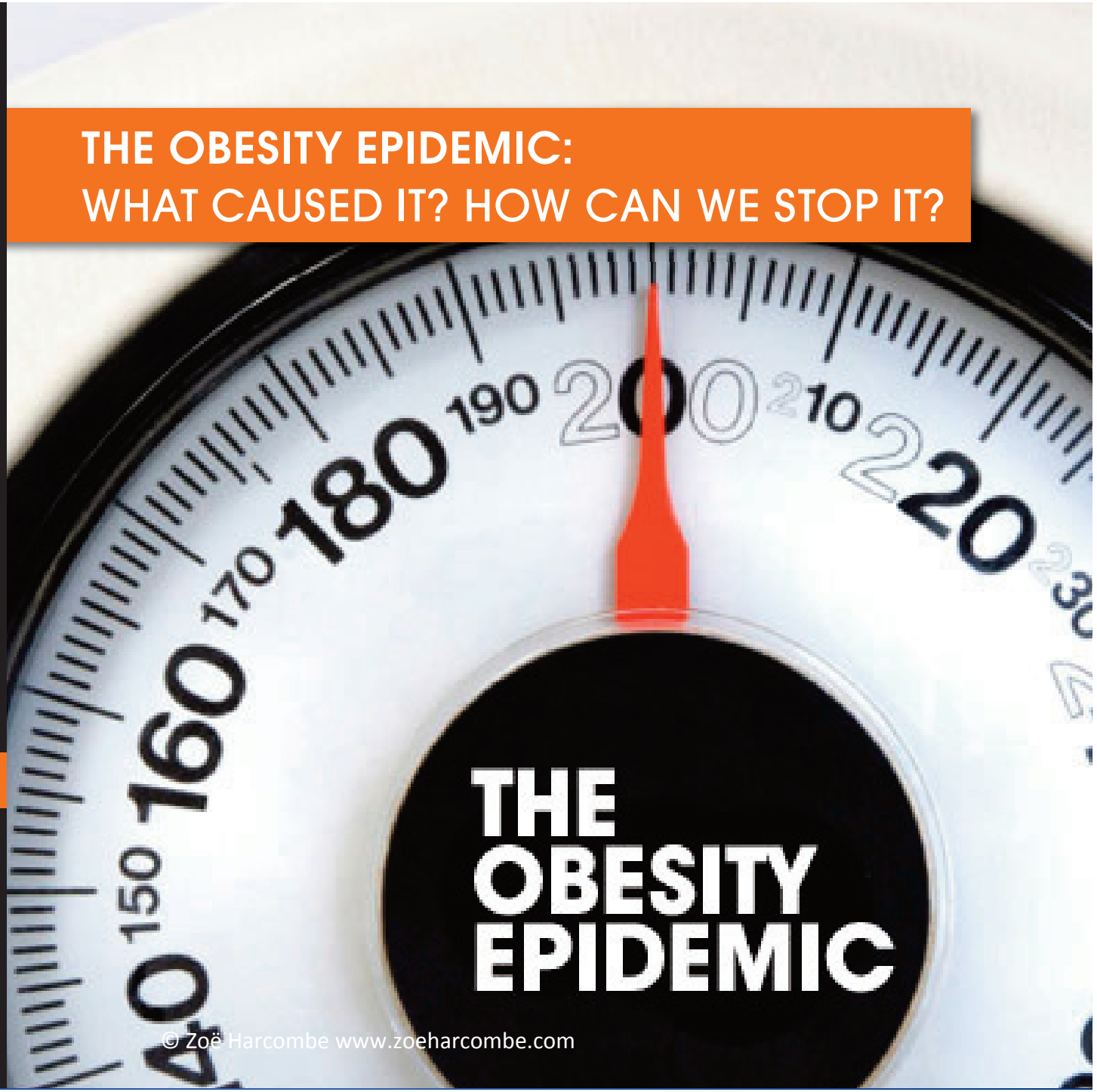
THE OBESITY EPIDEMIC: WHAT CAUSED IT? HOW CAN WE STOP IT?



Public Lectures 2012

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Content

- Part 1 – Conventional wisdom
- Part 2 – The Obesity Epidemic
- **How do we lose weight?**
- Part 3 – Current diet advice
- Part 4 – How do we stop The Obesity Epidemic?
- Part 5 – Pulling it all together

Part 1 – Conventional wisdom

1) The General Principle

   "Eat less/do more"

2) The Calorie Formula

   "To lose 1lb of fat you need to create a deficit of 3,500 calories"

The General Principle

The Laws of Thermodynamics

0) If object A is in thermal equilibrium with B and B is in thermal equilibrium with C then...

1) Conservation: In a closed system, in thermal equilibrium, energy can neither be created nor destroyed. It shall be conserved.

2) Entropy: The increase in the energy of a closed system = the energy added to the system – the energy lost in the form of work done.

3) As a system approaches absolute zero, all processes cease & the entropy of the system approaches a minimum value

Ref 12

The General Principle

Misapplications of the Laws of Thermodynamics

1) Law 1 – Energy in does not equal energy out
2) Law 2 – A calorie is not a calorie
3) There is no direction of causation in the laws of thermodynamics
4) Energy in & Energy out are dependent, not independent, variables
5) We flit between weight and energy as if they are interchangeable

Refs 29, 30

The Calorie Formula

"To lose 1lb of fat..."

"One pound of fat contains 3500 calories, so to lose 1lb a week you need a deficit of 500 calories a day." (BDA)

1) 1lb does not equal 3,500 calories
2) A deficit of 3,500 calories will not lead to a loss of 1lb of fat
3) The body can & does adjust

Ref 58

The Calorie Formula

"1lb does not equal 3,500 calories..."

1) 1lb = 454g
2) 1g fat = 9 calories
3) 1lb adipose tissue = 87% lipid

1lb = 454g x 9cals x 87% = 3,555 calories

"one less (sic) 50 calorie plain biscuit per day could help you lose 5lbs (2.3kg) in a year – and one extra biscuit means you could gain that in a year!"

Refs 79, 80

The Calorie Formula

"1lb does not equal 3,500 calories..."

1) 1lb = 454g
2) 1g fat = 8.7-9.5 calories (*)
3) 1lb adipose tissue = 72-87% lipid

1lb = 454g x 8.7cals x 72% = 2,843 calories (+84)

1lb = 454g x 9.5cals x 87% = 3,752 calories (-26)

Refs 79, 80, 81, 82, 83

(*) 4.1, 4.1, 9.3

The Calorie Formula

Where does the formula come from?

- Diet & Health – Lulu Hunt Peters (1918)?

  "Five hundred Calories equal approximately 2 ounces of fat. Two ounces per day would be about 4 pounds per month, or 48 pounds per year. Cutting out 1000 Calories per day would equal a reduction of approximately 8 pounds per month, or 96 pounds per year."

- British Health Authorities (June 2009)?:

- British Dietetic Association (BDA);
- National Health Service (NHS);
- National Institute for Clinical Excellence (NICE);
- Department of Health (DoH);
- National Obesity Forum (NOF);
- Dieticians in Obesity Management (DOM);
- Association for the Study of Obesity (ASO)

Ref 84

The Calorie Formula

Where does the formula come from?

DoH : "The Department is unaware of the rationale behind the weight formula you refer to."

NICE: "Whilst our guidance does contain reference to studies involving 500 calorie deficit diets we do not hold any information about the rationale behind the statement 'one pound of fat contains 3,500 calories, so to lose 1lb a week you need a deficit of 500 calories a day'."

DOM: "good evidence that c. 600 cal deficit produces weight differences of approx 5kg at 1 year."

ASO: 1 study, 12 people, 600 cals-a-day deficit for 1 year. Should have been 600*365/3,500 = 62.57 pounds of fat lighter; were 11lbs lighter. a) Range 0.8-17.2lbs; b) fat vs. water & muscle c) 1.5 billion overweight people in the world.

Ref NICE document *Management of obesity: Full Guidance*, December 2006

The Calorie Formula

Does the formula hold?

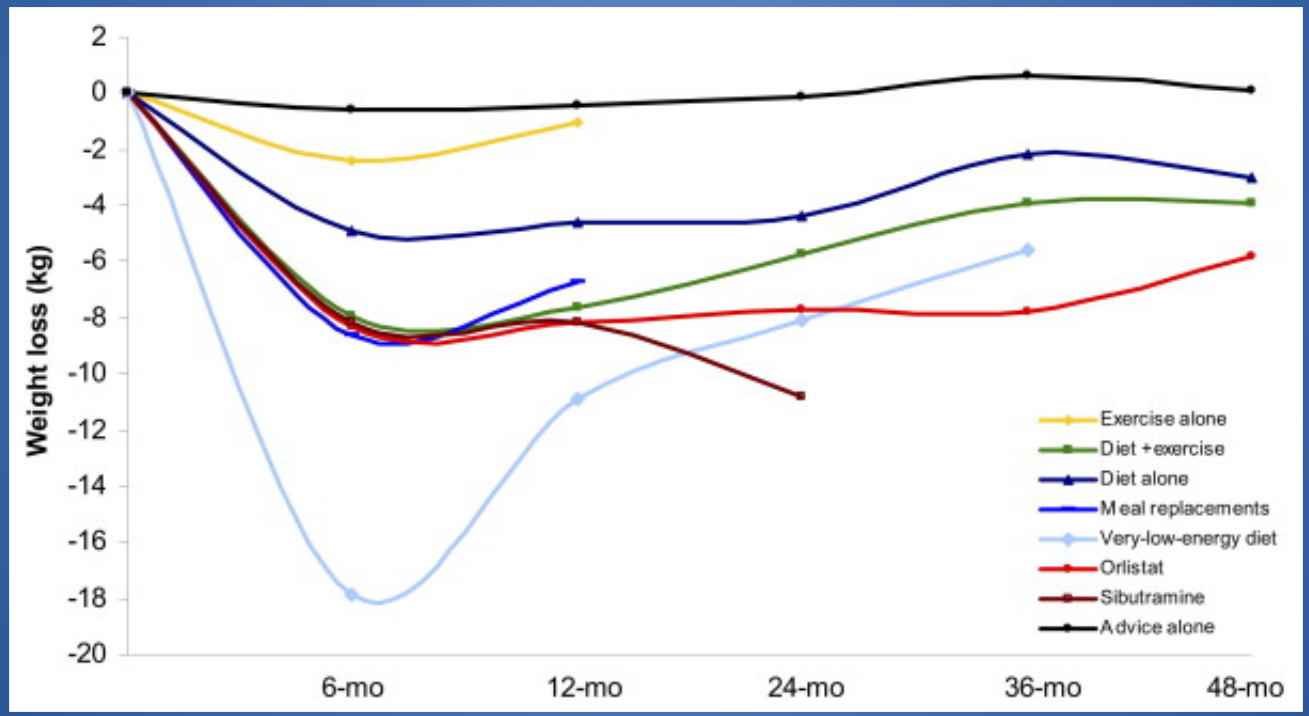
- Benedict (1917)
- Keys (1945)
- Stunkard & McLaren Hume (1959)

  "Only 12% of obese patients lost 20 pounds, despite having stones to lose, only one person in 100 lost 40 pounds and, two years later, only 2% of patients had maintained a 20 pound weight loss."
- Franz (2007)

Refs 90, 92, 93, 99

The Calorie Formula

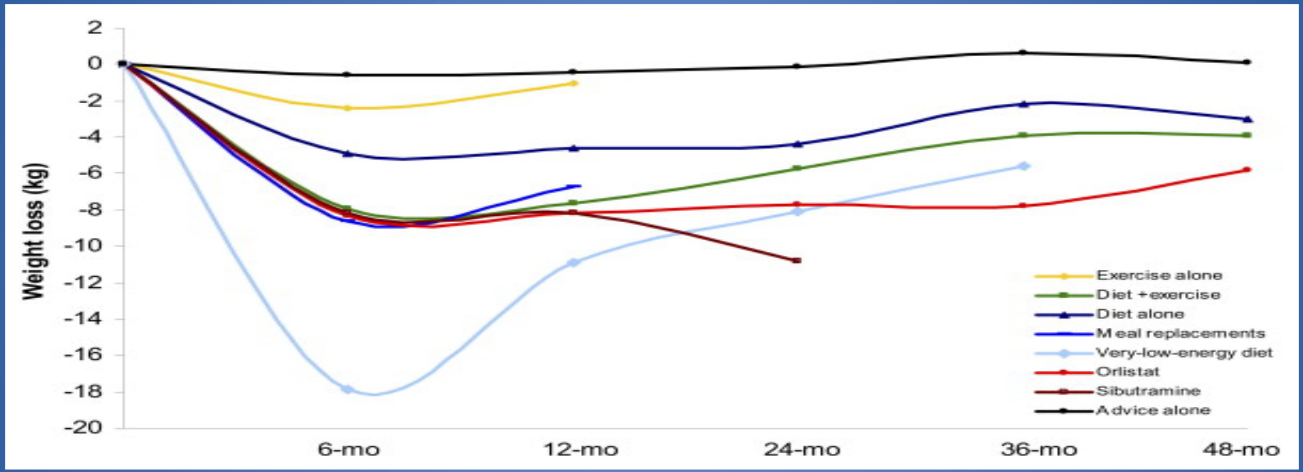
Does the formula hold?



Ref 99

The Calorie Formula

Does the formula hold?

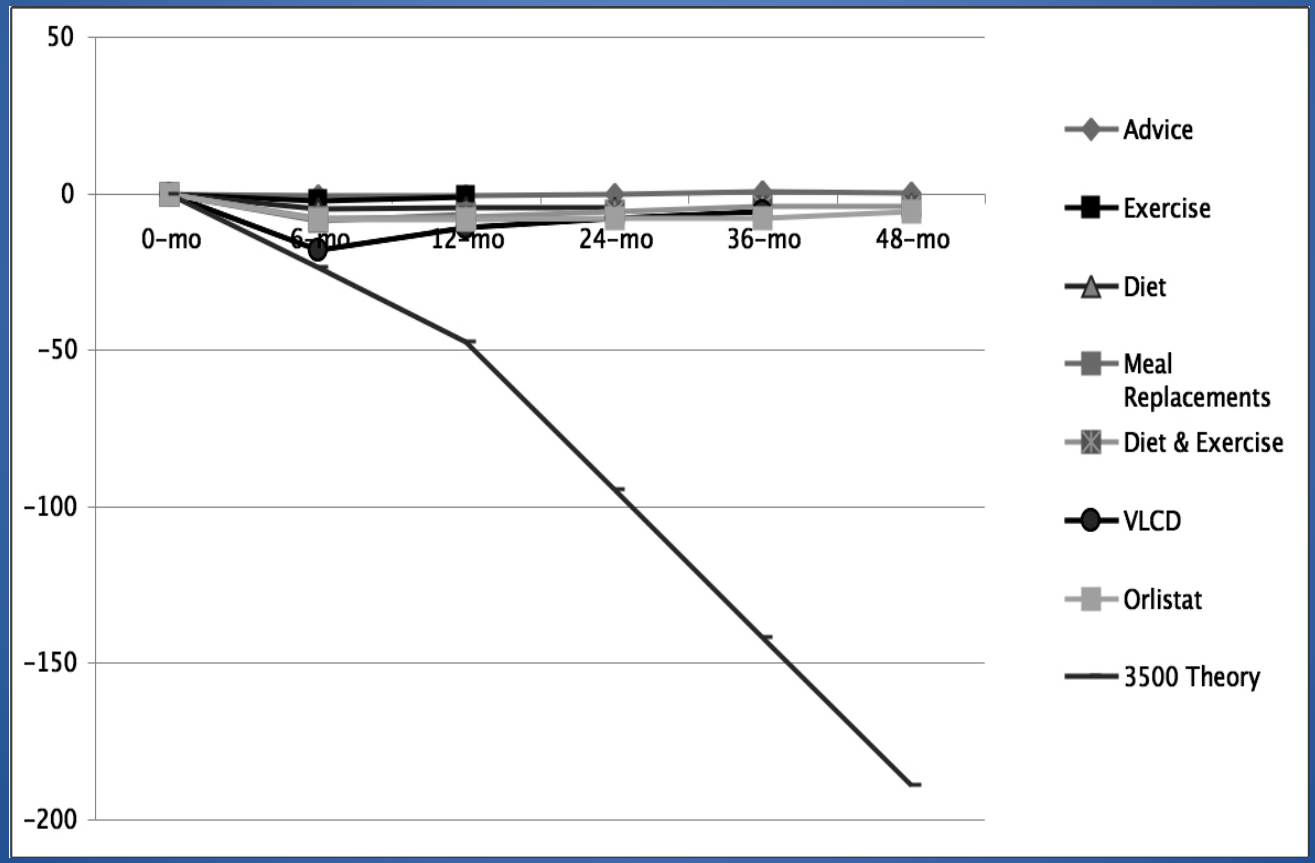


-23.6kg (52lbs)

-47.2kg (104lbs)

The Calorie Formula

The facts vs. the formula



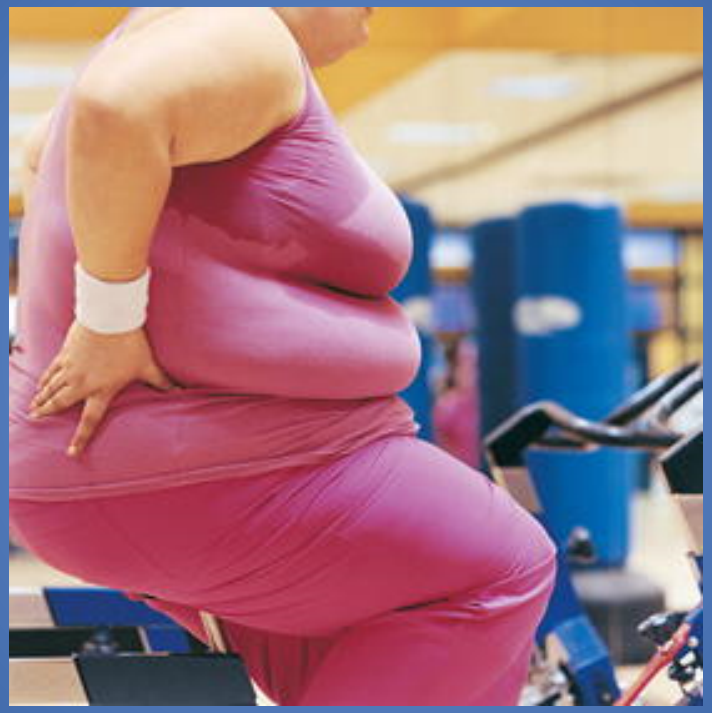
-94.4kg -188.8kg (vs. 3-6kg actual)

-208lbs -416lbs

The Calorie Formula

The body can & does adjust

Eat less (500)



Do more (200)

BMR 1,500 cals

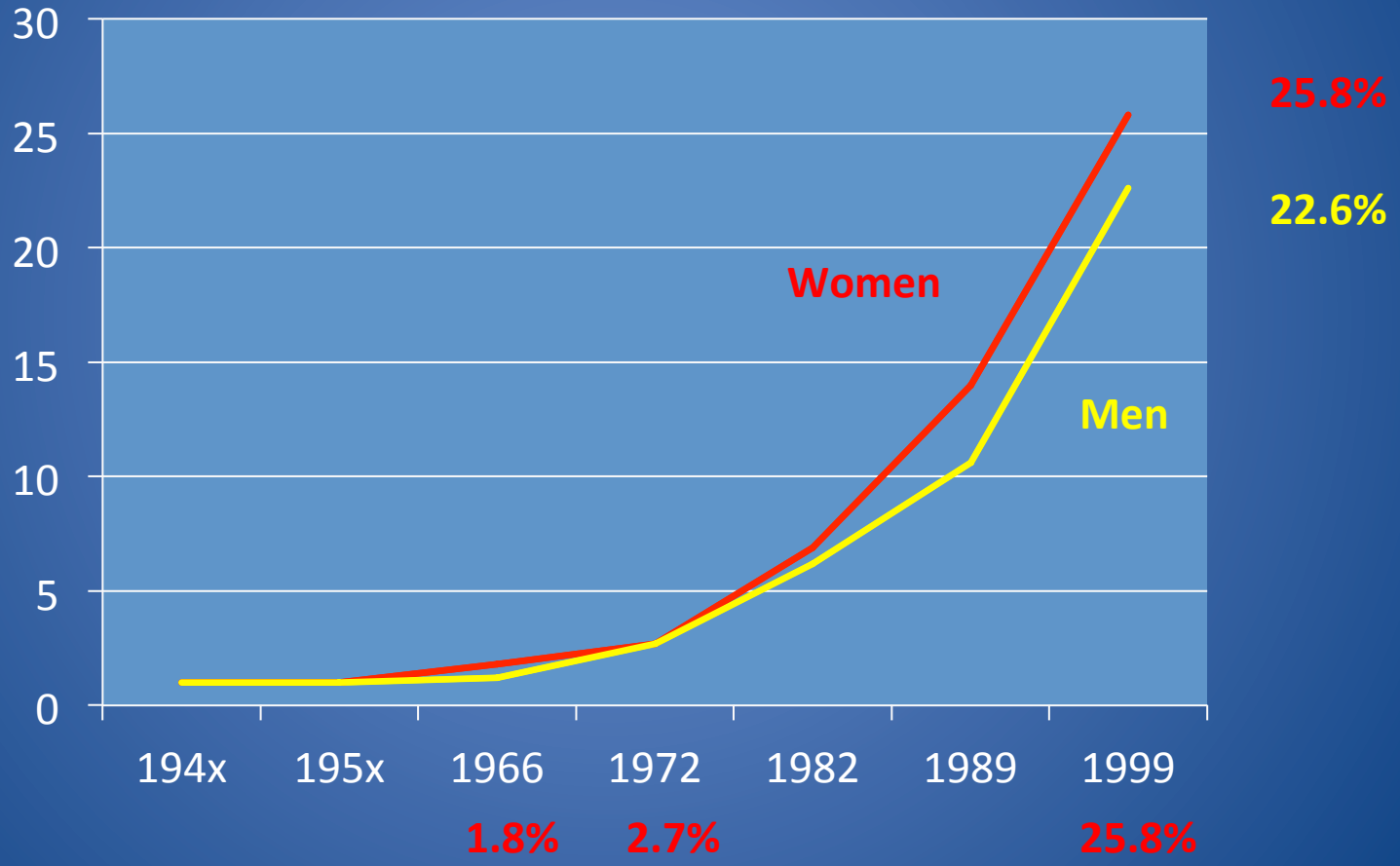
BMR+ 500 cals

700/3,500 =

Lose 1/5th lb fat?

Part 2 – The Obesity Epidemic

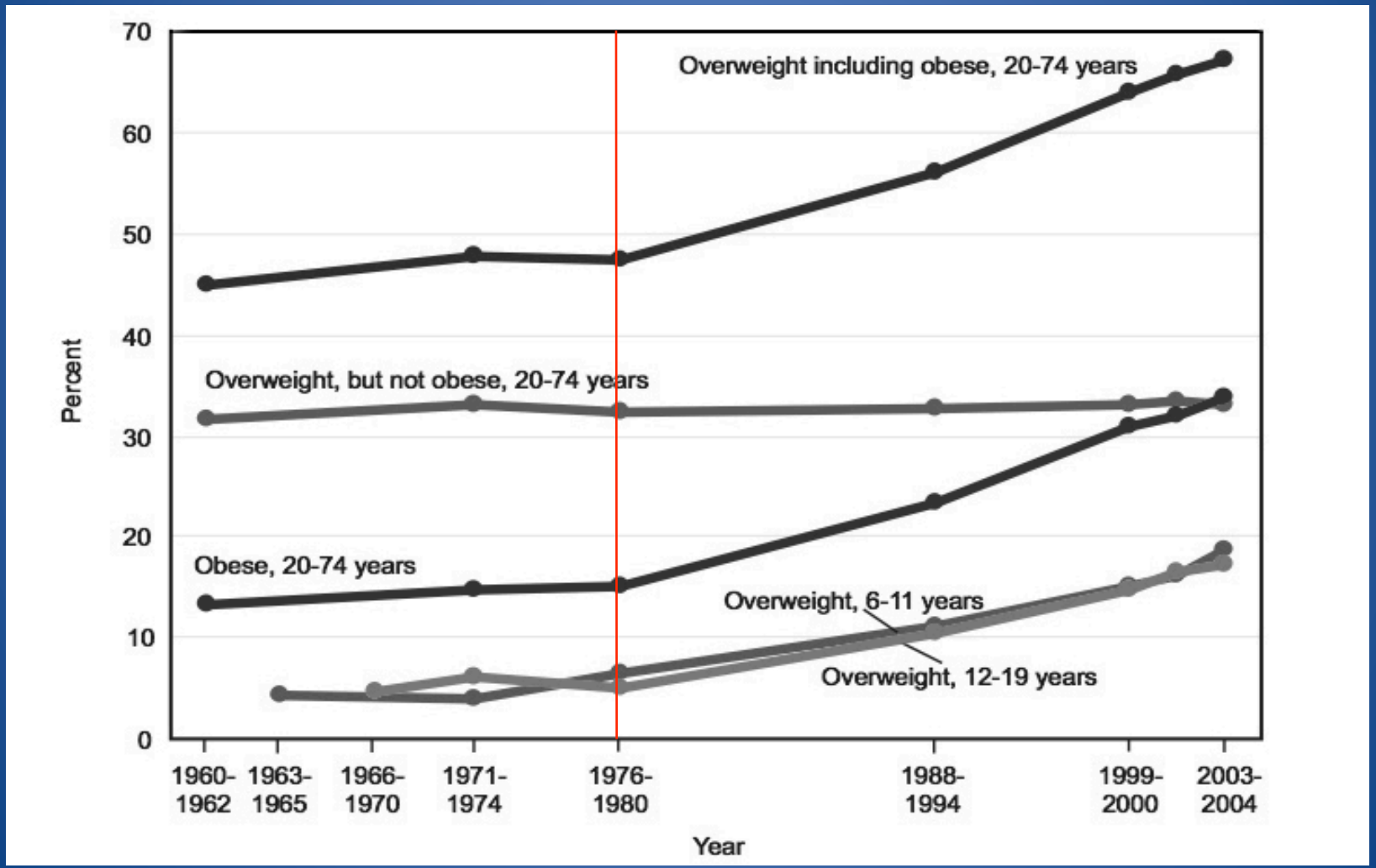
UK BMI statistics



Ref 3

The Obesity Epidemic

USA BMI statistics



Ref 4

What caused The Obesity Epidemic?

What happened c. 1980?

- We did a U-turn in our diet advice...
- 1977 Dietary Goals for the USA
- 1980 Dietary Guidelines for Americans
- 1983 Proposals for nutritional guidelines for health education in Britain (NACNE)
- 1984 Diet & cardiovascular disease policy paper (COMA)

Refs 162, 164, 166

What caused The Obesity Epidemic?

What happened c. 1980?

From: "Farinaceous and vegetable foods are fattening, and saccharine matters are especially so".

To: "The previous nutritional advice in the UK to limit the intake of all carbohydrates as a means of weight control now runs counter to current thinking and contrary to the present proposals for a nutrition education policy for the population as a whole… The problem then becomes one of achieving both a reduction in fat intake to 30% of total energy and a fall in saturated fatty acid intake to 10%."

Refs 5, 166

What caused The Obesity Epidemic?

Why did we change our advice?

Refs 127, 133, 160

How did fat become the bad guy?

Cholesterol & fat & logic

- "There's no connection whatsoever between cholesterol in food and cholesterol in blood. And we've known that all along. Cholesterol in the diet doesn't matter at all unless you happen to be a chicken or a rabbit.“
- Only animal foods contain cholesterol
- All animal foods contain fat
- If cholesterol has no impact...

Ref T.J. Moore, *Heart Failure* (1989)

How did fat become the bad guy?

The Seven Countries Study

- 1970; 7 countries (Finland, Greece, Italy, Japan, Netherlands, USA & Yugoslavia); 16 cohorts; 12,770 men aged 40-59 in 1956

1) CHD tends to be related to cholesterol
2) Cholesterol tends to be related to sat fat
3) CHD is as closely related to sat fat as it is to cholesterol

- r = 0.72 for CHD deaths at 25 years & cholesterol at start;
- r = 0.96 for CHD deaths & latitude!

Refs 133, 145

How did fat become the bad guy?

Over 50 years of macro nutrient confusion

- 1956-1970: The Seven Countries Study list of saturated fat: **cakes & ice cream**; **meat (pork & poultry), eggs**; milk and butter.
- 2011: NHS list of saturated fat: **biscuits, cakes, chocolate, confectionery, ice cream, pastries, pies, savoury snacks**; **fatty cuts of meat, (sausages), lard**; butter, ghee, cheese and cream.
- Demonise processed carbohydrates.
- Get the facts right about meat, eggs & lard.
- Understand the consequences of demonising dairy products.

Refs 131, 244

The truth about fat

Five facts about fat

1) Fat is utterly life vital – we would die without it.
2) There are 3 real fats: saturated; monounsaturated & polyunsaturated. All foods that contain fat contain all 3 fats. There are no exceptions.
3) Only dairy products have more saturated than unsaturated fat – not that any real fat is better or worse than any other.
4) Fat doesn't make us fat. UK saturated fat intake:

   1975 – 51.7 1999 – 28.1 grams per person per day
5) The UK is deficient in fat soluble vitamins:

   A (50%), D (25%), E (66%) and K (?%).

Refs MAFF National Food Survey 1975-1999, DEFRA Family Food Survey 2009

The truth about fat

Where is fat found?

Food (*)	Water	Carb	Protein	Fat	Sat	Mono	Poly
Pork	75	0	**21**	3.8	1.5	**1.8**	0.5
Whole wheat pita	37	**43**	13	4	0.9	0.8	**1.9**
Oats	11	**69**	13	7	1.1	2	**2.3**
Sirloin steak	71	0	**21**	7	2.1	**3**	0.3
Eggs	76	1	**13**	10	3.1	**3.8**	2.6
Mackerel	64	0	**19**	14	3.3	**5.5**	5.2
Cheese	37	1	25	**33**	**21**	9.4	1
Sunflower Seeds	5	20	21	**51**	5	19	**23**
Lard	0	0	0	**100**	39	**45**	11
Olive oil	0	0	0	**100**	14	**73**	11

(*) All based on 100g of food. Source: USDA Nutrition Database; adds to 100 with minerals & some rounding errors

The case against fat...

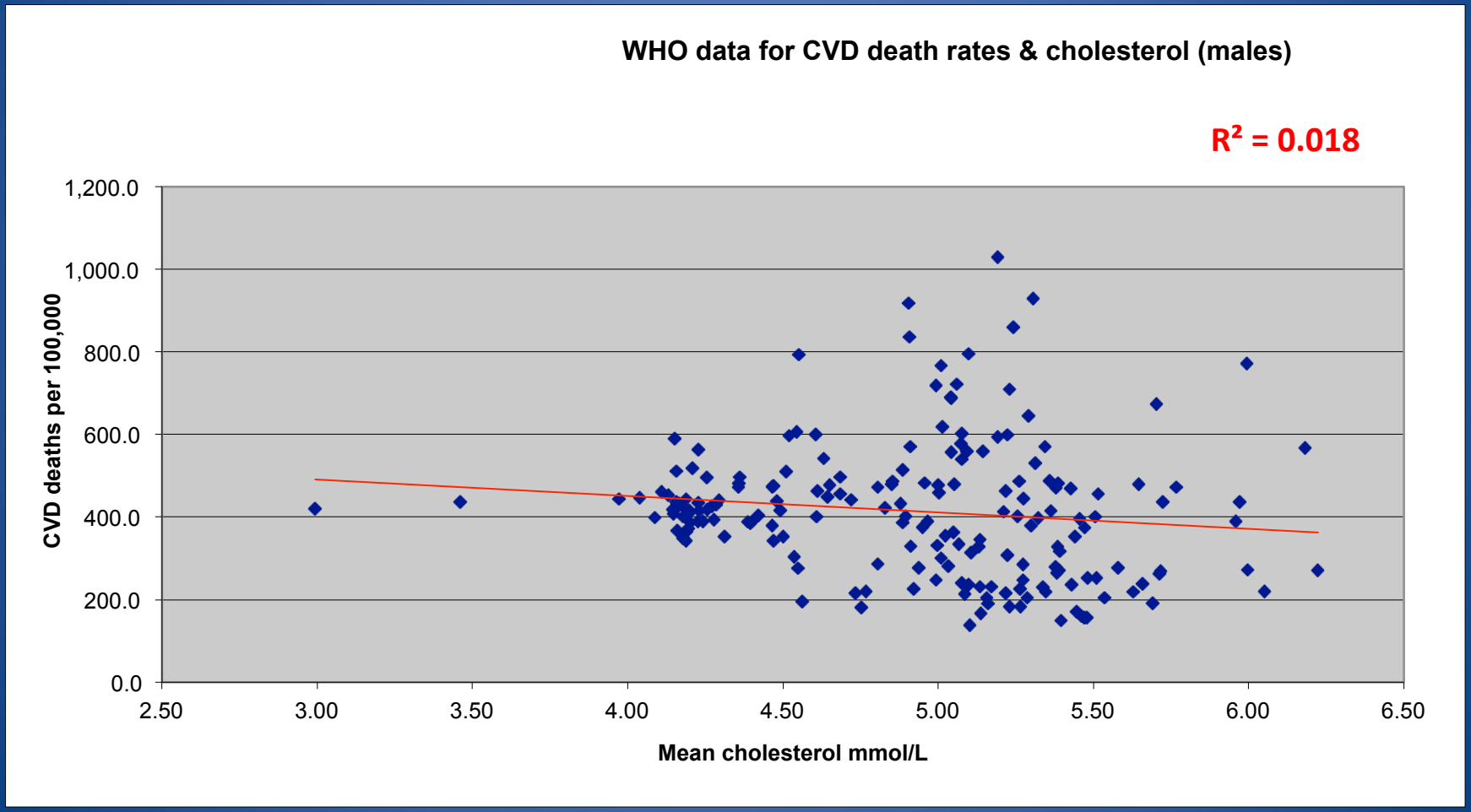
... The study has not, can not & will not be done

- "There has been no controlled clinical trial of the effect of decreasing dietary intake of saturated fatty acids on the incidence of coronary heart disease nor is it likely that such a trial will be undertaken." (COMA, 1984)
- "It has been accepted by experienced coronary disease researchers that the perfect controlled dietary trial for prevention of coronary heart disease has not yet been done and we are unlikely ever to see it done." (Truswell, 1994)
- "The ideal controlled dietary trial for prevention of heart disease has not yet been done and it is unlikely ever to be done." (FSA, 2009)

Refs 388,389,390

Cholesterol & death rates

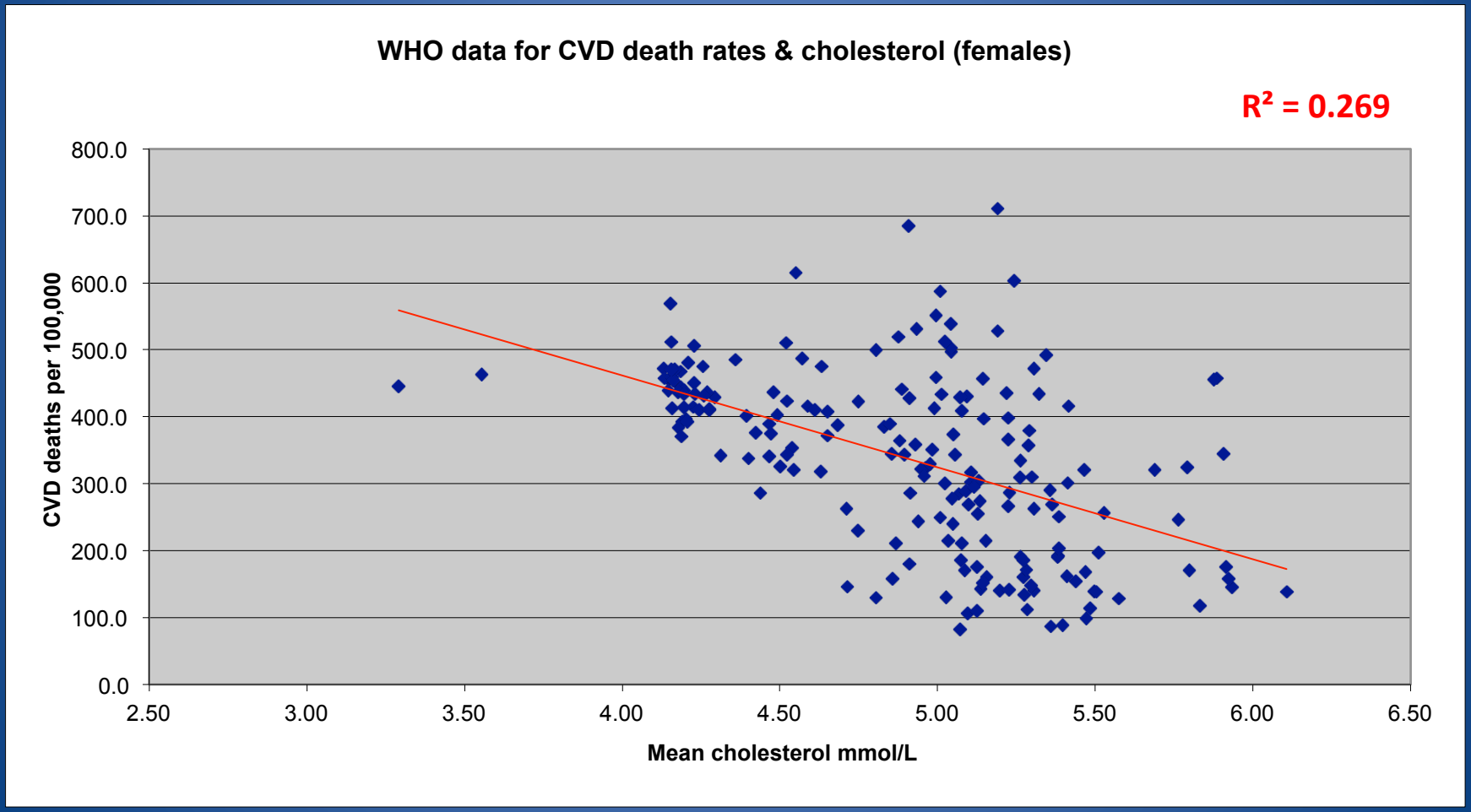
Males & heart deaths



Ref www.theobesityepidemic.org/research: WHO data for 192 countries

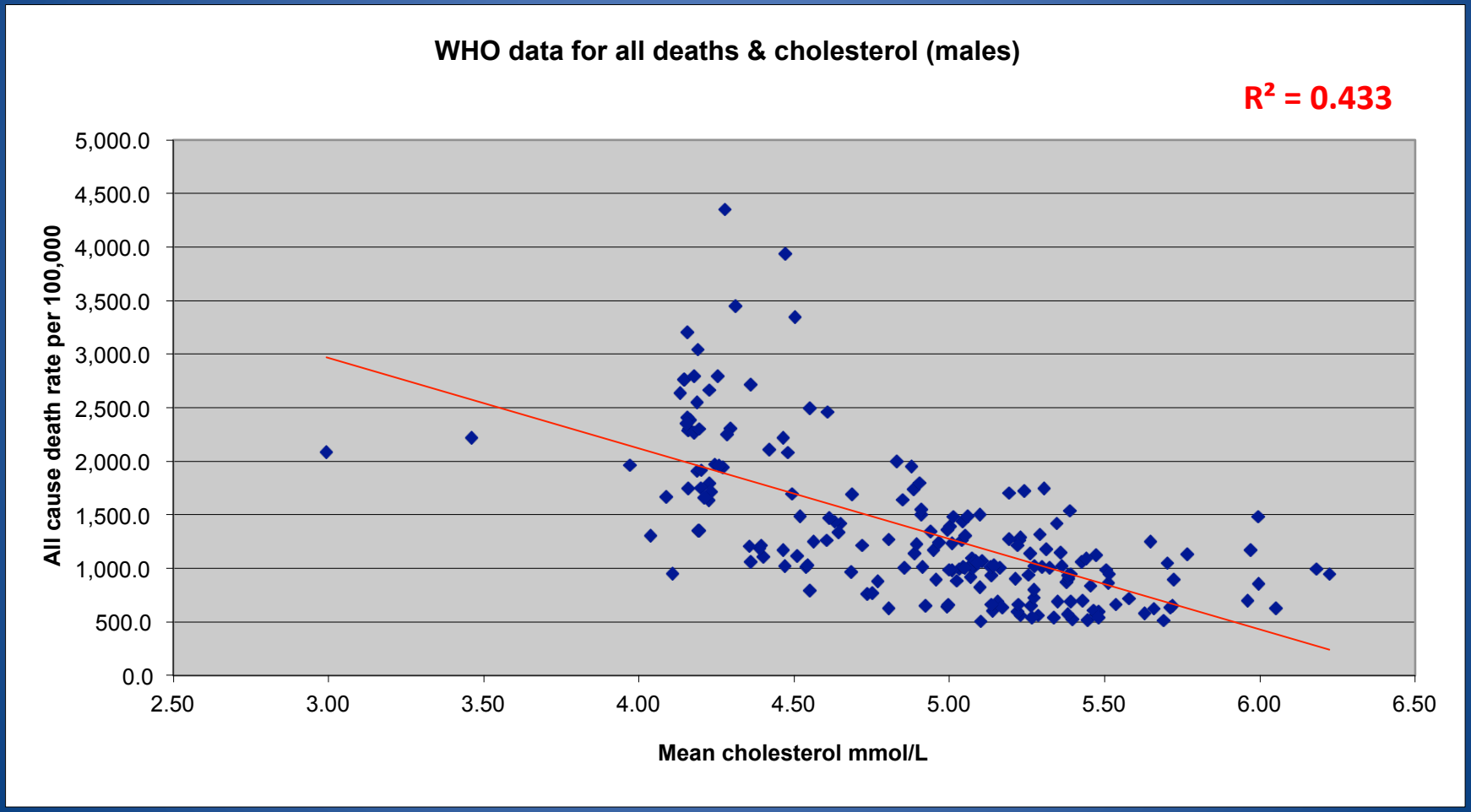
Cholesterol & death rates

Females & heart deaths



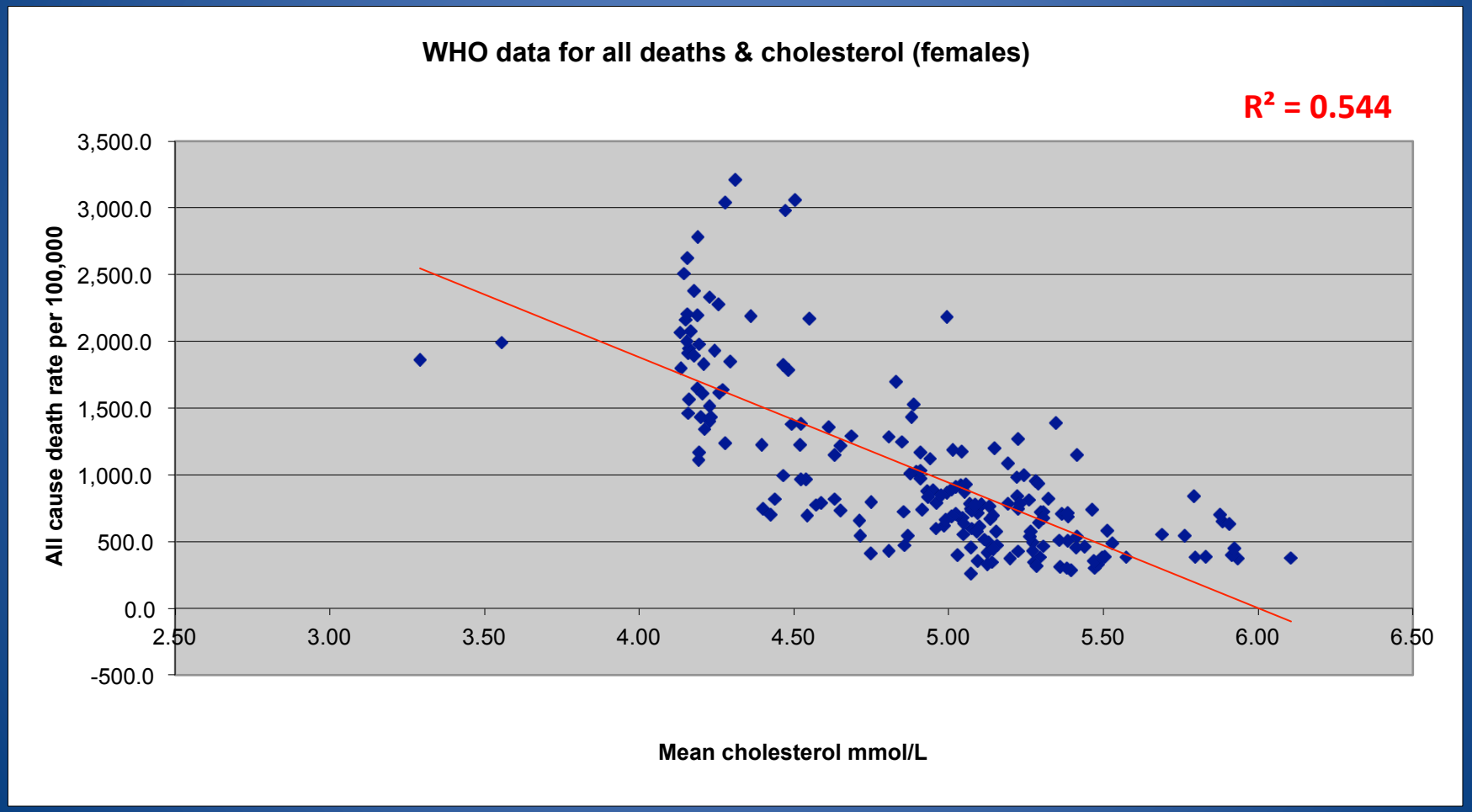
Cholesterol & death rates

Males & all deaths



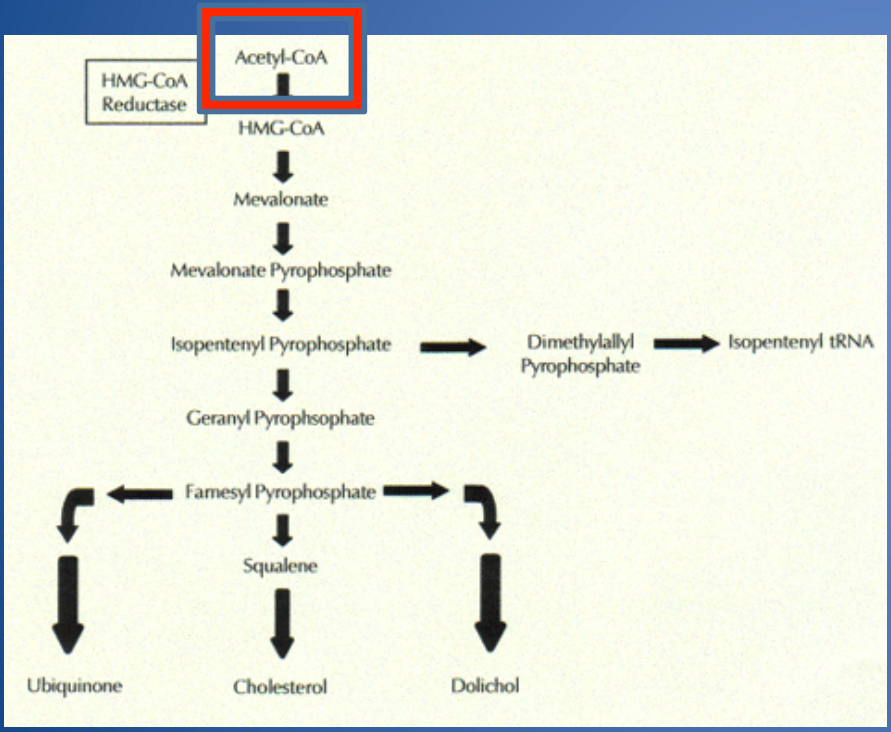
Cholesterol & death rates

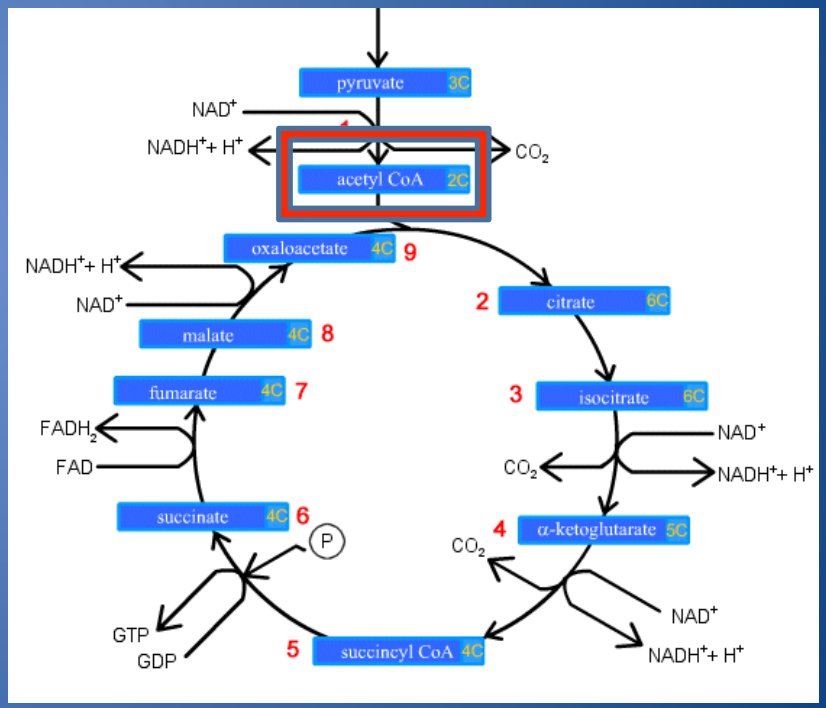
Females & all deaths



Cholesterol – the irony

What can unnaturally raise cholesterol?





Cholesterol synthesis

Kreb's Cycle

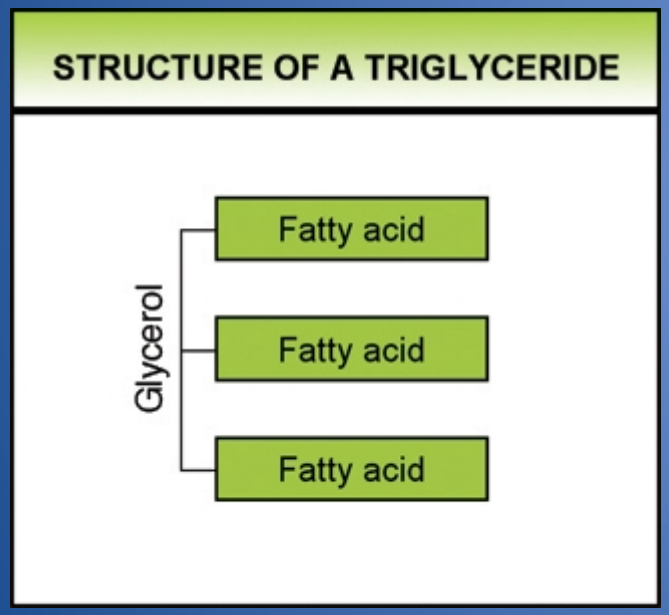
The Obesity Epidemic

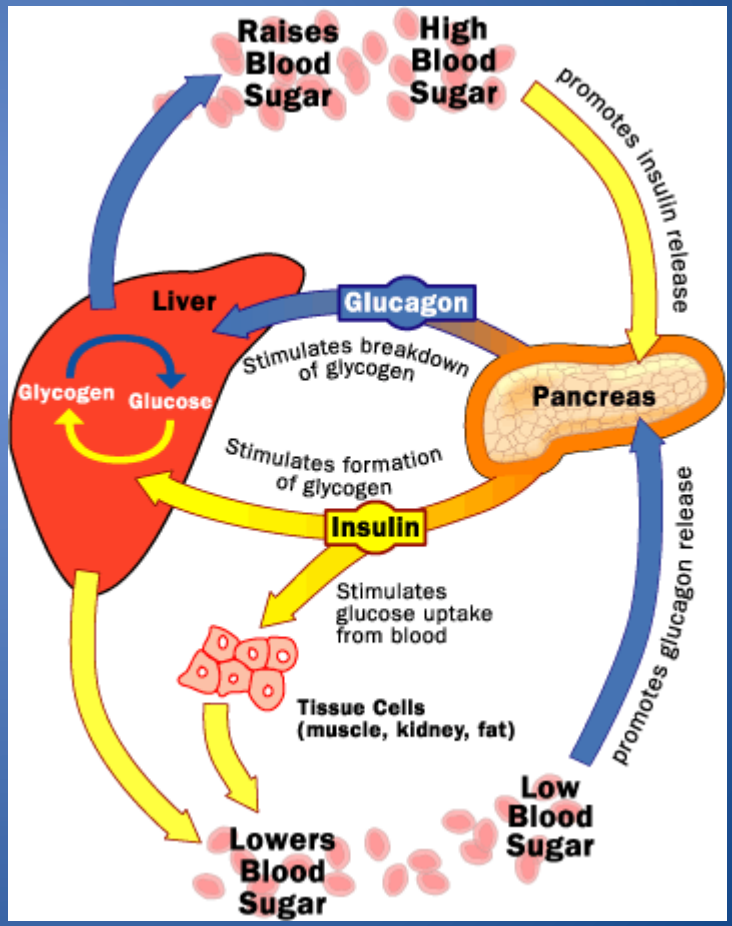
Three Questions...

1) Do you think that Mother Nature is trying to kill you?
2) Do you think that your body is trying to kill you?
3) If the answer to either (1) or (2) is yes, do you know what paranoia is?!

How do we lose weight?

Storing & un-storing fat





Part 3 – Current diet advice

The eatbadly plate

CANCER

DIABETES

NAFLD

Fructose

Glucose

CHD

Ref 116

Sucrose

MODERN FOOD/ILLNESS

Current diet advice

What are we eating?

1,536 processed food calories/day

1,423g 731g 39g Per week

1975-1999 **Down:** Real meat, eggs, butter, whole milk, vegetables (fresh green)

Up: Cereals, cereal products, confectionery & ice cream, fruit & fruit products, processed meat, processed potatoes & veg, soft drinks

Refs 109, 110, 120, 121, 192, 250

Current diet advice

American Dietetic Association

Ref 318

Current diet advice

Dieticians Association of Australia

Ref: DDA web site

Current diet advice
British Nutrition Foundation

Refs 322, 323

Current diet advice

Obesity organisations

- ASO (Association for the Study of Obesity)

- NOF (National Obesity Forum)

- Change4life

Refs 321, 332, ASO web site

Part 4 – How do we stop TOE?

What should individuals do?

1) Eat food ...
2) ... three times a day
3) Manage carbohydrate intake

- "Eat food; mostly plants; not too much" (Michael Pollan)
- "Eat food; mostly animals; quite a lot!"

Plants or animals?

Take care of the micro nutrients

(All per 100g)	Liver	Steak	Sardines	Broccoli	Apple	Sucrose	Flour
Calories	116	154	208	34	52	**387**	339
Protein Quality	**149**	94	148	83	31	0	54
A (3,000 IU)	**11,077**	0	108	623	54	0	0
B1 (1.2mg)	**0.3**	0.1	0.1	0.1	0.0	0	0.1
B2 (1.3mg)	**1.8**	0.1	0.2	0.1	0.0	0	0
B3 (16mg)	**9.7**	7.2	5.2	0.6	0.1	0	1.3
B5 (5mg)	**6.2**	0.6	0.6	0.6	0.1	0	0.4
B6 (1.7mg)	**0.9**	0.6	0.2	0.2	0.0	0	0
Folic Acid 400mcg	**588**	13	12	63	3	0	26
B12 (2.4mcg)	**16.6**	1.2	8.9	0	0.0	0	0
C (90mg)	17.9	0	0	**89.2**	4.6	0	0
D (400IU)	neg	0	**272**	0	neg	0	0
E (15mg)	0.7	0.3	**2**	0.8	0.2	0	0.1
K (120mcg)	0	1.2	2.6	**102**	2.2	0	0.3

Plants or animals?
Take care of the micro nutrients

(All per 100g)	Liver	Steak	Sardines	Broccoli	Apple	Sucrose	Flour
Calcium (1000mg)	8	27	**382**	47	6	0	15
Magnesium (420mg)	19	22	**39**	21	5	0	22
Phosphorus (700mg)	297	193	**490**	66	11	0	108
Copper (0.9mg)	**0.5**	0.1	0.2	0.0	0.0	0	0.1
Iron (18mg)	**9.0**	1.5	2.9	0.7	0.1	0	1.2
Manganese (2.3mg) **(3.8)**	0.3	0.0	0.1	0.2	0.0	0	**0.7**
Zinc (11mg)	2.7	**3.9**	1.3	0.4	0.0	0	0.7

How do we stop The Obesity Epidemic?

What should public health advisors do?

1) Tear down the eatbadly plate
2) Stop telling people to base their meals on ~~fattening~~ starchy foods
3) One public health message – Eat Real Food!
4) Eliminate conflicts of interest
5) Fiscal measures

Part 5 – Pulling it all together

Unconventional Wisdom

- Obesity is fat stored; weight loss is fat unstored
- No law says energy in = energy out;
- A calorie is **not** a calorie
- 1lb ≠ 3,500 calories; we know not from whence this came; we will not lose 1lb with a 3,500 cal deficit; there is no formula
- We did a U-Turn in our diet advice & obesity increased 10 fold
- We demonised the wrong macronutrient (fat) & told people to eat more of the macronutrient causing harm (carbohydrate)
- As we have eaten more carbohydrate & less fat we have got fat & sick in parallel

Pulling it all together

Answer must lie in what has *changed*

"If we have been eating real food for 24 hours, agriculture gave us large scale access to carbohydrates four minutes ago and sugar consumption has increased twenty fold in the past five seconds. I wonder which food is more likely to be responsible for the obesity epidemic or any modern disease..."

Pulling it all together

2,000 calories vs. 2,000 calories

Ms. Mother Nature		Ms. 'Eatwell' Plate
10/30/60	Carb/Fat/Protein	55/30/15
1,641 (186/585/870)	2,000 cals	1,826 (1,023/585/218)
1,455 fat/protein cals	1,500 BMR	803 fat/protein cals (nutritionally deficient)
186 carb cals (rest from body fat)	500 energy	1,023 carb cals (523 stored as body fat)
Slim & Healthy		Fat & Sick

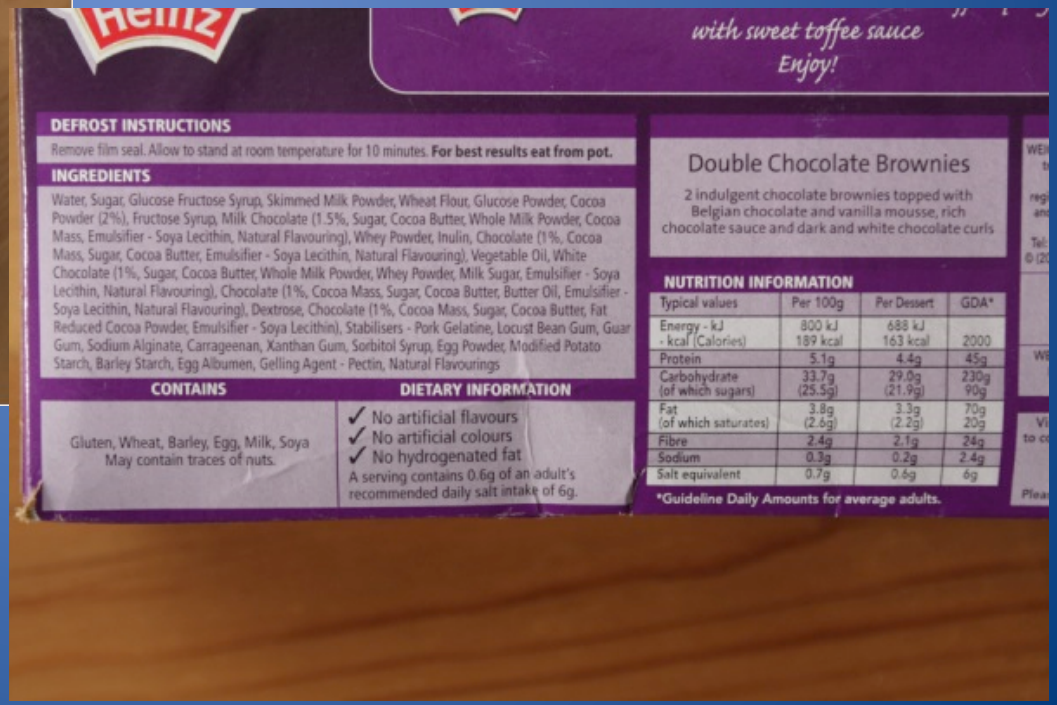
Pulling it all together

What happens when?... We eat...

Water, sugar, glucose fructose syrup, skimmed milk powder, wheat flour, glucose powder, cocoa powder (2%), fructose syrup, milk chocolate (1.5%, sugar, cocoa butter, whole milk powder, cocoa mass, emulsifier – soya lecithin, natural flavouring), whey powder, inulin, chocolate (1%, cocoa mass, sugar, cocoa butter, emulsifier – soya lecithin, natural flavouring), vegetable oil, white chocolate (1%, sugar, cocoa butter, whole milk powder, whey powder, milk sugar, emulsifier – soya lecithin, natural flavouring), chocolate (1%, cocoa mass, sugar, cocoa butter, butter oil, emulsifier – soya lecithin, natural flavouring), dextrose, chocolate (1%, cocoa mass, sugar, cocoa butter, fat reduced cocoa powder, emulsifier – soya lecithin), stabilisers – pork gelatine, locust bean gum, guar gum, sodium alginate, carrageenan, xanthan gum, sorbitol syrup, egg powder, modified potato starch, barley starch, egg albumen, gelling agent pectin, natural flavourings.

Pulling it all together

… Diet ‘food’

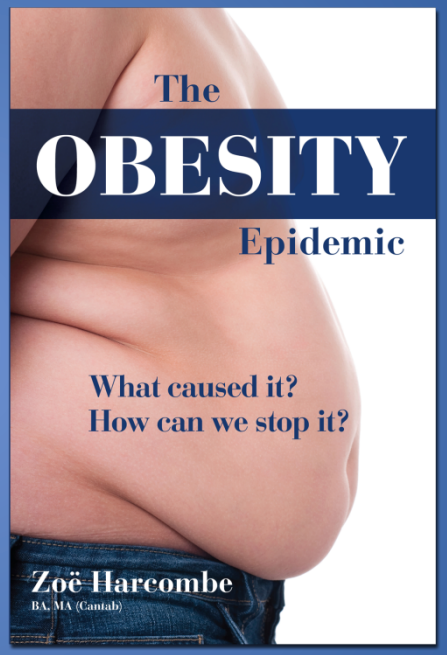


Ref 89

The final slide

- ’Civilised’ man is the only chronically sick animal on the planet. (Barry Groves)
- Man is the only species clever enough to make his own food...
- ... & stupid enough to eat it.

Thank you!



www.theobesityepidemic.org

www.zoeharcombe.com