

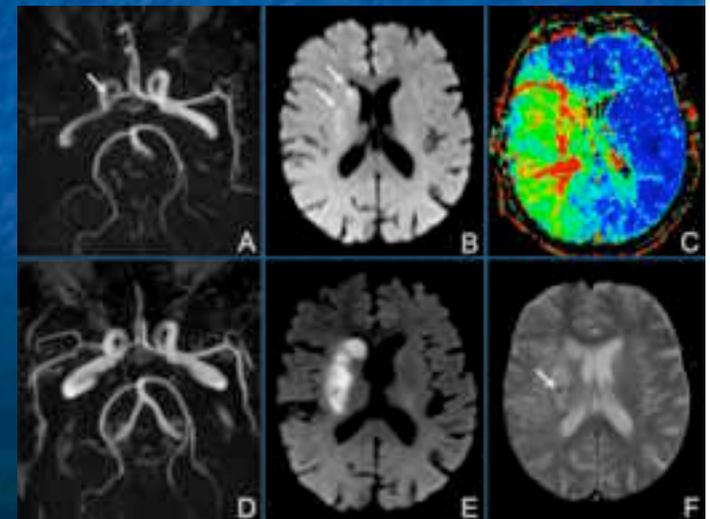
Ischémie Cérébrale

Comment j'utilise la diffusion / perfusion?

Marc Hermier

Service de Radiologie & IRM

Hôpital Neurologique - Lyon



Suspicion clinique d'AVC

- Vasculaire ou autre ?
- Ischémique ou hémorragique ?
- Occlusion artérielle ? Où ?
- Etendue de l'infarctus ?
- Zone à risque (pénombre ischémique) ?

IRM Multimodale

Ischémie vs.
Hémorragie

DWI/T2*

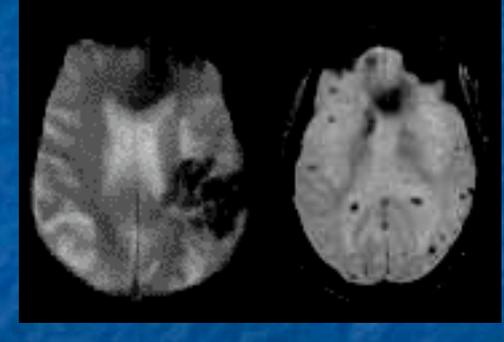
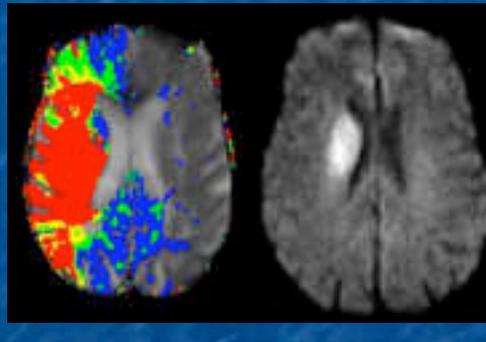
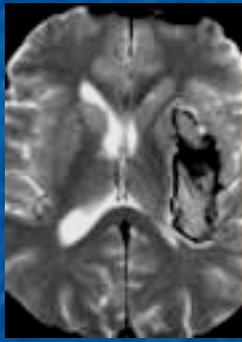
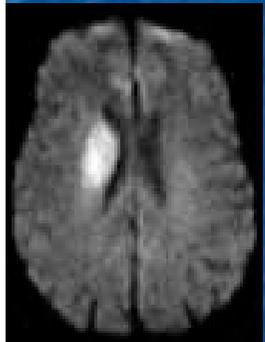
Occlusion artérielle
ARM

Zone à risque

PWI/DWI

Risque hémorragique

T2*



Séquences de diffusion et de perfusion

- Diffusion: visibilité des lésions ischémiques précoces dès les premières minutes
- Perfusion: étendue et sévérité de l'hypoperfusion
- Perfusion – diffusion = «pénombre ischémique»

Exploration IRM d'un AVC aigu

- T2*
- Diffusion
- ARM 3DTOF crâne (+/- cou si dissection?)
- Perfusion si rt-PA envisagé

- TSA gado si pas de thrombolyse

- Pas de FLAIR sauf indications particulières
- Pas de T1, pas de T2.

Exploration IRM d'un AVC aigu

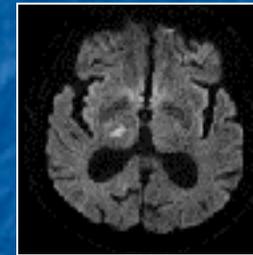
- Si diffusion normale et forte suspicion clinique d'AVC ischémique: diffusion haute résolution+++
- Si IRM non disponible: scanner avec perfusion et angioscanner

Diffusion

- Diagnostic positif d'AVC ischémique
- Mécanisme
- Datation
- Pronostic

Mécanisme de l'AVC

- Lacunaire ou systématisé
- Cardio-embolique
- Embolies à partir d'une lésion carotidienne
- Rarement: hémodynamique sur sténose carotidienne hyperserrée

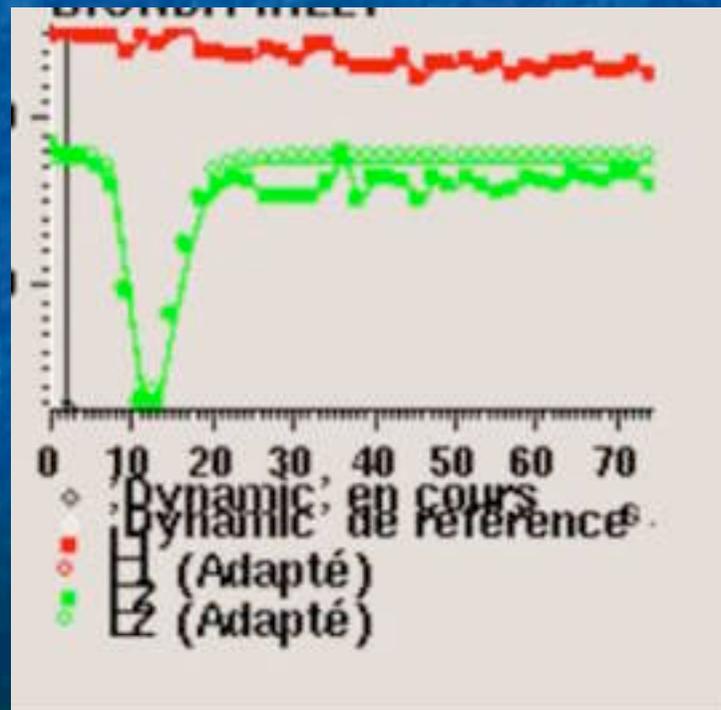
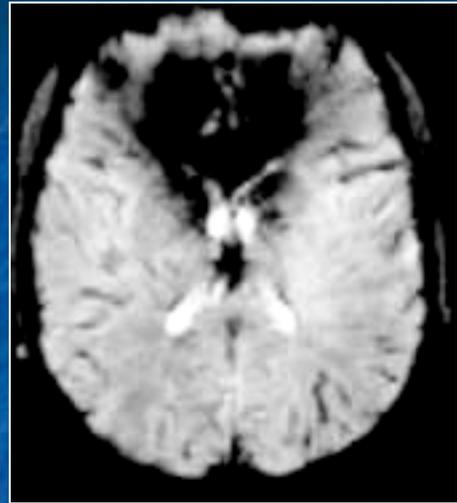
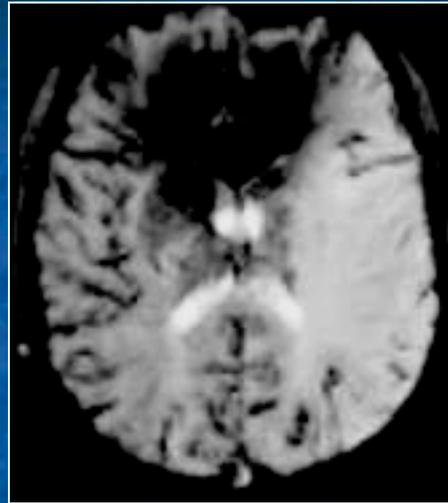
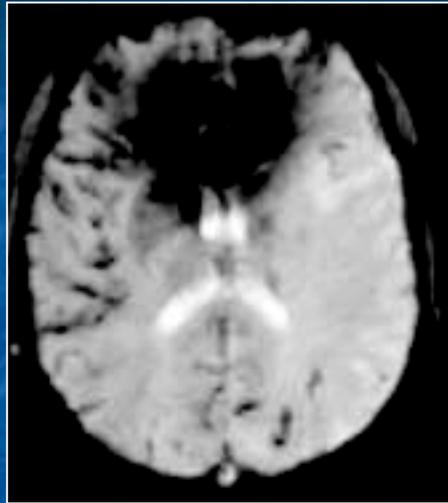
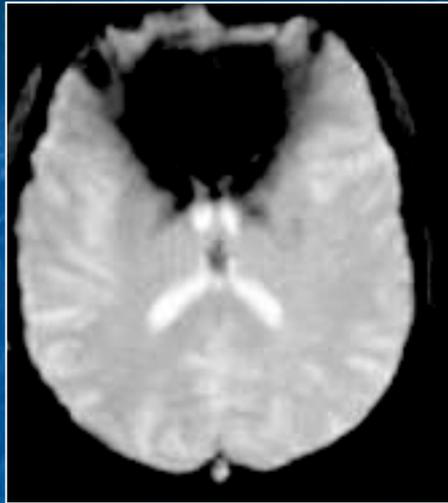


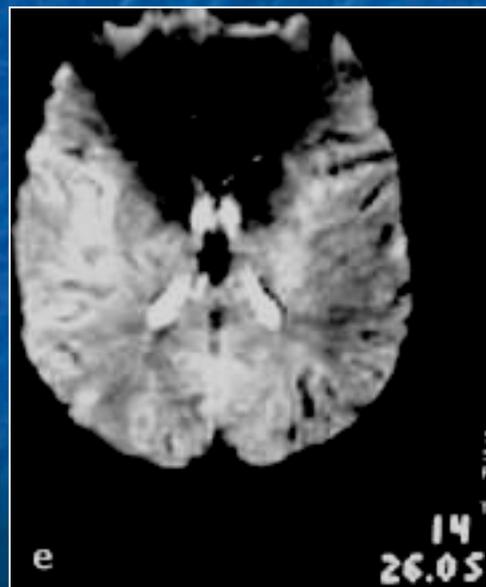
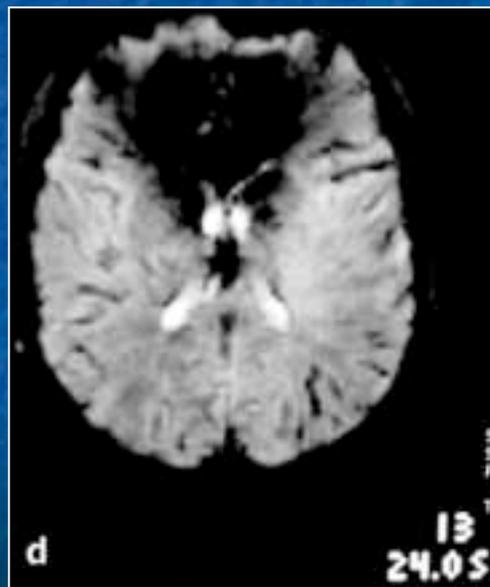
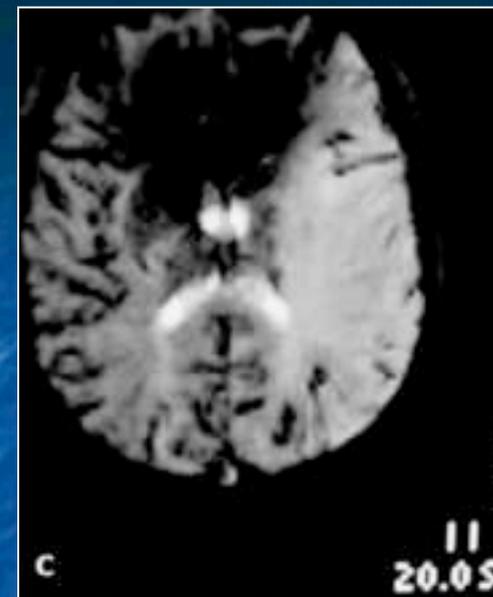
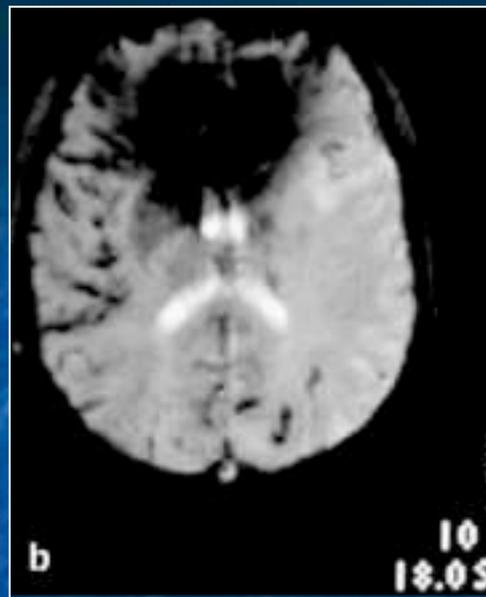
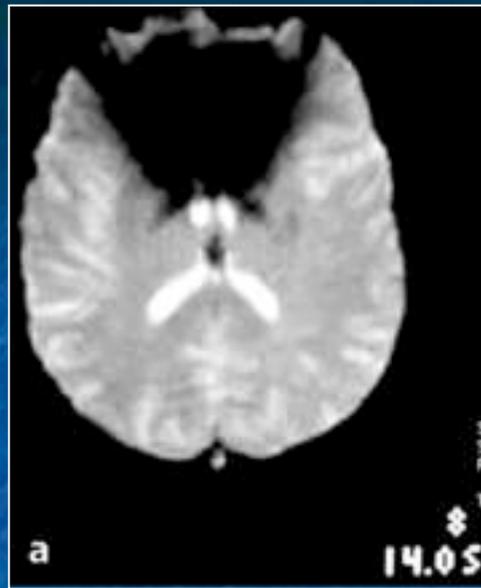
Perfusion

- Affirmation d'un trouble de perfusion persistant
- Pronostic tissulaire: Tissu à sauver?

IRM de perfusion avec bolus de gadolinium

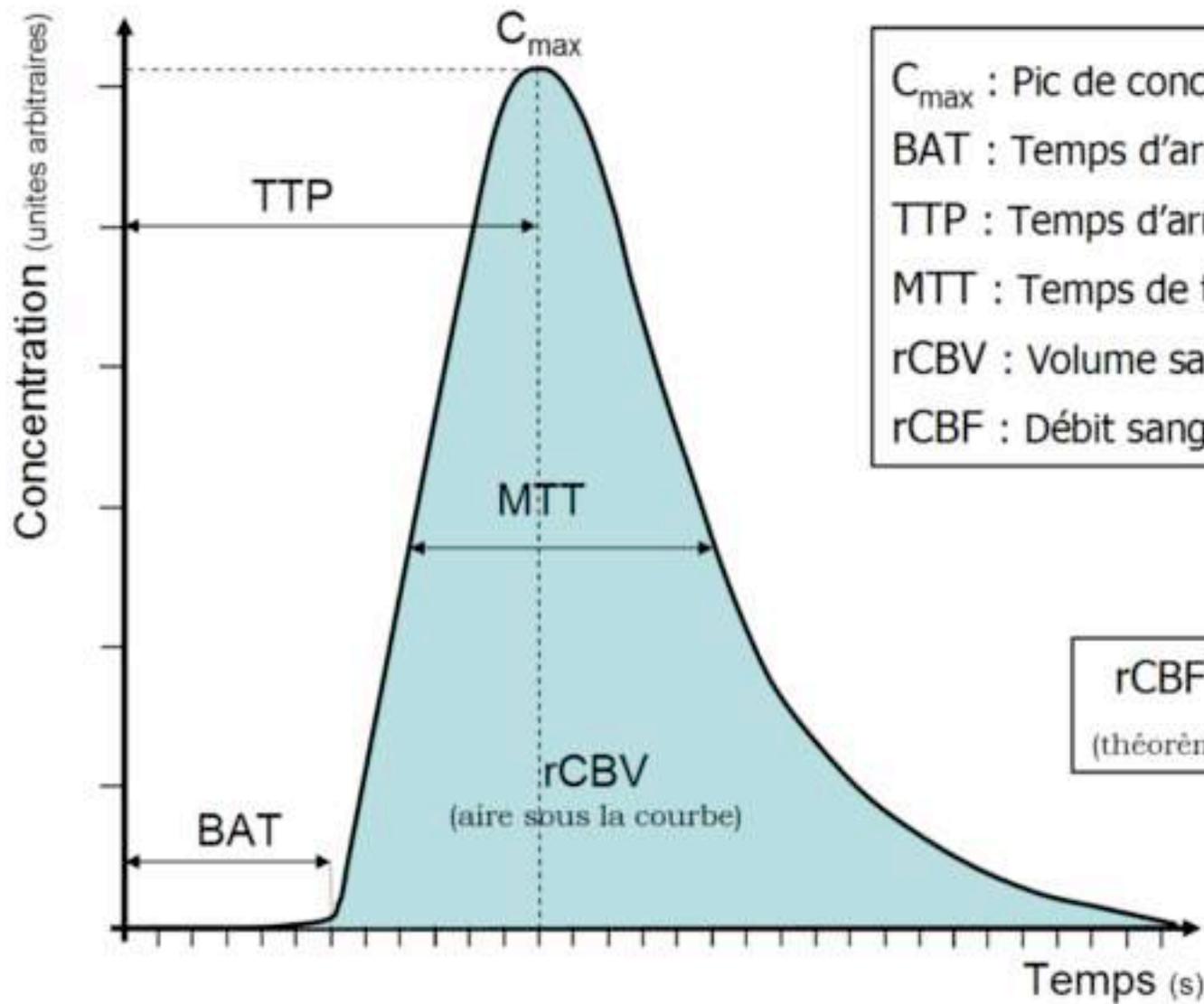
- suivi dans le temps de la circulation intracérébrale d'un bolus de gadolinium injecté par voie veineuse périphérique
- basée sur les modifications de susceptibilité magnétique induites par le gadolinium intravasculaire
- gadolinium concentré: chute de signal en T2*





Paramètres

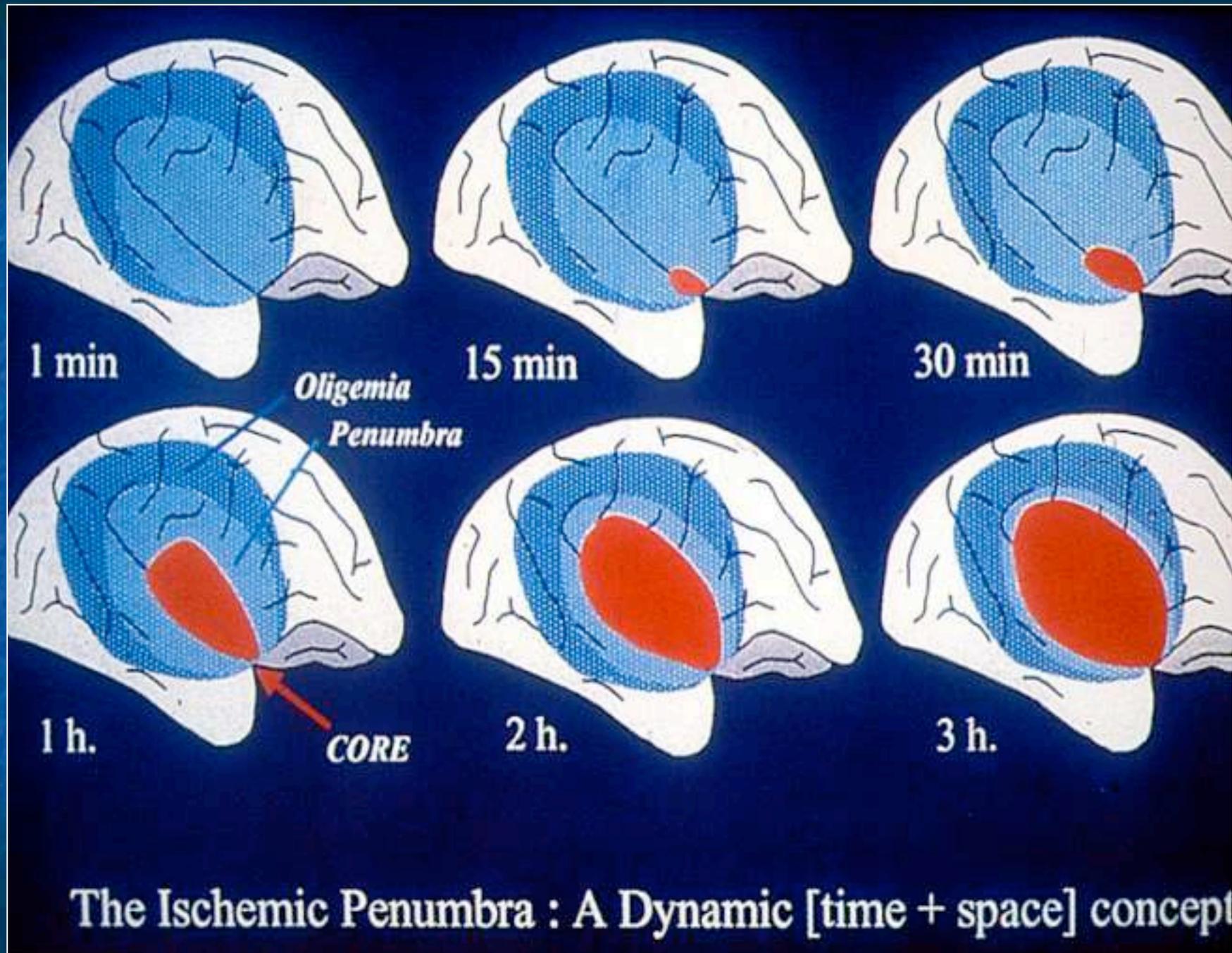
- rTTP ou MTT: étendue de l'hypoperfusion
- rCBF: peu informatif (non quantitatif)
- rCBV: viabilité tissulaire+++



C_{max} : Pic de concentration
 BAT : Temps d'arrivée du bolus
 TTP : Temps d'arrivée au pic
 MTT : Temps de transit moyen
 $rCBV$: Volume sanguin cérébral régional
 $rCBF$: Débit sanguin cérébral régional

$$rCBF = rCBV / MTT$$

(théorème du volume central)

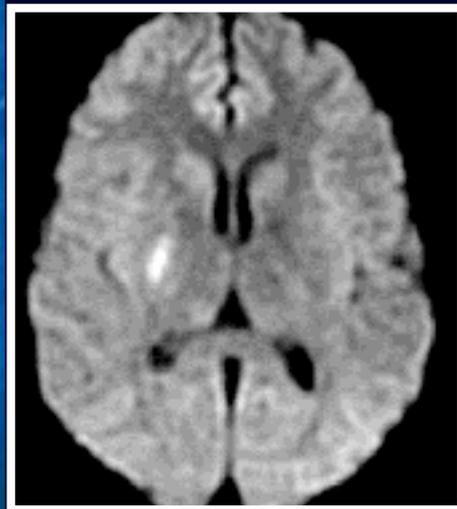
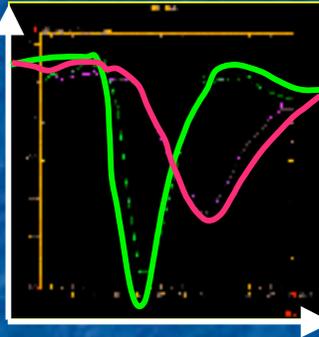
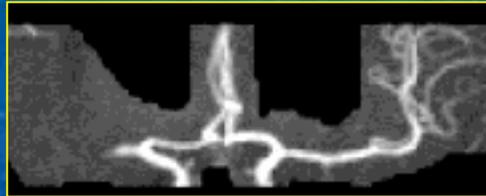


Taille finale des lésions

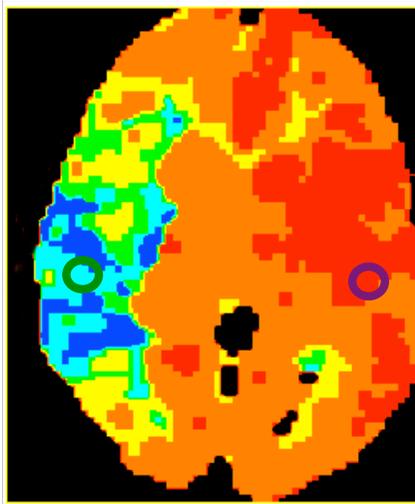
- Etendue de l'hypoperfusion
- Durée de l'hypoperfusion
- Sévérité de l'hypoperfusion
- Collatéralité

IRM et thrombolyse

H3

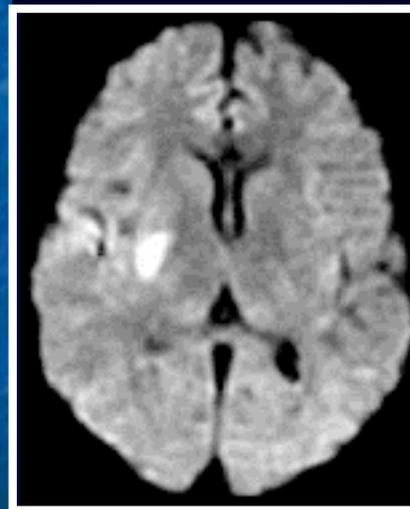
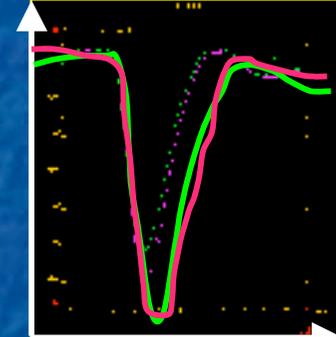


DWI

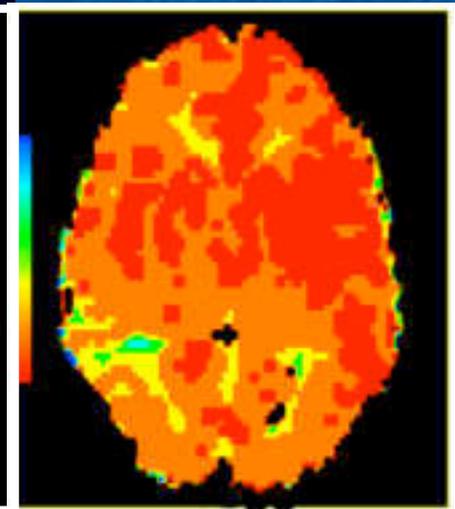


PWI

J1



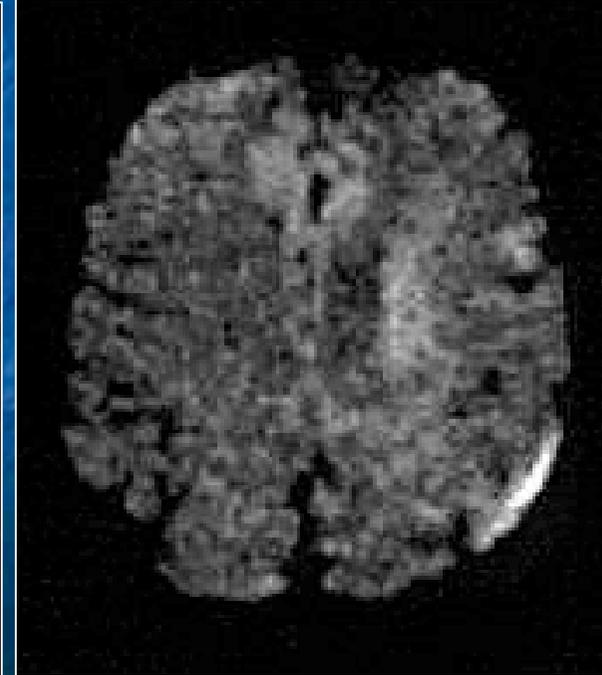
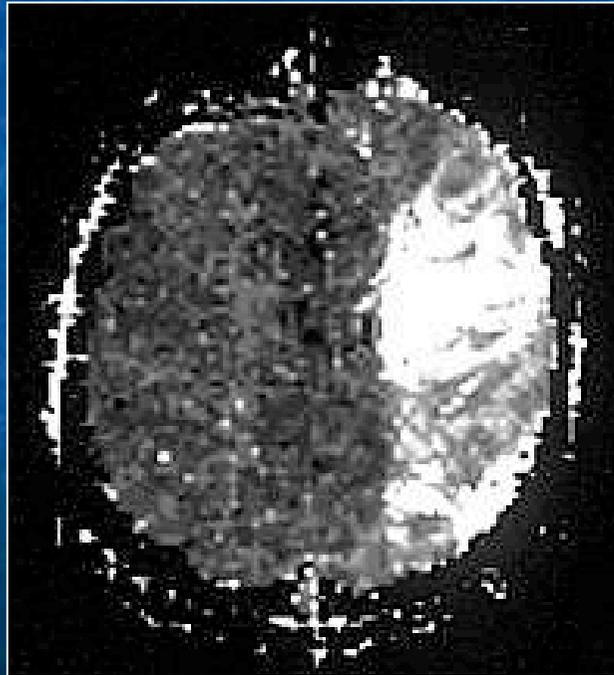
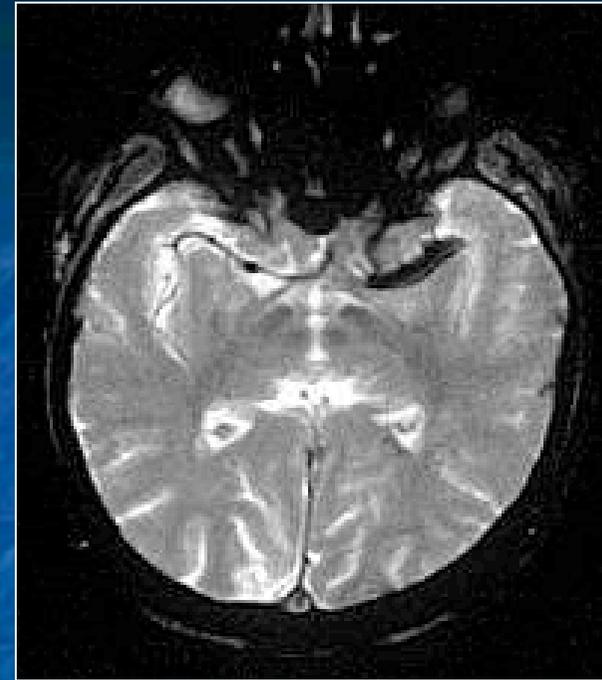
DWI



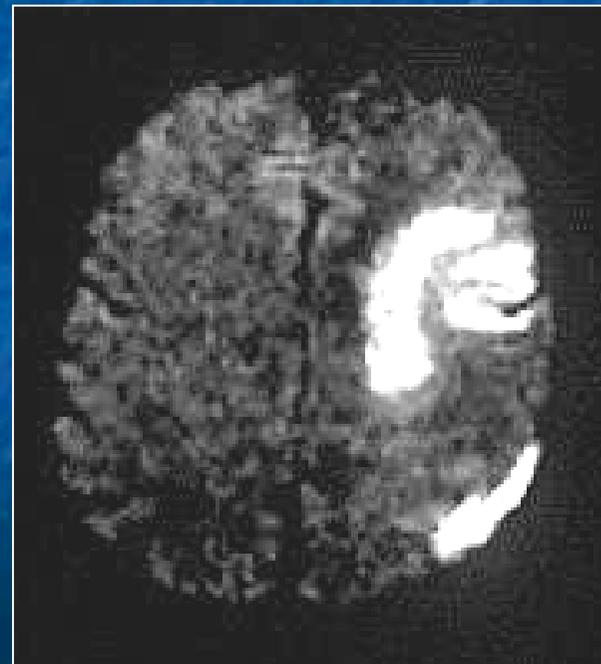
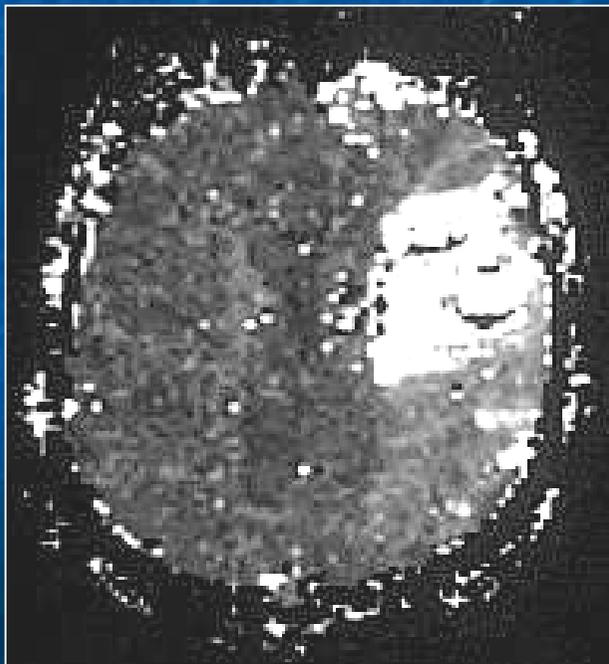
PWI

J0

H2



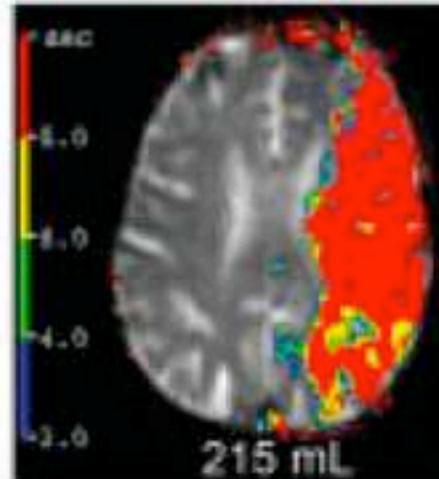
J1



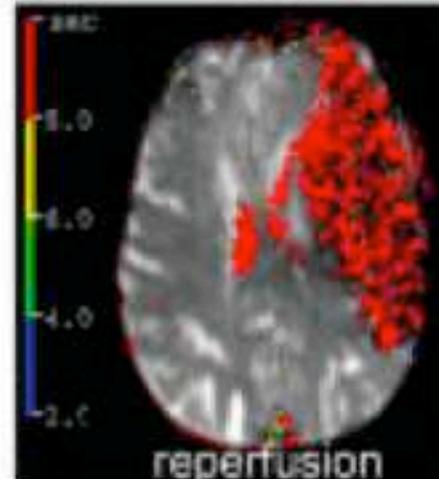
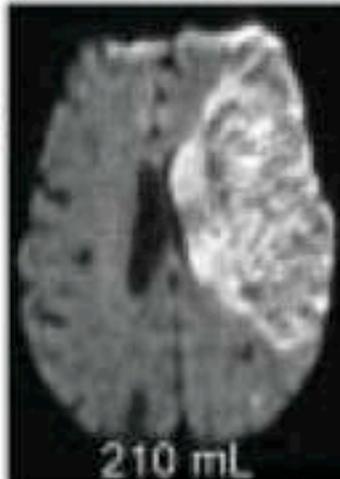
Profil infarctus malin : aucun bénéfice de la recanalisation après t-PA
DEFUSE, Albers Ann Neurol, 2006

Malignant Profile

4 hr 36 min after
stroke onset:
NIHSS 26



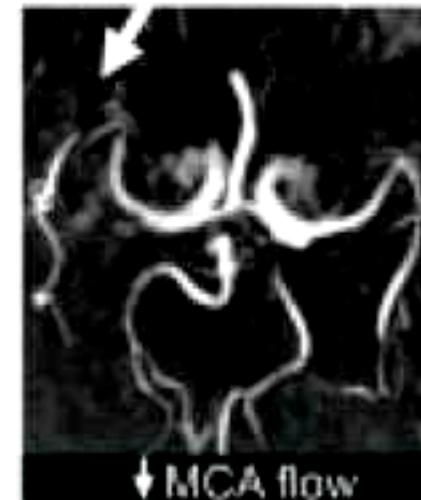
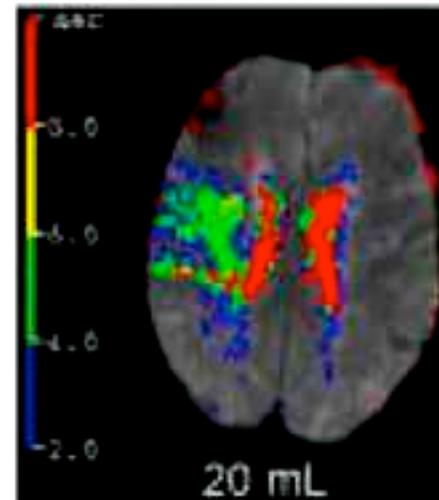
4 hrs after tPA
bolus: NIHSS 27



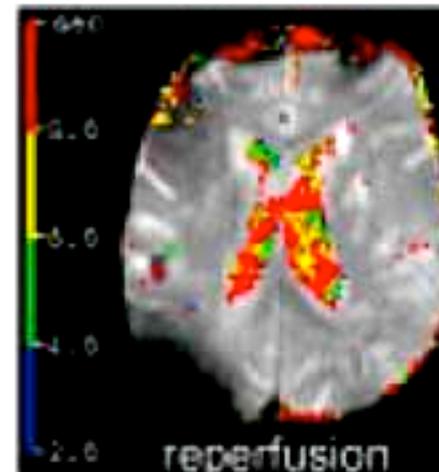
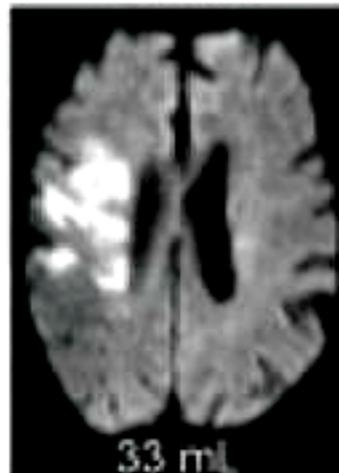
Absence de Mismatch mais volume lésionnel modéré: Bénéfice possible de la recanalisation par rt-PA

No Mismatch Profile

5 hr 15 min after stroke onset:
NIHSS 14



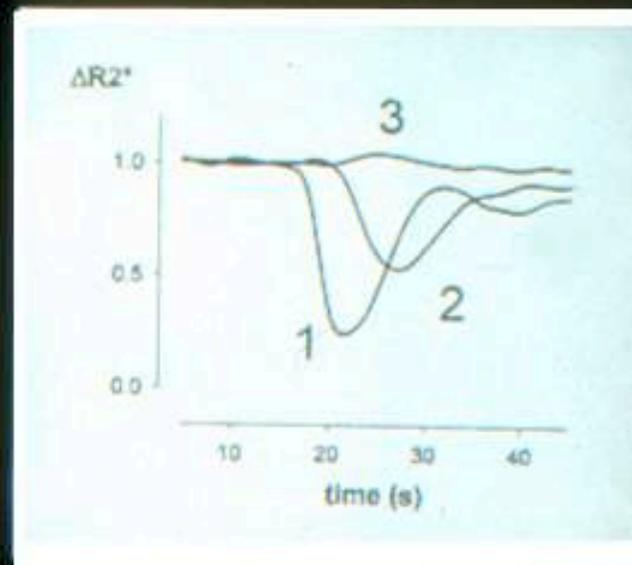
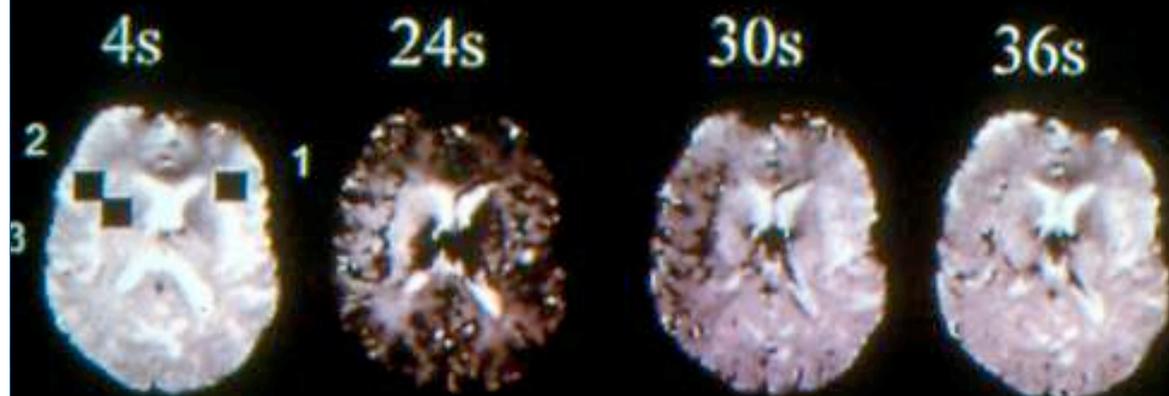
6.5 hrs after tPA
bolus: NIHSS 11



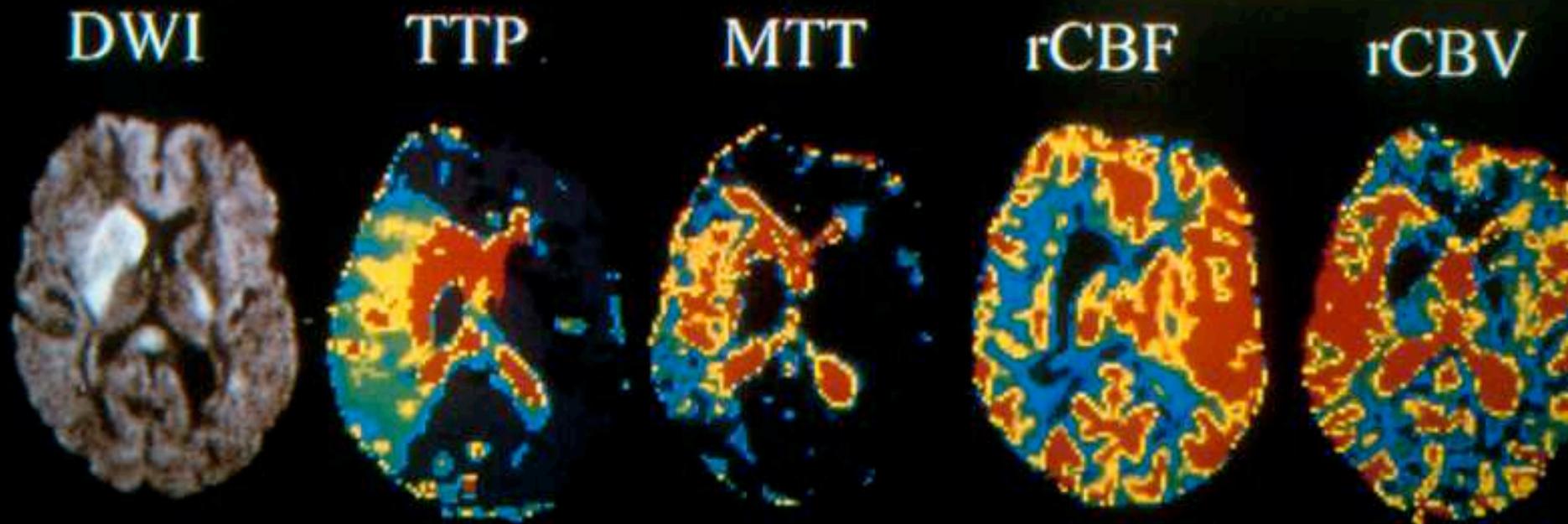
Diffusion/perfusion et pronostic tissulaire

- Lésion en diffusion: infarctus
- Zone hypoperfusée
 - Oligémie si TTP <4s
 - Tissu à risque de nécrose si TTP >4s
- rCBV effondré=nécrose

A)

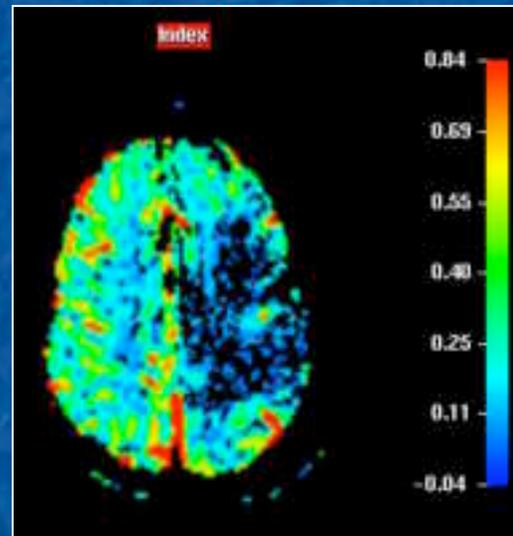
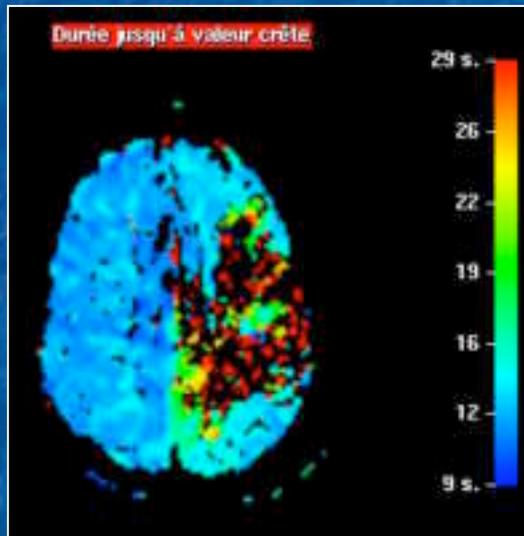
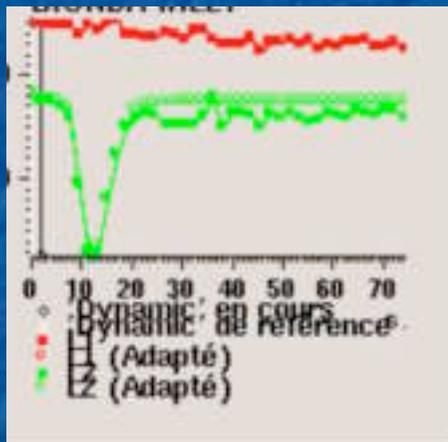
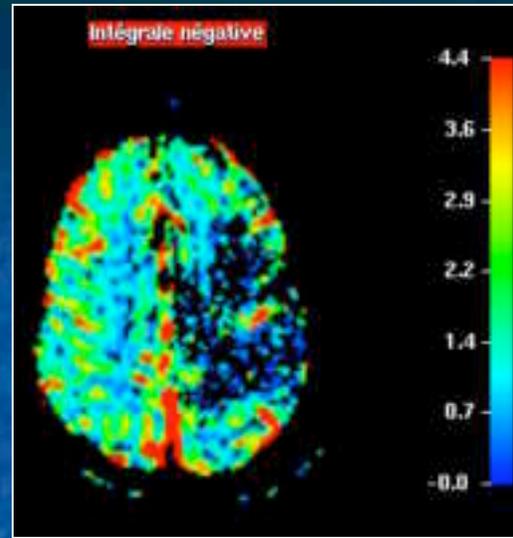
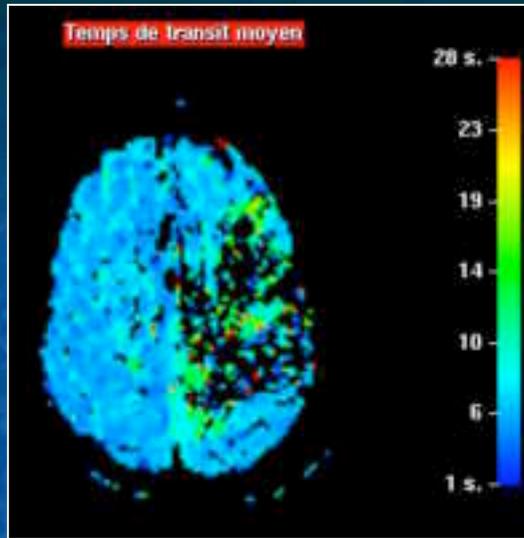
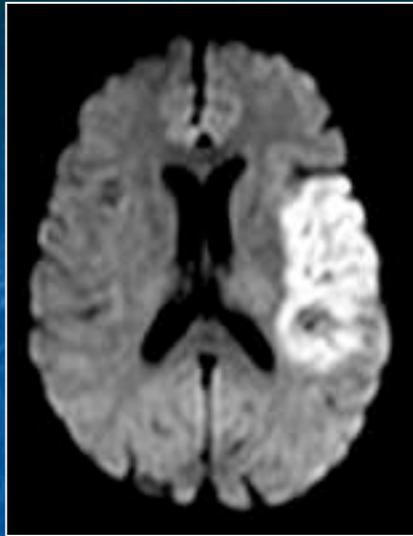


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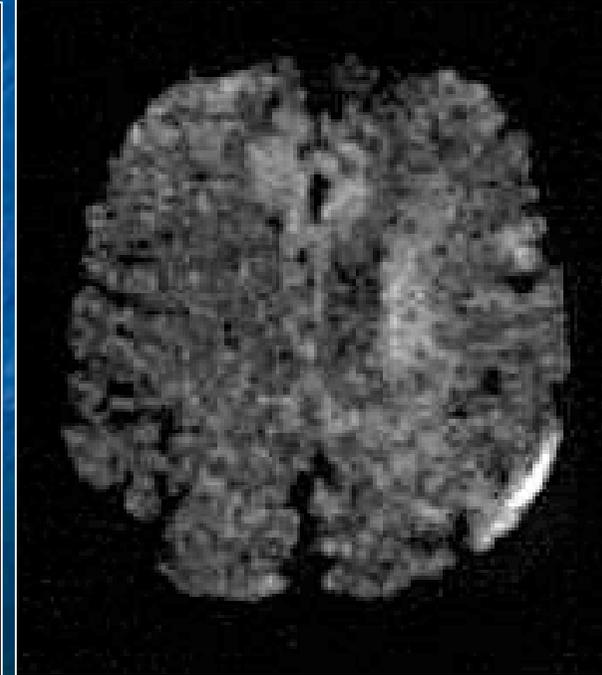
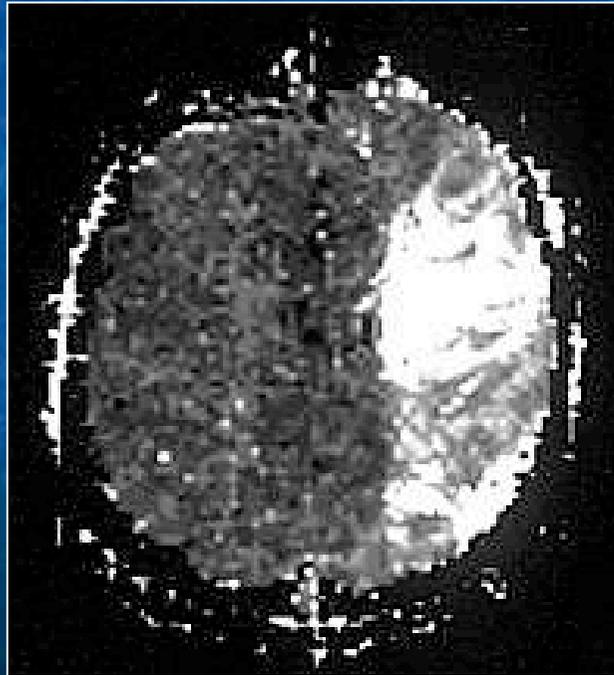
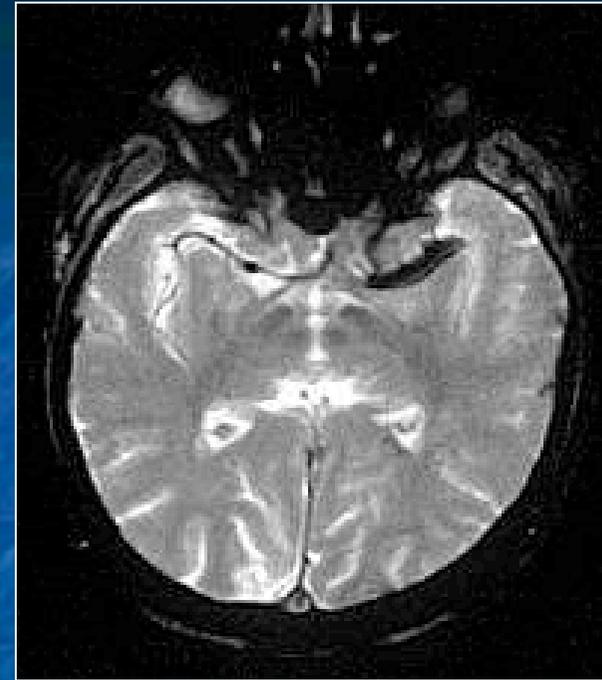
Paramètres étudiés

- Temps d'arrivée au pic: TTP
- Temps de transit moyen: MTT
- Débit sanguin cérébral (index): CBF
- Volume sanguin cérébral (intégrale): CBV

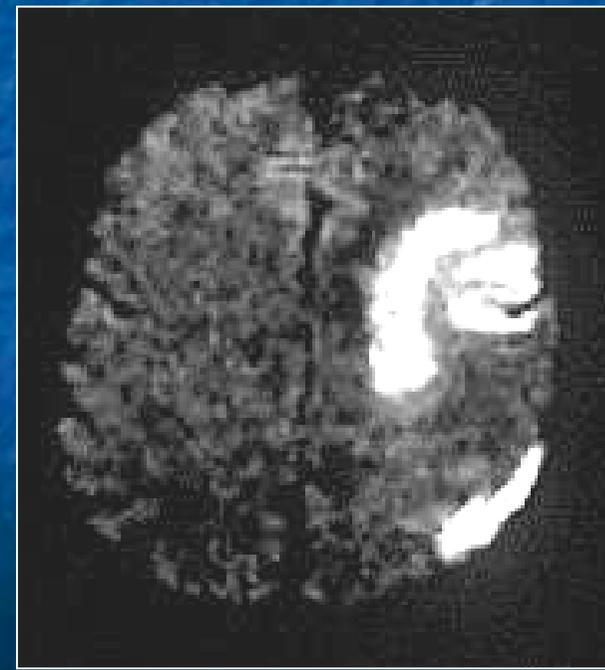
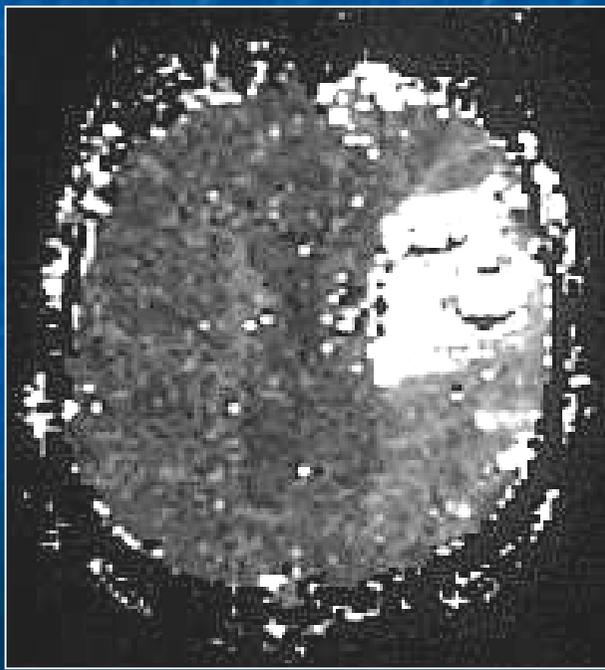
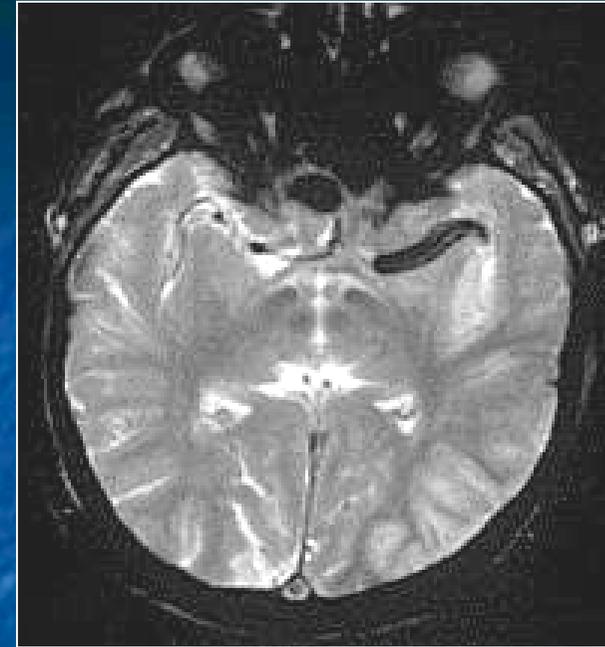


J0

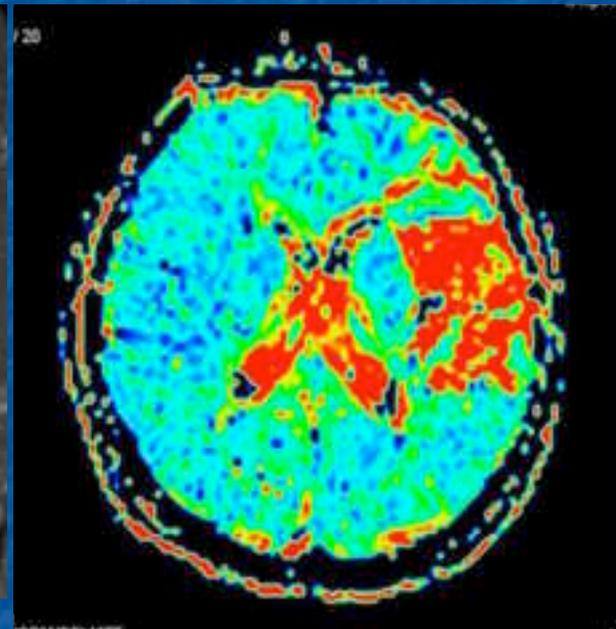
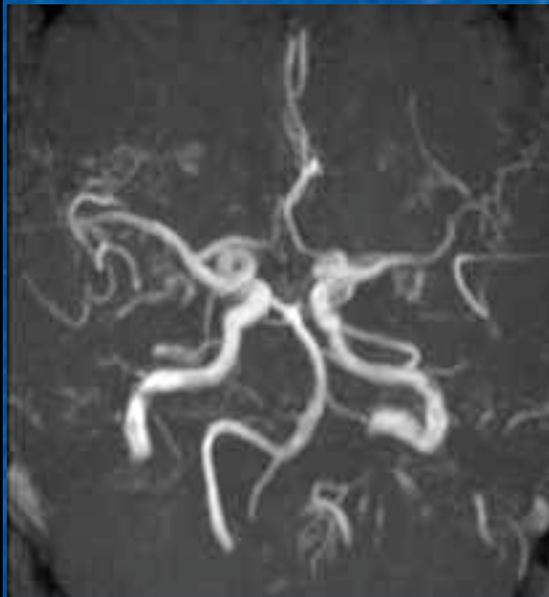
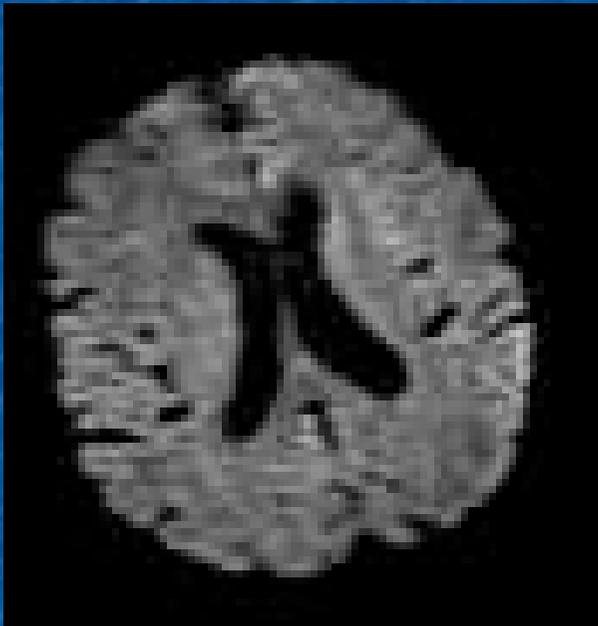
H2

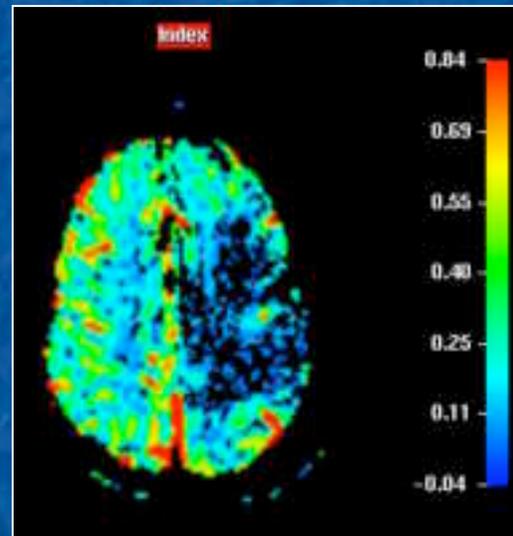
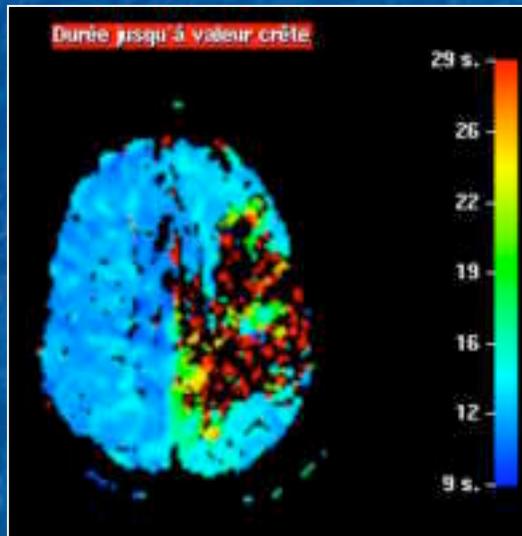
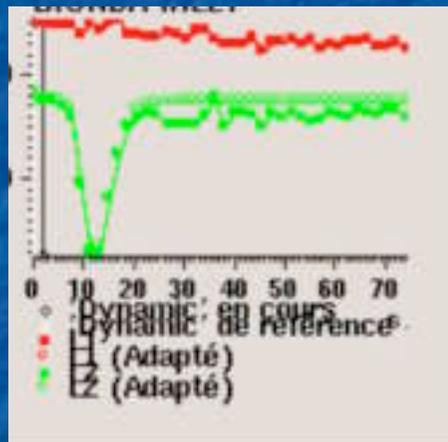
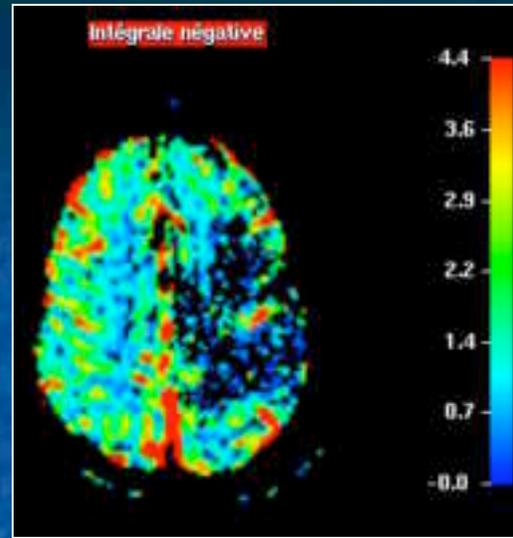
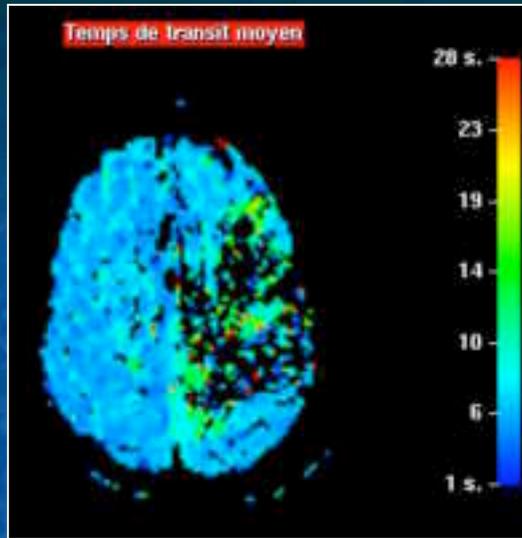
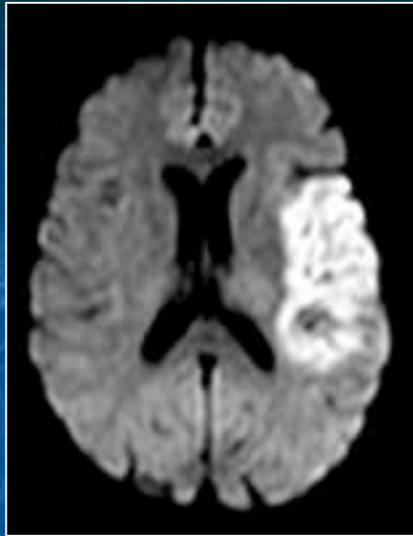


J1

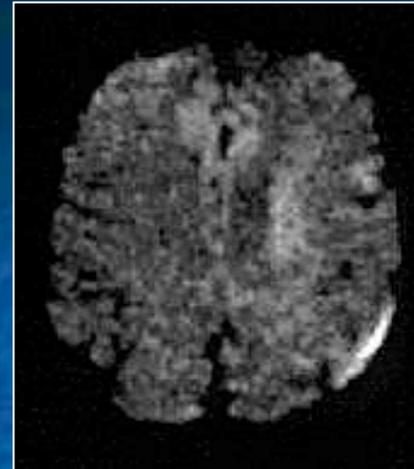
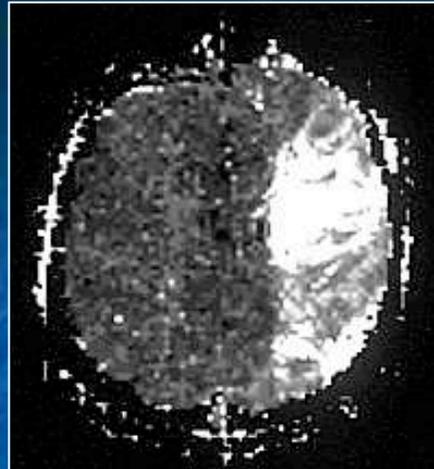


Aide au diagnostic d'occlusion distale

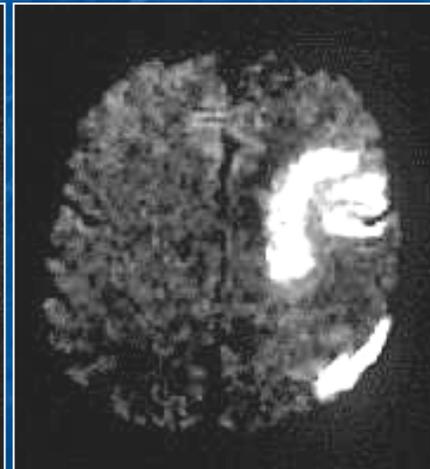
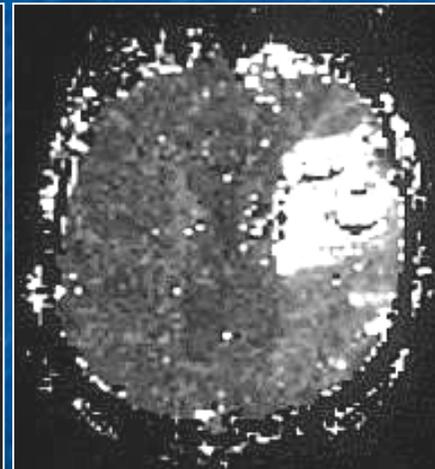


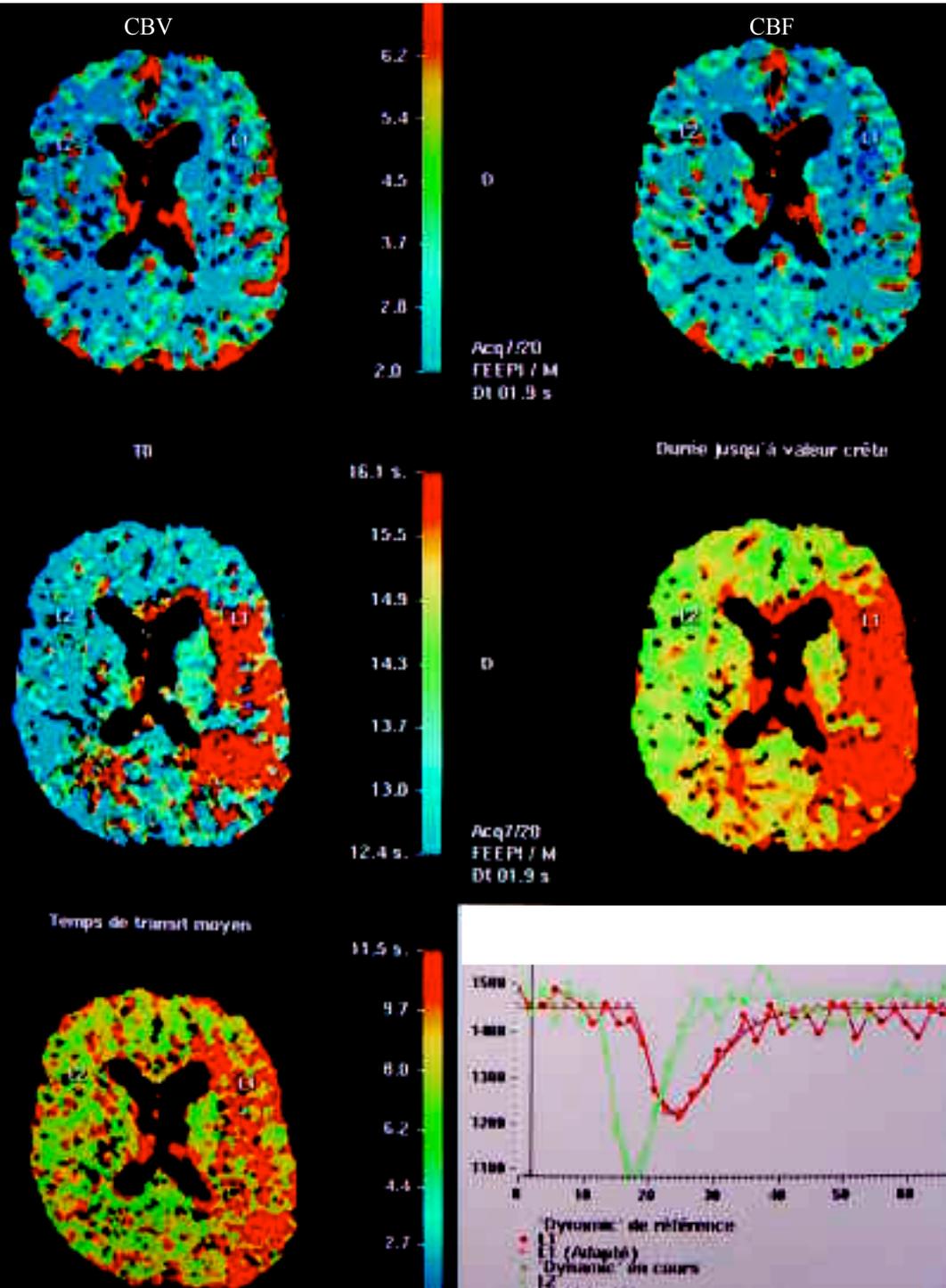
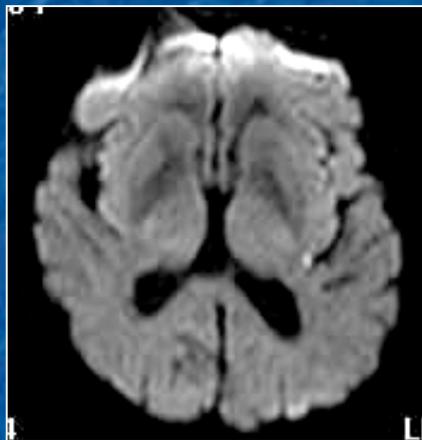


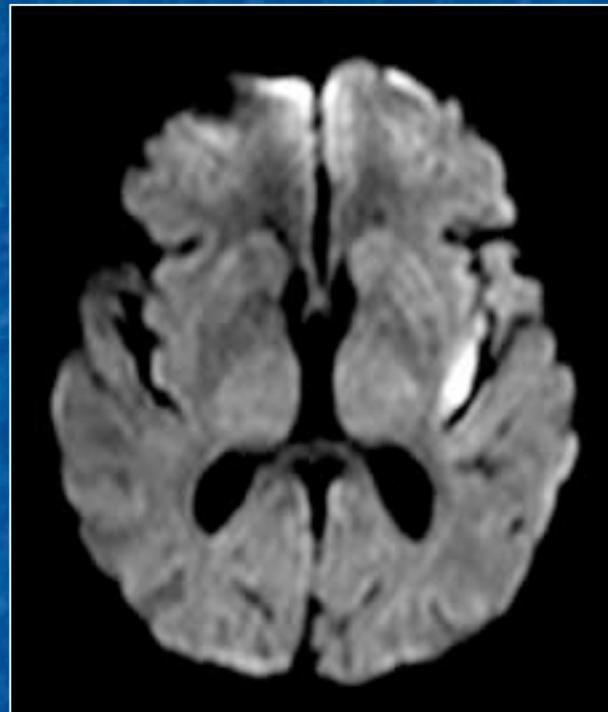
Day-0
(H2)



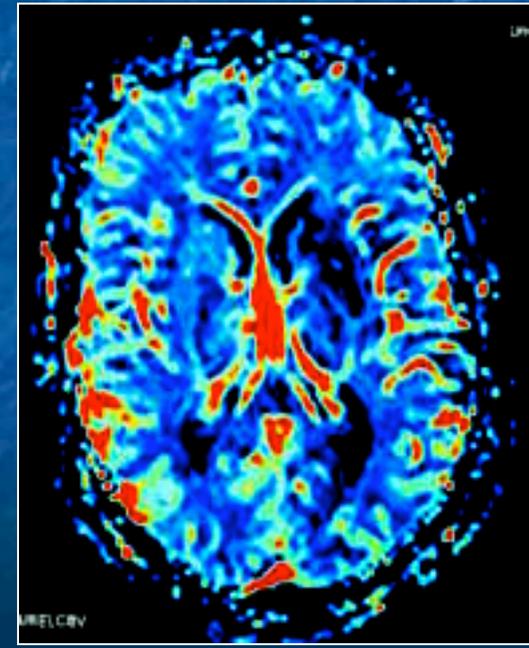
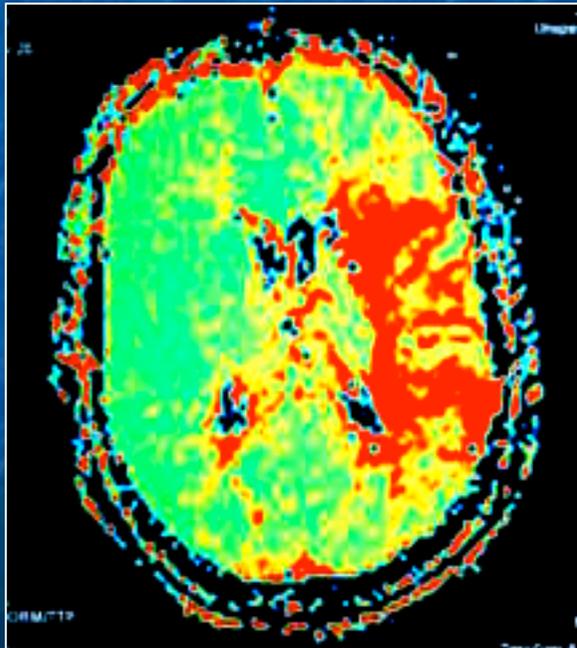
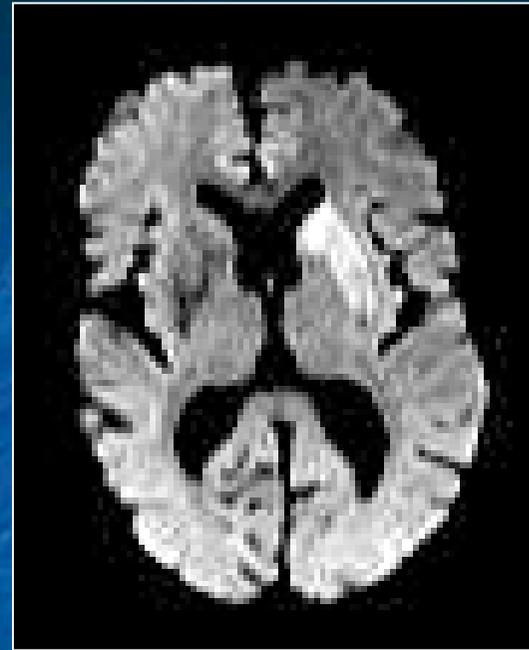
Day-1





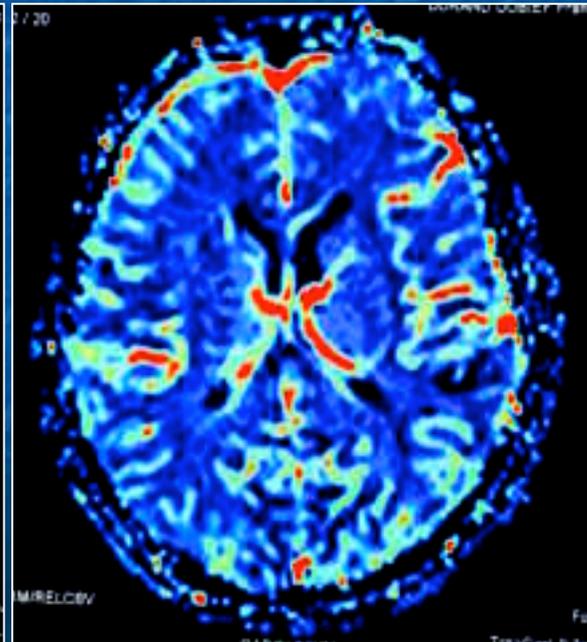
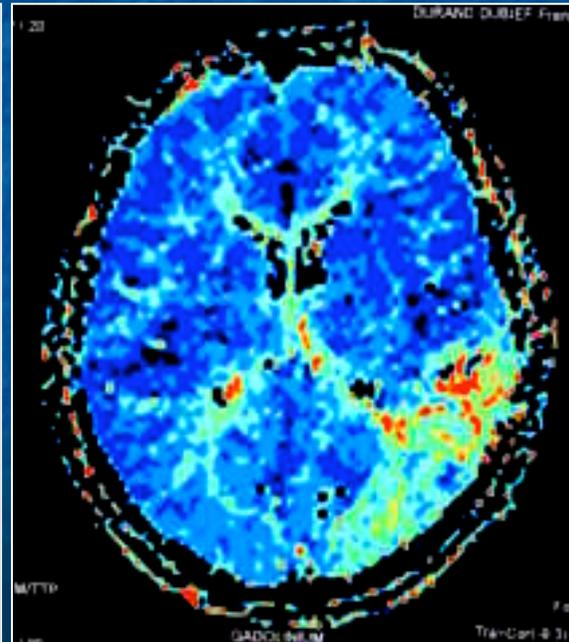
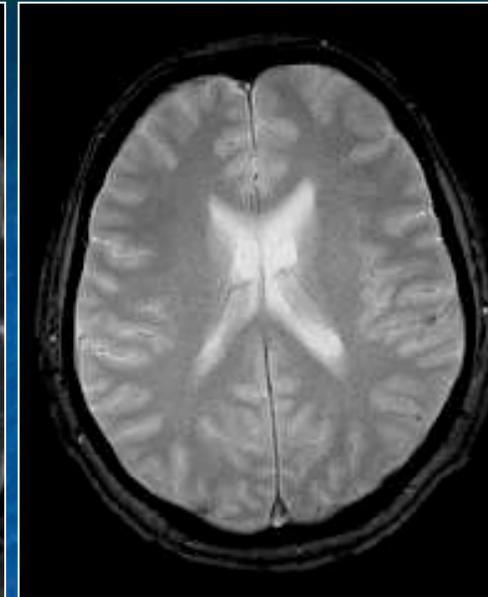
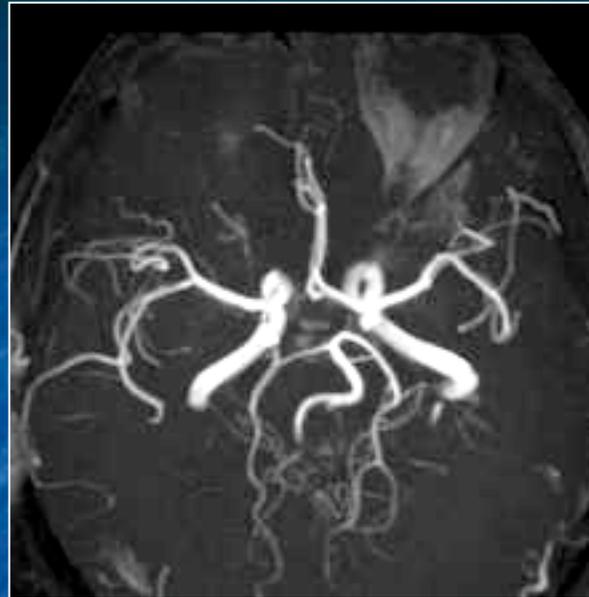


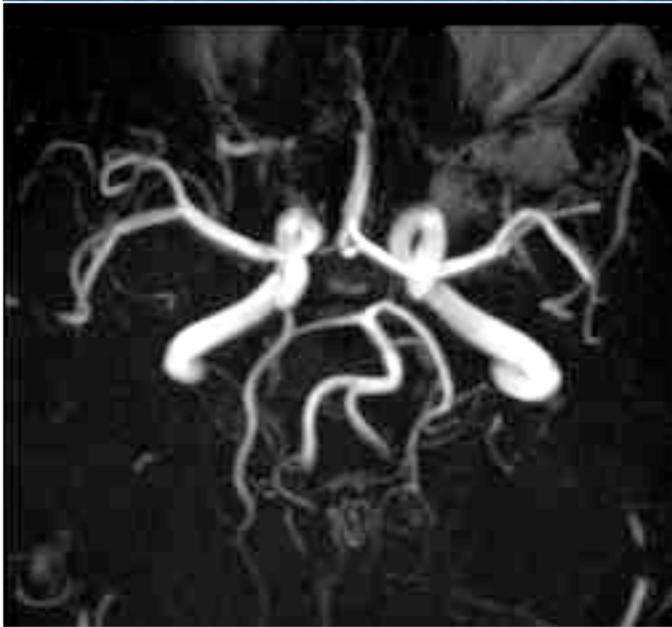
Pt47



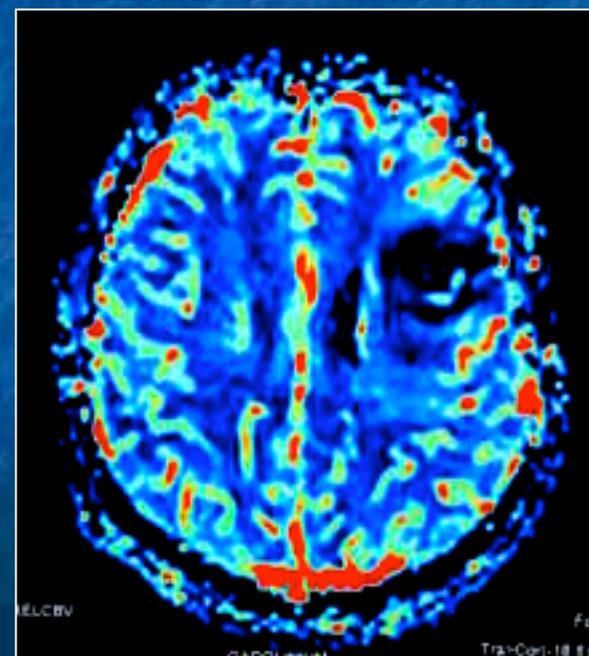
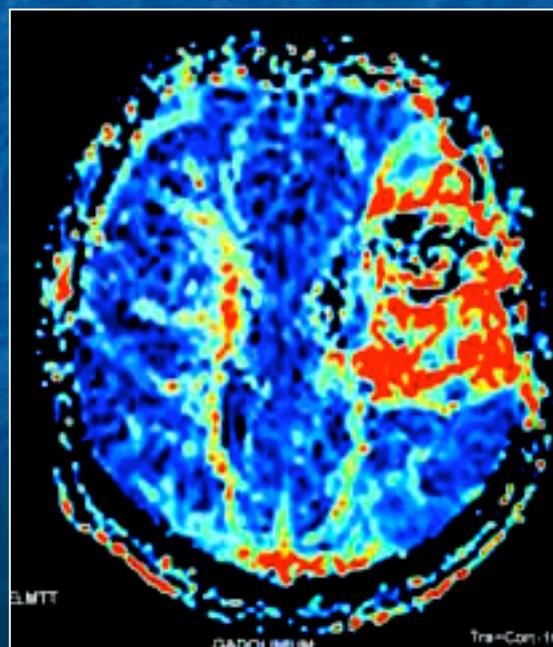
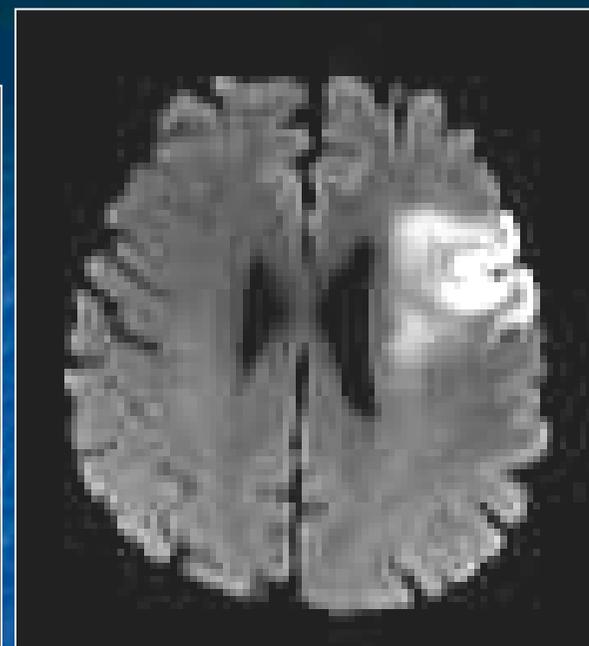


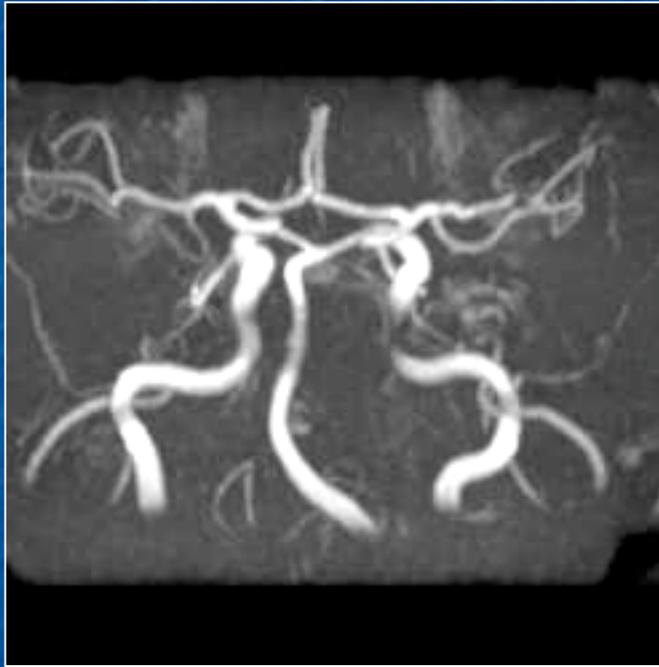
Pt 48



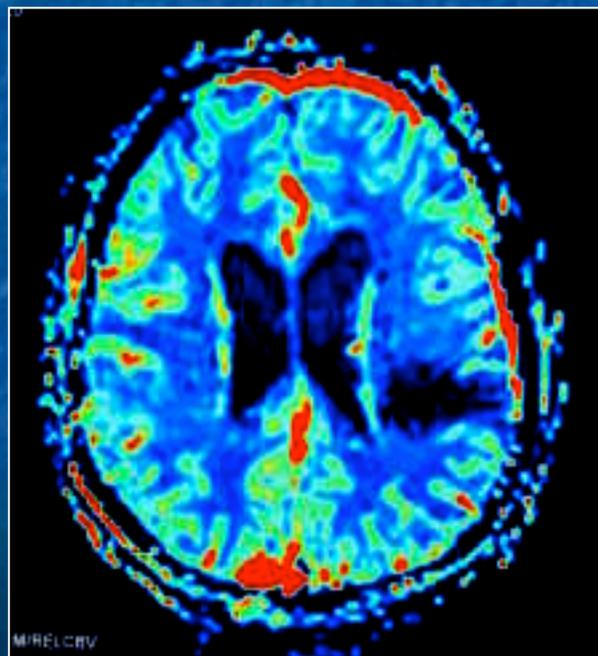
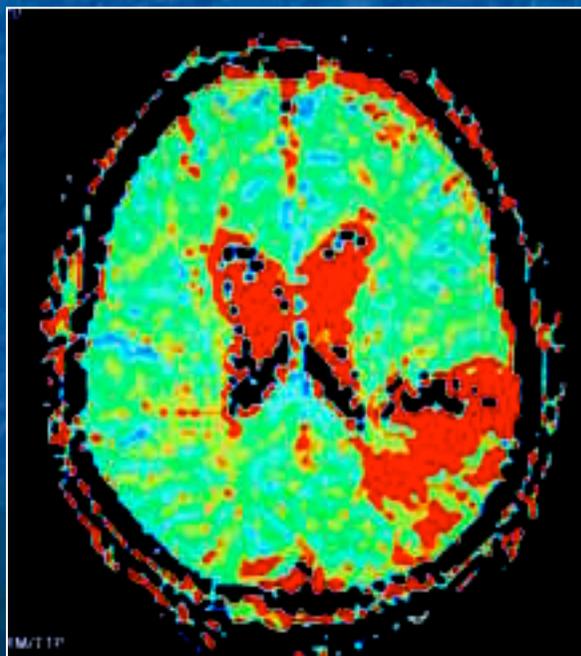
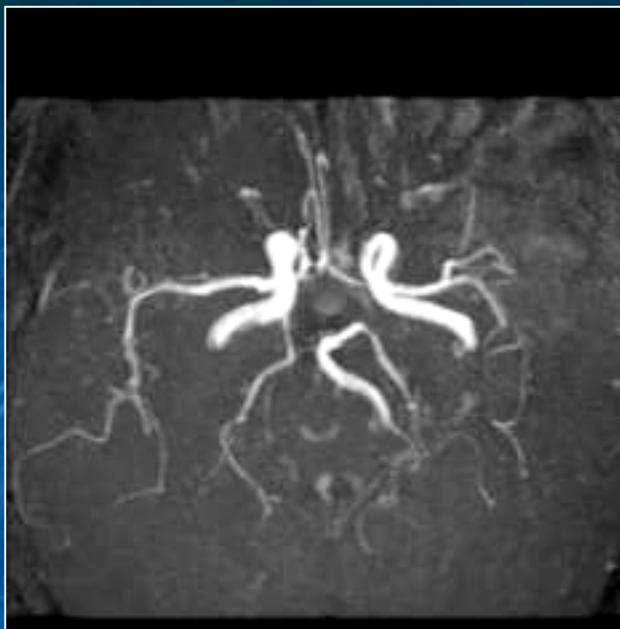


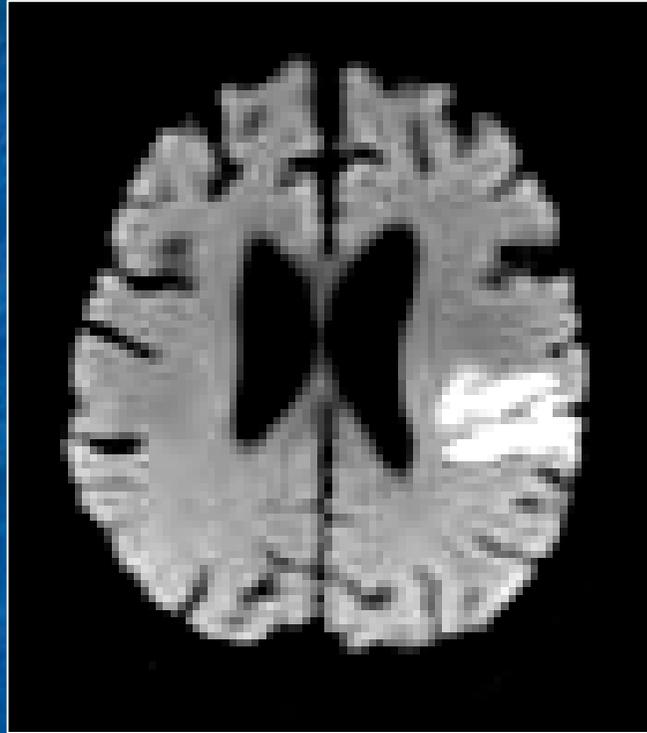
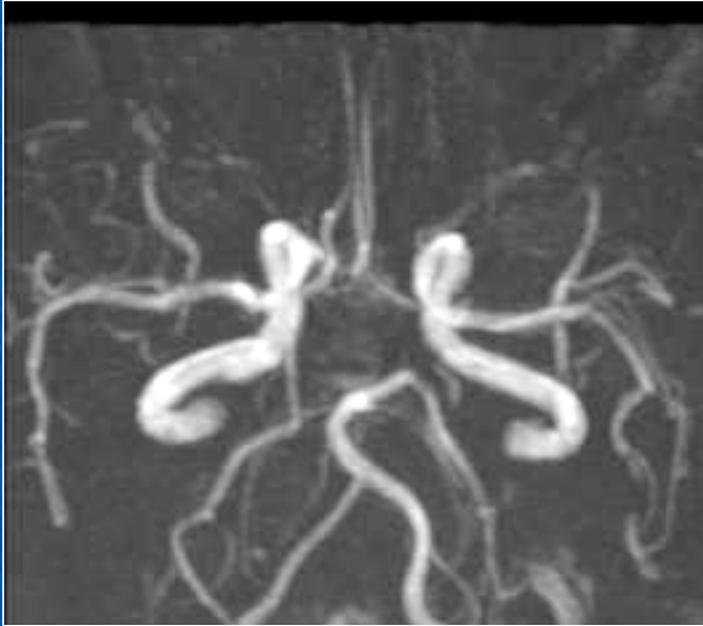
Pt 49

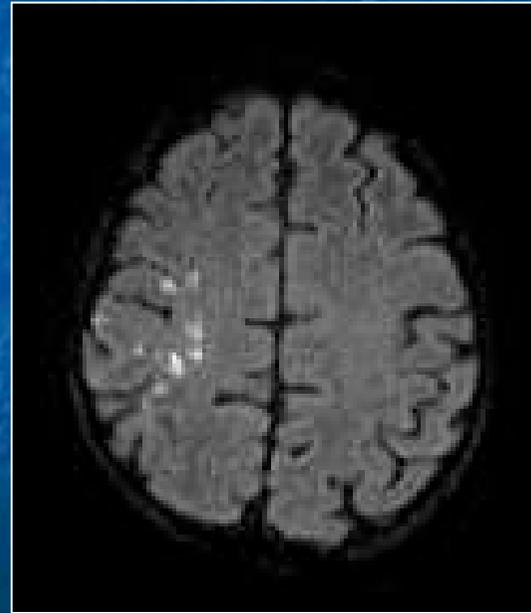
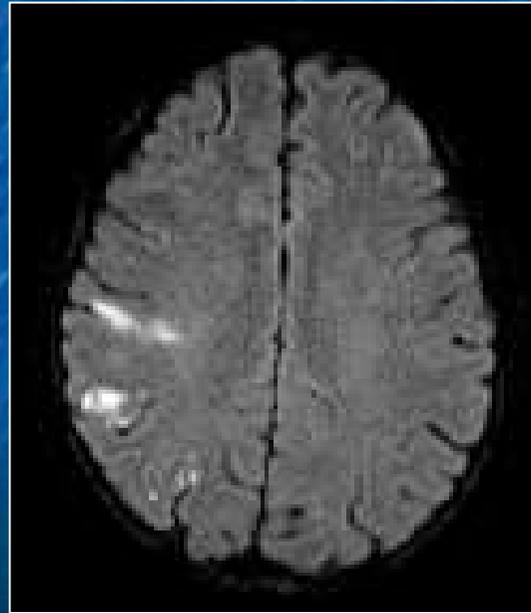


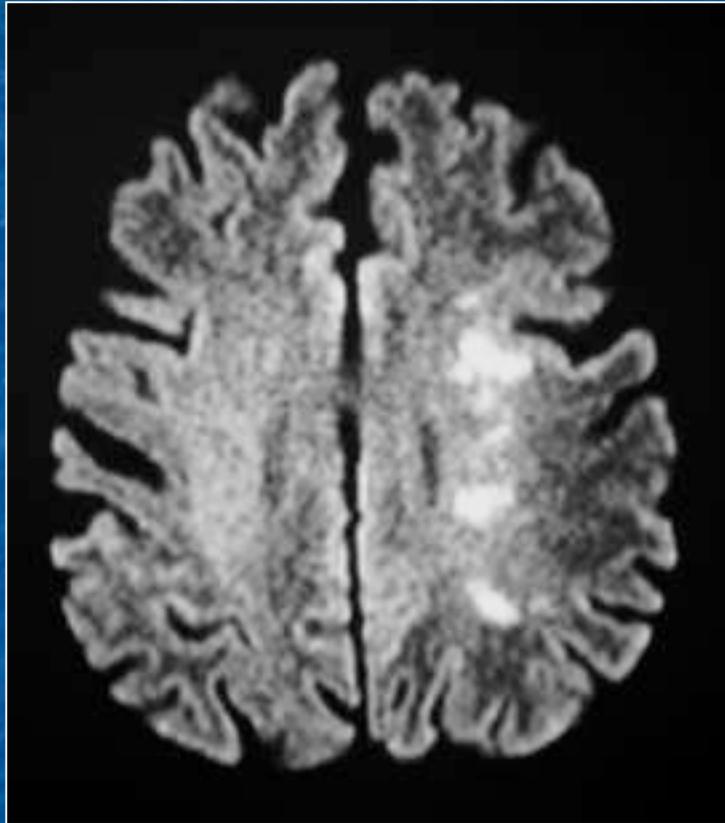


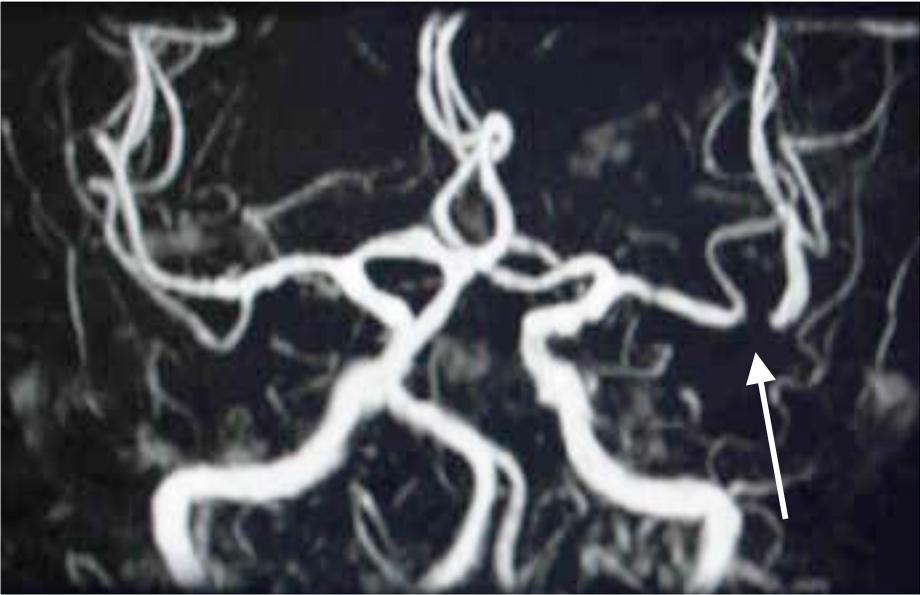
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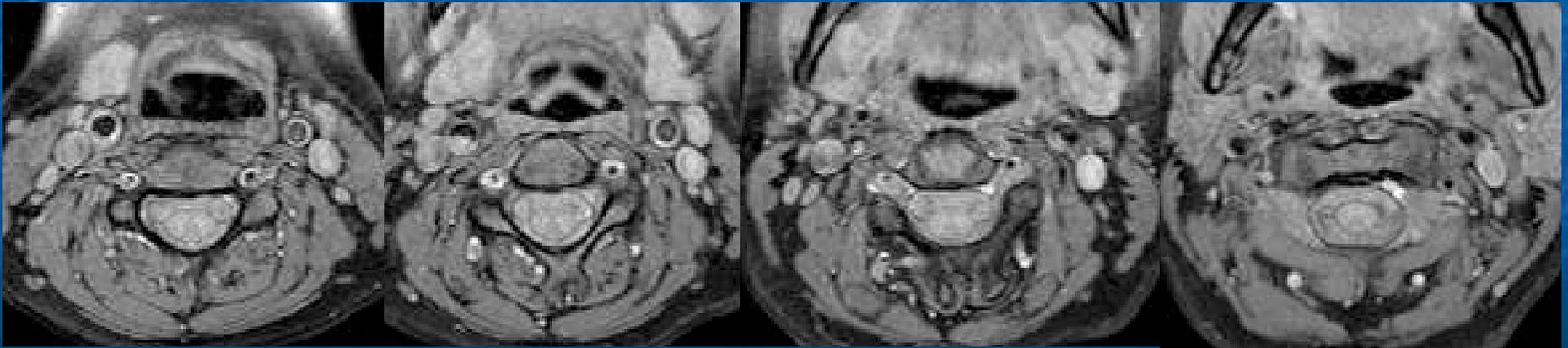
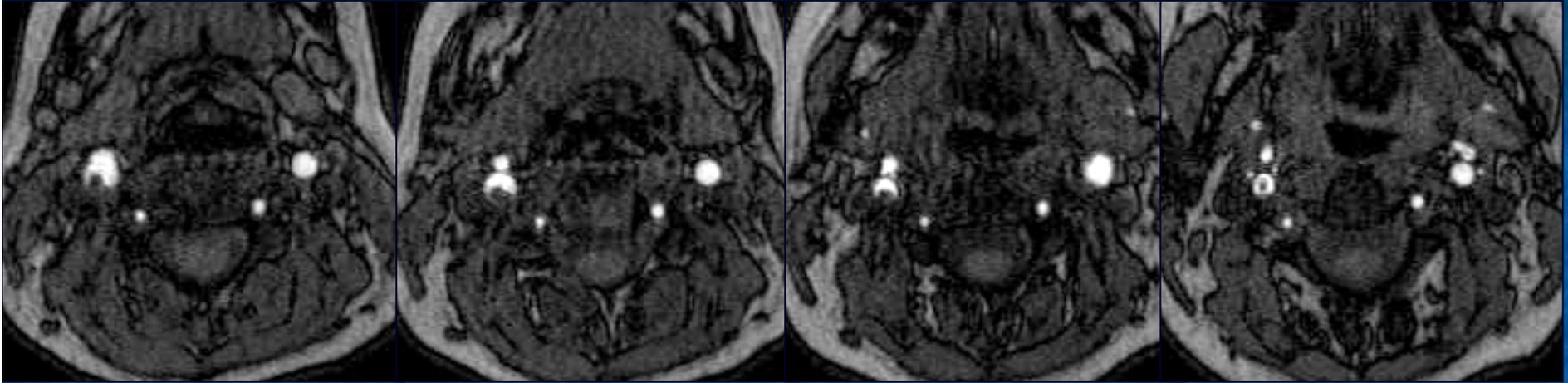


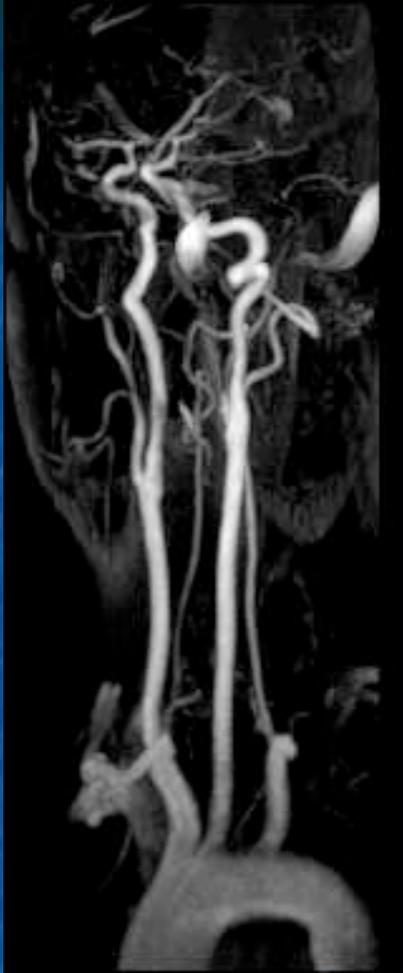


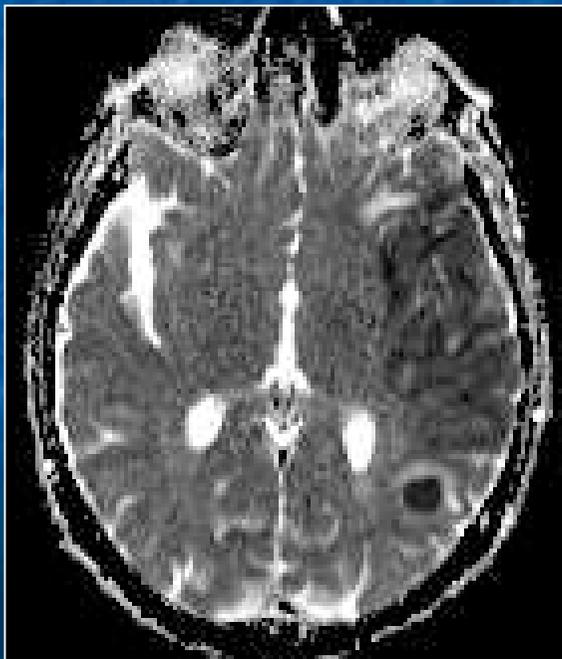
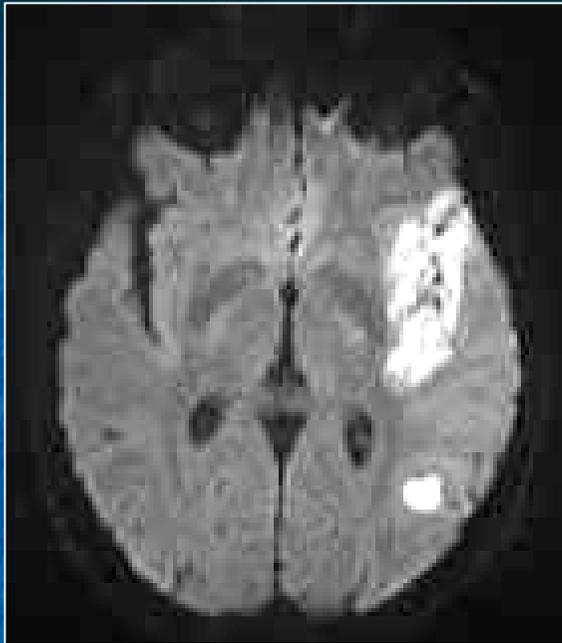


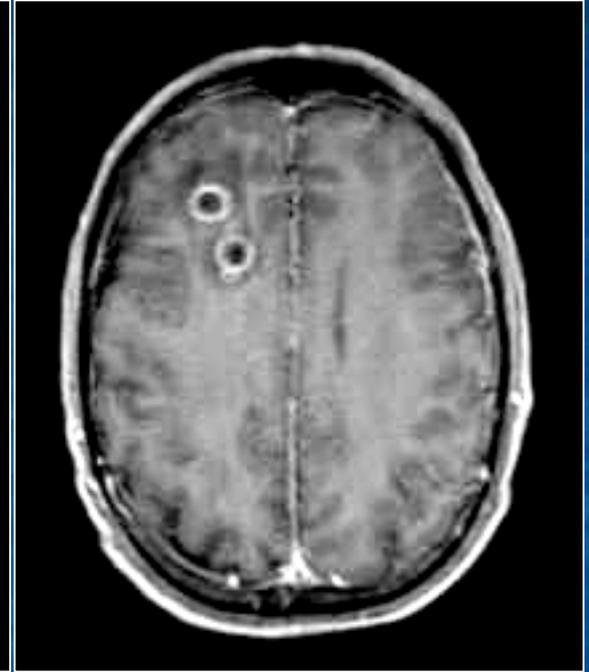
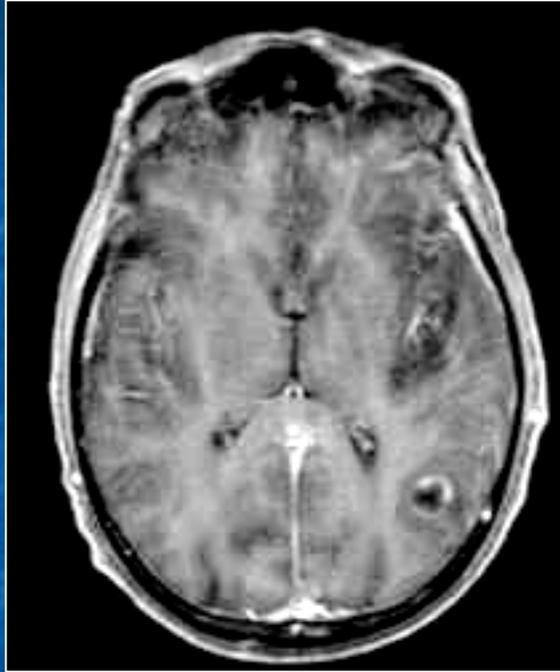
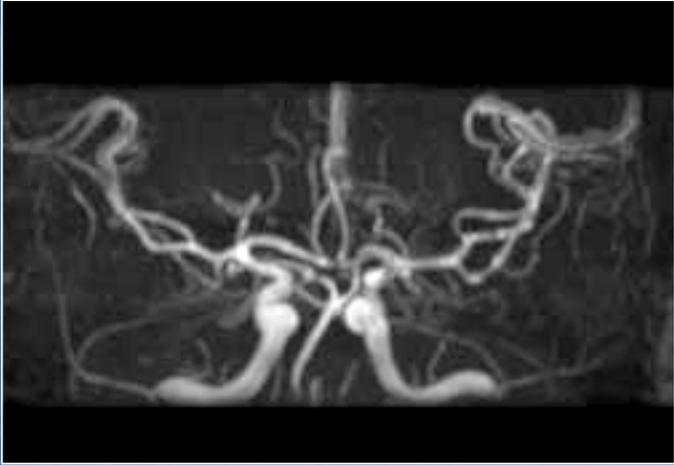


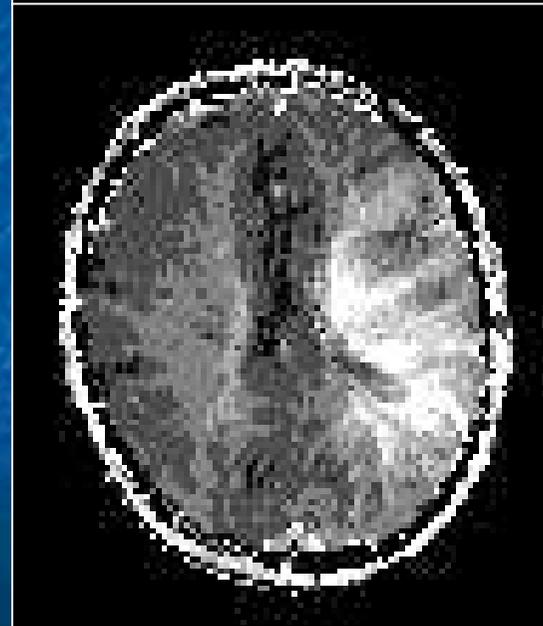
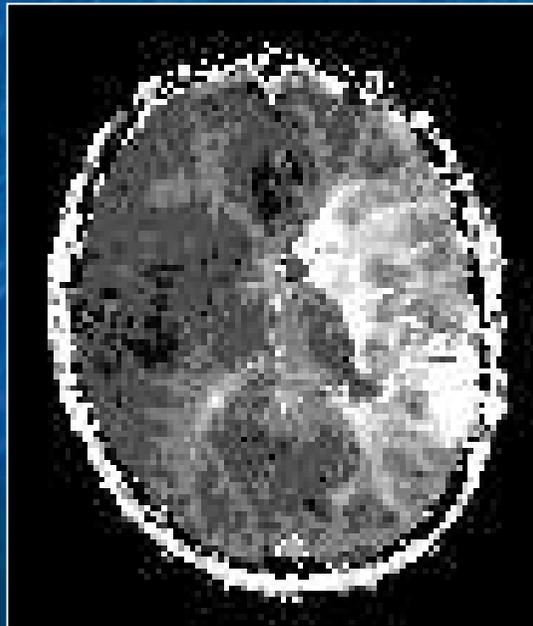
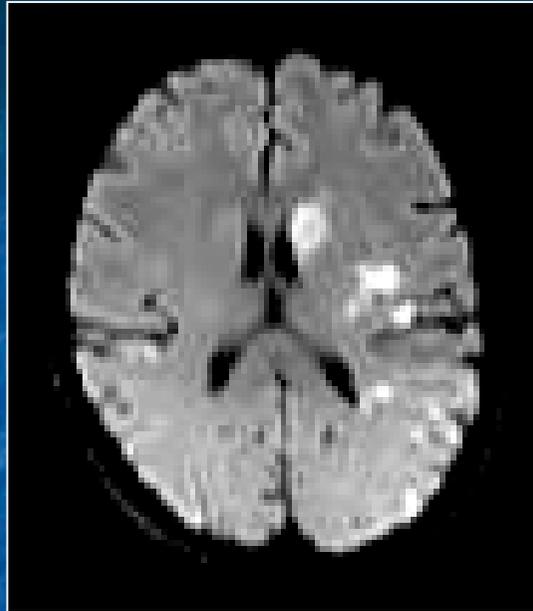
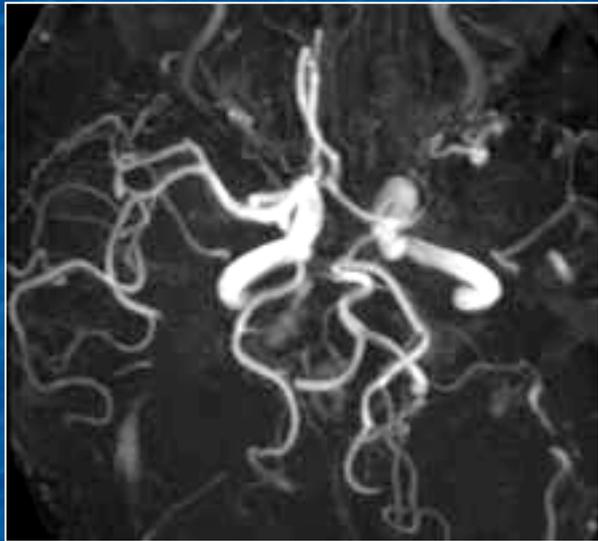


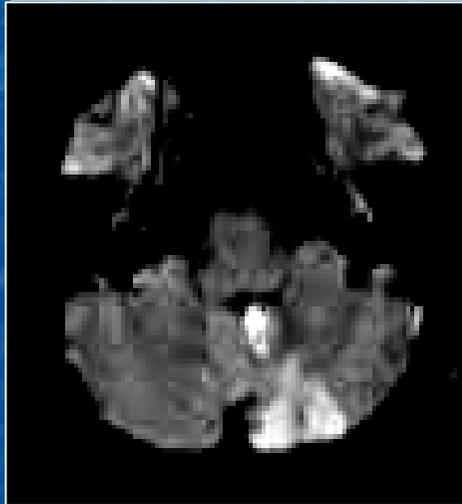
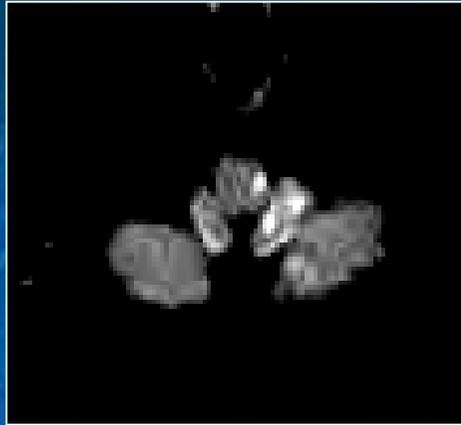












Dissection occlusive de l'artère vertébrale gauche;
accident ischémique dans le territoire de la PICA

