Update on stroke prevention, 2013

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Stroke Statistics

- 795,000 strokes a year in the United States
- 1 stroke every 40 seconds, fatal stroke every 3 minutes
- 11 million “silent strokes”: vascular dementia
- 4th leading cause of death (160,000/y)
- A leading cause of disability, 5.8 million stroke survivors
- Risk in males, older people, AA, Latinos
- Most strokes are preventable

The Stroke Belt

Stroke: Time is Brain:
Every minute, 1.9 million neurons are lost
Transient ischemic attacks: The “warning signs” of stroke

- Sudden loss of vision, one eye
- Sudden difficulty speaking or understanding
- Weakness or numbness on one side
- Dizziness, with loss of balance, difficulty walking
- Sudden, severe headache
Prognosis After TIA

1707 patients with TIA identified by ED physicians among 16 hospitals in northern California; follow-up to 90 days

Probability of Survival Free From Stroke of Adverse Events

Stroke 10.5%
Adverse Events 25.1%
(stroke, cardiovascular hospitalization, death or recurrent TIA)

Number of Patients at Risk
Stroke: 1001 1577 1527 1480 1451
Adverse Events: 1001 1462 1361 1293 1248

Stroke Risk and ABCD² Score
Oxfordshire TIA Study

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum score is 7. Score 6 or 7 = high risk</td>
</tr>
<tr>
<td><strong>A</strong>ge ≥60 years</td>
<td>1 point</td>
</tr>
<tr>
<td><strong>Blood pressure</strong> ≥140/90 mm Hg</td>
<td>1 point</td>
</tr>
<tr>
<td><strong>Clinical features</strong> [of TIA]</td>
<td>2 points for unilateral weakness</td>
</tr>
<tr>
<td></td>
<td>1 point for speech impairment without</td>
</tr>
<tr>
<td></td>
<td>weakness</td>
</tr>
<tr>
<td><strong>Duration</strong> [of TIA]</td>
<td>2 points for ≥60 minutes</td>
</tr>
<tr>
<td></td>
<td>1 point for 10-59 minutes</td>
</tr>
<tr>
<td><strong>Diabetes</strong></td>
<td>1 point</td>
</tr>
</tbody>
</table>


7-day stroke risk was 8.5-10.5%
Stroke Risk by ABCD² Score

N=4799.

EXPRESS Results
Phase I-Usual care: rate of stroke 10.3%
Phase II-Urgent care: rate of stroke 2.1% (p<.0001)

Rothwell et al, LANCET. 2007;370:1432-42
What do we do for TIA patients?

- Admit for observation
- ECG monitoring, carotid/VB imaging, echocardiogram, fasting lipids, A1C
- Initiate medical therapy (usually aspirin, but note CHANCE study and ongoing POINT study, early ASA+clopidogrel load)
Menu for Stroke Prevention (Primary and Secondary)

- Hypertension
- Hyperlipidemia (diet/statins)
- Diabetes
- Smoking
- Exercise
- Sleep apnea management
- Carotid endarterectomy/stenting
- Atrial fibrillation and other emboli, anticoagulation
- Antiplatelet therapy: aspirin, clopidogrel, ASA/ER-dipyridamole
How Many Strokes in the US Can Be Prevented by Risk Factor Control?

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th># of Preventable Strokes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>360,500</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>146,000</td>
</tr>
<tr>
<td>Cigarettes</td>
<td>89,500</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>68,500</td>
</tr>
<tr>
<td>Heavy alcohol use</td>
<td>34,500</td>
</tr>
</tbody>
</table>

*Based on estimated 700,000 annual strokes
Antihypertensives and Stroke Prevention

- Hypertension in 1/3 of U.S. population, the largest risk factor for stroke
- Risk of stroke is 6 times higher in people with hypertension than those with normal BP
- Multiple studies support 1st stroke reduction with antihypertensive Rx, upwards of 40%

# HYPERTENSION

7th Joint National Committee (JNC7) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure

<table>
<thead>
<tr>
<th>BP Classification</th>
<th>SBP* (mm Hg)</th>
<th>DBP* (mm Hg)</th>
<th>Lifestyle Modification</th>
<th>Initial Drug Therapy Without Compelling Indications</th>
<th>Initial Drug Therapy With Compelling Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120 and &lt;80</td>
<td>Encourage</td>
<td></td>
<td>No antihypertensive drug indicated</td>
<td>Drug(s) for compelling indications†</td>
</tr>
<tr>
<td>Pre-hypertension</td>
<td>120-139</td>
<td>80-89</td>
<td>Yes</td>
<td>Thiazide-type diuretics†</td>
<td>Drug(s) for compelling indications†</td>
</tr>
<tr>
<td>Stage 1 Hypertension</td>
<td>140-159</td>
<td>90-99</td>
<td>Yes</td>
<td>2-drug combination therapy</td>
<td>Other anti-hypertensives</td>
</tr>
<tr>
<td>Stage 2 Hypertension</td>
<td>≥160</td>
<td>≥100</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Treatment determined by highest category.
† Treat patients with chronic kidney disease or diabetes to BP goal of <130/80 mm Hg.
‡ May consider ACEI, ARB, BB, CCB, or combination.
Hypertension and Stroke

- **ACE inhibitors (HOPE, 1\(^0\) prevention, PROGRESS, 2\(^0\) prevention):** 28-32% reductions in stroke
- **ACE Receptor Blockers (ARB’s):** multiple studies (LIFE, SCOPE, ACCESS, VALUE, MOSES): also effective; **OnTarget:** ARB telmisartan equal to ramipril, both had increased toxicity
- **ALLHAT:** thiazide as effective as ACE, ACE alone ineffective in African American patients
- **ACE or ARB + diuretic, Ca channel blockers** effective and well tolerated, Beta blockers not as effective in stroke prevention


**PROGRESS Trial: secondary stroke prevention**

- **Proportion with event**
  - 95% CI 17 - 38%
  - *P* < 0.0001

- **Placebo**
- **Active (perindopril ± indapamide)**

- **28% RR**

Graph showing the proportion of events over time for Placebo and Active groups, with a significant reduction in the active group compared to the placebo group.
Blood Pressure and stroke
What to conclude?

- All studies support detection and aggressive treatment of hypertension
- Stroke prevention of 40-50% possible primary, 28% secondary
- Control of BP is more important than exact choice of agent
- ACE-i or ARB + diuretic may be advantageous, Ca channel blockers
Cholesterol and Stroke

- Little direct correlation between serum cholesterol and stroke (Framingham)
- Statin drugs: new data, “pleotropic effects”: plaque stability, antithrombotic, antiinflammatory (CRP), etc.
- Post MI: 4S, CARE, LIPID trials all show that statins prevent stroke as well as recurrent MI
- Simvastatin and pravastatin FDA indicated for post-MI stroke prevention
- ATPIII: stroke indication only carotid disease
- Recent studies (HPS, SPARCL) suggest statin therapy is indicated after stroke
<table>
<thead>
<tr>
<th>Risk Category</th>
<th>LDL Goal (mg/dL)</th>
<th>LDL Level at Which to Initiate Therapeutic Lifestyle Changes (TLC) (mg/dL)</th>
<th>LDL Level at Which to Consider Drug Therapy (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHD or CHD Risk Equivalents (10-year risk &gt;20%)</td>
<td>&lt;100</td>
<td>≥100</td>
<td>≥130 (100–129: drug optional)</td>
</tr>
<tr>
<td>2+ Risk Factors (10-year risk ≤20%)</td>
<td>&lt;130</td>
<td>≥130</td>
<td>10-year risk 10–20%: ≥130</td>
</tr>
<tr>
<td>0–1 Risk Factor</td>
<td>&lt;160</td>
<td>≥160</td>
<td>10-year risk &lt;10%: ≥160 (160–189: LDL-lowering drug optional)</td>
</tr>
</tbody>
</table>

CHD, coronary heart disease
Stroke Prevention with Aggressive Reduction in Cholesterol Levels (SPARCL)

- 4731 patients with stroke or TIA, LDL 100-190
- Randomized to atorvastatin 80 mg v placebo
- Mean on treatment LDL
  - Atorvastatin 73 mg/dL
  - Placebo 129 mg/dL
- 16% RRR for stroke (p<.03)
- 23% reduction in stroke or TIA (p<.001)
- Slight increase in cerebral hemorrhage
- Conclusion: most stroke pts should receive statin

Welch KM. 15th European Stroke Conference (ESC); May 18, 2006; Brussels, Belgium
**SPARCL**  Effects of High-dose Atorvastatin After Stroke or TIA

**SPARCL=Stroke Prevention by Aggressive Reduction in Cholesterol Levels.**


<table>
<thead>
<tr>
<th>Years Since Randomization</th>
<th>No. at Risk</th>
<th>Atorvastatin</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2365</td>
<td>2148</td>
<td>2023</td>
</tr>
<tr>
<td></td>
<td>2366</td>
<td>2132</td>
<td>1998</td>
</tr>
<tr>
<td></td>
<td>1933</td>
<td>1871</td>
<td>1837</td>
</tr>
<tr>
<td></td>
<td>1837</td>
<td>1780</td>
<td>1780</td>
</tr>
<tr>
<td></td>
<td>871</td>
<td>803</td>
<td>803</td>
</tr>
<tr>
<td></td>
<td>119</td>
<td>126</td>
<td>126</td>
</tr>
</tbody>
</table>

HR, 0.77 (95% CI, 0.67–0.88); P<0.001
Diabetes and Stroke

- Patients with diabetes require more rigorous control of blood pressure (<130/80 mm Hg) and blood lipids (LDL < 100)
- Tight glycemic control can reduce microvascular disease, including neuropathy
- Trends towards reduction in macrovascular disease (MI, stroke), but excessive glycemic control can increase mortality*
- Aim for HbA1C < 7


SMOKING CESSATION

- Smoking increases stroke risk 2-3 fold
- Risk decreases to baseline ~4 years after stopping
- Importance of providing help in hospital
- Behavioral therapy
- Rx: bupropion, patches, varenicline (ChantixR)
Stroke Subtypes

**Hemorrhagic Stroke (17%)** Ischemic Stroke (83%)

- Intracerebral Hemorrhage (59%)
- Subarachnoid Hemorrhage (41%)
- Atherothrombotic Cerebrovascular Disease (20%)
- Lacunar (SV) (25%)
- Embolism (20%)
- Cryptogenic, or other, known Cause (30%)

Carotid endarterectomy and stenting
Absolute Benefits of Carotid Endarterectomy (CEA)

CEA showed only marginal benefits on annual rates of ipsilateral stroke for patients with asymptomatic or moderate lesions. Dramatic benefit was seen for high-grade symptomatic stenoses.
Carotid Stenting: an Emerging Option
CREST final results
(CEA v CAS)

- 2502 pts, 53% asymptomatic
- 1<sup>st</sup> endpoint: stroke, MI, death
- CAS 7.2%, CEA 6.8% (p=0.51)
- Stroke or death 6.4% CAS, 4.7% CEA (p=.03)
- Perioperative Stroke 4.1% vs 2.3% (p=.01) but severe strokes ~1% in each group
- Perioperative MI 1.1% vs 2.3% (p=.03)
- After the periprocedural period, ipsilateral stroke rates were CAS 2.0%, CEA 2.4%
Primary End Point, According to Treatment Group

When to use warfarin in stroke? (Red Clot vs White Clot)

- Atrial fibrillation and related cardiac sources
- PFO/Atrial septal aneurysm (?)
- Venous sinus thrombus
- Hypercoagulable states (APL antibody (??))
- Carotid, vertebral dissections (?)
- Intracranial stenosis (X)
- “Treatment failures” (X)
Intention-to-Treat Analysis

Stroke rate (% / year)

<table>
<thead>
<tr>
<th>Study</th>
<th>Control</th>
<th>Warfarin</th>
<th>Person-years</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFASAK</td>
<td>4.6</td>
<td>1.9</td>
<td>825</td>
<td>0.03</td>
</tr>
<tr>
<td>SPAF</td>
<td>7.0</td>
<td>2.3</td>
<td>504</td>
<td>0.01</td>
</tr>
<tr>
<td>BAATAF</td>
<td>3.0</td>
<td>0.4</td>
<td>922</td>
<td>0.002</td>
</tr>
<tr>
<td>CAFA</td>
<td>3.6</td>
<td>2.1</td>
<td>490</td>
<td>&gt;0.2</td>
</tr>
<tr>
<td>SPINAF</td>
<td>4.3</td>
<td>0.9</td>
<td>896</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Adapted from Atwood, Albers. Herz 1993; 18: 27-38
CHADS\(_2\) Stroke Risk Stratification Scheme for Patients with Nonvalvular AF

Adapted from Hersi A and Wyse DG. 2005 *Curr Probl Cardiol*;30:175–234.

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>C Recent congestive heart failure</td>
<td>1</td>
</tr>
<tr>
<td>H Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>A Age ≥ 75 yrs</td>
<td>1</td>
</tr>
<tr>
<td>D Diabetes mellitus</td>
<td>1</td>
</tr>
<tr>
<td>S(_2) History of stroke or transient ischemic attack</td>
<td>2</td>
</tr>
</tbody>
</table>

- **0**: low risk, ASA only
- **1,2**: intermed Risk, ASA or warfarin (most do warfarin for 2)
- **>3**: high risk, warfarin

**Fig 6.** Relationship between CHADS\(_2\) score and annual risk of stroke (reproduced with permission\(^6\)).

Adapted from Hersi A and Wyse DG. 2005 *Curr Probl Cardiol*;30:175–234.
New Anticoagulants

- Direct thrombin inhibitor, dabigatran
- Two Factor Xa inhibitors: rivaroxaban and apixaban
- All have shorter half life, predictable effect on coagulation, do not require INR monitoring or dietary changes, few drug interactions
- More expensive, no reversal agents, renal
Cumulative Hazard Rates for the Primary Outcome of Stroke or Systemic Embolism, According to Treatment Group

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Months 0</th>
<th>Months 6</th>
<th>Months 12</th>
<th>Months 18</th>
<th>Months 24</th>
<th>Months 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warfarin</td>
<td>6022</td>
<td>5862</td>
<td>5718</td>
<td>4593</td>
<td>2890</td>
<td>1322</td>
</tr>
<tr>
<td>Dabigatran, 110 mg</td>
<td>6015</td>
<td>5862</td>
<td>5710</td>
<td>4593</td>
<td>2945</td>
<td>1385</td>
</tr>
<tr>
<td>Dabigatran, 150 mg</td>
<td>6076</td>
<td>5939</td>
<td>5779</td>
<td>4682</td>
<td>3044</td>
<td>1429</td>
</tr>
</tbody>
</table>
ROCKET AF: Primary Efficacy and Safety Outcomes
Non-Inferiority Analysis

Event Rate/100 Pt-Yrs

Rivaroxaban
Warfarin

P=0.001 noninf, Sig for superiority
P=0.001 for noninf
ICH = 0.5 vs 0.7

ROCKET AF: Primary Efficacy and Safety Outcomes

On Treatment Event Rate/100 Pt-Yrs

0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0

Stroke and Non-CNS Embolism

Major Bleeding Safety

Rivaroxaban FDA approved for stroke prevention in AF 11/11.
Event rates are per 100 patient-years. Based on safety on treatment or ITT.
Mahaffey KW. Presented at: American Heart Association 2010 Scientific Sessions; November 15, 2010; Chicago, IL.
AVERROES:
Stroke or Systemic Embolic Event and Major Bleeding

<table>
<thead>
<tr>
<th>Percent/Year</th>
<th>Apixaban*</th>
<th>Aspirin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke/Systemic Embolism</td>
<td>1.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Major Bleeding</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

\[ P < .001 \]
\[ P = .57 \]

Apixaban is now FDA-approved.
## WASID

**Warfarin-Aspirin Symptomatic Intracranial Disease Study: Results at Termination**

<table>
<thead>
<tr>
<th>Event</th>
<th>ASA 1300 mg qd (n=280)</th>
<th>Warfarin Targeted INR 2.0 to 3.0 (n=289)</th>
<th>Hazard ASA/Warfarin (95% CI)</th>
<th>P Value Log Rank Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1º Endpoint*</td>
<td>62 (22.1%)</td>
<td>63 (21.8%)</td>
<td>1.04 (0.73–1.48)</td>
<td>0.83</td>
</tr>
<tr>
<td>Death</td>
<td>12 (4.3%)</td>
<td>28 (9.7%)</td>
<td>0.46 (0.23–0.90)</td>
<td>0.02</td>
</tr>
<tr>
<td>Non-vascular Caused Death</td>
<td>3 (1.1%)</td>
<td>11 (3.8%)</td>
<td>0.3 (0.08–1.07)</td>
<td>0.05</td>
</tr>
<tr>
<td>MI</td>
<td>7 (2.5%)</td>
<td>12 (4.2%)</td>
<td>0.62 (0.24–1.58)</td>
<td>0.31</td>
</tr>
<tr>
<td>Major Hemorrhage†</td>
<td>9 (3.2%)</td>
<td>24 (8.3%)</td>
<td>0.39 (0.18–0.84)</td>
<td>0.01</td>
</tr>
</tbody>
</table>

*Ischemic stroke, brain hemorrhage, nonstroke vascular death.*
†Defined as any intracranial hemorrhage or systemic hemorrhage requiring hospitalization, blood transfusion, or surgery.

SAMMPRIS: Stenting vs Aggressive Medical Therapy for Intracranial Arterial Stenosis
(Stenting and Aggressive Medical Mgt for Preventing Recurrent Stroke in Intracranial Stenosis)

- Enrollment was stopped after 451 randomized pts, because the 30-day rate of stroke or death was 14.7% in the PTAS group vs 5.8% in the medical group (P=0.002).
- > 30 days, stroke in the same territory occurred in 13 pts in each group.
- The probability of a primary end-point event at 1 year was 20.0% in the PTAS group, 12.2% in the medical group (P=0.009).
- Conclusion: “In pts with intracranial stenosis, aggressive medical Rx was superior to PTAS with the Wingspan stent, both because the risk of early stroke after PTAS was high and because the risk of stroke with aggressive medical therapy alone was lower than expected”.
SAMMPRIS: Kaplan–Meier Curves for the Cumulative Probability of the Primary End Point, According to Treatment Assignment.

Oral Antiplatelet Agents: Mechanisms of Action

ADP = adenosine diphosphate, TXA$_2$ = thromboxane A$_2$, COX = cyclooxygenase.

Efficacy of Antiplatelets in Prevention of Ischemic Events (mostly ASA)

% of Patients Having Stroke, MI, or Vascular Death

- Prior Stroke/TIA: 22%↓
- Acute MI: 29%↓
- Prior MI: 25%↓
- Other High Risk: 32%↓
- High Risk: 27%↓
- All Patients: 25%↓

Is clopidogrel better than aspirin?
CAPRIE: Efficacy of Clopidogrel vs. Aspirin in MI, Stroke, or Vascular Death (n= 19,185)

*ITT analysis.
What about ASA + clopidogrel?

- Effective in acute coronary syndrome (CURE)
- 3 secondary stroke prevention studies all negative: MATCH, CHARISMA, SPS3; all showed increased bleeding
- Hence, should not be used routinely
- ? Effective in very acute Rx of stroke/TIA (CHANCE study, ongoing POINT study)
- ? Effective in TIA/stroke and IC stenosis (SAMMPRIS)

Probability of Survival Free of Stroke (CHANCE trial)


No. at Risk
Aspirin 2586 2307 2287 1906
Clopidogrel–aspirin 2584 2376 2361 1989

Hazard ratio, 0.68 (95% CI, 0.57–0.81) P<0.001
What about ASA+ER-dipyridamole?
ESPS 2: Effects on Stroke–RRR (Pairwise Comparisons)

ESPRIT trial: Nonrandomized, ASA v ASA + ER-dipyridamole, also showed 1° events in 13% (A+D), 16% (ASA).
### PROFESS

**Prevention Regimen for Effectively avoiding Second Strokes**

2x2 factorial design involving 20,000 stroke patients

<table>
<thead>
<tr>
<th>Telmisartan</th>
<th>ER-DP + ASA (200 mg/25 mg) + Telmisartan (80 mg) (5,000 pts)</th>
<th>Clopidogrel (75 mg) + Telmisartan (80 mg) (5,000 pts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo</td>
<td>ER-DP + ASA (200 mg/25 mg) + placebo (5,000 pts)</td>
<td>Clopidogrel (75 mg) + placebo (5,000 pts)</td>
</tr>
</tbody>
</table>

**PRoFESS: Primary Efficacy Outcome**

<table>
<thead>
<tr>
<th>Event</th>
<th>ER-DP + ASA</th>
<th>Clopidogrel</th>
<th>Hazard Ratio (95% Confidence Interval)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>First recurrent stroke</td>
<td>9.0%</td>
<td>8.8%</td>
<td>1.01 (0.92-1.11)</td>
<td>0.783</td>
</tr>
<tr>
<td>Recurrent ischemic stroke</td>
<td>7.7%</td>
<td>7.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemorrhagic stroke</td>
<td>0.8%</td>
<td>0.4%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Primary Outcome: Stroke Recurrence

<table>
<thead>
<tr>
<th>ASA+ER-DP</th>
<th>Clopidogrel</th>
<th>HR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>916 (9.0%)</td>
<td>898 (8.8%)</td>
<td>1.0</td>
<td>0.92, 1.11</td>
<td>0.783</td>
</tr>
</tbody>
</table>

* Covariates in cox model are age, baseline ACE-inhibitor use, Modified Rankin, and baseline diabetes status. (PRoFESS NEJM manuscript).
Cilostazol
(Dr. Y. Shinohara, ISC, 2/10)

- Cilostazol Stroke Prevention Study in Japan, more effective than placebo in secondary stroke prevention
- CSPS-2, 2757 noncardioembolic stroke pts, cilostazol 100 mg bid vs ASA 81 mg
- Stroke: 82/1337 C vs 119/1335 A, fatal 2 v 3
- ICH or major hemorrhage 23 C vs 57 A
- Other side effects: HA, palpitations, diarrhea, dizziness
- Cilostazol (Pletal\textsuperscript{R}) may offer an alternative in stroke prevention
What’s new with antiplatelet Rx

- Clopidogrel-PPI interaction (Gilard M, et al, JACC 2008;51:256-60)- FDA warning
- Reanalysis of Triton TIMI 38 prasugrel study found no influence of PPI use on outcomes
- Genetic variants CYP2C19 system (poor metabolizers): increased events in some trials; 2% Caucasians, 4% AA, 14% Chinese; ? Genetic testing
- ? Platelet resistance testing: VerifyNow, P300, platelet aggregometry): no consensus of which test is most accurate; need for “personalized medicine”
- New agents, prasugrel, ticagrelor (trial pending)
Noncardioembolic Stroke or TIA

- Antiplatelet agents rather than oral anticoagulation are recommended to reduce the risk of recurrent stroke and other cardiovascular events
  *(Class I, Level of Evidence A)*

- Aspirin (50 to 325 mg/d), the combination of aspirin and extended-release dipyridamole, and clopidogrel are all acceptable options for initial therapy
  *(Class Ila, Level of Evidence A)*

- ASA-ER dipyridamole recommended over aspirin (2/A)
- Clopidogrel may be considered over aspirin (2/B)
- Clopidogrel in ASA-allergic patients (1/A)

Stroke Centers

JCAHO/AHA credentialing begun 2004
2013: 8 measures

- tPA considered in all candidates (requires stroke team 24 hrs/7days, CT within 30 minutes, labs <45 min)
- Anticoagulation for atrial fibrillation
- Antiplatelet Rx on discharge
- DVT prophylaxis in nonambulatory pts
- Antiplatelet therapy initiated by 48 hrs
- Fasting lipid profile, statin if LDL >100
- Stroke education
- Rehab plan documented
- (Smoking cessation management)- not in 2013 list
- (Swallowing assessment)- not in 2013 list
### Performance on Selected Treatment and Quality of Care Indicators for Acute Stroke and Secondary Prevention (cont)

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Baseline</th>
<th>GWTG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antithrombotics at discharge*</td>
<td>91.0%</td>
<td>97.6%</td>
</tr>
<tr>
<td>Anticoagulation for atrial fibrillation at discharge*</td>
<td>81.4%</td>
<td>97.6%</td>
</tr>
<tr>
<td>Therapy at discharge if LDL &gt;100 mg/dL or on therapy at admit*</td>
<td>58.7%</td>
<td>81.6%</td>
</tr>
<tr>
<td>Counseling for smoking cessation*</td>
<td>38.8%</td>
<td>83.8%</td>
</tr>
<tr>
<td>Lifestyle changes recommended for BMI &gt;25 kg/m²</td>
<td>33.7%</td>
<td>42.3%</td>
</tr>
</tbody>
</table>

*Indicates 1 of the 7 key performance measures targeted in GWTG-Stroke.

Data collected from 141,449 clinically identified patients admitted to 778 hospitals participating in the GWTG-Stroke program from January 1, 2006, through December 31, 2006.

Conclusions

- Ischemic stroke is a major cause of mortality and disability in the United States
- Most strokes could be prevented by risk factor Rx
- Diet, exercise, smoking cessation, antihypertensive, lipid lowering Rx important
- Anticoagulation for atrial fib, related disorders
- Carotid endarterectomy, stenting
- Antiplatelet therapy for all but warfarin-indicated patients; no evidence for ASA+ clopidogrel
- New guidelines for primary and secondary stroke prevention published in 2011, acute stroke management just released