Klinikum rechts der Isar
Neurologische Klinik und Poliklinik

Technische Universität München

XXIV World Congress of Neurology, Dubai

Imaging in Parkinson´s disease

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Disclosures

None

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Learning objectives

1. Choose **adequate imaging modalities** for each question.

2. Identify **characteristic imaging findings** in parkinsonian syndromes.

3. Recognize structural abnormalities that can cause **secondary parkinsonism**.

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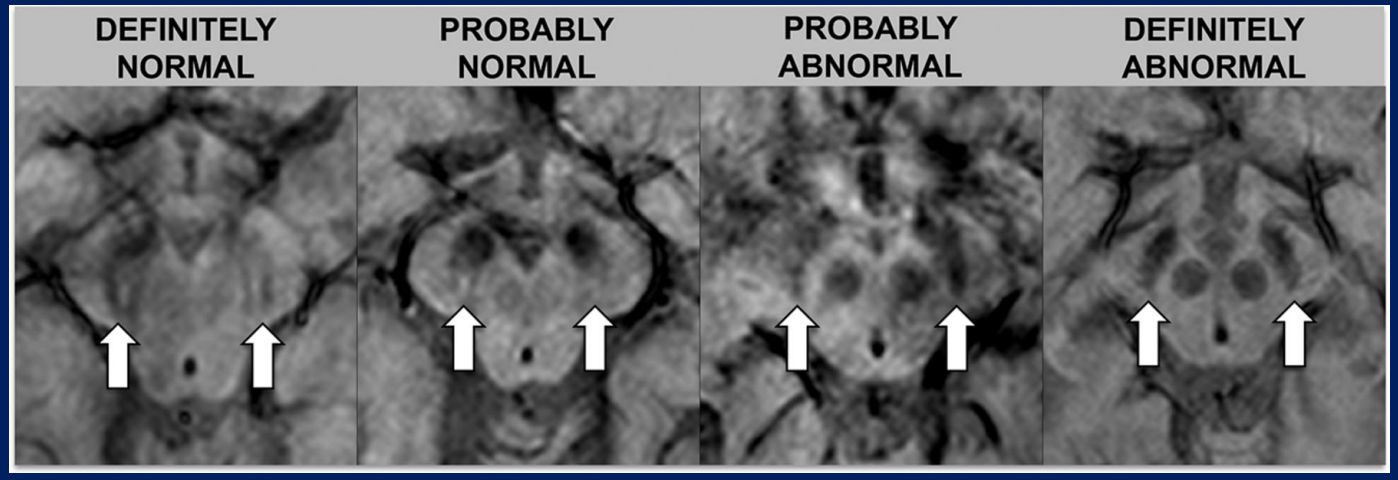
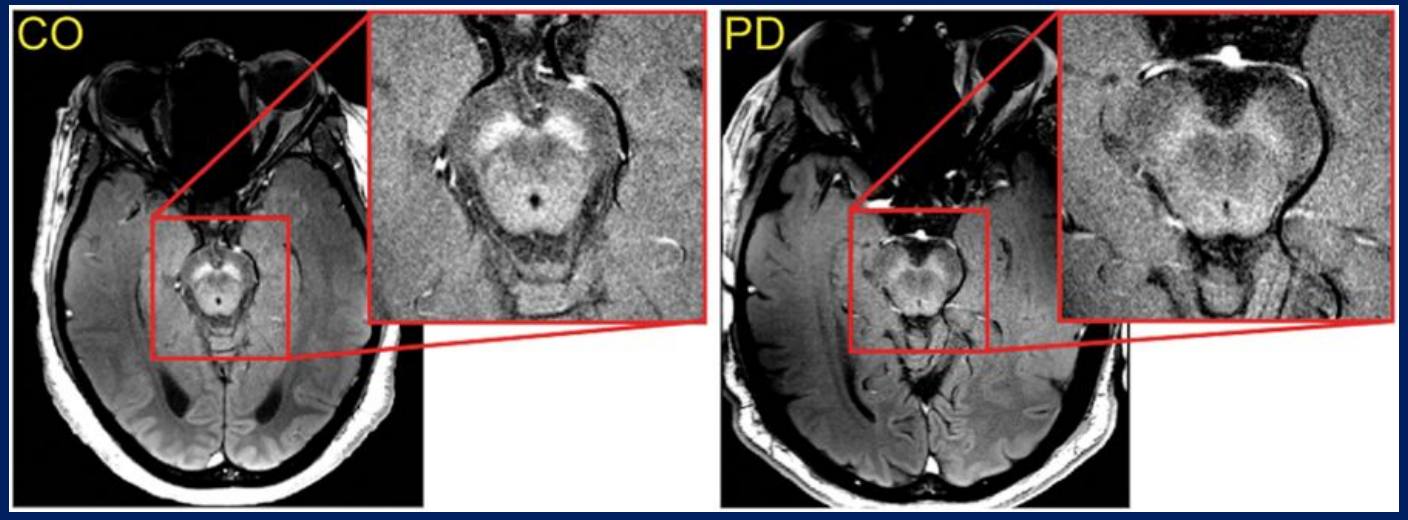
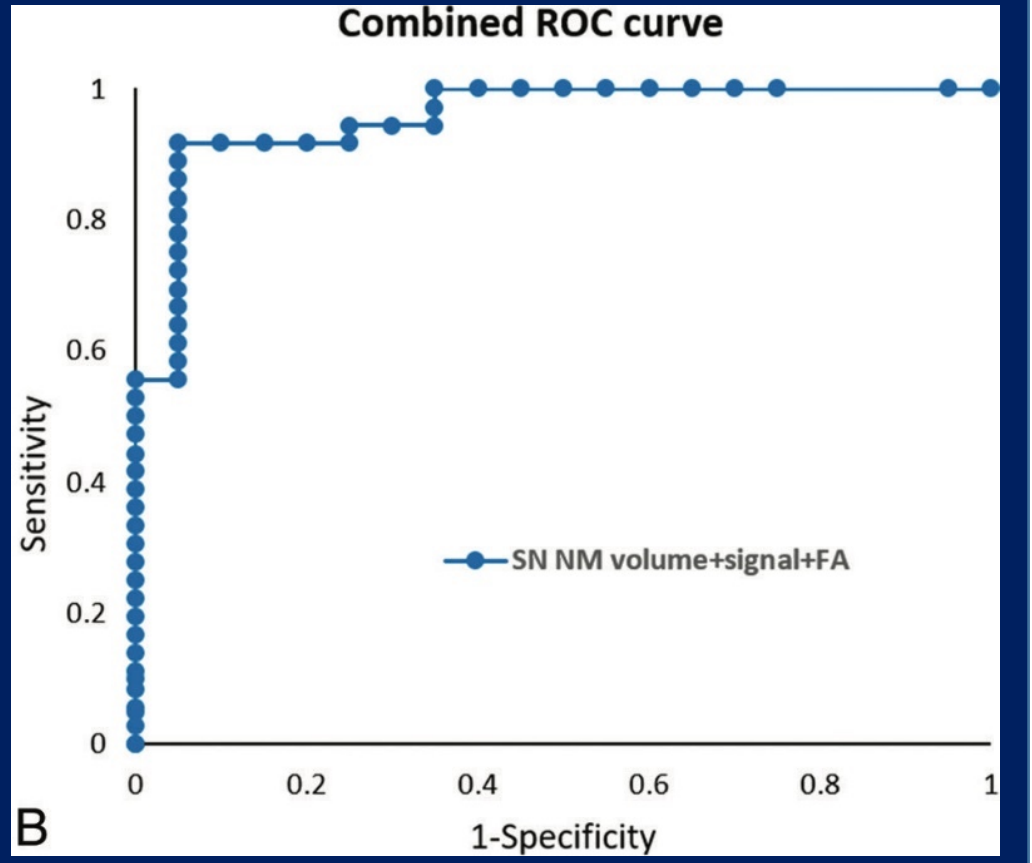
MRI biomarkers for idiopathic PD



Swallow tail sign: Shams et al. AJNR 2017



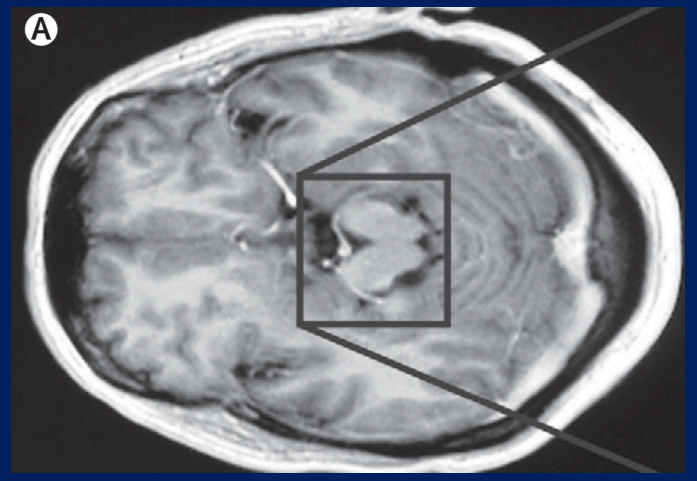
Neuromelanin detection: Sulzer et al. npj Parkinson‘s disease 2018



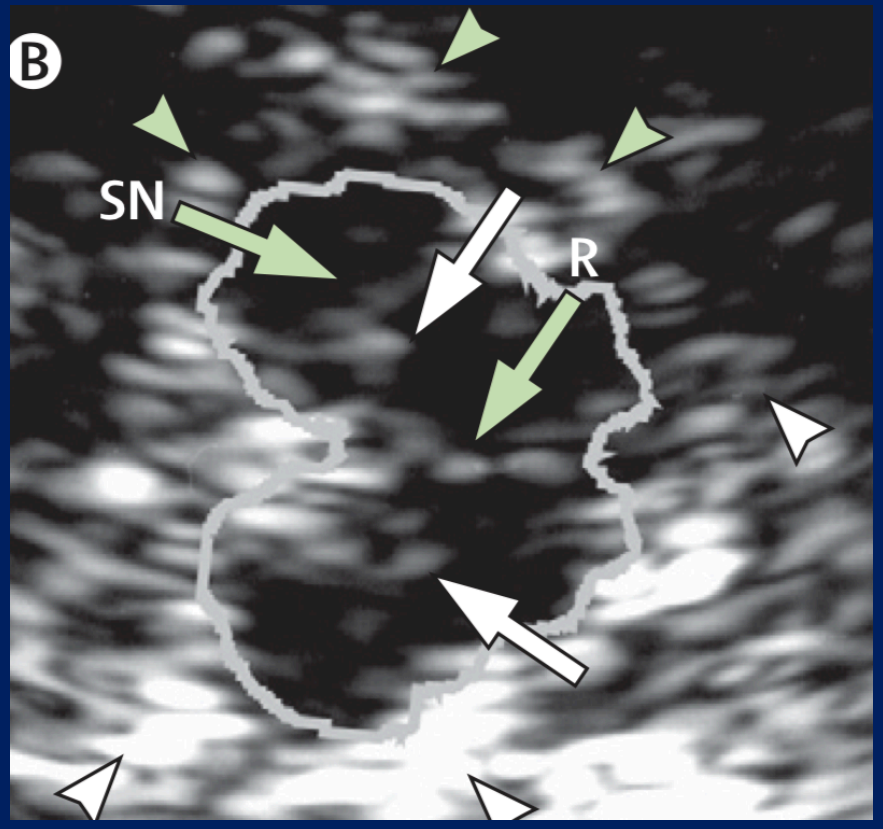
3T NM volume, 3T NM signal intensity ratio and 3T NM Fractional anisotropy for differentiating PD from HC

Pyatigorskaya et al. AJNR 2018

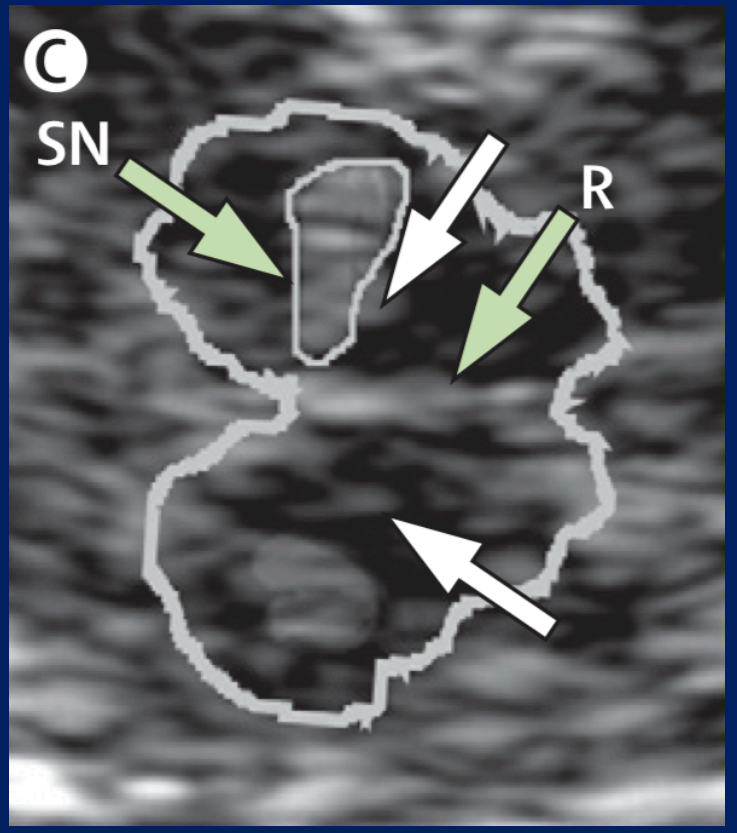
Transcranial sonography in idiopathic PD



Healthy volunteer :
Normal SN echogenicity



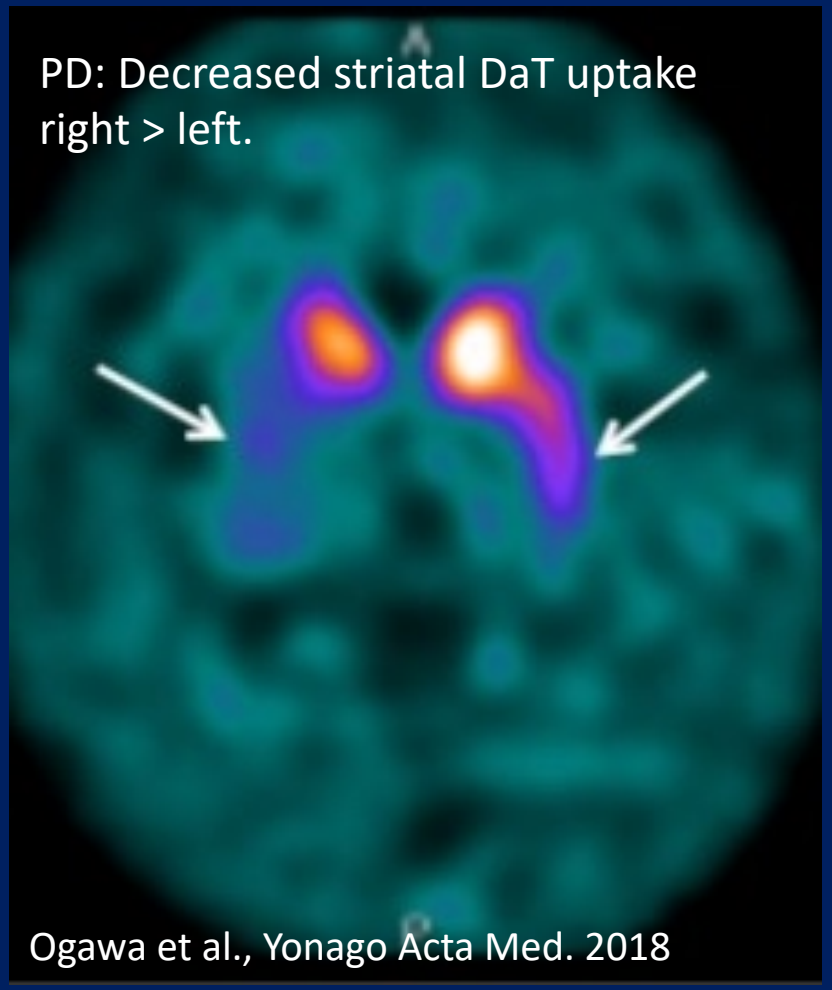
PD:
SN hyperechogenicity

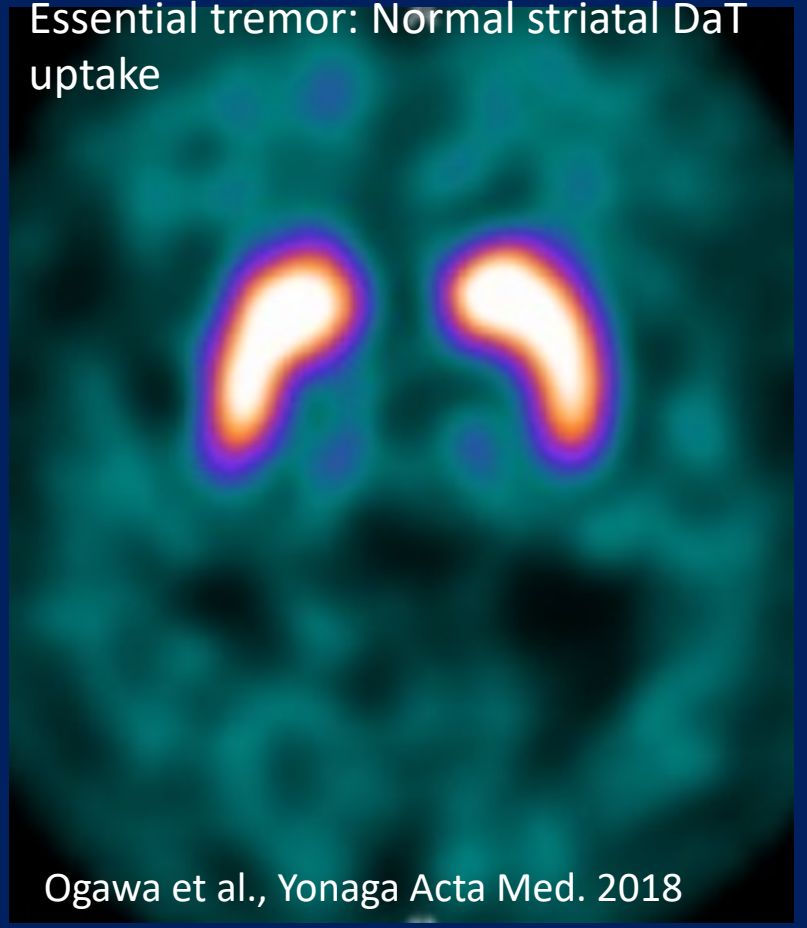


Berg, Godau, Walter. Lancet Neurol. 2008

Functional imaging biomarkers for idiopathic PD

^{123}I-FP-CIT dopamine transporter SPECT





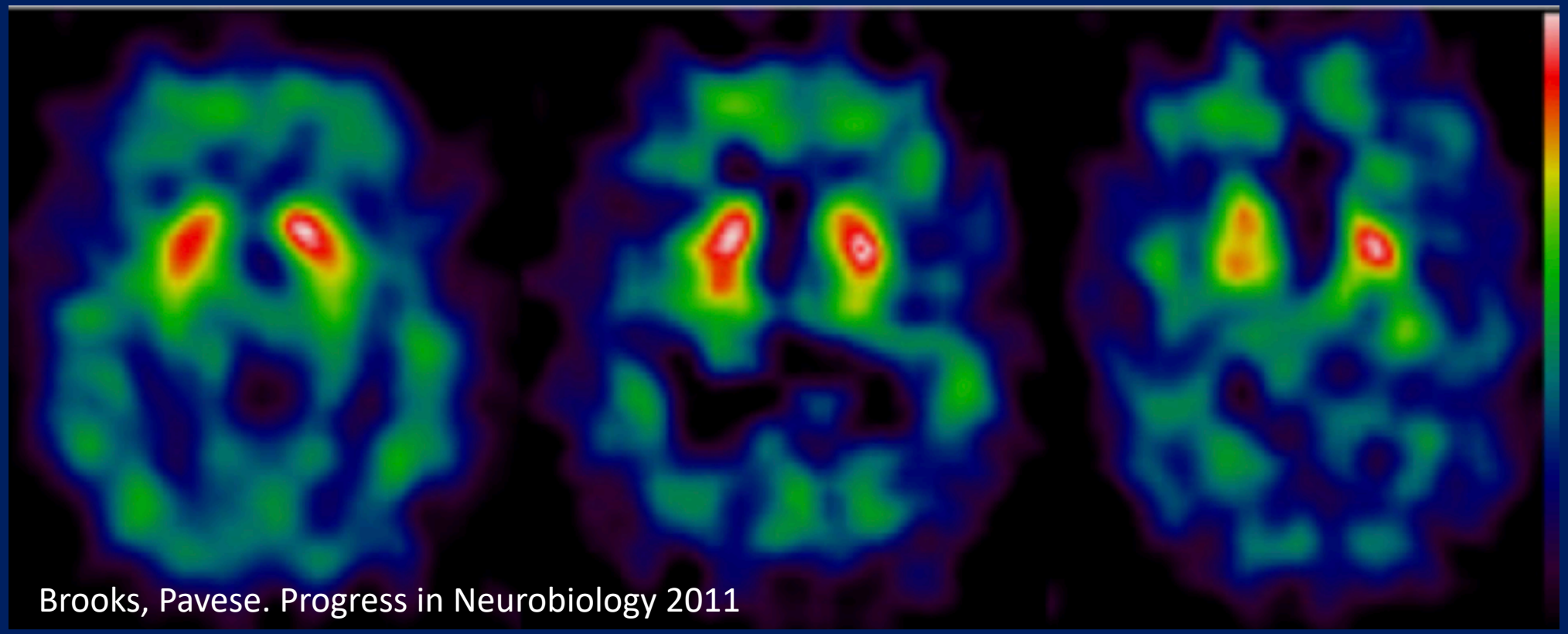
Functional imaging biomarkers for idiopathic PD

^{123}I-IBZM dopamine receptor SPECT

HC:
Normal striatal IBZM uptake

PD:
Normal striatal IBZM uptake

MSA:
Decreased striatal IBZM uptake



Brooks, Pavese. Progress in Neurobiology 2011

Functional imaging biomarkers for idiopathic PD

^{123}I-metaiodobenzylguanidine myocardial scintigraphy

PD:
Myocardial MIBG uptake markedly decreased.

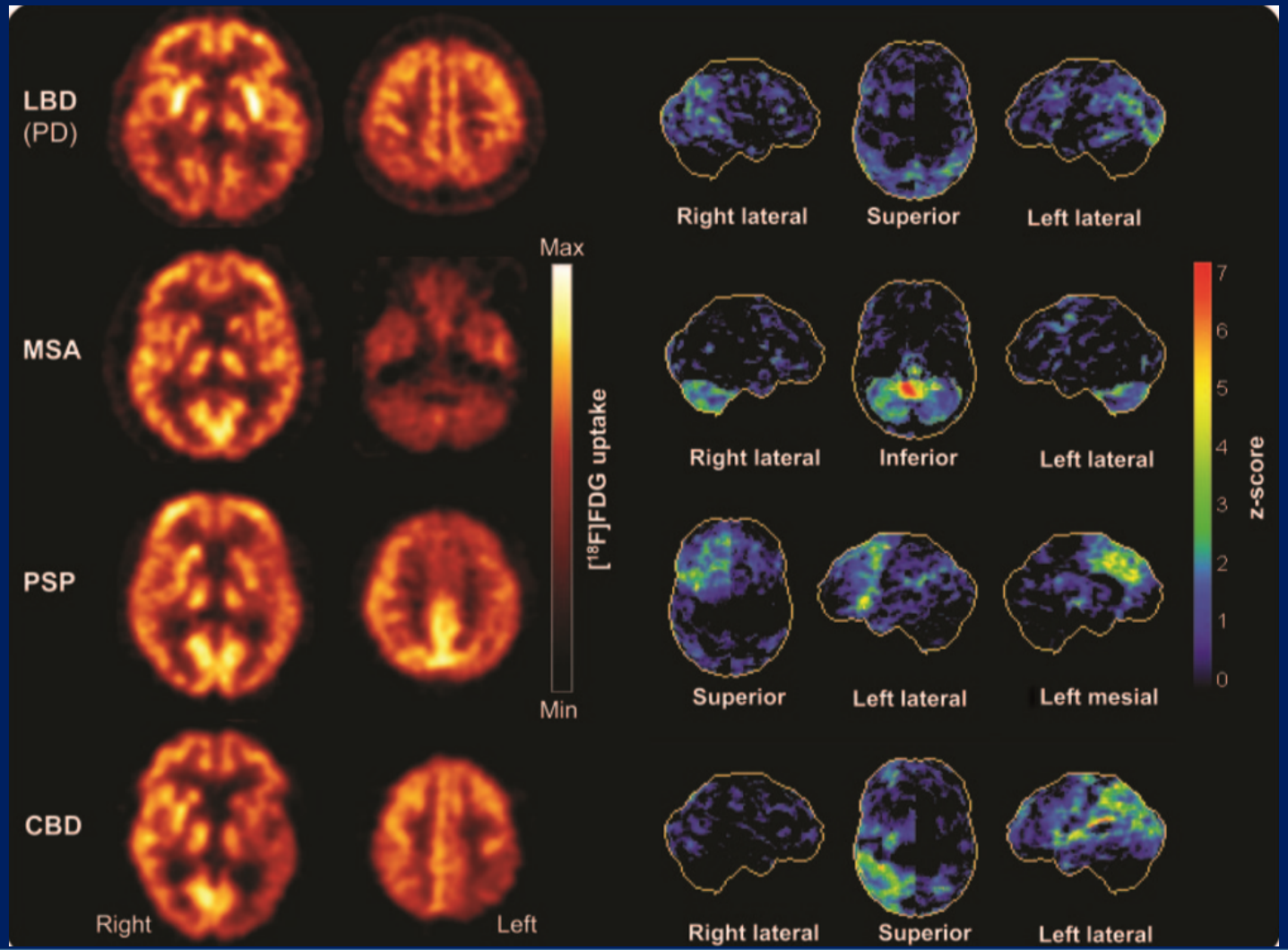
Ogawa et al., Yonago Acta Med. 2018

MSA and PSP:
Normal myocardial MIBG uptake.

Ogawa et al., Yonago Acta Med. 2018

Functional imaging biomarkers for idiopathic PD

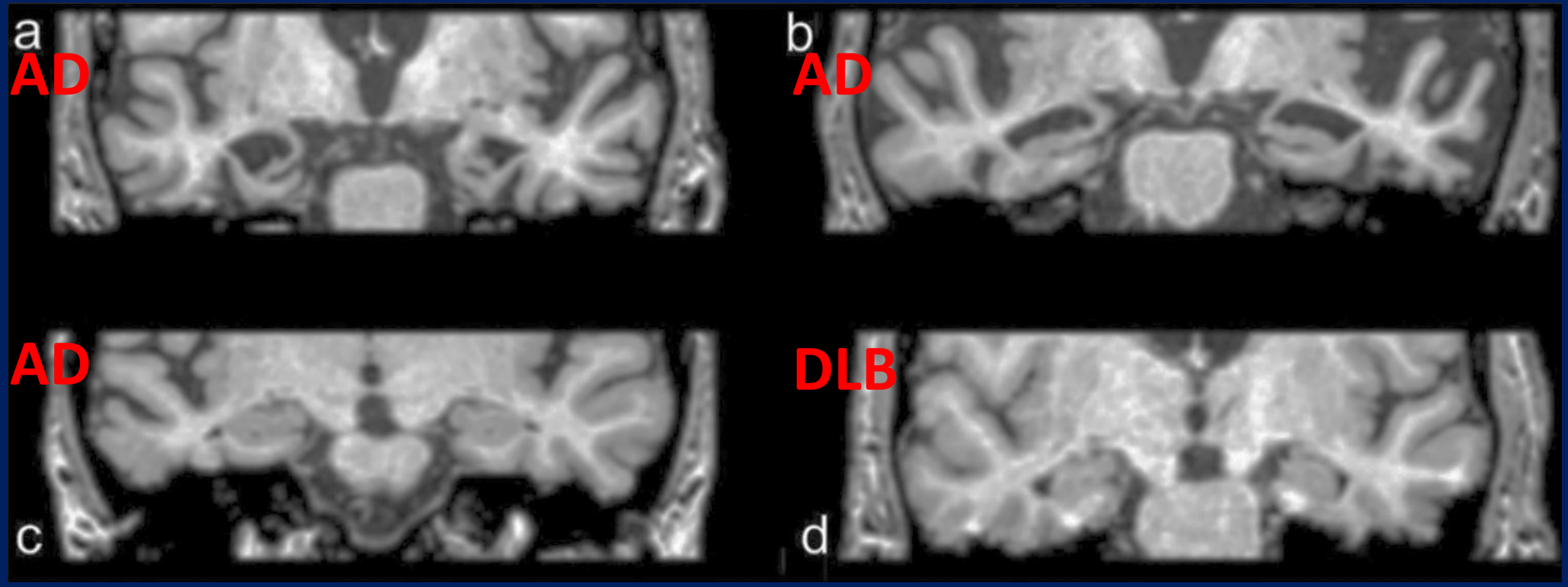
[^{18}F]fluorodeoxyglucose (FDG)-PET



Hellwig et al., Neurology. 2012

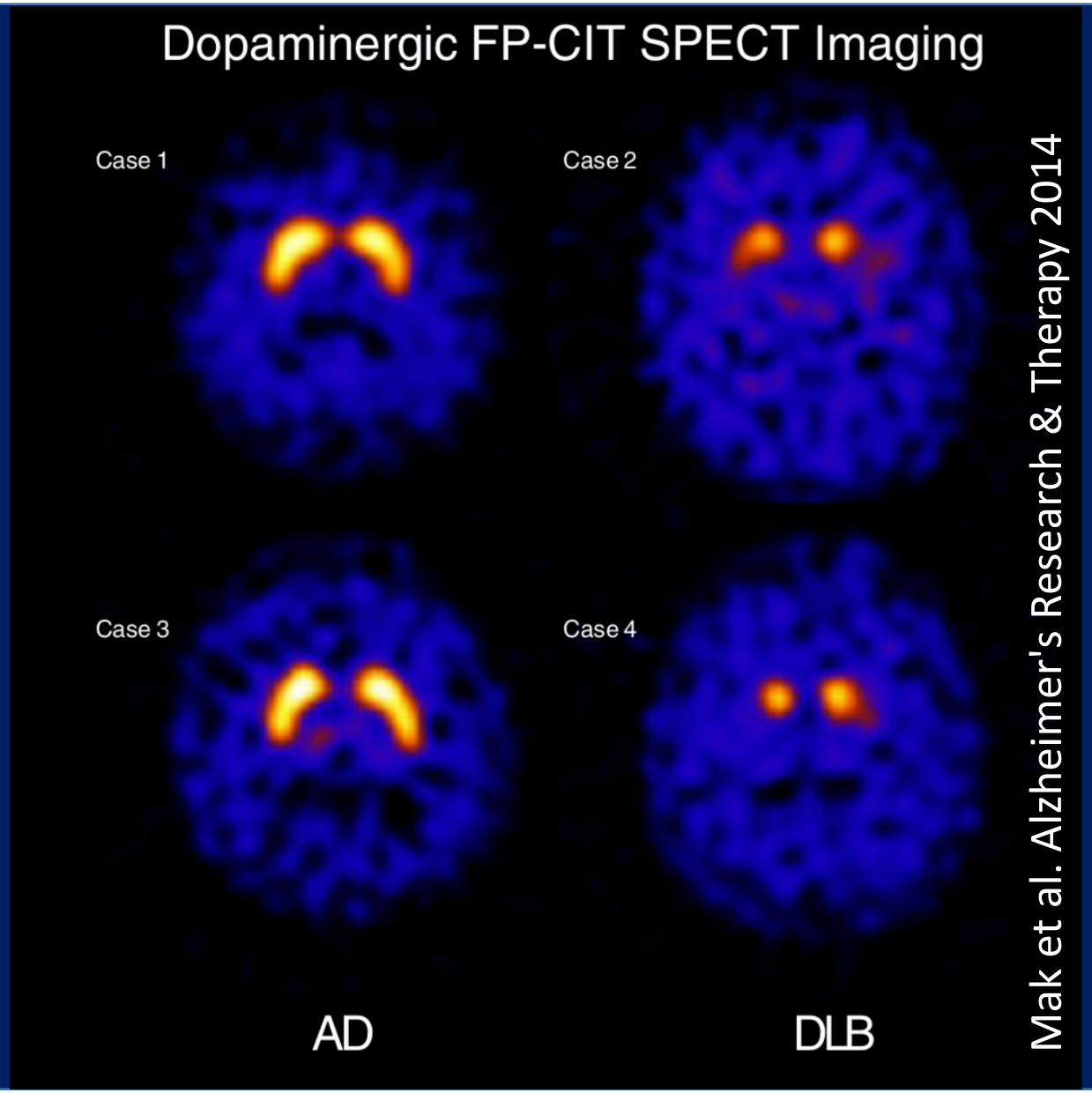
MRI biomarkers for Dementia Lewy Bodies (DLB)

Relative preservation of hippocampi possibly differentiating to AD



Mak et al. Alzheimer's Research & Therapy 2014

Functional imaging in Dementia Lewy Bodies (DLB)

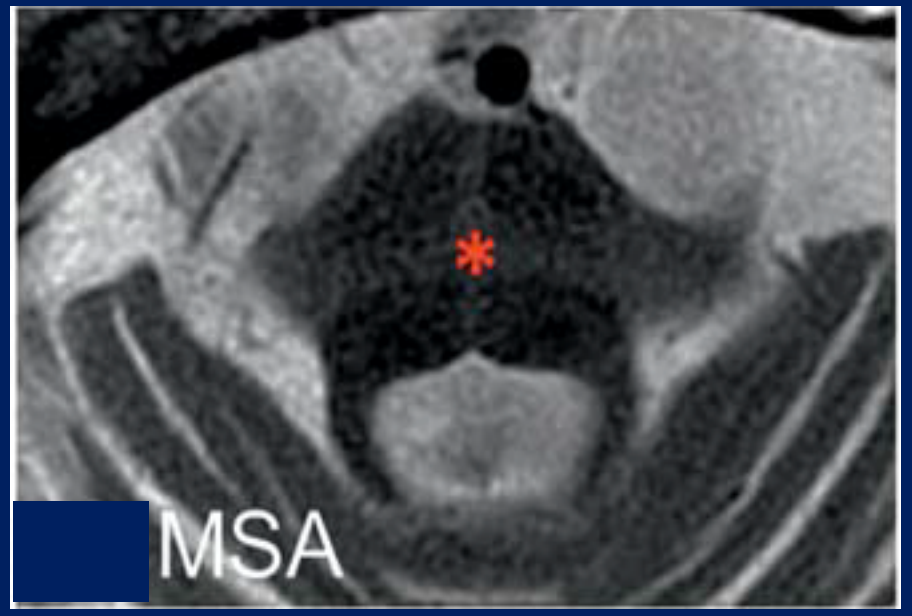


FP-CIT with reduced striatal signal differentiating DLB from AD

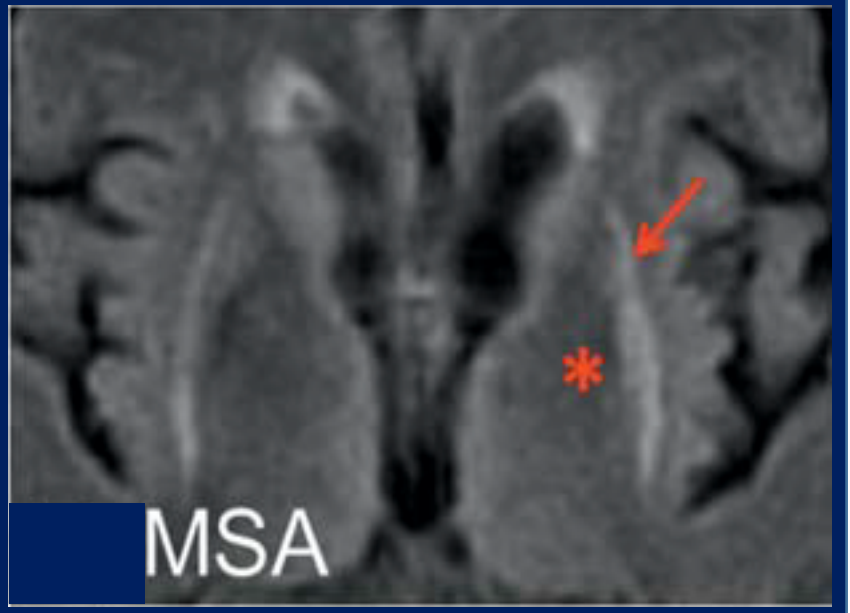
MRI biomarkers for Multiple System Atrophy (MSA)

Atrophy of pons (*) and cerebellar vermis (#)

Pons: „Hot Cross Bun Sign (*)

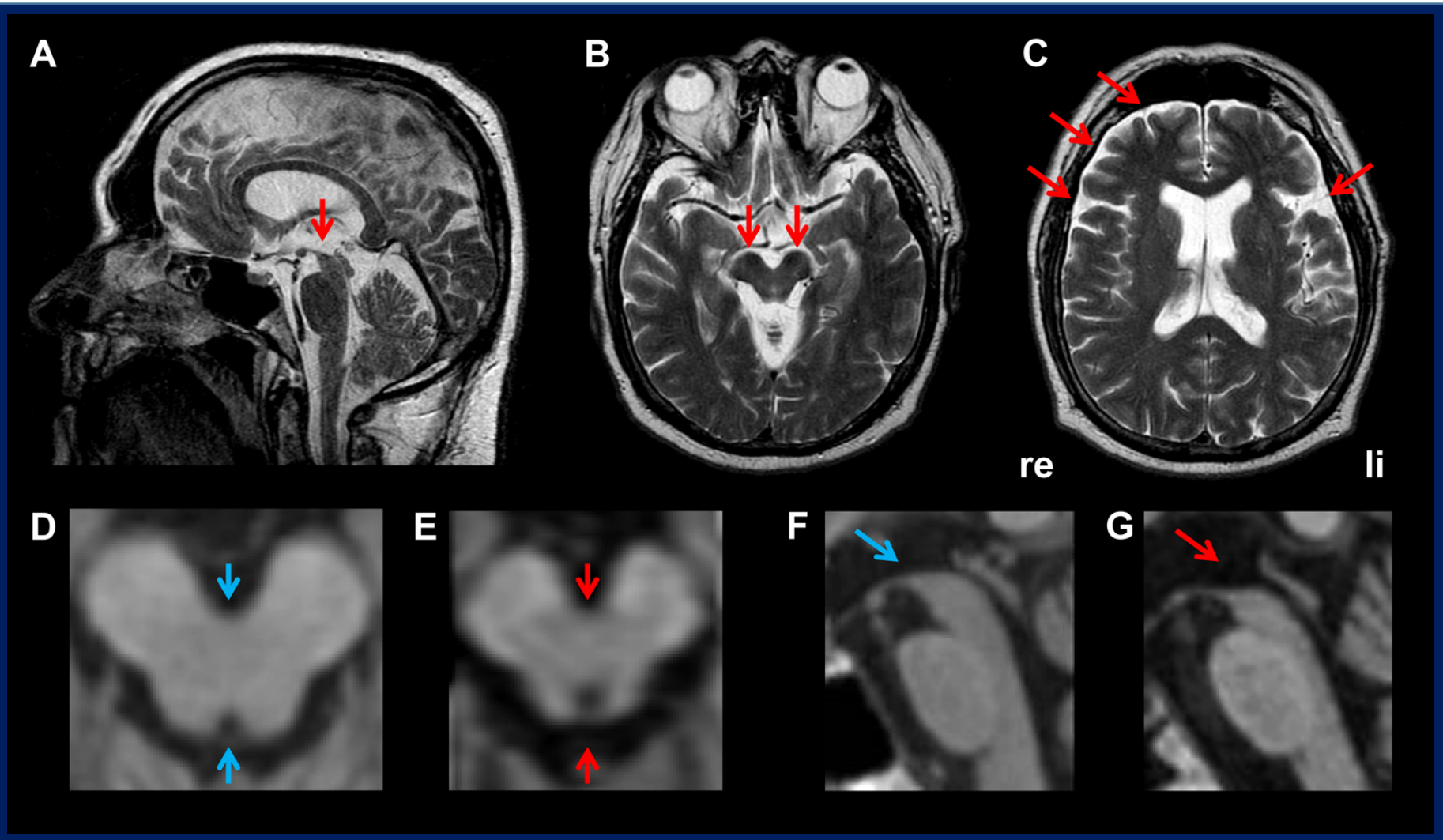


Hyperintens putaminal rim sign (*)



Levin et al., Dtsch Arztebl Int 2016

MRI biomarkers for Progressive Supranuclear Palsy



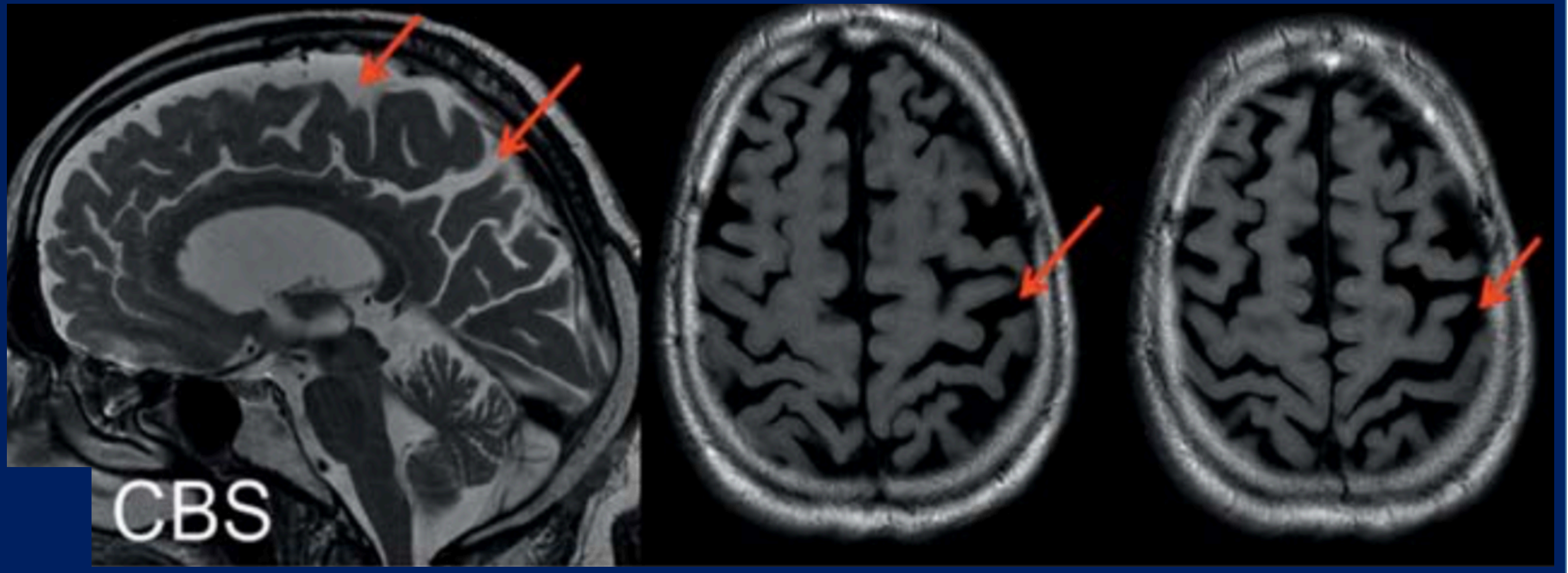
Oertel, Deuschl, Poewe. Thieme 2012.

Midbrain Atrophy a.p. < 15 mm

Mickey-Mouse Sign

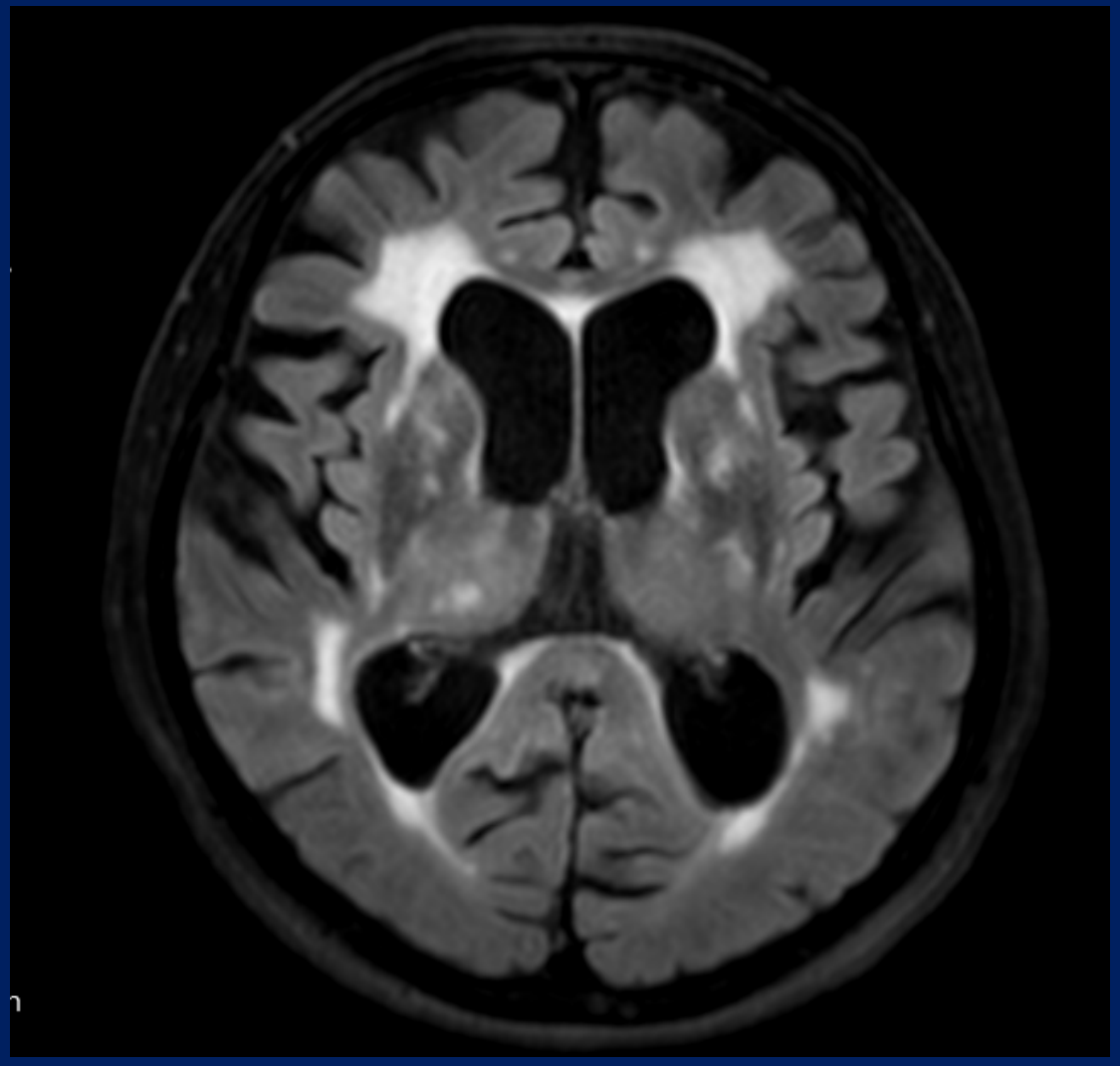
Kolibri/Pinguine Sign

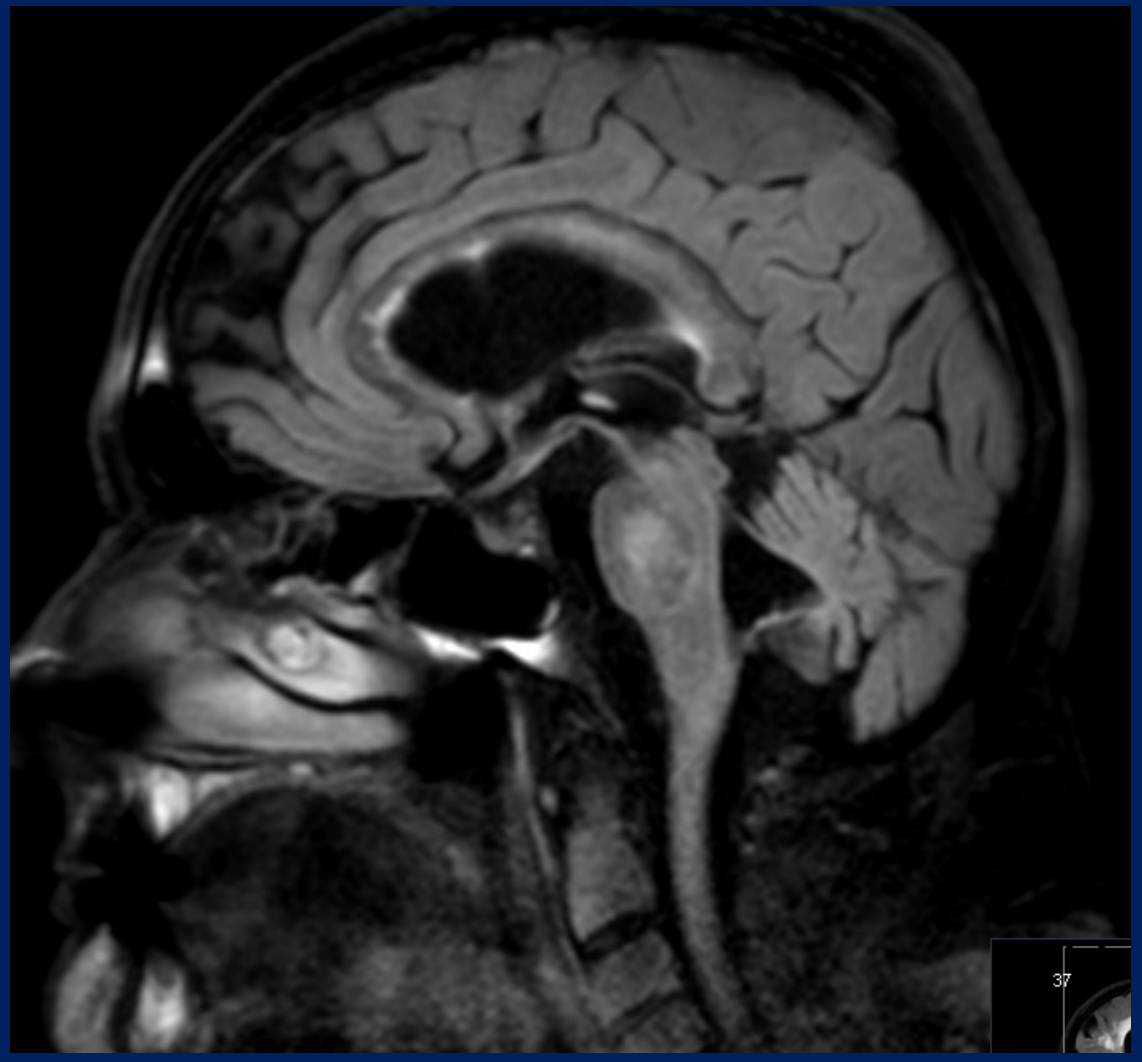
MRI biomarkers for Corticobasal Degeneration (CBD)



Levin et al., Dtsch Arztebl Int 2016

Vascular ("multi-infarct") parkinsonism





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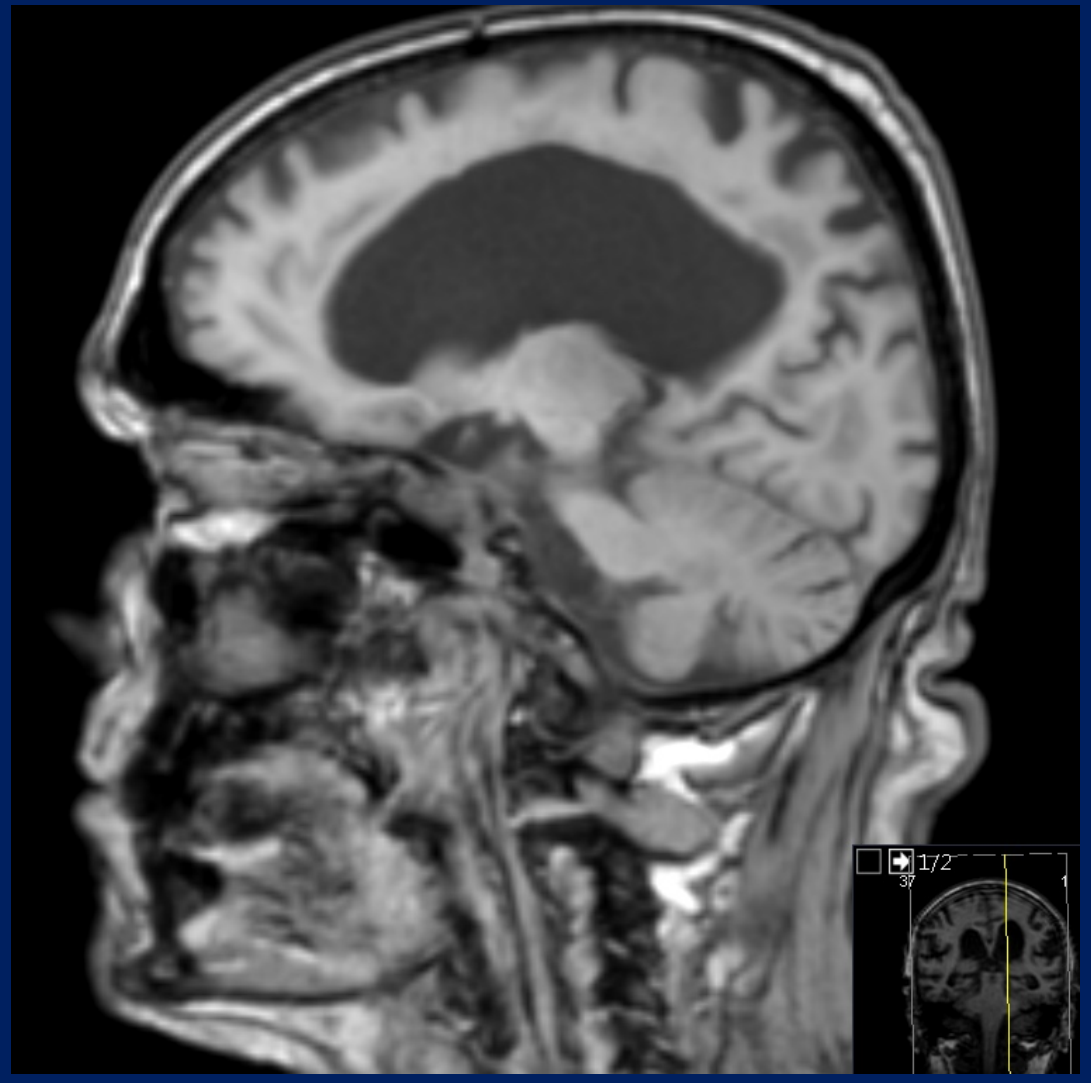
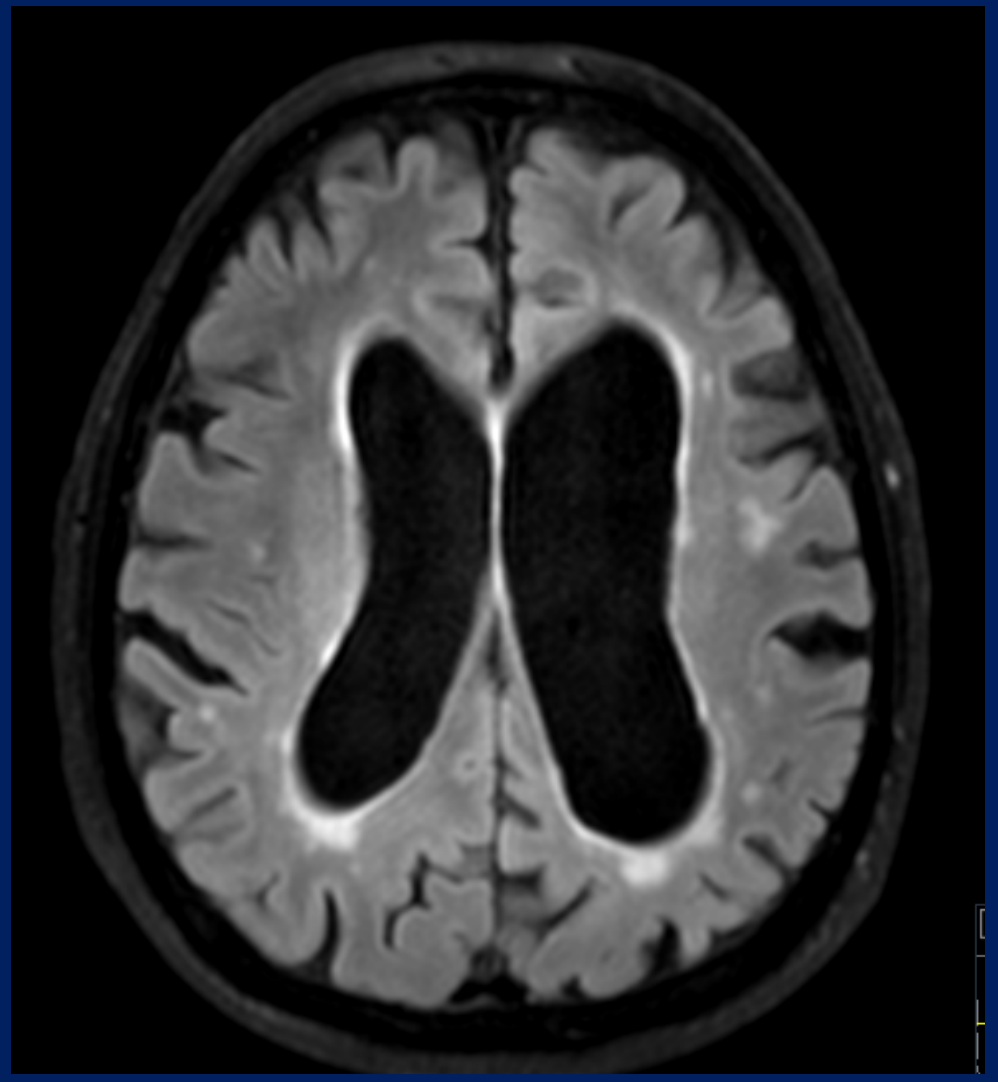
Normal pressure hydrocephalus





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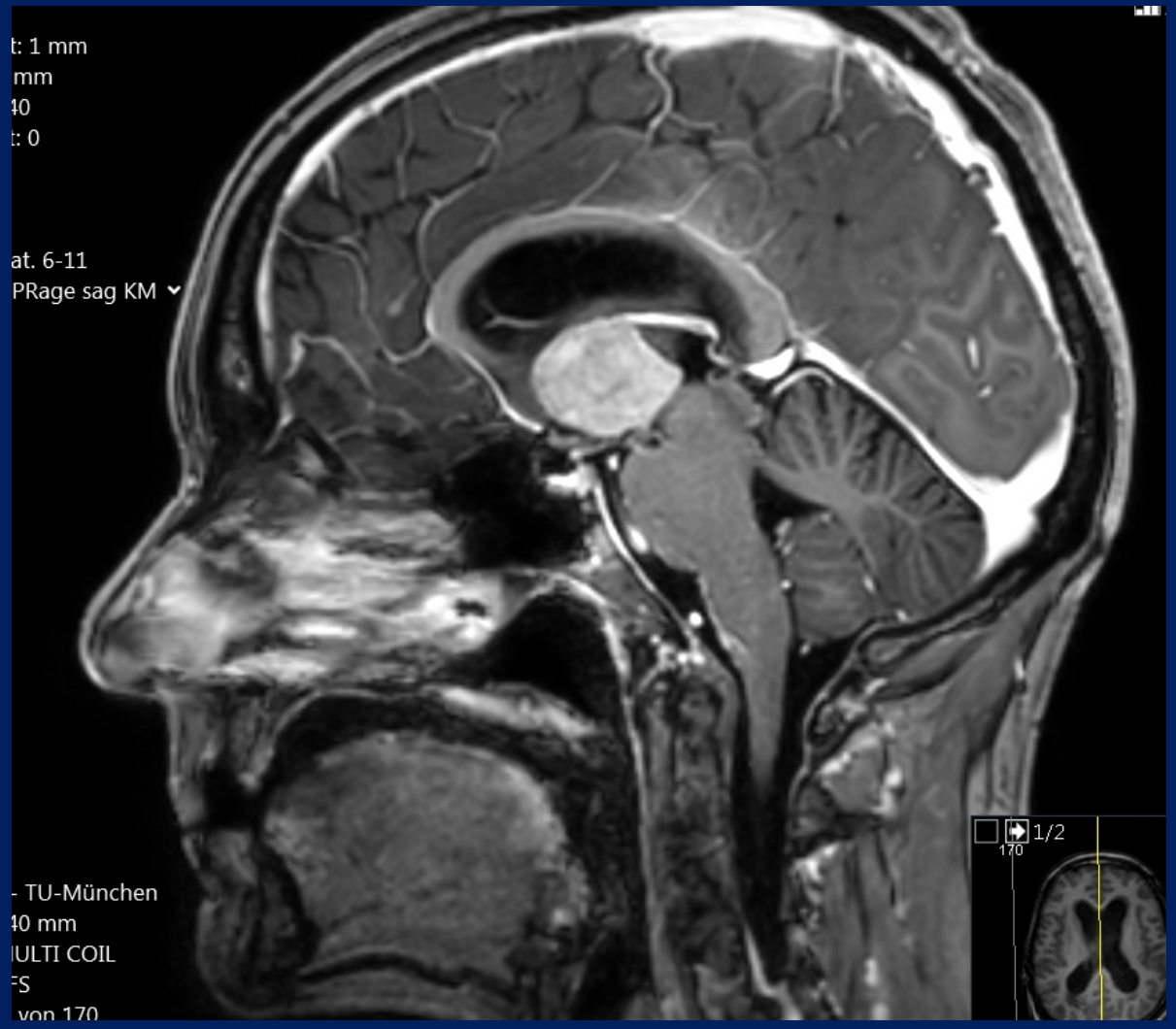
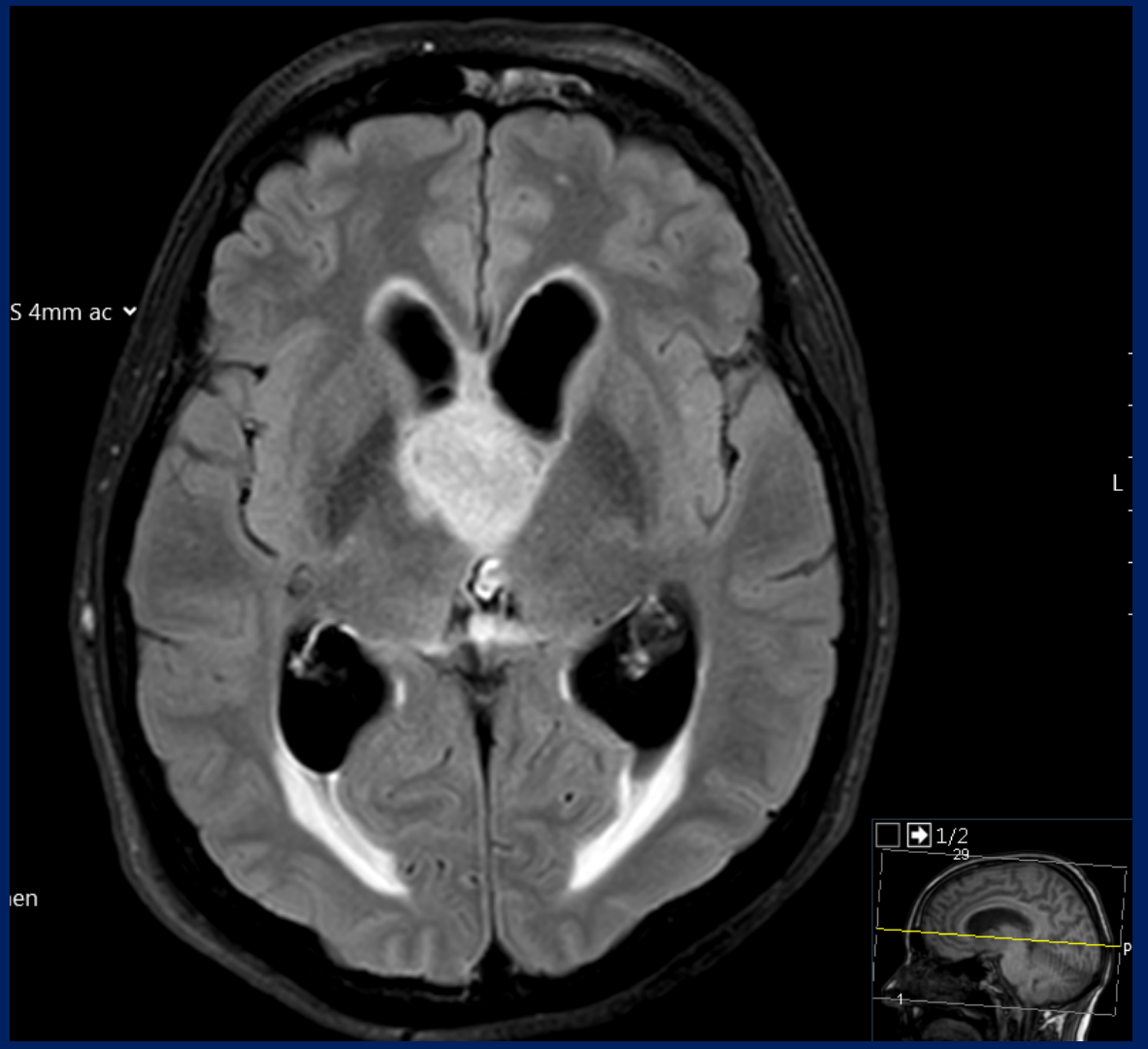
Brain metastasis of malignant melanoma





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Key messages

1. **Every patient** with parkinsonism should have an **MRI to exclude other diseases** (e.g. vascular lesions).

2. **Characteristic imaging findings** support the clinical diagnosis in parkinsonian syndromes.

3. **Future imaging markers** should project **molecular pathology.**

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References

1. Berg, Godau, and Walter, Transcranial sonography in movement disorders. Lancet Neurol. 2008;7:1044-55.
2. Hellwig et al. , [^{18}F]FDG-PET is superior to [^{123}I]IBZM-SPECT for the differential diagnosis of parkinsonism. Neurology 2012;79:2166-70.
3. Levin et al., The Differential Diagnosis and Treatment of Atypical Parkinsonism.. Dtsch Arztebl Int 2016; 113:61-9.
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9. Ogawa et al., Role of Neuroimaging on Differentiation of Parkinson's Disease and Its Related Diseases. Yonago Acta Medica 2018;61:145–155.

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MDS-PSP Study Group

Thank you!

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