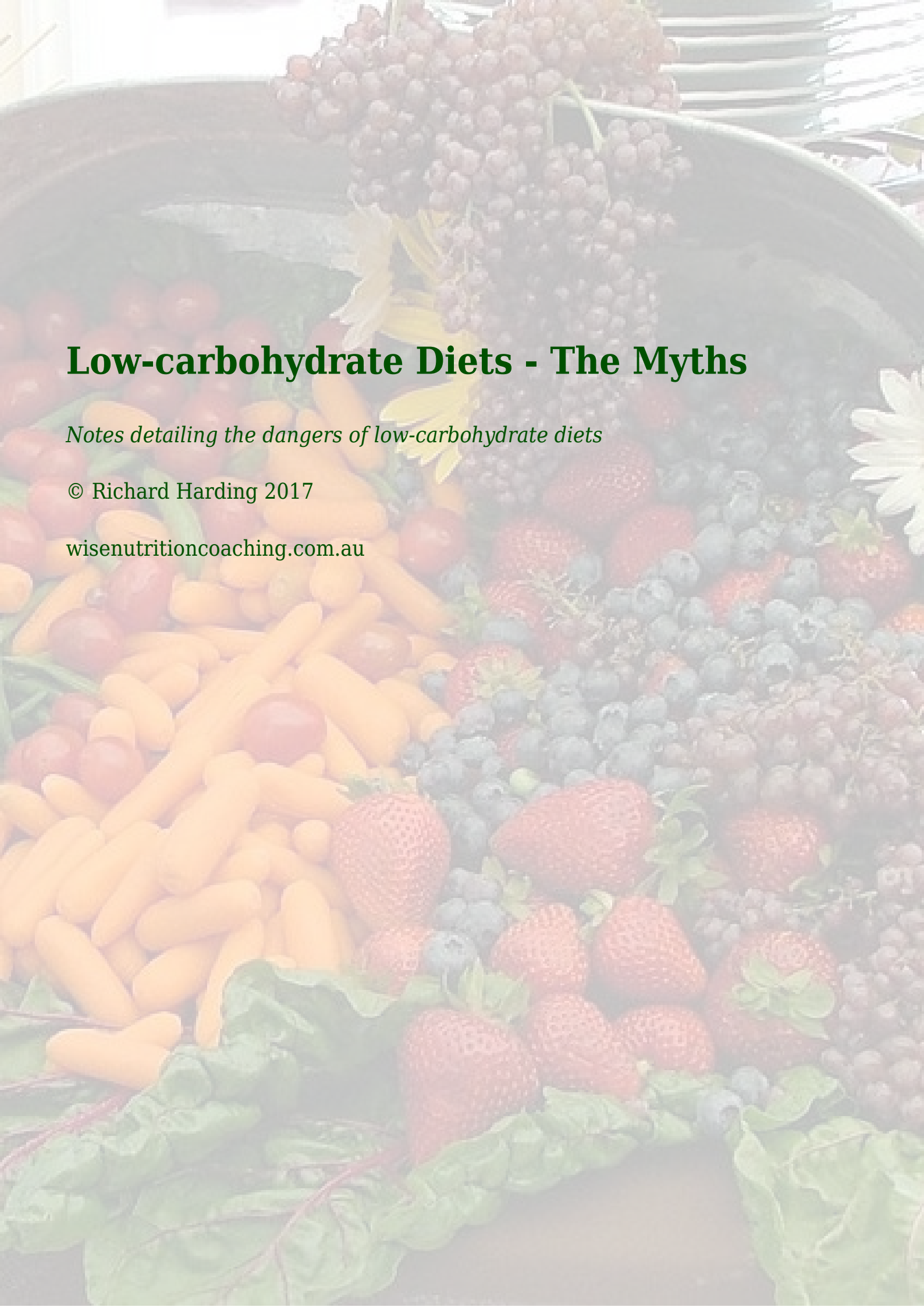

Low-carbohydrate Diets - The Myths

Notes detailing the dangers of low-carbohydrate diets

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Low-Carbohydrate Diets
The Myths

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Cover image: A wedding cornucopia 1 January 2003 by Jina Lee

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CSIRO Low-Carb Diet

The *CSIRO Low-Carb Diet* was developed in Australia by the CSIRO.

The diet is “low in carbohydrate and high in protein and unsaturated fat and claims improvement in metabolic health, blood glucose control and diabetes management”.

There is a tendency forlow-carbohydrate studies to follow a particular pattern. A low-carbohydrate diet is comparedwith a “low-fat” diet with very overweight and diabetic participants. The diets are usually very energy restricted and the compliance rate for both diets are not high. Restricting energy intake confounds results as energy restriction manifests certain outcomes independent ofdietary components.

High-fat, low-carbohydrate diets raise cholesterol, LDL-cholesterol, lipoprotein(a), triglycerides, uric acid, C reactive protein, fibrinogen, cortisol, IGF-1, homocysteine, ketones (acetone, acetoacetate and β-hydroxybutyrate) whilst coronary blood flow, body temperature and blood pH (blood becomes more acidic) are reduced.

High-fat, low-carbohydrate dietary trials focus on the macro-nutrient components of the diet-carbohydrate, fat and protein. Very rarely are other components considered. The quality of a diet is far more sophisticated.

The food we eat is a complex combination of many components— many different types of fat, carbohydrates, amino acids, and dietary fiber along with a multitude of vitamins, minerals and phytonutrients such as carotenoids, and polyphenols.

The vast majority of our nutrients is obtained from fruits, vegetables, greens and whole grains. A whole-food, plant-based diet will contain approximately 80% carbohydrate, 10% fat and 10% protein. The goal, however, is not to meet a prescribed macro-nutrient profile.

Very low-carbohydrate weight loss diet

A long-term (52 weeks) trial was undertaken by the Australian CSIRO to determine the weight loss and cardiometabolic effects of a very-low-carbohydrate, high-saturated-fat diet and a high-carbohydrate, low-fat diet.[1]

Below is the macronutrient profiles of the two diet groups. Note that the objective is to study long-term effects but the study is only lasted 12 months.

Macro-nutrient	Low-Carb	Low-Fat
Carbohydrate	4%	46%
Protein	35%	24%
Fat	61%	30%

The compliance rate for the low-carbohydrate diet was 60% and 70% for the low-fat diet.

Low-carbohydrate diets increases LDL cholesterol. The authors note that, “the increase in LDL cholesterol with the LC diet suggests that this measure should be monitored”.

The “low-fat” diet was 30% energy from fat. This is not a low-fat diet. The current average fat consumption is approximately 33%.

An approximation of the amount of protein consumed can be obtained by taking the midpoint of the energy consumption (6.5 MJ / 1550 kCal) and calculating the amount of energy obtained from protein from both diets. Since each gram of protein yields 17 MJ or 4 kCal of energy, then the low-carbohydrate group is consuming in the vicinity of 135 g protein with the “low-fat” group consuming 90 g protein.

This far exceeds the recommended dietary intake of close to 50 g based on the RDI of 0.84 g of protein for each kg of body weight.

Consuming more protein than you need is detrimental. There is an increase in blood urea, blood becomes more acidic, vitamin D is levels are lowered and blood cholesterol is increased.

At the end of the year-long study, both groups were still overweight with a BMI of 28.4 for the low-carbohydrate group and 29.2 for the low-fat group.

Ketones were present in the low-carbohydrate group. Ketosis occurs during starvation. It is not a normal, healthy condition. No animal species or human society normally lives in a state of ketosis. Ketosis occurs when fat in the body is utilized to obtain energy in the absence of glucose. Glucose is normally obtained from the digestion of carbohydrates. Ketosis results in the production of ketones—acetone being one of the three types of ketones produced during ketosis. Blood acidity rises with an increase in ketones.

During pregnancy, ketosis has been linked to adverse outcomes for the unborn child.

Low-carbohydrate diet for type 2 diabetes management

This trial[2] [3] measured the effects of a “very low-carbohydrate, high-unsaturated fat diet” on type 2 diabetes participants compared with a “high–unrefined carbohydrate, low-fat diet” diet over a 24 week and 52 week period. The diet was very restricted in energy intake with the participants consuming 1,429 kcal (6.0 MJ). The authors do not describe how this figure was derived. A reasonable estimate for their daily requirements is 2,400 kcal (10.2 MJ) for males and 2,000 kcal (8.7 MJ) for females. It is impossible not to lose weight on such a restricted diet.

The compliance rate was 79% for low-carbohydrate group and 82% for the low-fat group.

Once again, the “low-fat” diet of 30% energy from fat is NOT a low-fat diet and 53% of energy from carbohydrate is NOT a “high-carbohydrate” diet. The protein requirements far exceed human requirements.

Macro-nutrient	Low-Carb	Low-Fat
Carbohydrate	14%	53%
Protein	28%	17%
Fat	58%	30%

The participants were obese at the start of the trial and were still obese 12 months later.

The fasting glucose for the “low-carb” group at the start of the trial was 7.8 mmol/L and 8.4 mmol/L for the “high-carb” group. After 52 weeks the values were 7.1 for the “low-carb” group and 6.9 mmol/L for the “high-carb” group. Both are values are higher than the desirable range of 3.6-5.5 mmol/L.

Comparing two very unhealthy diets does not provide any clarification.

Vegan Diets for Management of Type 2 Diabetes

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.[4] [5]

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 from an average of 291 mg/day to 24 mg/day. The ADA group reduced their intake from an average 317 mg/day to 189 mg/day. A vegan diet contains no cholesterol.

Criteria	Vegan	ADA
% of participants that reduced diabetic medication	43%	23%
Reduction in HbA1C	0.96	0.56
Reduction in HbA1C (Excluding those who reduced medication)	1.23	0.38
Body weight decrease (kg)	6.5	3.1
LDL cholesterol decrease (%) (Excluding those who reduced medication)	21.2	10.7
Reduction in urinary albumin (mg/24 h)	15.9	10.9

Seventh-day Adventist's Studies

A strong commitment to health has been a part of Adventist's tradition since its founding in the 1840s.

The AHS-1 study showed 30-year-old Adventist males lives 7.3 years longer than the average 30-year-old white Californian male and with females living 4.4 years longer than the average Californian white female. For vegetarians, it is 9.5 years longer for men and 6.1 years longer for women.[6]

Note that Californians have a much longer longevity than the average American.

The comparison of the types of diet (in the AHS-2) showed a significant difference in both the body weight and the incidence of Type 2 Diabetes.[7]

Category	%	BMI	Type 2 diabetes Odds ratio (*)
Vegan No red meat, fish, poultry, dairy, eggs	4.2	23.6	0.32
Lacto-ovo vegetarians Vegan with eggs and milk	31.6	25.7	0.43
Pesco-vegetarians Vegan with fish, milk and eggs	11.4	26.3	0.56
Semi-vegetarians Red meat, poultry less than once a week plus fish, milk, and eggs	6.1	27.3	0.69
Non-vegetarians Red meat, poultry more than once a week plus fish, milk, and eggs	46.9	28.8	1

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

Insulin Resistance is Caused by Fat

Articles published in 1999 and 2001 describe the mechanism of insulin resistance. 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.[8] [9]

Increasing fat consumption, as advocated by the CSIRO diets, is magnifying the problem.

We Eat Food – not Carbohydrates, Fats & Proteins

The food we eat is a complex combination of many components—many different types of fat, carbohydrates, amino acids, and dietary fiber along with a multitude of micro-nutrients

including vitamins, minerals, carotenoids, and polyphenols. Focusing on one component such as carbohydrates, sugars, fats, saturated fats or cholesterol may help understand some elements of health. However, the complex interaction between even two or three components make it impossible to fully comprehend the effects of nutrition in real life. Most medical and nutritional studies are only concerned with the effects of one dietary component or intervention.

Our health is related to many interrelated factors and is not limited to what we eat.

A whole-food, plant-based diet is high in complex carbohydrates, fibre, vitamins, minerals and micro-nutrients as well as being low in fat, saturated fat and protein.

Dr Katharine Milton is a professor of physical anthropology at the University of California in Berkeley. She received her Ph.D. in anthropology from New York University in 1977.

Her field of expertise is the dietary ecology of primates, including human ancestors and modern humans. Professor Milton's conclusion is:

> It is prudent for modern-day humans to remember their long evolutionary heritage as anthropoid primates and heed current recommendations to increase the number and variety of fresh fruit and vegetables in their diets rather than increase their intake of domesticated animal fat and protein.[10]

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The Pioppi Diet

*The Pioppi Die*t is a 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 here for over 25 years. Martii Karvonen of Finland and Jerimiah Stamler of the USA are other well-known medical researchers who resided in the village.

The foreword for the book is written by Professor David Haslam of the UK National Obesity Forum. This is what he has to say about the book.

> Aseem Malhotra and Donal O'Neill trace the modern Mediterranean Diet back to its authors, Margaret and Ancel Keys, in a rather fond, nostalgic way, despite current scientific analysis demonstrating that much of Ancel's work was flawed.
>
> One of the last great and sensible medical textbooks was written in 1951 by Raymond Greene (the novelist Graham's brother). After this, falsehoods and misperceptions were peddled ubiquitously. Greene wrote, with regard to obesity:
>
> Foods to be avoided:
>
> 1. Bread and everything else made with flour
> 2. Cereals, including breakfast cereal and milk puddings
> 3. Potatoes and all other white root vegetables
> 4. Foods containing much sugar
> 5. All sweets
>
> You can eat as much as you like of the following foods:
>
> 1. Meat, fish, birds

2. All green vegetables
3. Eggs, dried or fresh

This is the perfect advice for a healthy diet and to counteract obesity.

Haslam does not say (and is unable to say) why Keys's work is flawed.

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.[1]

Malhotra claims that Keys's interpretation of the Mediterranean diet is skewed, without saying why.

Keys did not do research at Pioppi. This is where Ancel and Margaret lived after he retired from the University of Minnesota and where he wrote.

The Mediterranean diet at described by Ancel and Margaret Keys is based on the diets of Greece, southern Italy and the Mediterranean coasts of Spain and France of the 1960s. Below is how Keys described the diet.

> **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. [2]**

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".[3]

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 Keys's *Mediterranean Diet* – not eggs, dairy, chocolate, dairy, fish and definitely not coconut oil. It is Malhotra that is misrepresenting the *Mediterranean Diet* – not Keys. Recall that Keys based his version of the *Mediterranean Diet* on the diets of Greece, southern Italy and the Mediterranean coasts of Spain and France of the 1960s.

Malhotra published an article in The BMJ, *Saturated Fat is not the Major Issue*.[4] He starts his article by saying:

> Scientists universally accept that trans fats—found in many fast foods, bakery products, and margarines—increase the risk of cardiovascular disease through inflammatory processes.

He give a citation for that statement to the paper, *Trans-fatty acids and nonlipid risk factors*, which has a completely different conclusion.

> Consumption of industrially produced trans-fatty acids (TFA) is associated with substantial risk of coronary heart disease (CHD). The magnitude of this relationship […] cannot be fully explained by the well-established adverse effects of TFA on serum lipids. We review the evidence for effects of TFA intake on nonlipid risk factors. […] These include effects on systemic inflammation, endothelial dysfunction, visceral adiposity, insulin resistance, and arrhythmic risk. […] The multiple adverse effects and implicated pathways are consistent with the observed strong associations of TFA consumption with CHD risk.[5]

Popular commentators state that inflammation is the cause of heart disease whilst neglecting to explain what causes the inflammation in the first place.

LDL particles, which contain cholesterol, enter the space inside the lining of the arteries. The cholesterol becomes oxidised. White blood cells recognise this as a foreign particle and engulfs the intruder and plaques develop inside the artery wall. Plaques consist of dead white blood cells (macrophages), fats, cholesterol, and smooth muscle tissue. The plaques intrude into the arteries. Thrombosis (blood clot inside a blood vessel) at the site of a ruptured plaque precipitates most heart attacks.

Without high levels of blood cholesterol, there is no inflammation.

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[6] for this information. The article quotes Dr. Gregg Fonarow from the UCLA, who states, "that the current guidelines 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 too high.

William Roberts is a leading cardiovascular pathologist. He is the current editor (at 2016) of the American Journal of Cardiology—a position he has held since 1982. Dr Roberts has also suggested cholesterol goals should be less than 150 mg/dL (3.9 mmol/L) for total cholesterol and less than 60 mg/dL (1.5 mmol/L) for LDL cholesterol. He also contends that the HDL-cholesterol is largely irrelevant and that there is only one risk factor for heart disease—that is, "It's the cholesterol, stupid".[7]

Trichopoulou and colleagues[8] [9] conclude that the major components of the traditional Mediterranean diet are:

- high monounsaturated to saturated fat ratio—the main fat consumed is olive oil
- moderate alcohol consumption, consumed with meals
- high consumption of legumes
- high consumption of cereals (including bread)
- high consumption of fruits
- high consumption of vegetables
- low consumption of meat and meat products
- minimal consumption of milk and dairy products

Malhotra aversion to wheat results in him ignoring the role of bread and pasta in the Mediterranean Diet of Pioppi.

The popular view that wheat and bread is a major health issue is misplaced. Celiac, wheat allergies and non-celiac gluten sensitivity are important issues but their prevalence is

overstated. A review, published in *The Journal of Nutrition*, of 45 prospective cohort studies and 21 randomized-controlled trials between 1966 and February 2012 found that an increase in the intake of whole grain foods is associated with lower risk of type 2 diabetes, cardiovascular disease, and weight gain.[10]

Eggs are also problematic. David Jenkins, the Toronto-based researcher of glycaemic index fame, was a co-author of a paper, *Egg yolk consumption and carotid plaque*[11] that concluded, “Our findings suggest that regular consumption of egg yolk should be avoided by persons at risk of cardiovascular disease.” Given that approximately 30% of Australians and Americans die of heart disease, that would place the majority of people at risk.

Jenkins is now advocating a whole-food, plant-based diet for optimal health.

A key finding of the Physicians’ Health Study[12] is that physicians consuming 7 or more eggs per 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.
A British study reported a 2.7 times greater risk of death with an egg consumption greater than 6 eggs per week.[13]

Malhotra is a keen high-fat, low-carbohydrate diet advocate and is desperately trying (unsuccessfully) to combine a high-fat, low-carbohydrate diet into a distorted view of the Mediterranean diet.

Other related articles are:

Ancel Keys and the High-Fat Diet “Experts”
Ancel Keys did not manipulate his data
Robert Lustig and the Men Who Made Us Fat
The Big Fat Surprise
TIME Magazine Article – Eat Butter
TIME Magazine Article – Eat Butter – Part 2
Heart of the Matter – ABC Catalyst

Footnotes

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Robert Lustig and The Men Who Made Us Fat

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*.[1] He specializes 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 quotes from Lustig. There is a recording of him saying this – otherwise it would not be possible to believe that a nutrition expert could actually make such ignorant statements.

> **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.

Below is a table showing the macronutrient composition of 100 g of food.[2]

Nutrient	Olives	Coconut dried	Avocado
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Nutrient	Olives	Coconut dried	Avocado
Water (g)	84	3	73
Protein (g)	1	7	2
Fat (g)	7	65	15
Carbohydrate (g)	6	24	9
Fiber (g)	2	16	7

In *Fat Chance*, Lustig states 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.

Lustig featured in the BBC's documentary, *The Men Who Made Us Fat*, written by Jacques Peretti. At the beginning of the 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." Brief images of Ancel Keys and George McGovern are shown as two of the perpetrators of this exploit.

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.[3]

Much of what a rather chubby Robert Lustig states is false.

Firstly, 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 1950s. His studies showed dramatically lower rates of coronary heart disease in Italy and Spain. He introduced the concept of the Mediterranean diet to America—a diet he described as mainly vegetarian.

Initially, Keys did focus on fats in the diet—not saturated fats—as Lustig states above. Keys conducted many trials and experiments, both before and after he came to his initial conclusions regarding fat.

A number of other researchers, including Jeremiah Stamler, Gerry Shaper, Michael Oliver, and Geoffrey Rose, were of the opinion that "there was no firm evidence linking intake of dietary sugar and CHD."[4]

The claim that "Keys's theory was that fat alone caused heart disease" is false and deceptive. Keys noted in 1980, "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."[5] As the title of this report (*Seven Countries: A Multivariate Analysis of Death and Coronary Heart Disease*) indicates, Keys and his colleagues were examining a number of different variables in relation to heart disease.

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. The program 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 pemmican biscuits, veal meat, sausage, toilet paper, chewing gum, and cigarettes. The K-Ration was never designed for long-term use.

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.

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 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.

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

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, "Coloured" and Bantu groups in Cape Town.[6] The mean values for total cholesterol were 234 mg/dL (6.1 mmol/L), 204 mg/dL (5.3 mmol/L) and 166 mg/dL (4.3 mmol/L) respectively. 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. "[7]

A number of researchers (J Groen, LW Kinsell, EH Ahrens, A Keys, JM Beveridge and B Bronte-Stewart) studied the relationship of saturated fat to serum cholesterol during the 1950s using controlled feeding studies.

Lustig's admiration for Yudkin is unfounded. Yudkin was unable to produce the data to support his contention that sugar causes heart disease.

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.[8]

Yudkin performed a small study recording the intakes of sugar 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.[9]

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.

This was the extent of Yudkins's research.

His best-selling paper *Pure, White and Deadly: the problem with sugar*[10] contained no references.

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

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.[11]

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.[12]

This does not mean that Keys approved of the high level of sugar consumption:

> None of what is said here should be taken to mean approval of the common high level of sucrose in many diets. But there are plenty of good arguments to reduce the flood of dietary sucrose without building a mountain of nonsense about coronary heart disease.[13]

Sweeney[14] [15] showed in 1927 that high fat diets increase insulin resistance.

Students were fed their diets four highly improbable diets for two days: a high fat diet, high carbohydrate diet, high-protein diet and a fasting diet. A glucose tolerance test was performed on the morning of the third day.

After only two days on their experimental diets, the only group showing a normal, healthy

response to the glucose tolerance test was the high-carbohydrate group. Both the high-fat and fasting diet showed – after only two days – a significant increase in insulin resistance.

The relationship between an increase in fats in muscle cells and insulin resistance has been documented since the late 1990s.[16] [17] [18]

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 signaling 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.

Type 1 diabetes does result in an increase in glucose in the blood and urine but this does not mean that Type 1 diabetes is caused by a consumption of sugars or carbohydrates.

The food we eat is a complex combination of many components—many different types of fat, carbohydrates, amino acids, and dietary fiber along with a multitude of micro-nutrients including vitamins, minerals, carotenoids, and polyphenols. Focusing on one component such as sugar, carbohydrates, fats or saturated fats is not very productive.

A whole-food, plant-based is low in simple sugars, fats and saturated fats and high in fibre, carbohydrates and antioxidants.

Other related articles are:

Ancel Keys and the High-Fat Diet "Experts"
Ancel Keys did not manipulate his data
The Big Fat Surprise
TIME Magazine Article – Eat Butter

TIME Magazine Article – Eat Butter – Part 2
Heart of the Matter – ABC Catalyst
The Pioppi Diet

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BMJ Editorial - Are Some Diest "Mass Murder"?

Richard Smith’s article *Are some diets “mass murder”?* uses a work of a popular commentator to reach his conclusions in his editorial in The BMJ published on 15 December 2014. Responses to Smith’s article, including mine, can be viewed at www.bmj.com/content/349/bmj.g7654/rapid-responses

Smith writes:

> By far the best of the books I’ve read to write this article is Nina Teicholz’s *The Big Fat Surprise*, whose subtitle is “Why butter, meat, and cheese belong in a healthy diet.” […] the forensic demolition of the hypothesis that saturated fat is the cause of cardiovascular disease is impressive.

Smith’s conclusion that Teicholz demolishes the saturated fat hypothesis fails with just a little scrutiny. Below are several paragraphs from Smith’s editorial, followed by a brief commentary.

Teicholz begins her examination by pointing out that the Inuit, the Masai, and the Samburu people of Uganda all originally ate diets that were 60-80% fat and yet were not obese and did not have hypertension or heart disease.

According to Teicholz, Mann found that “he could identify almost no heart disease at all” in the Maasai. Mann’s paper, *Atherosclerosis in the Masai*, stated, “Measurements of the aorta showed extensive atherosclerosis with lipid infiltration and fibrous changes but very few complicated lesions. The coronary arteries showed intimal thickening by atherosclerosis which equaled that of old U.S. men.” [1] Smith’s and Teicholz’s assertion that heart disease was non-existent in the Maasai is clearly false.

> “[Keys is] possessing a very quick, bright intelligence” but also “direct to the point of bluntness, and critical to the point of skewering.”

The actual quote from Blackburn is “Ancel Keys has a quick and brilliant mind, a prodigious energy, and great perseverance. He can also be frank to the point of bluntness, and critical to the point of sharpness.” [2] Blackburn’s words of “can be” has been transformed into “as being”. Participants in the Minnesota starvation experiment spoke of Keys’s compassion.

> Keys launched his “diet-heart hypothesis” at a meeting in New York in 1952, when the United States was at the peak of its epidemic of heart disease, with his study showing a close correlation between deaths from heart disease and proportion of fat in the diet in men in six countries (Japan, Italy, England and Wales, Australia, Canada, and the United States). Keys studied few men and did not have a reliable way of measuring diets, and in the case of the Japanese and Italians he studied them soon after the second world war, when there were food shortages. Keys could have gathered data from many more countries and people (women as well as men) and used more careful methods, but, suggests Teicholz, he found what he wanted to find. A subsequent study by other researchers of 22 countries found little correlation between death rates from heart disease and fat consumption, and these authors suggested that there could be other causes, including tobacco and sugar consumption.

According to Truswell, USA male mortality reached its peak in 1967 or 1968 – 15 years after Teicholz claims. Truswell also states that heart disease reached its peak in 1978 in England and Wales and Scotland in 1973. [3] These dates are nowhere near the unsupported date of 1952 as claimed be Teicholz.

Smith is confusing the later Seven Countries Study with Keys’s minor discussion paper of 1953. Keys did not gather the data for this paper but used data from a number of existing sources.

Y&H criticised the 1953 paper in a document published in 1957. [4]

The Y&H paper (which uses FAO data from 1951-1953 that was published in 1956) shows the correlation between heart disease and total calories consumed, animal fat consumption and animal protein consumption at approximately 70%. They were disputing the classifications of heart disease and Keys’s methodology – not the lack of correlation.

Even if data from *all the 22 countries* are included, it still shows:

- positive correlations between heart disease and total calories consumed, fat consumption, animal fat consumption, and animal protein consumption, and
- negative correlations with heart disease and carbohydrate consumption, vegetable protein consumption, and vegetable fat consumption.

The above correlations are clearly noted in Y&H’s paper.

Note that Keys first presented his discussion paper in Amsterdam in 1952 which is before the time that the data used by Y&H was available.

Tobacco is not mentioned in this paper. Possibly Smith and Teicholz are confused by a later disagreement that Yerushalmy had with researchers who claimed that women who smoked had lower birth-weight infants. He suggested that smoking was not the cause of low-birth weight but the result of “mode of life” differences between the smoking population and non-smoking populations.

In recent years, far too much attention is paid to one page of a discussion paper written in the early 1950s. Keys writes, “the fact that the present high rate from degenerative heart disease in the United States is not inevitable is easily shown by the comparison with some other countries.” This was the purpose of the paper.

The comment that Keys could have gathered data from many more countries and people (women as well as men) obviously refers to Keys’s later Seven Countries Study – not the 1953 discussion paper. Keys explained why women were not involved – the invasiveness of the physical examinations and the fact that heart disease is much less prevalent in women.

An average of 95.9% of all eligible men participated in the Seven Countries Study — excluding the cohorts in the Netherlands and the U.S.

> William Banting, in 1864 in his best selling *Letter on Corpulence* and widely recommended by medical authorities until the 1950s. The diet was tested in the A TO Z Weight Loss Study in 311 overweight or obese premenopausal women over a year against three other diets, including that advocated by Dean Ornish, another US physician, which requires that fewer than 10% of energy comes from saturated fat.

Banting was 165 cm tall and weighed 92 kg at the start of his high-fat, low-carbohydrate diet. Over twelve months he lost 21 kg resulting in a weight of 76 kg. It was a big improvement but not exactly slim. He is still overweight with a BMI of 28.

Smith states that the Ornish Diet requires fewer than 10% energy from saturated fat. This simple view assumes that a criteria for a healthy diet is defined by the macronutrient ratio by energy intake. A person consuming a whole-food, plant-based diet as advocated by Ornish will consume about 10% fats, 10% protein and 80% carbohydrate. This diet will also be high in fibre, phytonutrients and low in saturated fats. Added oils are absent.

The Gardner study [5] referenced by Smith completely misrepresented the Ornish Diet. The diet consumed by the participants comprised of 52% carbohydrate, 30% fat and 18% protein. The amount of fibre consumed was very low at 19.3 g/d. Ornish wrote a letter to the editor of the journal complaining about the misrepresentation of his diet but it was not published.

Unfortunately, both Smith and Teicholz have numerous mistakes, For example, Teicholz describes cholesterol as being “yellow”—it is white. Lent is a 40-day period – not 48 days as described by Teicholz.

From the conclusion of *The Big Fat Surprise*, Teicholz proclaims:

> The advice that comes out of this book is that a higher-fat diet is almost assuredly healthier in every way than one low in fat and high in carbohydrates. […]
>
> Moreover, we now know that there are many good reasons to eat animal foods like red meat, cheese, eggs, and whole milk: they are particularly dense in nutrients— far more so than fruits and vegetables. […]
>
> And after all, red meat, cheese, and cream are delicious! Not to mention eggs fried in butter, cream sauces, and the drippings from a pan of roasted meats.

According to Ancel Keys, who originated the term, the best Mediterranean diet is “almost vegetarian (or lactovegetarian)” and consists of “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.” [6]

Perhaps Smith’s conclusion could be extended to, “it’s surely time for better science and for humility among popular commentators.”

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Deception From The BMJ

On 24th September 2015, BMJ issued a press release titled "***BMJ investigation questions expert advice underpinning new US dietary guidelines***" [1] The press release stated:

> 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" [2].

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.

I contacted The BMJ and received 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. [3]

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The Keto Diet Slays thte Opposition? - Not True

An article titled, ***How the Keto diet – even without exercise – slays the opposition***, by Derek Beres was published on *Think Big* website on 11th December 2017.[1]

Derek is a yoga and fitness instructor based in Los Angeles and author of the book *Whole Motion: Training Your Brain and Body for Optimal Health*. He advocates a diet based on the KETO Food Pyramid.

Derek advocates shunning rice (which is eaten by healthy Asians), corn & beans (eaten by healthy Hispanics and people of Central America) and bread & pasta (eaten by healthy Mediterranean communities) in favour of meat – eaten by unhealthy Americans, Europeans and Inuits.

He quotes a study by Gibas and Gibas[2] to support his claim. The Gibas article contends that ketosis is a useful and valid tool to control metabolic syndrome, diabetes and obesity.

Metabolic syndrome has not been defined in this paper.

The Adult Treatment Panel (ATP) III, definition that it consists of at least 3 of the following 5 conditions.[3]

- waist circumference greater than 102 cm (40 in) in men and 88 cm (35 in) in women
- serum triglycerides concentration of at least 150 mg/dL (1.7 mmol/L)
- serum high-density lipoprotein cholesterol concentration of less than 40 mg/dL in men and 50 mg/dL in women (1.0 mmol/L men and 1.3 mmol/L women)
- blood pressure of at least 130/85 mm Hg
- serum glucose concentration of at least 110 mg/dL (6.1 mmol /L)

The Gibas study examined 30 adults assessed by their doctor as having metabolic syndrome. All participants were overweight with a BMI of 25 or greater. Ten participants were randomly assigned to a ketogenic diet, ten to a Standard American Diet and ten to a Standard American Diet with exercise.

The references for this paper include a number of authors (J. Volek, R. Feiman, E. Westman) who have received funding from the Robert C. Atkins Foundation which supports research into low-carbohydrate nutrition.

The participants may have been randomly assigned to one of the three groups. However, the baseline measurements for weight were significantly different for the three groups which grossly distorts the results. For example, average weight for the ketogenic diet group was 240 pounds (109 kg) whilst the SAD (without exercise) was 190 pounds (86 kg) and SAD (with exercise) was 175 pounds (79 kg). Values are calculated from the graph as the original data is not provided.

> At the start of the trial, the average weight of the ketogenic group was 37% greater than the SAD exercise group and 25% higher than the SAD non-exercise group. Any results from this study are going to favour the ketogenic group as their initial conditions were more extreme. This is sufficient to completely invalidate the study.

The *Big Think* article states that the Ketogenic diet "slays the opposition". The Standard American Diet (SAD) was the only alternative that was compared to the Keogenic diet – presumably the same diet that placed the participants in their current state. So the claim that the Ketogenic diet "slays the opposition" is somewhat optimistic given the lack of any credible alternative.

The ketogenic diet consumed by the participants contained less than 30 g/day of carbohydrate. No other details of the diet were described. The alternative diet has not been described at all. The adequacy of a diet cannot be defined in terms of the macronutrient content – that is the proportion of energy obtained from carbohydrate, fat and protein.

A multitude of other factors determine the viability of a diet including the total amount of energy, amount of fibre, antioxidants and the source of fat and protein. It is simplistic to measure the proportion of carbohydrates, fats and proteins to determine the quality of a diet.

The trial only lasted for ten weeks which is insufficient time to adequately assess long-term health outcomes and the criteria recorded to measure the health status of the participants are very selective.

Despite cholesterol being part of the definition of metabolic syndrome, this was not measured.

High-fat and ketogenic diets:[4] [5] [6]

- Raise total cholesterol, LDL cholesterol, lipoprotein(a), triglycerides
- Homocysteine
- Fibrinogen and C-reactive protein (inflammation markers)
- Raise uric acid
- Raise IGF-1 which is associated with increased breast and prostate cancers
- Raise ketones (acetone, acetoacetate and β-hydroxybutyrate)
- Reduce coronary blood flow
- Reduce blood pH (blood becomes more acidic)

- Raise blood presssure
- Lower body temperature which reduces energy requirements
- Increase cortisol which is associated with stress

Ketogenic Diet Study

A study published in the journal *Nutrition and Metabolism* with the lead author Eric Westman is frequently cited by low-carbohydrate, high-fat diet advocates as evidence that low-carbohydrate, ketogenic diets are effective. The editorial board of this journal contains a number of low-carbohydrate, high-fat diet researchers.[7]

Overall, the completion rate was not high. Completion rate was greater for the low-glycemic group. Only 55% of the participants were able to complete the low-carbohydrate, high-fat ketogenic diet compared with 63% on the low-glycemic diet. The low-glycemic index diet was 36% fat which is not a low-fat diet. The average US diet is 33% fat by energy.

Participants were instructed to drink “bouillon dissolved in water was recommended 2–3 times a day during the first two weeks to reduce possible side effects.” This is to supply sodium and potassium to treat the side-effects of the ketogenic diet.

Headaches, constipation, diarrhoea, and insomnia were reported for both groups with a greater prevalence occurring in the ketogenic diet group. The paper stated that there was no significant difference between to two groups but the data supplied indicated otherwise.

Funding for this study was obtained from the Robert C. Atkins Foundation.

Seventh-day Adventist’s Studies

Seventh-day Adventist’s Studies (and many others) have shown that as the diet becomes more plant-based, the incidence of many ailments including obesity and diabetes decreases.[8]

Category	%	BMI	Type 2 diabetes Odds ratio*
Vegan No red meat, fish, poultry, dairy, eggs	4.2	23.6	0.51
Lacto-ovo vegetarians Vegan with eggs and milk	31.6	25.7	0.54
Pesco-vegetarians Vegan with fish, milk and eggs	11.4	26.3	0.70
Semi-vegetarians Red meat, poultry less than once a week plus fish, milk, and eggs	6.1	27.3	0.76
Non-vegetarians Red meat, poultry more than once a week plus fish, milk, and eggs	46.9	28.8	1

Much publicity is given to the longevity of the people of Japan and Okinawa (an archipelago that stretches from southern Japan to Taiwan). However, the healthiest population on the planet is the vegan Californian Seventh-day Adventists.[9]

Diabetes and Plant-based Diets

McDougall[10] showed significant improvement in diabetic and cardiovascular markers after seven days on a low-fat, plant-based diet. Carbohydrate intake was approximately 80% of total energy with fat representing 10% or less.

Barnard[11] compared a low-fat, plant-based diet to an American Diabetes Association diet. The plant-based diet out performed that ADA diet and showed a significant improvement in all markers measured over the 22 weeks of the trial.

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.

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 adhere strictly to their diet. Their cholesterol intake was reduced from an average of 291 mg/day to 24 mg/day. The ADA group reduced their intake from an average 317 mg/day to 189 mg/day. A vegan diet contains no cholesterol.

Criteria	Vegan	ADA
% of participants that reduced diabetic medication	43%	23%
Reduction in HbA1C	0.96	0.56
Reduction in HbA1C (Excluding those who reduced medication)	1.23	0.38
Body weight decrease (kg)	6.5	3.1
LDL cholesterol decrease (%) (Excluding those who reduced medication)	21.2	10.7
Reduction in urinary albumin (mg/24 h)	15.9	10.9

The Cause of Diabetes

Sweeney[12] [13] showed in 1927 that high-fat diets increase insulin resistance.

Students were fed their diets four highly improbable diets for two days: a high-fat diet, high-carbohydrate diet, high-protein diet and a fasting diet. A glucose tolerance test was performed on the morning of the third day.

After only two days on their experimental diets, the only group showing a normal, healthy response to the glucose tolerance test was the high-carbohydrate group. Both the high-fat and fasting diet showed – after only two days – a significant increase in insulin resistance.

The relationship between an increase in fats in muscle cells and insulin resistance has been documented since the late 1990s.[14] [15]

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.

Type 1 diabetes does result in an increase in glucose in the blood and urine but this does not mean that Type 1 diabetes is caused by a consumption of sugars or carbohydrates.

A paper, *Systematic review and meta-analysis of clinical trials of the effects of low carbohydrate diets on cardiovascular risk factors*, [16], claims that:

> LCD was shown to have favourable effects on body weight and major cardiovascular risk factors; however the effects on long-term health are unknown.

At least one of the authors, William S. Yancy, has received funding from *Robert C. Atkins Foundation*, which is committed to low-carbohydrate nutrition.

This study investigated 17 clinical trials involving 1.141 obese patients. Some results are highlighted below.

Criteria	< 6 months		6-11 months		12-23 months		> 23 months		All	
[Reference range]	n	Mean	n	Mean	n	Mean	n	Mean	n	Mean
Systolic BP (mm Hg) [<120]	5	-6.64	8	-5.19	7	-4.39	2	-1.67	22	-4.81
Fasting plasma glucose (mg/dL) [70-110] < 100 (optimal)	3	-0.67	7	-2.03	4	-3.56	2	3.50	16	-1.05
Fasting plasma glucose (mmol/L) [3.9-6.1] < 5.6 (optimal)	3	-0.04	7	-0.08	4	0.20	2	0.19	16	-0.06
LDL Cholesterol (mg/dL) [65-135] < 50 (optimal)	7	2.35	7	-0.30	6	-2.71	2	-3.27	22	-0.48
LDL Cholesterol (mmol/L) [1.7-3.5] < 1.3 (optimal)	7	0.06	7	-0.01	6	-0.07	2	-0.08	22	-0.01
Insulin (µIU/mL) [5-20]	2	-3.09	4	-2.56	3	-1.81	2	-1.07	11	-2.24
Insulin (pmol/L) [35-145]	2	-22	4	-18	3	-13	2	-8	11	16
Weight change (kg)	8	-6.82	9	-8.09	7	-6.33	4	-4.65	28	-7.04

The optimal results originate from Dr William Roberts, long-time editor of the American Journal of Cardiology.[17]

An examination of the table provides no evidence of an improvement.

- The average systolic blood pressure dropped 5 points. If a person has high blood pressure, that is not going to improve their health outcomes.
- The average fasting plasma glucose was reduced by 1.05 mg/dL (0.06 mmol/L). Given that the reference range is 70-110 mg/dL (3.9-6.1 mmol/L), do the authors really believe that such an insignificant difference is relevant.
- Similarly, the LDL cholesterol was reduced the miniscule amount of 0.48 mg/dL (0.01 mmol/L).

Low-carbohydrate diets are usually restricted in energy so weight loss is inevitable.

A much bigger study[18] investigated 17 studies involving 272,216 subjects. This examined the impact of low-carbohydrate diets on all-cause mortality. Their conclusion was:

> Low-carbohydrate diets were associated with a significantly higher risk of all-cause mortality and long-term harm and they were not significantly associated with a risk of CVD mortality and incidence.

Derek is the author of *Whole Motion: Training Your Brain and Body For Optimal Health*. He states that he is working on a new book about spiritual consumerism.

> **Slaughtering 8 billion animals annually in the US for "food" is not an example of spiritual consumerism.**
>
> **Consuming animal protein production that requires more than eight times as much fossil-fuel energy than the production of plant protein, is not an example of spiritual consumerism.[19]**
>
> **Consuming beef production takes 100,000 litres of water for every kilogram of food compared with soy production (2,000 litres for kilogram), rice (1,900 litres), wheat (900 litres) and potatoes (500 litres) is not an example of spiritual consumerism.[20]**

Producing beef consumes:

- 50 times more water than soy
- 52 times more water than rice
- 110 times more water than wheat
- 200 times more water than potatoes

Other posts relating to low-carbohydrate diets and ketogenic diets.

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What are the Benefits of a Low-Carbohydrate Diet in Treating Cancer?

The view that sugar causes cancer is prevalent in the popular press and on the internet.

A number of doctors and naturopaths hold this view. Since starches are digested as simple sugars then it is recommended that starches should also be avoided.

As a result, a low-carbohydrate diet is endorsed. Some ketogenic diets recommend high levels of vegetables which are high in nutrients but low in the amount of energy that is provided. The absence of starch from these diets results in a calorie restricted diet which is possibly ketogenic. If a diet is restricted in carbohydrates, it will be high in fat and protein.

Ketosis occurs when fat in the body is utilised to obtain energy in the absence of glucose. Glucose is obtained from the digestion of carbohydrates. Ketosis results in the production of ketones which includes acetone. Blood acidity rises with an increase in ketones.

Serious complications with a ketogenic diet have been reported, even when performed under medical supervision.[1] These issues relate to the high levels of protein and include headaches, nausea, lack of appetite, acidosis and hypoproteinemia. High levels of fat – any fat – has a negative impact on the endothelial cells of blood vessels and reduces the ability of the cells to produce nitric oxide.

Otto Warburg was awarded the Nobel Prize in Physiology or Medicine 1931 and nominated for the second time in 1944. He suggested that cancer growth was caused by “the replacement of the respiration of oxygen in normal body cells by a fermentation of sugar.” [2]

This talk appears to be one of the sources of the hypothesis that limiting carbohydrates is beneficial in treating cancers. Cancer cells do uptake glucose at a higher rate than normal cells but this does not imply that reducing carbohydrates is beneficial. Ketogenic diets cause acidosis which Warburg implicated as being conducive to cancer. Warburg was very particular in what he ate and advocated an organic, vegan diet – not a ketogenic diet.

Epidemiological studies comparing diet and rates of cancers have failed to show a link between carbohydrate intake and the rate of common IGF-1 related cancers such as breast, prostate, colon and rectal cancers.

Ken Carroll of University of Western Ontario (Canada) studied that components of the diet and the incidence of cancers in more than 30 countries. [3] [4] These studies showed a strong correlation with the prevalence of a number of cancers (breast, prostate, intestinal, leukeamia, rectal and pancreatic cancers), and the amount of fat in the diet. High levels of fat are frequently associated with high level of animal sourced foods.

Similarly, the *China-Cornell-Oxford Project* studied 65 counties in China. This showed a positive correlation between the amount of animal source foods and the levels of breast, prostate, colon and rectal cancers. The consumption of animal source foods and prevalence of these cancers is much less than in the USA.

Consumption of carbohydrates was ***negatively associated*** with the incidence of the above cancers.

A distinction must be made between added sugars consumed in isolation and carbohydrates that are consumed as part of a whole-food diet. Adding table sugar (sucrose) which is obtained from sugar cane and sugar beets to our diets is not beneficial to our health. High fructose corn syrup is another added sugar commonly found in processed food that has detrimental health benefits.

Cancer cells consume more glucose than normal cells but this does not imply that removing all sugars and carbohydrates from your diet will benefit cancer outcomes.

A study[5] published in 2012 investigated the effects of different types of sugars in the diet and their effect on cancer. This study investigated the association of ***total sugars, sucrose, fructose, added sugars, added sucrose and added fructose*** in the diet with the risk of 24 malignancies.

435,674 participants aged 50-71 years were followed for 7 years. These sugars were not associated with an increased risk of colorectal, breast, prostate, pancreatic or endometrial cancers or with other IGF-1 related cancers. Insulin-like growth factor-1 (IGF-1) is a hormone that promotes the growth of tissues including cancer cells.

All sugars studied were inversely associated with risk of ovarian cancer – the more sugar consumed then the risk of ovarian cancer was reduced.

There was an increased risk with some relatively rare cancers such as esophageal adenocarcinoma, pleural cancer and small intestinal cancers which the researchers suggested the “possibility of chance results”.

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The Big Fat Surprise

An article relating to Nina Teicholz book, *The Big Fat Surprise*, was printed in the Australian on 29th December 2014. Unfortunately, it is largely a repeat of misinformation and misunderstanding of the history of diet and cardiovascular research that is found in popular books and websites.

Whilst the current western diet is appalling and contributes to our poor health, it is absurd to contend that we have been lied to by the government, nutritionists and researchers. The contention that saturated fat from animals is actually quite good for you and cholesterol isn't really important is simply wrong and not supported by research.

Dr Ancel Keys is one person that the popular diet commentators love to demonise – a common label is "infamous". Keys did not lie, "cherry-pick" his data or manipulate results to confirm his hypothesis. There is a large body of evidence both before and after Keys' initial work regarding the role of fats in heart disease.

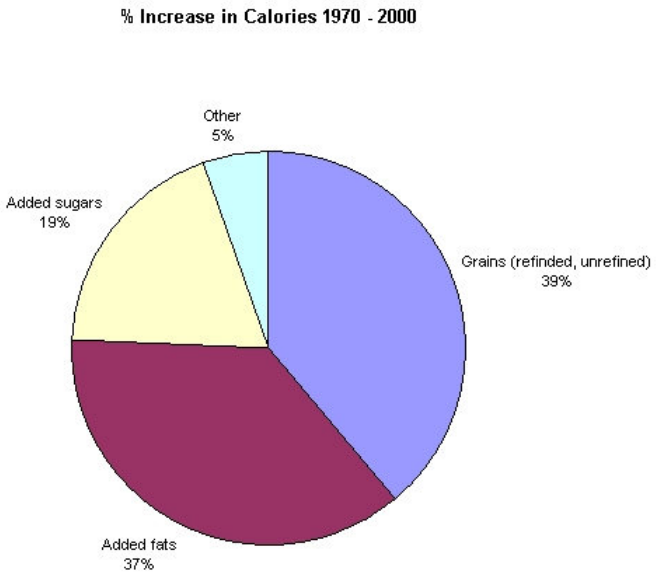
Unfortunately, the misinformation that is being propagated contributes to the increasing health crisis that these commentators contend that they are preventing.

Every preventable death is someone's husband, wife, father, mother, friend and acquaintance whose life is needlessly terminated prematurely and *The Big Fat Surprise* continues to propagate this misinformation.

From the introduction of *The Big Fat Surprise*, Teicholz claims that:

> Unaware of the flimsy scientific scaffolding upon which their dietary guidelines rest, Americans have dutifully attempted to follow them. Since the 1970s, we have successfully increased our fruits and vegetables by 17 percent, our grains by 29 percent, and reduced the amount of fat we eat from 43 percent to 33 percent of calories or less.

Teicholz neglects to inform us is that for the period 1970 – 2000, the consumption of total added fats (up 40%), dairy products (up 8%), cheese (up 107%), low fat milk (up 79%), all meat products (up 10%), poultry (up 89%) and fish (up 22%) increased. All of these food products, even low fat milk, are high fat foods.



The total calories consumed also rose significantly by 24%. (Data from United States, Department of Agriculture • Agriculture Fact Book 2001-2002)

The same publication shows the increase in different food groups from the 1950s.

Note that fats have 9 Cal/g whilst carbohydrates and protein have 4 Cal/g.

Item	1950-1959	2000	% change
Total Meats	138.2	195.2	41
Poultry	20.5	66.5	224
Fish	10.9	15.2	39
Added Fats and Oils	44.6	74.5	67
Total Calorific Sweeteners	109.6	152.4	39

USA Per Capita Annual Average (lbs)

The claim that the American people have been eating a "low-fat, near vegetarian diet for the last half-century" is absurd. Beef consumption may have reduced 20% but all meats have risen 10% and poultry 89%.

33% of calories from fat is NOT a low-fat diet.

It is reasonable to suggest that cholesterol and heart disease research originated with Nikolaj Anitschkow. This is how Nina Teicholz reports the situation in the early part of the 20th century.

> In 1913, the Russian pathologist Nikolaj Anitschkow reported that he could induce atherosclerotic-type lesions in rabbits by feeding them huge amounts of cholesterol. This experiment became quite famous and was widely replicated on all sorts of animals, including cats, sheep, cattle, and horses, leading to the widespread view that cholesterol in the diet—such as one finds in eggs, red meat, and shellfish—must cause atherosclerosis.

This research did NOT become famous. It was neglected for over 30 years.[1]

It was not replicated on cats (or rats or dogs) for decades because thyroid function in carnivores converts cholesterol into bile salts and does not raise serum cholesterol levels. Dietary cholesterol does increase serum cholesterol in humans that have comparative low initial serum cholesterol levels. "Normal" serum cholesterol levels are much higher in humans than other species.

Teicholz claims that:

> The hypothesis that saturated fat causes heart disease was developed in the early 1950s by Ancel Benjamin Keys.

This another rewrite of the actual history of cardiovascular research. In the early 1950s, Keys implicated fats, not saturated fats, as being implicated in heart disease. (The causes are more complex and the role of saturated fats was discovered several years in the future.)

Keys was certainly not the first person to link diet and fats to heart disease.

Cornelius de Langen worked as a doctor in the Dutch East Indies from 1916-1922, (yes 1916). 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.[2]

Lester Morrison in 1946 also linked diet, cholesterol and heart disease before Keys.

Dr John Gofman, a nuclear physicist, was a leading pioneer researcher in the field of lipoproteins who was familiar with Anitschkow's work. His work showed that both cholesterol and low-density lipoproteins were both indicators of coronary heart disease risk. This work and other evidence convinced Gofman that blood cholesterol, and the dietary determinants of blood cholesterol, was centrally important in atherosclerosis. His wife, Dr. Helen F. Gofman co-authored a low-fat, low-cholesterol diet book [3] that was published in 1951 – prior to Keys' paper. John Gofman wrote the preface for the book.

Teicholz cites Norman Joliffe's 1957 study, *The Anti-Coronary Club*, as further evidence of the failure of a low-fat diet to arrest heart disease.

According to Teciholz,

> A decade into the trial, however, investigators discovered that 26 members of Jolliffe's diet club had died, compared with only six men from the control group. Eight members of the club had died of heart attacks.

However, according to the paper *The Anti-Coronary Club – A Dietary Approach To The Prevention of Coronary Heart Disease – A Seven-Year Report*, states that the incidence of new cases in the *Active Group* was 339 compared with 980 per 100,000 on the *Control Group*. The same report states that there was 8 new events (note that it is 8 new events, not deaths) for the *Active Group* and 12 new events for the *Control Group*. Despite Teicholz's claims, the number of deaths was not reported.

The *Active Group* had a ***much*** higher level of risk factors than the control group.

Another criticism from Teicholz states,

> Critics have pointed out that Dr. Keys violated several basic scientific norms in his [Seven Countries] Study. For one, he didn't choose countries randomly but instead selected only those likely to prove his beliefs, including Yugoslavia, Finland and Italy. Excluded were France, land of the famously healthy omelet eater, as well as other countries where people consumed a lot of fat yet didn't suffer from high rates of heart disease, such as Switzerland, Sweden and West Germany.

Teicholz does not state which critics. Keys does give reasons why he choose the countries. Note that Keys and his colleagues were not studying countries. Paul Dudley White, the esteemed cardiologist, was involved in the selection of the regions. They selected 16 different, contrasting regions in 7 countries. There are wide regional variations in the diets of France with 8 distinct dietary regions. Similarly, there are wide variations in diet in rural and coastal areas, with Finland being particularly notable.

According to a paper in the *Dialogues of Medicine – Vol 13 No 3 2008*[4], the French paradox is indeed a myth.

> The clear conclusion, driven by the facts as summarized 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'

Teicholz states,

> As it turns out, Dr. Keys visited Crete during an unrepresentative period of extreme hardship after World War II.

There were 3 rounds of surveys in Crete in 1960, 1965 and 1970 which were many years (decades) after the end of World War II. Keys did not work isolation. He worked with teams that included native speaking researchers.

Jacob Yerushalmy and Herman Hilleboe strongly criticised Keys for "cherry-picking" data in his 1953 paper'. They examined the data from all of the 22 countries in the *WHO Epidemiological and Vital Statistics 1951-1953* publication. The results were published in their paper *Fat in the diet and mortality from heart disease*. Even when taking all of the 22 countries into account, their conclusion revealed that:

> For each of the heart disease groupings the strongest association is with the total number of calories from animal protein.

Their paper also revealed positive correlations between heart disease and calories consumed, fat consumption, animal fat consumption, animal protein consumption which is ignored by Teicholz. The paper also revealed negative correlations with heart disease and carbohydrate consumption, vegetable protein consumption, vegetable fat consumption.

Teicholz uses both the Inuit and Masai as examples of healthy populations that thrive on a high fat diet.

Inuit are far from being a healthy population They suffered from osteoporosis, a very high rate of stroke, kidney disease, parasites including toxoplasma, atherosclerosis and glucose intolerance. Parasitic infections lower blood cholesterol.

In 1906, Vilhjalmur Stefansson lived with the Inuit in northern Canada, living and eating with his hosts. A *Time* magazine article from March 31 1930, *Medicine: All-Meat Controversy* describes Stefansson and a colleague Karsten Anderson consuming a flesh only diet for a year. This experiment was funded partly by *Institute of American Meat Packers*.

They suffered constipation, their muscles were “soft and flabby” and suffered from glucose intolerance and acetonuria. Their urine acidity increased. Anderson suffered from glycosuria. However, the researchers, sponsored by the meat industry, reported “no ill-effects”.[5]

Similarly, Teicholz cites the Masai as a healthy population that had a high meat diet. She quotes the work of George Mann, a doctor and medical researcher from Harvard and Vanderbilt Universities. According to Teicholz, Mann found that “he could identify almost no heart disease at all“. [6] However, according to George Mann’s paper, *Atherosclerosis In The Masai,*[7]

> Measurements of the aorta showed extensive atherosclerosis with lipid infiltration and fibrous changes but very few complicated lesions. The coronary arteries showed intimal thickening by atherosclerosis which equaled that of old U.S. men.

Masai also have a very low energy intake in the foods, are active and suffer from parasitic infections – all which contribute to low serum cholesterol and lower the risk of heart disease.

In chapter 2, there is an incorrect diagram of a fatty acid with a caption A Fatty Acid Is a Chain of Carbon Atoms Surrounded by Hydrogen Atoms. Two of the carbon atoms only have 3 hydrogen atoms (high school chemistry tells as that there should be 4 hydrogen atoms). It is also missing the carboxyl group at one end that contains two oxygen atoms.

The focus on any one component of a diet such as fats, saturated fats or sugars is misleading.

Ancel Keys coined the name and introduced the concept of Mediterranean diet In 1975, Ancel Keys and his wife Margaret published the book *How to Eat Well and Stay Well the Mediterranean Way* (New York, NY: Doubleday & Co; 1975) based on the results of his studies. This diet was based on the diets of Greece, southern Italy and the Mediterranean coasts of France and Spain in the 1960s.

According to Keys,[8]

> The heart of what we now consider the Mediterranean diet is mainly vegetarian: 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.

Ancel Keys and his wife Margaret lived a village in southern Italy for 28 years. Keys lived to be 100 years old and his wife 97.

A Mediterranean diet or a Whole Food Plant-Based diet as practiced by societies that are longest lived and healthiest is, by it’s nature, low in fats, saturated fats, animal protein and high in carbohydrate, antioxidants, dietary fibre, vitamins, minerals and the many other micro nutrients that are essential for our well being.

Other related articles are:

Ancel Keys and the High-Fat Diet “Experts”
Ancel Keys did not manipulate his data
Robert Lustig and the Men Who Made Us Fat
TIME Magazine Article – Eat Butter
TIME Magazine Article – Eat Butter – Part 2
Heart of the Matter – ABC Catalyst
The Pioppi Diet

Footnotes

1. Steinberg, D. (2007) *The Cholesterol Wars: The Skeptics vs. the Preponderance of Evidence*. San Diego, CA: Academic Press.
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TIME Magazine Article - Eat Butter

It is with alarm that I read Bryan Walsh's article *Ending the War on Fat* that was published in TIME magazine on 23 June 2014.[1] According to Walsh,

> Keys' work became the foundation for a body of science implicating fat as a major risk factor for heart disease. The Seven Countries Study has been referenced close to 1 million times. But Keys' research had problems from the start. He cherry-picked his data.

If the book has really been "referenced close to a million times", it means that it has been referenced close to 80 times every day, including weekends, since the book was published in 1980.

Walsh claims that Keys "cherry-picked" his data. It is evident that Walsh has confused with Keys' 1953 paper Keys' paper, *Atherosclerosis, A Problem in Newer Public Health* and his later study *Seven Countries, A Multivariate Analysis of Death and Coronary Heart Disease*.

Walsh fails to elaborate on how Keys "cherry picked" his data. Commencing in 1957, the *Seven Countries Study* studied 12,763 men in 16 regions in seven countries. What data was omitted from this study? How was the data "cherry-picked"?

Keys collaborated with a number of highly regarded researchers, people who spoke the native language of the areas studied. He lists 15 collaborators in *the Seven Countries* book. According to Henry Blackburn, [2]

> At this time, Keys's matchup with great clinicians completed the picture – such leaders as Paul Dudley White of Boston, Vittorio Puddu of Rome, Noboru Kimura of Japan, John Brock of Capetown, Martti Karvonen of Helsinki, and Christ Aravanis of Athens. All saw beyond the clinic and beyond the individual patient – to the origins of common diseases – in the population and in society.

Paul Dudley White was a highly regarded and renowned cardiologist and is frequently viewed as a leader in preventive cardiology.

TIME magazine article contends that Keys manipulated data for his own purposes and at the same time managed to deceive for decades his collaborators who actually collected the data.

Popular commentators frequently falsely accuse Keys of manipulating data in his 1953 paper, *Atherosclerosis, A Problem in Newer Public Health*. In this paper, Keys lists death rates from 16 countries for the period 1947-1949. He excludes some of this data for reasons that are explained.

Jacob Yerushalmy and Herman Hilleboe examined the data from 22 countries (33 were available) in the *WHO Epidemiological and Vital Statistics 1951-1953* publication. The results were published in their paper *Fat in the diet and mortality from heart disease.* In this paper, Yerushalmy and Hilleboe criticise Keys for excluding data in his considerations. Note that Keys' paper was presented in January 1953. An earlier version was presented several months earlier in Amsterdam. Yerushalmy and Hilleboe used World Health Organisation data from the years 1951-1953. Does it need to be explicitly stated that Keys's paper was written long before the WHO data was available?

Please, please note that even if data from *all* the 22 countries are included, it still shows:

- positive correlations between heart disease and calories consumed, fat consumption, animal fat consumption, animal protein consumption and
- negative correlations with heart disease and carbohydrate consumption, vegetable protein consumption, vegetable fat consumption.

> This point is clearly stated in Yerushalmy and Hilleboe's paper, but it is unfortunately omitted from Walsh's article.

Norman Jolliffe and Morton Archer wrote a paper, *Statistical associations between international coronary heart disease death rates and certain environmental factors*. (*Journal of Chronic Diseases* 9 No 6, 1959) that examined Yerushalmy and Hilleboe's conclusions.

Jolliffe and Archer state that Yerushalmy and Hilleboe erred in disregarding the distinction between saturated fat and polyunsaturated fat. This distinction was not known when Keys wrote his original paper.

Jolliffe and Archer state that,

> the intake of saturated types of fat was most important in accounting for the differences in coronary heart disease death rates. Of somewhat lesser importance, the intake of animal protein also accounted for a large proportion of the explained variance in these death rates.

According to Walsh:

> Keys highlighted the Greek island of Crete, where almost no cheese or meat was eaten and people lived to an old age with clear arteries. But Keys visited Crete in the years following World War II, when the island was still recovering from German occupation and the diet was artificially lean. Even more confusing, Greeks on the neighboring isle of Corfu ate far less saturated fat than Cretans yet had much higher rates of heart disease.

Corfu and Crete are separated by over 600 km of ocean and dozens of islands – it is not a neighbouring island.[3] Surveys for the *Seven Countries Study* were conducted in Greece in 1960 and 1965. This is clearly not in the years immediately following World War II. It is false to state that the diet was “artificially lean”. It is simply not true that “almost no cheese or meat” was eaten.

Cohort	Meat (g/day)	Fish (g/day)	Eggs (g/day)	Cheese (g/day)	Milk (g/day)
Crete	35	18	25	13	235
Corfu	35	60	5	14	70

Edit

Significant differences in Cretan and Corfu diet include egg, fish, alcohol, milk, cereal and potato consumption, which is ignored in Walsh's article. There is also a difference in smoking habits which is also ignored in Walsh's article.[4]

Walsh claims that people of Corfu ate far less saturated fat than the Cretans. Where did this information come from? Below is a comparison of data from Crete, Corfu and East Finland with 10-year death rates.[5]

Cohort	Sample Size	All Causes Deaths	All Causes Death Rate	CHD Deaths	CHD Death Rate	Fat %	Saturated Fat %
Crete	686	42	656	1	9	39	8
Corfu	529	43	833	8	144	33	7
East Finland	817	147	1864	78	992	38	22

Edit

CHD – Cardiac Heart Disease; Aged Standardised Death Rate per 10,000

The amount of saturated fat consumed was very similar. Cretans ate more fat, in the form of olive oil.

The number of heart disease deaths for both Crete and Corfu were very low.

The focus on any one component of a diet such as saturated fats or sugars is misleading.

Ancel Keys coined the name and introduced the concept of Mediterranean diet In 1975, Ancel Keys and his wife Margaret published the book *How to Eat Well and Stay Well the Mediterranean Way* (New York, NY: Doubleday & Co; 1975) based on the results of his studies. This diet was based on the diets of Greece, southern Italy and the Mediterranean coasts of France and Spain in the 1960s.

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A Mediterranean diet or a Whole Food Plant-Based diet as practiced by societies that are longest lived and healthiest is, by it's nature, low in fats, saturated fats, animal protein and high in carbohydrate, antioxidants, dietary fibre, vitamins, minerals and the many other micro nutrients that are essential for our well being.

There is a reference in Walsh's article to papers by Patty Siri-Tarino and Rajiv Chowdhury. Walter Willet, Frank Hu, Stewart Truswell and Jeremiah Stamler have raised serious concerns regarding the conclusions of these papers. In some cases, Siri-Tarino and Chowdhury have managed to draw the opposite conclusions to the facts presented in the original papers that they reference.

Unfortunately, these papers are now referenced by popular commentators to encourage

people to continue eating unhealthy diets.

Much of this poorly researched article is based on popular books and does not stand up to scrutiny. Many popular books confuse the *Seven Countries Study* with the earlier 1953 paper.

A number of "experts" quoted in the article are supporters of the Atkins Foundation, promoters of a high fat, low carbohydrate diet that has been shown to be a considerable health risk. Stephen Phinney, Jeff Volek and Eric Westman are authors of *The New Atkins for a New You,* written on behalf of Atkins Nutritionals, an organisation committed to "groundbreaking work in the area of low-carb living."

Robert Atkins died at the age of 72, obese and with a history of cardiac problems.

According to a review in 2003 review in the *Journal of the American College of Nutrition*,

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> **When properly evaluated, the theories and arguments of popular low-carbohydrate diet books … rely on poorly controlled, non-peer-reviewed studies, anecdotes and non-science rhetoric. . . . A closer look at the science behind the claims made for these books reveals nothing more than a modern twist on an antique food fad.**
>
> **Journal of the American College of Nutrition**

Bryan Walsh has performed a great disservice to TIME magazine readers by presenting popular views that have now become "facts".

Other related articles are:

Ancel Keys and the High-Fat Diet “Experts”
Ancel Keys did not manipulate his data
Robert Lustig and the Men Who Made Us Fat
The Big Fat Surprise
TIME Magazine Article – Eat Butter – Part 2
Heart of the Matter – ABC Catalyst
The Pioppi Diet

Footnotes

1. Walsh, B. (2014) *Don’t Blame Fat*. TIME Magazine - 23 June 2014
2. Blackburn, H. W. (1995) On the Trail of Heart Attacks in Seven Countries. Mine: University of Minnesota. [online]. Available from: Seven Countries Study (Accessed 3 June 2016)
3. "Greece location map" by Lencer - own work, using United States National Imagery and Mapping Agency data. Licensed under CC BY-SA 3.0 via Wikimedia Commons - commons.wikimedia.org/wiki/File:Greece_location_map.svg#/media/File:Greece_location_map.svg
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TIME Magazine Article - Eat Butter - Part 2

TIME magazine published an article by Bryan Walsh that appeared in TIME magazine on 23 June 2014.

> The cover of the magazine asserts "***Eat Butter. Scientists labeled fat the enemy. Why they were wrong***."
> Unfortunately, much of the evidence that Walsh presents in the article "***Don't blame the fat***" is simply wrong and misleading.

Walsh states that between 1977-2012, egg consumption fell 9%, beef 37% and milk 72%.

For the period 1970 – 2000, total added fats (up 40%), dairy products (up 8%), cheese (up 107%), low fat milk (up 79%), all meat products (up 10%), poultry (up 89%) and fish (up 22%) increased. These significant increases were not included in Walsh's report. All of these food products, even low fat milk, are high fat foods.

The total calories consumed also rose significantly by 24%.

Item	Units	1970-1979	2000	Change
Energy	Kcal / capita	2170	2700	24%
Total added fats	lb / capita	53.4	74.5	40%
Butter	lb / capita	4.7	4.6	-2%
Margarine	lb / capita	11.2	8.2	-27%
Dairy products	lb / capita	548	593	8%
Cheese	lb / capita	14.4	29.8	107%
Whole milk	lb / capita	21.7	8.1	-63%
Low fat milk	lb / capita	8.1	14.5	79%
All meat	lb / capita	177.2	195.2	10%
Beef	lb / capita	80.9	64.4	-20%
Poultry	lb / capita	35.2	66.5	89%

Item	Units	1970-1979	2000	Change
Fish	lb / capita	12.5	15.2	22%
Eggs	Number	285	250	-12%
Fruit	lb / capita	248	279	13%
Vegetables	lb / capita	338	428	27%
Grain	lb / capita	138	199	44%
Calorific sweeteners	lb / capita	123.7	152.4	23%

Data from United States, Department of Agriculture • Agriculture Fact Book 2001-2002

Insulin resistance is caused by high fat diets – not a consumption of sugar. In type II diabetes, insulin is created in the pancreas and is transported via the blood to each cell. However, the insulin is unable to pass through the cell membrane – a condition known as insulin resistance. This is due to a build up of fat (intramyocellular lipids) inside muscle cells.[1]

Walsh states that, “fat and meat raises the sense of satiety”. Fruits, vegetables and grains as whole foods are less energy dense than animal foods and added fats. There are few calories in an equal volume of these foods than high fat foods such as oils and meat. Fats have 9 KCalories per gram – carbohydrates and protein have four KCalories per gram. Fruits, vegetables, and grains have a lot of fibre – you feel full but does not contribute to the amount of calories consumed.[2]

Walsh states that, “high levels of triglycerides are linked to heart disease”. High levels of triglycerides are only a moderate indicator of heart disease.

Walsh states that “there are two types of LDL (low density lipoproteins: large and fluffy which are raised by saturated fats that are benign – small and dense that are raised by carbohydrates”. This is an incorrect and misleading argument put forward by low carbohydrate diet proponents. It is not true. The assumption is made that the large, fluffy LDL particles cannot enter the arterial wall. They can. According to Evan Stein,

> **Subclass studies (of LDL) have proliferated over the last few years, but many of these studies were funded or subsidized either by suppliers of the assays as a method to expand their use and move them into mainstream practice, or by pharmaceutical companies in an attempt to claim some advantage over other therapeutic agents, especially when the LDL-C or Apo B reducing ability of their drug was less competitive. Although these studies have created more heat, they provide little additional light.**
>
> **Are Measurements of LDL Particles Ready for Prime Time?**
> **Clinical Chemistry September 2006 vol 25 No 9 1643-1644**
> **Evan A Stein**

Despite all of this, Walsh's conclusions are not too dissimilar to mine. Walsh states we should be aiming for a "whole food diet". I suggest that a "whole food, pant-based diet", as advocated by Professor Colin Campbell, Dr Dean Ornish, Dr John McDougall and Dr Caldwell Esselstyn, is our optimal diet.

Other related articles are:

Ancel Keys and the High-Fat Diet "Experts"
Ancel Keys did not manipulate his data
Robert Lustig and the Men Who Made Us Fat
The Big Fat Surprise
TIME Magazine Article – Eat Butter
Heart of the Matter – ABC Catalyst
The Pioppi Diet

Footnotes

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Heart of the Matter - Abc Catalyst

The Australian Broadcasting Corporation *Catalyst* program series produced a 2 part program collectively titled *Heart of the Matter*. The programs are titled *Dietary Villains* and *Cholesterol Drug War*. These programs were aired in October 2013.

The presenter and co-producer is Dr Marianne Demasi. The medical “experts” interviewed include Dr Michael Eades, Dr Jonny Bowden and Dr Stephen Sinatra. Science and medical writer Gary Taubes was also interviewed.

Eades is a medical doctor specialising in obesity. Bowden a PhD in nutrition from a non-accredited university. Sinatra is a medical doctor and cardiologist.

All sell supplements to support their nutritional programs and they have not published papers in peer-reviewed journals.

Demasi opens the program with the assertion:

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

The program claims that evidence linking saturated fats, cholesterol, and heart disease is based on “bad science”. The program declares that the idea that saturated fat raises cholesterol arose in the 1950s by Ancel Keys. The myths surrounding Ancel Keys have been addressed in other chapters.

Lyon Diet Heart Study

The *Catalyst* program *Heart of the Matter* references the *Lyon Diet Heart Study* as evidence that cholesterol is not implicated in heart disease. If you actually read the *Final Report of the Lyon Diet Heart Study* [1] , it clearly states that cholesterol is indeed implicated in heart disease.

The *Lyon Diet Heart Study* is 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 *Final Report of the Lyon Diet Heart Study* shows that "the data confirm the impressive protective effect of the Mediterranean diet." It also states, "major traditional risk factors, such as high blood cholesterol and blood pressure, were shown to be independent and joint predictors of recurrence."

This report concludes, that "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."

This is not the conclusion that *Catalyst* managed to derive from the *Lyon Diet Heart Study*.

This report also states that an increased leukocyte count increased the risk of heart disease.

George McGovern

Catalyst showed recordings of the U.S. Senate Select Committee on Nutrition hearings, chaired by Senator George McGovern. It showed an unnamed, heroic scientist passionately 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.[2]

As a member of the National Academy of Science, Olson co-authored a report *Toward Healthful Diets*[3] that extolled the virtues of the high-fat, high-meat American diet.[4]

McGovern was born in 1922 in small farming community in the south of South Dakota. His

father was a Methodist minister, who served the impoverished and hungry communities of South Dakota during the extreme hardships of the depression of the 1930s. McGovern served as a bomber pilot in Europe during the Second World War, earning an Air Force medal with three Oak Clusters and the Distinguished Flying Cross. McGovern was a skilled pilot and leader, who managed to landed his badly damaged bomber on several occasions— once with his co-pilot friend dead next to him. He was a senator of South Dakota from 1963 to 1980. He was the first director of the Food for Peace program in 1961 and was involved in the creation of the United Nations' World Food Programme. McGovern was the chairman of the Senate Select Committee on Nutrition and Human Needs from 1968 to 1977.[5]

In 1998, McGovern served a three-year term as United States' ambassador to the United Nations' Agencies for Food and Agriculture during President Clinton's administration. He worked with Bob Dole (U.S. Congressman from Kansas, 1961– 1996) to create the McGovern-Dole International Food for Education and Child Nutrition Program in 2000. In 2000, Clinton presented McGovern with the Presidential Medal of Freedom, the nation's highest civilian honor, in recognition of McGovern's service in the effort to eradicate world hunger. In October 2001, McGovern was appointed as the UN Global Ambassador on World Hunger and remained in that position until his death in October 2012, at the age of 90.

The first draft of the McGovern Report (1977), linking heart disease and food, caused such a tumult that major revisions were required before it was released for publication. In the Catalyst program, Eades claims that "McGovern himself was from a big wheat-growing state, so it didn't hurt him politically that people moved away from foods of animal origin into breads and pastas." As well is being a large wheat producing state, South Dakota also produces livestock. Much of the grain produced is used to raise livestock. McGovern believed that he and five other senators from agricultural states lost seats in November 1980, partly as a result of this report.[6] McGovern was not re-elected to office— any office — after the November 1980 senate elections. The notion that McGovern was driven by political motives cannot be substantiated and collapse with a little scrutiny.

Six Countries Study

Ancel Keys' paper *Atherosclerosis: A Problem in Newer Public Health* paper was presented in New York in January 1953. This paper is commonly referred to as the *Six Countries Study*. He stated that the present high rate of death from degenerative heart disease is not inevitable by showing comparisons with other countries. [7]

J Yerushalmy and H Hillboe criticised the paper *Atherosclerosis: A Problem in Newer Public Health* in the publication *Fat In The Diet and Mortality From Heart Disease* [8] , claiming that Keys only choose 6 countries that supported his hypothesis. They state Keys did not give reasons for his selection. This is clearly incorrect. If you read Keys' paper, Keys did give the reasons for choices.

Jacob Yerushalmy and Herman Hilleboe examined the data from 22 countries (out of a possible 33) in the *WHO Epidemiological and Vital Statistics 1951-1953* publication. The results were published in their paper *Fat in the diet and mortality from heart disease.*

Note that Keys' paper was presented in Amsterdam in late 1952 and later in New York in January 1953. Yerushalmy and Hilleboe used World Health Organisation data from the years 1951-1953, which was published in 1956.

Even if data from **all the 22 countries** are included, it still shows:

- positive correlations between heart disease and calories consumed, fat consumption, animal fat consumption, animal protein consumption and
- negative correlations with heart disease and carbohydrate consumption, vegetable protein consumption, vegetable fat consumption.

Hillboe later co-authored a paper *Risk Factors in Ischemic Heart Disease* in Vol 53 No 3 *American Journal of Public Health* showing that "high cholesterol was the greatest risk factor of any single variable in ischemic heart disease".

In the conclusion of this paper, Keys states that there is sufficient evidence to "warrant a

large extension of this type of epidemiological research". His views were refined with later studies including the *Seven Countries Study*.

Ancel Keys, the "Six Countries Study" and Seven Countries Study are examined in more detail in the following articles.

Ancel Keys and the high fat experts
Ancel Keys did not manipulate his data

Cholesterol Recommendations

Dr Bill Roberts (previous long-time editor of the medical journal *Cardiology*), Dr Bill Castelli (director of the Framingham Heart Study), Dr Caldwell Esselstyn (surgeon at the Cleveland Clinic) have stated that they have never seen a heart disease fatality when cholesterol levels are below 150 mg/dL (3.9 mmol/L). [9]

Dr John Mcdougall recommends the same guidelines and recommends oat bran, garlic, vitamin C, vitamin E and niacin if there is difficulty in reaching this level. [10]

He also states that *HDL "Good" Cholesterol is Not Worth Your Attention* because HDL cholesterol will fall as total and LDL cholesterol falls. [10] [11]

The Catalyst conclusion that a low-fat high carbohydrate Mediterranean style diet is the best way to avoid heart disease is consistent with Ancel Keys' conclusion. The producers are apparently unaware that it was Ancel Keys who devised the concept of the Mediterranean Diet based on the He based his version of the Mediterranean Diet on the diets of Greece, southern Italy and the Mediterranean regions of France and Spain of the 1960s. He and his wife Margaret wrote three popular books [12] [13] [14] espousing the virtues of this diet.

It is in stark contrast with the high fat, high protein diet advocated by Gary Taubes. [15]. Even more effective than a Mediterranean-style diet is a whole-food, plant-based diet as advocated by Professor Colin Campbell, Dr Caldwell Esselstyn, Dr Dean Ornish, Dr Neal Barnard, Dr John McDougall and Dr Michael Greger.

Other related articles are:
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Ancel Keys did not manipulate his data
Robert Lustig and the Men Who Made Us Fat
The Big Fat Surprise
TIME Magazine Article – Eat Butter
TIME Magazine Article – Eat Butter – Part 2
The Pioppi Diet

Footnotes

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8. Yerushalmy, J. & Hilleboe, H. E. (1957) *Fat in the Diet and Mortality from Heart Disease*.
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14. Keys, A. & Keys, M. (1975) *How to eat well and stay well the Mediterranean way*. Doubleday, Garden City, NY.
15. Greger, M. (2005) *Carbophobia: The Scary Truth about America's Low-Carb Craze*. New York: Lantern Books.

Ancel Keys did not Manipulate His Data

Popular commentators frequently accuse Keys of manipulating data in his 1953 paper, *Atherosclerosis, A Problem in Newer Public Health*.[1]

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 1952 and in January 1953 in New York.

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. United States compared unfavourably to all countries and Keys believed that what was possible for other countries “should be possible for Americans.” 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. The increase in Portugal’s mortality rate is attributed to tuberculosis and violence.

AGE	40–44		50–54		60–64	
Sex	M	F	M	F	M	F
Australia	75	91	87	96	94	94
Belgium	96	89	91	96	97	101
Canada	78	91	76	92	84	96
Denmark	59	83	63	88	70	100
England & Wales	68	78	76	83	93	88
France	96	100	91	91	93	91
Ireland	80	78	57	86	69	88
Italy	91	100	77	88	75	97
Netherlands	52	69	56	76	63	89
New Zealand	55	72	66	81	85	88
Norway	64	78	53	65	54	68
Portugal	139	125	99	96	99	103
Scotland	93	97	93	100	97	107
South Africa	93	108	102	115	94	104
Sweden	61	86	63	85	68	92
Switzerland	78	97	78	97	88	108
Mean	79.9	90.1	76.8	89.7	82.7	94.6

Death rates from all causes in 16 countries
All values from 1947-1949
Expressed as a percentage of rates in US at 1949.

On page 17 of this 22-page paper, Keys graphed the mortality rate for degenerative heart disease and fat intake for six countries that he stated had “fully comparable dietary and vital statistics data.” The food data was obtained from FAO for the year 1949.

This graph causes a great deal of consternation in the popular press. The claim is made that Keys “cherry-picked” his data, which is stating that he was dishonest.

Yerushalmy and Hilleboe criticized this paper in the publication *Fat in the Diet and Mortality from Heart Disease*,[2] claiming that Keys only choose 6 countries (Japan, Italy, England & Wales, Australia, Canada, U.S.) that supported his hypothesis instead of using the World Health Organization data from the 22 countries that was available. 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.

Even if data from all the 22 countries are included, it still shows:

- positive correlations between heart disease and total calories consumed, fat consumption, animal fat consumption, and animal protein consumption, and
- negative correlations with heart disease and carbohydrate consumption, vegetable protein consumption, and vegetable fat consumption.

This observation is clearly stated in Yerushalmy and Hilleboe's paper. Yerushalmy and Hilleboe were criticising the methodology and the classifications and sub-classifications of heart disease that were used. They were not criticising the lack of correlation.

Using the data supplied by Yerushalmy and Hilleboe for all of the 22 countries, it shows the following correlations.

- % fat in diet and heart disease – 55%
- % saturated fat in diet and heart disease mortality – 69%
- % animal protein in diet and heart disease mortality – 70%

As a generalization, 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.

Taubes, Teicholz and other popular commentators ignore the fact that Yerushalmy and Hilleboe found the greatest correlation with the percentage of animal protein and heart disease. Once again, that is simply being dishonest. (Note the difference is insignificant – and saturated fat and animal protein are often found in the same food.)

In the book *The Big Fat Surprise: why butter, meat, and cheese belong in a healthy diet*, Nina

Teicholz claims that,[3]

> This connect-the-dot exercise in 1952 [The “Six-Countries Study”] was the acorn that grew into the giant oak tree of our mistrust of fat today. All of the ailments that have been ascribed to eating fat over the years— not just heart disease but also obesity, cancer, diabetes, and more— stem from the implantation of this idea in the nutrition establishment by Ancel Keys and his perseverance in promoting it. Now, as you eat a salad with a lean chicken breast for lunch and choose pasta over steak for dinner, those choices can be traced back to him. The influence of Keys on the world of nutrition has been unparalleled.

Keys was opposed to dietary guidelines and advocated “our” version or the Mediterranean Diet, which based on the diets of Greece, southern Italy and the Mediterranean regions of Spain and France in the 1960s.

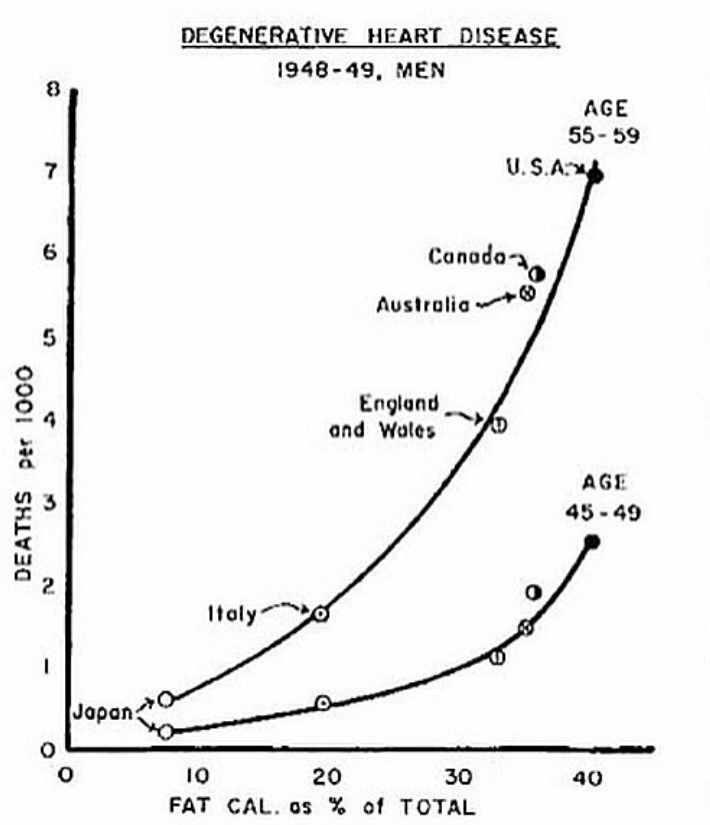
> Homemade minestrone; pasta in endless variety always freshly cooked, served with tomato sauce and a sprinkle of cheese, only occasionally enriched with some bits of meat, or served with a little local sea food without any cheese; a hearty dish of beans and short lengths of macaroni (pasta e fagioli); 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.[4]

> 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.[5]

Below are extracts from Teicholz's book as she tries to justify her argument that Keys manipulated his results. The data that Teicholz has added is shown in red text. It is clear that it is from a completely different set of data to that supplied by Keys. Teicholz has added data for *Great Britain for the years 1951-1953* whilst Keys used data for *England and Wales for the year 1949* supplied by the Food and Agriculture Organization of the United Nations. The 22 countries that is frequently cited comes from Yerushalmy and Hilleboe.

If you go back to the original Food and Agriculture Organization document for the year 1949, you will discover that there were actually 36 countries available. Perhaps we should be asking why Yerushalmy and Hilleboe only included 22 countries. No – not really, it is irrelevant.

What Keys Submitted as Evidence



What Keys Didn't Submit

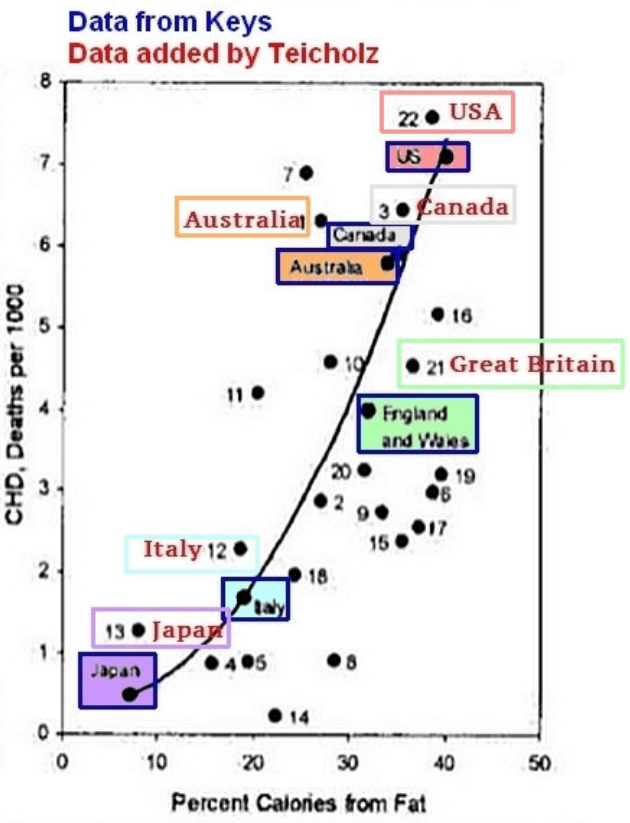
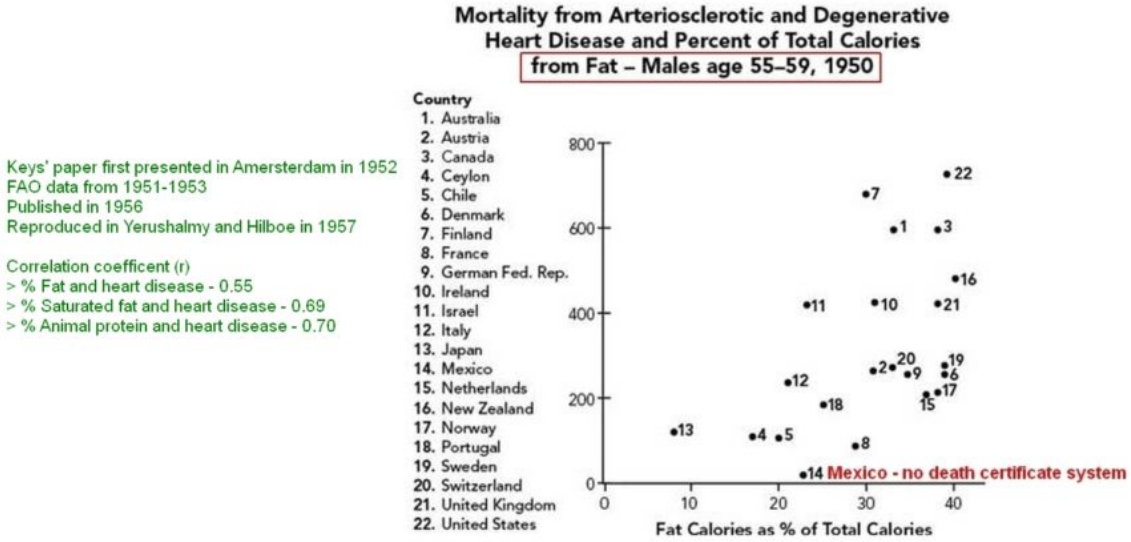


Figure 1B - as 1A but with all countries where data were available when Keys published. 1 Australia 2 Italy 3 Canada 4 Ceylon 5 Chile 6 Denmark 7 Finland 8 France 9 W Germany 10 Ireland 11 Israel 12 Italy 13 Japan 14 Mexico 15 Holland 16 New Zealand 17 Norway 18 Portugal 19 Sweden 20 Switzerland 21 Great Britain 22 USA
Data from Yerushalamy and Hilleboe

Teicholz has changed the date in the heading from *Males aged 50-59, 1951-1953 to 1950* so it fits with her chronology of Keys' deception. That can be only described as being dishonest. Clearly this data was not available to Keys as he first presented his talk in Amsterdam in 1952.



Source: Yerushalmy, J. and Herman E. Hilleboe, "Fat in the Diet and Mortality from Heart Disease: A Methodologic Note," *New York State Journal of Medicine* 57, no. 14 (July 1957): 2346.

Chart by critics of Keys showed no correlation of dietary fat with heart disease, when more countries beyond Keys's original six were added

The "Six-Countries Study" was a minor discussion paper that was ignored until Gary Taubes discovered it to criticise Keys in the book, *Good Calories, Bad Calories* in 2007.[6]

A common accusation regarding Keys is that he made his claims without the benefit of studies. There are numerous studies both before and after this paper performed by Keys and other researchers.

Some examples are listed below.

1. *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.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).[7]

2. *Lester Morrison*in 1946 also linked diet, cholesterol and heart disease before Keys. His 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, nine of the fifty patients treated with the diet survived. All of the fifty control patients had died by the twelfth year.
3. *Ancel Keys,*in 1947-48, of a long-term study of 281 Minnesota business and professional men, then aged 45 to 55 and clinically "healthy." The *Minnesota Business and Professional Men* study showed that, "the incidence of coronary heart disease tended to be higher among men above the median at first examination in relative weight, body fatness, systolic and diastolic blood pressure, and serum cholesterol concentration but these segregations were not statistically significant except with serum cholesterol".
4. *Dr John Goffman,* a nuclear physicist, was a leading pioneer researcher in the field of lipoproteins who was familiar with Anitschkow's work. His work showed that serum cholesterol and low-density lipoproteins were both indicators of coronary heart disease risk. This work and other evidence convinced Gofman that blood cholesterol, and the dietary determinants of blood cholesterol, were important in atherosclerosis. His wife, Dr Helen Gofman co-authored a low-fat, low-cholesterol diet book[8] that was published in 1951—prior to Keys's paper. John Gofman wrote the preface for the book.

In 1951, Keys was working at Oxford when the Food and Agriculture Organization asked him to chair their first conference on nutrition in Rome. He states, "The conferees talked only about nutritional deficiencies". When he asked about the new epidemic of coronary heart disease, Gino Bergami, Professor of Physiology at the University of Naples, said "coronary heart disease was no problem in Naples".

In 1952, Keys and his wife Margaret visited Naples. Margaret measured serum cholesterol concentrations and found them to be very low except among members of the Rotary Club. Heart attacks were rare except amongst the rich whose diet included daily servings of meat. He obtained similar results in studies in Madrid.

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). [9] [10] [11]

Popular commentators frequently confuse the “Six-Countries Study” with the Seven Countries Study.

The Seven Countries Study compared 16 contrasting regions in 7 countries which was carried out during 1958-1970. 13,000 men aged 40-59 participated with 95% of eligible men taking part. 15 local collaborators performed surveys – not Ancel Keys.

Below are two commentaries by self-styled health experts.

> Keys examined diet and heart disease trends in twenty-two countries. He was apparently more interested in headlines than science because he then published a study that included data from only the six countries that showed a scary link between diet and heart disease. Here are the facts: When the data from all twenty-two countries in Keys' study is examined, they showed no relationship between fat intake and heart disease deaths. Keys selectively picked data and designed a headline-worthy conclusion.

Jonathan Bailor Self-described "Internationally Recognized Wellness Expert"

> The misguided belief that saturated fats cause heart disease is rooted in a famous study published in 1970 called "The Seven Countries Study", in which renowned scientist Ancel Keys claimed that people in countries where more animal fat was eaten had more heart disease than people in countries where less animal fat was eaten. The original study actually involved 22 countries, not 7; the data from the other 15 countries having been omitted for undisclosed reasons. When the data from all 22 countries were analyzed, no correlation between fat and heart disease was found (Yerushalmy and Hilleboe 1957).

Georgia Ede, MD, Psychiatrist Speaker at Physicians for Ancestral Health Symposium 2016

Both are completely confused. Ede states that the *Seven Countries Study* was published in 1970 but claims that when Yerushalmy and Hilleboe examined the data that they found no correlation between fat and heart disease. Yerushalmy and Hilleboe's paper was published in 1957. The *Seven Countries Study* did not involve 22 countries. It involved 16 regions in 7 countries.

A biograph of Ancel and Margaret Keys, *Genius and Partnership Ancel and Margaret Keys and the Discovery of The Mediterranean Diet*[12] has been written by Joseph Dixon.

Other related articles are:

Ancel Keys and the High-Fat Diet “Experts”
Robert Lustig and the Men Who Made Us Fat
The Big Fat Surprise
TIME Magazine Article – Eat Butter
TIME Magazine Article – Eat Butter – Part 2
Heart of the Matter – ABC Catalyst
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Footnotes

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Ancel Keys and the High-Fat Diet "Experts"

Ancel Keys

Authors such as Uffe Ravnskov: (*The Cholesterol Myths* – 1991), Gary Taubes (*Why We are Fat* – 2011, *Good Calories, Bad Calories* -2007), Robert Lustig (*Fat Chance: Beating the Odds against Sugar, Processed Food, Obesity, and Disease* – 2013), John Yudkin (*Pure, White and Deadly* -1972) argue that cholesterol is **not** a health issue and concentrate on carbohydrates in the diet. One method of advocating their case is to ridicule the work of Ancel Keys.

Low-carbohydrate advocates claim he deliberately mislead generations of researchers, medical practitioners and the general public by manipulating data to fit his hypothesis and advocating a low fat, Mediterranean-style diet.

A brief biography of Ancel Keys can be found in *Dialogs in Cardiovascular Medicine – Vol 13 No 3* that gives a different picture than the deceptive and manipulative researcher than he is portrayed by populist commentators.[1]

Below is a brief overview of his life.

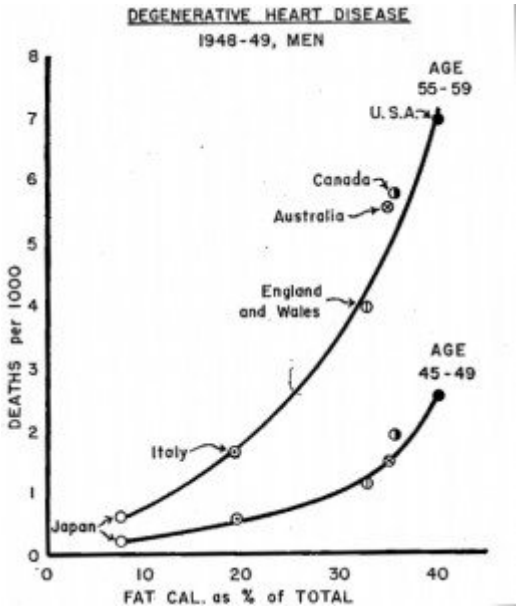
Ancel Keys[2] was one of the most famous public health researchers of the twentieth century. He was born in 1904, died in 2004. Peripatetic for the first third of his life, his outstanding research followed appointment age 36 to the Laboratory of Physiological Hygiene, at the University of Minnesota’s Minneapolis Football stadium. Born in Colorado, a refugee from the San Francisco earthquake aged 2, he studied chemistry at Berkeley, economics, and political science, earned a master’s degree in zoology, a PhD in oceanography and biology, won a fellowship in physiology to Copenhagen, and did a second PhD in physiology in Cambridge, England, becoming interested in high-altitude physiology. Offered a permanent post in Cambridge, he went to study biochemistry at Harvard, and then to the Mayo Foundation,

Rochester, Minnesota researching human biochemistry and physiology, before accepting the Minneapolis post in the same university.[3]

He pioneered several modern techniques in health and biology including detailed comparisons of whole populations to determine the effects of different lifestyle factors on health. He demonstrated experimentally that traits heretofore considered irrevocable and constitutional, such as body type, blood fat levels (cholesterol), blood pressure, heart rate, and responses to stress, were, in fact, largely modifiable by simple changes in the composition and quantity of diet and physical activity.[4]

His wife, Margaret, was a biochemist and an integral part of his work, She lived 97 years.

Atherosclerosis: A Problem in Newer Public Health – Six Countries Study



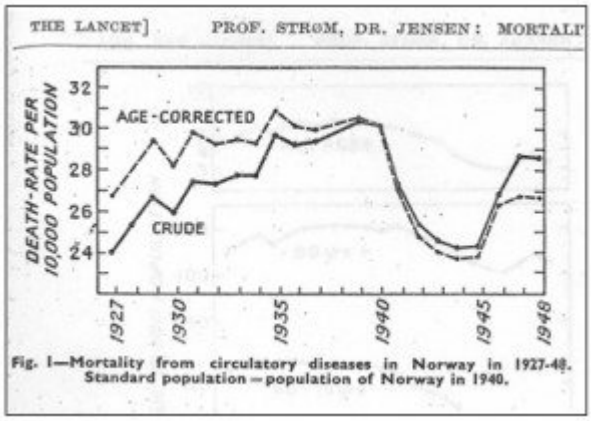
Atherosclerosis: a problem in newer public health[5] was first presented in Amsterdam in late 1952 and later in New York in early January 1953. He stated that the present high rate of death from degenerative heart disease is not inevitable by showing comparisons with other countries.

In the BBC documentary, Robert Lustig claims Keys made his claims regarding saturated fat in the diet as a hypothesis and that he spent the rest of his life trying to justify it. Firstly, at this stage of his research, Keys implicated fat (% calories from fat) as an indicator of heart disease – not saturated fat as Lustig states. Secondly, this paper does refer to his previous surveys and the works of others. He was not relying on only the statistics of the 6 selected

countries to make his conclusions.

J Yerushalmy and H Hillboe criticised the paper *Atherosclerosis: A Problem in Newer Public Health* in the publication *Fat In The Diet and Mortality From Heart Disease*[6], claiming that Keys only choose 6 countries that supported his hypothesis instead of using the World Health Organisation data from the 22 countries that was available. They state Keys did not give reasons for his selection. This is clearly incorrect. If you read Keys’ paper, Keys did give the reasons for choices.

The Scandinavian countries were excluded because of the effects of the World War II. The consumption of meat and eggs dropped during the war and so did the level of heart disease.[7] However, two areas of Finland were included later in the *Seven Countries Study*. The WHO data shows France as having little heart disease even though it has a high fat consumption, giving rise to the French Paradox myth. According to a paper in the *Dialogues of Medicine – Vol 13 No 3 2008*,[8] the French paradox is indeed a myth.



The clear conclusion, driven by the facts as summarized 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”.

Spain was excluded even though these figures supported the conclusions of the paper.

Mexico did not even have a death certificate system in place.

Yerushalmy and Hilleboe examined the data from all of the 22 countries in the *WHO Epidemiological and Vital Statistics 1951-1953* publication. The results were published in their paper *Fat in the diet and mortality from heart disease.*

Note that Keys’s paper was first presented as a talk in Amsterdam in late 1952 Yerushalmy and Hilleboe used WHO data from the years 1951-1953 that was not published until 1956.

TABLE III.—Rank Correlation Coefficients Between Various Dietary Components and Death Rates for Different Groupings of Categories* of Diseases of the Heart in 22 Countries (Males 55 to 59 Years)

Dietary Components†	Groupings of Categories of Diseases of the Heart: B-26	B-26 + B-27	B-26 + B-27 + B-28	B-25 + B-26 + B-27 + B-28
Number of calories				
Total calories	0.723	0.593	0.619	0.637
Calories from fat	0.659	0.470	0.508	0.523
Animal fat (N = 21)**	0.684	0.562	0.610	0.604
Vegetable fat (N = 21)**	−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	0.414
Per cent of total calories				
From fat	0.587	0.390	0.426	0.436
Animal fat (N = 21)**	0.677	0.557	0.610	0.604
Vegetable fat (N = 21)**	−0.468	−0.509	−0.526	−0.531
From protein	0.172	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
From carbohydrate	−0.562	−0.386	−0.415	−0.423

Critical Values of r

N	$\alpha = 0.05$	$\alpha = 0.02$
21	±0.438	±0.521
22	±0.428	±0.508

* Categories of diseases: B-25—chronic rheumatic heart disease; B-26—arteriosclerotic and degenerative heart disease; B-27—other diseases of the heart; B-28—hypertension with heart disease.
† Calculated from national food-balance data by F.A.O. (see text for definition).
** Data not available for France.

Even if data from **all the 22 countries** are included, it still shows:

- positive correlations between heart disease and total calories consumed (72%), fat consumption (59%), animal fat consumption (68%), animal protein consumption (64%)
- negative correlations with heart disease and carbohydrate consumption (-56%), vegetable protein consumption (-65%), vegetable fat consumption (-47%).

A correlation of 70% is considered to be a strong correlation and 50% a moderate correlation. Yerushalmy and Hilleboe were not disputing the correlation between components of the diet and heart disease. They were disputing the classifications of heart disease that Keys used and Keys’s methodology – not the lack of correlation.

Hilleboe later co-authored a paper *Risk Factors in Ischemic Heart Disease* in Vol 53 No 3 *American Journal of Public Health* showing that “high cholesterol was the greatest risk factor of any single variable in ischemic heart disease”.

In the conclusion, Keys states that there is sufficient evidence to “warrant a large extension of this type of epidemiological research”. His views were refined with later studies.

Critics commonly mistake the *Six Countries Study* with the later *Seven Countries Study* published in 1970.

Yerushalmy was involved in a dispute with researchers who suggested that smoking caused a reduction in birth weight. His view was that the differences could be explained by ‘mode of life’ differences between smokers and nonsmokers, such as smokers 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 suggested caution in implicating cigarette smoking in the reduction of birth weight.[9]

Seven Countries Study

Ancel Keys and colleagues posed the hypothesis that differences among populations in the frequency of heart attacks and stroke would occur as a result of physical characteristics and lifestyle and diet. Surveys were carried out between 1958 – 1970 in populations of men aged 40-59, in sixteen areas of seven countries. Follow-up surveys were continued until the 1990s. Most of the areas were stable and rural and had wide contrasts in habitual diet.

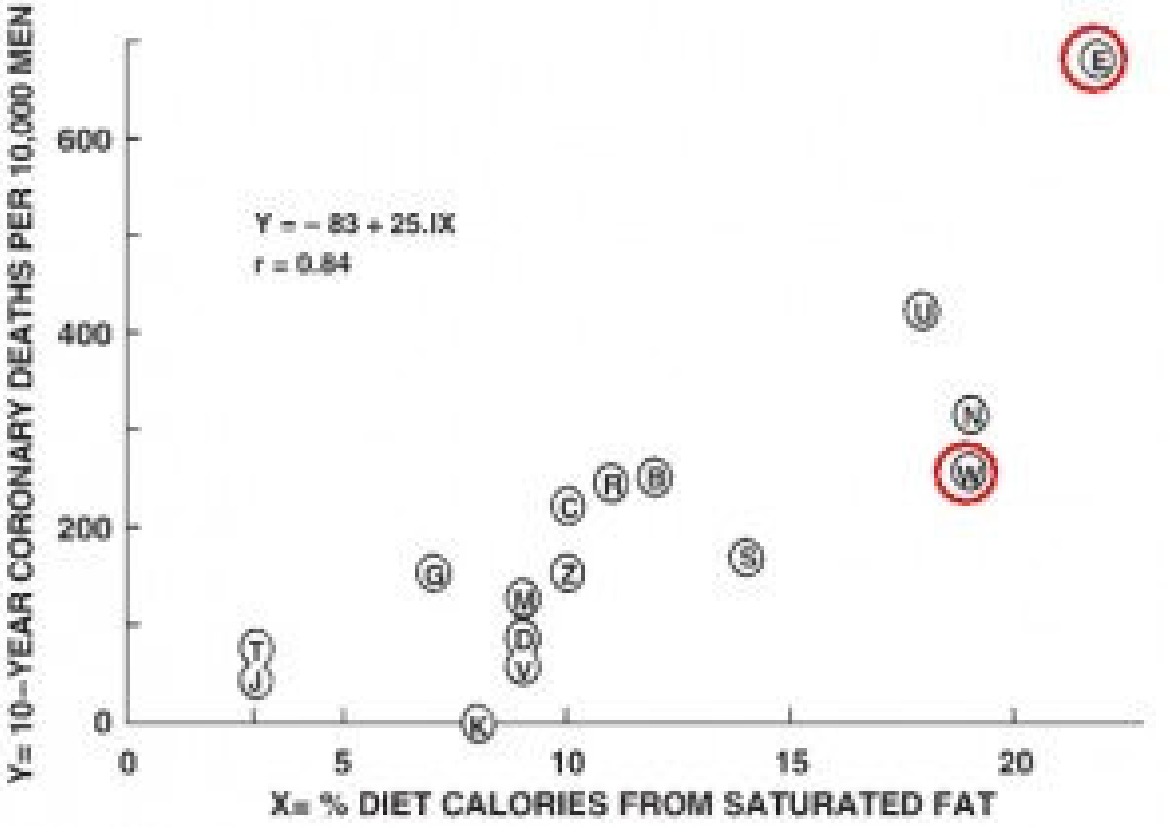
Women were excluded because cardiac disease was less common and because of the invasiveness of physical examinations. The Seven Countries Study was the first to explore associations among diet, risk, and disease in contrasting populations. Central chemical analysis of foods consumed among randomly selected 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.

The study areas were:

- one area is in the United States
- two areas in Finland
- one area in the Netherlands
- three areas in Italy
- five areas in the former Yugoslavia (two in Croatia, and three in Serbia)
- two areas in Greece (Crete, Corfu)
- two areas in Japan

A graph from the study shows the relationship between coronary deaths and saturated fats in the diet.[10] Note the difference between East Finland (E) and West Finland (W).



B: Belgrade, Yugoslavia; **C**: Crevalcore, Italy; **D**: Dalmatia, Yugoslavia; **E**: East Finland; **G**: Corfu, Greece; **J**: Ushibuka, Japan; **K**: Crete, Greece; **M**: Montegiorgio, Italy; **N**: Zutphen, Netherlands; **R**: Rome, Italy; **S:** Slavonia, Yugoslavia; **T**: Tanushimaru, Japan; **U**: USA; **V**: Velika Krsna, Yugoslavia; **W**: West Finland; **Z**: Zrenjanin, Yugoslavia

A common criticism that is prevalent on the internet is that Crete (K) had the lowest rate of heart disease of heart disease even though they consume more saturated fat than Corfu (G). The graph does show Crete (K) having a very low death rate from heart disease. What is not mentioned is that only 2 populations in Japan and the area in Corfu had a lower proportion of calories from saturated fats. Compared with the other populations, Crete and Corfu both had a very low intake of saturated fats.

According to Harry Blackburn, one of the collaborators in the study:

The Seven Countries Study provided evidence confirming the original hypotheses, that elevated mean blood cholesterol levels and intake of saturated fatty acids is a major and apparently necessary factor in the population burden of atherosclerotic diseases. Populations with saturated acid intake less than 10 percent of daily energy have little coronary heart disease or thrombotic stroke despite widely varying total fat intake or usual levels of blood pressure or high rates of tobacco use. Multivariate analysis of population rates and risk factors reveal that diet and smoking “explain” most of the differences in population rates and that the “standard” CVD risk factors operate universally within populations.

The main implications of the Seven Countries Study are that the mass burden and epidemic of atherosclerotic diseases has cultural origins, is preventable, can change rapidly, and is strongly influenced by the fatty composition of the habitual diet. The study implies the universal susceptibility of humans to CVD but that the frequency of susceptible phenotypes is greatly reduced in favorable environments. It suggests there may be other and important protective elements in the diet and lifestyles of Crete and Japan.[11]

Other related articles are:

Ancel Keys did not manipulate his data
Robert Lustig Exposed
The Big Fat Surprise
TIME Magazine Article – Eat Butter
TIME Magazine Article – Eat Butter – Part 2
Heart of the Matter – ABC Catalyst
The Pioppi Diet

Footnotes

1. Tunstall-Pedoe, H. (2008) The French Paradox : Fact or Fiction? *Dialogues in Cardiovascular Medicine*. 13 (3), 159–179.
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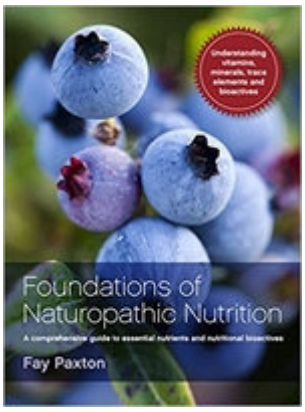
Foundations of Naturopathic Nutrition by Fay Paxton

Fay Paxton (PhD) is an Australian-based naturopath and nutritionist. She has taught nutrition at the Southern School of Natural Therapies and has worked as a consultant for dietary and herbal supplement manufacturers. She is an author of a popular text book, *Foundations of Naturopathic Nutrition.*[1]



Advocate for low-carbohydrate diets

Unfortunately, the book advocates high-fat, low-carbohydrate paleo diets and cites Lorain Cordain's *The Paleo Diet*, the CSIRO high-fat, low-carbohydrate diet studies.[2] and Maastricht University's high-fat, high-protein diet study.

On page 39-40, Paxton states:

> Overall, high-protein, low-carbohydrate diet foods will moderate insulin release and have less effect on fat synthesis. For weight loss, high-protein, low-fat diet may be equally or more effective than a high-carbohydrate, low-fat diet, and have a more beneficial effects on the risk factors for cardiovascular disease. These results show that many heart disease risk factors improve with weight loss and that a high-protein, low-fat diet may be preferable for people with elevated blood fats.

A number of similar papers and books from the CSIRO advocate high-fat, low-carbohydrate diets.[3] [4] [5] [6] [7] [8]

The Maastricht University High-protein Diet Study

The Maastricht University study[9] compared the effects of a low-fat, high-carbohydrate diet and two versions of a low-fat, high-protein diet on weight loss and maintenance following a very low-calorie restricted diet. Metabolic and cardiovascular risk factors in “healthy” obese subjects were examined.

There is no such person as a “healthy” obese subject. There is no mention of medication taken. The chances are high that the subjects are taking some medications. The average BMI is over 32 with a small standard deviation – the majority of the subjects are obese. They are obese at the start of the trial and obese at the end.

Subjects were excluded from the study if:

- fasting glucose was > 6 mmol/L or
- triglycerides > 2.3 mmol/L or
- total cholesterol levels of > 6.5 mmol/L were increased or
- diastolic blood pressure exceeded 100 mm Hg or
- the subjects were unable to lose at least 5% of their initial body weight during the weight loss period.

So, the study actually excludes the people who should be able to be assisted because their baseline results are too high and excludes those who do not lose “sufficient weight”. The study then has the audacity to conclude that it is a great diet for assisting those with weight loss. How many people were excluded who did not lose sufficient weight?

Forty-eight subjects completed the study that consisted of an energy restriction period of 5–6 weeks followed by a weight maintenance period of 12 weeks. During weight maintenance, the high carbohydrate group supplemented with maltodextrin (a carbohydrate) or protein in the form of casein or whey and consumed a “low-fat diet”.

Note that these components are received as supplements and not as part of a balanced diet.

Diet	Protein % Energy	Carbohydrate % Energy	Fat % Energy	Energy kcal / day	Energy Restriction from baseline %
High carbohydate	15.8	62.7	21.2	1868	22%
High Protein - casein	34.5	42.2	24.0	1828	10%
High protein - whey	35.2	42.1	24.3	1812	20%

The high-carbohydrate (63% by energy), low-fat (21% by energy) diet is not a low-fat diet or a high-carbohydrate diet.

The high-protein diets (35% by energy) far exceeds the Recommended Dietary Intake (RDI) ofapproximately 8%-10% when calculated using the WHO recommendation of 0.84 g/kg body weight. Note that the RDI meets or exceeds the requirements of 98% or the population. The actual requirements are less.

As Russel Henry Chittenden noted over 100 years ago, consuming excess protein produces toxic wastes which is detrimental to health.[10]

Ketogenic, calorie-restricted diet studies confound the results as they are studying two separate interventions: ketogenic intervention and calorie-restricted intervention. A plant-based, calorie restricted diet shows all the benefits of restricted food intake without the damaging effects of ketogenesis.[11] [12]

Even better, a whole-food, plant-based diet without any restrictions on energy has shown to improve indicators for diabetes and heart disease.[13] [14] [15] [16]

A widely cited paper, funded by “an unrestricted grant from the Atkins Center for Complementary Medicine”, a supporter of low-carbohydrate, ketogenic diet studies, showed side effects of headaches, constipation, diarrhea, and insomnia for those on a ketogenic diet. Also, the completion rate was not high at only 55%. Let’s face it, who wishes to life a live on a starvation diet with the above side-effects. The extensive range of supplements, required to

mitigate the side-effects of the diets, were provided by Atkins Nutritionals, Inc., New York.

I have written about the shortcomings of the CSIRO high-fat diet studies at:

wisenutritioncoaching.com.au/2017/10/csiro-low-carb-diet

The Paleo Diet

On pages 54-55, Paxton extols the virtues of Lorain Cordain's *Paleo Diet*. Paxton's claims that Neanderthals and early humans were largely carnivorous, subsisting mainly on animal flesh and fish, is conjecture.

There is no evidence that our predecessors were largely carnivorous. Orangutans, gorillas, bonobos and chimpanzees mainly consume plants. Chimpanzees consume the most animal-sourced foods – mostly coming from termites.

According to Richard Wrangham[17], it was the discovery of fire and cooking that transformed humans and our society – not the eating of meat which commenced some 500,000 years previously.

MYA	Species	Events
0.2	Homo sapiens	Modern humans
1.8	Homo erectus	Use of fire and cooking, change to society with man-woman pairs and sharing of food with partner. Similar appearance to humans, with large change to anatomy. Smaller digestive system, mouth and jaw, loss of hair. Food more energy dense, softer and easier to digest, less astringent and sweeter. Much less chewing time. Cooking destroys bacteria.
2.3	Homo hablis	Tool makers and meat eaters
3-6	Australopithecus sp	Ape-like Australopithecus. Lucy was an A. afarensis that lived in Ethopia 3.2 mya.

Dr Katharine Milton is a professor of physical anthropology at the University of California in Berkeley. She received her Ph.D. in anthropology from New York University in 1977. Her field of expertise is the dietary ecology of primates, including human ancestors and modern humans.

According to Professor Milton:

> In fact, we do not know much about the range of foods Paleolithic hunter-gatherers consumed in almost any environment.[18]
>
> Comparative and experimental data shows that modern humans, common chimpanzees, gorillas, and orangutans show close similarity to most features of gut anatomy as well as patterns of digestive kinetics.[19]

Professor Milton's conclusion is:

> It is prudent for modern-day humans to remember their long evolutionary heritage as anthropoid primates and heed current recommendations to increase the number and variety of fresh fruit and vegetables in their diets rather than increase their intake of domesticated animal fat and protein[20]

Saturated Fat Link to Heart Disease Sceptic

On pages 97-98, Paxton notes,

> However, new research has raised questions about the heart disease / SFA connection and a recent review concluded that there was no significant evidence for linking dietary SFAs with an increased risk of CHD or CVD.

No reference is for this statement although it is clear it is referring to papers by Siri-Tarino et al.[21] [22] and Chowdhury, R. et al.[23]

Professor Stewart Truswell, Emeritus Professor of Nutrition from University of Sydney wrote an extensive critique of both of these papers.[24]

Truswell wrote:

> In all, Chowdhury et al omitted or incorrectly reported 25 studies of omega-6 PUFAs and CHD. The protective effect of PUFAs would have been clear if all published studies had been included in their meta-analysis. Changes to established public health guidelines should not be advocated unless all the relevant evidence has been reviewed.

He also stated that:

> It seems inappropriate, however, for supplements trials to be pooled with dietary trials in which participants consumed both less saturated fats and more PUFAs.

Professor Walter Willett an epidemiologist Harvard School of Public Health stated:

> **The controversy should serve as a warning about meta-analyses. These analyses compile the data of individual studies to reach a clear-cut conclusion. It looks like a sweeping summary of all the data, so it gets a lot of attention. … But these days meta-analyses are often done by people who are not familiar with a field, who don't have the primary data or don't make the effort to get it.**

Note that Siri-Tarino and Krauss received funding from the [US] National Dairy Council.

A similar study by Jakobsen[25] in 2009 reported that reducing saturated fat in the diet and replacing it with polyunsaturated fatty acids (PUFAs) was associated with a significantly reduced risk of CHD.

The studies that get the attention in the popular press are those that dismiss the links between saturated fats and heart disease. Any papers that confirm it are ignored.

Paxton ignores the evidence obtained from Seventh-day Adventists studies and the National Geographic Blue Zone studies that have consistently shown that an increase in the consumption of plant-based foods results in an increase in health and longevity. The Japanese and the Okinawans are often described as the longest-lived populations but do not live as long as Californian Adventists.[26] Within the Seventh-day Adventist community, as the diet becomes more plant-based, the health indicators improve.

Footnotes

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