

Acute Stroke: Time for Effecting Treatment

Impact of EMS Driven Triage for ELVO Strokes

&

AHA/ASA Guidelines for Extended Window Treatment of
Large Vessel Occlusion Strokes

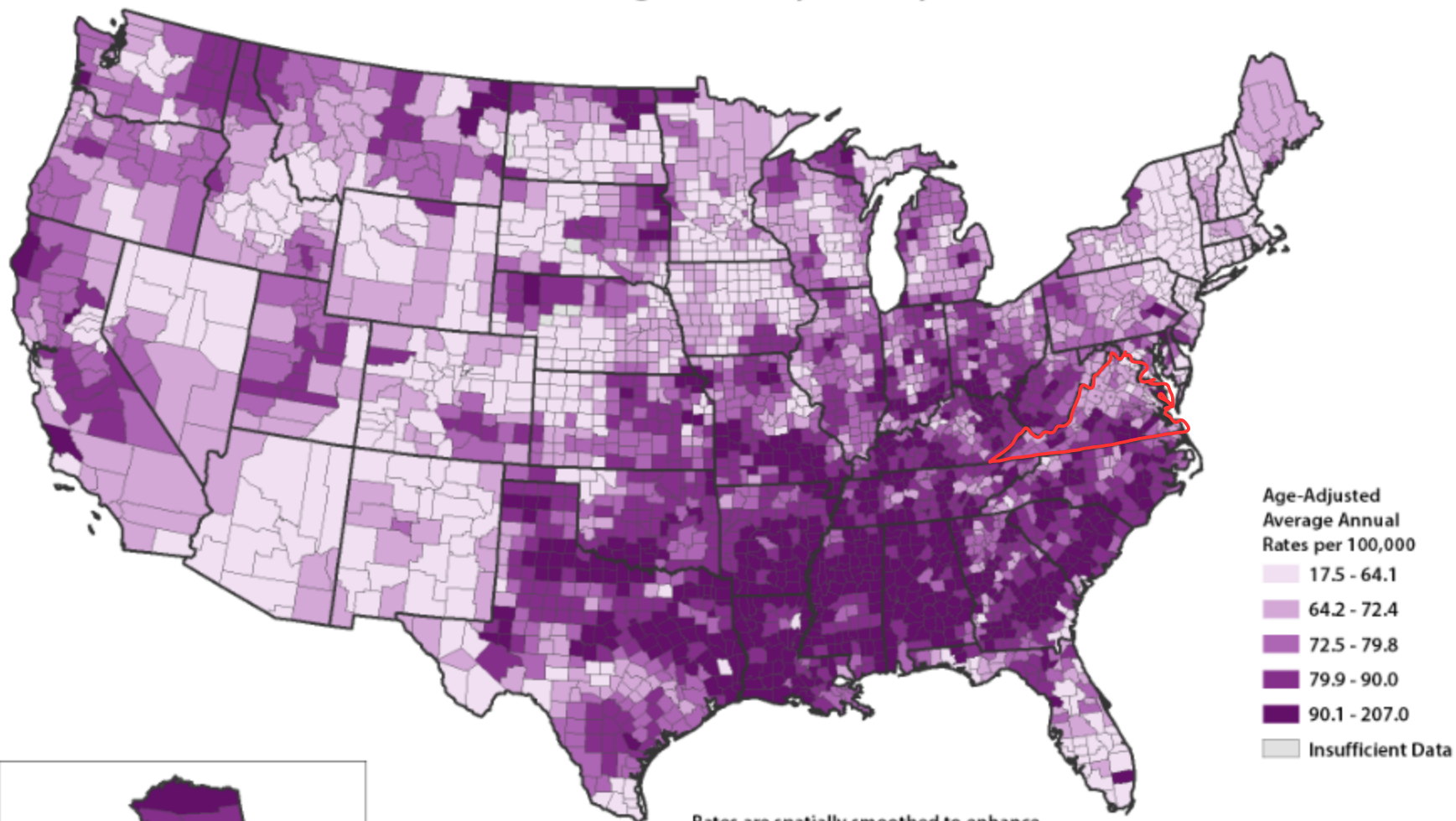
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Riverside Regional Medical Center
Comprehensive Stroke Center
Newport News, VA



August, 2018



Stroke Death Rates, 2013 - 2015 Adults, Ages 35+, by County



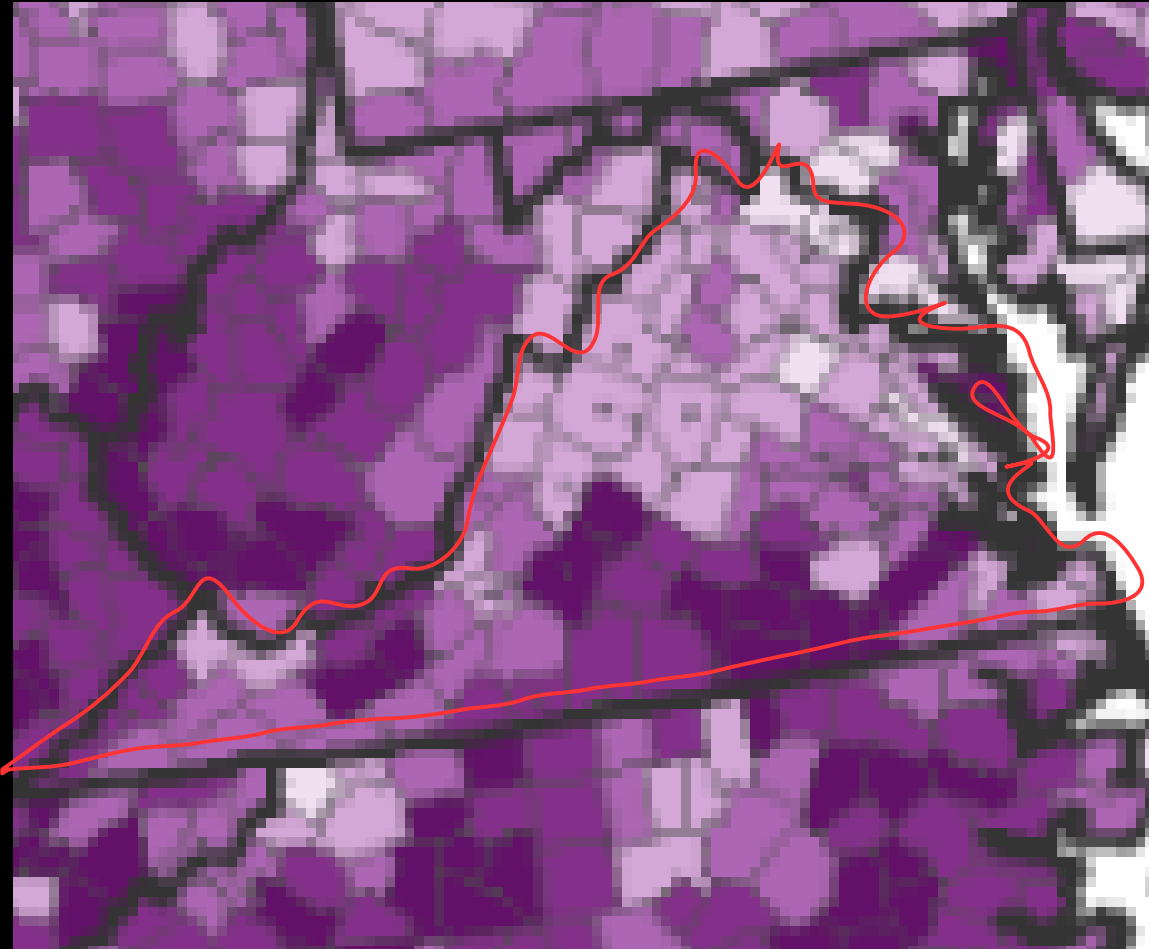
Rates are spatially smoothed to enhance the stability of rates in counties with small populations.

Data Source:
National Vital Statistics System
National Center for Health Statistics



<http://www.cdc.gov>

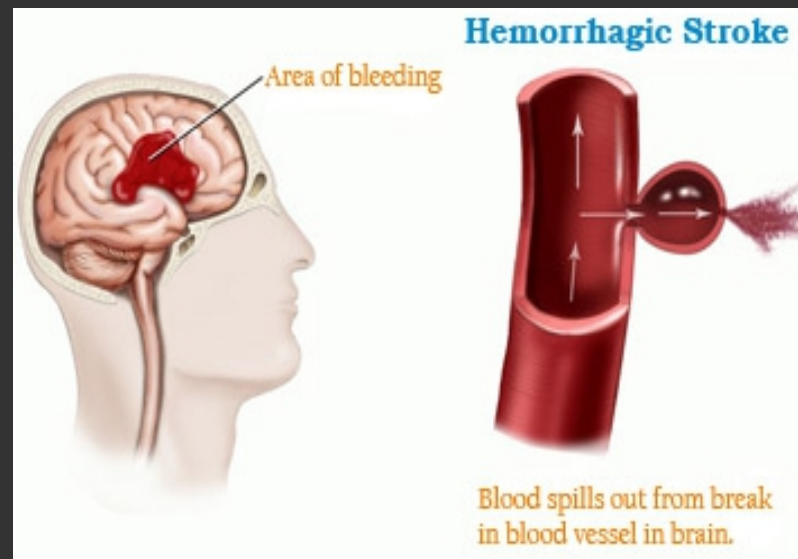
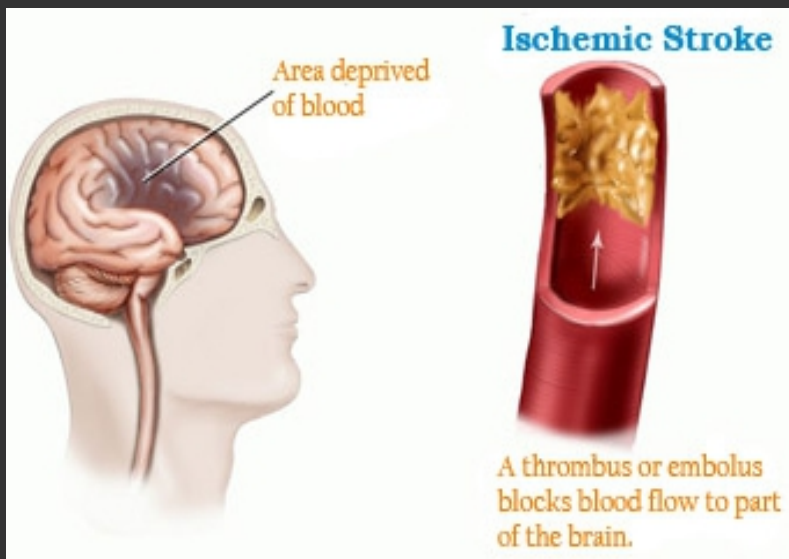
ACUTE ISCHEMIC STROKE: EPIDEMIOLOGY



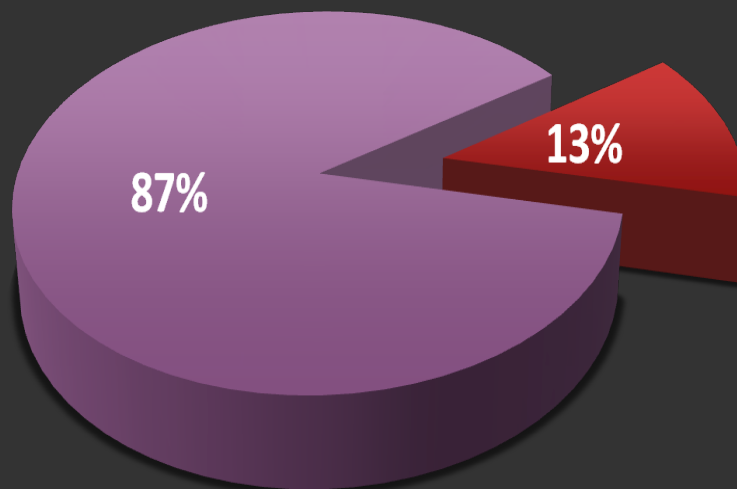
8.3 million residents
Stroke prevalence 3.5-4.0%/ yr = 335, 000

<http://www.cdc.gov>
www.vdh.virginia.gov

TYPES OF STROKE



**~293, 000
Virginians**



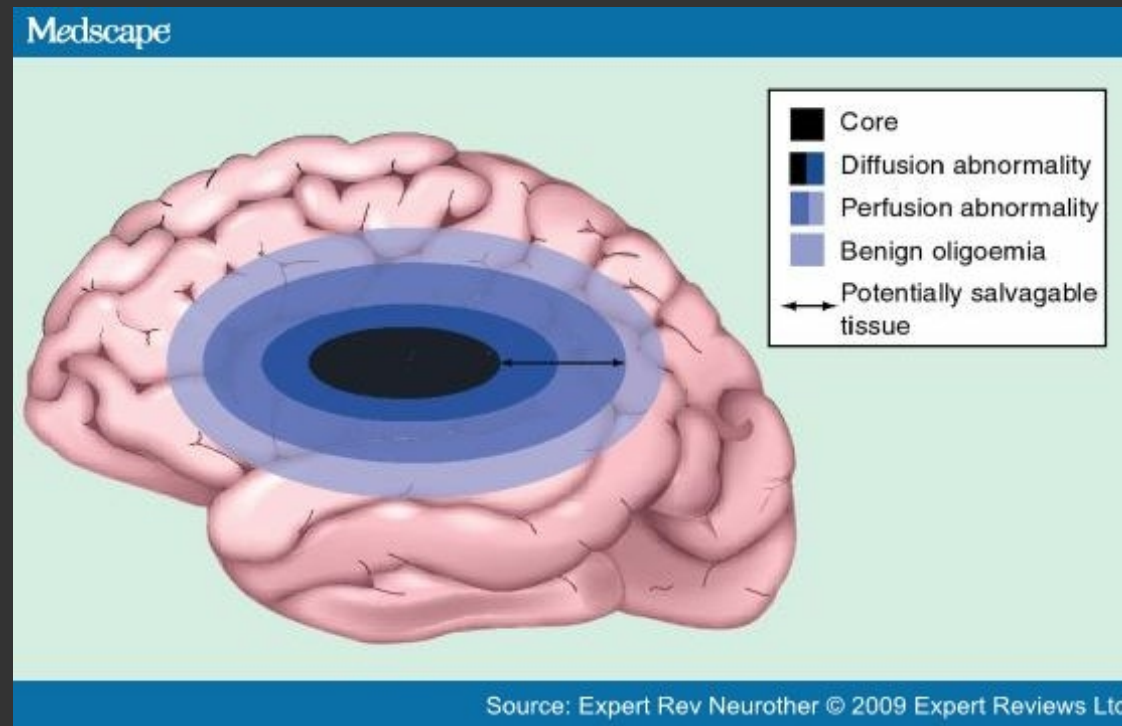
**~43,000
Virginians**

■ Ischemic ■ Hemorrhagic

KEY PRINCIPLES IN ISCHEMIC STROKE:

1.9 million neurons are lost/ minute of lack of blood flow

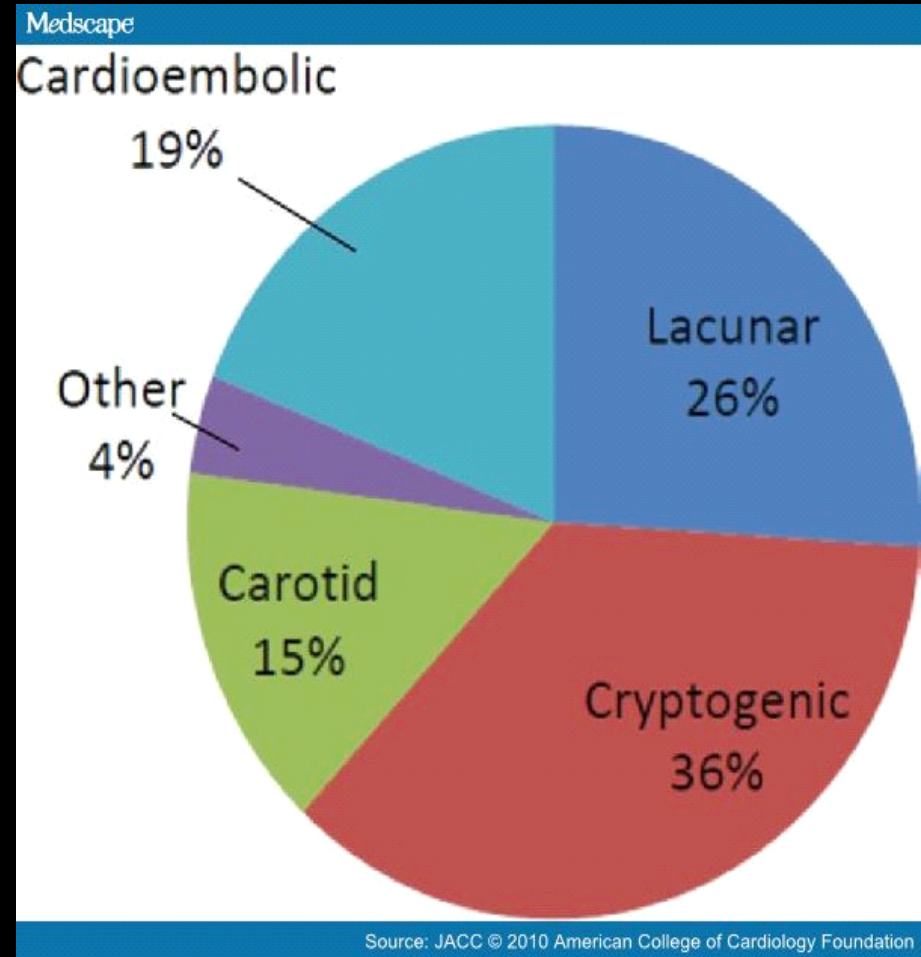
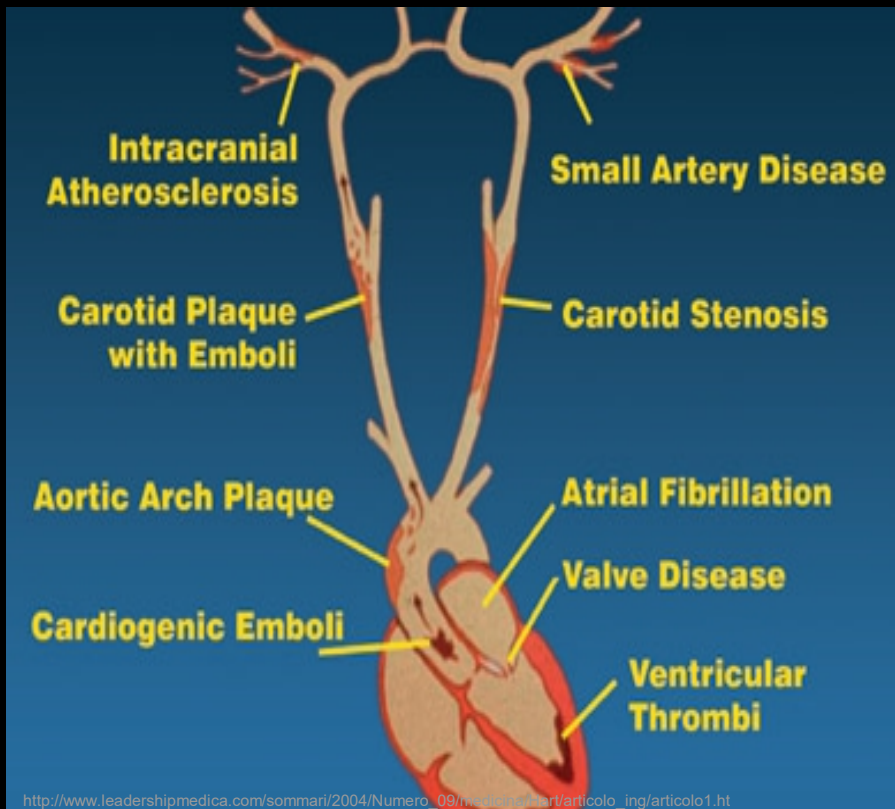
Brain ages 3.6 years for each hour without treatment



Core = dead brain tissue

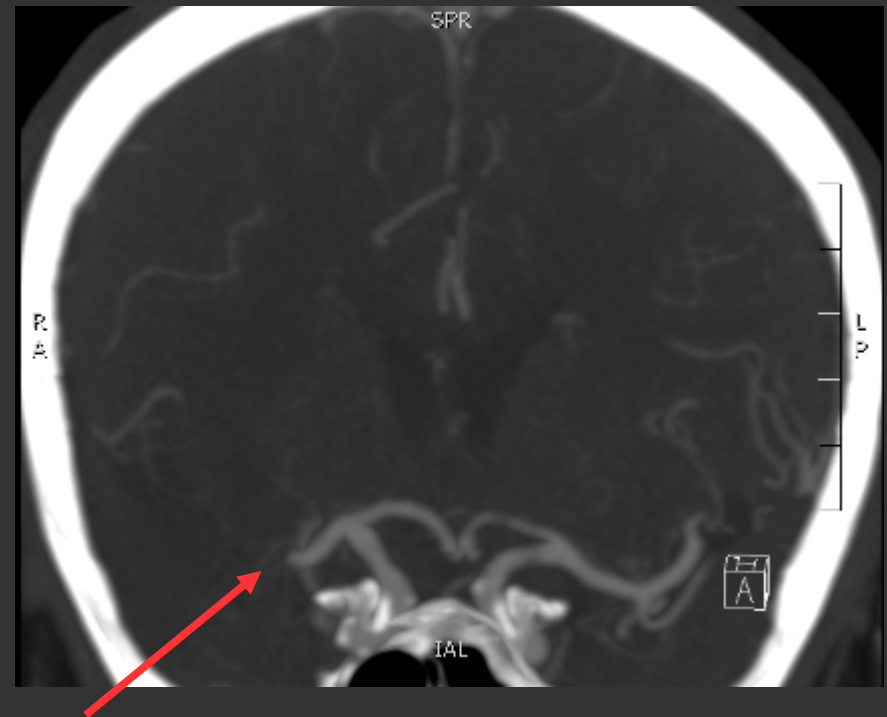
Penumbra = Brain at risk for infarct, salvageable brain

Ischemic Stroke Mechanisms



TOAST Criteria

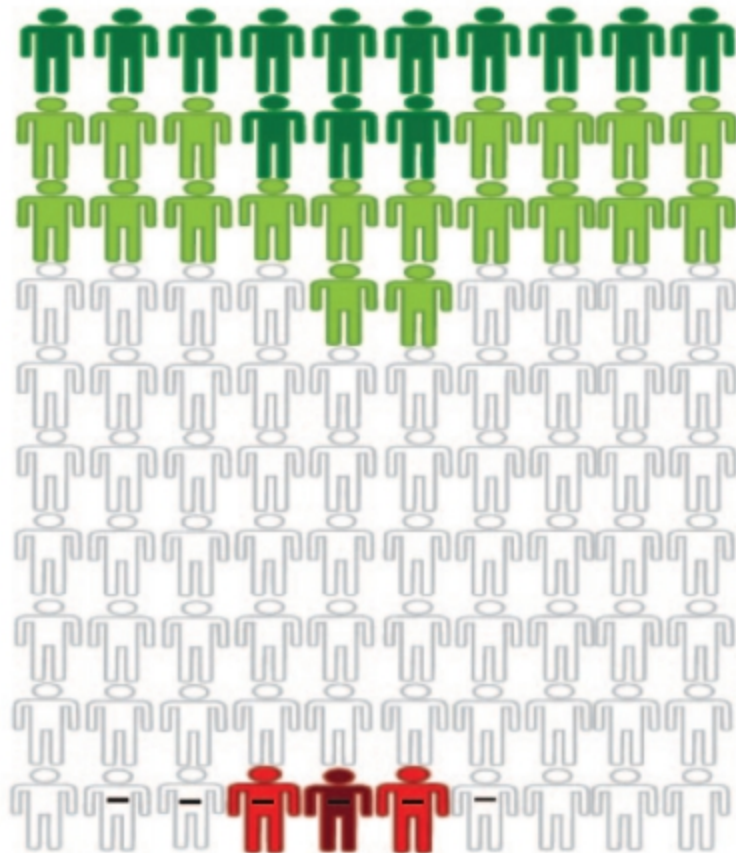
77 M Slurred speech, left face, and arm weakness, NIHSS 12



Improved to NIHSS 9 after iv tPA at 52 min

RRMC 2016

TPA for Cerebral Ischemia within 3 Hours of Onset-Changes in Outcome Due to Treatment



Changes in final outcome as a result of treatment:

- Green: Normal or nearly normal
- Light Green: Better
- White: No major change
- Red: Worse
- Dark Red: Severely disabled or dead

Early course:

- White: No early worsening with brain bleeding
- White with black line: Early worsening with brain bleeding

(Stroke. 2010;41:300-306.)

**TREATMENT EFFICACY OF
IV TPA**

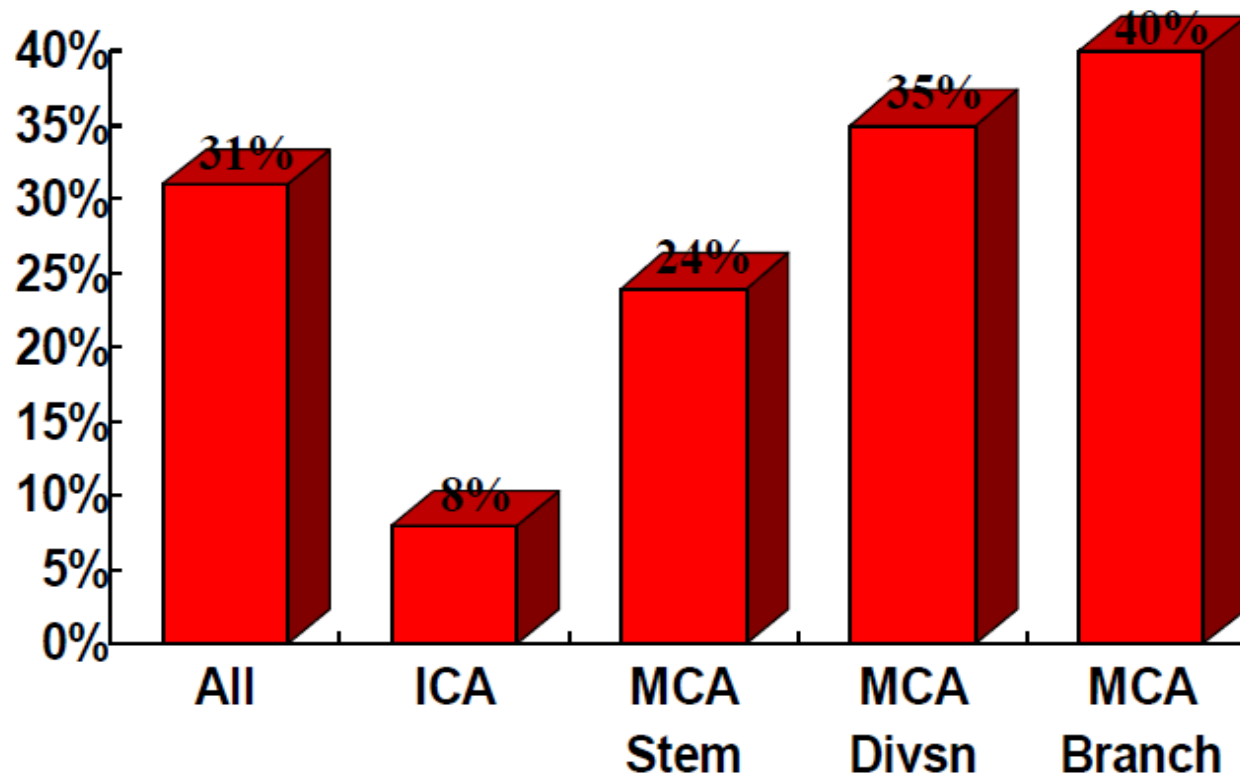
NNT (3h) 8

NNT (4.5h) 14

SICH 6.4%

HOW SUCCESSFUL IS iv tPA IN RECANALIZING A LVO?

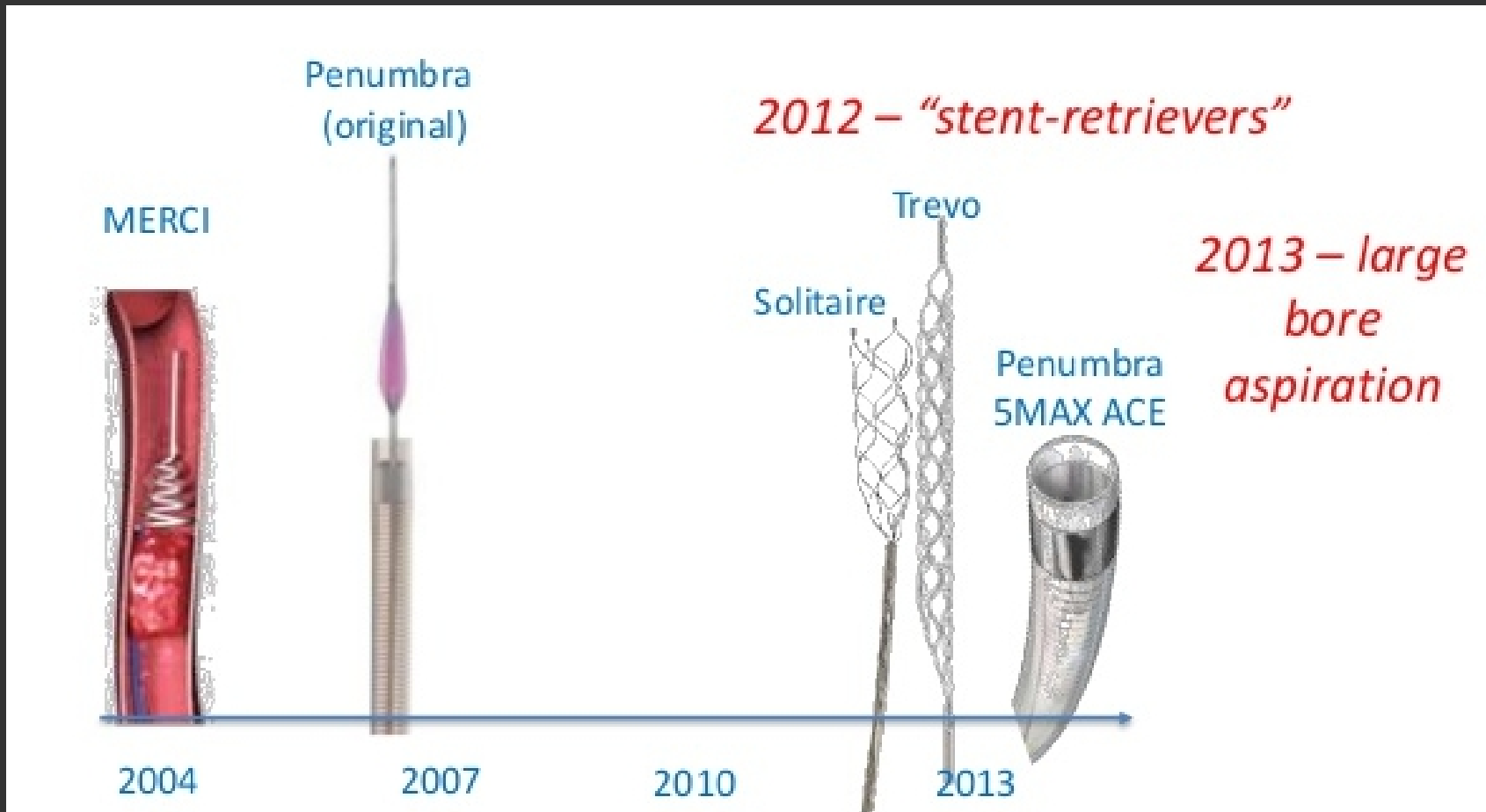
IV t-PA Re-canalization at One Hour (Angiographic Data)



Del Zoppo et al, *Ann Neurol* 1993

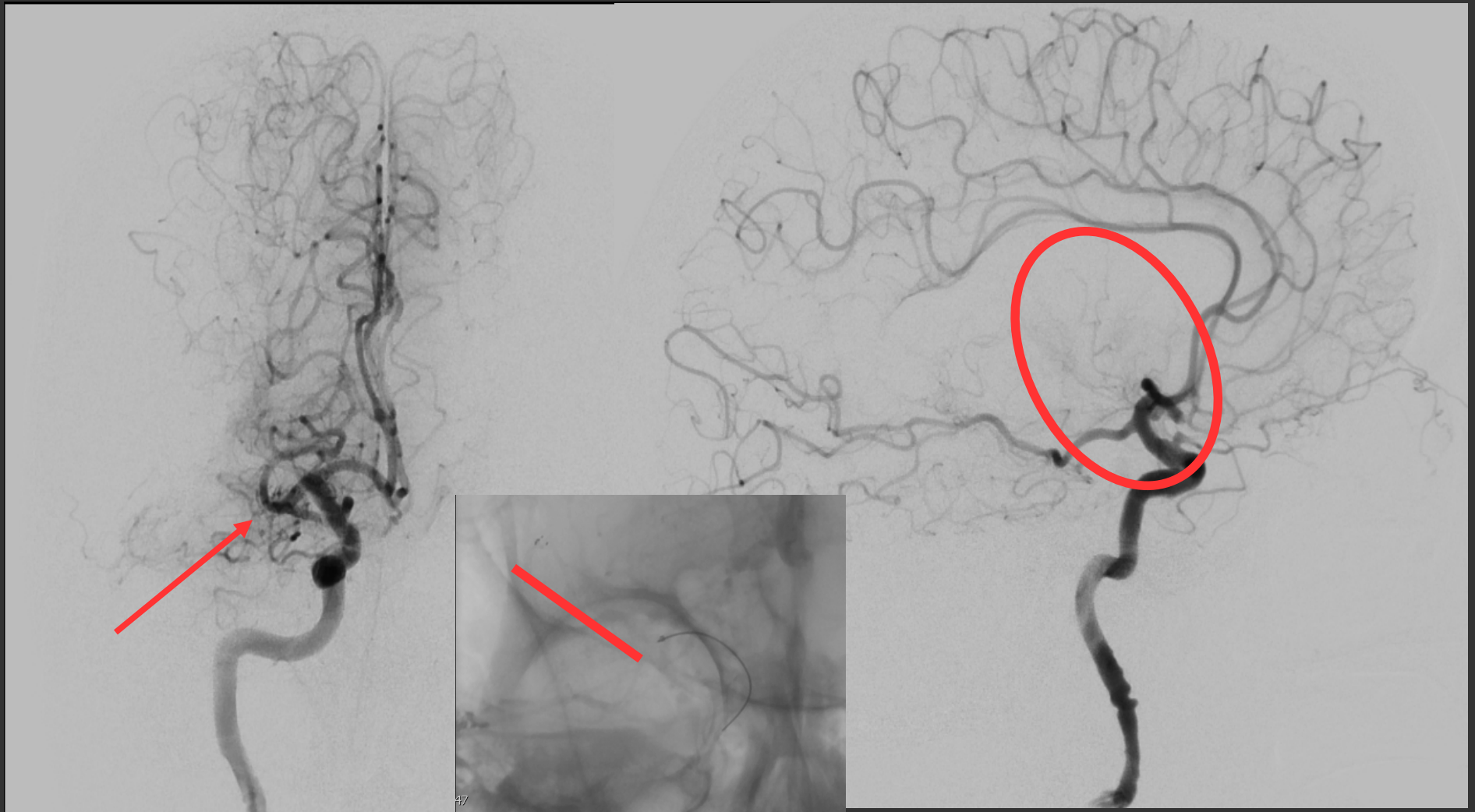
Courtesy: Dr. Peter Rasmussen

LARGE VESSEL OCCLUSION RECANALIZATION



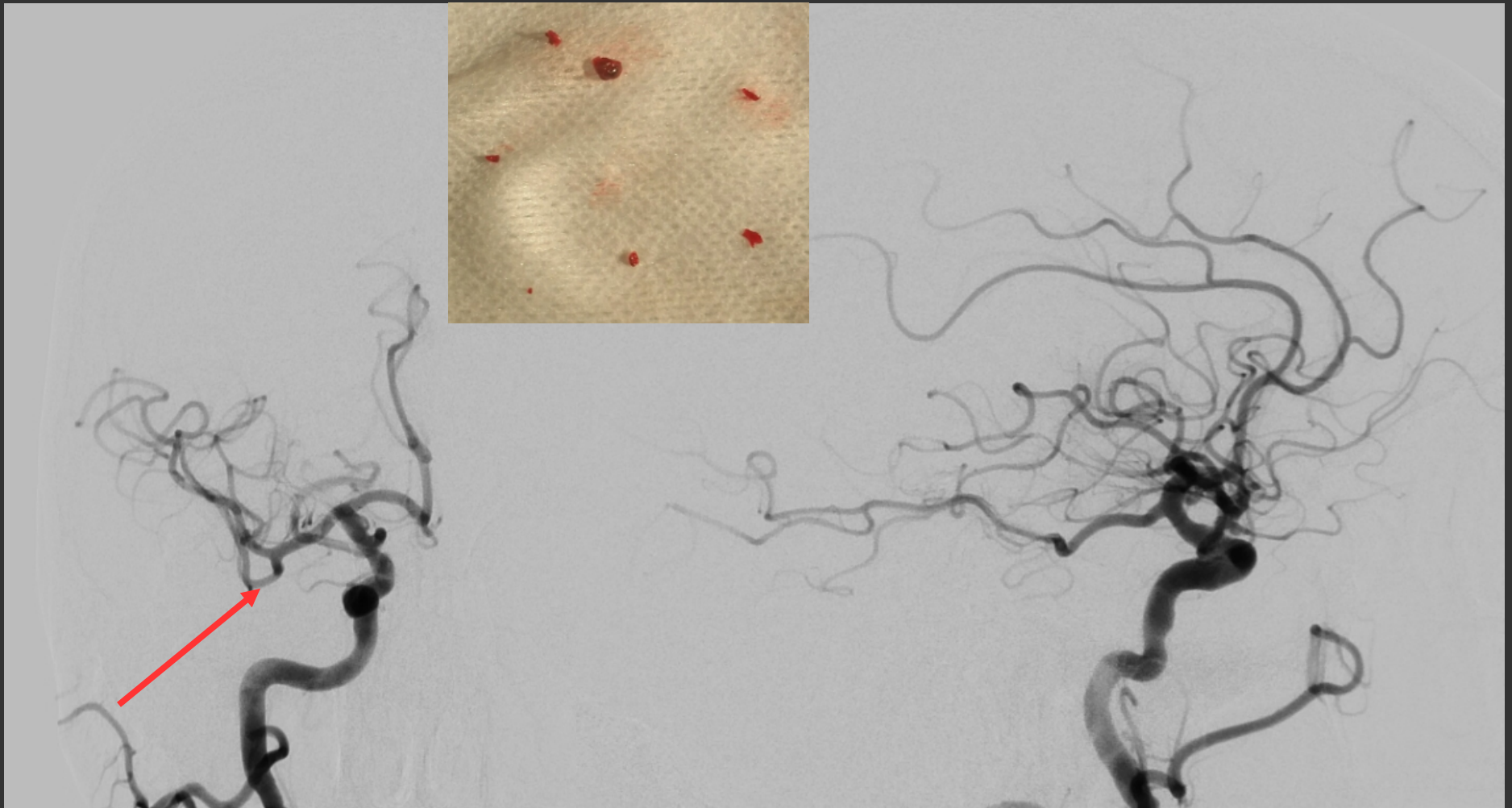
Courtesy: Dr. Josser Delgado

CEREBRAL ANGIOGRAM BEFORE THROMBECTOMY



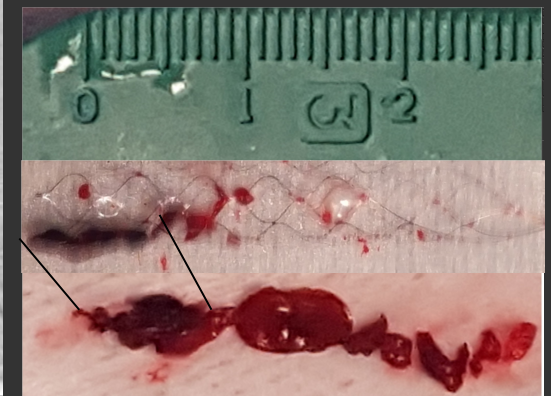
Groin Access to reperfusion: 20 min

CEREBRAL ANGIOGRAM AFTER THROMBECTOMY



1 month later, patient seen in follow up, no deficits!

CEREBRAL ANGIOGRAM AND THROMBECTOMY



NIHSS 13 to 0 at the time of discharge

RRMC Oct 2016

CEREBRAL ANGIOGRAM AND THROMBECTOMY

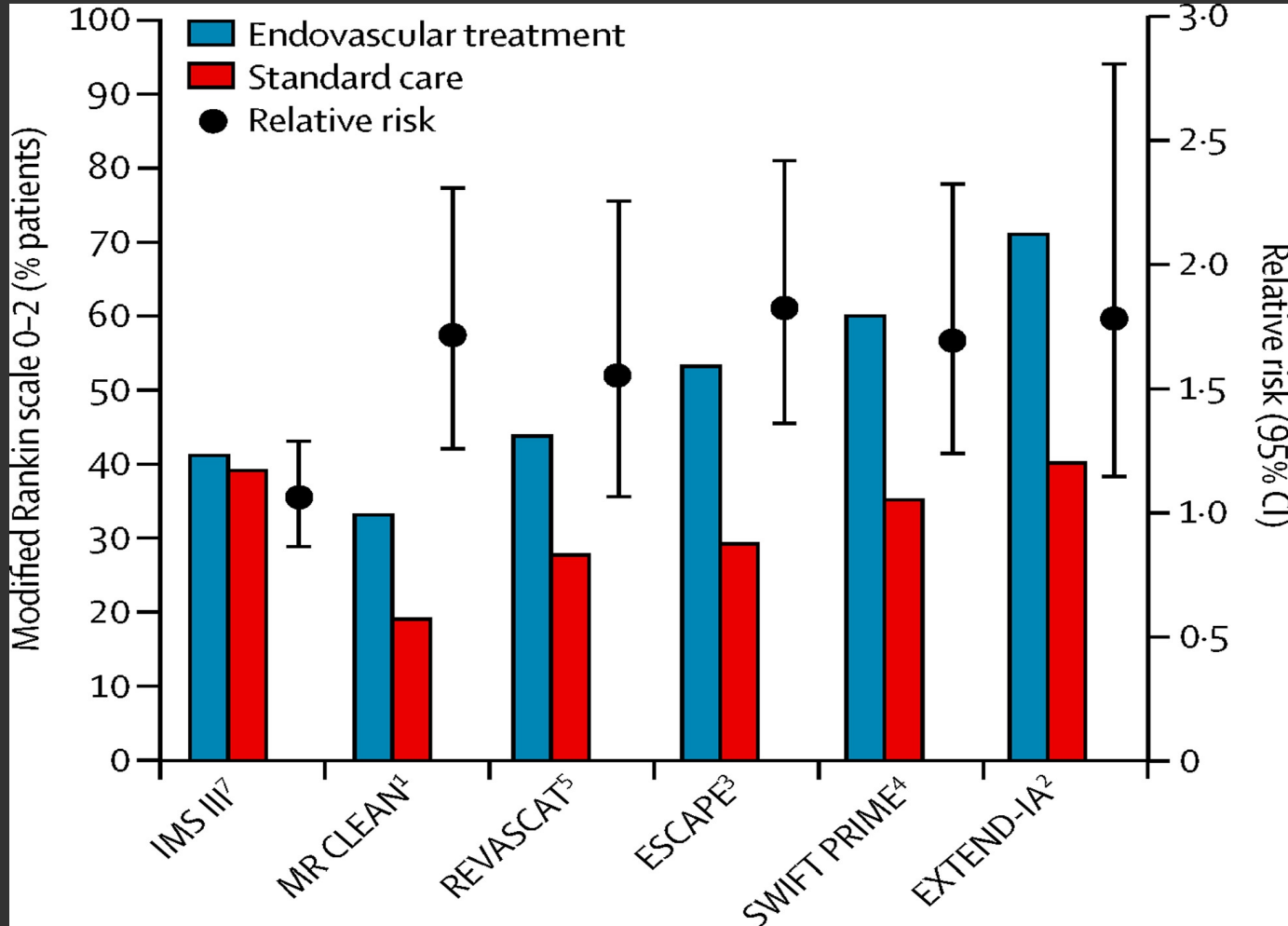
77 W with L ICA T occlusion; Recent back surgery precluded iv tPA use. NIHSS 22.



Groin Access to reperfusion: 45 min, NIHSS 2

RRMC May 2017

MECHANICAL THROMBECTOMY TRIALS FOR ELVO



NNT = 2.6

TICI 2b/ 3 ~ 70%

Median OTG 228'

LANCET NEUROLOGY 2015, 14(8): 846-854
 LANCET 2016, 387 (10029): 1723-31

MECHANICAL THROMBECTOMY

Overwhelming data that mechanical thrombectomy of ischemic stroke due to LVO

ACHIEVES SUCCESSFUL REPERFUSION

IMPROVES OUTCOMES

DECREASES MORTALITY

NO DIFFERENCE IN SICH

ELVO STROKE EPIDEMIOLOGY

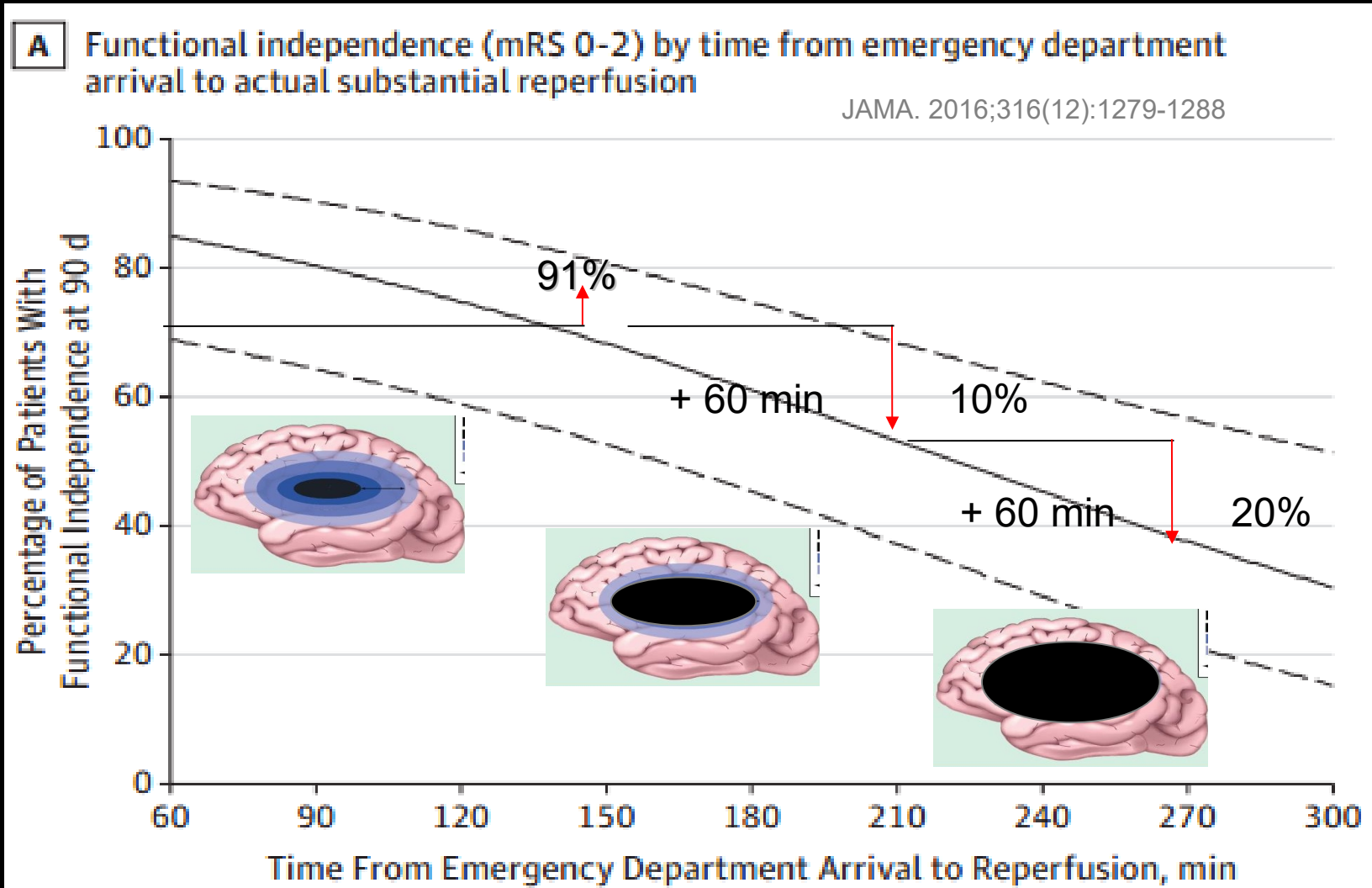
Conservatively, 10-15% of all ischemic strokes due to ELVO

No treatment, or ineffective treatment of LVO strokes is associated with a higher level of disability and mortality (75-80%)

Timely endovascular intervention can lower rates of mortality and improve rates of independence (60%)

However, 90% of all ELVO currently do not reach an endovascular capable center in a timely fashion

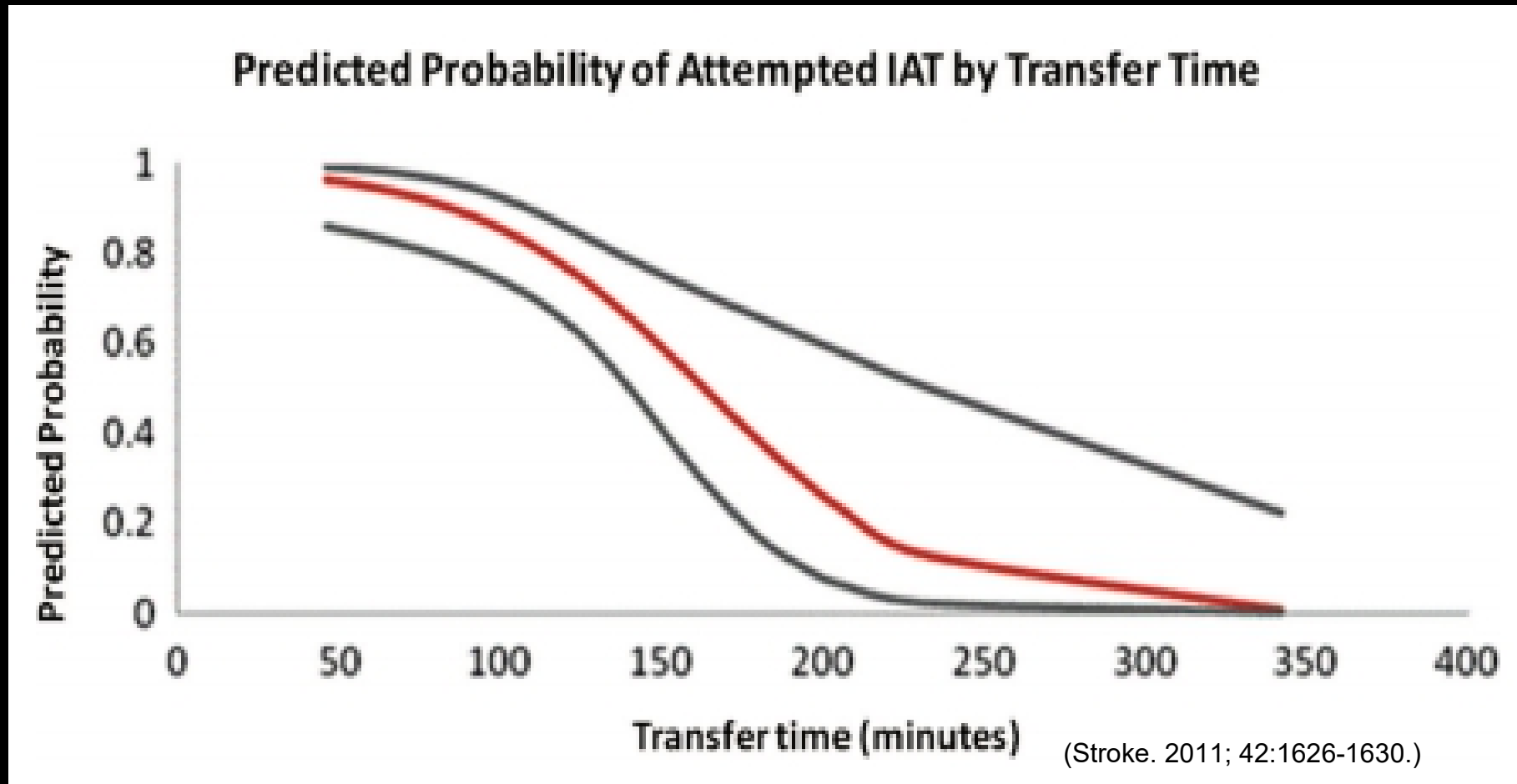
IMPACT OF DELAYED REPERFUSION ON OUTCOMES



Symptom onset to reperfusion time of 150 min a/w 91% of independent outcome

Each 1 h delay decreased the probability of good outcome by 10%, and after the 1st hour of delay, each additional hour delay → 20% decrease, per SWIFT-PRIME trial

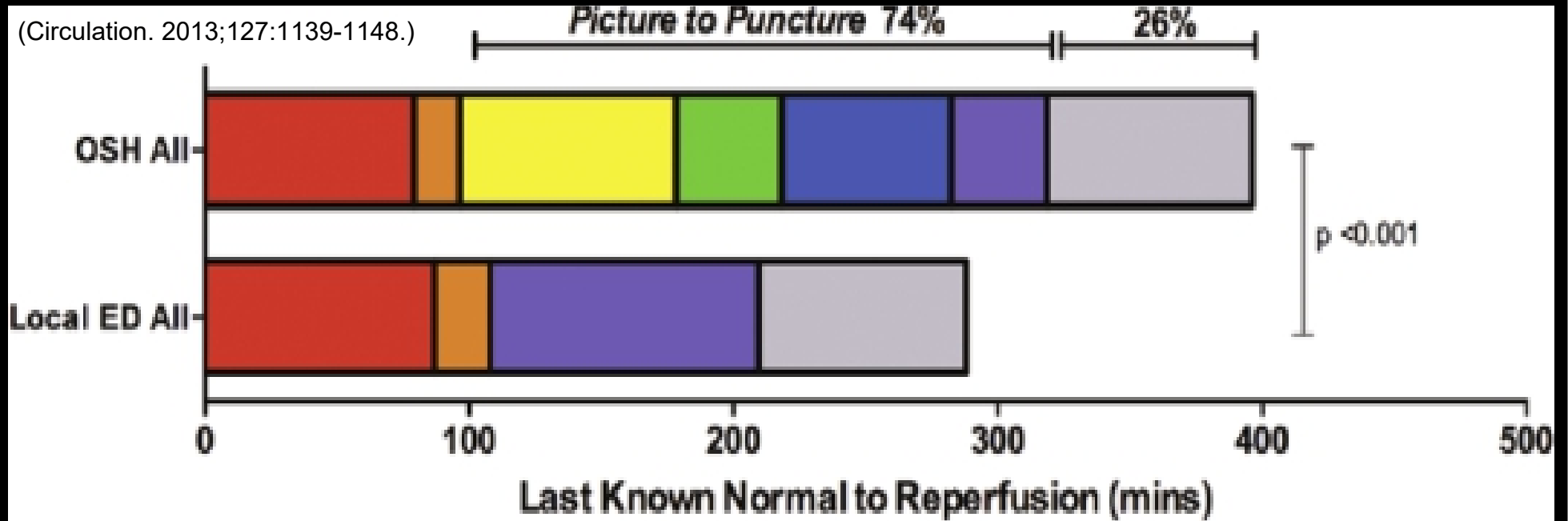
WHAT DO WE KNOW ABOUT INTERFACILITY STROKE TRANSFERS?



**For every minute after 46 min,
there is a 3% less chance of Intra-Arterial Treatment, IAT**

WHAT ARE SOME SOURCES OF DELAYS?

(Circulation. 2013;127:1139-1148.)



- LKN to Arrival
- Arrival to Initial CT
- Initial CT to CSC Notification
- CSC Notification to EMS Arrival
- EMS Arrival to CSC CT
- CSC CT to Groin Puncture
- Groin Puncture to Reperfusion

ELVO STROKE

We know how to treat these patients

We have highly effective tools

Can we use a stroke severity scale to identify patients with
Large vessel occlusion and triage from the field?

PEMS ELVO TRIAGE IN THE FIELD WITH RACE

Check the appropriate boxes			
Assessment	Instructions	Evaluation	Score
Facial Palsy	Smile and show teeth	Equal symmetrical smile	<input type="checkbox"/> 0
		Mild weakness crease still in nasolabial folds	<input type="checkbox"/> 1
		Severe weakness w/absent nasolabial folds and facial droop	<input type="checkbox"/> 2
Arm Motor Function	Sitting extend arms out 90 degrees or lying down extend arms out 45 degrees, palms up, eyes open, and hold out for 10 seconds	Limb upheld for 10 seconds	<input type="checkbox"/> 0
		Limb upheld for less than 10 seconds	<input type="checkbox"/> 1
		Limb does not rise against gravity	<input type="checkbox"/> 2
Leg Motor Function	Extend each leg out 30 degrees for 5 seconds	Limb upheld for 5 seconds	<input type="checkbox"/> 0
		Limb upheld for less than 5 seconds	<input type="checkbox"/> 1
		Limb does not rise against gravity	<input type="checkbox"/> 2
Head or Gaze Deviation	Observe eyes or head deviated to one side after requesting patient to look forward	Absent eye or head deviation	<input type="checkbox"/> 0
		Eyes or head deviation	<input type="checkbox"/> 1
If Right Sided Weakness, Perform Aphasia Assessment	Instruct patient to "close eyes" and "make fist" with left arm	Performs both tasks correctly	<input type="checkbox"/> 0
		Performs one task correctly	<input type="checkbox"/> 1
		Performs neither task	<input type="checkbox"/> 2
If Left Sided Weakness, Perform Agnosia Assessment	Ask patient while showing his/her left arm "Whose arm is this?" and "Do you feel weakness in this arm?"	Identifies his/her arm and feels weakness	<input type="checkbox"/> 0
		Does not recognize either arm or feeling of weakness in the arm	<input type="checkbox"/> 1
		Does not recognize both arm and feeling of weakness in the arm	<input type="checkbox"/> 2
Total score			

LKW < 6 h

RACE ≥ 5

Transport to CSC if detour no more than 15 min

LKW 6-12 h Medical Command for guidance

RACE 4 or less → closest PSC

PEMS ELVO TRIAGE IN THE FIELD WITH RACE: MAR-OCT '17

Between March 1st and October 31st, 2017 :

of the 171 brain attacks received in our CSC, PEMS screened 107 patients using the RACE scale.

64 patients scored ≥ 5 on the RACE scale (RACE +)
32 of those bypassed PSCs on their way

Results were compared to the preceding 8 months (Pre-RACE)

Table I. Baseline Characteristics		
	Pre-Race (n=114)	RACE + (n=64)
Median Age	66	72
Gender (female (%))	63 (55%)	33 (52%)
Median NIHSS	6	15
Median RACE Score	N/A	8

* $p < 0.05$

PEMS ELVO TRIAGE IN THE FIELD WITH RACE: MAR-OCT

CONCLUSIONS

In the RACE + patients, compared to the pre-RACE cohort:

More patients with severe strokes got to the appropriate hospital,
72% vs. 59%

More patients got iv tPA, 25% vs. 16%

More patients got to the angio suite quickly, 96 min vs. 118 min

More patients had their ELVO recanalized successfully, 89% vs. 67%

More patients had independent outcomes at 90 d (mRS 0-2) 47.4%
vs. 34.5%

STROKE TRIAGE AND TREATMENT: A MOVING TARGET

>6 HOURS? UNKNOWN TIME OF ONSET? WAKE UP STROKE?

Just recently, treating large vessel occlusions beyond the conventional 6 hour stroke treatment window was shown to be effective up to 24 hours in patients with brain to save.



TREATING STROKE PATIENTS WITH LVO > 6 HOURS



The NEW ENGLAND
JOURNAL of MEDICINE

DOI: 10.1056/NEJMoa1713973

Thrombectomy for Stroke at 6 to 16 Hours with Selection by Perfusion Imaging

**90 d mRS 0-2 (aka functional independence):
45% vs 17%**

90 d mortality 14% vs. 26%

TREATING STROKE PATIENTS WITH LVO UPTO 24 HOURS!



The NEW ENGLAND
JOURNAL of MEDICINE

N Engl J Med 2018; 378:11-21

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

**90 d mRS 0-2 (aka functional independence):
49% vs 13%**

90 d mortality 19% vs. 18%

TREATING STROKE PATIENTS WITH LVO UPTO 24 HOURS:

Riverside Regional Medical Center Data 2015-17



90 d mRS 0-2 (aka functional independence): 36% vs 13%

90 d mortality 28% vs. 20%

2018 AHA/ASA Acute LVO Stroke Treatment Guidelines

7. In selected patients with AIS within 6 to 16 hours of last known normal who have LVO in the anterior circulation and meet other DAWN or DEFUSE 3 eligibility criteria, mechanical thrombectomy is recommended.

LEVEL Ia

8. In selected patients with AIS within 6 to 24 hours of last known normal who have LVO in the anterior circulation and meet other DAWN eligibility criteria, mechanical thrombectomy is reasonable.

LEVEL IIa

DOI: 10.1161/STR.000000000000158

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2018 AHA/ASA Acute LVO Stroke Treatment Guidelines

10. As with IV alteplase, reduced time from symptom onset to reperfusion with endovascular therapies is highly associated with better clinical outcomes. To ensure benefit, reperfusion to TICl grade 2b/3 should be achieved as early as possible within the therapeutic window.

LEVEL Ia

DOI: 10.1161/STR.000000000000158

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CONCLUSION

1. Acute ischemic stroke is a neurologic emergency.
2. In addition to iv tPA, mechanical thrombectomy is a powerful treatment option for patients with emergent large vessel occlusion (ELVO).

CONCLUSION

3. Timeliness in identifying these patients and prompt triage to the nearest endovascular facility offers the best chance at minimizing disability and improving outcomes.
4. Infield stroke severity based assessment can play a crucial role in the timely identification and treatment of patients with ELVO
5. Treatment of Strokes due to ELVO can be done upto 24 hours, new AHA/ASA guidelines, Level I A.

So, What are some urgent next steps?

Implement in field screening for ELVO

Implement guidelines for triage and transport to the appropriate hospital the first time

Expand triage of patients with possible ELVO to an endovascular capable hospital upto 24 hours, as they could benefit from thrombectomy



AZ, CO, MA, RI, TN, VA

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AZ, CO, MA, RI, TN, VA

STROKE: NEUROLOGIC EMERGENCY

TIME IS BRAIN

THANK YOU!