

Carbs, how to explain their effects on the body to improve clinical outcomes

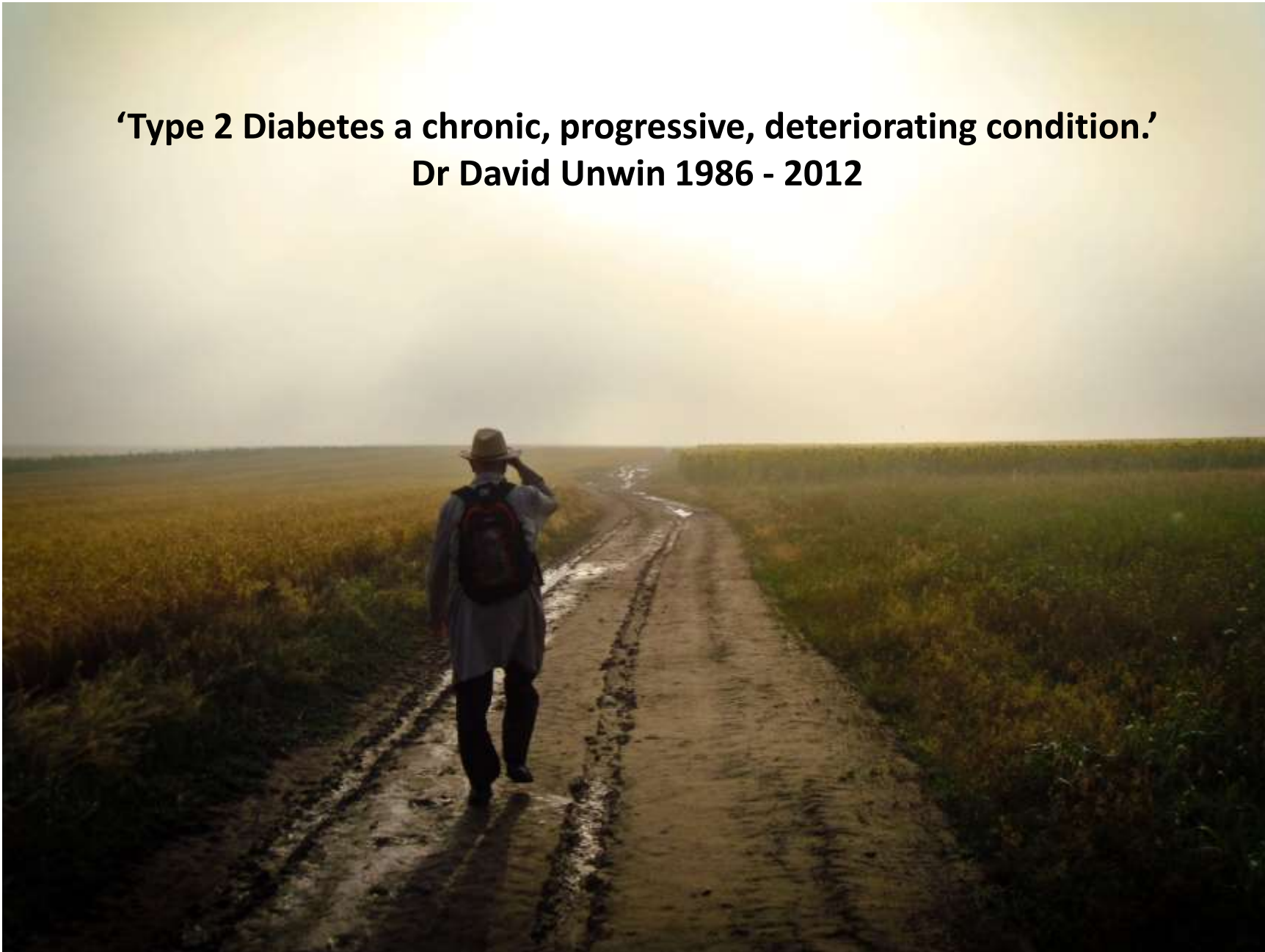


9
months
-34Kg



Dr David Unwin MbChB, FRCGP. Disclosures:

**‘Type 2 Diabetes a chronic, progressive, deteriorating condition.’
Dr David Unwin 1986 - 2012**

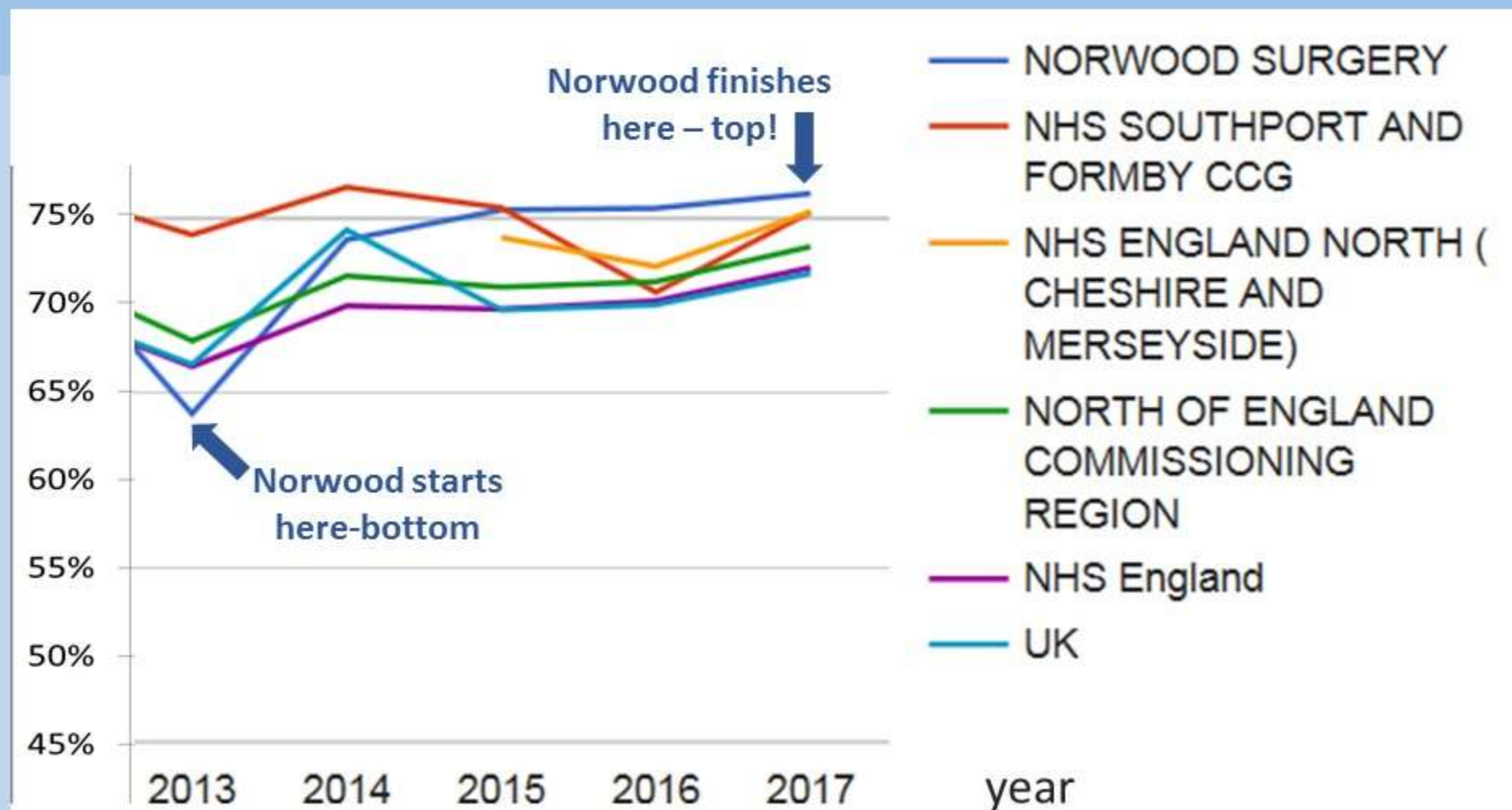


NORWOOD SURGERY, NHS SOUTHPORT AND FORMBY CCG, QOF Achievement

DM007: % of those with T2D & HbA1c is $\leq 59\text{mmol/mol}$ (good control)

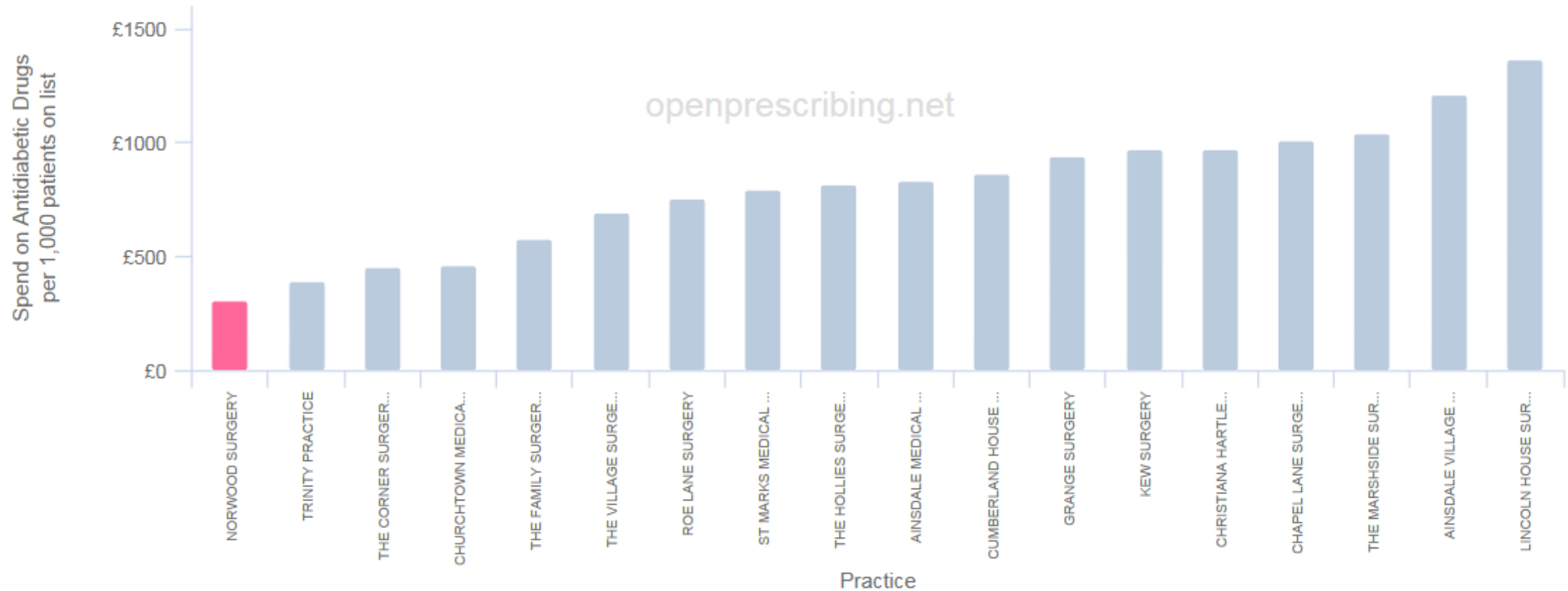
For the years 2013 to 2017 From the QOF database, updated 2018

Data from <https://www.gpcontract.co.uk/timeline/N84008/DM%206>



Spend on Antidiabetic Drugs vs patients on list by NORWOOD SURGERY and other practices in CCG in Jan '19

£50,000 per year less

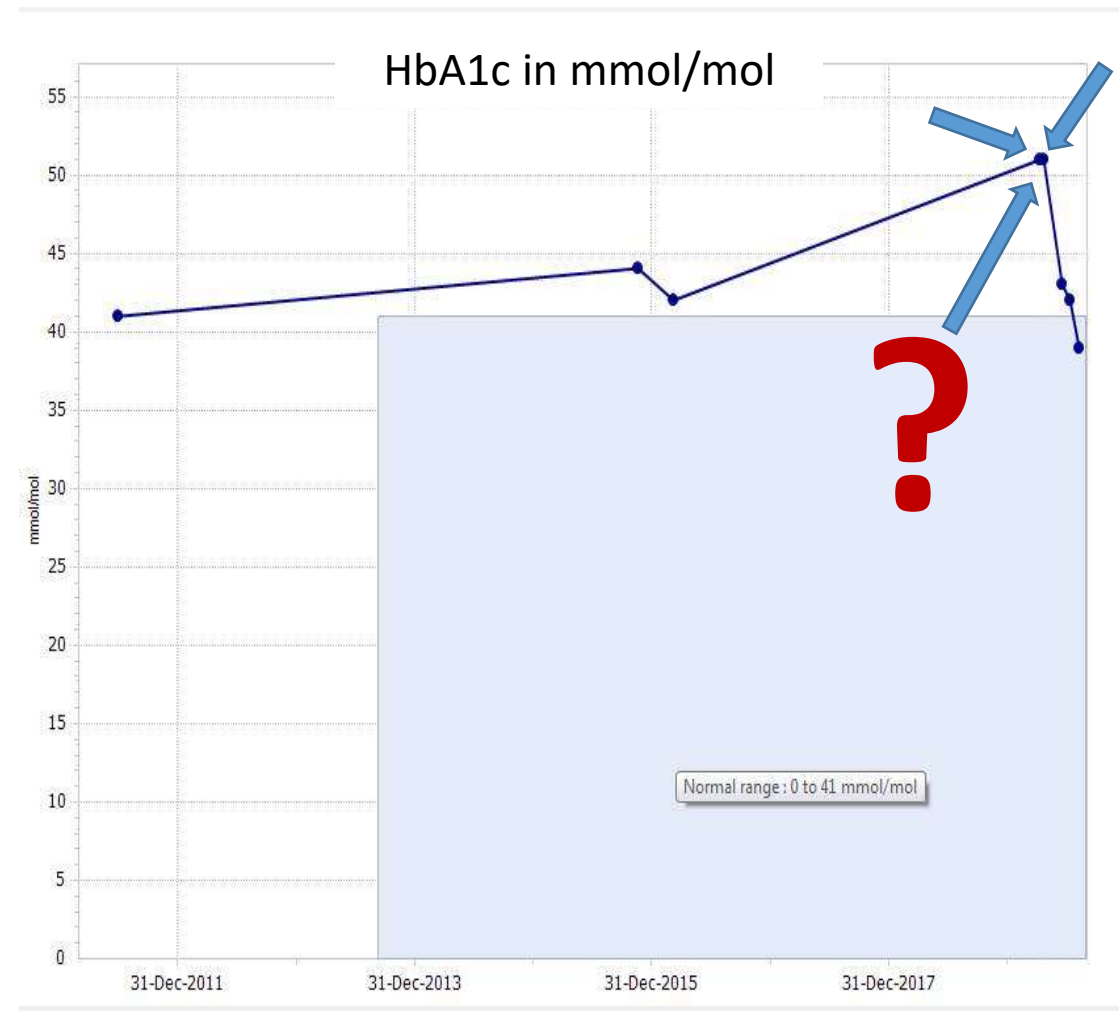




1. psychology



2. physiology



Drug free
T2 Diabetes Remission

psychology



Type 2 diabetes drug free
remission !

Currently 50% of my
diabetic patients

**Of 4,753 Norwood practice patients having
liver function blood tests in the last three years,
1,153 (24%) are abnormal**

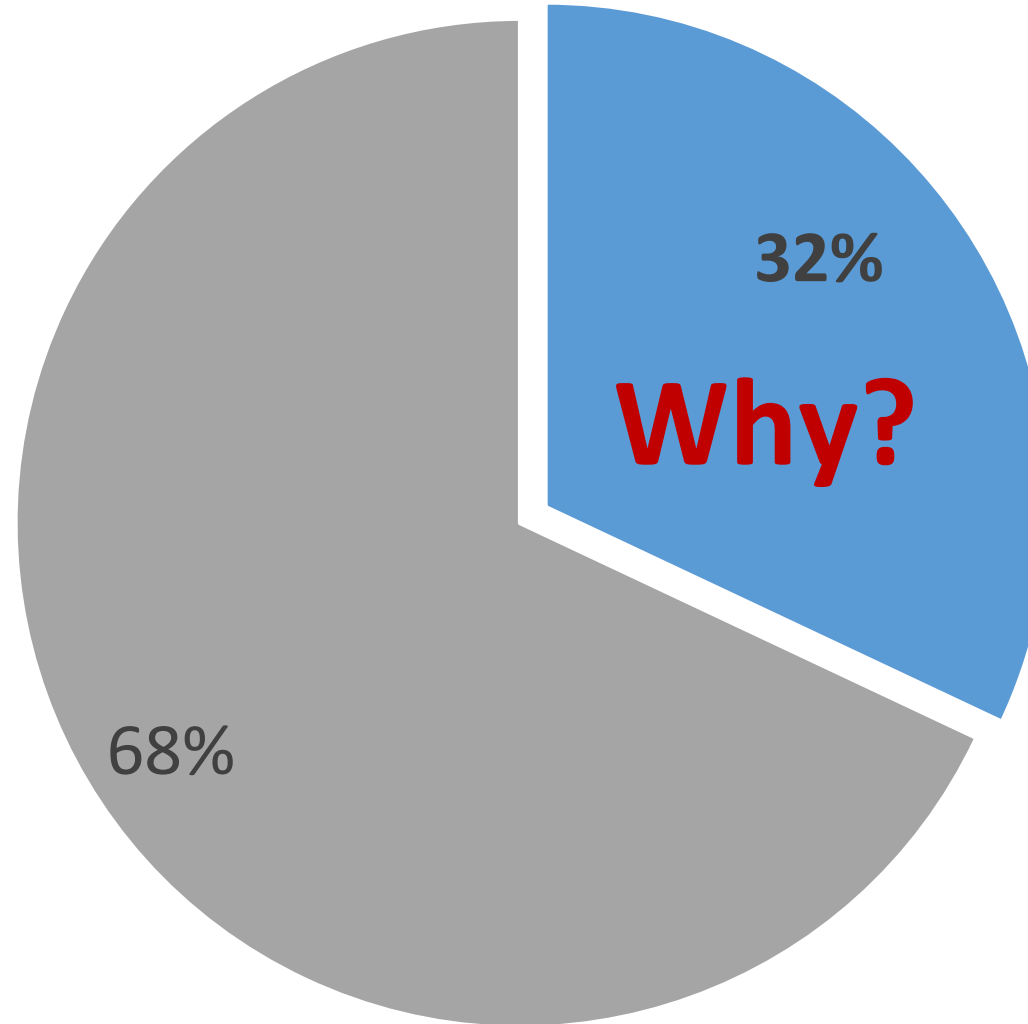
Why ?

**Non-alcoholic Fatty Liver Disease:
20% of the developed world.**

why?

Fasting triglyceride level

Out of 2458
Norwood practice
patients having a
lipid profile done
in the last 3 years
791 had an
abnormal
triglyceride result

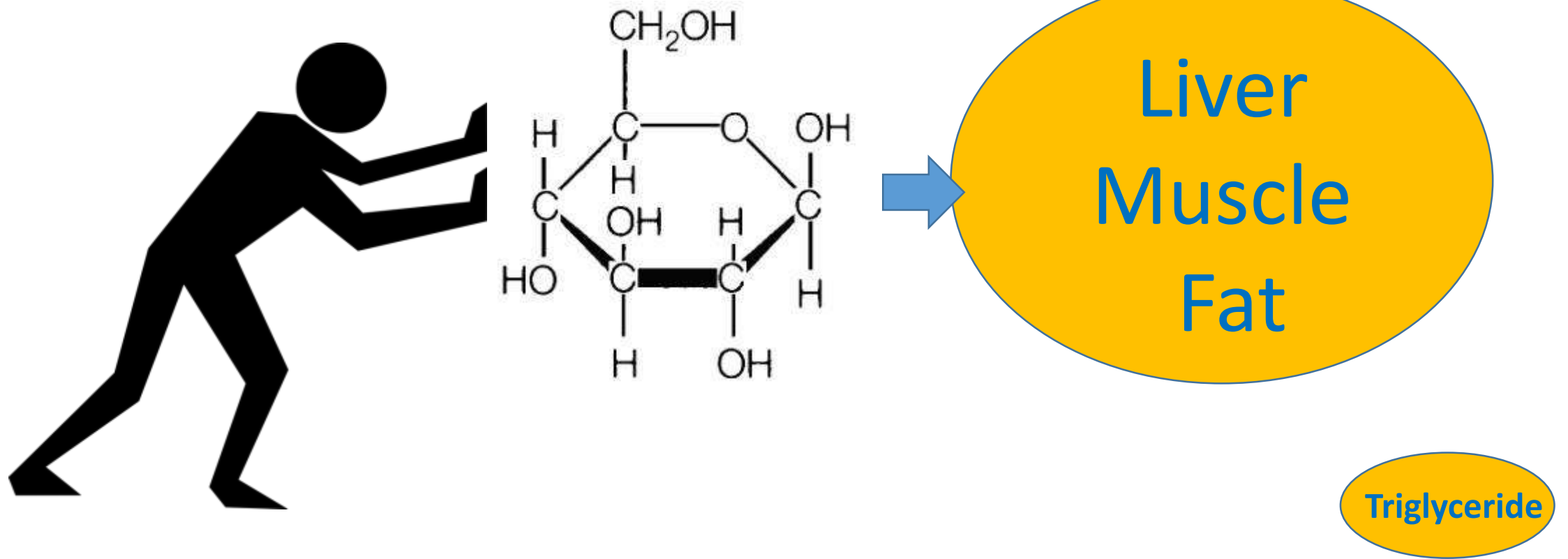


Explaining the physiology of insulin and carbs to patients in a way they can understand

Including:

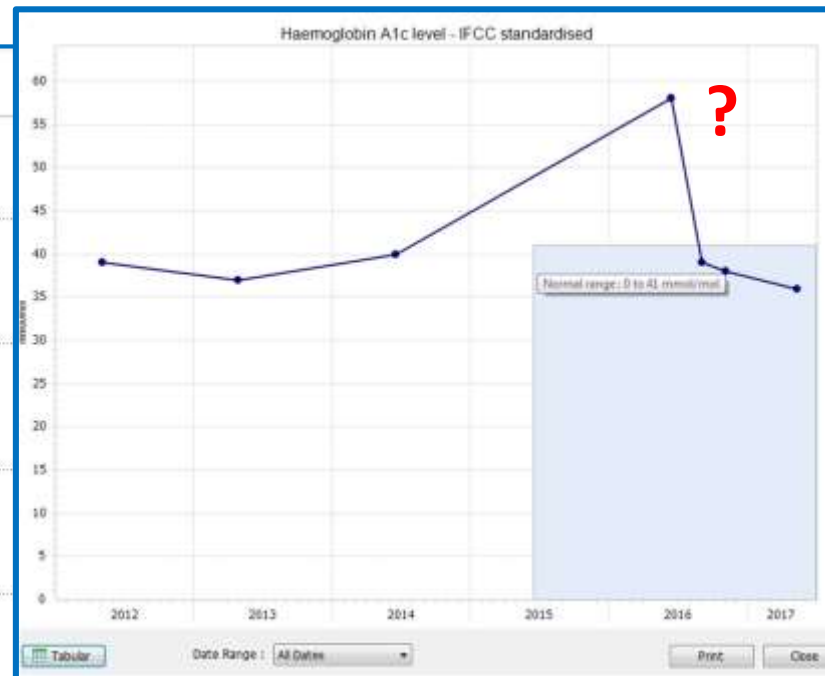
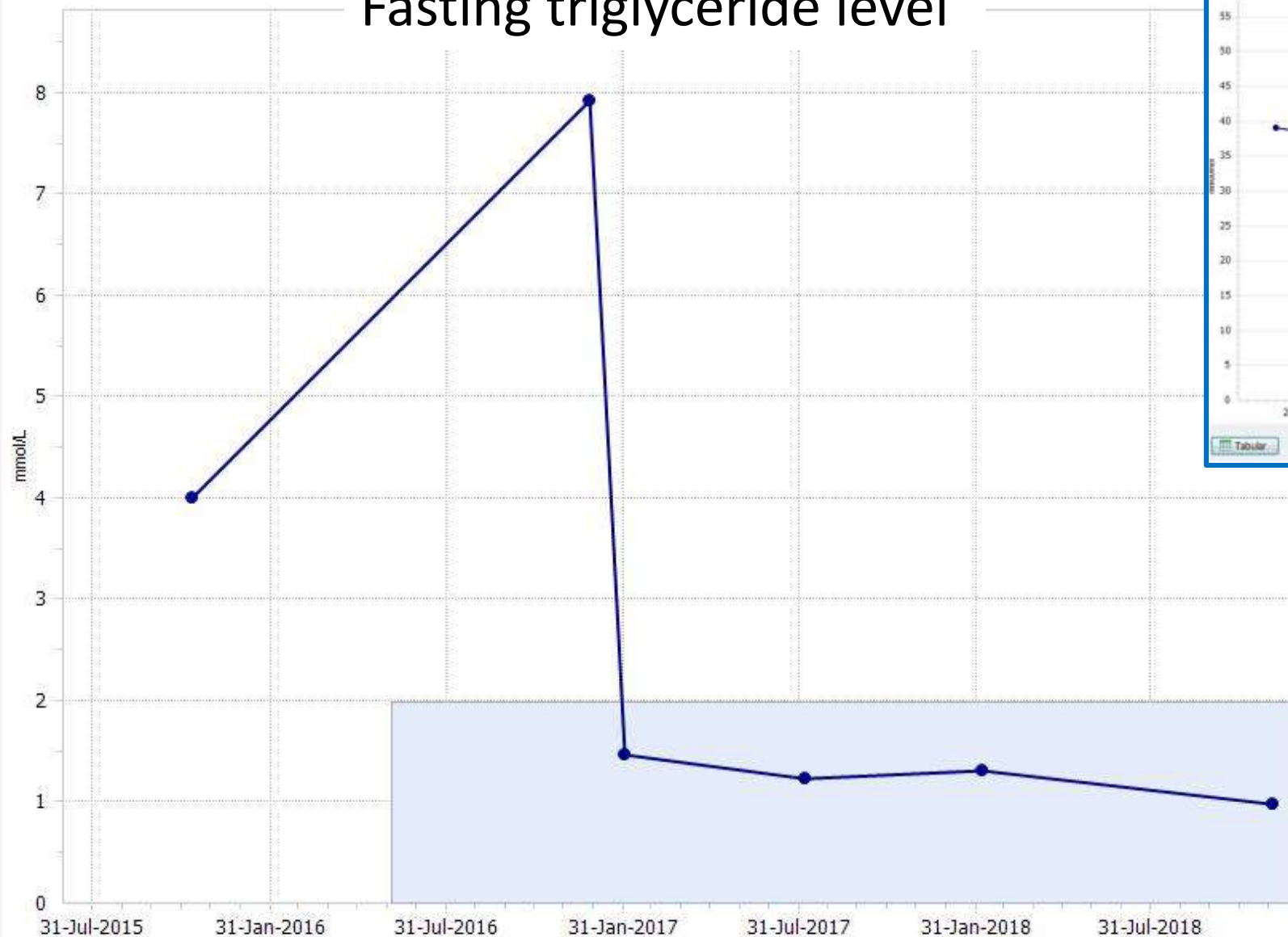
- Liver function
- Triglyceride levels
- Central Obesity & Hunger
- Salt and BP
- Type 2 diabetes itself



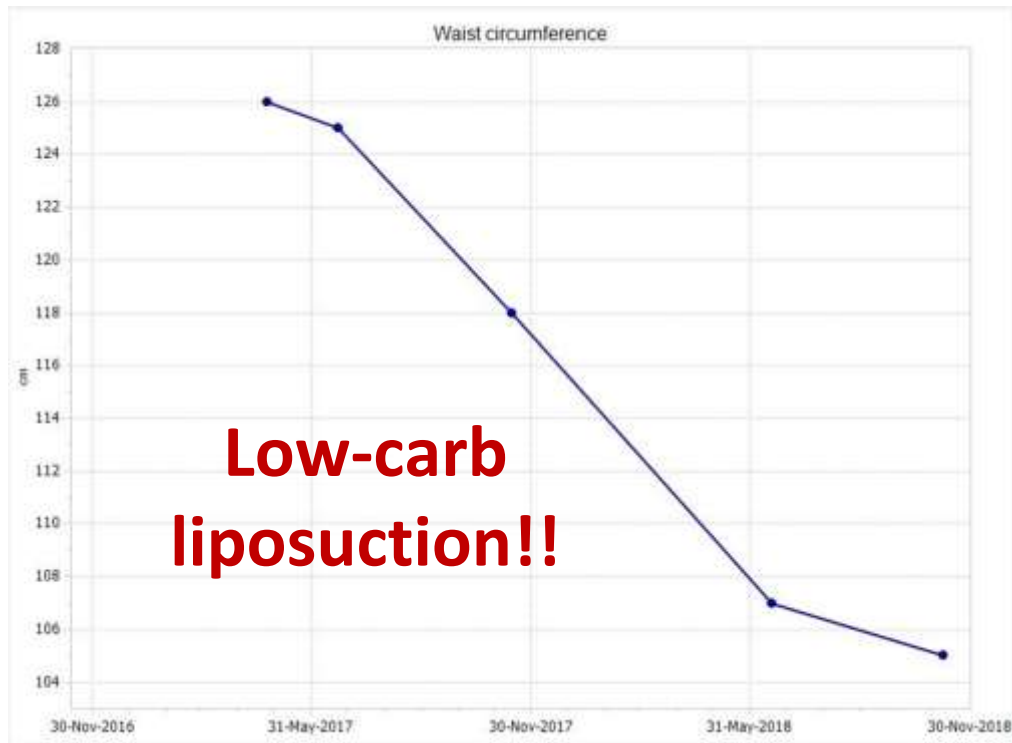


Insulin + Glucose → cells

Fasting triglyceride level



Central obesity



Insulin and fuel usage



We are dual-fuel, hybrid engines too

Insulin, sodium & blood pressure

Systolic BP in mmHg			Diastolic BP in mmHg		
Start	Finish	Loss	Start	Finish	Loss
143	132	11	84	78	6



[Chronic sodium-retaining action of insulin](#) M. Marlina Manhiani. Am J Physiol Renal Physiol. 2011 Apr; 300(4): F957–F965. Published online 2011 Jan 12. doi: 10.1152/ajprenal.00395.2010

[Insulin's impact on renal sodium transport and blood pressure in health, obesity, and diabetes](#). Swasti Tiwari, Am J Physiol Renal Physiol 293: F974–F984, 2007.

[Renal effects of insulin in man](#). J Nephrol. Quiñones-Galvan A 1997 Jul-Aug;10(4):188-91.

In insulin resistant (T2D) individuals compensatory hyperinsulinemia imposes a chronic antinatriuretic and antiuricosuric pressure on the kidney. This may provide an explanation for the clustering of insulin resistance with hypertension and hyperuricemia.

[A system view and analysis of essential hypertension Journal of Hypertension](#). Botzer A et al. 36(5):1094–1103, MAY 2018

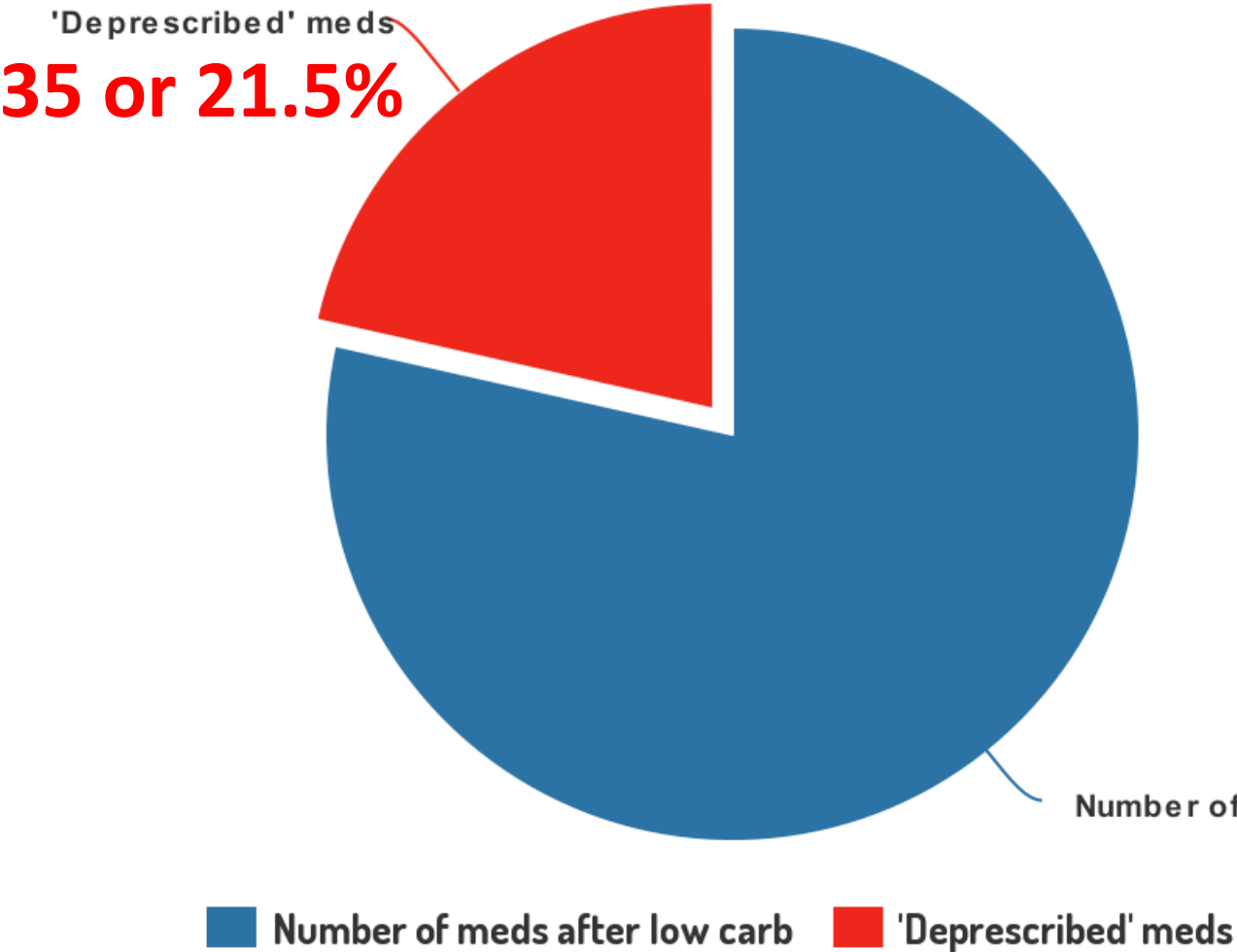
Our analysis suggests that insulin plays a primary role in hypertension, highlighting the tight link between essential hypertension and diseases associated with the metabolic syndrome

[Glycemic index, glycemic load, and blood pressure: a systematic review and meta-analysis of randomized controlled trials](#).

Evans C. et al The American Journal of Clinical Nutrition, Volume 105, Issue 5, 1 May 2017, Pages 1176–1190,

This review of healthy individuals indicated that a lower glycemic diet may lead to important reductions in blood pressure

Deprescribing of antihypertensive drugs
for 154 patients on a low carb diet for
an average of 24 months -**21.5%**



Net antihypertensives 'deprescribed'	No.
Ace inhibitors	11
Angiotensin 2 receptor antagonists	1
Alpha-adrenoceptor blockers	1
Beta-adrenoceptor blockers	4
Calcium-channel blockers	9
Diuretics	9
Total	35

Substantial & Sustained Improvements in Blood Pressure, Weight & Lipid Profiles from a Carbohydrate Restricted Diet:
An Observational Study of Insulin Resistant Patients in Primary Care.
Unwin D. et al.



International Journal of
*Environmental Research
and Public Health*

Explaining the physiology of insulin and carbs to patients in a way they can understand

Including:

- Liver function
- Triglyceride levels
- Central Obesity & Hunger
- Salt and BP
- **Type 2 diabetes itself**



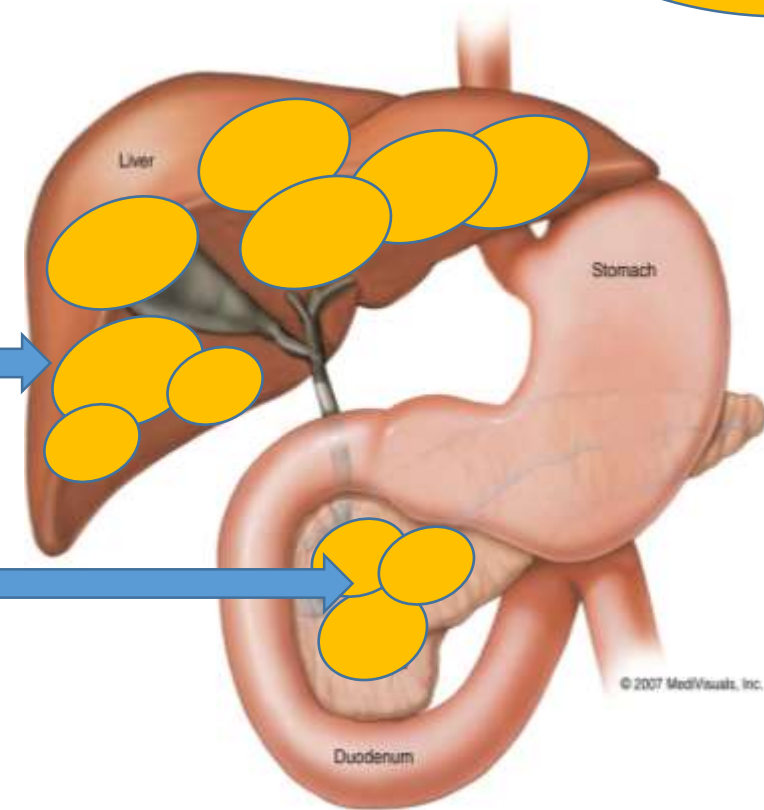
Counterpoint study

Type 2 diabetes results from accumulation of fat in the liver and pancreas

Triglyceride

Liver fat: linked to insulin resistance

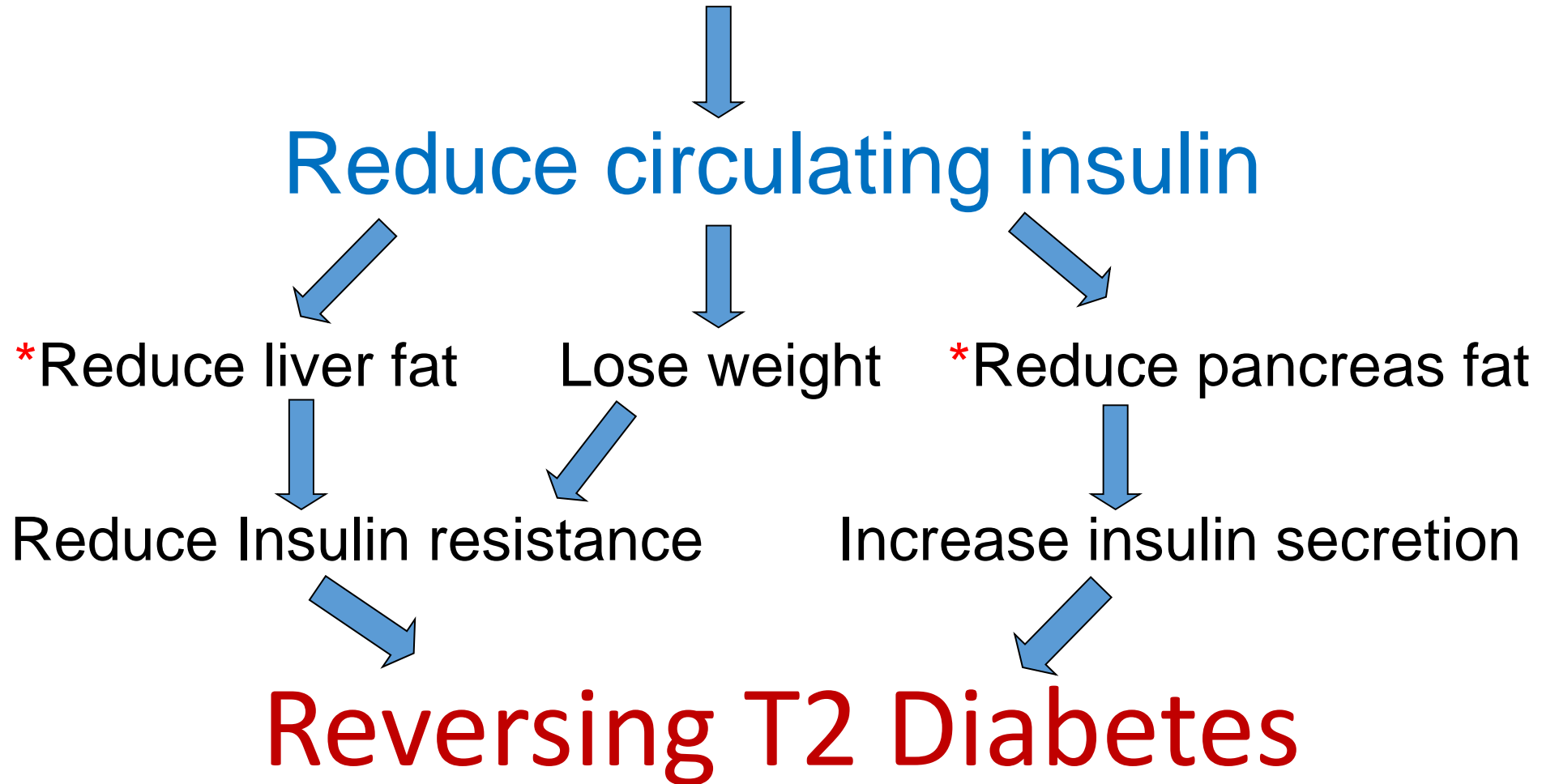
Pancreatic fat: inhibits B cell function -cannot produce enough insulin



Reversal of type 2 diabetes: Normalisation of beta cell function in association with decreased pancreas and liver triacylglycerol.

Lim EL1, Hollingsworth KG, Taylor R. Diabetologia. 2011 Oct;54(10):2506-14. doi: 10.1007/s00125-011-2204-7.

Reduced carbohydrate intake



***Reversal of type 2 diabetes: Normalisation of beta cell function in association with decreased pancreas and liver triacylglycerol.**

Lim EL1, Hollingsworth KG, Taylor R. Diabetologia. 2011 Oct;54(10):2506-14. doi: 10.1007/s00125-011-2204-7.

If you have Type 2 Diabetes glucose becomes a sort of metabolic poison.

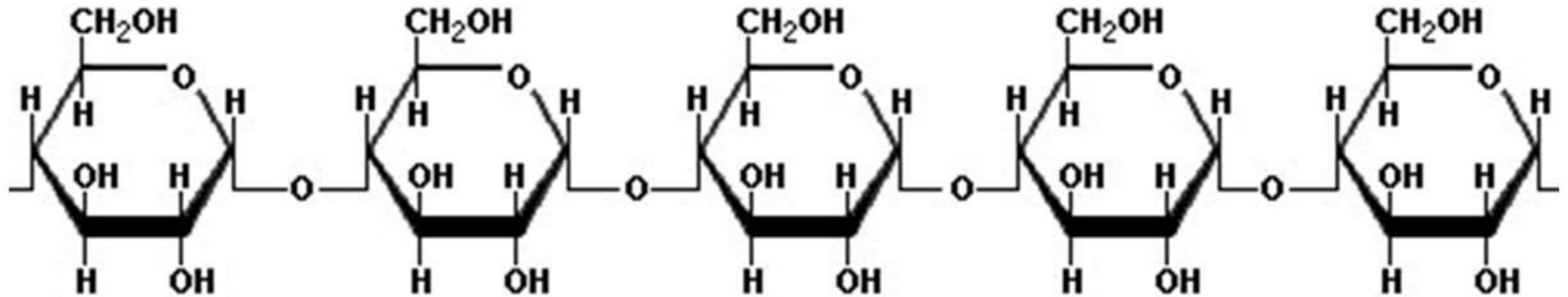
Also the HbA1c is a measure of how 'sugary' your diet has been

Try asking "*where do you think the sugar comes from in your diet?*"





































































































- The first priority is to cut out table sugar- but how do we help people who say they have already cut this out?



A Starch Molecule



**Many glucose molecules are linked together
– enzymal digestion will break them up again**

Food Item	Glycaemic index	Serve size g	How does each food affect blood glucose compared with one 4g teaspoon of table sugar? 									
Basmati rice	69	150	10.1									
Potato, white, boiled	96	150	9.1									
French Fries baked	64	150	7.5									
Spaghetti White boiled	39	180	6.6									
Sweet corn boiled	60	80	4.0									
Frozen peas, boiled	51	80	1.3									
Banana	62	120	5.7									
Apple	39	120	2.3									
Wholemeal Small slice	74	30	3.0									
Broccoli	15	80	0.2									
Eggs	0	60	0									

Other foods in the very low glycaemic range would be chicken, oily fish, almonds, mushrooms, cheese



Google: NICE sugar Unwin












Department
of Health &
Social Care

Rt Hon Matt Hancock MP
UK Secretary of State for
Health and Social Care



Using the Glycaemic Index to predict blood glucose

‘Fruit & veg’ so variable, why lump them together?

Food Item	Glycaemic index	Serving Size g	How might each food affect blood glucose compared to one 4g teaspoon of table sugar	
Potato boiled	96	150	9.1	
Sweet corn	60	80	4.0	
Frozen peas,	51	80	1.3	
Cabbage	10	80	0.1	
Raisins	64	60	10.3	
Banana	62	120	5.7	
Apple	39	120	2.3	
Strawberry	40	120	0.4	

As per calculations to be found in: It is the glycaemic response to, not the carbohydrate content of food that matters in diabetes and obesity: The glycaemic index revisited | Unwin | Journal of Insulin Resistance 2016 @lowcarbGP

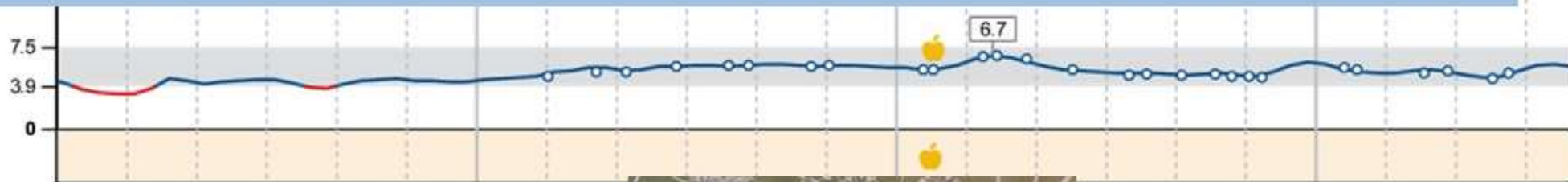
SUN5 Nov

Glucose mmol/L



MON6 Nov

Glucose mmol/L

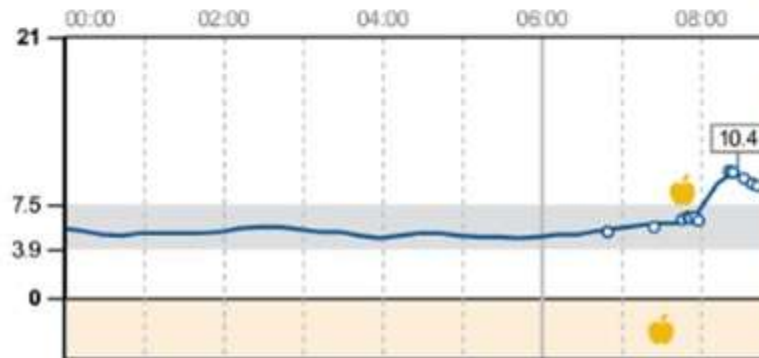


Daily Log

25 October 2017 - 7 November 2017 (14 Days)

TUE7 Nov

Glucose mmol/L



Carbs grams



LibreView

A lower carb diet for type 2 diabetes: In this condition your metabolism struggles to deal with sugar- so its consumption needs cutting back dramatically-

Sugar – cut it out altogether, although it will be in the blueberries, strawberries and raspberries you are allowed to eat. Cakes and biscuits are a mixture of sugar and starch that make it almost impossible to avoid food cravings; they just make you hungrier!!

Reduce starchy carbs a lot... Remember they digest down into surprising amounts of sugar. If possible just cut out the ‘White Stuff’ like bread, pasta, rice, crackers and breakfast cereals.

All green veg/salads are fine...Eat as much of these as you can –*turn the white stuff green* So that you still eat a good big dinner try substituting veg such as broccoli, courgettes or green beans for your mash, pasta or rice – still covering them with your gravy, Bolognese or curry!
Tip: try home-made soup – it can be taken to work for lunch and microwaved. Mushrooms, tomatoes, and onions can be included in this.

Fruit is trickier...

Some tropical fruits like bananas, oranges, grapes, mangoes or pineapple have too much sugar in and can set those carb cravings off. Berries are better and can be eaten; blueberries, raspberries, strawberries, apples and pears too.

Eat healthy proteins...

Such as non-processed meat, eggs (three eggs a day is not too much), fish – particularly oily fish such as salmon, mackerel or tuna –are fine and can be eaten freely. Plain **full fat** yoghurt makes a good breakfast with the berries. Processed meats such as bacon, ham, sausages or salami are not as healthy and should only be eaten in moderation.

Fats are fine in moderation...

Yes, fats can be fine in moderation: olive oil is very useful, butter may be tastier than margarine and could be better for you! Coconut oil is great for stir fries. Four essential vitamins A, D, E and K are only found in some fats or oils. Please avoid margarine, corn oil and vegetable oil.

Beware ‘low fat’ foods. They often have sugar or sweeteners added to make them palatable. Full fat mayonnaise and pesto are definitely on!!

Cheese only in moderation...

It’s a very calorific mixture of fat, and protein.

Snacks: avoid, as habit forming. But un-salted nuts such as almonds or walnuts are OK to stave off hunger. The occasional treat of strong dark chocolate 70% or more in small quantity is allowed.

Eating lots of green veg with protein and healthy fats leaves you properly full in a way that lasts

Alcohol is full of carbs...

Sadly many alcoholic drinks are full of carbohydrate – for example, beer is almost ‘liquid toast’ hence the beer belly!! The odd glass of dry white, red wine or spirits is not too bad if it doesn’t make you hungry afterwards – or just plain water with a slice of lemon.

Sweeteners can trick you...

Finally, about sweeteners and what to drink – sweeteners have been proven to tease your brain into being even hungrier, making weight loss more difficult – drink tea, coffee, and water or herb teas. (100ml milk is 1 teaspoon of sugar)

Important On medication? Check this first with your Doctor or HCP

PS some folk need more salt on a low carb diet



IN a case series of 138 T2D patients on a lower carb diet
In a primary care setting over an average of 24 months @lowcarbGP

70 in drug-free diabetes remission Oct 2019

Significant improvements in weight, liver function, lipids and blood pressure.

HbA1c in mmol/mol				Total Cholesterol			HDL Cholesterol			Cholesterol Ratio			Triglyceride		
Averages	Start	Finish	Loss	Start	Finish	Loss	Start	Finish	Loss	Start	Finish	Loss	Start	Finish	Loss
71 in remission	71.0	49.5	21.7	4.9	4.4	0.5	1.2	1.3	-0.1	4.0	3.5	0.5	2.5	1.6	0.9
HbA1c in %				Weight in Kg			Systolic BP in mmHg			Diastolic BP in mmHg			Gamma-G.T Level in U/L		
Averages	Start	Finish	Loss	Start	Finish	Loss	Start	Finish	Loss	Start	Finish	Loss	Start	Finish	Loss
50.7% remission	8.6	6.7	1.9	98.2	89.6	8.6	143	132	11	84	78	6	73	40	33

Type 2 Diabetes: Diabetic Medications on a Low Carbohydrate Diet - A Summary & Suggestions

There are **3 main** considerations for the use of diabetic medications in type 2 diabetes with a low carbohydrate diet:

- Is there a risk of hypoglycaemia?
- What is the degree of carbohydrate restriction?
- Does the medication provide any benefit, and/or do any potential benefits outweigh any side effects and potential risks?



Drug Group & example	Action	Hypo risk?	Suggested action (to continue/stop)
Biguanides -Metformin	Reduce hepatic gluconeogenesis, and reduce peripheral insulin resistance	No	Optional, consider clinical pros/cons.
GLP-1 agonists -Liraglutide	Slow gastric emptying. Glucose dependent pancreatic insulin secretion.	No	Optional, consider clinical pros/cons.
Insulins	Exogenous insulin	Yes	Reduce/Stop (*see below)
Sulfonylureas -Gliclazide	Increase pancreatic insulin secretion	Yes	Stop (or if gradual carbohydrate restriction then wean by e.g. halving dose successively)
Meglitinides -Repaglinide	Increase pancreatic insulin secretion	Yes	Stop (or if gradual carbohydrate restriction then wean by e.g. halving dose successively)
SGLT-2 inhibitors -Dapagliflozin	Increase renal glucose secretion	No	Stop (Concern over risk of ketoacidosis, unusually the blood glucose may be normal)
Thiazolidinediones -Rosiglitazone	Reduce peripheral insulin resistance	No	Usually stop. Concern over risks usually outweighs benefits.
DPP-4 inhibitors -Sitagliptin	Inhibit DPP-4 enzyme	No	Stop. No significant risk, but no benefit in most cases.

Murdoch C, Unwin D, **Adapting diabetes medication for low carbohydrate management of type 2 diabetes: a practical guide.**

Br J Gen Pract. 2019;69(684):360-1

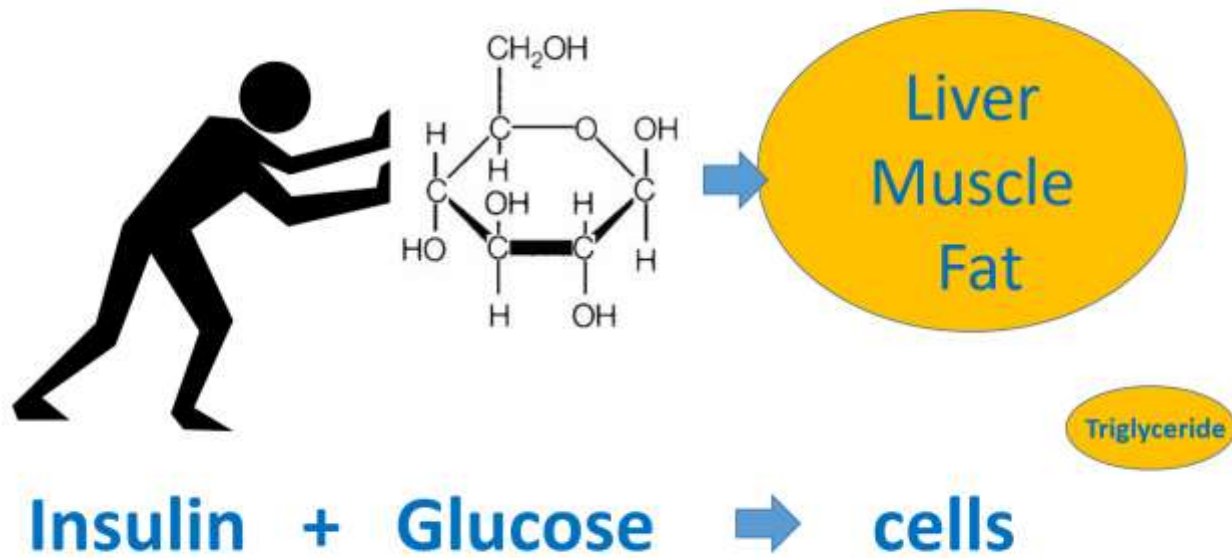
Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report



Diabetes Care

Consensus recommendations

- A variety of eating patterns (combinations of different foods or food groups) are acceptable for the management of diabetes.
- Until the evidence surrounding comparative benefits of different eating patterns in specific individuals strengthens, health care providers should focus on the key factors that are common among the patterns:
 - Emphasize nonstarchy vegetables.
 - Minimize added sugars and refined grains.
 - Choose whole foods over highly processed foods to the extent possible.
- ➡ • Reducing overall carbohydrate intake for individuals with diabetes has demonstrated the most evidence for improving glycemia and may be applied in a variety of eating patterns that meet individual needs and preferences.
- ➡ • For select adults with type 2 diabetes not meeting glycemic targets or where reducing antiglycemic medications is a priority, reducing overall carbohydrate intake with low- or very low-carbohydrate eating plans is a viable approach.



@lowcarbGP