

How to Stop Prediabetes from Becoming Diabetes

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Goals of today's talk

- Diabetes is a devastating disease
- Prediabetes and diabetes are on different ends of the same continuum
- Diabetes can be prevented/delayed with proper interventions



Goals of today's talk

- Even small interventions can be of great benefit.
- You don't have to get skinny to improve your health.
- You are the most important factor in this process – "You are in charge."



Type 2 diabetes mellitus

- Insulin doesn't work properly (insulin resistance)
- Pancreas increases insulin production
- Eventually the pancreas cannot produce enough insulin to overcome the insulin resistance and the blood sugars rise



Complications of diabetes

- Coronary artery disease
- Strokes
- Blindness
- Kidney failure
- Peripheral nerve damage
- Foot ulcers/amputation

What is prediabetes?

- Comes before type 2 diabetes.
- Blood glucose higher than normal, but not yet diabetes.
- More than 100 million Americans have prediabetes or diabetes.
- Estimated 34% of adults have prediabetes
 - 35% of US adults older than 20yrs
 - 50% of US adults older than 65yrs

Diagnosis of diabetes/prediabetes

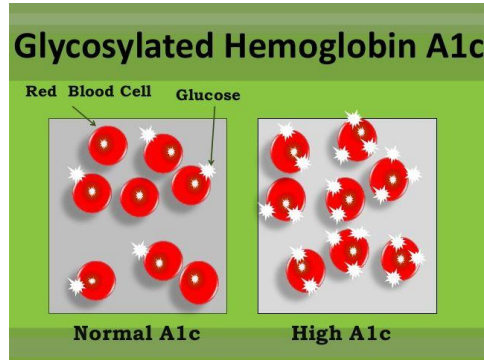
	Non-diabetic	Prediabetes	Diabetes
Before meals (fasting)	Less than 100 mg/dL (normal)	100-125 mg/dL	126 mg/dL or higher
Random	Less than 140 mg/dL	140-199 mg/dL	200 mg/dL or higher
A1C	Less than 5.7 %	5.7 – 6.4 %	6.5 % or higher

Diagnosis of prediabetes: Hemoglobin A1c

- A blood test that measures the amount of glycosylated hemoglobin in the blood.
- Gives you a picture of your average blood glucose control for the past 2 to 3 months.

Diagnosis of diabetes/prediabetes: Hemoglobin A1c

- Glucose molecules normally become stuck to hemoglobin molecules in red blood cells = hemoglobin becomes glycosylated
- As a person's blood sugar becomes higher, more of hemoglobin becomes glycosylated
- A1c range of 5.7–6.4% = prediabetes



Risk factors for Type 2 diabetes (Who should be tested for prediabetes?)

- You have high blood pressure (over 140/90)
- You have existing cardiovascular disease
- You have low HDL (good) cholesterol (40 or lower)
- You have high triglycerides (150 or higher)
- You smoke cigarettes

Risk factors for Type 2 diabetes (Who should be tested for prediabetes?)

- A parent, brother or sister has diabetes
- You are African American, Hispanic/Latino, Native American, Asian American or Pacific Islander
- You had a baby weighing more than 9 pounds or had gestational diabetes
- You have a history of polycystic ovary syndrome

Who should be tested for prediabetes? If you are...

- Age 45 or older and overweight, with a BMI above 25
- Age 45 or older and not overweight – ask your doctor if you need to be tested
- Under age 45, but overweight and at increased risk for diabetes
- Inactive

Not all prediabetics are obese or overweight

- In a sample area, 81% are overweight/obese while 19% had normal weight.

If you have prediabetes, why should you care?

- Increased risk of getting type 2 diabetes soon or sometime in the future:
 - 70% of individuals with prediabetes will eventually develop diabetes.
 - If prediabetes not treated, 37% of individuals will have diabetes in 4yrs.

If you have prediabetes, why should you care?

- Raises risk for heart disease and stroke
- Increased risk of:
 - Blood vessel changes in the eyes (retinopathy)
 - Changes in the nerves (neuropathy)
 - Kidney disease (nephropathy)

Prediabetes is reversible!

Goals of treatment for prediabetes

- Avoid progression to type 2 diabetes mellitus
- Lower blood sugars
- Decrease risk of complications of diabetes and prediabetes

Treatment of prediabetes

- Weight loss
- Exercise
- Medications

Treatment of prediabetes

The Diabetes Prevention Program study showed

- **30 minutes** a day of moderate physical activity along with a **5 to 10%** weight loss produced a **58% reduction** in diabetes!

Body Mass Index (BMI)

- Convenient measure of body fat
- $BMI = \text{Weight} / (\text{height} \times \text{height})$

BMI

- Underweight <18.5
- Normal weight 18.5-24.9
- Overweight 25-29.9
- Obesity 30-40
- Morbid obesity 40+

Weight loss

- The goal is a weight loss of 5-10% total body weight
- Focus on healthy eating and calorie reduction (avg 500 kcal/day).
- Optimal goal: a sustained weight loss of 7%.

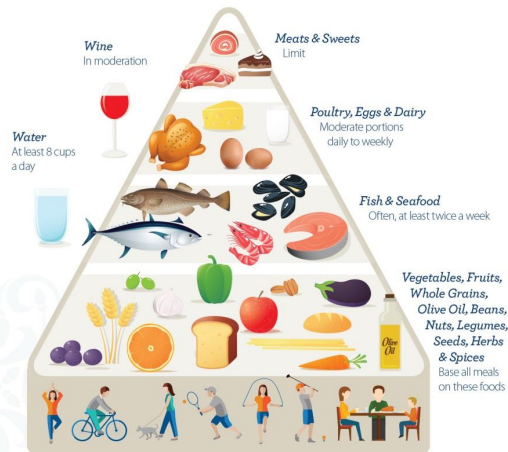
If You Weigh:	Losing 5 to 10% is
150 pounds	8 to 15 pounds
175 pounds	9 to 18 pounds
200 pounds	10 to 20 pounds
225 pounds	11 to 23 pounds
250 pounds	13 to 25 pounds
300 pounds	15 to 30 pounds

How to Achieve Weight Loss?

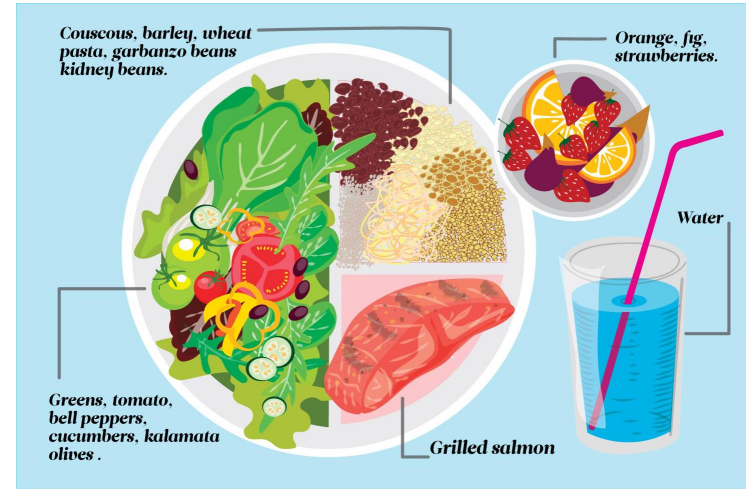
- Weekly self-weighing
- Eat breakfast
- Drink water
- Get sleep
- Eat healthy foods

Healthy Eating Patterns

THE MEDITERRANEAN DIET



Savor meals with loved ones and be active every day.



Mediterranean Diet on a Plate

Healthy Eating Patterns

The DASH Diet for Healthy Blood Pressure

Follow these DASH (Dietary Approaches to Stop Hypertension) guidelines for a healthier, more balanced diet

Grains
6 TO 8 SERVINGS PER DAY

Fresh Fruits and Vegetables
4 TO 5 SERVINGS OF EACH PER DAY

Lean Protein
6 OR LESS SERVINGS PER DAY

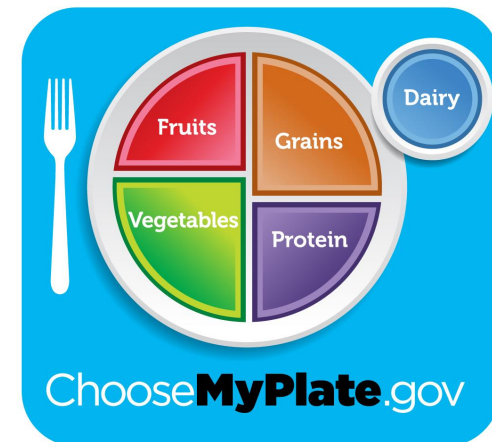
Low-fat Dairy
2 TO 3 SERVINGS PER DAY

Legumes or Nuts/Seeds
4 TO 5 SERVINGS PER WEEK

Fats and Sweets
LIMITED

OhioHealth
Discover how the DASH Diet can help you manage your blood pressure at blog.ohiohealth.com

Plate Method
www.myplate.gov



Carb Counting

The Recommended Daily Allowance (RDA) for carbs is 130 grams per day. Per meal this comes to about:

- 60-75 grams of carbohydrates per meal for men
- 45-60 grams per meal for women

Does food order matter?

- Eating protein and vegetables before carbohydrates leads to lower post-meal glucose and insulin levels in obese patients with type 2 diabetes, Weill Cornell Medical College researchers found.

Effect of regression from prediabetes to normal glucose regulation on long-term reduction in diabetes risk: results from the Diabetes Prevention Program Outcomes Study.
Lancet. 2012 Jun 16;379(9833):2243-51



Fiber for Controlling Blood Sugar

- Fiber doesn't require insulin [to digest], so it isn't counted as part of your carbohydrates.
- Adults need at least 25 grams of fiber daily for best health outcomes.
- Go slow. If you are new to fiber, increase your intake slowly. Your body will need time to adjust.



Fiber for Controlling Blood Sugar

- Plan on adding some time to your food preparation habits, look for higher-fiber options like salads, or keep healthy snacks on hand — such as a handful of nuts, fresh fruit, or veggie slices and a healthy dip — to tide you over.
 - Avoid processed and refined foods.
 - Eating foods that are cheap, quick, and easy, or grabbing fast food on the go, means you are probably not going to get the fiber you need.

What about resistant starch?

- Resistant starch improves insulin sensitivity in metabolic syndrome.

Johnston KL1, Thomas EL, Bell JD, Frost GS, Robertson MD.e

Examples of Resistant Starch:

- Oats
- Cooked and cooled potatoes
- Green bananas
- Cooked and cooled rice



Does cinnamon help?

- Research findings have been mixed.
- However, some studies suggest that cinnamon supplements added to standard hypoglycemic medications and other lifestyle therapies had modest effects on FPG and HbA1c.

[J Med Food](#). 2011 Sep;14(9):884-9. doi: 10.1089/jmf.2010.0180. Epub 2011 Apr 11.
Cinnamon intake lowers fasting blood glucose: meta-analysis.

[J Acad Nutr Diet](#). 2016 Nov;116(11):1794-1802. doi: 10.1016/j.jand.2016.07.015. Epub 2016
Do Cinnamon Supplements Have a Role in Glycemic Control in Type 2 Diabetes? A Narrative Review.



Does vinegar help?

- Several small trials in the recent past suggest that vinegar is a glucose-lowering agent.
- Study by Johnston, et. al, indicated that vinegar can
 - significantly improve insulin sensitivity in insulin-resistant patients
 - vinegar may possess physiological effects similar to acarbose or metformin

Diabetes Care 2004 Jan; 27(1): 281-282

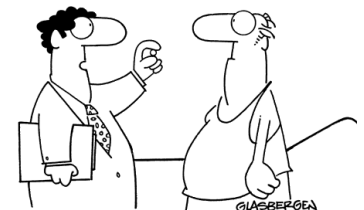
Vinegar Improves Insulin Sensitivity to a High-Carbohydrate Meal in Subjects With Insulin Resistance or Type 2 Diabetes

Carol S. Johnston, PHD, Cindy M. Kim, MS and Amanda J. Buller, MS

How to Achieve Weight Loss?

- Exercise
 - 30 minutes, 5-7 times/week (or a total of 150 minutes/week however you can get it)
 - + 2 days of resistance training (weights/arm bands, etc.).

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www.glasbergen.com



"To prevent a heart attack, take one aspirin every day.
Take it out for a jog, then take it to the gym,
then take it for a bike ride..."

Benefits of exercise

- Reduced risk of diabetes
- Reduced risk of cardiovascular disease
- Reduced risk of some cancers
- Improved bone density with decreased risk of hip fractures
- Improved pain and quality of life in patients with arthritis
- Improved sleep
- Decreased risk of falls
- Increased longevity
- Improved depression and anxiety
- Improved memory/decreased risk of dementia

Starting an exercise program

- Talk with your doctor before starting an exercise program
- Start slowly and increase the duration and intensity of your exercise gradually
- Goal is 30 minutes of moderate activity, 5-7 days each week

Pharmacologic intervention

- Lowers risk of developing diabetes by 45%.
- Greatest benefit = those prediabetics with higher Body Mass Index (BMI).
- Metformin has good safety profile, with beneficial effects on BMI and lipids.

Treatment recommendation for individuals with IFG, IGT, or elevated A1C

Population	Treatment
IFG, IGT, or A1C (5.7 to 6.4%)	Lifestyle modifications (i.e., 5 to 10% weight loss and moderate-intensity physical activity, approximately 30 min/day)
Individuals with IFG, IGT, or A1C 5.7 to 6.4%, especially for those: <60 years of age BMI ≥ 35 kg/m ² Women with prior gestational diabetes	Lifestyle modification (as above) and/or metformin*

IFG: Impaired fasting glucose; IGT: impaired glucose tolerance; A1C: glycated hemoglobin; BMI: body mass index. * **Metformin 850 mg twice per day.**

Reproduced with permission from: Nathan DM, Davidson MB, DeFronzo RA, et al. Impaired fasting glucose and impaired glucose tolerance. *Diabetes Care* 2007; 30:753. Copyright © 2007 American Diabetes Association. Updated information from American Diabetes Association. *Standards of medical care in diabetes – 2013. Diabetes Care* 2013; 36 Suppl 1:S11. The content within this table is still current as of the 2017 version of the *Standard of Medical Care in Diabetes. Graphic 67073 Version 9.0*
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Surgical Intervention

- For morbidly obese: bariatric surgery associated with sustained weight loss

Does sleep matter?

- Evidence from both longitudinal and prospective studies suggests that sleep loss is associated with an increase in the risk of obesity.
- Sleep restriction leads to hormonal alterations, which may favor an increase in calories intake and a decreased energy expenditure – and ultimately lead to weight gain.

[Curr Opin Clin Nutr Metab Care. 2011 Jul; 14\(4\): 402–412.](#)
Sleep and obesity
Guglielmo Beccuti^{a,b} and Silvana Pannain^a

Studies

Diabetes Prevention Program (DPP)

- 3234 patients average age 51, average BMI 34
- Followed for 3 years
- Low fat diet and 150 minutes exercise each week with a goal of 7% weight loss vs control
- Results:
 - 14% developed Diabetes vs 29 % in control group
 - average weight loss 15#
 - 16% reduction for every 2.2# lost

2012 Perreault, et al., study

- Showed reversion to normal glucose levels— even transiently— was associated with 56% reduced risk of future diabetes.

Effect of regression from prediabetes to normal glucose regulation on long-term reduction in diabetes risk: results from the Diabetes Prevention Program Outcomes Study.
Lancet. 2012 Jun 16;379(9833):2243-51

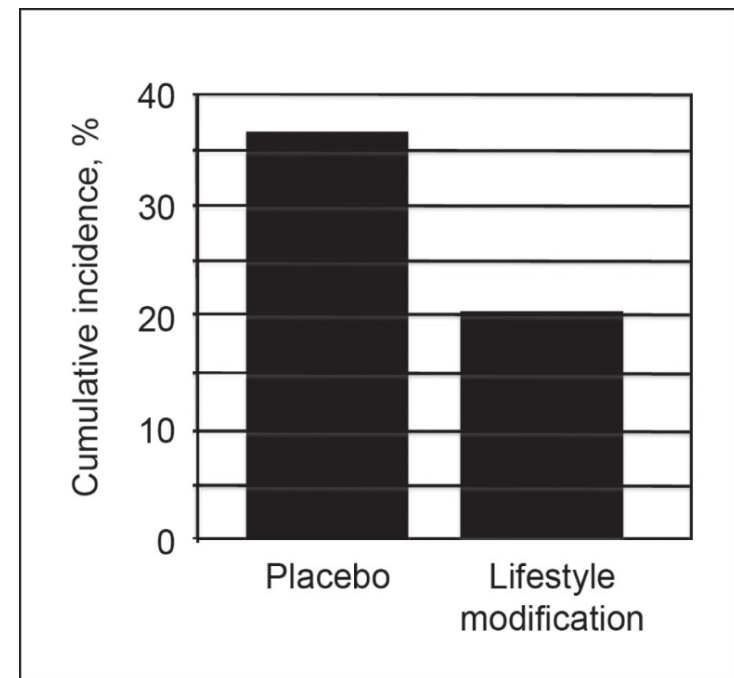
Finnish Diabetes Prevention Study

- 552 middle aged patients with IGT
- Average BMI 33.2
- Weight reduction and exercise vs control
- Average weight loss 7.7#
- Progression to Diabetes at 2 years
 - 11% in exercise/weight loss group
 - 22% in control group

Knowler, et al, study

- In 2002, Knowler, et al¹⁶, hypothesized that lifestyle intervention would prevent or delay the development of diabetes.
 - Randomly assigned patients with prediabetes to receive a placebo or a lifestyle modification program.
 - Goals of at least a 7% weight loss and at least 150 minutes of physical activity per week.

Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin.
N Engl J Med. 2002 Feb 7;346(6):393-403.
William C. Knowler, M.D., et al¹⁶



Knowler, et al, study

- Showed metformin lowered incidence of diabetes but not as much as lifestyle intervention



Take home message:

All it takes is exercise and weight loss
to reverse prediabetes!



Thank You!

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