875 Ellicott Street

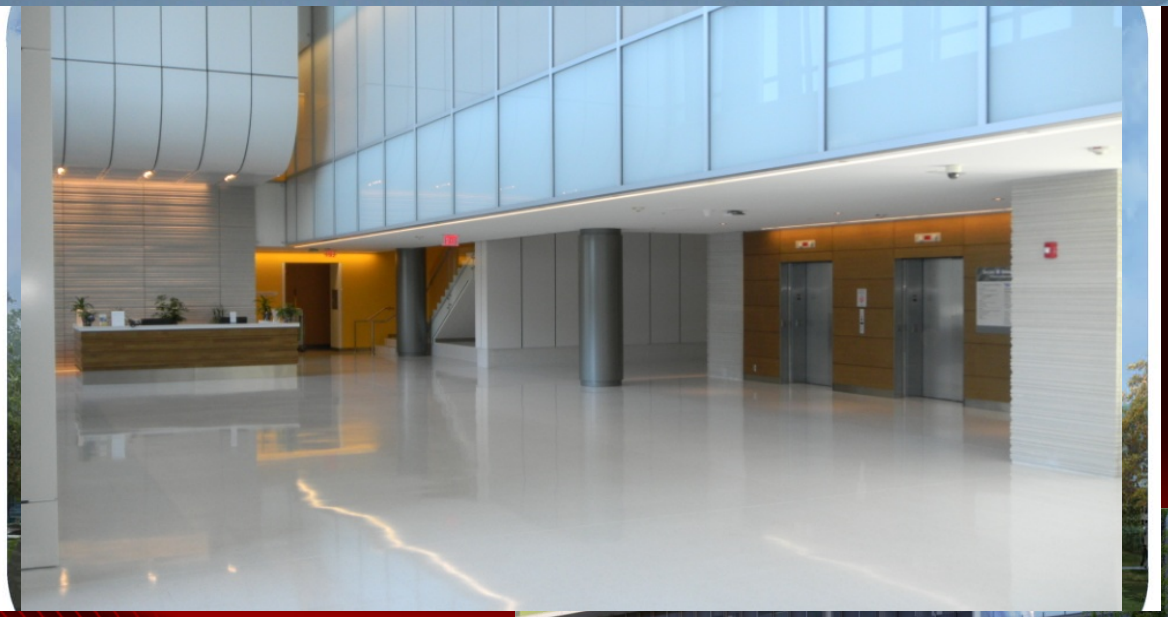
Gates Vascular Institute

A Kaleida Health Facility

Clinical and Translational Research Center

University at Buffalo, The State University of New York

Jacobs Institute



Gates Vascular Institute

Innovation in Cardiovascular Disease and Stroke

Building a Cardiovascular Center of Excellence

L.N. Hopkins, MD
SUNY Distinguished Professor, Neurosurgery and Radiology
Founder, Gates Vascular Institute and Jacobs Institute

Elad Levy, MD
Adnan Siddiqui, MD, PhD
Ken Snyder, MD, PhD
Jason Davies MD, PhD

University at Buffalo Neurosurgery

TOSHIBA STROKE & VASCULAR RESEARCH CENTER

Gates Vascular Institute
A Kaleida Health Facility

University at Buffalo
State University of New York

Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Affiliation/Financial Relationship	Company
• Grant/Research Support	• Canon Med
• Consulting Fees/Honoraria	• None
• Major Stock Shareholder/Equity	• Boston Scientific, Ocular, Silk Road, Imperative Care, Ostial, Cerebrotech, NexTgen, Endostream, Serenity, Synchron, BlinkTBI
• Royalty Income	• None
• Ownership/Founder	• None
• Intellectual Property Rights	• None
• Other Financial Benefit1	• None

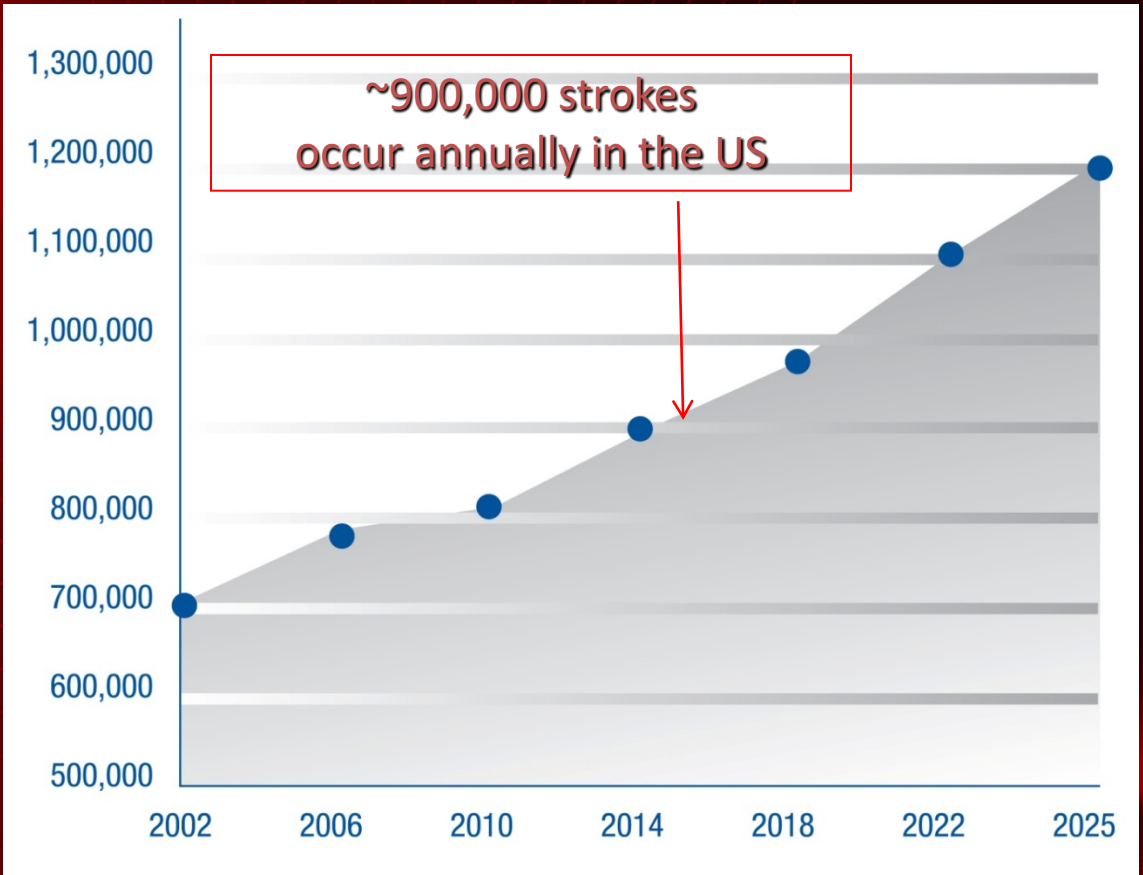
AIS: The Greatest Malady

4 cause of death

#1 cause of adult disability

Cost- $$ & Social Incalculable!

Projected number of strokes in US: 2002 – 2025



The leading cause of severe adult disability

WHO 2002:
-15.3 million strokes
-5.5 million deaths

Stroke, January 2004; J. P. Broderick, MD

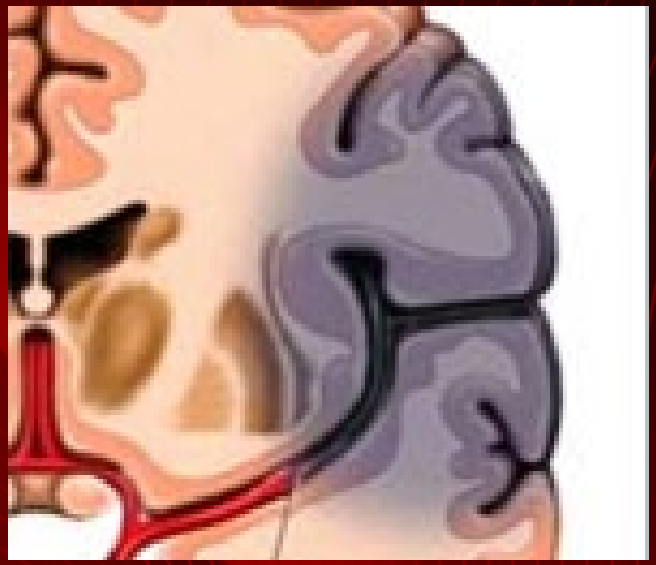
Acute Ischemic Stroke Care Delivery

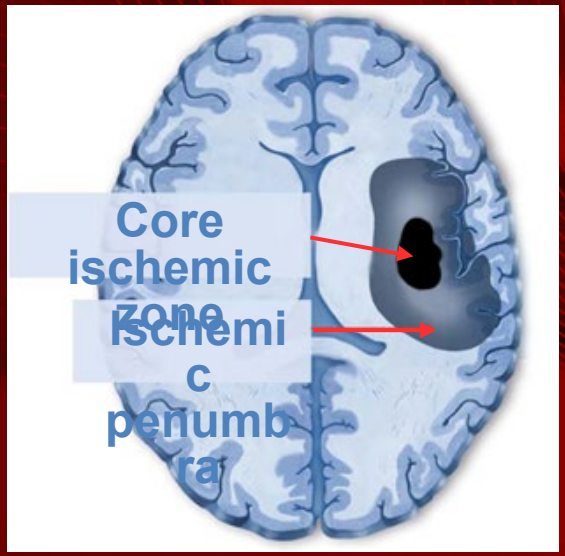
Myocardial Infarction Model

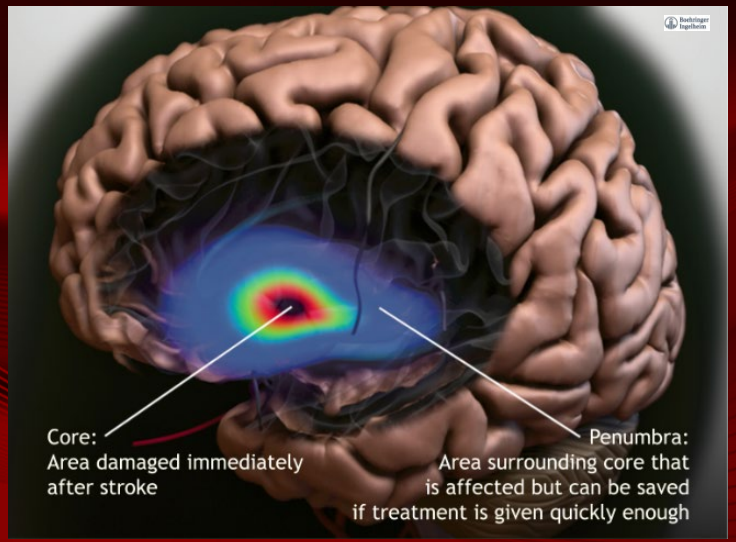
- Same trajectory as AMI as AMI
- Cerebral/coronary occlusion
- Treatment with Lytics initially
- Time is Brain>>Time is muscle
- Revascularization is best treatment
- Neuro is ten years behind Cardiology

Ischemic Stroke Pathophysiol & Treatment

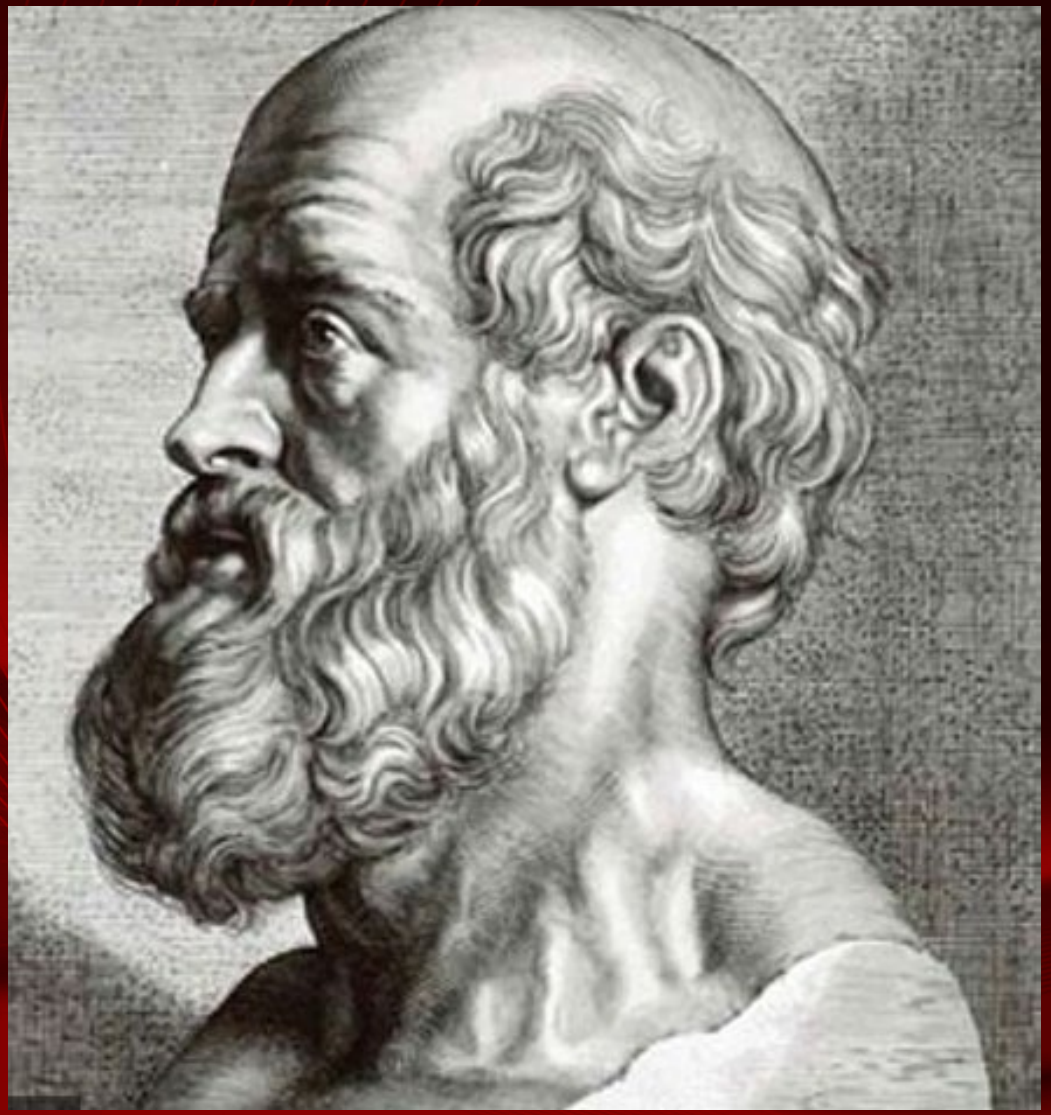
Save the Penumbra…Just like AMI







“APOPLEXY”



Hippocrates 460 BC

The NEW ENGLAND JOURNAL of MEDICINE

2015 Game Changer

Out to 6-12 Hours

MR CLEAN

ESCAPE

REVASCAT

THRACE

THERAPY

SWIFT PRIME

EXTEND-IA

ORIGINAL ARTICLE

A Rando
Treatmen

O.A. Berkhemer, P.S.S. Fra
W.J. Schonew
J. Staals, J.
P.A. Brouwe
E.J. van Dij
B.A.A.M.
P.C. Vroomen, O. Esl
A.V. Tielbeek, H.M. den
E.W. Steyerberg, H.Z. Fla
L.F.M. Beenen, R. van de

The NEW

ORIGINAL ARTICLE

Thrombectomy within 8 Hours after
c Stroke

T.G. J
. Molina, A. Rovira,
L. San Roman, J. Serena, S. Abilleira, M. Ribo, M. Millan, X. Urra, P. Cardona,
E. López-Cancio, A. Tomasello, C. Castaño, J. Blasco, L. Aja, L. Dorado,
a, M. Rubiera, M. Hernández-Pérez, M
, M. Gallofré, and A. Dávalos, for the R

ABSTRACT

ORIGINAL ARTICLE

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Rapid
nic Stroke

. Thornton, D. Roy,
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, W.F. Morrish,
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Jeffrey L. Saver, M

nic Stroke
ection

Demetrius K. Lopes, M.D., Vivek K. Reddy, M.D., Richard du Mesnil de Rochemont, M.D.
Oliver C. Singer, M.D., and Reza Jahan, M.D., for the SWIFT PRIME Investigators*

ABSTRACT

T. Wijeratne, T.G. Phan, W. Chong, R.V. Chandra, C.F. Bladin, M. Badve, H. Rice,
L. de Villiers, H. Ma, P.M. Desmond, G.A. Donnan, and S.M. Davis,
for the EXTEND-IA Investigators*

Endovascular Therapy (Out to 6 Hours): New Standard of Care

Number Needed to Treat (NNT)

In order to have 1 additional stroke patient be independent at 90 days

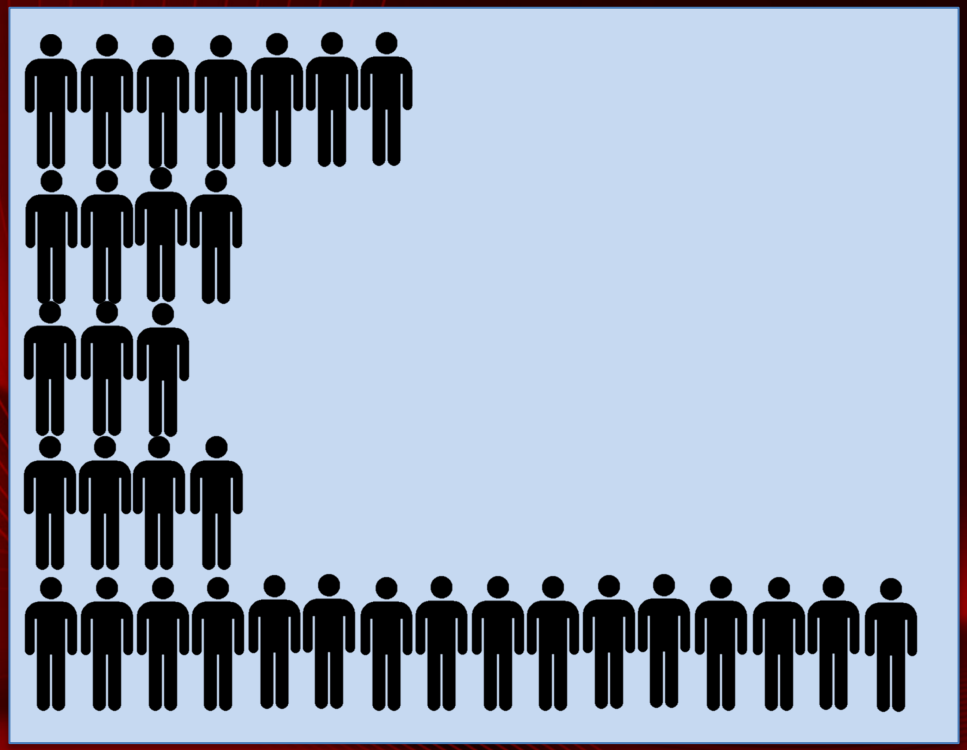
MR CLEAN

ESCAPE

EXTEND-IA

SWIFT PRIME

PCI for STEMI

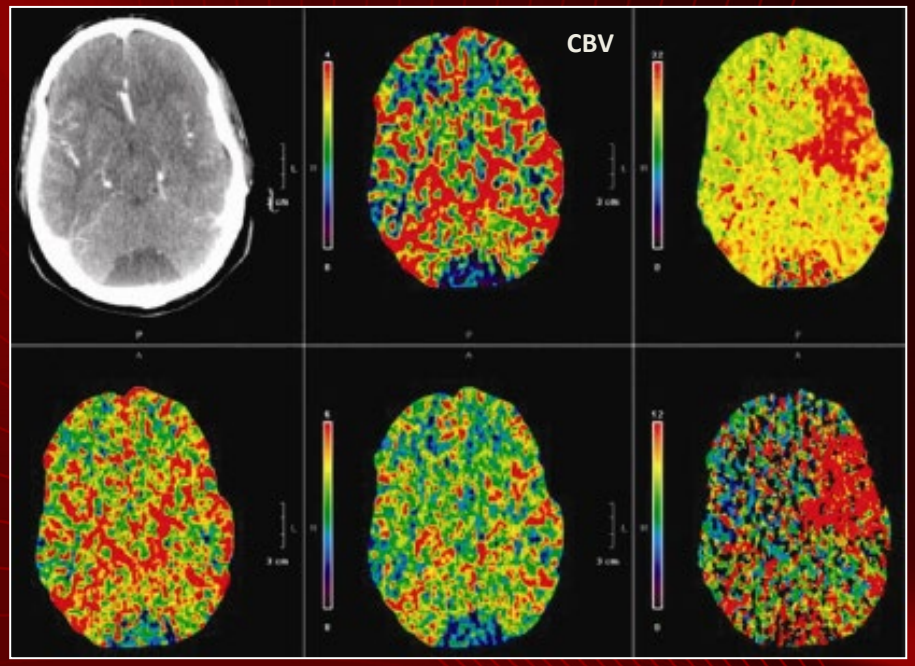


NNT for antimicrobial therapy in septic shock to prevent 1 patient death is 4 (Crit. Care Med. 2014; 42: 2342-9)

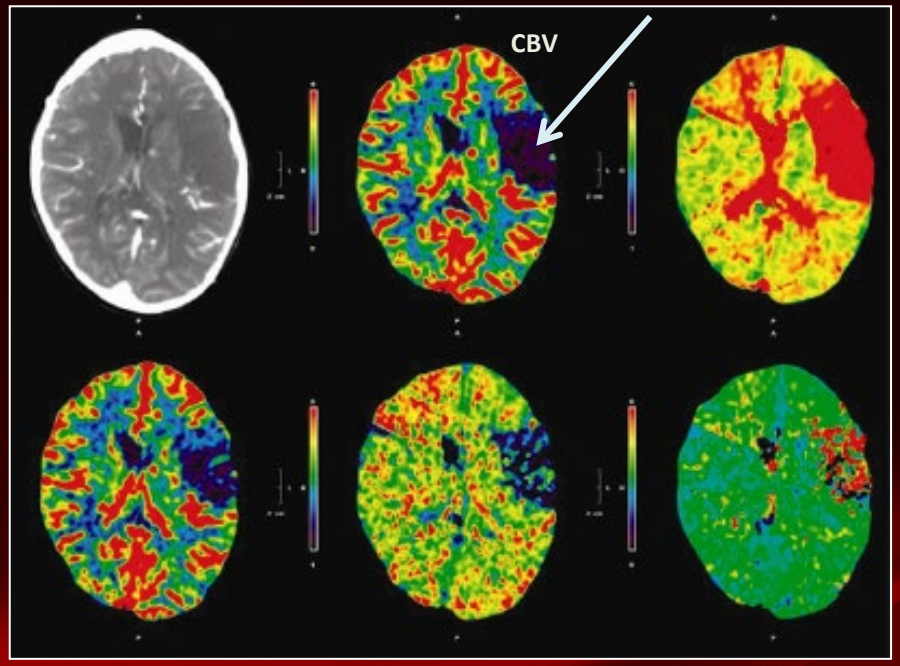
Imaging

CT Perfusion-Based Patient Selection

Is the Brain Viable??



Patient 1: has “penumbra” and likely to benefit from intervention



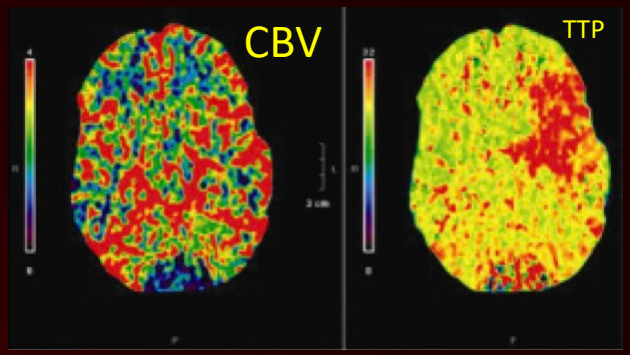
Patient 2: has volume loss (*arrow*) and no “penumbra”

Using CT Perfusion Imaging…

DAWN TRIAL

DWI or CTP Assessment with Clinical Mismatch in the Triage of Wake-Up and Late Presenting Strokes Undergoing Neurointervention

Extending the Time Window
Diffuse III and DAWN



Thrombectomy 6 to 24 Hours after Stroke with a Mismatch between Deficit and Infarct

R.G. Nogueira, A.P. Jadhav, D.C. Haussen, A. Bonafe, R.F. Budzik, P. Bhuva, D.R. Yavagal, M. Ribo, C. Cognard, R.A. Hanel, C.A. Sila, A.E. Hassan, M. Millan, E.I. Levy, P. Mitchell, M. Chen, J.D. English, Q.A. Shah, F.L. Silver, V.M. Pereira, B.P. Mehta, B.W. Baxter, M.G. Abraham, P. Cardona, E. Veznedaroglu, F.R. Hellinger, L. Feng, J.F. Kirmani, D.K. Lopes, B.T. Jankowitz, M.R. Frankel, V. Costalat, N.A. Vora, A.J. Yoo, A.M. Malik, A.J. Furlan, M. Rubiera, A. Aghaebrahim, J.-M. Olivot, W.G. Tekle, R. Shields, T. Graves, R.J. Lewis, W.S. Smith, D.S. Liebeskind, J.L. Saver, and T.G. Jovin, for the DAWN Trial Investigators*

NNT=2.8 !!

How We Select Patients:

Triage of the Acute Stroke Patient

Clinical

- Begins with recognition
- **Cognition may be lost!!**

Most Important- Time Is Brain

Meaning What??

In each minute we lose:

-1.9 million neurons,

-14 billion synapses (connections)

-12 km (7.5 miles) of nerve fibers

New Data from 2015 Trials :

If we reopen a major occluded artery-

Within 2 hours:

-Recovery rate is 90% !!

After 6 hours:

-Recovery rate is 20-30% !!!!

Pre

Post

What to do?

Remove the Clot ASAP

Thrombectomy Methods

Pharmacologic:

- IV tPA
- IA tPA

Mechanical:

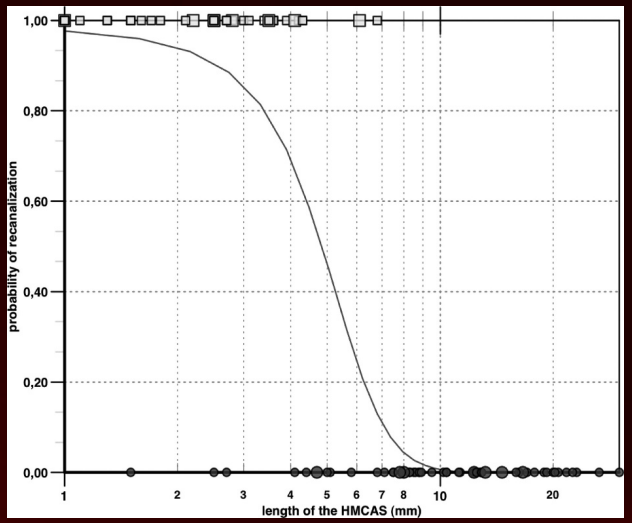
- Retrievable stent
- Aspiration
- Combination

  -aspiration +/- stent

IV-tPA- *ok for small distal vessels*

- Poor recanalization of large vessel occlusions
- 22 contraindications

Location	Recanalization
ICA terminus	32.3%
M1	4.4%
Basilar artery	4.0%

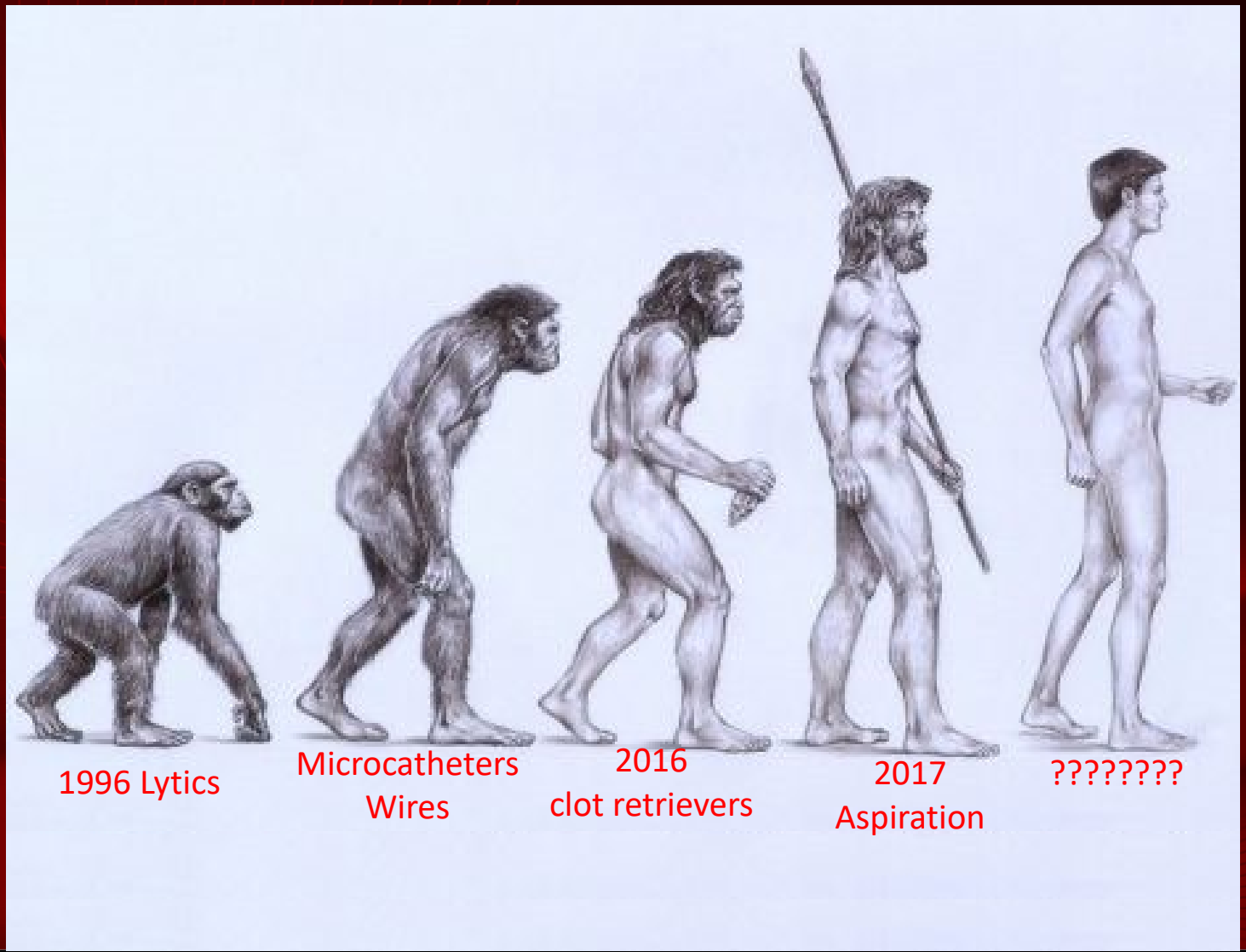


Conclusions—This study shows that in acute middle cerebral artery stroke, IVT has nearly no potential to recanalize occluded vessels if thrombus length exceeds 8 mm.

Stroke 2010; 41: 2254-2258. Stroke 2011; 42: 1775-1777

Innovation: Devices

Evolution of stroke devices



Time Really IS Brain…

2 Hour Window for Optimal Results

Challenges

- 2 Hour Onset-Revasc Goal
- Patient & Physician awareness
- Inertia
- Cataclysmic specialty shift
- Reimbursement
- Man Power
- Technology
- Systems of care

25 Million strokes per year world wide

~850,000 strokes in US

~250,000 pts are potential candidates for intervention

600 Stroke active 24/7/365 neurointerventionalists

2 Hour Goal!

Many more Interventionists needed…

Where will they come from??

Interventional Cardiologists

Interventional Radiologists

Vascular Surgeons

What's Important??

Population Health…

Not TURF!!

We are at the Dawn of a New Era in Stroke

Overwhelming BENEFIT for INTERVENTION!!!

We will need a STEMI model for stroke
Mandated door to clot retrieval times
Emergency treatment near the onset

Infrastructure for the provision of emergent endovascular care exists in rural areas as well as major centers

1 million PCI annually in the US.
Over 2,000 cardiac cath labs
>6,000 interventional cardiologists
Many Interested IR & VS

Contemporary cardiac cath labs have DSA & road-mapping

Acute stroke intervention techniques
-clot removal, angioplasty with stent placement
-Cardiologists and IR are experts

For rural areas around the world…
A New Paradigm

"Drip and Ship" becomes
"Treat (*Revascularize)* and Ship"
to a major Neuro Center if Necessary!

American Heart Association.

Circulation

Manuscript Submission and Peer Review System

The Public Health Urgency Created by the Success of Mechanical Thrombectomy Studies in Stroke

Authors

L. Nelson Hopkins MD[1-4] and David R. Holmes Jr MD[5]

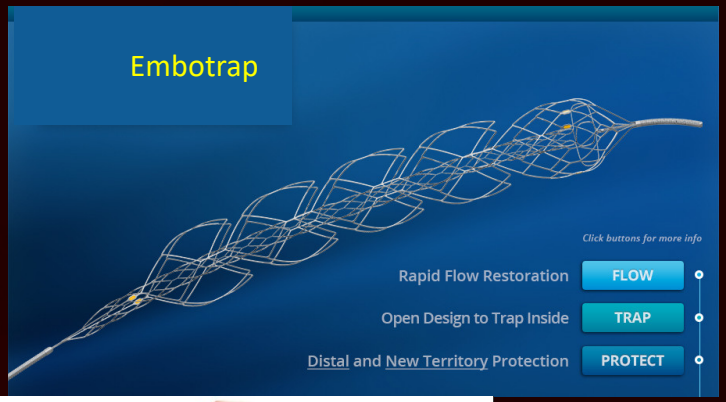
JACC

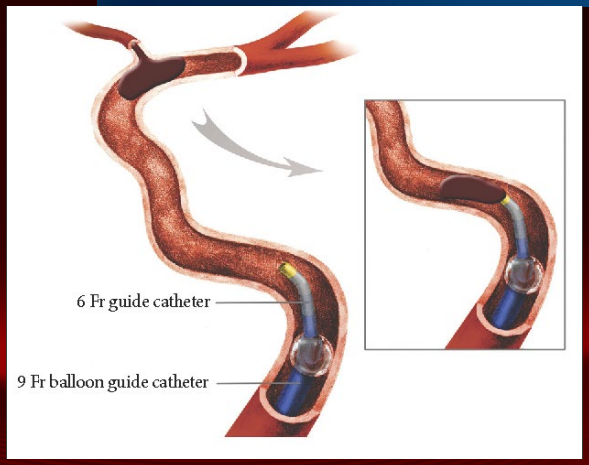
JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY

"Interventional Cardiology and Acute Stroke Care Going Forward. Is it Time?"
David R Holmes Jr MD and L Nelson Hopkins MD

What Else Do We Need for Stroke?

- Better Retrievers
- More effective aspiration
- Reduce distal embolic burden
  (eg, balloon guide, flow reversal)



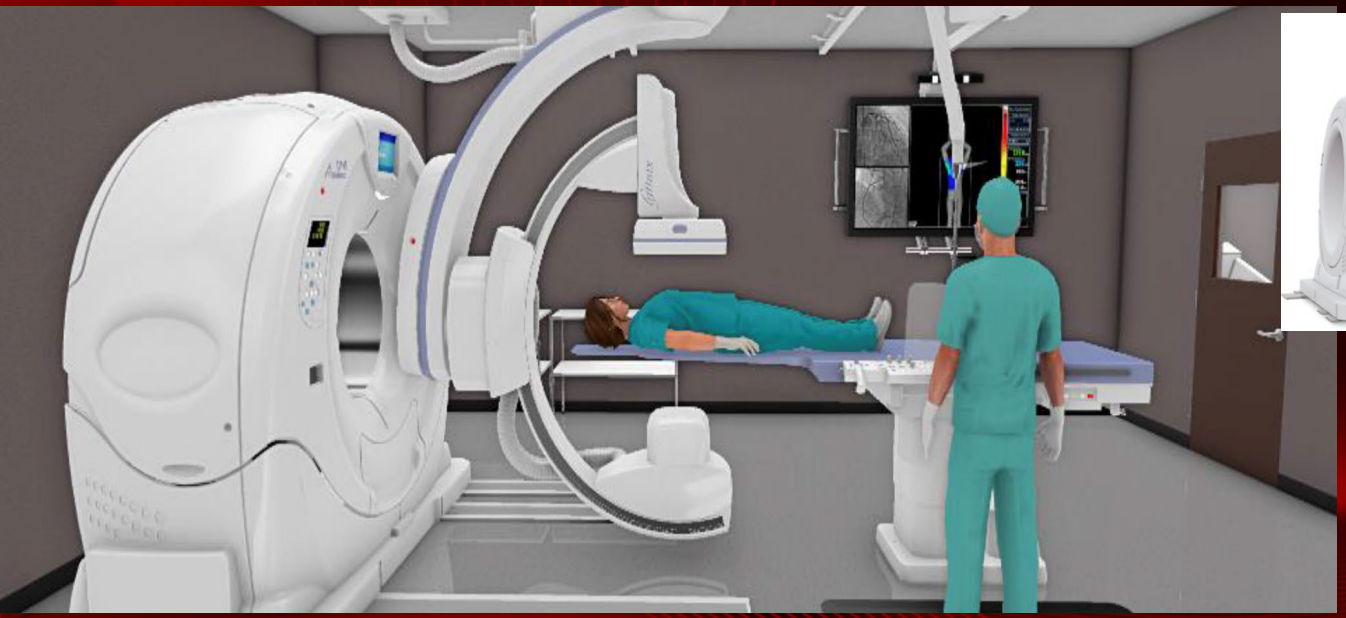


And…

< 2 Hour Goal

Onset to Revascularization
-ER door to CT- 5 min
-Door to CT Images- 10 min
-Door to needle <30 min
-Door to Revasc <60 min

- Improved work flow / "door-to-needle" times
  - Pre-hospital notification / preparation
  - New Imaging technology…CTP & Intervention in ER



Canon 4D CT Angio in ER (Door to needle < 30 min)

Thank You!!