The Stroke Center of the Future: What Does This Look Like? Michael R. Jaff, DO, FACC Professor of Medicine Harvard Medical School Chair, MGH Institute for Heart, Vascular and Stroke Care Boston, Massachusetts

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### Michael R. Jaff, DO Conflicts of Interest

#### Consultant

- Abbott Vascular (non-compensated)
- American Genomics, Inc
- Astra Zeneca Pharmaceuticals, Inc
- Boston Scientific (non-compensated)
- Cordis Corporation (non-compensated)
- Covidien (non-compensated)
- Ekos Corporation (DSMB)
- Medtronic (non-compensated)
- Micell, Incorporated
- Primacea
- Trivascular, Inc.
- Board Member
  - VIVA Physicians (Not For Profit 501(c) 3 Organization)
    - www.vivapvd.com

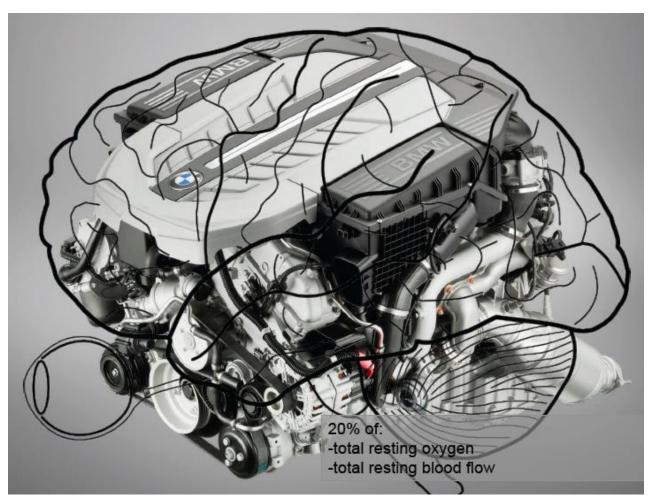
- Equity
  - Access Closure, Inc
  - Embolitech, Inc
  - Hotspur, Inc
  - Icon Interventional, Inc
  - I.C.Sciences, Inc
  - Janacare, Inc
  - MC10
  - Northwind Medical, Inc.
  - PQ Bypass, Inc
  - Primacea
  - Sadra Medical
  - Sano V, Inc.
  - Vascular Therapies, Inc

#### October 2013





### Stroke is a Big Deal

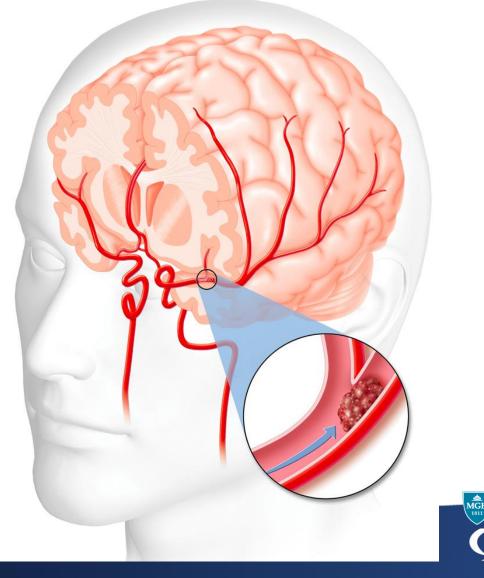








### And this is what it is all about...

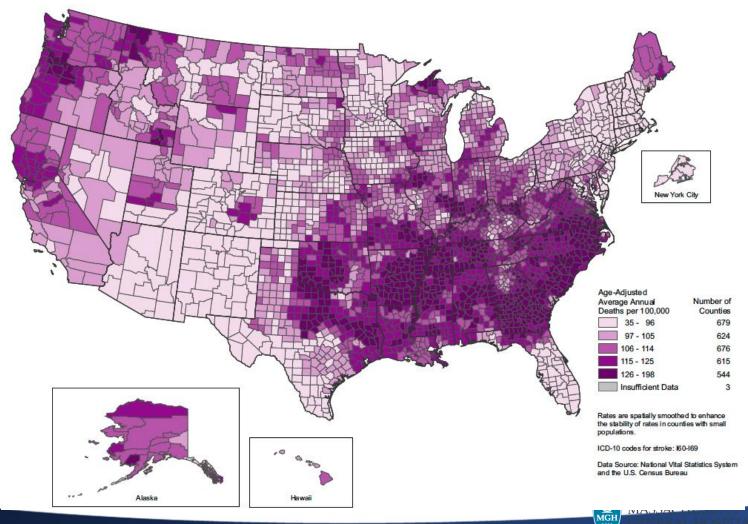




GENERAL HOSPITAL



### The Stroke Mortality Map





CARDIOVASCULARA RESEARCH FOUNDATION



### **Stroke Stats**

- Fourth leading cause of death in the US
  - 134,138 deaths in 2008
  - 1 out of 18 deaths due to stroke in US
    - One American dies of a stroke every 4 minutes
- Most common cause of adult disability
  - 31% of stroke survivors receive outpatient rehabilitation
    - 50% with some hemiparesis
    - 30% unable to walk without some assistance
    - 26% dependent in ADLs
    - 35% depressed
    - 26% institutionalized in a nursing home









Total cost of stroke care 2005-2050 (in 2005 dollars)

\$1.52 Trillion---Non-Hispanic Whites \$313 Billion---Hispanics \$379 Billion---Blacks







### The Basis of Acute Stroke Therapy

## тье "recanalization hypothesis"

 i.e. reopening of occluded vessels improves clinical outcome in acute ischemic stroke through reperfusion and salvage of threatened tissues.

- Several biologic factors weaken the relationship of recanalization to outcome in acute ischemic stroke patients:
  - too late
  - collateral circulation
  - reperfusion injury

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no-reflow phenomenon







### Time is Brain

#### Estimated Pace of Neural Circuitry Loss in Typical Large Vessel, Supratentorial Acute Ischemic Stroke

	Neurons Lost	Synapses Lost	Myelinated Fibers Lost	Accelerated Aging
Per Stroke	1.2 billion	8.3 trillion	7140 km/4470 miles	36 y
Per Hour	120 million	830 billion	714 km/447 miles	3.6 y
Per Minute	1.9 million	14 billion	12 km/7.5 miles	3.1 wk
Per Second	32 000	230 million	200 meters/218 yards	8.7 h

It is estimated that the typical stroke patient loses 2 million neurons per minute in which stroke is untreated

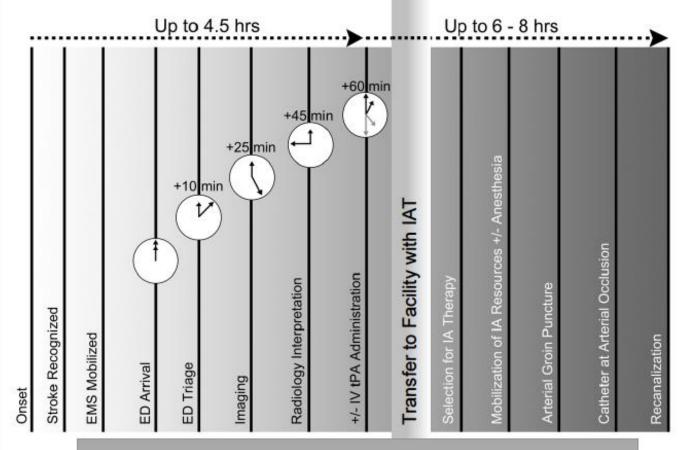








### Schematic Timeline of Acute Stroke Therapy



Schematic Timeline of Stroke Therapy





## So, How Do We Accomplish This?

- The Stroke Center of the Future
  - Mandatory Components for Success
    - Multidisciplinary
    - The system must work FAST
      - Door => ED => CT/CTA/Perfusion Scan => Needle =>
        - (?) Cooling to 33-degrees C on the way
      - IV rtPA within 4.5 hour window
      - When to proceed to IAT?
    - Center-specific prospective outcomes measurements



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# The Stroke Team

- Physicians
  - ED
  - Stroke Neurology
  - Neurosurgery
  - Neurointervention
  - Trainees (multiple specialties)
- Nursing
  - ED
  - Stroke Neuro ICU
  - Intervention

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- Technology
  - ED Radiology
  - Intervention
- Critical Support
  - Pharmacy
  - Research Coordinator
  - Social Service/Family







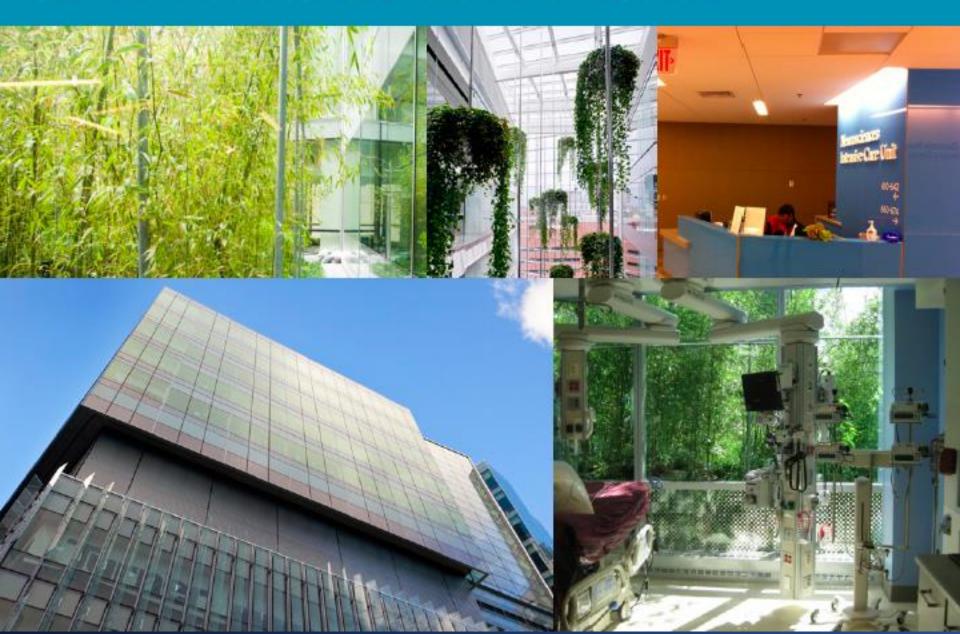
## You Must Have the Protocols...

Patient "	25	merger	ncy Departmen		CT Scanne	er			Scanner	
ER Resident	Page ED2CT (stroke, research, rads fellows) Obtain pertinent medical history									
ER Nurse	Get transport IV access, labs, equipment ready vitals, EKG		Transfer patient to CT scanner	Transfer patient to MRI scanner				Transfer patient to angio suite		
Neuro Resident	Mobilize			Confirm healthcare proxy, complete MRI checklist	Page acute stroke attending					
troke Fellow	Mobilize u ED-CT pa		te consult, establish LSW, NIHSS	Page INR fellow based on LVO prediction rule	Make IV tPA decision with input from attending	If eligible, give IV tPA	Obtain verbal consent for IAT	Review scans	Stroke attending assists with decision-making	Decision to treat, transfer patient to angio suite
NR Fellow	Mobilize, activate technologist			Arrive in ED, confirm LVO	Book case	Obtain written consent for IAT, alert attending	Review scans	NeurolR attending assists with decision-making	Update tech, prep angio suite	
NR Technologist					Mobilize			Arrive in angio suite	Prep table	Continue set-up
Anesthesia								Mobilize	Arrive in angio suite	Standby





# **Neurocritical Care Unit**



### The Stroke Center of the Future

Comprehensive Stroke Center: Neurosurgeon/Neuroendovascular On Site; Full Spectrum Care

Primary Stroke Center: Stroke Service/Coordinator/Continuity of Care

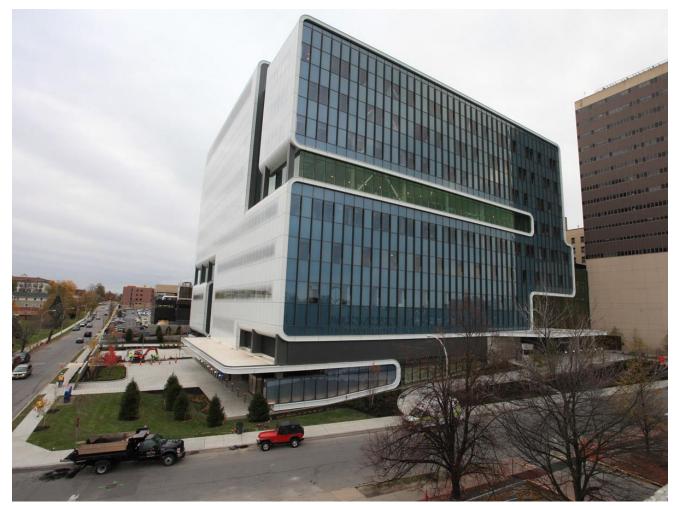
> Acute Stroke Capable Hospitals Emergent CT Scanner/IV rtPA

Basic Care: Assess/Identify/Stabilize





### Jacobs Institute, Buffalo, New York







# The Stroke Center of the Future

### What is Required to Build This?

- Broad expertise across all specialties
- Willingness to break down silos
- Pool finances (sorry, but I don't see this working any other way)
- Institutional Intestinal Fortitude
- A philanthropist who is a believer
- A commitment to prospective outcomes research
- Excellent planning
- Speed is at the center of the program







