F-18 Florbetaben PET Cases

May 18th, 2019

花蓮慈濟醫院核子醫學科

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Case 1

- **Clinical information –**

•57 y/o man

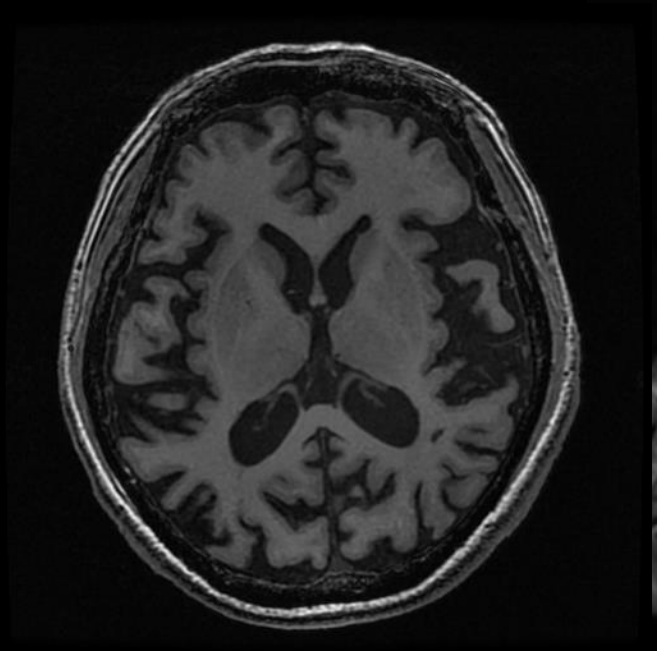
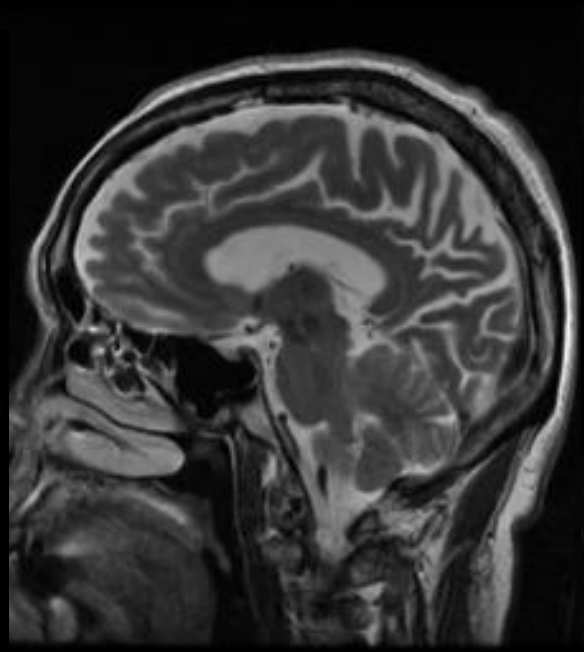
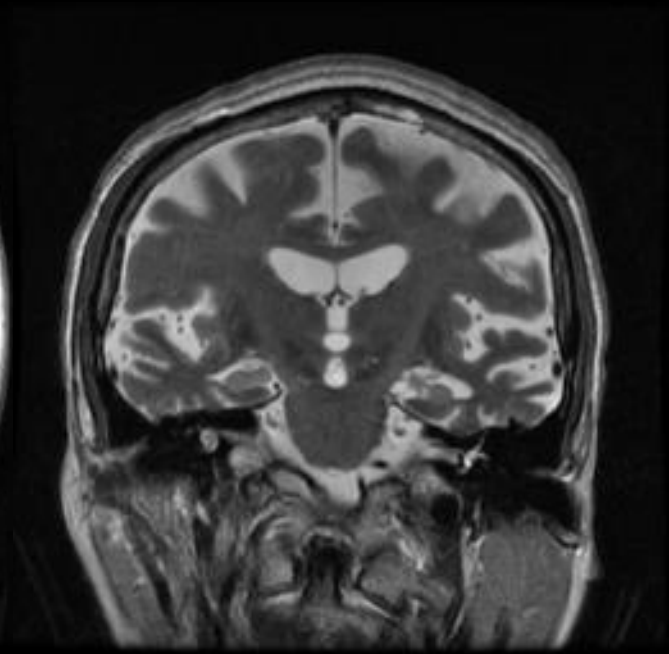
•Memory loss since 8 years ago, rapid progress

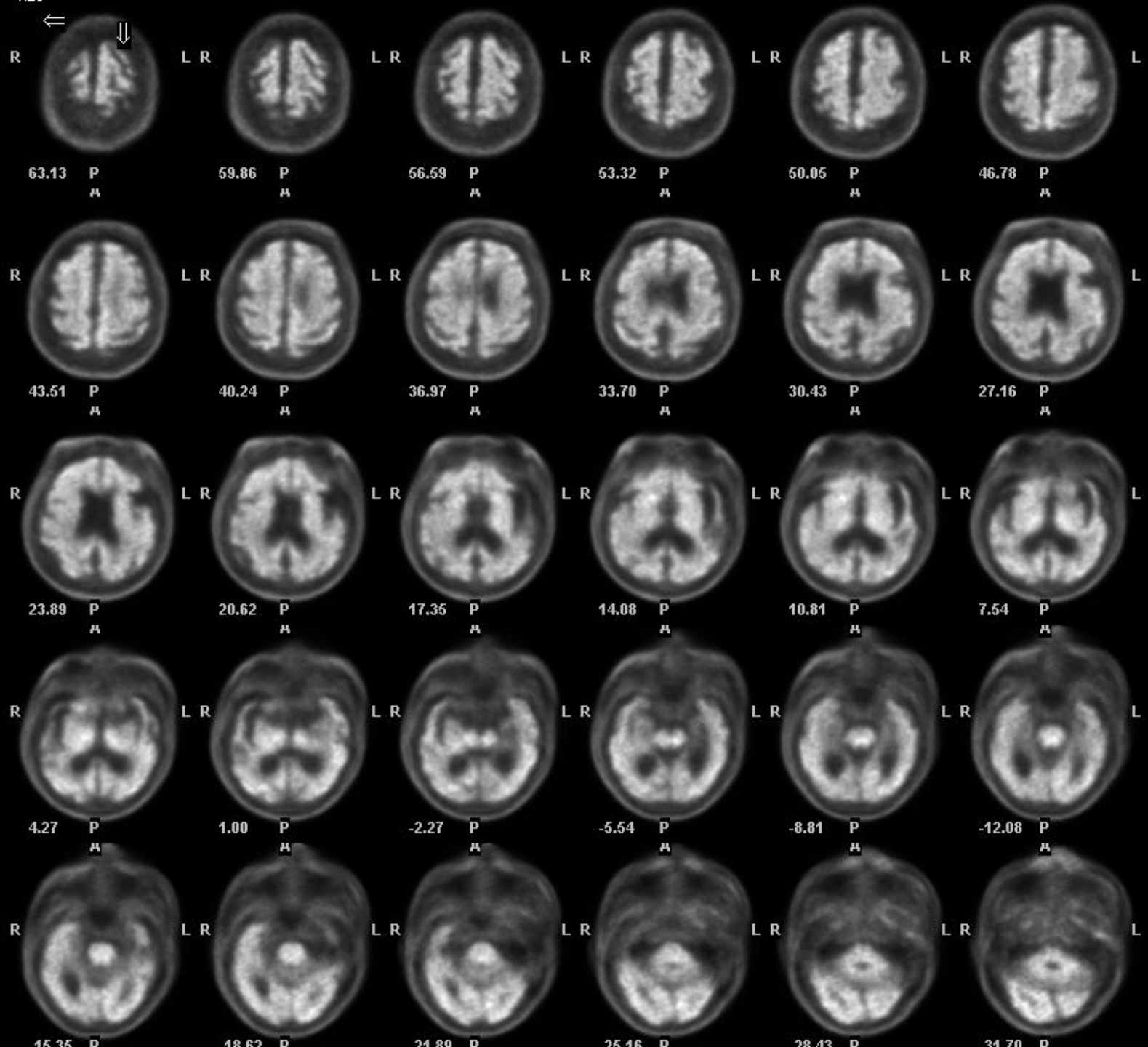
•Poor impulse control

•Aggressive behavior

•Behavior disinhibition

- **Clinical information –**
- **Fluent speech, comprehension ?**
- **MMSE (2010 to 2013) = 18 to 9**
- **CASI (2010 to 2013) = 60.7 to 25.1**
- **FTLD bv ? or atypical AD ?**


63.13
59.86
56.59
53.32
50.05
46.78
43.51
40.24
36.97
33.70
30.43
27.16
23.89
20.62
17.35
14.08
10.81
7.54
4.27
1.00
-2.27
-5.54
-8.81
-12.08

- **Diagnosis –**
  - **Alzheimer's disease, suspect frontal variant**
  - 10-40% clinical diagnosed bvFTD => AD pathology

Alzheimers Dement. 2017 Aug;13(8):870-884.

Clinical Utility

Clinical Utility of Amyloid PET Imaging

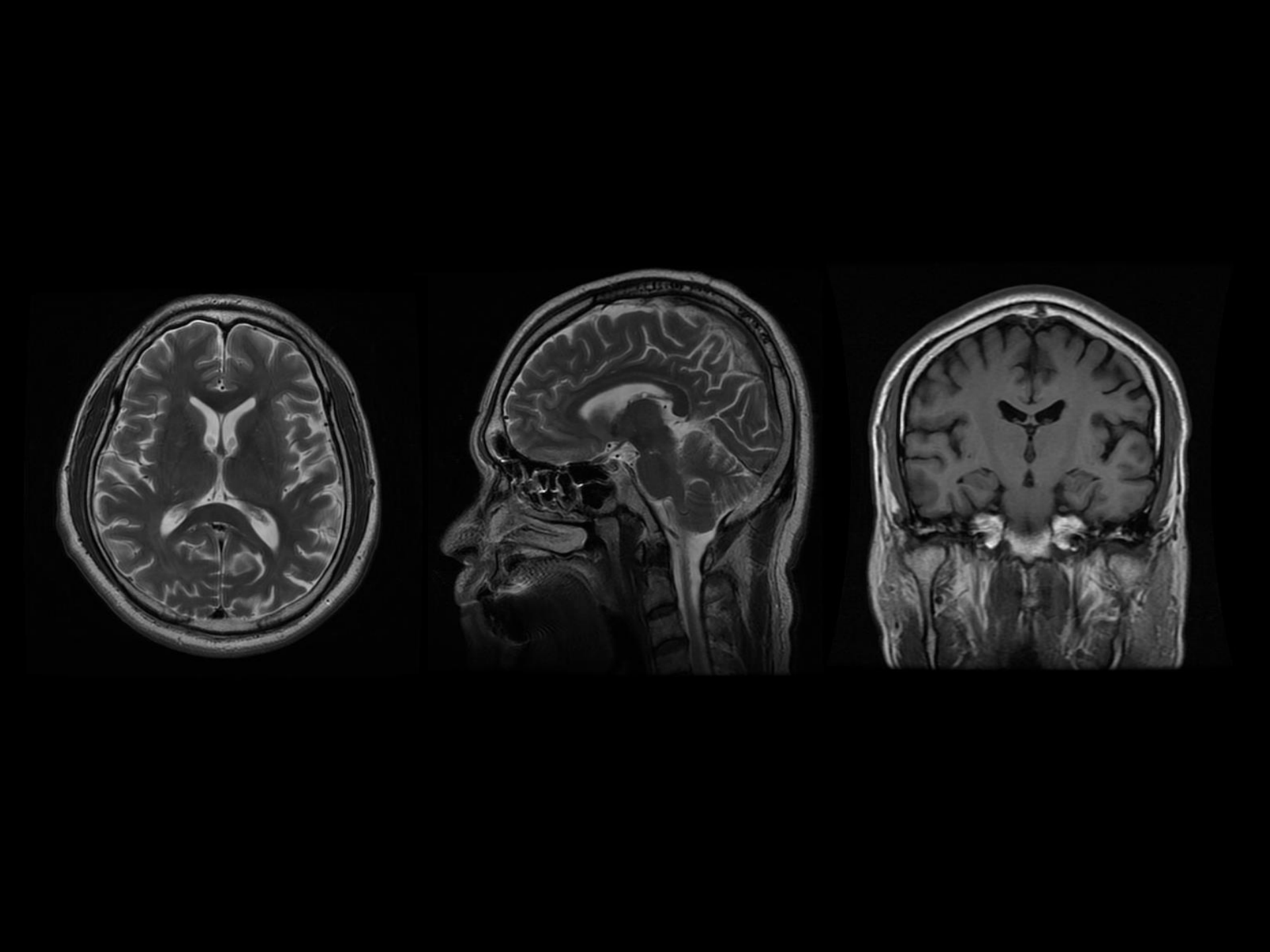
Study	Change in diagnosis (% of cases)	Gain in diagnostic confidence (% of cases)	Gain in diagnostic confidence (on 0%–100% scale)	Overall change in management (% of cases)	Change in medication (% of cases)
Frederiksen et al. 2012 (*34*)	23	49	—	—	—
Schipke et al. 2012 (*35*)	—	83	—	68	—
Degerman Gunnarsson et al. 2013 (*37*)	30	—	—	—	—
Ossenkoppele et al. 2013 (*38*)	23	—	16	—	—
Grundman et al. 2013 (*39*)	55	—	22	87	31
Mitsis et al. 2014 (*40*)	33	—	—	—	—
Sánchez-Juan et al. 2014 (*41*)	9	8	—	—	35
Zannas et al. 2014 (*42*)	72	36	—	—	45
Boccardi et al. 2016 (*10*)	27	—	21	—	60
Bensaïdane et al. 2016 (*45*)	32	44	—	71	39
Weston et al. 2016 (*46*)	35	90	—	40	30
Schönecker et al. 2017 (*47*)	21	—	—	—	—
Zwan et al. 2017 (*17*)	19	87	—	37	24
Mean weighted by study cohort size	**29**	**63**	**20**	**64**	**38**

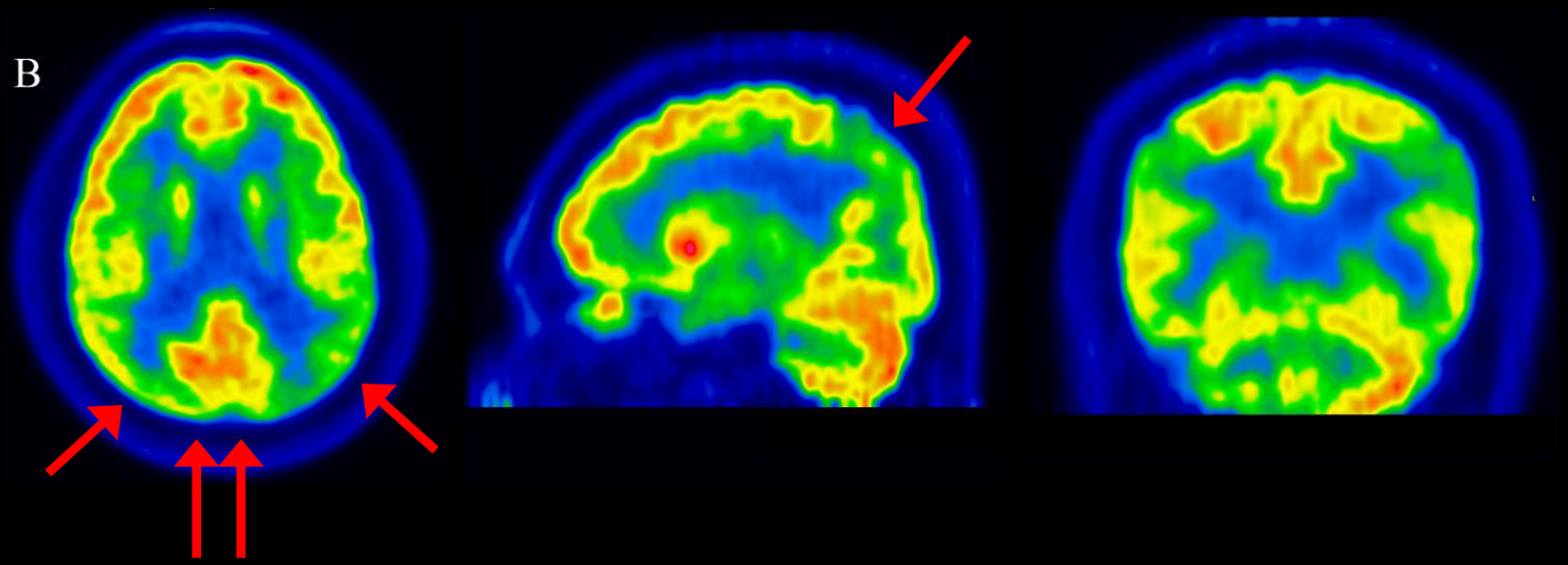
J Nucl Med. 2017 Nov;58(11):1711-1717.

Case 2

- **Clinical information –**
- **56 y/o man, architecture**
- **Memory decline for 2+ years (semantic symptom)**
- **VH for 2 years (visual spatial construction defect)**
- **Difficulty in drawing/writing**
- **Explains architectural business well**

- **Clinical information –**
- **No autonomic symptoms**
- **No motor symptoms**
- **No RBD (REM sleep behavior disorder)**
- **MMSE (2014 to 2017) = 27 to 22**
- **CASI (2014 to 2017) = 88 to 82**
- **PCA (posterior cortical atrophy) ?**

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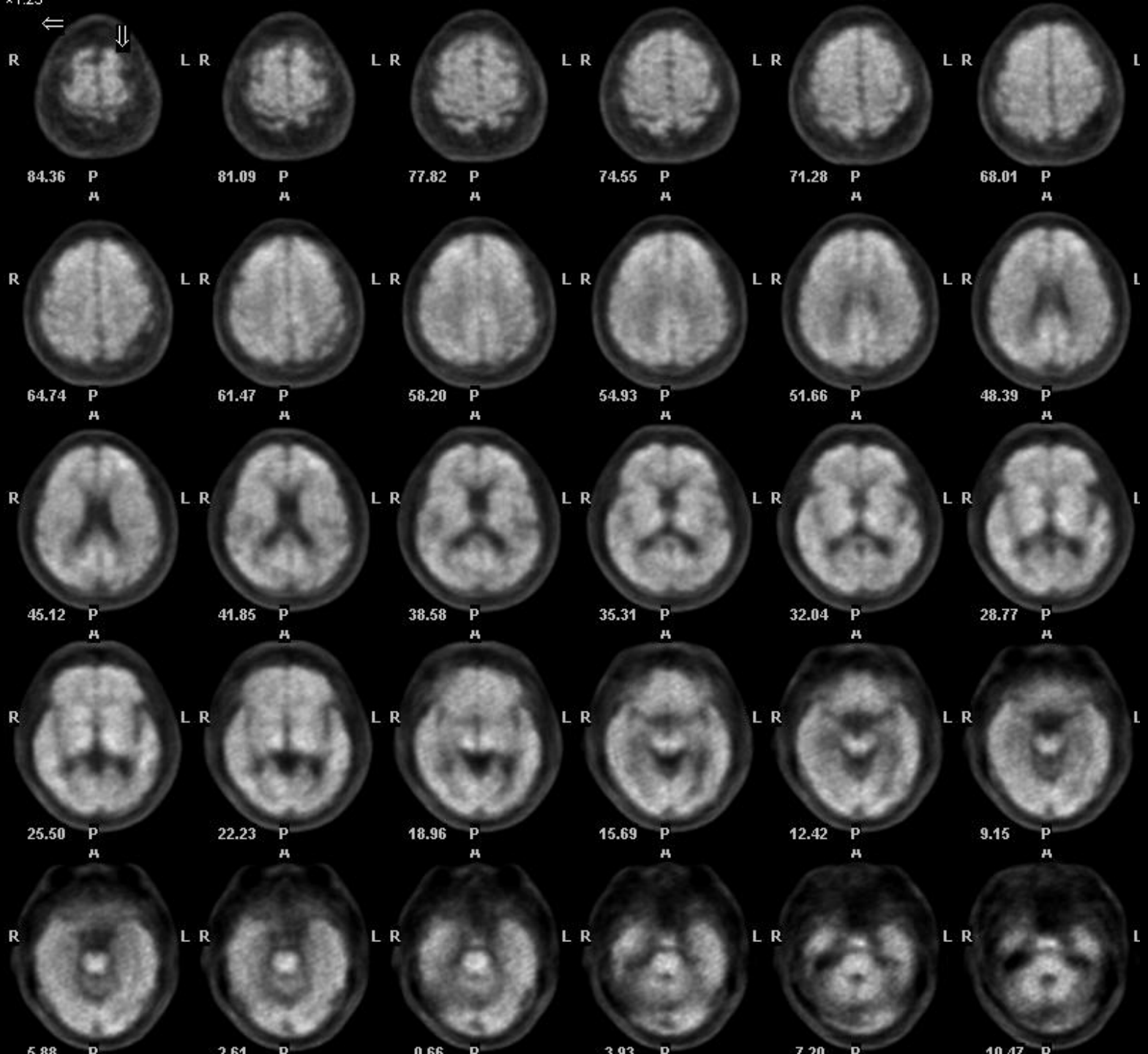
84.36
81.09
77.82
74.55
71.28
68.01
64.74
61.47
58.20
54.93
51.66
48.39
45.12
41.85
38.58
35.31
32.04
28.77
25.50
22.23
18.96
15.69
12.42
9.15

- **Diagnosis –**

•Posterior Cortical Atrophy (AD variant)

=> Donepezil

Clinical Utility

Clinical Utility of Amyloid PET Imaging

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J Nucl Med. 2017 Nov;58(11):1711-1717.

Case 3

- **Clinical information –**

•56 y/o woman

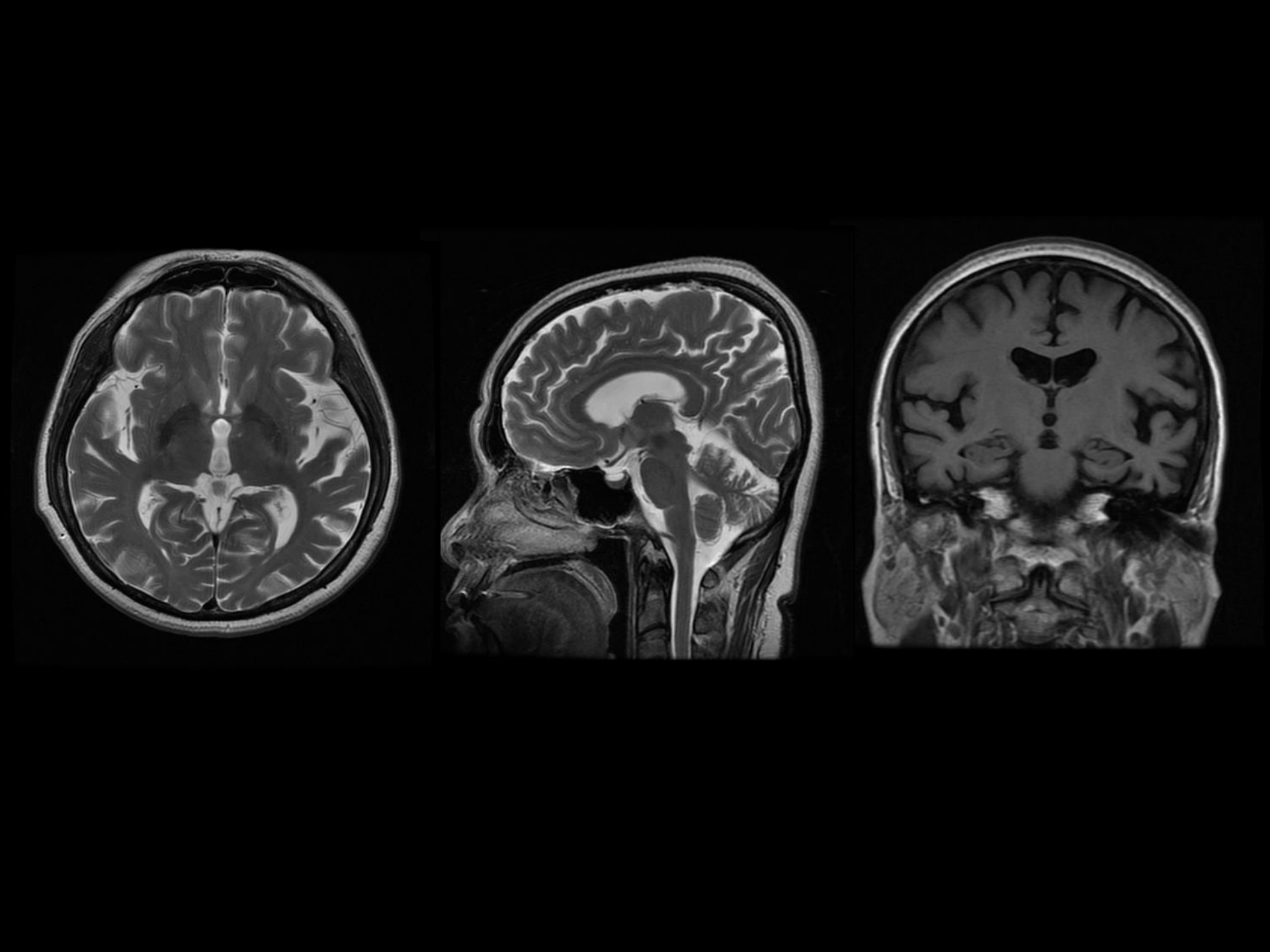
•Memory decline for 2 years

•Misplacement & disoriented (visit Japan)

•Speech: non-fluent/poor expression

•Poor naming

- **Clinical information –**
- **MMSE (2015 to 2016) = 13 to 6**
- **CASI (2015 to 2016) = 43 to 24**
- **Tentative diagnosis: PPA (primary progressive aphasia)**
  - 馬術治療



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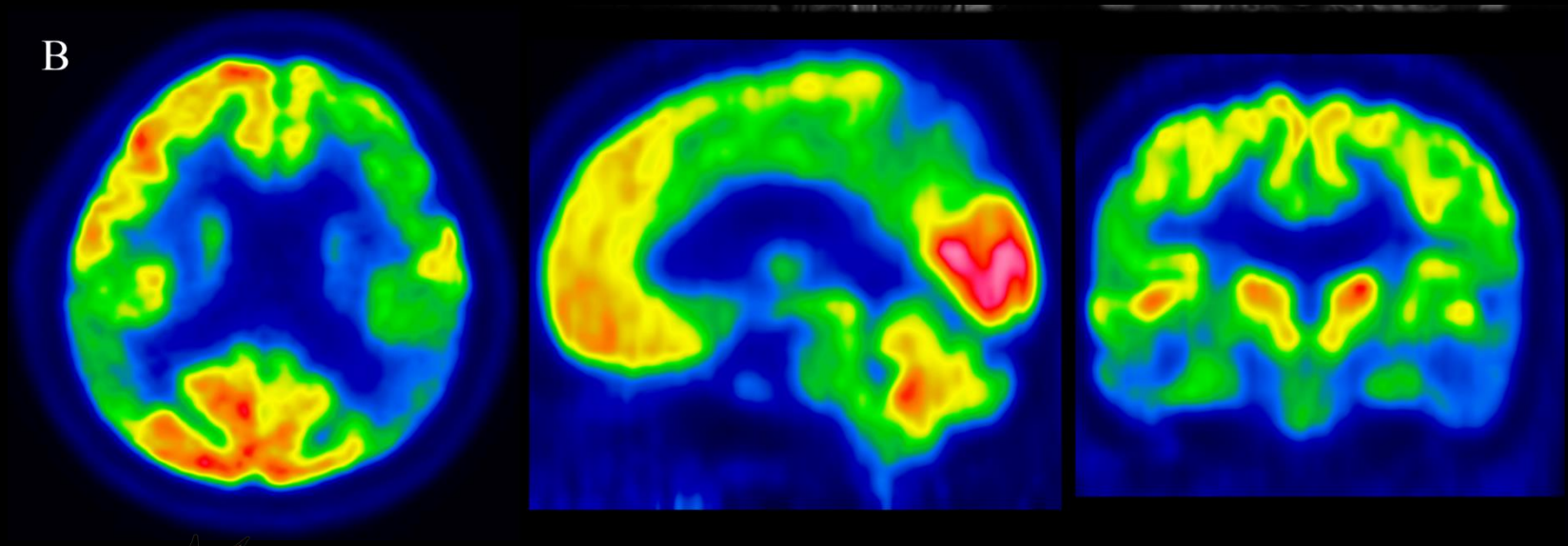


Primary Progressive Aphasia, which subtype ??

Table 2 Diagnostic features for the nonfluent/agrammatic variant PPA

I. Clinical diagnosis of nonfluent/agrammatic variant PPA

At least one of the following core features must be present:

1. Agrammatism in language production
2. Effortful, halting speech with inconsistent speech sound errors and distortions (apraxia of speech)

At least 2 of 3 of the following other features must be present:

1. Impaired comprehension of syntactically complex sentences
2. Spared single-word comprehension
3. Spared object knowledge

II. Imaging-supported nonfluent/agrammatic variant diagnosis

Both of the following criteria must be present:

1. Clinical diagnosis of nonfluent/agrammatic variant PPA
2. Imaging must show one or more of the following results:
   a. Predominant left posterior fronto-insular atrophy on MRI or
   b. Predominant left posterior fronto-insular hypoperfusion or hypometabolism on SPECT or PET

III. Nonfluent/agrammatic variant PPA with definite pathology

Clinical diagnosis (criterion 1 below) and either criterion 2 or 3 must be present:

1. Clinical diagnosis of nonfluent/agrammatic variant PPA
2. Histopathologic evidence of a specific neurodegenerative pathology (e.g., FTLD-tau, FTLD-TDP, AD, other)
3. Presence of a known pathogenic mutation

Table 3 Diagnostic criteria for the semantic variant PPA

I. Clinical diagnosis of semantic variant PPA

Both of the following core features must be present:

1. Impaired confrontation naming
2. Impaired single-word comprehension

At least 3 of the following other diagnostic features must be present:

1. Impaired object knowledge, particularly for low-frequency or low-familiarity items
2. Surface dyslexia or dysgraphia
3. Spared repetition
4. Spared speech production (grammar and motor speech)

II. Imaging-supported semantic variant PPA diagnosis

Both of the following criteria must be present:

1. Clinical diagnosis of semantic variant PPA
2. Imaging must show one or more of the following results:
   a. Predominant anterior temporal lobe atrophy
   b. Predominant anterior temporal hypoperfusion or hypometabolism on SPECT or PET

III. Semantic variant PPA with definite pathology

Clinical diagnosis (criterion 1 below) and either criterion 2 or 3 must be present:

1. Clinical diagnosis of semantic variant PPA
2. Histopathologic evidence of a specific neurodegenerative pathology (e.g., FTLD-tau, FTLD-TDP, AD, other)
3. Presence of a known pathogenic mutation

Table 4 Diagnostic criteria for logopenic variant PPA

I. Clinical diagnosis of logopenic variant PPA

Both of the following core features must be present:

1. Impaired single-word retrieval in spontaneous speech and naming
2. Impaired repetition of sentences and phrases

At least 3 of the following other features must be present:

1. Speech (phonologic) errors in spontaneous speech and naming
2. Spared single-word comprehension and object knowledge
3. Spared motor speech
4. Absence of frank agrammatism

II. Imaging-supported logopenic variant diagnosis

Both criteria must be present:

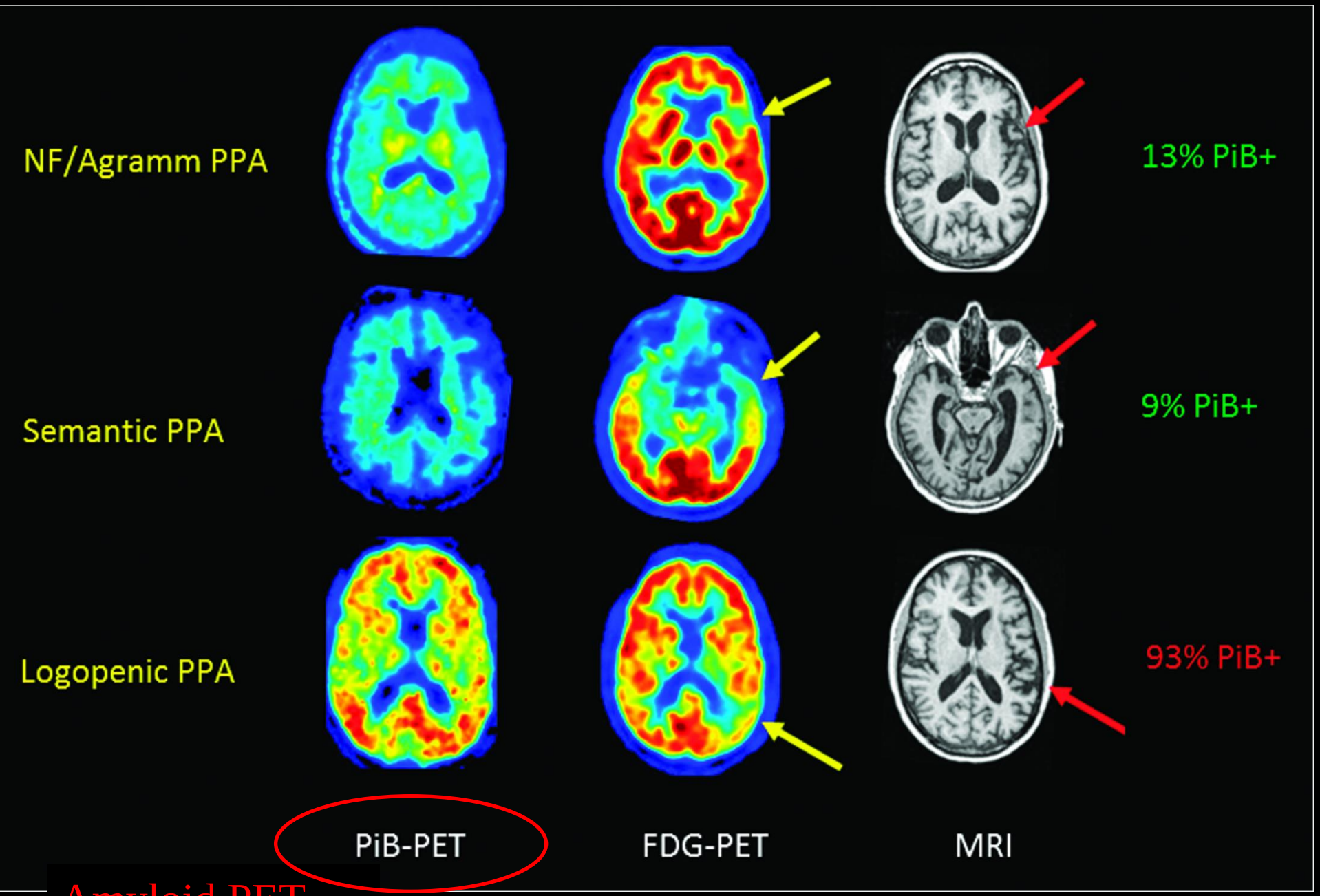
1. Clinical diagnosis of logopenic variant PPA
2. Imaging must show at least one of the following results:
   a. Predominant left posterior perisylvian or parietal atrophy on MRI
   b. Predominant left posterior perisylvian or parietal hypoperfusion or hypometabolism on SPECT or PET

III. Logopenic variant PPA with definite pathology

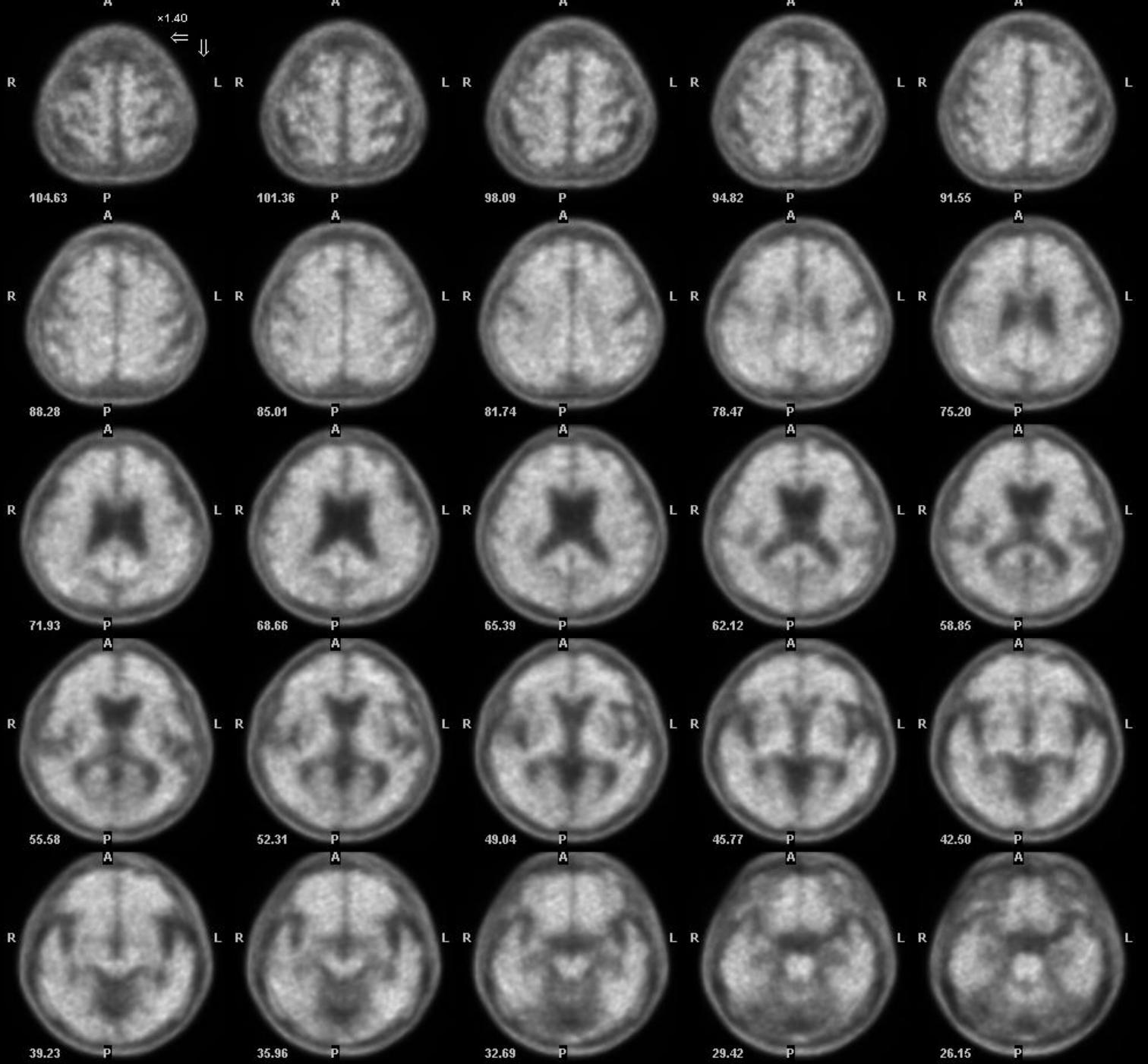
Clinical diagnosis (criterion 1 below) and either criterion 2 or 3 must be present:

1. Clinical diagnosis of logopenic variant PPA
2. Histopathologic evidence of a specific neurodegenerative pathology (e.g. AD, FTLD-tau, FTLD-TDP, other)
3. Presence of a known pathogenic mutation

Neurology. 2011 Mar 15;76(11)


NF/Agramm PPA
Semantic PPA
Logopenic PPA
13% PiB+
9% PiB+
93% PiB+
PiB-PET
FDG-PET
MRI

Amyloid PET



PET Transaxials

- **Diagnosis –**
- **Logopenic PPA (AD variant)**

Clinical Utility

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Atypical AD – IWG Criteria

Panel 2: IWG-2 criteria for atypical AD (A plus B at any stage)

A Specific clinical phenotype (one of the following)

- Posterior variant of AD (including)
  - An occipitotemporal variant defined by the presence of an early, predominant, and progressive impairment of visuoperceptive functions or of visual identification of objects, symbols, words, or faces
  - A biparietal variant defined by the presence of early, predominant, and progressive difficulty with visuospatial function, features of Gerstmann syndrome, of Balint syndrome, limb apraxia, or neglect
- Logopenic variant of AD defined by the presence of an early, predominant, and progressive impairment of single word retrieval and in repetition of sentences, in the context of spared semantic, syntactic, and motor speech abilities
- Frontal variant of AD defined by the presence of early, predominant, and progressive behavioural changes including association of primary apathy or behavioural disinhibition, or predominant executive dysfunction on cognitive testing
- Down's syndrome variant of AD defined by the occurrence of a dementia characterised by early behavioural changes and executive dysfunction in people with Down's syndrome

B In-vivo evidence of Alzheimer's pathology (one of the following)

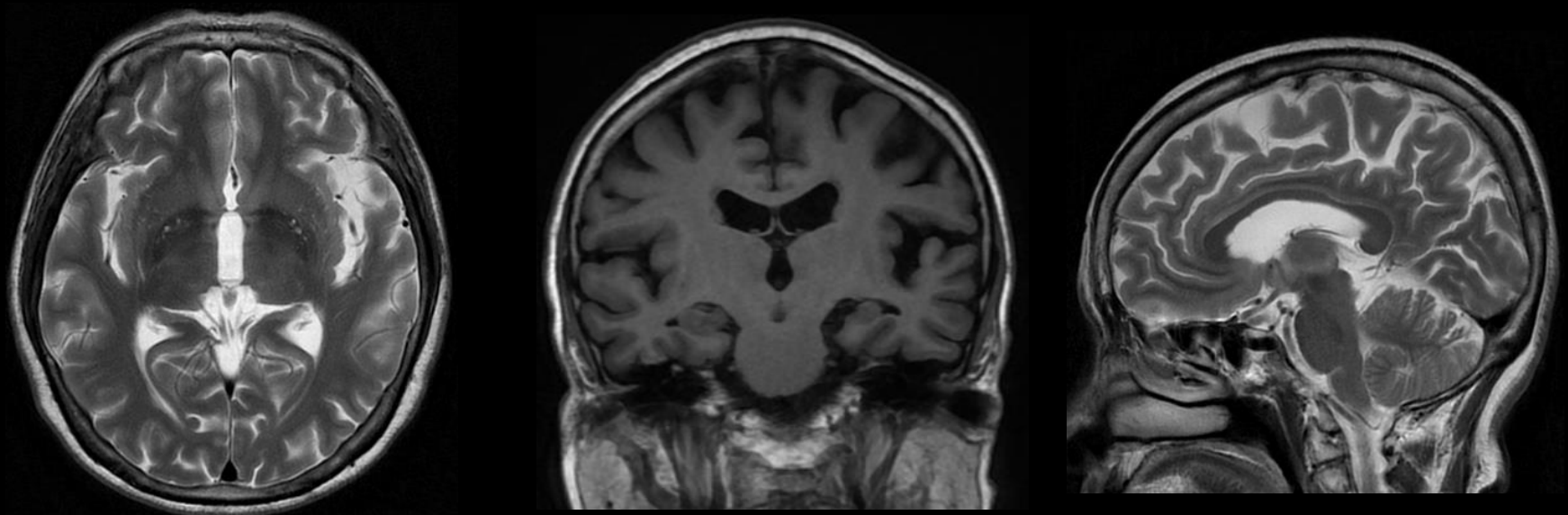
- Decreased $A\beta_{1-42}$ together with increased T-tau or P-tau in CSF
- Increased tracer retention on amyloid PET
- Alzheimer's disease autosomal dominant mutation present (in *PSEN1*, *PSEN2*, or *APP*)

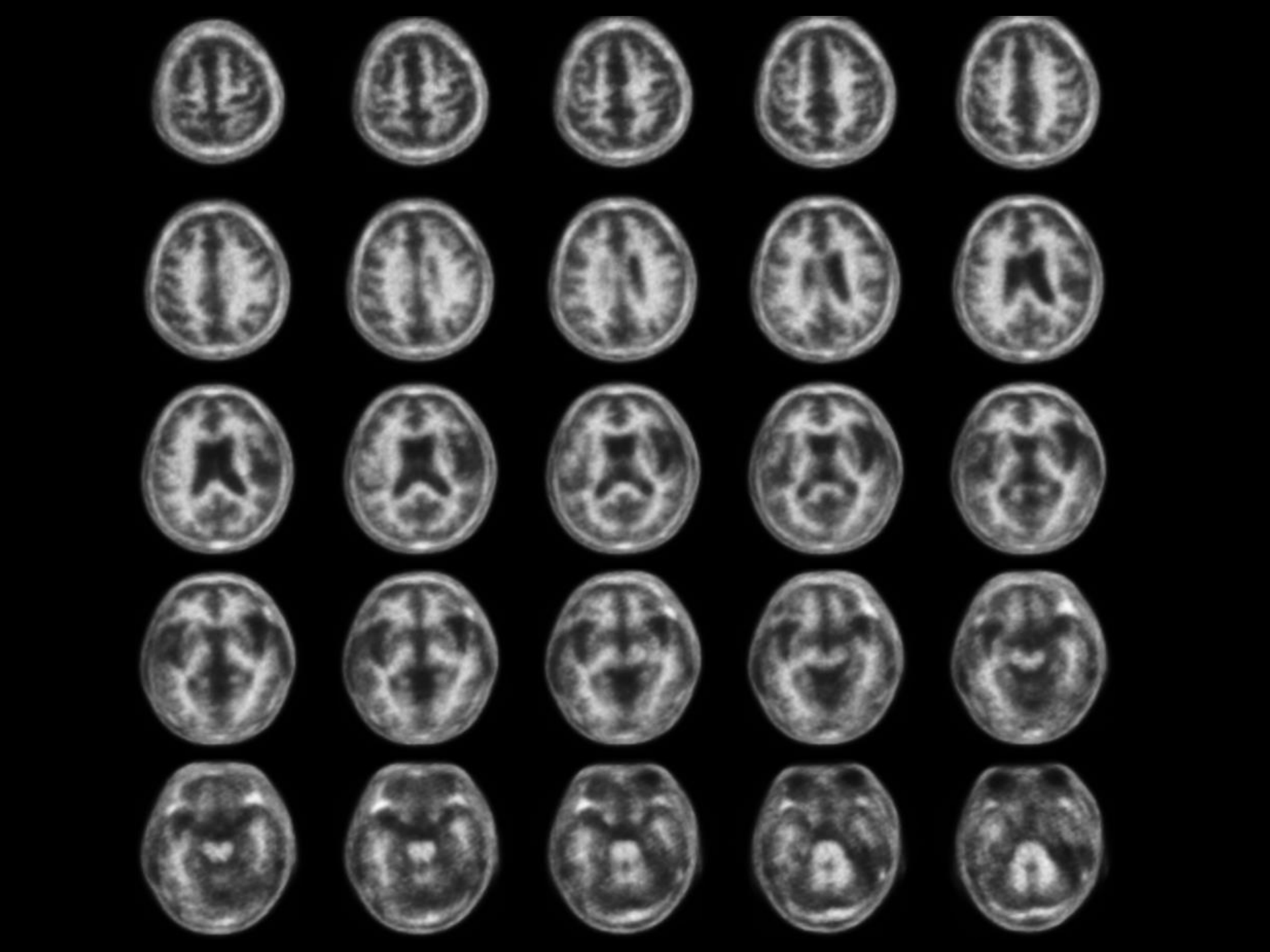
The Lancet Neurology 2014, 13(6):614-629.

Case 4

- **Clinical information –**
- **75 y/o woman**
- **Businesswoman (steel tube/pipe)**
- **Memory decline: soso/fair**
  - 喉嚨卡卡/清喉嚨
- **Writing the check wrong (incorrect name)**
- **Anxiety & agitated**
- **Incoherent speech/naming difficulty**

- **Clinical information –**
  - **MMSE (2019) = 22**
  - **CASI (2019) = 76**
  - **CDR (2019) = 0.5**
  - **Tentative diagnosis: PPA**





- **Diagnosis –**
  - **PPA/FTD**

=> Conservative treatment


Thank you !!!
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