

# DES - COURS de BASE NEURORADIOLOGIE

*Année académique 2020-2021*

## Pathologie cérébrale Vasculaire aiguë



**Dr Thierry Duprez**

*Professeur Clinique*

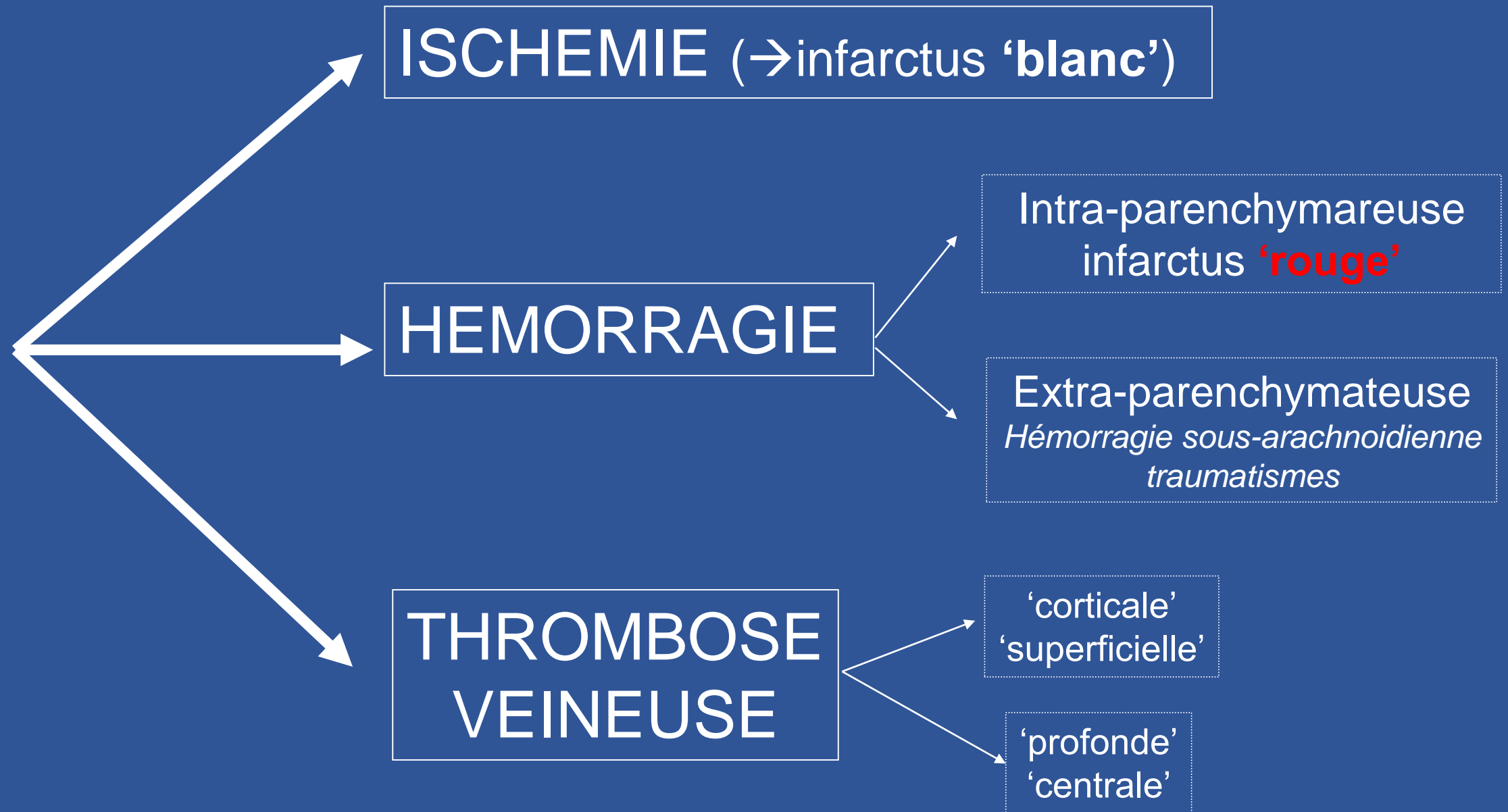
*Chef de Clinique*

Université catholique de Louvain  
Cliniques universitaires Saint-Luc

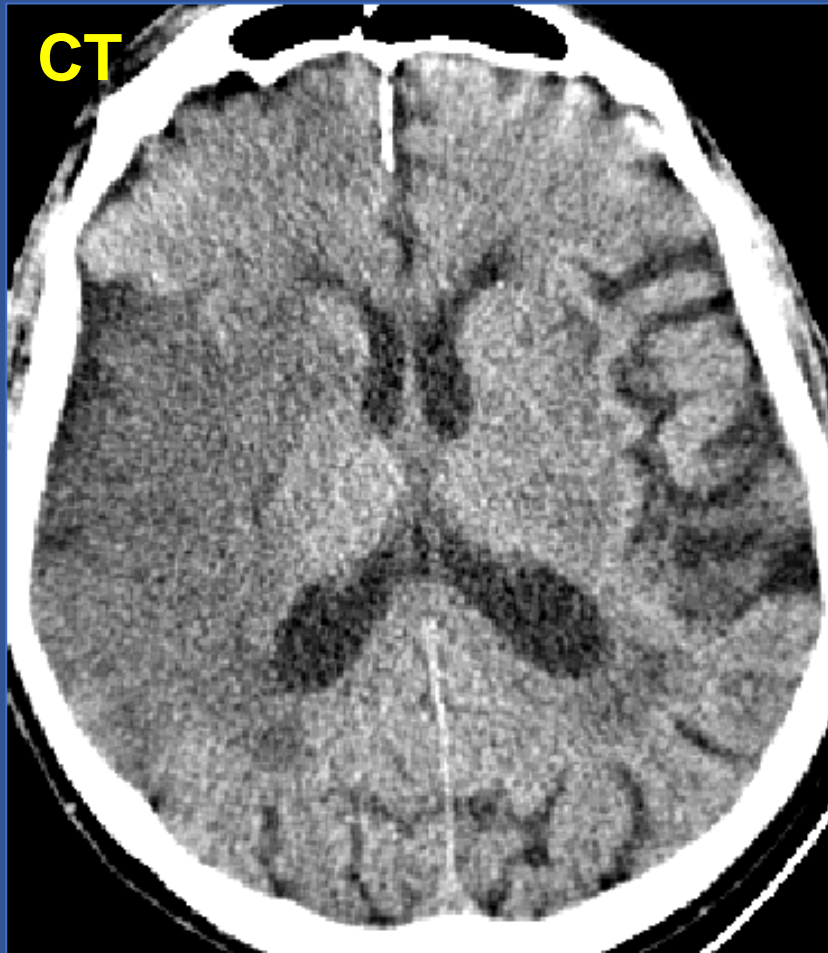
*Thierry.Duprez@uclouvain.be*

*<http://www.saintluc.be>*

22 janvier 2021 - Teams



# Ischémie cérébrale aiguë



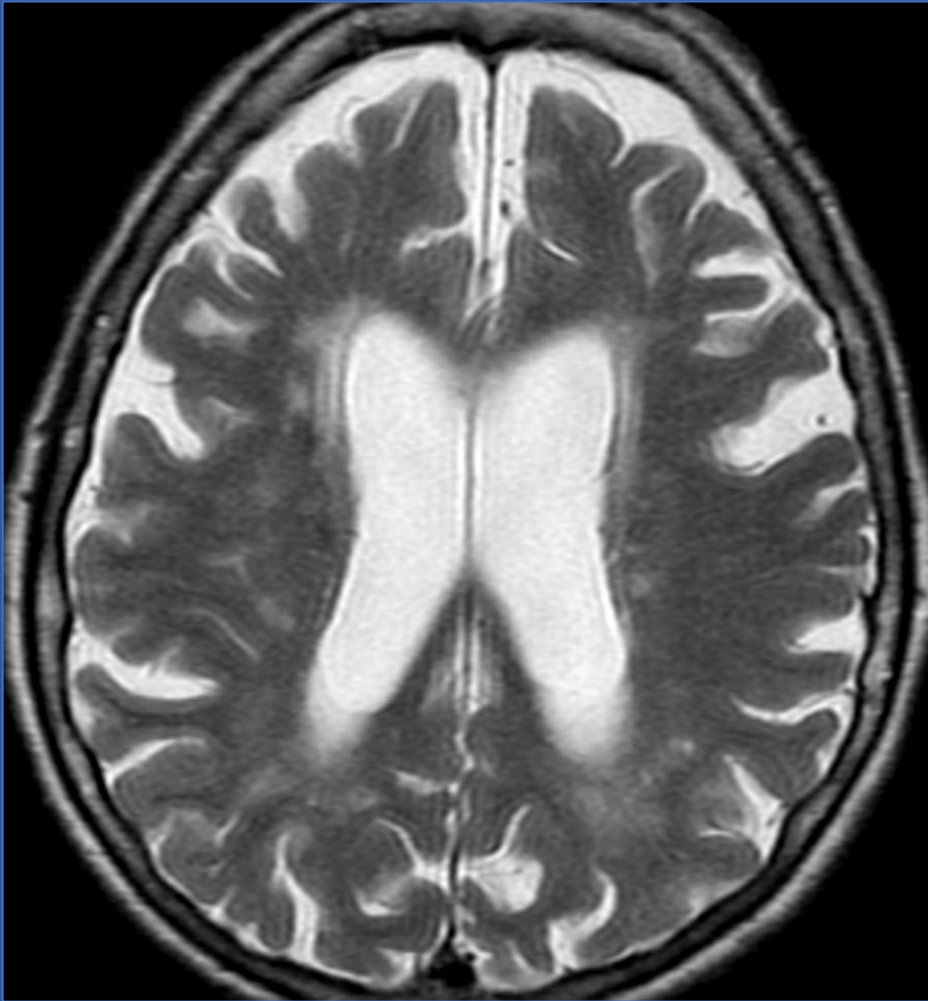
**hypodensité**



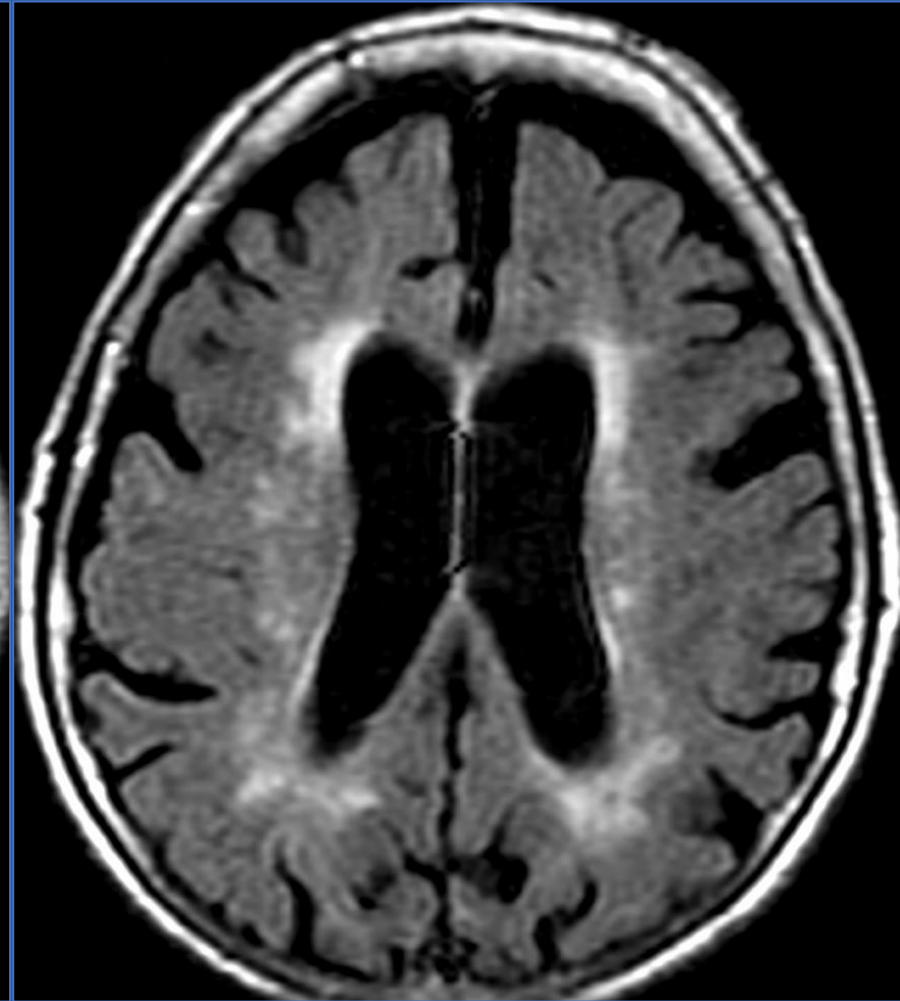
**hypersignal FLAIR/T2**

« **fenêtre thérapeutique** » pour traitement de revascularisation

## Imagerie morphologique

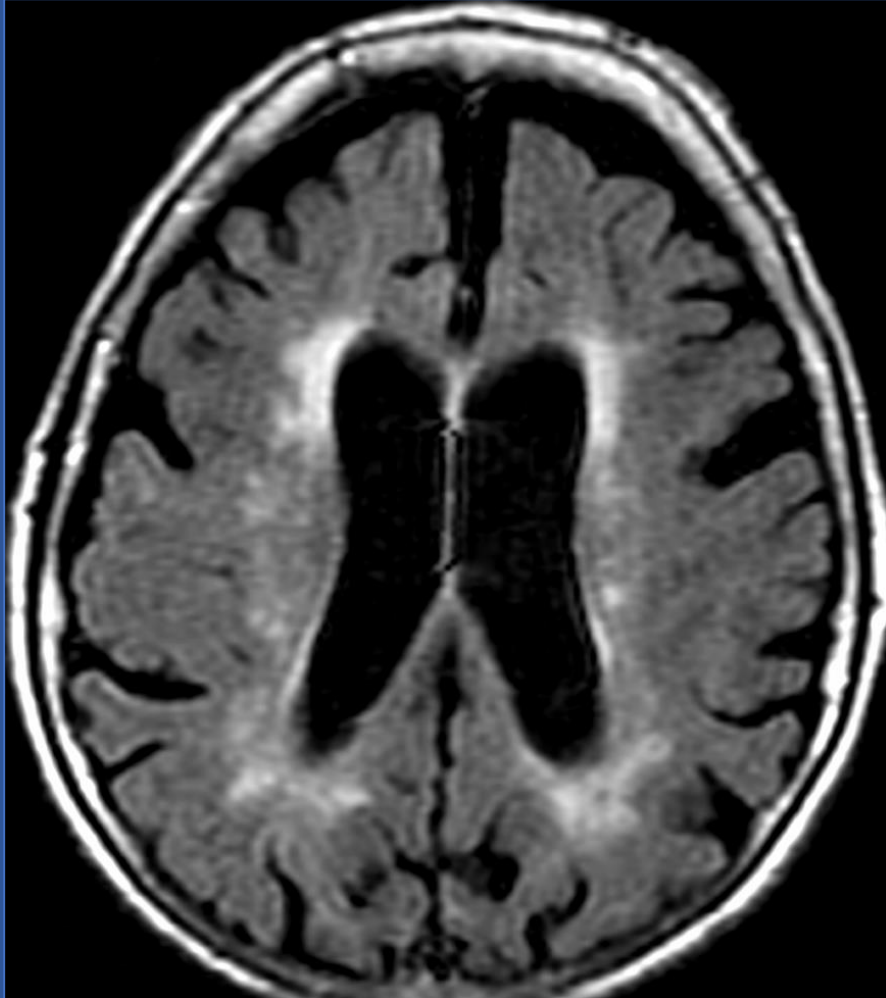


**T2-FSE**

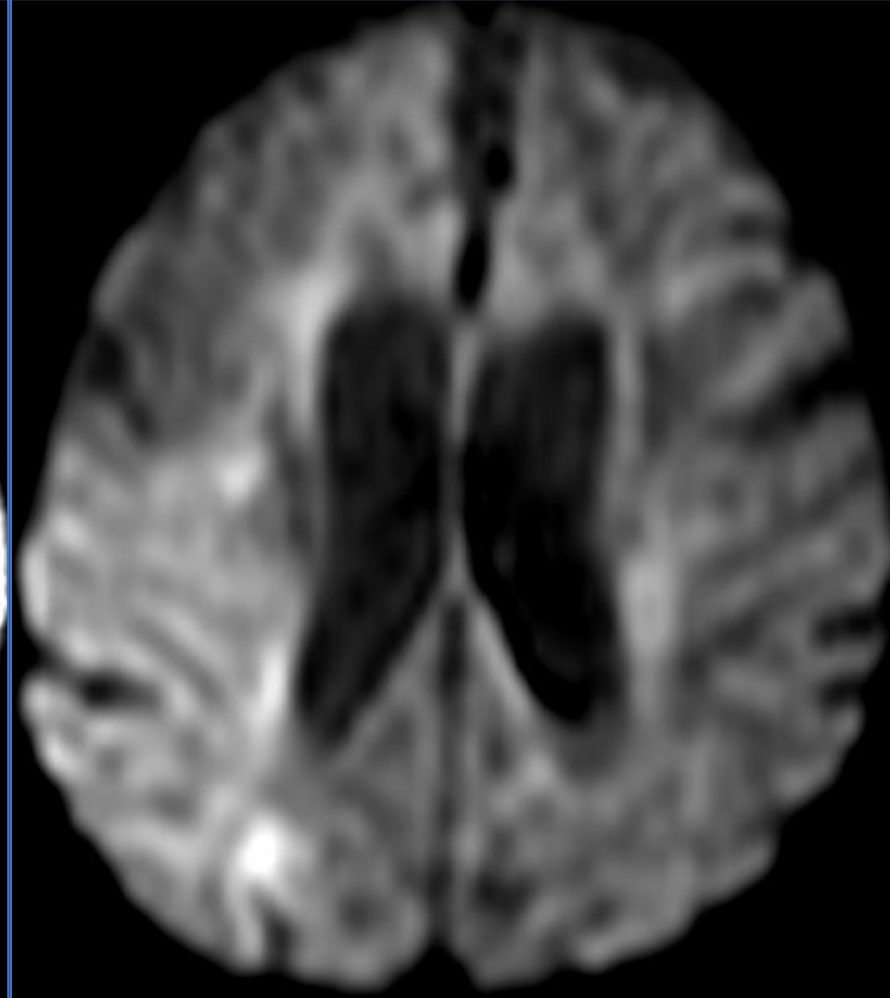


**FLAIR**

## Imagerie de diffusion (*Diffusion-Weighted Imaging*)



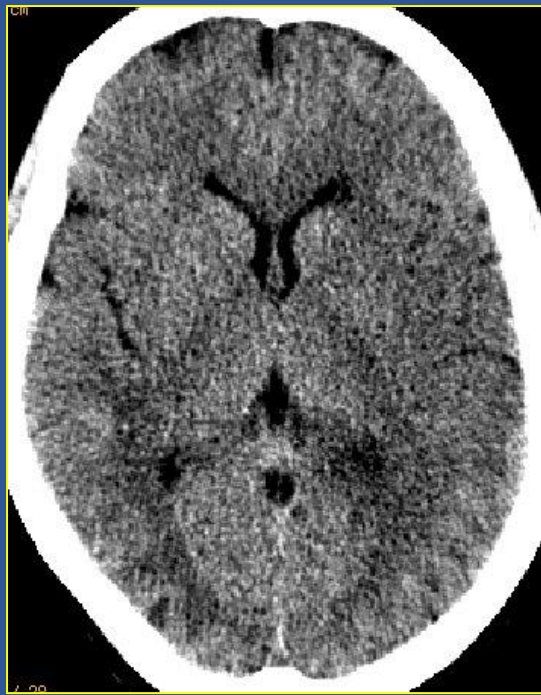
**FLAIR**



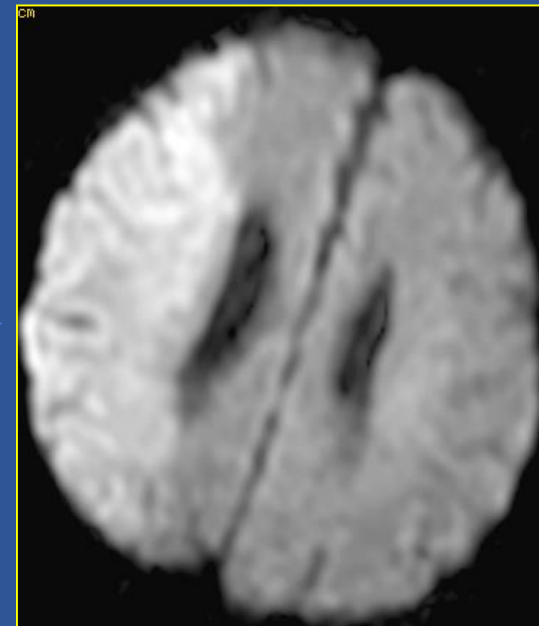
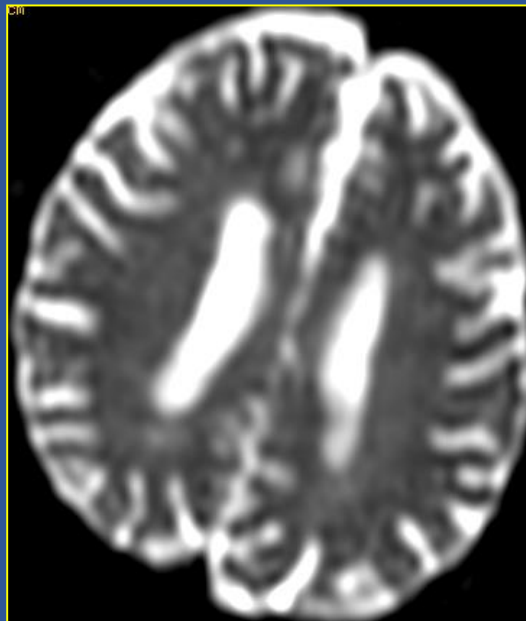
**Imagerie de diffusion**



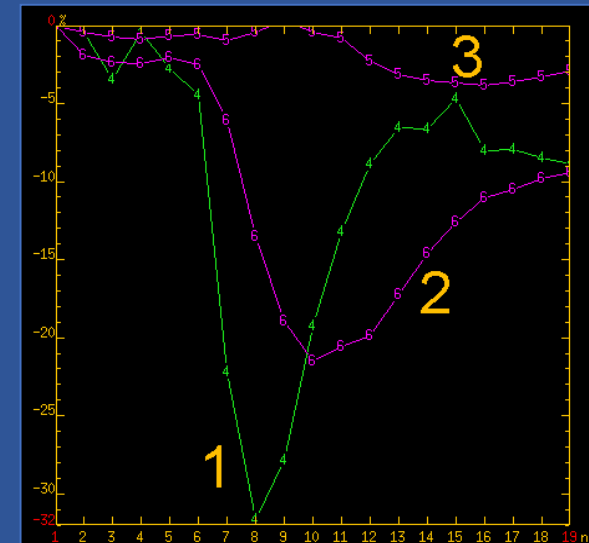
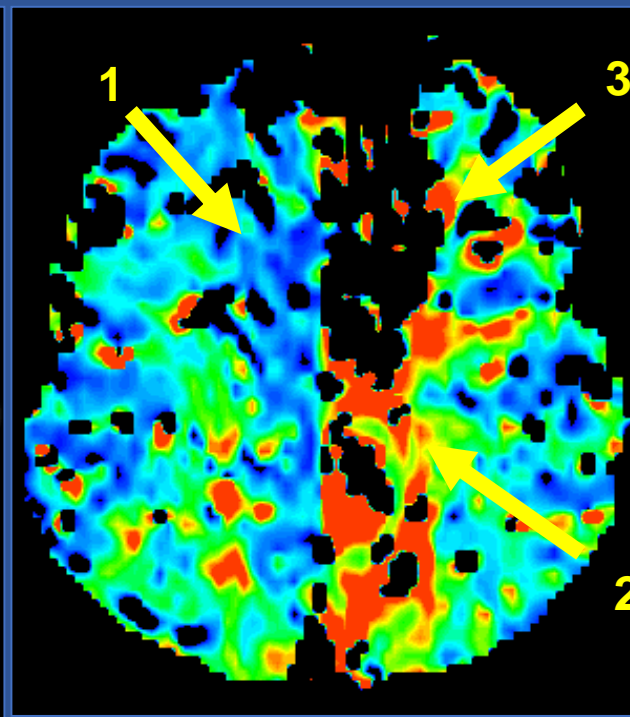
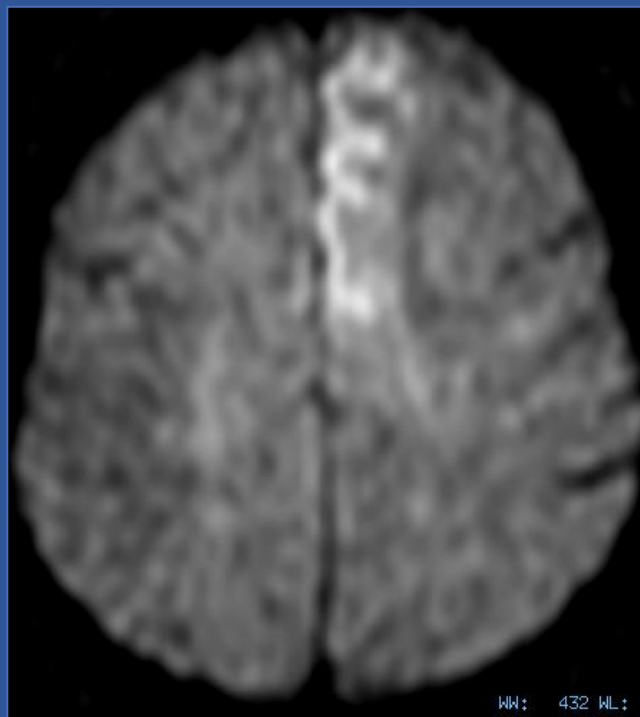
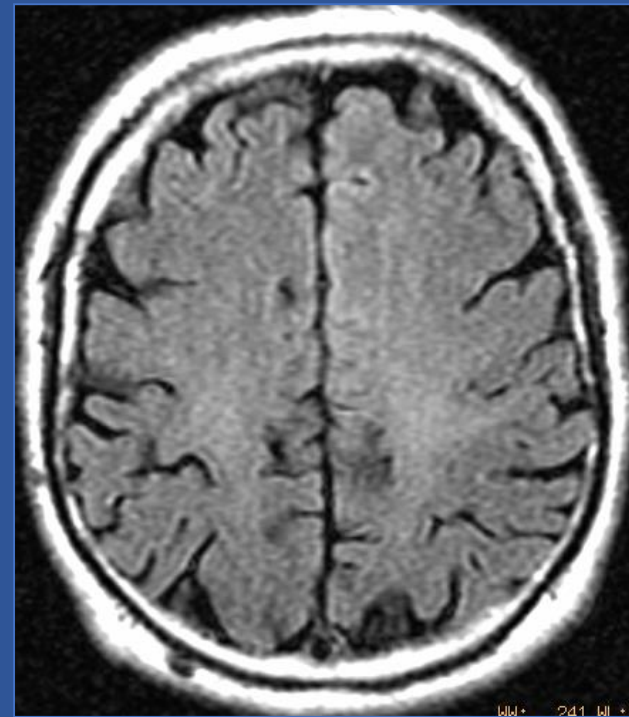
<6 heures



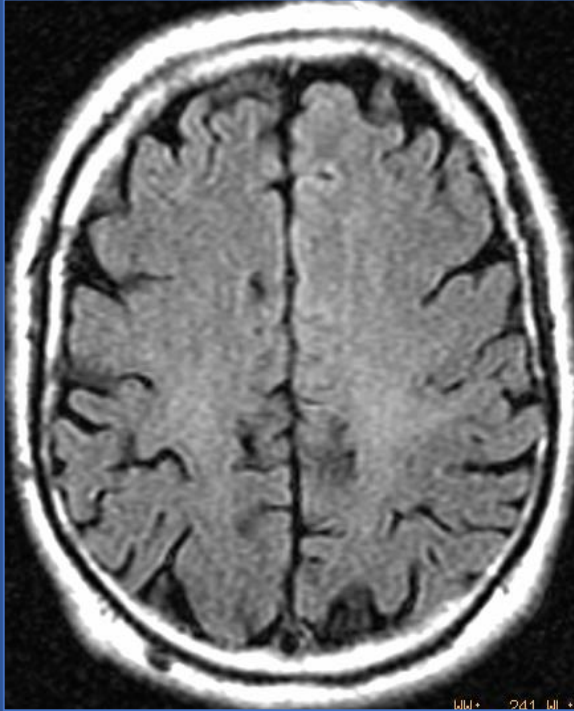
???



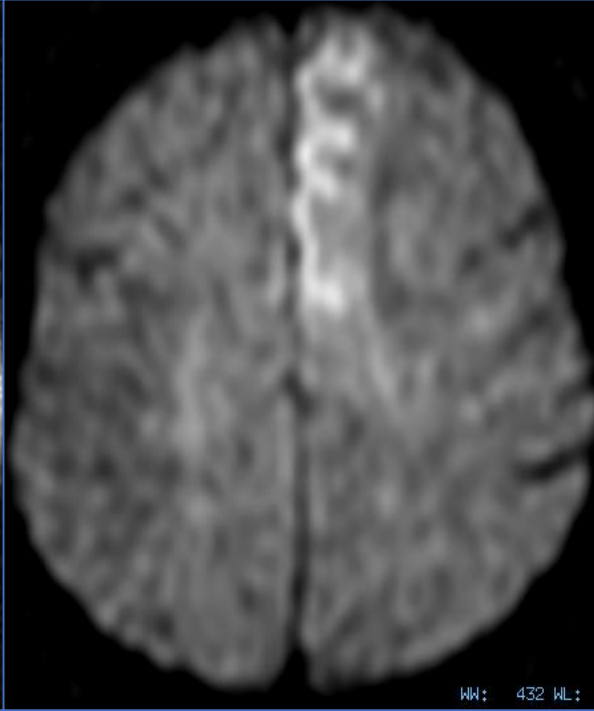
# Imagerie de perfusion (*Perfusion-Weighted Imaging*)



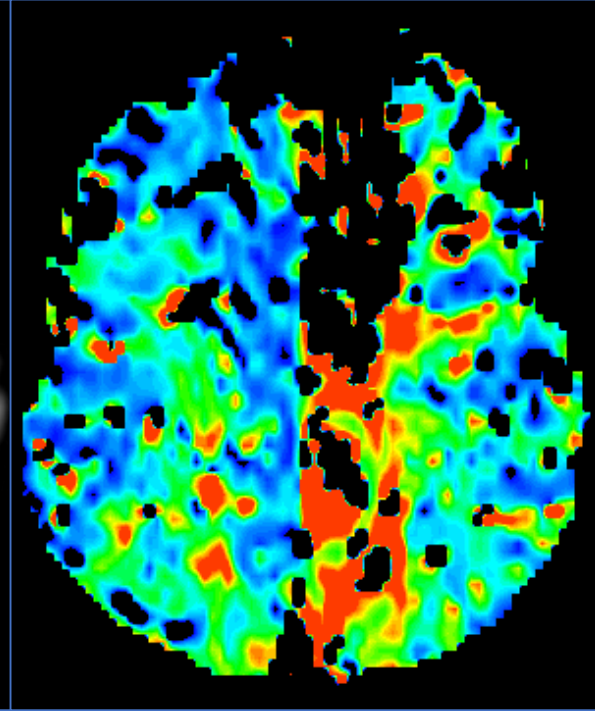
« MISMATCH »



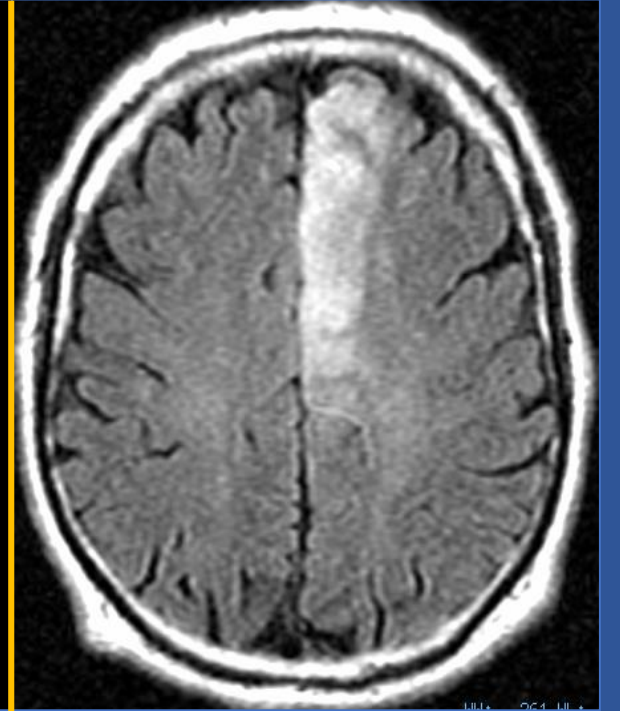
FLAIR 4 hours



DWI 4 hours



PWI 4 hours

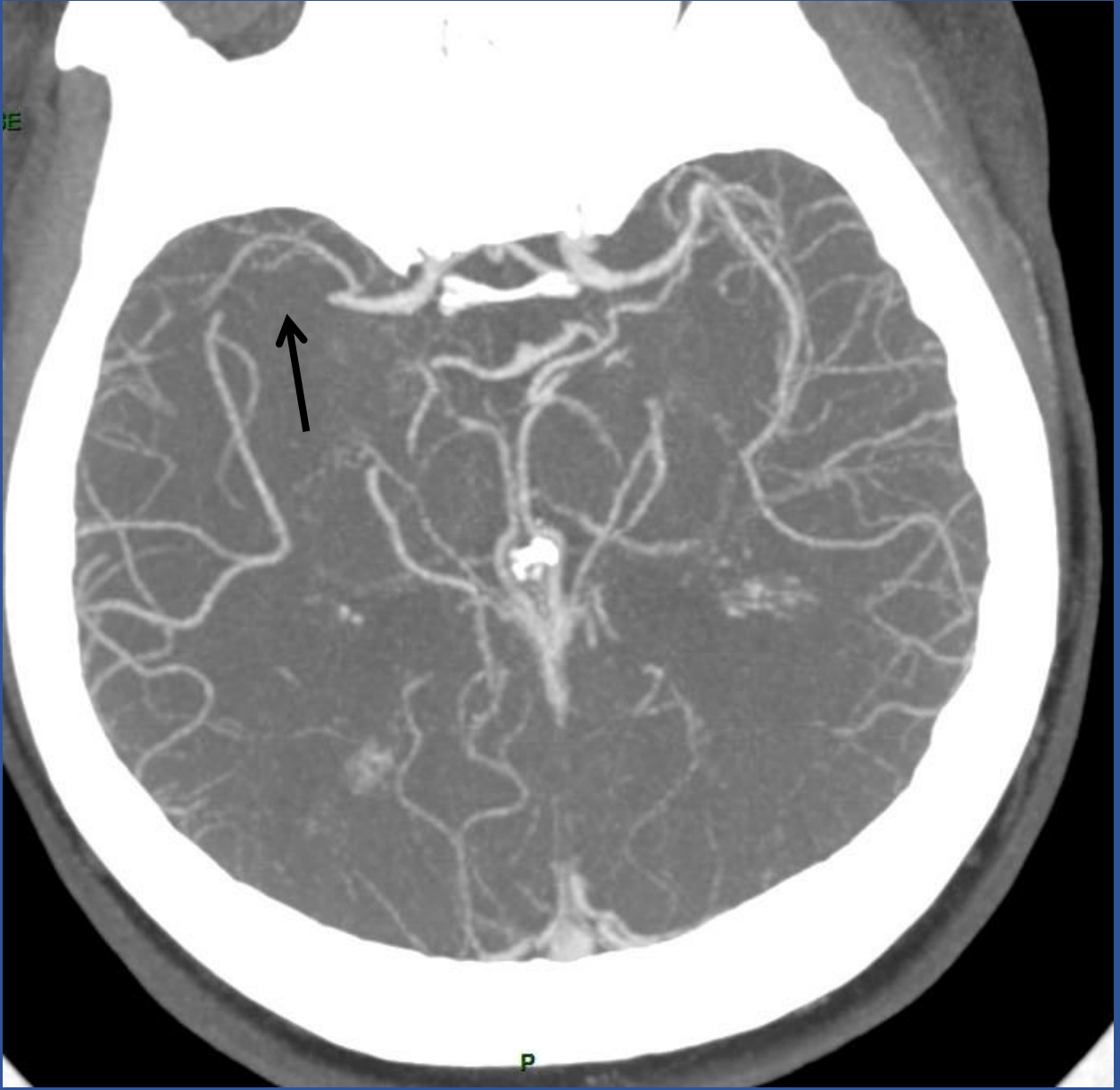
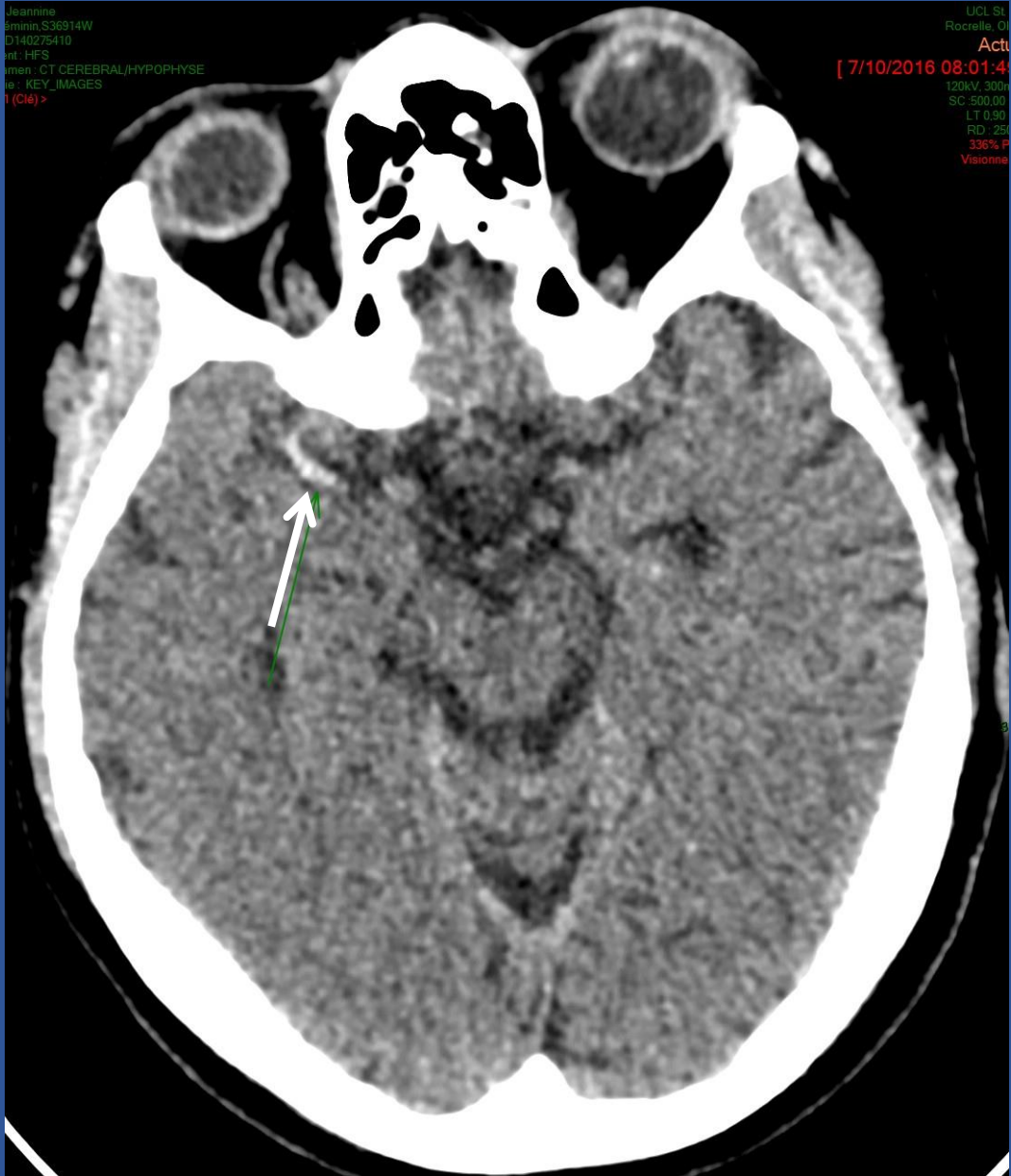


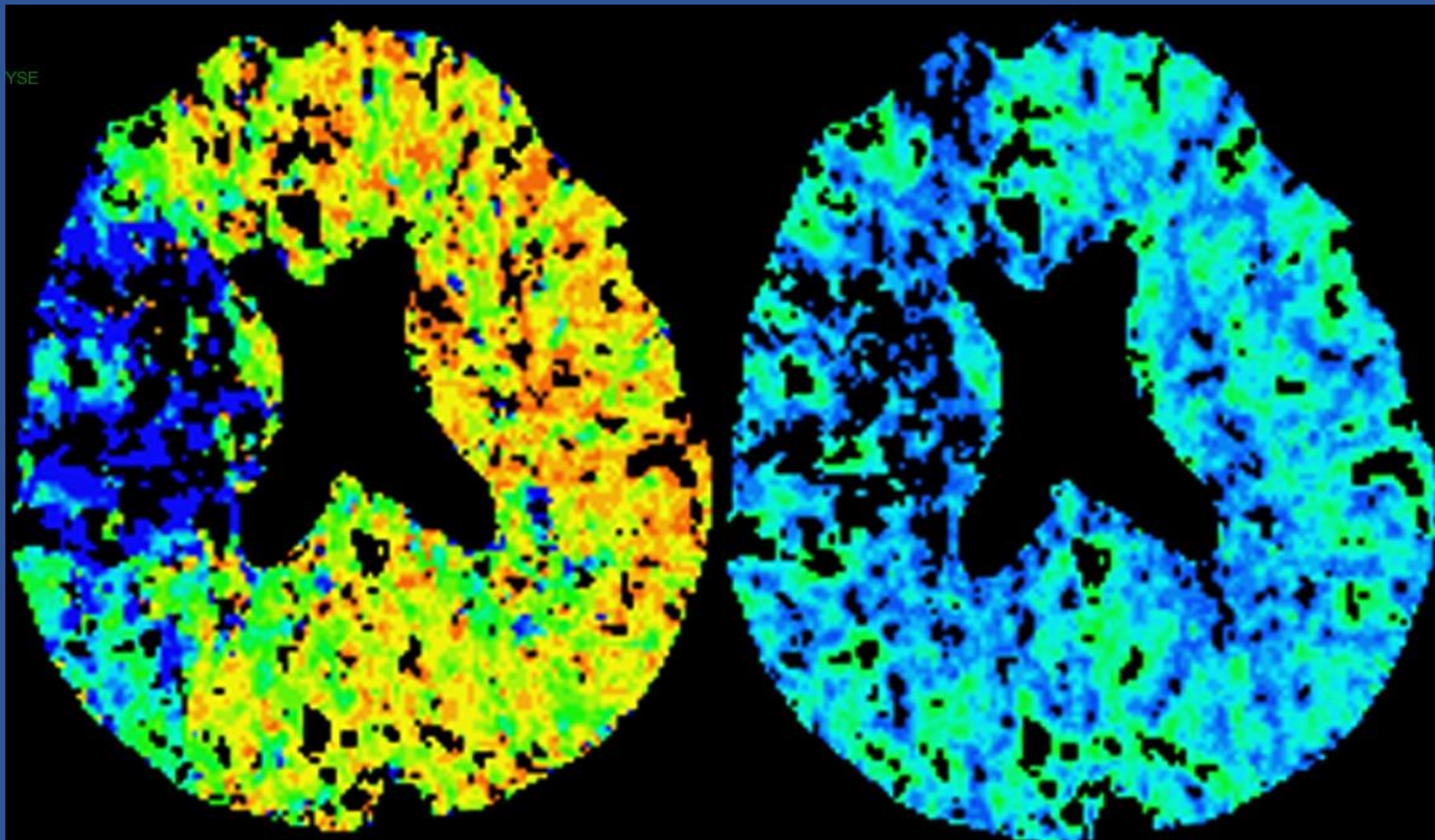
FLAIR 24 hours



Jeannine  
Bminin.S36914W  
D140275410  
nt: HFS  
amen: CT CEREBRAL/HYPOPHYSE  
ie: KEY\_IMAGES  
1 (Clé) >

UCL St  
Rocrelle, OI  
Actu  
[ 7/10/2016 08:01:4  
120kV, 300m  
SC: 500.00  
LT: 0.90  
RD: 25  
336% P  
Visionne





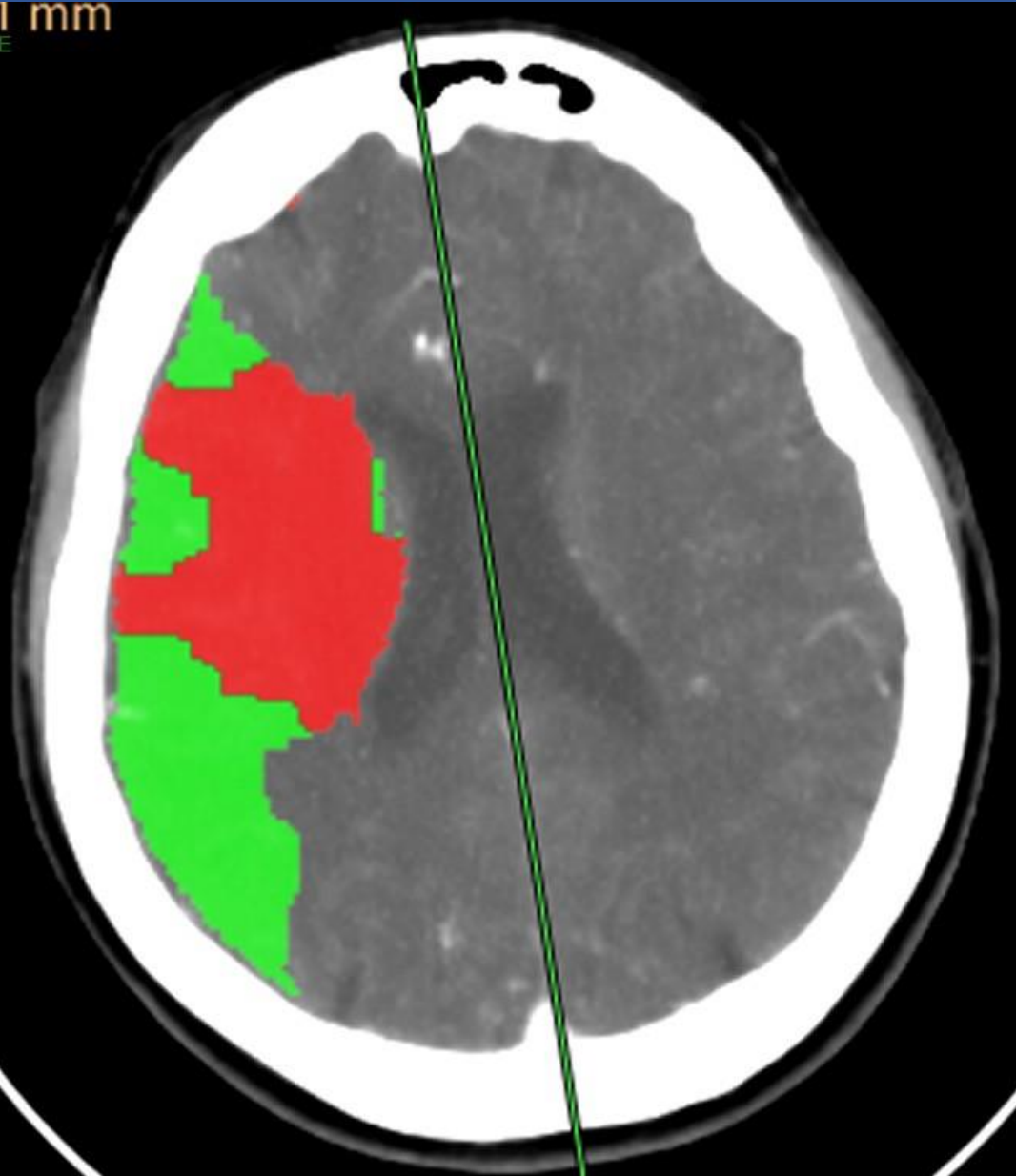
MTT

CBV

Pos. coupe : 187.1 mm  
Pos. patient : HFS  
Desc. examen : CT CEREBRAL/HYPOPHYSE  
Desc. série : resultats perfusion  
< 2184 - 8 >

MTT aug. et  
CBV norm.

MTT aug. et  
CBV rouge.



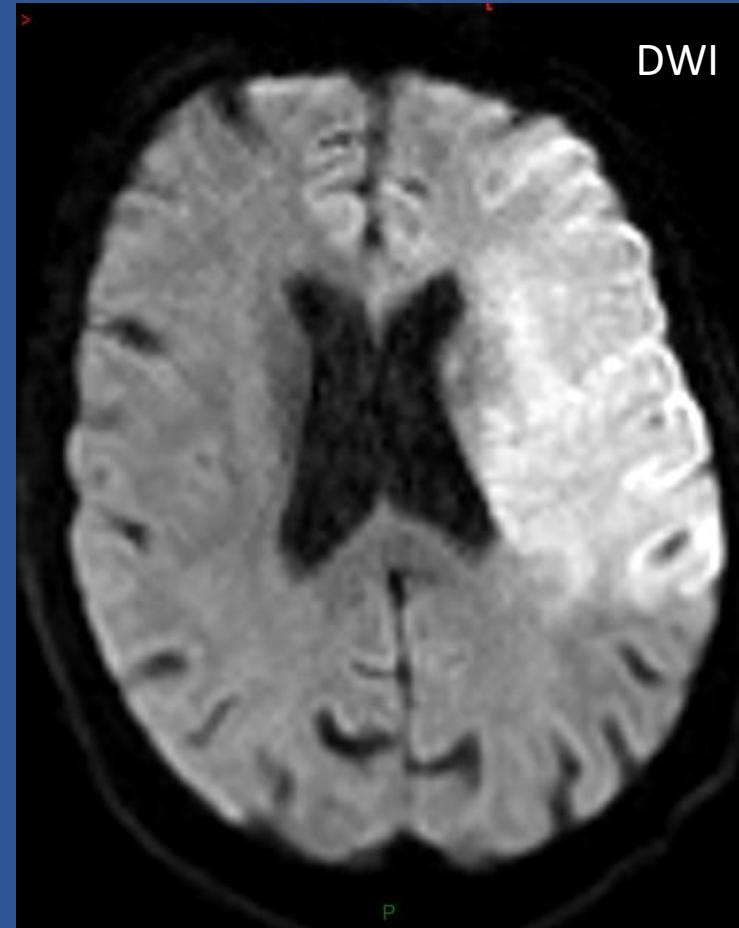
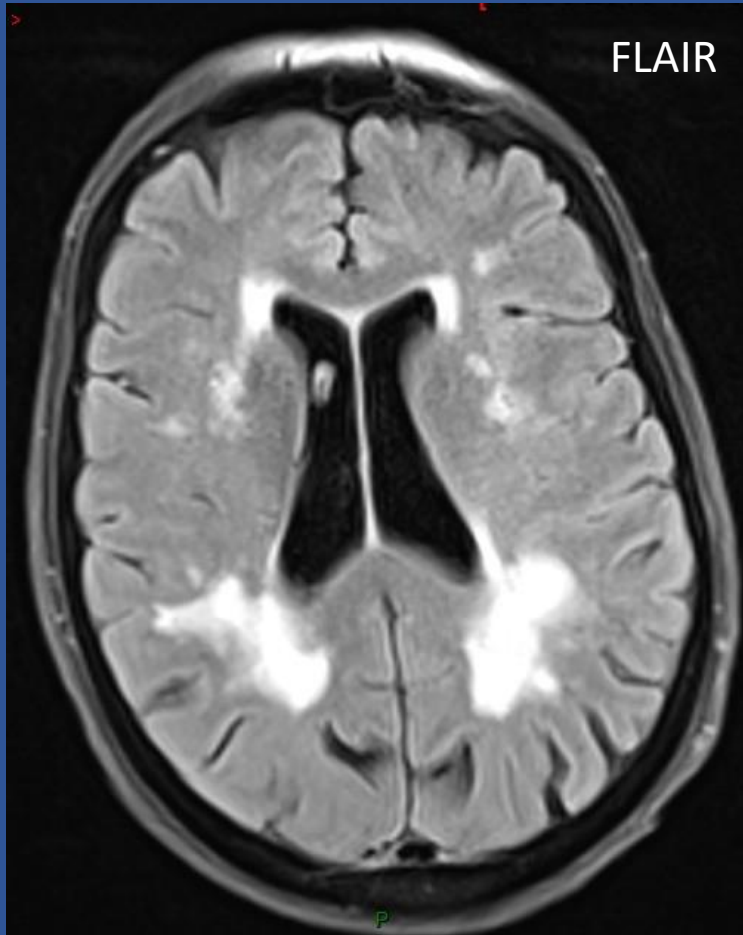
Infarctus

Pénombre

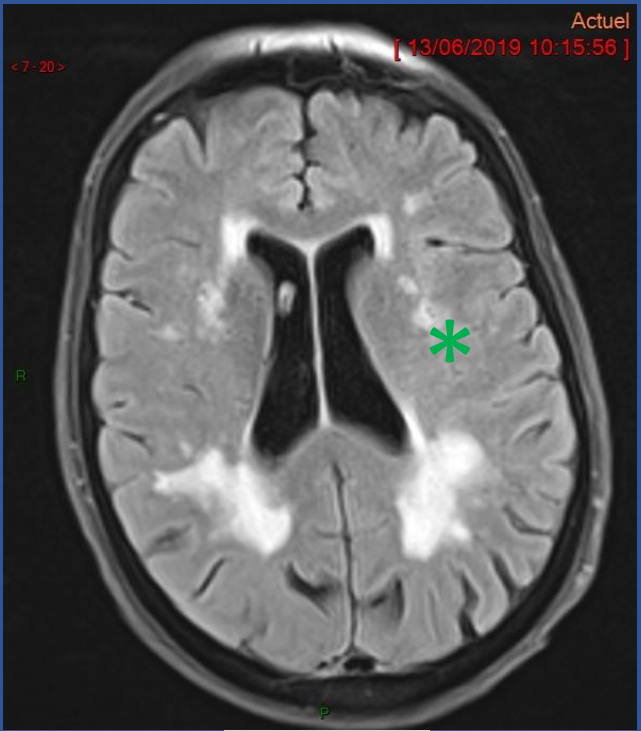
« **MISMATCH** »



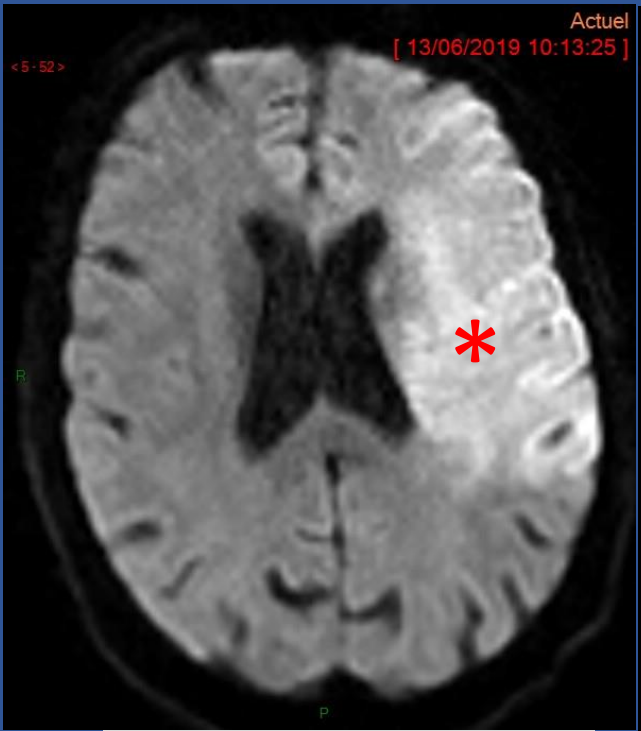
# Type I mismatch



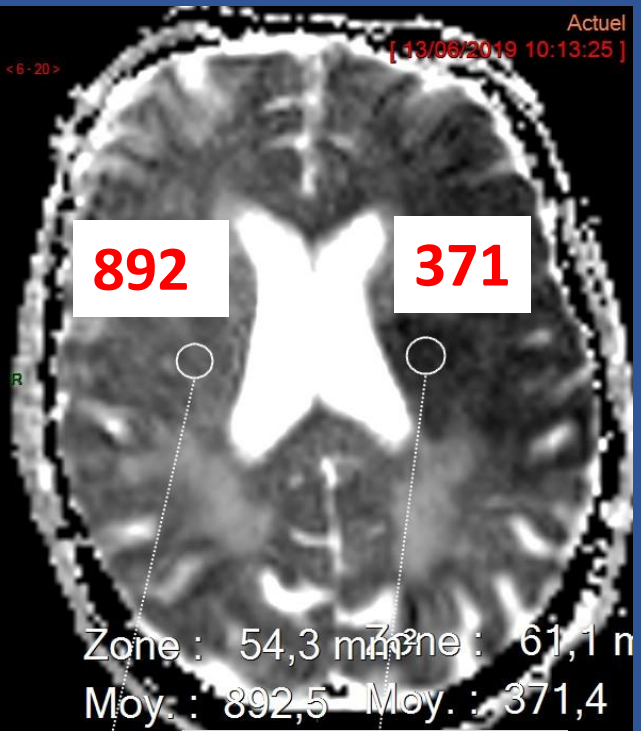
*90-year-old woman with aphasia and right hemiplegia on waking → 'WAKE UP' STROKE*



FLAIR (-)



Diffusion-weighting (+)



DWI-ADC map (+)

- 1 → acute left MCA ischemic stroke \*
- 2 → ... onseted < 4 hours \*

*The* **NEW ENGLAND**  
**JOURNAL of MEDICINE**

ESTABLISHED IN 1812      SEPTEMBER 25, 2008      VOL. 359 NO. 13

**Thrombolysis with Alteplase 3 to 4.5 Hours  
after Acute Ischemic Stroke**

Werner Hacke, M.D., Markku Kaste, M.D., Erich Bluhmki, Ph.D., Miroslav Brozman, M.D., Antoni Dávalos, M.D.,  
Donata Guidetti, M.D., Vincent Larrue, M.D., Kennedy R. Lees, M.D., Zakaria Medeghri, M.D.,  
Thomas Machnig, M.D., Dietmar Schneider, M.D., Rüdiger von Kummer, M.D., Nils Wahlgren, M.D.,  
and Danilo Toni, M.D., for the ECASS Investigators\*



ORIGINAL ARTICLE

### MRI-Guided Thrombolysis for Stroke with Unknown Time of Onset

G. Thomalla, C.Z. Simonsen, F. Boutitie, G. Andersen, Y. Berthezene, B. Cheng, B. Cheripelli, T.-H. Cho, F. Fazekas, J. Fiehler, I. Ford, I. Galinovic, S. Gellissen, A. Golsari, J. Gregori, M. Günther, J. Guibernau, K.G. Häusler, M. Hennerici, A. Kemrning, J. Marstrand, B. Modrau, L. Neeb, N. Perez de la Ossa, J. Puig, P. Ringleb, P. Roy, E. Scheel, W. Schonewille, J. Serena, S. Sunaert, K. Villringer, A. Wouters, V. Thijs, M. Ebinger, M. Endres, J.B. Fiebach, R. Lemmens, K.W. Muir, N. Nighoghossian, S. Pedraza, and C. Gerloff, for the WAKE-UP Investigators\*

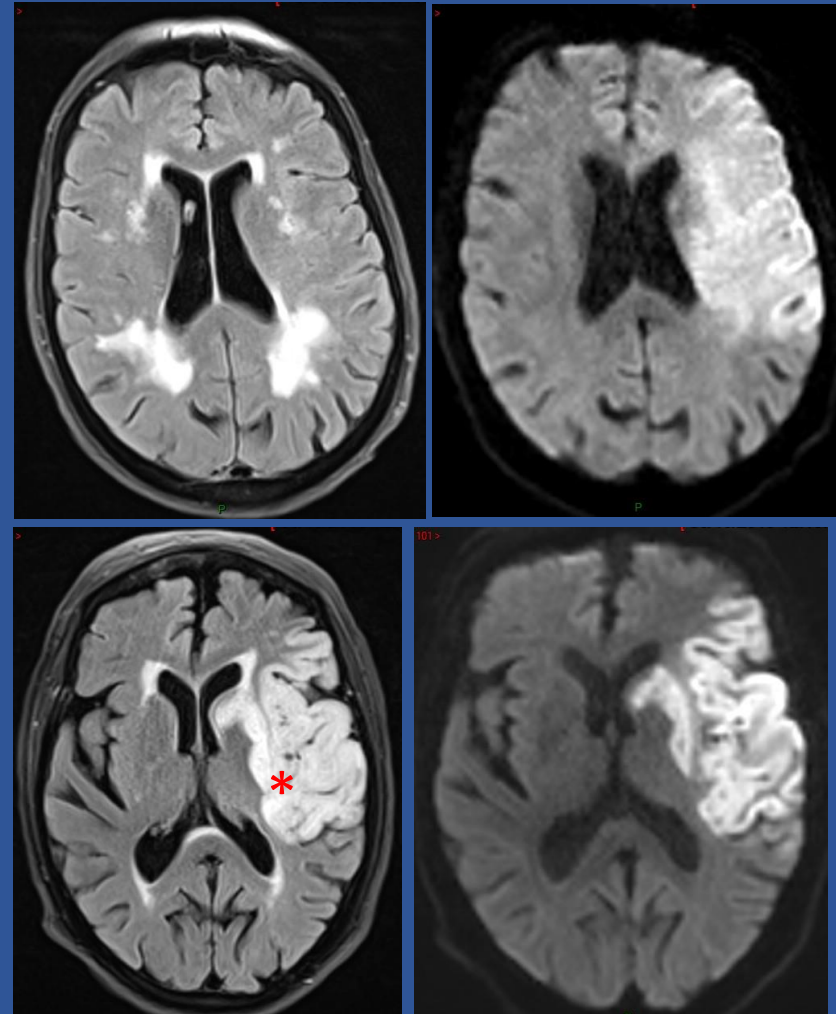
Patients having (-) FLAIR and (+) DWI fall into the time delay for IV thrombolytic therapy set at 4h30

Eligible for IV thrombolysis ?

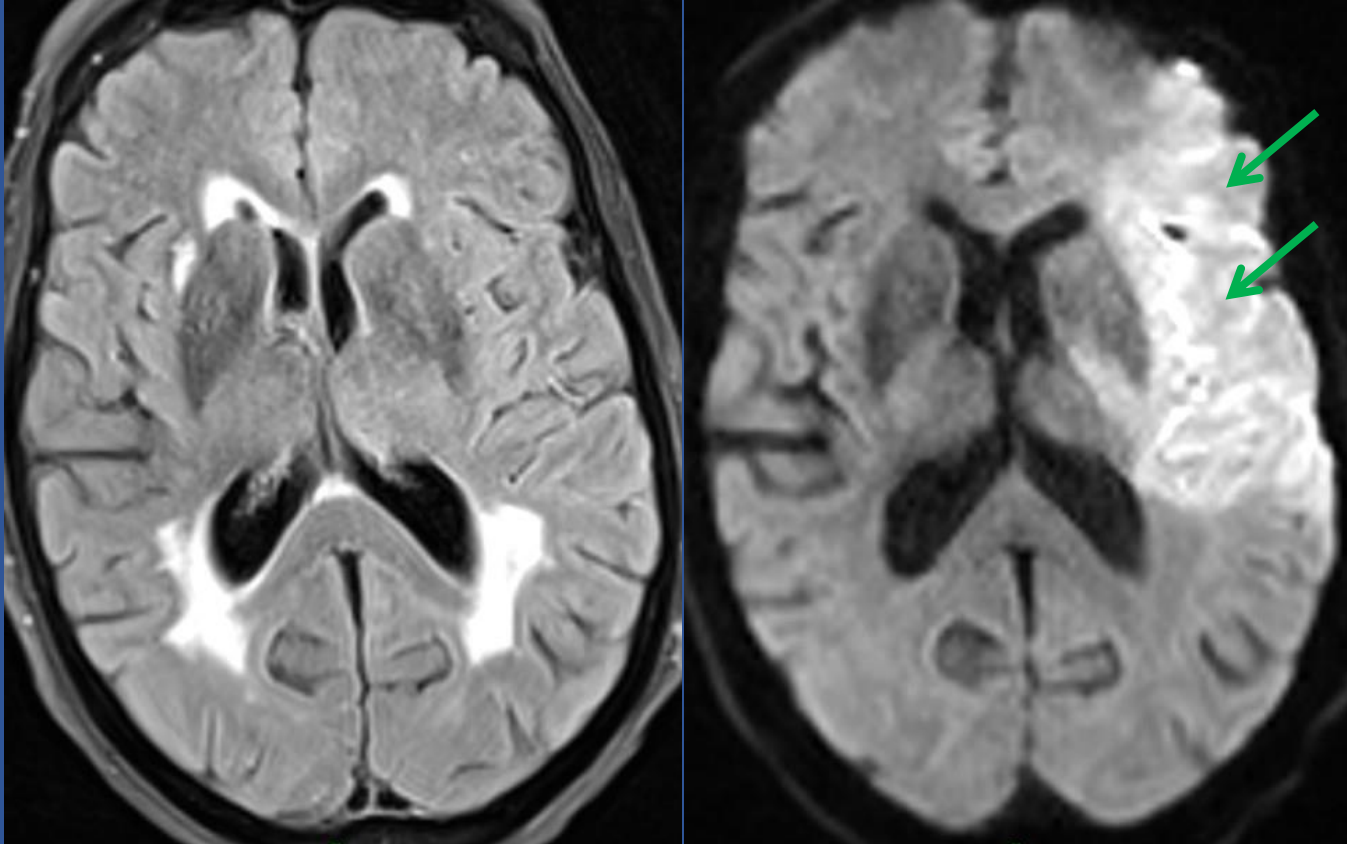
MISMATCH TYPE 1  
=  
TEMPORAL MISMATCH

YES

NO



# Type II mismatch

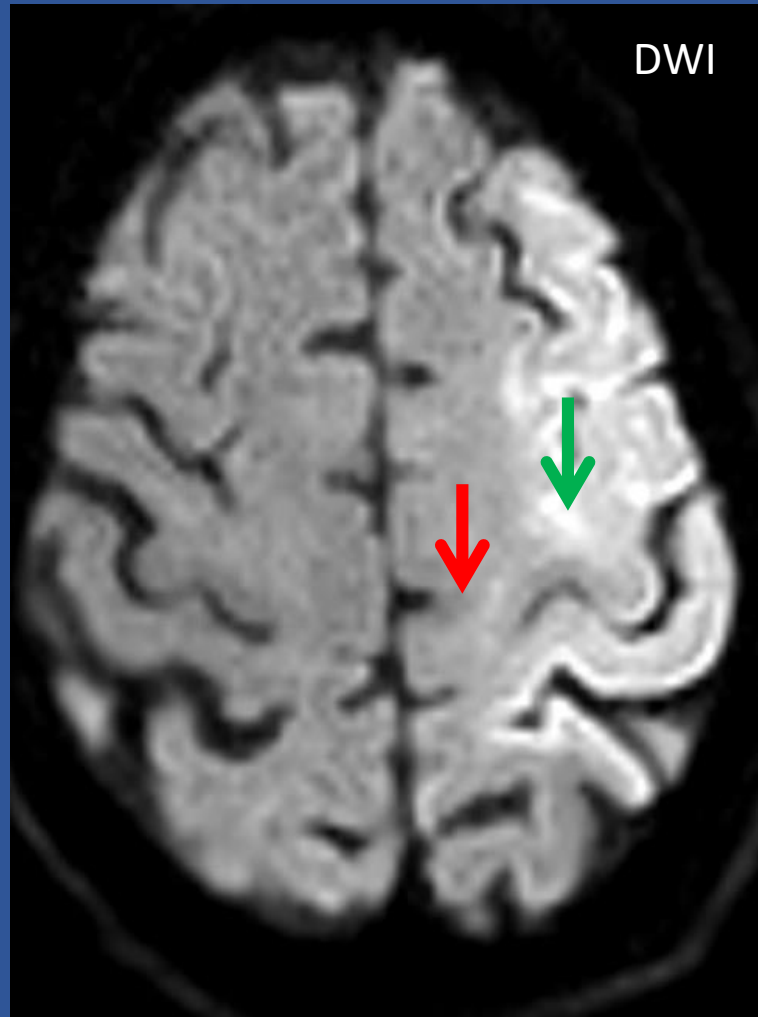
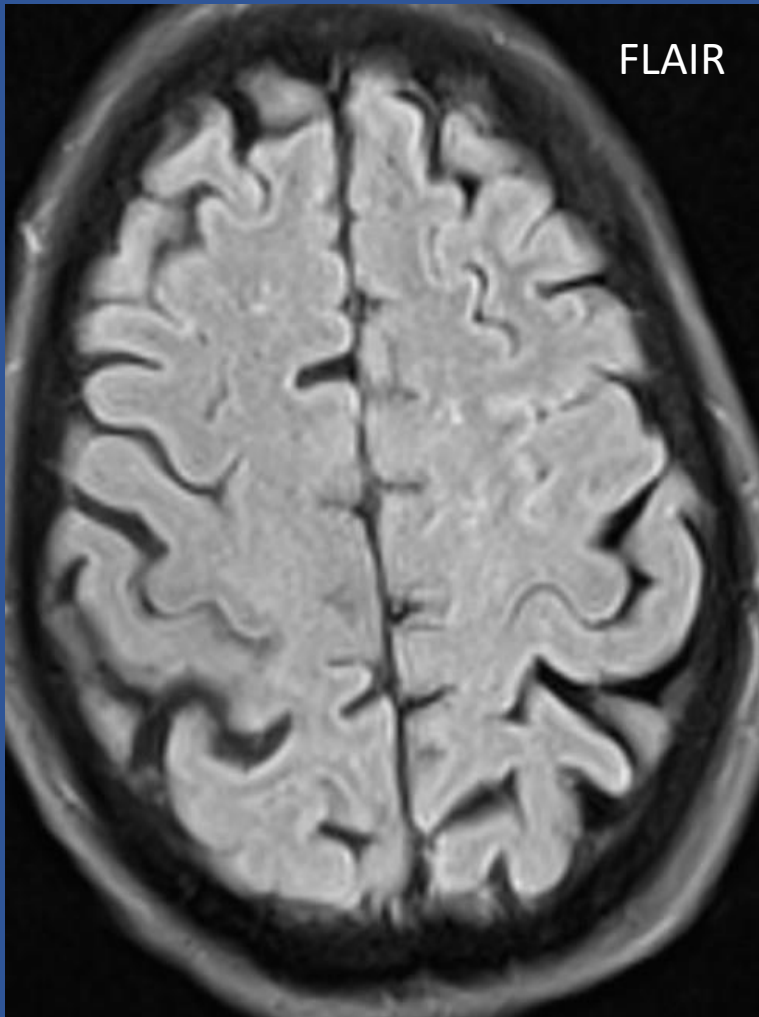


Clinically  
*aphasia*



Radiologically  
*infarction of the  
pars triangularis  
of the inferior  
frontal lobe*



90-year-old woman with *aphasia* and right hemiplegia involving both limbs

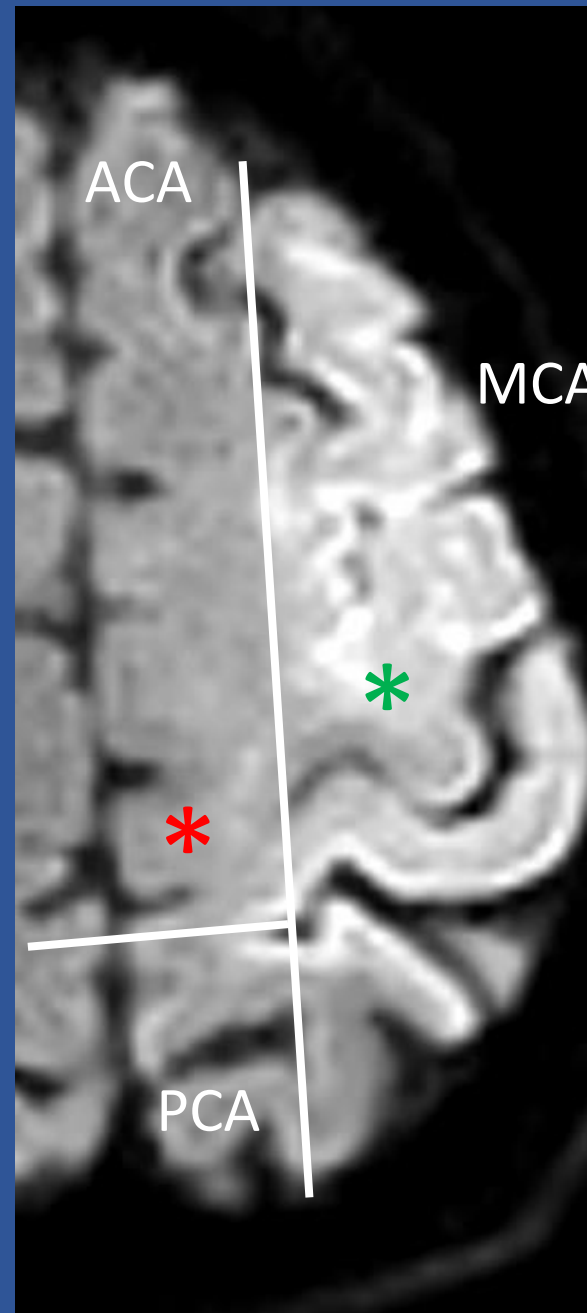
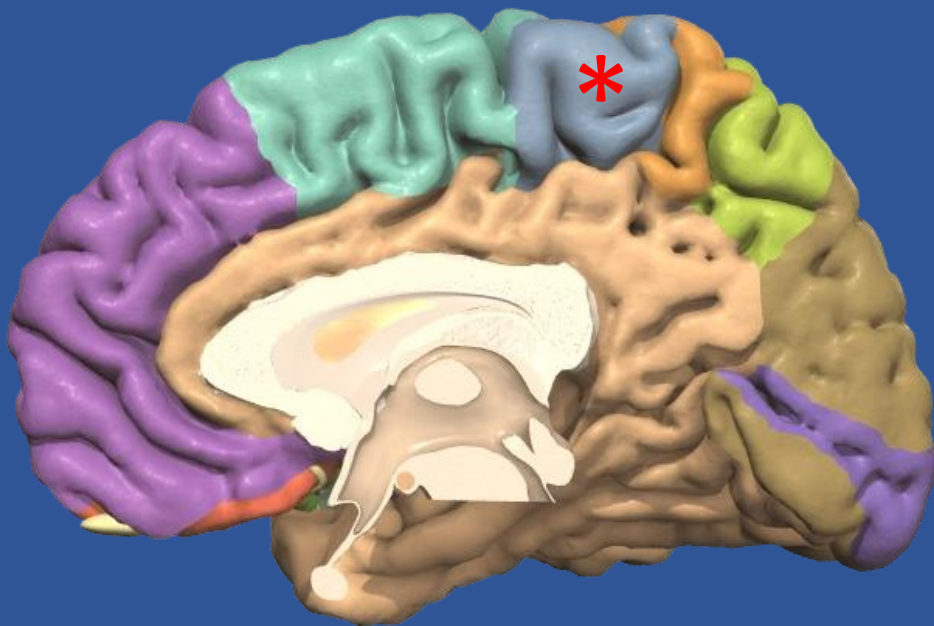
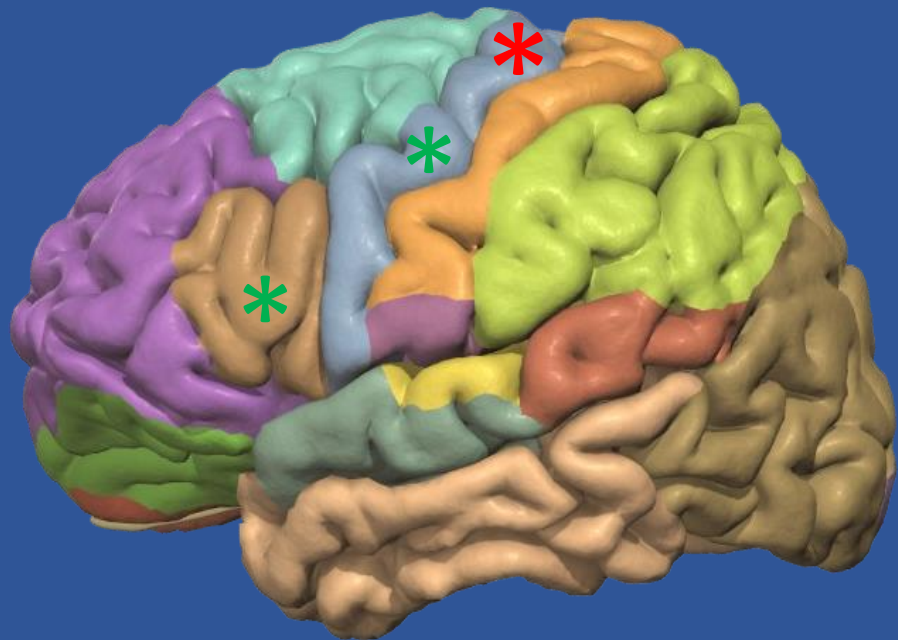


Clinically  
*1/2 plegia*



Radiologically  
*Infarct of the  
PMA  
with 'sparing'  
of the  
paracentral  
lobule*

-  match for the upper limb
-  mismatch for lower limb



I see a brain infarcted area  
on DW images...  
...but...  
... it does NOT (fully) match the clinical deficit

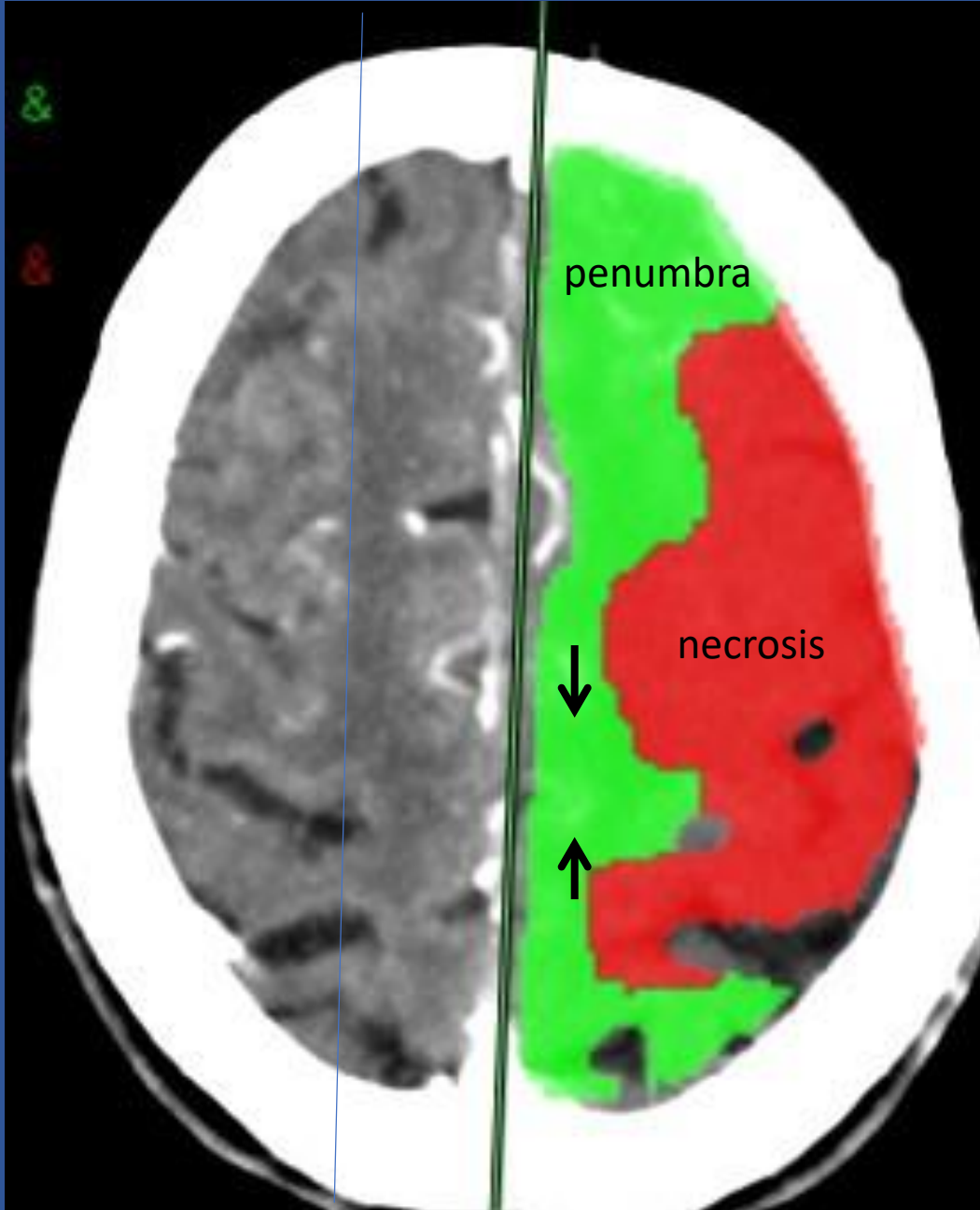


Where/which is the missing link ?

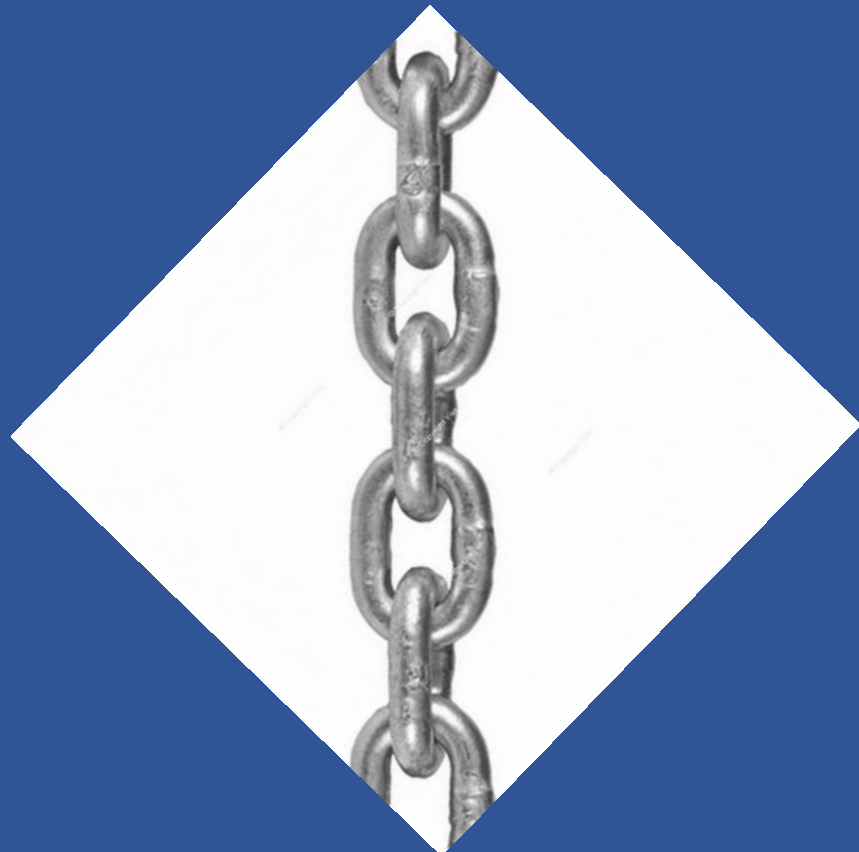


MISMATCH TYPE 2  
=  
CLINICAL-RADIOLOGICAL MISMATCH

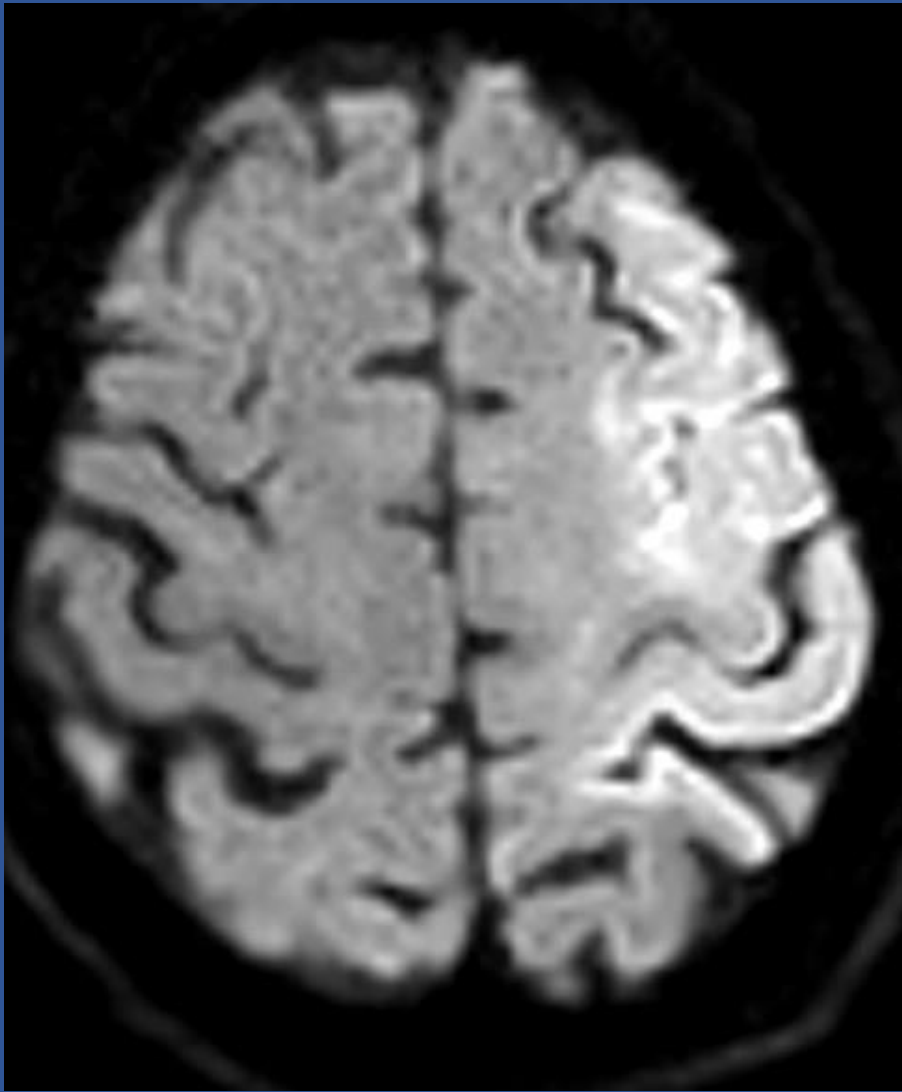




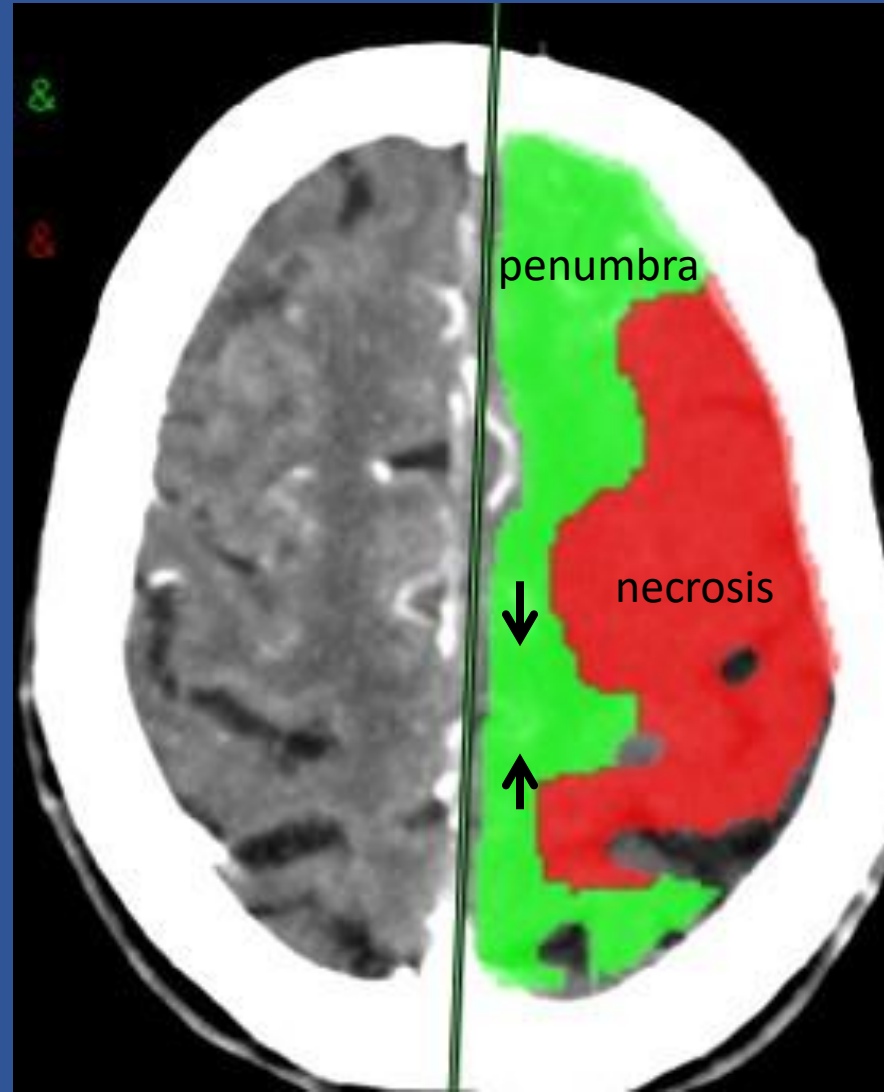
**Mismatch type 2**  
Clinical/radiological  
discrepancy



**Mismatch type 3**  
Imaging the penumbra

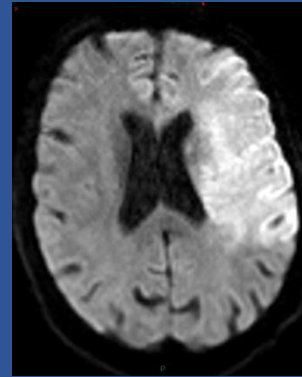
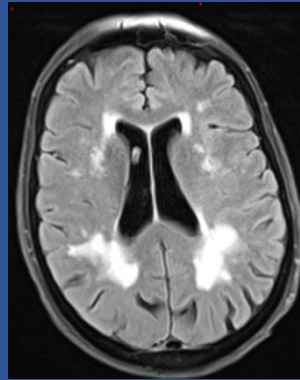


Diffusion-weighted imaging



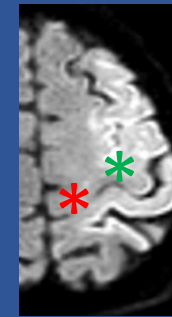
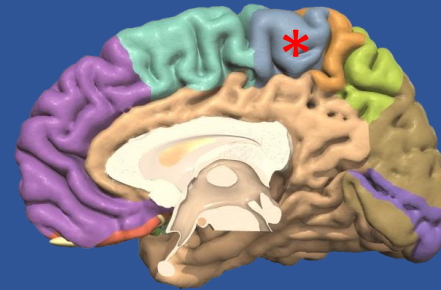
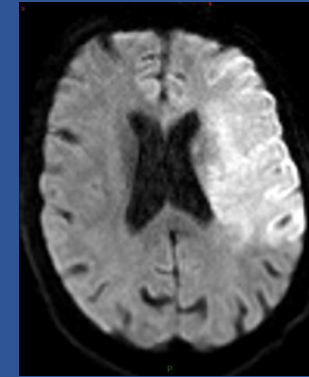
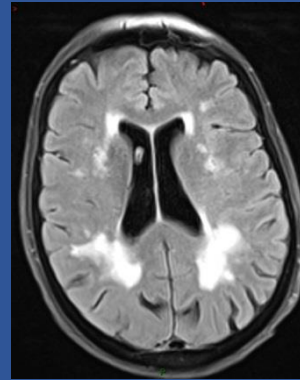
Perfusion-weighted imaging

MISMATCH TYPE I  
=  
TEMPORAL MISMATCH

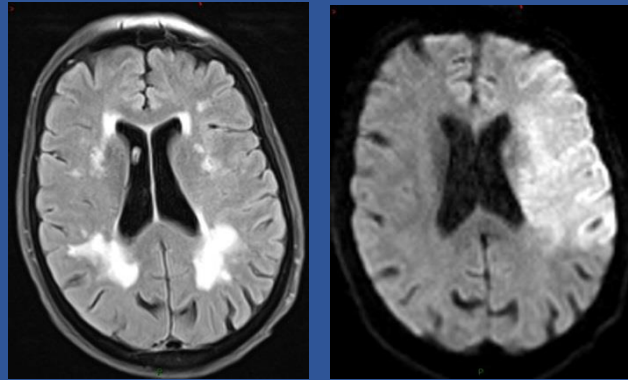


MISMATCH TYPE I  
=  
TEMPORAL MISMATCH

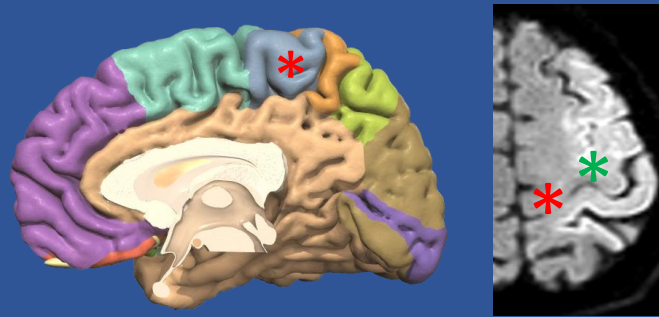
MISMATCH TYPE II  
=  
Clin/Rad MISMATCH



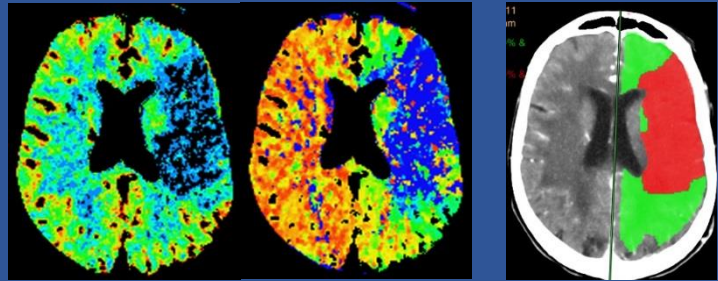
MISMATCH TYPE I  
=  
TEMPORAL MISMATCH



MISMATCH TYPE II  
=  
Clin/Rad MISMATCH

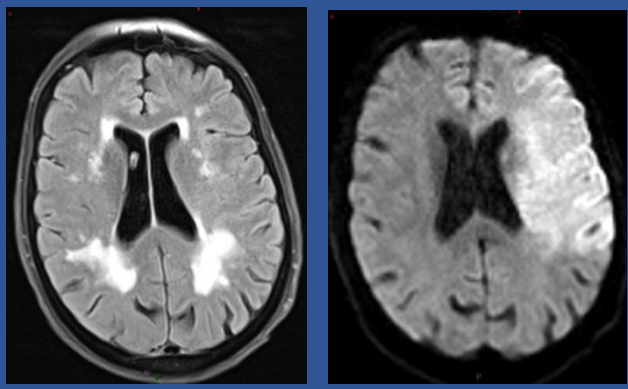


MISMATCH TYPE III  
=  
PENUMBRA imaging

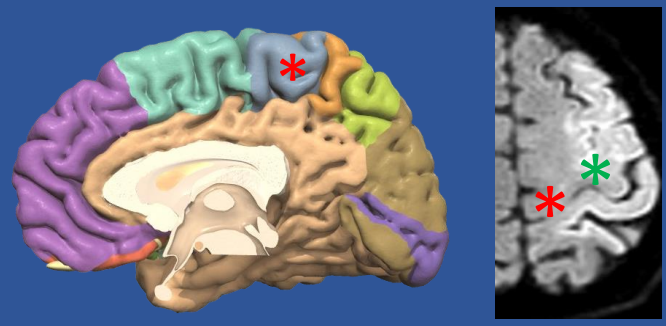




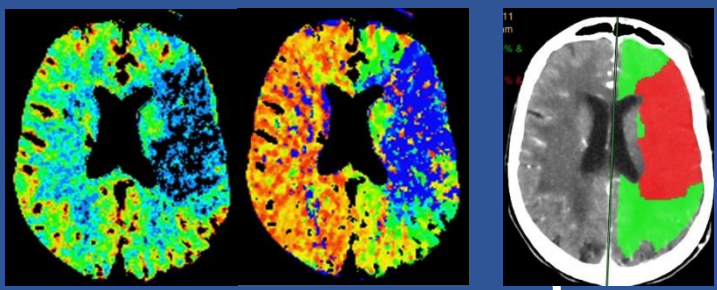
MISMATCH TYPE I  
=  
TEMPORAL MISMATCH



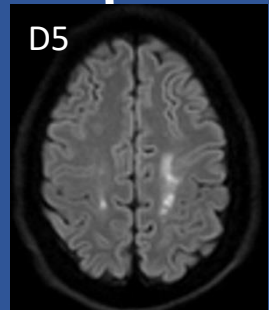
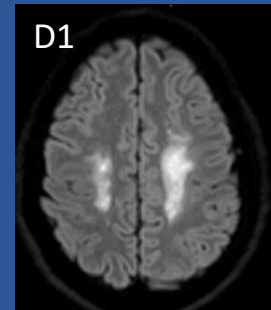
MISMATCH TYPE II  
=  
Clin/Rad MISMATCH



MISMATCH TYPE III  
=  
PENUMBRA imaging



MISMATCH TYPE IV  
=  
Brain resuscitation



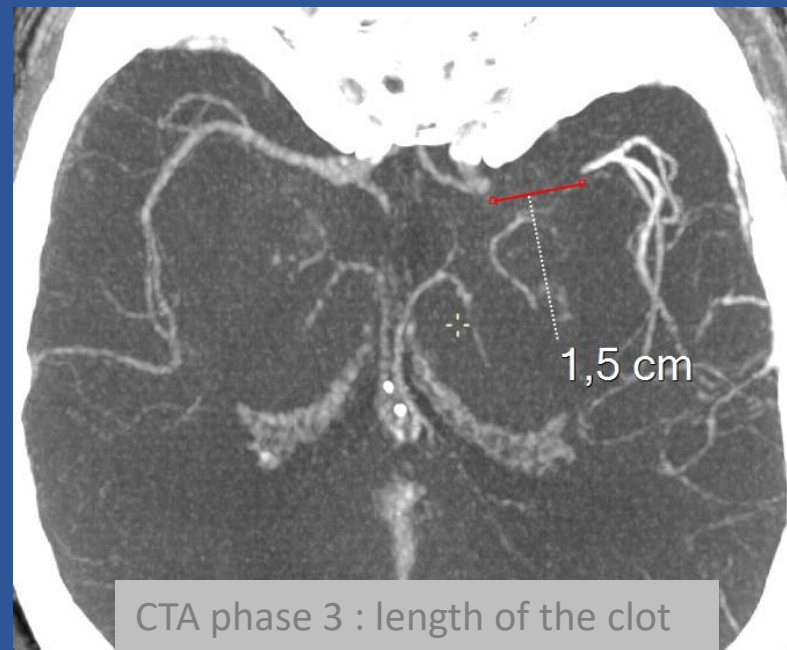
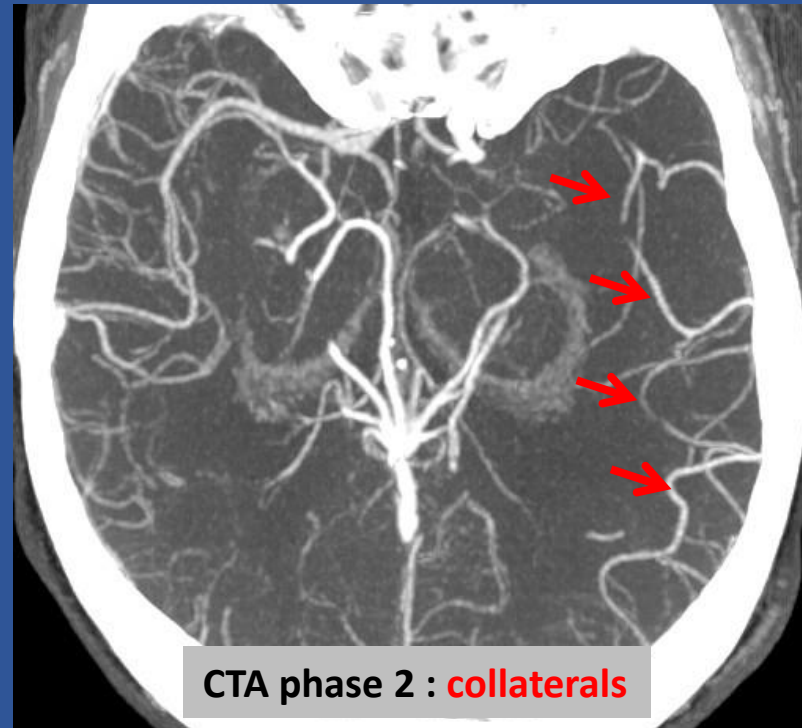
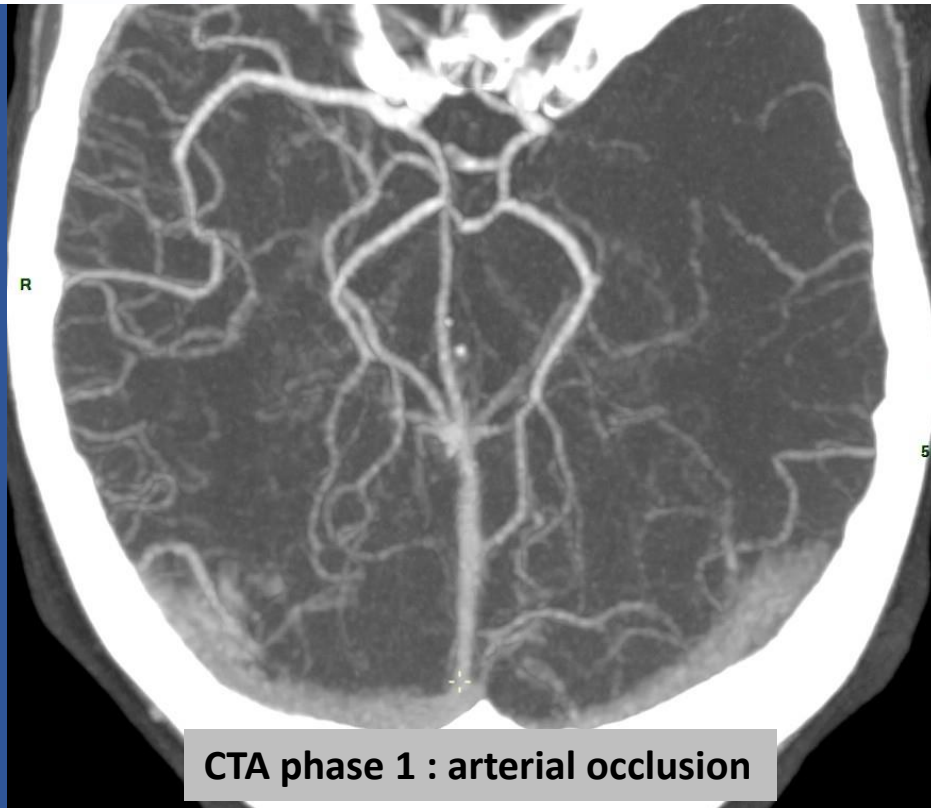
AVC ischémique aigu

Tricks and widgets for daily life

# Multiphase CT Angiography: A New Tool for the Imaging Triage of Patients with Acute Ischemic Stroke<sup>1</sup>

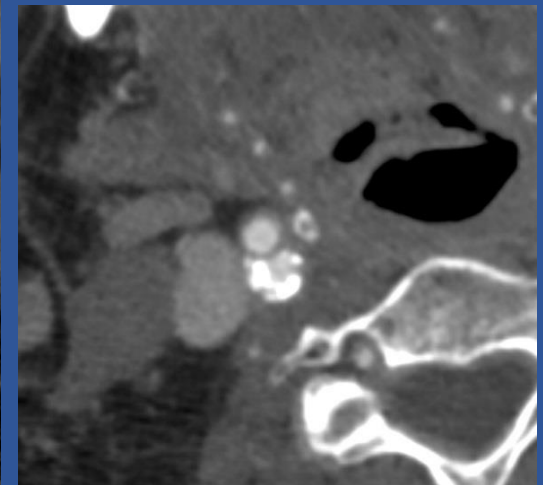
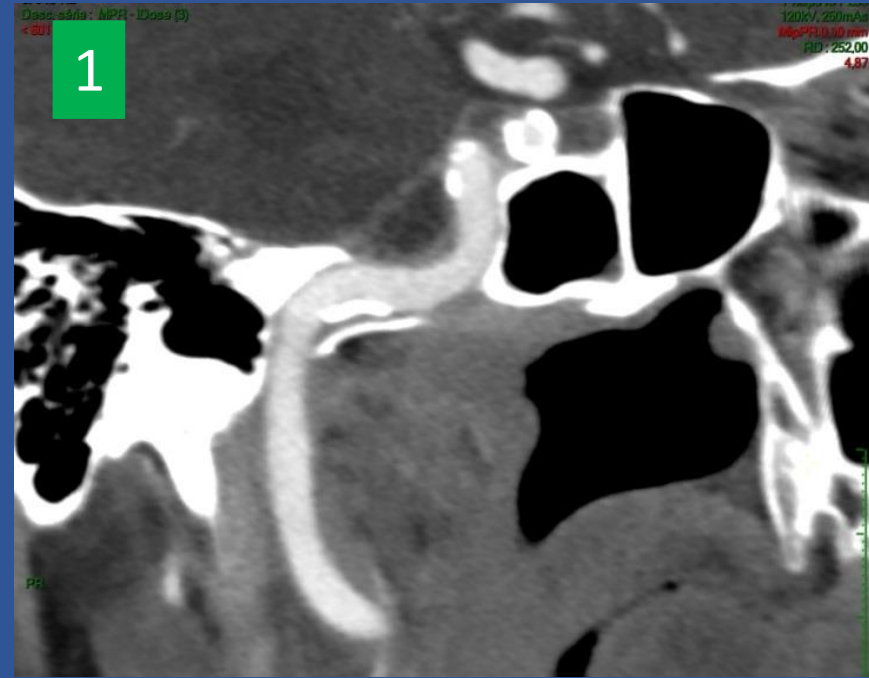
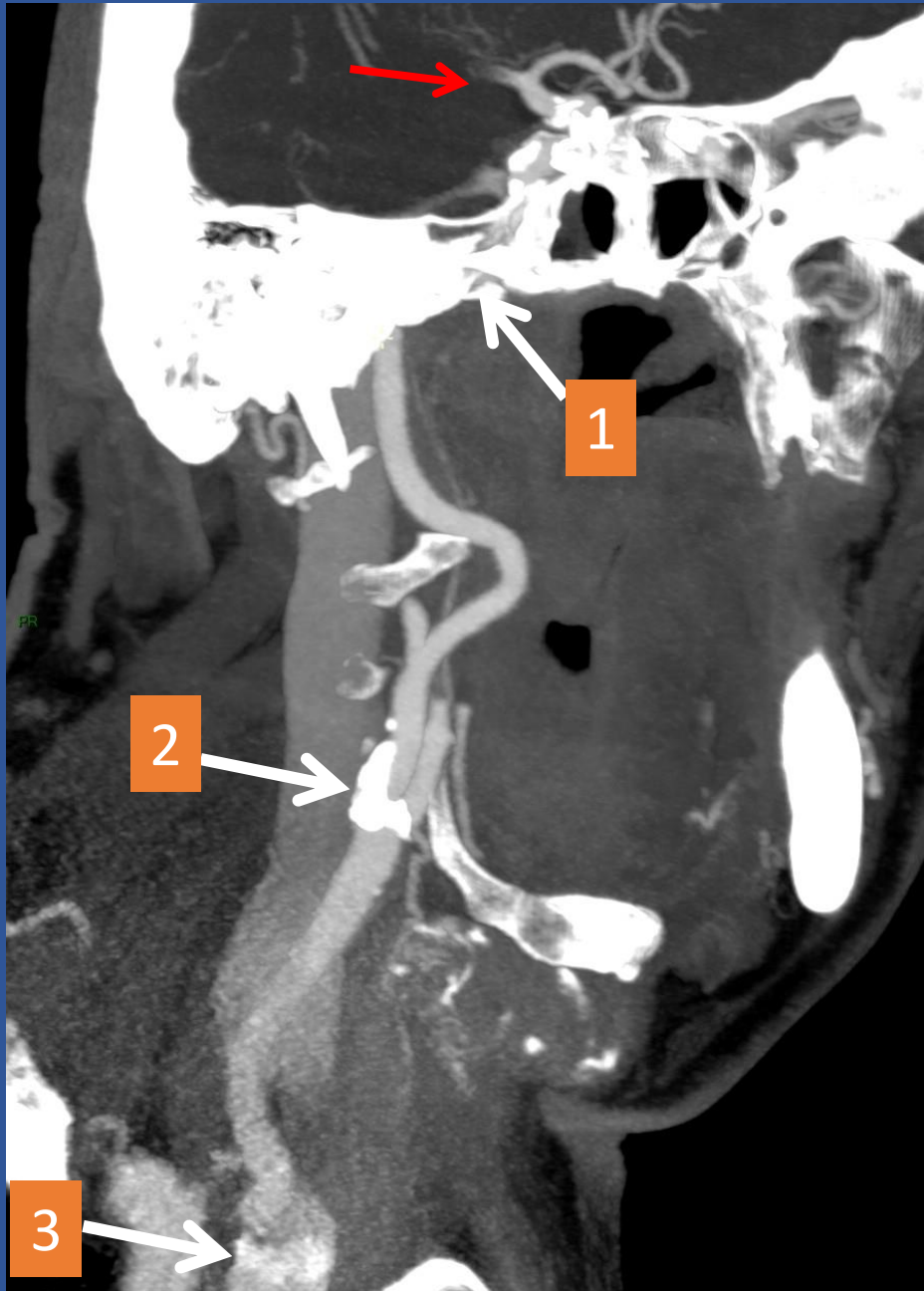
Menon *et al.* *Radiology* 2015; 275:510-517

1



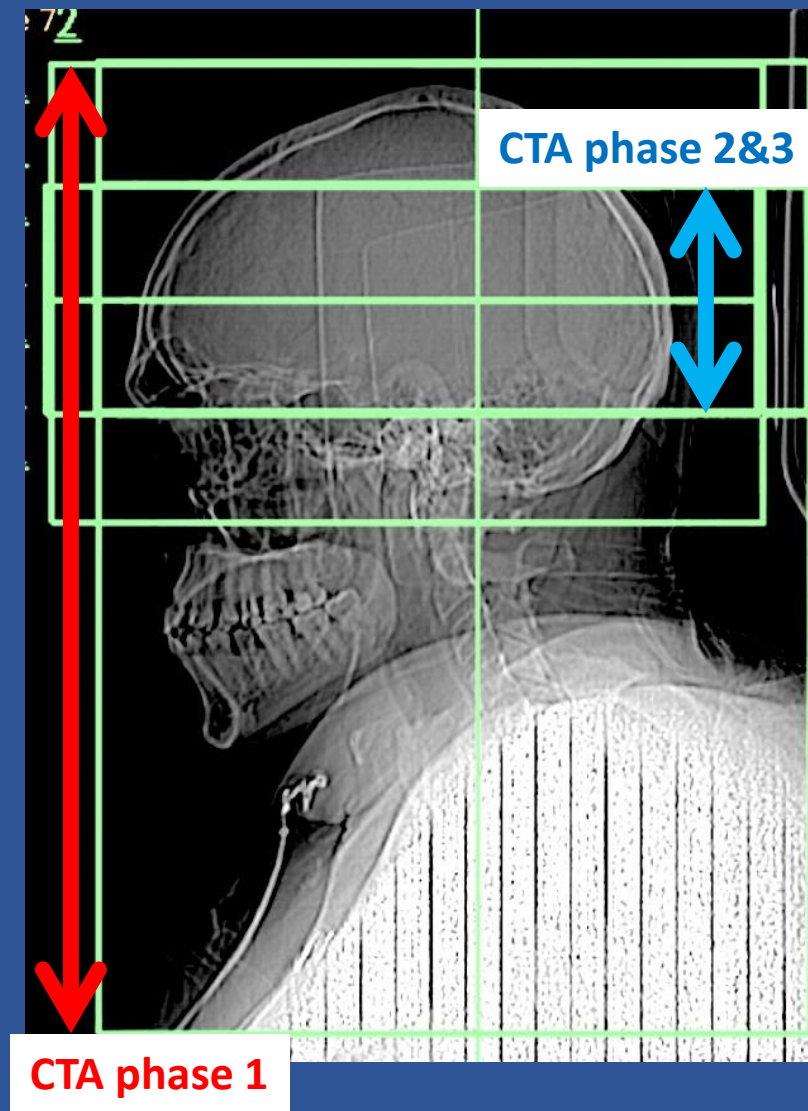
Perform **TRI**-phasic CTA for collaterality evaluation

2



86-year-old patient with aortic valve replacement





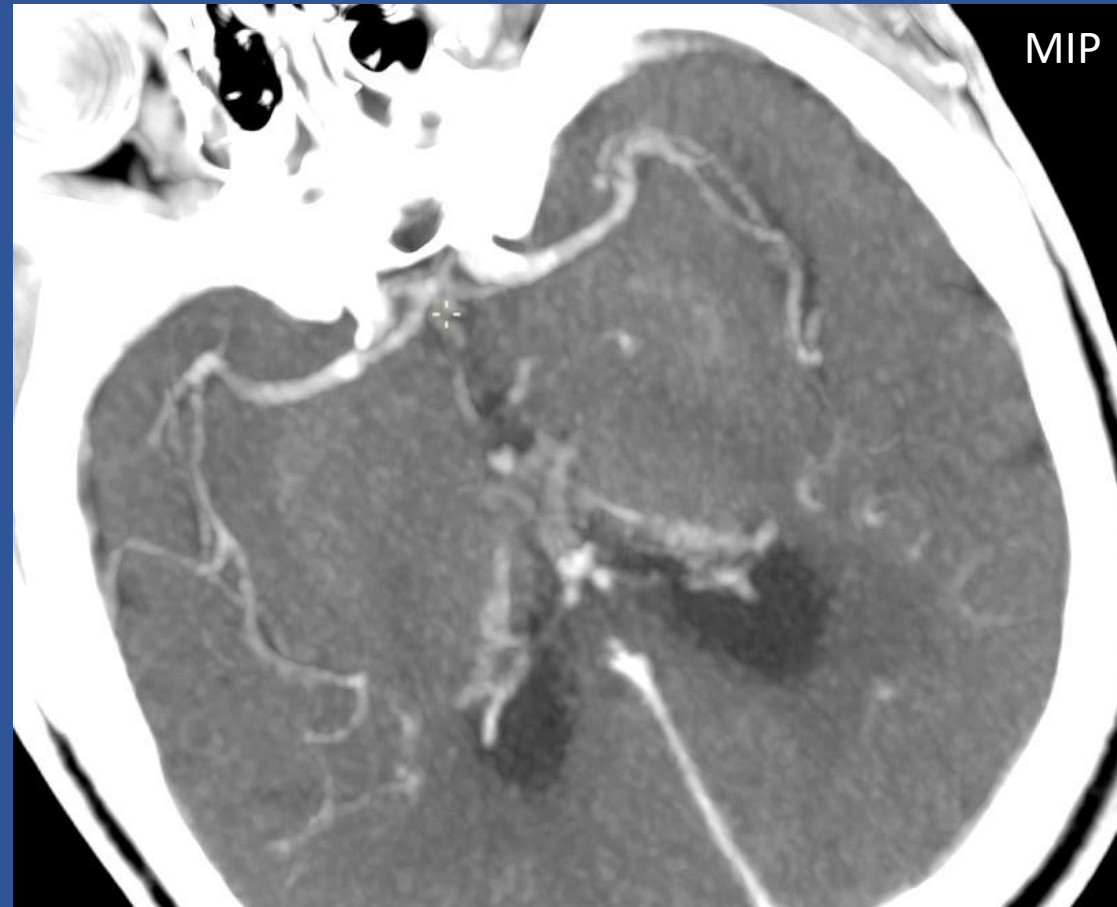
### 86-year-old patient

Left hemiplegia after aortic heart valve replacement  
by endovascular femoral approach

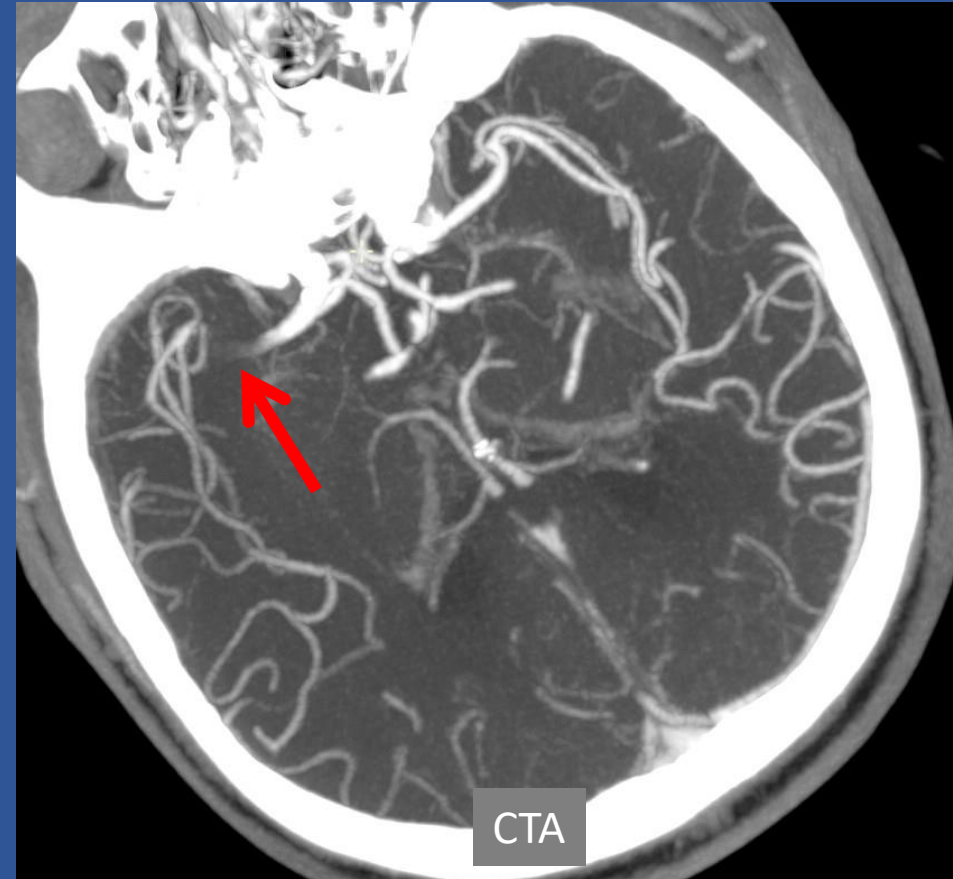
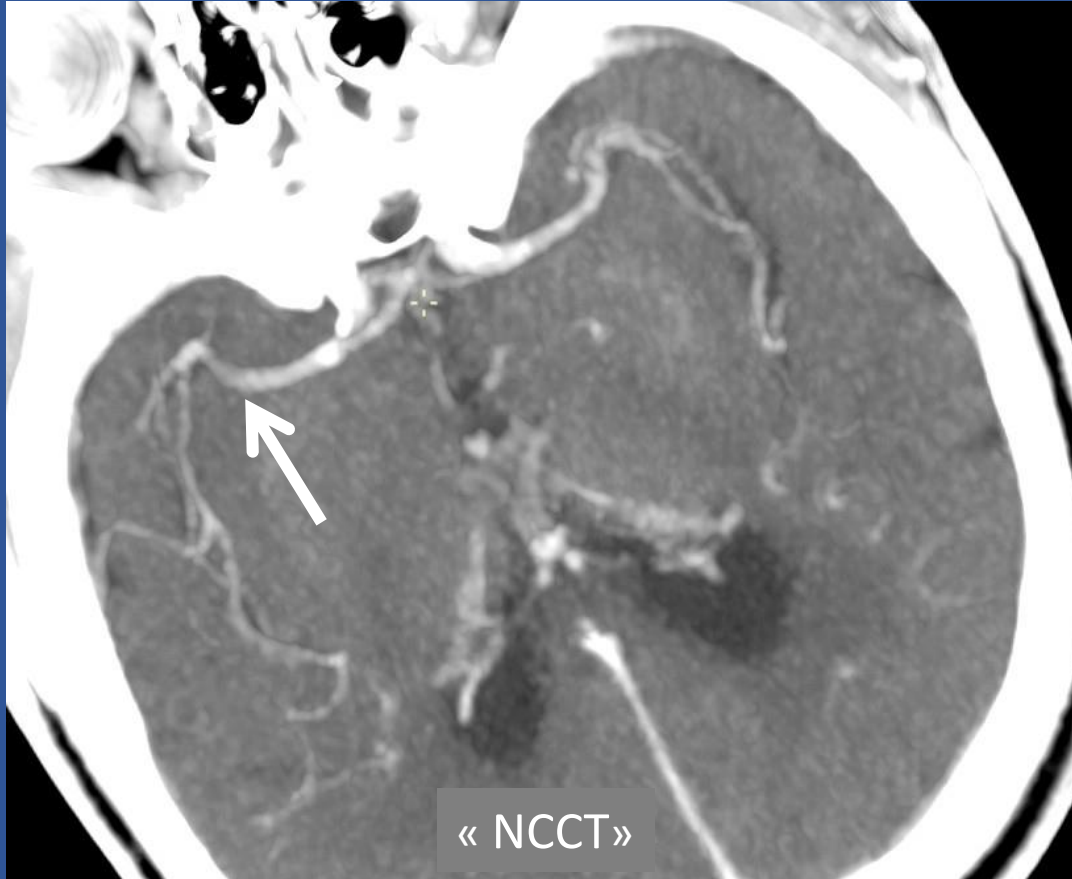
→ 'full' of CA

→ **heparin ! → IV thrombolysis contra-indicated**

3



« NCCT »



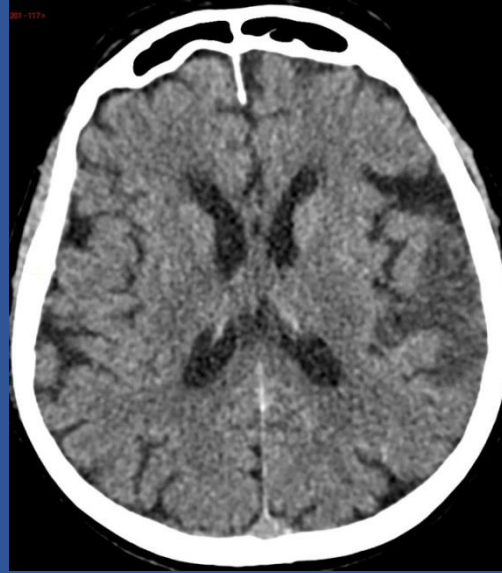
after bolus IV re-injection of Xenetix®

AVC AIGU

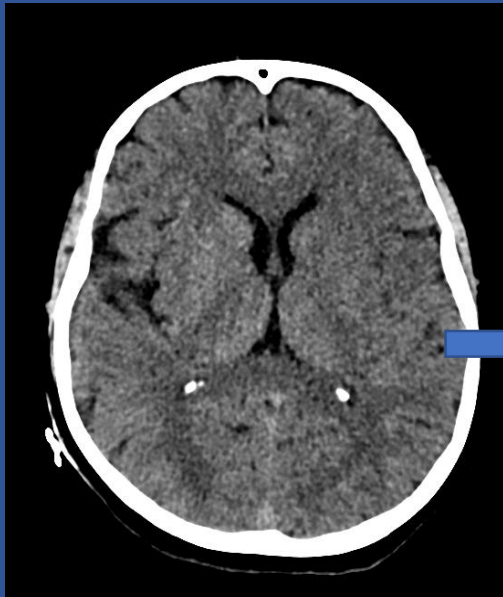
SEMIOLOGIE PORTATIVE



# NCCT



~~Thrombolyse  
Thrombectomie~~



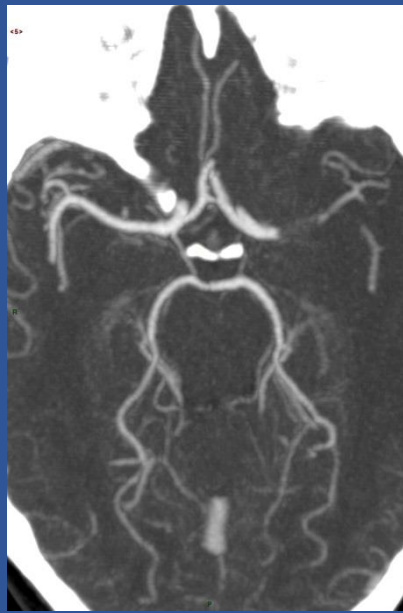
Thrombolyse  
si <4h30



Thombectomie  
si...



**CTA**



Caillot proximal  
Caillot court



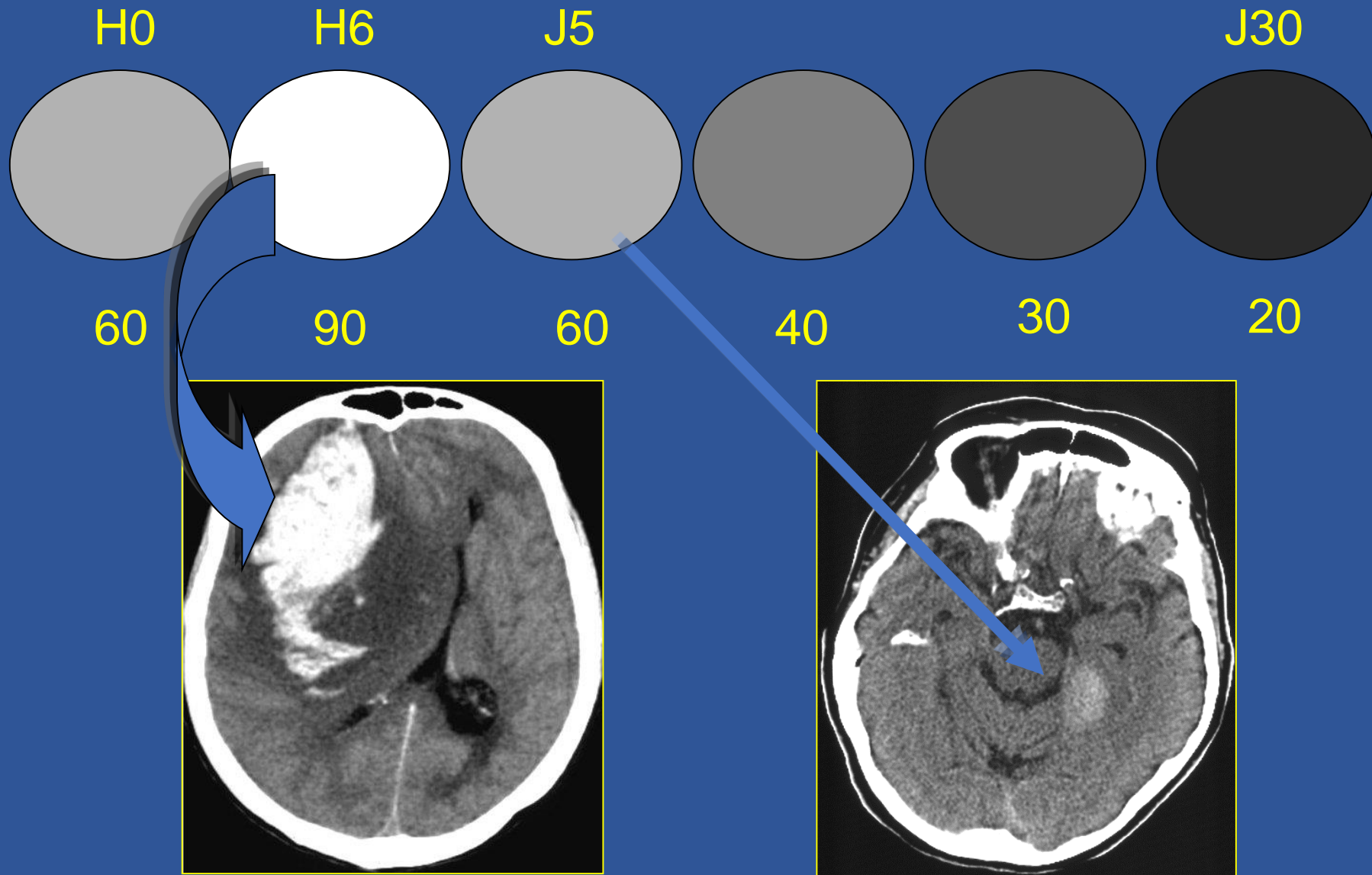
# HEMORRAGIE ENDOCRÂNIENNE

# Infarctus rouge



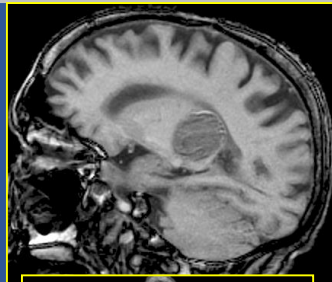


# Hématome parenchymateux en TDM

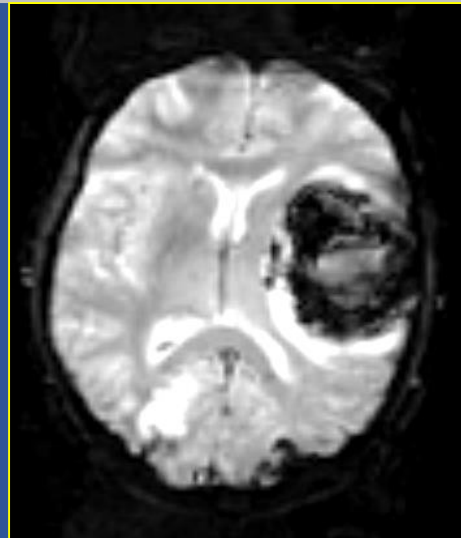


# Hématome parenchymateux IRM

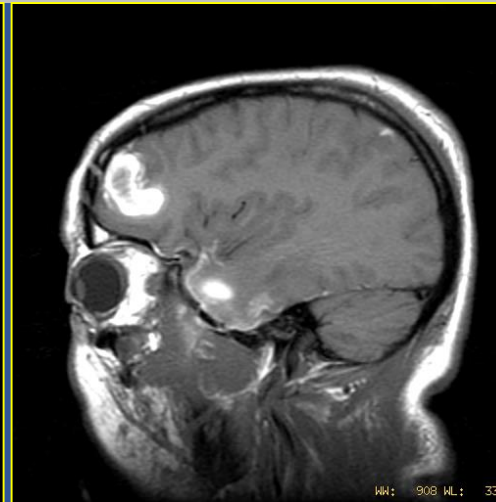
Délai	< 3 heures	4-24 heures	> 48 heures	1 semaine	1 mois
<b>Pondération T1</b>	<b>hypo/iso</b>	<b>iso</b>	<b>hyper</b>	<b>hyper</b>	<b>hypo</b>
substrat du signal	<i>oxyHb</i>	<i>oxyHb</i>	<i>metHb IC</i>	<i>metHb EC</i>	<i>liquide EC</i>
<b>Pondération T2</b>	<b>hyper</b>	<b>hypo++*</b>	<b>hypo</b>	<b>hyper</b>	<b>hyper</b>
substrat du signal	<i>serum</i>	<i>déoxyHb</i>	<i>déoxyHb</i>	<i>metHb EC</i>	<i>liquide EC</i>
					<b>couronne hypo++*</b>
* mieux mis en évidence par susceptibilité magnétique (séquence en écho de gradient)					<i>hémossidérine</i>
EC=extracellulaire / IC=intracellulaire					



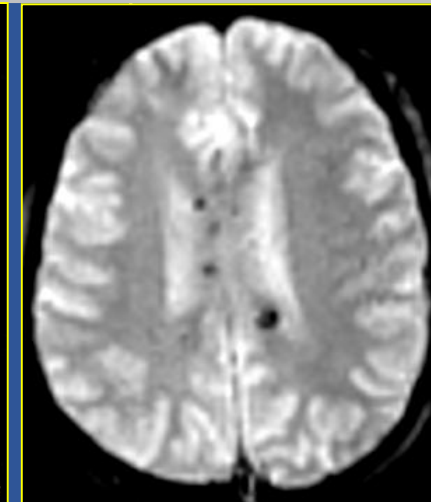
eau



déoxyHb → hypoT2



metHb → hyperT1



hémossidérine → hypoT2

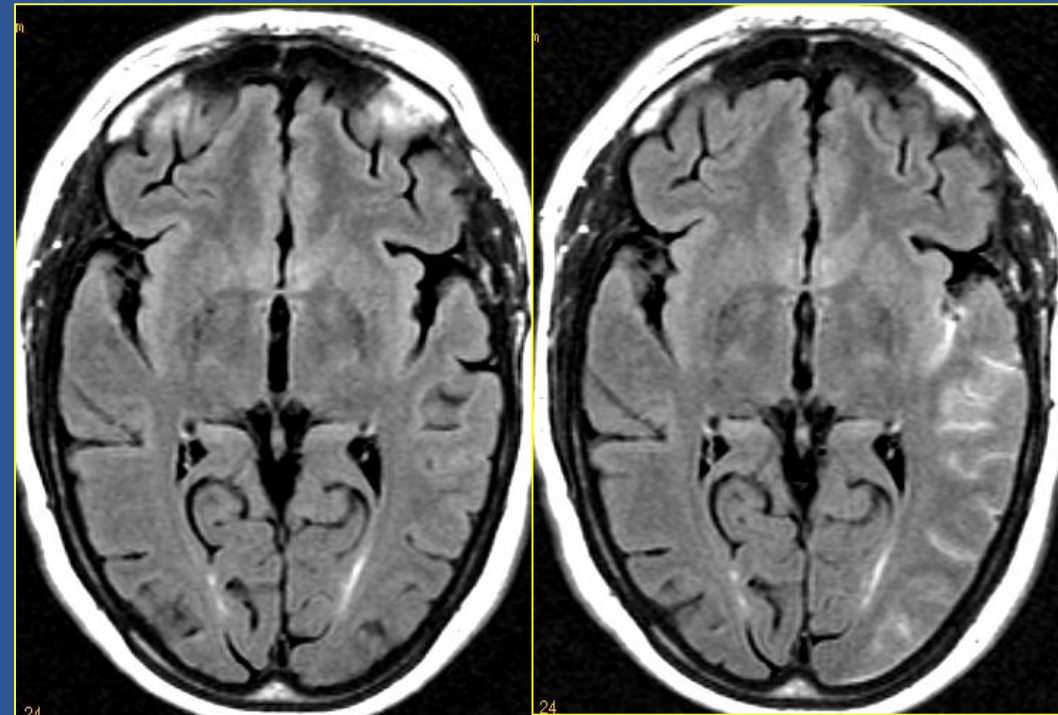
SANG frais en IRM → tout est compliqué

HEMORRAGIE SOUS-ARACHNOÏDIENNE

1.  Diagnostic (+) d'HSA



CT scan



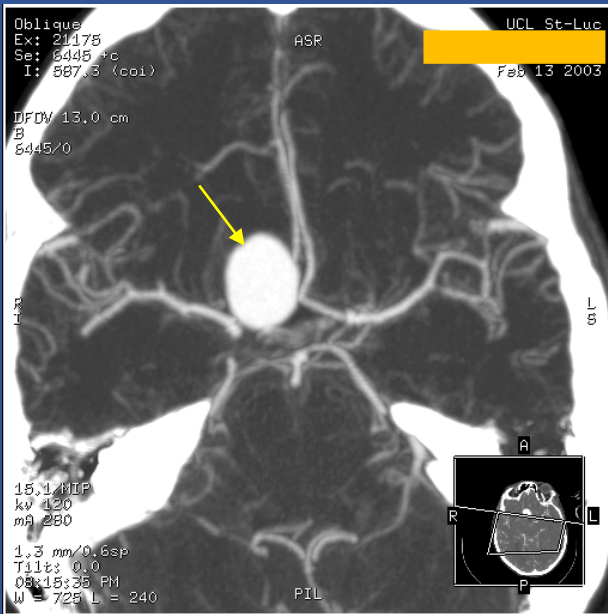
(-)

IRM

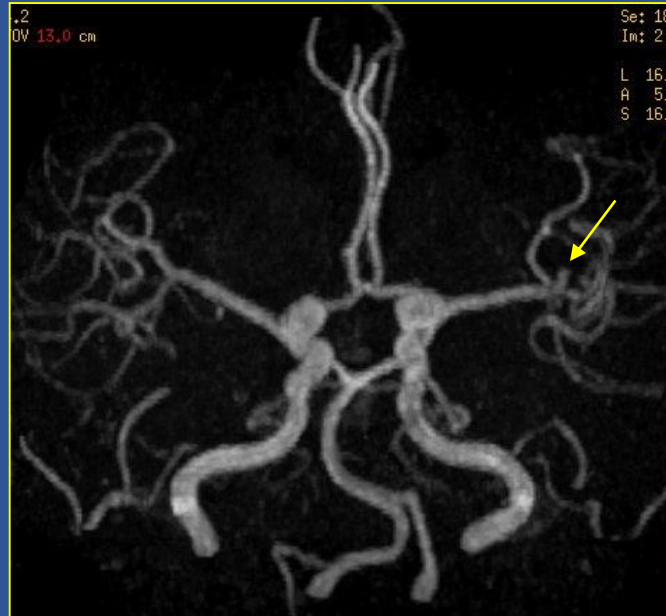
(+)



## 2. Localisation de l'anévrisme causal



Angio-CT

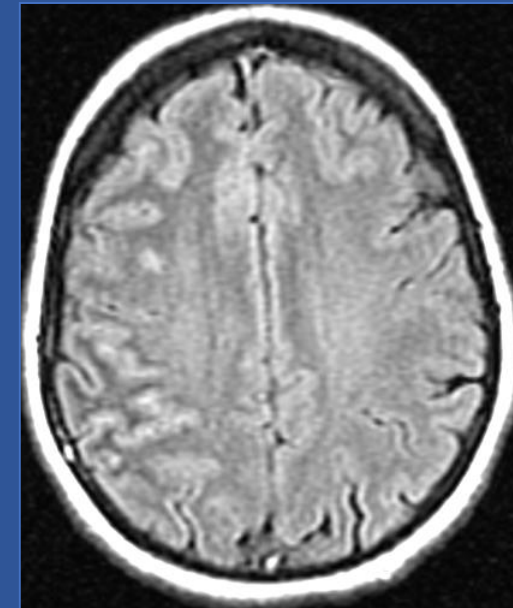
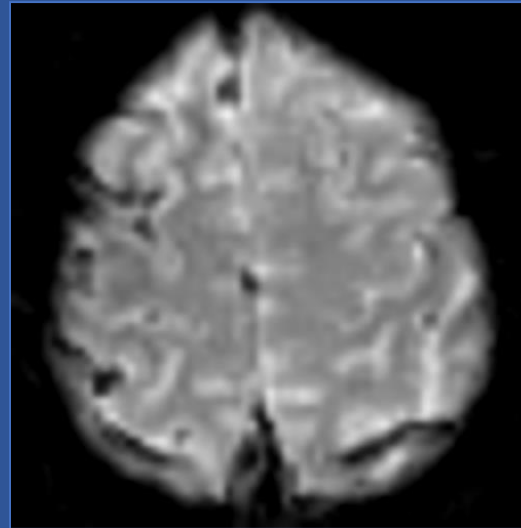
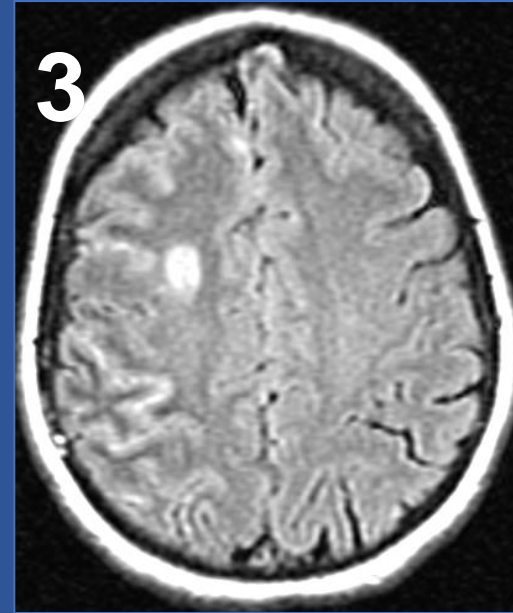
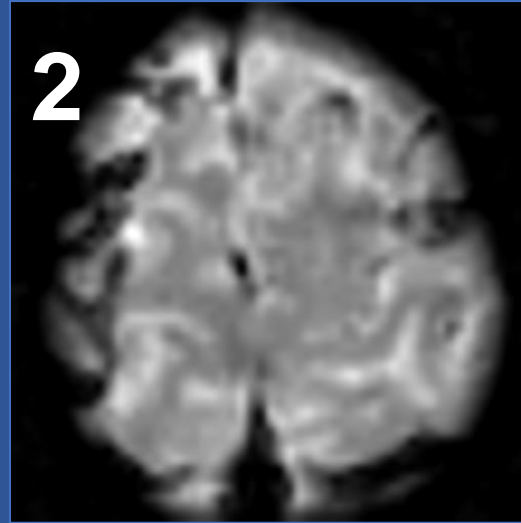
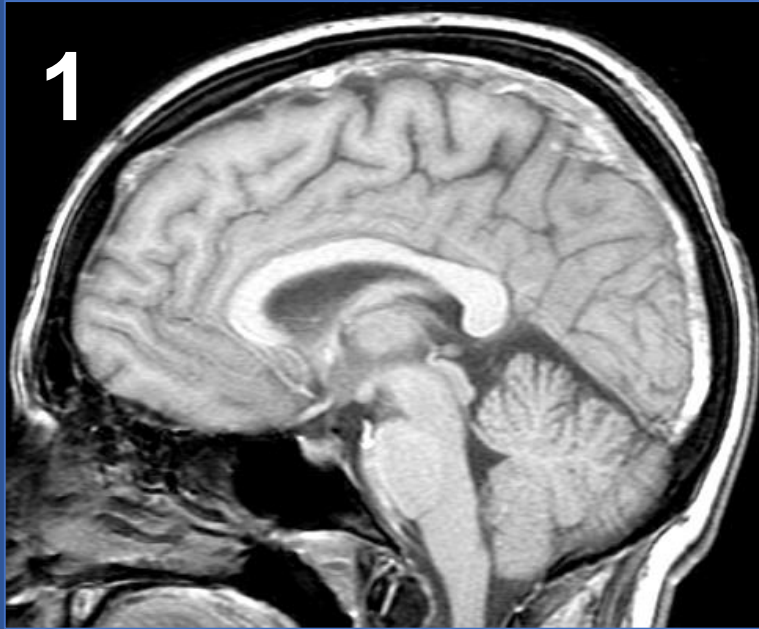


Angio-IRM

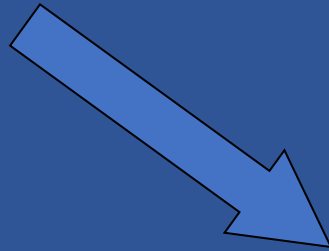


Angiographie

THROMBOPHLEBITE ENDOCRÂNIENNE



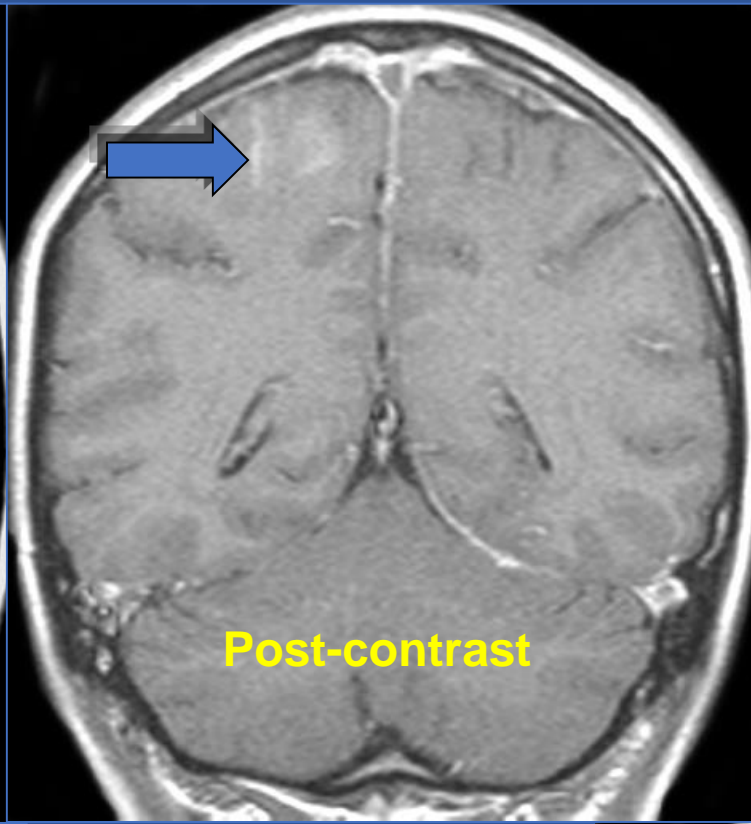
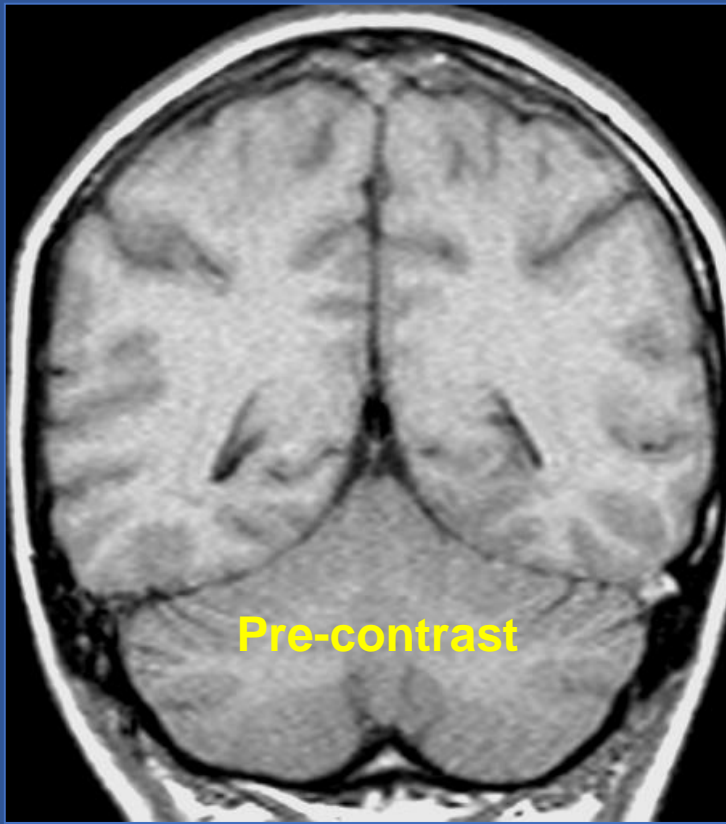
venous  
occlusion



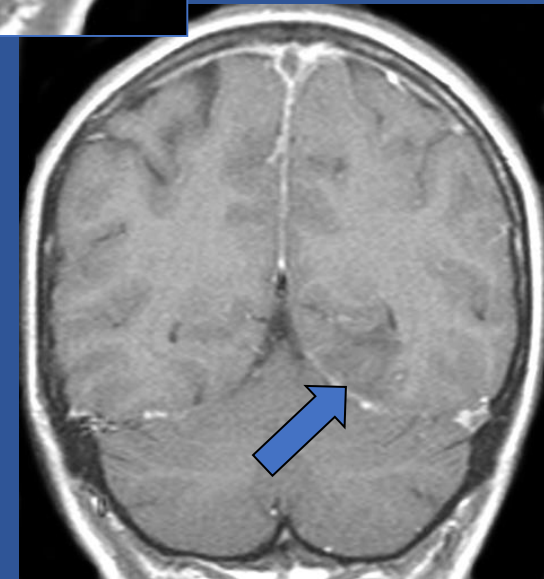
draining veins  
stasis



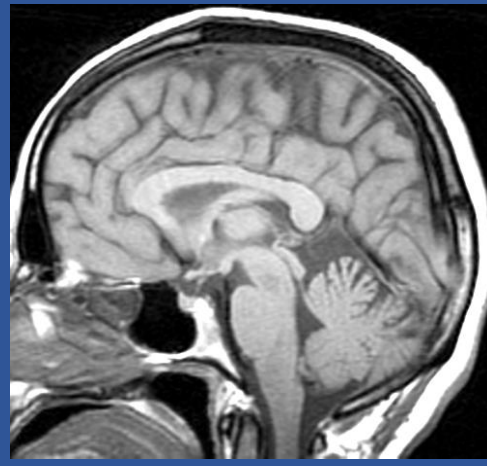
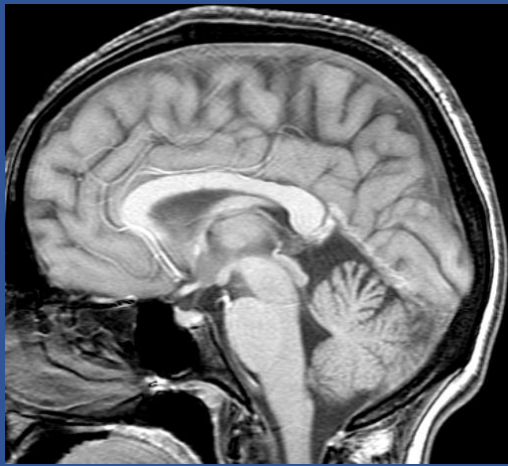
parenchymal damage



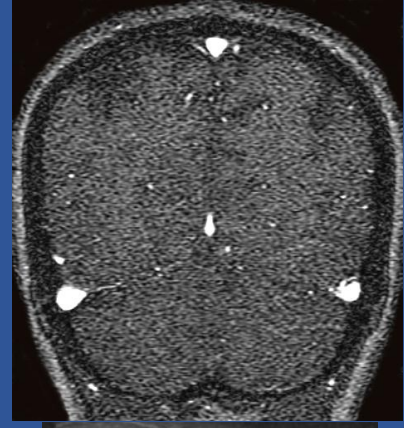
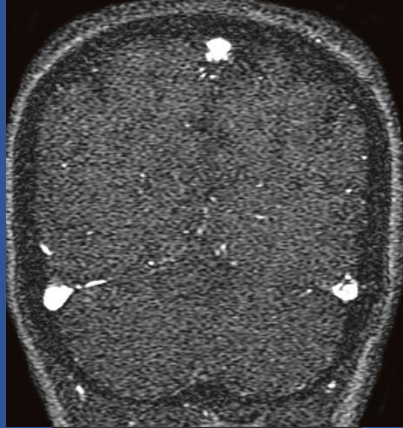
'Signe du delta'







**May 8<sup>th</sup>**



**June 21<sup>th</sup>**

