

Diabetes Across the Lifespan

Barnstable Brown Diabetes Symposium

October 27, 2017

John E. Anderson, MD

Disclosures

Advisory Board/Speaker's Bureau

Eli Lilly

Boehringer Ingelheim

Janssen

Sanofi

Astra Zeneca

Consultant

Abbott Diabetes

Merck

Intarcia

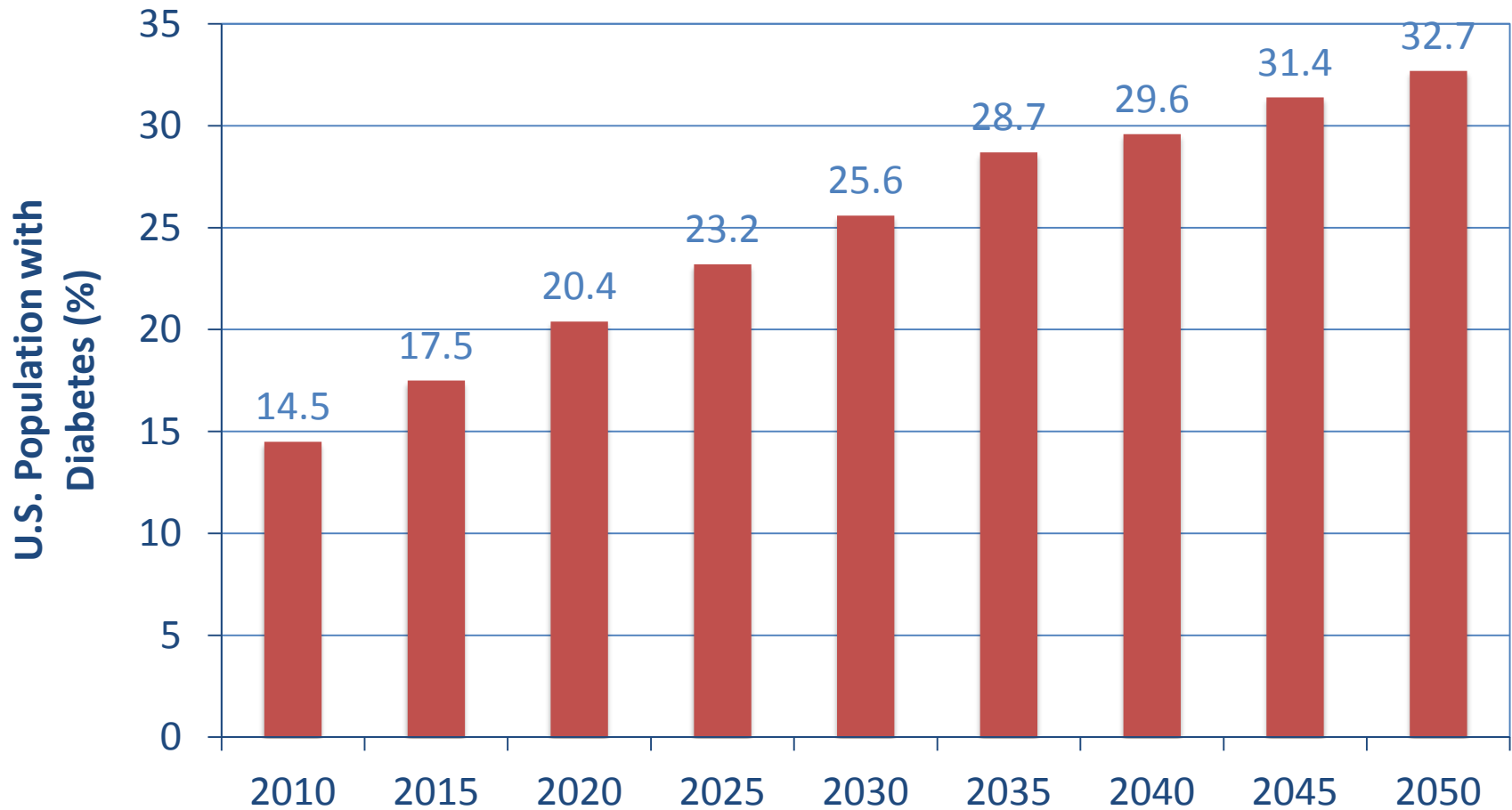
Acknowledgements

David G. Marrero, Ph.D.

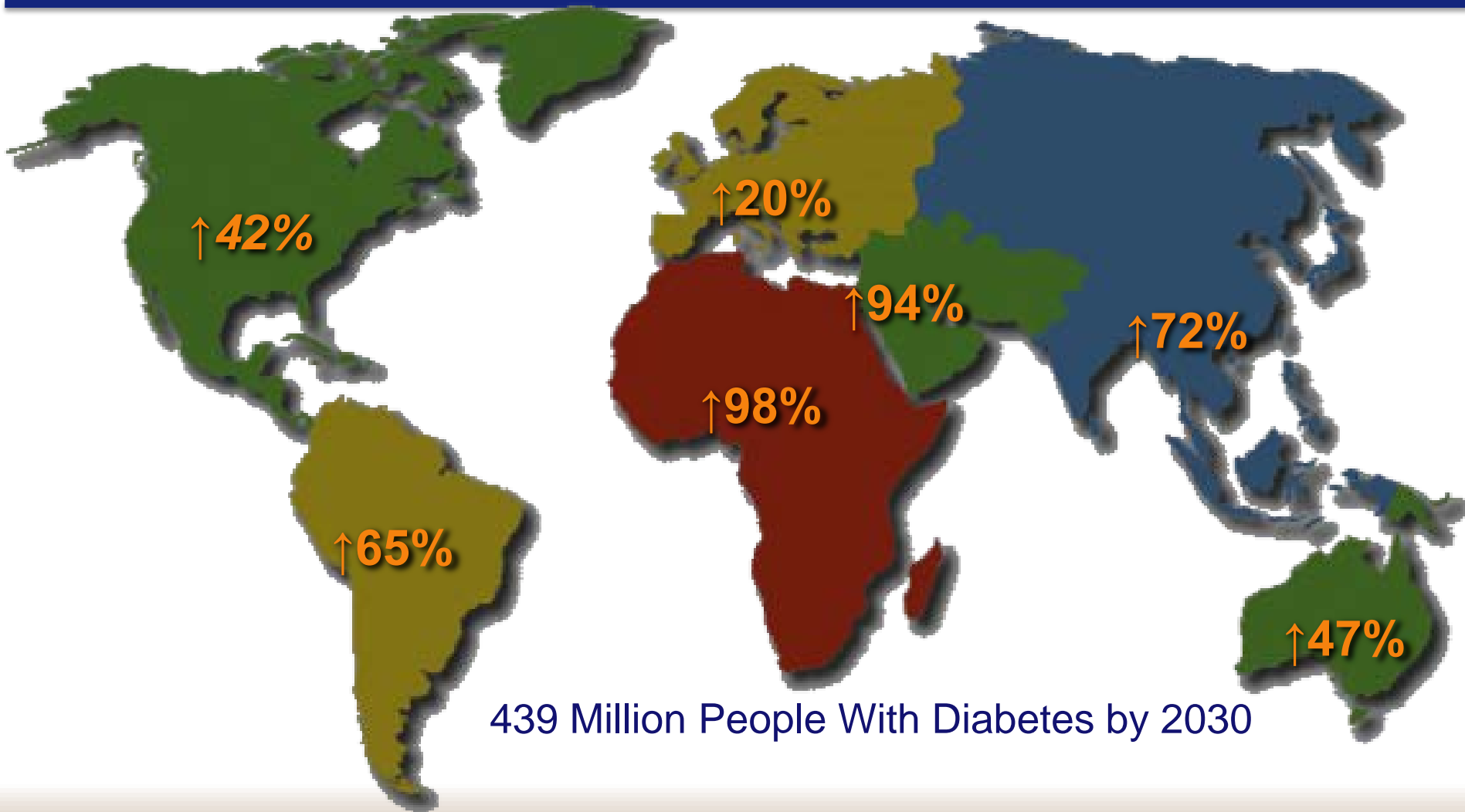
Kathleen Stanley, CDE, RD, LD, MSeD

Kristie

Projecting the Future Diabetes Population: The Imperative for Change

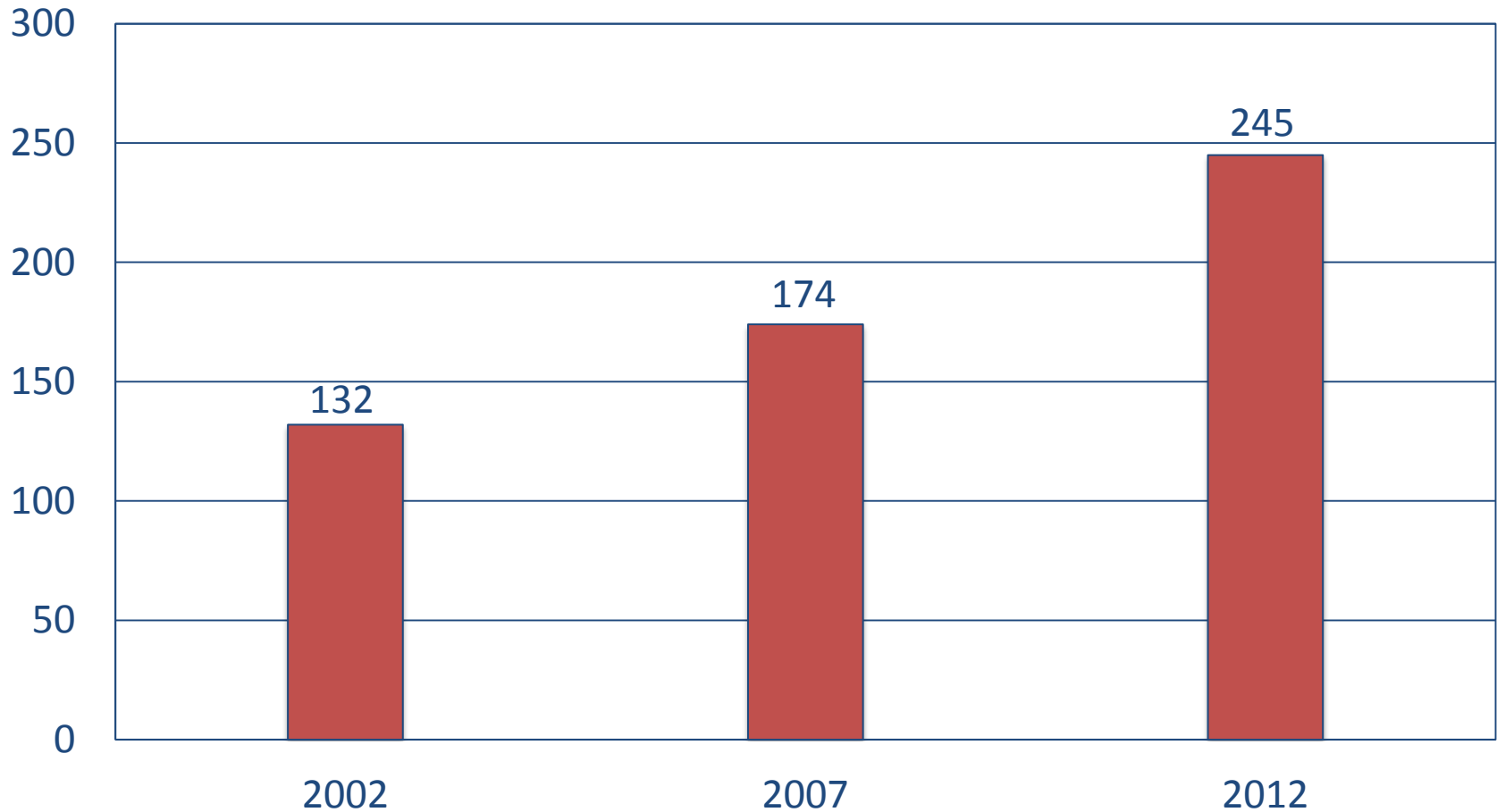


Global Projections for the Diabetes Epidemic



439 Million People With Diabetes by 2030

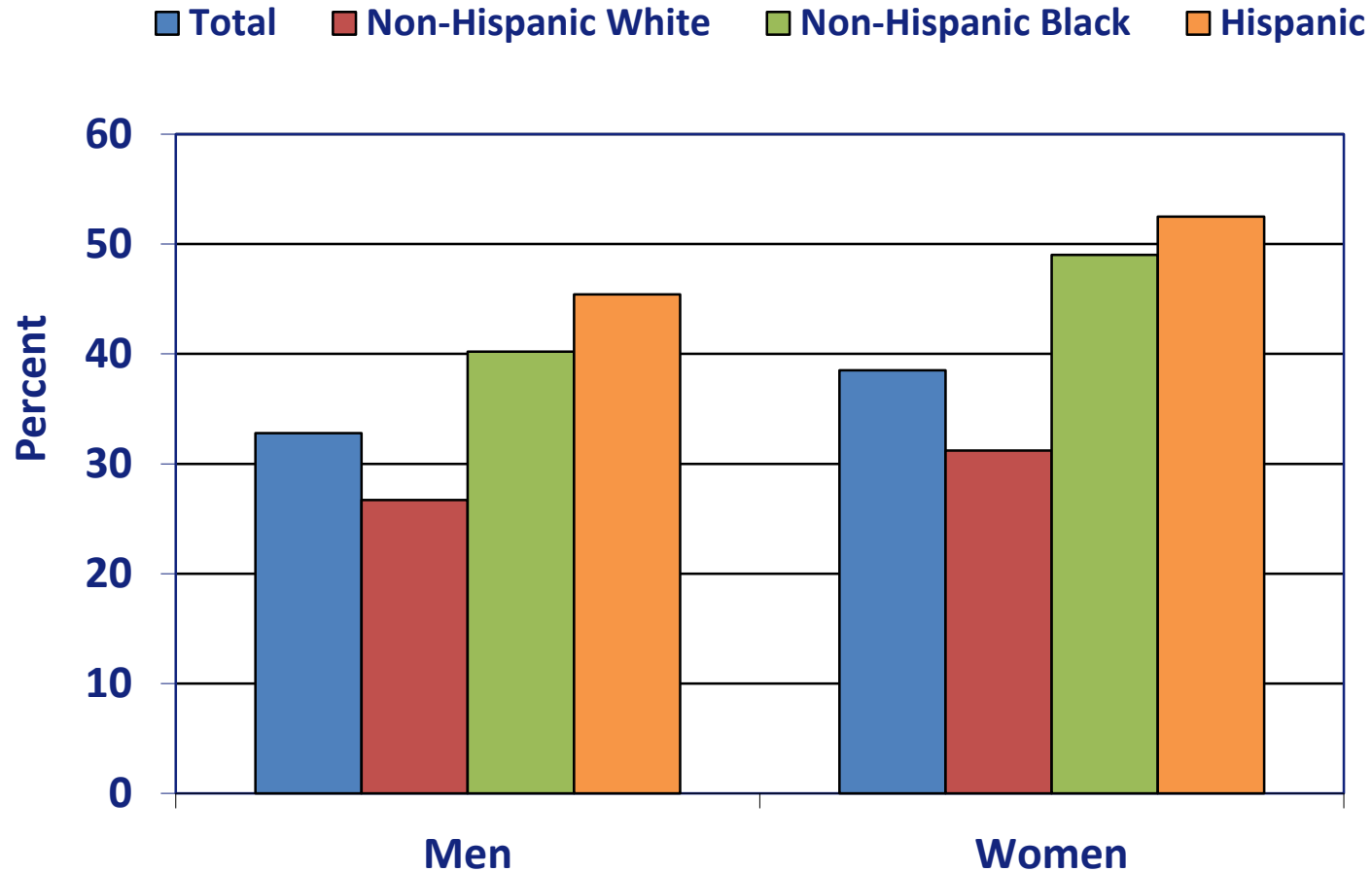
Diabetes Cost (in billions)



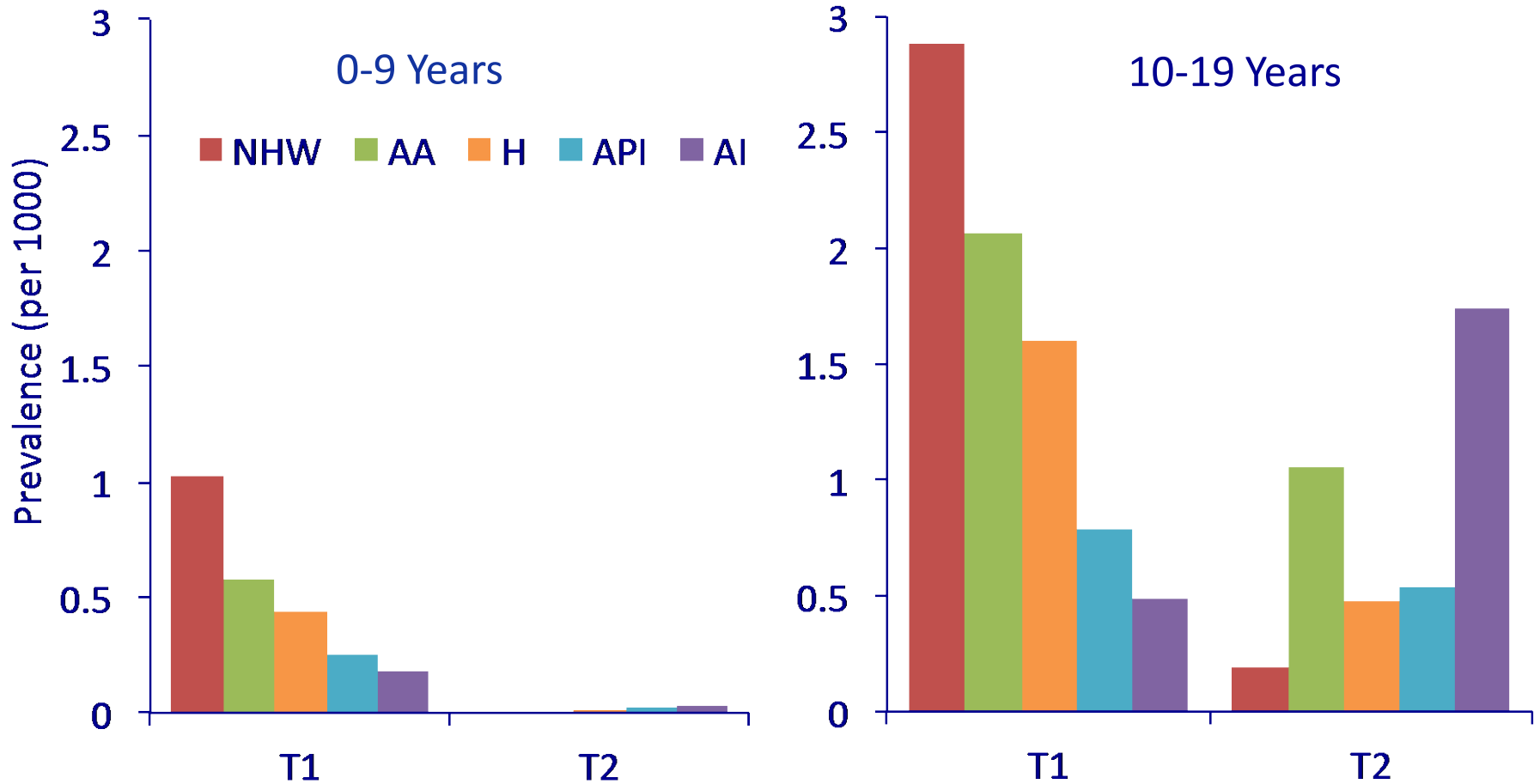
American Diabetes Association. *Diabetes Care*. 2013;36(4):1033-1046.

American Diabetes Association. *Diabetes Care*. 2003; 26 (3): 917-932.

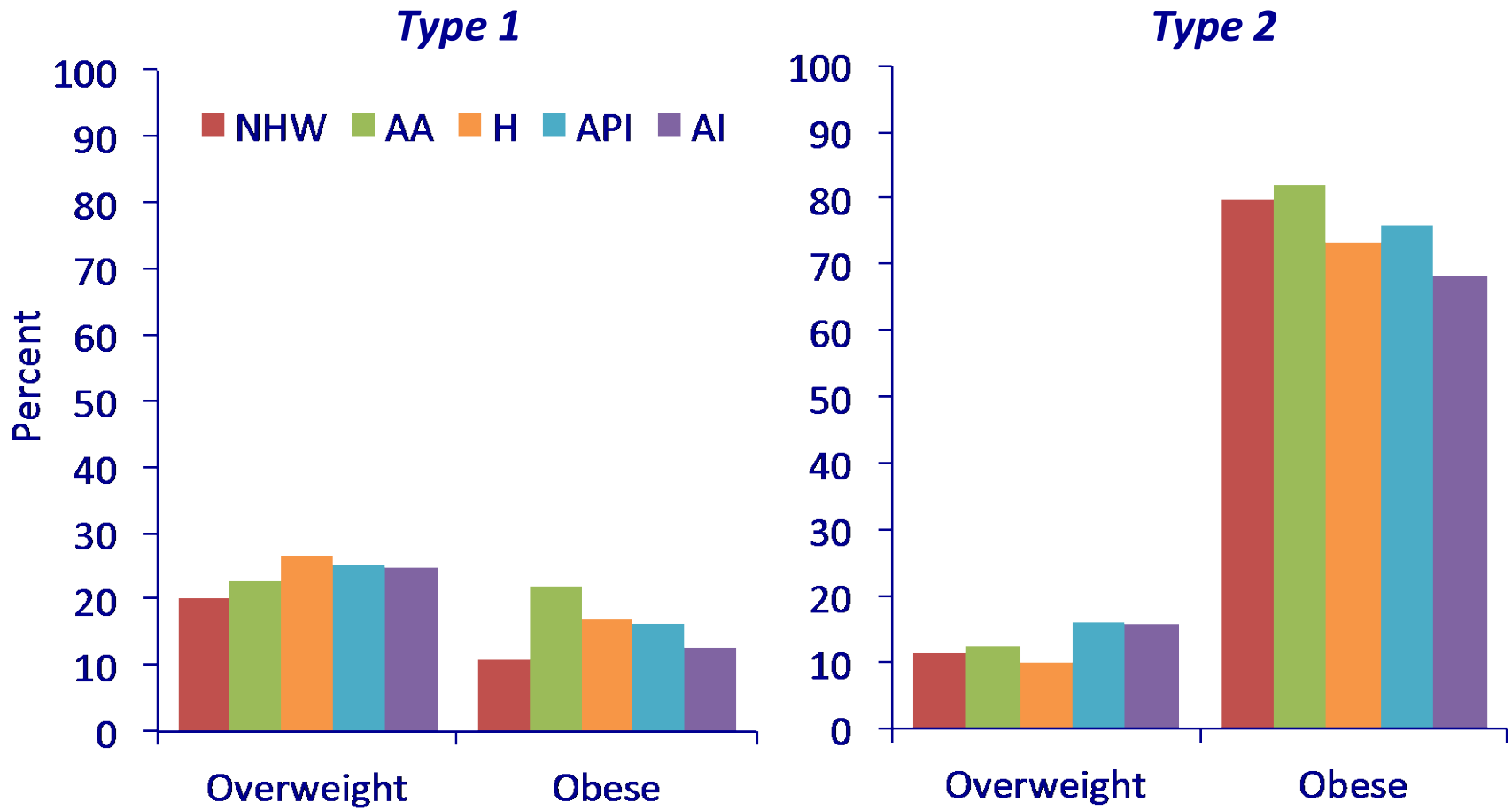
Estimated lifetime risk of developing diabetes for individuals born in the United States in 2000



Prevalence of DM in Youth



What about Overweight and Obesity?





**29.1 million
with Diabetes**

**86 million
with
Prediabetes**

Why are we all getting obese?

HOW DID OUR LIVES CHANGE OVER
THE LAST 25 YEARS?

Etiology of Obesity: Dietary Intake



Daily caloric intake increased dramatically in the past 30 years

Increased portion sizes

- **Marketplace portions are 2-8 fold larger than FDA recommendation**

Increased frequency of eating out/fast food consumption

Changes in Portion Sizes.....

CHEESEBURGER

25 Years Ago



333 calories

Today



**How many calories
are in today's
cheeseburger?**



CHEESEBURGER

25 Years Ago



333 calories

Today



590 calories

Calorie Difference: 257 calories

COFFEE

25 Years Ago
Coffee
(with whole milk and sugar)



45 calories
8 ounces

Today
Mocha Coffee
(with steamed whole milk and mocha syrup)



How many calories
are in today's coffee

COFFEE

25 Years Ago

Coffee

**(with whole milk and
sugar)**



45 calories

8 ounces

Today

Mocha Coffee

**(with steamed whole milk
and mocha syrup)**



350 calories

16 ounces

Calorie Difference: 305

POPCORN

25 Years Ago



270 calories
5 cups

Today



?

How many calories
are in today's large
popcorn?

POPCORN

25 Years Ago



270 calories

5 cups

Today



630 calories

11 cups

Calorie Difference: 360

Which is Your Favorite?





أحلى الأوقات وألذ طعام

今日も
カーネルの
調理法!



Kentucky Fried Chicken



's  麦当劳  McDonald's

 麦当劳开元餐厅8月31日隆重开幕 

开心乐园餐  

 麦当劳 
欢迎光临

麦当劳
隆重开幕






We Are Building Communities that Discourage Walking









Criteria for Diagnosing Diabetes

FPG \geq 126 mg/dl

HgbA1C \geq 6.5%

OGGT $>$ 200 mg/dl at 2 HR

Glucose $>$ 200 mg/dl with typical symptoms

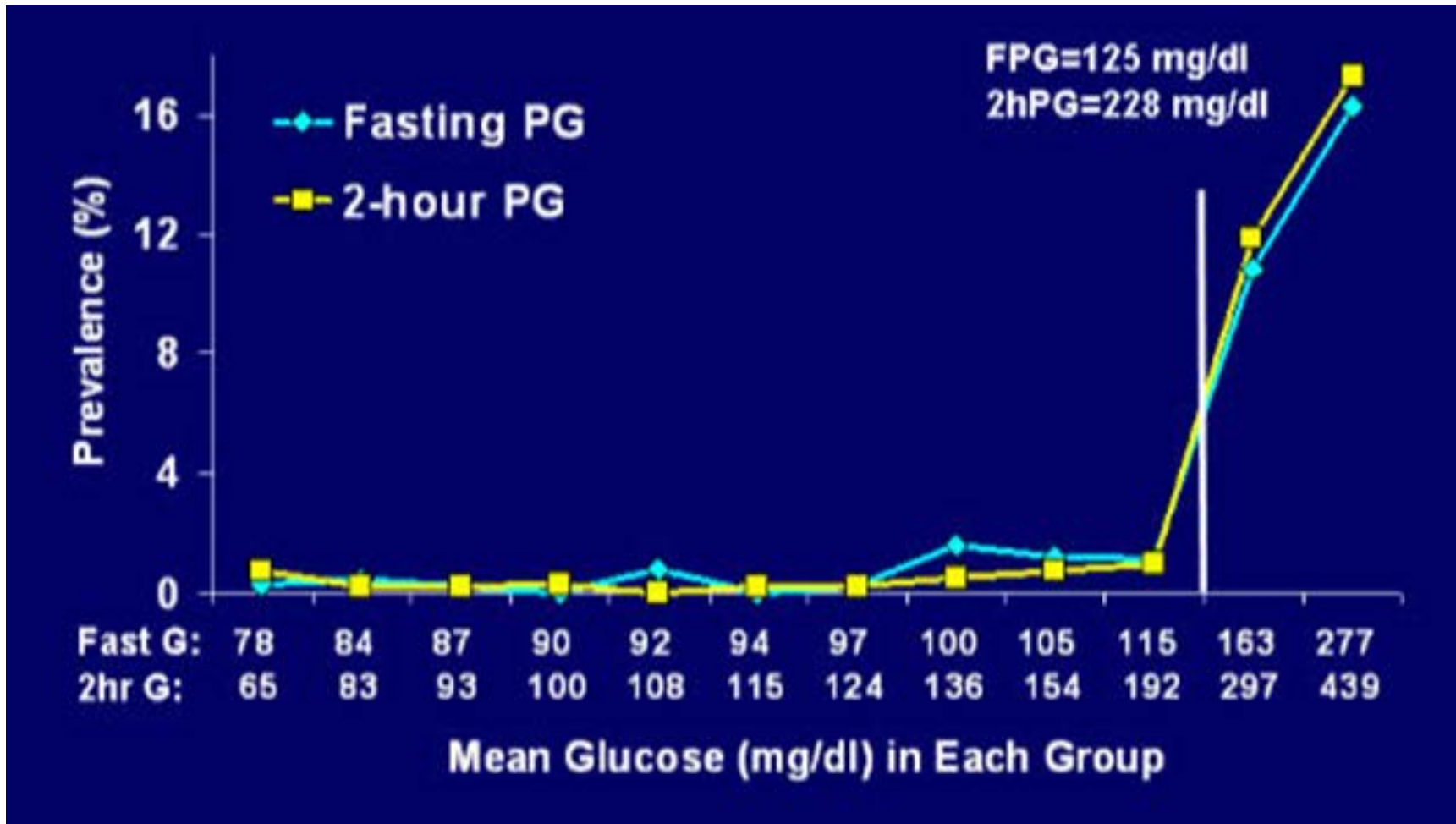
AACE/ACE 2010 Recommendation for Diagnosing Pre-diabetes

- 1. IFG- FPG 100-125 mg/dl (5.6- 6.9 mmol/l)**
- 2. IGT - 140- 199 mg/dl (7.8-11.0 mmol/l) 2-h post 75-g OGTT**
- 3. A1C 5.5–6.4% - a screening test requires:
*Fasting glucose or GTT of 75 gr Glucola***

*In 2008 AACE/ACE consensus position recommended that metabolic syndrome be considered a Pre DM equivalent.

AACE = american association of clinical endocrinologists; ACE = american council on education; OGTT = oral glucose tolerance test.

Retinopathy in 5007 Adult Pima Indians by 12 Equal-sized Groups of Plasma Glucose



PG = plasma glucose; FPG = fasting plasma glucose

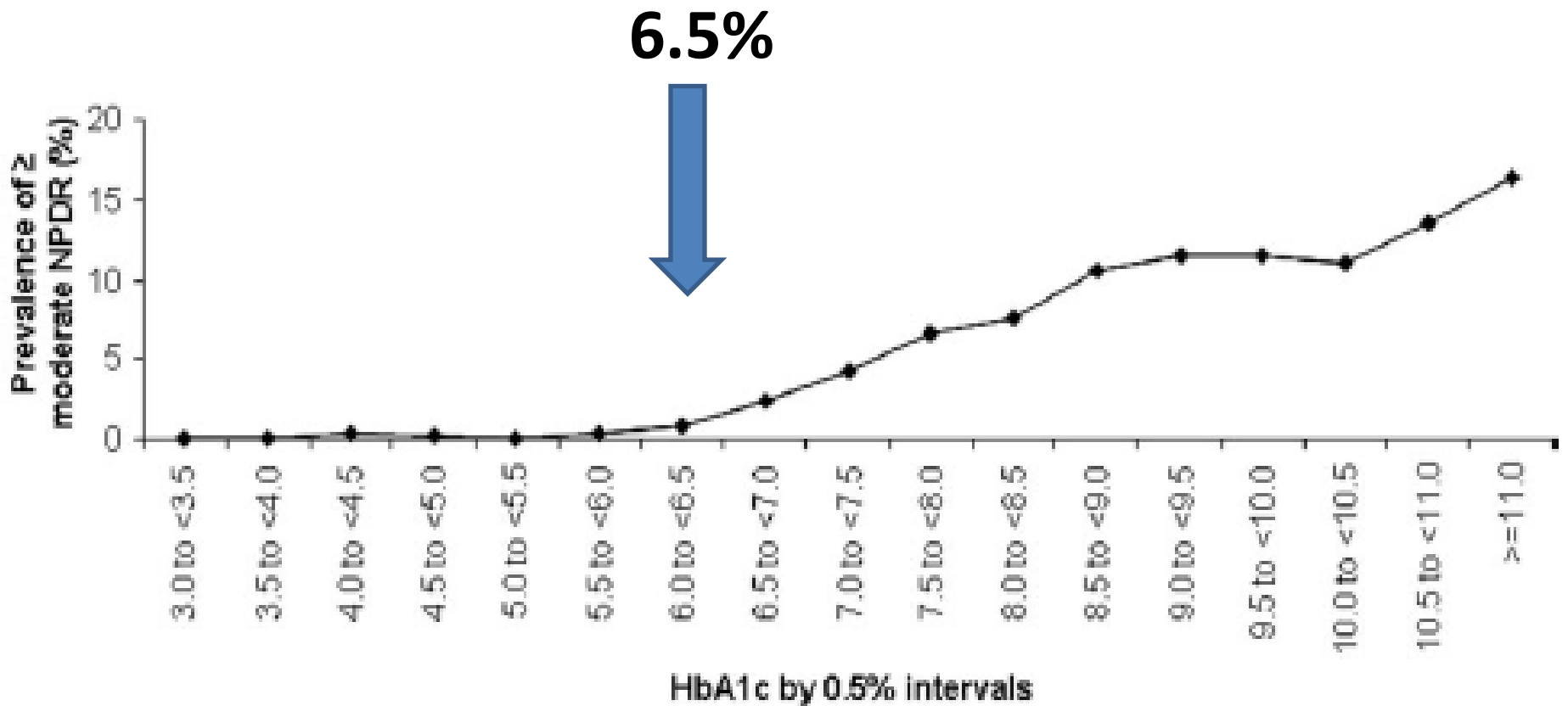
McCance DR, et al. *BMJ*. 1994;308(6940):1323-8;

Gabir MM, et al. *Diabetes Care*. 2000;23(8):1108-12.

Why Not Define Type 2 Diabetes as: Fasting Glucose >115 mg/dl?

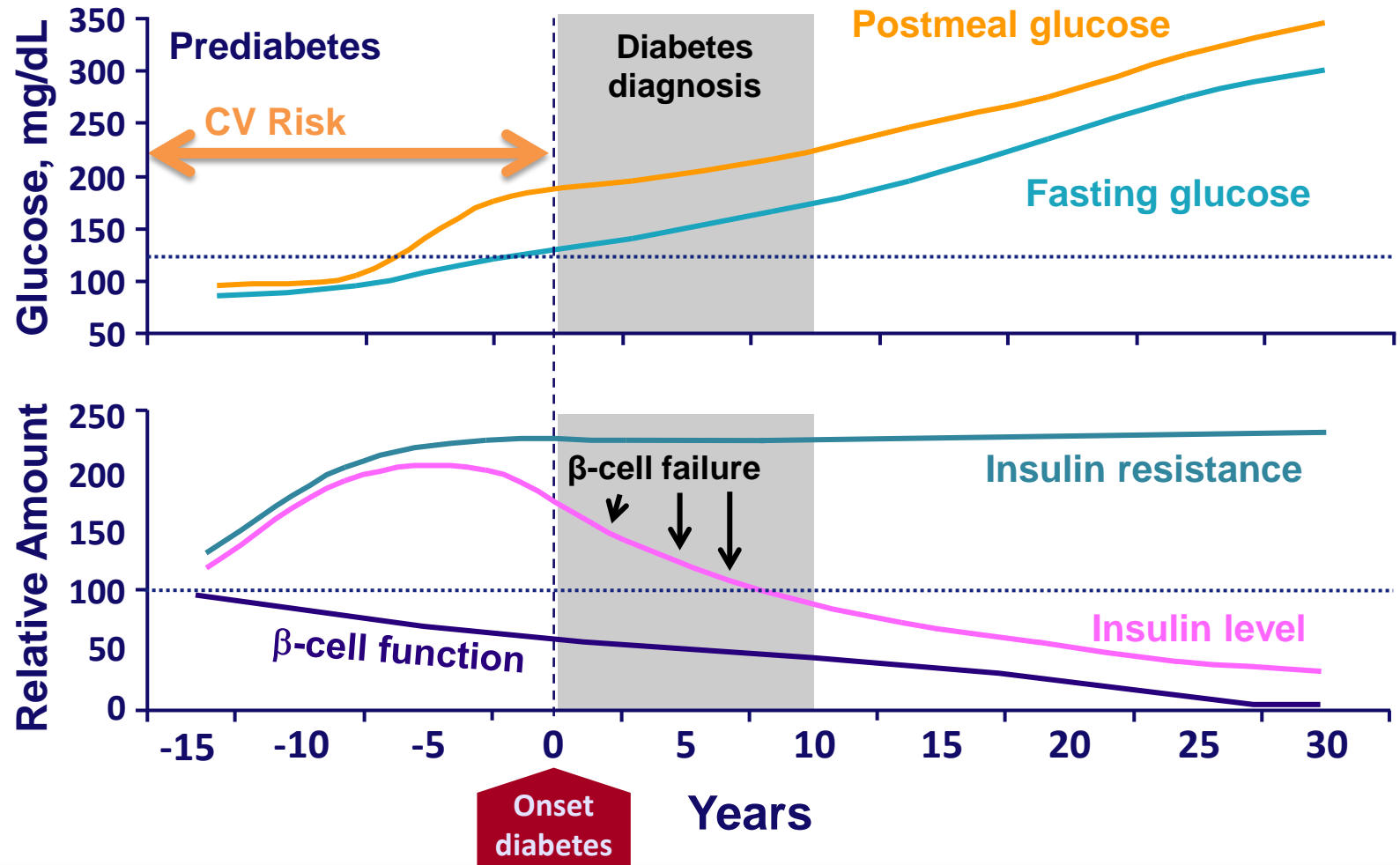
- “Too big a drop from 140 (old criterion)”
- “Too many people will be diagnosed”
- “We can’t afford to treat so many people”
- “126 mg/dl = 7.0 mmol/l – round number”
- These are hardly scientific arguments, but reflects consensus conferences

International Expert Committee Report on the Role of A1C in the Diagnosis of Diabetes



HbA1c = glycated haemoglobin; NPDR = nonproliferative diabetic retinopathy.

Diagnosis of Diabetes?



Feasibility of Preventing Type 2 Diabetes

- There is a long period of glucose intolerance that precedes the development of diabetes
- Screening tests can identify persons at high risk
- There are safe, potentially effective interventions that can address modifiable risk factors:
 - Obesity
 - Body fat distribution
 - Physical inactivity
 - High blood glucose

Prediabetes Management

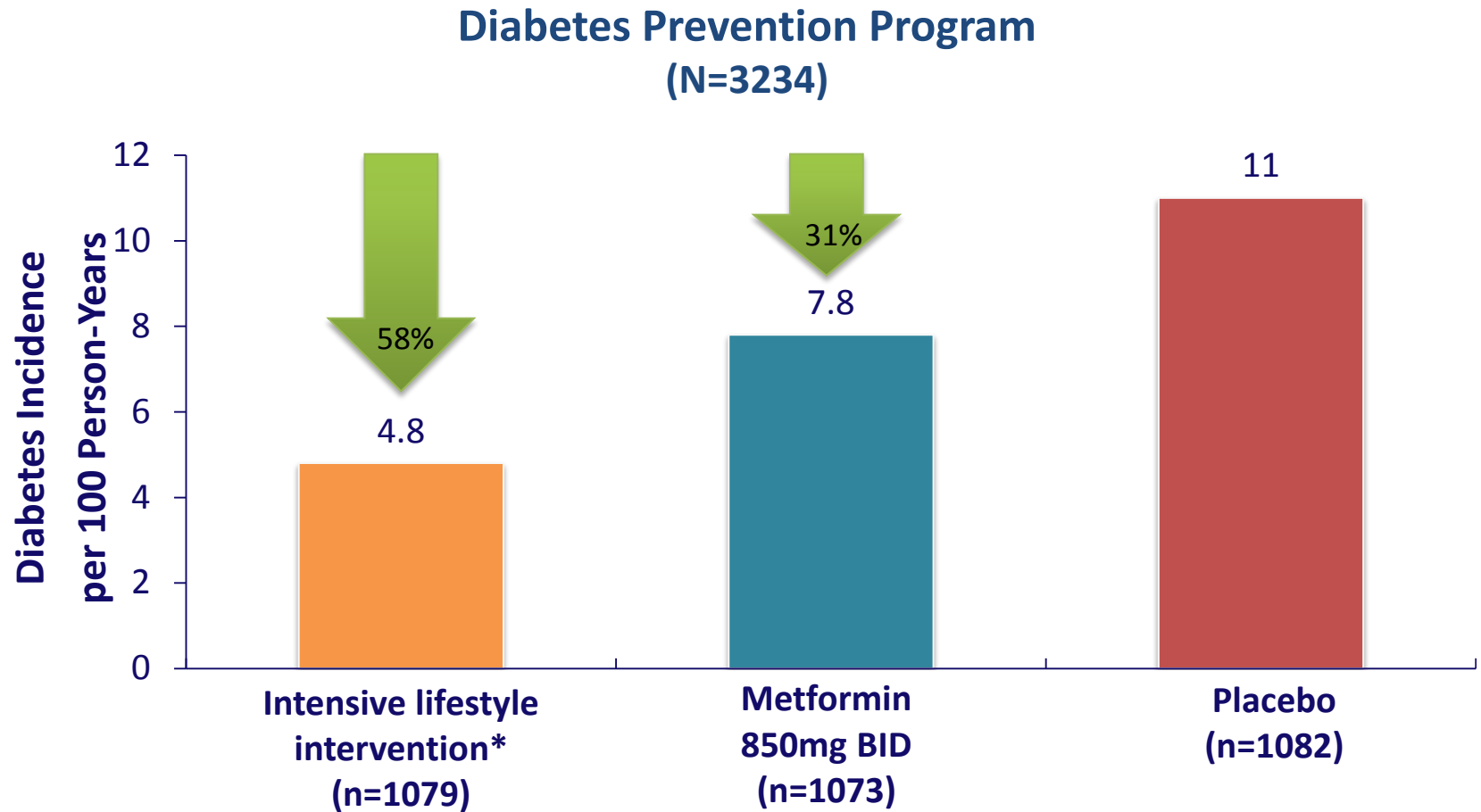
PREVENTION OF DIABETES: LIFESTYLE STUDIES

Prevention of T2D: Selected Lifestyle Modification Trials

Study	Country	N	Baseline BMI (kg/m ²)	Intervention period (years)	RRR (%)	NNT
Diabetes Prevention Program	USA	3234	34.0	2.8	58	21
Diabetes Prevention Study	Finland	523	31	4	39	22
Da Qing	China	577	25.8	6	51	30

NNT, number needed to treat; RRR, relative risk reduction; T2D, type 2 diabetes.

Intensive Lifestyle Intervention Effectively Prevents Progression From IGT to T2D



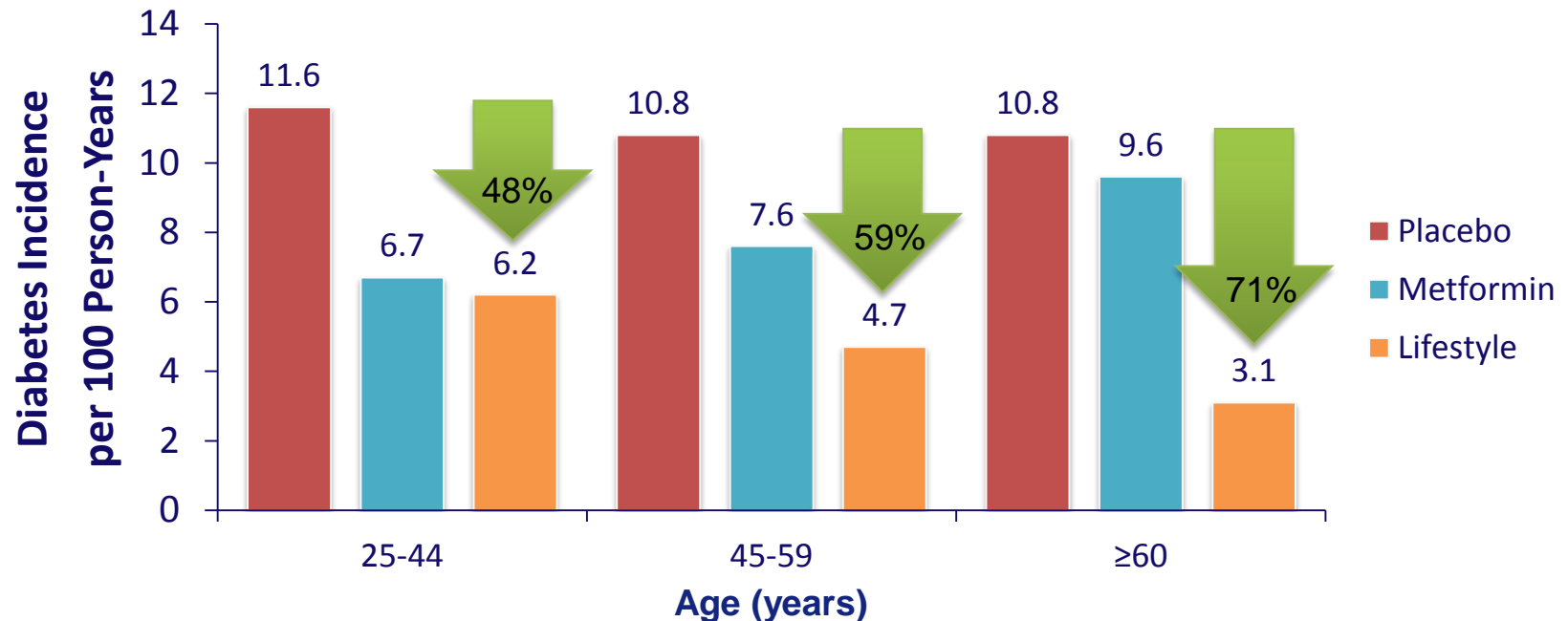
*Goal: 7% reduction in baseline body weight through low-calorie, low-fat diet and ≥ 150 min/week moderate intensity exercise .

IGT, impaired glucose tolerance; T2D, type 2 diabetes.

DPP Research Group. *N Engl J Med.* 2002;346:393-403.

Lifestyle Intervention More Effectively Prevents Diabetes as Populations Age

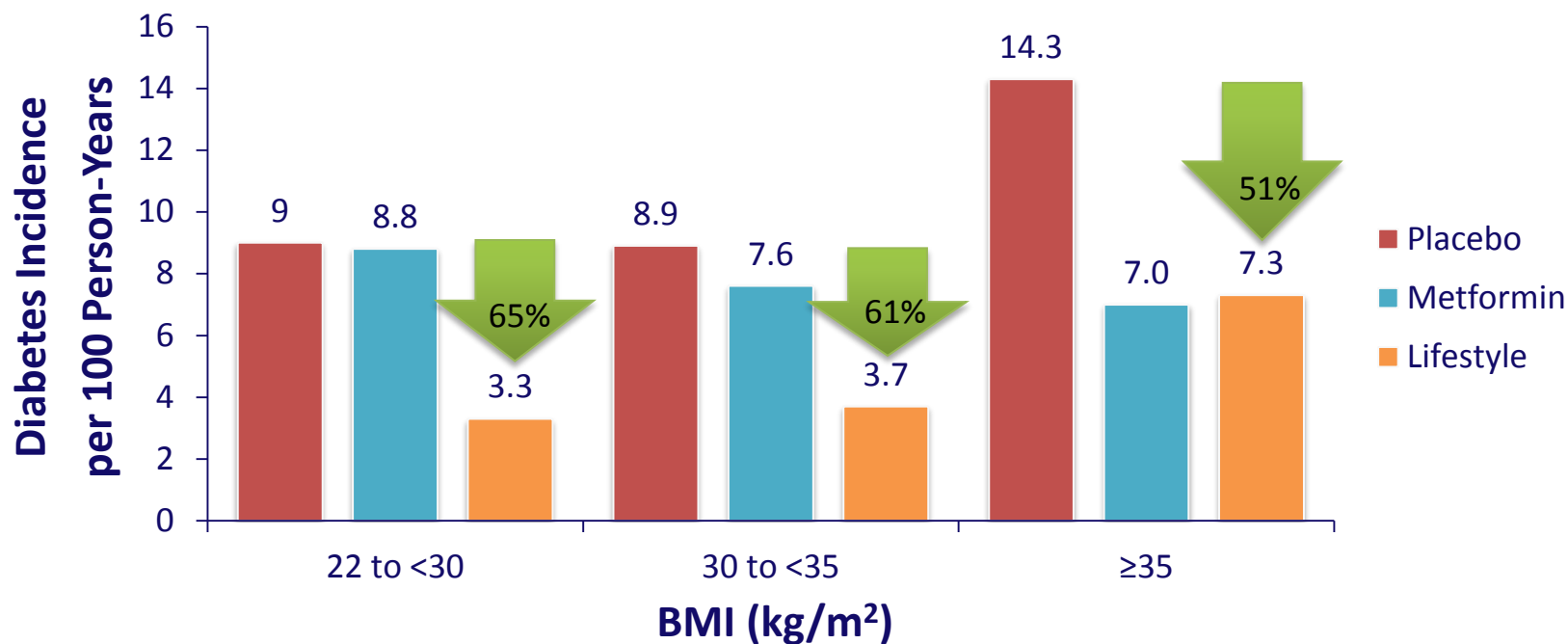
Diabetes Prevention Program (N=3234)



*Goal: 7% reduction in baseline body weight through low-calorie, low-fat diet and ≥150 min/week moderate intensity exercise .

Effectiveness of Lifestyle Intervention for Diabetes Prevention Wanes as Weight Increases

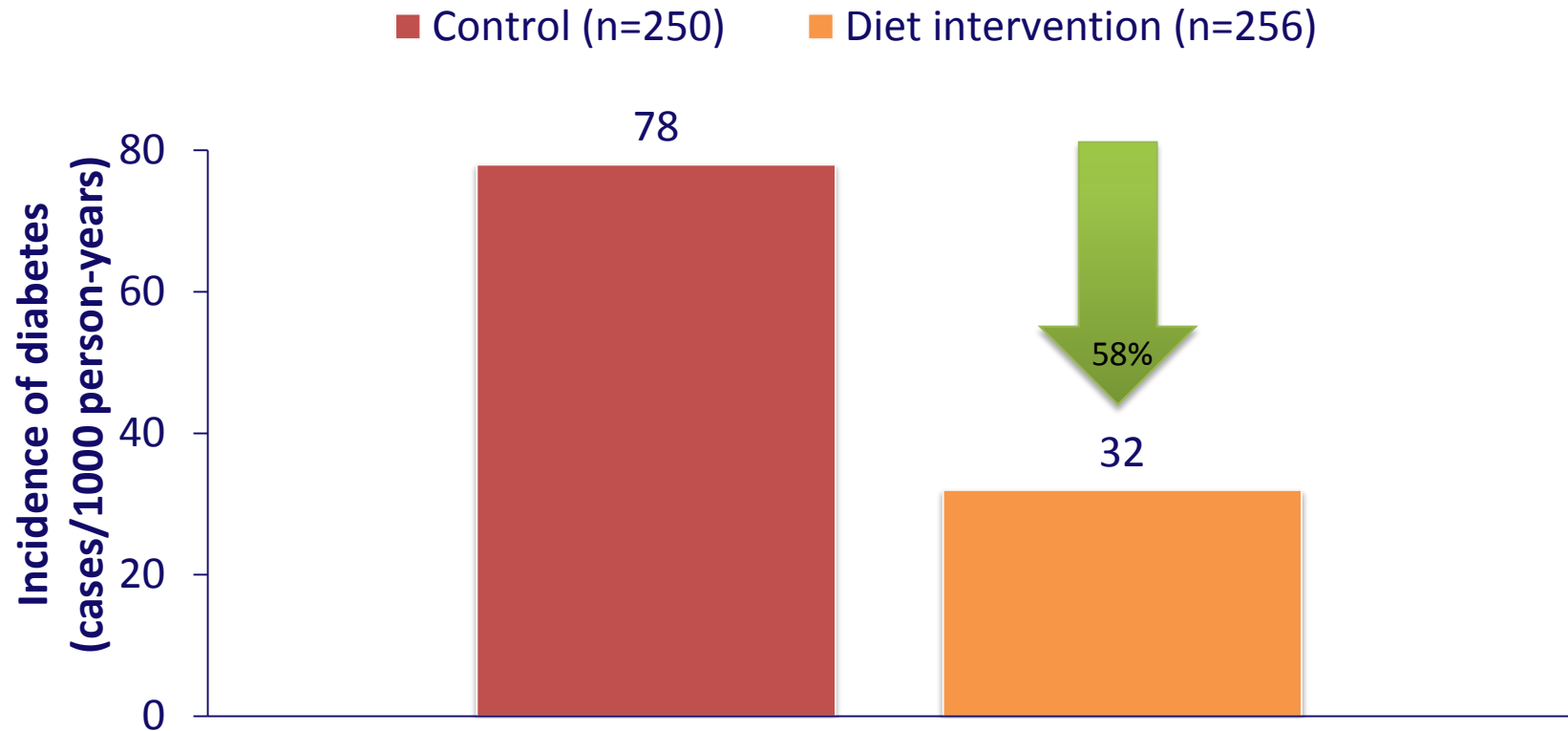
Diabetes Prevention Program (N=3234)



*Goal: 7% reduction in baseline body weight through low-calorie, low-fat diet and ≥150 min/week moderate intensity exercise .

Cumulative Incidence of Diabetes Over 4 Years

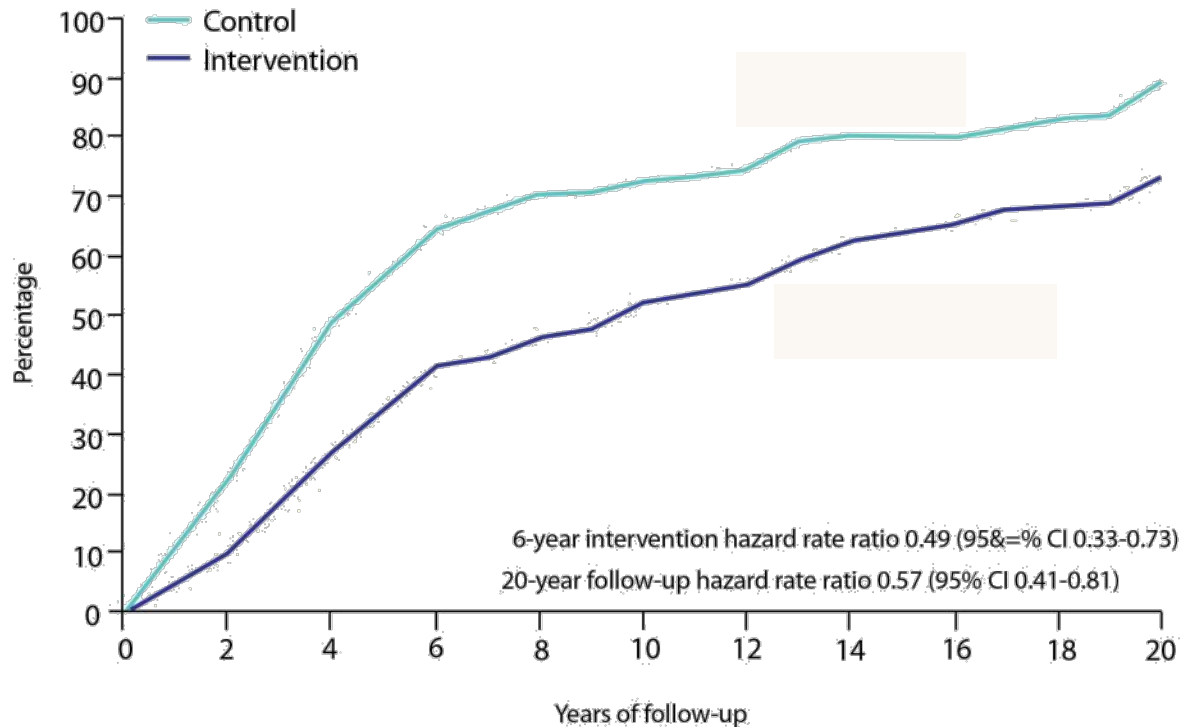
The Finnish Diabetes Prevention Study



DBP, diastolic blood pressure; SBP, systolic blood pressure.

20-Year Cumulative T2D Incidence in Asian Patients with IGT

Da Qing Diabetes Prevention Study



Number at risk

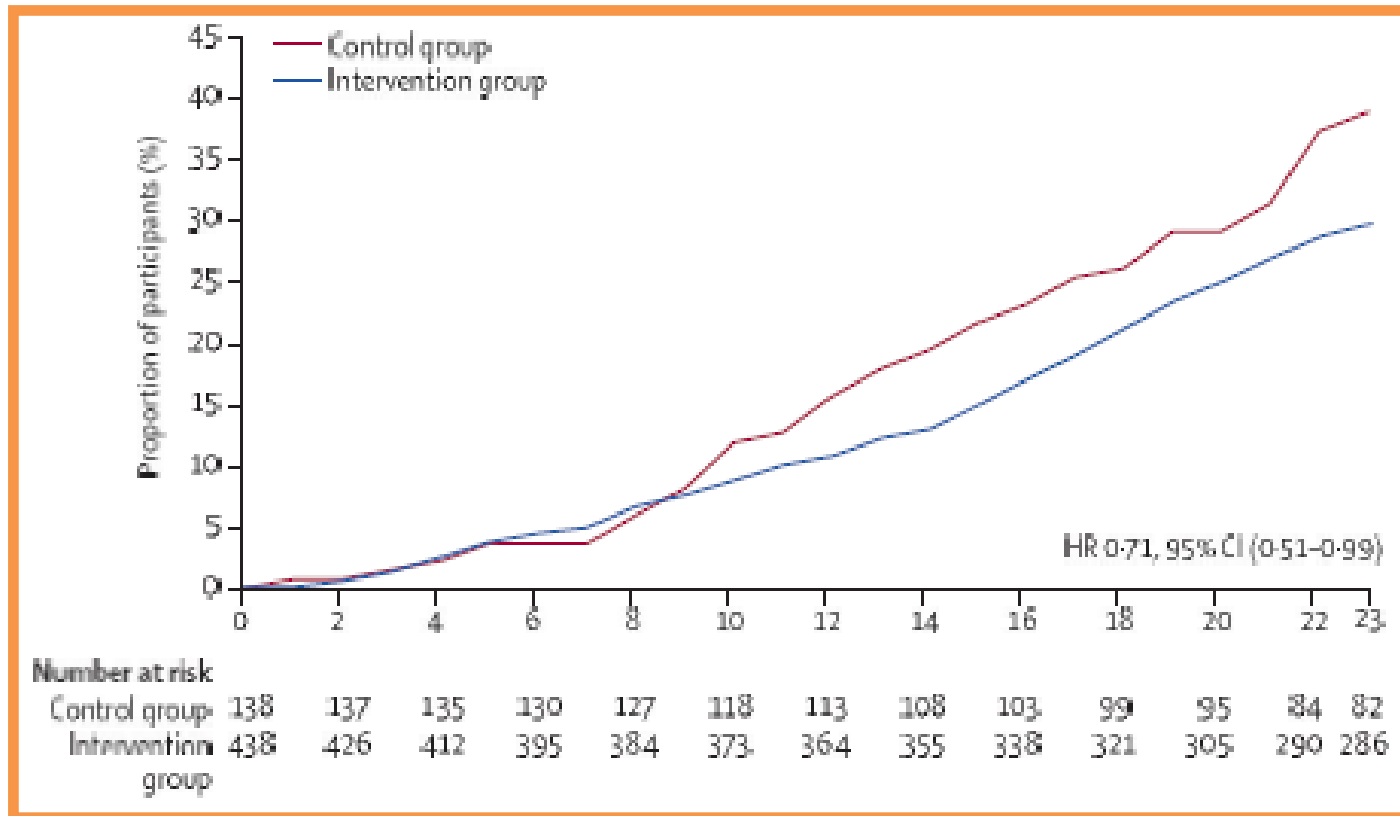
Control	135	105	69	48	40	37	34	27	27	23	14
Intervention	428	387	314	250	230	206	192	161	147	136	114

IGT, impaired glucose tolerance; T2D, type 2 diabetes.

Li G, et al. *Lancet*. 2008;371:1783-1789.

23-Year All-Cause Mortality in Asian Patients with IGT

Da Qing Diabetes Prevention Study

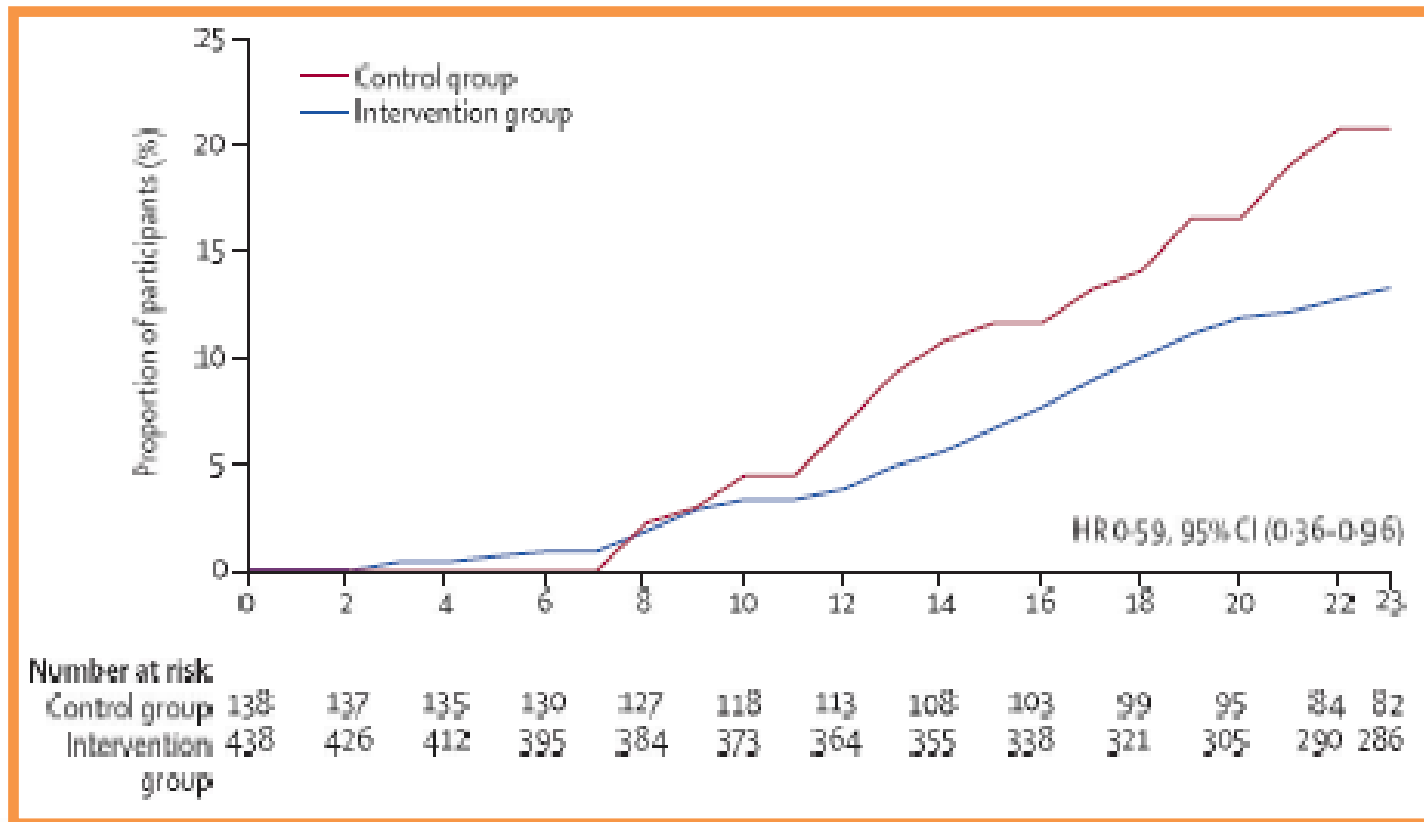


IGT, impaired glucose tolerance.

Li G, et al. Lancet Diabetes Endocrinol. 2014;2:474-478.

23-Year Cardiovascular Mortality in Asian Patients with IGT

Da Qing Diabetes Prevention Study



IGT, impaired glucose tolerance.

Li G, et al. Lancet Diabetes Endocrinol. 2014;2:474-478.

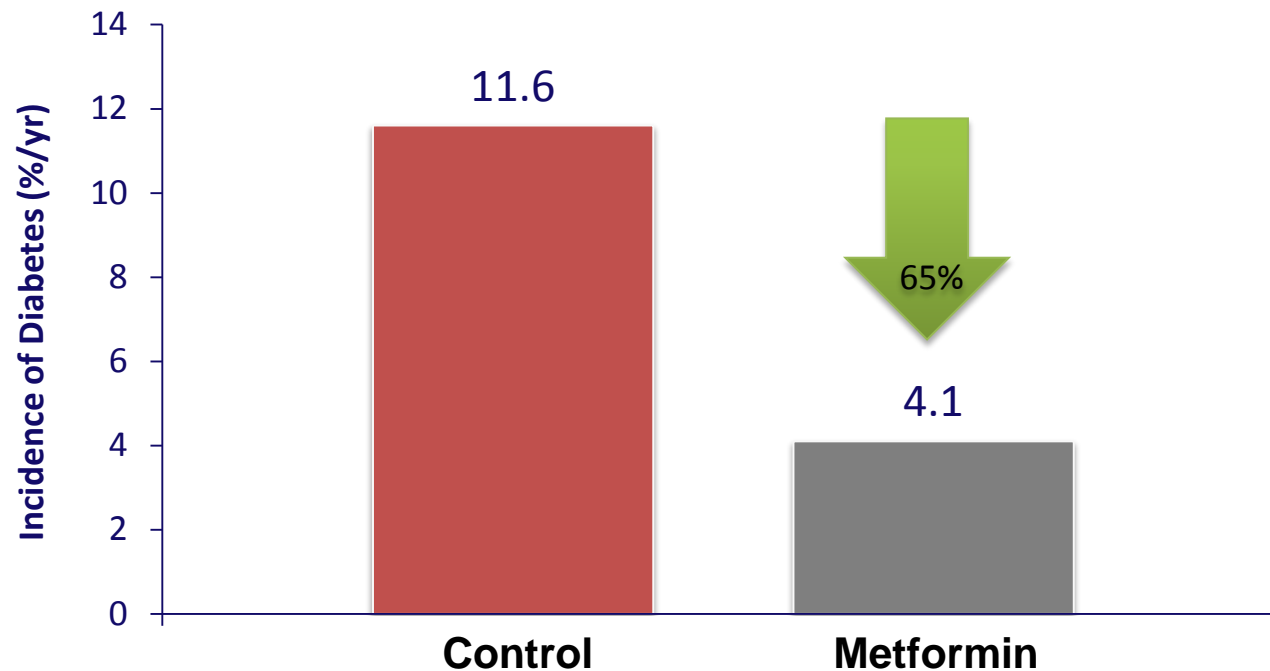
Medical and Surgical Interventions Shown to Delay or Prevent T2D

Intervention	Follow-up Period	Reduction in Risk of T2D (P value vs placebo)
Antihyperglycemic agents		
Metformin ¹	2.8 years	31% (P<0.001)
Acarbose ²	3.3 years	25% (P=0.0015)
Pioglitazone ³	2.4 years	72% (P<0.001)
Rosiglitazone ⁴	3.0 years	60% (P<0.0001)
Weight loss interventions		
Orlistat ⁵	4 years	37% (P=0.0032)
Phentermine/topiramate ⁶	2 years	79% (P<0.05)
Bariatric surgery ⁷	10 years	75% (P<0.001)

1. DPP Research Group. *N Engl J Med.* 2002;346:393-403. 2. STOP-NIDDM Trial Research Group. *Lancet.* 2002;359:2072-2077.
3. DeFronzo RA, et al. *N Engl J Med.* 2011;364:1104-15. 4. DREAM Trial Investigators. *Lancet.* 2006;368:1096-1105.
5. Torgerson JS, et al. *Diabetes Care.* 2004;27:155-161. 6. Garvey WT, et al. *Diabetes Care.* 2014;37:912-921.
7. Sjostrom L, et al. *N Engl J Med.* 2004;351:2683-2693.

The Effect of Metformin on the Progression of IGT to Diabetes Mellitus

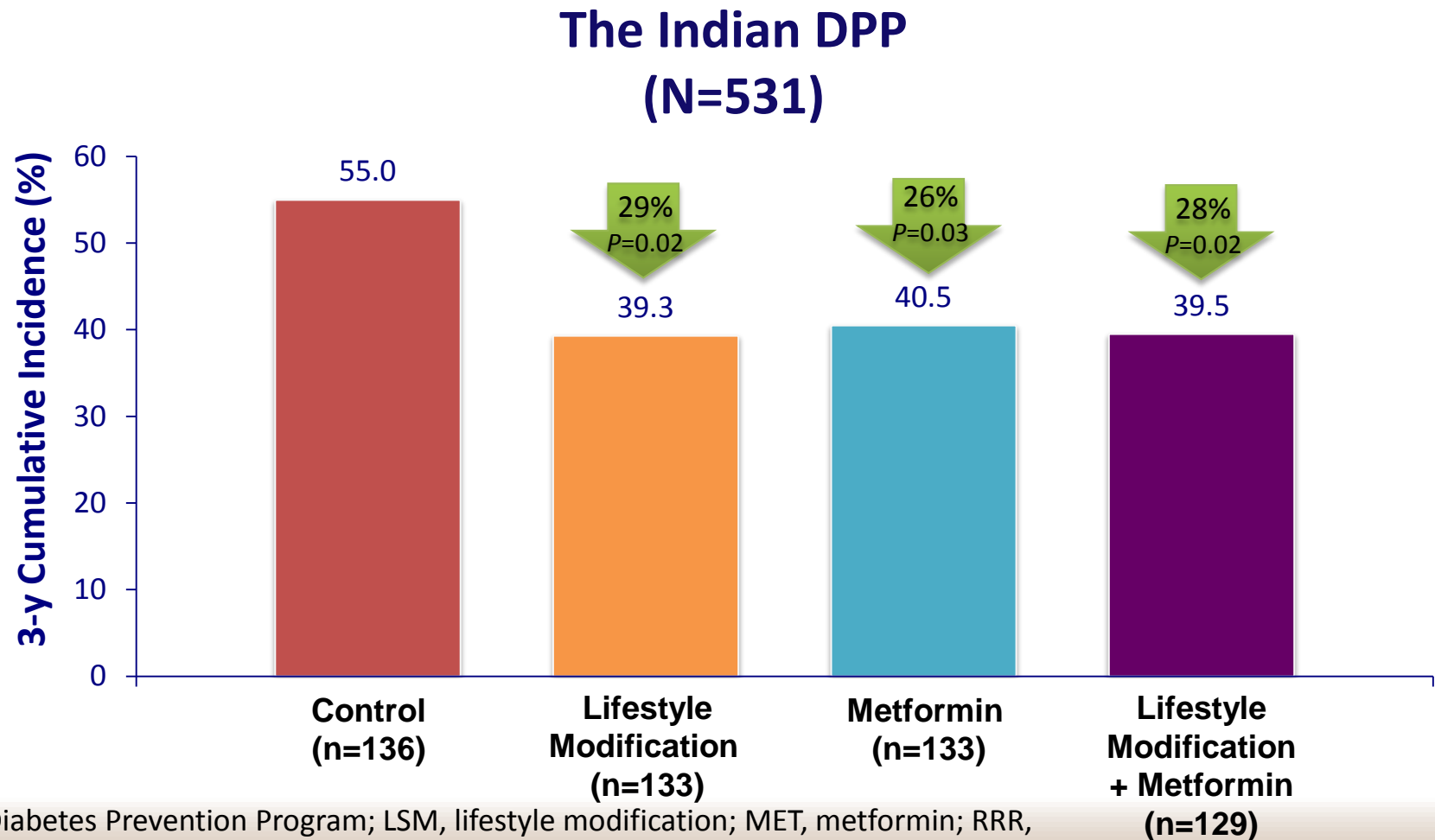
The Chinese Prevention Study (N=321)



IGT, impaired glucose tolerance; RRR, relative risk reduction.

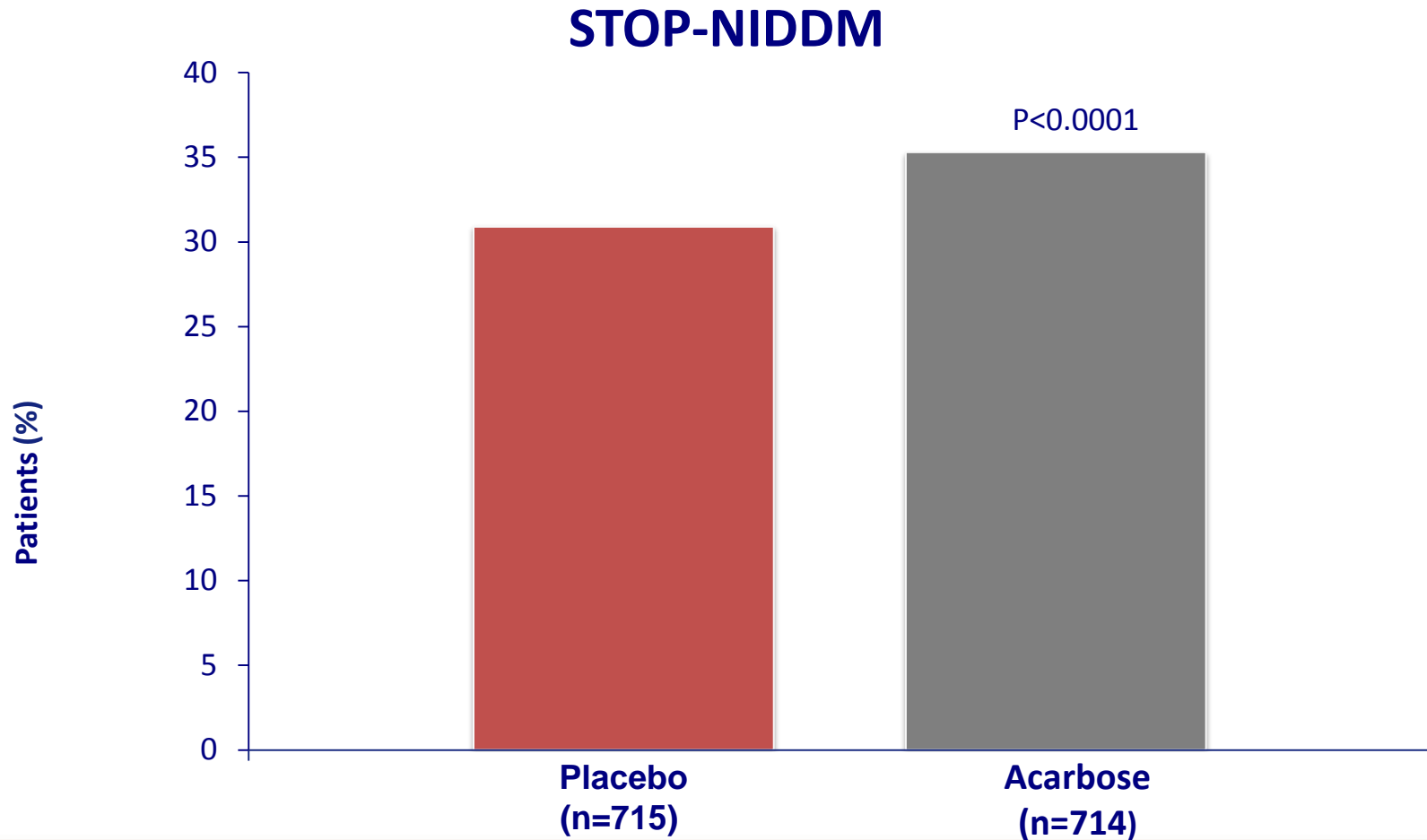
Yang W, et al. Chin J Endocrinol Metab. 2001;17:131-136.

Effect of Lifestyle Modification and Metformin on Cumulative Diabetes Incidence



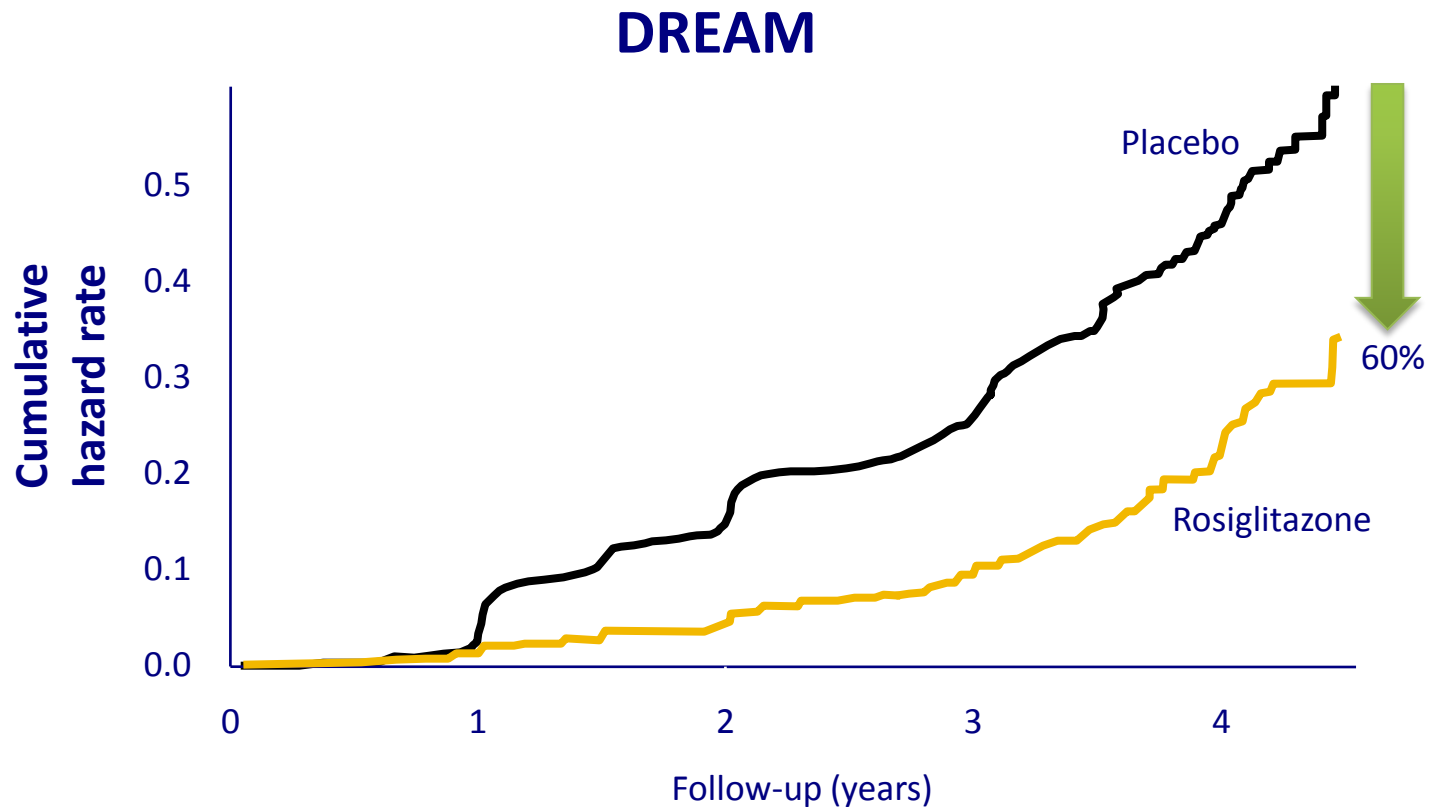
DPP, Diabetes Prevention Program; LSM, lifestyle modification; MET, metformin; RRR, relative risk reduction.

Effect of Acarbose on Reversion of IGT to NGT



IGT, impaired glucose tolerance; NGT, normal glucose tolerance; STOP-NIDDM, Study to Prevent Non-Insulin Dependent Diabetes Mellitus.

Effect of Rosiglitazone on New-Onset Diabetes or Death in Patients with Prediabetes



No. at risk

Placebo	2634	2470	2150	1148	177
Rosiglitazone	2635	2538	2414	1310	217

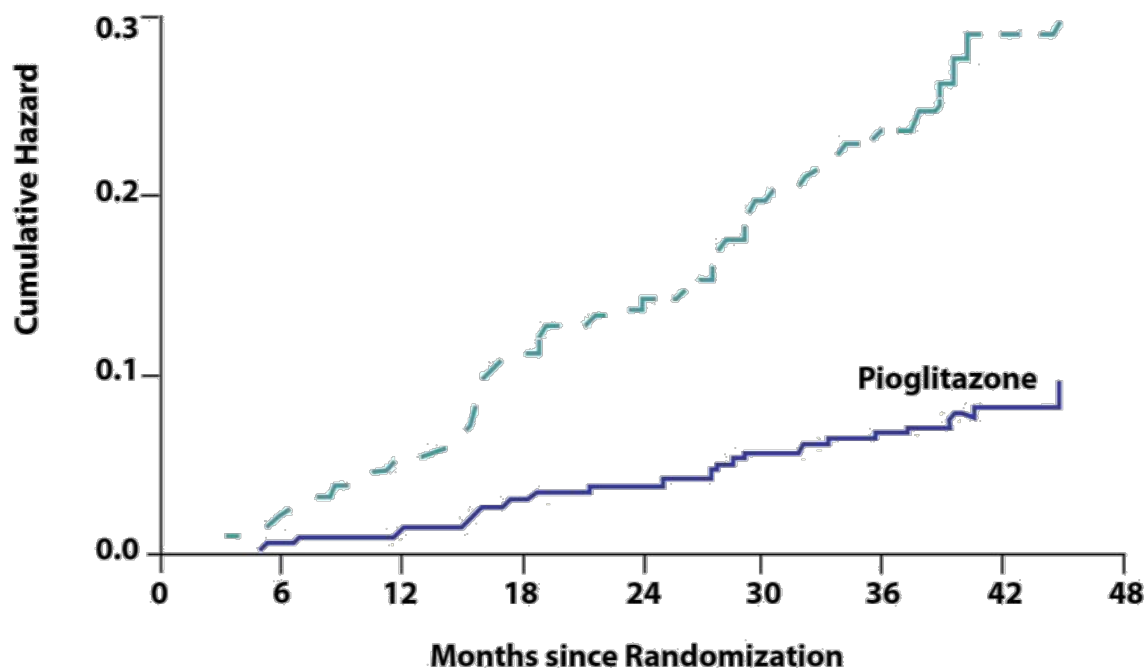
DREAM, Diabetes Reduction Assessment with Ramipril and Rosiglitazone Medication.

DREAM Trial Investigators. Lancet. 2006;368:1096-1105.

Effect of Pioglitazone on Development of T2D in Patients with IGT

ACT NOW

Kaplan-Meier plot of Hazard Ratios for Time to Development of T2D



No. at Risk

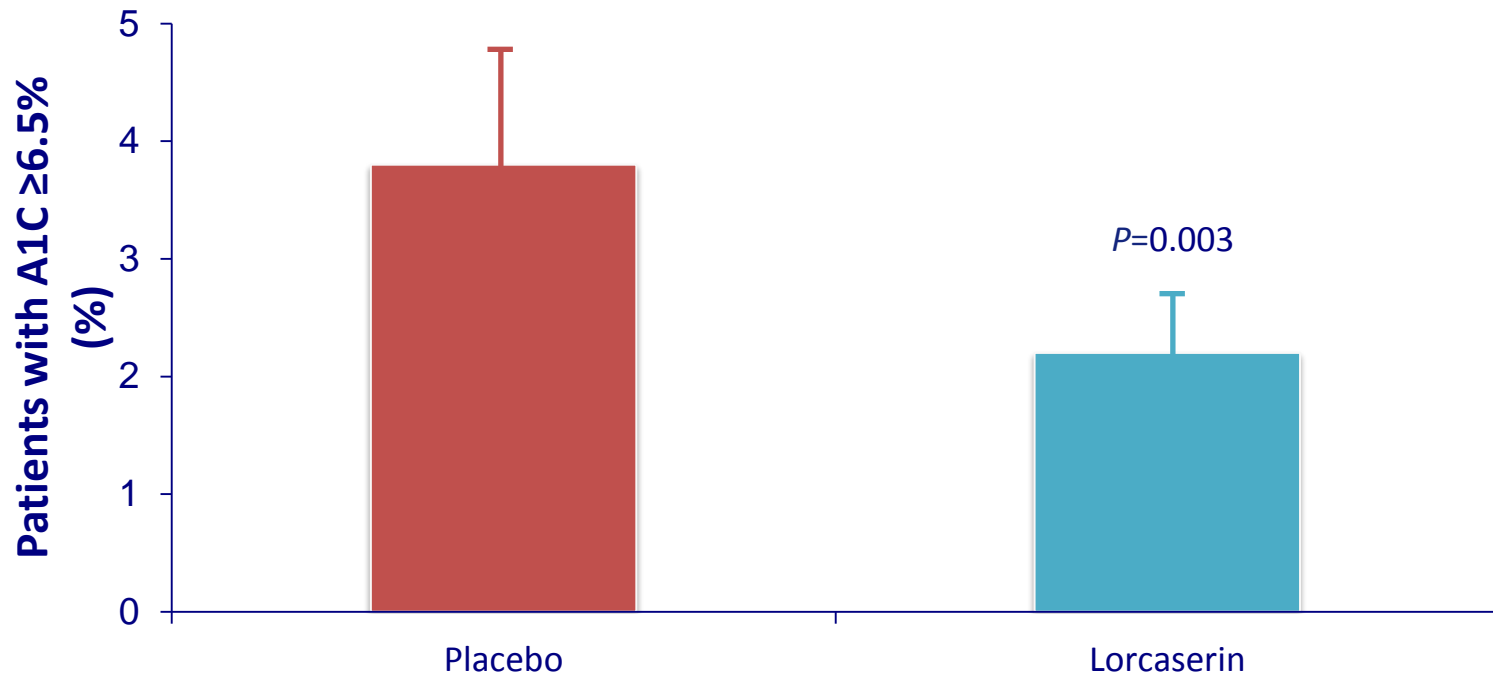
Placebo	299	259	228	204	191	134	83	17
Pioglitazone	303	262	244	228	218	140	87	24

ACT NOW, Actos Now for the Prevention of Diabetes; IGT, impaired glucose tolerance; T2D, type 2 diabetes.

DeFronzo RA, et al. *N Engl J Med.* 2011;364:1104-1115.

Effect of Lorcaserin on Progression to T2D

Proportion of BLOOM and BLOSSOM Patients With Newly Diagnosed Diabetes After 52 Weeks of Treatment

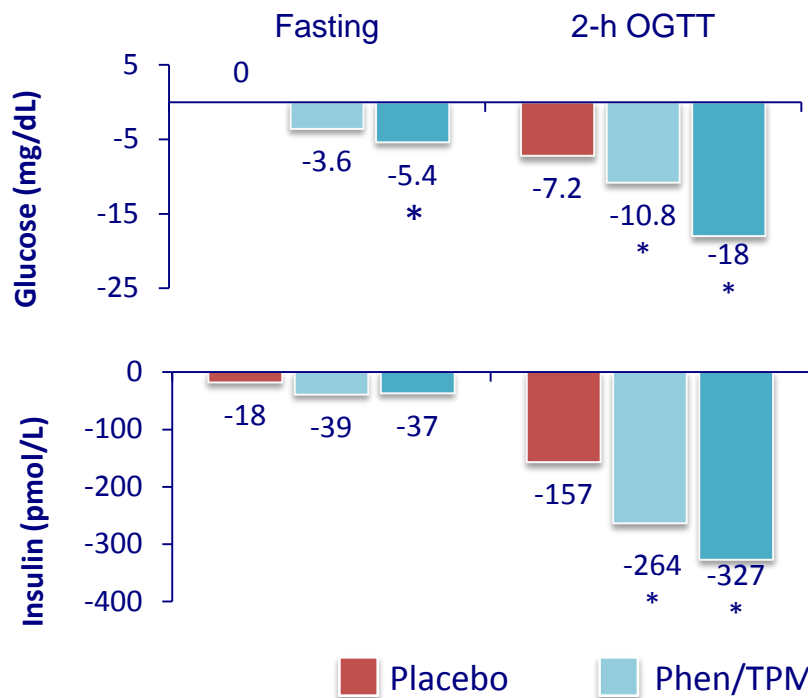


T2D, type 2 diabetes

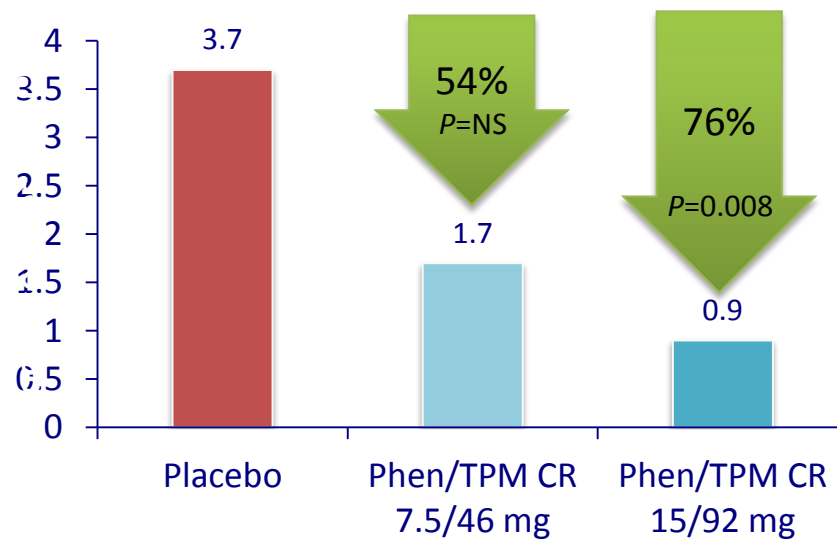
Effects of Phentermine/Topiramate ER on Glucose, Insulin, and Progression to T2D

SEQUEL Study (N=675)

Glucose and Insulin



Annualized Incidence of T2D



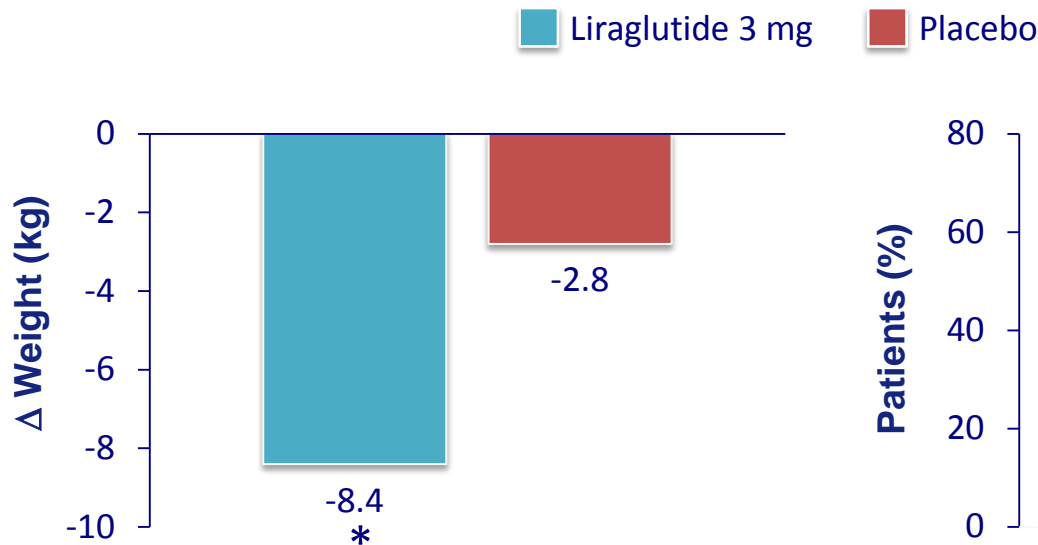
*P < 0.005 vs placebo.

NS, not significant; Phen/TPM ER, phentermine/topiramate extended release; T2D, type 2 diabetes.

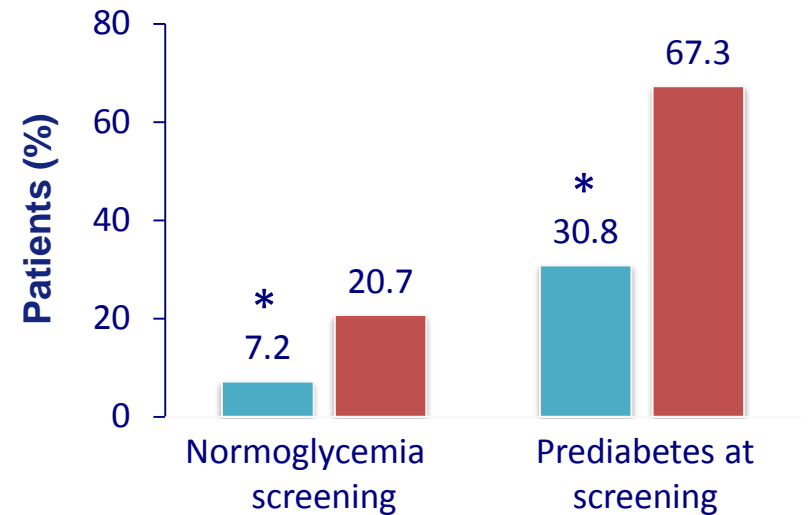
Effects of Liraglutide in Obese Patients with Prediabetes

SCALE Obesity and Prediabetes (N=3731)

Weight Change After 56 Weeks



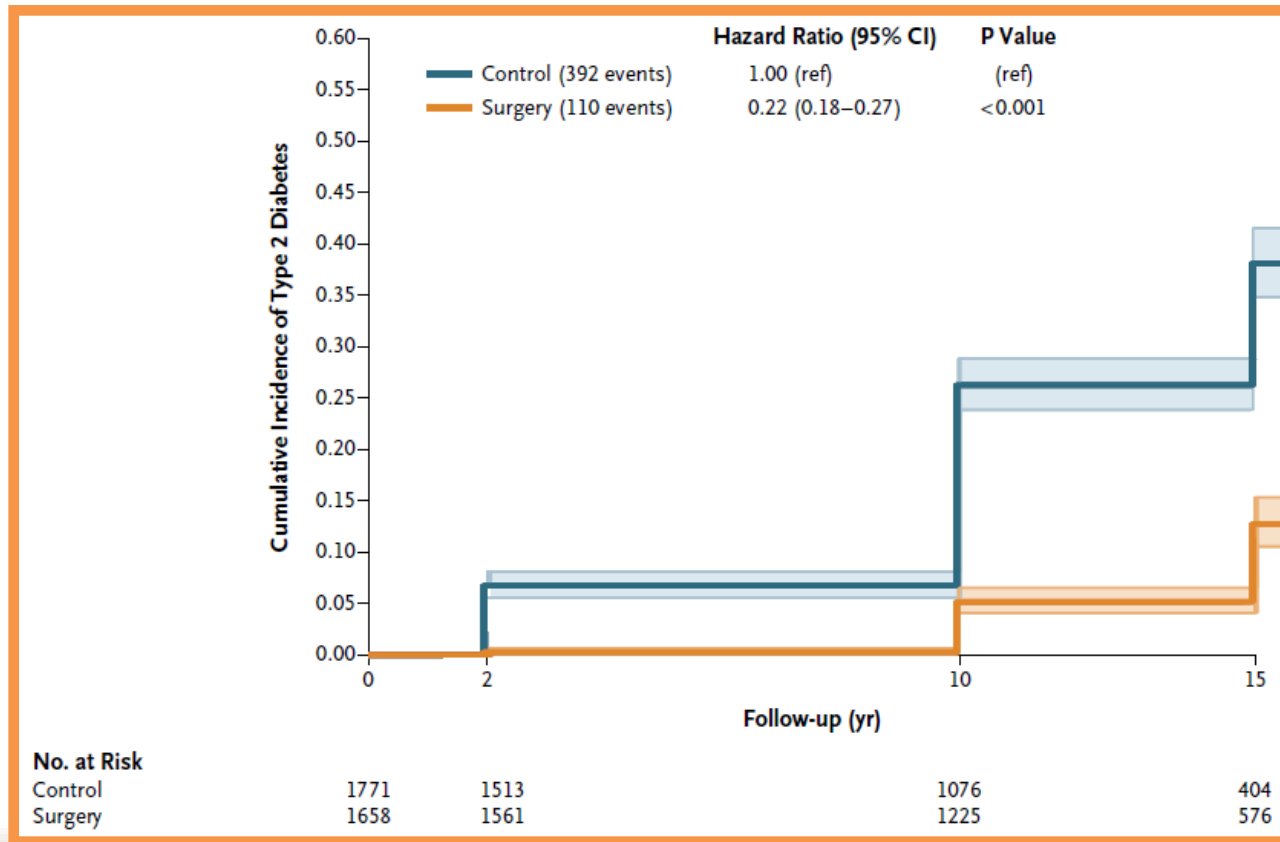
Patients with Prediabetes After 56 Weeks



* $P < 0.001$ vs placebo.

Effect of Bariatric Surgery on Incidence of Type 2 Diabetes

Swedish Obesity Study



DEPLOY

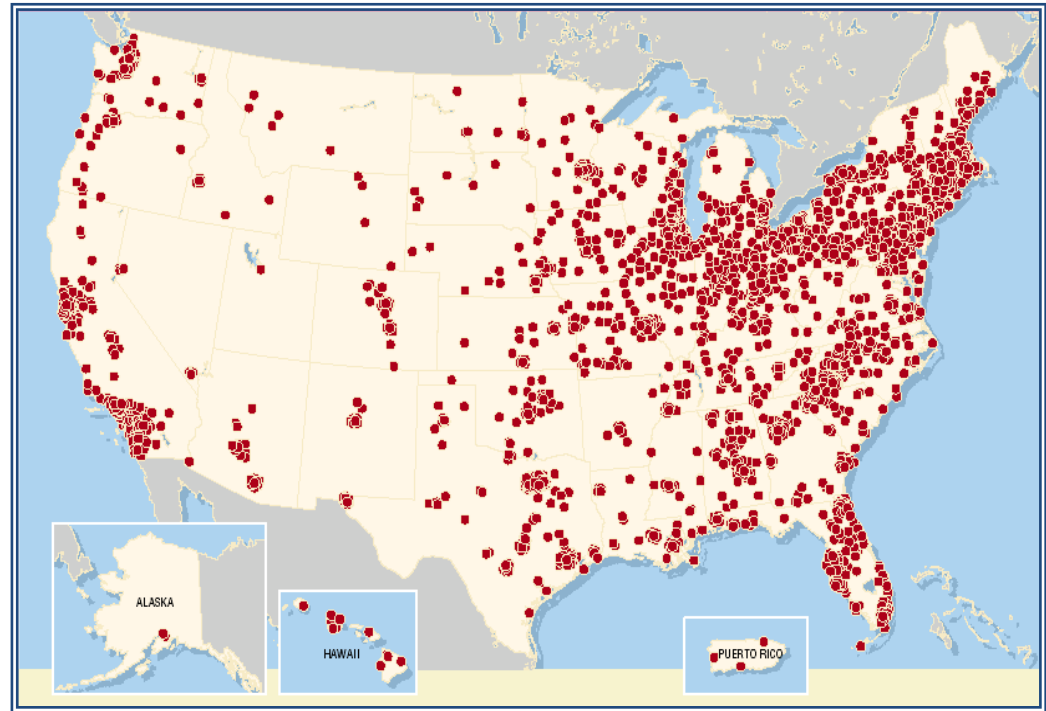
Diabetes Education & Prevention with a Lifestyle
Intervention Offered at the YMCA

Why the Y?

- Lower Cost Programs
 - Lower cost “lay” group leaders
 - Operate to achieve cost recovery only
 - Policy to turn no person away for inability to pay
- Past experience with national program scaling

Availability and Penetration

- 2700 Y facilities
- 57% of U.S. households are located within 3 miles of a YMCA

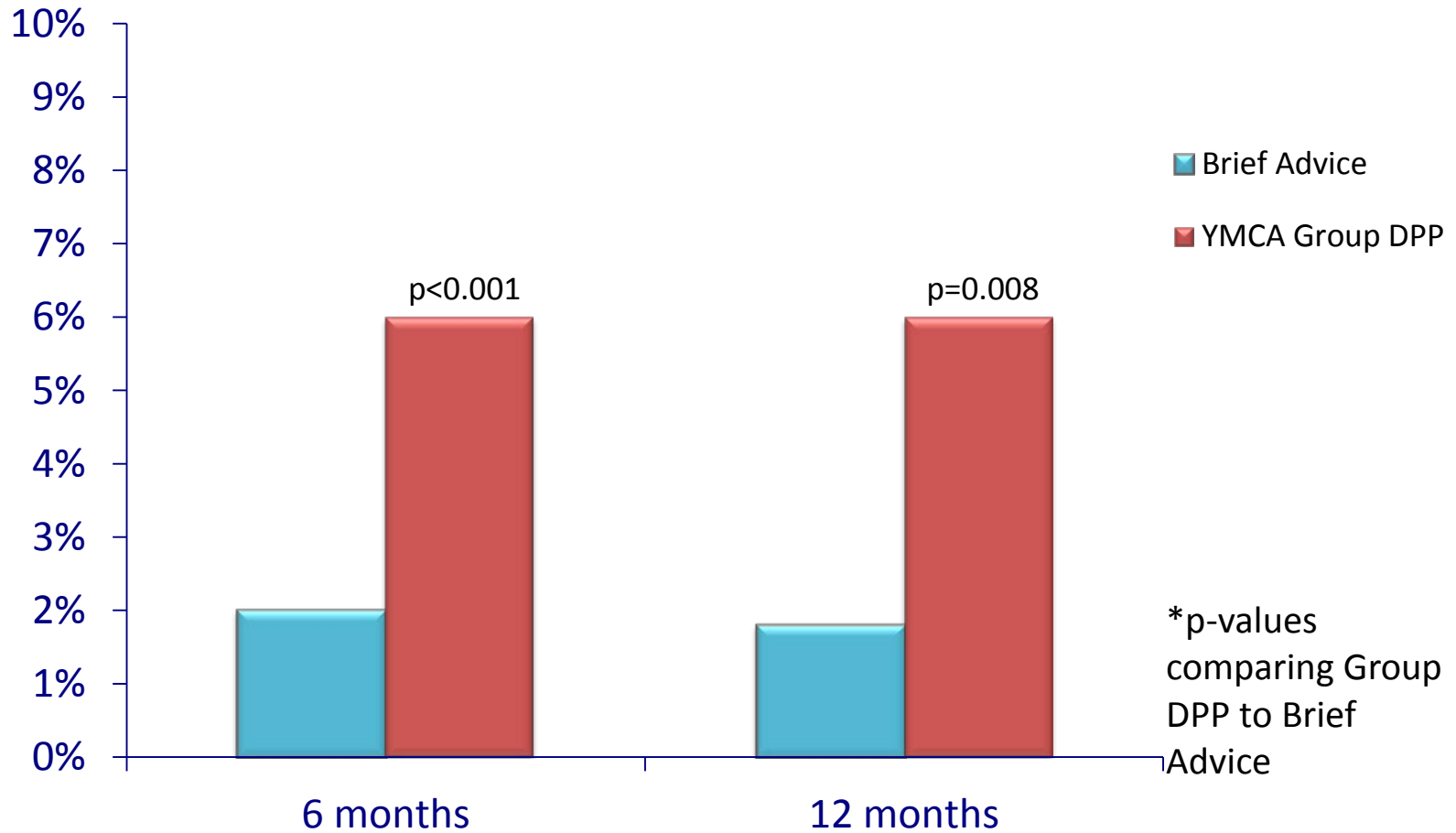


DPP Lifestyle Intervention Delivered in the YMCA

- Group randomized pilot comparative effectiveness trial
- Adults living within 5 km of 2 community YMCAs
- Participants (N = 94)
 - Overweight/obese
 - High random capillary glucose + T2DM risk factors*
 - Allocated based on YMCA site for screening
- Intervention – Offered group-based DPP
- Control – Given basic advice & other Y programs

- Study Questions
 - Can the YMCA deliver group-based DPP?
 - Could it achieve similar weight loss to DPP?
 - Would it be less costly?

DEPLOY Weight Loss & Maintenance



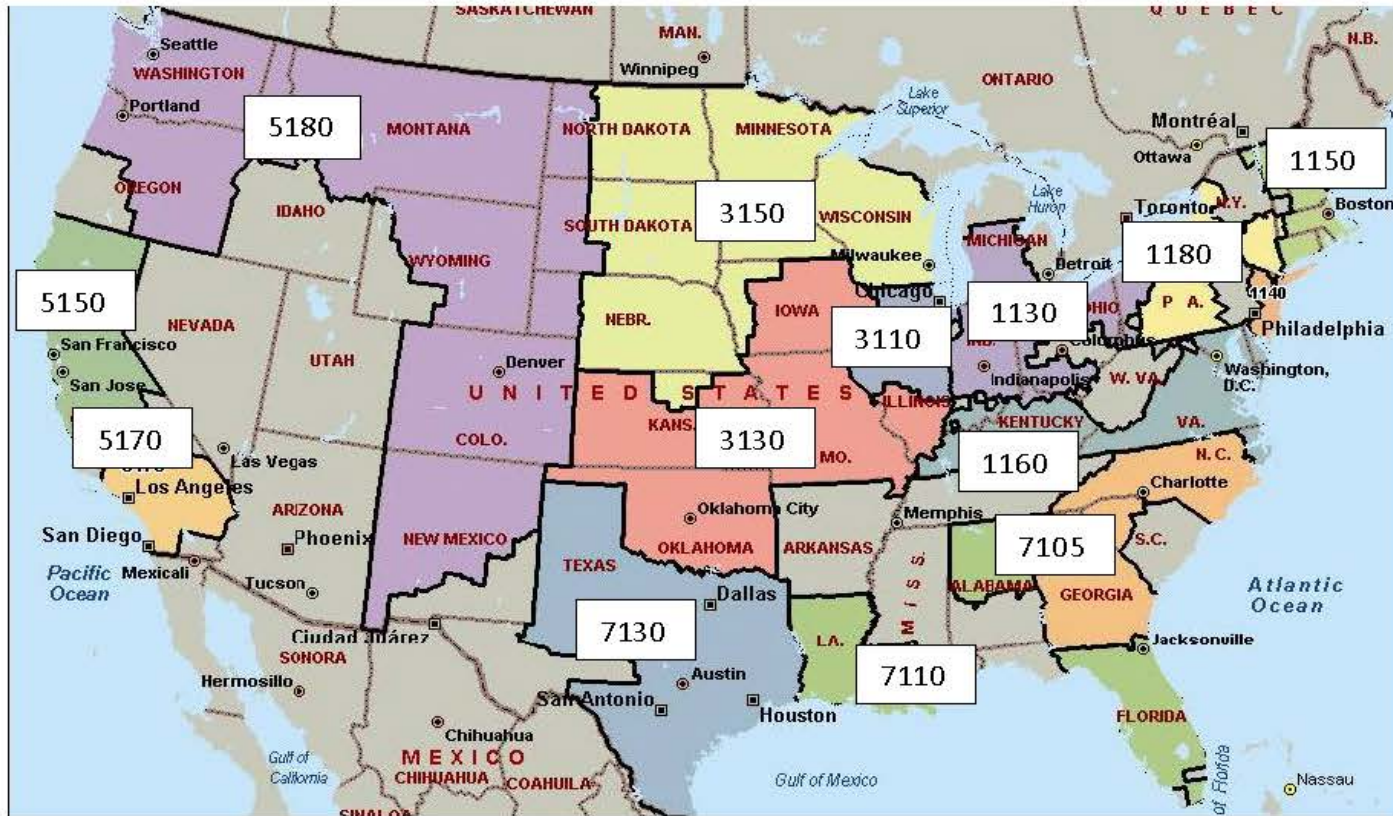


**CAN A COMMERCIAL PROGRAM
PROVIDE AN ALTERNATIVE APPROACH?**

- Leading global provider of weight management services
- Teach people to lose weight and keep it off by adopting a healthier lifestyle
- Clinically proven lifestyle program promotes healthy habits, a supportive environment, exercise, and smarter food choices

Weight Watchers Reach – U.S.

- Annually more than 1.7 million enrollments in Weight Watchers meetings and 1 million signups for WeightWatchers.com
- 25,000 meetings each week held in convenient times and locations (~5,000 in workplace)
 - 75% of members live with a 12 minute drive to a meeting
 - Open attendance – no need to reserve or schedule ahead of time
- 20,000 field staff, all of whom are Lifetime Members
 - LTMs attend meetings for free as a reward when maintaining their weight goal



Study Design

- RCT with 226 subjects with diagnosed IGT
 - Wait list control
- Comparison of WW with the same self help program used in DEPLOY
- Data collected at 6, 12, and 24 months
- At 6 months, 5.7% weight loss vs. 1% in controls.
- At 12 months, 5.8% vs. 2%

The Public Health Promise

- Weight Watchers is the only at-scale provider of education behavior modification for weight management in the world, and the only potential DPP partner with
 - Brand awareness, channel access and investment to drive demand for Diabetes Prevention Programs
 - Infrastructure to fulfill demand at scale quickly
 - Experience with recruitment, training and management to deliver consistent, high quality results
 - A built-in base of role model service providers
 - A science-based approach that mirrors that of the DPP



Preventing Diabetes: The National Diabetes Prevention Program as a Covered Benefit

Join the AMA-CDC initiative to increase the use of National Diabetes Prevention Programs

Prevent Diabetes **STAT**



Prevent Diabetes **STAT**

Screen / Test / Act Today™

84 MILLION
AMERICAN ADULTS
HAVE PREDIABETES

9 OUT OF **10** PEOPLE WITH
PREDIABETES DON'T
KNOW THEY HAVE IT.*

PARTNERS, PATIENTS AND PUBLIC

FOR HEALTH CARE PROFESSIONALS

PreventDiabetesStat.org

National Diabetes Prevention Program

Based on the NIH-funded research, the CDC-approved, evidence-based National Diabetes Prevention Program aims to slow and prevent the development of Type 2 diabetes in the US population

- Lay and health professional lifestyle coaches teach in-person or virtual group classes of 8-15 participants
- Comprehensive program focused on weight loss through exercise, healthy eating and behavior modification



Examples of topics covered in core curriculum include:

1. Balancing calories
2. Problem solving/coping
3. Overcoming physical activity barriers
4. Strategies for healthy eating out
5. Social cues
6. Managing stress

Cost of the National DPP

- The cost of covering the National DPP is less than the medical claims incurred in the first year after an individual is diagnosed with diabetes:

As an intervention to prevent diabetes, the National DPP costs

- An average of **\$450** per participant for a year

Payment models vary

Alternatively...

- **Diabetes costs approximately \$2,700 per individual** with newly diagnosed diabetes in the first year of treatment*
- Individuals with prediabetes have a 15% to 30% chance of developing type 2 diabetes within five years†

*2009-2012 individual level data from the Truven Health MarketScan® Lab Database - a 4.4 million subsample of the Truven Health MarketScan® Treatment Pathways. MarketScan is a registered trademark of Truven Health Analytics Inc.

† Centers for Disease Control and Prevention. *National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the United States, 2014*. Atlanta, GA; 2014. Available at: <http://www.cdc.gov/diabetes/pubs/statsreport14/national-diabetes-report-web.pdf>

Availability of National DPPs

- Programs with or seeking CDC recognition are available around the country. The CDC recognition program is critical to ensure program quality and fidelity.
- Both in-person and virtual National DPPs are available.



For more information, visit
cdc.gov/diabetes/prevention/recognition

Barriers

-
- Failure of uniform screening
 - USPSTF recommendations
 - Gaps in healthcare screening

Diabetes Fact Sheet, 2012

Gestational diabetes

- 2%–10% of pregnant women will develop gestational diabetes
 - Likely rate will be higher when using new diagnostic criteria
- Women are much more likely to get type 2 diabetes later if they have gestational diabetes
 - 5%–10% immediately after pregnancy
 - 35%–60% within 10–20



Coverage for Diabetes Prevention

- UHG and CMS
- NPPP referral requirement
- CMS reimbursement policy (incremental)
- Current data suggest decreased efficacy
- FDA ruling on medication for prevention

Solutions??

-
- Uniform screening
 - Universal coverage for DPP
 - Treat pre diabetes as diabetes
 - ? Lower A1C threshold
 - ? Address CM risk

Continue the Conversation . . .

... With Schools

... With the enemy

... With local, state and federal government

... With third party payer

... With providers

... With employers

Think Outside the Box . . .

Kristie



Thank you