

Cours RDGN2120 2019-2020

Compléments de Neuroradiologie

5^{ème} cours du jeudi 24 octobre 2019 (1)

Imagerie des démences



Dr Thierry Duprez

Professeur Clinique

Chef de Clinique

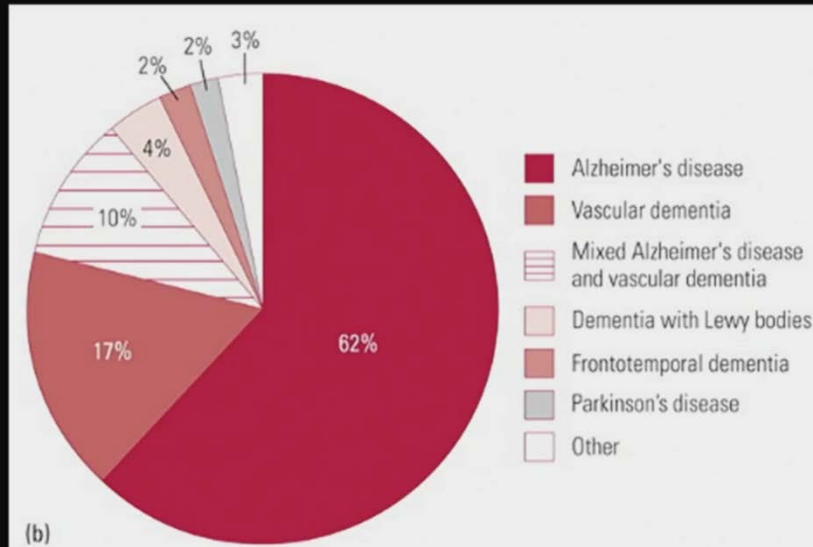
Université catholique de Louvain
Cliniques universitaires Saint-Luc

thierry.duprez@uclouvain.be

<http://www.saintluc.be>



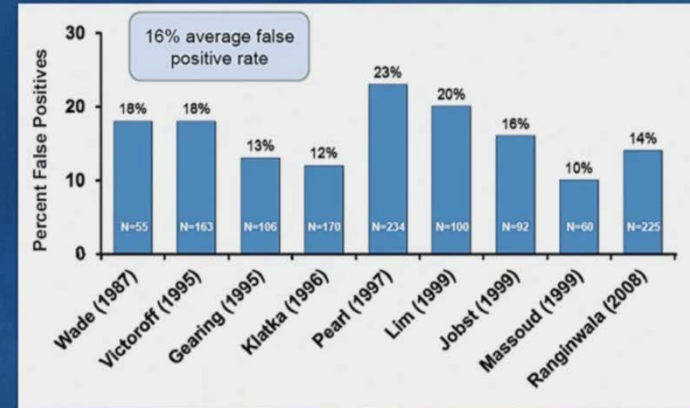
Causes of dementia



Prépondérance de AD dans les démences dégénératives

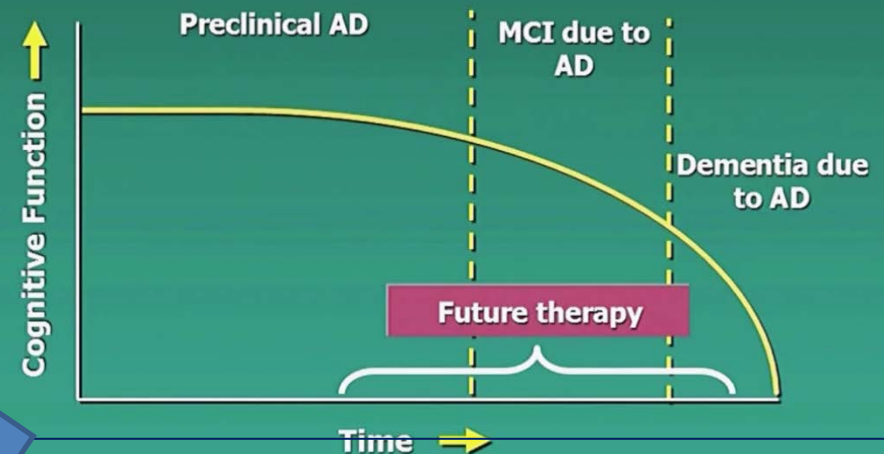
- Place pour l'imagerie
 - diagnostique
 - monitoring de réponse thérapeutique

Clinical Diagnosis



Précision diagnostique clinique imparfaite

Redefining Alzheimer's Disease



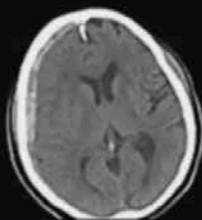
Thérapies ciblées (anti-amyloïdes et anti-tau)

FDA-approved techniques for imaging dementia

Clinical imaging for dementia

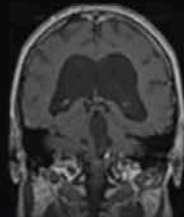
Noncon
head CT

- Identify urgent treatable causes



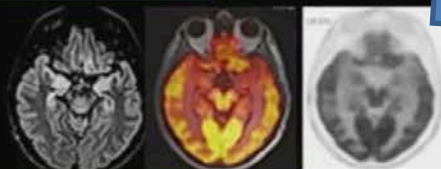
Noncon
brain MRI

- Exclude other causes



FDG PET

- Complex cases



EMERGING OPTIONS

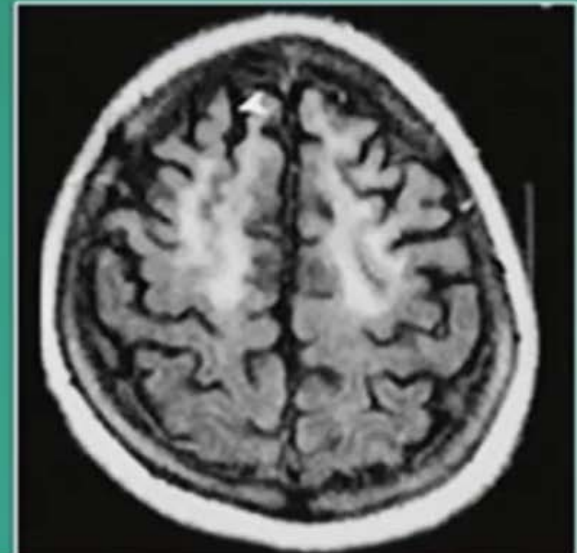
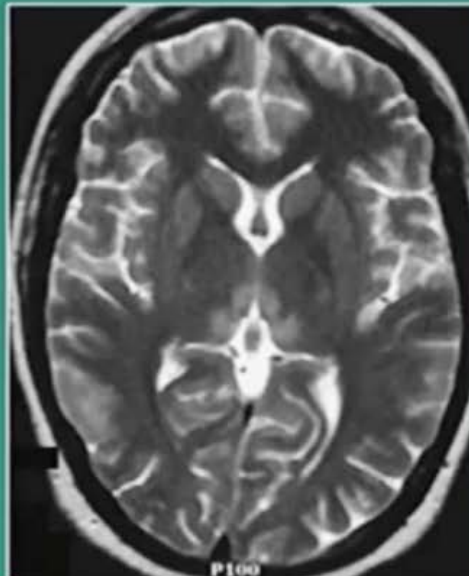
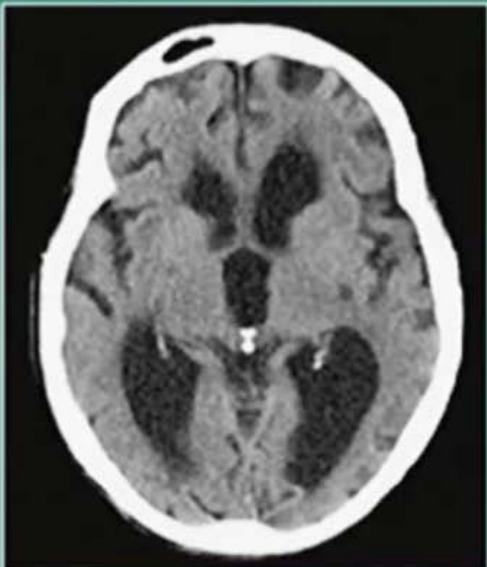
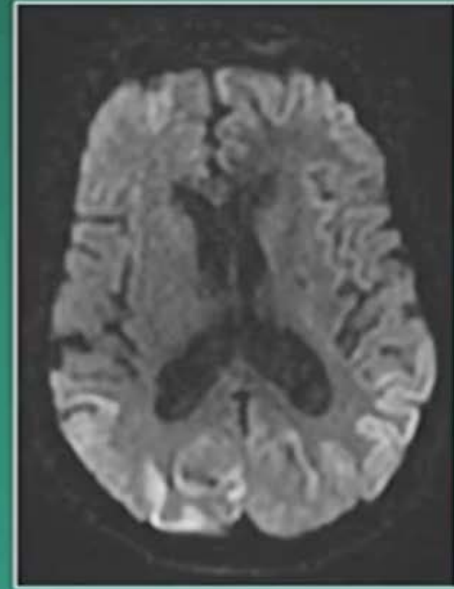
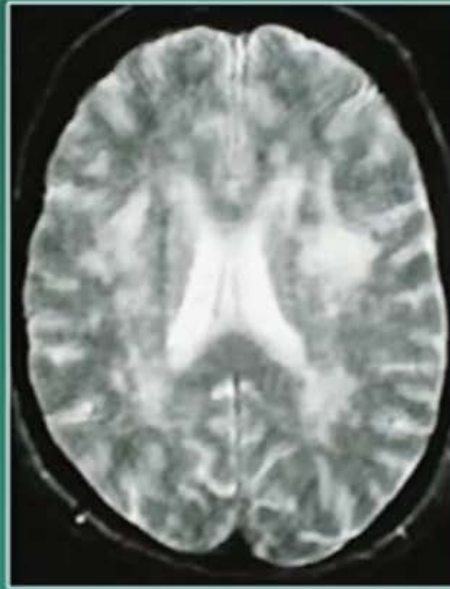
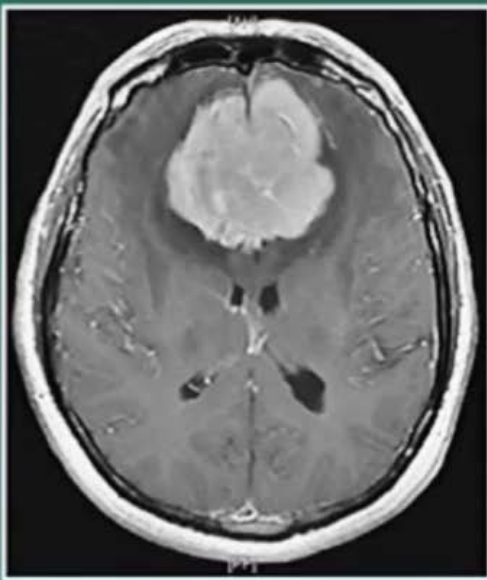
Amyloid PET

Quantitative
MRI

Perfusion MR (DSC,
ASL, DCE)

Functional MRI

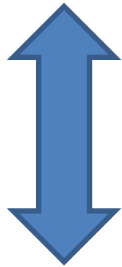
Imagerie morphologique CT/IRM → démences 'secondaires'



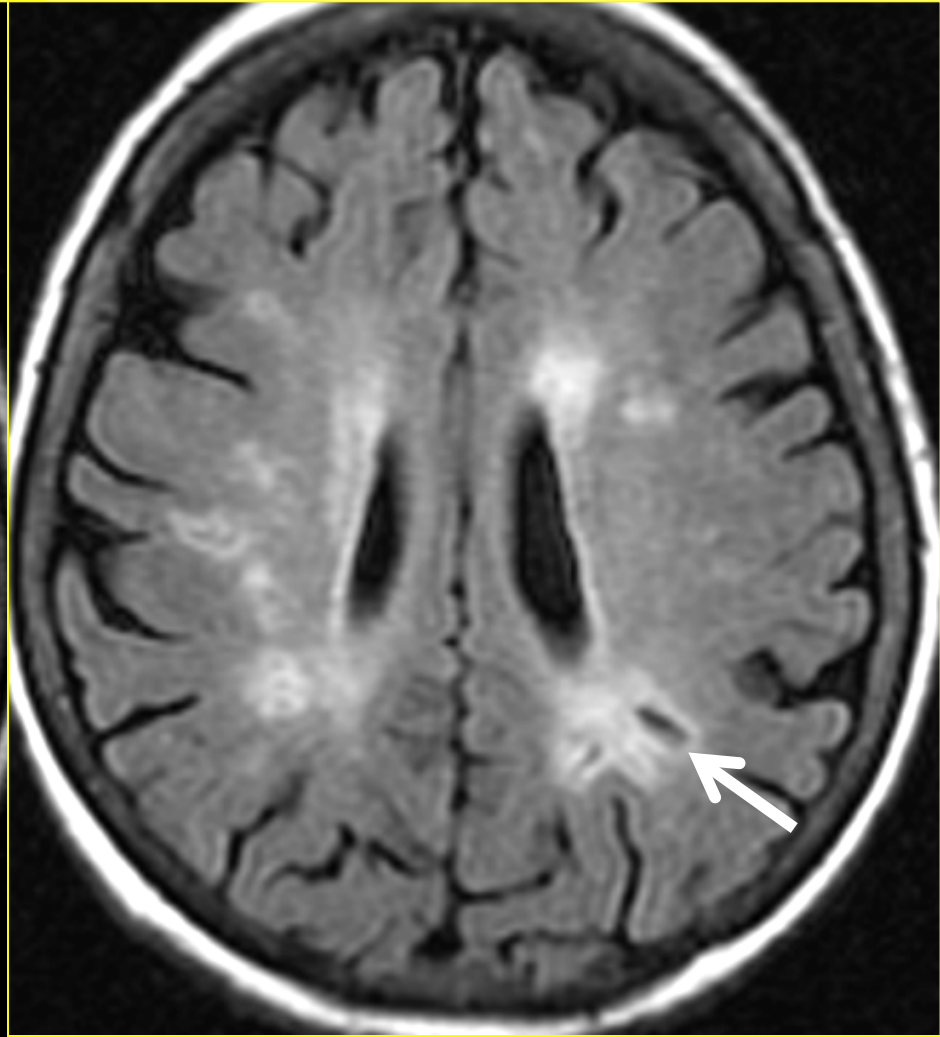
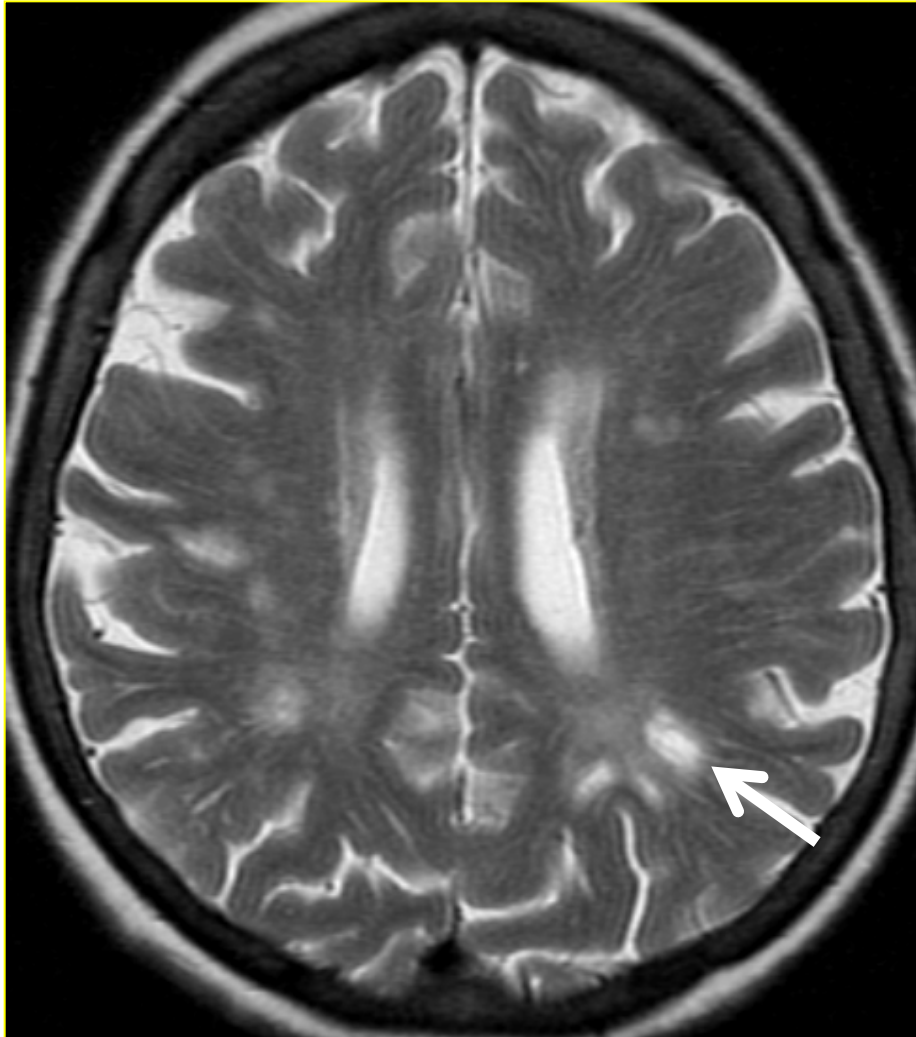
Veillessement cérébral 'normal'

Petites lésions *aspécifiques* de la SB

- Espaces péri-vasculaires de Virchow-Robin larges
→ LCR

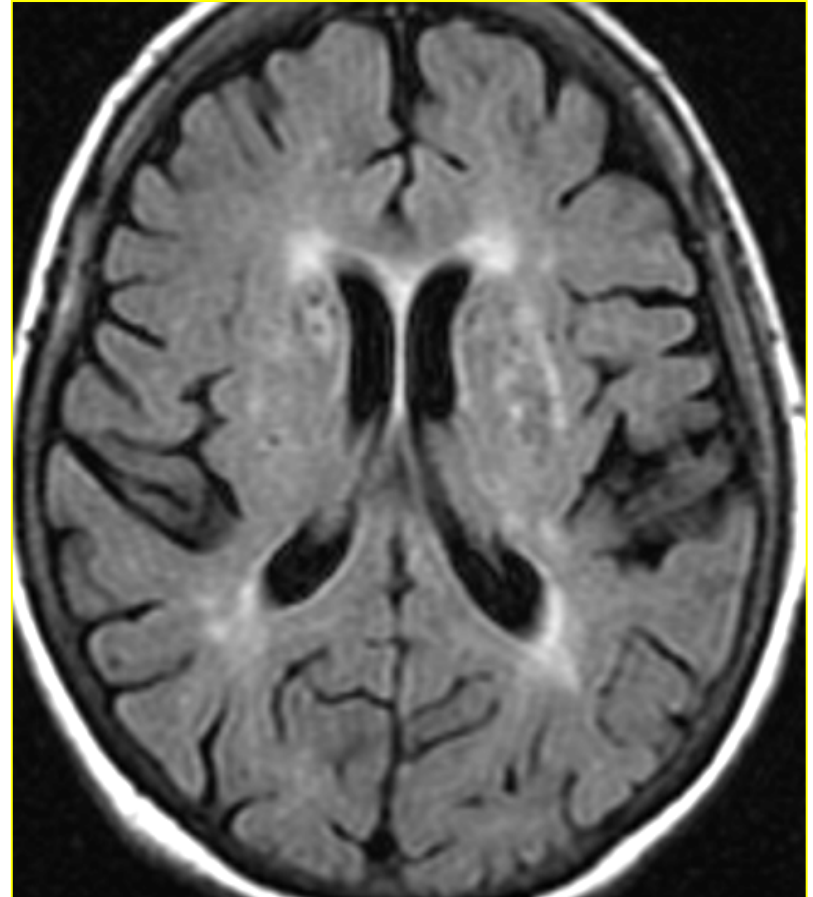
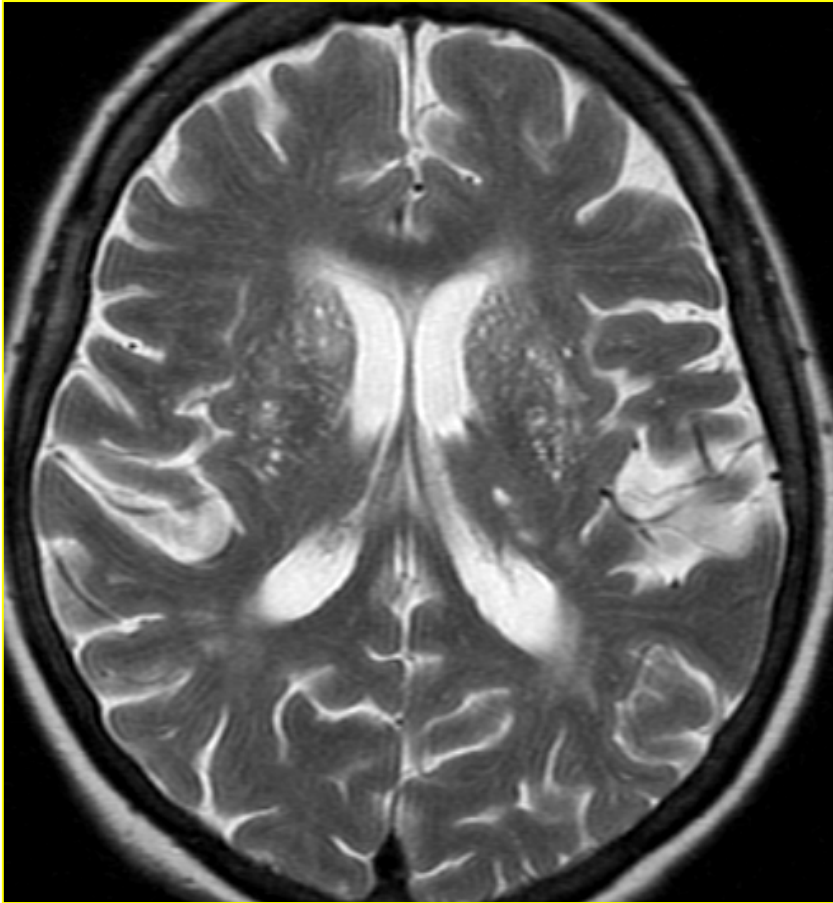


- Leucoaraiose
→ démyélinisation/gliose cicatricielle



'leucoaraiose' + 1 EPV de VR

Petites lésions aspécifiques de la SB



2 types

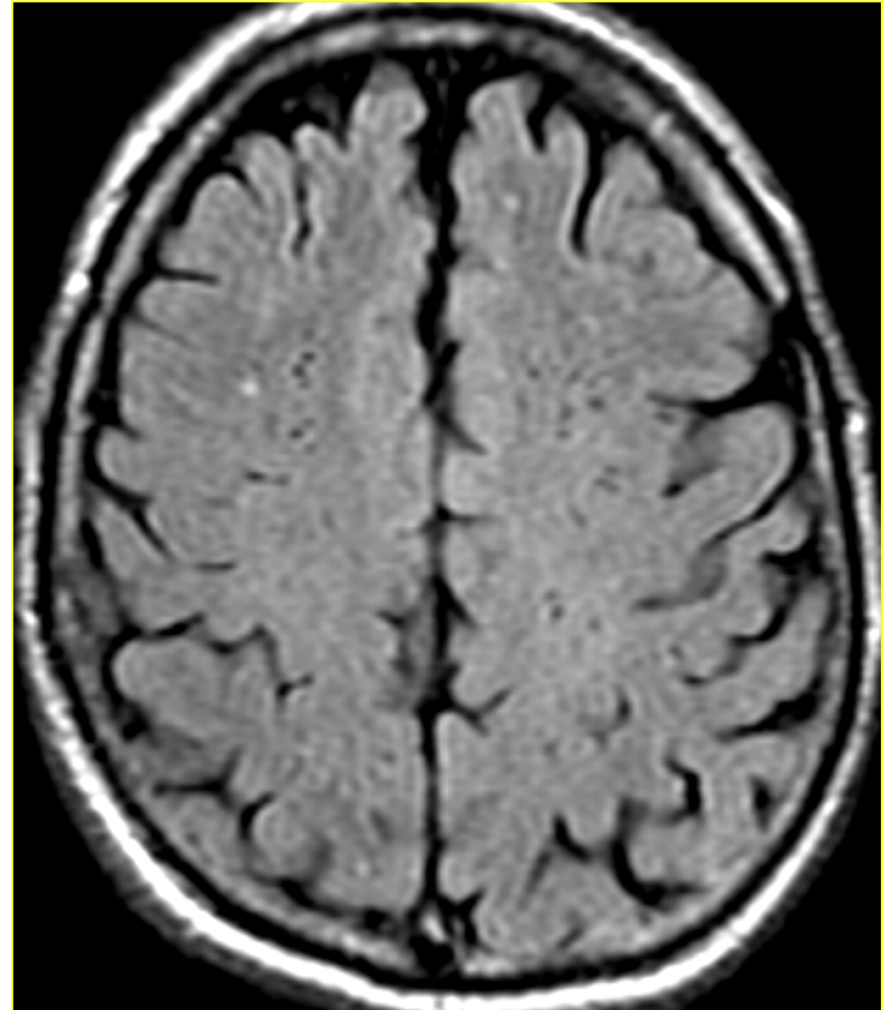
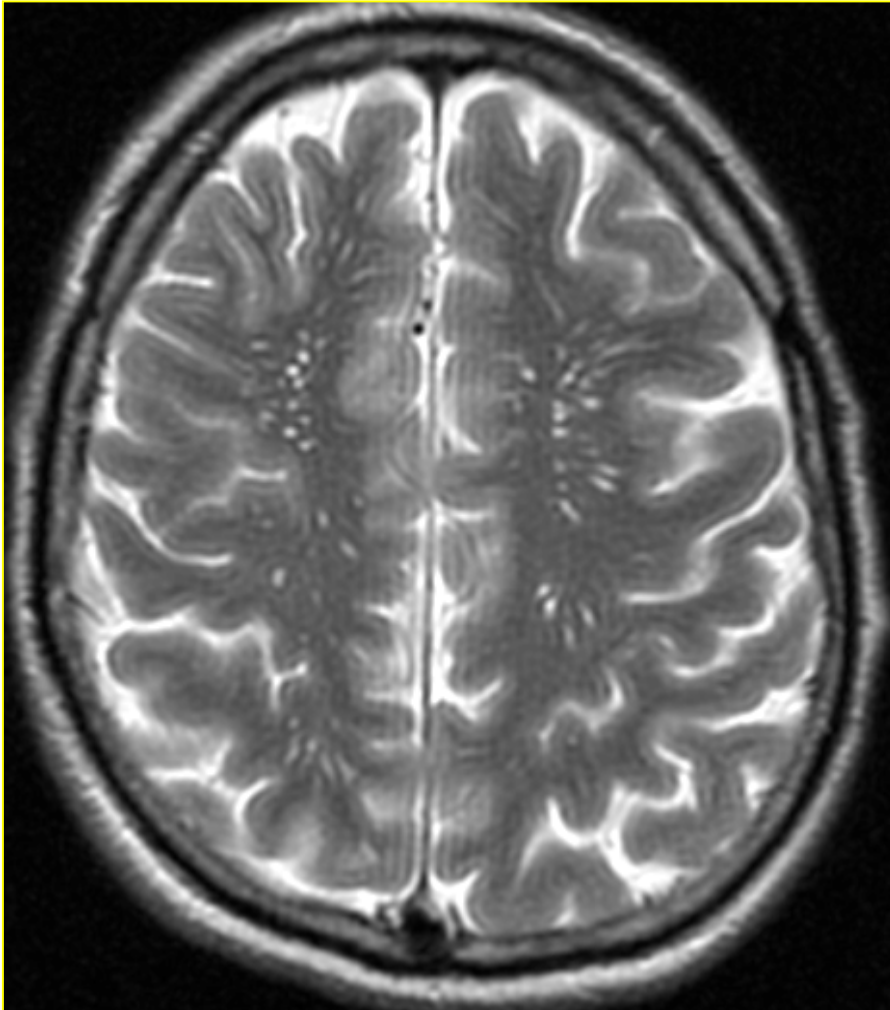
Blanc-Blanc = gliose

Blanc –Noir = LCR = EPV

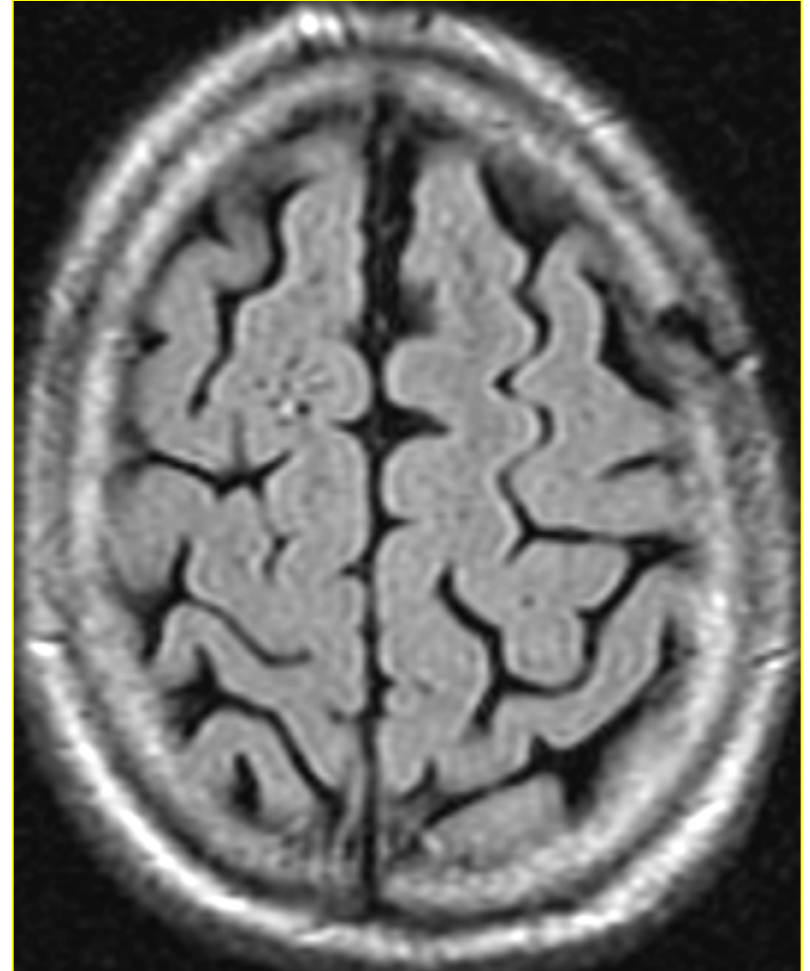
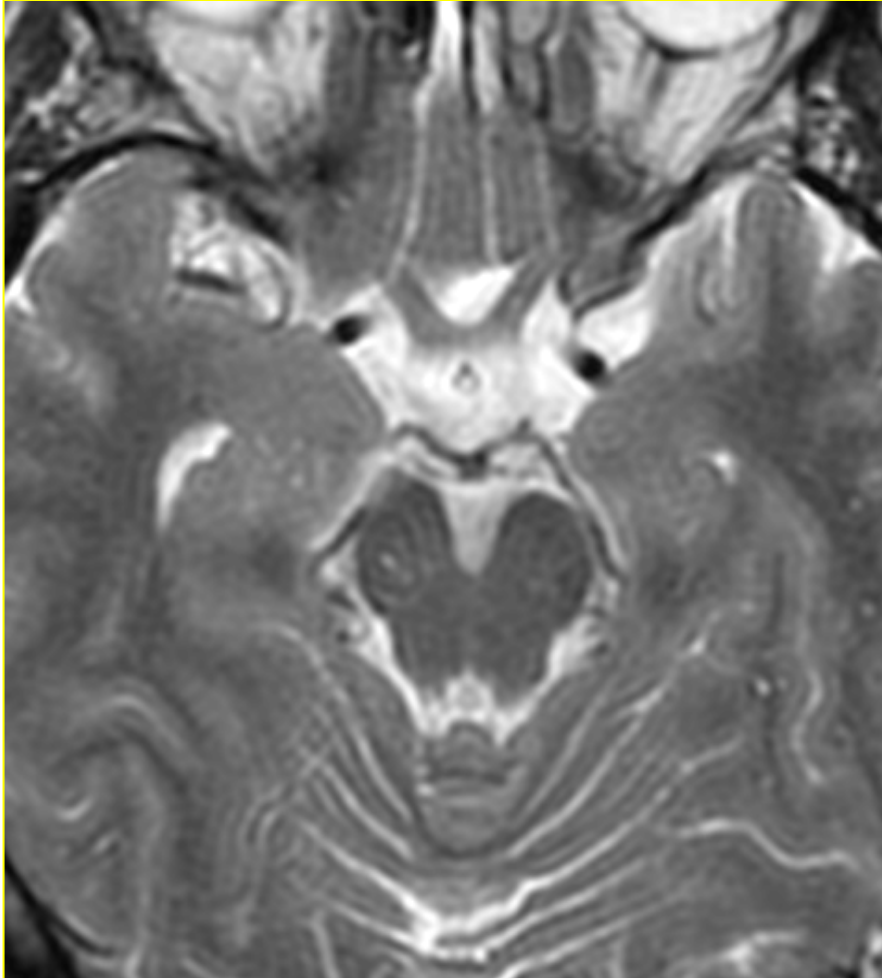
Veillessement cérébral

Petites lésions aspécifiques de la SB: *EPV de VR*

Localisations typiques



Petites lésions aspécifiques de la SB: *EPV de VR*



Démence vasculaire leucoaraiosique

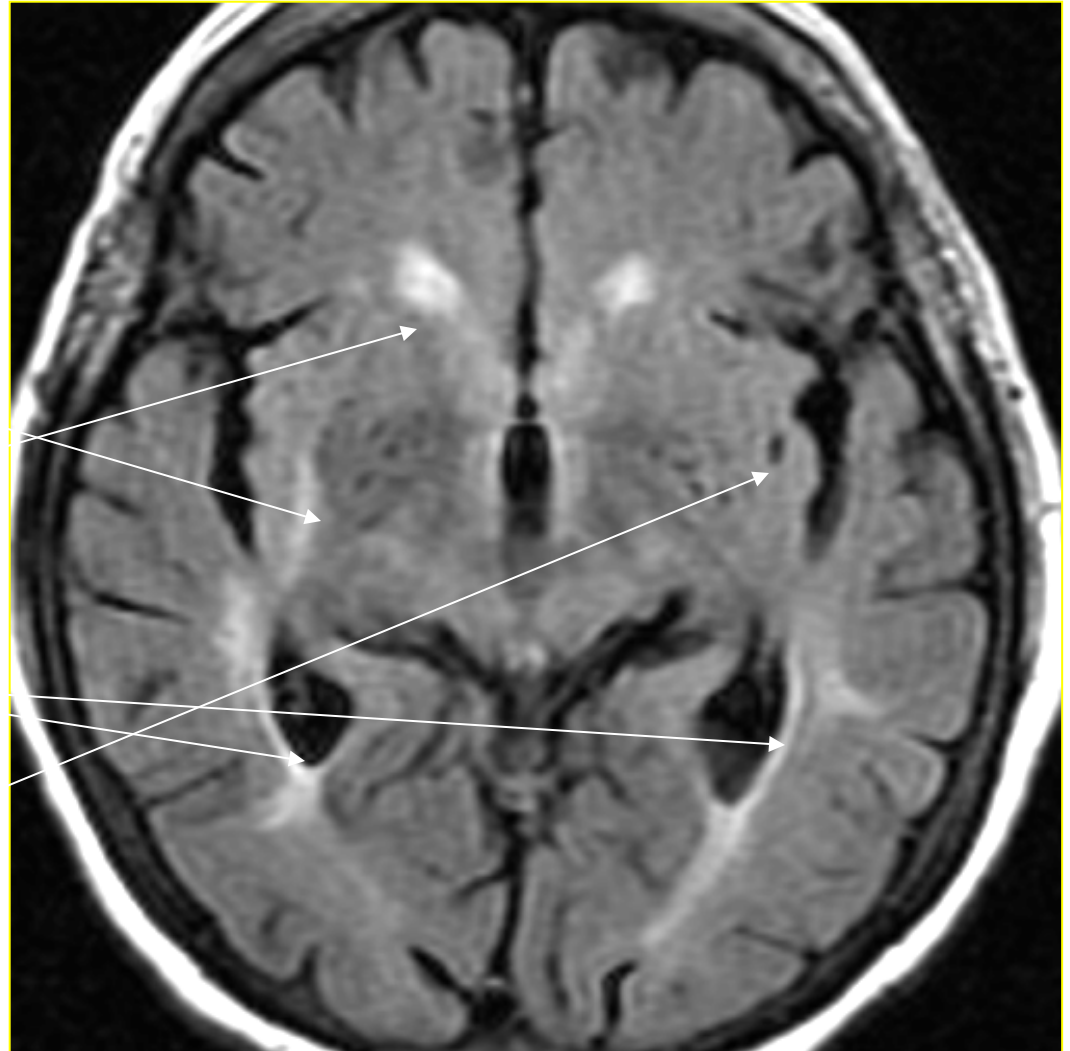
La « bande des quatre »

* WMHs

* CAPs

* PV Rim

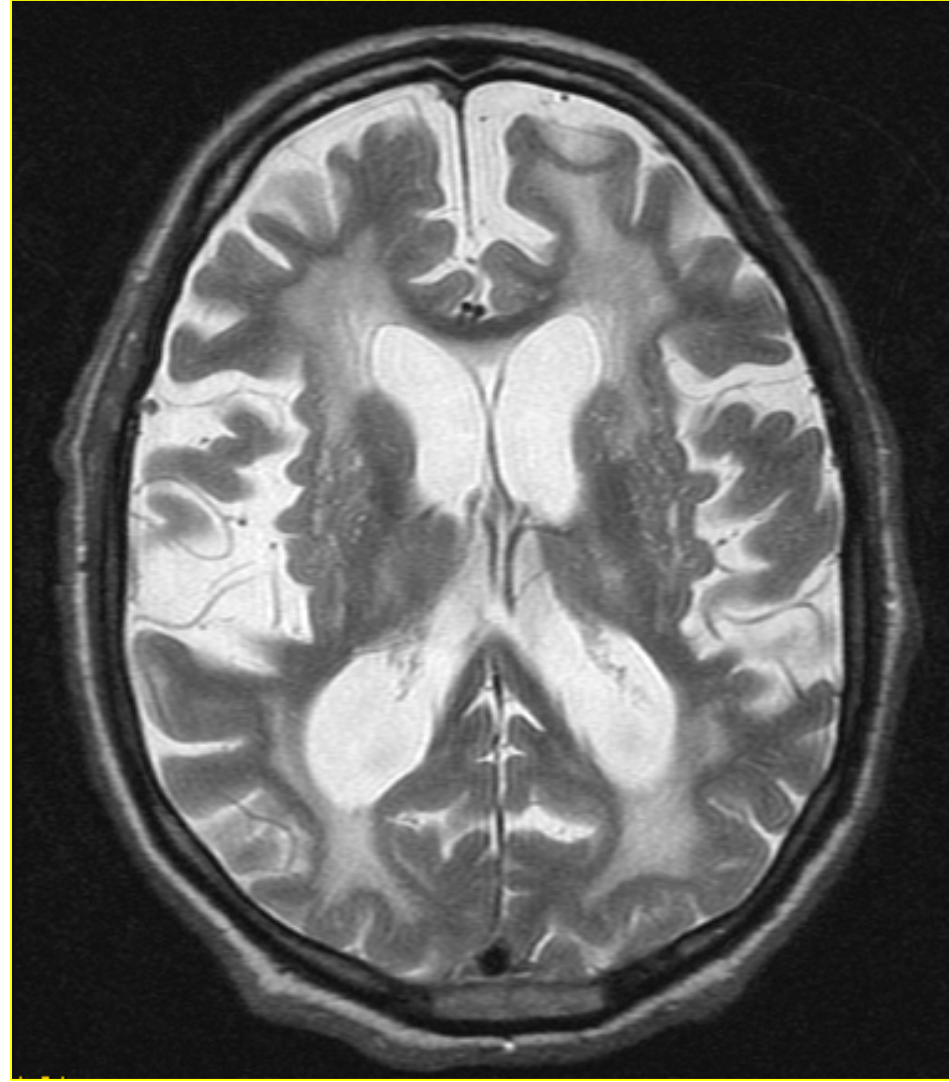
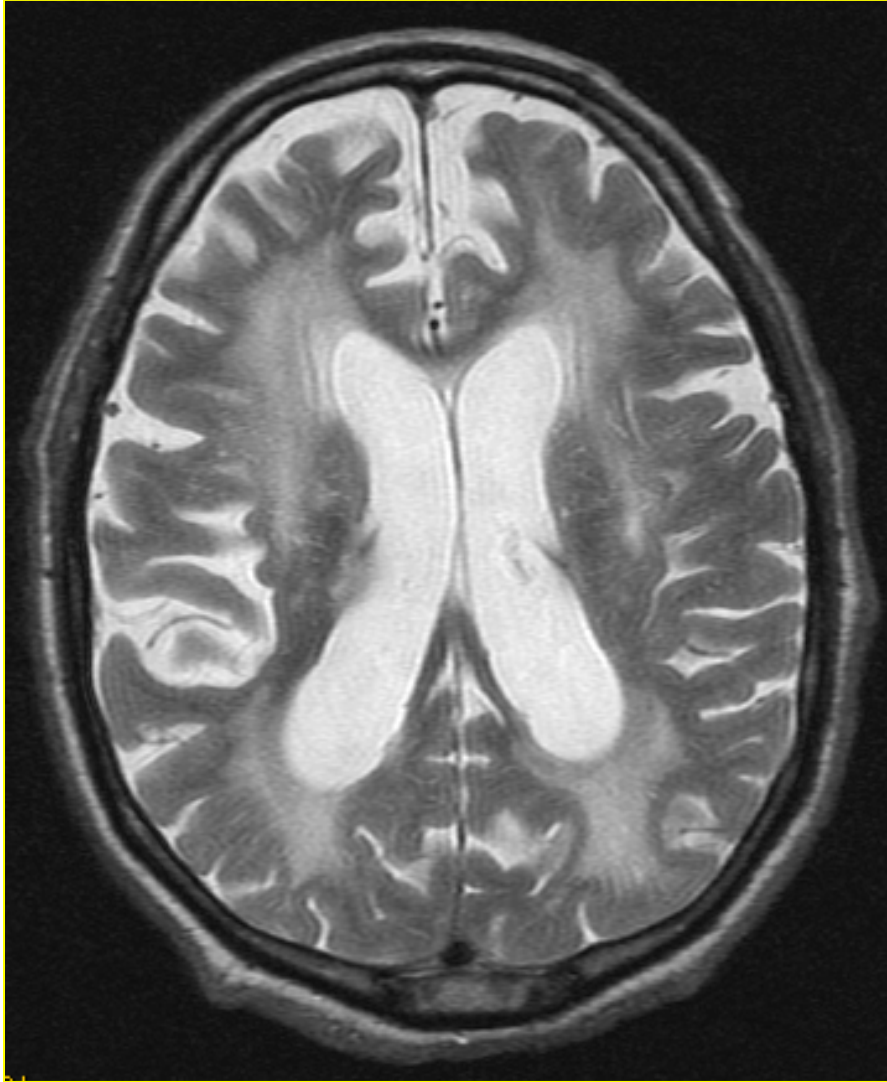
* EVR larges



Petites lésions aspécifiques de la SB

- * nombre/fréquence étroitement corrélés à l'âge et ...
- * ... aux facteurs de risques vasculaires
 - diabète
 - HTA
 - dyslipidémie
 - maladie cardio-vasculaire
- * signification clinique hasardeuse s'agissant des fonctions cognitives

Leucoaraiose....



... et atrophie cérébrale

Atrophie cérébrale globale 'aspécifique'

1. Élargissement des cavités ventriculaires

« *hydrocéphalie a vacuo* »

2. Approfondissement des sillons de la convexité et des citernes

3. Elargissement des espaces de Virchow-Robin

Atrophie cérébrale globale aspécifique

Notion connexe: vieilles notions sémiologiques
atrophie *corticale*, *sous-corticale*, et *cortico-sous-corticale*

1. Elargissement comparable des sillons de la convexité et des ventricules
= atrophie « globale » ou « **cortico-sous-corticale** »
2. Elargissement excessif des sillons par rapport aux ventricules
= atrophie « **corticale** »
3. Elargissement minime des sillons par rapport aux ventricules
= atrophie « **sous-corticale** »

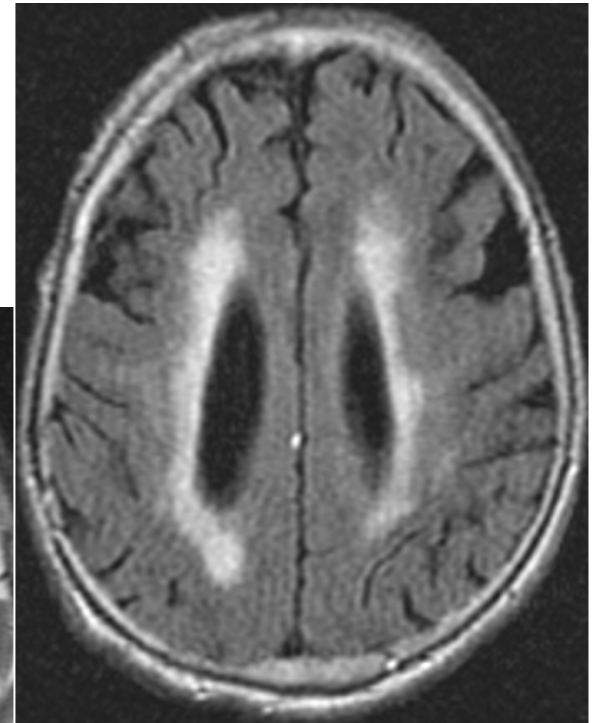
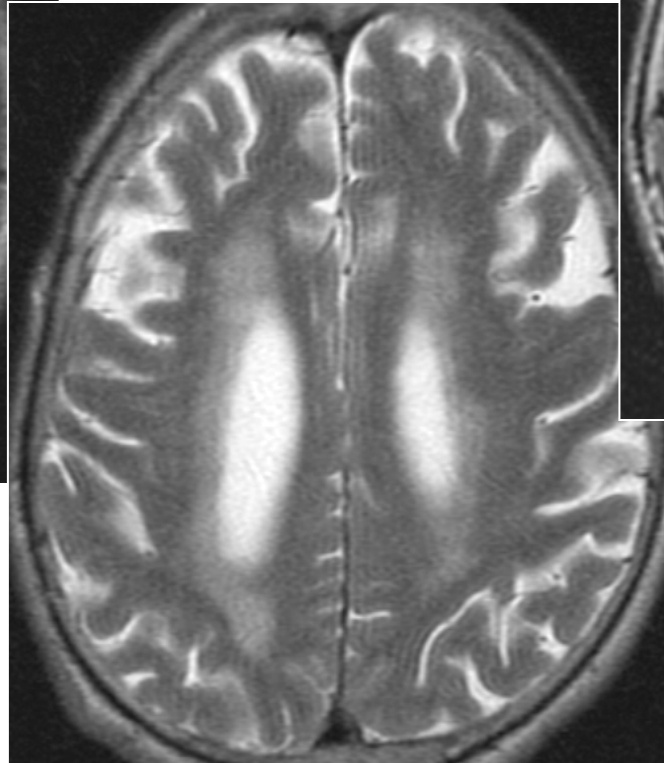
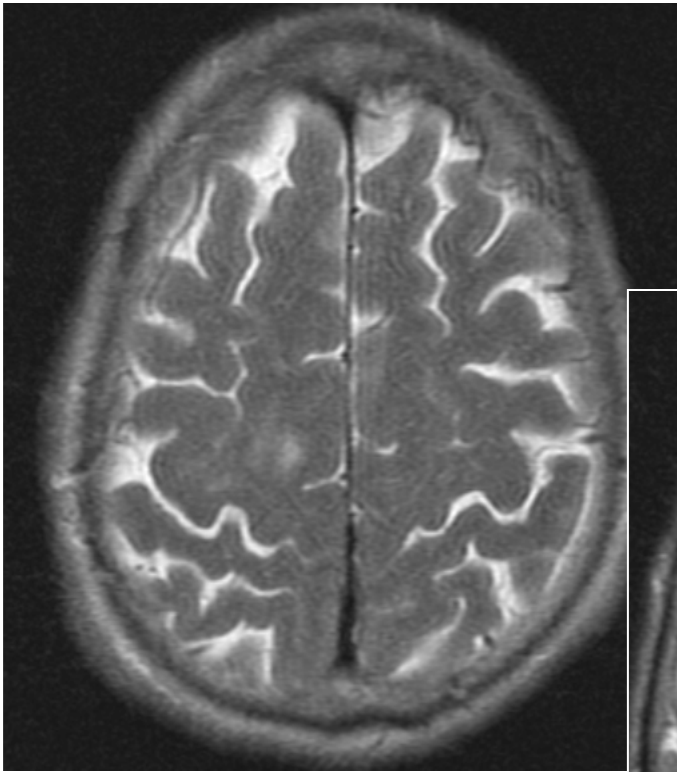
Hydrocéphalie normo-tensive vs '*atrophie sous-corticale*'

1. Cavités ventriculaires (très) larges
2. Sillons de la convexité normaux ou légèrement aplatis
3. Modifications sous-épendymaires accentuée, non transsudatives
4. Troubles de pulsation du LCR (turbulences)

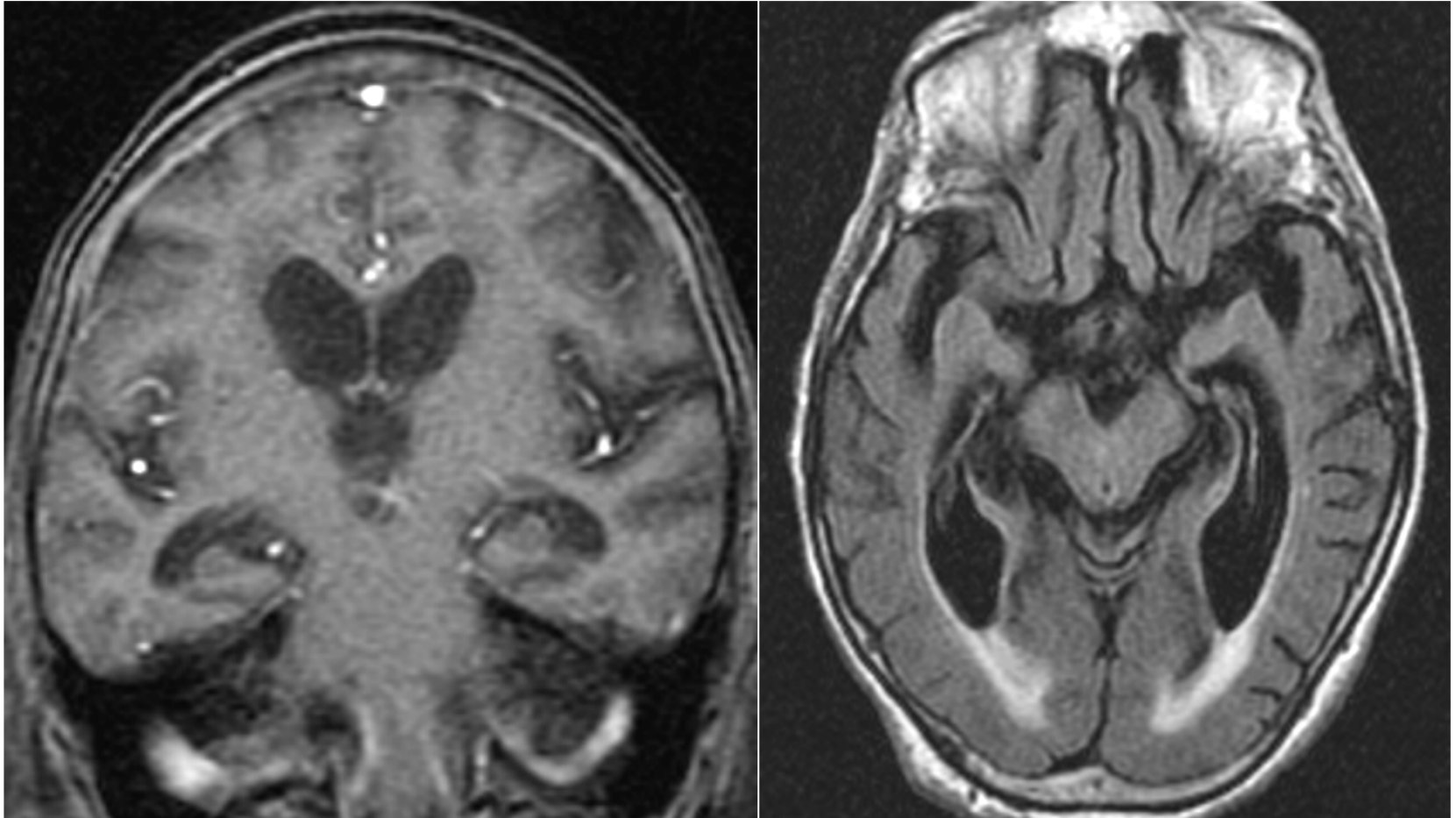
= diagnostic radiologique probabiliste, de compatibilité avec le diagnostic

PIC 24(48) heures / triple PL

hydrocéphalie normo-tensive



hydrocéphalie normo-tensive



Triade de HAKIM (1965)

- trouble de la marche ataxie-abasie
- incontinence urinaire
- démence progressive

« Démence curable »

Tests diagnostiques:

- PL: pression normale
- Tap test: amélioration à la soustraction de 30-50 ml de LCR
- PIC de 24 heures

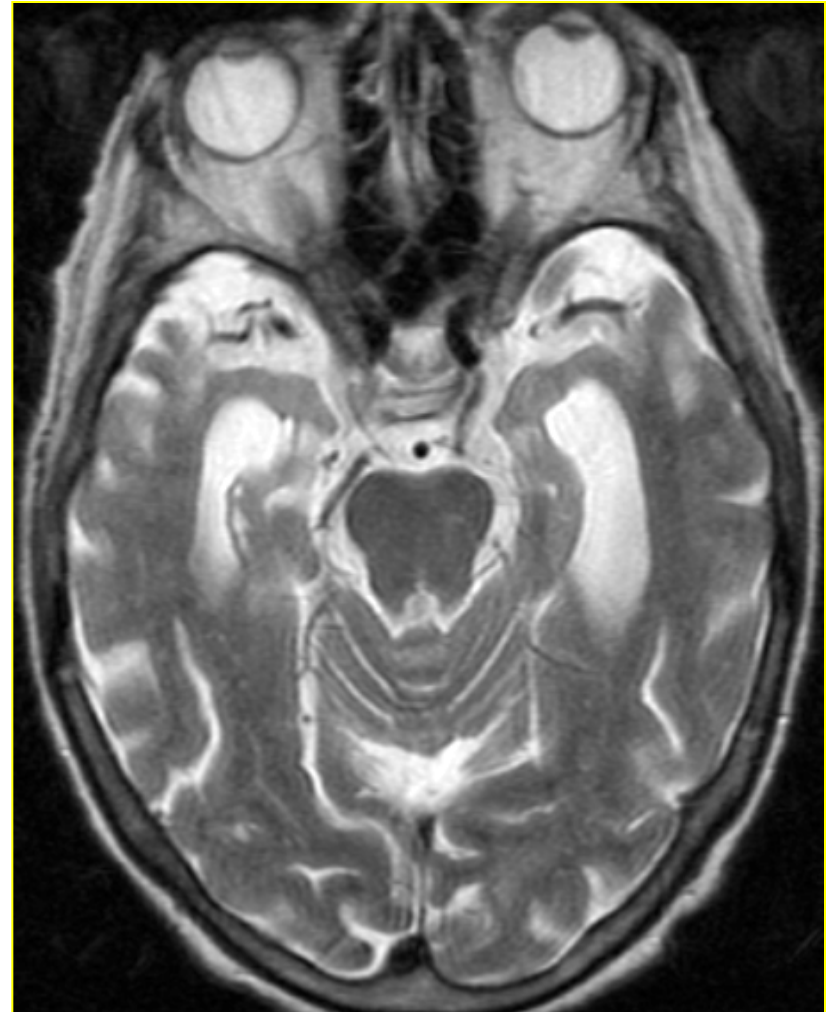
Bénéfice sur la démence: 25-80%

Désordres neuro-dégénératifs acquis de la substance grise

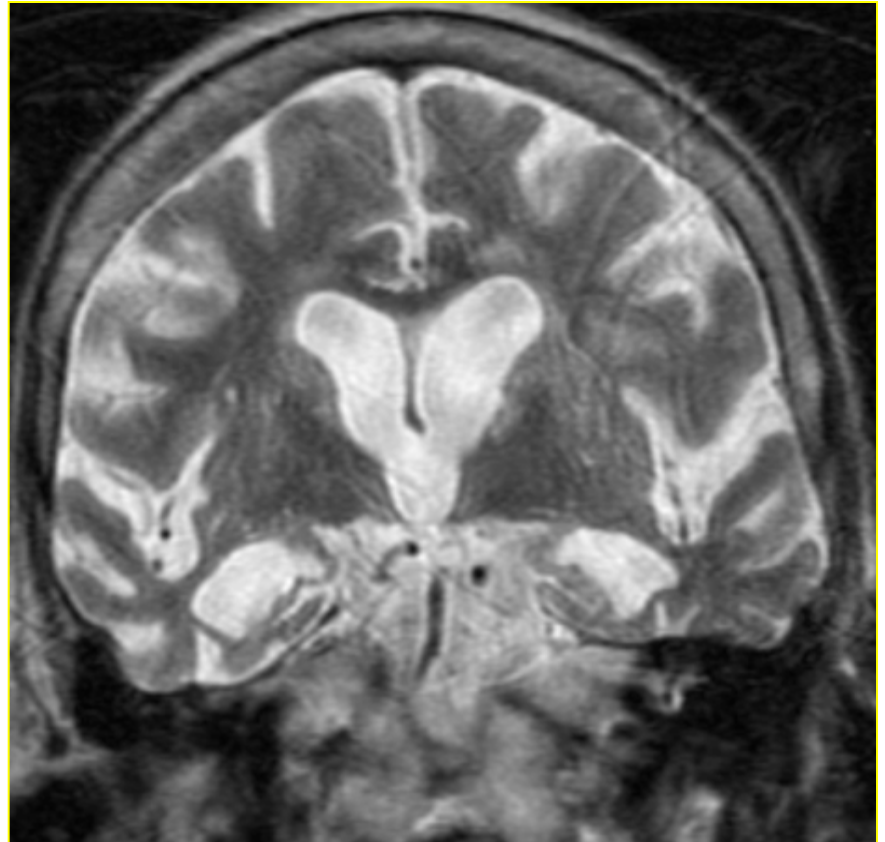
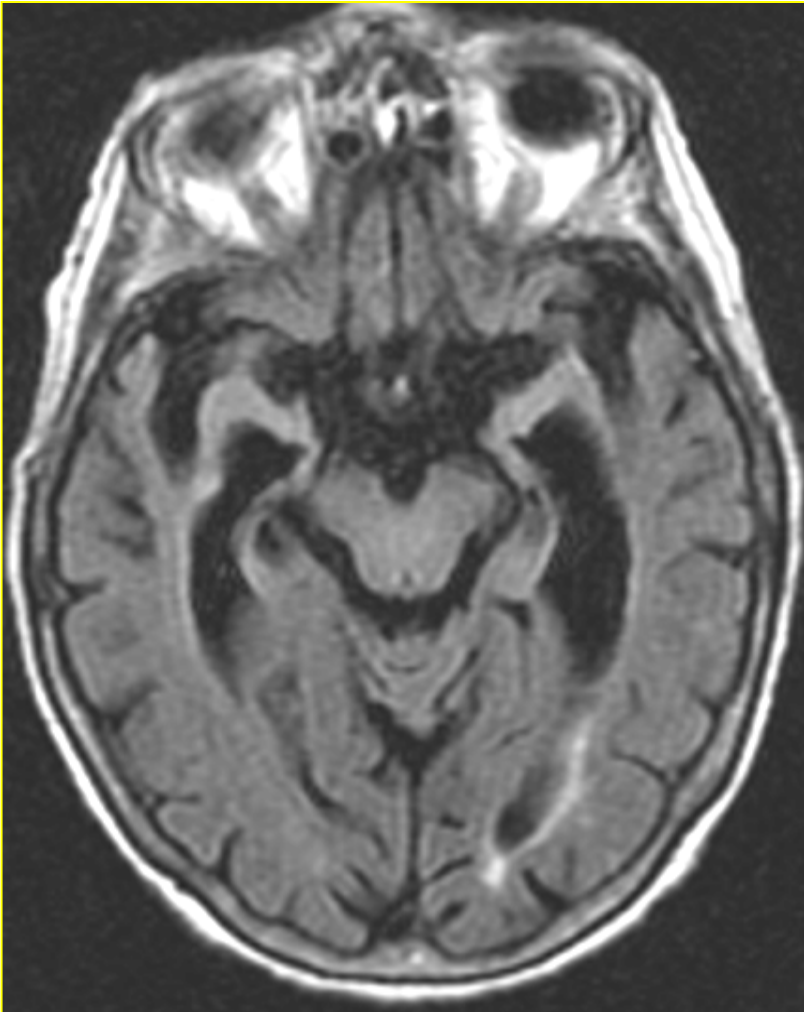
1. Maladie d'Alzheimer

- * souvent une *atrophie cérébrale globale*, aspécifique
- * parfois une *atrophie lobaire préférentielle* au niveau des lobes *temporaux*, surtout les régions hippocampiques
- * dans les examens sériels, une vitesse d'atrophie plus rapide

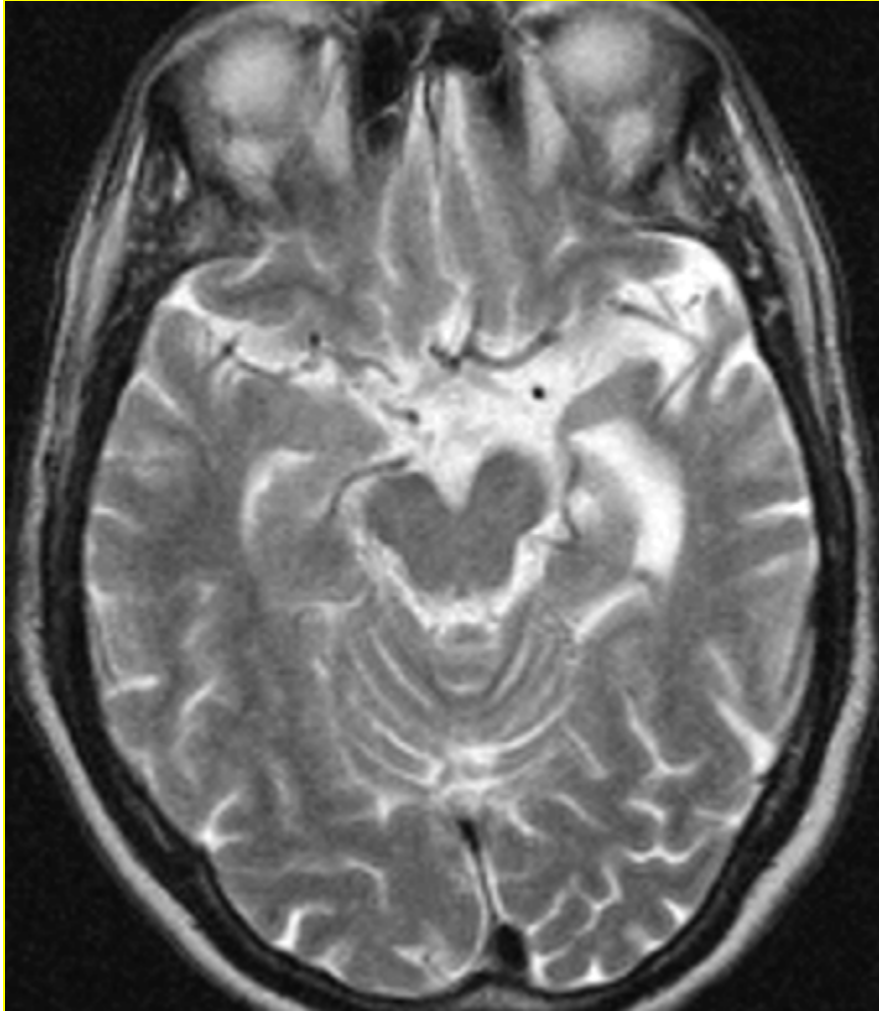
1. Atrophie temporelle bilatérale



1. Atrophie temporale bilatérale



2. Atrophie temporale unilatérale



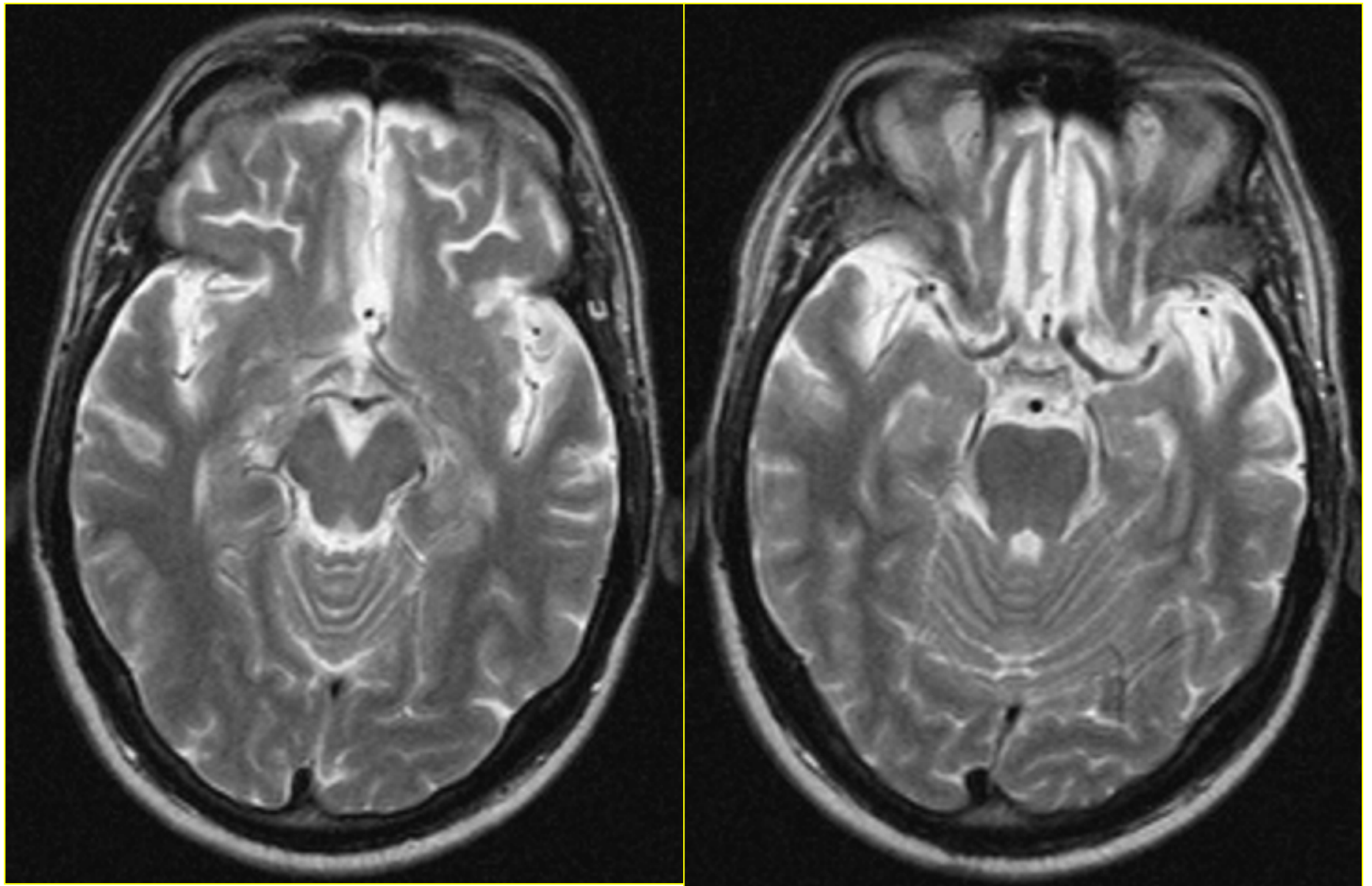
2. *Maladie de Pick*

Atrophie lobaire préférentielle

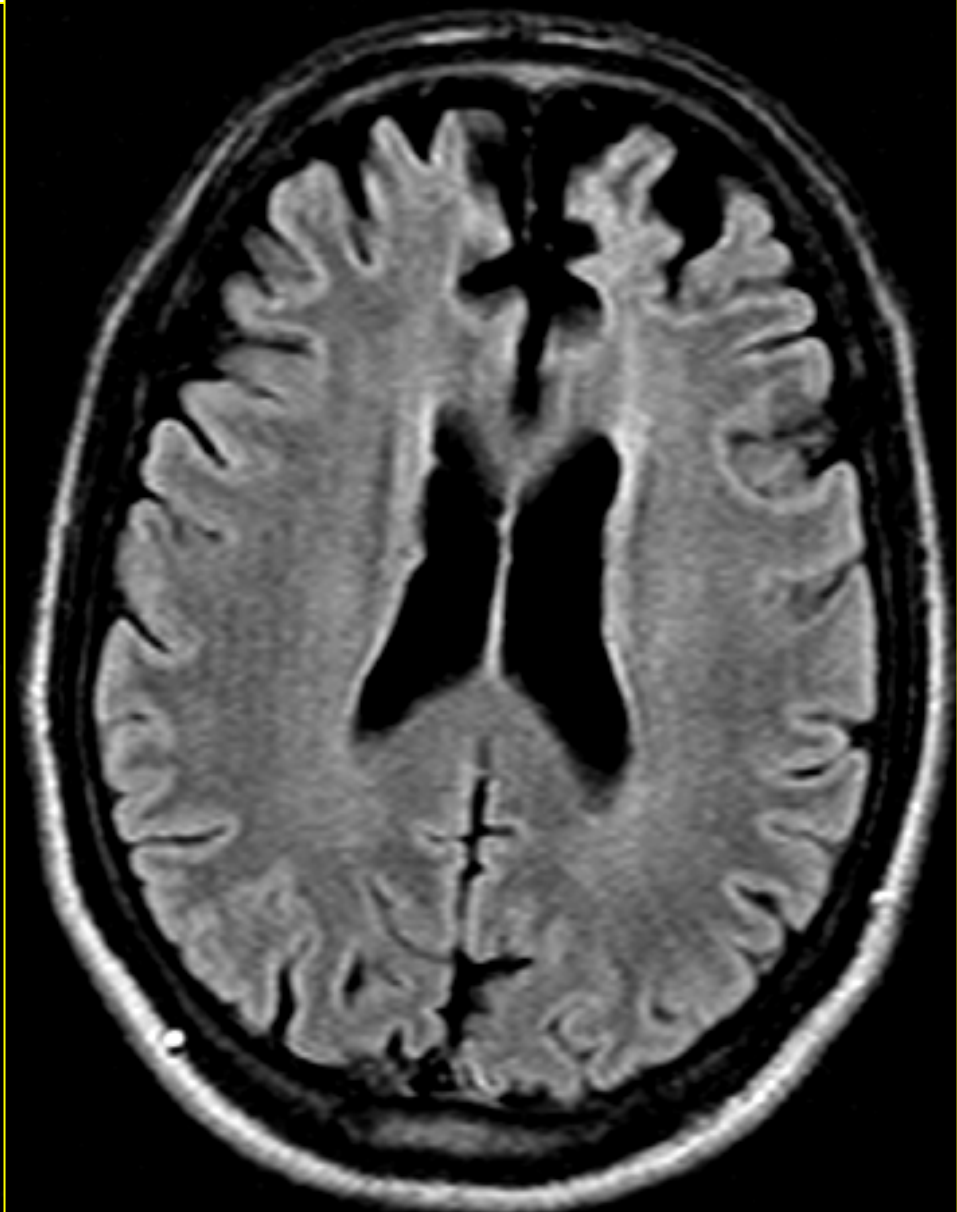
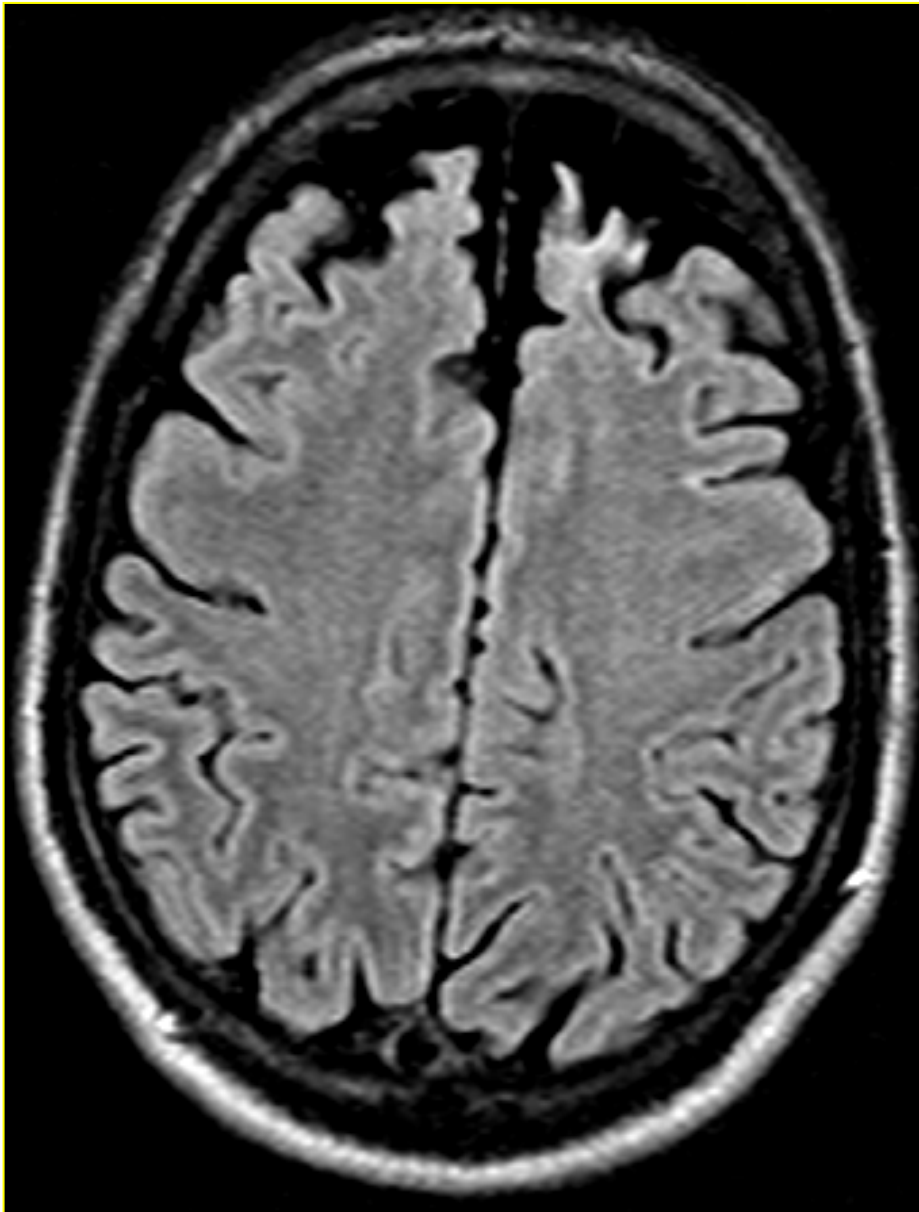
corticale

frontale interne

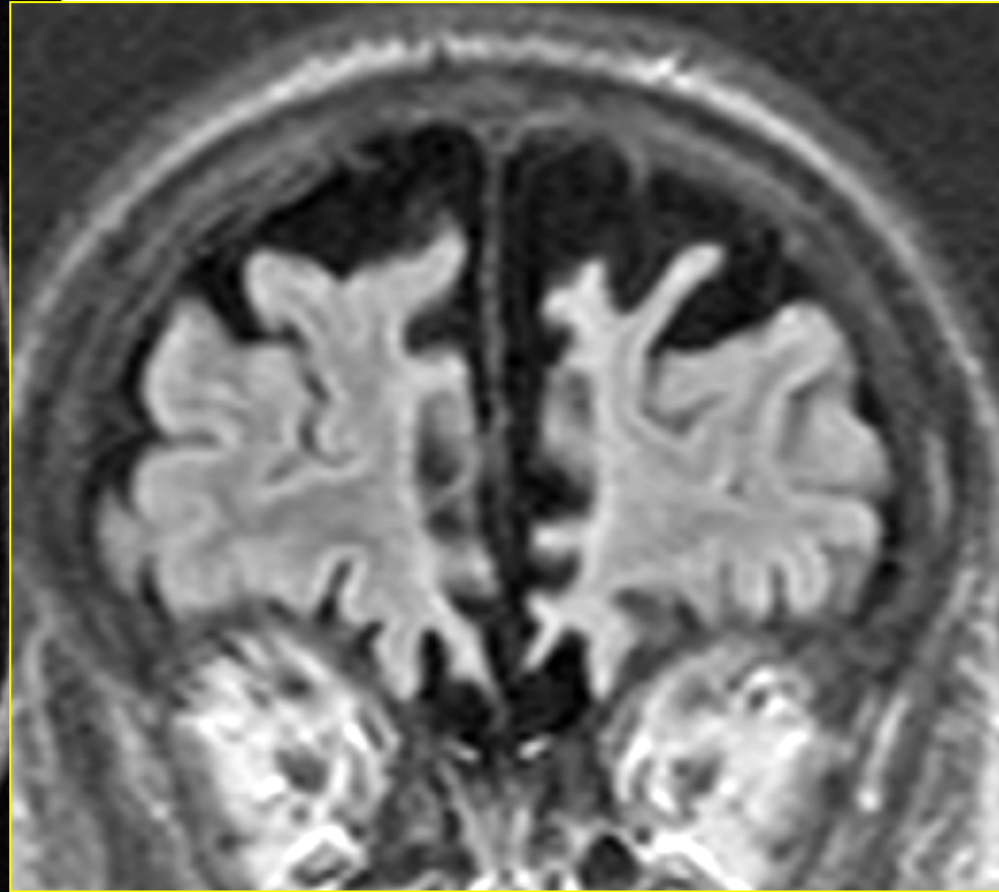
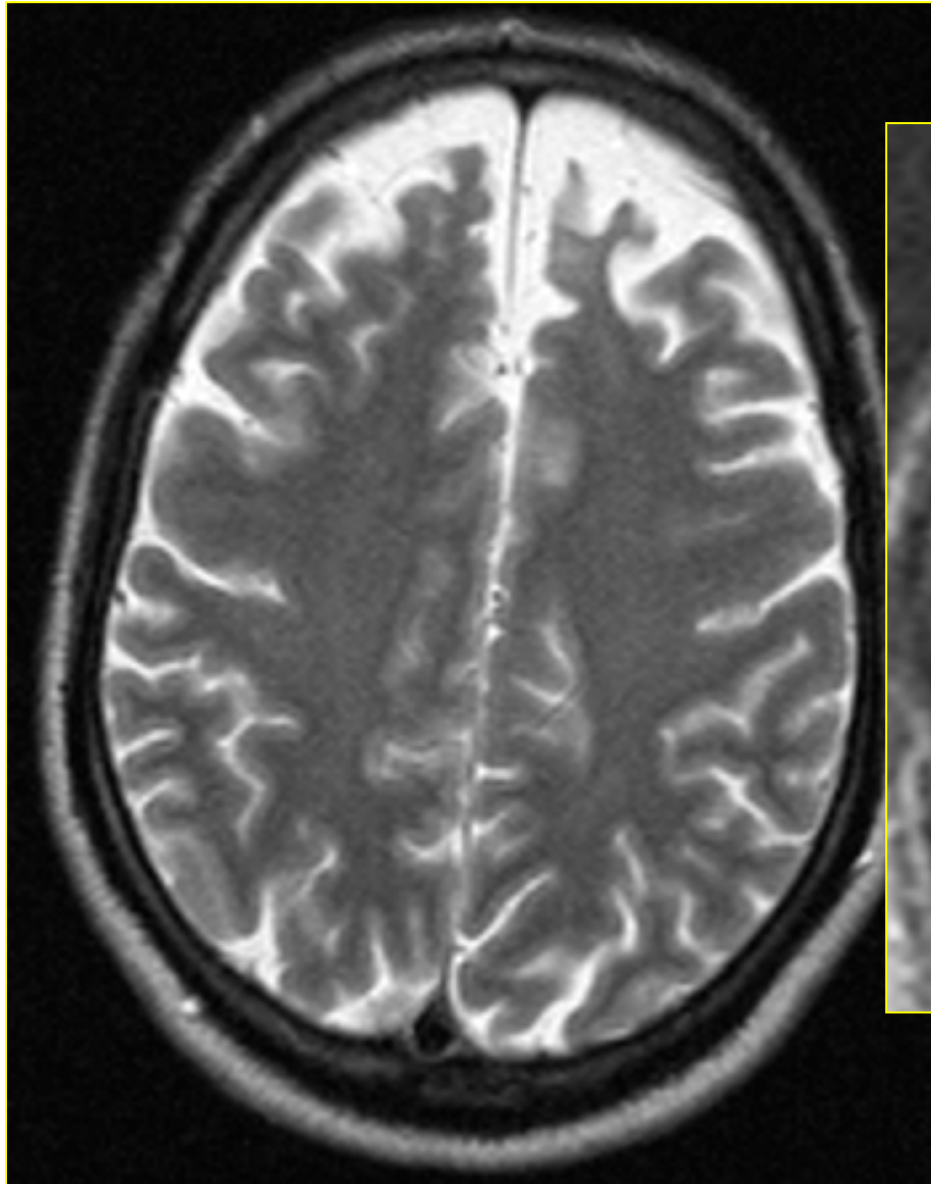
2. Maladie de Pick



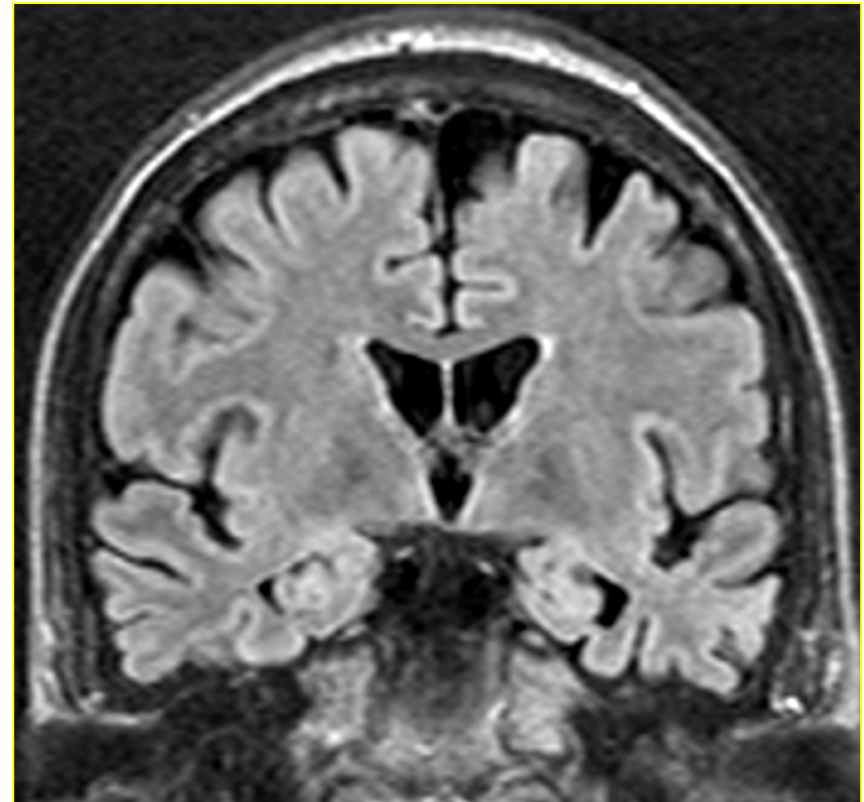
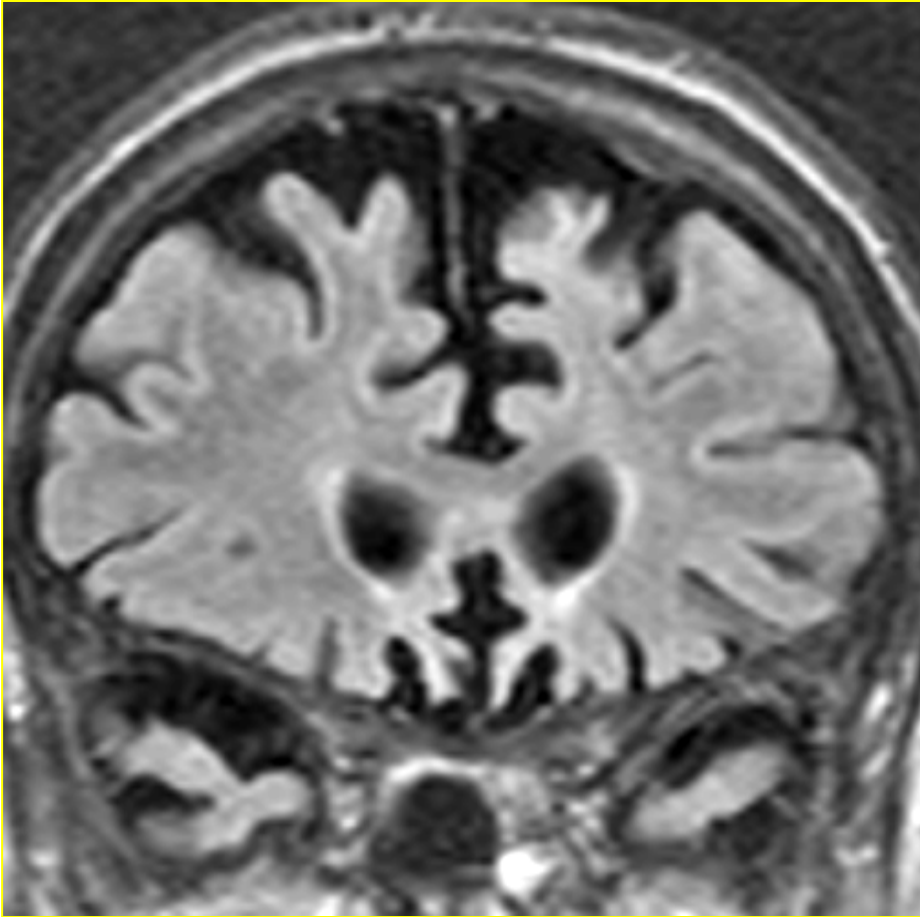
2. Maladie de Pick



2. Maladie de Pick



2. Maladie de Pick



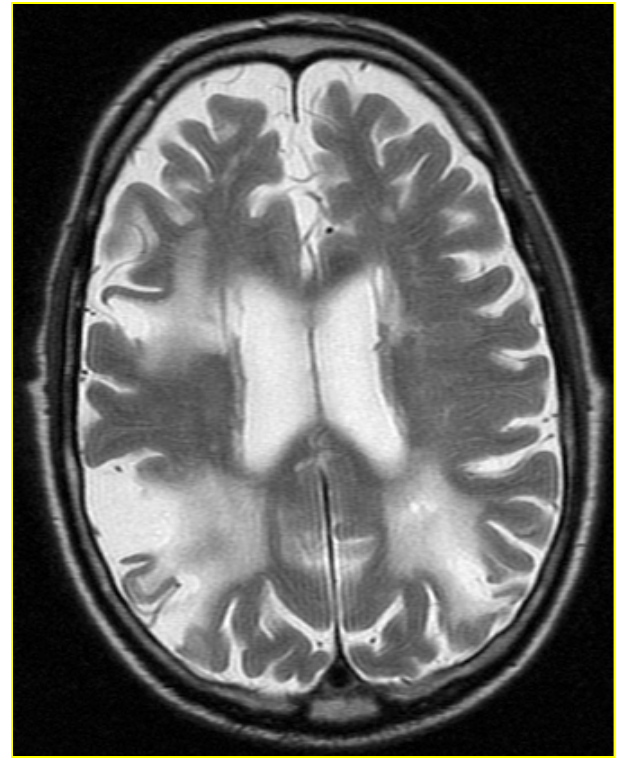
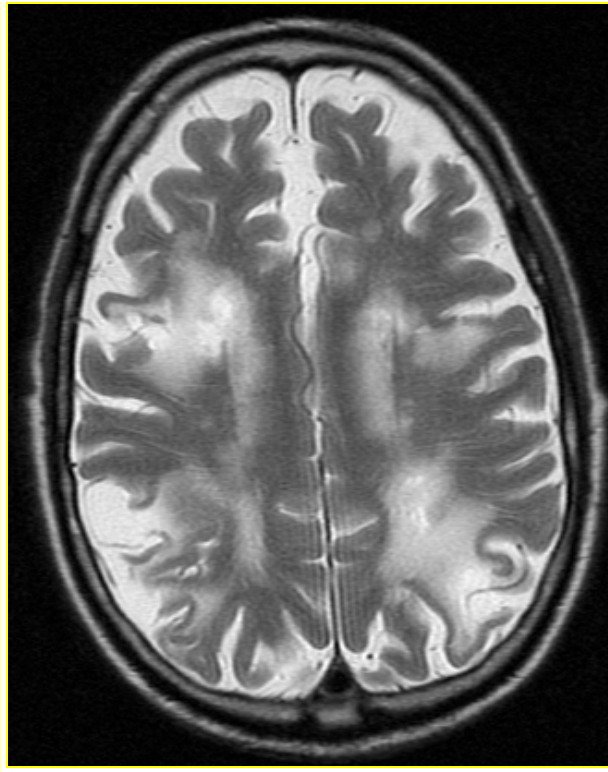
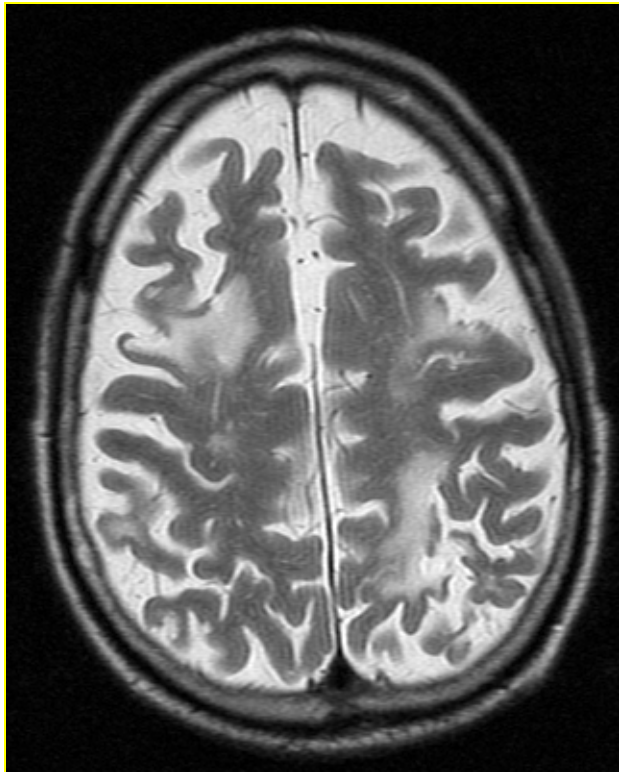
3. Démence vasculaire

Présence d'une quantité anormalement élevée
de lésions ischémiques cérébrales,
soit

- **micro-vasculaire** (leucoariose excessive)
« Subcortical Arteriosclerotic Encephalopathy »
SAE - Binswanger Disease
- **macro-vasculaire**: Multi-Infarct Dementia - MID

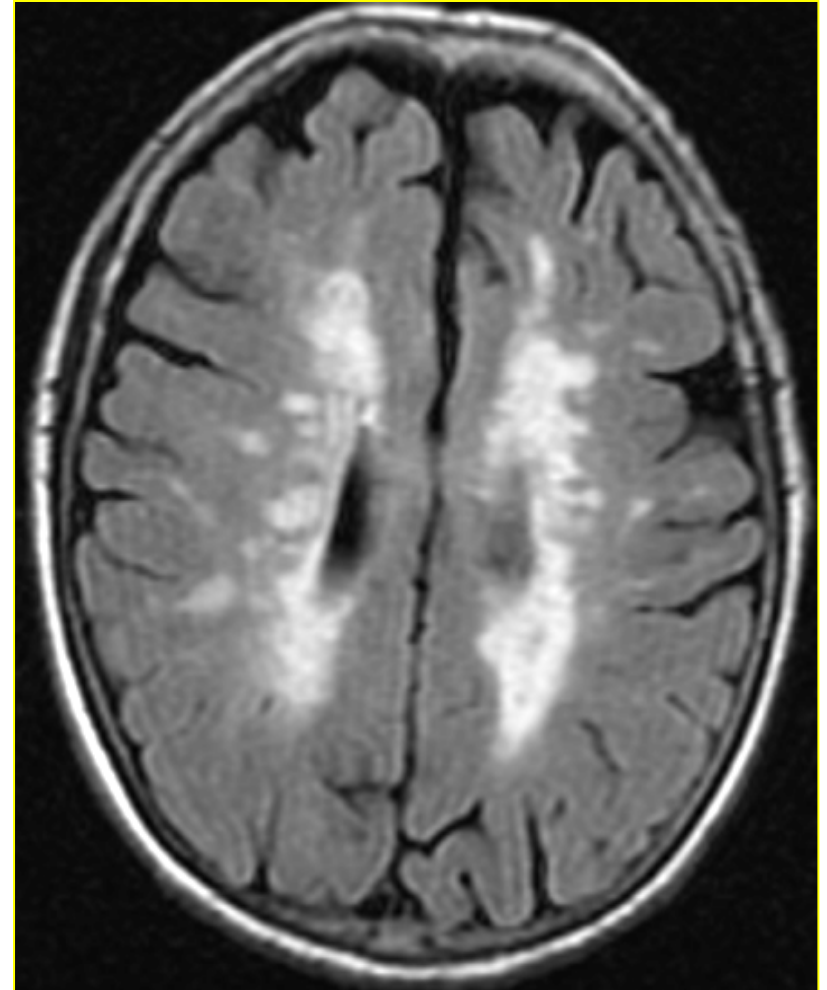
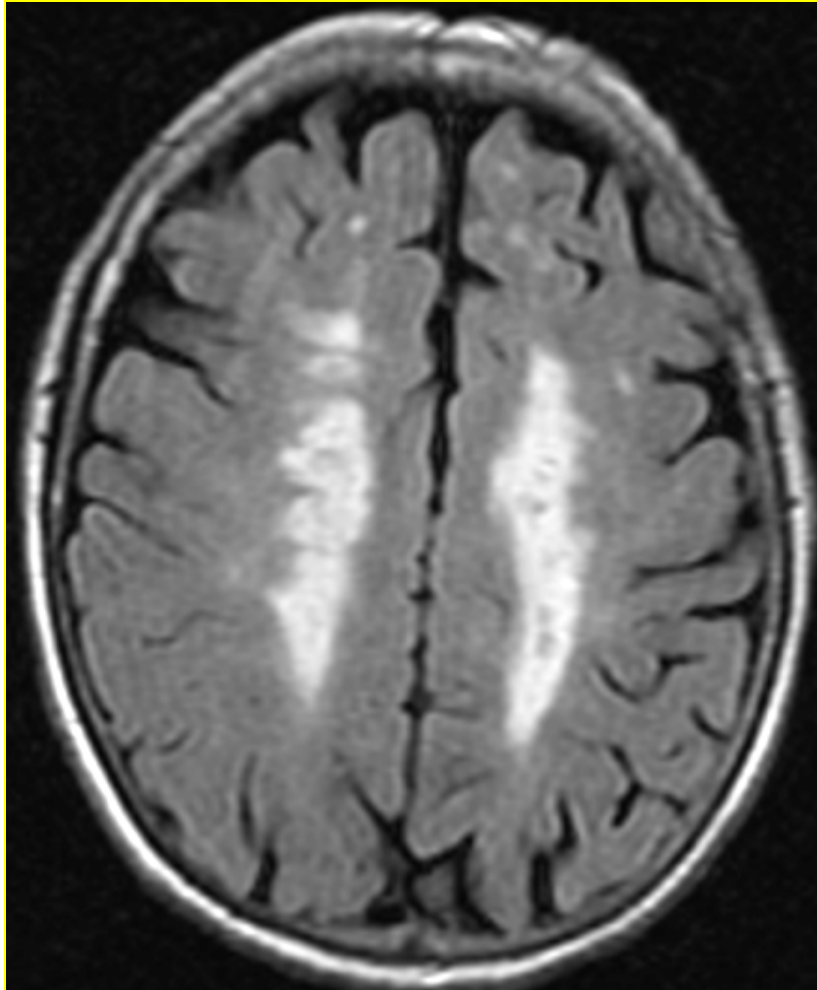
3. Démence vasculaire

1. Multi-Infarct-Dementia MID macro-vasculaire



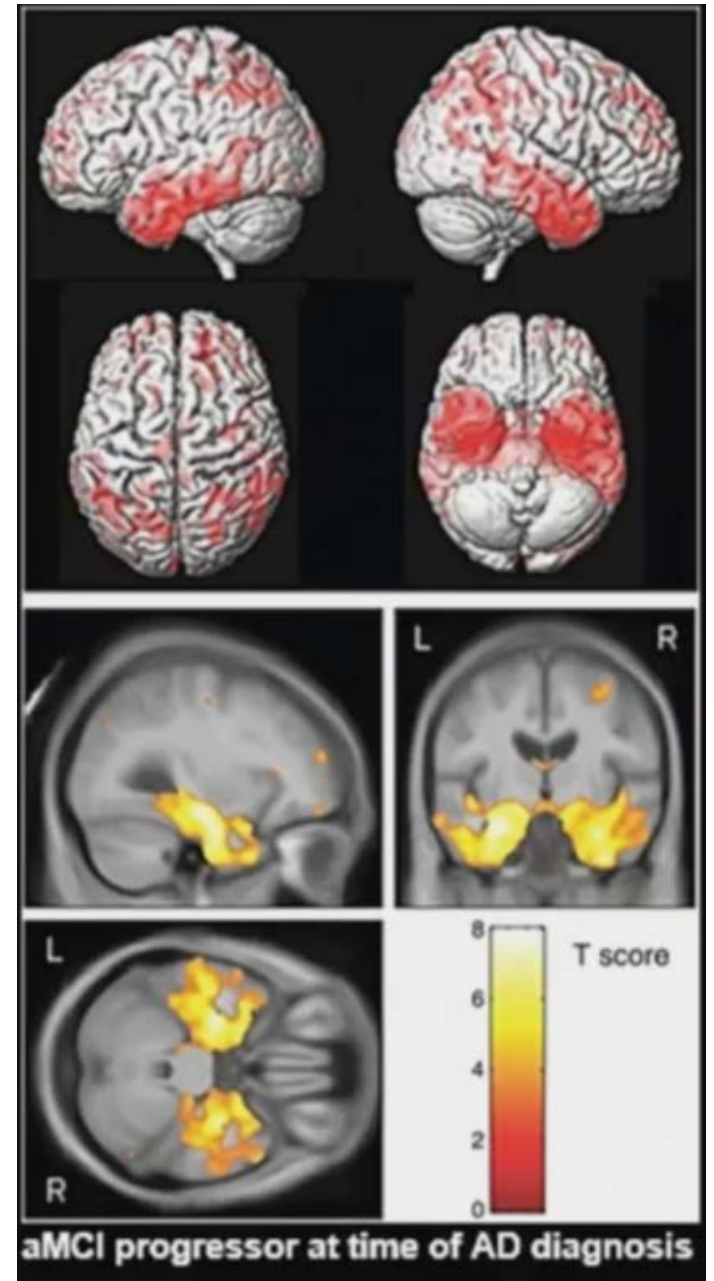
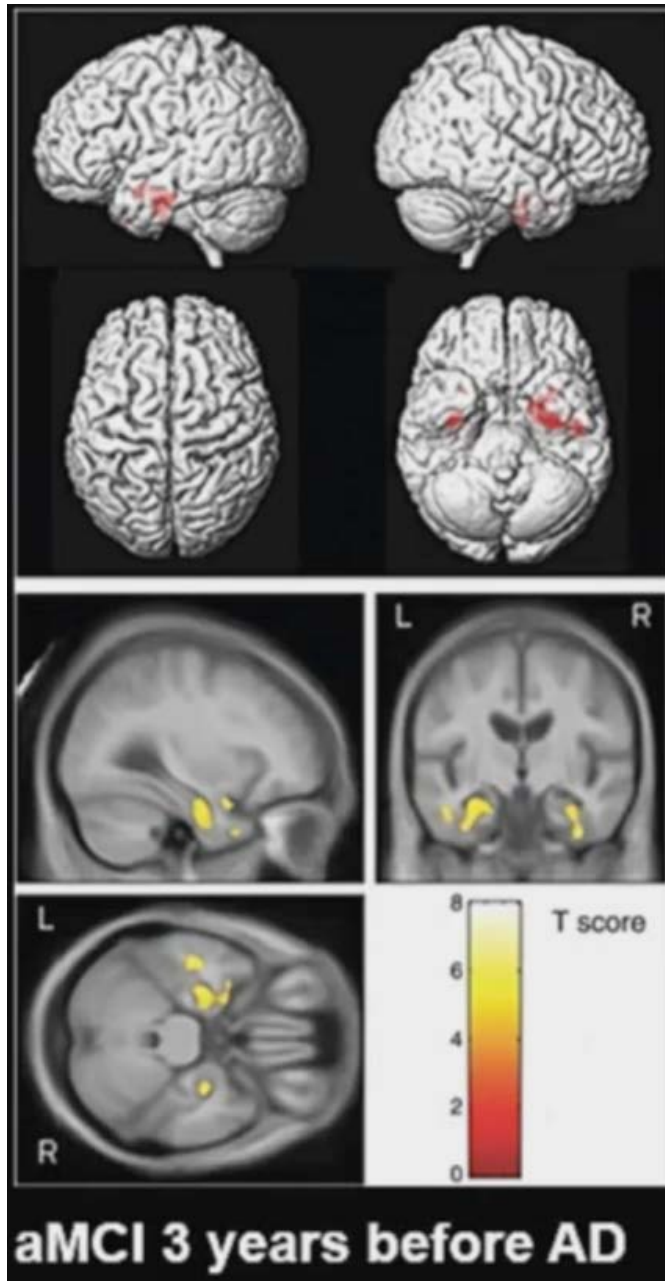
3. *Démence vasculaire*

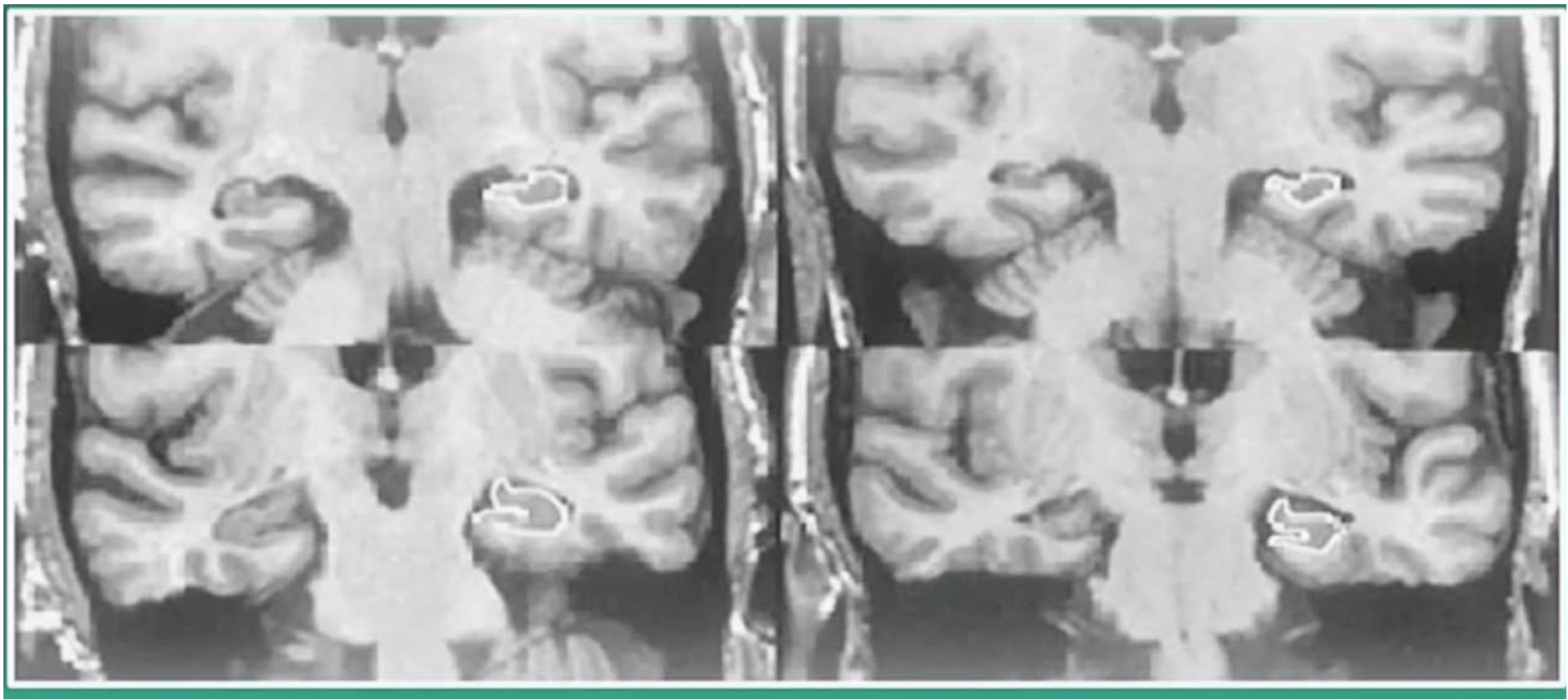
Subcortical Arteriosclerotic Encephalopathie (SAE)
micro-vasculaire



Démence d'Alzheimer
IMAGERIE
QUANTITATIVE

L'atrophie méso-temporale précède l'expression symptomatique démentielle catégorisée

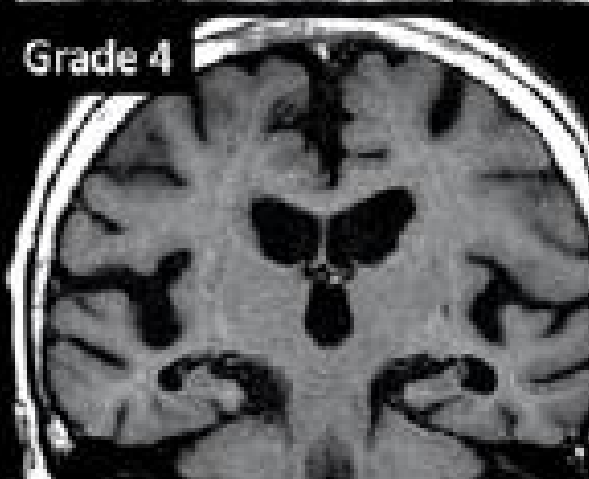
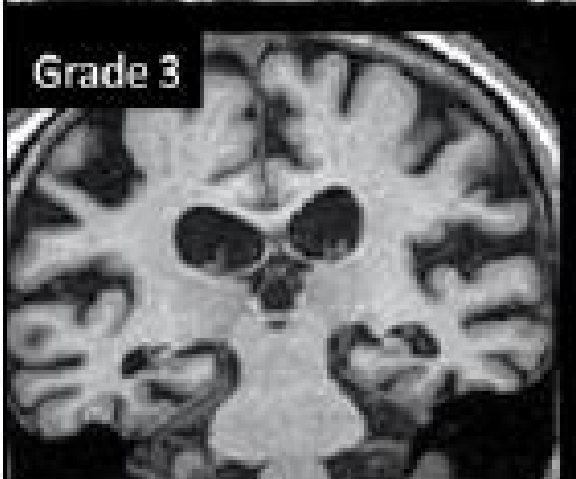
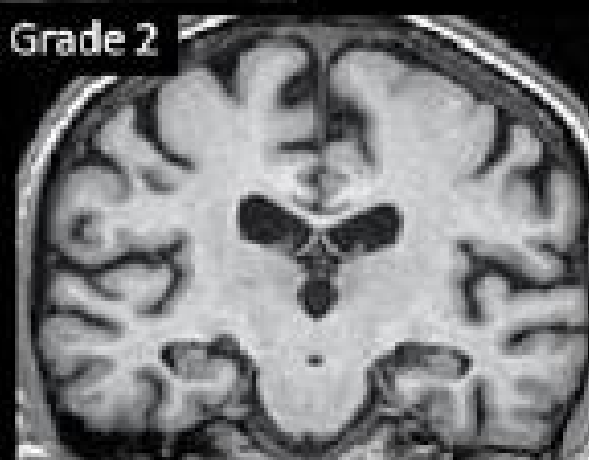
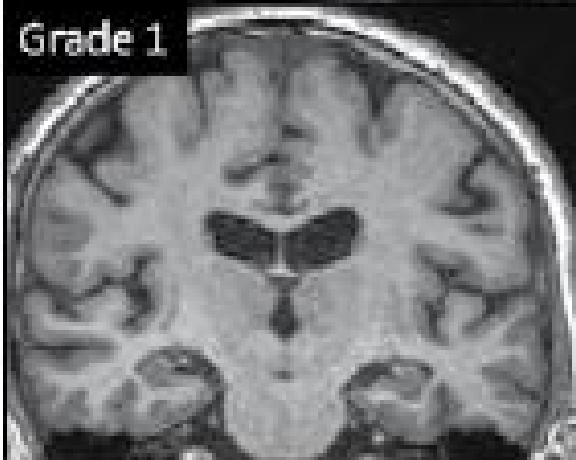
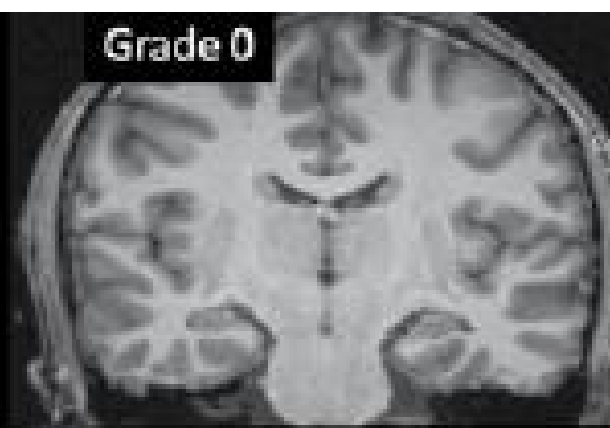




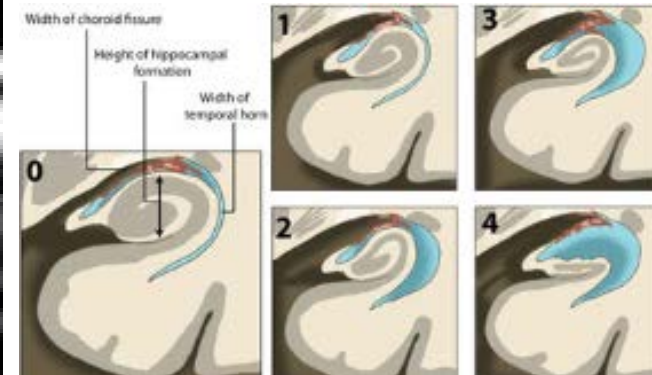
Jack CR, Neurology. 1999 April 22; 52(7): 1397–1403

Volumétrie manuelle

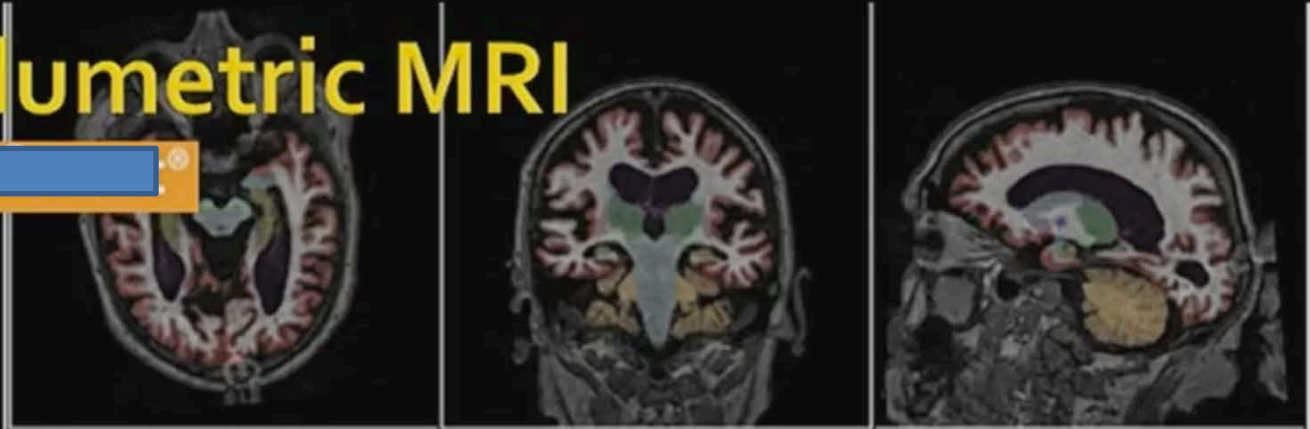
Fig. 2



Echelle de Scheltens



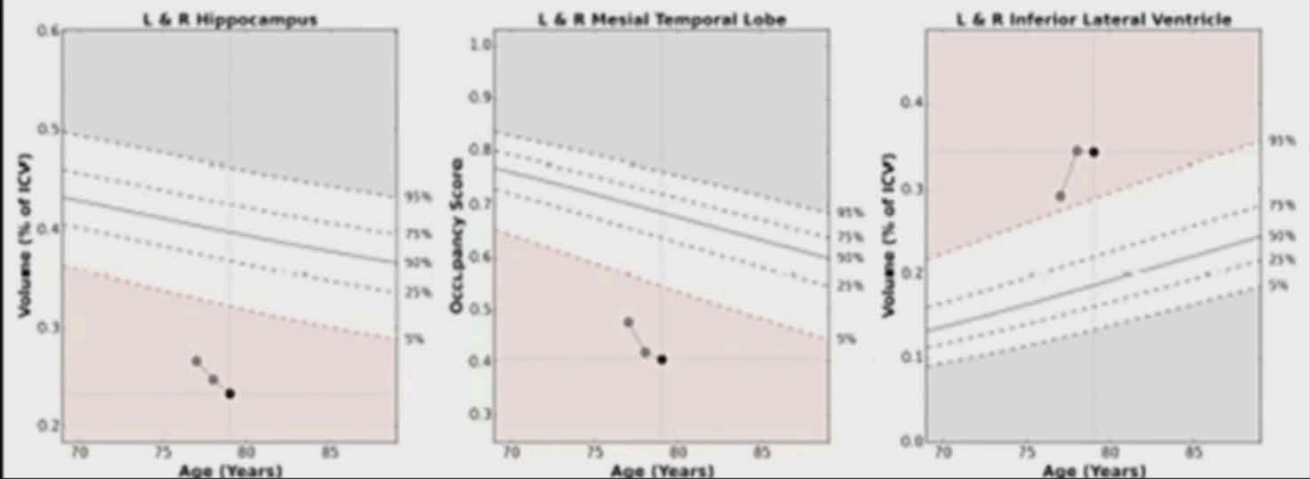
Clinical volumetric MRI



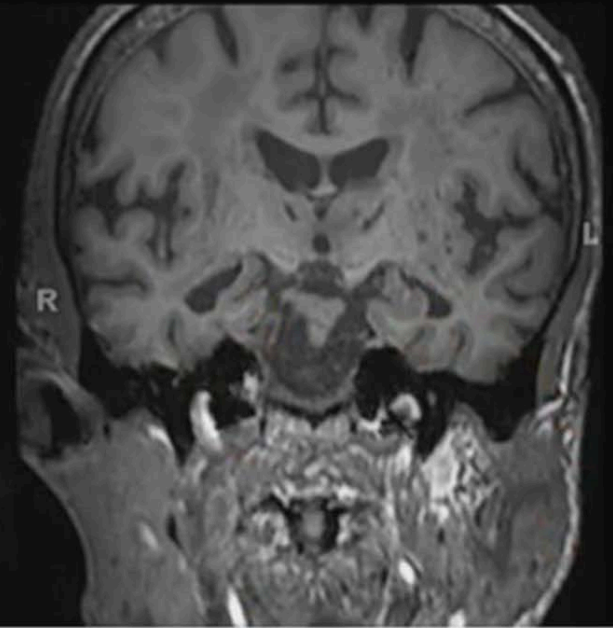
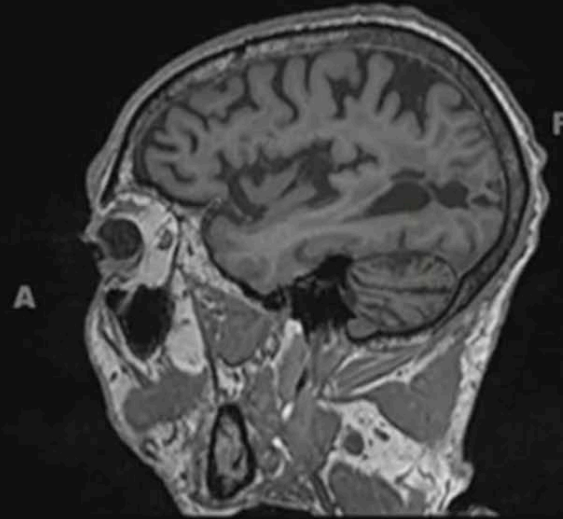
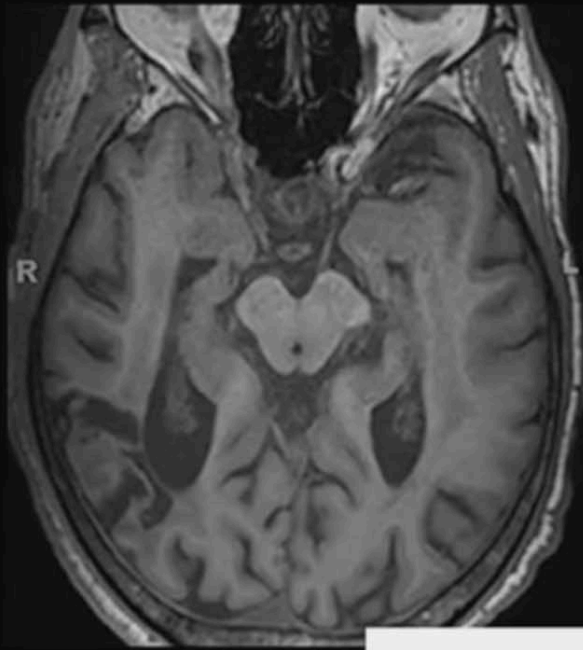
Case 1
Classic AD pattern

Hippocampal Occupancy Score (HOC)			0.41
Brain Structure	Volume (cm ³)	% of ICV (5%-95% Normative Percentile [†])	Normative Percentile [†]
Hippocampi	4.46	0.23 (0.32-0.46)	< 1
Lateral Ventricles	125.25	6.55 (1.85-4.98)	> 99
Inferior Lateral Ventricles	6.54	0.34 (0.13-0.29)	99

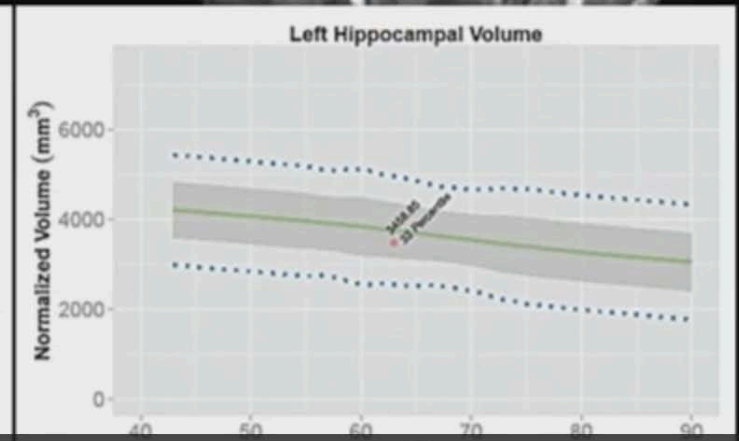
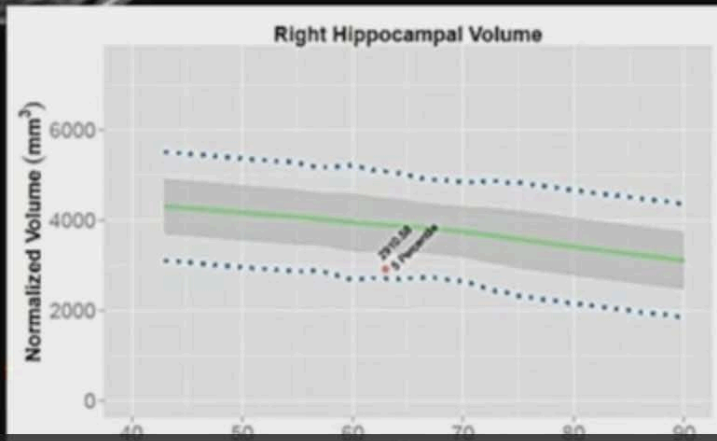
AGE-MATCHED REFERENCE CHARTS



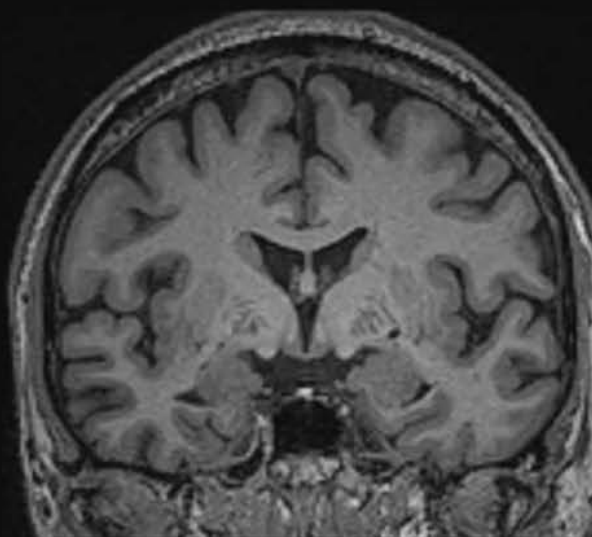
Volumétrie numérisée



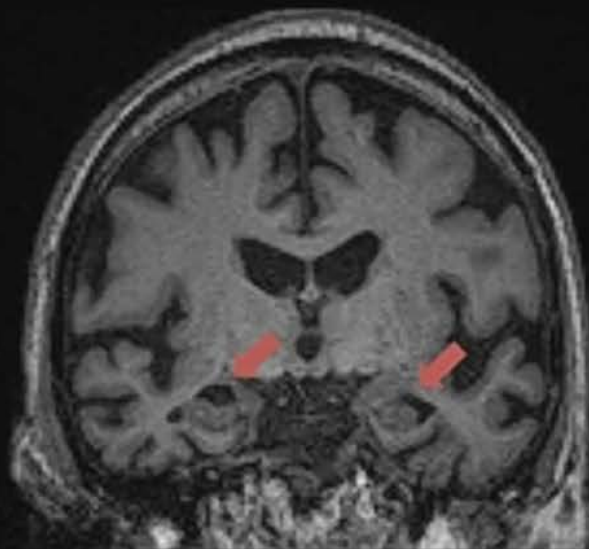
Diagnosis:
Post stroke
dementia



... parfois décompensation sur 1 stroke fatal



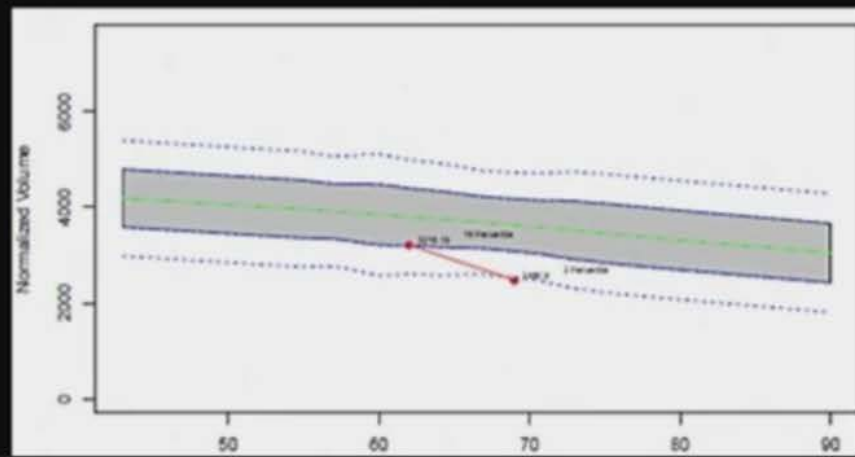
Age 62



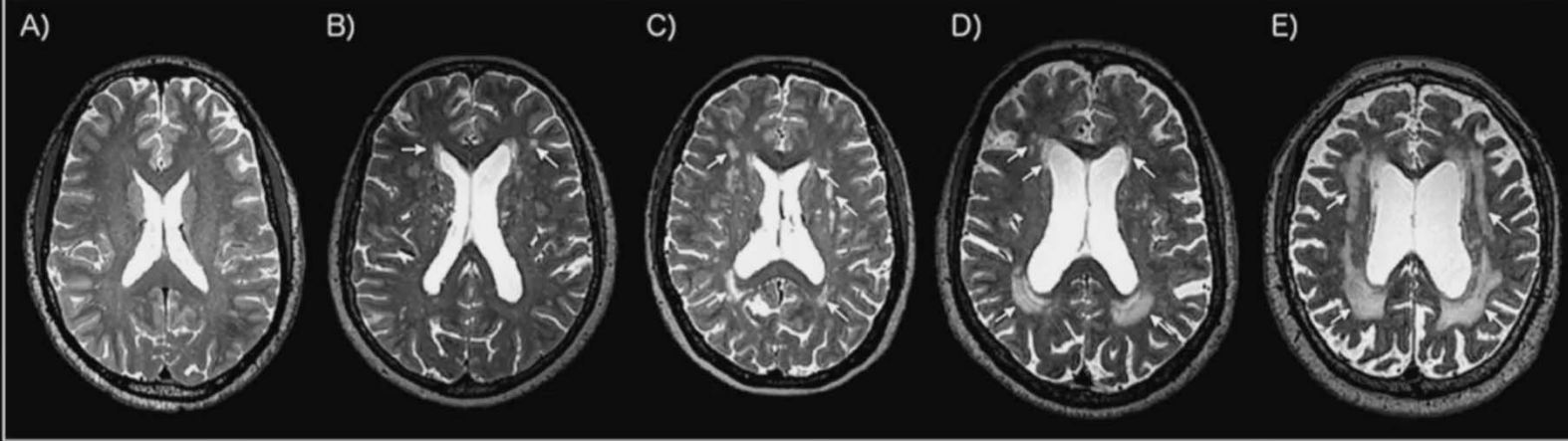
Age 69

Atrophie mesurée

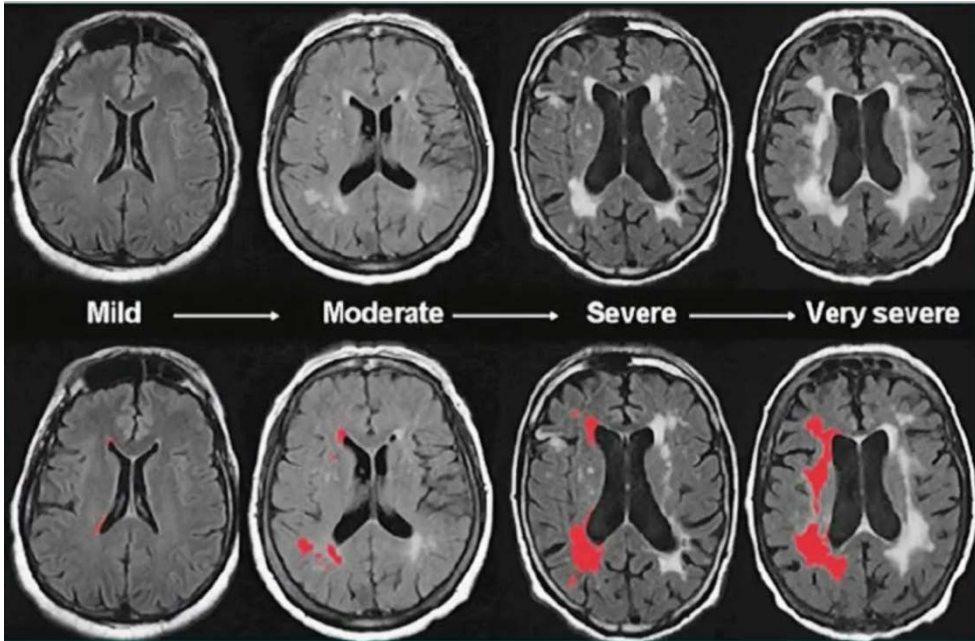
Atrophie 'visuelle'



Pattern typique d'AD: atrophie hippocampique élektive

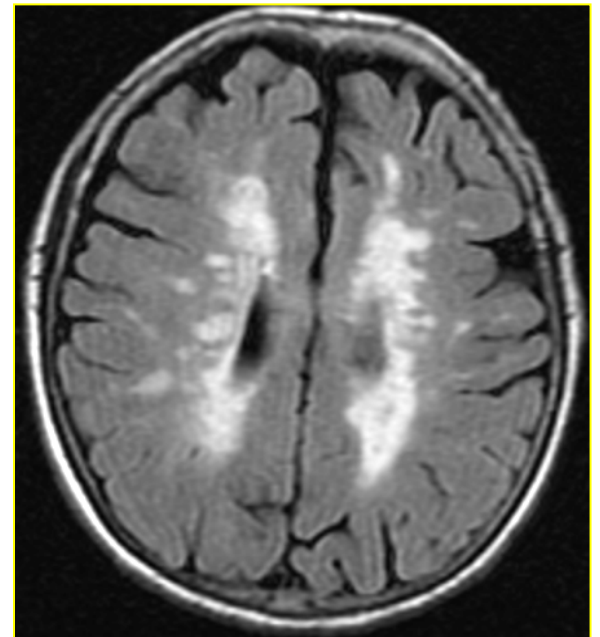


Levels of amyloid deposition ($p < 0.01$), as well as ratings of periventricular white matter hyperintensities (WMH) ($p < 0.01$) and deep WMH ($p < 0.05$) discriminate between cognitively normal and demented individuals.



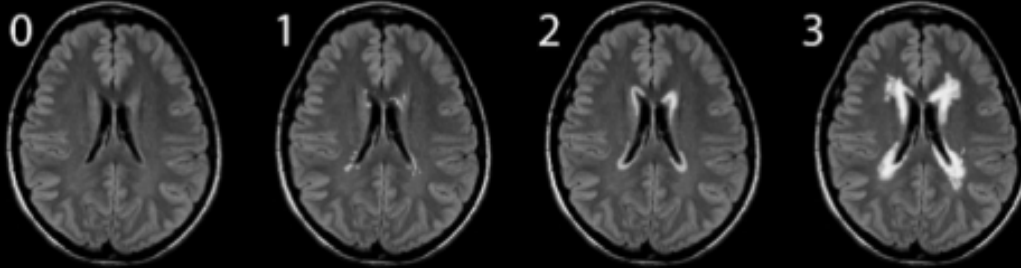
Fazekas Score

Lesion Quantification

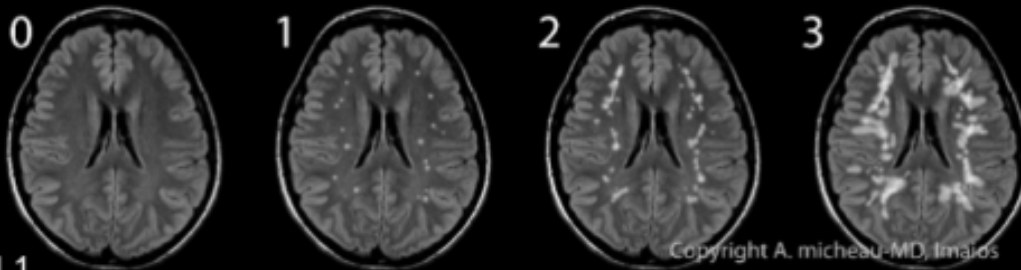


Score de Fazekas

Lésions périventriculaires

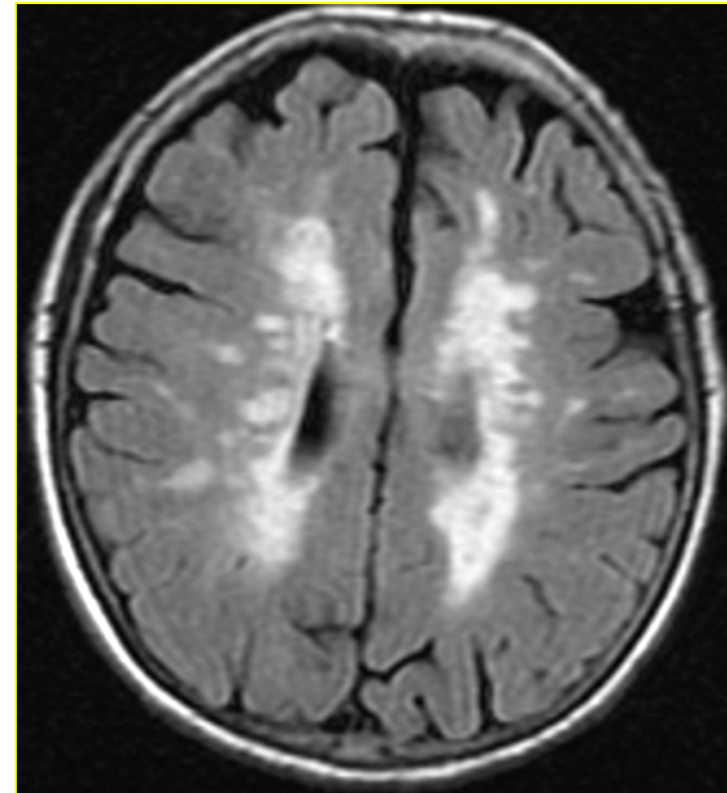


Lésions de la substance blanche



@1.1

Copyright A. micheau MD, Imajios



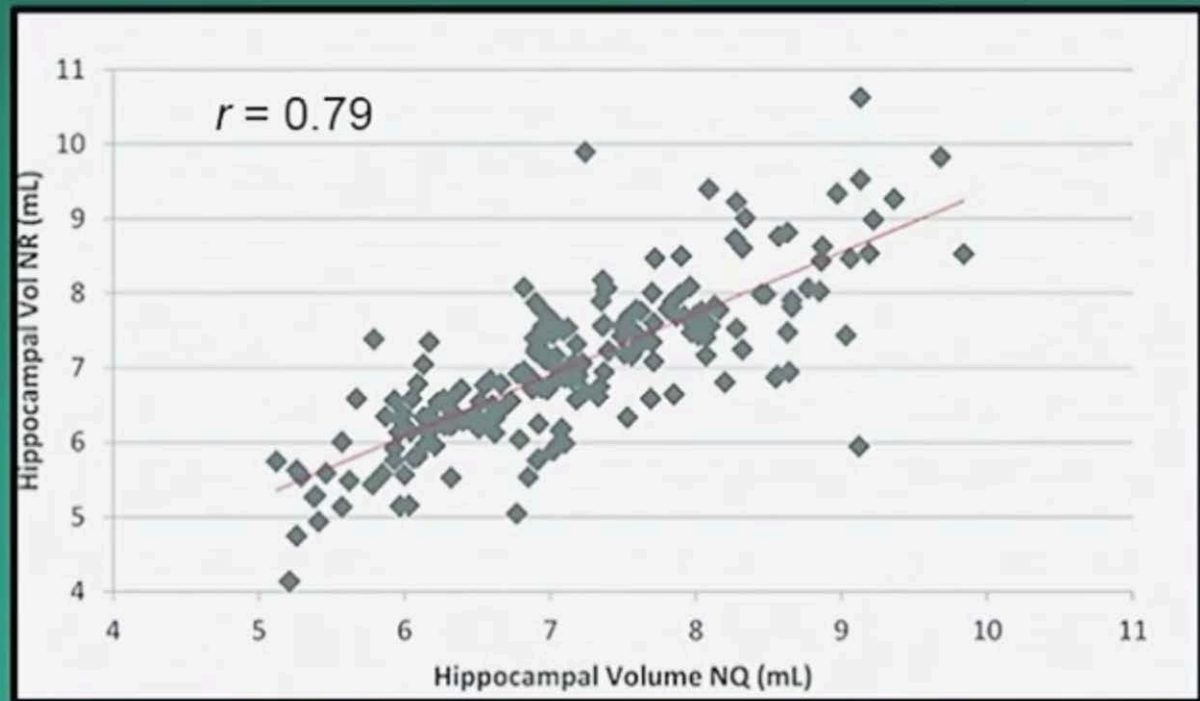
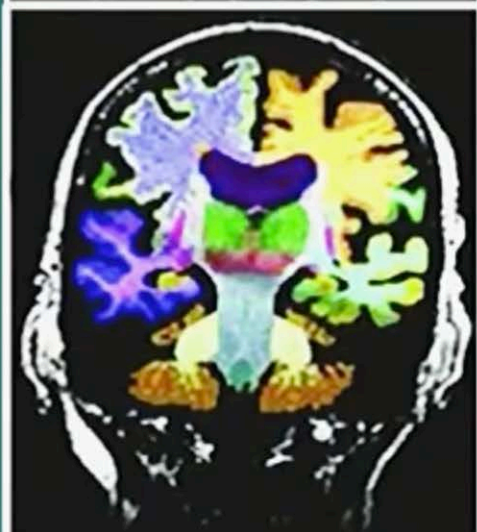
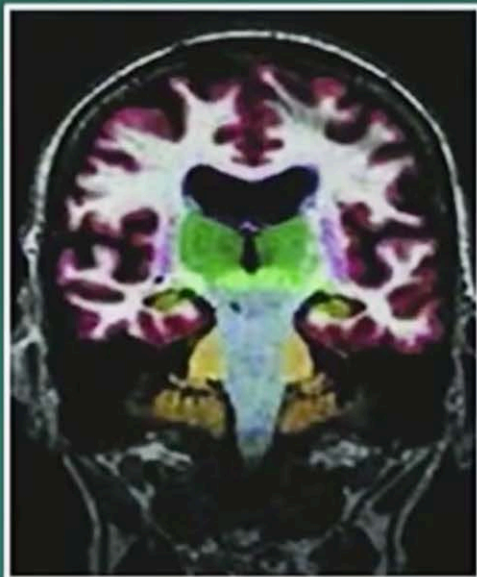
Démence micro-vasculaire sous-corticale

'Leucoarrose pathologique'

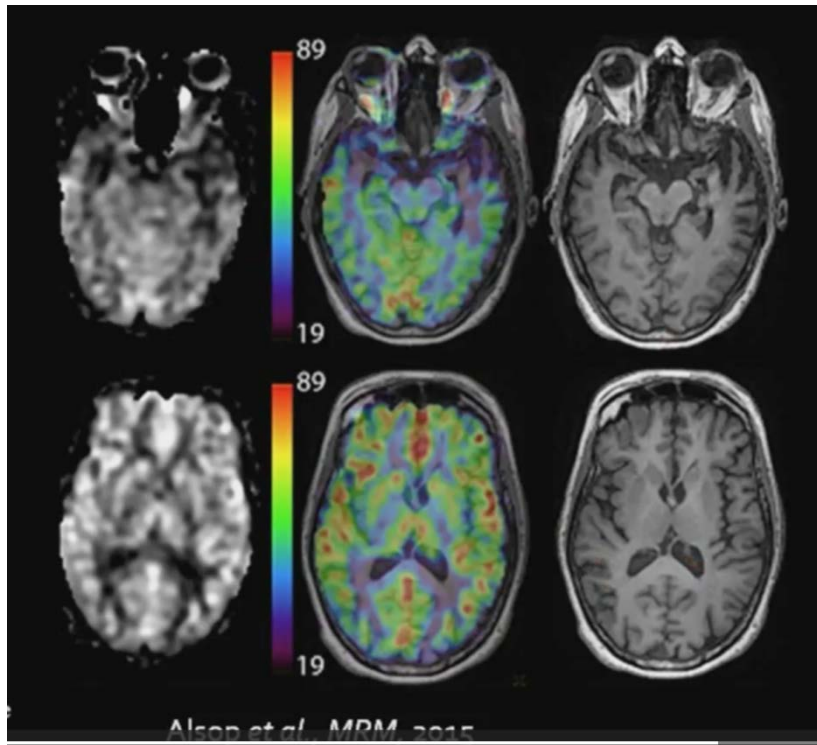
« Subcortical Arteriosclerotic encephalopathy » SAE

Binswanger's Disease

Comparison of Two Commercial Volumetric Software Products

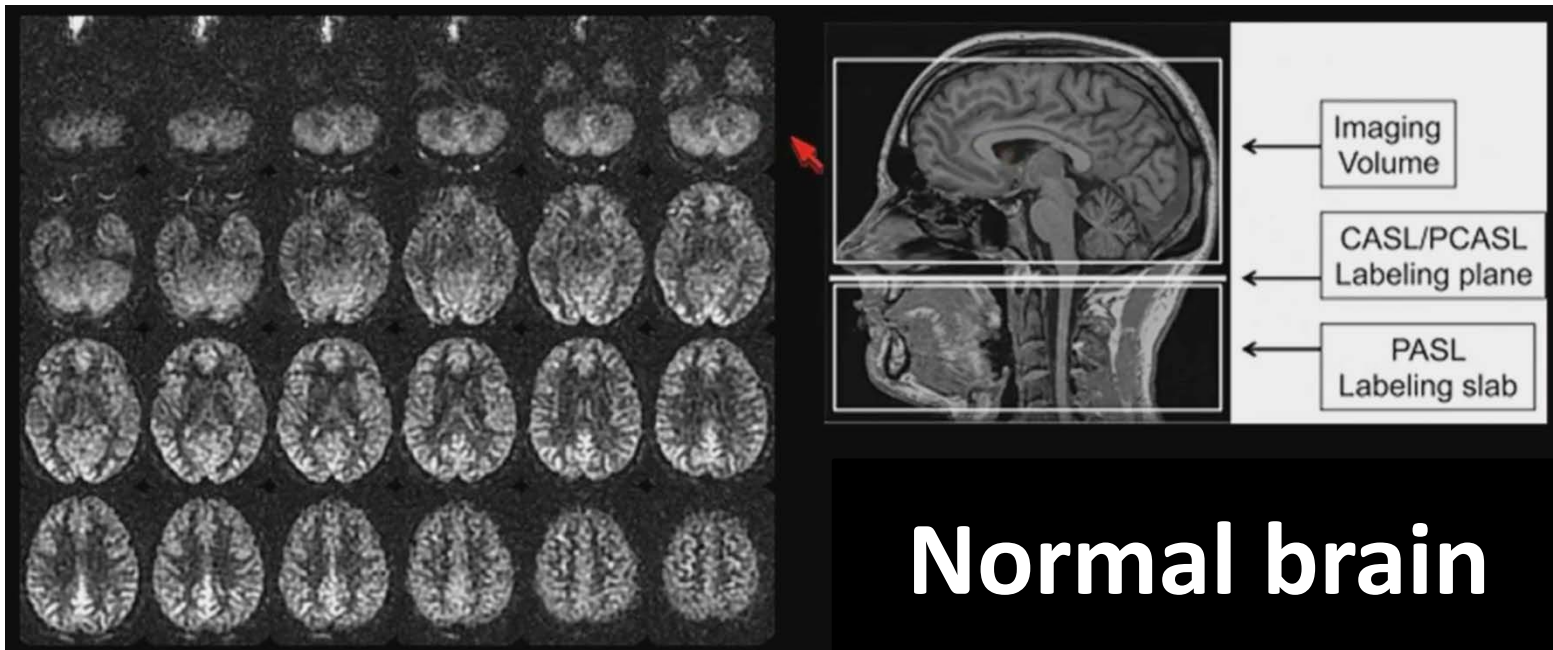


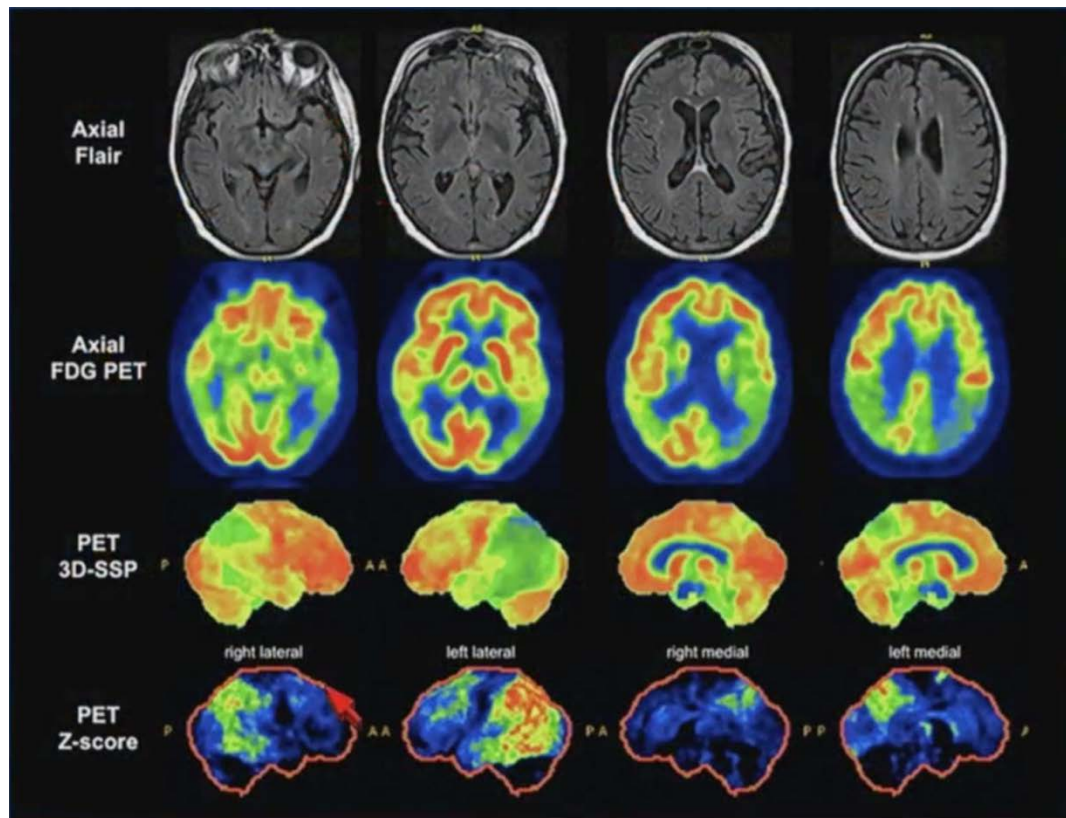
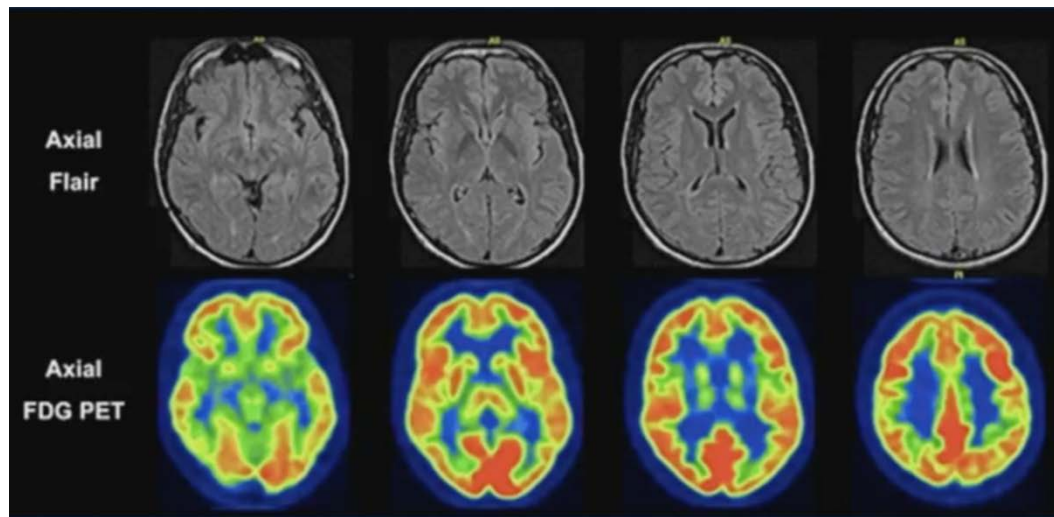
Tanpitukpongse TP, Mazurowski MA, Ikhen J, Petrella JR
AJNR 2017

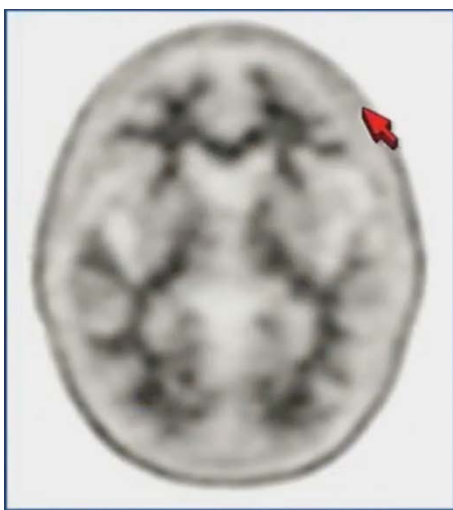


Aphasie dégénérative primaire

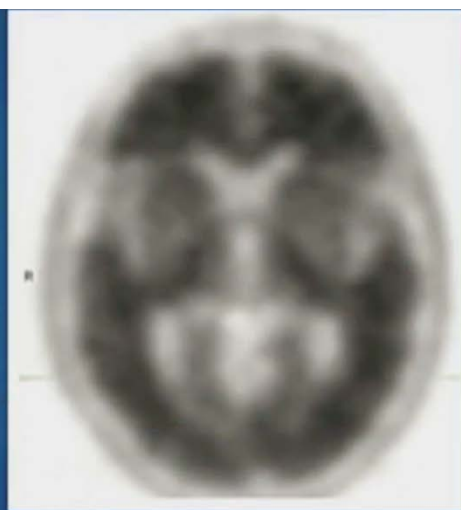
Co-registration de la perfusion ASL avec l'image morphologique T1



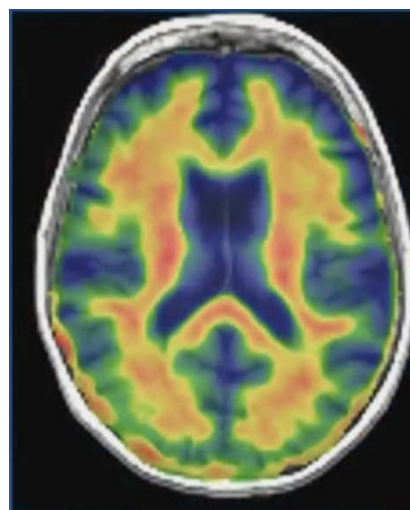




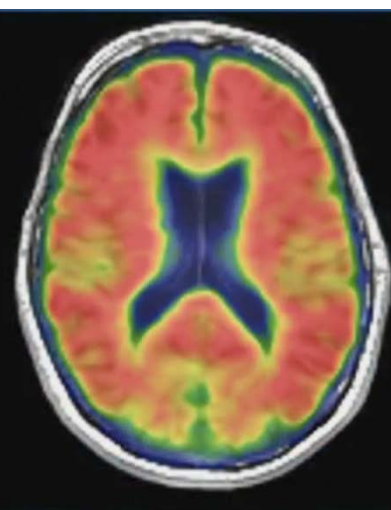
Negative



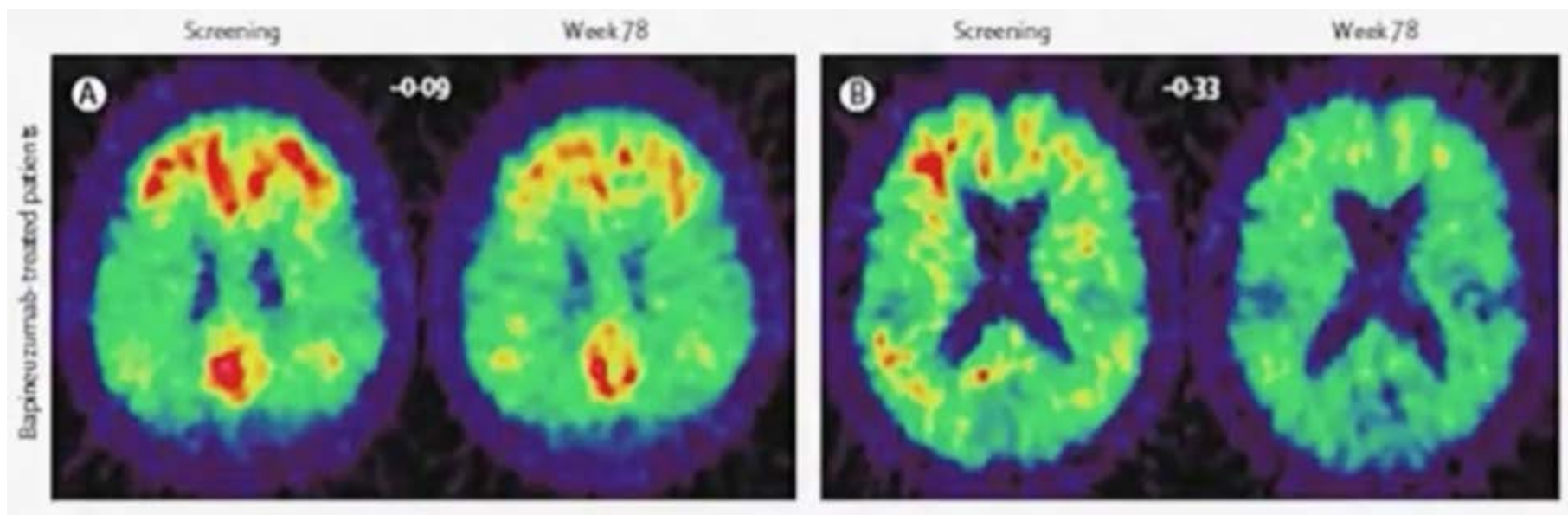
Positive



Negative



Positive



¹¹C-PiB PET assessment of change in fibrillar amyloid- β load in patients with Alzheimer's disease treated with bapineuzumab: a phase 2, double-blind, placebo-controlled, ascending-dose study

Rinne et al. Lancet Neurology 2010;9:363-372

Guidelines

1. Analyse morphologique 'éclairée'
(connaissance des entités morphologiques)
2. Analyse quantitative
 1. Scheltens
 2. Volumétrie → sérielle
3. Intégration ASL

