

# Rural Obesity Treatment

SRPC April 2019, Halifax, NS

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- We will look at:
  - Obesity
  - Evidence for weight loss of:
    - Low carb diets
    - Intermittent fasting
  - Results of a rural community weight loss study

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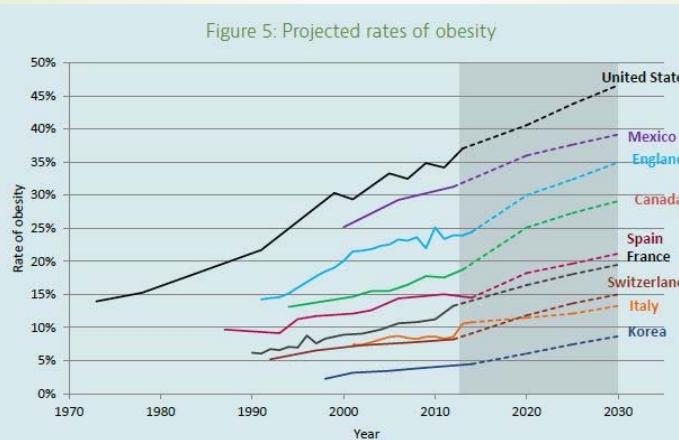
## Obesity in Canada

- ▶ In 2017: overweight or obese
  - ▶ 64% of Canadian adults (18+)
  - ▶ 60% of Canadian children (5-17)
  - ▶ 61.8% of males
  - ▶ 46.2% of females
- ▶ Obesity increases risk for: osteoarthritis, diabetes, high blood pressure, cardiovascular events
- ▶ Reversing obesity can reverse diabetes and high blood pressure

(PHAC, Stats Canada)

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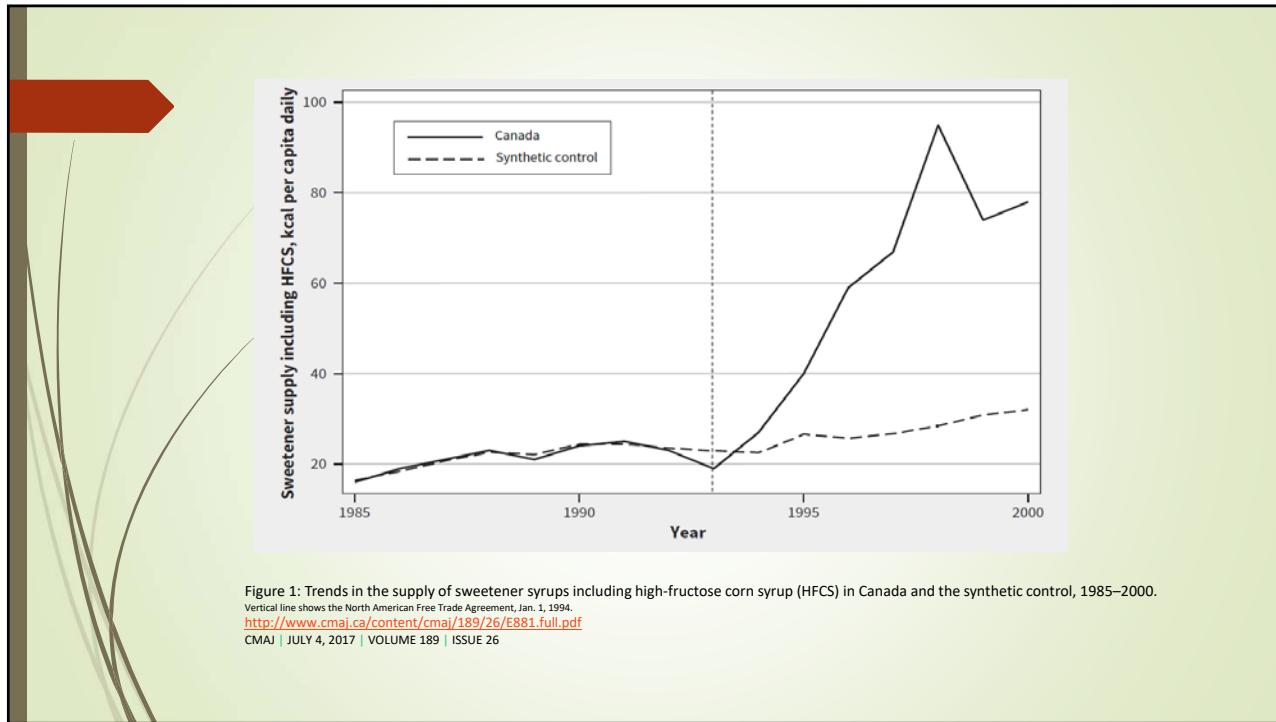
*we're not the only ones, but it's getting worse...*



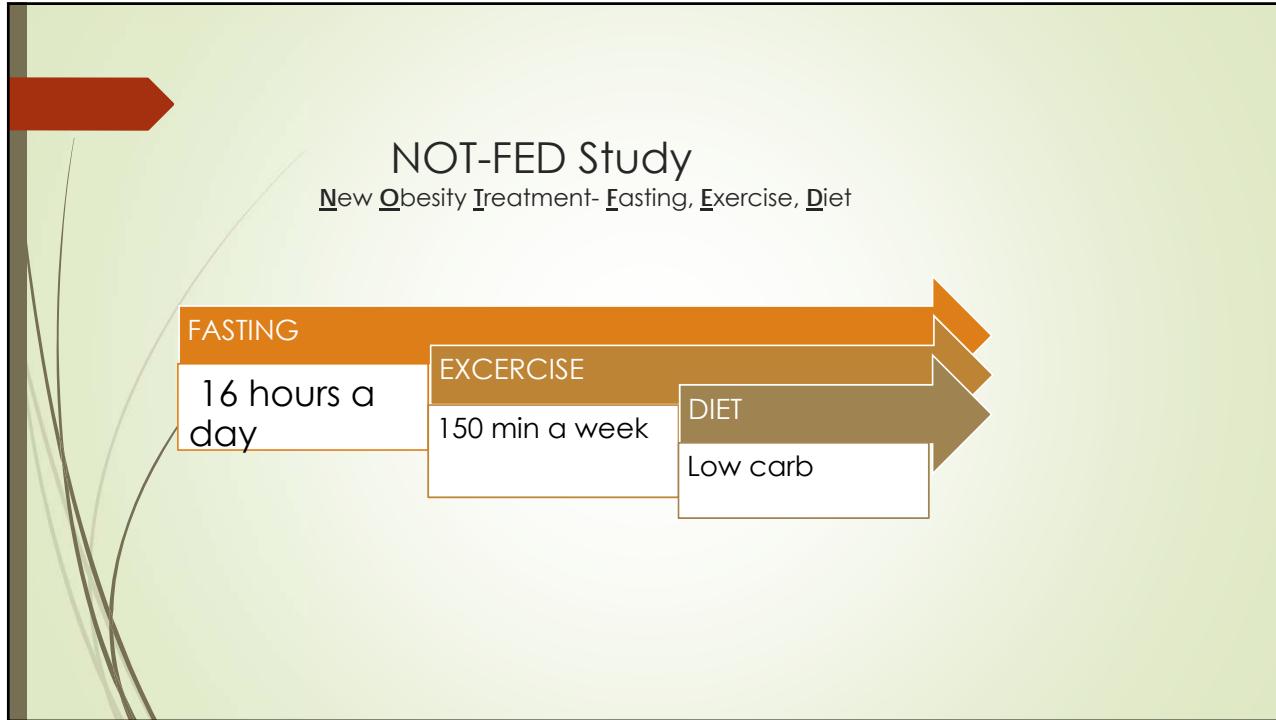
Note: Obesity defined as Body Mass Index (BMI)  $\geq 30\text{kg}/\text{m}^2$ . OECD projections assume that BMI will continue to rise as a linear function of time.  
Source: OECD analysis of national health survey data.

<https://www.marketwatch.com/story/the-us-is-the-most-obese-nation-in-the-world-just-ahead-of-mexico-2017-05-19>

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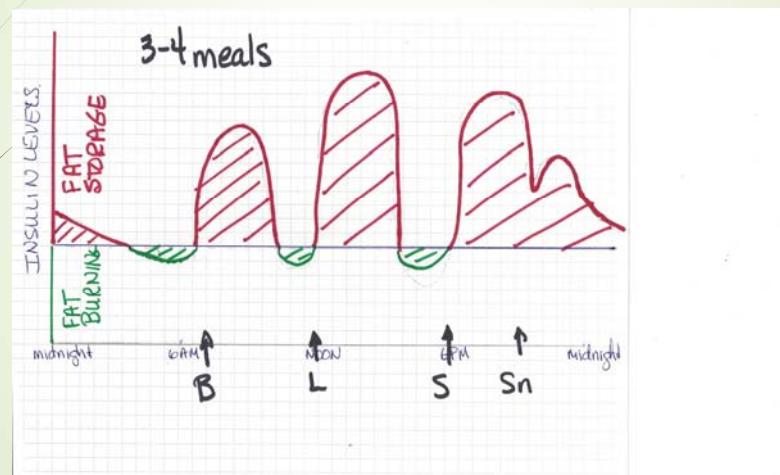


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## ► Intermittent Fasting

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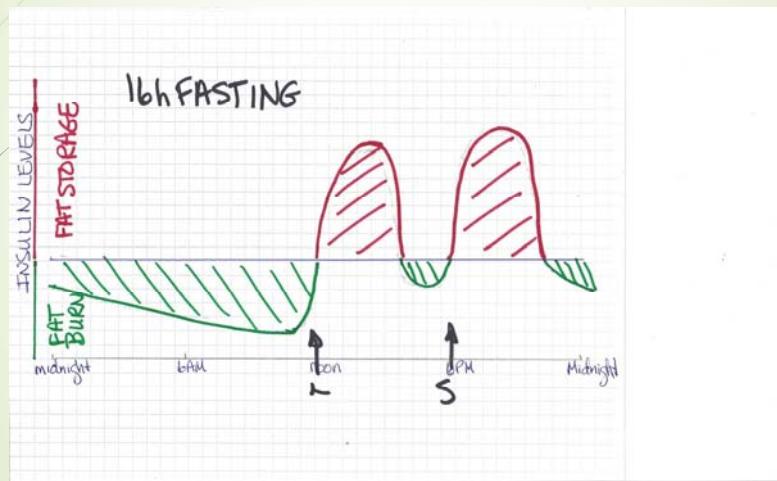
## Regular eating insulin response (lots of fat storage, little fat burning)



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## Intermittent fasting insulin pattern

(more time for fat burning)



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## Intermittent Fasting Regimes

- ▶ Principle is that fasting gives metabolic opportunity for fat burning
- ▶ Diversity in fasting regimes:
  - ▶ 16 hour a day fast
  - ▶ 5/2 fasting (fasting 2 non-consecutive days per week)
  - ▶ Alternate 24 hour periods of "fast" and "feast"

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## Existing Evidence

- ▶ 17 studies: 8 level I evidence, 9 level II evidence
- ▶ Studies were of short duration (2 - 24 weeks) and limited participation (n=10-107)
- ▶ All found weight loss (1-10%)
- ▶ Median BMI following 2-12 weeks of IF: ↓ 6%
- ▶ Waist measurement: ↓ 3-8 cm

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## Weight Loss with Intermittent Fasting

- ▶ Weight loss is *not* due to a reduction in calories
- ▶ Minimum effective fast duration is 16 hours
- ▶ Weight loss is directly related to number of adherent days per week
- ▶ Some post-study weight regain but not approaching baseline levels (2% weight regain 6-12 months post-fasting)
- ▶ Dropout rate ( up to 40% vs 14%) higher with fasting than with other interventions (Ornish, Atkins, etc.)
- ▶ No serious adverse effects

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## Intermittent Fasting and Diabetes

- ▶ 4 studies enrolled type 2 diabetic individuals to intermittent fasting

Findings:

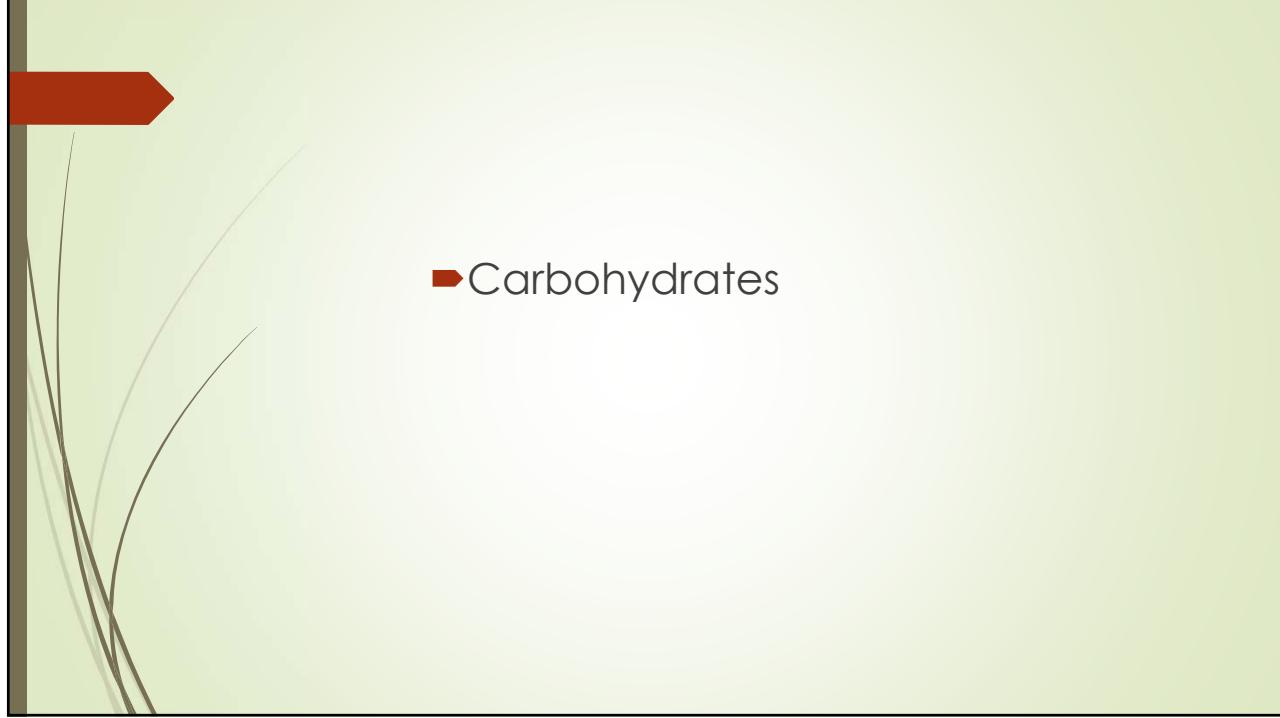
- ▶ Improvement in glycemic control
- ▶ Decrease in medication needs
- ▶ No severe hypoglycemic events
- ▶ Safe protocols exist for gradual decrease of glucose-lowering meds.

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## Comparison to Calorie Restriction

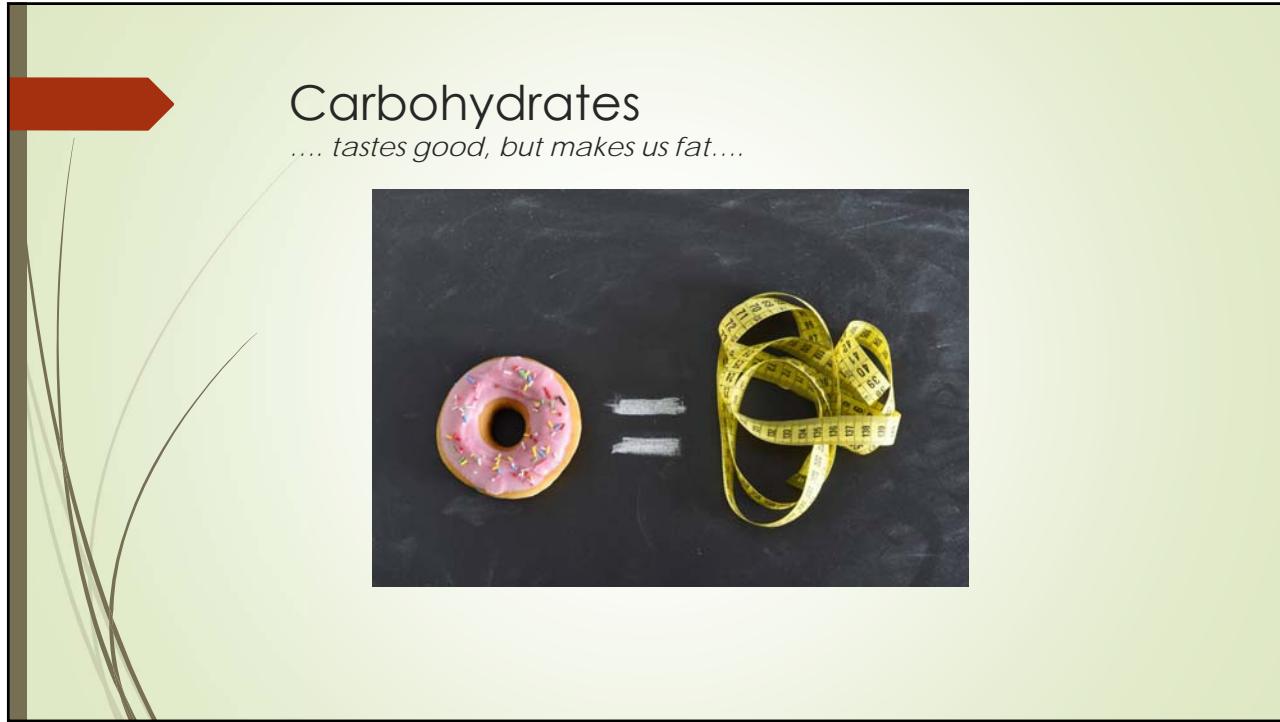
- ▶ Equivalent weight loss (5-6 kg) seen in studies comparing calorie reduction versus intermittent fasting
- ▶ Trend towards better outcomes with intermittent fasting
- ▶ More work is needed → comparison to other weight loss strategies, longer duration studies, with longer follow-up periods post-regimen

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## ► Carbohydrates

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## Carbohydrates

*.... tastes good, but makes us fat....*



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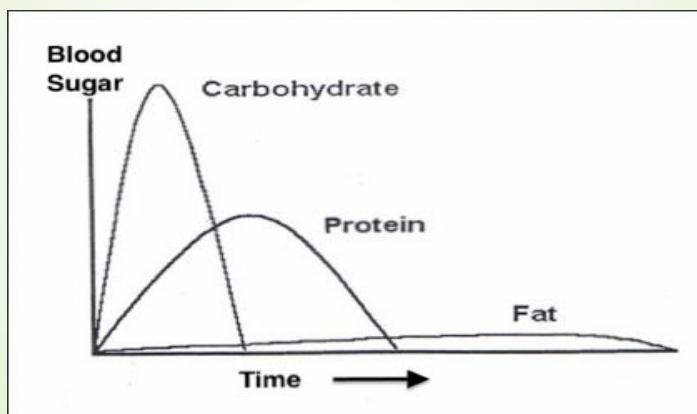
## 'Insulin hypothesis'

The endocrine vs the caloric hypothesis of obesity:

- ▶ foods which produce a rise in insulin cause weight gain, since insulin is a growth hormone and necessary for fat storage:
  - ▶ Obesity = ↑carb intake, *NOT necessarily* ↑ calorie intake.

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## Fat, protein, carbohydrates: glucose, insulin response



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## Diet- carbs

- ▶ Carbohydrates, are usually described as simple or complex
- ▶ Simple sugars (sweetened pop, chocolate bars, candies) give us 'sugar rush'
- ▶ They also give the greatest insulin rise; incoming excess carb-energy is stored as fat
- ▶ It makes sense to most of us that we need to avoid these simple carbs ...

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## Diet- complex carbs

- ▶ Complex carbohydrates generate a lower insulin response, but still add to the energy we store as fat.
- ▶ Complex carbs have a lower glycemic index (also glycemic load, insulin index)
- ▶ A low glycemic index (< 55) food typically gives less of an insulin surge.
- ▶ Since insulin is a growth hormone, the less of it we release, the better for weight loss.
- ▶ Simple carbs: breads, pasta, beans, sweetened pop, etc.
- ▶ Complex carbs: veg, fruit, whole grains, peas, beans, nuts

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## Low carb diets

- ▶ Eliminate simple carbs.
  - ▶ Diets arranged by decreasing levels of carbs they contain, from low to very low carb content:
- Low carb: (Atkins)      Paleo, Mediterranean      Ketogenic
- ▶ It is personal preference as to how many carbs you want in your diet. It will be a gradual and flexible process for many of us.

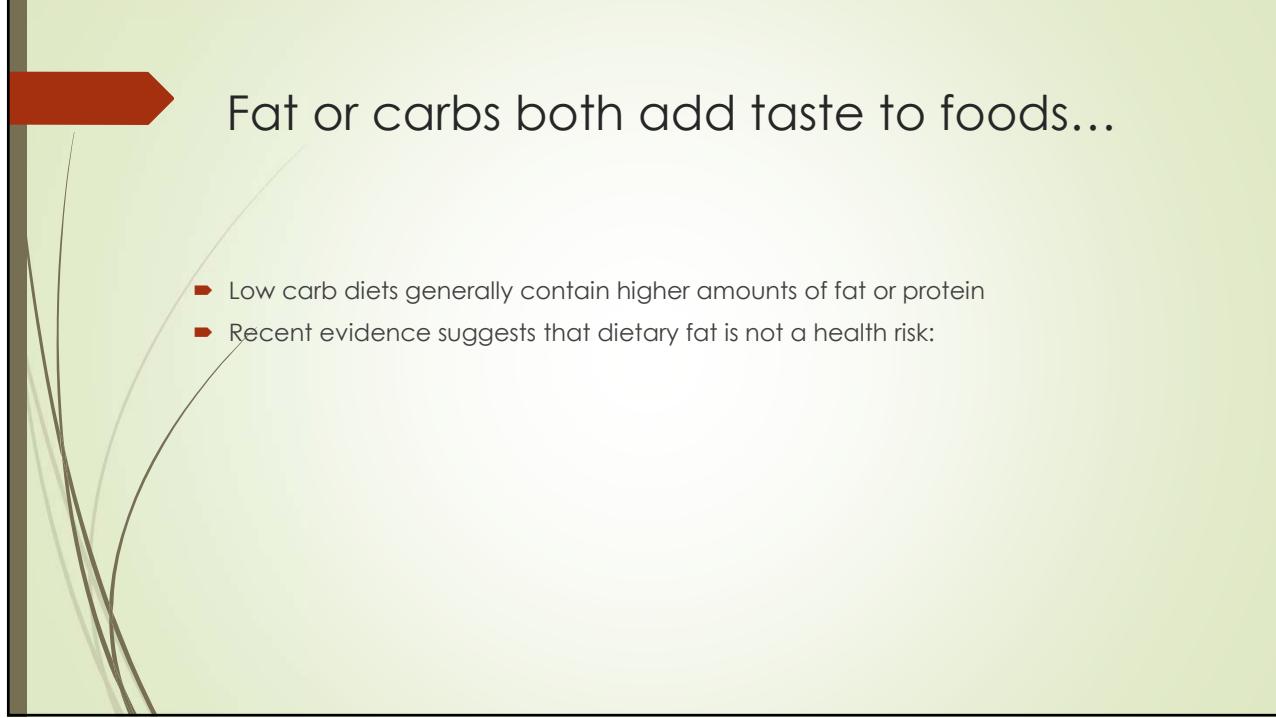
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## Foods associated with weight gain

- ▶ Most adult (20+) North Americans generally gain one pound per year
- ▶ That means by 60 years of age, we carry 40 extra pounds
- ▶ The most offending foods in a 4 year-4 lb weight gain are:
  - ▶ Potato chips (1.7 lbs)
  - ▶ Potatoes (including fries) (1.3 lbs)
  - ▶ Sweetened pop drinks (1 lb)
- ▶ These foods all contain many calories from simple carbohydrates

(Changes in Diet and Lifestyle and Long-Term Weight Gain in Women and Men. Mozaffarian, Hao, Willett, Hu.  
NEMJ 2011;364:2392-404.) prospective study of n=120,877

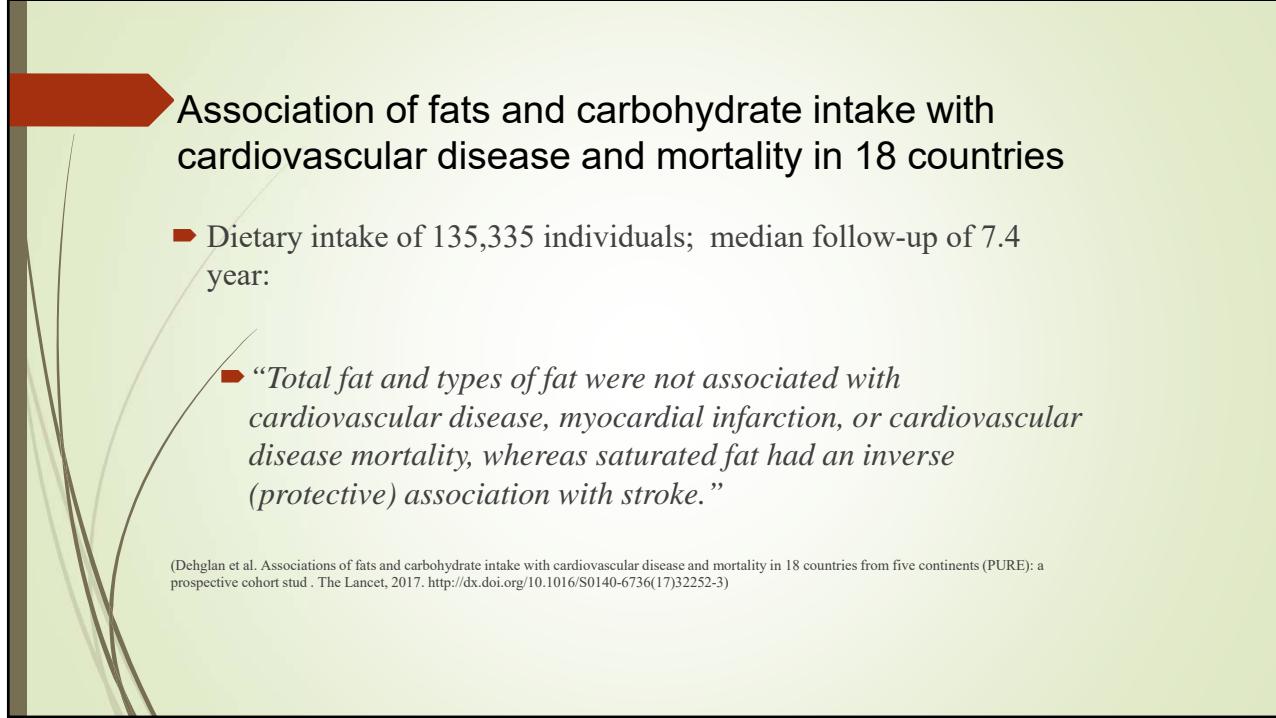
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## Fat or carbs both add taste to foods...

- ▶ Low carb diets generally contain higher amounts of fat or protein
- ▶ Recent evidence suggests that dietary fat is not a health risk:

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## Association of fats and carbohydrate intake with cardiovascular disease and mortality in 18 countries

- ▶ Dietary intake of 135,335 individuals; median follow-up of 7.4 year:
- ▶ “*Total fat and types of fat were not associated with cardiovascular disease, myocardial infarction, or cardiovascular disease mortality, whereas saturated fat had an inverse (protective) association with stroke.*”

(Dehghan et al. Associations of fats and carbohydrate intake with cardiovascular disease and mortality in 18 countries from five continents (PURE): a prospective cohort study. *The Lancet*, 2017. [http://dx.doi.org/10.1016/S0140-6736\(17\)32252-3](http://dx.doi.org/10.1016/S0140-6736(17)32252-3))

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## *Dehghan et al 2017 – cont'd*

- ▶ Higher carbohydrate intake was associated with an increased risk of total mortality HR 1.28 [95% CI 1.12–1.46]
- ▶ Intake of total fat and all types of fat (sat, mono un-sat, poly un-sat), was associated with lower risk of total mortality HR 0.77 [95% CI 0.67–0.87],
- ▶ Higher saturated fat intake was associated with lower risk of stroke HR 0.79 [95% CI 0.64–0.98]
- ▶ Total fat and saturated and unsaturated fats were not significantly associated with risk of myocardial infarction or cardiovascular disease mortality HR 0.92 [95% CI 0.72–1.16]

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## Recent Canadian-led Dietary outcomes study - 2017

- ▶ **Associations of fats and carbohydrate intake with cardiovascular disease and mortality in 18 countries from five continents (PURE): a prospective cohort study.**  
Dehghan et al.
- ▶ Dietary intake of 135,335 individuals
- ▶ median follow-up of 7.4 years
- ▶ 1° OUTCOMES: total mortality and major cardiovascular events
- ▶ 2° OUTCOMES: all myocardial infarctions, stroke, cardiovascular disease mortality, and non-cardiovascular disease mortality

(JAMMA, 2017. [http://dx.doi.org/10.1016/S0140-6736\(17\)32252-3](http://dx.doi.org/10.1016/S0140-6736(17)32252-3))

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## *They concluded:*

- ▶ High carbohydrate intake was associated with higher risk of total mortality, whereas total fat and individual types of fat were related to lower total mortality.
- ▶ Total fat and types of fat were not associated with cardiovascular disease, myocardial infarction, or cardiovascular disease mortality, whereas saturated fat had an inverse (protective) association with stroke.

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## Recent study in Lancet Public Health

- ▶ 15,428 adults 45-64 followed for 25 years:
  - ▶ negative long term association between life expectancy and both high and low carb diets
  - ▶ plant-based fats were superior to animal ones
- ▶ The low-carb group however differed significantly ( $p<0.001$ ) :
  - ▶ more smokers (78% vs 51%)
  - ▶ more diabetics (13% vs 10%)
  - ▶ higher BMI's (28.0 vs 27.4)
  - ▶ more male participants (53% vs 36%)

(Siedelman S, et al. Dietary carb intake and mortality. Lancet Public Health. [http://dx.doi.org/10.1016/S2468-2667\(18\)3015-X](http://dx.doi.org/10.1016/S2468-2667(18)3015-X))

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## Remission of DM studies

**ARTICLES | VOLUME 391, ISSUE 10120, P541-551, FEBRUARY 10, 2018**

**Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial**

Prof Michael EJ Lean, MD † • Wilma S Leslie, PhD • Alison C Barnes, PGDip • Naomi Brosnahan, PGDip • George Thom, MSc • Louise McCombie, BSc • et al.

Show all authors • Show footnotes

Published: December 05, 2017 • DOI: [https://doi.org/10.1016/S0140-6736\(17\)33102-1](https://doi.org/10.1016/S0140-6736(17)33102-1)

n= 306 adults with recent DM (<2 yrs) dx, not on insulin; A1c 7.7

12 months: 15 kg weight loss  
46% DM remission (A1c≤6.5)

### Interpretation

Our findings show that, at 12 months, almost half of participants achieved remission to a non-diabetic state and off antidiabetic drugs. Remission of type 2 diabetes is a practical target for primary care.

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## 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

Sarah J. Hallberg • Amy L. McKenzie • Paul T. Williams • Nasir H. Bhanpuri • Anne L. Peters • Wayne W. Campbell • Tamara L. Hazbun • Brittanie M. Volk • James P. McCarter • Stephen D. Phinney • Jeff S. Volek (Diabetes Therapy 2018;9:583-612)

n= 349 (94% on insulin), DM x 8 years  
Weight loss, 1 yr: 14 kg  
A1c: 7.6 to 6.3  
Off all sulfonylureas; most d/c or ↓ insulin

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## 2018: systematic reviews of Ketogenic diets:

- 2 reviews of 24 studies (n= 2,946):
- Ketogenic diets may help patients lose 2 kg more than low fat diets. Weight loss peaks at about 5 months, but is often sustained. Range: -30 to +10 kg with any diet.

(Ting R, et al. Can Fam Phys Dec 2018; 64:906)

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## NOT-FED study



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## Methodology

- ▶ 2 year prospective study of weight loss
  - ▶ primary outcomes: weight loss, BMI, change in waist size
  - ▶ Secondary outcomes: changes in labs (A1c, Lipids), BP/DM meds, self-reported quality of life.
- ▶ Staggered start of self-referred patients
- ▶ Initial average BMI 35.4 kg/m<sup>2</sup> (obese >30)
- ▶ Informed written consent for chart access to labs and measurements
- ▶ Ethics approved by Sioux Lookout Meno Ya Win Health Centre Research Review and Ethics Committee
- ▶ n=87
- ▶ No funding

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## Results- 6 month self-report

### Health Status

n= 38	Excellent	Very good	Good	Fair	poor
Initial (%)	3	18	63	13	3
6 Month (%)	<u>26</u>	42	32	0	0

### Energy and Exercise

n= 38	Increased	Unchanged	decreased
ENERGY LEVEL (%)	<u>51</u>	46	3
EXERCISE (%)	22	75	3

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## Results- 6 month self-report.... cont'd

### Dietary changes

n= 38	Increased	Unchanged	Decreased
FAT (%)	<u>42</u>	42	16
PROTEIN (%)	<u>51</u>	49	0
CARBOHYDRATE (%)	3	16	<u>82</u>

### Fasting

Average hours fasting/day (range)	15 (12-16)
Number of days/week (range)	6.27 (6-7)

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## Weight loss (kg) in 0 -15 months



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## Other changes 0-15 months

- BMI ↓ 8%
- A1c ↓ 0.2
- Systolic BP ↓ 2.6 mm Hg
- Diastolic BP ↑ 0.2 mm Hg

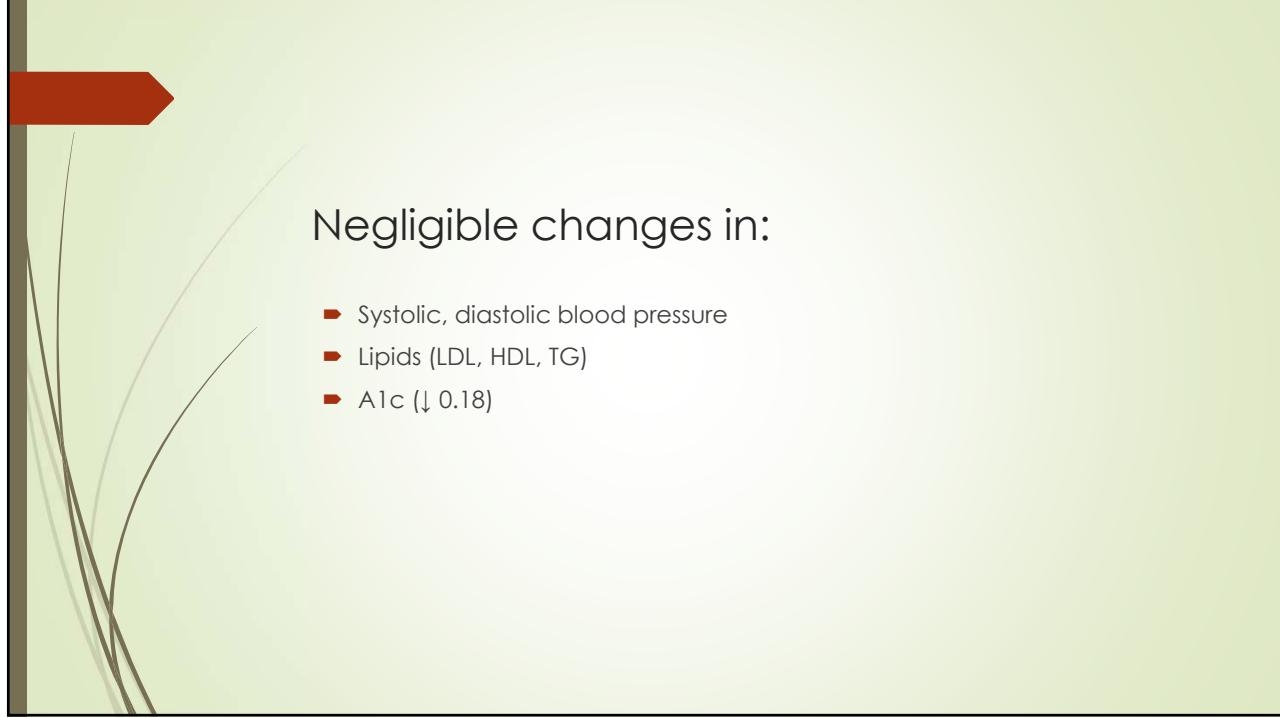
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## Results at 12 months

Initial average weight, kg 90.7	6 months	12 months
Weight, kg	↓ 7.2	↓ 9.3
BMI change, %	↓ 11%	↓ 9.3%
Waist circumference, cm	↓ 9.2 cm	↓ 9.1 cm

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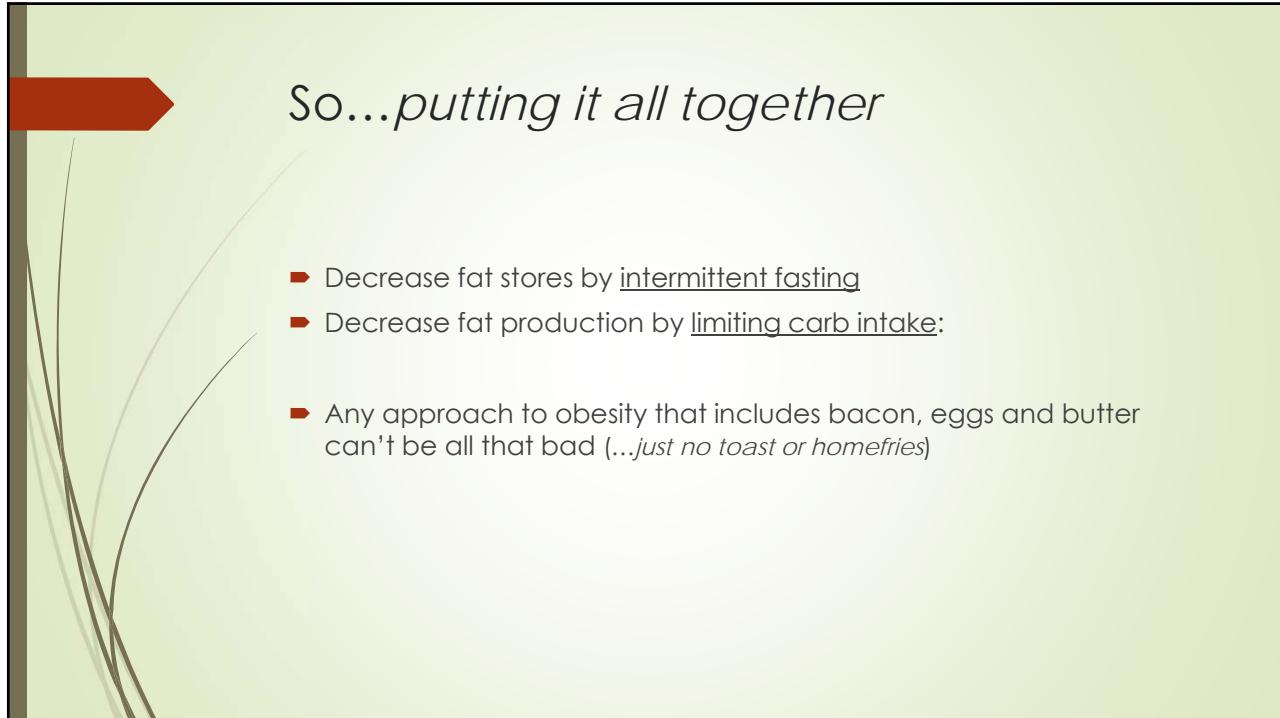
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## Negligible changes in:

- ▶ Systolic, diastolic blood pressure
- ▶ Lipids (LDL, HDL, TG)
- ▶ A1c ( $\downarrow 0.18$ )

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## *So...putting it all together*

- ▶ Decrease fat stores by intermittent fasting
- ▶ Decrease fat production by limiting carb intake:
- ▶ Any approach to obesity that includes bacon, eggs and butter can't be all that bad (...*just no toast or homefries*)

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## Conclusion

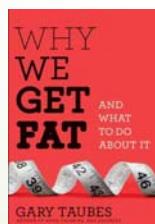
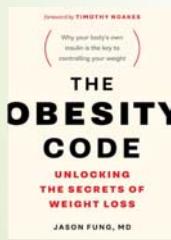
- ▶ A community-wide initiative with focus on diet and lifestyle
- ▶ Intermittent fasting and low carb diets are a low resource strategy for weight loss, even in a busy rural primary care clinic.
- ▶ Further information at: "[hughallenclinic.com](http://hughallenclinic.com)"



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## Adapting/adopting study to your community

- ▶ Available at: [hughallenclinic.com](http://hughallenclinic.com)
- ▶ Feel free to 'borrow' at will
- ▶ We can share study spreadsheet and information sheets to other towns



[CBC radio interview with Dr Jay Wortman:](#)

<http://www.cbc.ca/radio/checkup/what-s-the-best-way-to-tackle-canada-s-weight-problem-1.4558944/revisiting-my-big-fat-diet-how-a-m%C3%A9dical-doctor-lost-weight-with-a-traditional-indigenous-diet-1.4562134>

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## Conclusion

- ▶ A community-wide initiative with focus on diet and lifestyle
- ▶ Intermittent fasting and low carb diets are a low resource strategy for weight loss, even in a busy rural primary care clinic.
- ▶ Further information at: "[hughallenclinic.com](http://hughallenclinic.com)"



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## How I presently look at nutrition labels

Maximize fat content →

I do not look at calorie content

← Minimize carb content

**Nutrition Facts**  
Per 3 biscuits (33 g)

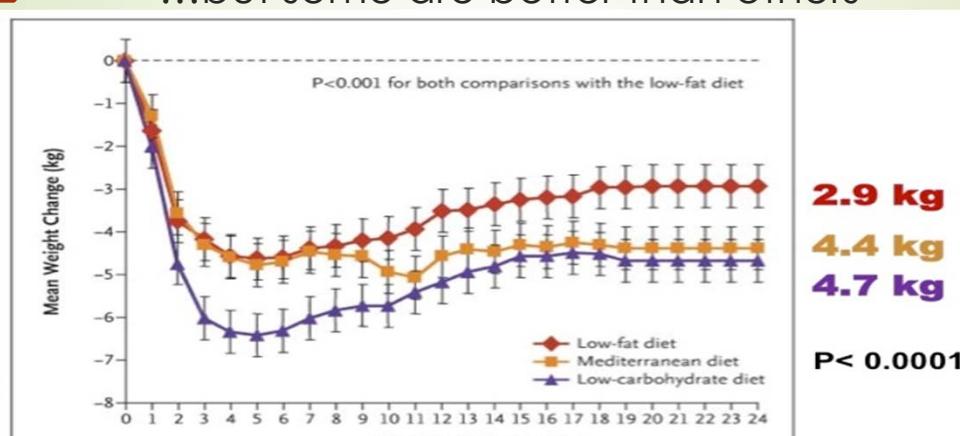
Amount	% Daily Value
Calories 160	
Fat 7 g	11 %
Saturated 1.5 g + Trans 0 g	8 %
Cholesterol 0 mg	0 %
Sodium 105 mg	4 %
Carbohydrate 23 g	8 %
Fibre 0 g	0 %
Sugars 7 g	
Protein 2 g	
Vitamin A 0 %	Vitamin C 0 %
Calcium 0 %	Iron 8 %

INGREDIENTS: WHEAT FLOUR, SHORTENING (VEGETABLE, MODIFIED PALM), SUGAR, GOLDEN SYRUP,

... cookie package from clinic lunch room

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ALL DIETS WORK a bit...  
...but some are better than others

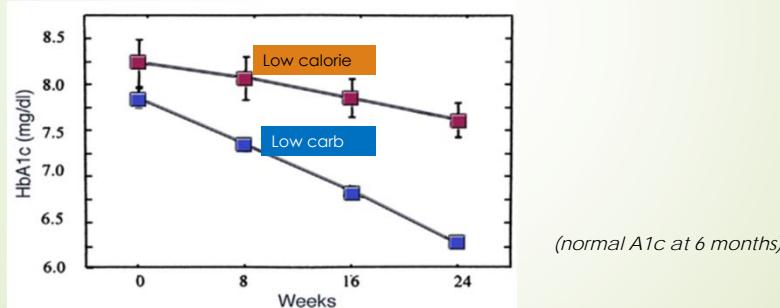


Dietary Intervention Randomized Controlled Trial (DIRECT) NEJM  
July 17, 2008 vol. 359 no. 3, Iris Shai (n=322)

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## Low carb diets and diabetes

- "The benefits of carbohydrate restriction in diabetes are immediate and well documented... Dietary carbohydrate restriction reliably reduces high blood glucose, does not require weight loss (although is still best for weight loss), and leads to the reduction or elimination of medication"
- Fineman et al. Dietary carbohydrate restriction as the first approach in diabetes management: Critical review and evidence base. Nutrition 31 (2015) 1–13.



N= 361, 102 DM, overweight or obese pts. 24 week diet.  
Hussain TA, Mathew TC, Dashti AA, Asfar S, Al-Zaid N, Dashti HM. Effect of low-calorie versus low-carbohydrate ketogenic diet in type 2 diabetes. Nutrition 2012;28:1016–21.