Changes in Stroke Demographics
Is the Stroke Belt Migrating?

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Disclosures

- None

- Disclaimer – The findings and conclusions presented in this talk are those of the presenter and do not necessarily represent the official position of the Centers for Disease Control and Prevention
“During the past decade, remarkable advances have taken place in our knowledge of cerebrovascular disease. The significant contributions of various investigators in this field have indeed created a dramatic "breakthrough" in recognition, prevention, diagnosis, and treatment of this disease entity. With modern knowledge in medicine, many patients for whom stroke may be anticipated can now be recognized and treated effectively to avert catastrophe. In addition, there is considerable clinical evidence to suggest that among those who have suffered stroke modern treatment, if properly used, can reduce or prevent premature death and chronic disability.”


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Goals

- **Consider the data**
  - Recent data trends in stroke mortality
  - Definitions of the Stroke Belt
- **Is the stroke belt expanding/changing/migrating?**
- **Is it really a Stroke Belt?**
- **Why is there a Stroke Belt?**
HISPANIC & BLACK STROKE MORTALITY, 1999–2010

Hispanic Stroke Mortality

2005-2007

2008-2010

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HISTORIC & CURRENT PATTERNS OF GEOGRAPHIC DIFFERENCES IN STROKE MORTALITY IN THE U.S.

Non-Hispanic Black Stroke Mortality

2005-2007

2008-2010

The geographic distribution of mortality due to cerebrovascular disease in the United States is presented. A definite clustering pattern of mortality is revealed and discussed. Furthermore, the authors point out a decline in mortality from this condition in the white population of the United States and discuss questions related to this development.

**CHANGES AND GEOGRAPHIC DISTRIBUTION OF MORTALITY FROM CEREBROVASCULAR DISEASE**

Nemat O. Borhani, M.D., M.P.H., F.A.P.H.A.
1965–2010, each map progresses by 5 years, all ages

**STATE CHANGES IN QUINTILE DISTRIBUTION OF STROKE MORTALITY**

Data source: CDC WONDER, www.cdc.gov
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2010 Stroke Mortality

<table>
<thead>
<tr>
<th>Rate Range</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.91 – 33.51</td>
<td>Light Purple</td>
</tr>
<tr>
<td>34.52 – 38.09</td>
<td>Purple</td>
</tr>
<tr>
<td>38.65 – 44.4</td>
<td>Dark Purple</td>
</tr>
<tr>
<td>44.49 – 53.75</td>
<td>Darker Purple</td>
</tr>
<tr>
<td>40.69 – 53.75</td>
<td>Very Dark Purple</td>
</tr>
</tbody>
</table>

Stroke Mortality Rate 2005 – 2007

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Stroke Mortality Rate 2008 – 2010

Hemorrhagic Stroke, Ages 35+, 2008-2010

Ischemic Stroke, Ages 35+, 2008-2010

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DEFINITIONS OF THE STROKE BELT
The National Heart, Lung, and Blood Institute (NHLBI) examined the 1980 age-adjusted stroke mortality rates by State. Eleven States had stroke death rates that were more than 10 percent higher than the U.S. average:

Alabama, Arkansas, Georgia, Indiana, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. Ten of these States are in a contiguous cluster in the Southeast. Indiana, the remaining State, is located on the northern border of the Southeast cluster. The NHLBI designated these 11 States as the Stroke Belt.

In FY 1991 and 1994, NHLBI funded state health department pilot projects to reduce stroke risk in the stroke belt. Each for 2-3 years.
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NHLBI Stroke Belt Based on 1980 Stroke Mortality and the Same Map using 2010 Stroke Mortality

http://wonder.cdc.gov/controller/datarequest/D76;jsessionid=8437190F97AE8F967D8E805C7953C677

Other Definitions of the Stroke Belt

- More recently, people have been meaning an 8-state region of the southeast as the stroke belt

- North Carolina
- South Carolina
- Georgia
- Tennessee
- Alabama
- Mississippi
- Arkansas
- Louisiana
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North Florida in the Stroke Belt?

- In 1992, Seigel et al (Florida Department of Health) identified a contiguous group of 34 counties in northern Florida that fit the NHLBI definition for inclusion in the stroke belt, and declared these counties as part of the stroke belt.

ARE TEXAS & OKLAHOMA PART OF THE STROKE BELT TODAY?

Texas and Oklahoma?

• Based on 1980 age-adjusted stroke mortality data, OK and TX were the next 2 states below the cut-off of 10% above the average – missed the cut-off by about 1%.
• Based on the 10% cut-off logic used in 1980 by NHLBI, OK and TX would now be part of the stroke belt.
Texas and Oklahoma?

• Stroke mortality rates equivalent with states in the current definition of the stroke belt
• Changes in high stroke mortality clusters over the past 10-15 years show that most of the change to from low- to high-rate clusters is in TX
• What is your conclusion?

IS IT REALLY A STROKE BELT?
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[Maps and statistical data related to health metrics such as ischemic stroke mortality, smoking prevalence, age-adjusted diabetes incidence, and hypertension hospitalization rates, along with related factors like obesity, education levels, and physical inactivity.]
“Two of the great mysteries of stroke epidemiology

…are the higher stroke mortality experienced by African Americans and by Southerners. Standard epidemiological reasoning would suggest that because a larger proportion of the population living in the ‘stroke belt’ region is African American, geography is a potential confounder of the estimated increased risk normally attributed to black race. In this report we have established that this is the case.”

This study found that between 2 and 15% of the excess mortality, normally attributed to black race, is attributable to geography (the southeast)

It is still not clear what the real underlying factors associated with either race or geography are.


1997

• Less than 16% of this excess stroke mortality was attributable to SES.

• Conclusions: SES does not appear to be a major contributor to the excess mortality in the southeastern United States. Of additional concern is the stroke buckle region, which was shown to have stroke mortality rates substantially greater than those in the traditionally recognized stroke belt.

Advancing the Hypothesis that Geographic Variations in Risk Factors Contribute Relatively Little to Observed Geographic Variations in Heart Disease and Stroke Mortality

**Conclusions**—Weak associations between CHD and stroke mortality and strong associations between CHD and stroke risk scores suggest geographic variation in risk factors may not underlie geographic variations in stroke and CHD mortality. The relationship between risk factor scores and mortality was stronger for CHD than stroke.

George Howard, DrPH, Mary Cushman, MD, MSc, Ronald J. Prineas, MD, PhD, Virginia J. Howard, PhD, Claudia S. Moy, PhD, Lisa M. Sullivan, PhD, Ralph B. D’Agostino Sr., PhD, Leslie A. McClure, PhD, Lea Vonne Pulley, PhD, and Monika M. Safford, MD. Prev Med. 2009; 49(2-3): 129–132.

Causes?

- Traditional risk factors
- Poverty & other SES factors
- Access to care
- Fried fish
- Southern diet – salty and higher fat
  - fried chicken, French fries, sweet tea, processed meats, salty greens,
  - low potassium (tomatoes, melons, avocados)

• The primary determinants of disease are mainly economic and social, and therefore its remedies must also be economic and social.

~ Geoffrey Rose, 1992, in Rose’s Strategy of Preventive Medicine