



# Stop Prediabetes from Becoming Diabetes

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# Key Points of Tonight'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 Tonight'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.”

# What is Diabetes?

- Diabetes is shortened form of “Diabetes Mellitus” and you’ll often see it abbreviated as DM.
- Diabetes = Greek “siphon” and Mellitus = Latin for “honey” or sweet.
- Doctors of old noticed patients would urinate frequently and the urine tasted sweet
- ... because the patients were dumping glucose in the urine, creating increased urination and a sweet taste to the urine (fortunately we have more accurate tests for urine glucose now)

# Type 1 vs. Type 2 Diabetes

## Type 1 Diabetes

- Usually onset in childhood or early 20s
- Pancreas does not produce ANY insulin
- Patients must take insulin shots several times a day

## Type 2 Diabetes

- 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

- Elevated glucose in the blood is **INFLAMMATORY** and damages blood vessels
  - Coronary artery disease
  - Strokes
  - Blindness
  - Kidney failure
  - Peripheral nerve damage
  - Foot ulcers/amputation

# What is Prediabetes?

- Blood glucose higher than normal, but does not meet criteria for diagnosis of diabetes
  - Elevated fasting blood glucose less than 126 mg/dL
  - Hemoglobin A1c between 5.7-6.4%
- 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

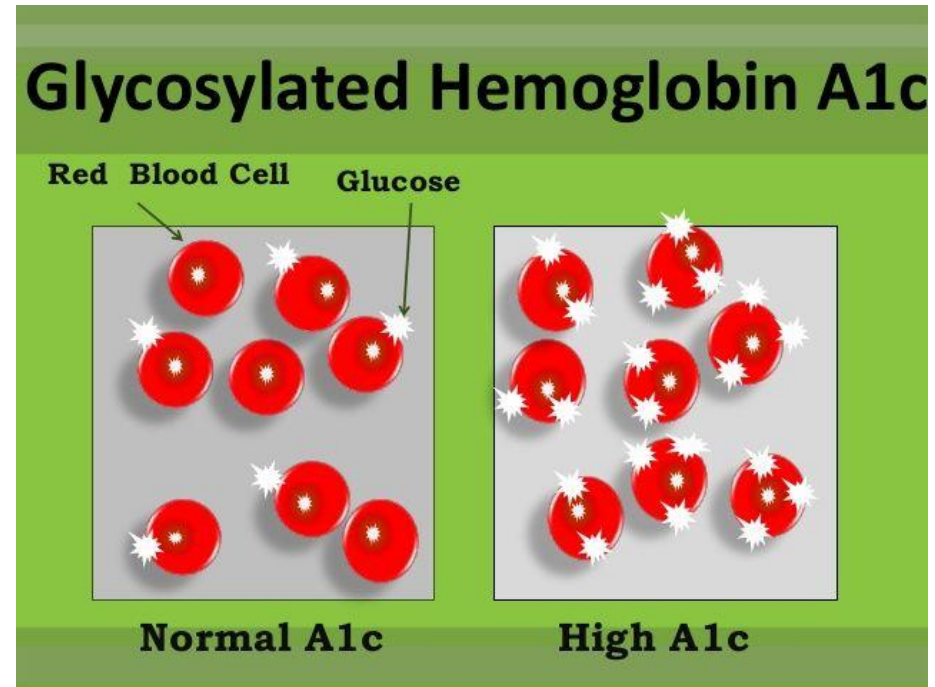


# Diagnosis of Prediabetes: Hemoglobin A1c

- 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 are overweight
- You smoke cigarettes

# Risk Factors for Type 2 Diabetes

## (Who should be tested for prediabetes?)

- You have a first degree relative with Type 2 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%** body weight loss produced a **58%** reduction in progression to diabetes!*

# Body Mass Index (BMI)

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

# 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%.

<b>If You Weigh:</b>	<b>Losing 5 to 10% is</b>
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

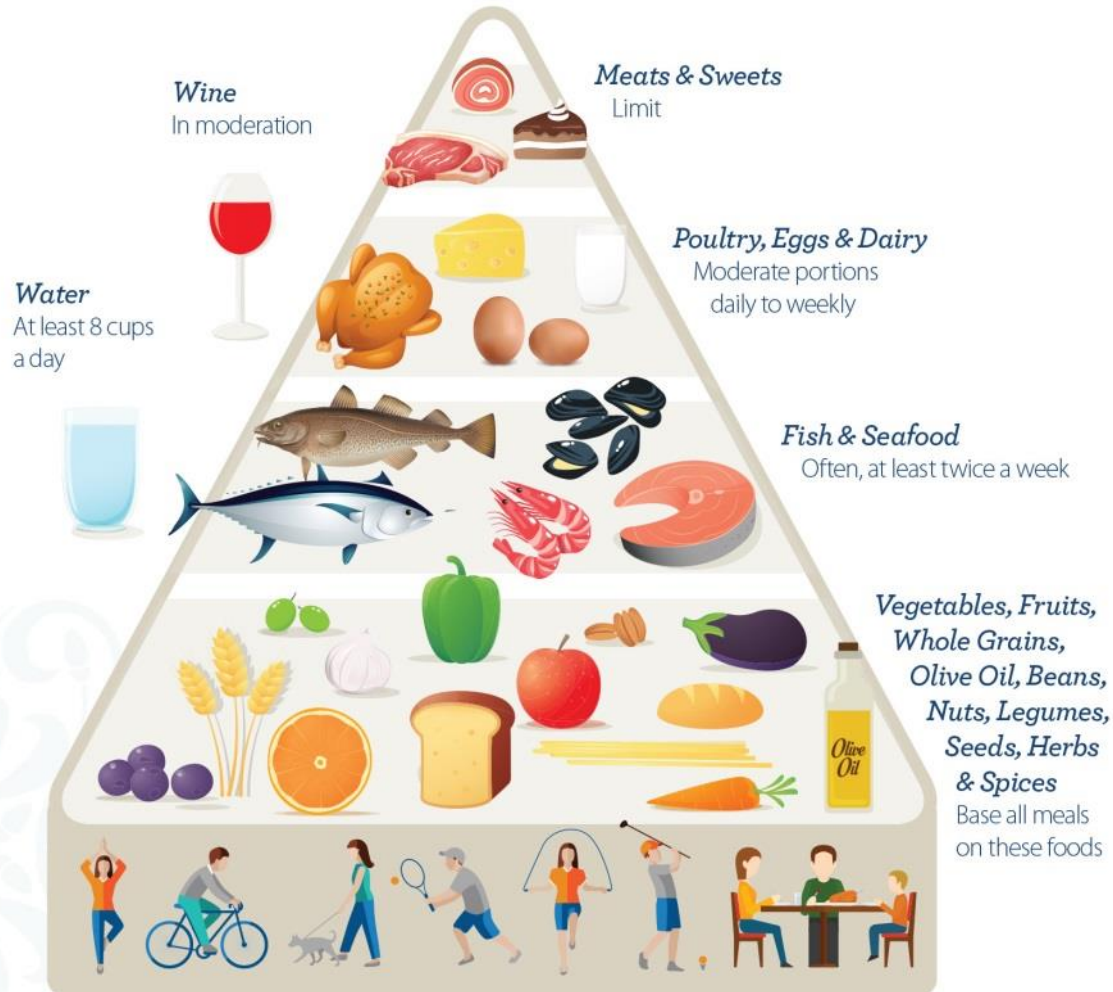


# How to Achieve Weight Loss?

- 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

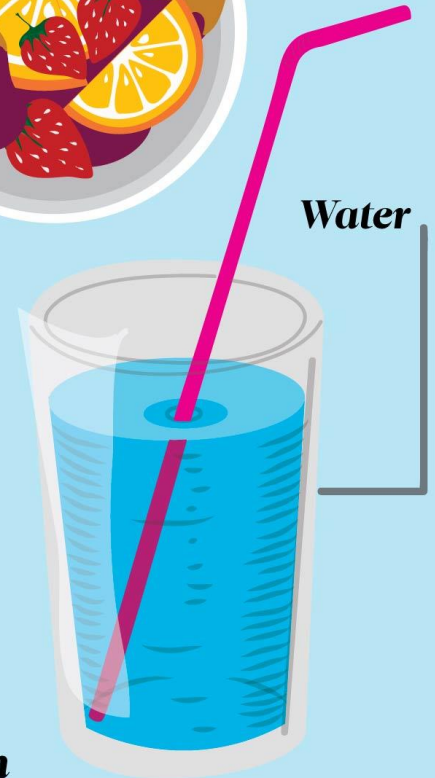
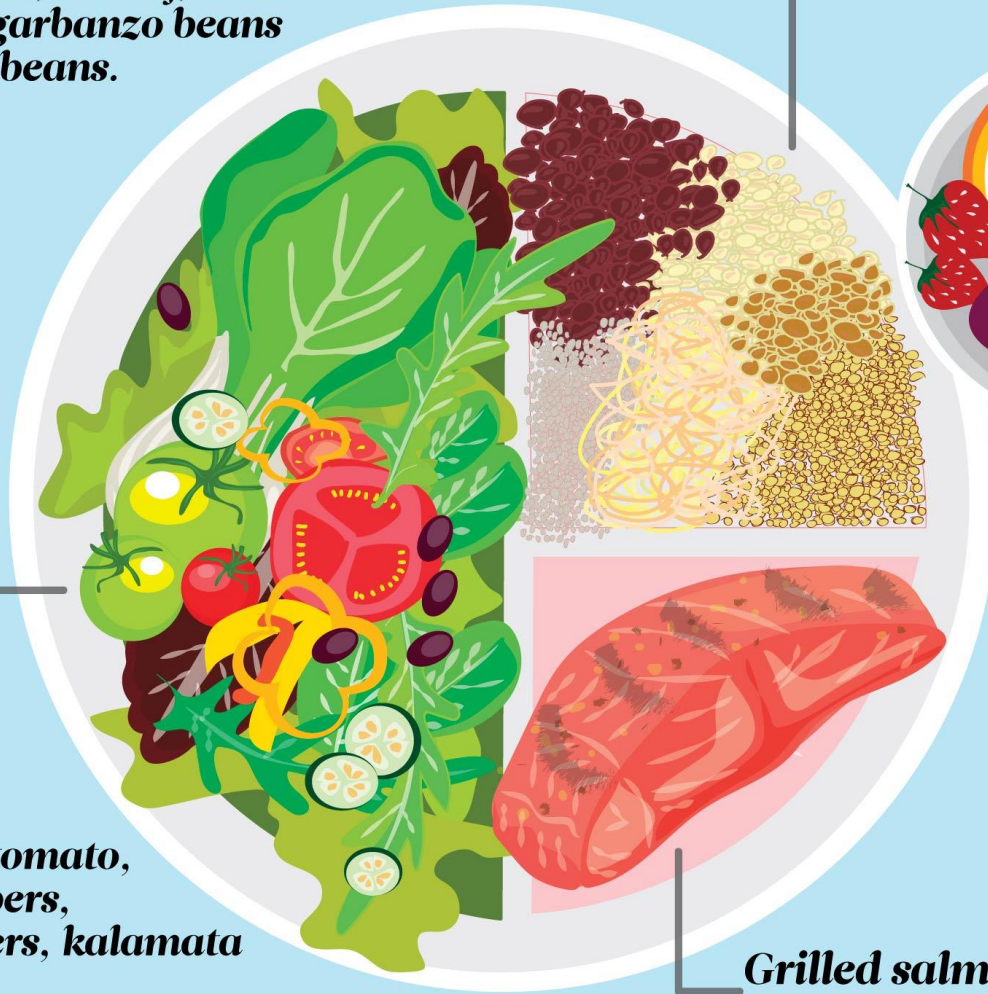
**Couscous, barley, wheat  
pasta, garbanzo beans  
kidney beans.**

**Orange, fig,  
strawberries.**

**Water**

**Greens, tomato,  
bell peppers,  
cucumbers, kalamata  
olives .**

**Grilled salmon**



# Healthy Eating Patterns

## The DASH Diet for Healthy Blood Pressure

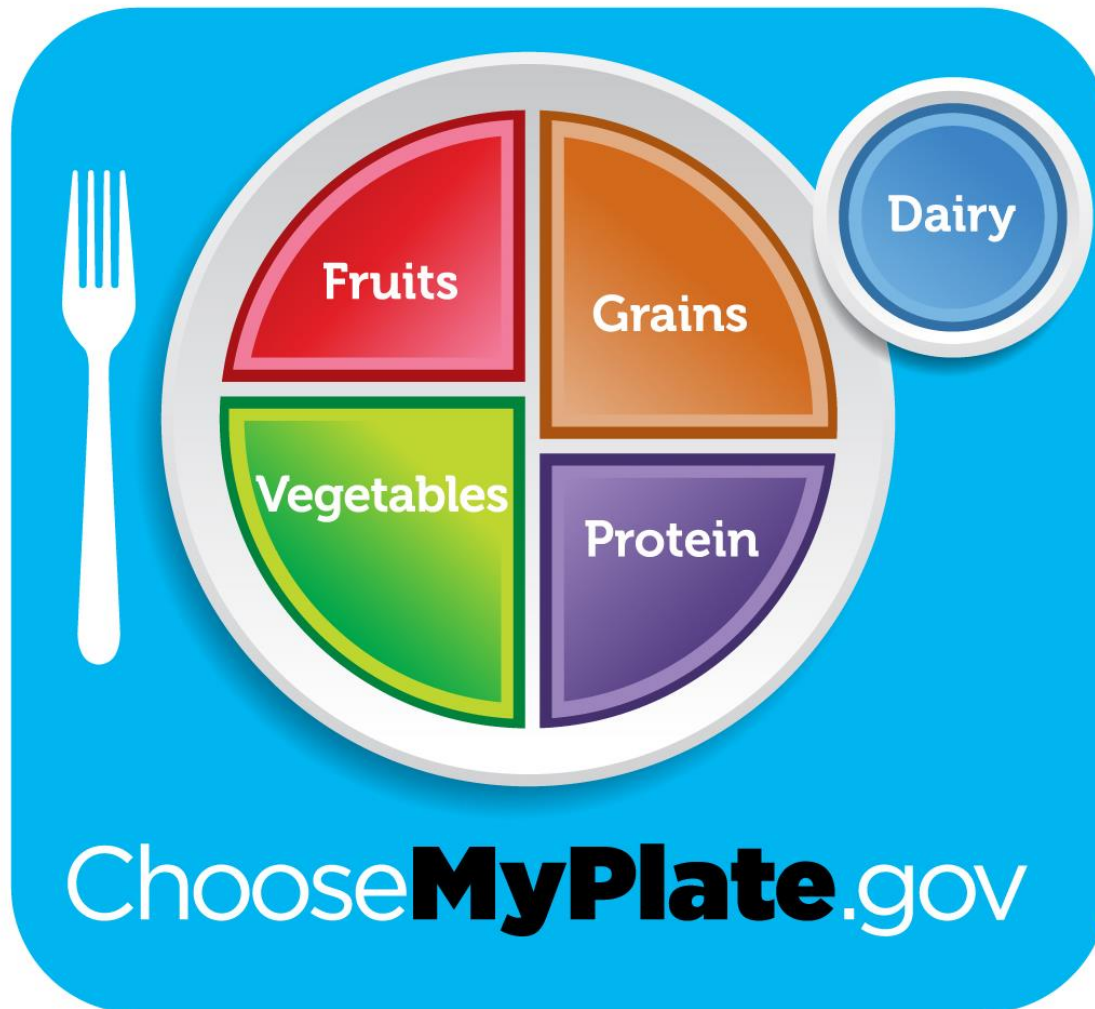
Follow these DASH (Dietary Approaches to Stop Hypertension) guidelines for a healthier, more balanced diet



Discover how the DASH Diet can help you manage your blood pressure at [blog.ohiohealth.com](http://blog.ohiohealth.com)

# Plate Method

[www.myplate.gov](http://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 may improve insulin sensitivity in metabolic syndrome

*\*Bindels et al. Curr Opin Clin Nutr Metab Care 2015 Nov; 18(6):559-565*

## Examples of Resistant Starch:

- Oats, barley, beans
- Cooked and cooled potatoes
- Green bananas
- Cooked and cooled rice
  - Do not release glucose in the small intestine but are fermented by bacteria in the colon
  - Cooling grains, potatoes changes the molecular configuration of the starches

*\*Yadav, Sharma, Yadav. Int J. Food Sci Nutr. 2009; 60 Suppl 4: 258-272*

# 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 fasting glucose 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 min./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.
  - Metformin works by improving insulin sensitivity and decreasing glucose manufacture in the liver



# 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 $\geq 35$ kg/m <sup>2</sup>  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](#)<sup>a,b</sup> and [Silvana Pannain](#)<sup>a</sup>

# Studies

# Diabetes Prevention Program (DPP)

- 3,234 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

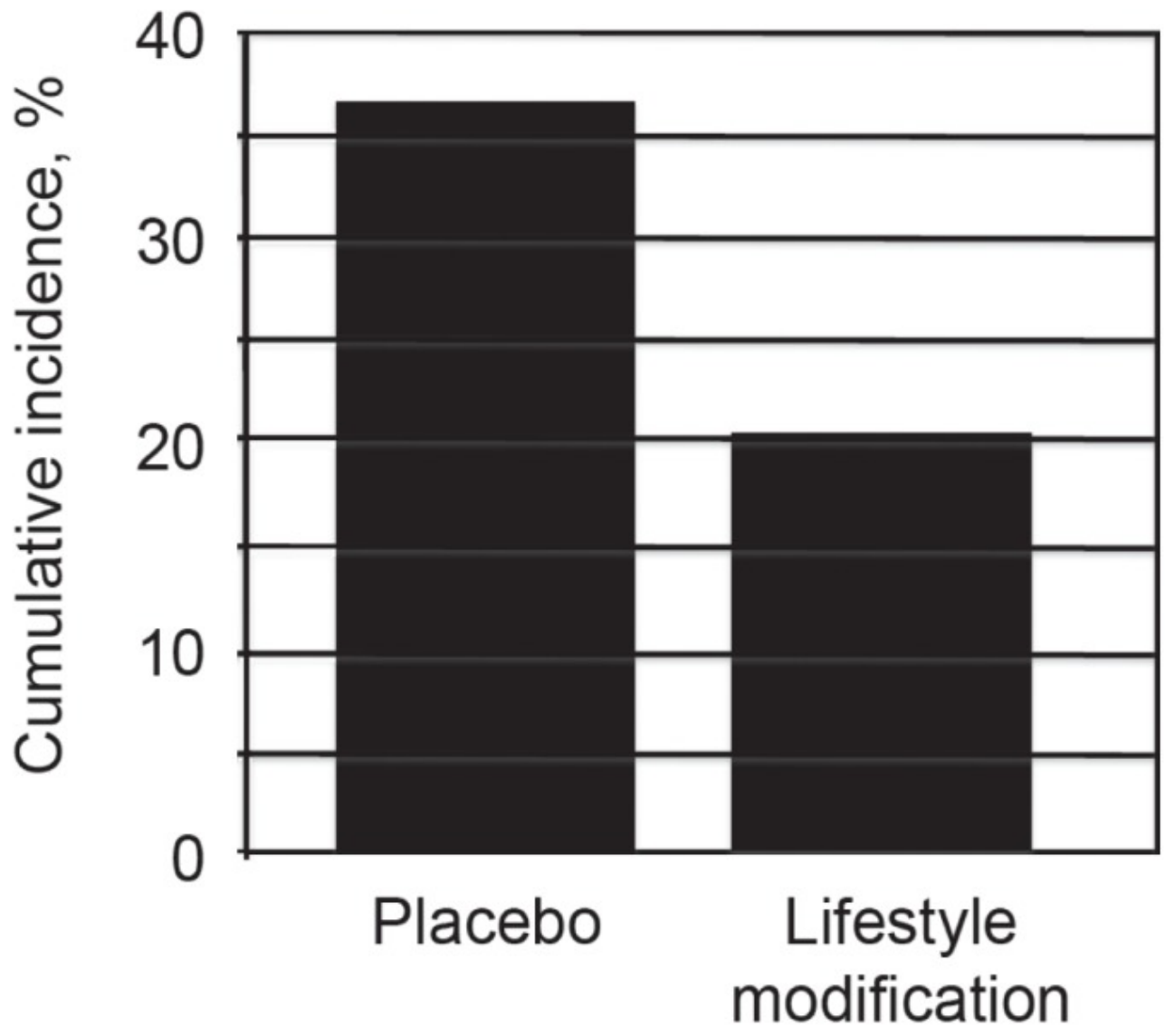
- In 2002, Knowler, et al<sup>16</sup>, hypothesized that lifestyle intervention would prevent or delay the development of diabetes.
  - Randomly assigned patients with prediabetes to receive a placebo or a lifestyle modification program.
  - Goals of at least a 7% weight loss and at least 150 minutes 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 al<sup>16</sup>





# 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!

# The Diabetes Prevention Program:

## Offered by Boulder County Area Agency on Aging:

- A proven behavior change program developed by the CDC
- A trained lifestyle coach provides support and guidance to the group
- Skill building to lose weight, become more physically active and manage stress
- A year-long program with weekly meetings for six-months, followed by one to two a month for the second six months.

### **New class starting September 16, 2020**

Limited space so sign up early, classes are offered without charge to qualified participants.  
Pre-registration is required.

### **Wednesdays, 1 - 2 p.m.**


Class will be held virtually, so you can attend from your own home.

### **To find out if you are eligible:**

Call 303-441-4710 or email [infohealthyaging@bouldercounty.org](mailto:infohealthyaging@bouldercounty.org)



**Thank You!**



# Stop Prediabetes from Becoming Diabetes

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Boulder Community Health



Did you know that one-in-three Coloradans have prediabetes? Are you one of them? Left untreated, prediabetes can raise your risk of developing Type 2 diabetes, heart disease and stroke. The good news is that you CAN PREVENT these serious complications.

The Diabetes Prevention Program, offered by Boulder County Area Agency on Aging, provides:

- A proven behavior change program developed by the Centers for Disease Control
- A trained lifestyle coach to provide support and guidance to the group
- Skill building to lose weight, become more physically active and manage stress
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Healthy Aging Programs

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Reasonable accommodations will be provided upon request for persons with disabilities. Please contact Julia Yager, ADA Coordinator or the Human Resources Division, at 303-441-3525 at least 48 hours prior to the scheduled event.