

# Cours RDGN2120 2020-2021

## Compléments de Neuroradiologie

6<sup>ième</sup> cours du jeudi 29 octobre 2020 (1)

*Première capsule vidéo*

### Imagerie des démences



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*Chef de Clinique*

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Cliniques universitaires Saint-Luc

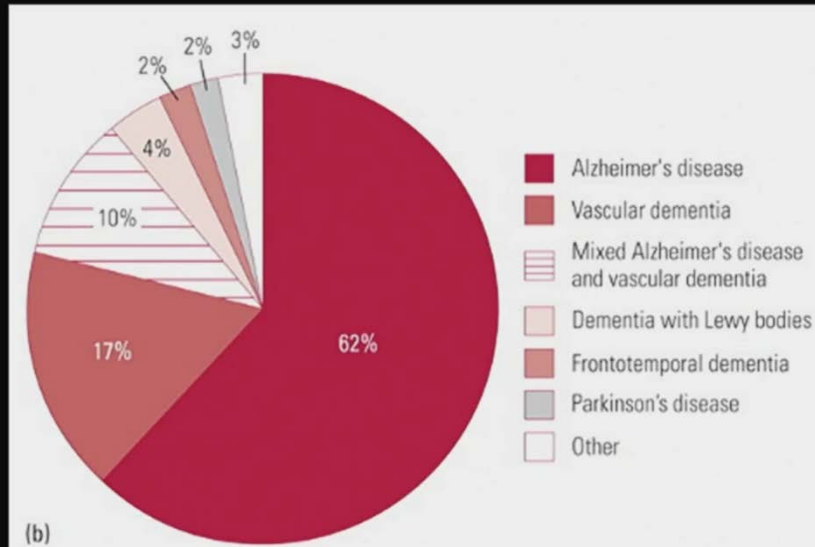
[thierry.duprez@uclouvain.be](mailto:thierry.duprez@uclouvain.be)

<http://www.saintluc.be>



*Première capsule vidéo*

## Causes of dementia



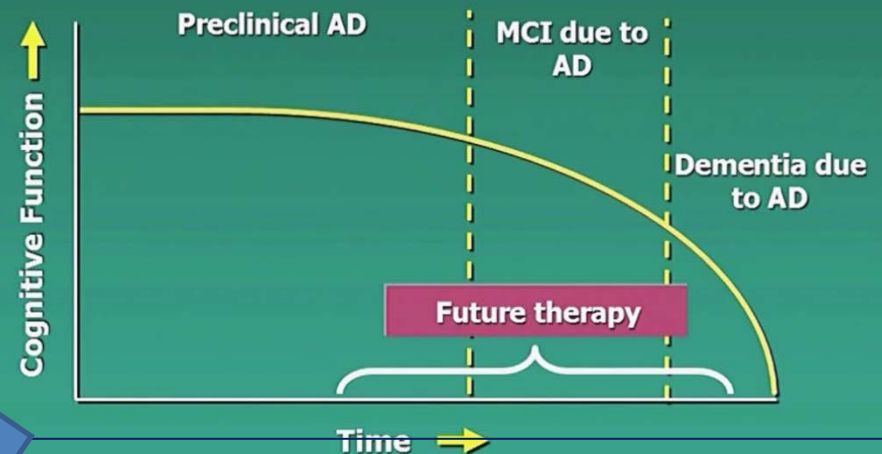
Prépondérance de AD dans les démences dégénératives

## Clinical Diagnosis



Précision diagnostique clinique imparfaite

## Redefining Alzheimer's Disease



Thérapies ciblées (anti-amyloïdes et anti-tau)

Place pour l'imagerie

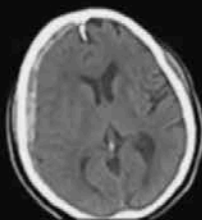
- diagnostique
- monitoring de réponse thérapeutique

# FDA-approved techniques for imaging dementia

## Clinical imaging for dementia

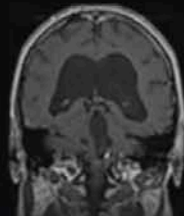
Noncon  
head CT

- Identify urgent treatable causes



Noncon  
brain MRI

- Exclude other causes



FDG PET

- Complex cases



### EMERGING OPTIONS

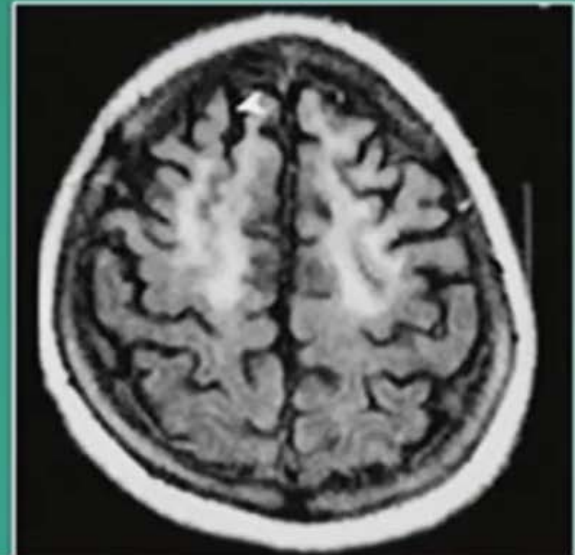
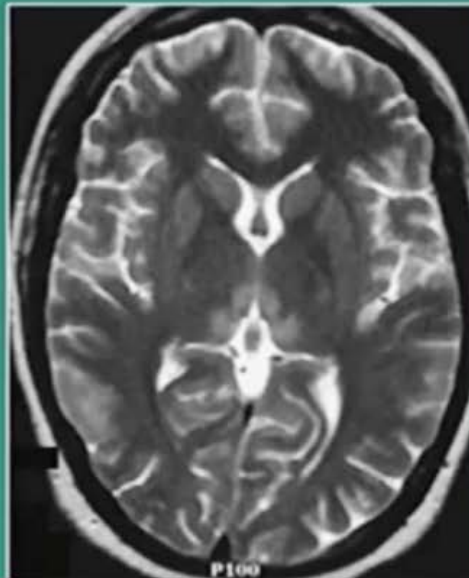
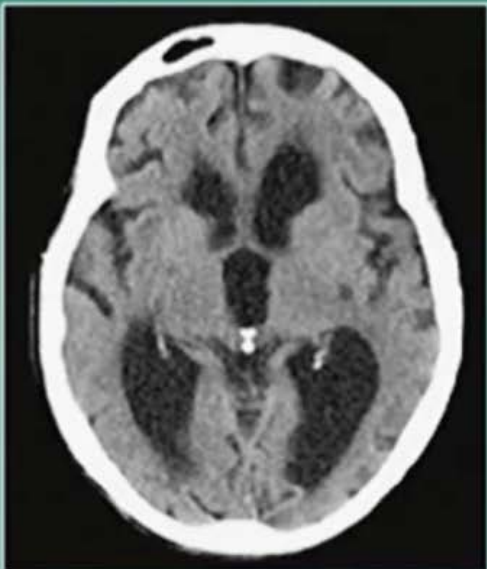
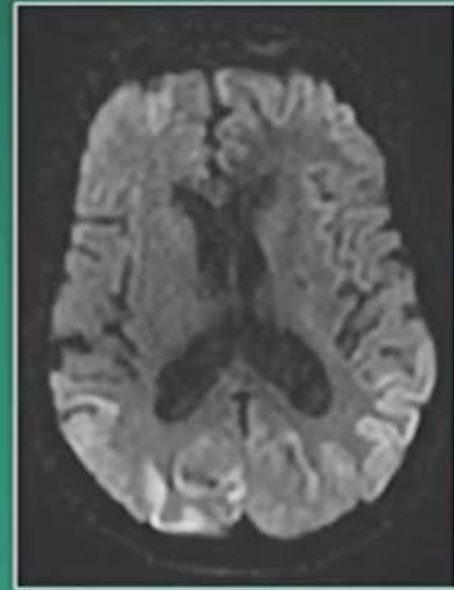
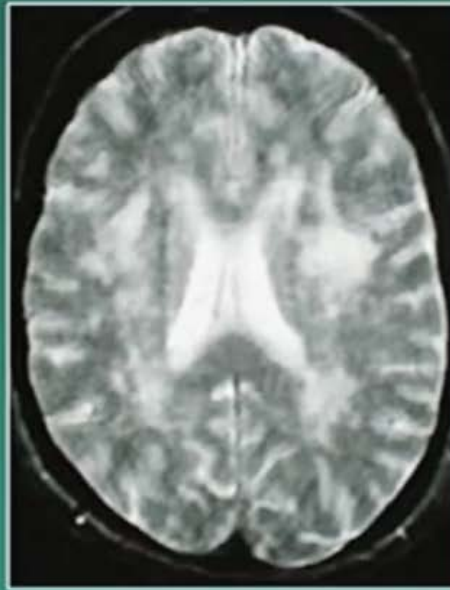
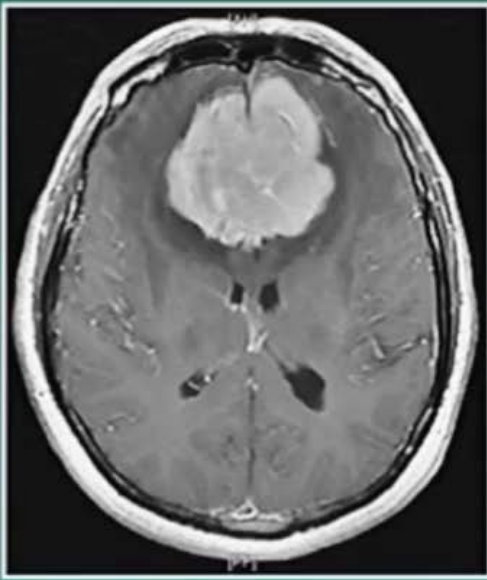
Amyloid PET

Quantitative  
MRI

Perfusion MR (DSC,  
ASL, DCE)

Functional MRI

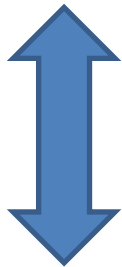
# Imagerie morphologique CT/IRM → démences 'secondaires'



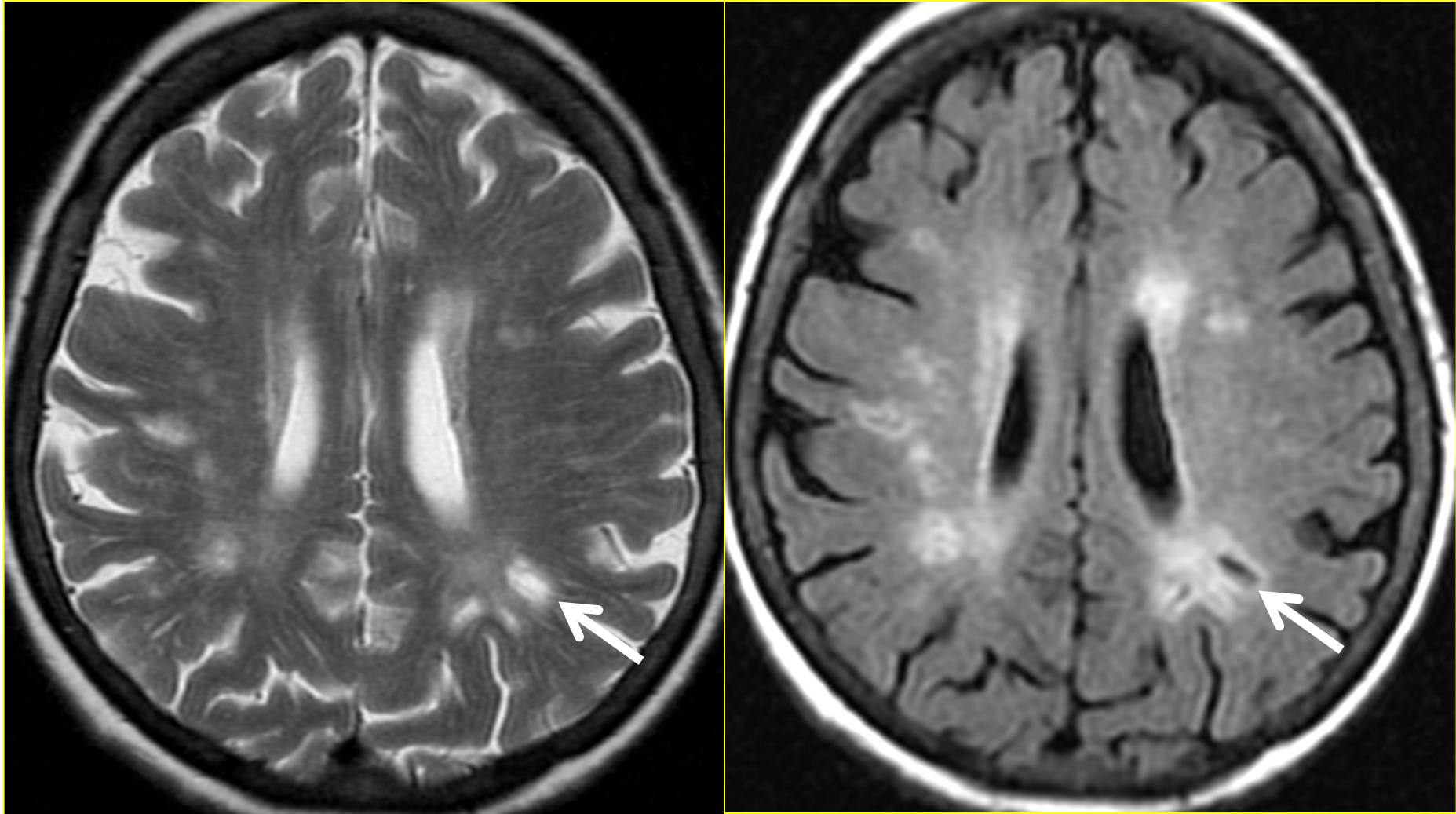
# Veillessement cérébral 'normal'

## Petites lésions *aspécifiques* de la SB

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

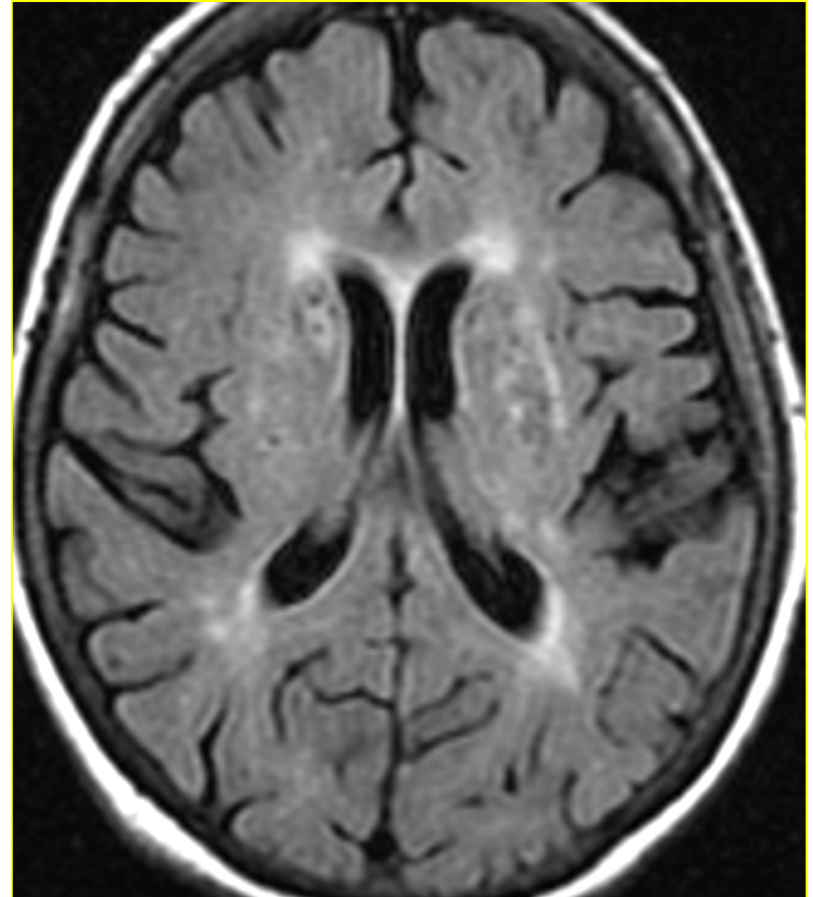
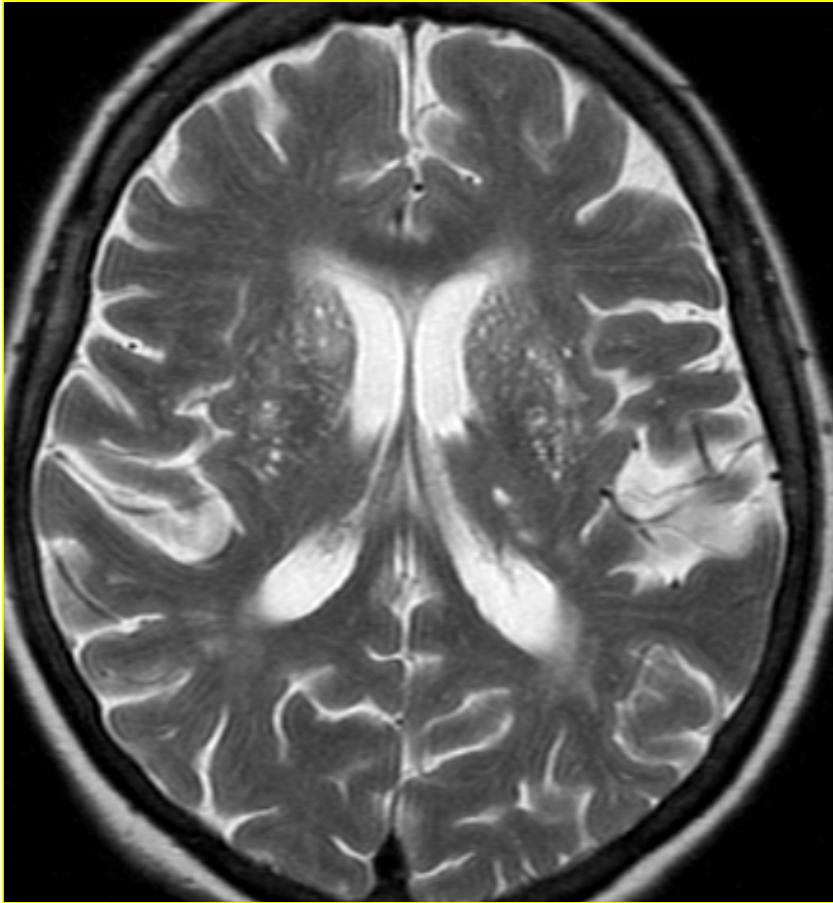


- Leucoaraiose  
→ démyélinisation/gliose cicatricielle



'leucoaraiose' + 1 EPV de VR

## Petites lésions aspécifiques de la SB



2 types

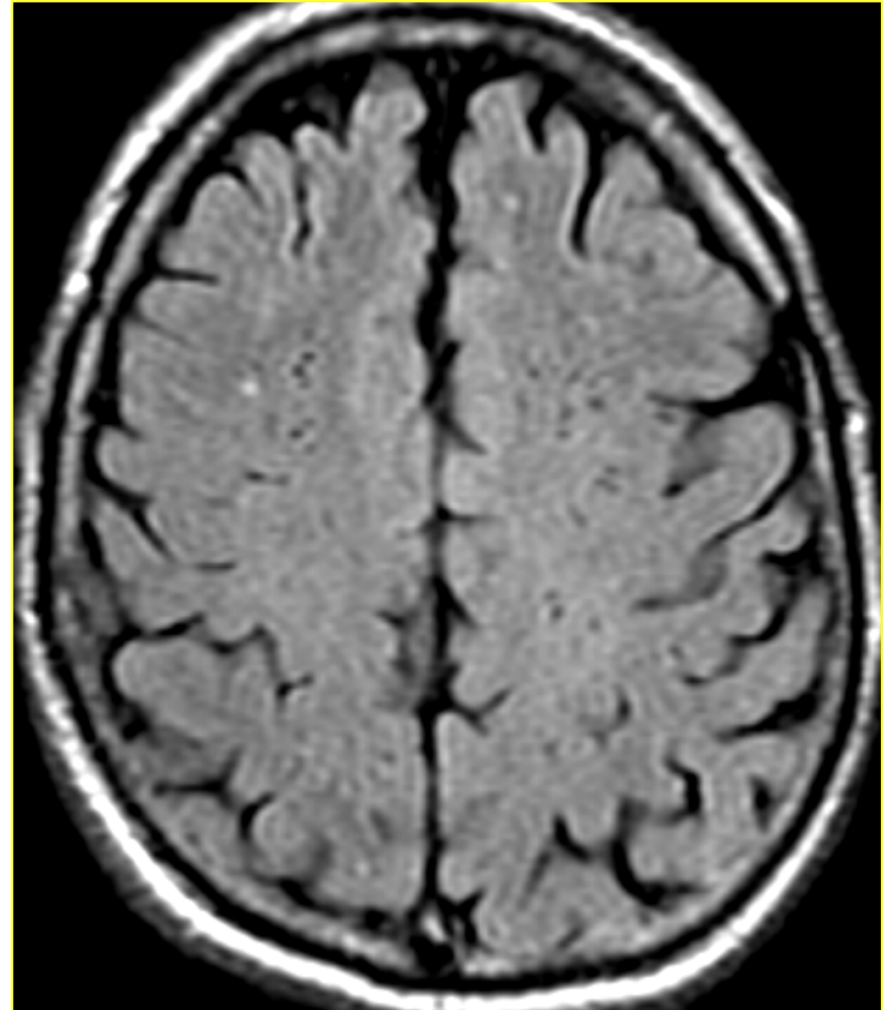
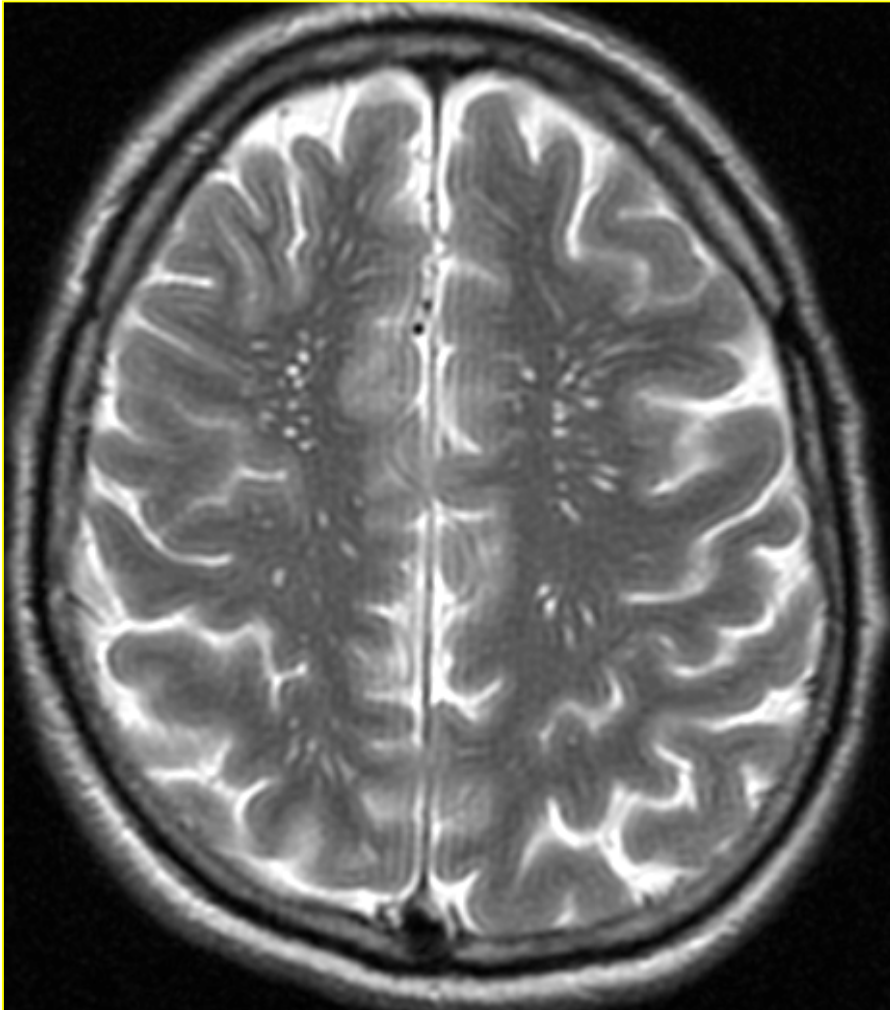
Blanc-Blanc = gliose

Blanc -Noir = LCR = EPV

# Veillessement cérébral

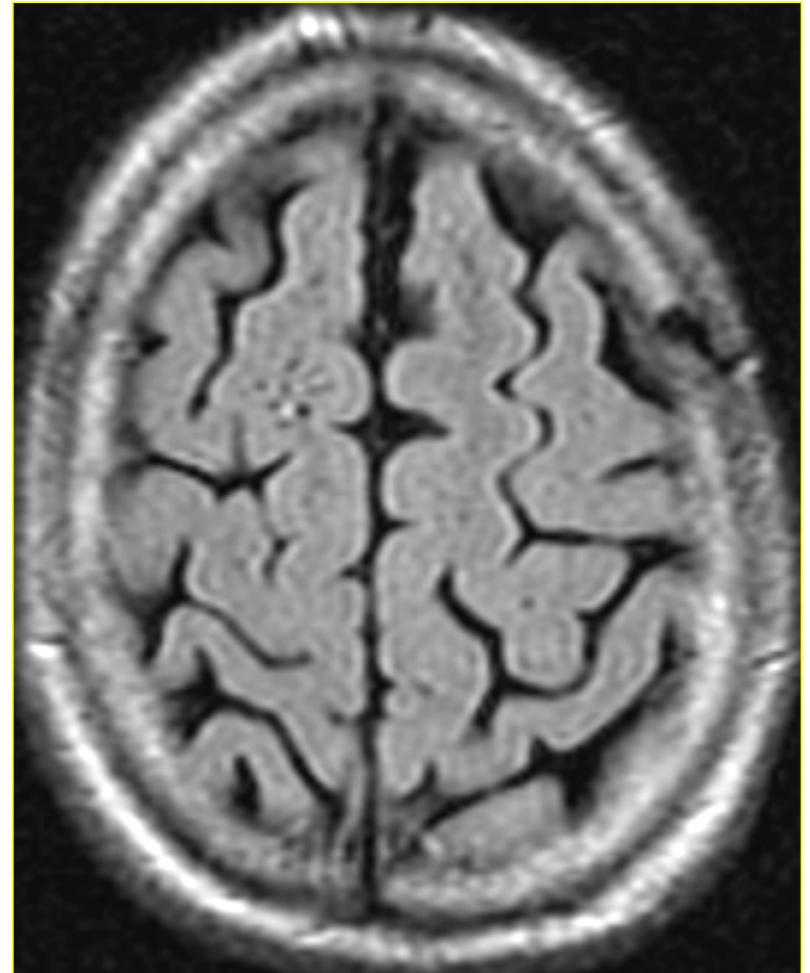
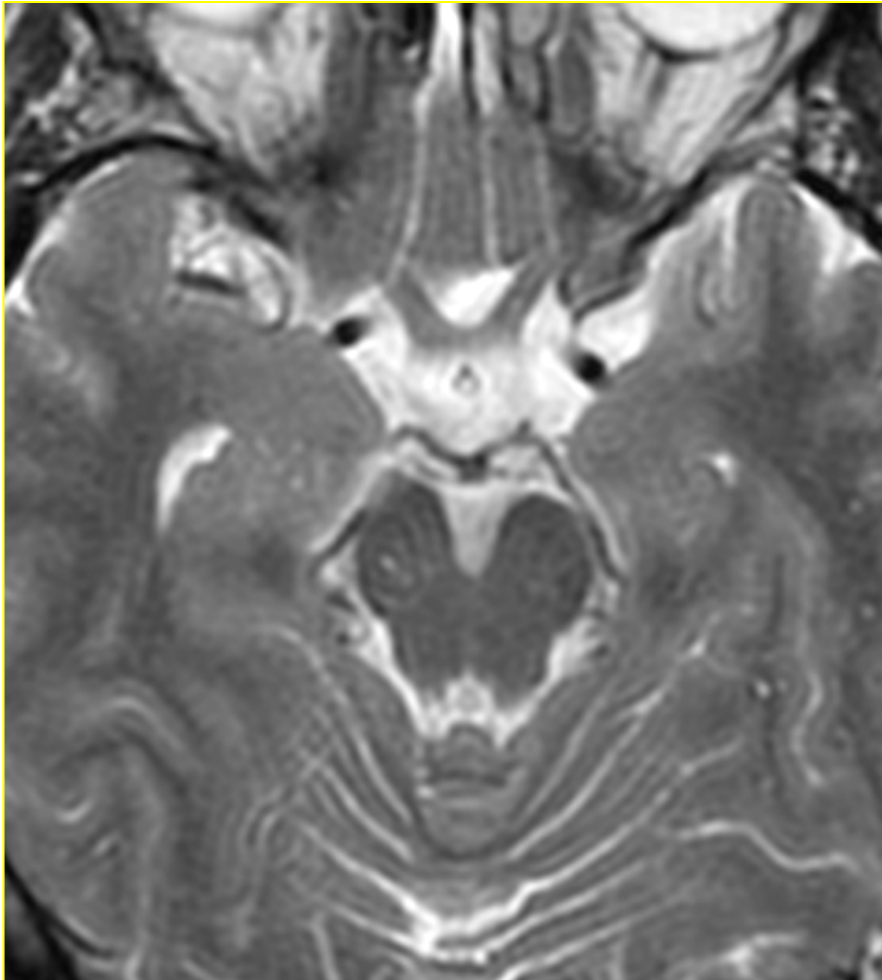
Petites lésions aspécifiques de la SB: *EPV de VR*

Localisations typiques





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



# Démence vasculaire leucoaraiosique

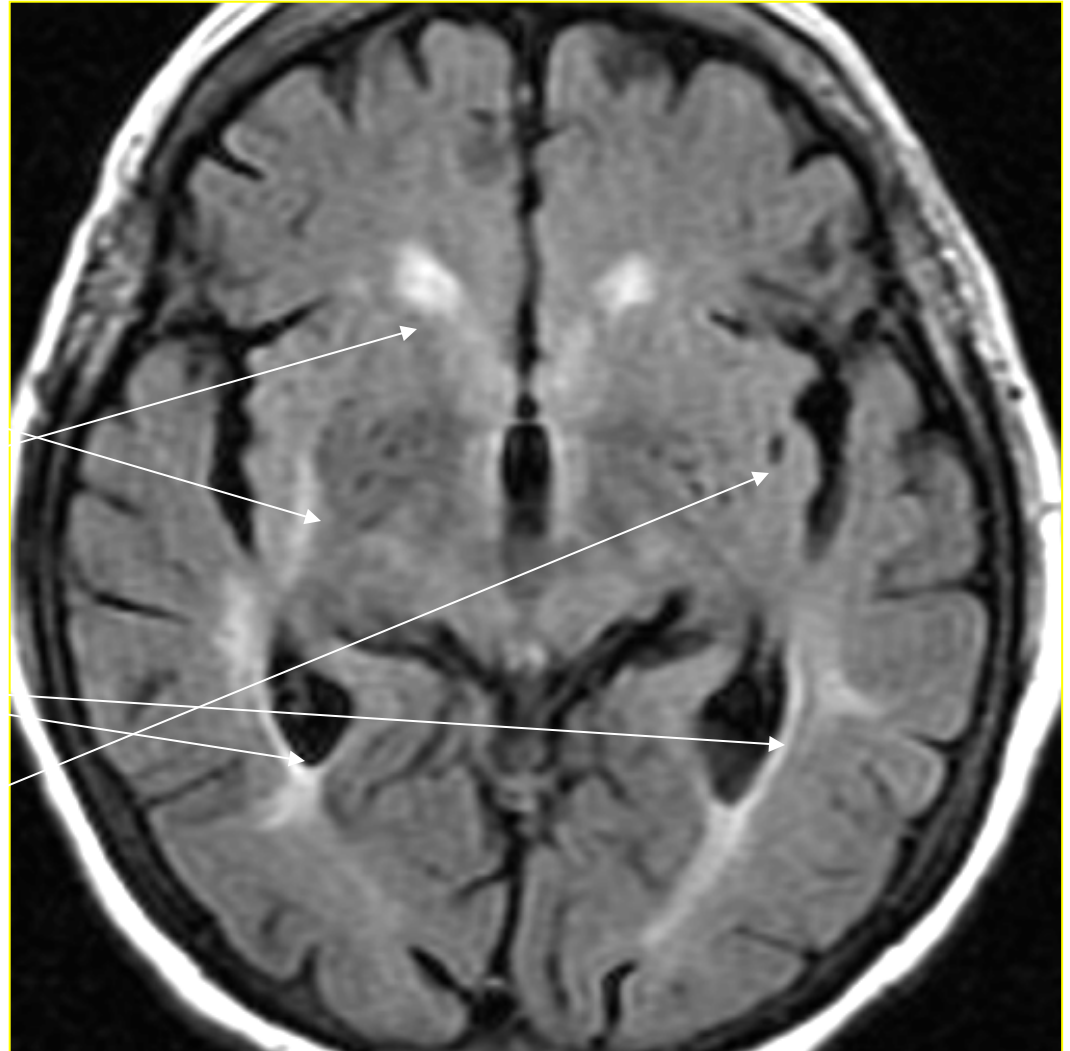
La « bande des quatre »

\* WMHs

\* CAPs

\* PV Rim

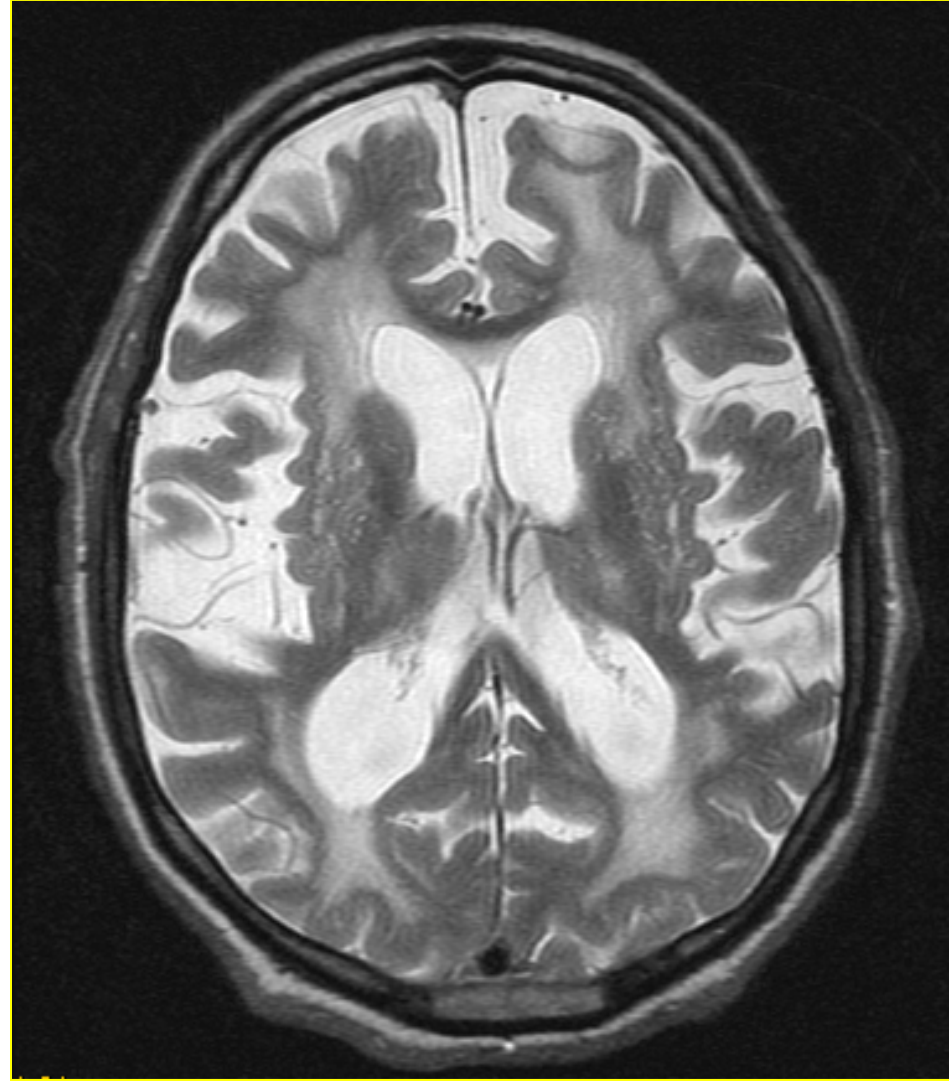
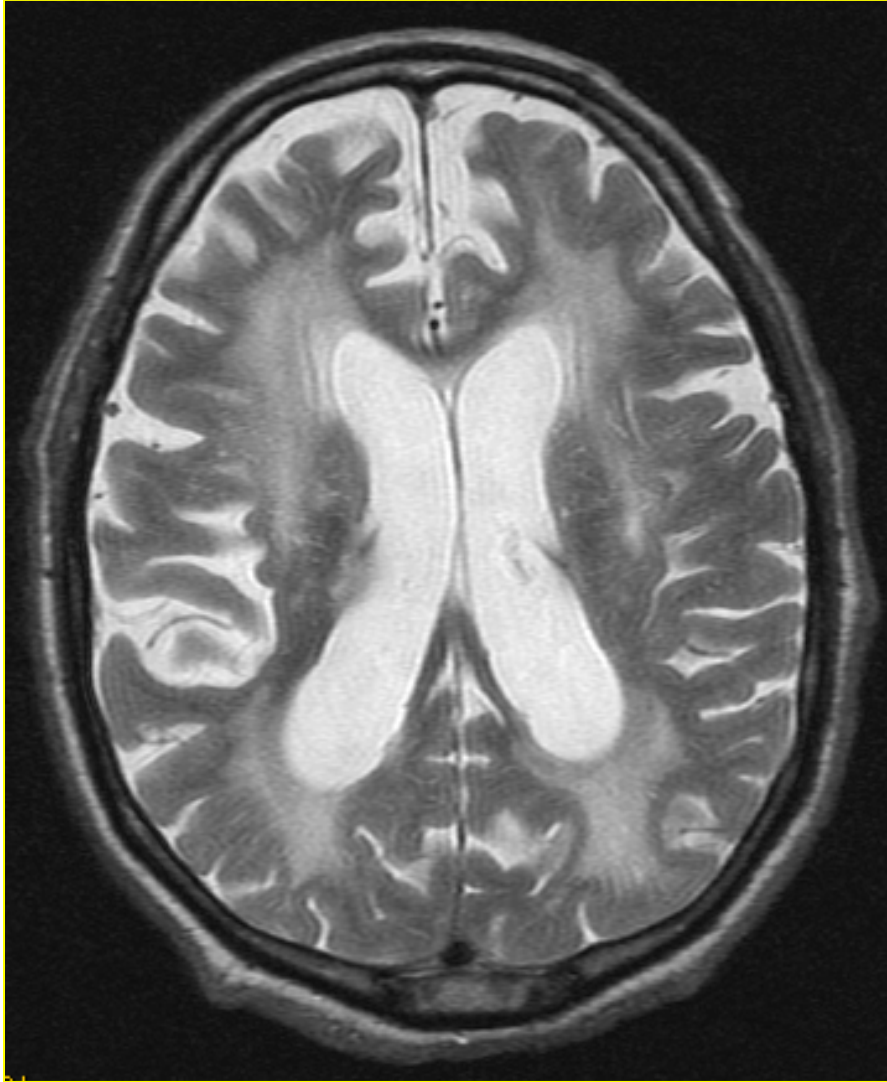
\* EVR larges



## 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** »

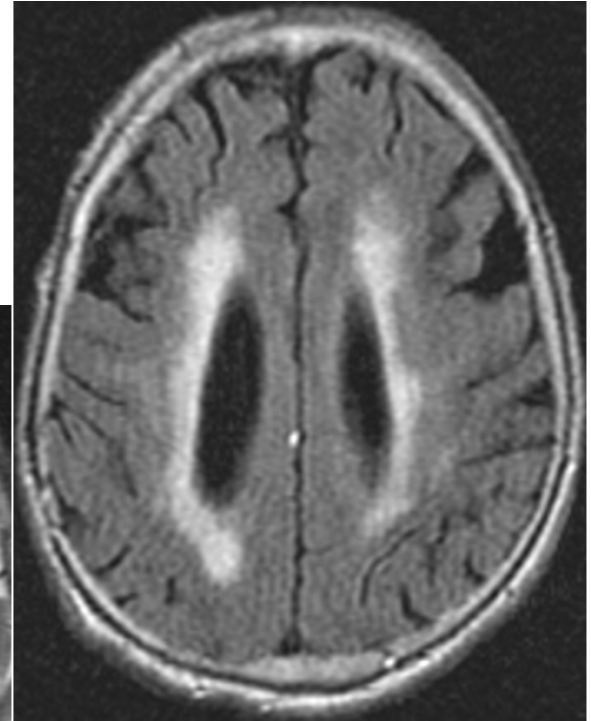
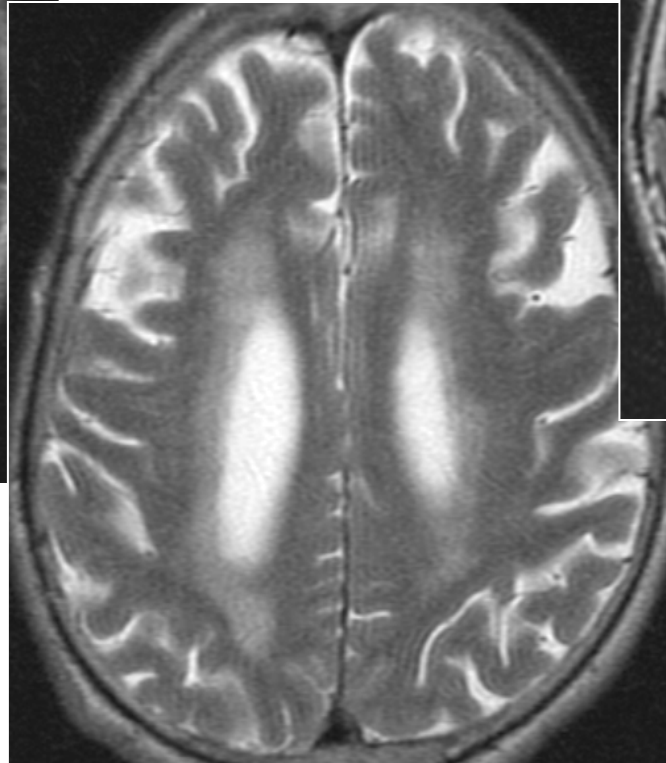
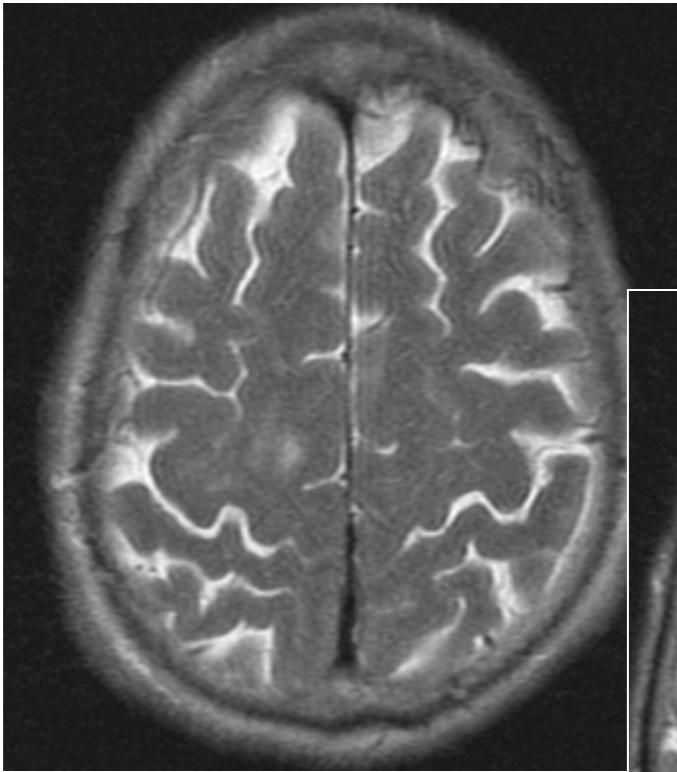
## *Hydrocéphalie normo-tensive* vs '*atrophie sous-corticale*'

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

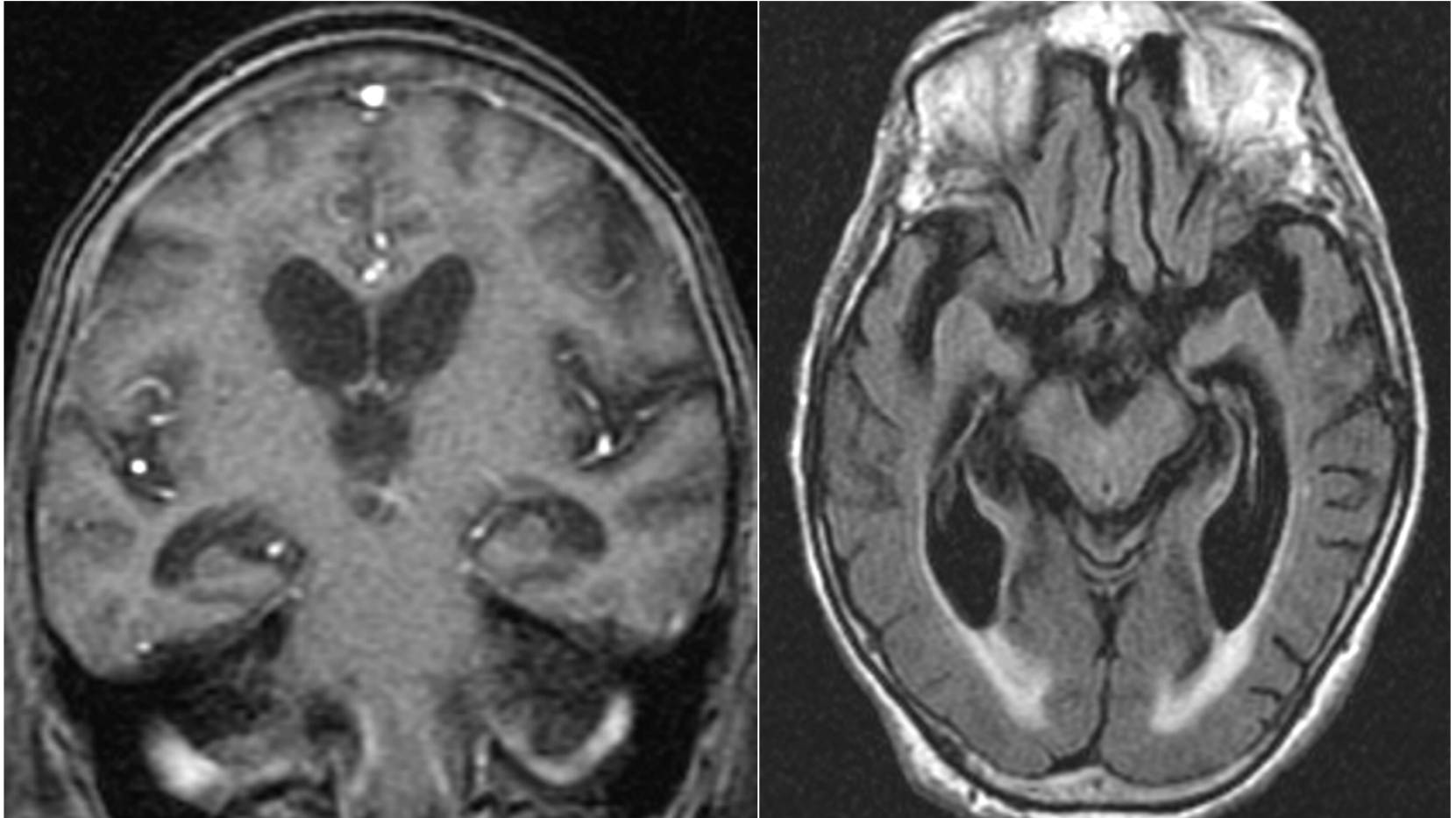
PIC 24(48) heures / triple PL

# 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

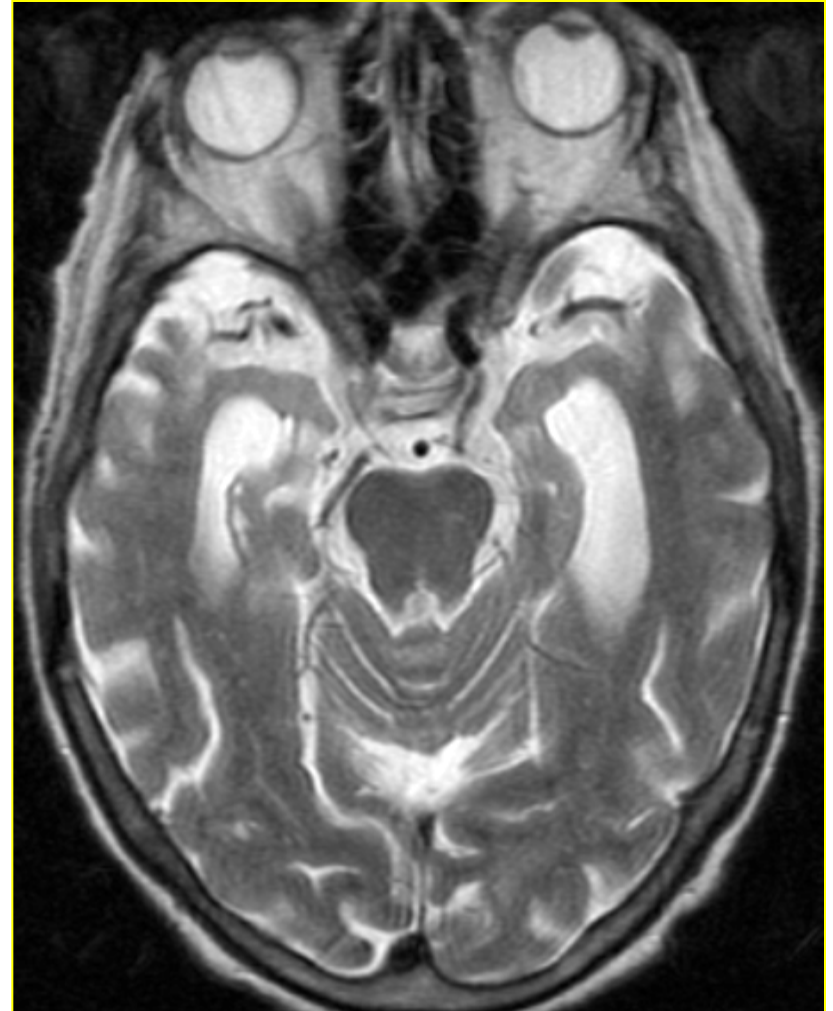
Bénéfice sur la démence: 25-80%

# Désordres neuro-dégénératifs acquis de la substance grise

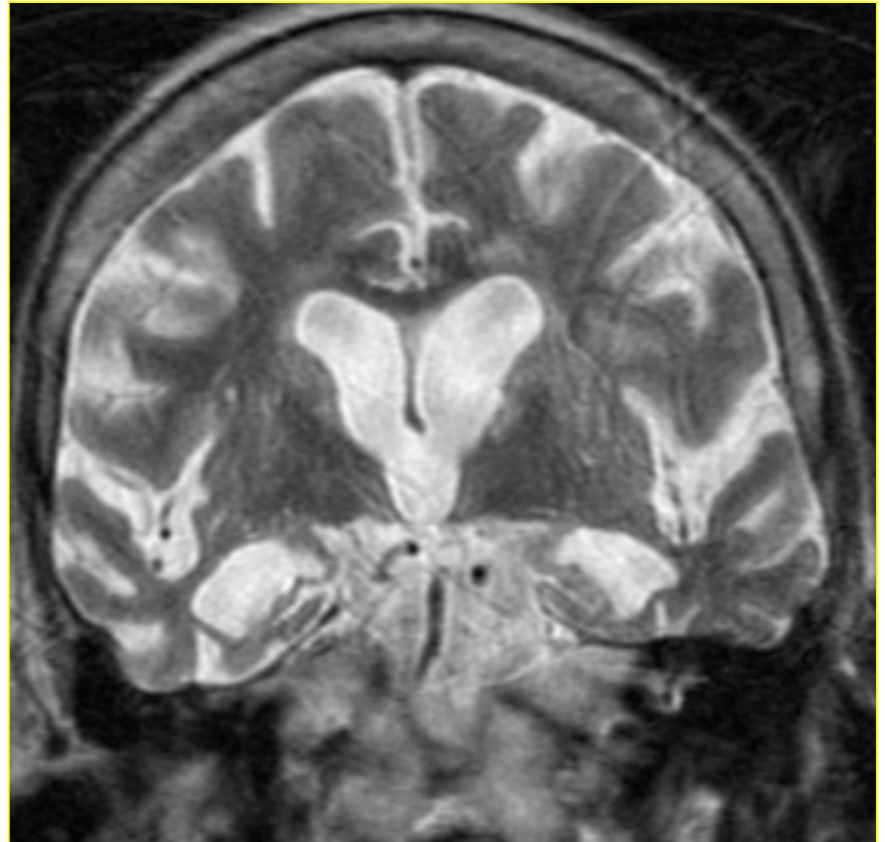
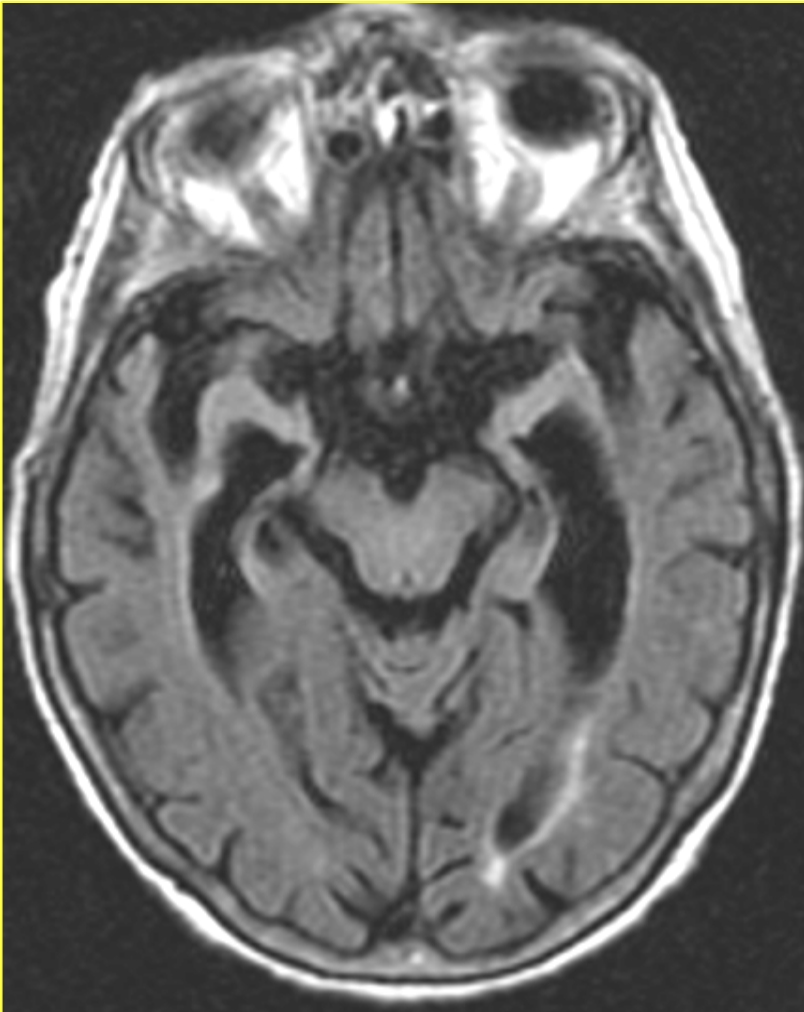
## 1. Maladie d 'Alzheimer

- \* 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

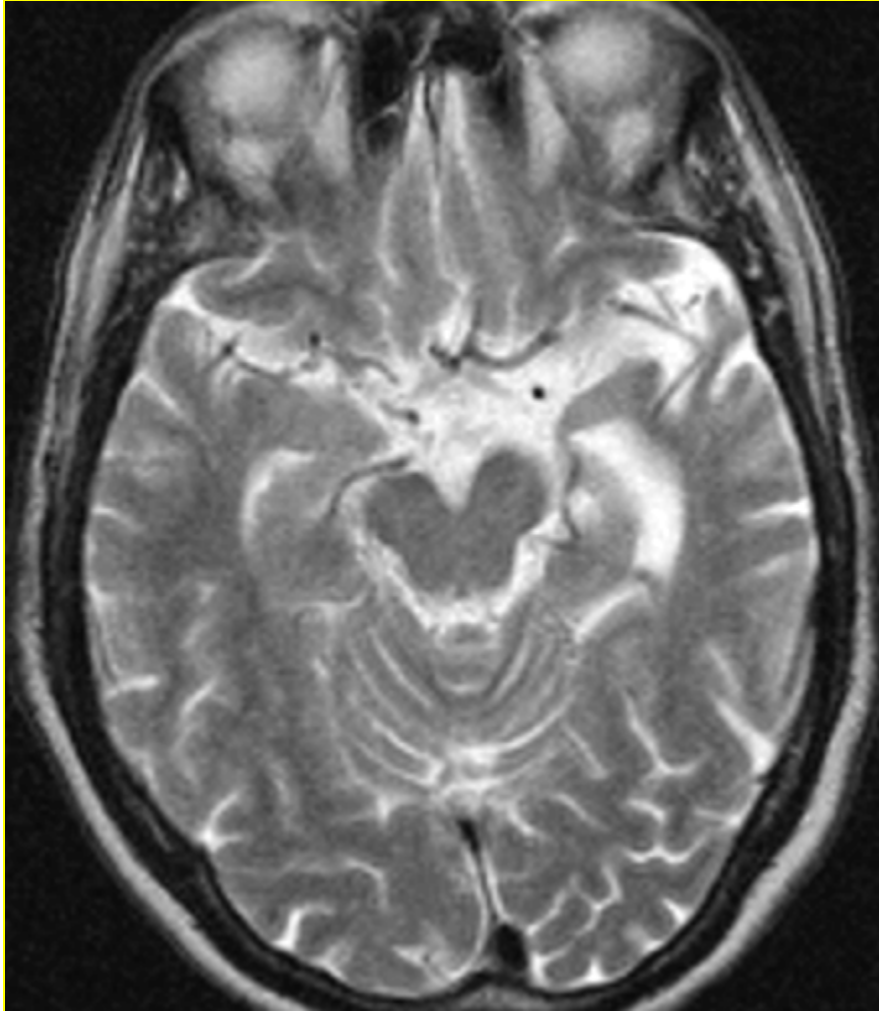
# 1. Atrophie tempore bilatérale



# 1. Atrophie temporale bilatérale



## 2. Atrophie temporale unilatérale



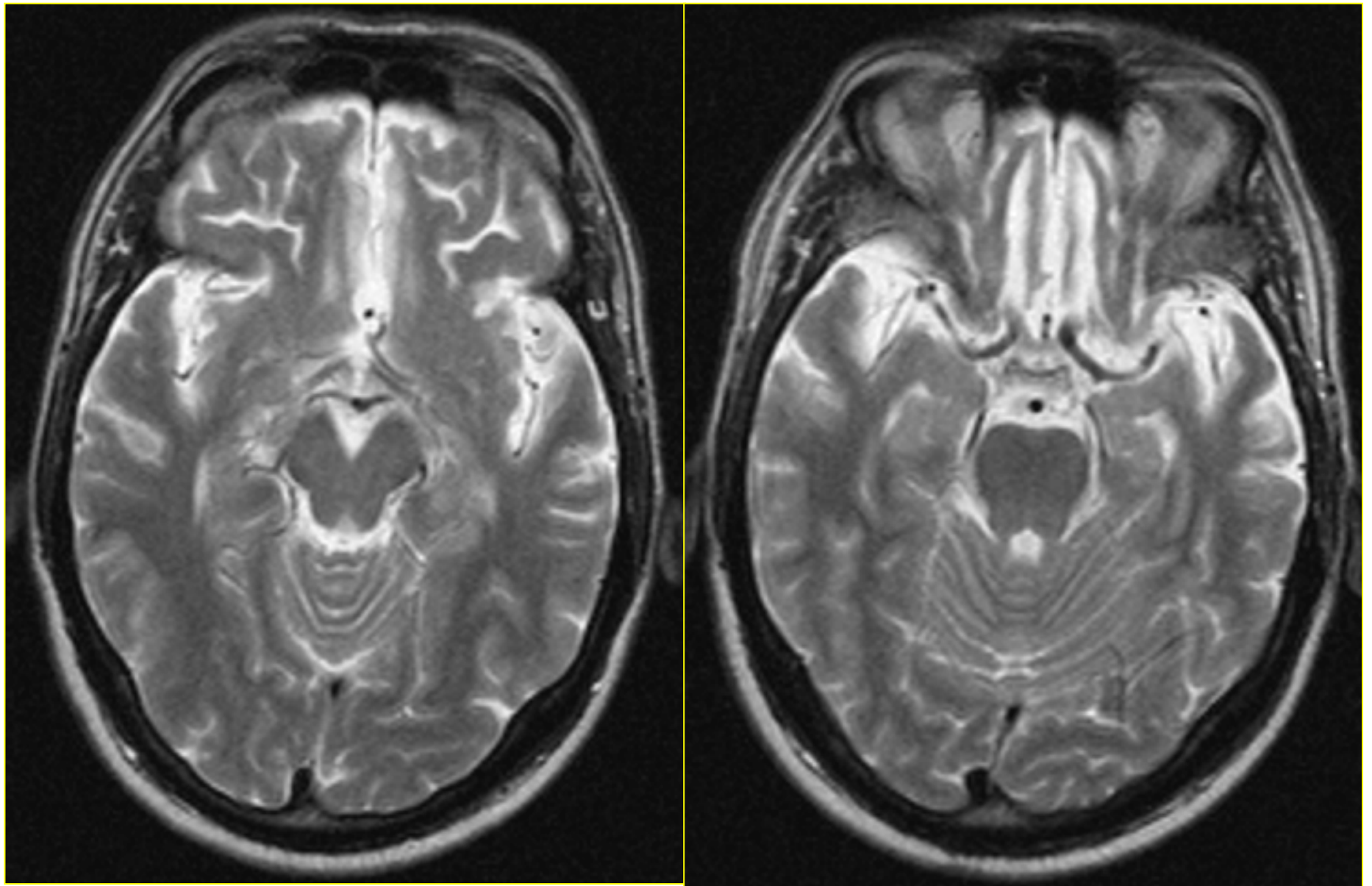
## 2. Maladie de Pick

Atrophie lobaire préférentielle

*corticale*

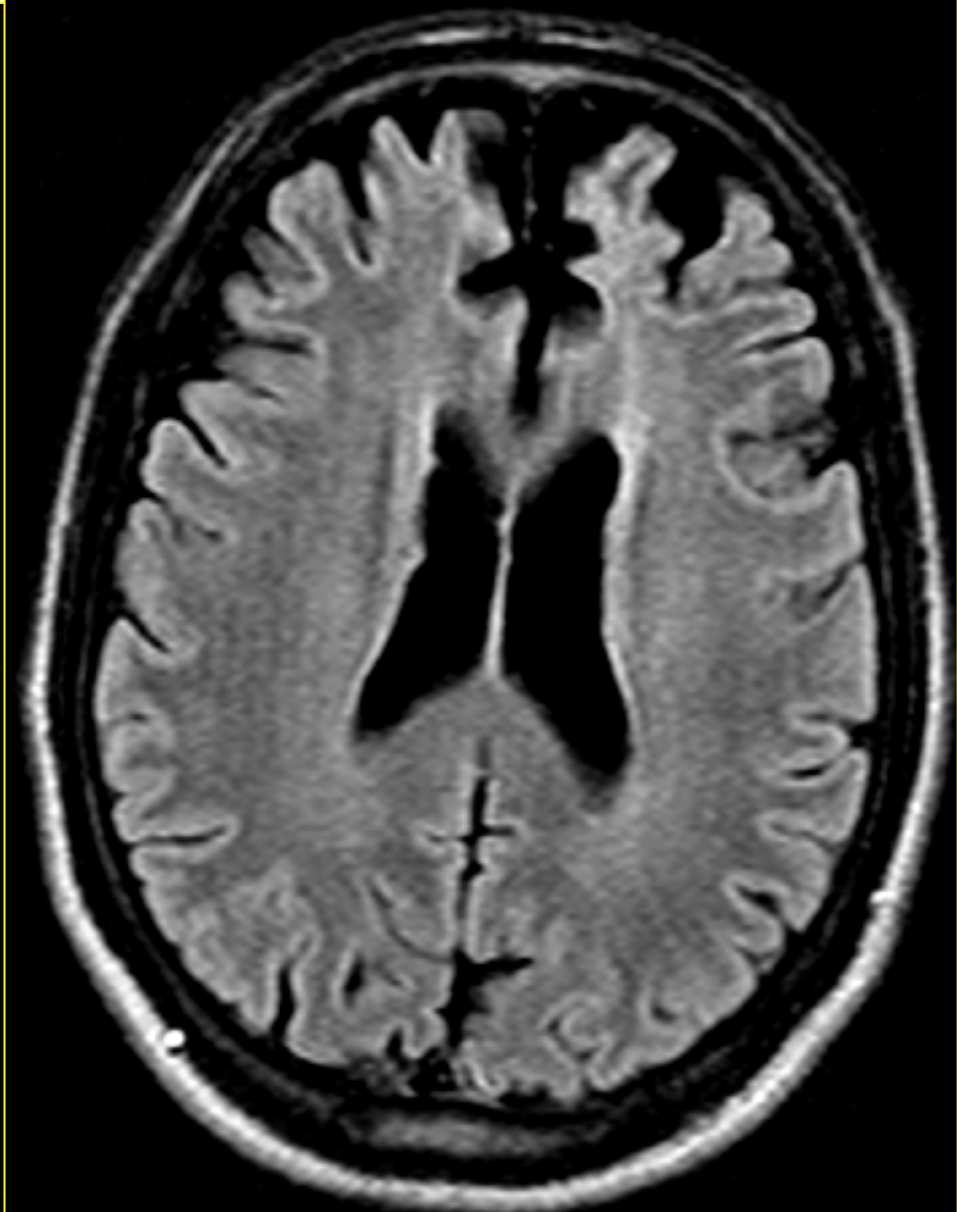
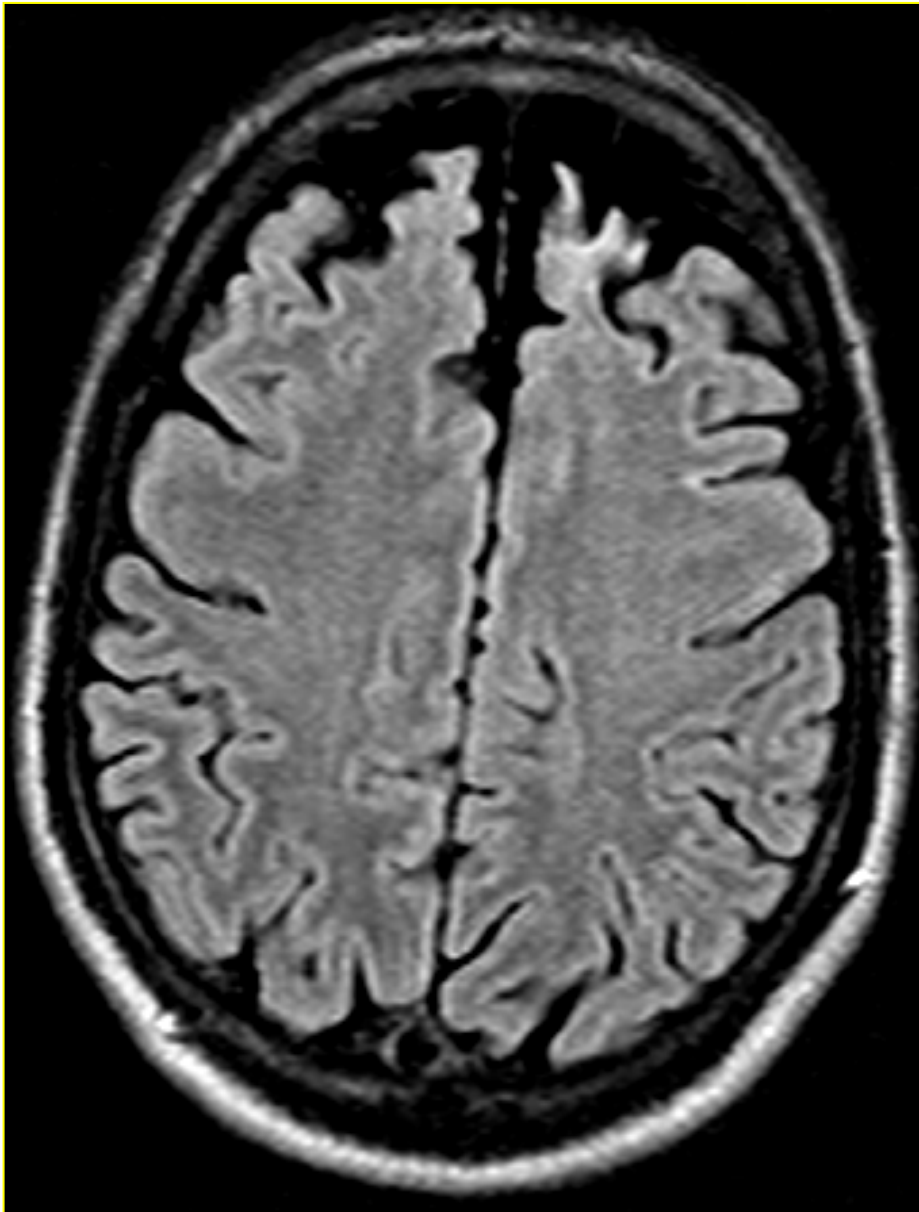
*frontale interne*

## 2. Maladie de Pick

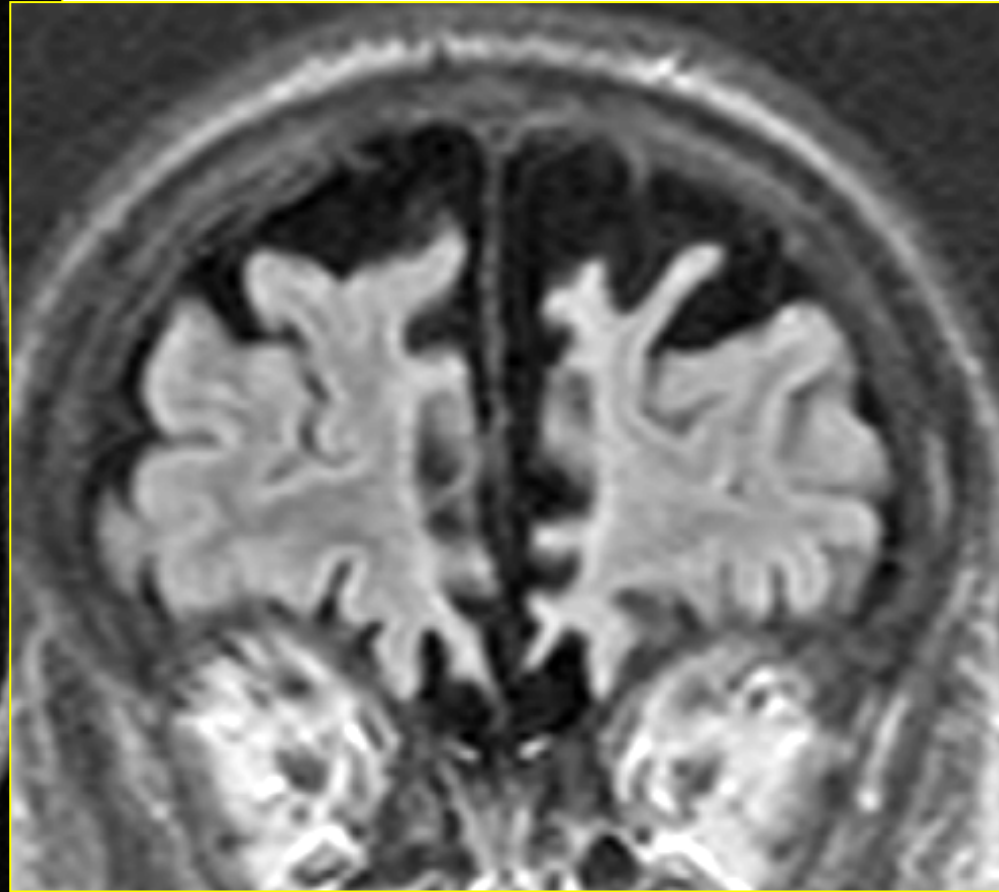
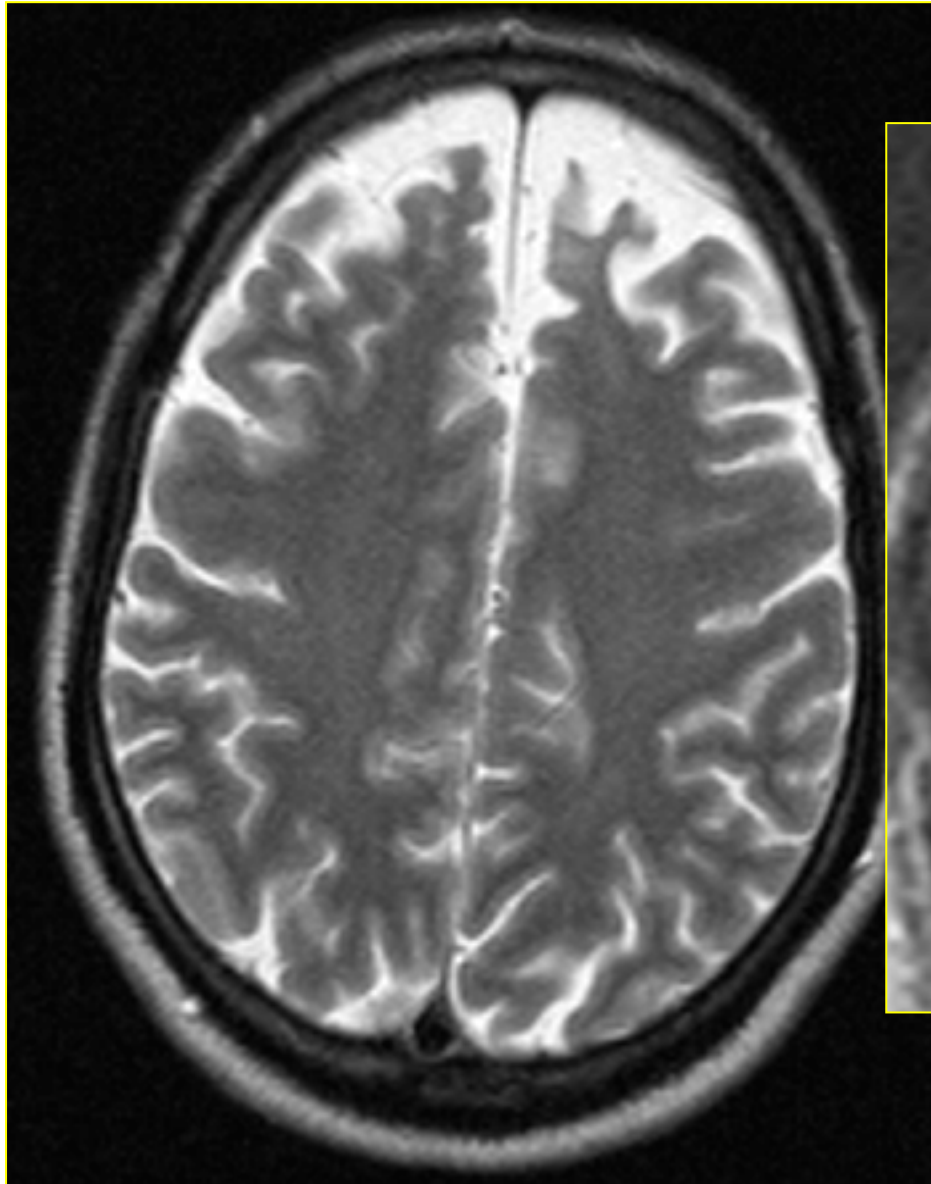




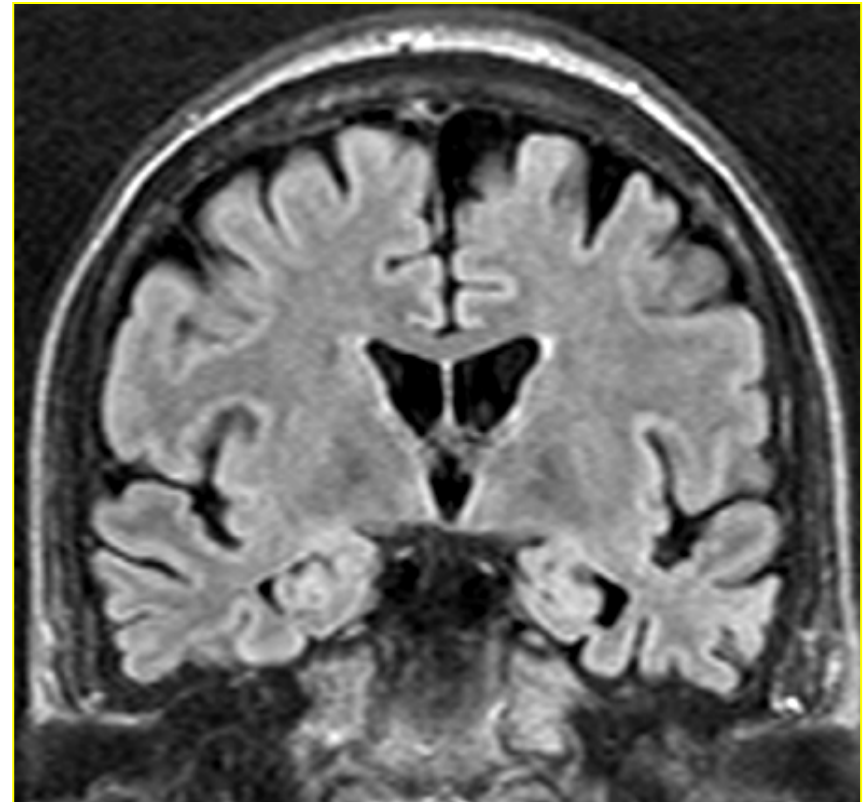
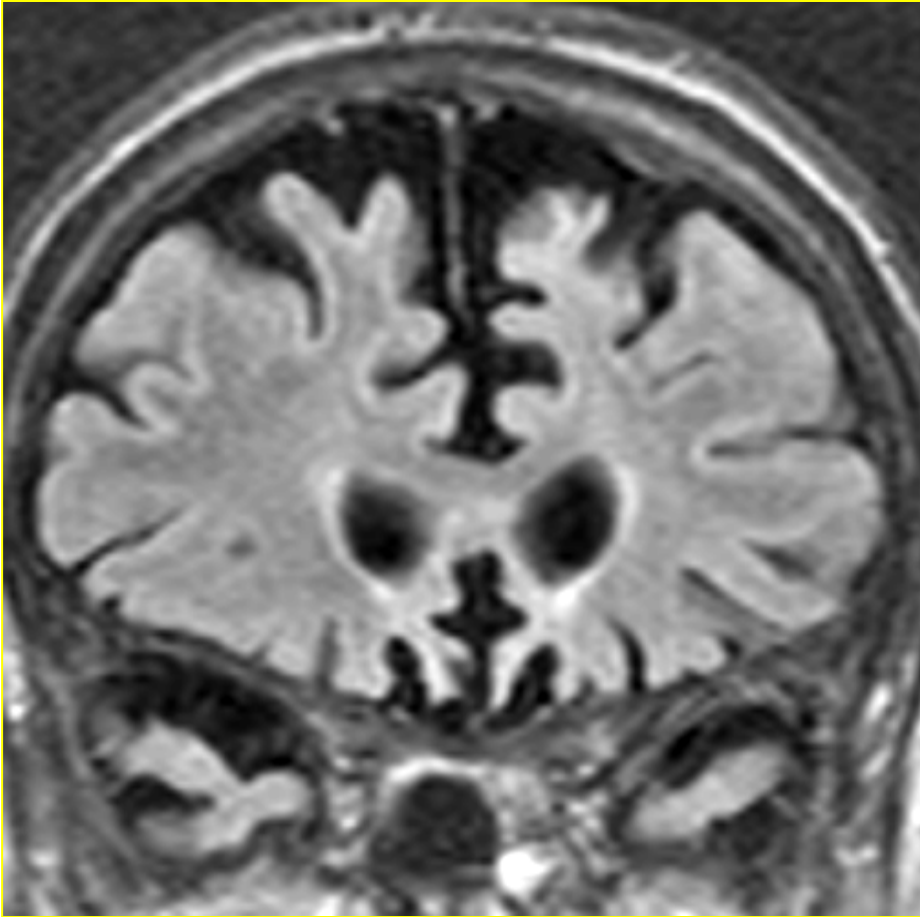
## 2. Maladie de Pick



## 2. Maladie de Pick



## *2. Maladie de Pick*



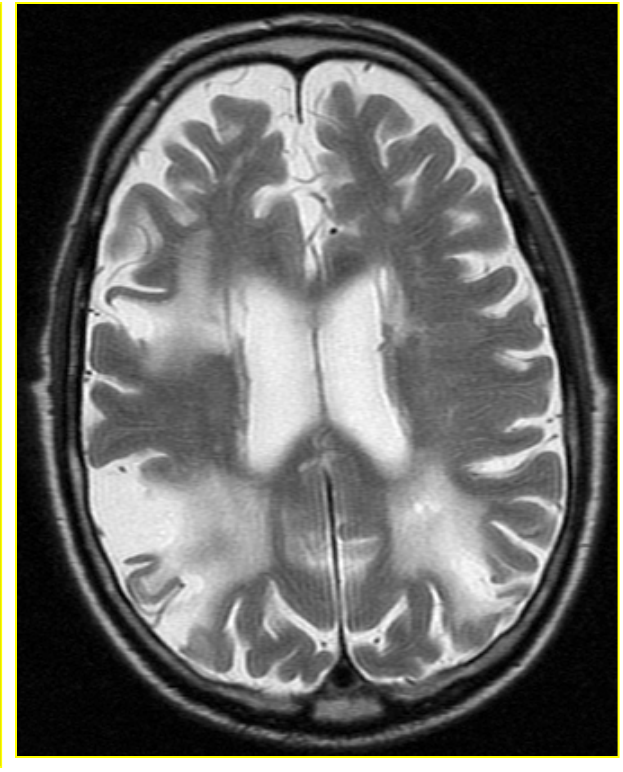
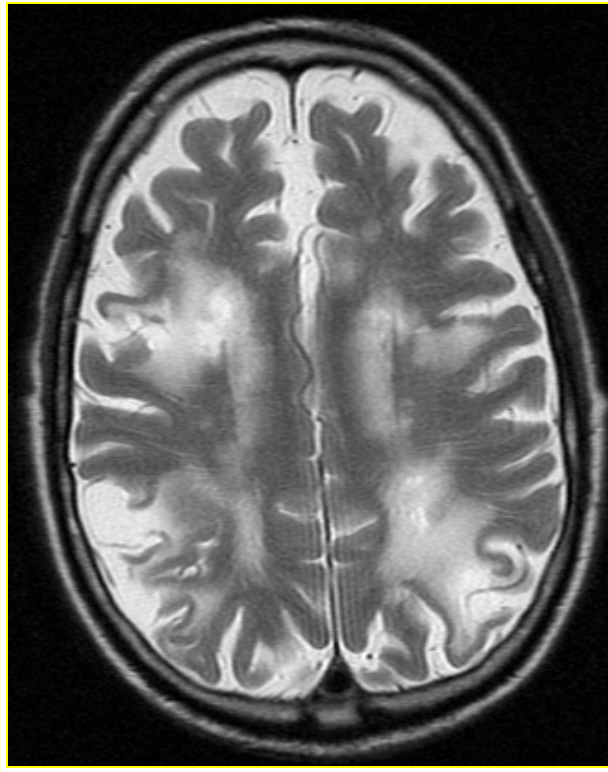
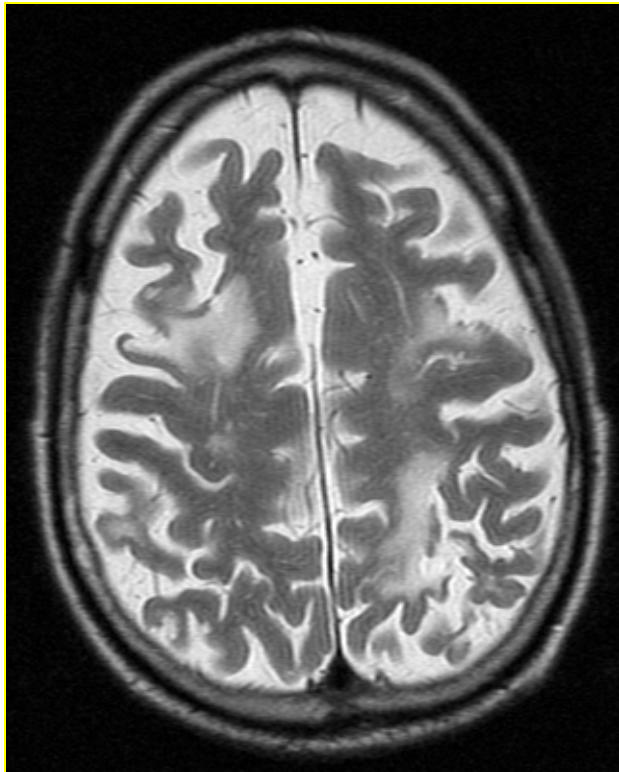
### *3. Démence vasculaire*

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

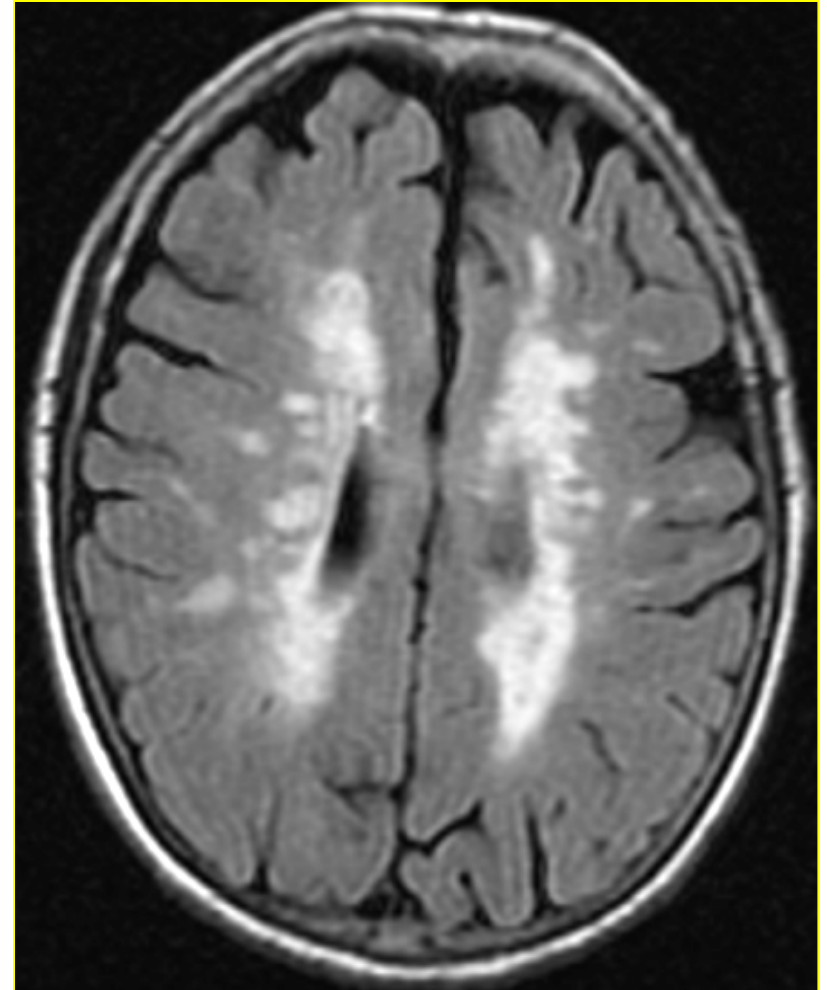
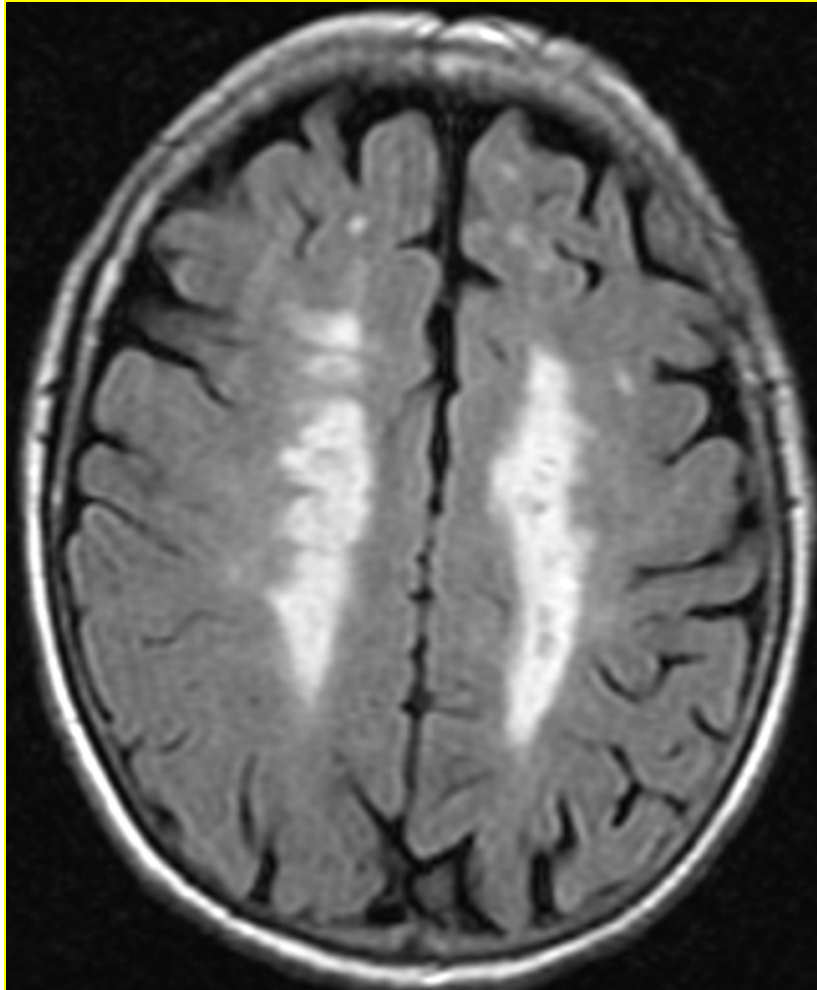
### 3. Démence vasculaire

#### 1. Multi-Infarct-Dementia MID macro-vasculaire



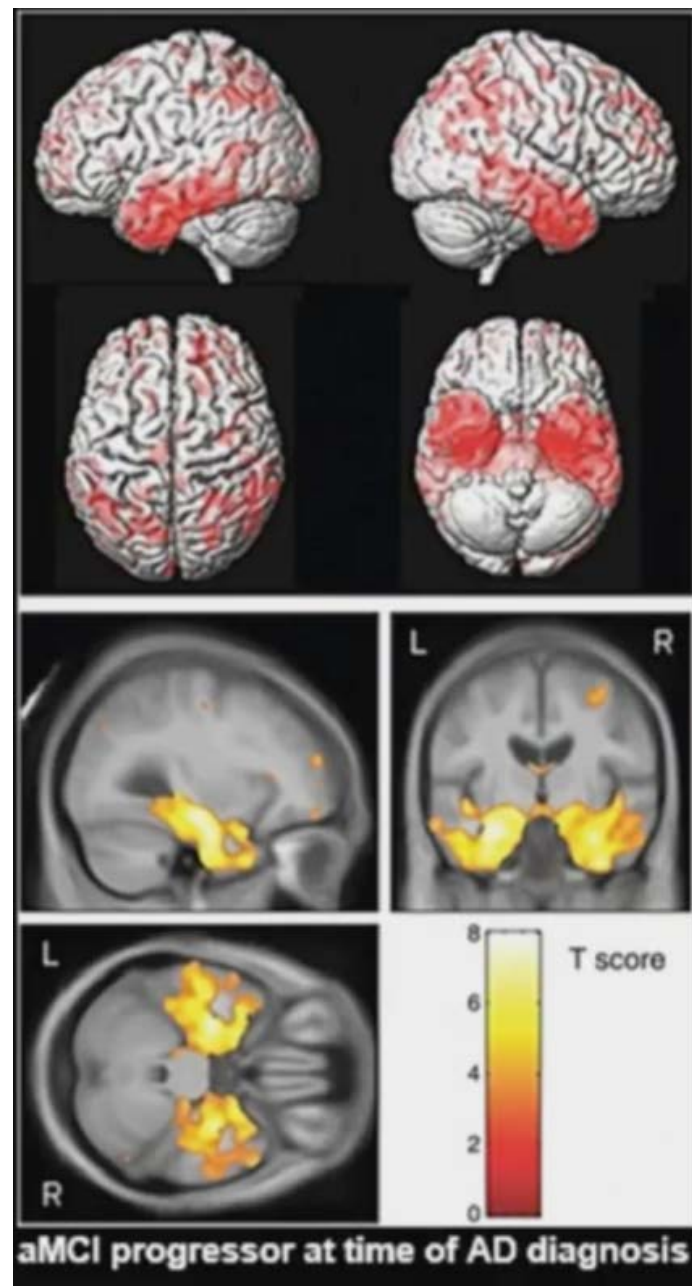
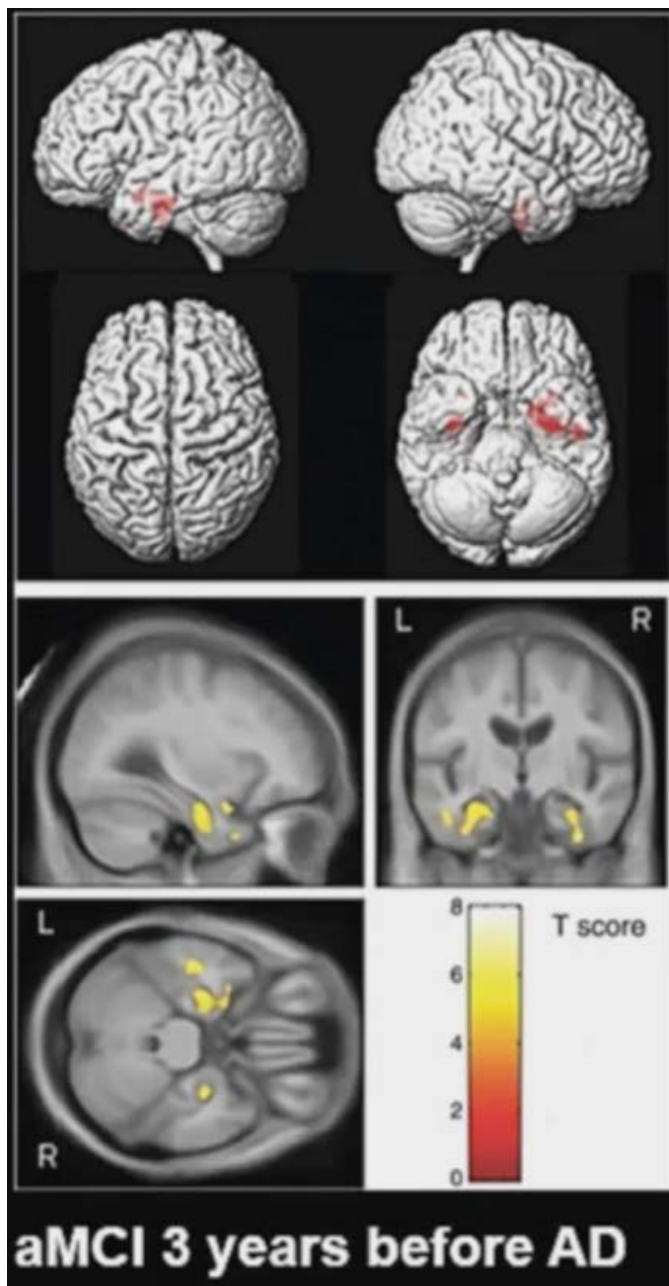
### *3. Démence vasculaire*

Subcortical Arteriosclerotic Encephalopathie (SAE)  
**micro-vasculaire**

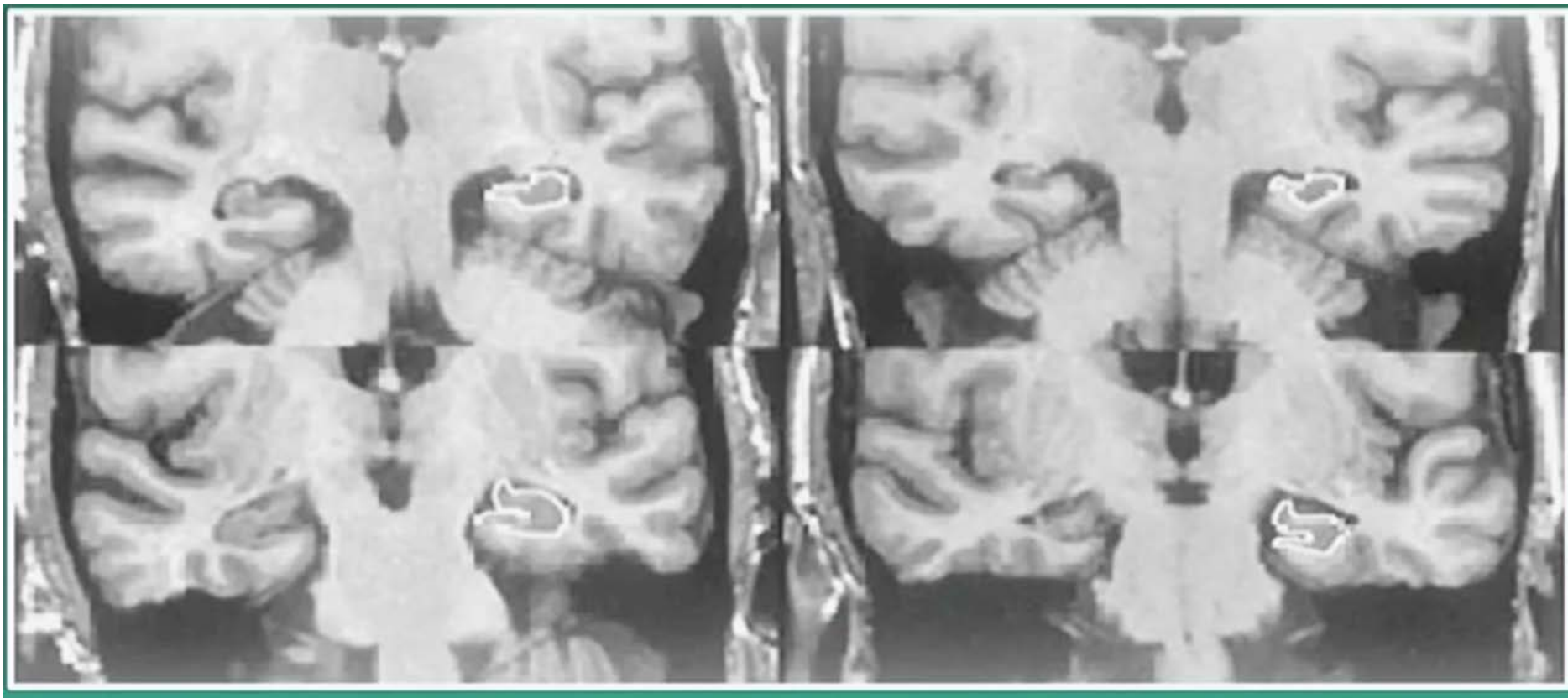


Démence d'Alzheimer  
IMAGERIE  
QUANTITATIVE

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



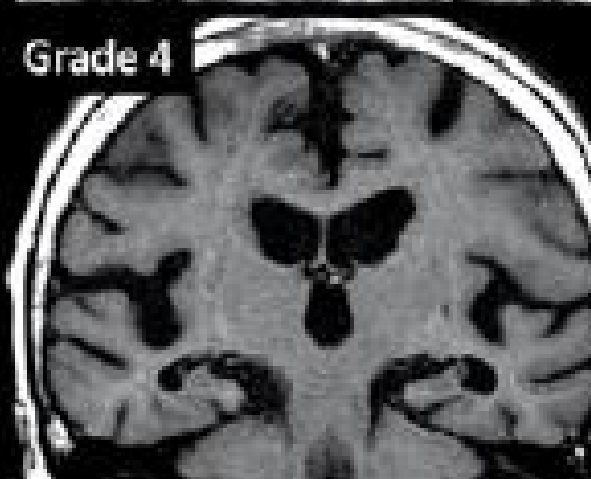
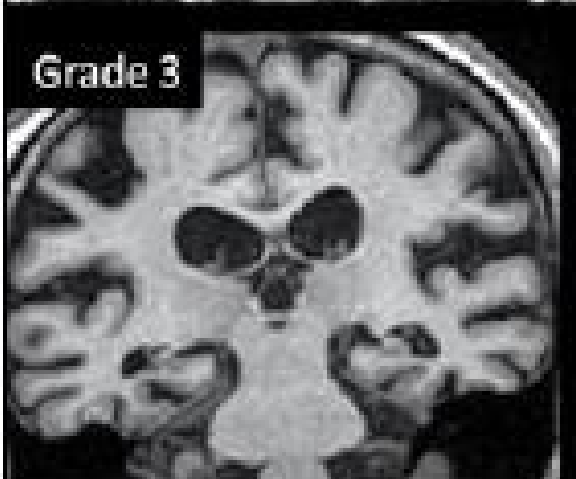
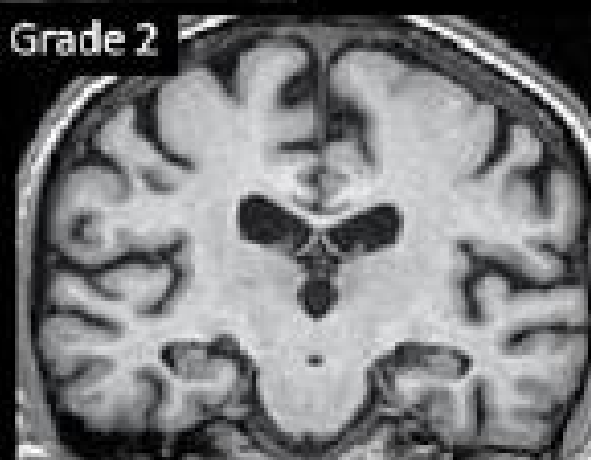
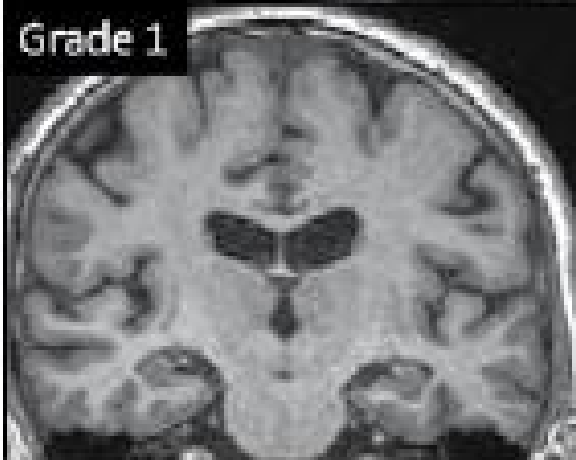
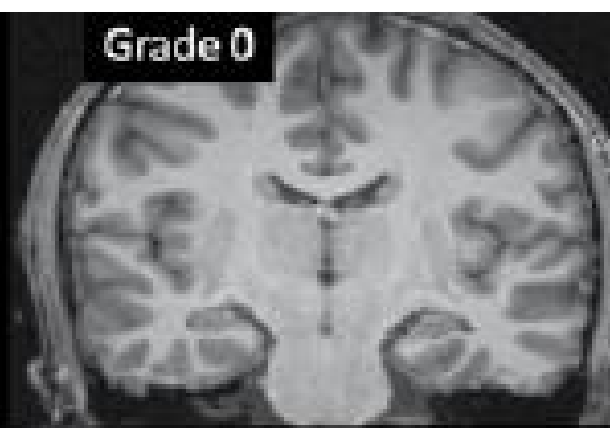




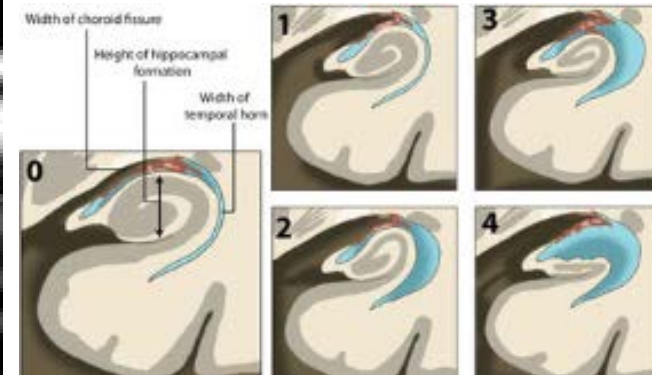
Jack CR, Neurology. 1999 April 22; 52(7): 1397–1403

**Volumétrie manuelle**

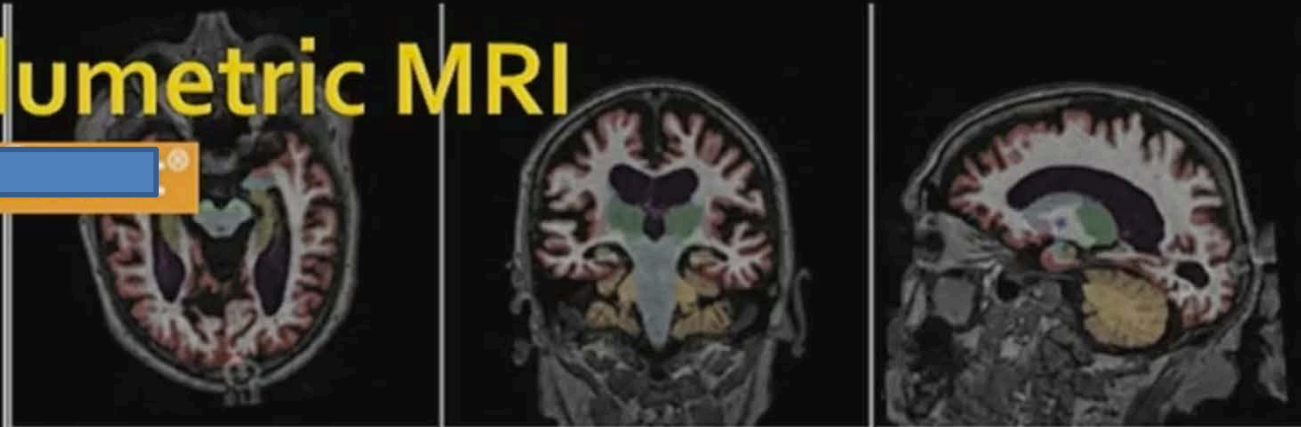
**Fig. 2**



## Echelle de Scheltens



# Clinical volumetric MRI

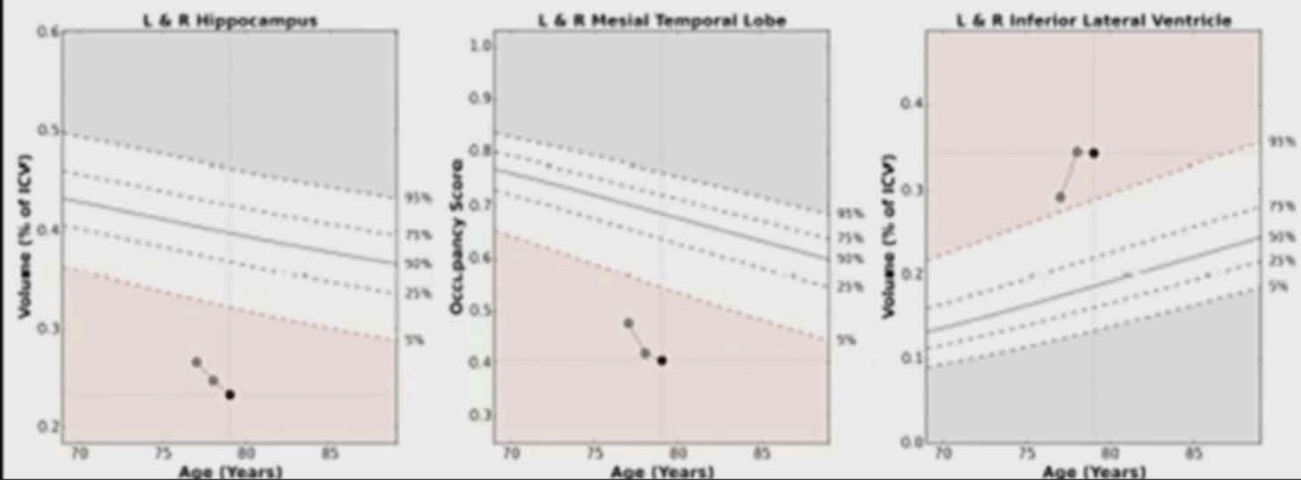


Case 1

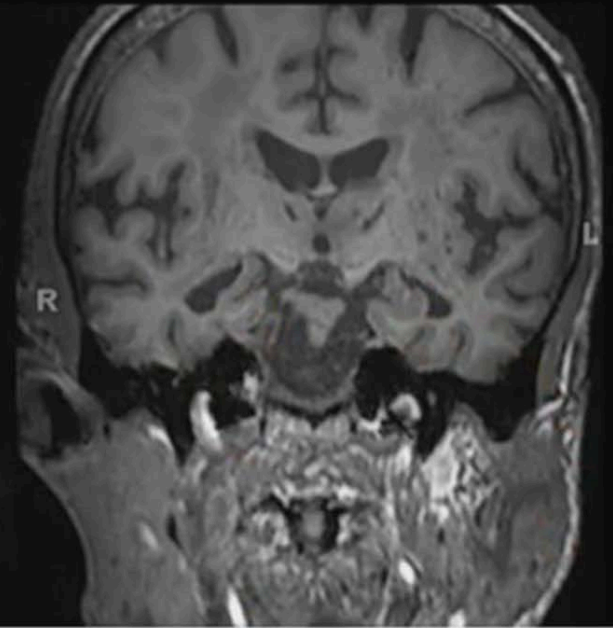
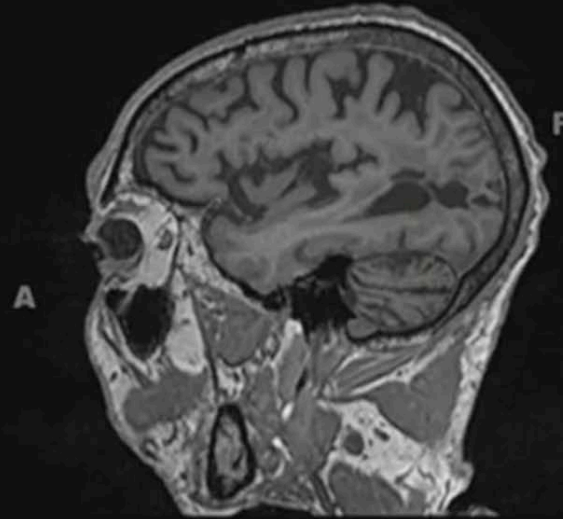
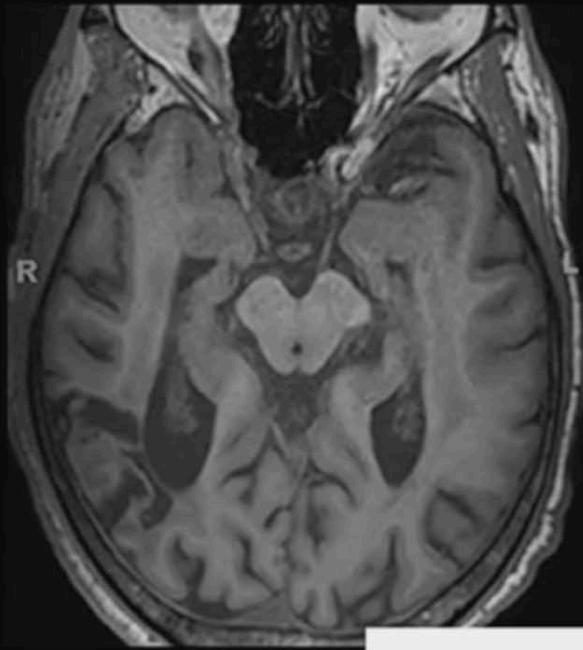
Classic AD pattern

Hippocampal Occupancy Score (HOC)			0.41
Brain Structure	Volume (cm <sup>3</sup> )	% of ICV (5%-95% Normative Percentile <sup>†</sup> )	Normative Percentile <sup>†</sup>
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

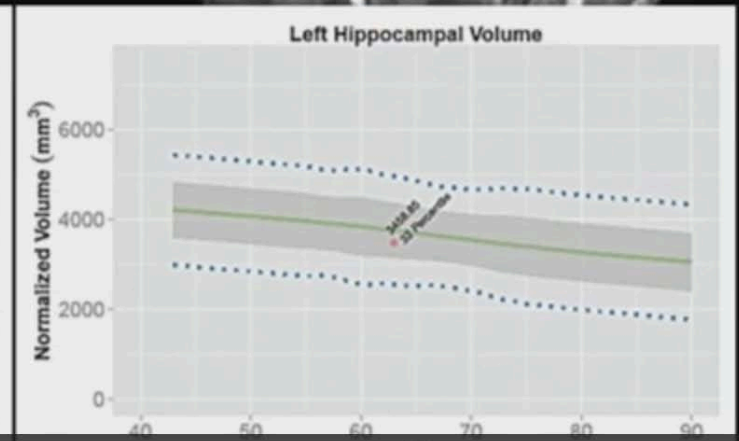
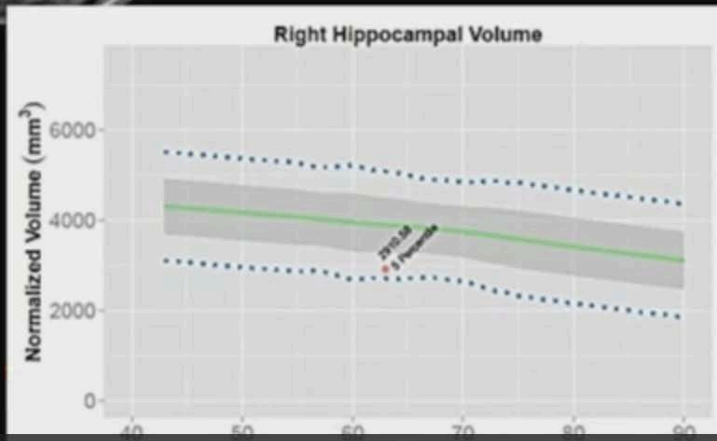
## AGE-MATCHED REFERENCE CHARTS



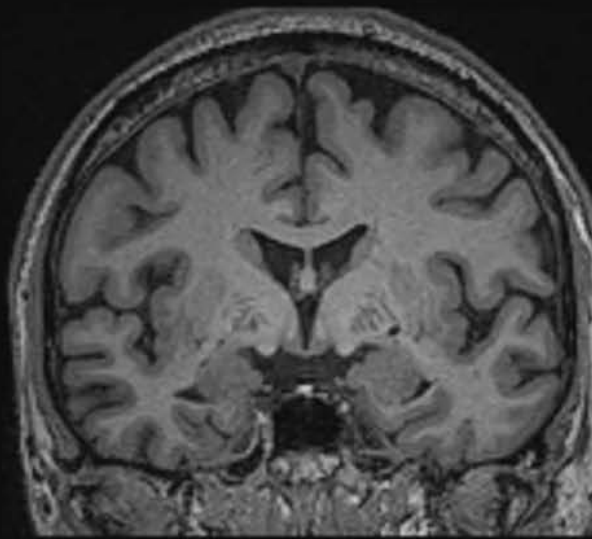
Volumétrie numérisée



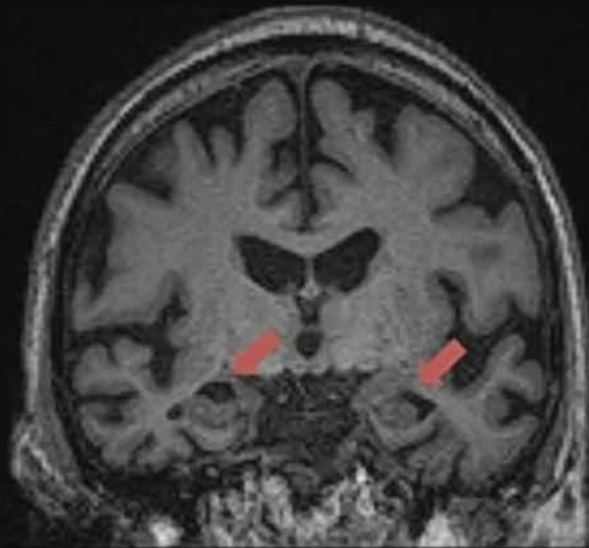
**Diagnosis:**  
**Post stroke**  
**dementia**



... parfois décompensation sur 1 stroke fatal



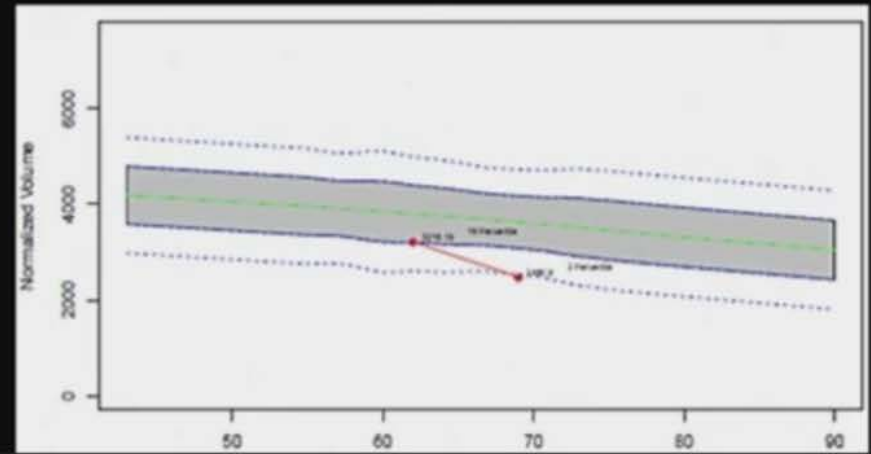
Age 62



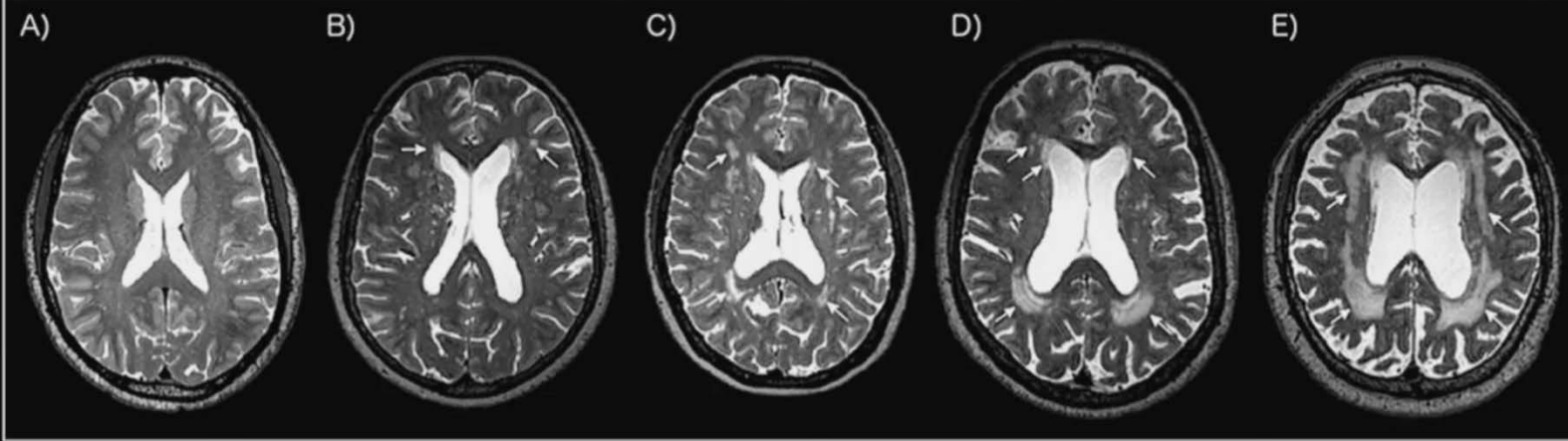
Age 69

Atrophie mesurée

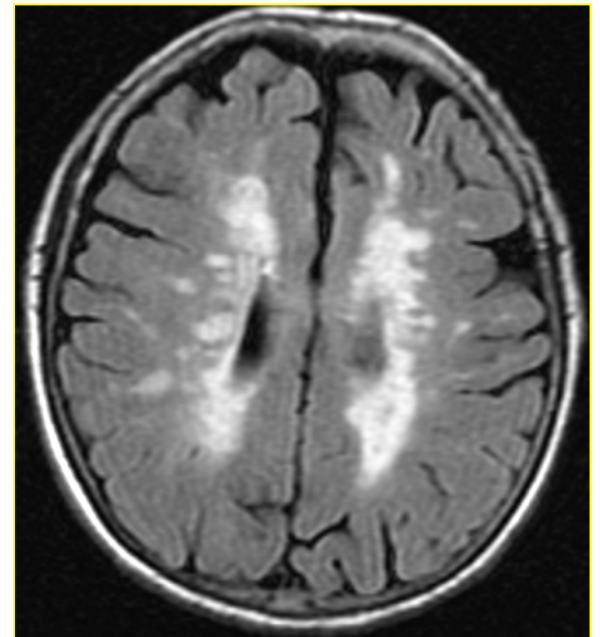
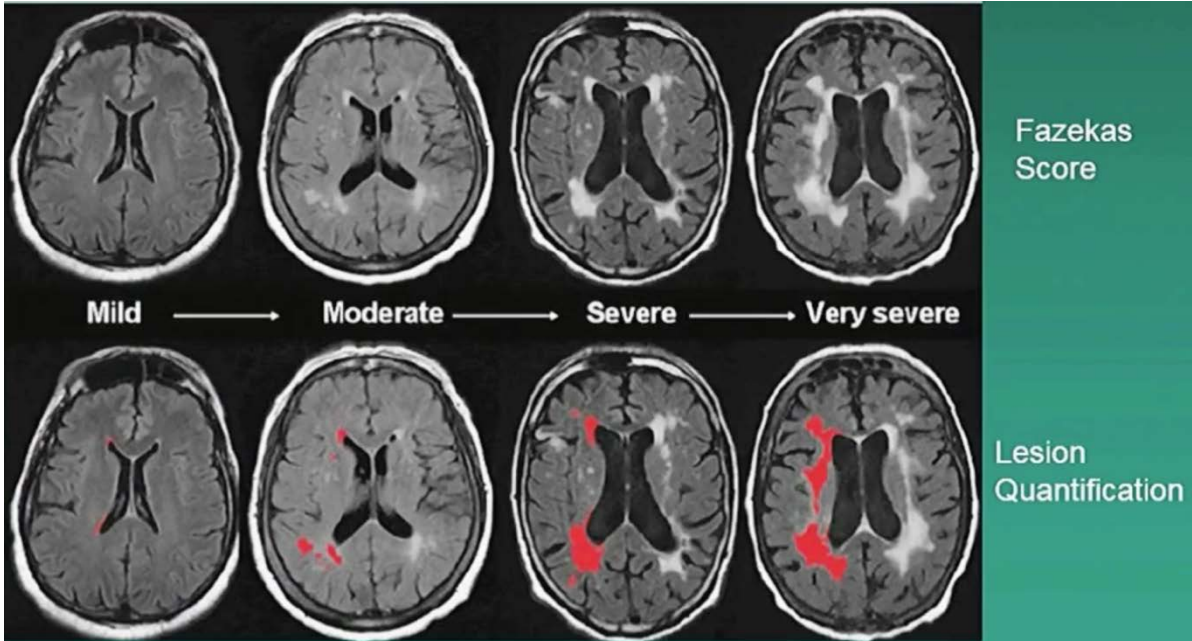
Atrophie 'visuelle'



Pattern typique d'AD: atrophie hippocampique élective

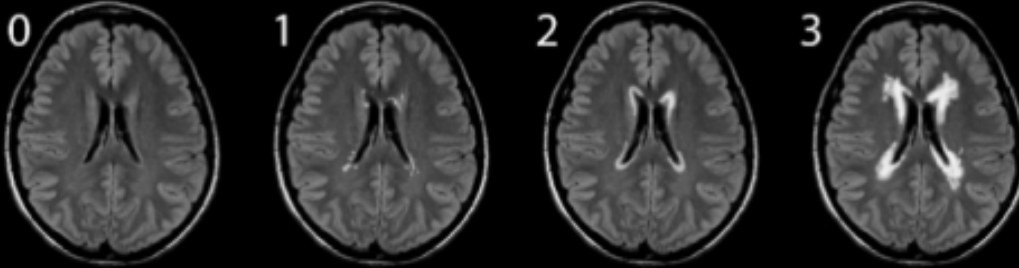


Levels of amyloid deposition ( $p < 0.01$ ), as well as ratings of periventricular white matter hyperintensities (WMH) ( $p < 0.01$ ) and deep WMH ( $p < 0.05$ ) discriminate between cognitively normal and demented individuals.

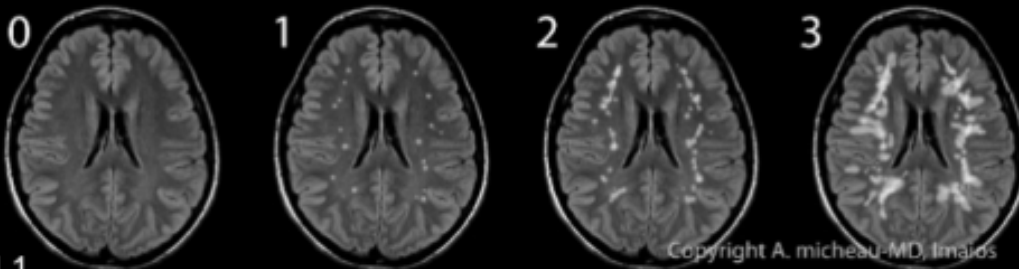


## Score de Fazekas

Lésions périventriculaires

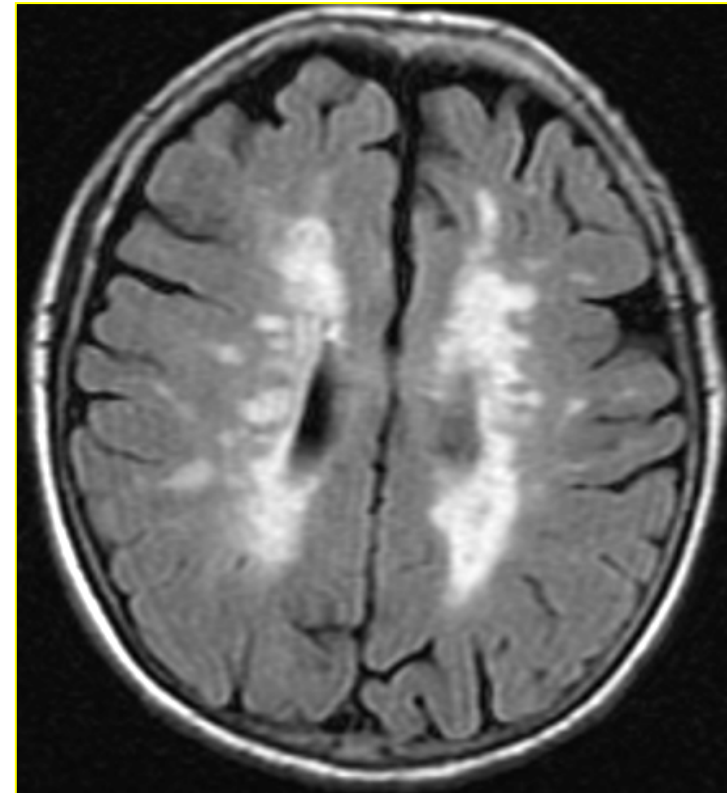


Lésions de la substance blanche



@1.1

Copyright A. micheau MD, Imajios



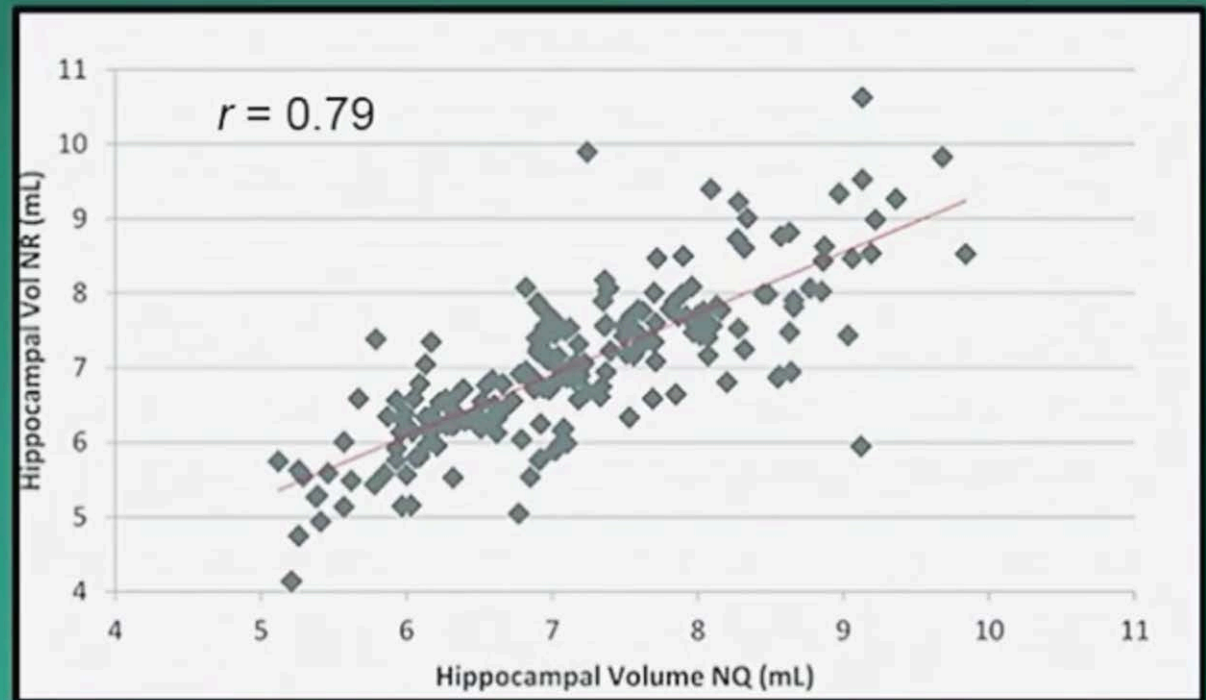
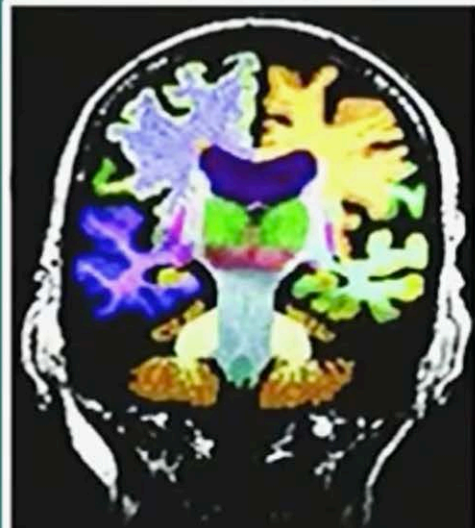
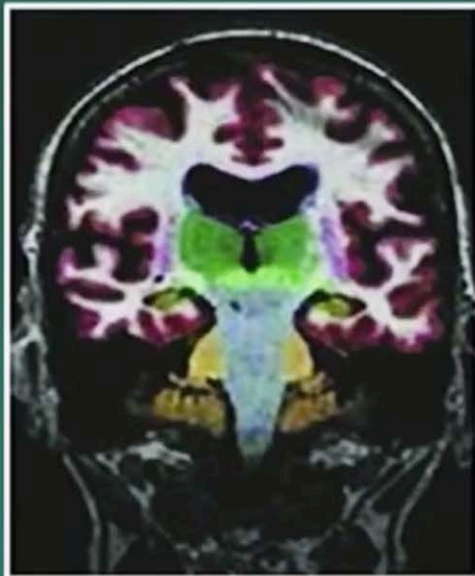
Démence micro-vasculaire sous-corticale

'Leucoarrose pathologique'

« Subcortical Arteriosclerotic encephalopathy » SAE

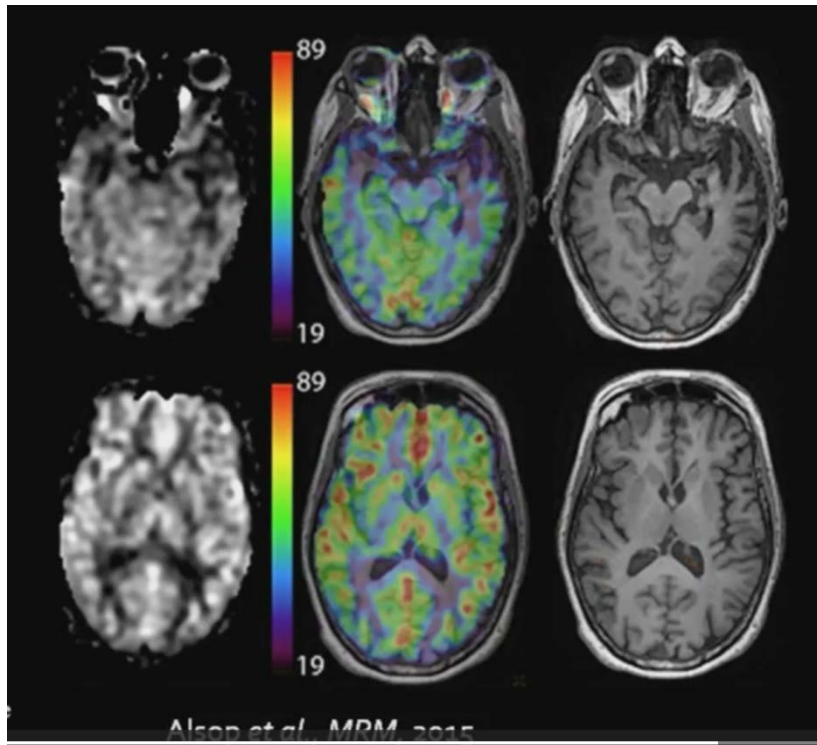
Binswanger's Disease

# Comparison of Two Commercial Volumetric Software Products



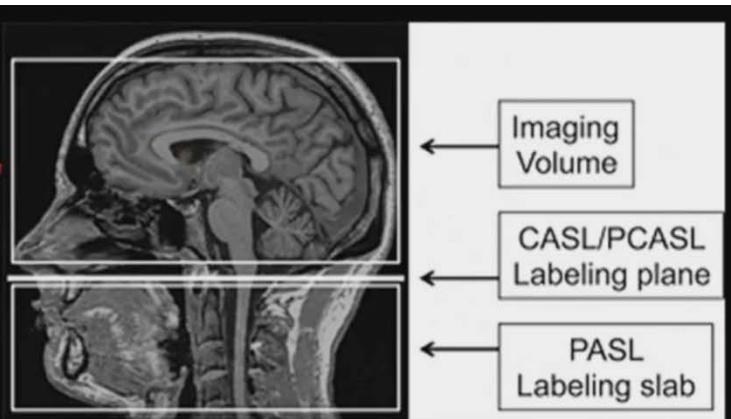
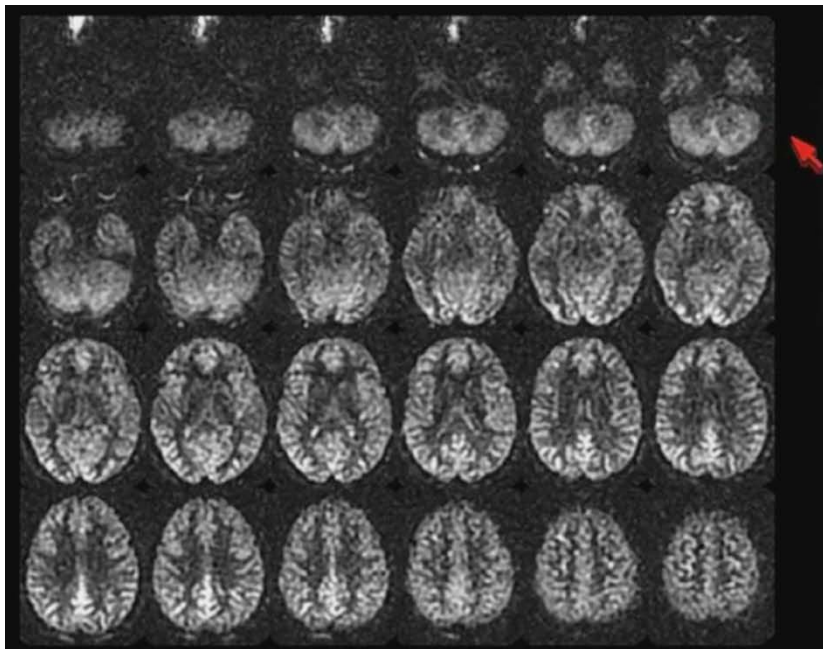
Tanpitukpongse TP, Mazurowski MA, Ikhen J, Petrella JR  
AJNR 2017



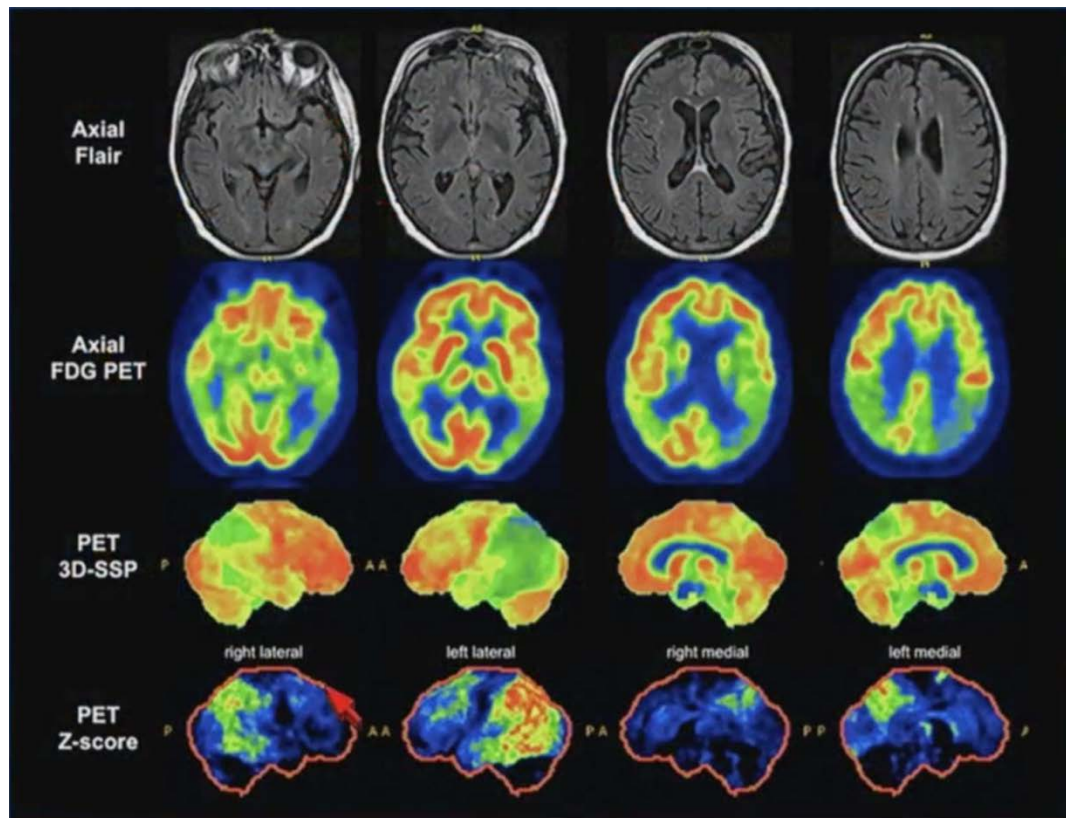
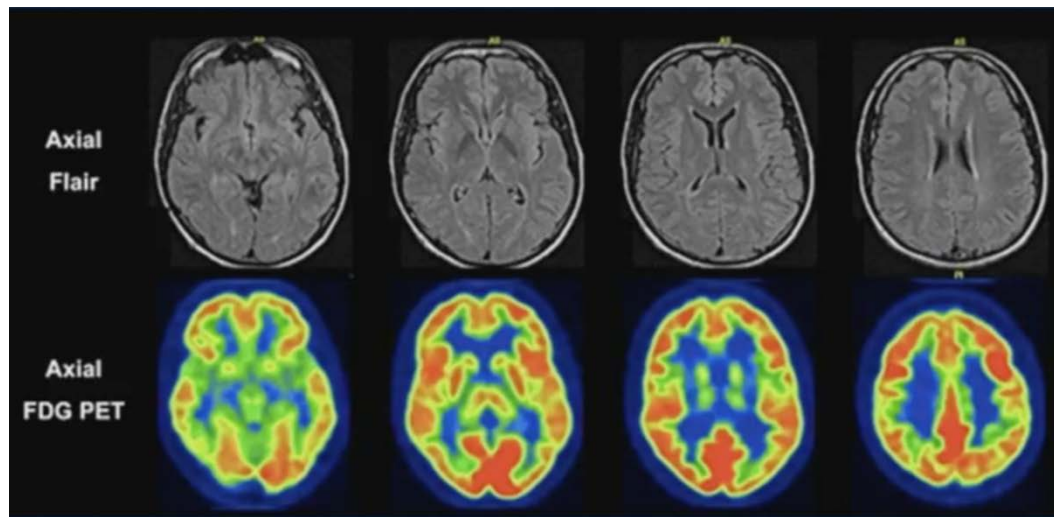


Aphasie dégénérative primaire

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

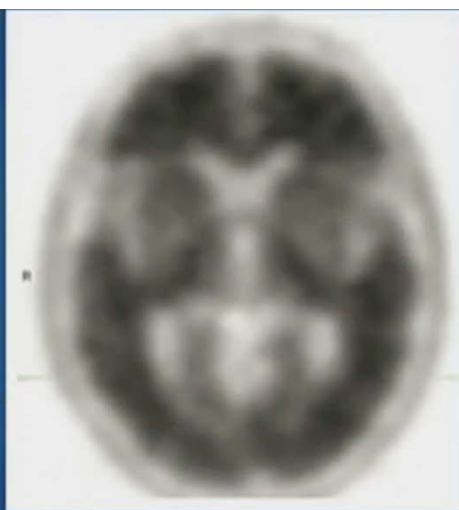


**Normal brain**

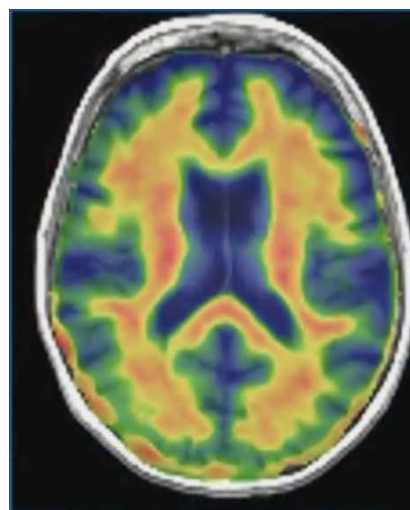




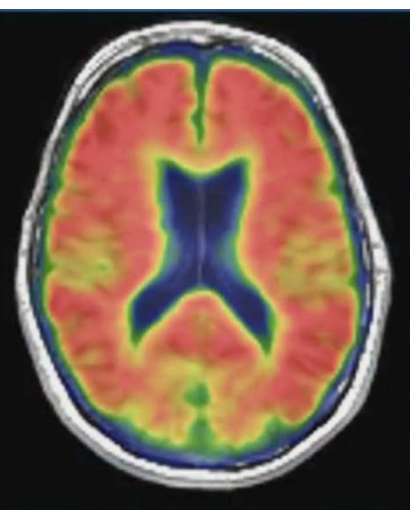
Negative



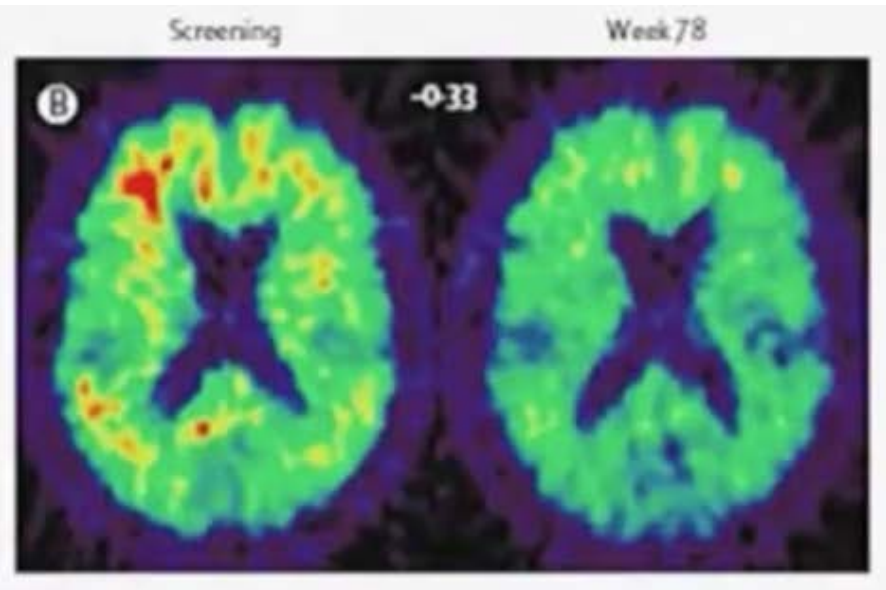
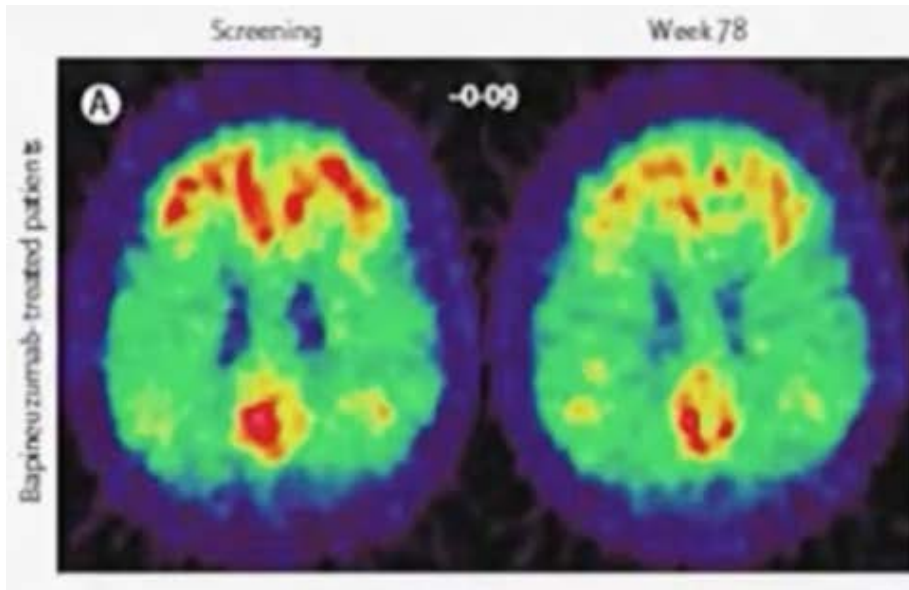
Positive



Negative



Positive



<sup>11</sup>C-PiB PET assessment of change in fibrillar amyloid- $\beta$  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

