Acute Stroke Management in the Emergency Department

Jason T Nomura MD FACEP FAHA FACP
Dept of Emergency Medicine
Stroke Program
ChristianaCare

Disclosures

Philips Healthcare: Consulting

Bristol Myers Squibb: Research

Stroke in the ED

A leading cause of death and disability

Over 795,000 acute strokes per year

610,000 are 1st time strokes

Majority are ischemic

Time is Brain

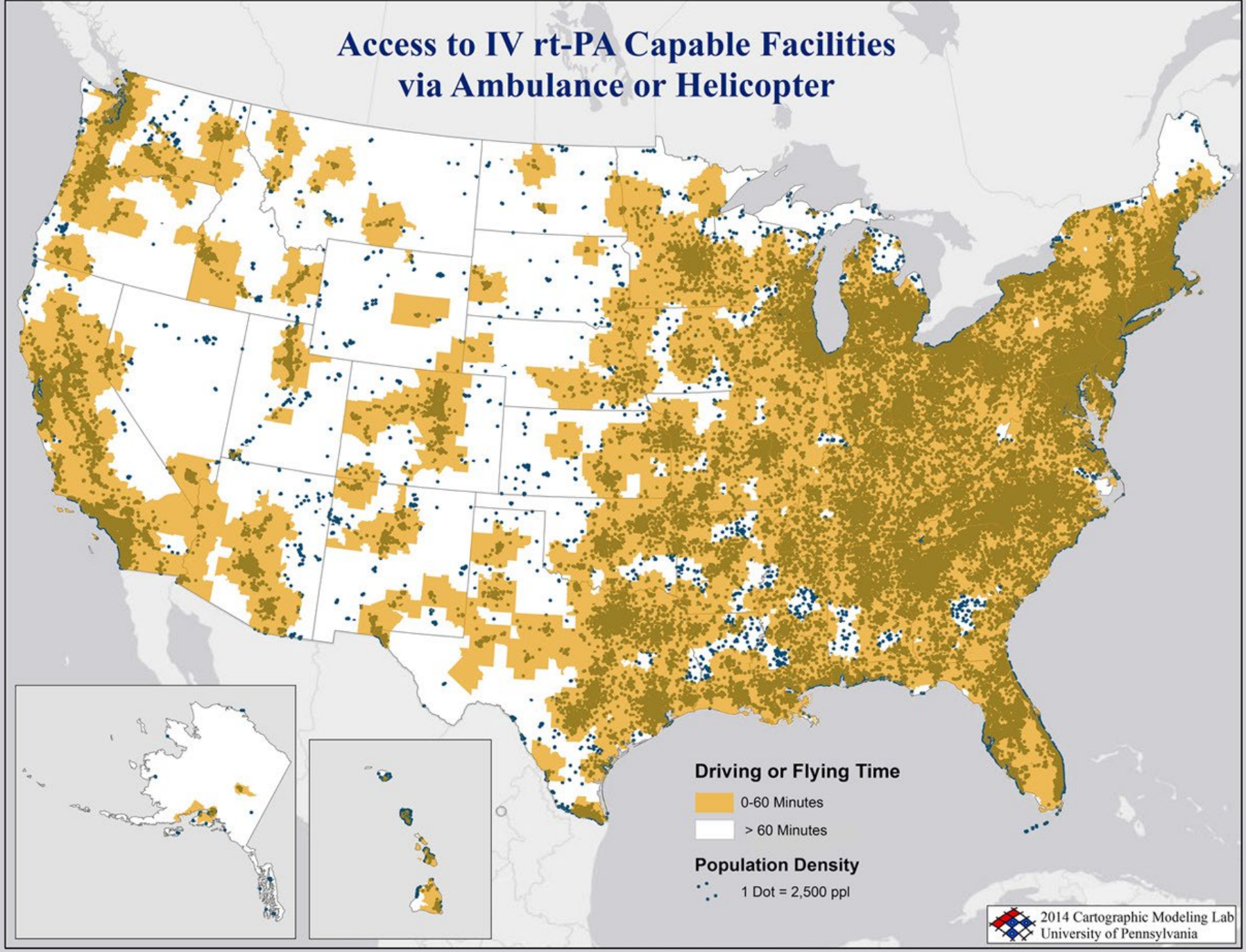

WHEN STROKE STRIKES, ACT F.A.S.T.
FACE
HAS IT FALLEN ON ONE SIDE?
ARMS
CAN THEY RAISE THEM?
SPEECH
IS IT SLURRED?
999
TIME
IF YOU NOTICE ANY OF THESE SIGNS MAKE THE CALL
DIAL 999

SPOT A STROKE

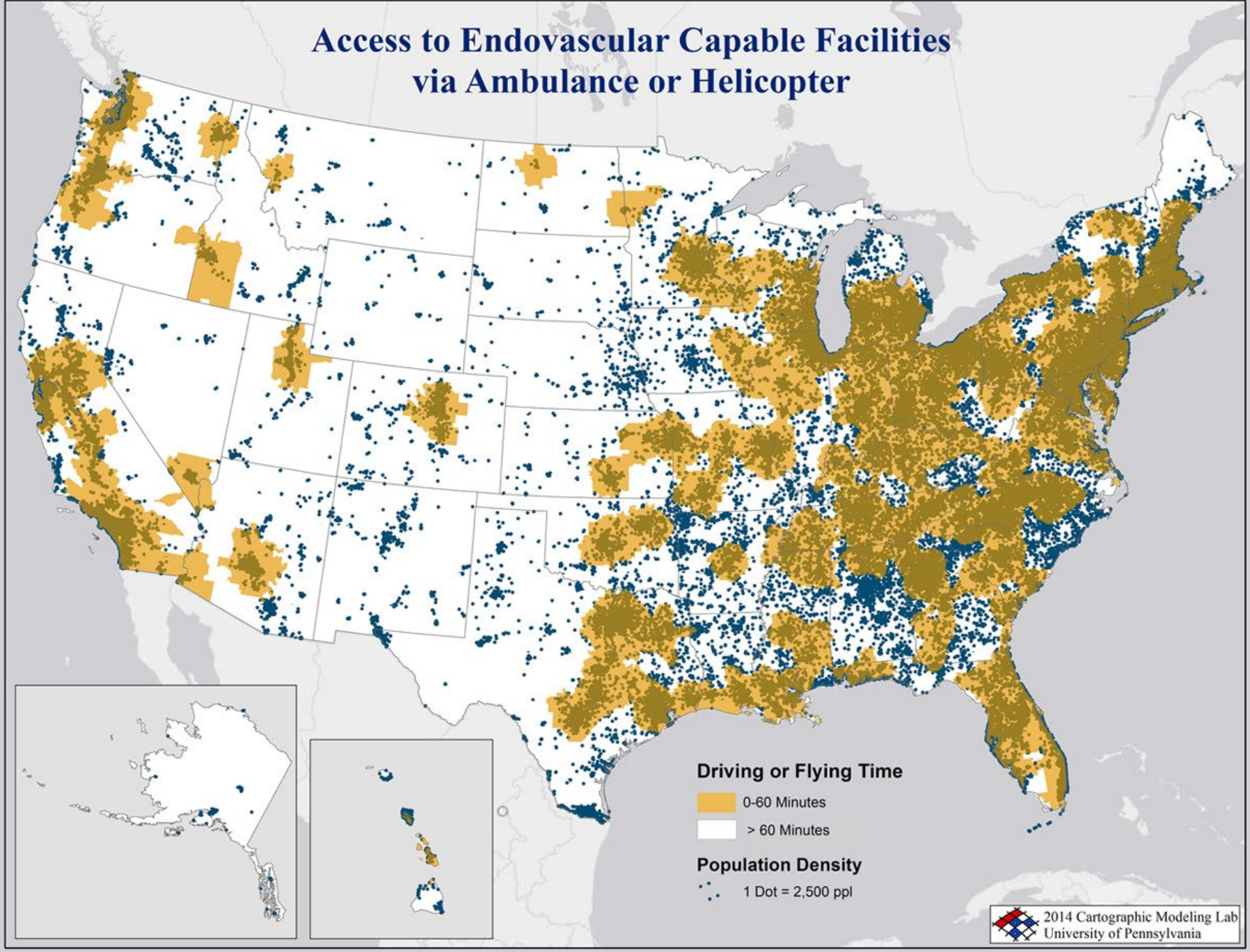
Stroke Warning Signs and Symptoms

	ASRH	PSC	TSC	CSC
Location	Likely rural	Likely urban/suburban	Likely urban	Likely urban
Stroke team accessible/available 24 h/d, 7 d/wk	Yes	Yes	Yes	Yes
Noncontrast CT available 24 h/d, 7 d/wk	Yes	Yes	Yes	Yes
Advanced imaging (CTA/CTP/MRI/MRA/MRP) available 24 h/d, 7 d/wk	No	Yes	Yes	Yes
Intravenous alteplase capable	Yes	Yes	Yes	Yes
Thrombectomy capable	No	Possibly	Yes	Yes
Diagnoses stroke pathogenesis/manage poststroke complications	Unlikely	Yes	Yes	Yes
Admits hemorrhagic stroke	No	Possibly	Possibly	Yes
Clips/coils ruptured aneurysms	No	Possibly	Possibly	Yes
Dedicated stroke unit	No	Yes	Yes	Yes
Dedicated neurocritical care unit/ICU	No	Possibly	Possibly	Yes

Adeoye O et al. Stroke 2019 e187-210.



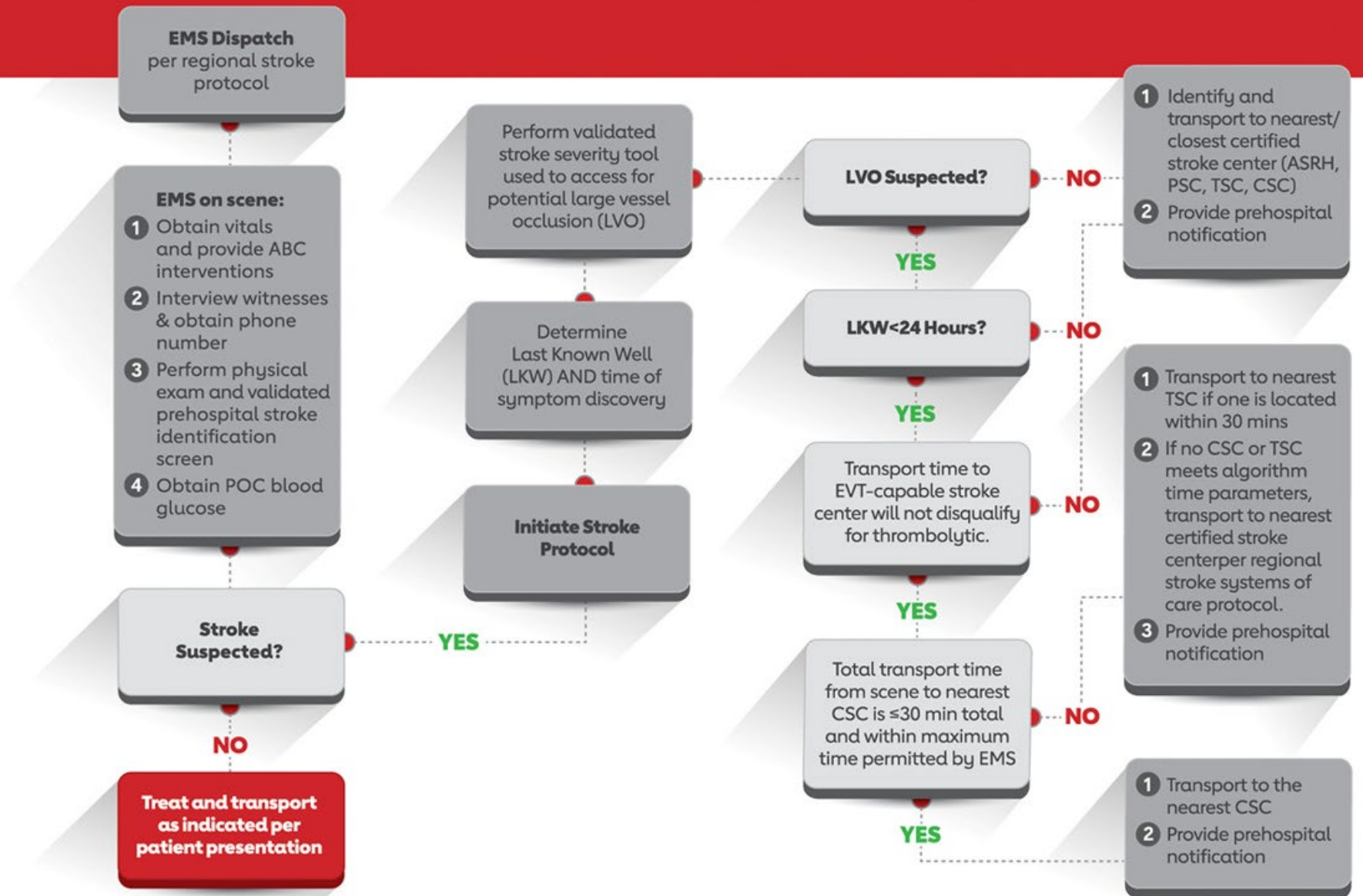
Adeoye O et al. Stroke 2019 e187-210.



Adeoye O et al. Stroke 2019 e187-210.

American Heart Association.
Mission:Lifeline®
Stroke

EMERGENCY MEDICAL SERVICES ACUTE STROKE ROUTING



American Heart Association.
Mission:Lifeline®
Stroke

EMERGENCY MEDICAL SERVICES
ACUTE STROKE ROUTING

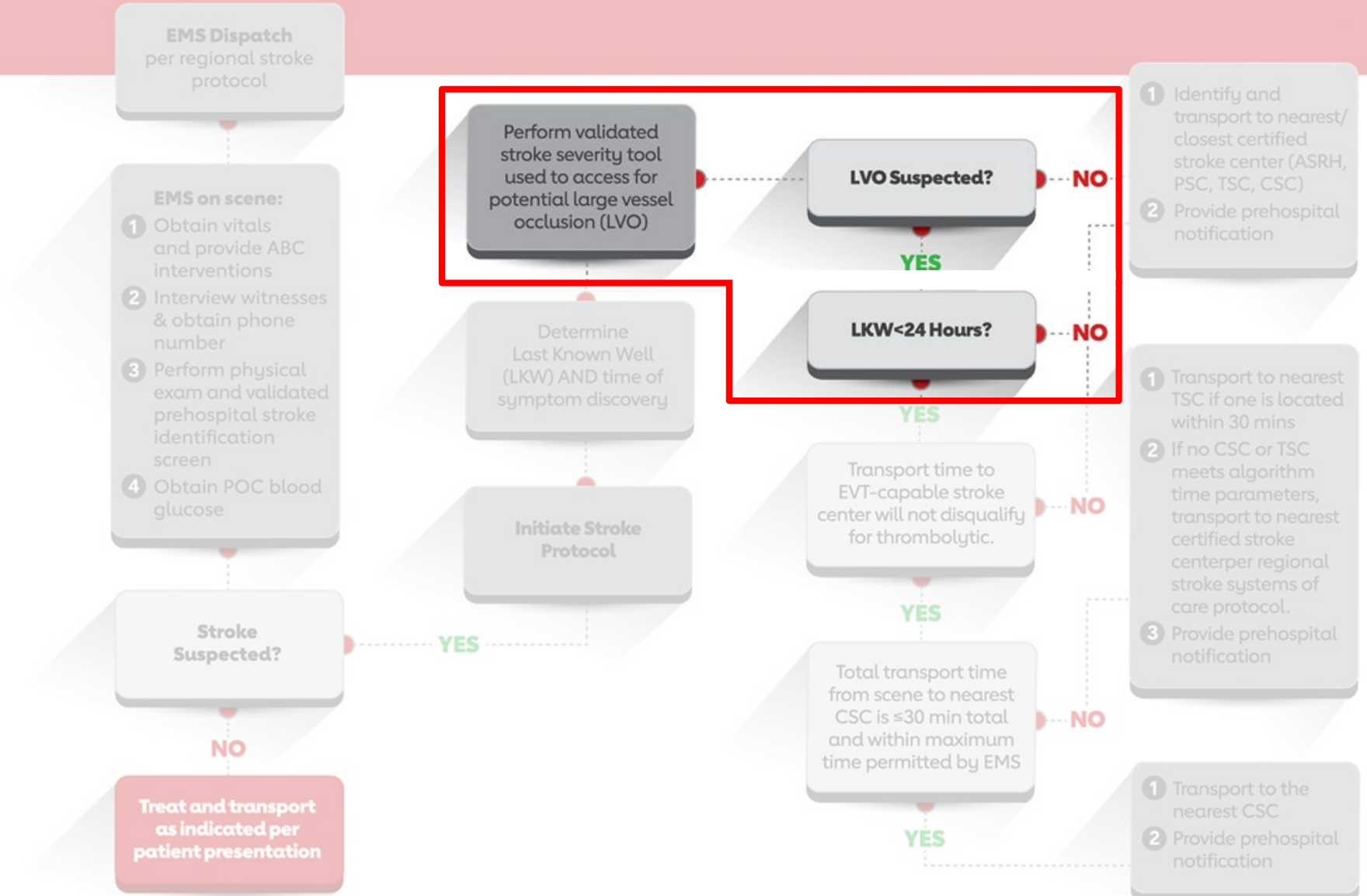
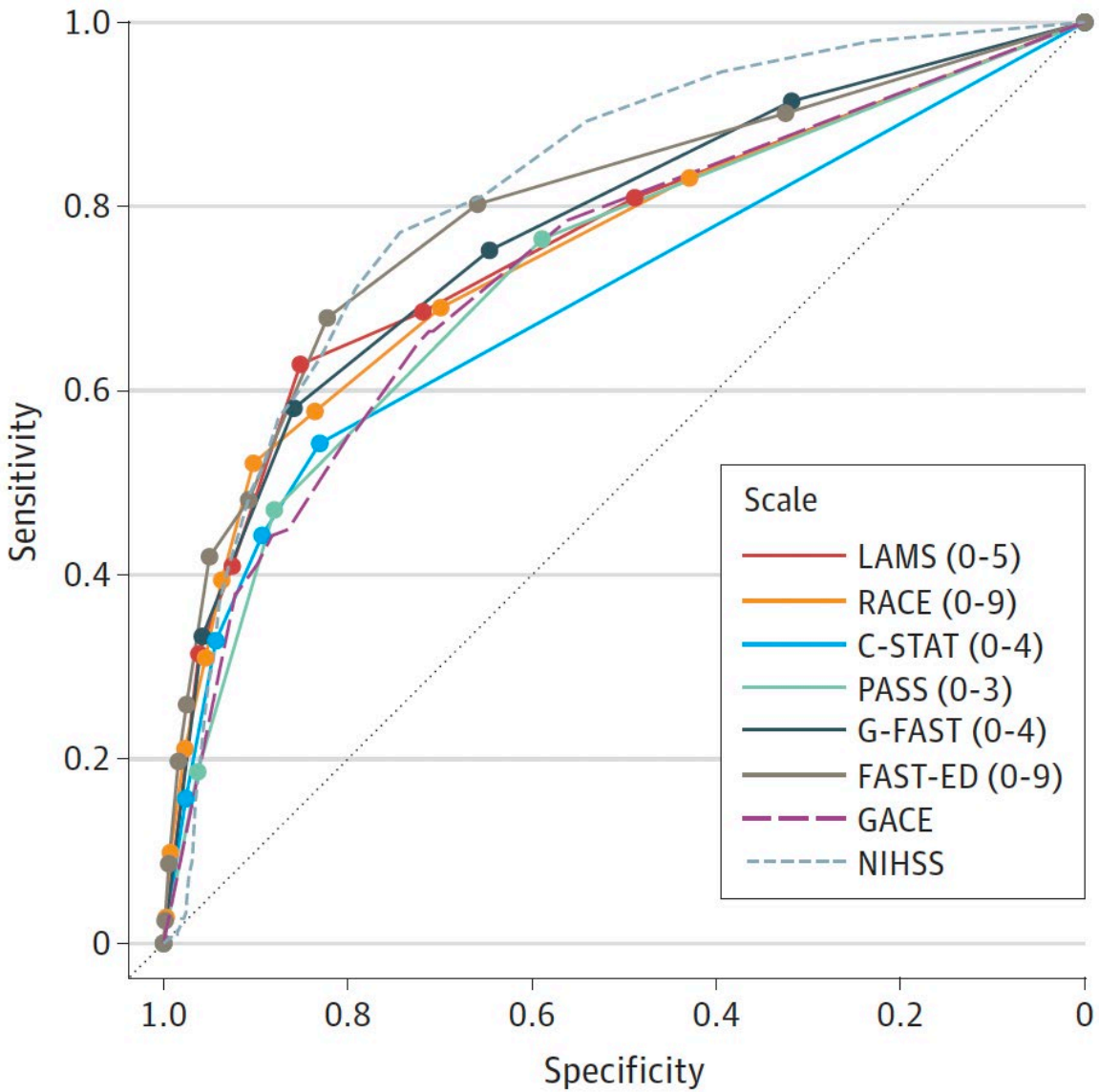


Table 3 Comparison of various published clinical scales with RF model to predict LVO in the test set

	Cut-off	AUC (95% CI)	SEN	SPE	Accuracy
RF	—	0.831 (0.819 to 0.843)	0.721	0.827	0.772
mNIHSS	≥7	0.809 (0.795 to 0.824)	0.760	0.755	0.769
sNIHSS-EMS	≥6	0.809 (0.795 to 0.824)	0.722	0.788	0.764
NIHSS	≥6	0.806 (0.792 to 0.820)	0.727	0.792	0.708
RACE	≥5	0.806 (0.791 to 0.821)	0.712	0.793	0.764
CPSSS	≥2	0.804 (0.789 to 0.819)	0.658	0.826	0.761
FAST-ED	≥4	0.804 (0.790 to 0.819)	0.611	0.850	0.760
s-NIHSS-5	≥4	0.804 (0.790 to 0.819)	0.738	0.763	0.760
3I-SS	≥4	0.798 (0.782 to 0.813)	0.641	0.852	0.759
LAMS	≥4	0.779 (0.764 to 0.795)	0.652	0.808	0.746
PASS	≥2	0.778 (0.763 to 0.794)	0.660	0.823	0.751
s-NIHSS-1	≥2	0.773 (0.757 to 0.789)	0.698	0.761	0.695
FPSS	≥5	0.762 (0.746 to 0.778)	0.781	0.620	0.711
G-FAST	≥3	0.755 (0.740 to 0.771)	0.763	0.653	0.697
VAN	≥2	0.732 (0.715 to 0.748)	0.847	0.534	0.650
ROSIER	≥4	0.730 (0.714 to 0.746)	0.886	0.467	0.694
FAST	≥3	0.706 (0.690 to 0.723)	0.682	0.681	0.685
aNIHSS	≥1	0.689 (0.672 to 0.706)	0.542	0.751	0.416

Figure 2. Receiver Operating Characteristic Curves of Prediction Scale Diagnostic Performance



Nguyen TTM et al. Jama Neuro 2021: 157-164.


EMERGENCY

Basic Emergency Medicine

ABCs

IV, O2 (?), Monitor

Blood Glucose

Targeted History

Last Known Well

Clinical Course

Previous Strokes

Hx of ICH/Neurosurgery

Medications/Allergies

Anticoagulation and last dose

POC INR >1.7
DOAC < 48 hours last dose

Recent Stroke or MI

Bleeding Risk

Eligibility for tPA

Age ≥18	**No**	Yes
Clinical diagnosis of ischemic stroke causing neurological deficit	**No**	Yes
Time of symptom onset <4.5 hours See Additional Warnings to tPA at 3-4.5hr below	**No**	Yes

Absolute Contraindications to tPA

Intracranial hemorrhage on CT	**No**	Yes
Clinical presentation suggests subarachnoid hemorrhage	**No**	Yes
Neurosurgery, head trauma, or stroke in past 3 months	**No**	Yes
Uncontrolled hypertension (>185 mmHg SBP or >110 mmHg DBP)	**No**	Yes
History of intracranial hemorrhage	**No**	Yes
Known intracranial arteriovenous malformation, neoplasm, or aneurysm	**No**	Yes
Active internal bleeding	**No**	Yes
Suspected/confirmed endocarditis	**No**	Yes
Known bleeding diathesis (1) Platelet count < 100,000; (2) Patient has received heparin within 48 hours and has an elevated aPTT (greater than upper limit of normal for laboratory); (3) Current use of oral anticoagulants (ex: warfarin) and INR >1.7; (4)Current use of direct thrombin inhibitors or direct factor Xa inhibitors	**No**	Yes
Abnormal blood glucose (<50 mg/dL)	**No**	Yes

Relative Contraindications/Warnings to tPA

Only minor or rapidly improving stroke symptoms	**No**	Yes
Major surgery or serious non-head trauma in the previous 14 days	**No**	Yes
History of gastrointestinal or urinary tract hemorrhage within 21 days	**No**	Yes
Seizure at stroke onset	**No**	Yes
Recent arterial puncture at a noncompressible site	**No**	Yes
Recent lumbar puncture	**No**	Yes
Post myocardial infarction pericarditis	**No**	Yes
Pregnancy	**No**	Yes

Neurologic Examination

Table 4. National Institutes of Health Stroke Scale

Tested Item	Title	Responses and Scores
1A	Level of consciousness	0—Alert
		1—Drowsy
		2—Obtunded
		3—Coma/unresponsive
1B	Orientation questions (2)	0—Answers both correctly
		1—Answers 1 correctly
		2—Answers neither correctly
1C	Response to commands (2)	0—Performs both tasks correctly
		1—Performs 1 task correctly
		2—Performs neither
2	Gaze	0—Normal horizontal movements
		1—Partial gaze palsy
		2—Complete gaze palsy
3	Visual fields	0—No visual field defect
		1—Partial hemianopia
		2—Complete hemianopia
		3—Bilateral hemianopia
4	Facial movement	0—Normal
		1—Minor facial weakness
		2—Partial facial weakness
		3—Complete unilateral palsy
5	Motor function (arm)	0—No drift
	a. Left	1—Drift before 10 s
	b. Right	2—Falls before 10 s
		3—No effort against gravity
		4—No movement
6	Motor function (leg)	0—No drift
	a. Left	1—Drift before 5 s
	b. Right	2—Falls before 5 s
		3—No effort against gravity
		4—No movement
7	Limb ataxia	0—No ataxia
		1—Ataxia in 1 limb
		2—Ataxia in 2 limbs
8	Sensory	0—No sensory loss
		1—Mild sensory loss
		2—Severe sensory loss
9	Language	0—Normal
		1—Mild aphasia
		2—Severe aphasia
		3—Mute or global aphasia
10	Articulation	0—Normal
		1—Mild dysarthria
		2—Severe dysarthria
11	Extinction or inattention	0—Absent
		1—Mild loss (1 sensory modality lost)
		2—Severe loss (2 modalities lost)

Adapted from Lyden et al.[74] Copyright © 1994, American Heart Association, Inc.

Powers WJ et al. Stroke 2019: e344-418.

NIH STROKE SCALE

Patient Identification. ___ ___-___ ___ ___-___ ___ ___

Pt. Date of Birth ___ ___/___ ___/___ ___

Hospital _____(___ ___-___ ___)

Date of Exam ___ ___/___ ___/___ ___

Interval: [ ] Baseline [ ] 2 hours post treatment [ ] 24 hours post onset of symptoms ±20 minutes [ ] 7-10 days
[ ] 3 months [ ] Other _____(___ ___)

Time: ___ ___:___ ___ [ ]am [ ]pm

Person Administering Scale _____

Administer stroke scale items in the order listed. Record performance in each category after each subscale exam. Do not go back and change scores. Follow directions provided for each exam technique. Scores should reflect what the patient does, not what the clinician thinks the patient can do. The clinician should record answers while administering the exam and work quickly. Except where indicated, the patient should not be coached (i.e., repeated requests to patient to make a special effort).

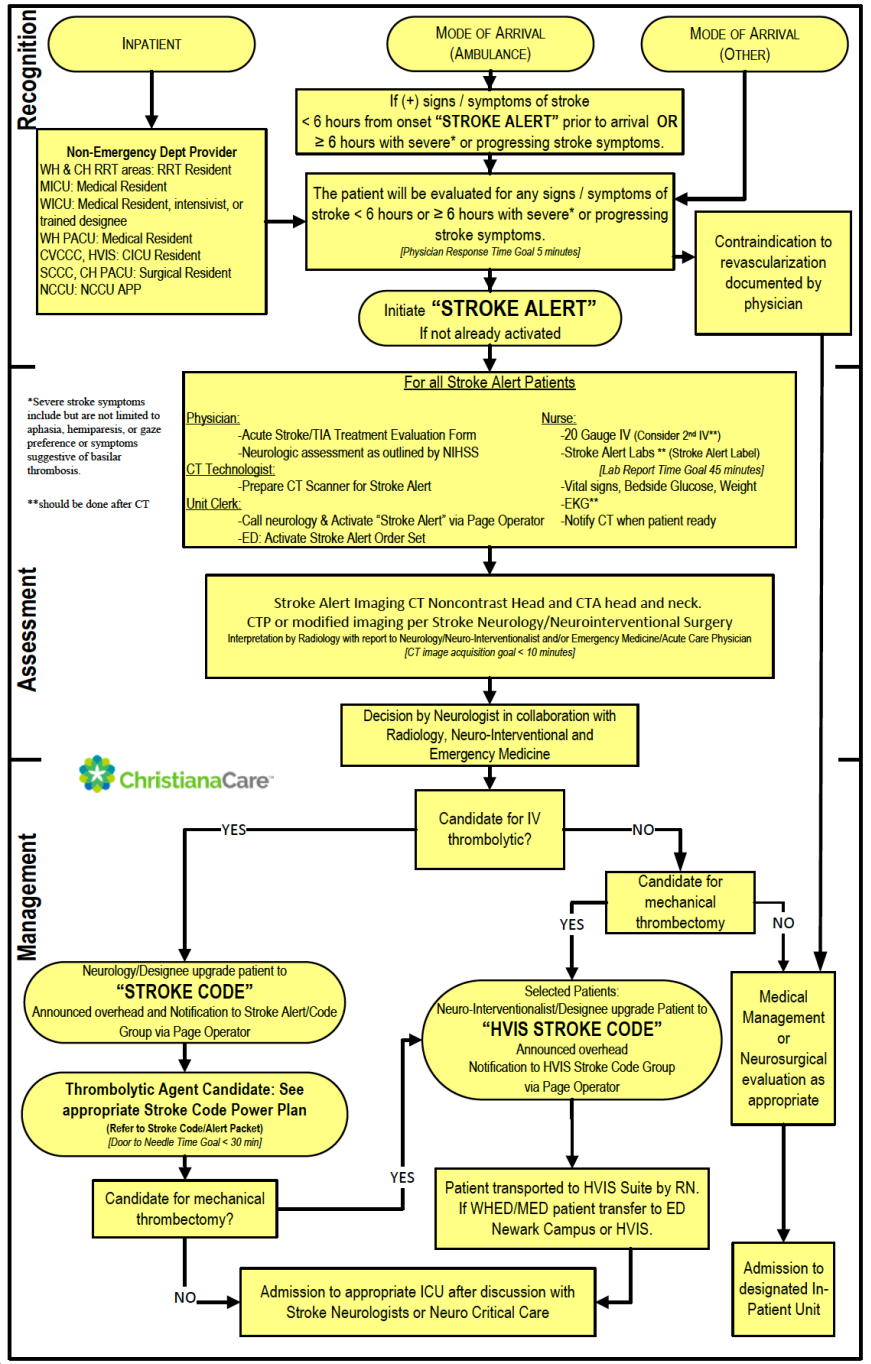
Instructions	Scale Definition	Score
1a. Level of Consciousness: The investigator must choose a response if a full evaluation is prevented by such obstacles as an endotracheal tube, language barrier, orotracheal trauma/bandages. A 3 is scored only if the patient makes no movement (other than reflexive posturing) in response to noxious stimulation.	0 = **Alert;** keenly responsive. 1 = **Not alert**; but arousable by minor stimulation to obey, answer, or respond. 2 = **Not alert**; requires repeated stimulation to attend, or is obtunded and requires strong or painful stimulation to make movements (not stereotyped)	_____

NIHSS Score

STROKE ALERT / STROKE CODE ALGORITHM

Last Updated 3/23/2022

APPENDIX A



For all Stroke Alert Patients

Physician:

-Acute Stroke/TIA Treatment Evaluation Form

-Neurologic assessment as outlined by NIHSS

CT Technologist:

-Prepare CT Scanner for Stroke Alert

Unit Clerk:

-Call neurology & Activate "Stroke Alert" via Page Operator

-ED: Activate Stroke Alert Order Set

Nurse:

-20 Gauge IV (Consider 2nd IV**)

-Stroke Alert Labs ** (Stroke Alert Label)

[Lab Report Time Goal 45 minutes]

-Vital signs, Bedside Glucose, Weight

-EKG**

-Notify CT when patient ready

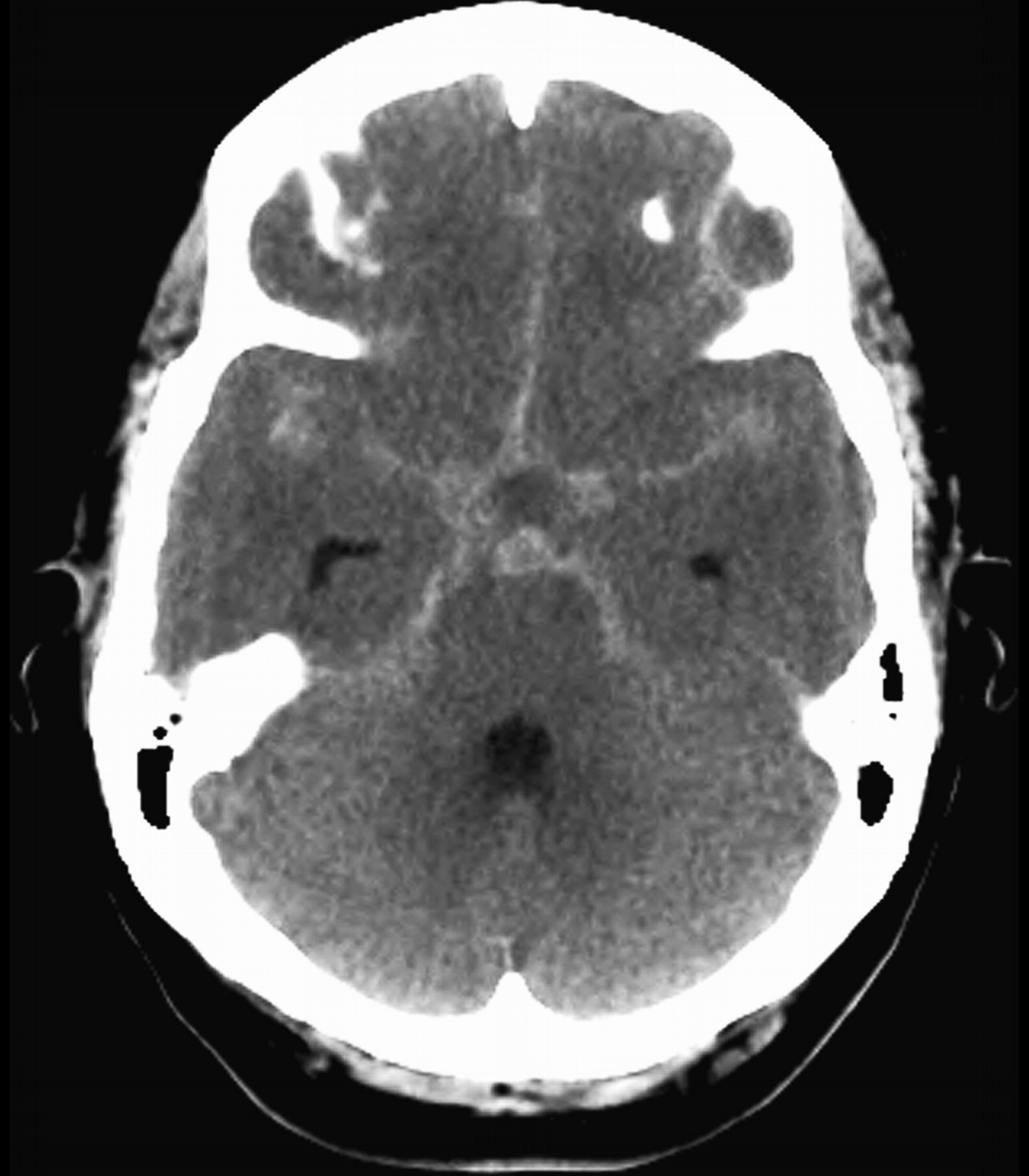
↓

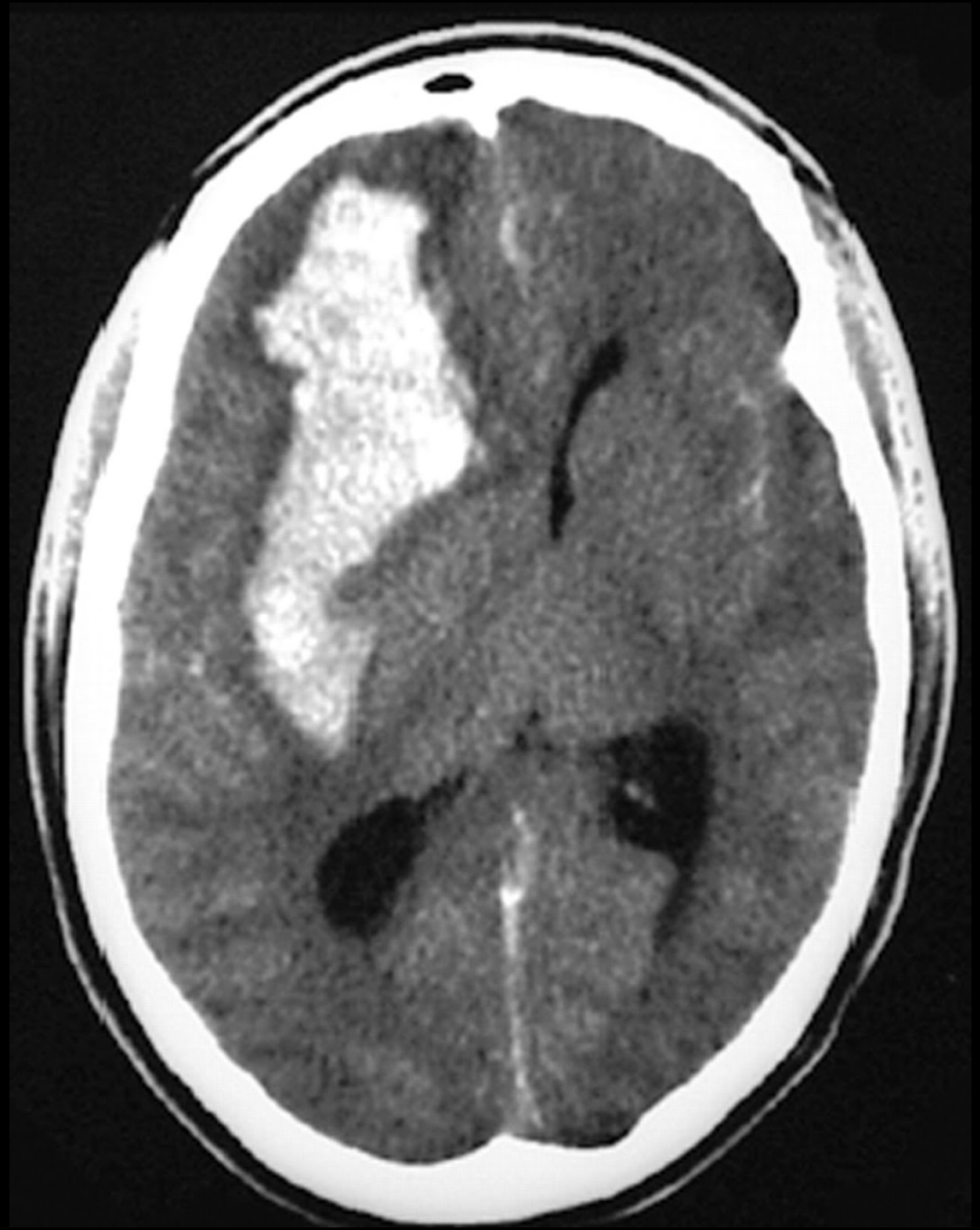
Stroke Alert Imaging CT Noncontrast Head and CTA head and neck.
CTP or modified imaging per Stroke Neurology/Neurointerventional Surgery
Interpretation by Radiology with report to Neurology/Neuro-Interventionalist and/or Emergency Medicine/Acute Care Physician
[CT image acquisition goal < 10 minutes]

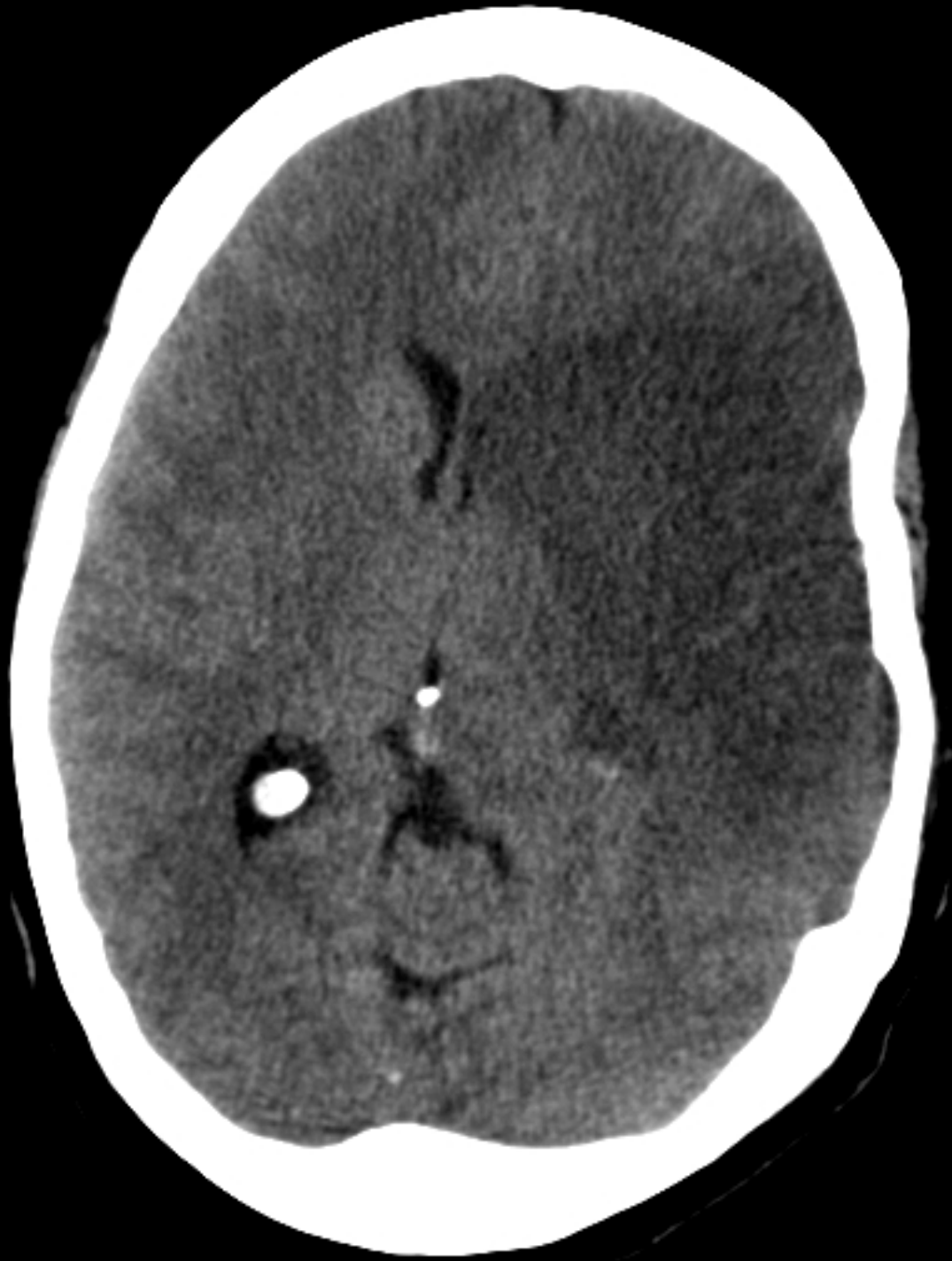
↓

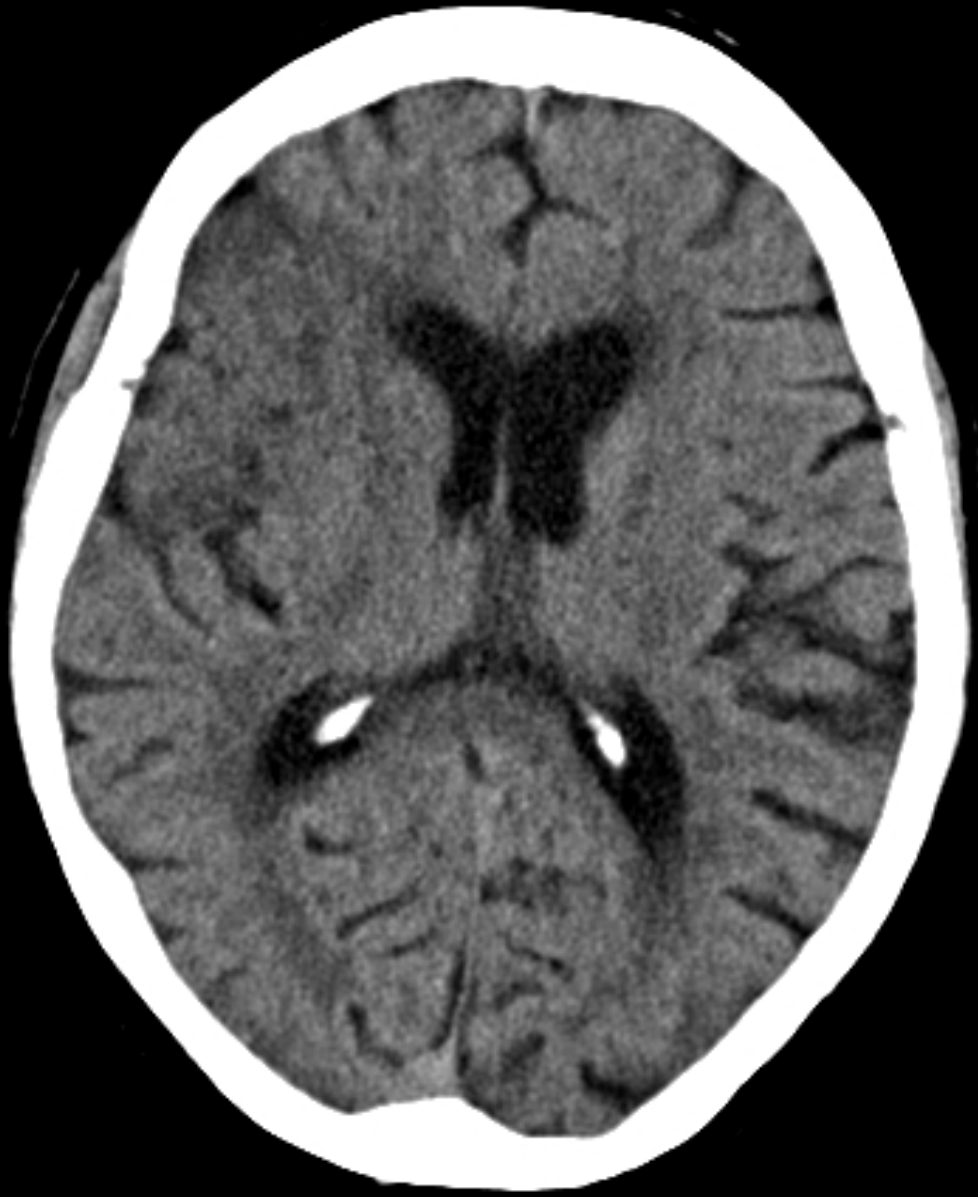
Decision by Neurologist in collaboration with Radiology, Neuro-Interventional and Emergency Medicine

Imaging

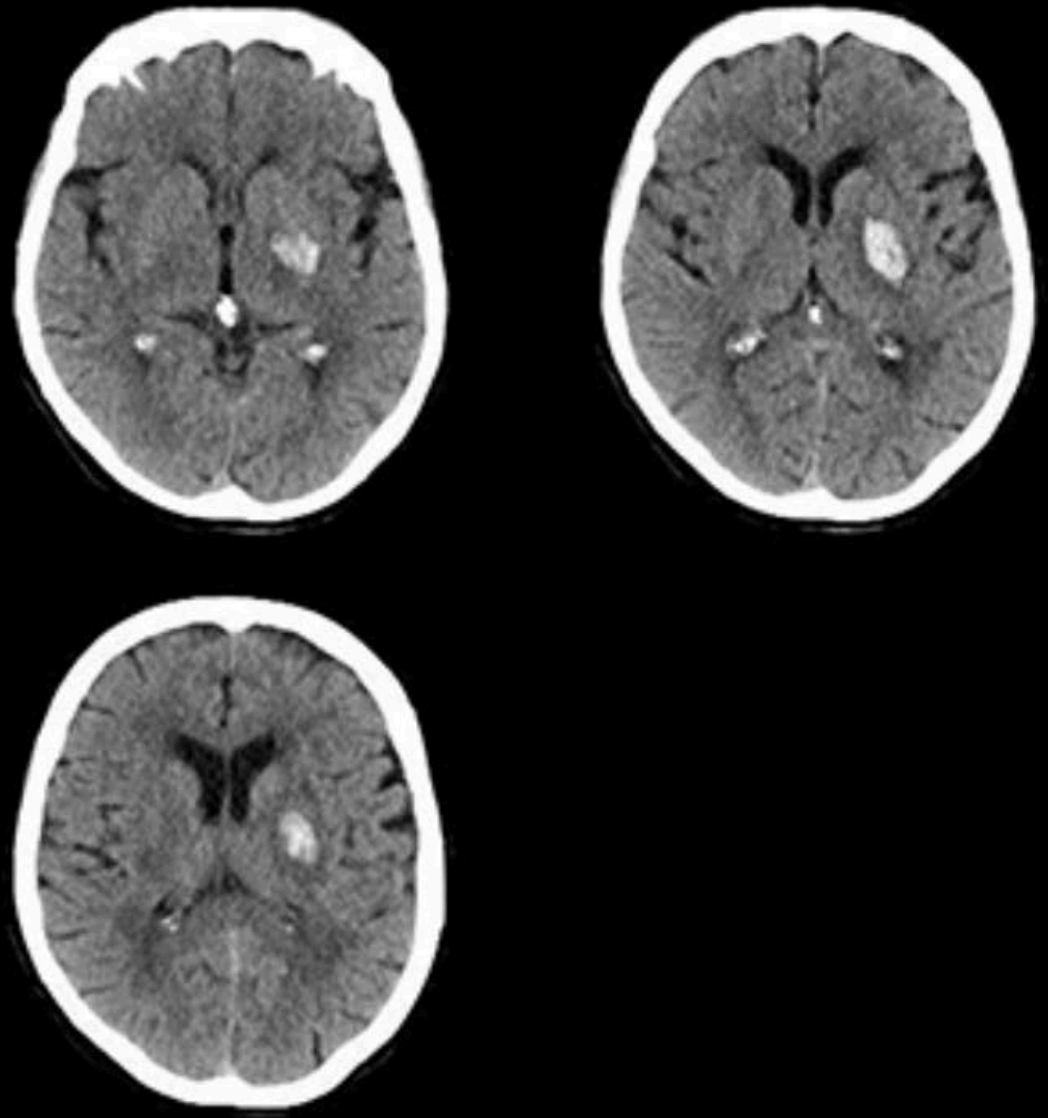






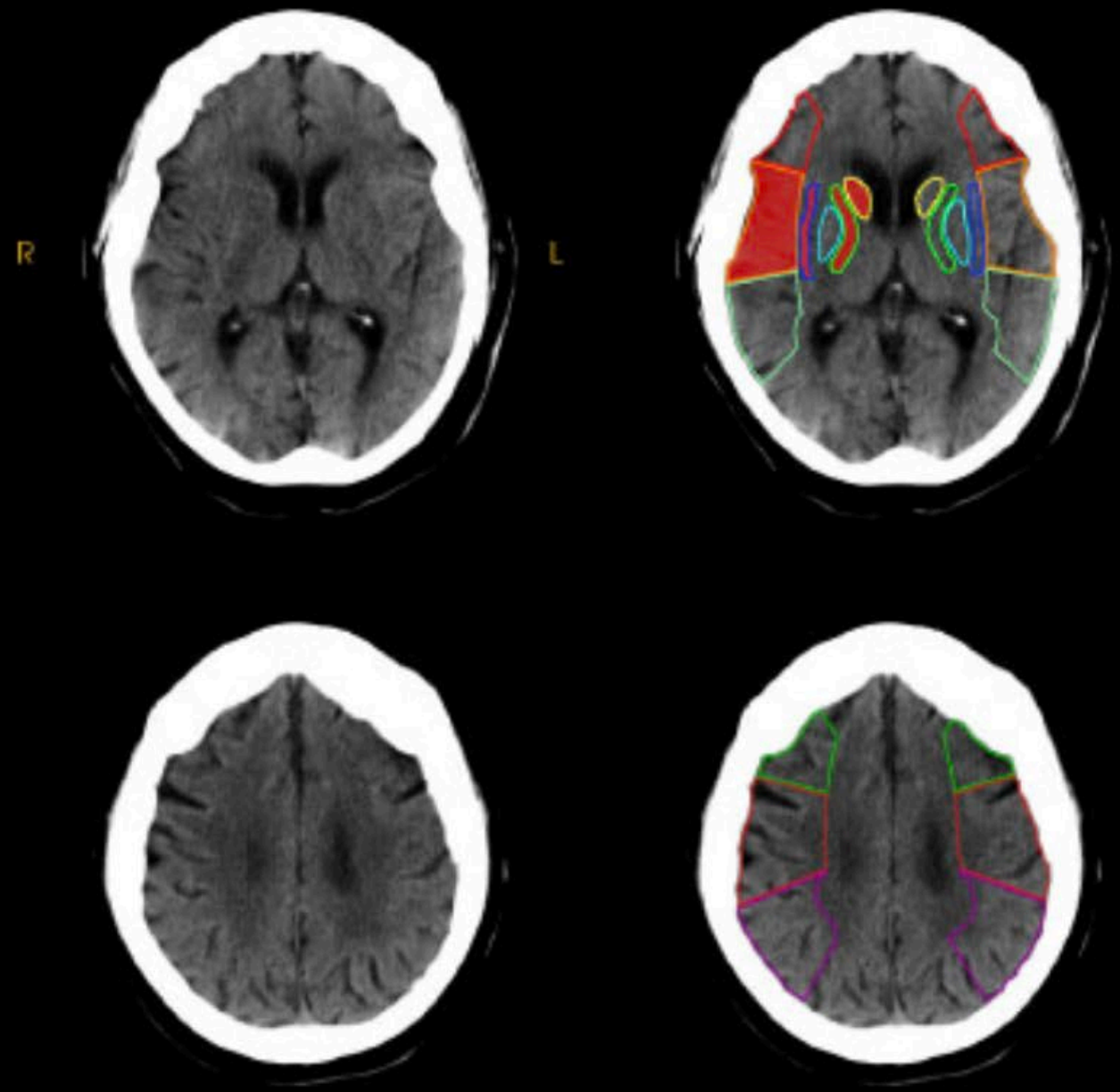


Suspected Hemorrhage



RAPID

Not for primary diagnosis.



Hounsfield Units Mean

	RIGHT	LEFT
C	22.3	24.6
IC	22.8	24.4
L	27.0	27.6
I	25.5	27.1
M1	26.8	26.9
M2	28.9	30.3
M3	30.6	30.7
M4	23.7	23.3
M5	24.4	25.2
M6	28.0	28.0

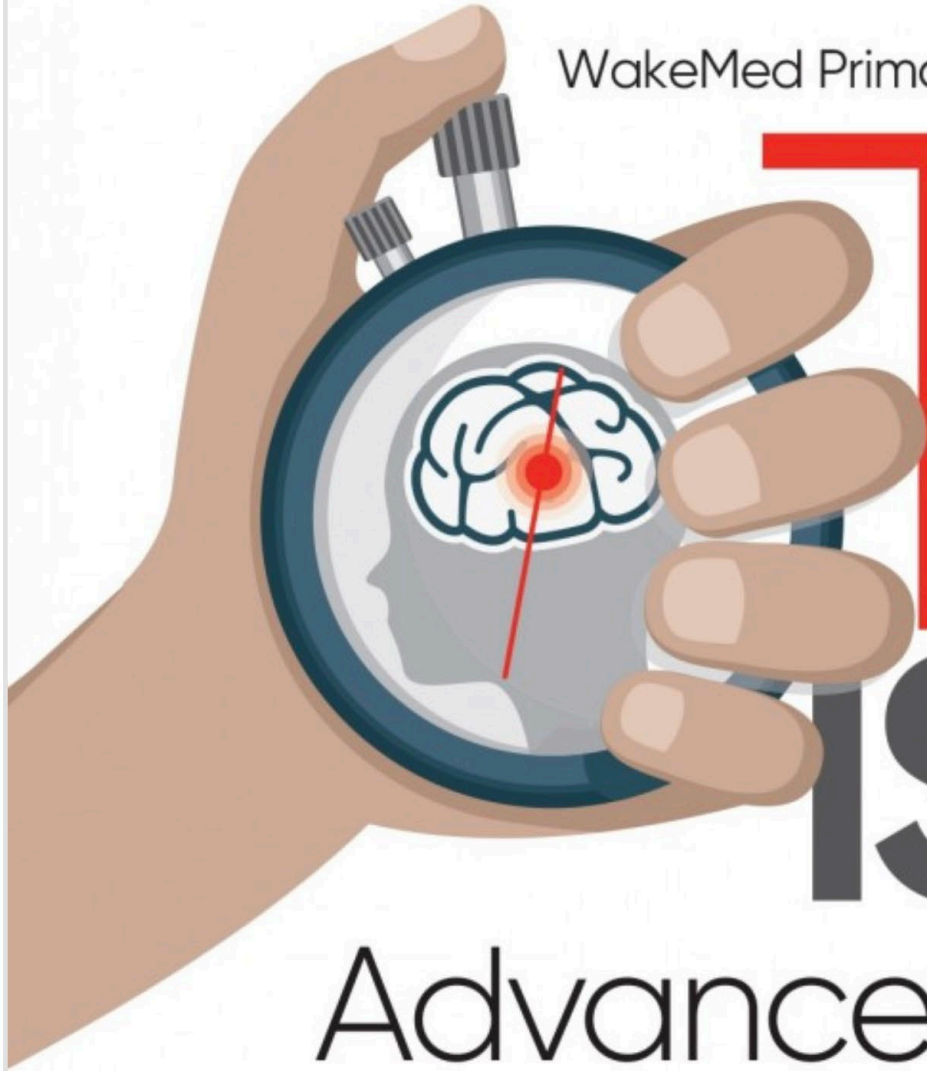
SCORE

6

RAPID

Not for primary diagnosis. For research purposes only.

Treatment Decision

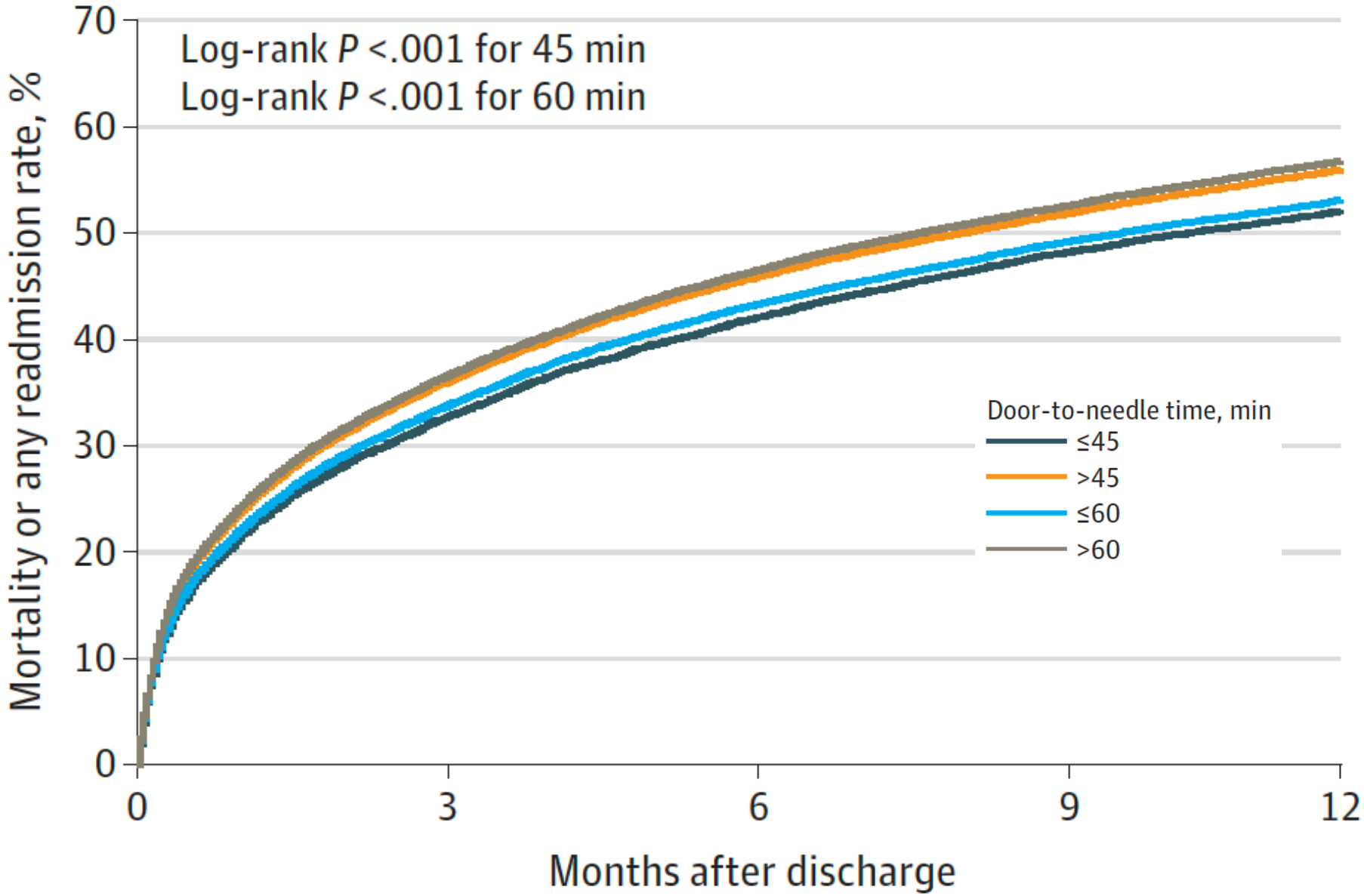


WakeMed Primary Stroke Program presents the **15th Annual**

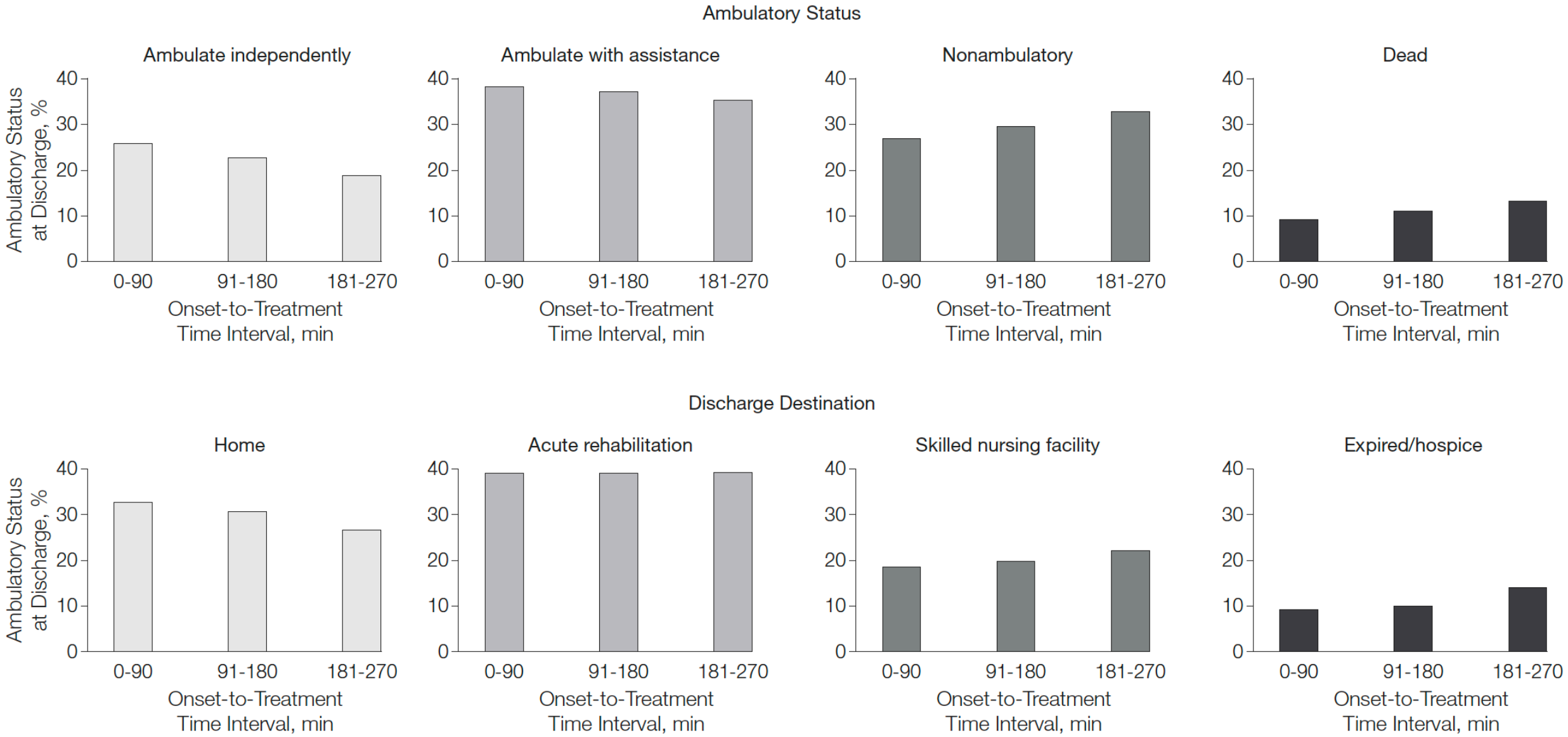
TIME IS BRAIN

Advances in Stroke Care

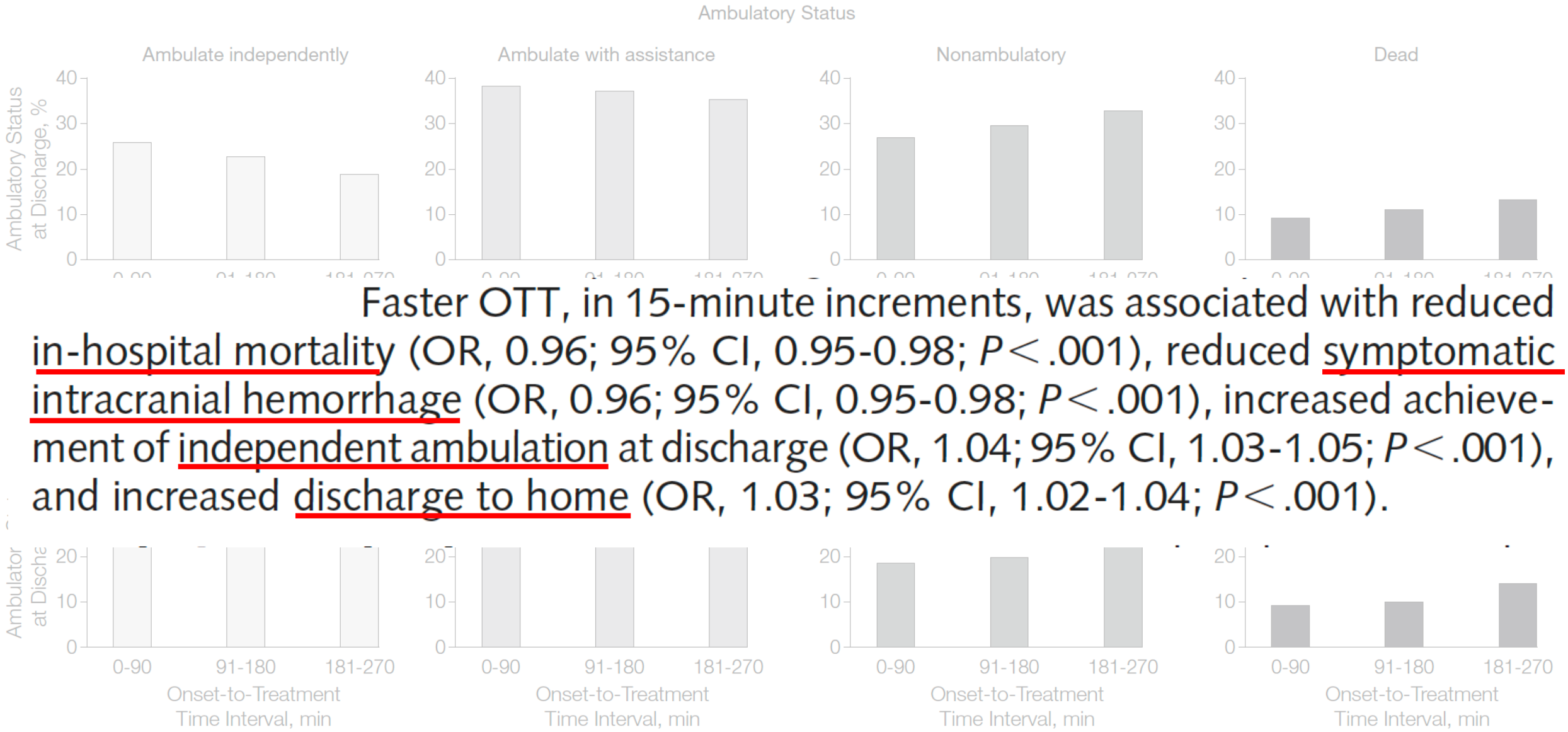
C Primary outcome of all-cause mortality or readmission[a]



Man S et al. JAMA 2020 2170-2184



Smith EE et al. JAMA 2013:2480-2488.



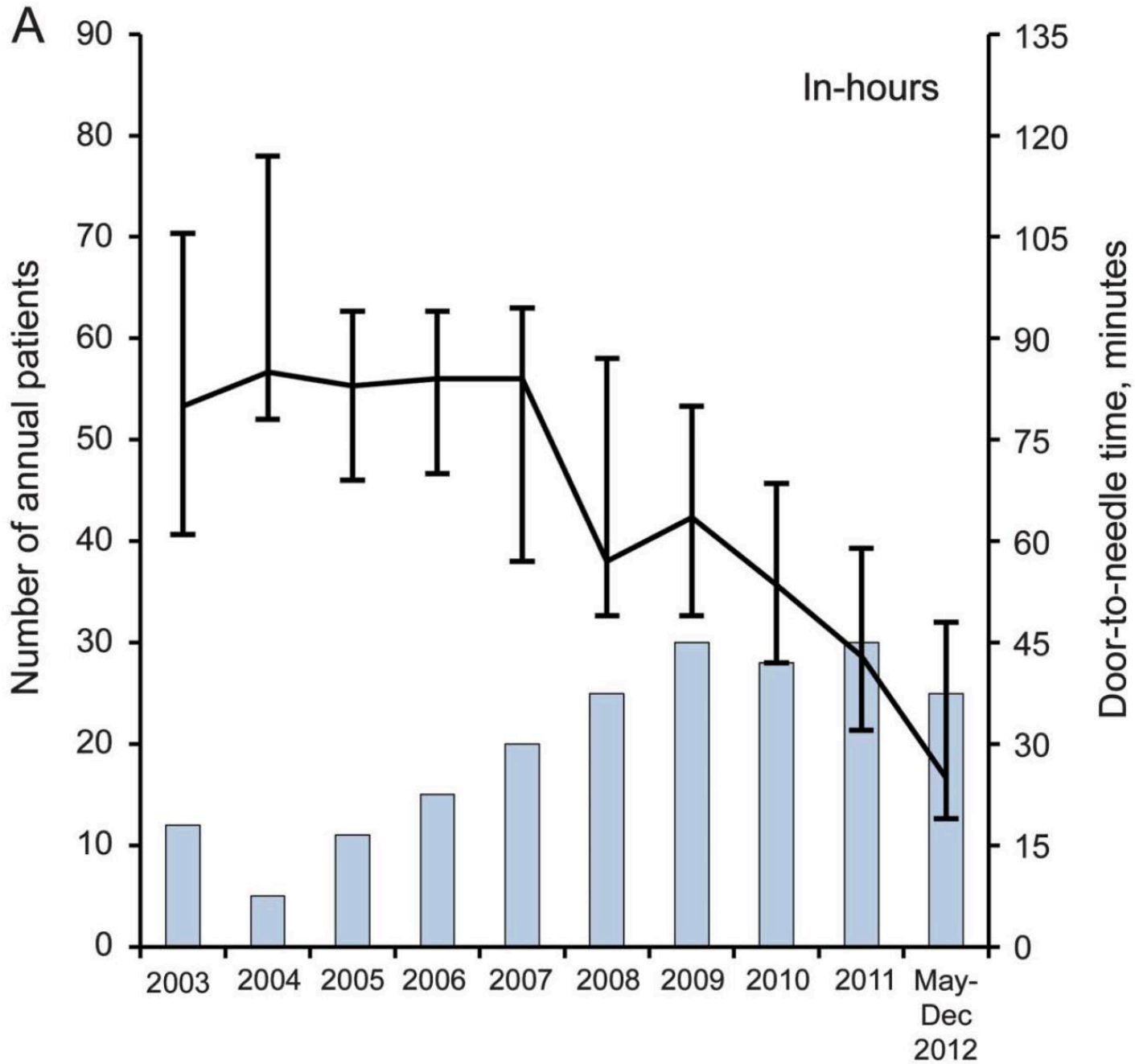
Faster OTT, in 15-minute increments, was associated with reduced in-hospital mortality (OR, 0.96; 95% CI, 0.95-0.98; $P < .001$), reduced symptomatic intracranial hemorrhage (OR, 0.96; 95% CI, 0.95-0.98; $P < .001$), increased achievement of independent ambulation at discharge (OR, 1.04; 95% CI, 1.03-1.05; $P < .001$), and increased discharge to home (OR, 1.03; 95% CI, 1.02-1.04; $P < .001$).

Smith EE et al. JAMA 2013:2480-2488.

Table 1 Comparison of Helsinki and Royal Melbourne Hospital models

Step	Helsinki model	Existing RMH model	May 2012 additions to existing RMH model (estimated saved time per step)
Prenotification	Ambulance calls stroke consultant on mobile phone, who accepts patients, takes history, and alerts the team.	Ambulance calls hospital ED over open-air radio. Once ED has assessed patient, a "code stroke" page is sent to stroke team.	ED pages stroke team on receiving ambulance call—stroke team present on patient arrival (5–10 min saved). Stroke team calls ambulance dispatch center for patient details during transport (no time saved, allows for steps below).
Medical history	Electronic province-wide PACS since 2002. Electronic lab and patient records with limited access to GP text. GP never called.	Electronic local lab and PACS since 2007. Paper records. GP sometimes called to obtain detailed history.	When available, history, lab, and imaging evaluated and GP called before patient arrival (5 min).
Registration and CT request	Unique personal identification number at birth, used in all public and private systems. Patient registration and CT request electronically before patient arrival.	Noncentralized records with unique identifiers different for each hospital. CT requests only after patient had arrived and was registered in local hospital system.	Registration done before arrival to retrieve existing record or generate new record based on name and date of birth. CT request form prefilled (3 min).
Labs	Preordered blood tests for all tPA candidates. Blood samples always drawn before tPA by lab nurse. POC-INR, glucose available at tPA decision.	Routine blood samples often drawn after tPA initiation. Capillary glucose before tPA. Only wait for INR in known and suspected anticoagulated patients.	POC-INR available since 11/2012 (60 min in anticoagulated patients).
IV line	Ambulance always inserts large-bore antecubital cannula during transport.	IV access often available on arrival, otherwise inserted in ED.	IV access often available on arrival, otherwise inserted on CT table.
Straight to CT	Patients go straight to CT on ambulance stretchers.		Patients go straight to CT on ambulance stretchers (10 min).
tPA on CT table	tPA can be initiated on CT table, but usually in adjacent room where the drug is kept.		tPA and infusion kit brought to CT room beforehand. Bolus and infusion initiated on CT table (3 min).

Meretoja A et al. Neurology 2013: 1071-1076.



Meretoja A et al. Neurology 2013: 1071-1076.

- **Target: Stroke Honor Roll:** Door-to-needle times within 60 minutes for at least 75 percent of applicable patients.
- **Target: Stroke Honor Roll-Elite:** Door-to-needle times within 60 minutes for at least 85 percent of applicable patients.
- **Target: Stroke Honor Roll-Elite Plus:** Door-to-needle times within 45 minutes for at least 75 percent of applicable patients and door-to-needle times within 30 minutes for at least 50 percent of applicable patients.
- **Target: Stroke Honor Roll Advanced Therapy:**Door-to-device times in at least 50% of applicable patients within 90 minutes for direct arriving and within 60 minutes for transfers.

Systemic Thrombolytics

Last Known Well < 4.5 h

Additional Warnings to tPA >3hr Onset

Age >80 years	No	Yes
History of prior stroke and diabetes	No	Yes
Any active anticoagulant use (even with INR <1.7)	No	Yes
NIHSS >25	No	Yes
CT shows multilobar infarction (hypodensity >1/3 cerebral hemisphere)	No	Yes

Disabling Stroke Deficits

Alteplase 0.9 mg/kg

10% bolus & 90% infusion (max 90 mg)

Dosing Chart for Alteplase (Activase®, tPA, r-tPA)
in Acute Ischemic Stroke

Total Dose = 0.9 mg/kg (max dose 90 mg) - weight should be rounded to the nearest kg
Reconstituted Drug Solution Concentration = 1 mg/mL (mix with sterile diluent provided)

Discard unused volume - see chart below (second column)
Bolus Dose (10% of total dose): Slow IV push over 1 minute
Remainder of Dose: IV infusion via infusion pump over 60 minutes

Patient Weight Kilograms (kg)	Withdraw and DISCARD volume (mL)	Total Dose (mg)	Bolus Dose (mg)	Infusion Dose (mg)	NSS Flush Rate (mL/hr)
34	**69.4**	30.6	3.1	27.5	27.5
35	**68.4**	31.5	3.2	28.4	28.4
36	**67.6**	32.4	3.2	29.2	29.2
37	**66.7**	33.3	3.3	30.0	30.0
38	**65.8**	34.2	3.4	30.8	30.8
39	**64.9**	35.1	3.5	31.6	31.6
40	**64**	36	3.6	32.4	32.4
41	**63.1**	36.9	3.7	33.2	33.2
42	**62.2**	37.8	3.8	34.0	34.0
43	**61.3**	38.7	3.9	34.8	34.8
44	**60.4**	39.6	4.0	35.6	35.6
45	**59.4**	40.5	4.1	36.5	36.5
46	**58.6**	41.4	4.1	37.3	37.3
47	**57.7**	42.3	4.2	38.1	38.1
48	**56.8**	43.2	4.3	38.9	38.9
49	**55.9**	44.1	4.4	39.7	39.7
50	**55**	45	4.5	40.5	40.5
51	**54.1**	45.9	4.6	41.3	41.3
52	**53.2**	46.8	4.7	42.1	42.1
53	**52.3**	47.7	4.8	42.9	42.9
54	**51.4**	48.6	4.9	43.7	43.7
55	**50.4**	49.5	5.0	44.6	44.6
56	**49.6**	50.4	5.0	45.4	45.4
57	**48.7**	51.3	5.1	46.2	46.2
58	**47.8**	52.2	5.2	47.0	47.0
59	**46.9**	53.1	5.3	47.8	47.8
60	**46**	54	5.4	48.6	48.6
61	**45.1**	54.9	5.5	49.4	49.4
62	**44.2**	55.8	5.6	50.2	50.2
63	**43.3**	56.7	5.7	51.0	51.0
64	**42.4**	57.6	5.8	51.8	51.8
65	**41.4**	58.5	5.9	52.7	52.7
66	**40.6**	59.4	5.9	53.5	53.5
67	**39.7**	60.3	6.0	54.3	54.3
68	**38.8**	61.2	6.1	55.1	55.1
69	**37.9**	62.1	6.2	55.9	55.9
70	**37**	63	6.3	56.7	56.7
71	**36.1**	63.9	6.4	57.5	57.5
72	**35.2**	64.8	6.5	58.3	58.3
73	**34.3**	65.7	6.6	59.1	59.1
74	**33.4**	66.6	6.7	59.9	59.9
75	**32.4**	67.5	6.8	60.8	60.8
76	**31.6**	68.4	6.8	61.6	61.6
77	**30.7**	69.3	6.9	62.4	62.4
78	**29.8**	70.2	7.0	63.2	63.2
79	**28.9**	71.1	7.1	64.0	64.0
80	**28**	72	7.2	64.8	64.8
81	**27.1**	72.9	7.3	65.6	65.6
82	**26.2**	73.8	7.4	66.4	66.4
83	**25.3**	74.7	7.5	67.2	67.2
84	**24.4**	75.6	7.6	68.0	68.0
85	**23.4**	76.5	7.7	68.9	68.9
86	**22.6**	77.4	7.7	69.7	69.7
87	**21.7**	78.3	7.8	70.5	70.5
88	**20.8**	79.2	7.9	71.3	71.3
89	**19.9**	80.1	8.0	72.1	72.1
90	**19**	81	8.1	72.9	72.9
91	**18.1**	81.9	8.2	73.7	73.7
92	**17.2**	82.8	8.3	74.5	74.5
93	**16.3**	83.7	8.4	75.3	75.3
94	**15.4**	84.6	8.5	76.1	76.1
95	**14.4**	85.5	8.6	77.0	77.0
96	**13.6**	86.4	8.6	77.8	77.8
97	**12.7**	87.3	8.7	78.6	78.6
98	**11.8**	88.2	8.8	79.4	79.4
99	**10.9**	89.1	8.9	80.2	80.2
100	**10**	90	9.0	81.0	81.0
> 100	**10**	90	9.0	81.0	81.0

INSERT TRANSFER PIN IN SWFI VIAL

INSERT ACTIVASE VIAL ON OTHER END OF PIN

PUSH DOWN

MIX GENTLY

LET IT SETTLE (SEVERAL MINUTES)

INSPECT SOLUTION

Blood Pressure Control

185/110 mm Hg - Bolus
180/105 mm Hg - Infusion

Vital Sign and Neuro-checks

Tenecteplase?

3.6. Other IV Fibrinolytics and Sonothrombolysis	COR	LOE	New, Revised, or Unchanged
1. It may be reasonable to choose tenecteplase (single IV bolus of 0.25-mg/kg, maximum 25 mg) over IV alteplase in patients without contraindications for IV fibrinolysis who are also eligible to undergo mechanical thrombectomy.	**IIb**	**B-R**	New recommendation.
IV tenecteplase (0.25 mg/kg bolus, maximum 25 mg) was compared with IV alteplase (usual dose of 0.9 mg/kg over 60 minutes, maximum 90 mg) in the EXTEND-IA TNK trial (Tenecteplase Versus Alteplase Before Endovascular Therapy for Ischemic Stroke).[178] This multicenter trial randomized 202 patients without previous severe disability and with documented occlusion of the internal carotid artery, proximal MCA (M1 or M2 segments), or basilar arteries presenting within 4.5 hours of symptom onset to receive 1 of these 2 fibrinolytic agents. Primary end point was reperfusion of >50% of the involved ischemic territory or an absence of retrievable thrombus at the time of the initial angiographic assessment. The trial was designed to test for noninferiority and, if noninferiority proven, for superiority. Secondary outcomes included the mRS score at 90 days. Median NIHSS score was 17. The primary end point was achieved by 22% of patients treated with tenecteplase versus 10% of those treated with alteplase (P=0.002 for noninferiority and 0.03 for superiority). In an analysis of secondary end points, tenecteplase resulted in better functional outcomes at 90 days on the basis of the ordinal shift analysis of the mRS score (common OR [cOR], 1.7 [95% CI, 1.0–2.8]; P=0.04) but less robustly for the proportion who achieved an mRS score of 0 to 1 (P=0.23) or 0 to 2 (P=0.06). sICH rates were 1% in both groups.			See Table XLIII in online Data Supplement 1.

Powers WJ et al. Stroke 2019: e344-418.

2. Tenecteplase administered as a 0.4-mg/kg single IV bolus has not been proven to be superior or noninferior to alteplase but might be considered as an alternative to alteplase in patients with minor neurological impairment and no major intracranial occlusion.	**IIb**	**B-R**	New recommendation.
IV tenecteplase has been compared with IV alteplase up to 6 hours after stroke onset in 3 phase II and 1 phase III superiority trials; tenecteplase appears to be similarly safe, but it is unclear whether it is as effective as or more effective than alteplase.[179–182] In the largest trial of 1100 subjects, tenecteplase at a dose of 0.4 mg/kg failed to demonstrate superiority and had a safety and efficacy profile similar to that of alteplase in a stroke population composed predominantly of patients with minor neurological impairment (median NIHSS score, 4) and no major intracranial occlusion.[182] Tenecteplase is given as a single IV bolus as opposed to the 1-hour infusion of alteplase.			See Table XLIII in online Data Supplement 1.

Powers WJ et al. Stroke 2019: e344-418.

Tenecteplase versus alteplase for management of acute ischaemic stroke (NOR-TEST): a phase 3, randomised, open-label, blinded endpoint trial

Nicola Logallo [1], Vojtech Novotny [2], Jörg Assmus [3], Christopher E Kvistad [2], Lars Alteheld [4], Ole Morten Rønning [5], Bente Thommessen [6], Karl-Friedrich Amthor [7], Hege Ihle-Hansen [8], Martin Kurz [9], Håkon Tobro [10], Kamaljit Kaur [11], Magdalena Stankiewicz [12], Maria Carlsson [13], Åse Morsund [14], Titto Idicula [15], Anne Hege Aamodt [16], Christian Lund [16], Halvor Næss [17], Ulrike Waje-Andreassen [2], Lars Thomassen [2]

Affiliations + expand

PMID: 28780236 DOI: 10.1016/S1474-4422(17)30253-3

Interpretation: Tenecteplase was not superior to alteplase and showed a similar safety profile. Most patients enrolled in this study had mild stroke. Further trials are needed to establish the safety and efficacy in patients with severe stroke and whether tenecteplase is non-inferior to alteplase.

Tenecteplase versus Alteplase before Thrombectomy for Ischemic Stroke

Bruce C.V. Campbell, Ph.D., Peter J. Mitchell, M.Med., Leonid Churilov, Ph.D., Nawaf Yassi, Ph.D., Timothy J. Kleinig, Ph.D., Richard J. Dowling, M.B., B.S., Bernard Yan, M.B., B.S., Steven J. Bush, M.B., B.S., Helen M. Dewey, M.D., Vincent Thijs, M.D., Rebecca Scroop, M.B., B.S., Marion Simpson, M.B., B.S., et al., for the EXTEND-IA TNK Investigators*

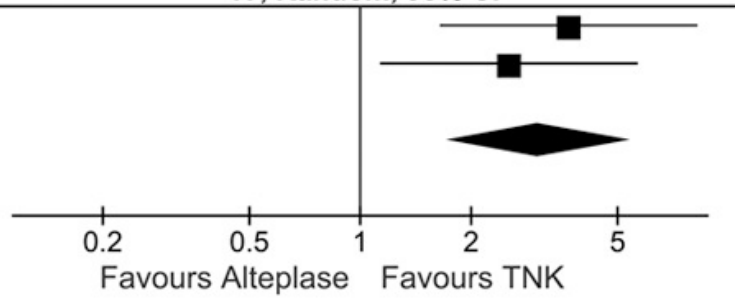
CONCLUSIONS

Tenecteplase before thrombectomy was associated with a higher incidence of reperfusion and better functional outcome than alteplase among patients with ischemic stroke treated within 4.5 hours after symptom onset. (Funded by the National Health and Medical Research Council of Australia and others; EXTEND-IA TNK ClinicalTrials.gov number, NCT02388061.)

A

Study or Subgroup	TNK Events	TNK Total	Alteplase Events	Alteplase Total	Weight	Odds Ratio IV, Random, 95% CI
ATTEST + Australian TNK	46	60	25	53	50.0%	3.68 [1.64, 8.23]
EXTEND-IA TNK	22	101	10	101	50.0%	2.53 [1.13, 5.67]
Total (95% CI)		**161**		**154**	**100.0%**	**3.05 [1.73, 5.40]**
Total events	68		35			

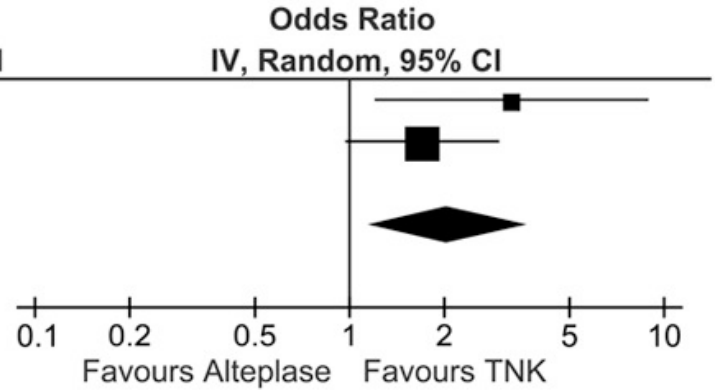
Heterogeneity: Tau² = 0.00; Chi² = 0.41, df = 1 (P = 0.52); I² = 0%
Test for overall effect: Z = 3.84 (P = 0.0001)



B

Study or Subgroup	TNK Events	TNK Total	Alteplase Events	Alteplase Total	Weight	Odds Ratio IV, Random, 95% CI
Australian TNK	36	50	11	25	29.1%	3.27 [1.20, 8.92]
EXTEND-IA TNK	65	101	52	101	70.9%	1.70 [0.97, 2.99]
Total (95% CI)		**151**		**126**	**100.0%**	**2.06 [1.15, 3.69]**
Total events	101		63			

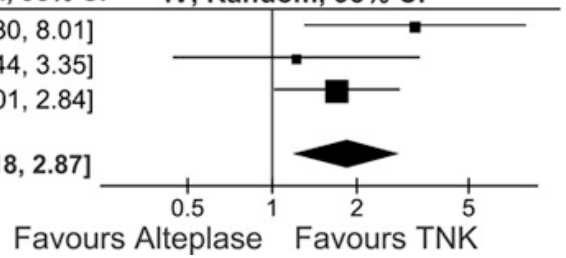
Heterogeneity: Tau² = 0.04; Chi² = 1.24, df = 1 (P = 0.26); I² = 20%
Test for overall effect: Z = 2.43 (P = 0.02)



C

Study or Subgroup	log[Odds Ratio]	SE	TNK Total	Alteplase Total	Weight	Odds Ratio IV, Random, 95% CI
ATTEST + Australian TNK (complete occlusion)	1.171	0.464	37	32	22.0%	3.23 [1.30, 8.01]
ATTEST + Australian TNK (partial occlusion)	0.198	0.516	23	21	18.0%	1.22 [0.44, 3.35]
EXTEND-IA TNK	0.53	0.263	101	101	59.9%	1.70 [1.01, 2.84]
Total (95% CI)			**161**	**154**	**100.0%**	**1.84 [1.18, 2.87]**

Heterogeneity: Tau² = 0.02; Chi² = 2.19, df = 2 (P = 0.33); I² = 9%
Test for overall effect: Z = 2.71 (P = 0.007)



Katsanos AH et al. Stroke 2020: 308-312.

Tenecteplase 0.25 mg/kg (max 25 mg)

Hold antiplatelets and anticoagulation

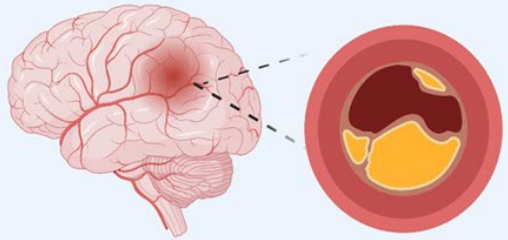
“Minor” Stroke?

3.9. Antiplatelet Treatment (Continued)	COR	LOE	New, Revised, or Unchanged
2. In patients presenting with minor noncardioembolic ischemic stroke (NIHSS score ≤3) who did not receive IV alteplase, treatment with dual antiplatelet therapy (aspirin and clopidogrel) started within 24 hours after symptom onset and continued for 21 days is effective in reducing recurrent ischemic stroke for a period of up to 90 days from symptom onset.	I	A	New recommendation.

Powers WJ et al. Stroke 2019: e344-418.

Dual Antiplatet Therapy Versus Aspirin in Minor Stroke or TIA

Meta-Analysis of Randomized Controlled Trials



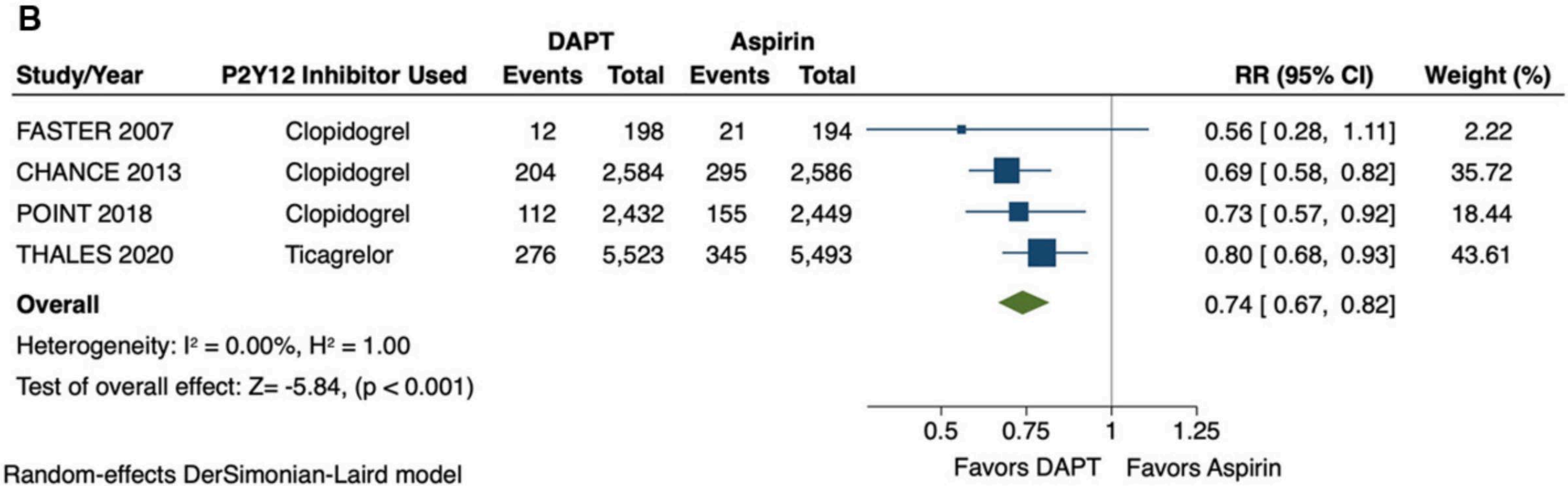
4 trials, 21,459 patients with minor stroke or high-risk TIA

	Aspirin + P2Y12i	Aspirin + Placebo
		
	N = 10,737	N = 10,722
Recurrent Stroke (N)	626	827
	RR 0.76; 95% CI, 0.68-0.83; P <0.001	
Major Bleed (N)	71	29
	RR 2.2; 95% CI, 1.14-4.34; P =0.02	

In minor stroke or high-risk TIA, short term DAPT reduced the risk of recurrent stroke at the expense of a higher risk of major bleeds

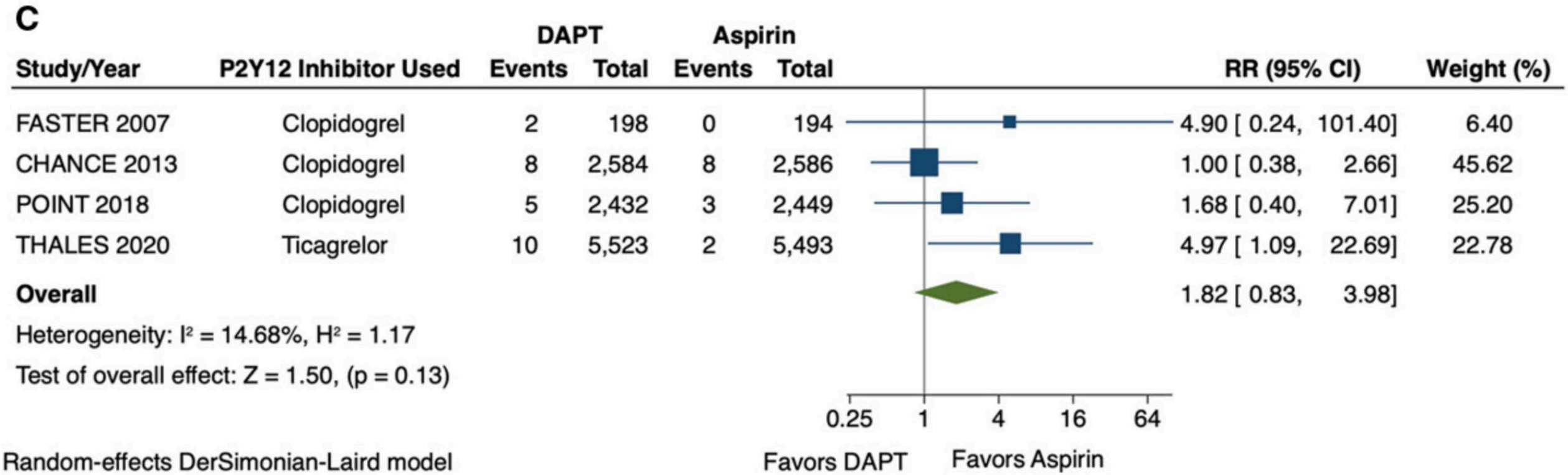
Bhatia K et al. Stroke 2021: e217-223.

B



Bhatia K et al. Stroke 2021: e217-223.

C

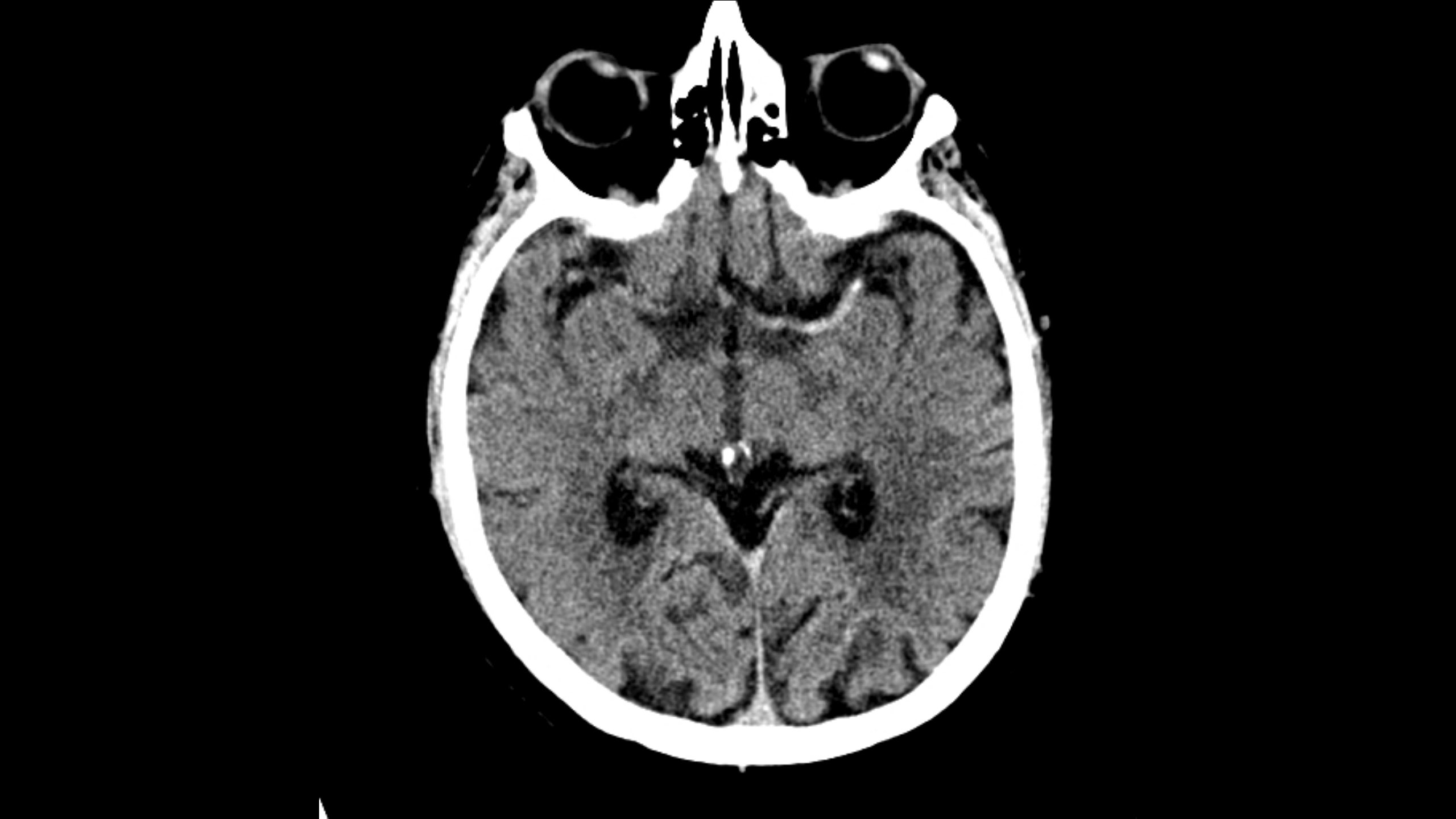


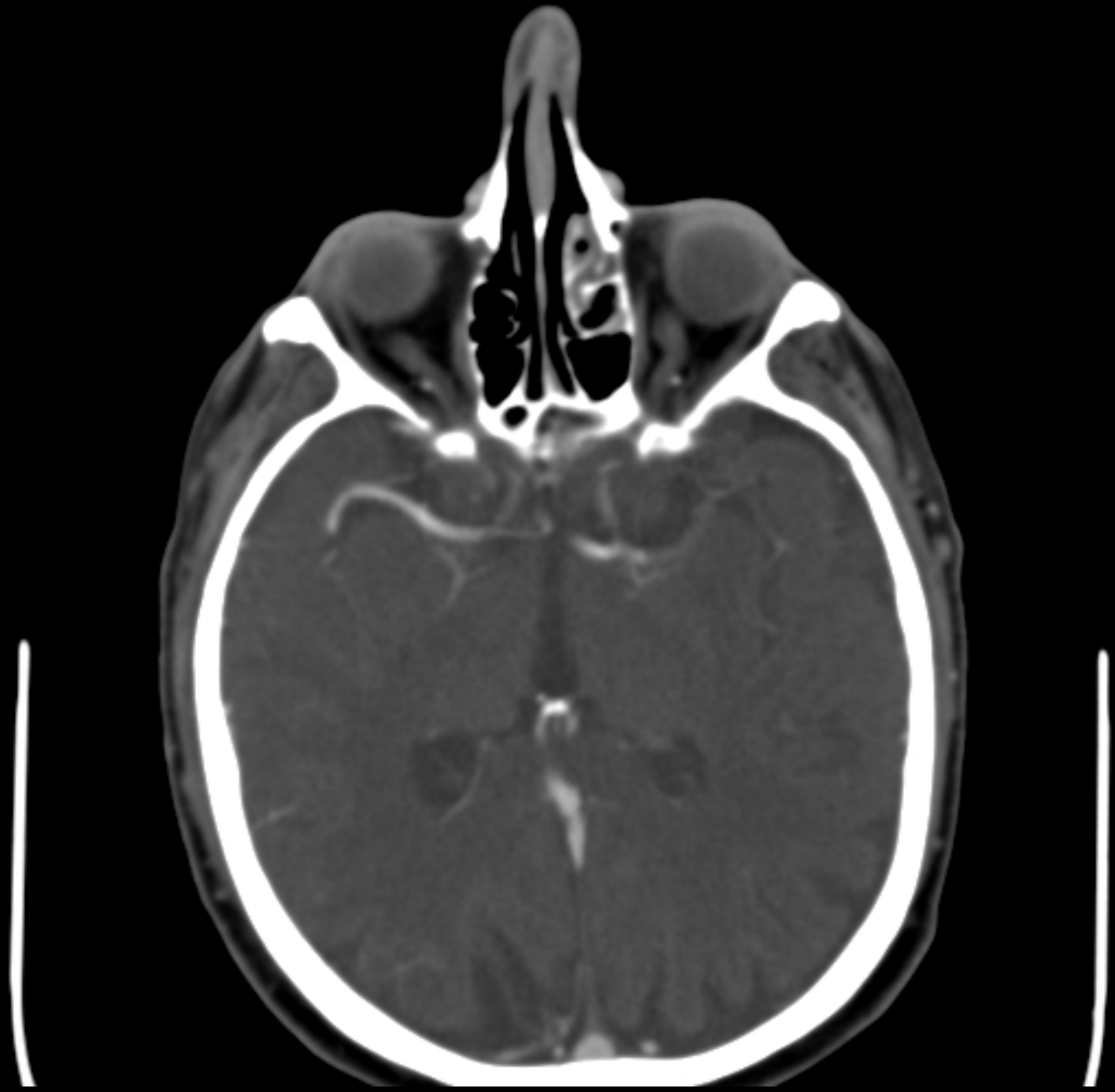
Bhatia K et al. Stroke 2021: e217-223.

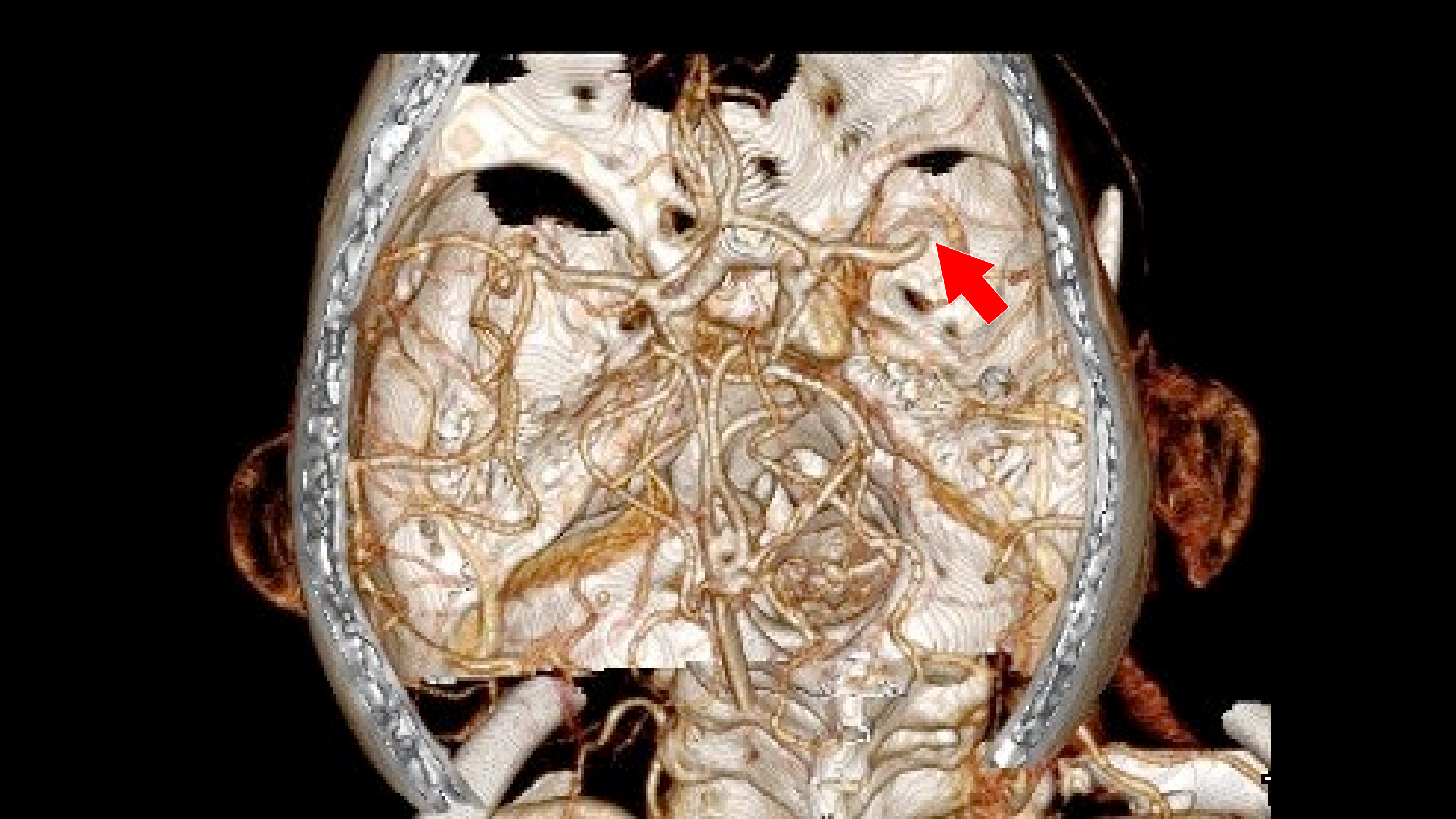
ASA 325 + Clopidogrel 300mg Load

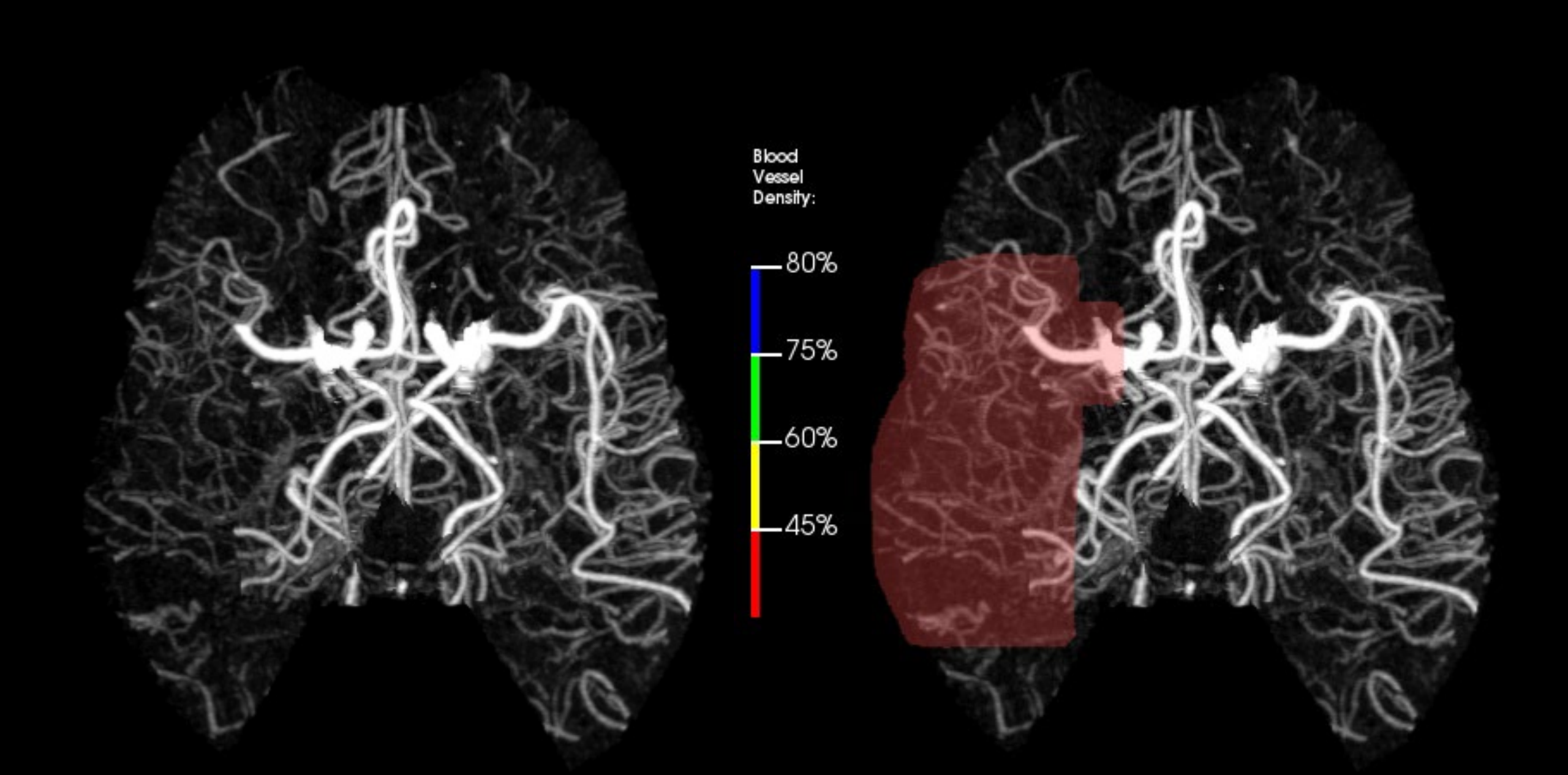
Aspirin 81mg + Clopidogrel 75mg

Large Vessel Occlusion







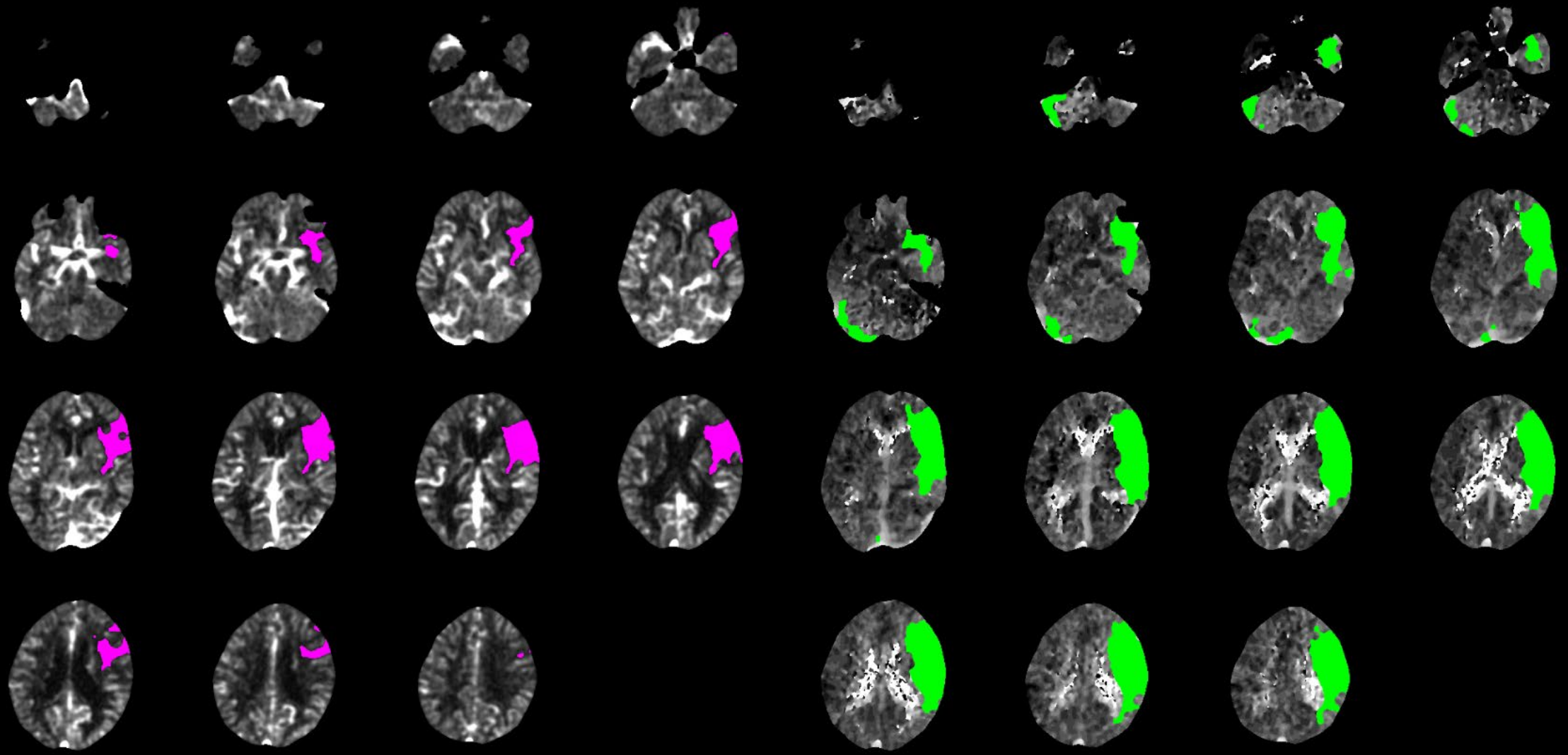


ID

for primary diagnosis.

RAPID

Not for primary diagnosis.



CBF<30% volume: 35 ml

Tmax>6.0s volume: 121 ml

Mismatch volume: 86 ml
Mismatch ratio: 3.5

RAPID

Not for primary diagnosis.


Life Net

ChristianaCare™

Jason T Nomura MD
jnomura@christianacare.org