivian C Luft, Bruce B Duncan

The Journal of Nutrition, Volume 146, Issue 1, 1 January 2016, Pages 81–89,
https://doi.org/10.3945/jn.115.220699
Published: 27 October 2015 Article history ▼

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.
Saturated Fat in Dairy and Heart Disease

Why isn’t dairy fat a risk factor for heart disease when it’s high in saturated fat?

- Odd chain saturated fat
- Good trans fat
- Calcium
- Probiotics
Intake of Saturated Fat and Type 2 Diabetes

A  Even-chain fatty acids
   France  1.22 (1.09–1.37)
   Italy   1.88 (1.67–2.11)
   Spain  1.61 (1.46–1.76)
   UK      1.37 (1.22–1.54)
   Netherlands  1.34 (1.22–1.46)
   Germany  1.65 (1.44–1.88)
   Sweden  1.28 (1.18–1.39)
   Denmark 1.23 (1.12–1.35)
   Overall (P=88.1%, p<0.0001) 1.43 (1.29–1.58)

B  Odd-chain fatty acids
   France  0.61 (0.47–0.78)
   Italy   0.68 (0.60–0.76)
   Spain  0.73 (0.68–0.78)
   UK      0.73 (0.64–0.84)
   Netherlands  0.61 (0.52–0.71)
   Germany 0.79 (0.72–0.87)
   Sweden  0.63 (0.57–0.70)
   Denmark 0.72 (0.65–0.78)
   Overall (P=54.1%, p=0.033) 0.70 (0.66–0.74)
Conclusions: Higher dairy fat exposure is not associated with an increased risk of CVD.
Pooled Relative Risks of CVD for Top Third vs. Bottom Third

<table>
<thead>
<tr>
<th>Fatty Acids</th>
<th>Pool Relative Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentadecanoic acid (15:0)</td>
<td>0.94</td>
</tr>
<tr>
<td>heptadecanoic acid (17:0)</td>
<td>0.82</td>
</tr>
<tr>
<td>trans-palmitoleic acid (trans-16:1n-7)</td>
<td>0.82</td>
</tr>
</tbody>
</table>
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 Souza¹,²,³,⁴ Andrew Mente¹,²,⁵ Adriana Maroleanu², Adrian I Cozma³,⁴ Vanessa Ha¹,³,⁴ Teruko Kishibe⁶, Elizabeth Uleryk⁷ Patrick Budylowski⁴, Holger Schünemann¹,⁸ Joseph Beyene¹,² Sonia S Anand¹,²,⁵,⁸

Outcome | No of studies/comparisons | No of events/participants | Risk ratio (95% CI) | Relative risk (95% CI) | P | P_net | I² (%)
--- | --- | --- | --- | --- | --- | --- | ---
**Total trans fats**
All cause mortality | 2/2 | 2141/20 346 | 1.34 (1.16 to 1.56) | 1.34 (1.16 to 1.56) | <0.001 | 0.07 | 70
CHD mortality | 5/6 | 1234/70 864 | 1.28 (1.09 to 1.50) | 1.28 (1.09 to 1.50) | 0.003 | 0.66 | 0
CHD total | 6/7 | 4579/145 922 | 1.21 (1.10 to 1.33) | 1.21 (1.10 to 1.33) | <0.001 | 0.43 | 0
Ischemic stroke | 3/4 | 1905/190 284 | 1.07 (0.88 to 1.28) | 1.07 (0.88 to 1.28) | 0.50 | 0.03 | 67
Type 2 diabetes | 6/6 | 8690/230 135 | 1.10 (0.95 to 1.27) | 1.10 (0.95 to 1.27) | 0.21 | 0.03 | 66
**Industrial trans fats**
All cause mortality | 1/2 | 11 890/71 464 | 0.98 (0.92 to 1.04) | 0.98 (0.92 to 1.04) | 0.52 | 0.52 | 0
CHD mortality | 2/2 | 3018/93 394 | 1.18 (1.04 to 1.33) | 1.18 (1.04 to 1.33) | 0.009 | 0.68 | 0
CHD total | 2/2 | 454/69 848 | 1.42 (1.05 to 1.92) | 1.42 (1.05 to 1.92) | 0.02 | 0.22 | 34
Ischemic stroke | 0 | 0/0 | - | - | - | - | -
Type 2 diabetes | 0 | 0/0 | - | - | - | - | -
**Ruminant trans fats**
All cause mortality | 1/2 | 11 890/71 464 | 1.04 (0.92 to 1.18) | 1.04 (0.92 to 1.18) | 0.51 | 0.31 | 4
CHD mortality | 2/3 | 3018/93 394 | 1.01 (0.71 to 1.43) | 1.01 (0.71 to 1.43) | 0.95 | 0.01 | 79
CHD total | 3/4 | 828/73 546 | 0.93 (0.73 to 1.19) | 0.93 (0.73 to 1.19) | 0.55 | 0.13 | 46
Ischemic stroke | 0 | 0/0 | - | - | - | - | -
Type 2 diabetes | 5/5 | 1153/12 942 | 0.58 (0.46 to 0.74) | 0.58 (0.46 to 0.74) | <0.001 | 0.22 | 30

Assessed study risks of bias: Multivariable relative risk estimates and ORs for all cause mortality, cardiovascular disease and type 2 diabetes were adjusted for age, sex, race, smoking, alcohol, history of heart disease, diabetes, hypertension, body mass index, physical activity, diet, socioeconomic status, education, and treatment with statins, aspirin, and blood pressure medications.
Fatty Acid Structures

**Industrial**

- a. Elaidic acid

- b. Vaccenic acid

**Ruminant**

- c. CLA

- d. Oleic acid
Conclusions: Compared with the control diet, milk- and cheese-based diets attenuated saturated fatty acid–induced increases in total and LDL cholesterol and resulted in increased fecal fat excretion; however, effects of milk and cheese did not differ. Because the diets contained similar amounts of saturated fat, similar increases in total and LDL cholesterol could be expected; however, both milk and cheese attenuated these responses, which seem to be explained by their calcium contents.
Dairy Consumption to Prevent Cardiometabolic Diseases

Yogurt and dairy product consumption to prevent cardiometabolic diseases: epidemiologic and experimental studies

Arne Astrup


Published: 02 April 2014

**FIGURE 3.** Effects of a probiotic milk product on plasma cholesterol; differences in the changes in LDL cholesterol (intervention minus control; mmol/L) with 95% CIs for 6 studies included in a meta-analysis are shown. Estimates of overall fixed and random effects are also shown. Reproduced with permission from reference 54. Ref., reference.
What does this all mean?

You can encourage full-fat dairy along side low-fat dairy!

• Full-fat dairy need not be avoided.
• Sauces may be added to the diet without feeling guilty.
• Use fatty foods like avocados, nuts, and seeds to add *taste* and *texture*.
• Whole milk is back!
• Sauces have a new lease on life, so use them without apology.
Thank You!
Questions?
Thank you to siggi’s for making this presentation possible!