Hyperacute therapy in ischemic stroke

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Disclosures

SIZE OF TREATMENT EFFECT

ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT

	CLASS I *Benefit >>> Risk* Procedure/Treatment **SHOULD** be performed/ administered	CLASS IIa *Benefit >> Risk* *Additional studies with focused objectives needed* **IT IS REASONABLE** to perform procedure/administer treatment	CLASS IIb *Benefit ≥ Risk* *Additional studies with broad objectives needed; additional registry data would be helpful* Procedure/Treatment **MAY BE CONSIDERED**	CLASS III *No Benefit* or CLASS III *Harm* Procedure/ Test / Treatment COR III: No benefit — Not Helpful — No Proven Benefit COR III: Harm — Excess Cost w/o Benefit or Harmful — Harmful to Patients
LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	■ Recommendation that procedure or treatment is useful/effective ■ Sufficient evidence from multiple randomized trials or meta-analyses	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Sufficient evidence from multiple randomized trials or meta-analyses
LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is useful/effective ■ Evidence from single randomized trial or nonrandomized studies	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Evidence from single randomized trial or nonrandomized studies
LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	■ Recommendation that procedure or treatment is useful/effective ■ Only expert opinion, case studies, or standard of care	■ Recommendation in favor of treatment or procedure being useful/effective ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation's usefulness/efficacy less well established ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Only expert opinion, case studies, or standard of care

The New England Journal of Medicine

Volume 333 DECEMBER 14, 1995 Number 24

TISSUE PLASMINOGEN ACTIVATOR FOR ACUTE ISCHEMIC STROKE

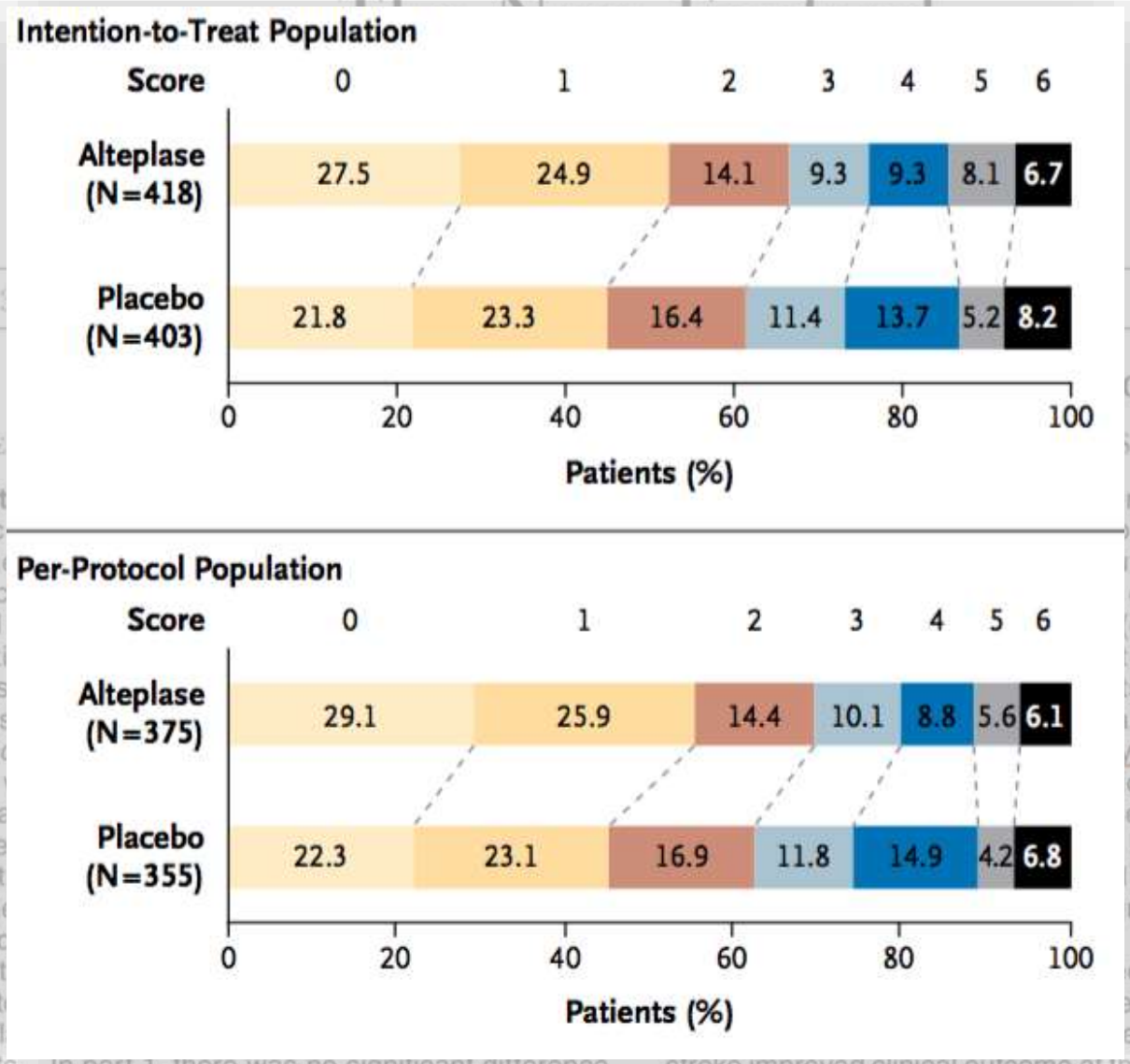
THE NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE rt-PA STROKE STUDY GROUP*

Abstract *Background.* Thrombolytic therapy for acute ischemic stroke has been approached cautiously because there were high rates of intracerebral hemorrhage in early clinical trials. We performed a randomized, double-blind trial of intravenous recombinant tissue plasminogen activator (t-PA) for ischemic stroke after recent pilot studies suggested that t-PA was beneficial when treatment was begun within three hours of the onset of stroke.

Methods. The trial had two parts. Part 1 (in which 291 patients were enrolled) tested whether t-PA had clinical activity, as indicated by an improvement of 4 points over base-line values in the score of the National Institutes of Health stroke scale (NIHSS) or the resolution of the neurologic deficit within 24 hours of the onset of stroke. Part 2 (in which 333 patients were enrolled) used a global test statistic to assess clinical outcome at three months, according to scores on the Barthel index, modified Rankin scale, Glasgow outcome scale, and NIHSS.

Results. In part 1, there was no significant difference between the group given t-PA and that given placebo in the percentages of patients with neurologic improvement at 24 hours, although a benefit was observed for the t-PA group at three months for all four outcome measures. In part 2, the long-term clinical benefit of t-PA predicted by the results of part 1 was confirmed (global odds ratio for a favorable outcome, 1.7; 95 percent confidence interval, 1.2 to 2.6). As compared with patients given placebo, patients treated with t-PA were at least 30 percent more likely to have minimal or no disability at three months on the assessment scales. Symptomatic intracerebral hemorrhage within 36 hours after the onset of stroke occurred in 6.4 percent of patients given t-PA but only 0.6 percent of patients given placebo ($P<0.001$). Mortality at three months was 17 percent in the t-PA group and 21 percent in the placebo group ($P=0.30$).

Conclusions. Despite an increased incidence of symptomatic intracerebral hemorrhage, treatment with intravenous t-PA within three hours of the onset of ischemic stroke improved clinical outcome at three months. (N Engl J Med 1995;333:1581-7.)


Intention-to-Treat Population
Score
0
1
2
3
4
5
6
Alteplase (N=418)
27.5
24.9
14.1
9.3
9.3
8.1
6.7
Placebo (N=403)
21.8
23.3
16.4
11.4
13.7
5.2
8.2
0
20
40
60
80
100
Patients (%)
Per-Protocol Population
Score
0
1
2
3
4
5
6
Alteplase (N=375)
29.1
25.9
14.4
10.1
8.8
5.6
6.1
Placebo (N=355)
22.3
23.1
16.9
11.8
14.9
4.2
6.8
0
20
40
60
80
100
Patients (%)

The New York Times

Copyright © 1996 The New York Times NEW YORK, WEDNESDAY, JUNE 19, 1996 $1 beyond the greater New York metropolitan area.

Clot-Dissolving Drug Approved to Treat Stroke

WASHINGTON, June 18 (AP) — The Food and Drug Administration cleared the way today for stroke victims to take a clot-dissolving drug that could protect their brains from permanent injury, but only if they get to the emergency room fast.

The drug, tissue plasminogen activator, or T.P.A., sold by Genentech Inc. under the brand name Activase, is widely used to treat heart attacks. Some stroke specialists were already giving it to their patients as well.

The drug must be used within three hours of the onset of the symptoms of an ischemic stroke, which is caused by a clot that blocks blood flow into the brain. Treatment with the drug after that can set off dangerous bleeding in the brain. Some strokes are caused by this hemorrhaging to begin with, so doctors must rule that out with a brain scan before administering the drug, the drug agency said.

The agency's action means that Genentech can advertise T.P.A., and educate patients and doctors to recognize the earliest signs of ischemic strokes so the drug can be given within the prescribed three-hour period.

Improper use of the drug can kill, so doctors must use it very carefully and on only some patients, the drug agency warned.

"This is an extremely promising and effective therapy if done right," said Dr. James Grotta of the University of Texas at Houston, a lead investigator in a Federal study that had demonstrated the drug's benefit. "It is an extremely dangerous therapy if done wrong."

Some 500,000 Americans suffer strokes every year. They are the leading cause of adult disability and the nation's No. 3 killer, claiming about 150,000 lives a year. Until now, doctors, powerless to stop the damage, focused instead on rehabilitating patients. The vast majority of strokes, 400,000, are ischemic. Brain hemorrhages cause the rest.

In December, the National Institutes of Health published a landmark study showing that ischemic stroke victims who got T.P.A. within three hours of their initial symptoms were at least 33 percent more likely to recover or have minimal disability than those not given the drug.

A three-hour window to get help.

Not every patient will be cured, doctors emphasized. But for every 100 ischemic stroke victims treated with T.P.A., at least 11 have a more favorable outcome, Genentech said.

But even proper use of the drug can be risky. It caused bleeding in the brain in 6.4 percent of the study participants.

Because doctors must give patients CT scans before administering T.P.A., the procedure cannot be used in ambulances, the F.D.A. said.

The brain scan should help weed out patients most at risk from the drug: those experiencing brain bleeding, who have had recent strokes or head injuries or have high blood pressure or seizures. Also, patients with mild strokes might suffer more risk from T.P.A. than benefit, the agency said.

Educating doctors will be vital, said Dr. Grotta. But average Americans must also learn the earliest symptoms of these "brain attacks" and that there finally is a treatment, said Dr. Michael Walker of the N.I.H., which is planning a national stroke education program. The message is to treat stroke symptoms just as one would treat chest pain, by assuming the worst and getting to a doctor.

"Every minute counts," said Zach Hall, the stroke chief at the N.I.H.

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 SEPTEMBER 25, 2008 VOL. 359 NO. 13

Thrombolysis with Alteplase 3 to 4.5 Hours after Acute Ischemic Stroke

Werner Hacke, M.D., Markku Kaste, M.D., Erich Bluhmki, Ph.D., Miroslav Brozman, M.D., Antoni Dávalos, M.D., Donata Guidetti, M.D., Vincent Larrue, M.D., Kennedy R. Lees, M.D., Zakaria Medeghri, M.D., Thomas Machnig, M.D., Dietmar Schneider, M.D., Rüdiger von Kummer, M.D., Nils Wahlgren, M.D., and Danilo Toni, M.D., for the ECASS Investigators*

Main inclusion criteria

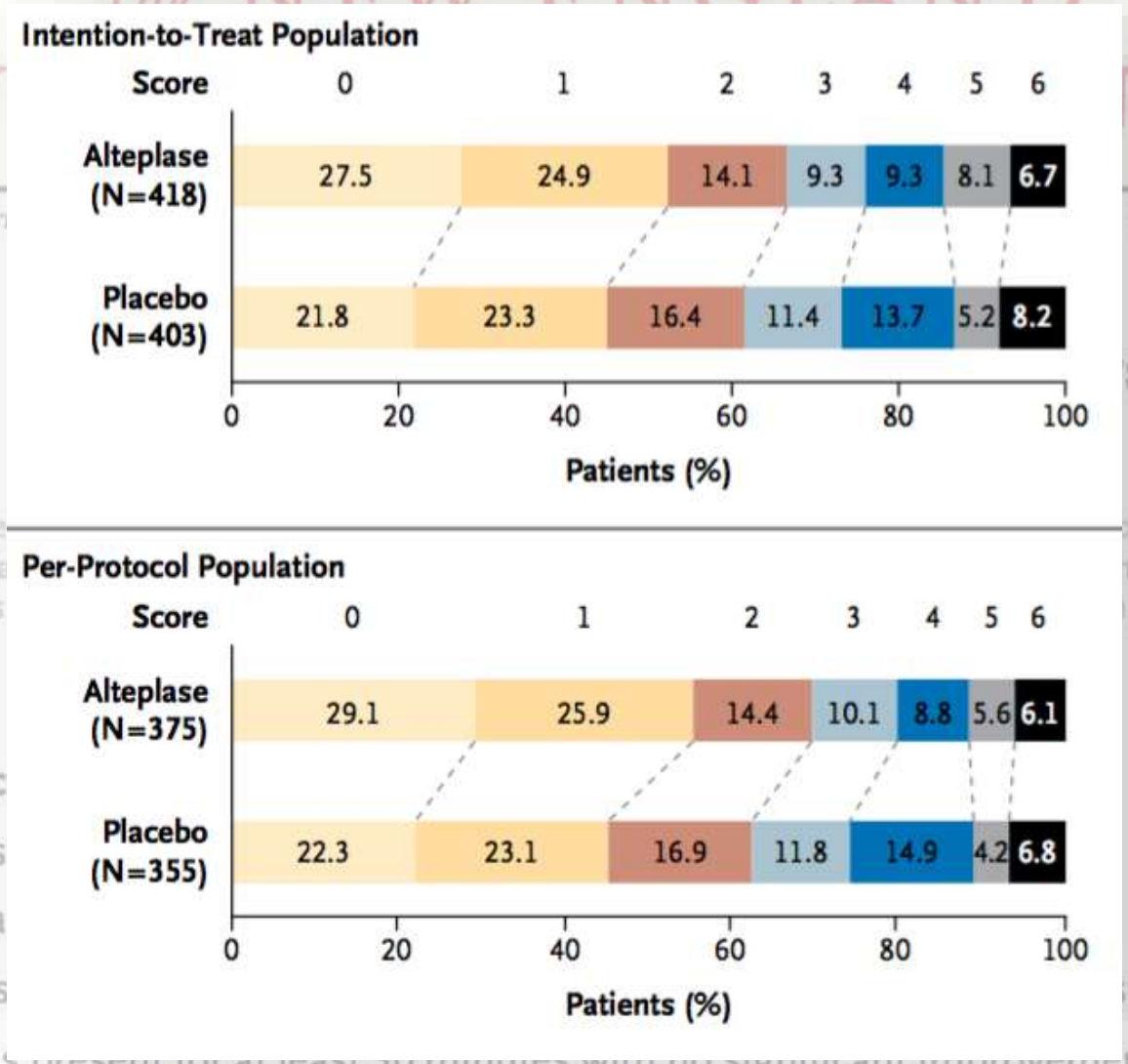
Acute ischemic stroke

Age, 18 to 80 years

Onset of stroke symptoms 3 to 4.5 hours before initiation of study-drug administration

Stroke symptoms present for at least 30 minutes with no significant improvement before treatment

N Engl J Med 2008;359:1317-29.



Additional Inclusion and Exclusion Criteria for IV tPA Within 3 - 4.5 Hours From Symptom Onset

Inclusion criteria

- Diagnosis of ischemic stroke cousin measurable neurologic deficit
- Onset of symptoms within 3 to 4.5 hours before beginning treatment

Exclusion criteria

- Age > 80 years
- Severe stroke (NIHSS > 25)
- Taking an oral anticoagulant regardless of INR
- History of both diabetes and prior ischemic stroke

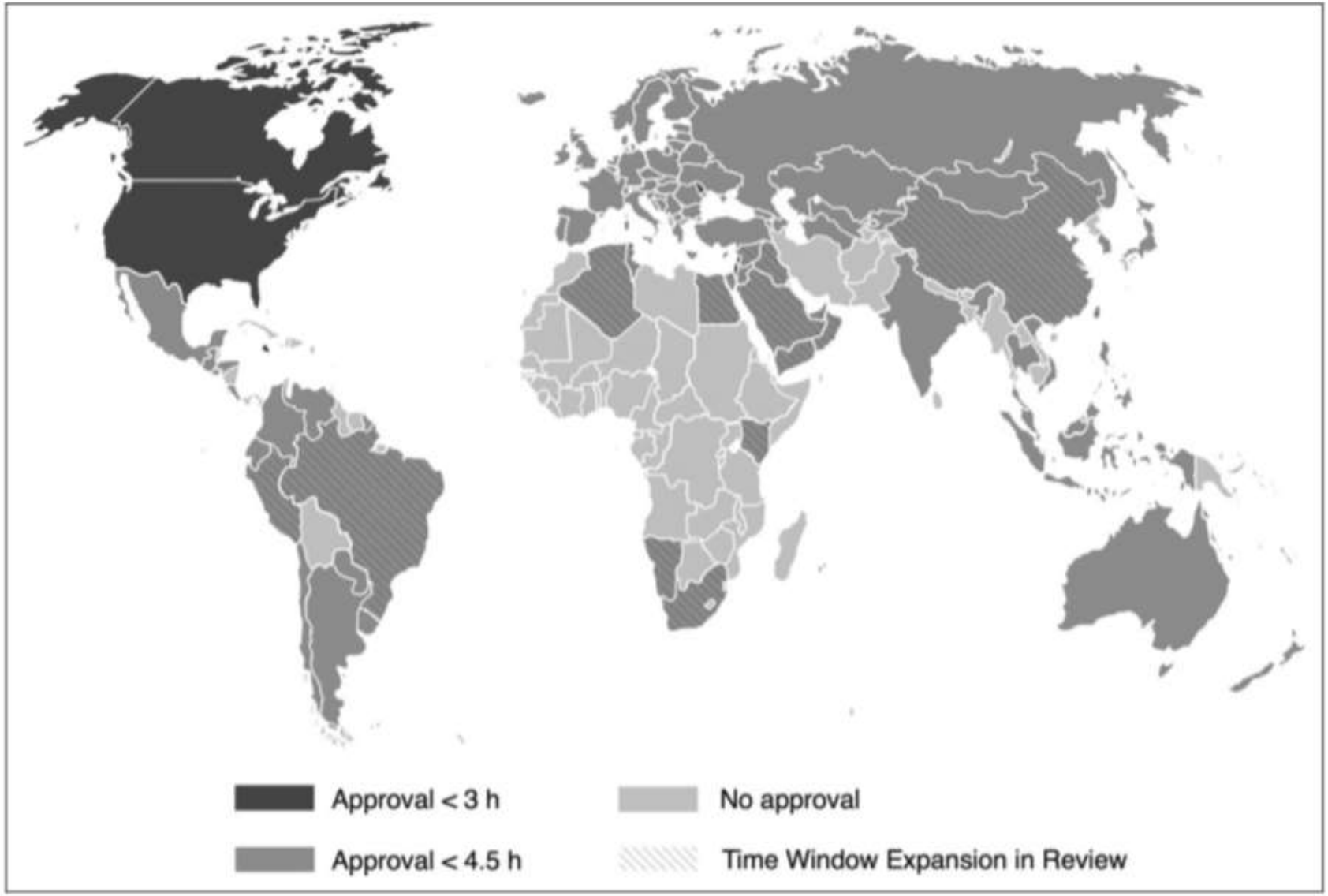


Figure 1. World map of countries with IV tPA approval in the 3- to 4.5-hour window as of January 20, 2014 (courtesy of Peter Schillinger and Boeringer-Ingelheim).

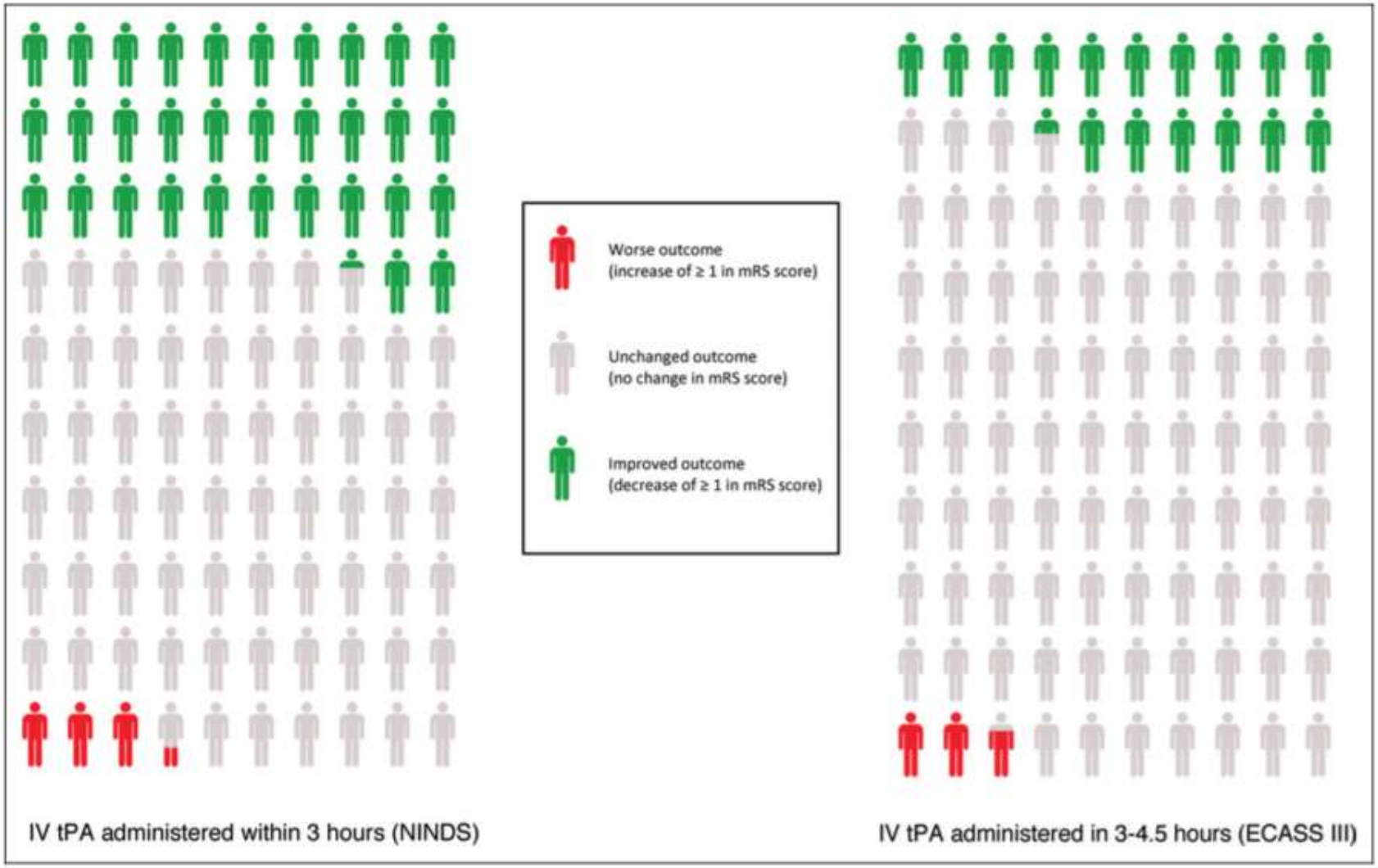


Figure 3. Number needed to treat to benefit and harm per 100 patients treated with intravenous recombinant tissue-type plasminogen activator (IV tPA) for acute ischemic stroke in the <3-hour versus 3- to 4.5-hour time windows.[24] mRS indicates modified Rankin scale; NINDS, National Institute of Neurologic Disorders and Stroke; ECASS-III, European Cooperative Acute Stroke Study-III.

AHA/ASA Guideline

Guidelines for the Early Management of Patients With Acute Ischemic Stroke

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

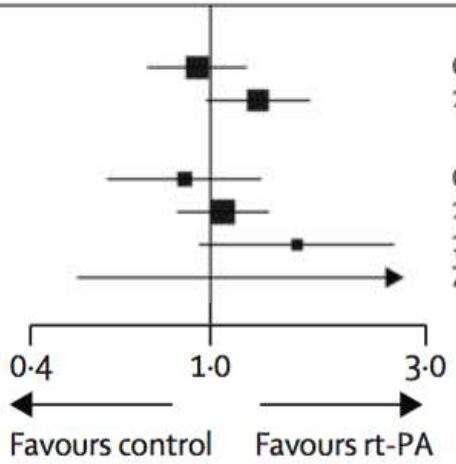
Intravenous rtPA (0.9 mg/kg, maximum dose 90 mg) is recommended for selected patients who may be treated within 3 hours of onset of ischemic stroke (**Class I; Level of Evidence A**).

Intravenous rtPA (0.9 mg/kg, maximum dose 90 mg) is recommended for administration to eligible patients who can be treated in the time period of 3 to 4.5 hours after stroke onset (**Class I; Level of Evidence B**).

The benefits and harms of intravenous thrombolysis with recombinant tissue plasminogen activator within 6 h of acute ischaemic stroke (the third international stroke trial [IST-3]): a randomised controlled trial

*The IST-3 collaborative group**

Subgroup	Events/number of patients		Adjusted odds ratio (99% CI)	Adjusted p value
	rt-PA	Control		
Age (years)				0·029
≤80	331/698 (47·4%)	346/719 (48·1%)	0·92 (0·67–1·26)	
>80	223/817 (27·3%)	188/799 (23·5%)	1·35 (0·97–1·88)	
NIHSS score				0·003
0–5	221/304 (72·7%)	232/308 (75·3%)	0·85 (0·52–1·38)	
6–14	276/728 (37·9%)	268/724 (37·0%)	1·08 (0·81–1·45)	
15–24	50/402 (12·4%)	33/421 (7·8%)	1·73 (0·93–3·20)	
≥25	7/81 (8·6%)	1/65 (1·5%)	7·43 (0·43–129·00)	



Lancet 2012;379:2352– 2363.

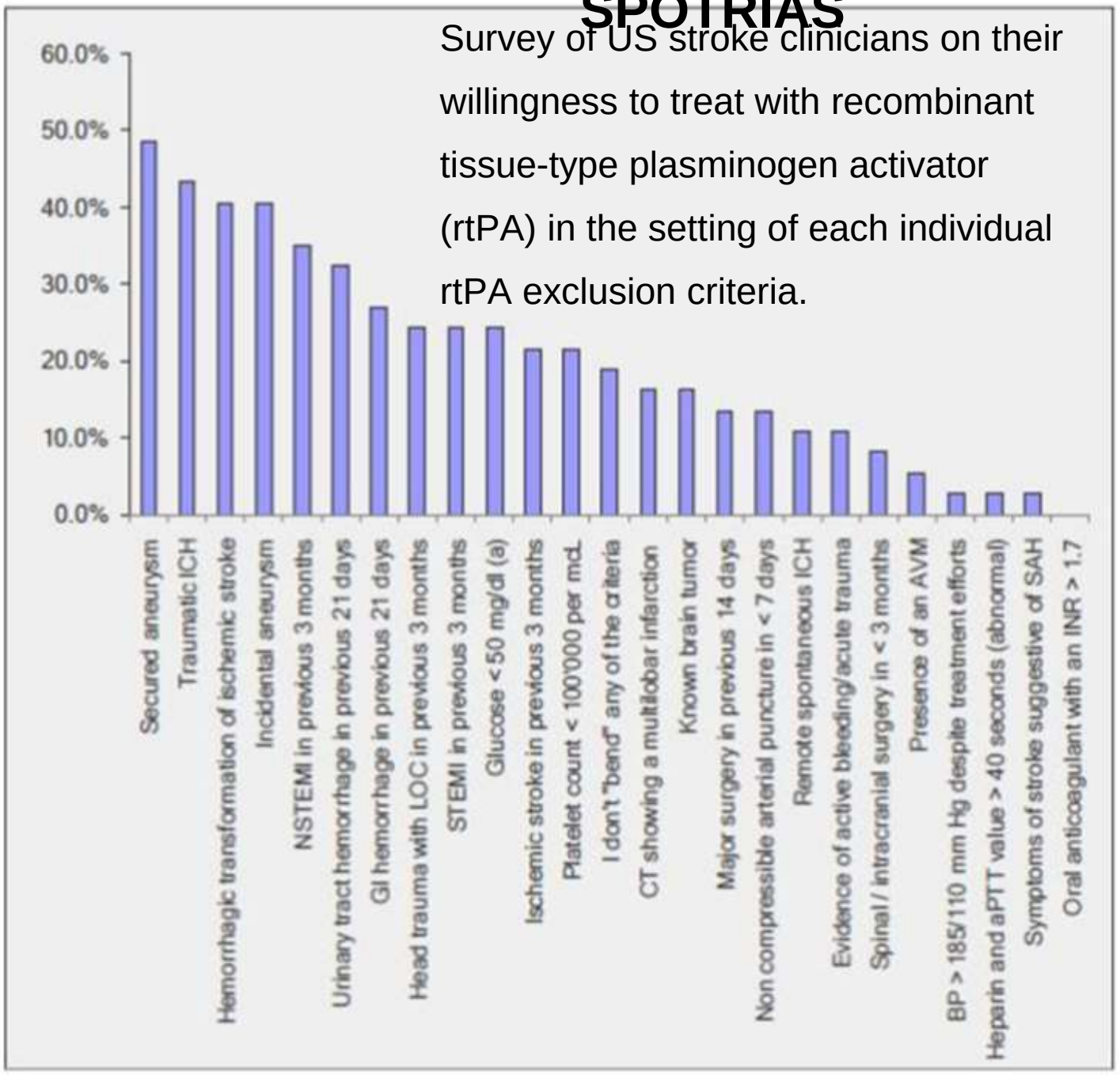
Comparison of Favorable Outcomes at 90 Days Between tPA and Control Among Participants <80 and >80 Years of Age in the NINDS and IST-3 Trials

				Favorable Outcome at 3 mo		
Study	Age Group, y	tPA, n	Control, n	tPA, n (%)	Control, n (%)	OR (95% CI)
NINDS[1]	≤80	272	283	142 (52.2)	102 (36.0)	1.94 (1.38–2.72)
	>80	40	29	9 (22.5)	6 (20.7)	1.11 (0.35–3.37)
IST-3[6]	≤80	698	719	331 (47.4)	346 (48.1)	0.92 (0.67–1.26)
	>80	817	799	223 (27.3)	188 (23.5)	1.35 (0.97–1.88)
Total	≤80	970	1002	473 (48.8)	433 (43.2)	1.25 (1.04–1.50)
	>80	857	828	232 (27.1)	194 (23.4)	1.21 (0.97–1.52)

Favorable outcome defined as a modified Rankin Scale score of 0 to 2 in the NINDS trials and as an Oxford Handicap Score of 0 to 2 in the IST-3 trial. CI indicates confidence interval; IST-3, Third International Stroke Trial; NINDS, National Institute of Neurological Diseases and Stroke; OR, odds ratio; and tPA, tissue-type plasminogen activator.

SPOTRIAS

Survey of US stroke clinicians on their willingness to treat with recombinant tissue-type plasminogen activator (rtPA) in the setting of each individual rtPA exclusion criteria.



J Stroke Cerebrovasc Dis. 2014;23:2130–2138.

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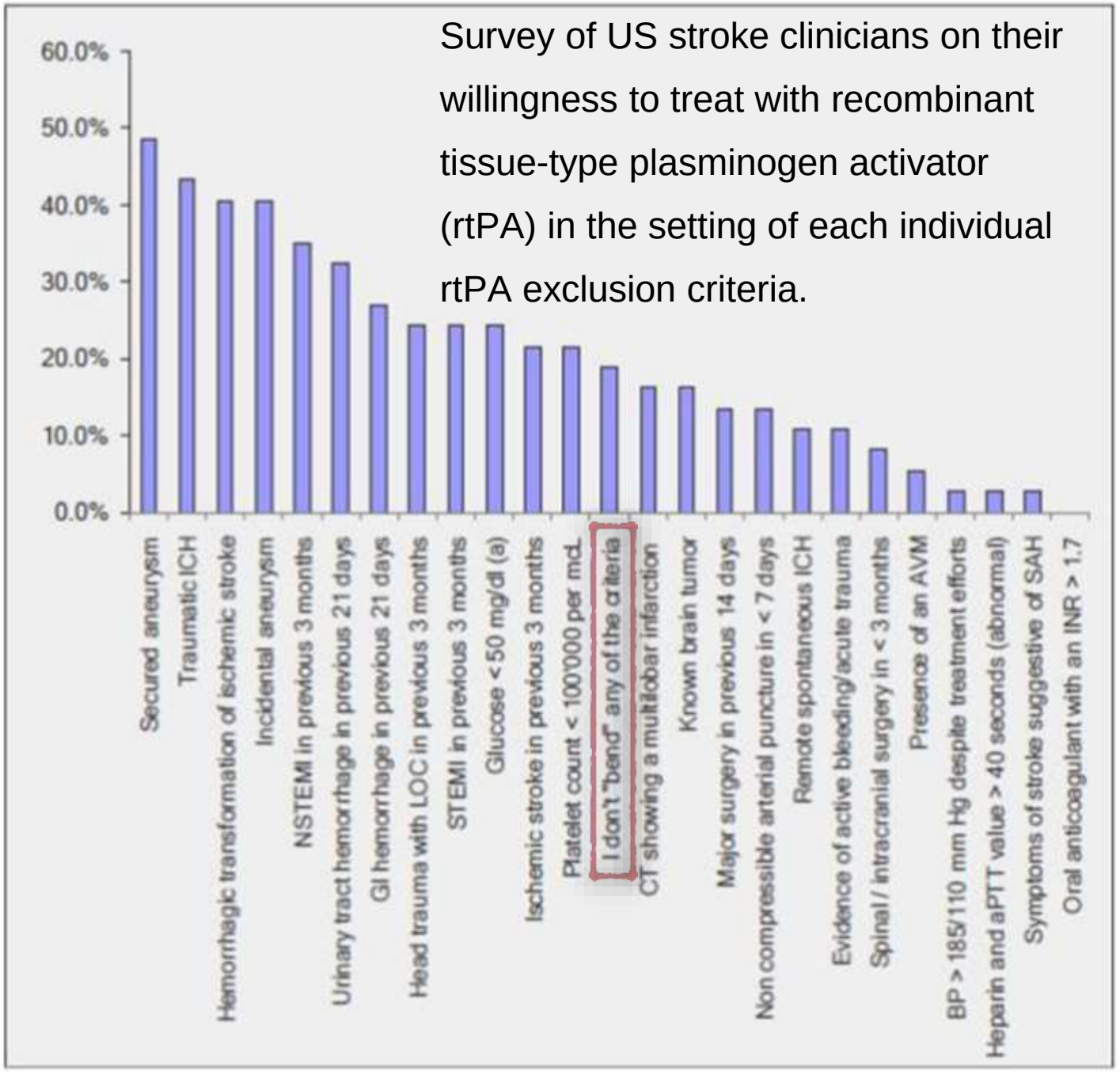


J Stroke Cerebrovasc Dis. 2014;23:2130–2138.

✓ FEB 2015


ACTIVASE®
ALTEPLASE
A RECOMBINANT TISSUE PLASMINOGEN ACTIVATOR

Protocol

International Journal of Stroke WSO

European Cooperative Acute Stroke Study-4: Extending the time for thrombolysis in emergency neurological deficits ECASS-4: ExTEND

International Journal of Stroke
2016, Vol. 11(2) 260–267

DOI: 10.1177/1747493015620805
wso.sagepub.com
SAGE

Hemasse Amiri[1], Erich Bluhmki[2], Martin Bendszus[3], Christoph C Eschenfelder[4], Geoffrey A Donnan[5], Didier Leys[6], Carlos Molina[7], Peter A Ringleb[1], Peter D Schellinger[8], Stefan Schwab[9], Danilo Toni[10], Nils Wahlgren[11] and Werner Hacke[1]

Phase 3, Randomized, Multi-center,

Imaging criteria Double-blind, Placebo- controlled study

infarct core volume <100 ml

perfusion:infarct core mismatch ratio >1.2

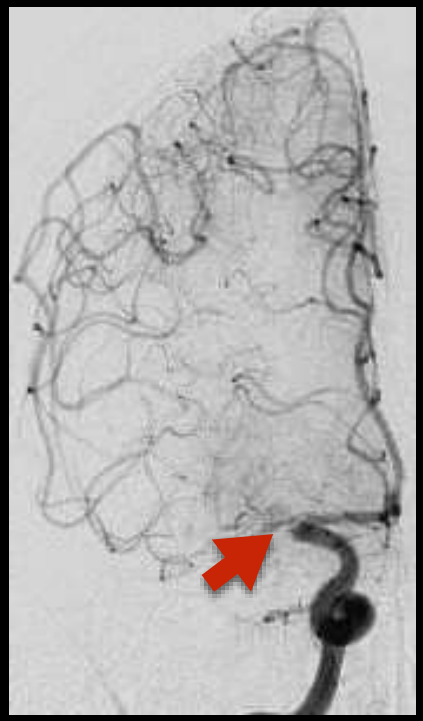
minimum perfusion lesion volume of 20 ml

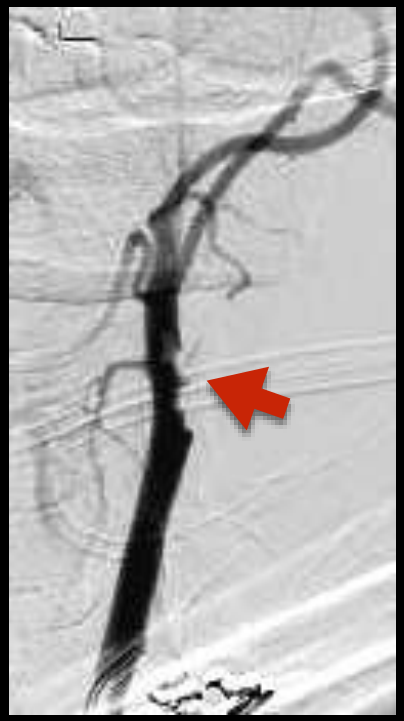
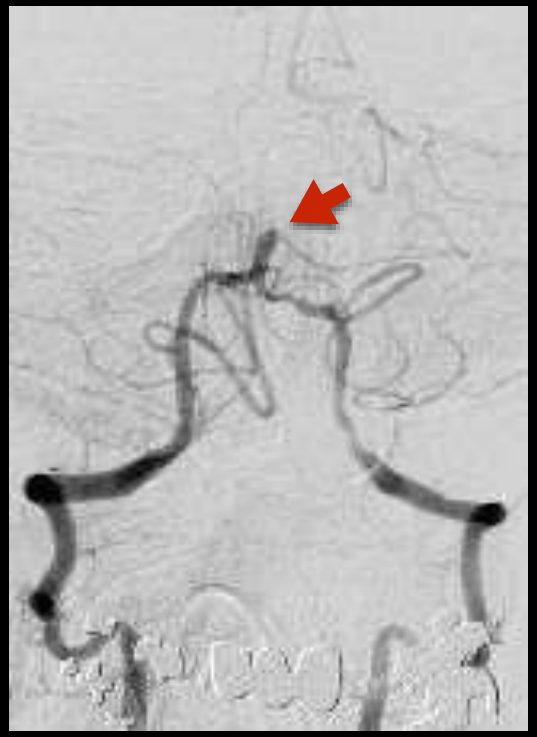
within **4.5 and 9 h** of stroke onset

> 18 years old

NIHSS 4 – 26

Emergent Large Vessel Occlusion



Low Rates of Acute Recanalization With Intravenous Recombinant Tissue Plasminogen Activator in Ischemic Stroke

Real-World Experience and a Call for Action

Table 2. Baseline Occlusions and Proportional Recanalization

Occlusion Location	Recanalization (All)	Recanalization After IV rt-PA	Recanalization After Endovascular Treatment	No Recanalization
M1-MCA	75.4% (49)	32.3% (21)	43.1% (28)	24.6% (16)
ICA terminus (T, L) occlusion	43.5% (10)	4.4% (1)	39.1% (9)	56.5% (13)
M2-MCA	92.3% (12)	30.8% (4)	61.5% (8)	7.7% (1)
BA	56.0% (14)	4.0% (1)	52.0% (13)	44.0% (11)
All	67.7% (86)	21.3% (27)	46.5% (59)	32.3% (41)

BA indicates basilar artery; ICA, internal carotid artery; IV, intravenous; MCA, middle cerebral artery; rt-PA, recombinant tissue plasminogen activator.

PROACT II

EKOS

MERCI

Multi MERCI

PENUMBRA

SWIFT TREVO 2

IMS III SYNTHESIS EXPANSION

MR CLEAN

Intra-arterial fibrinolysis

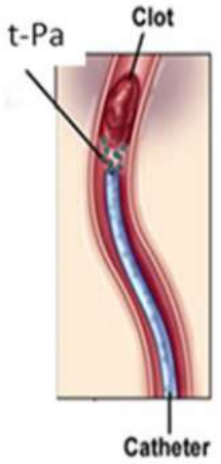
Ultrasound

Coil retrievers

Aspiration

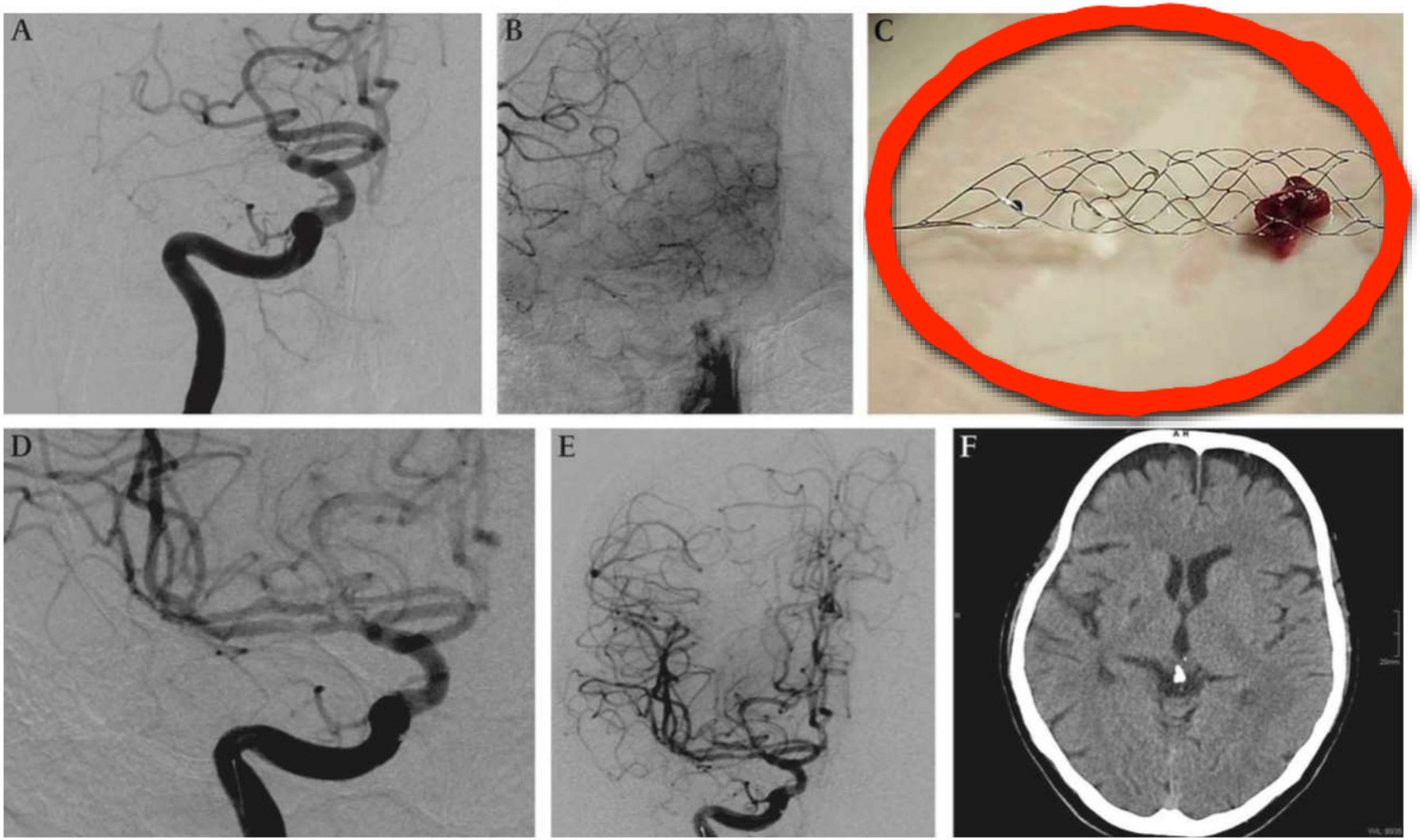
Stent retrievers

1999 — 2003 — 2005 — 2008 — 2009 — 2012 — 2013 — 2014



Stroke. 2015;46:909-914.

67-year-old woman presented on **3rd March 2008**



N Engl J Med 2015;372:1019–1030

MR CLEAN

N Engl J Med 2015;372:11–20.

A Multicenter Randomized CLinical trial of Endovascular treatment for Acute Ischemic stroke in the Netherlands

SWIFT PRIME

N Engl J Med 2015;372:2285–2295

EXTEND-IA

N Engl J Med 2015;372:1009–1018.

REVASCAT

N Engl J Med 2015;372:2296–2306

2013

X 
IMS III
INTERVENTIONAL
MANAGEMENT OF
STROKE

X 
Synthesis
EXPANSION

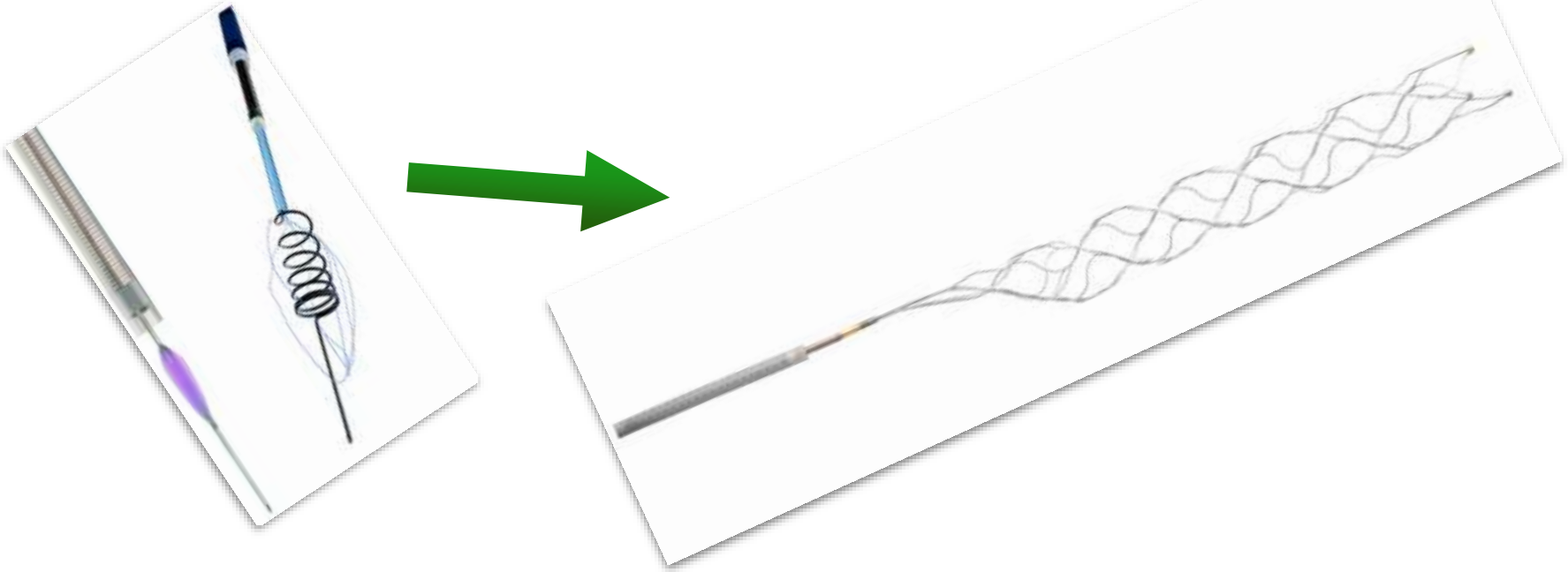
X 
MR Rescue

2013

X IMS III INTERVENTIONAL MANAGEMENT OF STROKE

X Synthesis EXPANSION

X MR Rescue



	MR CLEAN	ESCAPE	EXTEND-IA	SWIFT PRIME
TICI 2b/3	58.7%	72.4%	86%	88%
mRS 0-2	32.6%	53%	71%	60%
NNT	8	4	3.2	4
Death	30 day:18.9% (vs.18.4%)	10.4% (vs.19%)	9% (vs. 20%)	
ICH	sICH: 7.7% (vs.6.4%)	3.6% (vs. 2.7%) No difference in serious ICH	sICH: 0 (vs. 6%) IPH: 11% (vs. 9%)	sICH: 1% (vs. 3.1%)
Embolization	5.6%		6%	
Perforation	0.9%	0.6%	2.9%	
Dissection	1.7%			
Any serious event		Large/Malignant MCA stroke: 4.8% (vs. 10%)		35.7% (vs. 30.9%)

	MR CLEAN	ESCAPE	EXTEND-IA	SWIFT PRIME
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Emb				
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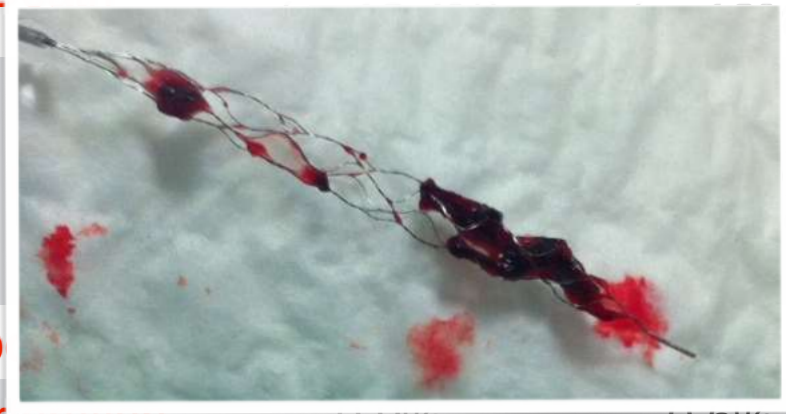
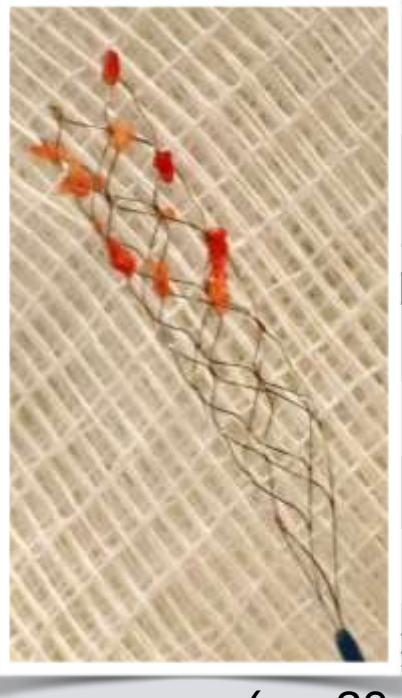




AHA/ASA Guideline

2015 American Heart Association/American Stroke Association Focused Update of the 2013 Guidelines for the Early Management of Patients With Acute Ischemic Stroke Regarding Endovascular Treatment

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

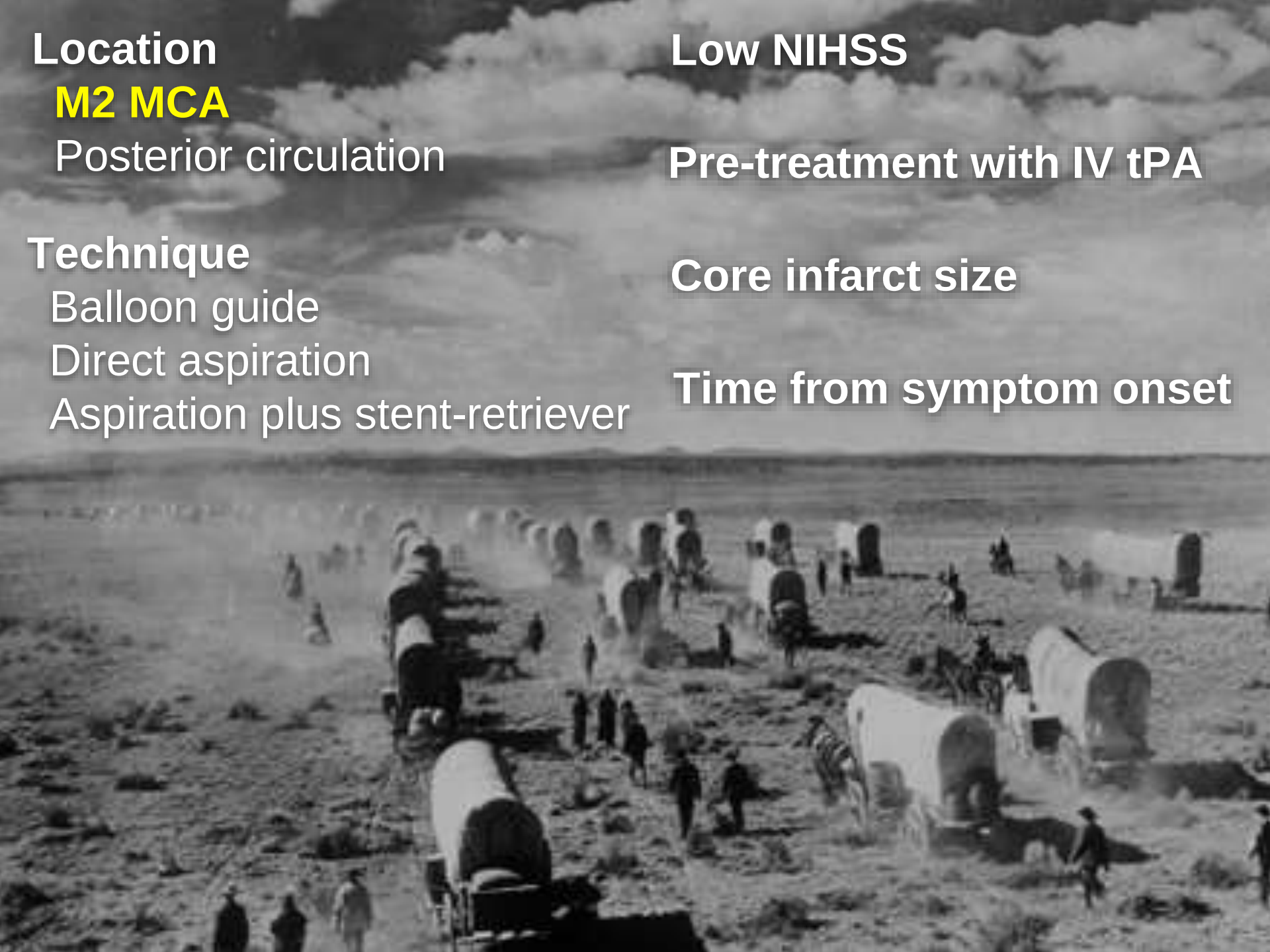
Powers WJ et al. Stroke. 2015;46:3020–3035

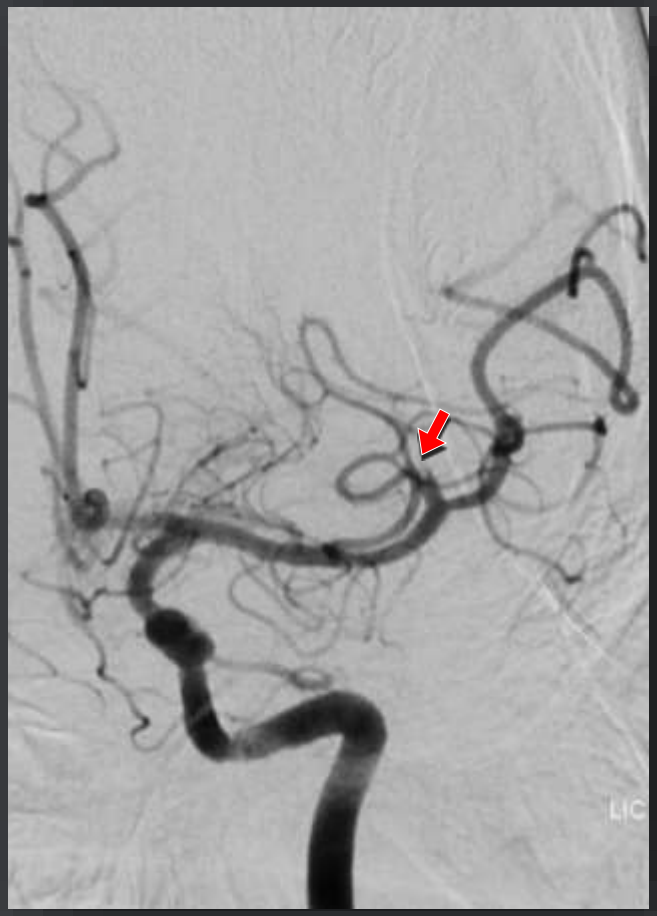
CLASS I: (STRONG) Benefit >>> Risk

2. Patients should receive endovascular therapy with a stent retriever if they meet all the following criteria *(Class I; Level of Evidence A)*. (New recommendation):

a. Prestroke mRS score 0 to 1,
b. Acute ischemic stroke receiving intravenous r-tPA within 4.5 hours of onset according to guidelines from professional medical societies,
c. Causative occlusion of the ICA or proximal MCA (M1),
d. Age ≥18 years,
e. NIHSS score of ≥6,
f. ASPECTS of ≥6, and
g. Treatment can be initiated (groin puncture) within 6 hours of symptom onset


Location
M2 MCA
Posterior circulation
Technique
Balloon guide
Direct aspiration
Aspiration plus stent-retriever
Low NIHSS
Pre-treatment with IV tPA
Core infarct size
Time from symptom onset


Location
M2 MCA
Posterior circulation
Technique
Balloon guide
Direct aspiration
Aspiration plus stent-retriever
Low NIHSS
Pre-treatment with IV tPA
Core infarct size
Time from symptom onset



MR CLEAN < 8%
REVASCAT n=10
ESCAPE n=6
EXTEND-IA n=4
SWIFT-PRIME excluded M2s

Research

JAMA Neurology | Original Investigation

Endovascular Therapy for Acute Ischemic Stroke With Occlusion of the Middle Cerebral Artery M2 Segment

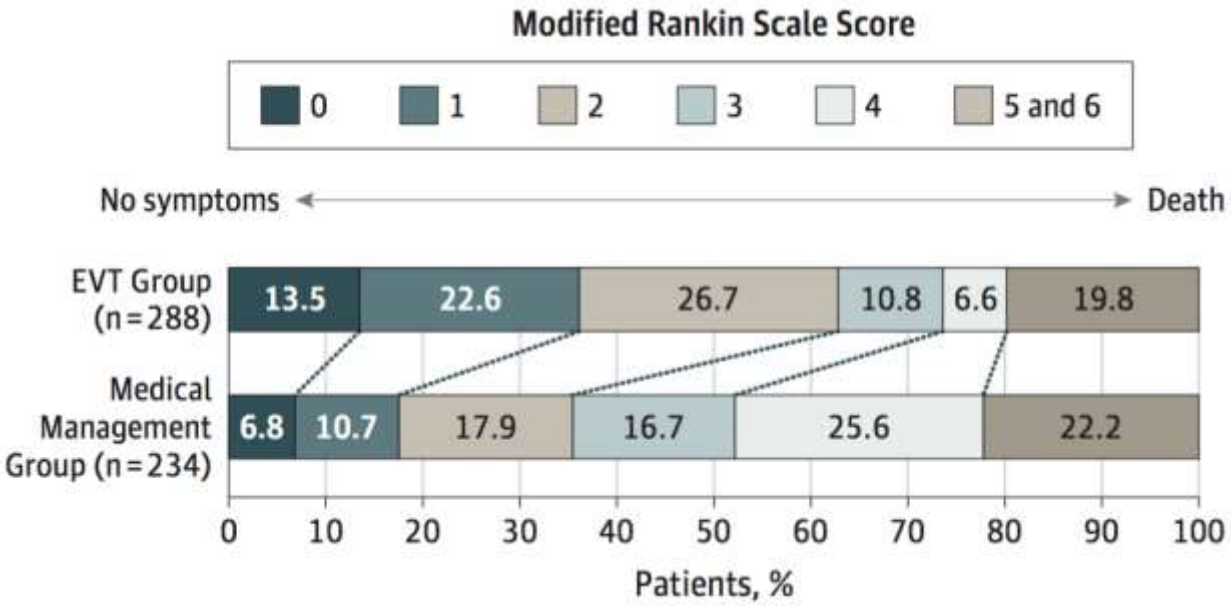
Amrou Sarraj, MD; Navdeep Sangha, MD; Muhammad Shazam Hussain, MD; Dolora Wisco, MD; Nirav Vora, MD; Lucas Elijovich, MD; Nitin Goyal, MD; Michael Abraham, MD; Manoj Mittal, MD; Lei Feng, MD; Abel Wu, MD; Vallabh Janardhan, MD; Suman Nalluri, MD; Albert J. Yoo, MD; Megan George, MD; Randall Edgell, MD; Rutvij J. Shah, MD; Clark Sitton, MD; Emilio Supsupin, MD; Suhas Bajgur, MD; M. Carter Denny, MD; Peng R. Chen, MD; Mark Dannenbaum, MD; Sheryl Martin-Schild, MD; Sean I. Savitz, MD; Rishi Gupta, MD

Multicenter retrospective study, cohort of **isolated M2** occlusion within 8hrs of onset (2012-4/2015).

288 patients received endovascular therapy

234 were treated with medical therapy

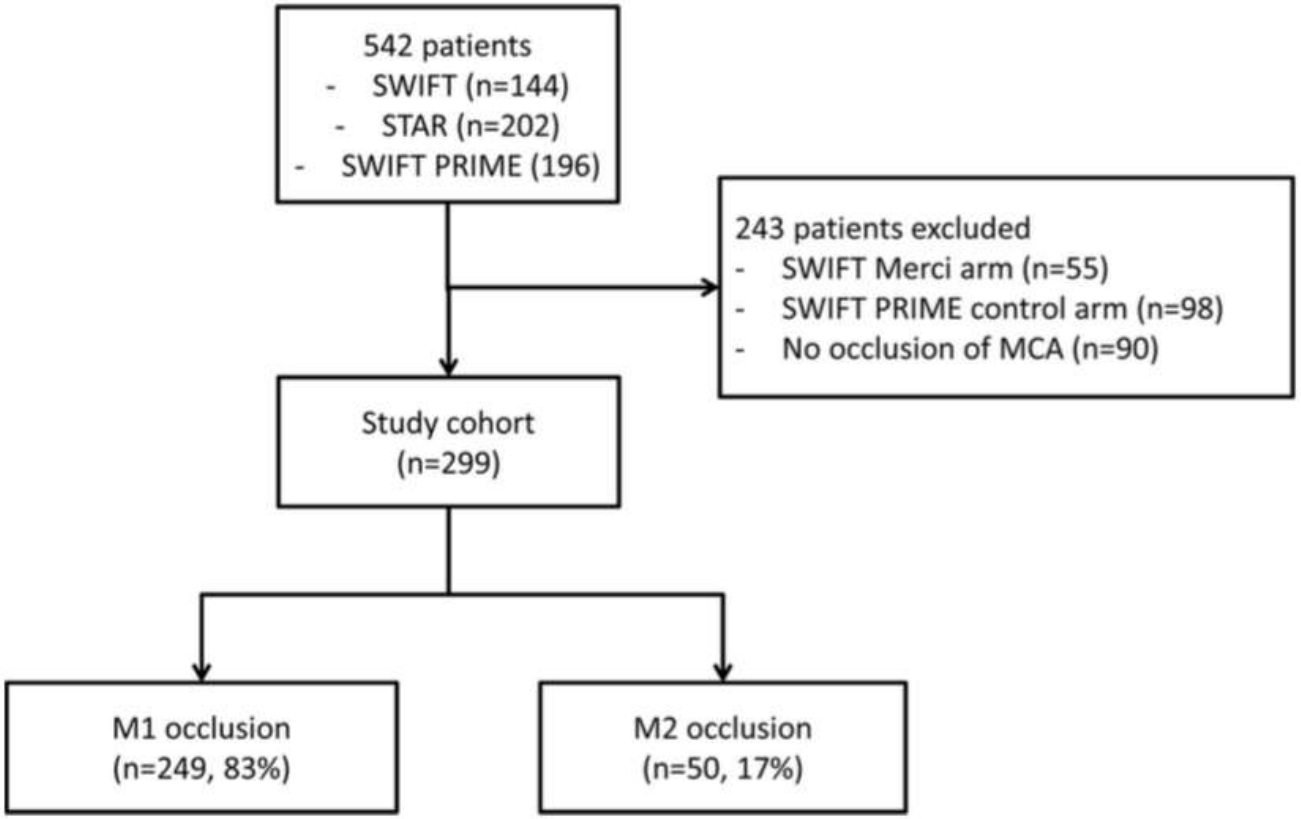
Outcome	Study Group		P Value
	EVT (n = 288)	Medical Management (n = 234)	
Primary outcomes			
90-d mRS score, median (IQR)[b]	2 (1-4)	3 (2-4)	.001
90-d mRS score 0-2, No. (%)[b]	181 (62.8)	83 (35.4)	.001
mTICI score ≥2b, No. (%)[c]	225 (78)	NA	NA
Secondary outcomes, No. (%)			
Symptomatic ICH	16 (5.6)	5 (2.1)	.10
Asymptomatic ICH	15 (5.2)	17 (7.3)	.40
Neurologic worsening	26 (9)	33 (14.1)	.10



mRS Score[a]	Study Group, No. (%) of Patients	
	EVT (n = 288)	Medical Management (n = 234)
0	39 (13.5)	16 (6.8)
1	65 (22.6)	25 (10.7)
2	77 (26.7)	42 (17.9)
3	31 (10.8)	39 (16.7)
4	19 (6.6)	60 (25.6)
5 and 6	57 (19.8)	52 (22.2)

Mechanical Thrombectomy for Isolated M2 Occlusions: A Post Hoc Analysis of the STAR, SWIFT, and SWIFT PRIME Studies

J.M. Coutinho, D.S. Liebeskind, L.-A. Slater, R.G. Nogueira, B.W. Baxter, E.I. Levy, A.H. Siddiqui, M. Goyal, O.O. Zaidat, A. Davalos, A. Bonafé, R. Jahan, J. Gralla, J.L. Saver, and V.M. Pereira



Coutinho JM et al. AJNR Am J Neuroradiol 2016. 37:667–72

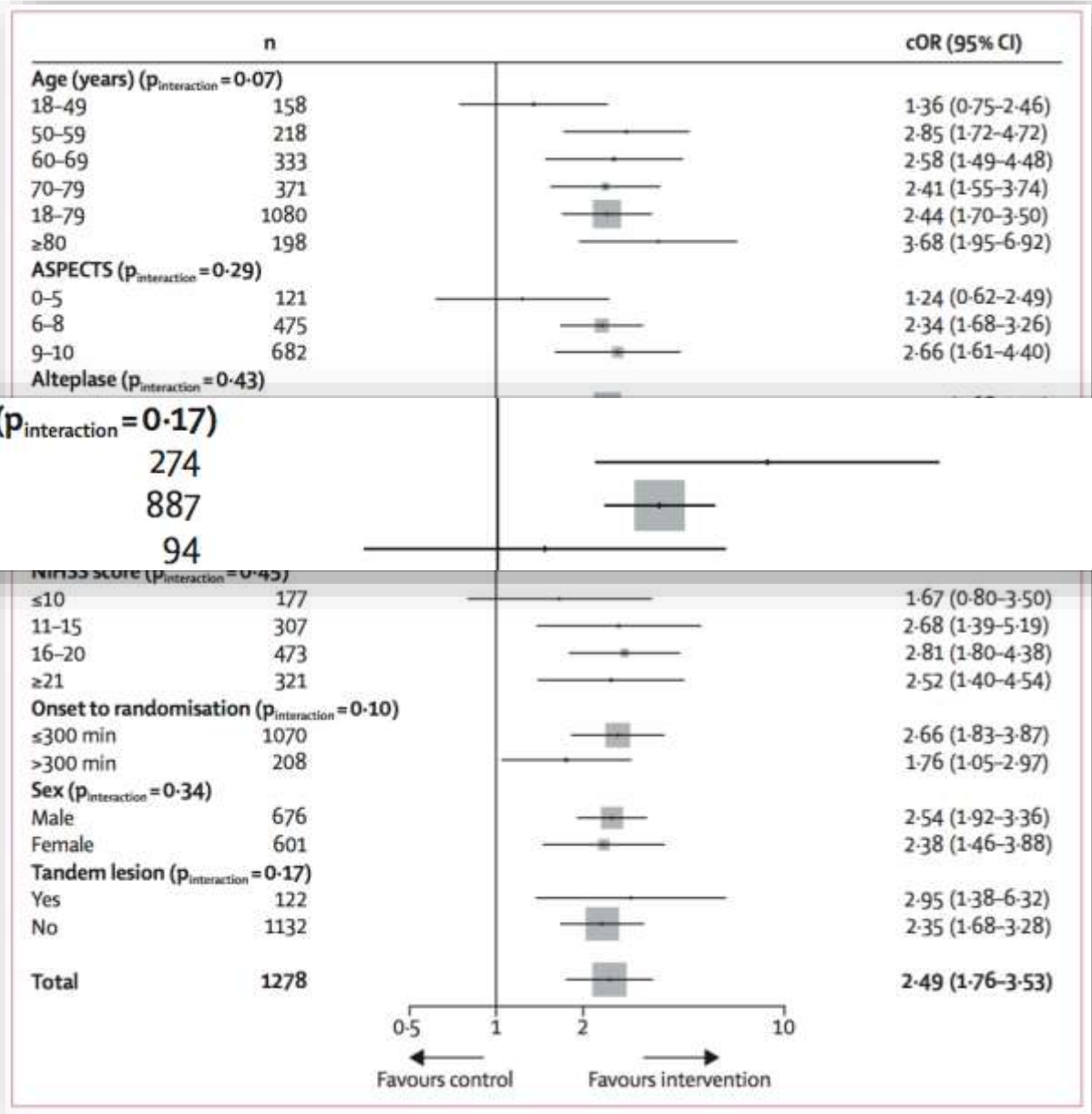
	M2 Occlusion (*N* = 50)	M1 Occlusion (*N* = 249)	*P* Value
Time from groin puncture to recanalization (min) (median) (IQR)	29 (22–45)	35 (25–52)	.41
No. of passes with stent retriever (mean)	1.4 ± 0.8	1.7 ± 1.0	.07
≥3 Passes with stent retriever	13% (5/38)	23% (52/227)	.21
mTICI 2b or 3 reperfusion	85% (34/40)	82% (193/235)	.82
Rescue therapy	6% (3/50)	8% (19/249)	1.000
Complications			
Device-related serious adverse events	6% (3/50)	4% (10/249)	.46
Symptomatic ICH	2% (1/50)	2% (5/249)	1.000
Outcome at 90-day follow-up			
mRS 0–1	50% (25/50)	41% (100/243)	.27
mRS 0–2	60% (30/50)	56% (136/243)	.64
Mortality	12% (6/50)	10% (25/249)	.62

Endovascular thrombectomy after large-vessel ischaemic stroke: a meta-analysis of individual patient data from five randomised trials

Mayank Goyal, Bijoy K Menon, Wim H van Zwam, Diederik W J Dippel, Peter J Mitchell, Andrew M Demchuk, Antoni Dávalos, Charles B L M Majoie, Aad van der Lugt, Maria A de Miquel, Geoffrey A Donnan, Yvo B W E M Roos, Alain Bonafe, Reza Jahan, Hans-Christoph Diener, Lucie A van den Berg, Elad I Levy, Olvert A Berkhemer, Vitor M Pereira, Jeremy Rempel, Mònica Millán, Stephen M Davis, Daniel Roy, John Thornton, Luis San Román, Marc Ribó, Debbie Beumer, Bruce Stouch, Scott Brown, Bruce C V Campbell, Robert J van Oostenbrugge, Jeffrey L Saver, Michael D Hill, Tudor G Jovin, for the HERMES collaborators

HERMES collaboration to pool patient-level data from five trials (MR CLEAN, ESCAPE, REVASCAT, SWIFT PRIME, and EXTEND IA) between Dec 2010, and Dec 2014.

Goyal M et al.Lancet. 2016 Apr 23;387(10029):1723-31.



Goyal M et al.Lancet. 2016 Apr 23;387(10029):1723-31.


Location
M2 MCA
Posterior circulation
Technique
Balloon guide
Direct aspiration
Aspiration plus stent-retriever
Low NIHSS
Pre-treatment with IV tPA
Core infarct size
Time from symptom onset

Acute Basilar Artery Occlusion: Outcome of Mechanical Thrombectomy with Solitaire Stent within 8 Hours of Stroke Onset

J.M. Baek, W. Yoon, S.K. Kim, M.Y. Jung, M.S. Park, J.T. Kim, and H.K. Kang

Baseline characteristics of the study population

	Good Outcome (*n* = 12)	Poor Outcome (*n* = 13)	Total (*n* = 25)	*P*
Age, y (mean ± SD)	63.2 ± 16.86	71.8 ± 11.92	68	
Sex, male, n (%)	6 (50%)	8 (61.5%)	14 (56%)	
Risk factors				
Hypertension	3 (25%)	12 (92.3%)	15 (60%)	.001
Atrial fibrillation	5 (41.7%)	4 (30.8%)	9 (36%)	
Diabetes mellitus	4 (33.3%)	4 (30.8%)	8 (32%)	
Dyslipidemia	4 (33.3%)	2 (15.4%)	6 (24%)	
Smoking	3 (25%)	3 (23.1%)	6 (24%)	
History of stroke or TIA	0%	4 (30.8%)	4 (16%)	
Coronary artery disease	0%	2 (15.4%)	2 (8%)	
Patent foramen ovale	1 (8.3%)	0%	1 (4%)	
Valvular heart disease	1 (8.3%)	0%	1 (4%)	
Atrioventricular block	0%	1 (8.3%)	1 (4%)	

Baek JM et all. AJNR Am J Neuroradiol 35:989 –93.

Acute Basilar Artery Occlusion: Outcome of Mechanical Thrombectomy with Solitaire Stent within 8 Hours of Stroke Onset

J.M. Baek, W. Yoon, S.K. Kim, M.Y. Jung, M.S. Park, J.T. Kim, and H.K. Kang

Baseline characteristics of the study population

	Good Outcome (*n* = 12)	Poor Outcome (*n* = 13)	Total (*n* = 25)	*P*
Intravenous thrombolysis	3 (25%)	3 (23.1%)	6 (24%)	
Time to procedure, min	260 ± 100.32	290 ± 74.42	285 ± 88.48	
Procedure time, min	27.5 ± 24.21	30 ± 20.35	30 ± 21.91	
Time to recanalization, min	300 ± 110.03	310 ± 91.23	310 ± 99.91	
Rescue treatment				
Clot disruption with intra-arterial urokinase	1 (8.3%)	0%	1 (4%)	
Angioplasty with or without stenting	3 (25%)	3 (23.1%)	6 (24%)	
Baseline NIHSS score	9.5 ± 3.13	14 ± 5.75	11	.005
Discharge NIHSS score	2 ± 2.57	9 ± 8.21	4	.003
Stroke etiology				
Large-artery atherosclerosis	4 (33.3%)	5 (38.5%)	9 (36%)	
Cardioembolic	6 (50%)	6 (46.2%)	12 (48%)	
Undetermined	2 (8.3%)	2 (15.4%)	4 (16%)	

Baek JM et all. AJNR Am J Neuroradiol 35:989 –93.

Research

JAMA Neurology | Original Investigation

Safety and Outcome of Intra-Arterial Treatment for Basilar Artery Occlusion

Reinier C. van Houwelingen, MD; Gert-Jan Luijckx, MD, PhD; Aryan Mazuri, MD; Reinoud P. H. Bokkers, MD, PhD; Omid S. Eshghi, MD; Maarten Uyttenboogaart, MD, PhD

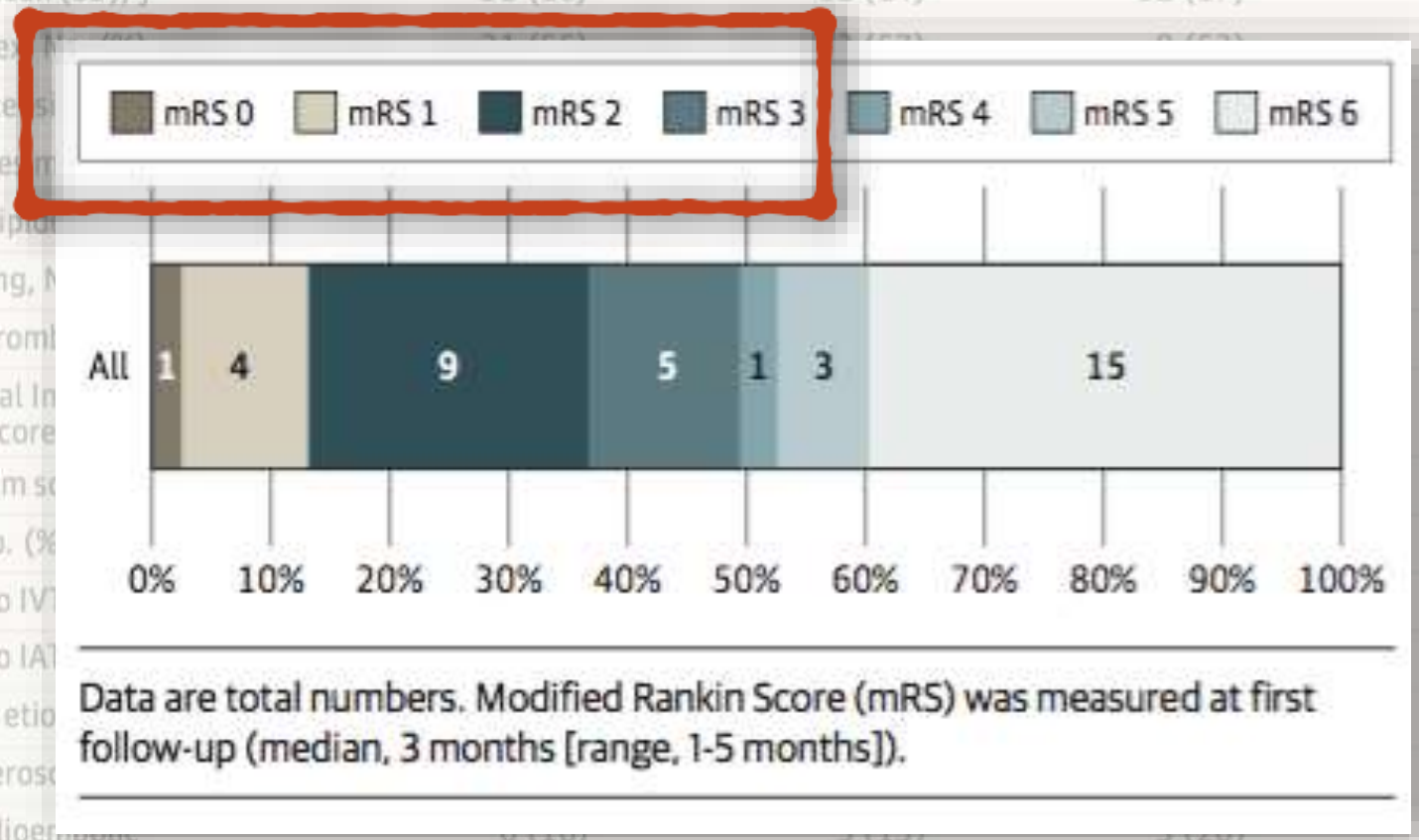
Single centre retrospective case series of 38 consecutive patients treated at CSC in Netherlands 2006-2015

Table 1. Baseline Characteristics

Characteristic	All (N = 38)	Severe (n = 23)	Mild/Moderate (n = 15)	*P* Value[a]
Age, mean (SD), y	58 (16)	62 (14)	52 (17)	.08
Male sex, No. (%)	21 (55)	13 (57)	8 (53)	.85
Hypertension, No. (%)	19 (50)	10 (44)	9 (60)	.32
Diabetes mellitus, No. (%)	4 (11)	3 (13)	1 (6)	>.99
Hyperlipidemia, No. (%)	19 (50)	8 (35)	11 (73)	.02
Smoking, No. (%)	15 (40)	7 (30)	8 (53)	.16
Antithrombotic treatment,[b] No. (%)	7 (18)	4 (17)	3 (20)	>.99
National Institutes of Health stroke scale score, median (IQR)	21 (15-32)	31 (22-34)	14 (9-16)	<.001
GCS sum score,[c] median (IQR)	10 (6-11)	7 (5-10)	11 (11-14)	<.001
IVT, No. (%)	27 (71)	16 (70)	11 (73)	>.99
Time to IVT, median (IQR), min	155 (120-180)	158 (135-194)	120 (90-160)	.03
Time to IAT, median (IQR), min	288 (216-380)	255 (195-320)	340 (255-480)	.20
Stroke etiology, No. (%)				
Atherosclerosis	19 (50)	12 (52)	7 (47)	.74
Cardioembolic	6 (16)	3 (13)	3 (20)	.66
Other	7 (18)	4 (17)	3 (20)	>.99
Unknown	6 (16)	4 (17)	2 (13)	>.99

Table 1. Baseline Characteristics

Characteristic	All (N = 38)	Severe (n = 23)	Mild/Moderate (n = 15)	P Value[a]
Age, mean (SD), y	58 (16)	62 (14)	52 (17)	.08
Male sex				.85
Hyperte				.32
Diabetes				>.99
Hyperlipi				.02
Smoking,				.16
Antithrom				>.99
National In scale score				<.001
GCS sum s				<.001
IVT, No. (%				>.99
Time to IV				.03
Time to IA				.20
Stroke etio				
Atheros				.74
Cardioe				.66
Other	7 (18)	4 (17)	3 (20)	>.99
Unknown	6 (16)	4 (17)	2 (13)	>.99



Data are total numbers. Modified Rankin Score (mRS) was measured at first follow-up (median, 3 months [range, 1-5 months]).

Treatment and outcomes of acute basilar artery occlusion in the Basilar Artery International Cooperation Study (BASICS): a prospective registry study

Wouter J Schonewille, Christine A C Wijman, Patrik Michel, Christina M Rueckert, Christian Weimar, Heinrich P Mattle, Stefan T Engelter, David Tanne, Keith W Muir, Carlos A Molina, Vincent Thijs, Heinrich Audebert, Thomas Pfefferkorn, Kristina Szabo, Perttu J Lindsberg, Gabriel de Freitas, L Jaap Kappelle, Ale Algra, on behalf of the BASICS study group*

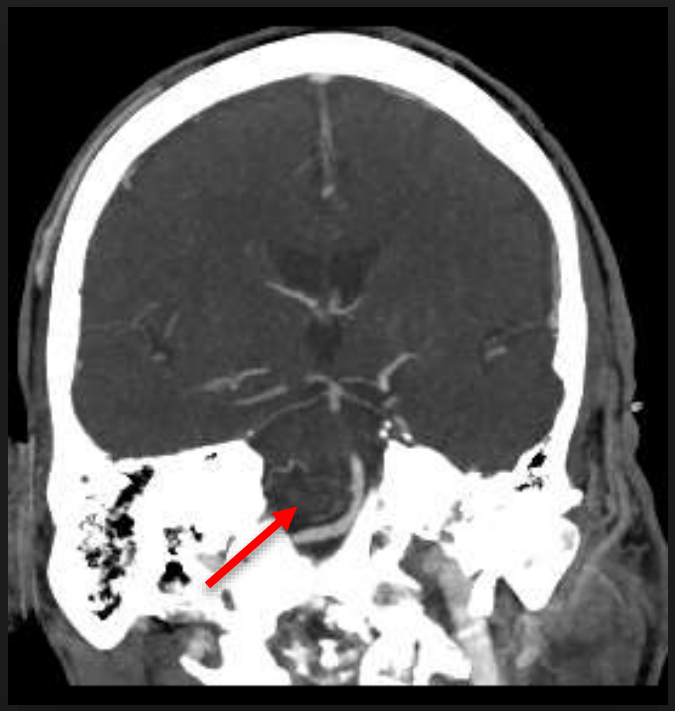
592 patients
Radiologically confirmed acute Basilar Artery Occlusion

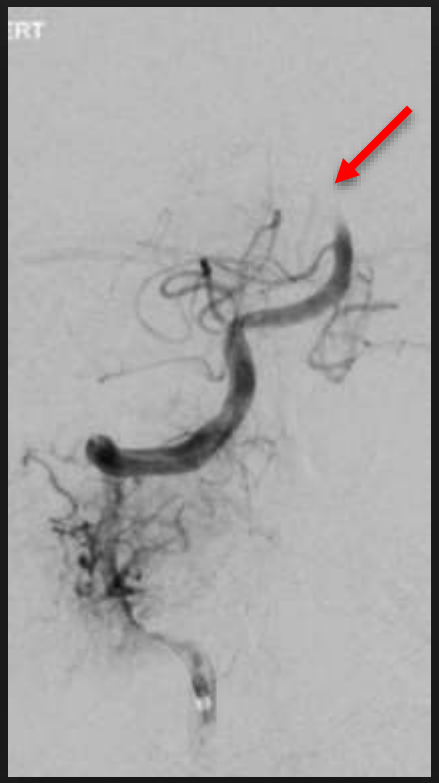
3 groups
Antithrombotics (n=183)
Primary IV r-tPA, including subsequent IA thrombolysis (n=121)
IA therapy; thrombolysis, mechanical thrombectomy, stenting or combination (n=288)

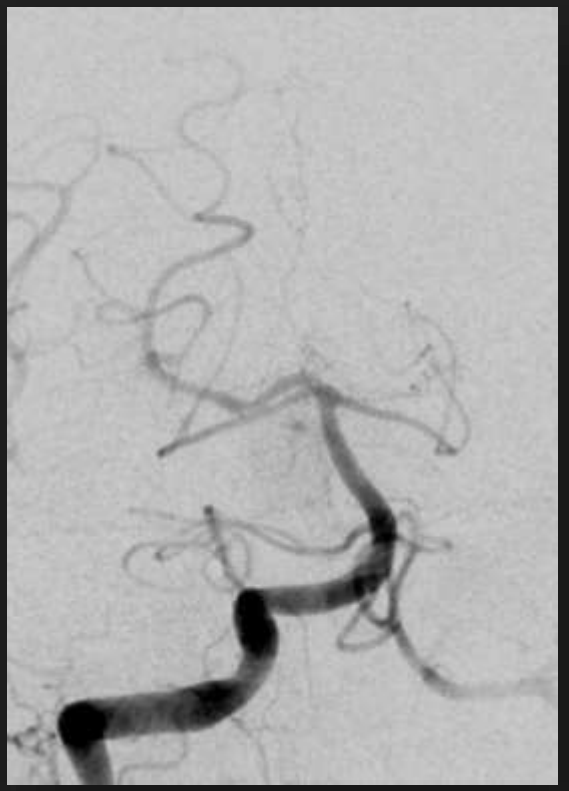
68% (n=402) poor outcome (mRS 4-5)

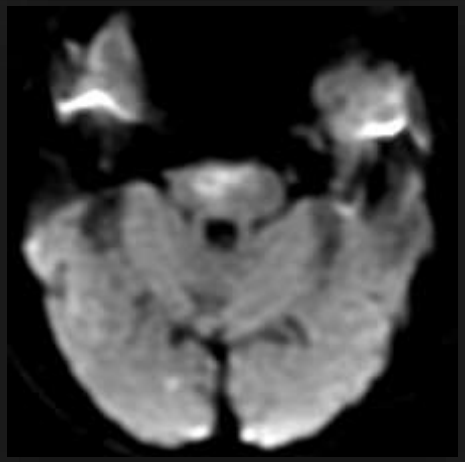
No statistical superiority of any specific therapy

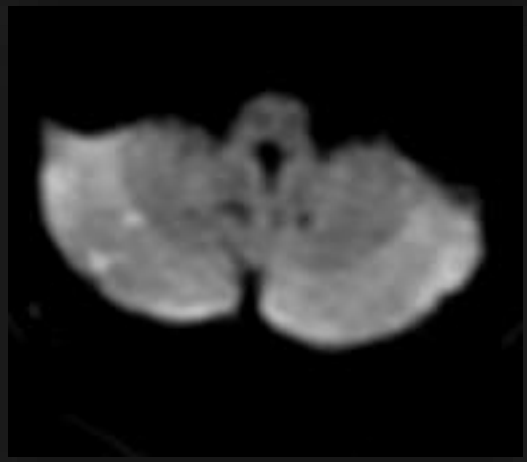
Schonzwille WJ et al. Lancet Neurol. 2009 Aug;8(8):724-30.

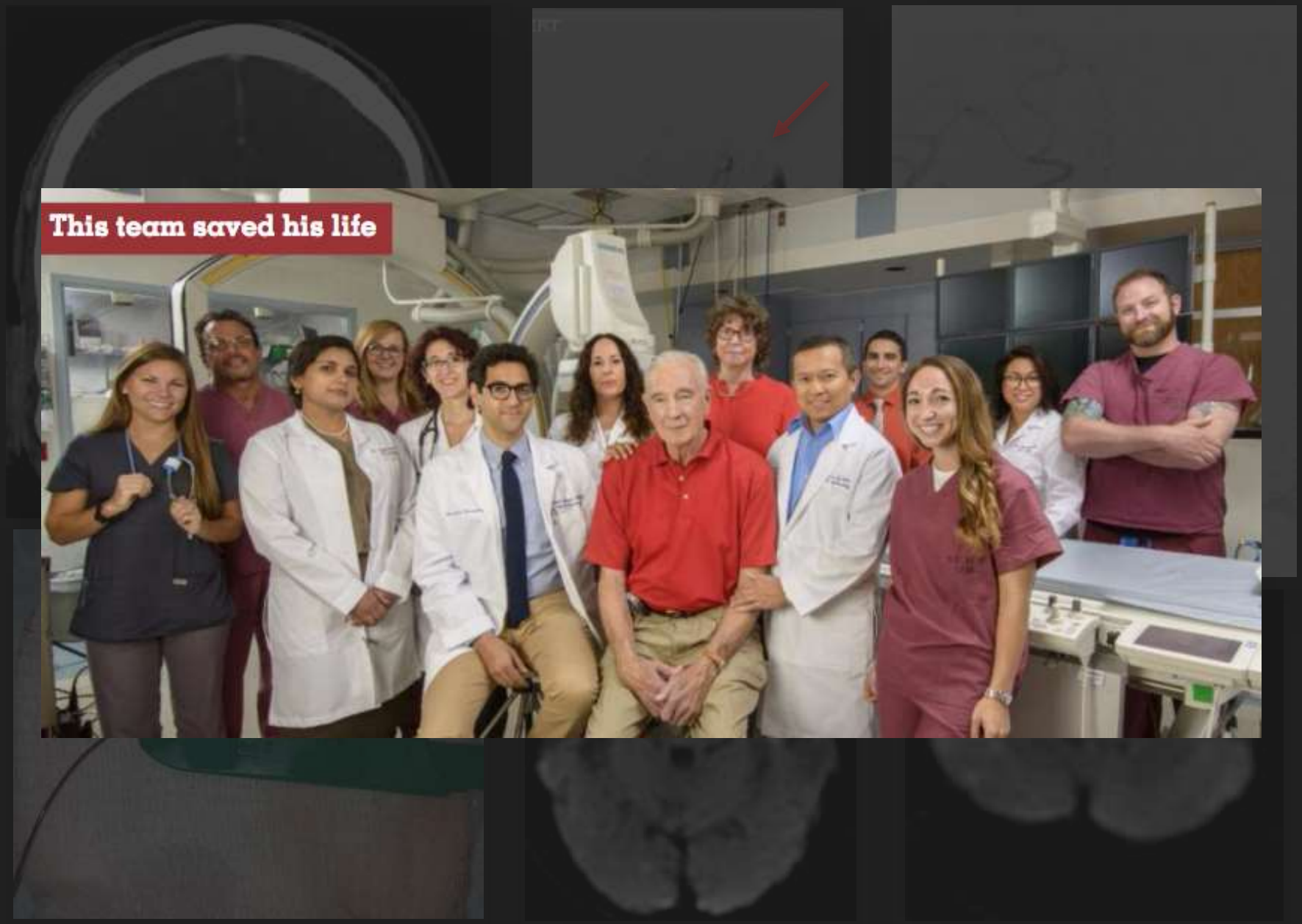











This team saved his life

CLASS IIb: (Weak) Benefit ≥ Risk

6. Although the benefits are uncertain, the use of endovascular therapy with stent retrievers may be reasonable for carefully selected patients with acute ischemic stroke in whom treatment can be initiated (groin puncture) within 6 hours of symptom onset and who have causative occlusion of the M2 or M3 portion of the MCAs, anterior cerebral arteries, vertebral arteries, basilar artery, or posterior cerebral arteries *(Class IIb; Level of Evidence C)*. (New recommendation)