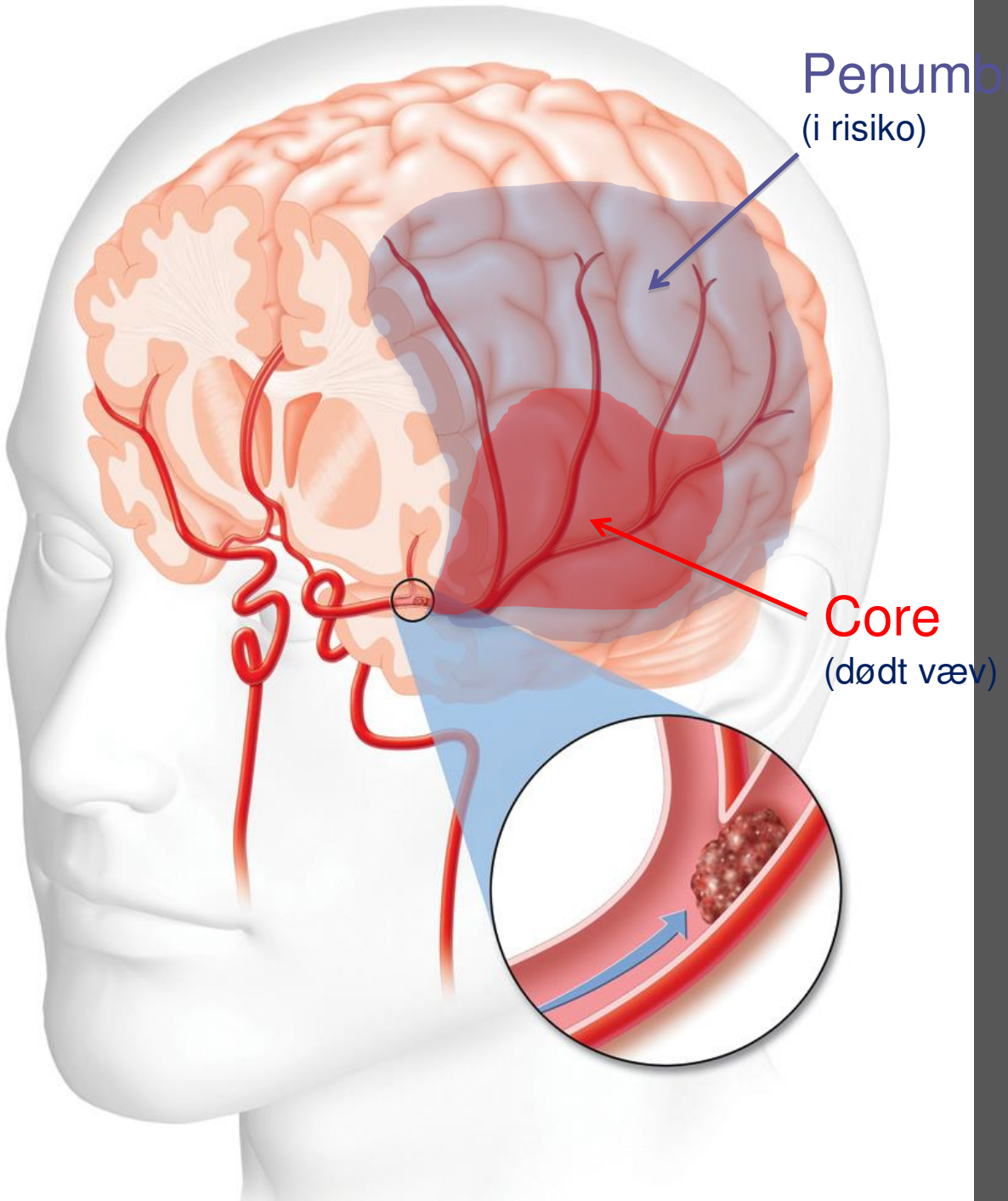
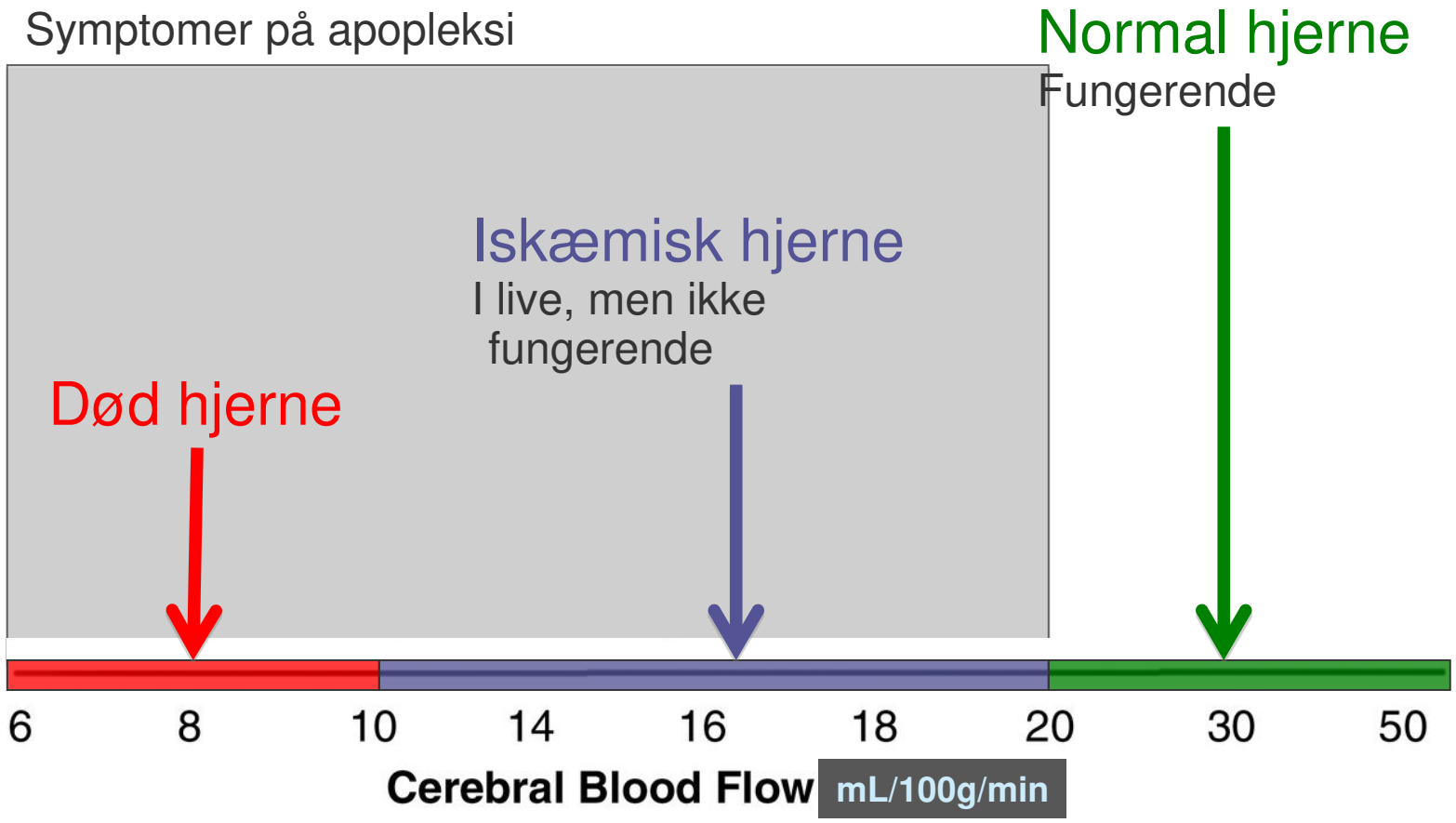
Trombektomi anno 2024 – udvidede indikationer og øget arbejdsbelastning

Afd. læge, ph.d.
Andreas Hjelm Brandt
Radiologisk Klinik, Neuroendovaskulær sektion
Rigshospitalet

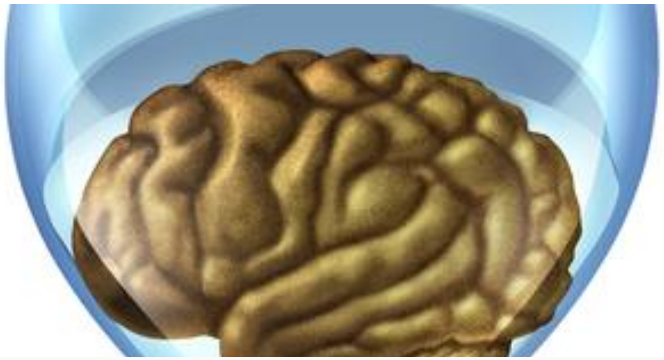

Penumbra
(i risiko)
Core
(dødt væv)

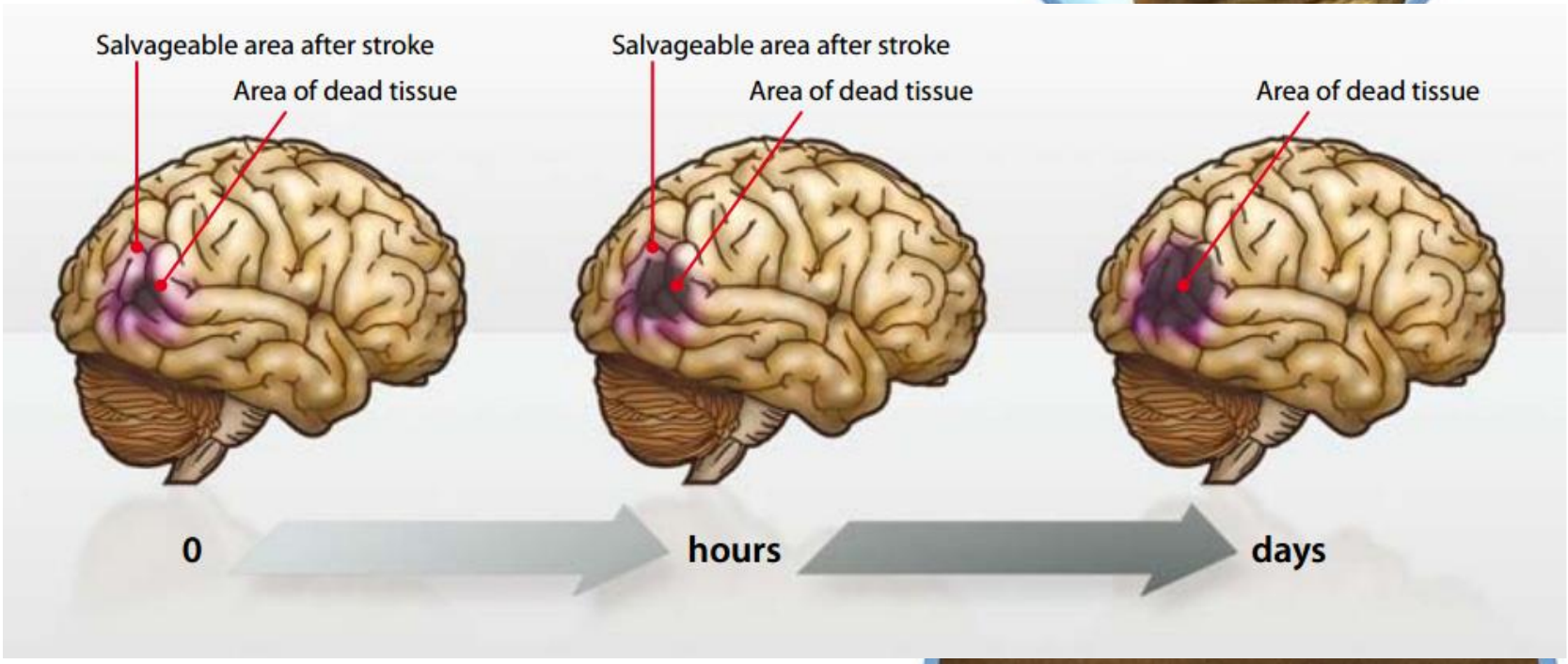
Penumbra Koncept



"Time is brain"

Ved en blodprop i hjernen:
Tid tabt = hjerne tabt!





Akute Stroke Behandling

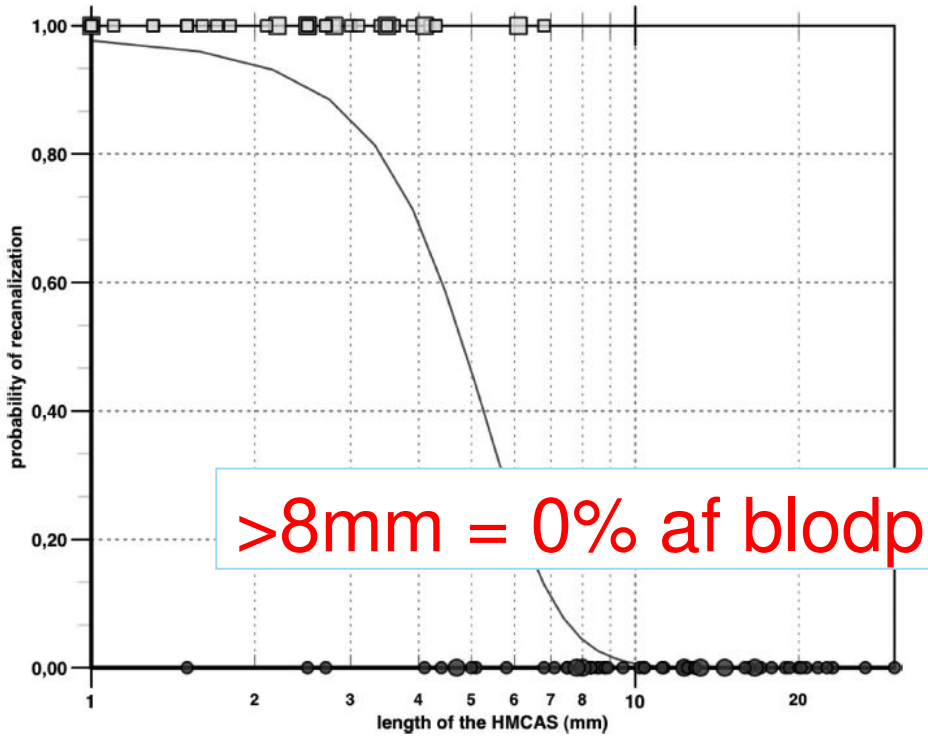
- Re-vaskularisering

- Medicinsk (trombolyse)
- Mekanisk (trombektomi) ved stor blodprop

The Importance of Size: Successful Recanalization by Intravenous Thrombolysis in Acute Anterior Stroke Depends on Thrombus Length

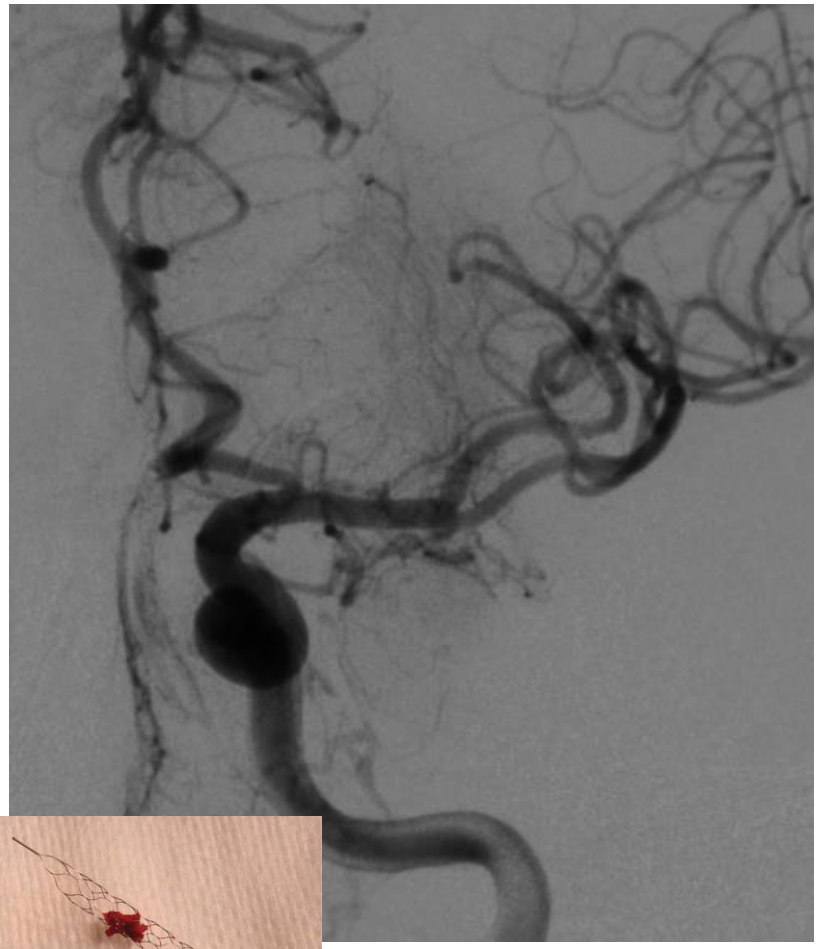
Christian H. Riedel, Philip Zimmermann, Ulf Jensen-Kondering, Robert Stingele, Günther Deuschl and Olav Jansen

Sandsynlighed for rekanalisering med trombolyse: Afhængig af trombens længde !

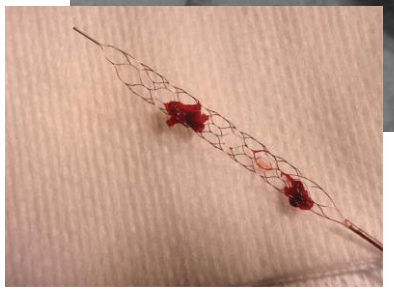


>8mm = 0% af blodpropperne er væk

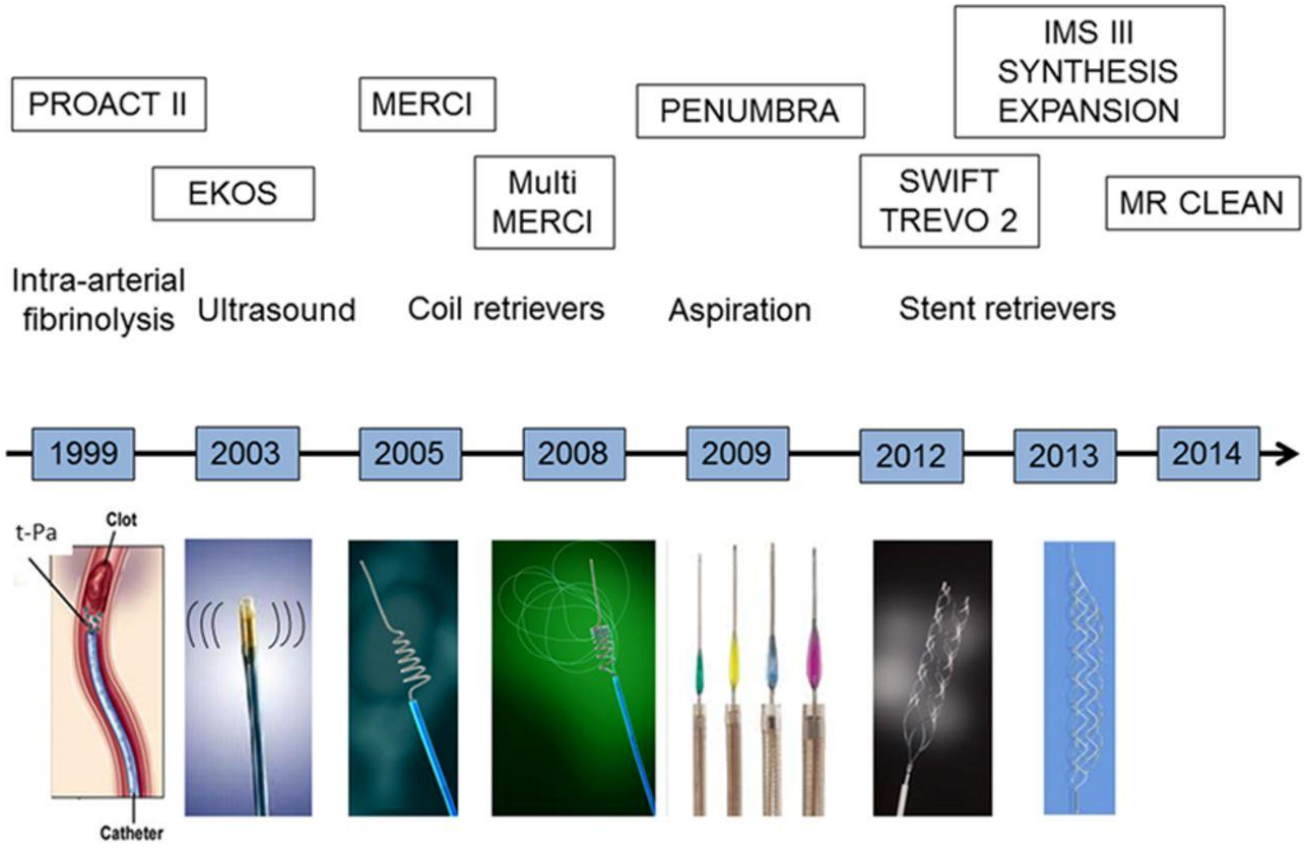
Stroke 2011;42:1775-1777




0
1
2
3
4
5
6 cm



Evidens for Trombektomi



Pierot et al. Stroke. 2015

Evidens i 2013

3 RCT i 2013 publiceret i NEJM som sammenligner trombolyse med add on af trombektomi

A Trial of Imaging Selection and Endovascular Treatment for Ischemic Stroke

Chelsea S. Kidwell, M.D., Reza Jahan, M.D., Jeffrey Gornbein, Dr.P.H., Jeffry R. Alger, Ph.D., Val Nenov, Ph.D., Zahra Ajani, M.D., Lei Feng, M.D., Ph.D., Brett C. Meyer, M.D., Scott Olson, M.D., Lee H. Schwamm, M.D., Albert J. Yoo, M.D., Randolph S. Marshall, M.D., et al., for the MR RESCUE Investigators*

Endovascular Treatment for Acute Ischemic Stroke

Alfo[illegible] Luca Va[illegible] Psy[illegible]zio, Ph.D., Roberto Sterzi, M.D., and Edoardo Boccardi, M.D. for [illegible] Investigators

No difference

Endovascular Therapy after Intravenous t-PA versus t-PA Alone for Stroke

Joseph P. Broderick, M.D., Yuko Y. Palesch, Ph.D., Andrew M. Demchuk, M.D., Sharon D. Yeatts, Ph.D., Pooja Khatri, M.D., Michael D. Hill, M.D., Edward C. Jauch, M.D., Tudor G. Jovin, M.D., Bernard Yan, M.D., Frank L. Silver, M.D., Rüdiger von Kummer, M.D., Carlos A. Molina, M.D., et al., for the Interventional Management of Stroke (IMS) III Investigators

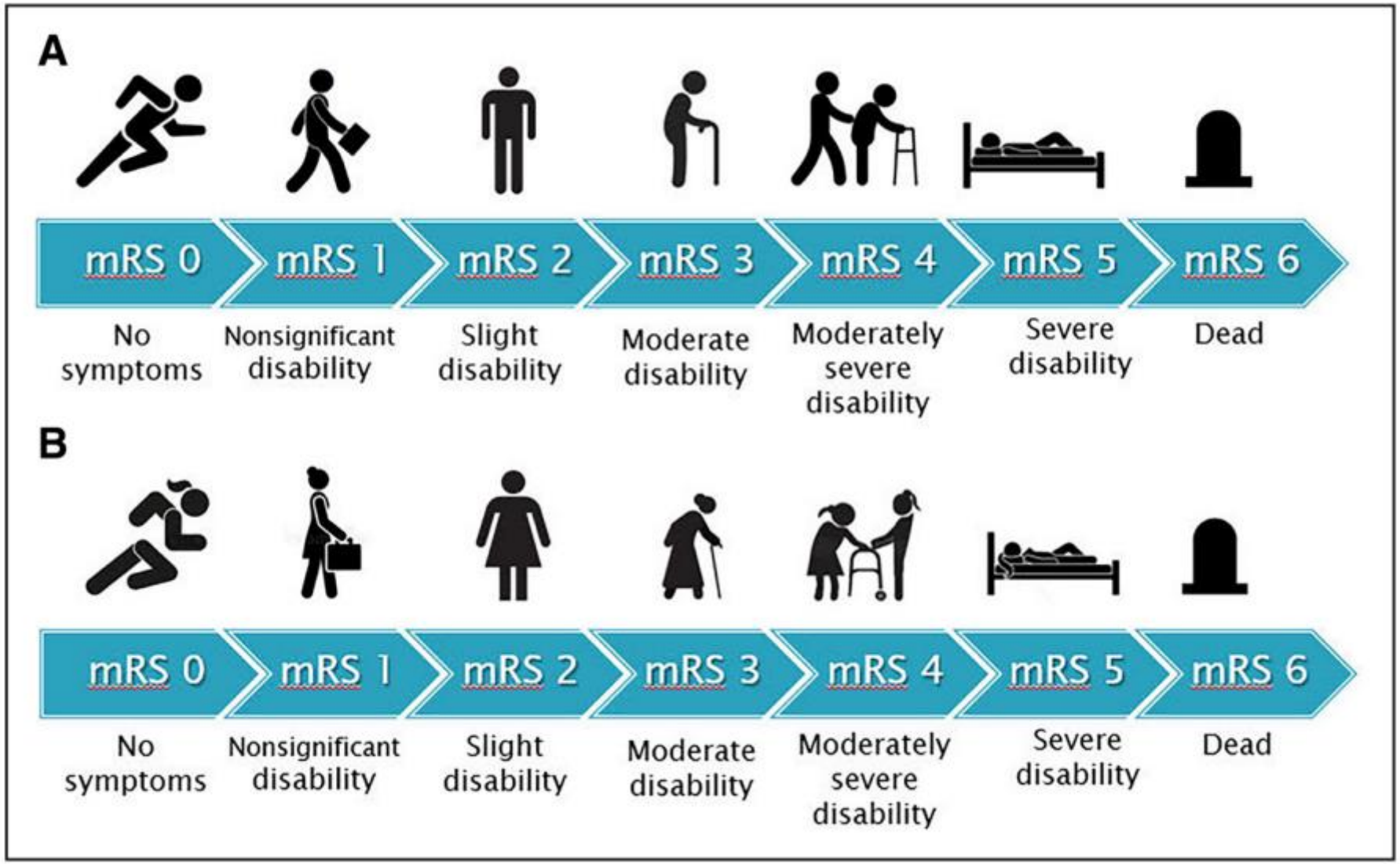
Januar 2015..

The NEW ENGLAND JOURNAL of MEDICINE

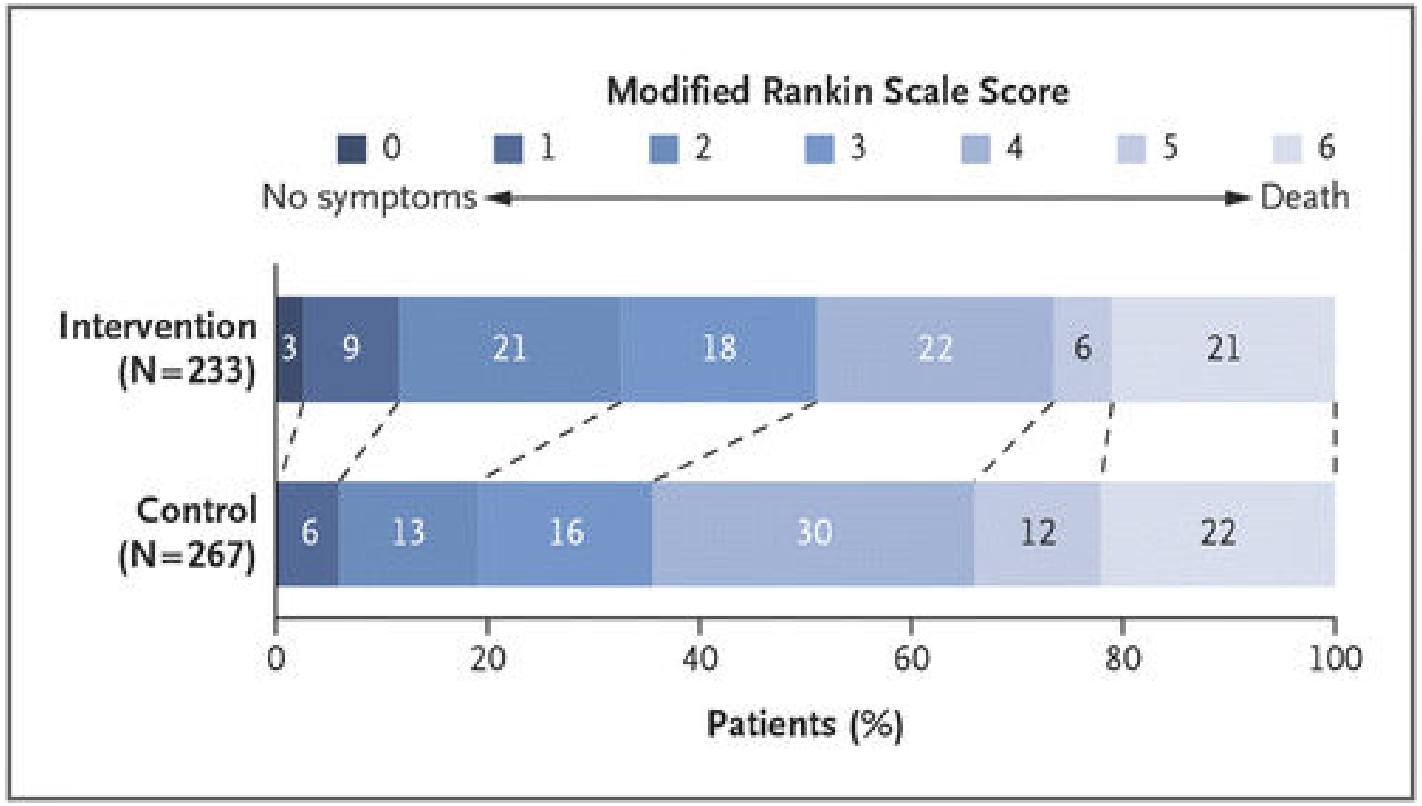
ORIGINAL ARTICLE

A Randomized Trial of Intraarterial Treatment for Acute Ischemic Stroke

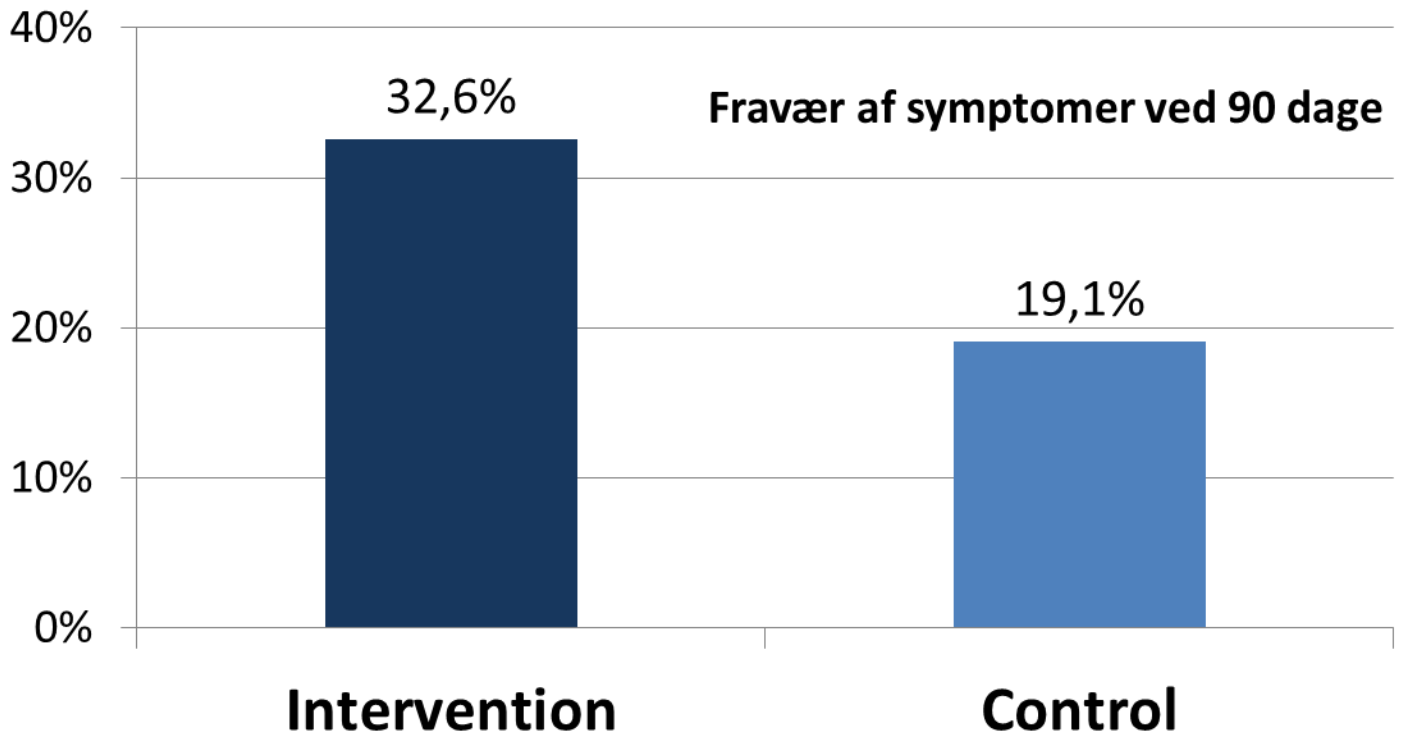
O.A. Berkhemer, P.S.S. Fransen, D. Beumer, L.A. van den Berg, H.F. Lingsma, A.J. Yoo, W.J. Schonewille, J.A. Vos, P.J. Nederkoorn, M.J.H. Wermer, M.A.A. van Walderveen, J. Staals, J. Hofmeijer, J.A. van Oostayen, G.J. Lycklama à Nijeholt, J. Boiten, P.A. Brouwer, B.J. Emmer, S.F. de Bruijn, L.C. van Dijk, L.J. Kappelle, R.H. Lo, E.J. van Dijk, J. de Vries, P.L.M. de Kort, W.J.J. van Rooij, J.S.P. van den Berg, B.A.A.M. van Hasselt, L.A.M. Aerden, R.J. Dallinga, M.C. Visser, J.C.J. Bot, P.C. Vroomen, O. Eshghi, T.H.C.M.L. Schreuder, R.J.J. Heijboer, K. Keizer, A.V. Tielbeek, H.M. den Hertog, D.G. Gerrits, R.M. van den Berg-Vos, G.B. Karas, E.W. Steyerberg, H.Z. Flach, H.A. Marquering, M.E.S. Sprengers, S.F.M. Jenniskens, L.F.M. Beenen, R. van den Berg, P.J. Koudstaal, W.H. van Zwam, Y.B.W.E.M. Roos, A. van der Lugt, R.J. van Oostenbrugge, C.B.L.M. Majoie, and D.W.J. Dippel, for the MR CLEAN Investigators*

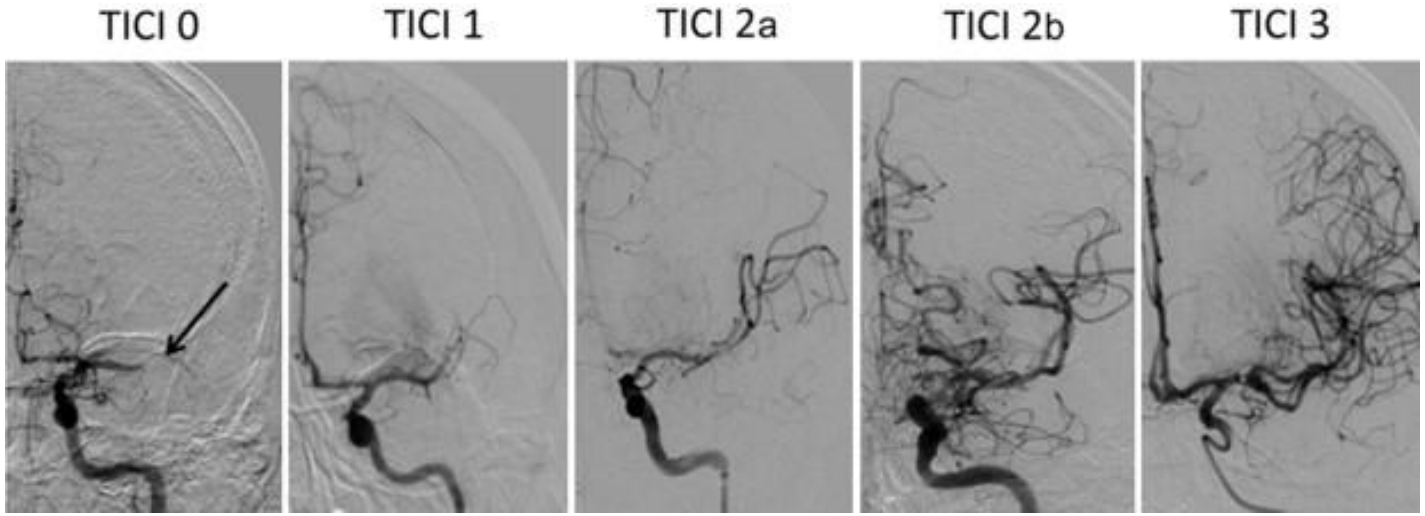

A
mRS 0
mRS 1
mRS 2
mRS 3
mRS 4
mRS 5
mRS 6
No symptoms
Nonsignificant disability
Slight disability
Moderate disability
Moderately severe disability
Severe disability
Dead
B
mRS 0
mRS 1
mRS 2
mRS 3
mRS 4
mRS 5
mRS 6
No symptoms
Nonsignificant disability
Slight disability
Moderate disability
Moderately severe disability
Severe disability
Dead

MR CLEAN resultater



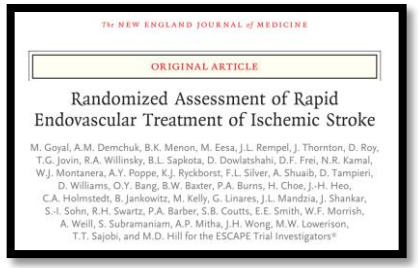
MR CLEAN resultater





TICI SCORE	
Grade O	No perfusion.
Grade 1	Perfusion past the initial obstruction, but limited distal branch filling with little or slow distal perfusion.
Grade 2a	Perfusion of less than 1/2 of the vascular distribution of the occluded artery (e.g., filling and perfusion through 1 M2 division).
Grade 2b	Perfusion of 1/2 or greater of the vascular distribution of the occluded artery (e.g., filling and perfusion through 2 or more M2 divisions)
Grade 3	Full perfusion with filling of all distal branches.

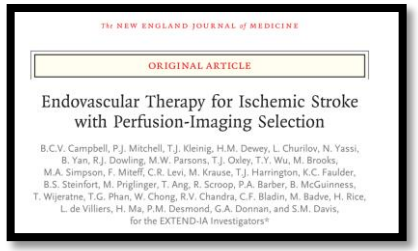
Evidence 2015


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Randomized Assessment of Rapid Endovascular Treatment of Ischemic Stroke

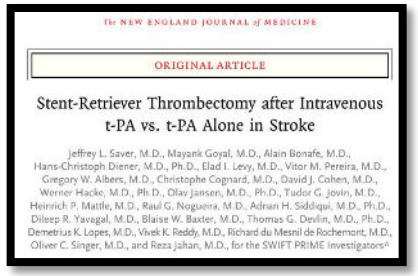
M. Goyal, A.M. Demchuk, B.K. Menon, M. Eesa, J.L. Rempel, J. Thornton, D. Roy, T.G. Jovin, R.A. Willinsky, B.L. Sapkota, D. Dowlatshahi, D.F. Frei, N.R. Kamal, W.J. Montanera, A.Y. Poppe, K.J. Ryckborst, F.L. Silver, A. Shuaib, D. Tampieri, D. Williams, O.Y. Bang, B.W. Baxter, P.A. Burns, H. Choe, J.-H. Heo, C.A. Holmstedt, B. Jankowitz, M. Kelly, G. Linares, J.L. Mandzia, J. Shankar, S.-I. Sohn, R.H. Swartz, P.A. Barber, S.B. Coutts, E.E. Smith, W.F. Morrish, A. Weill, S. Subramaniam, A.P. Mitha, J.H. Wong, M.W. Lowerison, T.T. Sajobi, and M.D. Hill for the ESCAPE Trial Investigators*


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Endovascular Therapy for Ischemic Stroke with Perfusion-Imaging Selection

B.C.V. Campbell, P.J. Mitchell, T.J. Kleinig, H.M. Dewey, L. Churilov, N. Yassi, B. Yan, R.J. Dowling, M.W. Parsons, T.J. Oxley, T.Y. Wu, M. Brooks, M.A. Simpson, F. Miteff, C.R. Levi, M. Krause, T.J. Harrington, K.C. Faulder, B.S. Steinfort, M. Priglinger, T. Ang, R. Scroop, P.A. Barber, B. McGuinness, 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*


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Stent-Retriever Thrombectomy after Intravenous t-PA vs. t-PA Alone in Stroke

Jeffrey L. Saver, M.D., Mayank Goyal, M.D., Alain Bonafe, M.D., Hans-Christoph Diener, M.D., Ph.D., Elad I. Levy, M.D., Vitor M. Pereira, M.D., Gregory W. Albers, M.D., Christophe Cognard, M.D., David J. Cohen, M.D., Werner Hacke, M.D., Ph.D., Olav Jansen, M.D., Ph.D., Tudor G. Jovin, M.D., Heinrich P. Mattle, M.D., Raul G. Nogueira, M.D., Adnan H. Siddiqui, M.D., Ph.D., Dileep R. Yavagal, M.D., Blaise W. Baxter, M.D., Thomas G. Devlin, M.D., Ph.D., 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*


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Thrombectomy within 8 Hours after Symptom Onset in Ischemic Stroke

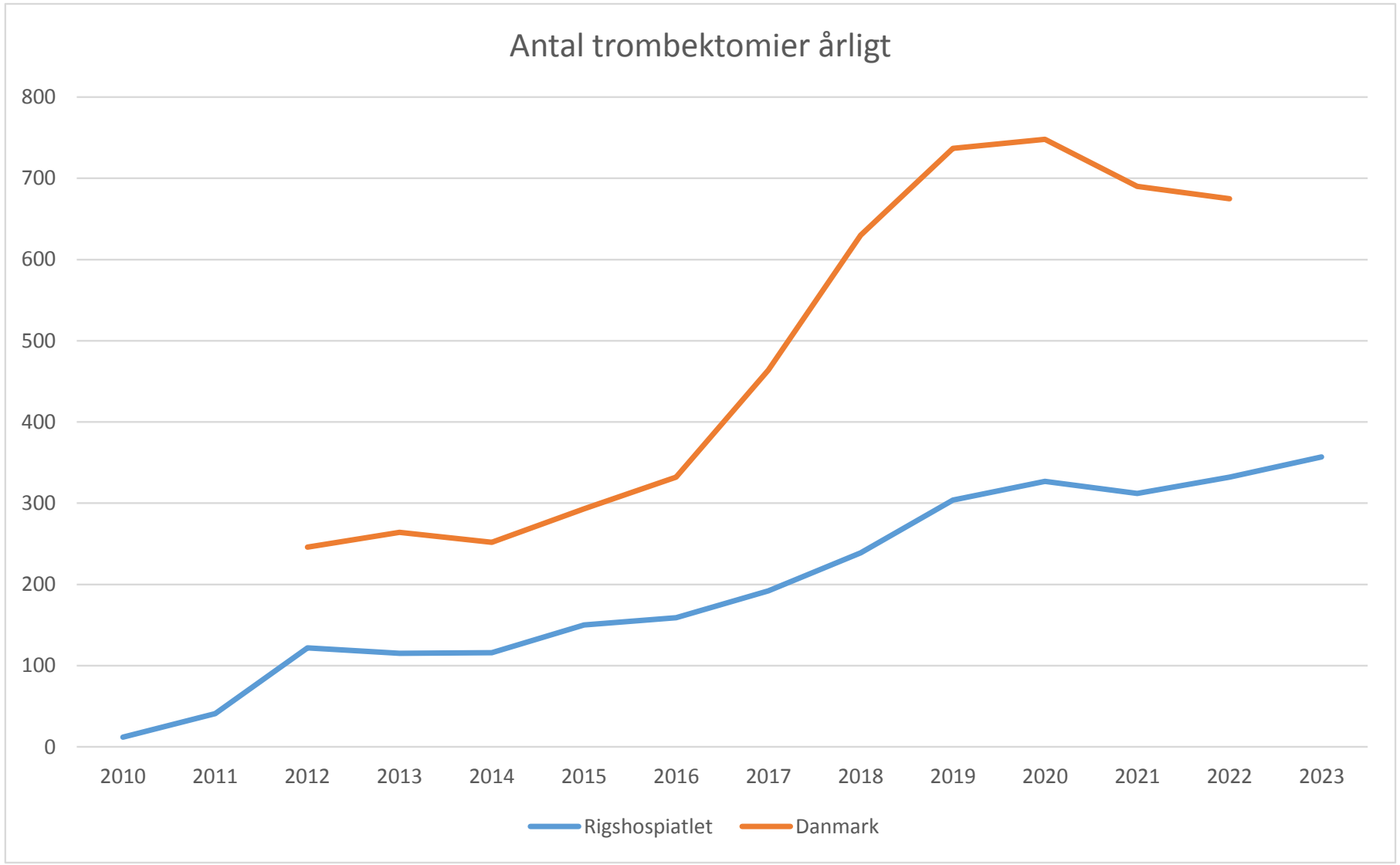
T.G. Jovin, A. Chamorro, E. Cobo, M.A. de Miquel, C.A. Molina, A. Rovira, L. San Román, J. Serena, S. Abilleira, M. Ribó, M. Millán, X. Urra, P. Cardona, E. López-Cancio, A. Tomasello, C. Castaño, J. Blasco, L. Aja, L. Dorado, H. Quesada, M. Rubiera, M. Hernández-Pérez, M. Goyal, A.M. Demchuk, R. von Kummer, M. Gallofré, and A. Dávalos, for the REVASCAT Trial Investigators*

5 Total Major Thrombectomy Trials Published in NEJM in 2015

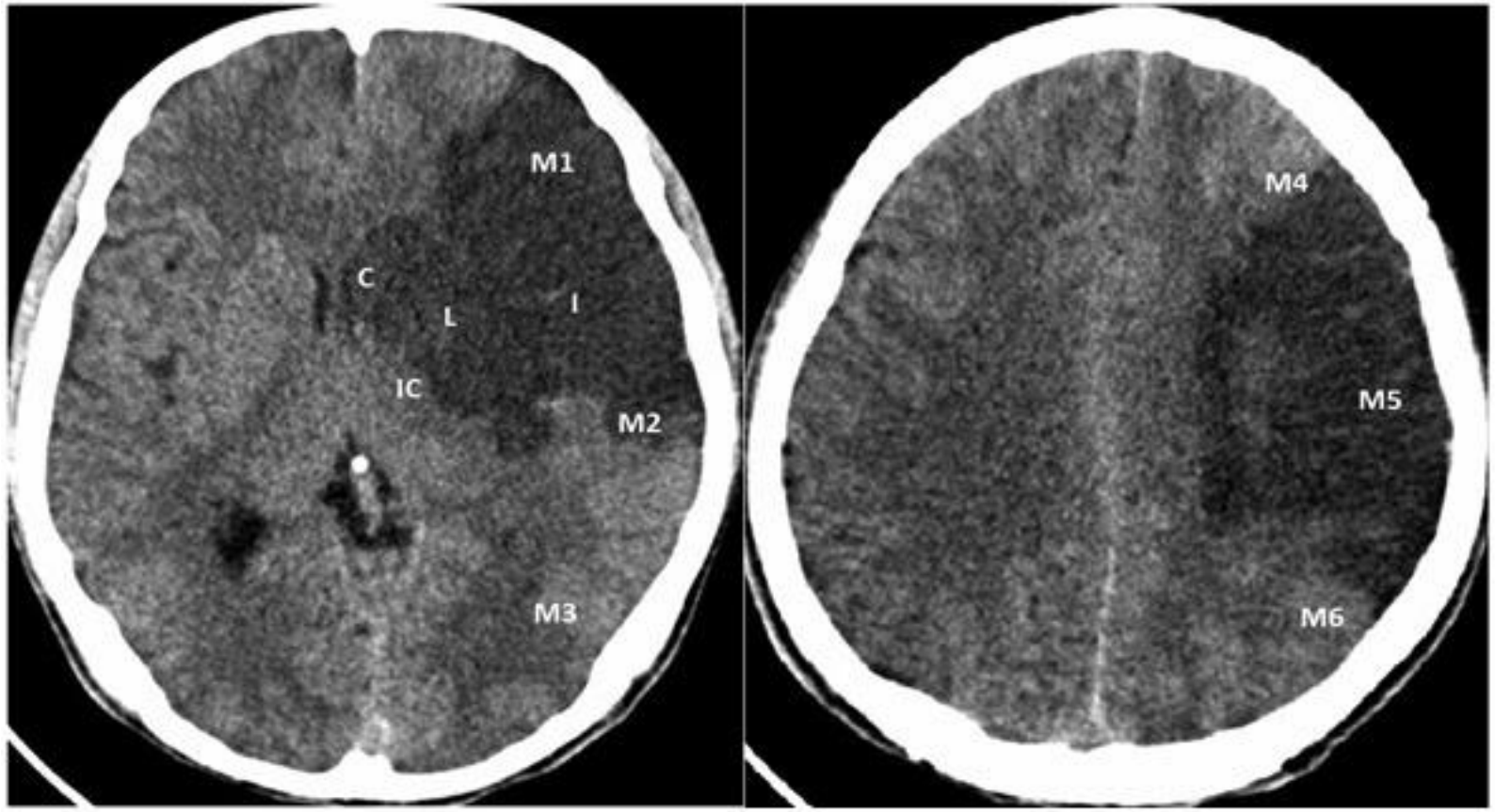
	TICI 2b/3 rate	mRS 0-2 at 90 days	Death rate
MR CLEAN	59%	32.6% v. 19.1%	21% v 22%
ESCAPE	72%	53% v. 29%	10% v. 19%
EXTEND-IA	86%	71% v. 40%	9% v. 20%
SWIFT PRIME	88%	60% v. 36%	9% v. 12%
REVASCAT	66%	44% v 28%	18% v 16%

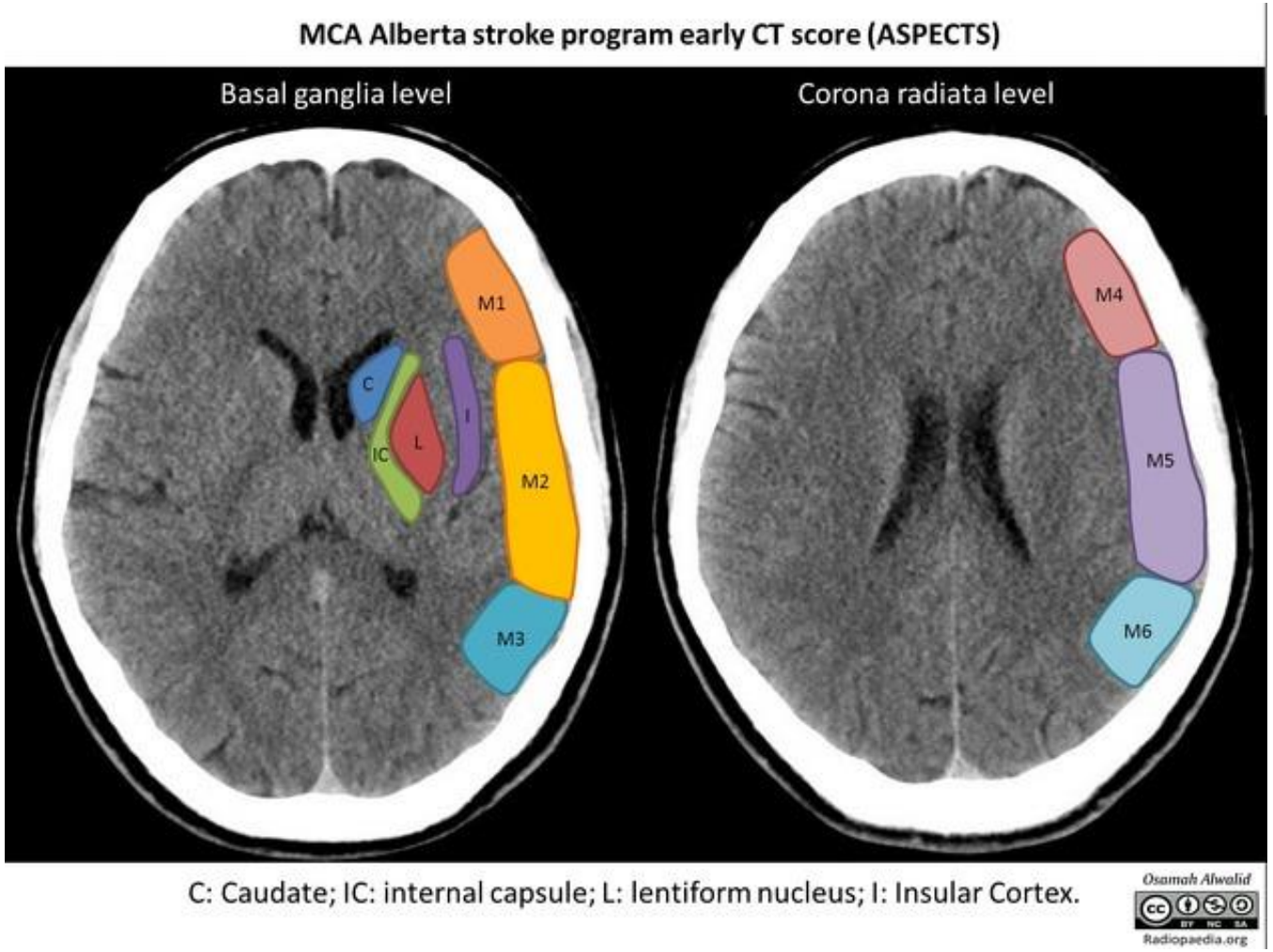
Study	Imaging (beyond ASPECTS and CTA)	Maximal time allowed to treatment in hours	% mTICI 2b/3	Effect size for good outcome (mRS 0-2 IAT vs control)	NNT for mRS 0-2
MR CLEAN	None	6	58.7	13 % (32 vs 19 %)	7
EXTEND-IA	RAPID CTP	6	86	31 % (71 vs 40 %)	3.2
ESCAPE	CTA collaterals	12	72	23.7 % (53 vs 29.3 %)	4.2
SWIFT PRIME	RAPID CTP	6	88	25 % (60 vs 35 %)	4
REVASCAT	None	8	66	15.5 % (43.7 vs 28.2 %)	6.4

- Man skal behandle 4-7 patienter for at redde 1 til selvhjulpenhed


Antal trombektomier årligt
800
700
600
500
400
300
200
100
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Rigshospiatlet
Danmark

Trombektomi ved store etablerede infarkter





Barber PA, Demchuk AM, Zhang J et-al. Validity and reliability of a quantitative computed tomography score in predicting outcome of hyperacute stroke before thrombolytic therapy. ASPECTS Study Group. Alberta Stroke Programme Early CT Score. Lancet. 2000;355 (9216): 1670-4.

Tre RCT om etablerede store infarkter 2022/23

- Aspect score 3-5 or infarct core-volume of 70–100 mL

- Japansk studie RESCUE-Japan LIMIT 352 pat
- Kinesisk studie ANGEL-ASPECT 456 pat
- Europæisk stuide TENSION 253 pat

ORIGINAL ARTICLE

Endovascular Therapy for Acute Stroke with a Large Ischemic Region

Shinichi Yoshimura, M.D., Ph.D., Nobuyuki Sakai, M.D., Ph.D., Hiroshi Yamagami, M.D., Ph.D., Kazutaka Uchida, M.D., Ph.D., Mikiya Beppu, M.D., Ph.D., Kazunori Toyoda, M.D., Ph.D., Yuji Matsumaru, M.D., Ph.D., Yasushi Matsumoto, M.D., Kazumi Kimura, M.D., Ph.D., Masataka Takeuchi, M.D., Ph.D., Yukako Yazawa, M.D., Ph.D., Naoto Kimura, M.D., Ph.D., et al.

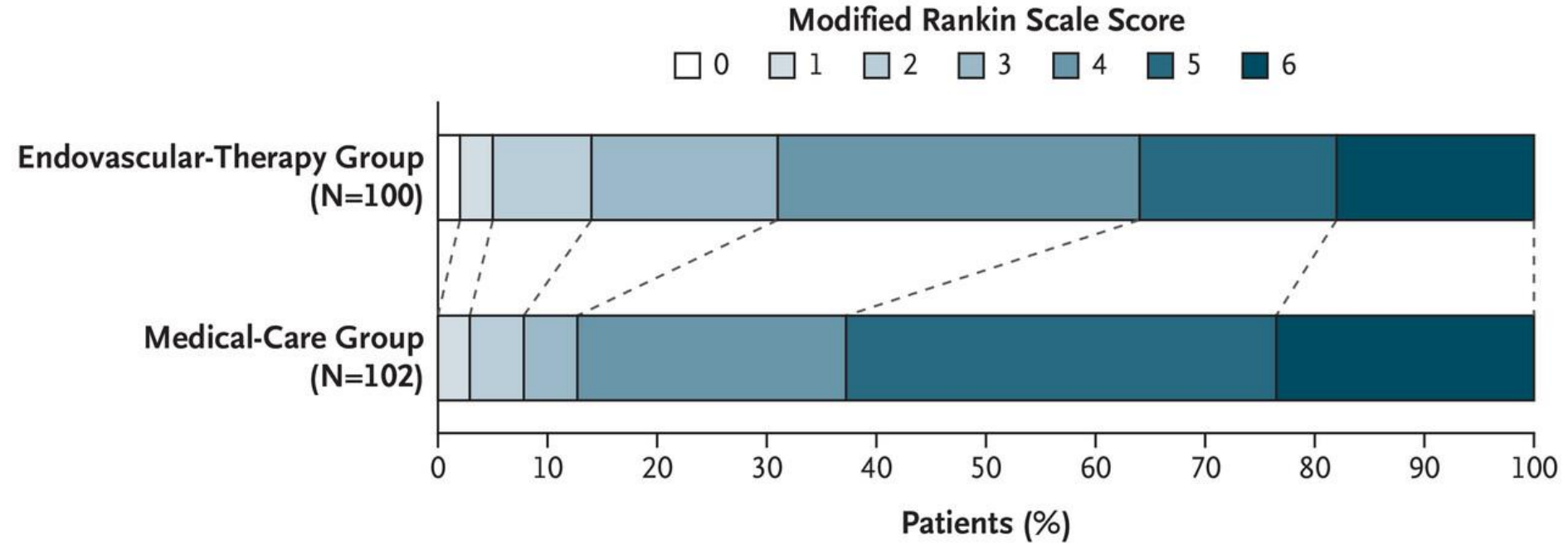
Article Figures/Media Metrics

25 References 158 Citing Articles Letters 3 Comments

April 7, 2022
N Engl J Med 2022; 386:1303-1313
DOI: 10.1056/NEJMoa2118191
Chinese Translation 中文翻译

CONCLUSIONS

Patients with large cerebral infarctions had better functional outcomes but more overall intracranial hemorrhages with endovascular therapy added to medical therapy than with medical therapy alone.



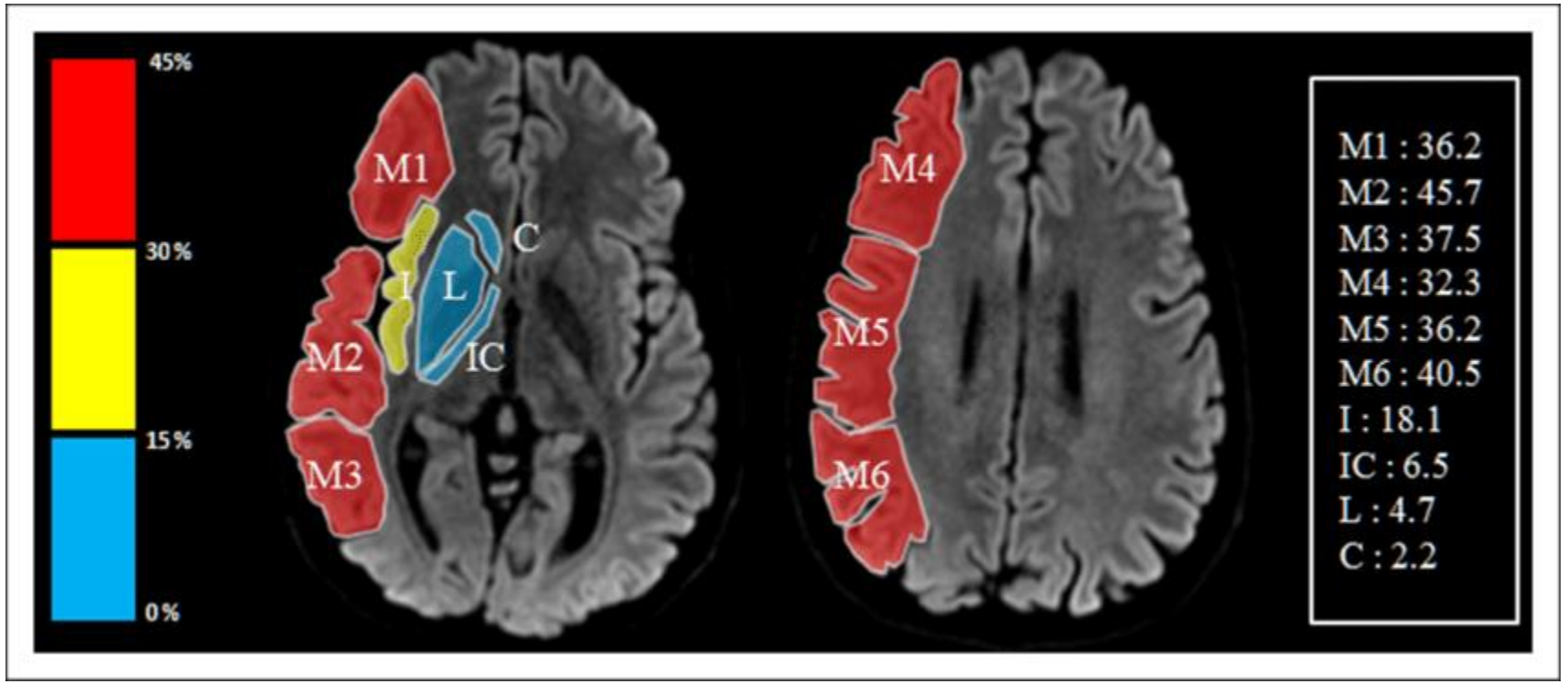
Modified Rankin Scale Score at 90 Days	0	1	2	3	4	5	6
Endovascular-therapy group — no. (%)	2 (2.0)	3 (3.0)	9 (9.0)	17 (17.0)	33 (33.0)	18 (18.0)	18 (18.0)
Medical-care group — no. (%)	0	3 (2.9)	5 (4.9)	5 (4.9)	25 (24.5)	40 (39.2)	24 (23.5)

Table 2. Trial Outcomes.

Outcome	Endovascular-Therapy Group (N=100)	Medical-Care Group (N=102)	Treatment Effect (95% CI)*	P Value
	number (percent)			
Primary outcome				
Modified Rankin scale score of 0 to 3 at 90 days	31 (31.0)	13 (12.7)	2.43 (1.35–4.37)	0.002
Secondary outcomes				
Modified Rankin scale score of 0 to 2 at 90 days	14 (14.0)	8 (7.8)	1.79 (0.78–4.07)	
Modified Rankin scale score of 0 or 1 at 90 days	5 (5.0)	3 (2.9)	1.70 (0.42–6.93)	
Ordinal shift across the range of modified Rankin scale scores toward a better outcome	NA	NA	2.42 (1.46–4.01)	
Improvement of ≥8 points on the NIHSS at 48 hr	31 (31.0)	9 (8.8)	3.51 (1.76–7.00)	
Safety outcomes				
Symptomatic intracranial hemorrhage within 48 hr	9 (9.0)	5 (4.9)	1.84 (0.64–5.29)	0.25
Any intracranial hemorrhage within 48 hr	58 (58.0)	32 (31.4)	1.85 (1.33–2.58)	<0.001
Death within 90 days	18 (18.0)	24 (23.5)	0.77 (0.44–1.32)	0.33
Recurrence of cerebral infarction within 90 days	5 (5.0)	7 (6.9)	0.73 (0.24–2.22)	0.58
Decompressive craniectomy within 7 days	10 (10.0)	14 (13.7)	0.73 (0.34–1.56)	0.41

* Treatment effects are reported as relative risks with 95% confidence intervals for all outcomes, except for the ordinal shift across the range of modified Rankin scale scores toward a better outcome, for which the treatment effect is reported as a common odds ratio with the 95% confidence interval. The widths of confidence intervals for secondary outcomes were not adjusted for multiple comparisons, and no definite conclusions can be drawn from these data.

Problem MRI ASPECT scoring

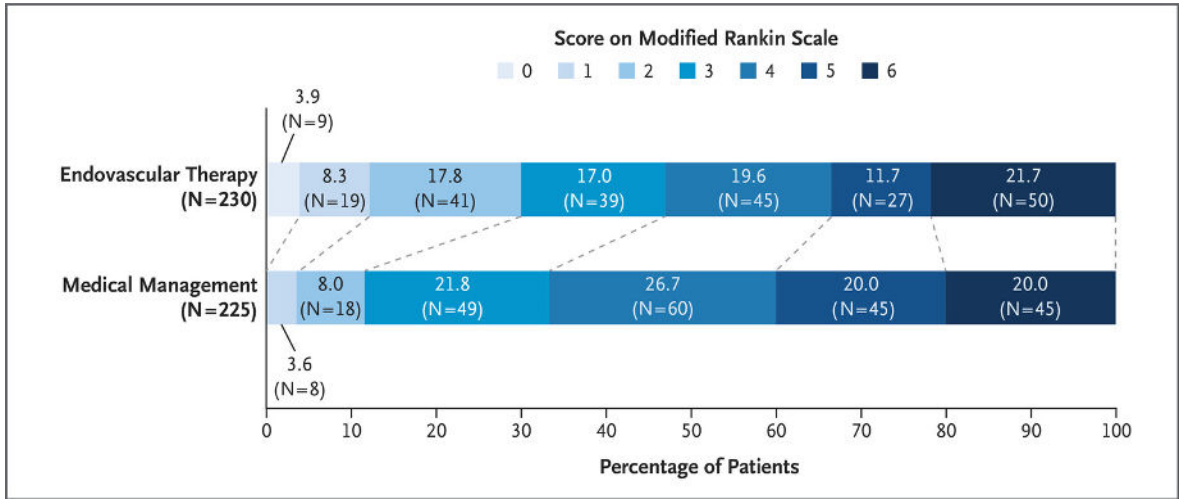


ORIGINAL ARTICLE

Trial of Endovascular Therapy for Acute Ischemic Stroke with Large Infarct

Xiaochuan Huo, M.D., Ph.D., Gaoting Ma, M.D., Ph.D., Xu Tong, M.D., Ph.D., Xuelei Zhang, M.D., Ph.D., Yuesong Pan, Ph.D., Thanh N. Nguyen, M.D., Guangxiong Yuan, M.D., Hongxing Han, Ph.D., Wenhuo Chen, Ph.D., Ming Wei, M.D., Jiangang Zhang, M.D., Zhiming Zhou, M.D., et al., for the ANGEL-ASPECT Investigators*

April 6, 2023
N Engl J Med 2023; 388:1272-1283
DOI: 10.1056/NEJMoa2213379
Chinese Translation 中文翻译

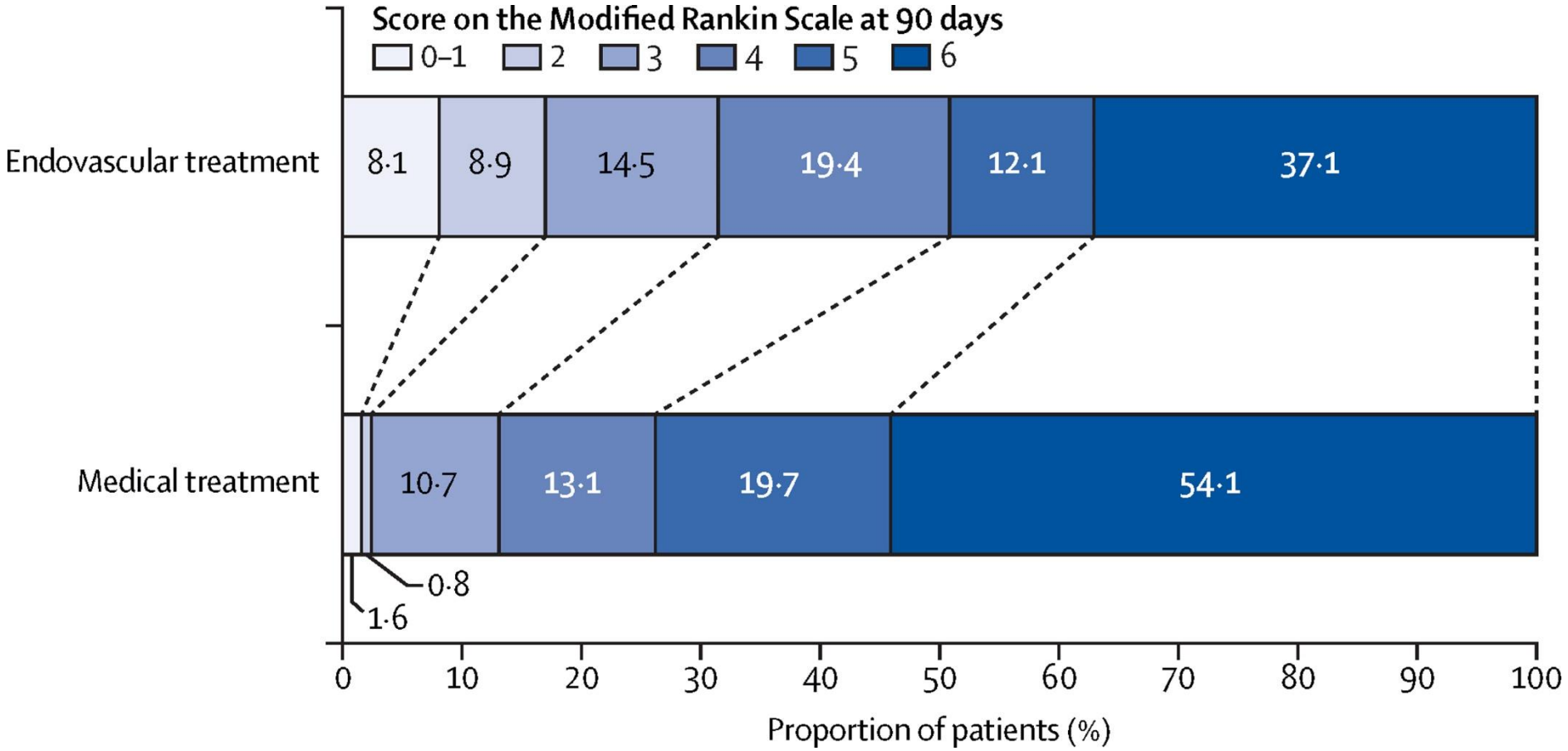


TENSION

TENSION (Efficacy and safety of ThrombEctomy iN Stroke with extended leSION and extended time window: a randomized, controlled trial) is a randomized, controlled, prospective, open-label, blinded endpoint (PROBE) trial of thrombectomy in stroke patients with extended ischemic stroke lesions and patients presenting in a late time window. These patients are currently excluded from available effective treatment approaches.

11. Oktober 2023

In the primary outcome analysis including all 253 randomised patients, a shift in the distribution of scores on the mRS at 90 days was present towards better outcomes in favor of endovascular thrombectomy with medical treatment over medical treatment alone (adjusted common odds ratio, 2.58).
Thrombectomy was associated with an 18% absolute increase of patients able to walk unaided, and 11% reduction in mortality.


Score on the Modified Rankin Scale at 90 days
0–1
2
3
4
5
6
Endovascular treatment
8·1
8·9
14·5
19·4
12·1
37·1
Medical treatment
1·6
0·8
10·7
13·1
19·7
54·1
0
10
20
30
40
50
60
70
80
90
100
Proportion of patients (%)

FULL TEXT ARTICLE

Mechanical Thrombectomy in Patients Presenting with NIHSS Score <6: A Safety and Efficacy Analysis

Rawad Abbas MD, Nabeel A. Herial MD, MPH, Kareem El Naamani MD, Ahmad Sweid MD, Joshua H. Weinberg MD, Karl John Habashy BS, Stavropoula Tjoumakaris MD, Michael R. Gooch MD, Robert H. Rosenwasser MD, MBA and Pascal Jabbour MD

Journal of Stroke and Cerebrovascular Diseases, 2022-03-01, Volume 31, Issue 3, Article 106282, Copyright © 2021 Elsevier Inc.

	Mechanical thrombectomy (n=41)	Medical management (n=42)	*P*-value
Infarct Location			
Left Right Bilateral	15 (36.6%) 26 (63.4%) 0 (0%)	21 (50%) 19 (45.2%) 2 (4.8%)	0.13
Vessel Occlusion			
ICA M1/A1	**15 (36.6%) 26 (63.4%)**	**4 (9.5%) 38 (90.5%)**	**0.003**
tPA administration	14 (34.1%)	20 (47.6%)	0.21
sICH	2 (4.9%)	1 (2.6%)	0.57
Length of stay (days)	**8.8 ± 1.59***	**5.33 ± 0.58***	**0.024**
Infarct size (cm^2)	**9.36 ± 1.84***	**14.6 ± 2.39***	**0.084**
Mortality	**1 (2.4%)**	**6 (14.3%)**	**0.052**
Readmission rate	4 (9.8%)	6 (14.3%)	0.53
No change or lower NIHSS score on discharge	26 (65%)	25 (65.8%)	0.94
90-day mRS 0-2	26 (72.2%)	13 (61.9%)	0.42

NIHSS SCORE	STROKE SEVERITY	IMPACTED BRAIN DENSITY
0	No Stroke	
0 – 4	Minor Stroke	
5 – 15	Moderate Stroke	
16– 20	Moderate to Severe Stroke	
21 - 42	Severe Stroke	

Figure 1. The National Institutes of Health Stroke Scale or NIH Stroke Scale (NIHSS) is a tool used by healthcare providers to objectively quantify and succinctly communicate the impairment caused by a stroke.

Efficacy and Safety Outcomes	OR / β	95 % CI	*P* -value
Clinical improvement (NIHSS)	0.91	0.32 – 2.57	0.85
Functional improvement (90-day mRS, 0-2)	0.33	0.07 – 1.53	0.15
Mortality	0.05	0.004 – 0.77	**0.032**
Final infarct size †	β = -0.26	-12.96 – -0.19	**0.044**
Length of stay †	β = 0.23	-0.13 – 6.53	0.059

DISTAL Study

EnDovascular therapy plus best medical treatment (BMT) versus BMT alone for MedIum VeSsel Occlusion sTroke- a prAgmatic, international, multicentre, randomized triaL (DISTAL)

Principal Investigators
Prof. Marios-Nikos Psychogios, Head of diagnost. and interv. Neuroradiology, and Prof. Urs Fischer, Head of Neurology, USB

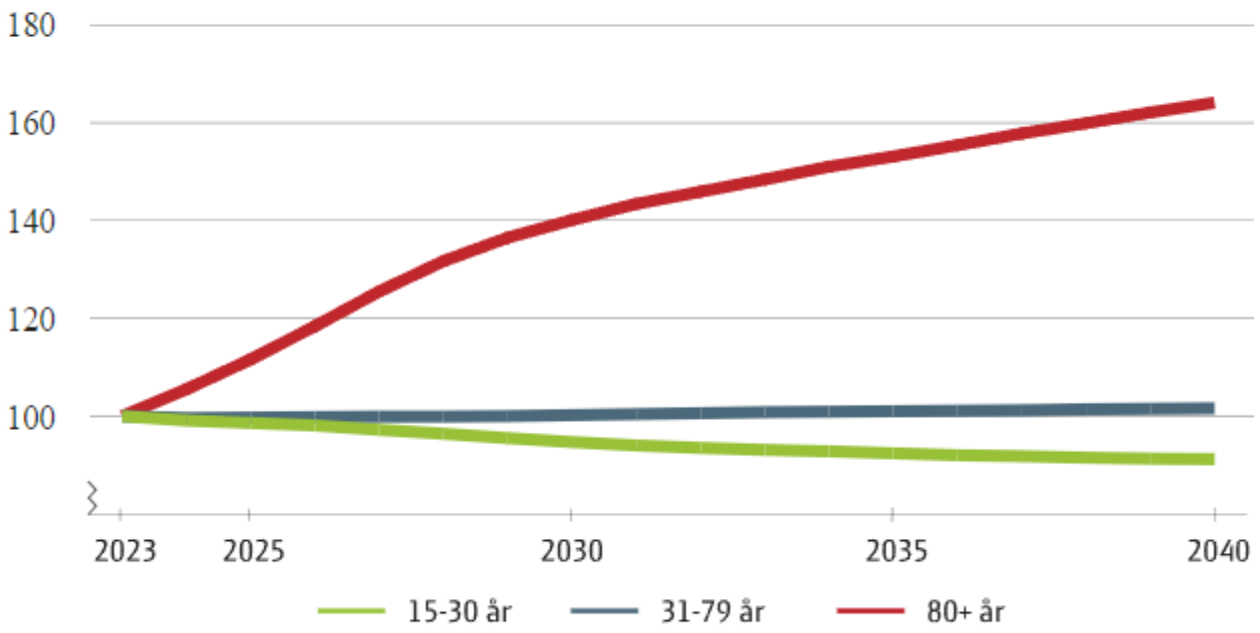
Study design
International, multicentre, pragmatic, randomised clinical trial

Study centres
At least 20 in Switzerland, Germany, Belgium, Portugal, Spain, Finland and Israel

Planned patients
526

Project duration
2021-2026

Indekseret udvikling i demografien 2023-2040, prognose
1. kvartal 2023=100



Kilde: Egne beregninger på baggrund af data fra Danmarks Statistik

Brugerguide - Slet før anvendelse

Brug tekst typografier

Brug **TAB** for at gå frem i tekst-niveauer. Klik **ENTER**, derefter **TAB** for at skifte fra et niveau til et næste

For at gå tilbage i tekst-niveauer, brug **SHIFT+TAB**

Alternativt kan **Forøg** og **Formindsk** listeniveau bruges

Ændre slide layouts

1. Klik på pilen ved siden af **Layout** for at få vist en dropdown menu af mulige slides layout

2. Vælg **Layout** for at ændre dit nuværende layout til et alternativt

Nulstil slide

1. Klik på fanen **Hjem**

2. Vælg **Nulstil** for at nulstille placering, størrelse og formatering af pladsholdere til layoutets oprindelige design

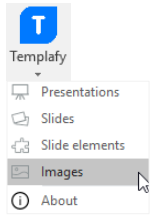
Indsæt billede

På slides med billedpladsholder eller hvilken som helst anden pladsholder, klik på pladsholderens kant. TIP: Hold Shift nede og klik på pladsholderen

A. Indsæt firma billede

1. Klik på den blå **Templafy**-knap

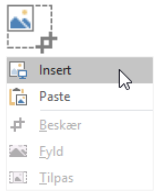
2. I drop ned menuen, vælg **Images**, eller klik på **Images**-knappen i Templafy vinduet i højre side af skærmen



B. Browse efter andre billeder

1. Klik på **Image Tools-**knappen som findes under firma fanen

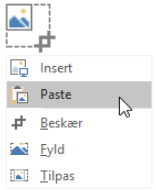
2. Klik på **Indsæt** for at browse efter et billede



C. Indsæt et kopieret billede

1. Klik på **Image Tools-**knappen som findes under firma fanen

2. Klik på **Paste** for at indsætte det kopierede billede



Beskær billede

1. Klik **Beskær** for at ændre billedets fokus/størrelse

2. Ønsker du at skalere billedet, så hold **SHIFT**-knappen nede, mens du trækker i billedets hjørner

Tips: Hvis du sletter billedet og indsætter et nyt, kan billedet lægge sig foran tekst og grafik. Hvis dette sker, højreklik på billedet og vælg **Placer bagest**

For at justere sidenummerering, dato og sidefod

Gør dette som det sidste i din præsentation, så det slår igennem på alle slides

1. Klik på fanen **Indsæt**

2. Klik **Sidehoved og Sidefod** (Tekst kommer fra Templafy)

Vælg **Anvend på alle** eller **Anvend** hvis det kun skal være på et enkelt slide

Hjælpelinjer

For at se hjælpelinjer

1. Klik på fanen **Vis** og sæt hak ved **Hjælpelinjer**

Tips: Alt + F9 for hurtig visning af hjælpelinjer