



Does protein turn into chocolate cake in your blood stream?

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DPC 2021 – Stand D54



Blood Vessel



Learning outcomes

1. Why dietary protein is essential, good sources and the minimum daily protein requirement to prevent diseases of deficiency
2. Protein involvement with appetite control and body weight
3. The benefits from consuming sufficient protein and what does 'sufficient' look like?
4. What gluconeogenesis is and how protein can influence blood glucose, glucagon and insulin

CONFLICT OF INTEREST



**CHARITY COMMISSION
FOR ENGLAND AND WALES**



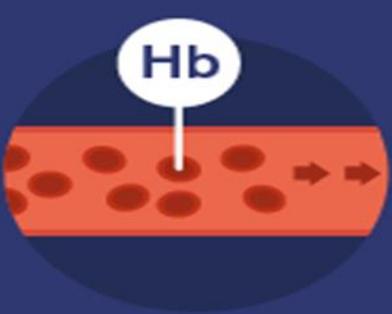
Why is dietary protein essential?

- Protein got its name from Swedish chemist Jöns Jacob Berzelius in 1838
- Derived from the Greek word for "primary," meaning "in the lead" or "standing in front"
- Vital for survival
- 2nd most abundant compound in the body
- ~43% muscle / ~16% blood / ~15% skin

Proteins provide many essential functions in the body



support muscle contraction & movement



move essential molecules around the body



provide support to the body



hormones help coordinate bodily function



support the regulation and expression of DNA and RNA



antibodies support immune function



digestive enzymes help facilitate chemical reactions





20 Amino Acids

Essential	Conditionally Non-Essential	Non-Essential
Histidine	Arginine	Alanine
Isoleucine	Cystine	Asparagine
Leucine	Glutamine	Aspartate
Lysine	Glycine	Glutamate
Methionine	Proline	Serine
Phenylalanine	Tyrosine	
Threonine		
Tryptophan		
Valine		

Protein quality based on ability to provide all EAA in the correct quantity

How much do we need and how can we get it?

19-50 years	55.5 (Males) 45.0 (Females)
50+ years	53.3 (Males) 46.5 (Females)

*UK Reference Nutrient Intakes (RNI) for protein for the population (DH 1991)

- RI 50g/day <https://www.nhs.uk/live-well/eat-well/what-are-reference-intakes-on-food-labels/>
- These values are in accord with the FAO/WHO/UNU daily recommendation of not less than 0.75g good quality protein/kg body weight/d (WHO 1985)

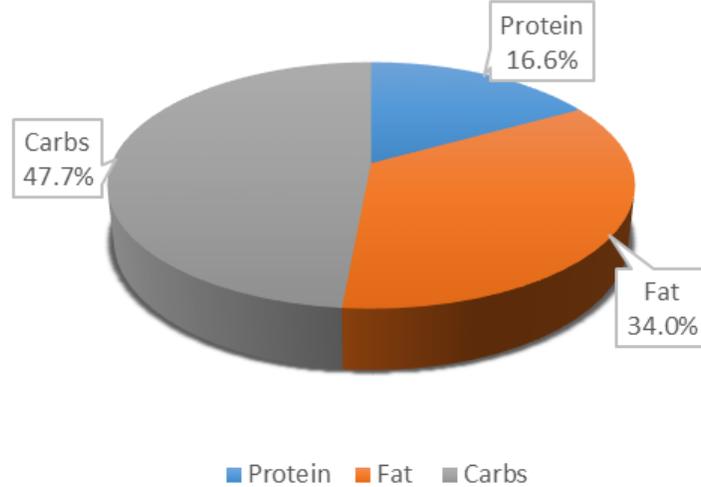
How much do we need?

- BUT - this is based on an **average minimum requirement** needed for maintaining bodily function and avoiding deficiency
- Current evidence suggests that 1.2-1.6g/kg bodyweight is more ideal for health outcomes

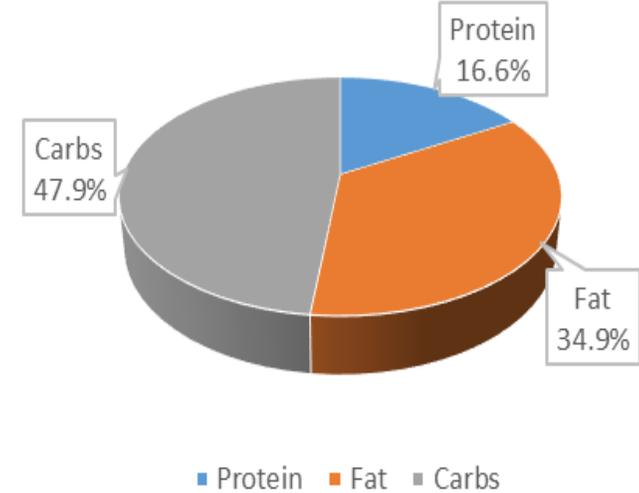
Phillips SM *et al.* Protein "requirements" beyond the RDA: implications for optimizing health. *Applied physiology, nutrition, and metabolism = Physiologie appliquee, nutrition et metabolisme.* 2016;41(5):565-72.

How much protein are people eating?

Men (19-64 years)
Macronutrient Percentage Breakdown



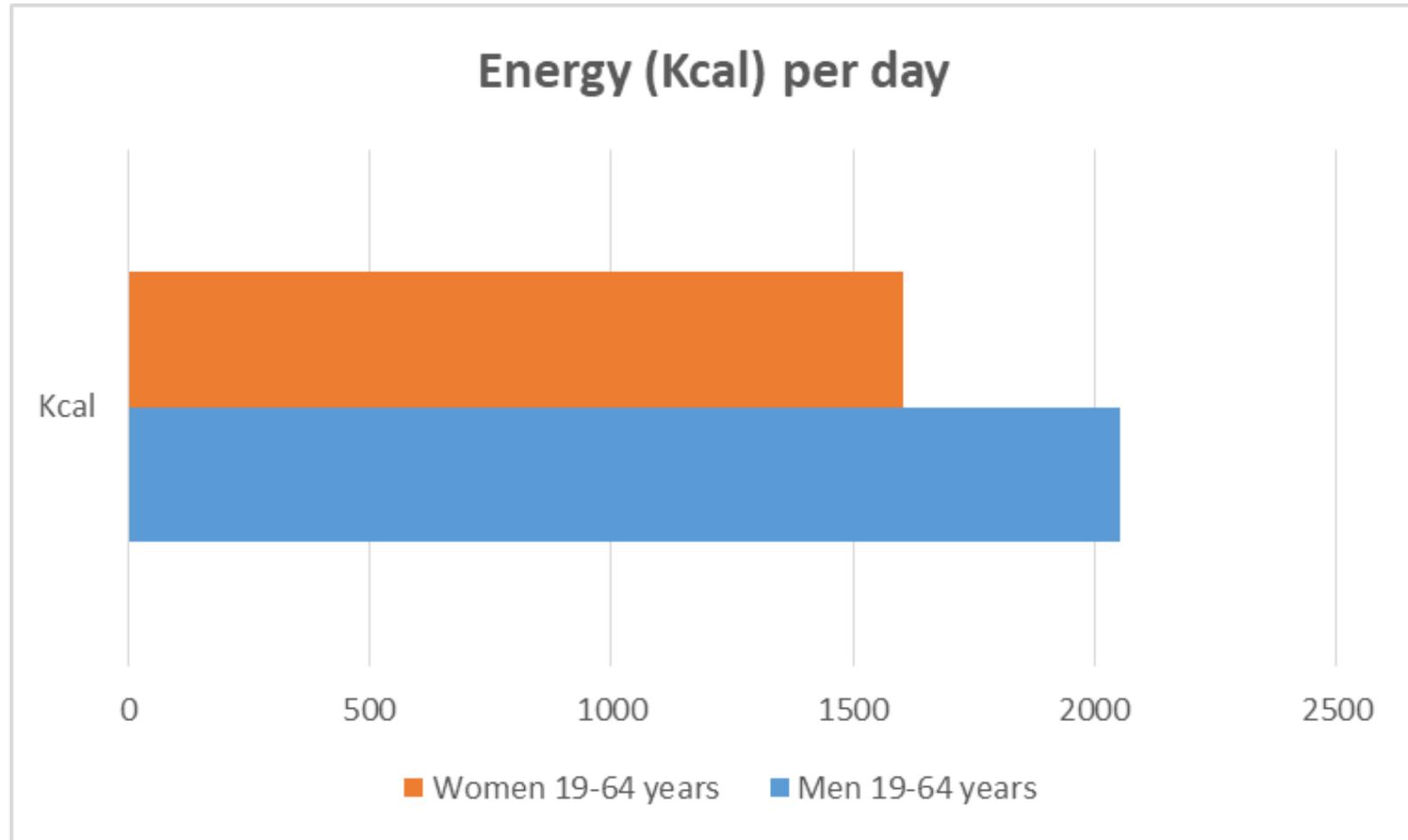
Women (19-64 years)
Macronutrient Percentage Breakdown



Source: UK National Diet and Nutrition Survey 2016/2017 to 2018/2019

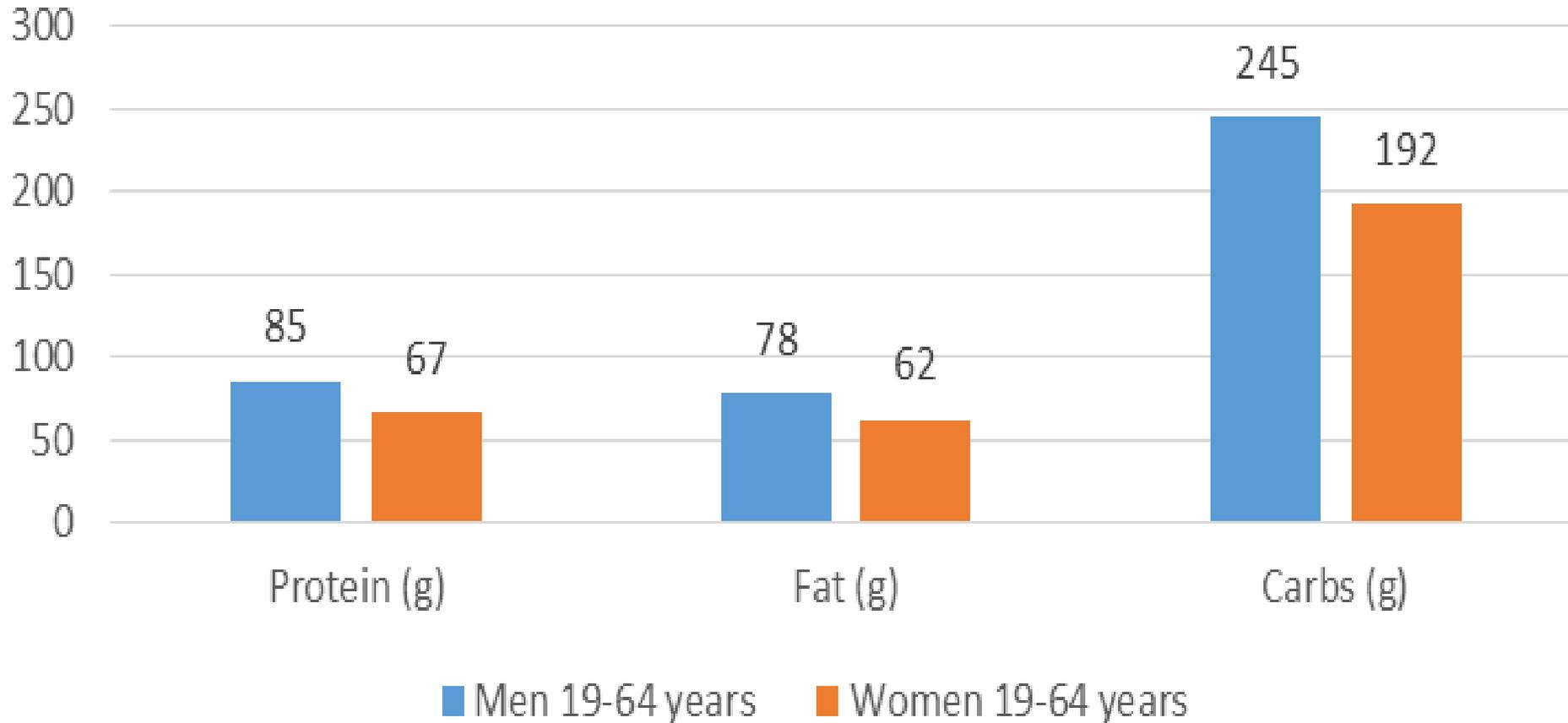


Broadly meeting government guidelines



Source: UK National Diet and Nutrition Survey 2016/2017 to 2018/2019

Grams of Protein, Fat and Carbohydrate per Day



Source: UK National Diet and Nutrition Survey 2016/2017 to 2018/2019



So why the overweight and obesity statistics?

Around three quarters of people aged 45-74 in England are overweight or obese

- Obese
- Overweight
- Normal
- Underweight

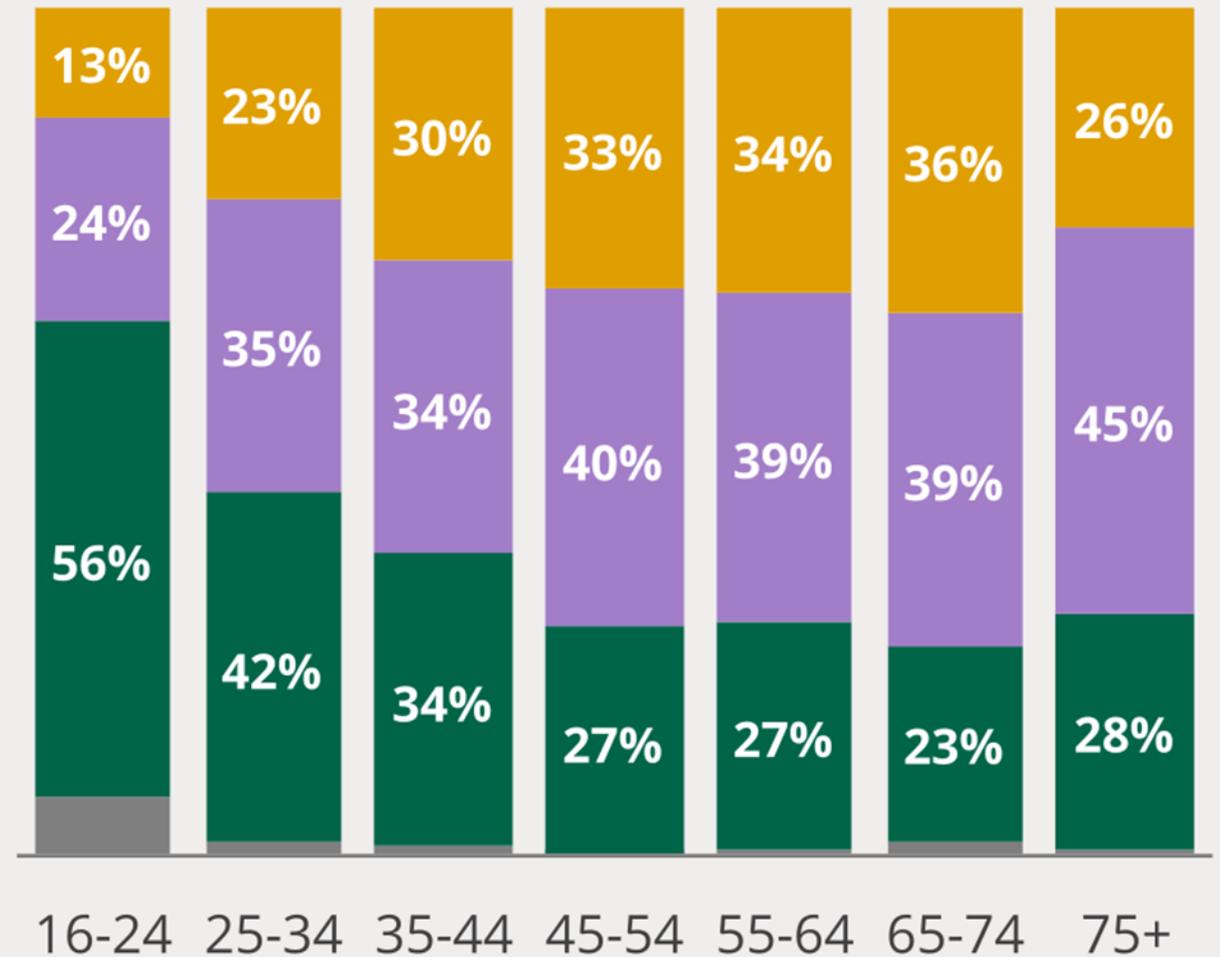
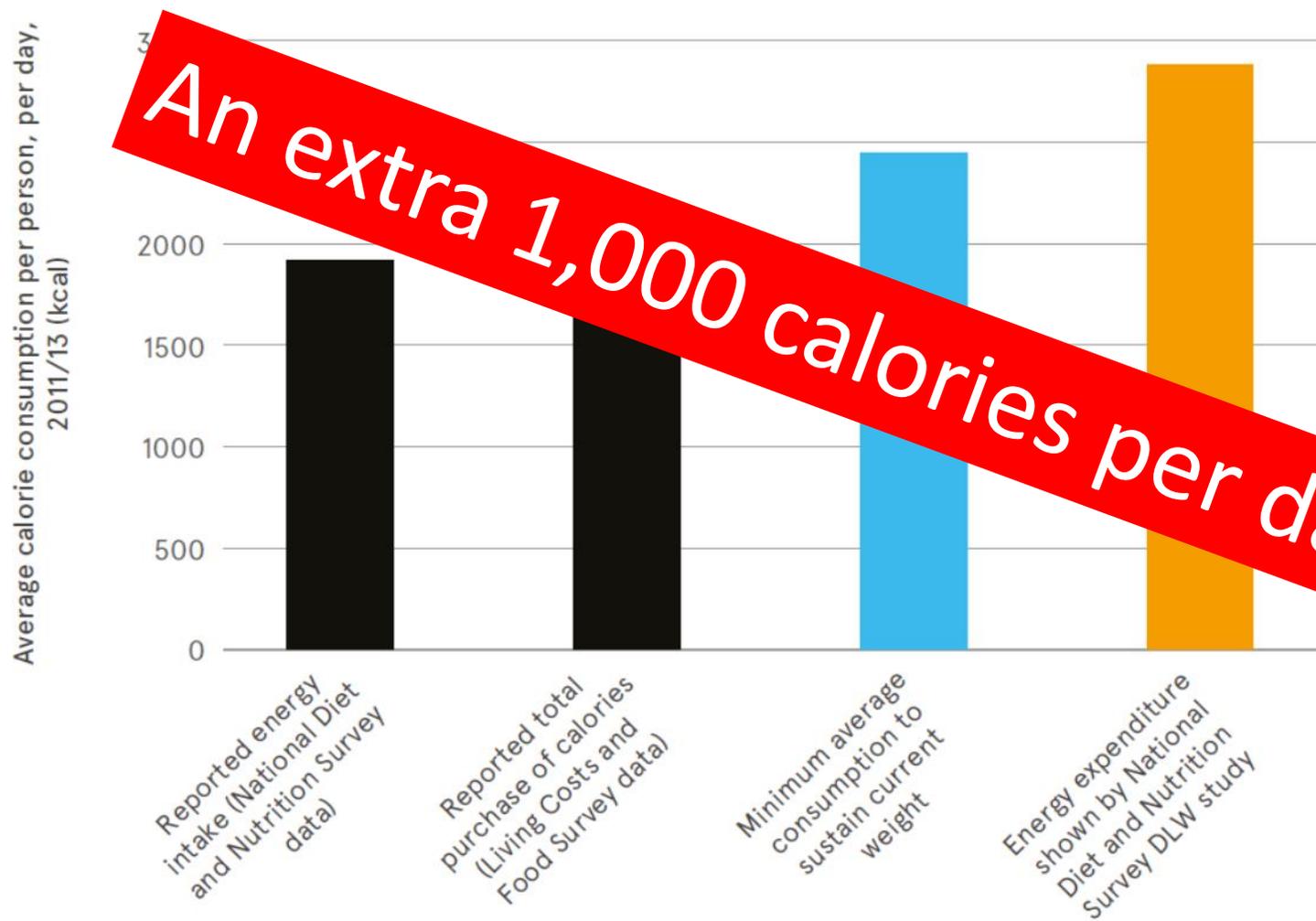


Chart: @commonslibrary

Source: NHS Digital, Health Survey for England 2019

So why is weight increasing when total energy intake wouldn't sustain weight maintenance?

Figure 1 Reported calorie intake versus estimated true calorie intake for adults



An extra 1,000 calories per day!



Why are people eating excess calories?



Ultra-processed food
High in fat and carbs, low protein

Protein Leverage

People decide what to eat.....



versus



.....and the body decides how much of it to eat

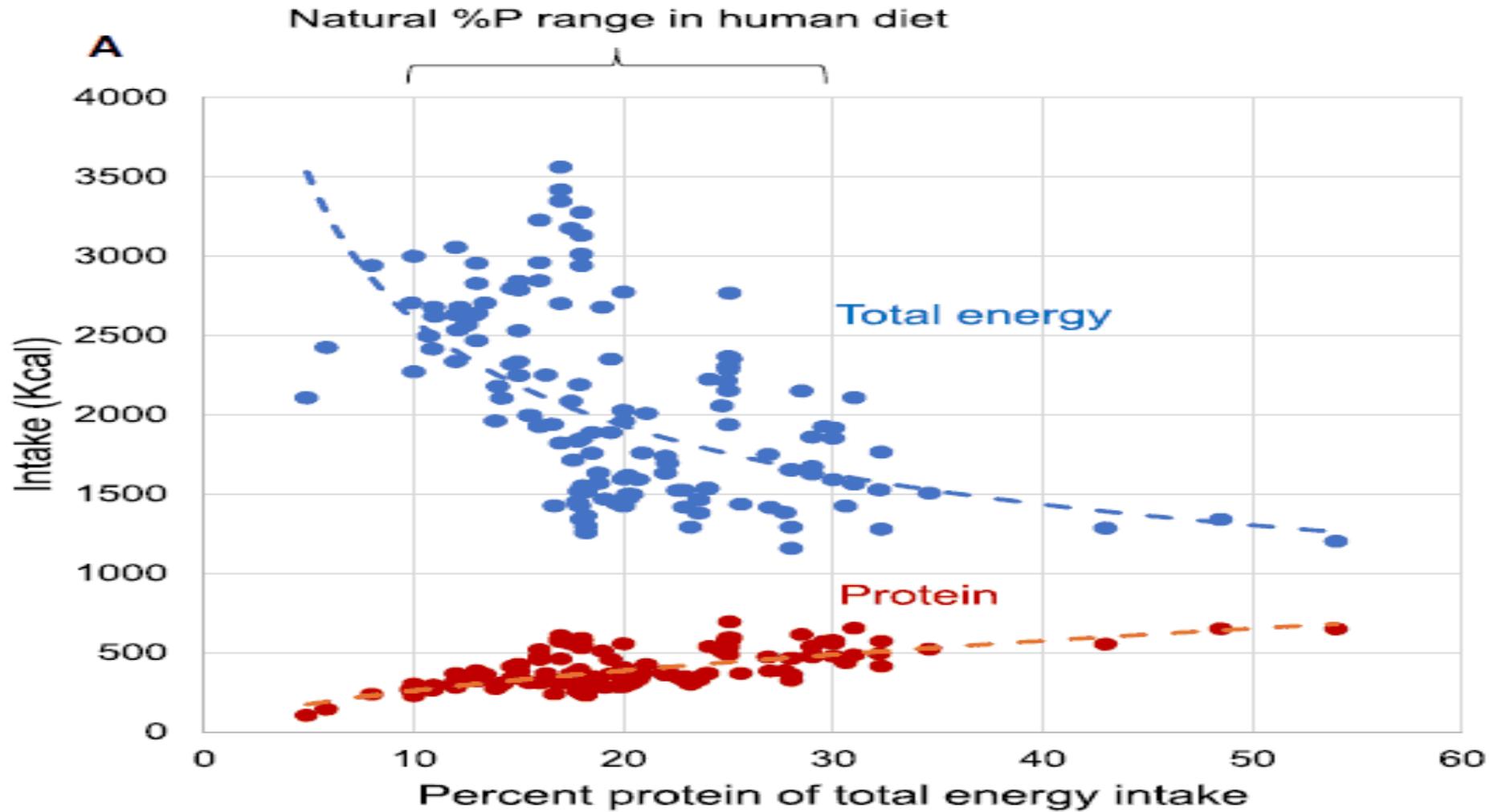


Protein Leverage Hypothesis

We will continue eating until our protein requirements have been met no matter how many calories are consumed - ultra processed food are lacking in protein and are driving the obesity pandemic



Protein Leverage



Raubenheimer D, Simpson SJ. Protein Leverage: Theoretical Foundations and Ten Points of Clarification. *Obesity* 2019;27(8):1225-38.



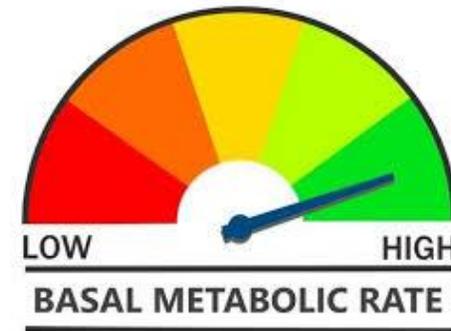
In addition to Protein Leverage

Protein has been shown to:

- reduce appetite
- increase feelings of fullness
- increased postprandial thermogenesis
- lower the amount of weight regained
- maintain or increase metabolic rate
- protect muscle mass during weight loss

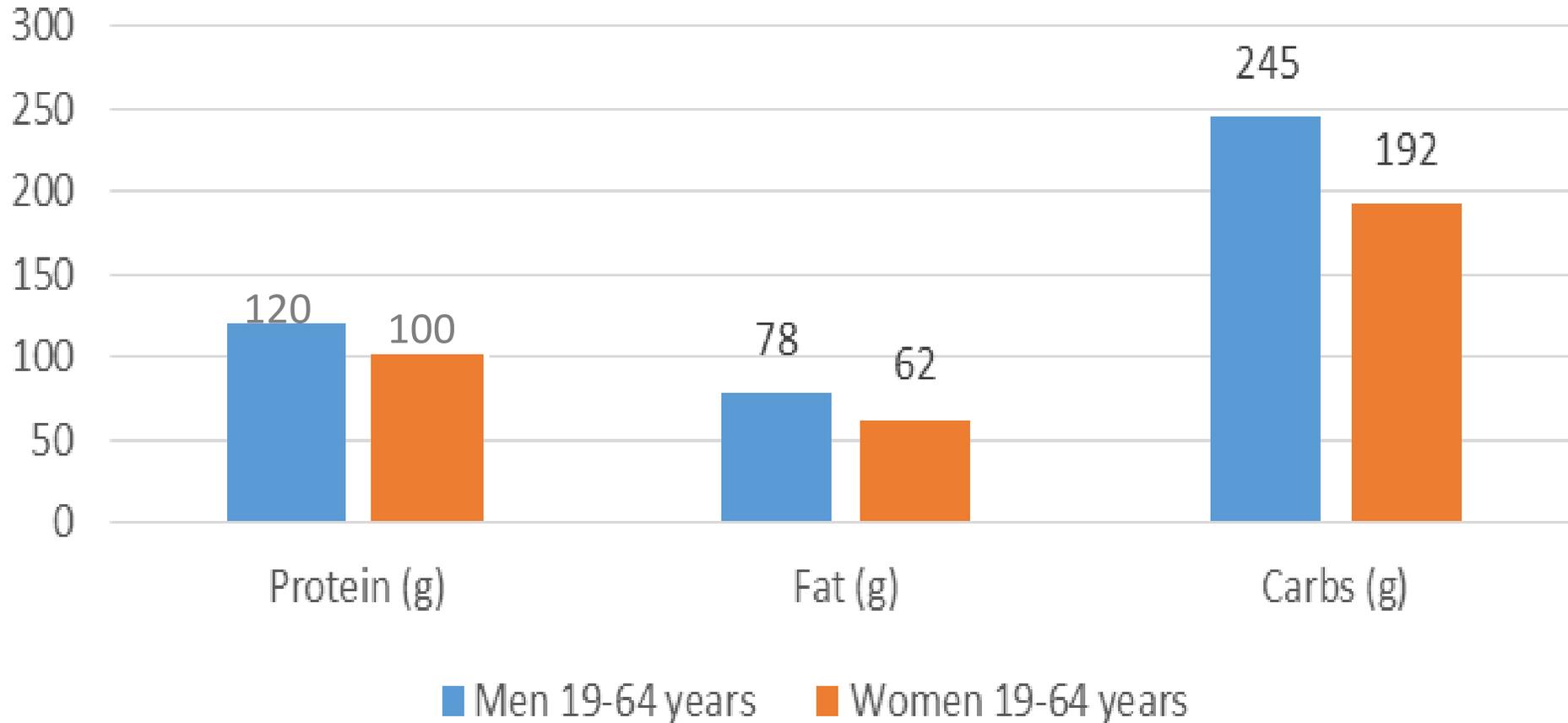


The Real Diet Story



1. Leidy HJ et al, The American Journal of Clinical Nutrition, Volume 101, Issue 6, June 2015, Pages 1320S–1329S, <https://doi.org/10.3945/ajcn.114.084038>
2. Aller, E et al. Int J Obes 38, 1511–1517 (2014). <https://doi.org/10.1038/ijo.2014.52>
3. Schiavo, L et al. OBES SURG 27, 881–888 (2017). <https://doi.org/10.1007/s11695-016-2382-y>

Grams of Protein, Fat and Carbohydrate per Day



Source: UK National Diet and Nutrition Survey 2016/2017 to 2018/2019





So how do you calculate protein requirements?

60kg women: $60 \times 1.2\text{g to } 1.6\text{g protein} = 72\text{g to } 96\text{g protein per day}$

74kg man: $74 \times 1.2\text{g to } 1.6\text{g} = 89\text{g to } 118\text{g protein per day}$

General rule of thumb: minimum of 30g protein per meal



PROTEIN PER 100G

Exact values may vary slightly.

@ketofitnessclub

Values are per 100g of raw weight unless otherwise stated.



Chicken Breast

24g

Chicken Thighs

18g

Turkey Breast

24g

Turkey Mince (2%)

24g

Turkey Mince (7%)

20g

Pork Loin Steaks

21g

Pork Mince (5%)

21g

Lamb Mince (17%)

17g

Lamb Liver

26g

Lamb Leg Steak

20g

Streaky Bacon

13g

97% Pork Sausages*

9g

Ribeye Steak

19g

Beef Mince

20g

Beef, Diced

21g

Prawns

10g

Skinless White Fish

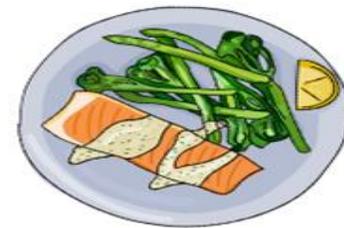
17g

Smoked Salmon

22g

Salmon Fillet

25g



Large Egg*

7.5g

Halloumi

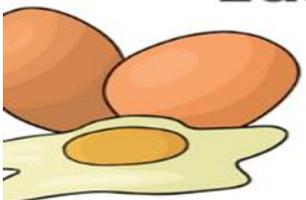
22g

Mozzarella

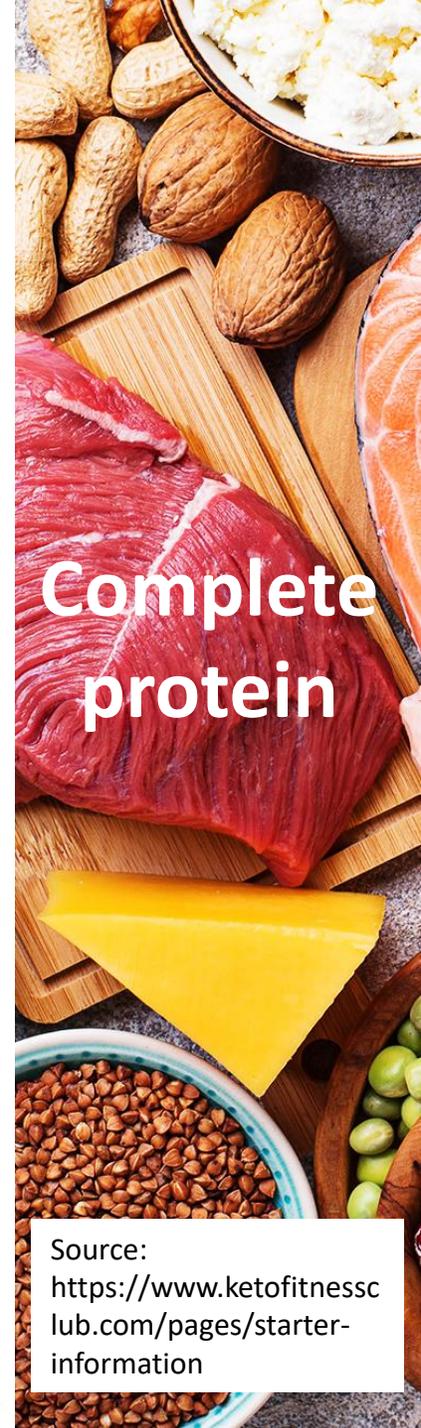
18g

Mature Cheddar

25g



*protein per individual item - e.g. per sausage, egg, etc.



Complete protein

Source:
<https://www.ketofitnessclub.com/pages/starter-information>



Plant-based protein foods

- Plant foods do not provide all of the essential amino acids in significant quantities
- Protein from a variety of plant foods, eaten during the course of a day can supply enough of all the essential amino acids
- More planning required (food quality)
- Organic soy is better, avoid GM
- Be aware of protein leverage

Source:

<https://www.pinterest.co.uk/pin/505177283184500303/>

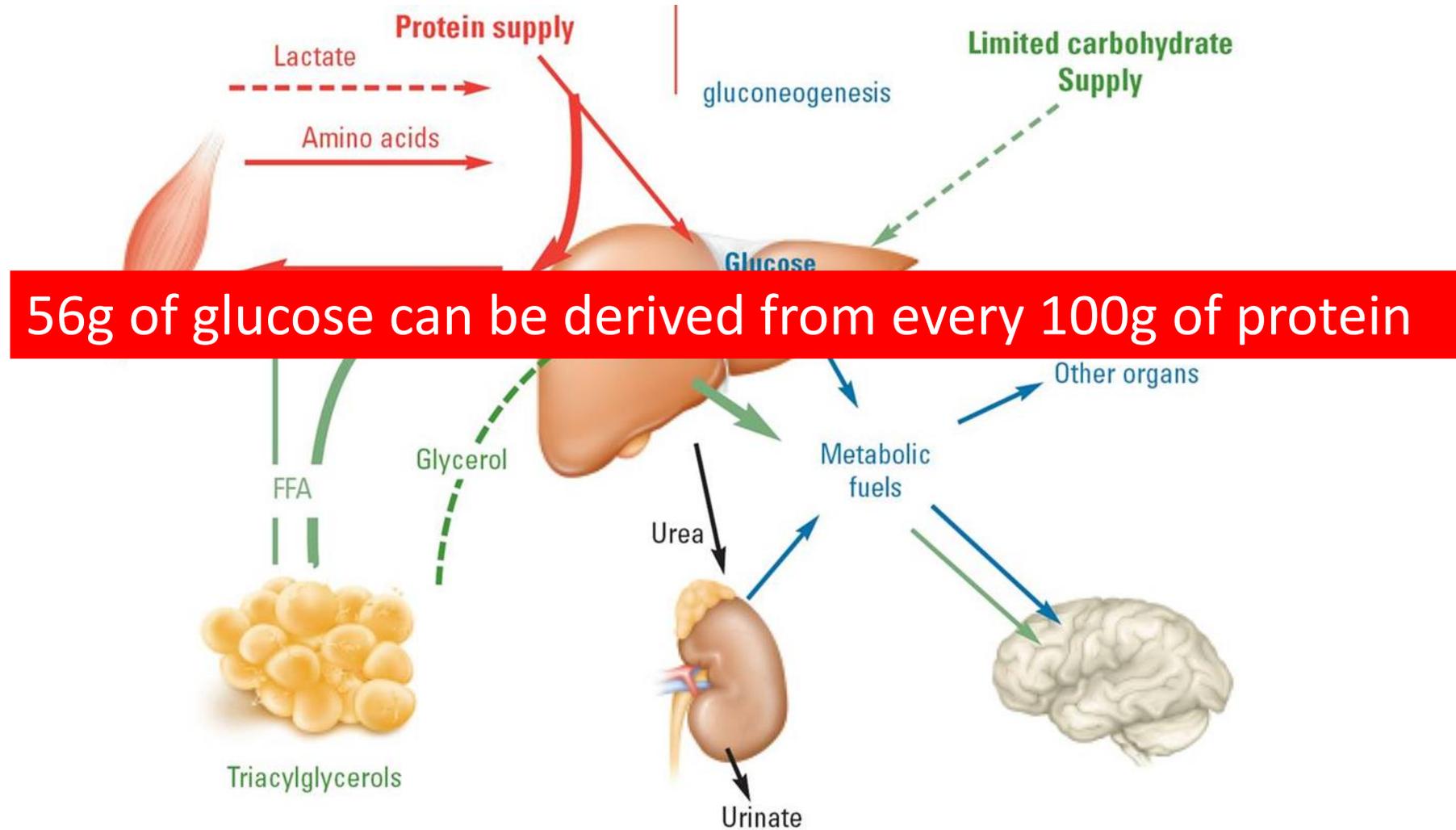


But isn't this level of
protein harmful –
especially for people with
diabetes?

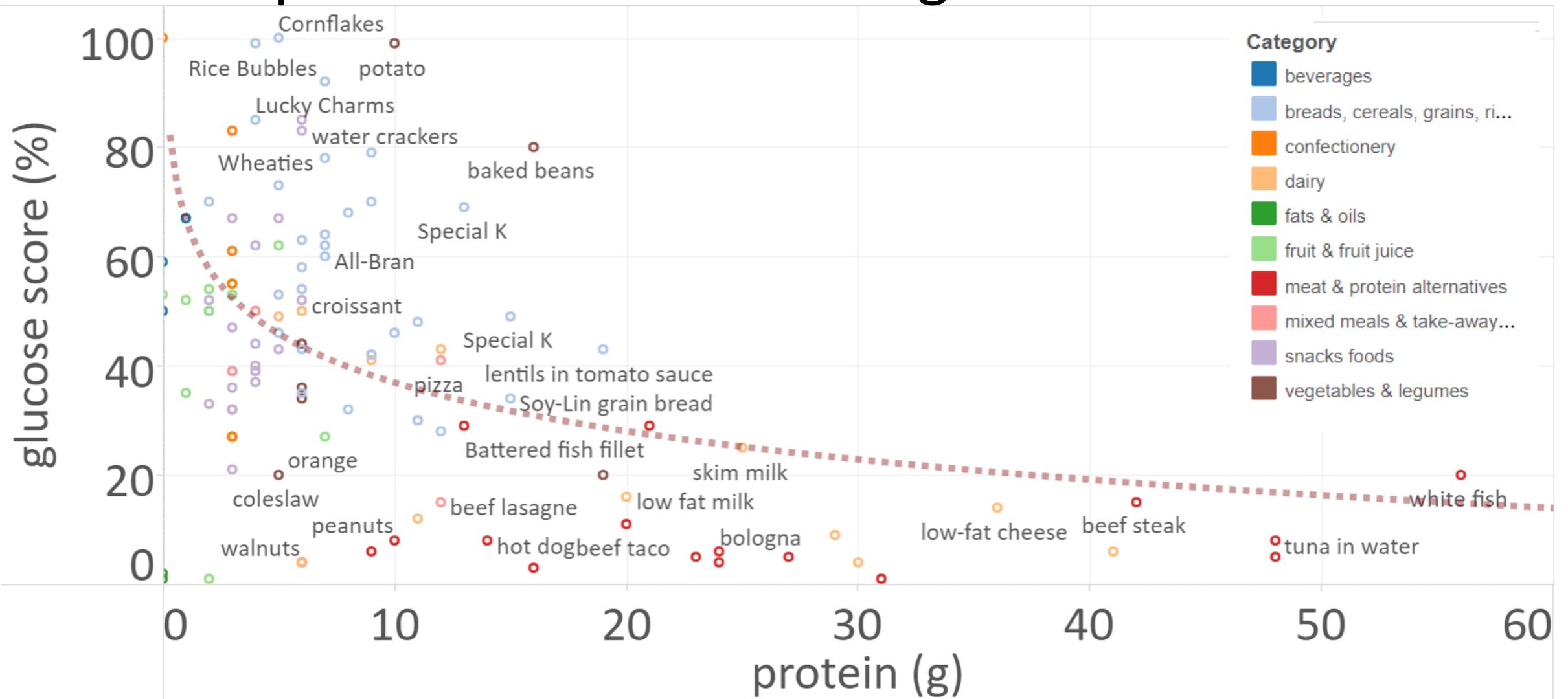


Gluconeogenesis

At rest: 6g glucose/hour
During exercise: 25g/hour



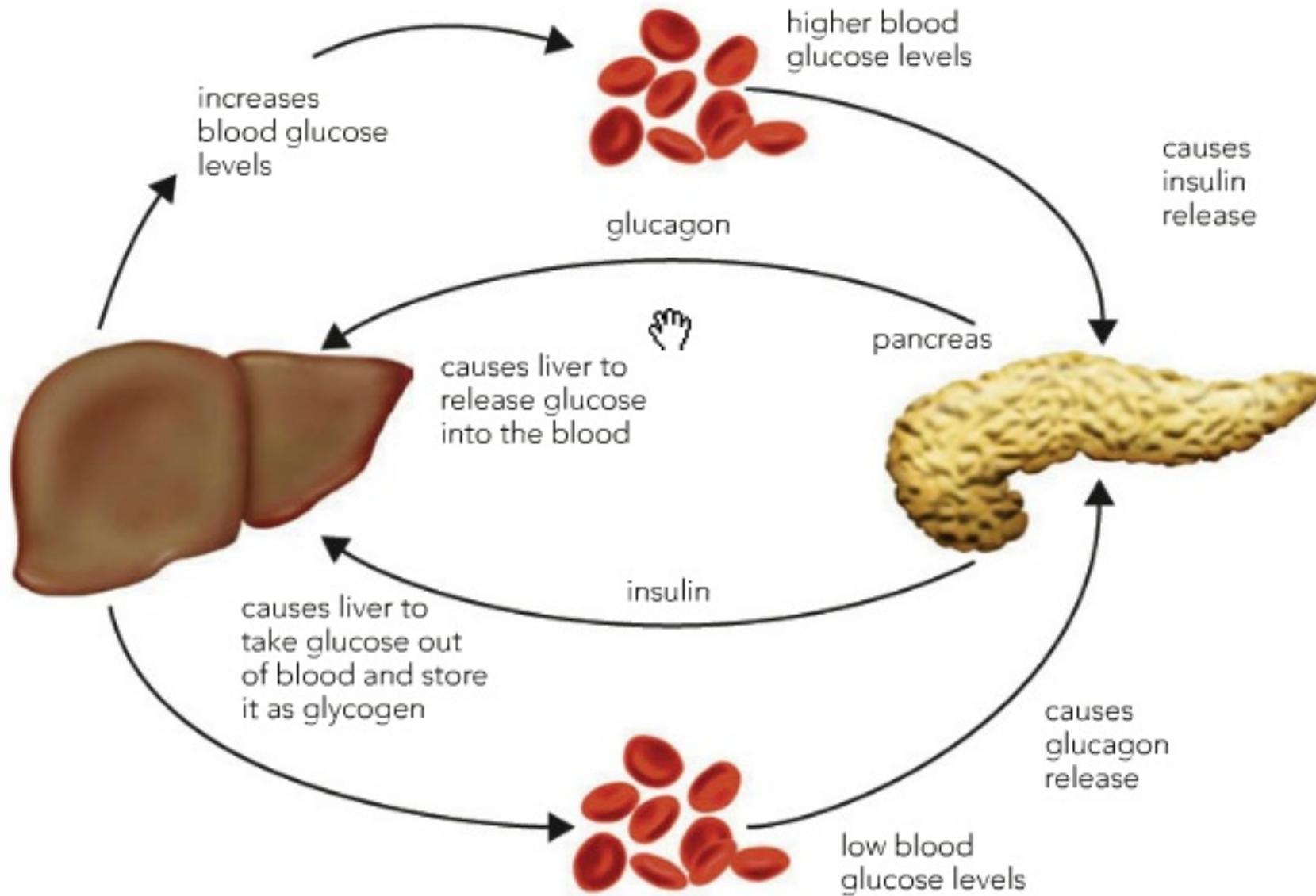
Impact of foods on blood glucose



High protein foods will raise blood glucose a little, but much less than low protein foods that contain refined carbohydrates.

As a general rule, consuming a higher percentage of protein will lower blood glucose:

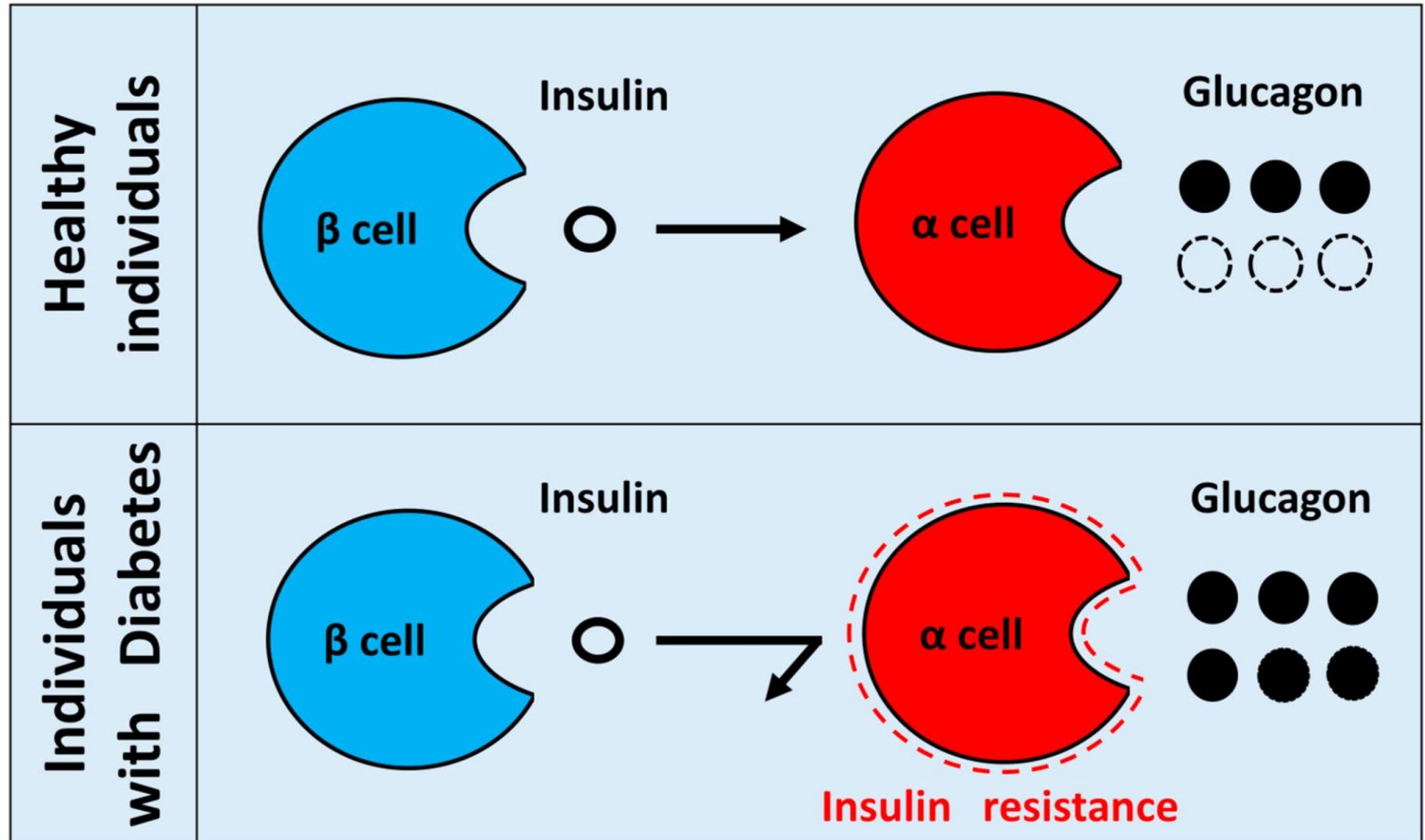
<https://optimisingnutrition.com/food-insulin-index-2/#htoc-does-protein-raise-blood-sugar>



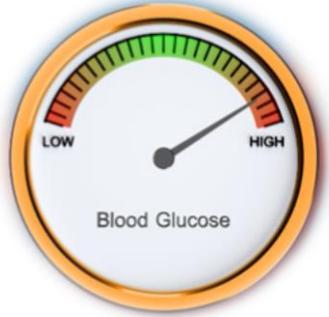
- When protein is eaten, the pancreas secretes glucagon, which pushes glycogen from the liver into the bloodstream as glucose
- The glycogen response is balanced by insulin, and hence blood glucose remains stable for most people



If people are insulin resistant e.g. prediabetes / Type 2 diabetes, this signal becomes imbalanced and leads to a more dominant glucagon response from the liver and blood glucose can rise

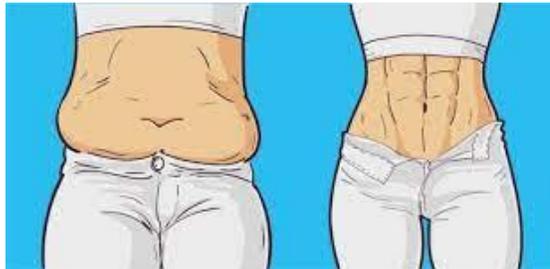


Deal with the root cause



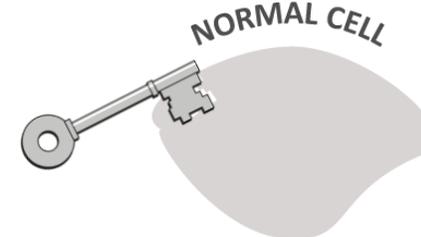
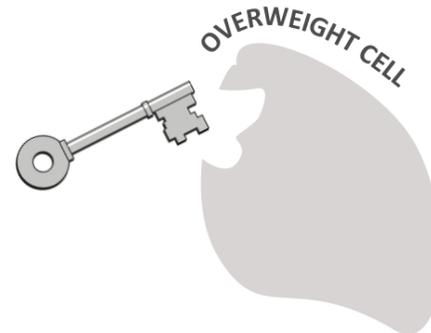
Some people see this rise in blood glucose as a reason to avoid protein

But - avoiding protein can lead to increased appetite and a reduced metabolic rate



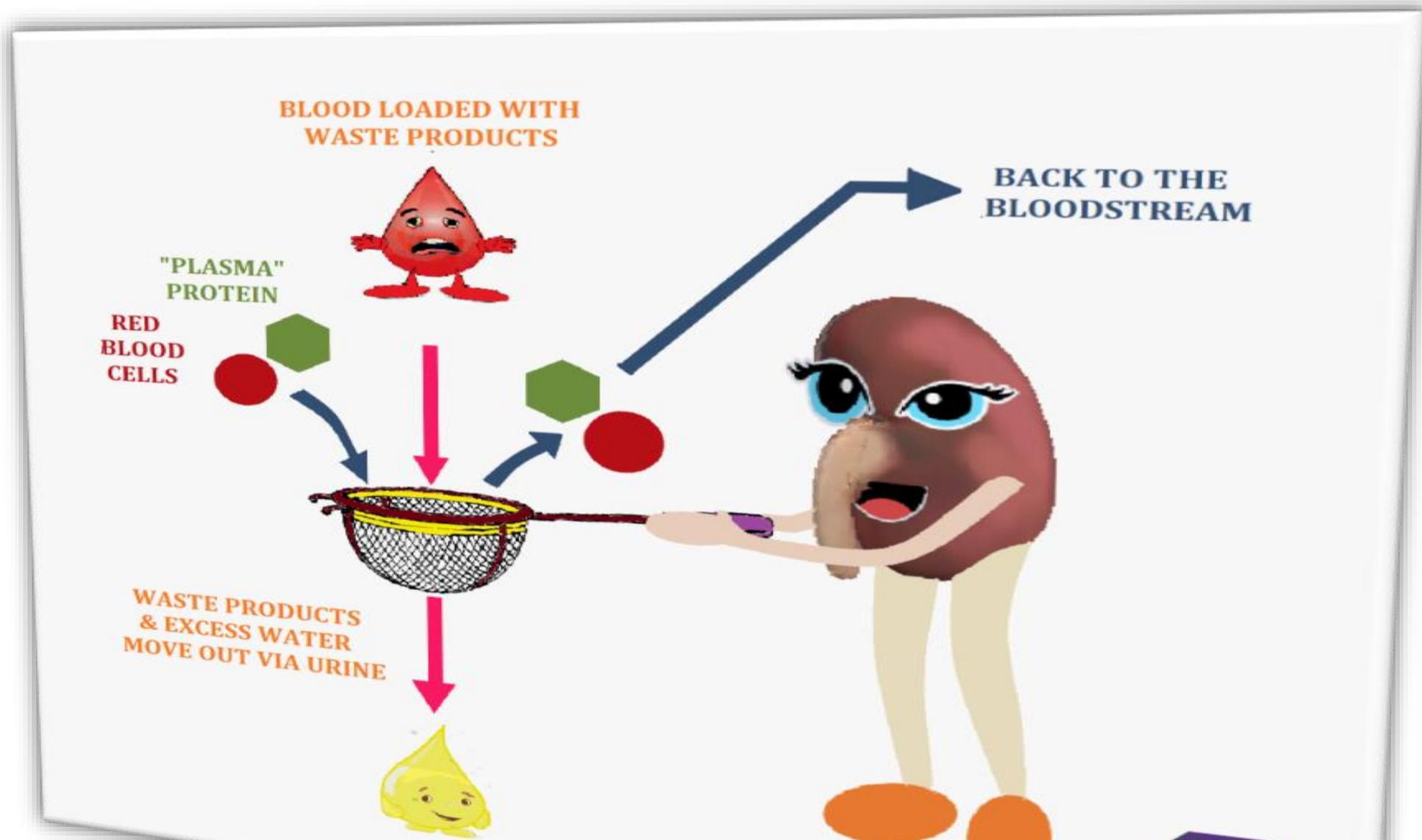
Increasing protein in the diet tends to lower overall energy intake and hence reduce body fat levels

Reducing body fat reduces insulin resistance!





But isn't protein bad for the kidneys?



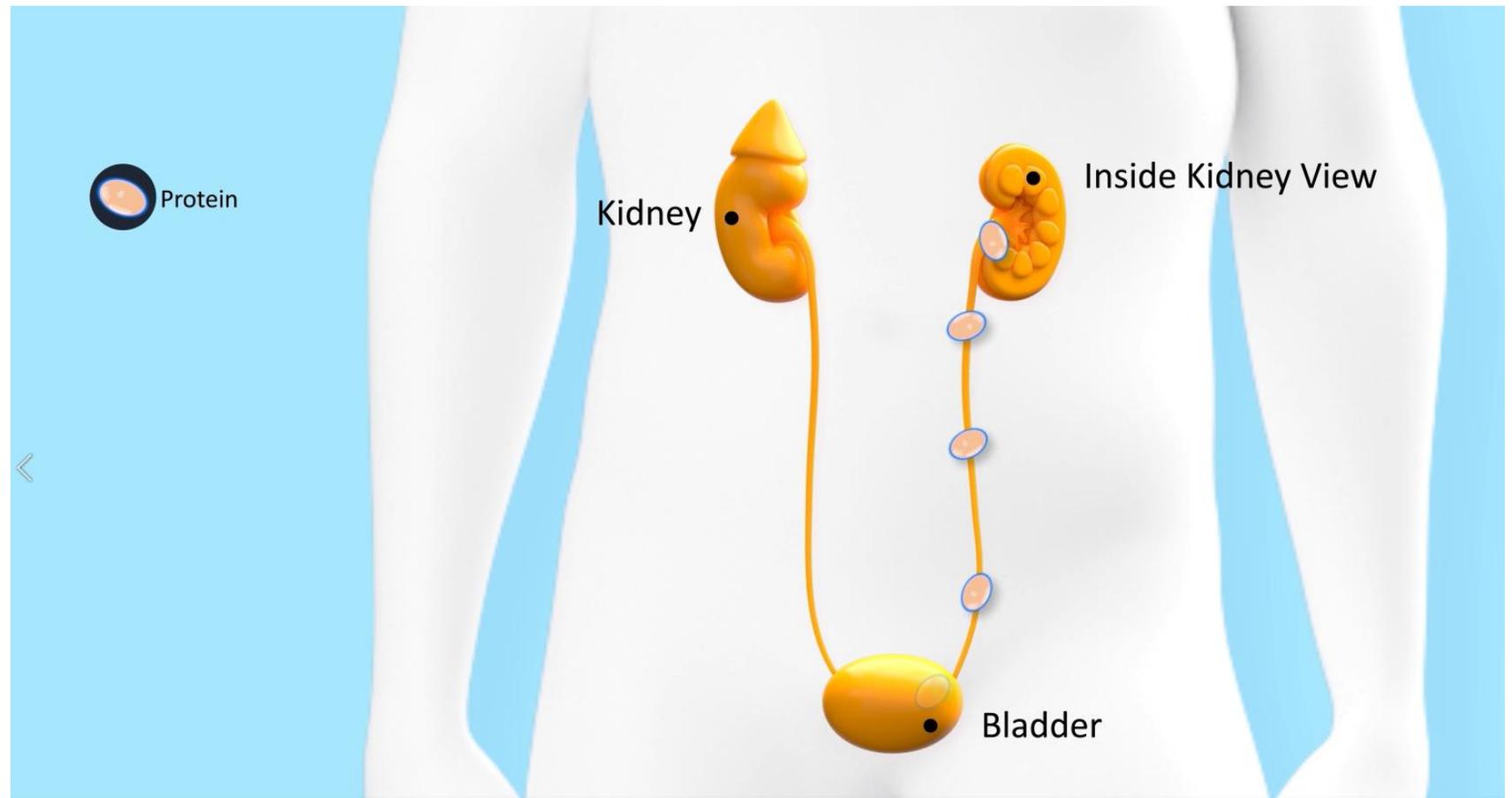
Changes in Kidney Function Do Not Differ between Healthy Adults Consuming Higher- Compared with Lower- or Normal-Protein Diets: A Systematic Review and Meta-Analysis

“There is no evidential link that shows that HP intake somehow leads to declines in renal function in otherwise healthy persons and, as our analysis indicates, even in populations with greater risk for declines in renal function such as those with type 2 diabetes. Given the proposed advantages of consuming HP diets to promote muscle hypertrophy during resistance training, high-quality weight loss during energy restriction, and maintenance of muscle mass with aging, the finding that an HP diet does not negatively affect kidney function is of relevance”

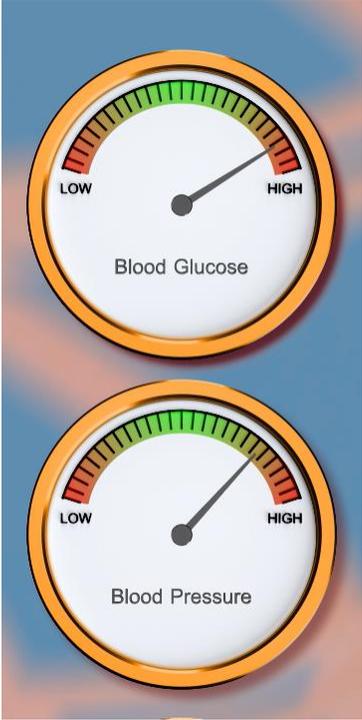
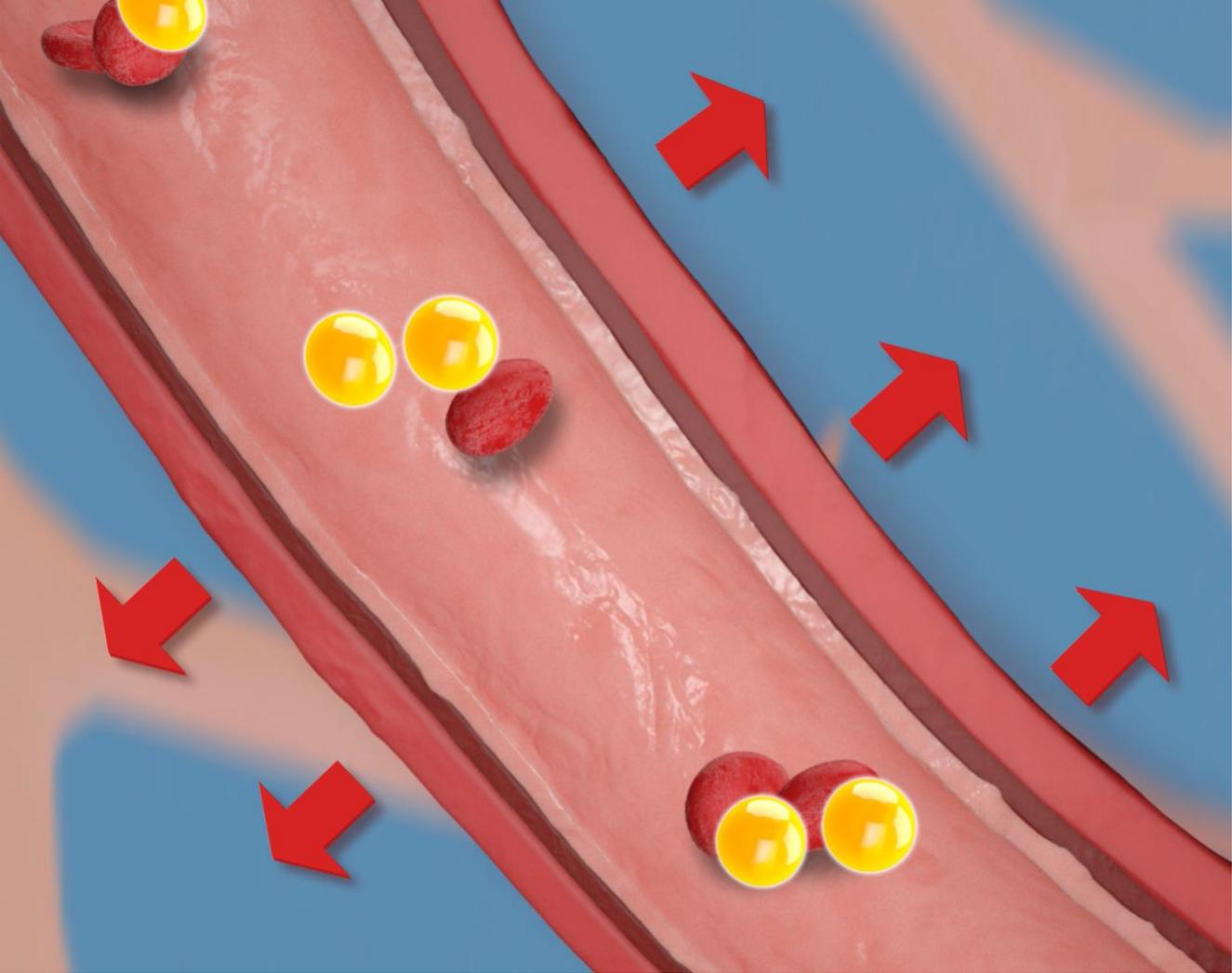




Nephropathy



Cause of nephropathy



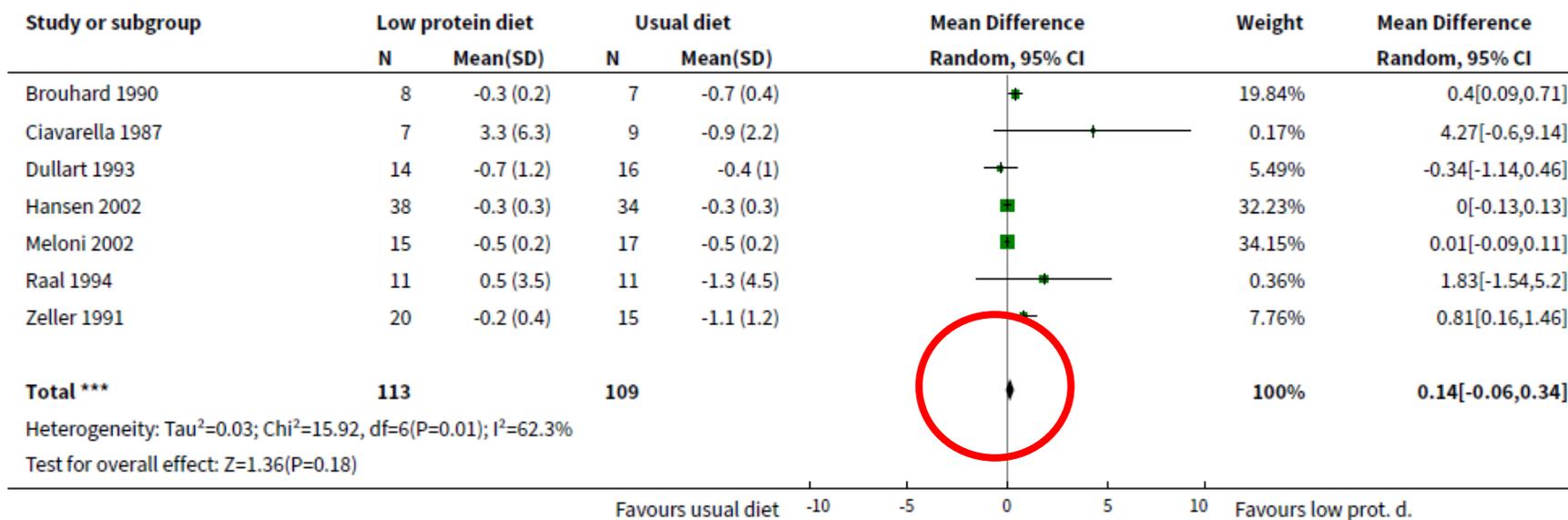
(UKPDS 33, 34 & 38, 1998)



Protein restriction for diabetic renal disease (Review)

Robertson LM, Waugh N, Robertson A

Analysis 1.1. Comparison 1 Low protein diet versus usual diet, Outcome 1 Change in glomerular filtration rate (ml/min).



Summary

- Not consuming enough protein can cause people to overeat fat and carbohydrate (excess calories)
- Consuming sufficient protein is important for many essential functions in the body and weight management
- Protein will be converted into glucose if carbs and fat are unavailable or in the presence of insulin resistance
- If good quality protein is consumed, blood glucose levels tend to be lower and can reduce insulin resistance
- Best to eat at least 30g/protein per meal
- Reference Nutrient Intakes are minimum amounts, health improvement is seen with ~ double this amount
- No strong evidence that protein can harm the kidneys or that low protein diets improve kidney function





No ~~into chocolate~~
cake in your diet

Thank you!

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