



TOSHIBA
STROKE
RESEARCH
CENTER



KALEIDA
H E A L T H



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I disclose the following financial relationship(s):

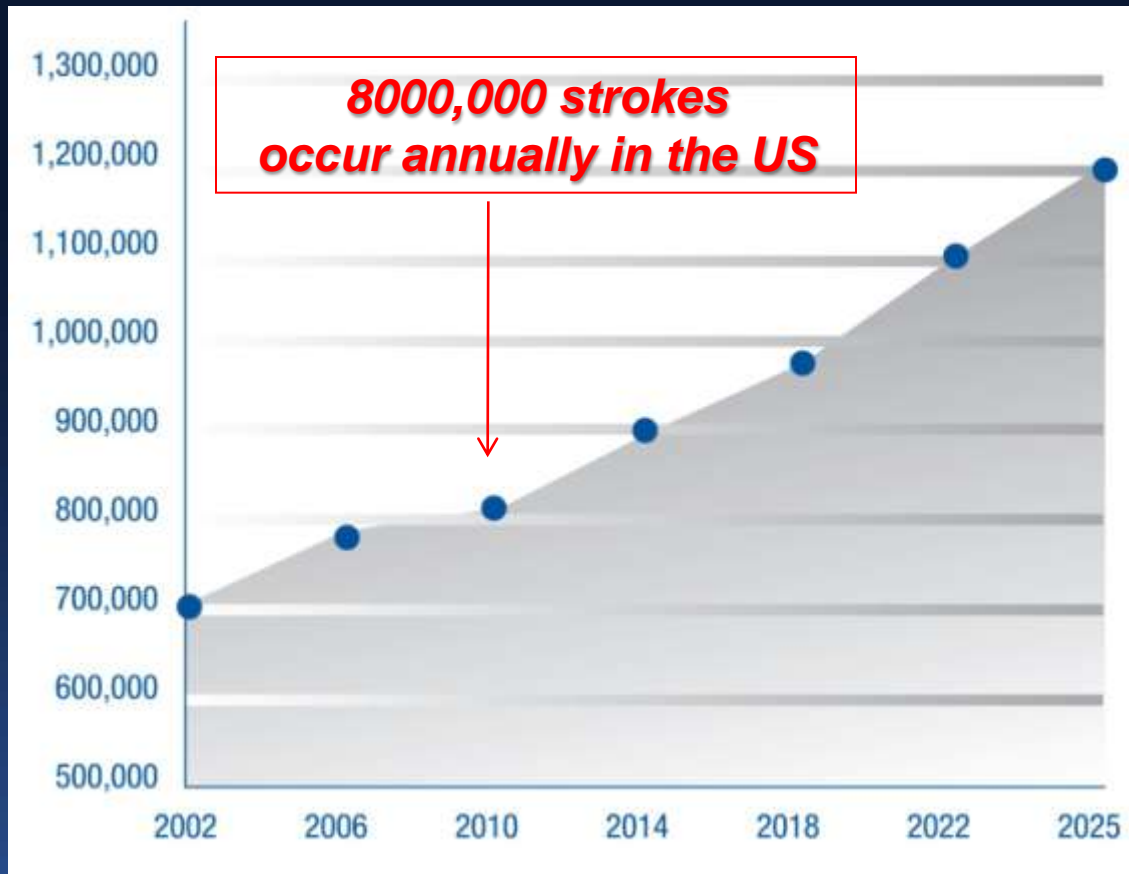
Consultant, Honoraria - Abbott , BARD, Boston Scientific, Cordis, Micrus, Toshiba, Gore, Invatec
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TCT 2010

Management of Acute Stroke By Cardiologists

LN Hopkins MD
David Orion MD

Projected number of strokes vs. aneurysms in US: 2002 – 2025



The leading cause of adult disability

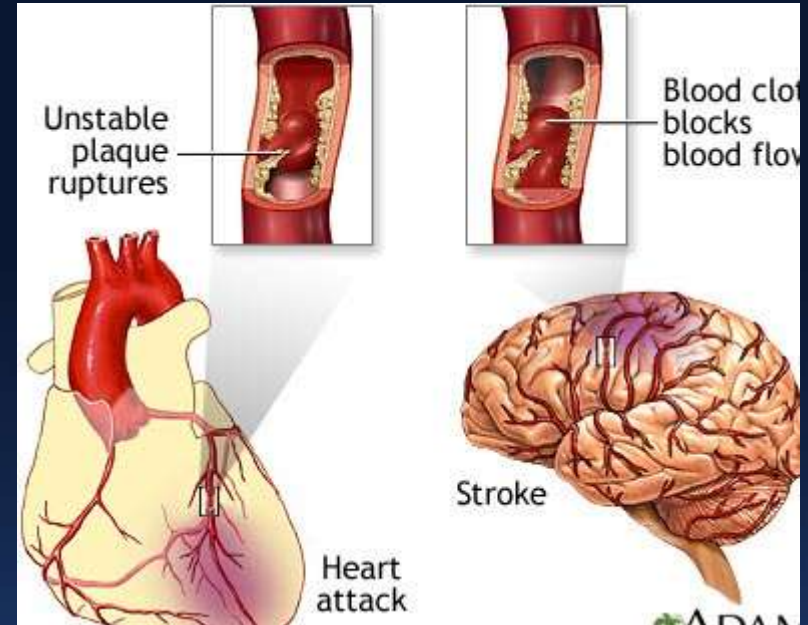
Stroke, January 2004; J. P. Broderick, MD

As with the coronary circulation:

Duration of ischemia

Degree of collateral circulation

greatest influence on morbidity and mortality in stroke.



Early revascularization key to reversal of Stroke

Stroke

Greatest Potential Impact

#1 cause of disability & cost

#3 cause of death

To battle stroke must be a clinical objective of all cerebrovascular specialists.

800,000 strokes
200 neurointerventionalists

**Several thousand more
physicians needed...**
Where will they come from??

8,000 interventional cardiologists

Cranial vessels

Size = coronaries
Goals same as AMI
Treatment similar

Differences

- Access- tortuosity/skull base
- Vessel fragility
- Perforators
- Anatomy & physiology

Currently FDA-approved therapy ...
Efficacy is fair
Speed is poor

Infrastructure for the provision of emergent endovascular care exists



1 million PCI annually in the US.
Over 2,000 procedure rooms
8,000 interventional cardiologists

Contemporary cardiac cath labs have DSA & road-mapping

Acute **stroke intervention techniques** (clot removal, angioplasty with stent placement) already **familiar to the interventional cardiologist**

Stroke associated with cardiac catheterizations

0.12% for coronary interventional procedures

0.38% in children
(due to congenital anomalies)

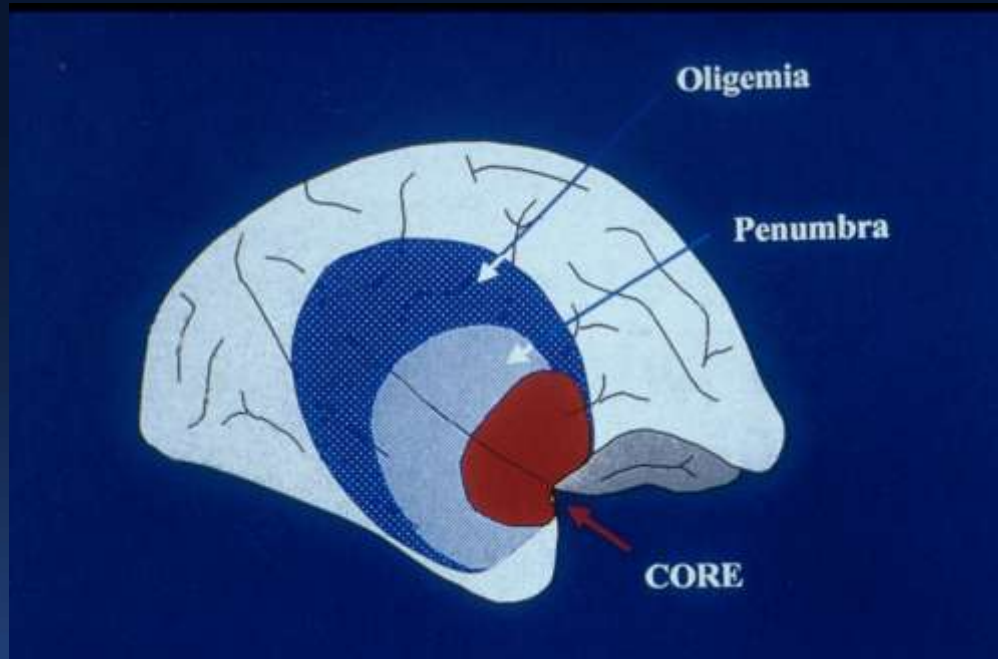
Shouldn't cardiologists be prepared?

Treatment Options Now

- **Medical** lytics, antiplatelet, anticoagulants, blood pressure regulation, electrolyte control...
- **Endovascular** i.a. injections, mechanical thrombolysis/clot retrieval plasty, **stents** (not FDA approved)

Cardiologists do all this already!

Stroke Intervention: What are we trying to accomplish?



Similar to AMI

IV tPA

NOW, after ECASS 3.....

- Green light to the use of tPA -3 and 4.5 hours from onset

Except:

- older than 80 years
- Use of oral anticoagulants
- NIHSS >25
- history of stroke and diabetes

N Engl J Med. 2008 Sep 25;359(13):1317-29

Why consider Intraarterial lytics

IA not FDA approved for stroke

- IV rt-PA:
 - Limited to < 3H or now 4.5H
 - Limited clinical benefit
 - Rate of recanalisation (doppler):
 - Complete: 32%
 - Partial or none 68%:
- At 3 months, 60% of pts dead or disabled

(Christou et al 2001)

PROACT II Trial

IA tPA



mRS < 2 : 40% VS 25% -

Beneficial effect limited to patients with NIHSS > 10

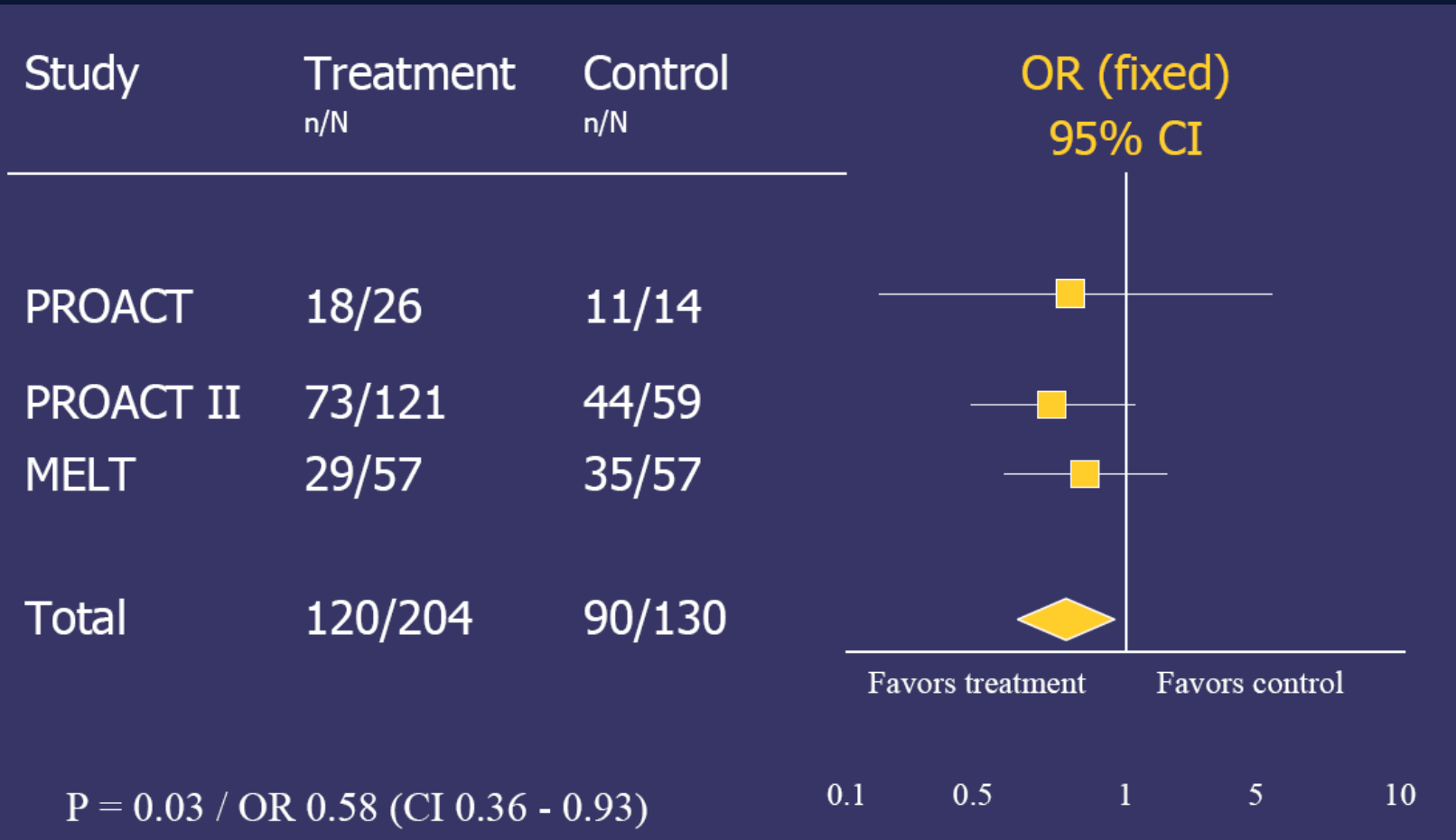
ICH at 36h:

- all: 46% vs 16%
- symptomatic: 10% vs 2%

No difference in mortality

IA Lytics

Metaanalysis of PROACT I+II and MELT



SAVER J. STROKE 2007; 38: 2627-8

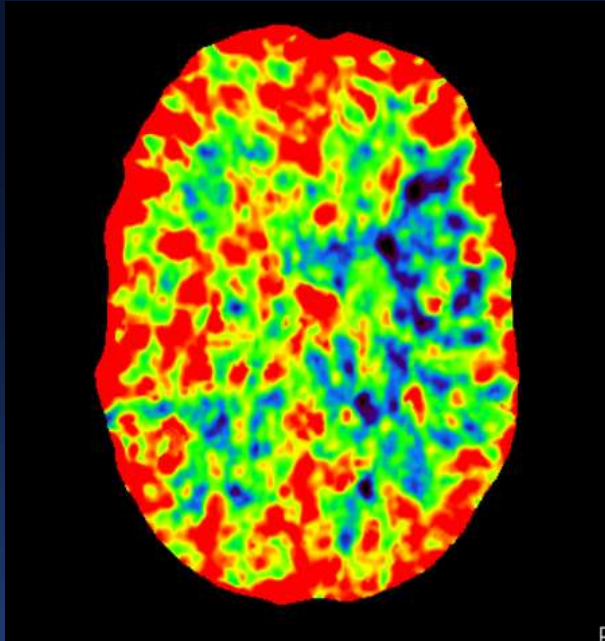
Complication avoidance

Patient Selection

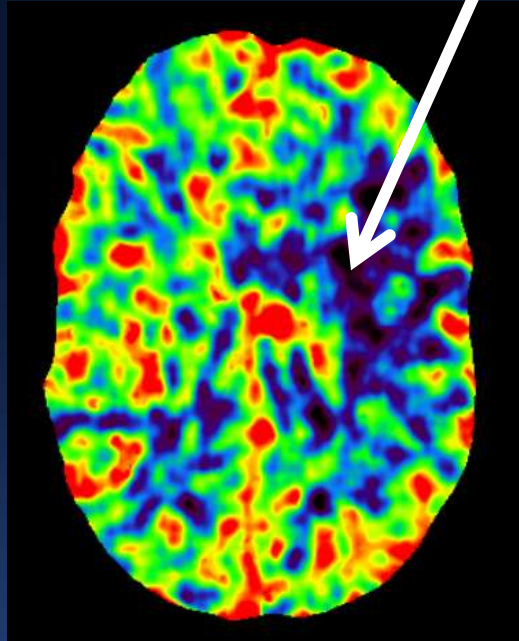
Increased risk with:

- Time of onset beyond 6 hours
- Signs of (large) stroke on plain CT
- Older patients???
- Diminished CBV ('black hole')

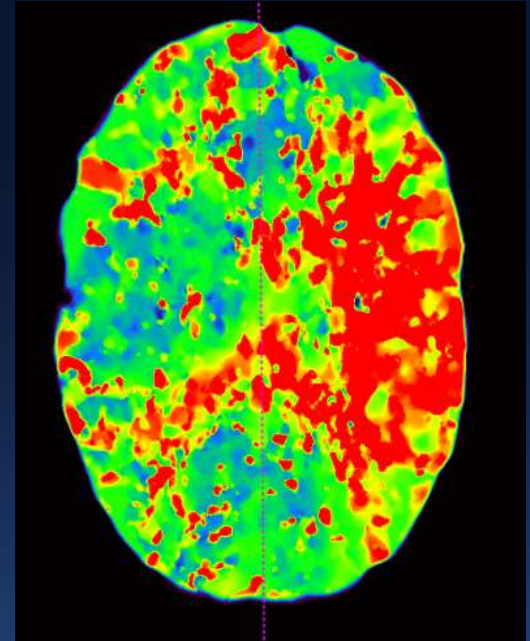
CT Perfusion ... Caveat: Decreased CBV !!!



CBF



CBV

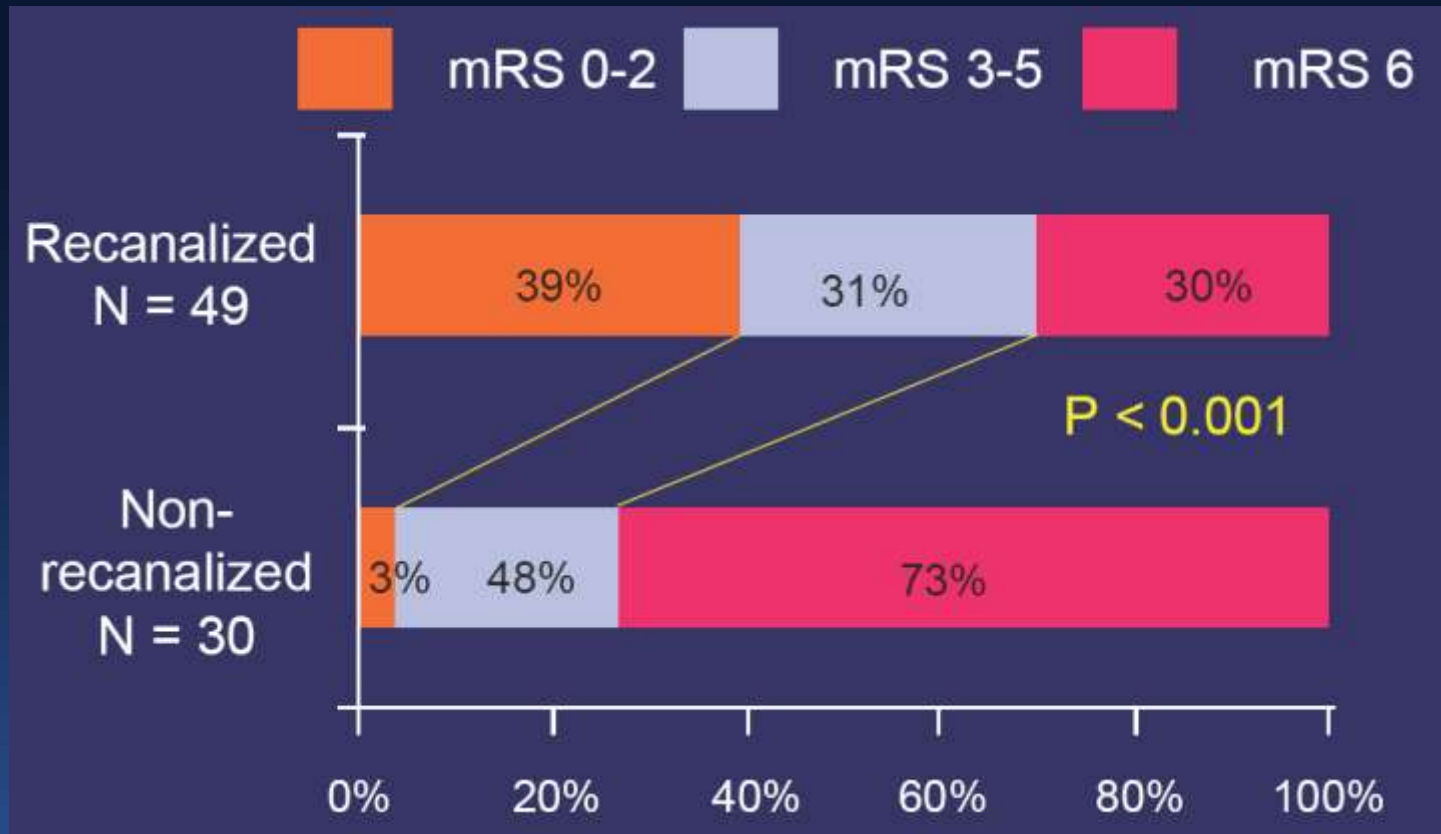


TTP

MECHANICAL CLOT EXTRACTION

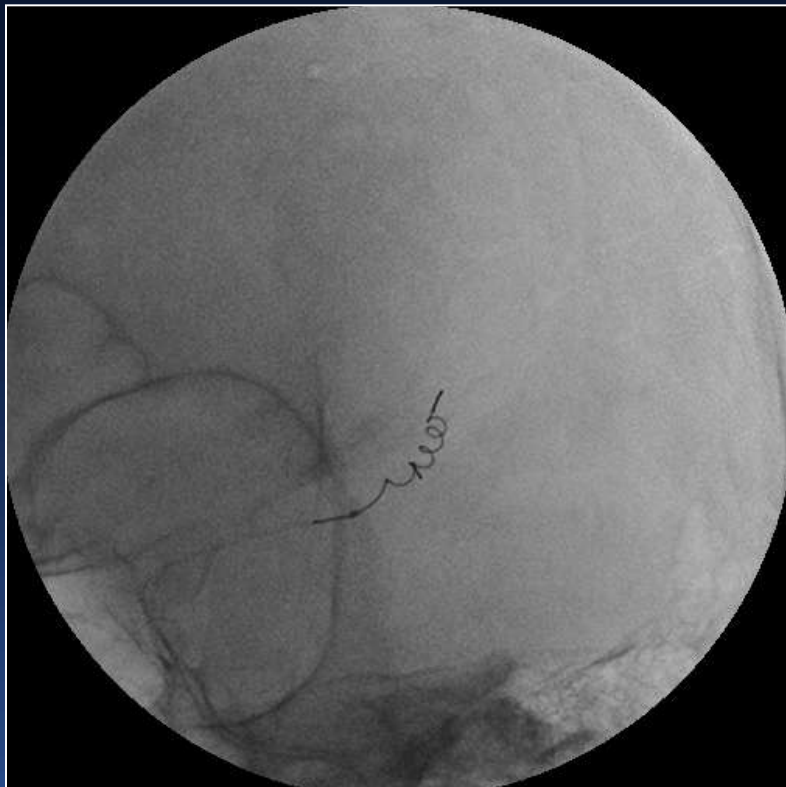
- Thrombectomy- clot-retrieval devices
- Thromboaspiration- penumbra device
- Thrombus obliteration devices
- Angioplasty
- **Stents** (not FDA approved)

Mechanical Thrombectomy of ICA Occlusion: MERC1 and Multi MERC1 Trials RECANALIZATION WORKS



A. Flint et al., Stroke 2007; 38: 1274-80

Intervention - Clot Retrieval



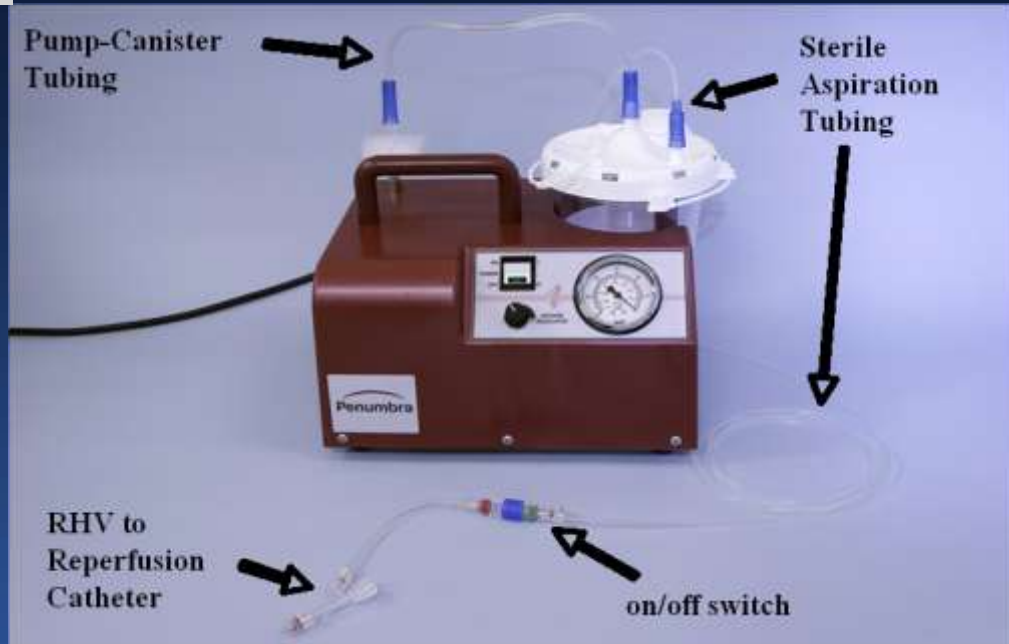
041

032

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Penumbra

**Suction aspiration +
mechanical
manipulation**



The Penumbra Pivotal Stroke Trial

Safety and Effectiveness of a New Generation of Mechanical Devices for Clot Removal in Intracranial Large Vessel Occlusive Disease

- prospective, multicenter, single-arm study
- 125 patients, NIHSS ≥ 8 , within 8 hours of Sx

81.6% - revascularized to TIMI 2 to 3
25% achieved mRS of 2.

Serious procedural events : 2.4%
ICH - 28% , 11.2% were symptomatic.

Mortality was 32.8% at 90 days

Stroke. 2009;40:2761-2768

Stenting

AMI vs Acute Stroke

CVA=Different Pathophysiology (**embolic**), but...

- emboli quickly become very adherent
- are often difficult to remove
- and time is critical

Stenting makes sense and is what Cardiologists
do best but...
Limited data are available

STENT-ASSISTED INTRACRANIAL RECANALIZATION FOR ACUTE STROKE: EARLY RESULTS

A retrospective analysis 2001 - 2005 (19 patients)
vessel resistant to standard thrombolytic techniques

Stenting as last resort

Baseline NIHSS -16 (range, 15-22)

Recanalization rate (TICI 2 or 3) -79%.

6 deaths: 5 due to progression of stroke.

1 asymptomatic ICH

Median discharge NIHSS of surviving patients was 5 (range, 2.5-11.5).

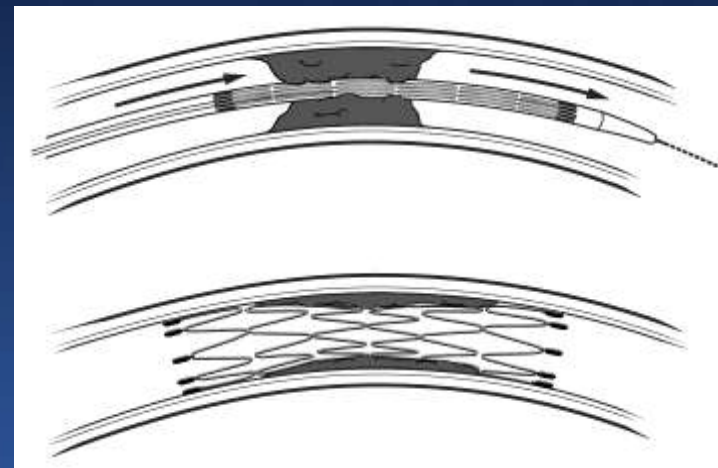
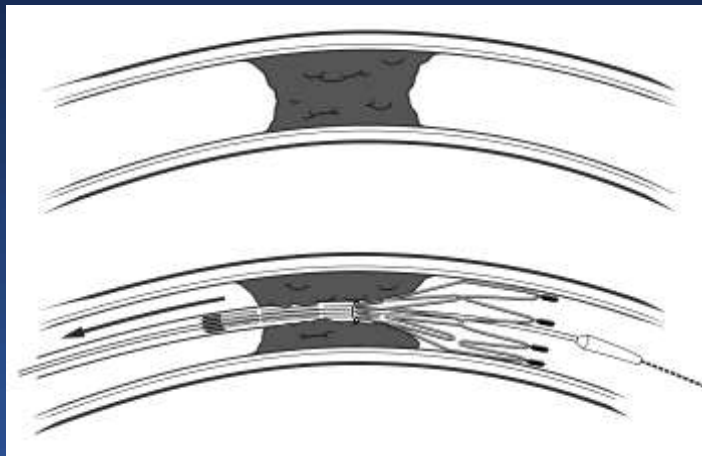
Levy et al. Neurosurgery. 2006 Mar;58(3):458-63; discussion 458-63.

SARIS: a stent for stroke PILOT study

First Food and Drug Administration-Approved Prospective Trial of Primary Intracranial Stenting for Acute Stroke. SARIS (Stent-Assisted Recanalization in Acute Ischemic Stroke)

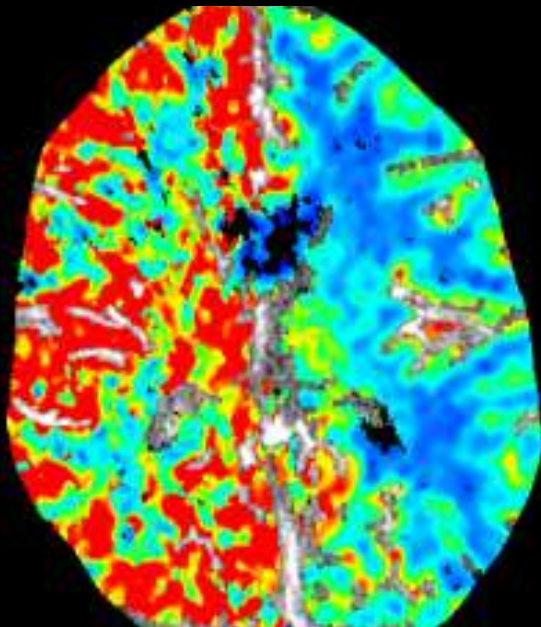
Elad I. Levy, Adnan H. Siddiqui, Annemarie Crumlish, Kenneth V. Snyder, Erik F. Hauck, David J. Fiorella, L. Nelson Hopkins and J Mocco
Stroke published online Aug 21, 2009;

- 20 patient safety study
- Wingspan stent
- NIHSS- median 13 (8-20)
- *Hand-picked cases*
- *CT perfusion guided*

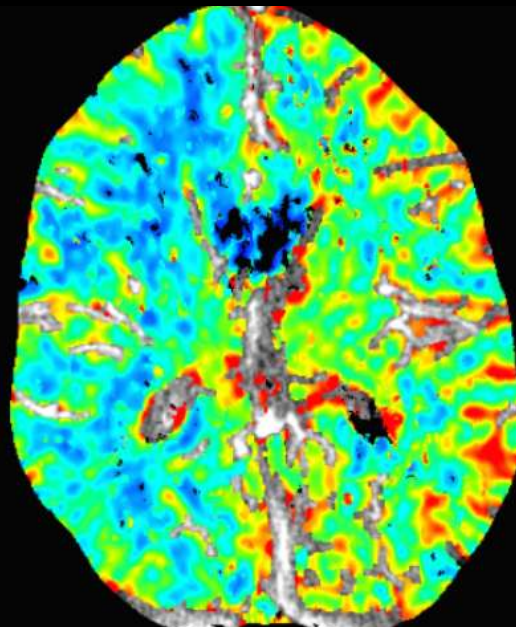


CT perfusion at presentation

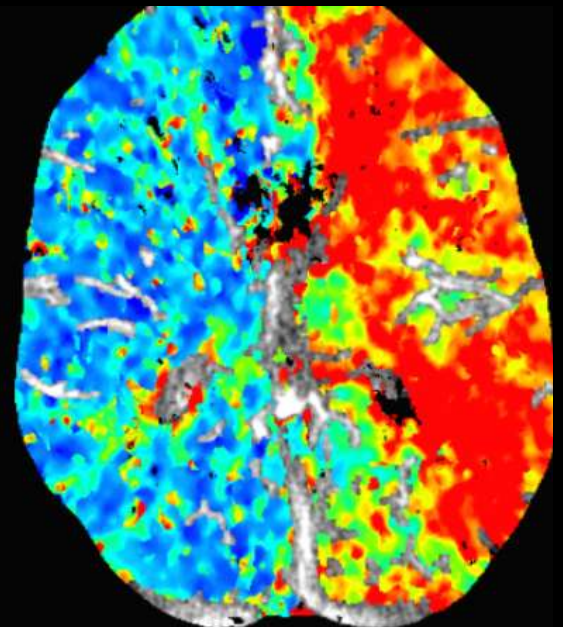
Volume Preserved



CBF



CBV



MTT

SARIS PILOT

Outcomes

Recanalization

**100% of patients improved to
TIMI ≥ 2 (p<0.0001)**

- 60% TIMI 2
- 40% TIMI 3

■ Compare with

- 64% in MERCI 1
- 63% in Pooled MERCI and Multi-MERCI
- 63% in UCLA Broad Ischemic Cohort

Clinical

- 65% improved ≥ 4 NIHSS points at discharge
- Median NIHSS change from presentation to discharge = 9 (6 to 14), p<0.001
- 4 deaths

***Data superior due to patient selection...
and rapid recanalization***

Stroke Intervention:

Patient Selection:

The problem with time...



Stroke Intervention:

Patient Selection:

*Time is only a surrogate
for brain physiology*

*We can quantify CBF,
CBV, and MTT
with perfusion imaging!!*



Problems for stroke intervention

- Manpower ... we need Cardiologists
- Turf and politics
- Lack of training availability for Cardiologists

Future Directions

- Creating cardiologist training programs
- Joint ventures: other stroke specialists
- New and better technology

Politics Aside ...

Stroke therapy = “get the artery open”
IF
The brain is viable

INR ... inadequate numbers but vocal minority

Threats to companies supporting cardiology training...

UNACCEPTABLE and probably illegal

Educational standpoint

Cardiologists must learn basic neuro or join multidisciplinary teams

- Cardiologists need neuroanatomy and stroke basics
- Rapid Neuro assessment and imaging define tx options
- Skill set : cerebral vessels tortuous and delicate, with lower threshold for perforation and rupture
- Better technology is coming

Case

Stent for Acute Stroke as the Primary Treatment Strategy

Clinical Summary

HPI: 63 yo F with acute onset of left-sided weakness 90 minutes from onset.

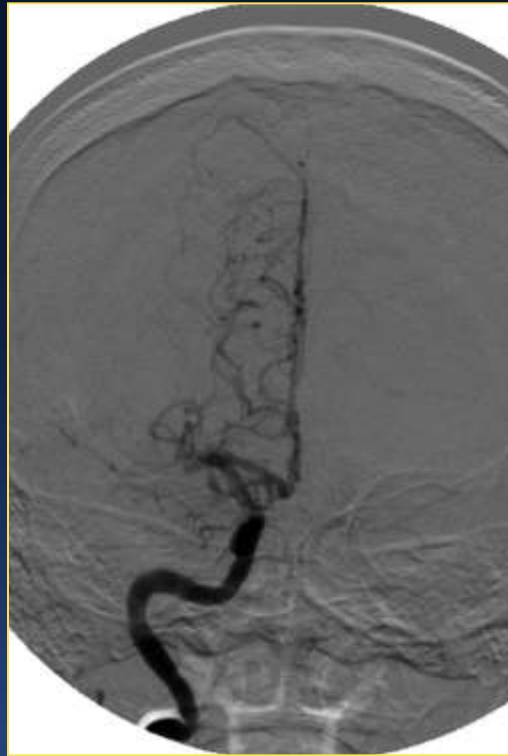
PMH: CAD, CHF, HTN,
Dyslipidemia, pacemaker

PE: L Hemiplegia, Facial droop,
Dysarthria,

NIHSS 15

Stent for Stroke – Summary

Door to Needle 60 minutes
Needle to Recan 30 minutes



NIHSS 15 (before)



NIHSS 0 (after)

Conclusion

Stent for salvage of ischemia works.

The principle developed by cardiology can be applied directly, but carefully, to the cerebral circulation.

The Future

- Cardiology must treat stroke ...don't give up
- Training courses SCAI/other = good intro
- Training programs exist ...get training
- Politics be damned ...go forward



Thanks