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# Letter on Corpulence: One Actuary's Attempt at Carbocide & an Underwriter's View

Chris Reynolds – Head of Long Term Propositions
Cillian Tierney – Senior Development Underwriter - Global

12 March 2018

# Disclaimer

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Views or opinions expressed, whether oral or in writing do not necessarily reflect those of PartnerRe nor do they constitute legal or professional advice.

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Source: fotolia.com

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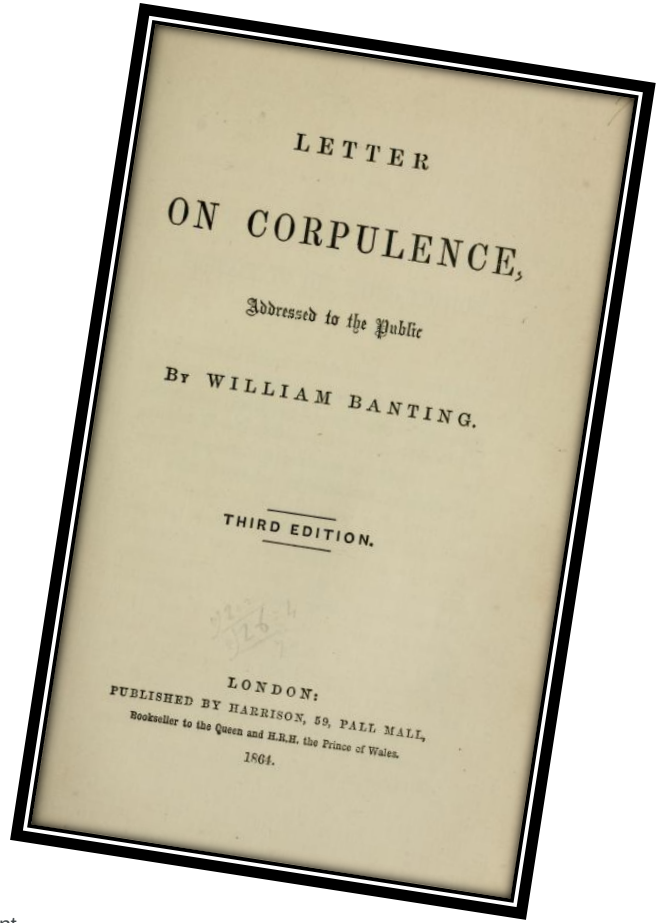


"… about 5 feet 5 inches in stature, and, in August last, weighed 202 lbs … I now weigh 167 lbs, showing a diminution of something like 1 lb, per week since August, …"

BMI: 33.6 → 27.8

Source: https://archive.org/details/letteroncorpulen00bant

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# Nutritional Advice Today

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# General Wisdom – Last 50 Years

↓ Saturated Fats (butter, lard, milk red meat, coconut oil)

↓ Cholesterol (eggs, poultry, beef, etc.)

↑ Polyunsaturated Fats (soybean, sunflower, corn, cottonseed oils)

↑ Carbohydrates (pasta, bread, sugar etc.)

Source: fotolia.com

# Eatwell Guide

Use the Eatwell Guide to help you get a balance of healthier and more sustainable food. It shows how much of what you eat overall should come from each food group.

Check the label on packaged foods

Each serving (150g) contains

| Energy | Fat | Saturates | Sugars | Salt |
|---|---|---|---|---|
| 1046kJ 250kcal | 3.0g | 1.3g | 34g | 0.9g |
| | LOW | LOW | HIGH | MED |
| 13% | 4% | 7% | 38% | 15% |

of an adult's reference intake

Typical values (as sold) per 100g: 697kJ/ 167kcal

Choose foods lower in fat, salt and sugars

Eat at least 5 portions of a variety of fruit and vegetables every day

Fruit and vegetables

Raisins

Chopped tomatoes

Frozen peas

Choose wholegrain or higher fibre versions with less added fat, salt and sugar

Potatoes, bread, rice, pasta and other starchy carbohydrates

Potatoes

Whole grain cereal

Cous Cous

Porridge

Whole wheat pasta

Bagels

Rice

Spaghetti

Beans, pulses, fish, eggs, meat and other proteins

Lentils

Beans lower salt and sugar

Tuna

Lean mince

Plain nuts

Chick peas

Eat more beans and pulses, 2 portions of sustainably sourced fish per week, one of which is oily. Eat less red and processed meat

Dairy and alternatives

Low fat soft cheese

Semi skimmed milk

Soya drink

Plain Low fat yoghurt

Choose lower fat and lower sugar options

6-8 a day

Water, lower fat milk, sugar-free drinks including tea and coffee all count.

Limit fruit juice and/or smoothies to a total of 150ml a day.

Oil & spreads

Choose unsaturated oils and use in small amounts

Sauce

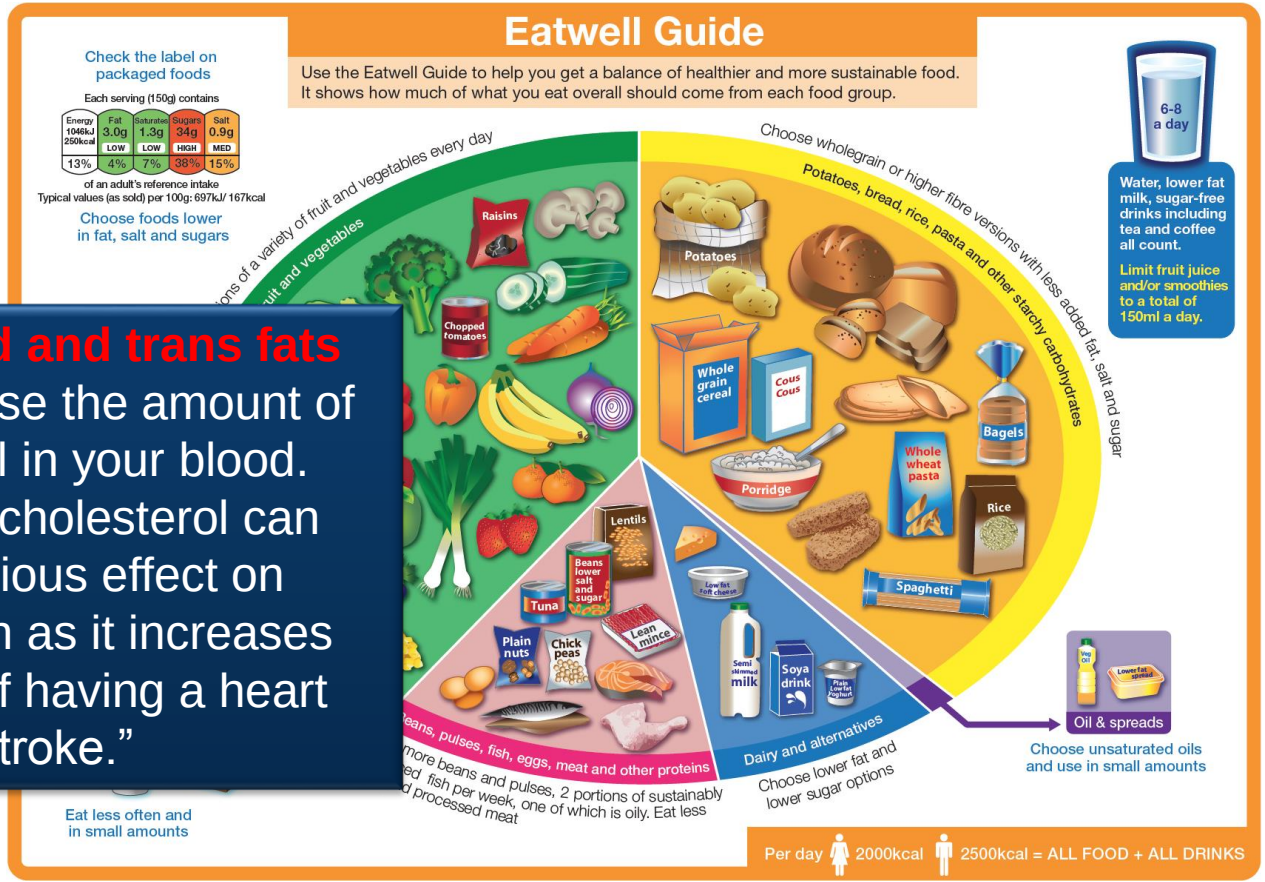
Crisps

Eat less often and in small amounts

Per day 2000kcal 2500kcal = ALL FOOD + ALL DRINKS

Source: Public Health England in association with the Welsh Government, Food Standards Scotland and the Food Standards Agency in Northern Ireland

"**Saturated and trans fats** can increase the amount of cholesterol in your blood. Too much cholesterol can have a serious effect on your health as it increases your risk of having a heart attack or stroke."




Source: Public Health England in association with the Welsh Government, Food Standards Scotland and the Food Standards Agency in Northern Ireland


"Consume less than 10 percent of calories per day from **saturated fats**"

Source: Dietary Guidelines for Americans 2015-2020

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# Why we think Saturated Fat is Unhealthy

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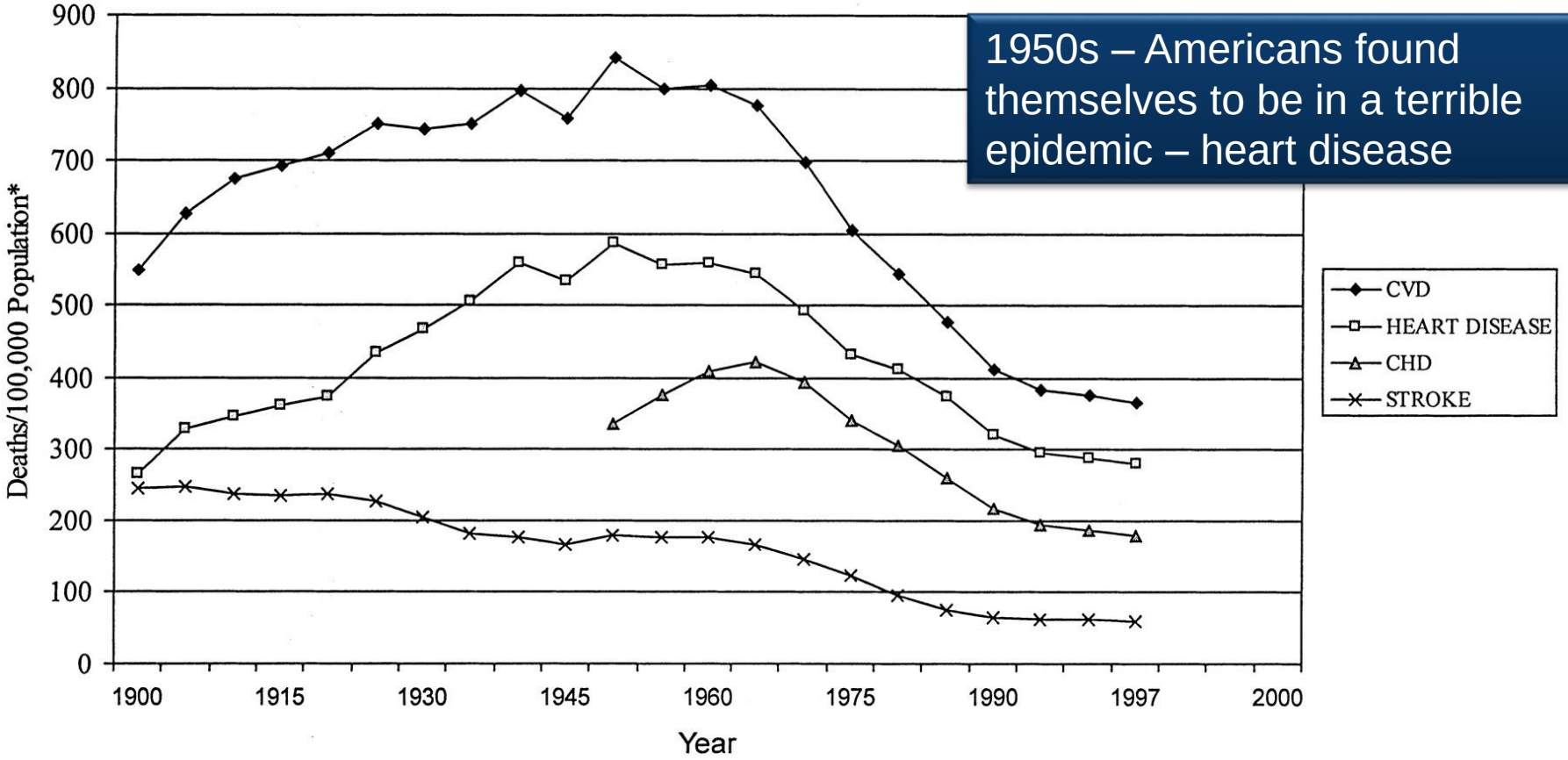
1950s – Americans found themselves to be in a terrible epidemic – heart disease




Source: https://doi.org/10.1161/01.CIR.102.25.3137Circulation. 2000;102:3137-3147

* Rates are age-adjusted to 2000 standard

# Cholesterol

Vital component of every cell membrane, controlling what goes in and out of the cell.

Responsible for the metabolism of sex hormones and is found at its highest concentration in the brain.

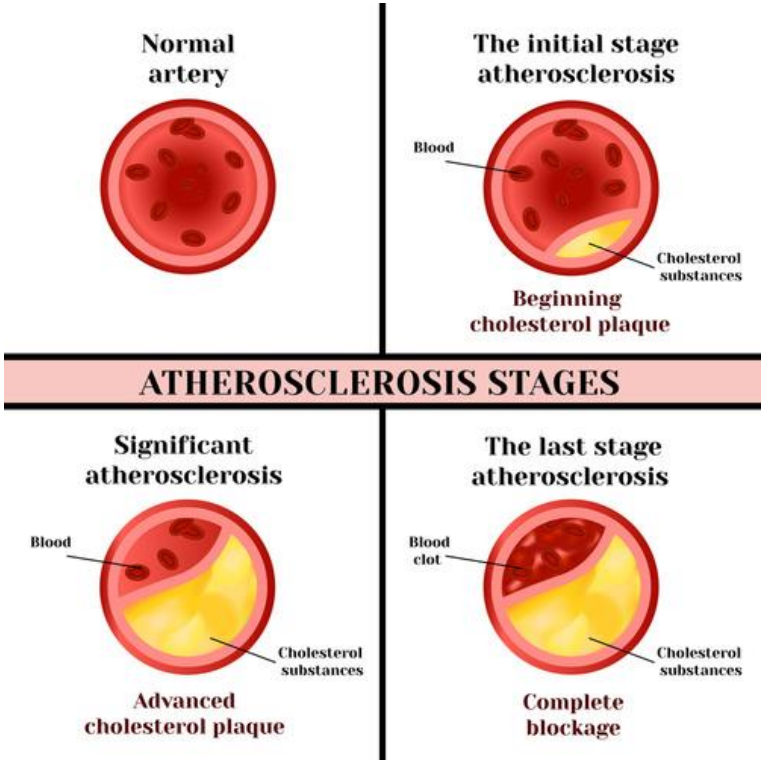
# Cholesterol

Vital component of every cell membrane, controlling what goes in and out of the cell.

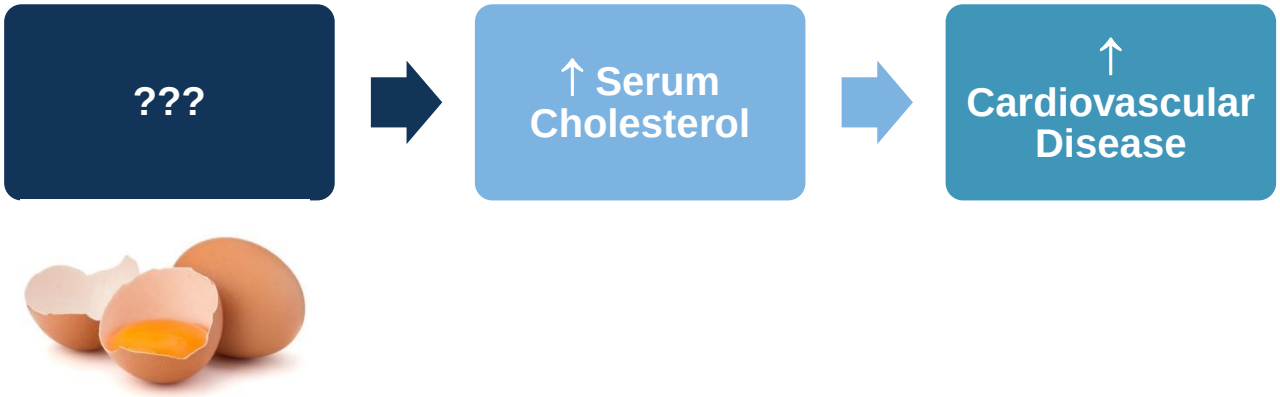
Responsible for the metabolism of sex hormones and is found at its highest concentration in the brain.

A primary component of atherosclerotic plaques.

A main culprit in the development of coronary disease?



# Diet Heart Hypothesis




Source: fotolia.com


Ancel Benjamin Keys, a physiologist at the University of Minnesota

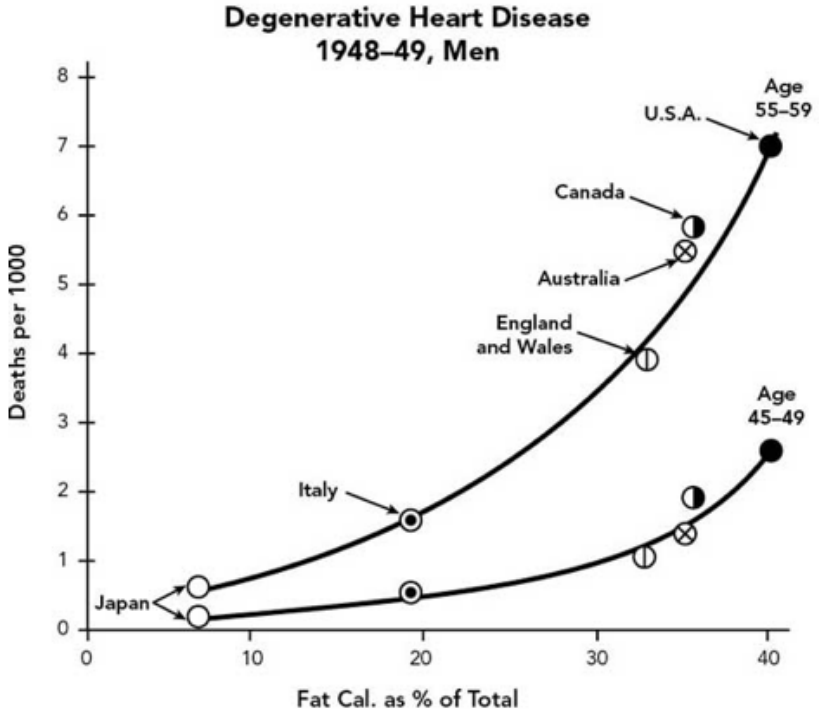
Inventor of K-Rations and the man who revolutionized the study of heart disease

Synonymous with the Diet Heart Hypothesis and the 7 countries study

Source: http://content.time.com/time/covers/0,16641,19610113,00.html

# The Evidence

## Keys's 1952 Chart: Fat Calories vs. Deaths from Degenerative Heart Disease




Source: Keys A. Atherosclerosis: a problem in newer public health. J. Mt. Sinai Hosp. N. Y. 1953;20(2):118-39

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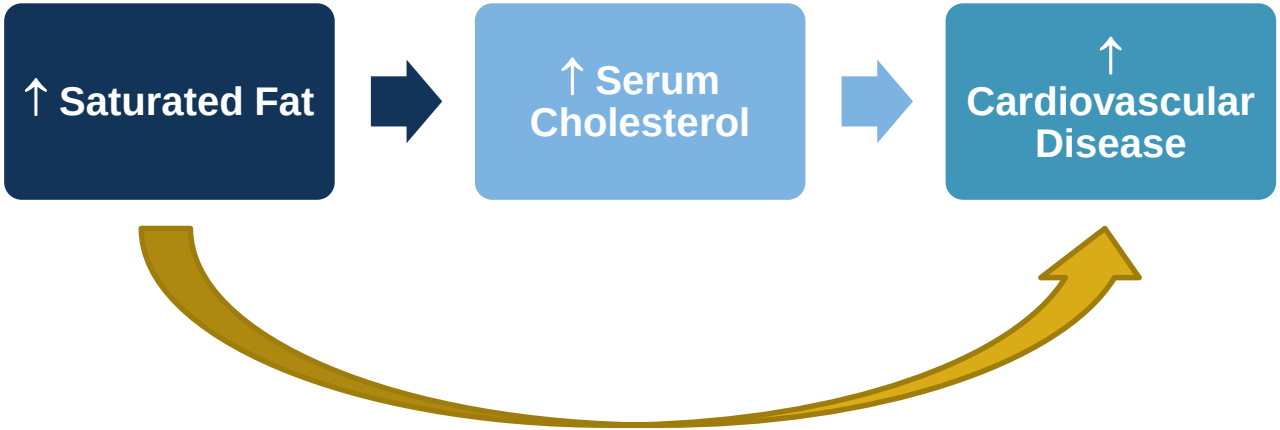
# Diet Heart Hypothesis

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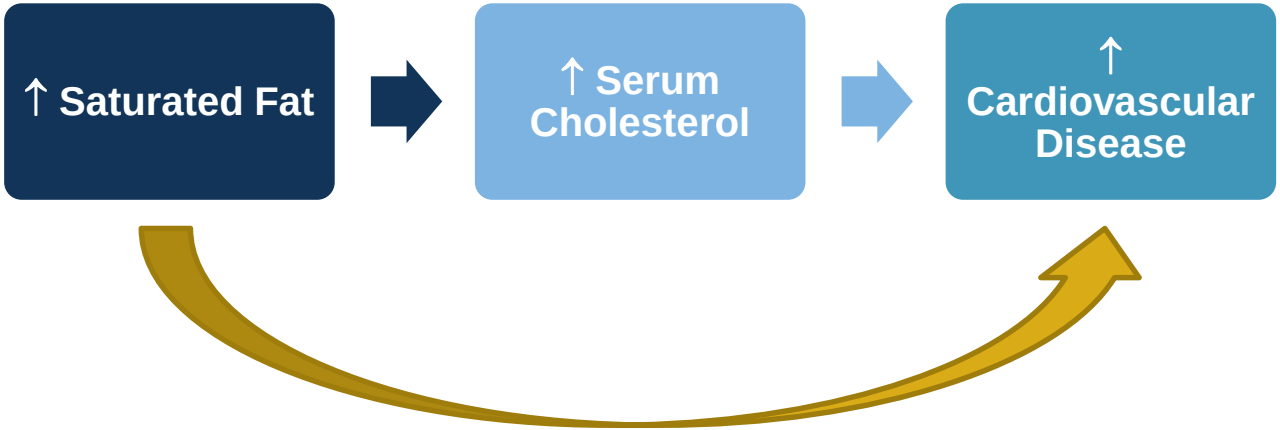
# Diet Heart Hypothesis

$$\Delta \text{ Serum Cholesterol } (mmol/l) = 0.031\left(2D_{sf} - D_{puf}\right) + 1.5\sqrt{D_{ch}}$$

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# View of the Insurance Industry

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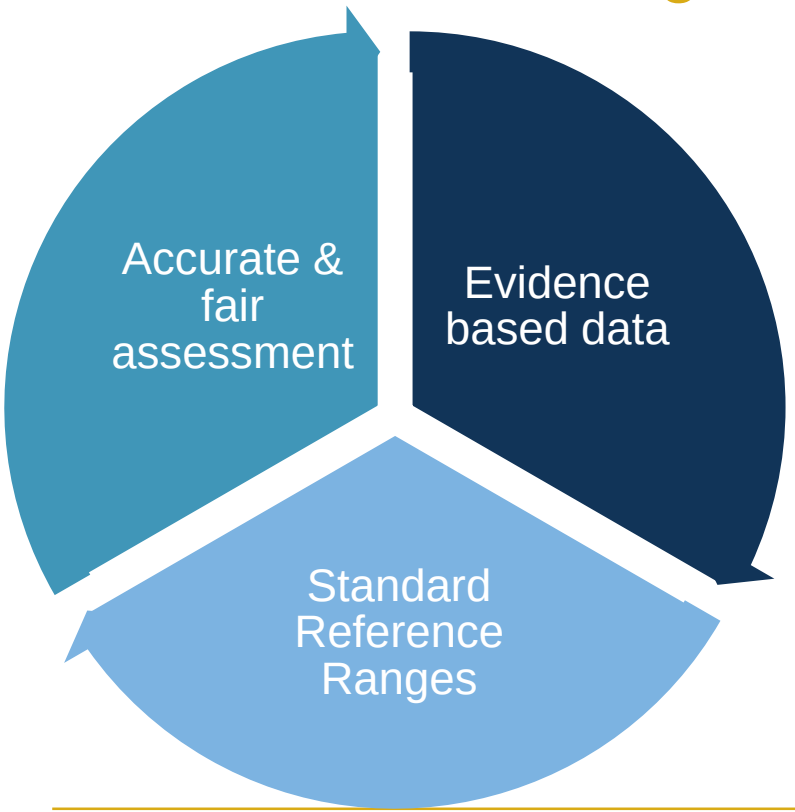
# Medical Underwriting




## Cholesterol “Normal” Limits

Total Cholesterol @ <5 mmol/L (<4)

LDL – C @ <3 mmol/L (<2)

HDL – C @ >1mmol/L

Triglycerides @ <1.7mmol/L

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# The Framingham Study

**High total cholesterol** was a reliable **predictor for heart disease**.

Solved a problem that had **plagued heart disease research from the start**, namely, that investigators needed **something they could measure to assess heart attack** risk before death.

"**blood cholesterol is somehow** intimately **related to coronary atherosclerosis** is no longer subject to reasonable doubt."

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# More Complex

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# Fat

Mono-unsaturated Fats

Poly-unsaturated Omega-3

Poly-unsaturated Omega-6

Saturated Fats

Trans Fats

Source: fotolia.com

# Fat

Mono-unsaturated Fats

Poly-unsaturated Omega-3

Saturated Fats

Poly-unsaturated Omega-6

Trans Fats

Source: fotolia.com

# Cholesterol

HDL

High Density Lipoproteins (HDL – C)

High concentrations of blood cholesterol causes CVD
and
Dietary saturated fats cause the raised concentrations of blood cholesterol

LDL

Low Density Lipoproteins (LDL – C)

Source: fotolia.com

# Cholesterol

HDL

TG / HDL

Total / HDL

LDL

Size of LDL particles

vs

Source: https://www.medicalnewstoday.com/articles/318712.php

# Insulin Resistance (IR)

Is a pathological condition in which **cells fail to respond normally to** the hormone **insulin**....

When the body produces insulin under conditions of insulin resistance, the **cells are resistant to the insulin** and are unable to use it as effectively, leading to **high blood sugar**.

**“INSULIN RESISTANCE SYNDROME”**

Source: fotolia.com

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# Latest Research

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# LDL Research

- 2009 – 137,000 adults with **heart attacks – 75% had low LDL**
- 2016 – ***British Medical Journal*** – **inverse relationship** between **high LDL and mortality**
- 2017 – ***Evidence Based Medicine***, patients with CAD **reduced LDL by 37%, with no reduction in mortality**
- ***Fourier*** study – **reducing LDL** by 60% **did not increase life span**

# The Framingham Study – follow up

**Predictive power of total cholesterol** was **not nearly as strong** as study leaders had originally thought

Data also failed to show that **lowering one's cholesterol** over time was even remotely helpful

**Cholesterol sub-fractions**, which could now be measured and whose predictive powers **showed more promise**

"In Framingham, Mass, **the more saturated fat one ate . . . the lower the person's serum cholesterol** . . . and [they] **weighed the least**,"

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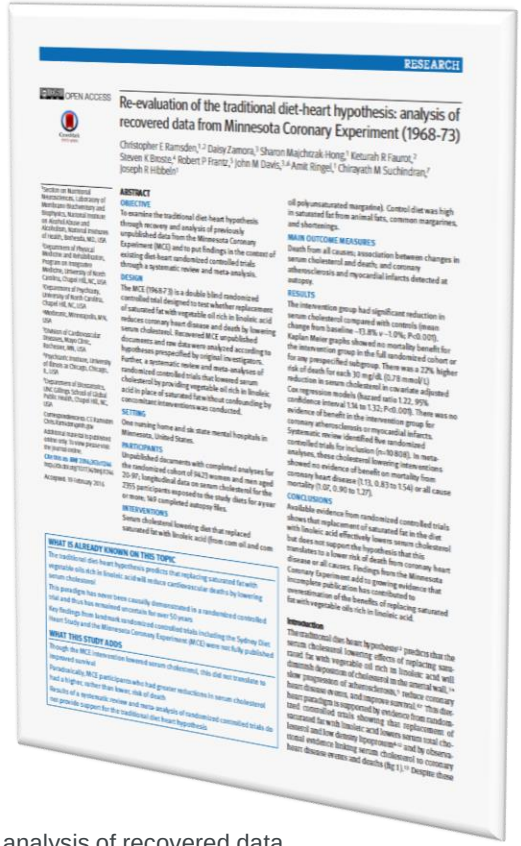
# Minnesota Coronary Experiment

**Double blind RCT** to test whether replacement of saturated fat with vegetable oil rich in linoleic acid reduces coronary heart disease and death

Trial ran from 1968-1973, but unpublished documents and raw data were recovered in 2016



RESEARCH

OPEN ACCESS

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

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

ABSTRACT

OBJECTIVE

DESIGN

SETTING

PARTICIPANTS

INTERVENTIONS

MAIN OUTCOME MEASURES

RESULTS

CONCLUSIONS

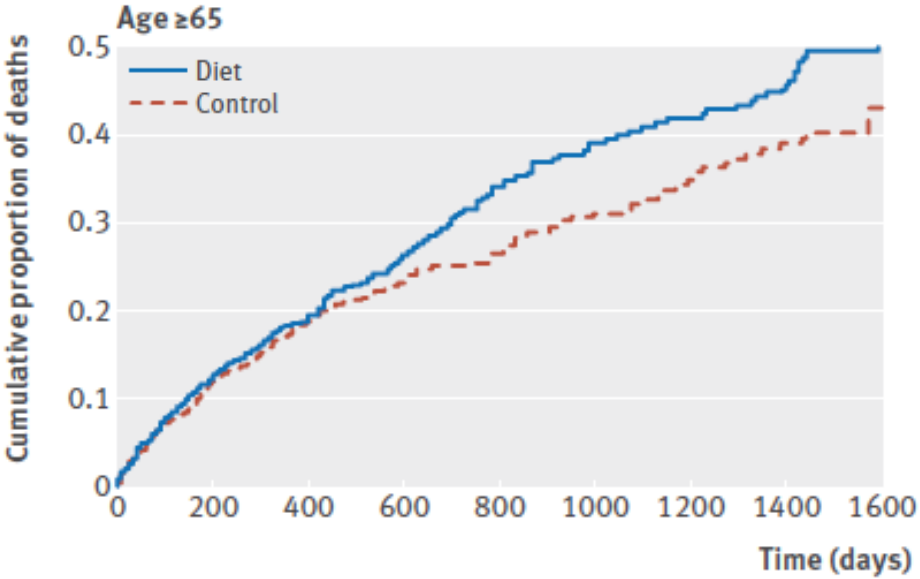
WHAT IS ALREADY KNOWN ON THIS TOPIC

WHAT THIS STUDY ADDS

Introduction

Source: Ramsden CE, Zamora D, Majchrzak-Hong S, et al. Re-evaluation of the traditional diet-heart hypothesis: analysis of recovered data from Minnesota Coronary Experiment (1968–73). BMJ 2016;353: i1246

# Minnesota Coronary Experiment




"Though the MCE intervention **lowered serum cholesterol**, this **did not translate to improved survival**"

"Paradoxically, MCE participants who had **greater reductions in serum cholesterol** had a **higher**, rather than lower, **risk of death**"

Source: Ramsden CE, Zamora D, Majchrzak-Hong S, et al. Re-evaluation of the traditional diet-heart hypothesis: analysis of recovered data from Minnesota Coronary Experiment (1968–73). BMJ 2016;353: i1246

# Pure Study – Nov 2017

Large epidemiological cohort study of individuals aged 35-70 years over 18 countries

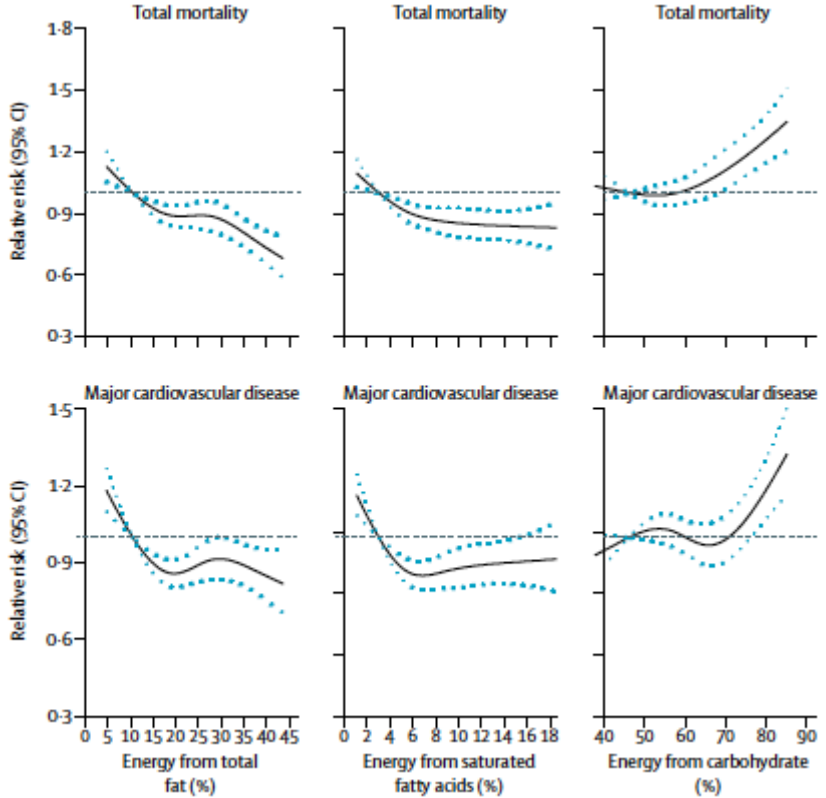
Dietary intake of 135,335 individuals recorded using validated food frequency questionnaires

Assessed associations between consumption of carbohydrate, total fat, and each type of fat with cardiovascular disease and total mortality


Articles

Associations of fats and carbohydrate intake with cardiovascular disease and mortality in 18 countries from five continents (PURE): a prospective cohort study

Source: The Lancet - Volume 390, No. 10107, p2050–2062, 4 November 2017




"… a **high carbohydrate intake** was associated with an **adverse impact on total mortality**, whereas **fats** including **saturated and unsaturated** fatty acids were associated with **lower risk** of total mortality and stroke."

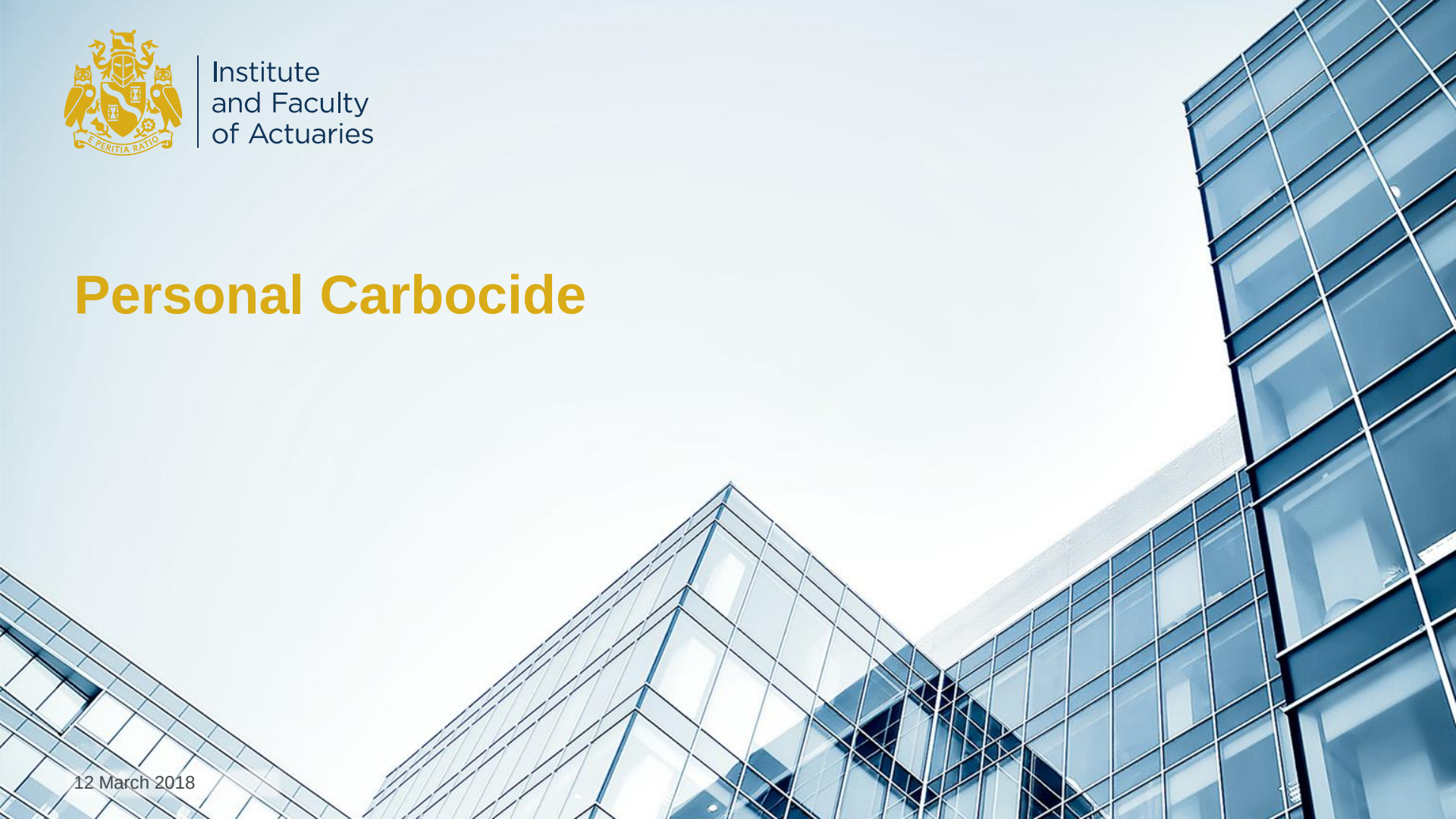
"We did not observe any detrimental effect of fat intakes on cardiovascular disease events"

***"Global dietary guidelines should be reconsidered …"***

Source: The Lancet - Volume 390, No. 10107, p2050–2062, 4 November 2017

# What should the industry be doing?

- Watch this space…..
- Educate the consumer and……
- Medically assess applicants differently
- New products



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# Personal Carbocide

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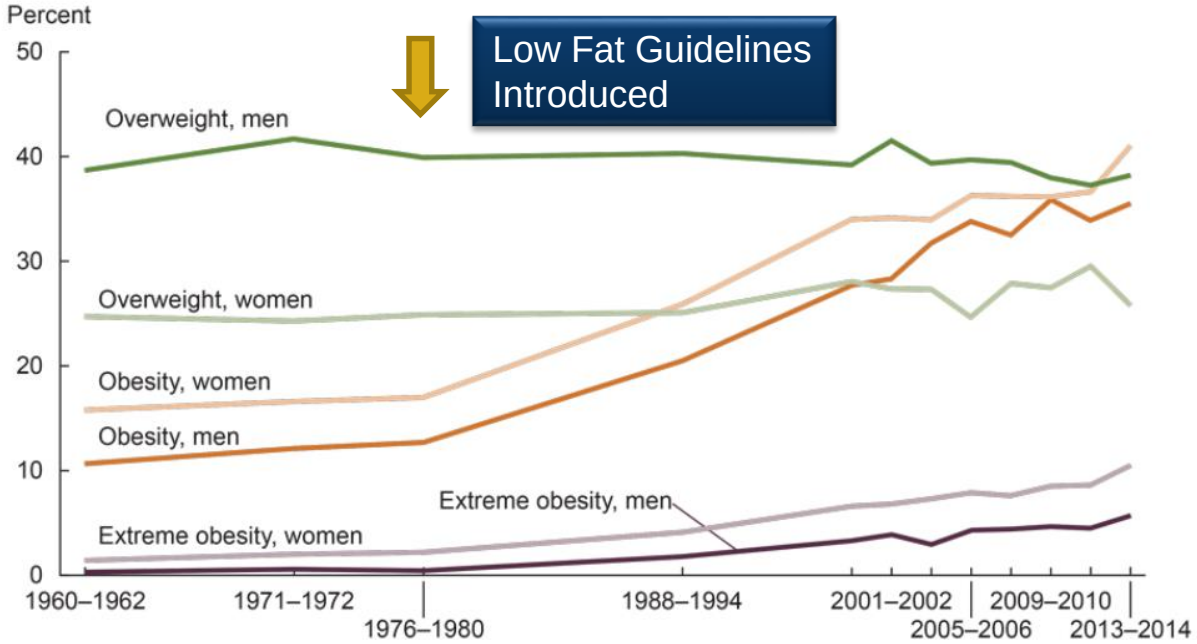
## Figure. Trends in adult overweight, obesity, and extreme obesity among men and women aged 20–74: United States, 1960–1962 through 2013–2014




NOTES: Age-adjusted by the direct method to the year 2000 U.S. Census Bureau estimates using age groups 20–39, 40–59, and 60–74. Overweight is body mass index (BMI) of 25 kg/m$^2$ or greater but less than 30 kg/m$^2$; obesity is BMI greater than or equal to 30; and extreme obesity is BMI greater than or equal to 40. Pregnant females were excluded from the analysis.
SOURCES: NCHS, National Health Examination Survey and National Health and Nutrition Examination Surveys.

Source: https://www.cdc.gov/nchs/data/hestat/obesity_adult_13_14/obesity_adult_13_14.pdf

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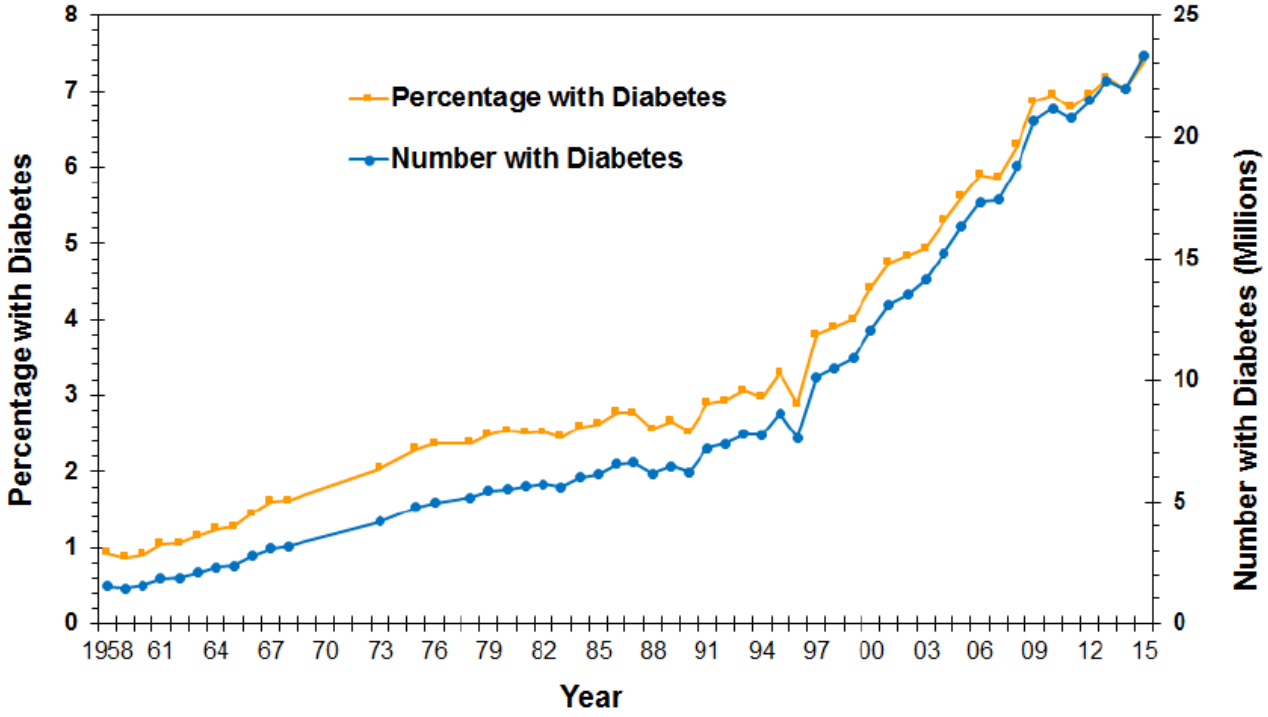
# Number and Percentage of U.S. Population with Diagnosed Diabetes, 1958-2015




Source: http://www.cdc.gov/diabetes/data

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# Banting

| Animal protein | Dairy | Fats | Nuts and seeds | Vegetables |
|---|---|---|---|---|
| Eggs | Cottage cheese | Olive oil | Almonds | All green leafy vegetables, cruciferous vegetables or above ground vegetables |
| Meats | Cream | Avocados | Flaxseeds | |
| Poultry | Full-cream | Coconut oil | Macadamia | |
| Game | Greek Yogurt | Macadamia nut oil | Pecan | |
| Seafood | Cheeses | | Pine nuts | |

Source: Noakes TD., Windt J. Evidence that supports the prescription of low-carbohydrate high-fat diets: a narrative revie, Br J Sport Med 2016; 51:133-139.

# Before and After

**May 2011**

**Dec 2015**

Source: PartnerRe

# Measures

| | | |
|---|---|---|
| Energy ↑ | Triglycerides ↓ | Weight ↓ |
| HDL ↑ | LDL ↓ | BMI ↓ |
| Satiety ↑ | Blood Glucose ↓ | Migraines ↓ |
| Clothing Budget ↑ | TG / HDL ↓ | |

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# Diabetes Treatment

Dr. David Unwin – Norwood Surgery Southport

Pilot study exploring the results of a low carbohydrate diet of 19 type 2 diabetics over an 8 month period

Blood Glucose ↓

Weight ↓

Waist Circumference ↓

Total Serum Cholesterol ↓

Source: Practical Diabetes 2014; 31(2): 76–79

# View of British Heart Foundation

## Saturated fat claims are misleading

26 April 2017 BHF Press Office

Category: BHF Comment

**Claims made about saturated fat in a recent editorial are unhelpful and misleading.**

Clinicians, published in the British Journal of Sports Medicine, claimed that the common belief that 'saturated fats clog up arteries' is wrong.

However, the consensus among world-leading researchers is that too much saturated fat can increase the amount of cholesterol in your blood, which can increase your risk of developing coronary heart disease.

"… I'm afraid the claims about saturated fat made in this opinion piece are unhelpful and misleading.

Decades of research have **proved** that a **diet rich in saturated fat** increases 'bad' LDL cholesterol in your blood, which **puts you at greater risk of a heart attack** or stroke"

Source: https://www.bhf.org.uk
(accessed 30th Oct 2017)

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# Final Thoughts

The diet heart hypothesis has **never been proved**

Source: fotolia.com

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Saturated fats may increase LDL

Saturated fats raise HDL

Source: fotolia.com

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# Final Thoughts

The diet heart hypothesis has **never been proved**

Saturated fats may increase LDL

Saturated fats raise HDL


No such thing as “good” and “bad” cholesterol.

Size of LDL particles matters → Small dense LDL particles associated with greater risk

Source: fotolia.com

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# Final Thoughts

The diet heart hypothesis has **never been proved**

Saturated fats may increase LDL

Saturated fats raise HDL

Shifts LDL-C from small, dense to large LDL


No such thing as “good” and “bad” cholesterol.

Size of LDL particles matters → Small dense LDL particles associated with greater risk

Source: fotolia.com

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# VERY Final Thought

Homonyms are problematic:

Eat FAT so that
you don't get FAT

*"The important thing is not to stop questioning.*
*Curiosity has its own reason for existing"*

Albert Einstein

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# Questions

# Comments



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# Appendix

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# Terminology

## EPI Epidemiological / Observation Studies

A group of subjects is profiled and investigators watch them over a period of time. Outcomes are then correlated to the variables originally measured. These studies can demonstrate **associations** but **not causations.**

## RCT Randomized Control Trial

A study in which the participants are assigned by chance to separate groups; neither the researchers nor the participants can choose which group. The **gold standard** for establishing causal conclusions. Ideally conducted they ensure that the treatment ‘causes’ the outcome in the experiment.

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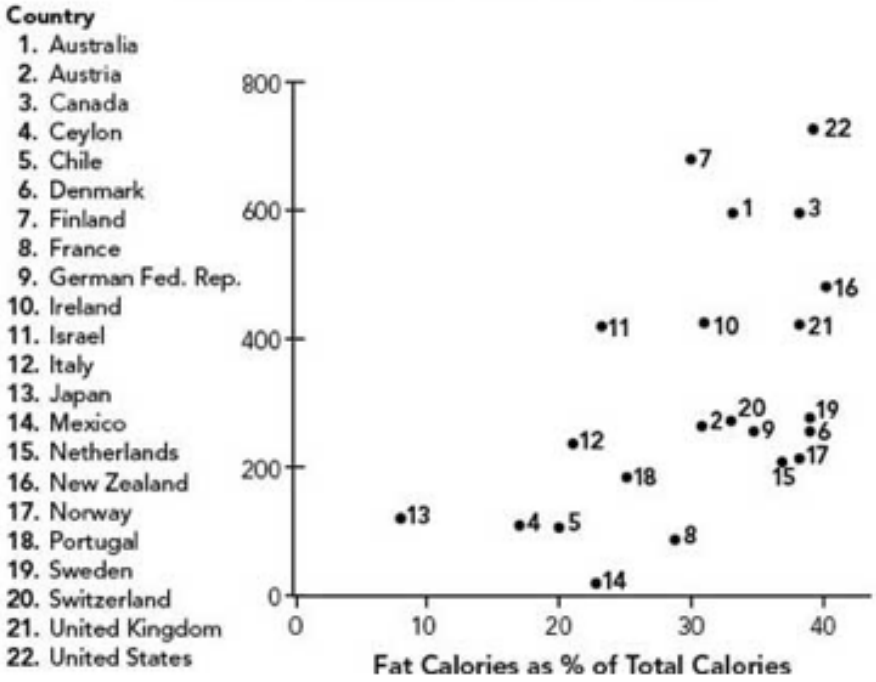
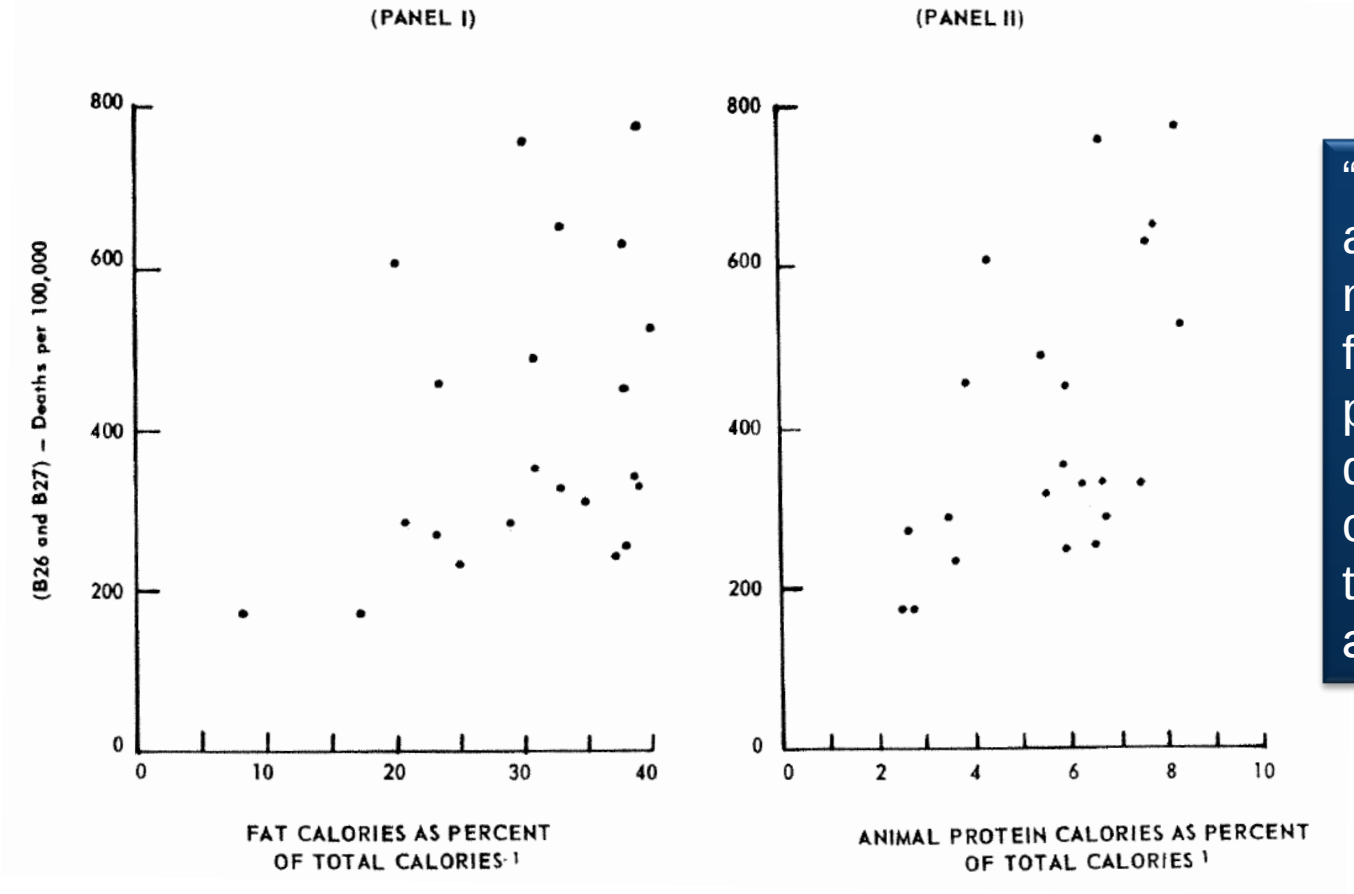
## Mortality from Arteriosclerotic and Degenerative Heart Disease and Percent of Total Calories from Fat – Males age 55–59, 1950




Source: Yerushalmy, J. and Hilleboe, H.E. (1957) Fat in the Diet and Mortality from Heart Disease. A Methodologic Note. New York State Journal of Medicine, 57, 2343-2354.




"… suggested association between national death rates from heart disease and percentage of fat in the diet available for consumption **cannot** at the present time be accepted as valid."

Source: Yerushalmy, J. and Hilleboe, H.E. (1957) Fat in the Diet and Mortality from Heart Disease. A Methodologic Note. New York State Journal of Medicine, 57, 2343-2354.