

Right that's T2 Diabetes sorted, how about we cure hypertension next!



Dr David Unwin FRCGP
COI:

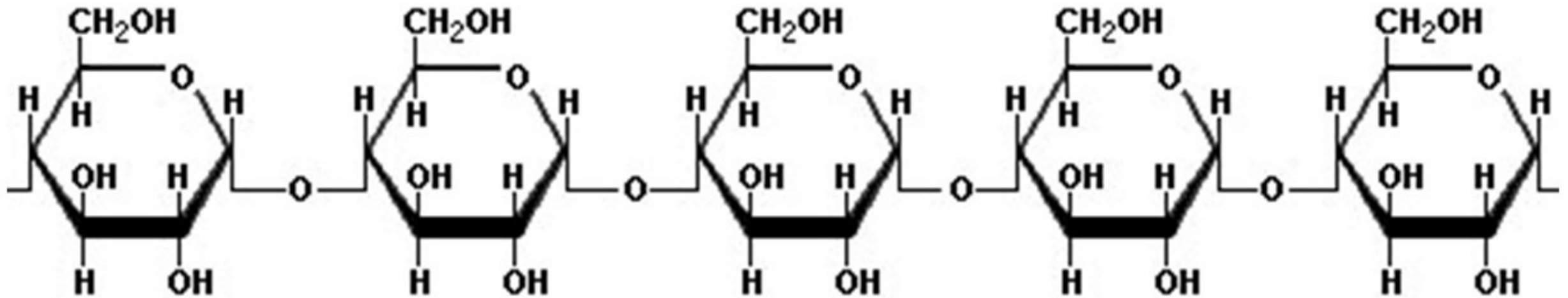
Prologue

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





































































































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



Department
of Health &
Social Care

Google Unwin sugar PHC

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



IN a case series of 170 T2D patients on a lower carb diet
In a primary care setting over an average of 30 months @lowcarbGP

84 in drug-free diabetes remission August 2020

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
84 in remission	71	49	22	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
49.% remission	8.6	6.7	1.9	99.8	90.3	9.5	143	132	11	84	78	6	73	40	33

Type 2 Diabetes remission rates Norwood

March 2017- January 2021

Data collected To:	Mean duration of low carb approach	Number of T2D cases in remission HbA1c <48*	Number choosing the approach	Remission rate for people who choose the low carb approach	Number of T2D patients on the diabetic register	Remission rate for Norwood practice
March 2017	13 months	15	48	31%	416	4%
May 2018	20 months	41	106	39%	454	9%
January 2019	22 months	59	123	48%	469	13%
March 2020	30 months	68	143	48%	485	14%
January 2021	30 months	87	181	48%	473	18%

Type 2 diabetes remission defined as: previous diagnosis of type 2 diabetes (T2D) by WHO criteria and HbA1c <6.5% (<48mmol/mol) without antidiabetes medication. As per McCombie L, Leslie W Taylor R, Kennon B, Sattar N, Lean MEJ, Beating type 2 diabetes into remission. BMJ 2017; 358:j4030.

* in mmol/mol



High blood pressure ? the second biggest known global risk factor for disease (after poor diet)

- Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. 2015;386(10010):2287-323. Collaborators GBDRF, Forouzanfar MH, Alexander L, Anderson HR, Bachman VF, Biryukov S, et al.



THE TIMES

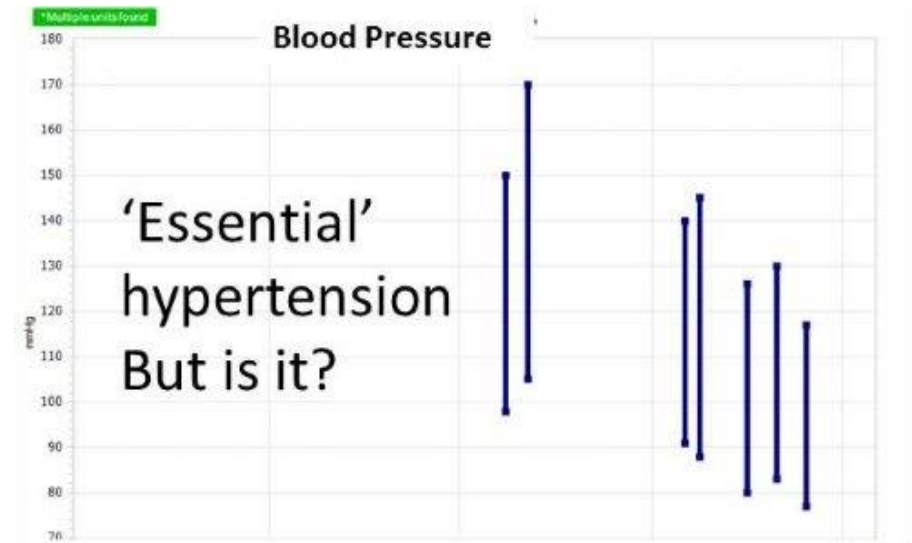
March 12, 2019
What is the cause
of hypertension?

underlying medical problems, such
as kidney disease, that can raise BP,
→ but in more than 90 per cent of cases
it is simply a result of ageing of the
circulation, because the heart has to
pump harder to maintain flow through
stiffened arteries.

Perhaps its all about weight?

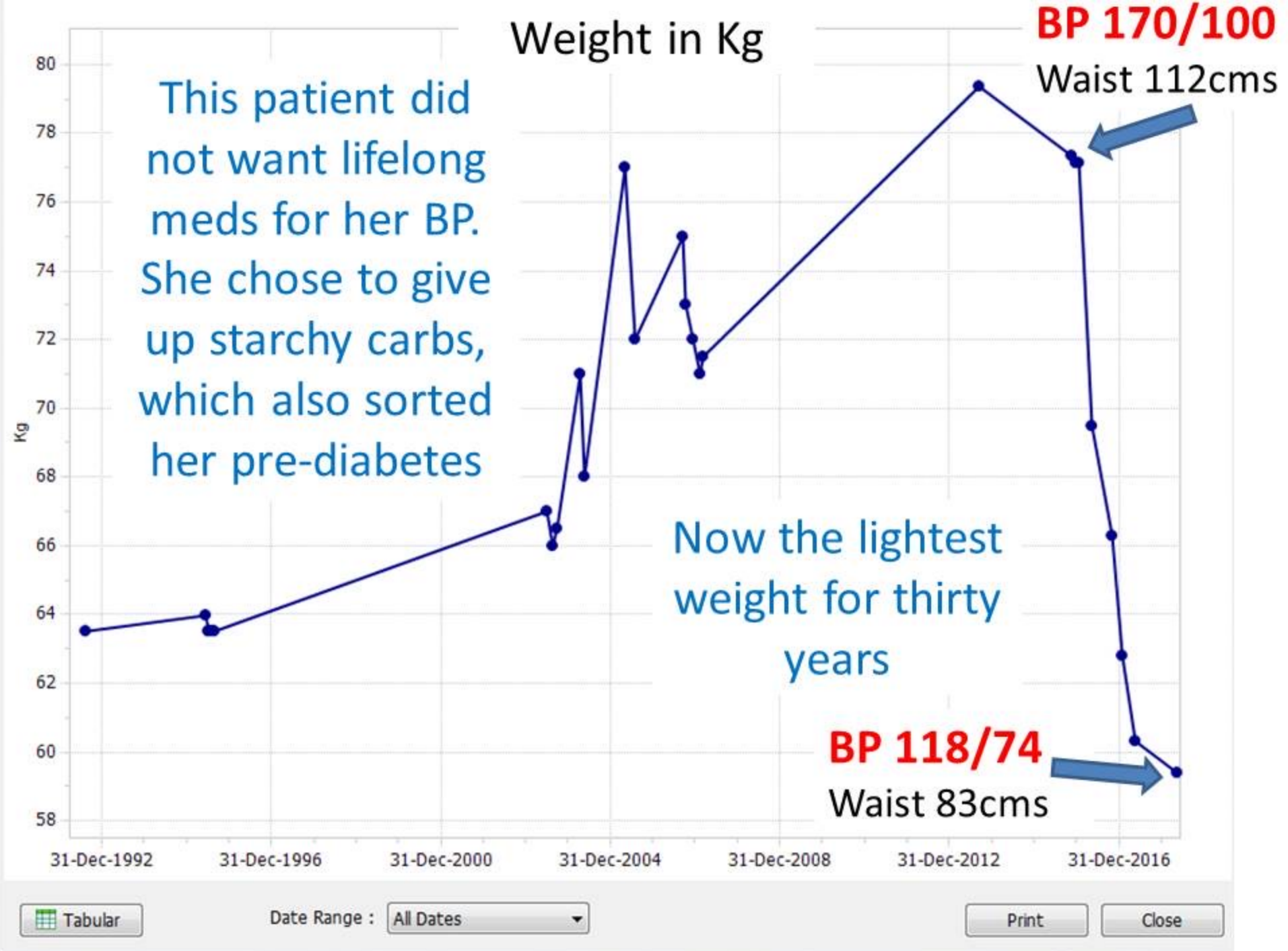
“one mm Hg for one kg” Recognised for 20 years, a predictable effect

Harsha DW, Bray GA. Weight loss and blood pressure control (Pro). Hypertension. 2008;51(6):1420-5;



weight loss and improvements in BP
correlated over the same period of 5 months



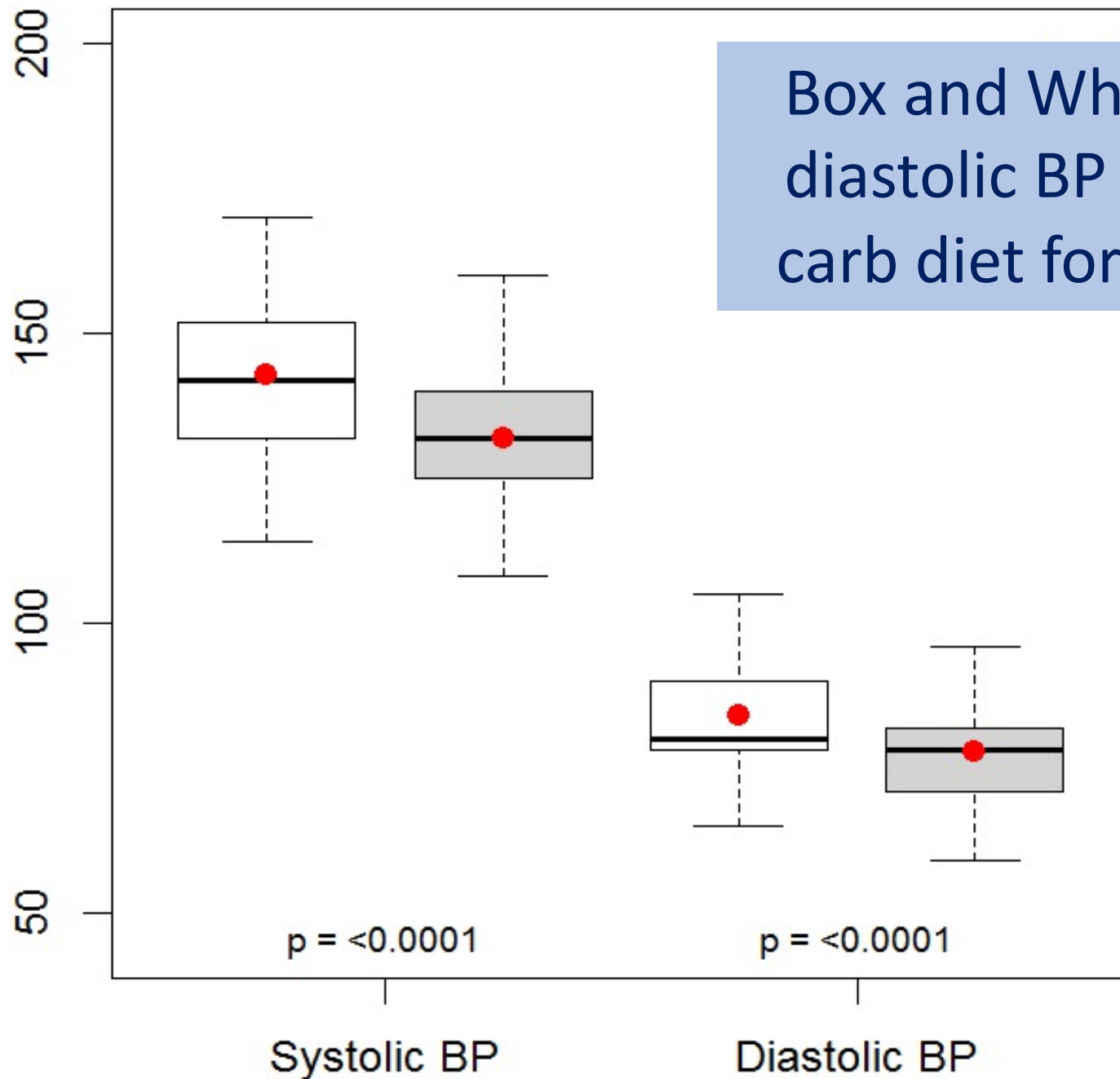


BP, Perhaps its all about weight?

But what is the physiology of the link
between obesity & hypertension?



Blood Pressure (mmHg)



Box and Whisker plots of systolic and diastolic BP for 159 patients on a low carb diet for an average of 24 months

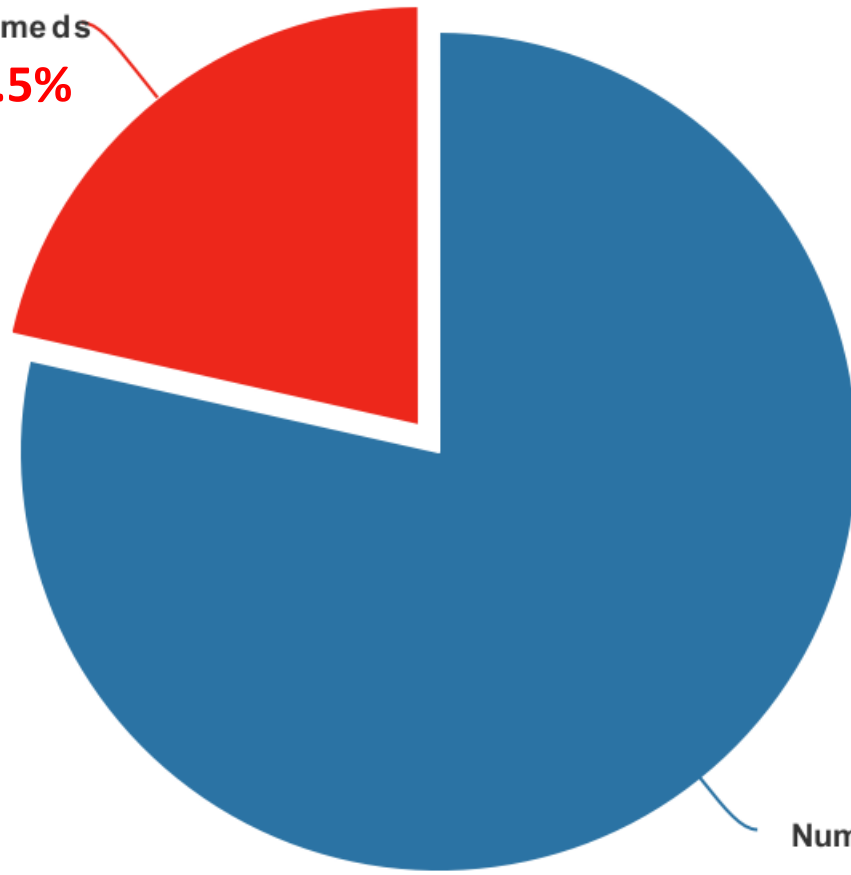
Before

After

**Average improvements
In blood pressure:
Systolic 10.8 mmHg
Diastolic 6.2 mmHg**

Substantial and Sustained Improvements in Blood Pressure, Weight and Lipid Profiles from a Carbohydrate Restricted Diet: An Observational Study of Insulin Resistant Patients in Primary Care. International Journal of Environmental Research and Public Health. Unwin, David J., Murray, Scott W. July 2019 doi:10.3390/ijerph16152680

'Deprescribed' meds
35 or 21.5%



Number of meds after low carb

128

■ Number of meds after low carb ■ 'Deprescribed' meds

Pie chart to show the number of medications for blood pressure 'deprescribed' against the total at the start of the low carb intervention

Adjusted BP lowering effect;
14.8mmHg systolic
8.07mmHg diastolic.

“one mm Hg for one kg”



*Environmental Research
and Public Health*

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

International Journal of Environmental Research and Public Health. Unwin, David J..Murray, Scott W. July 2019 doi:10.3390/ijerph16152680

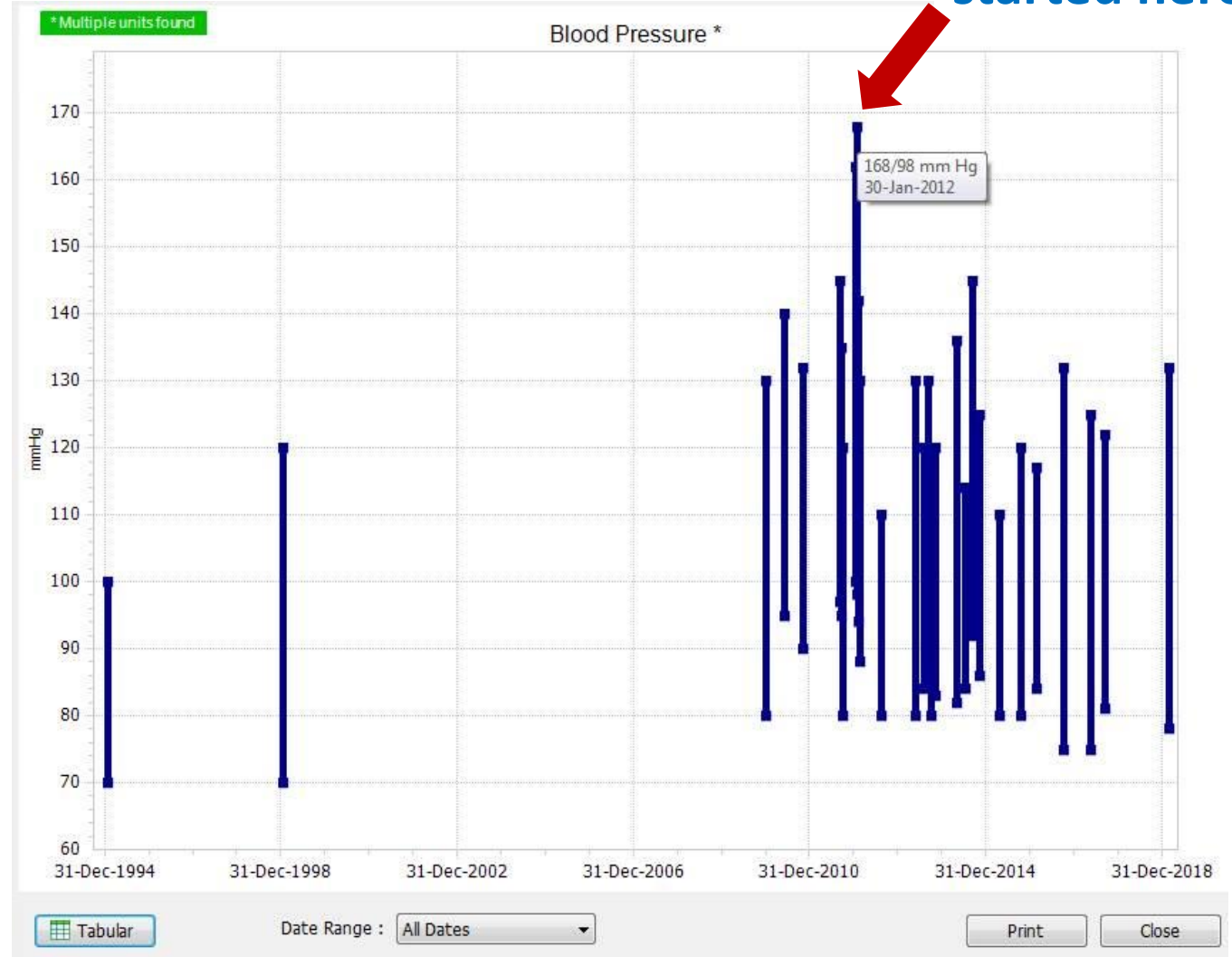
50 year old

Wt 55.3kg or
8st 12lb

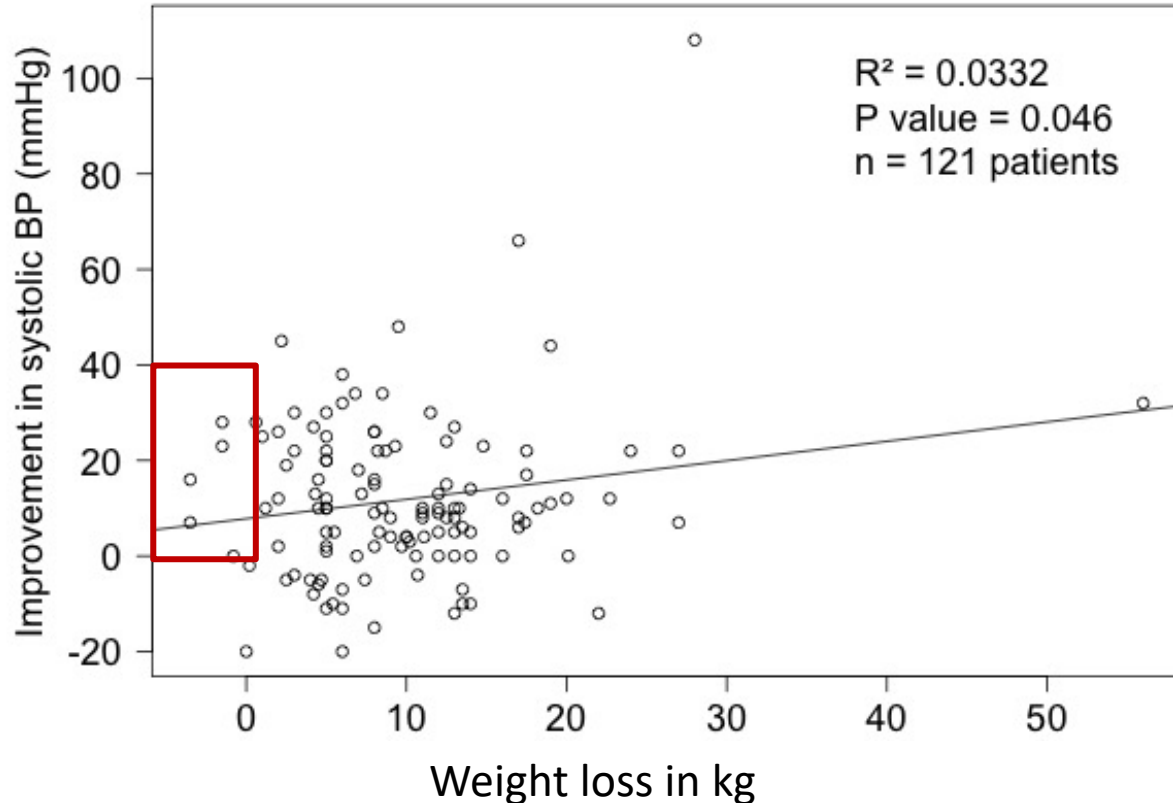
Height 158 cms

BMI 22.1

Perindopril 4mg
started here

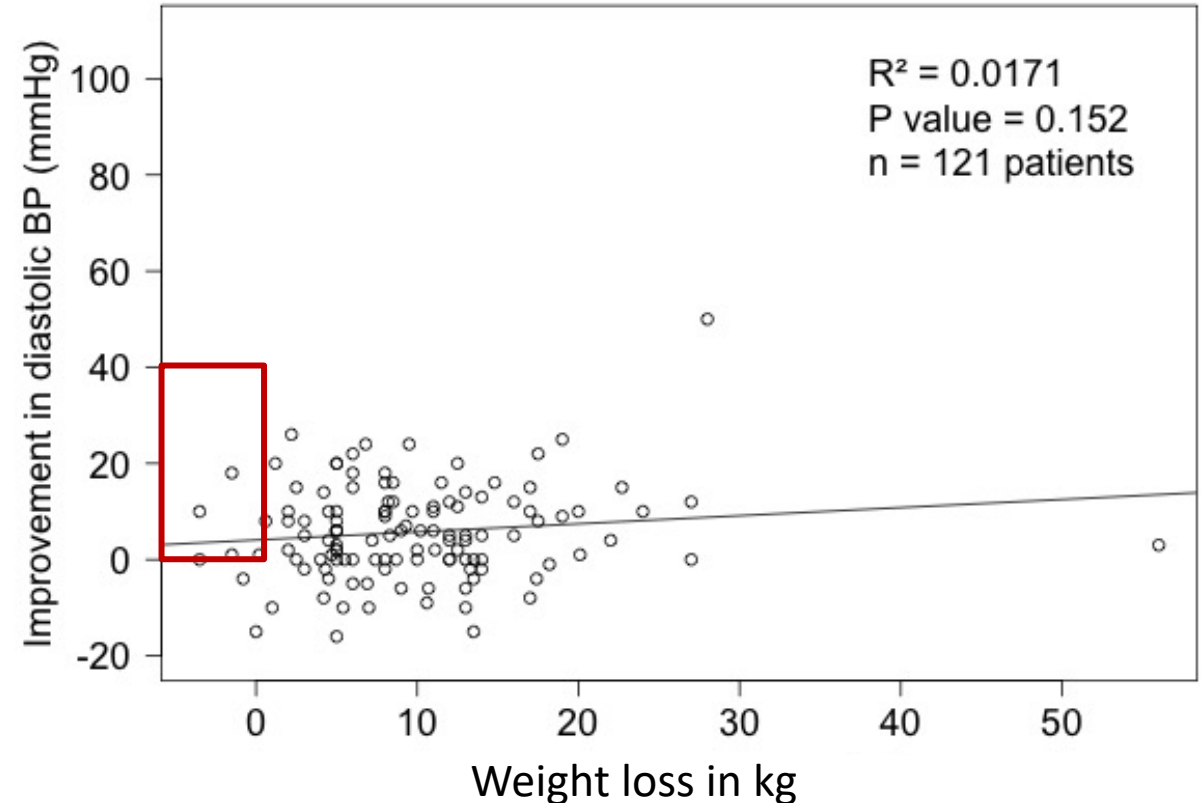


Weight loss in kg plotted against improvements in both systolic and diastolic blood pressure for 121 patients on a low carb diet for 30 months

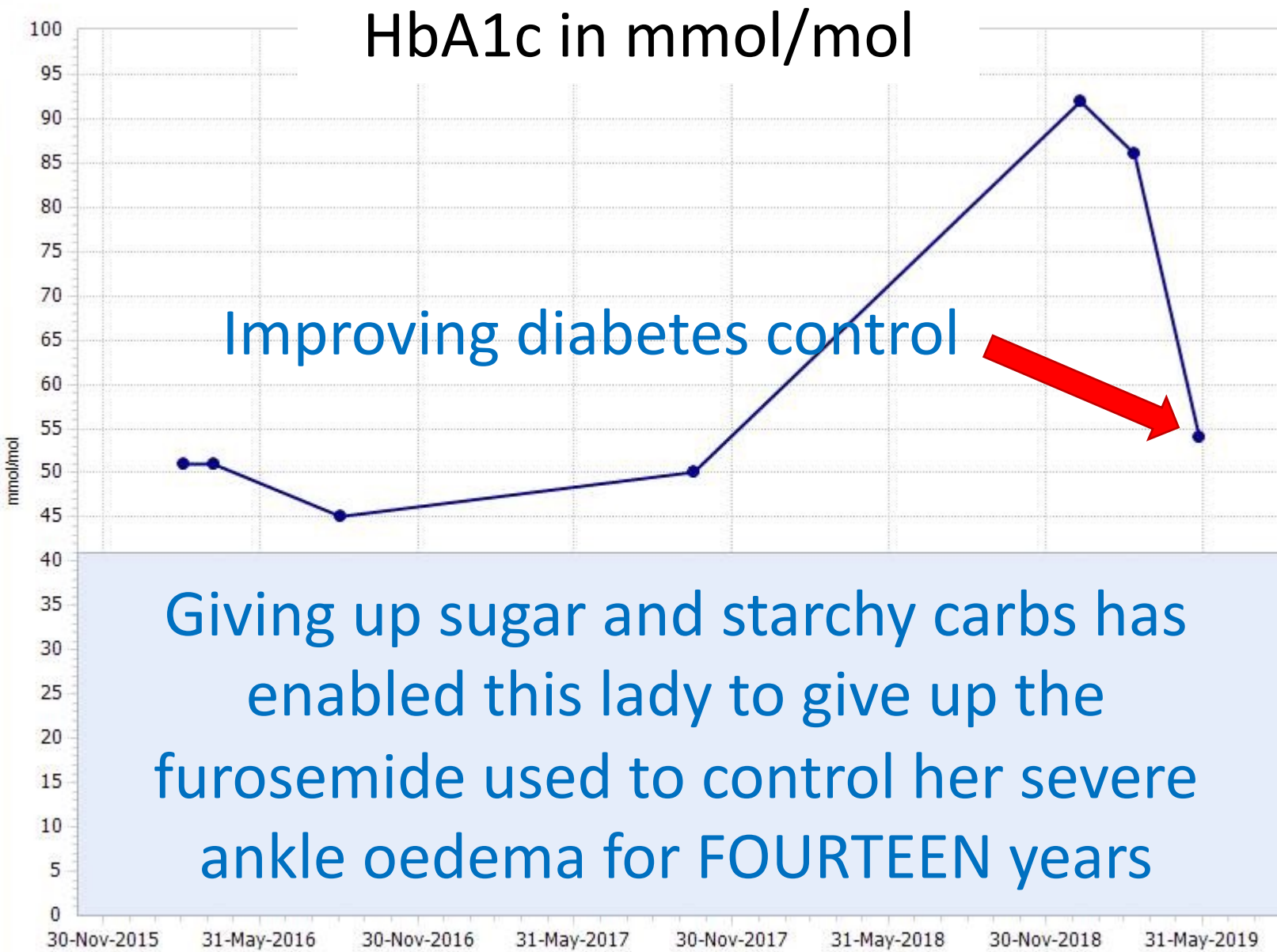


For systolic BP: just 3.3% of the variation in BP loss can be explained by the variation in weight loss

For diastolic BP: 1.7% of the variation in BP loss can be explained by the variation in Weight loss. Weight loss plays little or no explanatory role in improvement of diastolic BP.







#proud!



Some people who go low carb need to take more salt in the diet.

WHY?

Insulin, sodium & blood pressure



1933. Type 1 Diabetic subjects showed acute **natriuresis** following abrupt withdrawal of insulin therapy and **antinatriuresis** upon resumption of insulin therapy, suggesting that insulin could affect renal sodium excretion

Atchley DW, et al. ON DIABETIC ACIDOSIS: A Detailed Study of Electrolyte Balances Following the Withdrawal and Reestablishment of Insulin Therapy. J Clin Invest. 1933;12(2):297-326.

1975 Insulin infusions in euglycemic human subjects significantly decreased urinary sodium excretion due most likely to stimulation of tubular reabsorption

DeFronzo RA, et al. The effect of insulin on renal handling of sodium, potassium, calcium, and phosphate in man. J Clin Invest. 1975;55(4):845-55.

Insulin, sodium & blood pressure



1997 In insulin resistant (T2D) individuals compensatory hyperinsulinemia imposes a chronic antinatriuretic pressure on the kidney. This may provide an explanation for the clustering of insulin resistance with hypertension and hyperuricemia. [Renal effects of insulin in man. J Nephrol. Quiñones-Galvan A 1997 Jul-Aug;10\(4\):188-91.](#)

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



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,

***A lower glycemic diet may lead to important reductions
in blood pressure***



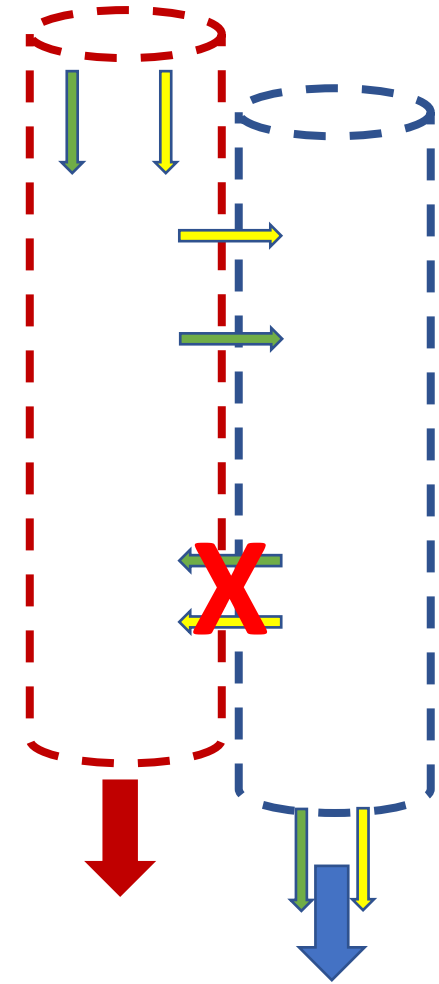
Blood Pressure Reduction: An Added Benefit of Sodium–Glucose Cotransporter 2 Inhibitors in Patients With Type 2 Diabetes

Approximately 90% of glucose filtered by the kidney is reabsorbed by the sodium-glucose co-transporter 2 (SGLT2), located in the proximal tubule of the nephron

If this reabsorption is blocked, urinary glucose and sodium excretion is increased, improving both diabetic control and BP.

Three mechanisms by which SGLT2i reduce BP:

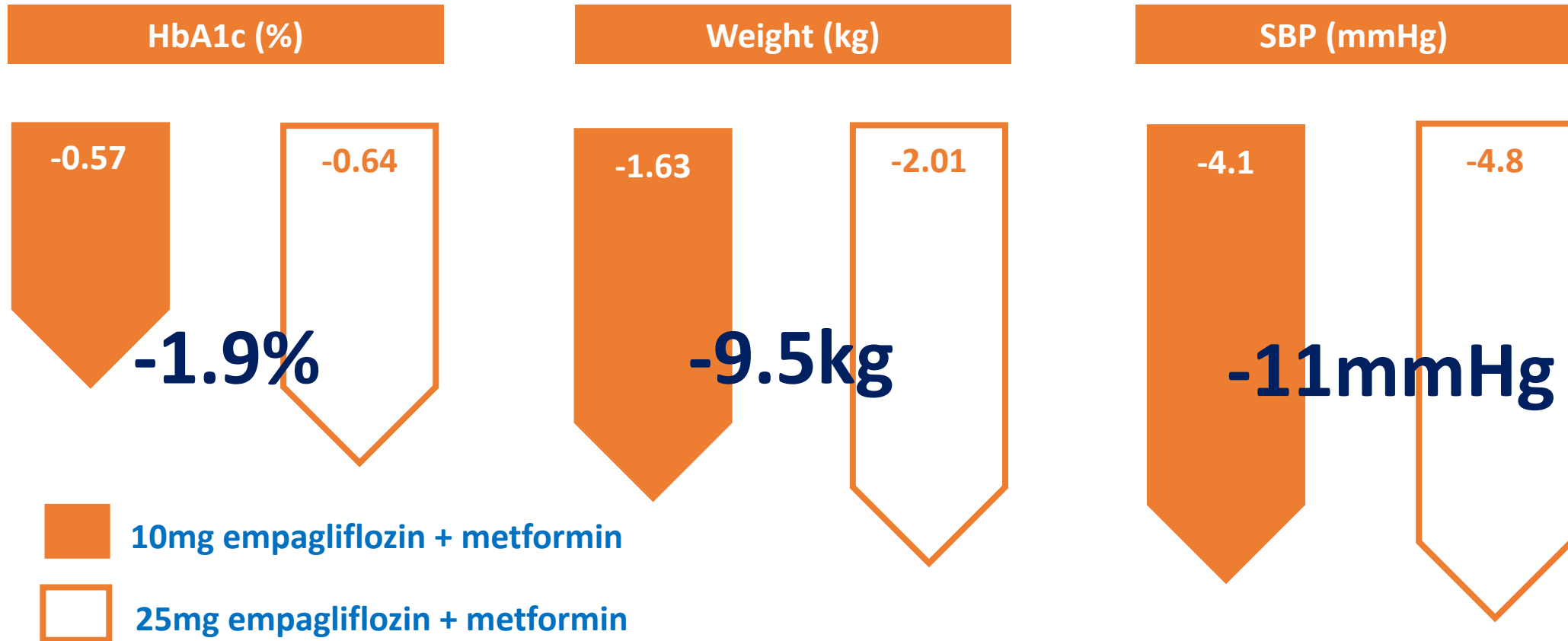
- Osmotic diuresis glucose
- Osmotic diuresis sodium (Natriuresis)
- Weight loss (a late effect)



1. Majewski C, Bakris GL. Blood Pressure Reduction: An Added Benefit of Sodium–Glucose Cotransporter 2 Inhibitors in Patients With Type 2 Diabetes. *Diabetes Care*. 2015;38(3):429-30.

2. Gerich JE. Role of the kidney in normal glucose homeostasis and in the hyperglycaemia of diabetes mellitus: therapeutic implications. *Diabet Med*. 2010;27(2):136-42.

Placebo-adjusted changes from baseline measurements at week 24 with empagliflozin as an add-on to metformin



Figures represent placebo-adjusted changes from baseline measurements; placebo, n=207; empagliflozin 10 mg, n=217; empagliflozin 25 mg, n=213. Change in HbA1c was a primary endpoint in the trial.

SBP: systolic blood pressure

1. Jardiance (empagliflozin) Summary of Product Characteristics; 2. Häring H-U *et al. Diabetes Care* 2014;37:1650–1659 and supplementary appendix.

Low carb diet compared to SGLT2i

	Low carb diet	SGLT2 inhibitor
How it works	Reduced glucose intake	Increased glucose excretion
insulin	↓	↓
Weight	↓↓	↓
Blood pressure	↓↓	↓
HbA1C	↓↓	↓
Triglycerides	↓	↓
LDL	↓↑	↓
HDL	↑	↑
Ketones	↑	↑
Side effects	Hypotension Keto 'flu'	Hypotension Genitourinary infections DKA (euglycaemic) Necrotising fasciitis of the perineum

Substantial and Sustained Improvements in Blood Pressure, Weight and Lipid Profiles from a Carbohydrate Restricted Diet: An Observational Study of Insulin Resistant Patients in Primary Care

Unwin D. Murray S. et al. Altmetric data

Substantial and Sustained Improvements in Blood Pressure, Weight and Lipid Profiles from a Carbohydrate Restricted Diet: An Observational Study of Insulin Resistant Patients in Primary Care

Overview of attention for article published in International Journal of Environmental Research and Public Health, July 2019



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SUMMARY News Writer Analysis Related Dimensions citations

Title Substantial and Sustained Improvements in Blood Pressure, Weight and Lipid Profiles from a Carbohydrate Restricted Diet: An Observational Study of Insulin Resistant Patients in Primary Care
Published in International Journal of Environmental Research and Public Health, July 2019
DOI 10.3390/ijerph16112680
PubMed ID 31376472
Authors Unwin, Tobin, Murray, Delon, Brady

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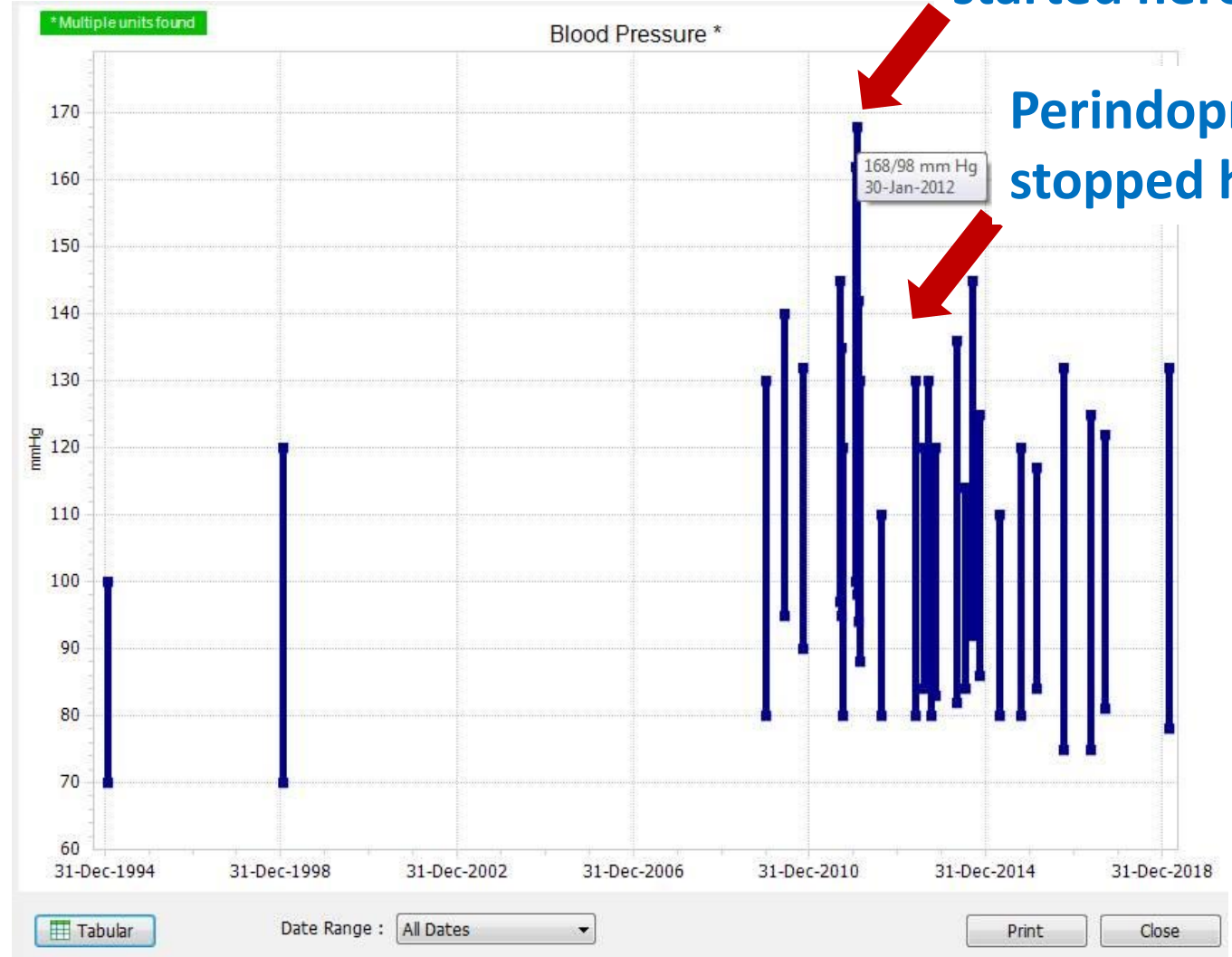
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50 year old
Wt 55.3 or 8st 12lb
Height 158 cms
BMI 22.1

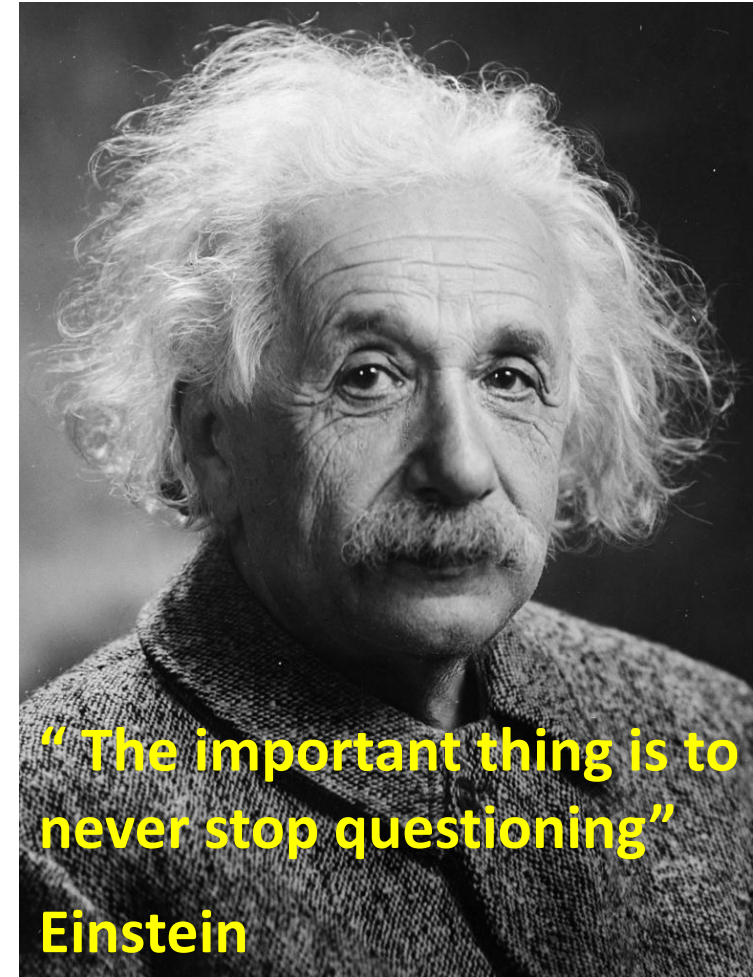
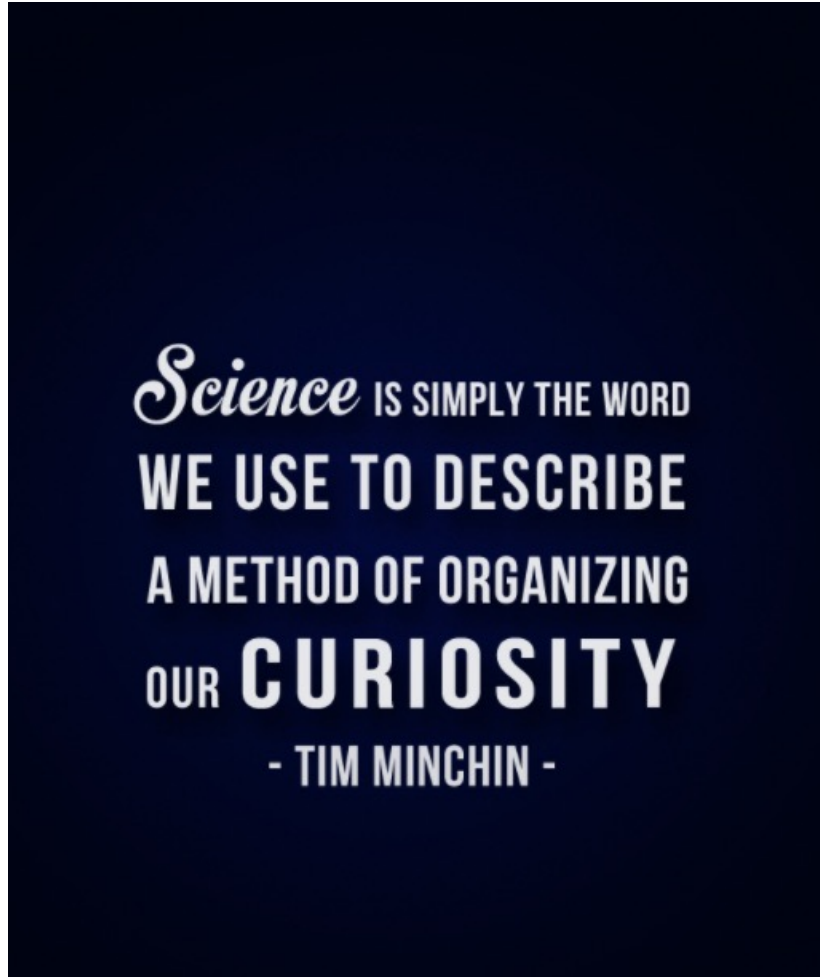


Nutrition Therapy for Adults With Diabetes or Prediabetes:

A Consensus Report by the American Diabetes Association

	Low-carbohydrate (110–112)	Emphasizes vegetables low in carbohydrate (such as salad greens, broccoli, cauliflower, cucumber, cabbage, and others); fat from animal foods, oils, butter, and avocado; and protein in the form of meat, poultry, fish, shellfish, eggs, cheese, nuts, and seeds. Some plans include fruit (e.g., berries) and a greater array of nonstarchy vegetables. Avoids starchy and sugary foods such as pasta, rice, potatoes, bread, and sweets. There is no consistent definition of “low” carbohydrate. In this review, a low-carbohydrate eating pattern is defined as reducing carbohydrates to 26–45% of total calories.	• A1C reduction	
			• Weight loss	
			• Lowered blood pressure	
			• Increased HDL-C and lowered triglycerides	
	Very low-carbohydrate (VLC) (110–112)	Similar to low-carbohydrate pattern but further limits carbohydrate-containing foods, and meals typically derive more than half of calories from fat. Often has a goal of 20–50 g of nonfiber carbohydrate per day to induce nutritional ketosis. In this review a VLC eating pattern is defined as reducing carbohydrate to <26% of total calories.	• A1C reduction	
			• Weight loss	
			• Lowered blood pressure	
			• Increased HDL-C and lowered triglycerides	

What is science about ?



Noticing things and asking interesting questions



When people present
with a raised BP
Consider offering a
dietary (low carb) option
BEFORE starting lifelong
medication



Unwin D, Tobin S. A patient request for some "deprescribing".
BMJ. 2015;351:h4023.



@lowcarbGP

Refs

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