

# Stroke Prevention and Treatment

Shyam Prabhakaran, MD, MS  
Rush University Medical Center  
2/19/11

# Public Awareness

- 1 stroke every 40 seconds in the US
  - 780,000 new strokes per year
  - 150,000 transient ischemic attacks per year
- 1 of 6 Americans will be affected in a lifetime
- **3<sup>rd</sup> (4<sup>th</sup>) leading cause of death**
  - Every 3 minutes someone dies of a stroke
  - 167,000 per year: 25% mortality
- **Leading cause of major disability**
- About 4.8 million stroke survivors
- **Economic burden: \$62 billion/year in the US**

- **General public awareness is poor** (Pancioli AM 1998)
  - 43% could not identify 1 warning sign
  - 32% could not identify 1 risk factor
- Up to 40% of stroke patients cannot identify symptoms, signs, or risk factors for stroke (Kothari R 1997)
- Knowledge is worse among elderly, and especially among women and minorities (Ferris A 2005)
- Awareness of time-dependent treatments such as clot-busting agents (tPA) is also less than optimal

- Knowledge is POWER
  - Public and medical education
  - Recognize stroke symptoms and risk factors
    - TIME IS BRAIN
  - Realize that there are approved and effective treatments
    - Clot busters (TPA)
    - Surgeries
    - Medications

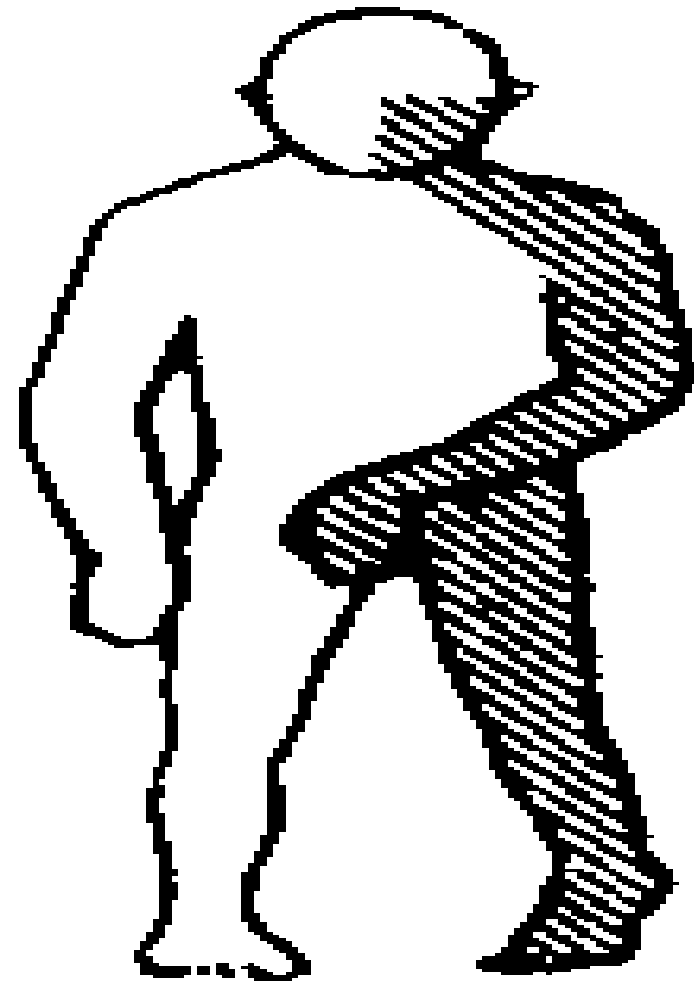


=



EACH MINUTE THAT THE BRAIN DOESN'T RECEIVE  
BLOOD FLOW, 1.9 MILLION NEURONS DIE  
COMPARED TO NORMAL AGING, THE BRAIN AGES 36  
YEARS AFTER AN ISCHEMIC STROKE

# What is a stroke?

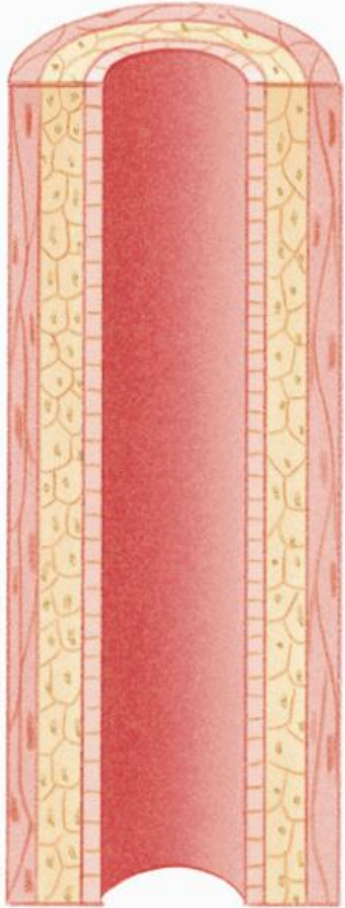


# Types of stroke

- Ischemic stroke – persistent blockage of blood vessel
- Transient ischemic attack – temporary blockage of blood vessel
- Hemorrhagic stroke – rupture of blood vessel

# What's in a name?

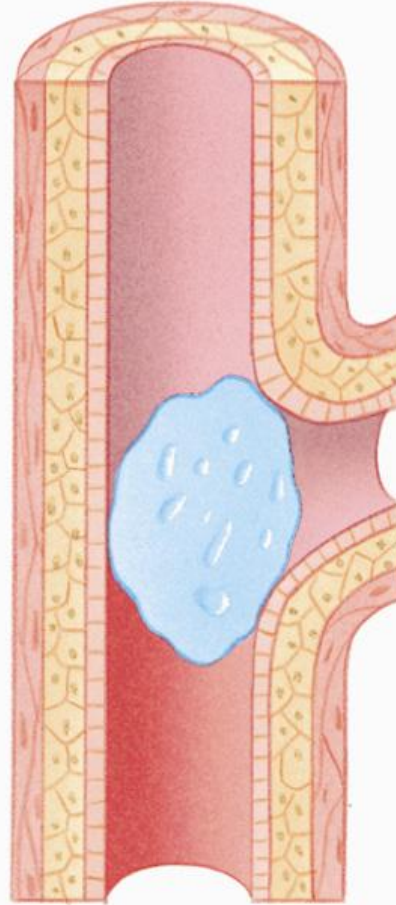
- Stroke as in “struck down”
  - Emphasizes the suddenness but suggests that it is something out of our control
- Other technical (confusing) terms
  - Cerebrovascular accident (CVA), cerebral infarction, cerebral thrombosis
- From a public health perspective, “brain attack” may be more preferable
  - Similar to “heart attack”



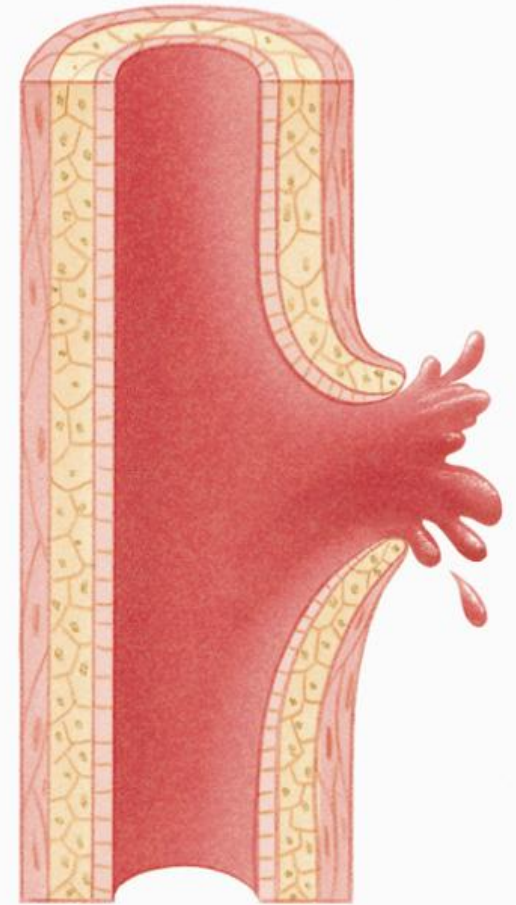
Normal  
Artery



Atheromatous  
Artery



Embolus



Hemorrhage

# Brain Attack: Warning Signs

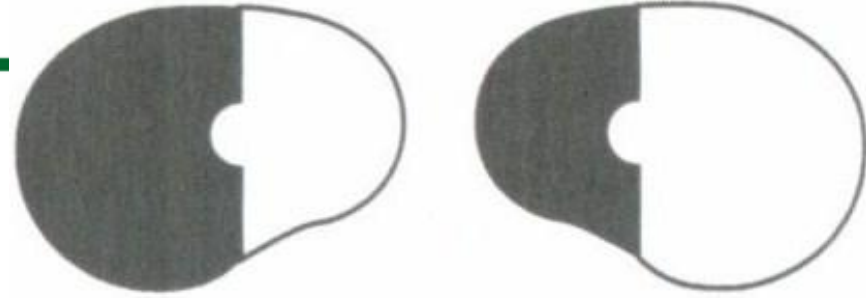
- Paralysis (usually one-sided)
- Language or speech disturbance
- Blindness in one or both eyes
- Numbness (usually one-sided)
- Double vision
- Vertigo
- Imbalance
- Loss of consciousness

# Unilateral Paralysis

- Weakness, clumsiness, or heaviness. Involves hand, arm, face, or leg, alone or in combination, most commonly the hand and face
- Droop on one side of the face may occur (*facial palsy*)
- The involved body parts are opposite the side of the diseased artery



## Visual Disturbance



- Blurred or indistinct vision in one side of the field of vision in both eyes
- Involved visual field is opposite the side of the diseased artery

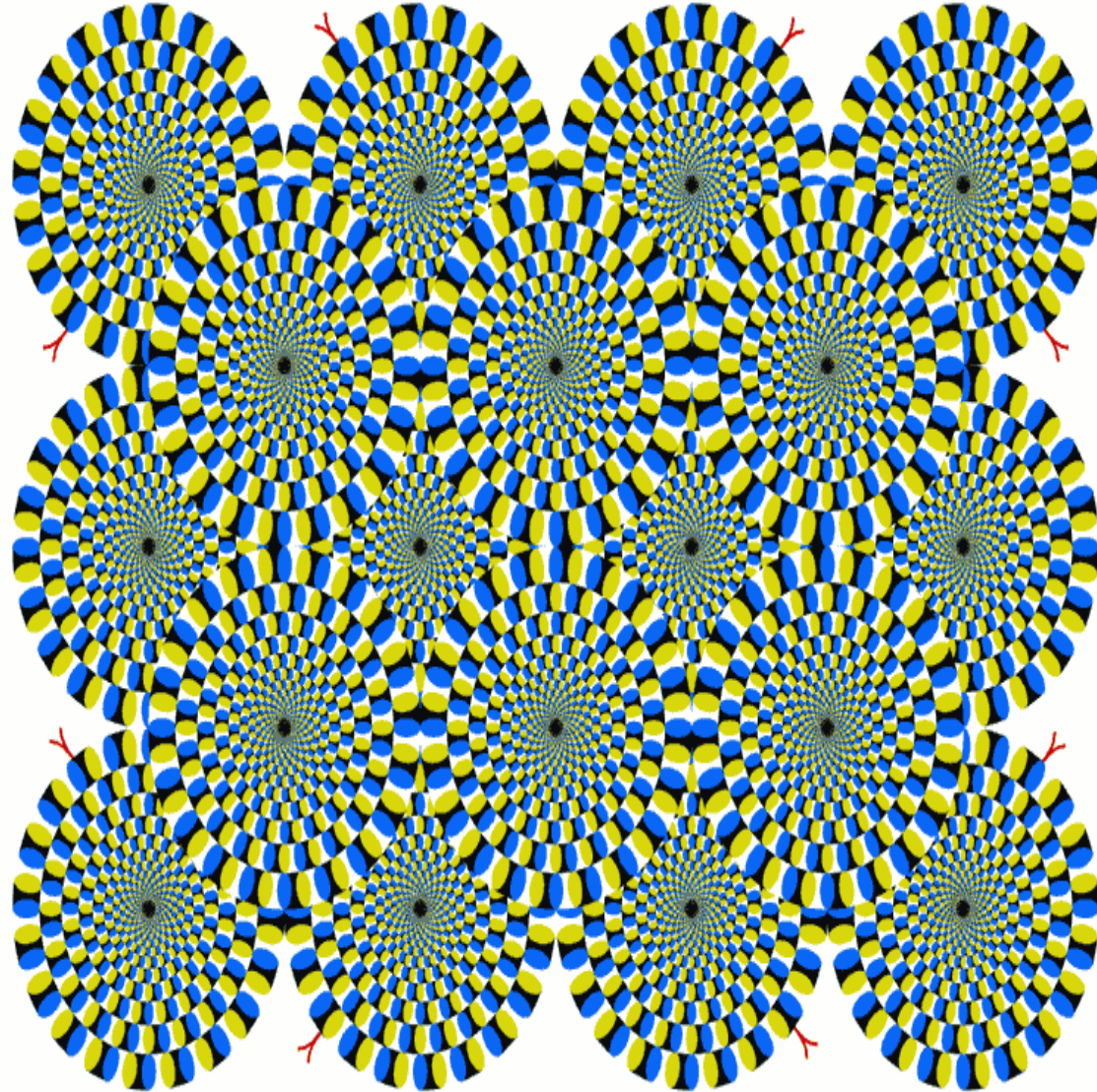
## Double vision

- Perception of two images instead of one due to misalignment of the eyes



# Vertigo

- An illusion of movement caused by a dysfunction of equilibrium centers of the nervous system



# Brain Attack: Risk Factors

# Things you CAN'T change

- Age
  - Risk doubles each decade after 55
- Gender
  - Men have 50% higher risk as women
- Race-Ethnicity
  - African-American, Hispanic, and Asians have 2x risk as Caucasians
- Genetics / Heredity
  - First-degree relatives at higher risk

# Things you CAN change

- High blood pressure (hypertension)
- Tobacco use (smoking)
- High cholesterol and obesity
- Carotid artery narrowing
- Prior transient ischemic attack
- Irregular heart rhythm (atrial fibrillation)
- High sugar (diabetes)
- Other heart diseases

# High blood pressure

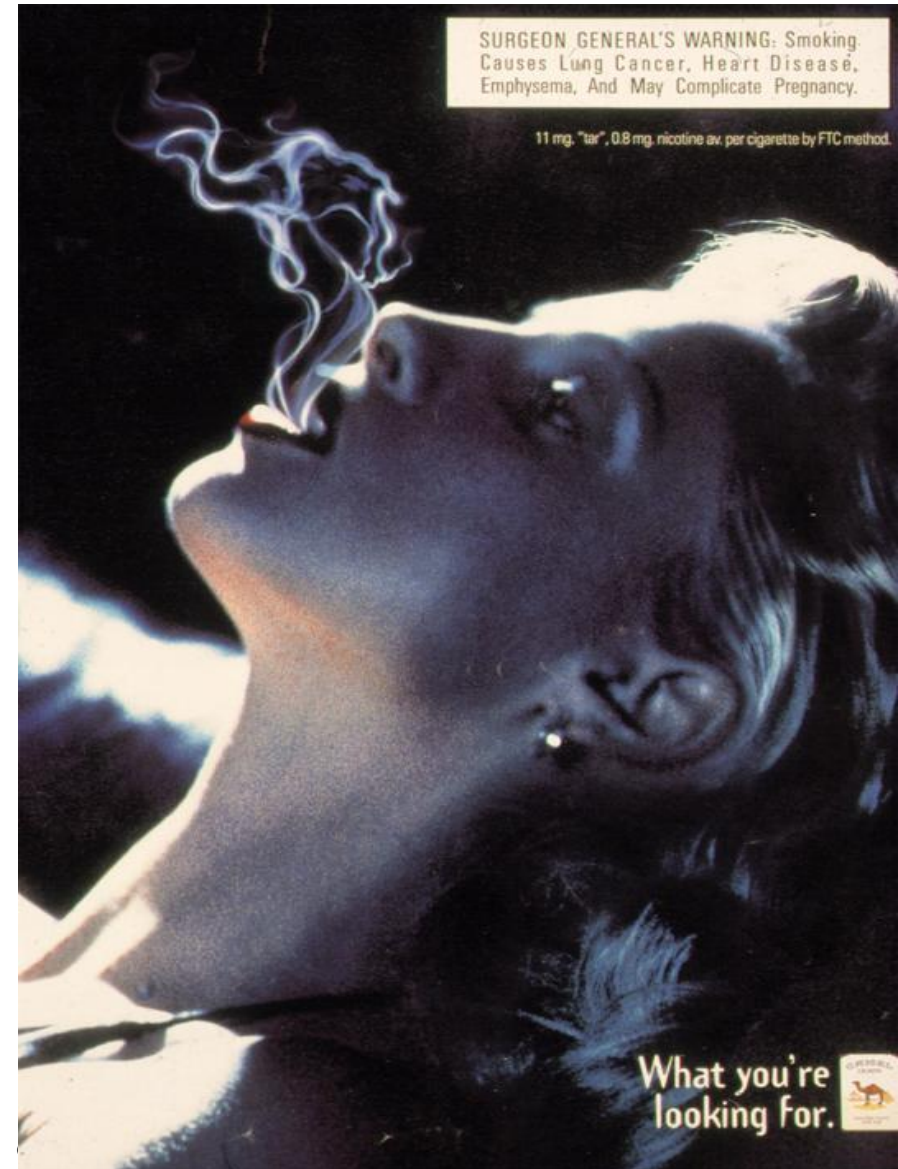
- Most important risk factor for stroke, both ischemic and hemorrhagic
- Normal blood pressure is < 120/80 mmHg
- Risk rises steadily with higher blood pressures above this level
- Treatment with blood-pressure lowering pills reduces risk of stroke by 40%
- Treatment should also include weight loss, salt restriction, and exercise



# Treating Mild Hypertension Without Drugs (How not to do it)



- One in four Americans still smoke
- Increasing among young women
- Smoking doubles risk of stroke
- **Smoking cessation can reduce stroke risk to normal within 2 – 5 years**



- 6 of 10 Americans are overweight or obese
- 1 in 4 have high cholesterol
- Cholesterol lowering therapy with “statins” reduces risk of stroke by 30% in primary and secondary prevention
- Weight loss, exercise, and balanced diet must be part of every healthy lifestyle

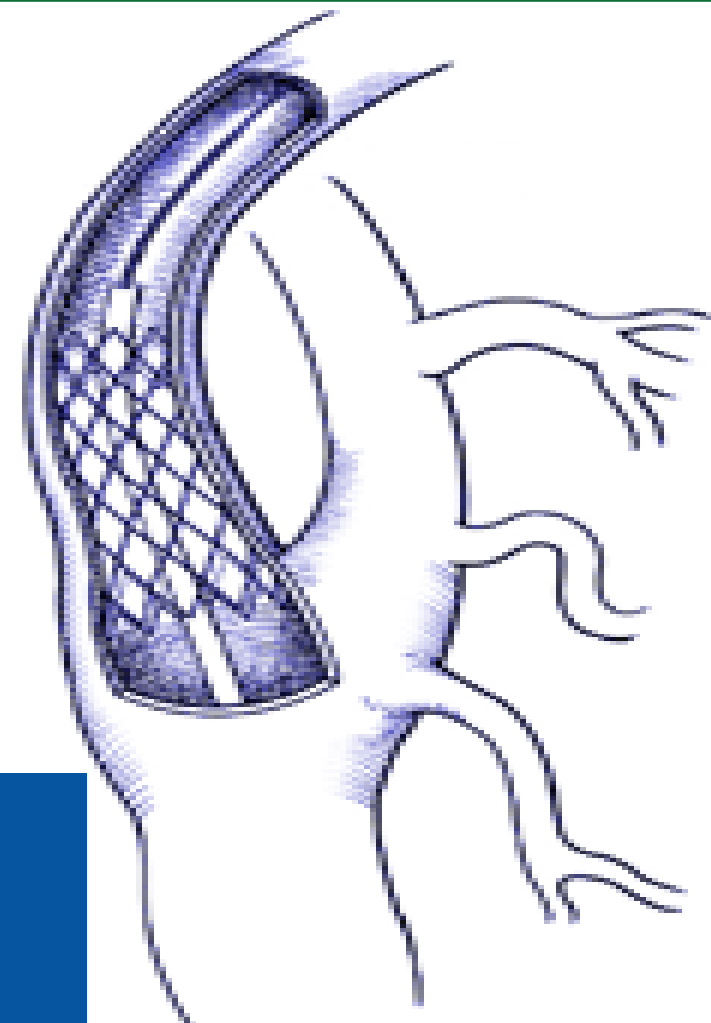
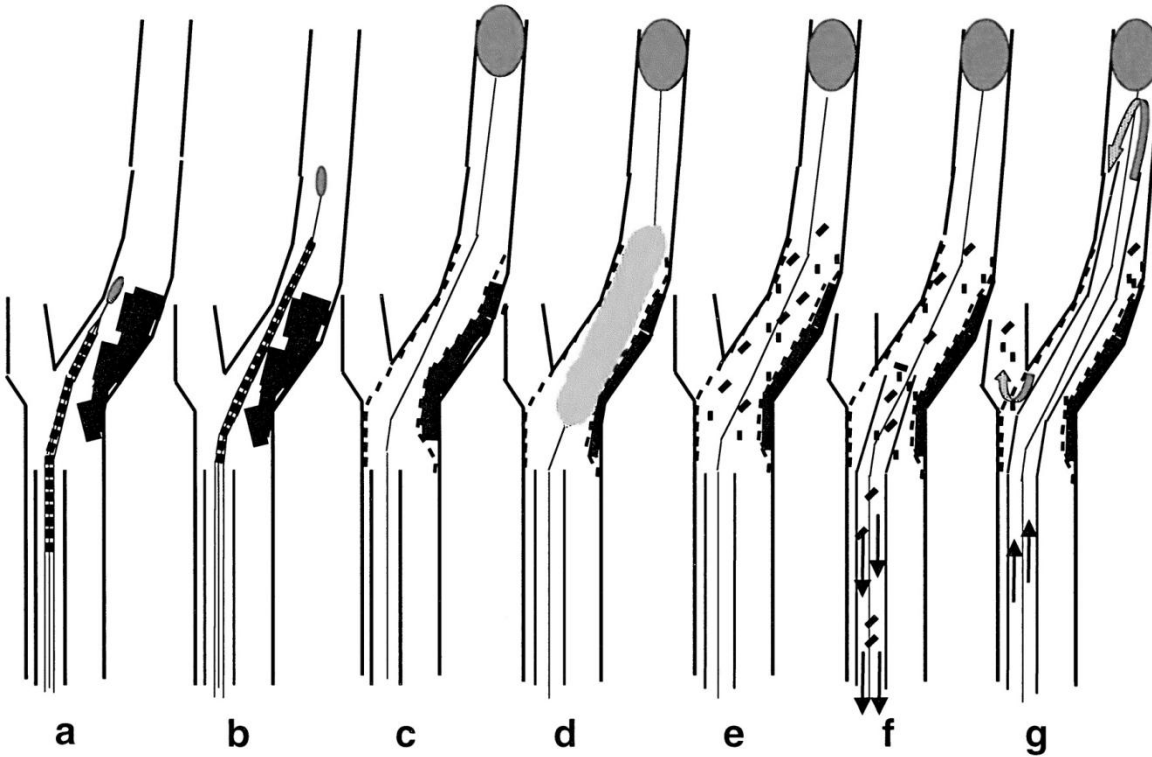


# Narrowing of arteries

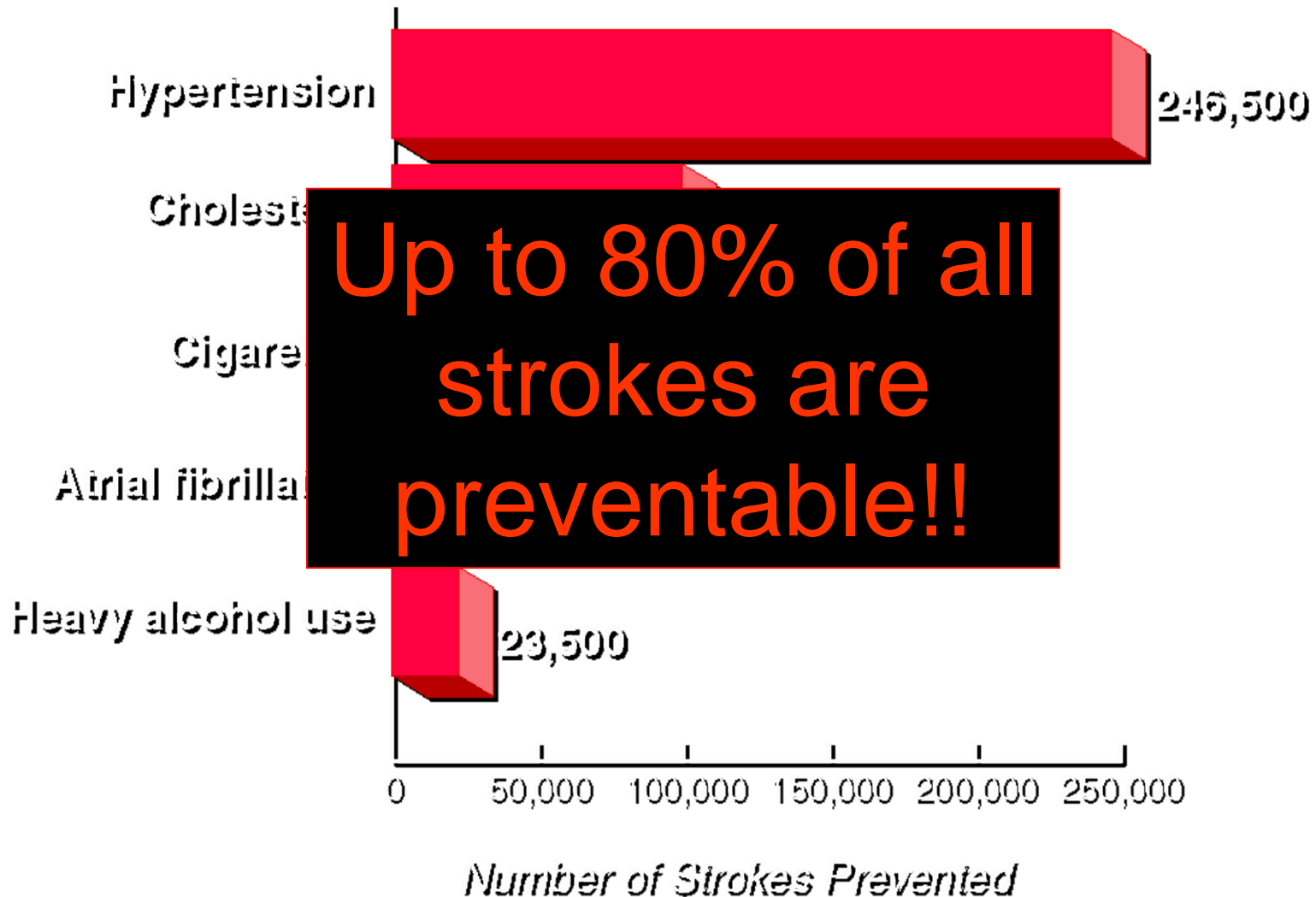
- 5-10% of general population have narrowing of carotid arteries
- Significant narrowing ( $> 60\%$ ) can increase risk of stroke 2-fold
- Early identification and aggressive risk factor control is warranted
- **Surgical opening of narrowed arteries in addition to medical therapies can reduce risk of stroke in selected patients**



# Carotid artery stenting



# Primary Prevention



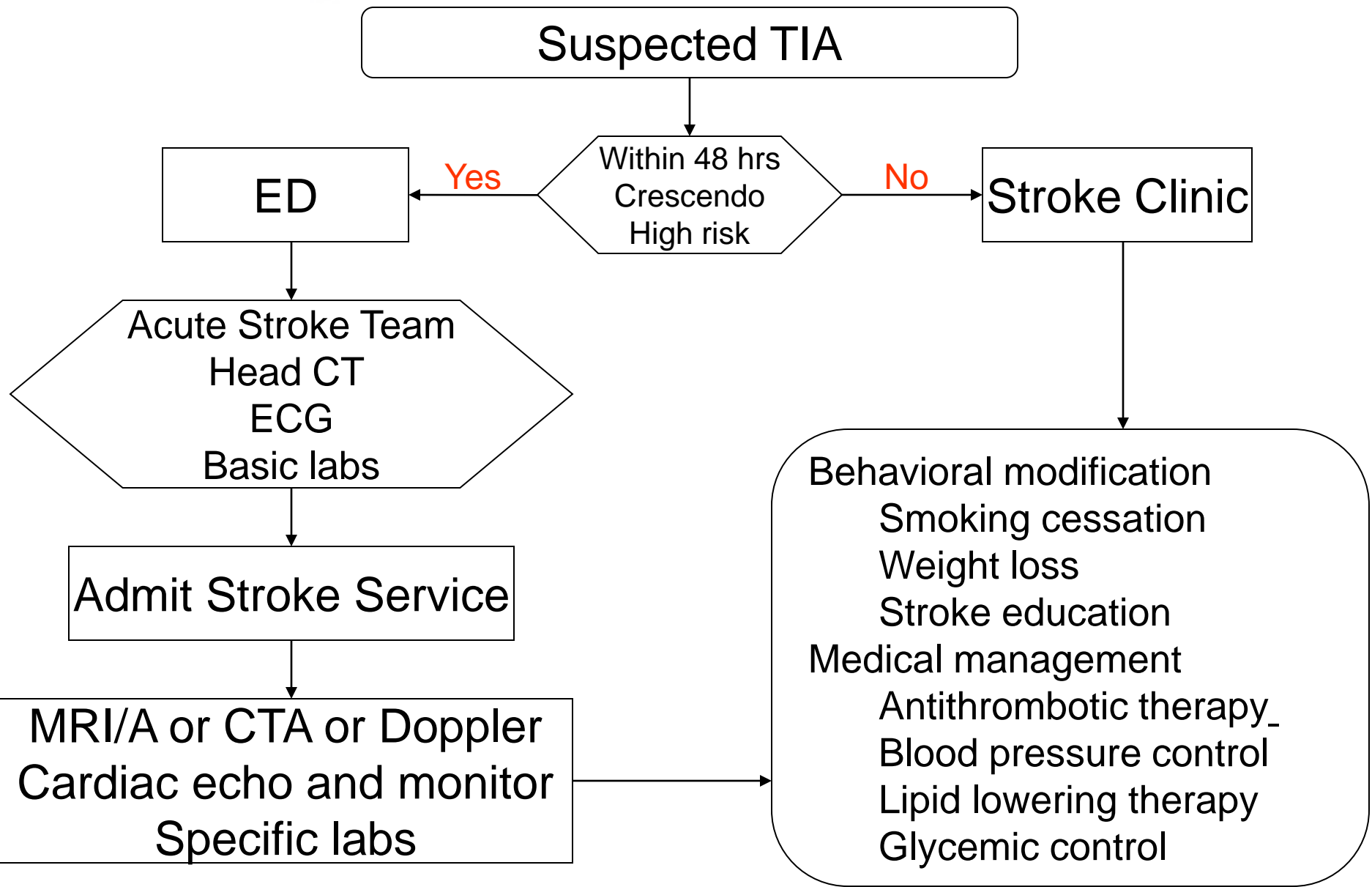
- 15-20% of stroke patients have a TIA prior to the stroke, usually within a week
  - TIA is a warning sign of a pending stroke
  - Analogous to an earthquake, TIA is a major warning sign of a major stroke
- Symptoms of a TIA and stroke are short-lived (usually less than an hour)
- 5% of TIA patients have strokes within 48 hours of the TIA and 11% within 3 months

**TIA is an emergency and an opportunity to intervene to prevent stroke**

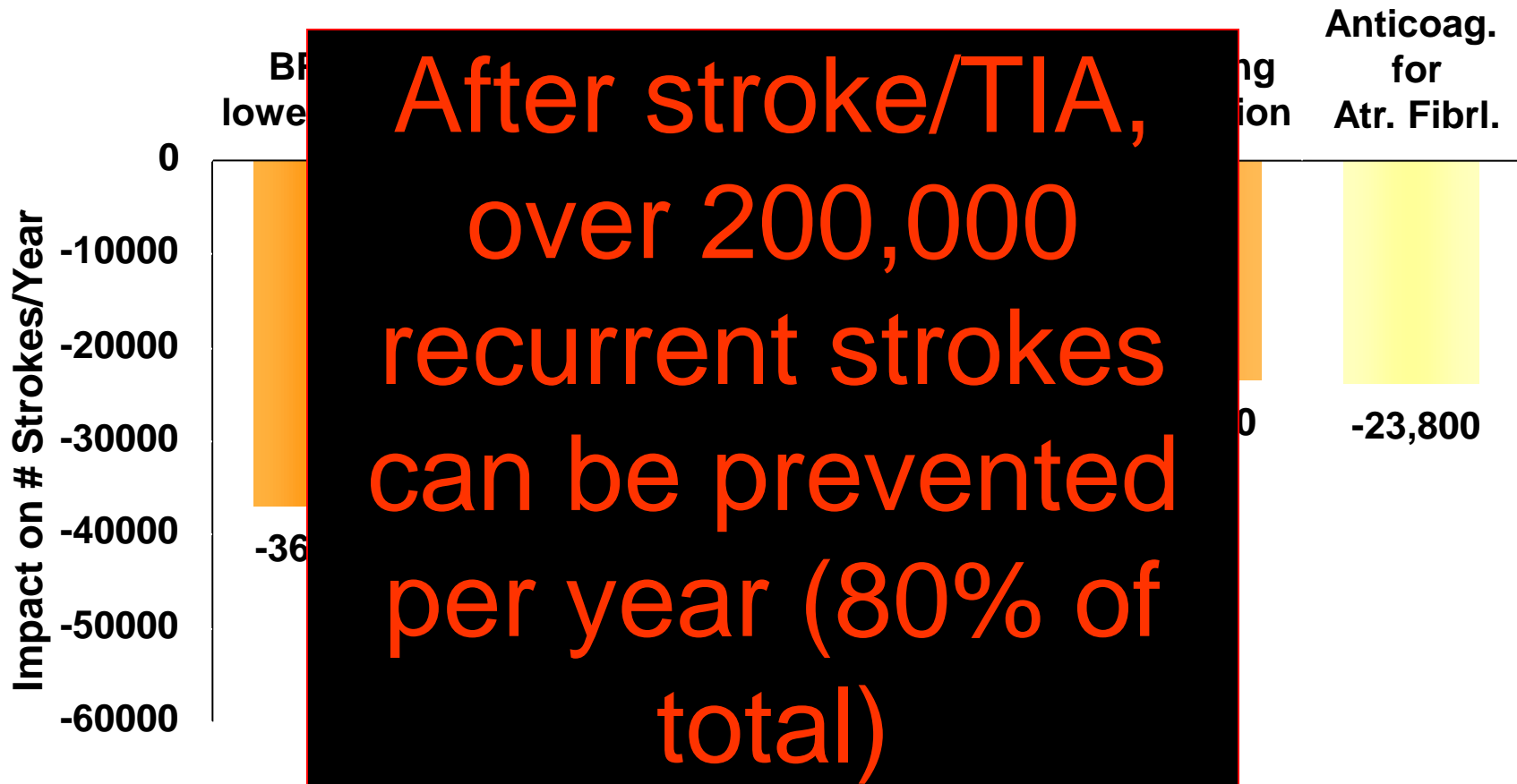
- Acute hospitalization is recommended for:

Timeframe	Patients should go to
<b>Within 48 hours of 1<sup>st</sup> TIA</b>	<b>Emergency department</b>
<b>Multiple recurrent TIAs (crescendo) within past 7 days</b>	<b>Emergency department</b>
<b>Within 7 days of 1<sup>st</sup> TIA if:</b> >1 hour duration ABCD <sup>2</sup> score > 3 High-risk co-morbidity Carotid stenosis Atrial fibrillation	<b>Emergency department</b>

# TIA Express Service



# Secondary Prevention



Hankey; Lancet 1999;354:1457-63.

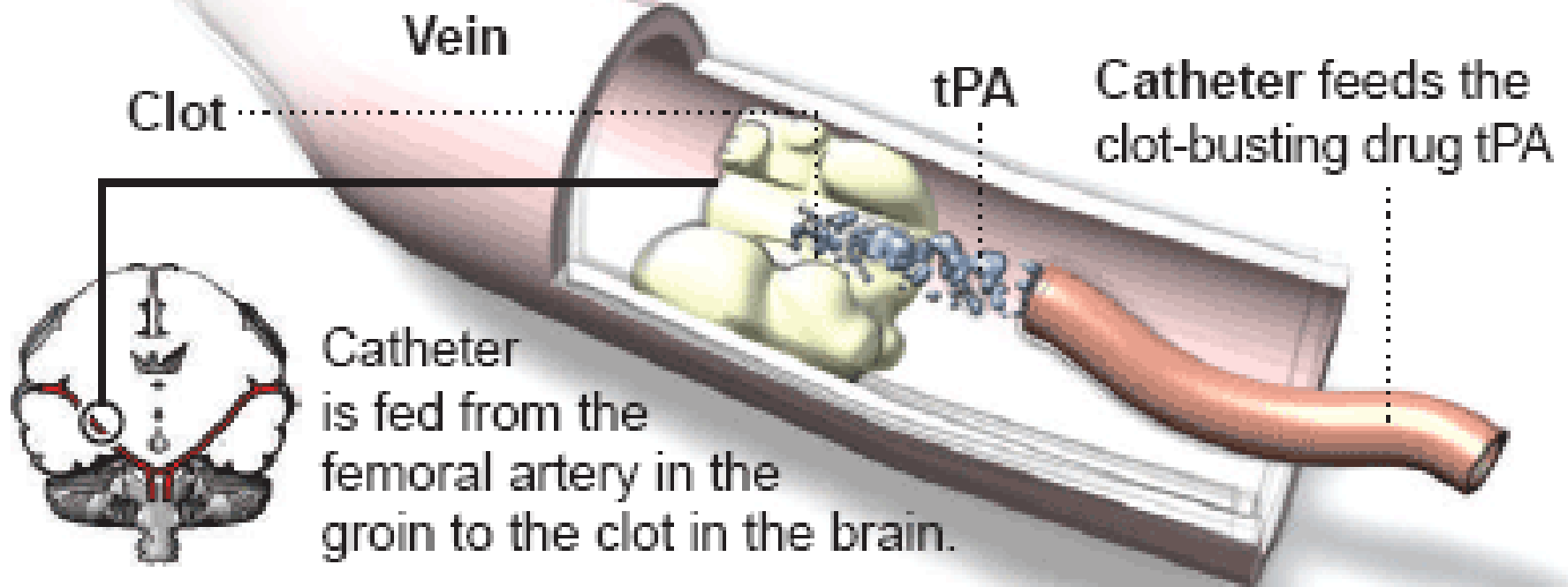
# Brain Attack: Treatment

# Acute Treatments

<u>Time window</u>	<u>Treatment</u>	<u>Study</u>
<b>0-4.5 hours</b>	<b>IV rt-PA 0.9 mg/kg</b>	<b>NINDS ECASS III</b>
<b>0-6 hours</b>	<b>IA pro-UK (rt-PA)</b>	<b>PROACT MELT</b>
<b>0-8 hours</b>	<b>mechanical extraction</b>	<b>MERCI PENUMBRA</b>

## Drug aids survival from stroke

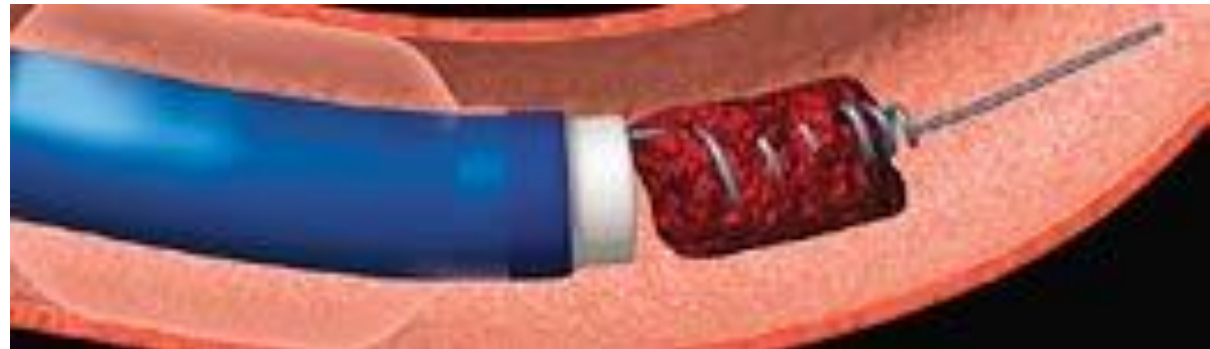
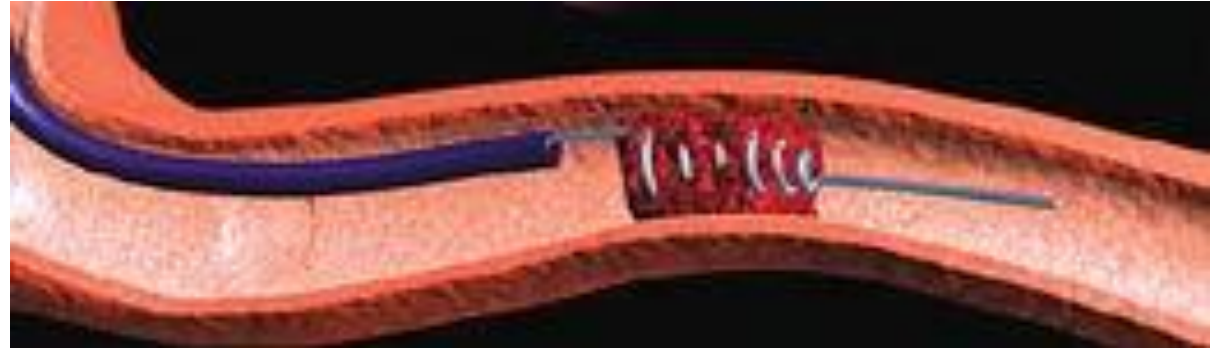
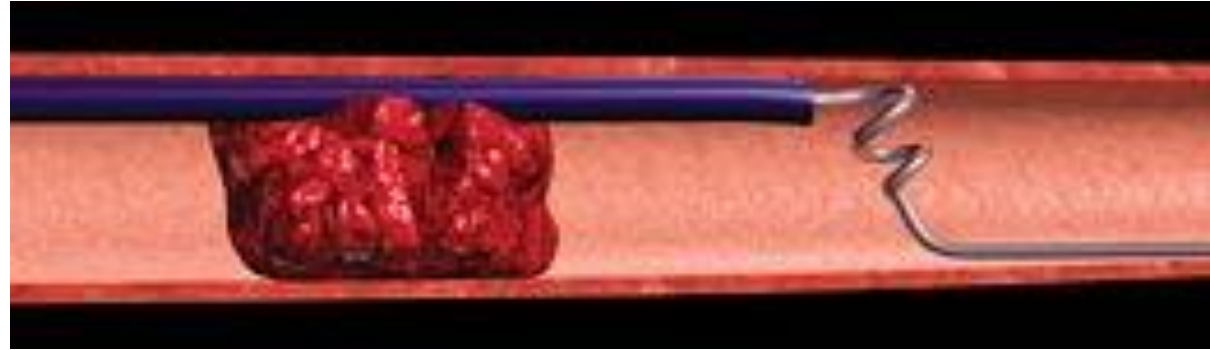
By dripping clot-busting drug tPA directly onto a clot through a catheter, it does not have to make its way through the bloodstream.



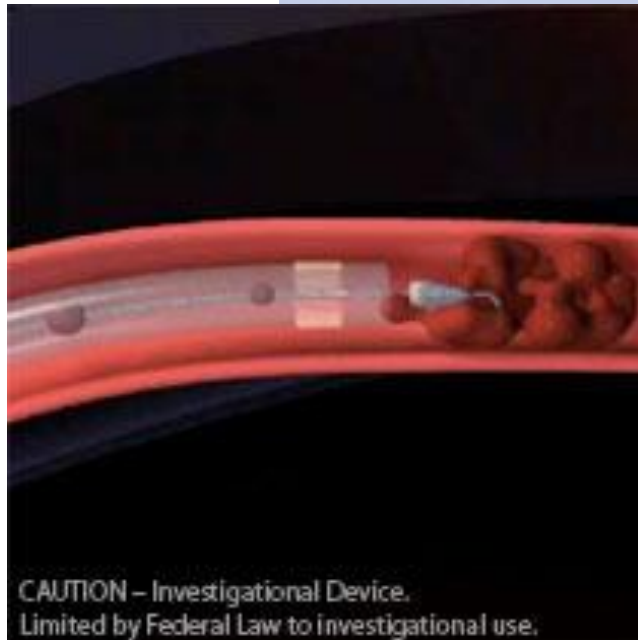
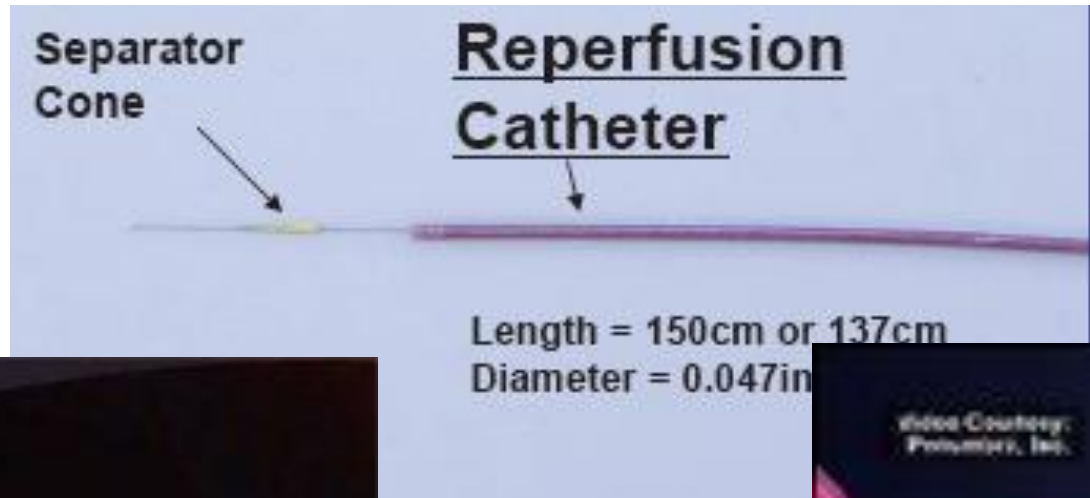
SOURCE: American Heart Association

AP

# Clot Retrievers



Penumbra  
the path is clear





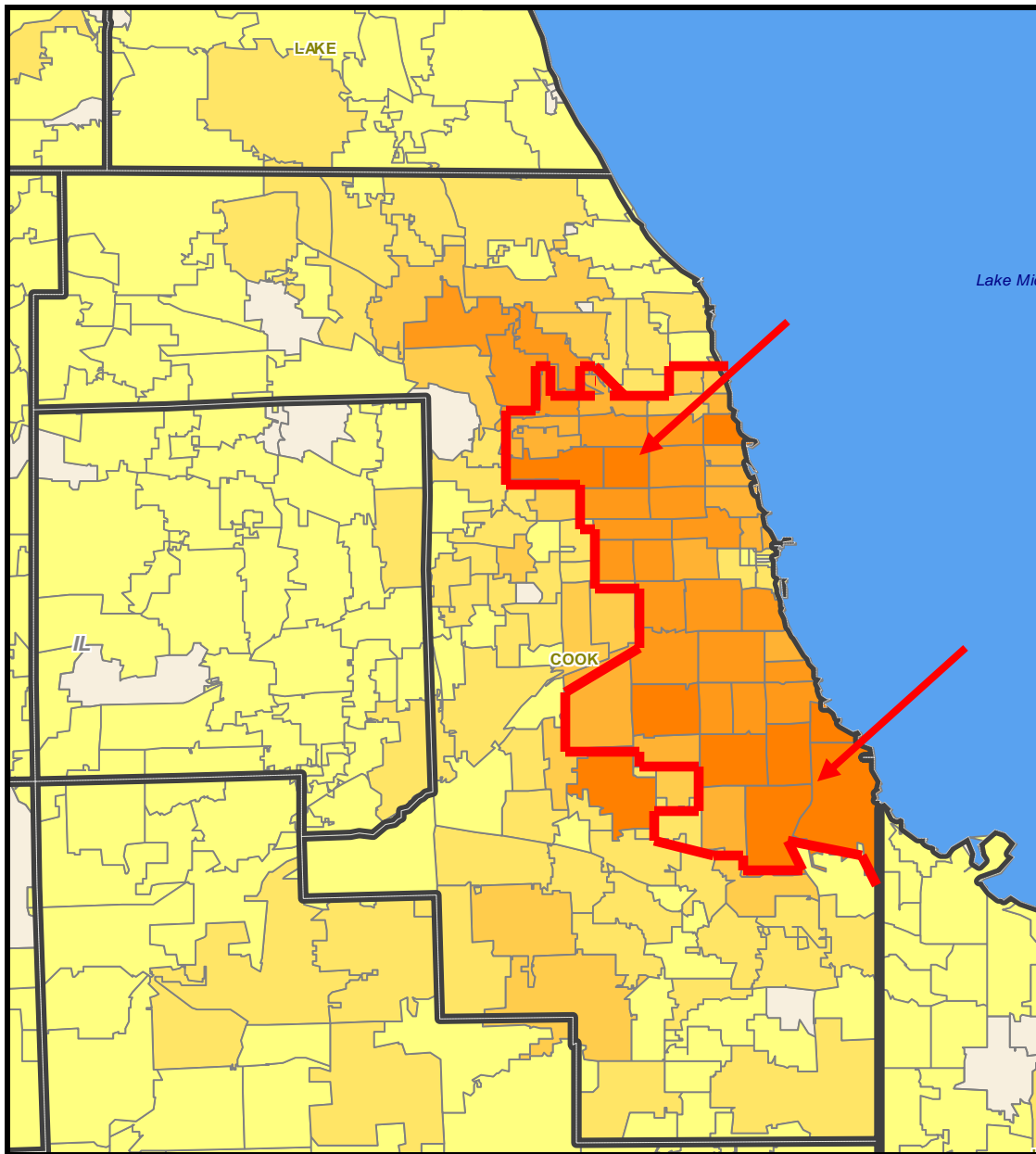
# Brain Attack: Organized Systems of Care

- **Certified primary stroke centers (PSC)**
  - Written protocols and pathways
  - Stroke team 24/7 for prompt response
  - Stroke unit
  - Data collection and quality improvement
- Treatment at a PSC reduces mortality, complications, increases chance of treatments with standards of care such as:
  - Aspirin
  - Tissue plasminogen activator (clot-buster)
  - Specialized stroke unit admission
  - Medications and surgeries for prevention

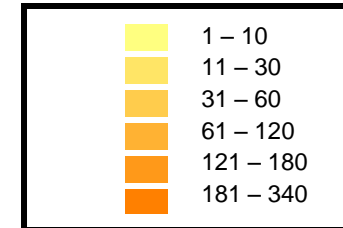
- AHA guidelines recommend preferential triage to stroke centers
  - “For patients with suspected acute stroke, EMS should bypass hospitals that do not have resources to treat stroke and go to the closest facility capable of treating acute stroke”
- Routinely done in many other cities, regions, and states
  - New York City, Houston, Phoenix, Bay Area
  - Florida, Massachusetts, New York

- **2.8 million** reside in Chicago city limits
  - 3<sup>rd</sup> largest in US
- 33 Chicago hospitals
- About 8500-9000 strokes/TIA in Chicago per year
- Arrival mode
  - **35-45% EMS**
  - 35% private/walk-in
  - 15% transfers
  - 5-10% other
- **Current EMS model**
  - patients taken to closest hospital

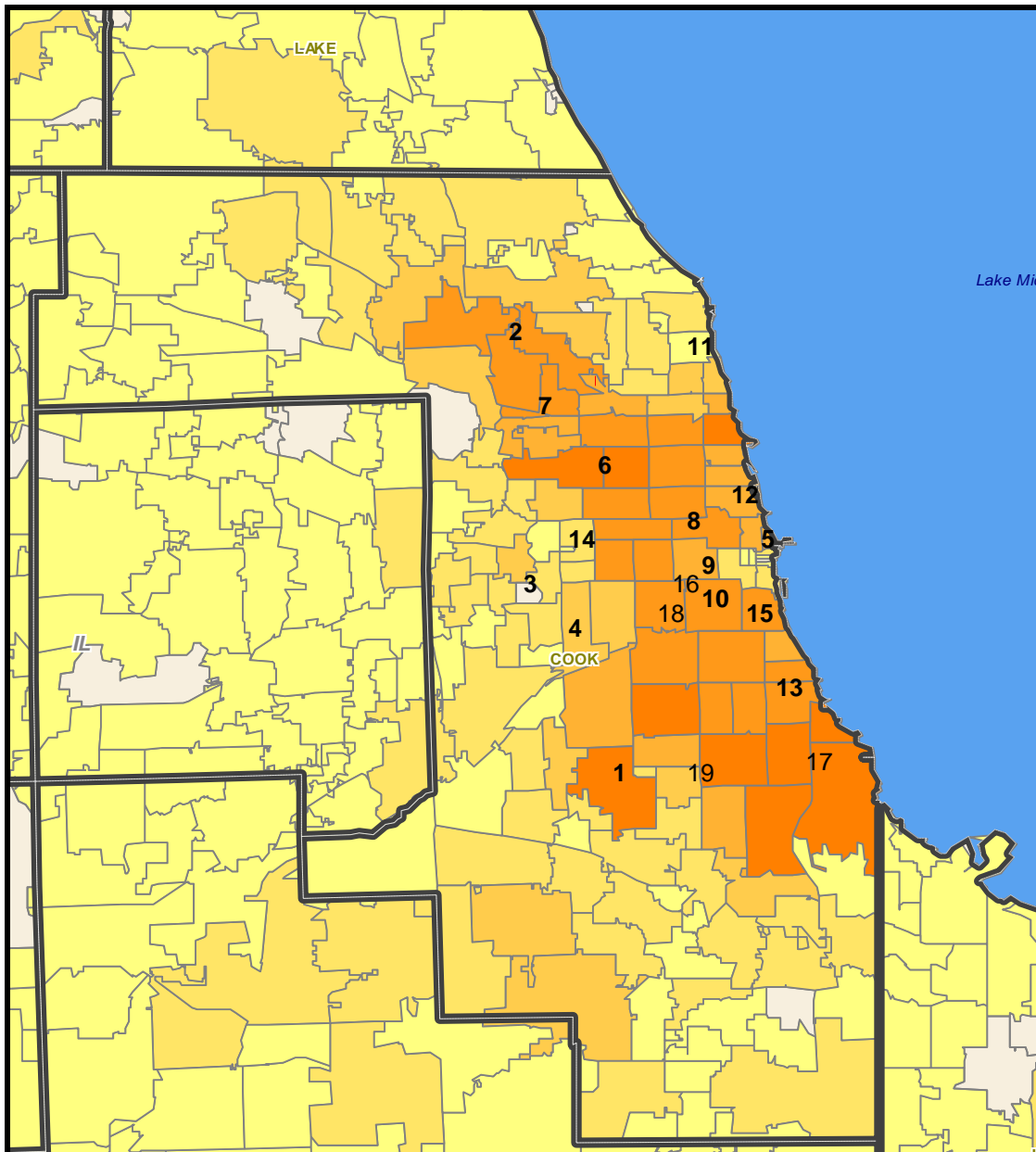
# Epidemiology in Chicago



## Stroke Patients



# Primary Stroke Center Map



## Certified Primary Stroke Centers

1. Advocate Christ
2. Advocate Lutheran General
3. Loyola
4. MacNeal
5. Northwestern Memorial
6. Our Lady of Resurrection
7. Resurrection
8. St. Mary/Elizabeth's Hospital
9. Rush University
10. U of Illinois
11. St. Francis of Evanston
12. St. Joseph
13. University of Chicago
14. West Suburban
15. Mercy
16. Stroger
17. Trinity
18. Mount Sinai
19. Little Company of Mary

- Signed by Governor Quinn in August 2009
  - Allows Illinois Department of Public Health (IDPH) to designate hospitals as stroke centers and **directs EMS personnel to transport possible acute stroke patients to stroke centers**
- Chicago to begin diversion to PSCs on 3/1/11
- **We need to make this process a priority to ensure that we don't lose any more time and stroke patients get best care possible as soon as possible**

# What can you do?

- Know your risk factors and ask your doctor if you're on the right medications to lower risk
- Know stroke warning signs
- Call 911 immediately if you or someone you love may be having a stroke
- Ask about clot-busting and other treatments
- **REMEMBER TIME LOST IS BRAIN LOST!**

<b>Act F.A.S.T.</b>	
<b><u>F</u>ACE</b>	<p><b>Ask the person to smile.</b></p> <p><b>Does one side of the face droop?</b></p>
<b><u>A</u>RMS</b>	<p><b>Ask the person to raise both arms.</b></p> <p><b>Does one arm drift downward?</b></p>
<b><u>S</u>PEECH</b>	<p><b>Ask the person to repeat a simple sentence.</b></p> <p><b>Are the words slurred? Can he/she repeat the sentence correctly?</b></p>
<b><u>T</u>IME</b>	<p><b>If the person shows any of these symptoms, time is important.</b></p> <p><b>Call 911 or get to the hospital fast. Brain cells are dying.</b></p>

**Thank you for your attention!!!**