Preventing Stroke: Some Reflections from NIH

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NIH Extramural & Intramural Funding
FY 2011 Enacted: $30.9 Billion

- Spending at NIH
  $5.0 B
  16%

- Spending Outside NIH
  $25.9 B
  84%

Spending at NIH:
- $3.3 B Intramural Research
- $1.5 B Research Management & Support
- $0.2 B Buildings and Facilities, Other

Spending Outside NIH:
- Supports over 325,000 Scientists & Research Personnel
- Supports over 3,000 Institutions
“Science in pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life and reduce illness and disability.”
Selected NINDS-supported Stroke epidemiology projects

• Greater Cincinnati/Northern Kentucky Stroke Project
• Northern Manhattan Stroke Study
• Minnesota Stroke Survey
• Siblings With Ischemic Stroke Study
• Brain Attack Surveillance in Corpus Christi
• Precursors of Stroke Incidence and Prognosis
• Alaska Native Stroke Registry
• Reasons for Geographic and Racial Differences in Stroke
• Ethnic/Racial Variation in Intracerebral Hemorrhage
• Stroke Prevention/Intervention Research Program – *program projects currently ongoing at UCLA, UCSF, and U. Miami*

• Health Disparities Advisory Panel – 2010 report

• Interventions Designed to Eliminate Stroke Disparities (IDEAS) workshop – Nov. 2013
Clinical trials

- Currently approximately 60 stroke trials funded by NINDS
- Includes pilot, phase I, II, or III
- SPRG identified need for greater participation of non-academic medical centers in stroke clinical trials
- Recommend a large, randomized, community-based trial combining an effective means of primary prevention with acute stroke treatment
NINDS- funded phase III stroke prevention trials

- NASCET: endarterectomy reduces stroke risk in symptomatic patients
- ACAS: endarterectomy reduces stroke risk in asymptomatic patients
- SPAF: warfarin better than aspirin in preventing stroke in non-valvular atrial fibrillation
- WARSS: warfarin vs aspirin to prevent recurrent stroke
- WEST: hormone replacement therapy in post-menopausal women
- VISP: vitamins to reduce homocysteine
- WASID: warfarin vs. aspirin in symptomatic intracranial disease
Stroke Prevention Trials, continued

- AAASPS: antiplatelet therapy to prevent recurrent stroke, death, MI
- WARCEF: warfarin vs. aspirin for reduced ejection fraction
- CREST: carotid endarterectomy vs stenting to prevent recurrent stroke
- COSS: carotid occlusion surgery
- SPS3: intensive blood pressure control and antiplatelet therapy to prevent recurrent stroke
- IRIS: management of insulin resistance to prevent recurrent stroke
- SAMMPRIS: stent vs medical management to prevent recurrent stroke in intracranial stenosis
- POINT: antiplatelet therapy to prevent stroke after TIA
What Are the Underlying Causes of Death in the United States?

From Schroeder, N Engl J Med 2007; 357:1221-1228

- A variety of different analyses consider the factors underlying the most common cause of death.
- Across studies, the high estimate for the benefits of health care is 20%, with most studies estimating around 10%.
Lifestyle and Risk of Stroke in Finland - 13.7 year follow-up

All Strokes (Ischemic + Hemorrhagic) by Physical Activity

<table>
<thead>
<tr>
<th>Level of Physical Activity</th>
<th>Relative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>1</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.8</td>
</tr>
<tr>
<td>High</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Data from Zhang et al
Arch Intern Med.
2011;171(20):1811-1818

Hemorrhagic Stroke by Smoking

<table>
<thead>
<tr>
<th>Smoking Status</th>
<th>Relative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>1</td>
</tr>
<tr>
<td>Ever</td>
<td>1.5</td>
</tr>
<tr>
<td>Current</td>
<td>2</td>
</tr>
</tbody>
</table>

Hemorrhagic Stroke by Vegetable Consumption

<table>
<thead>
<tr>
<th>Servings Per Week</th>
<th>Relative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>0.8</td>
</tr>
<tr>
<td>&gt;1</td>
<td>0.6</td>
</tr>
<tr>
<td>&gt;7</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Data from Zhang et al
Arch Intern Med.
2011;171(20):1811-1818
Change in Female Mortality Rates From 1992–96 To 2002–06 In US Counties.

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The Stroke Belt

Stroke Death Rates
2002-2007, Adults Ages 35+, by County

http://apps.nccd.cdc.gov/GISCVH2/
Self-Report of Stroke, Transient Ischemic Attack, or Stroke Symptoms and Risk of Future Stroke in the Reasons for Geographic And Racial Differences in Stroke (REGARDS) Study
Risk of future stroke (Kaplan-Meier) after self-report stroke, transient ischemic attack (TIA), or stroke symptoms in REGARDS

Judd S et al. Stroke 2012;44:55-60
Black-to-white hazard ratio (and 95% confidence interval) for intracerebral hemorrhage as a function of age after adjustment for sex, systolic blood pressure, and warfarin use.

Prevalence of two or more stroke symptoms and stroke symptom clusters by diabetes status: the REGARDS study.

Carson A P et al. Dia Care 2012;35:1845-1852
Even at Current Levels…

- Awareness: 80%
- Treatment: 70%
- Control: 50%

\[0.8 \times 0.7 \times 0.5 = 0.28\]

Only 28% of people with high blood pressure are being successfully treated.
Proportion of population aware, treated, and controlled in NHANES, CHS, and REGARDS.

Howard G et al. Stroke 2006;37:1171-1178
Future directions

• Impact of disease and treatment on quality of life
• Impact of vascular risk factors on cognitive decline
• Health disparities in stroke risk
• Common data elements in stroke trials
Summary

New Directions in Stroke Prevention

• NIH is back to work
• Several NIH Institutes and Centers are interested in heart disease and stroke prevention
  – NINDS
  – NHLBI
  – NICHD
  – NIA
  – NIDCD