Stroke Alert!

Emergent Workup and Treatment of Acute Stroke

SENTARA®

Strokes are bad

#5 Cause of death in the US

#1 Cause of disability in the US

80% Strokes can be prevented

#2 Cause of disability in the world

Every

40 seconds

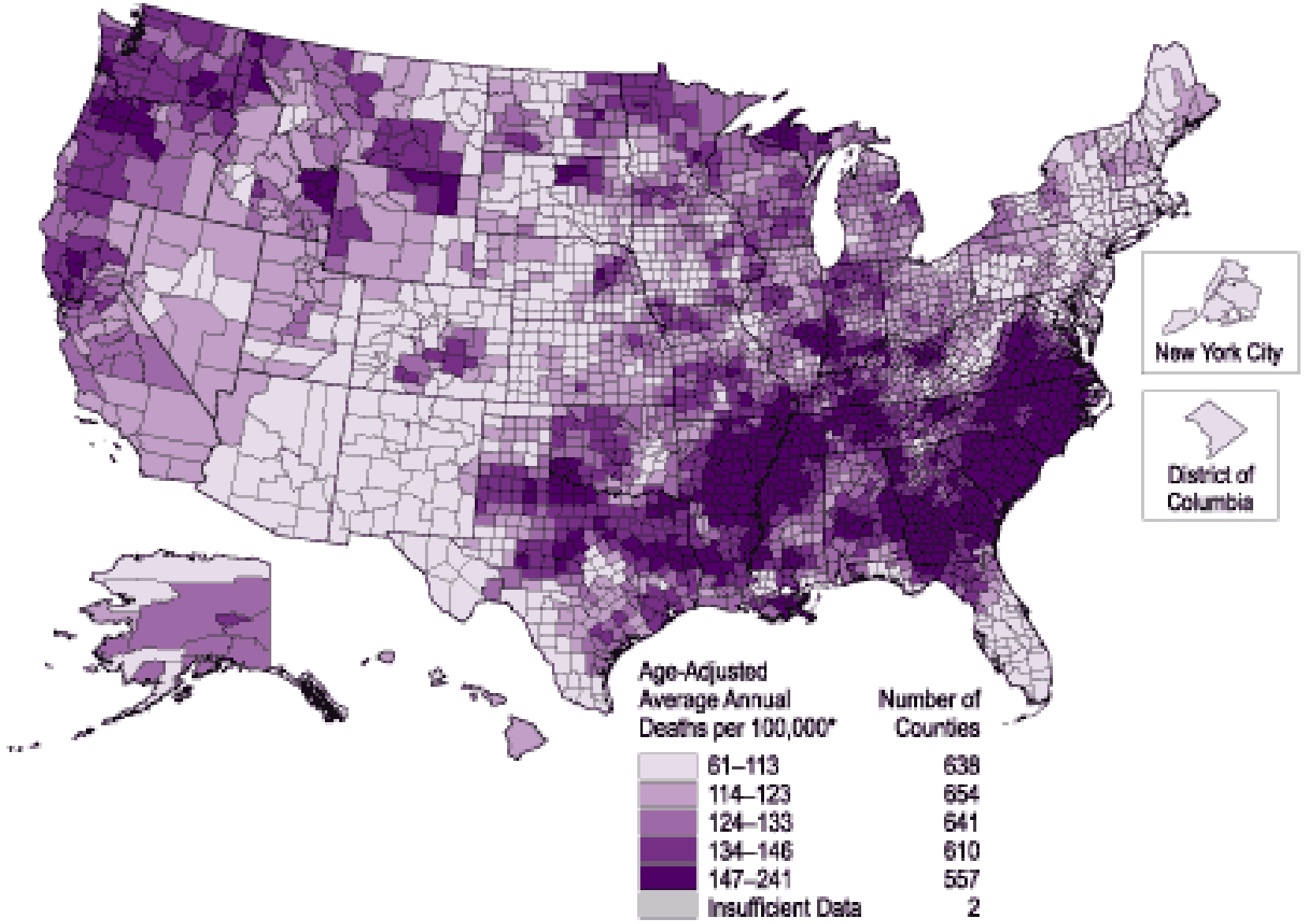
Someone has a stroke

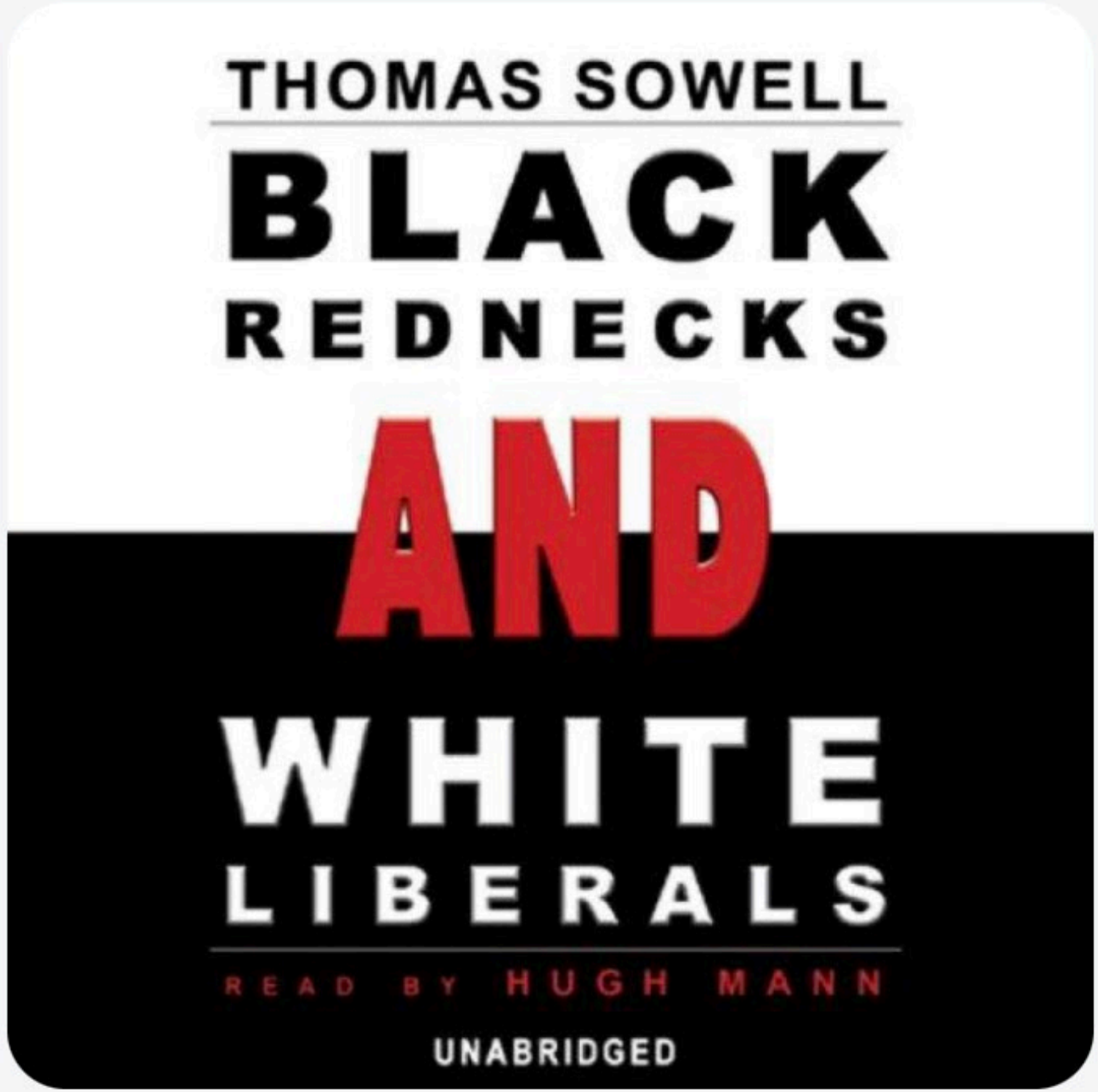
COST to society:

34 Billion annually

American Heart Association®

We Live in the “Stroke Belt”




THOMAS SOWELL
BLACK
REDNECKS
AND
WHITE
LIBERALS
READ BY HUGH MANN
UNABRIDGED

TIME IS BRAIN!

- Average neuron loss during untreated large vessel ischemia is 1.9 million neurons/minute
- That equals approx 3.6 years of accelerated brain age for every hour of sustained ischemia
- For every 30 minute delay there is a 10% decrease in favorable outcome

Large Vessel Occlusion Mortality

Estimated 3-22 % of acute stroke presentation

Carotid-T: 53%

MCA: 30-35%

Basilar: 89-92%

80%

MORTALITY rate LVO at 1 year if untreated

70%

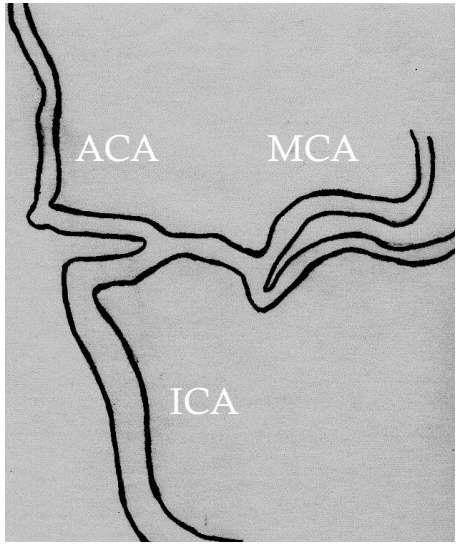
Proximal MCA occlusions ***do not respond*** to IV tPA

96%

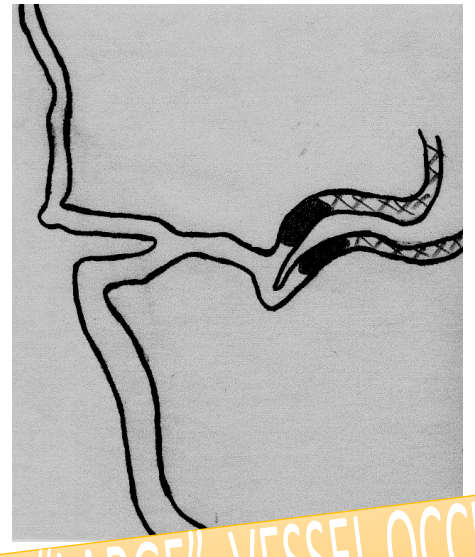
Carotid terminus & basilar artery occlusions ***do not respond*** to IV tPA

LVO accounts for greatest proportion of stroke patients with long term disability

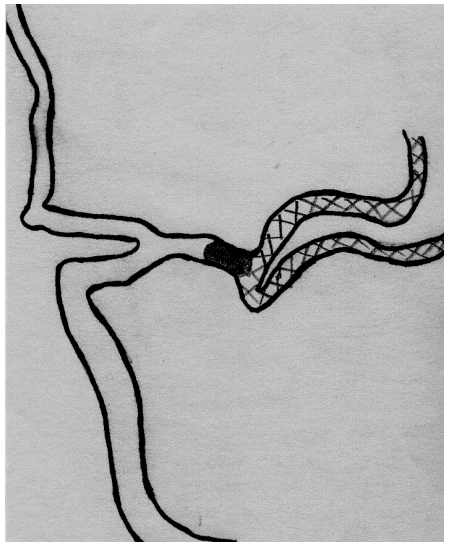
ICA



M2 Emboli

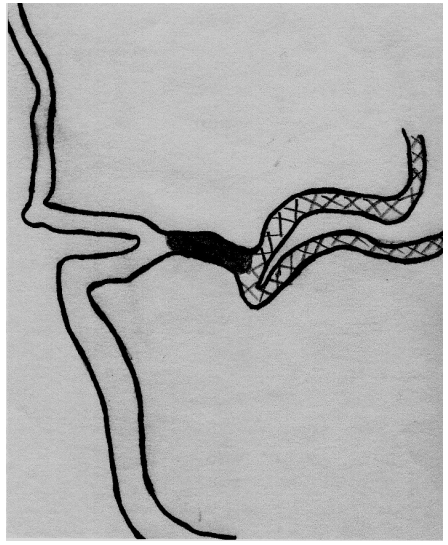


Distal M1

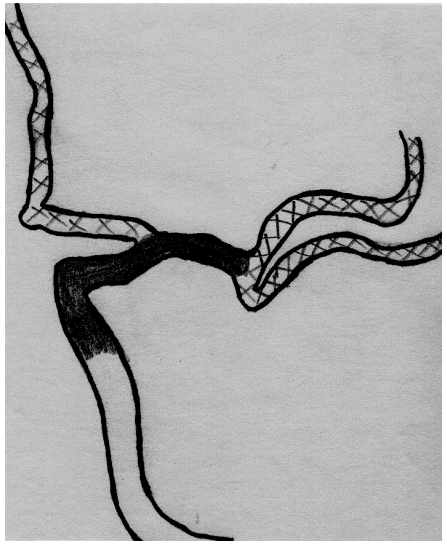


How large is "LARGE" VESSEL OCCLUSION?

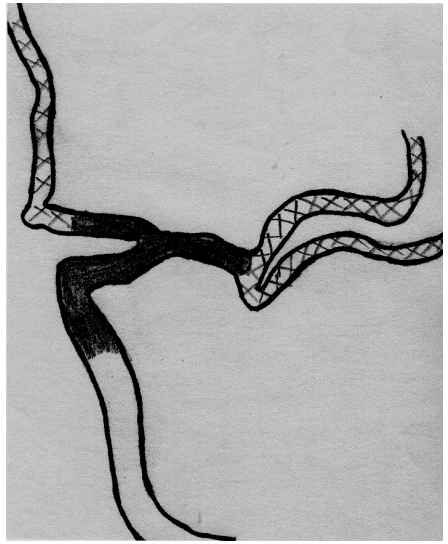
Proximal M1



Carotid "L"



Carotid "T"



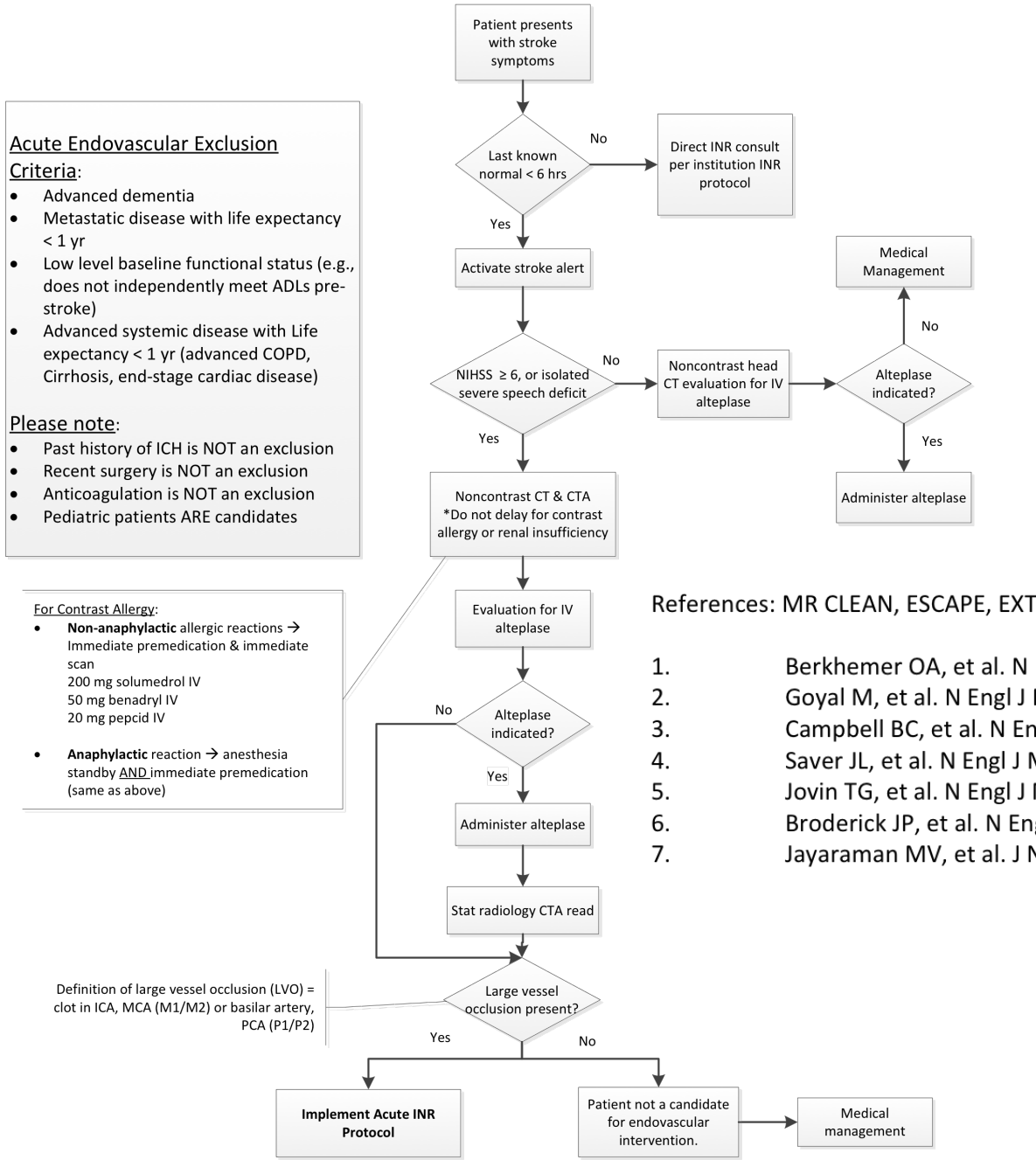
Stroke Alert

- **STROKE ALERT** results in simultaneous direct group paging to:
  - Tele-Neurologist on call
  - CT tech on site
  - Lab tech on site

Stroke Alert

- Triage is conducted by Tele Neurology with dispatch to INR for possible thrombectomy candidates

Acute Stroke Intervention Protocol



Acute Endovascular Exclusion Criteria:

- Advanced dementia
- Metastatic disease with life expectancy < 1 yr
- Low level baseline functional status (e.g., does not independently meet ADLs pre-stroke)
- Advanced systemic disease with Life expectancy < 1 yr (advanced COPD, Cirrhosis, end-stage cardiac disease)

Please note:

- Past history of ICH is NOT an exclusion
- Recent surgery is NOT an exclusion
- Anticoagulation is NOT an exclusion
- Pediatric patients ARE candidates

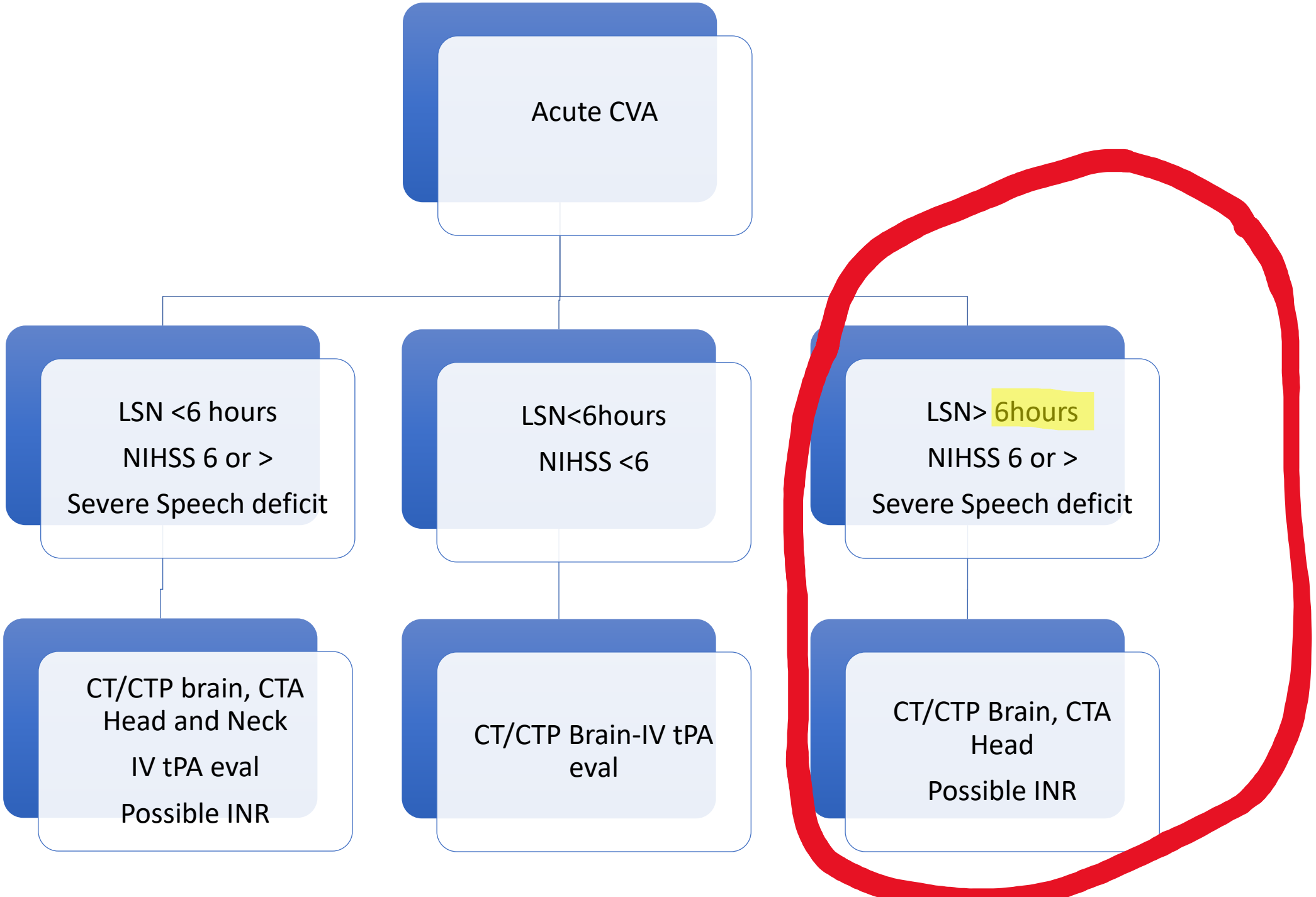
For Contrast Allergy:

- **Non-anaphylactic** allergic reactions → Immediate premedication & immediate scan
  200 mg solumedrol IV
  50 mg benadryl IV
  20 mg pepcid IV
- **Anaphylactic** reaction → anesthesia standby AND immediate premedication (same as above)

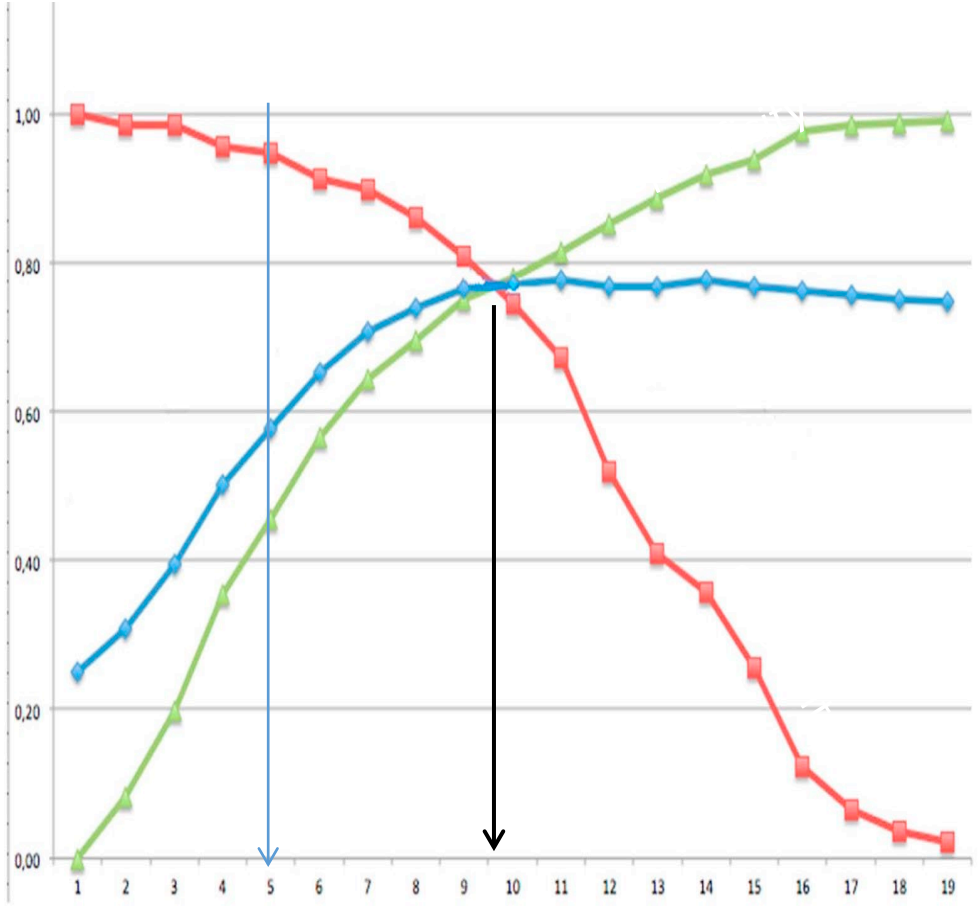
Definition of large vessel occlusion (LVO) = clot in ICA, MCA (M1/M2) or basilar artery, PCA (P1/P2)

References: MR CLEAN, ESCAPE, EXTEND-IA, PRIME SWIFT, REVASCT, IMS-III, ELVO guideline

1. Berkhemer OA, et al. N Engl J Med 2015;372:11-20.
2. Goyal M, et al. N Engl J Med. 2015;372(11):1019-30.
3. Campbell BC, et al. N Engl J Med 2015;372:1009-18.
4. Saver JL, et al. N Engl J Med. 2015. Pub ahead of print
5. Jovin TG, et al. N Engl J Med. 2015. Pub ahead of print
6. Broderick JP, et al. N Engl J Med 2013;368:893-903.
7. Jayaraman MV, et al. J NeuroIntervent Surg. 2015;7:316–321.


Acute CVA
LSN <6 hours
NIHSS 6 or >
Severe Speech deficit
LSN<6hours
NIHSS <6
LSN> 6hours
NIHSS 6 or >
Severe Speech deficit
CT/CTP brain, CTA Head and Neck
IV tPA eval
Possible INR
CT/CTP Brain-IV tPA eval
CT/CTP Brain, CTA Head
Possible INR

NIH Stroke Scale Helps Predict LVO
(But NOT duration of symptoms)



Severe strokes are more likely to have LVO

Item	Description	Range
1a	Level of Consciousness	0 – 3
1b	LOC Questions	0 – 2
1c	LOC Commands	0 – 2
2	Best Gaze	0 – 2
3	Best Visual	0 – 3
4	Facial Palsy	0 – 3
5	Motor Arm Left	0 – 4
6	Motor Arm Right	0 – 4
7	Motor Leg Left	0 – 4
8	Motor Leg Right	0 – 4
9	Limb Ataxia	0 – 2
10	Sensory	0 – 2
11	Neglect	0 – 2
12	Dysarthria	0 – 2
13	Best Language	0 – 3

Andrew Asimos, MD, FACEP

INDICATIONS FOR AESI

1. Large vessel occlusion-CTA or MRA
2. Viable brain/ small infarct core-CT/CTP or MR
   - **regardless** of time of onset!
3. High stroke scale -NIHSS >6

Notably Absent from List of "CI" for AESI

- IV tPA
- Anticoagulation
  - coumadin, Pradaxa, heparin, Integrilin, etc
  - LVAD patients!
- Recent major surgery
- Strict time constraints (intervention based on brain viability rather than time last seen normal or time of symptom onset)
- Recent or current GI bleeding
- Prior history of ICH

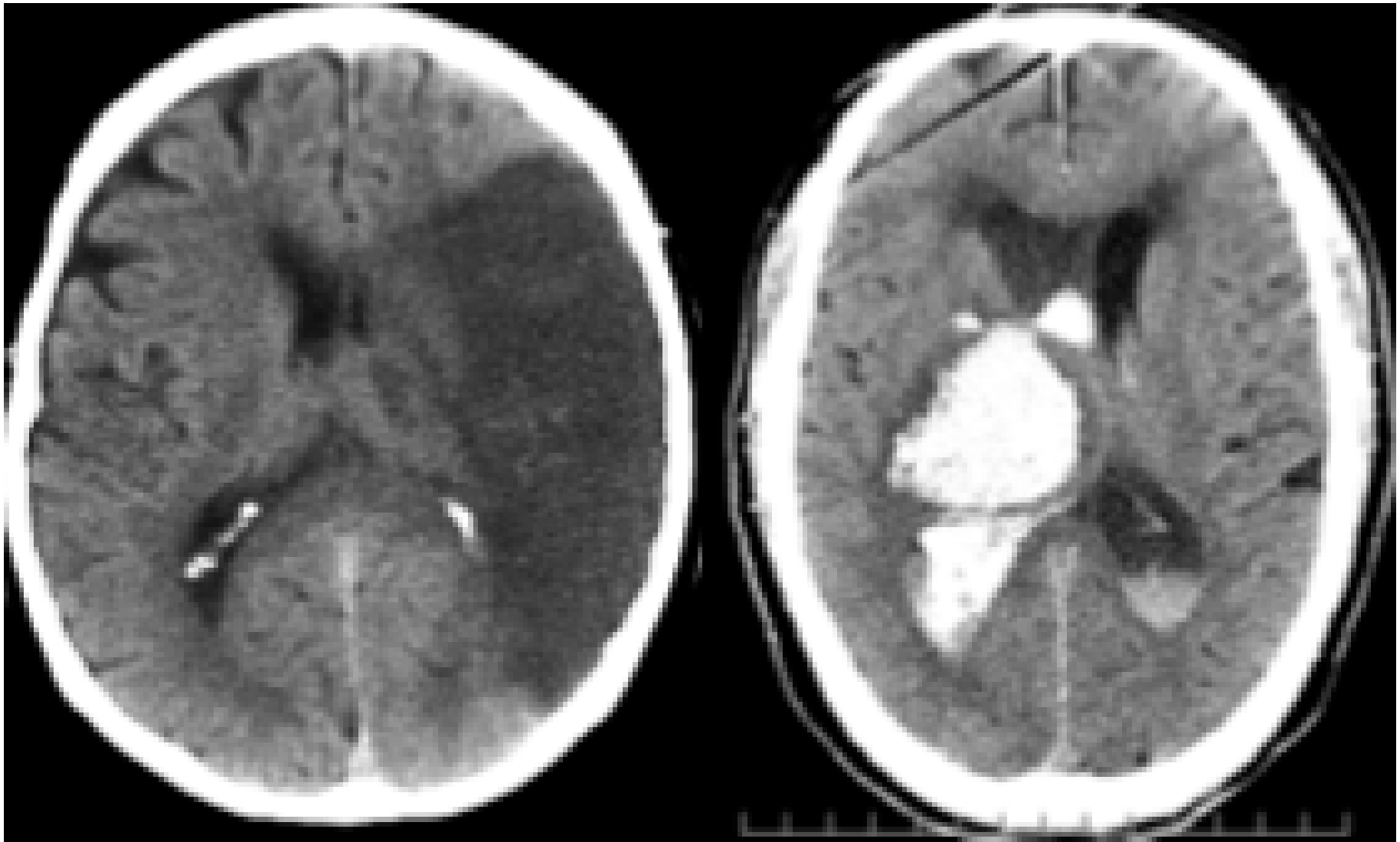
Contraindications for AESI

- Large volume infarcted brain (>70 cc)
- Hemorrhagic stroke
- Other considerations:
  - Mass in the ipsilateral hemisphere
  - Severe coagulopathy
  - Poor baseline function (dementia, life expectancy < 1 yr, bedridden, etc.)
  - Advanced age with other significant comorbidities

Risks of AESI

- Vessel perforation
- Dissection
- Distal emboli
- Reperfusion hemorrhage (2-7%)
  - IV tPA 6%
- Access complications femoral artery
- Medical issues: Cardiac/ respiratory/ renal

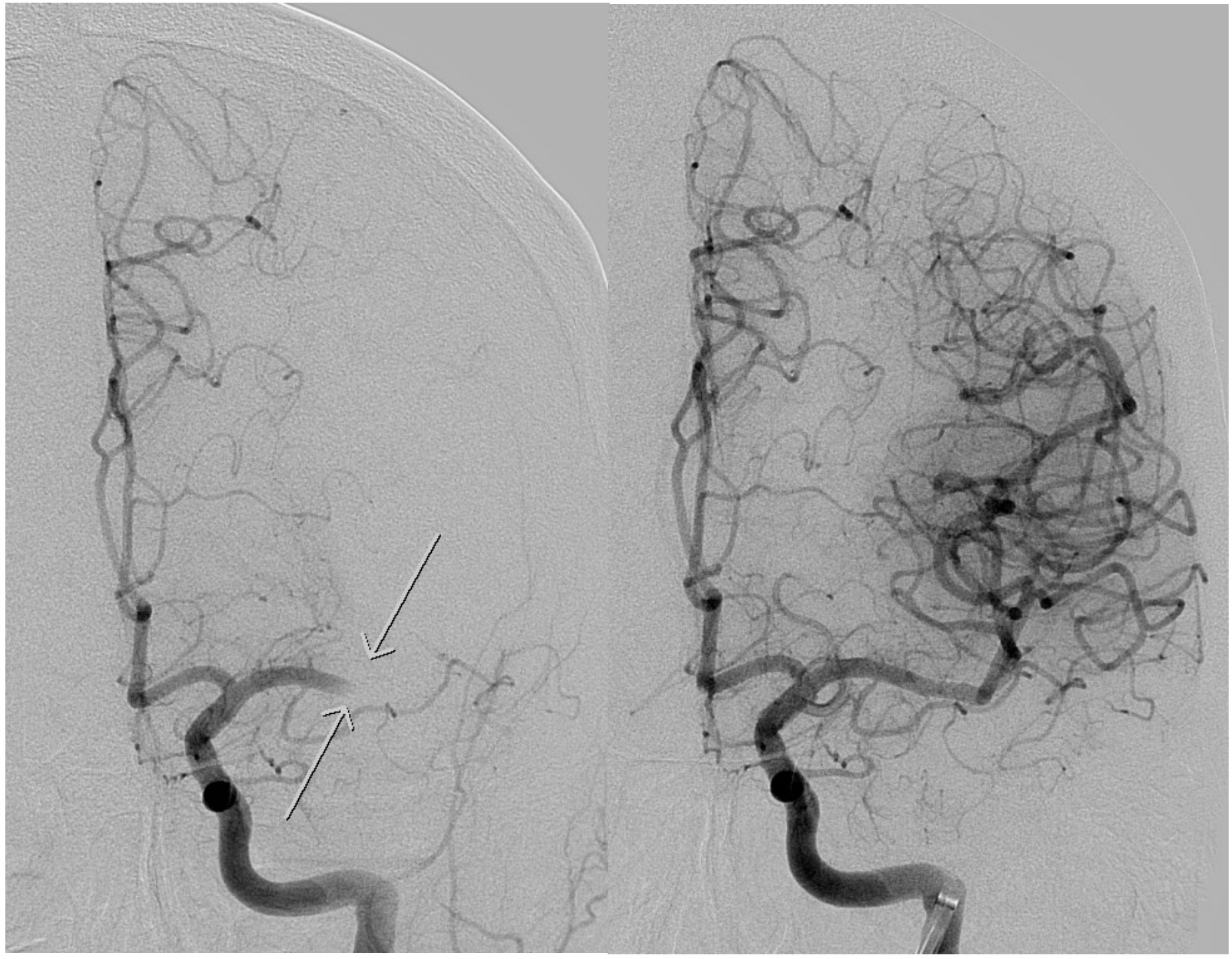
Excluded!

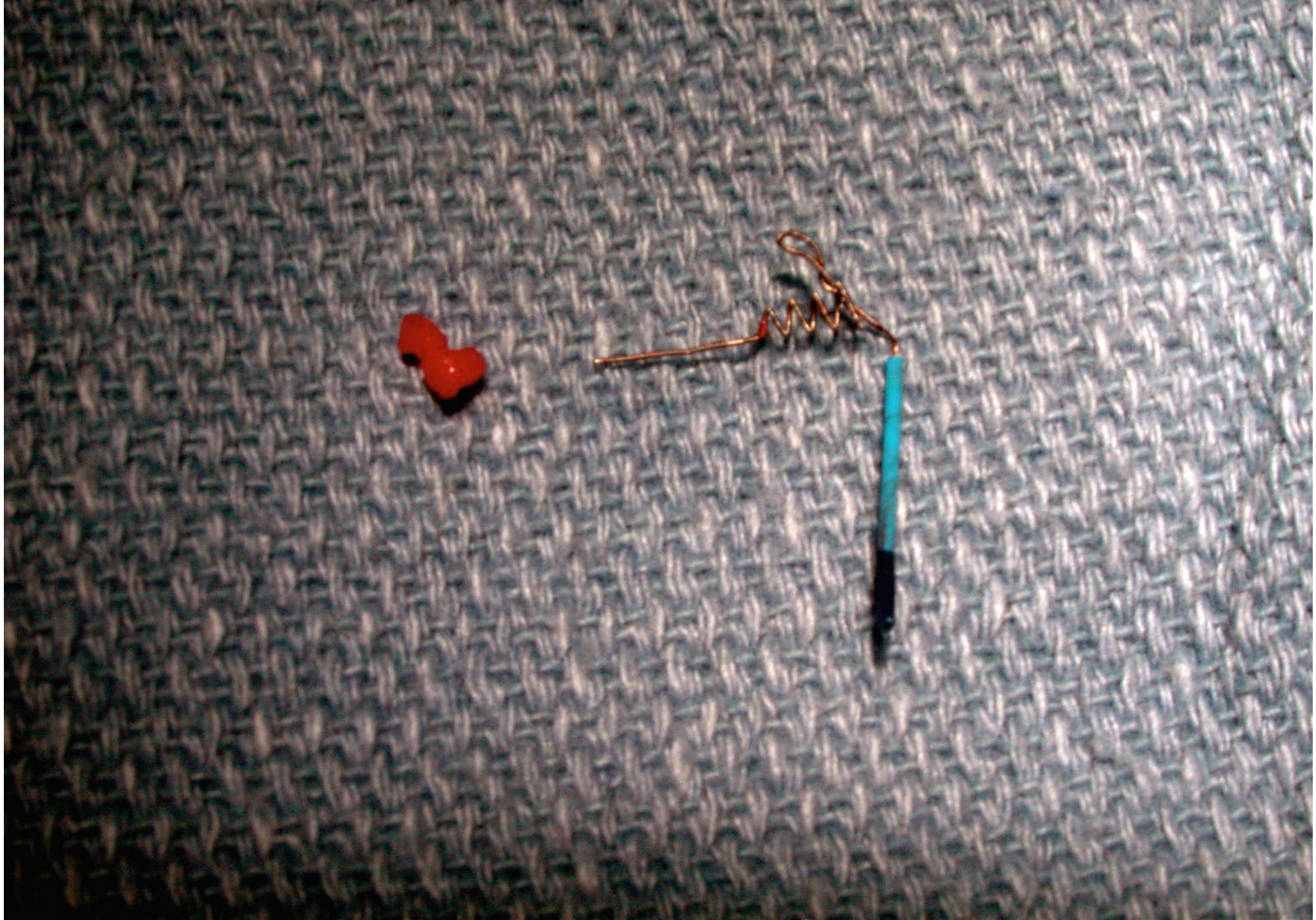


Included!

DATELINE: 2006

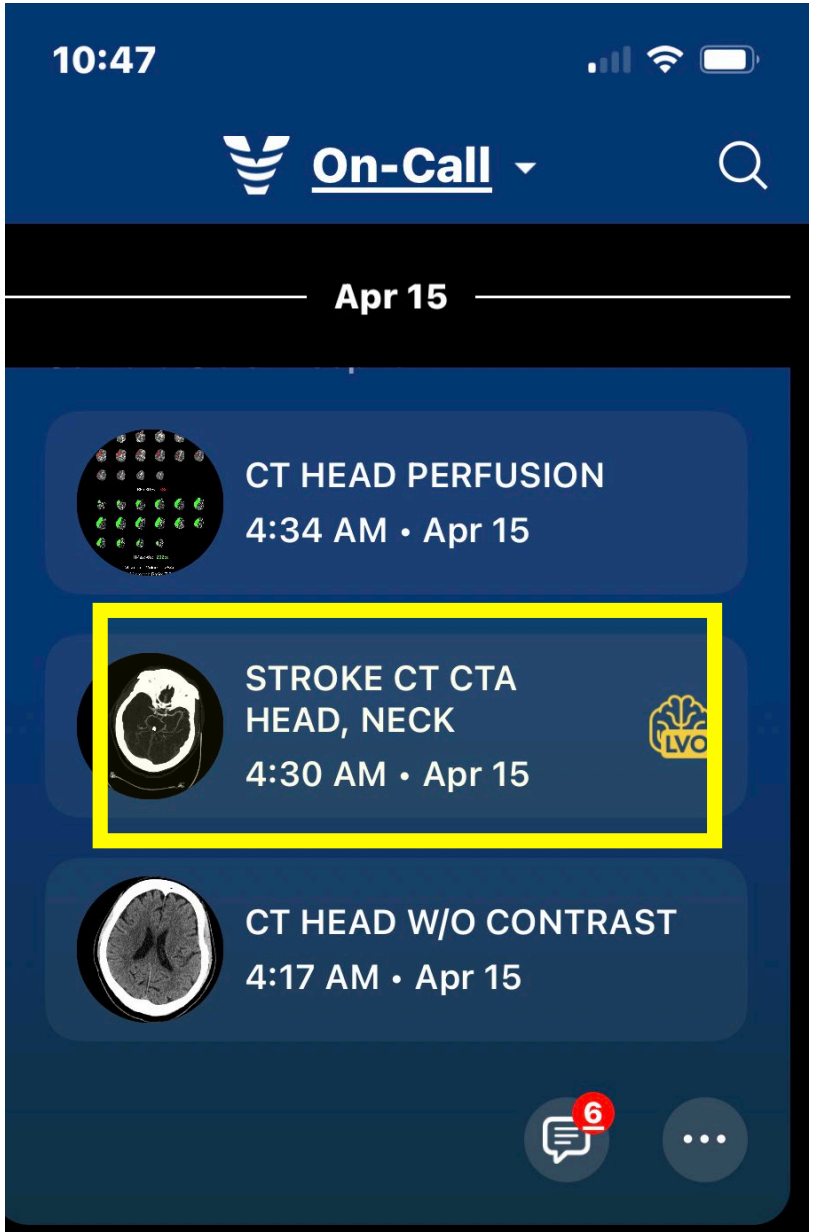
- 4 DAYS POST UNCOMPLICATED CABG, TYPICAL RISK FACTORS
- NEW ONSET R HEMIPARESIS/APHASIA IN HOSPITAL WHILE DRESSING FOR DISCHARGE
- STAT NEURO CONSULT AND REFERRAL TO INR
- CT/CTA/ANGIO/ WORKUP WITH “MERCI” CLOT RETRIEVAL, PROCEDURE TIME < 60 MINUTES
- NEURO RETURNS TO BASELINE, D/C HOME NEXT DAY

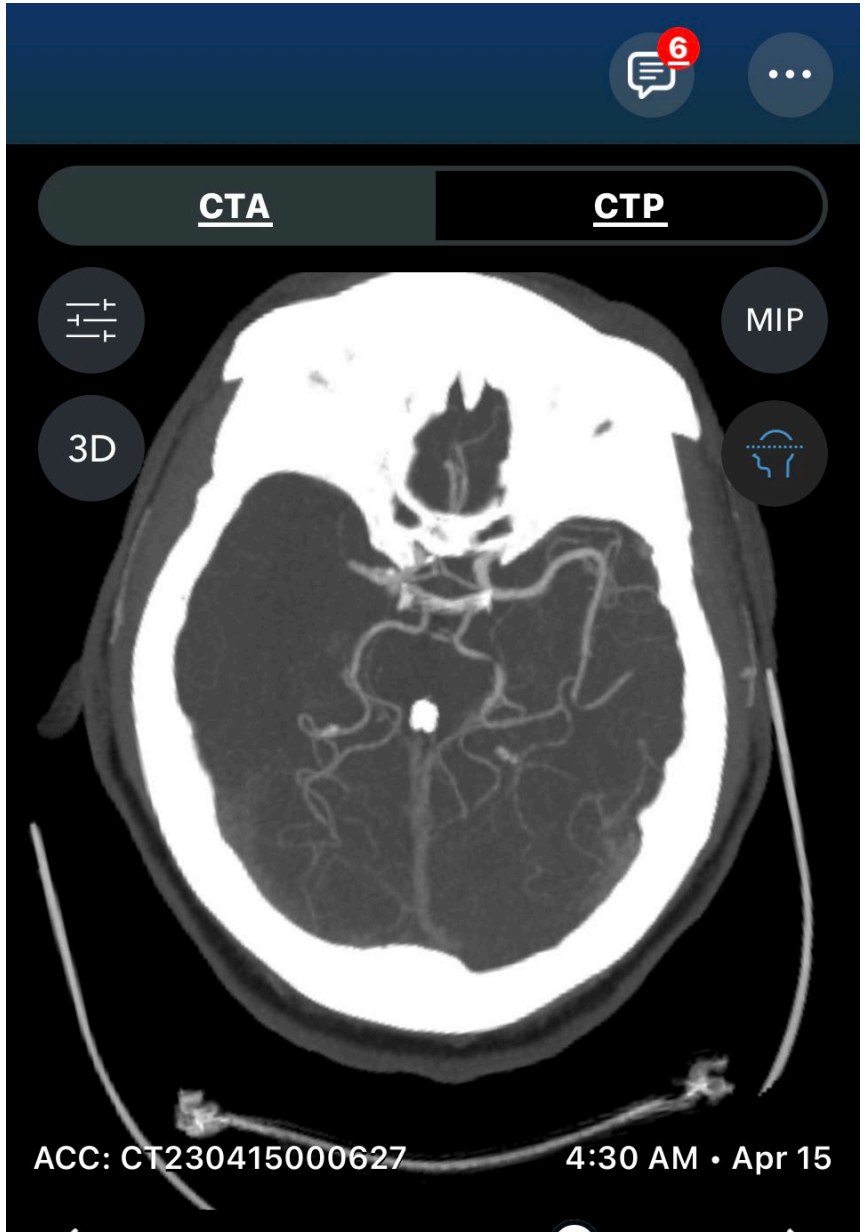


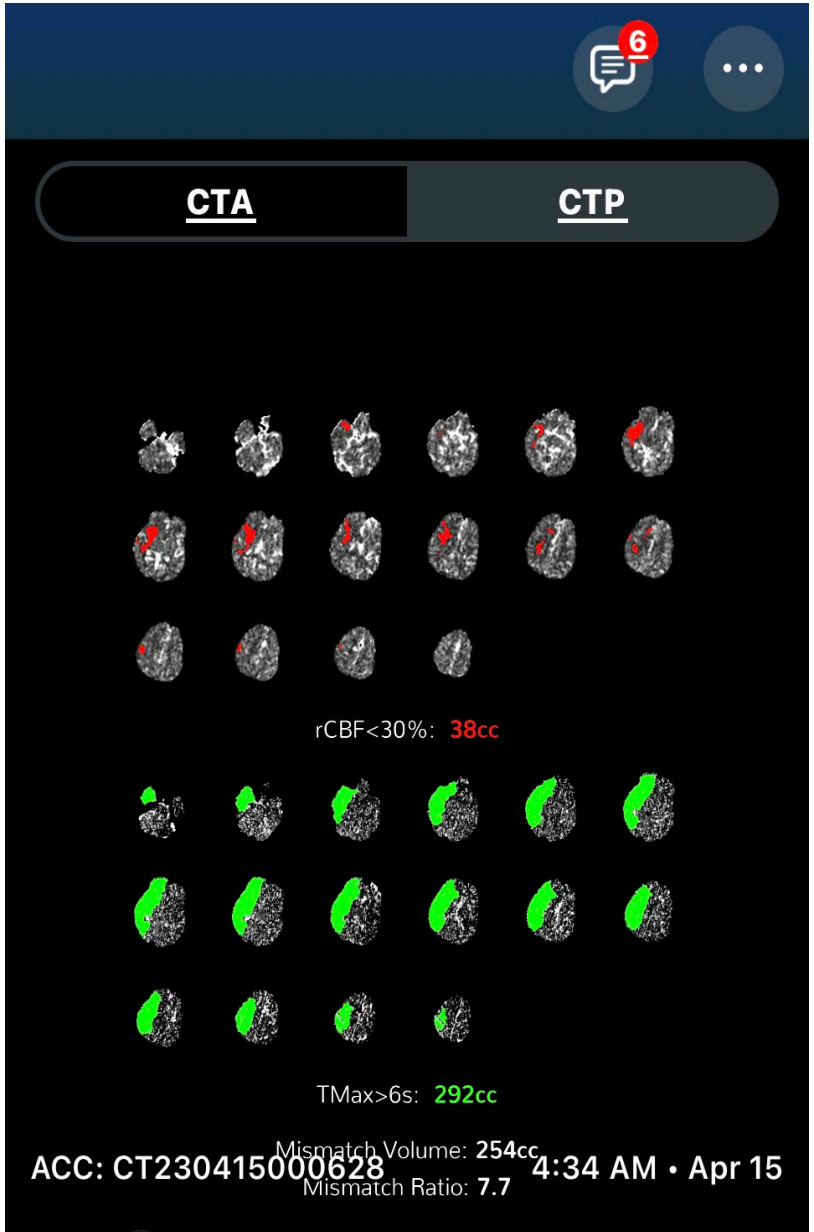


FAST FORWARD 17 YEARS!!

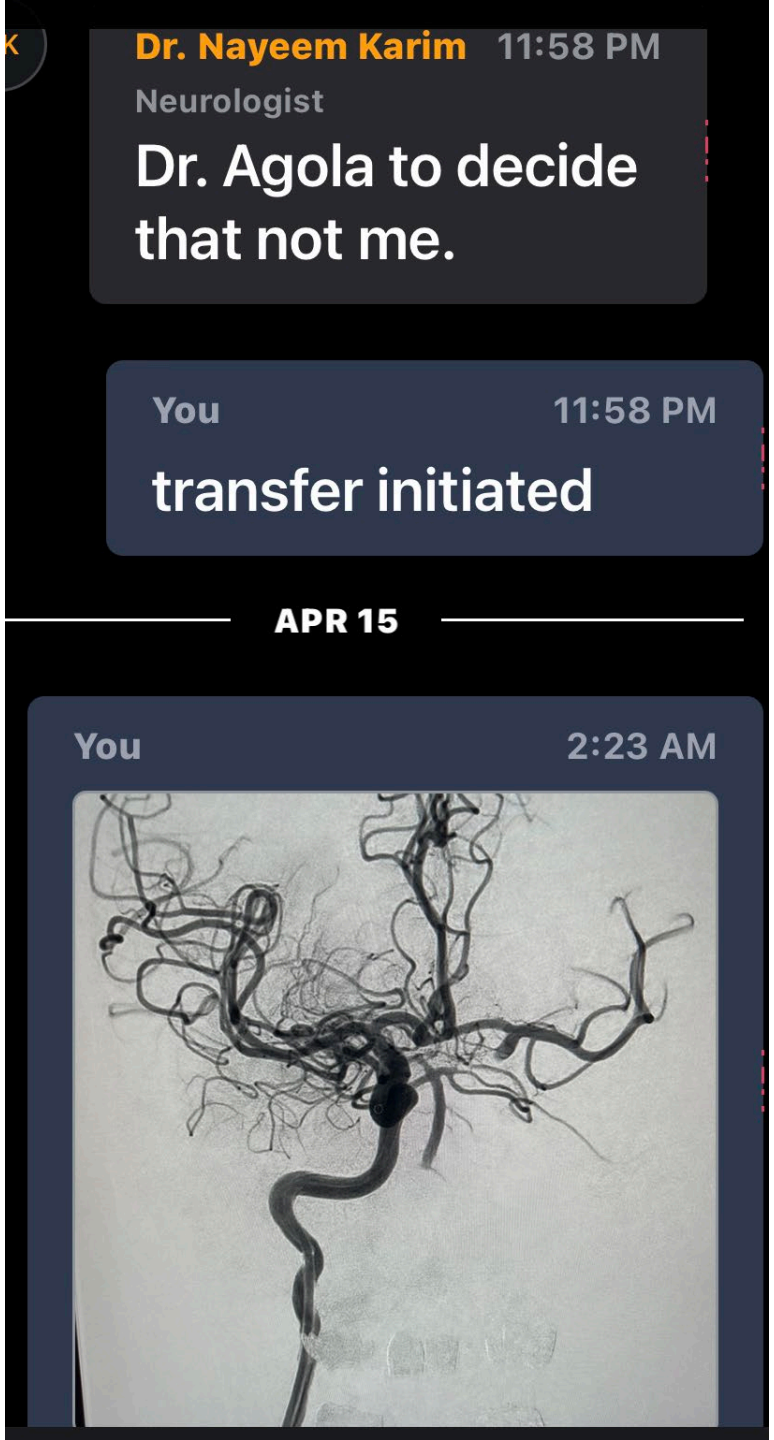
VIZ.ai


10:47
On-Call
Apr 15
CT HEAD PERFUSION
4:34 AM • Apr 15
STROKE CT CTA
HEAD, NECK
4:30 AM • Apr 15
LVO
CT HEAD W/O CONTRAST
4:17 AM • Apr 15
6


6
CTA
CTP
MIP
3D
ACC: CT230415000627
4:30 AM • Apr 15


6
CTA
CTP
rCBF<30%: 38cc
TMax>6s: 292cc
Mismatch Volume: 254cc
Mismatch Ratio: 7.7
ACC: CT230415000628
4:34 AM • Apr 15

VIZ.ai



Real time HIPPA protected image display and care communications.

GOAL:Table to clot access = 30 minutes!

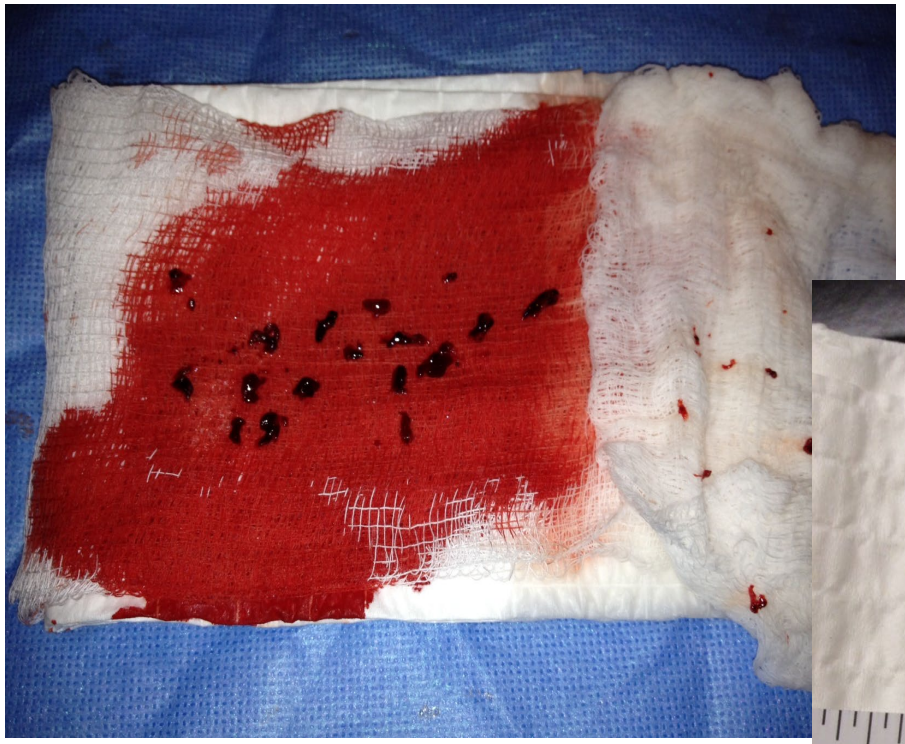
SNGH Neuro-Interventional

SNGH Door-to-Puncture Median Times (minutes)

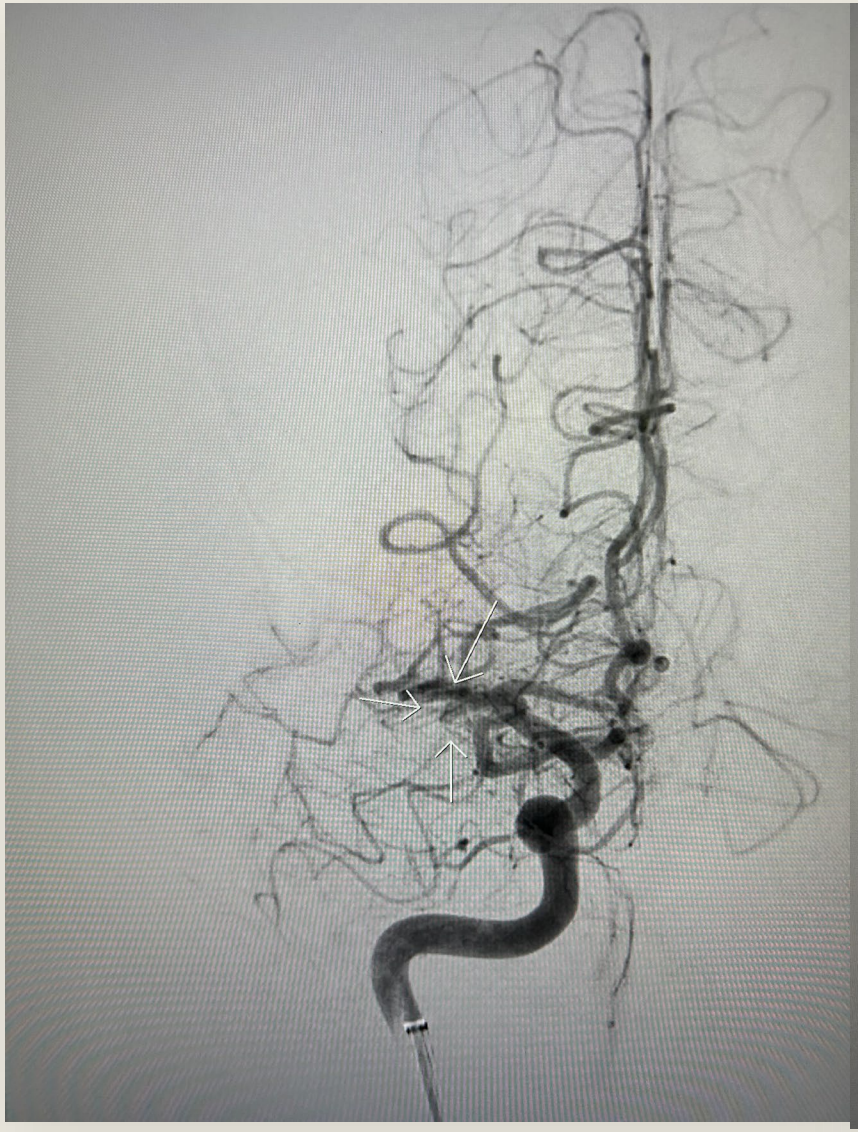
	2021	2022
Overall	**21**	**20**
Direct	98	120
Transfer	19	19

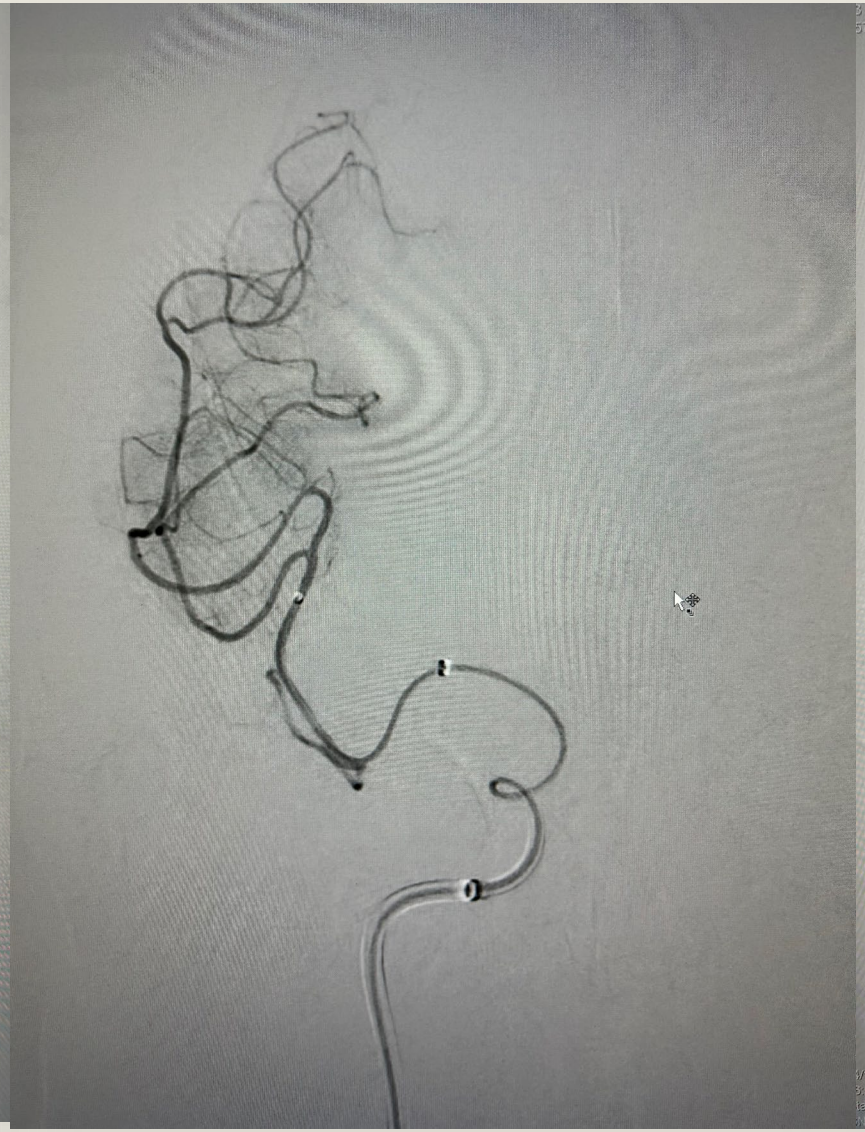
INR TOOL BOX

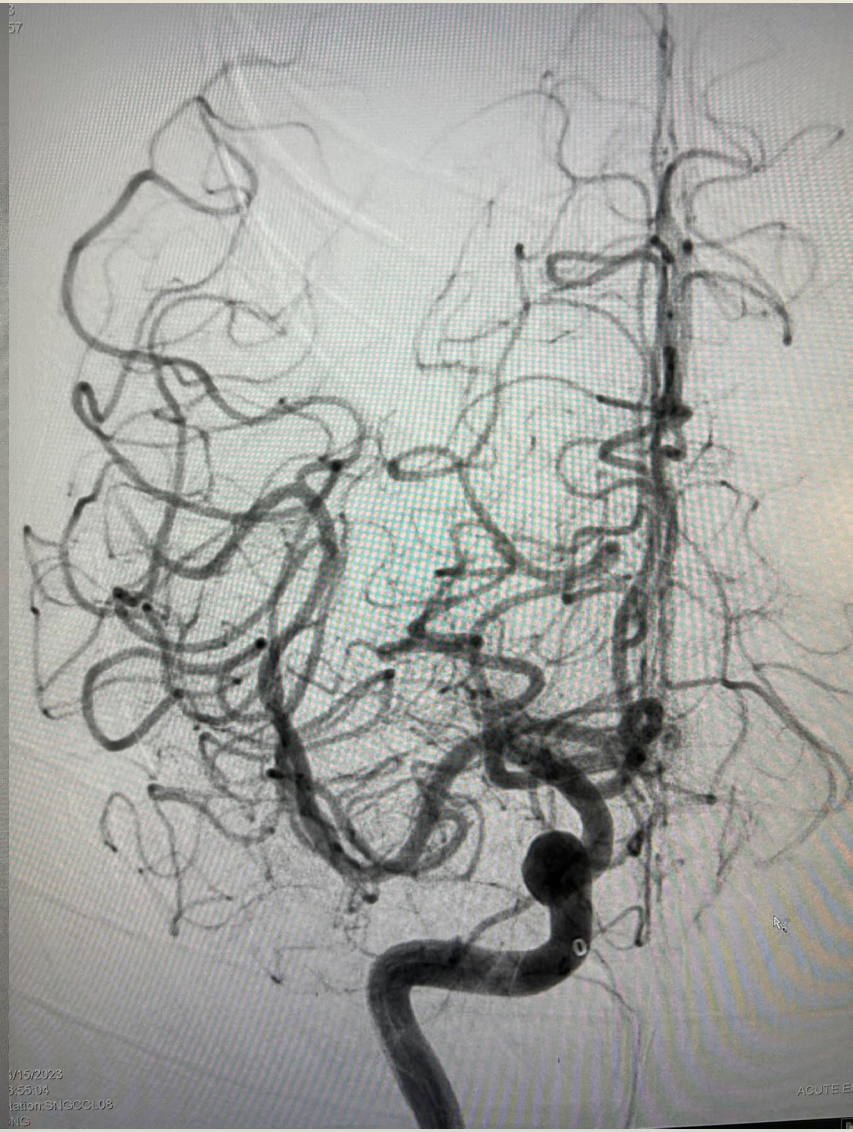
Suction Thrombectomy



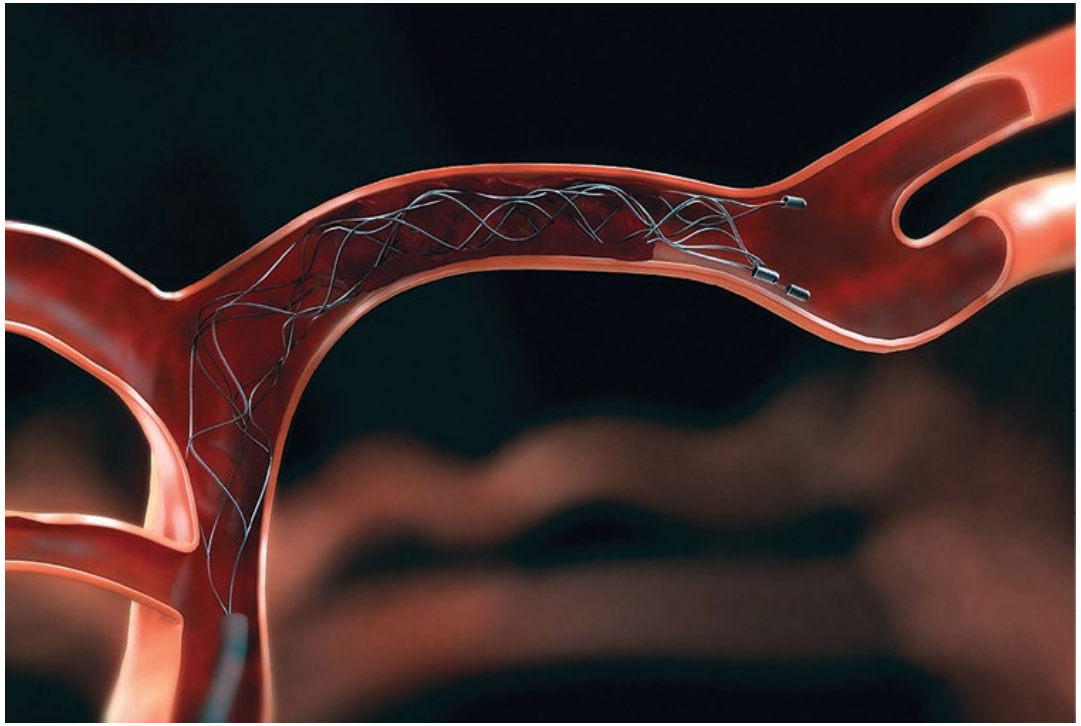
Suction Thrombectomy

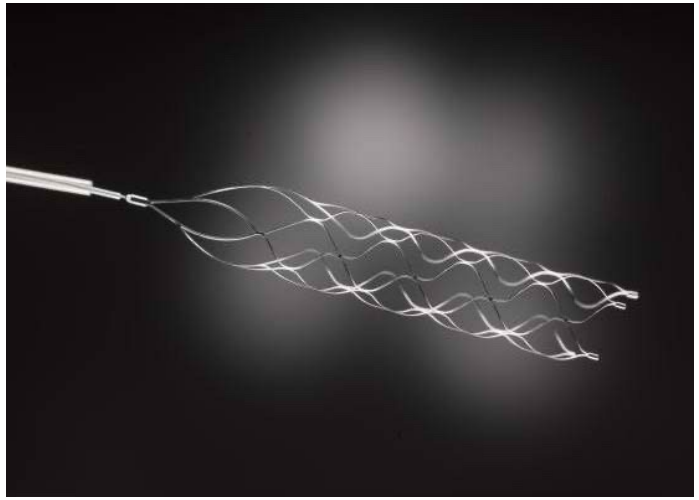


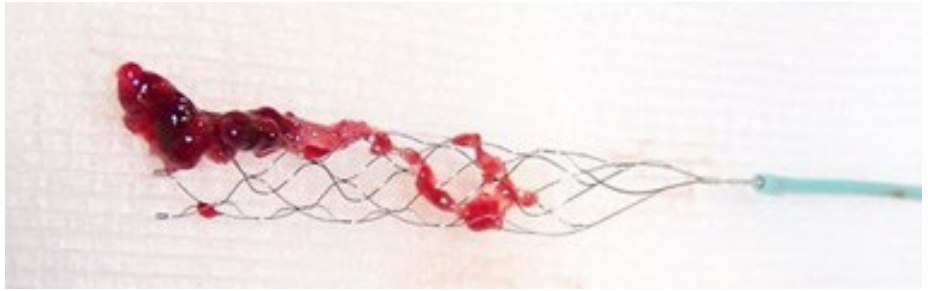




Stent Retriever Embolectomy







Full Revascularization and clot removal of MCA Stroke in Afib Patient

Norfolk General Hospital

PATIENT OVERVIEW

- Patient underwent Afib Ablation at Sentara Heart hospital 48 hours prior
- Alert of stroke occurred at 7:45 am
- Patient was sent to Interventional Lab at 8:30 am
- Groin puncture at 8:41am
- Full clot retrieval and TICI 3 revascularization at 9:15

CASE CONCLUSION

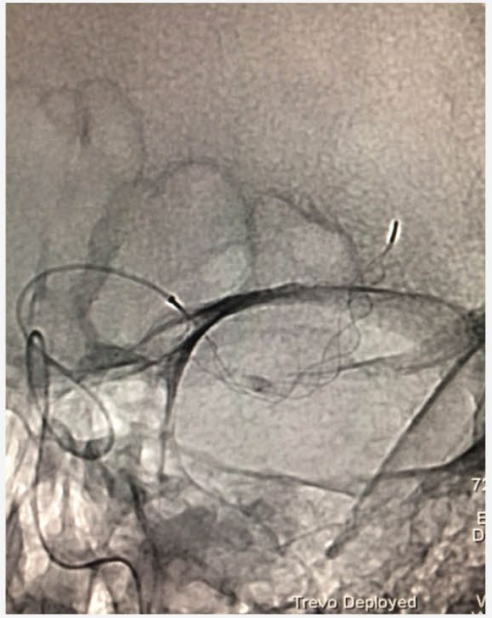
- NIHSS 1

PROCEDURAL DESCRIPTION

- Merci Balloon Guide Catheter was used for flow arrest and aspiration
- Trevo ProVue was deployed in MCA
- Full Clot retrieval and full revascularization
- **Total procedure time to revasc: 34 minutes**...Time to complete revasc from symptom alert: 1 hr 30 min
- TICI 3 revascularization was observed

Angiogram revealing MCA Clot

Trevo ProVue Deployed in clot



Full Revascularization

- Neuro Interventionalists: - Dr. John Agola and Dr. Karah Lanier
- Special thanks to Sentara Heart Hospital for quick response

600 Gresham Dr.
Norfolk, VA
23507

TICI 3 revascularization was observed

Angiogram revealing MCA Clot

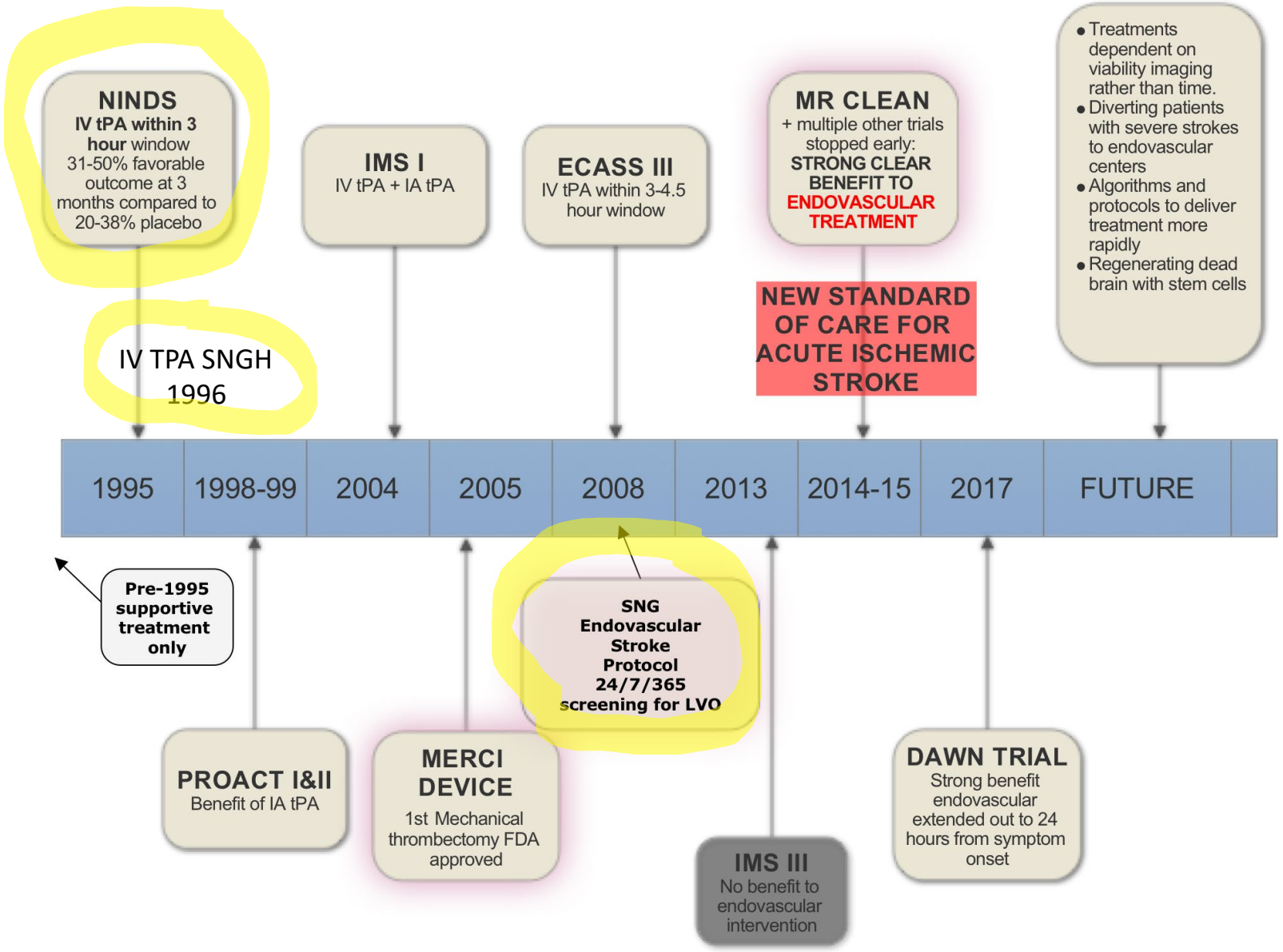
Trevo ProVue Deployed in clot

Full Revascularization

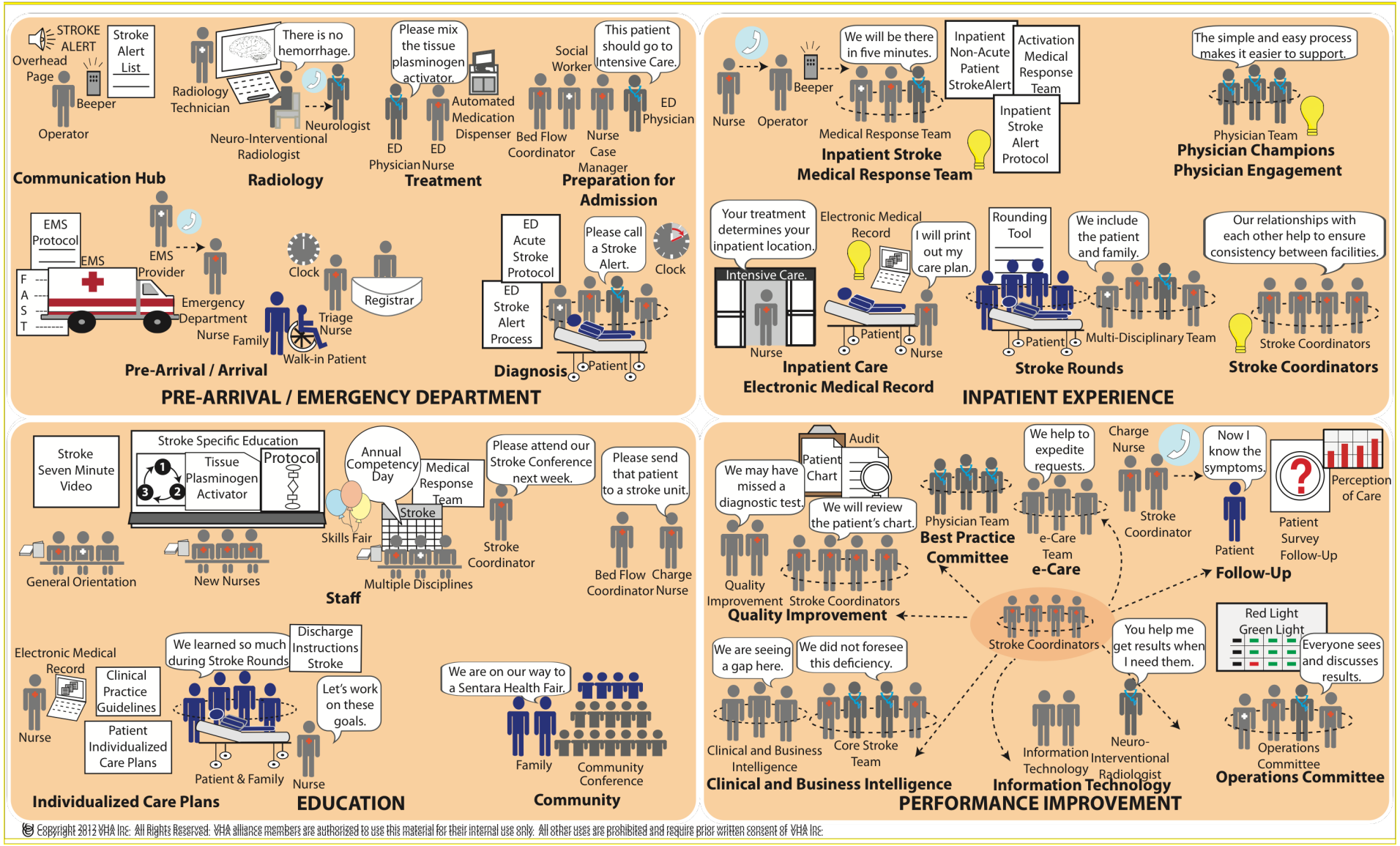
“COMBO PLATTER”

!!!!Specials every Tuesday and Friday!!!!

Endovascular Stroke Care Evolution



VHA Leading Practice Blueprint™
Sentara Healthcare - Stroke
Getting Better Together



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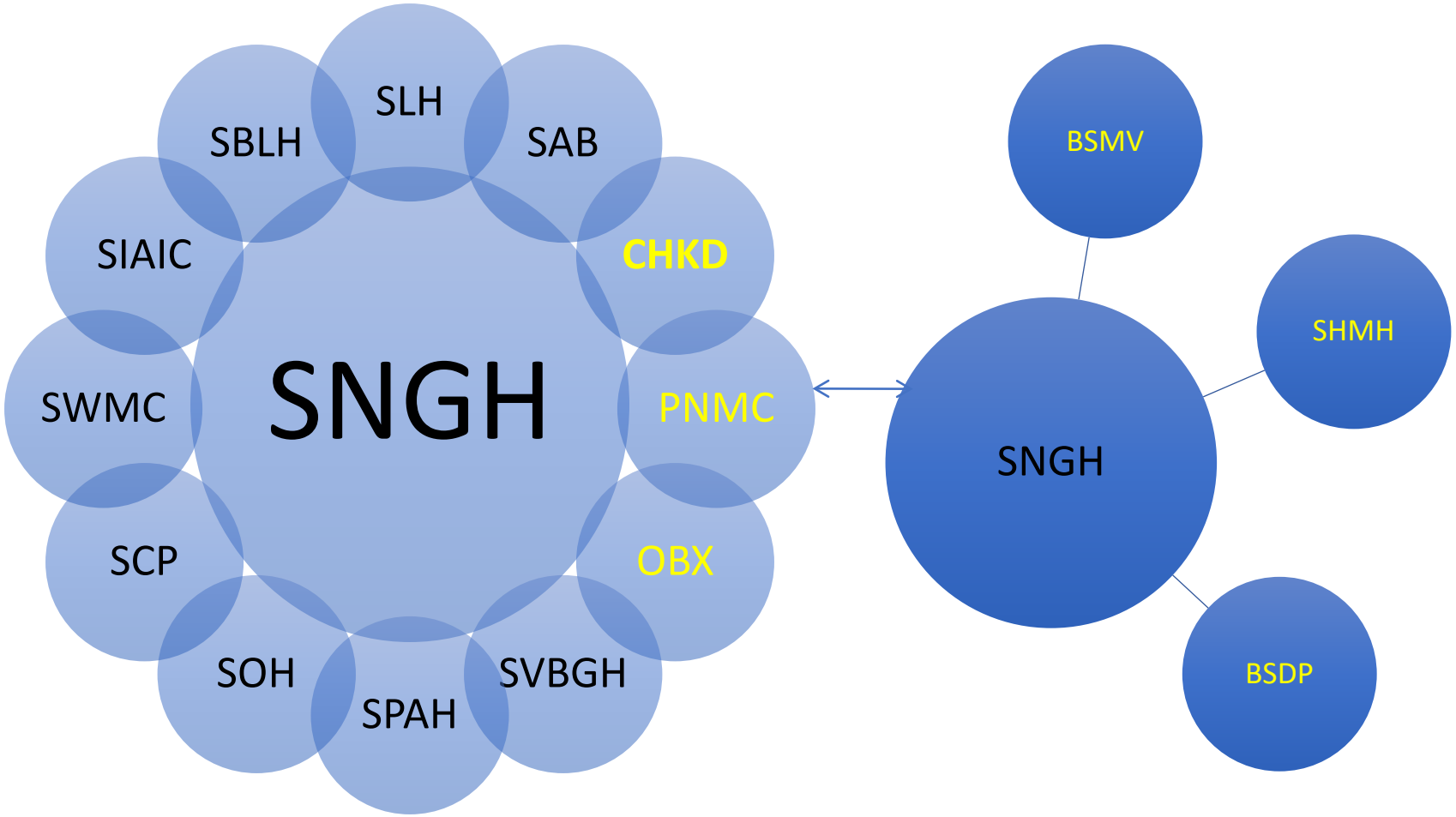
Summary

- Cerebral LVO is Deadly or Disabling
- Prompt recognition with Teleneurology and advanced imaging identifies LVO and brain viability
- Advanced real time secure communication tools streamline triage
- Safe, effective and rapid thrombectomy readily available with favorable results
- Stroke Alert is a carefully coordinated brisk tempo “ballet”

Sentara Southside INR Stroke Universe



SNGH Neuro Interventional “Provider” Team

John Agola, MD
Interventional Neuroradiologist
1994-present

Wilson Daugherty, MD, PhD
Neurosurgeon
2015-present

Dr. Aaron Wessell, MD
Neurosurgeon
2022-present

Thank You

SENTARA®