How to Reverse Type 2 Diabetes Naturally

I think it'll be ok as long as we don't eat the buns...

The Atkins Diet
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
Beta Cell Dysfunction

Surgical treatment of obesity and its effect on diabetes: 10-y follow-up
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.

http://www.diabetes.org/diabetes-basics/myths
What is Insulin Resistance?

The New Paradigm
Eat Food → Increase Insulin → Store Sugar in Liver → Produce Fat in Liver

Burn Stored Sugar in Liver → Decrease Insulin → Burn Fat in Liver → No Food “Fasting”

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,\textsuperscript{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

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

- Stored Sugar
- Glycogen
- High Insulin
- Stored Fat
- De Novo Lipogenesis
- Low Insulin
Fatty Liver causes Insulin Resistance!

Stored Sugar

High Insulin

Food/Energy

Stored Fat

Low Insulin
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?
What causes Fatty Liver?

Hormonal Obesity

Fattening Carbohydrates → High Insulin → Obesity

Insulin Resistance

Fatty Liver

Fructose
Glucose + Fructose = Fatty Liver = Insulin Resistance =
Beta cell dysfunction
Burnout?
Surgery cures diabetes

Bariatric Surgery versus Intensive Medical Therapy in Obese Patients with 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.
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
Decrease in Pancreatic Fat

Pancreas TG content (%)

Weeks of hypocaloric diet

Taylor R Dia Care 2013;36:1047-1055
Restoration of Beta Cell Function

Maximal insulin response (nmol.min$^{-1}$.m$^{-2}$)
Restoration of First Phase Insulin Response

![Graph showing the first phase insulin response over time.](Taylor R Dia Care 2013;36:1047-1055)
The Sugar Bowl
The End Game
Glucose

Cell

Normal

Insulin Resistance

“Internal Starvation” Paradigm

“Overflow” Paradigm
ACCORD

Cumulative Incidences of Events, According to Glucose-Control Strategy

## Meta-analysis of intensive glucose control in T2DM: mortality

<table>
<thead>
<tr>
<th>Number of events</th>
<th>Difference in HbA1c (%)</th>
<th>HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>More intensive</td>
<td>Less intensive</td>
<td></td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>980</td>
<td>884</td>
</tr>
<tr>
<td>CV death</td>
<td>497</td>
<td>441</td>
</tr>
<tr>
<td>Non-CV death</td>
<td>476</td>
<td>432</td>
</tr>
</tbody>
</table>

- 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

**Figure 2.** Effect of Acarbose on the Probability of Remaining Free of Cardiovascular Disease

![Graph showing the effect of Acarbose on cardiovascular disease]

- **49% RRR**
- **2.5% ARR**

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