

DES INTERUNIVERSITAIRE DE RADIOLOGIE

Secteur de Neuroradiologie

Infections du SNC



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Vendredi 13 novembre 2020

OBJECTIFS de l'imagerie

1. Établir le diagnostic de présomption: examen **anormal compatible** avec un sepsis → *pas de cortisone sans R/ bactéricide spécifique*
2. Approcher le diagnostic étiologique
*probabiliste vs **pattern spécifique***  Pattern recognition
3. Bilanter l'extension lésionnelle
 1. *Chirurgicaux*: abcès, empyèmes, hydrocéphalie
 2. *Médicaux*: extension parenchymateuse cérébrale → couverture anti-E
4. Trouver la voie d'inoculation (sinus, brèche durale)
si macro-anatomique -> *fermer*
5. Monitorer le R/: **en aigu**: *essai thérapeutique* toxo vs lymphome chez HIV(+)

Trois 'filets':

- Hémoculture
- Ponction lombaire
- Ponction-biopsie évacuatrice

Méningite

1. Diagnostic → PAS d'imagerie

1. clinique: céphalées, fièvre, raideur de nuque, phono-photophobie, ...
2. biologique (sang + LCR): numération des éléments, lymphos vs neutros...

'PL blanche en phase précoce'

'IRM contributive car les méninges enflammées rehaussent'

'Petite touche encéphalitique'

'Avant PL pour ne pas modifier les méninges'

2. Bilan des complications → IMAGERIE



Méningite $\neq$ diagnostic d'imagerie

Méningite virale

bénigne – auto-régressive – sans séquelle

Virale (*identifiée*) > 70% des cas

Entérovirus - Coxsackie – Echovirus – Varicella Zoster – oreillons, ...

'Idiopathique' auto-immune post-infectieuse, SLE,...

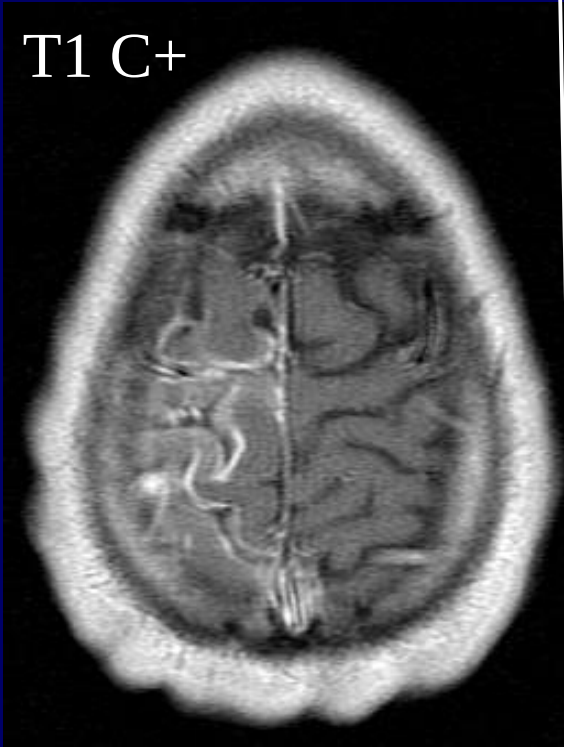
IRM:

Rehaussement méningé:

- * 'lisse'
- * discret: souvent 'borderline' → lié à la PL?'
- * diffus
- * DWI (-) → pas d'irritation parenchymateuse → pas de crise E

Méningite bactérienne

T1 C+



Rehaussement focal
‘nodules & placards’

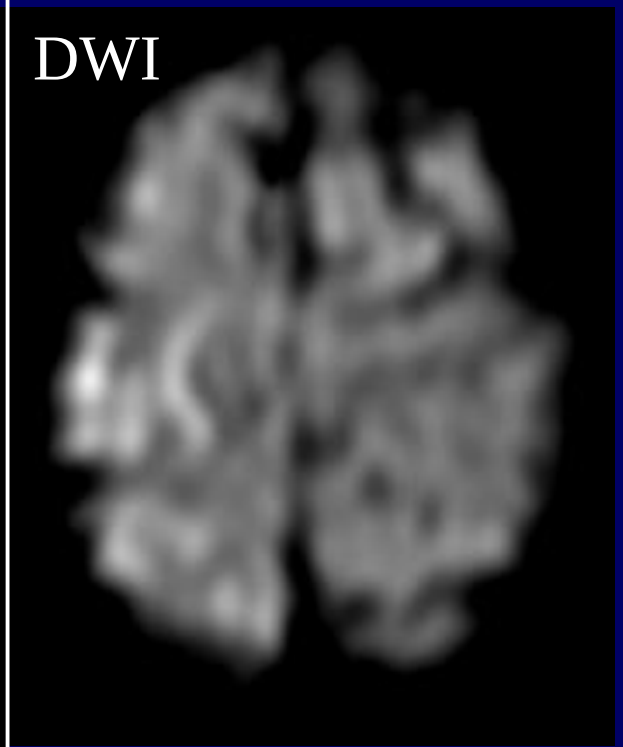
FLAIR C+



Rehaussement
FLAIR post C+

- Bénéfice du rehaussement
- Contraste avec le LCR effacé

DWI



Réduction de l'ADC



Risque épileptique

Méningite à BK

Méningite fébrile

Signes de localisation

Diagnostic **IRM**:

- Magma caséux
- Tropisme pour la BC



Pattern recognition



versus autre granulomatose, pas forcément septique
versus IgG4

Complications des méningites:

- vasculite sténosante → *ischémie*
- anévrismes mycotiques → *hémorragie*
- thrombophlébite → *infarctus veineux*
- hydrocéphalie → R/*drainage ventric.*
 - *blocage de circulation
 - *défaut de résorption
- empyèmes → R/*drainage évacuat.*

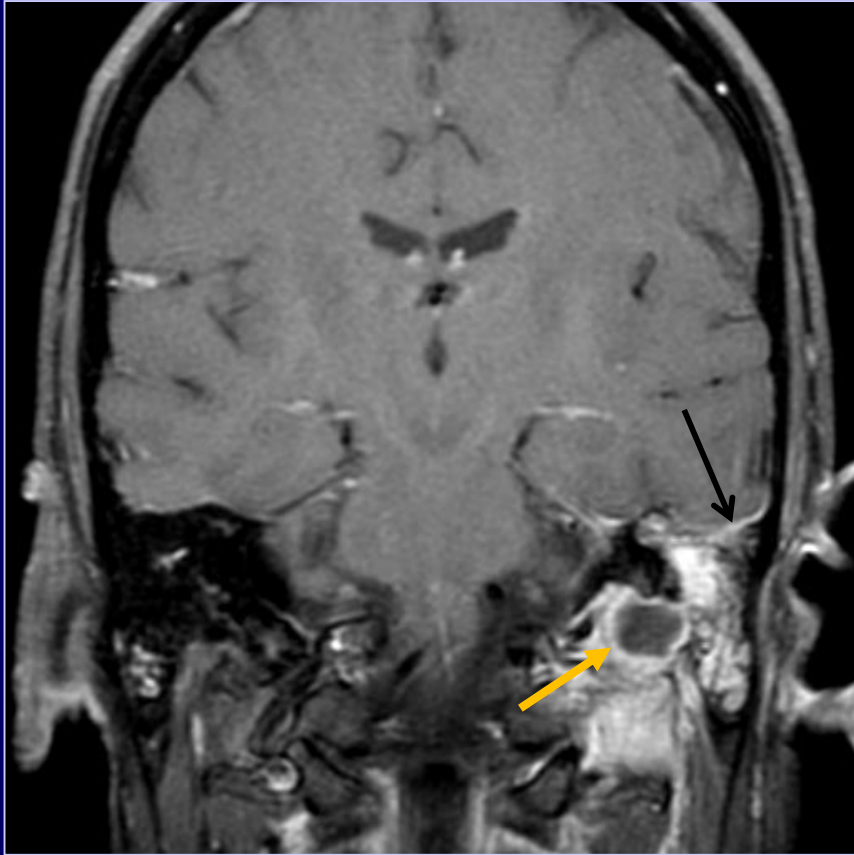


focalisation...

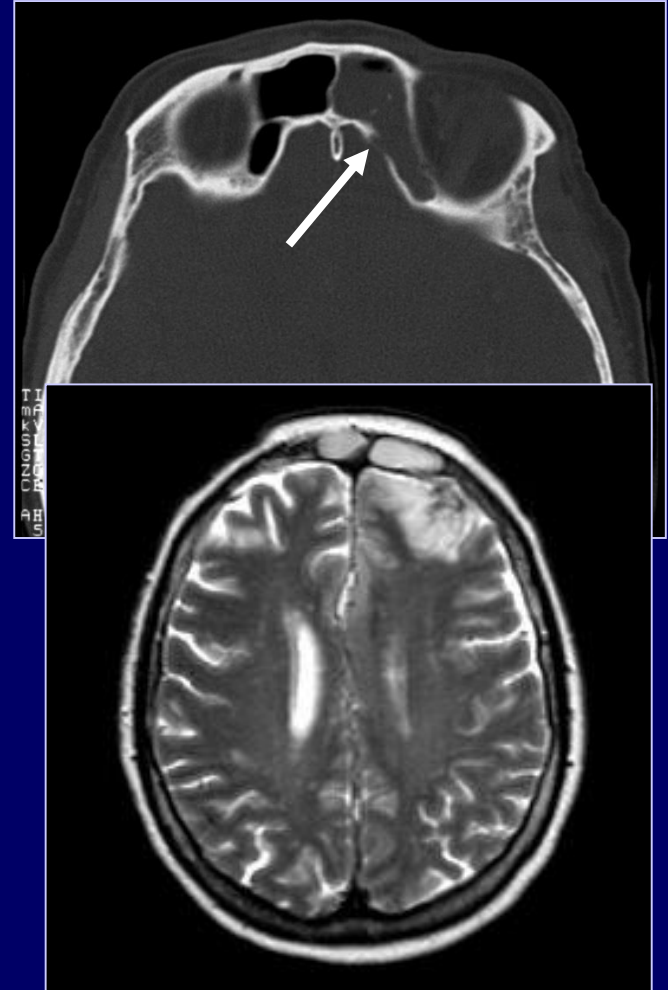


Souvent superficiels
Risque hémorragique
Contexte fungique
<5% de tous les anévrismes
Multiples 20%.

focalisation... chercher le voie d'entrée



mastoïdienne



sinusienne

(Trauma crânien: chercher la bulle IC)

Encéphalite

Agents étiologiques

- **protéine** : prions Creutzfeld Jacob disease
- **virus**: HSV – LEMP – VIH - IRIS
- **bactéries**: abcès chaud à pyogène
variantes 'froides'
- champignons/parasites/protozoaires

Encéphalite herpétique

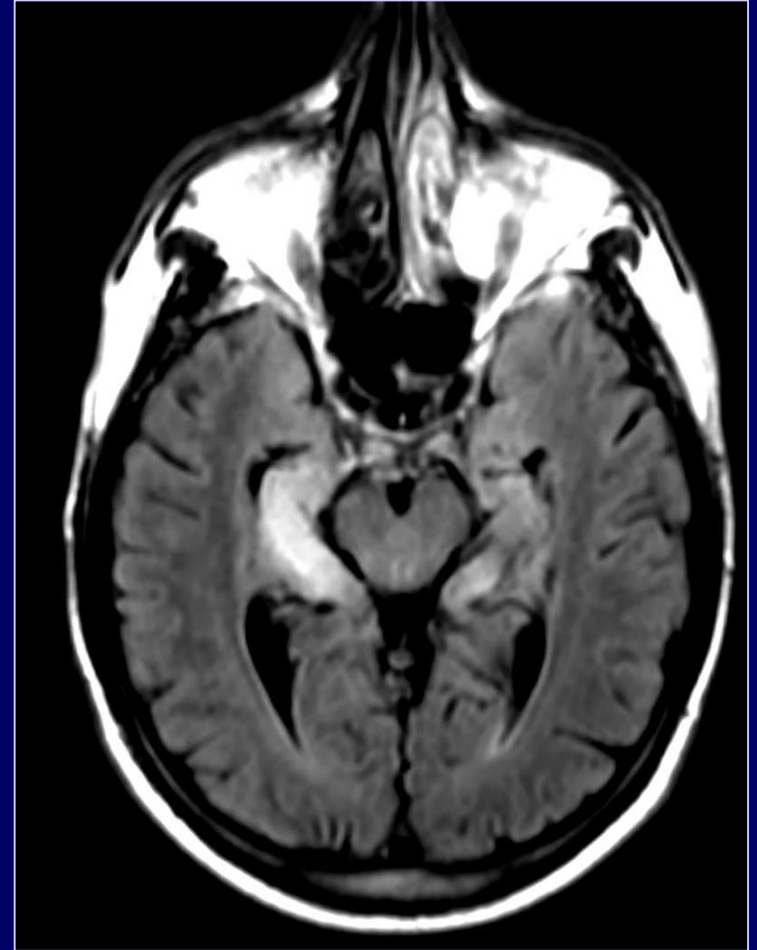


Pattern recognition

La plus fréquente des encéphalites focales sporadique de l'adulte **immuno-compétent**

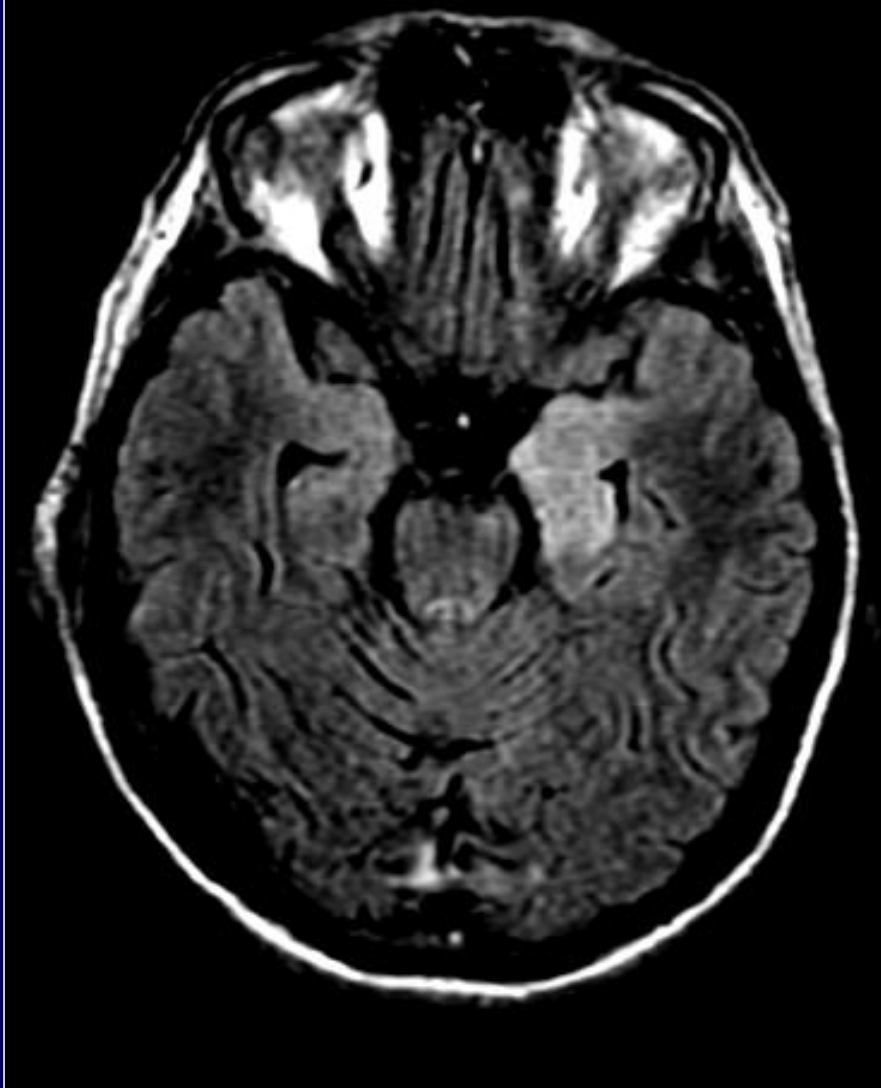


90% HSV type 1
60-100% séropositifs popul. génér.

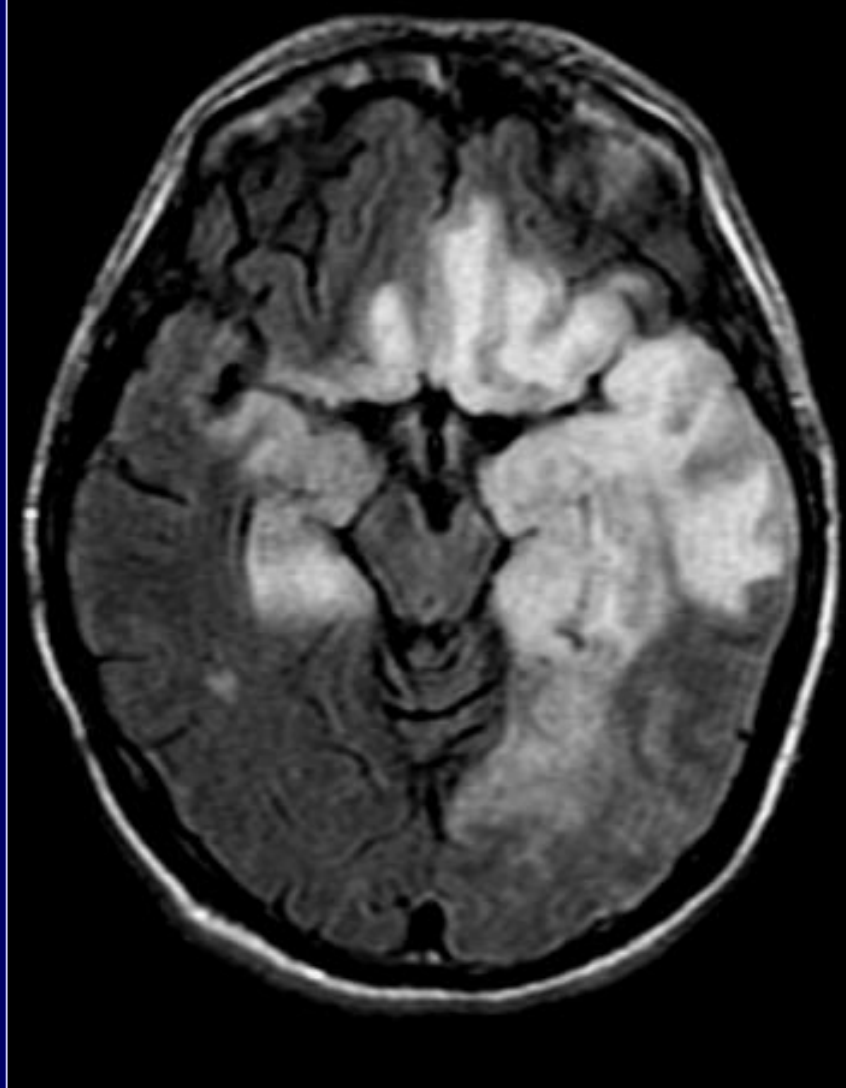


Bilatérale Asymétrique Limbique

J0

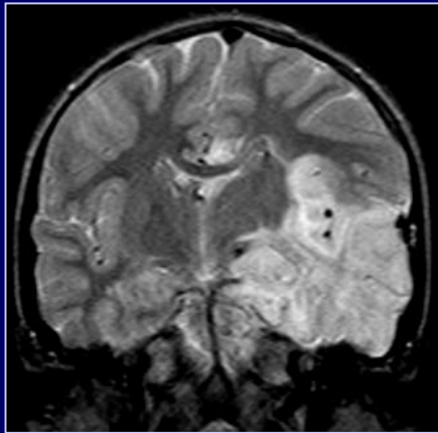


J15



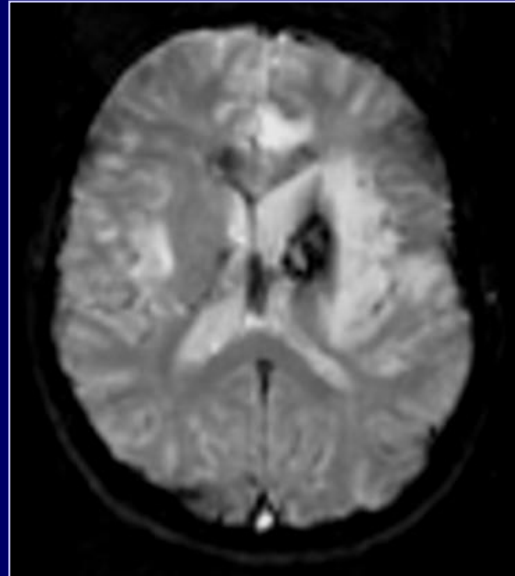
Fulminante sans R/ **ZOVIRAX®**

T2

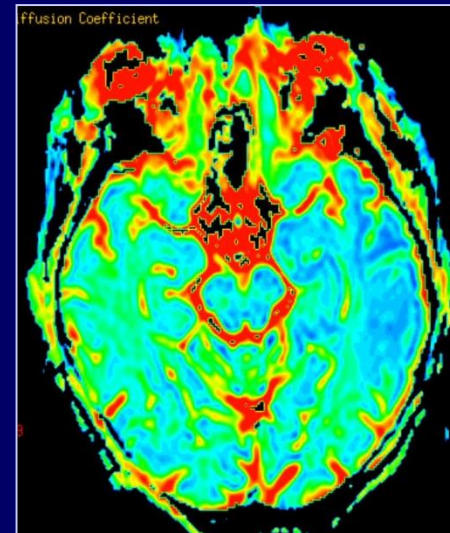
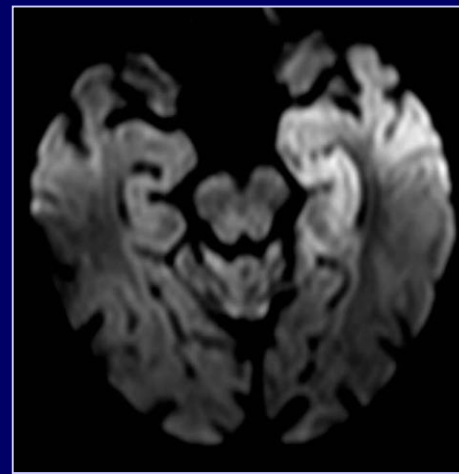


fulminante

GRE-T2

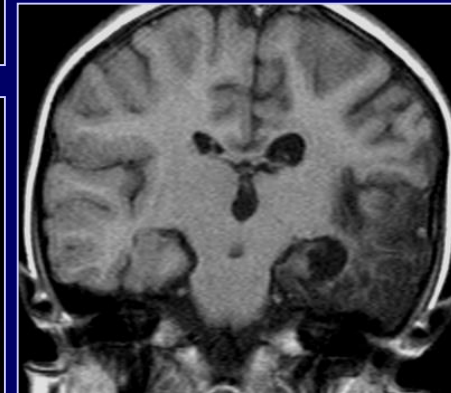


hémorragique



cytotoxique

T1



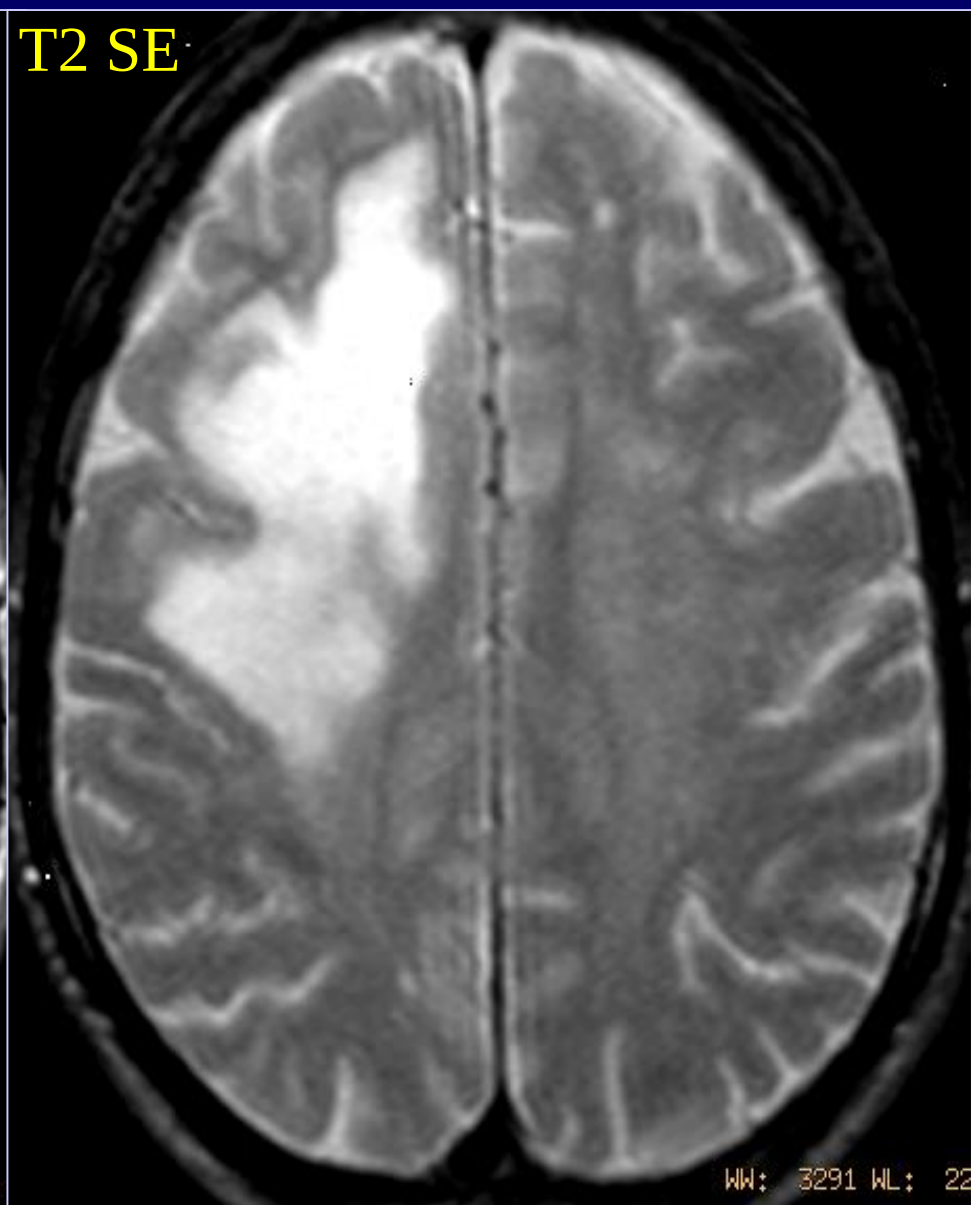
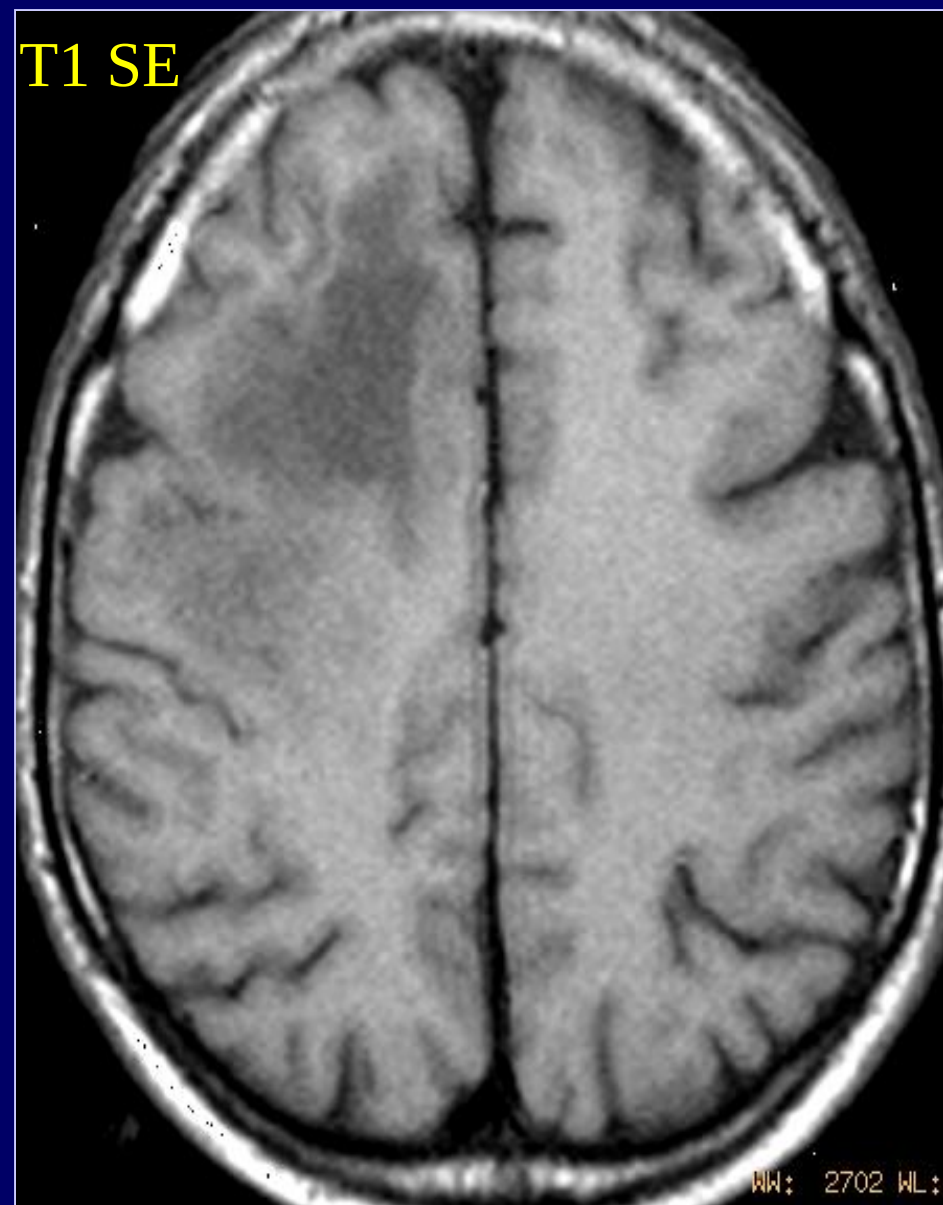
nécrosante

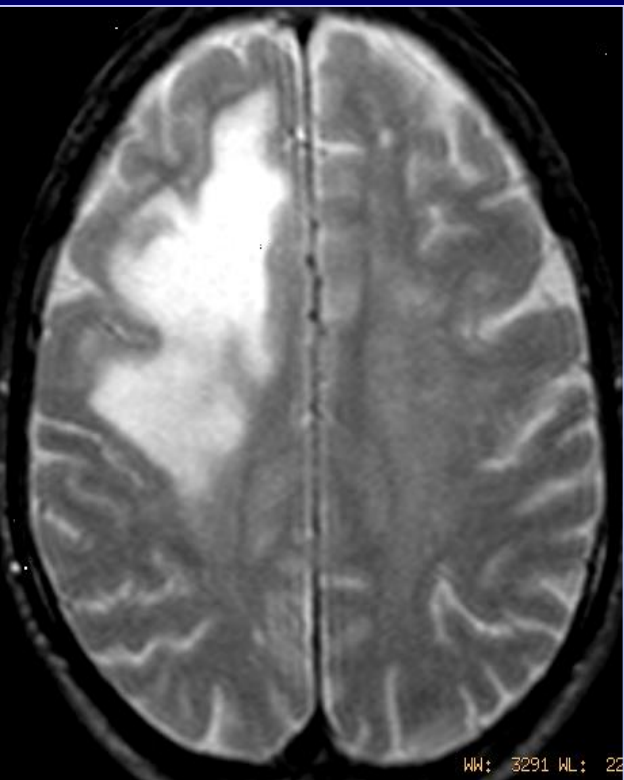
LeucoEncéphalite Multifocale Progressive (LEMP)

- papova virus JC
 - SIDA
 - immuno-déprimés non SIDA (e.a. CHT pour hémopathie maligne)
 - *non-immuno-déprimés*
- destruction oligodendrocytaire sélective (tropisme viral)
 - *cell-targeted selective vulnerability*
- myelinoclasie intense dans un climat « froid »

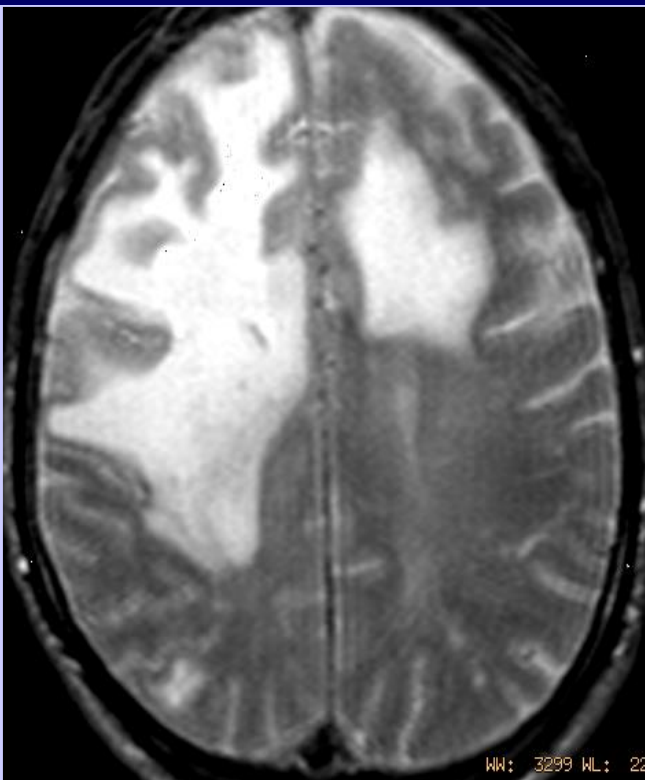


Pattern recognition

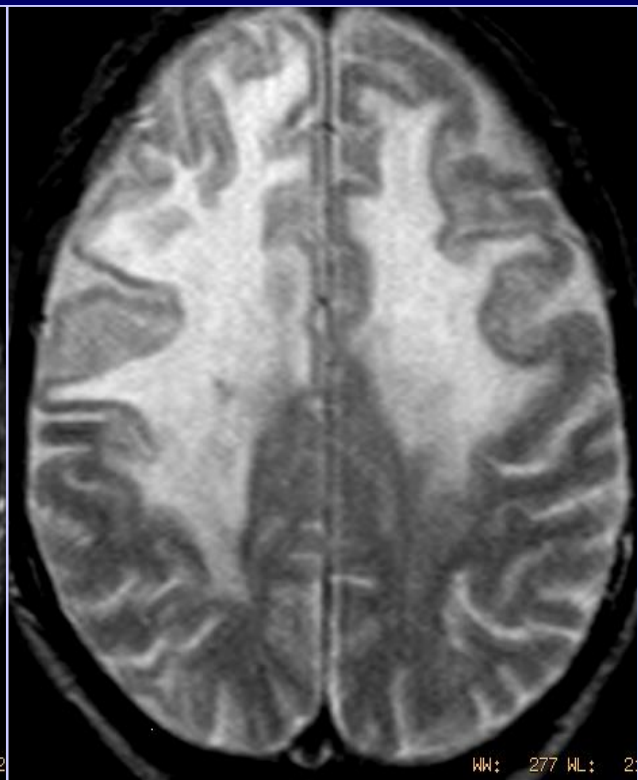




20 nov 92



19 jan 93



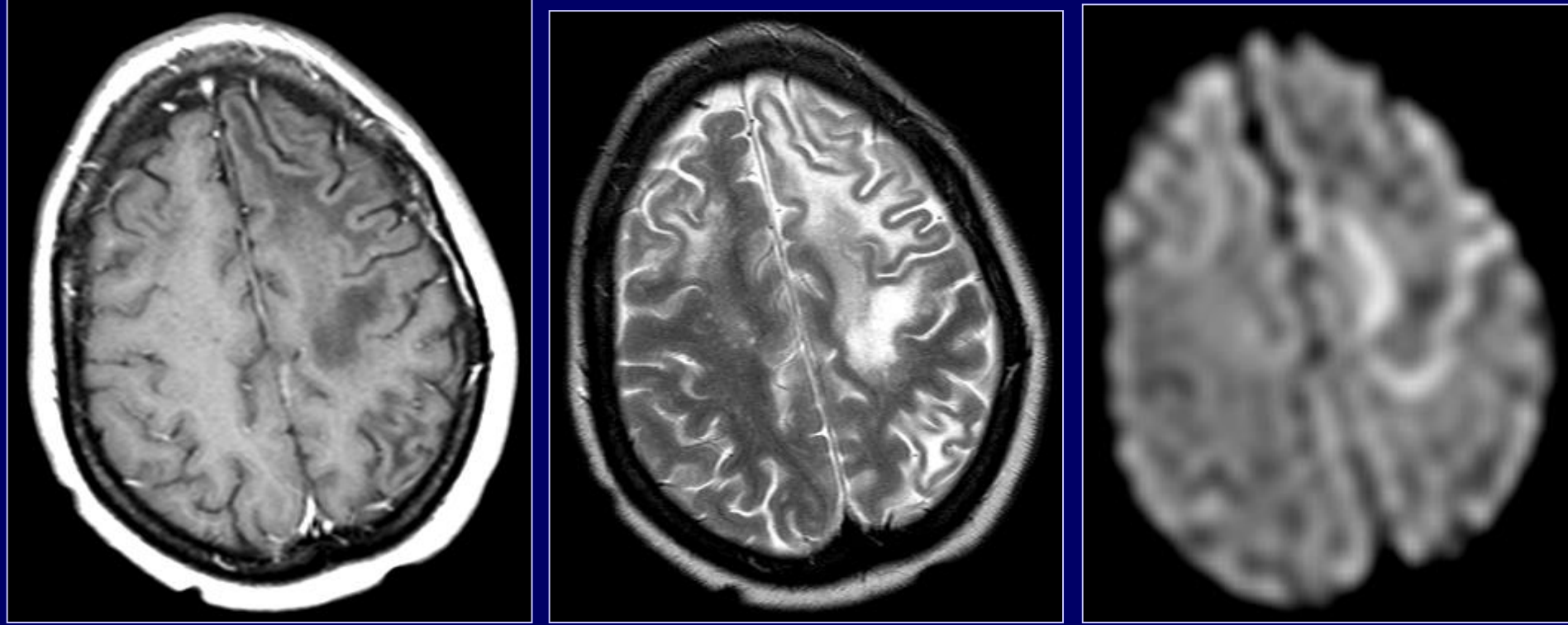
21 avr 93



Pondération T1 post-contraste

Rehaussement mince
du 'front de progression'





Pondération de diffusion

Hypersignal mince
du 'front de progression'

LEMP

très myélinoclastique
focal

Rehaussement minime et transitoire
du front de progression

CDS

peu myélinoclastique
diffus

Pas de rehaussement
du front de progression

Encéphalite HIV

HIV-CMC

HIV cognitive/motor complex

CDS

Complexe démentiel du SIDA

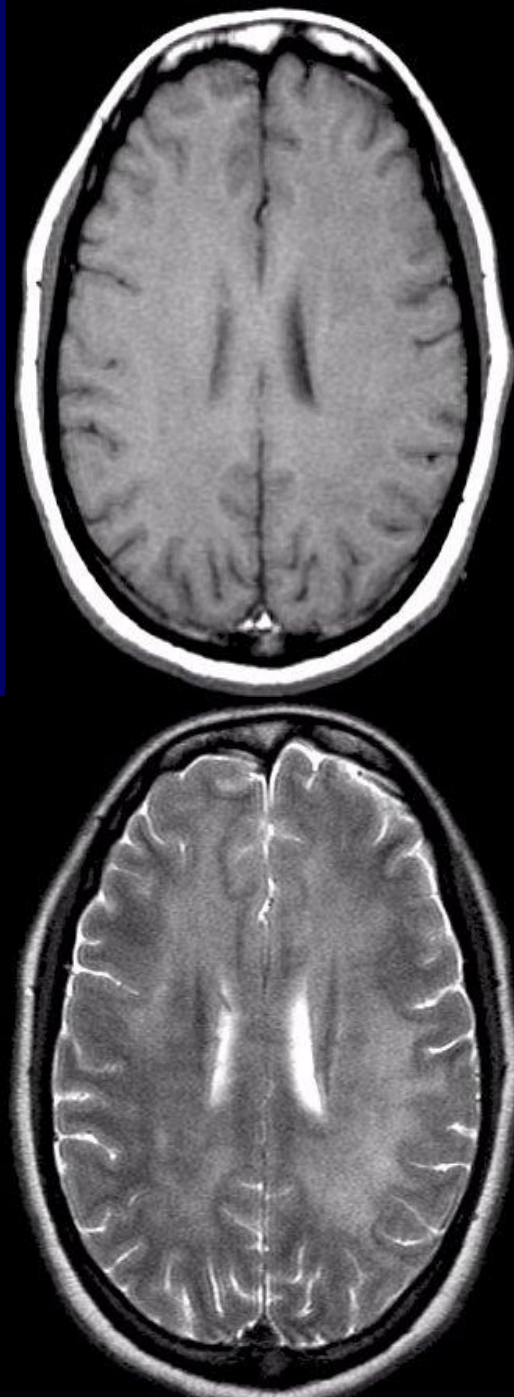
Démence sous-corticale

- ralentissement idéatoire/psycho-moteur
- déclin cognitif
- imprécision motrice

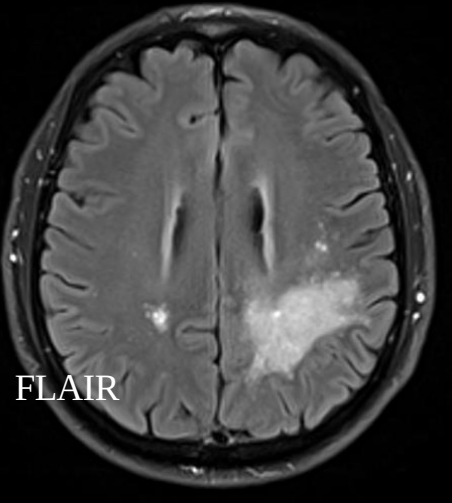
Souvent tardive dans l'évolution
mais inaugurale chez 3-10%

‘Véritable encéphalite’

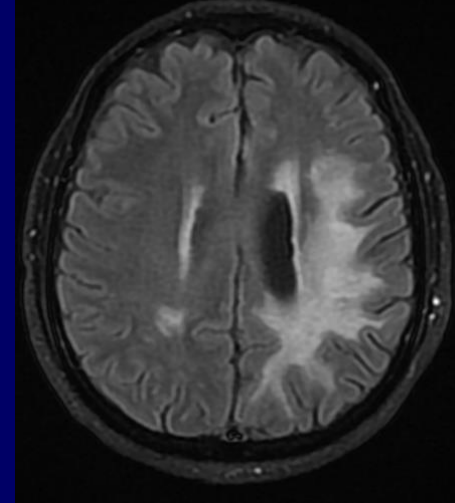
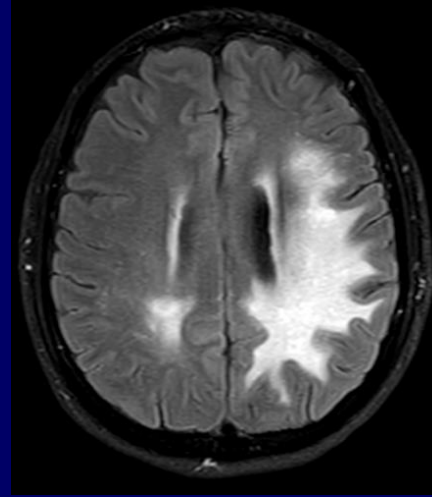
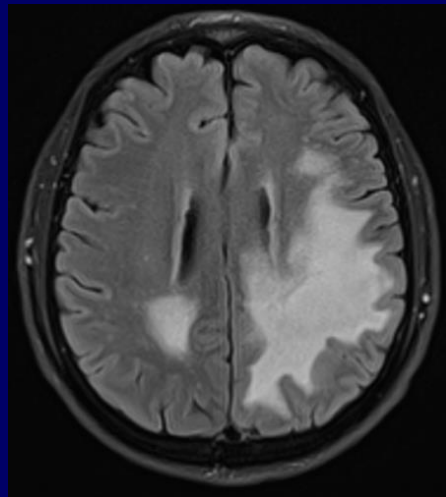
Réplication du virus dans micro-glie et MΦ
→ cytokines et neurotoxines



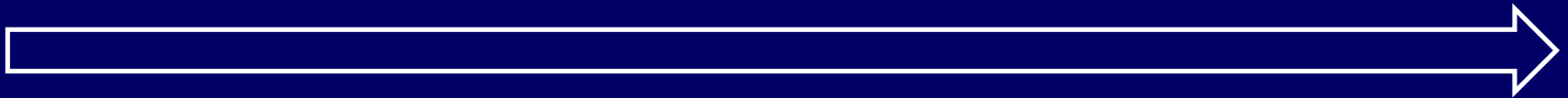
Immune Reconstruction Inflammatory Syndrome (IRIS)



symptomatologie



temps



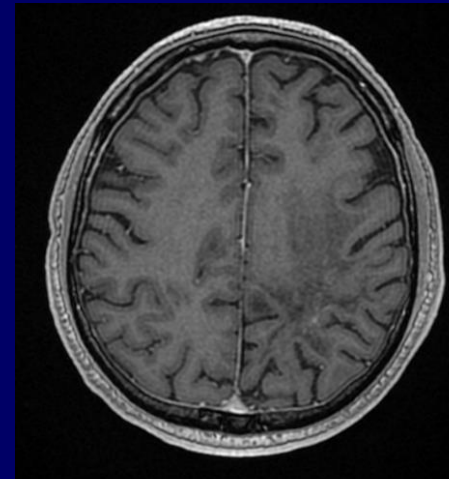
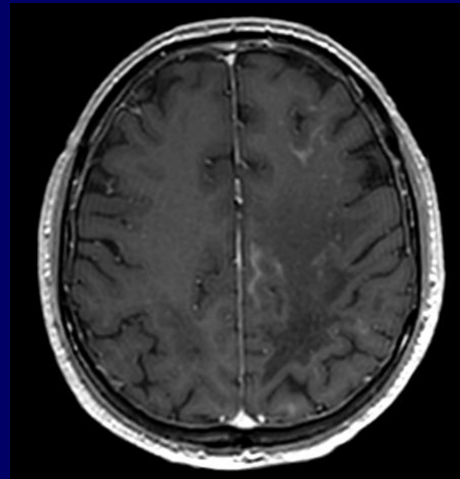
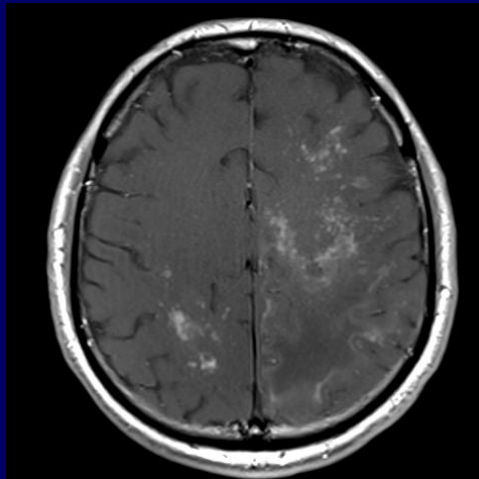
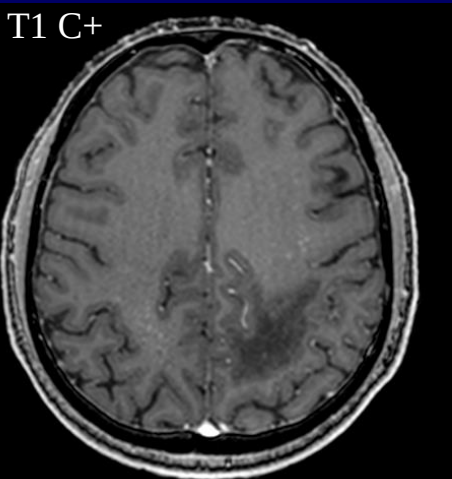
Admission: **LEMP**

5W: **IRIS**

11w

22w

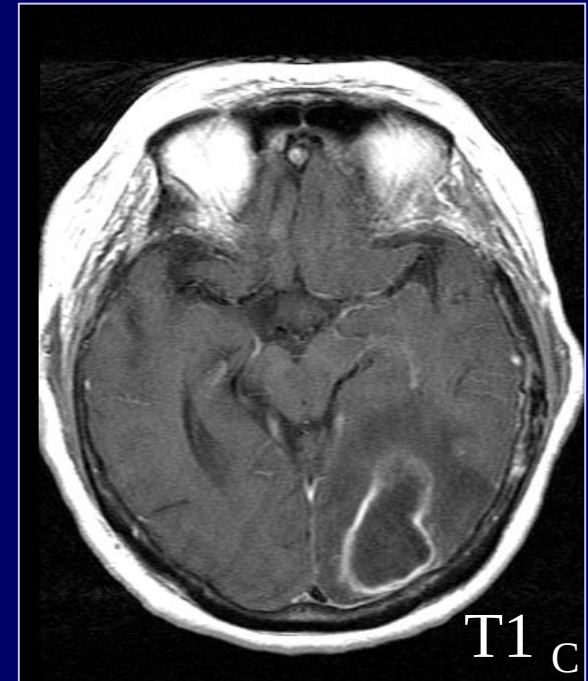
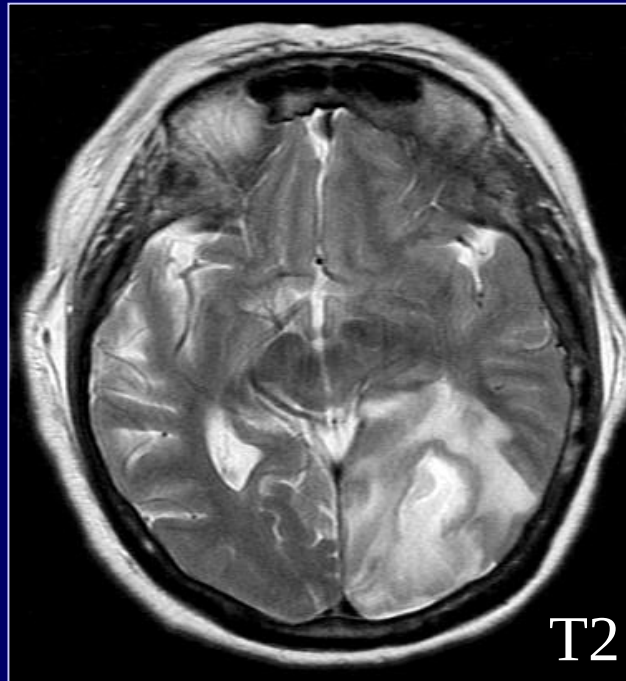
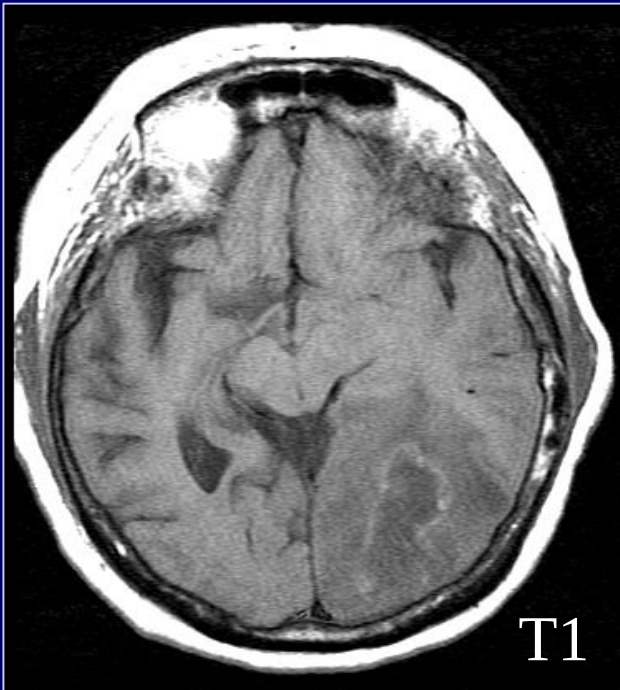
T1 C+



Abcès 'chaud' (à pyogène)

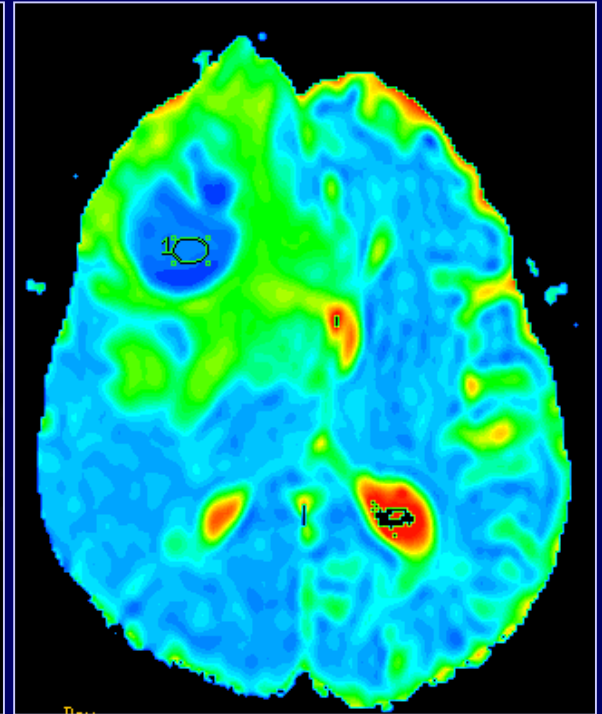
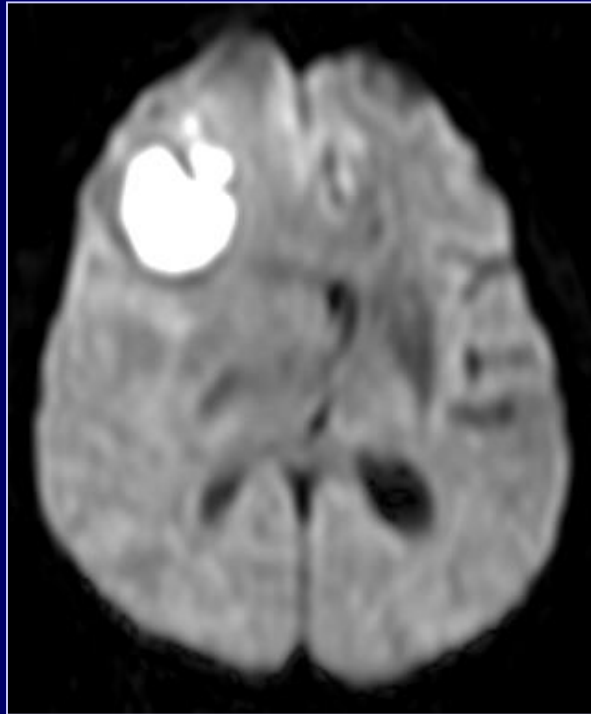
2 pièges cliniques:

- expression pauci-symptomatique
- biologie blanche (sérum parfois LCR)



Pattern recognition

Réduction du coefficient de diffusion dans le pus

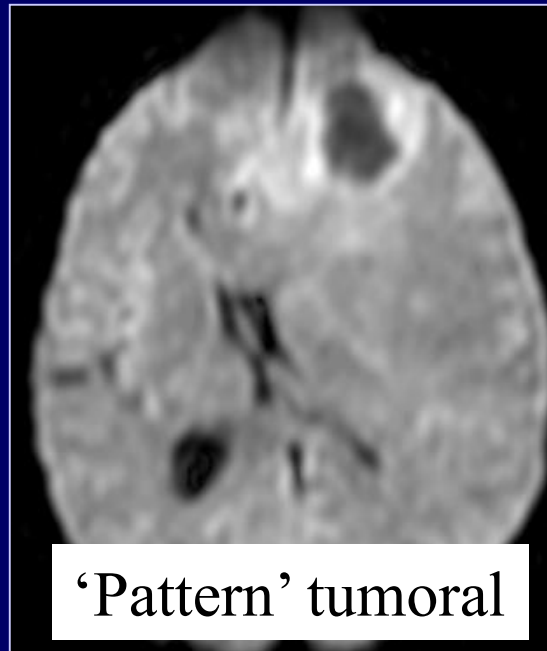
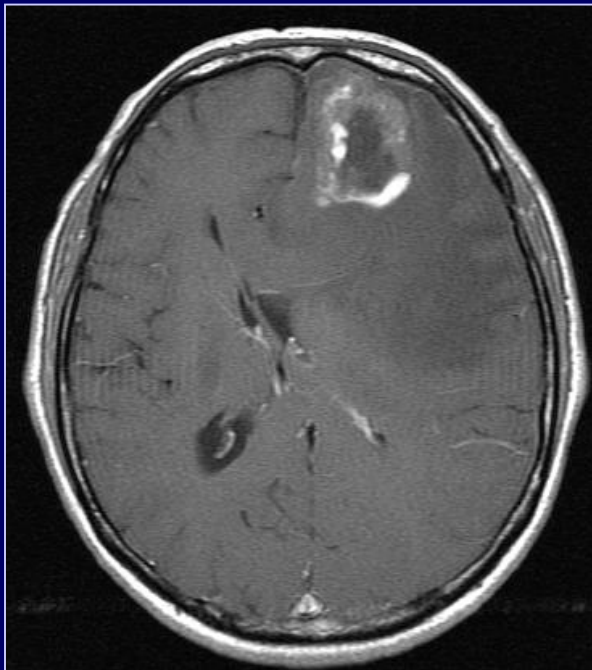


2 pièges radiologiques en Pondération de Diffusion (DWI)

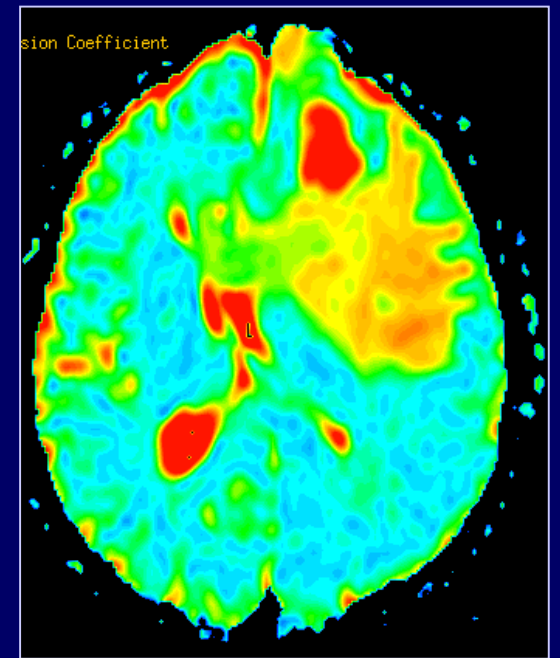
- shine-through effect → vérifier carte d'ADC
- liquéfaction du pus → remontée de l'ADC



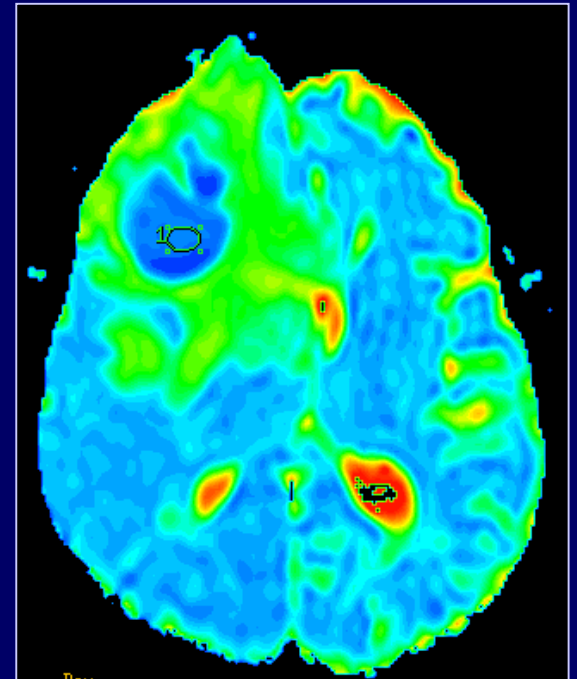
Pattern recognition



‘Pattern’ tumoral



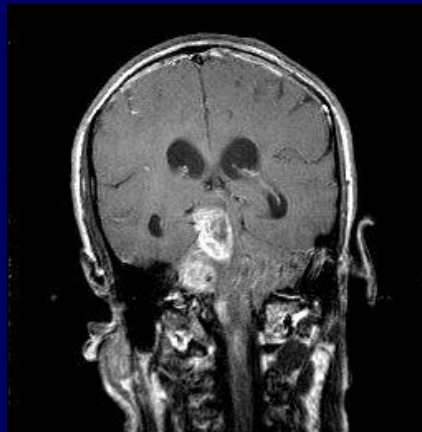
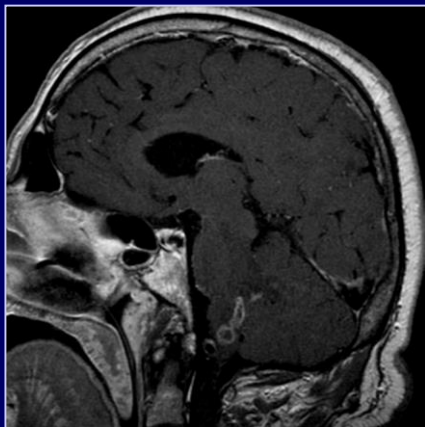
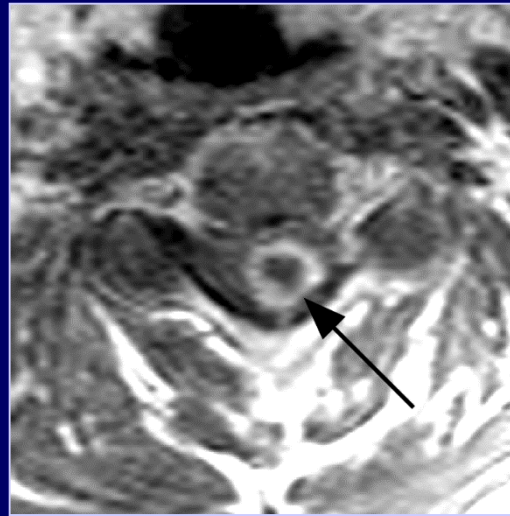
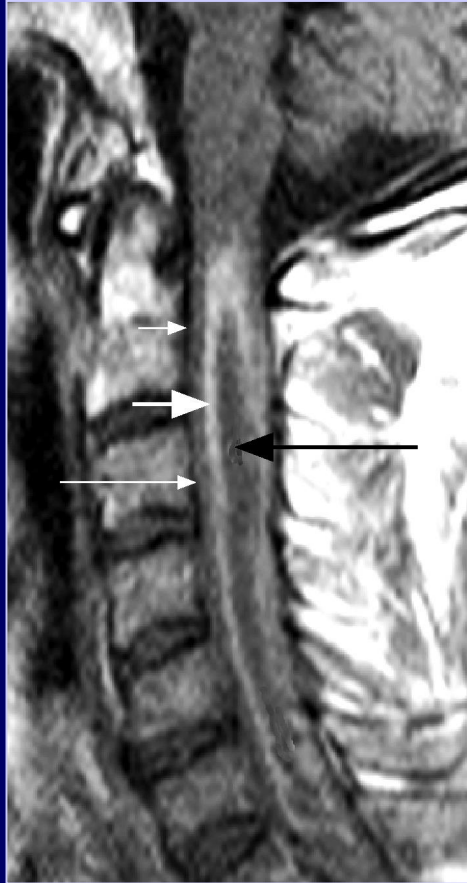
‘Pattern’ abcès



Listériose

Rare
Rhombencéphalite+++
Listeria monocytogenes

Mortalité élevée
→ Thérapeutique d'emblée
avant confirmation diagnostique

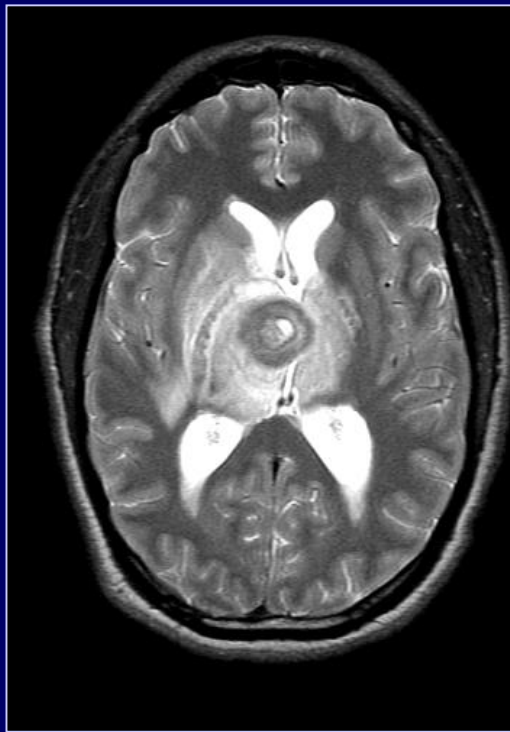


Multiple abcès en fosse postérieure
Croûtes de fromage à risque



Pattern recognition

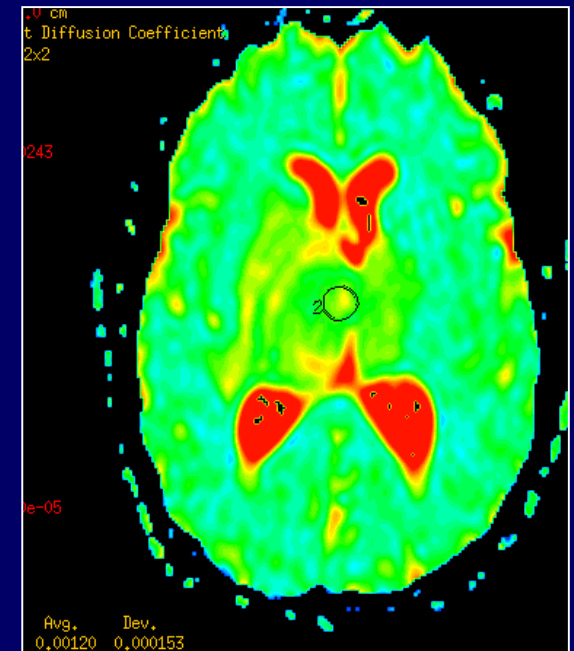
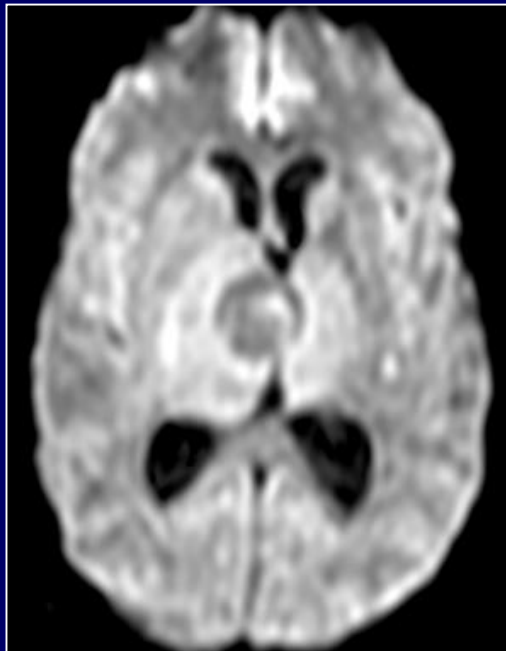
Courtesy Drs Balériaux et Ph. David



Abcès 'froid'
À BK



Pattern recognition



Toxoplasmose

Immunodéprimés

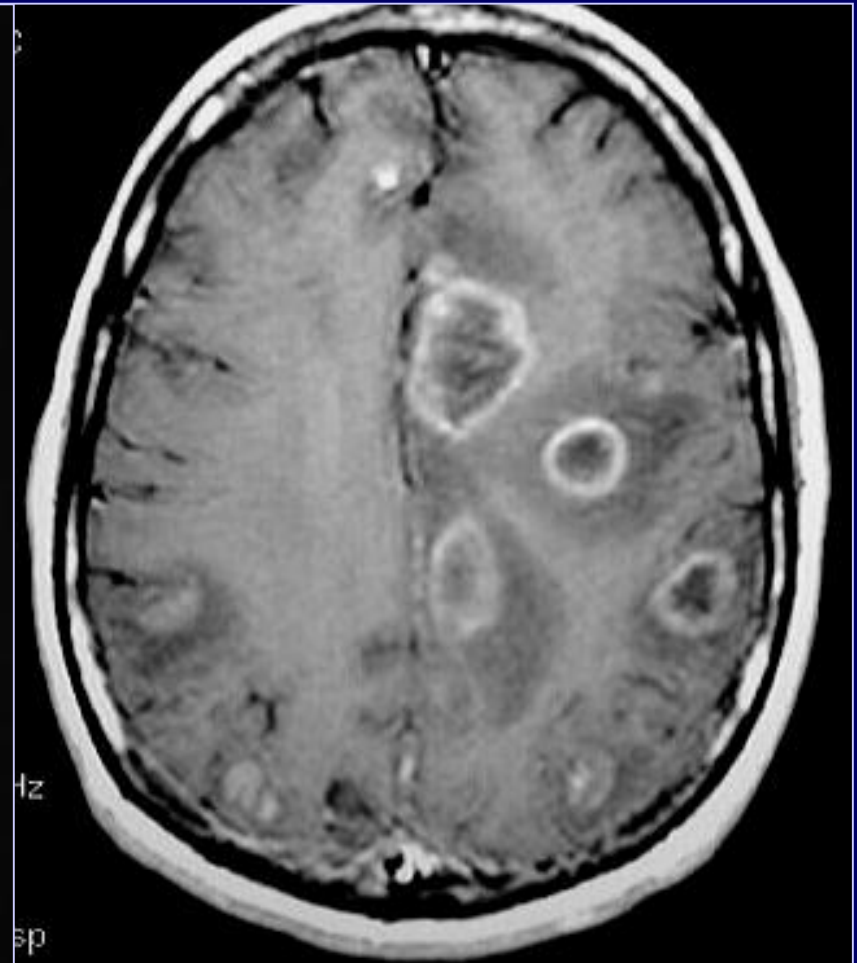
Patients VIH

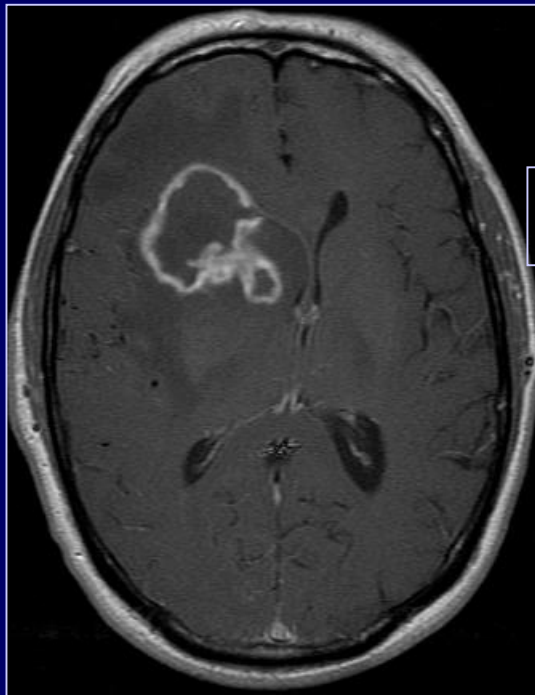
Greffés

pas d'hypersignal en diffusion

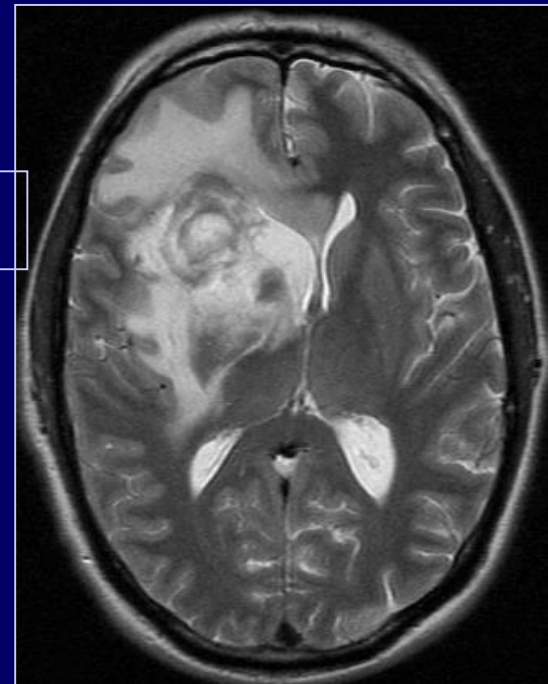
pas de réduction d'ADC

hypersignal spontané en T1 des lésions traitées





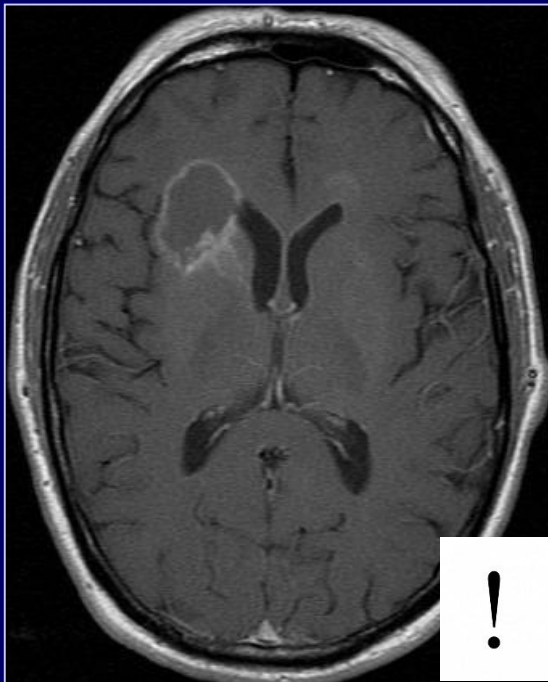
Test thérapeutique



15/2/06

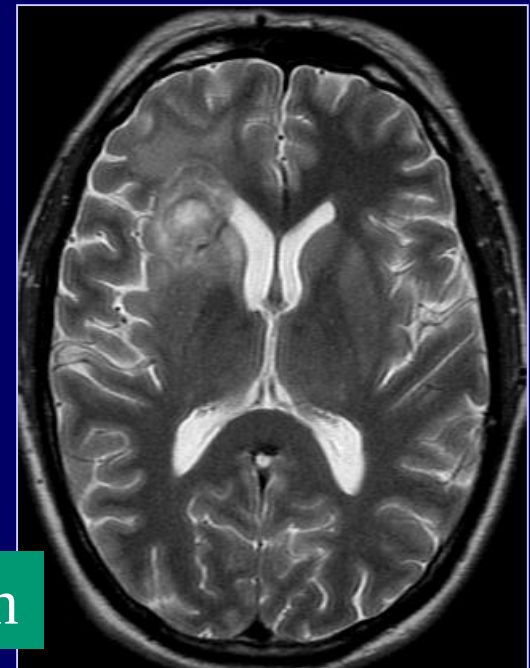


6/3/06



!

Pattern recognition



Encéphalites à prions

Encéphalopathie spongiforme transmissible

Point commun: *dépôt parenchymateux
d'une glycoprotéine membranaire 'prion'
sous isoforme résistant à la protéase*

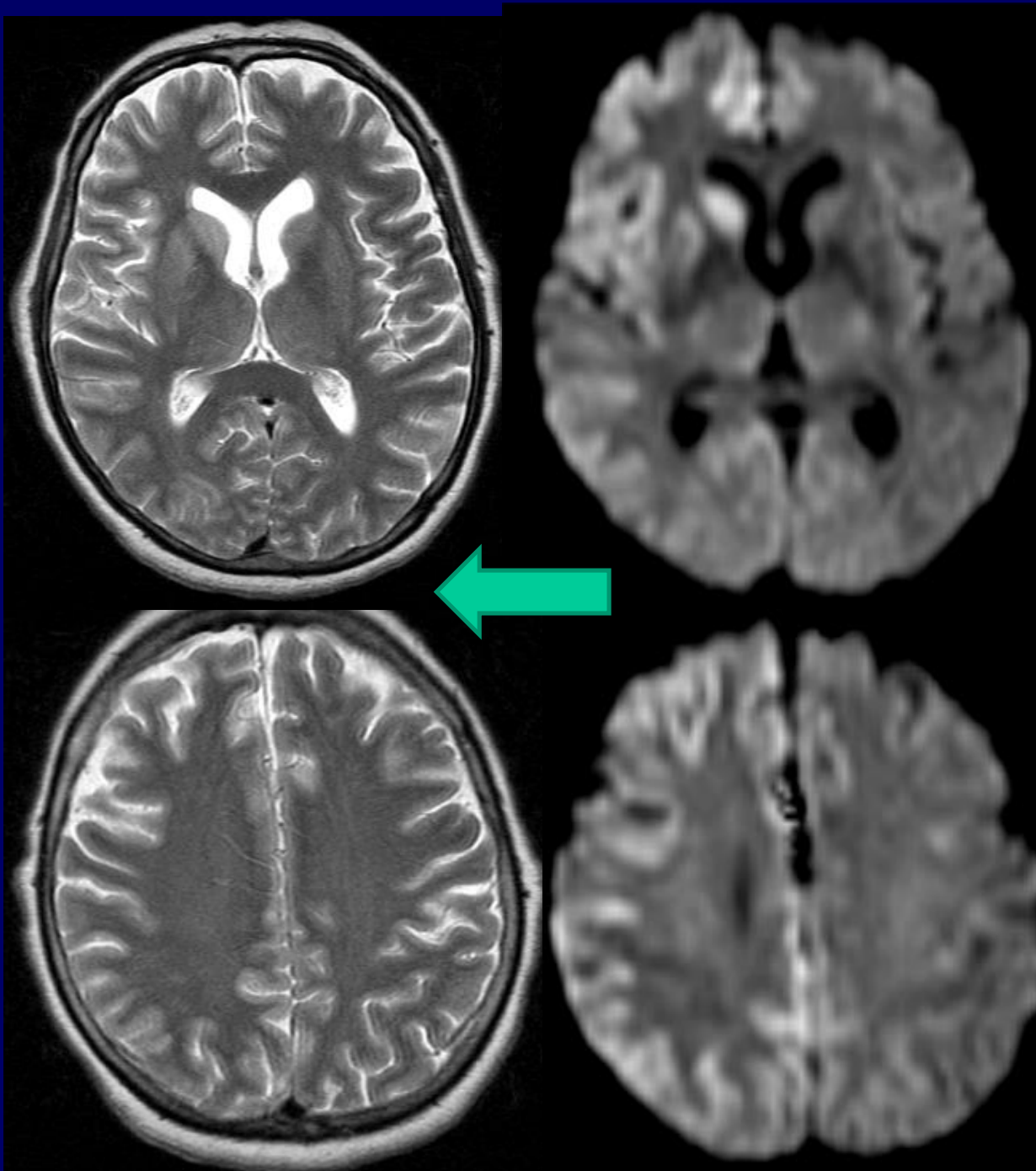
Forme *familiale*: autosome dominante chromosome 20

Forme *sporadique*: mutation du gène

Forme *infectieuse*: transmission de la protéine

- * iatrogène: HGH de cadavre – greffon de dure-mère

- * exogène: viande bovine ('vache folle')



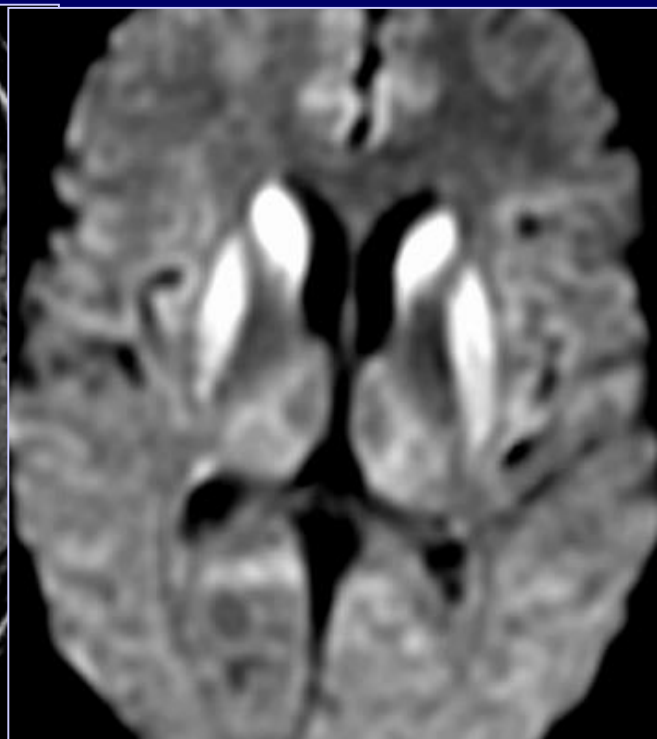
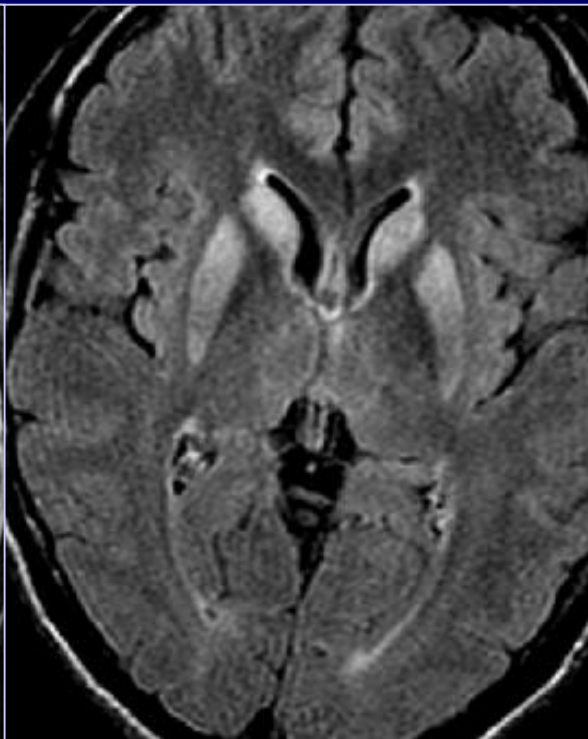
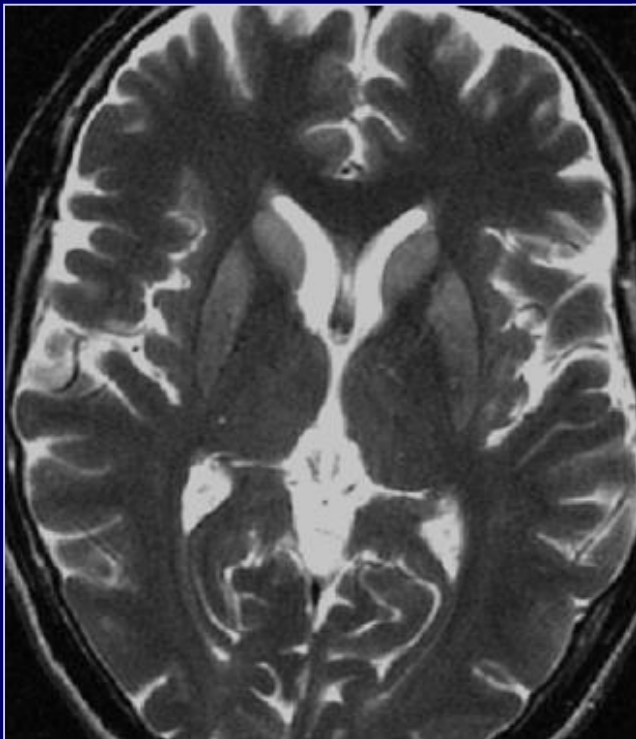
Atteinte
de la SG
corticale
et
NGC

Atteinte
bilatérale
Asymétrique

*Bien vue en
pondération de diffusion*



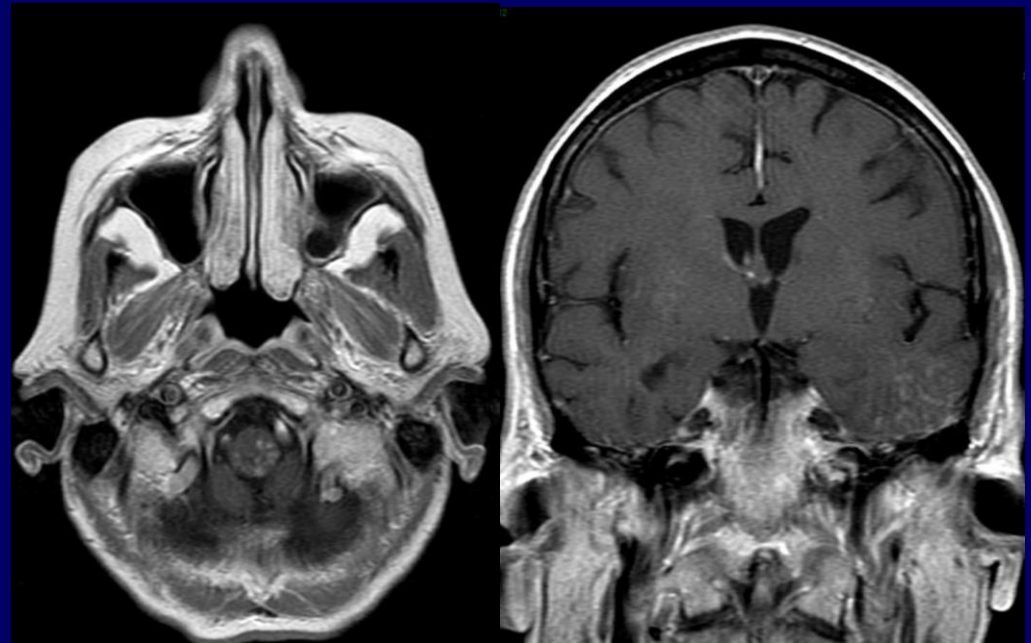
Pattern recognition



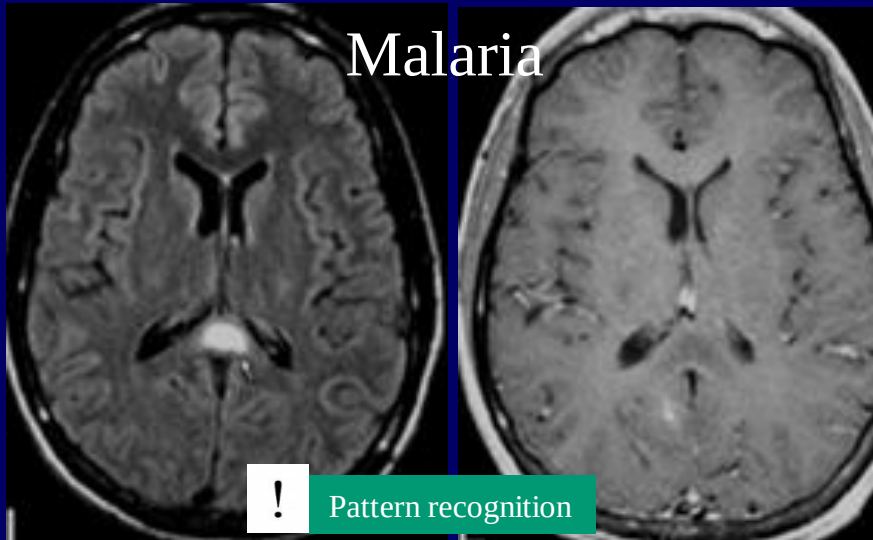
Kyste hydatique

PARASITOSE

Bilharziose

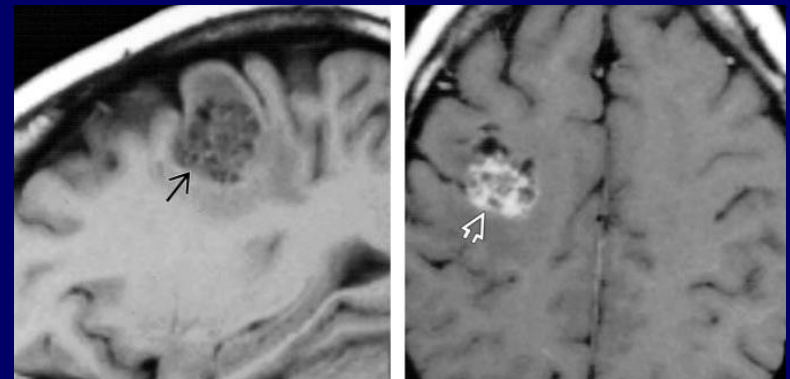


Malaria

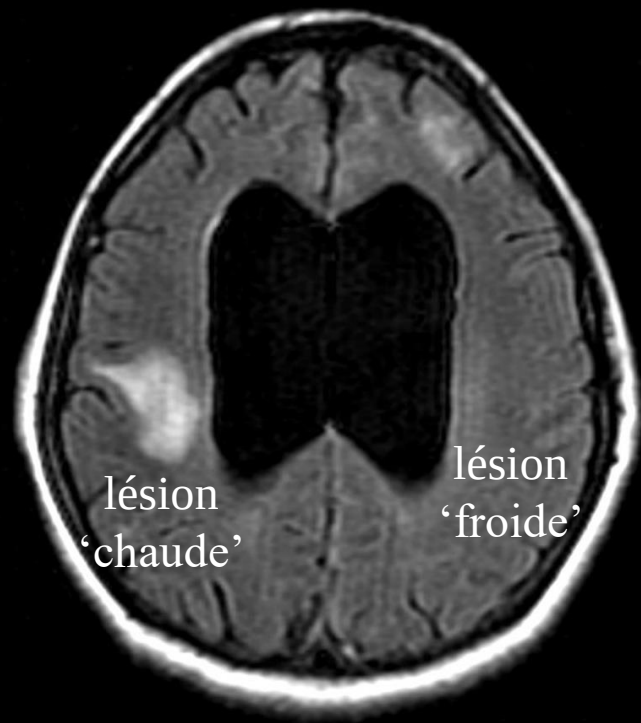
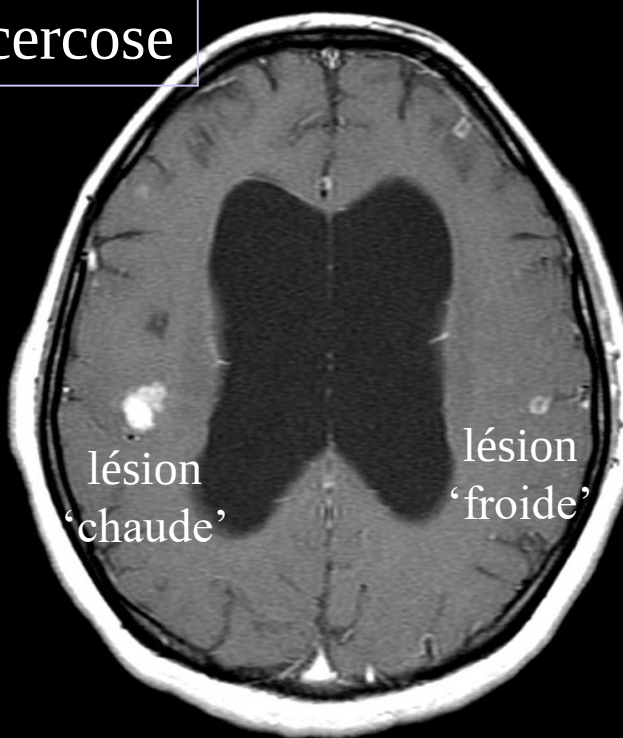
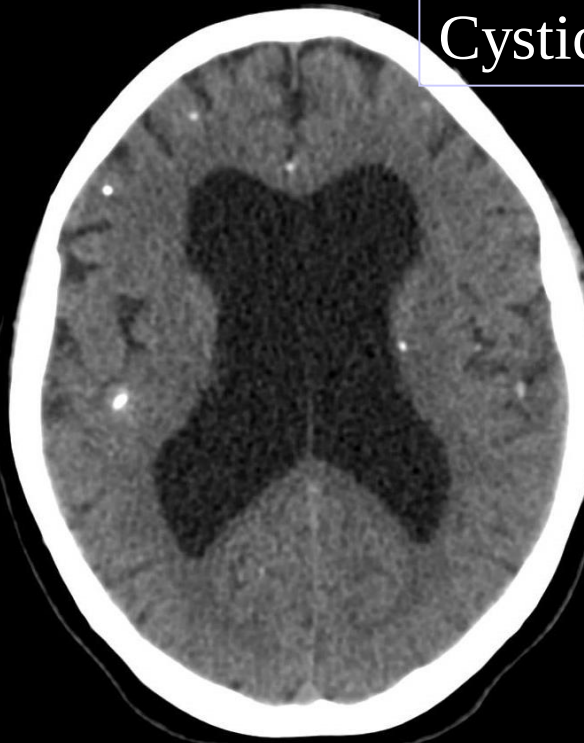


Pattern recognition

Amibiase



Cysticercose



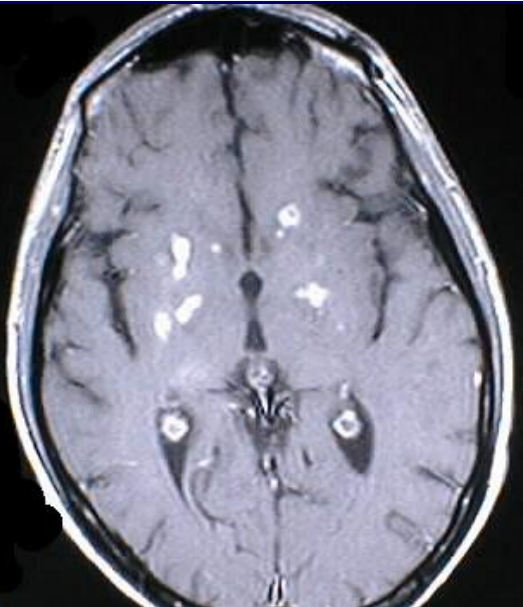
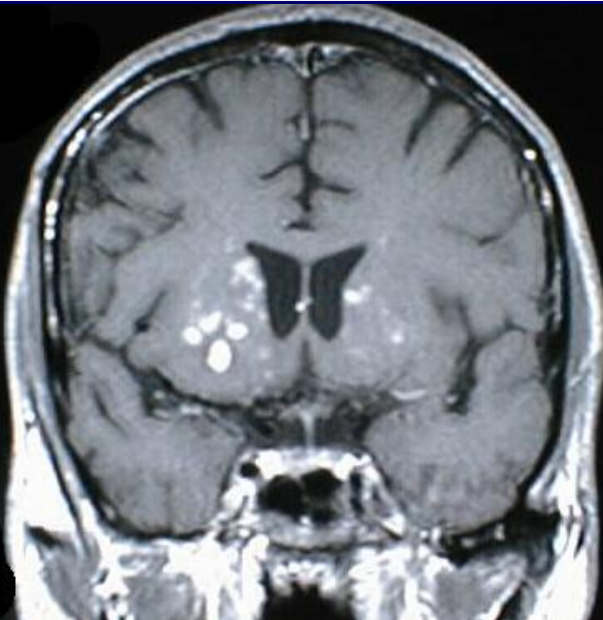
FUNGI

Cryptocoque

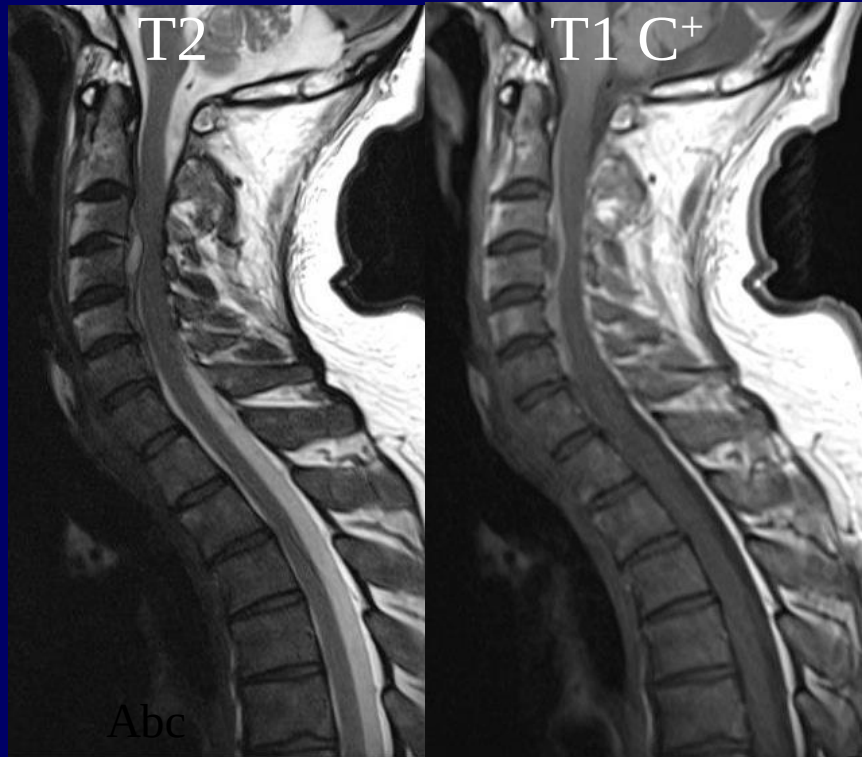
Méningite

Lésions des EPV de VR des NGC

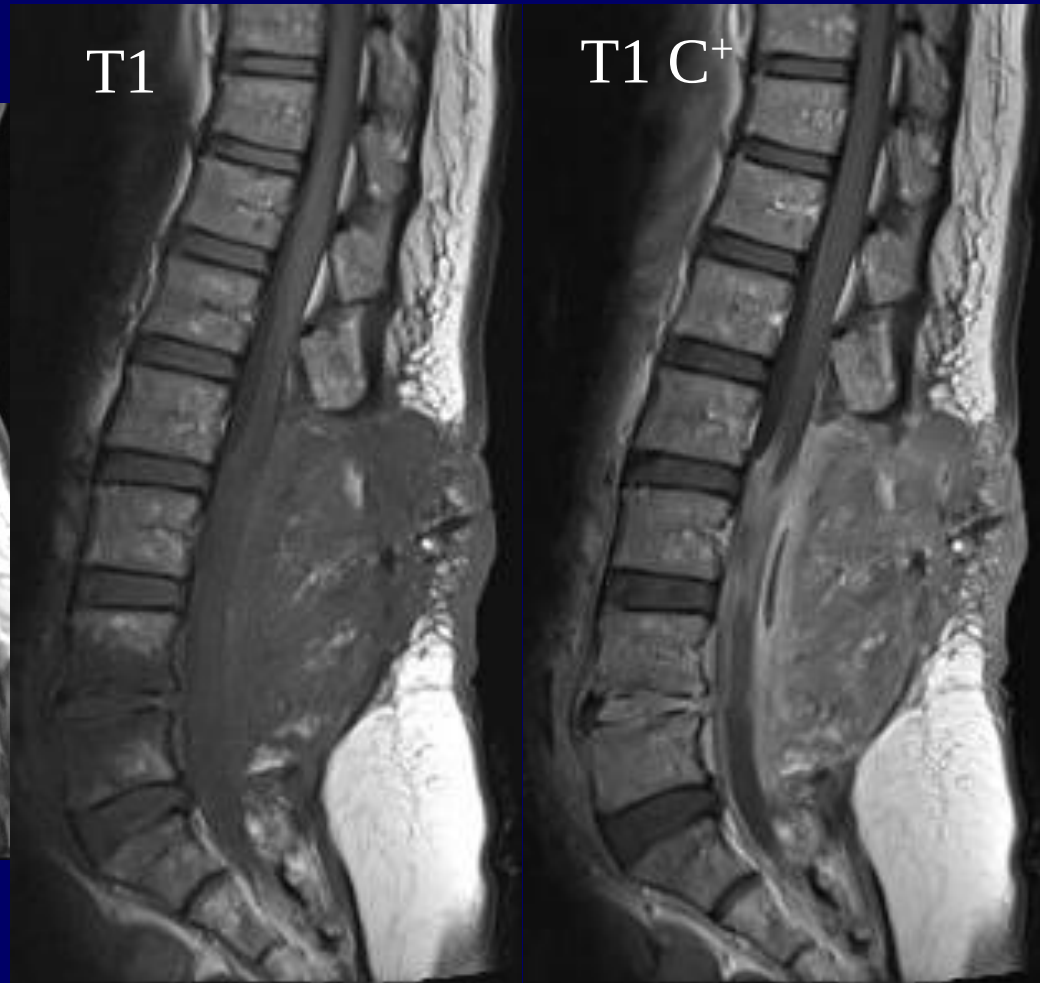
Patient immunodéprimé



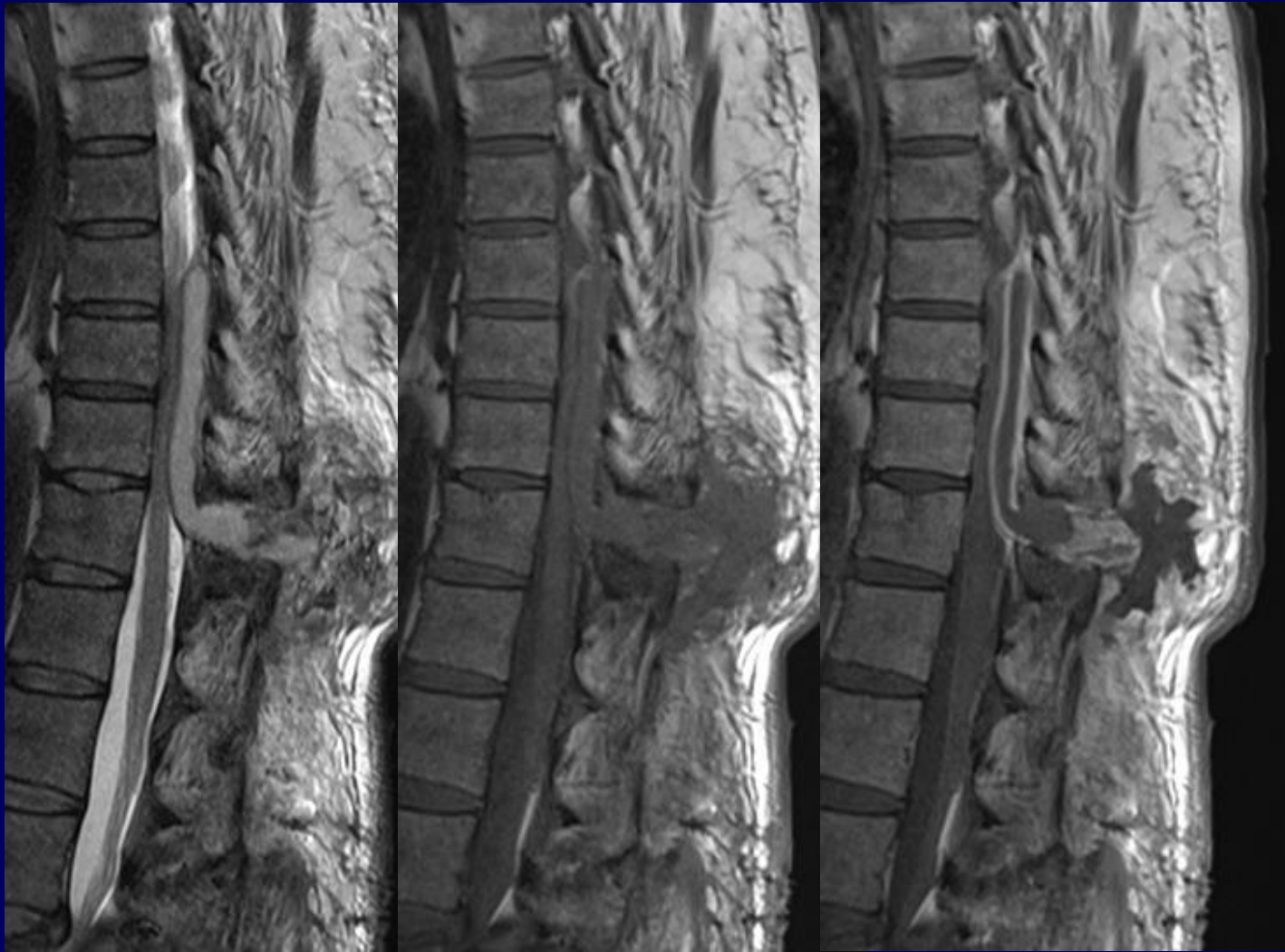
Infectiologie spinale



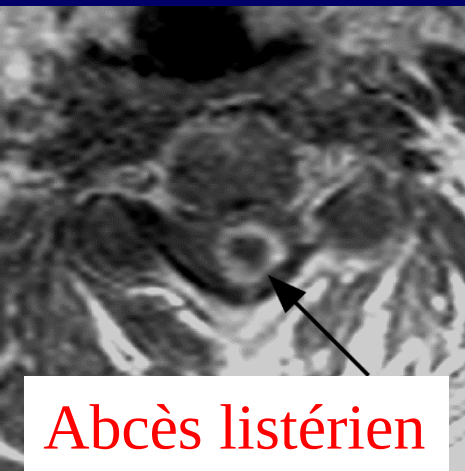
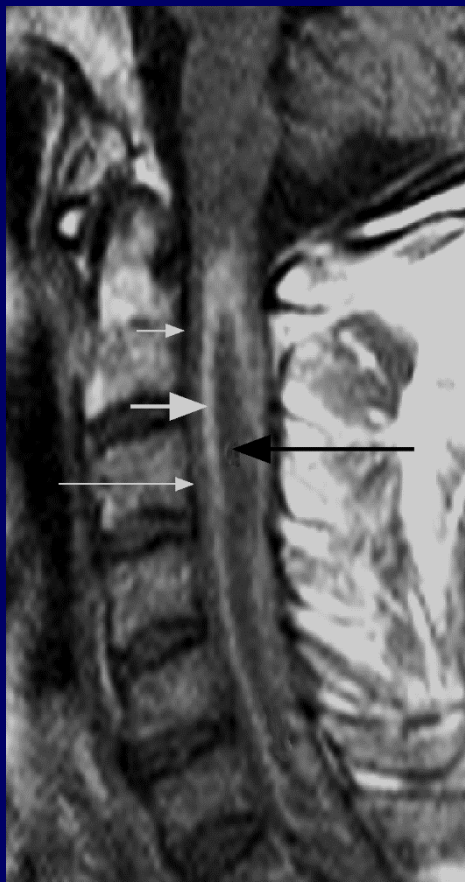
Abcès épidural 'hématogène'



Abcès épidural & spondylodiscite



Abcès épidual 'signé'



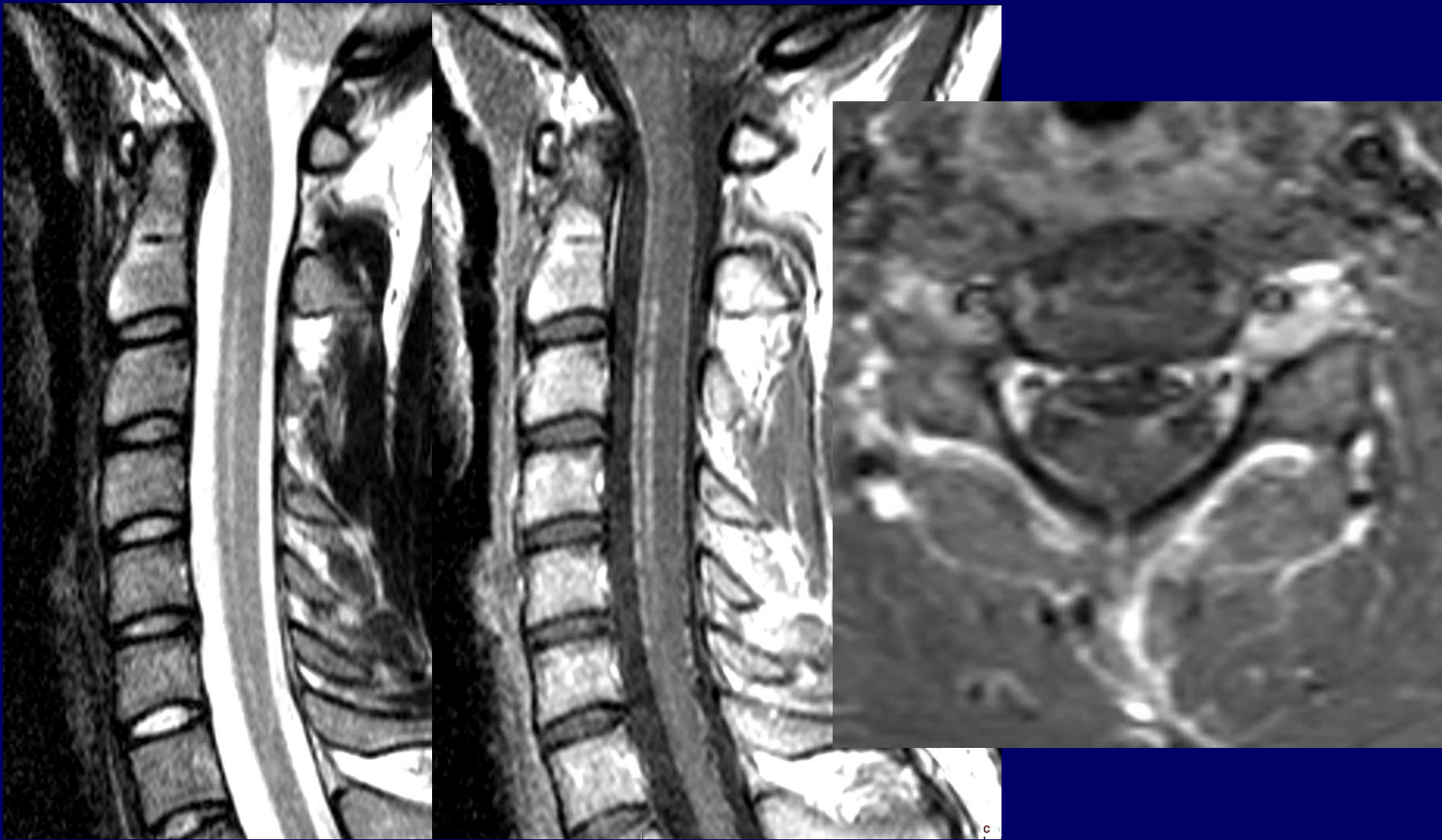
Abcès listérien



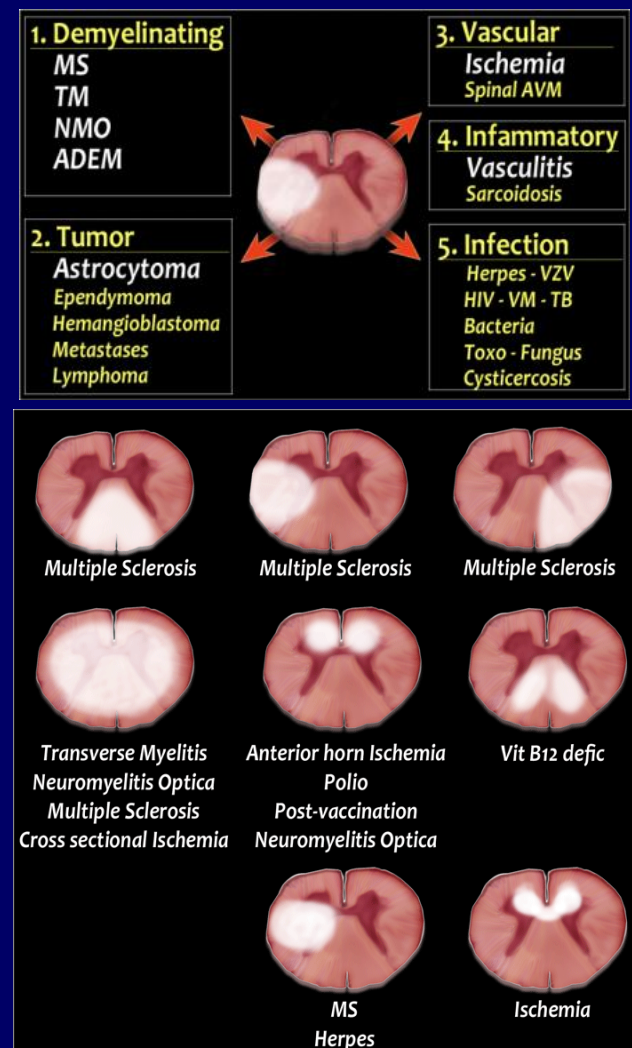
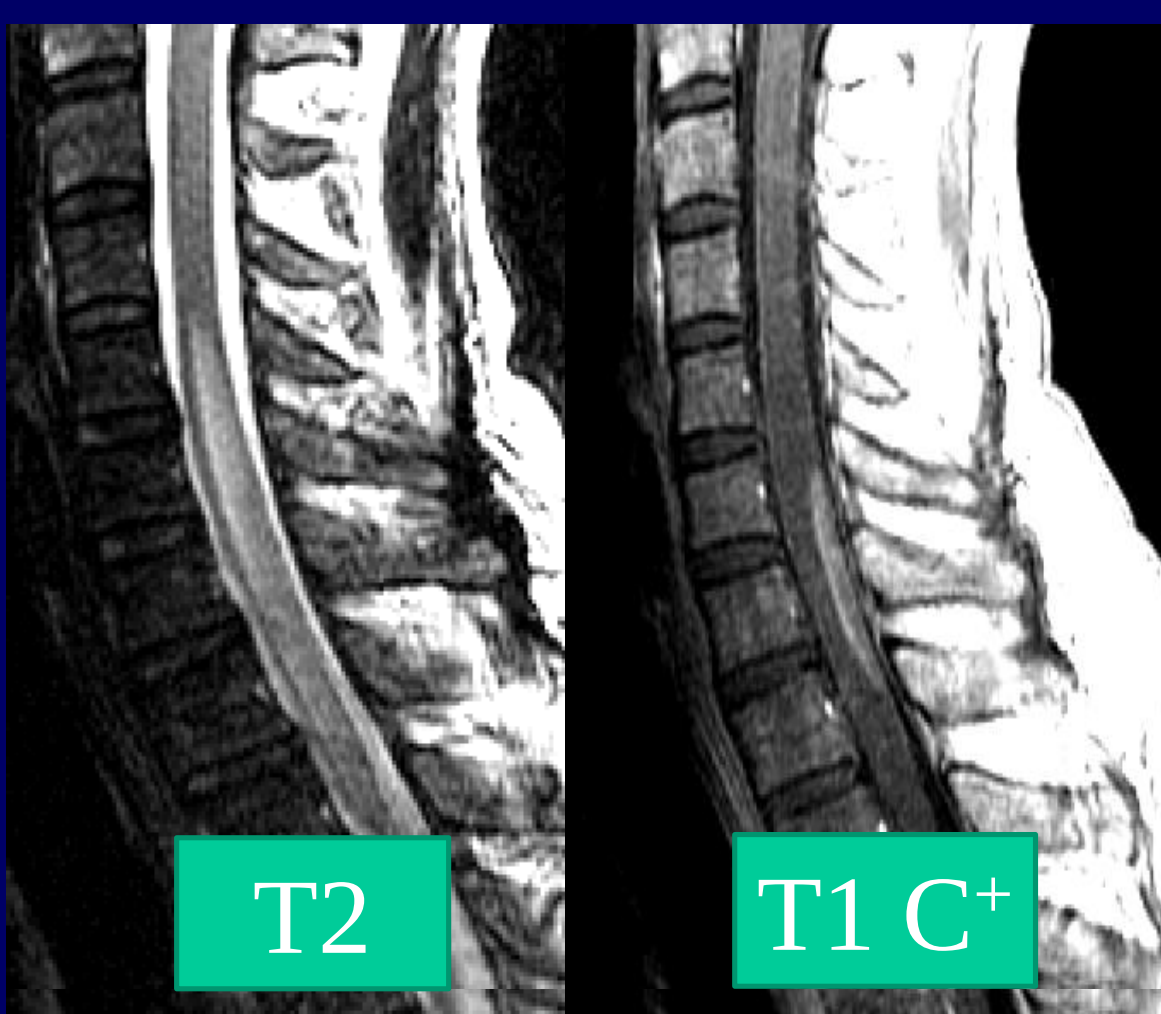
Schistosomiase



Toxocarose

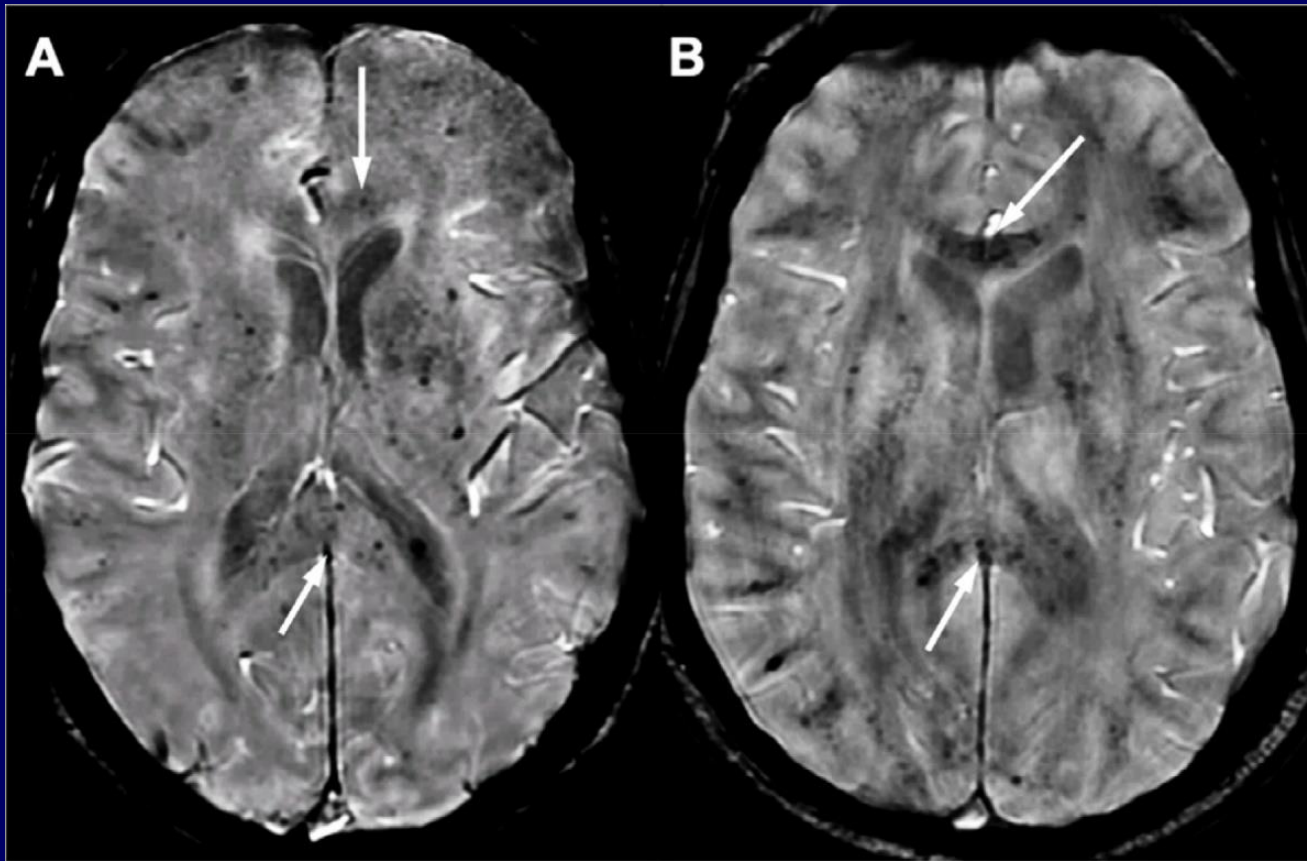


Radiculo-myélite à *Borrelia burgdorferi*

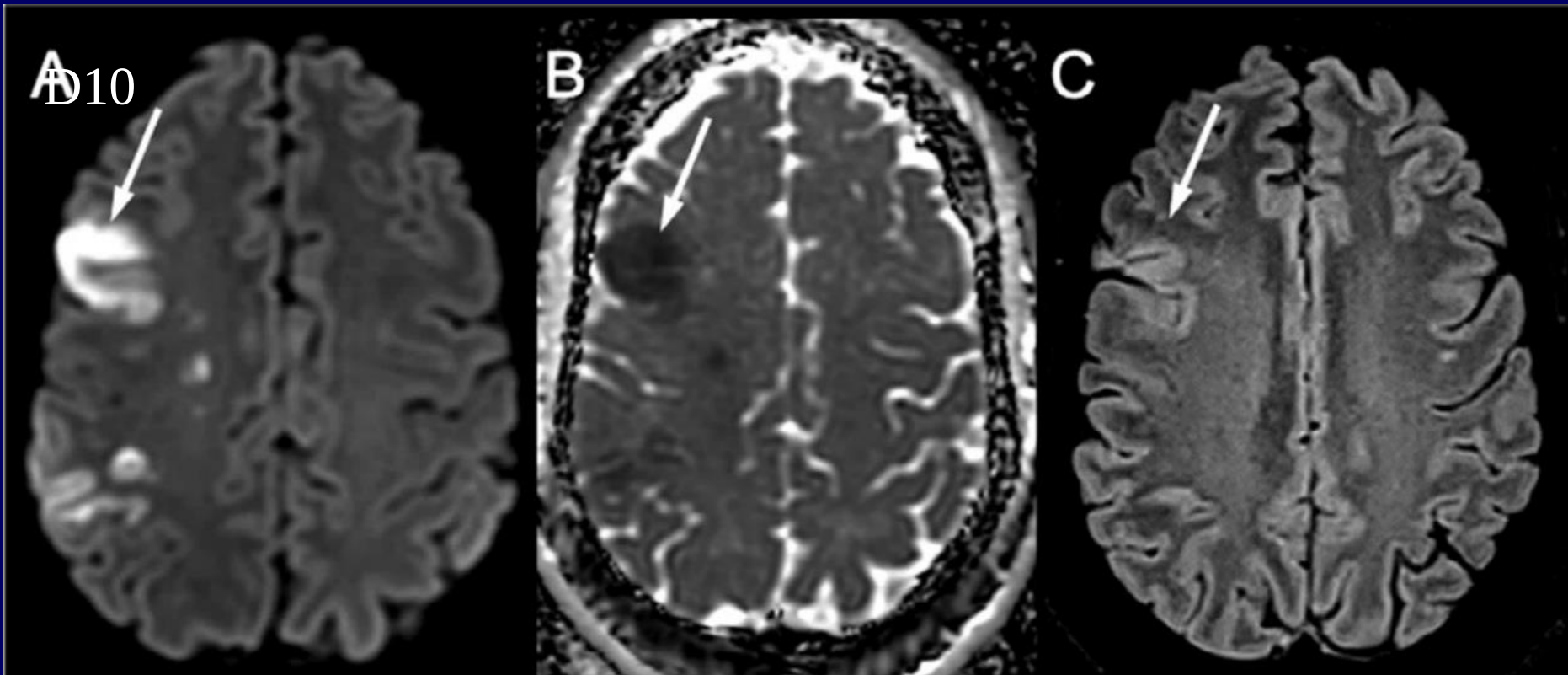


1. Disposer de T2 ('œdème') et T1 post-C⁺ (rupture de BHM)
2. Distinguer: **infection inflammation** carence tumeur ischémie

COVID 19 Sars-COV-2



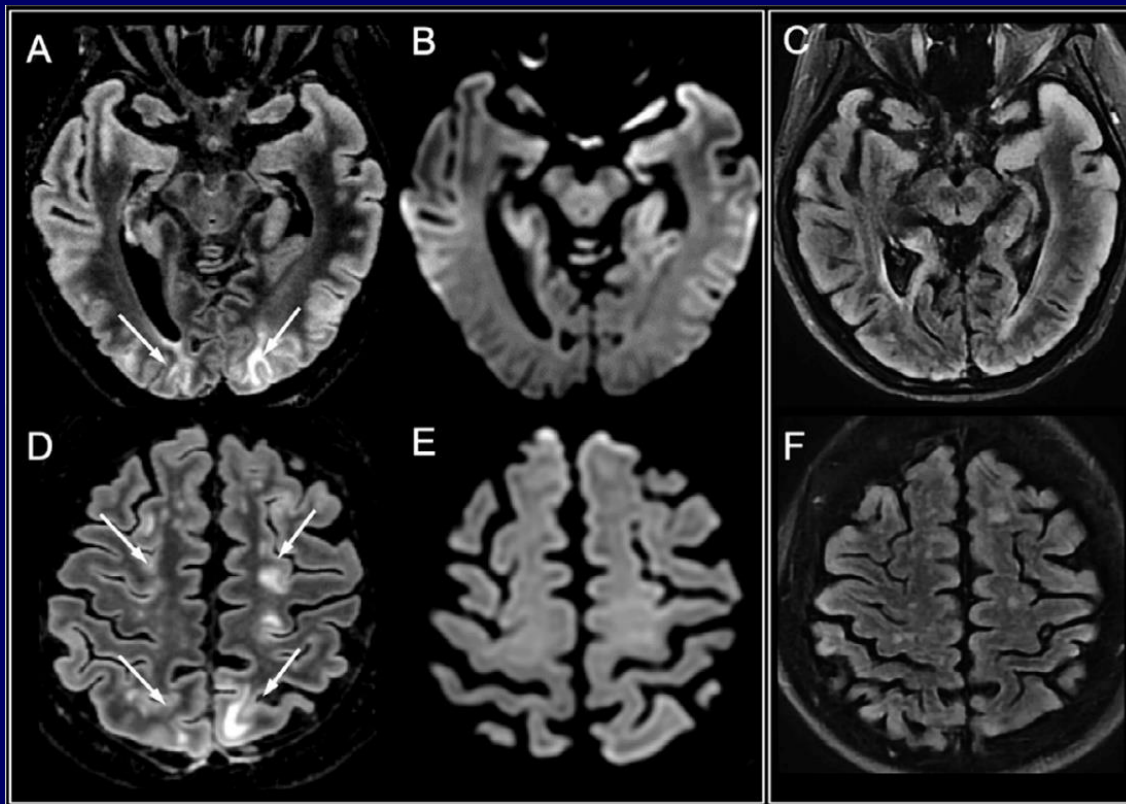
Dépositions hémossidériniques (surtout post-ECMO)



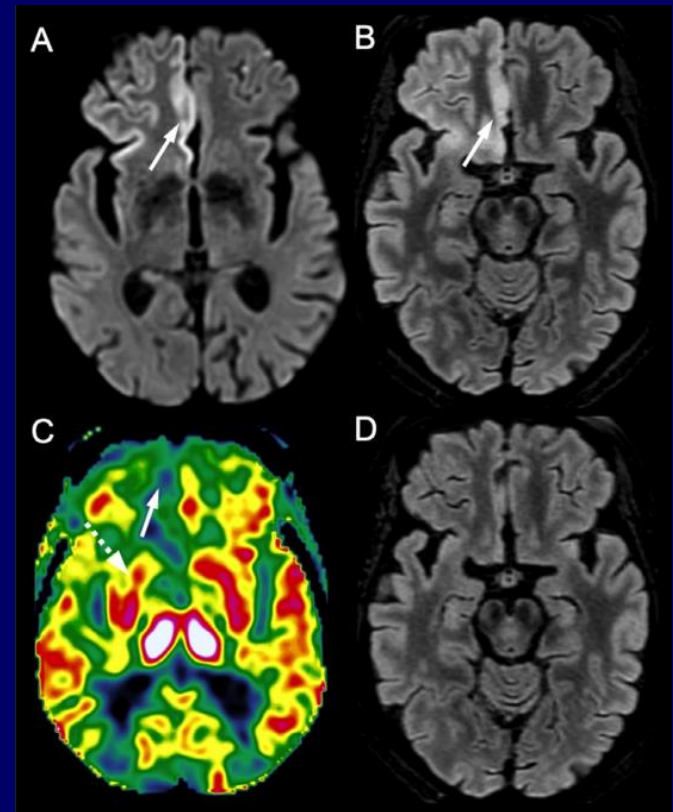
Thrombogène

artériel

veineux



PRES



Post-ictal

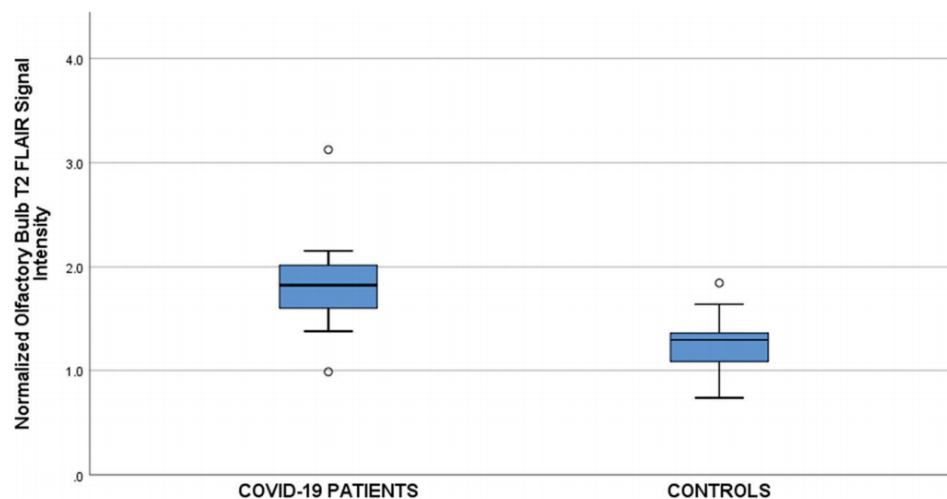
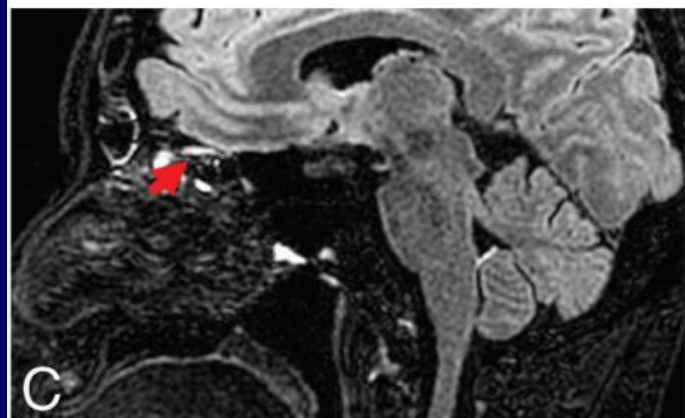
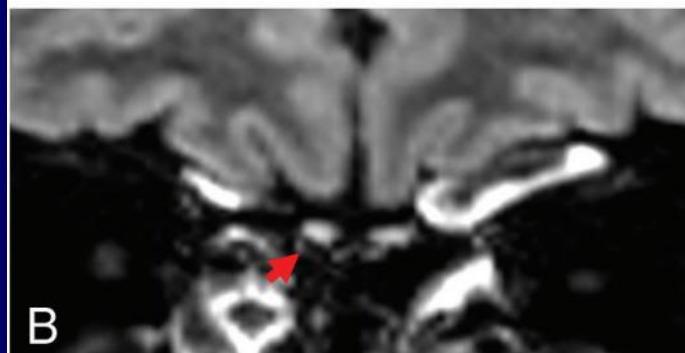
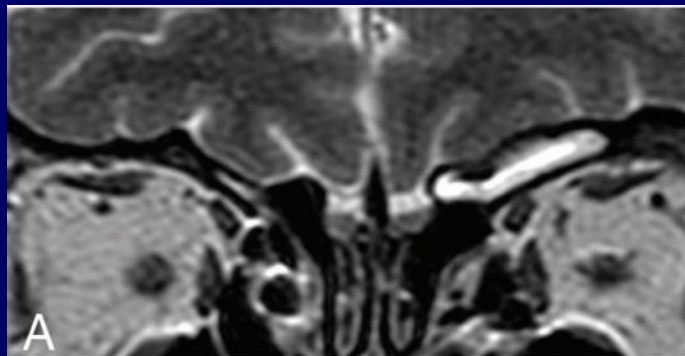


FIG 2. Normalized OB T2 FLAIR signal intensity in patients and controls. Box-and-whisker plots show median and interquartile ranges for each group. There was a significant difference in mean signal intensity between the patients and the controls ($P = .003$). Findings remain significant even with the exclusion of the COVID-19 high outlier depicted at a mean normalized OB T2 FLAIR signal intensity of 3.1.

Olfactory Bulb Signal Abnormality in Patients with COVID-19 Who Present with Neurologic Symptoms

S.B. Strauss, J.E. Lantos, L.A. Heier, D.R. Shatzkes, and C.D. Phillips

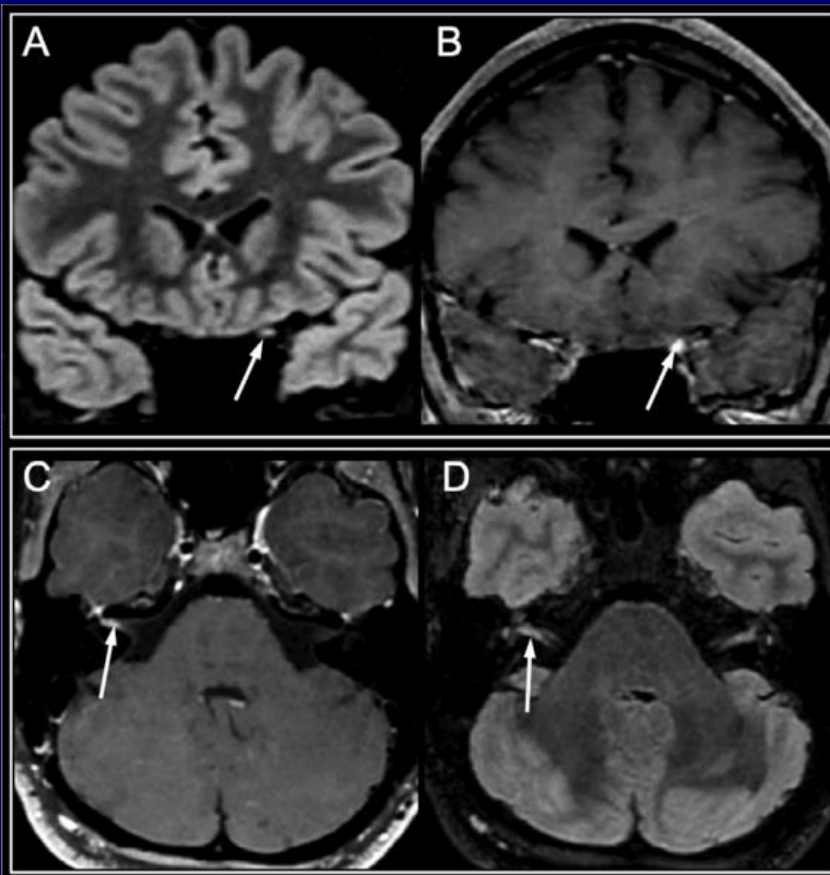


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<http://dx.doi.org/10.3174/ajnr.A6751>

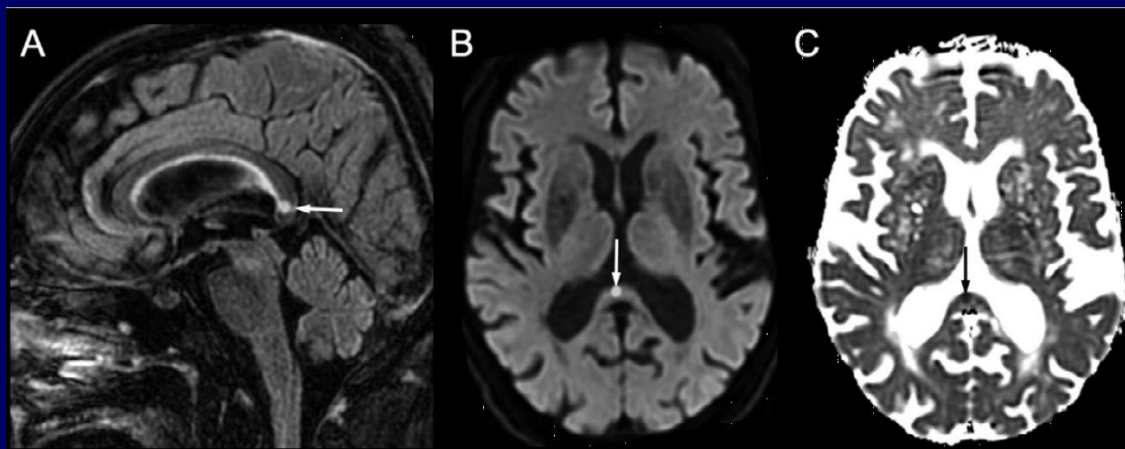
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Strauss Oct 2020 www.ajnr.org

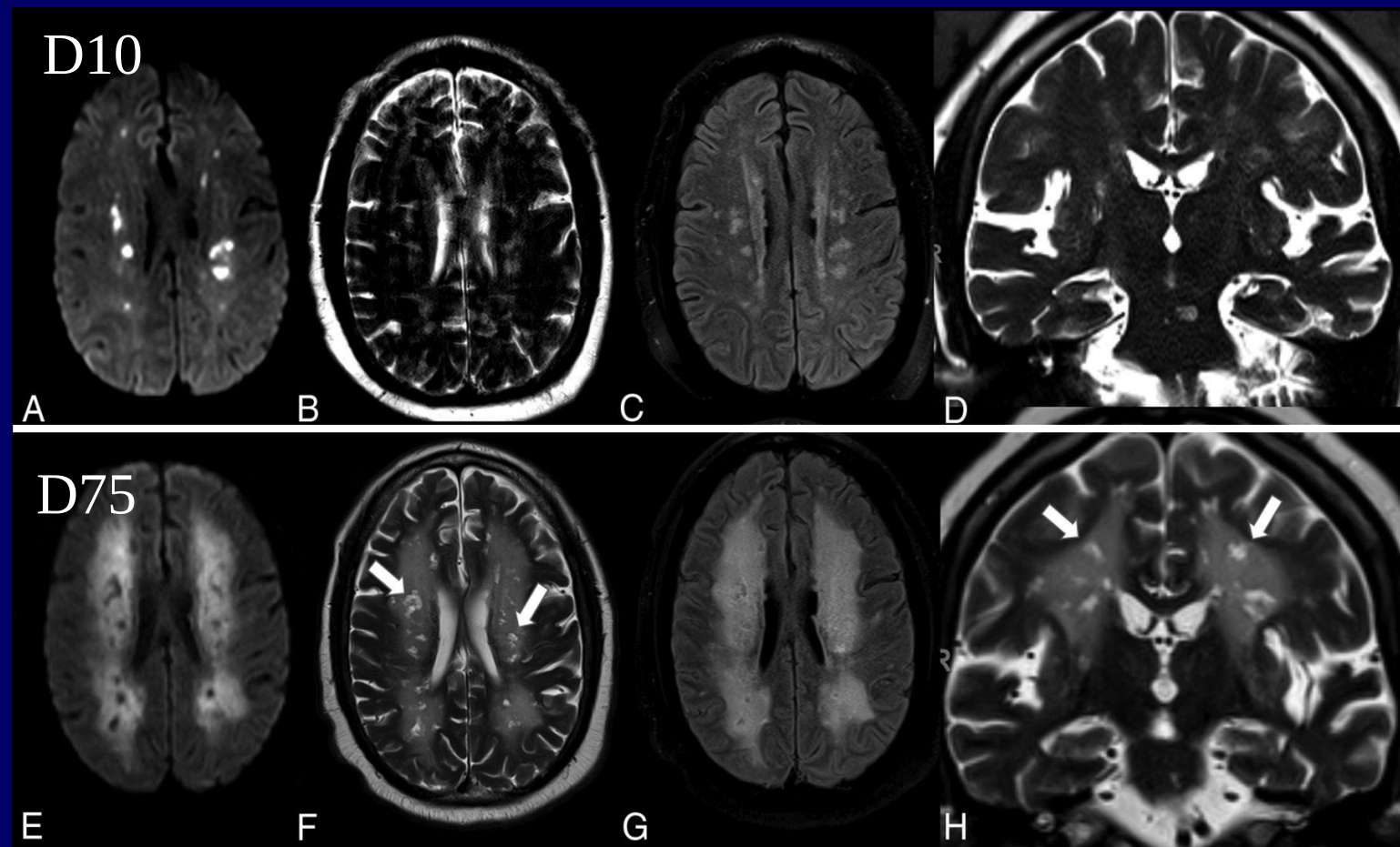


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S. Agarwal et al. AJNR Am J Neuroradiol
doi:10.3174/ajnr.A6898



VANDAL : Virus Associated Necrotizing Disseminated Encephalopathy

This may be the result of COVID19-related

endothelial injury
cytokine storm
micro-angiopathy