

Impact of improved lifestyle on management of chronic disease - can Type 2 Diabetes Mellitus be reversed?

Sarah Bennett
Professor Tim Noakes

4 April 2019



Acknowledgements

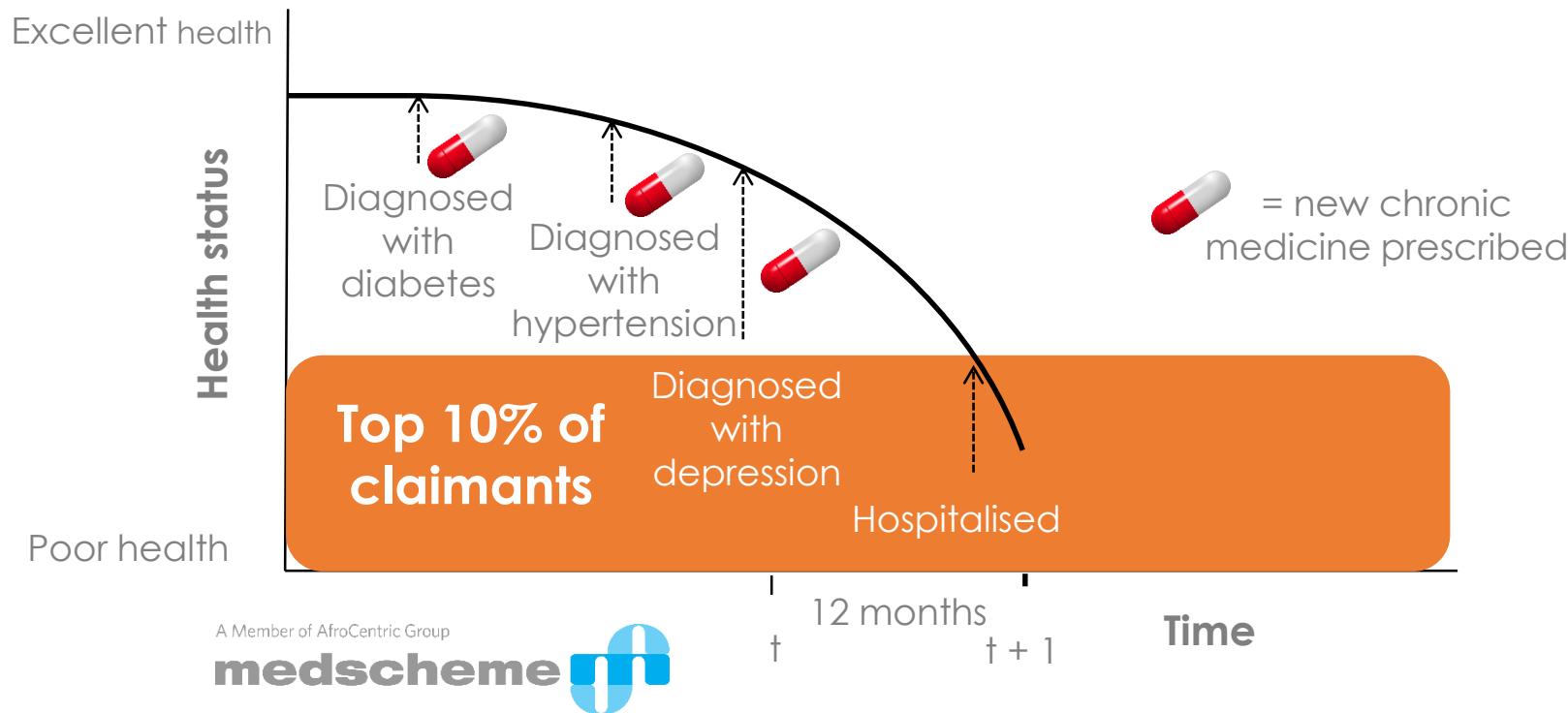
Professor Tim Noakes, A1 rated scientist

Relevant to the modern actuary

- **CHALLENGE:** Challenges ideas “All great advances in science come from studying the paradoxes”.
- **INFLUENCE:** Very influential. The low-carbohydrate, high-fat diet, is often referred to as the "Tim Noakes", "Banting" or LCHF diet in South Africa.
- **LEAD:** A thought leader on the 8 paradoxes he has studied and defended. Published many books.

Actuarial model of chronic disease: A new paradigm is needed

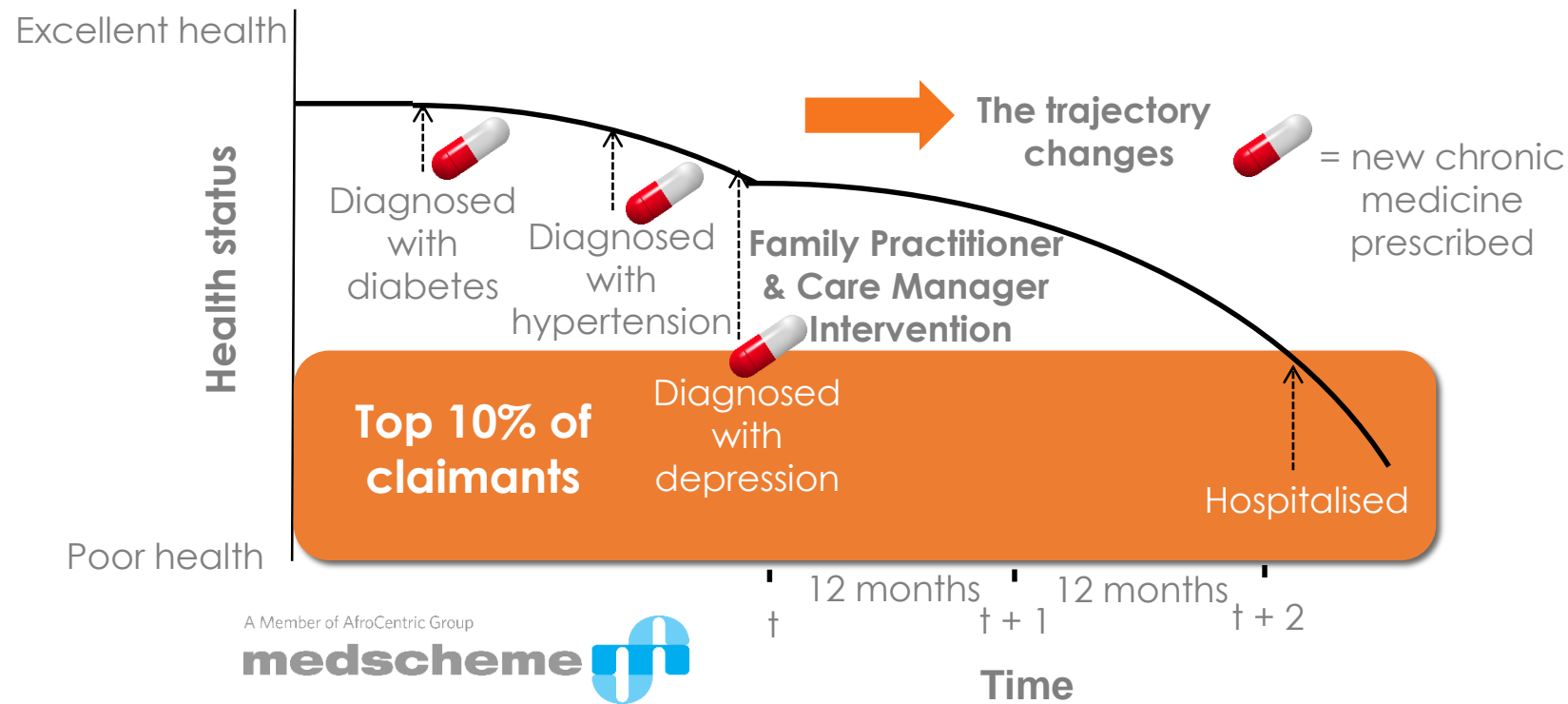
Example: Mrs Smith



- This is a slide I have presented at previous conferences
- My paradigm was that chronic disease is irreversible
- A one way transition probability model
- Diabetics are “impaired lives” subject to stringent underwriting due to increased morbidity and mortality risk
- Our predictive model detects people at time t who are likely to be high claimers in the next 12 months

Actuarial model of chronic disease: A new paradigm is needed

Example: Mrs Smith



- The good news is that our managed care interventions are intended to change the trajectory of disease progression
- Once these people are picked up by our predictive model our health coaches contact them to help them change their lifestyle
- Family Practitioners are key to changing behavior and we work with them, sharing information
- Family Practitioners see at best a levelling out

Internationally accepted that diabetes has serious consequences

WHO report on diabetes¹ states that :

- The prevalence of retinopathy in persons with diabetes is 35%
- Adults with diabetes historically have a two or three times higher rate of cardiovascular disease (CVD) than adults without diabetes
- The incidence of End Stage Renal Disease is up to 10 times as high in adults with diabetes as those without
- Lower limb amputation rates are 10 to 20 times higher among people with diabetes

¹ World Health Organisation Global report on diabetes 2016

Local evidence that diabetes has serious consequences

Adults only 1 Jan 2017 – 31 Mar 2019	Alzheimers & Dementia	Chronic Renal Failure	Cardio- Vascular Disease	Lower limb amputation	Non Alcoholic Fatty Liver Disease	Retino- pathy
Prevalence in non-diabetics	0.38%	0.16%	15.52%	0.02%	0.43%	0.06%
Prevalence in diabetics	1.13%	1.78%	78.04%	0.28%	2.12%	0.97%
Ratio: Diabetic:Non-Diabetic Prevalence	2.96	11.25	5.03	13.02	4.91	17.02
Risk adjustment*	1.44	1.44	1.44	1.44	1.44	1.44
Risk adjusted ratio	2.05	7.79	3.48	9.02	3.40	11.79
Increase with high HbA1c?	No	No	No	Yes	No	Yes

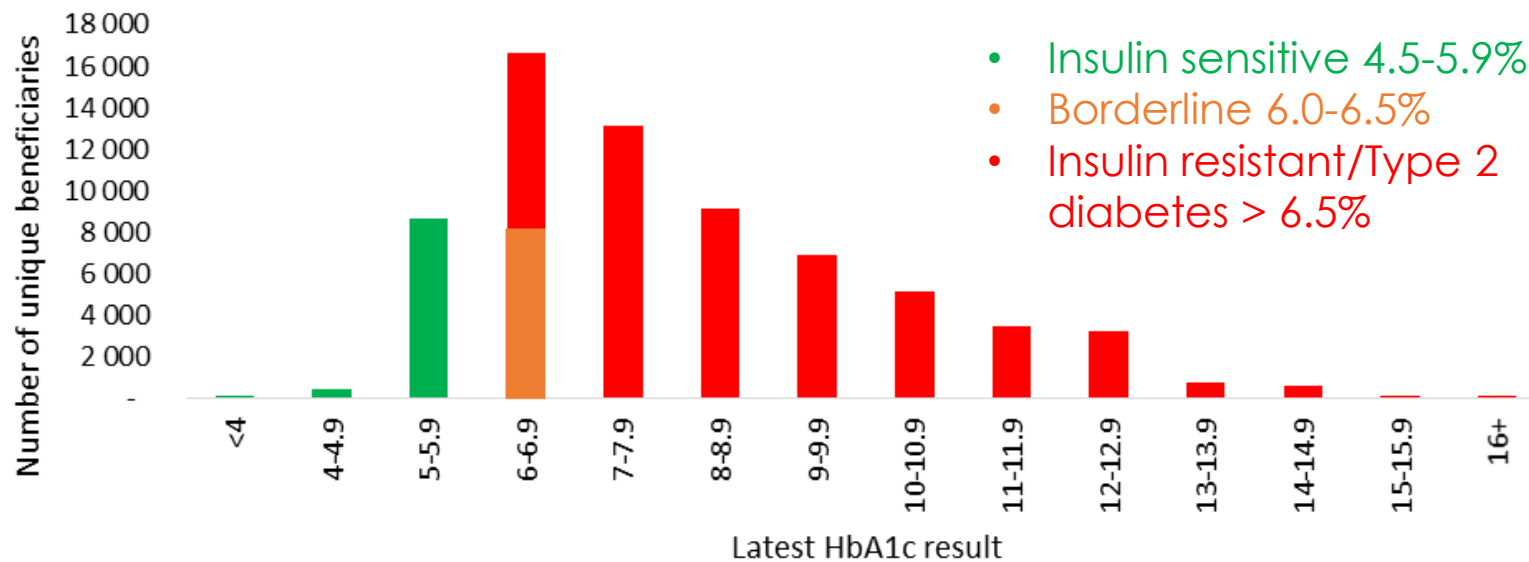
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*Approximate adjustment for risk using average age of diabetics, which is 58.5 years vs non diabetics, which is 43.7 years.

How well is diabetes being managed in South African populations?

Distribution of HbA1c results for diabetics (n = 68404)
with 86.6% ≥ 6 , 62.3% ≥ 7 and 43.2% ≥ 8

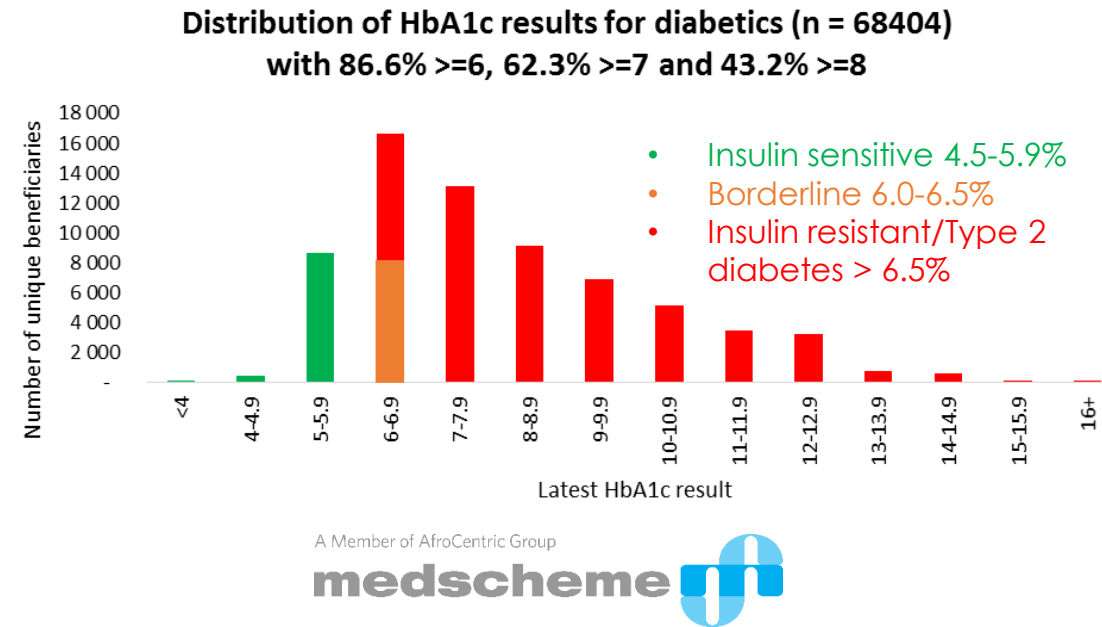
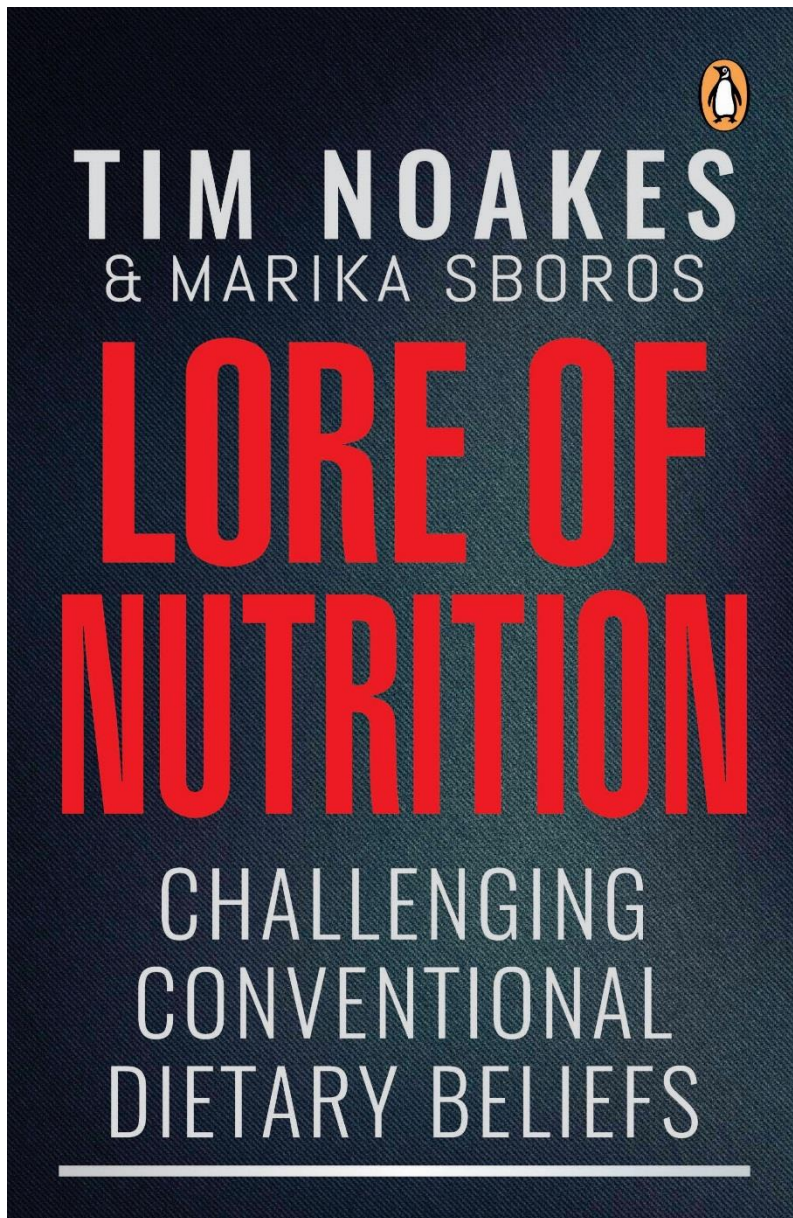


- Risk of death increases by 21% per 1% increase in HbA1c
- Risk of microvascular complications of Type 2 diabetes increases by 37% per 1% increase in HbA1c
- Risk of amputation increases by 43% per 1% increase in HbA1c (p350, Lore of Nutrition)

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How well is diabetes being managed in South African populations?



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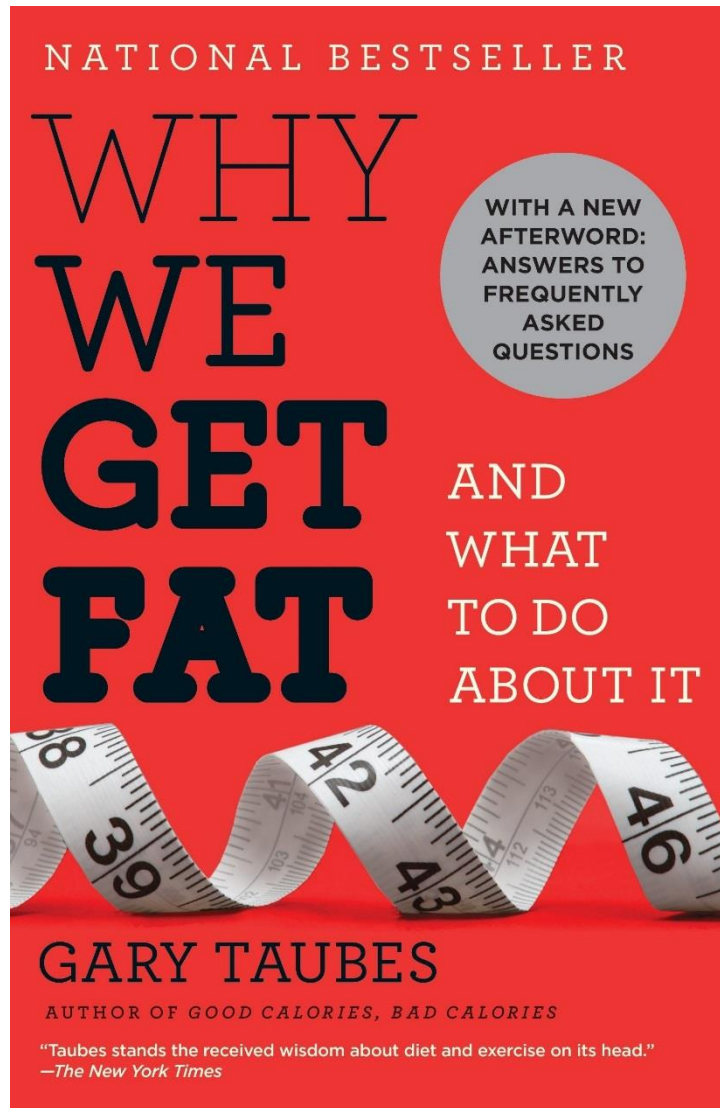
Not very well

What if we could reverse diabetes in these people?



**Sugar and carbohydrates
are the problem**

What if we could reverse diabetes in these people?



August 7, 2014

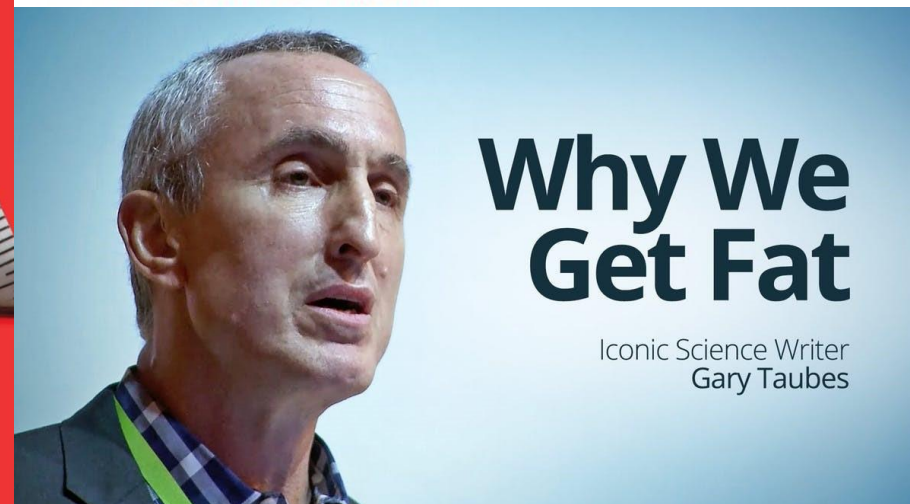
"We'd Be Better Served Watching the Carb Content of the Diet Rather than How Much We Eat and Exercise."



Habits interview: [Gary Taubes](#).

I'm so pleased to be posting this interview with Gary Taubes, because it's no exaggeration to say that his work has had more practical influence on my day-to-day habits than probably any other writer.

In [Better Than Before](#), I describe the multiple strategies we can use to change our habits. One of the most powerful, but also one of the most mysterious and unpredictable strategies, is the [Strategy of the Lightning Bolt](#).



What is diabetes reversal?

Definition of diabetes reversal vs diabetes remission

Diabetes reversal is defined as being able to maintain blood sugar levels below the diabetic range without the assistance of insulin or any other diabetic medication.

Diabetes remission is defined as being able to maintain blood sugar levels below the diabetic range without the assistance of insulin but with the assistance of oral medications such as Metformin.

Neither diabetes reversal nor diabetes remission imply that the condition is cured because poor glucose control will return the moment the person goes back to their high carb diet.

Evidence of reversal of diabetes

- Medscheme's Active Disease Risk Management and Integrated Chronic Care Management programmes aim to improve lifestyle and management of chronic conditions.
- The range of services we provide gives rise to a wealth of data on chronic disease management.
- We are seeing diabetics who are moving to Dormant status, ie no longer collecting their chronic medicine. There are three possible reasons:

1. Non-compliance

2. Purchasing elsewhere

3. Reversal of chronic conditions

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Evidence of reversal of diabetes



Dr Neville Wellington

- Cape Town based family practitioner who specialized in diabetes management (University of Cardiff).
- Treats diabetes with low carbohydrate diets with careful monitoring of glucose levels.
- Published an article in the South African Journal of Diabetes titled “Carbohydrates, oxidative stress and low carbohydrate living” in 2014.
- Regularly speaks at conferences and talks about diabetes management on the radio.
- Works with Medscheme as one of our selected Integrated Chronic Care (‘ICC’) practitioners.
- Assisted with providing case studies demonstrating diabetes reversal.

Evidence of reversal of diabetes

Case study 1: Female aged 70.
Diagnosed at age 59 and was started on Metformin.
Two years later her HbA1c was 7.3%.

She faced a choice between commencing insulin and radically changing her diet.

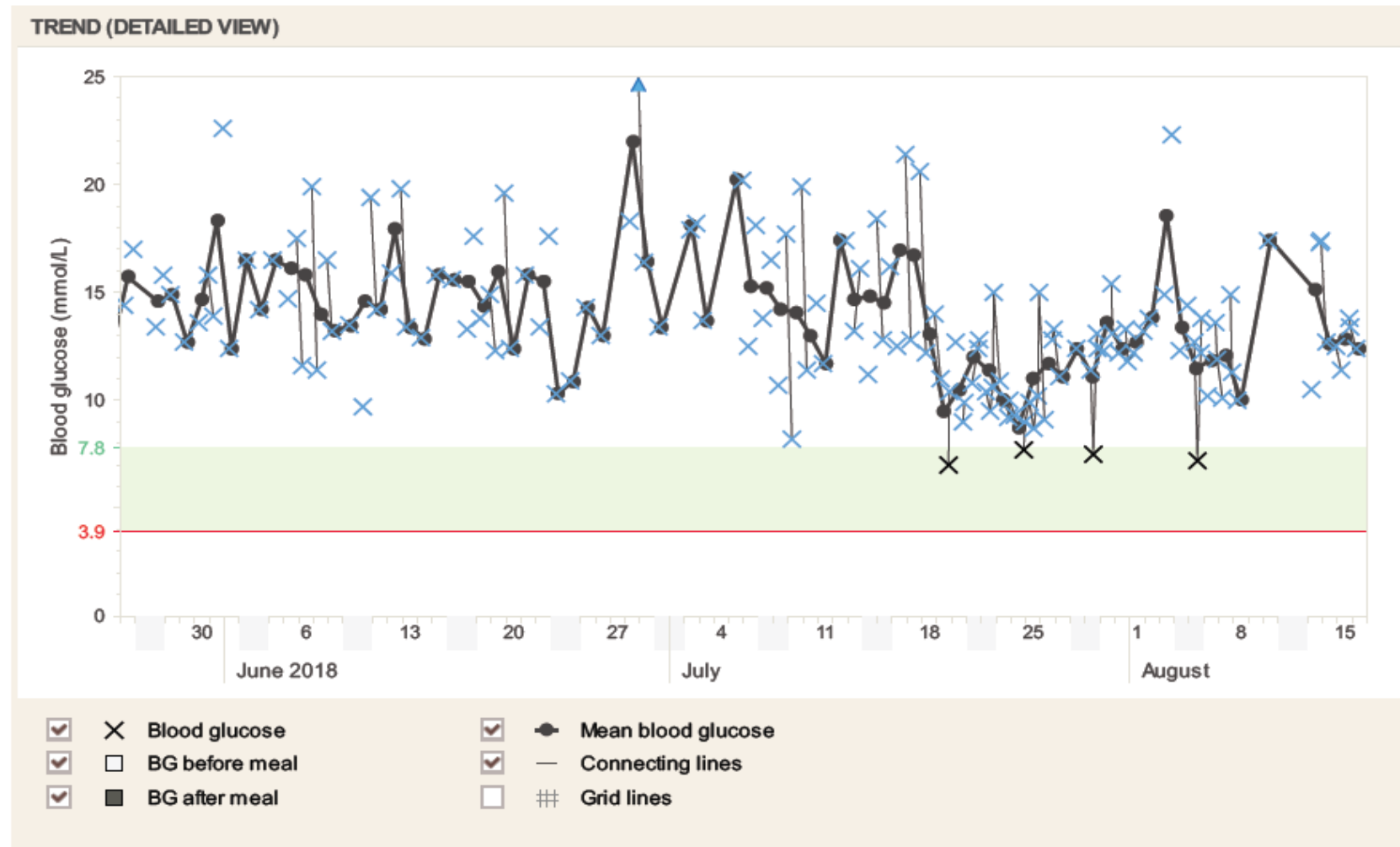
She started a Low Carb High Fat lifestyle and her HbA1c came down to 5.8%.

A year later she stopped the Metformin and her Blood Pressure Medicines.
For the past 5 years she has maintained her lifestyle really well.
Dr Wellington saw her recently and her HbA1c was still 5.3%.

What poor control looks like

ACCU-CHEK® Report

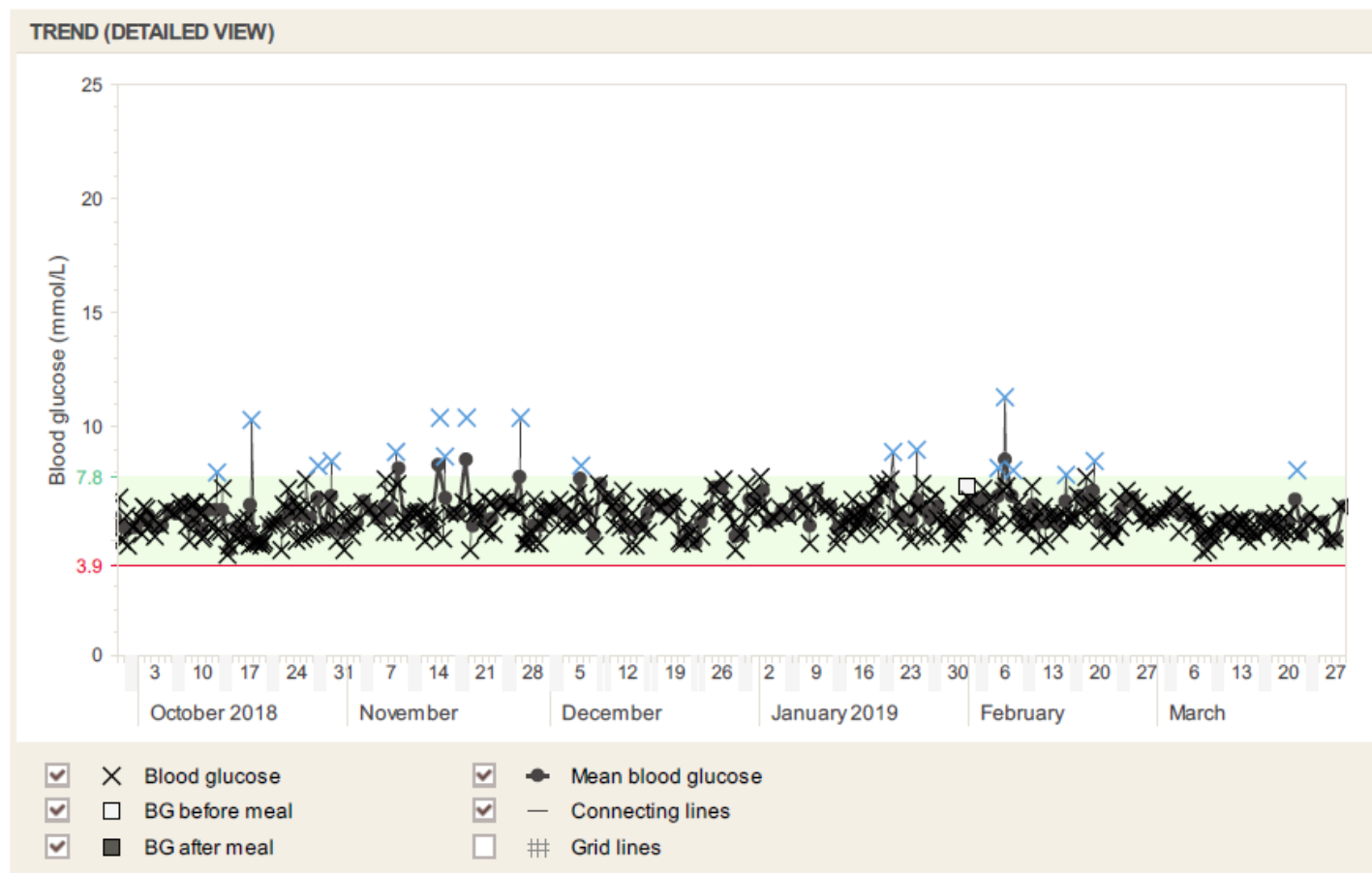
25. MAY 2018–16. AUG 2018



Case study 2: Male aged 64

ACCU-CHEK® Report

28. SEP 2018–28. MAR 2019



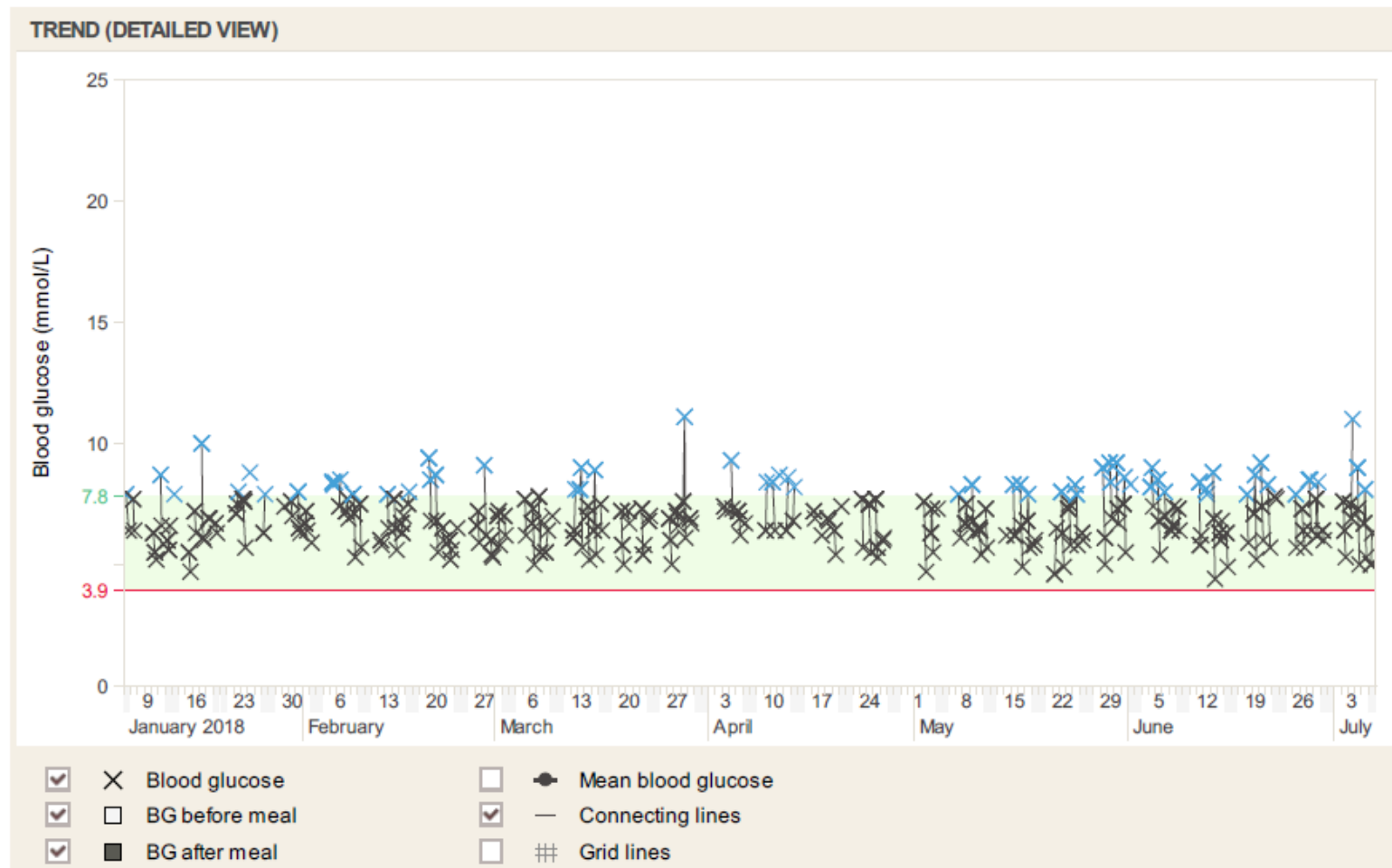
Case study 2: Male aged 64

- Dr Wellington started seeing him five years ago and started him on a LCHF diet. At that stage he weighed 109.1kg, HbA1c was 7.7% and he was on Metformin 500mg tds, Dynagliclazide MR 30 and Atacand plus 1 daily.
- Over the past 5 years he has progressively improved and lost weight and regulated his glucose levels with his testing and HbA1c has mostly been under 6.5%.
- Dr Wellington saw him last week and he weighed 101.8kg, BP 112/68, and HbA1c 6.5% and his medication has reduced to Metformin 500 bd and Atacand only.
- He has maintained his health over the past 5 years, reduced meds and also his cholesterol has remained normal. While he is not totally off medicines, he is in remission.

Case study 3: Female aged 69, diagnosed age 64

ACCU-CHEK® Report

6. Jan 2018–6. Jul 2018



Case study 3: Female aged 69

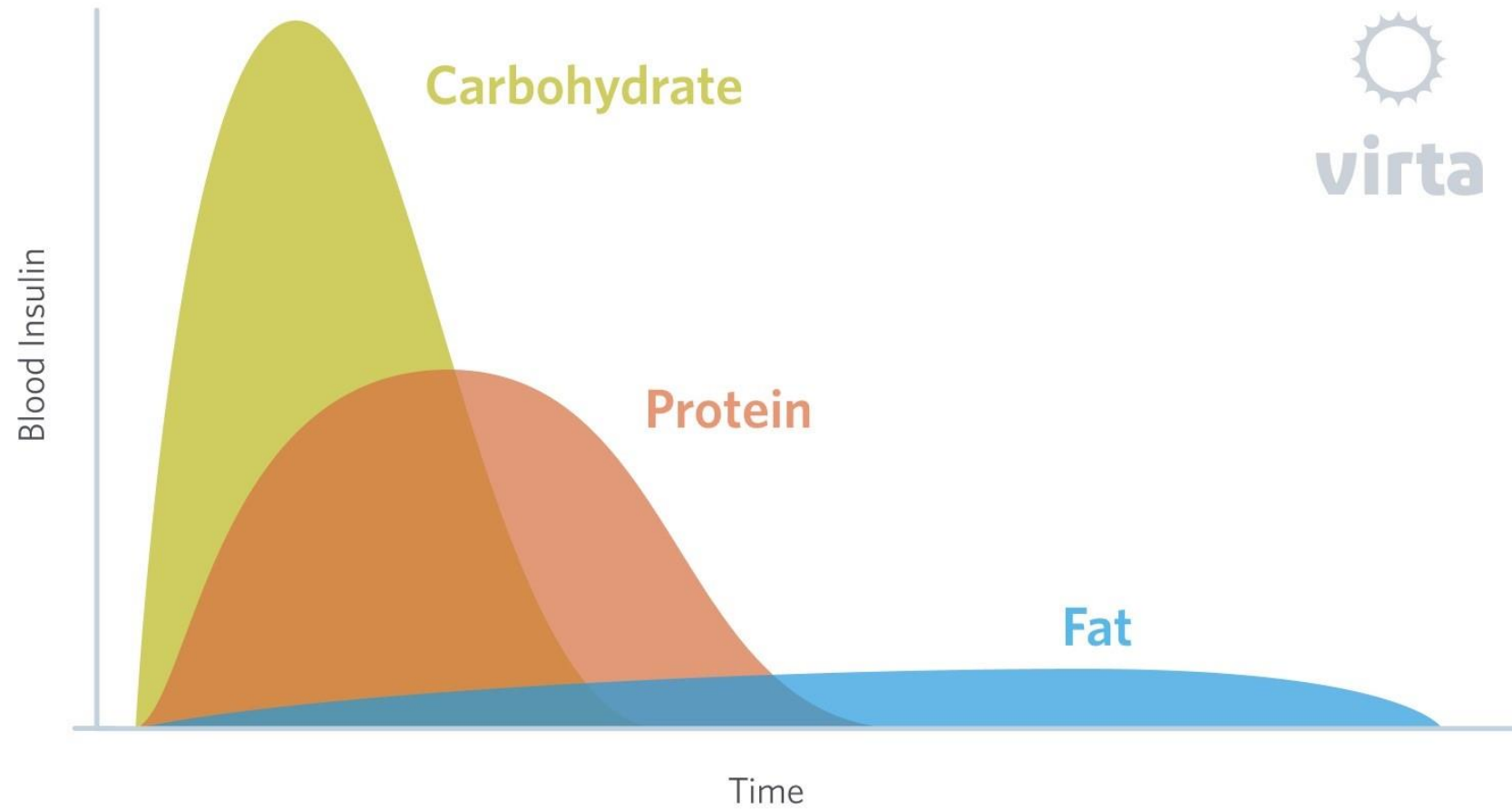
- A female aged 69 who started seeing Dr Wellington at diagnosis 5 years ago, when her hbA1c was 13.8%.
- She enthusiastically embraced LCHF lifestyle and only on metformin within 4 months her HbA1c was 6%.
- Over the past 5 years she has maintained her glucose levels and HbA1c below 6%.
- She also lost 15 kg and stopped smoking.
- Her last HbA1c was 5.6% last year, she has been a great success and has not needed more medications

Evidence of reversal of diabetes (United States)

How to help
patients reverse
type 2 diabetes
Dr. Sarah Hallberg

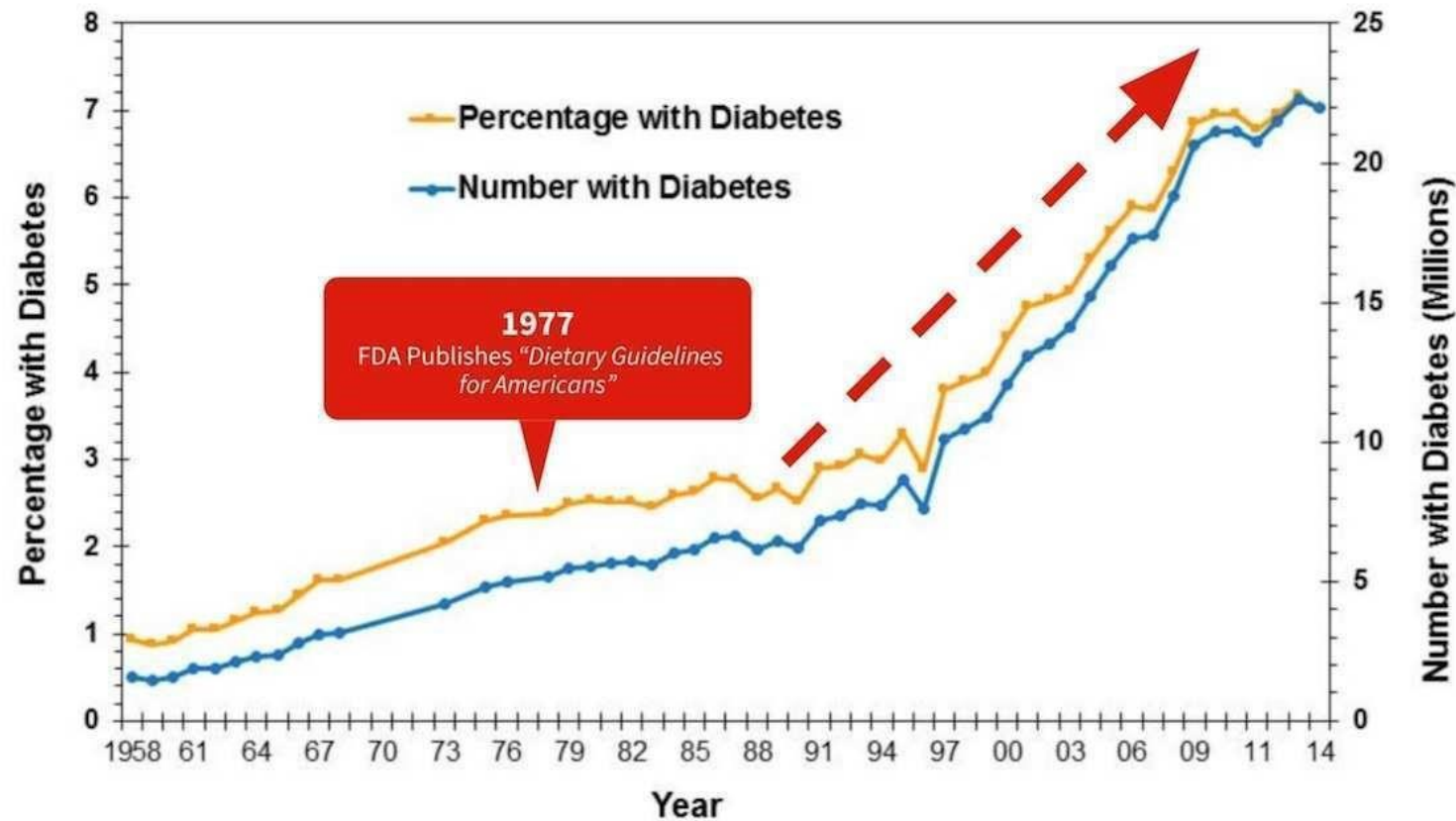


Evidence of reversal of diabetes (United States)



Evidence of reversal of diabetes (United States)

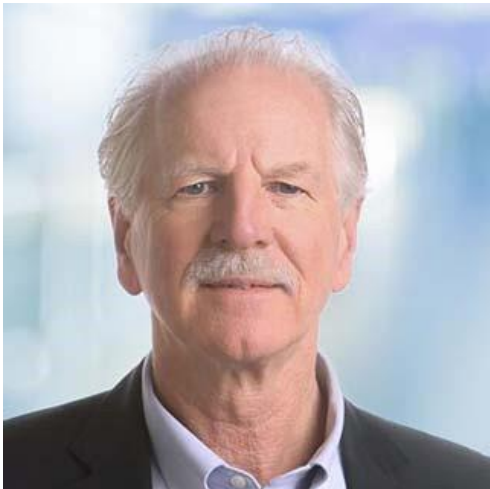
Type 2 Diabetes Prevalence: 1958–2014



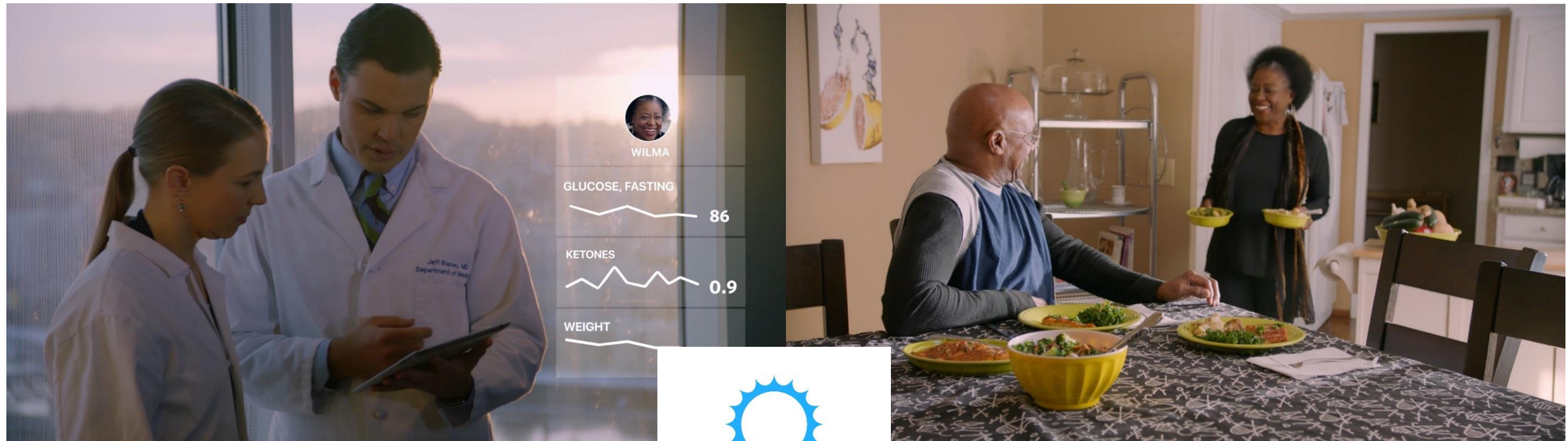
CDC's Division of Diabetes Translation. United States Diabetes Surveillance System available at <http://www.cdc.gov/diabetes/data>



Evidence of reversal of diabetes (United States)



Evidence of reversal of diabetes (United States)



Evidence of reversal of diabetes (United States)

Effectiveness and Safety of a Novel Care Model for the Management of Type 2 Diabetes at 1 Year: An Open-Label, Non-Randomized, Controlled Study

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ABSTRACT

Introduction: Carbohydrate restriction markedly improves glycemic control in patients with type 2 diabetes (T2D) but necessitates prompt medication changes. Therefore, we assessed the effectiveness and safety of a novel care model providing continuous remote care with medication management based on biometric feedback combined with the metabolic approach of nutritional ketosis for T2D management.

Enhanced content To view enhanced content for this article go to <https://doi.org/10.6084/m9.figshare.5803119>.

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s13300-018-0373-9>) contains supplementary material, which is available to authorized users.

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Methods: We conducted an open-label, non-randomized, controlled, before-and-after 1-year study of this continuous care intervention (CCI) and usual care (UC). Primary outcomes were glycosylated hemoglobin (HbA_{1c}), weight, and medication use. Secondary outcomes included fasting serum glucose and insulin, HOMA-IR, blood lipids and lipoproteins, liver and kidney function markers, and high-sensitivity C-reactive protein (hsCRP).

Results: 349 adults with T2D enrolled: CCI: $n = 262$ [mean (SD); 54 (8) years, 116.5 (25.9) kg, 40.4 (8.8) kg m², 92% obese, 88% prescribed T2D medication]; UC: $n = 87$ (52 (10) years, 105.6 (22.15) kg, 36.72 (7.26) kg m², 82% obese, 87% prescribed T2D medication]. 218 participants (83%) remained enrolled in the CCI at 1 year. Intention-to-treat analysis of the CCI (mean ± SE) revealed HbA_{1c} declined from

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“After 1 year, patients in the Continuous Care Intervention, on average, lowered HbA_{1c} from 7.6 to 6.3%, lost 12% of their body weight, and reduced diabetes medicine use.

94% of patients who were prescribed insulin reduced or stopped their insulin use, and sulfonylureas were eliminated in all patients.

Participants in the Usual Care group had no changes to HbA_{1c}, weight or diabetes medicine use over the year.”

“This suggests the novel care model studied here using dietary carbohydrate restriction and continuous remote care can safely support adults with T2D to lower HbA_{1c}, weight, and medicine use.”

Potential implications for morbidity and mortality

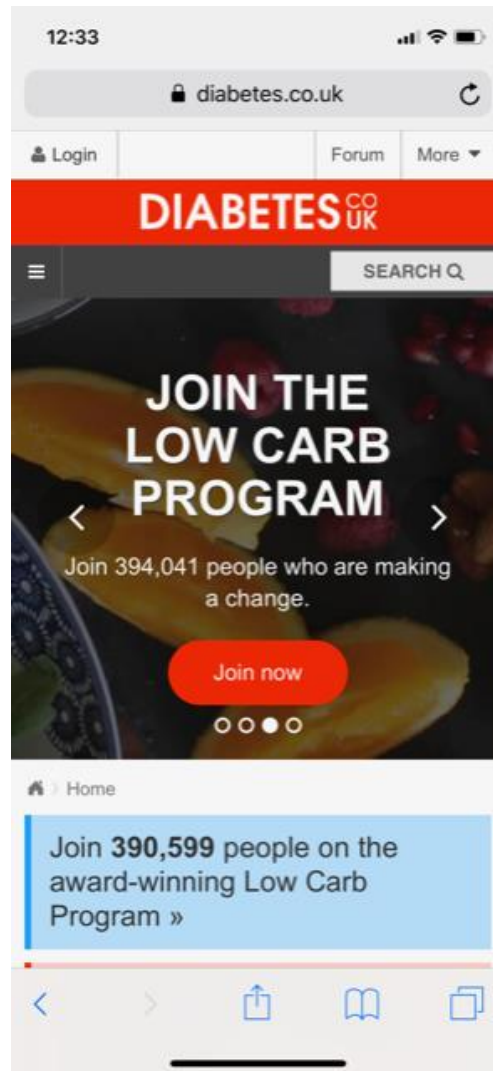
TABLE 1. US DIABETES FORECASTS, 2015 TO 2030

	2015	2020	2025	2030
Total United States				
Population	321,363,000	333,896,000	346,407,000	358,471,000
Prediabetes	90,644,000	97,284,000	103,950,000	107,713,000
Diagnosed diabetes	26,019,000	32,021,000	37,349,000	41,733,000
Undiagnosed diabetes	9,625,000	11,250,000	12,450,000	13,180,000
Total with diabetes	35,644,000	43,271,000	49,799,000	54,913,000
Complications:				
Visual impairment	4,267,000	5,098,000	5,770,000	6,260,000
Renal failure	62,020	73,650	82,900	89,390
Leg amputation	53,860	60,840	65,360	67,190
Annual deaths attributable to DM	280,210	329,260	364,650	385,840
Total annual cost (2015 dollars)	\$407.6B	\$490.2B	\$564.2B	\$622.3B
Annual medical costs	\$312.2B	\$374.2B	\$428.9B	\$472.0B
Annual nonmedical costs	\$95.4B	\$116.7B	\$135.3B	\$150.3B

- The Institute for Alternative Futures has updated its diabetes forecasting model and extended its projections to 2030
- Concludes that diabetes will remain a major health crisis in America, in spite of medical advances and prevention efforts.
- The prevalence of diabetes will increase by 54% to more than 54.9 million Americans between 2015 and 2030 (15%).
- Adding prediabetes and undiagnosed diabetes brings the 2030 projection to 163 million (45%)
- Annual deaths attributed to diabetes will climb by 38% to 385,800.
- Total annual medical and societal costs related to diabetes will increase 53% to more than \$622 billion by 2030.

Diabetes 2030: Insights from Yesterday, Today, and Future Trends
William R. Rowley, MD,¹ Clement Bezold, PhD,¹ Yasemin Arikian, BA, Erin Byrne, MPH,² and Shannon Krohe, MPH³
POPULATION HEALTH MANAGEMENT, Volume 20, Number 1, 2017, Mary Ann Liebert, Inc.
DOI: 10.1089/pop.2015.0181

Potential implications for morbidity and mortality



Diabetes.co.uk estimates there are 3.5 million with diabetes in the UK and 415 million people worldwide, which is 1 in 11 of the world's adult population.

The International Diabetes Federation states that the top 5 countries with the highest amount of people with diabetes are China (109m), India (69m), USA (29m), Brazil (14m) and Russian Federation (12m).

There is a diabetes tsunami heading towards us.



LCHF could radically improve morbidity and mortality



And now over to Professor Tim Noakes

Insulin resistance is the cause of 85% of chronic disease.

Books:

- Lore of Nutrition (2017)
- The Real Meal Revolution (2015)
- Waterlogged (2012)
- Challenging beliefs (2011)
- Rugby without Risk (1996)
- Lore of Running (1986)

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