

WHO's Guidelines for Saturated Fats

Time for an examination of our values



Richard Harding

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Wise Nutrition Coaching

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WHO guidelines on saturated fats

ABC News Item

On the 4th July 2019, the ABC published this news item as its top news story.

World Health Organisation's recommendations on saturated fat are out of date, expert team says. *1*

It was based on an article published in THE BMJ the **previous day**, written by Arne Astrup and 17 colleagues, *WHO draft guidelines on dietary saturated and trans fatty acids: Time for a new approach?* **2**

I made a complaint to the ABC regarding the accuracy of both the original BMJ article, and ABC's article. I sent the journalist a 70 page A5 document, outlining many errors.

I received an email from the journalist on 24th September stating that, "I very much appreciate the time you've taken to get in touch and share your research with me, however, it's not something I can act on at the moment."

As a result I wrote a formal complaint to the ABC's Investigation Unit, and was told it **NOT** the responsibility of ABC's journalists to fact check journal articles, that are printed in reputable journals such as The BMJ. I can appreciate that journalists may not have the expertise to fact check article such as this. That is why I provided a 70 page document highlighting the errors.

Whilst the links to the dairy and beef industries are noted in THE BMJ article, it is not mentioned in the ABC's article. There is no mention that the researchers have been paid millions of dollars by the Dairy, Beef, and Chocolate industries.

It is not responsible to leave the information published in ABC's article to be uncorrected. The majority of readers will only see the statement,

A global team of researchers has taken aim at World Health Organisation draft guidelines that recommend people reduce their saturated fat intake.

The picture shows burger, chips, eggs, and baked beans.

The readers' conclusion - eating bacon and eggs is no longer considered to be unsafe.

People do not need to read any further. They have already received the information that the wish to know.

The ABC's editorial guidelines state, "reasonable efforts must be made to ensure that material facts are accurate and presented in context." and "factual content must not be presented in a way that will materially mislead the audience."

At the end of Astrup's article, the evidence for including eggs, chocolate, cheese, and meat is listed, which matches the needs of their corporate sponsors.

Funding Sources

At least 13 of the 18 authors of this paper, have received funding from the dairy, and beef industries.

Arne Astrup is a member of the Communications and Scientific Advisory Board of The Global Dairy Platform.

Arne Astrup's "department receives funding and food provision for our experimental supermarket from more than 100 food producers". ³

Astrup is a director of the Nordea Foundation OPUS Research Centre which is responsible for developing and testing the New Nordic Diet.

The New Nordic Diet is based on the diets of the Scandinavian countries - Denmark, Finland, Iceland, Norway and Sweden. It is a plant-based diet (berries, root vegetables, nuts, legumes, whole-grains) with the addition of cold-water, fatty fish such as salmon and mackerel and low-fat dairy. The concept is based on the Mediterranean diet but with a much greater emphasis on low-fat dairy and fish. It substitutes olive oil for canola oil.

Despite the claim that it is similar to the Mediterranean Diet, there are significant differences.

Hanne Bertram has received financial support for research activities from Danish Dairy Research Foundation, and Arla Food – a multinational Scandinavian dairy co-operative – the largest dairy producer in Scandinavia.

Emma Feeney has received research funding from Food for Health Ireland, a dairy technology organisation and has received speaking expenses from the National Dairy Council and European Milk Forum.

Ian Givens has received funding from Estonian BioCompetance Centre of Healthy Dairy Products, consultant to the Dairy Council, received travel expenses from the (UK) Dairy Council, Dutch Dairy Association, Global Dairy Platform and the International Dairy Federation.

Frans Kok has been a member of the Scientific Advisory Panel of the International Dairy Platform and has received research funding from the Dutch Dairy Association and several food companies.

Ronald Krauss has been funded by the National Dairy Council since 1989, National Cattleman's Beef Association and the Robert C. Atkins and Veronica Foundation. The Atkins Foundation has funded 42 research programs and endowed eight university chairs. The foundation researches "low-carbohydrate nutrition".

Benoit Lamache is Chair of Nutrition at Laval University, which is supported by private endowments from Pfizer. He has received funding

the Agriculture and Agri-Food Canada which is supported by the Dairy Farmers of Canada Canola Council of Canada. Other organisations include the [Indian] Dairy Research Institute, Dairy Australia and Merck Frosst.

Jean-Michel Lecerf works for the Centre National Interprofessionnel de l'Économie Laitière (CNIEL), Yoplait, Syndifrais (Yogurt manufacturer), Lactalis Alliance 4.

Philippe Legrand has received research grants from the French Dairy Council. He has received funding from *Lactalis*, which is a French-based dairy products organisation – the world's largest producer of dairy product. His research is focused on changing the saturated fatty acid profile of meat by changing the feed of the animals.

Michelle McKinley has received travel expenses for presentations given at conferences organised by the Dairy Council for Northern Ireland and the European Milk Forum.

Marie-Caroline Michalski is a paid consultancies for CNIEL (French Dairy Interbranch Sector) and, Sodial-Candia Research and Development and Danone Research.

Dariusz Mozaffarian is a consultant to Danone; scientific advisory board, consultant and owns shares with Elysium Health (a nutrition supplement manufacturer).

Sabita Soedamah-Muthu has received funding from Global Dairy Platform, Dairy Research Institute and Dairy Australia. She received The Wiebe Visser International Dairy Nutrition Prize from the Dutch Dairy Association.

Lesser and colleagues explored the relationship between funding and the study results in a paper titled *Relationship between Funding Source and Conclusion among Nutrition-Related Scientific Articles*. 4



This debate will not be won by a rational dialog in medical journals but by holding these industry-funded researchers to account for their deceptions – misrepresentations made necessary by the need to obtain funding.



As well as blindness being introduced by funding, personal preferences also greatly influence results.

Sir Ronald Fisher was a legendary statistician, well known to all who has any association with statistics.

Richard Doll and Bradford Hill co-authored a paper in 1950, *Smoking and Carcinoma of the Lung*. The conclusion was that "[...], smoking is an important factor in the cause of carcinoma of the lung". **5**

This was passionately attacked by Fisher. As well as being funded by the tobacco industry, Fisher was a chain smoker. He wrote extensively about the weak links between cigarette smoking and lung cancer.

[This leads] to the almost shrill conclusion that it was necessary that every device of modern publicity should be employed to bring home to the world at large to this terrible danger [of smoking].

What is not so much the work of a good citizen is to plant fear in the minds of perhaps a hundred million smokers throughout the world - to plant it with the aid of all means of modern publicity backed by public money, without knowing for certain that they have anything to be afraid of in the particular habit against which the propaganda is to be directed. After all, a large number of smokers are not very clever, perhaps not very strong-minded. **6**

As well as the well-publicised influence of funding on study outcomes, nutritional researchers are also influenced by their dietary preferences. They are much less likely to find evidence against food items that they consume and enjoy.

MARS Center for Cocoa Health Science

MARS Center for Cocoa Health Science is based at University of California – Davis Campus (which is near Sacramento). Ronald Krauss, one of the authors of Astrup’s paper is based at University of California – San Francisco campus.

MARS has contributed \$40 million to fund the institute.

“Mars and the University of California, Davis have a long history of collaborative cocoa flavanol research dating back to the 1990s.” ⁷

Between 2000 and 2021, the MARS institute has produced 157 articles extolling the benefits of chocolate and cocoa. ⁸

Since raw cocoa is bitter and distasteful to most people, manufacturers add sweeteners, oils and dairy to ensure it is palatable.



MARS acknowledged “there is a risk its cocoa research could lead to confusion about chocolate’s health benefits.” ***That is the intention.***

According to MARS, “chocolate should not be considered a health food. Chocolate is a treat and should be enjoyed as such, and in moderation.”

“Everyone knows” that chocolate is really healthy and good for you based on research such as this. ⁹

Summary of Astrup’s Paper

Arne Astrup and 17 colleagues published a paper **10**, *WHO draft guidelines on dietary saturated and trans fatty acids: Time for a new approach?* in 2019 that examined the question, *How robust is the evidence linking saturated fat to cardiovascular disease?*

The answer was “*very little*”.

This paper was enthusiastically embraced by the media and health professionals including a number of academics.

This booklet examines the validity of this claim.

The main points addressed in the Astrup's paper are listed below.

- Changes in lipoprotein profiles (such as the reduction of cholesterol and LDL cholesterol) do not translate into a reduction in cardiovascular events.
- The US dietary guidelines published in 1980, and international guidelines ever since, have focused on reducing intake of saturated fat at the expense of advocating healthy foods which according to the list at the end of the paper includes eggs, dark chocolate, cheese and meat.
- There is a great deal of variety of saturated fats. Some are much healthier than others. Only 3 types of saturated fat raise cholesterol.
- Trans fat, produced by the partial hydrogenation of vegetable oils, is the main contributor to avoidable cardiac events.
- The evidence linking saturated fat to heart disease is sparse.
- By avoiding eggs, dark chocolates, cheese and meat that contain a substantial amount of saturated fats, we are missing out on many essential nutrients.

Dietary Guidelines

Dietary Goals of the United States - McGovern Report

The first edition of the Dietary Goals of the United States (the McGovern Report) was released in February 1977. This document linked heart disease and food and caused such a tumult that major revisions were required before the second edition was released in December 1977.

As the report stated,

In the early 1900's almost 40 percent of our caloric intake came from fruit, vegetables and grain products. Today only as little more than 20 percent of these calories comes from these sources.

The dietary suggestions from the second edition were:

1. Increase consumption of fruits and vegetables and whole grains.
2. Decrease consumption of refined and other processed sugars and foods high in such sugars.
3. Decrease consumption of foods high in total fat, and partially replace saturated fats, whether obtained from animal or plant sources, with poly-unsaturated fats.
4. Decrease the consumption of animal fat, and choose meats, poultry and fish which will reduce saturated fat intake.
5. Except for young children, substitute low-fat and non-fat milk for whole milk, and low-fat dairy products for high fat dairy products.
6. Decrease consumption of butterfat, eggs and other high cholesterol sources.[...]
7. Decrease consumption of salt and foods high in salt content.

The first edition stated,

2. Decrease the consumption of meat and increase the consumption of poultry and fish, which was unacceptable to the beef industry.

The following note was included in the second edition.

Two industries – meat and egg producers – requested additional hearings to express their views. [...] In addition, the National Live Stock and Meat Board sent the Select Committee the names of 24 experts, “whose professional background and experience suggest

intimate knowledge of the fact, fallacies and controversy which surround the concepts or hypotheses of diet as a precursor to atherosclerosis and other of the degenerative diseases in America or elsewhere.”

George McGovern was the senator of South Dakota from 1963 to 1980. McGovern believed that he and five other senators from agricultural states lost seats in November 1980, partly as a result of this report. McGovern was not re-elected to office - any office - after the November 1980 senate elections. **11**

Recordings of the US Senate Select Committee on Nutrition hearings, chaired by Senator George McGovern show an unnamed scientist imploring that the guidelines be deferred - “that’s why I have pleaded in my report and will plead again orally here for more research on the problem before we make announcements to the American public.” The scientist was Robert (Bob) Olson, professor of medicine and chairman of biochemistry at St. Louis University and a consultant to the American Egg Board. **12**

As a member of the National Academy of Sciences, Olson co-authored a 1980 report *Toward Healthful Diets* **13** in response to the McGovern Report. According to this report:

The recent Surgeon General's report [of 1979] on healthy people has stated that the population of the United States has never been healthier.

The American food supply on the whole is nutritious and provides adequate quantities of nutrients to protect essentially all healthy Americans from deficiency diseases. The excellent state of health of the American people as documented in the Surgeon General's report could not have been achieved unless most people made wise food choices.

It was not that he disagreed with cholesterol being involved with heart disease. In a biography, *The Making of a Clinical Nutritionist 14*, Olson writes,

When dietary protein was reduced to 25 grams per day of vegetable protein, serum cholesterol fell. [...] I propose that the beta lipoproteins could be considered the agent of atherosclerosis.

Evidence Provided by Astrup's Article

Minnesota Coronary Survey

Reanalysis of the Minnesota Coronary Experiment (a double blind randomised controlled trial that tested whether replacing saturated fat with polyunsaturated fat reduced coronary heart disease and death) also supports the claim that serum cholesterol is not a valid surrogate biomarker for cardiovascular disease risk when making dietary changes.

The *Minnesota Coronary Survey 15* was a 4.5-year, double blind, randomized clinical trial that was conducted in six Minnesota state mental hospitals and one nursing home.

This was conducted during the years 1968-1973.

It involved 9,000 institutionalised men and women. The trial compared the effects of a 39% fat control diet with a 38% fat treatment diet with saturated fats being replaced by polyunsaturated fats. The trial was examining the dietary effects on serum cholesterol levels and the incidence of heart attacks, sudden deaths and all-cause mortality.

The following extract shows the amount of effort that was involved in making the control diet and experimental diet look and taste identical.

Procurement of suitable foods for the treatment diet, (with the desired polyunsaturated fat, which were yet palatable, stable, and

indistinguishable from the corresponding components of the control diet) presented a great challenge.

It was achieved through the cooperation of the study nutritionists, the hospital dietitians, manufacturers of food products, and the Food Inspection Division of the Minnesota Department of Agriculture. Products that proved particularly useful were filled milk and ice cream, a whole egg substitute, soft margarine, whipped topping, filled cheese, low fat ground beef with added vegetable oil, and filled sausage products.

Filled milk is milk that has been reconstituted with added oils, usually from vegetable sources.

A diet of 40% fat is not healthy, irrespective of any other components. The margarine has a high proportion of trans-fats. It takes a lot of imagination to believe that such a diet constitutes a healthy regime.

Diet Group	Total fat % calories	Sat fat % calories	Polyunsat fat % calories	Chol mg/d	Poly/Sat Ratio
Control	39.1	18.3	5.2	446.0	0.3
Treatment	37.8	9.2	14.7	166.0	1.6

The Astrup's paper refers to a 2016 paper **16** that claims a re-evaluation of the data from the 1968-1973 trial supports their view that serum cholesterol is not a valid indicator of heart disease. Both the control diet and experimental diets are so unhealthy it is difficult to draw such a conclusion.

Both diets certainly were not based on high levels of fruit, vegetables, whole grains, or beans and the experimental diet relied heavily on manufactured foods.

As we will show later, high levels of fat from any source (plant or animal) damages endothelial cells of arteries which is detrimental to our health.

It is fascinating that researchers find it necessary to re-examine a dietary trial from such an early period of nutritional research to discover apparent inconsistencies.

PURE Study

According to Astrup, the PURE study provided evidence that diets high in saturated fat were not associated with cardiovascular disease events.

The PURE study found that diets high in saturated fats were associated with higher concentrations of LDL cholesterol, but also higher concentrations of HDL cholesterol, lower concentrations of triglycerides, and a lower apolipoprotein B:apolipoprotein A ratio. **17** The study also found that diets high in saturated fat were not associated with cardiovascular events, except for a lower risk of stroke. **18**

Dr William Roberts is a leading cardiovascular pathologist. He is the current editor (at 2019) of the American Journal of Cardiology—a position he has held since 1982. He has published over 1,500 articles. His view is that the only relevant markers for heart disease is total cholesterol at less than 150 mg/dL (3.9 mmol/L) and LDL cholesterol at less than 60 mg/dL (1.5 mmol/L). He states that HDL cholesterol is largely irrelevant. **19**



The PURE Study is an observational study in 27 countries that examined 225,000 people. The study period is 20 years.

The purpose of the PURE study is to examine the impact of urbanisation on the development of risk factors such as physical activity, nutrition changes, obesity, high blood pressure, abnormal blood sugars, abnormal blood lipids and smoking on heart disease.

It is an observational study in 27 countries that examined 225,000 people. The study period is 20 years.

The purpose of the PURE study is to examine the impact of urbanisation on the development of risk factors such as physical activity, nutrition changes, obesity, high blood pressure, abnormal blood sugars, abnormal blood lipids and smoking on heart disease.

Participating countries in the study were Argentina, Bangladesh, Brazil, Canada, Chile, China, Colombia, Ecuador, India, Iran, Kazakhstan, Kyrgyzstan, Malaysia, Pakistan, Palestine, Peru, Philippines, Poland, Russia, Saudi Arabia, South Africa, Sweden, Tanzania, Turkey, United Arab Emirates, Uruguay, Zimbabwe. Very different countries with very different cultures and levels of development. It is difficult to make valid comparisons. **20**

The comparisons are with the lowest 20% of consumption with the highest 20% consumption. The results from this study showed:

The results from this study showed: **21**

- Higher carbohydrate intake increased the risk (128%) for total mortality.
- Higher carbohydrate intake did not increase the risk of heart disease.
- Higher intake of fats lowered the risk (77%) for total mortality.
- Higher intake of saturated fats lowered the risk (81%) for total mortality.
- Higher intake of polyunsaturated fat lowered the risk (80%) for total mortality.
- Higher intake of saturated fat lowered the risk (79%) for stroke.
- Total fat and saturated and unsaturated fats were **not** significantly associated with risk of heart disease.

However, other researchers examining the same data have found that,

Higher total fruit, vegetable, and legume intake was inversely associated with heart disease and total mortality.” 22

Some points to consider when evaluating this study.

- All carbohydrates are grouped together. No distinction is made between simple carbohydrates, added carbohydrates, starches or dietary fibre.
- Fats are separated into saturated, monounsaturated and polyunsaturated categories. However, trans fats, which have a high level of consumption in some Asian countries, were not recorded.
- Dietary data was self-reported which under-report food intake, particularly fat consumption. Dietary data was only collected once at the start of the study.
- Regional variations in countries were not considered.
- The role of poverty and undernourishment has not been adequately taken into account.

There is a very long list of sponsors including pharmaceutical companies – all anxious to provide medications especially since they can now claim that the link between diet and heart disease is unproven.

As David Katz commented, the real conclusion from the PURE Study is:

Very poor people with barely anything to eat get sick and die more often than affluent people with access to both ample diets, and hospitals. 23

The above concerns preclude the study from serious consideration.

PREDIMED Study

The PREDIMED Study is a Spanish study that Astrup used to show that cholesterol was not a valid indicator for heart disease.

The PREDIMED Trial [...] showed that LDL cholesterol concentrations is not a valid biomarker for alterations in cardiovascular disease caused by dietary changes.

The PREDIMED **24** study examined 7447 participants ranging from 55 to 80 years of age who were at high cardiovascular risk, but with no cardiovascular disease at enrollment, to one of three diets:

- a “Mediterranean Diet” supplemented with extra-virgin olive oil
- a “Mediterranean Diet” supplemented with mixed nut or
- control diet with advice to reduce dietary fat.

The “Mediterranean Diet” was the participants normal diet. For all three groups, the mean BMI at the start of the trial was 30 - that is, obese. The majority of the participants were receiving medications that conflicts with the claim that there was “no cardiovascular disease at enrollment”. 50% were receiving ACE inhibitors, 20% diuretics, 29% other anti-hypertensive agents, 40% statins, 20% antiplatelet therapy. This is not a full list of medications.

- Angiotensin-converting enzyme (ACE) inhibitors are a group of medications that dilate blood vessels and consequently lowers blood pressure and increase the flow of blood. Nitric oxide is produced by the endothelial cells to produce the same effect.
- Diuretics increase the amount of water and salt expelled as urine. They are most commonly used to treat high blood pressure.
- Other anti-hypertensive agents are used to treat high blood pressure.
- Statins are used to reduce the levels of cholesterol in the blood.
- Antiplatelet therapy drugs are used to decrease platelets from clotting. Platelets are involved in forming blood clots to prevent bleeding and are used to prevent stroke and heart attacks.

All participants received educational sessions and free provision of extra-virgin olive oil, mixed nuts or non-food gifts depending on group assignment.

Despite the fact that obesity is a major risk factor for cardiac disease, the average BMI at the end of the five year trial was not published. The change to medication use after five years was also omitted. The use of medications confounds and invalidates any results that may be due to dietary intervention.

After five years, the average absolute risk for a major cardiovascular event (heart attack, stroke, or death from cardiovascular causes) was 5.7% for the control diet. For the *Mediterranean Diet with Extra Virgin Olive Oil*, the average risk was 3.6% and 4.0% for the *Mediterranean Diet with Nuts*.

The relative decrease in the primary outcome for the *Olive Oil diet* was 37% and 34% for the *Nut diet* which may seem reassuring, it only resulted an absolute decrease in risk of 2.1% and 1.7% respectively.



Over 4.8 years of follow-up, metabolic syndrome developed in 50.0% of the participants who did not have the condition at baseline. The risk of developing metabolic syndrome did not differ between participants assigned to the control diet or to either the two Mediterranean diets. 25

Condition	Low-fat Diet		Med Diet + EVOO		Med Diet + Nuts	
	Baseline %	Final %	Baseline %	Final %	Baseline %	Final %
Metabolic syndrome	64.7	68.6	65.1	66.6	61.8	64.9
Central Obesity	75.3	75.0	74.4	74.1	69.5	70.9
High triglycerides	32.5	33.4	34.3	32.6	32.5	30.6
High blood pressure	94.7	95.4	93.5	95.4	93.8	94.8
High fasting serum glucose	66.3	71.9	65.6	68.9	64.5	68.9

Prevalence (%) of participants with metabolic syndrome and component conditions

After nearly 5 years of follow-up, all diets increased the markers of metabolic syndrome with the exception of triglycerides which was marginally reduced.

The average fat consumed for all three groups at the start of the trial was 40%. Since the participants were given free olive oil or free nuts, it is

unsurprising that the consumption of these items were increased, resulting in an increase of fat consumption at 12 months to 41% for the olive oil group and 43% for the nut group. The control group, the misnamed *Low-fat Diet*, reduced their fat consumption to 38%.

The average US fat consumption is 33%.



To summarise, 50% of the participants that did not have metabolic syndrome at the start of the trial, were afflicted at the end of the trial.

The only dietary change that the participants made was the addition of either olive oil or nuts to their normal diet - a diet that led them to be very overweight with the majority having metabolic syndrome and taking medications in the first place.

A lead researcher of the PREDIMED study was emailed asking if the medication use at the end of the trial was published. A response was received on the 28th August 2019, stating, in bold lettering, that “You are right. We have not published yet this information.” The same applies to the weight status. Given the large increase of consumption of both olive oil and nuts in the intervention diets, **26** it is highly likely that both the extra olive oil and nuts groups increased their weight and medication use. This was the experience in the *Lyon Diet-Heart Study*.

The participants were very unhealthy at the start of trial and were worse at the end. The change in medication use is not recorded so this confounds the results – it is not possible to determine if the results are a reflection of medication use or dietary interventions.

This is not an endorsement of the Mediterranean Diet - or at least the Mediterranean Diet as defined by the PREDIMED study.

Lyon Diet-Heart Study

The *Lyon Diet-Heart Study* is a French study, that was also used by Astrup, to show that cholesterol was not a valid indicator for heart disease.

Mediterranean-style diets were associated with a significant reduction in major cardiovascular disease events without any reduction in LDL cholesterol in the Lyon Diet Heart Study[]

The *Lyon Diet-Heart Study* was a “randomized, single-blind secondary prevention trial aimed at testing whether a Mediterranean-type diet, compared with a prudent Western-type diet, may reduce recurrence after a first myocardial infarction.”

The study consisted of 605 patients who had recovered from a myocardial infarction at a hospital in southern France. The experimental group emphasised “more bread, more root vegetables and green vegetables, more fish, less meat (beef, lamb and pork to be replaced with poultry), no day without fruit, and butter and cream to be replaced with margarine” which was high in alpha-linolenic acid (an omega-3 fatty acid). 27

At the end of the trial, the experimental group had 30% of the cardiac deaths of the control group, despite the fact that the average cholesterol measurements were similar for the two groups.

Source	Control		Experimental		Rate Change
	Number	Rate / 100	Number	Rate / 100	%
Cardiac Deaths	19	1.37	6	0.41	-68
Non-fatal Heart Attacks	25	2.70	8	0.83	-68
Non-cardiac Deaths	5	0.36	8	0.54	+60
All Cause Deaths	24	1.74	14	0.95	-42
Major secondary endpoints	46	4.96	13	1.35	-42
Minor secondary endpoints	90	9.71	68	7.04	-24
Total endpoints	180	18.74	95	9.63	-47

Lyon Diet-Heart Study – Comparison of Cardiac Outcomes

However, within the two cohorts, cholesterol did have a significant impact.

For each increase of 1 mmol/ L of total cholesterol increased the risk of recurrence by 20% to 30%. Epidemiological studies have consistently shown a positive correlation between plasma cholesterol levels and the incidence of (and mortality from) CHD in various populations. Thus, our population does not appear to be different from other low-risk populations. **28**

Given the extent of medication use in both groups, it is difficult (impossible) to determine the true effect of the dietary interventions.

The participants from both groups were overweight at the start of the study with an average weight of 74 kg and BMI of 25.8. At the end of the study, the average weight for both groups had increased by 1-2 kg.

Below is a comparison of medication use in the control group compared with the experimental group.

Anticoagulant agents (16.1%, 11.4%); Anti-platelet agents (69.7%, 75.8%), beta-blocking agents (47.3%, 47.5%); Calcium channel blockers (28.4%, 25.6%); ACE inhibitors (17.4%, 18.3%); and Lipid-lowering drugs (34.0%, 26.5%). Anti-platelet agents increased from 70% to 76% on their version of a “healthy Mediterranean-style” diet.

The use of anticoagulant and lipid-lowering (statins) medications were reduced and anti-platelet medication increased for the experimental group.

- Anticoagulant agents prevent blood from clotting. They perform the same function as antiplatelet therapy drugs but act in a different manner.
- Antiplatelet therapy drugs are used to decrease platelets from clotting. Platelets are involved in forming blood clots to prevent bleeding.
- Beta-blocking agents reduce blood pressure.
- Calcium channel blockers dilate blood vessels.
- Angiotensin-converting enzyme (ACE) inhibitors are a group of medications that dilate blood vessels. Nitric oxide is produced by the endothelial cells to produce the same effect.
- Statins are used to reduce the levels of cholesterol in the blood

On the experimental diet, the participants had not only increased their weight but their medication use was essentially unchanged. Whilst anticoagulant medication use decreased, anti-platelet medication use increased from 70% to 76%. The study was designed to improve heart health but lipid-lowering drug use was decreased by only 22% in 4 years.

The participants were overweight and unhealthy at the start of the trial and, whilst the experimental group did not do as badly as the control group, 31% were still afflicted with cardiac events during the four-year trial which is not a great result for a condition which is mostly preventable. **29**

The Role of Trans-Fats

Astrup considers trans-fats to be instrumental in cardiac mortality. Trans-fatty acids are made when unsaturated fats is partially converted into saturated fat during the manufacture of margarine. This is termed industrial trans-fats. Trans-fats are also found in animal fats such as meat and butter. Astrup advocates legislation to reduce the consumption of industrial fats.

Consensus exists on the health benefits of eliminating industrially produced trans fatty acids—that it will reduce incidence of cardiovascular disease and mortality.

Astrup believes the role of trans-fats to be much more important than saturated fats.

Astrup quotes a paper, *Effectiveness and cost effectiveness of cardiovascular disease prevention in whole populations: modelling study*. **30** written by Barton and colleagues to support this view.

Barton states that,

The widespread consumption of trans fat is considered [...] to have caused about 2700 deaths annually and loss of 570 000 life years in the UK every year.

The same paper states that,

[By] reducing the cardiovascular risk of the population by just 1% sustained over 10 years would prevent approximately 25 000 new cases of cardiovascular disease and 3500 deaths from cardiovascular disease.

Reducing population blood pressure levels or total cholesterol concentrations by 5% would result in correspondingly larger health gains. Annual equivalent savings would be approximately £100 million for blood pressure and £80 million for cholesterol.

These authors believed that small decreases to blood pressure and total cholesterol resulted in significant outcomes, a conclusion that is ignored in Astrup's article.



US government advisers say that that have decided not to set limits for trans-fats because it would be too hard for people to meet them.

According to the renowned Harvard nutritional epidemiologist, Eric Rimm,

If a limit for all trans-fats were to be set it should be zero. We can't tell people to stop eating all meat and all dairy products. Well, we could tell people to become vegetarians. If we were truly basing this only on science, we would, but it is a bit extreme. **31**

Heptadecanoic acid

Moreover, high plasma concentrations of the heptadecanoic acid (17:0) are associated with a reduced risk of coronary heart disease. Thus, saturated fatty acids cannot be viewed as one homogeneous group with regard to effects of diet on disease risk.

Astrup's article states "heptadecanoic acid in dairy have completely different physiological effects." The article cited **32** does ***not*** mention heptadecanoic acid by name or any other alternative nomenclature. Heptadecanoic acid is a very minor component of milk products and meat only.

A 2015 paper, written by researchers who wish to find a role for heptadecanoic and pentadecanoic acids in heart disease, state that heptadecanoic (17:0) and pentadecanoic (15:0) fatty acids - the main odd-chained saturated fatty acids in milk - can be utilised as a tentative markers for dairy fat intake. However, their low levels in milk fat (1.5%-2.5%) precludes their use in "any statistical analysis and therefore no correlations can be deduced". **33**

Data from 32,826 participants in the Nurses' Health Study was used to assess dairy fat intake to heart disease. The indicators of dairy fat in the blood and red blood cells included trans-fatty acids and pentadecanoic acid (15:0). This study showed that higher intake of dairy fat is associated with a greater risk heart disease. **34**

Egg consumption, CVD and type 2 diabetes

Benefits of Two Eggs per Day

Astrup claims that “two eggs a day has beneficial effects on cardiovascular disease biomarkers and improved glycaemic control in type 2 diabetes”.

A 2018 paper “*Egg consumption, cardiovascular diseases and type 2 diabetes*”, **35** is referenced to support this claim.

The conclusion of this paper is,

In patients with established CVD or T2D, ***up to seven eggs per week*** can safely be consumed ***only*** if special emphasis is placed on a healthy lifestyle.

Astrup's conclusion does not match the conclusion of this paper – and he is a co-author of this paper.



The DIABEGG Study

DIABEGG is an Australian study, that compared the effects of a high-egg diet with a low-egg diet over a 12 month period.

The high-egg diet participants consumed 2 eggs/day for six days a week with the low-egg diet consuming 2 egg/week for breakfast. To ensure an equivalent amount of protein, those on a low-egg diet added meat, chicken, fish, legumes or dairy.

There were no significant differences in fasting serum concentrations of LDL cholesterol, total cholesterol, triglycerides, or inflammation markers between the 2 groups from start of the weight-loss intervention at 3 months to the end of the study at 12 months.

Similarly, there were no significant differences in waist circumference, total body fat, fat-free mass, radial pulse rate or systolic blood pressure at the end of the study.

After 12 months on two equally unhealthy, high-protein, high-fat, high-animal based diets, the participants from both groups were still overweight and unhealthy.

After 12 months on their 2 egg / day diet, resulted in the following changes.

Criteria	Units	Baseline	12 month change	Change	Goal
Cholesterol	mm/L	5.0	-0.07	-1%	<= 4.2
C-Reactive Protein	mg/L	4.8	0.58	12%	<= 3.0
HbA1c	%	6.5	0.33	5%	<= 5.6
Systolic Blood Pressure	mmHg	134.7	-6.18	-5%	90-120

The C-Reactive Protein inflammation marker rose from its already elevated average as did the elevated HbA1c diabetes marker. The other changes are negligible.

It certainly does not warrant Astrup's claim that "random clinic trial data show that two eggs a day has beneficial effects on cardiovascular disease biomarkers".

The study was funded by a research grant from the Australian Egg Corporation.



Physicians' Health Study & SDA Studies

The *Physicians' Health Study* commenced in 1981. It consisted of a study of 22, 071 male doctors between 40 and 84 years of age in the U.S. **36**

The results from a 20-year follow-up showed those 7 or more eggs a week had a 31% increase in all-cause mortality compared with those consuming less than 1 egg per week. For diabetic physicians, the association was much higher with the increase in mortality slightly more than doubled. **37**



A British study followed 10,802 health-conscious men and women in the UK with an average follow-up period of 13.3 years. This study reported a 2.7 times increase in risk of death from heart disease with an egg consumption greater than 5 eggs per week compared with those who ate eggs less than once a week. **38**



A strong commitment to health has been a part of Adventist's tradition since its founding in the 1840s. There has been three large Adventist cohort studies in the United States and Canada. These studies have generated hundreds of papers, which give a valuable insight to diet and the implication for our health.

As the diet becomes more vegetarian, so the risk of diabetes is reduced. Note the comparison is with non-vegetarian Seventh-day Adventists who are much healthier than the average American. Also, adjustments are made for data that is not necessarily independent. **39**

Category	%	BMI	Type 2 diabetes %	Odd Ratio (*)
Vegan No red meat, fish, poultry, dairy, eggs	4.2	23.6	2.9	0.51
Lacto-ovo vegetarians Vegan with eggs and milk	31.6	25.7	3.2	0.54
Pesco vegetarians Vegan with fish, eggs and milk	11.4	26.3	4.8	0.70
Semi-vegetarians Red meat, poultry, fish, milk and eggs less than once a week and more than once a month	6.1	27.3	6.1	0.76
Non-vegetarians Red meat, poultry, fish, milk and eggs more than once a week	46.8	28.8	7.6	1.00

(*) After adjustment for age, sex, ethnicity, education, income, physical activity, television watching, sleep habits, alcohol use and BMI.

Chocolate consumption and cardiometabolic disorders

Astrup claims that,

Meta-analysis of observational evidence find dark chocolate consumption to be associated with a substantial reduction in risk of cardiovascular disease.

The Astrup's paper references two meta-analysis studies that relate chocolate consumption and cardiometabolic disorders.

The first is a 2011 Colombian study that examined 7 studies, after evaluating 4567 references. There were no random clinical trials selected. This study showed that high chocolate consumption was associated with about a 37% decrease in the risk of cardiometabolic disorders.

The second is a 2016 Swedish study that examined 6 studies. Three studies were included in both meta-analysis. The conclusion was that, "the overall relative risk for the highest versus lowest category of

chocolate consumption was 90%,” and that, “chocolate consumption is associated with lower risk of heart disease”.

All studies were self-reported, and reported chocolate consumption in a different manner. Even two studies that had the same author reported chocolate consumption differently.

Some examples of the categories used are listed below.

- two categories (less than once a week, at least once a week);
- three categories (less than once a month, less than once a week, at least once a week);
- thirds of cacao intake (lowest third, middle third, highest third);
- four categories (never, less than once a month, less than once a week, at least once a week);
- fourths of chocolate consumption;
- four categories (none, 1–3/month, 1–4/week, and > 5/week);
- five categories (none, 1–3/month, 1–2/week, 3–6/week, at least once a day)



The comparison in each study is being made with the lowest level of self-reported chocolate consumption and the highest level in each study. This results in very different comparisons being made.

Number Categories	Lowest Category	Highest Category
2	less than 1 per week	at least 1 per week
3	less than 1 per month	at least 1 per week
3	lowest third	highest third
4	lowest quarter	highest quarter
4	none	more than 5 per week
5	none	at least 1 per day

The conclusion of these flawed and dubious meta-analysis studies is that the highest category of chocolate consumption has a reduction of risk of heart disease compared with the lowest category of chocolate consumption. Even the results are true, it is still fanciful to report that,

Dark chocolate consumption is associated with a substantial reduction in risk of cardiovascular disease.

as claimed by Astrup and colleagues.



Whilst Astrup is keen to include Larsson’s meta-analysis of chocolate studies, he has not included Larsson’s meta-analysis of meat and diary studies.

Findings [...] showed a positive association between the consumption of red meat, particularly processed meat, and all-cause mortality. These results add to and extend the evidence that high red meat consumption may have adverse health consequences. **40**

In conclusion, results of this meta-analysis provide some support for the hypothesis that high intakes of milk and lactose may be associated with an increased risk of ovarian cancer. **41**

The Misuse of Meta-analysis

Eysenck wrote **42** that many studies “mixed apples and oranges—and sometimes “apples, lice, and killer whales”—yielding meaningless conclusions.”

A paper, *The Misuse of Meta-analysis in Nutrition Research*, **43** co-authored by epidemiologists Walter Willett and Eric Ding from Harvard School of Public Health and Neal Barnard discusses the problems of meta-analysis.

In addition to the problems associated with self-reporting food consumption, this paper comments on the difficulties of reporting “dietary intakes [in] intertiles, quartiles, quintiles, or other groupings of their own choosing” and that “participant-level data” may be difficult to obtain. These limitations are present in the chocolate studies.

A paper **44** that is referenced by Astrup to conclude that,

Total red meat intake of ≥ 0.5 servings/d does not negatively influence cardiovascular disease risk factors.

is specifically mentioned as an example of a poor meta-analysis study.

The Barnard, Willett and Ding paper states,

Controversial conclusions from meta-analyses in nutrition are of tremendous interest to the public and can influence policies on diet and health. When the results of meta-analyses are the product of faulty methods, they can be misleading and can also be exploited by economic interests seeking to counteract unflattering scientific findings about commercial products.

The paper continues with,

The food industry is well aware of the power of science-driven headlines and has invested in meta-analyses. In the process, nutritional science may be adversely affected.

Related Articles

Arne Astrup - Where does the evidence stand in 2010?

Arne Astrup was the lead author a very similar article, *The role of reducing intakes of saturated fat in the prevention of cardiovascular disease, Where does the evidence stand in 2010?*⁴⁵

A symposium brought together all 17 authors at The University of Copenhagen, Denmark in May 2010. This symposium was supported by unrestricted grants from:

- The Beef Checkoff (USA)
- CNIEL - (French Dairy Industry Organisation)
- The Danish Agriculture & Food Council
- Dairy Australia
- The Dairy Council for Great Britain
- The Dairy Council of California
- The Dairy Farmers of Canada
- The Global Dairy Platform
- Milchindustrie-Verband (German Dairy Industry Association)
- The National Dairy Council (USA)
- Svensk Mjolk (Swedish Milk)

There are a number of common authors with Astrup's latest paper: Arne Astrup, Frans Kok, Ronald Krauss, Jean-Michel Lecerf, Philippe Legrand.

One of the co-authors of this paper, Tom Sanders,

- is a member of the Scientific Advisory Panel of the International Dairy Platform
- a former chair of the Global Nutrition Advisory Panel of Cadbury.
- receives research funding mainly from the UK Food Standards Agency but his division is also in receipt of funding or materials in

kind from several food and pharmaceutical companies, notably Tate & Lyle, which donated £4.5 million.

Tate & Lyle is a food manufacturer producing Beverages, Dairy Products and Soups, Sauces and Dressings.

Nina Teicholz - US dietary guidelines: is it scientific?

On 23 September, 2015, another BMJ article was published by Nina Teicholz, *The scientific report guiding the US dietary guidelines: is it scientific?* **46**

It asks the question,

So why does the expert advice underpinning US government dietary guidelines not take account of all the relevant scientific evidence?

The author is wanting information on the benefits of saturated fats, animal products, and low-carbohydrate diets to be included in the guidelines.

The next day, The BMJ issues this press release stating,

The expert report underpinning the latest dietary guidelines for Americans fails to reflect much relevant scientific literature in its reviews of crucial topics and therefore risks giving a misleading picture, an investigation by The BMJ has found.

The press release failed to mention that nature of the BMJ investigation, the name of the expert report or the name of the committee that produced the report. The expert report is the *Scientific Report of the 2015 Dietary Guidelines Advisory Committee*. **47**

The “*BMJ investigation*” was an article written by Nina Teicholz in response to the above report. ***It was not a BMJ investigation.*** Why is The BMJ press release stating that they, The BMJ, performed an investigation when it is clear that this is not the case?

At the end of the article in The BMJ, written by Teicholz, it clearly states:

This article was fully funded with a grant from the Laura and John Arnold Foundation (www.arnoldfoundation.org). The analysis was conducted independently, and the report reflects the views of the author and not necessarily those of the foundation.

An email was sent to The BMJ and the following response on 29 June 2017 at 20:04.

The editorial team have advised that this article was fully funded with a grant from the Laura and John Arnold Foundation. Therefore, BMJ would have used the grant to cover all expenses for this publication.

The Laura and John Arnold Foundation provided the seed funding for NuSI, the organisation founded by Gary Taubes and Peter Attia to promote low-carbohydrate nutritional science. **48**

Siri-Tarino & Krauss – The association of saturated fat with heart disease

A paper written by Siri-Tarino and Krauss **49** and colleagues has been frequently cited as evidence of a lack of association of saturated fat intake and heart disease.

This paper has been examined in some detail in an article published in the Australian Medical Journal in 2015. **50** Below is a summary of the review.

In this meta-analysis the authors found no significant association between saturated fat consumption and the risk of CHD. It is remarkable that this unconvincing review stimulated extensive interest in the media, whereas a large pooled analysis by experts from 10 universities, published in the same journal a year earlier, had not attracted the same

attention. The 2009 article, **51** by Jakobsen and colleagues, had reported that reducing saturated fat in the diet and replacing it with polyunsaturated fatty acids was associated with a significantly reduced risk of cardiac heart disease.

Siri-Tarino and Krauss did not consider most of the prospective studies in the Jakobsen paper that reported dietary substitution of saturated fats by polyunsaturated fats.

In several studies, participants were asked to recall what they had eaten during a single 24-hour period, an approach that is inadequate for assessing long-term dietary history.

Women's Health Initiative

The *Women's Health Initiative* was not included in Astrup's paper but is frequently raised as failing to find an association with diet and heart disease. Krauss and Siri-Tarino are among those who raise this concern.

52 53

The *Women's Health Initiative* is a US study involving 161,808 women aged 50-79. It investigated hormone therapy, dietary patterns, calcium, and vitamin D supplementation and their effects on the prevention of heart disease, cancer, and osteoporotic fractures.

The Dietary Modification trial evaluated the effect of a low-fat and high-fruit, vegetable-and-grain diet on the prevention of breast and colorectal cancers, and coronary heart disease in post-menopausal women. The participants followed either their usual eating pattern or a low-fat dietary pattern. The women were randomly assigned to the control group or intervention group. The women self-reported their diets. According to the study, the intervention consisted of:

Intensive behavior modification in group and individual sessions designed to reduce total fat intake to 20% of calories and increase intakes of vegetables/ fruits to 5 servings/ d and grains to at least 6

servings/ d. The comparison group received diet-related education materials.

This was achieved by holding 18 group sessions in the first year and quarterly maintenance sessions afterwards for the intervention group. It could be disputed that this constitutes intensive behavior modification. The widely-reported conclusion from this study informed readers that:

Over a mean of 8.1 years, a dietary intervention that reduced total fat intake and increased intakes of vegetables, fruits, and grains did not significantly reduce the risk of CHD, stroke, or CVD in post-menopausal women and achieved only modest effects on CVD risk.

Whilst the conclusion states that the mean period for the participants in the study was 8.1 years, the data shows changes at years 3 and 6.

Risk Factor	Baseline Mean		Year 3 Mean		Change at year 3	
	Int.	Comp.	Int.	Comp.	Int.	Comp.
Weight, kg	76.8	76.7	75.7	76.7	-0.7	0.6
Body Mass Index	29.1	29.1	28.8	29.2	-0.2	0.3
Waist, cm	89.0	89.0	88.2	89.3	-0.4	0.5
Blood Pressure, systolic, mmHg	127.5	127.9	125.1	125.7	-2.2	-2.1
Cholesterol, mg/dL	224.0	224.2	214.1	216.6	-10.2	-6.9

Differences between the Mean Changes in Cardiovascular Disease Risk Factors from Baseline to Year 3 in the Intervention Group and the Comparison Group

Dietary Intakes	Baseline Mean		Year 6 Mean		Year 6 Diff	
	Int.	Comp.	Int.	Comp.	Int.	Comp.
Total energy, kcal/d	1790.2	1789.4	1431.8	1546.2	-358.4	-243.2
Total fat - % energy	37.8	37.8	28.8	37.0	-9	-0.8
Saturated fat - % energy	12.7	12.7	9.5	12.4	-3.2	-0.3
P/S ratio	0.6	0.6	0.7	0.6	0.1	0
Total trans fat - % energy	2.7	2.8	1.8	2.4	-0.9	-0.4
Protein - % energy	16.5	16.4	17.7	17.1	1.2	0.7
Carbohydrate - % energy	45.6	45.6	53.9	45.9	8.3	0.3
Dietary fibre – g/d	15.4	15.4	16.9	14.4	1.5	-1
Cholesterol – mg/d	260.5	260.0	193.6	243.5	-66.9	-16.5
Vegetables & fruits – serv/d	3.6	3.6	4.9	3.8	1.3	0.2
Grains – servings/d	4.7	4.8	4.3	3.8	-0.4	-1
Whole Grains – serv/d	1.1	1.1	1.2	1.0	0.1	-0.1
Soy – servings/d	0.1	0.1	0.3	0.2	0.2	0.1
Nuts- servings/d	1.5	1.5	1.0	1.8	-0.5	0.3
Fish – servings/wk	1.9	1.9	2.0	2.0	0.1	0.1

Mean Baseline and Follow-up Nutrient Intakes at 6 years

An examination of the tables reveal the following:

- Instead of comparing the differences in the control group and the experimental group, it is more productive to examine the changes that each group made – which was not very much.
- There was very little change in both the control group and intervention group in the risk factors: body mass index; waist circumference; cholesterol; triglycerides; insulin resistance; and serum carotenoids. On average, the women were very overweight at the start of the study and were still overweight at the 3-year point, with an average weight loss of 1.29 kg. Their weight was not reported at the 6-year period.
- If the participants really did reduce the energy consumption by 20% then it would be expected that the weight loss would be much greater than indicated.
- The total fat consumption reduced from 37.8% to 28.8%— a 33% reduction. However, a diet obtaining 28.8% of energy from fat cannot be considered a low-fat diet. The stated goal of the study was

to reduce that fat to 20% of the calories so that goal was not achieved.

- The amount of saturated fat consumed by the intervention group at 6 years (9.5%) is still higher than the recommended 8%.
- The average dietary fibre intake was 16.9 g after 6 years, which is significantly below the recommendation of 25-30 g/ day.
- The goal of the study was to increase fruit and vegetable consumption to 5 servings per day. The achieved average was only 4.9 servings per day
- The goal was to increase the amount of grain consumption to 6 servings per day. The amount of grains consumed in the intervention group was reduced— not increased.
- The dietary intake was based on self-reporting which has a tendency to be unreliable. Participants are inclined to report findings that support the perceived goals of the researchers.
- The goals of the study are dietary goals for individuals. Ideally, everyone should be reaching these goals. Even if the group average reached the stated goal, there would still be a significant number that did not.

One of the conclusions of this large study was, “that more focused diet and lifestyle interventions may be needed to improve risk factors and reduce CVD risk.”

Given that there was so little change in the diet of the intervention group over the six years then it is not surprising that the results did not show a reduction in the risk of heart disease and stroke.

For any lifestyle change, participants and their families need to be committed to the concept. Randomly assigning participants to a particular group is not conducive to a positive outcome. Do we really need a random trial that lasts for a number of years, wait for the results to be analysed and published to validate the hypothesis that diet is an important component of our health?

Evidence Relating Diet and Cardiovascular Disease

Seven Countries Study

In 1947, Keys commenced the *Minnesota Business and Professional Men Study* to determine why apparently healthy middle-age men were dying from heart attacks. A number of variables were examined, with serum cholesterol being the most significant variable. **54**

Keys performed studies with his wife, Margaret, in Naples, Rome and Madrid in 1952. **55**

In 1955, Brian Bronte-Stewart, John Block (professor of medicine at University of Cape Town), Ancel and Margaret Keys and colleagues published a paper examining serum cholesterol, diet, income and cardiovascular mortality in Europeans, “Colored” and Bantu groups in Cape Town. **56**

Population	Cholesterol (mg/dL)	Cholesterol (mmol/L)
Bantu	166	4.3
Colored (Asian)	204	5.3
White	234	6.1

Serum cholesterol in healthy subjects from three Cape Town communities (1955)

Heart disease for Europeans was more than twice that of Cape Coloured and among Bantu it was “exceedingly rare as a cause of death”. This was the first study to show that the increase in LDL cholesterol was related to the consumption of animal fats.



In 1958, Keys and his colleagues published a paper examining serum cholesterol, diet and cardiovascular disease in Japanese living in Japan, Hawaii and Los Angeles. In Japan, “heart disease is rare, in Hawaii, where it is fairly common but less so than among local Caucasians, and in California, where the local Japanese are similar to the local

Caucasians in regard to the frequency of the disease. In middle age, coronary heart disease is at least 10 times as common in the United States as in Japan.” 57



Surveys were carried out in 16 regions of 7 countries between 1958-1970 in populations of men aged 40-59. Follow-up surveys were continued until the 1990s. Most of the areas were stable, rural and had wide contrasts in diet. Nearly 13,000 men participated, 95% of the eligible population. Women were excluded because cardiac disease was much less common and because of the invasive nature of the physical examinations.

15 local collaborators performed the surveys. 58

The study areas were:

- US railway employees in the mid-west and northwest
- Two contrasting regions in east and south-west Finland
- Zutphen in the Netherlands
- Crevalcore in northern Italy, Montegiorgio which is more “Mediterranean” and a railway employee group from Rome
- five areas in the former Yugoslavia (two in Croatia, and three in Serbia)
- two areas in Greece (Crete, Corfu)
- two contrasting areas in southern Japan, a rural and a fishing community

18 articles by Keys and his colleagues were published in 1970 as a supplement to the journal *Circulation* 41 (4S1) which unfortunately is no longer available.

The study was,

The first to explore associations among diet, risk, and disease in contrasting populations (ecologic correlations). Central chemical analysis of foods consumed among randomly selected families in

each area, plus diet-recall measures in all the men, allowed an effective test of the dietary hypothesis. The study was unique for its time, in standardization of measurements of diet, risk factors, and disease; training its survey teams; and central, blindfold coding and analysis of data.

This documented the study program and the five year results.

In the first paper in this supplement, *I. The Study Program and Objectives*, 59 Keys clearly stated the reasons for embarking on the Seven Countries Program.

Epidemiological studies alone can rarely if ever produce final proof of a causal sequence, particularly in the case of a condition such as coronary heart disease in which there is no single cause but several major influences that promote or retard the development of the disease. If some of those influences can be identified, however, and factors that alter them discovered, at least some directions for preventive efforts would be indicated.

Ancel Keys wrote *Seven Countries: A Multivariate Analysis of Death and Coronary Heart Disease*, published in 1980, a 380-page book, which documented the results of the 10-year follow-up.

There was a significant correlation of 84% between the 10-year incidence of coronary deaths, and the percentage of saturated fat in the diet. The relationship between the 10-year incidence of coronary deaths, and the percentage of total fat in the diet is not nearly as significant, the correlation being 50%.

Note the Keys used the word partly in his overview of the conclusions following the ten-year follow-up:

The differences found in the Seven Countries Study were *partly* explained by differences in the blood pressure, serum cholesterol, and the typical diets of the cohorts.



Keys and his wife Margaret wrote three books extolling the virtues of the Mediterranean diet: *Eat Well and Stay Well* (1959), *The Benevolent Bean* (1967); and *How to eat well and stay well the Mediterranean Way* (1975). **60 61 62**

Keys based “our” version of the Mediterranean Diet on the diets of Greece, southern Italy and the Mediterranean coasts of Spain and France of the 1960s. This is how Keys described the diet of southern Italy in the 1960s.

Homemade minestrone; pasta in endless variety always freshly cooked, served with tomato sauce and a sprinkle of cheese, only occasionally enriched with some bits of meat, or served with a little local sea food without any cheese; a hearty dish of beans and short lengths of macaroni (pasta e fagioli); lots of bread never more than a few hours from the oven and never served with any kind of spread; great quantities of fresh vegetables; a modest portion of meat or fish perhaps twice a week; wine [...]; always fresh fruits for desert. **63**

The heart of what we now consider the Mediterranean diet is mainly vegetarian [or lactovegetarian]: pasta in many forms, leaves sprinkled with olive oil, all kinds of vegetables in season, and often cheese, all finished off with fruit, and frequently washed down with wine. I say “leaves.” Near our second home in southern Italy, all kinds of leaves are an important part of the everyday diet. There are many kinds of lettuce, spinach, Swiss chard, purslane, and plants I cannot identify with an English name such as lettuga, barbabietole, scarola, and rape. **64**

Differences in coronary mortality in 40 Countries

Artaud-Wild et al (1993), using data from 40 countries, **65** showed a strong correlation of 76% with the Cholesterol-Saturated Fat Index (CSI) **66** per 1000 kcalories per day with heart disease in men aged 55 to 64 years. Even though Artaud-Wild is the lead author of this paper, it is known as the Connor study with William and Sonja Connor being two of the contributors. **67**

However, France and Finland were outliers in this correlation with Finland having a higher than expected death rate and France a lower rate.

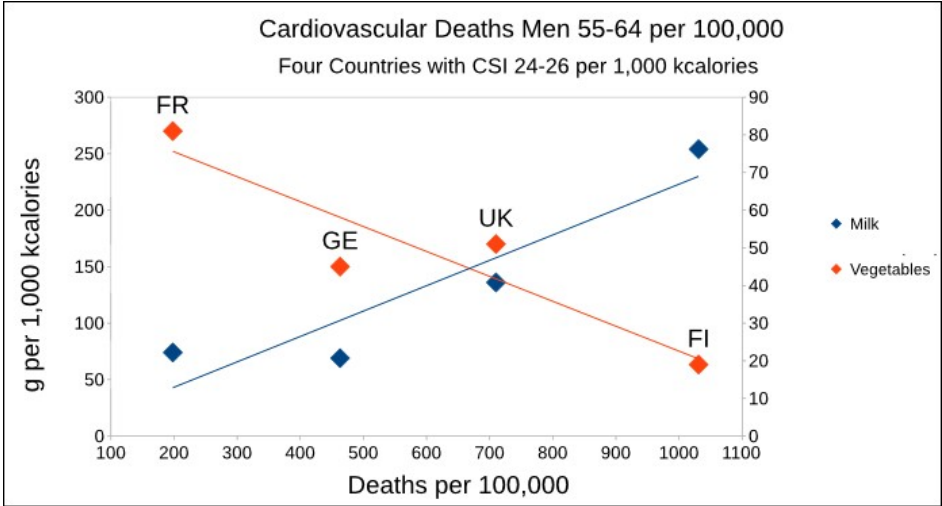
The relationship with heart disease and milk intake showed the same correlation to the CSI but France and Finland were no longer outliers.

The Finnish population consumes 3.5 times more milk than the French, and the French consume 4 times more vegetables, measured in grams per 1000 kcalories. The French also consume less food. Note that the items are measured per 1000 kcalories. The total amount consumed during the day is more significant.

Food Item	Units	France	West Germany	United Kingdom	Finland	Finland / France
CHD Mortality	per 100,000	198	463	710	1031	5.2
CSI	CSI/1000 kcal	24	24	24	26	1.1
Milk	g/1000 kcal	74	69	136	254	3.4
Vegetable Oils	g/1000 kcal	8	4	5	1	0.13
Vegetables	g/1000 kcal	81	45	51	19	0.23

Food Intakes of Countries with Similar Cholesterol-Saturated Fat Intake

Whilst France, West Germany, the United Kingdom and Finland have similar CSI values (24-26), it is the differences in milk consumption and vegetable consumption account for the CHD mortality rate.



This study showed strong correlations with heart disease and a number of dietary components.

Food item	Units	Correlation
Calories from animal foods	Calories	79%
Cholesterol Saturated Fat Index	CSI / 1000 kcal	78%
Saturated Fat	% kcal	77%
Milk	g / 1000 kcal	76%
Cholesterol	mg / 1000 kcal	69%
Calories from vegetable foods	Calories	-80%
Starch	g / 1000 kcal	-69%

Correlations with heart disease mortality and food components

The conclusions of the Connor study are:

The country in which people also consume more plant foods, including small amounts of liquid vegetable oils, and more vegetables (more antioxidants) had lower rates of CHD mortality” and that “diets high in cereals, legumes, and vegetables have been consistently associated with low plasma cholesterol levels, and a low incidence of CHD.

The Connor Study dismisses the claims that the French or Finns are different from other countries when considering the role of diet and its impact on heart disease.

French Regional Differences

For many countries, speaking of one national diet is meaningless. There are strong regional variations in diet and disease patterns in France. A north-south-east gradient exists for all-cause mortality, cardiovascular mortality, hypertension, obesity and high lipids. **68**

A study involving French women born between 1925 and 1950 showed that the north has a greater consumption of: fat products, butter, margarine, potatoes, processed meat, alcohol, coffee and saturated fats; and has a lower consumption of fibre than the rest of France. **69**

The French Paradox

“Everyone knows” about the French Paradox – that is, the French consume lots of saturated fat in the form of meat, butter, cheese and eggs and yet have a low risk of heart disease. This proves that the health advice regarding the role of fats and saturated fats in causing heart disease is wrong. **70**

The French Paradox has only been with us for a short period of time but it quickly resonated with the general population – we no longer need to be concerned about the amount of meat, butter, cheese and eggs that we consume.

In 1992, when the Frenchmen, Serge Renaud and Michael de Lorgeril published the article *Wine, alcohol, platelets, and the French paradox for coronary heart disease* that propelled the concept of the French Paradox onto a receptive public. It was not the first time that the phrase was used but *The Lancet* gave the phrase credibility.

The article's conclusion was:

In most countries, high intake of saturated fat is positively related to high mortality from coronary heart disease (CHD).

However, the situation in France is paradoxical in that there is high intake of saturated fat but low mortality from CHD. This paradox may be attributable in part to high wine consumption.

Epidemiological studies indicate that consumption of alcohol at the level of intake in France (20-30 g per day) can reduce risk of CHD by at least 40%.

In 2008, the journal, *Dialogues in Cardiovascular Medicine*, devoted a 76 page issue addressing the history and myths of the French Paradox.
71

The conclusion of this investigation is:

The clear conclusion, driven by the facts as summarised by Pierre Ducimetière, is that the rates of CHD are not so low in France, animal fat intake is not so high, and the diet-heart concept is not so unique that the existence of a “French paradox” can be sustained, except for satisfying cultural fantasy or for wine enthusiasm and marketing.

Thus, the real paradox is why the French paradox continues to exist as a concept, when it should be replaced by the less mystifying view, namely, “the more Mediterranean, the better”.

Interventional Studies

Cornelius de Langen

Cornelius de Langen worked as a doctor in the Dutch East Indies from 1916-1922. He linked diet, serum cholesterol and heart disease by comparing diets of native Javanese and Europeans. He also noted low cholesterol content of bile and the rarity of gallstone in Javanese. He performed possibly the first intervention trial relating to diet and serum cholesterol. Five Javanese men were fed a diet rich in eggs, butter and meat for three months. Their mean serum cholesterol rose 30% from 3.3 mmol/L (128 mg/dL). **72**

Dietary Influence on Insulin Resistance - Sweeney

The Astrup's article claims that,

Two eggs a day has beneficial effects on cardiovascular disease biomarkers and improved glycaemic control in type 2 diabetes.

It has been known since at least the 1920s that high fat and high protein diets contribute to type 2 diabetes.

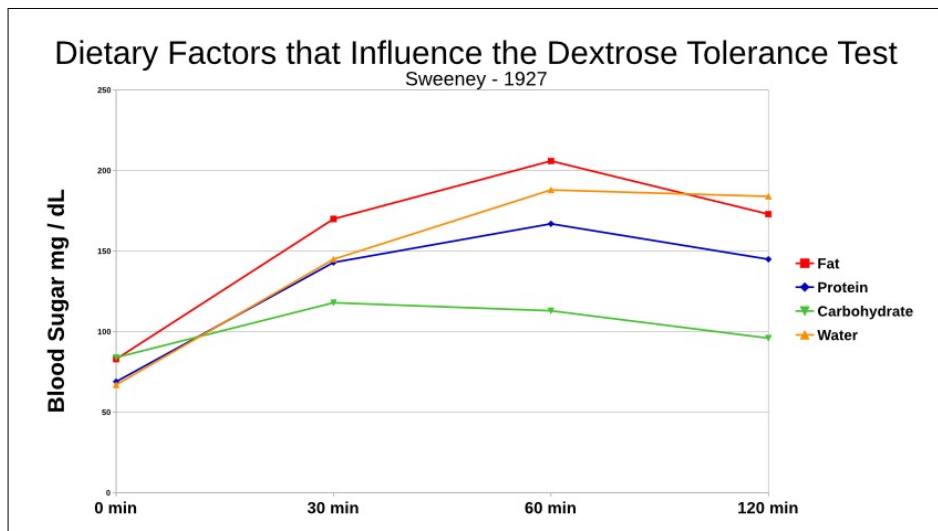
Sweeney assigned healthy, young medical students into four dietary groups: **73**

- high-carbohydrate diet consisting of sugar, candy, syrup, baked potatoes, bananas, and oatmeal, rice, and white bread
- high-fat diet consisting of olive oil, butter, mayonnaise, egg-yolks, and cream
- high-protein diet consisting of lean meat, lean fish, and egg-whites
- the fourth group was placed on a fasting regime

The students were fed their diets for two days and a glucose tolerance test was performed on the morning of the third day.

After only two days on their improbable, experimental diets, the only group showing a normal, healthy response to the glucose tolerance test

was the high-carbohydrate group. The protein group had slightly impaired glucose tolerance whilst the high-fat and starvation diets showed a marked decrease in their tolerance for sugar.



Sir Harold Himsworth (1905-1993)

Sir Harold Himsworth (1905–93) was a renowned medical doctor and researcher. He was appointed Professor of Medicine at the University of London in 1939. He is best known for his work on diabetes although he had many other interests including the effects of radiation, tropical medicine and epidemiology. **74 75**

Himsworth presented a paper in 1935,

showing the different diets eaten by different races, nations and social classes throughout the world and a close correlation has been demonstrated between dietary preference and the incidence of diabetes mellitus. [...] A high proportion of carbohydrate and low proportion of fat were found in all cases to be associated with low diabetic incidence, whilst a low proportion of carbohydrate and a high proportion of fat were associated with a high incidence. **76**

Himsworth's conclusions after a lifetime of diabetic experimental work, research and study was:

It is now established that the sugar tolerance is impaired by starvation or the taking of diets with a high content of fat, whilst it is improved by taking diets containing an excess of carbohydrate.

77

and

In comparison with the diet of normal subjects, contained the same amount of protein, a diminished amount of carbohydrate and an increased amount of fat. It is pointed out that such a diet impairs sugar tolerance and sensitivity to insulin in nondiabetic subjects, and would favour the appearance of diabetes in the potential diabetic. 78

This is in direct contrast with the popular views that high intake of carbohydrates are responsible for the alarming rise of diabetes. Note that this does not give approval for the high consumption of sugar common in modern diets.

North Karelia Project

The Seven Countries Study highlighted the high death rate, particularly from heart disease, in North Karelia and Finland. North Karelia is an inland region in Eastern Finland that borders Russia. The North Karelia Project is documented in a 300-page document produced by Finland's National Institute for Health and Welfare (THL), in collaboration with the North Karelia Project Foundation. 79

In 1973, Finland had a highest country death rate for men from cardiac heart disease and North Karelia had the highest rate in Finland. The difference in mortality rates between East and West Finland had been occurring since the nineteenth century. In the east, prior to World War II, men were often lumberjacks. Diets included game from hunting, picking berries and fishing. Accidents were a health issue as well as tuberculosis

and other infectious diseases. After the war, veterans were given small plots of land to farm pigs and cows. Dairy became an important part of the economy and diet.

As a direct result of the Seven Countries Study, the North Karelia Project, was instigated in 1971. Following its success, the project was expanded to include all of Finland. Programs centred around anti-smoking, cholesterol lowering nutrition, blood pressure lowering—emphasising non-pharmacological interventions, weight reduction and physical and social activities.

Many concerns were expressed over the impact of the dietary changes to the economy. Growing berries as a replacement for dairy was considered as a possibility. Red and black currants, strawberries and the wild berries growing in the forest areas was a viable opportunity. The *Berry Project* was conceived in 1985. Local berry consumption has risen with farmers switching from dairy to berry production.

By 2007, the heart disease death rate for men dropped by 80%. Saturated fat intake decreased from 22% of dietary energy intake to 13% and total fat from 38% to 31–32%. ***Over the period from 1971 to 2006, life expectancy at birth rose 8.2 years for males and 7.0 years for females.***

Although mortality has declined significantly, there is still room for considerable improvement. Smoking rates are still high: in North Karelia - 52% of men were smokers in 1972 and 31% in 2007.

Despite the significant reduction in fat consumption, consumption of fat is relatively high.

Comparisons of Vegan Diet with ADA diet

David Jenkins, the Toronto-based researcher who created the glycaemic index and Neal Barnard are amongst the co-authors of a trial studying the impact of vegan diets on the management of type 2 diabetes. **80 81**

Results were evaluated at 22 weeks and 74 weeks. The results below are from 22 weeks because these results distinguish between those participants that did not reduce their medication so it does not confound the results.

Nine vegan (completion rate 82%) and seven (completion rate 86%) from the ADA diet group did not complete the 74 week program, which is much higher than the completions rates for studies comparing high-fat, low-carbohydrate diets with “low-fat” diets.

Note that 16 of the 49 vegan-group participants did not strictly adhere to their diet. Their cholesterol intake was reduced by 77% from an average of 159 mg/day. The ADA group increased their intake by 1% from an average 168 mg/day. A vegan diet contains no cholesterol.

The total energy intake was reduced by the same amount for both groups (23-24%).

Food Item	Vegan			ADA		
	Start	74 weeks	% Δ	Start	74 weeks	% Δ
Energy (kcalories)	1798	1366	-24%	1840	1422	-23%
Fat (% energy)	36	22	-39%	35	34	-3%
Saturated Fat (% energy)	12	5	-56%	11	10	-8%
Cholesterol (mg/1000 kcalories)	159	36	-77%	168	170	1%
Carbohydrate (% energy)	48	66	39%	46	47	0%
Protein (% energy)	17	15	-13%	19	21	11%
Fibre (g / 1000 kcalories)	11	22	100%	11	13	22%

The plant-based diet outperformed that ADA diet and showed a significant improvement in all markers measured over the first 22 weeks of the trial. The first 22 weeks distinguished between those who reduced their medication and those who did not. This more relevant as it removes the confounding effects of the medication.

Criteria	Vegan			ADA		
	Start	End	% change	Start	End	% change
% participants that reduced cholesterol medications	-	-	20%	-	-	18%
% participants that reduced diabetic medications	-	-	51%	-	-	34%
Weight (kg)	97.0	91.1	-6%	35.9	95.0	-4%
HbA1C	8.00	7.10	-13%	7.90	7.40	-8%
HbA1C (Exc those who reduced medication)	8.07	6.84	-15%	7.88	7.50	-5%
Total cholesterol	4.84	4.13	-15%	5.15	4.52	-12%
Total cholesterol (Exc those who reduced medication)	4.93	4.06	-18%	5.05	4.56	-10%
LDL cholesterol	2.70	2.28	-16%	3.07	2.67	-13%
LDL cholesterol (Exc those who reduced medication)	2.78	2.19	-21%	2.99	2.71	-9%
Urinary albumin (mg/24 h)	33.0	14.6	-56%	55.0	43.7	-21%

Observational Studies

In 1990s, Finland had the highest incidence of diabetes and cow's milk consumption in the world. In Finland, researchers compared levels of incompletely digested cow's milk protein (Bovine Serum Albumin – BSA) in 142 diabetic children. Levels of IgG anti-BSA antibodies were higher than 3.55 RFUs (relative fluorescence units) for the 142 diabetic children whilst each non-diabetic child in the control group of 79 children had levels of less than 3.55. **82**

There was no overlap of the levels between the two groups of children. All children with diabetes had a higher level of the antibodies (which can only occur from consuming cow's milk) than the group without diabetes.

Antibody	Normal Children			Diabetic Children			p
	Mean	Min	Max	Mean	Min	Max	
Anti-BSA IgG	1.3	0.7	3.5	8.5	3.6	18.2	<0.001
Anti-BSA IgA	1.8	0.8	3.5	3.2	1.4	7.6	<0.001
Anti-BSA IgM	3.8	1.6	9.5	3.4	1.1	6.8	<0.05

Significant increases in BSA antibodies in diabetic children have been found in other studies in Finland **83** and France. **84**



To assess the impact of egg consumption on type 2 diabetes in China, a survey was performed among 2849 adults in Jiangsu Province, China. Jiangsu is a coastal Chinese province north of Shanghai. **85**

Dietary information was obtained by a validated food frequency questionnaire and 3 day weighed food records. Note that this survey did not rely on dietary recall.

Egg consumption was significantly and positively associated with diabetes risk. Below is the risk of diabetes according to egg consumption.

Egg consumption	Women Odds ratio	Men Odds ratio
Less than 2 eggs per week	1.00	1.00
2-6 eggs per week	1.67	2.03
1 egg per day or greater	3.22	2.44

Plasma triglyceride and total cholesterol levels were also significantly higher in women who consumed more than 2 eggs/week than those who consumed eggs less often.

The conclusion of this paper is,

Considering the high percentage of participants who consumed more than 1 egg/d in this population and the substantially increasing burden of diabetes in China and worldwide, a clearer message on egg consumption and diabetes risk is needed.

Insulin Resistance

If you type “*intramyocellular lipids diabetes*” into a Google Scholar search, you will receive hundreds of search results. This refers to fats inside muscle cells. The type of fat is irrelevant.

- *Diabetes* (2001) Effects of Intravenous and Dietary Lipid Challenge on Intramyocellular Lipid Content and the Relation With Insulin Sensitivity in Humans. **86**
- *Diabetes* (1999) Association of Increased Intramyocellular Lipid Content With Insulin Resistance in Lean Nondiabetic Offspring of Type 2 Diabetic Subjects. **87**
- *Diabetologia* (1999) Intramyocellular lipid concentrations are correlated with insulin sensitivity in humans: A 1H NMR spectroscopy study. **88**
- *Diabetes* (1999) Rapid impairment of skeletal muscle glucose transport / phosphorylation by free fatty acids in humans. **89**
- *Journal of Clinical Investigation* (1996) Mechanism of free fatty acid-induced insulin resistance in humans. **90**

Normally, insulin attaches to protein receptors on the cell’s surface and signals the cell membrane to allow glucose to enter. If there is an accumulation of fat in the cell, it interferes with insulin’s signalling process and glucose cannot enter the cell. Fat can accumulate inside muscle cells even in slim people. The real cause of type 2 diabetes is not an excess of sugar or carbohydrates. It is an accumulation of fat inside the cells that interferes with the muscle cells’ ability to respond to insulin. The muscle cells are unable to access glucose, which is required for energy production.

Advice to limit carbohydrates actually magnifies the problem as it results in an increase of fat and protein in the diet.

Biological Plausibility

It is helpful when a theory is developed that it is plausible. It is possible that the mechanism has not yet been discovered or that a discovery completely overturns existing knowledge. However, in the case of cardiac vascular disease, the basics has been known for many decades.

Endothelial cells line all blood (arteries, veins, capillaries as well as the heart) and lymphatic vessels. The endothelium is one cell thick. **91**

- When we eat a high-fat (or even a medium fat) standard Western diet, it increases the viscosity of the blood. White and red blood cells, platelets, endothelial cells, and low-density lipoprotein (LDL) particles containing cholesterol become adhesive—our blood becomes “sticky”.
- The LDL particles, which contain cholesterol, enter into the space beneath the endothelium.
- The cholesterol becomes oxidised by free radicals. The activity of free radicals is greatly increased by eating oil, dairy, and animal protein.
- Macrophages cross into the sub-endothelial space and engulf LDL particles containing oxidised cholesterol. Macrophages are a type of white blood cell, which are components of the immune system.
- After the macrophage engulfs its share of LDL particles, it dies.
- Plaques develop in the sub-endothelial space. Plaques consist of macrophages, foam cells, dead foam cells, fats, cholesterol, and smooth muscle tissue. The plaques intrude into the arteries.
- Blood clot inside a blood vessel at the site of a ruptured plaque precipitates most heart attacks.
- The vessel may become completely blocked. If this is a small blood vessel within the brain, the person may not be aware of the situation. If it is a large vessel, the person will have a heart attack or a stroke.

Popular commentators frequently claim that heart disease is caused by inflammation. A person can have heart disease with or without inflammation. Inflammation can be caused by many causes – an infected cut, a twisted ankle. With heart disease, inflammation is caused by the creation of pus-filled plaques.

Other Factors that Influence Heart Disease

Looking for a single cause or biomarker for heart disease is not productive.

Animal Protein is Atherogenic

David Kritchevsky was one of the early investigators of the relationship of cholesterol and heart disease in the 1950s. He linked different types of proteins to heart disease, determining that protein of animal origin leads to an increase of cholesterol in the blood. **92**

The addition of lysine to soy protein, sufficient to change its normal lysine/arginine ratio to that of casein, significantly increases its atherogenicity. Addition of arginine to casein to lower its lysine/arginine ratio to that of soy protein decreases its atherogenicity. **93**

Foods high in lysine include meat, poultry, fish, cheese, yoghurt and eggs. Wheat and oats are low in lysine.

Methionine is an amino acid that is essential to human health. However, a diet high in methionine is detrimental and “poses a threat to cardiac health”. **94** A diet high in red meat and eggs increases the level of methionine. Methionine is a sulphur-containing amino acid which results in the formation of rotten-egg gas.

Effect of Lipids on Endothelial Function

All fats damage the endothelial lining of the arteries – cells cannot produce nitric oxide which ensures that arteries remain dilated. This is why people use nitroglycerin patches.

A journal article titled, *Cocoa flavanol intake improves endothelial function*, **95** explores the benefits of cocoa flavanol supplements. Improved endothelial function improves arterial blood flow. At the end of the one month trial performed on low-risk, healthy individuals taking cocoa supplements, resulted in an increase in blood flow by an ***average of 1.2%***.

This really is not a very impressive result.

The co-author Hagen Schroeter was employed by MARS Inc., is a member of the Flaviola research consortium and a company engaged in flavanol research and flavanol-related commercial activities.



Flow-mediated brachial artery vasoactivity is a sensitive, nitric oxide–dependent index of endothelial function. **96**

This study compared to the effect of a single high-fat meal (Sausage and Egg McMuffin with 50 g fat) on the arterial blood flow compared to a meal that had no fat.

Brachial artery vasoactivity was measured hourly for 6 hours after eating the above meals. Each hour a baseline measurement was taken. Another was taken 1 minute after the release of 5 minutes pressure of a blood pressure cuff on the upper arm. The percentage change is the measure of flow-mediated vasoactivity.

Before the high-fat meal, the measurement was 21%. With the high-fat meal, the vasoactivity decreased at 2, 3 and 4 hours to 11%, 11% and 10%. It takes about 6 hours to recover a normal flow rate in the artery – which is not enough time to fully recover before your next high-fat meal.

With the low-fat meal, the measurement prior to the meal was 18% with the 2, 3 and 6 hour measurements all being 17%.

Meal	Before	1 hour	2 hours	3 hours	4 hours	5 hours	6 hours
High fat	21%	15%	11%	11%	10%	13%	15%
Low fat	18%	18%	17%	17%	17%	17%	16%

According to the study,

These results demonstrate that a single high-fat meal transiently impairs endothelial function. These findings identify a potential process by which a high-fat diet may be atherogenic independent of induced changes in cholesterol.

What impact is expensive cocoa supplementation going to have in overcoming the effects of this single high-fat meal? To claim that cocoa flavanols improves endothelial function is being imaginative.

High levels of blood glucose also causes an acute but transient decrease in blood flow caused by a reduction in endothelial function. **97**

The “oral glucose loading” was 75g (15 teaspoons). These findings do NOT suggest that drizzling maple syrup over your pancakes is causing any harm.

Overweight

Being overweight increases the risk of heart disease independent of other factors.

According to the Australian Heart Foundation, 36% of Australians aged 18 and over are overweight (BMI of 25 to up to 30) and 27% of the population are obese (BMI 30 or more).

Note that overweight and obese are separate categories.

Close to six million adult Australians have hypertension (greater than 140/90 or taking medication). This represents 33.7% of adult Australians. According to the Framingham Risk Assessment calculator, a systolic value of less than 120 mmHg is ideal.

Being overweight increases the risk of cardiovascular disease, high blood pressure, type 2 diabetes and a number of common cancers.

Gut Bacteria and Heart Health

There is an increasing awareness of the importance of gut flora and its role in health. **98 99 100 101**

Microbes in the intestines are essential for the breakdown of complex carbohydrates, the production of short chain fatty acids and synthesis of vitamins. More than 1000 different species have been identified.

Despite the vast number of bacteria species and people, there are only two types of bacteriological ecosystems in the gut, called enterotypes. Those that are dominated by *Bacteroides* genus bacteria, and those by *Prevotella* genera. Enterotypes are strongly associated with long-term diets, with *Bacteroides* bacteria being associated with protein and animal-fat based diets, and *Prevotella* being associated with carbohydrate-based diets.

Bacteria are responsible for producing short-chain fatty acids (acetate, propionate, and butyrate) by the fermentation of dietary fibre. Short chain fatty acids increase intestinal pH (becomes more acidic), are important in maintaining the integrity of the lining of the intestine and prevents growth of dangerous pathogens. Short-chain fatty acids that are consumed do not have these benefits.

Gluten-free diets also have a significantly detrimental effect on the intestinal microflora and immune function in healthy people. The level of beneficial organisms are reduced, detrimental organisms are increased along with an increase in health risks. It is estimated that approximately 5-6% of the population have a need for a gluten-free diet. **102**



Choline is converted by our gut bacteria into trimethylamine (TMA) which is then converted into trimethylamine N-oxide (TMAO) in our liver.

Recent human studies have established that the levels of TMAO in serum are positively correlated with impaired renal function, colorectal cancer, and cardiovascular disease (CVD). TMAO exacerbates atherosclerosis [...].

In addition, TMAO exacerbates impaired glucose tolerance, obstructs hepatic insulin signaling, and promotes adipose tissue inflammation of mice maintained on a high-fat high-sugar diet.

103

The choline in foods, such as eggs, can be turned by gut bacteria into TMA. However, it is only produced by the *Bacteroides* bacteria that are prevalent in high-fat, low-fibre, animal-based diets.

Carnitine is similar in structure to choline and the major food source is red meat. Unlike choline, which is an essential nutrient, we have no need to consume carnitine. It is also found in dietary supplements and carnitine-energy drinks. **104**

Keys and Low-Carbohydrate Commentators

Heart of the Matter - Dietary Villains

Two episodes of the *Heart of the Matter* series were presented in October 2013 by *Catalyst*, a program produced in Australia by the Australian Broadcasting Corporation (ABC).

The first episode, *Dietary Villains*, argued that saturated fats and cholesterol was not involved in coronary vascular disease. The second episode, *Cholesterol Drug War*, argued that statin drugs were not an appropriate treatment for people with elevated blood cholesterol levels.

The complaints against the first episode was dismissed with the review process concluding that “no material inaccuracy has been demonstrated by any complainant.” **105**

At least three complaints were presented to the ABC regarding the first episode demonstrating many basic errors in the program.

The complaint against the second episode was upheld. The reason given was that “the principal relevant perspective that statins have wider benefits for this group was not properly presented.”

The mechanism of cholesterol manufacture in the body is well understood. Statins work by inhibiting mevalonate formation. Since mevalonate is produced during the synthesis of cholesterol then cholesterol production is reduced. This results in an increase in the number of LDL receptors on liver cell membranes and increases the ability of the liver cells to extract cholesterol from the blood. If statins do have a benefits for a “certain group of people”, it is only because high levels of cholesterol is implicated in heart disease.

It is difficult to comprehend how the review considered statins to be important for the treatment of heart disease whilst believing that there is

a “compelling case to cast doubt over the intense focus that has been given to the role of cholesterol in heart disease”.



The report also stated that “the program did not explicitly endorse the unorthodox view” that saturated fat and heart disease are not linked. The following statement made at the beginning of the program clearly is an endorsement of the unorthodox view.

I will follow the road which lead us to believe that saturated fat and cholesterol cause heart disease and reveal why it is being touted as the biggest myth in medical history.

The Men Who Made Us Fat

At the beginning of the three-part BBC documentary *The Men Who Made Us Fat*, Jacques Peretti informs,

I am going to trace those responsible for a revolution in our eating habits. I'll be looking at how decisions made behind closed doors transformed food into an addiction.

A brief shot of Ancel Keys and George McGovern are shown as two of the perpetrators of this exploit.

Robert Lustig is a pediatric endocrinologist at the University of California, San Francisco. He is the author of *Fat Chance: Beating the Odds against Sugar, Processed Food, Obesity, and Disease*. **106**

He specialises in childhood obesity and studying the effects of sugar in the diet. He is the director of the UCSF Weight Assessment for Teen and Child Health Program and a member of the Obesity Task Force of the Endocrine Society. Below are some comments by Lustig from the documentary.

This man, Ancel Keys, claimed he had the answer to heart disease. His theory had a decisive impact on what we would all eat. But it also had a devastating side effect— creating the conditions for obesity. Keys’s theory was that fat alone caused heart disease. [...]

In 1952, Keys did a sabbatical in England where he saw the epidemic of heart disease himself and correlated it with the enormously poor British diet of fish and chips, etc.— you know what I’m talking about— and decided that saturated fat had to be the culprit. And he actually said that back in the fifties before he did any studies.

And he spent the next fifty years attempting to prove himself right. Keys won the battle. Yudkin was thrown under the bus. And— well, he was discredited by numerous societies basically saying that he did not have the data to make his claims about the importance of sugar.

The K-Ration contained approximately 3,000 calories. Lustig had overestimated the amount of energy in the K-Ration by three to four times. The K-Ration consisted of non-perishable food designed for a few days use only. As well as chocolate bars, it contained high fat foods such as pemmican biscuits, veal meat, sausage, chopped eggs and ham, toilet paper, chewing gum, and cigarettes. The K-Ration was never designed for long-term use. It was a survival ration.

It was not named after Keys. The K was chosen because it was phonetically different from the C and D rations that were all ready in use.

Keys’s research was not the starting point for nutritional and cholesterol research, which had its foundations in the early years of the twentieth century. Keys’s early views on diet were formed in Italy and Spain, not in England. He developed his ideas about diet and heart disease when he was invited to Naples in the early 1952 by Professor Gino Bergami who informed Keys that heart disease was very rare. Margaret measured the

serum cholesterol and found significantly lower levels. They obtained similar results in Madrid later in that year. **107**

Lustig states, “Keys was already pretty famous in America because he was the originator, inventor, of the K-Ration. The K-ration was a way of getting 12,000 calories in a very small, compact little box.”

Lustig had overestimated the amount of energy in the K-Ration by three to four times. The K-Ration was an emergency survival ration consisting of non-perishable food designed for a few days’ use only. Lustig claims that the K-Ration contained a lot of sweet food like chocolate, “never for one moment [realising that] it could be harmful.” As well as chocolate bars, it contained high fat foods such as pemmican biscuits, veal meat, sausage as well as toilet paper, chewing gum, and cigarettes. The K-Ration was never designed for long-term use.

Other aspects of Ancel Keys’s work that Lustig mentions is addressed later.



The conclusion of part one of *The Men Who Made Us Fat* states, whilst showing a picture of Ancel Keys, that “another [Keys] gave the risk of sugar a clean bill of health.” Keys disapproved of “the common high level of sucrose in many diets.” **108**

At no stage did Keys give sugar a clean bill of health. He did indicate that sugar was not involved in heart disease.

He stated,

None of what is said here should be taken to mean approval of the common high level of sucrose in many diets.

It is dishonest to state that Keys gave sugar “a clean bill of health”.

Keys made it clear that there were many variables involved with heart disease. He wrote,

Responsible students of the coronary problem long ago abandoned the idea of seeking the cause of the disease, agreeing that several, perhaps many, variables are involved in almost all cases.

He advocated a Mediterranean-style diet of traditional Greece, Spain, and southern Italy. This diet was high in unprocessed foods, consisted of “pasta in many forms, leaves sprinkled with olive oil, all kinds of vegetables in season,” was “almost vegetarian (or lactovegetarian),” and was “much lower in meat and dairy product” than American diets.

Six Countries Study

Popular commentators frequently accuse Keys of manipulating data in his 1953 paper, *Atherosclerosis, A Problem in Newer Public Health*. This study is sometimes referred as the “Six Countries Study”.

A number of popular commentators think this is the Seven Countries Study—they count England & Wales as two countries.

This paper was presented in Amsterdam in late 1952 and in New York in January 1953.

On page 4 of this paper, Keys lists 16 countries (which includes France, The Netherlands, Switzerland, and Sweden) and compared their all-cause death rates to the United States for the age groups 40-44, 50-54 and 60-64 for males and females. The mortality data was for the years 1947–1949.

The only countries that have a higher all-cause mortality rate for males are South Africa for 50-54 years old and Portugal for 40-44 year old which have mortality rates of 102% and 139% of the US mortality rate respectively. Portugal’s mortality rate was attributed to tuberculosis and violence.

On page 17 of this 22-page paper there is a graph showing the mortality rate for degenerative heart disease and fat intake for six countries. The food data was obtained from FAO for the year 1949.



Yerushalmy and Hilleboe criticized this paper in the publication *Fat in the Diet and Mortality from Heart Disease* claiming that Keys only choose 6 countries (Japan, Italy, England & Wales, Australia, Canada, US) that supported his hypothesis instead of using the World Health Organization data from the 22 countries that was available. It is not mentioned where the data was available from.

The data for the 22 countries that Yerushalmy and Hilleboe listed were for the years 1951-1953, a period which is after the publication of Keys's paper in 1953 and well after his presentation in Amsterdam in late 1952. The data was published by the World Health Organization in 1956 so clearly the was not available for Keys. It was the data from 1951-1953 that was used in Yerushalmy and Hilleboe's paper in 1957. Nina Teicholz has superimposed a completely different sent of data onto Keys's graph. Teicholz replaced the data for England and Wales with that of Great Britain.

The reason Keys did not submit the data shown by Teicholz because it was not available until 1956.

Teicholz changed the year in heading of the graph in her book, *The Big Fat Surprise*, to indicate that the data was from the year 1950, instead of the years 1951-1953. This gives the false impression that the data was available to Keys.



Keys used B-26 code with sub-categories 420 and 422 which relates to atherosclerotic heart disease and other myocardial degeneration. He left out sub-category 421 (chronic endocarditis not specified as rheumatic).

Endocarditis is an infection of the inner lining of the heart chambers and valves.

Yerushalmy and Hilleboe acknowledged that this group appears to be the “most specific and relevant group”.

However, Yerushalmy and Hilleboe included sub-category 421 in their evaluations.

Yerushalmy and Hilleboe examined other groupings, including B-25 (chronic rheumatic heart disease), B-27 (other diseases of the heart), and B-28 (hypertension with heart disease) to determine which grouping would “provide the most sensitive measure”.

Yerushalmy and Hilleboe were not disputing the correlations between heart disease and diet. They were disputing which categories and sub-categories of heart disease were most appropriate to compare.

Yerushalmy and Hilleboe were not disputing the correlations between heart disease and diet. They were disputing which categories and sub-categories of heart disease were most appropriate to compare.

Below are two tables that were published in Yerushalmy and Hilleboe’s paper. The first shows the correlations between total calories consumed from the dietary components and the second shows the percentage.

As a generalisation, 90% indicates a very strong correlation, 70-90% a strong correlation and 50-70% a moderate correlation. The claim that there is no correlation (even with all the countries included) is simply false.

Grouping of Categories of Diseases of the Heart				
Dietary Component	B-26	B-26 – B-27	B-26 – B28	B-25 - B28
<i>Number of calories</i>				
Total Calories	0.723	0.593	0.619	0.637
Calories from fat	0.659	0.470	0.508	0.523
• Animal fat	0.684	0.562	0.610	0.604
• Vegetable fat	–0.236	–0.282	–0.187	–0.186
Calories from protein	0.709	0.694	0.691	0.692
• Animal protein	0.756	0.695	0.708	0.708
• Vegetable protein	–0.430	–0.153	–0.197	–0.181
Calories from carbohydrate	0.305	0.423	0.390	0.411

Grouping of Categories of Diseases of the Heart				
Dietary Component	B-26	B-26 – B-27	B-26 – B28	B-25 - B28
<i>Per cent of total calories</i>				
Total Calories	0.723	0.593	0.619	0.637
Calories from fat	0.587	0.390	0.426	0.436
• Animal fat	0.677	0.557	0.640	0.604
• Vegetable fat	–0.468	–0.509	–0.526	–0.531
Calories from protein	0.472	0.465	0.421	0.411
• Animal protein	0.643	0.608	0.616	0.608
• Vegetable protein	–0.651	–0.483	–0.519	–0.411
Calories from carbohydrate	–0.562	–0.386	–0.415	–0.423

Note the correlations with heart disease and the following dietary components.

- Total calories consumed (72%)
- Total calories from fat (66%)
- Total consumption of animal protein (75%)
- Percentage of calories from vegetable protein (-65%)
- Percentage of calories from carbohydrates (56%)

That is, the greater the percentage of carbohydrates and vegetable protein results in less heart disease.

Popular commentators neglect that fact that the greatest correlation occurred with the consumption of animal protein. The fact that there are associations with each of the categories of heart disease, with the total amount of calories from animal protein, is clearly documented by Yerushalmy and Hilleboe.

Whilst Yerushalmy and Hilleboe states that there are strong associations between dietary protein and heart disease, they state that this does not imply that these dietary factors are implicated in heart disease.

Yerushalmy was later involved in a disagreement with researchers who claimed that women who smoked had lower birth-weight infants. He suggested that smoking was not the cause of the lower birth weight but a result of “mode of life” differences between the smoking population and non-smoking population.

According to Yerushalmy, *109*

In this case, that means that testing alternative hypotheses, such as the biological or ‘mode of life’ differences between smokers and nonsmokers, may explain the results. Indeed, compared with nonsmokers, smokers in the CHD study were less likely to use contraceptive methods, less likely to plan the pregnancy, more likely to drink hard liquor, beer and coffee and more likely to indulge in these behaviours to a greater extreme.

Yerushalmy was also a consultant to the tobacco industry.

Far too much attention is paid to one page of a minor discussion paper from the early 1950s.



Lustig's claim that Keys made his assertion regarding the implications of fats in the diet with heart disease without the backing of research is not true. There were dozens of researchers involved with heart disease and diet prior to Keys.

In 1922, de Langen, working with Javanese men in the East Indies, showed that a diet high in eggs, butter, and meat raised serum cholesterol.

In 1946 Dr Lester Morrison, a Los Angeles cardiologist, linked diet, cholesterol and heart disease before Keys. His intervention study consisted of one hundred people, mostly men. Every second person was assigned to a low-fat, low-cholesterol diet. The others were told to maintain their usual diet. By the end of twelve years, 19 of the fifty patients treated with the diet survived. All of the fifty control patients had died by the twelfth year. **110**

In 1947, Keys commenced the *Minnesota Business and Professional Men Study* to determine why apparently healthy middle-age men were dying from heart attacks. A number of variables were examined, with serum cholesterol being the most significant variable.

There is even a low-fat, low-cholesterol diet book, that was written and published in 1951, prior to Keys's 1953 paper. This book was co-authored by Helen Gofman, a medical doctor, who was the wife of John Gofman. **111**

Dr John Gofman, a nuclear physicist, was a pioneer researcher in the field of lipoproteins. His work showed that serum cholesterol and low-density lipoproteins were both indicators of coronary heart disease risk.

In 1952, Ancel and Margaret Keys visited Naples, Rome and Madrid and confirmed the low rates of heart disease and low serum cholesterol.

A number of researchers studied the relationship of saturated fat to serum cholesterol during the 1950s. J Groen, LW Kinsell, EH Ahrens, A Keys, JM Beveridge and B Bronte-Stewart replaced saturated fats in the diet with polyunsaturated fats. All other components of the diet remained the same and the total fat content of the diet did not change.

When the unsaturated fats, such as corn or safflower oil, were replaced by the saturated fats of butter, lard, or coconut oil, the serum cholesterol rose. The serum cholesterol fell when the polyunsaturated fats were reintroduced. The experiments were repeated, and whilst there was variability with the amount of change for different individuals, the results were consistent for each individual. The changes occurred rapidly within one or two weeks. Ahrens's study kept the total fats at 40%, which was the average fat intake of the US. at that time. *112*

The contention by popular commentators that the idea relating cholesterol, fats and heart disease originated with Ancel Keys's 1952 sabbatical in England and his minor discussion paper from 1953 and that there was no research supporting this is clearly incorrect.

The Pioppi Diet

The Pioppi Diet is a best-selling book by the London cardiologist Aseem Malhotra and Donal O'Neill, an Irish film-maker.

Pioppi is a small village on the Tyrrhenian Sea which is located on the west coast of Italy. It is approximately 150 km (90 miles) south of Naples. Ancel and Margaret Keys resided there for over 28 years.

In the introduction, Malhotra claims:

Be prepared for everything you know and believe to be true to be turned on its head. Misguided public health messages and the

marketing campaigns that push them continue to mislead doctors, the public and politicians, but it's time for that to change.

The following chapters will explode several myths, including why you need to stop fearing saturated fat and cholesterol.

The solutions of the Pioppi Diet are driven by the best available modern scientific evidence. This book is based on the 2016 documentary film *The Big Fat Fix*, which was co-produced by me and former international athlete and film-maker Donal O'Neill. The former Secretary of State for Health and current Mayor of Greater Manchester, Andy Burnham, has publicly recognized the film's potential 'to help millions and save thousands of lives'..

Malhotra states in the book that:

When he [Keys] visited the region after the Second World War (he had, famously, invented the K-ration, a portable, non-perishable ration containing enough calories to sustain a soldier for up to two weeks), Keys was so taken with Pioppi that he would return years later, to conduct the research that has ultimately framed our modern, albeit skewed, interpretation of the traditional Mediterranean lifestyle.

Keys and his wife, Margaret, would live and work among the people of Pioppi for four decades before his death in 2004. His name is still spoken with reverence and no short measure of affection there.

The K-ration was originally designed to last for 15 meals – not two weeks as stated. *113*

Malhotra claims that Keys's interpretation of the Mediterranean diet is skewed.

Keys did not do research at Pioppi or live in Pioppi for 4 decades. This is where Ancel and Margaret lived after he retired from the University of Minnesota in 1971 at the age of 67 and where he continued his writings.

Perhaps Malhotra is confusing Pioppi with the village of Nicotera which is a village close to the southern end of Italy where Keys and colleagues performed preliminary studies for the Seven Countries Study in 1957.

Whole grain bread is an important part of the diet in these regions, consisting of 30-40% of energy intake. Bread consumption was less in Italy because “they eat so much pasta”. *114*

Malhotra’s version of Pioppi’s Mediterranean diet includes the following advice.

- Don’t fear fat
- Sugar and refined carbs are the enemy
- Extra virgin olive oil is medicine, 2-4 tablespoons a day (30-60ml)
- A small handful of nuts every day
- Eat 10 eggs a week – they’re satiating and full of protein
- Oily fish at least 3 times a week
- Two portions of vegetables in at least two meals a day
- Fast once a week for 24 hours after dinner
- Eat the local eat pasta – but only in small quantities
- full-fat dairy
- coconut oil
- dark chocolate

Coconut oil, dark chocolate, no bread, only four portions of vegetables a day? This advice is far removed from the actual diet of Pioppi and from the Mediterranean diet as described by Keys.

Pasta and bread as well as fruit and vegetables were the major components of the southern Italian diet – not eggs, dairy, chocolate, dairy, fish and definitely not coconut oil. Ancel and Margaret Keys lived in Pioppi for 28 years. For decades, Keys worked with leaders of nutritional research in Greece, Italy, Spain and elsewhere.

It is Malhotra that is misrepresenting the diet of the village of Pioppi – not Keys.



Malhotra also states:

Now two thirds of people admitted to hospital with a diagnosis of acute myocardial infarction really have metabolic syndrome—but 75% of these patients have completely normal total cholesterol concentrations. Maybe this is because total cholesterol isn't really the problem?

Malhotra quotes a newspaper report **115** for this information. The article quotes Dr. Gregg Fonarow from the UCLA, who states, “that the current guidelines [for cholesterol] may not be low enough to cut heart attack risk in most who could benefit”.

Having “normal” cholesterol levels when it is normal to die from a heart attack is not a healthy choice.

Malhotra completely misrepresents the newspaper article's message, which is the cholesterol guidelines are far too high. That is being dishonest.

Astrup, Lustig and Insulin Resistance

Insulin resistance refers to the inability of muscle cells to respond normally to insulin. Metabolic syndrome refers to a cluster of conditions such as abdominal obesity, raised triglycerides, raised blood pressure and raised fasting serum glucose.

In 2017, Maryanne Demasi, Robert Lustig, Aseem Malhotra published a paper, *The cholesterol and calorie hypotheses are both dead — it is time to focus on the real culprit: insulin resistance*. **116**

Their conclusion is:

In summary, for many patients at high risk of CVD, one of the safest and most effective ways to reduce the risk of heart attack and stroke is to consume a ***high-fat and low-glycaemic load***

Mediterranean diet and engage in regular exercise. At the very least, exercise interventions are often similar to drug interventions in terms of their mortality benefits in the secondary prevention of coronary heart disease, and do not come with side effect.

Note that a Mediterranean diet as defined by Keys is mainly vegetarian with some cheese.

The high-fat, and mislabelled Mediterranean diets of the Lyon Diet-Heart and PREDIMED studies resulted in participants being unhealthier at the end of the studies. Recall that, as a consequence of the PREDIMED study, 50% of the participants who did not have metabolic syndrome at the start of the study did so at the end and their medication use increased.

Malhotra's definition of a Mediterranean diet is so far removed from the actual diets of the Mediterranean coastal regions of France, Spain, southern Italy, and Greece of the 1960s, to be meaningless.

The consequences of the advice that, "one of the safest and most effective ways to reduce the risk of heart attack and stroke is to consume a high fat and low glycaemic load Mediterranean diet", is resulting in unimaginable damage to our society.

Below are some quotes from Lustig. **117**

Sugar – because of its unique composition is the only food on the planet that is both fat and carbohydrate at the same time.

Is there one reaction in your body that actually requires sugar?
Zero.

Even fatty fruits – coconut, olives, avocado – have no carbohydrates.

There is no foodstuff on this planet that have both fat and carbohydrate at the same time. It is one or the other because that is evolution – that is nature – that is what God did.

Sugars are carbohydrates – they are not fats. This is basic chemistry. Fatty acids contain a carboxyl group (–COOH) – sugars do not.

It is simply wrong to state that coconut, olives, avocados have no carbohydrates.

Nutrient	Olives	Dried Coconut	Avocado
NDB No	09194	12108	09037
Water (g)	84	3	73
Protein (g)	1	7	2
Fat (g)	7	65	15
Carbohydrate (g)	6	24	9

Composition of 100g of food from US Department of Agriculture - USDA Food Composition Databases

He also states in *Fat Chance* that the browning of bananas is caused by the Maillard reaction due to its fructose content. Browning of freshly cut fruit and vegetables is a reaction caused by enzymes. Maillard reaction is a non-enzymatic reaction between reducing sugars (glucose, fructose, galactose, maltose, lactose) and amino acids that occur from around 140°C to 165°C. At higher temperatures, caramelisation occurs. The golden crust of bread is due to Maillard reactions.

Pure, White and Deadly – John Yudkin

During the 1960s, John Yudkin noted that the consumption of sugar increased in Britain more than any other food item in the last 100 years. Both sugar consumption and total fat consumption (note the correlation is with total fat and not saturated fat) correlated with heart disease but Yudkin concluded that sugar was the more likely cause. **118**

Yudkin performed a small study recording the sugar intakes of 70 men: 20 with a recent first heart attack, 25 with peripheral arterial disease and 25 healthy men. The mean daily intakes were 132, 141 and 77 g, with medians 113, 128 and 56g, respectively. The intakes of the patients were

significantly higher than those of the healthy controls. Both groups of patients took more sugar in more cups of tea or coffee per day than controls. **119**

Yudkin also performed a feeding experiments with rats. A diet high in sugar increased serum triglycerides. Triglycerides are no longer considered to be a high risk factor for heart disease.

A number of other researchers, including Jeremiah Stamler, Gerry Shaper, Michael Oliver, Geoffrey Rose as well as Ancel Keys were of the opinion that “there was no firm evidence linking intake of dietary sugar and CHD.” **120**

Ancel Keys, Geoffrey Rose and many others criticised Yudkin because “he did not have the data” to support his contention that sugar caused heart disease. Mortality from heart disease started reducing in 1966 in U.S., Finland, and Australia. It was another 10 years before this happened in the United Kingdom because of Yudkin’s influence. **121**

Rose believed that there would have been 25,000 fewer deaths in England and Wales if the gains made in Australia and America were duplicated in the United Kingdom. **122** When viewed in that light, Yudkin’s legacy is not very inspiring.

His best-selling book *Pure, White and Deadly: the problem with sugar* **123** contained no references.

Lustig wrote the introduction for the reissue of the book in 2012.

Conclusion

Given our distrust of authorities, we want to hear that we have been deceived by the medical establishment into believing that their advice on fats and saturated fats is based on myths.

The Dietary Guidelines for Americans are revised jointly by the US Department of Agriculture (USDA) and the Department of Health and Human Services every 5 years. Originally, the USDA was responsible. The US Department of Agriculture represents the interests of the agricultural industry.

In 2002, dietary guidelines report emphasised that total dietary protein as high as 35% of total diet calories would “minimize risk for those chronic diseases”. This was not based on scientific evidence.

A lawsuit forced the committee to reveal that the majority of its members at the time had an association with the dairy industry.



The message of the Astrup's paper is that we should be adding healthy foods to our diet to overcome heart disease and type 2 diabetes.

Consuming dairy, chocolate, eggs - or a much, much more profitable nutraceutical supplement is not going to change an unhealthy diet into a healthy meal – no matter how desperately that we wish that it would.

A nutraceutical is a manufactured product that is derived from food or part of a food that purportedly provides health benefits.

Professor Manohar Garg was one of the authors of Astrup's paper (Astrup, 219) that advocated eating more red meat, eggs, dairy and chocolate.

In 2017, the University of Newcastle and the Hunter Medical Research Institute (HMRI) were performing 5 trials to investigate nutraceuticals.

- A four week intervention trial to investigate the effects of plant sterols and curcumin combined in a dip. According to Professor Garg, “the foods we use will be delicious and versatile so volunteers can easily add them to their regular diet. We hope blood cholesterol, blood pressure and inflammation markers will all reduce – these are the three main risk factors for coronary disease”.
- A study involving people with a BMI ranging between 25 and 45. They will receive two fish oil tablets each day for 12 weeks to determine whether omega-3 fatty acids can improve insulin signaling and reduce risk factors for the development of type 2 diabetes.
- A study that examines participants who have type 2 diabetes to determine the heart health benefits of curcumin and/or fish oil capsule supplementation, over and above their usual medications and management.
- A similar study for those with pre-diabetes that examines whether the participant’s risk of developing the disease has been minimised with the curcumin and/or fish oil capsule supplementation, over and above their usual medications and management.
- A trial involving expectant mothers and gestational diabetes which occurs in 10% of pregnancies. Professor Garg stated that, “expectant mothers will receive omega 3 supplementation to improve the quality of fatty tissue gained during pregnancy”.

The only outcome that these expensive nutraceuticals will deliver is an increase in corporate profits. For many people, the concept of changing diet and lifestyle is such a big challenge that they prefer to seek an easier but ineffective solution.



Agricultural, food and retail companies have merged into large transnational corporations. The challenge for these corporations is how to continue to make profits when the market for food is saturated in developed countries. In the United States, the food supply contains 15.9

MJoule for every adult and child in the United States which is nearly twice what is needed. **124**

Companies address this by:

- convincing people to "consume more, and more highly energy dense foods through relentless advertising and ubiquity of outlets"
- "increasing serving size and adding price inducements to order the larger sizes"
- "opening up markets in transitional and developing countries"
- substitution of low-cost agricultural products (such as fruit, vegetables, whole-grains and beans) with high-value processed products

Food industry is constantly attempting to increase demand. Use of industry-funded research to supply misinformation, to create conflicting evidence where none exists and hiding negative data are part of the tactics used to ensure a continued expansion of their markets.



A quest for truth is not simply to confirm your view of the world. It is a continual challenge where every belief, every contradiction, every cherished ideal that can be the very basis of who we believe that we are, must be questioned.

Almost the truth simply does not work.

Did your search result in a more restricted view of the world simply to confirm what you dearly wish to believe?

Or is there a more expansive view that includes all that has been discovered? Does the world become more coherent and complete?

A quest for truth is only valid if you are prepared to change your beliefs based on what you have found.

A quest for truth is only useful if you are prepared to take action on what you have discovered.



Much publicity is given to the longevity of the people of Japan and Okinawa (an archipelago that stretches from southern Japan to Taiwan). However, it is vegetarian Californian Seventh-day Adventists that have the longest lifespan and the highest levels of health on the planet.

Vegetarian Californian Adventists have a higher life expectancy at the age of 30 years than other white Californians by 9.5 years in men and 6.1 years in women, giving them the highest life expectancy of any formally described population. **125**

Note that Californians are much healthier than the average American being in the top five states for longevity with an average life expectancy of 5-6 years greater than the Mississippi states.

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