Of Cows and Men: Reviewing the Link Between Dairy Fat and Human Health

Eduardo Rico, Ph.D., and Daniel Rico, Ph.D.

The Times, They Are A’-Changing

To keep in mind: what “100% of experts” believe and recommend usually changes over time

A brief history of fat

History of a Changing Perception
The Fear of Fats

Cardiovascular disease

Excess weight gain and obesity


The Diet-Heart Hypothesis: A Hypothesis

The 6 Country study

Father of the lipid hypothesis!

Premises of the Diet-Heart Hypothesis

Dietary Saturated Fatty Acids

A

Serum (bad) Cholesterol

B

Coronary heart disease and deaths

C

Fooling Ourselves?

When tested rigorously, claims from observational studies fail to replicate findings 80% of the time.

Young and Karr, 2011
The strength of evidence

Randomized Trials of Disease Outcomes
Prospective Cohorts of Disease Outcomes
Randomized Trials of Physiologic Measures/Risk Factors
Retrospective Case-Control Studies of Disease Outcomes
Epidemiologic Studies
Prevalence Studies
Case Series/Case Reports
Animal Studies

Micha and Mozaffarian, 2010

Causality!

Were the Dietary Fat Guidelines Backed by Good Evidence?

Evidence from randomised controlled trials did not support the introduction of dietary fat guidelines in 1977 and 1983: a systematic review and meta-analysis

Zoli Harcombe,1 Julien S Baker,1 Stephen Mark Cooper,1 Bruce Davies,2 Nicholas Sculthorpe,1 James J DiNicolantonio,4 Fergal Grace3

A Big Fat Problem!

Los Angeles Times
Fat tax in Denmark: Why they have it; could it happen in U.S.?
And then this Happened...

Fluid Milk Consumption Trends


A Wise Choice?

Bovine Milk Substitutes Today
Was the Problem Solved?

Although the rates of Death attributable to CVD have declined in the United States, the burden remains high.

Getting the Fats straight

Markers of Cardiovascular Disease

The good and the not so good..

- Total Cholesterol
- LDL-Cholesterol
- HDL-Cholesterol
- Triglycerides
- LDL particle size distribution
- Total-/ HDL-cholesterol
- Triglyceride / HDL-cholesterol

Removing Dairy Fat from the Diet
A Randomized Controlled Trial

Removing Dairy Fat from the Diet
Reduced “Bad” Cholesterol...but

Removing Dairy From the Diet Increased CVD Risk

Cardiovascular Disease
Saturated fats Do Not Increase Cardiovascular Disease Risk

**Meta-analysis of 21 prospective cohorts, n >340,000 subjects**

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Risk Ratio (95% CI)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary Heart Disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Siri et al.</td>
<td>1.11 (0.91, 1.38)</td>
<td>2010</td>
</tr>
<tr>
<td>McKeigue et al.</td>
<td>0.68 (0.57, 0.81)</td>
<td>1994</td>
</tr>
<tr>
<td>Kushi et al.</td>
<td>1.33 (0.96, 1.87)</td>
<td>1995</td>
</tr>
<tr>
<td>Poulsen et al.</td>
<td>0.93 (0.74, 1.18)</td>
<td>1991</td>
</tr>
</tbody>
</table>

**CVD, CHD inclusive of stroke:**

**RR** **1.00 [0.89, 1.11]**

_Siri Tarino et al., 2010_

---

**Saturated fats Do not Increase Cardiovascular Disease Risk**

**Relative risks for coronary outcomes in prospective cohort studies of dietary fatty acid intake.**

<table>
<thead>
<tr>
<th>Circulating Blood Fatty Acid Composition</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total saturated fatty acids</td>
<td>1.04 (0.86-1.26)</td>
</tr>
<tr>
<td>14:0, Myristic</td>
<td>0.94 (0.83-1.08)</td>
</tr>
<tr>
<td>16:0, Palmitic</td>
<td>0.94 (0.87-1.22)</td>
</tr>
<tr>
<td>16:0, Palmitoleic</td>
<td>1.15 (0.96-1.37)</td>
</tr>
<tr>
<td>16:0, Oleic</td>
<td>0.77 (0.63-0.93)</td>
</tr>
<tr>
<td>18:0, Palmitoleic + 16:1, Margaric</td>
<td>0.81 (0.62-1.08)</td>
</tr>
<tr>
<td>18:0, Oleic</td>
<td>1.23 (0.83-1.81)</td>
</tr>
</tbody>
</table>

_Meta-analysis of 78 prospective cohorts and RCTs, with ~650,000 participants_

_Chowdhury et al. 2014_

---

**Saturated fats Do not Increase Cardiovascular Disease Risk**

**Coding 17:0 (found in dairy) intake was associated with 23% reduction in CVD risk**

_Chowdhury et al. 2014_

---

**Major CVD and Mortality Across the Continents - The PURE study.**

**Dehghan et al., 2018**
Major CVD and Mortality Across the Continents - The PURE study.

“Higher dairy consumption was associated with lower risks of mortality and cardiovascular disease, particularly stroke”

Dehghan et al., 2018

Does Fat Make Fat?

Gary Taubes, 2002

Does Dairy Increase Body Weight?

Dairy consumption does not change risk of body weight gain.

Chen et al et al., 2012

Does Dairy Increase Body Fat %

Dairy consumption does not change risk of body fat gain.

Chen et al., 2012
If not Fat, then What?!

Could Carbs be the Enemy on your Plate?

Dietary Carbohydrates Impair Healthspan and Promote Mortality

A Global Sugar Cult

Fructose intake, % of total calories

Fructose consumption raises circulating triglycerides and dysregulates hunger/satiety signals

The Yudkin/Sugar Fight

Vos et al., 2008; Teff et al. 2004
Milk Fat Intake & the Risk of Incident Diabetes Mellitus

- 2 large prospective cohorts
- Use of dairy intake markers in plasma
- 3,333 adults followed for 15 years
- Adjustments for lifestyle differences in multivariate analysis

Plasma FA, % of total FA

Adapted from Yakoob et al., 2016

The Fear of Fat is Melting Away

WSJ: “The Dubious Science Behind the Anti-Fat Crusade”
Summary and Final Thoughts

- No good evidence that dietary fats—including dairy—cause CVD, obesity, and chronic diseases: The fear of fats seems unjustifiable.
- Heavy focus on dietary fats has been generally limited in predicting clinical outcomes, and arguably counterproductive.
- Higher quality evidence (prospective and randomized control trials) suggests dairy may be protective.

Can dairy products help combat the spread of chronic diseases?

Policy and guidelines
The need to address bias
A Global Sugar Cult

Fructose Consumption Dysregulates Appetite

Some Saturated Fatty Acids Found in Dairy Fat Reduce CVD Risk

Carbohydrates Raise Small LDLs

1 % of energy intake from CHO replaced with FA

Mensik et al., 2003

Vos et al., 2008; Teff et al. 2004

Teff et al. 2004

Krauss et al., 2003
New Evidence is Shifting Minds..

Cardiovascular Disease Risk in Individuals with the Highest Milk/Dairy Consumption

<table>
<thead>
<tr>
<th>Disease</th>
<th>Relative Risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic heart disease</td>
<td>0.84 (0.76-0.93)</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.79 (0.75-0.82)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.92 (0.76-0.99)</td>
</tr>
</tbody>
</table>

Adapted from Elwood et al., 2008

Some Saturated Fatty Acids Found in Dairy Fat Reduce CVD Risk
Cholesterol and Diet- “Mega” analysis

Some Saturated Fatty Acids Found in Dairy Fat Reduce CVD Risk
Cholesterol and Diet- “Mega” analysis

Micha and Mozaffarian 2010, from Mensik (2003) and Mozaffarian and Clark (2009)
Dairy products consumption and metabolic syndrome in adults: systematic review and meta-analysis of observational studies

Chen et al., 2015

Our findings suggest an inverse dose-response relationship between dairy consumption and risk of metabolic syndrome

Chen et al., 2015