Welcomes You To

THE CONVERGENCE OF TYPE 2 DIABETES & CARDIOVASCULAR DISEASE

Convergence of Diabetes & Cardiovascular Disease

Acknowledgments

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Takeda

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sanofi aventis

Because health matters

Presenter Disclosure Information

Alan Zajarias, M.D., F.A.C.C.

The following relationships exist related to this presentation:

Nothing to disclose

Program Overview

Cardiovascular disease and diabetes are closely related and as a result, the ACC is conducting a large initiative over the next two years to increase this awareness and to provide further education to medical professionals.

Learner Objectives

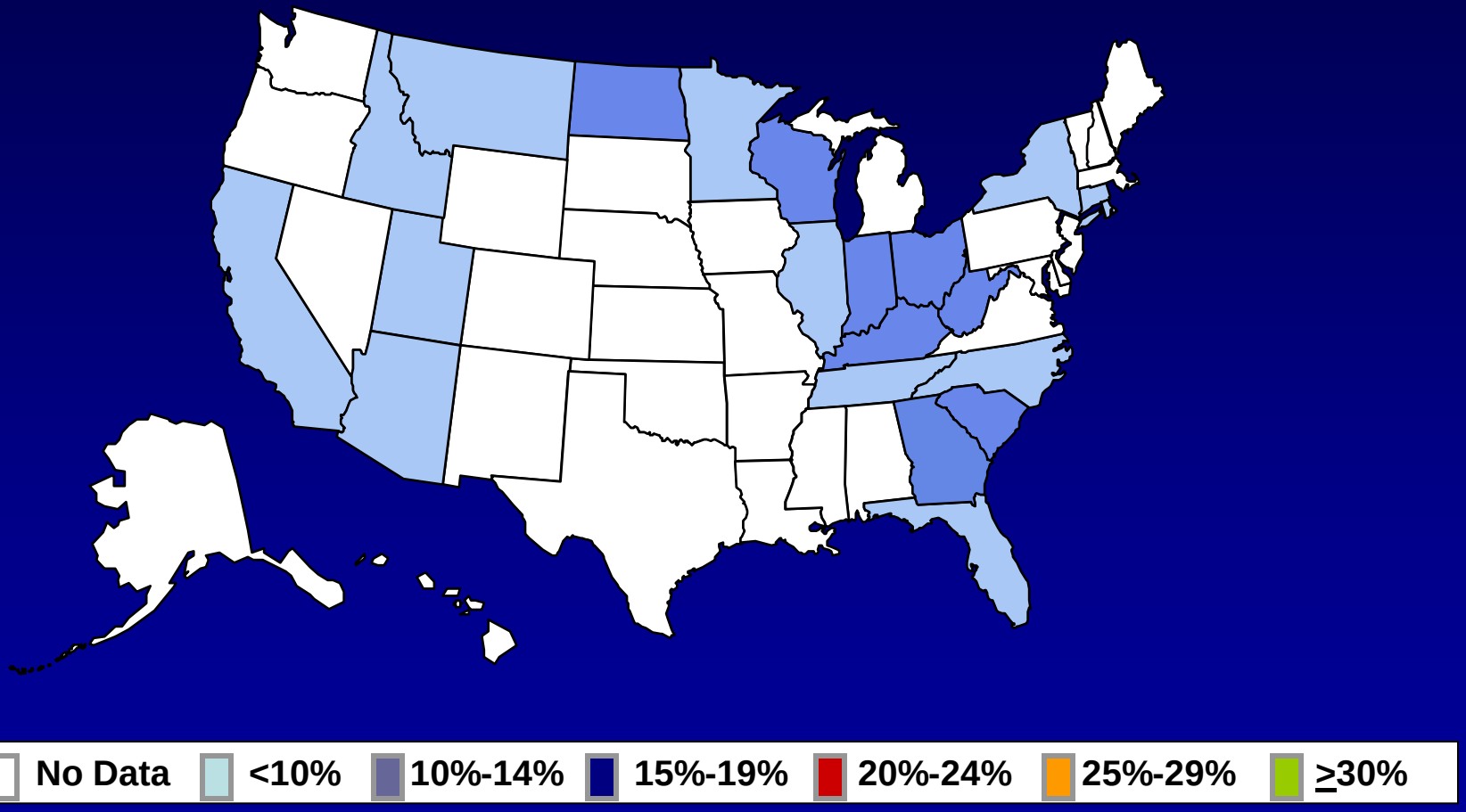
The overall goal of this program is to enhance participants' competence by providing the most up-to-date information on the correlation of type 2 diabetes and cardiovascular disease.

Upon completion of this program, attendees should be able to —

- Describe the prevalence of CV disease in patients with diabetes
- Identify patients with known diabetes and those at risk for diabetes, who are at significantly increased risk for CV disease based on the most current screening and treatment guidelines
- Apply modifiable and controllable risk factor strategies in the daily management of patients with diabetes and/or CV disease, to achieve evidence-based optimal outcomes

Obesity Trends* Among U.S. Adults: BRFSS - 1985

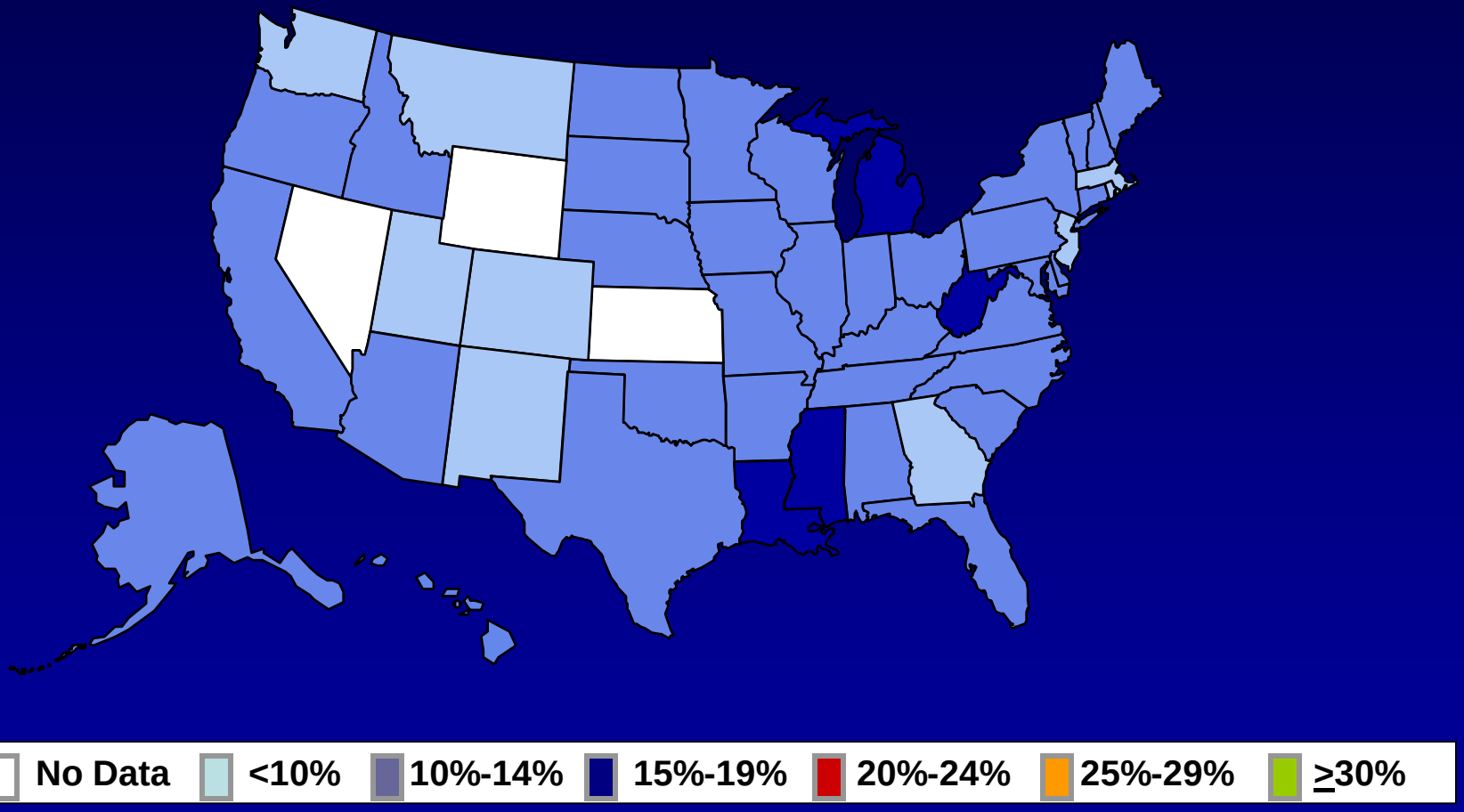
(*BMI ≥30, or ~ 30 lbs overweight for 5'4" woman)



JAMA 1999;282:16, JAMA 2001;286:10.

Obesity Trends* Among U.S. Adults: BRFSS - 1991

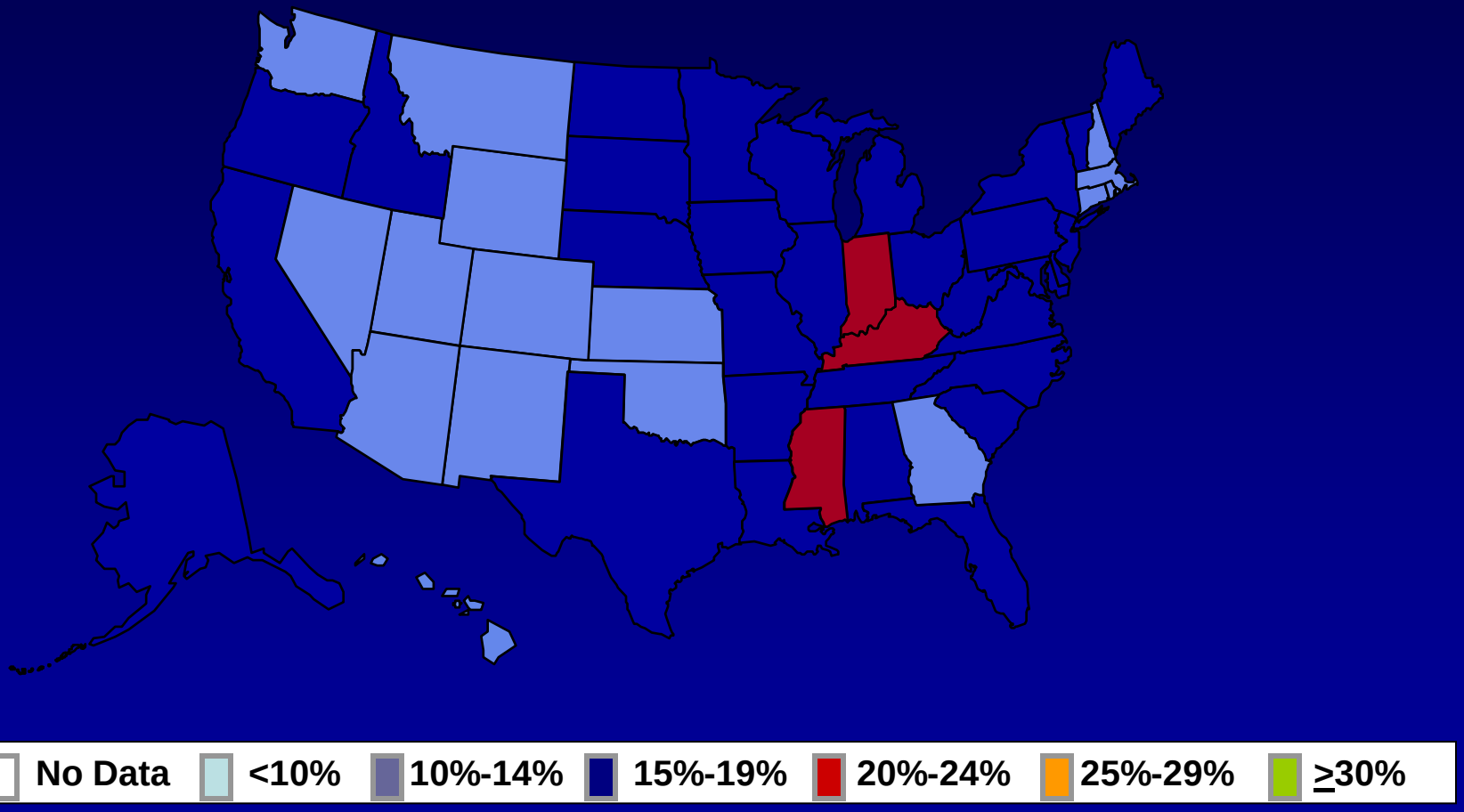
(*BMI ≥30, or ~ 30 lbs overweight for 5'4" woman)



JAMA 1999;282:16, JAMA 2001;286:10.

Obesity Trends* Among U.S. Adults: BRFSS - 1997

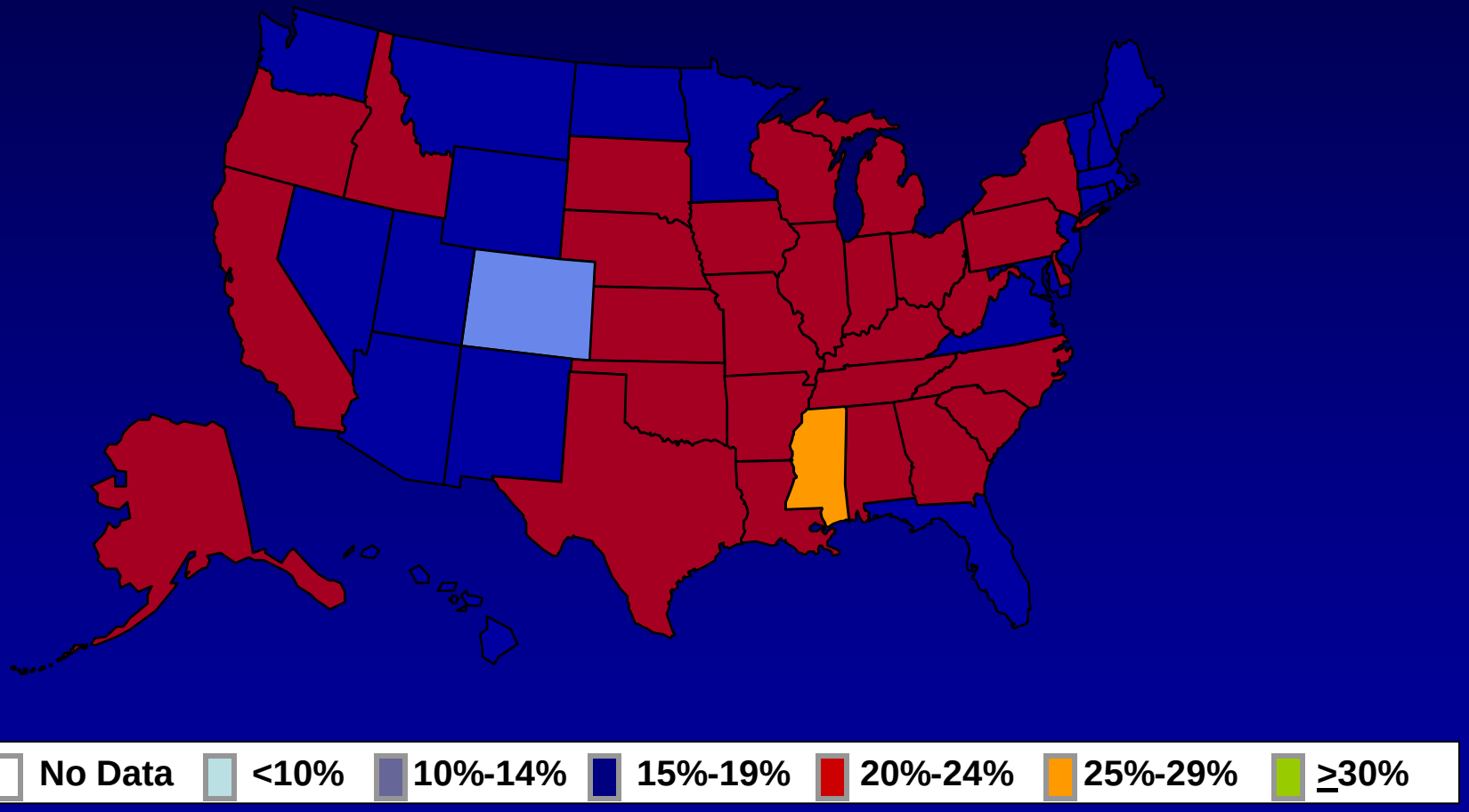
(*BMI ≥30, or ~ 30 lbs overweight for 5'4" woman)



JAMA 1999;282:16, JAMA 2001;286:10.

Obesity Trends* Among U.S. Adults: BRFSS - 2001

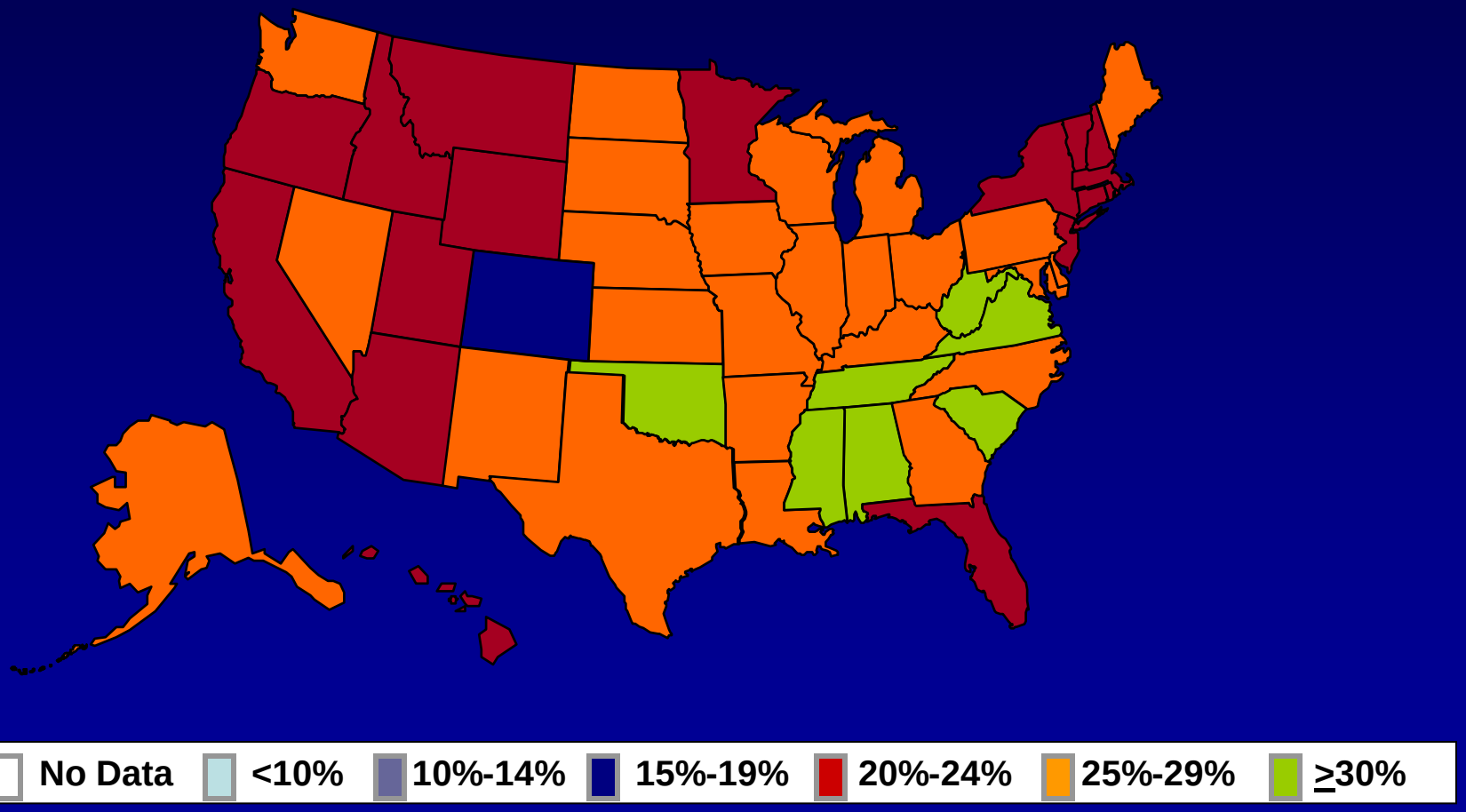
(*BMI ≥30, or ~ 30 lbs overweight for 5'4" woman)



JAMA 1999;282:16, JAMA 2001;286:10.

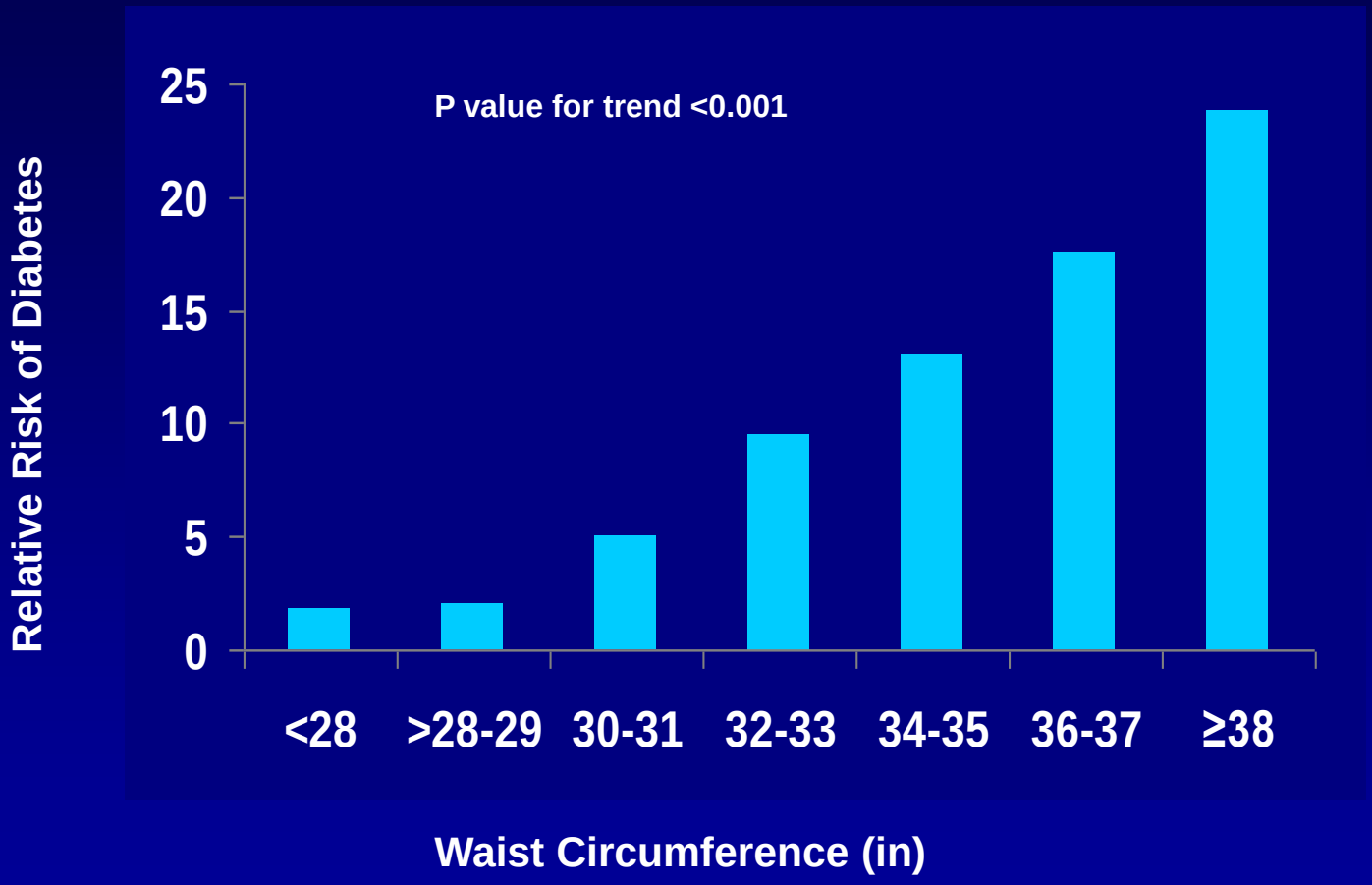
Obesity Trends* Among U.S. Adults: BRFSS - 2008

(*BMI ≥30, or ~ 30 lbs overweight for 5'4" woman)



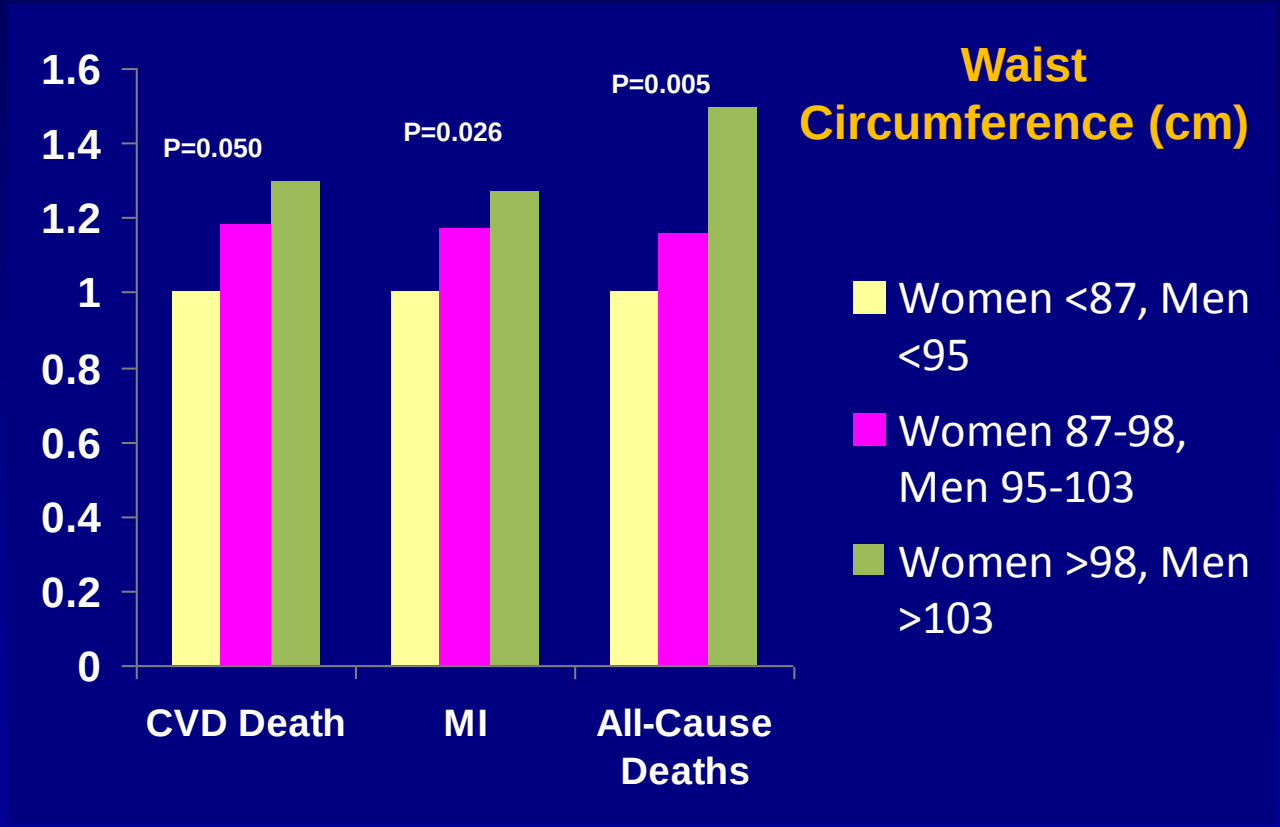
http://www.cdc.gov/obesity/downloads/obesity_trends_2008.ppt#491,29,Obesity Trends* Among U.S. Adults BRFSS,

Abdominal Adiposity Is Associated With Increased Risk of Diabetes



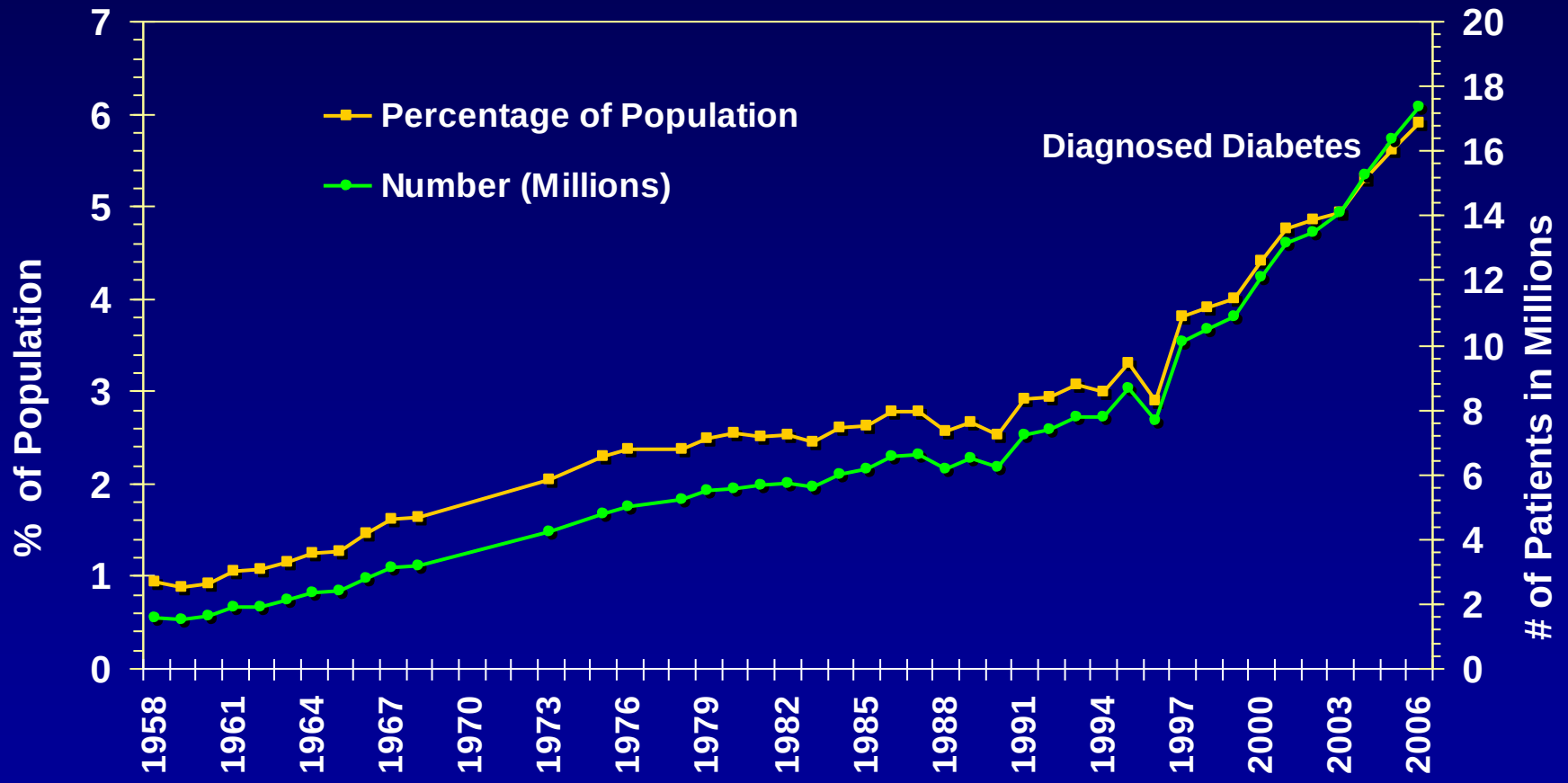
Carey VJ, et al. Am J Epidemiol. 1997;145:614-619

Abdominal Adiposity Is Associated With Increased Risk of CV Events



Dagenais GR, et al. Am Heart J. 2005; 149:54-60.

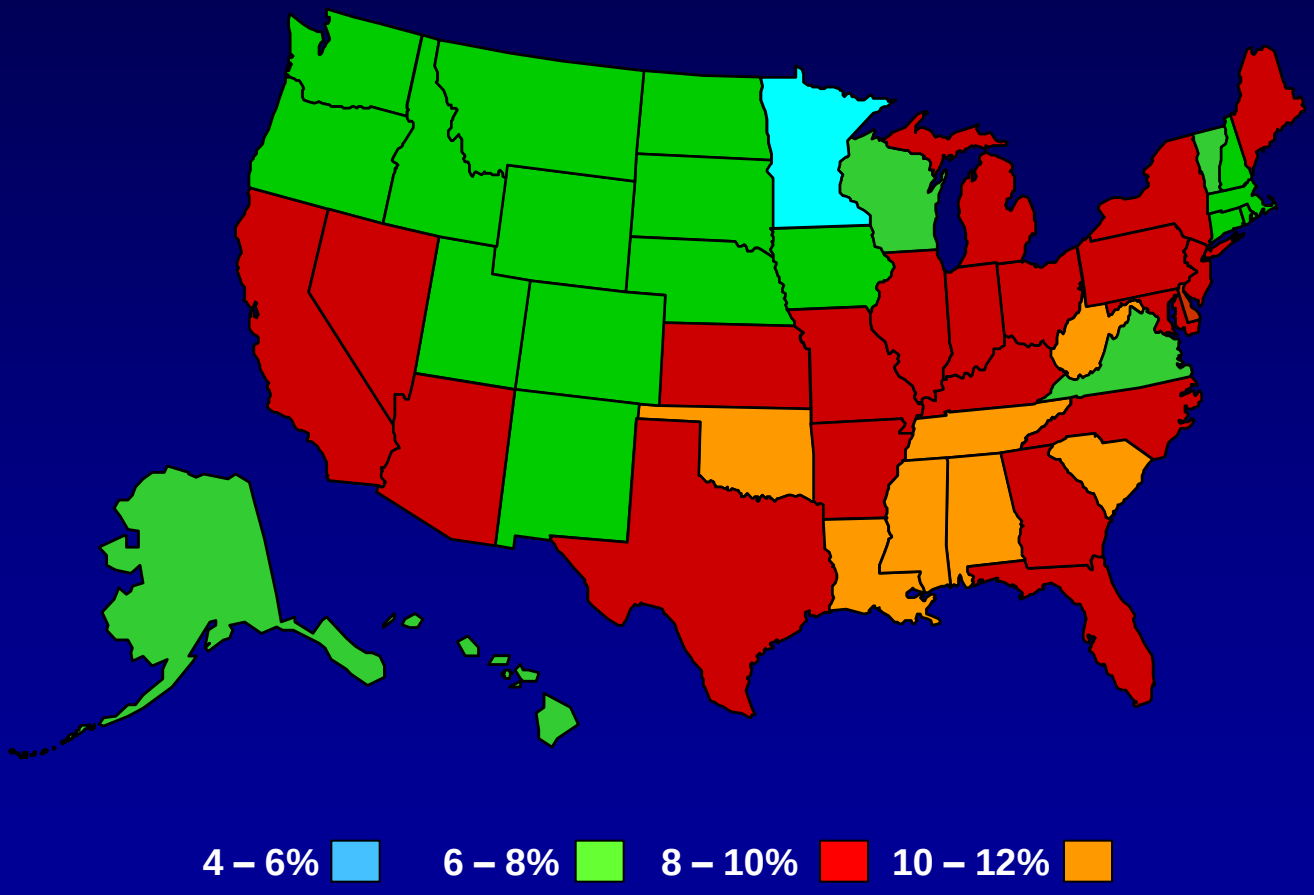
Diabetes: A Growing Challenge
Prevalence in the United States



Centers for Disease Control and Prevention, Division of Diabetes Translation.
National Diabetes Surveillance System. Available at http://www.cdc.gov/diabetes/statistics.

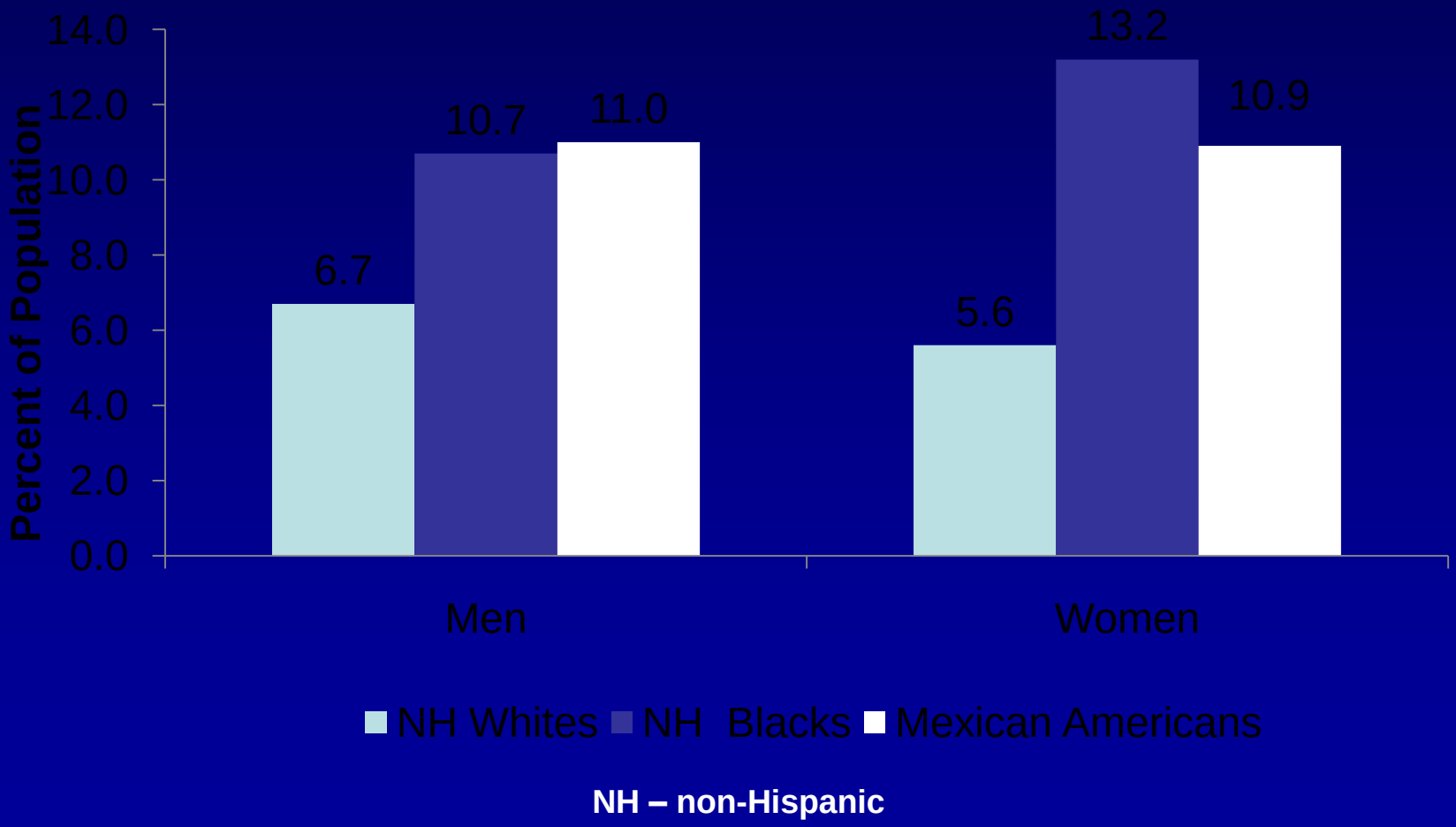
Diagnosed Diabetes in the US: 2008

CDC BRFSS: Self-Reported Diabetes: 8.2% Nationwide



http://apps.nccd.cdc.gov/brfss/list.asp?cat=DB&yr=2008&qkey=1363&state=All

Age-Adjusted Prevalence of Physician-Diagnosed Diabetes in Adults Age 18 and Older by Race/Ethnicity and Sex

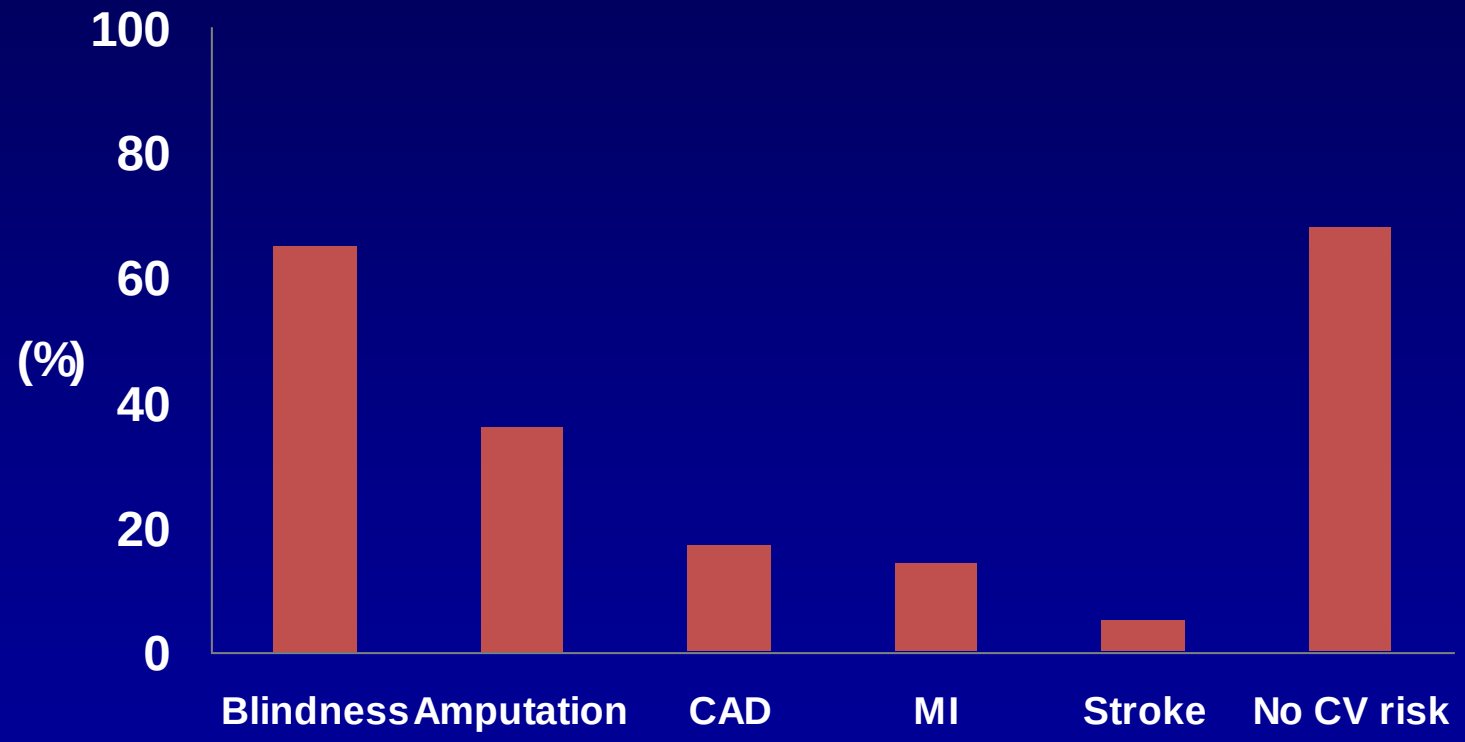


NH – non-Hispanic

(NHANES: 1999-2004). **Source: NCHS and NHLBI.** Briefel and Johnson. Annu Rev Nutr. 2004;24:401-431

Patient Beliefs About Diabetes Risks

ACC/ADA Diabetes Knowledge Survey (n=2008)



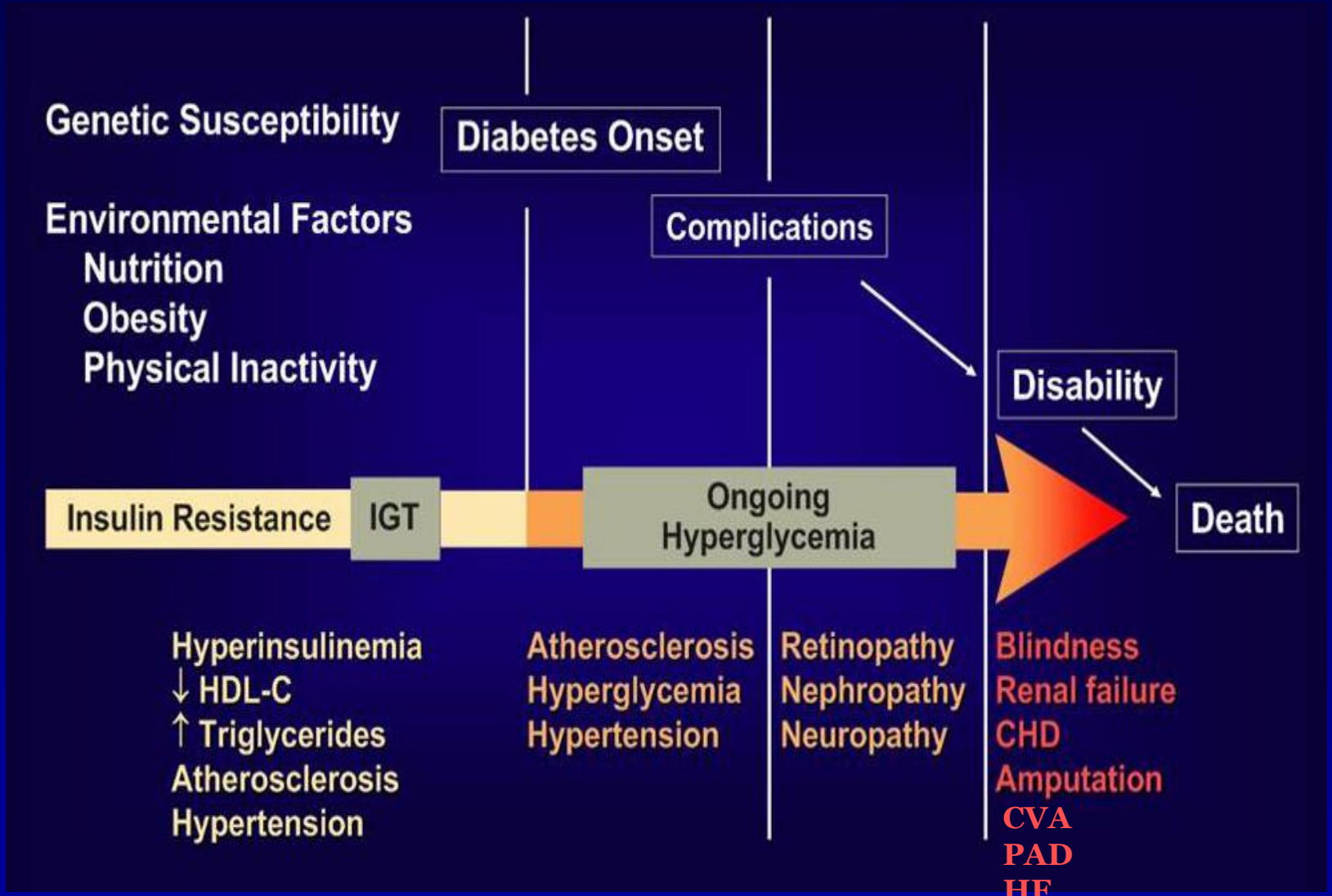
http://www.diabetes.org/uedocuments/executivesummary.pdf

Diabetes and CVD

- Atherosclerotic complications responsible for
  - 80% of mortality among patients with diabetes
  - 75% of cases due to coronary artery disease (CAD)
  - Results in >75% of all hospitalizations for diabetic complications
- 50% of patients with type 2 diabetes have preexisting CAD. (This number may be less now that more younger people are diagnosed with diabetes.)
- 1/3 of patients presenting with myocardial infarction have undiagnosed diabetes mellitus

Lewis GF. *Can J Cardiol*. 1995;11(suppl C):24C-28C
Norhammar A, et.al. *Lancet* 2002;359;2140-2144

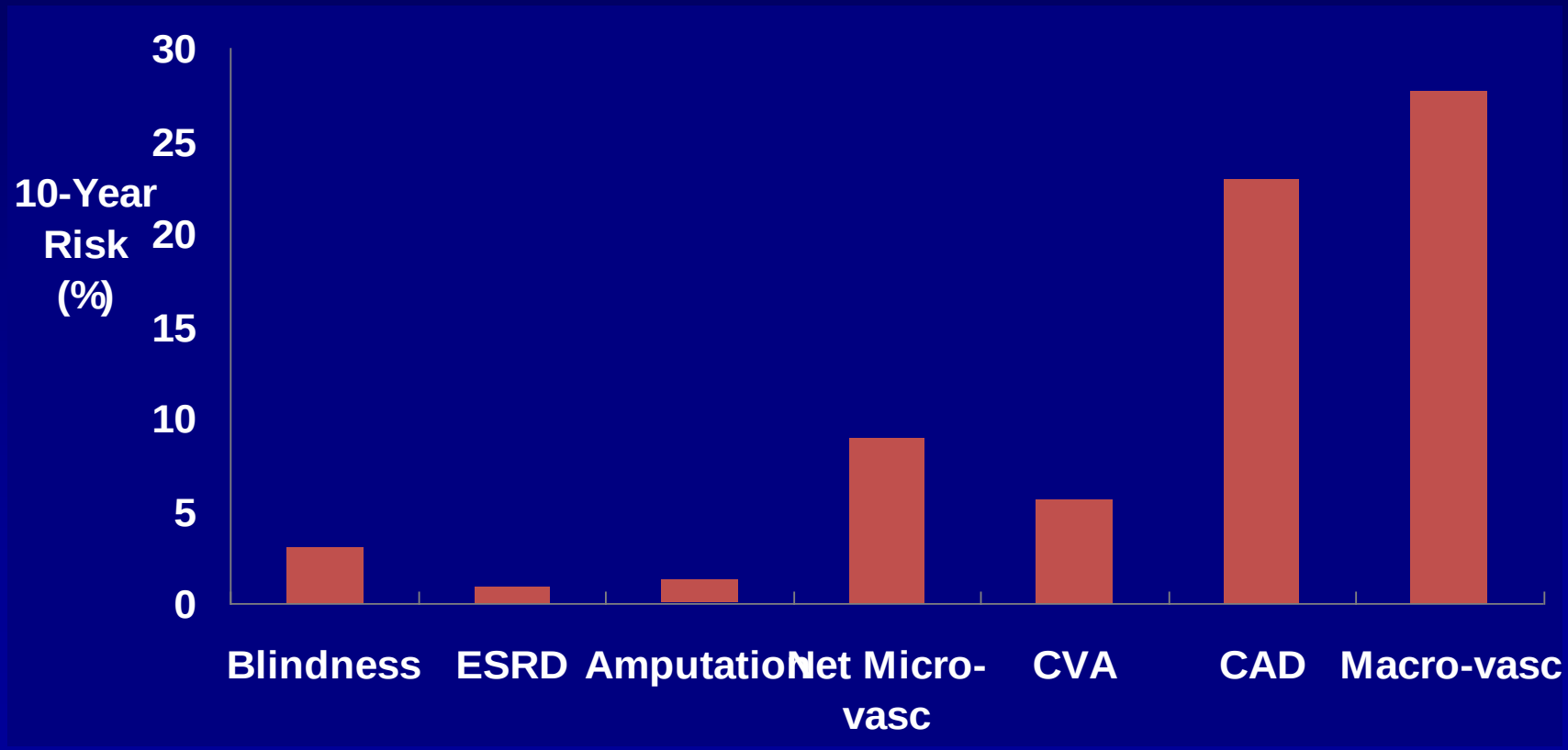
The Continuum of CV Risk in Type 2 Diabetes



Adapted from American Diabetes Association. *Diabetes Care*. 2003;26:3160-3167.; Tsao PS, et al. *Arterioscler Thromb Vasc Biol.* 1998;18:947-953.; Hsueh WA, et al. *Am J Med*. 1998;105(1A):4S-14S.; American Diabetes Association. *Diabetes Care*. 1998;21:310-314.

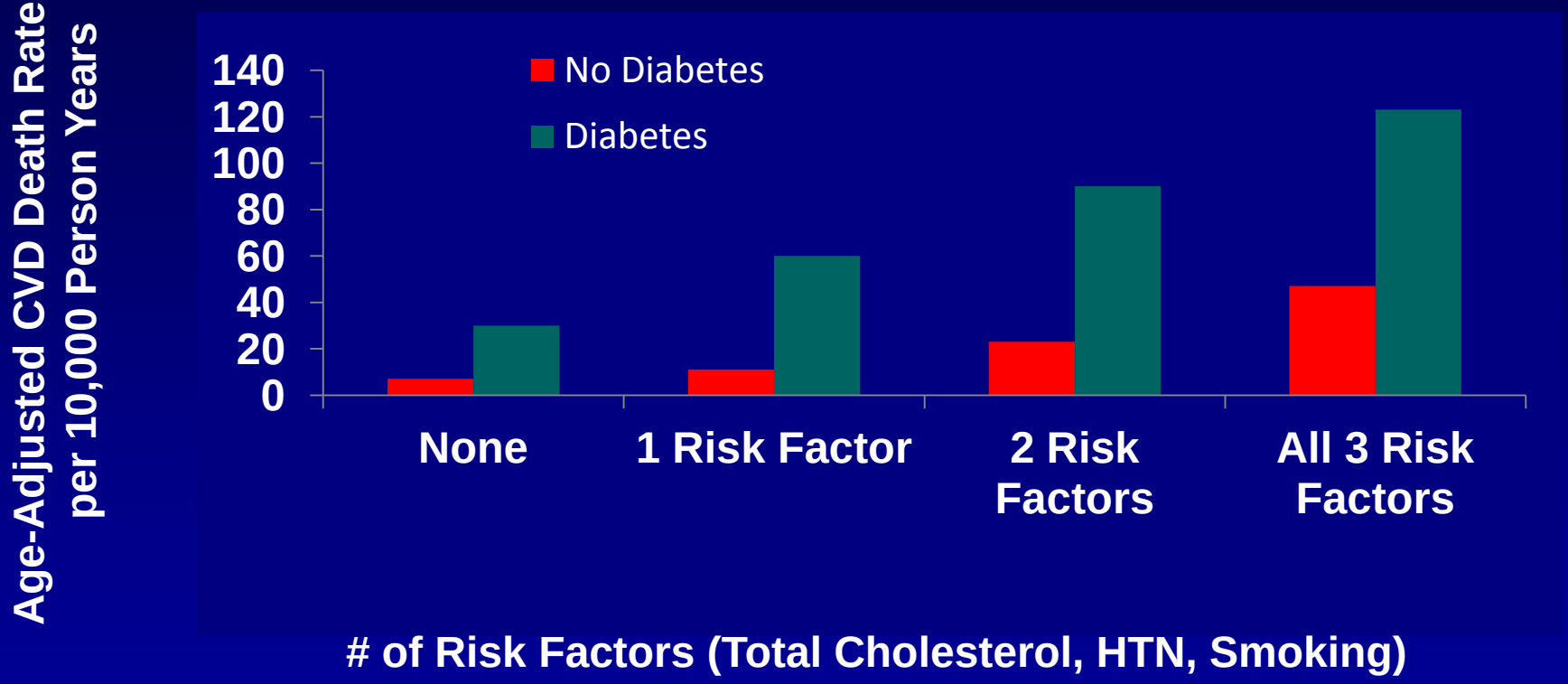
Diabetes Mellitus: A Cardiovascular Disease

United Kingdom Prospective Diabetes Study (n=3867)



UKPDS Investigators. Lancet 1998; 352: 837

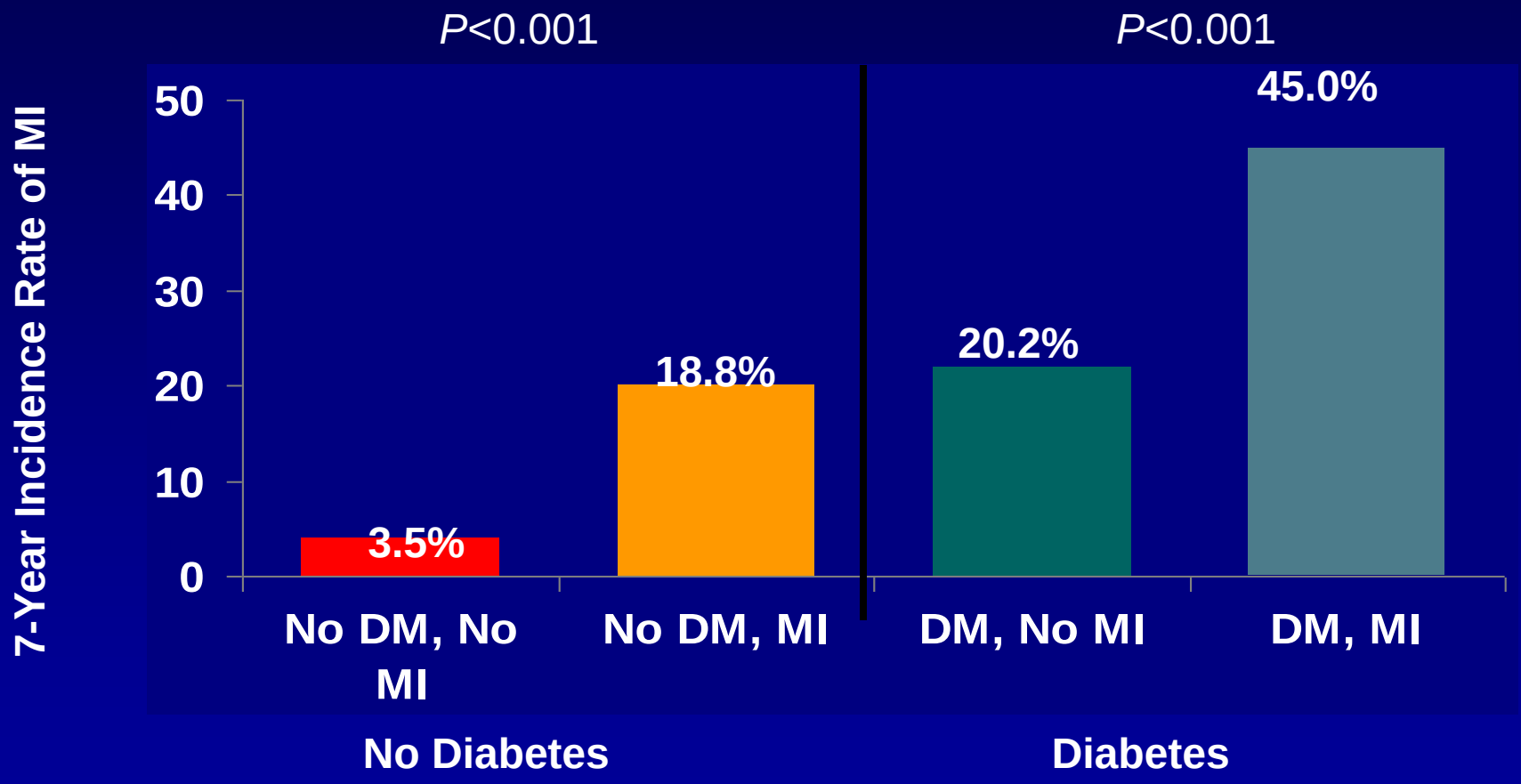
Age-Adjusted CVD Death Rates (MRFIT)



CVD=cardiovascular disease
MRFIT=multiple risk factor intervention trial

Adapted with permission from Stamler J et al.
Diabetes Care. 1993;16:434-444.

Type 2 Diabetes and CHD
7-Year Incidence of Fatal/Nonfatal MI (East West Study)

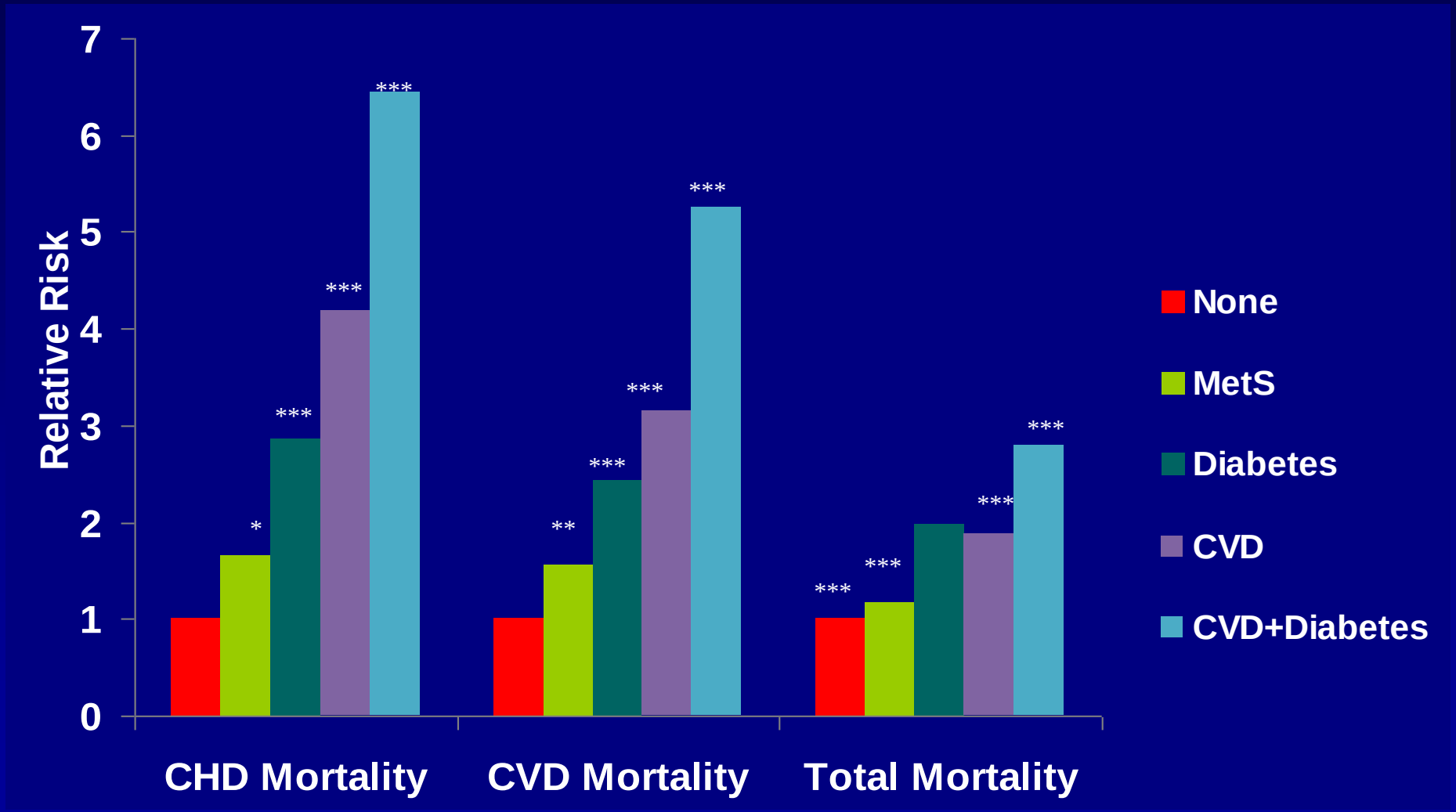


CHD=coronary heart disease; MI=myocardial infarction; DM=diabetes mellitus

Haffner SM et al. *N Engl J Med*. 1998;339:229-234.

Cardiovascular Disease (CVD) and Total Mortality: U.S. Men and Women Ages 30-74

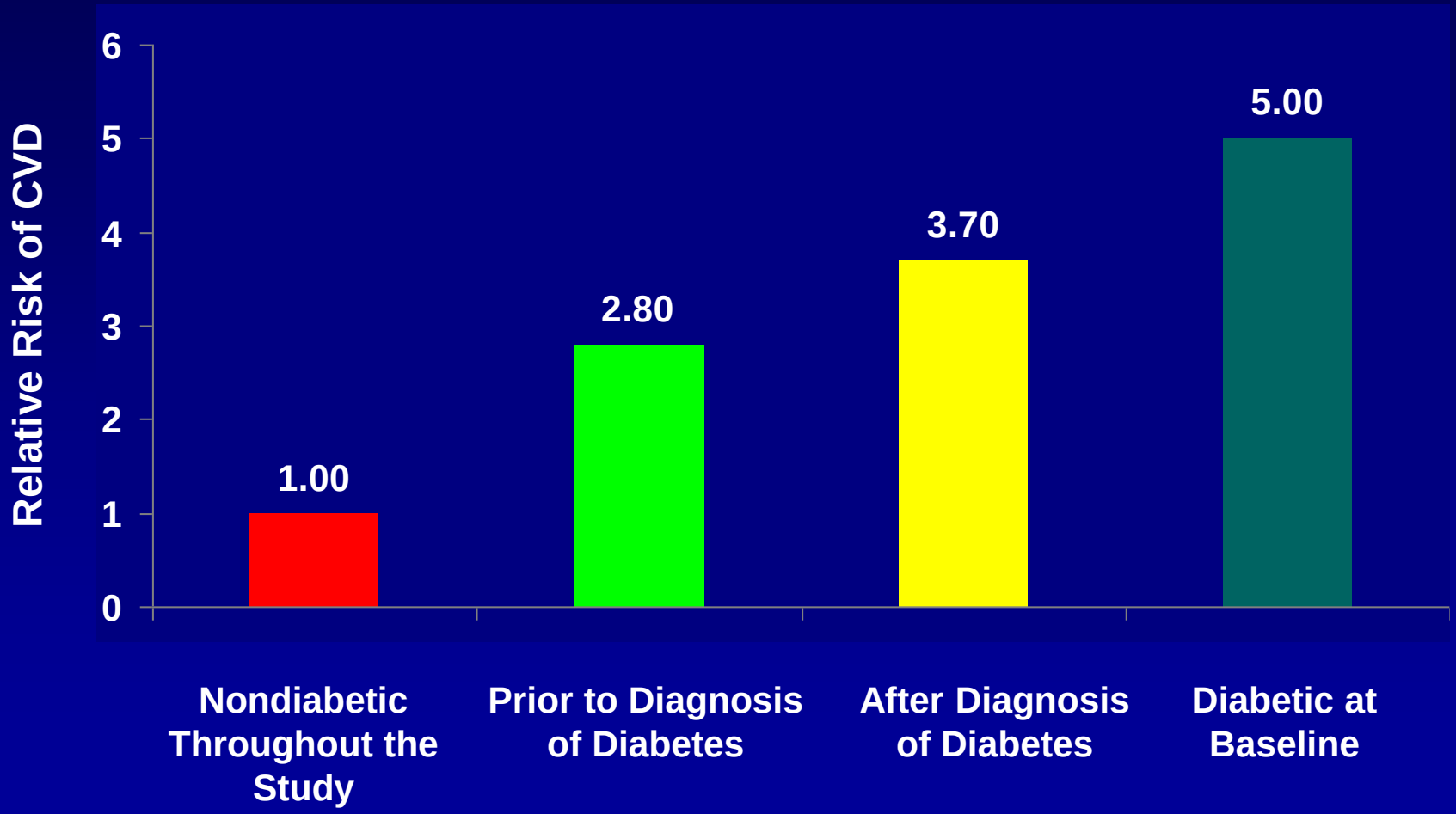
(Risk-factor Adjusted Cox Regression) NHANES II Follow-up (n=6255)



* p<.05, ** p<.01, **** p<.0001 compared to none

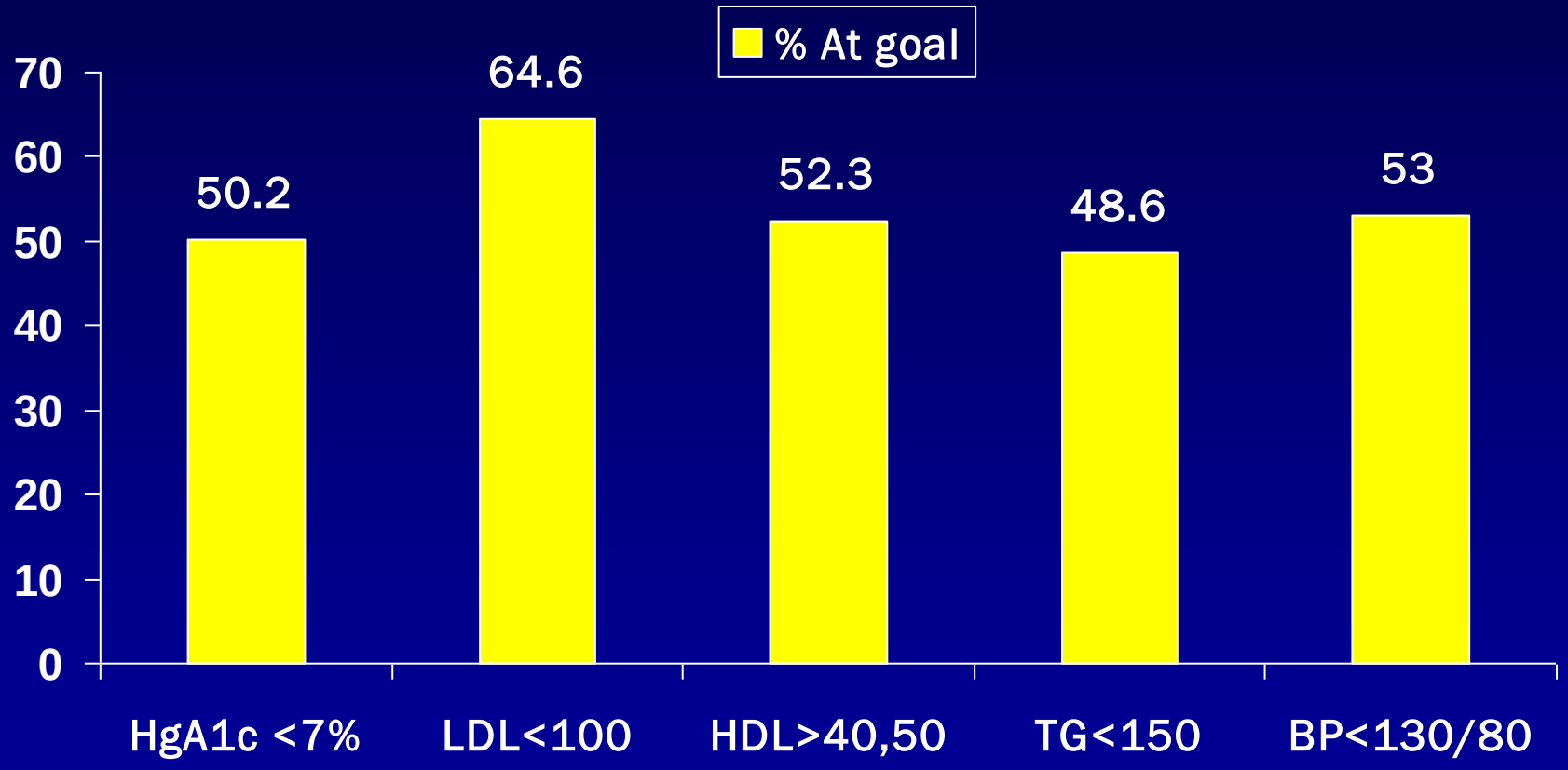
Malik and Wong, et al., **Circulation 2004; 110: 1245-1250.**

Nurses' Health Study:
Elevated Risk of CVD Prior to Clinical Diagnosis of Type 2 Diabetes



Adapted with permission from Hu FB et al. *Diabetes Care*. 2002;25:1129-1134.

Under-Treatment of Cardiovascular Risk Factors Among U.S. Adults with Diabetes



Malik S, Wong ND et al. Diab Res Clin Pract 2007;77:126-33.

Summary

- Prevalence of obesity is increasing
- The number of patients with diabetes is increasing
- There is increased mortality and morbidity associated with diabetes
  - Primarily attributable to cardiovascular disease
- Patients with diabetes underestimate the risk of the disease

Summary of Care: ABC's for Providers

Convergence of Diabetes & Cardiovascular Disease

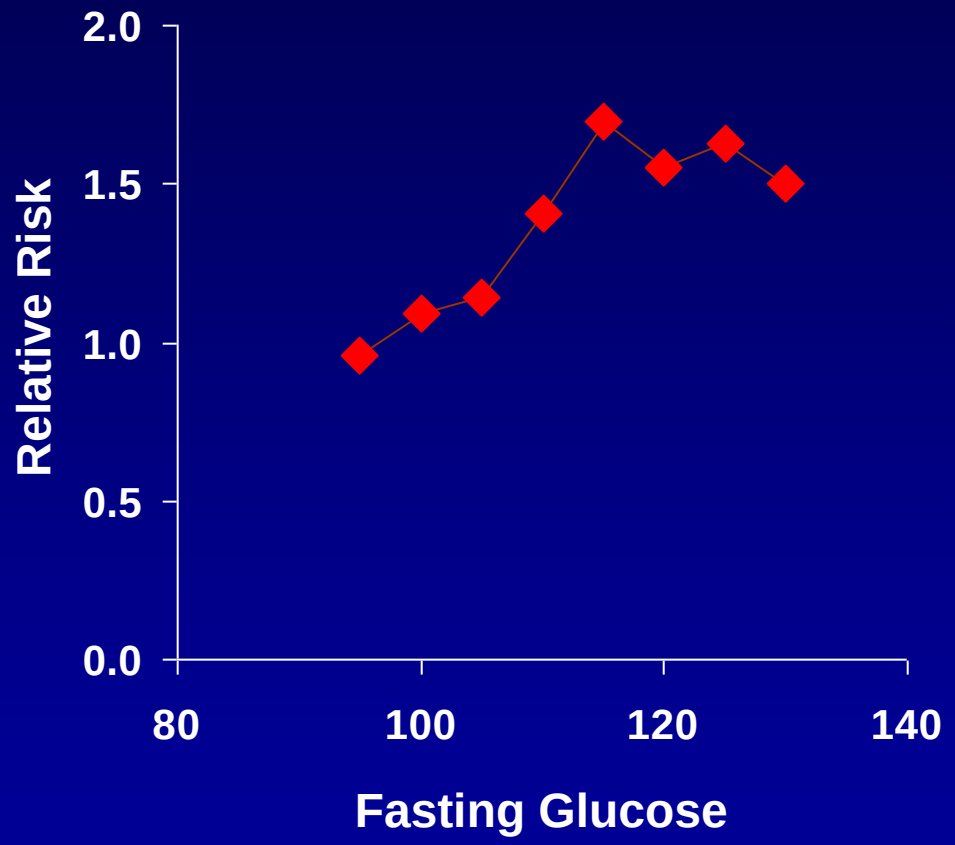
A	A1c Target Aspirin Daily
B	Blood Pressure Control
C	Cholesterol Management Cigarette Smoking Cessation
D	Diabetes and Pre-Diabetes Management
E	Exercise
F	Food Choices

A1c Target
Aspirin Daily

- A1c Target: Glucose lowering to achieve normal to near normal plasma glucose, as defined by the HbA1c <7%

- Aspirin Daily: Secondary prevention or primary prevention in higher risk patients with diabetes

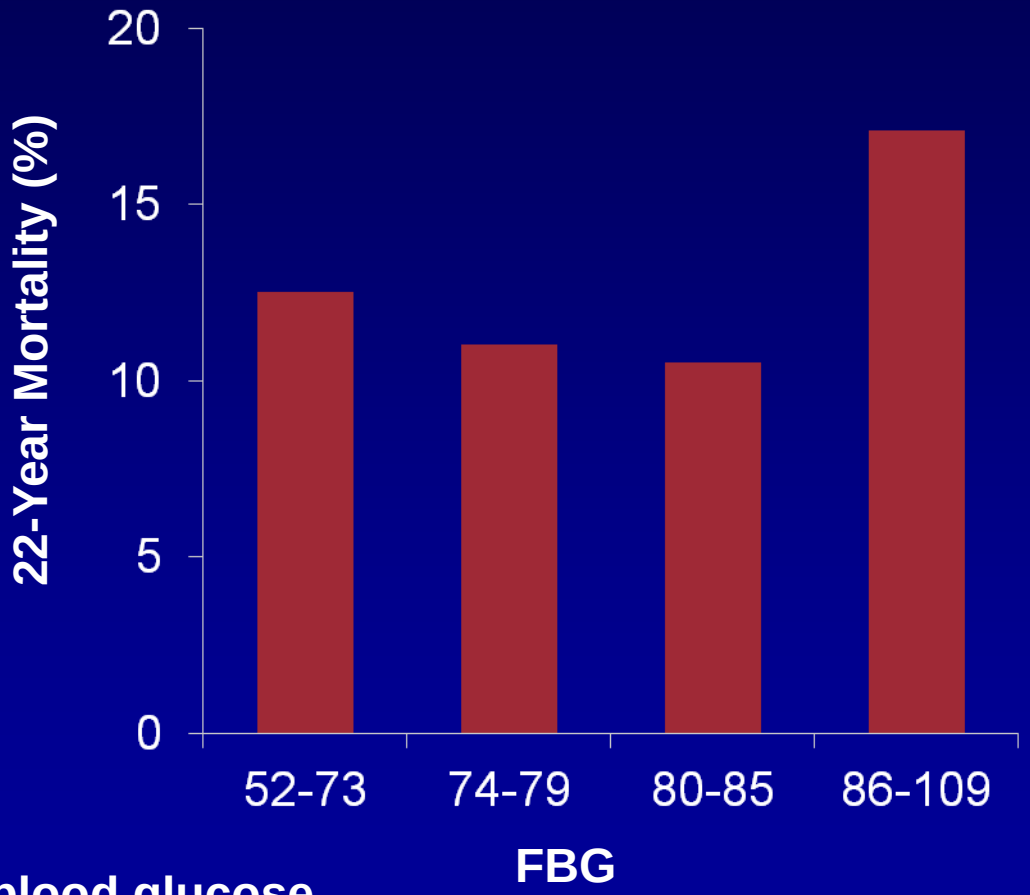
CAD Event Risk vs. Fasting Glucose (CARE)



CAD=coronary artery disease; CARE=Cholesterol and Recurrent Events trial.

Adapted with permission from Goldberg RB et al. *Circulation*. 1998;98:2513-2519.

CV Mortality vs. FBG: 22-Year Follow-Up

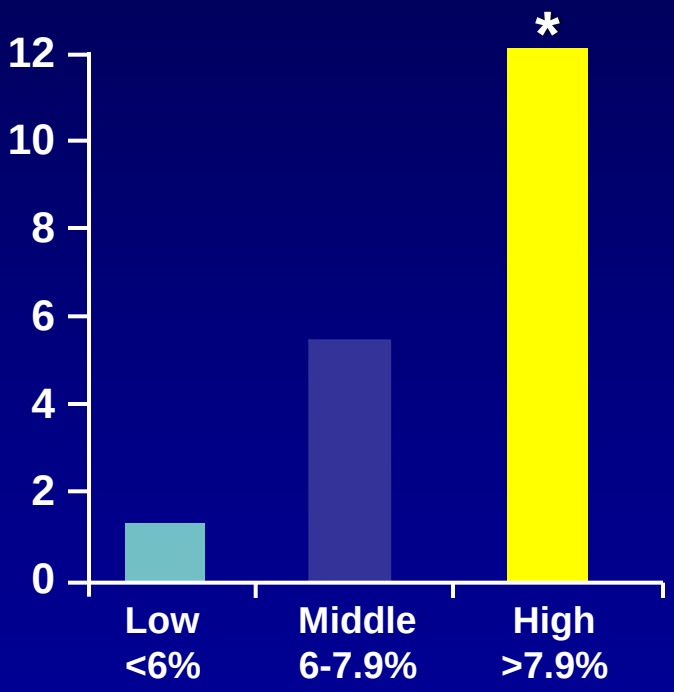


FBG=fasting blood glucose

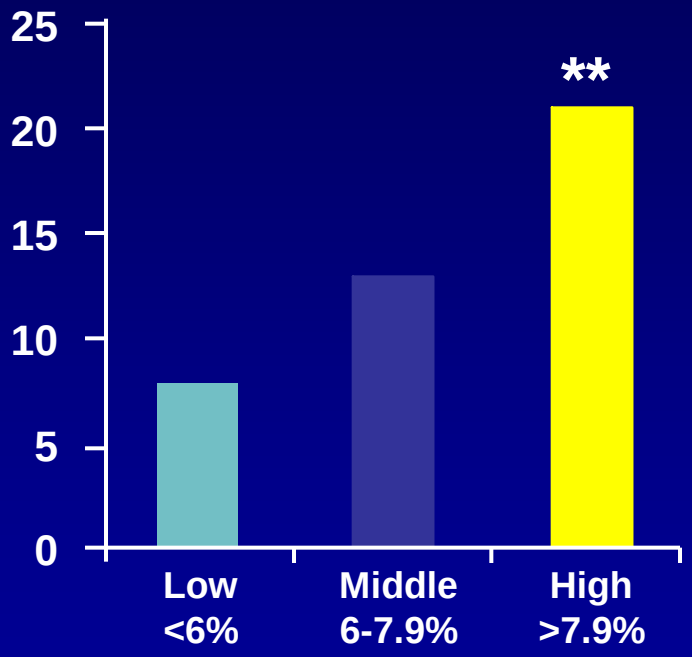
Adapted with permission from Bjornholt JV et al. *Diabetes Care*. 1999;22:45-49.

Type 2 Diabetes: A1C Predicts CHD

CHD Mortality Incidence (%) in 3.5 Years



All CHD Events Incidence (%) in 3.5 Years



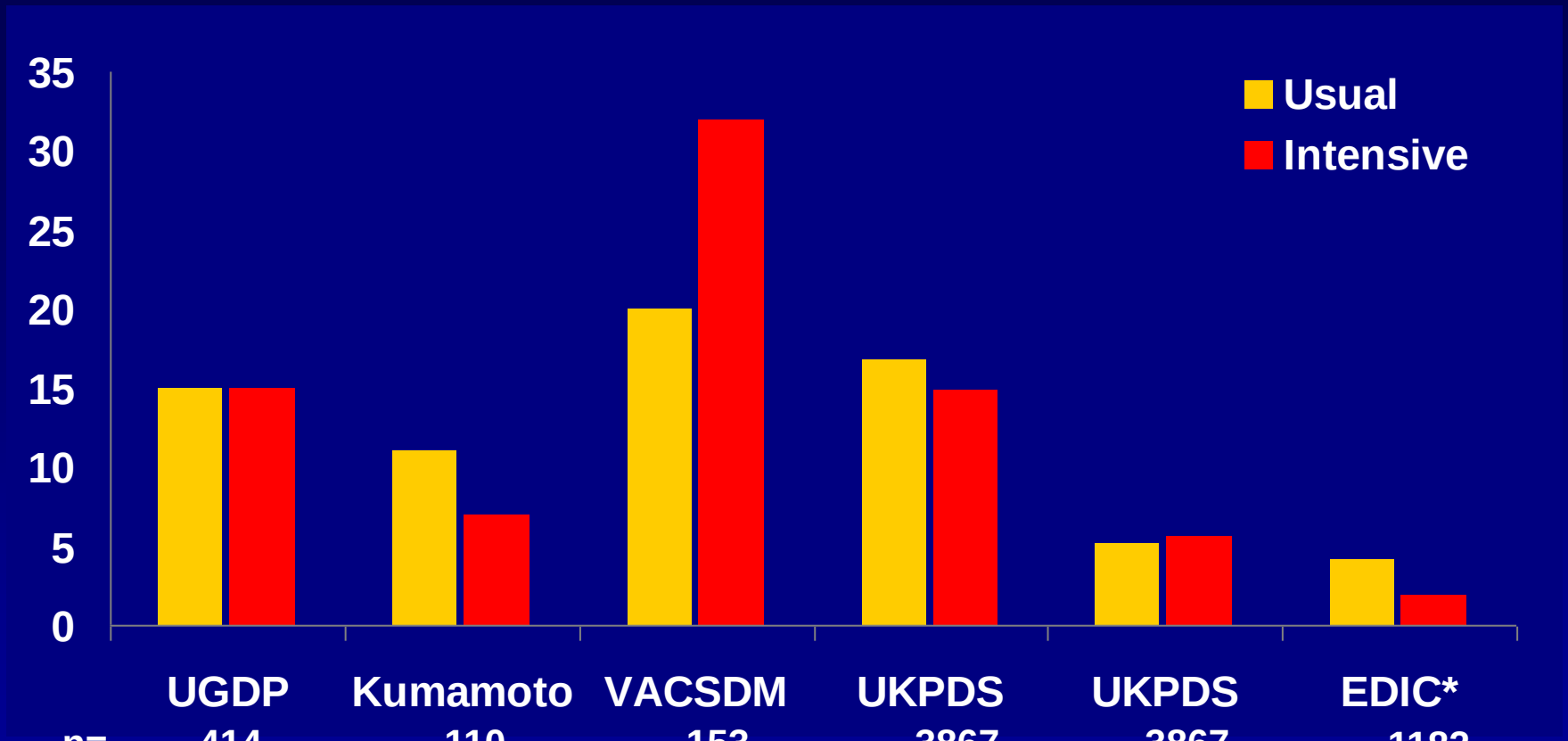
A1C=hemoglobin A1C
*P<0.01 vs lowest tertile
**P<0.05 vs lowest tertile

Adapted with permission from Kuusisto J et al. *Diabetes*. 1994;43:960-967.

Impact of Glycemic Control on Clinical Outcomes

- Proven efficacy for microvascular complications
- Uncertain effects on cardiovascular outcomes
  - Most trials to date not designed nor powered to assess CVD effects

Impact of Glycemic Control on Cardiovascular Outcomes

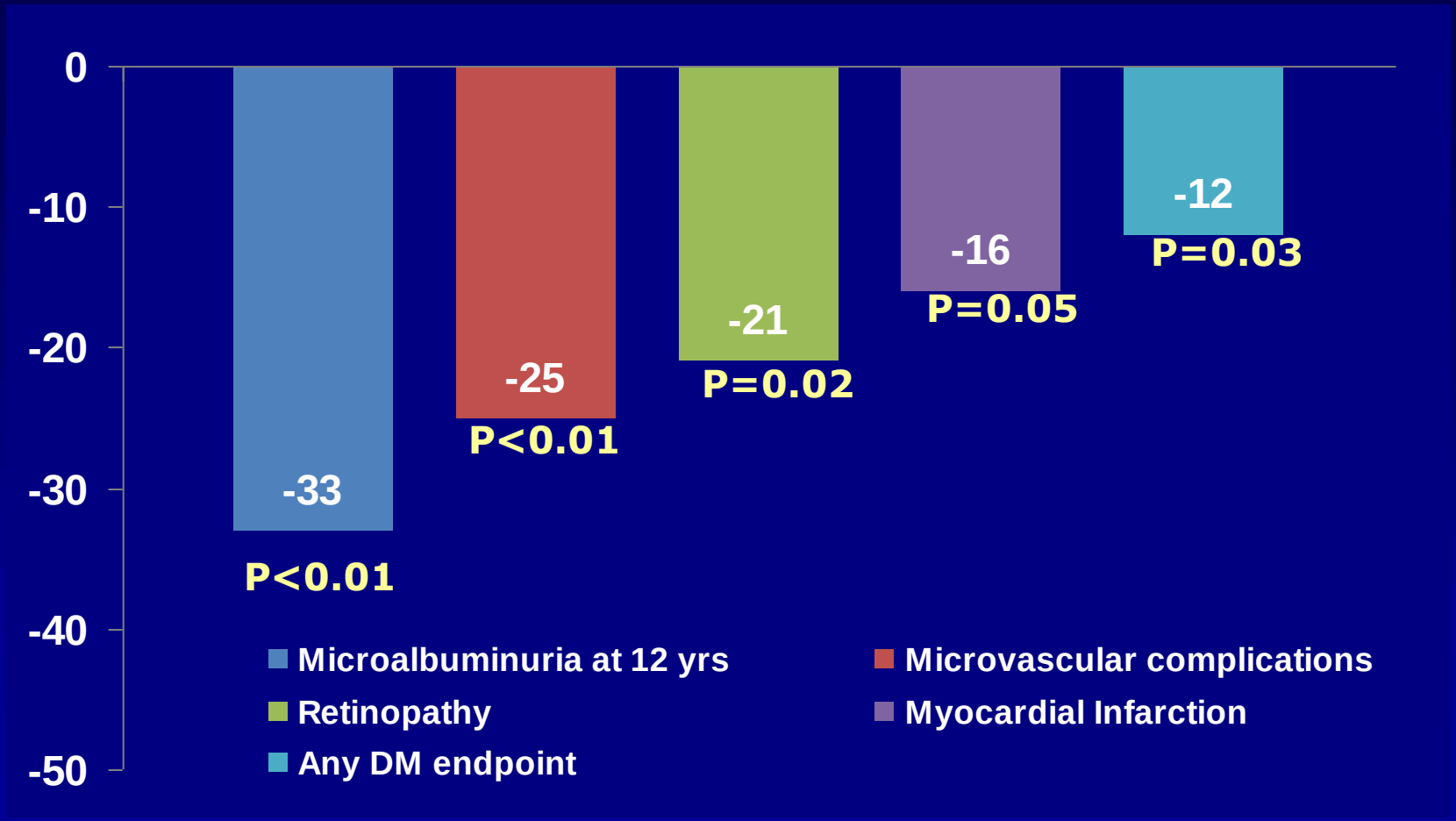


	UGDP	Kumamoto	VACSDM	UKPDS	UKPDS	EDIC*
n=	414	110	153	3867	3867	1182
Endpoint:	CV death	MACE	MACE	MI	CVA	CV death/MI/CVA
Follow-up:	13 yrs	8 yrs	2 yrs	10 yrs	10 yrs	17 yrs
# Endpoints:	62	10	40	595	216	36

Diabetes 1970;19 (Suppl 2):747; Diabetes Care 2000; 23 (Suppl 2):B21;
Arch Intern Med 1997; 157:181; Lancet 1998; 352: 837; NEJM 2005; 353: 2643

UKPDS Relative Risk Reduction

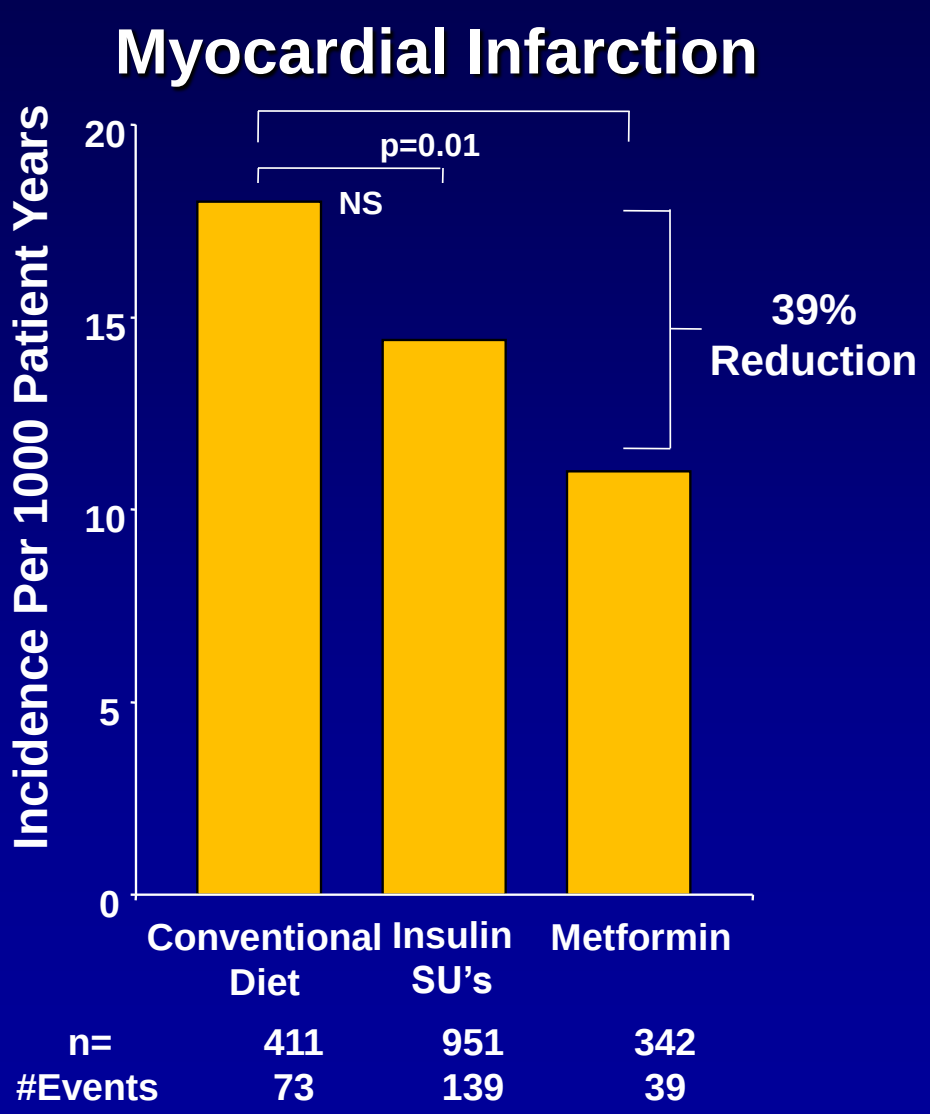
for Intensive vs. Less Intensive Glucose Control

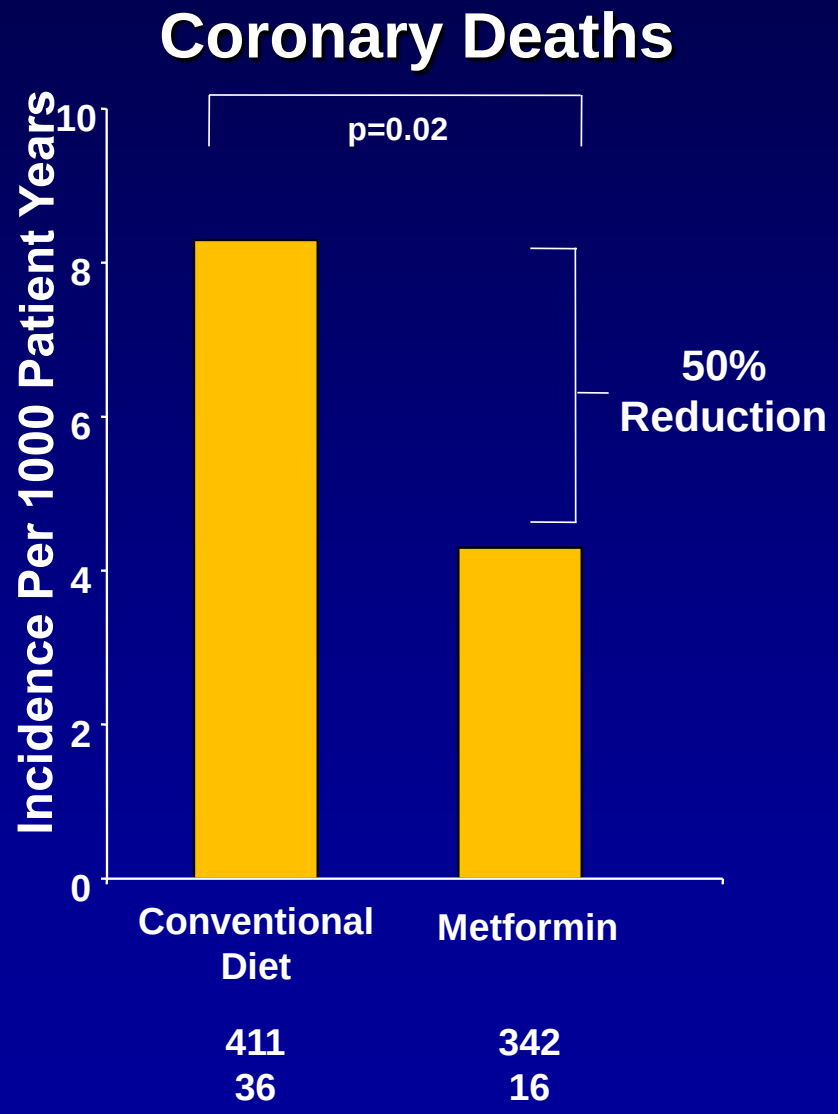


Over 10 years, HbA_{1c} was 7.0% (6.2-8.2) in the intensive group (n=2,729) compared with 7.9% (6.9-8.8) in the conventional group (n=1,138).

UKPDS Group. Lancet. 1998;352:837-853.

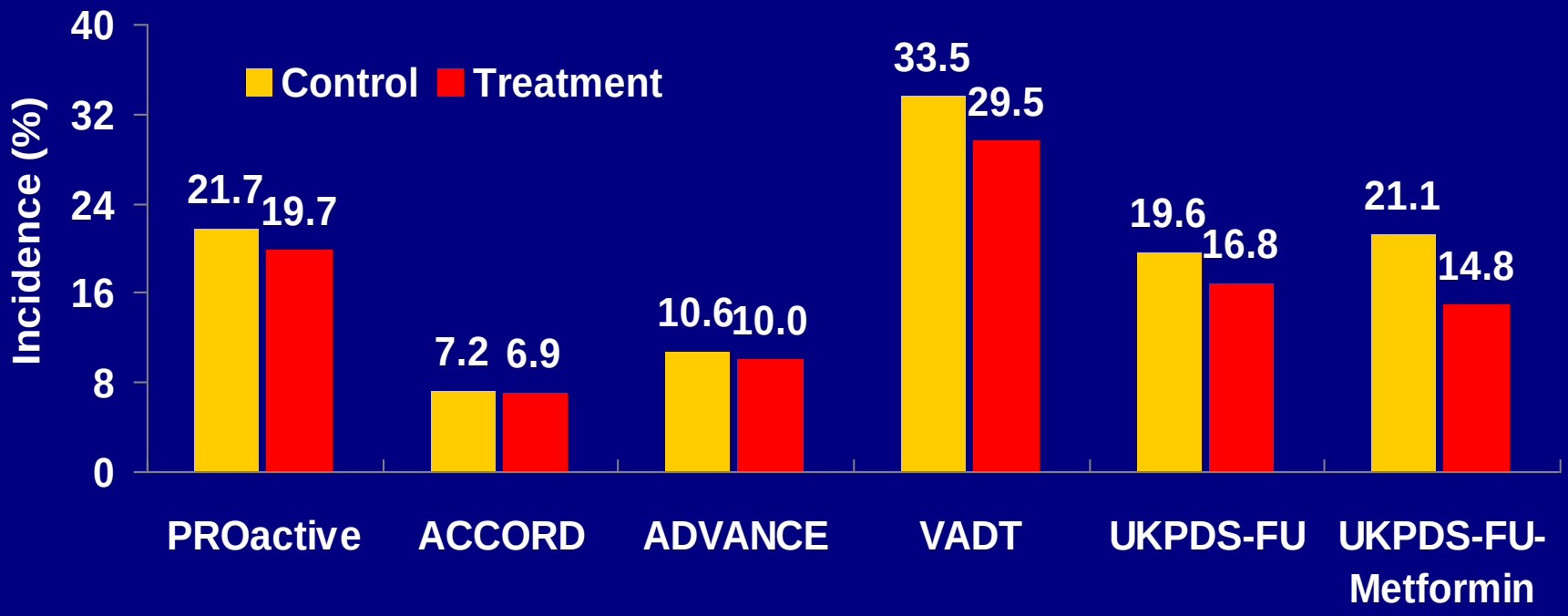
UKPDS Metformin Sub-Study: CHD Events





UKPDS 34, Lancet 352: 854, 1998

CV Effects of Glucose Control in Recent Large-Scale Trials



Events (n):	358 vs. 301	371 vs. 352	590 vs. 557	264 vs. 235	319 vs. 678	126 vs. 81
RRR	0.9	0.9	0.94	0.88	0.85	0.67
95% CI	0.8-1.02	0.78-1.04	0.84-1.06	0.74-1.05	0.74-0.97	0.51-0.89

Dormandy JA, et al. *Lancet*. 2005;366:1279-1289; ACCORD Study Group. *N Engl J Med*. 2008;358:2545-2559; ADVANCE Collaborative Group. *N Engl J Med*. 2008;358:2560-2572; Holman RR, et al. *N Engl J Med*. 2008;359:1577-1589.

2009 ADA/AHA/ACC Statement Recommendations

- Goal of A1c<7% remains reasonable
  - for uncomplicated patients
    - *ACC/AHA Class I (A)*
  - and for those with macrovascular disease
    - *ADA Level B; ACC/AHA Class IIb (A)*
- Incremental microvascular benefit may be obtained from even lower goals
    - *ADA Level B; ACC/AHA Class IIa (C)*
- Less stringent goals may be appropriate for those with labile glucose control or with advanced micro- or macrovascular disease
    - *ADA Level C; ACC/AHA Class IIa (C)*

Circulation 2009; 119: 351-357

A1c Target
Aspirin Daily

- A1c Target: Glucose lowering to achieve normal to near normal plasma glucose, as defined by the HbA1c <7%

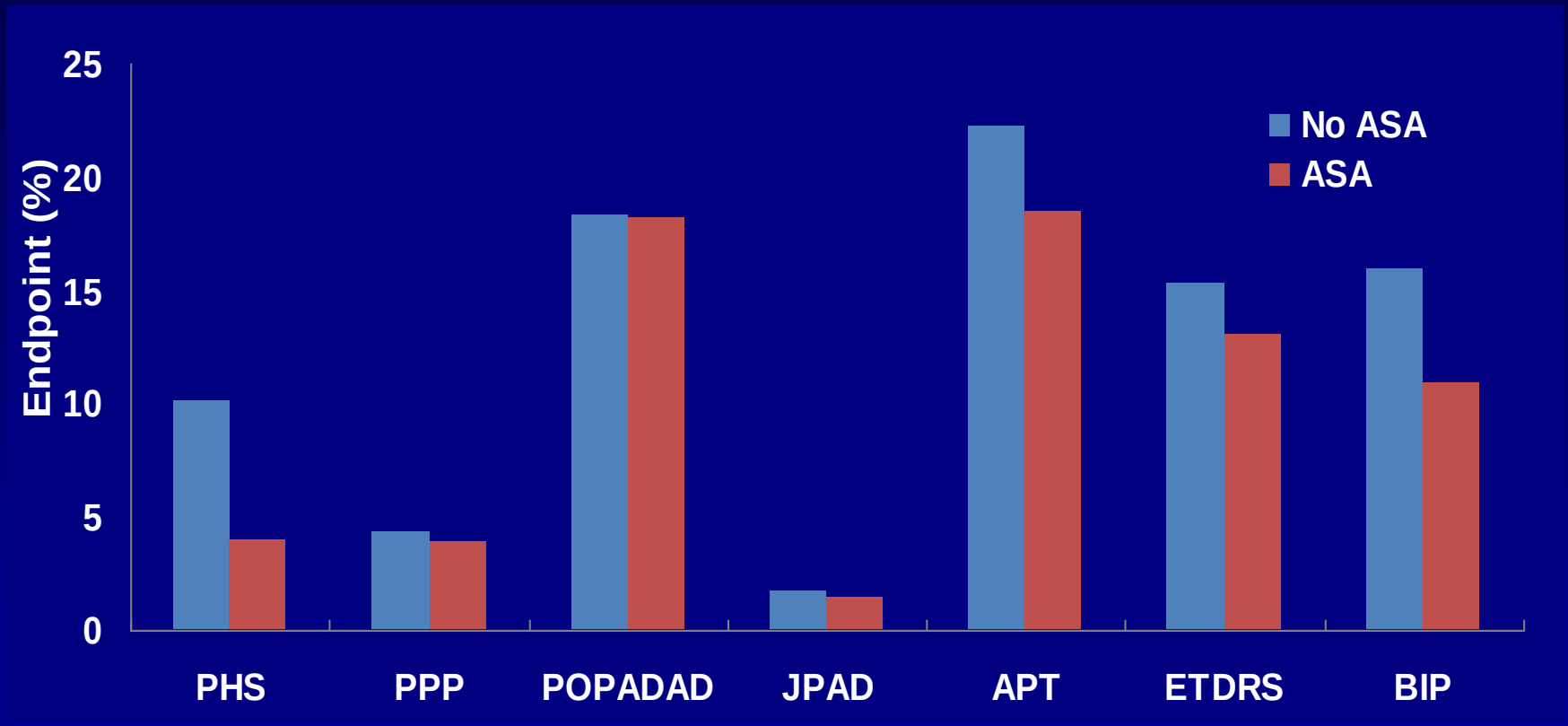
- Aspirin Daily: Secondary prevention or primary prevention in higher risk patients with diabetes

Aspirin Therapy

- Aspirin therapy 75-162 mg for secondary prevention in patients with diabetes with CVD
- Aspirin therapy 75-162 mg for type 1 or type 2 at increased CV risk (10 year risk > 10%)
  - Men > 50 or women > 60 and
    - Family History
    - Hypertension
    - Smoker
    - Dyslipidemia
    - Albuminuria

American Diabetes Association. *Diabetes Care.* 2010:32 (suppl 1) pgS11-S61

Therapeutic Efficacy in Diabetes: ASA



n=	533	1031	1276	2539	4502	3711	2368
Endpoint	5yr MI	4yr MCE	7 yr MCE	4 yr MCE	1 yr MCE	7yr MI	5yr CVDeath
# Events	26 vs 11	20 vs 22	117 vs 116	86 vs 68	426 vs 403	283 vs 241	183 vs 133

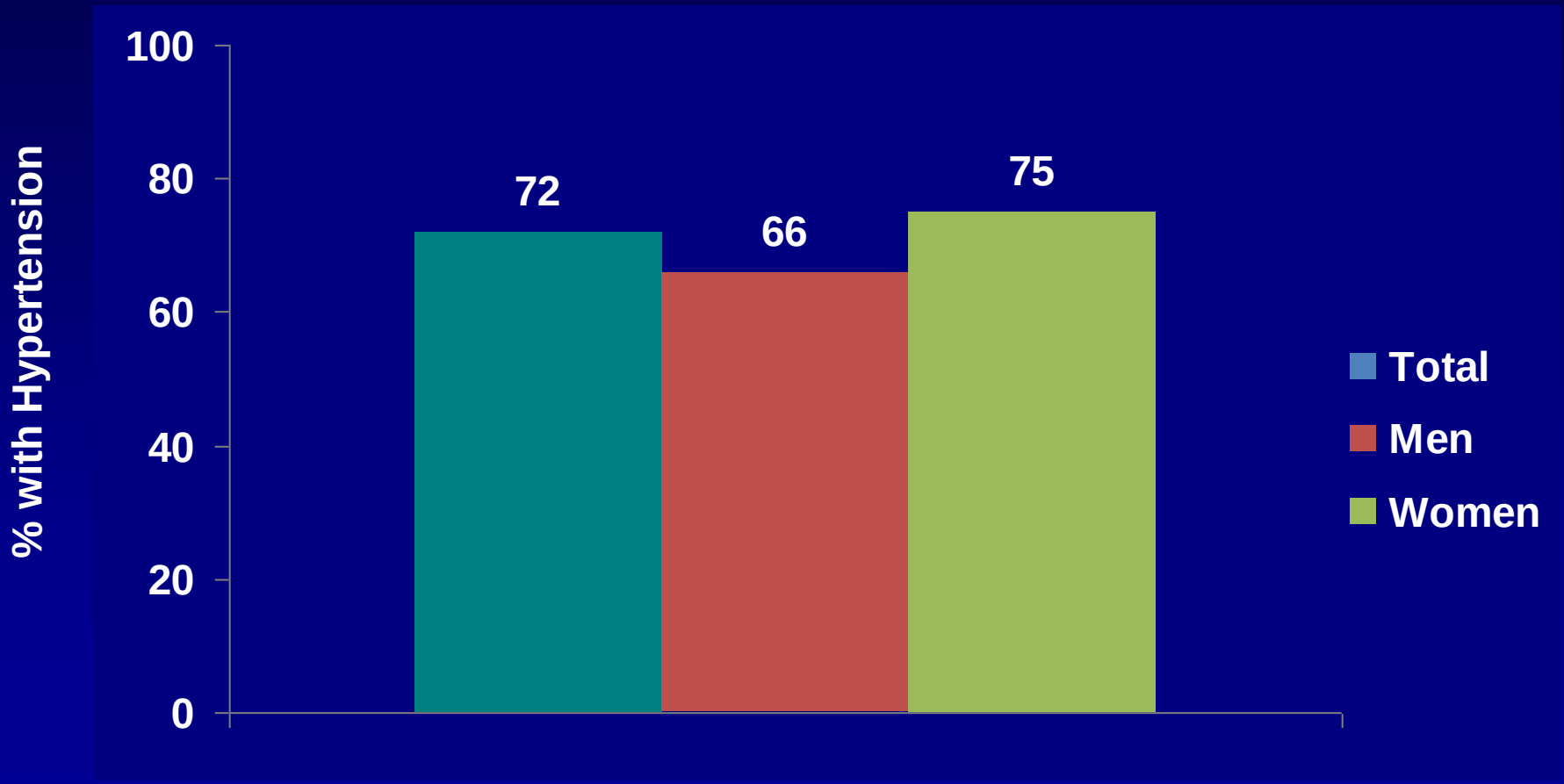
NEJM 1989; 321: 129; Diabetes Care 2003; 26: 3264; BMJ 2008; 337: a1840;
JAMA 2008; 300: 2134; BMJ 1994; 308: 81; JAMA 1992; 268: 1292; Am J Med 1998; 105: 494

Summary of Care: ABC's for Providers

Convergence of Diabetes & Cardiovascular Disease

A	A1c Target Aspirin Daily
B	**Blood Pressure Control**
C	Cholesterol Management Cigarette Smoking Cessation
D	Diabetes and Pre-Diabetes Management
E	Exercise
F	Food Choices

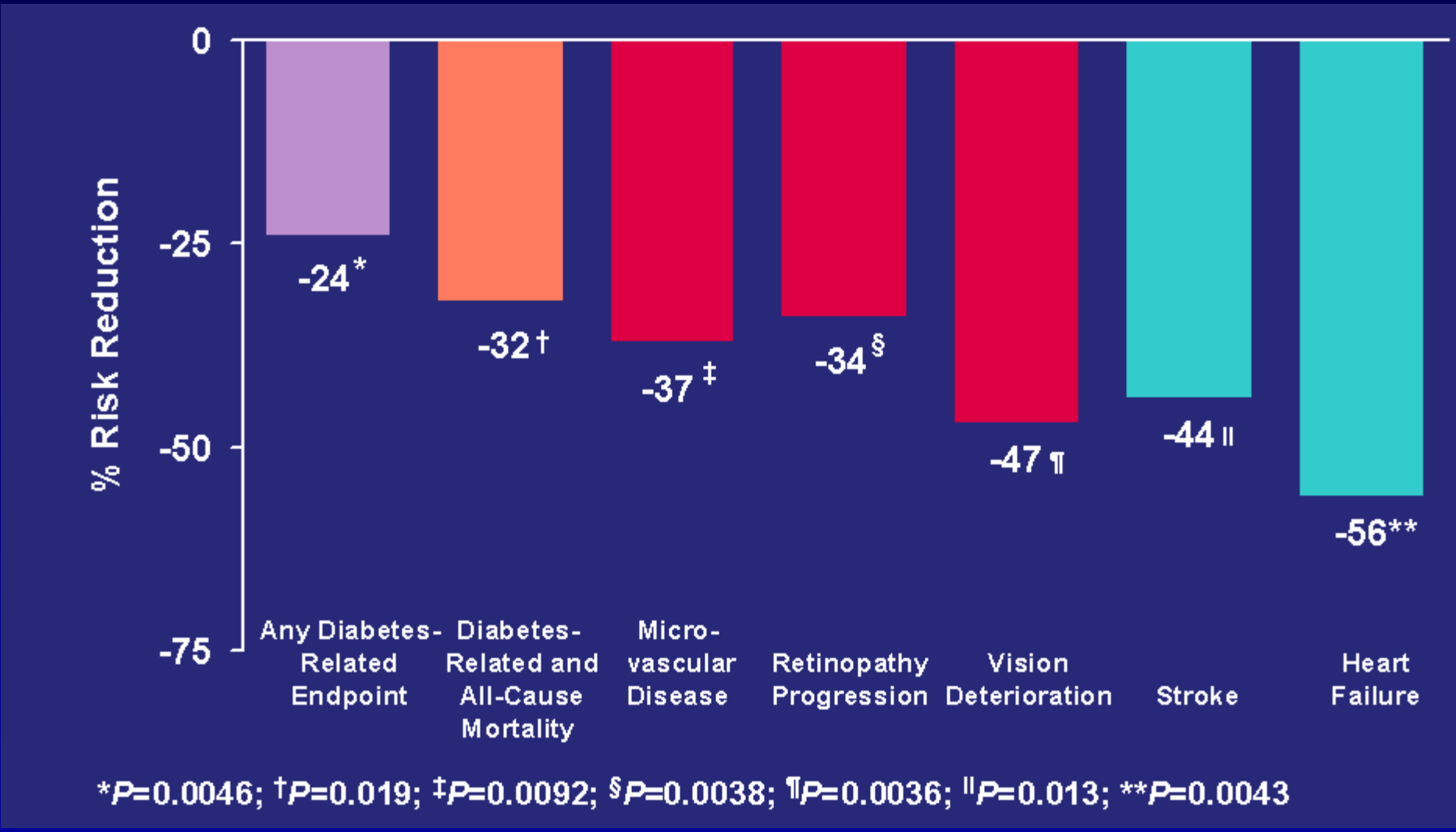
Prevalence of Hypertension* in Adults with Diabetes: NHANES III 1988-1994



*BP ≥130/85 or therapy for hypertension

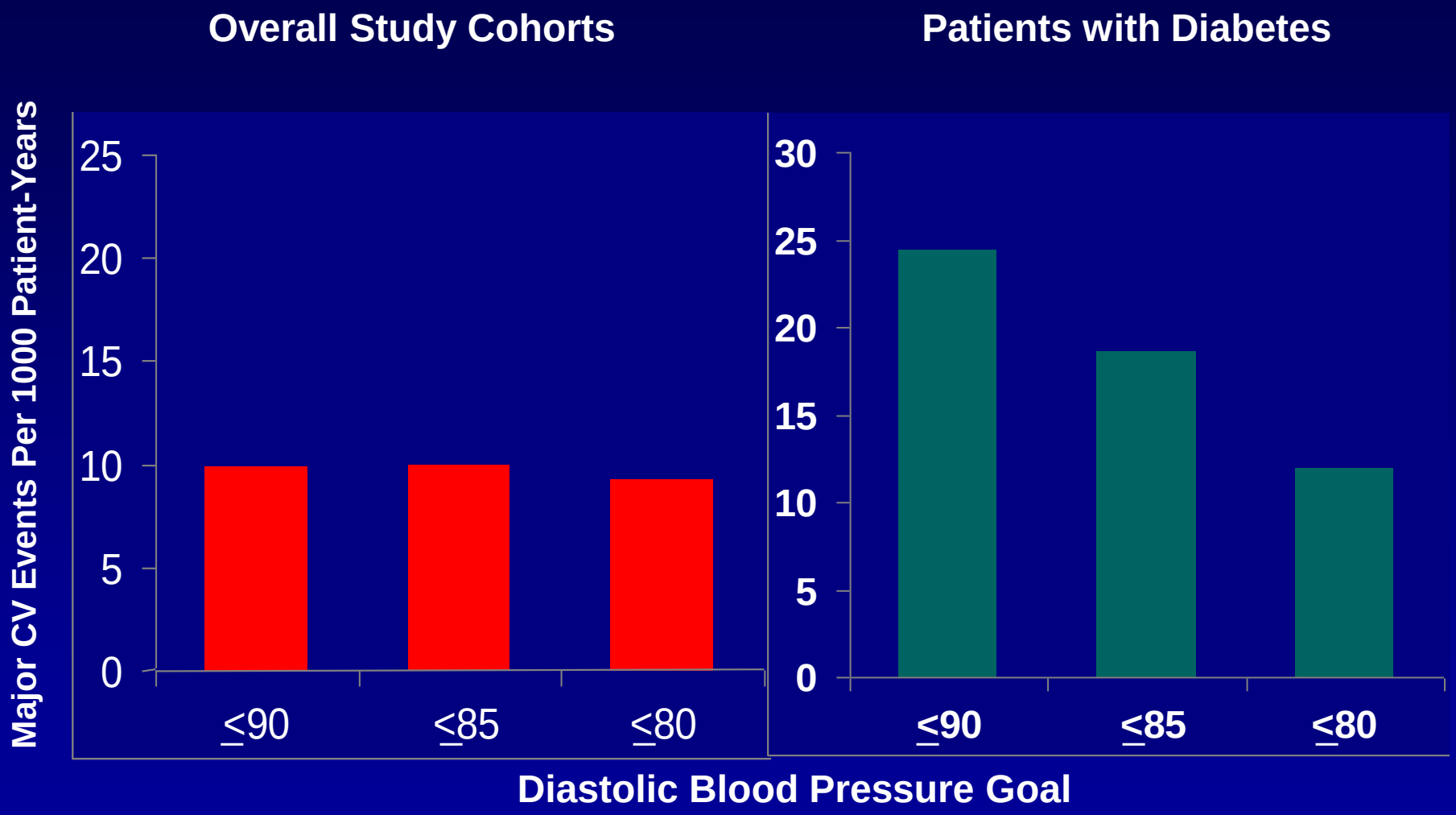
Geiss LS, et al. Am J Prev Med. 2002;22:42-48.

UKPDS: Effects of Tight vs. Less-Tight Blood Pressure Control



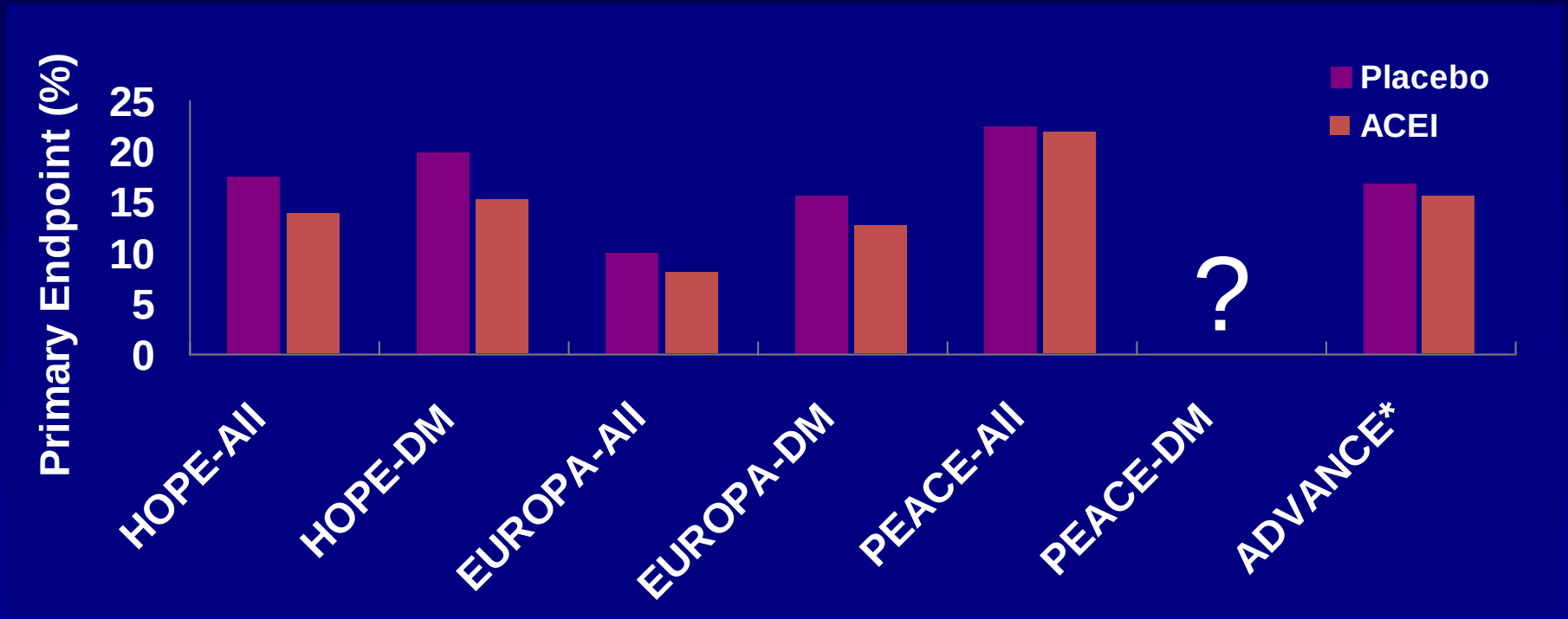
UK Prospective Diabetes Study Group. *BMJ.* 1998; 317:703-713.

HOT Trial: Effect of BP Control on CV Event Rate



Hansson L et al. *Lancet*. 1998;351:1755-1762.

Therapeutic Efficacy in Diabetes: ACE Inhibitors



***Experimental therapy was ACEI plus indapamide**

Lancet 2000; 355: 253-9; Lancet 2003; 362: 782-8;
NEJM 2004; 351: 2058-68; Lancet 2007; 320: 829-40

Scientific Statements: Diabetes, CV Disease and Hypertension

- JNC VII Report on Diabetic Hypertension
  - BP goal (<130/80 mm Hg)
    - Commonly requiring combinations of ≥2 drugs
  - ACEIs, CCBs, Thiazide-diuretics, β-blockers, and ARBs shown to reduce CVD/CVA risk
  - ACEIs/ARBs reduce progression of diabetic nephropathy and reduce albuminuria
  - ARBs reduce progression of macroalbuminuria

Grundy SM, et al. *Circulation*. 1999;100:1134-1146.
Chobanian AV, et al. *JAMA*. 2003;289:2560-2572.

ADA Standards of Medical Care in Diabetes – 2010

- Treatment of hypertension
  - Target SBP<130 and DBP<80 mmHg
    - In patients with BP 130-139/80-89 may try three months of diet, weight management and exercise
  - ACEI or ARB for initial drug therapy
    - Especially with micro or macroalbuminuria, given benefit in both type1diabetes and type 2 diabetes
  - Multiple drug therapy is generally required to achieve BP control

American Diabetes Association. *Diabetes Care.* 2010;33 (suppl 1) pgS12-S61

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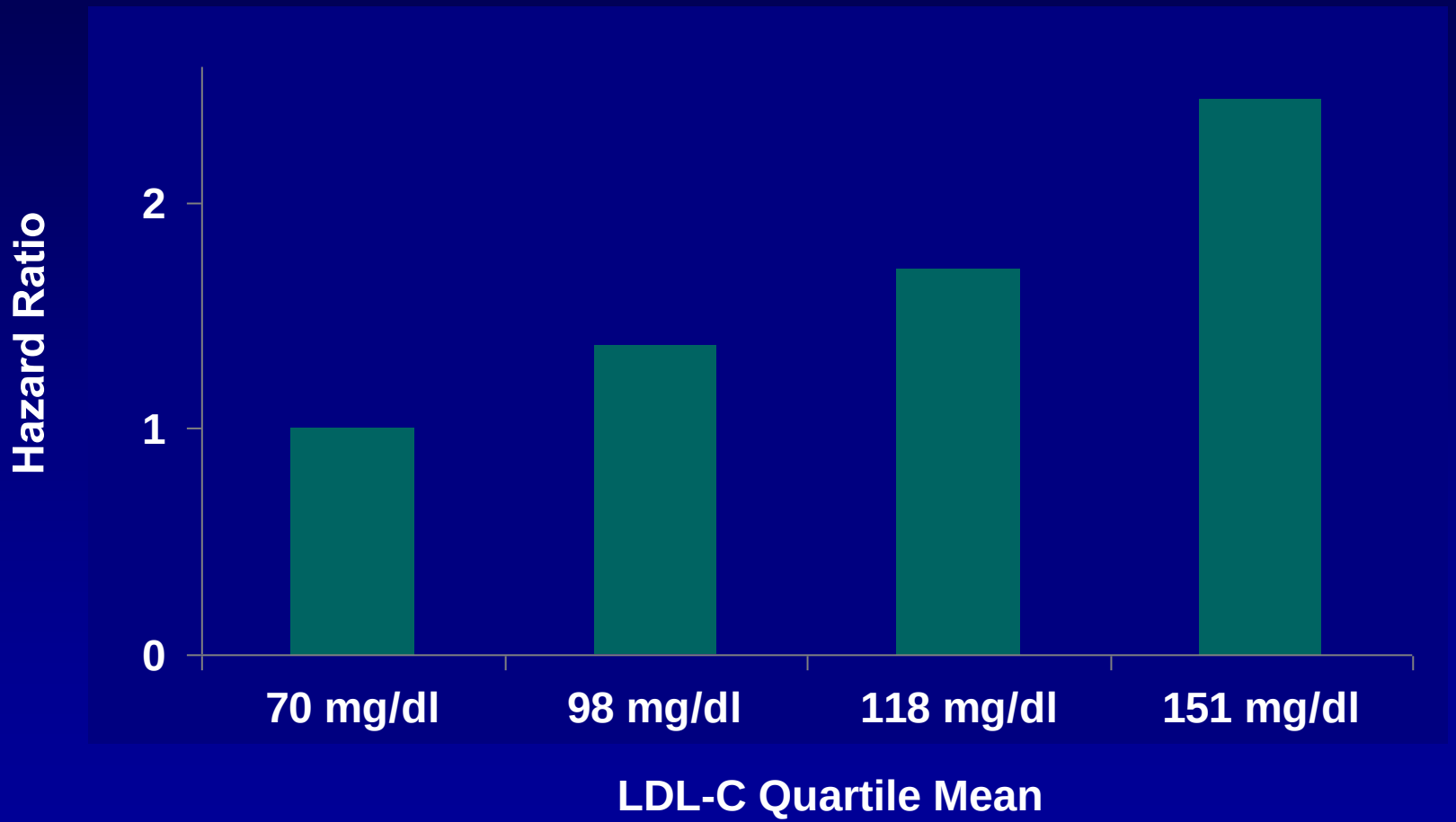
A	A1c Target Aspirin Daily
B	Blood Pressure Control
C	**Cholesterol Management** Cigarette Smoking Cessation
D	Diabetes and Pre-Diabetes Management
E	Exercise
F	Food Choices

LDL-C as a Predictor of CAD in Patients with Diabetes



LDL=low-density lipoprotein cholesterol; CAD=coronary artery disease.

Adapted with permission from Howard BV et al. *Arterioscler Thromb Vasc Biol*. 2000;20:830-835.

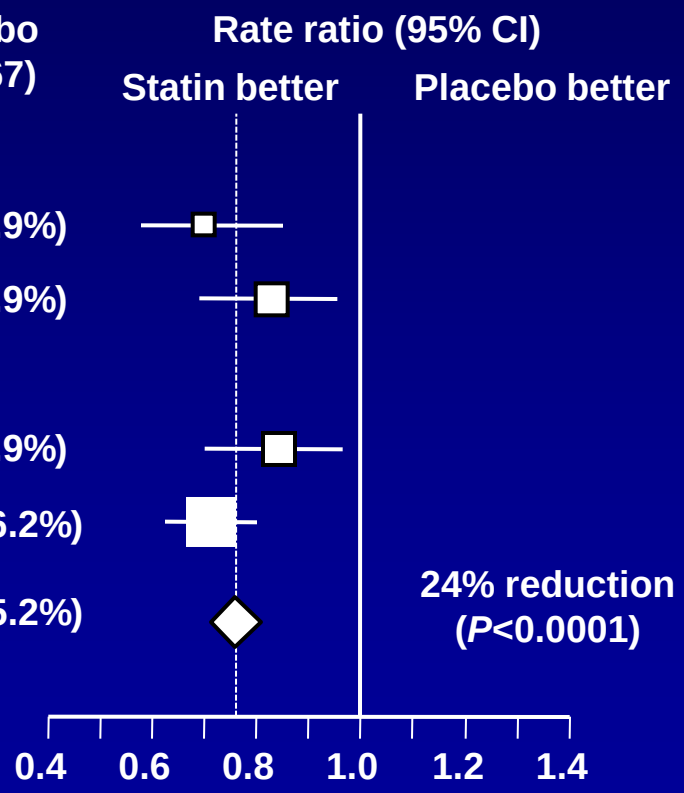
Lipid Treatment Goals for Patients with Type 2 Diabetes

	ADA 2010[1]	ATP III[4]
LDL (mg/dL)	<100 <70 highest risk	<100
TG (mg/dL)	<150	<150
HDL (mg/dL)	>50	*
Non HDL (mg/dL)	<130	<130

1. American Diabetes Association. *Diabetes Care.* 2010;33 (suppl 1) pgS12-S61
2. American Association of Clinical Endocrinologists Diabetes Guidelines. *Endocr Pract*. 2002;8(suppl 1):41-65.
3. The JNC 7 Report. *JAMA.* 2003;289(19):2560-2572.
4. NCEP ATP III Executive Summary. *JAMA*. 2001;285(19):2486-2497.

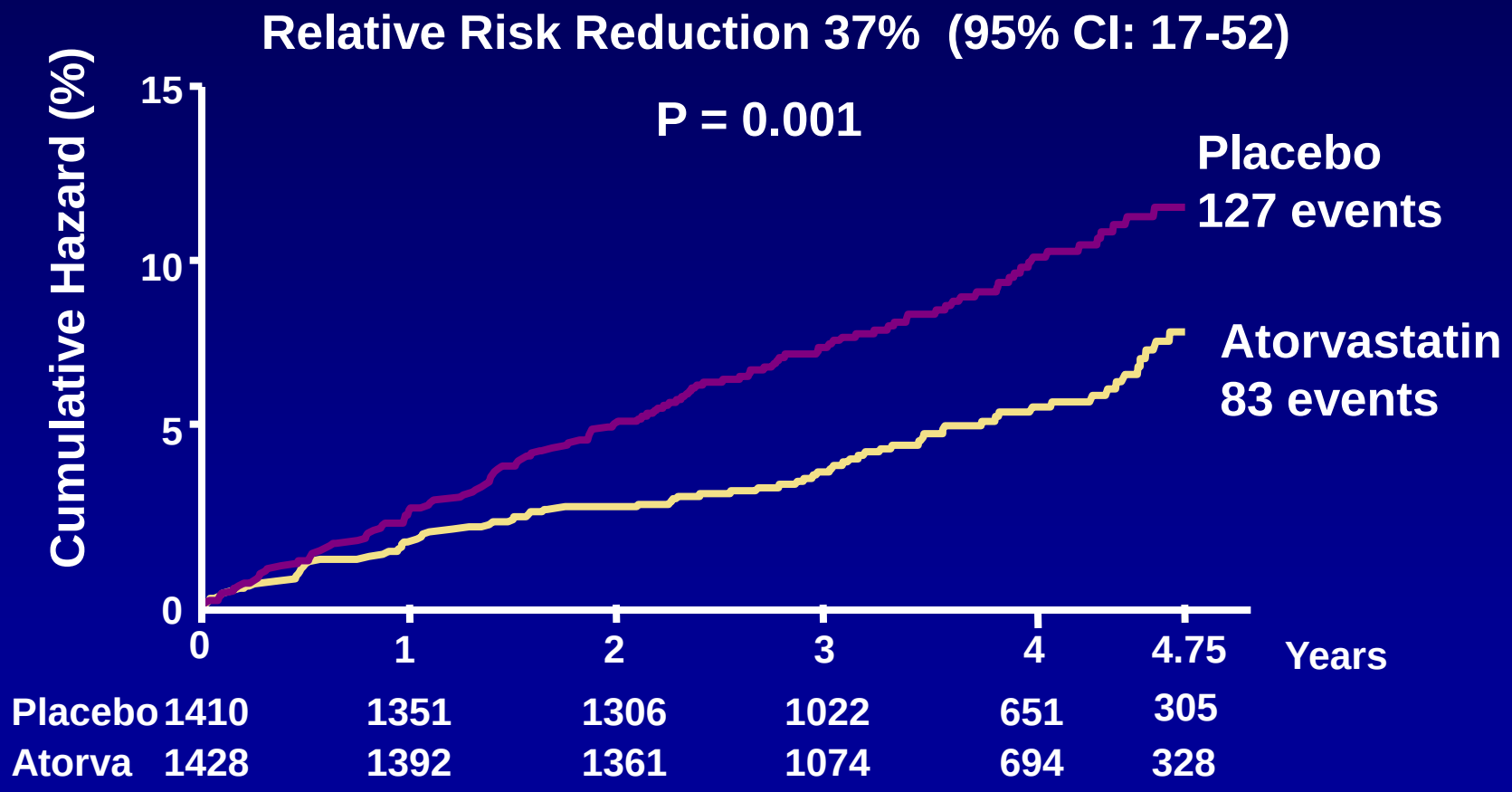
HPS Substudy: First Major Vascular Event by LDL-C and Prior Diabetes Status

LDL-C and diabetes status	Simvastatin (10,269)	Placebo (10,267)
<116 mg/dL		
With diabetes	191 (15.7%)	252 (20.9%)
No diabetes	407 (18.8%)	504 (22.9%)
≥116 mg/dL		
With diabetes	410 (23.3%)	496 (27.9%)
No diabetes	1,025 (20.0%)	1,333 (26.2%)
All patients	2,033 (19.8%)	2,585 (25.2%)



HPS Collaborative Group. *Lancet*. 2003;361:2005-2016.

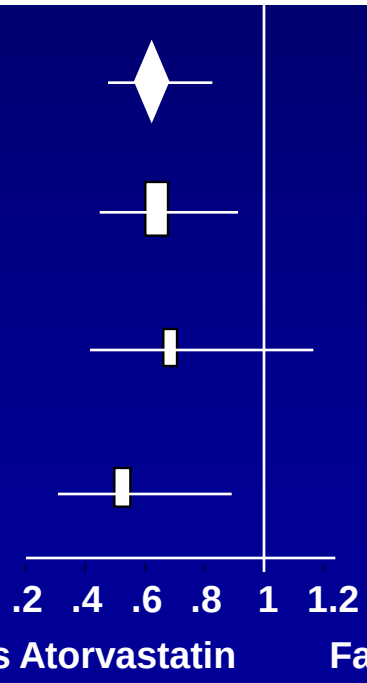
CARDS: Primary Endpoint



Colhoun HM et al. Lancet 2004;364:685-96.

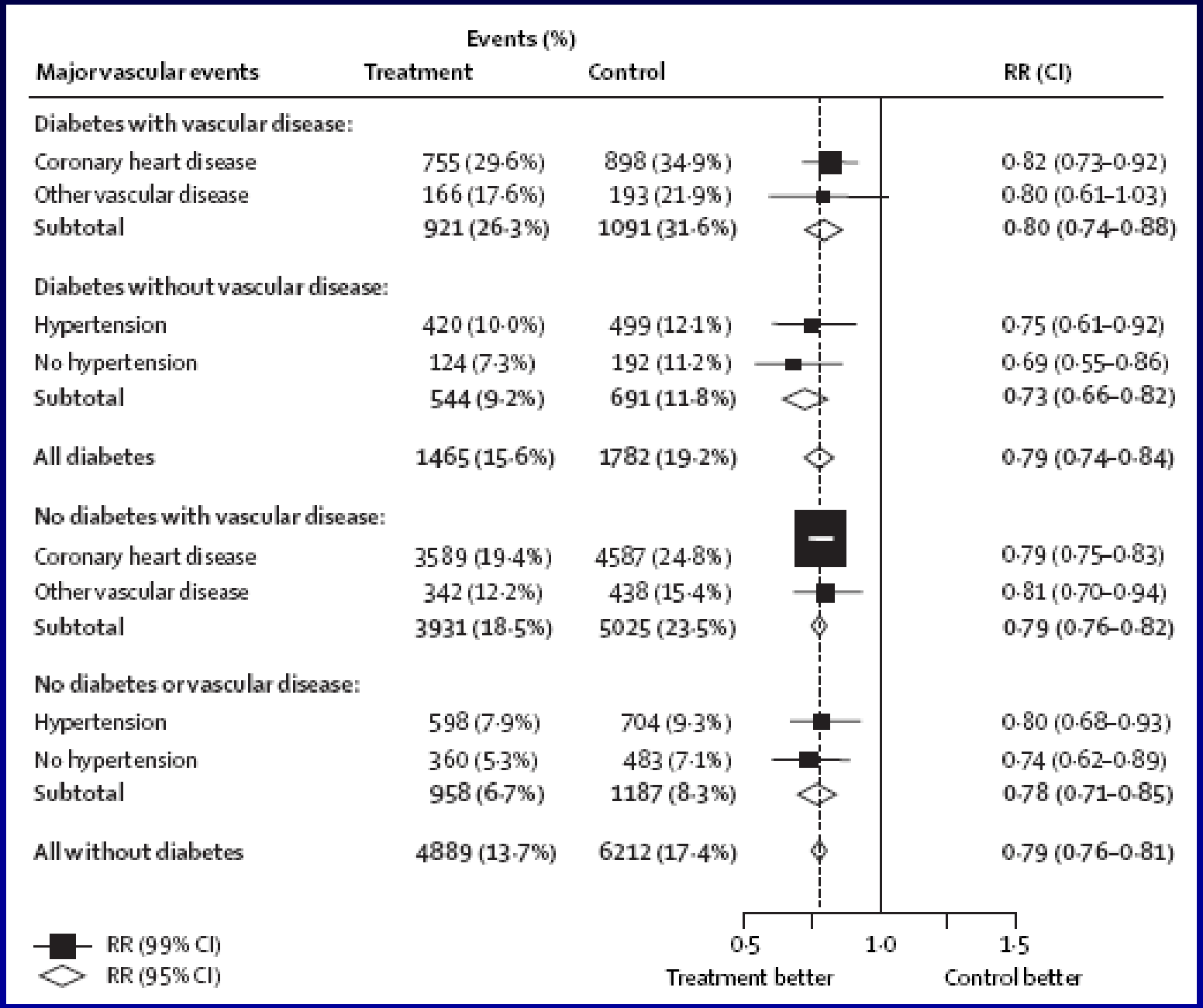
CARDS: Treatment Effect on the Primary Endpoint

Event	Placebo*	Atorva*	Hazard Ratio	Risk Reduction (CI)
Primary endpoint	127 (9.0%)	83 (5.8%)		37% (17-52) p=0.001
Acute coronary events	77 (5.5%)	51 (3.6%)		36% (9-55)
Coronary revascularization	34 (2.4%)	24 (1.7%)		31% (-16-59)
Stroke	39 (2.8%)	21 (1.5%)		48% (11-69)



*** N (% randomized)**

Colhoun HM et al. Lancet 2004;364:685-96.



Kearney PM Lancet;2008:371:227-239.

Reducing CVD Risk with Statin Therapy in Patients with Diabetes

- Number needed to treat to prevent 1 major CVD event
  - From meta-analysis
    - Without vascular disease 39
    - With vascular disease 19

Kearney PM Lancet;2008:371:227-239

ADA 2010 Guidelines

- *Statin therapy should be added to lifestyle therapy, regardless of baseline lipid levels, for diabetic patients:*
  - *With overt CAD*
  - *Without CVD >40 and have ≥ 1 CVD risk factor*

American Diabetes Association. *Diabetes Care.* 2010;33 (suppl 1) pgS12-S61

Specific Dyslipidemias: Elevated Triglycerides

Non-HDL: Secondary Target

- Non-HDL = TC – HDL
- Non-HDL: secondary target of therapy when serum triglycerides are ≥200 mg/dL (esp. 200-499 mg/dl)
- Non-HDL goal: LDL goal + 30 mg/dL

Specific Dyslipidemias: Low HDL Cholesterol

Management of Low HDL

- LDL is primary target of therapy
- Weight reduction and increased physical activity (if the metabolic syndrome is present)
- Non-HDL is secondary target of therapy (if triglycerides ≥200 mg/dL)
- Consider nicotinic acid or fibrates (for patients with CHD or CHD risk equivalents)

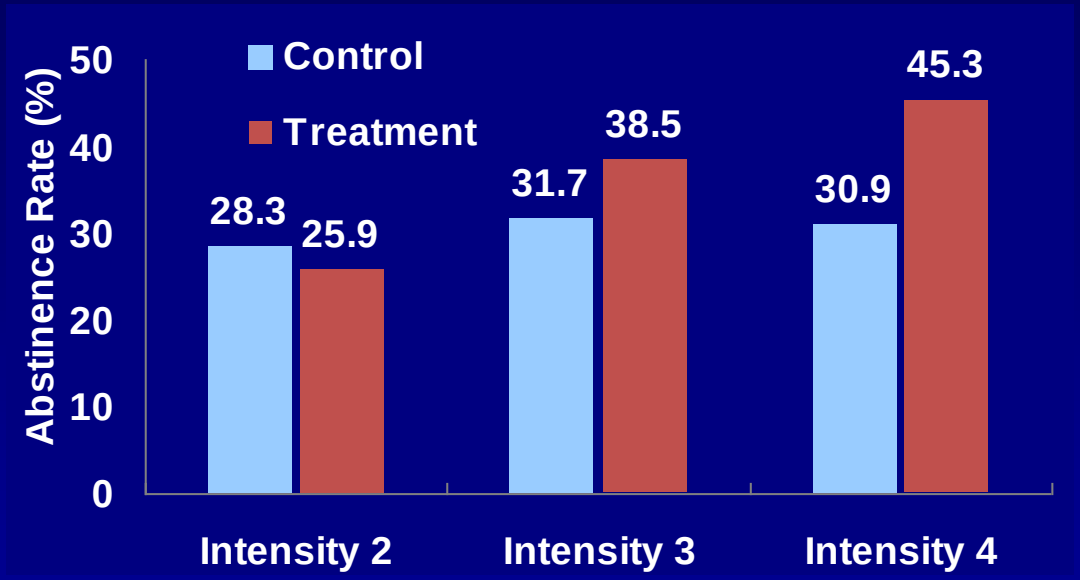
Summary of Care: ABC's for Providers

Convergence of Diabetes & Cardiovascular Disease

A	A1c Target Aspirin Daily
B	Blood Pressure Control
C	Cholesterol Management **Cigarette Smoking Cessation**
D	Diabetes and Pre-Diabetes Management
E	Exercise
F	Food Choices

Effectiveness of Smoking Cessation Interventions for CVD Admissions

- Smoking cessation intervention
  - MI = “teachable moment”
  - JCAHO/CMS core measure for MI care
- Meta-analysis of 18 RCTs in CVD, by intensity of intervention
- Only extended support programs significantly improved abstinence



	Intensity 2	Intensity 3	Intensity 4
Summary OR	1.14	1.07	1.81
95% CI	0.9-1.4	0.7-1.6	1.5-2.2

Rigotti et al. Arch Intern Med 2008; 168: 1950-1960

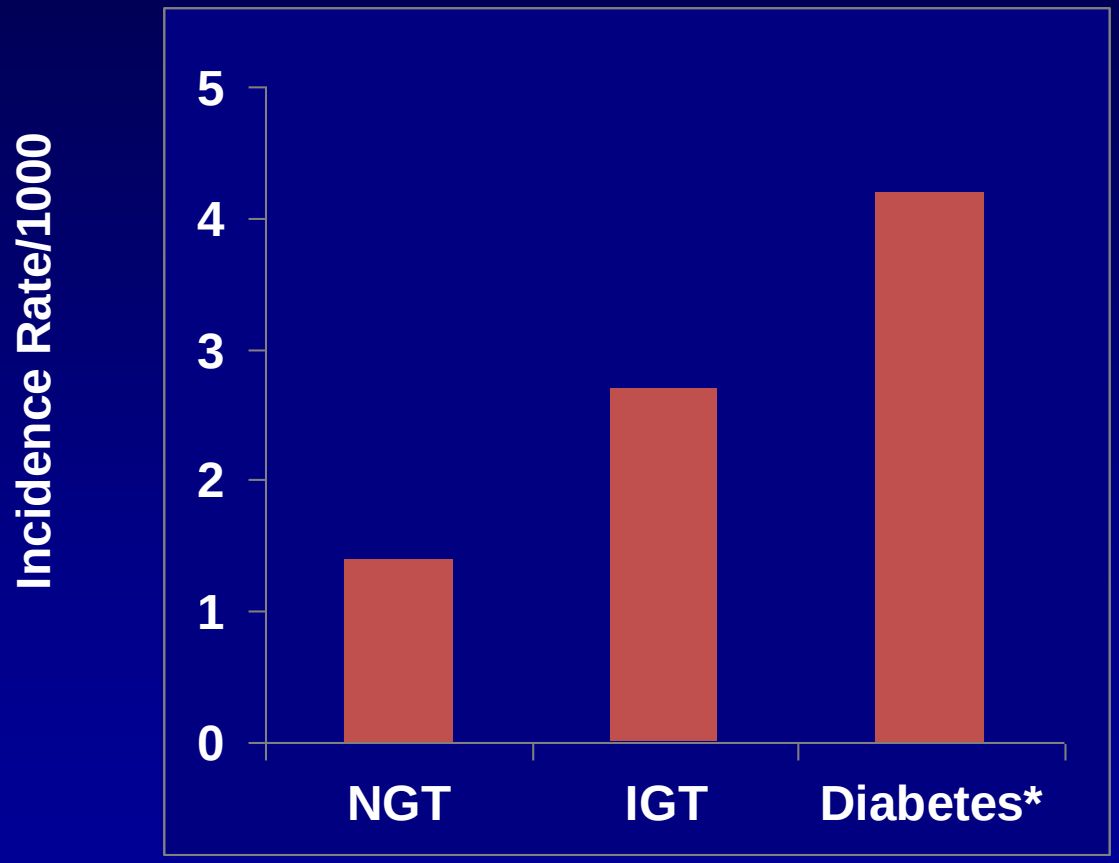
The 5 “A’s” for Effective Smoking Intervention

1. **ASK** about smoking
2. **ADVISE** to quit
3. **ASSESS** willingness to make a quit attempt
4. **ASSIST** if ready - offer therapy and consultation for quit plan and if not, then offer help when ready
5. **ARRANGE** follow up visits

Summary of Care: ABC's for Providers

A	A1c Target Aspirin Daily
B	Blood Pressure Control
C	Cholesterol Management Cigarette Smoking Cessation
D	**Diabetes and Pre-Diabetes Management**
E	Exercise
F	Food Choices

CHD Mortality Rates (by Degree of Glucose Tolerance)

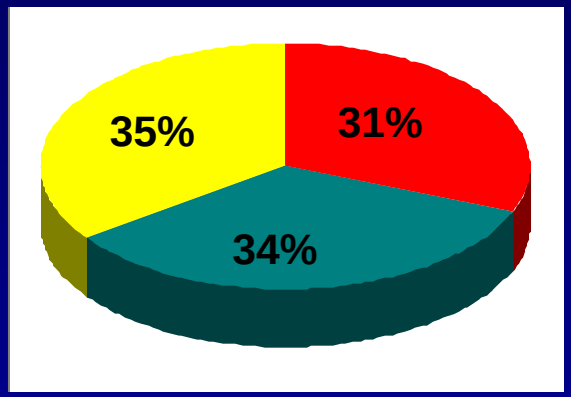


***Indicates patients known to have diabetes prior to the study.**
CHD=coronary heart disease; NGT=normal glucose tolerance; IGT=impaired glucose tolerance

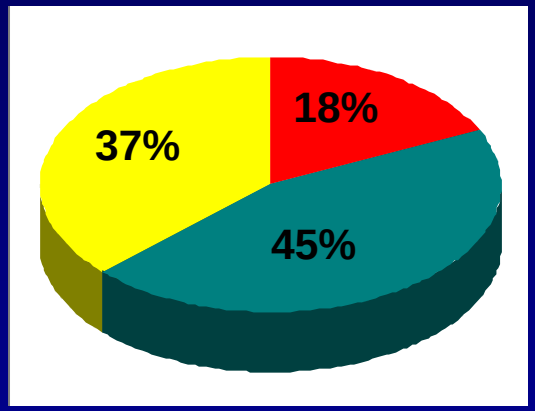
Adapted with permission from Eschwege E et al. *Horm Metab Res Suppl*. 1985;15:41-46.

Most Cardiovascular Patients Have Abnormal Glucose Metabolism

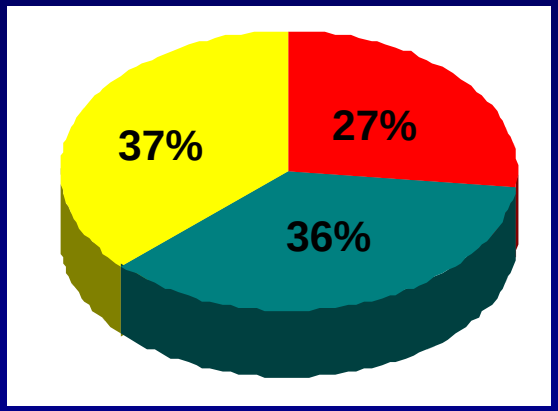
GAMI
n = 164



EHS
n = 1920



CHS
n = 2263



- Normoglycemia
- Prediabetes
- Type 2 Diabetes

GAMI = Glucose Tolerance in Patients with Acute Myocardial Infarction Study
EHS = Euro Heart Survey
CHS = China Heart Survey

Anselmino M, et al. *Rev Cardiovasc Med*. 2008;9:29-38.

Diagnostic Criteria for Metabolic Syndrome: Modified NCEP ATP III

≥3 Components Required for Diagnosis

Components	Defining Level
Increased waist circumference Men Women	 ≥ 40 in ≥ 35 in
Elevated triglycerides	≥150 mg/dL (or Medical Rx)
Reduced HDL-C Men Women	 <40 mg/dL <50 mg/dL (or Medical Rx)
Elevated blood pressure	≥130 / ≥85 mm Hg (or Medical Rx)
Elevated fasting glucose	≥100 mg/dL (or Medical Rx)

AHA/NHLBI Scientific Statement; Circulation 2005; 112:e285-e290.

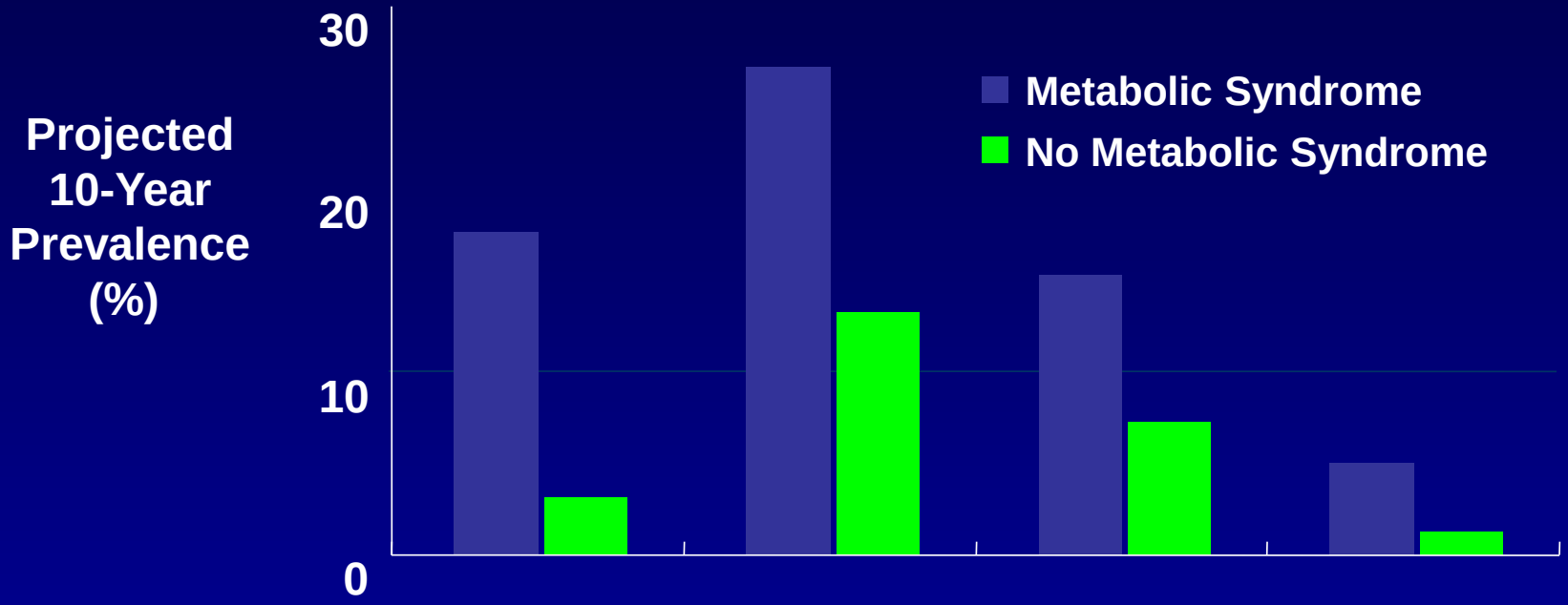
IDF Criteria: Abdominal Obesity and Waist Circumference Thresholds

	Men	Women
Europid	≥ 94 cm (37.0 in)	≥ 80 cm (31.5 in)
South Asian	≥ 90 cm (35.4 in)	≥ 80 cm (31.5 in)
Chinese	≥ 90 cm (35.4 in)	≥ 80 cm (31.5 in)
Japanese	≥ 85 cm (33.5 in)	≥ 90 cm (35.4 in)

- AHA/NHLBI criteria: ≥ 102 cm (40 in) in men, ≥ 88 cm (35 in) in women
- Some US adults of non-Asian origin with marginal increases should benefit from lifestyle changes. Lower cutpoints (≥ 90 cm in men and ≥ 80 cm in women) for Asian Americans

Alberti KGMM et al. *Lancet* 2005;366:1059-1062. | Grundy SM et al. *Circulation* 2005;112:2735-2752.

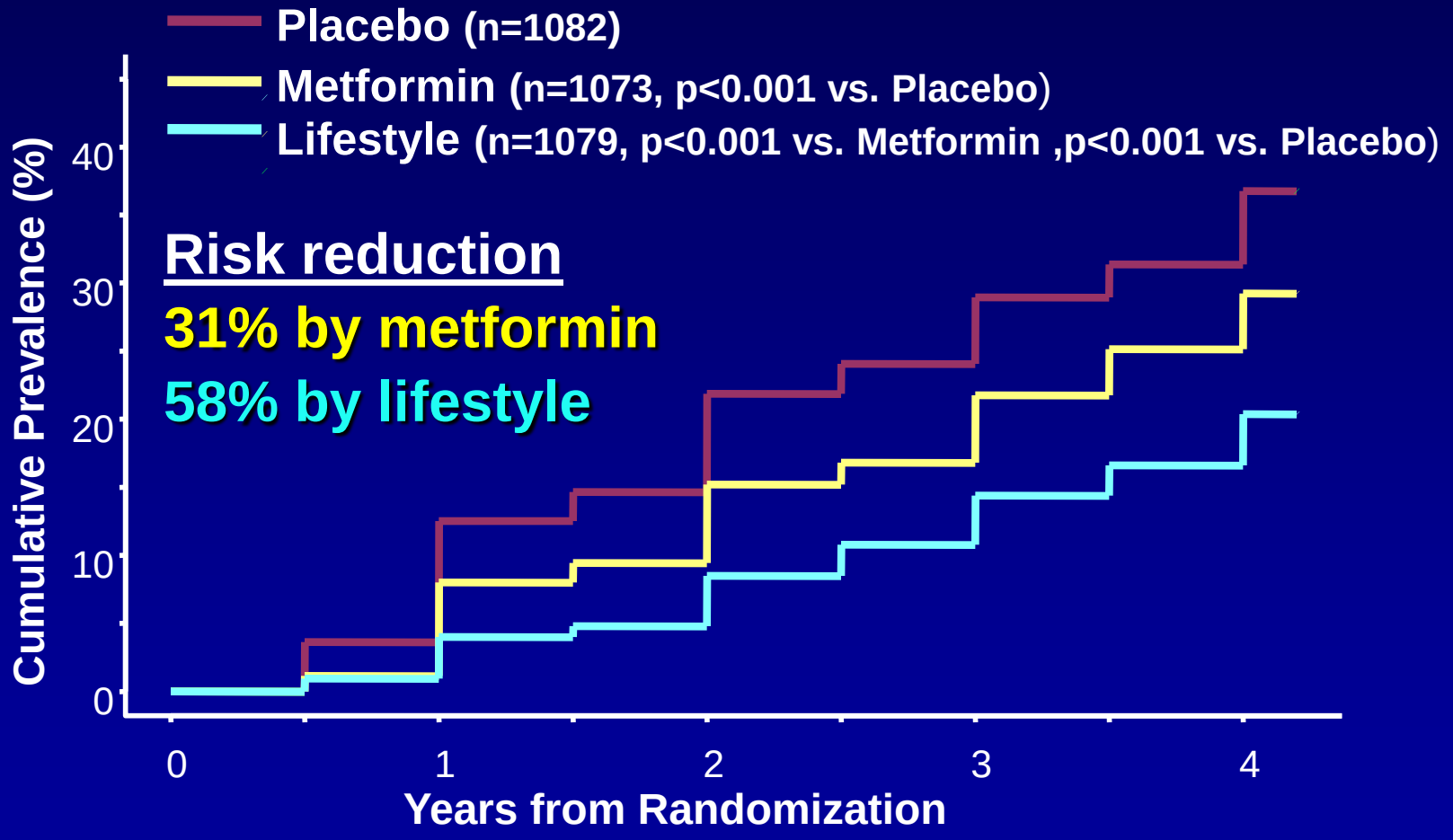
10-Year CVD Risk Estimates Associated with Metabolic Syndrome



	Botnia	TARFS	Kuopio	WHS
N=	4483	2398	1209 men	14,719 women
Mean Age	54	49	52	54
F/U	6.9 yrs	3 yrs	13.7	8 yrs
1º Endpoint	CV Death	CHD events	Mortality	MACE
DM Included	Y	Y	N	N

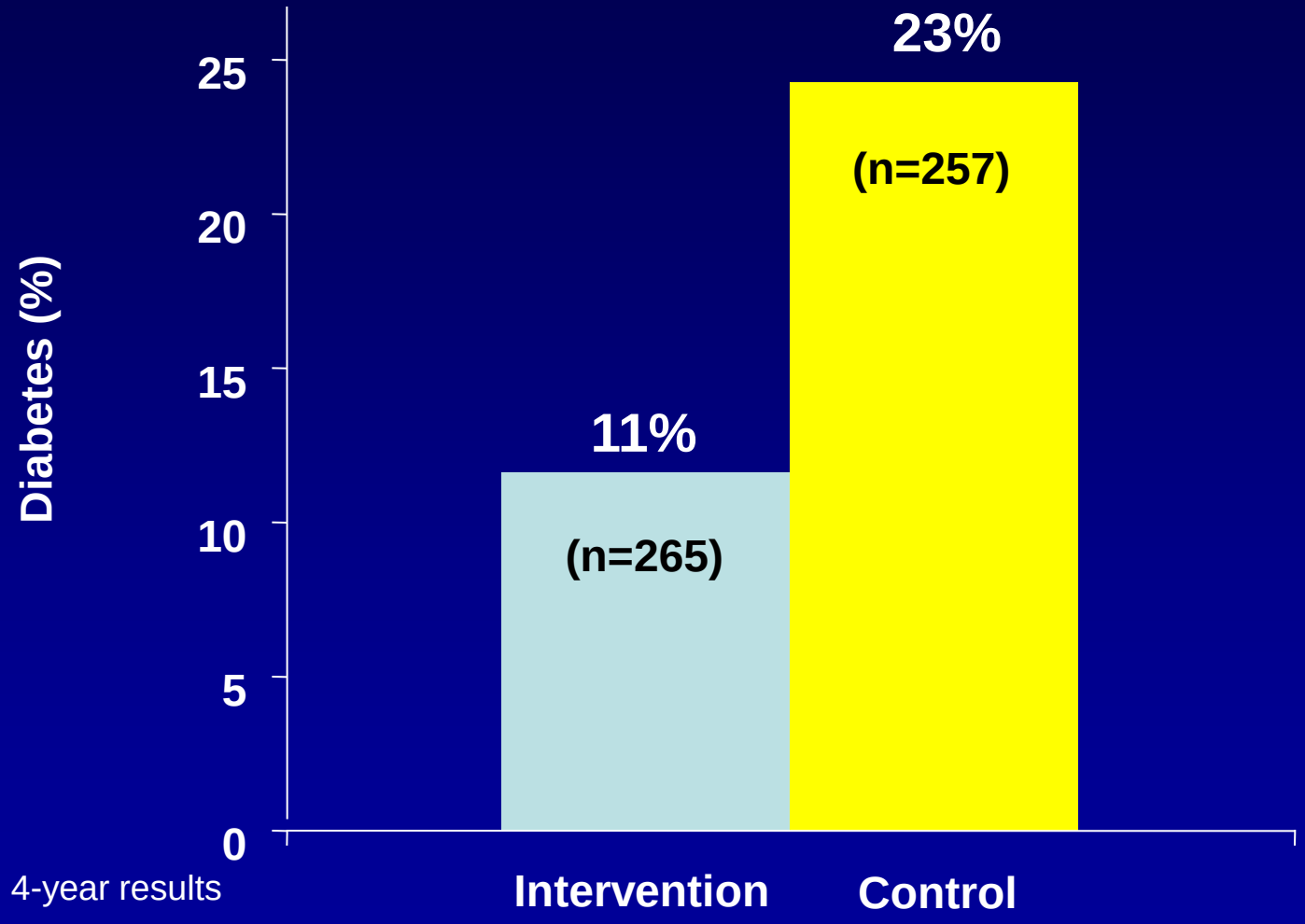
Isomaa B et al. Diabetes Care 2001; 24: 683; Onat A et al. Atherosclerosis 2002; 165: 285;
Lakka HM et al. JAMA 2002; 288: 2709; Ridker PM et al. Circ 2003; 107: 391.

Management Opportunity: Prevent Diabetes



NEJM 346:393-403, 2002

Finnish Diabetes Prevention Study: Reduction in Risk for Diabetes*

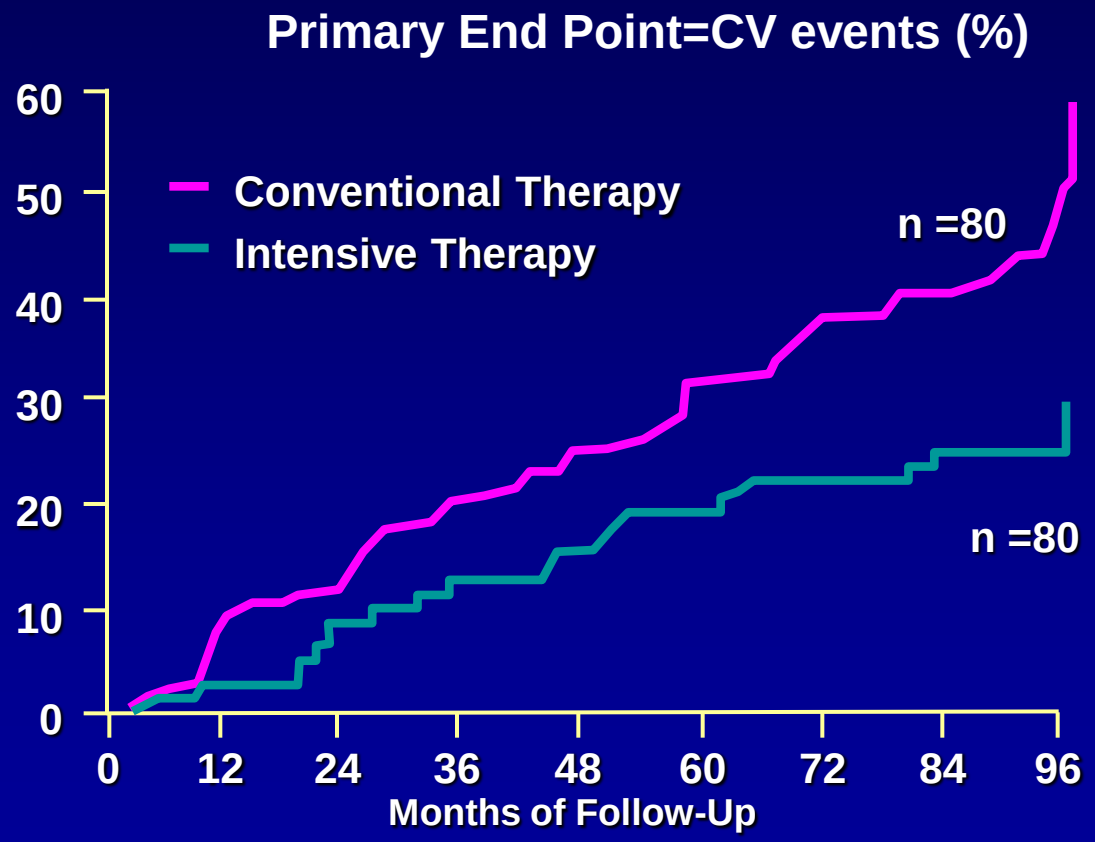


*P<0.001; 4-year results

Tuomilehto J et al. *N Engl J Med*. 2001;344:1343-1350.

Benefit of Comprehensive, Intensive Management: STENO 2 Study

- Treatment Goals:
  - Intensive TLC
  - HgbA1c <6.5%
  - Cholesterol <175
  - Triglycerides <150
  - BP <130/80



Gaede, P. et al, NEJM 2003;348:390-393

Summary of Care: ABC's for Providers

A	A1c Target Aspirin Daily
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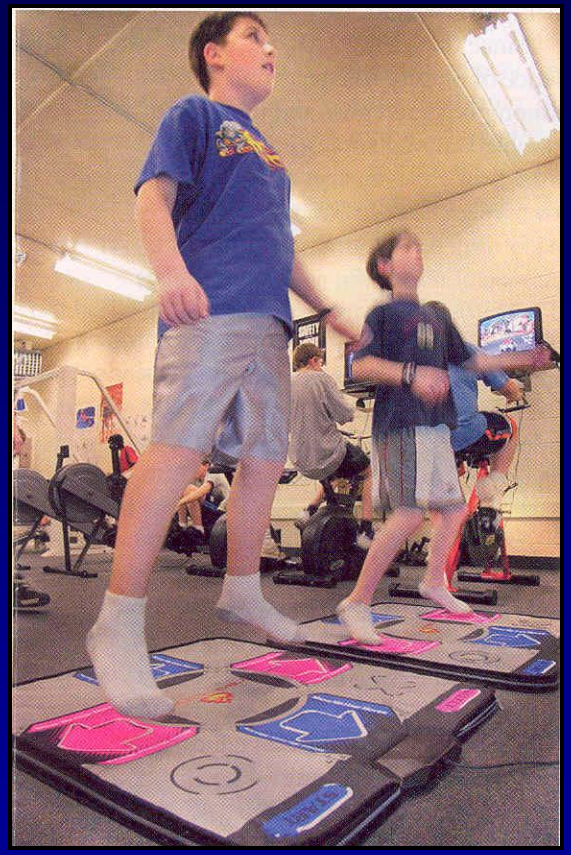
D	Diabetes and Pre-Diabetes Management
E	**Exercise**
F	Food Choices

Physical Inactivity: A Call to Arms

10,000 Steps Daily



30 minutes most days

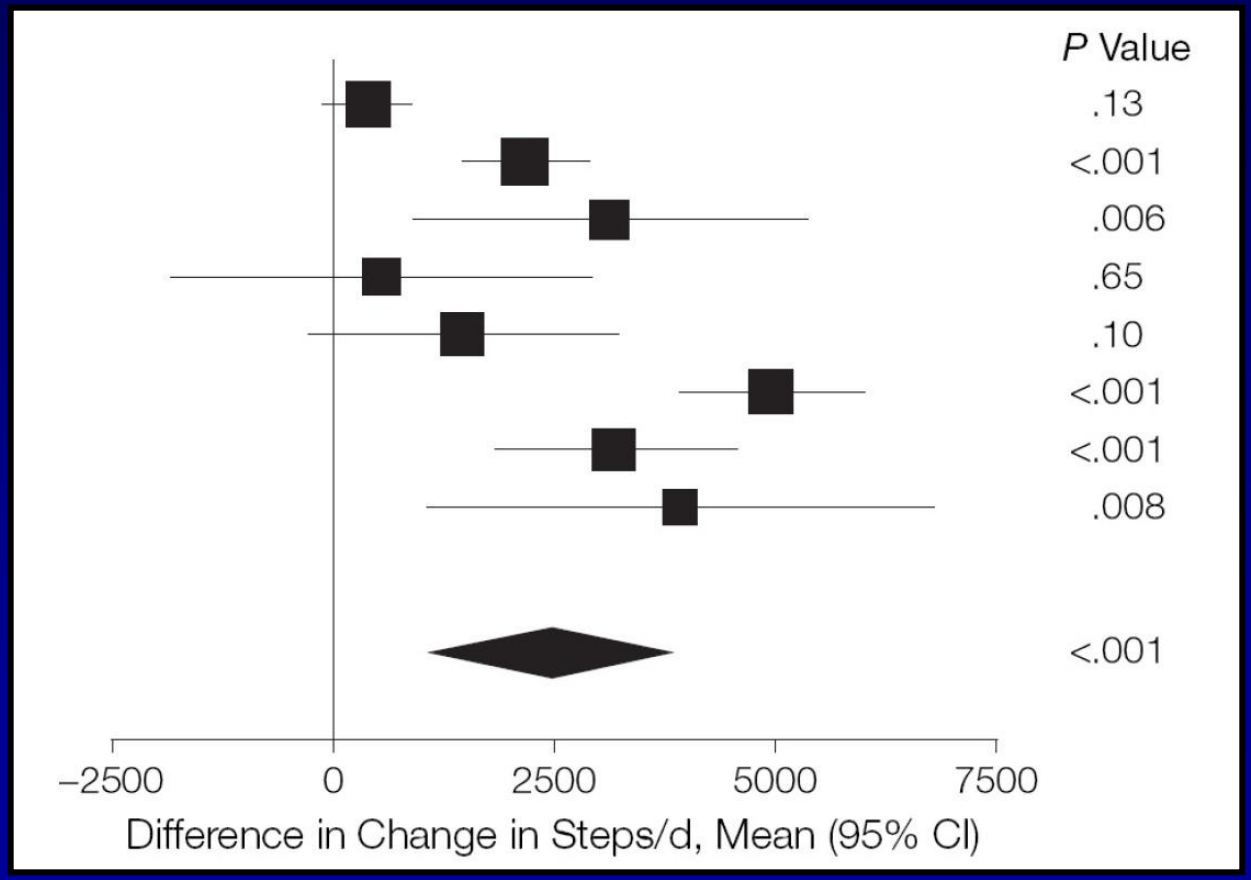
Take an Exercise History and Encourage Increased Physical Activity

- Brisk walking is an ideal physical activity for those without orthopedic issues
- Walking uses the patient's increased body weight to increase energy expenditure
- Pedometers provide daily feedback - 10,000 Steps Per Day

RCT Trial Assessment of Pedometer Interventions

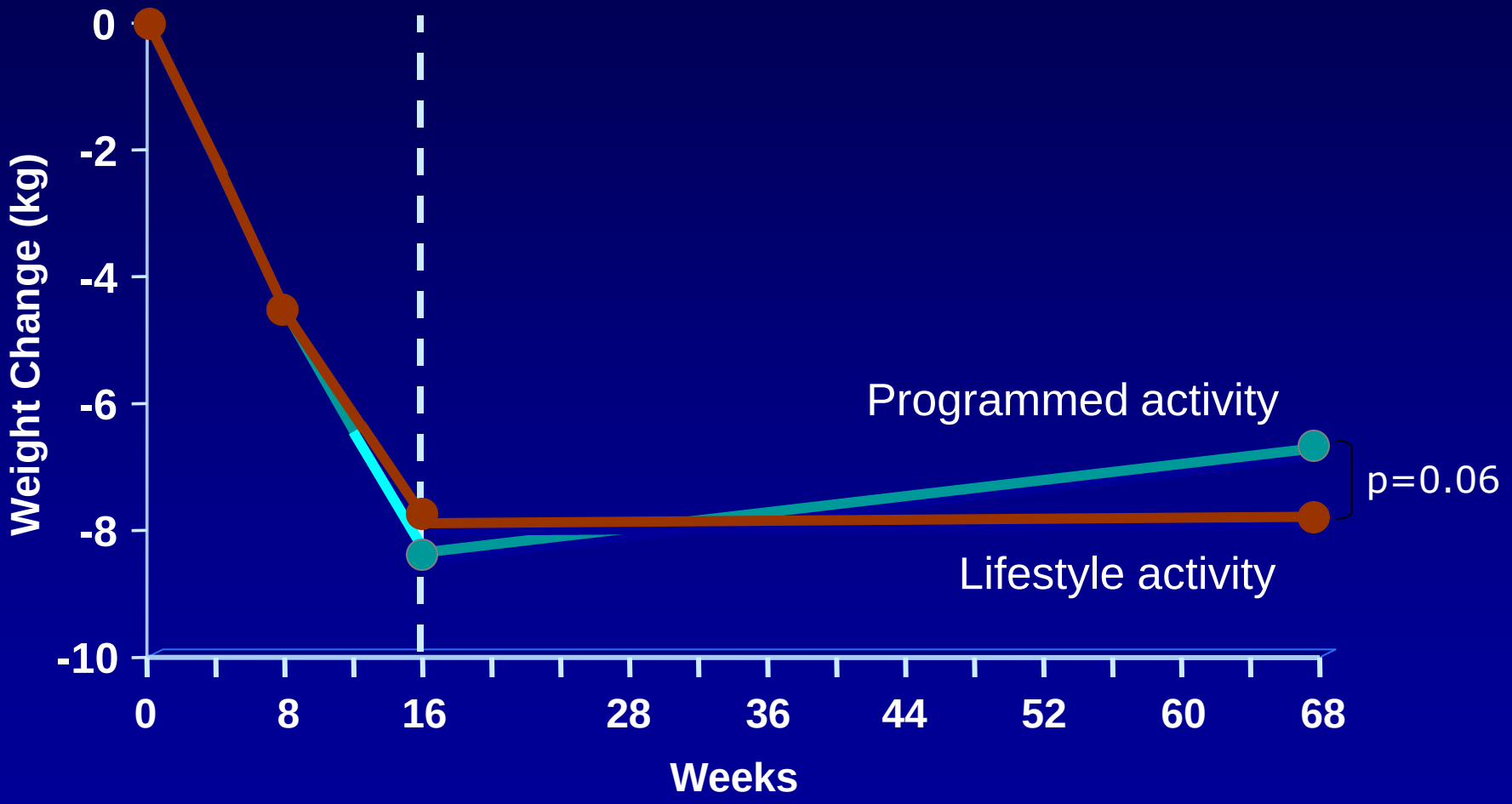
N=277; 8 Trials

Pedometer increased steps by 2500/day



Bravata, DM et al. JAMA 2007; 298:2296-2304

Lifestyle Activity as an Alternative to "Working Out"



Andersen RE et al. *JAMA* 1999;281:335-340.

National Weight Control Registry

- Successful Losers: >10% Body weight for 1 year
- 3000 Registrants, 80% Women
- Average Loss = 30 kg; Time = 5.5 yrs
- How? ~Low Fat Diet
  ~Self-monitoring
  ~Physical Activity
- 81% Reported More Physical Activity

Wing & Hill Annu Rev Nutr 2001:21:323-41

Physical Activity Recommendations

Mode of exercise	Frequency	Intensity	Duration	Class and level
Cardio-respiratory (large muscle)	3-7 d/week	Moderate intensity OR	150 min/week	1 (A)
Cardio-respiratory (large muscle)	3 d/week	Vigorous Intensity	90 min/week	1 (A)
Resistance	3 d/week	2-4 sets of 8-10 reps		1 (A)

Marwick TH . Circulation 2009;119:3244-62

Summary of Care: ABC's for Providers

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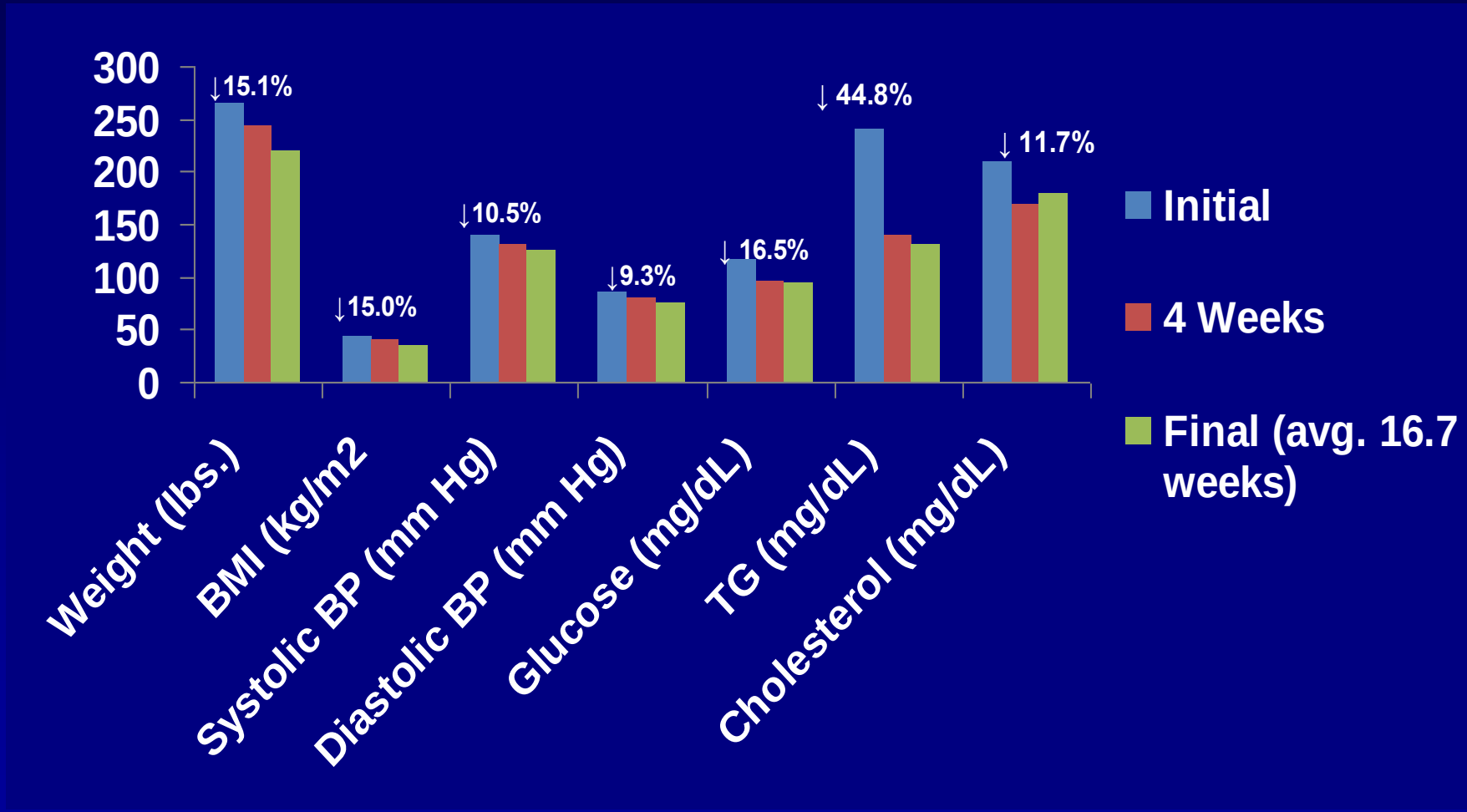
Effect of Moderate Weight Loss On Cardiometabolic Risk Factors



Percent changes are initial visit to final visit.

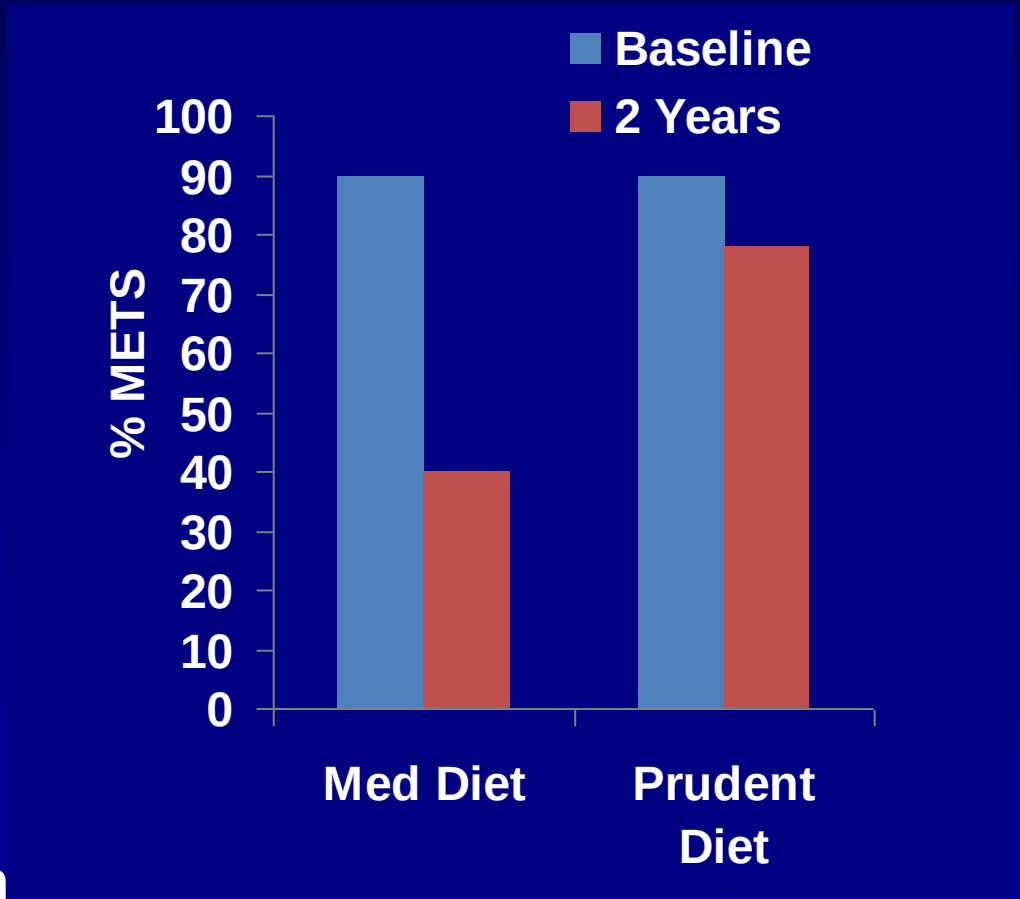
Case CC, et al. *Diabetes Obes Metab*. 2002;4:407-414.

ADA Nutritional Guidelines

- Patients with pre-diabetes should receive individualized Medical Nutrition Therapy (MNT)
- Weight loss recommended for all overweight or obese individuals who have or are at risk for diabetes
- Physical activity and behavior modification effective for weight loss and maintenance
- Fiber 14 g/1000 kcal intake
- Saturated fat 7% with minimal trans fat

Effect of Mediterranean-Style Diet in the Metabolic Syndrome

- 180 pts with metabolic syndrome randomized to Mediterranean-style vs. prudent diet for 2 years
- Those in intervention group lost more weight (-4kg) than those in the control group (+0.6kg) ($p<0.01$), and significant reductions in CRP and Il-6



Esposito K et al. JAMA 2004; 292(12): 1440-6.

Patient Education

- Educational Objectives
  - Ensure patients realize the link between metabolic syndrome and risk of heart disease
  - Reinforce the patient's role and control in disease management
    - Focus on significant impact even modest exercise and weight loss will have
  - Verify patients understand how to implement healthy changes to diet and physical activity level

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