Measuring and Addressing Disparities in Stroke Prevention

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Consultant for Boehringer Ingelheim, Sanofi, GlaxoSmithKline, Merck, Wyeth

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UNLABELED/UNAPPROVED USES DISCLOSURE: None
African Americans have nearly twice the mortality from stroke according to US health statistics.

Little is known about Hispanics, the fastest growing population in the US.

Prior stroke epidemiology studies have been performed in predominantly white populations.
260,000 people
15% White
20% Black
63% Hispanic
(Dominican 60%)
Annual Stroke Incidence
Northern Manhattan Stroke Study

Age-adjusted stroke incidence for white, black, and Hispanic northern Manhattan residents over age 20

Source: Sacco et al., *Am J Epidemiol* 1998;147
Relative Risk of Stroke by Race

Northern Manhattan Stroke Study

Race-Ethnic Group
(White is the reference group)
Northern Manhattan Stroke Study
Frequency of first choice diagnosis

- Cryptogenic Infarction: 32.0%
- Cardiac Embolism: 15.7%
- Lacunar: 16.8%
- Atherosclerotic Intracranial: 5.9%
- Atherosclerotic Extracranial: 5.6%
- Conflicting Mechanism: 2.2%
- ICH: 15.7%
- SAH: 5.9%
- Total Infarcts: 78.4%

Total: RLS 12.00
Relative Risk of Stroke by Subtype

Northern Manhattan Stroke Study

Race and Gender Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Inf.</th>
<th>ICH</th>
<th>SAH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Men</td>
<td>2.0</td>
<td>2.4</td>
<td>5.3</td>
</tr>
<tr>
<td>Black Women</td>
<td>3.2</td>
<td>3.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Hispanic Men</td>
<td>1.9</td>
<td>2.9</td>
<td>1.3</td>
</tr>
<tr>
<td>Hispanic Women</td>
<td>2.3</td>
<td>2.0</td>
<td>1.3</td>
</tr>
</tbody>
</table>
Ischemic Stroke Subtypes for Whites, Blacks, and Hispanics
The Northern Manhattan Study
Northern Manhattan Stroke Study
Age Adjusted Relative Incidence Rates

Atherosclerotic Subtype

White as reference group
Northern Manhattan Stroke Study
Age-Adjusted Relative Incidence Rates

Non-Atherosclerotic Subtype

White as reference group

Relative Risk

- LAC
  - Hispanics: 3.1
  - Blacks: 2.3

- CEMB
  - Hispanics: 1.6
  - Blacks: 1.4

- CRYPT
  - Hispanics: 1.8
  - Blacks: 1.4
Stroke Risk Factors

Modifiable

Behavioral
- Smoking
- Alcohol use
- Physical Inactivity
- Obesity and Waist-Hip Ratio

Medical
- Hypertension
- Diabetes
- Coronary Artery Disease
- Atrial Fibrillation
- Lipids
## Ischemic Stroke Subtypes for Whites, Blacks, and Hispanics

### The Northern Manhattan Study

<table>
<thead>
<tr>
<th>Table 1. Sociodemographic Data and Risk Factors Among Individuals With First Ischemic Stroke in Northern Manhattan 1993–1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
</tr>
<tr>
<td>(n=714)</td>
</tr>
<tr>
<td>Age at first ischemic stroke, y</td>
</tr>
<tr>
<td>Male gender, n (%)</td>
</tr>
<tr>
<td>More than a high school education,* n (%)</td>
</tr>
<tr>
<td>Hypertension, n (%)</td>
</tr>
<tr>
<td>Diabetes, n (%)</td>
</tr>
<tr>
<td>Hypercholesterolemia, n (%)</td>
</tr>
<tr>
<td>Myocardial infarct, n (%)</td>
</tr>
<tr>
<td>Atrial fibrillation, n (%)</td>
</tr>
<tr>
<td>Current smoker, n (%)</td>
</tr>
<tr>
<td>Heavy alcohol use, n (%)</td>
</tr>
<tr>
<td>Prior TIA,* n (%)</td>
</tr>
</tbody>
</table>
Smoking in NYC

Current smoking — racial/ethnic disparities and income disparities

Percent of adults who smoke

<table>
<thead>
<tr>
<th>Household Income</th>
<th>White</th>
<th>Black</th>
<th>Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; $25,000</td>
<td>30</td>
<td>25</td>
<td>22</td>
</tr>
<tr>
<td>$25,000 – $49,999</td>
<td>28</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>≥ $50,000</td>
<td>20</td>
<td>15</td>
<td>21</td>
</tr>
</tbody>
</table>

Percent are age-adjusted.
Source: NYC Community Health Survey, 2002
Survey respondents were asked: Do you now smoke cigarettes every day, some days, or not at all?
Obesity, NYC

About 1 in 4 Black and Hispanic New Yorkers are obese

Percent of adults who are obese

- White: 18, 16, 12
- Black: 28, 27, 23
- Hispanic: 25, 21, 23

Household Income
- < $25,000
- $25,000 – $49,999
- ≥ $50,000

Percents are age-adjusted.
Source: NYC Community Health Survey, 2002.
Obesity was defined as body-mass index ≥30, calculated from respondents’ height and weight.
Physical Inactivity, NYC

Income disparities in exercise rates

Percent of adults not exercising in the past month

<table>
<thead>
<tr>
<th>Household Income</th>
<th>White</th>
<th>Black</th>
<th>Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; $25,000</td>
<td>31</td>
<td>35</td>
<td>38</td>
</tr>
<tr>
<td>$25,000 - $49,999</td>
<td>20</td>
<td>26</td>
<td>29</td>
</tr>
<tr>
<td>≥ $50,000</td>
<td>14</td>
<td>21</td>
<td>19</td>
</tr>
</tbody>
</table>

Percent are age-adjusted.
Source: NYC Community Health Survey, 2002
Survey respondents were asked: During the past 30 days, other than your regular job, did you participate in any physical activities or exercises, such as running, calisthenics, golf, gardening, or walking for exercise?
No Physical Activity: Etiologic Fraction

Northern Manhattan Stroke Study

Matched for age and gender and adjusted for HTN, DM, AF, CAD, and education.

Sacco et al. *Stroke* 2001;32:1725-31
WHR and Ischemic Stroke
Stratified by Gender, Age, and Race-ethnicity
Northern Manhattan Stroke Study

Gender-Specific Median
Adjusting for HTN, DM, LDL-C, HDL-C, Smoking, Cardiac Disease, Moderate Alcohol, Any Physical activity, Education and BMI

Suk et al. Stroke 2002
# Stroke Risk Factors

## Modifiable

| Medical | • Hypertension  
|         | • Diabetes  
|         | • Coronary Artery Disease  
|         | • Atrial Fibrillation  
|         | • Lipids  |
Hypertension: Etiologic Fraction
Northern Manhattan Stroke Study

Matched for age and gender and adjusted for DM, AF, CAD, no physical activity, and education.

Sacco et al. *Stroke* 2001;32:1725-31
Diabetes Prevalence in NYC
By Ethnicity, 2002

Healthy People 2010 Goal: 2.5%
Atrial Fibrillation: Etiologic Fraction

Northern Manhattan Stroke Study

Matched for age and gender and adjusted for HTN, DM, CAD, no physical activity, and education.

Sacco et al. Stroke 2001;32:1725-31
Cholesterol and Stroke Subtypes

Age-Adjusted Prevalence of Americans Age 20 and Older With LDL Cholesterol > 130 mg/dL
NHANESI: 1999-2002

Source: CDC/NCHS and NHLBI. NH – non-Hispanic.
Lipids across Race-Ethnicity

- Washington Height and Inwood Community Aging Program Study (WHICAPS)
  - Cross-Sectional study of 1,118 men and women living in Northern Manhattan

- Race was an independent predictor of all lipid and lipoprotein levels
- Hispanics had lower HDL-C
- African-Americans had higher HDL-C
  - More had HDL-C levels >55mg/Dl
- Triglycerides levels were also lower among African-Americans

Rodriguez C Am J Cardiol 2002;89:178
NOMAS: Dyslipidemia by Ethnicity/Race

Percent with TC > 240

- Blacks: 15.5%
- Hispanics: 16.2%
- Whites: 17.8%

Percent with LDL > 130

- Blacks: 42.3%
- Hispanics: 47.5%
- Whites: 50.5%

P Value = 0.52

P Value = 0.01
NOMAS: Dyslipidemia by Ethnicity/Race

Percent with HDL < 40

P Value < 0.0001

Percent with TG > 150

P Value < 0.0001

BLACKS: 23.2%
WHITES: 28.8%
HISPANICS: 40.8%
BLACK: 17.5%
WHITE: 28.1%
HISPANIC: 35.2%
NOMAS: Treatment of Dyslipidemia Among Hispanics

Of those with TC > 240,
% on Lipid Lowering Therapy at enrollment

83

Of those with LDL > 130,
% on Lipid Lowering Therapy at enrollment

86.3
Race, ethnicity, and sociocultural characteristics predict noncompliance with lipid-lowering medications

Robert C. Kaplan, Ph.D., a, * Narendra C. Bhalodkar, M.D., b Edward J. Brown Jr., M.D., b Jessica White, a and David L. Brown, M.D. a, c

<table>
<thead>
<tr>
<th>Factor</th>
<th>Multivariate-adjusted OR</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 50 years</td>
<td>1 reference group</td>
<td></td>
<td>0.78</td>
</tr>
<tr>
<td>50–59 years</td>
<td>1.5</td>
<td>0.5, 3.5</td>
<td></td>
</tr>
<tr>
<td>60–69 years</td>
<td>0.9</td>
<td>0.3, 2.5</td>
<td></td>
</tr>
<tr>
<td>70–79 years</td>
<td>1.2</td>
<td>0.4, 3.6</td>
<td></td>
</tr>
<tr>
<td>80 years and older</td>
<td>2.3</td>
<td>0.5, 11.6</td>
<td></td>
</tr>
<tr>
<td>Female sex</td>
<td>0.8</td>
<td>0.4, 1.6</td>
<td>0.54</td>
</tr>
</tbody>
</table>

No side effects

| Mildly unpleasant side effects      | 1.0                      | < 0.01       |         |
| Very unpleasant side effects       | 3.9                      | 1.8, 8.8     |         |

Sad, blue, depressed, or lost pleasure in things

| white, blue, depressed, or lost | 1.9                      | 1.0, 3.5     | 0.05    |
| pleasure in things | | | |

> 2 weeks of year

| White Non-Hispanic                 | 1.0                      | < 0.01       |         |
| Black                              | 3.7                      | 1.0, 13.5    |         |
| Hispanic                           | 6.3                      | 1.8, 22.2    |         |
| Other or unknown race              | 6.0                      | 1.0, 35.8    |         |

Married or living with partner

| Single or divorced                 | 2.1                      | 1.1, 4.2     |         |
| Widow or widower                   | 0.4                      | 0.1, 1.4     |         |

Children in home (per child)

| No health insurance                | 2.4                      | 1.0, 5.7     | 0.05    |
Stroke Risk and Metabolic Syndrome
The Northern Manhattan Study

The Metabolic Syndrome
3+ vascular factors

BP $\geq$ 130/85 or Hx

Triglyceride $> 150$ mg/dl

Blood Sugar $> 110$ mg/dl

HDL M $\leq 40$ mg/dl
F $\leq 50$ mg/dl

Insulin Resistance
Hypercoagulability
Endothelial Dysfunction
Inc Hcy, fibrinogen, CRP, PAI-1, Uric Acid, apo B

Waist M $> 108$ cm
F $> 88$ cm
Stroke Risk and Metabolic Syndrome
The Northern Manhattan Study

Proportion Surviving

Time To Ischemic Stroke in Years

- No Metabolic Syndrome
- Metabolic Syndrome
Metabolic Syndrome and Ischemic Stroke Risk by Race-ethnicity

All models adjusted for age, race-ethnicity, gender, education, physical inactivity and current smoking.
Cholesterol Control
ASA 2006 Secondary Stroke Recs

• Those with elevated chol, CHD, or evidence of an atherosclerotic origin should be managed according to NCEP III (Class I, Evidence A).

• **Statins** are recommended with target LDL-C of <100 mg/dL and <70 mg/dL for the very high–risk (Class I, Evidence A).

• Those with no pre-existing indications for statins (nl chol levels, no CHD, or no atherosclerosis), are reasonable to consider for statins to reduce the risk of vascular events (Class IIa, Evidence B).
GWTG-Stroke
2005 ASA International Stroke Abstract Presentations
Table B: Get With The Guidelines—Stroke Produces Sustainable Improvements in Hospital-Based Acute Stroke Care

<table>
<thead>
<tr>
<th>Measure</th>
<th>Base</th>
<th>Q2</th>
<th>Q4</th>
<th>Q6</th>
<th>Q8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rx-AT-DC</td>
<td>92.5</td>
<td>96.3</td>
<td>97.4</td>
<td>97.2</td>
<td>97.9</td>
</tr>
<tr>
<td>WAR-AF-Rx-DC</td>
<td>92.2</td>
<td>96.1</td>
<td>96.0</td>
<td>97.1</td>
<td></td>
</tr>
<tr>
<td>LDL-100-Rx-DC</td>
<td>78.9</td>
<td>75.5</td>
<td>79.5</td>
<td>81.0</td>
<td></td>
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<tr>
<td>DM-Rx-DC</td>
<td>56.0</td>
<td>68.1</td>
<td>73.4</td>
<td>83.1</td>
<td>86.1</td>
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<tr>
<td>SMOKE-Rx-DC</td>
<td>45.3</td>
<td>41.8</td>
<td>56.0</td>
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<tr>
<td>BMI-Rx-DC</td>
<td>39.1</td>
<td>41.8</td>
<td>39.1</td>
<td>34.6</td>
<td>38.4</td>
</tr>
</tbody>
</table>
Other Stroke Risk Factors

- Diet and Vitamins
- Homocysteine
- Chronic Infections and Inflammation
- Coagulation factors
- Stress
- Genetic factors
ASA INITIATIVES – Power to End Stroke Update
Future Research
Ethnic Disparities

• Improve implementation of proven stroke prevention guidelines
• Develop and validate better tools for assessment of stroke risk
• Detect new modifiable risk factors
• Test novel risk factor control strategies
• Disseminate news to the Public