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New York Presbyterian Hospital / Weill Cornell Medicine

Prevention and Treatment of Stroke

AMAZING THINGS ARE HAPPENING HERE

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NewYork-Presbyterian

Neurology Scope of Practice

"disorders of brain, spine, muscles, and nerves"

- Aging and Memory Loss
- Critical Care Neurology
- Epilepsy and Clinical Neurophysiology
  - EEG & Evoked Potentials
- General Neurology
- Headache and Facial Pain
- Hospitalist Neurology
- Movement Disorders
  - Botox therapies
- Multiple Sclerosis & Neuro-Immunology
- Neuromuscular Disorders
  - Nerve conductions
  - Electromyography
  - Autonomic function
- Neuro-Ophthalmology
- Neuropsychology
- Neurostimulation
- Oncology
- Sleep-Wake Disorders
- Stroke and Cerebrovascular Diseases
- Trauma and Concussion

World Health Organization

Of the ten most important global health challenges identified by the WHO, four of them are “brain” related.

Stroke

Dementia

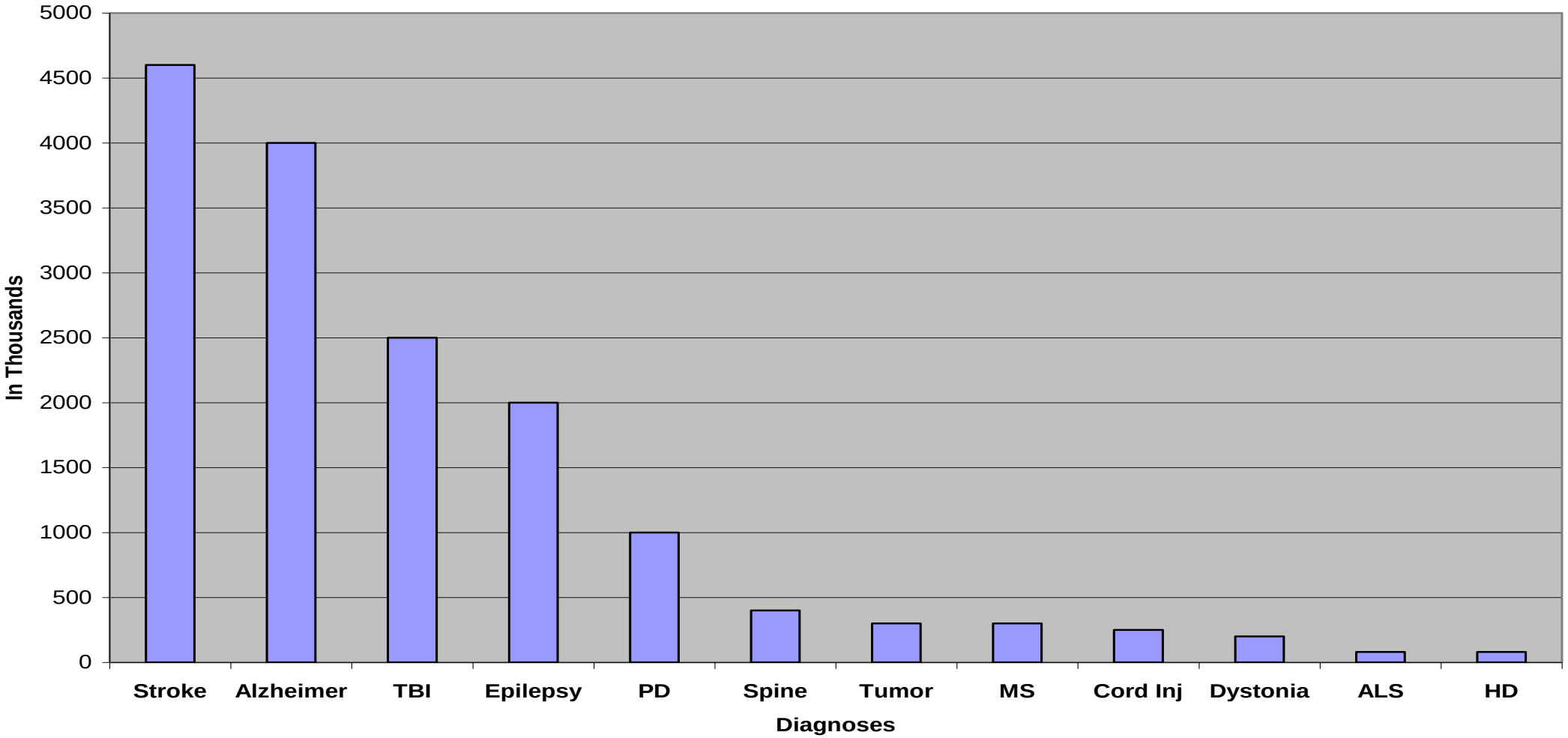
Traumatic Brain Injury

Depression

Global Burden of Disease

Deaths (*Top Ten*)	**Disability**
Ischemic Heart Disease	**Low Back Pain**
Stroke	**Major Depression**
Lung Cancer	Musculoskeletal Disease
Alzheimer's & other dementia	**Neck Pain**
COPD	**Anxiety Disorders**
Diabetes mellitus	COPD
Pneumonias	Drug abuse
Colorectal Cancer	Diabetes mellitus
Kidney Disease	Osteoarthritis
Other Cardiovascular	Asthma

Neurological Disorders in the U.S.



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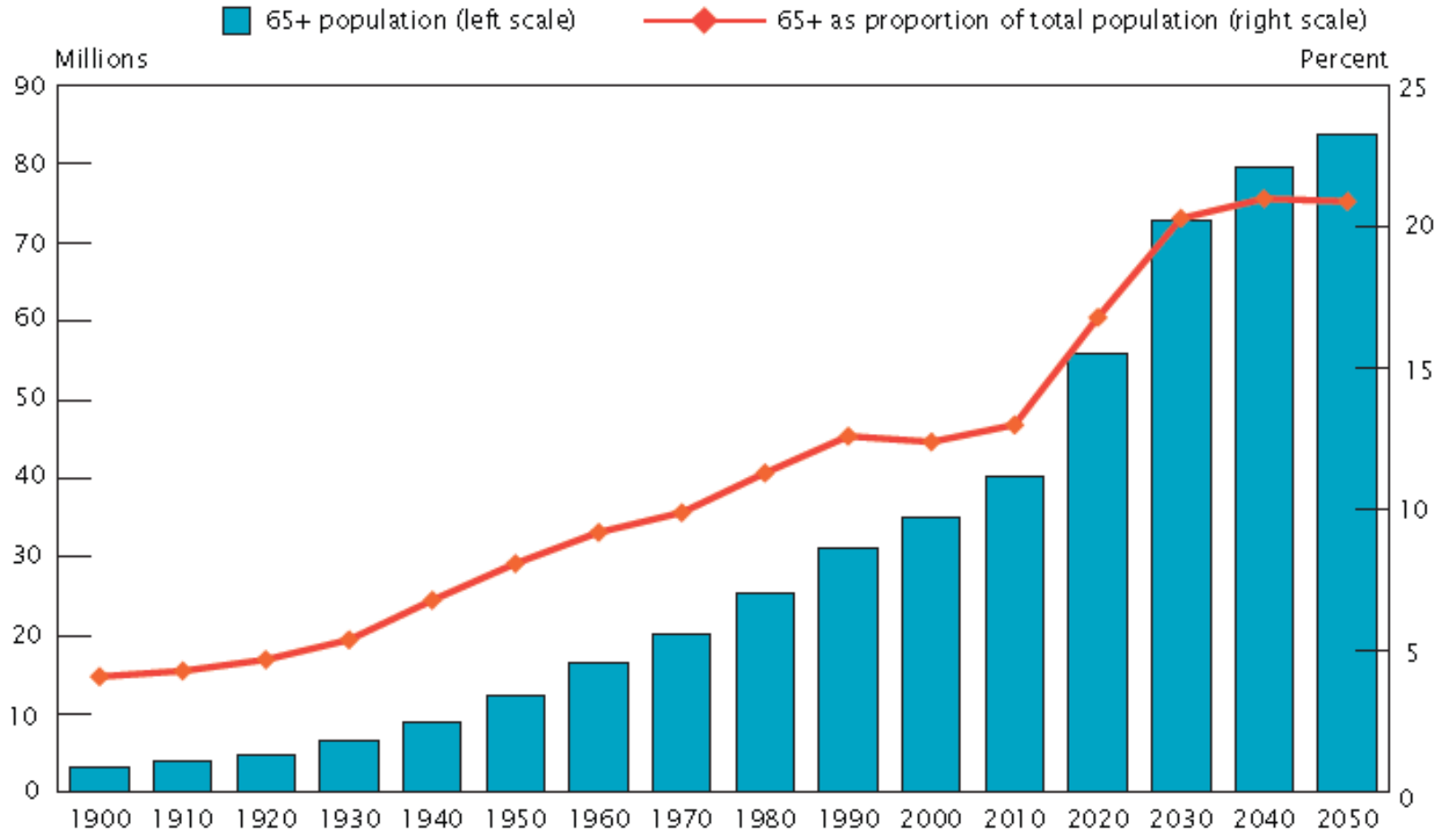
Aging U.S. Population

Age 65 years and older



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The Baby Boomers

Every day, until the year 2030,

10,000 Baby Boomers will turn 65.

(www.pewresearch.org)

STROKE in the US - 2018

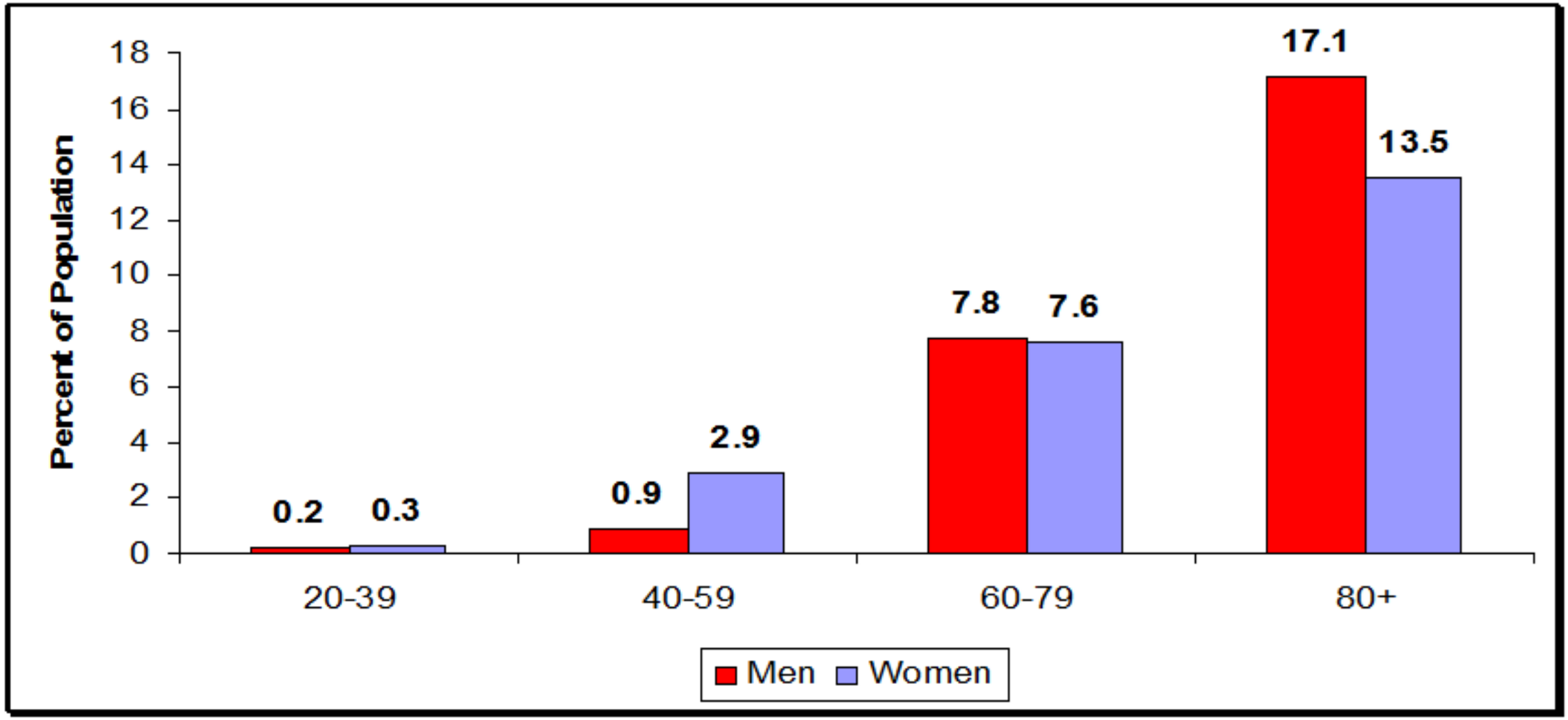
- 795,000 people will suffer a new or recurrent stroke
  - On average, someone suffers a stroke every 40 seconds

- Stroke is the 5th leading cause of death
  - There are 137,000 stroke deaths each year
  - On average, every 4 minutes someone dies of stroke
  - In **New York**, stroke is the **4th** leading cause of death

- Stroke is a leading cause of adult disability

- There are approximately 7,000,000 stroke survivors

Prevalence of stroke by age and sex (NHANES: 2005-2006)



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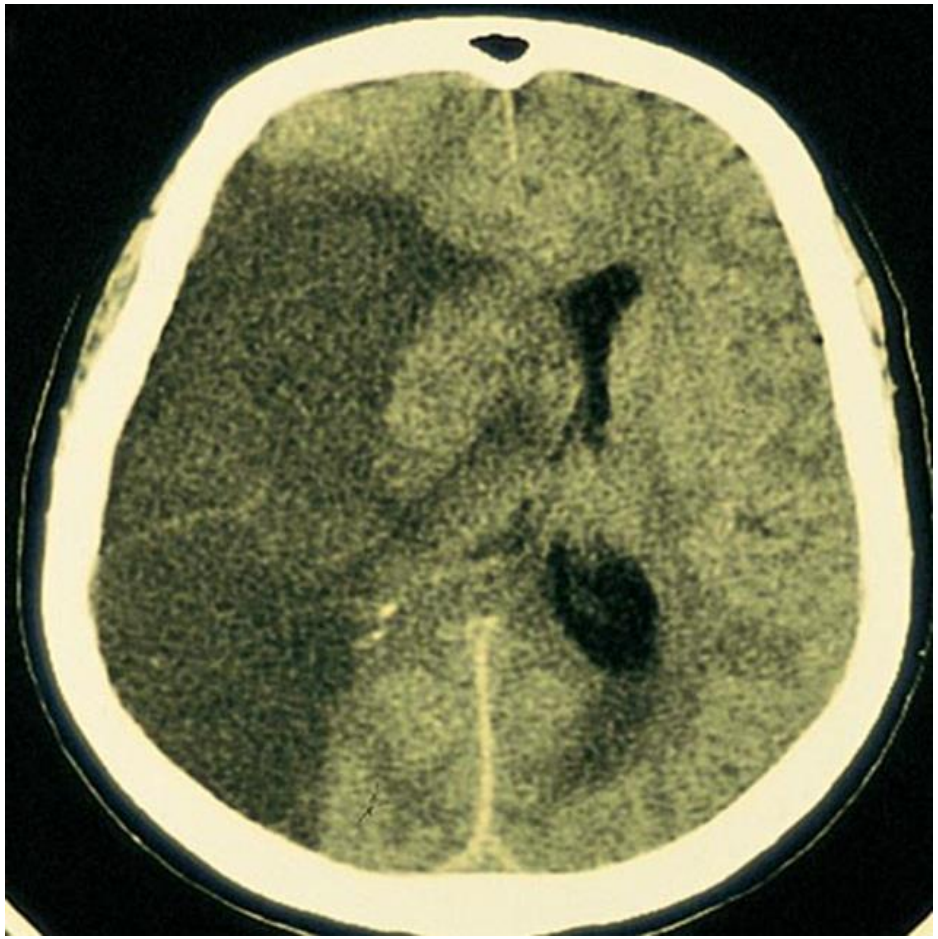
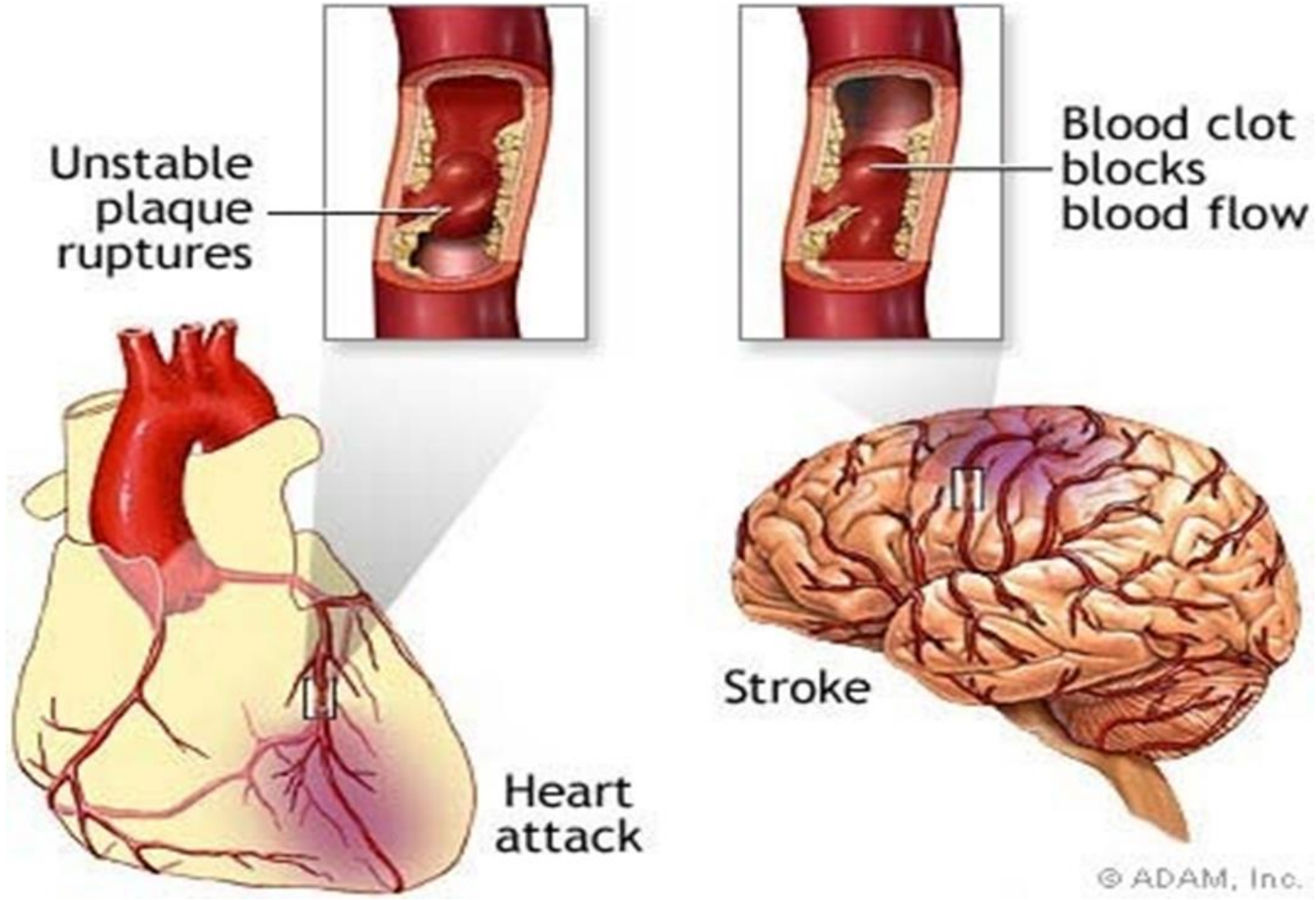
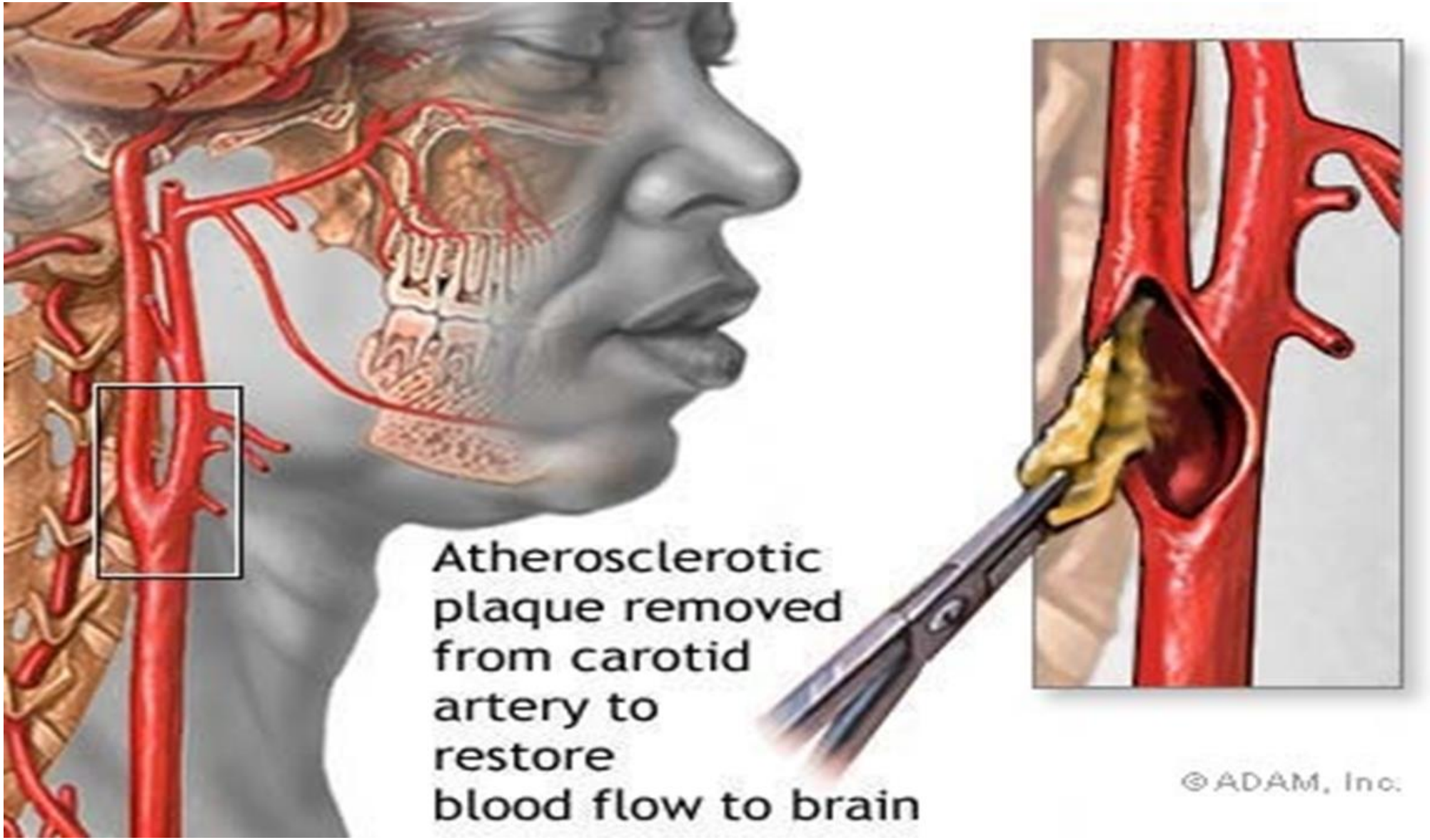
Middle cerebral artery infarction

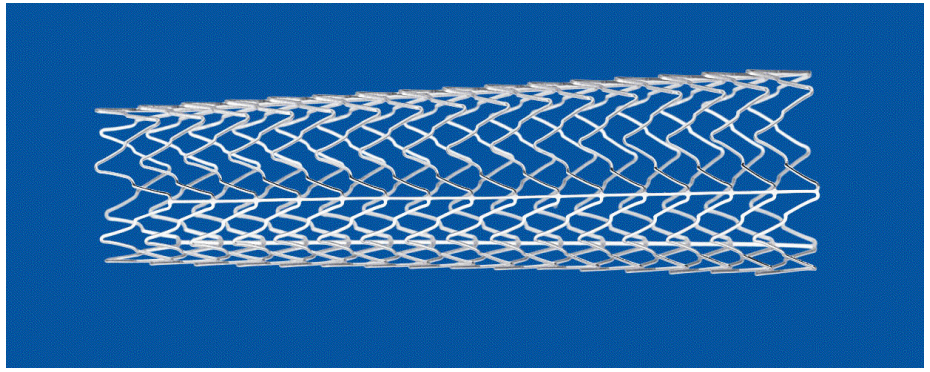



Unstable plaque ruptures
Blood clot blocks blood flow
Heart attack
Stroke
© ADAM, Inc.

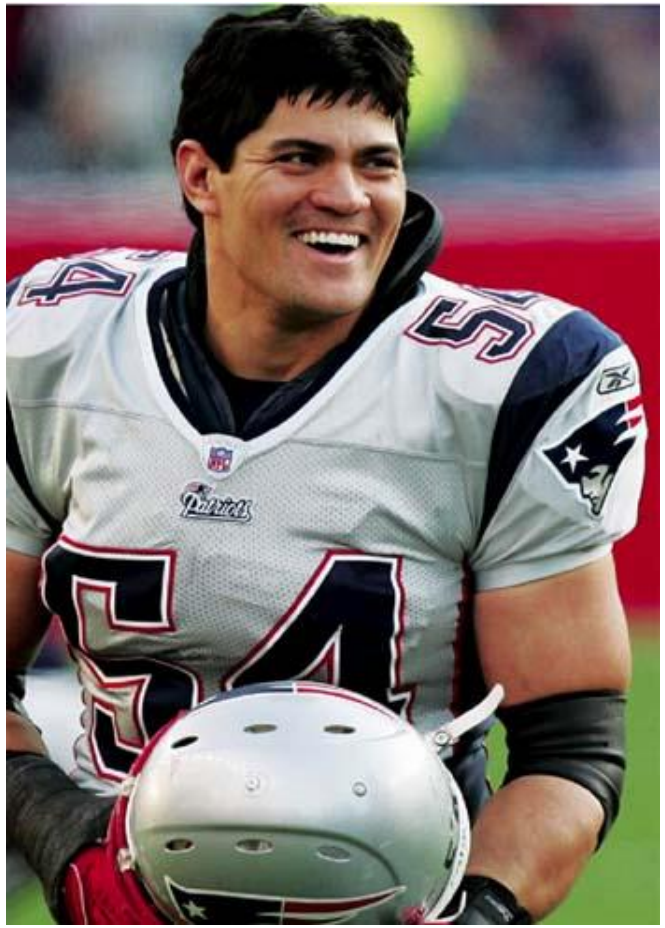
Carotid Artery Atherosclerosis


Atherosclerotic plaque removed from carotid artery to restore blood flow to brain
©ADAM, Inc.

Carotid Stent



At Risk for Stroke?



Stroke Can Be Prevented!

- With current knowledge and technology we **CAN** prevent 80 percent of all strokes.

- This includes strokes from aneurysms, vascular malformations, cardiac embolism, and atherosclerosis.

Modifiable Risk Factors for Stroke

- Previous Stroke or TIA
- Hypertension
- Cardiac Disease
- Diabetes and Glucose Metabolism
- Hypercholesterolemia
- Carotid Artery Disease
- Cigarette Smoking
- Lifestyle Factors *(obesity, physical inactivity, diet, illicit drug use, emotional stress)*
- Oral contraceptives

National STROKE Association®

Stroke Risk Scorecard

Each box that applies to you equals 1 point. Total your score at the bottom of each column and compare with the stroke risk levels on the back.

RISK FACTOR	HIGH RISK	CAUTION	LOW RISK
Blood Pressure	☐ >140/90 or unknown	☐ 120-139/80-89	☐ <120/80
Atrial Fibrillation	☐ Irregular heartbeat	☐ I don't know	☐ Regular heartbeat
Smoking	☐ Smoker	☐ Trying to quit	☐ Nonsmoker
Cholesterol	☐ >240 or unknown	☐ 200-239	☐ <200
Diabetes	☐ Yes	☐ Borderline	☐ No
Physical Activity	☐ None	☐ 1-2 times a week	☐ 3-4 times a week
Weight	☐ Overweight	☐ Slightly overweight	☐ Healthy weight
Stroke in Family	☐ Yes	☐ Not sure	☐ No
TOTAL SCORE	☐ High Risk	☐ Caution	☐ Low Risk

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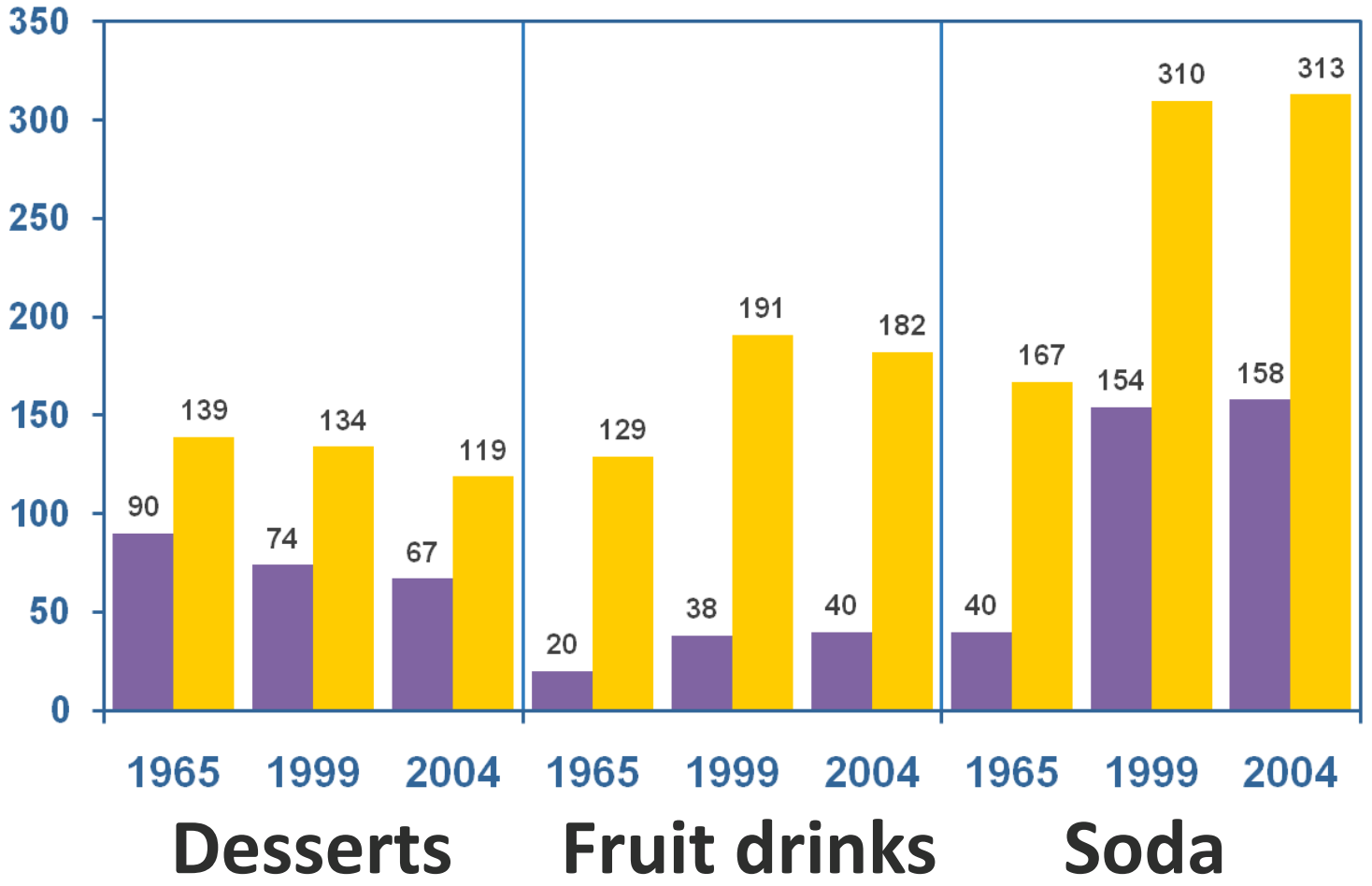
Calories from Sugar in the U.S.



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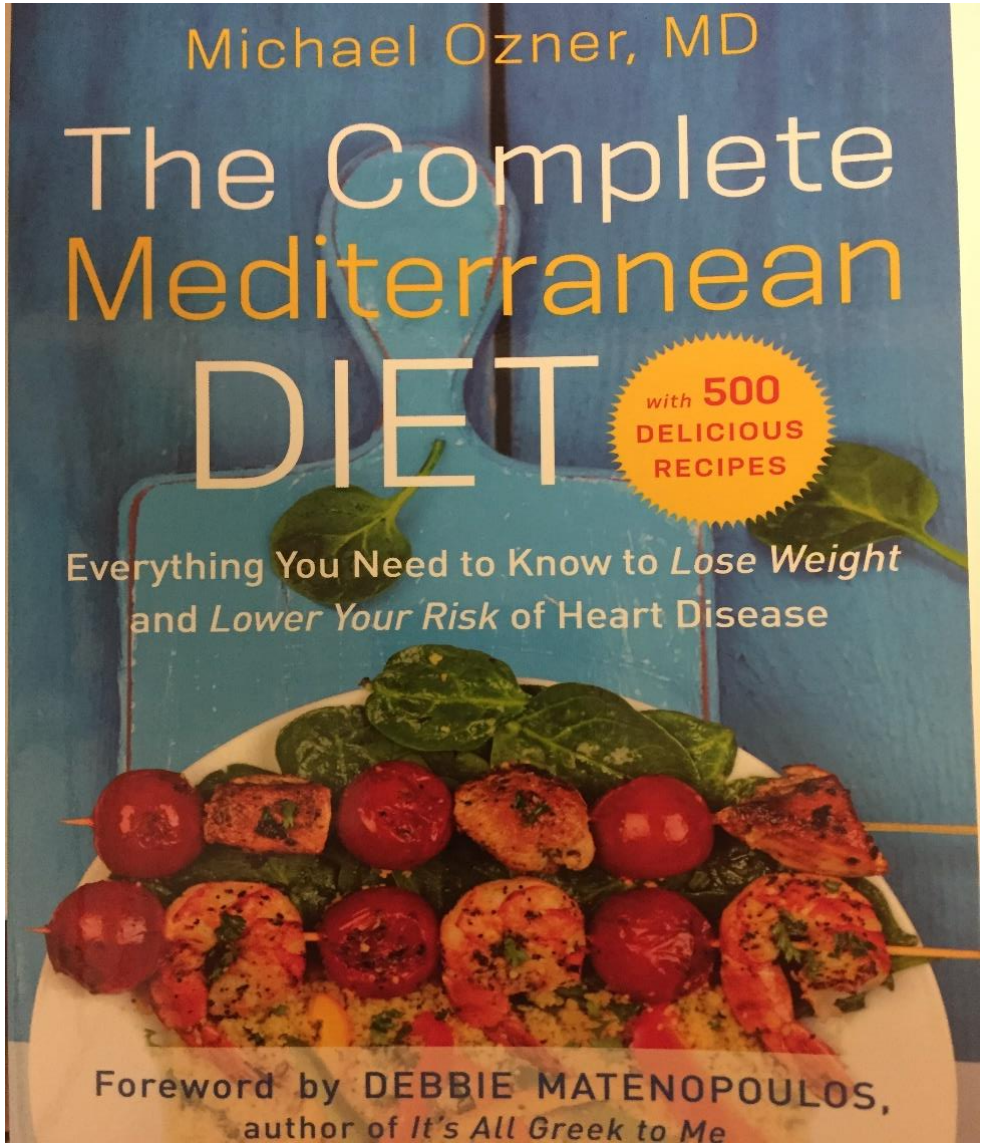
What About Diet?

Eat Food.
Not Too Much.
Mostly Plants.

(Michael Pollan, NY Times, Jan. 28, 2007)

The Mediterranean Diet
delays onset of dementia by five years

(Scarmeas et al, NYP/CUMC,
Arch Neurol, 2009, 2010, 2015)


Michael Ozner, MD
The Complete Mediterranean DIET
with 500 DELICIOUS RECIPES
Everything You Need to Know to Lose Weight and Lower Your Risk of Heart Disease
Foreword by DEBBIE MATENOPOULOS, author of It's All Greek to Me

Life's Simple 7

(www.heart.org)

Manage Blood Pressure

Control Cholesterol

Reduce Blood Sugar

Get Active

Eat Better

Lose Weight

Stop Smoking

(Protect Against Head Injuries)

Stroke Warning Signs

- Sudden weakness, numbness, or paralysis of the face, arm or leg – especially on one side of the body
- Sudden blurry vision or loss of vision in one or both eyes
- Unable to speak clearly or understand simple statements
- Unexplained dizziness, unsteadiness, loss of balance or coordination, especially when combined with any other symptom
- Sudden, severe headache with no apparent cause often described as – *"the worst headache of your life"*
- *Stroke is an Emergency!*

Stroke Prevention, 1997. National Stroke Association

Milestone – 1995

NINDS rt-PA Stroke Study N Engl J Med

- 624 patients treated with 0.9 mg/kg/hour
- Treated in less than three hours; ½ less than 90 minutes
- t-PA group: 31-50% complete recovery
- Control: 20-38% complete recovery
- ICH: 6.4% v. 0.6%
- Mortality: 17% v. 20%

Odds Ratio for Good Outcomes After Intravenous rTPA (Lees, Lancet, 2010)

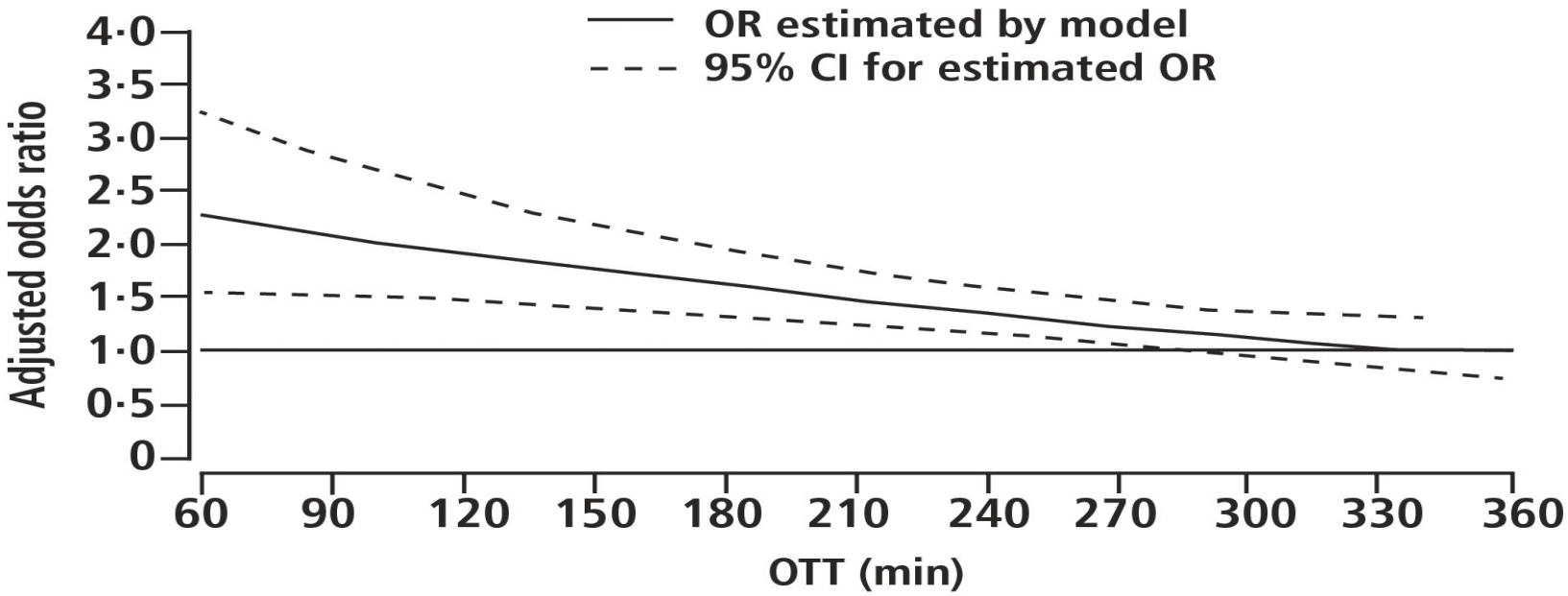
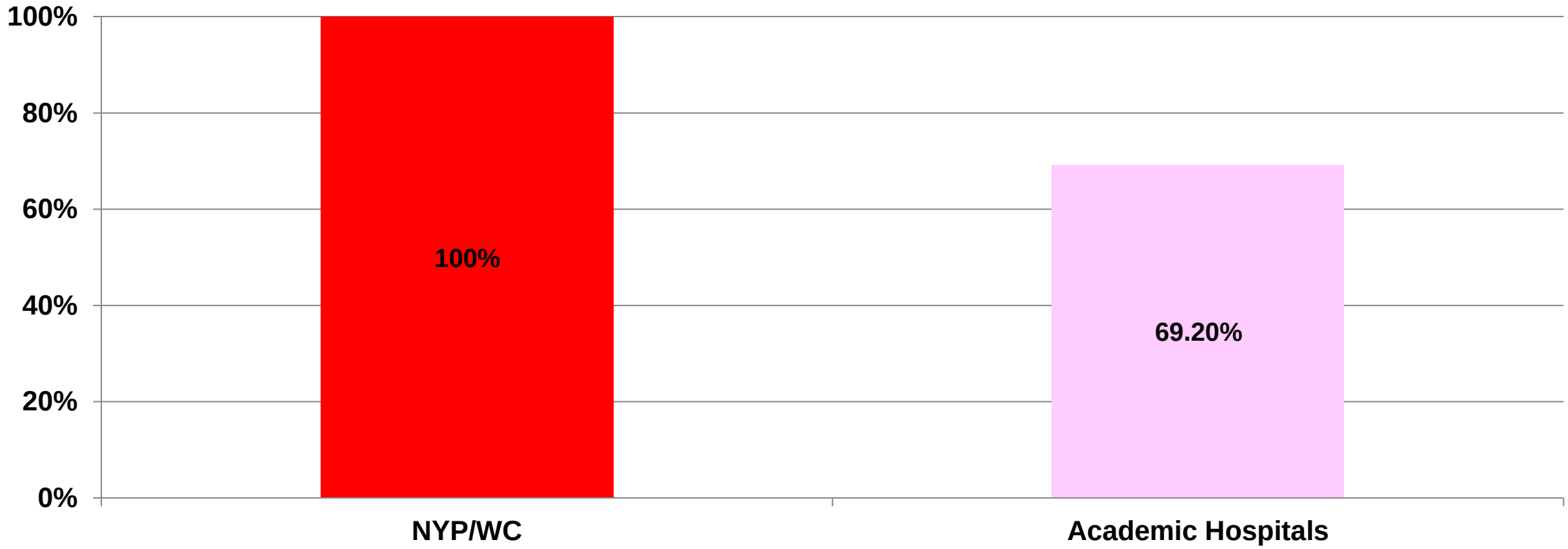


Table 1. Time-to-treat impact on stroke outcomes

	Neurons lost[a]	Synapses lost	Accelerated aging
Per stroke	1.2 billion	8.3 trillion	36 yr
Per hour	120 million	830 billion	3.6 yr
Per minute	1.9 million	14 billion	3.1 wk
Per second	32,000	230 million	8.7 hr

Saver, Stroke, 2006

Percent of Patients Receiving tPA in 60 Minutes or Less: 2014



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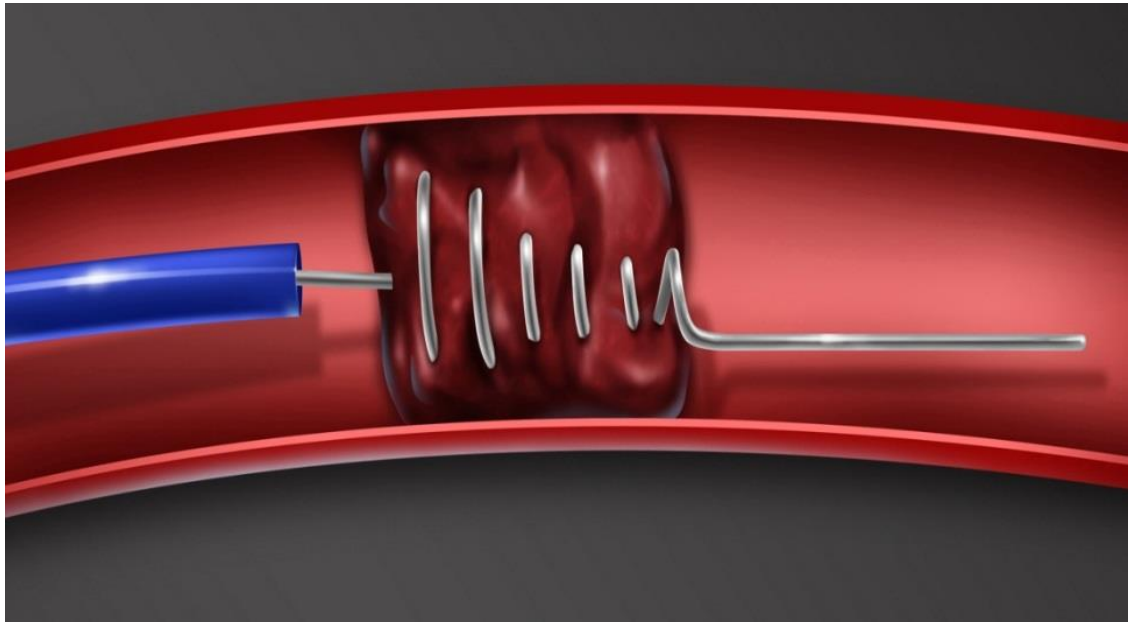
Mechanical Thrombectomy

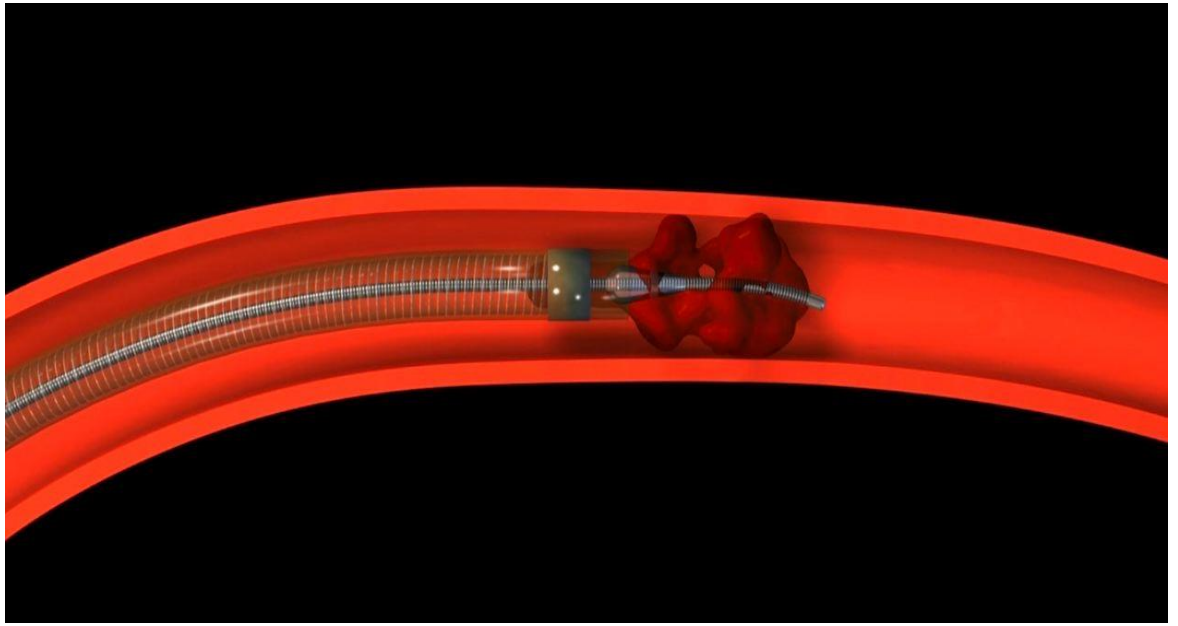
MERCI retriever
FDA Approved in 2004

Concentric Medical, Inc, Mountain View, California



Penumbra system
FDA Approved in 2008

Penumbra, Inc. Alameda, California

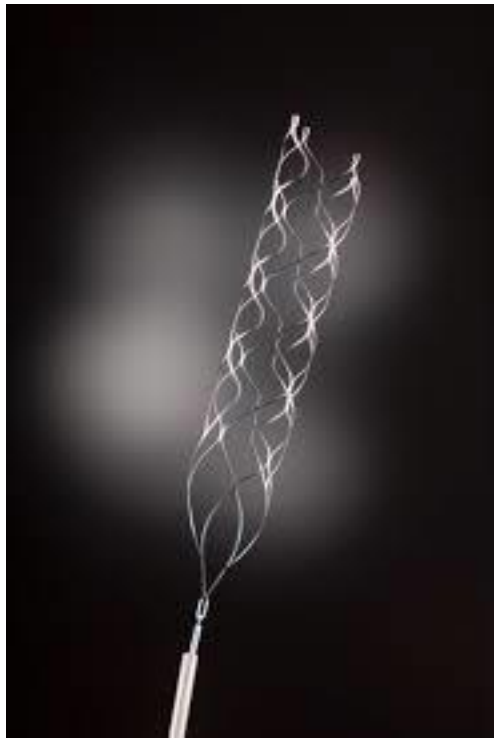


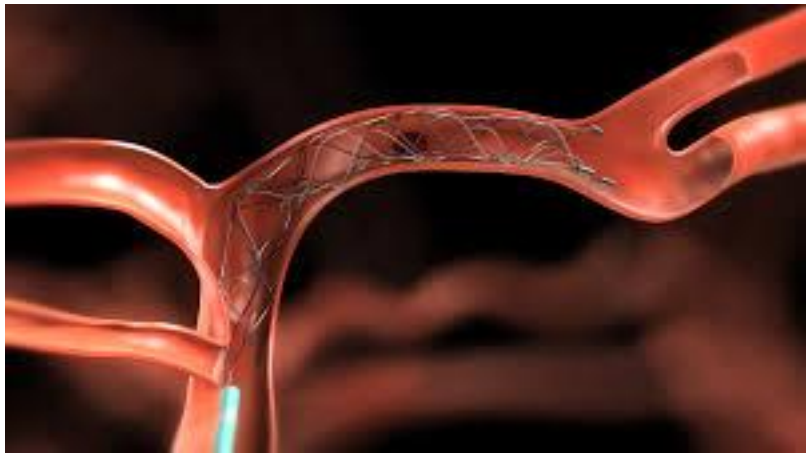
Milestone - 2015

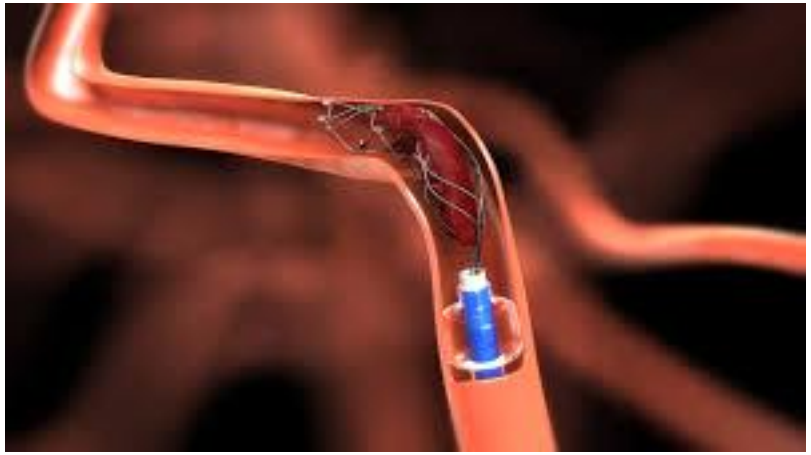
International Stroke Conference

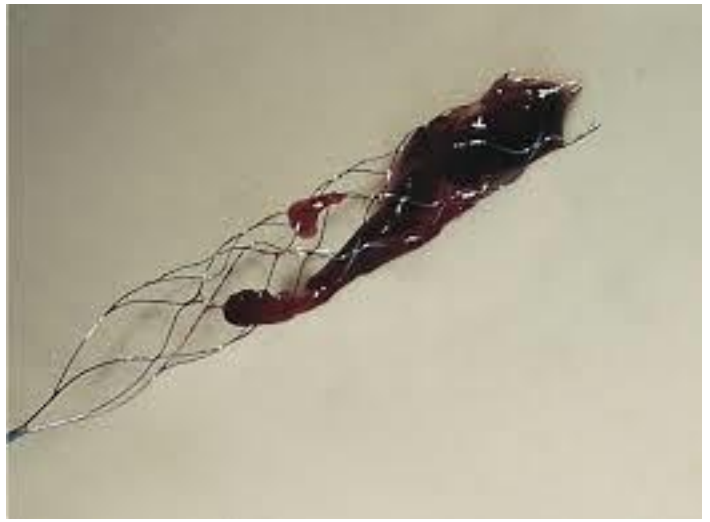
Five separate randomized trials confirmed the added benefit of endovascular clot extraction in addition to IV rt-PA.

'Solitaire' Stent Retriever

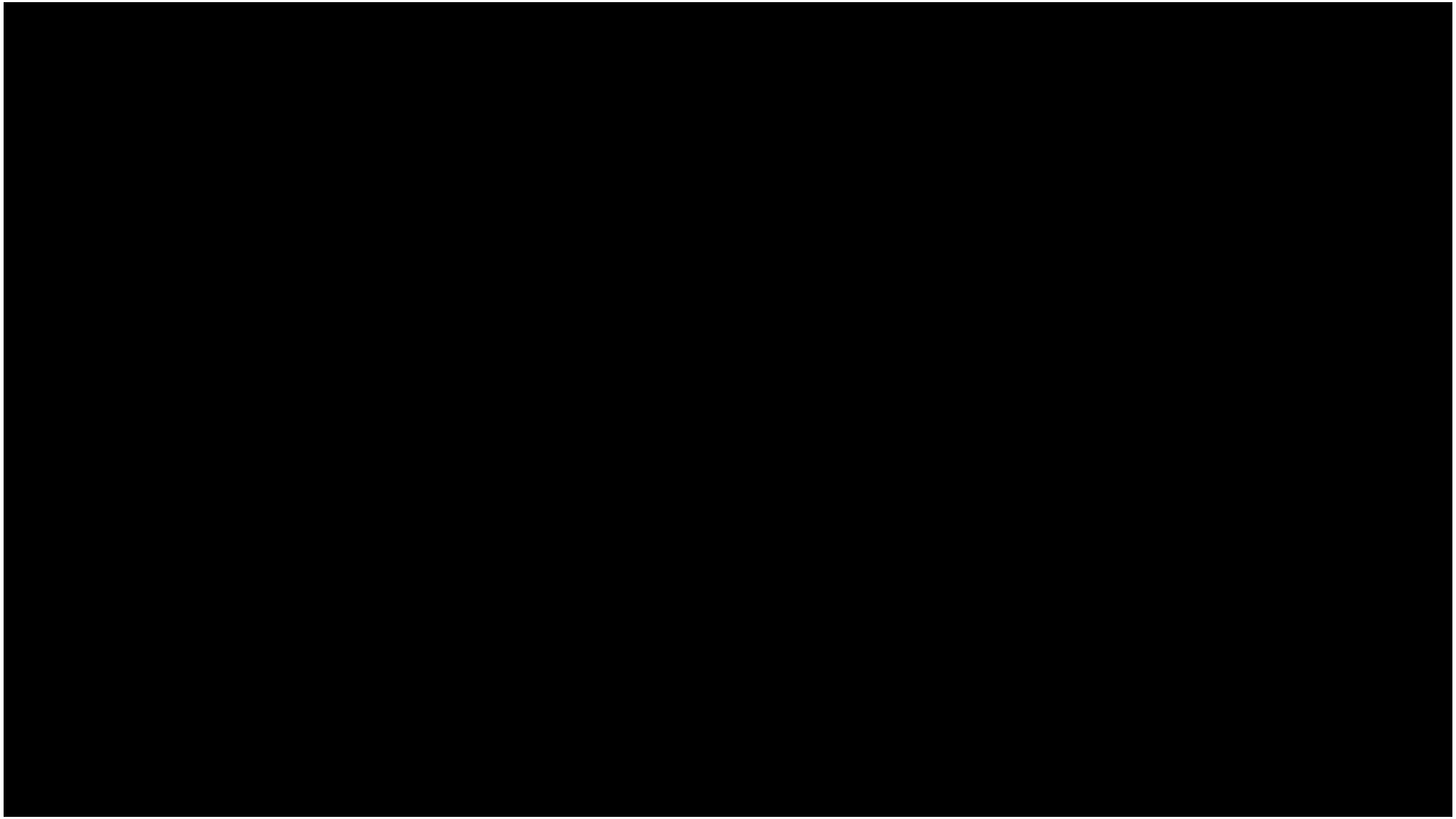




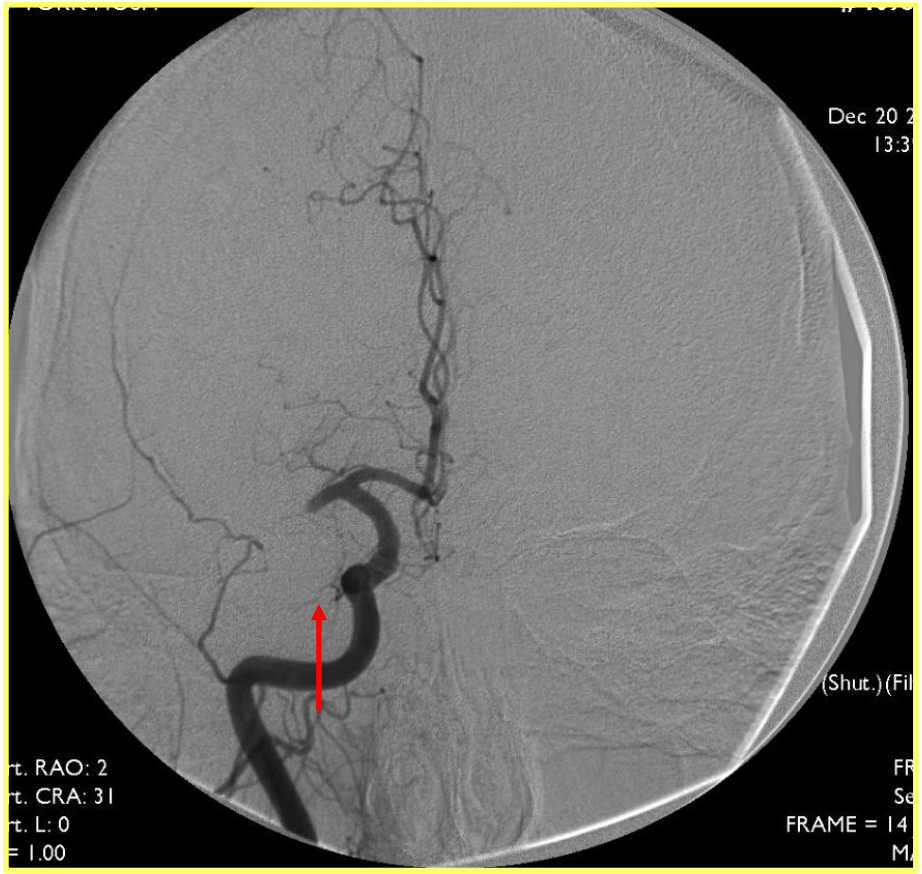




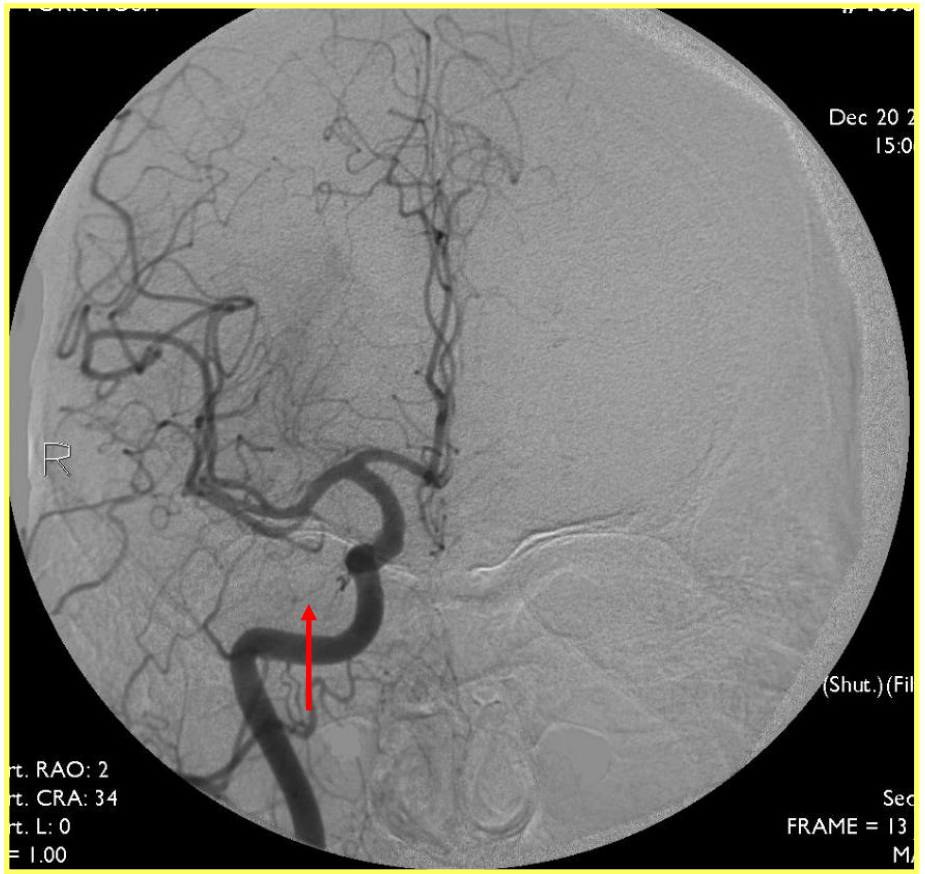
Intracranial Clot Extraction



Intra-Arterial Clot Removal



Angio Before



Angio After

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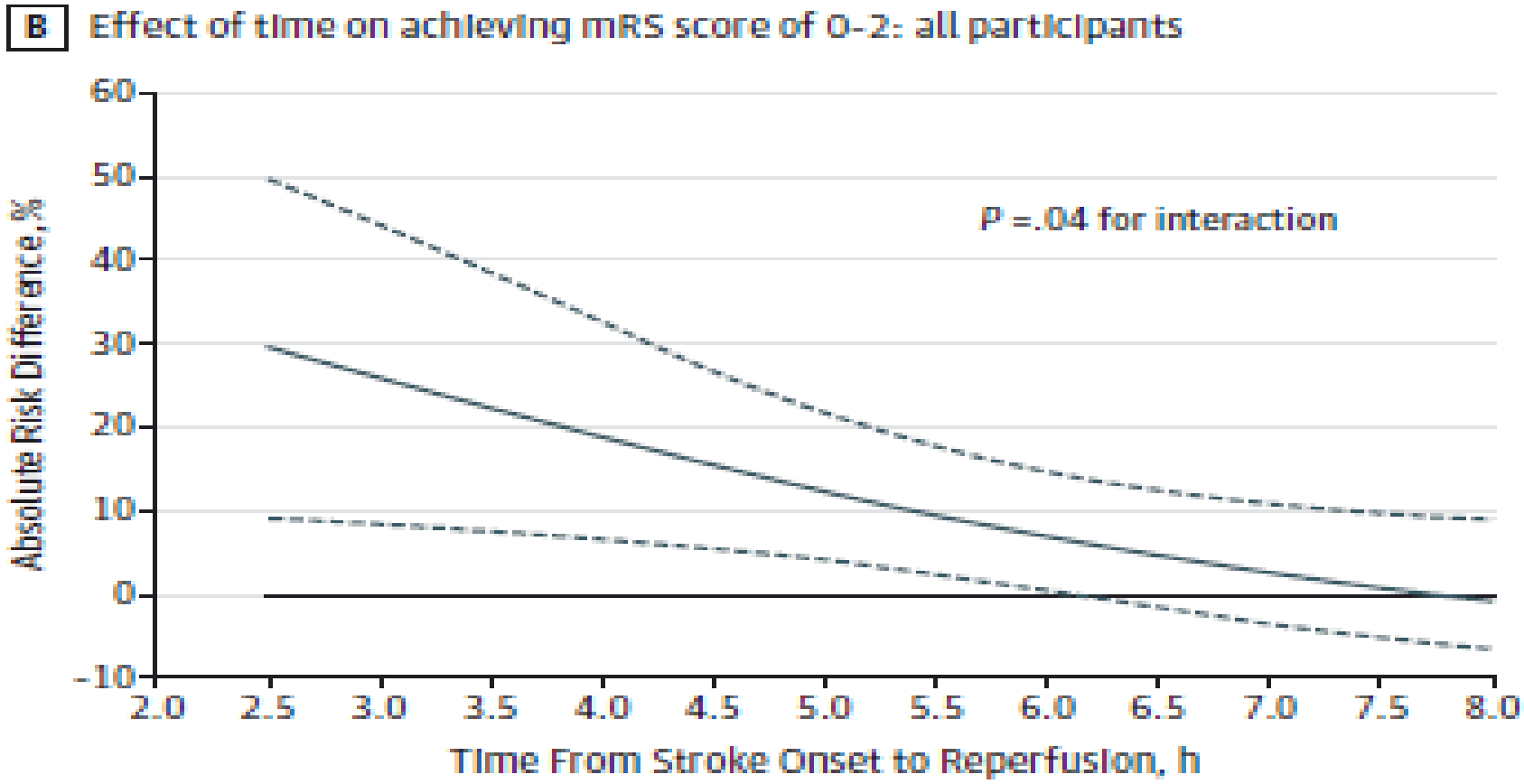
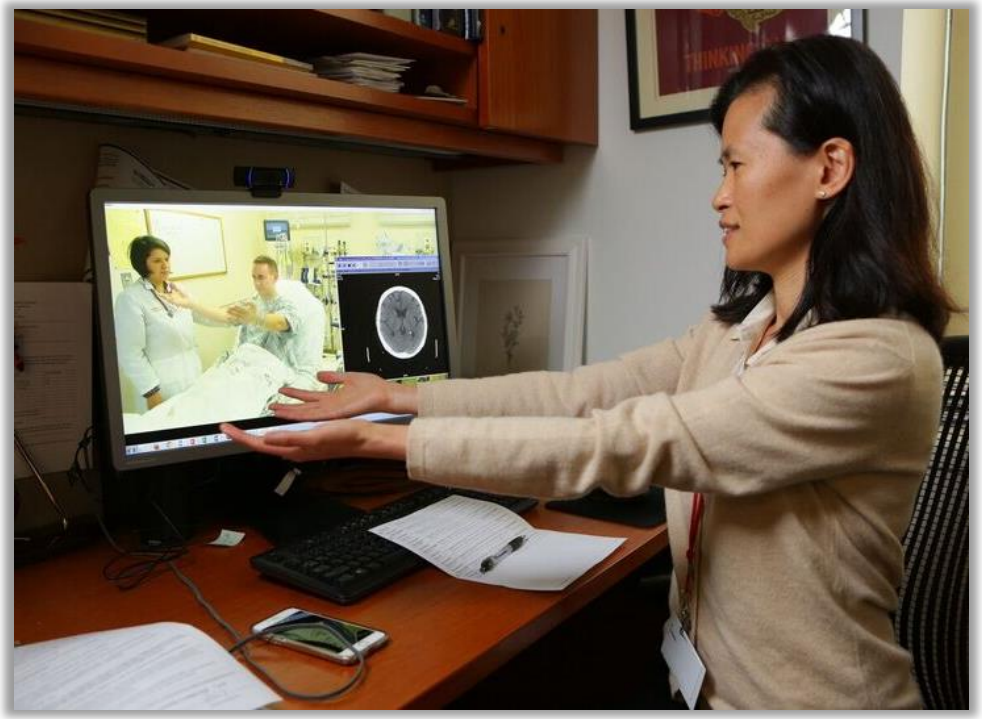
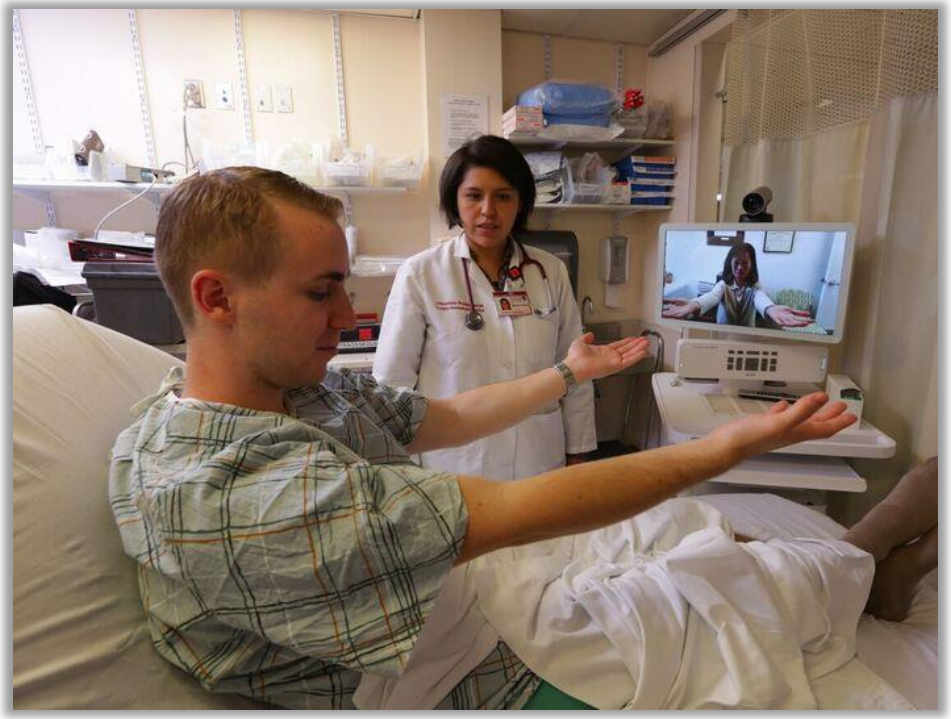
MR CLEAN Intra-arterial Clot Extraction – Time v. Outcome

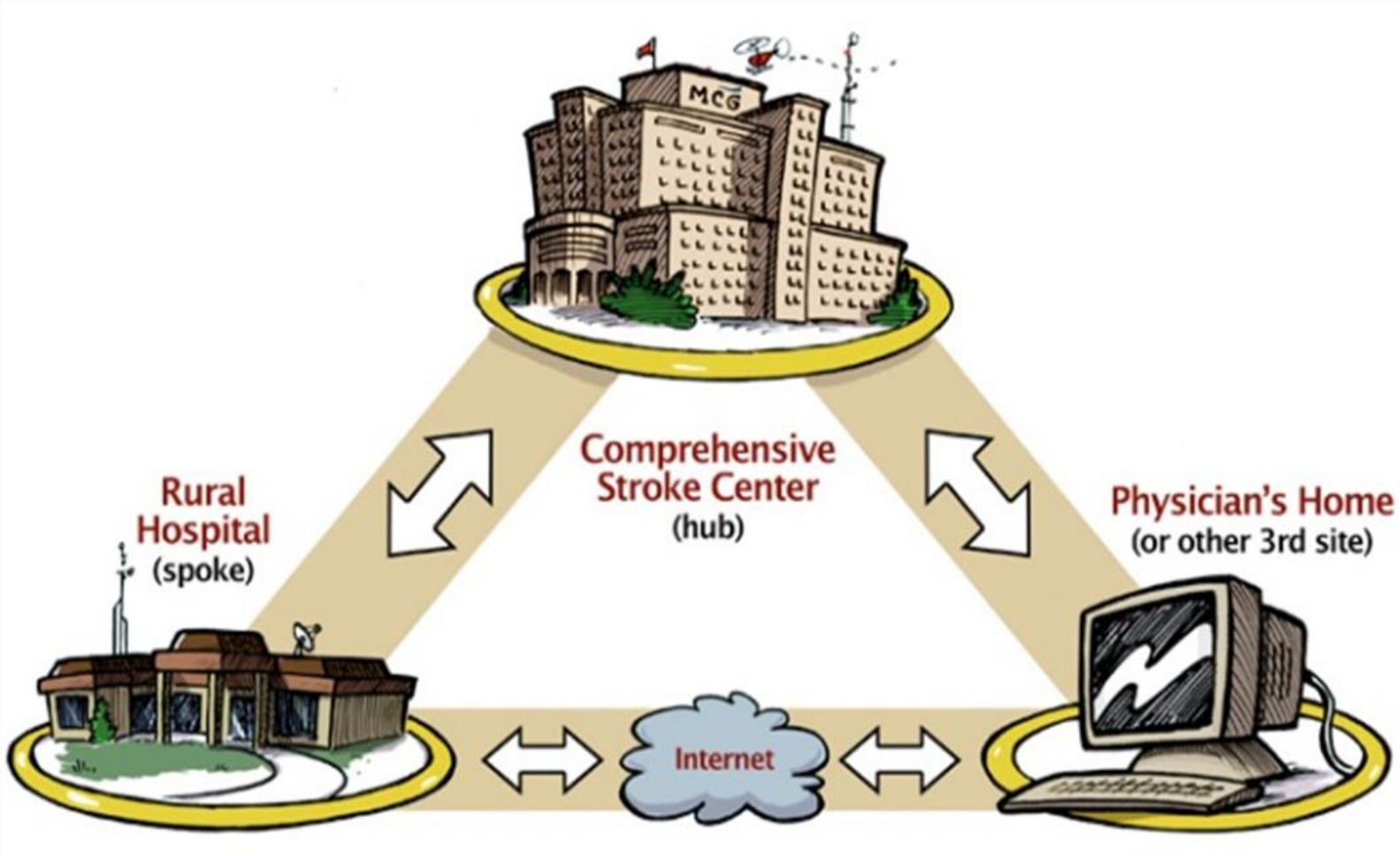


Tele-Neurology





Telestroke – Hub and Spoke Model



New York Presbyterian Mobile Stroke Unit

2016

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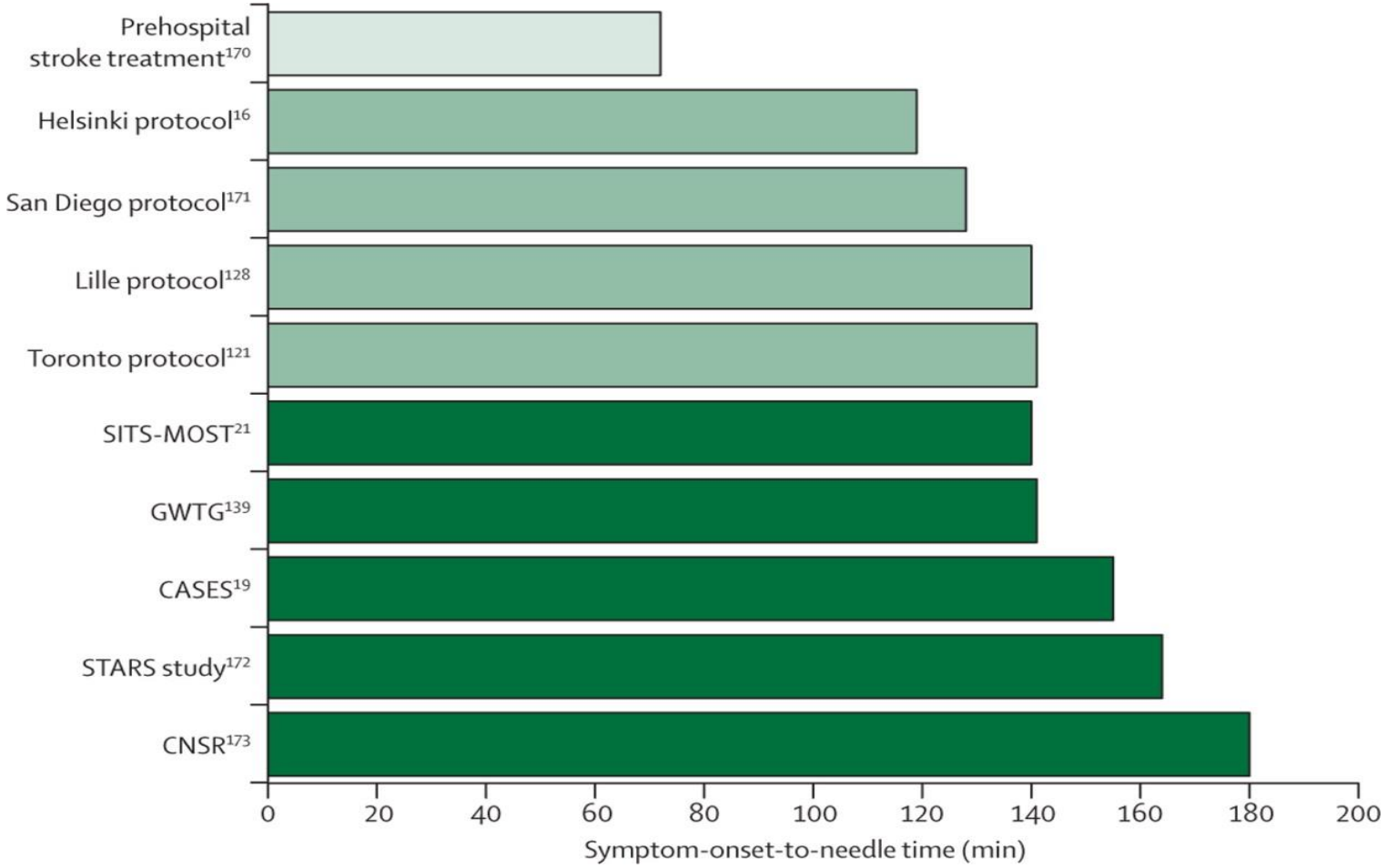
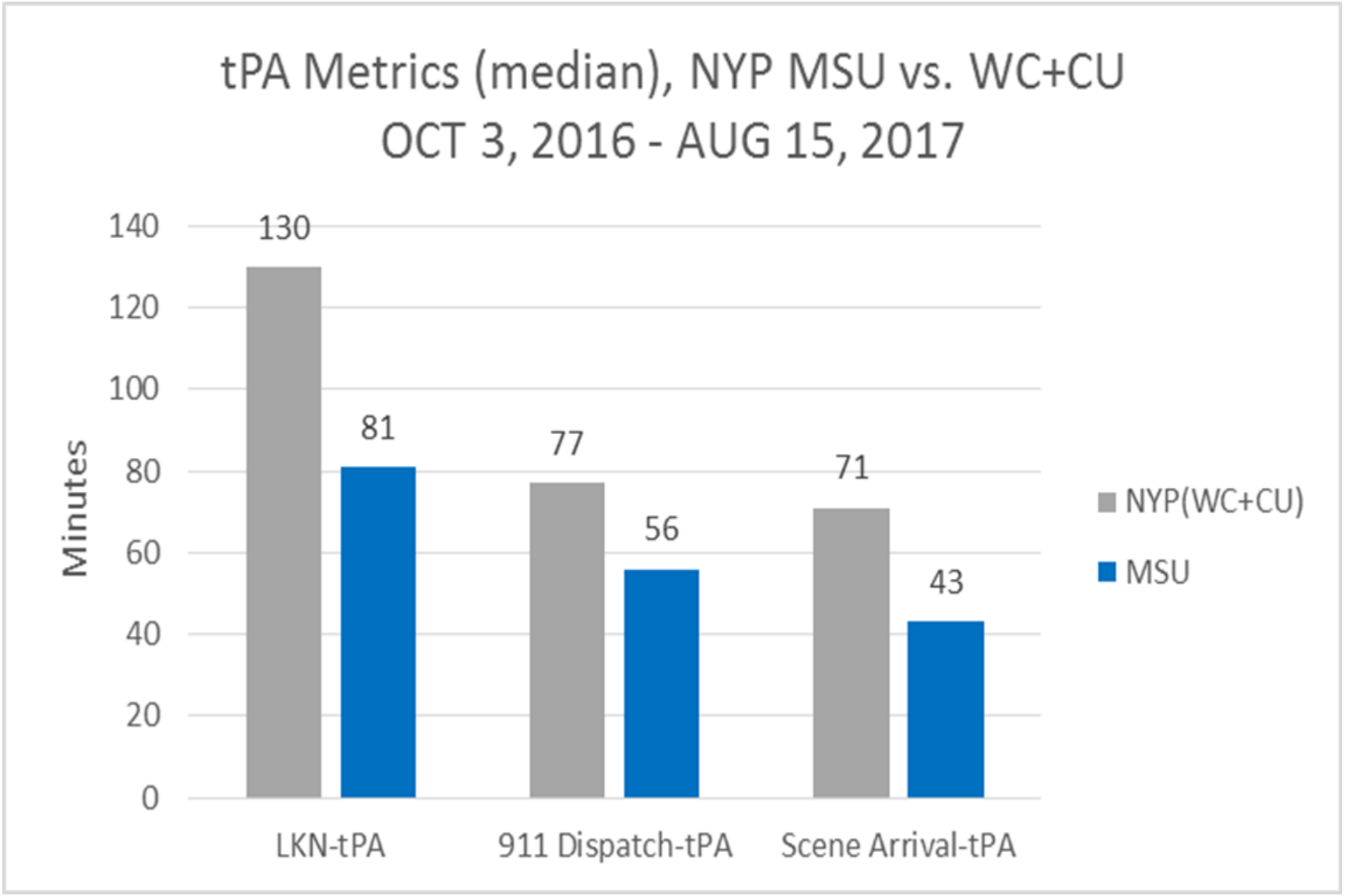
Potential of the Mobile Stroke Unit

- Bring the physician expertise & diagnostic tools to the patient
- Initiate treatment at the scene
- **Cut time to treatment**
- **Increase tPA delivery & access to endovascular therapy**
- **Increase chances for better neurologic outcomes**

Improving Onset-to-Treatment Times



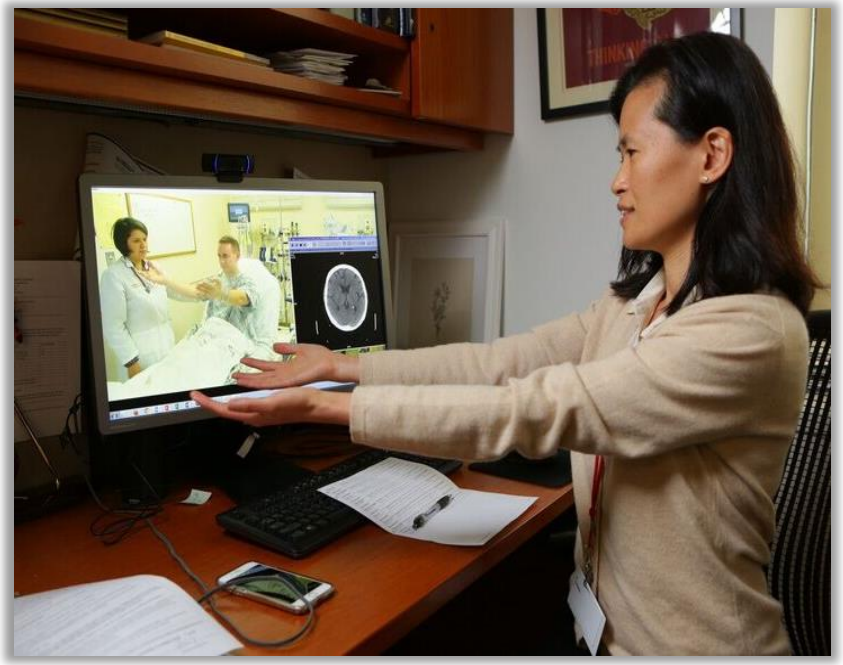

tPA Metrics (median), NYP MSU vs. WC+CU
OCT 3, 2016 - AUG 15, 2017
Minutes
140
120
100
80
60
40
20
0
130
81
77
56
71
43
LKN-tPA
911 Dispatch-tPA
Scene Arrival-tPA
NYP(WC+CU)
MSU

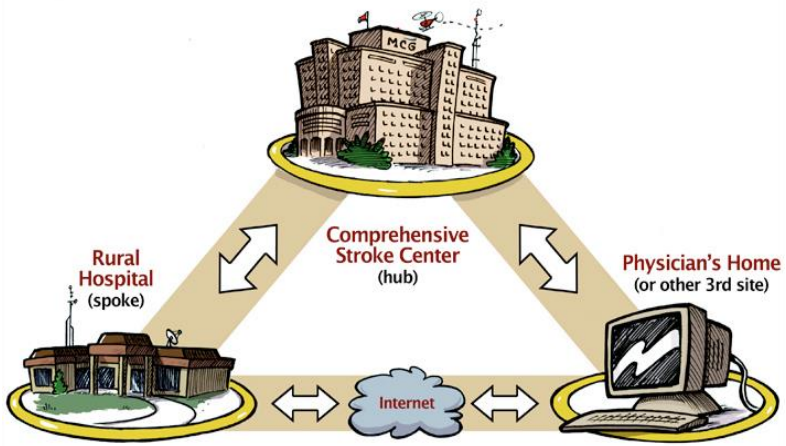
Potential of the Mobile Stroke Unit

New Units Deployed

- Queens – April 30, 2018
- Brooklyn – May 29, 2018

1840
NewYork-Presbyterian
EMERGENCY MEDICAL SERVICES
MOBILE STROKE TREATMENT UNIT
citi




MCG
Comprehensive
Stroke Center
(hub)
Rural
Hospital
(spoke)
Physician's Home
(or other 3rd site)
Internet

5:43 41°
2
CBSNewYork

Questions?