

# Hypertension: *“You Can’t Stand The Truth!”*

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*Grants: Blue Cross Blue Shield of Michigan, NIH,  
sanofi-aventis, Pfizer, Mardigian Foundation,  
Varbedian Fund, GORE, Bristol-Myers Squibb*

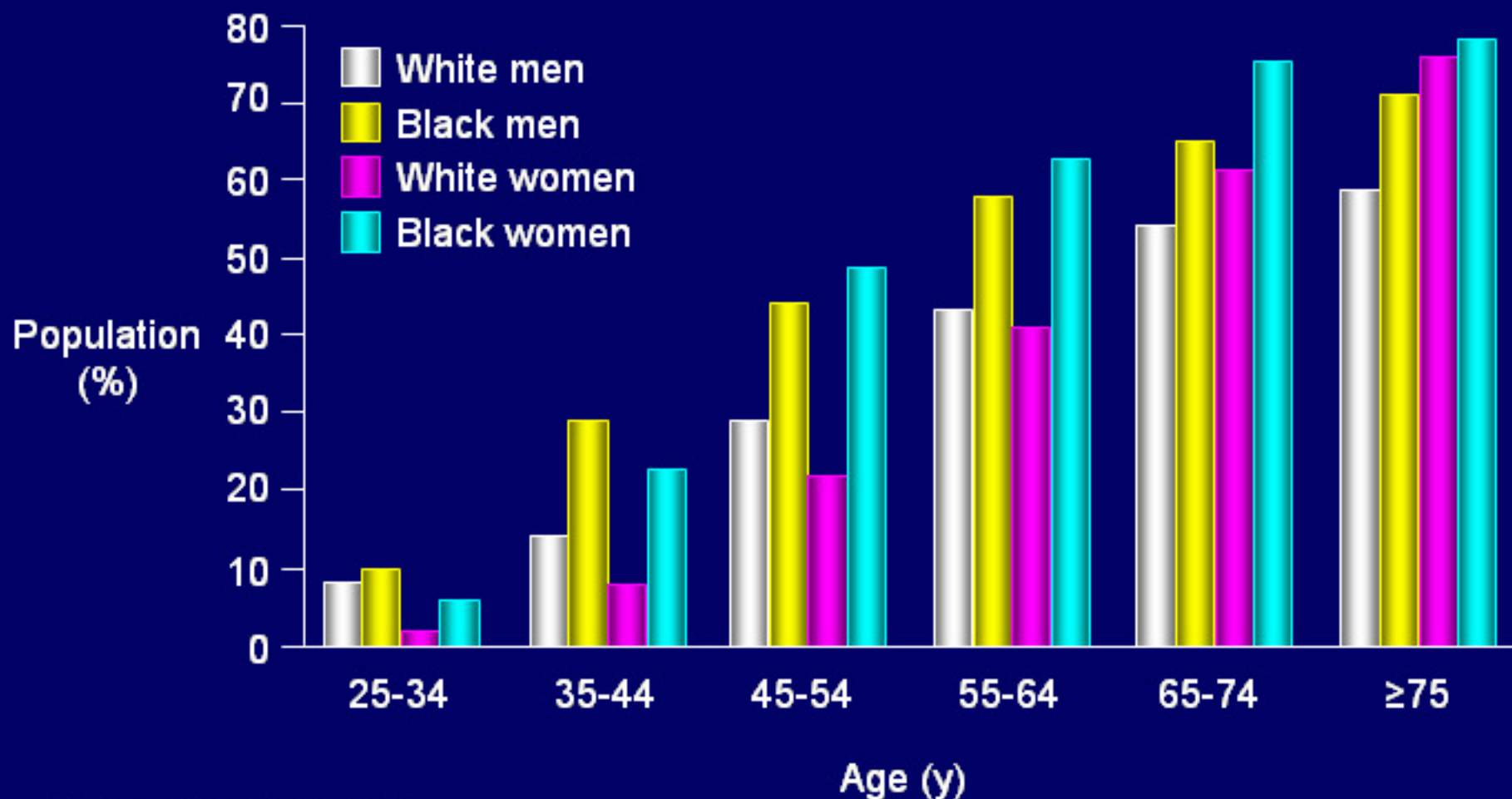
**Consultant: NIH NHLBI, sanofi-aventis,  
Pfizer, RWJ Foundation**

# What is the Truth?

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- HTN is under treated
- Some HTN is NOT controllable
- B-Blockers may be over-rated

# Prevalence of Hypertension by Age, Gender, and Race\*



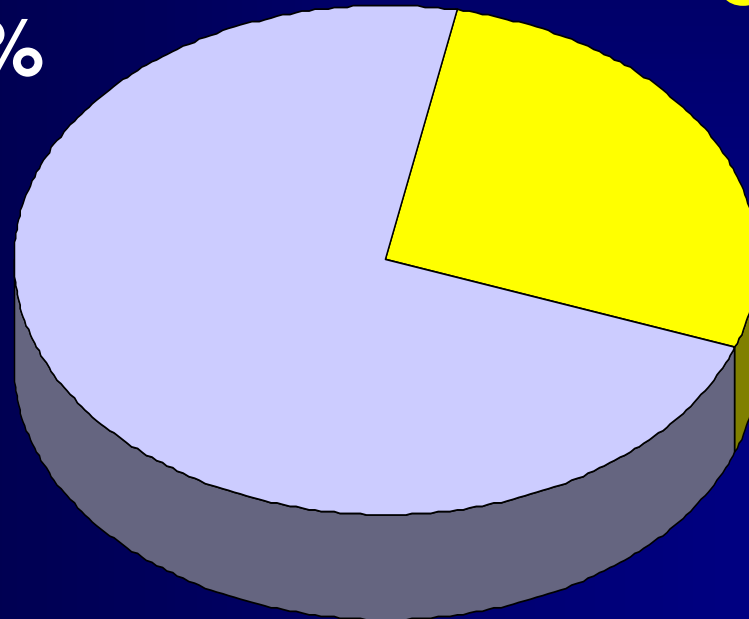
\*United State: 1988-1994.

Wolz M et al. *Amer J Hypertens*. 2000;13:103-104.

American Heart Association. *Heart Disease and Stroke Statistics - 2003 Update*.

# Approximately 50 Million Americans Have Hypertension (most inadequately controlled)

**Uncontrolled**  
66%

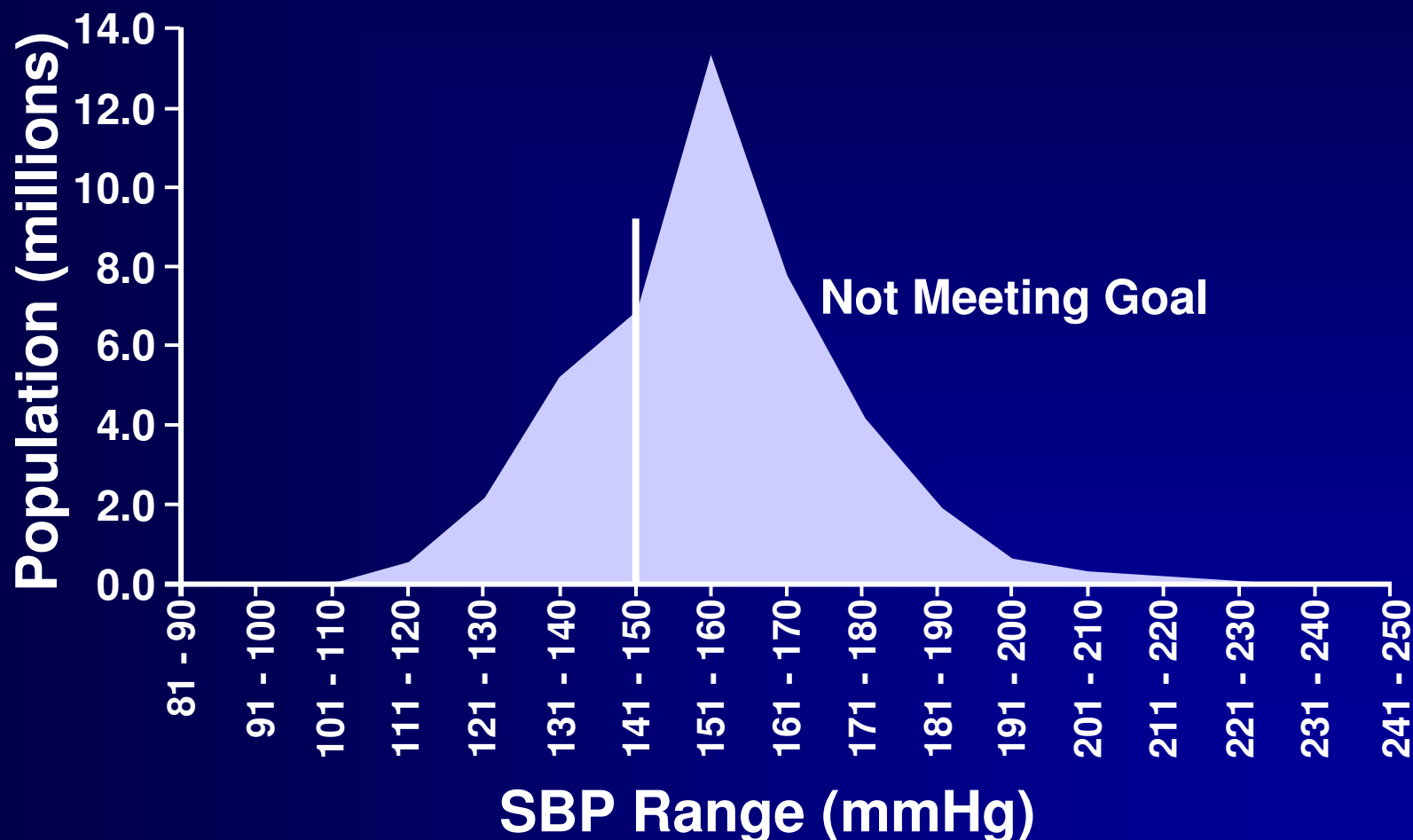


**Controlled**  
34.0%

Uncomplicated HTN	<140/90
Hypertension with diabetes mellitus	<130/85 <130/80*
Heart failure	<130/85
Hypertension with renal impairment (>1g/prot/24 hr)	<125/75

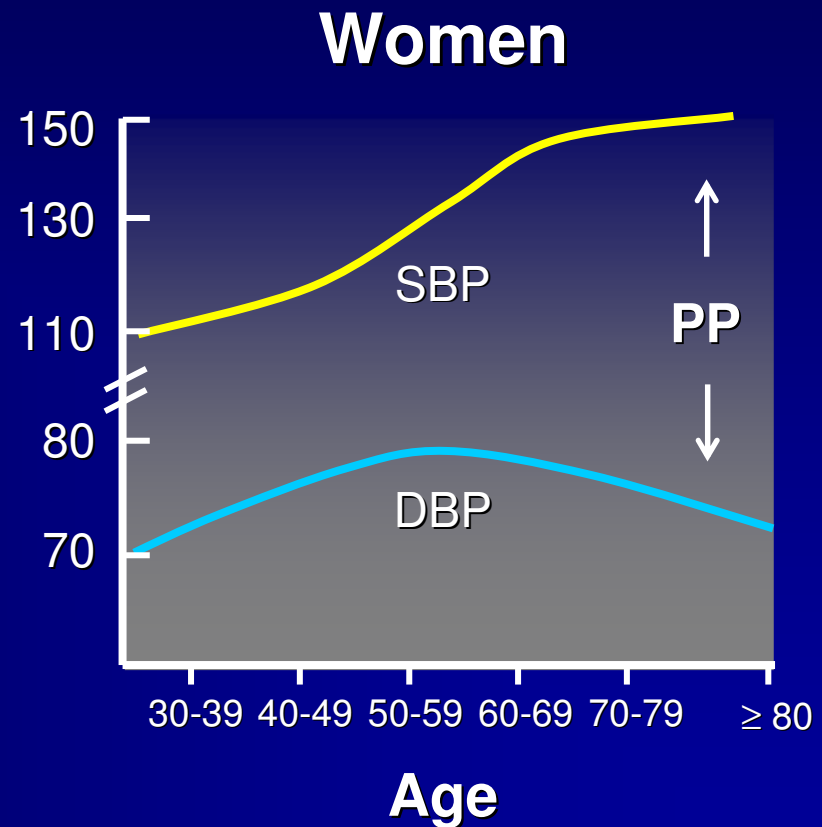
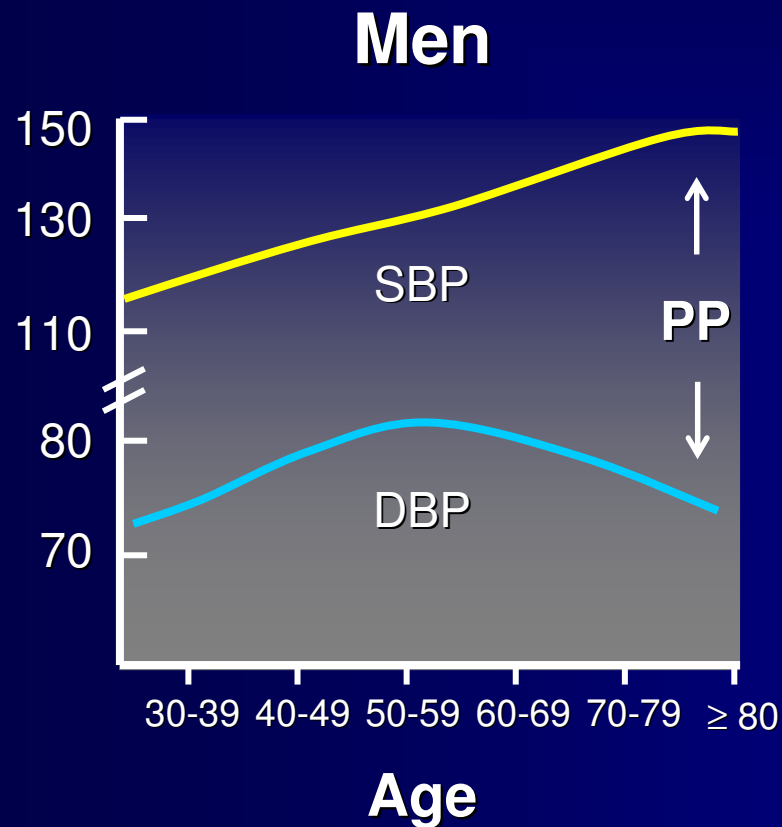
\*Control rate estimated at 9%

# Majority of HBP Patients Are Not at SBP Goal of < 140 mmHg



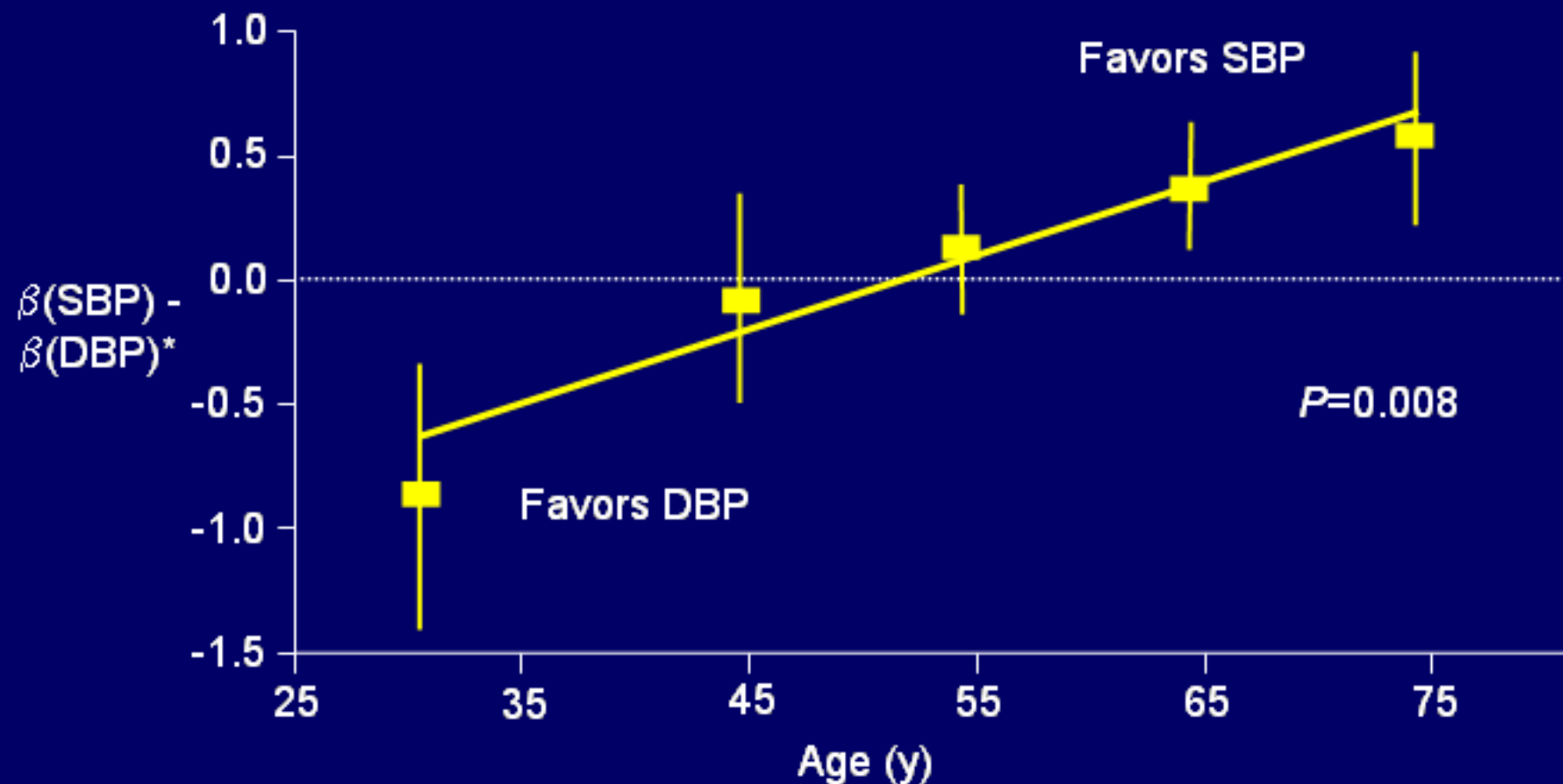
(Adapted from Lapuerta P, L'Italien GJ. *Am J Hypertens*. 1999)

# Blood Pressure Patterns in the General Population (NHANES III)



Adapted from: Burt, V., et al. *Hypertension* 1995;25:305-313.

# Relative Importance of DBP and SBP as Predictors of CHD as a Function of Age

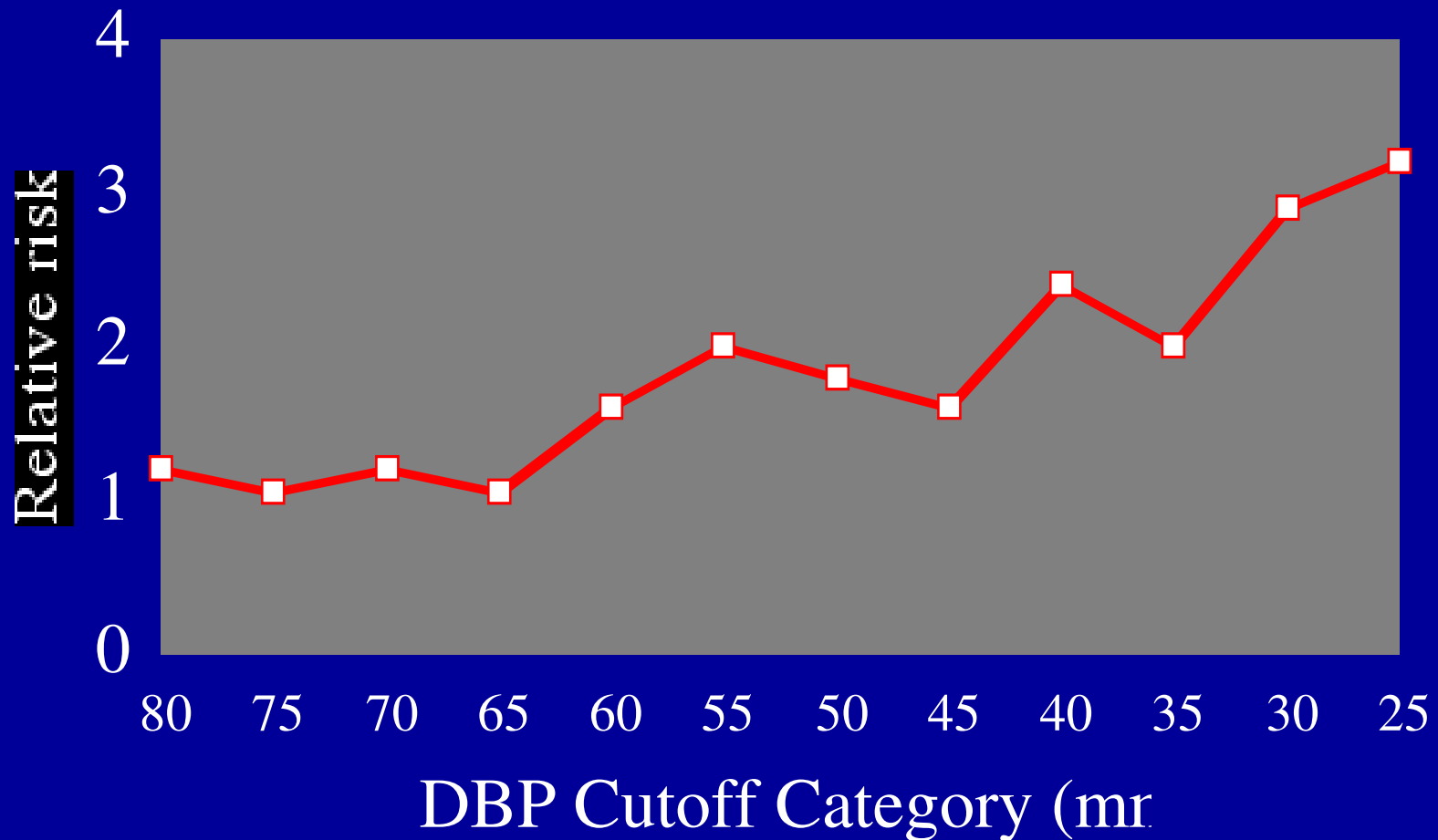


CHD, coronary heart disease.

\*The difference between SBP and DBP proportional hazard regression coefficients, ie,  $\beta(\text{SBP}) - \beta(\text{DBP})$ , was estimated for each age group.

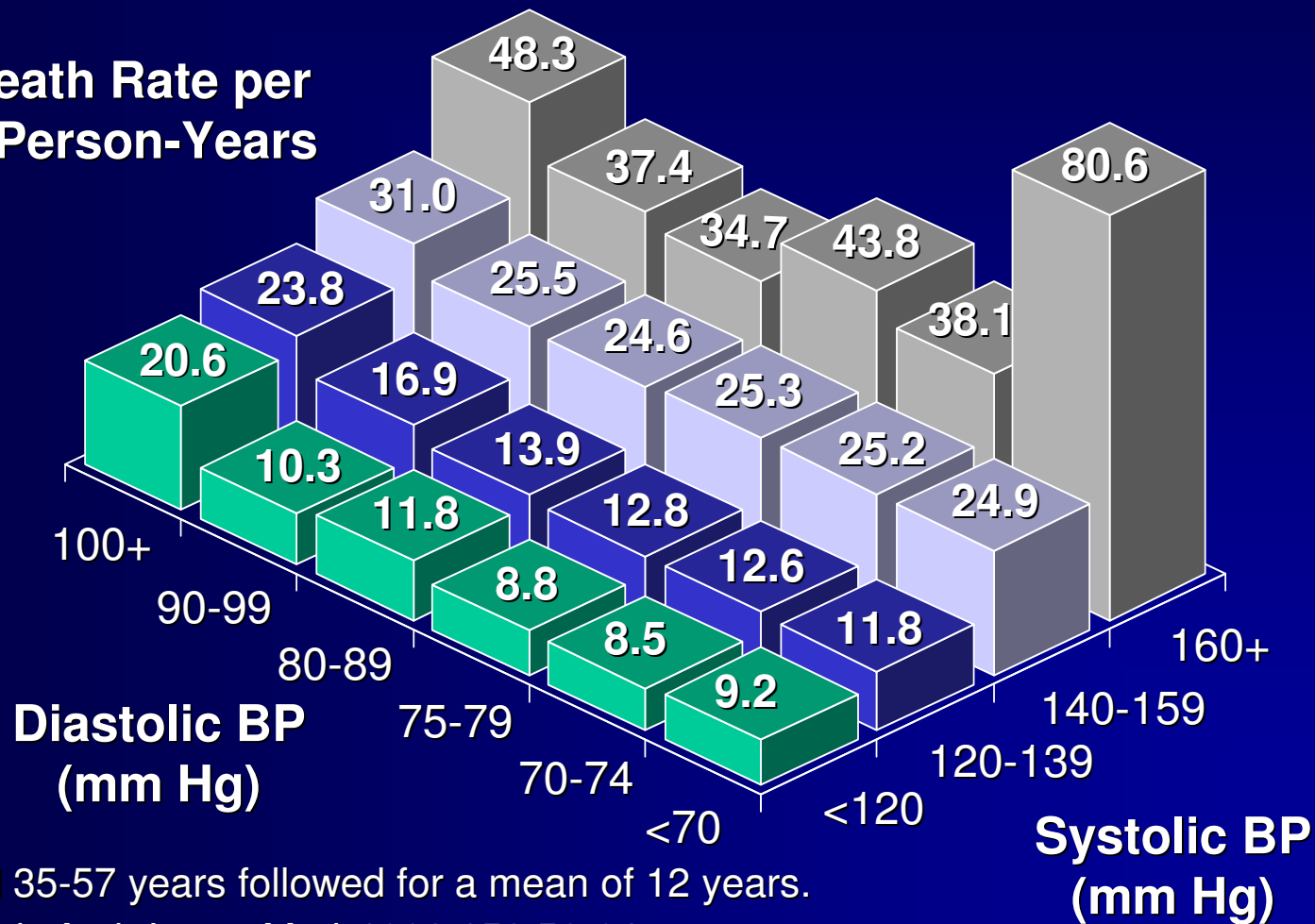
Franklin SS et al. *Circulation*. 2001;103:1245-1249.

# Low DBP Increases Risk of CVD in Treated ISH (SHEP)



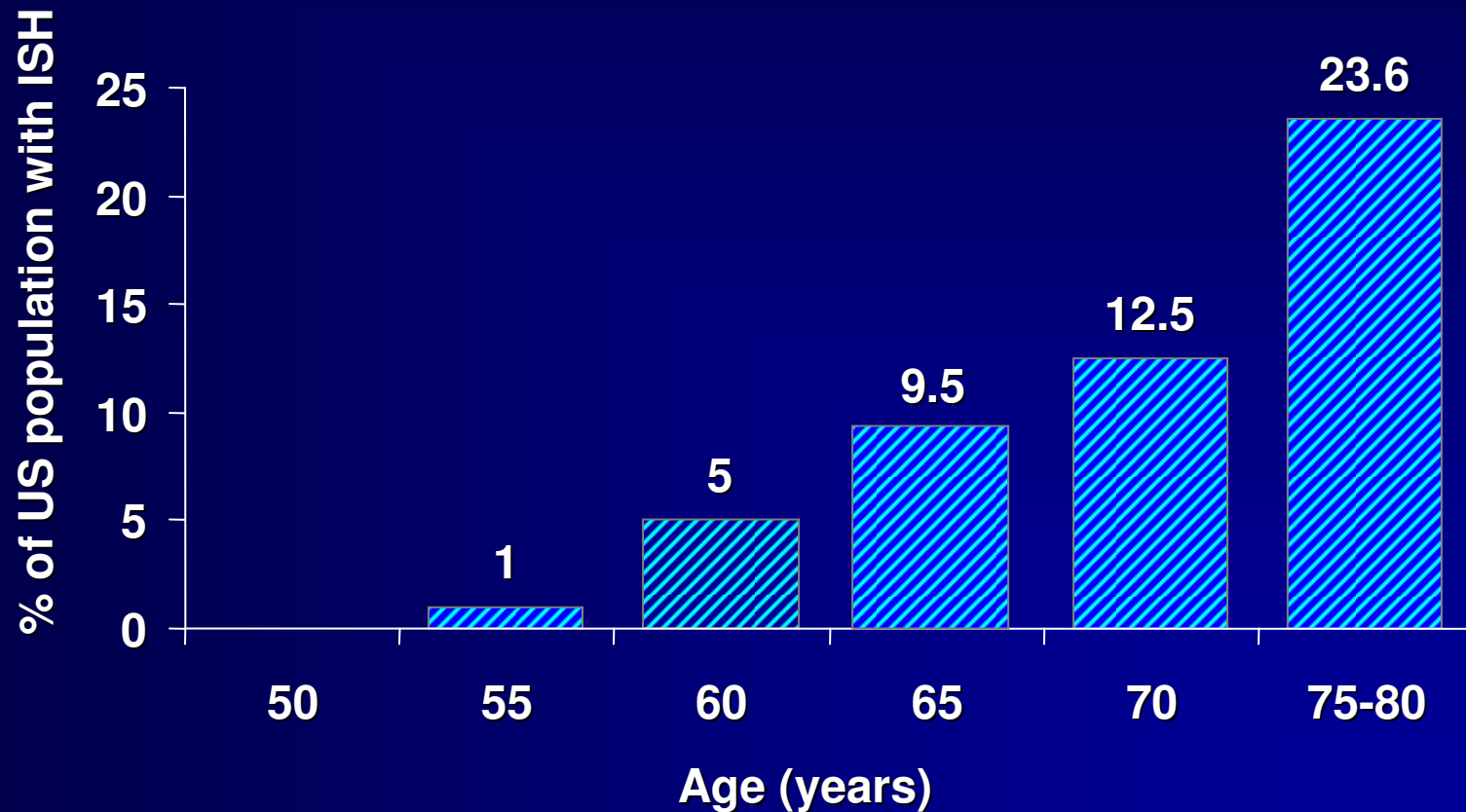
# Effect of Systolic BP and Diastolic BP on CHD Mortality: MRFIT Screenenees (N=316,099)\*

CHD Death Rate per 10,000 Person-Years



\*Men aged 35-57 years followed for a mean of 12 years.  
Neaton et al. *Arch Intern Med.* 1992;152:56-64.

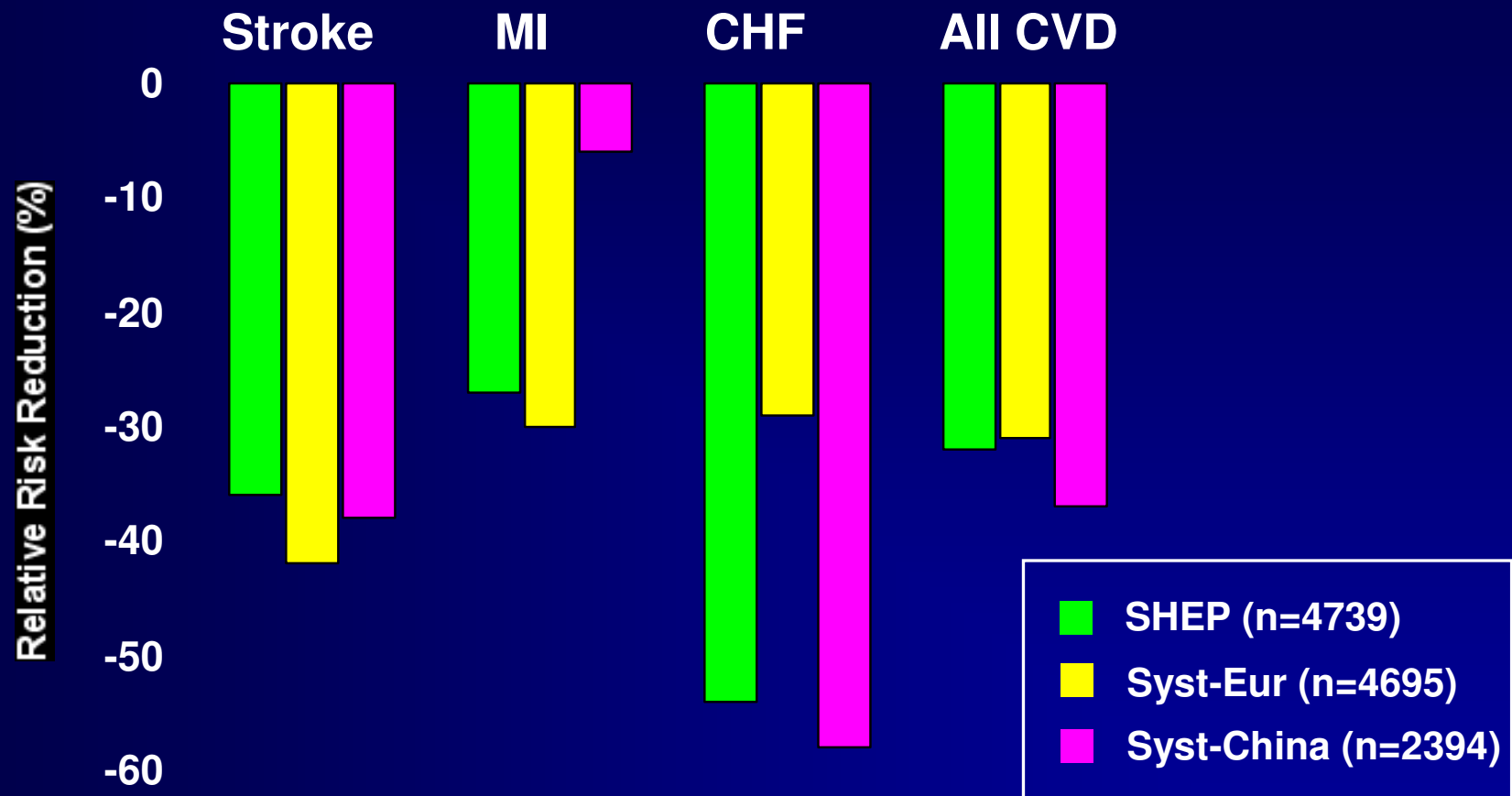
# Prevalence of ISH\*



\*SBP  $\geq$ 160 mm Hg and DBP  $<$ 90 mm Hg

Adapted with permission from Staessen J. *J Hypertens.* 1990;8:393

# Major Trials in ISH in Patients $\geq 60$ Years



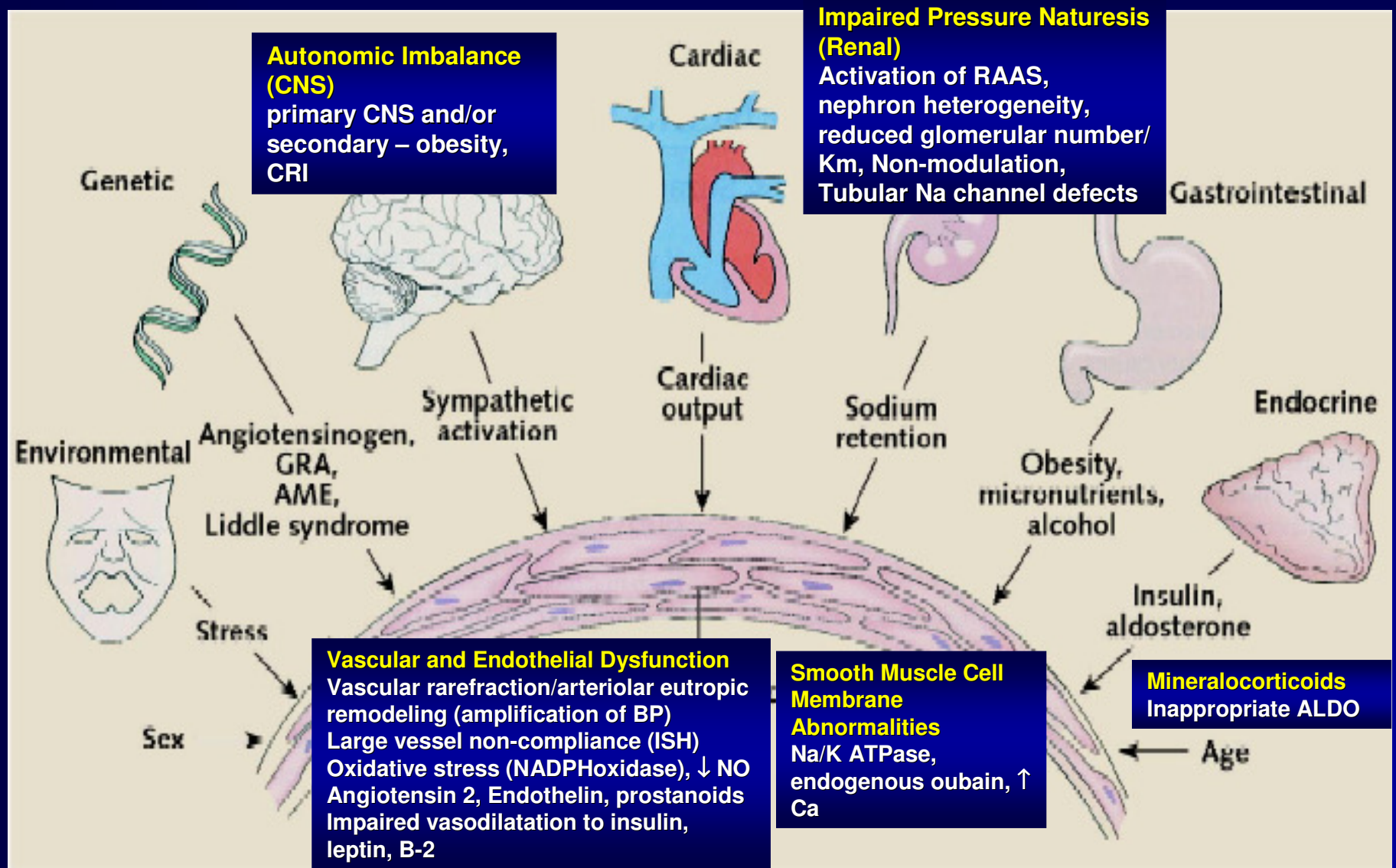
<sup>1</sup>SHEP Cooperative Research Group. *JAMA*. 1991;265:3255

<sup>2</sup>Staessen JA et al. *Lancet*. 1997;350:757

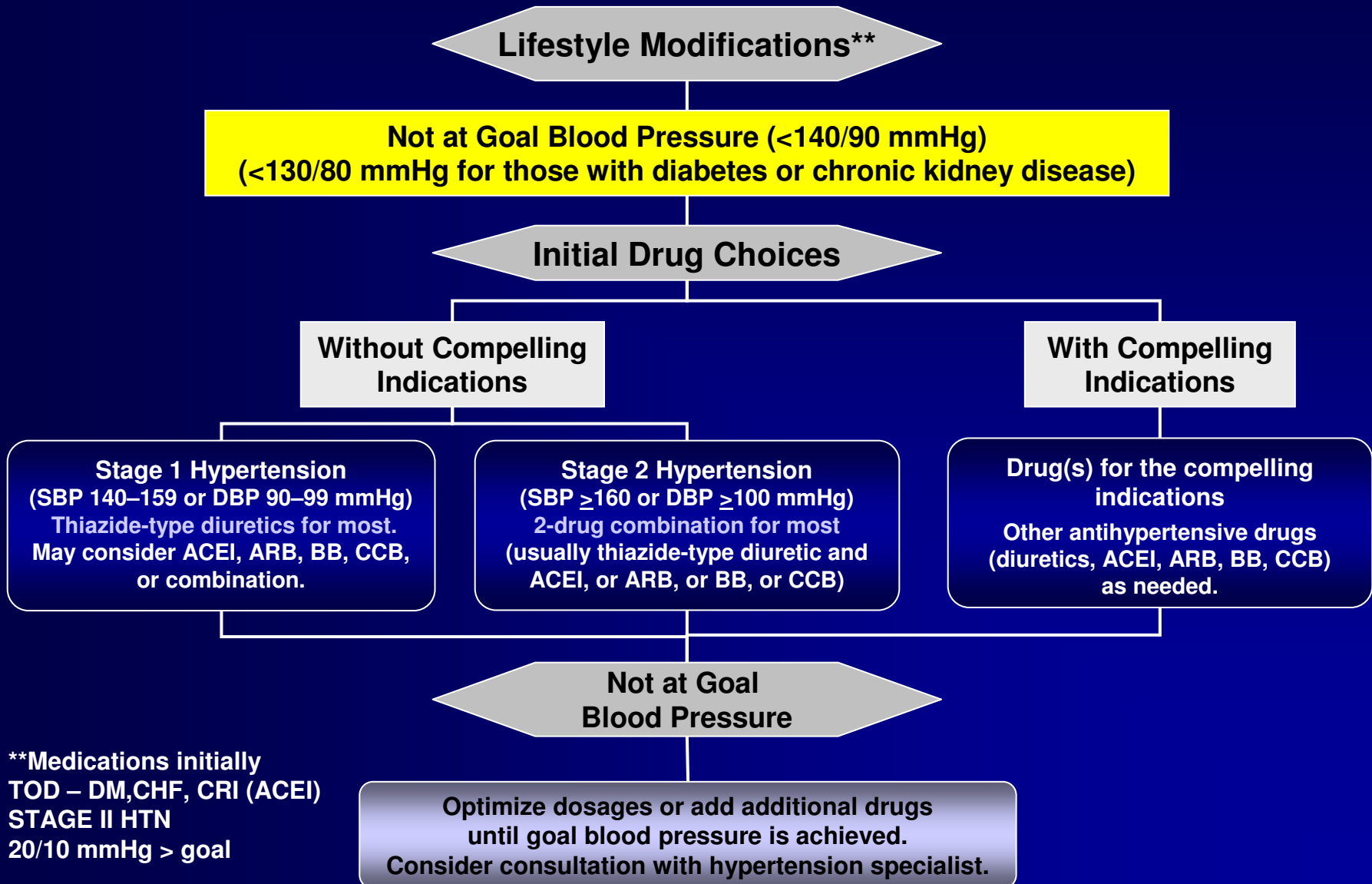
<sup>3</sup>Liu L et al. *J. Hypertens*. 1998;16:1823

# Primary Hypertension Etiology Mosaic

MAP (2/3 dbp + 1/3 sbp) = CO (SV x HR) x SVR (primarily vasoconstriction)



# Algorithm for Treatment of Hypertension JNC-7



\*\*Medications initially  
TOD – DM, CHF, CRI (ACEI)  
STAGE II HTN  
20/10 mmHg > goal

# Lifestyle Modification

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<b>Modification</b>	<b>Approximate SBP reduction (range)</b>
Weight reduction	5–20 mmHg/10 kg weight loss
Adopt DASH diet	8–14 mmHg
Dietary sodium	2–8 mmHg
Physical activity	4–9 mmHg
Moderation of alcohol consumption	2–4 mmHg

# Clinical Trials and Guideline Basis for Compelling Indications for Individual Drug Classes

Compelling Indication	Recommended Drugs					
	Diuretic	BB	ACEi	ARB	CCB	Aldo ANT
Heart Failure	●	●	●	●		●
Post-myocardial Infarction		●	●			●
High Coronary Disease Risk	●	●	●		●	
Diabetes	●	●	●	●	●	
Chronic Kidney Disease			●	●		
Recurrent Stroke Prevention	●		●			

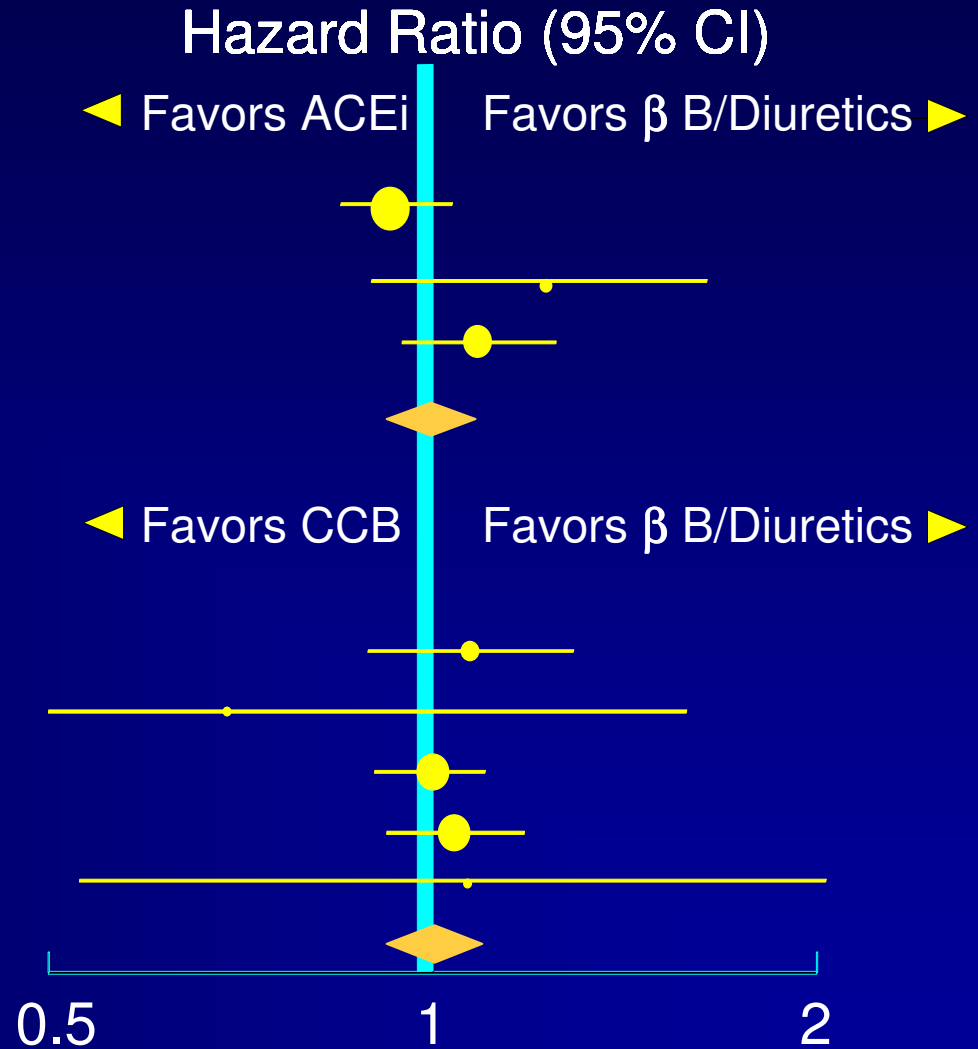
# ACE/CCB Trials vs Beta-Blockers/Diuretics

## ACEi vs $\beta$ B/Diuretics

	n	RR
STOP2	6614	0.94
UKPDS-HDS	758	1.21
CAPP	10985	1.08
<i>Overall</i>	<i>18357</i>	<i>1.00</i>

## CCB vs $\beta$ B/Diuretics

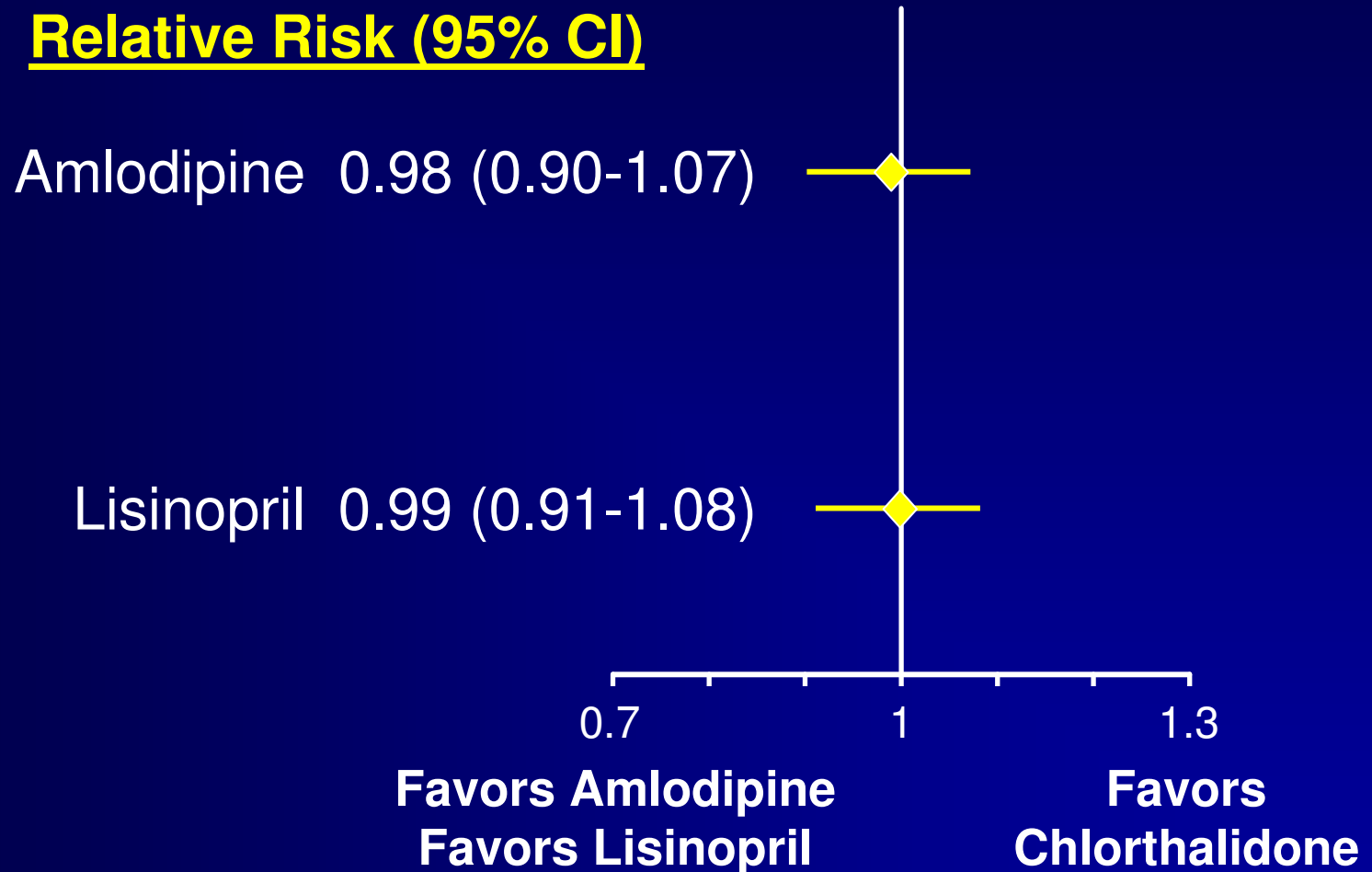
	n	RR
INSIGHT	6321	1.07
NICS-EH	429	0.69
STOP-2	6614	1.00
NORDIL	10881	1.04
VHAS	1414	1.07
<i>Overall</i>	<i>25659</i>	<i>1.02</i>



Major cardiovascular events included stroke, myocardial infarction, heart failure, or any cardiovascular death. Adapted from Blood Pressure Lowering Treatment Trialists' Collaboration. Lancet 2000;356:1956-64.

# ALLHAT Primary Endpoint: CHD Death and Nonfatal MI

## Relative Risk (95% CI)



# Ascot Trial: Non Fatal and Fatal Coronary Events

(12,759 Pts;  $\overline{\text{age}}$  63Yrs)

## Heart Rate Categories

<60 bpm

60 to <70 bpm

70 to <80 bpm

80 to <90 bpm

90+ bpm

**Overall**

## No. Events/Patients Atenolol Amlodipine

26/616 30/658

83/1643 59/1546

88/1739 78/1796

58/1035 62/1078

26/521 19/533

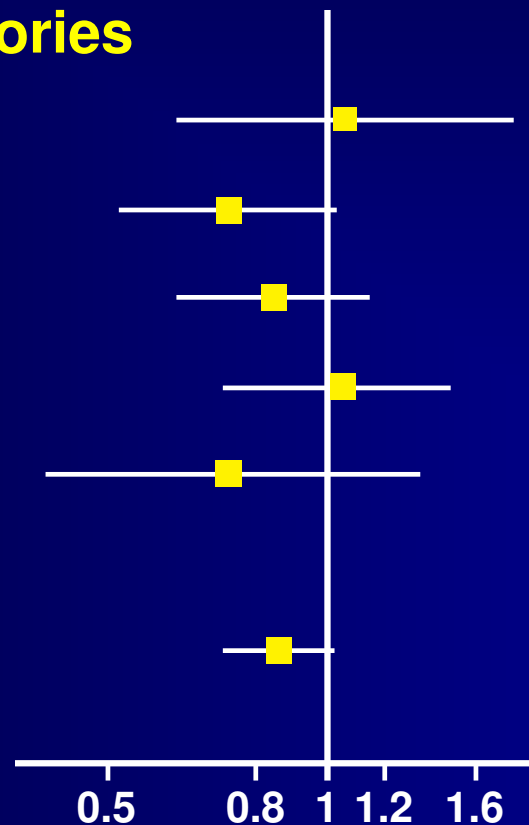
**281/5554 248/5611**

Interaction  
p value=0.91

**Amlodipine Better**    **Atenolol Better**

Hazard ratio and 95% CI (log scale)

Poulter et al. *JACC* 2009;54:1154-61.



# Ascot Trial: Total Strokes

## Heart Rate Categories

<60 bpm

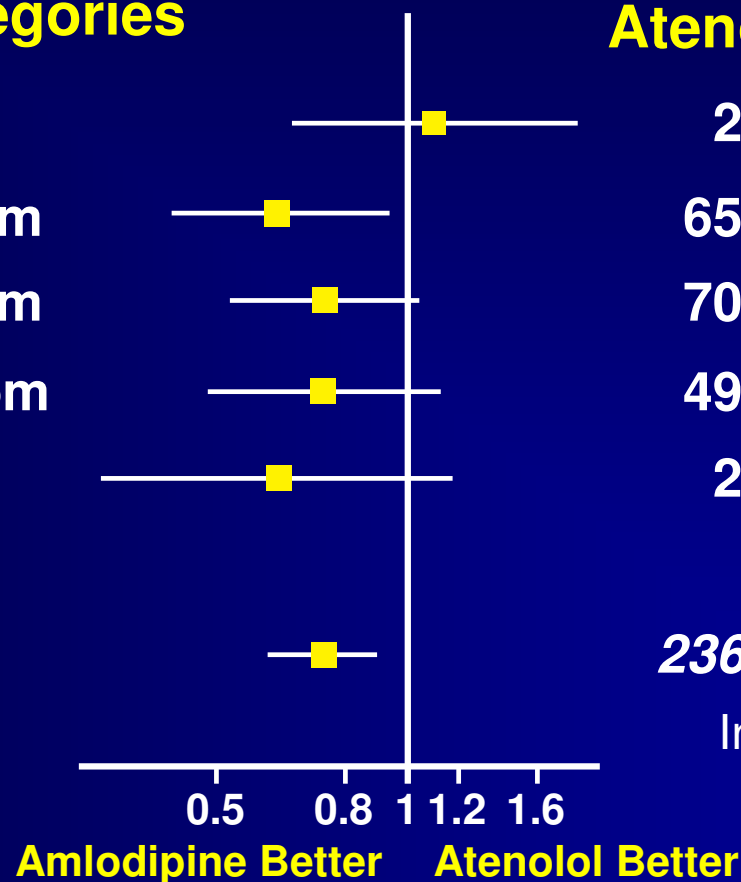
60 to <70 bpm

70 to <80 bpm

80 to <90 bpm

90+ bpm

**Overall**



## No. Events/Patients Atenolol Amlodipine

27/616 32/658

65/1643 40/1547

70/1739 59/1795

49/1034 37/1078

25/521 15/532

**236/5553 183/5610**

Interaction  
p value=0.51

**Amlodipine Better    Atenolol Better**

Hazard ratio and 95% CI (log scale)

# Risk Estimates for Stroke

*Standardized for Blood*

*Pressure Reduction*

*Clinical history of*

*participants on entry*

No of Trials

CHD Events

Stroke

No Vascular Disease

27

0.79 (0.72 to 0.86)

0.54 (0.45 to 0.65)

CHD

37

0.76 (0.68 to 0.86)

0.65 (0.53 to 0.80)

Stroke

13

0.79 (0.62 to 1.00)

0.66 (0.56 to 0.79)

All Trials

72

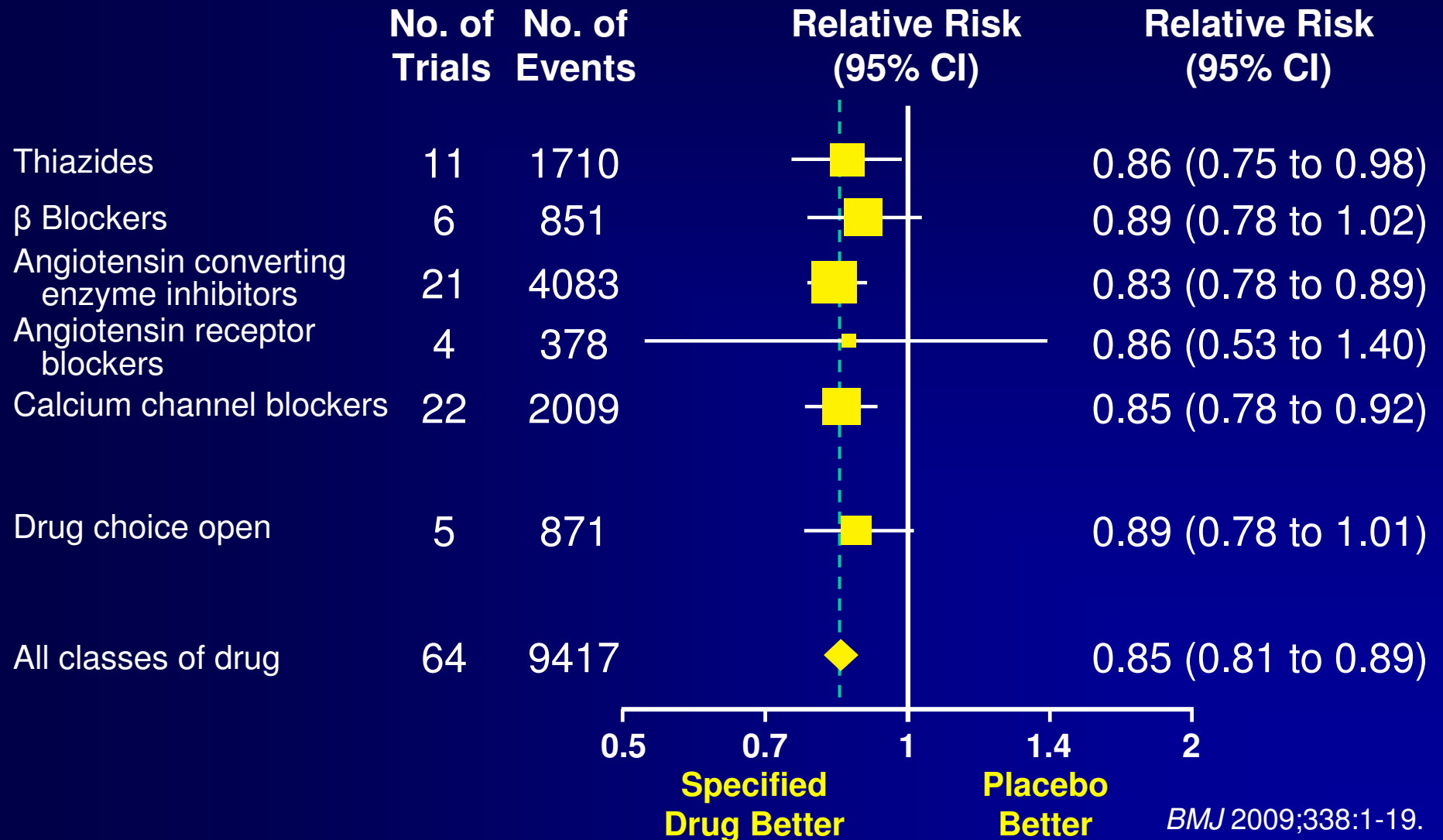
0.78 (0.73 to 0.83)

0.59 (0.52 to 0.67)

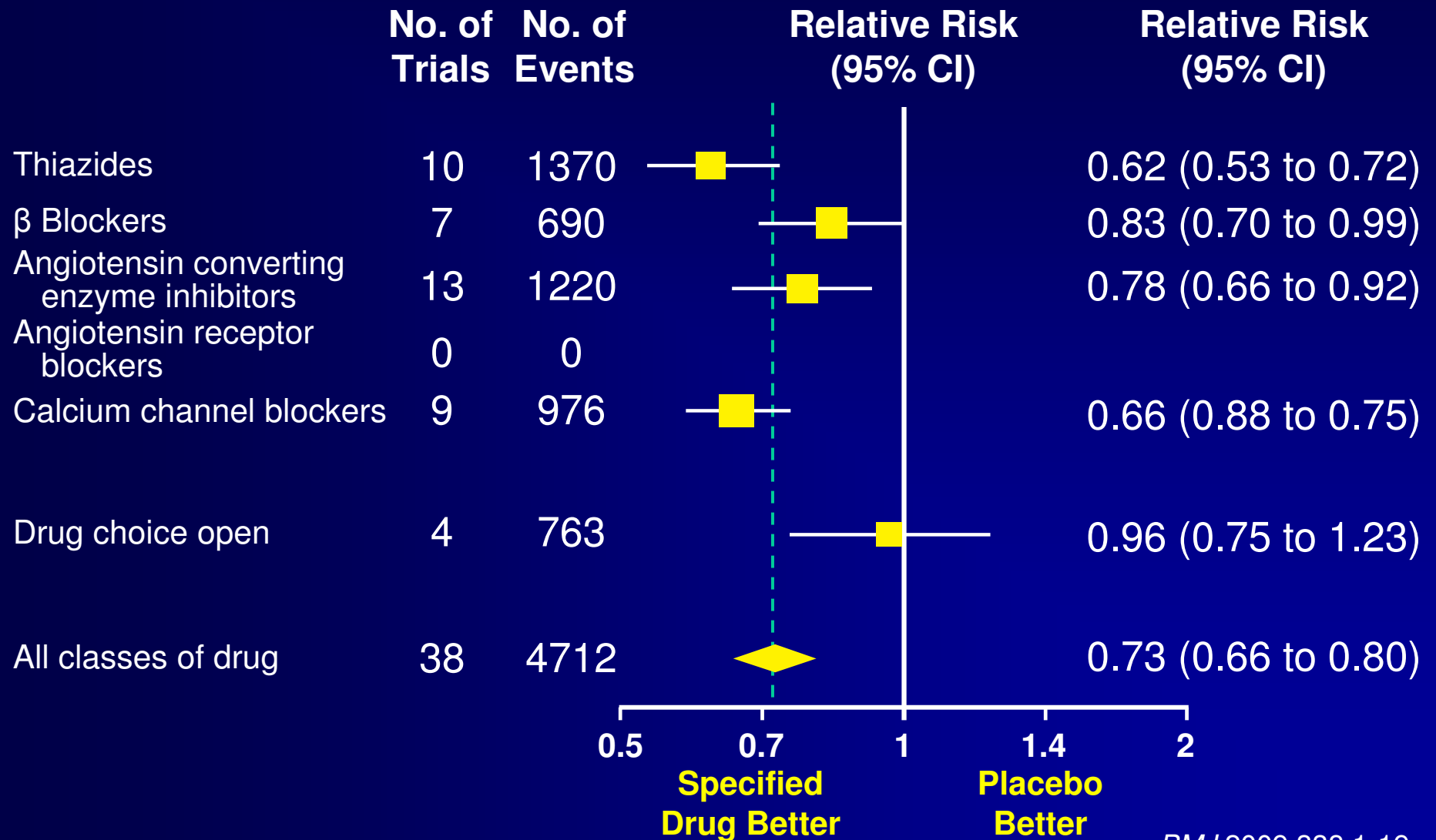
(95% Confidence Interval)

BMJ 2009;338:1-19.

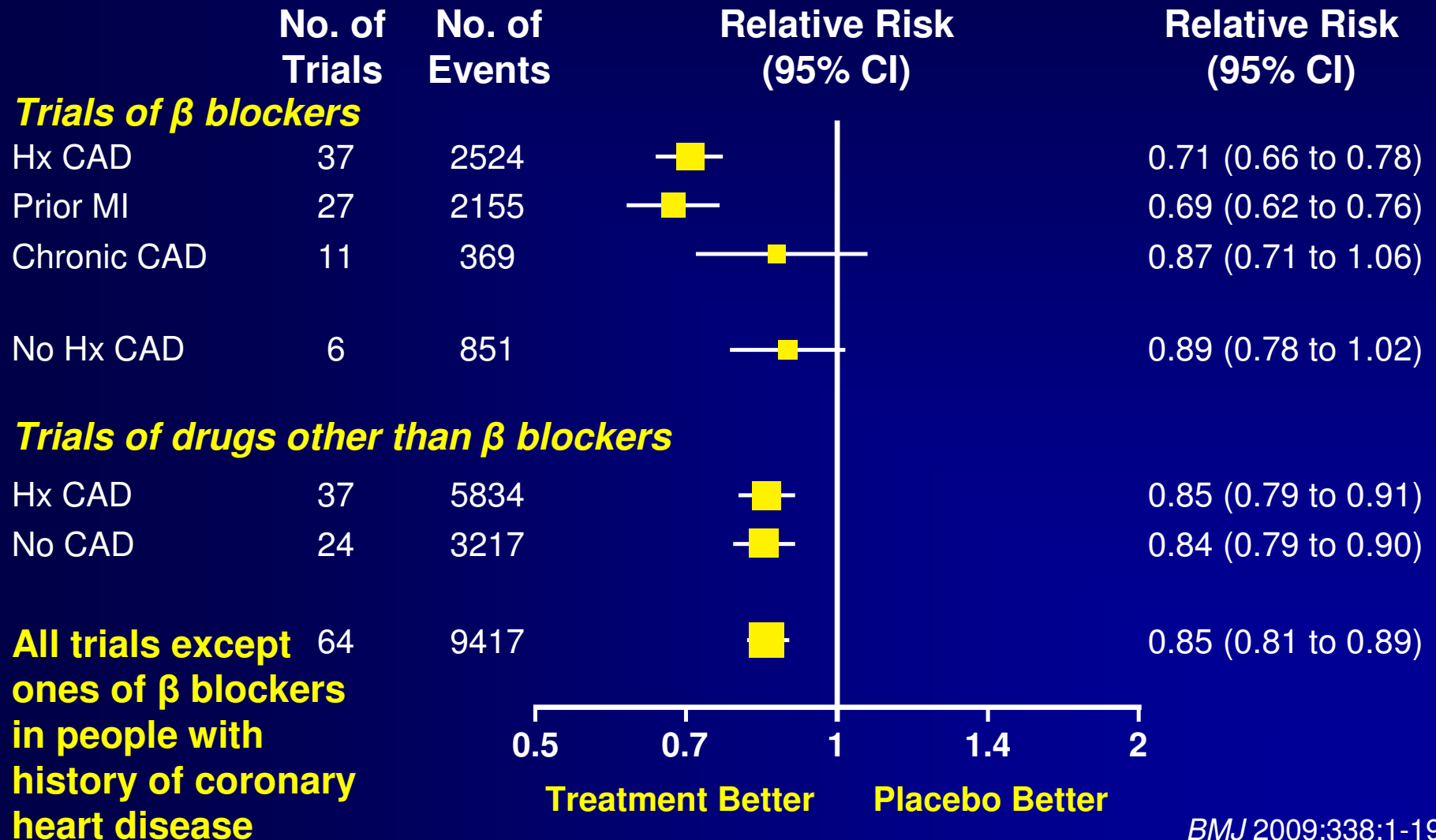
# Risk Estimates for Coronary Heart Disease Events



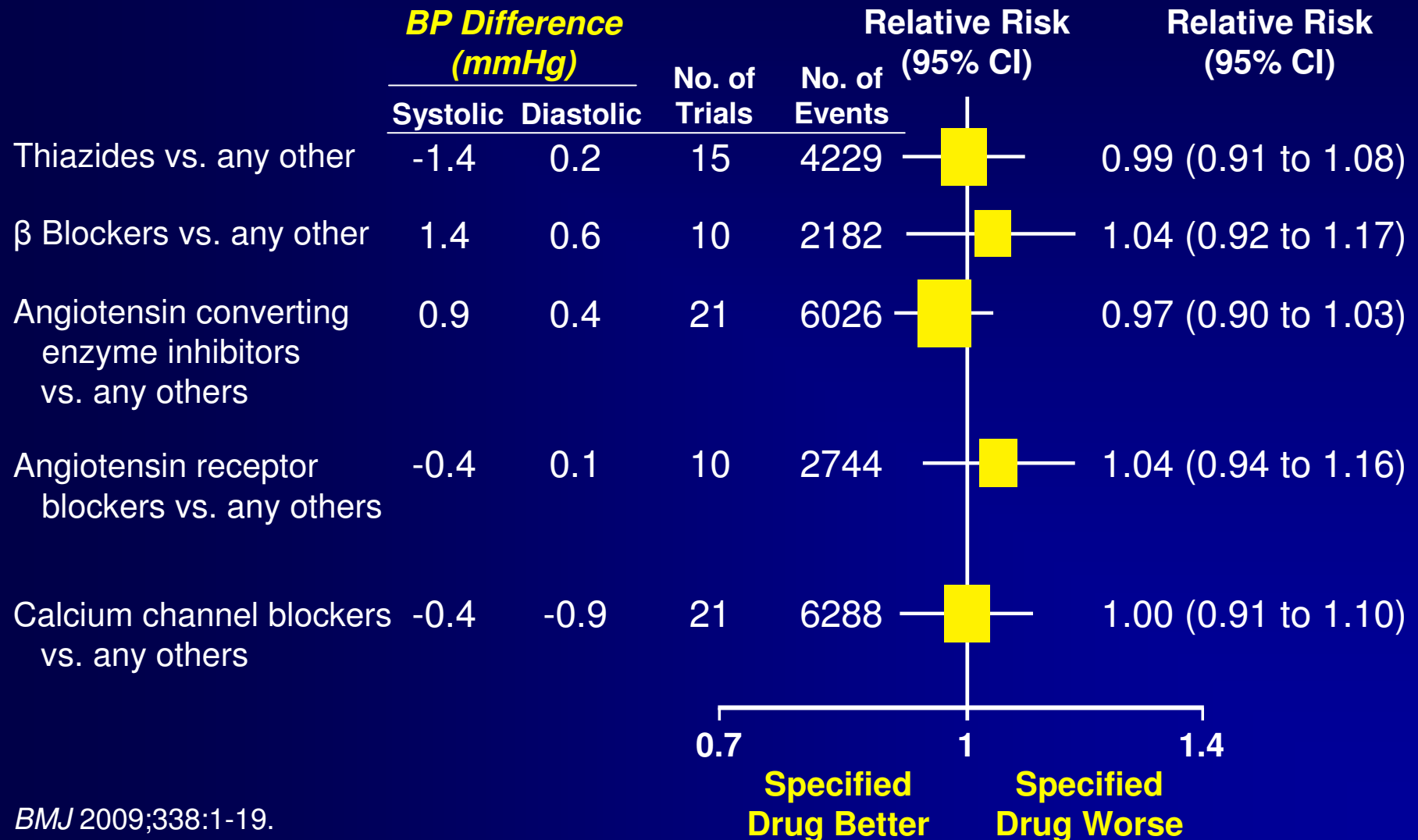
# Risk Estimates for Stroke



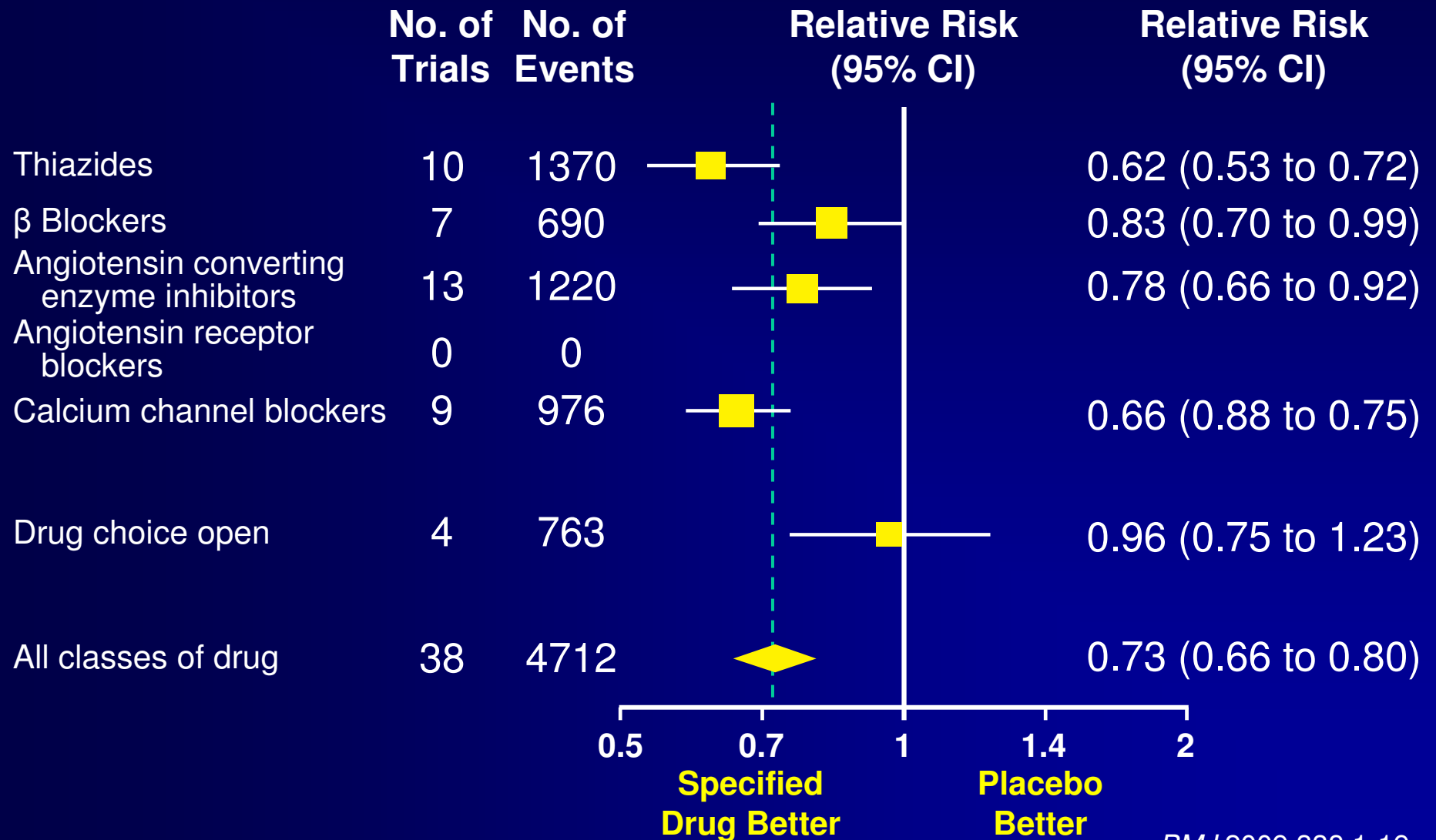
# Treating Hypertension with B-Blockers: World Experience



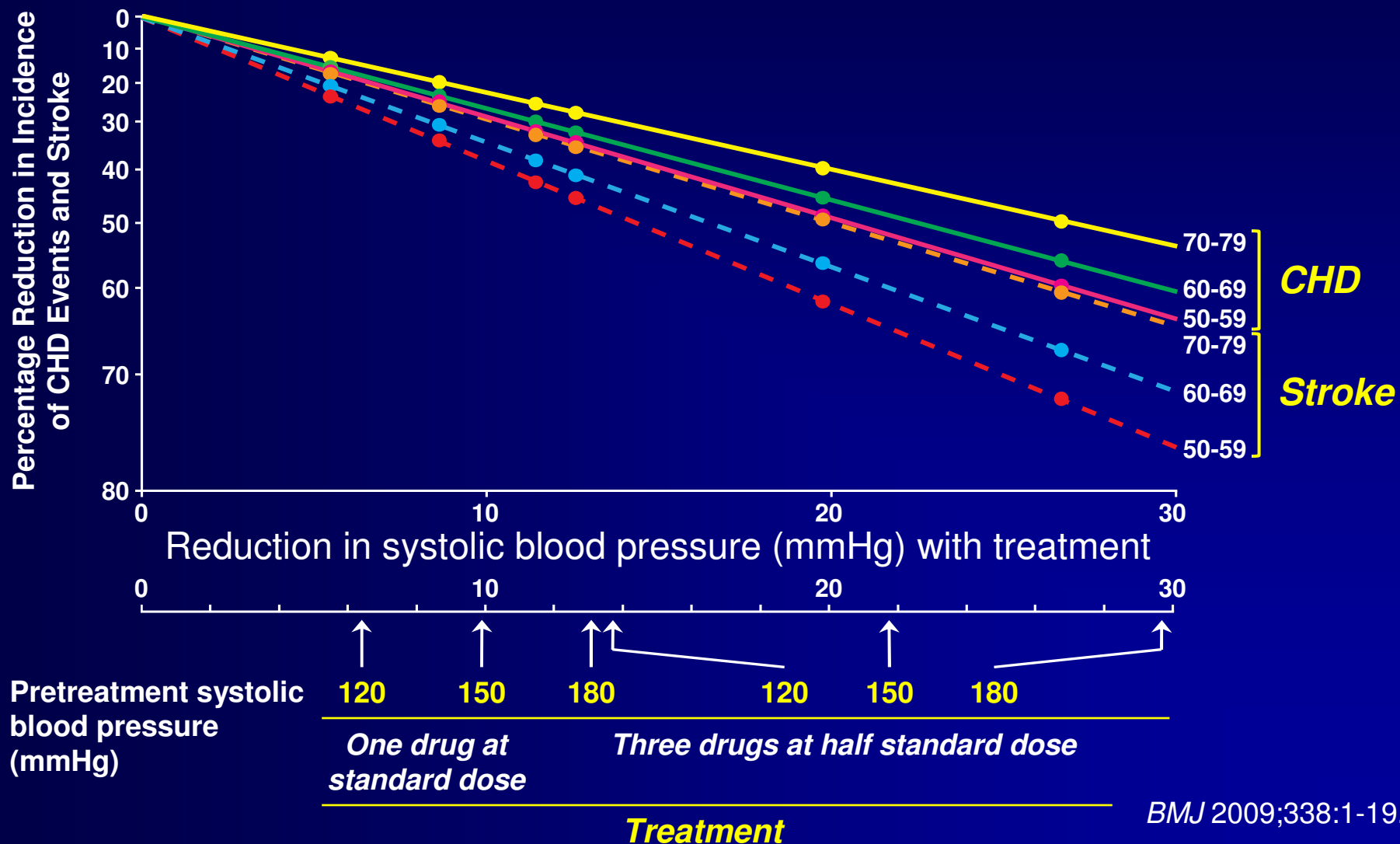
# Risk Estimates for Coronary Heart Disease Events



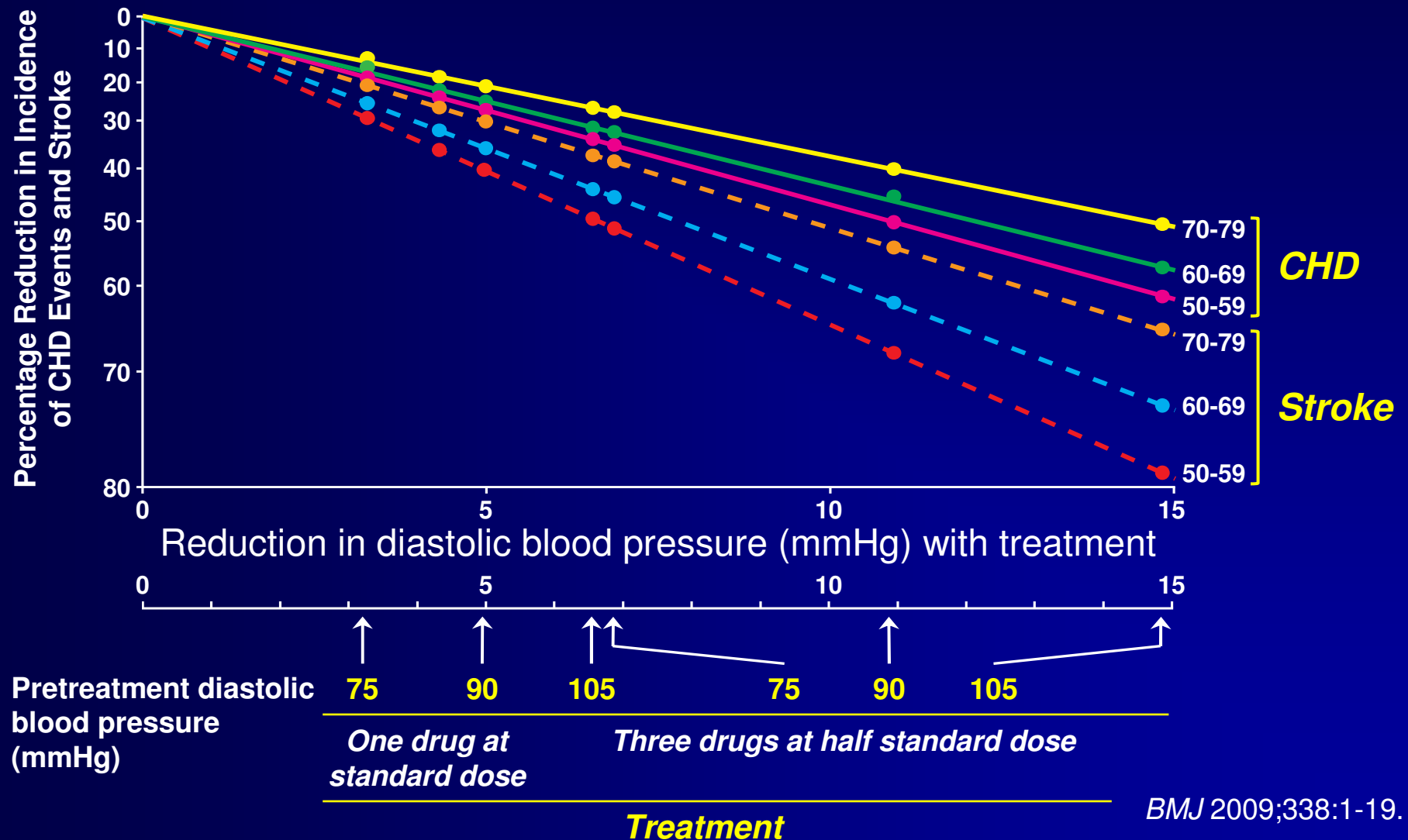
# Risk Estimates for Stroke



# Reduction in Incidence of Coronary Heart Disease Events and Stroke



# Reduction in Incidence of Coronary Heart Disease Events and Stroke



# Conclusions:

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- HTN is not well controlled in the USA
- Some pt's with severe systolic HTN and low diastolic pulse are not "controllable"
- B-Blockers are over-rated for treating HTN except in patients with known CAD