Ethnic Differences in Presentation and Outcomes for Cardiovascular Disease in North America

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DISCLOSURE STATEMENT – Dr. Narendra Singh MD

- **Research grants**
  - Novartis, Gilead, Pfizer, Cardiomems, GSK, Sanofi, Takeda,
  - Astra Zeneca, Medtronics, St Jude Medical, Biotronik, Sorin
  - Merck/Schering, Boehringer Ingelheim, J and J, Roche, Eli Lily,
  - Dalichi-Sankyo, Forrest Pharma, Amarin, Gilead, Astellas

- **Speakers Bureau, consultative, advisory board honoraria**
  - Pfizer /BMS, Glaxo Smith Kline, Novartis, Sanofi, Boehringer Ingelheim, Astra
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  - ACC-GA Chapter, CCRN
  - Northside Hospital, St Josephs Hospital, Dekalb Medical, Emory Johns Creek

- **Equity – stocks, options**
  - none

This presentation; No conflicts
The Racial and Ethnic Diversity of the US Population Will Continue to Increase

- Non-Hispanic White: 69.4% (2000), 61.3% (2020), 50.1% (2050)
- Hispanic (of any race): 12.6% (2000), 17.8% (2020), 24.4% (2050)
- African American: 12.7% (2000), 13.5% (2020), 14.6% (2050)
- Asian: 3.8% (2000), 5.4% (2020), 8.0% (2050)

Ethnicity does not = Race

Race – Dorland’s dictionary;
- An ethnic stock, or division of mankind. In genetics, races are considered as populations having different distributions of gene frequency.

Ethnic – Dorland’s dictionary;
- Pertaining to a social group who share cultural bonds (religious, national, etc) or physical (racial) characteristics.

American Anthropological Association
- “It has become clear that human populations are not unambiguous, clearly demarcated, biologically distinct groups…. Any attempt to establish lines of division among biological populations is both arbitrary and subjective.”
RISKS OF ETHNICITY RESEARCH

- Defining ethnic origin is not easy and likely to get more difficult in the future with increasing migration and inter-ethnic marriages
  - *This in turn can affect the validity and applicability of research conclusions*

- Ethnic labels could be used as a source of discrimination by health insurers and employers
  - *On the other hand identification of common high risk gene pools (alleles) may in the future allow us to tailor medical therapy to those in whom the cost-benefit ratio is most favorable*
GEOGRAPHIC CHD DIVERSITY

MI

Rate per 1,000 Medicare enrollees
- 13.6 - 20.3
- 12.1 - 13.5
- 8.2 - 12.1

CVA

Rate per 1,000 Medicare enrollees
- 16.7 - 21.9
- 14.3 - 16.7
- 11.8 - 14.2

CHF

Rate per 1,000 Medicare enrollees
- 23.0 - 33.7
- 17.6 - 22.9
- 11.5 - 17.5

Death rate per 100,000 population
- 170 - 204
- 205 - 222
- 223 - 251
- 252 - 274
- 275 - 330

Death rate per 100,000 population
- 38.0 - 50.2
- 50.3 - 57.3
- 57.4 - 60.3
- 60.4 - 65.4
- 65.5 - 76.0
Geographic Diversity in CHD Deaths By Ethnicity

Asians

Native Indians

Hispanics

← Blacks

Whites →
**Geographic/Ethnic Disparity within Georgia**

### State Profile — Georgia

<table>
<thead>
<tr>
<th>Race or Ethnicity</th>
<th>State Population 2000</th>
<th>State Heart Disease Death Rate, 1991-1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Women</td>
<td>1,783,350</td>
<td>449</td>
</tr>
<tr>
<td>American Indian and Alaska</td>
<td>3,598</td>
<td>Insufficient Data</td>
</tr>
<tr>
<td>Native Women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian and Pacific Islander</td>
<td>24,878</td>
<td>197</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Women</td>
<td>430,197</td>
<td>354</td>
</tr>
<tr>
<td>Hispanic Women</td>
<td>24,530</td>
<td>132</td>
</tr>
<tr>
<td>White Women</td>
<td>1,338,750</td>
<td>408</td>
</tr>
</tbody>
</table>

1. Average annual age-adjusted rate, deaths per 100,000 for women ages 35 years and older.
2. Data for Hispanic are also included within each of the four categories of race.
INTERHEART: Positive impact of lifestyle factors on acute MI for all ethnic groups

Risk factor

- Current smoking
- Diabetes
- Hypertension
- Abdominal obesity
- Psychosocial factors
- Fruits/Vegetables
- Exercise
- Alcohol
- ApoB/ApoA1 ratio

Women
Men

Asian Indian (South Asian) Population
1994 - 38 yr old South Asian male-
coronary anatomy at presentation
Who are “South Asians”
AGE-ADJUSTED CV deaths declining in N America but rising in INDIA/CHINA
Visible Minorities in Canada and USA

CANADA Total  
= 1,262,865

South Asians

Chinese  S Asian  Black
latin Am  Filipino  SE Asian
Other

TORONTO

Outside GTA  GTA

USA Census 2010, Stats Canada, 2006

Asian-Indians
Georgia – 96,116
USA- 3,183,063

Total SA-USA  
3,795,562
CHD as Cause of Death in Asians

*CHD is the leading cause of death

Vietnamese
Korean
Chinese*
Japanese*
Samoan*
Filipino*
Guamanian*
Hawaiian*
Asian Indian*

Percent of Deaths

0% 5% 10% 15% 20% 25% 30% 35% 40%

National Vital Statistics System, CDC, NCHS.
Don’t Blame just the Diet!
Coronary Heart Disease in South Asians

- Two-fold increased risk of developing CHD for SA vs. Caucasians
- SA develop CHD and heart failure at younger ages
- More diffuse CAD at angiography, worse outcome following CABG
- Larger MI size, later presentation to hospital
- Approximately 50% higher CHD mortality

- Similar LDL levels, prevalence of HT, smoking similar or lower
- Lower HDL, higher prevalence of DM
- Conventional risk factors do not explain excess CHD

Gupta M et al. CMAJ. 2002
Hamdoolay Z et al. Circulation. 2004 (AHA)
Gupta M et al. Canadian Journal of Cardiology 2001;17(supp C):68C
Gupta M et al. Circulation. 2006:113;924-929
Prevalence of CVD for Given Levels of Carotid Atherosclerosis (IMT)

*Note: Overall P value <0.001, comparing SA, CH and EC*
Non-Traditional Risk Factors


Homocysteine

Lp(a)

PAI-1

Fibrinogen
South Asians and CAD

- Rapidly growing segment of US population
- Elevated CAD incidence in young adults
- High CAD risk compared to whites, with equivalent risk factors
  - Higher prevalence rates of insulin resistance
  - Metabolic syndrome
  - Diabetes
  - Elevated CRP
  - Lipoprotein (a) levels

Environment, “Thrifty Genotype” and the Metabolic Syndrome

- Genes that convert and store simple sugars to abdominal fat
- Selective advantage in times of famine

Low caloric intake
High energy expenditure
Low BMI and WHR

High caloric intake
Low energy expenditure
High BMI and WHR

Urbanization
Changes in Risk Factors with Migration

- Rural India: 51.6% Risk Factor, BMI 19.1
- Urban India: 19.4% Risk Factor, BMI 13.5
- Canada: 9.3% Risk Factor, BMI 16.8

BMI

- BMI in Rural India: 19
- BMI in Canada: 26.3

n=972 n=775 n=342

BMI

- 36 lbs
- 42 lbs

Risk factors:
- Smoke
- DM
- HTN

Graph showing changes in risk factors with migration to Canada.
Racial and Ethnic Minority Groups Are More Likely to Have Type 2 Diabetes

Adjusted* Odds of Type 2 Diabetes Compared With Non-Hispanic Whites

- **Asians**: 1.6 times more likely†
  - Adjusted odds ratio: 1.6 (1.1-2.2)

- **African Americans**: 1.9 times more likely†
  - Adjusted odds ratio: 1.9 (1.7-2.2)

- **Hispanics**: 1.9 times more likely†
  - Adjusted odds ratio: 1.9 (1.6-2.1)

- **Native Americans**: 1.8 times more likely†
  - Adjusted odds ratio: 1.8 (1.3-2.5)

* Adjusted for age, sex, and body mass index (BMI).
† P<0.01 vs non-Hispanic Whites.

Analysis of 163,584 subjects aged ≥30 years who participated in the 2001 Behavioral Risk Factor Surveillance System (BRFSS).

Racial and Ethnic Minorities Tend to Have Worse Glycemic Control

<table>
<thead>
<tr>
<th>Race</th>
<th>% of Patients With A1C &lt;7%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic Whites</td>
<td>48.4%</td>
</tr>
<tr>
<td>Non-Hispanic Blacks</td>
<td>36.5%</td>
</tr>
<tr>
<td>Mexican Americans</td>
<td>34.2%</td>
</tr>
<tr>
<td>Other Races*</td>
<td>34.4%</td>
</tr>
</tbody>
</table>

* Includes individuals who reported all remaining single-race responses, individuals who reported more than one race but did not identify a major race, individuals with multi-races, and people with missing values on race.

Based on data from 757 patients with type 2 diabetes who participated in the National Health and Nutrition Examination Survey (NHANES) 1999-2002.

The Mortality Rate due to Diabetes Is Higher in Racial and Ethnic Minority Groups

Age-Adjusted Death Rate by Race in US, 2002

- Whites: 23.1
- Blacks: 49.5

Age-Adjusted Death Rate by Ethnicity in US, 2002

- Non-Hispanics: 24.8
- Hispanics: 35.6

Summary of Our Research

- South Asians have an increased risk of cardiovascular disease and a presentation profile similar to diabetics.
- Aggressive risk factor modification can reduce morbidity and possibly mortality.
- Insulin resistance / diabetes is a key factor in the development of diffuse atherosclerosis.
- Early identification and intervention with evidence-based therapy can reduce morbidity and possibly mortality.

**MY OPINION:** Consider SA ethnicity + 1 risk factor as a CAD equivalent.
<table>
<thead>
<tr>
<th>Ethnic group</th>
<th>Male nonsmoker</th>
<th>Male smoker</th>
<th>Female nonsmoker</th>
<th>Female smoker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian</td>
<td>22.4</td>
<td>36.7</td>
<td>8.7</td>
<td>15.1</td>
</tr>
<tr>
<td>Pakistani</td>
<td>24.7</td>
<td>40.0</td>
<td>13.4</td>
<td>22.8</td>
</tr>
<tr>
<td>Bangladeshi</td>
<td>24.9</td>
<td>40.4</td>
<td>7.4</td>
<td>13.0</td>
</tr>
<tr>
<td>All South Asians</td>
<td>23.6</td>
<td>38.5</td>
<td>9.7</td>
<td>16.9</td>
</tr>
<tr>
<td>Chinese</td>
<td>11.1</td>
<td>19.1</td>
<td>2.5</td>
<td>4.4</td>
</tr>
<tr>
<td>Caribbean</td>
<td>13.3</td>
<td>22.7</td>
<td>9.7</td>
<td>16.9</td>
</tr>
<tr>
<td>Black African</td>
<td>20.1</td>
<td>33.3</td>
<td>10.8</td>
<td>18.7</td>
</tr>
<tr>
<td>Irish</td>
<td>16.0</td>
<td>27.0</td>
<td>9.1</td>
<td>15.8</td>
</tr>
<tr>
<td>Framingham score</td>
<td>14.1</td>
<td>22.3</td>
<td>8.7</td>
<td>14.7</td>
</tr>
</tbody>
</table>

South Asians have a higher percentage of body fat and increased intra-abdominal fat compared to white Caucasians.

Insulin resistance is common in South Asians at BMI lower than 25.

South Asians develop type 2 diabetes at a younger age and at lower BMI compared to white Caucasians.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Current BMI Target</th>
<th>Asian BMI Target</th>
<th>Risk of Co-Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.5</td>
<td>&lt;18.5</td>
<td>Low</td>
</tr>
<tr>
<td>Ideal Range</td>
<td>18.5-24.9</td>
<td>18.5-22.9</td>
<td>Average</td>
</tr>
<tr>
<td>Overweight</td>
<td>25 or more</td>
<td>23 or more</td>
<td>Increased</td>
</tr>
<tr>
<td>Obese I</td>
<td>30-34.9</td>
<td>25-29.9</td>
<td>Moderate</td>
</tr>
<tr>
<td>Obese II</td>
<td>35 or more</td>
<td>30 or more</td>
<td>Severe</td>
</tr>
</tbody>
</table>
IDF Diagnostic Criteria for Metabolic Syndrome

<table>
<thead>
<tr>
<th>Central adiposity (waist circumference in cm)</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europid</td>
<td>&lt;94</td>
<td>&lt;80</td>
</tr>
<tr>
<td>South Asian</td>
<td>&lt;90</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Chinese</td>
<td>&lt;90</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Japanese</td>
<td>&lt;85</td>
<td>&lt;90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IDF 2004</th>
<th>Plus 2 or more of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Adiposity (waist)</td>
<td></td>
</tr>
<tr>
<td>Triglycerides</td>
<td>≥ 1.7 mmol/L</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td></td>
</tr>
<tr>
<td>&lt;0.9 mmol/L</td>
<td></td>
</tr>
<tr>
<td>&lt;1.1 mmol/L</td>
<td></td>
</tr>
<tr>
<td>Blood pressure</td>
<td></td>
</tr>
<tr>
<td>≥130 or ≥ 85 mmHg</td>
<td></td>
</tr>
<tr>
<td>Fasting glucose</td>
<td>≥ 5.6 mmol/L or DM or IGT</td>
</tr>
</tbody>
</table>
Challenges of Rx of risk factors in Ethnic populations

- Language barriers for information especially with 1st generation immigrants
- Lack of adequate insurance – many self-employed individuals
- Inappropriate dietary and lifestyle advice
- Reluctance to accept “Western medicine”
- Fatalistic attitude to life - “reincarnation”
Various Recipes Available
Latha Palaniappan, MD, MS
Internal Medicine, Clinical Epidemiology
Stanford Center for Research in Disease Prevention
Phone: (650) 498-4427
E-mail: saiwwls@yahoo.com
Resources - British Heart Foundation

Heart Disease and South Asians
Delivering the National Service Framework for Coronary Heart Disease

Improving access to treatment and services for South Asians

The National Service Framework for Coronary Heart Disease aimed to secure fair access to high quality services for all. As the NSF is implemented, facilities and services are being deliberately targeted at the areas which need them most to reduce inequalities in access to treatment and services.

Potential barriers to access
Some barriers are common to all communities: poor health, lack of time and absence of support may all influence people’s ability and motivation to access services and lead a healthy lifestyle. Or practical problems, for example transport issues, may make it difficult for people to get to hospital. However, South Asian communities potentially face a number of additional barriers that service providers need to be aware of and address.

CASE STUDY
Project Dil: Peer Education Programme

Khush Dil “Happy Heart” Project

The Coriander Club, Spitalfields City Farm

The team offers the following services:

- 

- 

- 

- 

- 

-
RESOURCES – Clinician Update

- Gupta M, Singh N, Verma S.
- South Asians and Cardiovascular Risk: What Clinicians Should Know
- Circulation 2006;113 924-929
African American and Hispanic Populations
Risk of Cardiovascular Disease

Death Rates per 100,000 Persons Among US Ethnicities

- African American Men: 479.6
- African American Women: 354.8
- White Women: 256.2
- White Men: 359.1
- American Indian Women: 123.6
- American Indian Men: 201.2
- Hispanic Women: 149.7
- Hispanic Men: 219.8

American Heart Association. 2006. *Heart Disease and Stroke Statistical Update.*
Figure 4. Years of potential life lost (YPLL) before 75 years of age resulting from diseases of the heart, ischemic heart disease, and stroke, United States, 2001. API indicates Asian or Pacific Islander; AIAN, American Indian or Alaska Native. Source: CDC, Health United States, 2003.
### Clinical Study Examples - LIPIDS

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Aim</th>
<th>Overall n</th>
<th>% Minority Subjects</th>
<th>Major Results</th>
<th>Subgroup Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CARE, 1996</strong></td>
<td>Effect of pravastatin on fatal/nonfatal coronary events; MI and 115&lt;LDL-C&lt;174mg/dL</td>
<td>4159</td>
<td>7-8% non-white participants</td>
<td>Fatal coronary event + nonfatal MI RRR=24%</td>
<td>Need for CABG RRR=26%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stroke RRR=31%</td>
</tr>
<tr>
<td><strong>LIPID, 1998</strong></td>
<td>Effect of pravastatin on coronary/all cause mortality in CHD patients</td>
<td>9014</td>
<td></td>
<td>Coronary death RRR=24%</td>
<td>Overall mortality RRR=22%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Age ≥ 70 yrs: Coronary mortality + non-fatal MI RRR=15%</td>
</tr>
</tbody>
</table>
### Clinical Study Examples - HYPERTENSION

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Aim</th>
<th>Overall n</th>
<th>% Minority Subjects</th>
<th>Major Results</th>
<th>Subgroup Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ALLHAT, 2002</strong></td>
<td>Antihypertensive and Lipid Lowering Treatment to Prevent Heart Attack Trial</td>
<td>Effect of CCB or ACEi vs. diuretic, CHD</td>
<td>33,357</td>
<td>No difference in outcomes</td>
<td>Thiazide type diuretics are superior in preventing CVD</td>
</tr>
<tr>
<td><strong>MRFIT, 1985</strong></td>
<td>Multiple Risk Factor Intervention Trial</td>
<td>Special intervention vs. Usual care</td>
<td>11,342</td>
<td>No favorable association between lowering BP and CHD rate</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Study Aim</td>
<td>Overall n</td>
<td>% Minority Subjects</td>
<td>Major Results</td>
<td>Subgroup Results</td>
</tr>
<tr>
<td>-------</td>
<td>-----------</td>
<td>-----------</td>
<td>---------------------</td>
<td>---------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>EPHEHSUS, 2005</strong></td>
<td>Eplerenone Post Acute MI Heart Failure Efficacy and Survival Study</td>
<td>Impact of eplerenone on mortality (30 days post MI LVEF &lt;40% and clinical signs of heart failure)</td>
<td>6632</td>
<td>1%</td>
<td>All cause mortality RRR= 31% CV mortality RRR=32% Sudden cardiac death RRR=37%</td>
</tr>
<tr>
<td><strong>HOPE, 2000</strong></td>
<td>Heart Outcomes Prevention Evaluation</td>
<td>Role of ramipril (In patients at high risk for cardiovascular events, without LV Dysfunction or heart failure)</td>
<td>9297</td>
<td></td>
<td>CV death RR=0.74 MI RR=0.80 Stroke RR=0.68 All cause mortality RR=0.84 Heart failure RR=0.77</td>
</tr>
</tbody>
</table>
Review of Studies Regarding Cardiovascular Disease That Include Racial/Ethnic Subgroups

The Jackson Heart Study (2000 – Present)

• Single site, prospective epidemiologic study of cardiovascular disease among African-Americans in Jackson, Mississippi
• 6500 African American subjects
• Largest investigation of CVD that has ever been undertaken in African Americans
• Questionnaires: lifestyle habits, medical history, medications, social/cultural factors
• Physical Assessment: weight, height, body size, BP, EKG echocardiogram
• Labs: lipids, glucose, hemostatic factors
Review of Studies Regarding Cardiovascular Disease That Include Racial/Ethnic Subgroups

The Strong Heart Study (1988-1992)

- Population based, epidemiologic, longitudinal study
- Studies CVD and pulmonary disease and their risk factors
- 4,549 Native Americans in Arizona, Oklahoma and North and South Dakota
- Included personal interview, physical exam, BP measurements and labs (OGTT)
Review of Studies Regarding Cardiovascular Disease That Include Racial/Ethnic Subgroups

The San Antonio Family Heart Study (1991- Present)

• Studies cardiovascular and diabetes and their risk factors
• 1,400 members of > 40 large Mexican American families
• Risk factor data collected by questionnaire plus physical exam and phlebotomy for genetic studies
• Two follow-up examinations through 2005
Review of Studies Regarding Cardiovascular Disease That Include Racial/Ethnic Subgroups


• Prospective population based, epidemiologic, study
• Studies CHD, atherosclerosis, stroke and risk factors
• 15,792 participants from 4 U.S. communities, including 12% Blacks in the Forsyth County, NC site
• Included personal interview, risk factor determination, physical exam, BP, BMI and waist circumference measurements, labs (HDL-C, TG, glucose levels)
• Echocardiographic studies were preformed in the Jackson site between 1993-1996
Review of Studies Regarding Cardiovascular Disease That Include Racial/Ethnic Subgroups


- Studies prevalence, treatment and control of dyslipidemia
  - A multi-center cohort
  - 6814 participants, free of CVD at baseline, 28% black, 12% Chinese, 22% Hispanic
  - Participants were evaluated for CVD risk, CT (CAC) and fasting lipid profiles
Review of Studies Regarding Cardiovascular Disease That Include Racial/Ethnic Subgroups

**The Dallas Heart Study (2000-2002)**

- Single-site population based probability sample of Dallas residents
- Aim: to evaluate ethnic differences in cardiovascular health
- Included survey questionnaires, labs and imaging studies
- 6101 subjects, 50% Black
Ethnic differences in risk factors in women 25-64 years old, NHANES 1988-1994


JNC 7- Minority Populations

- In general, treatment similar for all demographic groups.
- Socioeconomic factors and lifestyle important barriers to BP control.
- Prevalence, severity of HTN increased in African Americans.
- African Americans demonstrate somewhat reduced BP responses to monotherapy with BBs, ACEIs, or ARBs compared to diuretics or CCBs.
- These differences usually eliminated by adding adequate doses of a diuretic.
BEST Trial; Effect of Bucindolol on Mortality by Race

Hazard ratio = 1.31


HF NOT AN APPROVED INDICATION
US Carvedilol Trials: Effect of Race on Death or Hospitalization for Any Cause

Black Patients

Risk reduction 48% (12%, 69%)  
\( P = .01 \)

Non-black Patients

Risk reduction 30% (8%, 47%)  
\( P = .01 \)

Death or hospitalization for any cause rates:
Placebo 36.7%; Carvedilol 20.5%

Death or hospitalization for any cause rates:
Placebo 29.2%; Carvedilol 20.9%

SOLVD Studies: Racial Differences in Mortality Rates


V-HeFT II Retrospective Analysis: Effect on All-Cause Mortality in Black Patients

Retrospective analyses are hypothesis generating only

**Whites**

- 26% reduction in AMR $P<.02$
- Enalapril vs ISDN/HYD

**Blacks**

- Enalapril vs ISDN/HYD $P<.95$

AMR = annual mortality rate; ISDN/HYD = isosorbide dinitrate/hydralazine.
V-HeFT I Retrospective Analysis: Survival Benefit in Black Patients

Retrospective analyses are hypothesis generating only

**Whites**

<table>
<thead>
<tr>
<th>Cumulative Mortality</th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8</td>
<td>0</td>
</tr>
<tr>
<td>0.7</td>
<td>6</td>
</tr>
<tr>
<td>0.6</td>
<td>18</td>
</tr>
<tr>
<td>0.5</td>
<td>30</td>
</tr>
<tr>
<td>0.4</td>
<td>54</td>
</tr>
<tr>
<td>0.3</td>
<td>58</td>
</tr>
<tr>
<td>0.2</td>
<td>66</td>
</tr>
</tbody>
</table>

P=NS
n=324

**Blacks**

<table>
<thead>
<tr>
<th>Cumulative Mortality</th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8</td>
<td>0</td>
</tr>
<tr>
<td>0.7</td>
<td>6</td>
</tr>
<tr>
<td>0.6</td>
<td>18</td>
</tr>
<tr>
<td>0.5</td>
<td>30</td>
</tr>
<tr>
<td>0.4</td>
<td>54</td>
</tr>
<tr>
<td>0.3</td>
<td>58</td>
</tr>
<tr>
<td>0.2</td>
<td>66</td>
</tr>
</tbody>
</table>

n=128
Risk Reduction 44% P=.04

ISDN/HYD=isosorbide dinitrate/hydralazine.
A-HeFT: Study Design

- African American Heart Failure Trial (A-HeFT)\textsuperscript{1}
  - Hypothesis: Fixed-dose of ISDN/HYD will improve outcomes in black patients with moderate-to-severe symptomatic HF
- 169 sites\textsuperscript{2}
- 1050 randomized patients (518 BiDil\textsuperscript{®}, 532 placebo)\textsuperscript{1,2}
- Up to 18 months of follow-up\textsuperscript{1,2}
- No patient lost to follow-up for vital status\textsuperscript{1}
- Study initiated 6/12/01, and terminated early due to significant survival benefit in the BiDil\textsuperscript{®} group\textsuperscript{1,2}

ISDN/HYD=isosorbide dinitrate/hydralazine.
2. BiDil\textsuperscript{®} Prescribing Information.
A-HEFT Trial - Kaplan-Meier Estimates of Overall Survival
Disparities in Cardiovascular Care
Increased awareness crucial to CVD prevention in minority patients

Minority patients are less likely to be screened for CVD risk factors and less likely to receive risk-reducing treatments.
68 studies find a racial/ethnic difference in care (84%)

11 studies find no racial/ethnic difference in care (14%)

2 studies find racial/ethnic minority group more likely than whites to receive appropriate care (2%)

Total = 81 studies
CRUSADE/NSTE ACS: In-Hospital Procedures

CRUSADE/NSTE ACS Recommendations at Discharge

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Black</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking Cessation*</td>
<td>55.5</td>
<td>65.2</td>
</tr>
<tr>
<td>Dietary Modification</td>
<td>71.6</td>
<td>70.4</td>
</tr>
<tr>
<td>Cardiac Rehabilitation†</td>
<td>33.9</td>
<td>41.8</td>
</tr>
</tbody>
</table>

* For current smokers.
† For patients with positive markers.
Nonwhite patients vs. white patients

- Less likely to be
  - Taking aspirin
  - Taking beta-blockers
  - Taking statins
  - Referred for coronary angiography in the absence of clear-cut ischemia
TACTICS-TIMI 18: Influence of Race in Non-ST Elevation ACS

Nonwhite patients vs. white patients

- Less likely to receive a stent when undergoing percutaneous coronary revascularization
- Less successful procedural outcomes
- Regardless, after adjustment for differences in rates and types of revascularization, nonwhite patients still had a worse prognosis
The Effect of Race and Sex on Physicians' Recommendations for Cardiac Catheterization “Patients” Experiencing Symptoms of Heart Disease

Results: Referral for cardiac catheterization according to race

<table>
<thead>
<tr>
<th></th>
<th>Mean Referral Rate %</th>
<th>Odds Ratio (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>90.6</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>84.7</td>
<td>0.6 (0.4-0.9)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Rate of Use of Cardiac Catheterization within 60 Days after Acute Myocardial Infarction among Black Patients and White Patients, According to the Race of Their Physicians

<table>
<thead>
<tr>
<th>Rate</th>
<th>White Physicians</th>
<th>Black Physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White Patients</td>
<td>Black Patients</td>
</tr>
<tr>
<td></td>
<td>(n=35,176)</td>
<td>(n=3476)</td>
</tr>
<tr>
<td>Unadjusted</td>
<td>45.7</td>
<td>38.4†</td>
</tr>
<tr>
<td>Adjusted</td>
<td>45.7‡</td>
<td>32.9 (30.1-36.1)§</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rate</th>
<th>White Physicians</th>
<th>Black Physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White Patients</td>
<td>Black Patients</td>
</tr>
<tr>
<td></td>
<td>(n=500)</td>
<td>(n=563)</td>
</tr>
<tr>
<td>Unadjusted</td>
<td>49.6</td>
<td>38.2†</td>
</tr>
<tr>
<td>Adjusted</td>
<td>53.4 (43.4–65.8)</td>
<td>36.5 (29.2–45.2)¶</td>
</tr>
</tbody>
</table>

*In the adjusted analyses, adjustments were made for the characteristics of the patients, the physicians, and the hospitals. There were no significant differences in the rates of cardiac catheterization among either the white patients or the black patients according to the race of their physicians.

†P<0.001 for the comparison between black patients and white patients, regardless of the race of their physician.

‡These patients served as the reference group.

§P<0.001 for the comparison between black patients treated by white physicians and white patients treated by white physicians.

¶P=0.04 for the comparison between black patients treated by black physicians and white patients treated by black physicians.
LESS REVASCULARIZATION, MORE ANGINA

Figure 2. Revascularization (PCI and/or CABG surgery) status among blacks (n=295) and whites (n=1367) during the initial catheterization hospitalization and at 6 months (overall and by presence of single-vessel/multivessel disease). P values correspond to $\chi^2$ tests of revascularization rates among black and white patients.

Figure 3. Angina symptoms at baseline and 6 months among black (n=295) and white (n=1367) patients (overall and by presence of single-vessel/multivessel disease). $P$ values correspond to $\chi^2$ tests of revascularization rates among black and white patients.

Circulation
111: 2005
Weight of the Evidence

- African Americans less likely than whites to receive catheterization, angioplasty, bypass surgery and thrombolytic therapy
- Racial/ethnic differences in care remain after adjustment for clinical and socioeconomic factors
- Evidence of disparities in other procedures and treatments mixed
- Limited data on Latinos, Asians and Native Americans
Proportion responding that they believe that within the healthcare system in general, patients receive different care on the basis of the factors shown (n=344)

Proportion responding that they believe that clinically similar patients receive different care on the basis of race/ethnicity by proximity to practice (n=344)
Percentage reporting that specific patient characteristics contribute a great deal to racial/ethnic disparities in cardiovascular care in the United States

Percentage reporting that specific nonclinical factors contribute a great deal to racial/ethnic disparities in cardiovascular care in the United States.

- Insurance
- Insurance type
- MD Availability
- Cardiac MD availability
- Same race MD availability
- Quality care
- MD attitudes
- Miscommunication
- Lack of time
- Lack continuity care
- Lack of translators
- Fear of litigation

Percentage achieving goals at 1-year follow-up by intervention group (community based vs standard clinic)

Potential Primary Prevention Implantable Cardioverter-Defibrillator (ICD) Patients Lack Understanding, Want More Information and are Willing to Reconsider Implant Refusal

N Singh, E Hall, E Lucas, S Chandra, D Song, L Yan, D Suh, A Dorsey, S Ramamurthy
Summary
Back up Slides