MEET 2015
MULTIDISCIPLINARY EUROPEAN
ENDOVASCULAR THERAPY

Evidence for Mechanical Thrombectomy For Acute Ischemic Stroke

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Disclosure

Speaker name:

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I have the following potential conflicts of interest to report:

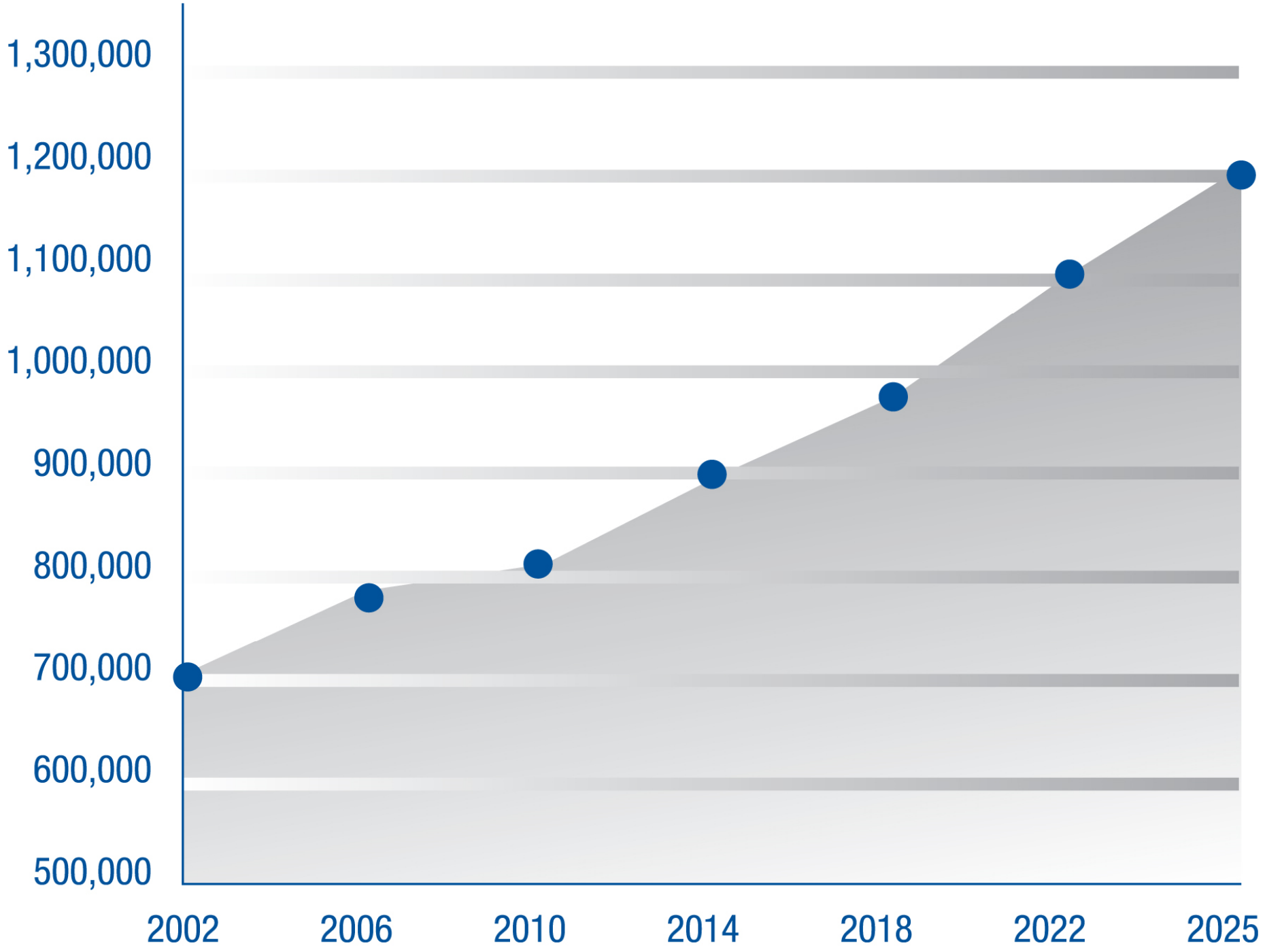
- ☐ Honorarium : Toshiba
- ☐ Institutional Grant/Research Support: Toshiba

Public Health Impact of Stroke

Amazing Parallels with AMI

- 4th leading cause of death in US, 2nd worldwide
- Leading cause of long-term care disability
  - Most prevalent neurologic condition
  - Most common discharge diagnosis to nursing homes
  - Most common diagnosis treated in rehab
  - $70 Billion Annually in US

Lloyd-Jones D , Circulation 2010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900,000
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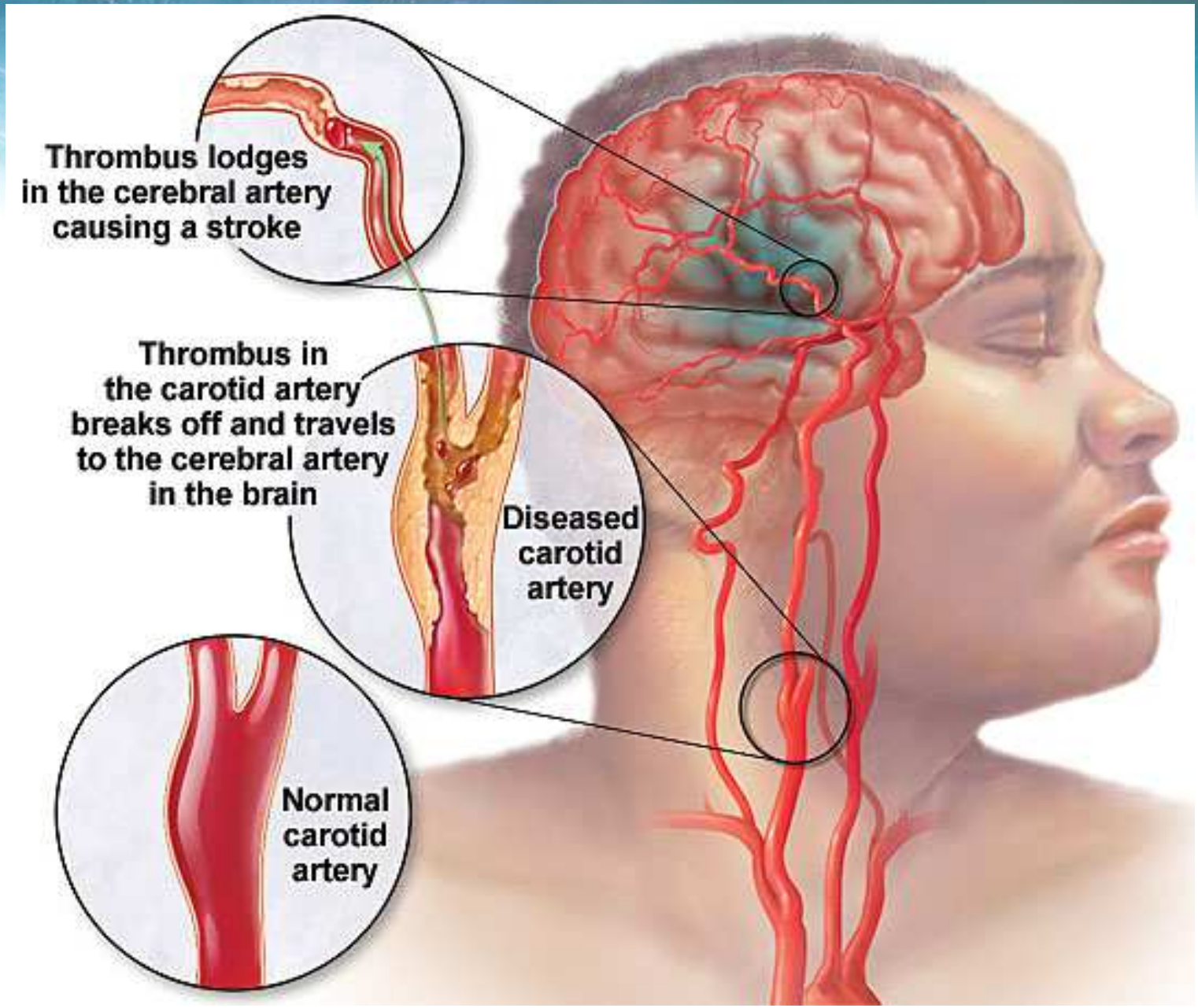
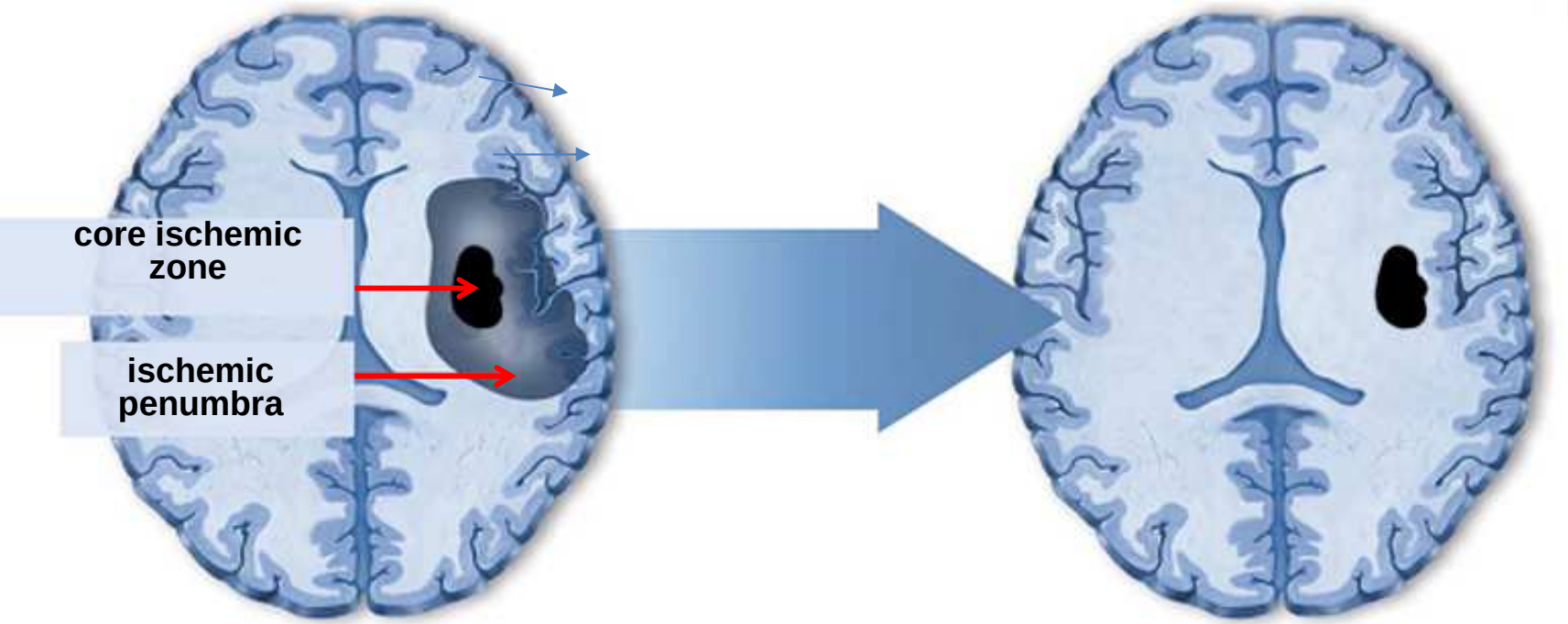
2002
2006
2010
2014
2018
2022
2025

Plaque Rupture (AMI) vs Embolus



Rapid Reperfusion May Reduce Neurologic Deficit

Just Like AMI



- Reperfusion of the ischemic penumbra may reduce the extent of damage and improve recovery of function
- Time is Brain

Goal of Acute Stroke Treatment

Just Like AMI

- Restore blood flow to salvageable brain
- Reduce infarct volume
- Improve clinical outcomes

The Rumor

- Many called for the end of Endovascular Stroke therapy after the publication of 3 negative trials in NEJM in 2013
  - IMS III
  - SYNTHESIS
  - MR RESCUE
- These trials concluded that there is no difference between standard medical therapy and endovascular therapy

What did we learn

- Large Vessel occlusion = best target
- Stroke intervention is safe
- Modern Clot retrievers are effective
  - **Only 5% of patients had modern therapy in these trials**

The Truth

Stroke Intervention Works

Just Like AMI

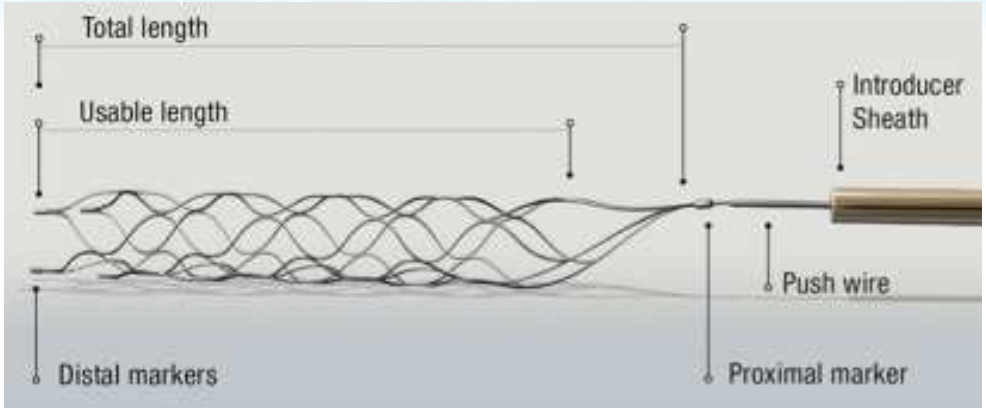
- This year has seen the publication of 5 major studies evaluating the role of endovascular therapy in stroke treatment
  - MR CLEAN
  - EXTEND-IA
  - ESCAPE
  - SWIFT PRIME
  - REVASCAT
- ALL 5 trials stopped because of significant benefit in the Endovascular arms

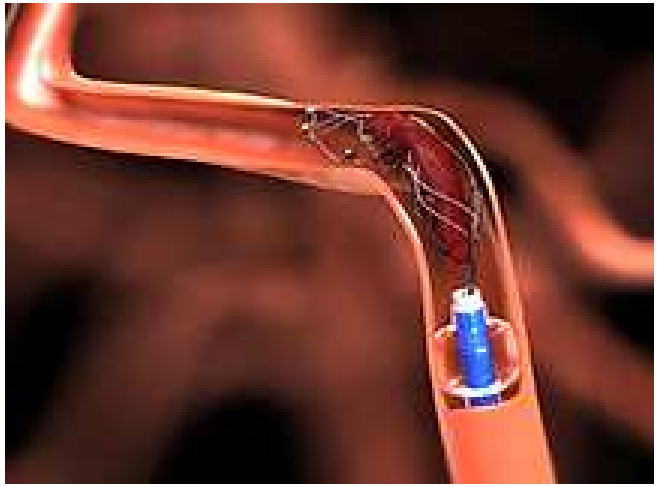
Interventions in Cardiology

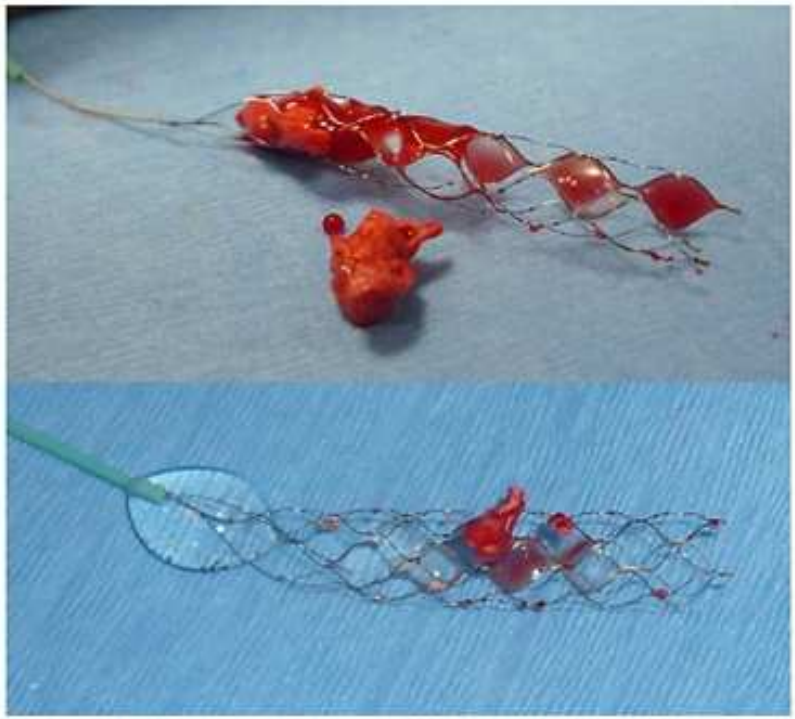
- Current status of stroke neurointerventions reminiscent of the evolution of PCI procedures for AMI
- Thrombolysis evolved to PCI as…
  - Technology improved
  - Data showed efficacy
  - Cardiologists adapted to change

What is a Stentreiver?

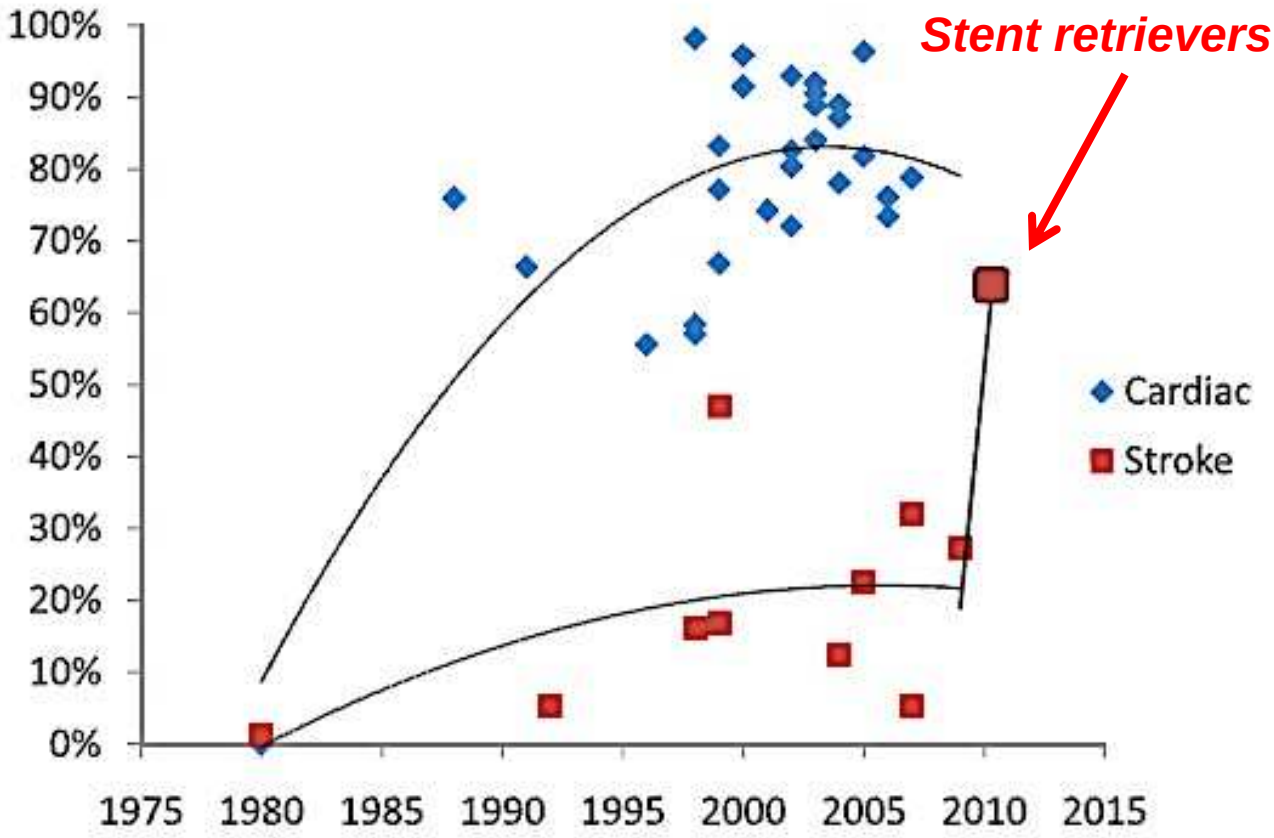
A Stent Attached to a Wire







Why it matters



Saver JL, Stroke 2013;44:270-277

What Made These Trials Different?

- Confirmation of large vessel occlusion
- Use of retrievable stents in the majority of patients

MR CLEAN

Netherlands

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- Proximal anterior circulation occlusion
- Randomized to endovascular therapy or usual care within 6 hrs of symptom onset (90% received IV tPA)

- RESULTS:
- Endovascular showed improvement in functional independence at 90 days
  - 32.6% vs 19.1% (95% CI, 5.9 to 21.2)
- No significant difference in mortality
- No significant difference in symptomatic ICH

ESCAPE

Canada

- Proximal anterior circulation occlusion
- Randomized to endovascular therapy or usual care within 12 hrs of symptom onset
- RESULTS:
- Endovascular showed improvement in functional independence at 90 days
  - 53% vs 29.3% (P<0.001)
- Improvement in mortality in endovascular group
  - 10.4%, vs. 19.0% (P=0.04)
- No significant differences in the occurrence of symptomatic ICH

ESCAPE

Canada

- Proximal anterior circulation occlusion
- Randomized to endovascular therapy or usual care within 12 hrs of symptom onset

- RESULTS:
- Endovascular showed improvement in functional independence at 90 days
  - 53% vs 29.3% (P<0.001)
- Improvement in mortality in endovascular group
  - 10.4%, vs. 19.0% (P=0.04)
- No significant differences in the occurrence of symptomatic ICH

EXTEND-IA

Australia

- Proximal anterior circulation occlusion
- Randomized patients who received IV-tPA to undergo endovascular therapy with Solitaire or continue receiving IV-tPA alone

- RESULTS:
- Endovascular showed improvement in functional independence at 90 days
  - 71% vs 40% (P = 0.01)
- No significant differences in mortality or the occurrence of symptomatic ICH
- NNT = 3

SWIFT PRIME

Medtronic- US

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- Proximal anterior circulation occlusion
- Randomized patients who received IV-tPA to undergo endovascular therapy with Solitaire or continue receiving IV-tPA alone

- RESULTS:
- Endovascular showed improvement in functional independence at 90 days
  - 60.2% vs 35.5% , P<0.001
- No significant differences in mortality or the occurrence of symptomatic ICH
- NNT = 4

REVASCAT

Medtronic- Spain

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- Proximal anterior circulation occlusion
- Randomly assigned patients within 8 hrs of symptom onset to receive medical therapy alone or endovascular therapy with Solitaire retrievable stent

- RESULTS:
- Endovascular showed improvement in functional independence at 90 days
  - 43.7% vs. 28.2% (95% CI, 1.1 to 4.0)
- No significant differences in mortality or the occurrence of symptomatic ICH

What's the point?

- Documented large vessel occlusion
- Use of contemporary (and successful/reliable) endovascular techniques
- Intervention works…Just Like AMI !!

Critics

Additional imaging & endovascular evaluation delays treatment

Endovascular Triage and Therapy Does Not Delay Treatment Initiation

Study	From symptom onset to IV tPA*		From symptom onset to groin puncture	From groin puncture to recanalization
	Endovascular	IV tPA Alone		
MR CLEAN[30]	85 (67-110)	87 (65-116)	260	30
EXTEND-IA[33]	127 (93-162)	145 (105-180)	210	43
ESCAPE[31]	110 (80-142)	125 (89-183)	185	56
SWIFT PRIME	110.5 (85-156)	117 (80-155)	224	24
REVASCAT	117.5 (90-150)	105 (86-137.5)	269	59

SUMMARY

- We have established that endovascular treatment adds major benefit

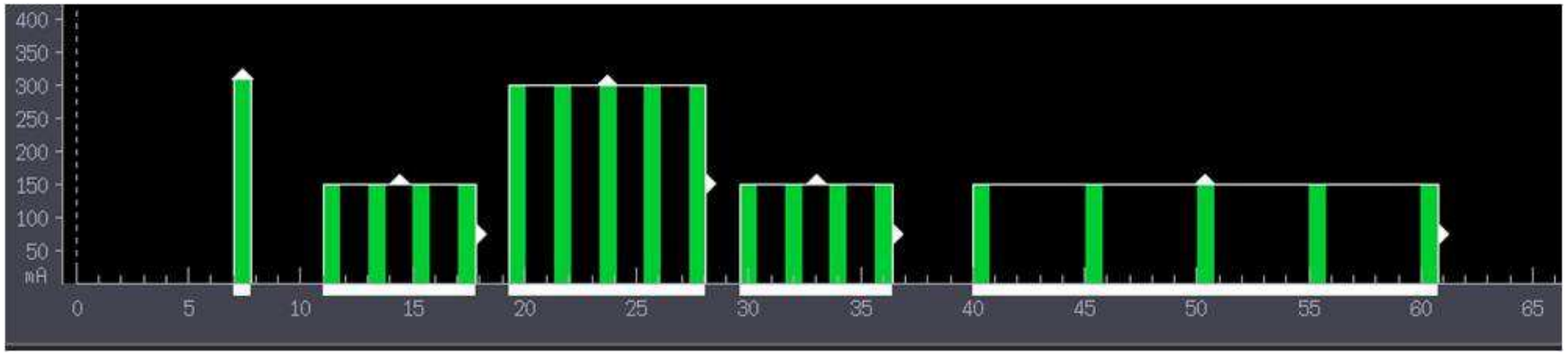
- The Challenge:
- To rapidly offer endovascular treatment to all eligible stroke patients
- WE NEED HELP
- Physiologic Imaging so that we can increase eligibility for treatment
- Improved Speed to recanalization

What are Perfusion Studies?

- Dynamic Studies – not single snap shot
- Physiology: Transit Time, Blood Flow, Blood Volume
- Ability to distinguish core (infarcted tissue) from penumbra (salvagable tissue)
- Individualize stroke treatment

Neuro One Protocol

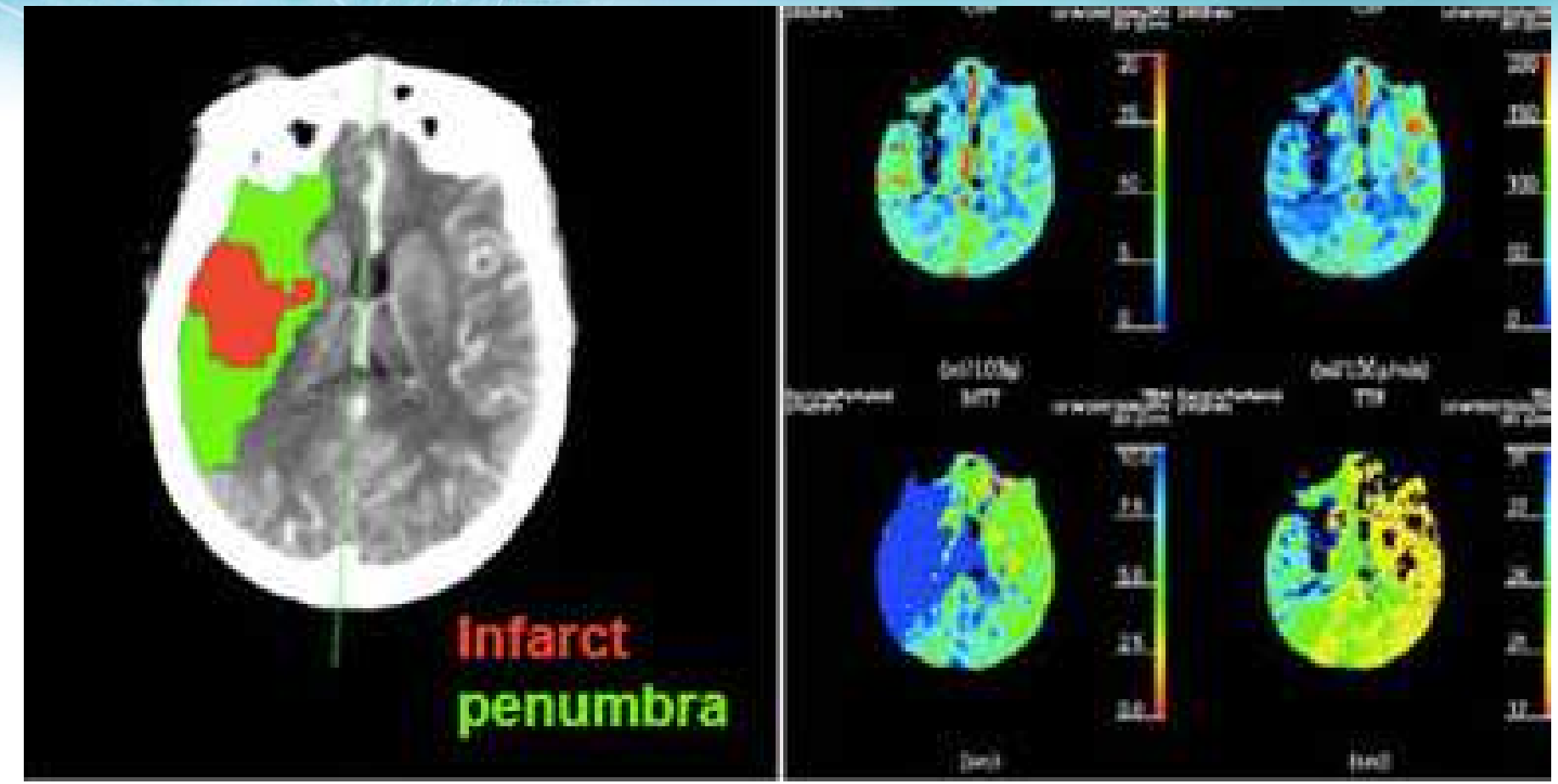
- Perfusion
  - 50 cc at 5cc/s 19 volumes
- Equivalent to 1.5 NCCT Rad Dose



Condition	rTTP	rCBF	rCBV
None	Normal	Normal	Normal
Art stenosis/ occl with comp	Prolonged	Normal	Normal or Increased
Oligemic	Prolonged	> 60%	> 80%
Tissue at risk	Prolonged	> 30%	> 60%
Dead tissue	Strong prolonged	< 30%	< 30-40%

Tomandl, 2003; Mayer 2000; Koenig 2001

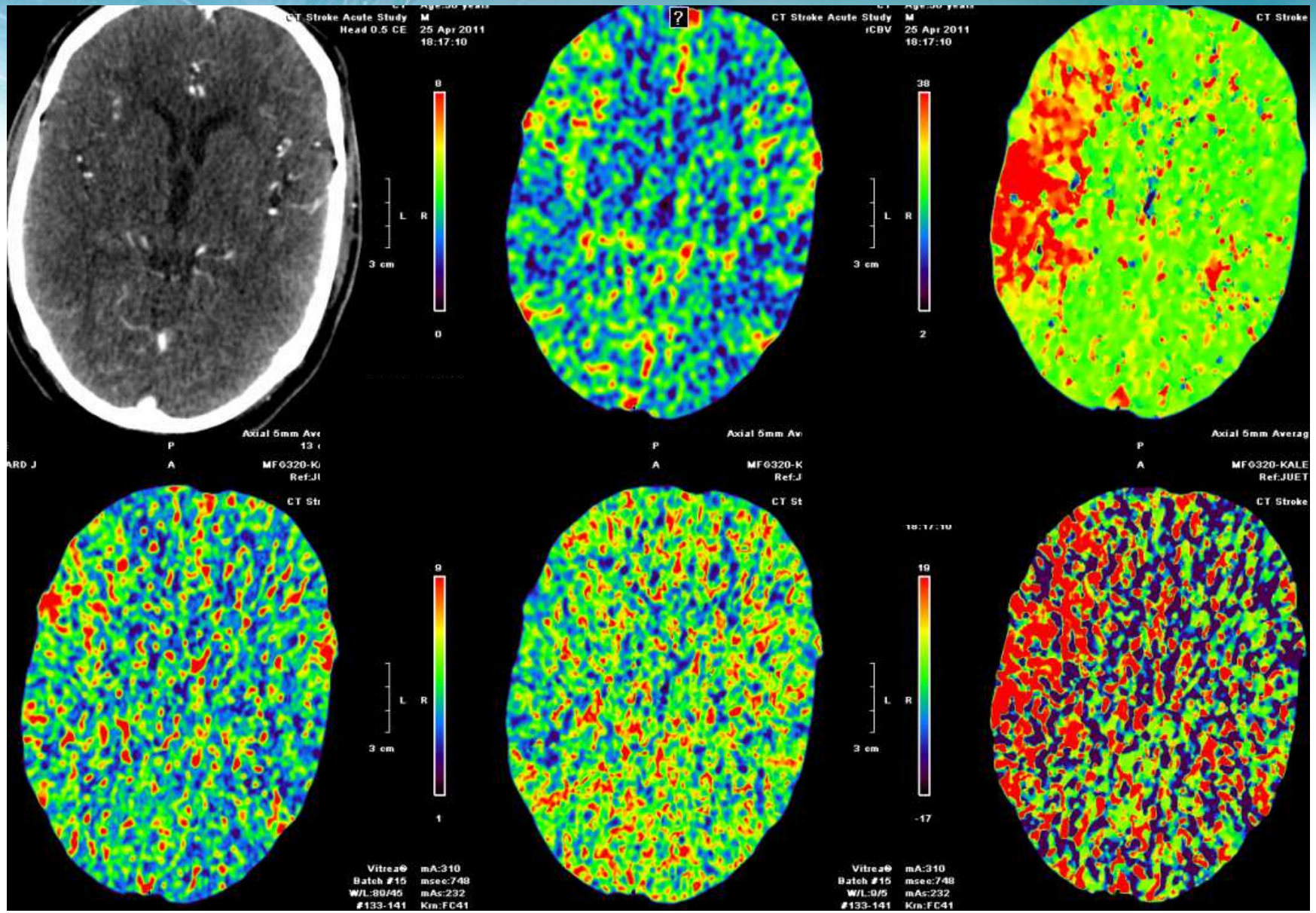
Mismatch

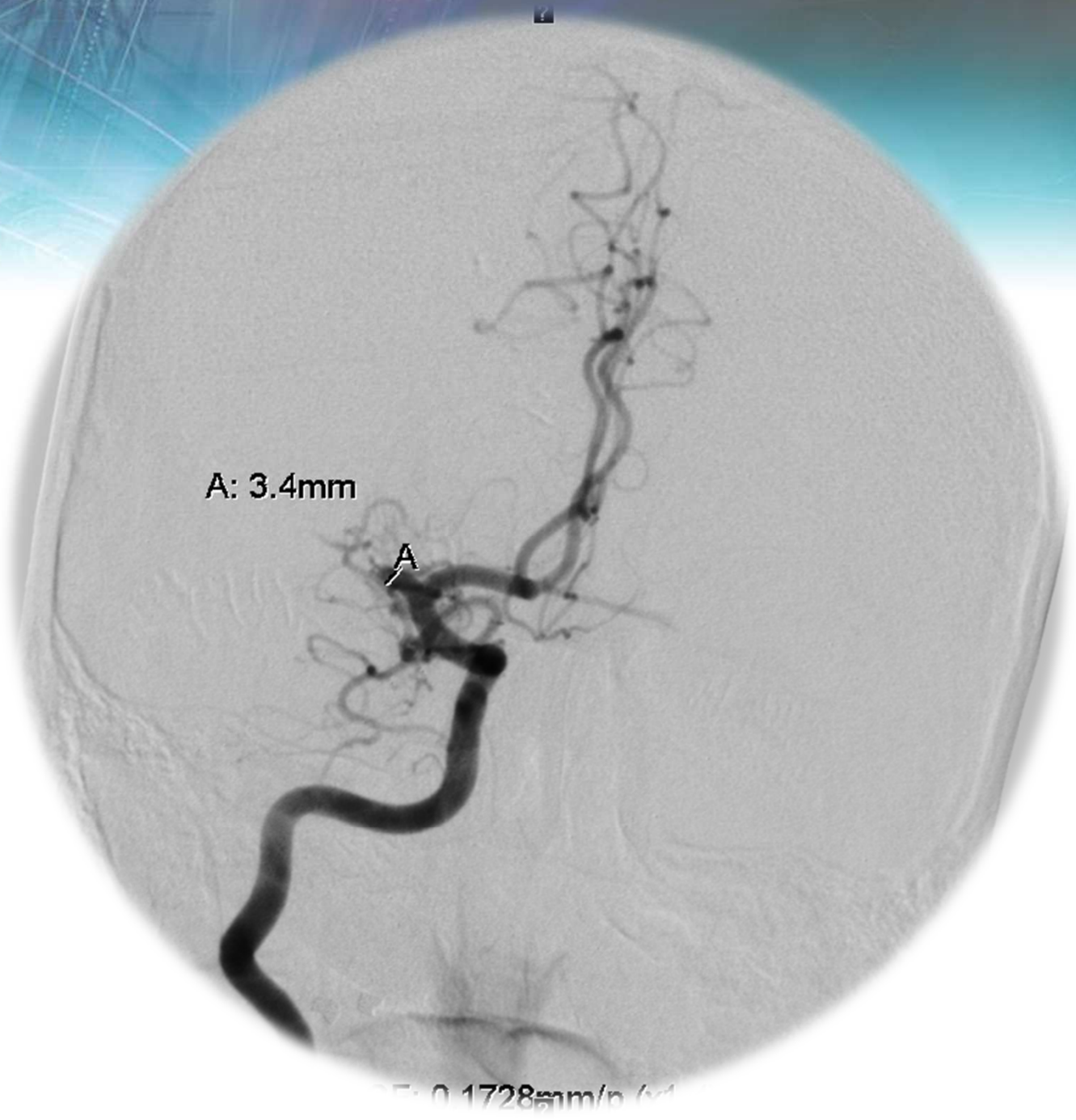


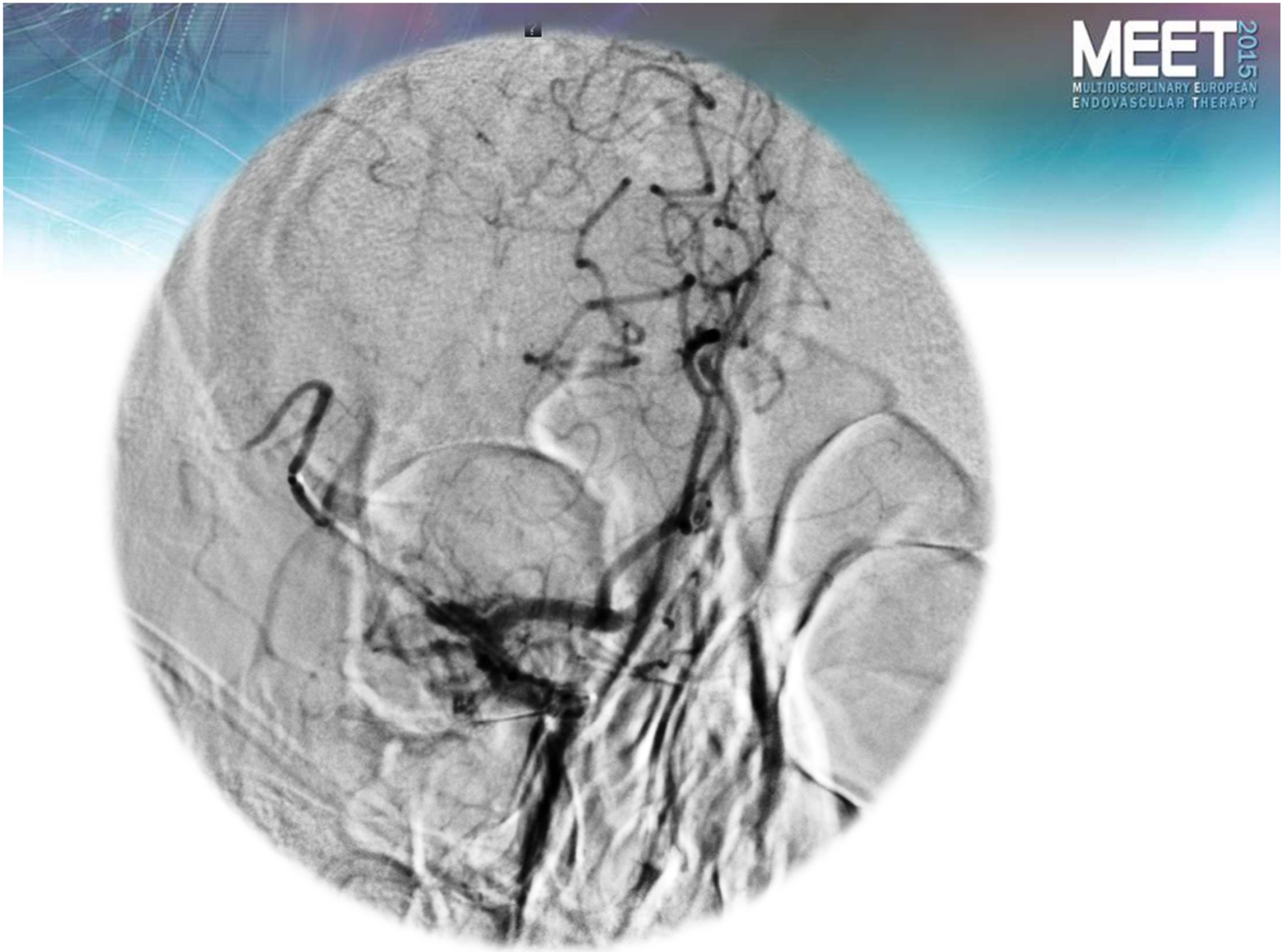
Clinical History

- 50 yo who woke up with with left hemiplegia, dysarthria, and facial droop.
- NIHSS = 16.

- PMH - Anxiety disorder, tobacco dependence, alcohol dependence


CT Stroke Acute Study
Head 0.5 CE
25 Apr 2011
18:17:10
CT Stroke Acute Study
rCBV
25 Apr 2011
18:17:10
CT Stroke
Axial 5mm Ave
Axial 5mm Av
Axial 5mm Averag
MF0320-K
MF0320-KALE
Ref:JUET
CT St
CT Stroke
3 cm
Vitrea
Batch #15
W/L:80/45
#133-141
mA:310
msec:748
mAs:232
Krn:FC41


A: 3.4mm
A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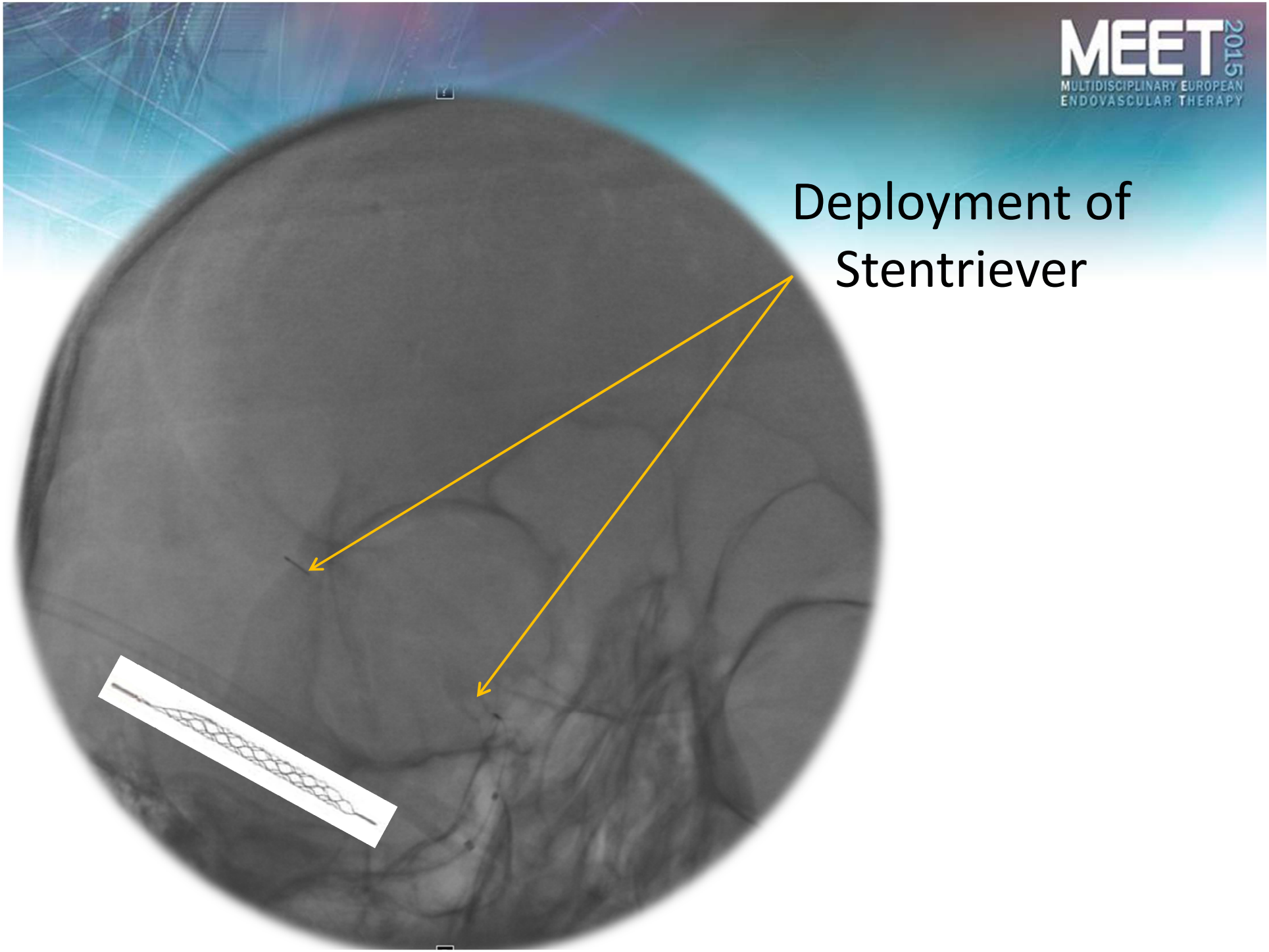
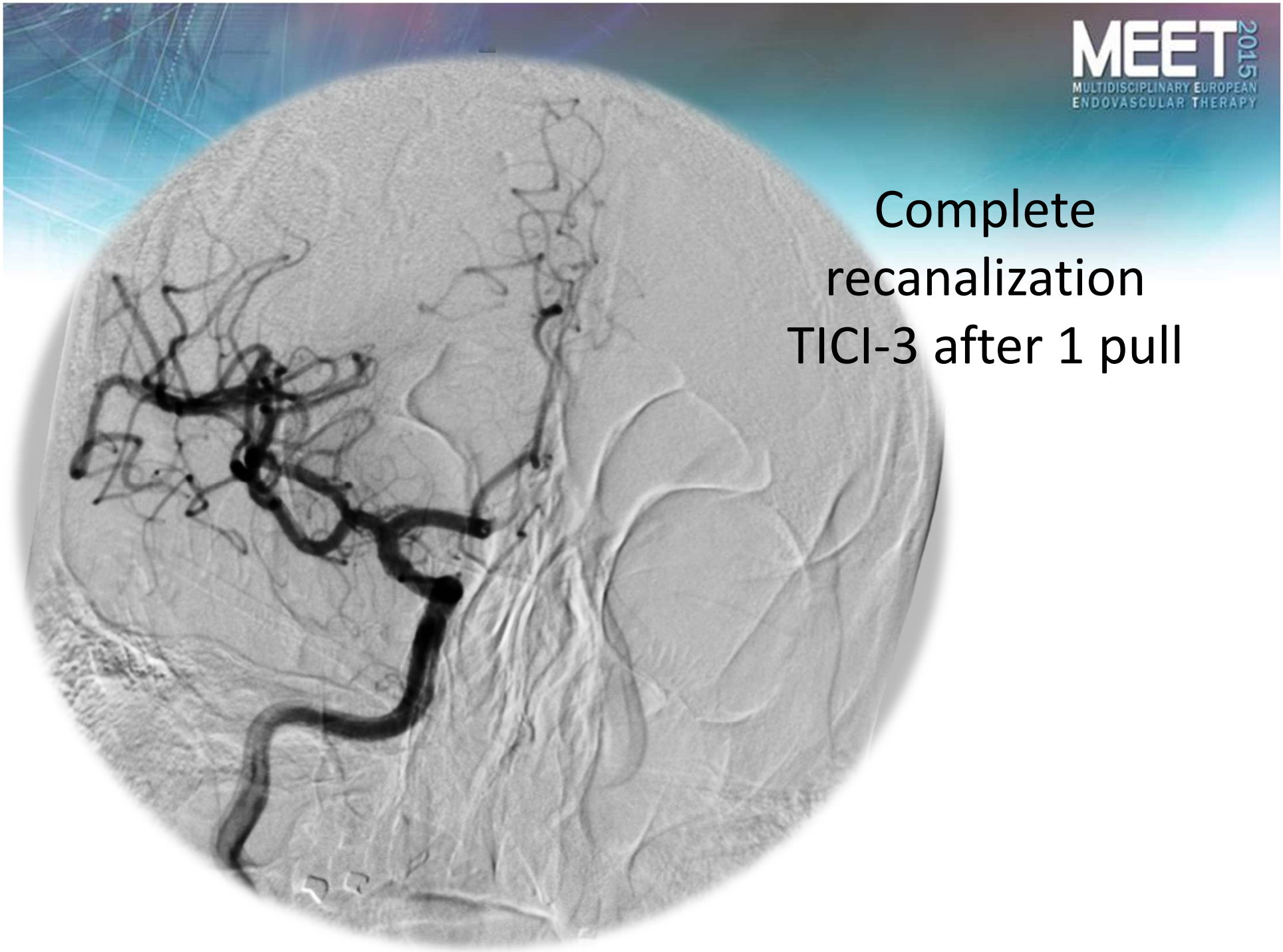
Deployment of Stentriever



1st pull of the microcatheter with the retrieval device

Total intervention time ~20 min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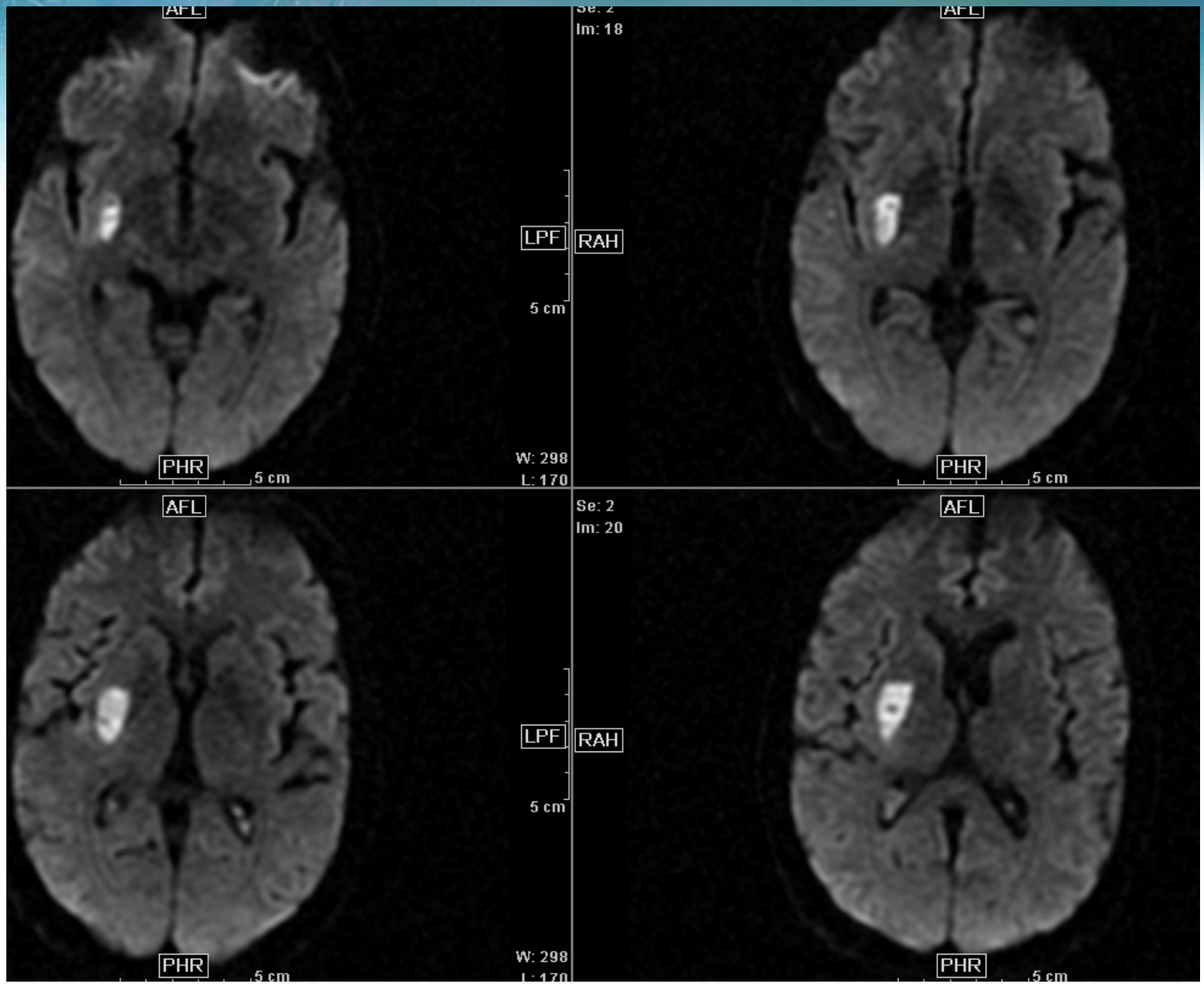
Complete
recanalization
TICI-3 after 1 pull

- In the angio suite – the patient could lift his Rt arm antigravity, improved gaze, NIHSS 16 to 5 immediately

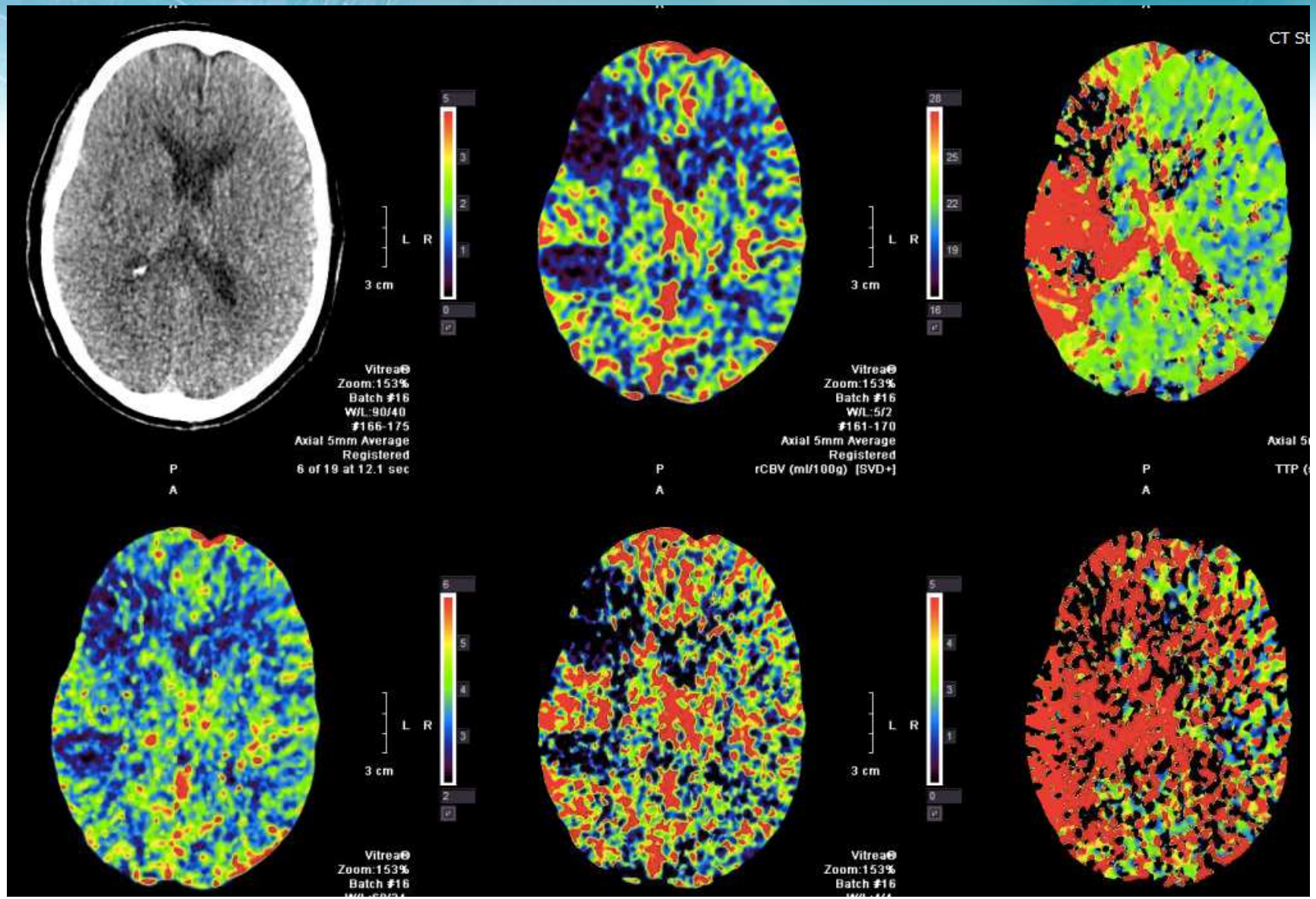
- POD#1 NIH -3

- POD#2– NIH -0


AFL
LPF
5 cm
PHR
5 cm
W: 298
L: 170
Se: 2
Im: 18
AFL
RAH
PHR
5 cm
AFL
LPF
5 cm
PHR
5 cm
W: 298
L: 170
Se: 2
Im: 20
AFL
RAH
PHR
5 cm

Clinical History

- 75 yo WM last seen normal at 10 pm, ? Issues at 2 am, awoke thrashing at 4 am with Right gaze preference and left HP, arrived at hospital 2 hours later
- NIHSS 18


CT St
L R
3 cm
Vitrea
Zoom:153%
Batch #16
W/L:90/40
#166-175
Axial 5mm Average
Registered
6 of 19 at 12.1 sec
P
A
L R
3 cm
Vitrea
Zoom:153%
Batch #16
W/L:5/2
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Axial 5mm Average
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rCBV (ml/100g) [SVD+]
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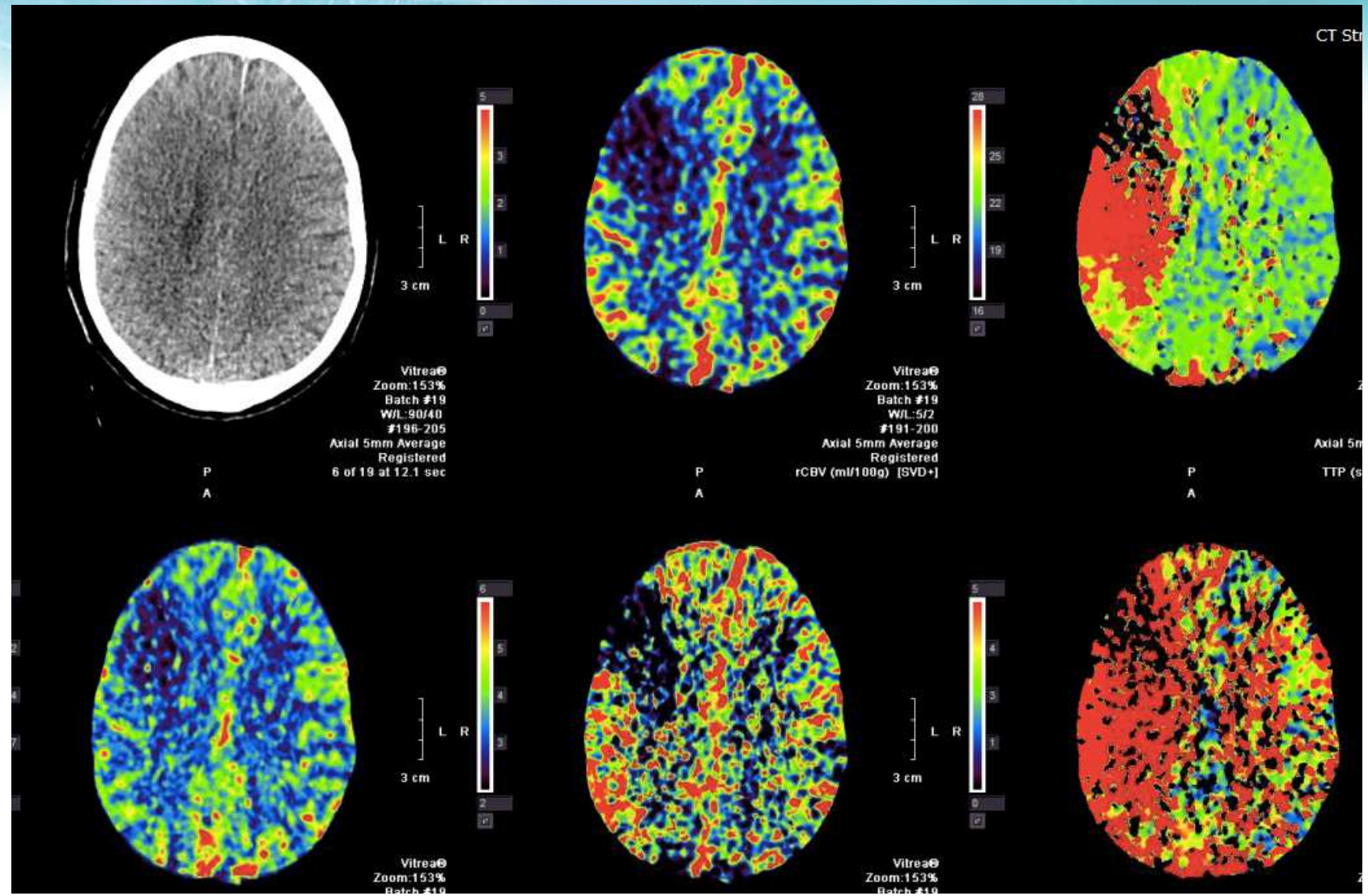
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#196-205
Axial 5mm Average
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Vitrea
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Registered
rCBV (ml/100g) [SVD+]
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3 cm
Vitrea
Zoom:153%
L R
3 cm
Vitrea
Zoom:153%


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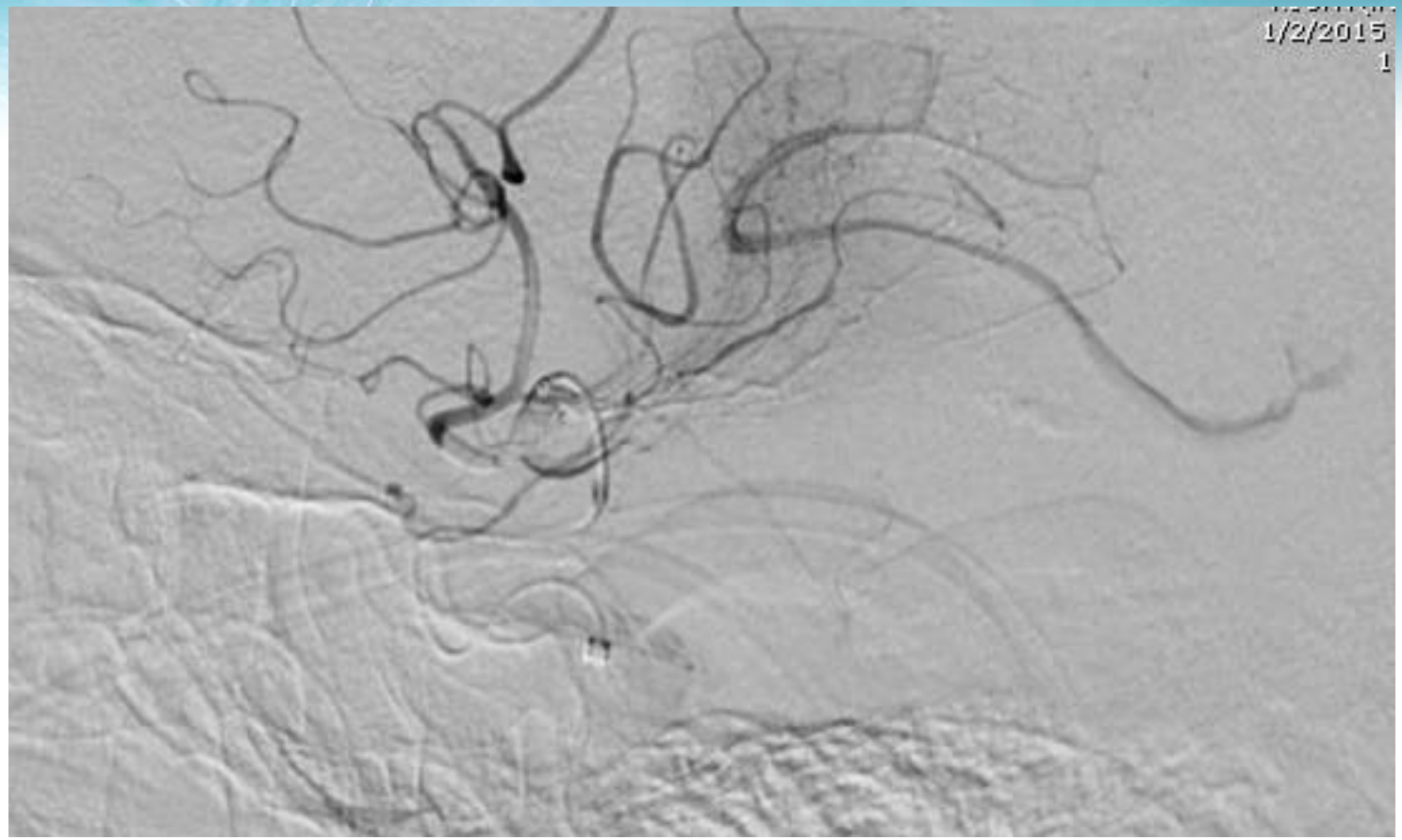
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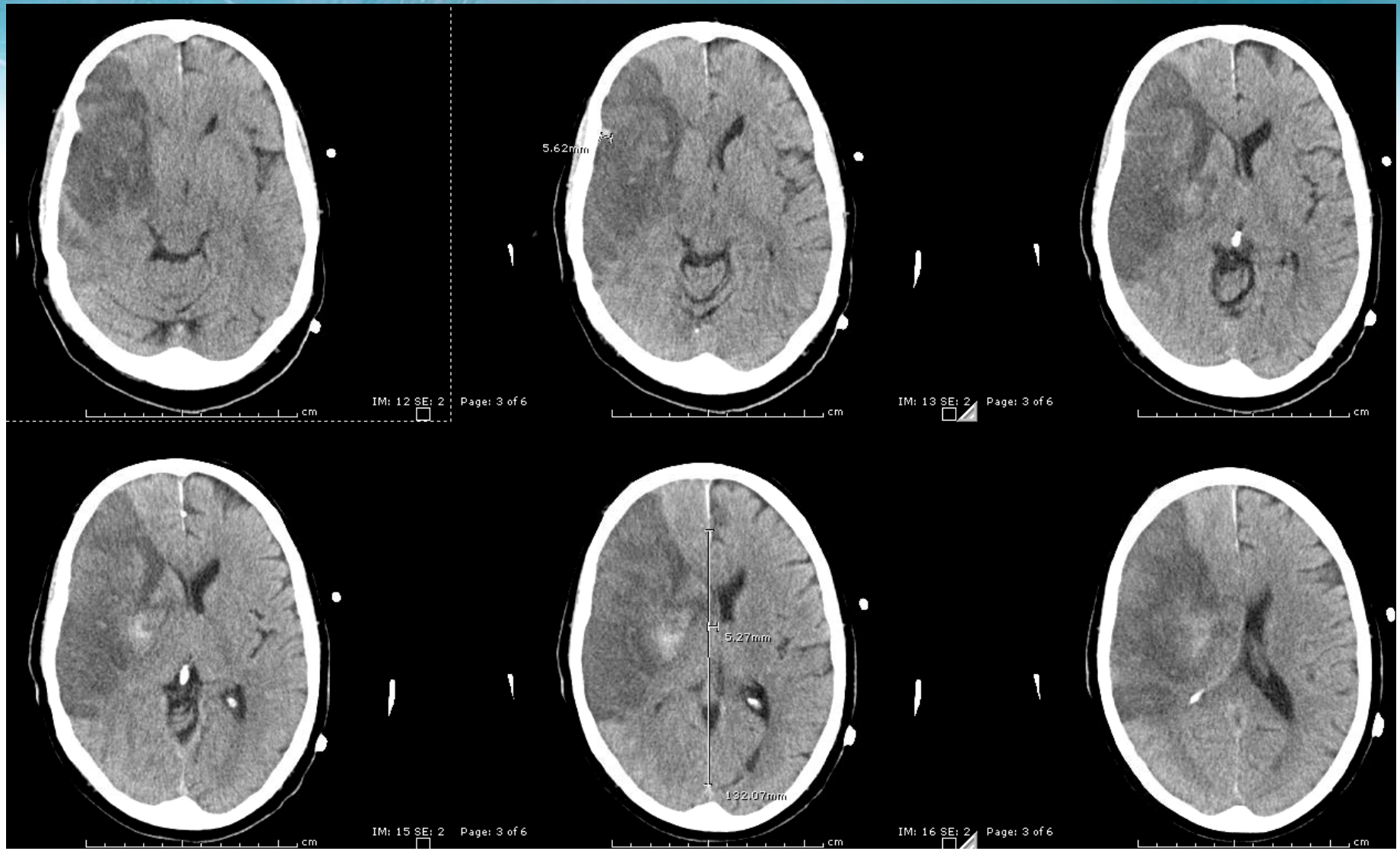
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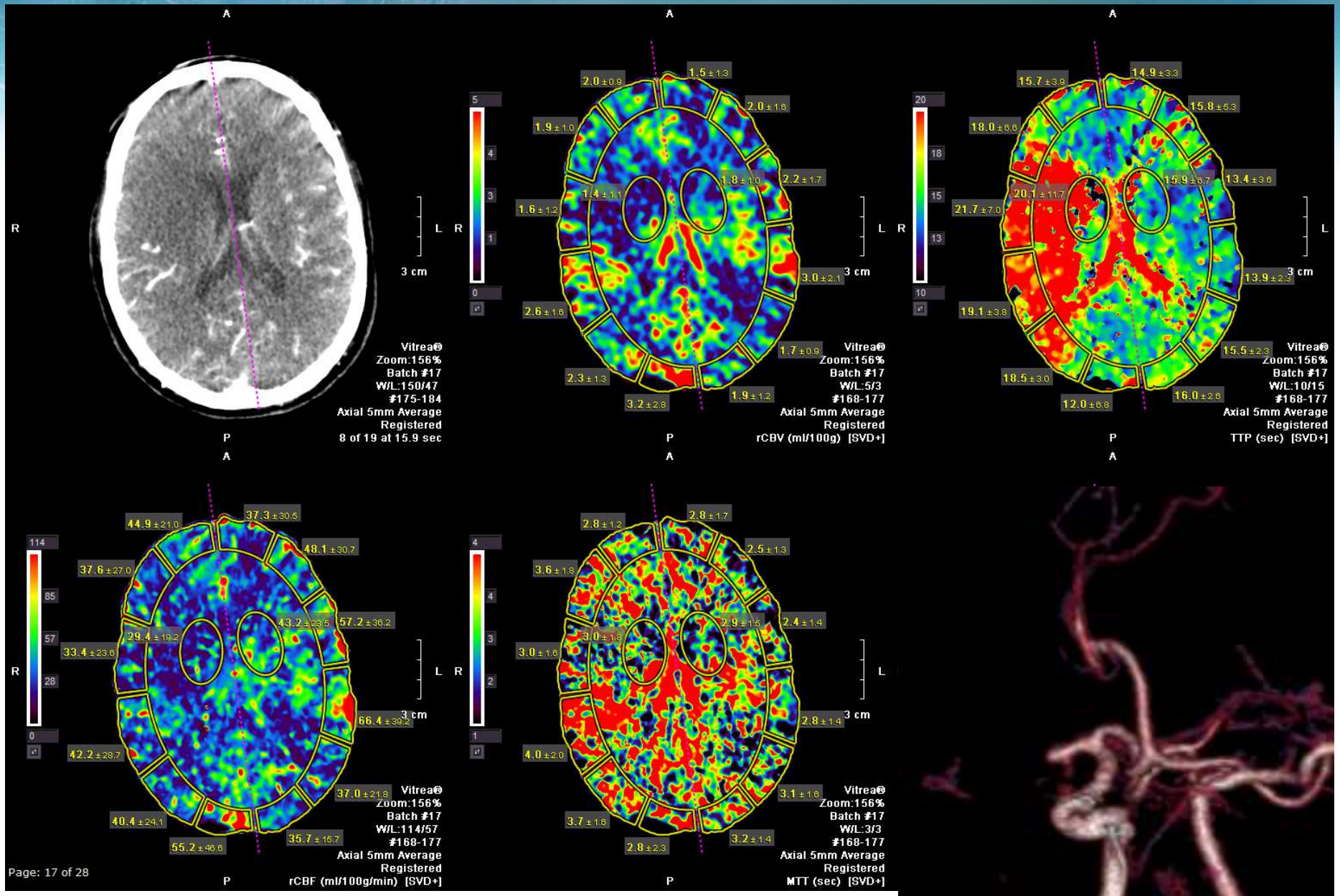
IM: 12 SE: 2
Page: 3 of 6
IM: 13 SE: 2
Page: 3 of 6
5.27mm
132.07mm
IM: 15 SE: 2
Page: 3 of 6
IM: 16 SE: 2
Page: 3 of 6
cm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Batch #17
W/L:150/47
#175-184
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8 of 19 at 15.9 sec
5
4
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0
2.0 ±0.9
1.5 ±1.3
2.0 ±1.6
1.9 ±1.0
1.8 ±1.0
2.2 ±1.7
1.4 ±1.1
1.6 ±1.2
3.0 ±2.1
2.6 ±1.6
1.7 ±0.9
2.3 ±1.3
3.2 ±2.8
1.9 ±1.2
Vitrea®
Zoom:156%
Batch #17
W/L:5/3
#168-177
Axial 5mm Average
Registered
rCBV (ml/100g) [SVD+]
20
18
15
13
10
15.7 ±3.9
14.9 ±3.3
15.8 ±5.3
18.0 ±6.6
15.9 ±6.7
13.4 ±3.6
20.1 ±11.7
21.7 ±7.0
13.9 ±2.3
19.1 ±3.8
15.5 ±2.3
18.5 ±3.0
16.0 ±2.6
12.0 ±6.8
Vitrea®
Zoom:156%
Batch #17
W/L:10/15
#168-177
Axial 5mm Average
Registered
TTP (sec) [SVD+]
114
85
57
28
0
44.9 ±21.0
37.3 ±30.5
48.1 ±30.7
37.6 ±27.0
43.2 ±23.5
57.2 ±36.2
29.4 ±19.2
33.4 ±23.6
66.4 ±39.2
42.2 ±28.7
37.0 ±21.8
40.4 ±24.1
55.2 ±46.6
35.7 ±15.7
Vitrea®
Zoom:156%
Batch #17
W/L:114/57
#168-177
Axial 5mm Average
Registered
rCBF (ml/100g/min) [SVD+]
4
3
2
1
2.8 ±1.2
2.8 ±1.7
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3.6 ±1.8
2.9 ±1.5
2.4 ±1.4
3.0 ±1.8
3.0 ±1.6
2.8 ±1.4
4.0 ±2.0
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3.7 ±1.6
2.8 ±2.3
3.2 ±1.4
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Axial 5mm Average
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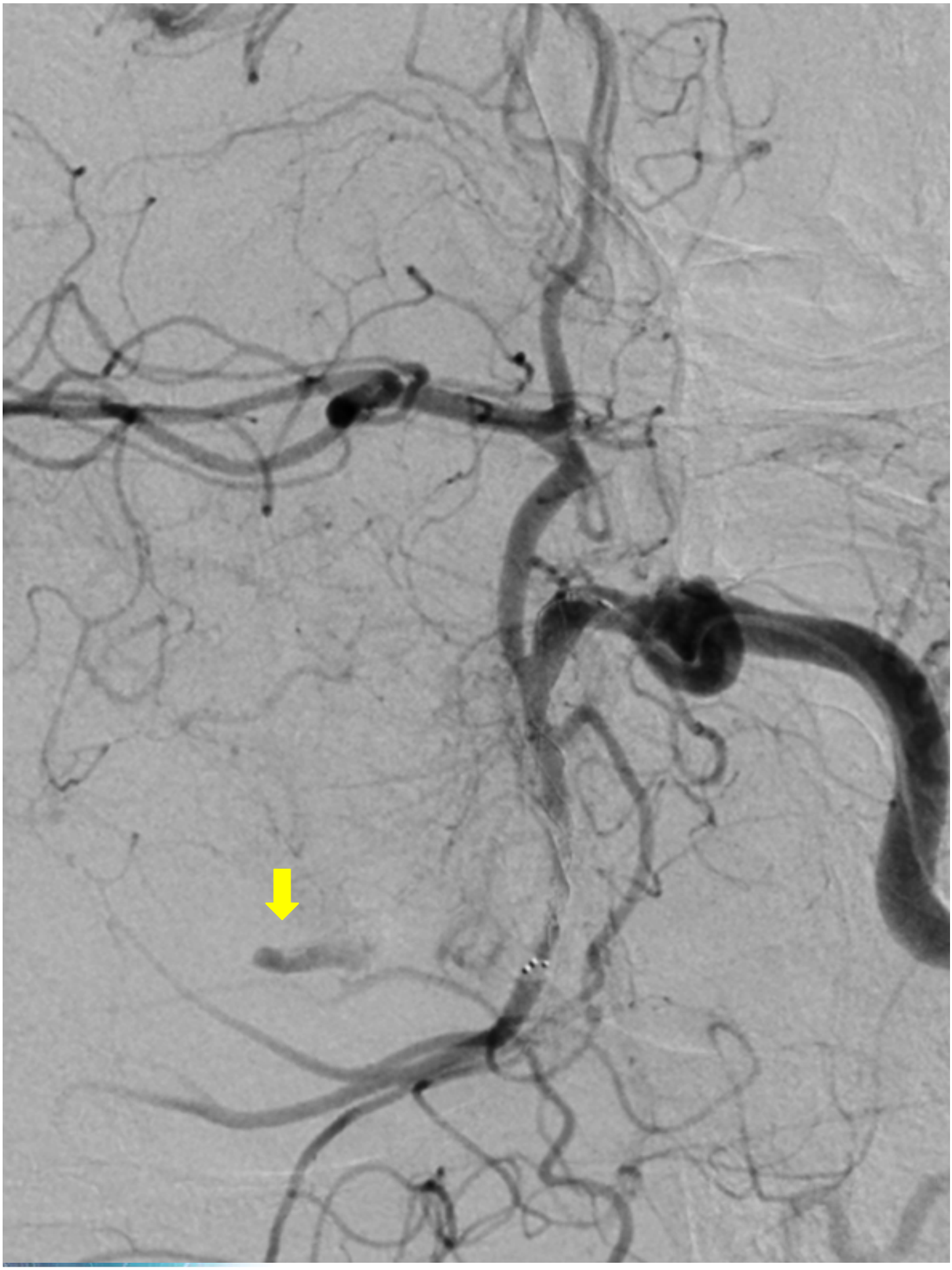
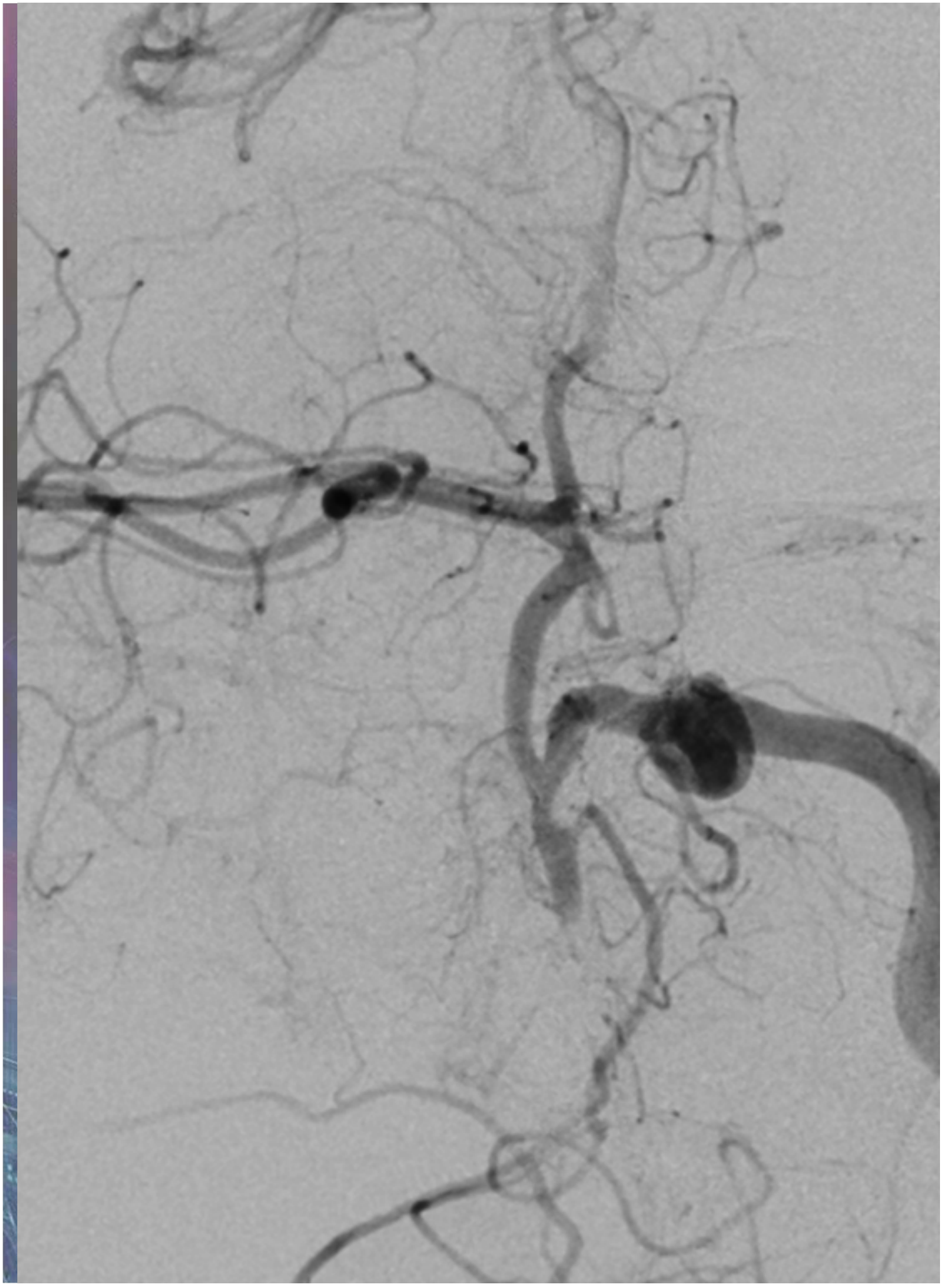
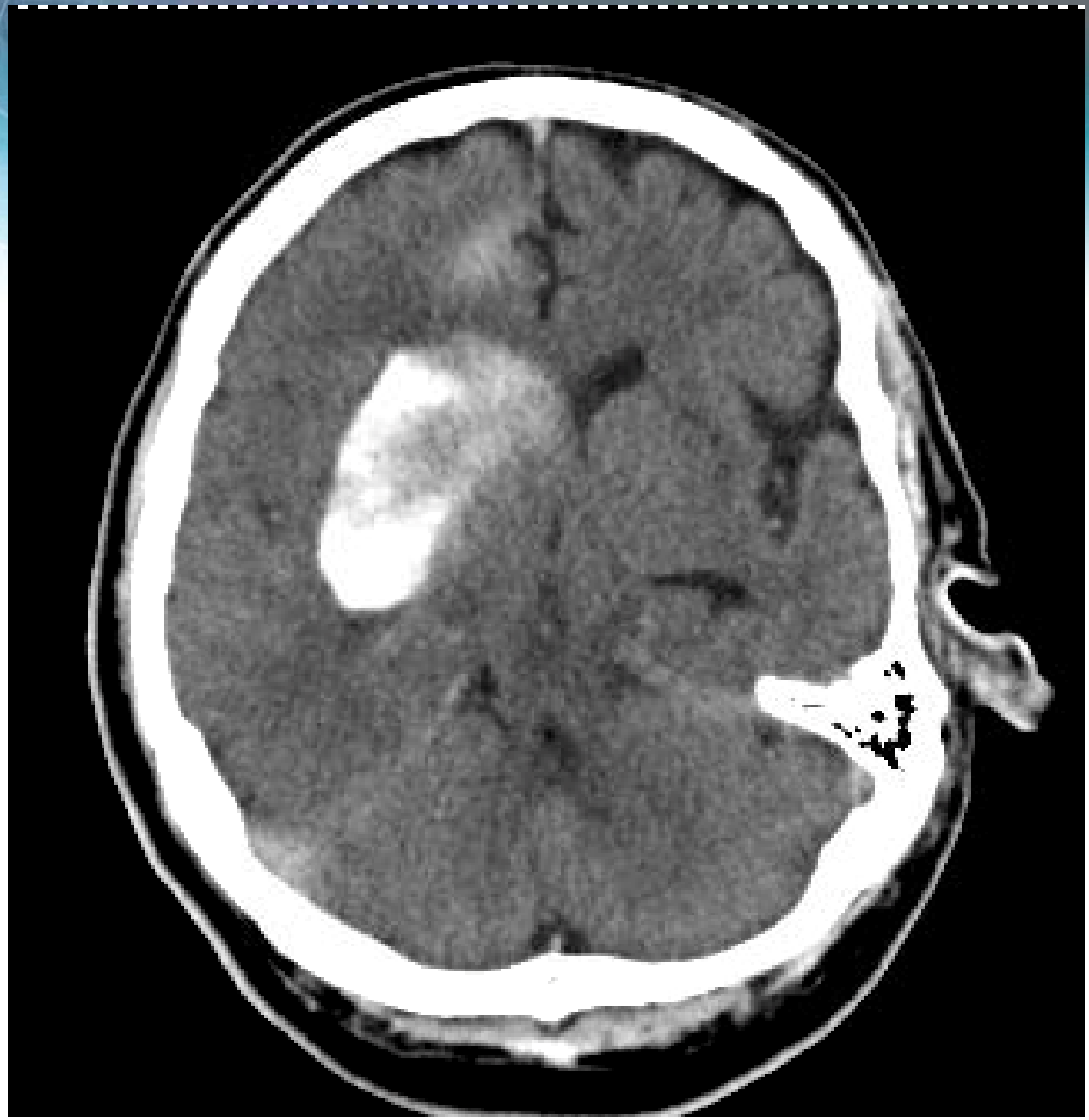
MTT (sec) [SVD+]







Summary

- Clinical Exam
- Imaging Criteria – No ICH, No EIC, core < 1/3 territory at risk

- We are smarter than a stop watch
- Physiologic Imaging is the next frontier

SUMMARY

- We have established that endovascular treatment adds major benefit

- The Challenge:
- To rapidly offer endovascular treatment to all eligible stroke patients
- WE NEED HELP
- Physiologic Imaging so that we can increase eligibility for treatment
- Improved Speed to recanalization

Thank you!
Questions?