How to Reverse Type 2 Diabetes Naturally

Presenter Disclosure

- **Presenters – Jason Fung**
- **Relationships with commercial interests:**
  - **Grants/Research Support: None**
  - **Grants/Speakers Bureau/Honoraria: Consulting Fees: None**
  - **Consulting Fees: None**
  - **Other: None**

Two Phases of Type 2 Diabetes

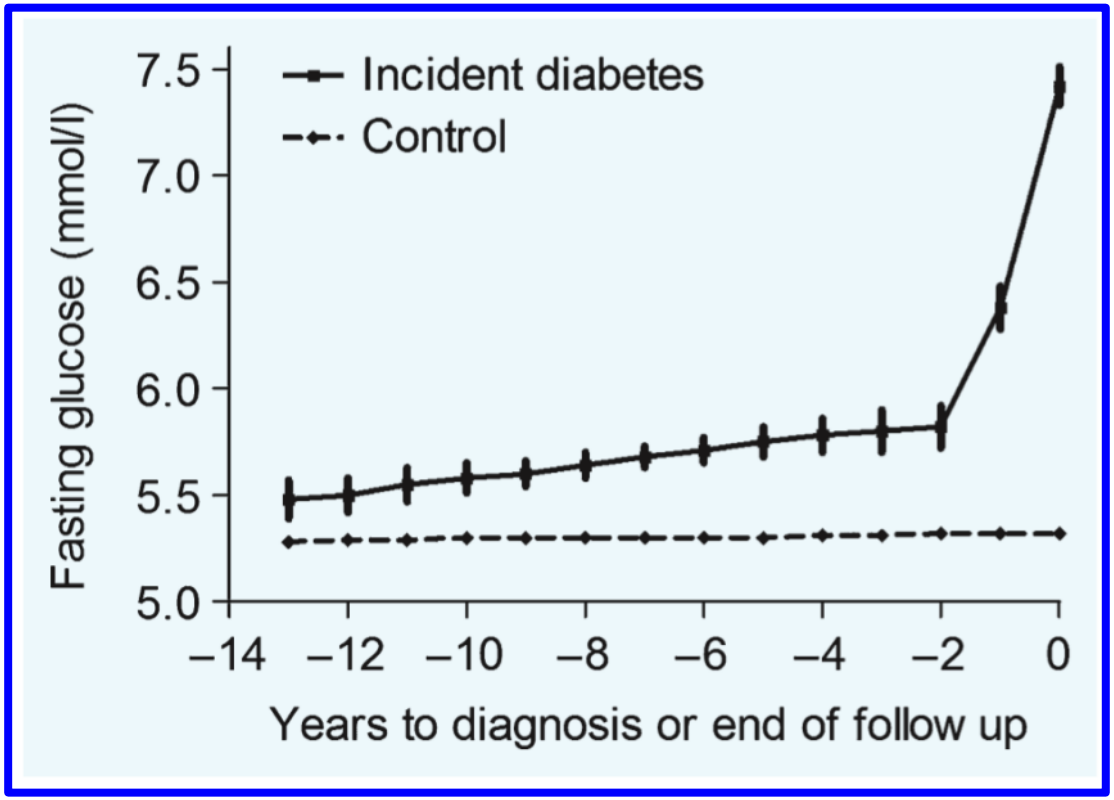


FIGURE 1 Change in fasting plasma glucose during the 13 years prior to onset of Type 2 diabetes. These data from the Whitehall II study demonstrate the elevation of plasma glucose within the normal range

Trajectories of glycaemia, insulin sensitivity, and insulin secretion before diagnosis of type 2 diabetes: an analysis from the Whitehall II study. Lancet 2009; 373: 2215–2221.

Insulin Resistance

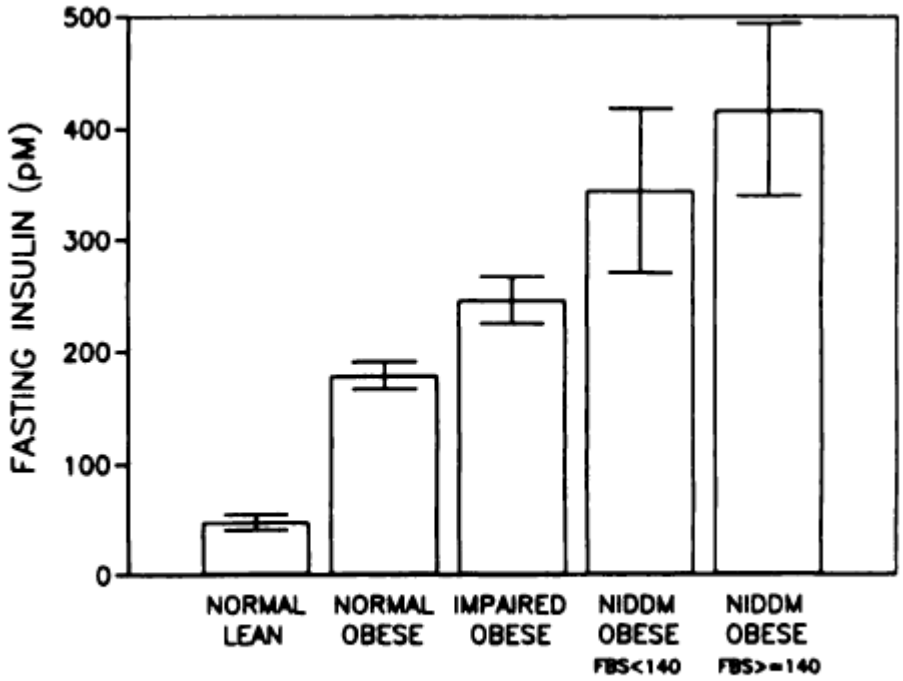
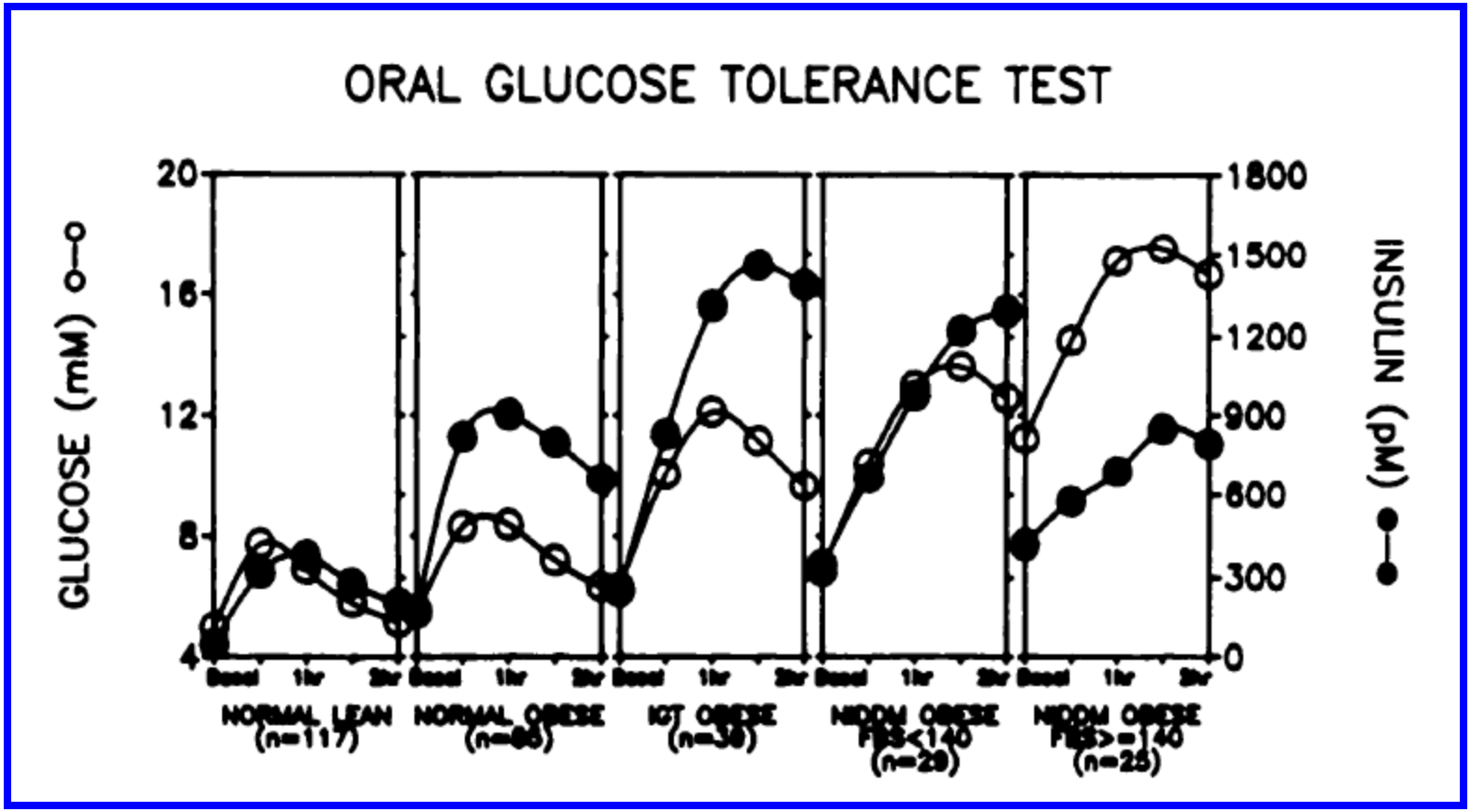


FIG 2. Changes in fasting insulin with the progression of obesity.

Surgical treatment of obesity and its effect on diabetes: 10-y follow-up
Am J Clin Nutr 1992:55(Suppl.):582S-585S

Beta Cell Dysfunction



Surgical treatment of obesity and its effect on diabetes: 10-y follow-up
Am J Clin Nutr 1992:55(Suppl.):582S-585S

Learned Helplessness

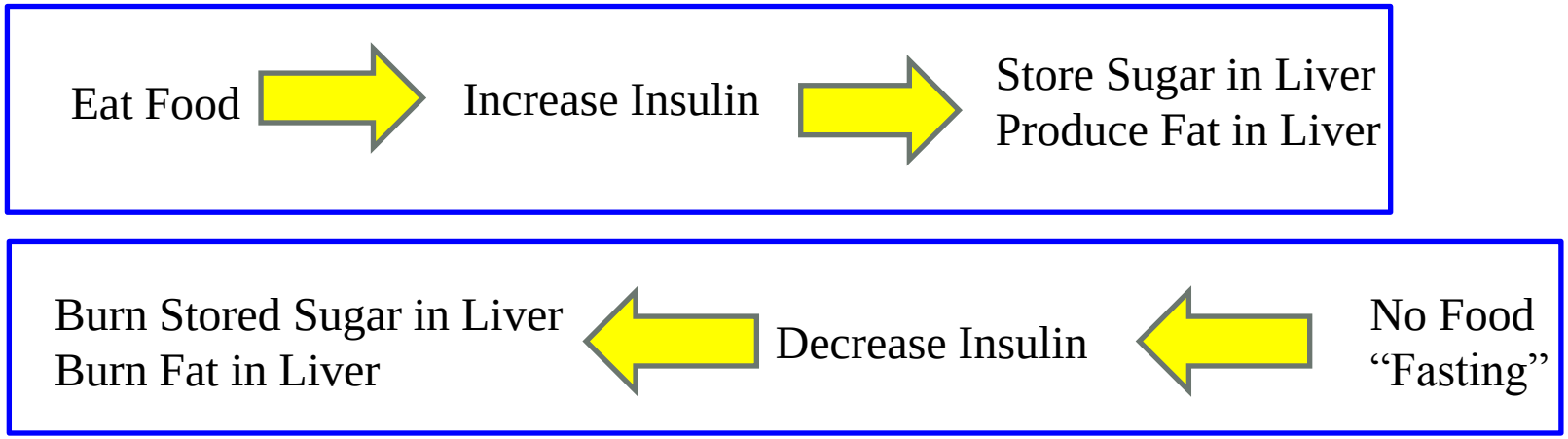
- Fact: For most people, type 2 diabetes is a progressive disease.
- eventually oral medications may not be enough to keep blood glucose levels normal. Using insulin to get blood glucose levels to a healthy level is a good thing, not a bad one.

American Diabetes Association®

http://www.diabetes.org/diabetes-basics/myths

What is Insulin Resistance?

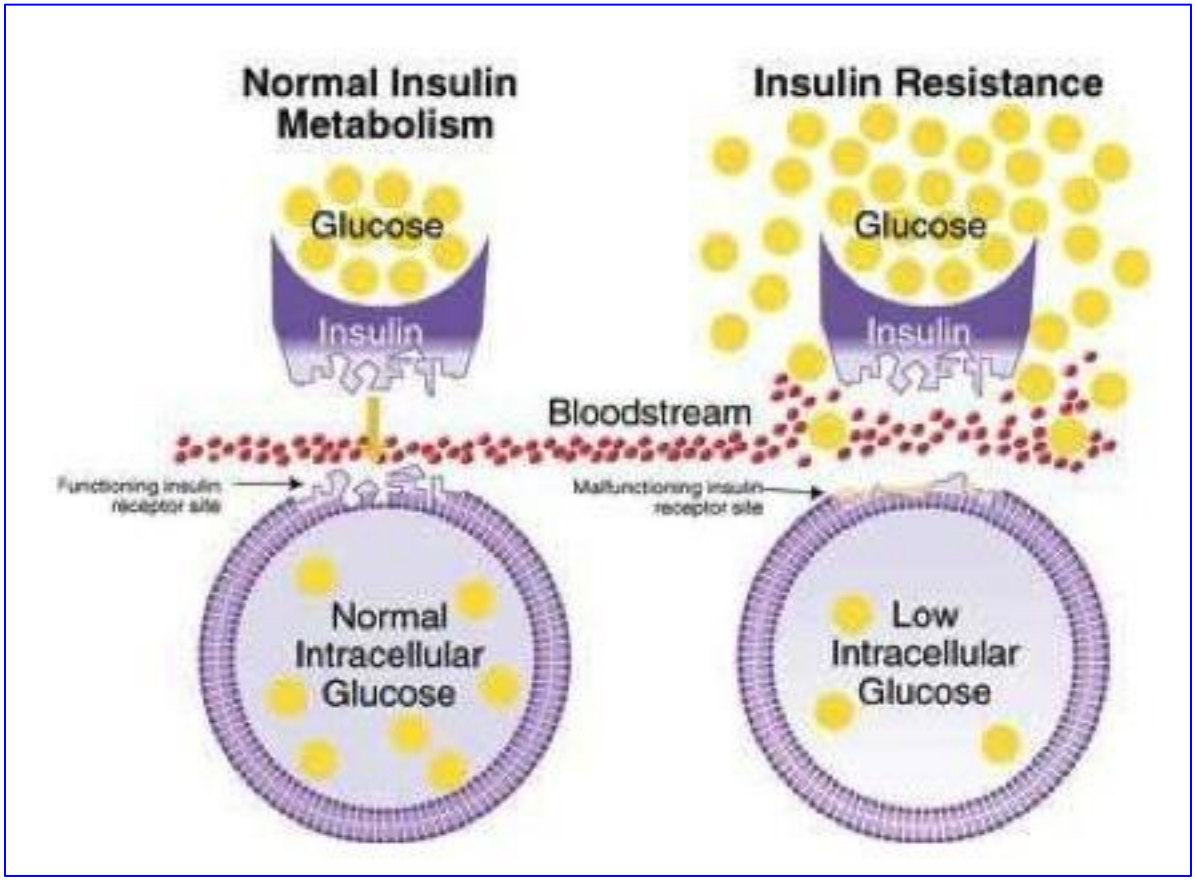
The New Paradigm



Functions of Insulin:

1. Increase glucose entry into cells
2. Turn on De Novo Lipogenesis

The ‘Lock and Key’ paradigm



“Internal Starvation” – Cannot drive DNL

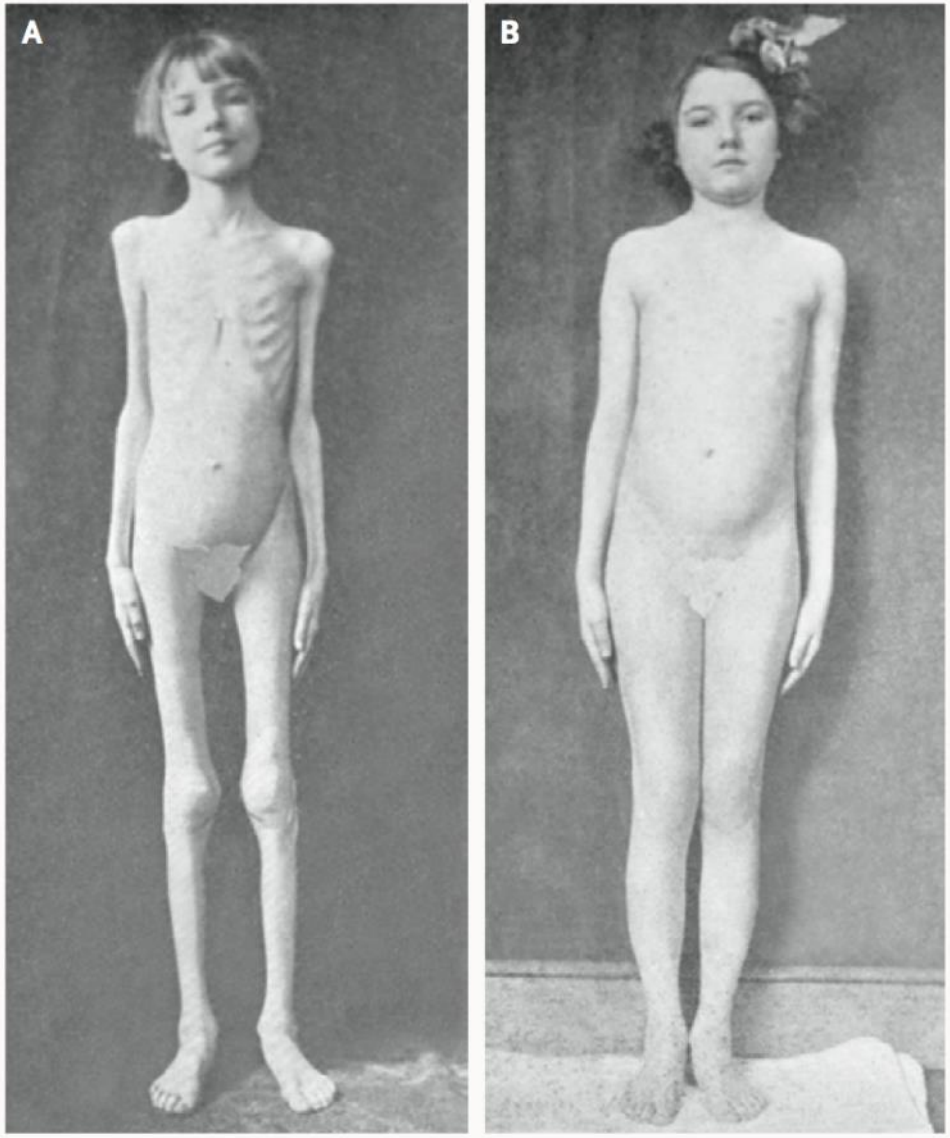


Figure 1. Effects of Insulin Therapy.

These photographs from 1922, in a case described by Geyelin,[11] show a young girl with insulin-deficient diabetes before treatment with insulin (Panel A) and after treatment (Panel B).

Internal Starvation?

The Central Paradox

Functions of Insulin (Insulin resistant cell):

1. Increase glucose entry into cells - resistant
2. Turn on De Novo Lipogenesis - supersensitive

Liver Cells

Stored Sugar
Glycogen

High Insulin

Food/

Energy

Stored Fat
De Novo Lipogenesis

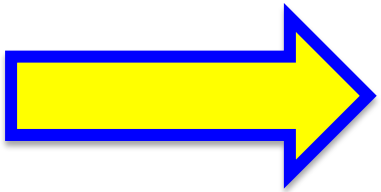
Low Insulin

Under conditions of high persistent insulin:
Liver becomes full of sugar and fat

Fatty Liver causes Insulin Resistance!

Stored Sugar

High Insulin

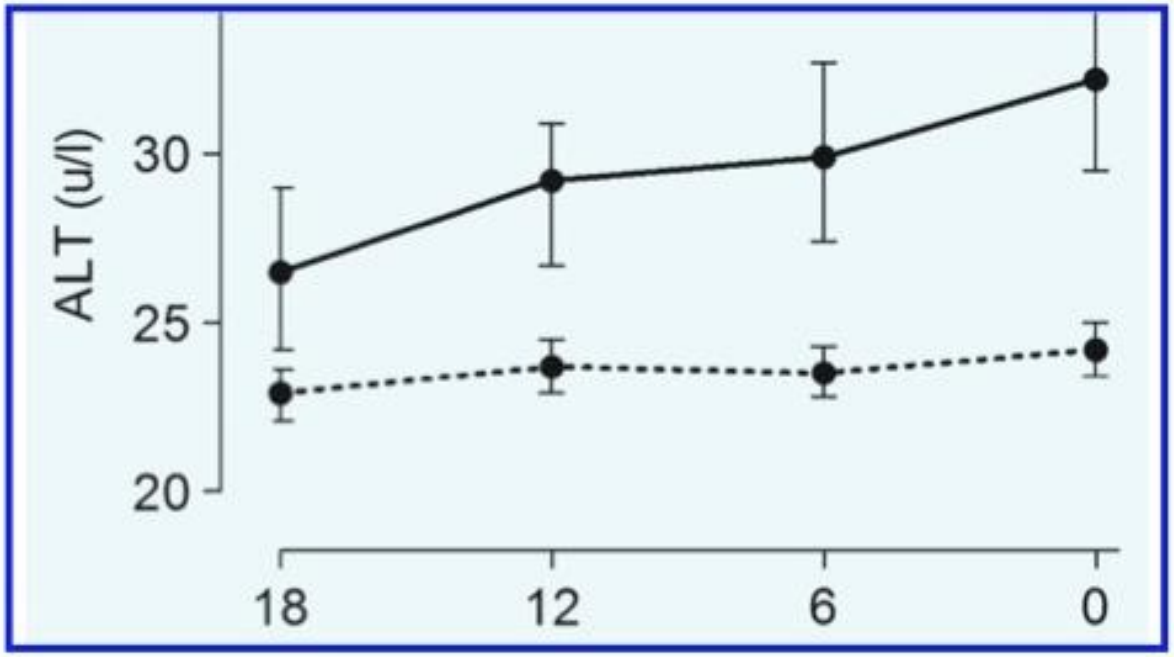


Low Insulin

Food/ Energy

Stored Fat

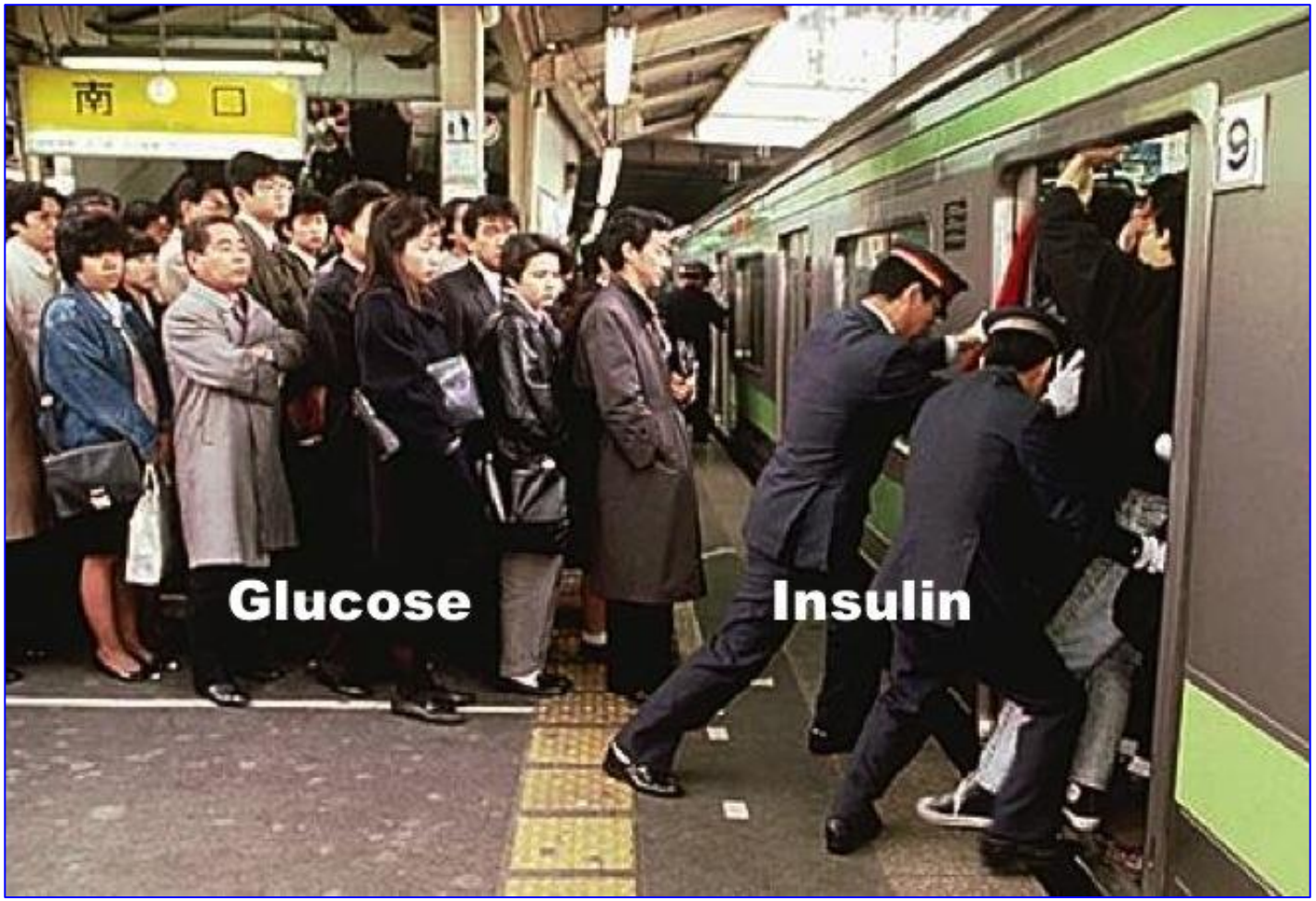
Fatty Liver precedes T2D



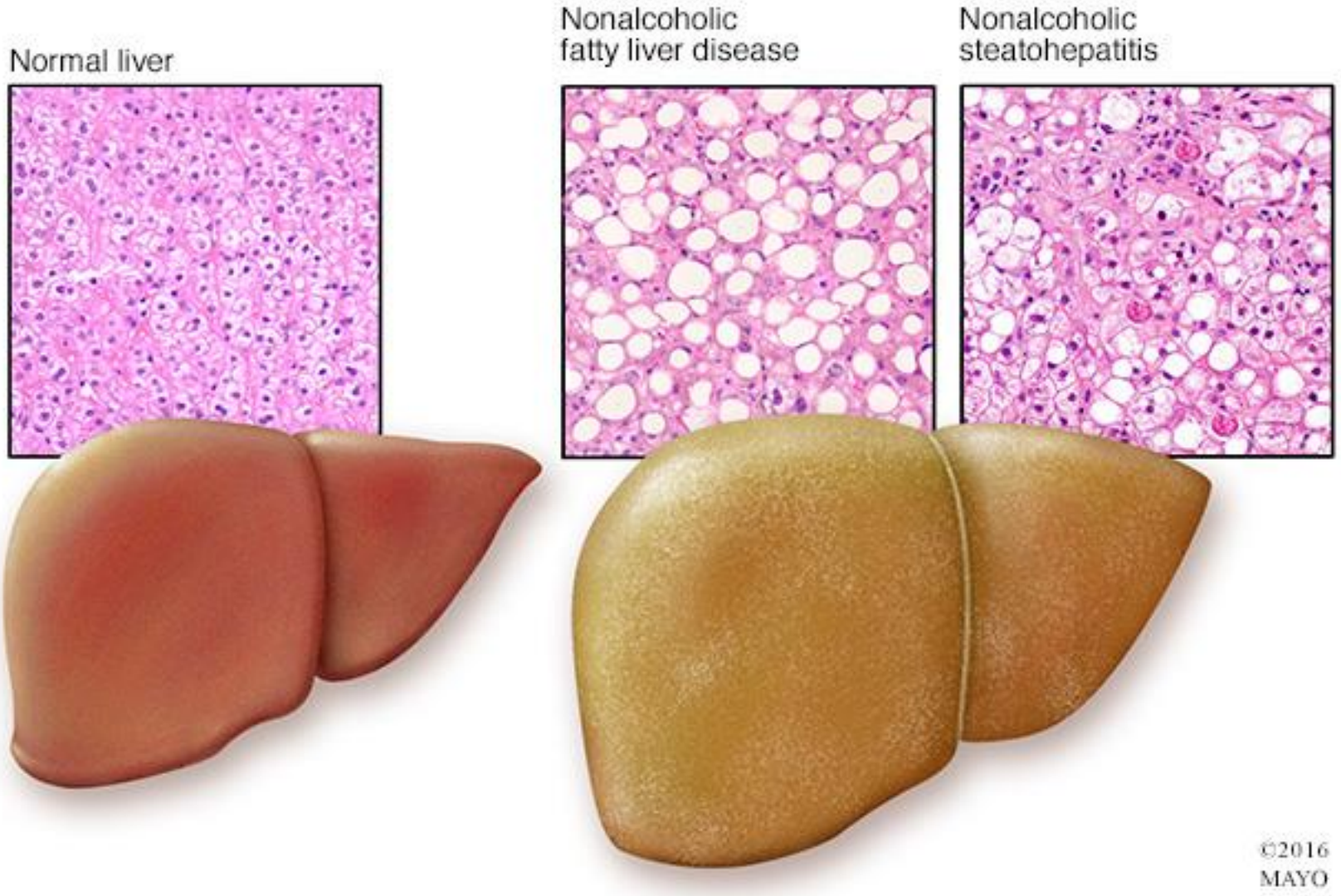
18 months prior to diagnosis of DM
Long silent scream from the liver

Insulin Resistance is an Overflow Phenomenon

Insulin Resistance is an Overflow Phenomenon



What causes fatty liver?



What causes Fatty Liver?

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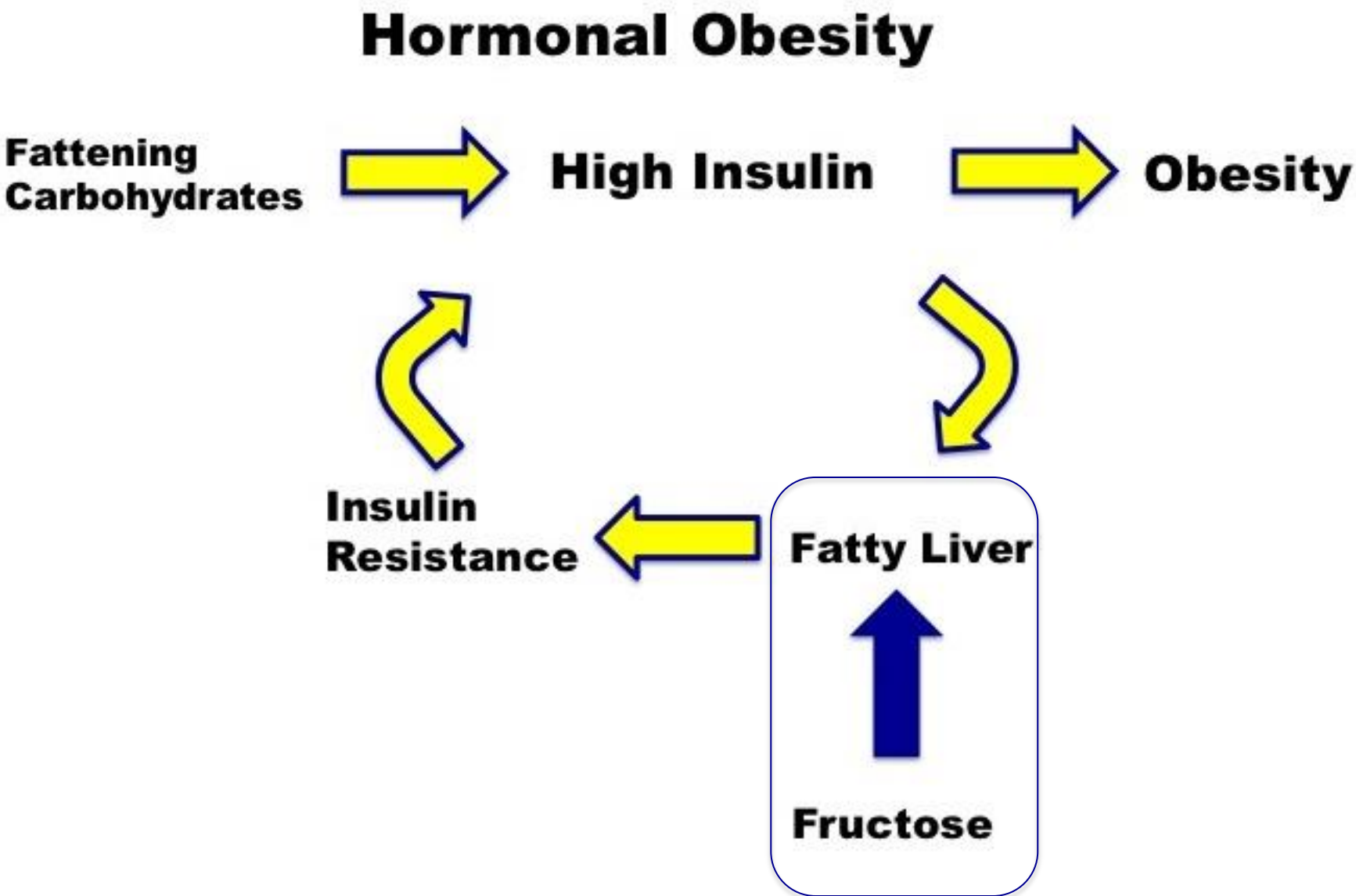
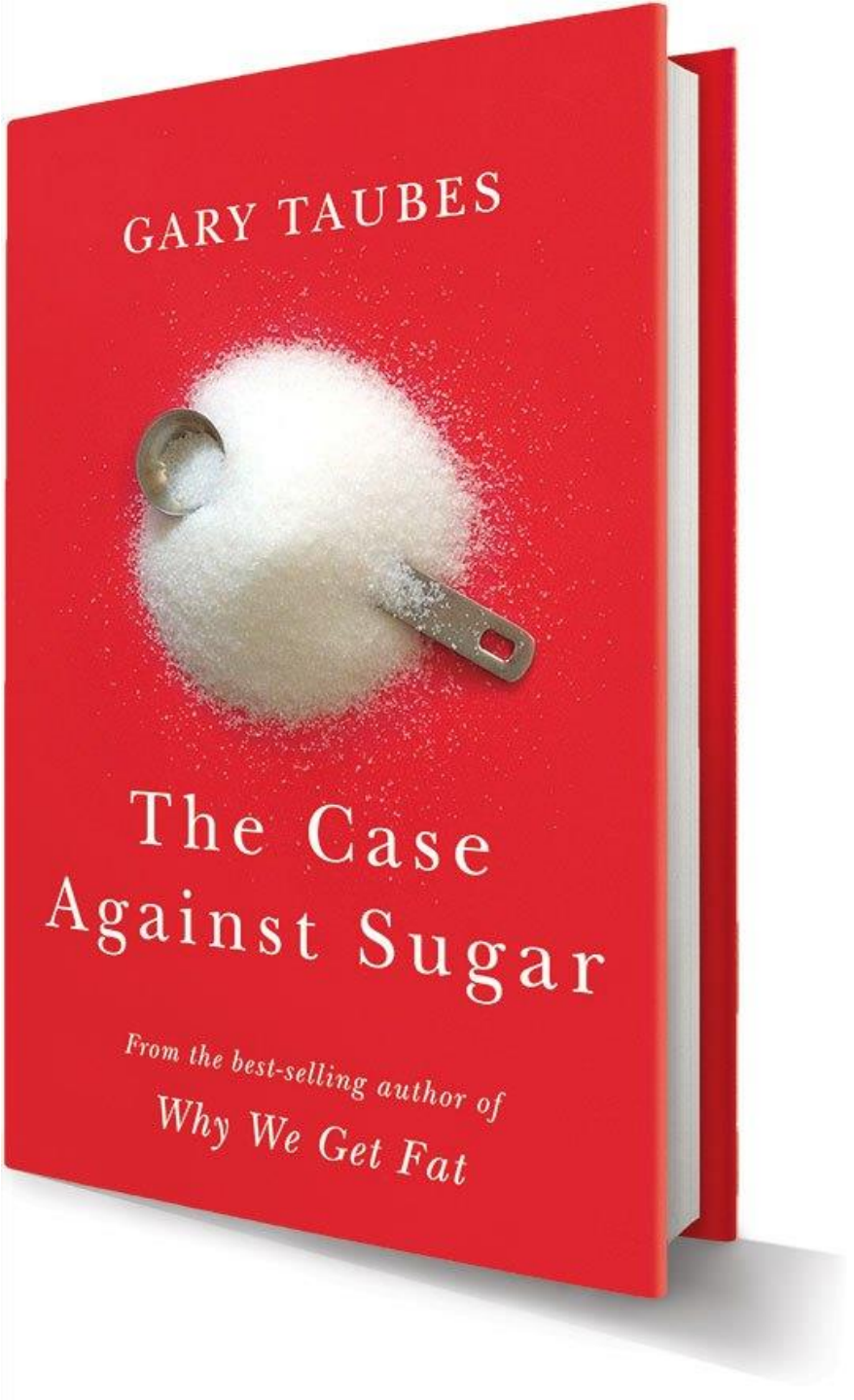


Glucose + Fructose =

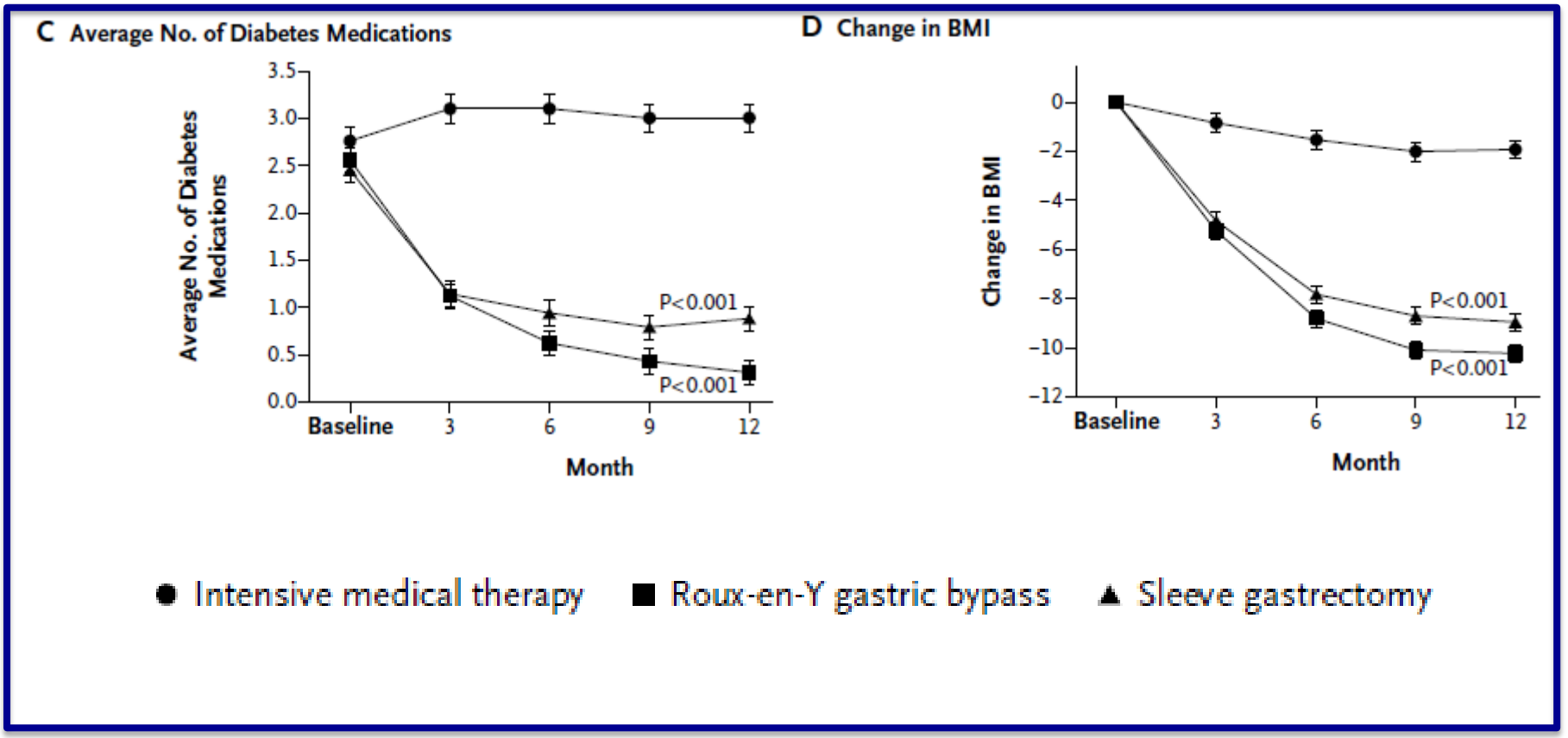
Fatty Liver =

Insulin Resistance =



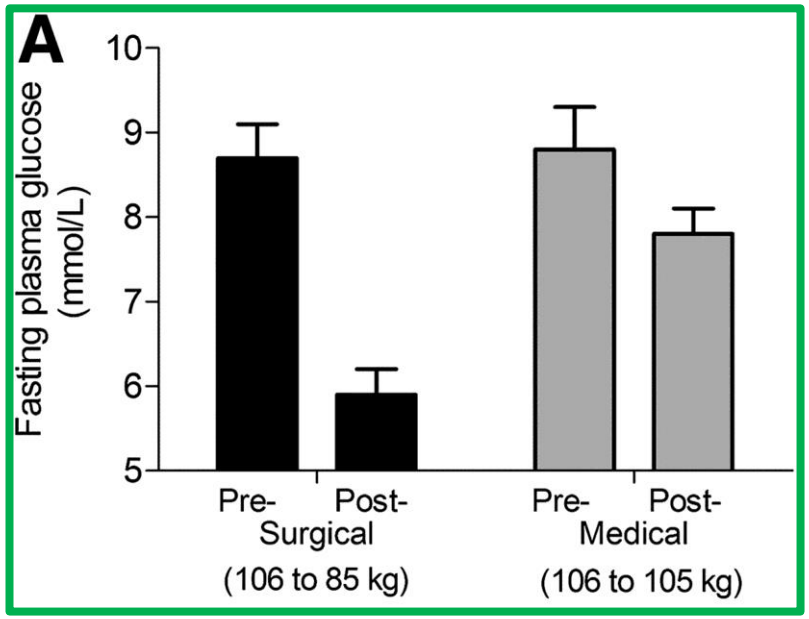
Beta cell dysfunction
Burnout?

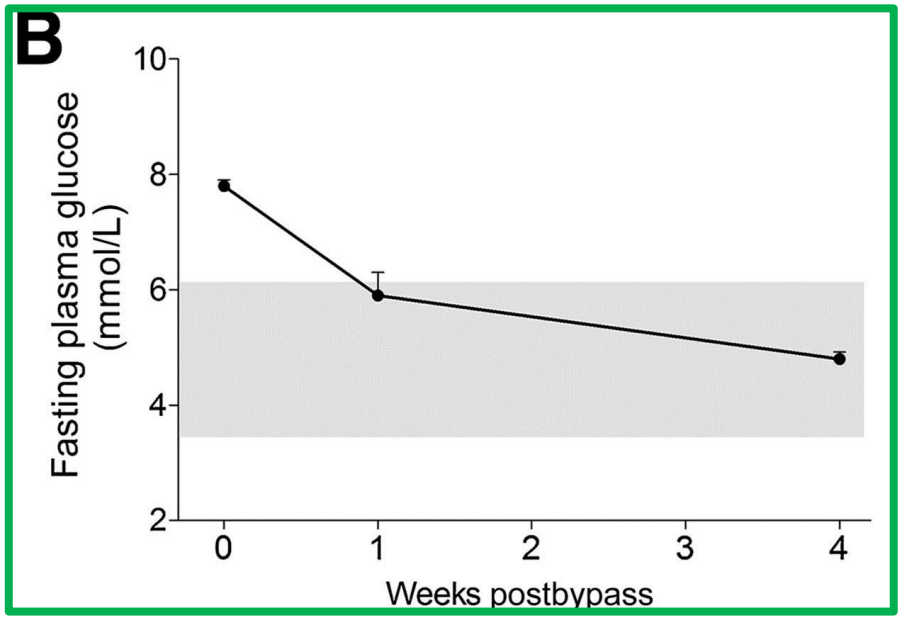
Surgery cures diabetes



Bariatric Surgery versus Intensive Medical Therapy in Obese Patients with Diabetes
N Engl J Med 2012;366:1567-76 Schauer PR

Gastric Banding cures Diabetes



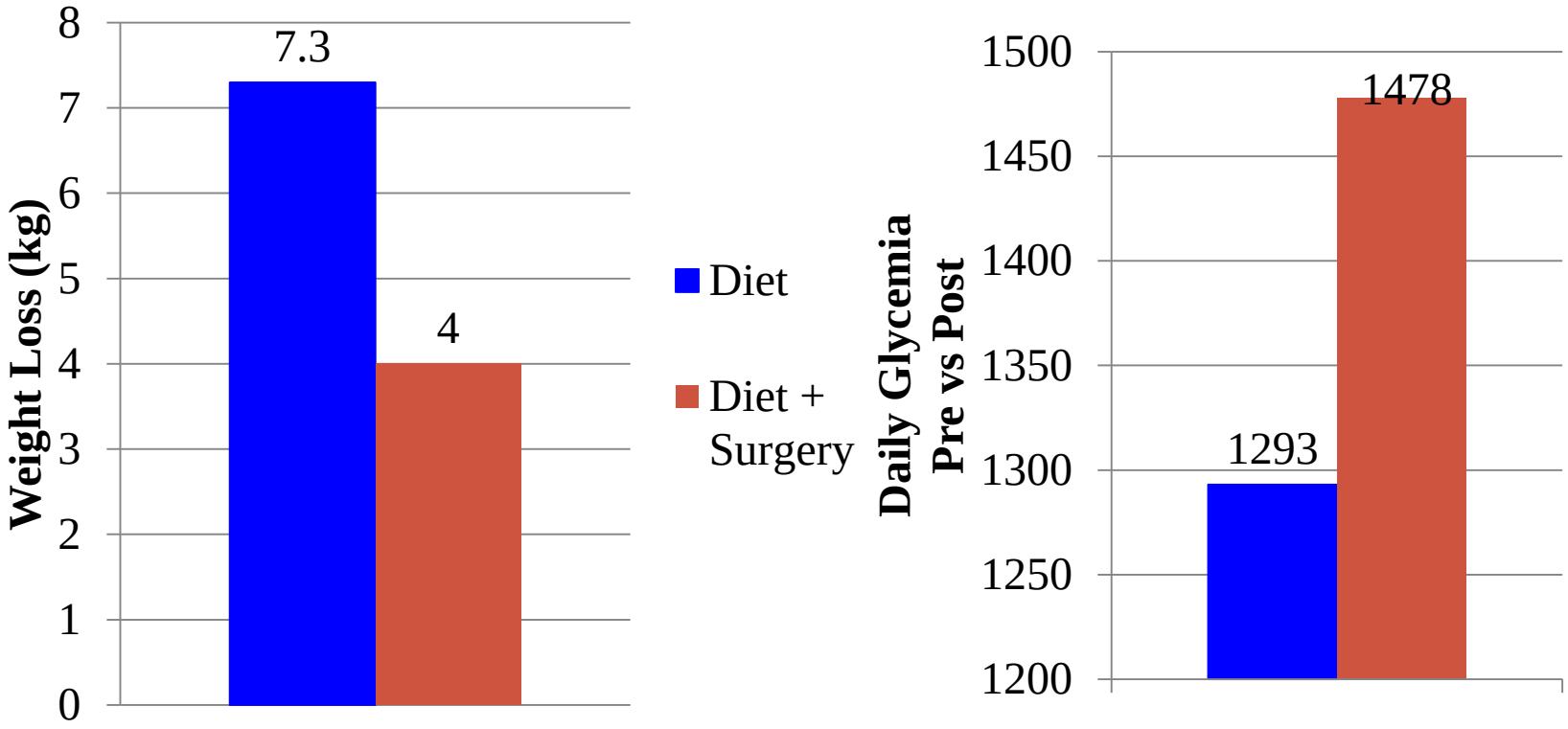


A: Fasting plasma glucose and weight change 2 years after randomization either to gastric banding or to intensive medical therapy for weight loss and glucose control.

Adjustable gastric banding and conventional therapy for type 2 diabetes JAMA 2008;299:316-232
Taylor R Dia Care 2013;36:1047-1055

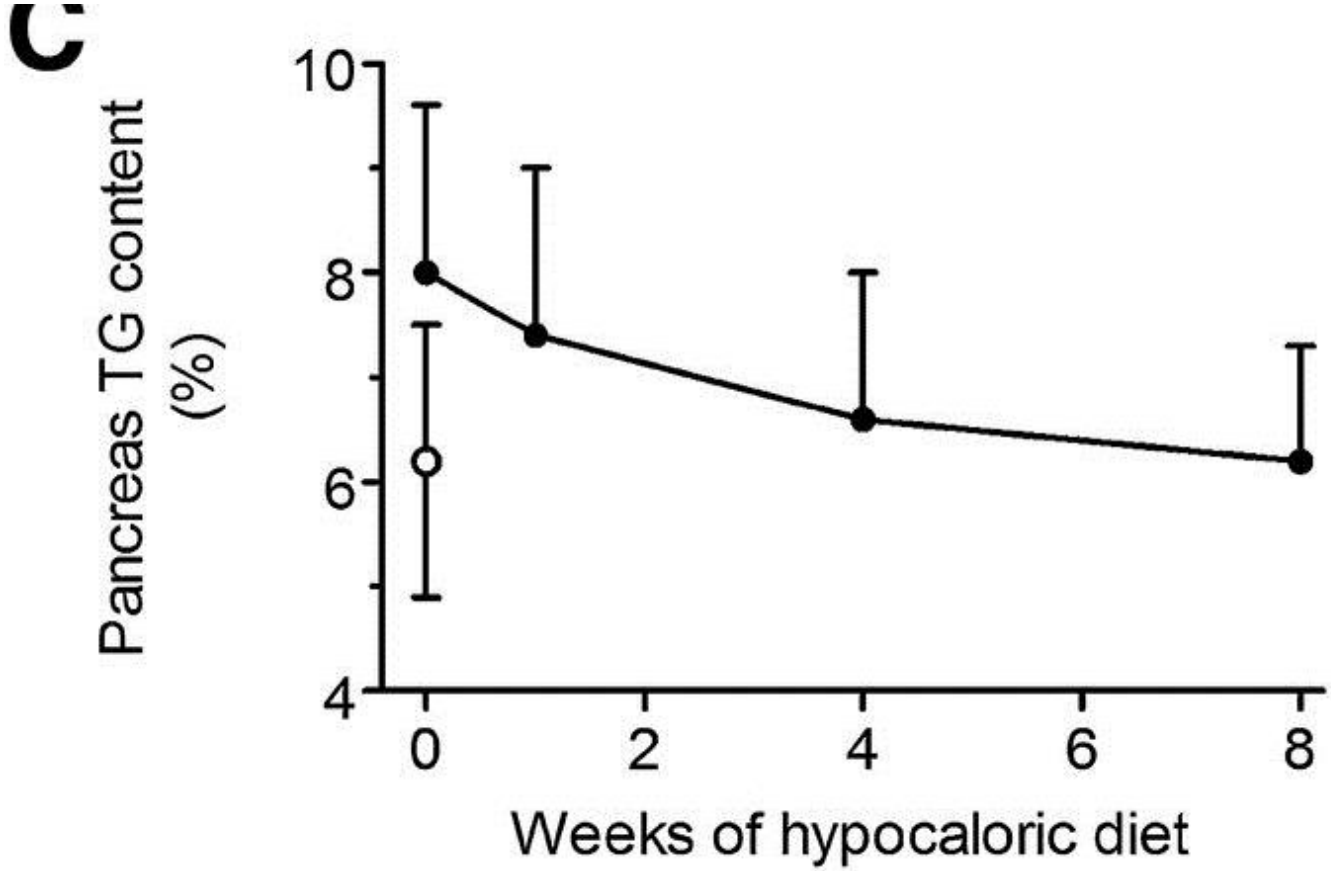
American Diabetes Association.

Fasting vs. Bariatric Surgery



Rapid Improvement of Diabetes After Gastric Bypass Surgery: Is It the Diet or Surgery? Diabetes Care. 2013 Mar 25, Lingvay I
http://www.ncbi.nlm.nih.gov/pubmed/23530013

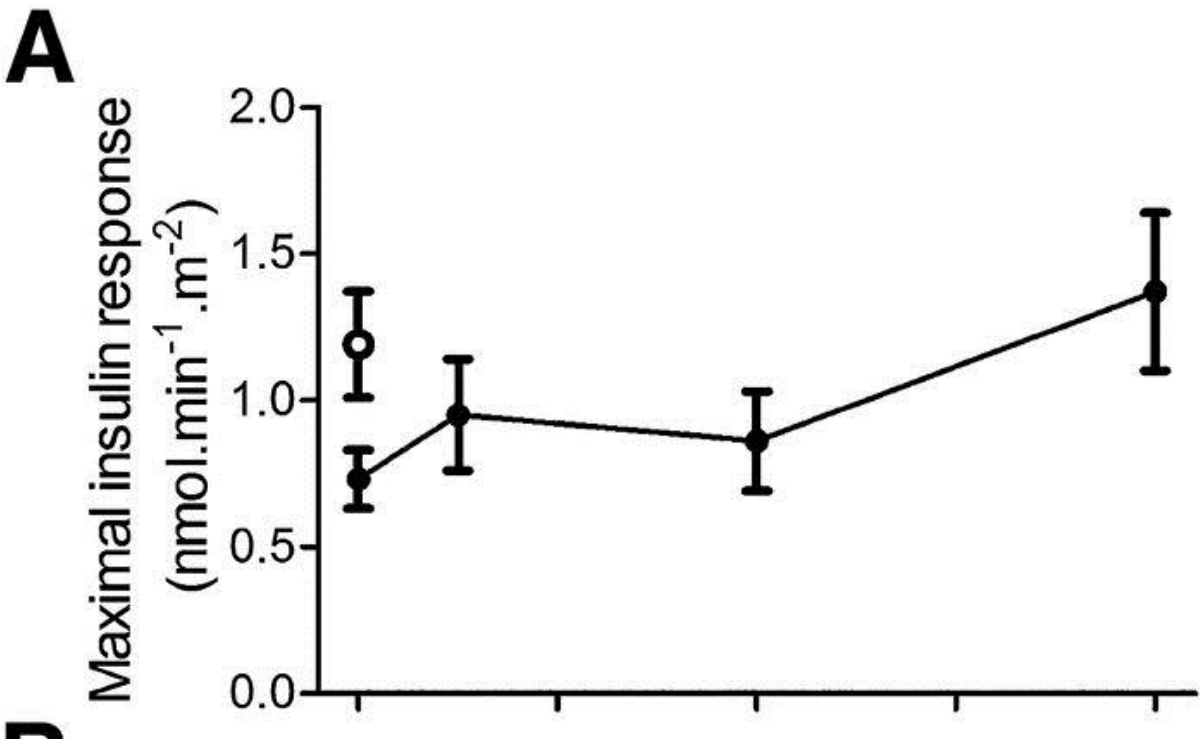
Decrease in Pancreatic Fat



Taylor R Dia Care 2013;36:1047-1055

American Diabetes Association.

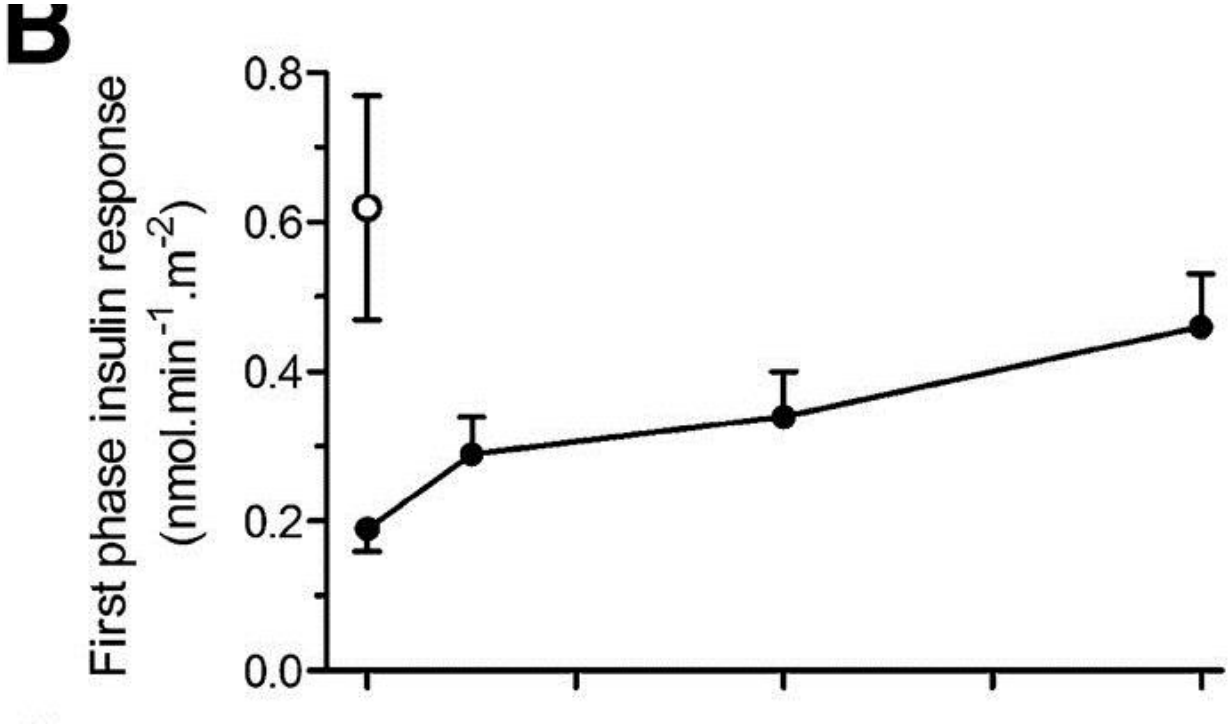
Restoration of Beta Cell Function



Taylor R Dia Care 2013;36:1047-1055

American Diabetes Association.

Restoration of First Phase Insulin Response



Taylor R Dia Care 2013;36:1047-1055

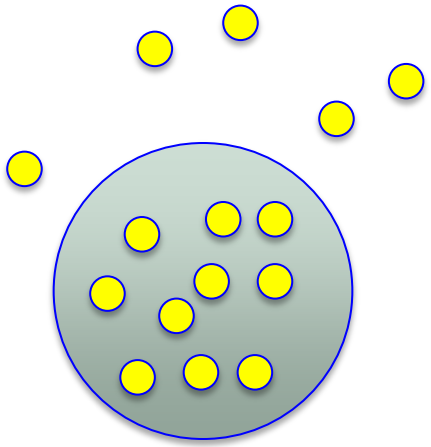
American Diabetes Association.

The Sugar Bowl

The End Game

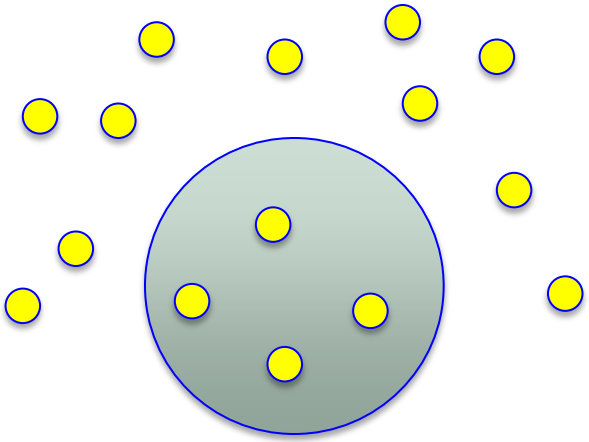
Normal

Glucose

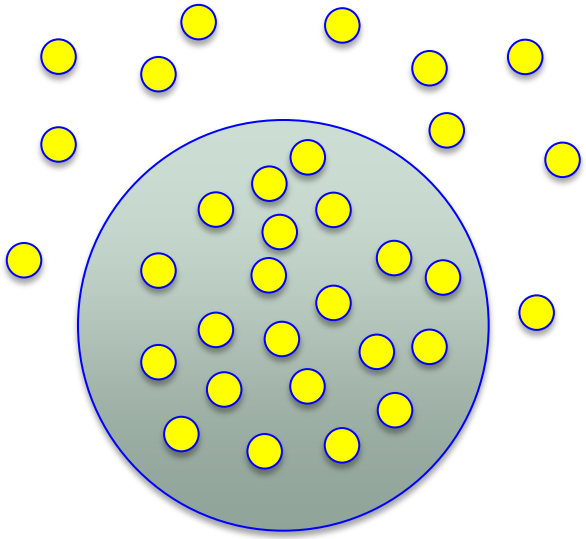


Cell

Insulin Resistance

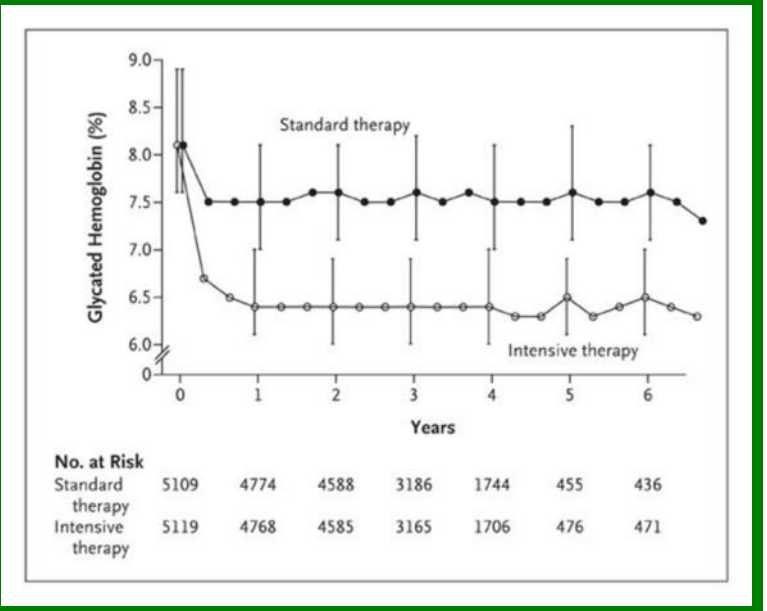


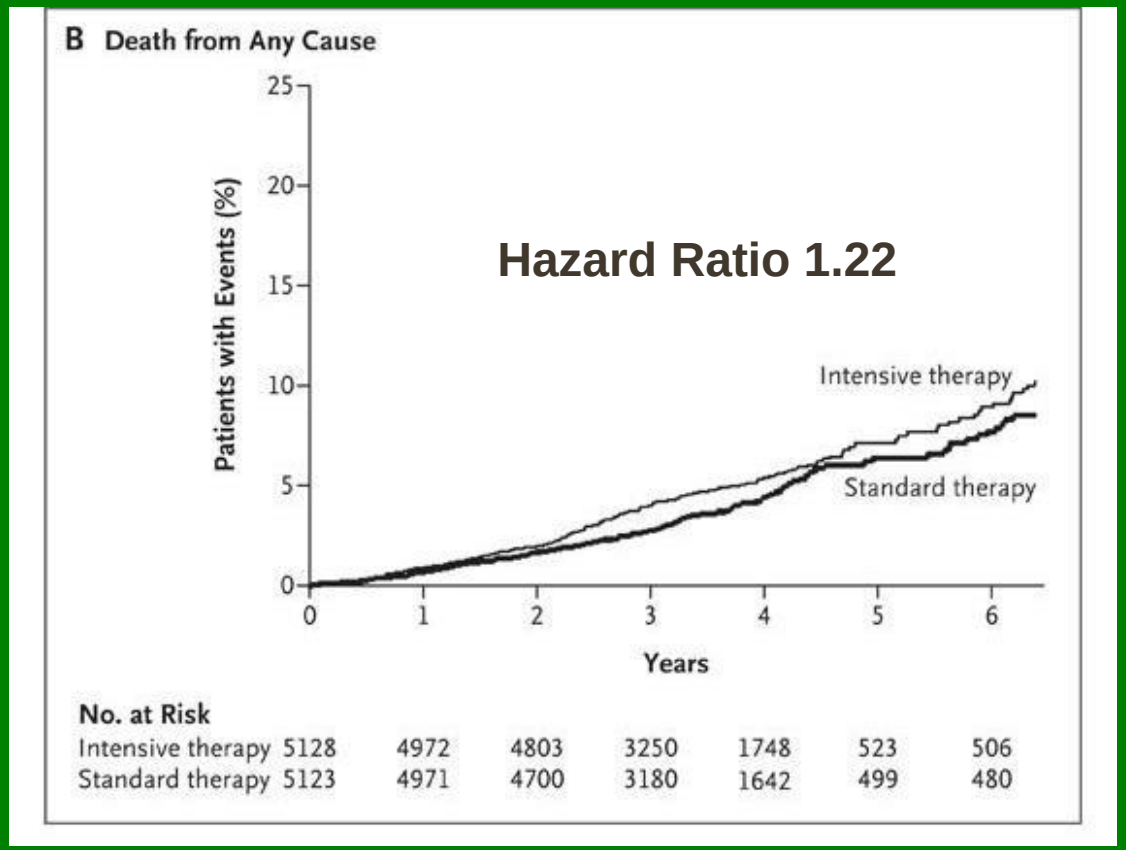
"Internal Starvation"
Paradigm



"Overflow"
Paradigm

ACCORD

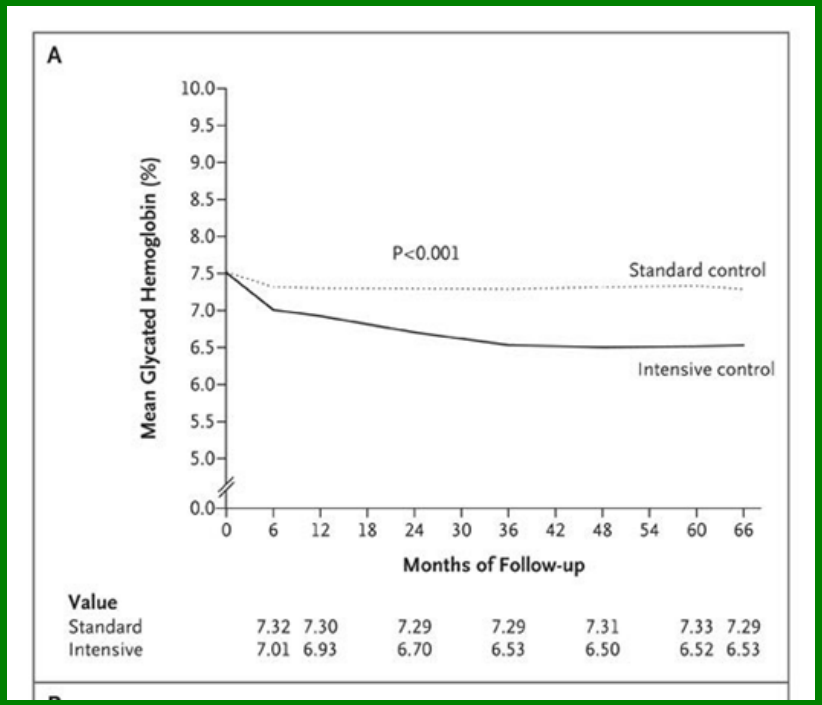


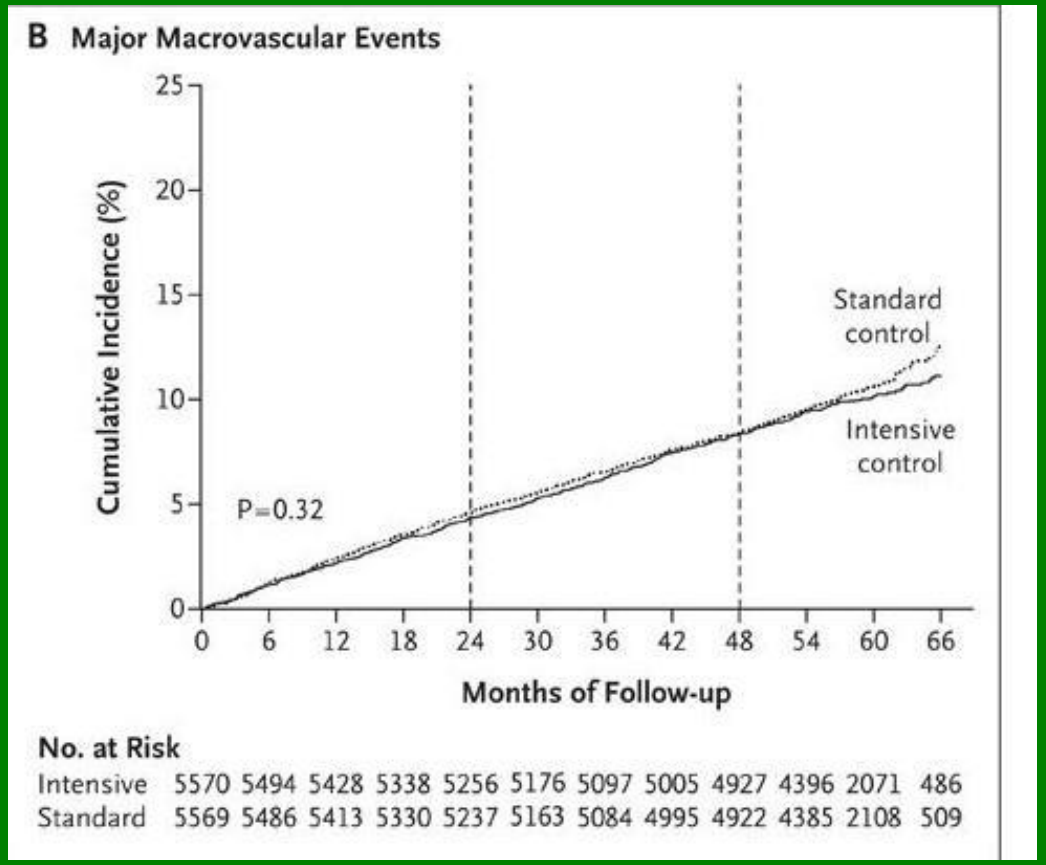


The Action to Control Cardiovascular Risk in Diabetes Study Group. N Engl J Med 2008;358:2545-2559

The NEW ENGLAND JOURNAL of MEDICINE

ADVANCE





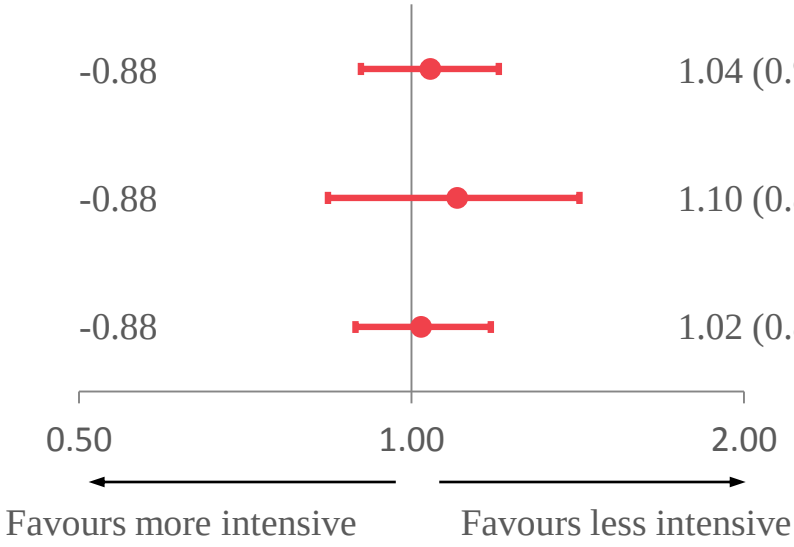
Cumulative Incidences of Events, According to Glucose-Control Strategy

The ADVANCE Collaborative Group. N Engl J Med 2008;358:2560-2572

The NEW ENGLAND JOURNAL of MEDICINE

Meta-analysis of intensive glucose control in T2DM: mortality

	Number of events			
	More intensive	Less intensive	Difference in HbA1c (%)	HR (95% CI)
All-cause mortality	980	884	-0.88	1.04 (0.90,1.20)
CV death	497	441	-0.88	1.10 (0.84,1.42)
Non-CV death	476	432	-0.88	1.02 (0.89,1.18)



- Meta-analysis of 27,049 participants and 2370 major vascular events from
  - ADVANCE
  - UKPDS
  - ACCORD
  - VADT

HR, hazard ratio; CV, cardiovascular

Turnbull FM et al. Diabetologia 2009;52:2288–2298

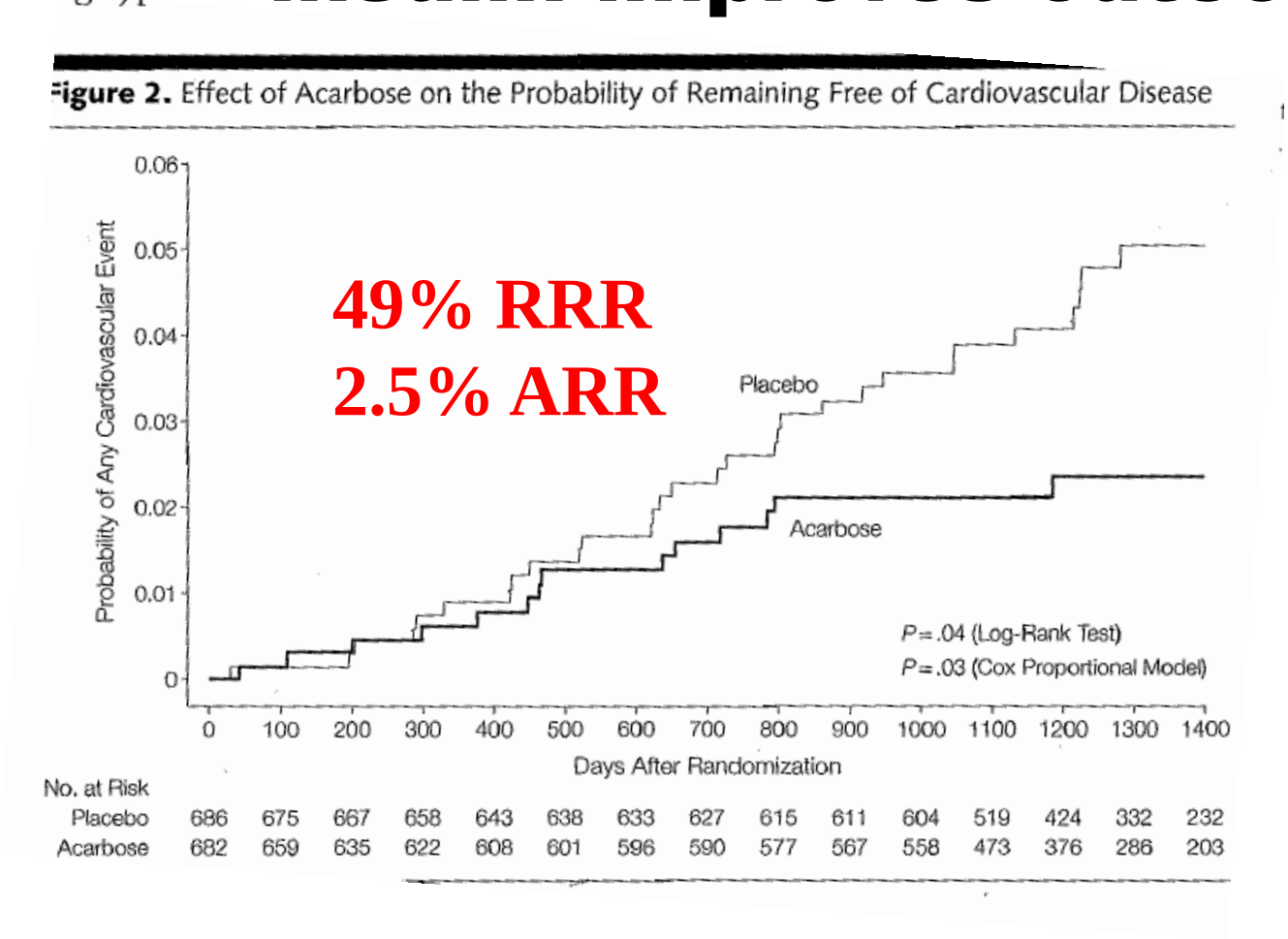
How To Reverse Type 2 Diabetes

Type 2 diabetes is too much sugar in the body

Treatment

1. Don’t put more in – Low Carbohydrate Diet

Lowering glucose *without raising insulin* improves outcomes



Randomized 1,429 patients

3.3 year follow up

Acarbose Treatment and the Risk of Cardiovascular Disease and Hypertension in Patients with Impaired Glucose Tolerance

JAMA 2003; 290: 486-494

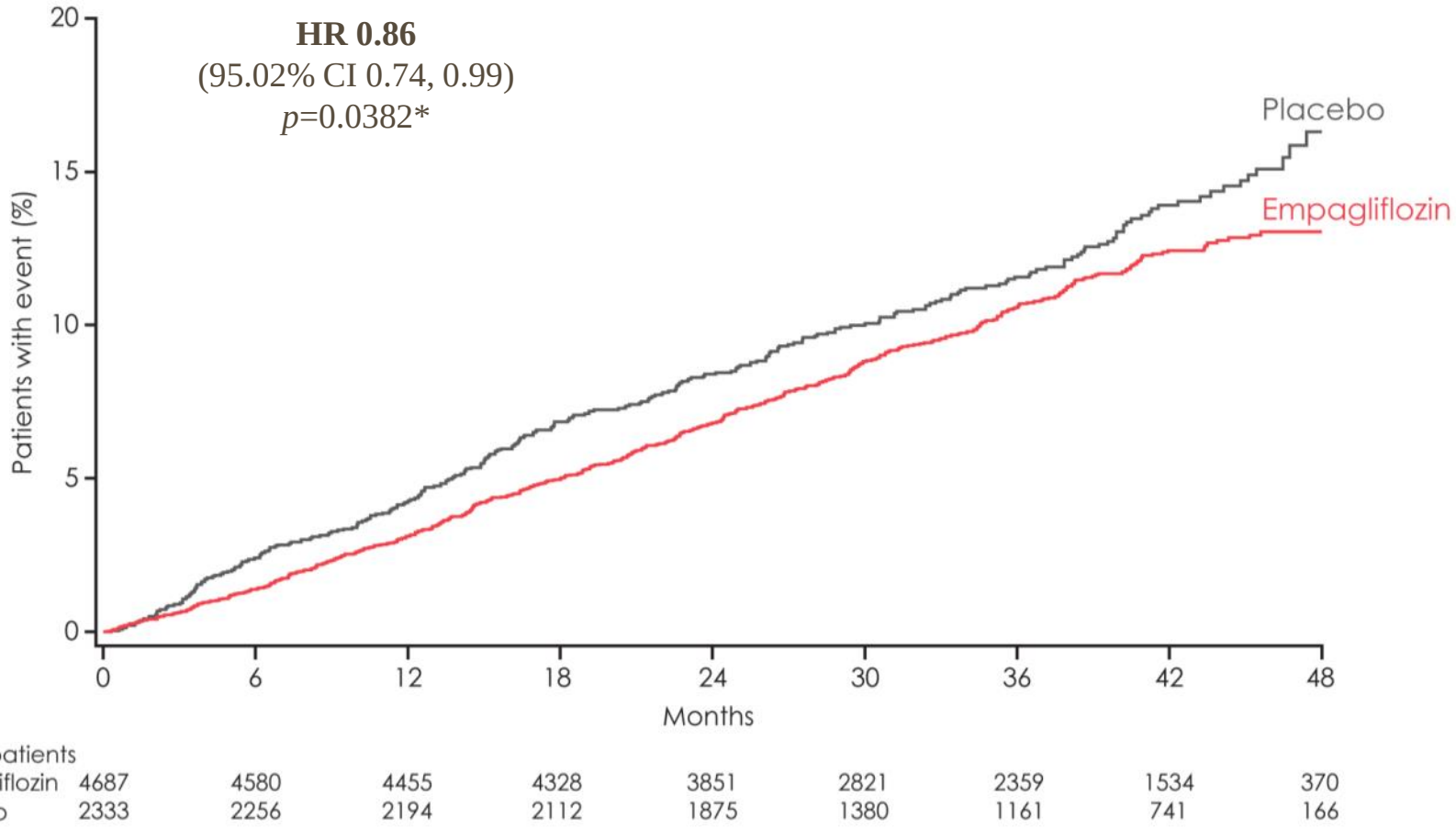
How To Reverse Type 2 Diabetes

Type 2 diabetes is too much sugar in the body

Treatment

1. Don’t put more in – Low Carbohydrate Diet
2. Burn it off – Intermittent Fasting

EMPA-REG MACE



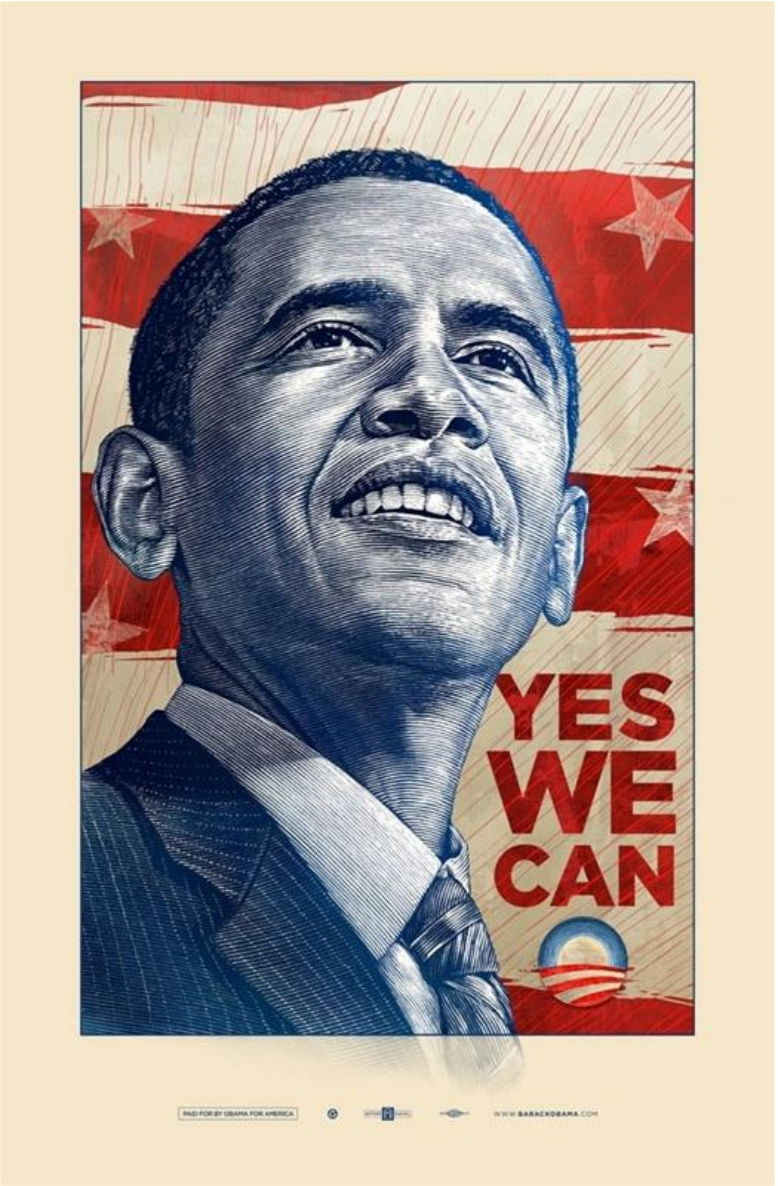
Cumulative incidence function. MACE, Major Adverse Cardiovascular Event; HR, hazard ratio.

* Two-sided tests for superiority were conducted (statistical significance was indicated if p≤0.0498)

Can We Cure Type 2 Diabetes?

No Diabetes – no diabetic nephropathy, no diabetic foot ulcers, diabetic retinopathy, reduced stroke, MI, cancers

No Drugs, No Surgery, No Cost



Time to get started…

www.intensivedietarymanagement.com