Citation Key

for more information see: http://open.umich.edu/wiki/CitationPolicy

Use + Share + Adapt

{ Content the copyright holder, author, or law permits you to use, share and adapt. }

Public Domain – Government: Works that are produced by the U.S. Government. (17 USC § 105)

Public Domain – Expired: Works that are no longer protected due to an expired copyright term.

Public Domain – Self Dedicated: Works that a copyright holder has dedicated to the public domain.

Creative Commons – Zero Waiver

Creative Commons – Attribution License

Creative Commons – Attribution Share Alike License

Creative Commons – Attribution Noncommercial License

Creative Commons – Attribution Noncommercial Share Alike License

GNU – Free Documentation License

Make Your Own Assessment

{ Content Open.Michigan believes can be used, shared, and adapted because it is ineligible for copyright. }

Public Domain – Ineligible: Works that are ineligible for copyright protection in the U.S. (17 USC § 102(b)) *laws in your jurisdiction may differ

{ Content Open.Michigan has used under a Fair Use determination. }

Fair Use: Use of works that is determined to be Fair consistent with the U.S. Copyright Act. (17 USC § 107) *laws in your jurisdiction may differ

Our determination **DOES NOT** mean that all uses of this 3rd-party content are Fair Uses and we **DO NOT** guarantee that your use of the content is Fair.

To use this content you should **do your own independent analysis** to determine whether or not your use will be Fair.

Identifying Issues and Overcoming Barriers: Hypertension in African Americans

Kenneth A Jamerson, M.D.
Professor of Cardiovascular Medicine
University of Michigan Health System
Medical Director, Program for Multi-cultural Health

Fall 2008

University of Michigan
Medical School

Hypertension in African Americans

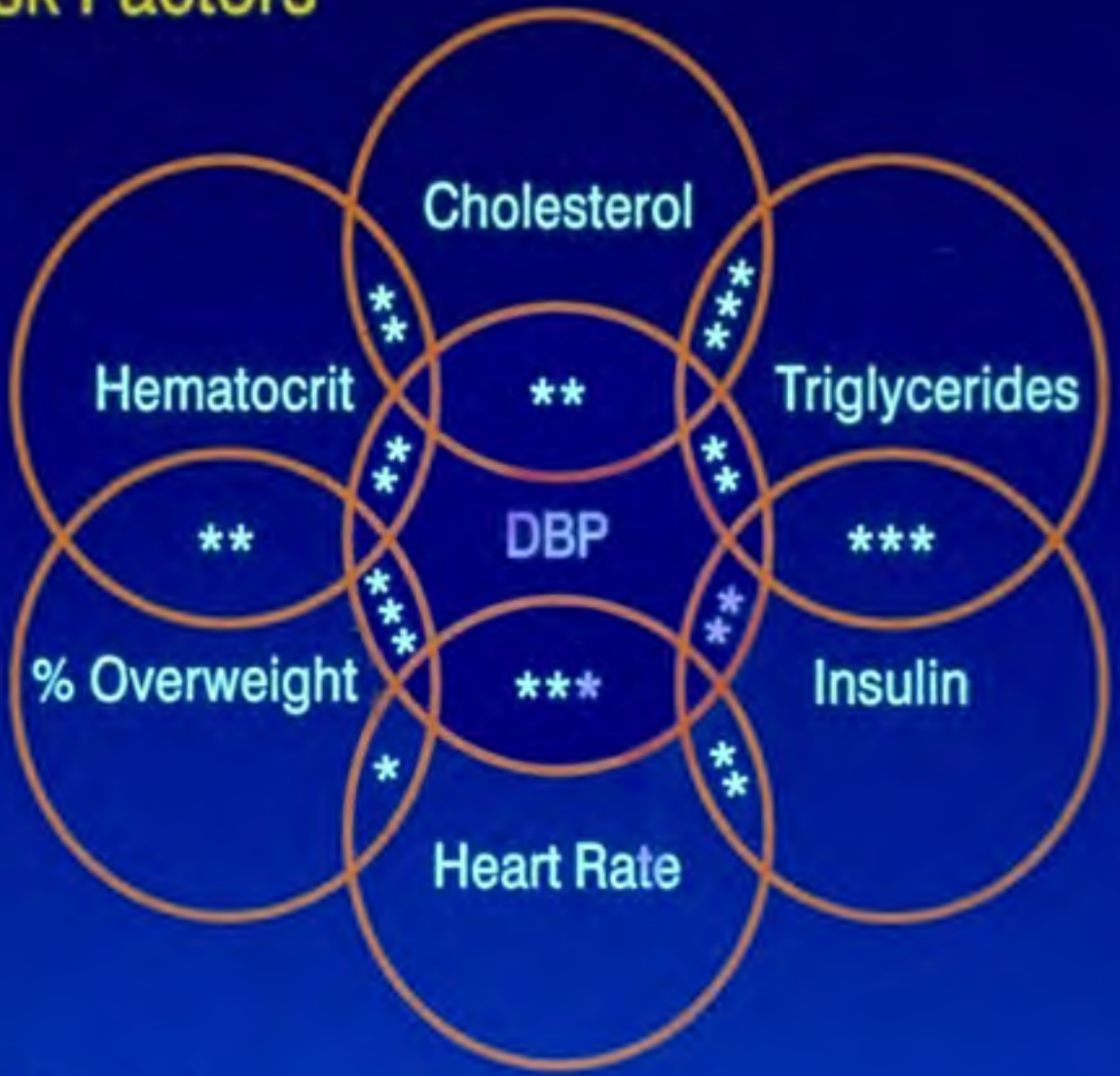
- African Americans develop HTN earlier in life and their average BPs are much higher
- Prevalence of HTN in African Americans in US is among the highest in world
- African American have increased Target Organ Damage compared with whites
  - 4.2X greater rate of ESRD
  - 1.8X greater rate of fatal stroke
  - 1.5X greater rate of heart disease death

Chobanian AV et al. *JAMA*. 2003;289:2560-2572.
Heart Disease and Stroke Statistics- 2005 Update, AHA.
ALLHAT Investigators. *JAMA*. 2002;288:2981-2997

The Tecumseh Blood Pressure Study

A prospective epidemiological study of the antecedents of hypertension and cardiovascular disease in 1100 young men and women

Tecumseh BP Study: Association of DBP and Other CHD Risk Factors

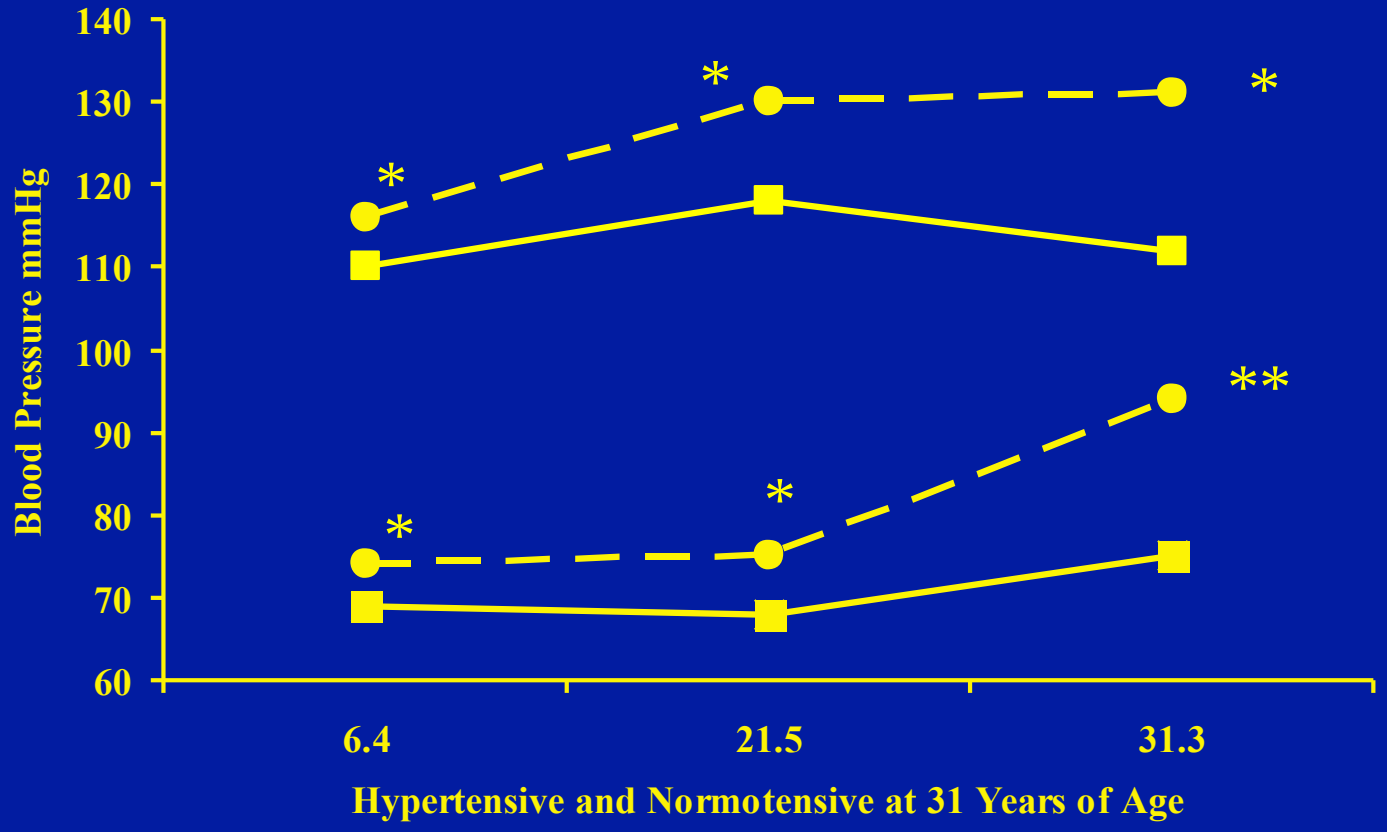


*** P < 0.001
** P < 0.01
* P < 0.05

n = 124 (aged 18-38 years)

Adapted from Julius et al. JAMA 1990;264:354-358. © Am Med Assn.

BLOOD PRESSURE TRENDS IN TECUMSEH, MI



S. Julius, et al: JAMA 264:354-358, 1990

Insulin Resistance Syndrome

DeFronzo RA, Ferrannini E. Diabetes Care 1991;14:173-194. © ADA.

TREATMENT

Lifestyle

- Know your caloric needs to achieve and maintain a healthy weight.
- Know the calorie content of the foods and beverages you consume.
- Track your weight, physical activity, and calorie intake.
- Prepare and eat smaller portions.
- Track and, when possible, decrease screen time (eg, watching television, surfing the Web, playing computer games).
- Incorporate physical movement into habitual activities.
- Do not smoke or use tobacco products.
- If you consume alcohol, do so in moderation (equivalent of no more than 1 drink in women or 2 drinks in men per day).

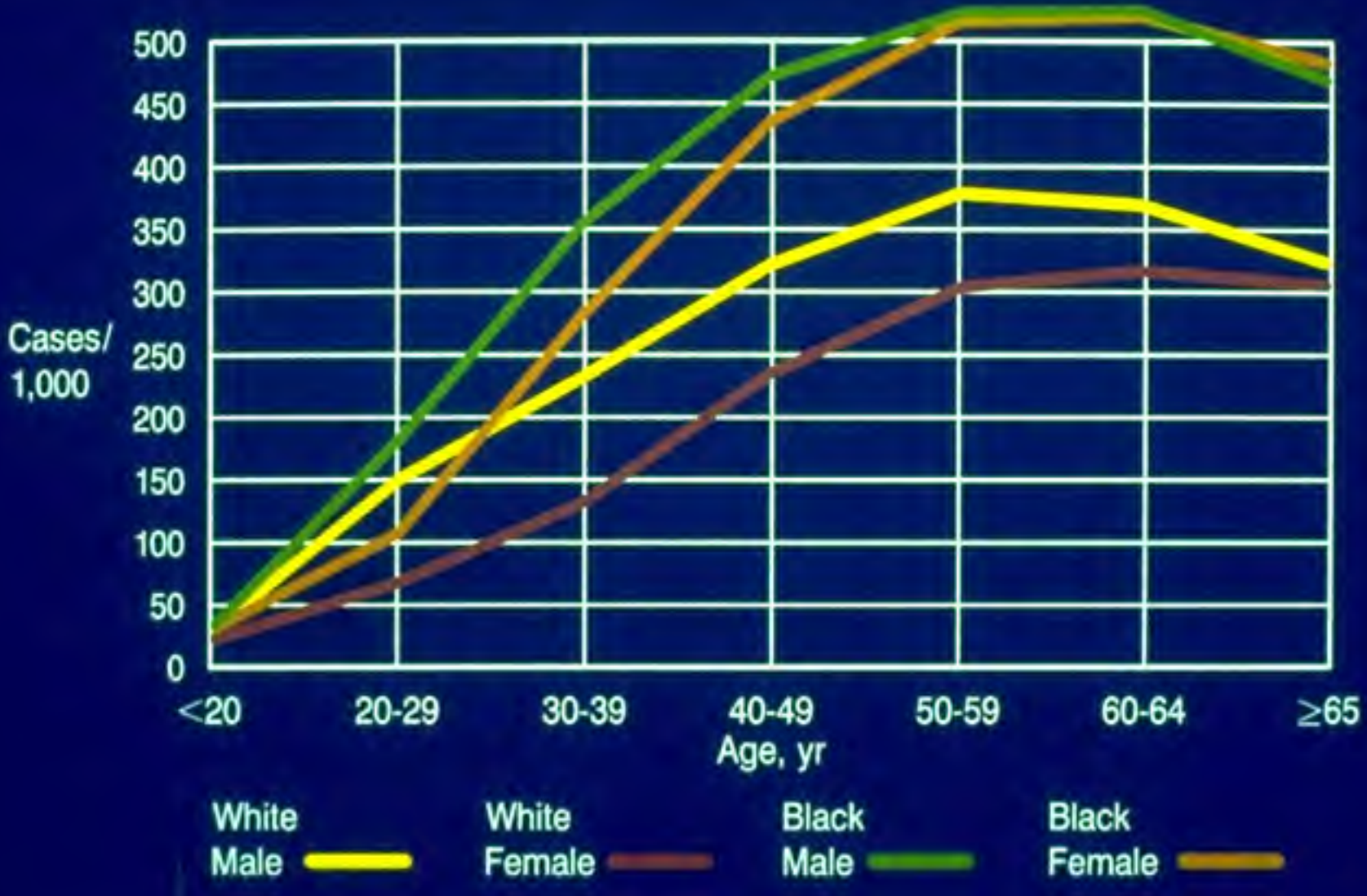
Impact of Surgery For Obesity

- Weight had increased by 1.6% in the control group and decreased by 16.1% in the surgical group
- Calorie intake was lower and physical activity was higher in the surgery group than in the control group
- Recovery from high blood pressure, diabetes, high triglyceride levels, and a low HDL ('good') cholesterol level was more frequent in the surgical group than in the control group, both at 2 and 10 years
- After 10 years diabetes had developed in 24% of those in the non-surgery group and 7% in the surgery group

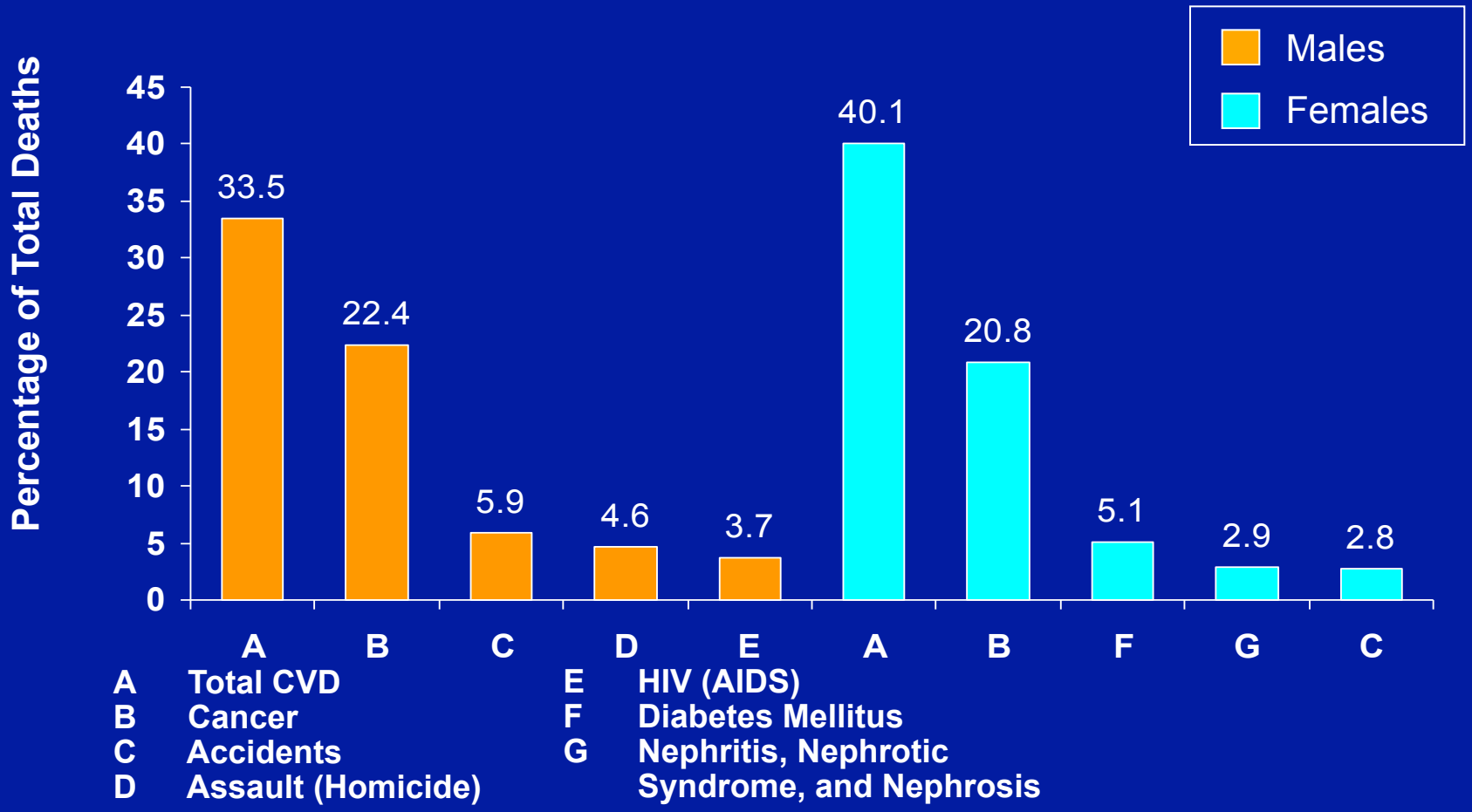
Potential Drugs for Metabolic Syndrome

LIPIDS	HTN	DIAB	OBESE	coag
Stains	Diuretic	SU	orlistat	ASA
ezetimibe	Ace/Arb	MF	sibutramine	clopid
Bile seq	a block	ins	rimonabant	
niacin	Bblock	gilt		
fibrate	CCB	PPG reg		
		incretins		

INCIDENCE OF HYPERTENSION IN BLACK AND WHITE POPULATIONS BY AGE AND SEX



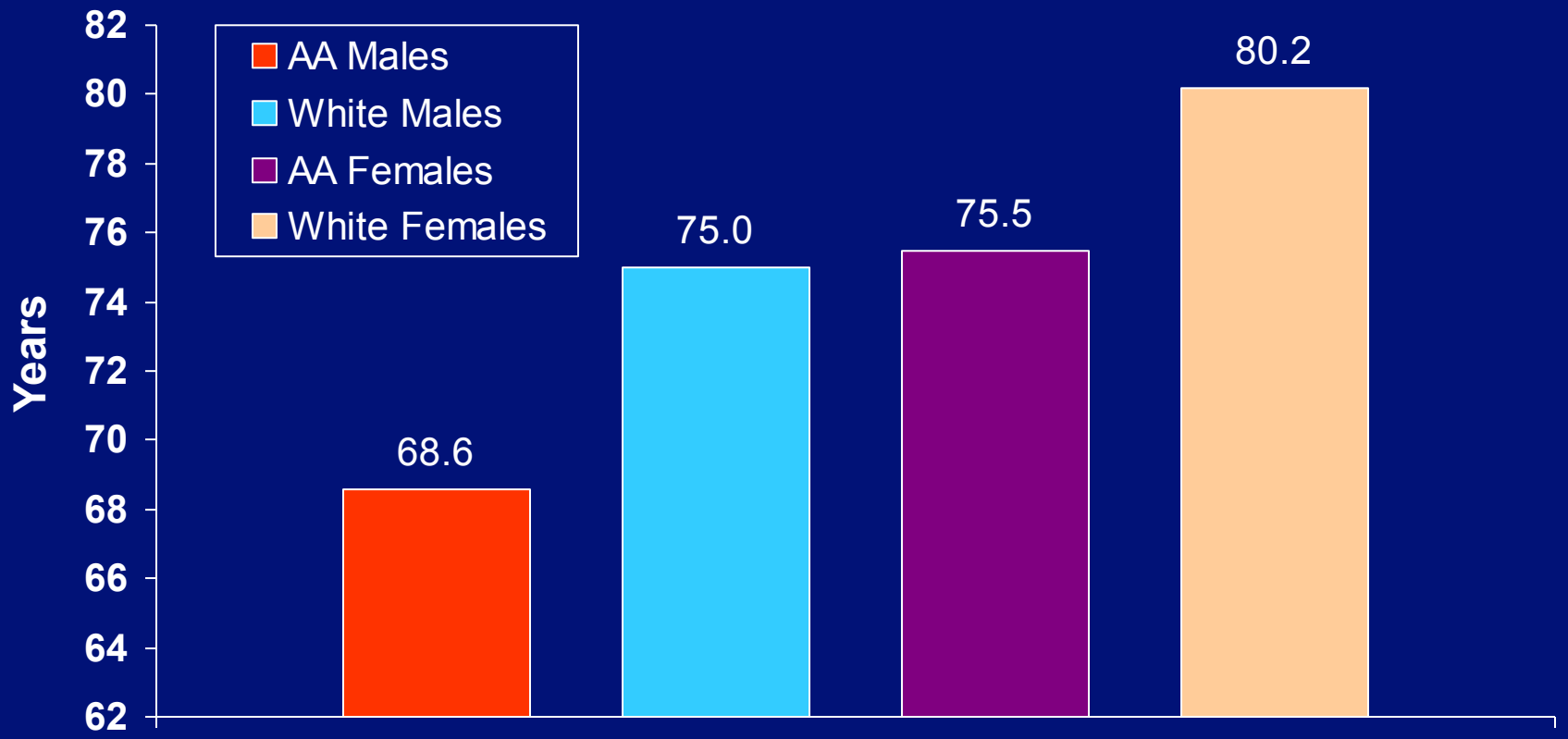
Leading Causes of Death for African American Males and Females



CVD=cardiovascular disease.

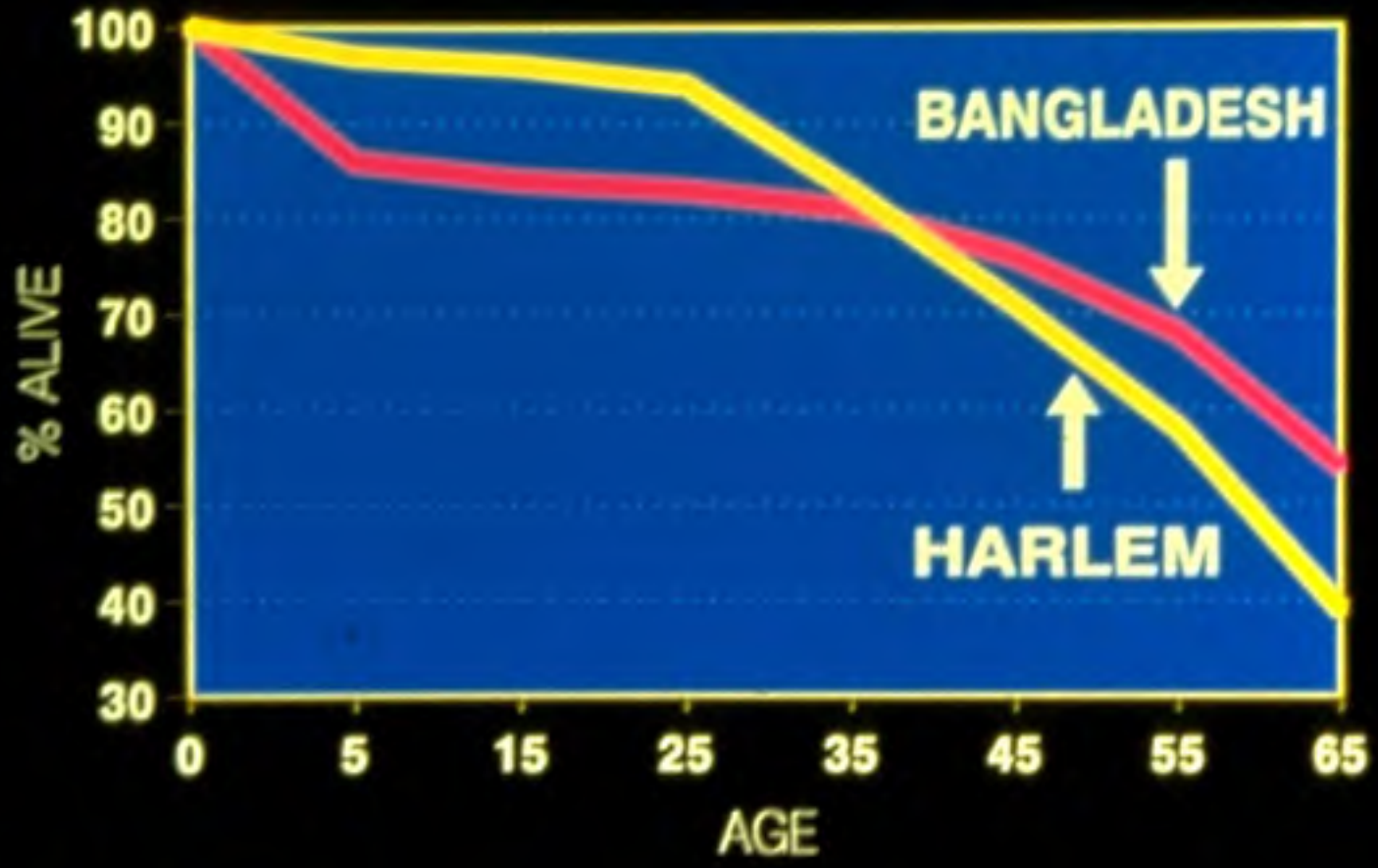
Adapted from *Heart Disease and Stroke Statistics—2004 Update.* American Heart Association; 2003:6.

Estimated Life Expectancy: 2001



National Vital Statistics Reports. 2004;52:33–34.

SURVIVAL OF MEN:
HARLEM (U.S.) & BANGLADESH



SOURCE: NEJM 322:173

Is There a Unique Etiology for Hypertension in African Americans?

Repeated Observations on Racial Differences in the Pathophysiology of Hypertension

Variable of Interest	Black vs. White		Family History		Genetic Influence	
	Normotensive	Hypertensive	Black	White	Black	White
Kidney:						
Creatinine clearance	B = W	B < W	?	?	?	Yes
Renal blood flow	?	B < W	?	?	?	?
Excretion of Na^+ load	B < W	B < W	?	+ < −	?	Yes
Increase BP with Na^+ load	B > W	?	?	?	?	?
Decrease BP with low Na^+	B > W	B > W	?	?	?	Yes
Fractional Excret. Li +	B = W	B = W	?	?	?	?
Plasma Renin Activity	B < W	B < W	+ > −	+ > −	?	Yes
Aldosterone	B = W	B = W	?	?	?	?
Sympathetic (UNE/PNE)	B = W	B = W	+ = −	+ < −	?	Yes
Response to Stressors	B = W	B > W	+ > −	+ > −	?	Yes
Dopamine ß-Hydroxylase	B < W	B < W	?	?	?	Yes
Kallikrein	B < W	B < W	+ > −	+ > −	?	?
Red Cell Transport	B < W	B < W	?	+ < −	?	Yes
Atrial Natriuretic Factor	?	B > W	?	?	?	?
Natriuretic Hormone	?	?	?	?	?	?

+ = family history positive for hypertension; − = family history negative; = = groups are similar; BP = blood pressure; UNE = urinary norepinephrine; PNE = plasma norepinephrine; ? = unknown

Updated from Grim, et al and Savage, et al. Saunders: Cardiovascular Disease in Blacks, F.A. Davis Company, 1991.

Physiologic Differences Between Blacks and Whites

- Plasma Renin Activity
- Renal Function
- Vascular Reactivity
- Sodium Sensitivity
- Expanded Plasma Volume

Ethnicity and Plasma Volume in Hypertension

- **172 consecutive cases were examined**
- **Arbitrary cut point for plasma volume were established**
- **Subject with normal plasma volume were excluded for the analysis**

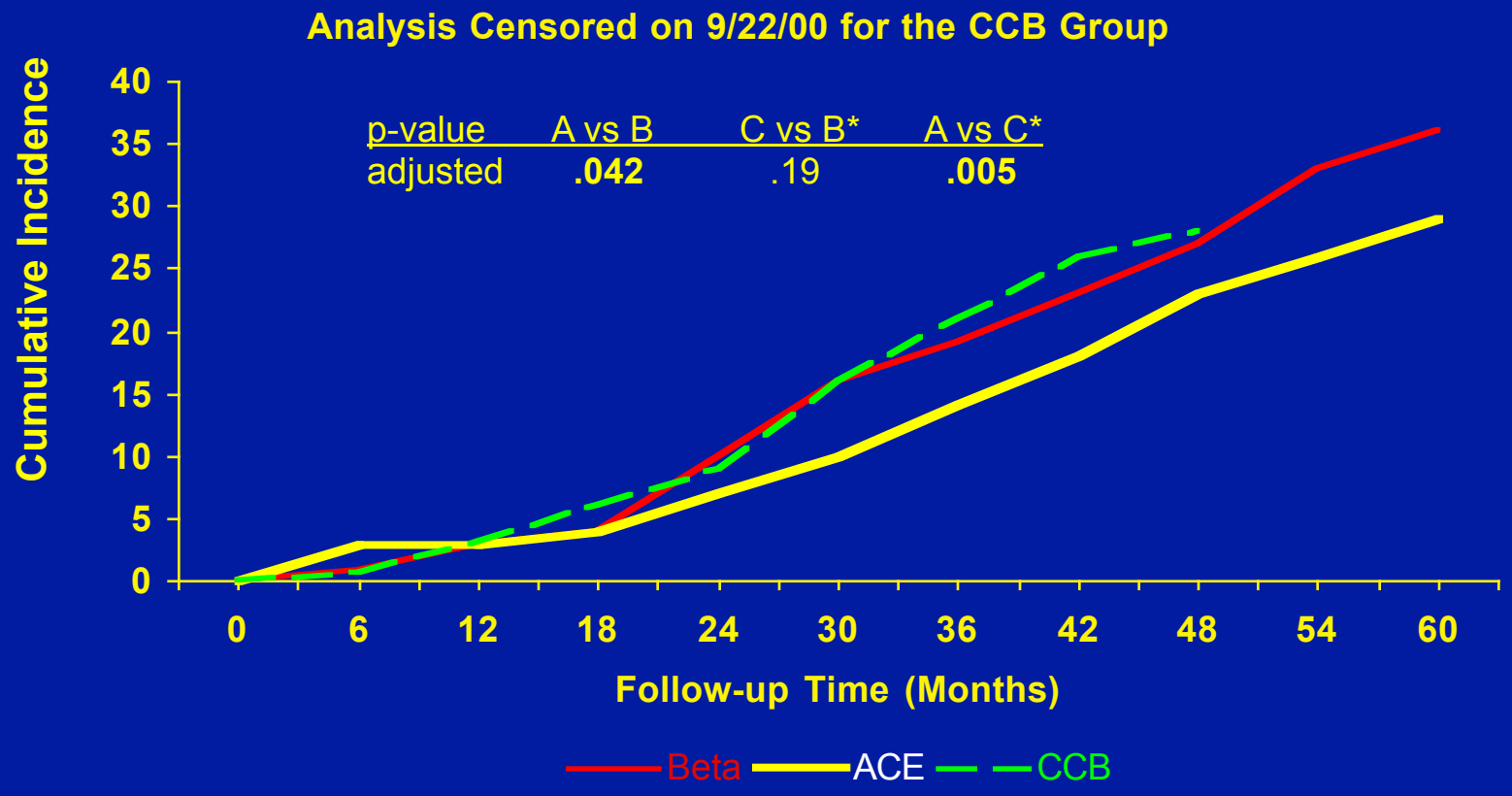
Source: Chysant 1979

African American Study of Kidney Disease and Hypertension

ACHIEVED BLOOD PRESSURE IN AASK

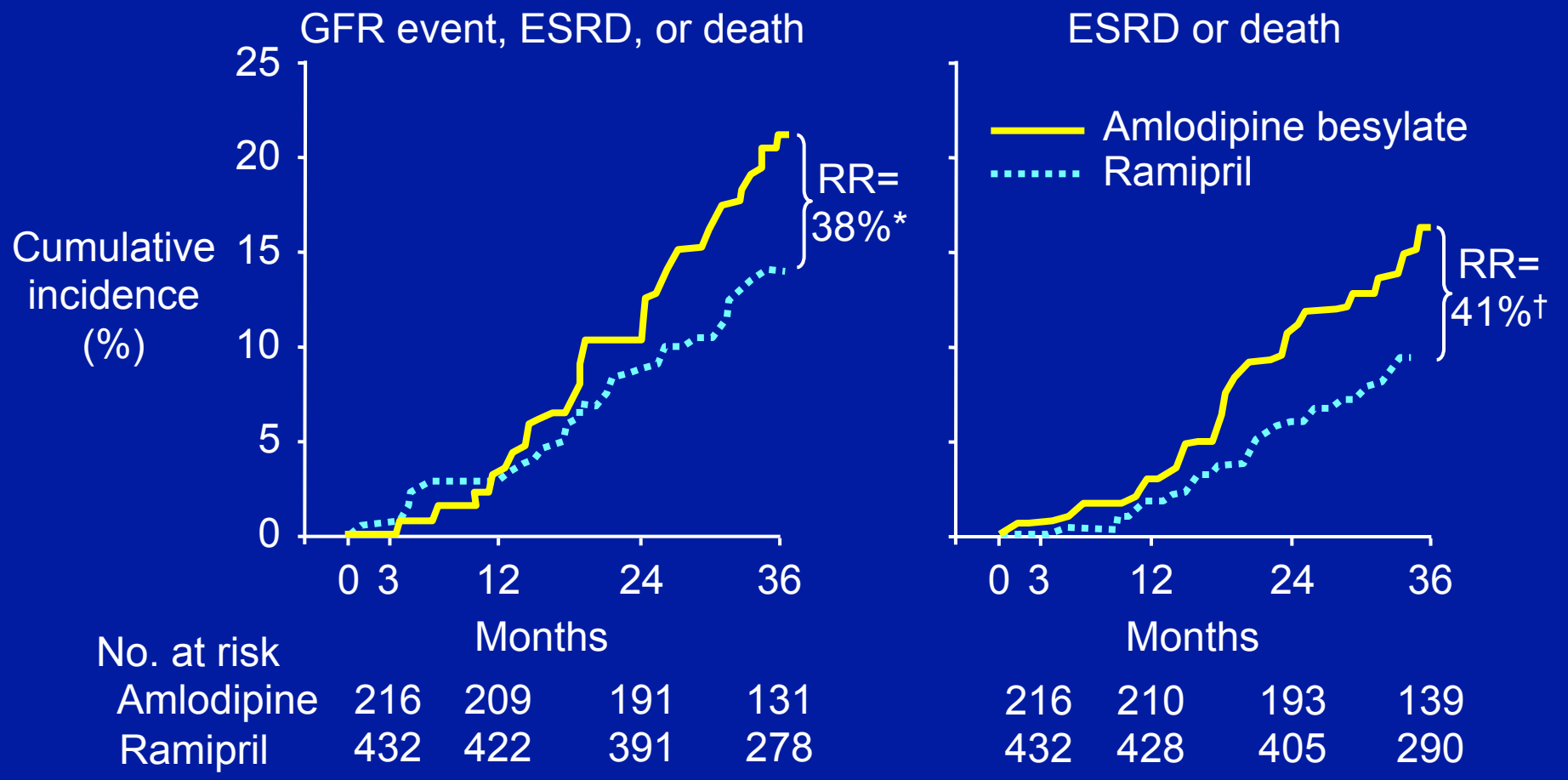
	ACE	CCB	BB	LOW	USUAL
SBP	133.6	131.4	134.2	126.9	140.0
DBP	81.1	80.7	80.9	76.6	85.2
NEED FOR STEP 5	28%	24%	32%	35%	23%

Cumulative Incidence of Confirmed Declining GFR Event, Dialysis or Death by Drug group (Data as of 10/19/01)



.

Incidence of Renal Events and Death: AASK



GFR, glomerular filtration rate; ESRD, end-stage renal disease; RR, adjusted risk reduction.
*P=0.005 (95% CI, 13-56%); †P=0.007 (95% CI, 14-60%).

Agodoa LY et al. *JAMA*. 2001;285:2719-2728.

IMPLICATIONS OF THE AASK STUDY

- **Aggressive control of blood pressure can eliminate ethnic differences in ESRD**
- **Inadequate treatment of hypertension may causes excess risk of target organ disease.**
- **Cultural rather than genetic differences may underlay the excess risk of hypertensive ESRD**

- ARE OTHER ETHNIC GROUPS AT RISK FOR CARDIOVASCULAR DISEASE?

Prevalence of MI in Asian Indians Living in the U.S.: Introduction

- Approx. 1.9 million Asian Indians currently live in the United States and are one of the fastest growing ethnic minorities in this country
- Data on epidemiology of MI in this community is very limited
- Present study estimates the prevalence of MI and associated risk factors in this group

Source: Nanda NC et al. Unpublished.

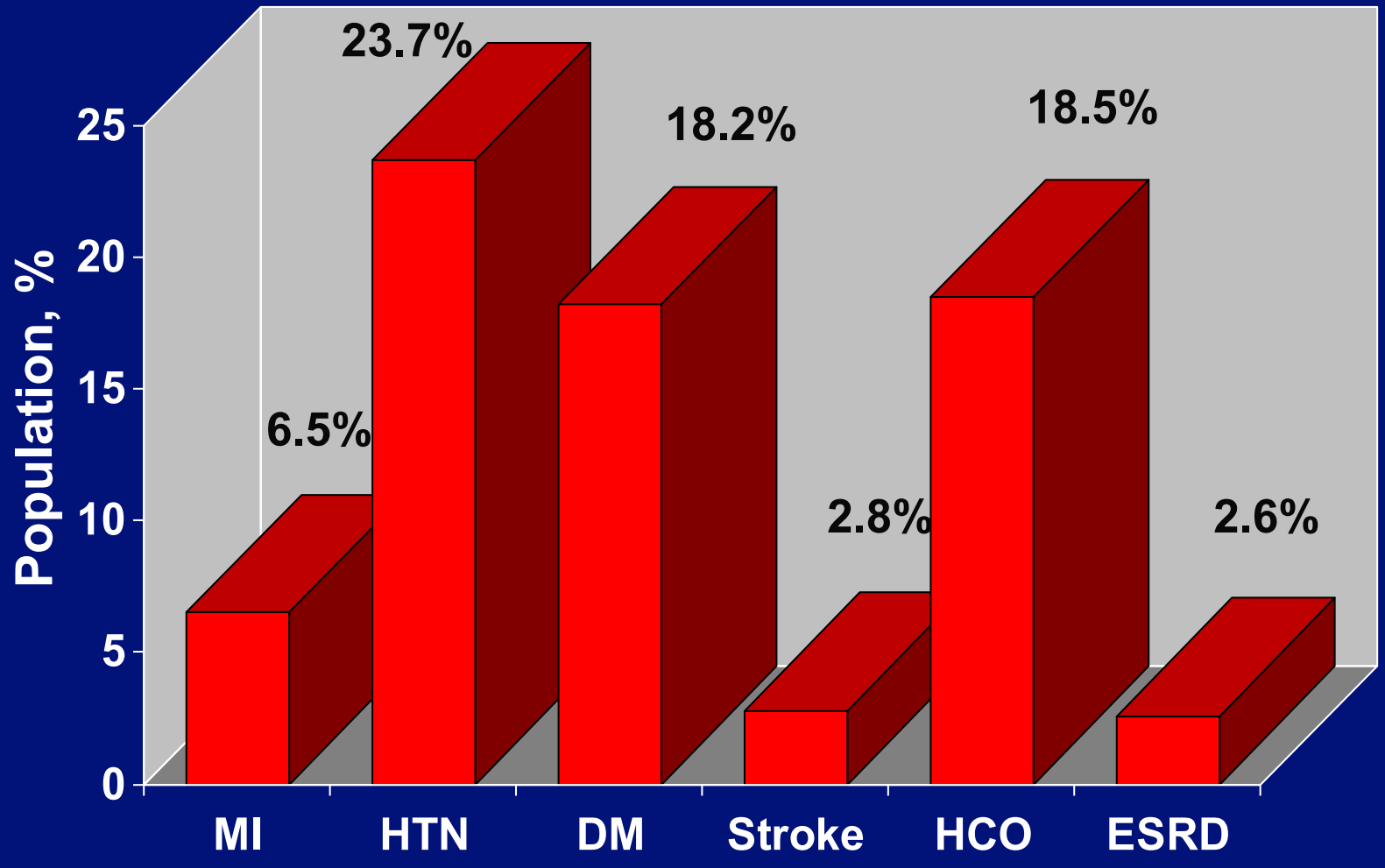
Prevalence of MI in Asian Indians Living in the U.S. -- Results

- Total population surveyed—1046 adults*
- 537 men (51.3%), 509 women (48.7%)
  - sex ratio- 1.06
- Mean age of the population 53.7 yrs (± 11.3 yrs)
  - ages ranged from 17 to 87 yrs
- Mean age for men 53.7 yrs (± 11.3 yrs); women 51.9 yrs (± 11.3 yrs)

***Members of Bochasanwasi Shri Akshar Purushottam Swaminarayan Sanstha, a prominent Hindu sect**

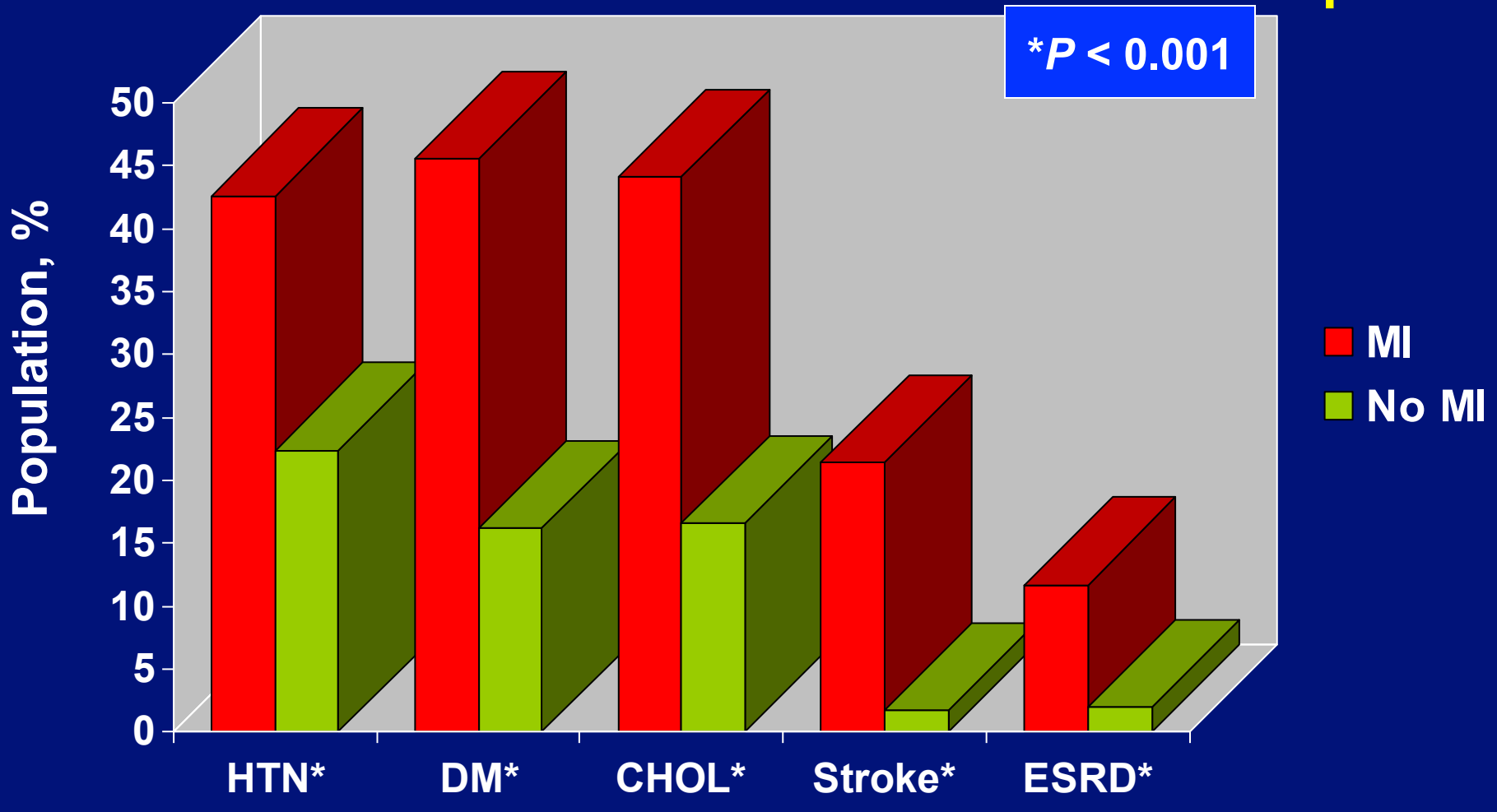
Source: Nanda NC et al. Unpublished.

Asian Indians Living in the U.S. -- Prevalence of MI and Risk Factors



Nanda NC et al. Unpublished.

Prevalence of MI in Asian Indians Living in the U.S. -- Distribution of Risk Factors in MI and Control Group



Nanda NC et al. Unpublished.

Prevalence of MI: Data from India

- In two large studies from New Delhi, India, the prevalence of MI between ages 25–64 was 1.05%
- Prevalence among Asian Indian immigrants to the U.S. was 5.31% in this age group

Sources:

Gopinath N et al. *J Assoc Physicians India.* 1995;43:30-33.
Chadha SL et al. *Indian J Med Res*. 1990;92:424-430.

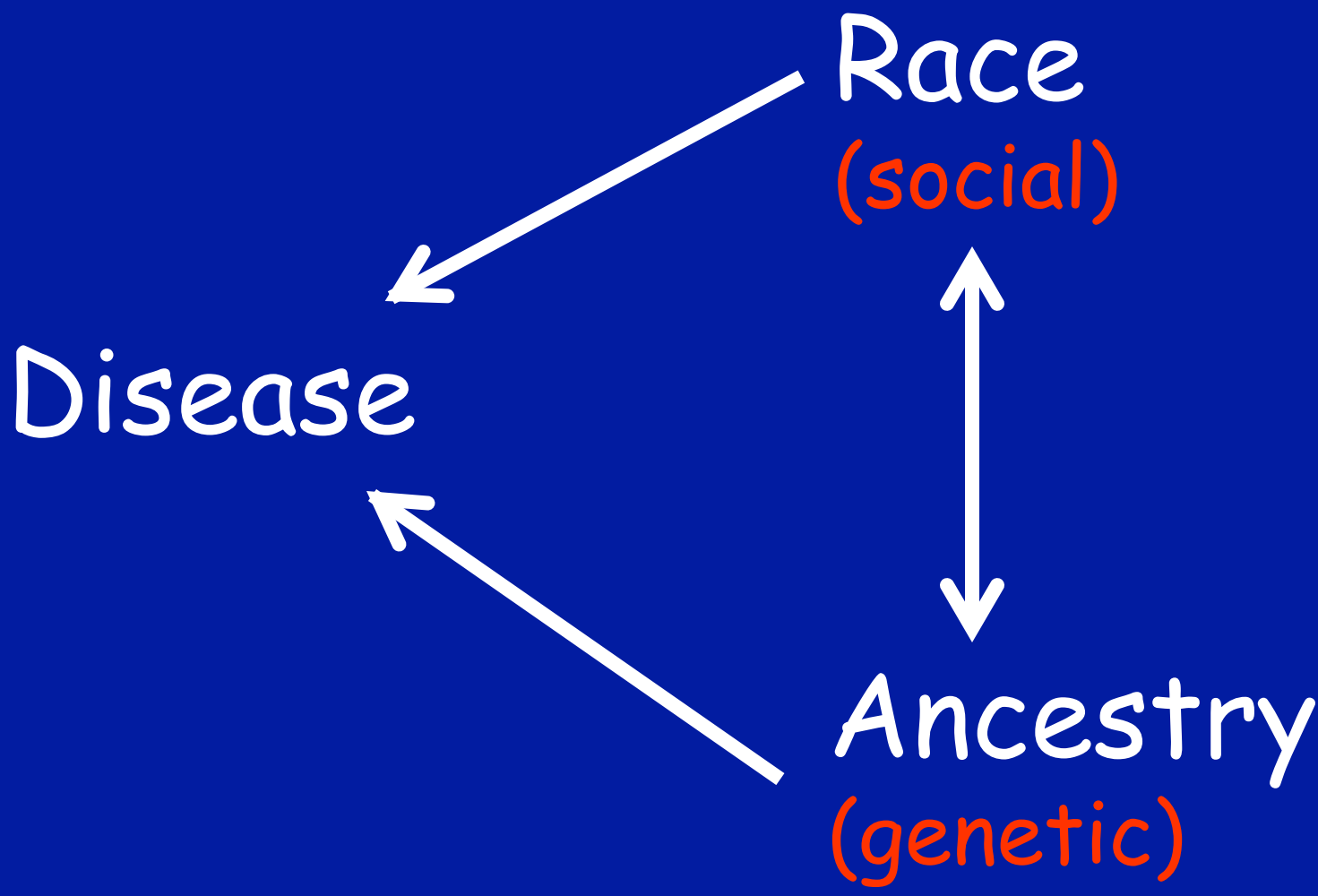
Conclusions

- Prevalence of MI among Asian Indians in the United States is higher than in India
- It approaches the same level as whites and slightly higher than Hispanics and blacks in the United States
- HTN, HCO, DM, ESRD, stroke and FH of MI were independent risk factors for MI in this group

Source: Nanda NC et al. Unpublished.

Models to explain Health Disparities

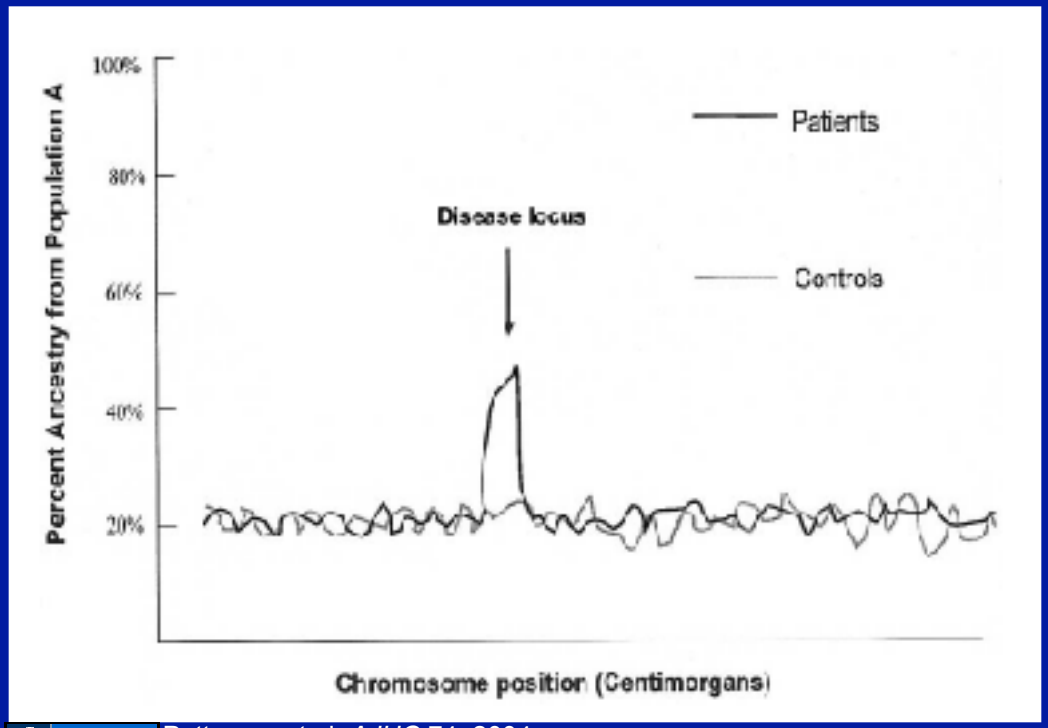
- Racial Genetic Model
  - **Cause of HD: population differences in the distribution of *genetic variants***
- Health-behavior Model
  - **Cause of HD: differences between R/E groups in the distribution of *individual behaviors* related to health such as diet, exercise, and tobacco use**
- SES Model
  - **Cause of HD: over-representation of some R/E groups within *lower SES***
- Psychosocial Stress Model
  - **Cause of HD: stresses associated with minority group status, especially the experience of racism and discrimination**



Although much genetic variation (85-90%) is shared among all human populations, about 5% of SNPs have high levels of allele frequency differential (δ>50%). We call these markers Ancestry Informative Markers (AIMs).

Admixture mapping for disease genes

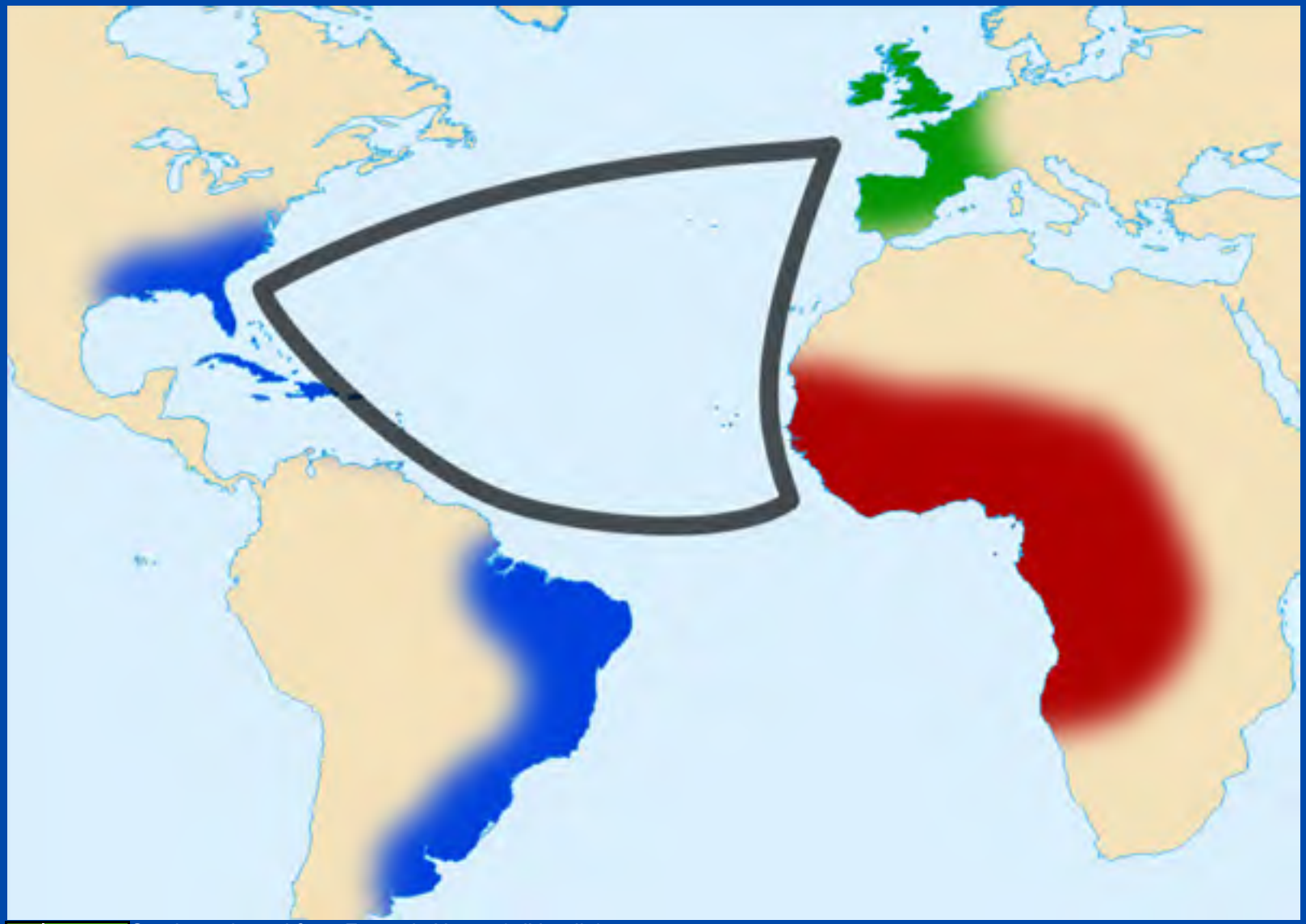
Disease gene identification may be facilitated if we know which parts of the genome the cases and controls have inherited at a disproportionate rate from one of the parental populations.



PD-INCL Patterson et al. *AJHG* 74, 2004

Era of Genomic Ancestry and challenges related to Health.

1. Group definition and membership.
2. Can we accurately assess genomic ancestry?
3. How does genomic ancestry relate to skin color and possibly SES?
4. How useful is genomic ancestry for informing us about disease risk?
5. Health Disparities: are they due to biological differences?
6. How do we prevent repeating the negative past abuses of “race”.



GNU-FDL Semhur adapted from Francois Nancy (wikipedia)

The Future

Whole genome Association

Population Genomics

HuGENet

Pharmacogenomics

Gene Expression

Model Systems

Proteomics

Additional Source Information

for more information see: http://open.umich.edu/wiki/CitationPolicy

Slide 4: Chobanian AV et al. *JAMA*. 2003;289:2560-2572; Heart Disease and Stroke Statistics- 2005 Update, AHA.; ALLHAT Investigators. *JAMA*. 2002;288:2981-2997
Slide 5: Source Undetermined
Slide 6: S. Julius, et al: JAMA 264:354-358, 1990
Slide 7: S. Julius, et al: JAMA 264:354-358, 1990
Slide 8: DeFronzo RA,Ferrannini E, Diabetes Care, 1991, 14:173-194. American Diabetes Association
Slide 11: K. Jamerson
Slide 12: Source Undetermined
Slide 13: Adapted from *Heart Disease and Stroke Statistics—2004 Update.* American Heart Association; 2003:6.
Slide 14: *National Vital Statistics Reports.* 2004;52:33–34.
Slide 15: NEJM 322:173
Slide 17: Updated from Grim, et al and Savage, et al. Saunders: Cardiovascular Disease in Blacks, F.A. Davis Company, 1991.
Slide 19: Source: Chysant 1979
Slide 21: K. Jamerson
Slide 22: Source Undetermined
Slide 23: Agodoa LY et al. *JAMA*. 2001;285:2719-2728.
Slide 26: Nanda NC et al. Unpublished.
Slide 27: Nanda NC et al. Unpublished.
Slide 28: Nanda NC et al. Unpublished.
Slide 29: Nanda NC et al. Unpublished.
Slide 30: Gopinath N et al. *J Assoc Physicians India.* 1995;43:30-33.; Chadha SL et al. *Indian J Med Res*. 1990;92:424-430.
Slide 31: Source: Nanda NC et al. Unpublished.
Slide 33: K. Jamerson
Slide 35: Patterson et al. *AJHG* 74, 2004
Slide 37: GNU FDL 1.2, Semhur adapted from Francois Nancy, wikipedia, http://commons.wikimedia.org/wiki/File:Triangular_trade.png,
Slide 38: Da Vinci, Wikimedia Commons, http://commons.wikimedia.org/wiki/File:Da_Vinci_Vitruve_Luc_Viatour.jpg