# How to Live Diabetes Free
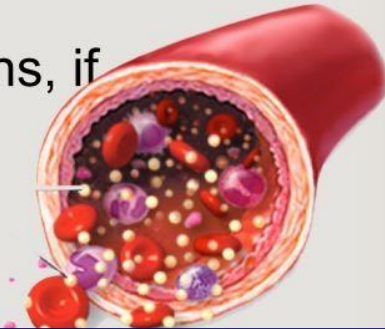
Leonard L Gibbons, DrPH, MPH, HT, MT, RD
Health Ministries Director, BCSDA
Lifestyle Intervention Specialist BWOC

## What is Diabetes?

Diabetes is simply having blood sugar levels so high, and for so long, that they eventually cause significant health complications, if not corrected.
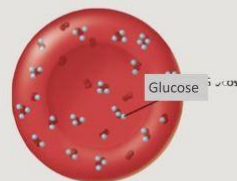
## Blood Sugar Tests



Fasting/ Random Glucose Test

Glucose Tolerance Test

Pepsi/Jelly Bean Challenge

Hemoglobin a1c

Glucose

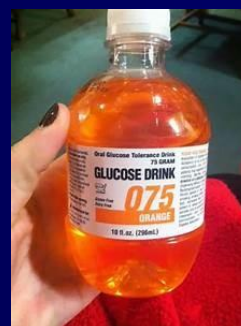**28 jelly beans = 50 grams of simple sugar**

# Know Your Numbers

**Normal blood sugar: <u>70 - 99</u> mg/dl**

**Prediabetes: 100 - 125 mg/dl**

**Diabetes: <u>≥126</u> mg/dl**
(12 hr. fast before the test)

**OGTT- 75 g of glucose**
**Diabetes: ≥ 200mg/dl**
**Normal blood: < 140 mg/dl** (2 hrs. later & once more during the testing)



# Know Your Numbers
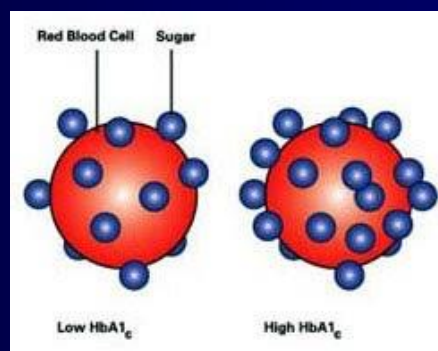
**HbA1c (**hemoglobin with glucose attached)

**Normal: 4.5-5.6**

**Optimal: Under 5 (97 mg/dl)**

**Prediabetes: 5.7-6.4**

**Diabetes: <u>6.5</u> (140 mg/dl ) and higher**



**Excess sugar (AGEs) changes the shape and function of cells**

# Health Benefits of Lowering HgA1c

| HbA1c | Blood Glucose Average |
|---|---|
| 12 | 298 |
| 11 | 269 |
| 10 | 240 |
| 9 | 212 |
| 8 | 183 |
| 7 | 154 |
| 6 | 126 |
| 5 | 97 |

| Complications | Reduced risk for ever 1 % reduction in HgA1c |
|---|---|
| Nerve Damage | 37% |
| Vision | 37% |
| Kidney Disease | 37% |
| Amputation or Death from Peripheral Vascular Disease | 43% |
| Heart Attack | 14% |
| Diabetes-r-deaths | 21% |

# Type II Diabetes Risk Factors

‣ You're 45 years or older
‣ You're overweight or obese
‣ You do not exercise regularly
‣ You have high blood pressure
‣ You have high cholesterol or blood fats
‣ You have a family history of diabetes
‣ You are Black, Hispanic, Native American, Asian, or Pacific Islander

## Complications

- Eye problems
- Kidney damage
- Heart disease and stroke
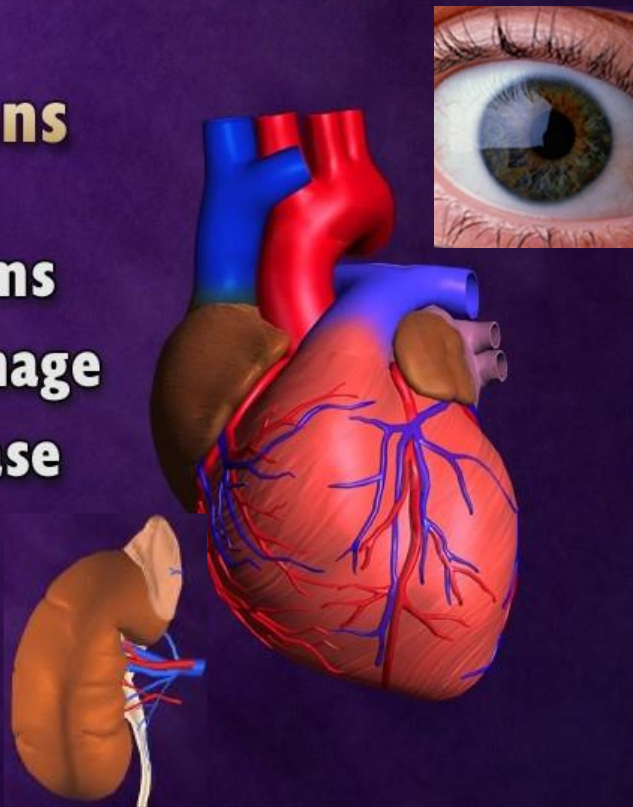
2 to 4 times

- **Dementia**
- Sexual impotence
- Ulcerative sores
- Infections
- Amputations
- Breast and uterine cancers



Type II

90% of all diabetics

# Overweight & Obesity

**More than ½ of all obese individuals will develop diabetes**

| BMI classification | |
|---|---|
| Underweight | < 18.5 |
| Normal range | 18.5 - 24.9 |
| Overweight | ≥ 25.0 |
| *Preobese* | 25.0 - 29.9 |
| Obese | ≥ 30.0 |
| *Obese class I* | 30.0 - 34.9 |
| *Obese class II* | 35.0 - 39.9 |
| *Obese class III* | ≥ 40.0 |

# What's Your BMI?

## Body Mass Index (BMI) Chart for Adults
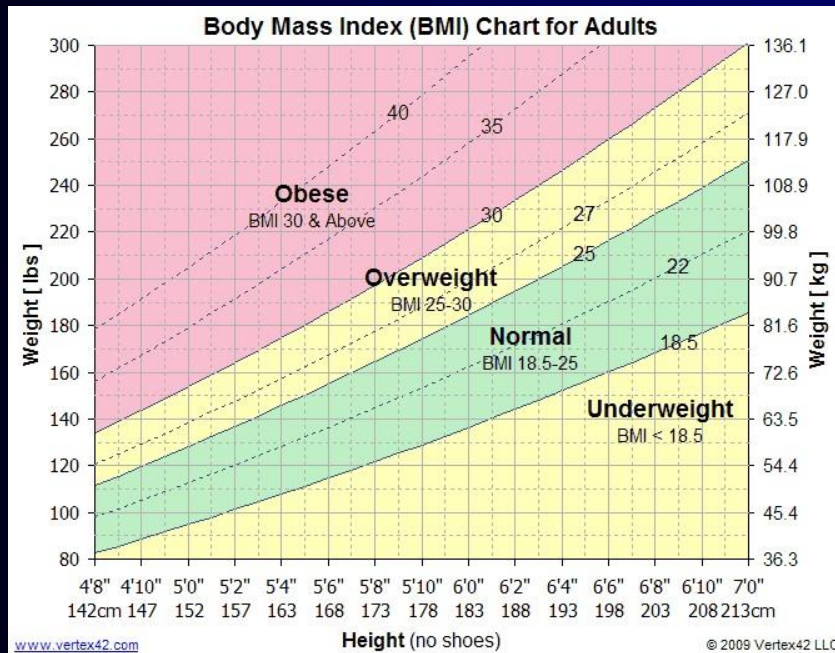
Not insulin shortage
Insulin blockage



Type I

5-10% of
all diabetics

Insulin dependent

How does diabetes work?

Glucose-the fuel of the body
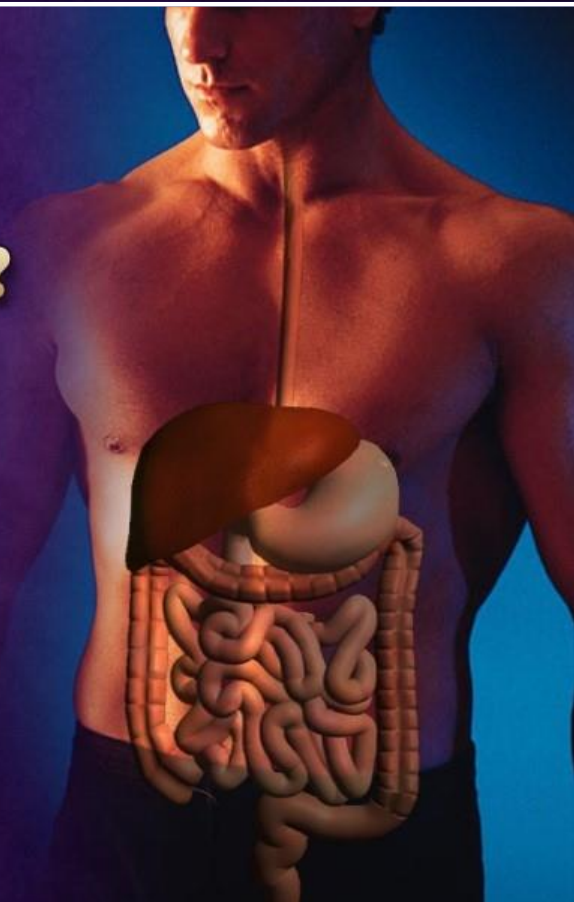

Insulin

What causes non-insulin dependent diabetes?


Not insulin shortage
Insulin blockage

**Insulin resistance** causes Type II Diabetes

Pima Indians

# Type II Diabetes

Diabetes is **6.4%** of the global population, **9.4 %** of the U.S. population, **12 -13%** of Bermudian adults and **38%** among the Pima Indians of central Arizona.



Age-adjusted prevalence of diabetes

# Lifestyle and Type II Diabetes

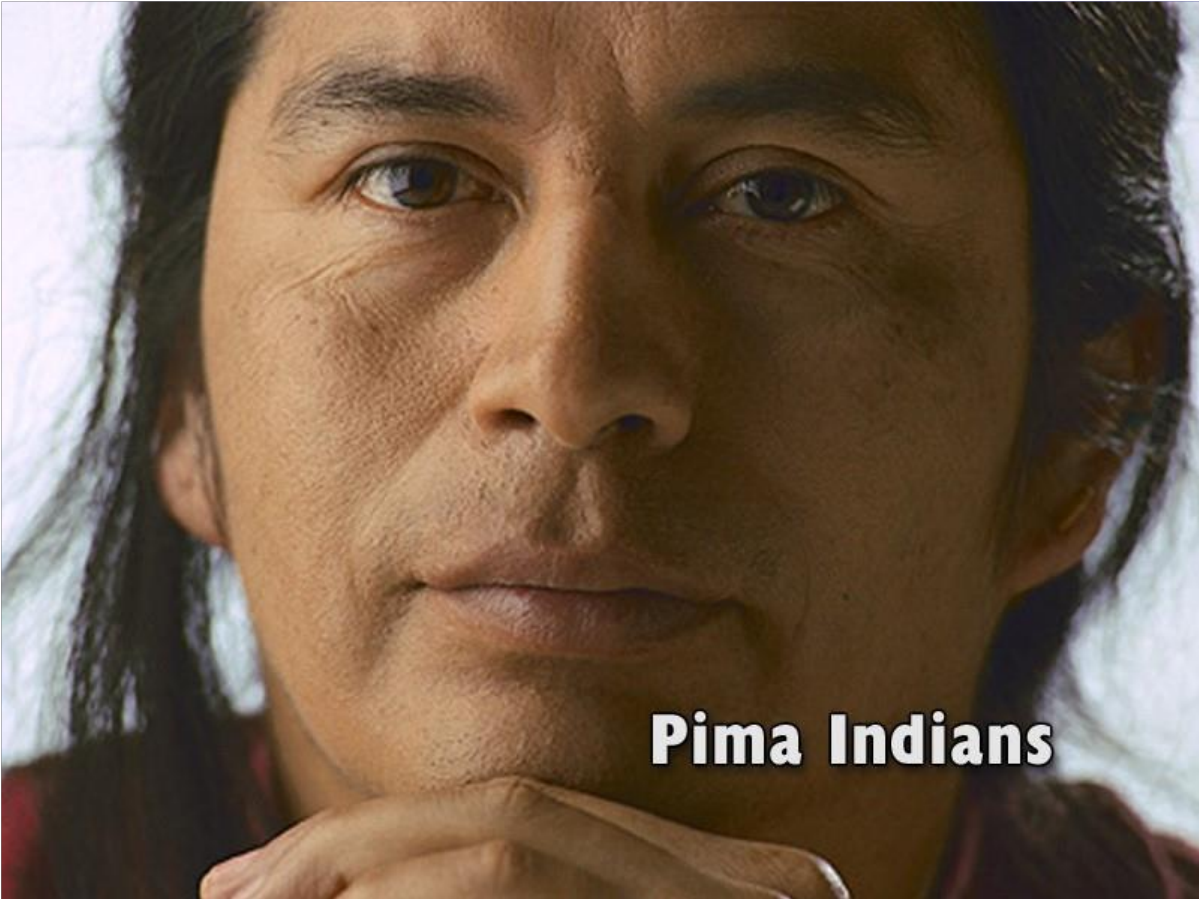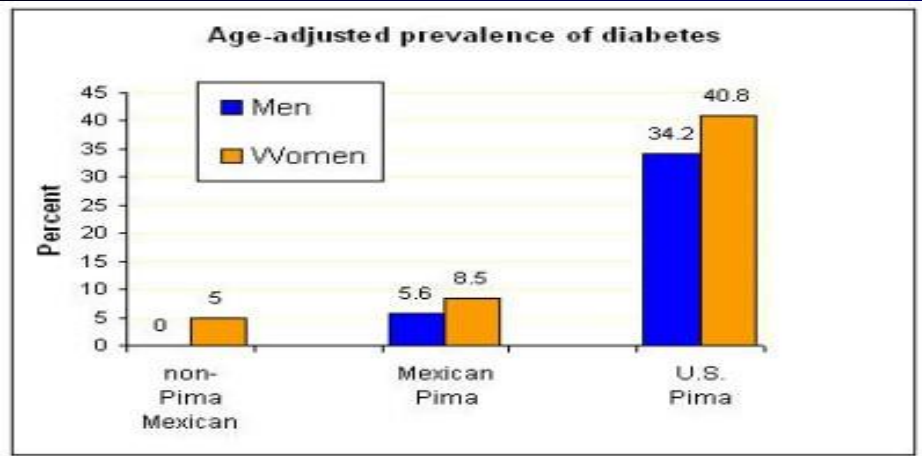| Measured Variable | Pima Indians in Mexico | Pima Indians in Arizona |
|---|---|---|
| Weight | Male: 145 lbs. Female: 138.6 lbs. | Male: 215 lbs. Female: 200 lbs. |
| Obesity | Male: **6.5%** Female: **19.8%** | Male: **63.8%** Female: **74.8%** |
| Fat Intake | =< 25% of calories from fat | >40% of calories from fat |
| Physical Activity | 22 hours pe=<r week | 3 hours per week |
| Fat Intake | 25% of calories from fat | >40% of calories from fat |

# Lifestyle and Type II Diabetes

| Measured Variable | Pima Indians in Mexico | Pima Indians in Arizona |
|---|---|---|
| Dietary Fiber | > 50 grams per day | < 20 grams per day |
| Dietary Fiber | **Non-Pima Mexican Men** : None of them had Type II Diabetes . They had the highest fiber intake (**56 grams a day** ), an important dietary factor in preventing and reversing Type II Diabetes . | |

# Lifestyle and Type II Diabetes

| Measured Variable | Pima Indians in Mexico | Pima Indians in Arizona |
|---|---|---|
| **Diet** *Diabetes Care1993 Jan; 16(1);369-371 ncbi.nlm.nih.gov/pmc/articles/PMC4418* | **Beans, potatoes, corn, garlic, green peppers, peaches, apples. 70-80% carbs,8-12%fat, 12-18% protein** | Subsidized U.S. food after taking their land and water supply. **The foods included white flour, sugar, lard and canned goods. Almost 40% fat** |

# Dietary Fiber & Risk of Diabetes
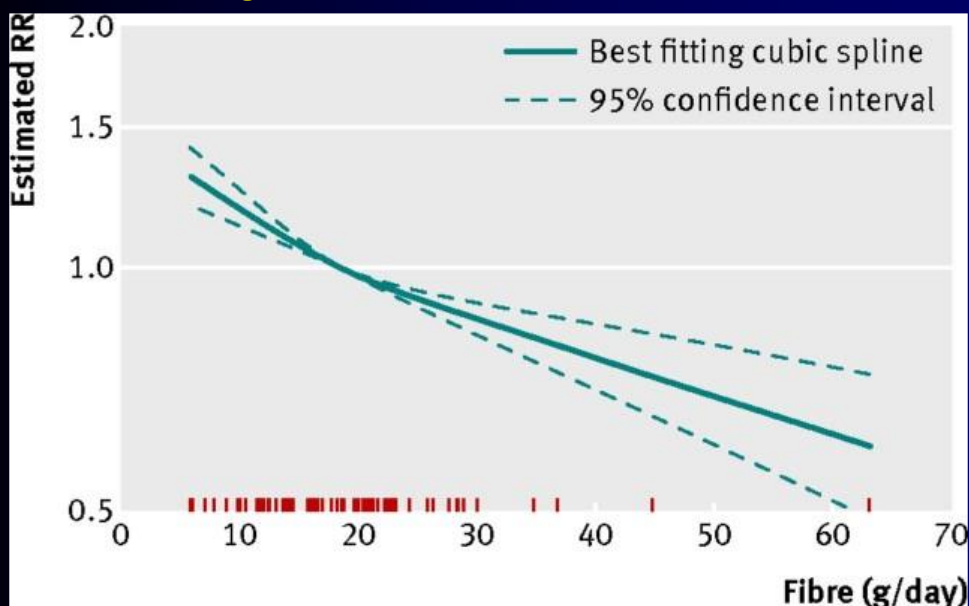


Dietary fiber intake and risk of type 2 diabetes: a dose-response analysis of prospective studies Yao, B., Fang, H., Xu, W. et al. Eur J Epidemiol (2014) 29: 79

# Fiber and Heart Disease, Breast Cancer and Diabetes



Relative Risk vs Fiber (g/day)

- Heart Disease ▲ 0%
- Breast Ca ▲ 0%
- Diabetes ○ ▲ 0%

*References*

... (2013) Dietary fibre intake and risk of cardiovascular disease: systematic review and meta-analysis

... (2014) Dietary fiber intake and risk of type 2 diabetes: a dose–response analysis of prospective stu…

... (2012) Dietary fiber and breast cancer risk: a systematic review and meta-analysis of prospective s…

## Top 20 High Fiber Foods

**(Fiber amount per cup unless otherwise indicated)**

| PASSION FRUIT | NAVY BEANS | WHITE BEANS | ADZUKI BEANS |
|---|---|---|---|
| 25g | 19g | 19g | 17g |

| BUCKWHEAT | SPLIT PEAS | LENTILS | FIGS |
|---|---|---|---|
| 17g | 16g | 16g | 16g |

**Buckwheat** groats are gluten free seeds of a flowering plant.

| BLACK BEANS | LIMA BEANS | PEAS (green) | OAT BRAN (1oz) |
|---|---|---|---|
| 15g | 14g | 14g | 12g |

Note: The **best beans** for blood sugar control according to research include **chickpeas, pinto beans and black beans**.

Top 20 High Fiber Foods

| PINON NUTS | ACORN SQUASH | AVOCADO | GUAVA |
|---|---|---|---|
| 12g | 9g | 9g | 9g |

| FLAXSEED (1oz) | BLACKBERRIES | RASPBERRIES | BULGUR (cooked) |
|---|---|---|---|
| 8g | 8g | 8g | 8g |

*Amounts are per cup unless otherwise noted

@naturallysavvy

# Nutrition and Type II Diabetes

*"Wild harvested **roots, vegetables, fruits, grains, nuts, beans**, and **herbs** were also enjoyed. These provided a healthy diet, low in fat and high in nutrients. To heal diabetes and other health - related ailments, Native Americans are **now rejecting large amounts of highly processed and animal - based foods**"*

Chef Lois Ellen Frank, PhD

# Vegan Diet Vs. ADA Diabetic Diet for 22 weeks

<u>**Vegan Diet**</u>: Beans, lentils, peas, green leafy vegetables and **almost all fruit** <u>except watermelon</u> and <u>pineapple.</u>

This diet also included **barley, bulgur wheat**, converted rice, **rye and pumpernickel breads**, **yams, sweet potatoes**, **bran cereal** and **oatmeal**. <u>No calorie restriction.</u>



# Vegan Diet Vs. ADA Diabetic Diet (22 weeks)

<u>**ADA Diet:**</u> **Cut back** on **sugar and starchy foods** (e.g., bread, potatoes and rice) **lower cholesterol** intake to **200 mg per day**, and **reduce calorie intake if overweight**.

# Vegan Diet Vs. ADA Diabetic Diet

| Measured Variable | Vegan Diet | ADA Diet |
|---|---|---|
| Weight loss | -14.3 pounds | -6.8 pounds |
| HgA1c | -1.38% | -0.38% |
| LDL cholesterol | -21.2% | -10.7% |
| Reduced diabetic Rx | 43% of patients | 21% of patients |
| Dietary compliance | More compliant with the eating program | Less compliant with the eating program |

## Reversing Diabetes at Lifestyle Centers

*Weimar Institute*
50% of Type II diabetics were of all medications and insulin and their blood sugar levels normalized in 21 days!

80% of patients with neuropathy were pain free in just 17 days!

*Lifestyle Centers of America*

14 (82%) of Type II Diabetics (in a group of 17 diabetics) were of insulin at the end of 19 days!
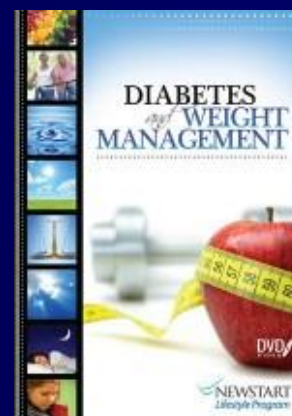
# Reversing Diabetes at Lifestyle Centers

***21-Day Health Recovery Program***
*Gabriel Cousins MD*



**Type II –NIDDM. 100% got of all medication. Blood sugar** became **normal in 61%**. **Type II – IDDM 86.4% got of** all medication. **Blood sugar became normal in 24%.**

Blood Sugar  baseline:       247 mg/dl
Blood Sugar (21 days ):   - 86 mg/dl
Weight Loss (21 days ):   -18 pounds

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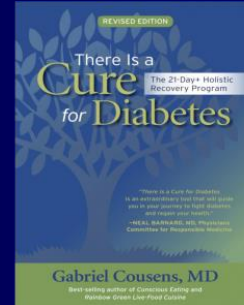
# The High Fiber –High Carb Diet

**16 Day Program**
**Twenty diabetics** on an average of **20 units of insulin** for up to **twenty years** were put on a **high fiber low fat plant-based diet** for **16 days** in a metabolic ward.



**Insulin requirement dropped about 60%** on this diet and **10 of the participants got of all insulin** in only **16 days**! **Average cholesterol** went from **206 to 147 mg/dl.**

# The High Fiber –High Carb Diet
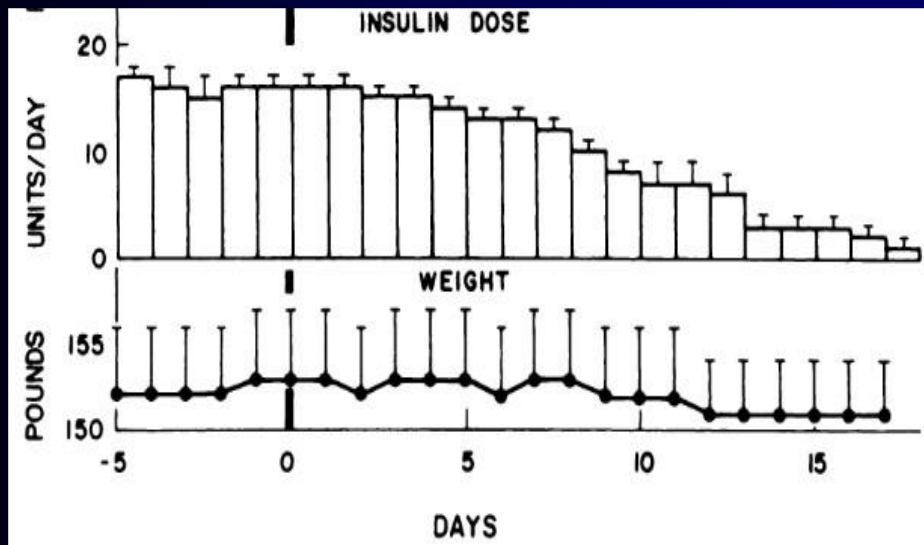


See the average change in body weight and insulin injections amounts (15 to 20 units at baseline) in 8 men put on a high fiber diet.

# High Fiber –Low Fat Diets Work

A diet **low in saturated fat and high in fiber** rich **whole plant foods** improves cell membrane function, thus **increasing insulin sensitivity** which normalizes blood sugar levels .



A diet **low in fiber and high in processed foods,** saturated fat **found mostly in animal** products, and **processed hardened vegetable fats,** (e.g. stick margarine) **reduces insulin sensitivity** which increases blood sugar levels.

# 46% of Diabetics Cured at 1 Year
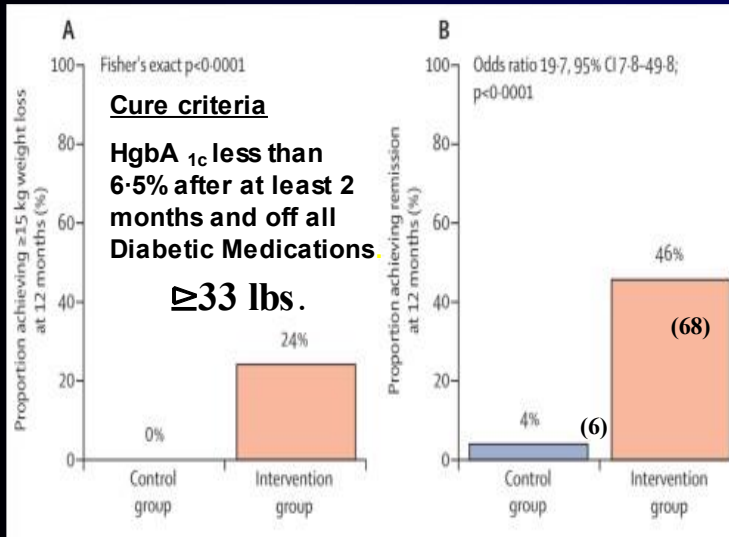


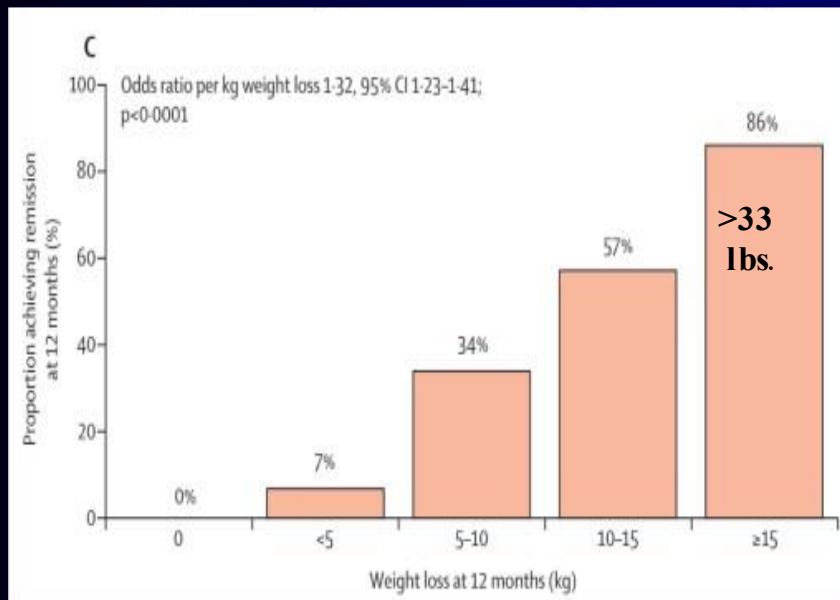Withdrawal of diabetes and high blood pressure medications.

825–853 kcal/day for 3-5 months.

Food reintroduced from weeks 2-8 wks.

Support for long-term weight loss.

*Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial* Lean, Michael EJ et al.; The Lancet, December 2017

# 86% Cured who Lost > 33 Pounds



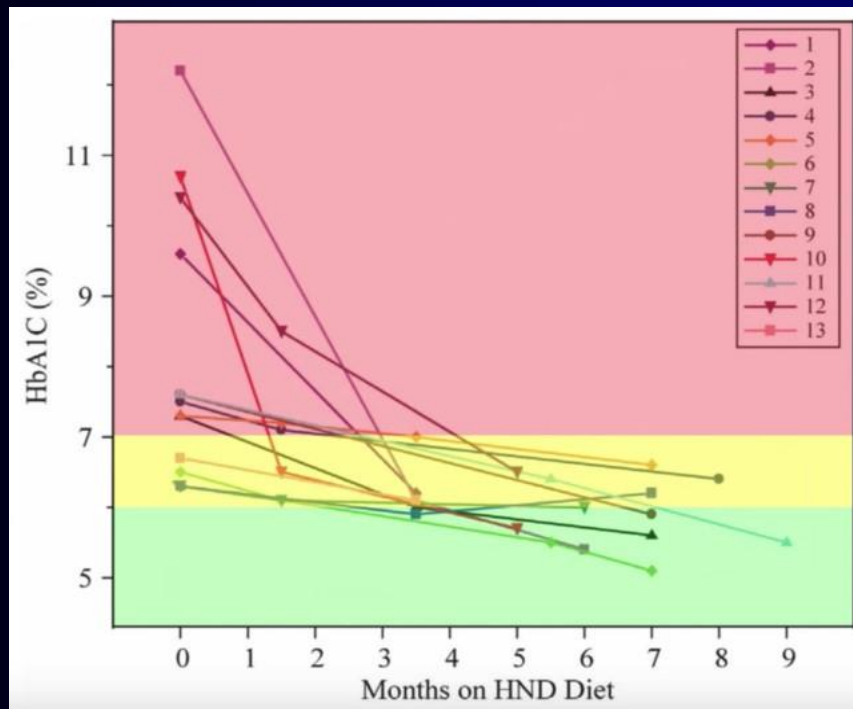*Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial* Lean, Michael EJ et al.; The Lancet, December 2017

# Drop in HbA1c on Nutrient Density Foods



# Dr. Fuhrman's High Nutrient Density Foods



**1** A large salad, include some raw onion and shredded cruciferous vegetables on top

**2** At least a ½ cup of beans or lentils in a soup, stew, on top of a salad or in another dish

**3** At least 3 fresh fruits, especially berries, pomegranates, cherries, plums, oranges

**4** At least 1 ounce of raw nuts and seeds, focus on high omega-3 nuts and seeds (walnuts, hemp, flax, chia)

**5** 1 double-size serving of steamed greens, utilize mushroom and onions in your dishes

6) Only one serving a day of non-bean starch, such as squash, steel cut oats, brown/wild rice.

7) Exclusion of white flour, sweets, and oils, while limiting animal products to 12 ounces per week.

# Exercise

Regular exercise can **prevent 30-50% of all new cases of diabetes.** *Harvard University*

When **inactive muscle cells start working**, they become more **sensitive to insulin** and increase the uptake of sugar from the blood stream.

# Exercise

For diabetes…

1. A combination of **aerobic and resistance** training exercise is best.
2. **Variety** of exercises (circuit training) is better than just a few.
3. **Interval training** is more potent than continuous intensity.
4. **Digestive walk** after meals for about 15 to 30 minutes (low intensity).

# Aerobic Exercise

- Continuous, brisk exercise
- Involves large muscle groups
- Promotes circulation of oxygen through the blood
- Increases breathing rate
- Brisk walking, jogging/running, cycling, rowing, swimming





# Resistance Exercise

- Causes muscles to contract against an external resistance

- External resistance can be
  - Dumbbells
  - Weight machines
  - Body weight
  - Water bottles/cans
  - Resistance bands

# Aerobic Exercise and HA1c Levels

There is a dose response relationship between exercise and HgA1c levels, meaning the more you exercise, the more your HgA1c levels will drop.

For aerobic exercise **>150 minutes** per week (25 minutes a day 6 days a week), the HgA1c decreased **0.89%.** For Aerobic exercise **<150 minutes** per week, the HgA1c decreased **0.36%.**

Umpierre, D. *Physical activity advice only or structured exercise training and association with HbA1c levels in type 2 diabetes: a systematic review and meta-analysis.* JAMA 2011; 305 (17); 1790-99.

# Supervised Exercise and HA1c

For **each** additional **aerobic exercise session** <u>per week</u>, **HgA$_{1c}$** levels **decrease by 0.39 %.**

High intensity exercise <u>did not improve</u> **HgA$_{1c}$** Levels.

*Diabetologia. February 2013, Volume 56, Issue 2, pp 242–251*
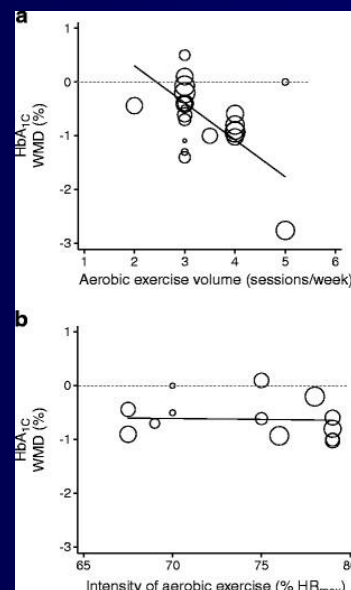
# Resistance training and type 2 diabetes

Older adults with **type 2 diabetes lose muscle mass and strength more rapidly** when compared to people of the same age **without diabetes.**



Resistance training and mortality: Strength training for 30 plus minutes per week **decreased CVD risk by 23 %.**

Tanasescu M. *Exercise type and intensity in relation to coronary heart disease in men.* JAMA Oct 23-30; 288(16): 1994-2000.

# Walk After Meals

**A 10 minute** walk after dinner dropped glucose spike after dinner by **22%!**

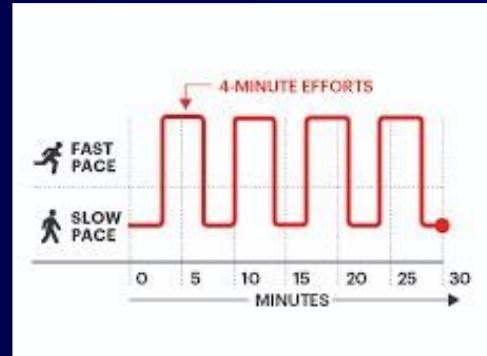**Each 1 minute** of post-meal exercise reduces the post-meal glucose spike by about **2 mg/dL**



Diabetologia (20160 59:2572 -2578
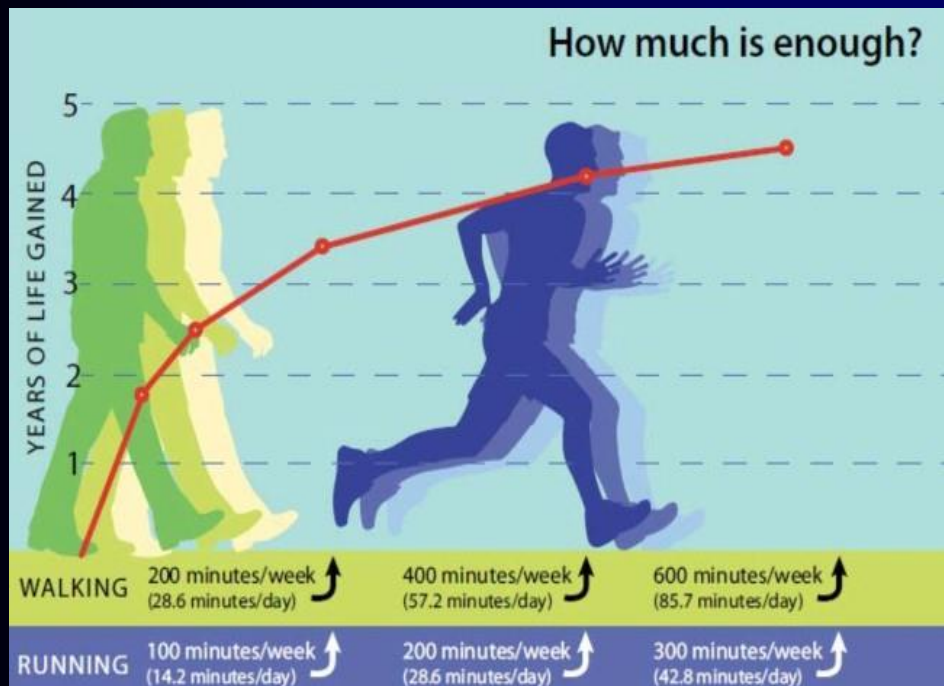
Goodbye Diabetes by Dr. Wes Youngberg, 2017

# Interval Training

Intervals: **20 seconds of exercise followed by 10 seconds of rest.**

1. Walk in place/high knees
2. Jumping jacks
3. Squat holds
4. Leg raises



# Exercise and Longevity

# Television kills!
# All Cause Mortality (Death)
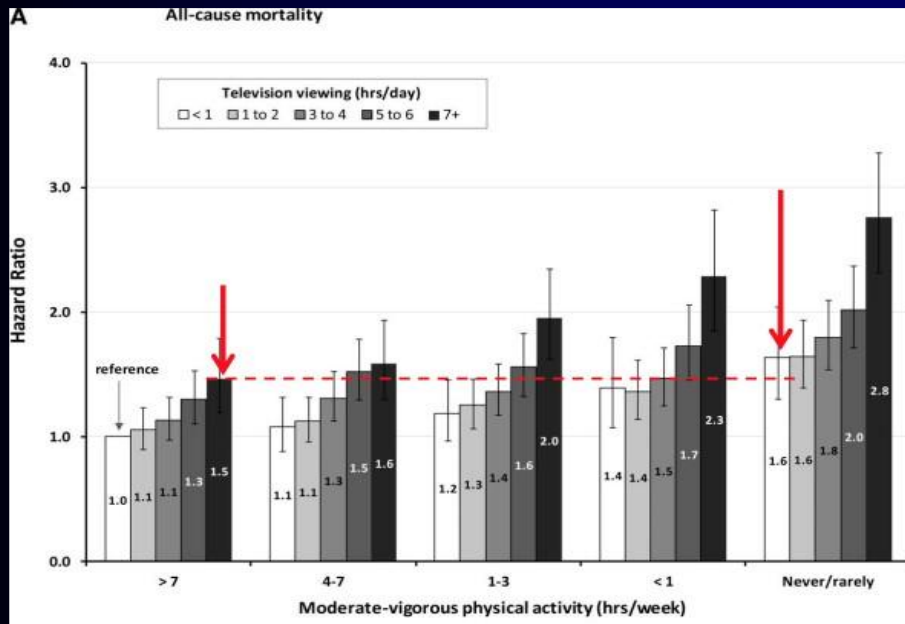


Matthews et al, Am J Clin Nutr 2012;95:43745

# Set Exercise Goals



- I will do intervals of walking and jogging for at least 20 minutes on Mondays, Wednesdays, and Fridays.

- I will weight train for at least 30 minutes on Tuesday and Friday mornings before work.

- I will take a 2-mile walk after dinner 5 nights a week.

# Water as Hydrotherapy

**80 diabetic** patients sat in a hot tub with water up to their shoulders at a temperature between 100 - 106° F for 30 minutes a day, six days a week, for **three weeks**.



There was an **average drop** in blood sugar by **23 mg/dl.** These patients also experienced **improved sleep** habits and an **increased general sense of well-being.**
*NEJM Vol. 341:924 925 (12)16, 1999 No.12*



**Heat therapy reduces** fasting blood sugar, HgA1c, body weight, and body fat. *Curr Opin Clin Nutr Metab Care, 2015 Jul;18(4):374 80.*

# Water and Weight Loss

In one study drinking 2 cups of water before the main meal for 12-weeks resulted in a weight loss of 3 pounds.
*Obesity (Silver Spring) 2015 Aug 3 doi: 10.1002/oby.2110 7.*



**Drink 5 or more cups** of water a day. Start the day with 2 cups of water. Hydrate 30 minutes before meals and at least 1 to 2 hours after meals.

# Sunlight

Sunlight improves **sleep habits**, reduces **stress**, enhances positive **moods** and reduces **pain**…all of which support normalization of blood sugar levels in diabetic patients.

"Increased bright sunlight exposure may be associated with a reduced risk for type 2 diabetes and heart disease by **lowering blood insulin and lipid levels**." *Constantinos Christodoulides*

*Bright sunlight exposure may decrease risk for type 2 diabetes, CVD. The Journal of Clinical Endocrinology & Metabolism* February 19, 2019

# Temperance or Self Control

A **low-fiber junk food diet** high in saturated fat from animal products <u>and</u> processed hardened vegetable fats can increase body weight, **reduces insulin sensitivity and** increase levels of **blood sugar and HgA1c.**

# Fresh Air

**Deep breathing exercise** can help **prevent and/or reverse** the release of **stress brain chemicals** that <u>elevated blood sugar</u> levels and <u>increase insulin resistance</u>.



# Sleep

Short (<7 hours) and long (9> hours) hours of sleep duration and poor sleep quality <u>increase levels of HbA1c</u>.

**Sleep deprivation** associated with higher baseline insulin and blood glucose levels <u>increase insulin resistance</u>.

# Sleep

Sleep deprivation **triggers** activation of the sympathetic nervous system and **cortisol release** which elevates blood sugar levels and insulin resistance.

The hormone **Leptin** which curbs appetite decreases while **Ghrelin** which stimulates hunger increases.

Curr Diab Rep. 2016 November ; 16(11): 106. doi:10.1007/s11892-0805-8

# Stressing Less and Trusting More

Stress **triggers** activation of the sympathetic nervous system and **cortisol release** which elevates blood sugar levels leading to insulin resistance.

– "Be **anxious for nothing**, but in everything by prayer and supplication **with thanksgiving** let your request be made know unto God and **the God of peace shall keep you hearts and minds** by Christ Jesus." *Philp 4:6-7*

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## How to Live Diabetes Free – Quiz Questions

1. Diabetes is all about high levels of blood sugar to the point where it creates health problems. T   F
2. The normal blood sugar range is 70 - 99 mg/dl. The prediabetes blood sugar range is 100 - 125 mg/dl. The diabetes blood sugar range is ≥130 mg/dl. T  F
3. The HgA1c levels are as follows: Optimal is under 5 (97 mg/dl), prediabetes is 5.7-6.4 and diabetes is 6.5 (140 mg/dl) or higher. T  F
4. A 1% decrease in HgA1c can lower the risks of nerve damage, kidney disease and vision complications in diabetic patients by 37%. T  F
5. Type II Diabetes is an insulin blockage problem, not an insulin shortage problem. T  F
6. The key factors that separated the Pima Indians in Mexico who have very low rates of diabetes from their genetic cousins living in Arizona who have high rates of diabetes include a low-fat high fiber diet (>50grams/day), low levels of obesity and lots of weekly exercise (22hours/week). T  F
7. Consuming 60 or more grams of fiber per day is associated with the lowest risk of becoming diabetic, based on the graphs in the course handout. T  F
8. The best beans for lowering blood sugar, based on research are chickpeas, pinto beans and black beans. T  F
9. In a 22-week study that compared a vegan diet to the ADA Diabetic Diet, the study participants who consumed the ADA Diet were more satisfied with their eating plan and lost more weight when compared to the study participants on the whole plant food diet. T  F
10. In one live-in lifestyle change programme after 21 days, 50% of the Type II Diabetics were off all medications and insulin, and their blood sugar levels were in the normal range. T  F

11. A diet low in saturated fat and high in fiber rich whole plant foods improves cell membrane function, thus increasing insulin sensitivity, which in turn increases blood sugar levels. T  F
12. Regular exercise can prevent 30-50% of all new cases of diabetes. T  F
13. Interval training is not more potent at enhancing weight loss than exercising at one level of intensity for the entire exercise session. T  F
14. In one study, for each additional aerobic exercise session per week, $HbA_{1c}$ levels decreased by 0.39%. T  F
15. Heat therapy (e.g., sauna and a hot tub) reduces the levels of blood sugar, HgA1c, body weight and body fat. T  F
16. Increased bright sunlight exposure may be associated with a reduced risk for Type II Diabetes and Coronary Heart Disease because it lowers both blood insulin and blood lipid levels. T  F
17. Sleep deprivation is associated with higher baseline insulin and glucose levels and decreased insulin resistance. T  F
18. Stress triggers activation of the sympathetic nervous system and cortisol release, which elevates blood sugar levels leading to insulin resistance. T  F
19. Short (<7 hours) and long (9> hours) time periods of sleep, as well as poor quality of sleep are associated with increased levels of HgA1c. T  F
20. Deep breathing exercise cannot prevent and/or reverse the release of stress brain chemicals that elevate blood sugar levels and increase insulin resistance. T  F