

# Medical Management of Prediabetes

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# Question 1

From clinical trial evidence which of the following types of diabetes can be prevented?

- a. Type 1 diabetes
- b. Type 2 diabetes
- c. Gestational diabetes
- d. Steroid induced diabetes

## Question 2

Clinical trials of diabetes prevention have been conducted in all of the following populations EXCEPT?

- a. Chinese men and women
- b. Elderly Americans
- c. Women with gestational diabetes
- d. Obese children
- e. Persons at risk of type 1 diabetes

## Question 3

Which of the following are **proven** risk factors for type 2 diabetes?

- a. Obesity
- b. Sugar sweetened beverage consumption
- c. Having a first degree relative with diabetes
- d. Gestational diabetes
- e. Being sedentary

# Question 4

**Prediabetes** refers to which of the following results?

- a. Fasting plasma glucose 5.6-6.9mmol/L
- b. 2 hour glucose after 75g OGTT of 7.9-11.0mmol/L
- c. An HbA1c of 5.7-6.9% on a NSGP standardized assay
- d. All of the above

## Question 5

Most diabetes prevention studies have been conducted populations that meet which of the following criteria for pre-diabetes?

- a. Fasting plasma glucose 5.6-6.9mmol/L
- b. 2 hour glucose after 75g OGTT of 7.9-11.0mmol/L
- c. An HbA1c of 5.7-6.9% on a NSGP standardized assay
- d. All of the above

## Question 6

Which of the following medications have been demonstrated to reduce the risk of diabetes in patients with prediabetes?

- a. Metformin
- b. Pioglitazone
- c. Acarbose
- d. Liraglutide
- e. Orlistat
- f. None of the above

# Question 7

Which of the following medications have been approved by the US Food and Drug Administration for diabetes prevention?

- a. Metformin
- b. Pioglitazone
- c. Acarbose
- d. GLP-1 receptor agonists
- e. Orlistat
- f. None of the above



## Question 8

The Diabetes Prevention Programme found that lifestyle change was most effective in preventing diabetes among which of the following groups of persons?

- a. Men
- b. Those with elevated fasting glucose
- c. Participants over 60 years old
- d. Participants under 45 years old

## Question 9

Which of the following medications have been demonstrated to reduce the risk of both cardiovascular events and diabetes?

- a. Metformin
- b. Pioglitazone
- c. Acarbose
- d. Atorvastatin

# Question 10

Which of the following have the potential to “reverse” diabetes

- a. Bariatric surgery
- b. Metformin
- c. Very Low Calorie Diets
- d. Sitagliptin

# Objectives

At the end of this presentation and with the use of supplemental reading the participant should be able to :

- a. Describe the natural history of type 2 diabetes
- b. Identify modifiable and non-modifiable risk factors for type 2 diabetes
- c. Define pre-diabetes
- d. Explain the clinical importance of pre-diabetes why it can be a critical point for intervention
- e. Discuss the findings from major clinical trials that have attempted to reduce the risk of type 2 diabetes in vulnerable populations through pharmacological and non-pharmacological methods.
- f. Discuss the role of newer pharmacological agents on type 2 diabetes risk and prevention.

# What is Diabetes?

- **Definition** - A syndrome of inappropriate metabolism of carbohydrate protein and fat related to insufficient production of insulin, inappropriate usage of insulin or both
- This dysmetabolism is the cause of the many complications of the disease, resulting in a huge cost to the healthcare system

# Why is Diabetes Important?

- Associated with acute and chronic complications
- **Acute**  
diabetic ketoacidosis, hyperglycemic  
hyperosmolar states, hypoglycemic states
- **Chronic**  
**Microvascular Complications** - eye, kidney,  
nerve damage  
**Macrovascular** - heart, peripheral vascular  
disease, stroke and amputations

# Symptoms of Diabetes

- Can be asymptomatic – type 1 diabetes tends to be acute in onset so this period is short but for type 2 diabetes symptoms may only occur 3-5 years after the onset of the disease !!
- Increased thirst (polydipsia)
- Increased urination (polyuria)
- Weight loss
- Blurred vision
- Coma – ketoacidosis or hyperglycemic hyperosmolar coma (HHS)
- Death

# Diagnosing Diabetes

## The 1997 ADA criteria

- Symptoms of diabetes with a random plasma glucose of  $\geq 11.1$  mmol/l
- Fasting (no caloric intake for at least 8 hours) plasma glucose  $\geq 7.0$  mmol/l\*
- 2 hour plasma glucose during an Oral Glucose Tolerance Test using 75g of anhydrous glucose dissolved in water of  $\geq 11.1$  mmol/l\*

\*Confirm by repeat testing on another day



# Retinopathy in 5,023 Pima Indians by 5-Percentile Groups of Plasma Glucose

FPG=117 mg/dl  
2hPG=193 mg/dl



Groups by Glucose

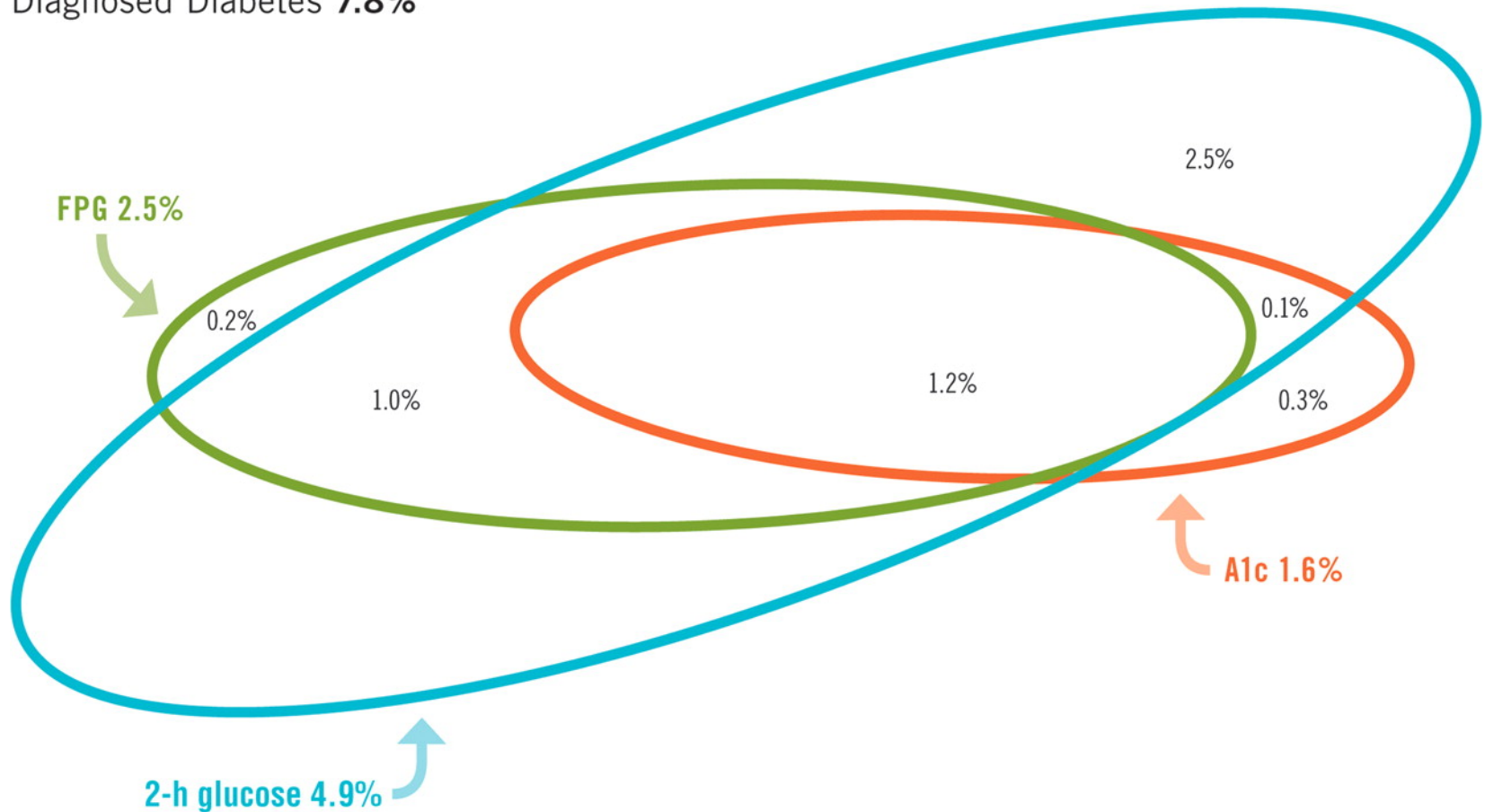
# Diabetes Diagnosis - Expert Committee

- Glucose measurements are not as standardized.
- Glucose is not stable at room temperature - even in a Fluoridated Tube.
- The HbA1c requires no preparation, is more stable at room temperature, less day to day variability, more work internationally has been done to standardize the assay.
- Recommended a HbA1c value  $> 6.5\%$  be used to diagnose diabetes

# Undiagnosed diabetes in the U.S. population aged $\geq 20$ years by three diagnostic criteria—NHANES 2005–2006.

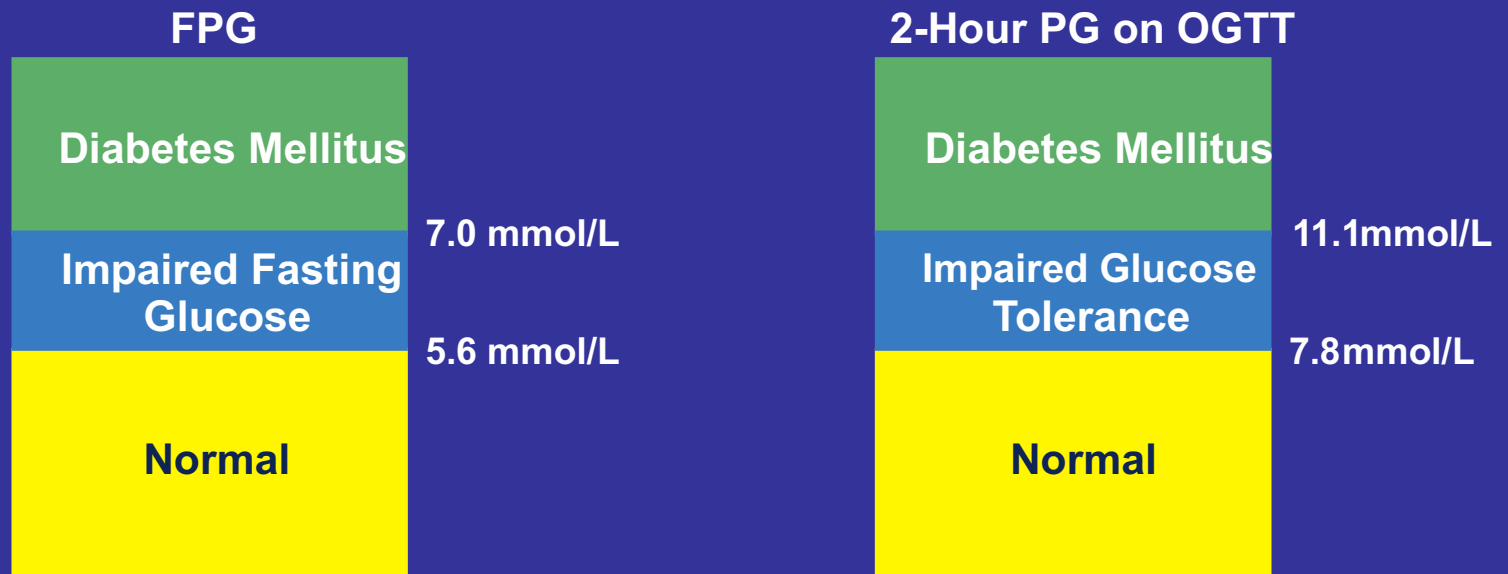
No Diabetes 86.9%

Diagnosed Diabetes 7.8%



Catherine C. Cowie et al. *Dia Care* 2010;33:562-568

# Glucose Tolerance Categories



Adapted from The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*. 1997;20:1183-1197  
Report of a WHO Consultation. Definition, diagnosis and classification of diabetes mellitus and its complications: part 1.  
Geneva: WHO/NCD/NCS 1999, p1-66

# Prediabetes

- Abnormal fasting plasma glucose (Impaired Fasting Glucose /IFG)
  - 5.6 – 6.9mmol/L (*ADA definition*)
- Abnormal 2 hour plasma glucose after 75g OGTT (Impaired Glucose Tolerance /IGT)
  - 7.8-11.0mmol/L
- Abnormal HbA1c - 5.6-6.4%

# Prediabetes

- Not a clinical entity in itself but identifies persons who are at increased risk of type 2 diabetes
- Associated with obesity, dyslipidemia (high triglycerides or low HDL-cholesterol) and hypertension

# Barbados Heath of the Nation Study

## Undiagnosed Diabetes and Pre-Diabetes Prevalence (95% Confidence Interval)

	Fasting Plasma Glucose	HbA1c
Undiagnosed Diabetes	3.5 (2.4-5.1)%	5.5 (4.1-7.3)%
Pre-diabetes	15.0 (12.8-17.5)%	34.1 (30.6-37.7)%

Excluding 16% of the sample with established diabetes

# Type 1 diabetes

- Aetiology is unclear
- Autoimmunity and Genetic factors may increase predisposition to an environmental trigger
- No clear risk factors have been identified
- Antibodies may predict risk but routine screening not recommended as diagnostic methods not standardized, no interventions helpful



# Type 2 Diabetes

Aetiology is unclear but risk factors consistently identified include

## Non Modifiable

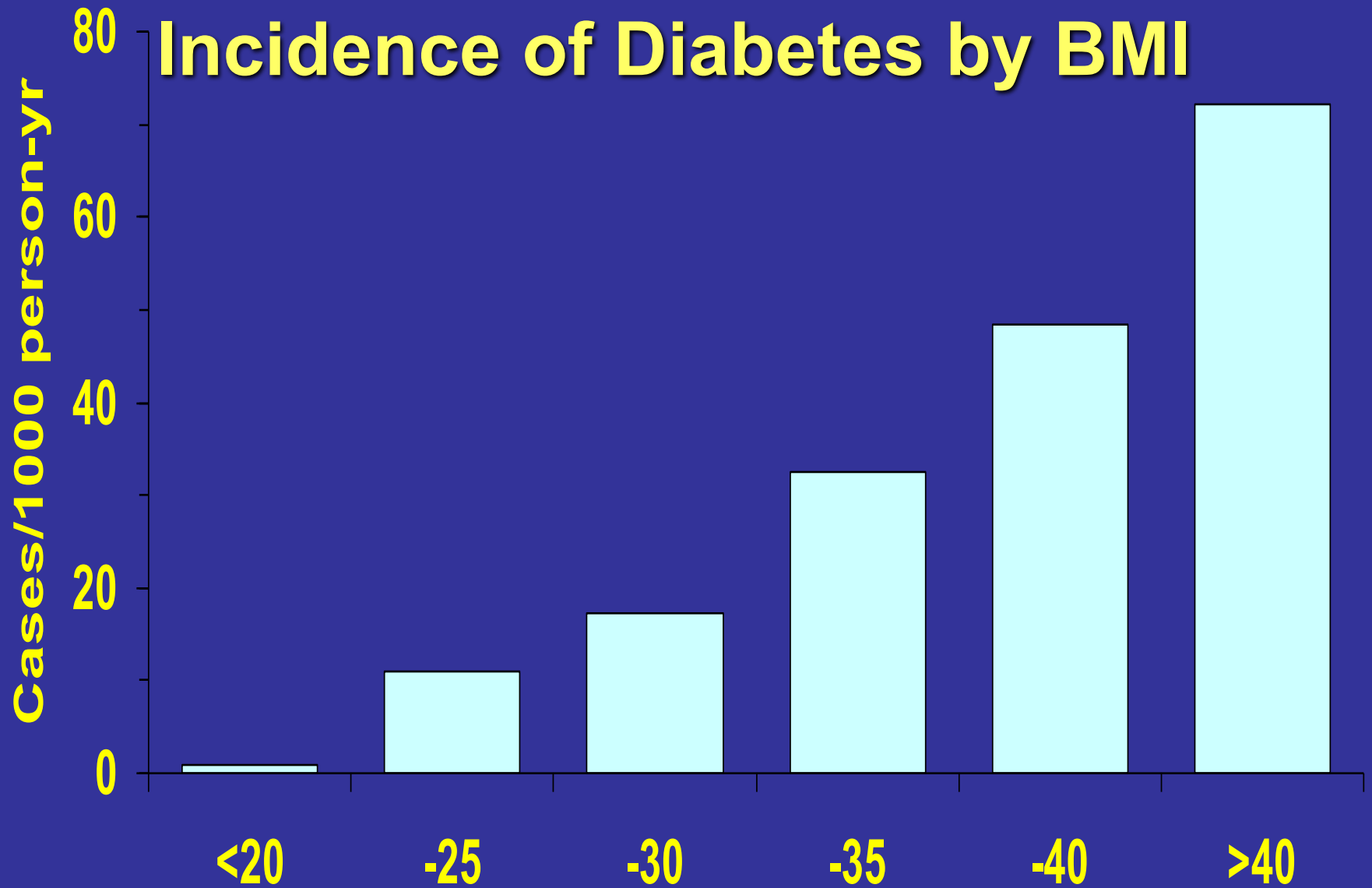
- Age
- Genetic Factors - Family history of diabetes / Ethnicity
- Macrosomia – mother at increased risk?
- History of gestational diabetes

# Type 2 Diabetes

Aetiology is unclear but risk factors consistently identified include

## Modifiable Risk Factors

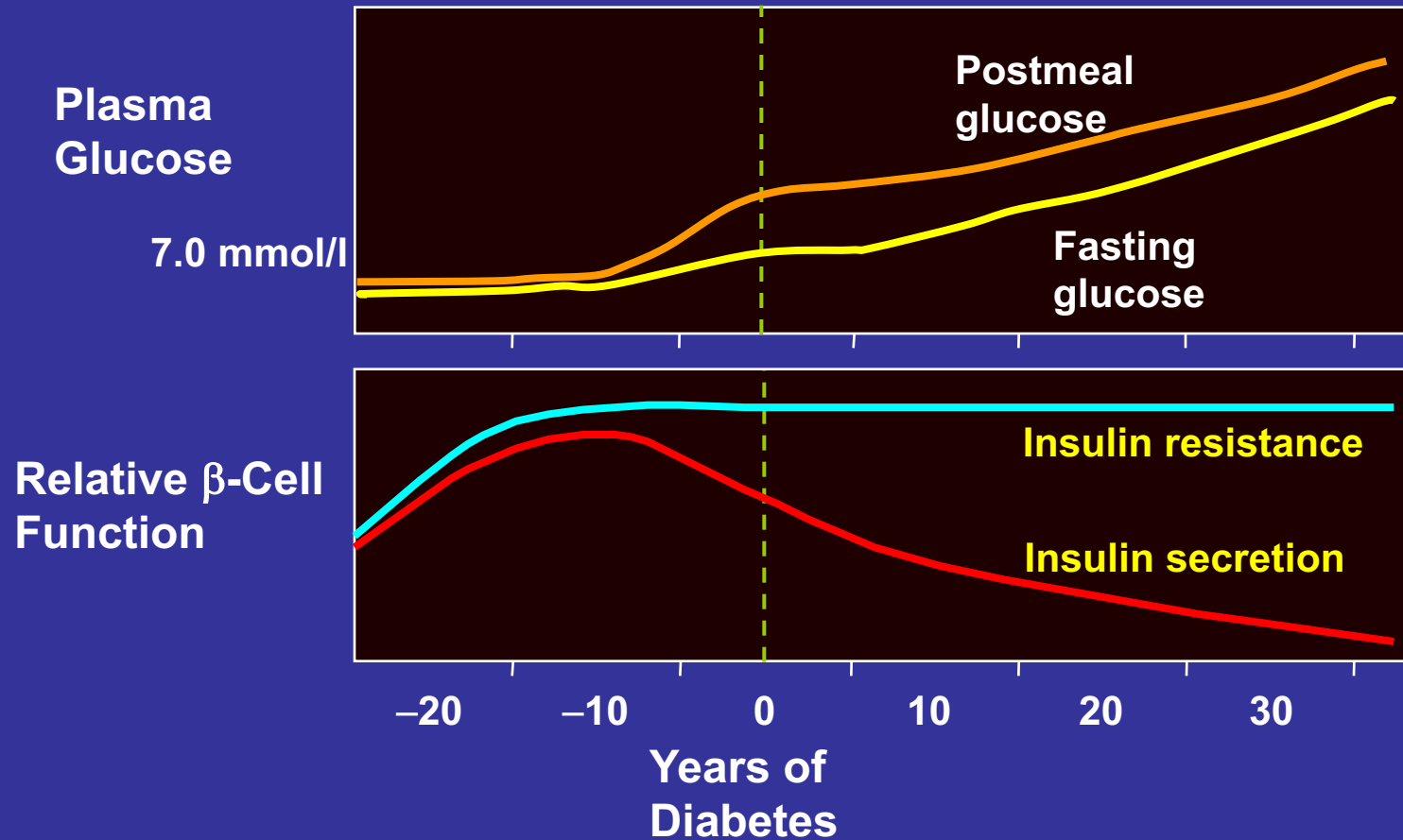
- Obesity
- Sedentary lifestyle
- Dyslipidaemia
- Hypertension
- Smoking
- Diet



Knowler: Am J Epidemiol, 1981

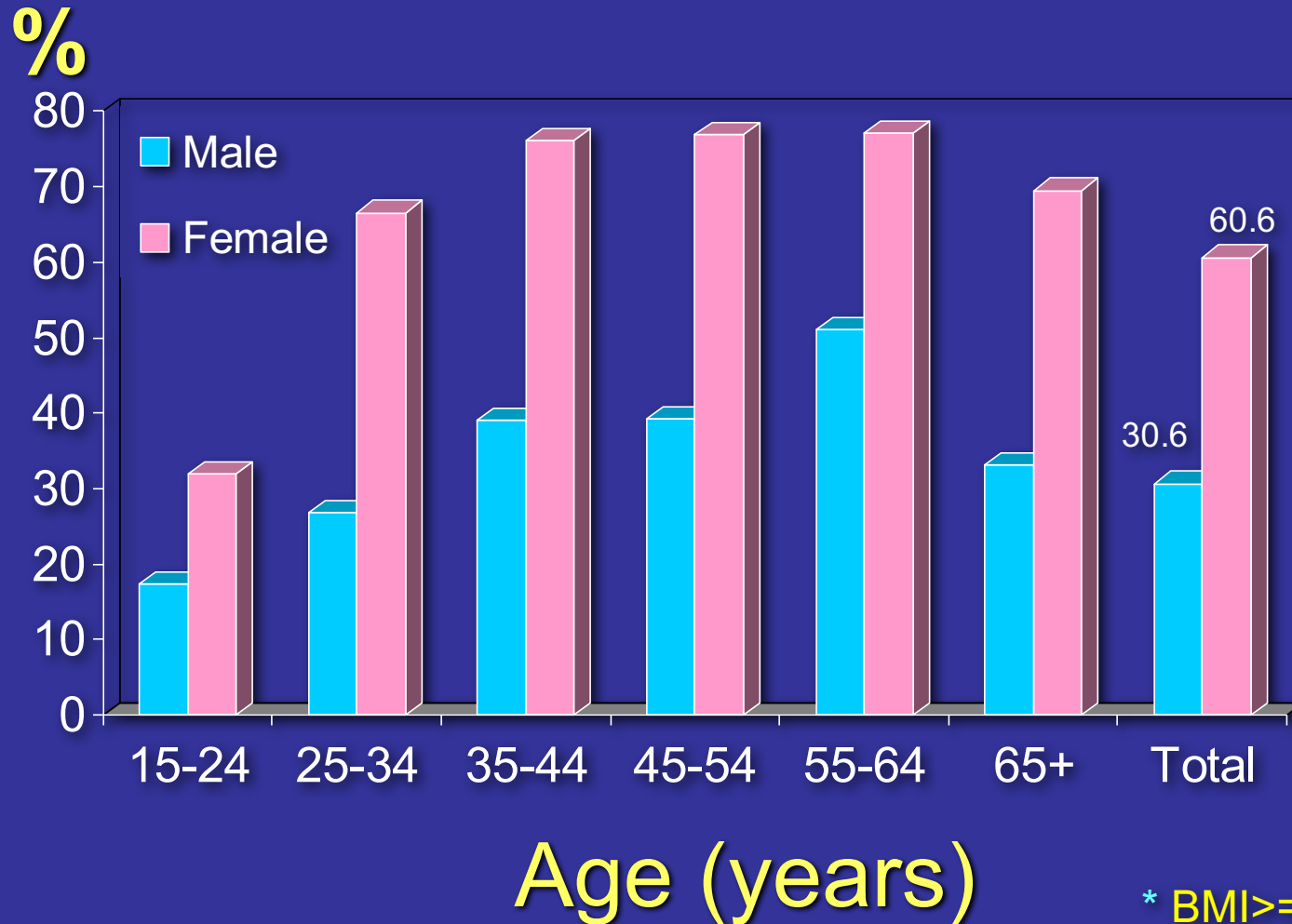
Body Mass Index (kg/m<sup>2</sup>)

# Natural History of Type 2 Diabetes



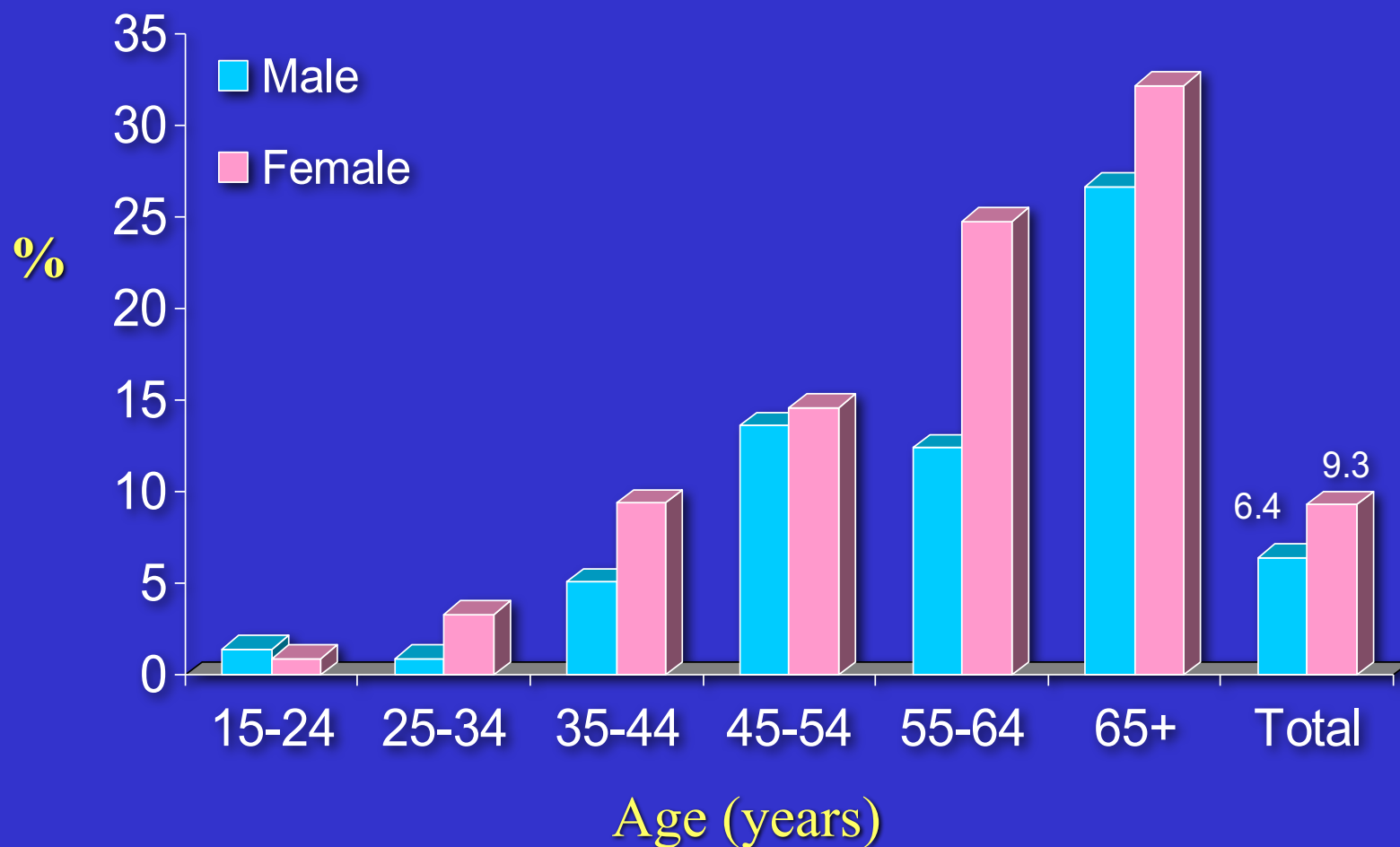
Adapted from International Diabetes Center (IDC). Minneapolis, Minnesota.

# Prevalence of Overweight & Obesity\* by Age Group & Gender



\* BMI  $\geq$  25 kg/m<sup>2</sup>

# Prevalence of Diabetes in Jamaica by Age Group & Gender



# Jamaica Health and Lifestyle Survey I and II Comparison

<b>Disease Condition</b>	<b>JHLS-2000</b>	<b>JHLSII-2008</b>
<b>Diabetes Mellitus</b>	<b>7.2(6.0-8.3)</b>	<b>7.9(6.7-9.0)</b>
<b>Hypertension*</b>	<b>20.9(18.4-23.2)</b>	<b>25.2(23.3-27.2)</b>
<b>Overweight (25-29.99 kg/m<sup>2</sup>)</b>	<b>26.1(23.5-28.7)</b>	<b>26.4 (24.5- 28.6)</b>
<b>Obese (≥30 kg/m<sup>2</sup>)*</b>	<b>19.7(17.4-22.0)</b>	<b>25.3 (22.8- 27.4)</b>

\* Statistically significant

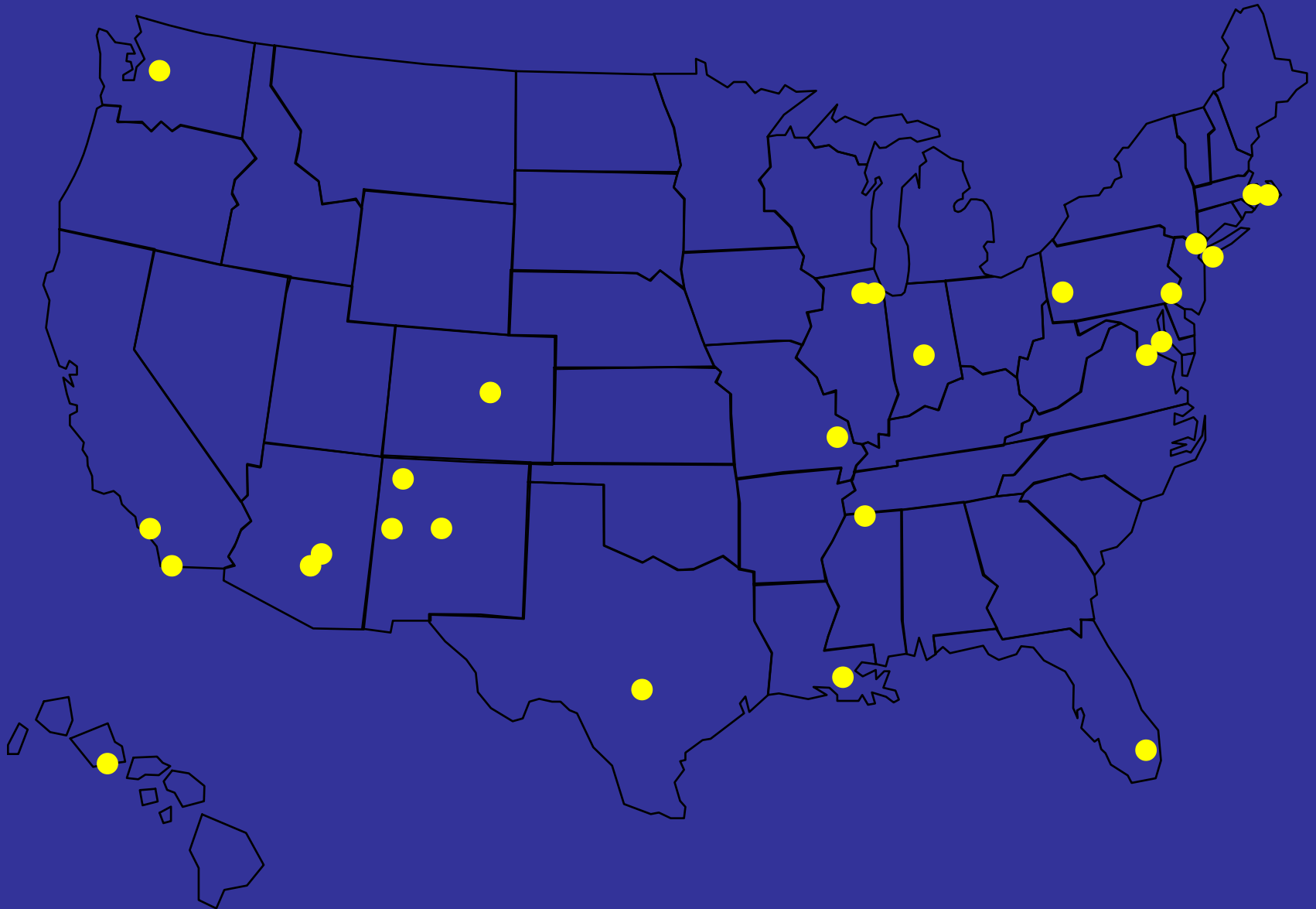
# Preventing Type 2 Diabetes

Evidence from several clinical trials that lifestyle changes can prevent type 2 diabetes in persons with impaired glucose tolerance

- Da Qing Study
- Finnish Diabetes Prevention Study
- Diabetes Prevention Program



# Diabetes Prevention Program Clinics



# Eligibility Criteria

- Age  $\geq 25$  years
- Plasma glucose
  - 2 hour glucose 140-199 mg/dl (7.8-  $<11.1$  mmol/L)
  - and
  - Fasting glucose 95-125 mg/dl (5.3-  $<7.0$  mmol/L)
- Body mass index  $\geq 24$  kg/m<sup>2</sup>
- All ethnic groups
  - goal of up to 50% from high risk populations

# DPP Treatments

- Lifestyle Goals
  - 7% weight loss
  - 150 minutes activity each week
- Metformin Goals
  - 850 mg twice daily

# Study Interventions

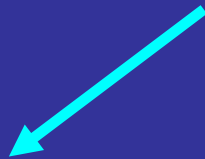
Eligible participants



Randomized



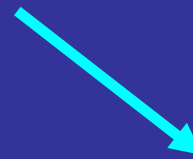
Standard lifestyle recommendations



**Intensive  
Lifestyle**  
(n = 1079)



**Metformin**  
(n = 1073)



**Placebo**  
(n = 1082)

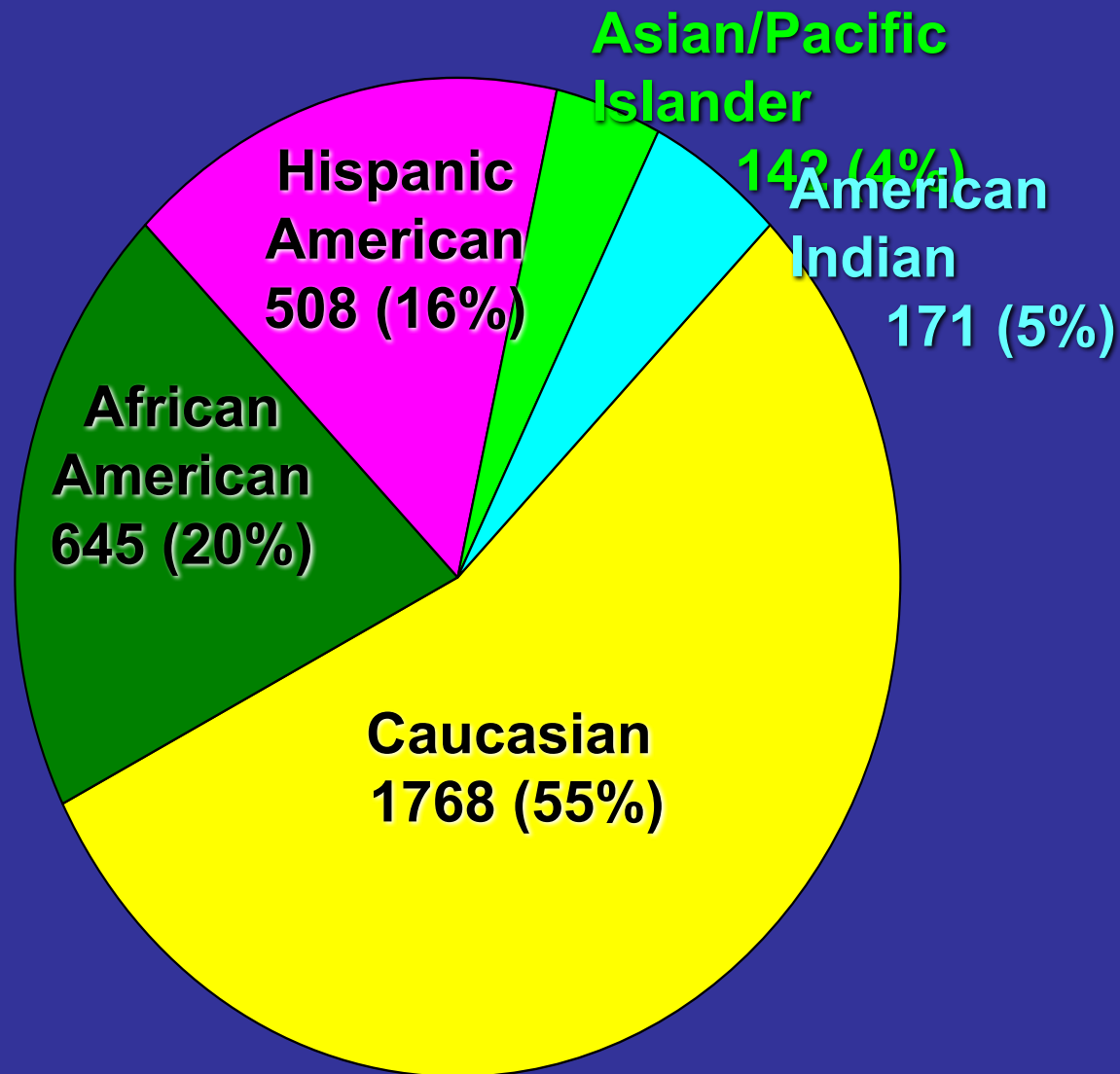
# Primary Outcome: Diabetes

- Annual fasting plasma glucose (FPG) and 75 gm Oral Glucose Tolerance Test
  - FPG  $\geq$  126 mg/dL (7.0 mmol/L) or
  - 2-hr  $\geq$  200 mg/dL (11.0 mmol/L),
  - Either confirmed with repeat test
- Semi-annual FPG
  - $\geq$  126 mg/dL, confirmed

# Lifestyle Intervention Structure

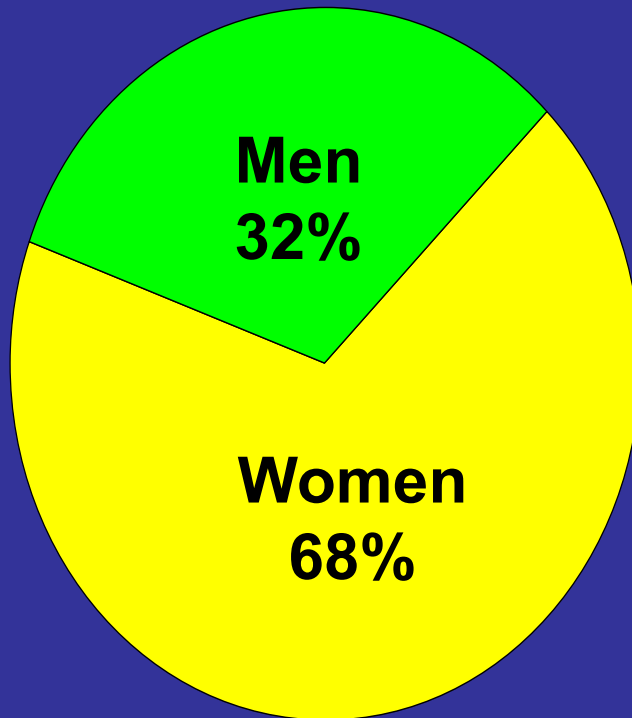
- 16 session core curriculum (over 24 weeks)
- Long-term maintenance program
- Supervised by a case manager
- Access to lifestyle support staff
  - Dietitian
  - Behavior counselor
  - Exercise specialist

# DPP Population

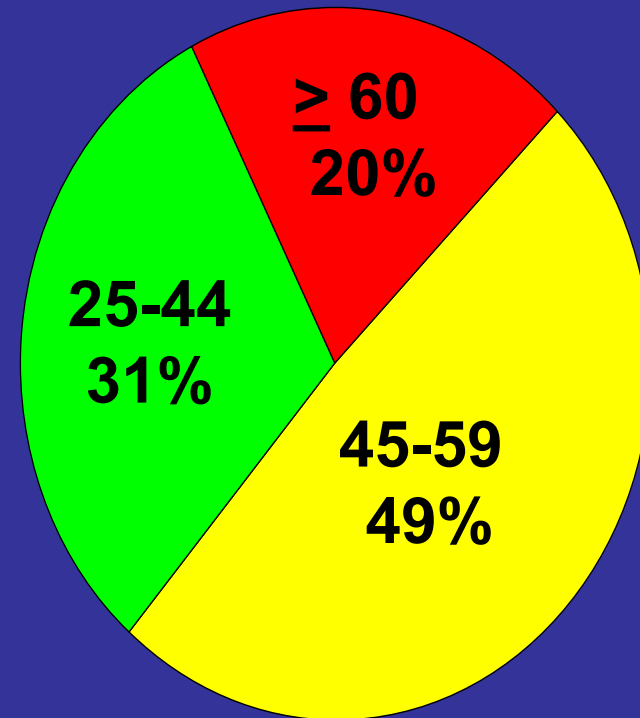


# DPP Population

## Sex Distribution

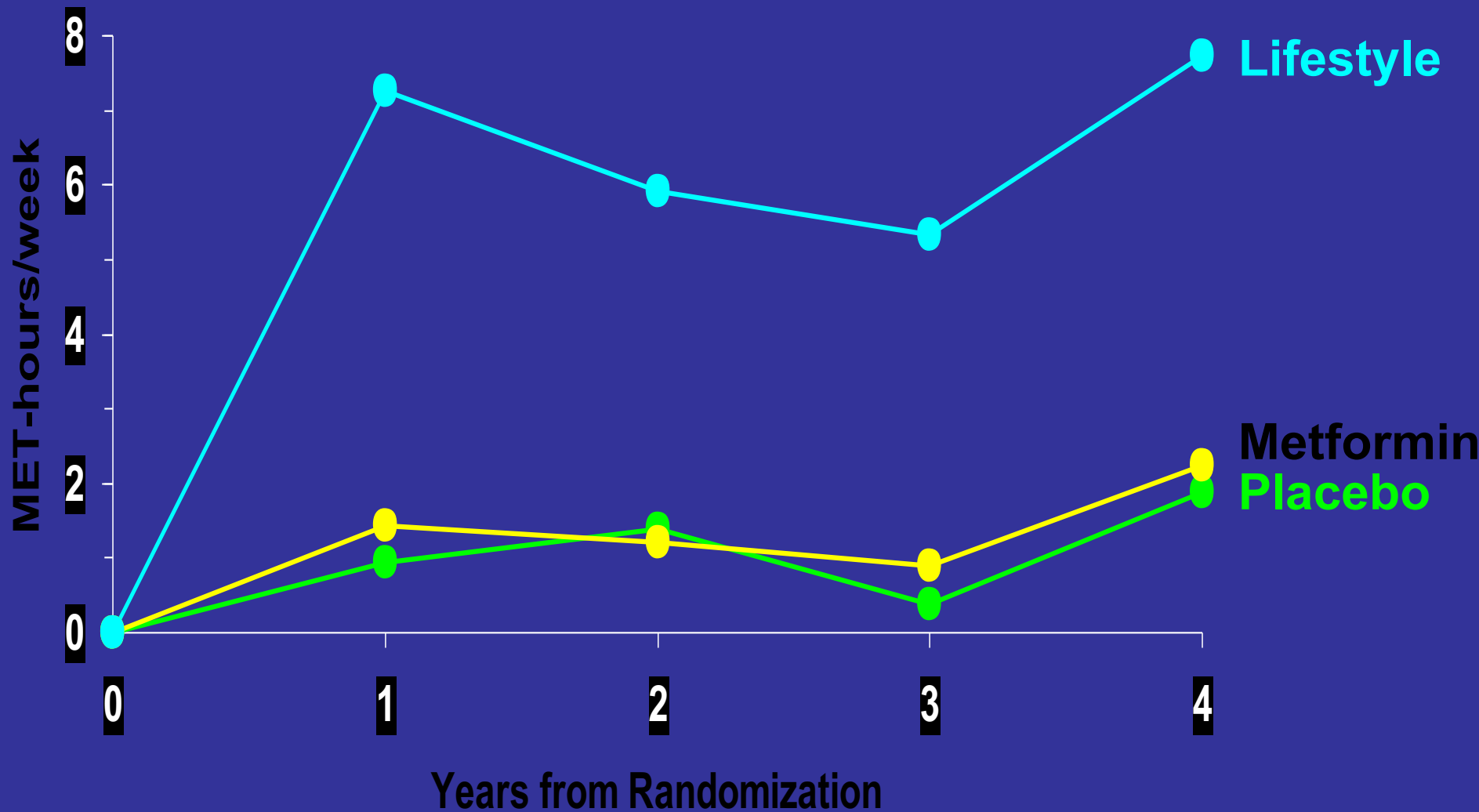


## Age Distribution

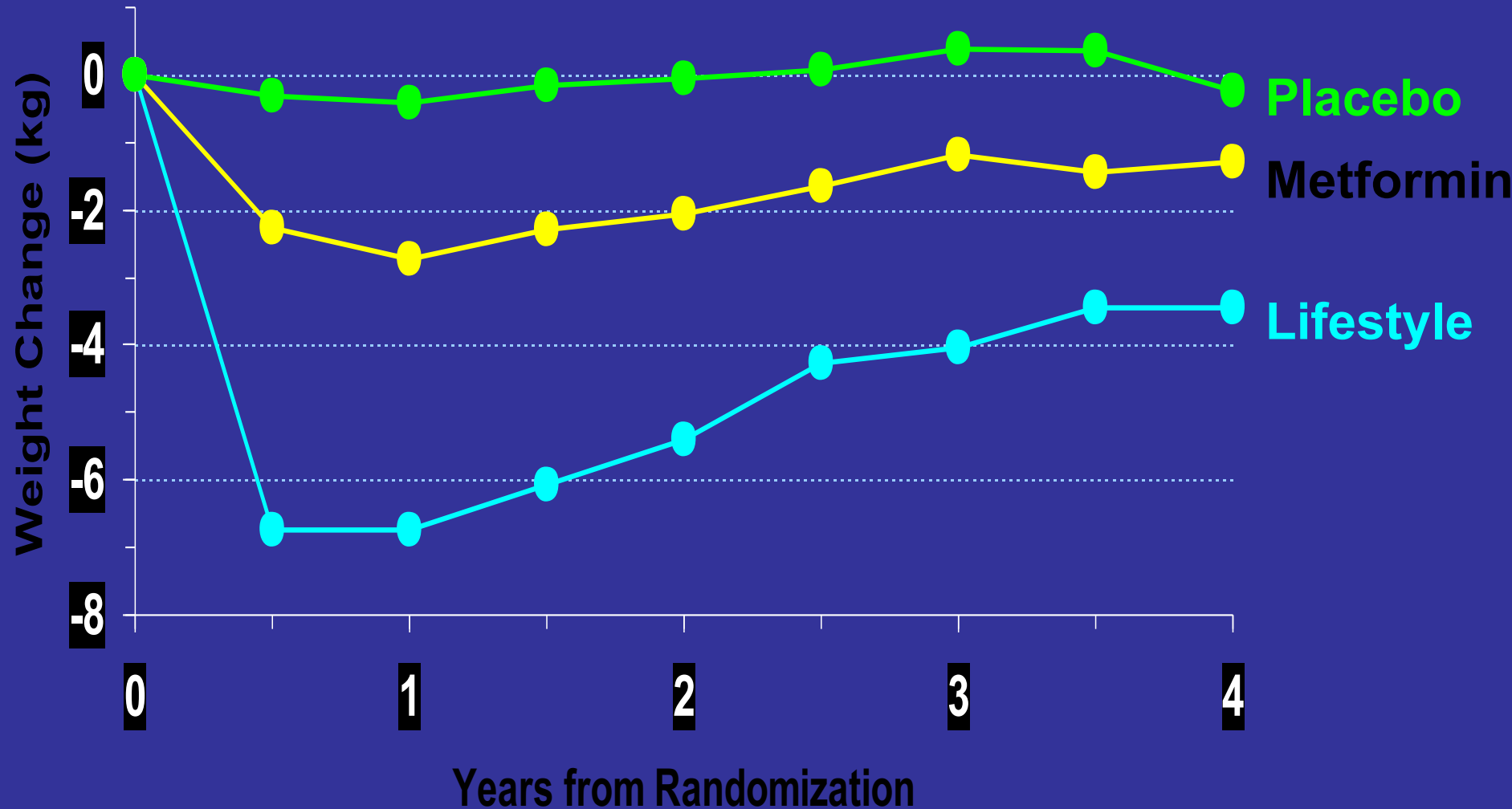




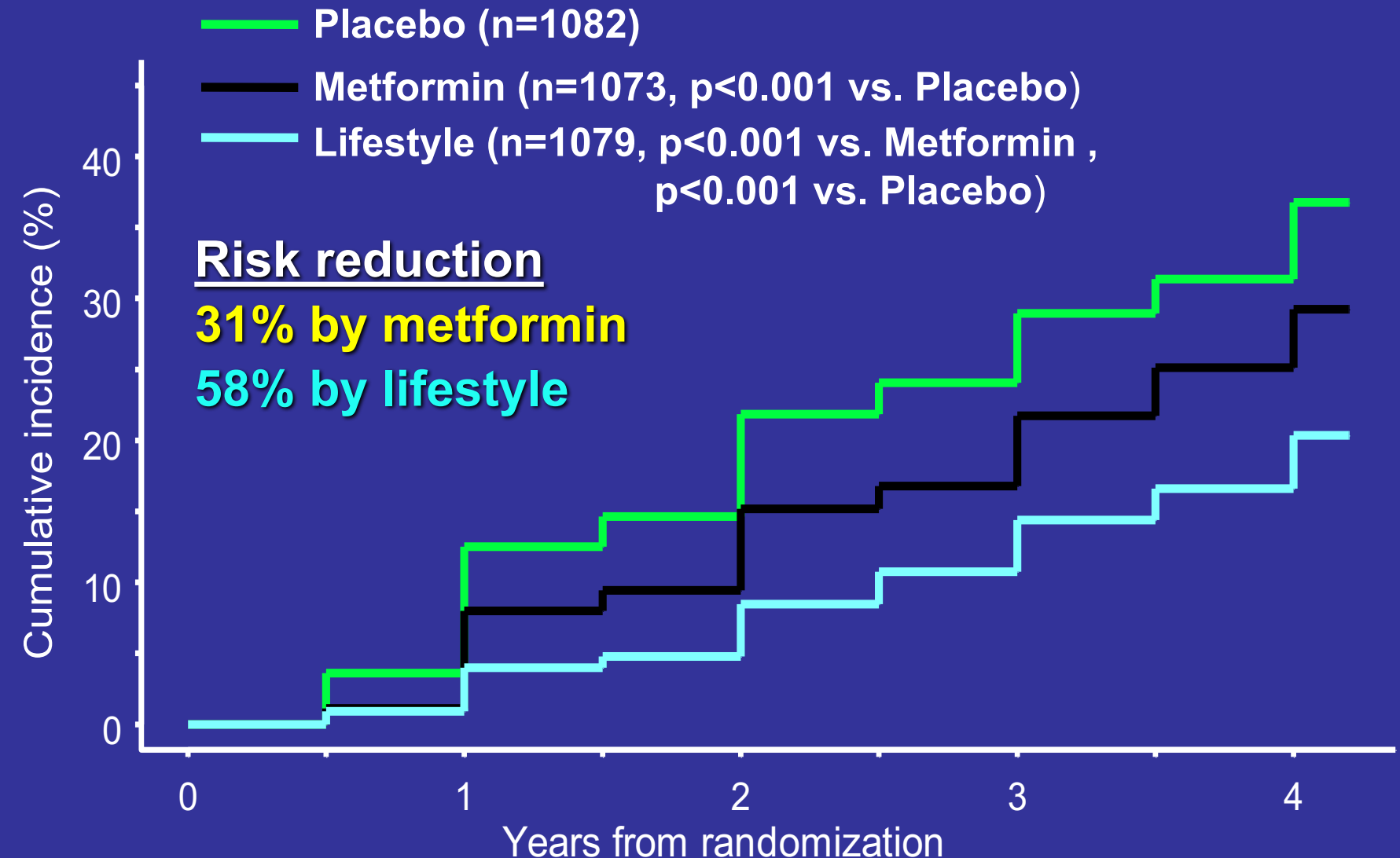
# Mean Change in Leisure Physical Activity



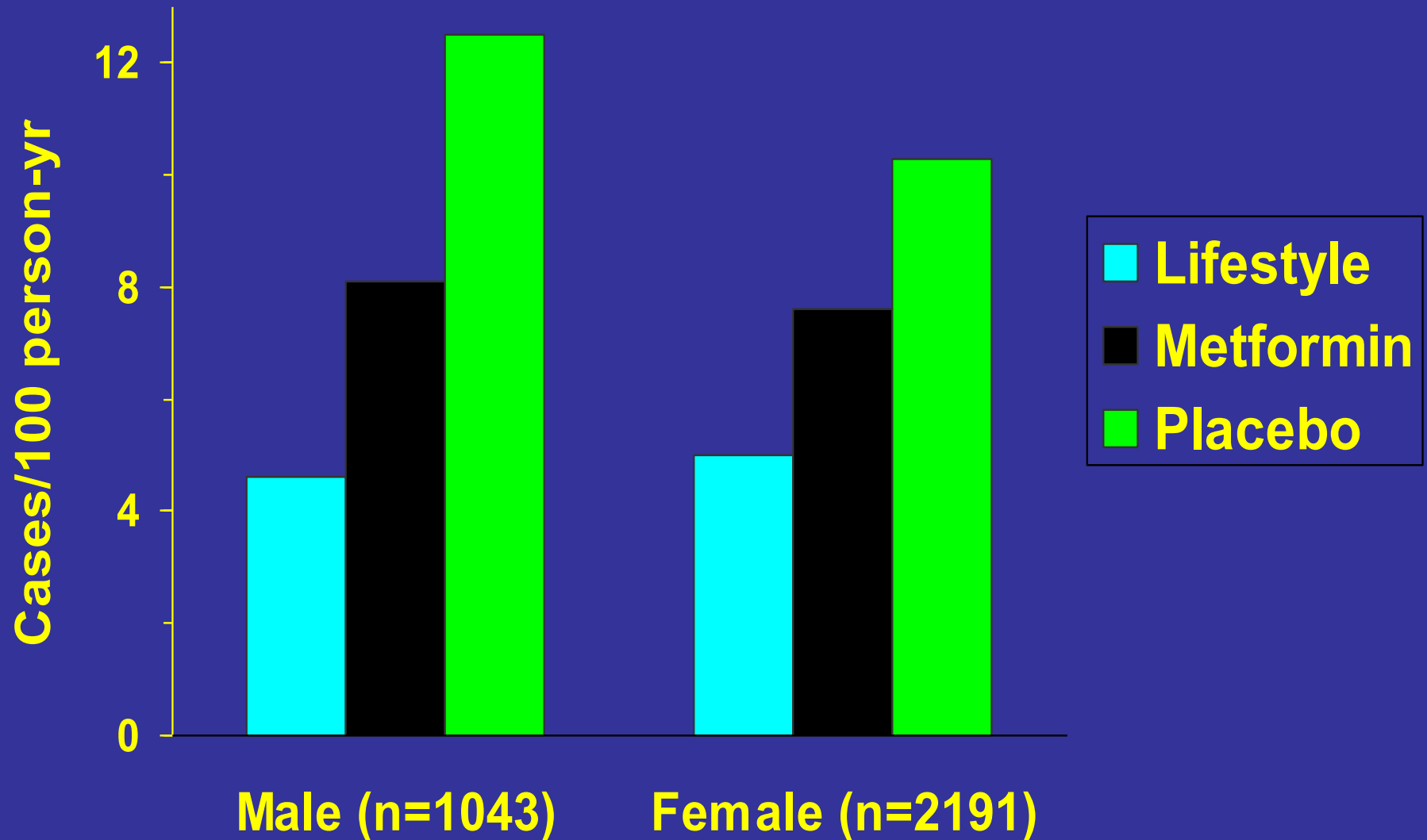
# Mean Weight Change



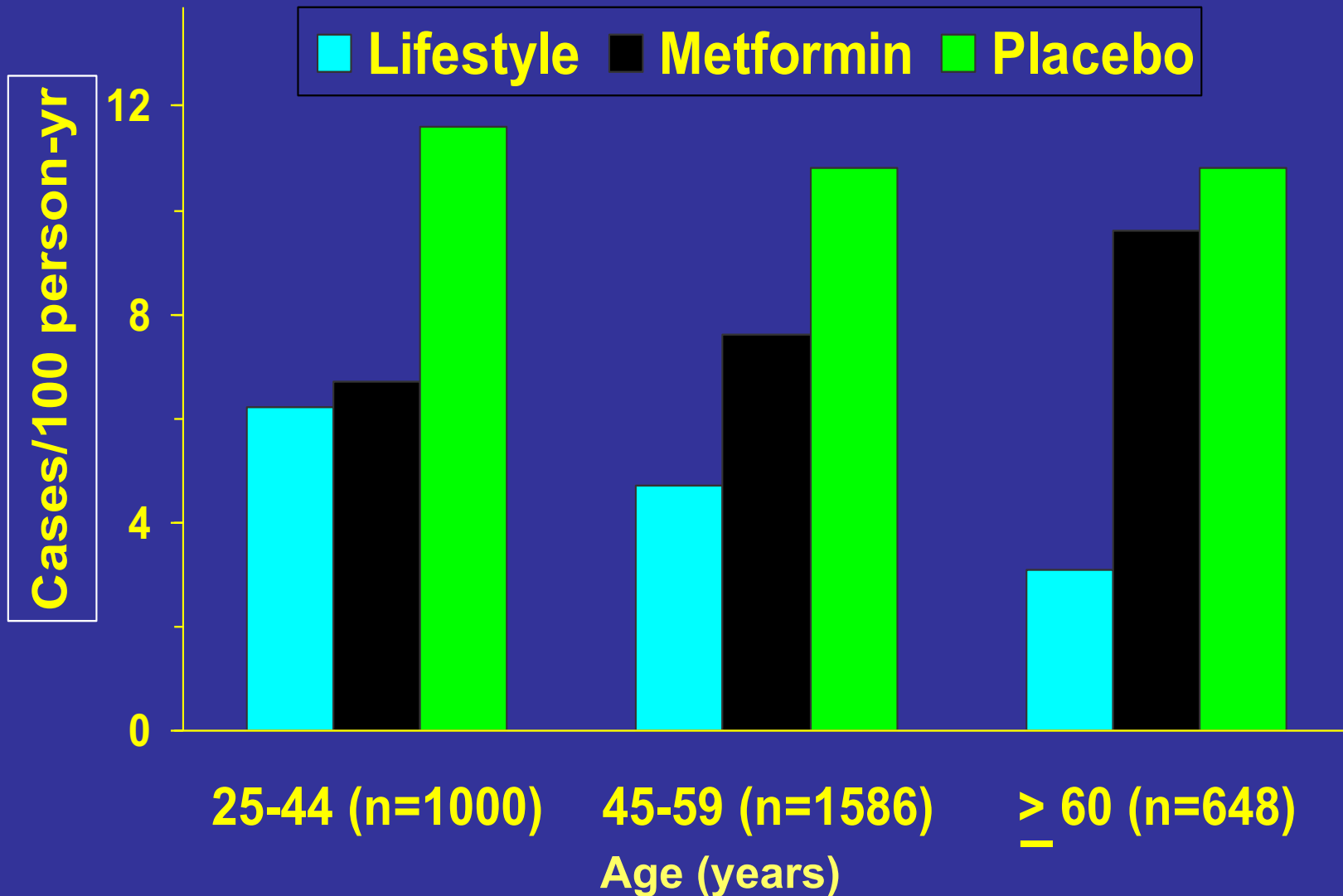
# Incidence of Diabetes



# Diabetes Incidence Rates by Sex



# Diabetes Incidence Rates by Age



# Metformin in DPP

- **Most effective in DPP participants:**
  - BMI  $>35$
  - Age 25-44 years
- **Little risk reduction in DPP participants :**
  - BMI 24-30
  - Age  $\geq 60$  years

# **DPPPOS Diabetes Risk Reduction**

- **Delay in diabetes onset after 10 years follow-up:**
  - 4 years for Lifestyle
  - 2 years for Metformin
- **The lower rate of diabetes development for lifestyle and metformin during DPP means:**
  - Original Lifestyle participants have a 34% lower risk of diabetes compared to Placebo
  - Original Metformin participants have a 18% lower risk of diabetes compared to Placebo

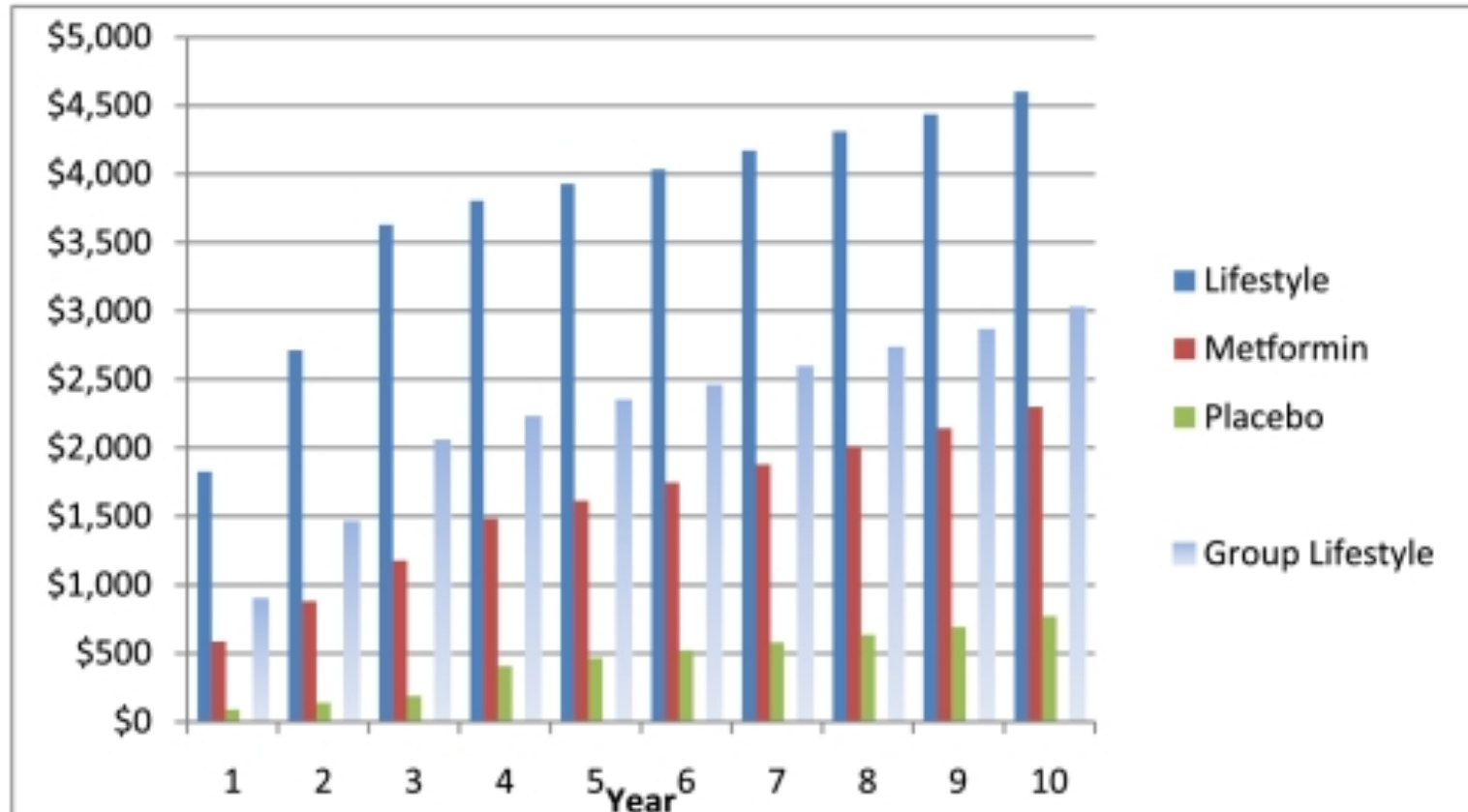
## **DPPPOS 15 year Follow Up**

- **Diabetes incidence 27% in the lifestyle intervention group and 18% in the metformin group**
- **No differences in combined microvascular complications : placebo 12.4%, metformin 13.0%, lifestyle 11.3% but incidence lower in those who did not develop diabetes, regardless of group**



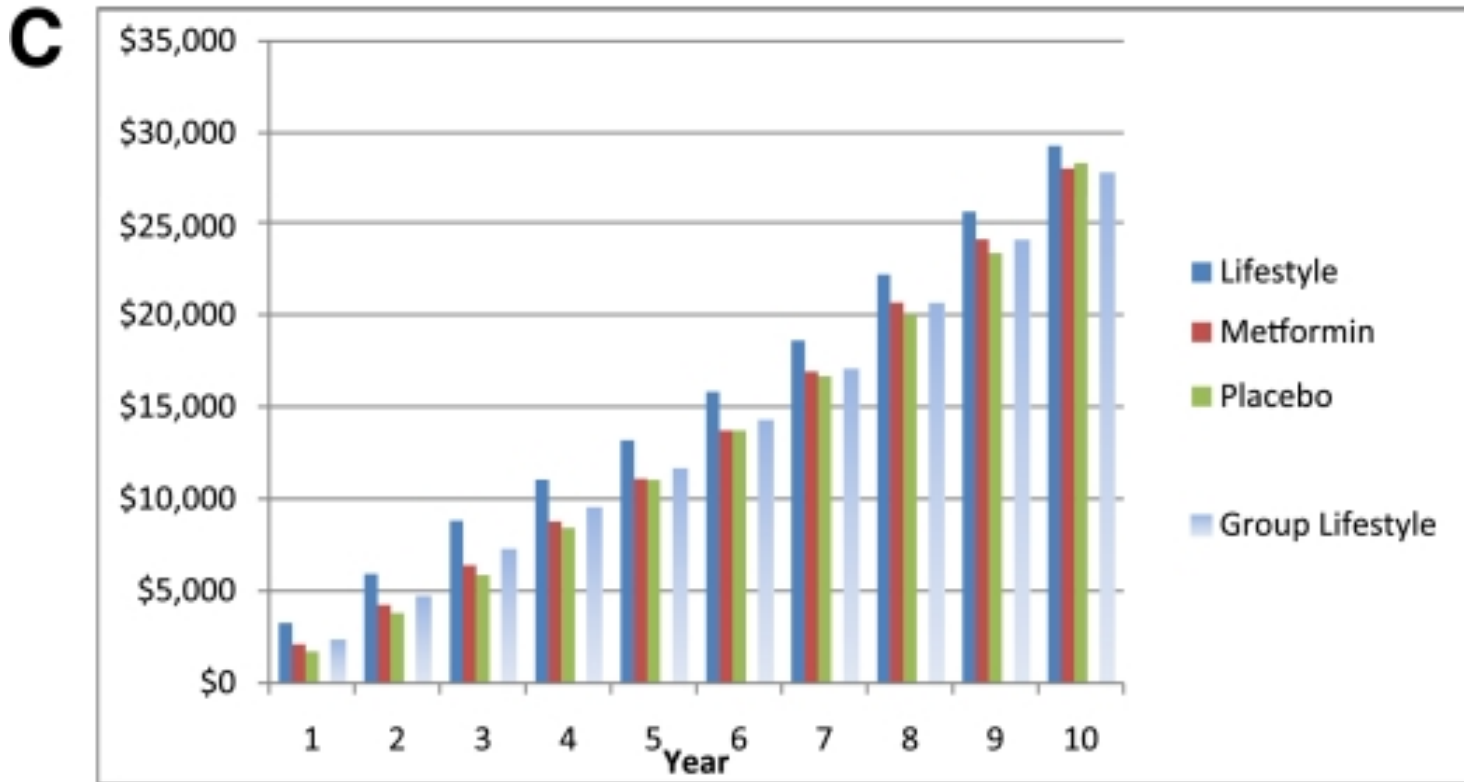
# Cost Effectiveness

**A**



**Cumulative, undiscounted, per participant, direct medical costs of the DPP/DPPPOS interventions by intervention group and study year.**

# Cost Effectiveness



Cumulative, undiscounted, per participant, total direct medical costs of the DPP/DPPOS interventions and medical care received outside the DPP/DPPOS by intervention group and study year

# Making Lifestyle more Cost Effective

- Group vs. individual sessions for lifestyle
- New approaches to delivery –virtual small groups, Internet-driven social networks
- Use of technology – Mobile apps

# Diabetes Educators of the Caribbean Diabetes Prevention Workshop



# The *DREAM* Trial

- Aims: Does ramipril 15 mg/d prevent diabetes?  
Does rosiglitazone 8 mg/d prevent diabetes?
- Design: 2 X 2 factorial, double-blind RCT
- Sample: Age 30+; IGT (FPG  $<7$  & 2 hr 7.8-11) &/or IFG (FPG 6.1-6.9)
- Pts: 5269 in 191 sites, 21 countries, & F/U 3 yrs
- Outcome: Incident DM (confirmed FPG  $\geq 7$  or 2 hr  $\geq 11.1$ ; or MD diagnosis) or death\*

\*because undiagnosed diabetes may be more frequent in those who die than in those who do not

# Adherence/Adverse Effects

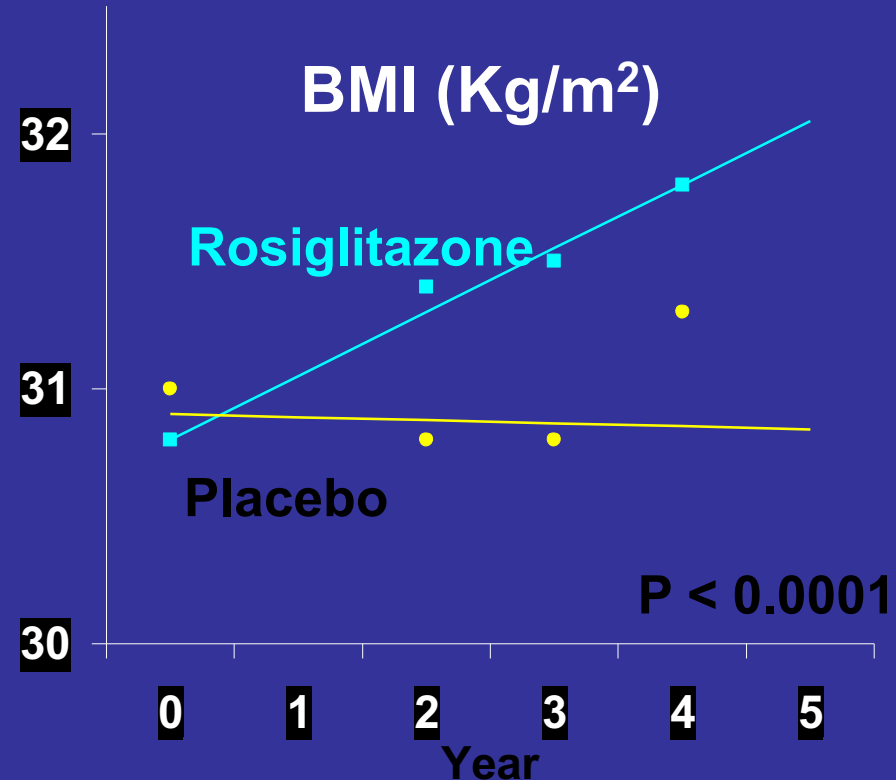
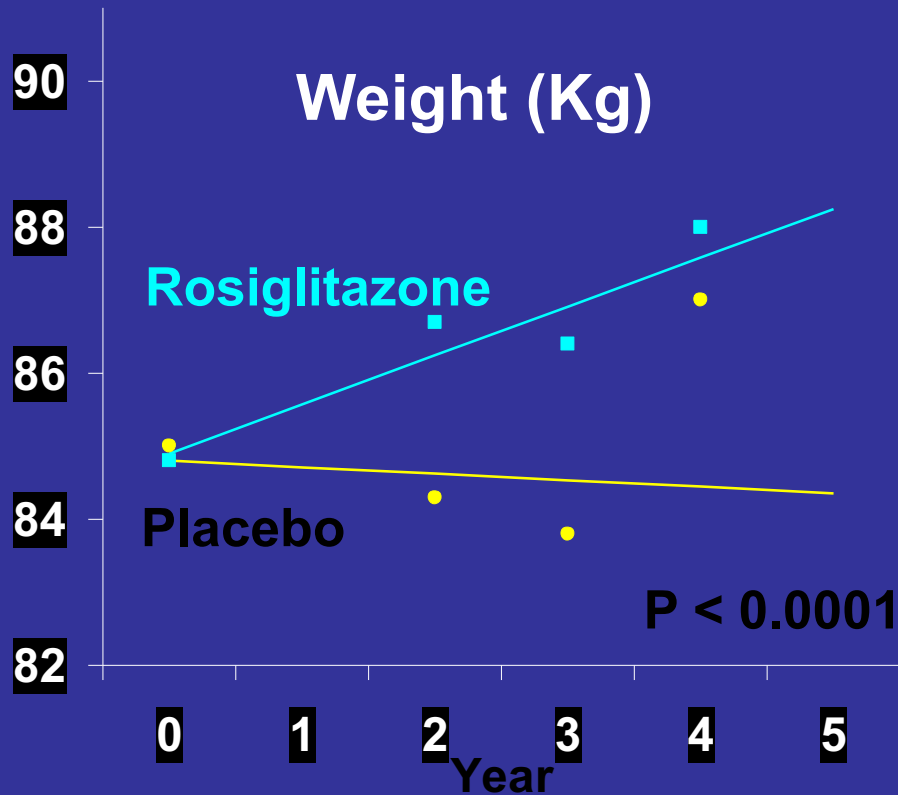
		Rosiglitazone	Placebo
<b>On Study Drug</b>	<b>at 1 year</b>	<b>88.4%</b>	<b>91.3%</b>
	<b>at 2 years</b>	<b>83.7%</b>	<b>87.7%</b>
	<b>at 3 years</b>	<b>79.5%</b>	<b>84.0%</b>

## Reasons for Stopping Study Drug

Participant Refusal	19.1%	16.7%
Edema	4.8%	1.6%
MD advice	1.9%	1.5%
Weight Gain	1.9%	0.6%



# Rosiglitazone & Weight, BMI



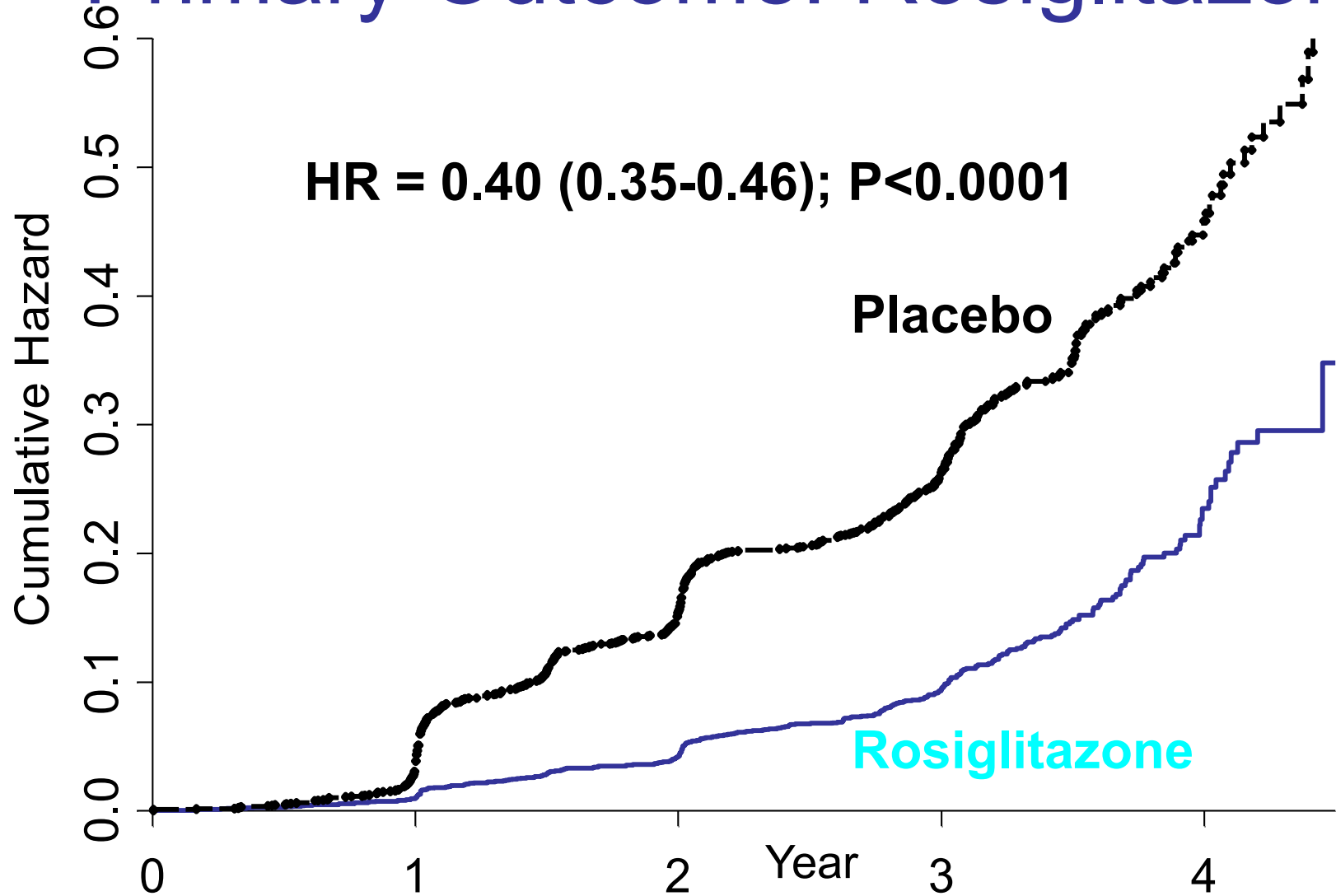
Change/yr (Slope)	Rosiglitazone	Placebo
Weight (kg)	0.67(2.77)	-0.09 (2.41)
BMI (kg/m <sup>2</sup> )	0.25 (1.01)	-0.01 (0.84)

# Rosiglitazone & Primary Outcome

	Rosi N=2635	Placebo N=2634	HR (95% CI)	P
<b>Primary Composite</b>	306 (11.6)	686 (26.0)	0.40 (0.35-0.46)	<0.0001
<b><i>Diabetes</i></b>	280 (10.6)	658 (25.0)	0.38 (0.33-0.44)	<0.0001
Dx by FPG/OGTT	231 (8.8)	555 (21.1)	0.38 (0.33-0.44)	<0.0001
MD Diagnosed	49 (1.9)	103 (3.9)	0.47 (0.33-0.66)	<0.0001
<b><i>Death</i></b>	30 (1.1)	33 (1.3)	0.91 (0.55-1.49)	0.70



# Primary Outcome: Rosiglitazone



Placebo  
Rosiglitazone

2634  
2634

2470  
2470

2150  
2150

1148  
1148

177  
177

2635  
2635

2538  
2538

2414  
2414

1310  
1310

217  
217

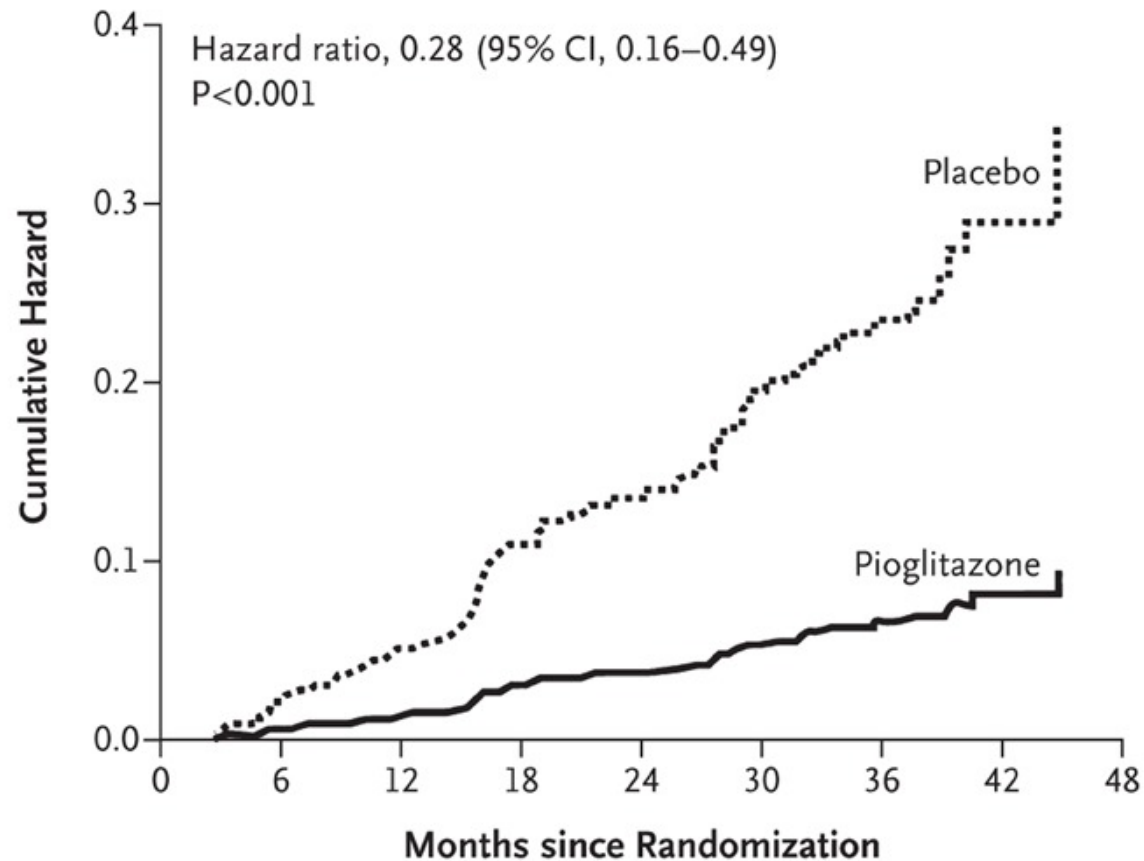
# Summary & Conclusions: Rosiglitazone

- A dose of 8 mg/day reduces new DM by > 60% in people with IGT or IFG
- Promotes regression to normal FPG & 2 hr PG by >70%
- Effective in all regions of the world
- Eliminates the gradient of DM risk with increasing weight
- ~ 3% increase in body weight, but a favourable effect on waist/hip ratio
- Reduces ALT

# ACT Now Study

- A total of 602 patients were randomly assigned to receive pioglitazone or placebo.
- Intervention - 30 mg of pioglitazone per day or placebo. One month after randomization, the dose of pioglitazone was increased to 45 mg per day.

# ACT Now



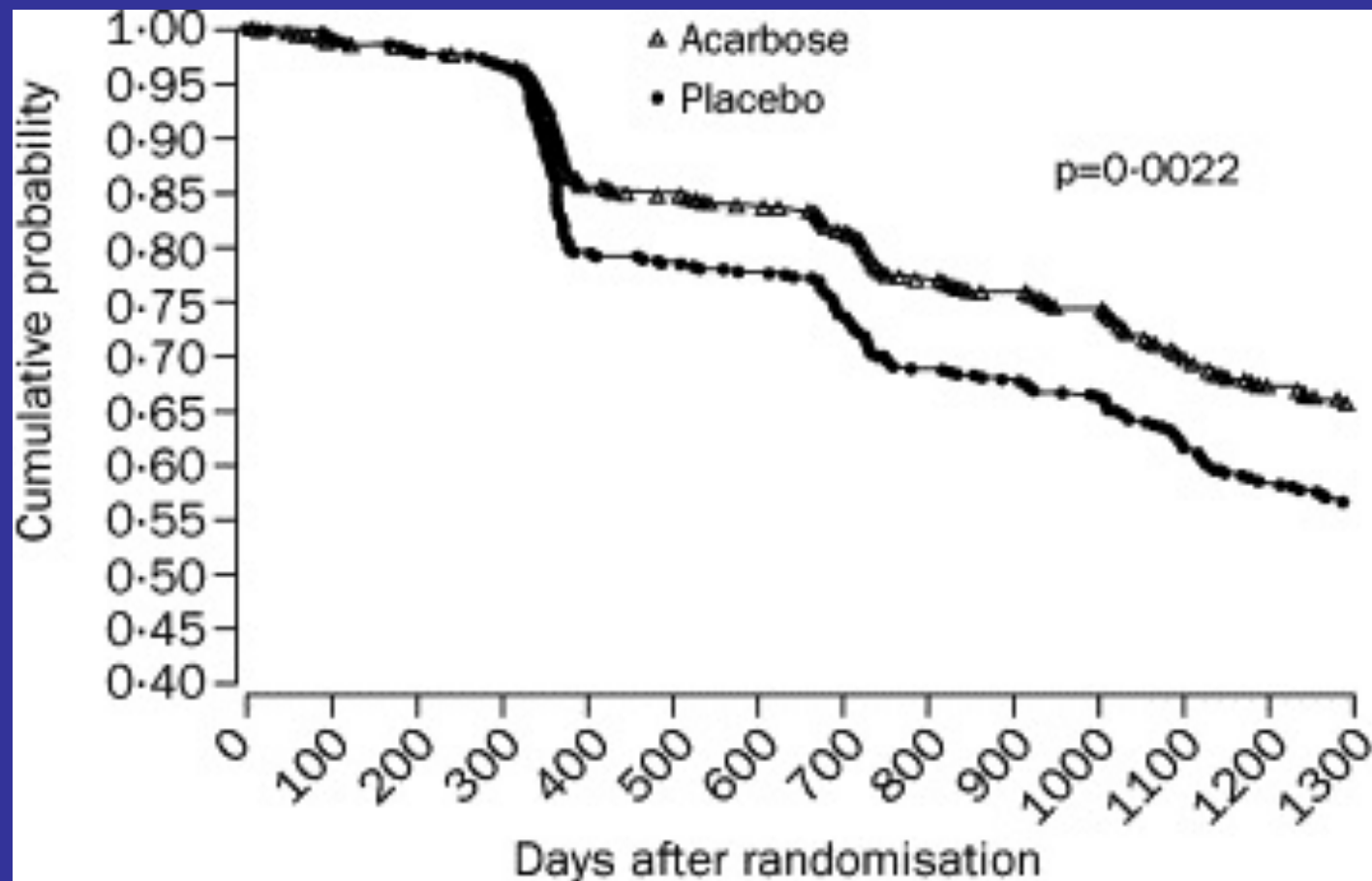
## No. at Risk

Placebo	299	259	228	204	191	134	83	17
Pioglitazone	303	262	244	228	218	140	87	24

# STOP NIDDM Trial

- Population – multi-centre study conducted in patients with IGT from Canada, Germany, Austria, Norway, Denmark, Sweden, Finland, Israel, and Spain - 714 patients to acarbose and 715 to placebo.
- Intervention- placebo or 100 mg of acarbose 3 times a day, taken with the first bite of each meal
- Drop out - 211 (31%) of 682 patients in the acarbose group and 130 (19%) of 686 on placebo.

# STOP NIDDM Trial - Diabetes



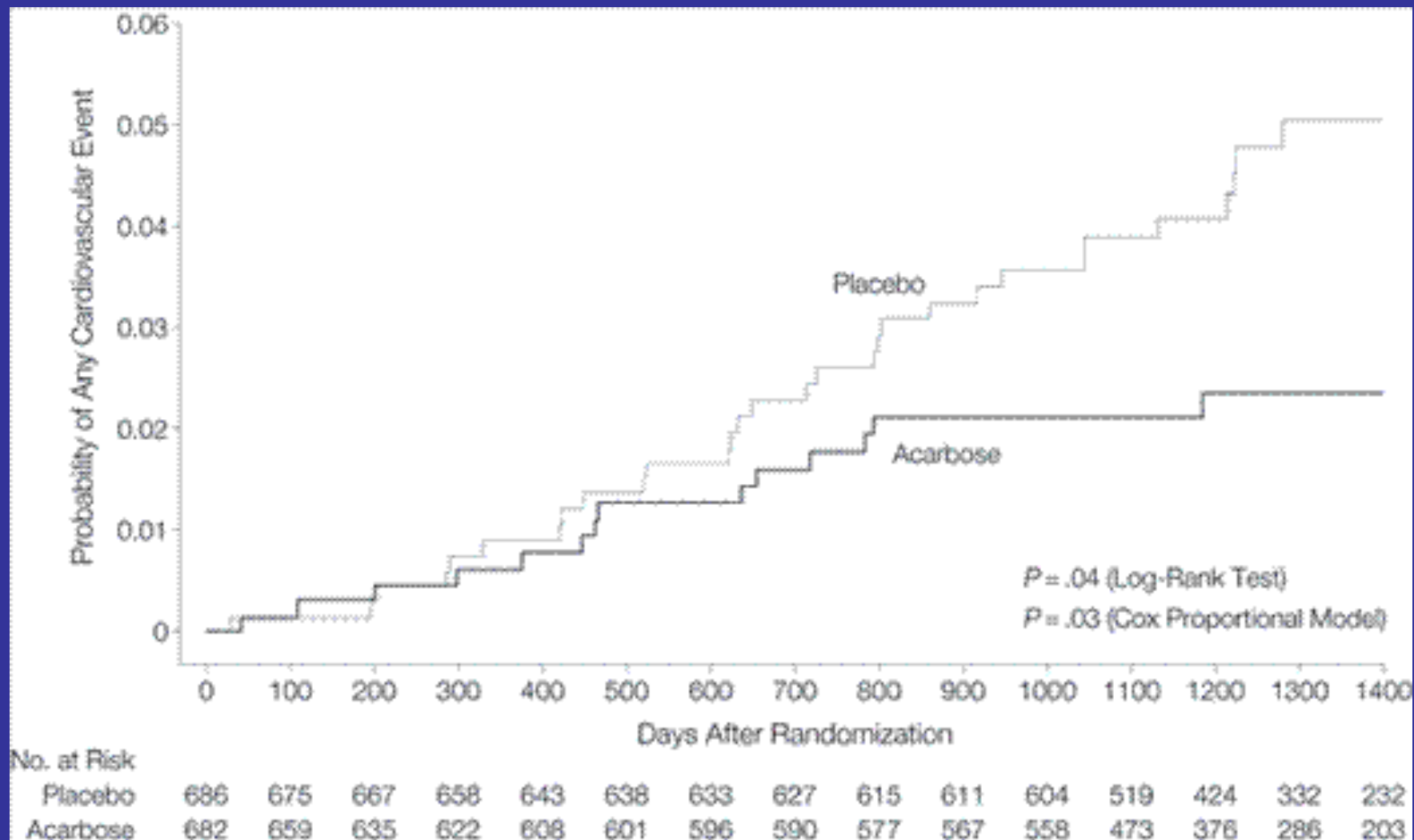
## Patients at risk

Acarbose	682	655	628	612	531	523	515	497	463	447	432	349	268	212
Placebo	686	671	655	640	512	505	497	470	434	427	414	331	255	208

# STOP NIDDM Trial - Diabetes

- 221 (32%) patients randomised to acarbose and 285 (42%) randomised to placebo developed diabetes (relative hazard 0.75 [95% CI 0.63-0.90];  $p=0.0015$ ).

# STOP NIDDM Trial – CVD Outcomes





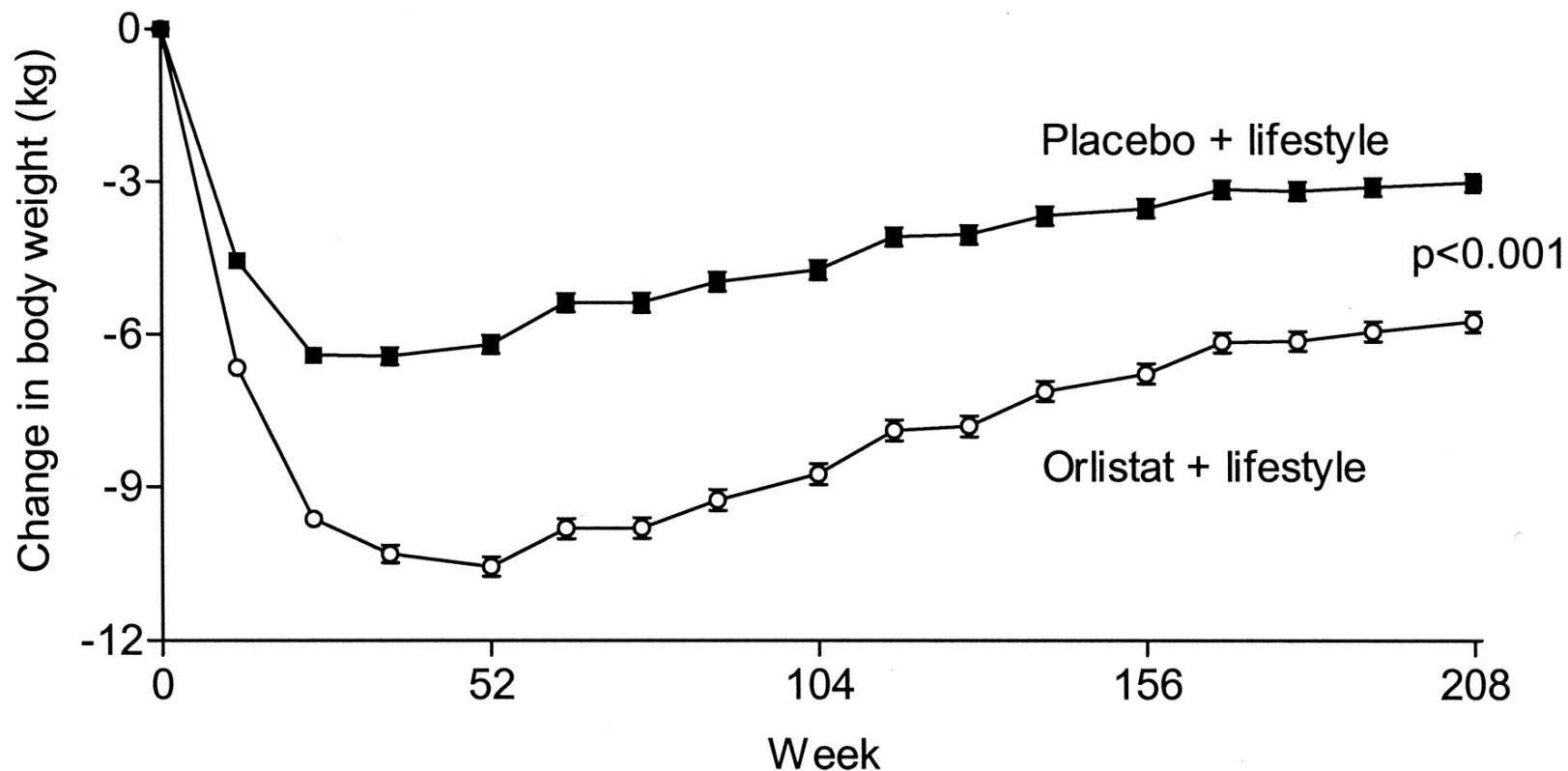
# STOP NIDDM Trial - CVD

- 49% relative risk reduction in the development of cardiovascular events (hazard ratio [HR], 0.51; 95% confidence interval [CI]; 0.28-0.95;  $P = .03$ )
  - adjusted HR(0.47; 95% CI, 0.24-0.90;  $P = .02$ )
  - mainly from reduction in the risk of myocardial infarction (HR, 0.09; 95% CI, 0.01-0.72;  $P = .02$ ).
- 34% relative risk reduction in the incidence of new cases of hypertension (HR, 0.66; 95% CI, 0.49-0.89;  $P = .006$ ) – adjusted HR (0.62; 95% CI, 0.45-0.86;  $P = .004$ )

# XENical in the Prevention of Diabetes in Obese Subjects (XENDOS) Study

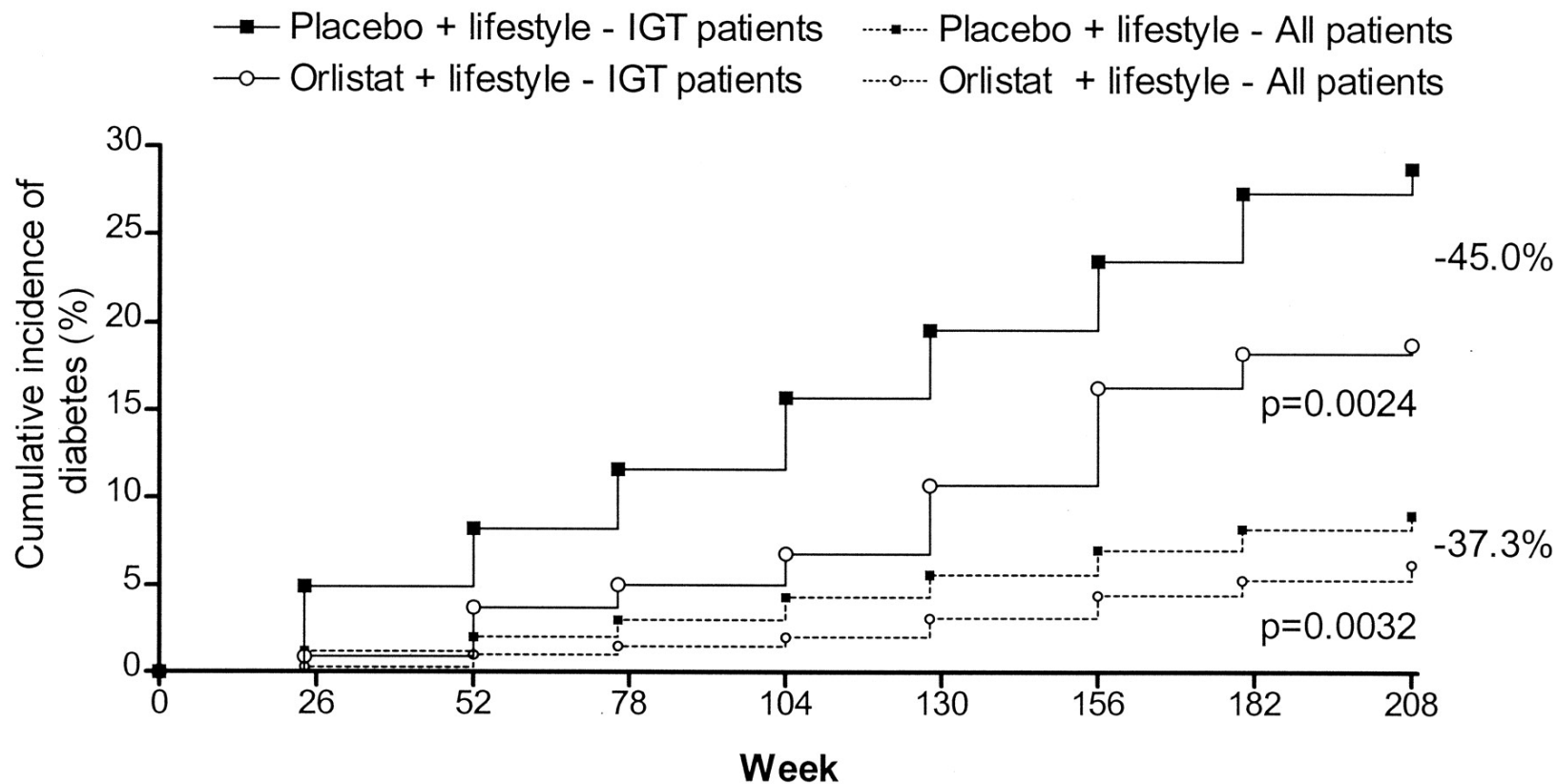
- 3,305 patients with a BMI  $\geq 30$  kg/m<sup>2</sup> ( 21% with impaired glucose tolerance)
- Intervention – Orlistat 120 mg or placebo, three times daily.

**Weight loss (means  $\pm$  SEM) during 4 years of treatment with orlistat plus lifestyle changes or placebo plus lifestyle changes in obese patients (LOCF data).**



Jarl S. Torgerson et al. Dia Care 2004;27:155-161

**Cumulative incidence of diabetes by study group in all obese patients (IGT or NGT at baseline) and only in obese patients with IGT at baseline.**



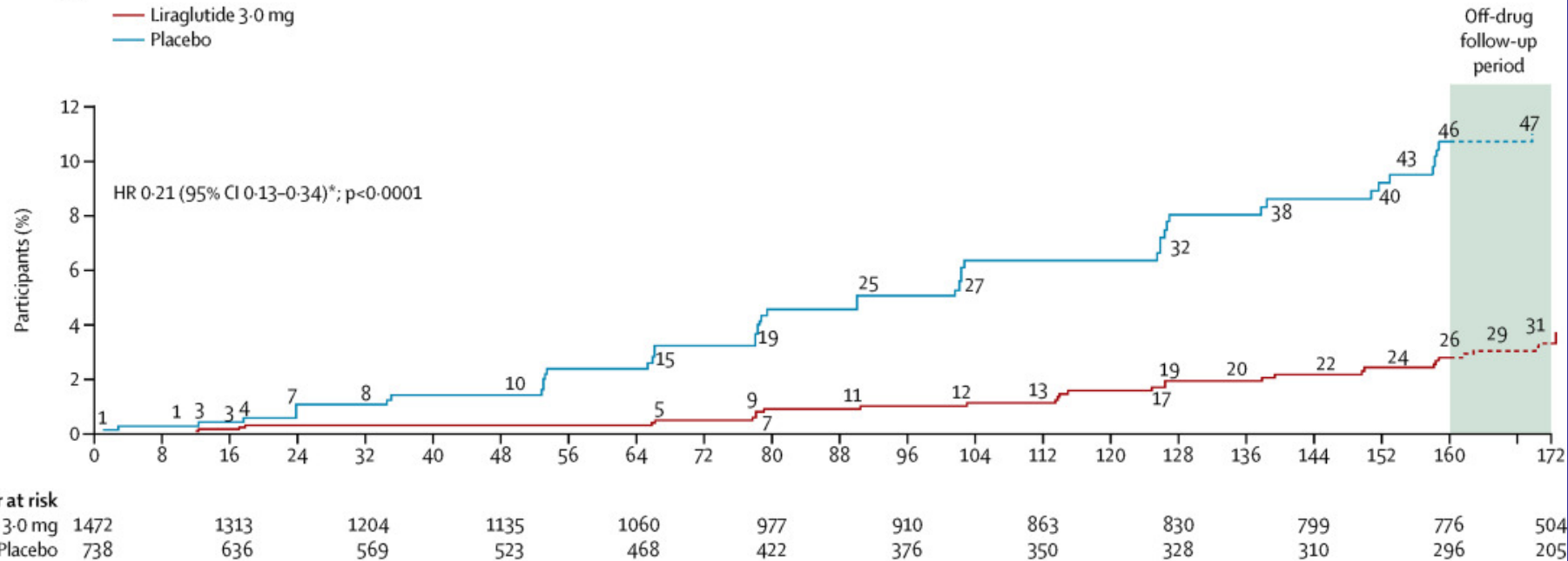
Jarl S. Torgerson et al. *Dia Care* 2004;27:155-161

# Liraglutide

- 2254 adults with prediabetes and a body-mass index of at least 30 kg/m<sup>2</sup>, or at least 27 kg/m<sup>2</sup> with comorbidities recruited in 2:1 ratio
- Intervention - once-daily subcutaneous liraglutide 3.0 mg or matched placebo
- By week 160, 26 (2%) of 1472 individuals in the liraglutide group versus 46 (6%) of 738 in the placebo group

# Liraglutide and Type 2 diabetes incidence

A



# Medications for Diabetes Prevention

- None recommended by FDA
- ADA - balance the risk/benefit of each medication - cost, side effects, and durable efficacy require consideration.
- Metformin has the strongest evidence base and demonstrated long-term safety as pharmacologic therapy for diabetes prevention

# Medications for Diabetes Prevention

- Metformin less effective than lifestyle modification in the DPP/ DPPPOS, though group differences declined over time
- Metformin may be cost-saving over a 10-year period
- For women with history of GDM, metformin and intensive lifestyle modification led to an equivalent 50% reduction in diabetes risk



# Medications for Diabetes Prevention

- Metformin should be recommended as an option for high-risk individuals (e.g., those with a history of GDM or those with BMI  $\geq 35$ ).
- Check Vitamin B12 levels with use

# ADA Screening for Pre-Diabetes

Overweight persons (BMI  $> 25$  or  $23 \text{ kg/m}^2$ ) with

- First-degree relative with diabetes
- High-risk race/ethnicity
- History of CVD
- Hypertension ( $\geq 140/90$  mmHg or on therapy for hypertension)
- HDL cholesterol level  $< 35$  mg/dL (0.90 mmol/L) and/or a triglyceride level  $> 250$  mg/dL (2.82 mmol/L)
- Women with polycystic ovary syndrome
- Physical inactivity
- Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)

# ADA risk test (diabetes.org/socrisktest).

ARE YOU AT RISK FOR

## TYPE 2 DIABETES?



### Diabetes Risk Test

- 1 How old are you?**  
Less than 40 years (0 points)  
40–49 years (1 point)  
50–59 years (2 points)  
60 years or older (3 points)
- 2 Are you a man or a woman?**  
Man (1 point) Woman (0 points)
- 3 If you are a woman, have you ever been diagnosed with gestational diabetes?**  
Yes (1 point) No (0 points)
- 4 Do you have a mother, father, sister, or brother with diabetes?**  
Yes (1 point) No (0 points)
- 5 Have you ever been diagnosed with high blood pressure?**  
Yes (1 point) No (0 points)
- 6 Are you physically active?**  
Yes (0 points) No (1 point)
- 7 What is your weight status?**  
(see chart at right)

Write your score in the box.









Add up your score.

#### If you scored 5 or higher:

You are at increased risk for having type 2 diabetes. However, only your doctor can tell for sure if you do have type 2 diabetes or prediabetes (a condition that precedes type 2 diabetes in which blood glucose levels are higher than normal). Talk to your doctor to see if additional testing is needed.

Type 2 diabetes is more common in African Americans, Hispanics/Latinos, American Indians, and Asian Americans and Pacific Islanders.

Higher body weights increase diabetes risk for everyone. Asian Americans are at increased diabetes risk at lower body weights than the rest of the general public (about 15 pounds lower).

For more information, visit us at [diabetes.org](http://diabetes.org) or call 1-800-DIABETES (1-800-342-2383)

Height	Weight (lbs.)		
4' 10"	119-142	143-190	191+
4' 11"	124-147	148-197	198+
5' 0"	128-152	153-203	204+
5' 1"	132-157	158-210	211+
5' 2"	136-163	164-217	218+
5' 3"	141-168	169-224	225+
5' 4"	145-173	174-231	232+
5' 5"	150-179	180-239	240+
5' 6"	155-185	186-246	247+
5' 7"	159-190	191-254	255+
5' 8"	164-196	197-261	262+
5' 9"	169-202	203-269	270+
5' 10"	174-208	209-277	278+
5' 11"	179-214	215-285	286+
6' 0"	184-220	221-293	294+
6' 1"	189-226	227-301	302+
6' 2"	194-232	233-310	311+
6' 3"	200-239	240-318	319+
6' 4"	205-245	246-327	328+
		(1 Point)	(2 Points) (3 Points)
You weigh less than the amount in the left column (0 points)			

Adapted from Bang et al., Ann Intern Med 151:775-783, 2009.  
Original algorithm was validated without gestational diabetes as part of the model.

#### Lower Your Risk

The good news is that you can manage your risk for type 2 diabetes. Small steps make a big difference and can help you live a longer, healthier life. If you are at high risk, your first step is to see your doctor to see if additional testing is needed. Visit [diabetes.org](http://diabetes.org) or call 1-800-DIABETES (1-800-342-2383) for information, tips on getting started, and ideas for simple, small steps you can take to help lower your risk.



Visit us on Facebook  
[Facebook.com/AmericanDiabetesAssociation](https://www.facebook.com/AmericanDiabetesAssociation)

American Diabetes Association Dia Care 2018;41:S13-S27



American  
Diabetes  
Association.

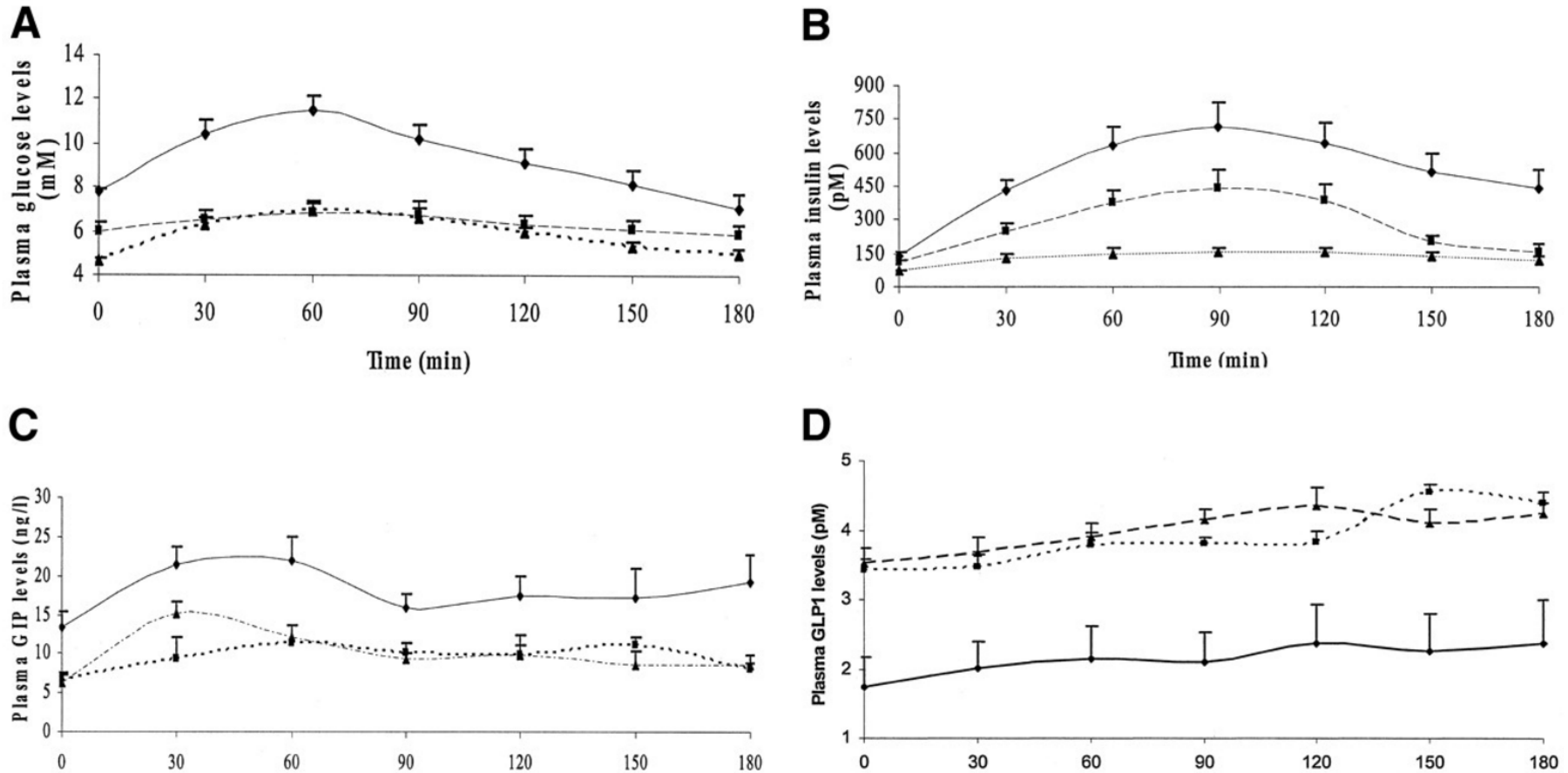
# Diabetes Reversal

- If diabetes does occur can it be reversed?

# Diabetes Reversal

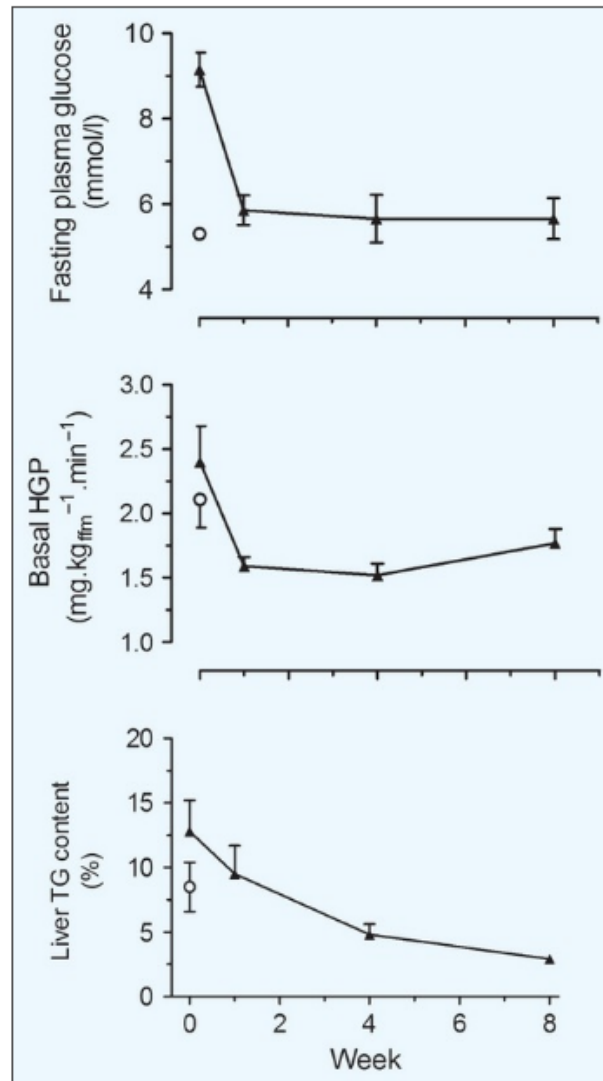
- If diabetes does occur can it be reversed?
- Potentially - needs to be done early.
- Reversal related to duration of diabetes and also degree of weight loss

# Diabetes Reversal – Bariatric Surgery



Time courses of plasma glucose, insulin, GIP, and GLP-1 after OGTT before and after BPD. Solid line, before BPD; dashed line, 1 week after BPD; dotted line, 4 weeks after BPD. Data are expressed as means  $\pm$  SE.

# Reversing Diabetes Very Low Calorie Diet



# DiRECT Study

- **Population:** 20-65 years who had been diagnosed with type 2 diabetes within the past 6 years, BMI of 27-45 kg/m<sup>2</sup>, and were not receiving insulin
- **Intervention:** withdrawal of antidiabetic and antihypertensive drugs, total diet replacement (825-853 kcal/day formula diet for 3-5 months), stepped food reintroduction (2-8 weeks), and structured support for long-term weight loss (15kg) maintenance



# Results

- Of 305 participants remission of diabetes took place in 68 (46%) participants in the intervention group and 6 (4%) participants in the control group (odds ratio 19·7, 95% CI 7·8-49·8;  $p < 0·0001$ ).
- Remission related to weight loss

# Summary

- Intensive lifestyle interventions can prevent or delay progression to type 2 diabetes in persons with pre-diabetes
- Several medications have been shown to reduce disease progression and may have other health benefits.
- New approaches can also help reverse type 2 diabetes in those who fail prevention efforts.

# Question 1

From clinical trial evidence which of the following types of diabetes can be prevented?

- a. Type 1 diabetes
- b. Type 2 diabetes
- c. Gestational diabetes
- d. Steroid induced diabetes

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From clinical trial evidence which of the following types of diabetes can be prevented?

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## Question 2

Clinical trials of diabetes prevention have been conducted in all of the following populations EXCEPT?

- a. Chinese men and women
- b. Elderly Americans
- c. Women with gestational diabetes
- d. Obese children
- e. Persons at risk of type 1 diabetes

## Question 2

Clinical trials of diabetes prevention have been conducted in all of the following populations EXCEPT?

- a. Chinese men and women
- b. Elderly Americans
- c. Women with gestational diabetes
- d. Obese children**
- e. Persons at risk of type 1 diabetes

## Question 3

Which of the following are **proven** risk factors for type 2 diabetes?

- a. Obesity
- b. Sugar sweetened beverage consumption
- c. Having a first degree relative with diabetes
- d. Gestational diabetes
- e. Being sedentary

## Question 3

Which of the following are **proven** risk factors for type 2 diabetes?

- a. **Obesity**
- b. Sugar sweetened beverage consumption
- c. **Having a first degree relative with diabetes**
- d. **Gestational diabetes**
- e. **Being sedentary**



# Question 4

**Prediabetes** refers to which of the following results?

- a. Fasting plasma glucose 5.6-6.9mmol/L
- b. 2 hour glucose after 75g OGTT of 7.9-11.0mmol/L
- c. An HbA1c of 5.7-6.9% on a NSGP standardized assay
- d. All of the above

# Question 4

**Prediabetes** refers to which of the following results?

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- b. 2 hour glucose after 75g OGTT of 7.9-11.0mmol/L
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## Question 5

Most diabetes prevention studies have been conducted populations that meet which of the following criteria for pre-diabetes?

- a. Fasting plasma glucose 5.6-6.9mmol/L
- b. 2 hour glucose after 75g OGTT of 7.9-11.0mmol/L
- c. An HbA1c of 5.7-6.9% on a NSGP standardized assay
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Most diabetes prevention studies have been conducted populations that meet which of the following criteria for pre-diabetes?

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- b. 2 hour glucose after 75g OGTT of 7.9-11.0mmol/L**
- c. An HbA1c of 5.7-6.9% on a NSGP standardized assay
- d. All of the above

## Question 6

Which of the following medications have been demonstrated to reduce the risk of diabetes in patients with prediabetes?

- a. Metformin
- b. Pioglitazone
- c. Acarbose
- d. Liraglutide
- e. Orlistat
- f. None of the above

## Question 6

Which of the following medications have been demonstrated to reduce the risk of diabetes in patients with pre-diabetes?

- a. **Metformin**
- b. **Pioglitazole**
- c. **Acarbose**
- d. **Liraglutide**
- e. **Orlistat**
- f. None of the above

# Question 7

Which of the following medications have been approved by the US Food and Drug Administration for diabetes prevention?

- a. Metformin
- b. Pioglitazone
- c. Acarbose
- d. GLP-1 receptor agonists
- e. Orlistat
- f. None of the above

# Question 7

Which of the following medications have been approved by the US Food and Drug Administration for diabetes prevention?

- a. Metformin
- b. Pioglitazone
- c. Acarbose
- d. GLP-1 receptor agonists
- e. Orlistat
- f. **None of the above**



## Question 8

The Diabetes Prevention Programme found that lifestyle change was most effective in preventing diabetes among which of the following groups of persons?

- a. Men
- b. Those with elevated fasting glucose
- c. Participants over 60 years old
- d. Participants under 45 years old

## Question 8

The Diabetes Prevention Programme found that lifestyle change was most effective in preventing diabetes among which of the following groups of persons?

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- b. Those with elevated fasting glucose
- c. Participants over 60 years old**
- d. Participants under 45 years old

## Question 9

Which of the following medications have been demonstrated to reduce the risk of both cardiovascular events and diabetes?

- a. Metformin
- b. Pioglitazone
- c. Acarbose
- d. Atorvastatin

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## Question 10

Which of the following have the potential to “reverse” diabetes

- a. Bariatric surgery
- b. Metformin
- c. Very Low Calorie Diets
- d. Sitagliptin

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- c. Very Low Calorie Diets**
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MARK YOUR CALENDER!  
**DIABETES CLINICAL UPDATE 2018**

THE CCDE ADVISORY BOARD  
INVITES YOU TO JOIN US

FOR A ONE DAY **DIABETES  
WORKSHOP  
&  
SYMPOSIUM**



- THE 2018 AMERICAN DIABETES ASSOCIATION (ADA) GUIDELINES
- CARDIOVASCULAR OUTCOMES AND THE NEW ORAL AGENTS USED TO MANAGE T2DM
- PATIENT/ PROVIDER PERSPECTIVES IN DIABETES MANAGEMENT IN JAMAICA TODAY – SUCCESSES/ BARRIERS TO CARE
- TARGETED THERAPY FOR PREVENTING AND SLOWING RENAL DISEASE IN DIABETES
- NEW INSULINS AND INJECTABLE AGENTS FOR THE MANAGEMENT OF DIABETES
- THE WAY FORWARD FOR DIABETES CARE IN JAMAICA – DEVELOPING A STRATEGY

**SUNDAY  
JULY 22, 2018**

**9:00 am-4:00 pm**

**Venue: TBA**



**CE HOURS – 5**

FOR MORE INFORMATION:  
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