CT Cerebral Perfusion

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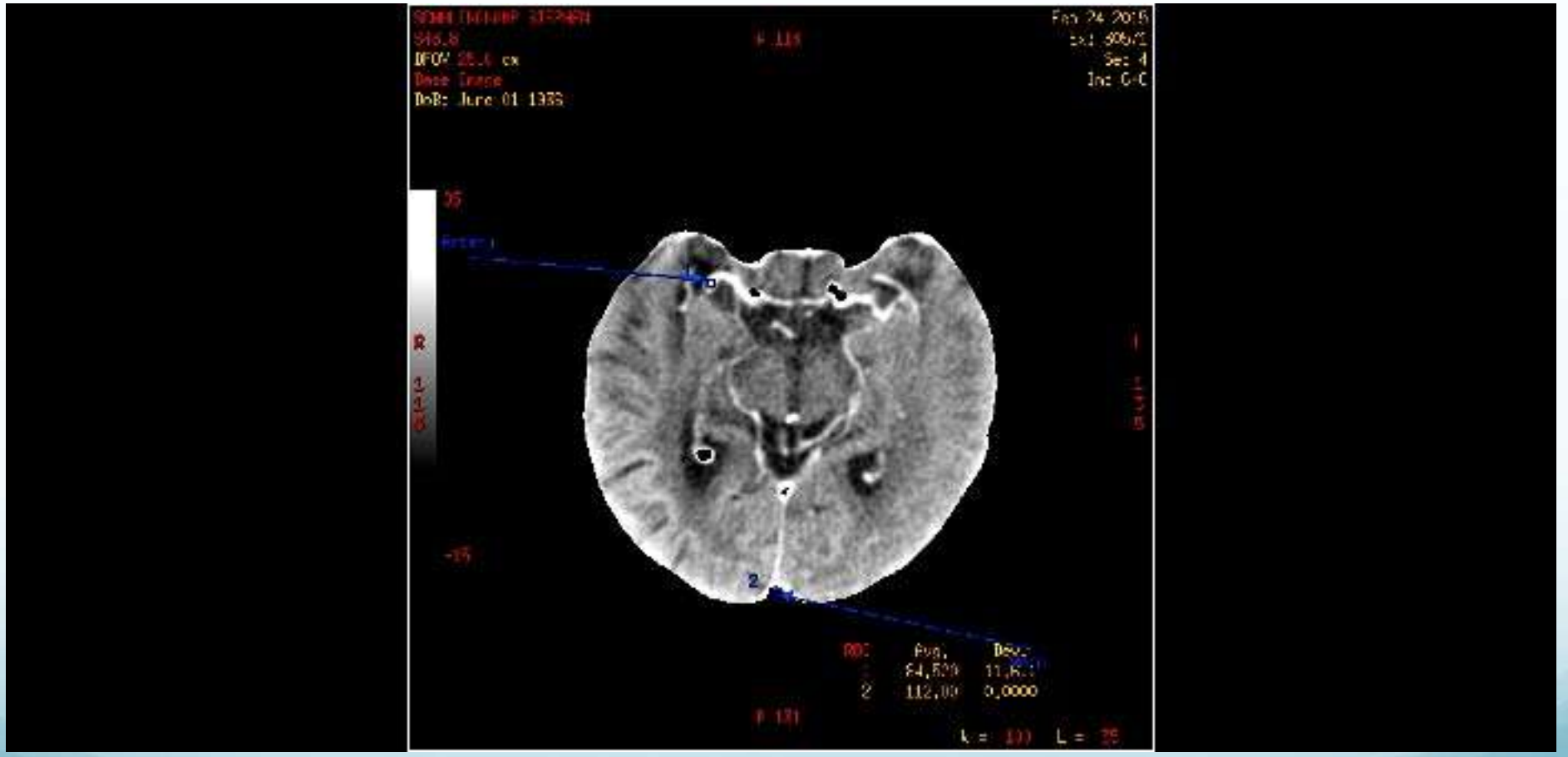
Problems

- Technical
  - Patient Motion
  - Poor Contrast Bolus
  - Poor choice of Artery and Vein
- Anatomical
  - Old Infarct
  - Other Pre-existing Pathology
  - Seizure

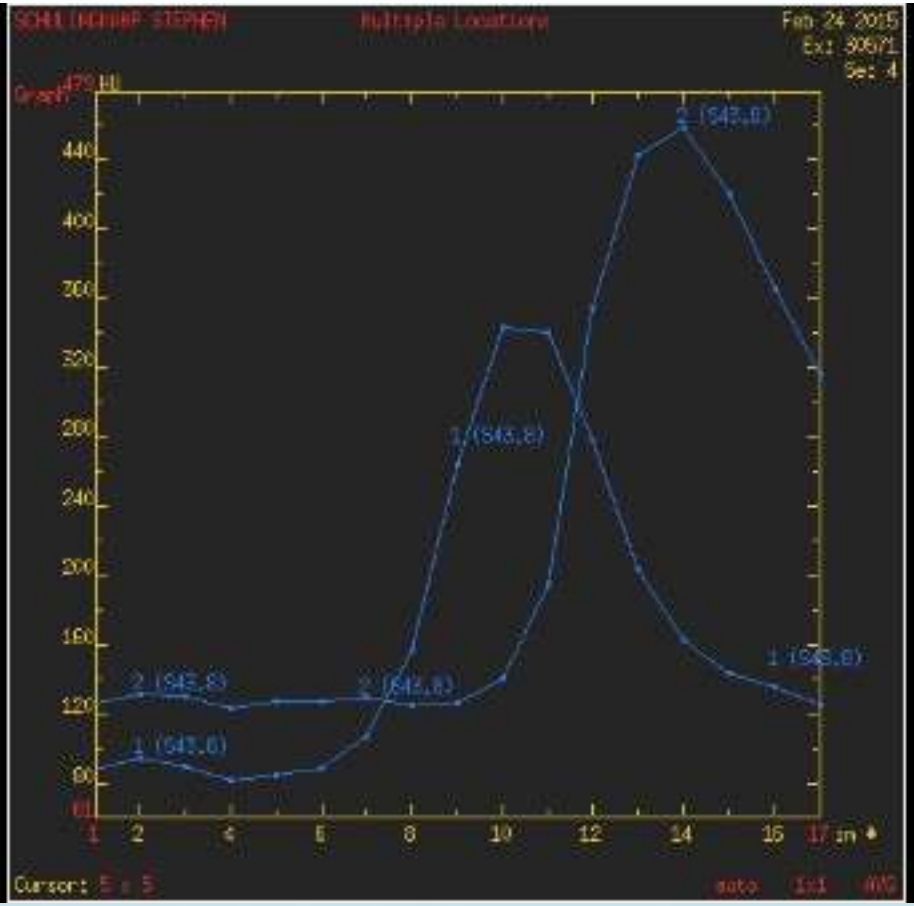
- Noncontrast CT is often the first and only study we have before Perfusion. Need to review this first for preexisting stroke, hemorrhage, mass, etc.
- Should have some ER info indicating expected side of stroke, ie., facial palsy, unilateral extremity weakness, etc.

Artery and Vein

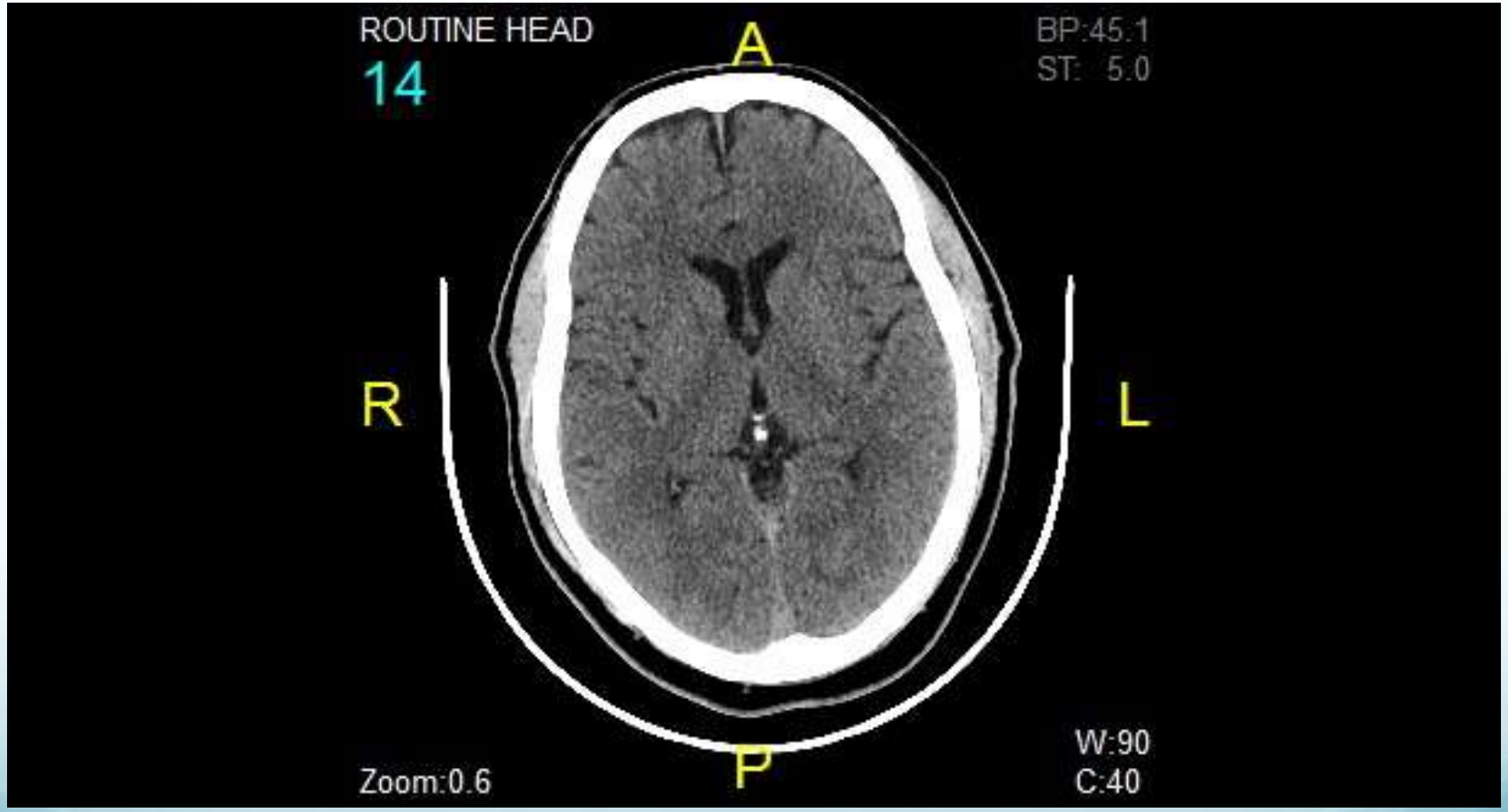


Need to make sure that the Artery and Vein are properly chosen

Graph of Arterial & Venous Flow

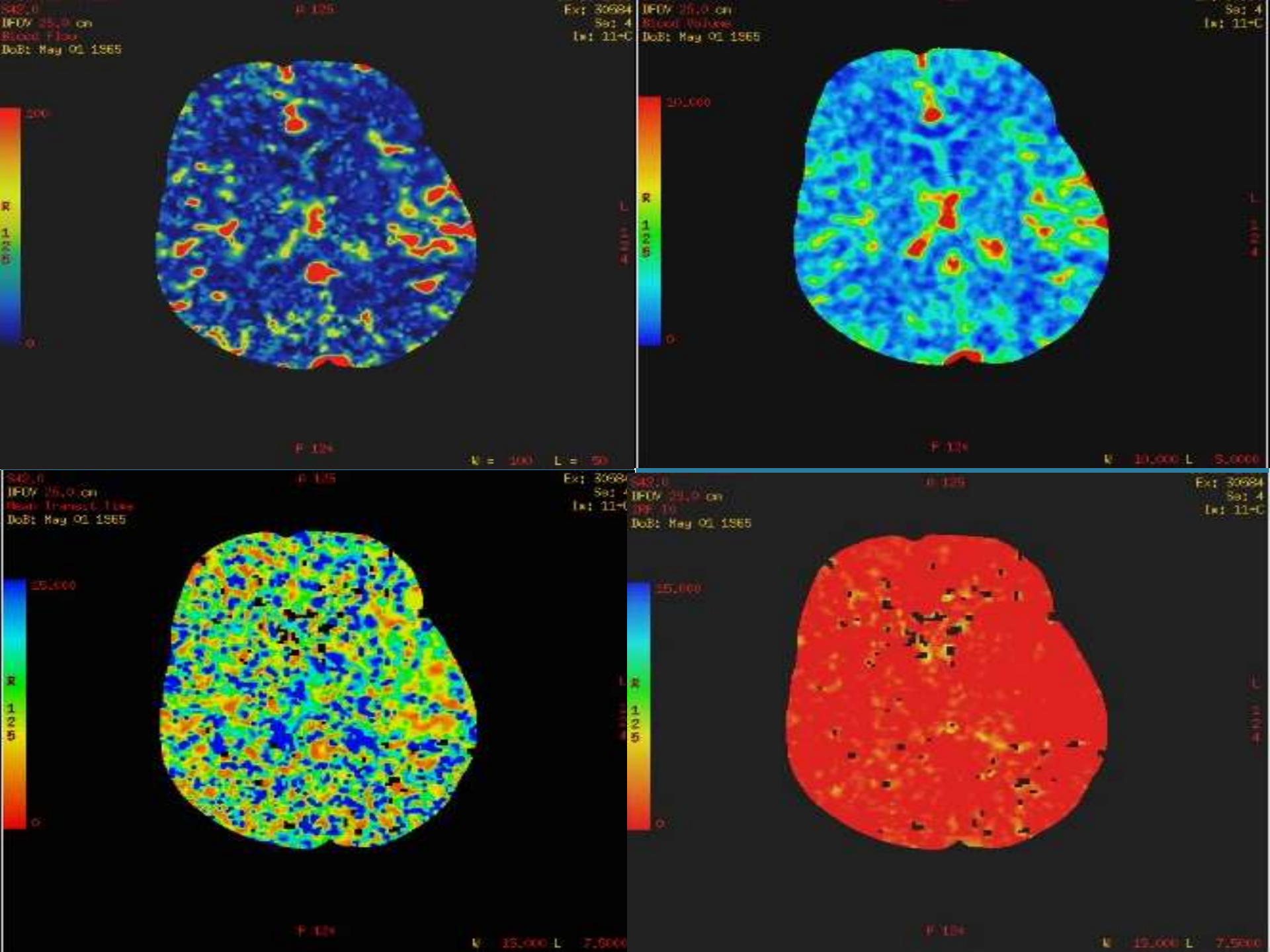


Patient #1
Normal CT



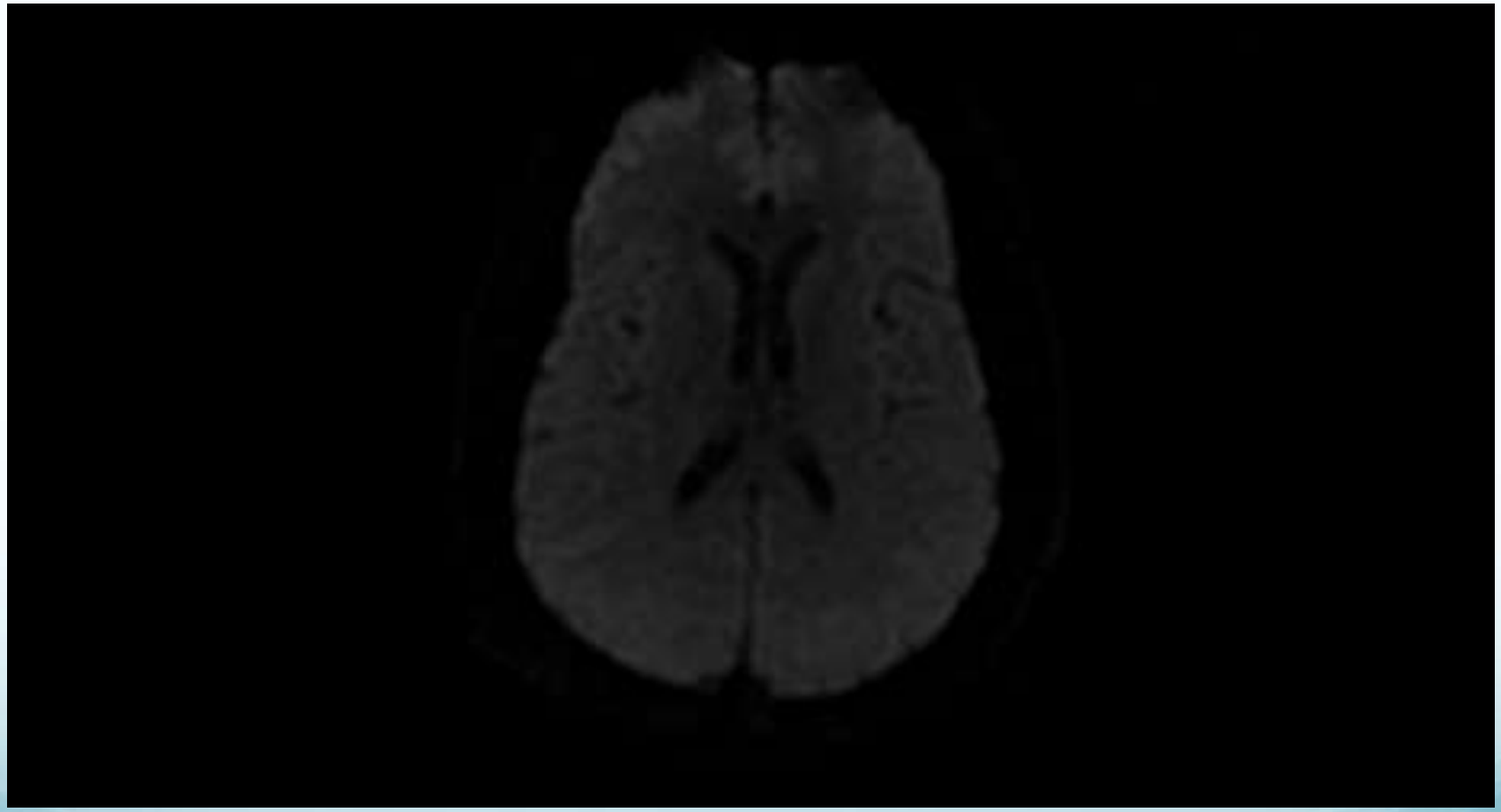
All color maps in this PPT use the following layout

Blood Flow	Blood Volume
Mean Transit Time	IRF T0

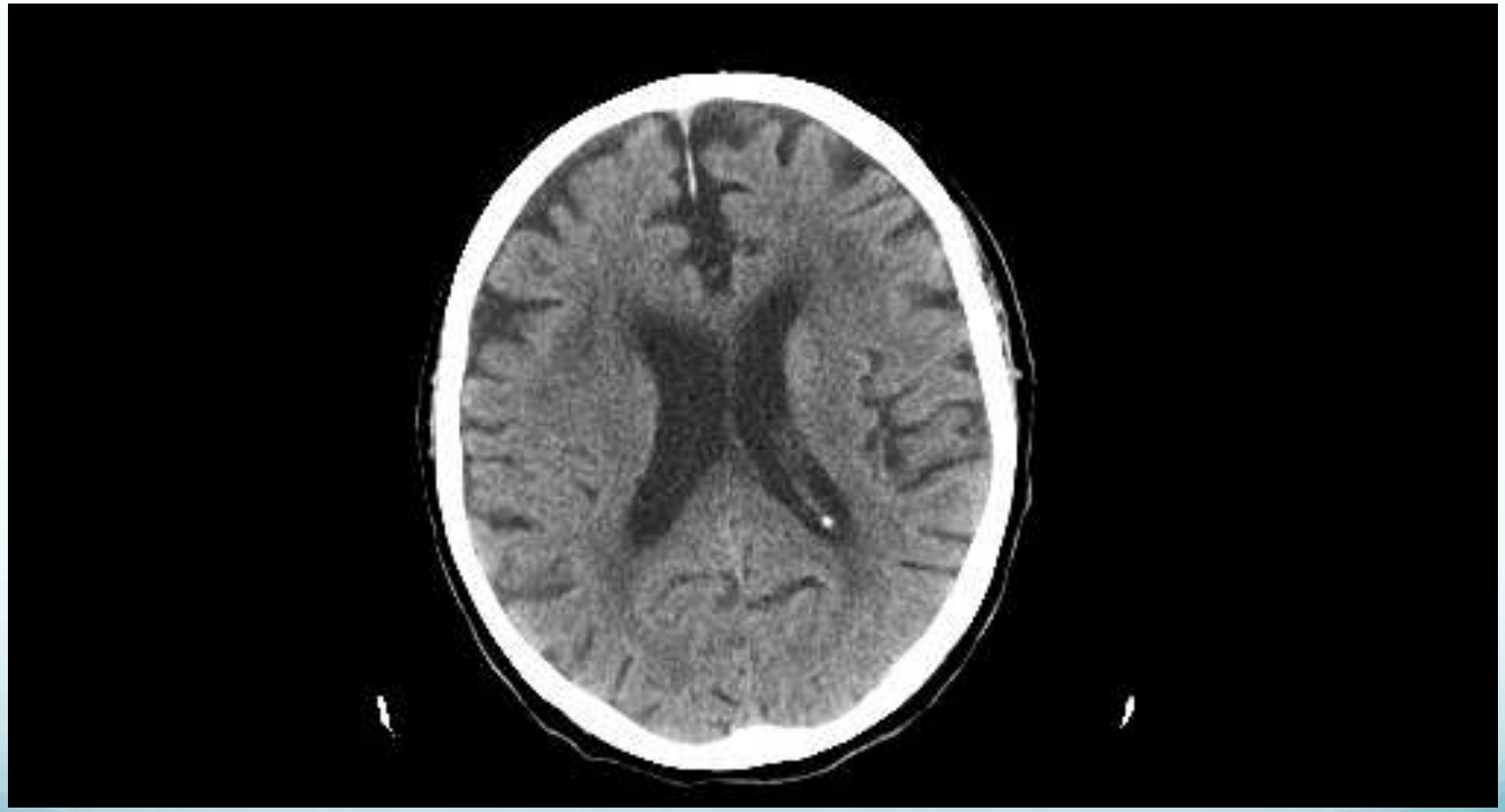

Blood Flow
Blood Volume
Mean Transit Time
DoB: May 01 1965

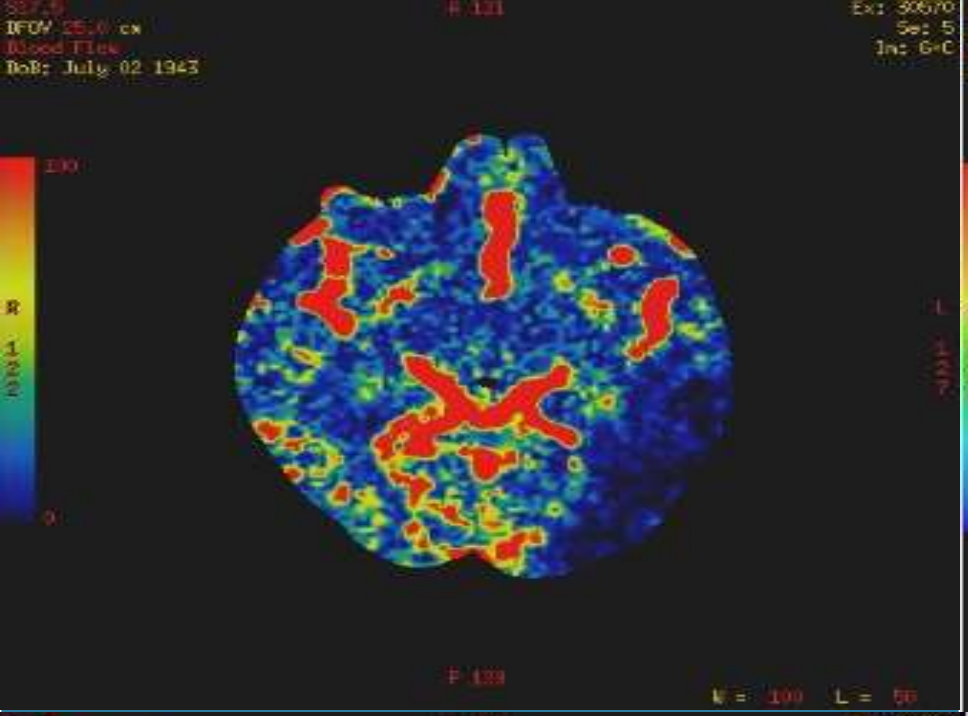
- Prior Slide demonstrates normal color maps

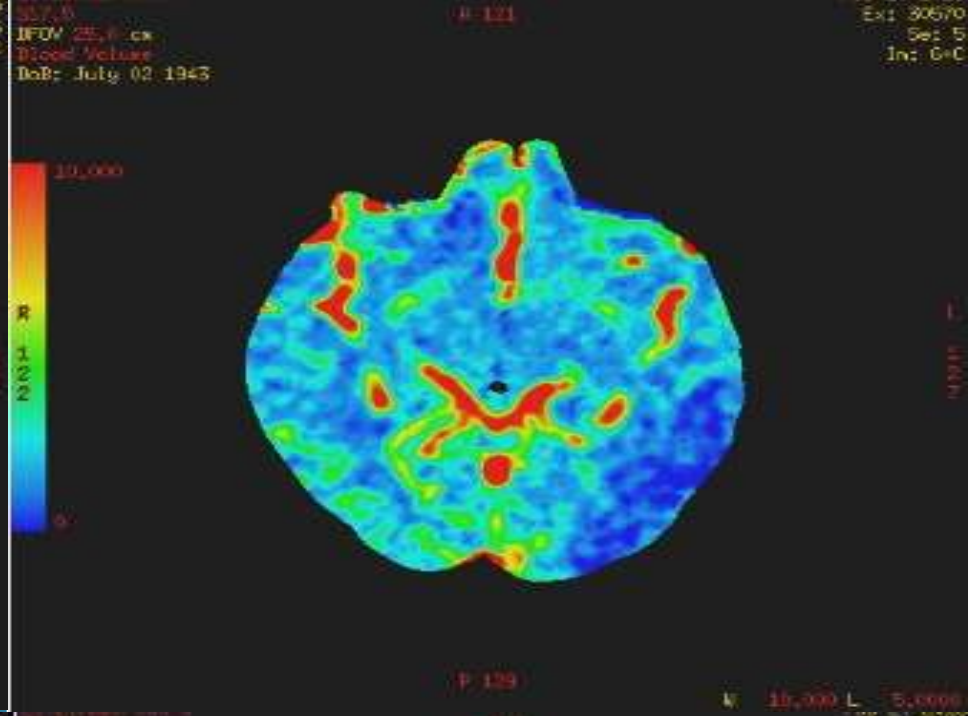
Normal Diffusion

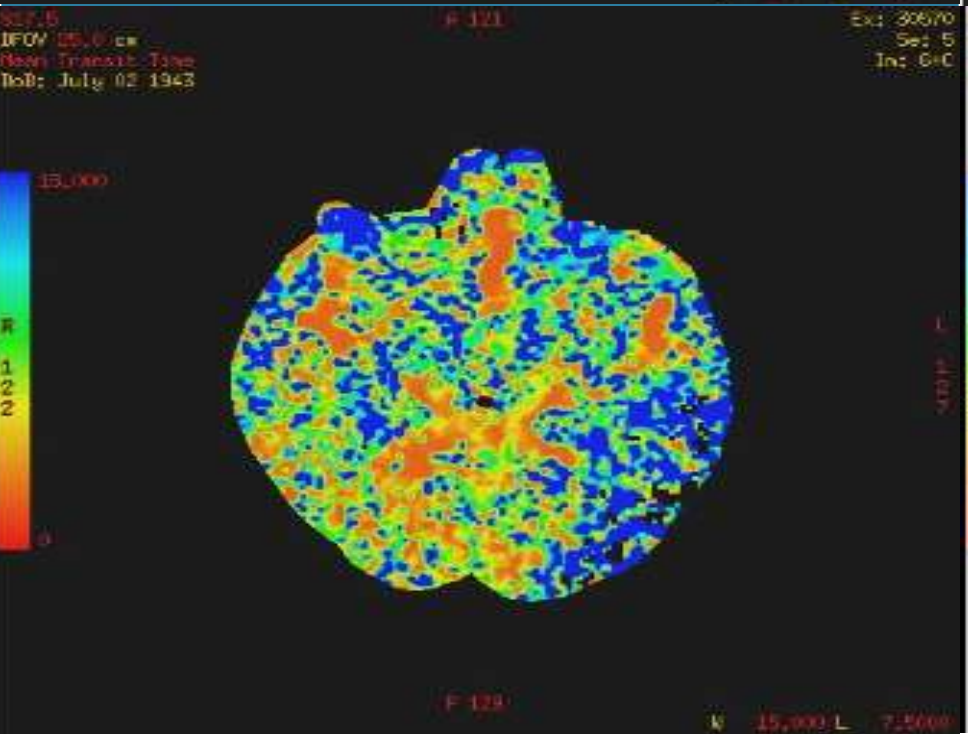


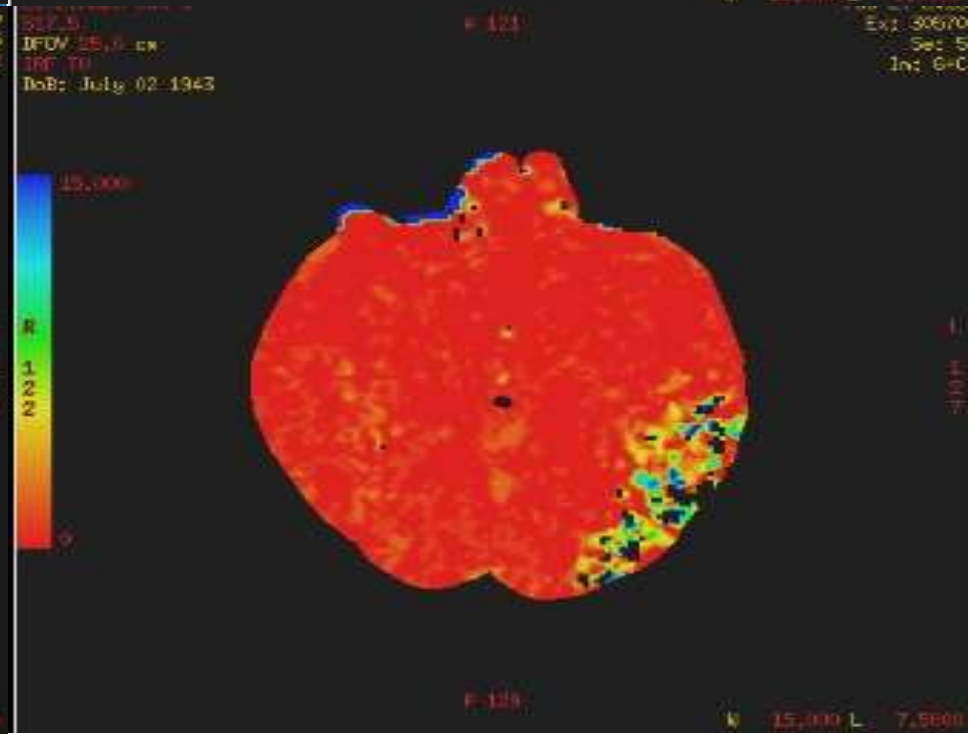
#2 Stroke post-op Endarterectomy




DFOV 25.0 cm
Blood Flow
DoB: July 02 1943
Ex: 306/70
Se: 5
Im: 6+C
100
R
122
0
P 121
P 129
K = 100 L = 50


DFOV 25.0 cm
Blood Volume
DoB: July 02 1943
Ex: 306/70
Se: 5
Im: 6+C
10.000
R
122
0
P 121
P 129

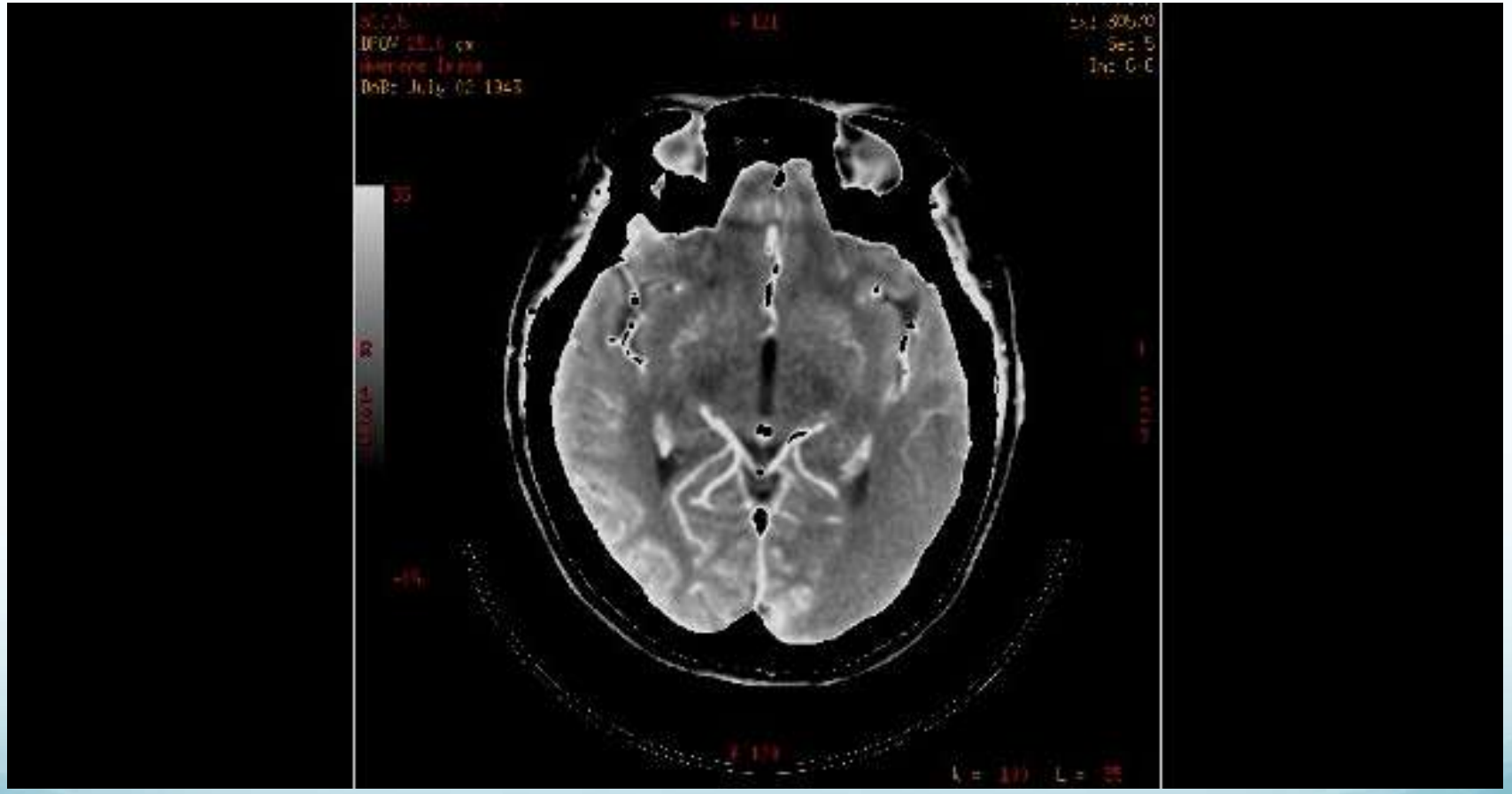

DFOV 25.0 cm
Mean Transit Time
DoB: July 02 1943
Ex: 306/70
Se: 5
Im: 6+C
15.000
R
122
0
P 121
P 129
K 15.000 L 7.5000


DFOV 25.0 cm
DoB: July 02 1943
Ex: 306/70
Se: 5
Im: 6+C
15.000
R
122
0
P 121
P 129
K 15.000 L 7.5000

Core Infarct

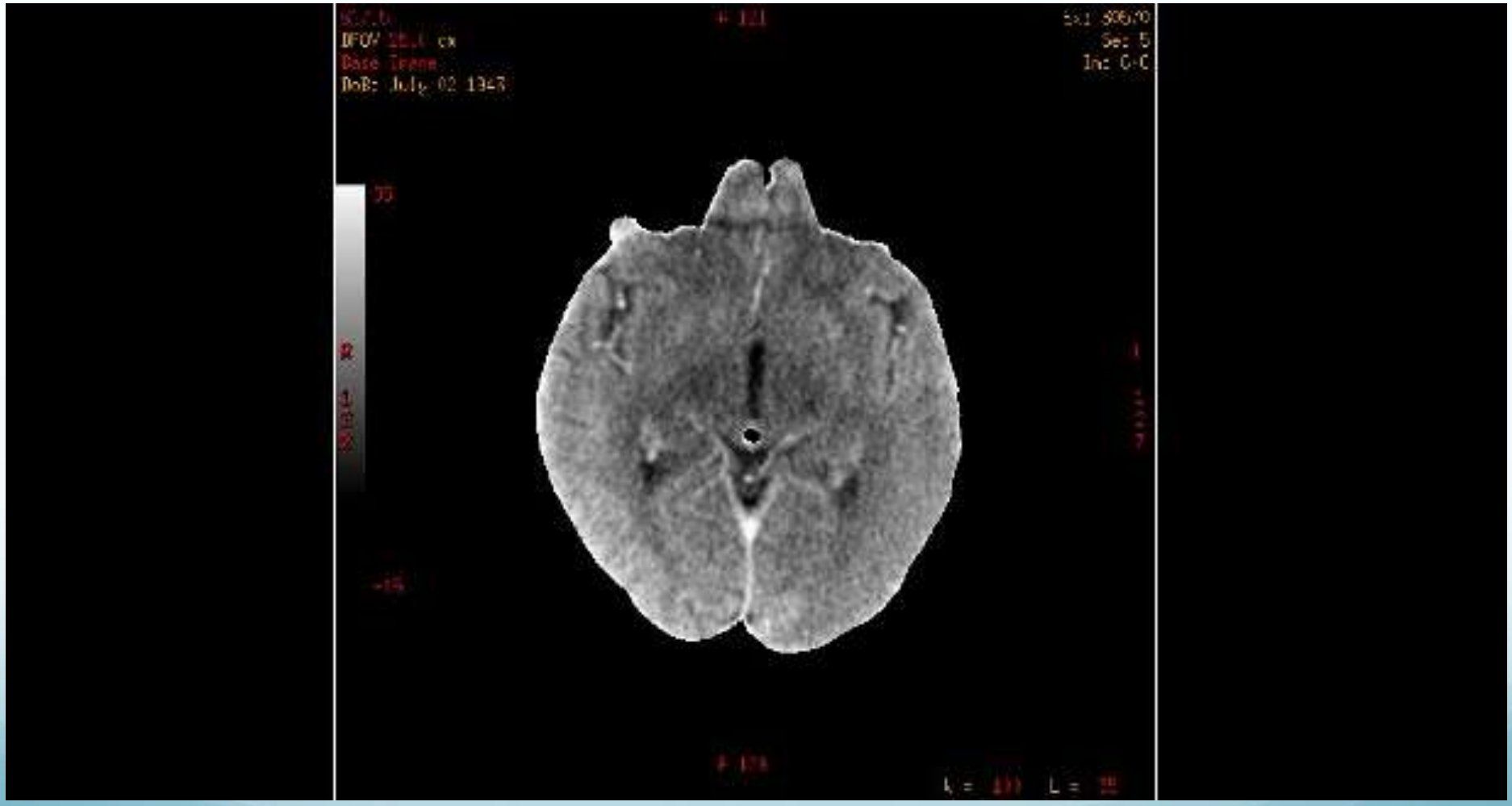
- Prior slide shows:
- Diminished Blood Flow
- Diminished Blood Volume in approximately the same distribution as BF
- This corresponds to the abnormal area on IRF T0
- You might argue that BV defect is slightly smaller than BF so there is penumbra. Maybe a little but not significant, and certainly nothing you'd want to recommend for interventional therapy.
- This is Core infarct without penumbra

Average Image



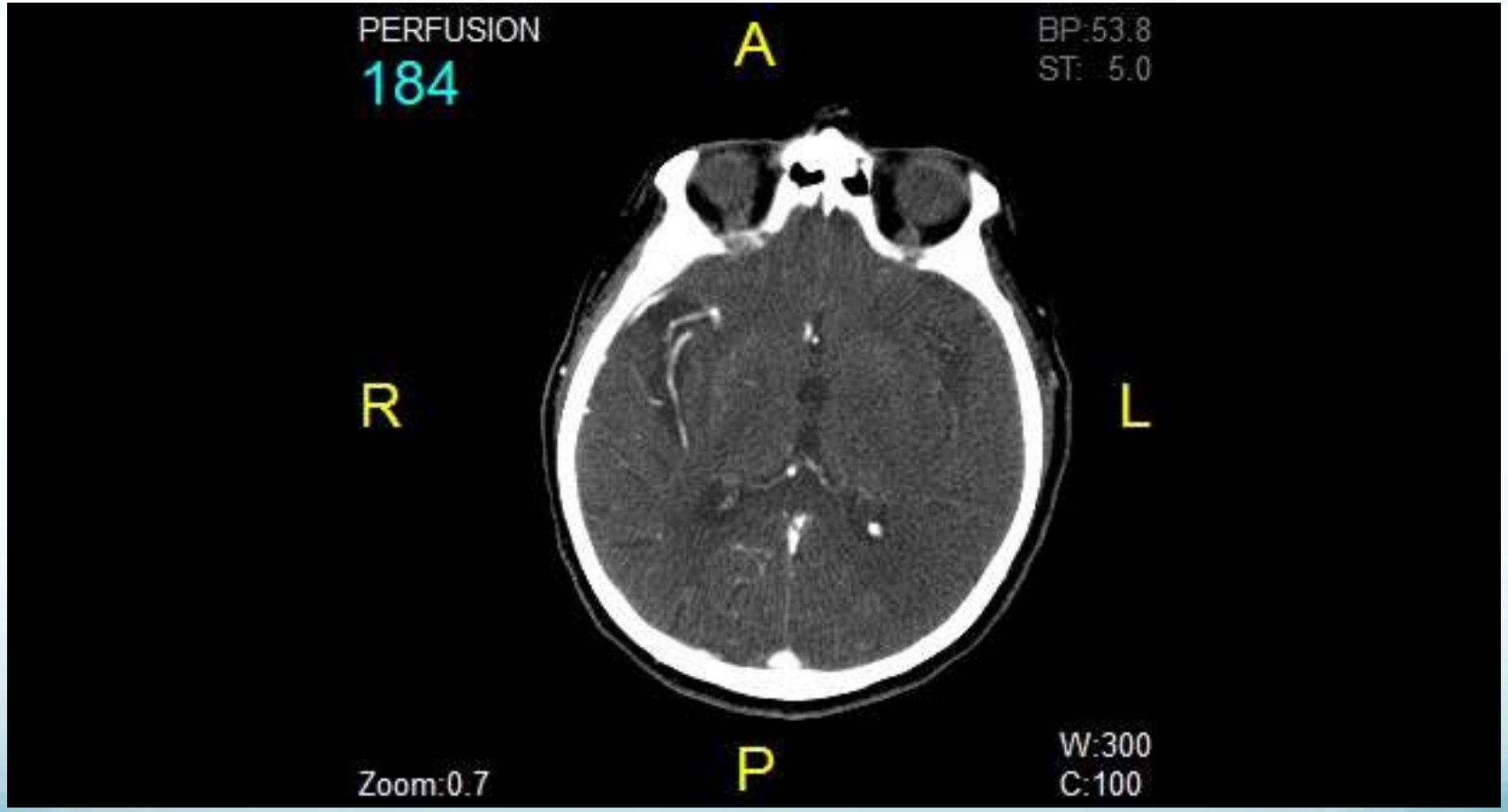
Average images are included with perfusion color maps and may be helpful in identifying location of concern. Look at the Left temporo-occipital lobe. Loss of gray white matter differentiation and no blood vessels.

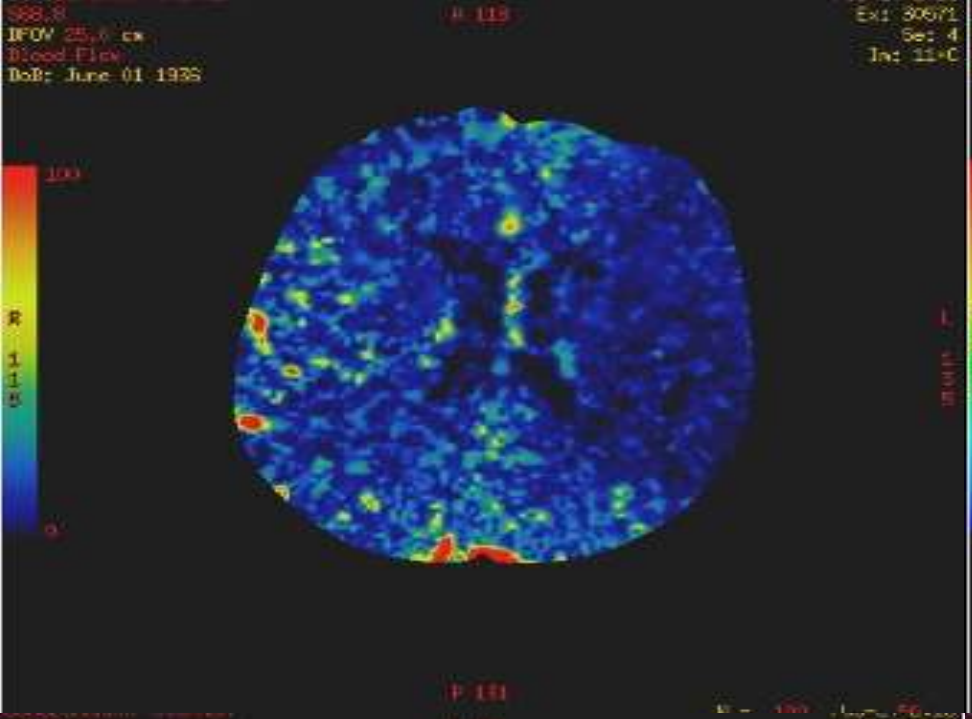
Loss of G-W differentiation

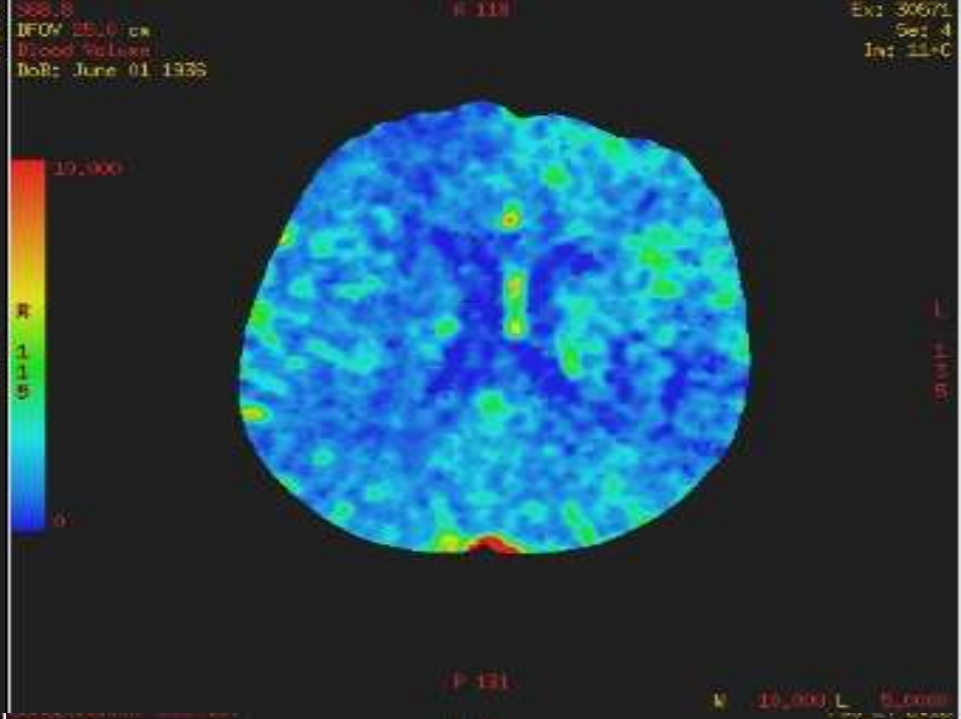


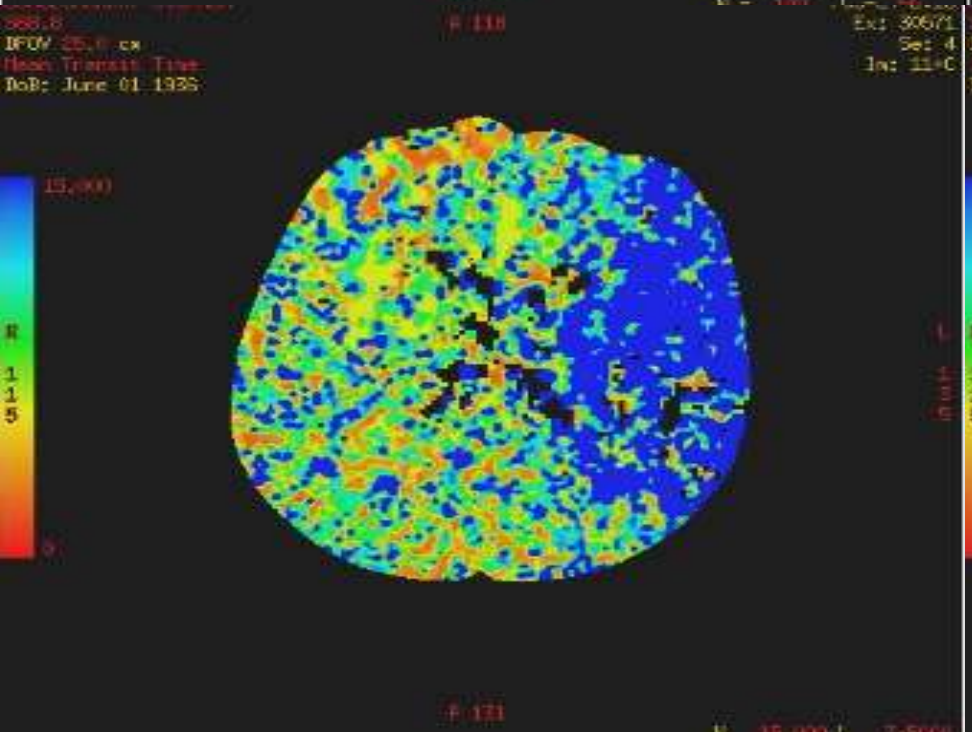
#3 LICA Occlusion

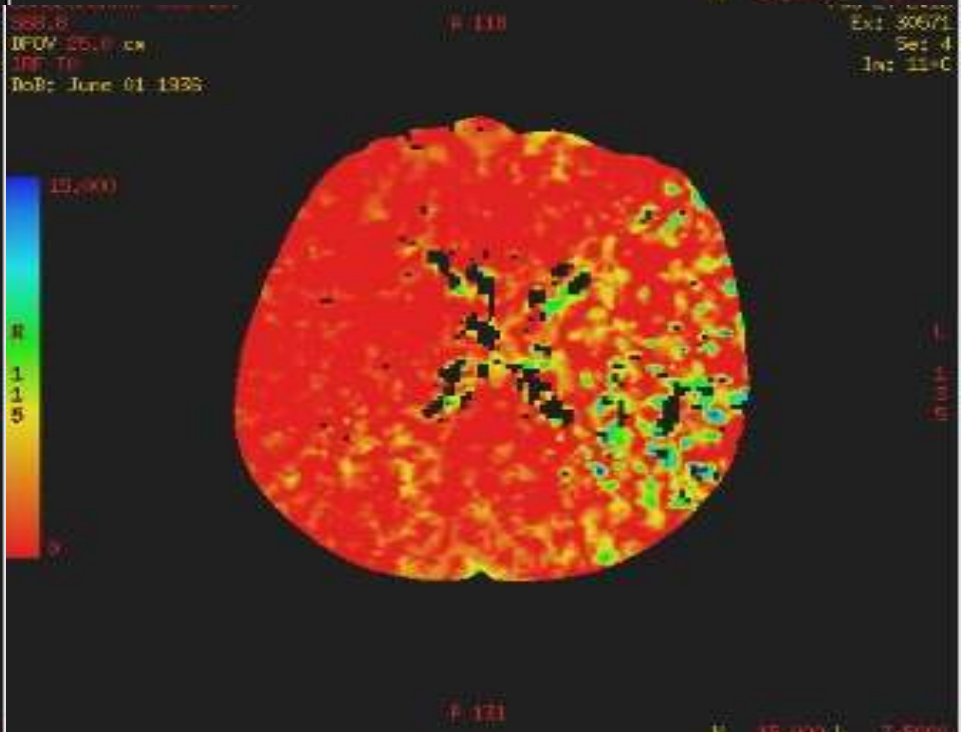
No Contrast L MCA




DFOV 25.6 cm
Blood Flow
DoB: June 01 1935
Ex: 30671
Se: 4
Im: 11+C
100
R 115
0


DFOV 25.6 cm
Blood Volume
DoB: June 01 1935
Ex: 30671
Se: 4
Im: 11+C
10,000
R 115
0

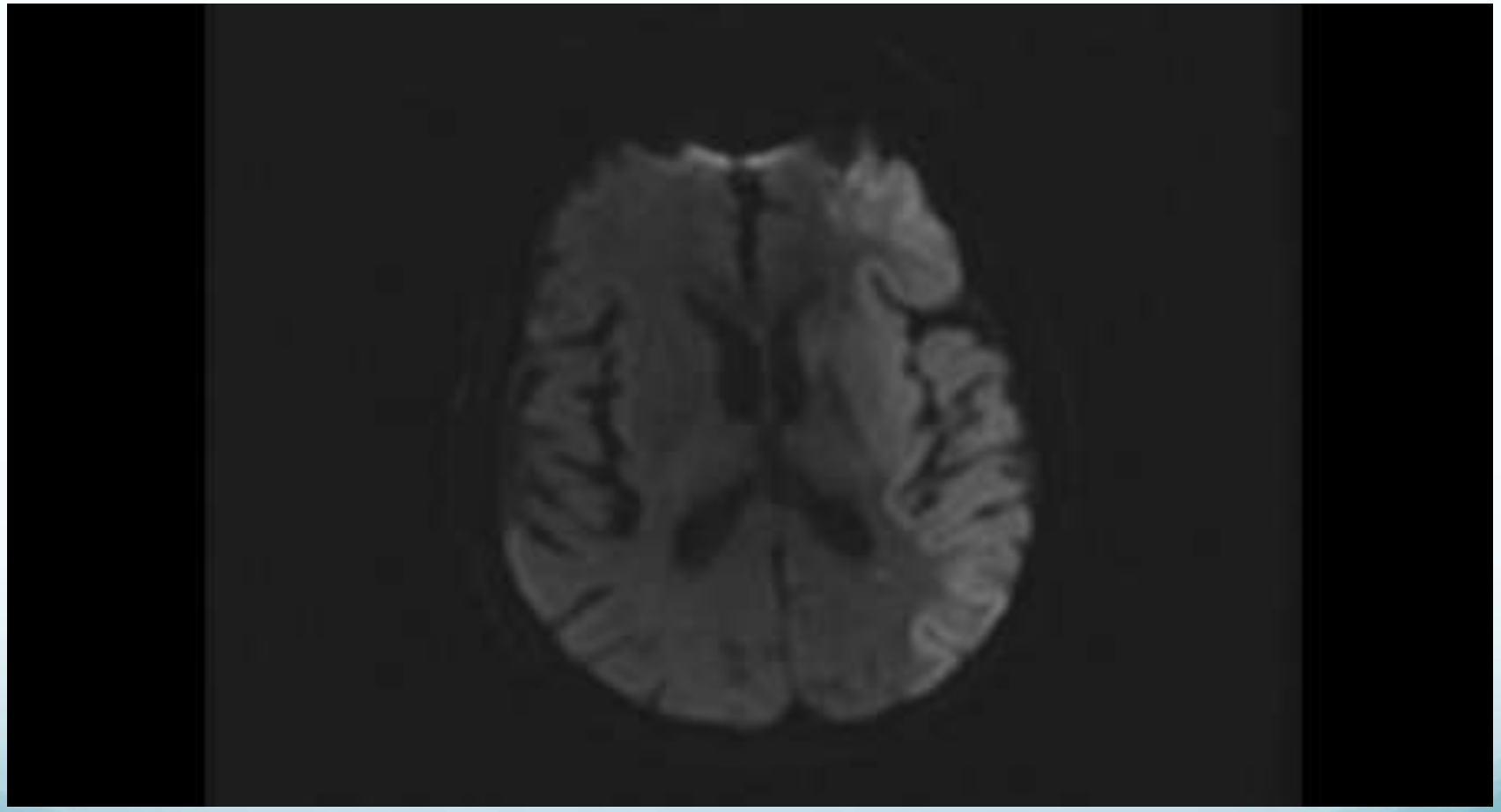

DFOV 25.6 cm
Mean Transit Time
DoB: June 01 1935
Ex: 30671
Se: 4
Im: 11+C
15,000
R 115
0


DFOV 25.6 cm
TTP
DoB: June 01 1935
Ex: 30671
Se: 4
Im: 11+C
15,000
R 115
0

Core Infarct with Penumbra

- Look at color maps on last slide.
- Large area of darkest blue on left (BF) corresponds to area of abnormality on IRF T0 and MTT.
- But the more anterior portion is higher in BV than the more posterior dark blue. This anterior green certainly represents penumbra.
- Again you could argue that the more posterior left parietal dark blue is similar to right. True, but if there's a core infarct, its here.

Diffusion



Ultimately, diffusion shows that the whole area of abnormal MTT and IRF T0 becomes infarcted, including the ischemic penumbra.

- We have Perfusion 4D software on Enterprise AW in offices and at ARMC
- You can choose to analyze and review case yourself
- May be helpful if there is patient motion and you want to remove one or more of 17 sequences that are merged
- If motion, you may consider injecting again and repeating study (or not)
- Remember there is some contrast onboard from prior CTA

Perfusion Motion

- The prior movie slide is a compilation of the 1st image of each the 17 phases combined to make the perfusion maps.
- I think there are 16 images in each of the 17 phases.
- I made this compilation from the AW to demonstrate the effects of patient motion.
- The CT techs can remove a phase if one is bad, but significant motion makes this study unreadable.

Thanks!