MDS African Parkinson's Disease and Movement Disorders Conference (APMC)
Nairobi, Kenya | March 10-11, 2026

International Parkinson and Movement Disorder Society African Section

Global Parkinson's Genetics Program

Supported in part by the Global Parkinson's Genetics Program, a program of the Aligning Science Across Parkinson's initiative and implemented by the Michael J. Fox Foundation.

Neuroimaging in Movement Disorders

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❖ Confirm diagnosis

- e.g., dopamine deficiency in Parkinson's disease

❖ Differentiate disorders

- Parkinson disease vs. atypical parkinsonism

❖ Exclude secondary causes

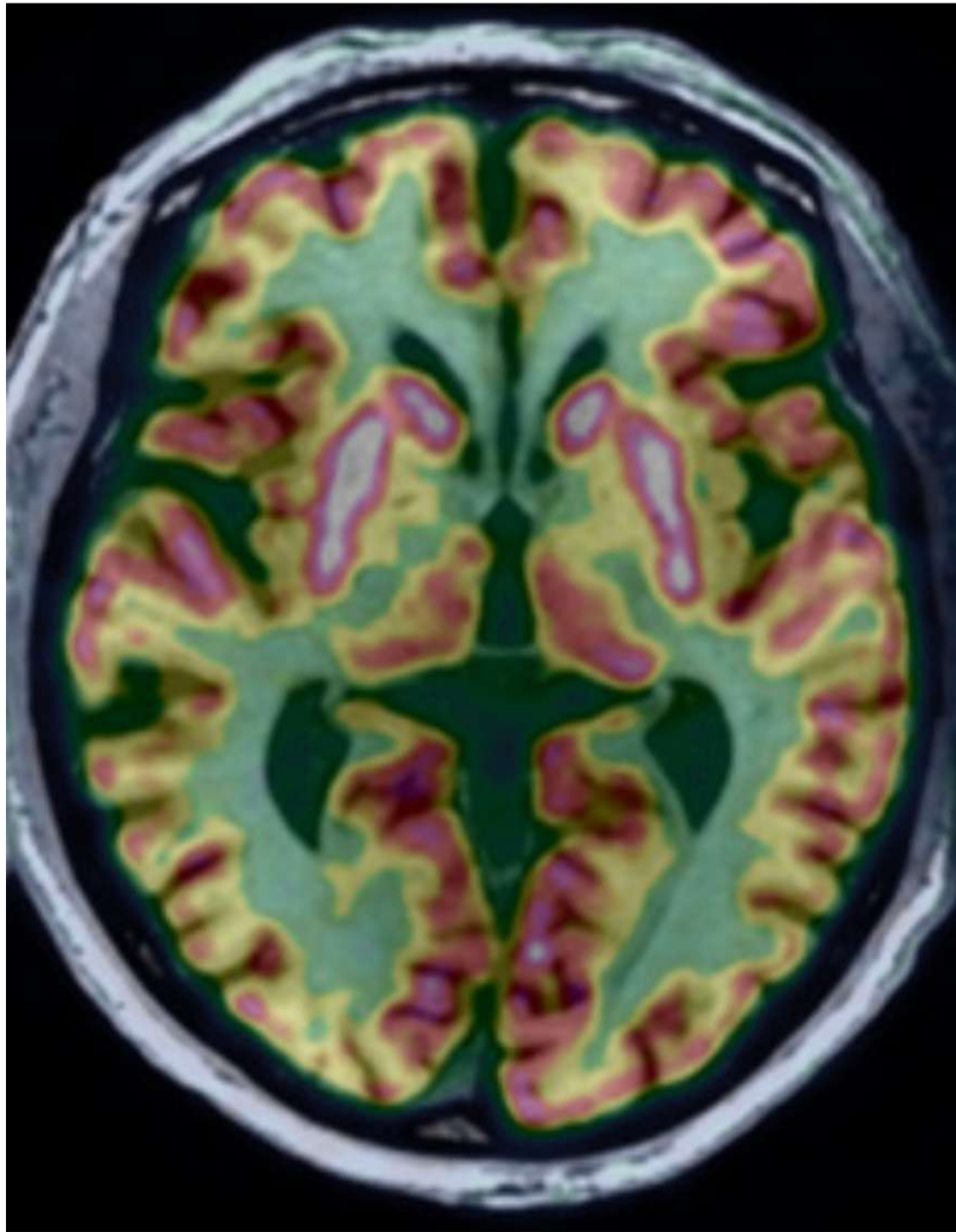
- tumors
- vascular lesions
- infections

❖ Guide treatment

- planning procedures like Deep Brain Stimulation

❖ Research and disease monitoring

- understanding disease progression



❖ Structural Neuroimaging

A. Magnetic Resonance Imaging (MRI)

- Most commonly used imaging modality in movement disorders
- Detects **structural abnormalities** in the brain
- Helps rule out (tumors, stroke, demyelinating disease)
- Characteristic findings **(Atrophy, signal changes, …)**

B. Computed Tomography (CT)

- Used when MRI is unavailable or contraindicated.
- Useful to detect (calcifications, hemorrhage, large structural lesions)

❖ Functional Neuroimaging

A. Positron Emission Tomography (PET)

- Helps identify **dopaminergic deficits** in Parkinson's disease.
- Can differentiate Parkinson’s disease from atypical parkinsonism.

B. SPECT

- Often used for **dopamine transporter imaging**
- DaTscan evaluates **dopamine transporter function**.
- Helps distinguish (Parkinsonian syndromes et Essential tremor)

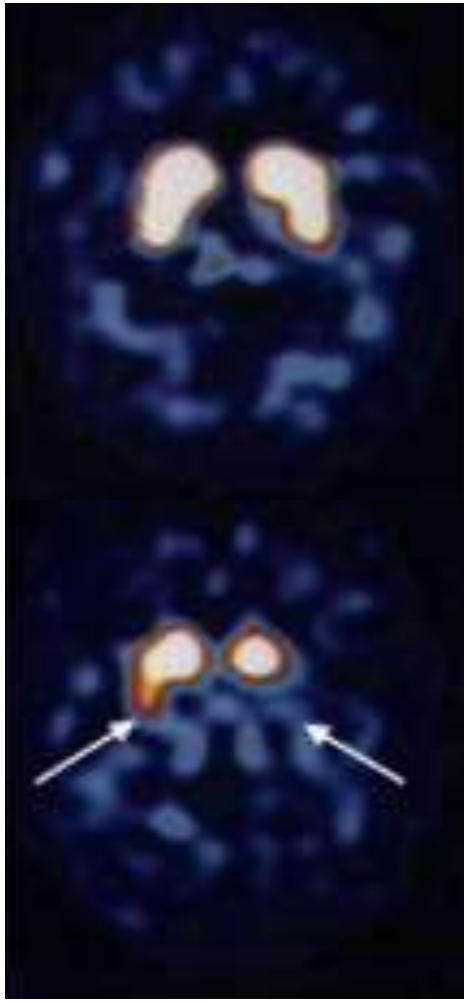
Clinical uncertain parkinson's syndrome (Essential tremor? Iatrogenic cause?)

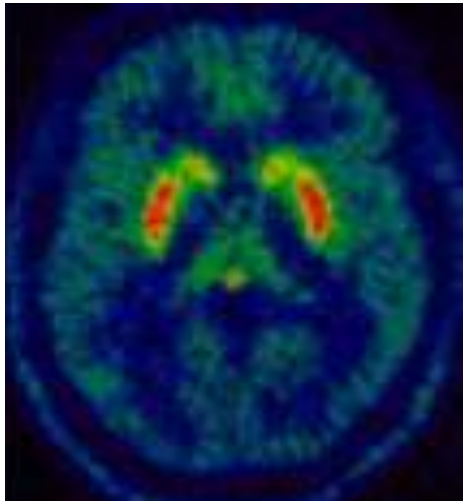
→ **DATScan**
PET F Dopa

DATScan

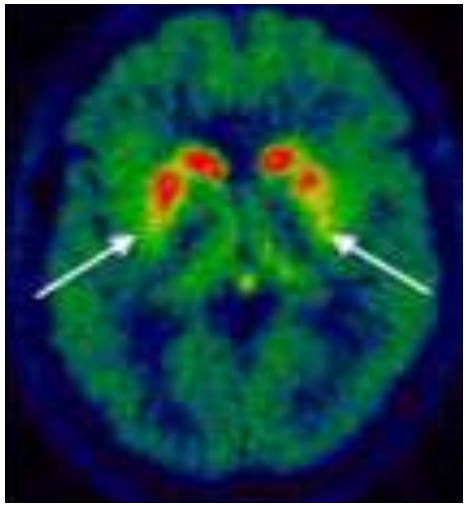
PET 18F Dopa

Control
ET
Iatrogenic





Degnerative parkinsonism



Pavese et al (2009)

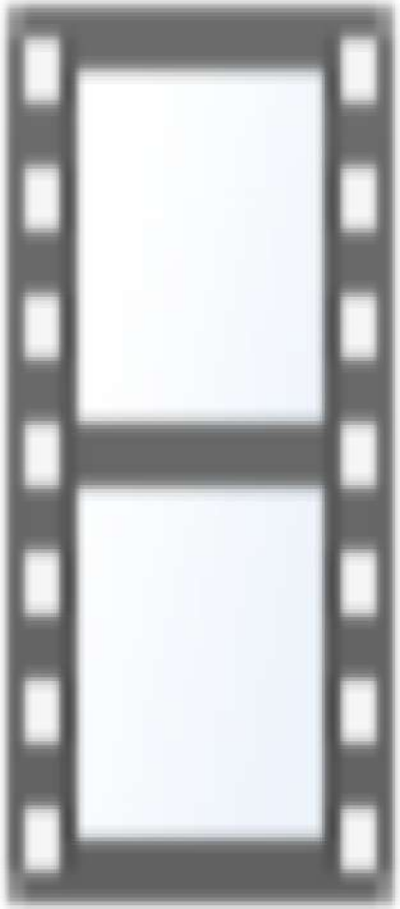
	Benefits	Disadvantages	Drug interactions
PET F DOPA	Best resolution Shortest acquisition time (10 min)	Lower sensitivity (possible false negatives) due to a compensation phenomenon	Anti-parkinsonian treatments (to be stopped 12 hours beforehand) Neuroleptics Amino acids (fasting required 4 hours beforehand)
DATScan	Better sensitivity	Lower resolution Long acquisition time	Cocaine, amphetamines, modafinil, anticholinergics, fentanyl, anesthetics, antidepressants (SSRI type ++), lithium

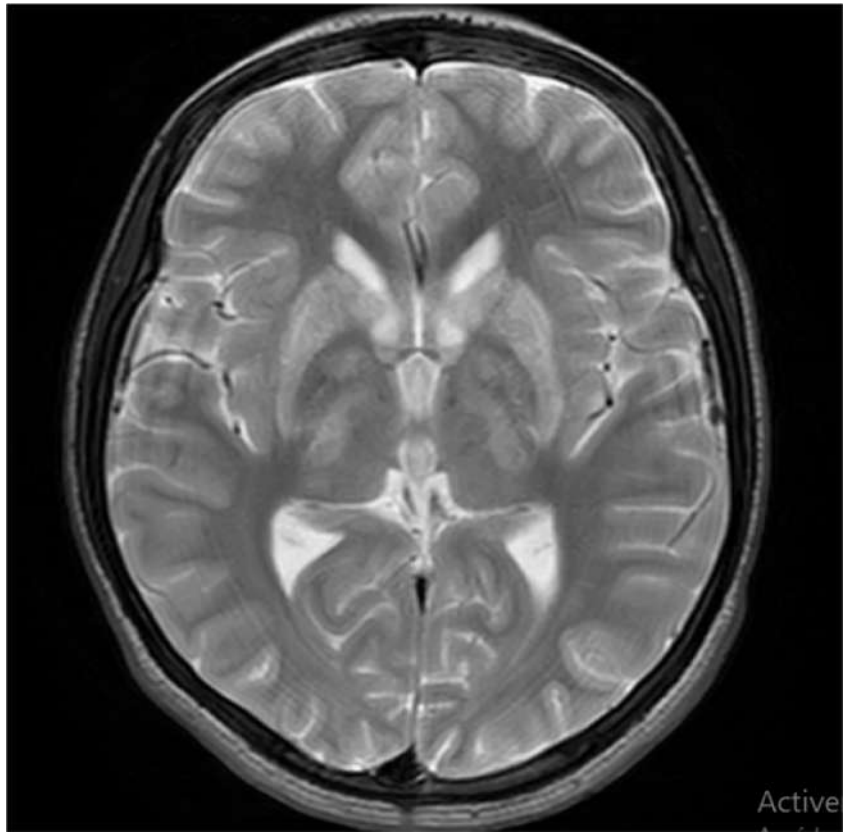
Horrowitz, Grimaldi et al (2022)

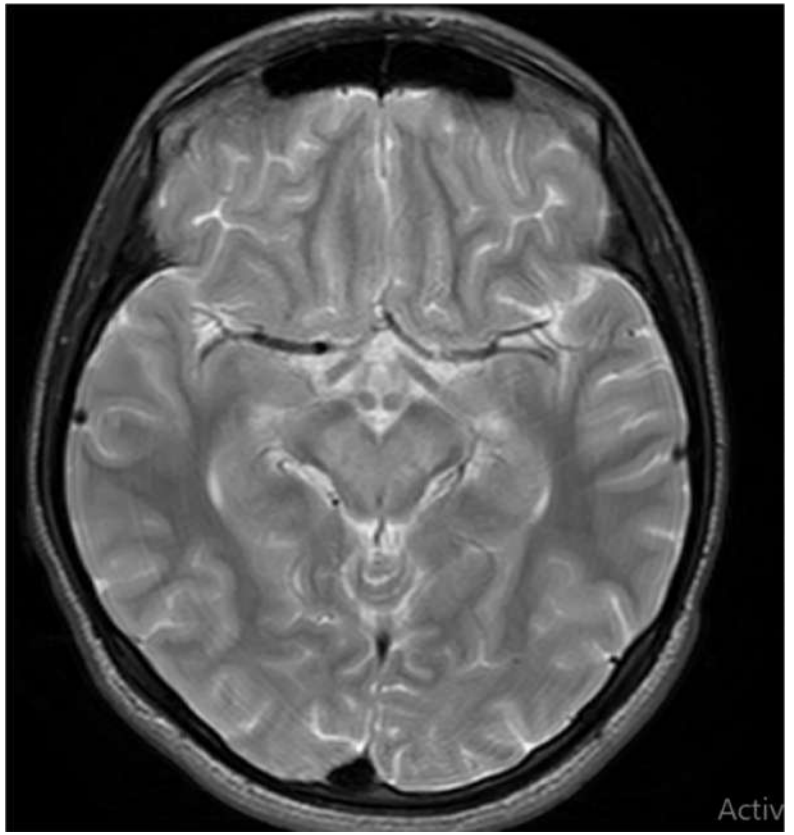
Clinical uncertain parkinson's syndrome
(Essential tremor? Iatrogenic cause?)
or
Young subject (< 40 years old)

→ DATScan
PET F Dopa

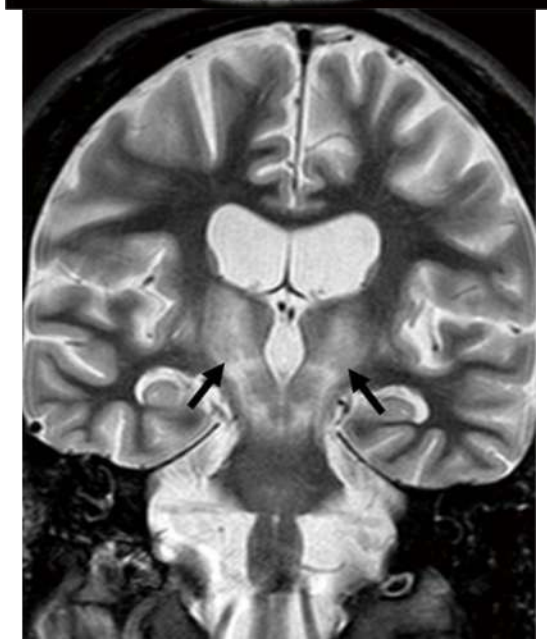
→ Wilson, NBIA
(Genetic PD)

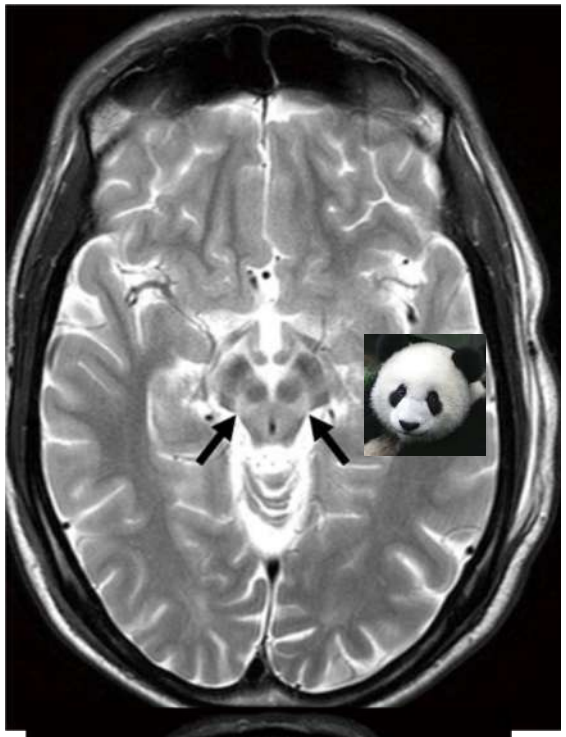


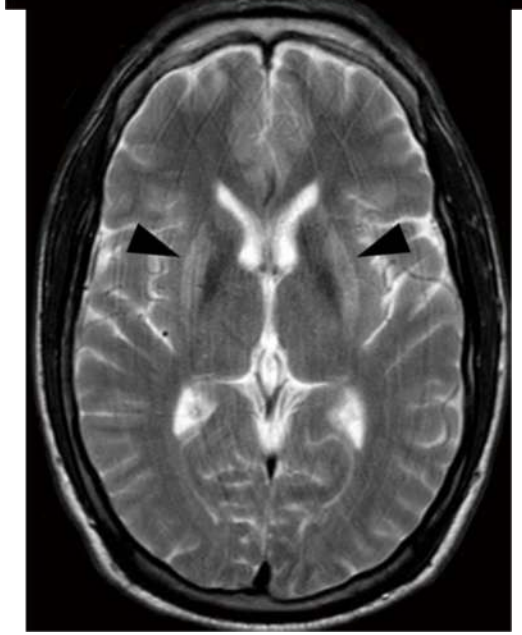


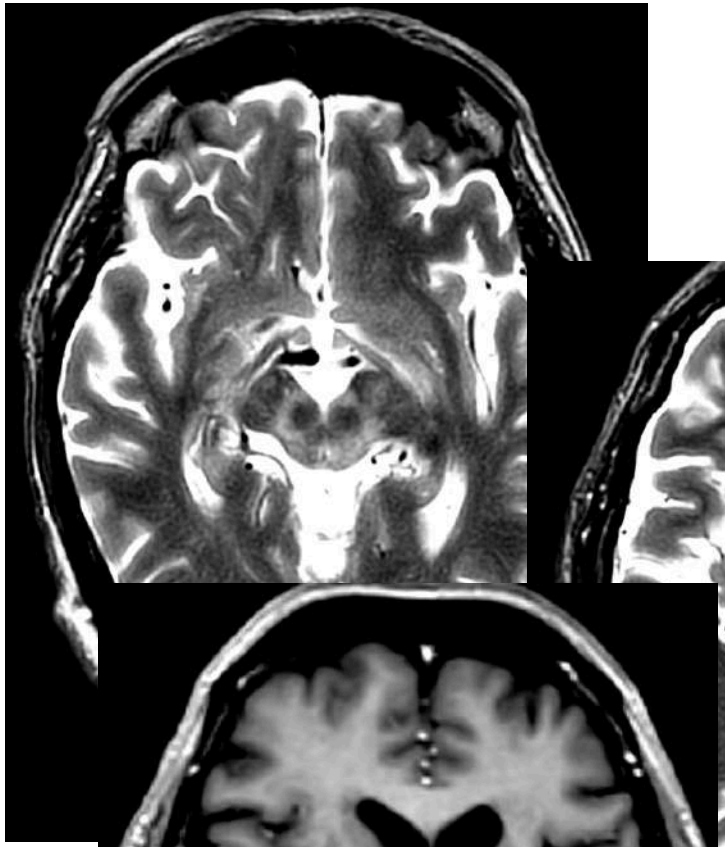


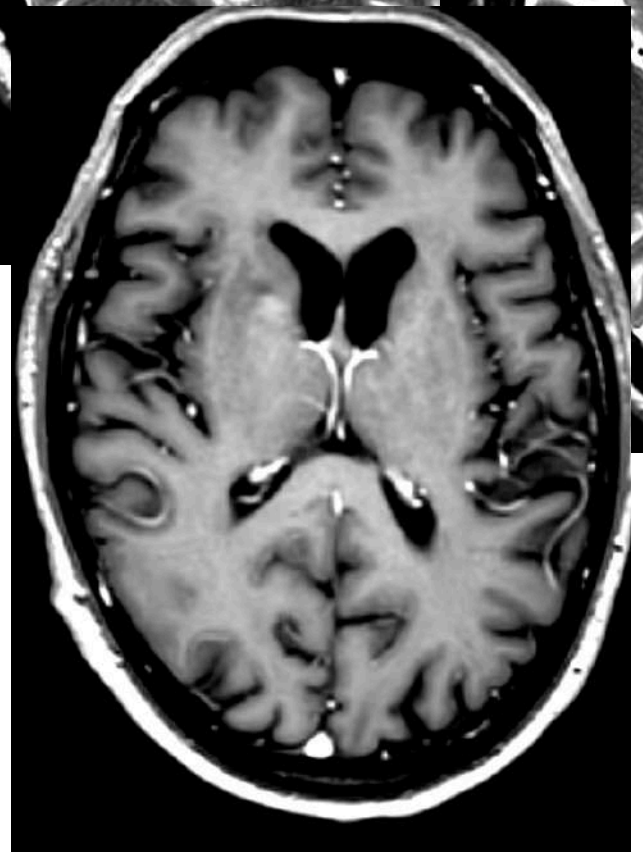
Fall M, CHN de Pikine, 2020

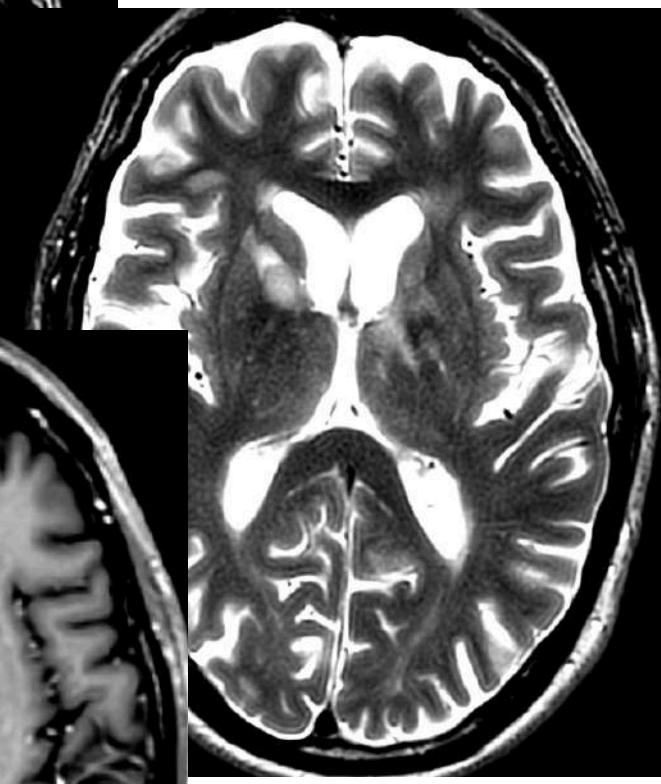




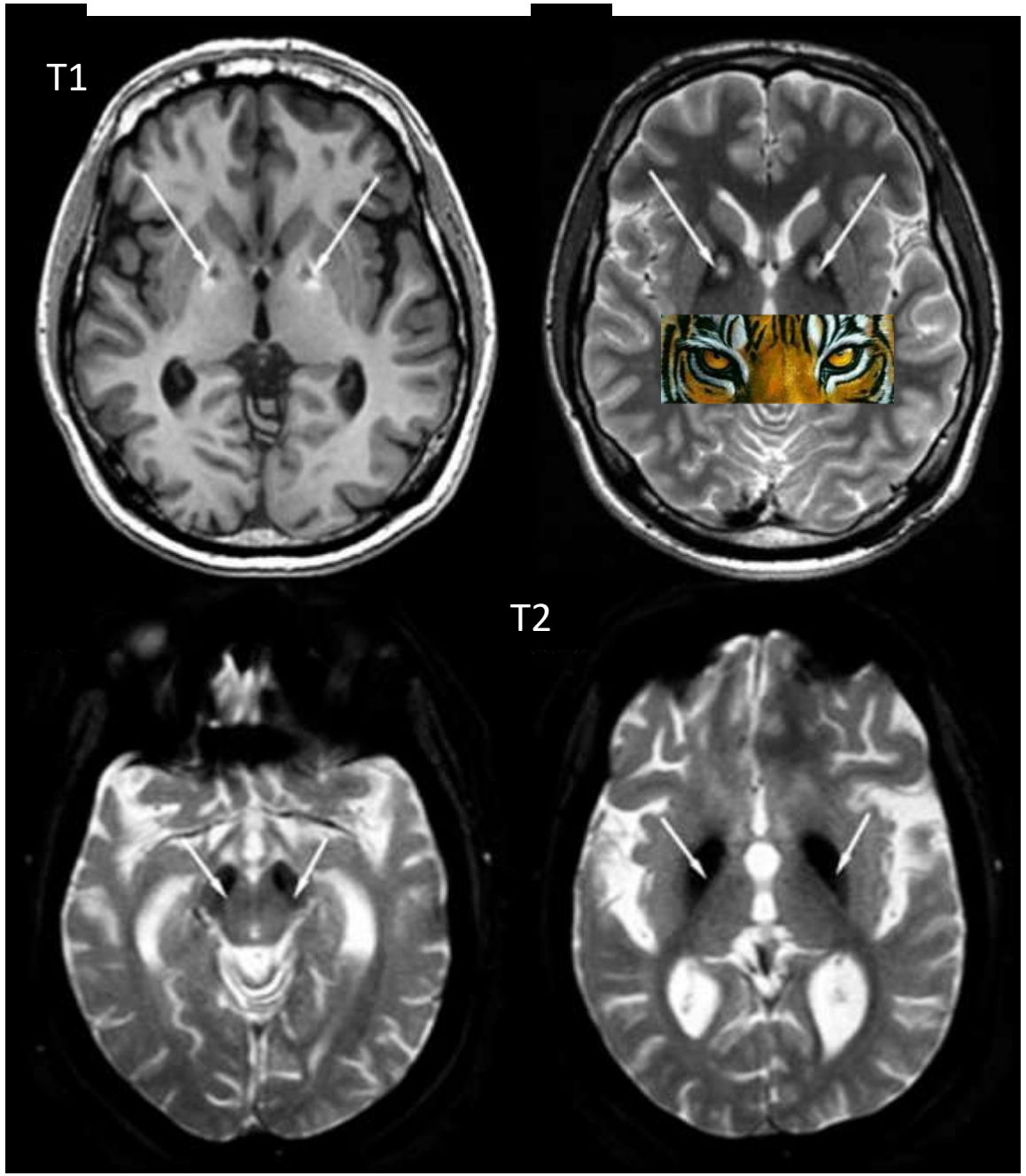








Dusek et al (2019);
Pougeon et al (soumis, 2024)


T1
T2

Clinical uncertain parkinson's syndrome
(Essential tremor? Iatrogenic cause?)
or
Young subject (< 40 years old)
or
Presence of atypical symptoms (early falls, early cognitive impairment, oculomotor disorder, cerebellar syndrome, etc.)

→ DATScan
PET F Dopa

→ Wilson, NBIA
(Genetic PD)

MRI

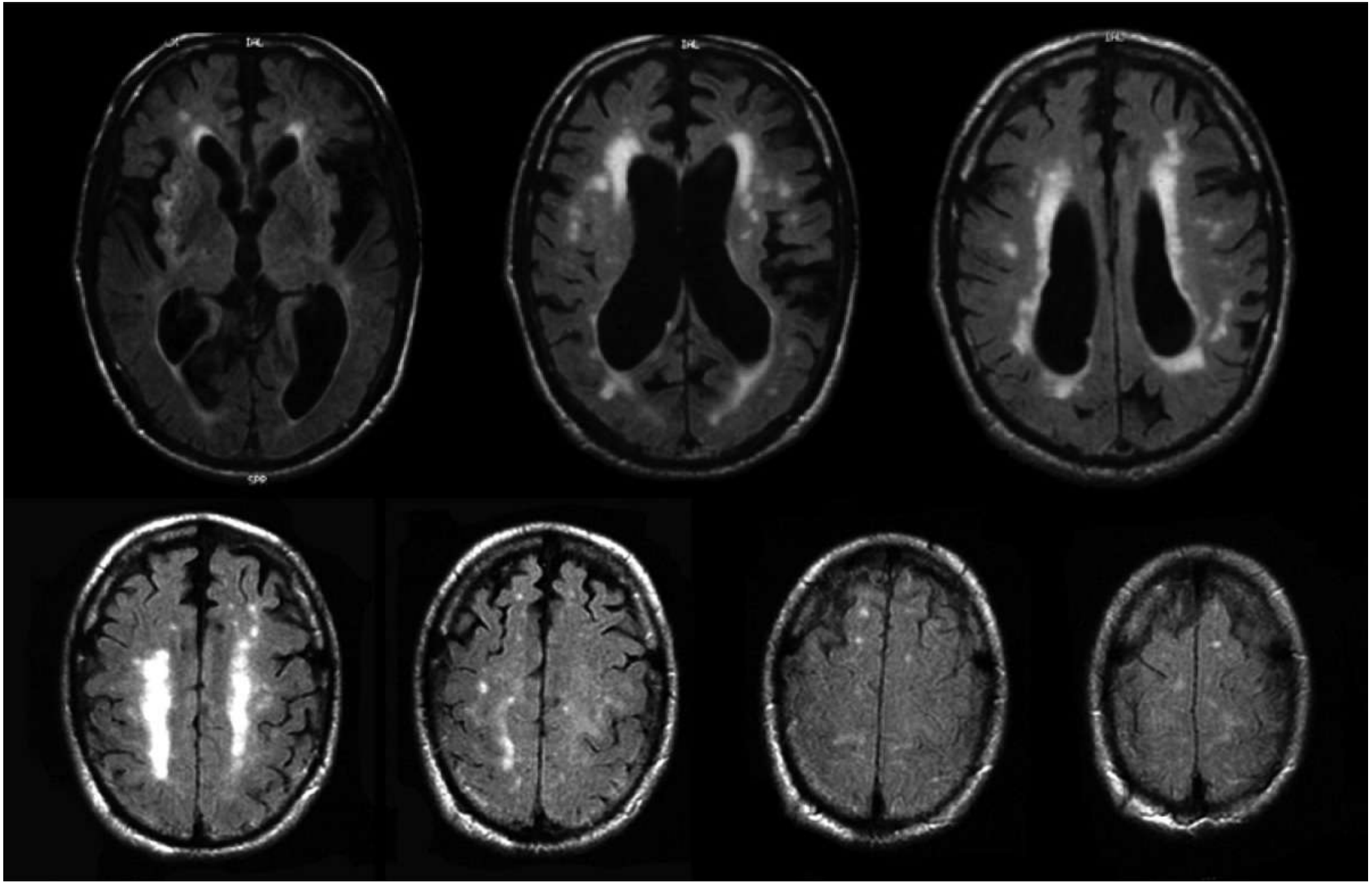
PET 18F FDG

Myocardial scintigraphy

Is there a non-degenerative cause for this Parkinson's syndrome?

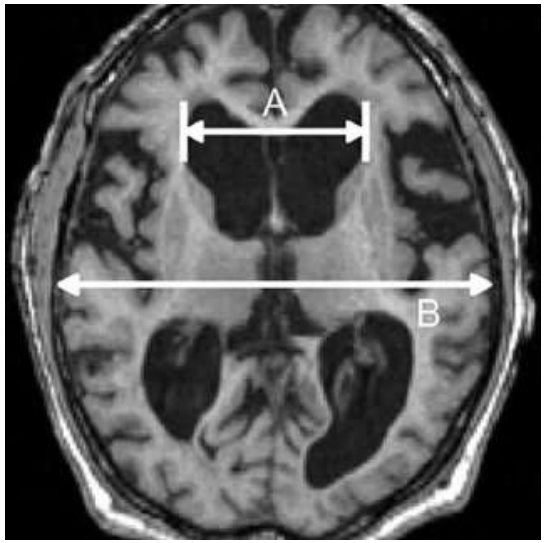
Are there any arguments in favor of a degenerative Parkinson's syndrome?

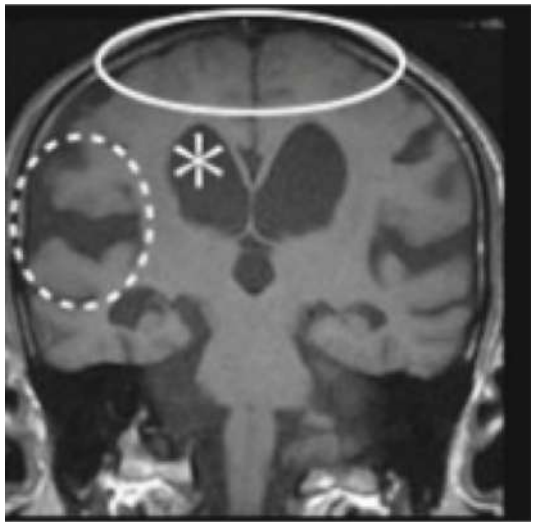
Vascular Parkinson's syndrome

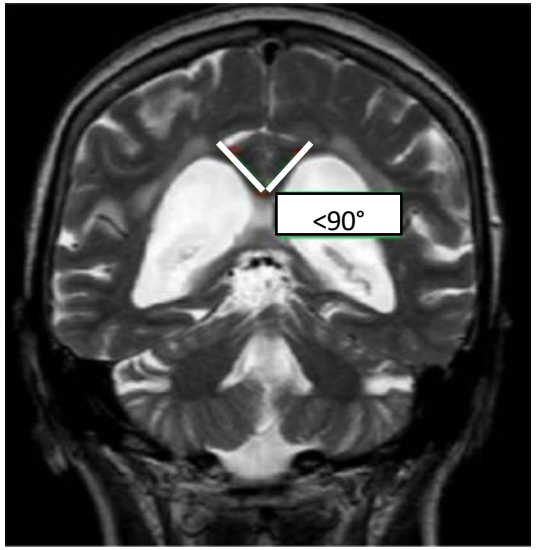


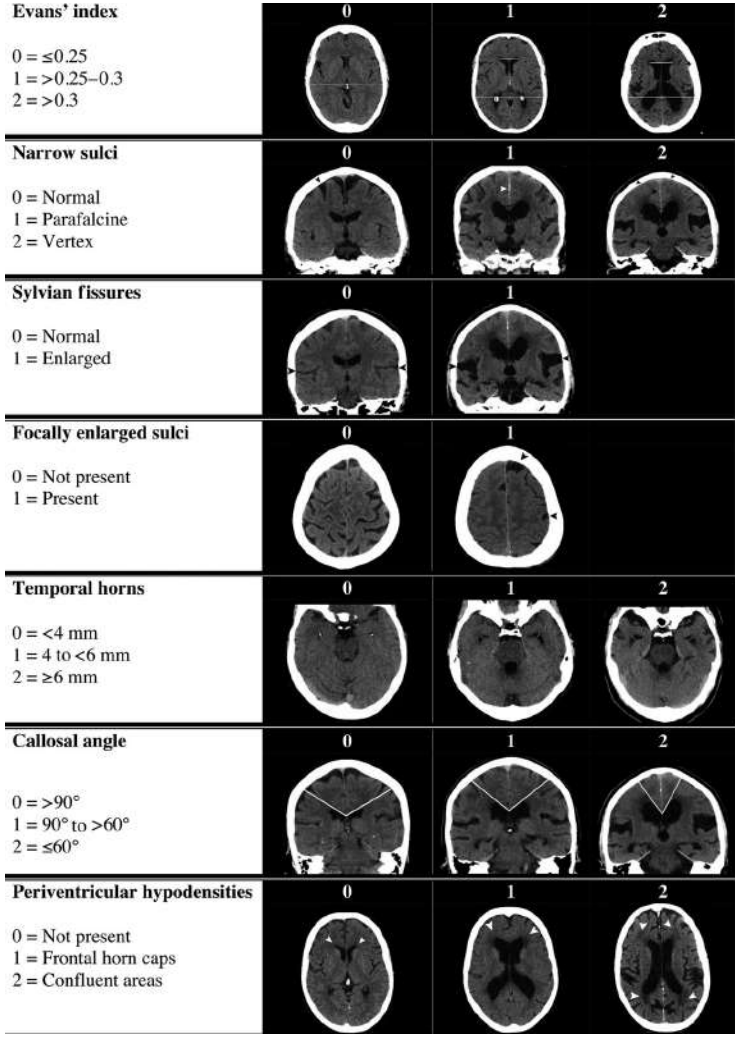
Vizcarra et al (2015); Hashimto et al (2010)

Chronic hydrocephalus in adults









≥ 6 - 7: in favor of CHA

The idiopathic normal-pressure hydrocephalus Radscale: a radiological scale for structured evaluation

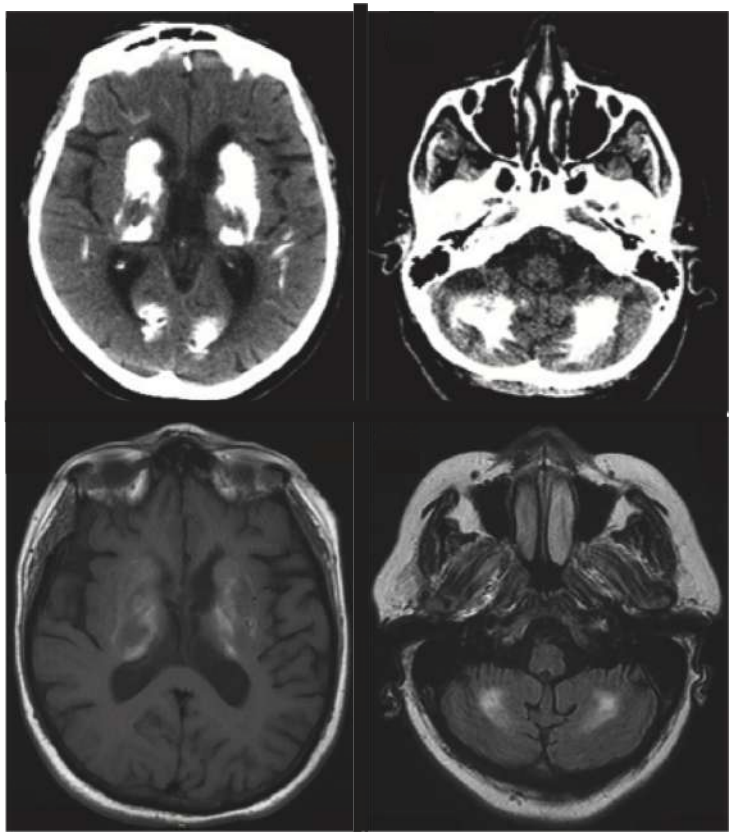
K. Kockum[a], O. Lilja-Lund[a], E.-M. Larsson[b], M. Rosell[a], L. Söderström[a], J. Virhammar[c] and K. Laurell[a]

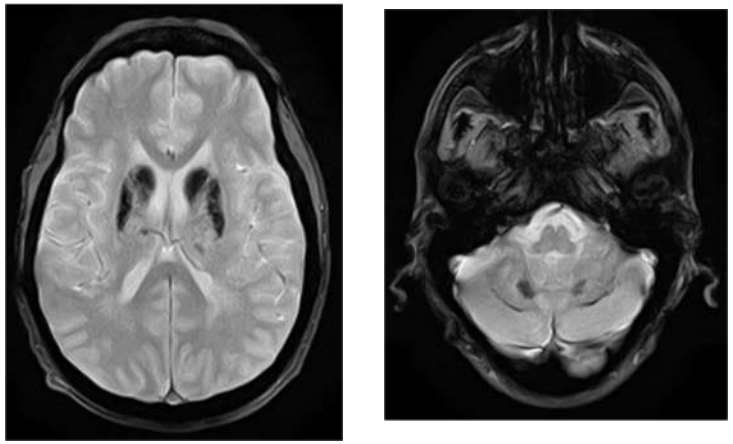
Cerebral calcifications (Fahr's disease)

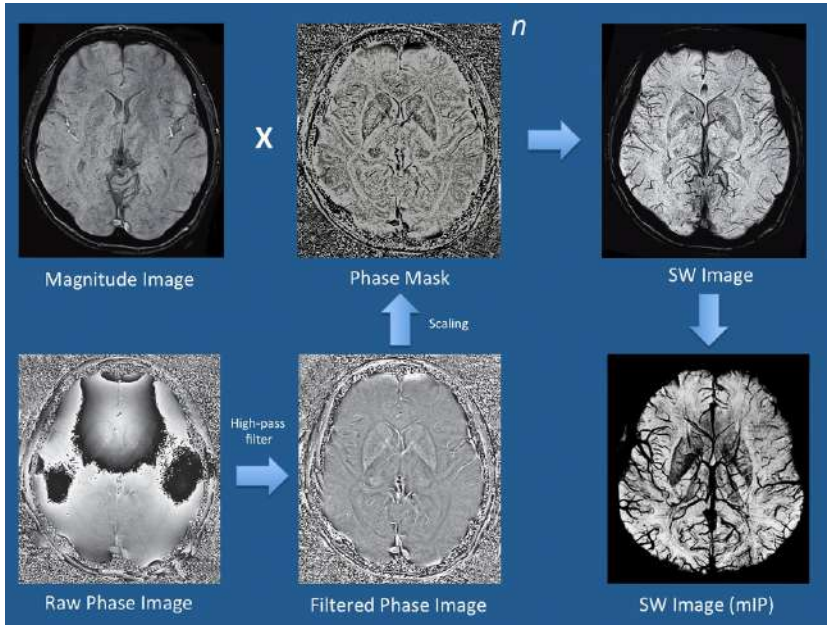
CT

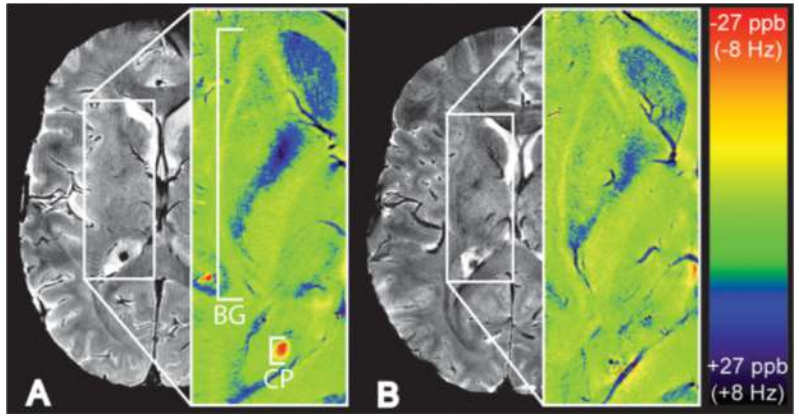
T1

T2*

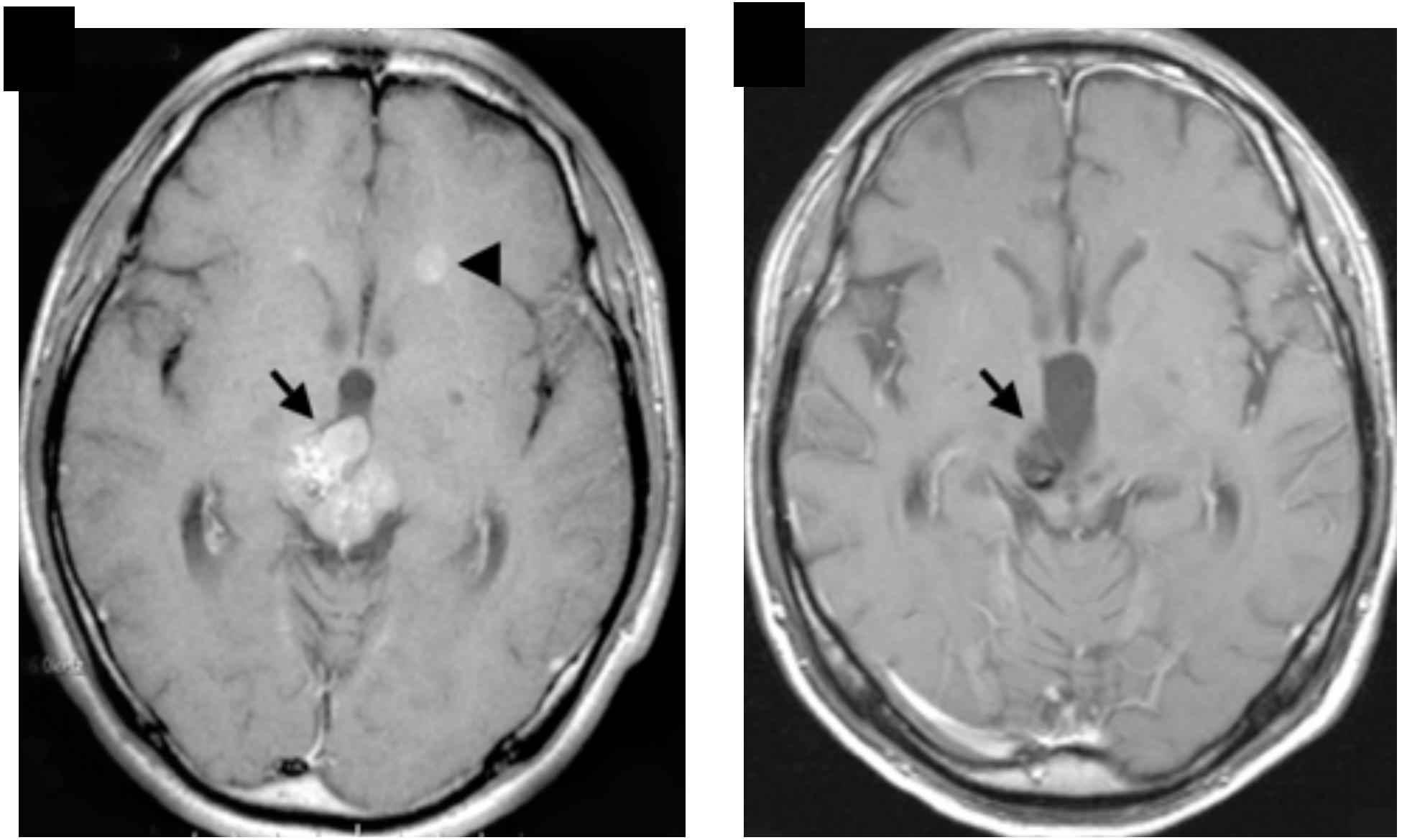




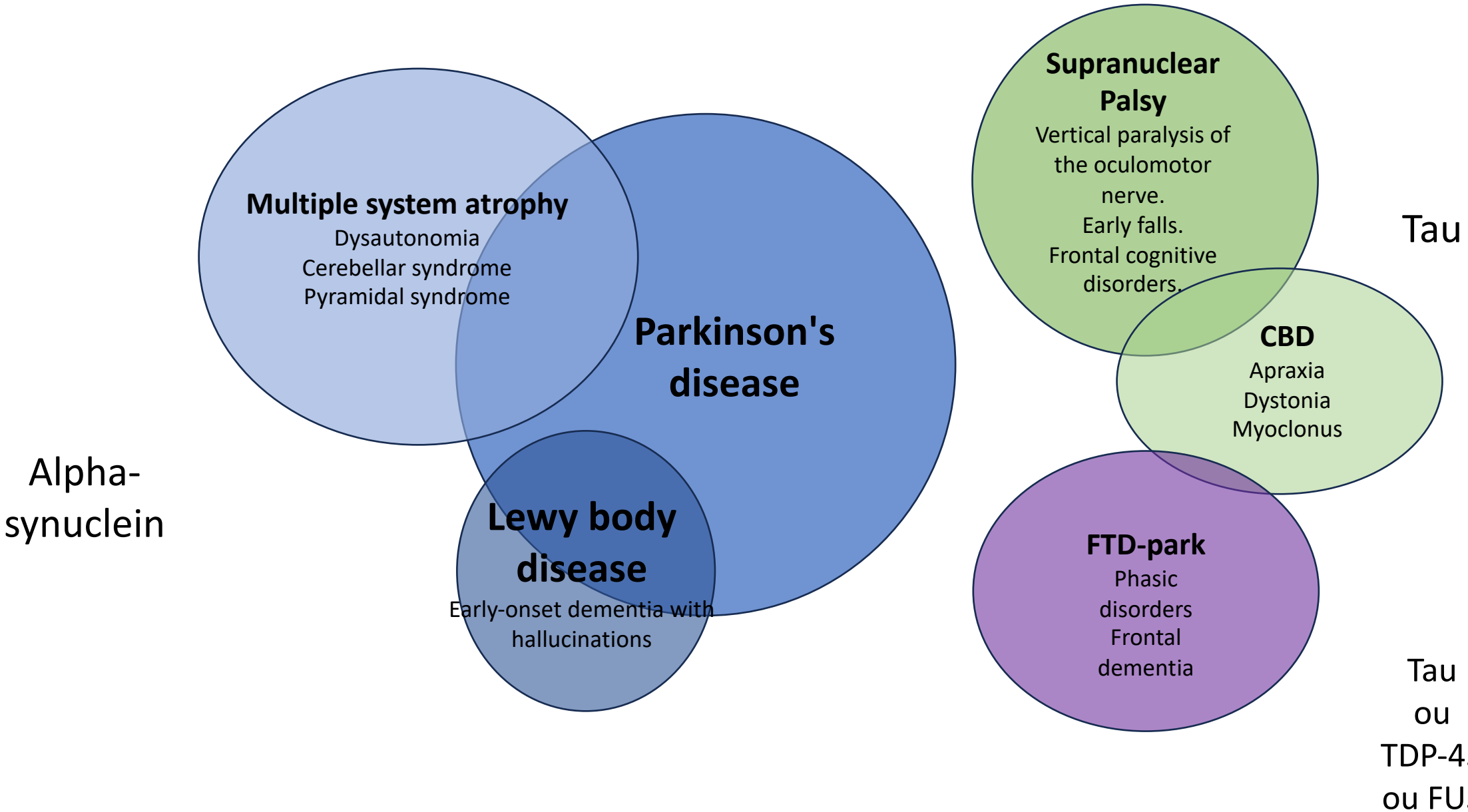




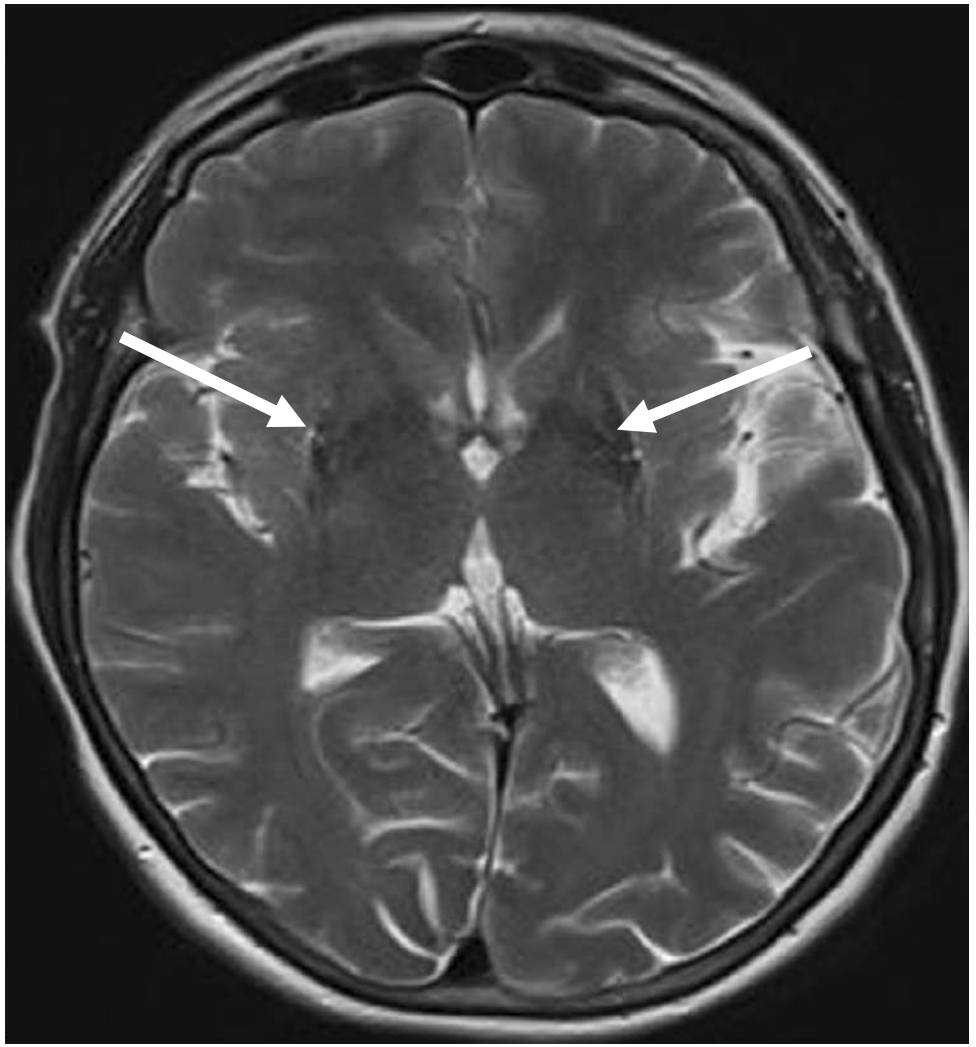
Tumor lesion



Yasuhara et al (2009)

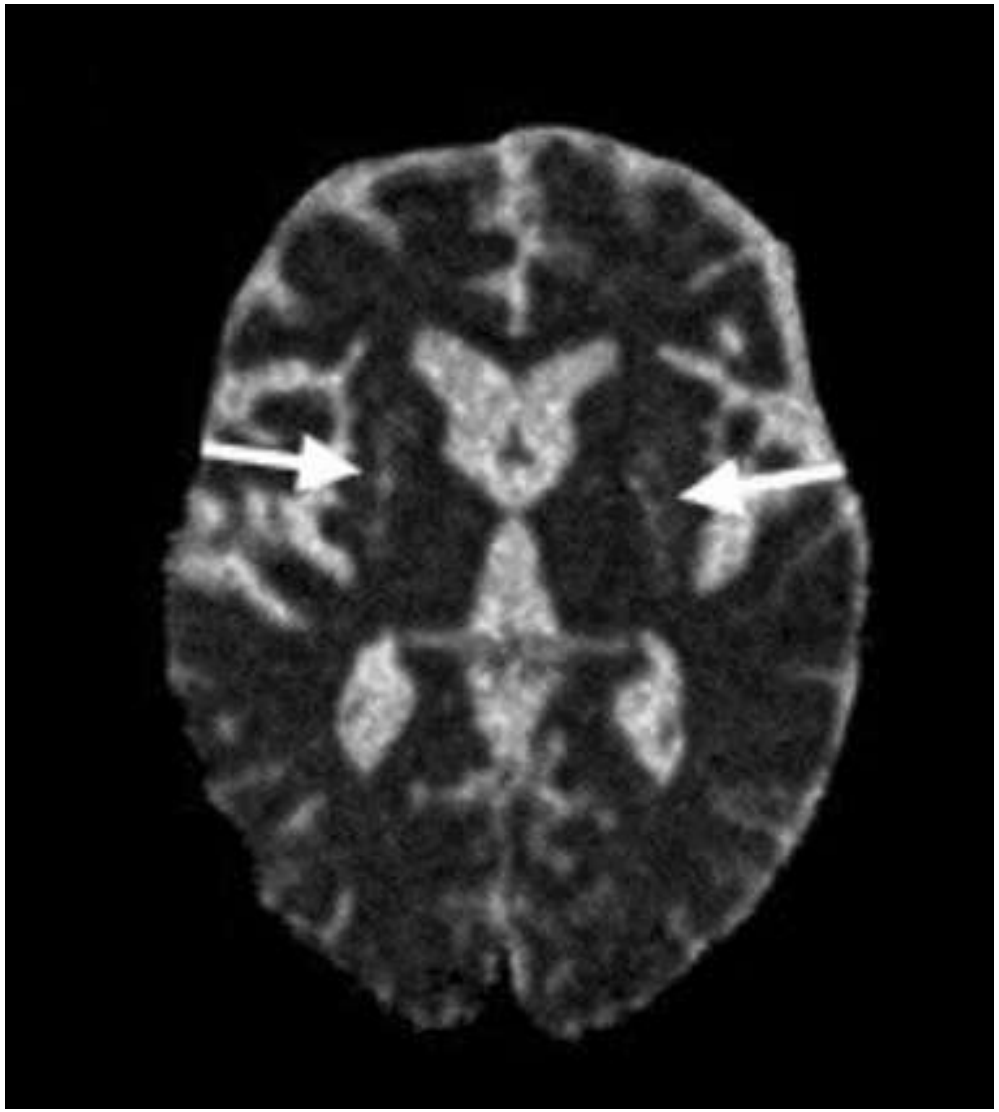

Multiple system atrophy
Dysautonomia
Cerebellar syndrome
Pyramidal syndrome
Parkinson's disease
Lewy body disease
Early-onset dementia with hallucinations
Supranuclear Palsy
Vertical paralysis of the oculomotor nerve.
Early falls.
Frontal cognitive disorders.
CBD
Apraxia
Dystonia
Myoclonus
FTD-park
Phasic disorders
Frontal dementia
Alpha-synuclein
Tau
Tau ou TDP-43 ou FUS

Multiple System Atrophy: Parkinsonian form



T2

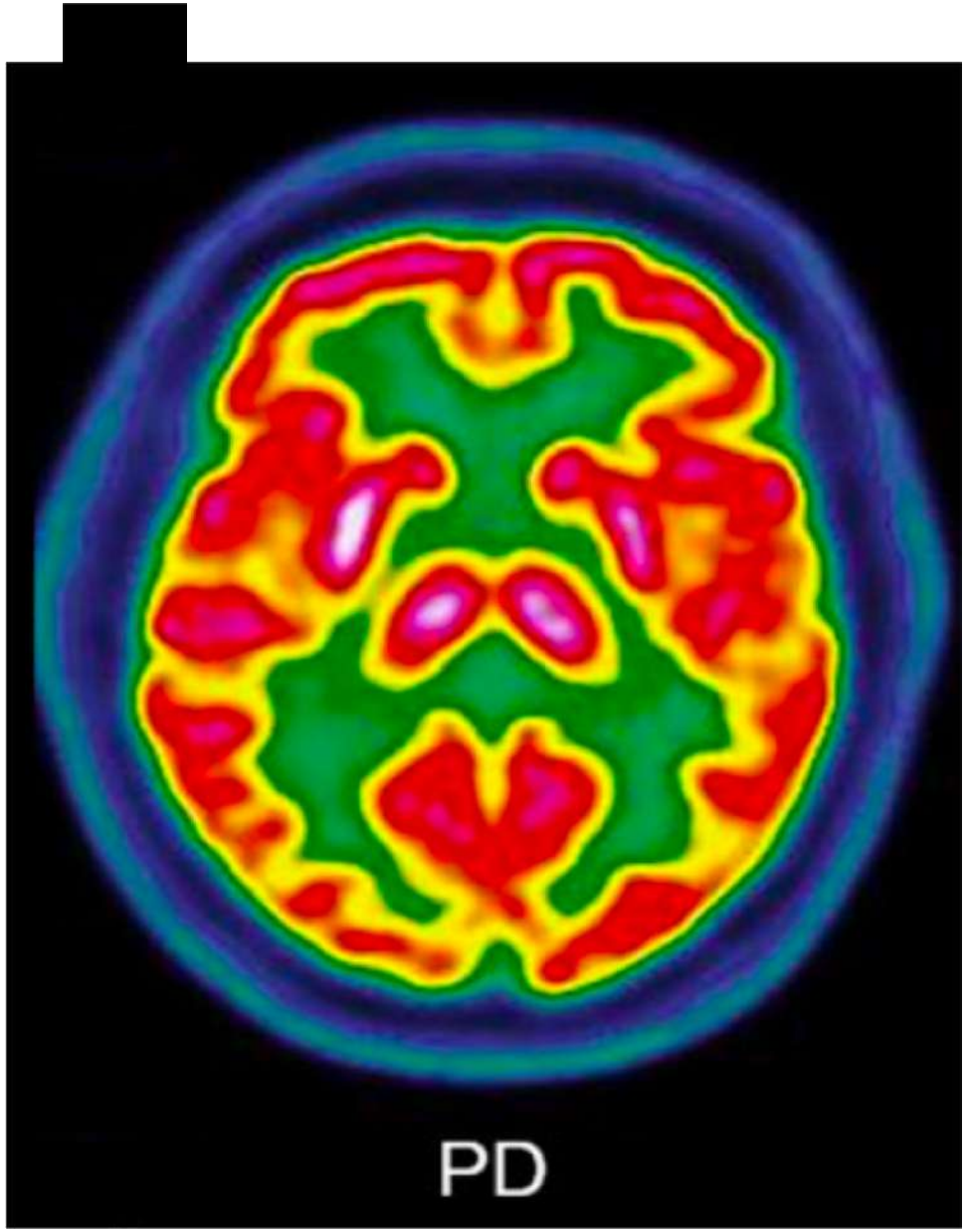
Lateral putaminal hypersignal

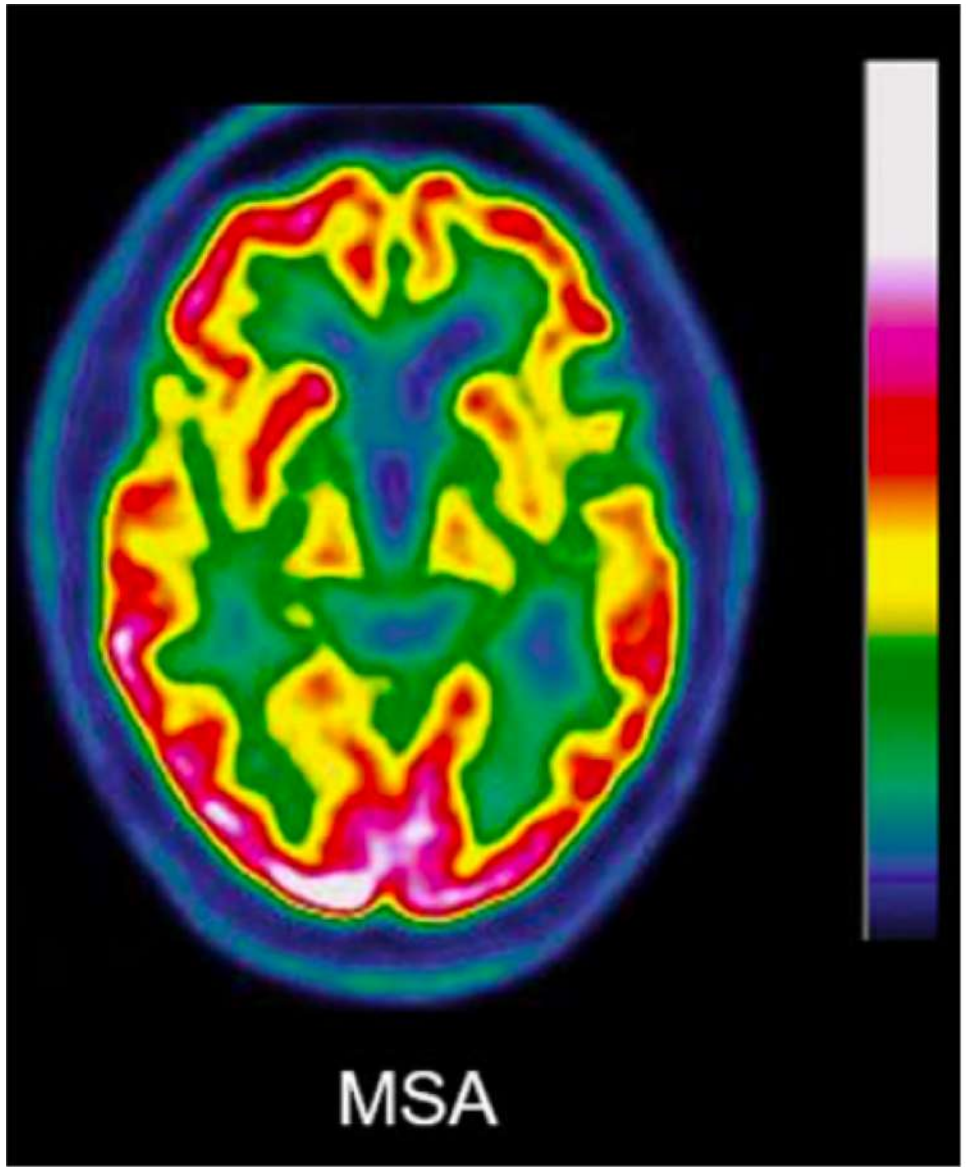


Diffusion

Dabrowska M et al (2015); Seppi K et al (2006)

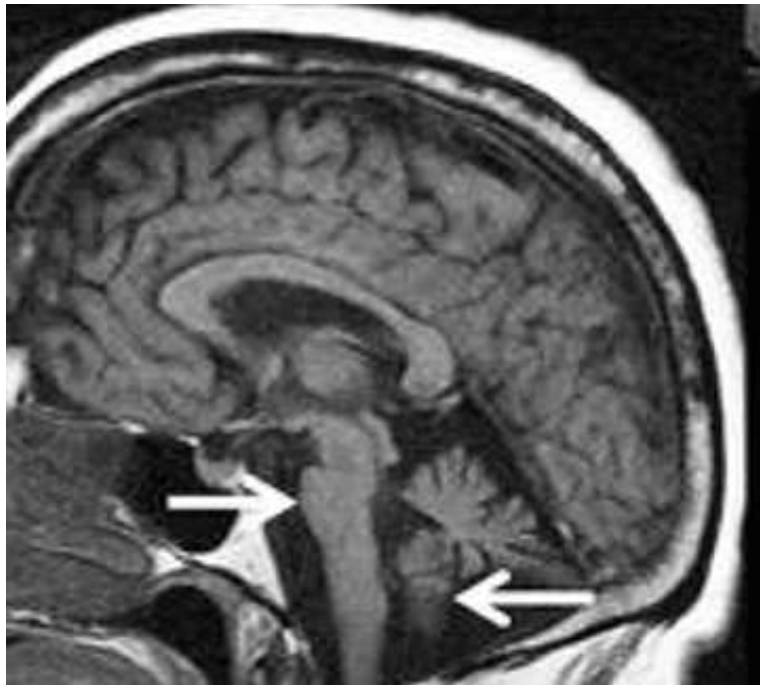
Multiple System Atrophy: Parkinsonian form



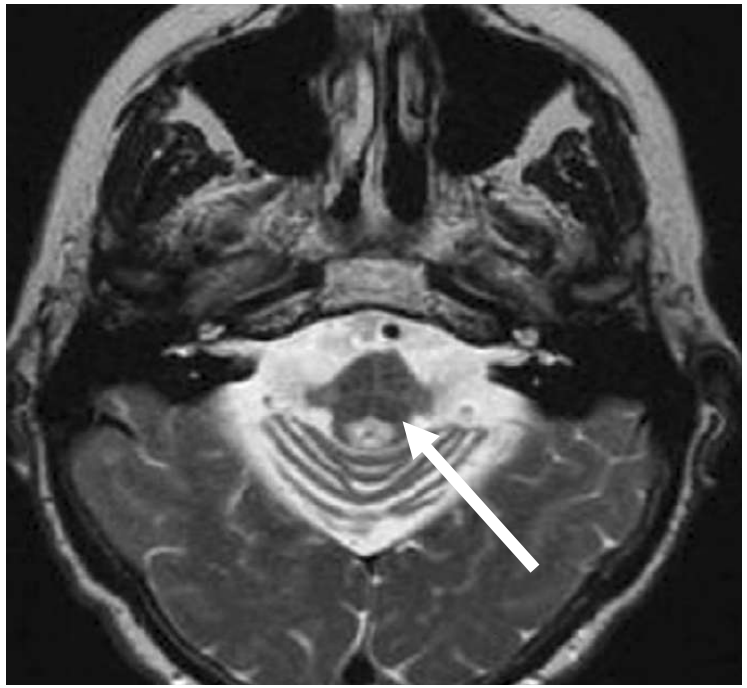


Verger et al (2021)

Multiple System Atrophy: cerebellar form

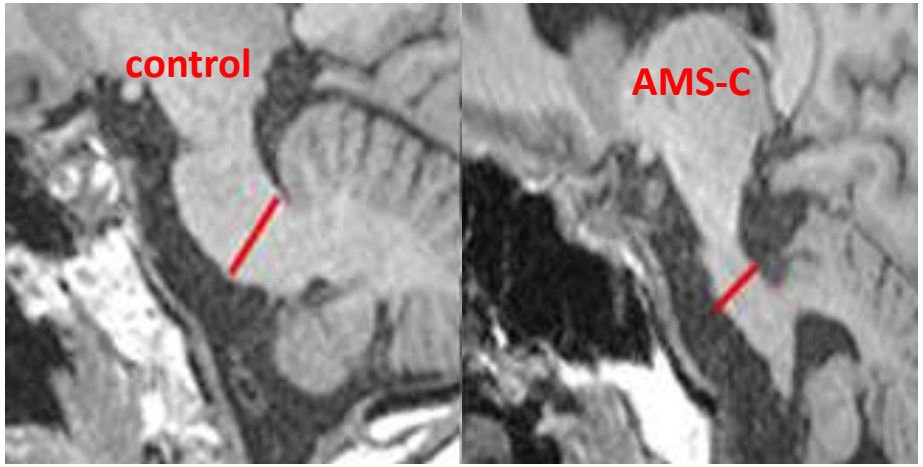


Atrophy of the pons and cerebellum (T1)



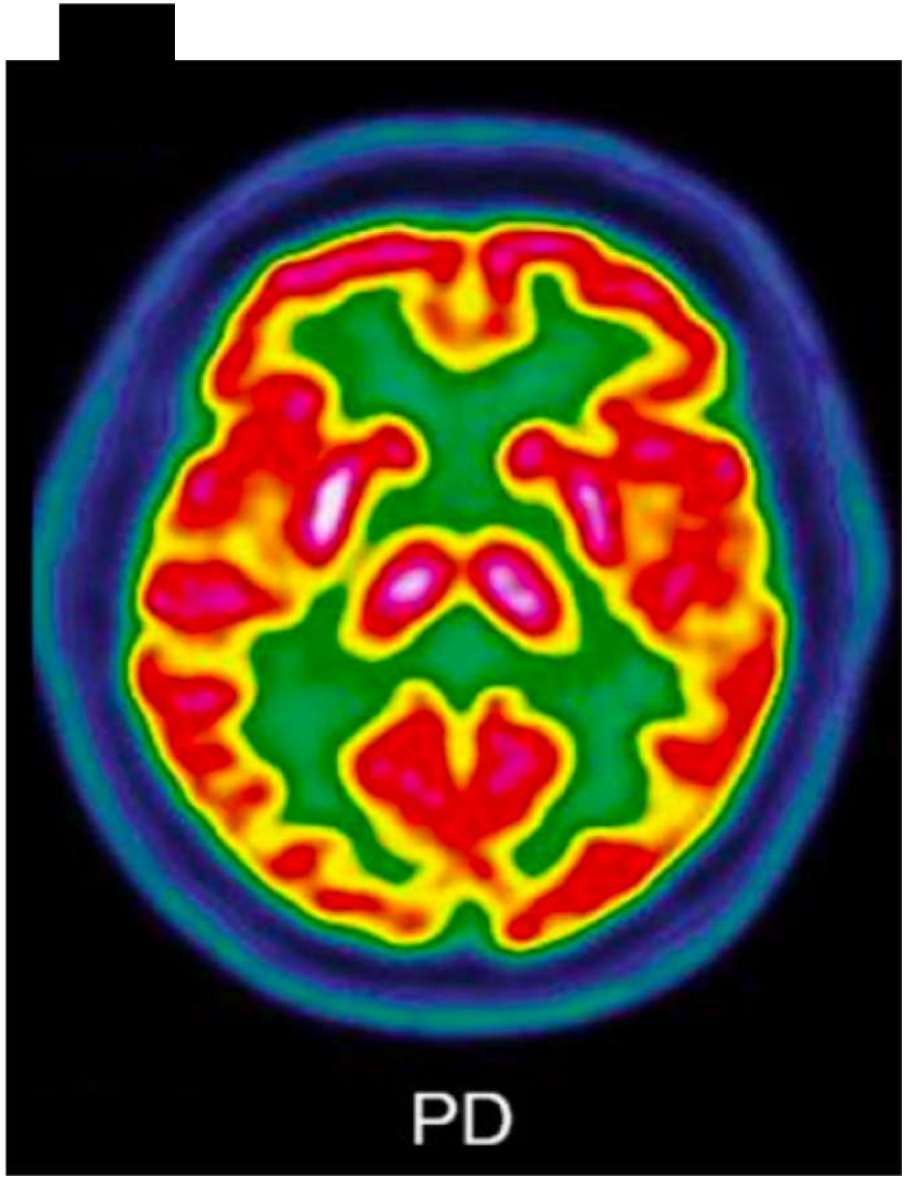
Hot cross-bun sign (T2)

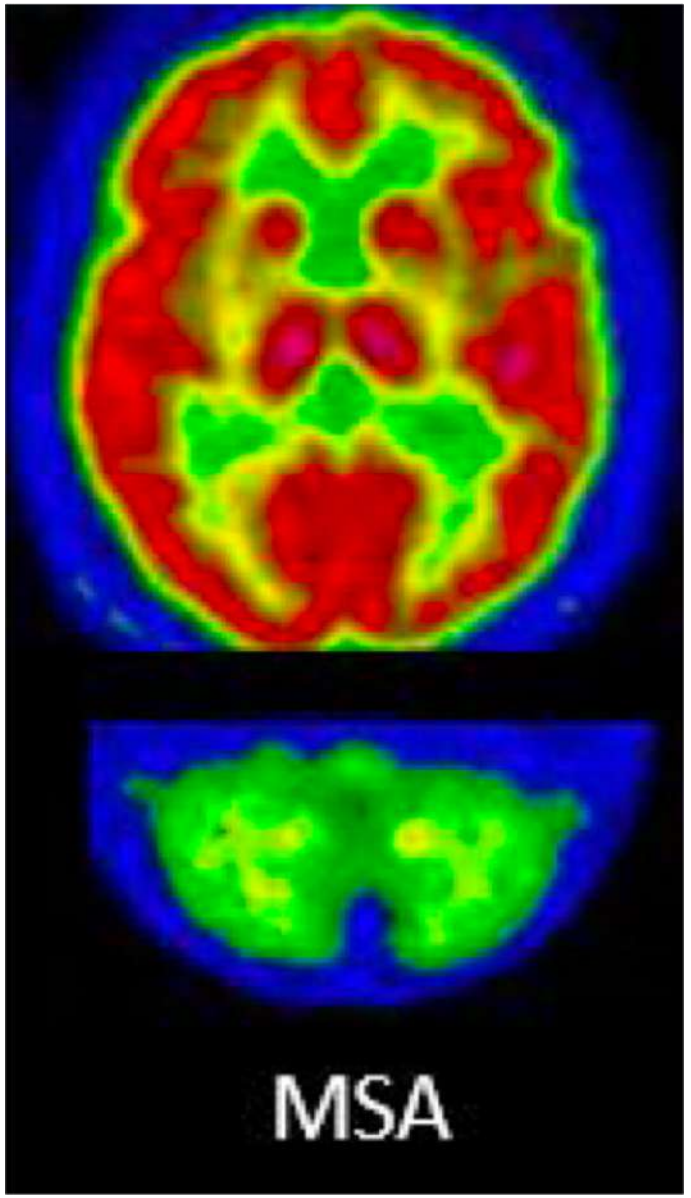
Hypersignal (FLAIR) and atrophy of the middle cerebellar peduncles (T1)



Dabrowska M et al (2015); Saeed U et al (2017);Chougar et al (2020)

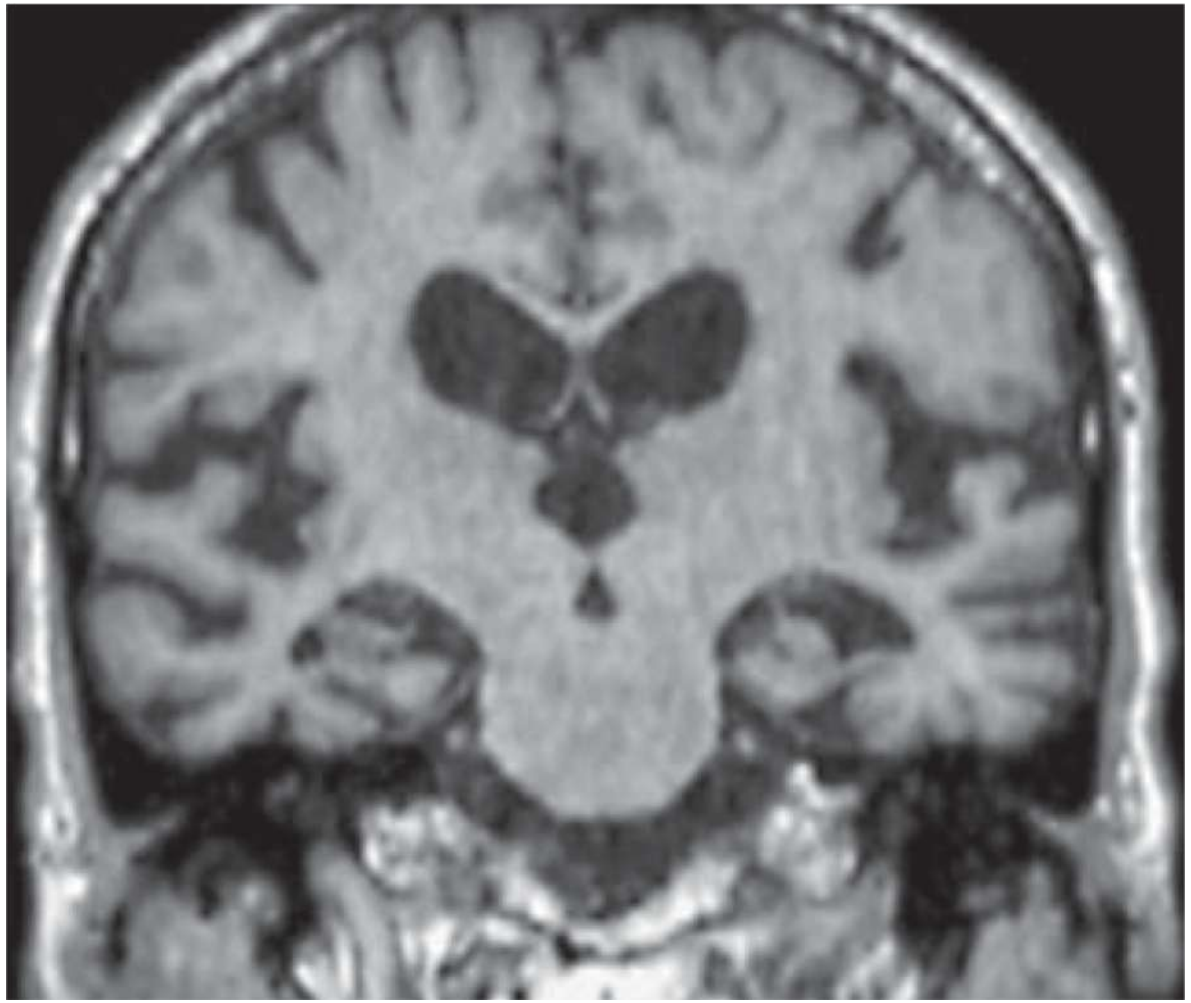
Multiple System Atrophy: cerebellar form



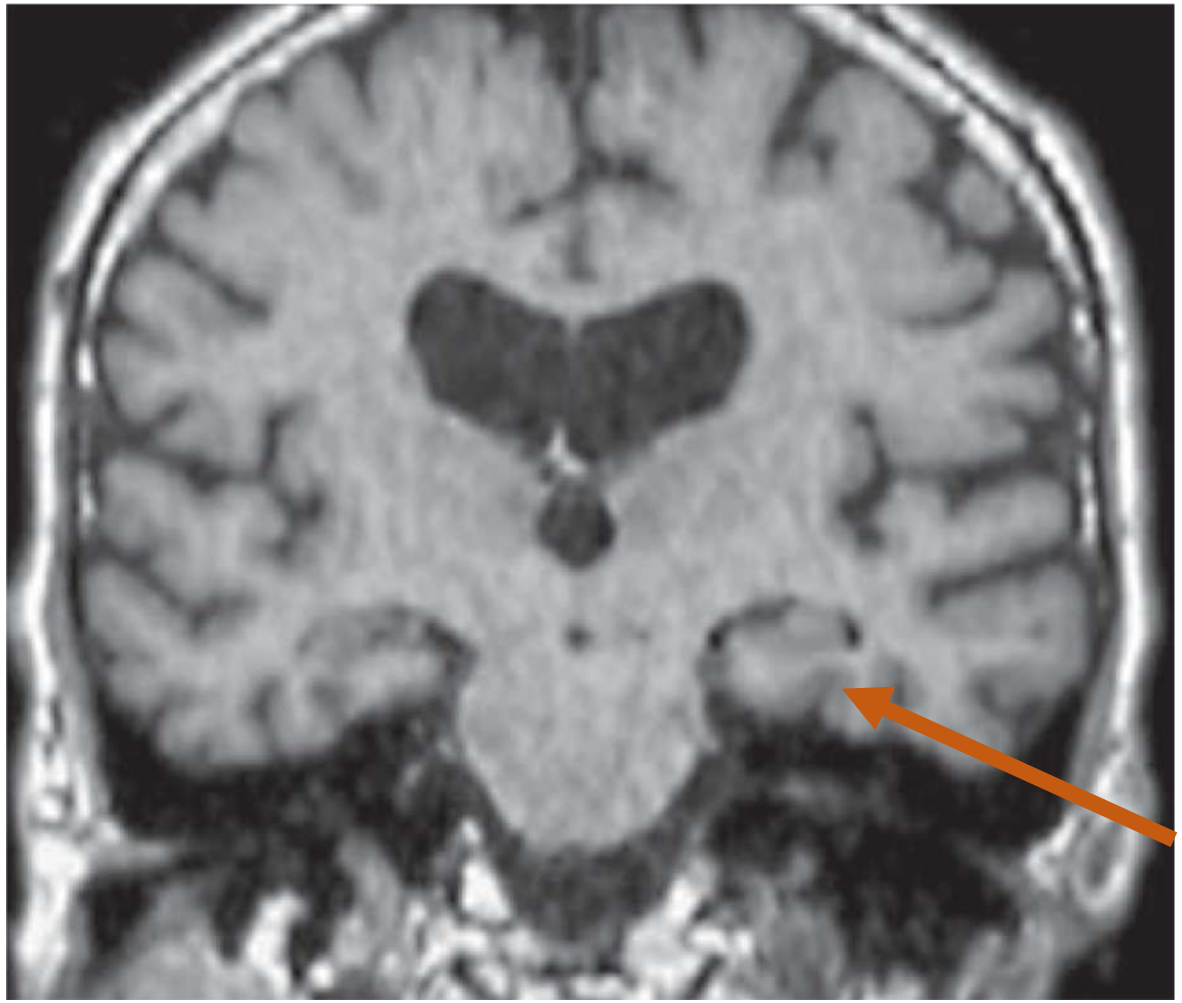


Horowitz et al (2022)

Lewy body dementia



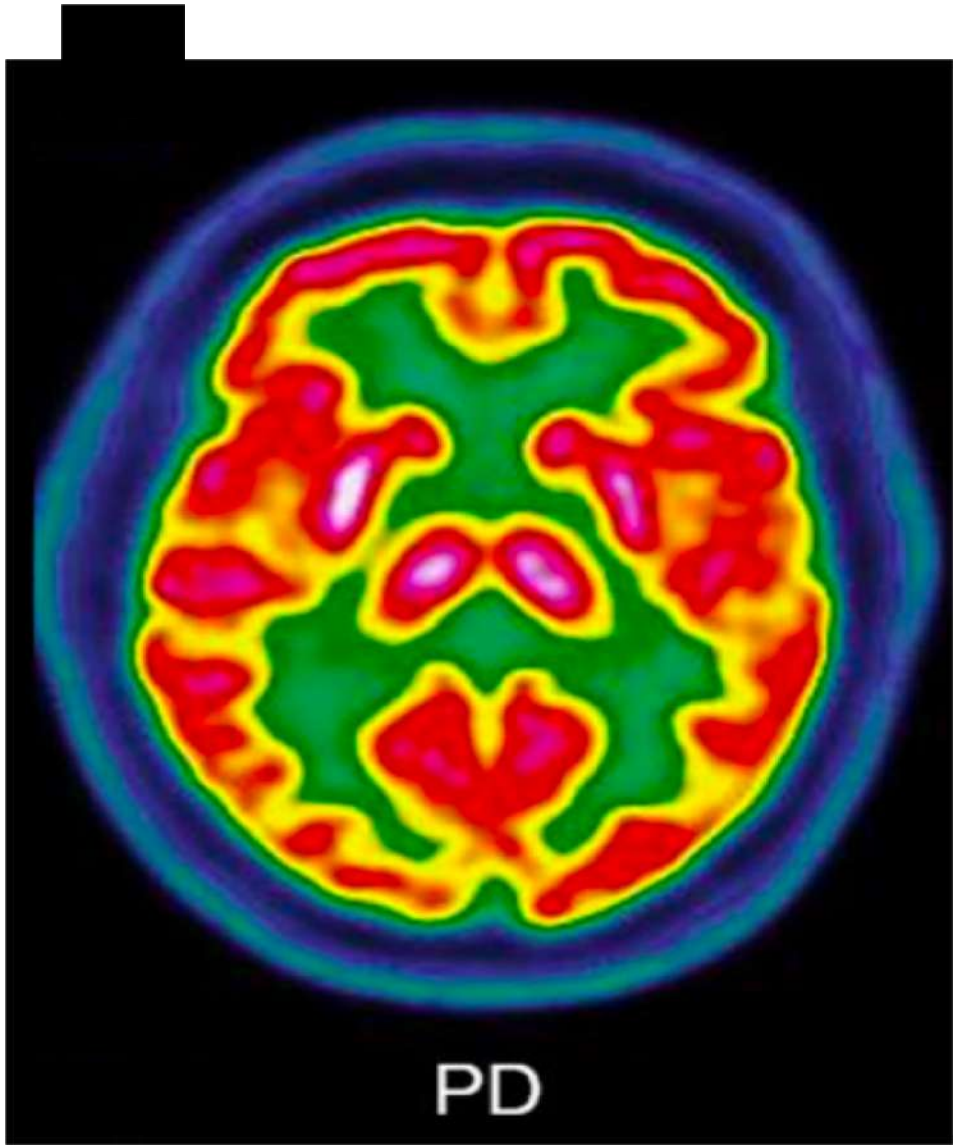
Alzheimer

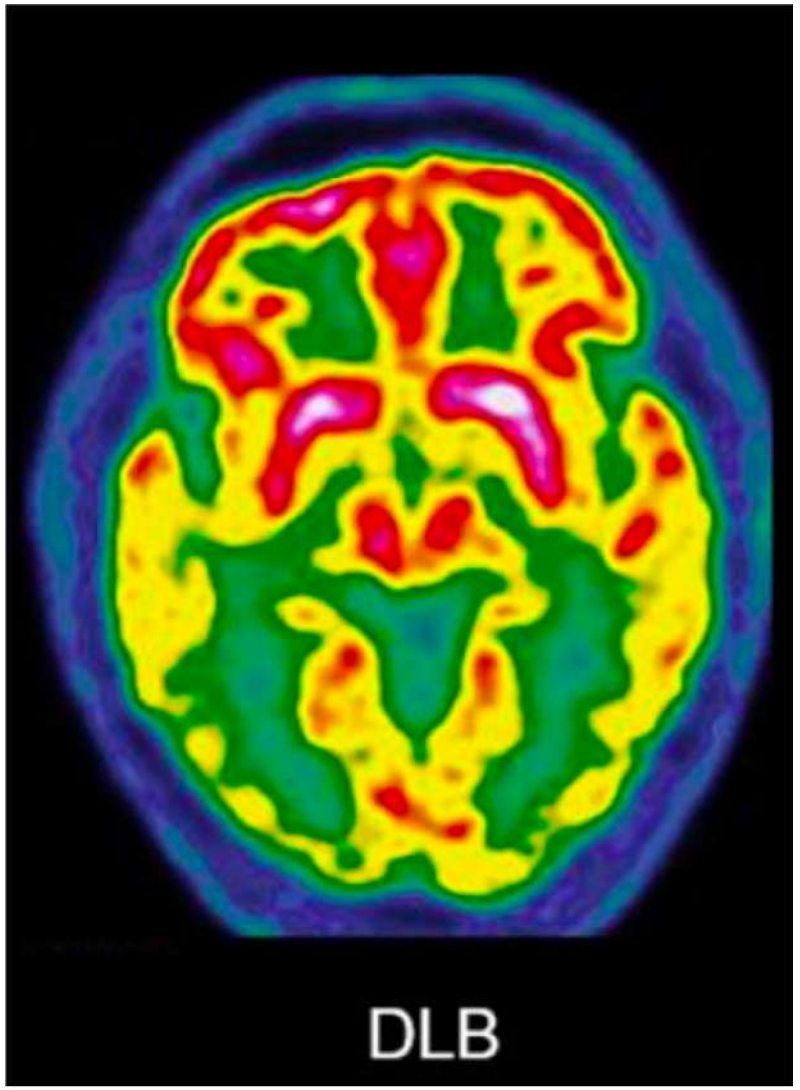


DLB

Watson et al (2009)

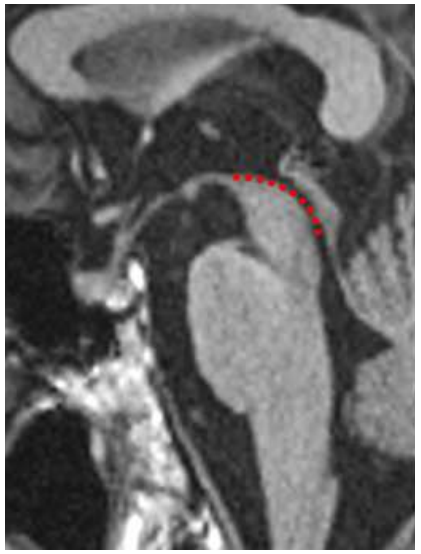
Lewy body dementia





Verger et al (2021)

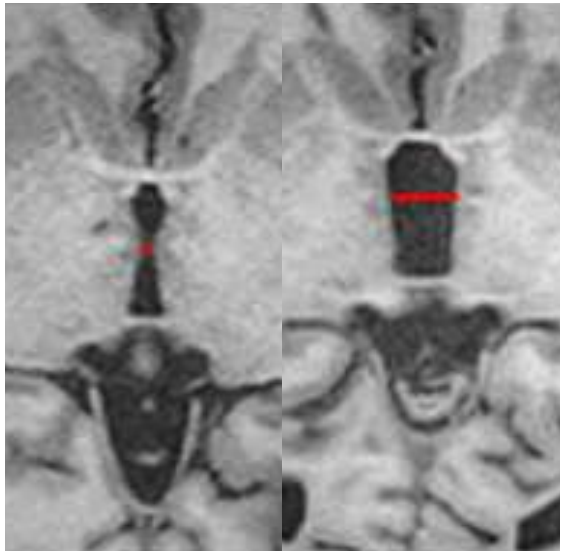
Supranuclear Palsy



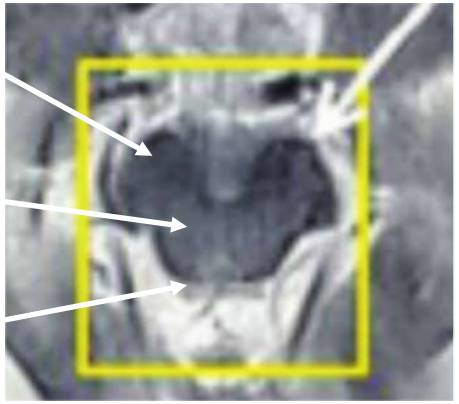
Normal

Severe atrophy

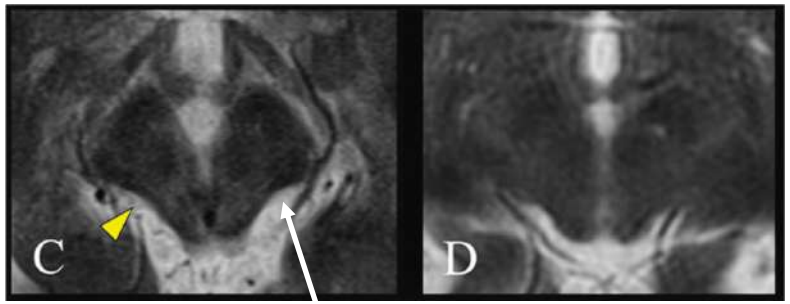
Humming bird



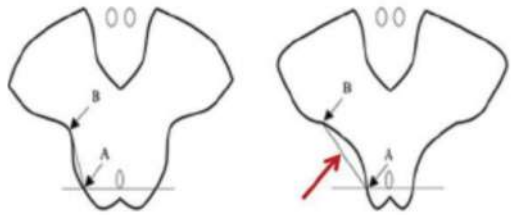
Enlargement of the third ventricle



Mickey ears



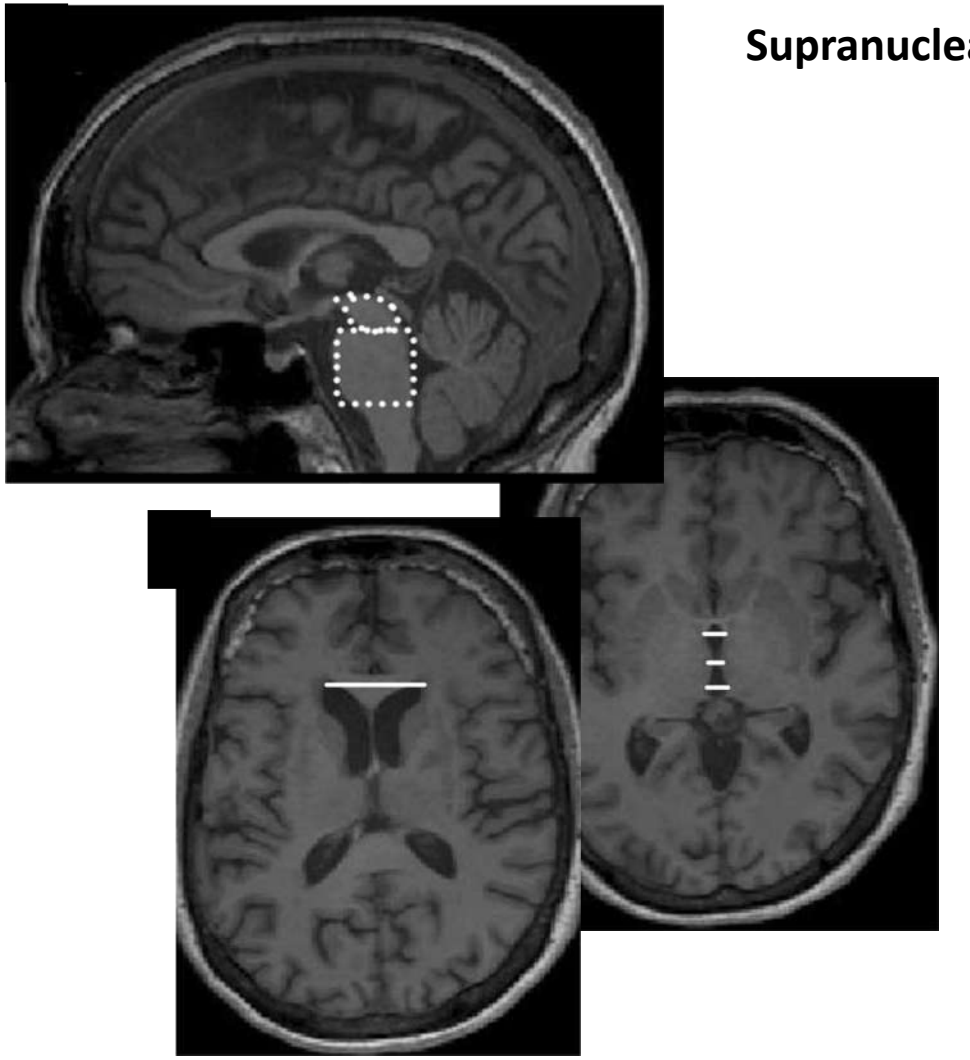
Increased lateral concavity of the tegmentum



Morning Glory sign

Saeed U et al (2017) ; Jalala et al (2017)
Chougar et al (2020), Sule Tinaz (2023)

Supranuclear Palsy



$\frac{M}{P}$ < 0.22 for SNP

$$MRPI = \frac{Pons\ area}{Midbrain\ area} \times \frac{Middle\ cerebellar\ peduncle\ width}{Superior\ cerebellar\ peduncle\ width}$$

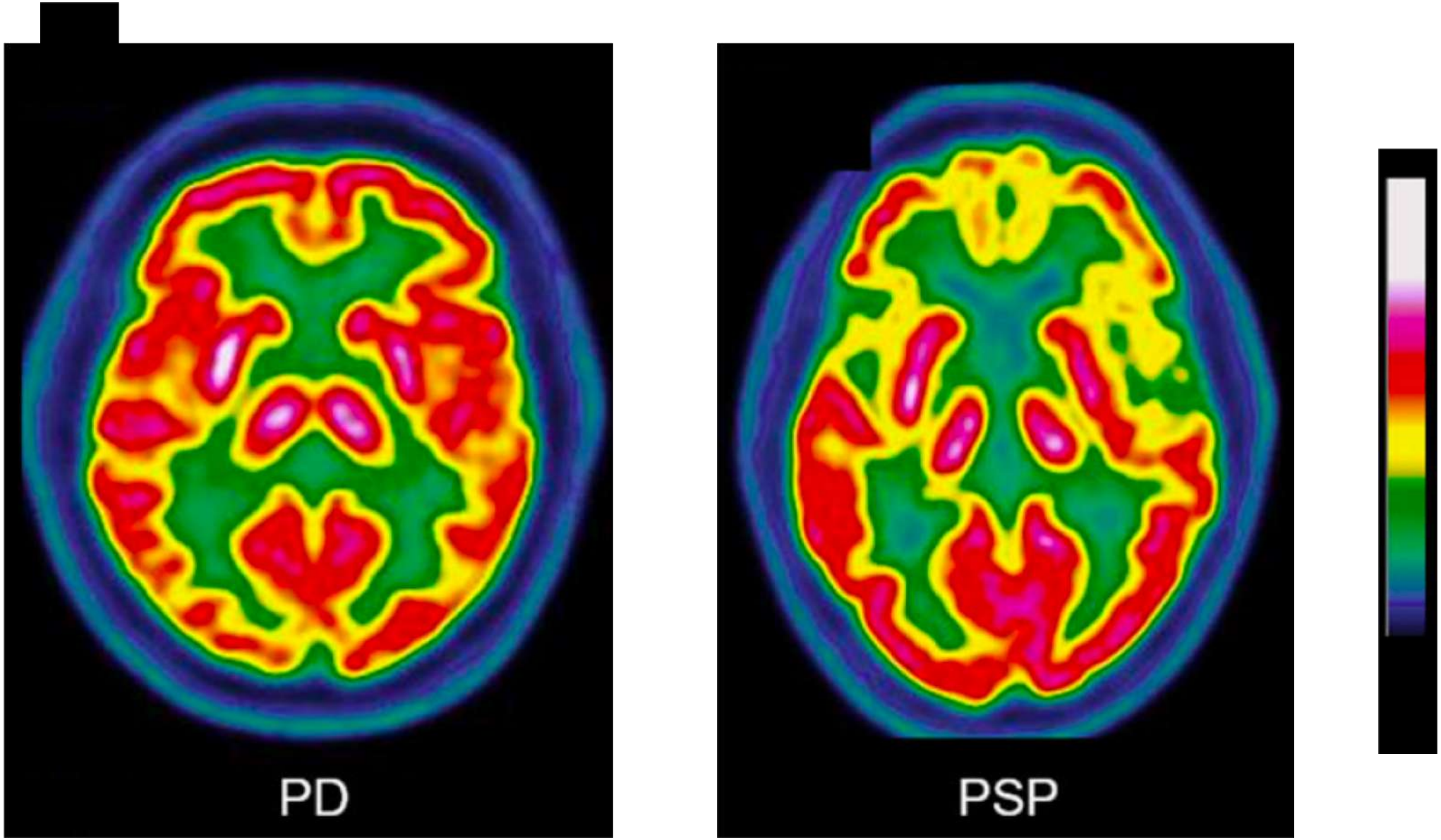
> 13.88 pour PSP-RS

$$MRPI\ 2.0 = MRPI \times \frac{3rd\ Ventricle\ width}{Frontal\ horn\ width}$$

> 2.50 pour PSP-RS

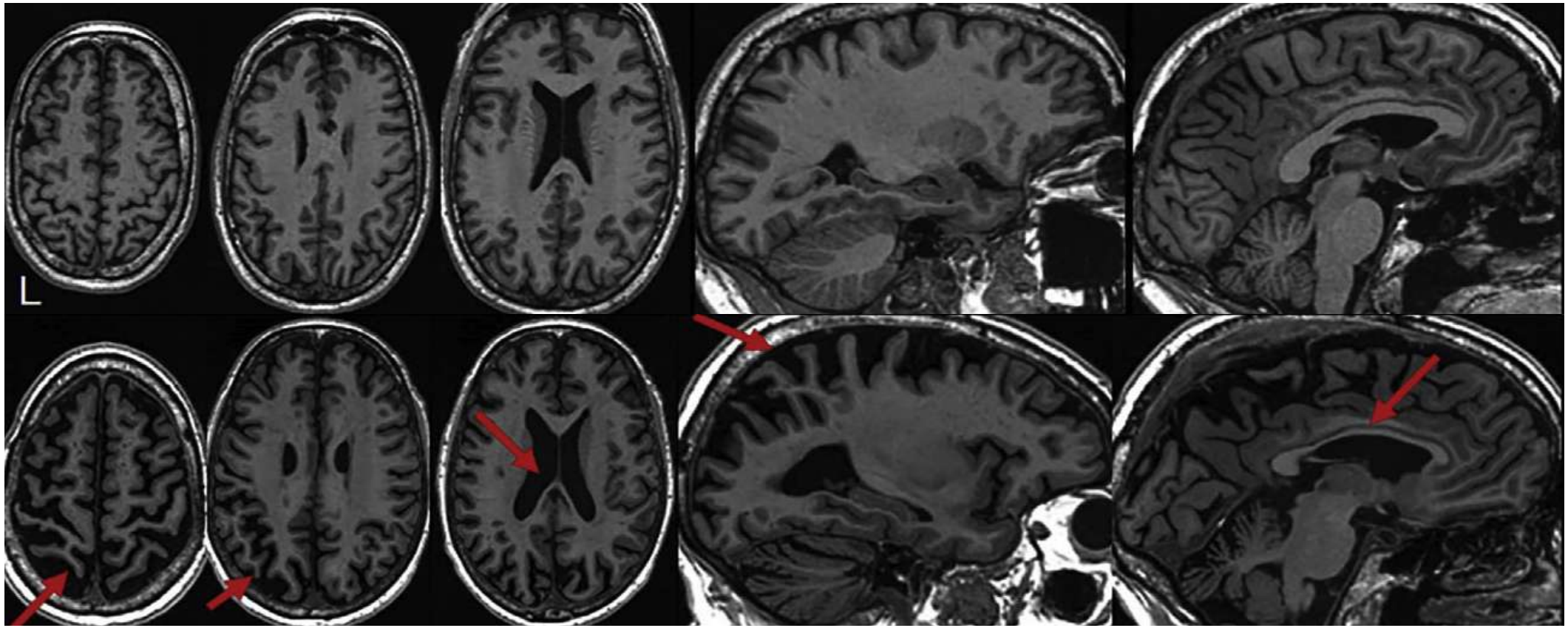
Saeed U et al (2017) ; Jalal et al (2017) Chougar et al (2020), Sule Tinaz (2023)

Supranuclear Palsy



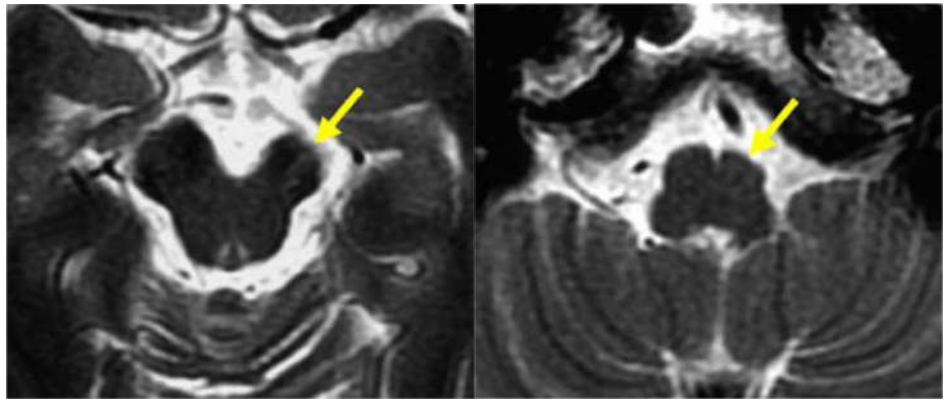
Verger et al (2021)

Cortical-basal degeneration



Control, 70 ans

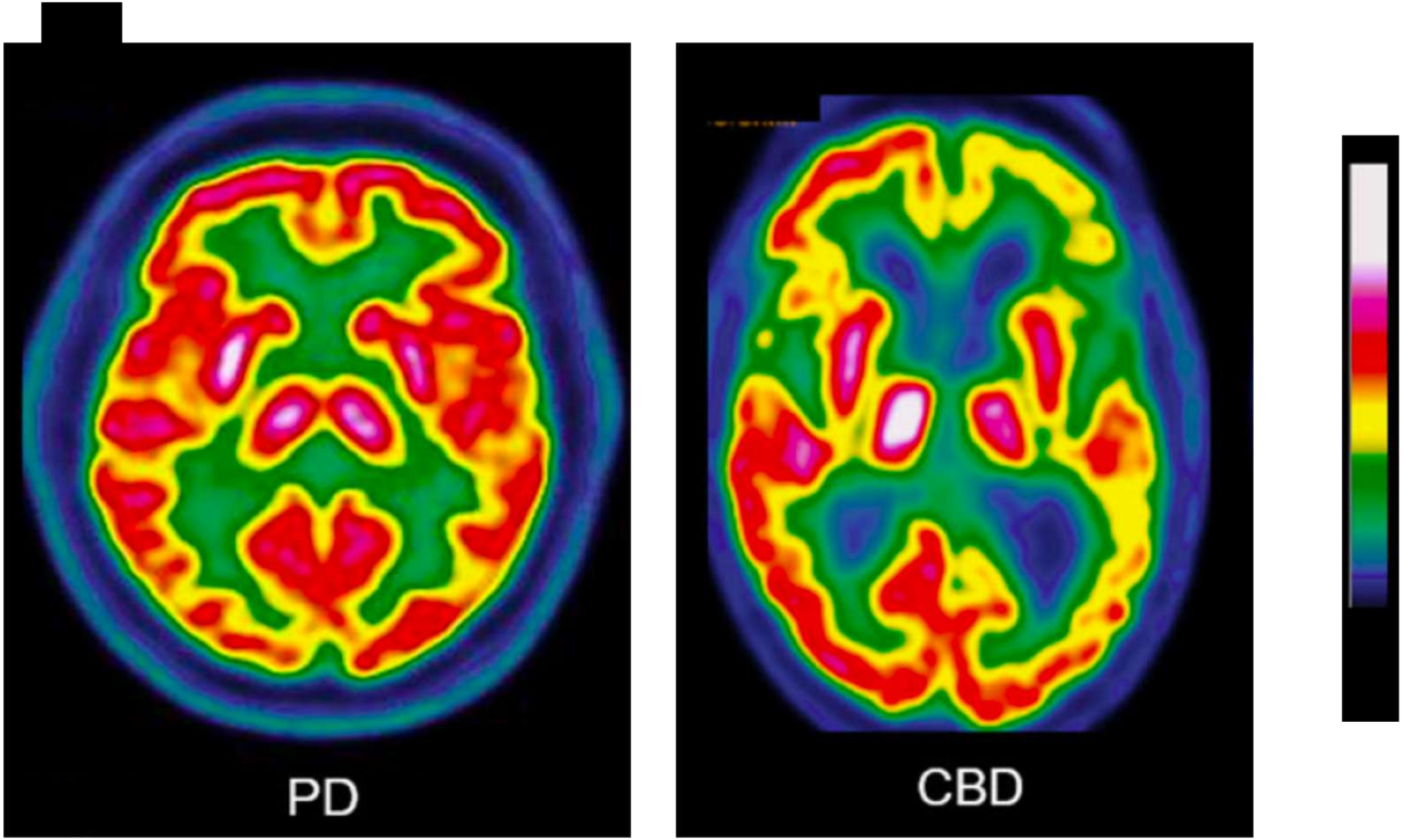
CBD, 73 ans



Atrophy of the left cerebral peduncle and left pyramid

Koyama et al (2007); Saranza et al (2019)

Cortical-basal degeneration



Verger et al (2021)

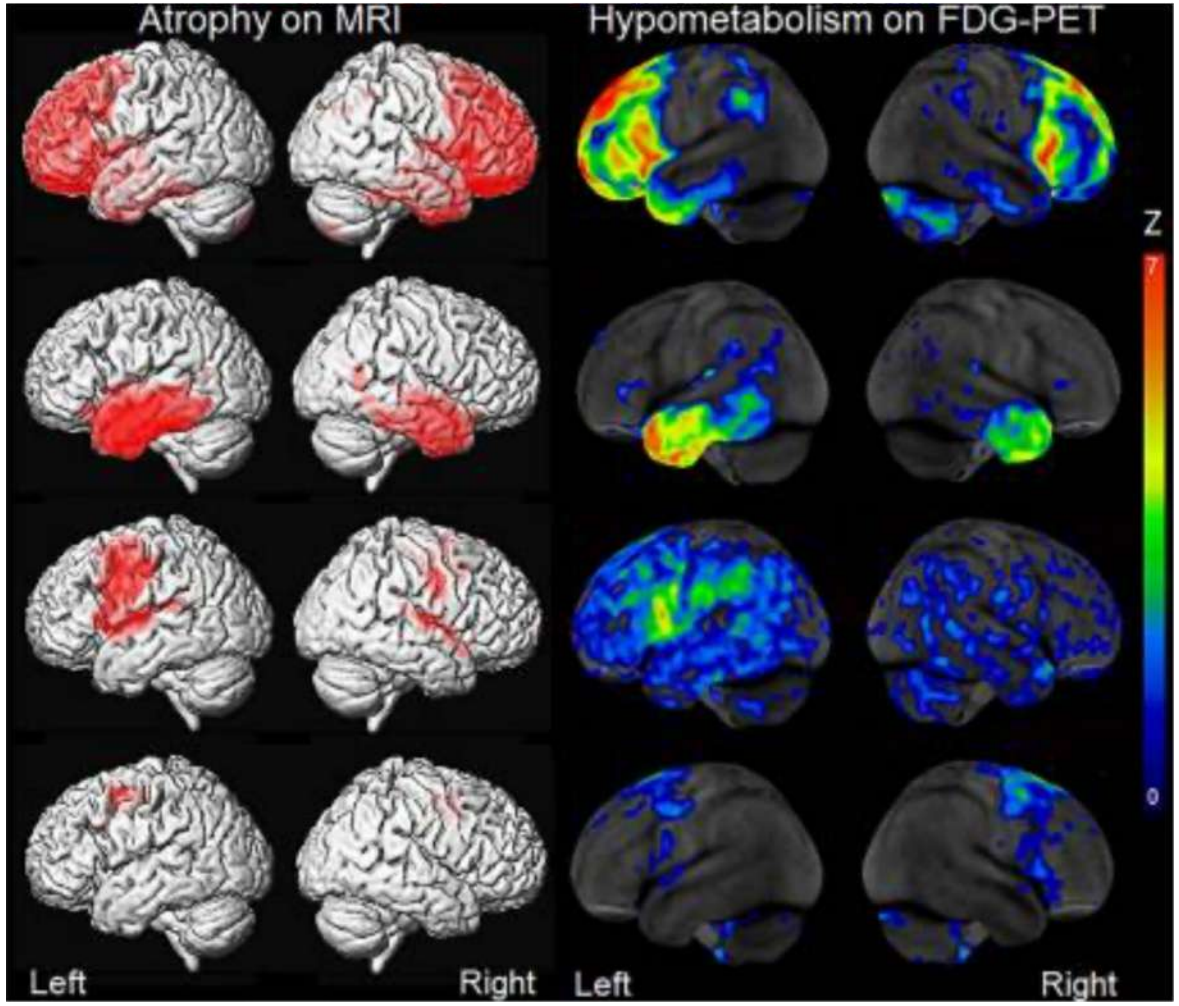
FTD - Parkinsonism

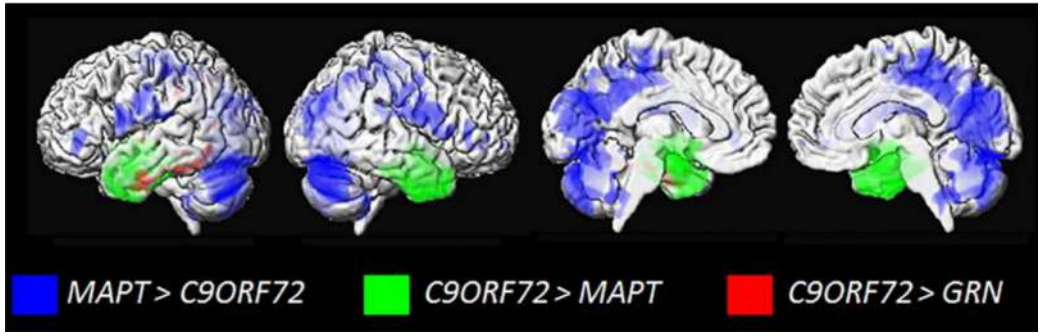
Frontal impairment

Semantic impairment

Agrammatical variant of primary progressive aphasia

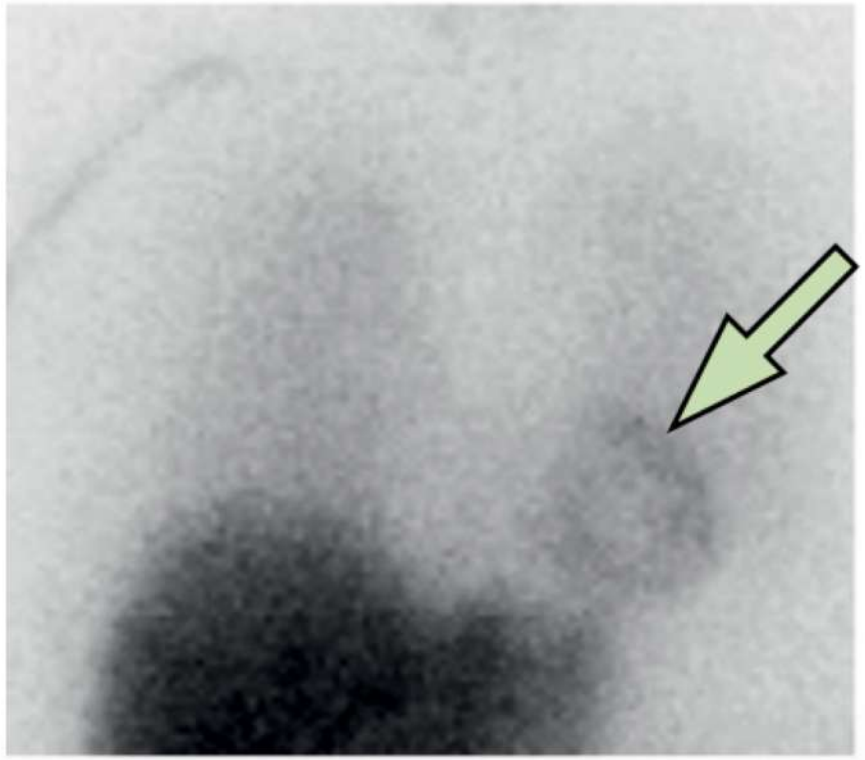
Progressive speech apraxia

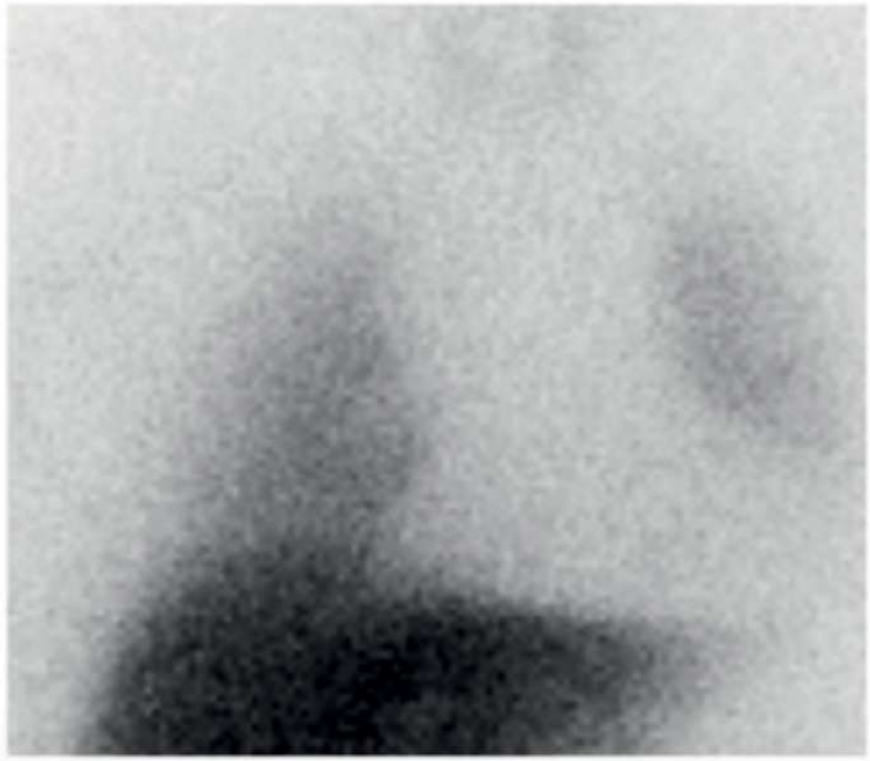




Whitwell (2019)

Exploration of the autonomic nervous system: Myocardial scintigraphy with 123I-MIBG

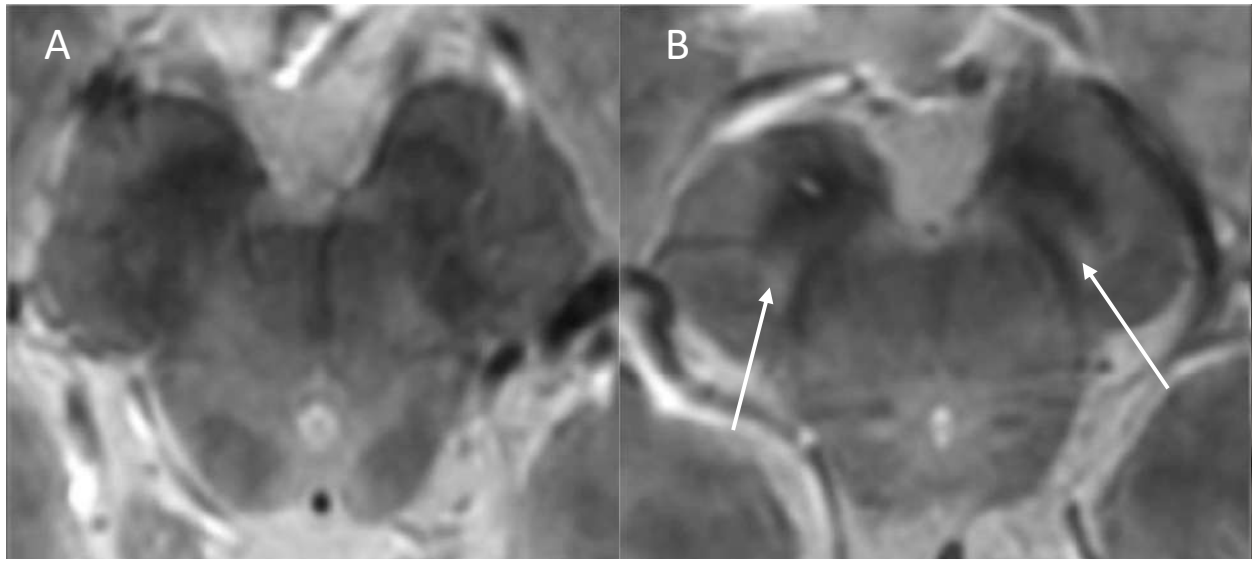


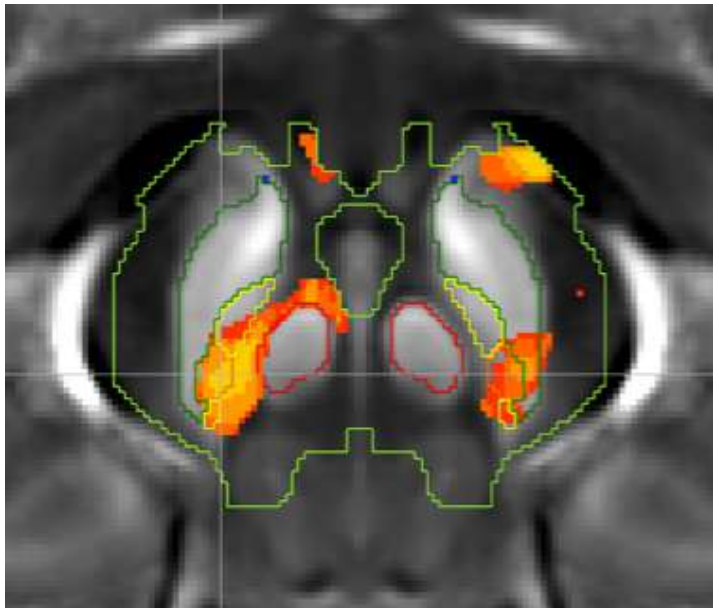


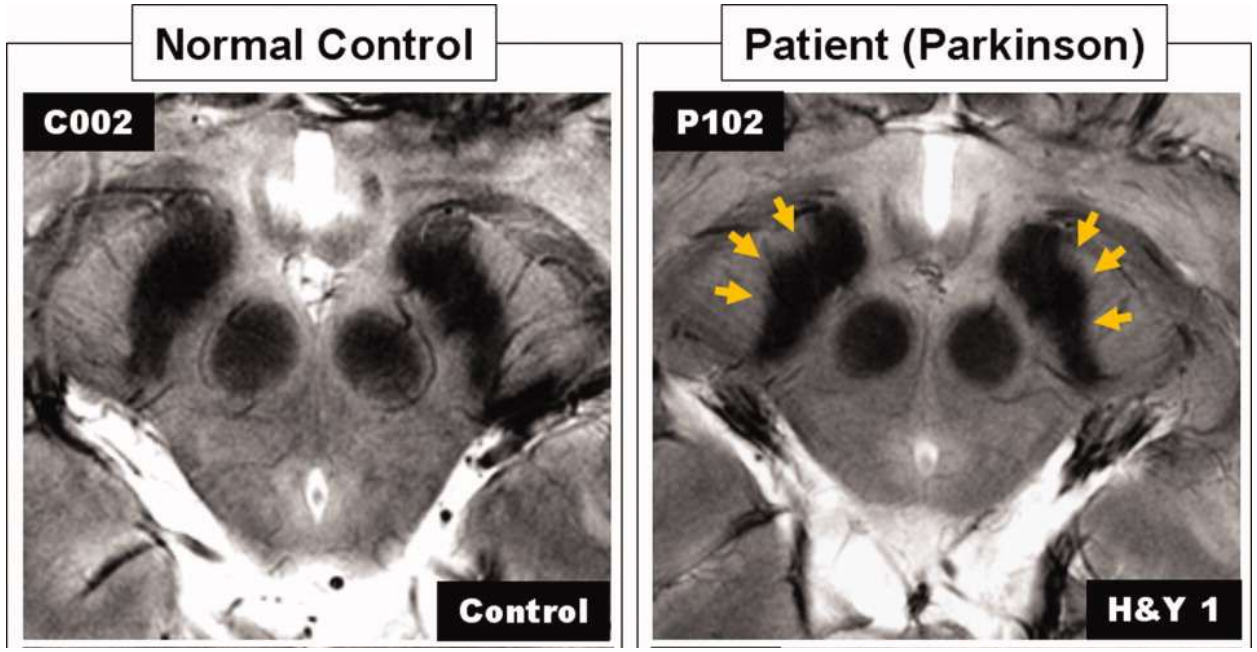
Control
SNP
CBD
MSA (70% of cases)
Alzheimer

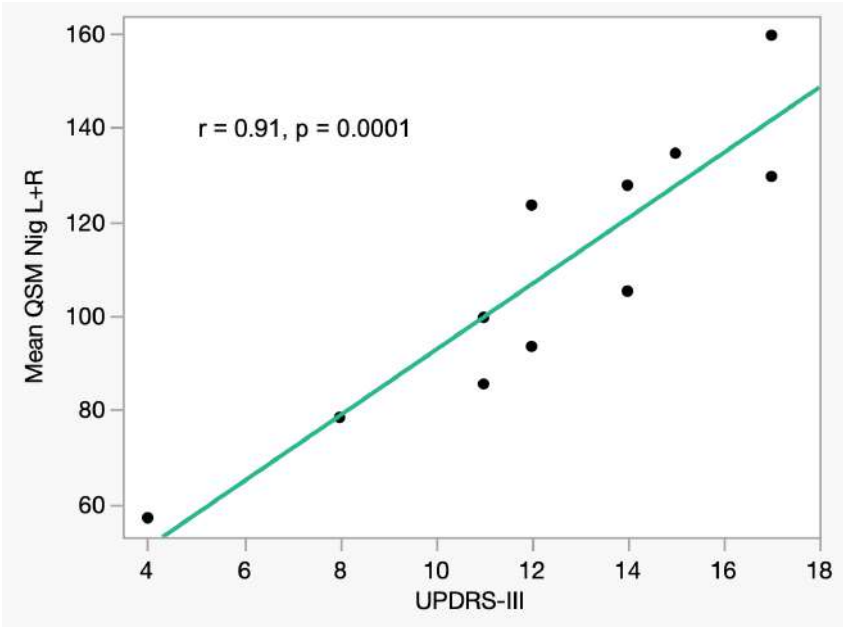
RBD
Parkinson's disease
DLB

General arguments in favor of neurodegeneration:
Iron accumulation



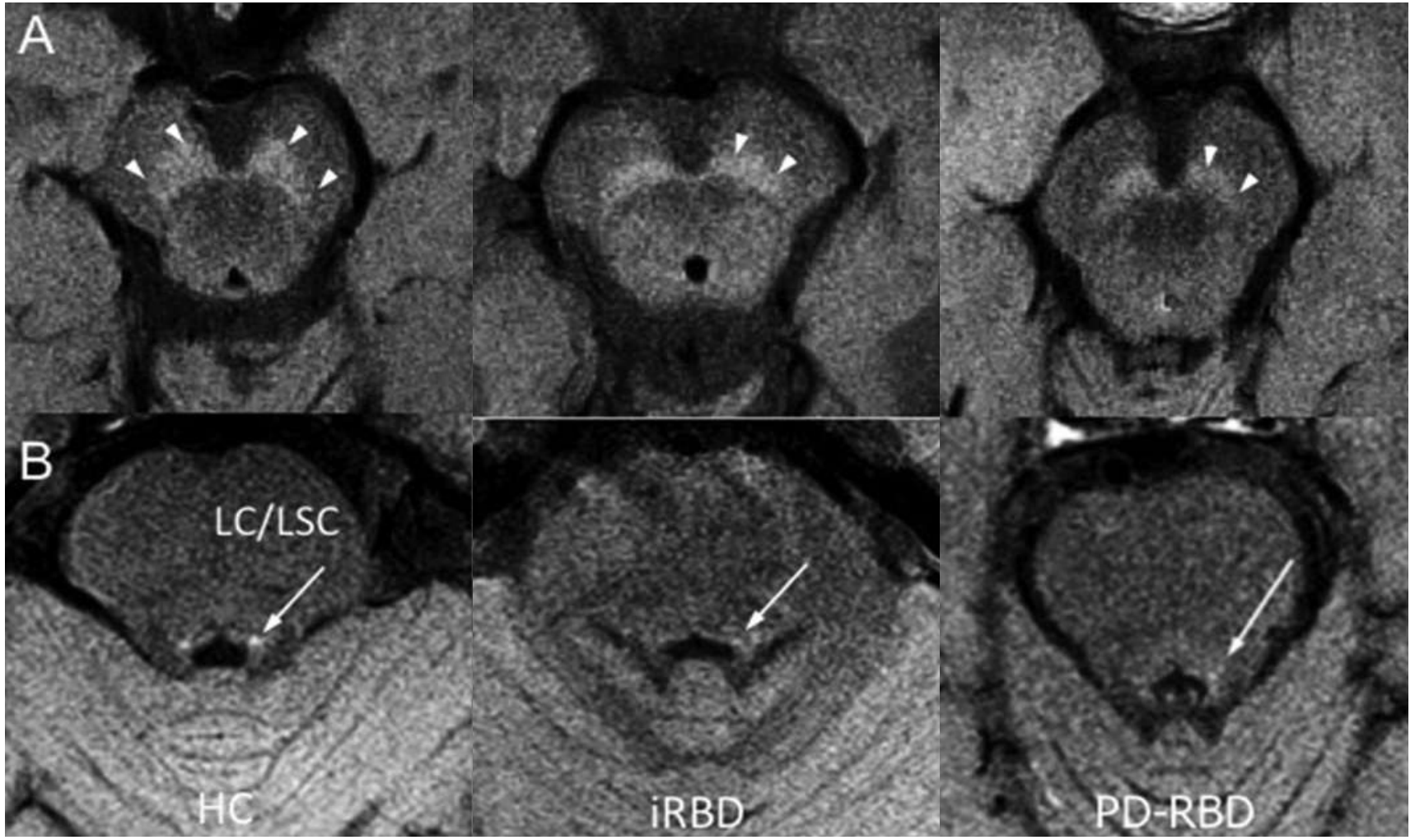




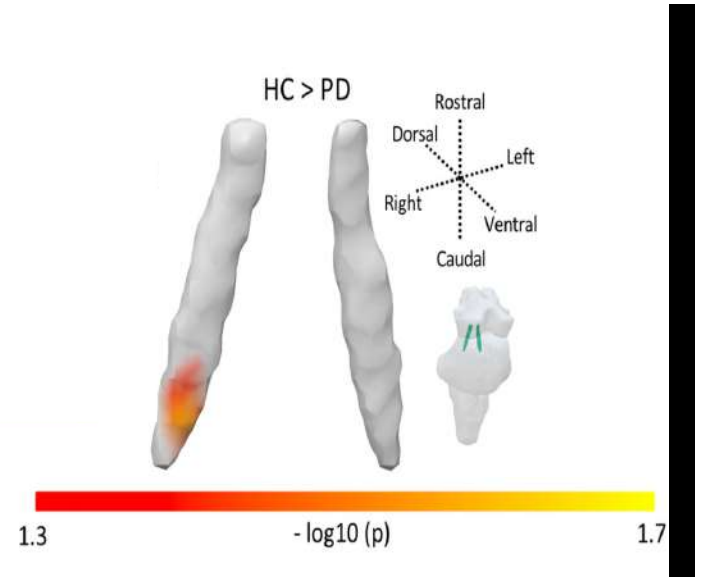


Lehéricy et al, 2014; Frosini et al, 2017 ; Grimaldi et al 2024

General arguments in favor of neurodegeneration:
Loss of neuromelanin signal in the Substantia Nigra and Locus Niger

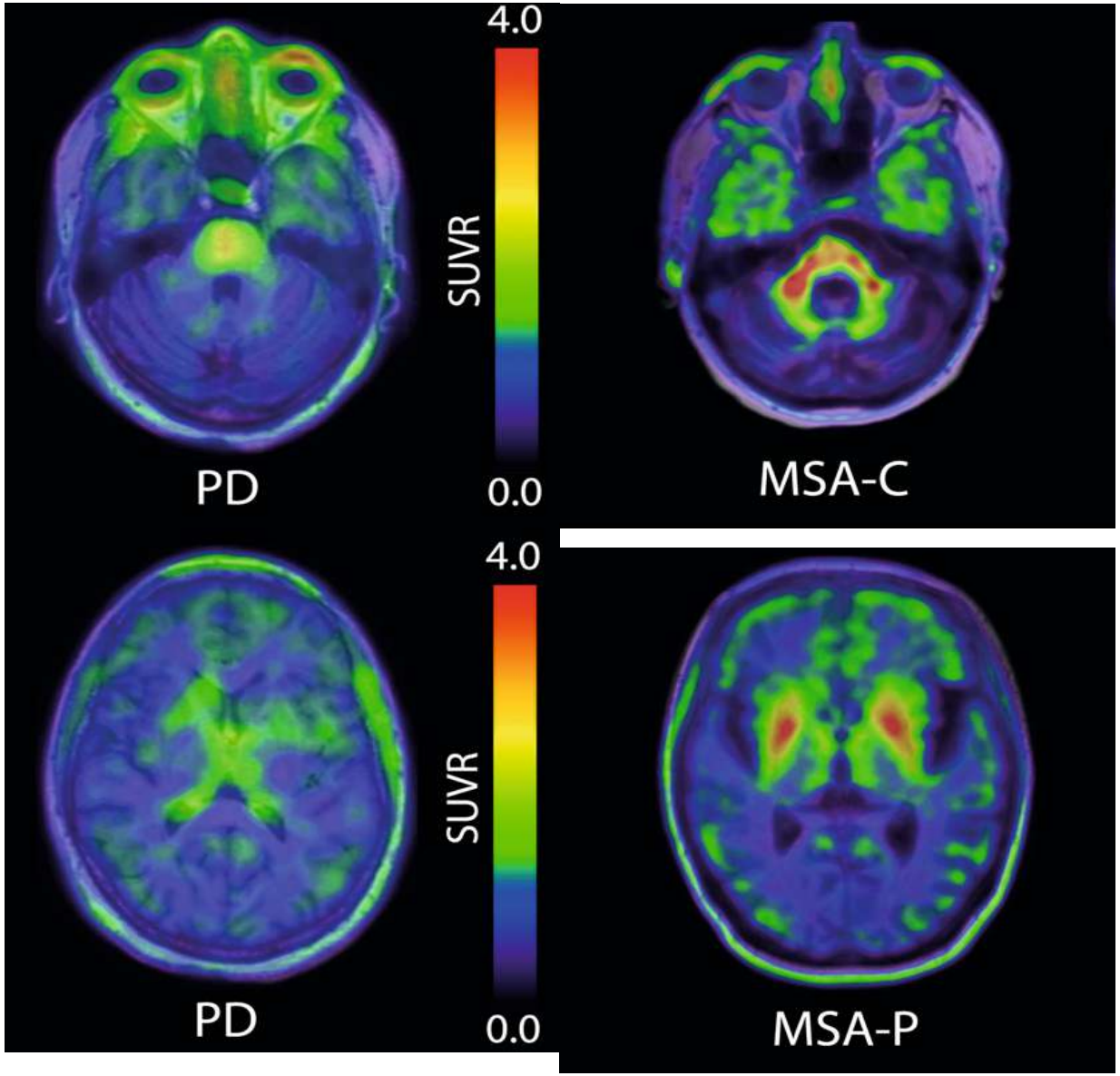


sensibility : 82.5%
spécificity : 81%



Lehericy, S., Vaillancourt, D. E., Seppi, K., Monchi, O., Rektorova, I., Antonini, A., ... & International Parkinson and Movement Disorder Society (IPMDS)-Neuroimaging Study Group. (2017). The role of high-field magnetic resonance imaging in parkinsonian disorders: Pushing the boundaries forward. *Movement Disorders*, *32*(4), 510-525.

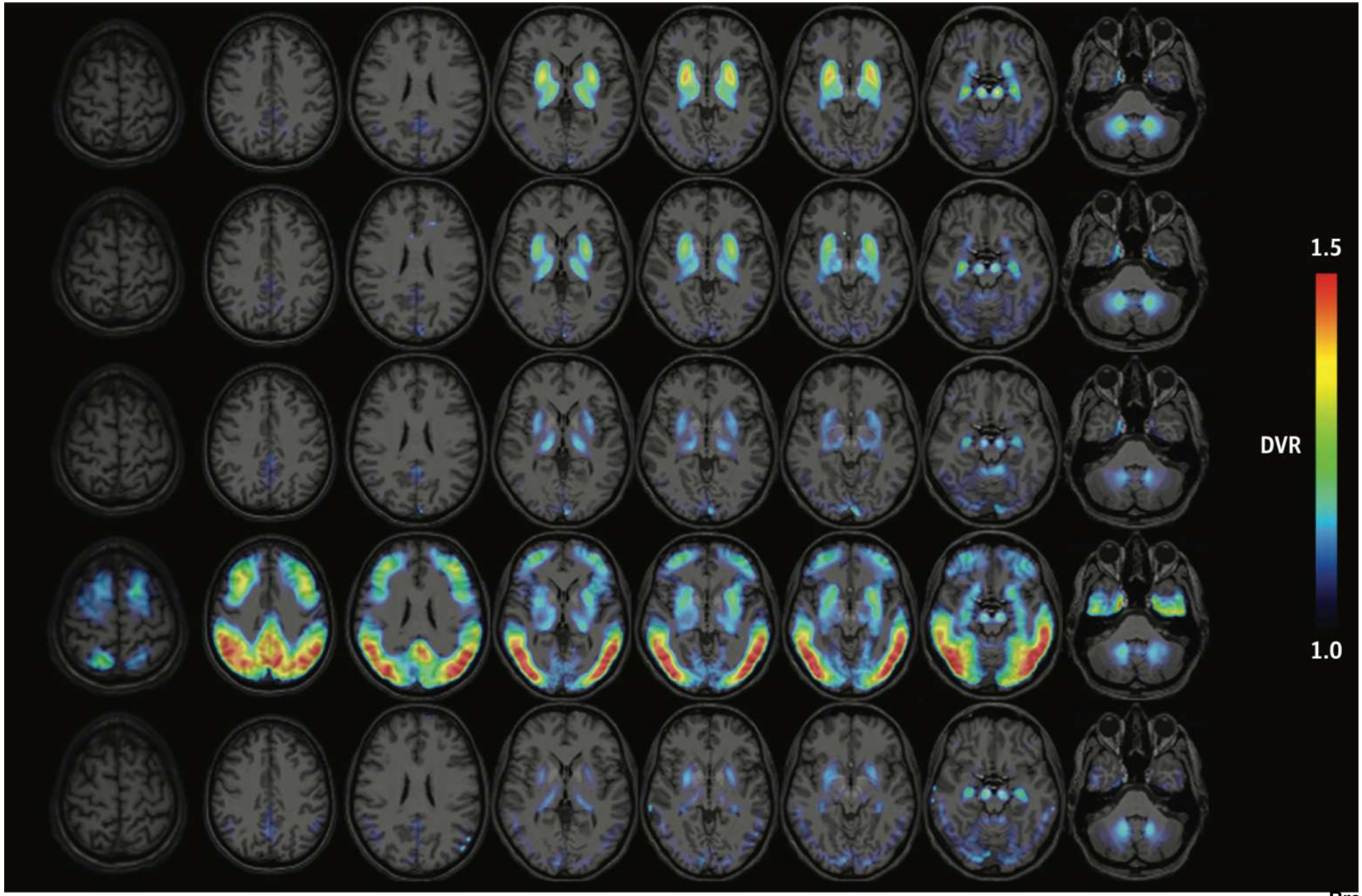
Alpha-synuclein marker: example of [18F]ACI-12589



SUVR = standardized uptake value ratio

Smith, R. et al. The α-synuclein PET tracer [18F] ACI-12589 distinguishes multiple system atrophy from other neurodegenerative diseases. Nat Commun 14, 6750 (2023)

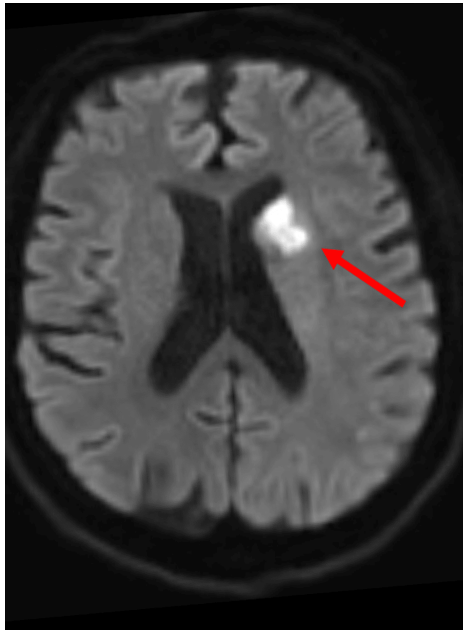
Tau marker: example of [18F]-PI 2620

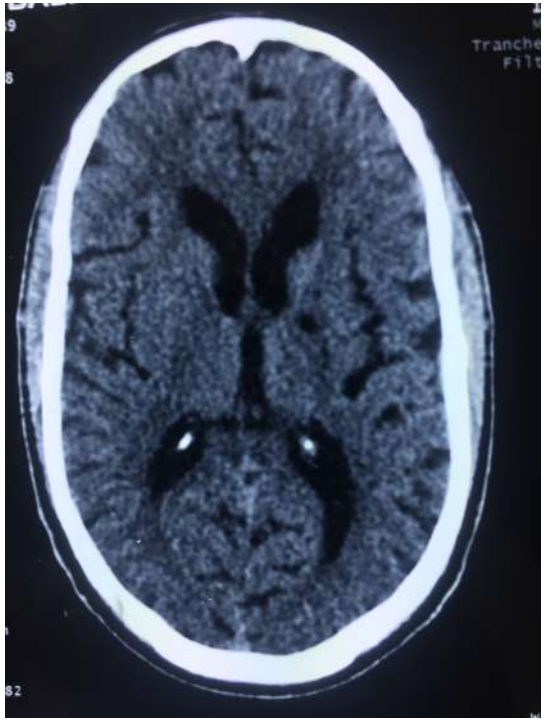


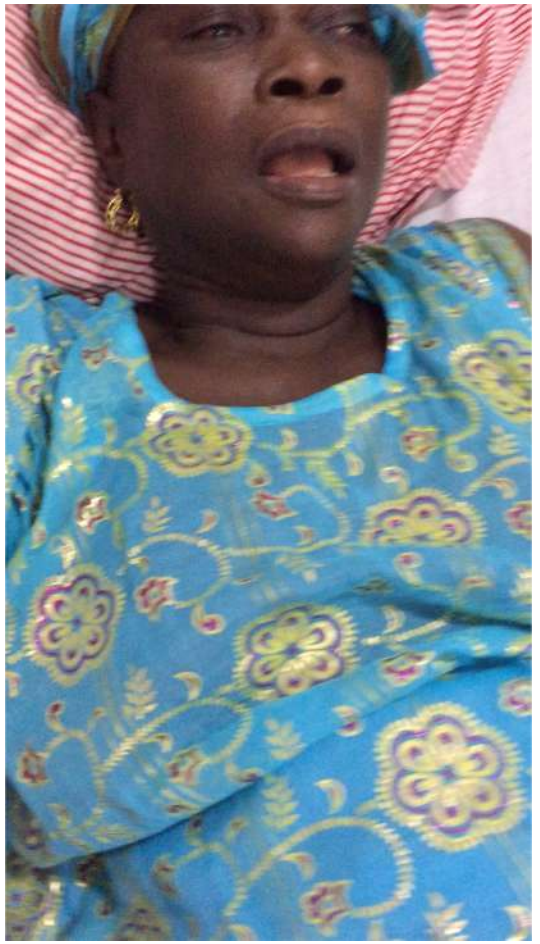
Brendel et al (2020)

Some hyperkinetic movement disorders ...

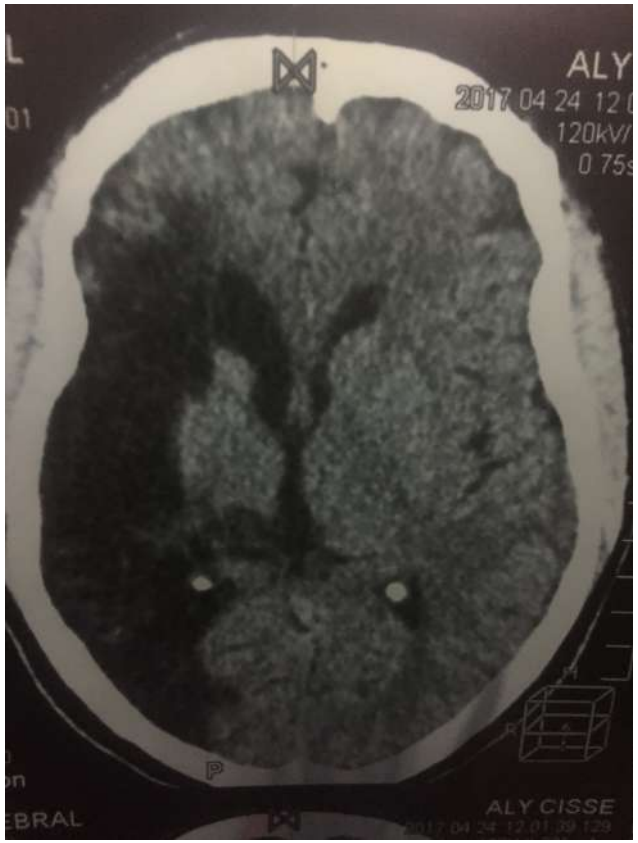
Stroke



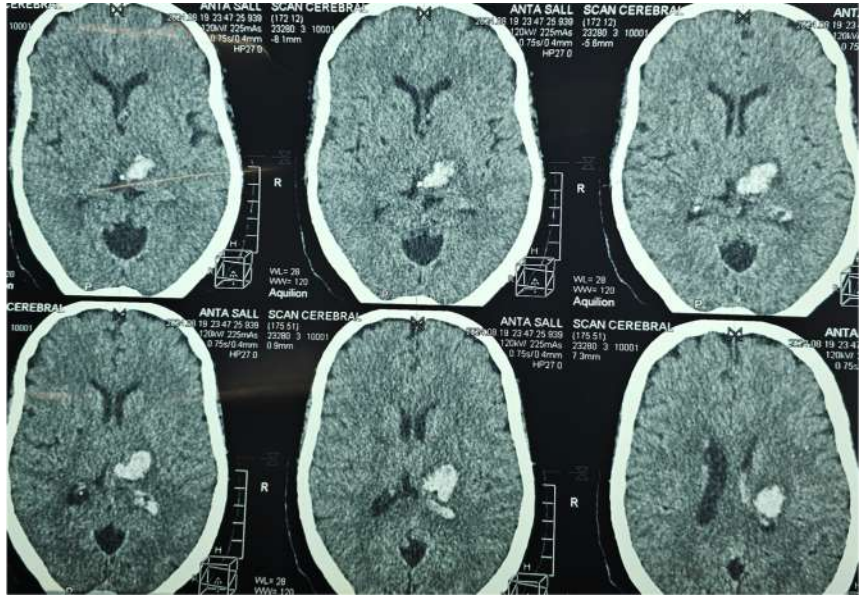




Stroke

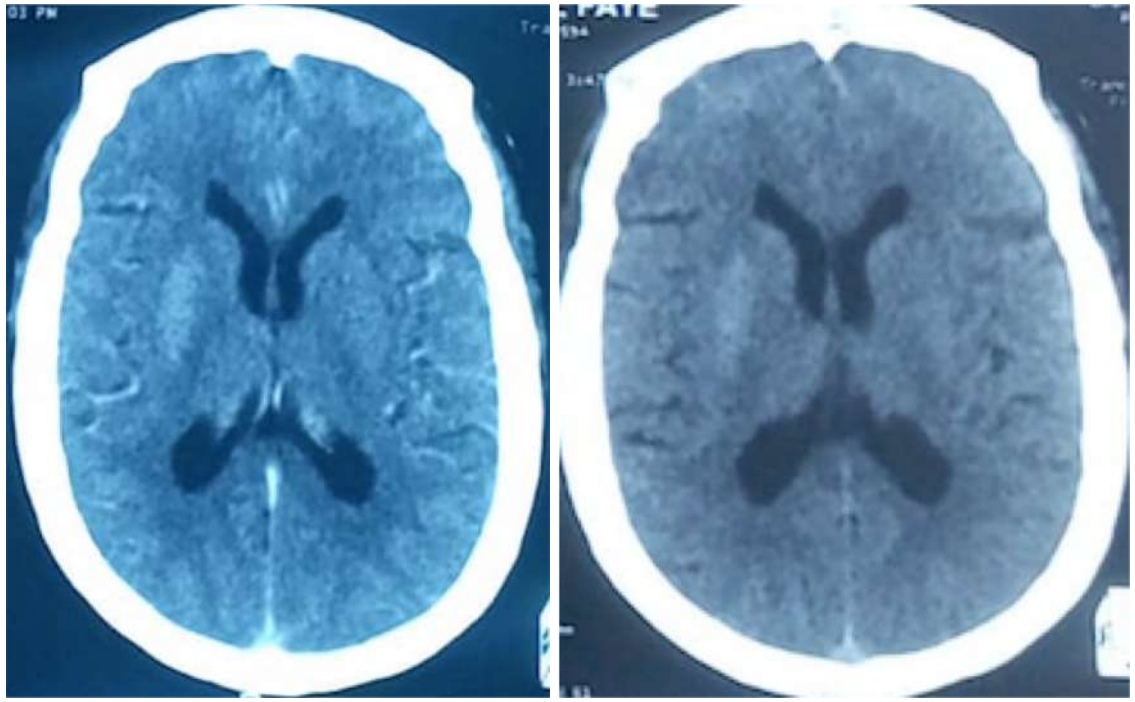


Stroke



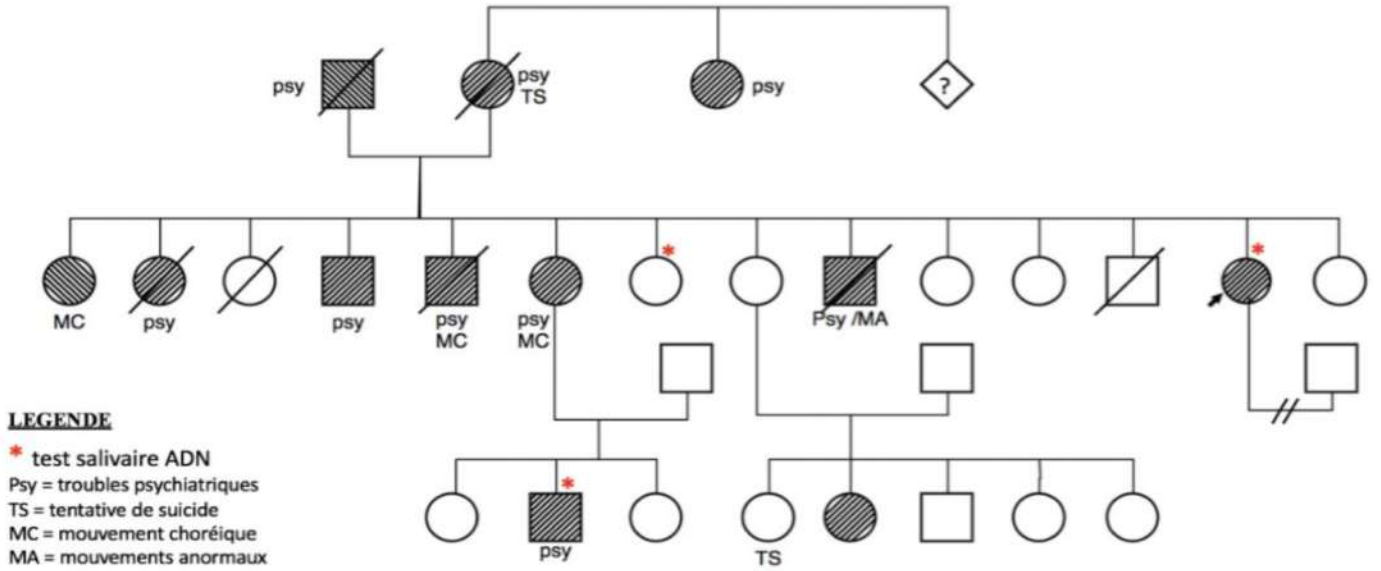
Some hyperkinetic movement disorders ...

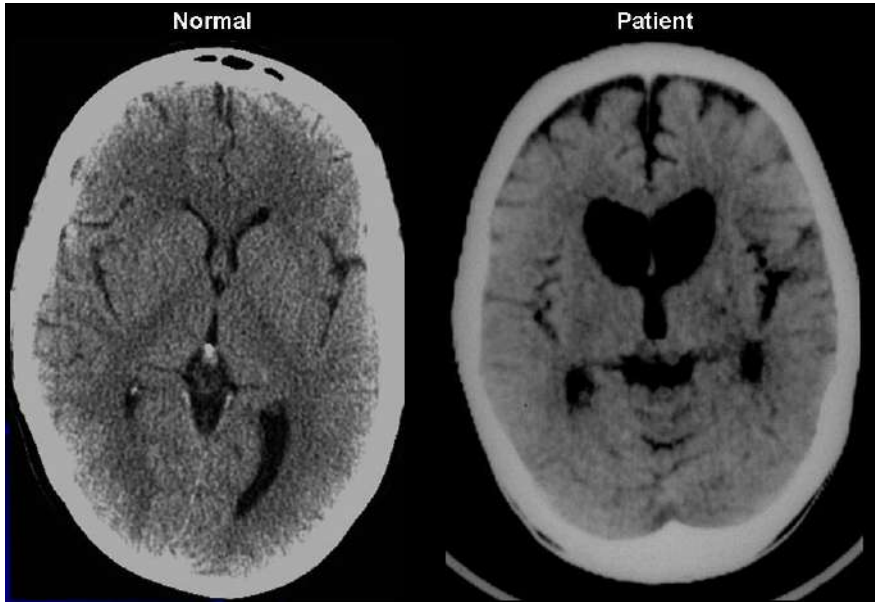
Hyperglycemia without ketones

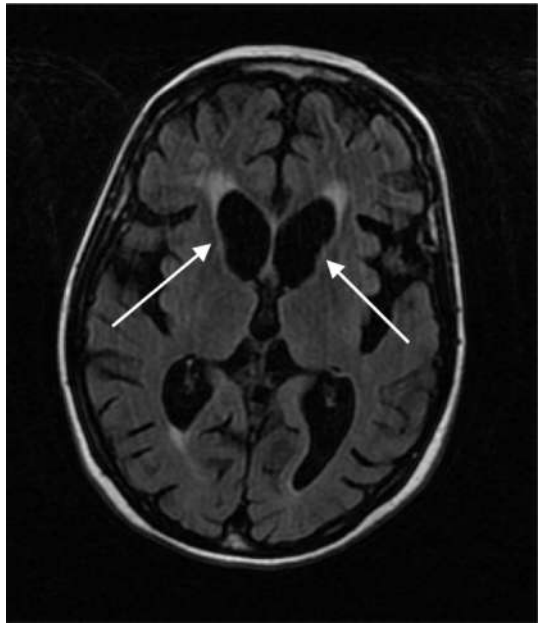


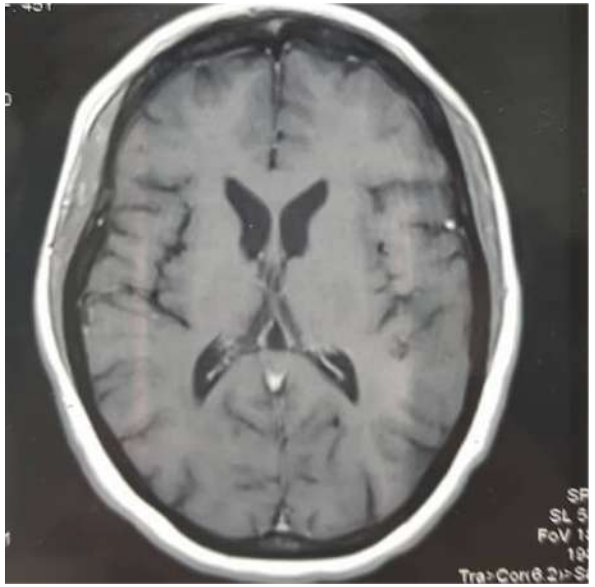
Some hyperkinetic movement disorders ...

Huntington



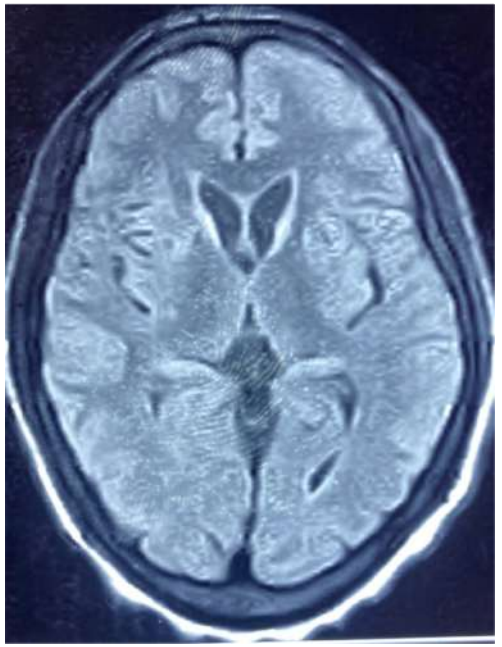


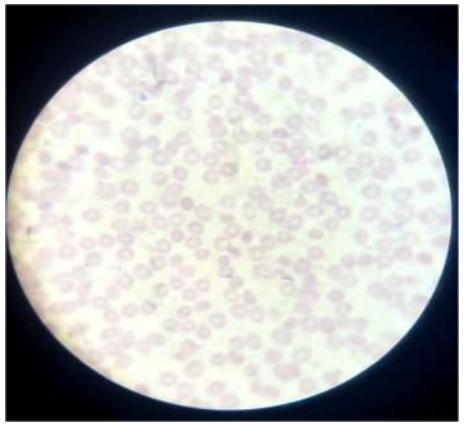


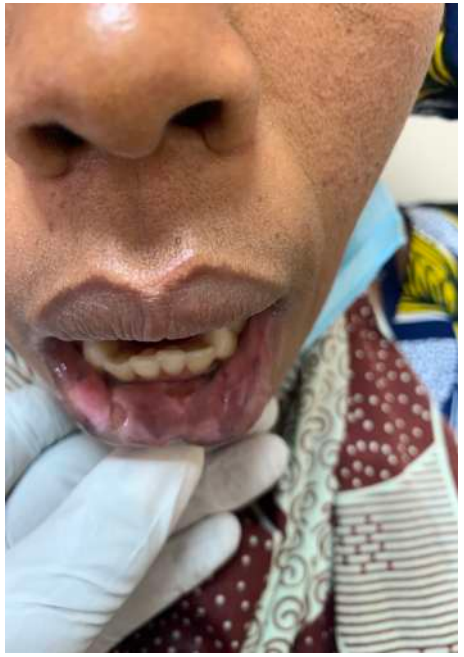


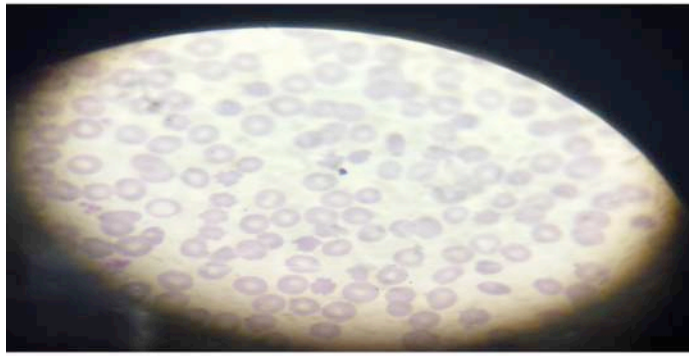
Some hyperkinetic movement disorders ...

chorea
acanthocytosis



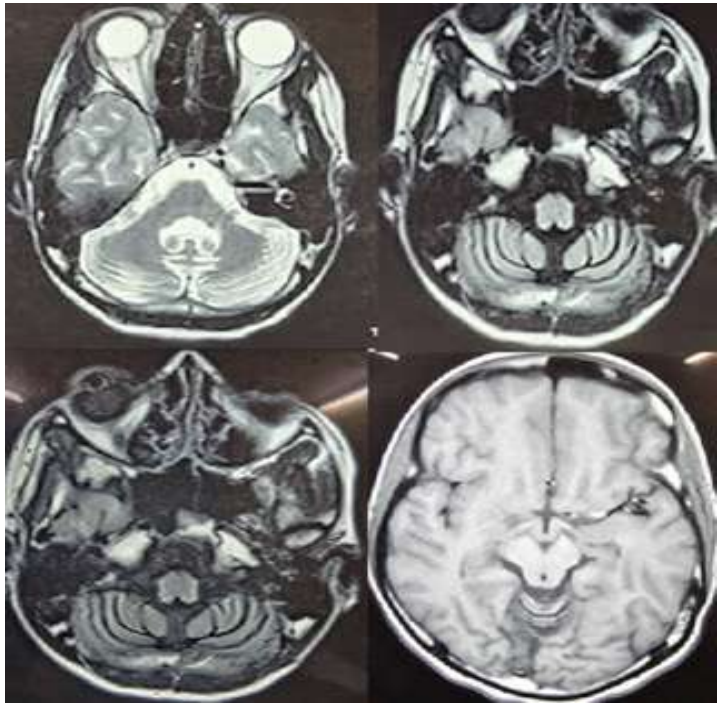


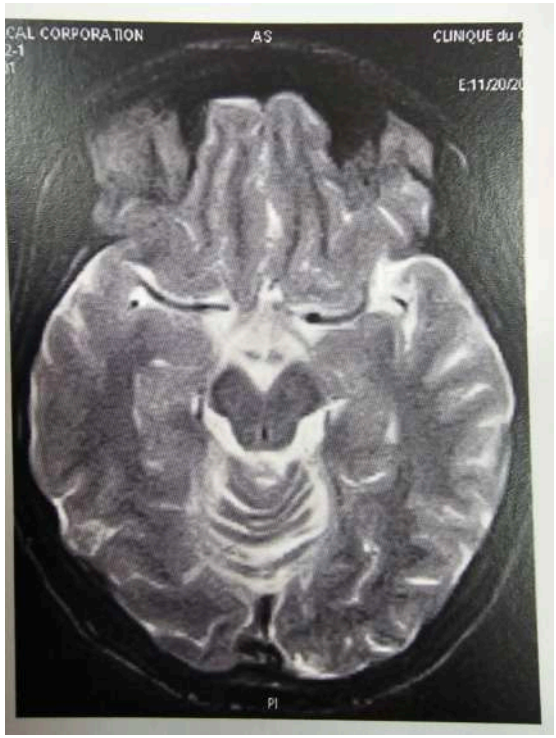




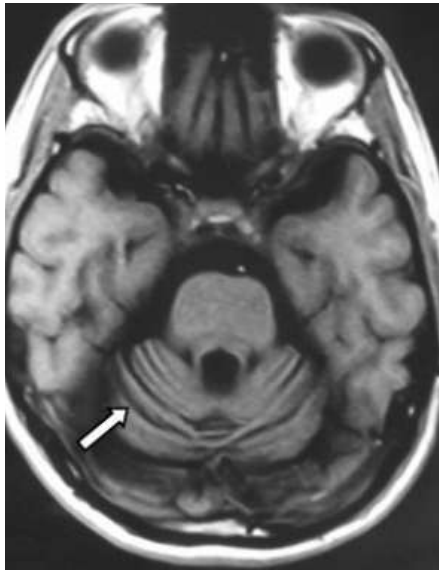
Some hyperkinetic movement disorders ...

SCA7





SCA17
DRPLA



SCA2

Movement Disorder	Key Brain Area Affected	Typical Neuroimaging Findings	Imaging Modality
Parkinson's disease	Substantia nigra, basal ganglia	Reduced **dopamine transporter uptake in striatum**	DaTscan / Single Photon Emission Computed Tomography
Multiple System Atrophy	Putamen, cerebellum, pons	**Hot cross bun sign** in pons; **putaminal atrophy**	Magnetic Resonance Imaging
Progressive Supranuclear Palsy	Midbrain	**Hummingbird (penguin) sign** due to **midbrain atrophy**	Magnetic Resonance Imaging
Huntington's disease	Caudate nucleus	**Caudate atrophy** → enlarged frontal horns of lateral ventricles	Magnetic Resonance Imaging / Computed Tomography
Wilson's disease	Basal ganglia, midbrain	**Face of the giant panda sign** in midbrain	Magnetic Resonance Imaging
Corticobasal Degeneration	Cortex and basal ganglia	**Asymmetric cortical atrophy** (parietal/frontal)	Magnetic Resonance Imaging
Essential tremor **Ataxia**	Cerebellum	**Usually normal (ET)**; sometimes cerebellar changes on functional studies (**Atrophy in ataxia**)	Positron Emission Tomography

Merci
de
votre attention