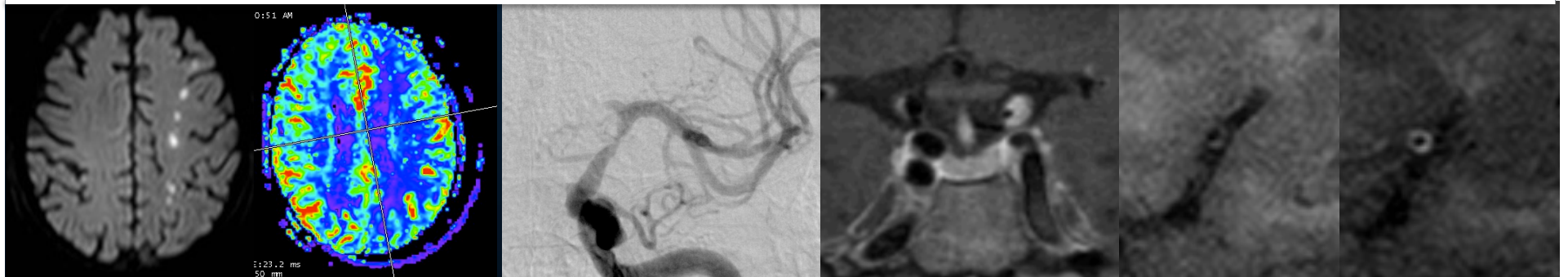


Imagerie de paroi artérielle intra-crânienne par IRM



Laurent Letourneau-Guillon, MD, FRCPC

Professeur adjoint de clinique,

Université de Montréal

Neuroradiologue, CHUM



Divulgation de conflits d'intérêts potentiels

Société des sciences vasculaires du Québec (SSVQ)

7^e COLLOQUE NEUROVASCULAIRE

12 septembre 2014

**Dr Laurent Létourneau-Guillon, Neuroradiologiste,
CHUM – Hôpital Notre-Dame**

Rémunération pour panel d'expert EMD Serono

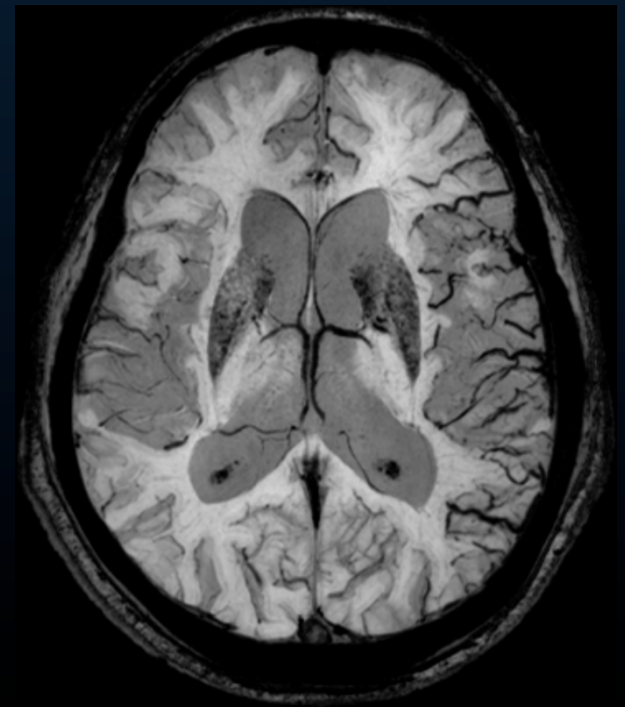
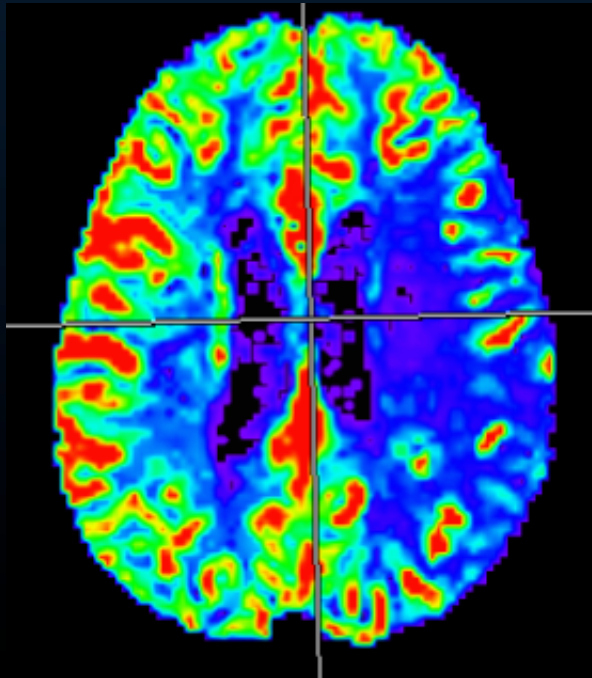
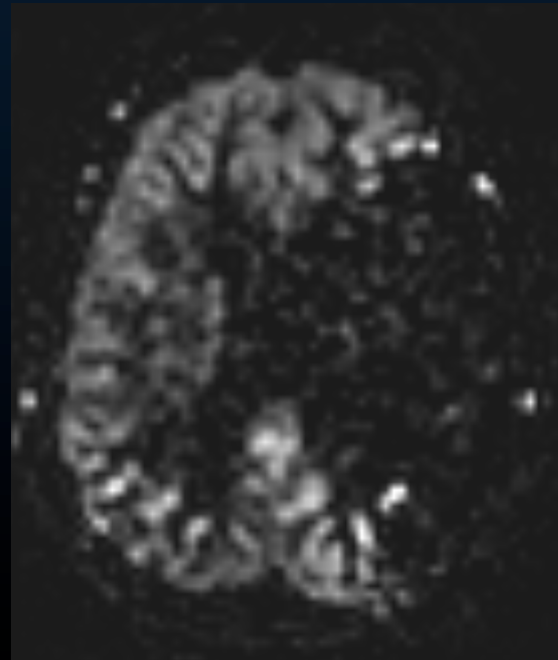
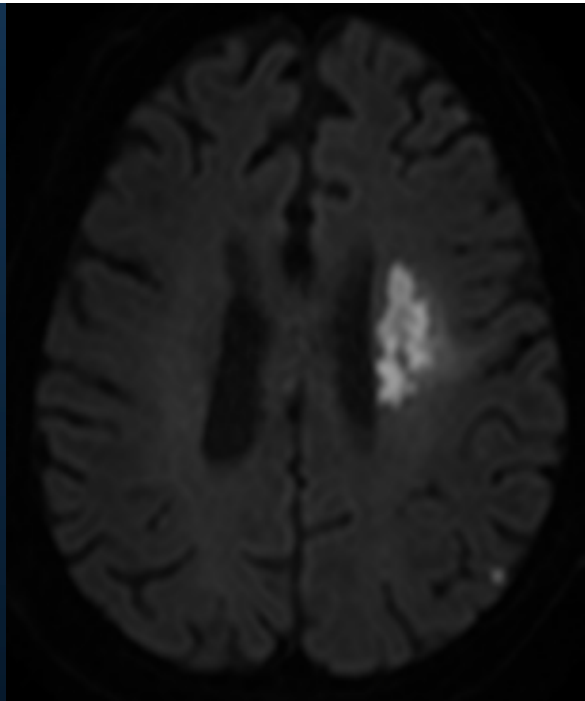
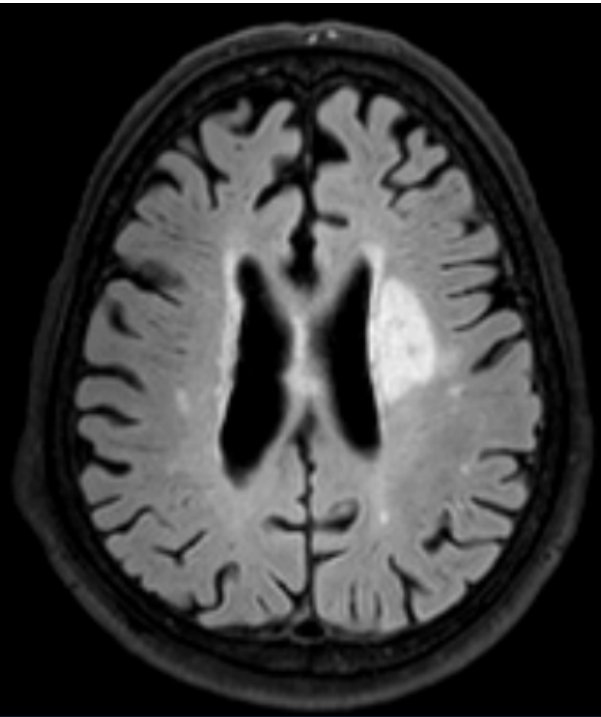
Septembre 2012

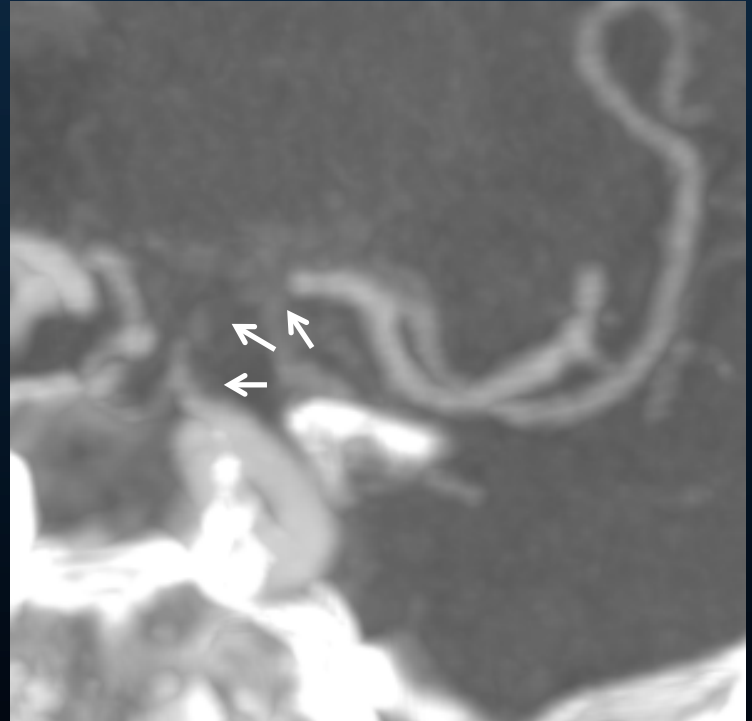
Objectifs

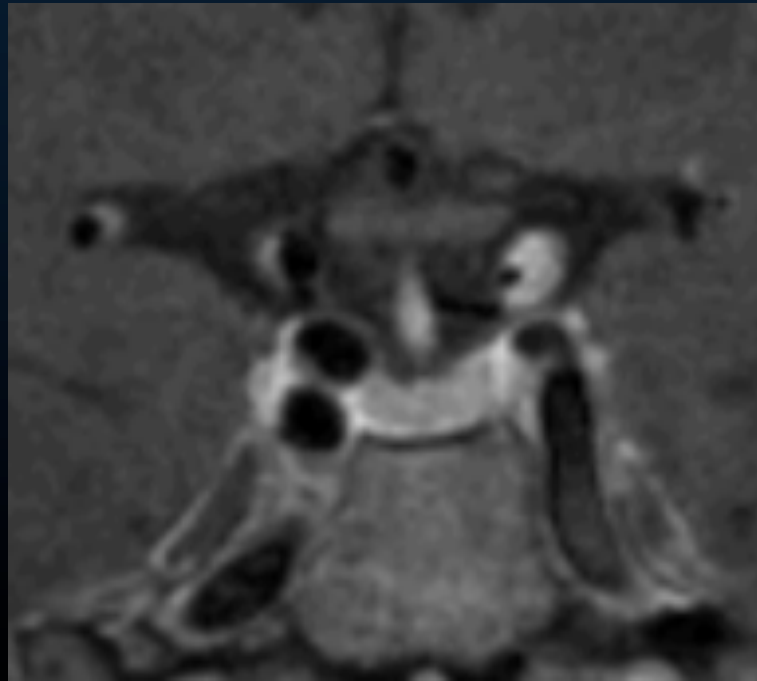
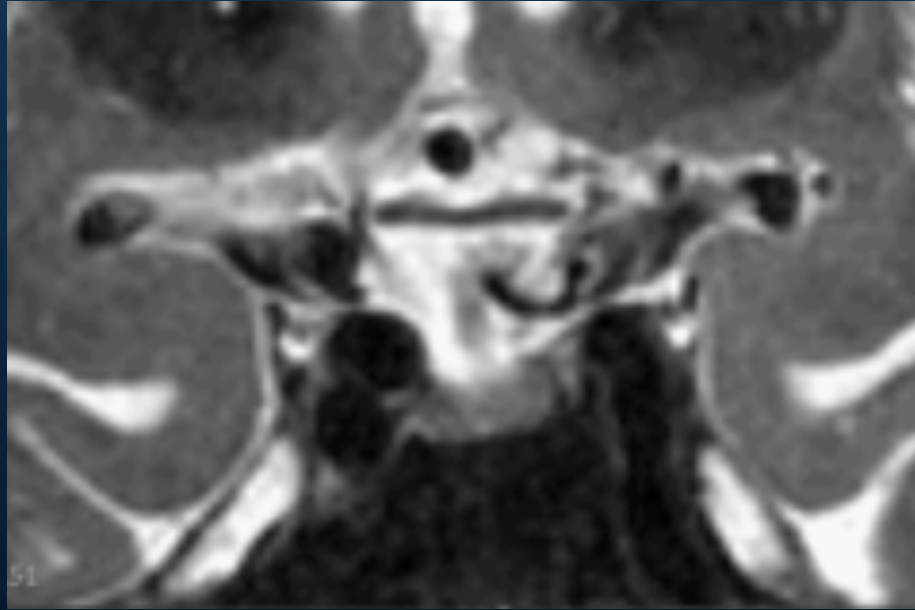
- Se familiariser avec l'imagerie haute résolution de la paroi artérielle intra-crânienne;
- Identifier les situations où ce type d'imagerie peut être utile;
- Identifier les limitations de cette nouvelle technologie.

CAS CLINIQUE

Homme de 65 ans
Hémiplégie droite









THE
DONUT HOLE
"IT'S THE QUALITY"



Evidence based medicine



Evidence based medicine

Imagerie des
sténoses
carotidiennes



Evidence based medicine



Imagerie de
paroi intra-
crânienne

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[Molecular imaging of plaque vulnerability.](#)
1. Tavakoli S, Vashist A, Sadeghi MM.
J Nucl Cardiol. 2014 Aug 15. [Epub ahead of print]
PMID: 25124827 [PubMed - as supplied by publisher]
[Related citations](#)

[Endovascular repair of arterial iliac vessel wall lesions with a self-expandable minimol stent graft system.](#)
2. Mensel B, Kühn JP, Hoene A, Hosten N, Puls R.
PLoS One. 2014 Aug 13;9(8):e103980. doi: 10.1371/journal.pone.0103980. eCollection 2014.
PMID: 25119346 [PubMed - in process] [Free Article](#)
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[Cardiovascular magnetic resonance profiling of coronary atherosclerosis: vessel wall remodelling and related myocardial](#)
3. Jahnke C, Manka I
Eur Heart J Cardiovasc Imaging. 2014 Aug 7. [Epub ahead of print]
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4. Maser RE, Lenhart
Endocr Pract. 2014 Aug 7. [Epub ahead of print]
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[K-t GRAPPA-accelerated MRI for quantification of myocardial T2* in Type 2 Diabetes](#)
5. Stankovic Z, Fink J
MAGMA. 2014 Aug 7. [Epub ahead of print]
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[Endovascular treatment of acute aortic dissection: a systematic review and meta-analysis](#)

Results by year

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Results by year

Results by year

Considérations techniques

- 3 Tesla favorisée
- Imagerie haute résolution *black blood* T2 et T1 pré- et post-gadolinium
- Meilleure séquence T1 encore a déterminer

Limité aux artères intracrâniennes proximales

Technique



LCR

Technique

BLACK BLOOD

- Séquence avec effet black blood intrinsèque (TSE)
- Double inversion récupération
- +/- préparation diffusion (E.g. MSDE)

LCR

A diagram illustrating the LCR (Liquor Cerebral) region. It features a central vertical cylinder with a red outline, representing the LCR. The cylinder is surrounded by a large, irregular, light blue cloud-like shape that represents the brain tissue. The text 'LCR' is written in white inside the brain tissue area to the left of the cylinder.

Technique

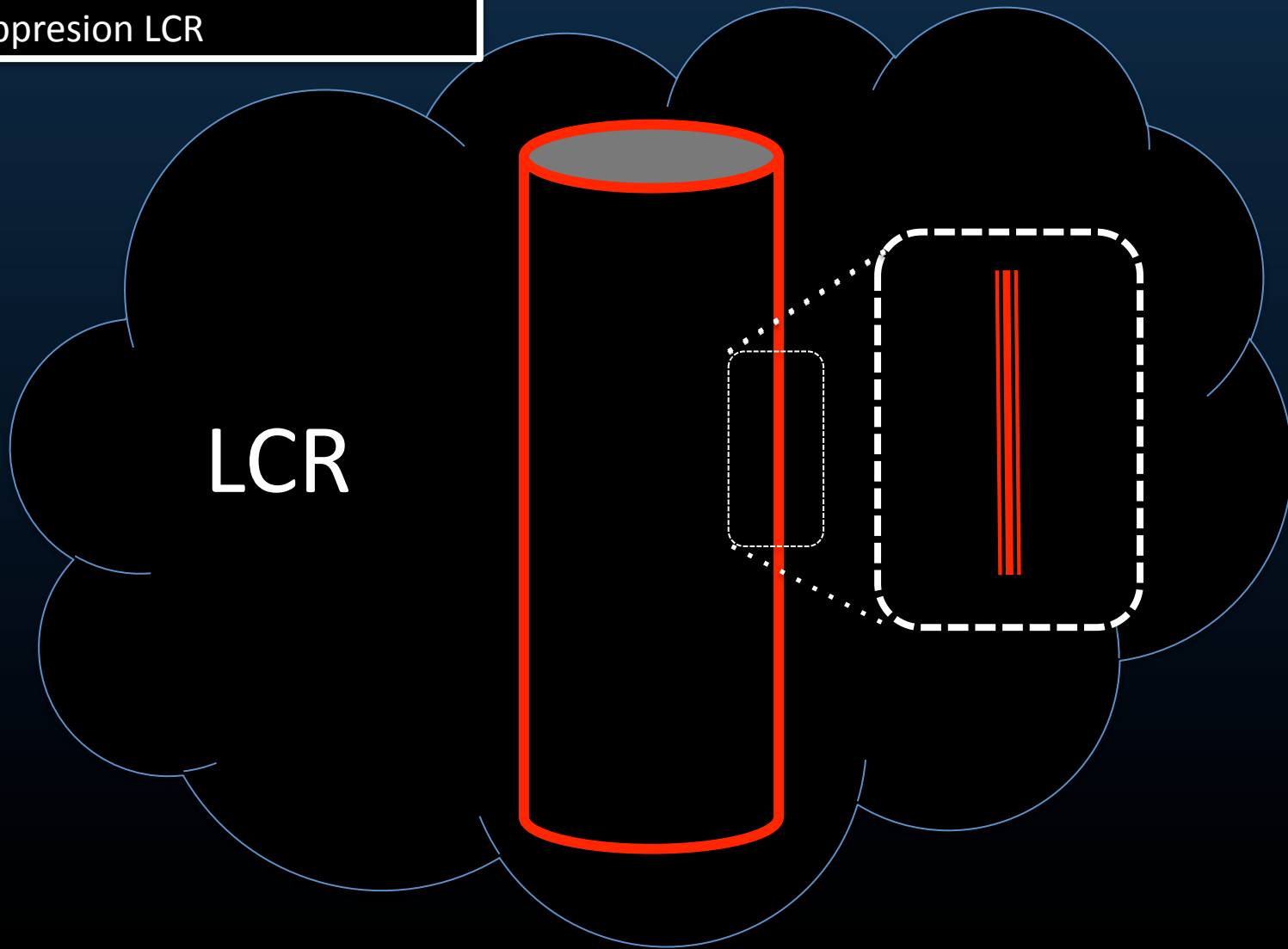
+/- suppresion LCR

LCR

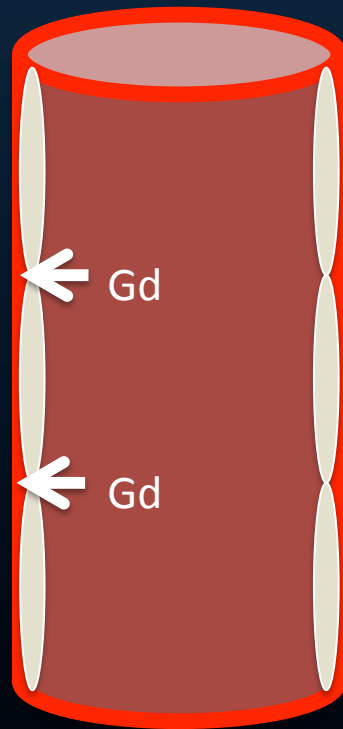
A diagram illustrating a technique. It features a central vertical cylinder with a red outline and a grey top surface. The cylinder is positioned within a large, dark blue, cloud-like shape composed of several overlapping circles. The word "LCR" is written in white text inside the cloud shape, to the left of the cylinder. A white-bordered box in the upper left corner contains the text "+/- suppresion LCR".

Technique

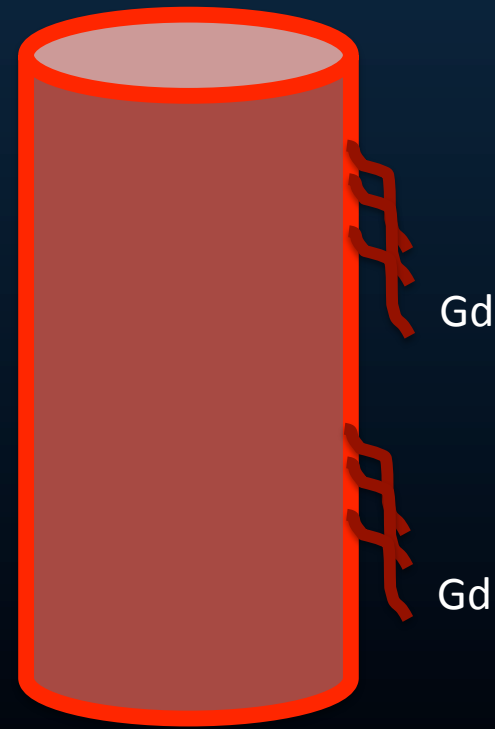
+/- suppression LCR



Rehaussement de paroi intra-crânienne

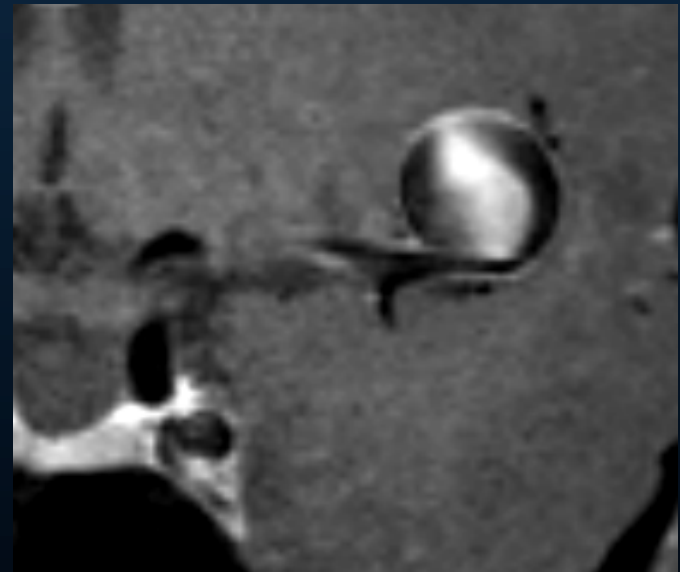
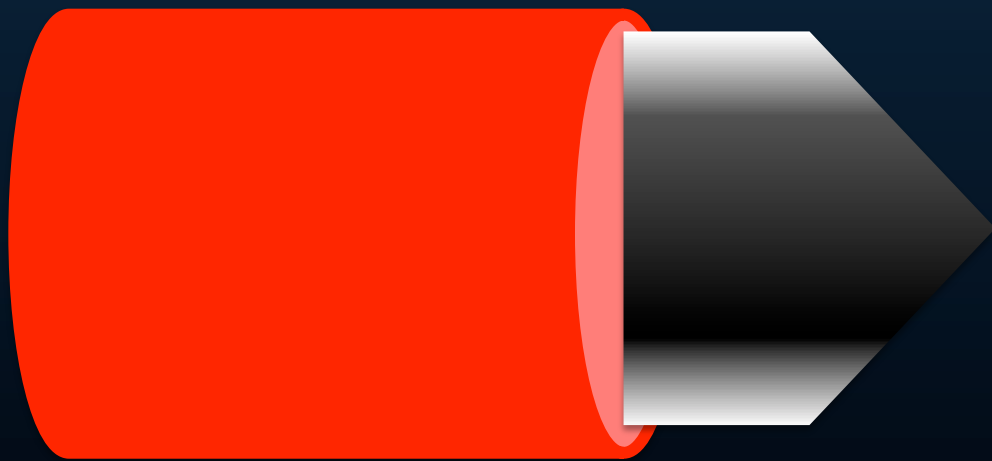


Augmentation de
perméabilité de
l'endothélium ?



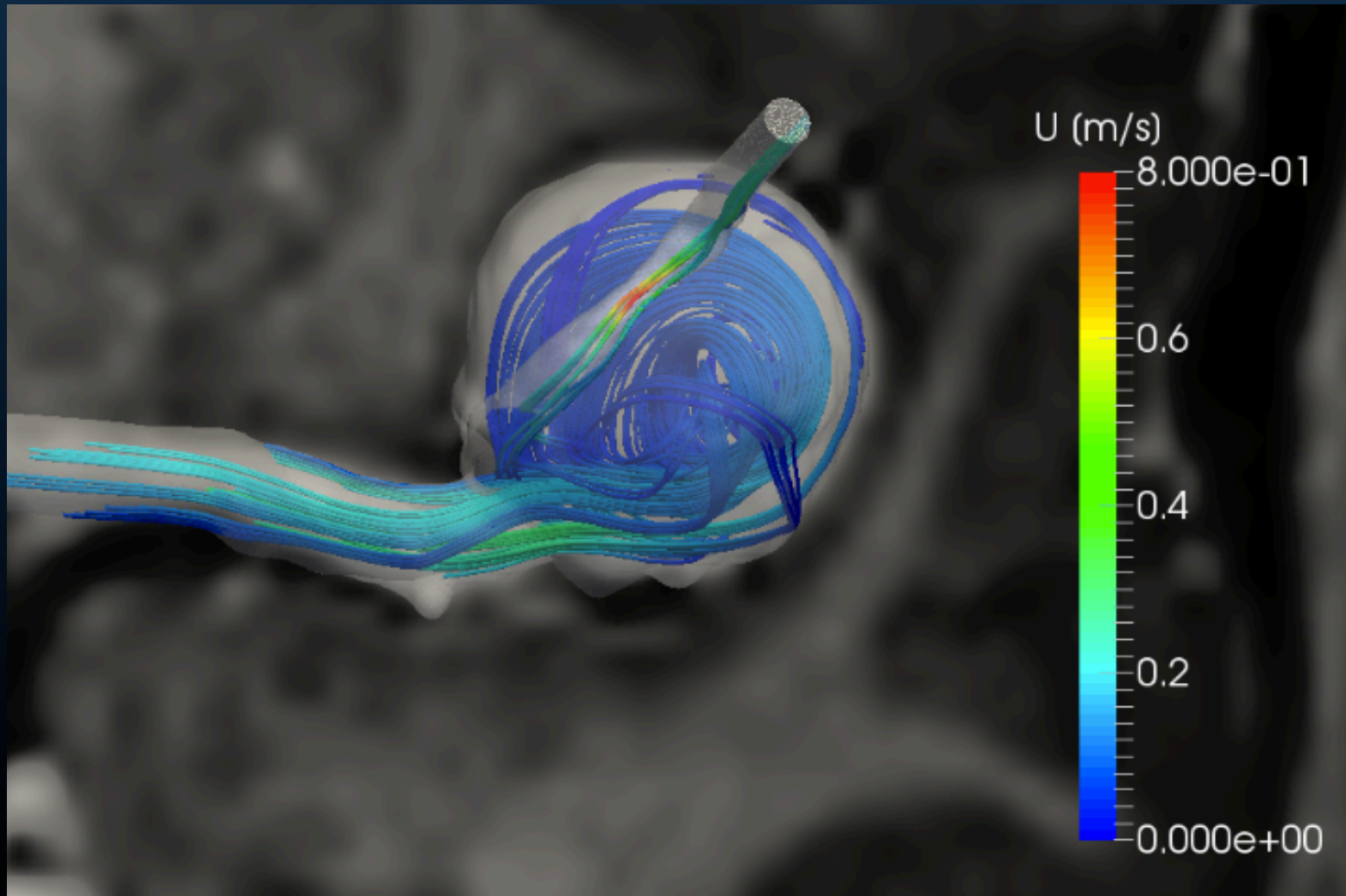
Vasa vasorum ?

Artéfacts



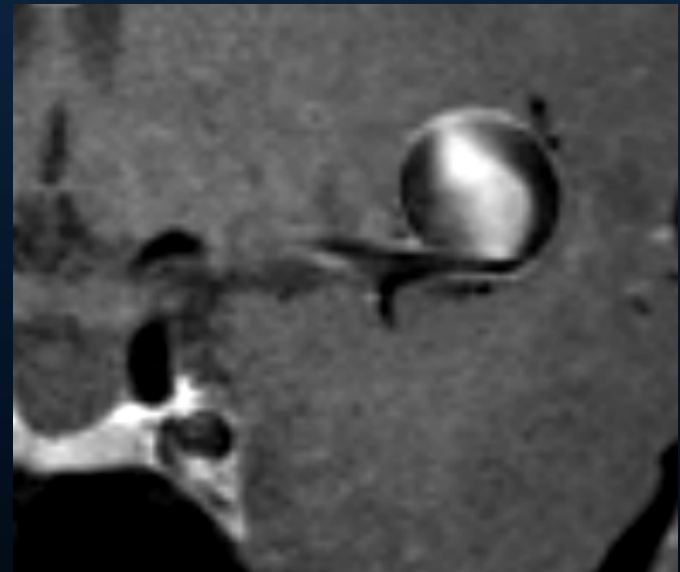
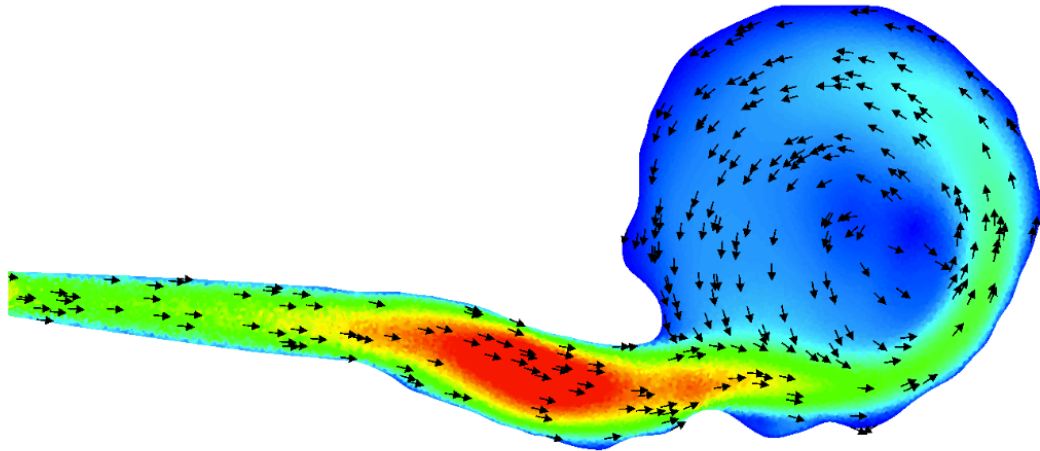
Imitation/surestimation rehaussement paroi secondaire à flux lent en marge de la paroi

Artéfacts



Courtoisie de C. Kauffman et F. Joly

Artéfacts

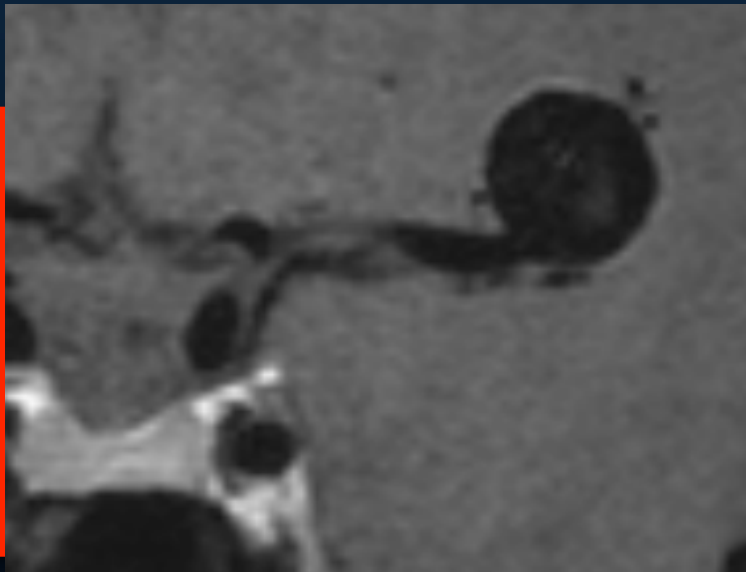


Imitation/surestimation rehaussement paroi secondaire à flux lent en marge de la paroi

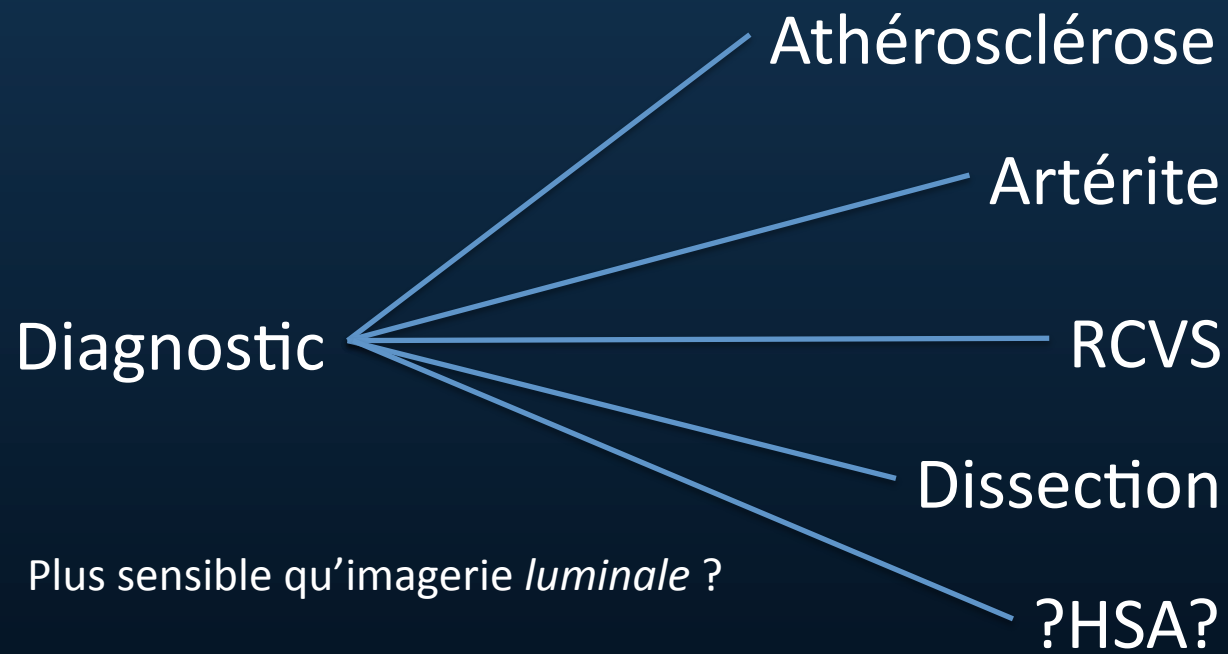
Courtoisie de C. Kauffman et F. Joly

Artéfacts

Suppression flux
préparation diffusion (MSDE)



Imitation/surestimation rehaussement paroi secondaire à flux lent en marge de la paroi



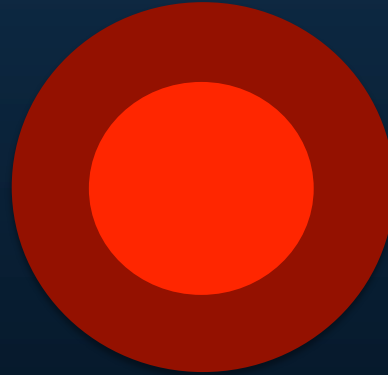
Prognostic ————— Athérosclérose

Étiologies sténoses intracrâniennes



Athérosclérose

- Excentrique > concentrique
- Irrégulier
- Rehaussement = instable ?



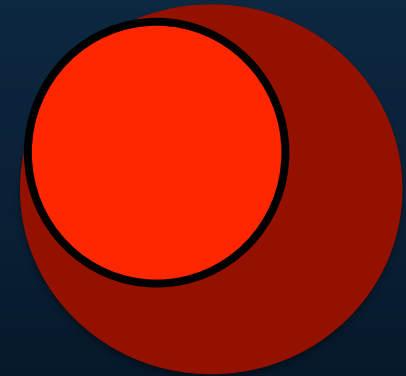
Artérite

- Concentrique
- Régulier
- Rehaussement = activité ?



Spasme

- Pas ou peu épaissement
- Rehaussement = activité ?



Dissection

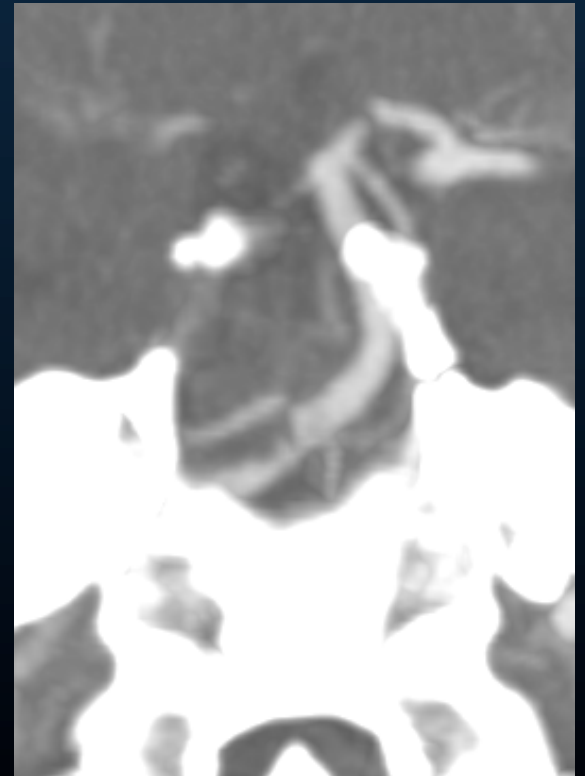
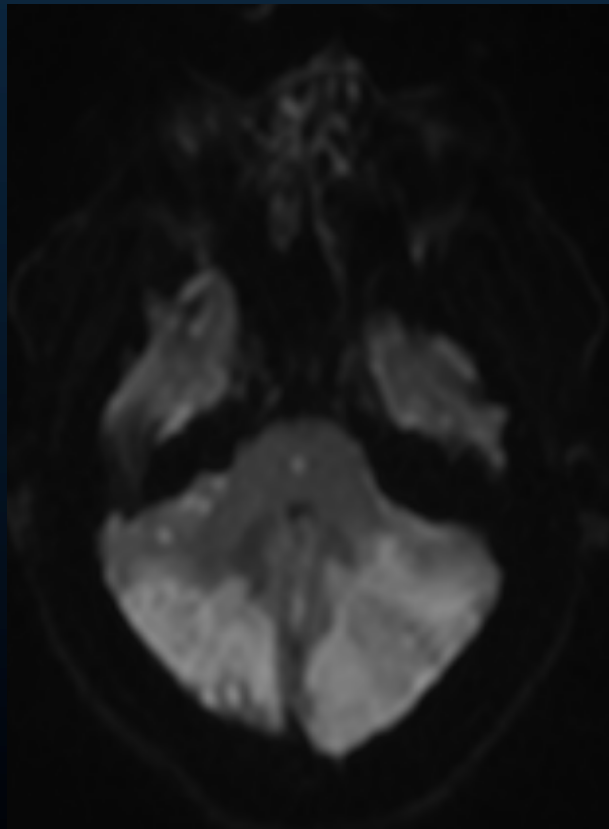
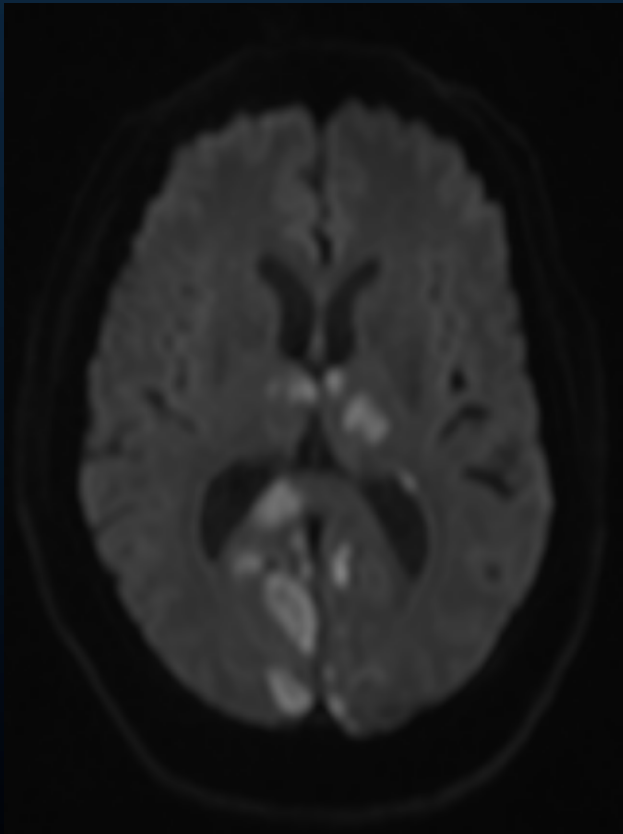
- Excentrique
- Hématome intramural (distinction hémorragie plaque athérosclérotique ???)

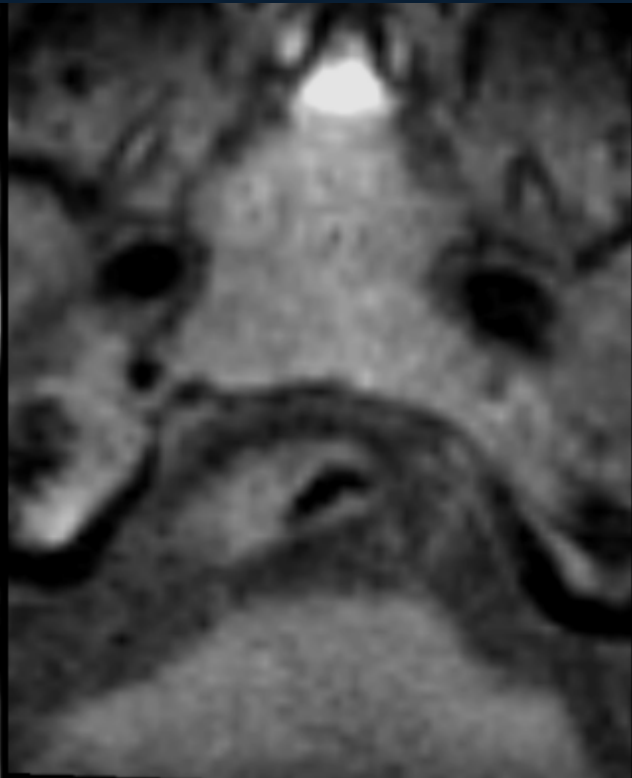
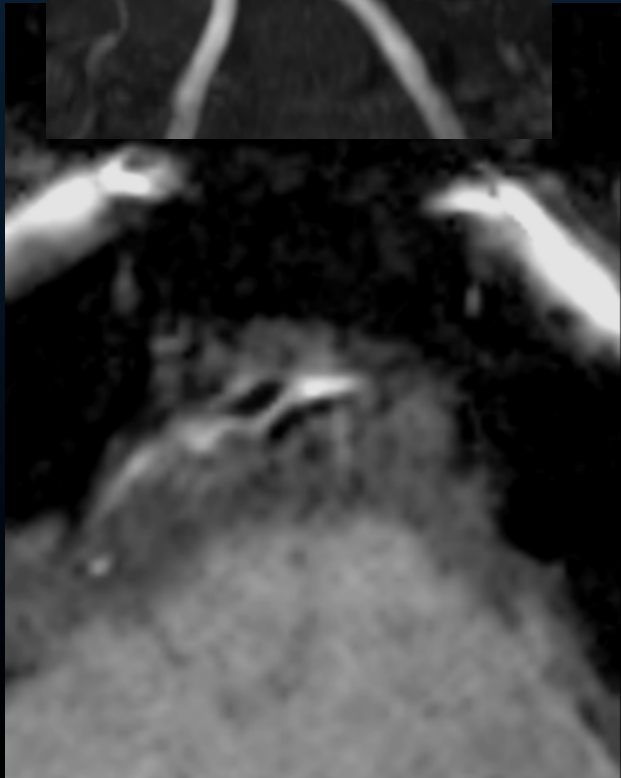
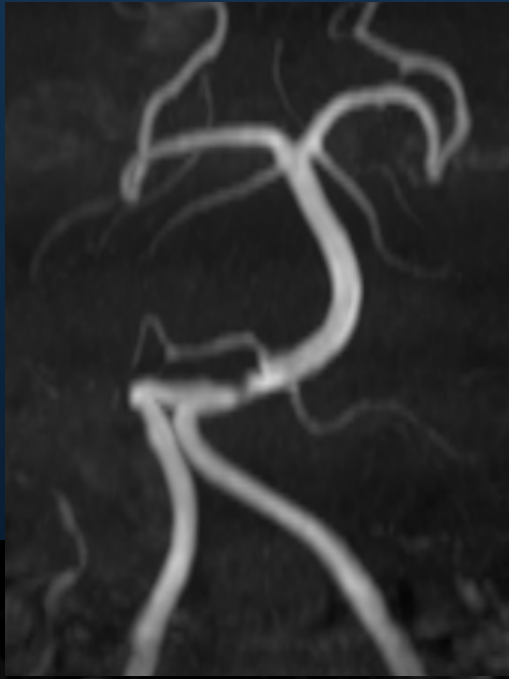
Athérosclérose

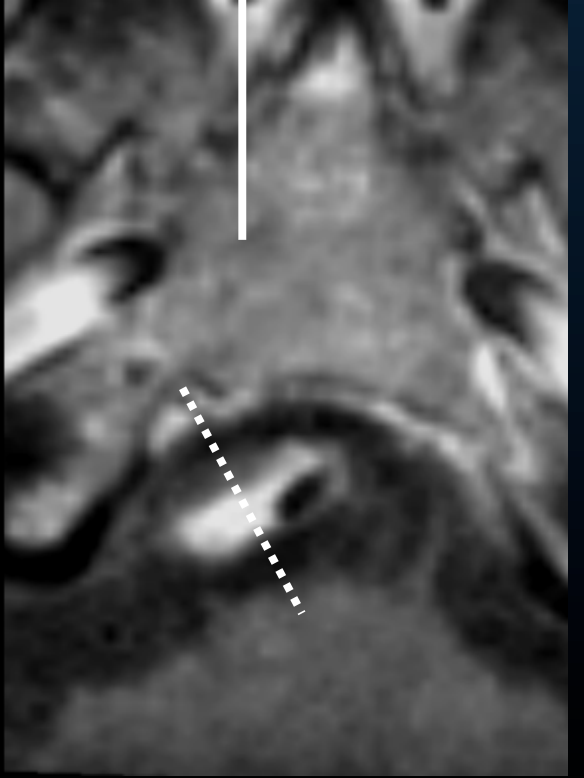
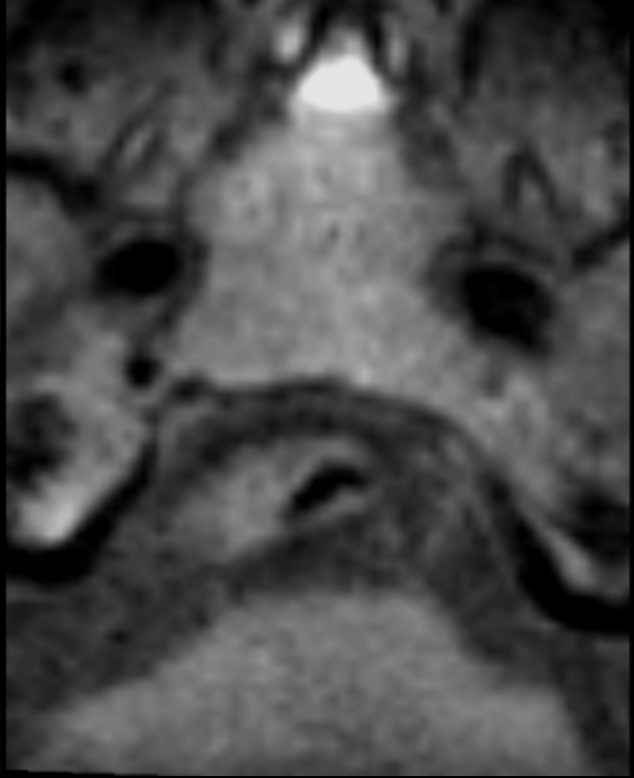
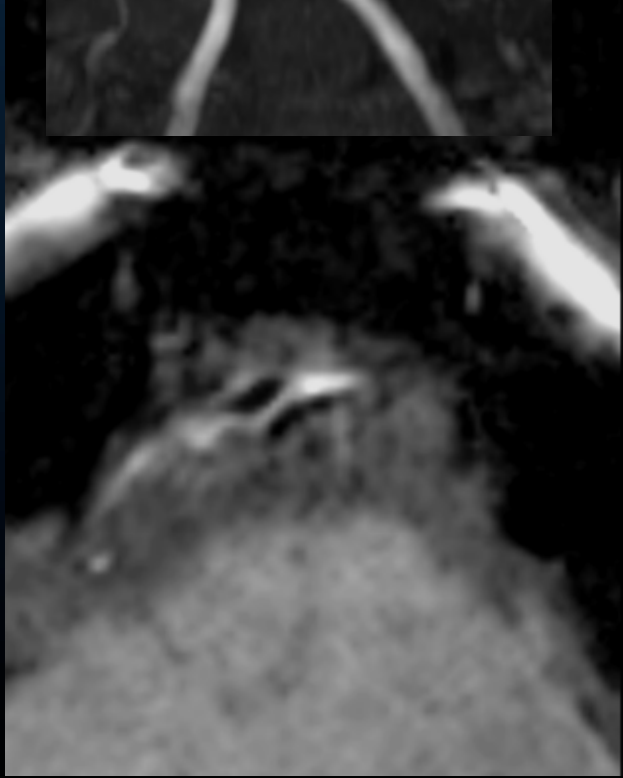
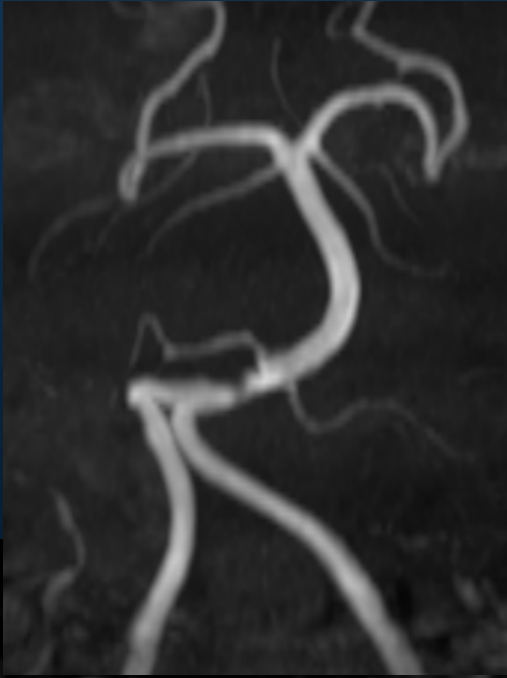
- Épaississement excentrique > concentrique
- Irrégulier
- Remodelage lumière
- Multisegment, multifocal
- Rehaussement = vulnérabilité ?

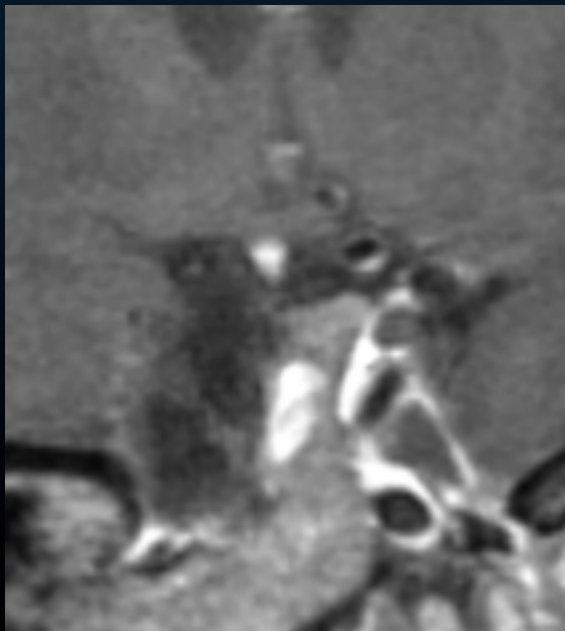
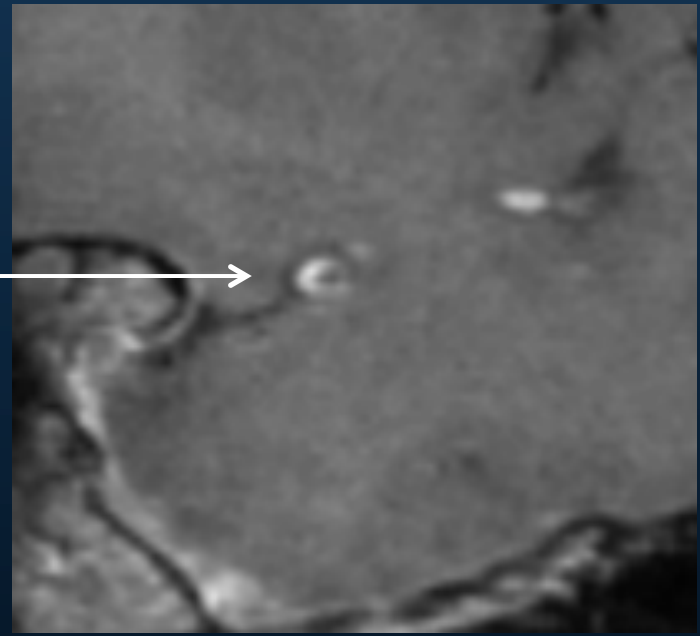
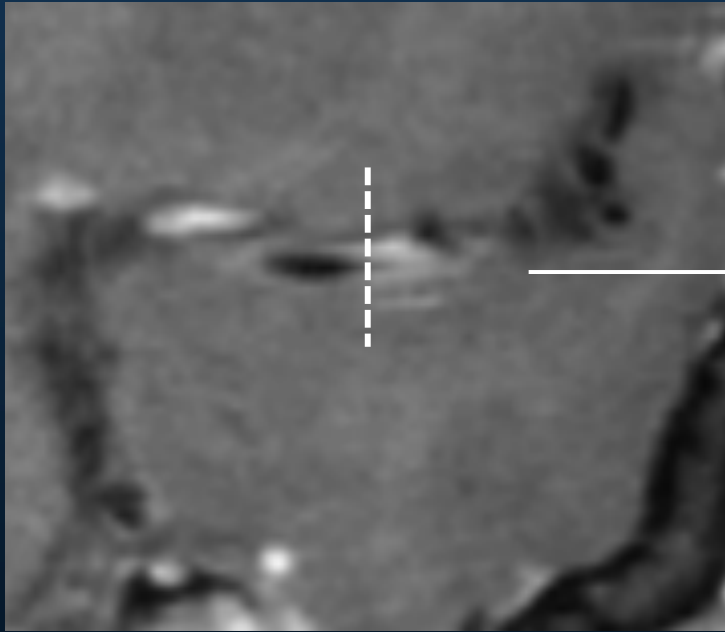


57 ans. Céphalée, vomissement et diminution de l'état de conscience.









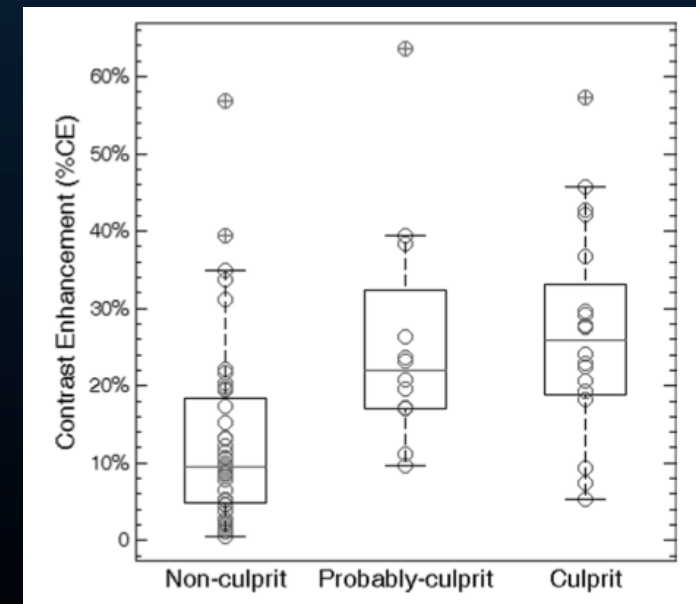
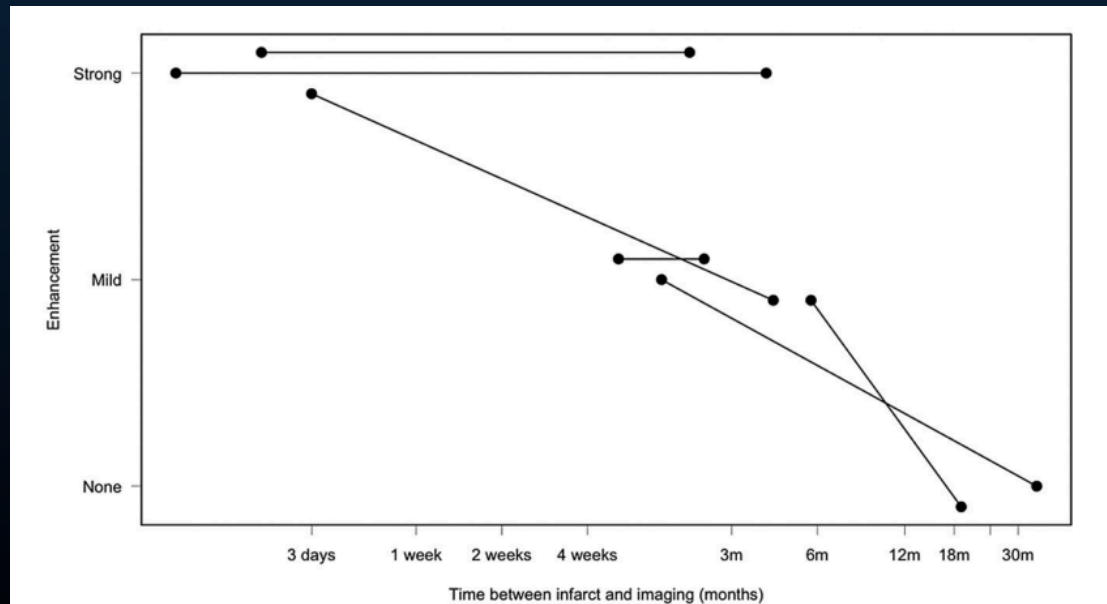
Multifocal, multisegmentaire
Eccentrique
Rehaussant (instable ?)



Athérosclérose



- Rehaussement = vulnérabilité ?



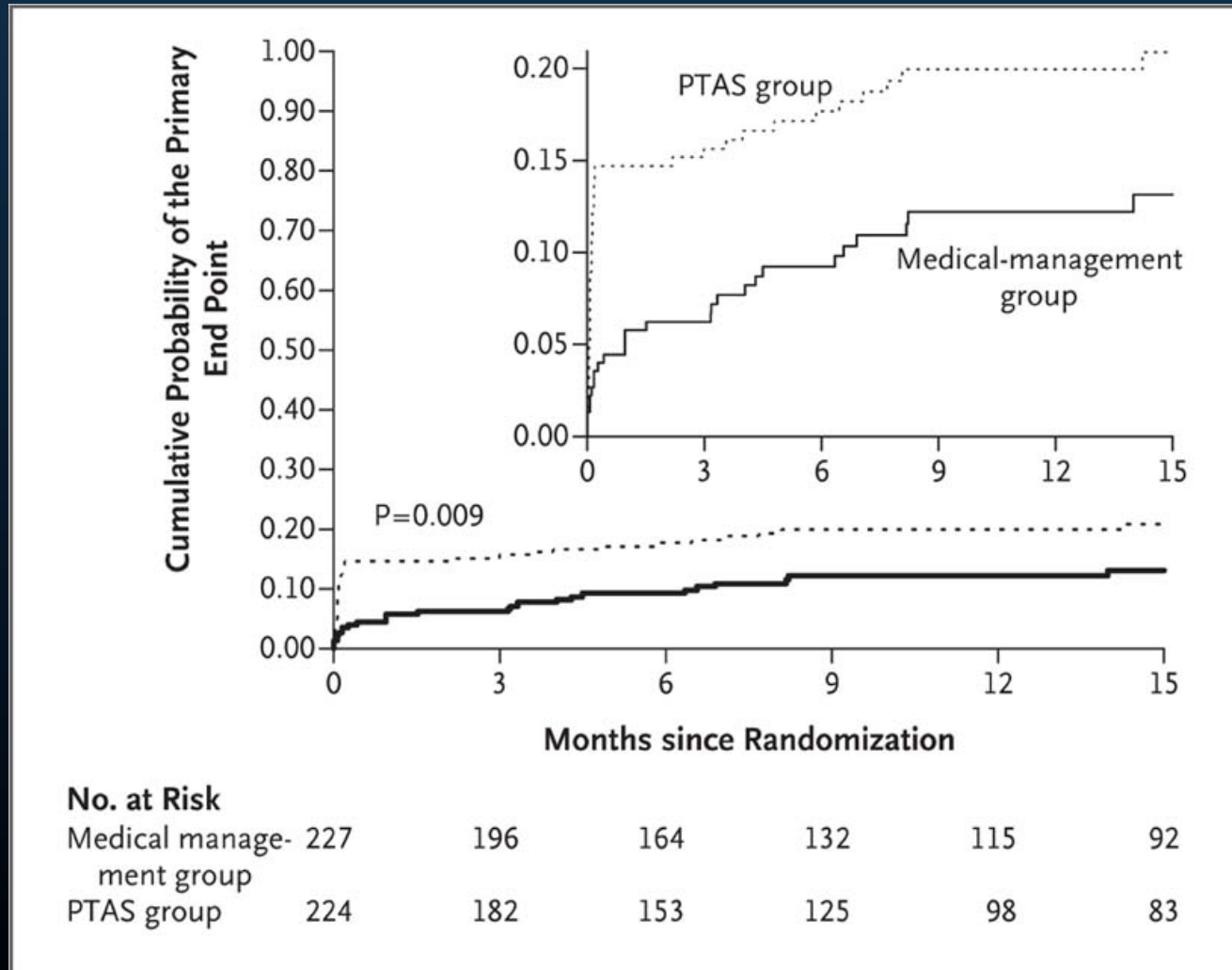
Skarpathiotakis et al. AJNR 2013 Feb;34(2)
Qiao et al. Radiology 2014; 271 (2):534-542

Athérosclérose



- Utilité clinique ?
 - Meilleure sensibilité qu'imagerie luminale
 - Étiologie → meilleure prise en charge ?
 - Choix option thérapeutique (médical vs stenting ?)

Kaplan–Meier Curves for the Cumulative Probability of the Primary End Point, According to Treatment Assignment.



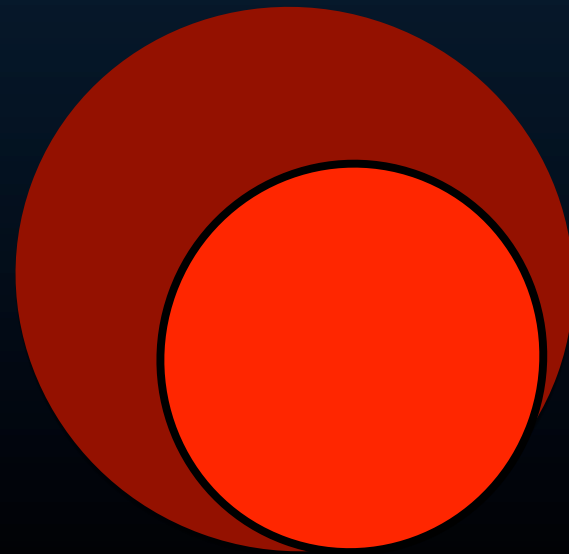
SAMMPRIS TRIAL
Chimowitz MI et al. N Engl J Med 2011;365:993-1003

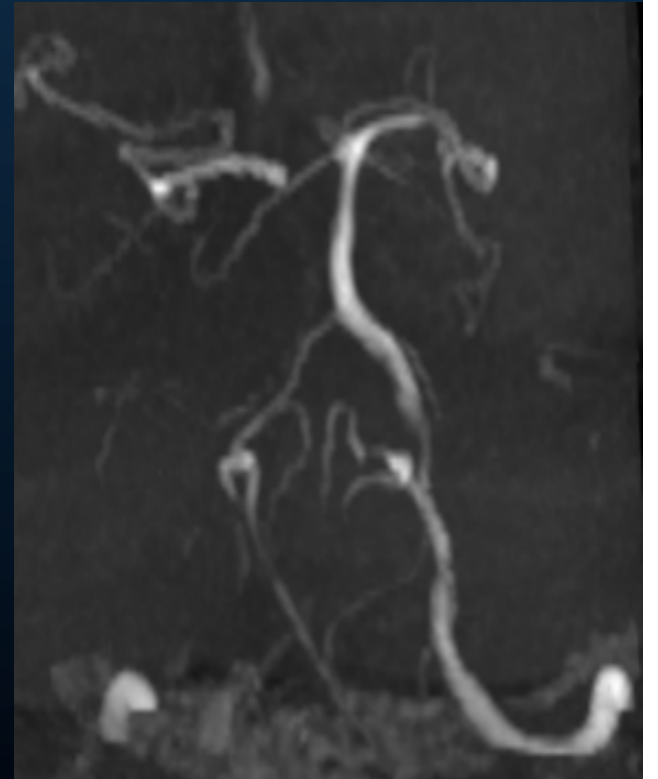
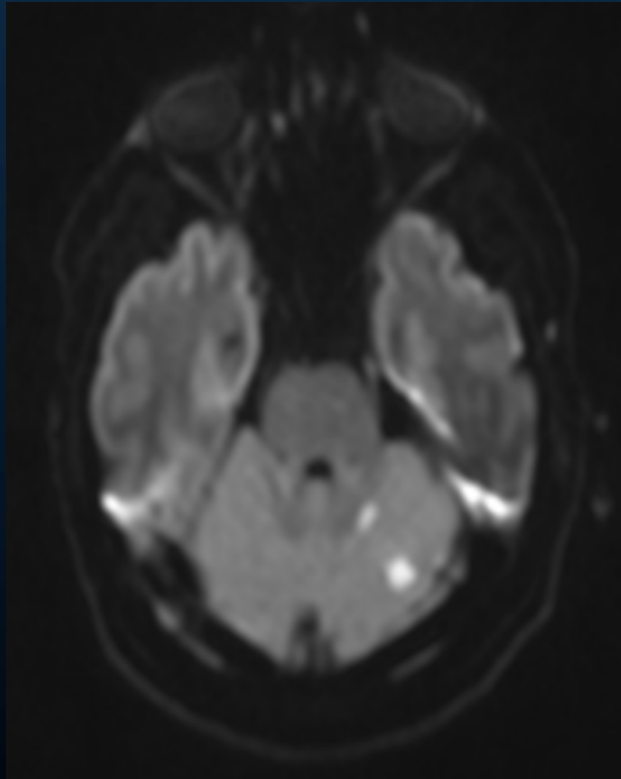
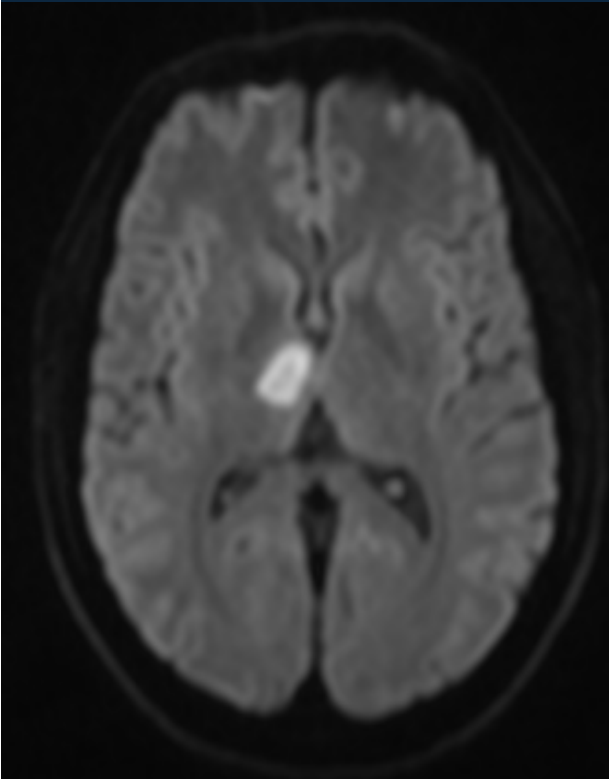


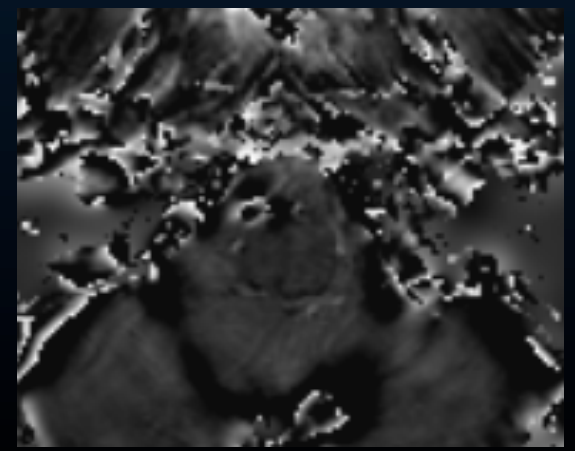
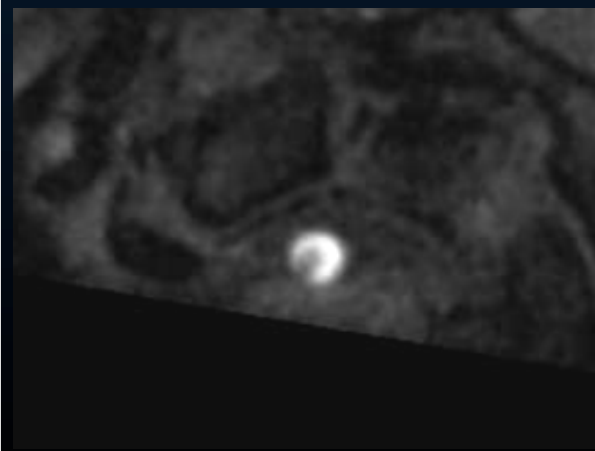
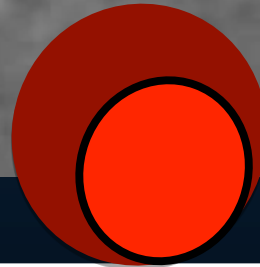
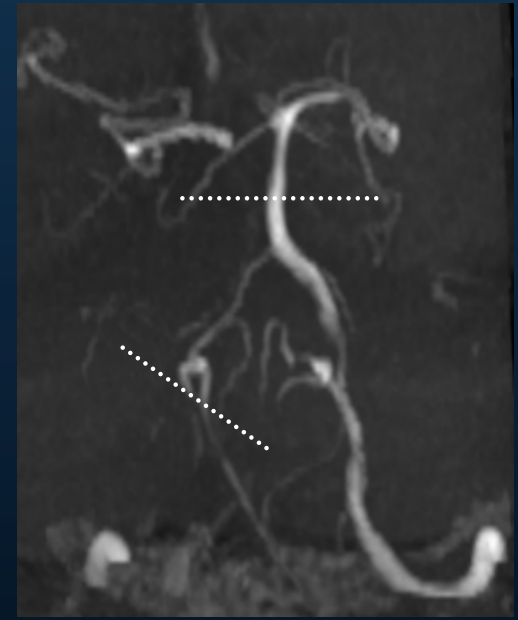
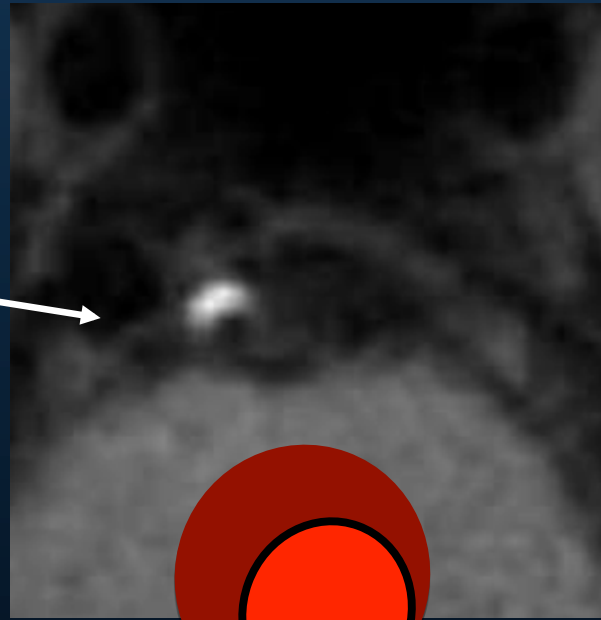
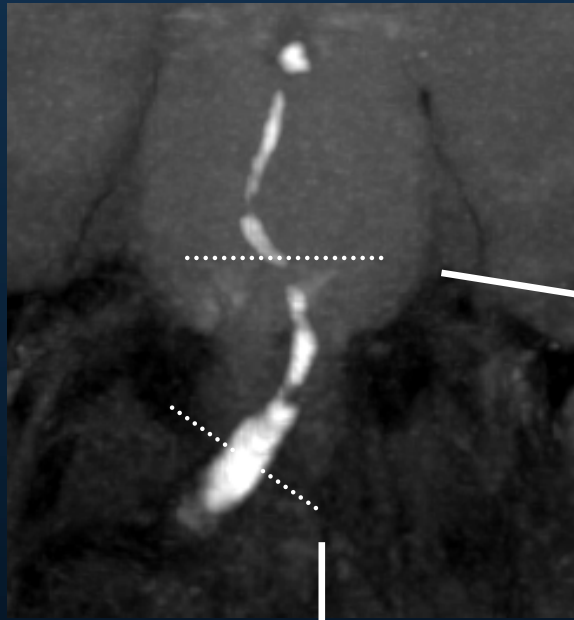
The NEW ENGLAND
JOURNAL of MEDICINE

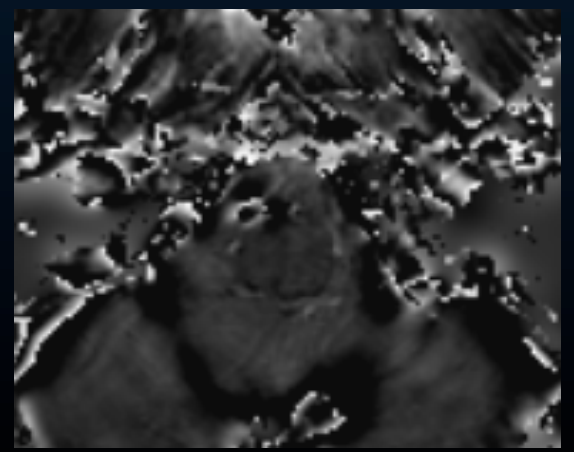
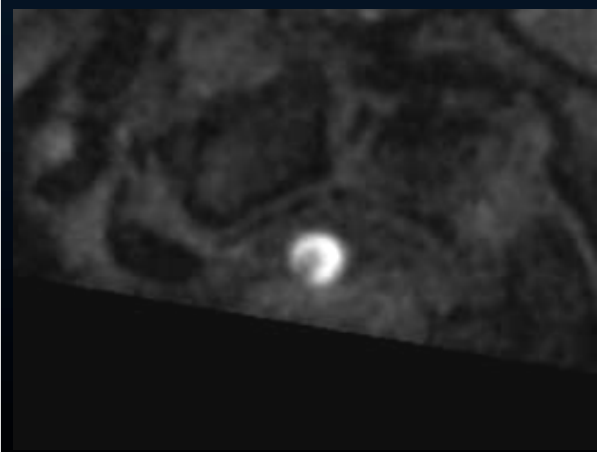
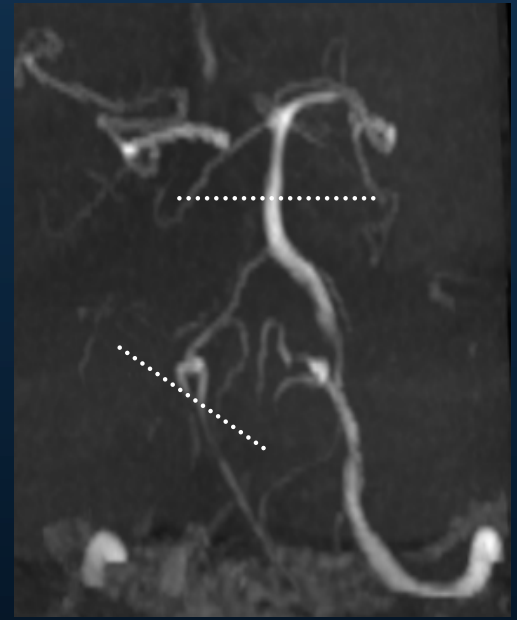
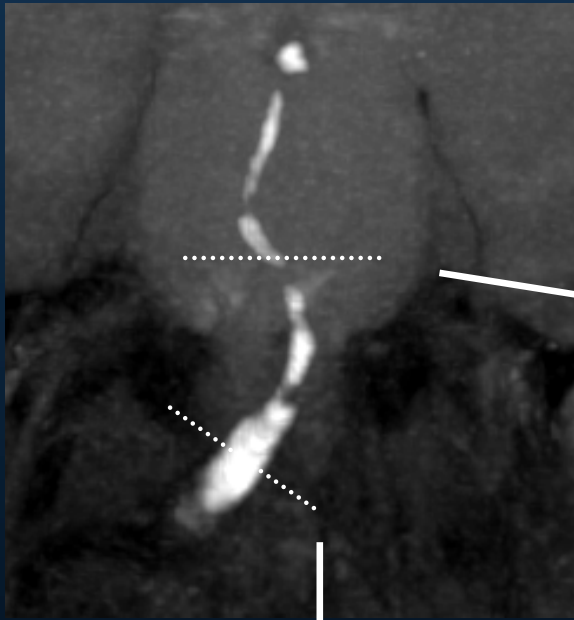
Dissection intracrânienne

- Longue sténose irrégulière eccentricque
- Hématome intra-mural









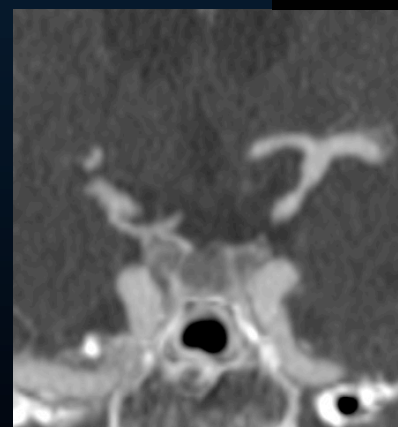
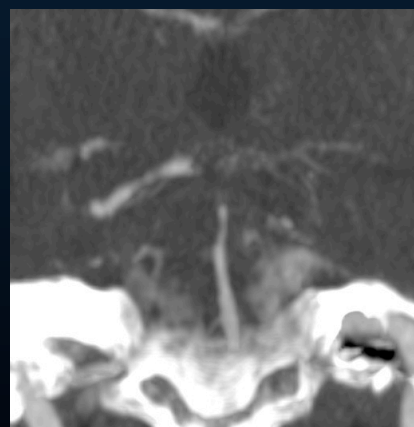
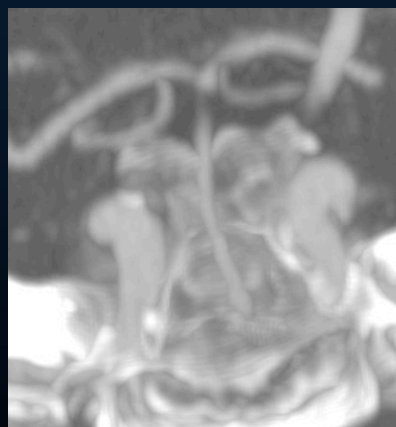
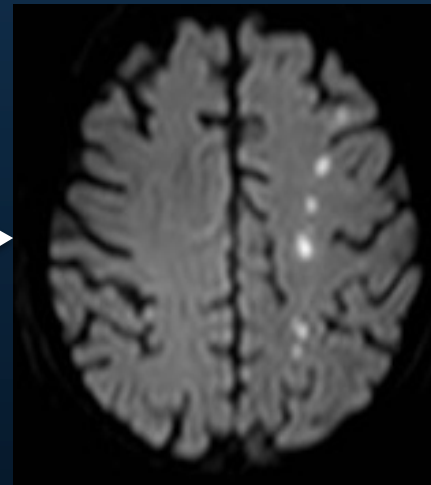
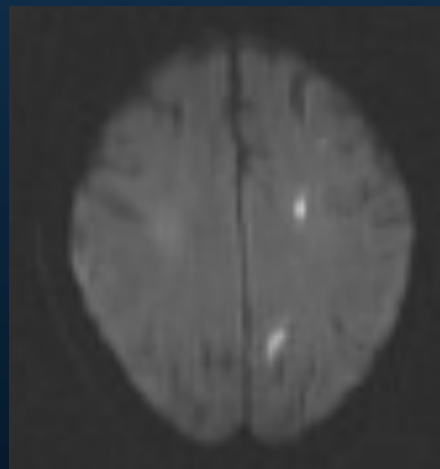
Artérite

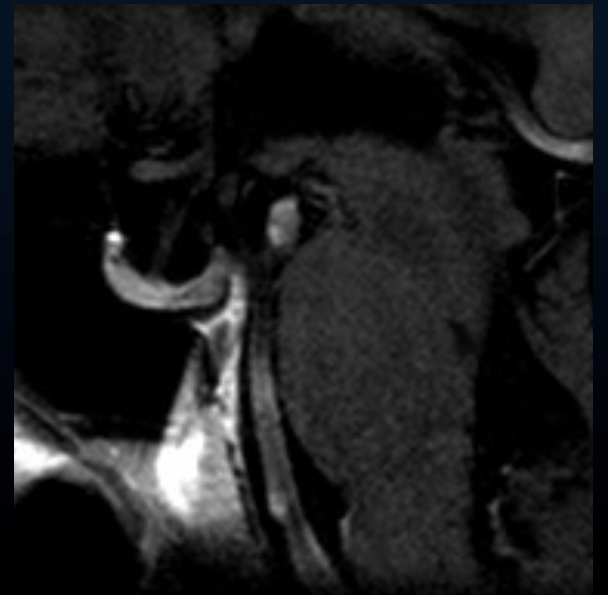
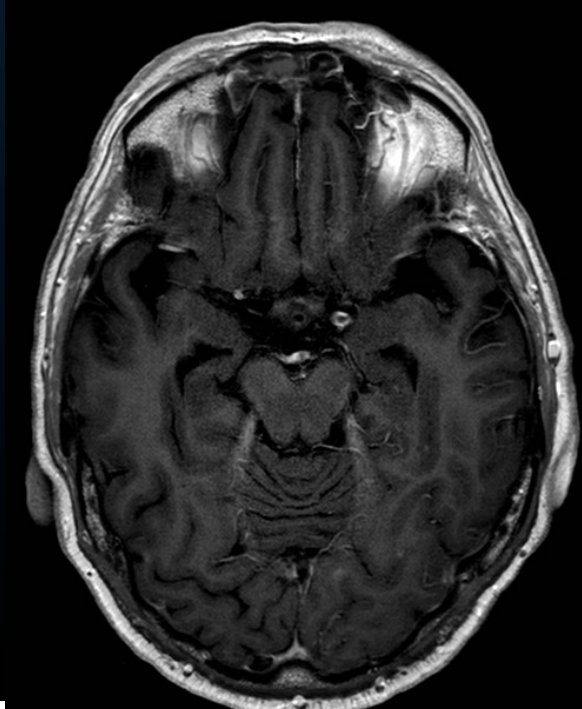
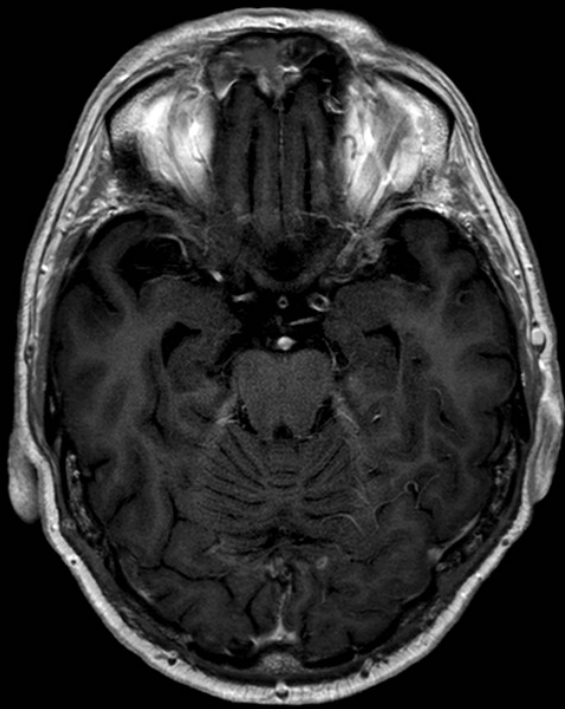
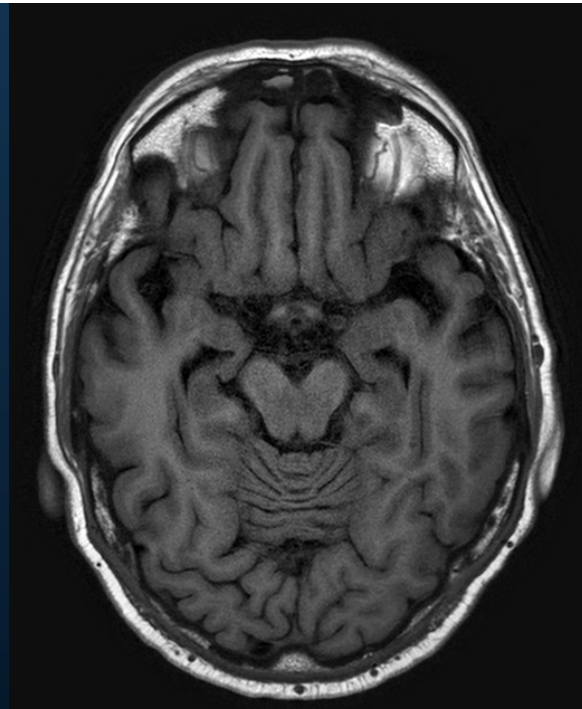
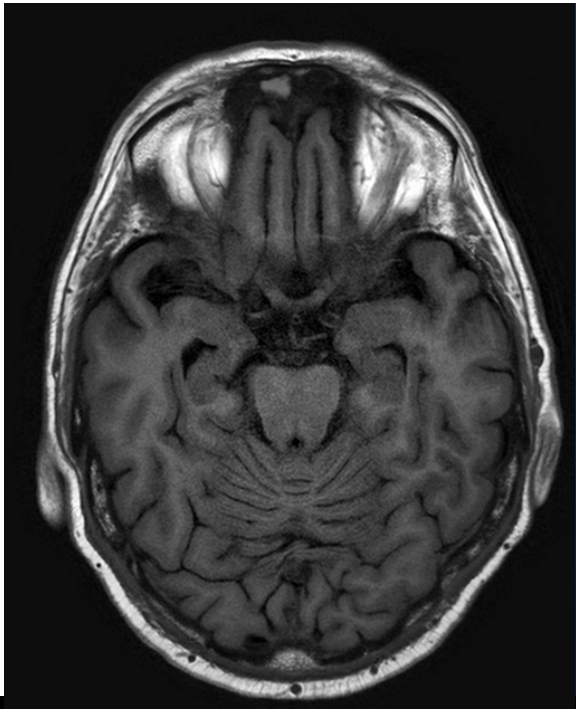
- Épaississement concentrique > eccentric
- Multifocal, segmentaire
- Utilité clinique ?
 - Diminuer la nécessité de procédure invasive (DSA) ?
 - Guider biopsie ?
 - Monitorer réponse au traitement

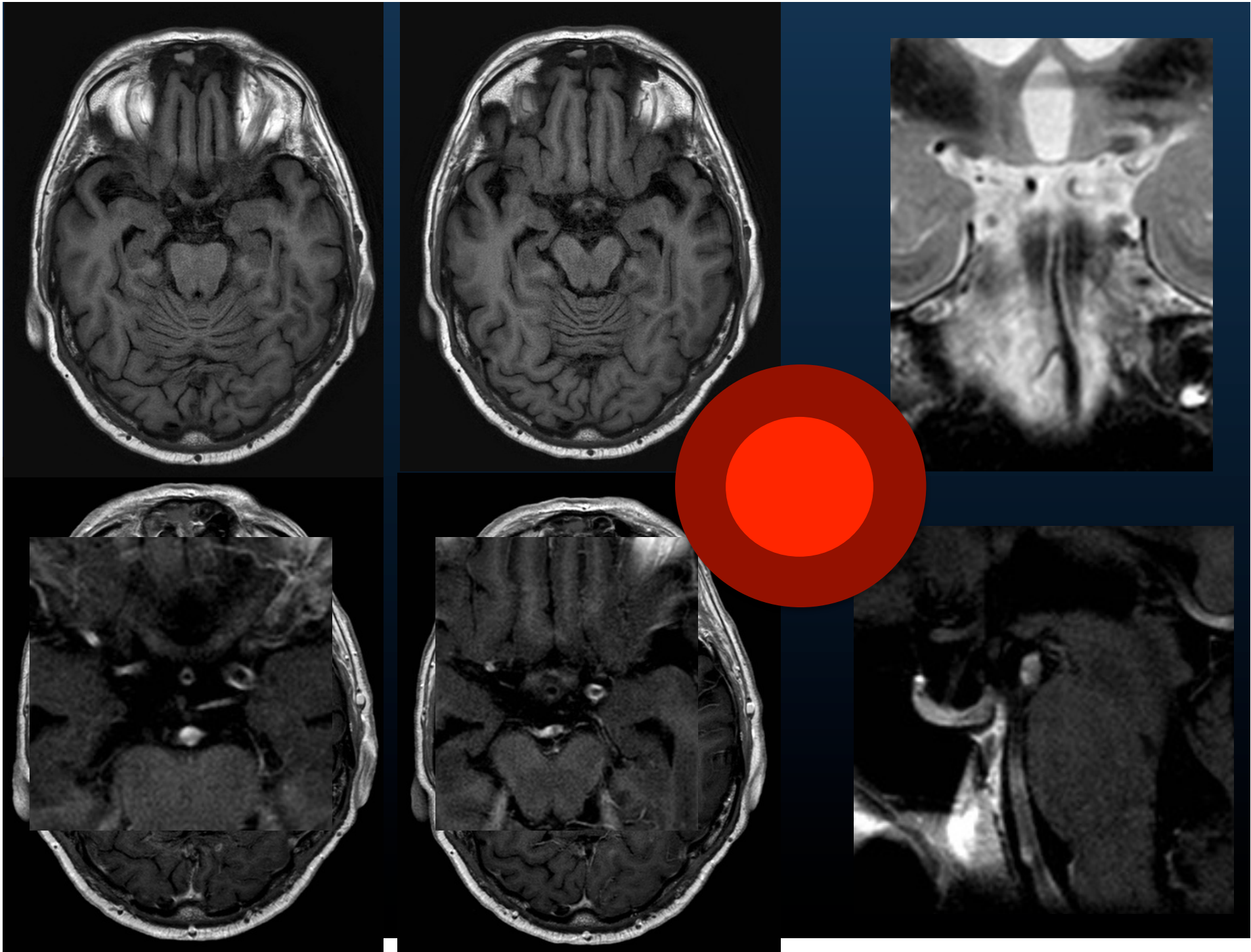


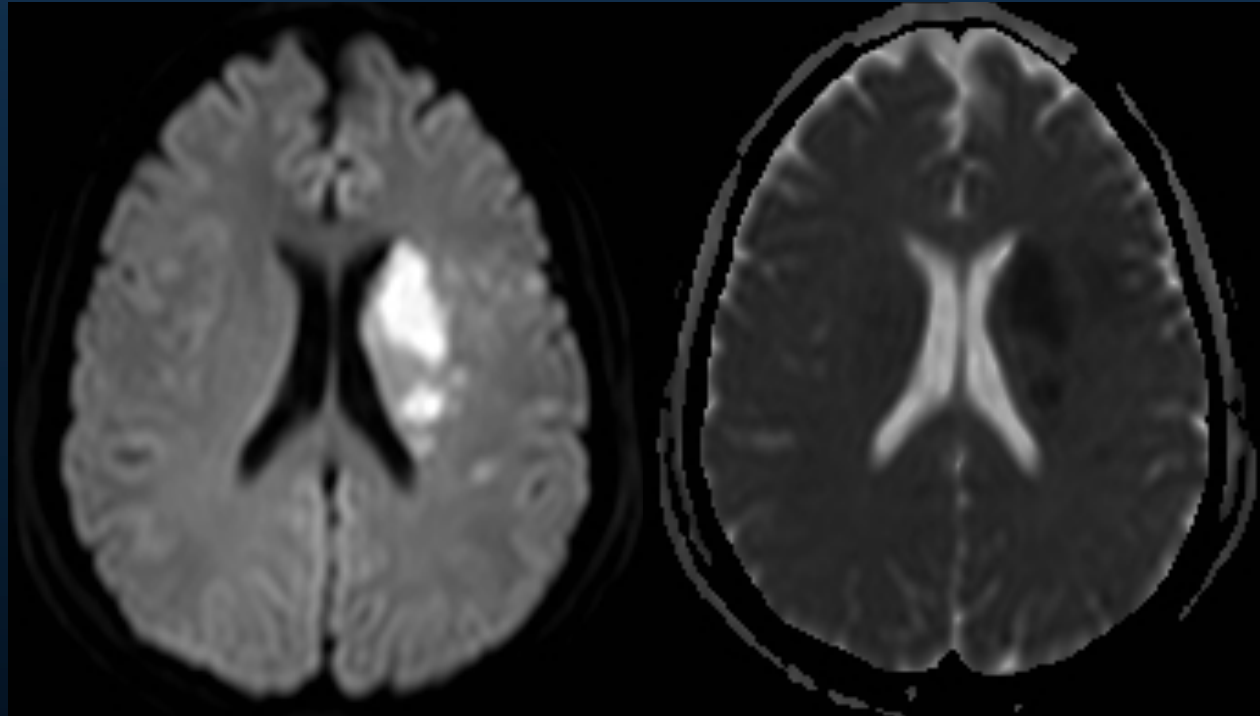
Août 12

Nov 12

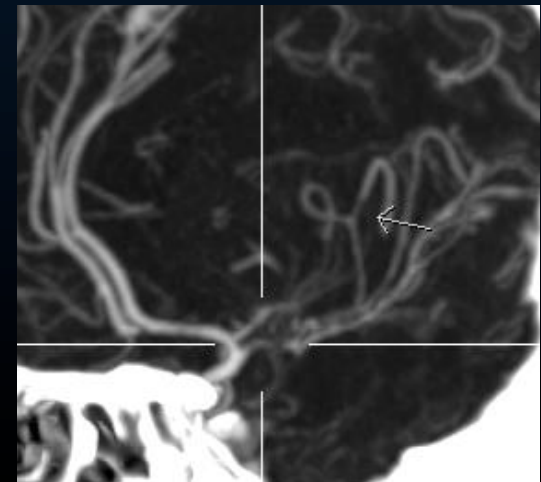


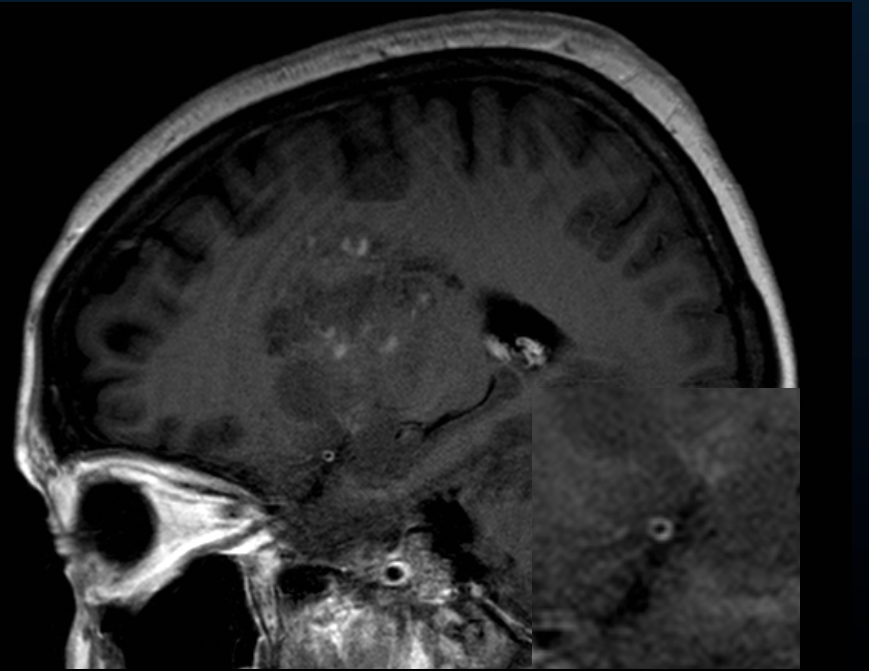
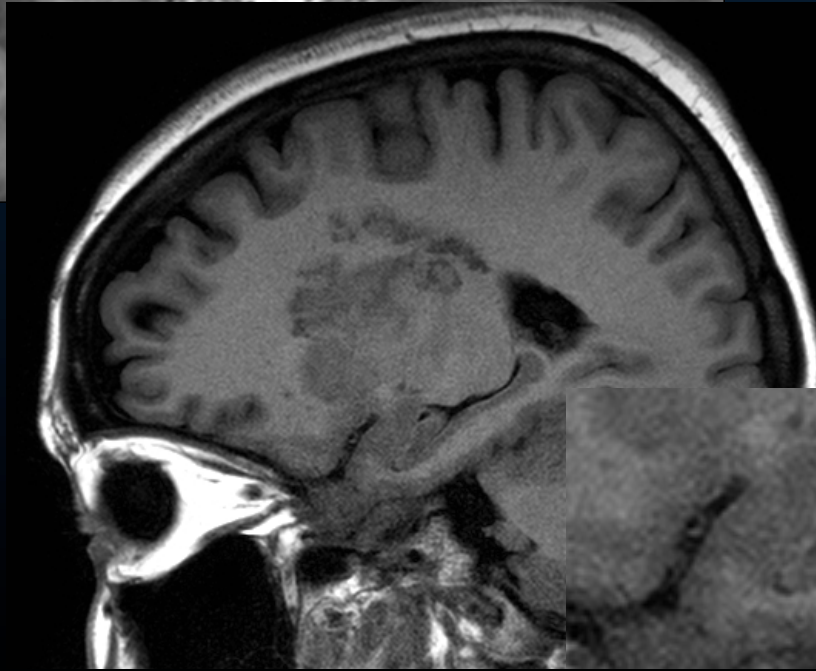
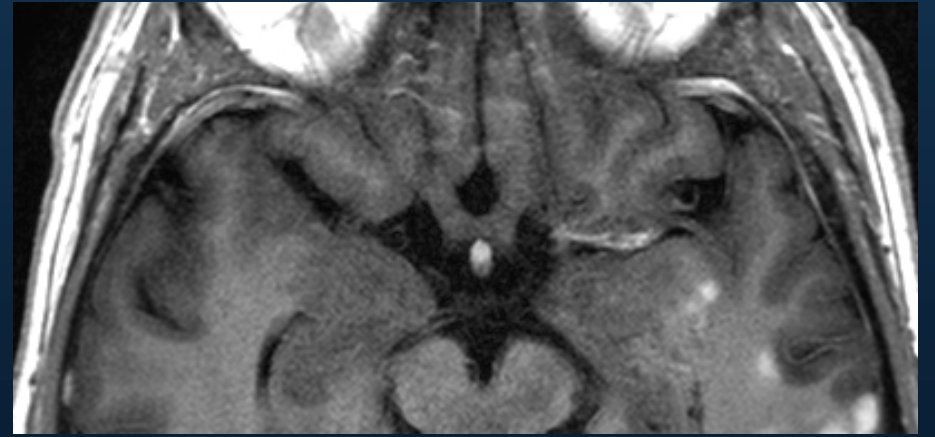
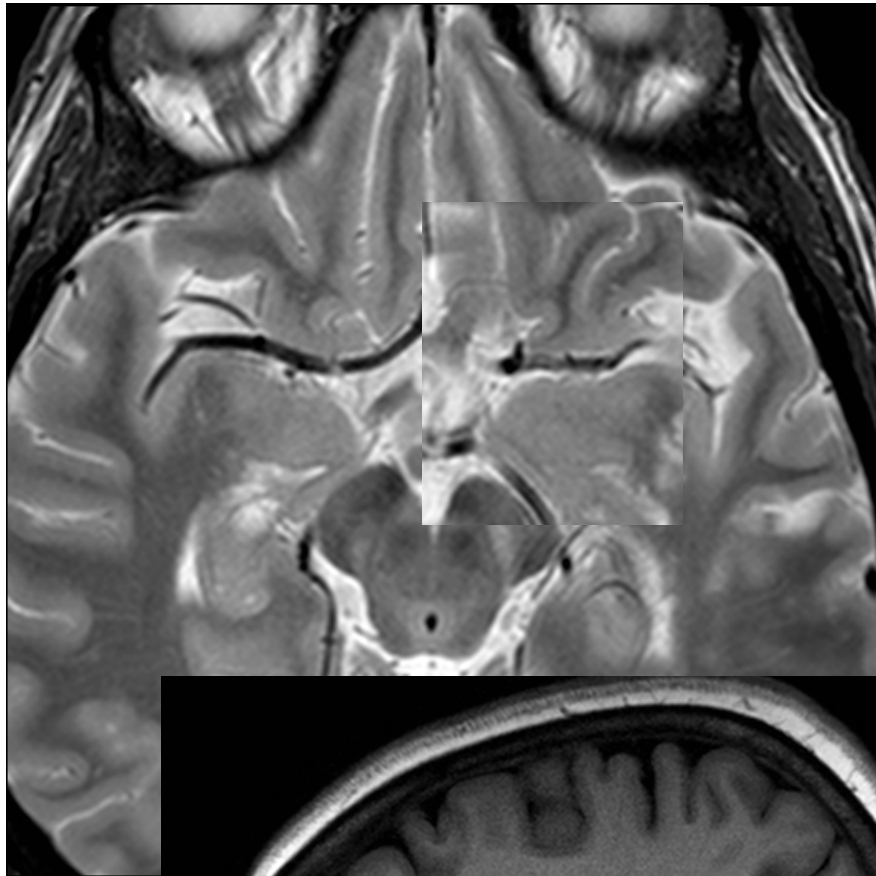


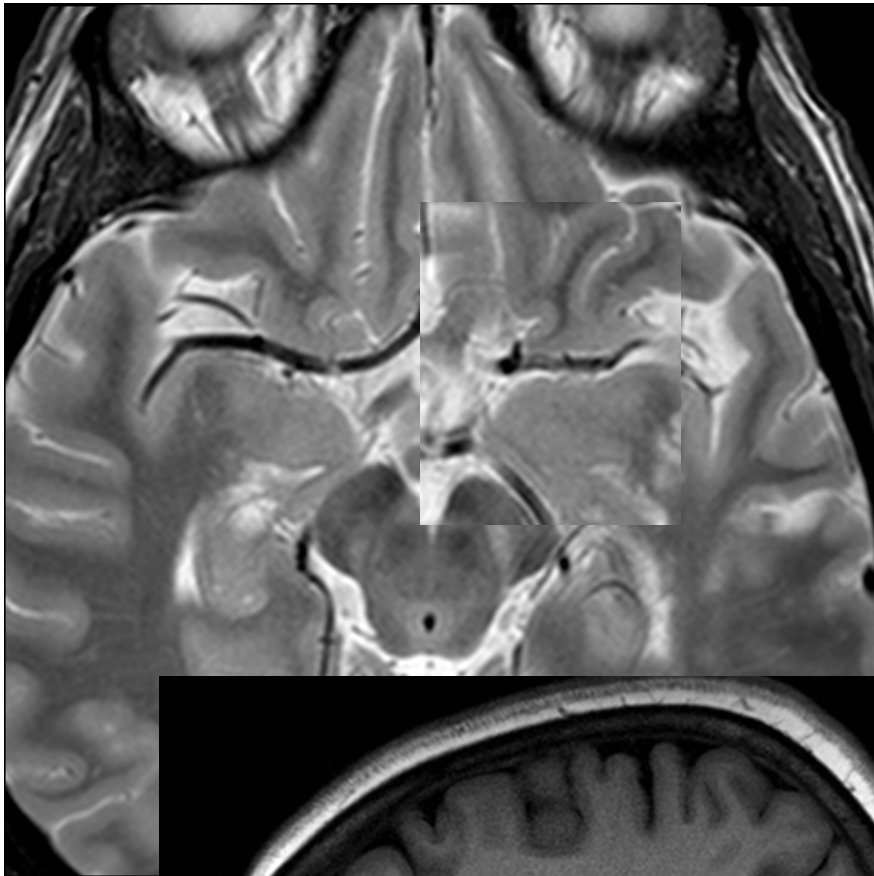




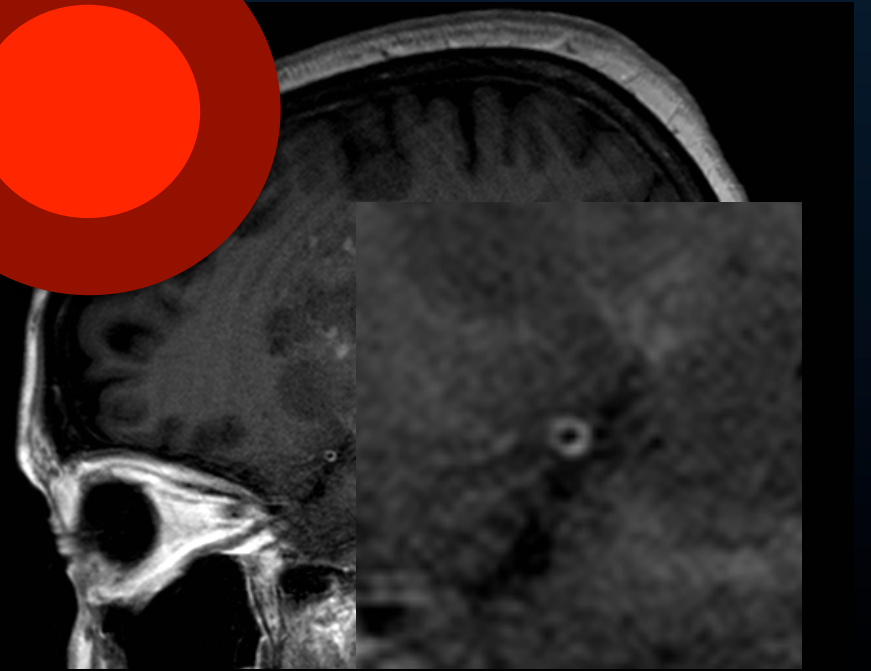
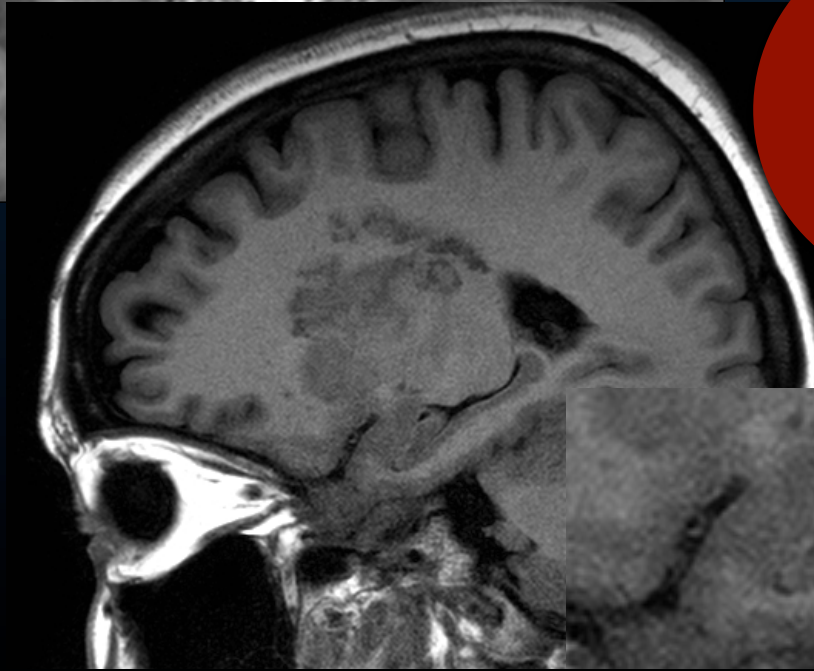
Femme 52 ans
Pas d'ATCD. Hémiplégie
droite.



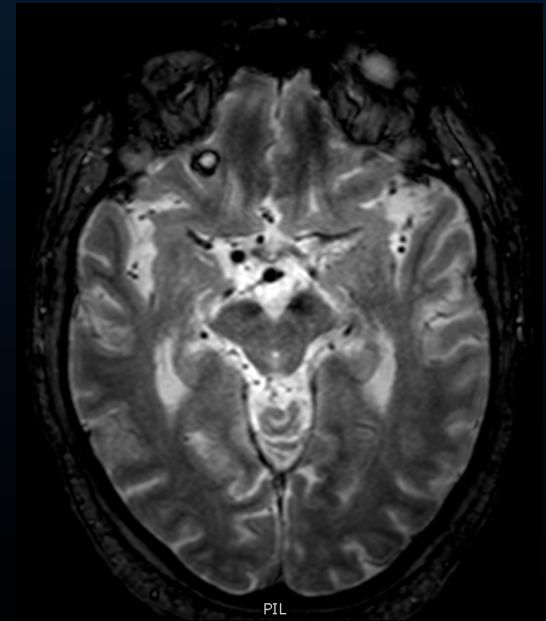
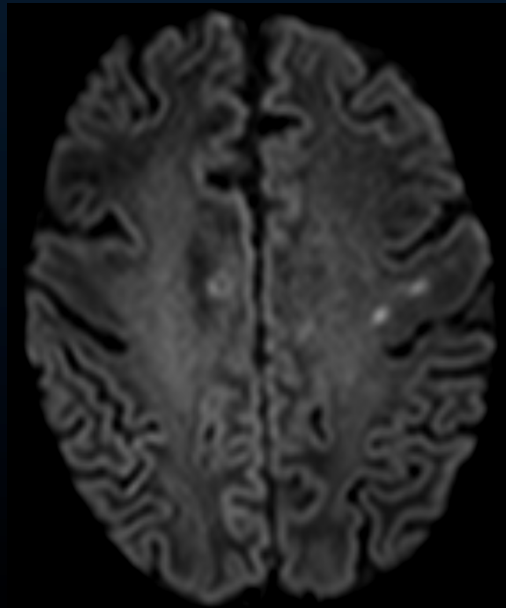
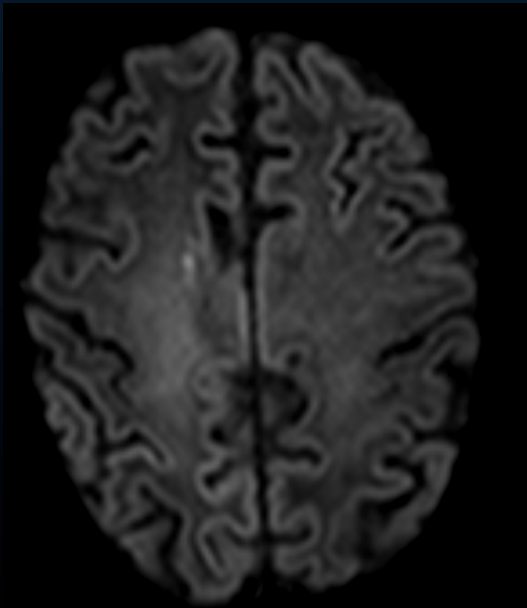
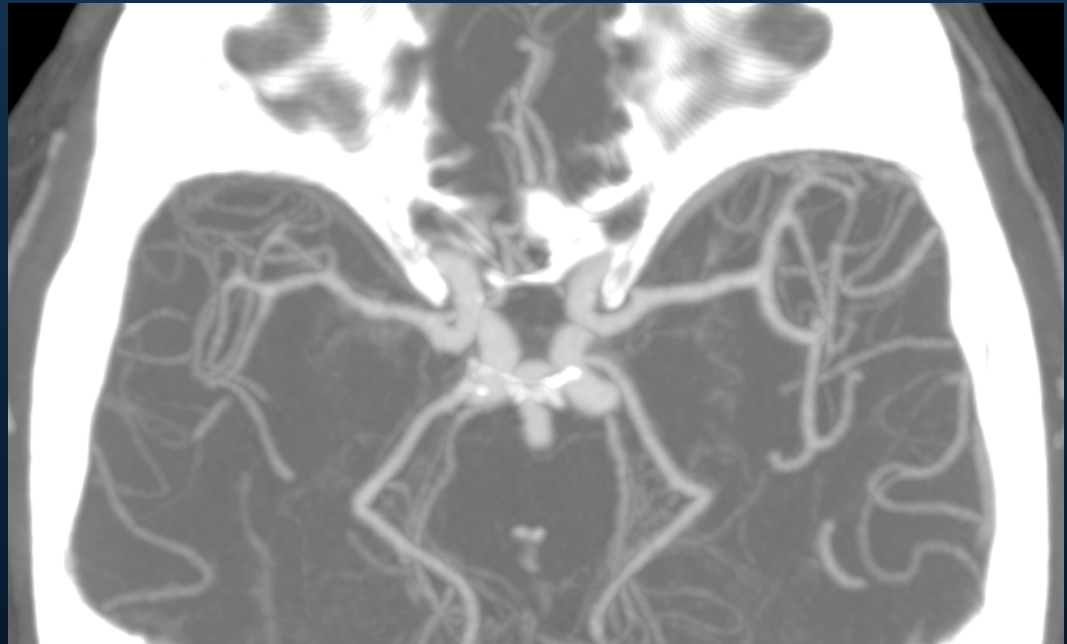




Concentrique

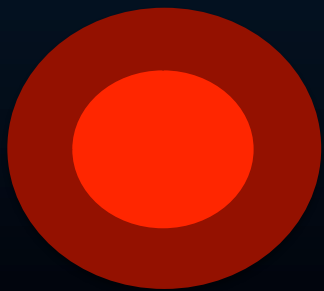


Homme de 65 ans.
Hémiplégie gauche.
Dysarthrie.
Diminution de l'état de conscience.
Température jusqu'à 38,9°C.

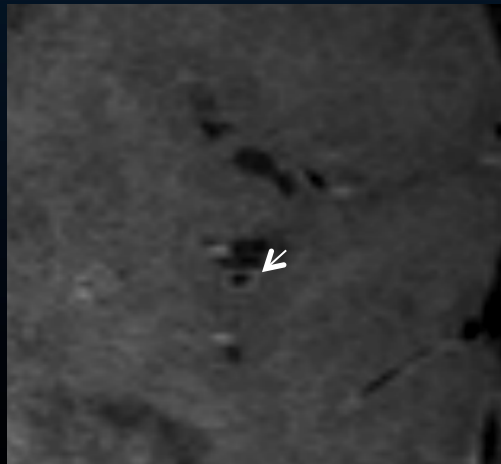
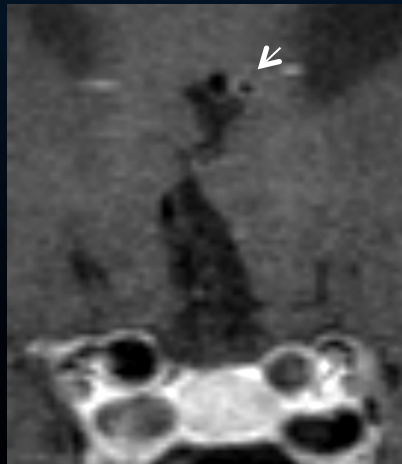






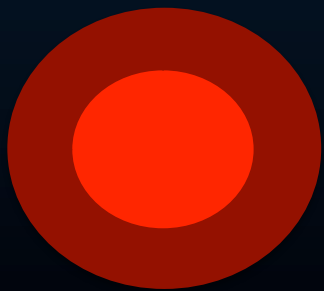


Concentrique

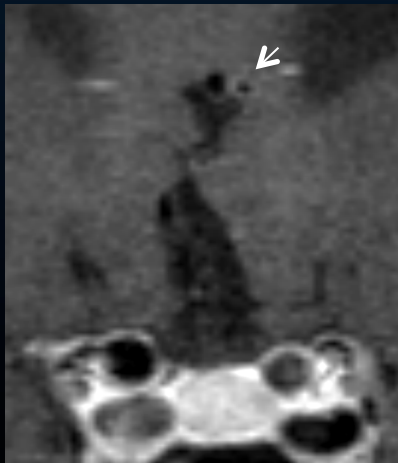




Artérite syphilitique



Concentrique



Artérite vs RCVS

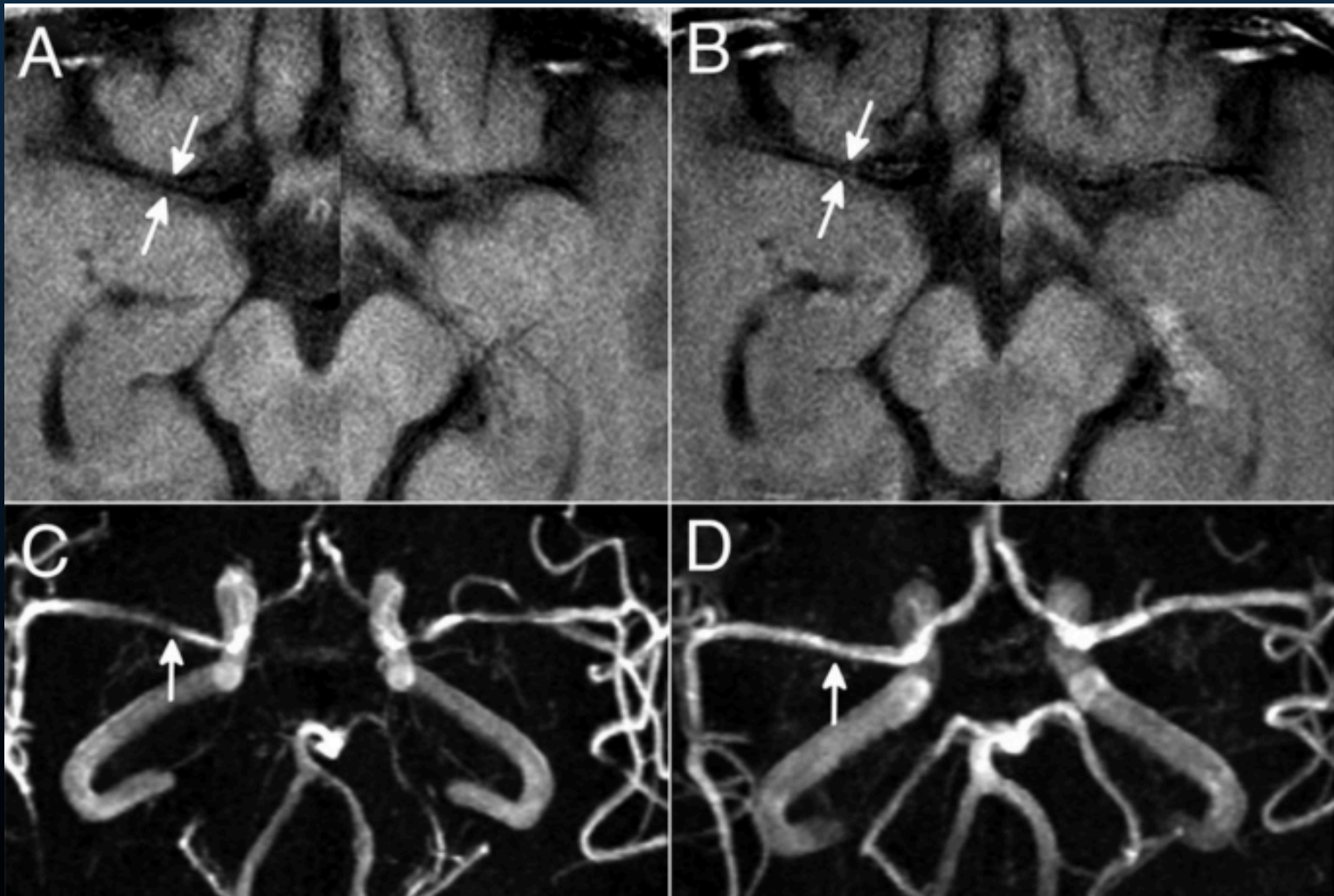
Artérite

- Rehaussement concentrique franc
- Persistance temporelle (mois)
- Immunosuppression

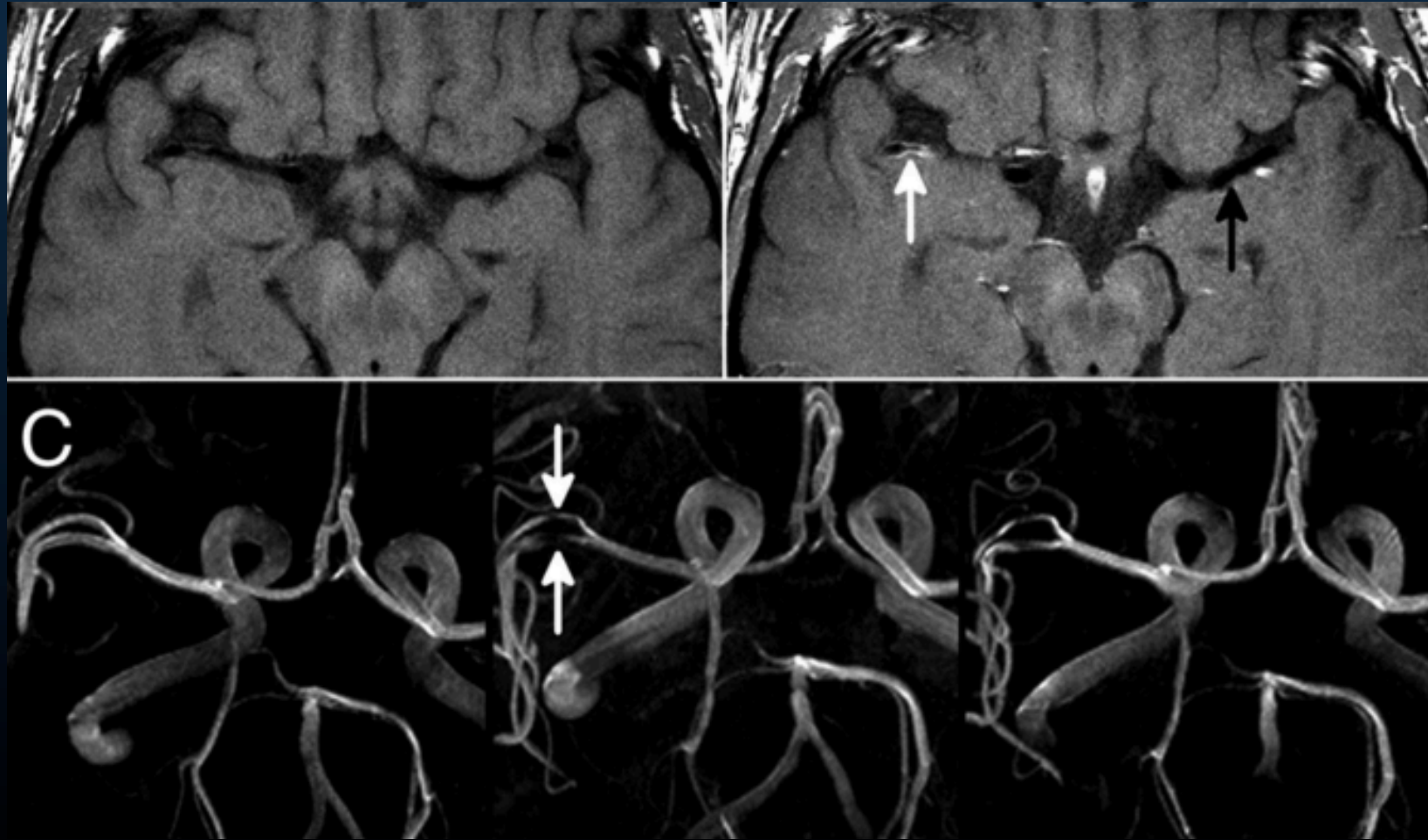
RCVS

- Pas ou peu de rehaussement
- Épaississement mural diffus et uniforme
- Résolution temporelle
- Bloqueurs calciques

RCVS



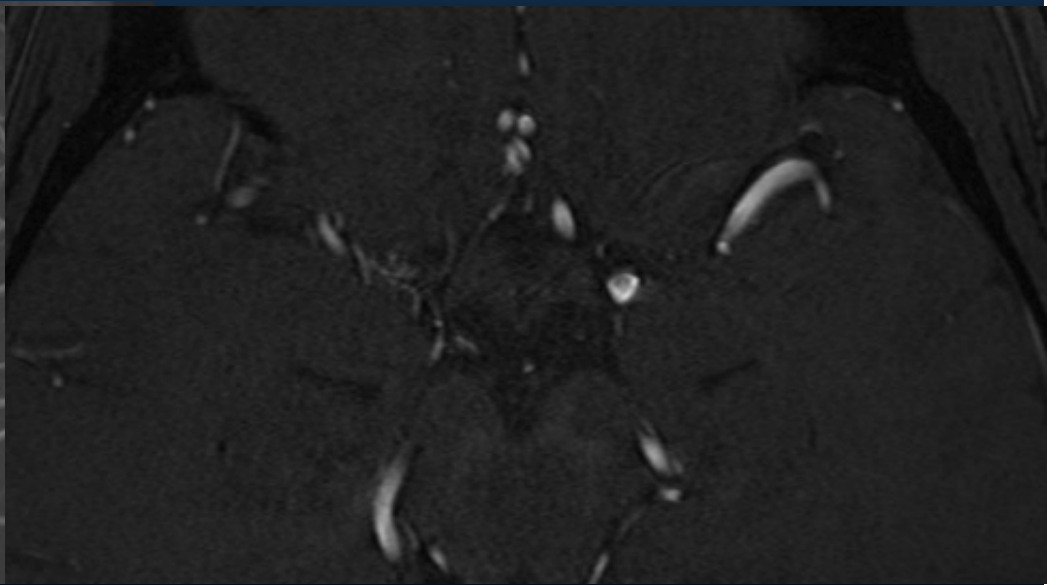
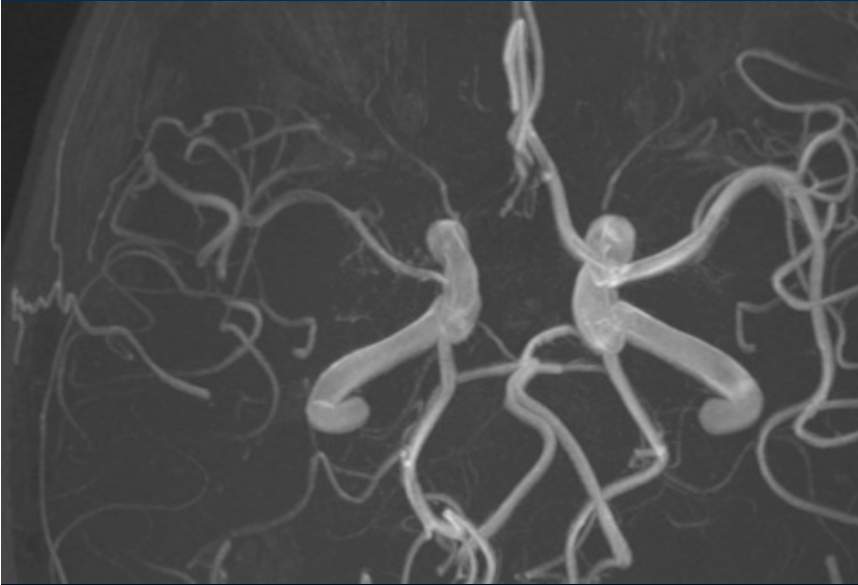
Artérite



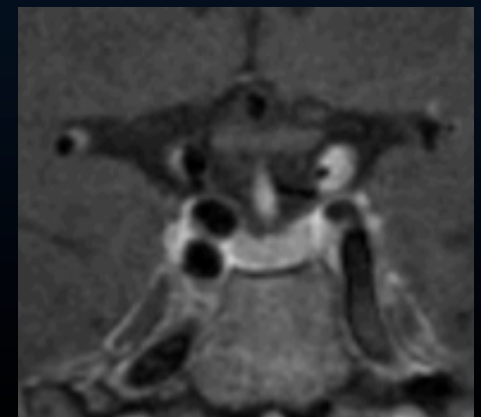
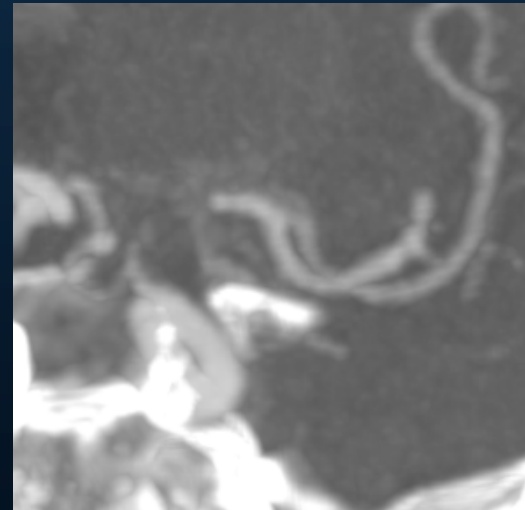
Moya-Moya

- Épaississement +/- rehausant carotidien bilatérale concentrique
- Réduction de calibre des artères carotidiennes
- IRM-HR permet distinction MM vs plaque athéromateuse

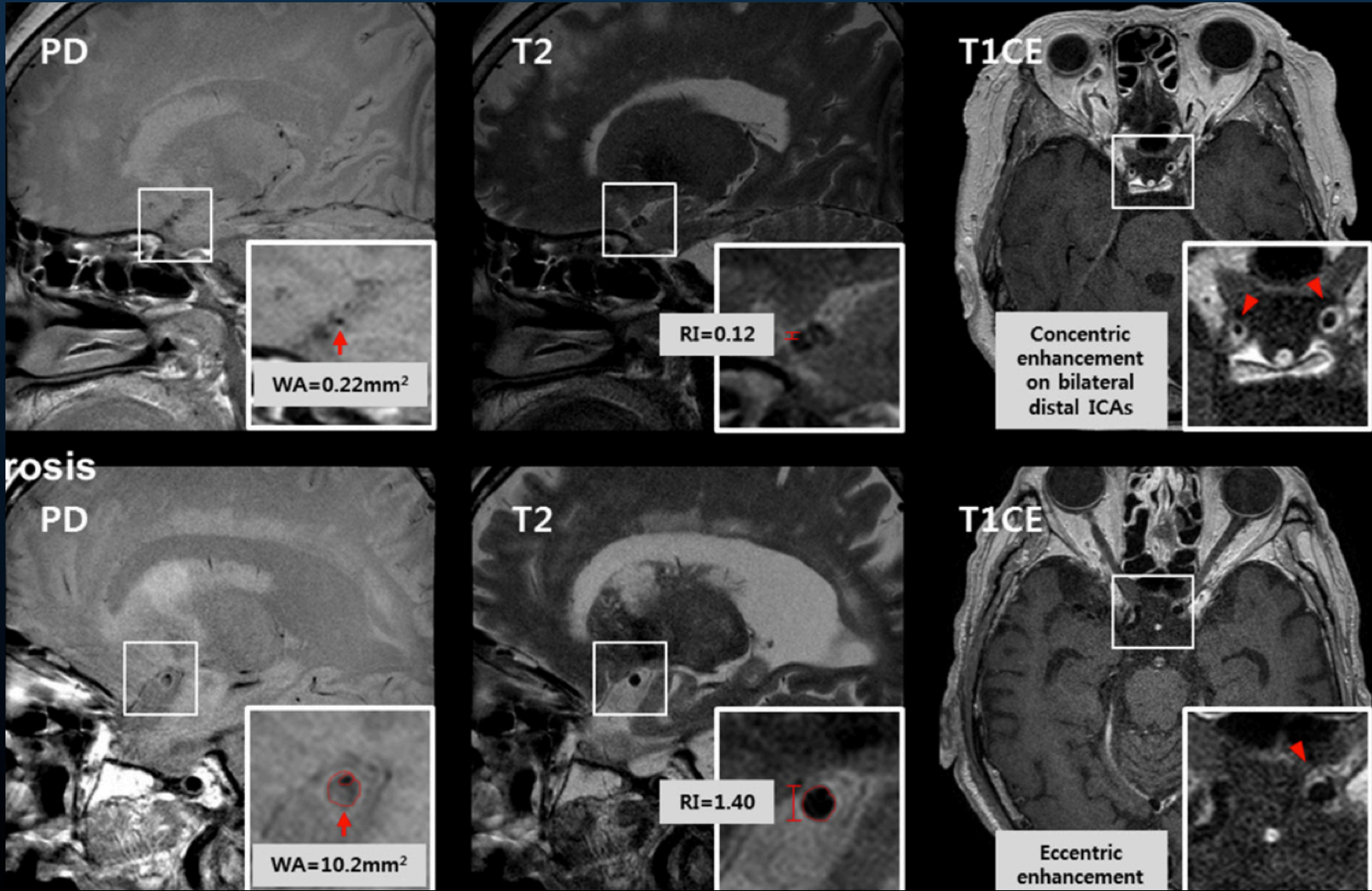
Moya-Moya



Moya-Moya vs ASO



Moya-Moya vs ASO

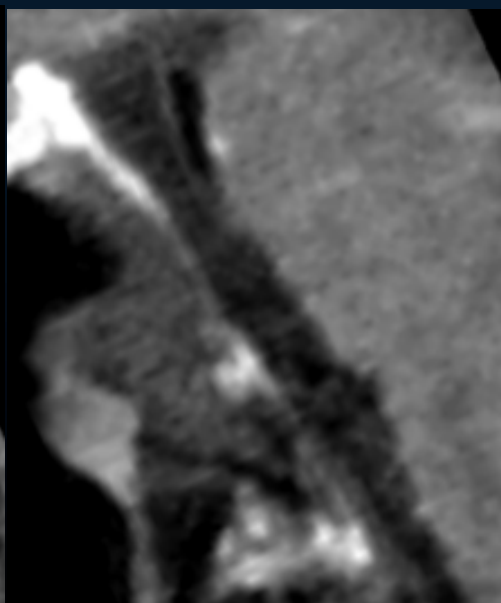
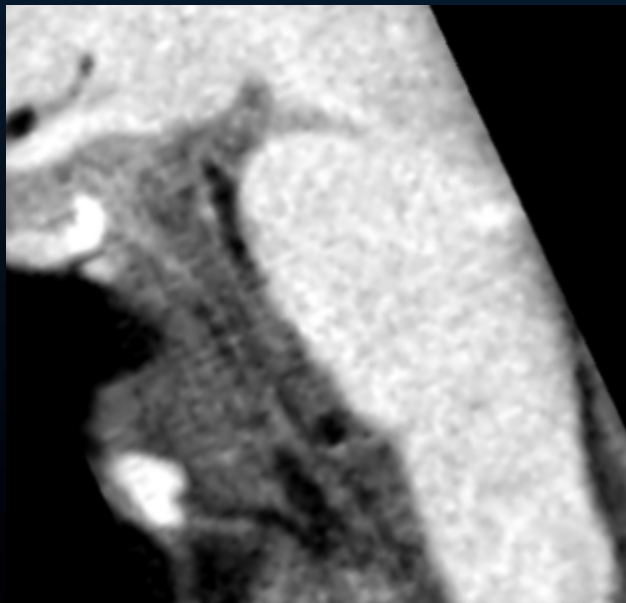


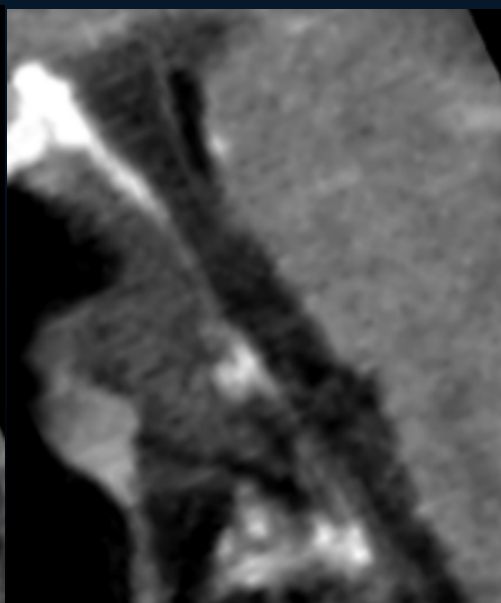
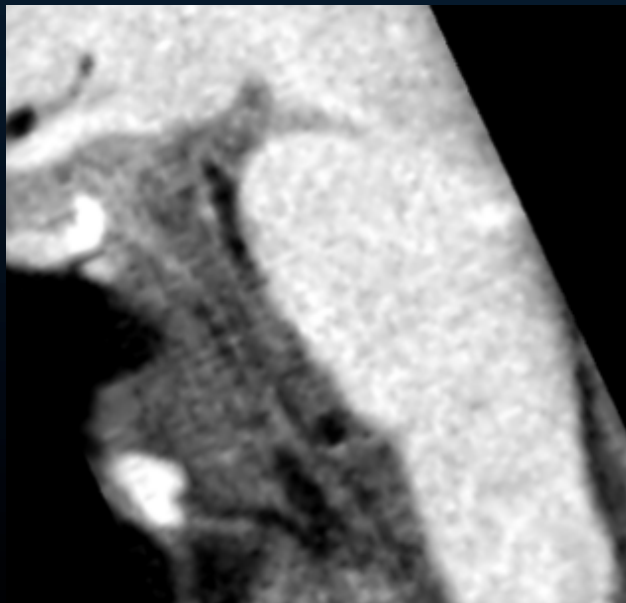
HSA

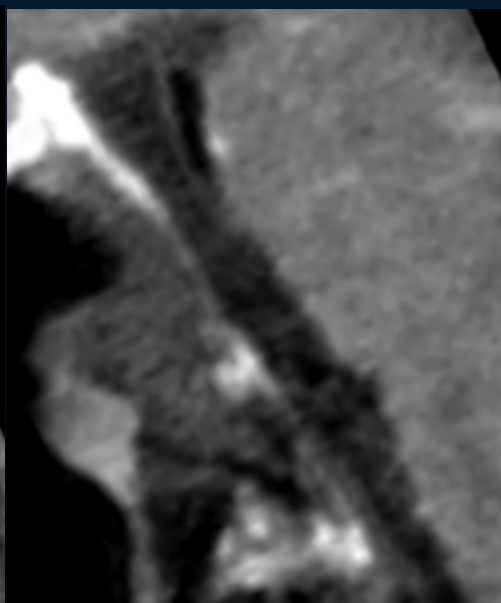
- Travaux très précoces
- Augmentation sensibilité pour inflammation menant à rupture ?
- Outil complémentaire à angiographie ?



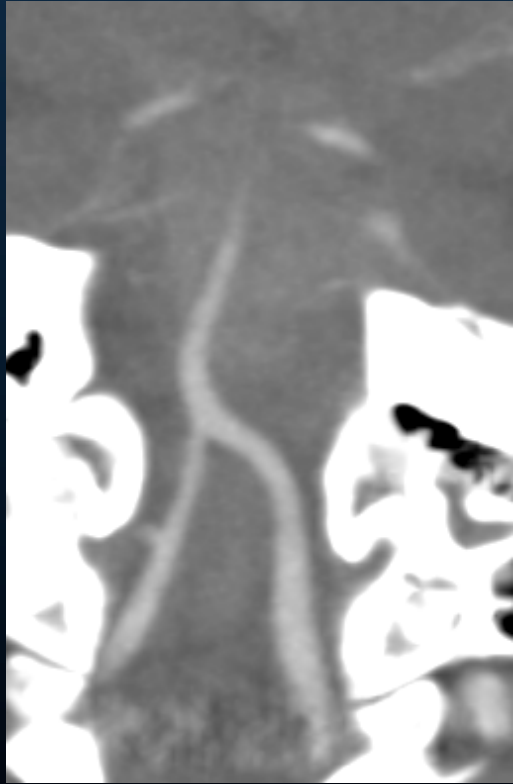


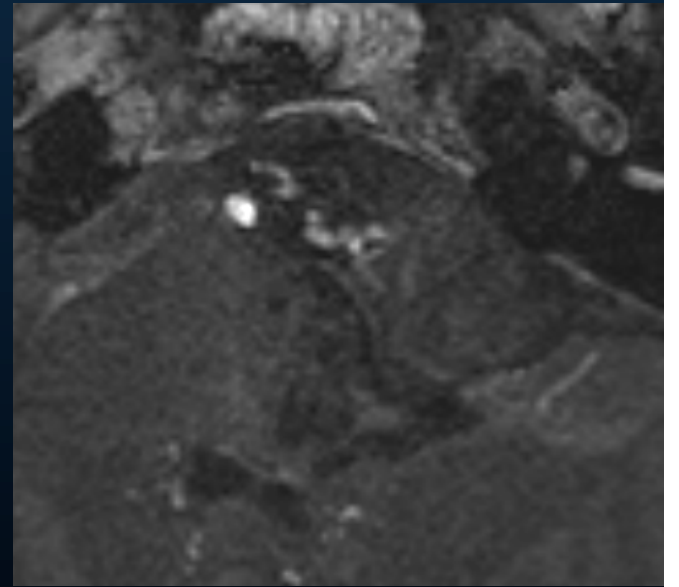
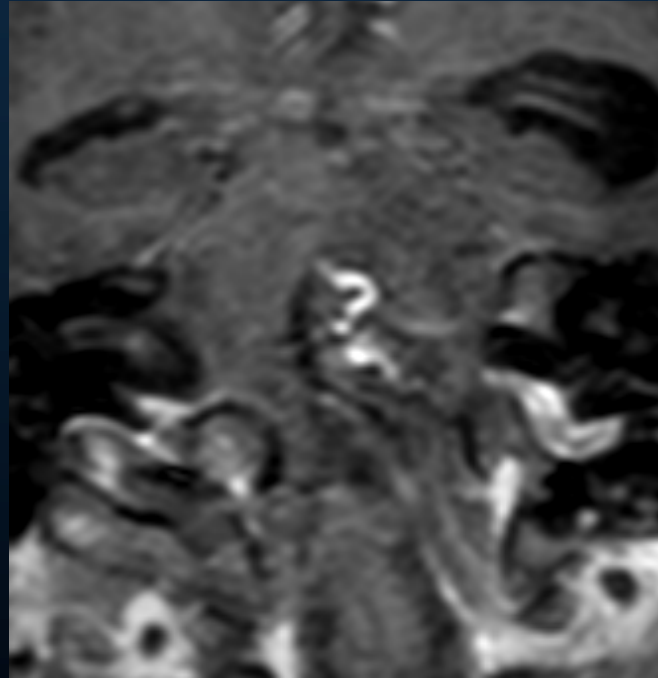
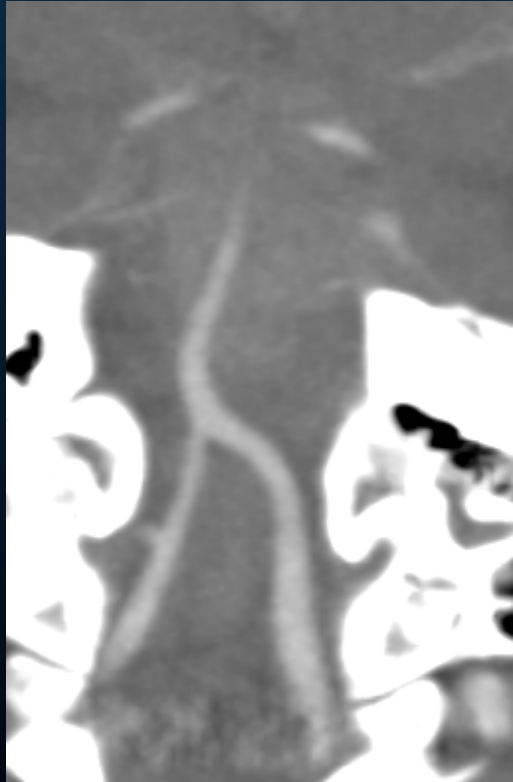


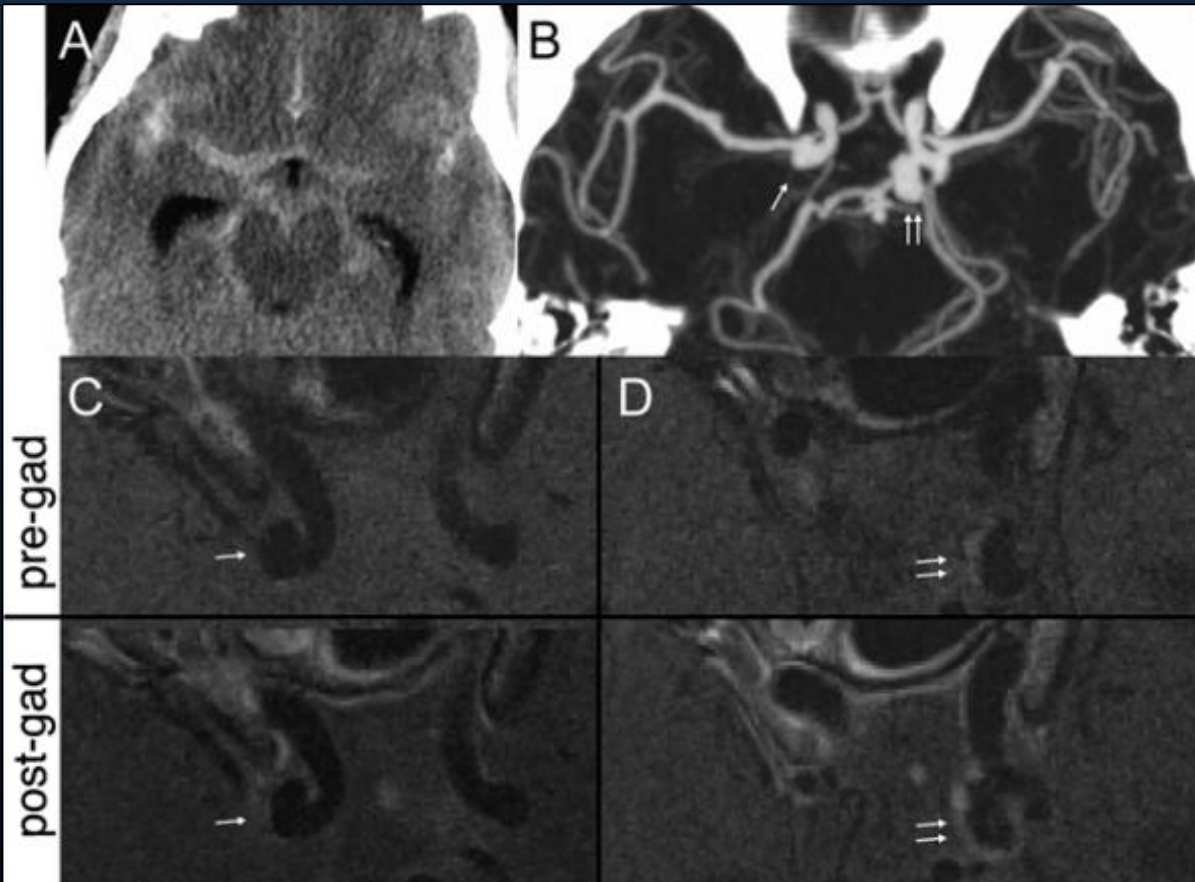












Vessel Wall Magnetic Resonance Imaging Identifies the Site of Rupture in Patients With Multiple Intracranial Aneurysms: Proof of Principle.

Matouk, Charles; Mandell, Daniel; Gunel, Murat; Balsara, Ketan; Malhotra, Ajay; Hebert, Ryan; Johnson, Michele; Mikulis, David; Minja, Frank

DOI: 10.1227/NEU.0b013e31827d1012

FIGURE 5 . A, axial noncontrast CT brain scan demonstrating diffuse SAH. B, the accompanying CT angiogram reveals mirror PComA aneurysms (single arrow, right PComA aneurysm; double arrows, left PComA aneurysm). T1-weighted black blood vessel wall sequences of the right (C) and left (D) PComA aneurysms before (top) and after (bottom) administration of gadolinium. Hyperintense blood product in, and thick enhancement of, the vessel wall are exclusively demonstrated in the ruptured left PComA aneurysm. PComA, posterior communicating artery; SAH, subarachnoid hemorrhage; gad, gadolinium.

Conclusion

- Imagerie encore à son début
- Améliorations techniques à venir
- Applications neurovasculaires multiples

- Collaboration: *laurentletg@gmail.com*

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- Florian Joly et Claude Kauffman, PhD
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