Case Sharing:

Persistent/progressive unexplained MCI

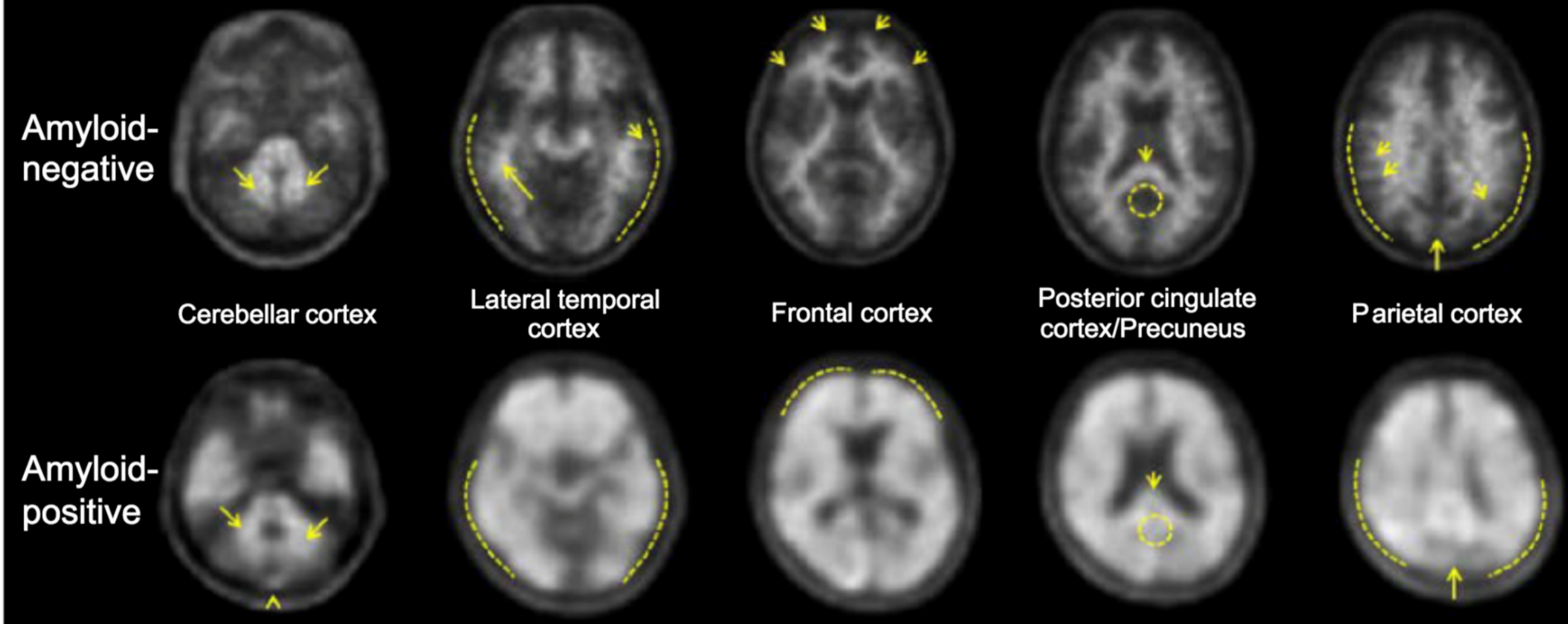
Dementia or Normal Aging?

AD or other dementia?

Nuclear Medicine in Alzheimer's Disease

- Cerebral Perfusion → Tc-99m ECD SPECT
- Cerebral Glucose Metabolism → F-18 FDG PET
- Neuropathological Markers → Amyloid PET (or Tau PET…)

Amyloid PET



18F-florbetaben (FBB)

Osama Sabri •Clin Transl Imaging •2015

Case 1 : 76/M

- 2018-1-15
- Symptom:
  - 家人反應最近半年來記性持續減退
- Education level: 高職
- History:
  - Denies head injury、stroke、HTN、DM、drugs abuse、CNS medications
  - Family history with dementia: -

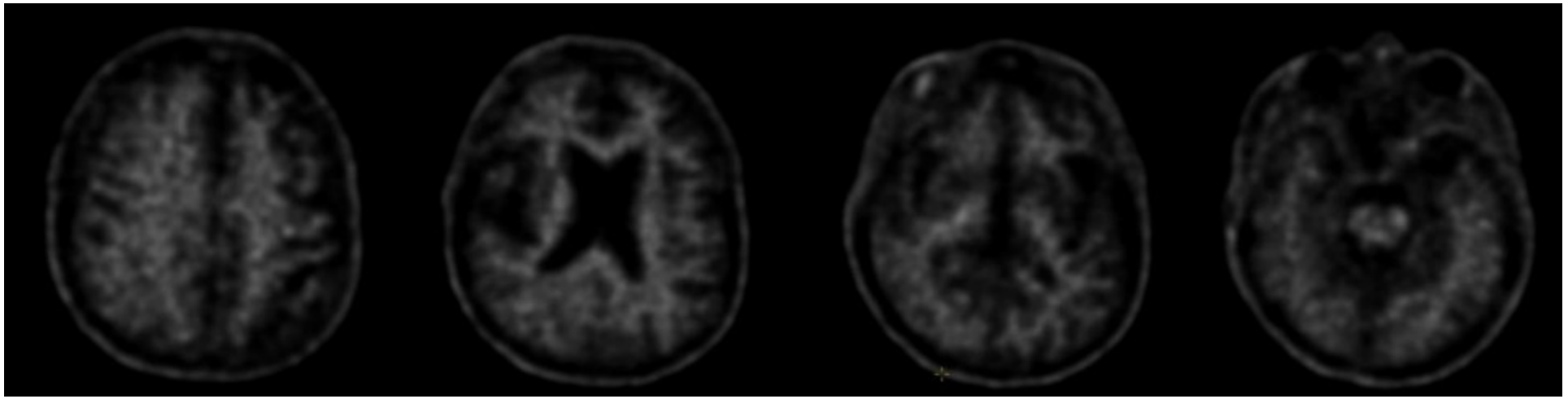
- MMSE-psychophysiological exam: 29/30

- Clinical impression:
  - suspected Dementia
    - r/o normal aging or AD or VD

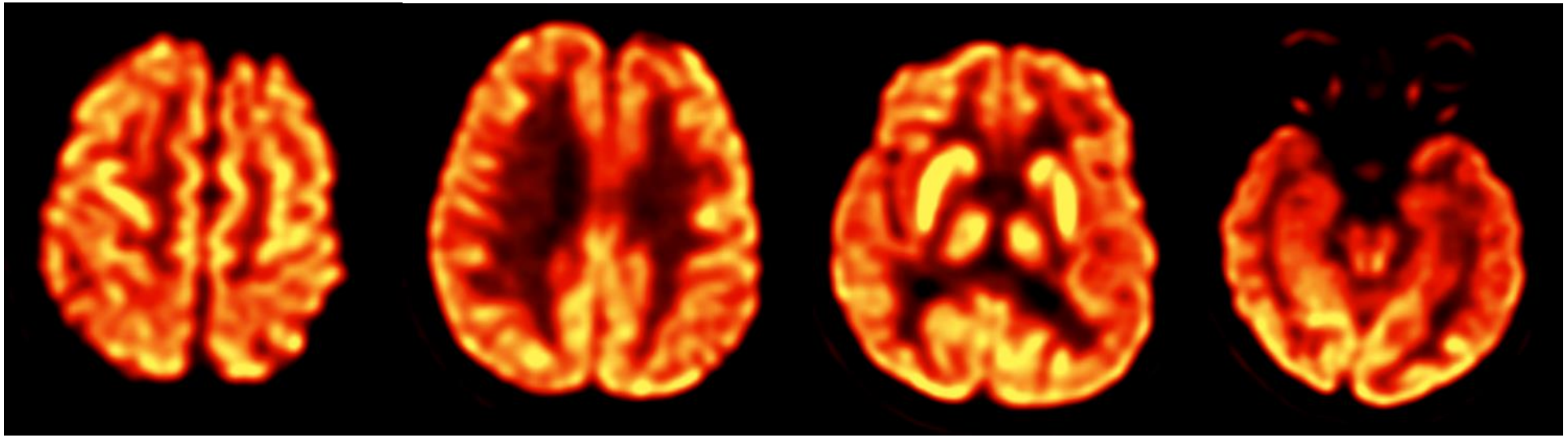
No brain imaging

FBB PET scan: negative

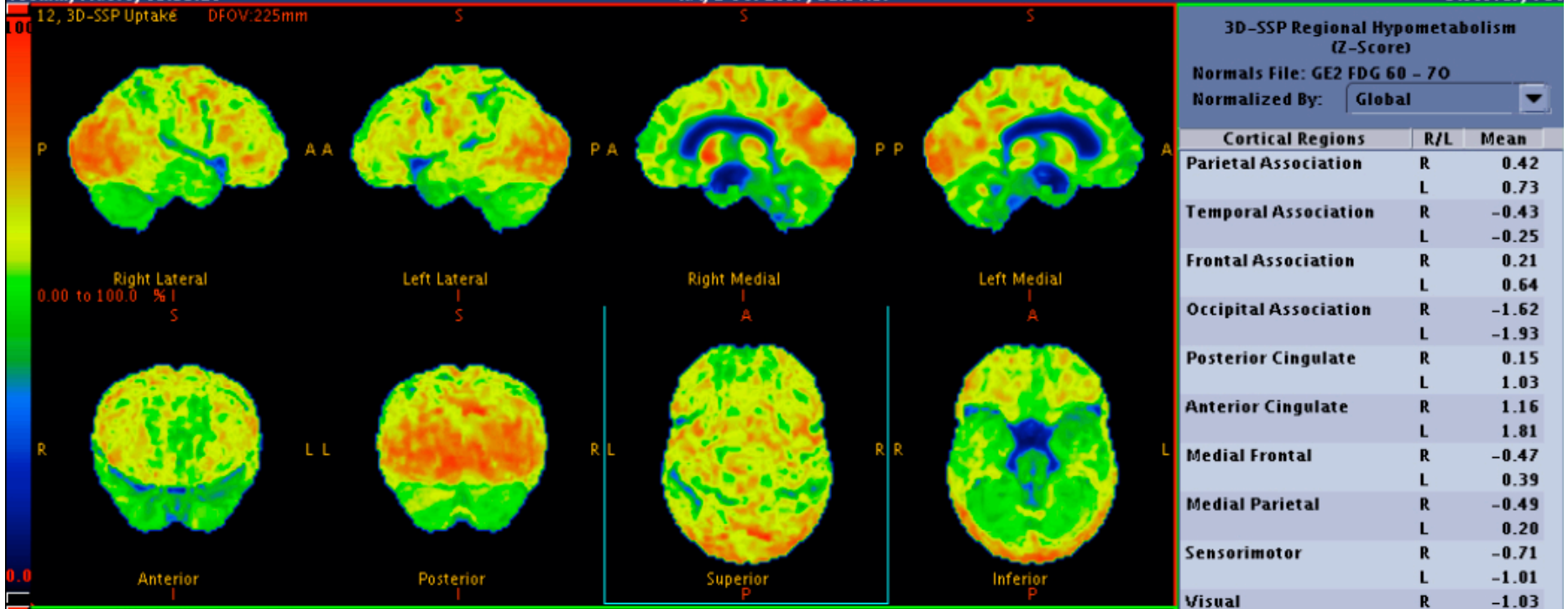
2018-2-2



2018-2-5



FDG PET scan: normal



3D-SSP Regional Hypometabolism (Z-Score)

Normals File: GE2 FDG 60 - 70

Normalized By: Global

Cortical Regions	R/L	Mean
Parietal Association	R	0.42
	L	0.73
Temporal Association	R	-0.43
	L	-0.25
Frontal Association	R	0.21
	L	0.64
Occipital Association	R	-1.62
	L	-1.93
Posterior Cingulate	R	0.15
	L	1.03
Anterior Cingulate	R	1.16
	L	1.81
Medial Frontal	R	-0.47
	L	0.39
Medial Parietal	R	-0.49
	L	0.20
Sensorimotor	R	-0.71
	L	-1.01
Visual	R	-1.03
	L	-1.22
Caudate Nucleus	R	-4.02
	L	1.63
Cerebellum	R	0.49
	L	0.08
Vermis	R	0.21
	L	0.08
Pons		-0.74
Average Association	R	0.03
	L	0.37
Averaged Cerebral		-0.01
Global Average		-0.04

Favor normal aging

Case 2 : 64/M

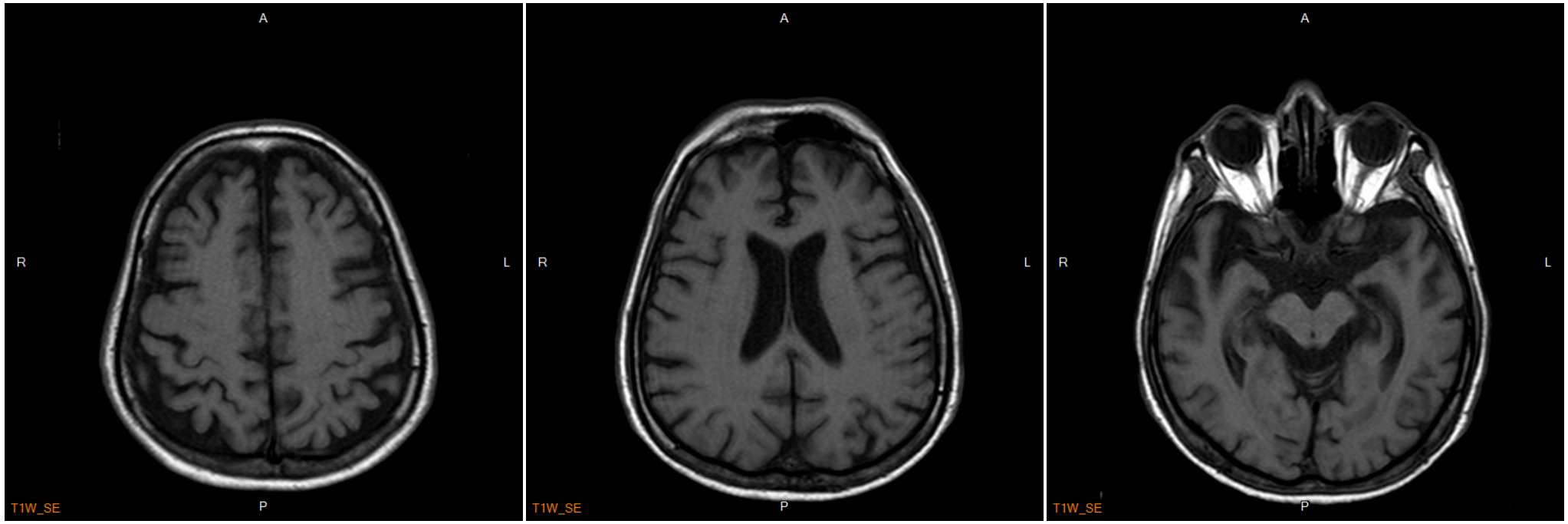
2013-8

- Symptom:
  - 持續記憶力減退，妄想及聽幻覺約半年，情況加劇
- Education level:高職
- History:
  - HTN, CKD, gouty arthritis
  - Family history with dementia: -

- MMSE-psychophysiological exam:
  15/30 (moderately)

2013-9-20 Brain MRI

Mild senile brain atrophy



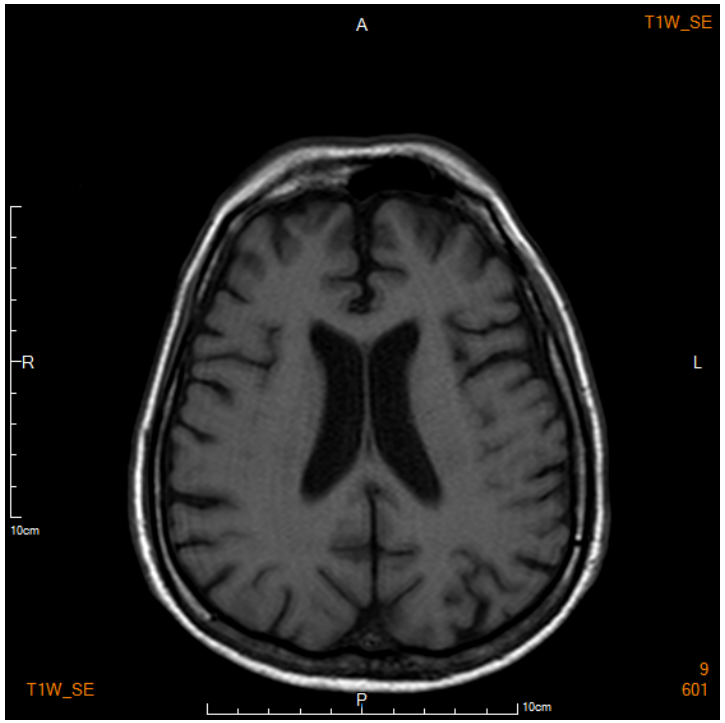
Dx: presenile dementia, suspected AD

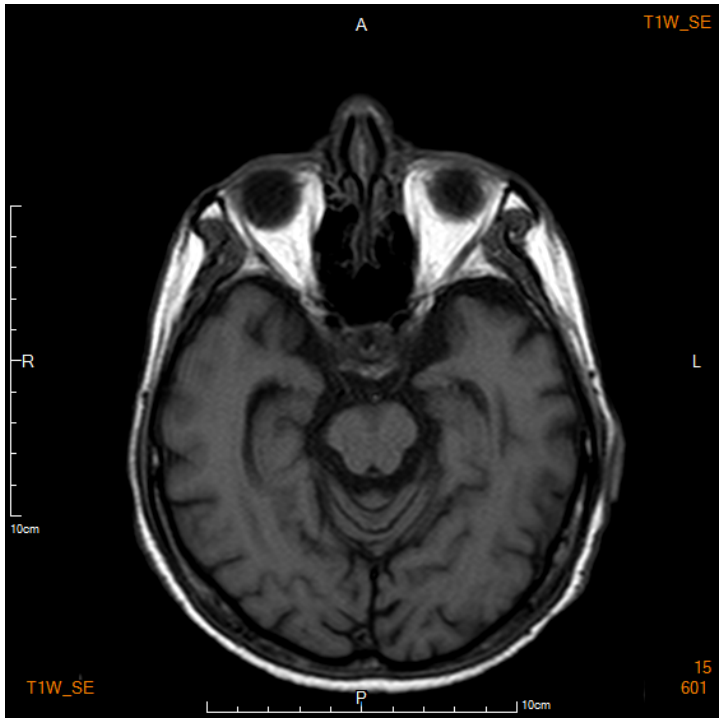
→Rivastigmine* 4.5mg (Exelon) BID since 2013-10~

(*cholinesterase inhibitor)

2016-9 s/s got worse

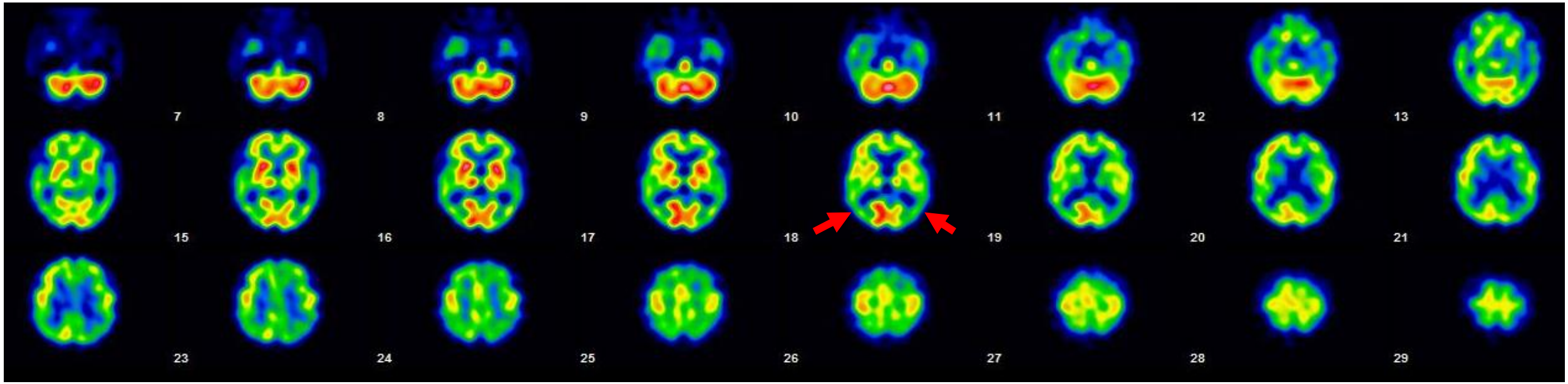
2016-9-19
Brain MRI: Mild senile brain atrophy (no marked interval change)

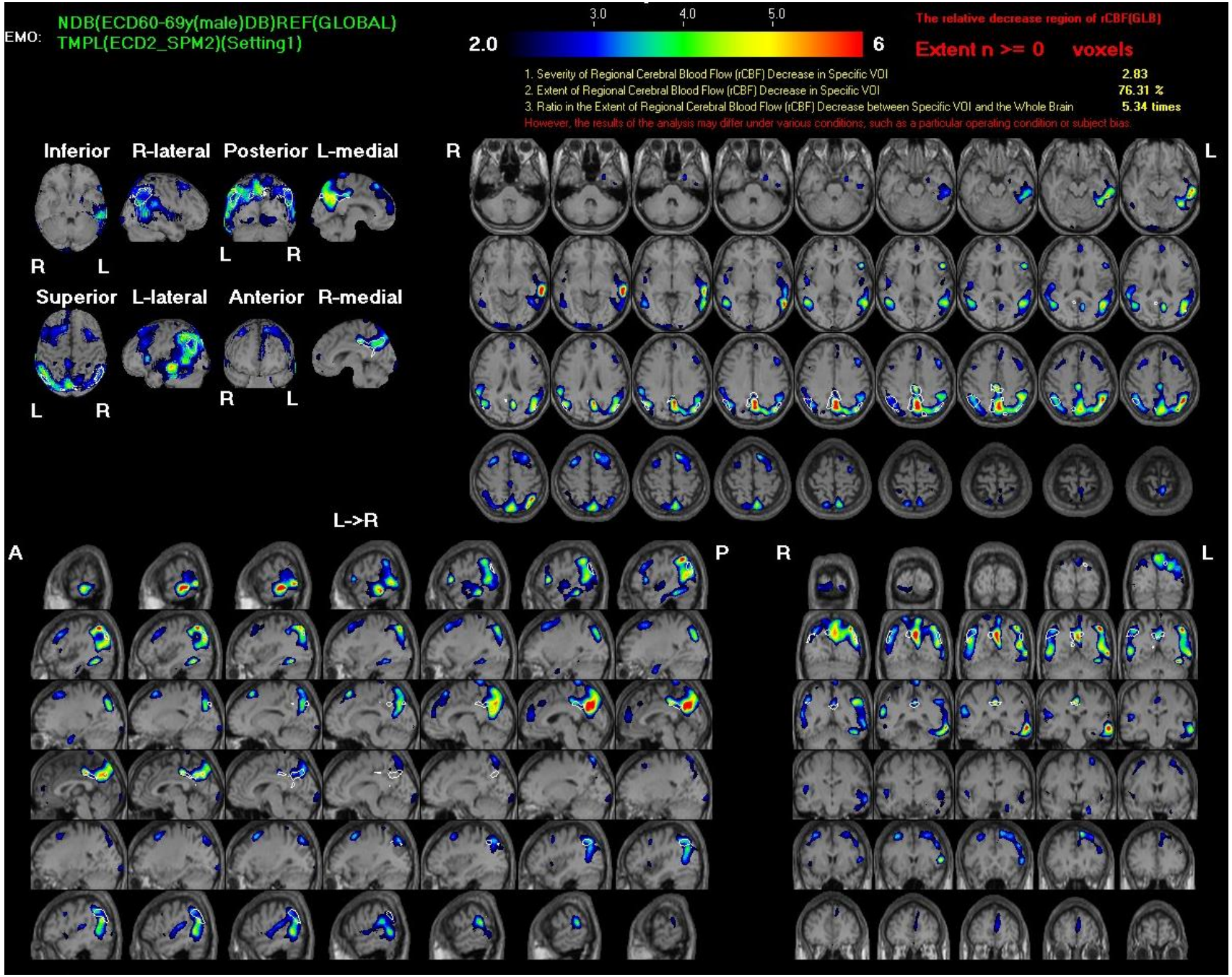




2016-9-20

ECD brain perfusion scan



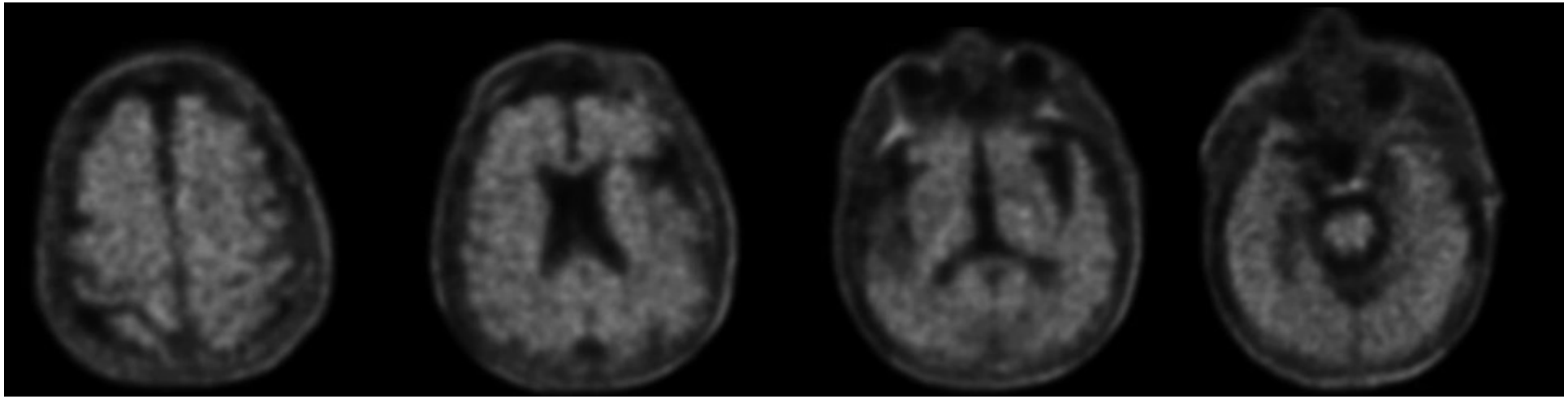

EMO:
NDB(ECD60-69y(male)DB)REF(GLOBAL)
TMPL(ECD2_SPM2)(Setting1)
3.0
4.0
5.0
2.0
6
The relative decrease region of rCBF(GLB)
Extent n >= 0 voxels
1. Severity of Regional Cerebral Blood Flow (rCBF) Decrease in Specific VOI 2.83
2. Extent of Regional Cerebral Blood Flow (rCBF) Decrease in Specific VOI 76.31 %
3. Ratio in the Extent of Regional Cerebral Blood Flow (rCBF) Decrease between Specific VOI and the Whole Brain 5.34 times
However, the results of the analysis may differ under various conditions, such as a particular operating condition or subject bias.
Inferior
R-lateral
Posterior
L-medial
R
L
L
R
Superior
L-lateral
Anterior
R-medial
L
R
R
L
L->R
A
P
R
L

- MMSE-psychophysiological exam: 12/30 (moderately)

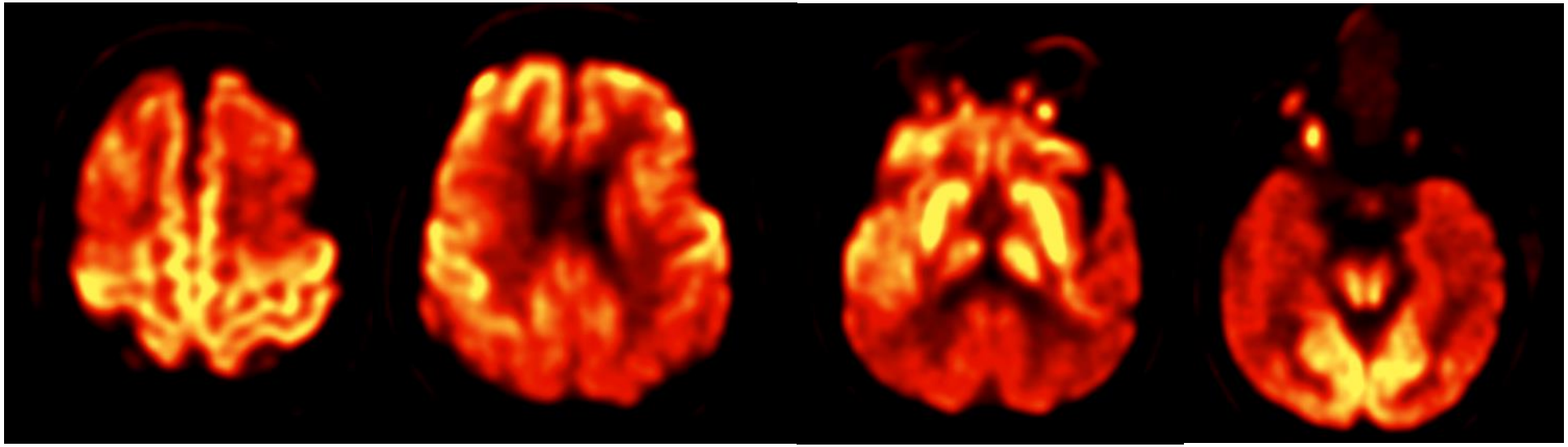
- Clinical impression:
  - Presenile dementia
    - r/o **AD or Dementia with Lewy body**
      - **Fluctuation** of cognitive function (MMSE: 15→12), improved after antipsychotics administration
      - Advance effect with nausea, GI upset, drowsiness

FBB PET scan: positive

2018-1-15



2018-1-12



FDG PET scan: Symmetrical and marked hypometabolism over the bilateral parietal and temporal lobes

Medications

- Favor AD and keep cholinesterase inhibitor
  (Rivastigmine 4.5mg (Exelon))

Case 3 : 69/M

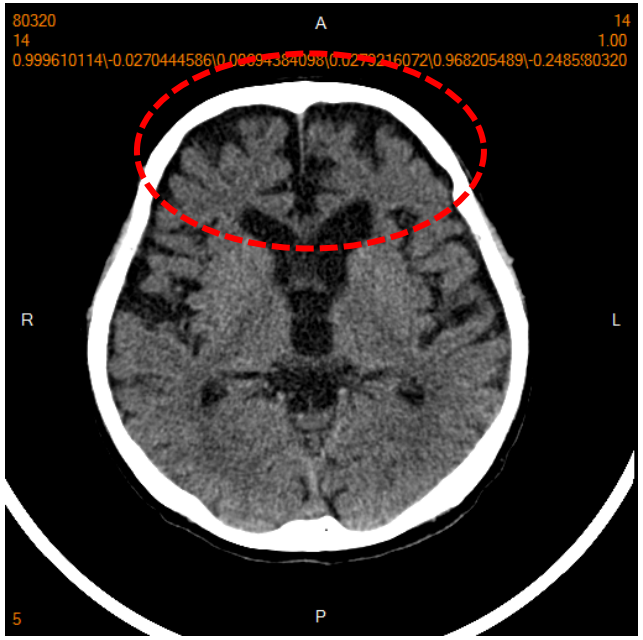
2017-8-17

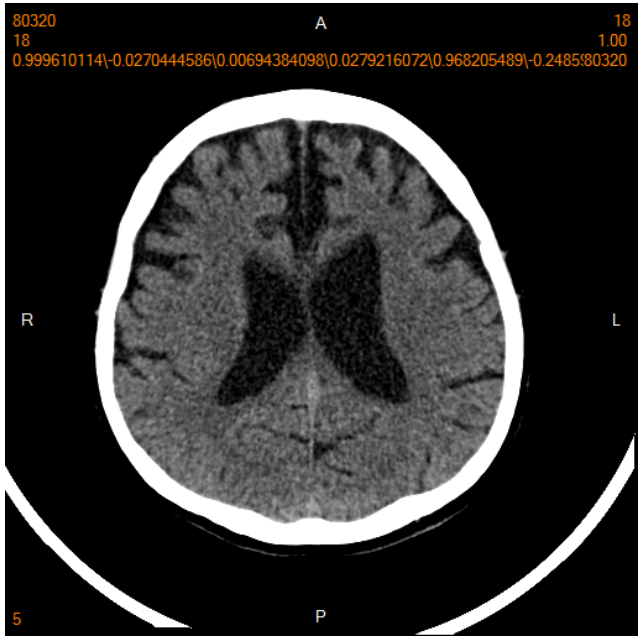
- Symptom:
  - 家人反應最近半年來記性持續減退，方向感變差，常會忘記東西放哪裡；情緒波動大，容易為小事生氣
- Education level: 碩士
- History:
  - Denies head injury、stroke、HTN、DM、drugs abuse、CNS medications
  - Family history with dementia: -

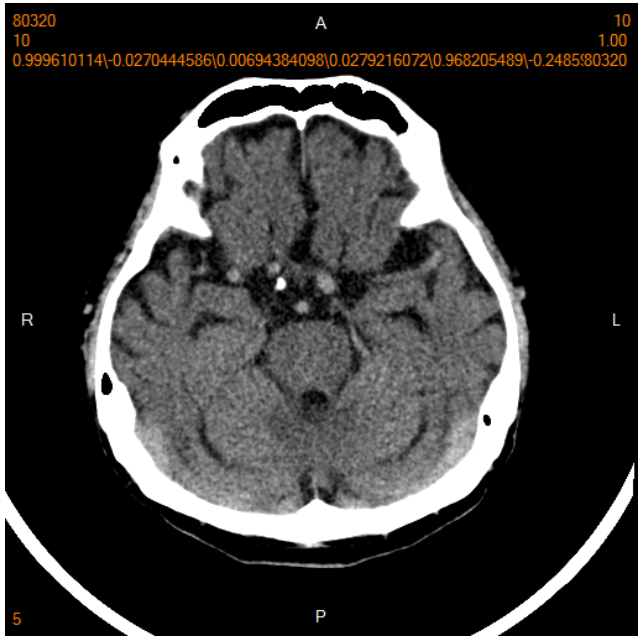
- MMSE-psychophysiological exam: 30/30

2017-9-4 Brain CT: Senile atrophy of the brain

Frontal atrophy?







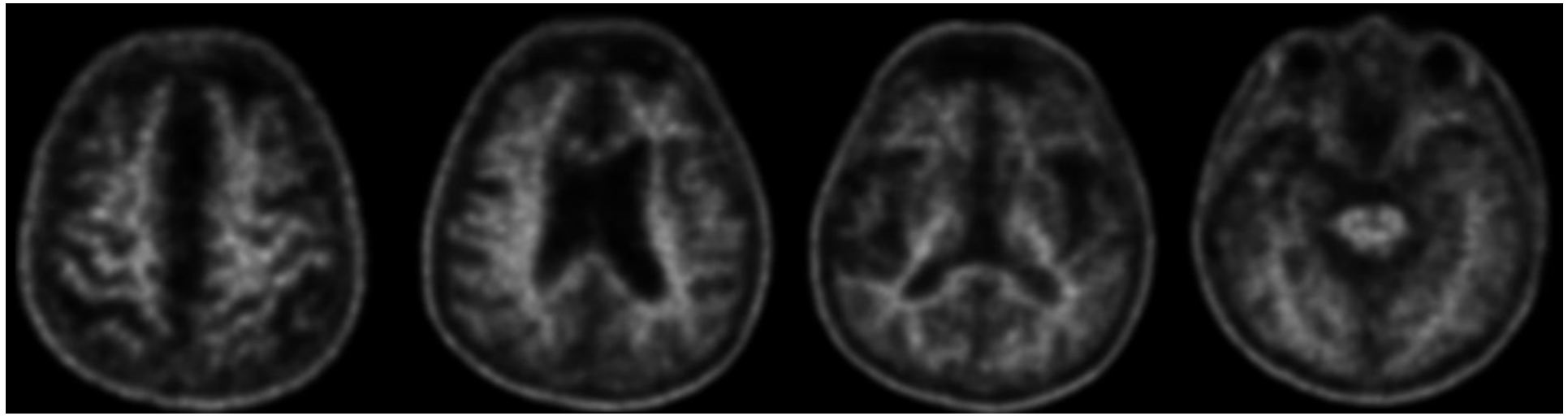
Clinical impression:

suspected Dementia

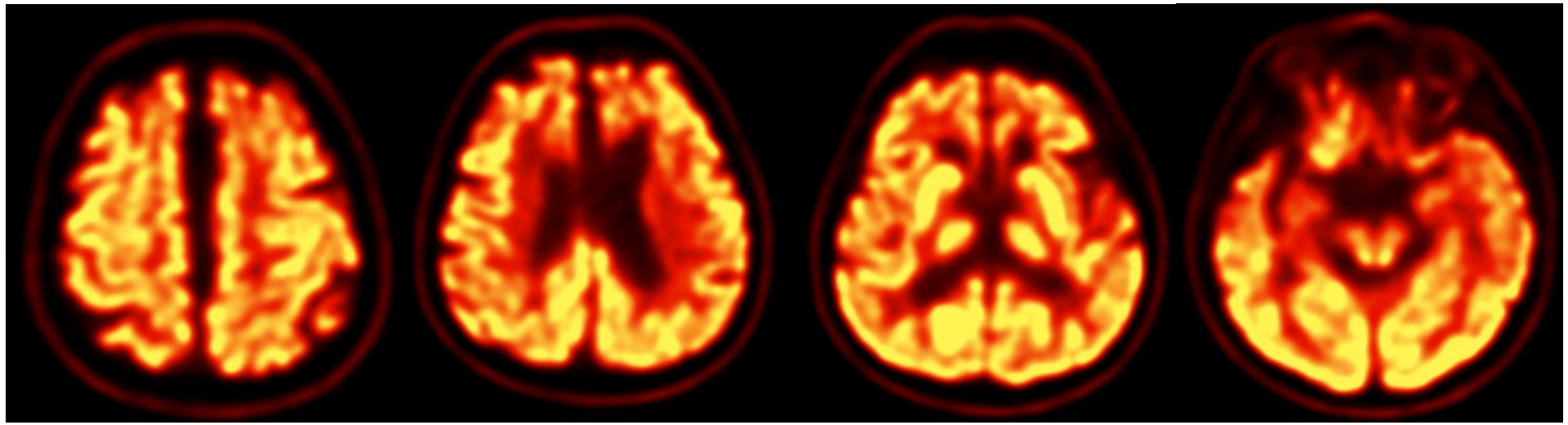
r/o normal aging, **AD or FTLD**

FBB PET scan: negative

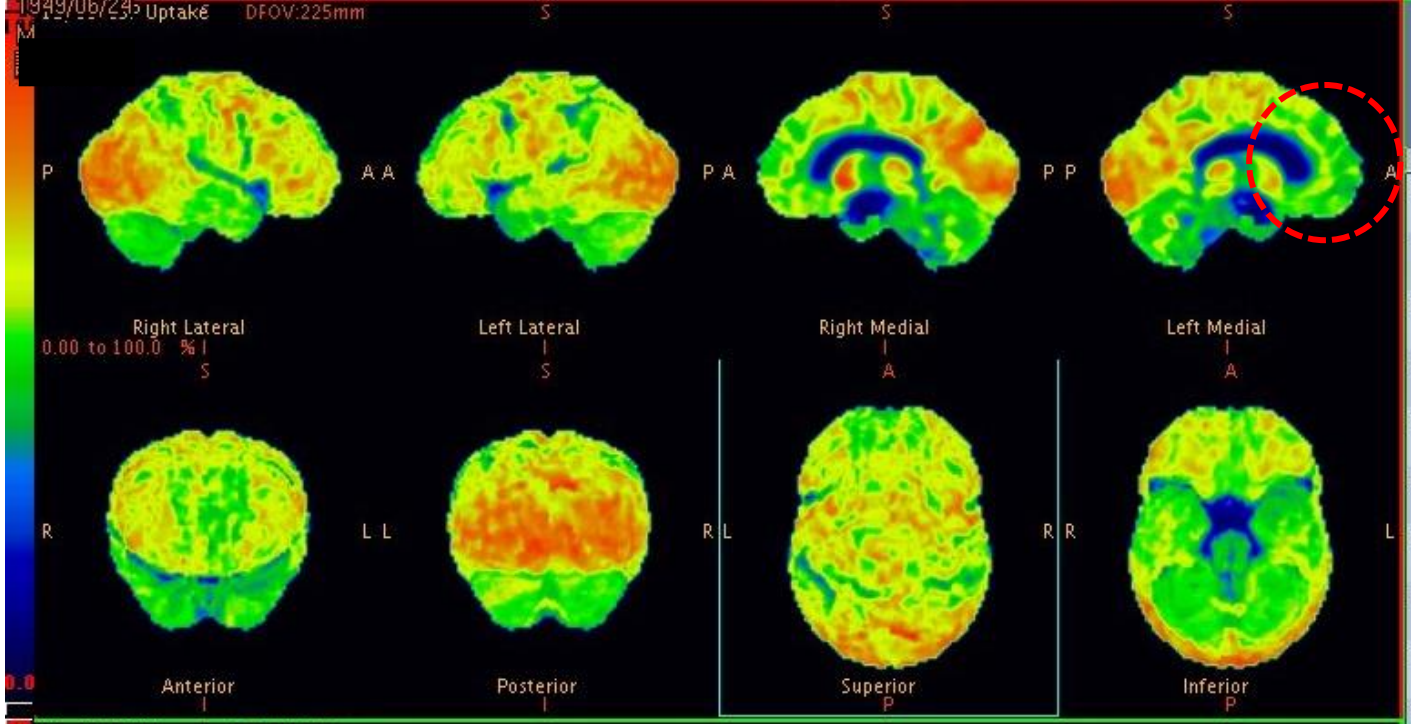
2017-9-29

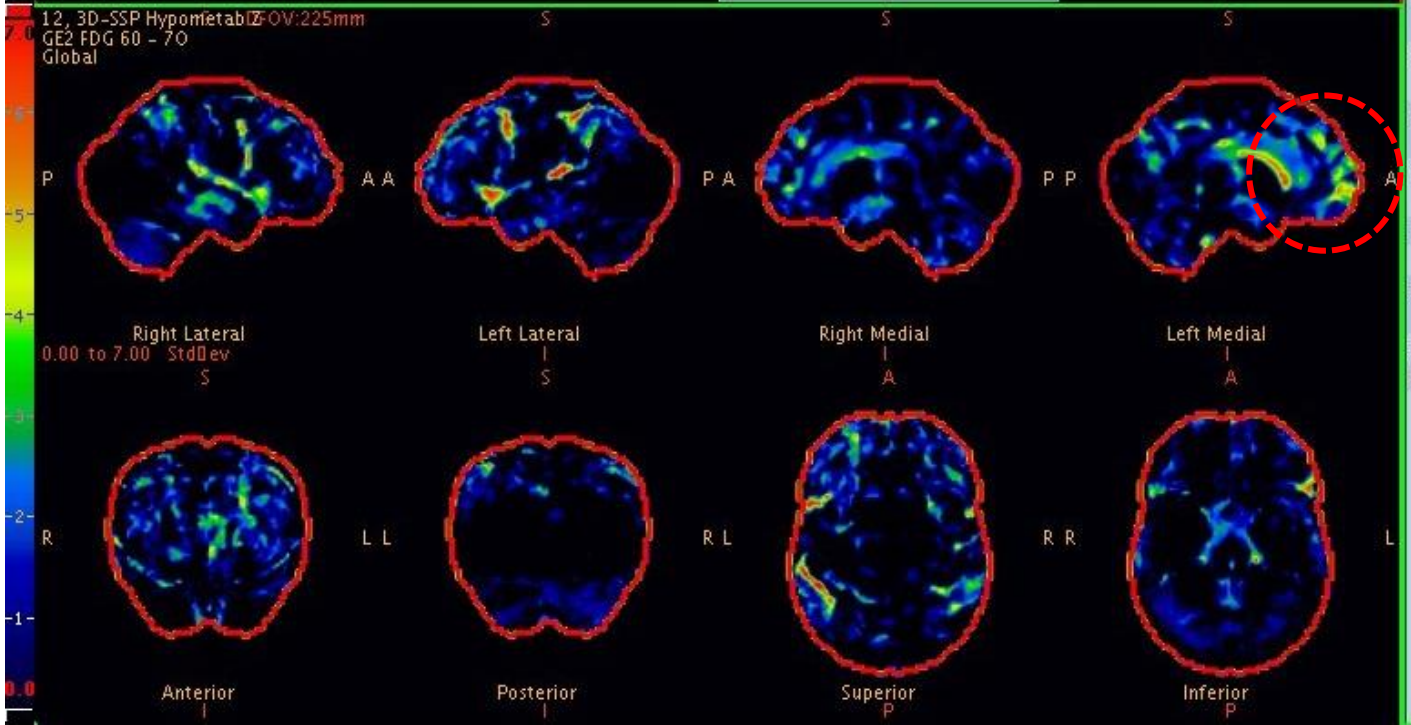


2017-10-2



FDG PET scan: normal





3D-SSP Regional Hypometabolism (Z-Score)

Normals File: GE2 FDG 60 – 70

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	L	0.73
Temporal Association	R	-0.43
	L	-0.25
Frontal Association	R	0.21
	L	0.64
Occipital Association	R	-1.62
	L	-1.93
Posterior Cingulate	R	0.15
	L	1.03
Anterior Cingulate	R	1.16
	L	1.81
Medial Frontal	R	-0.47
	L	0.39
Medial Parietal	R	-0.49
	L	0.20
Sensorimotor	R	-0.71
	L	-1.01
Visual	R	-1.03
	L	-1.22
Caudate Nucleus	R	-4.02
	L	1.63
Cerebellum	R	0.49
	L	0.08
Vermis	R	0.21
	L	0.08
Pons		-0.74
Average Association	R	0.03
	L	0.37
Averaged Cerebral		-0.01
Global Average		-0.04

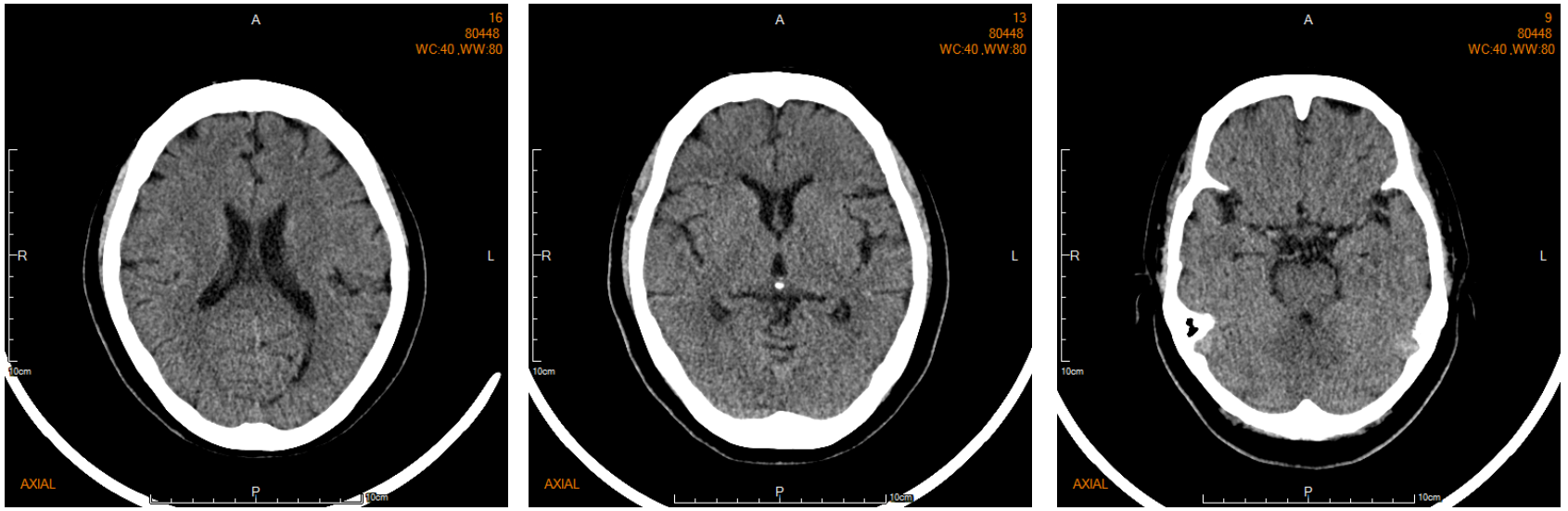
Early FTLD??

Case 4 : 59/F

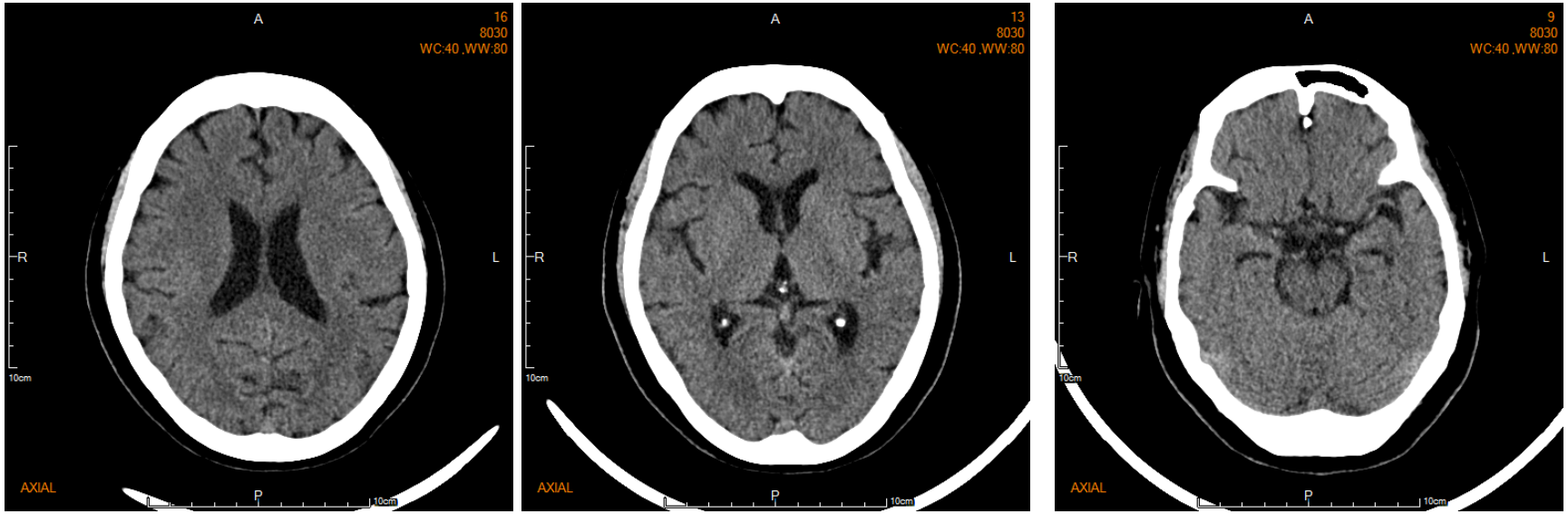
Since 2014-11

- Symptom:
  - 家人反應最一年來認知功能及記性持續減退
- Education level: 小學
- History:
  - HTN, DM, Dyslipidemia
  - Family history with dementia: mother, onset at 70 y/o; elder brother, onset at 60 y/o

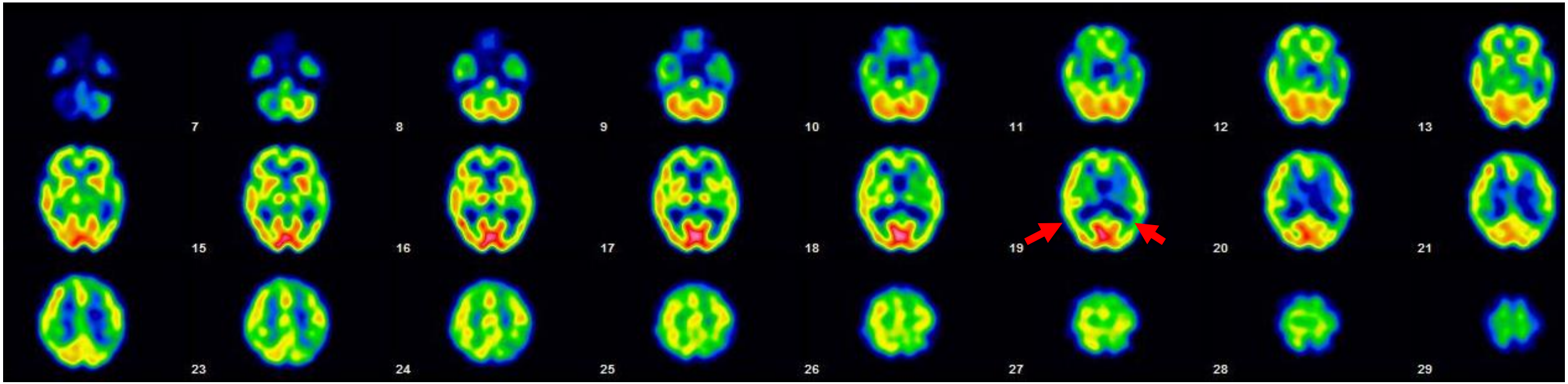
2014-11-11 Brain CT: no significant abnormal finding

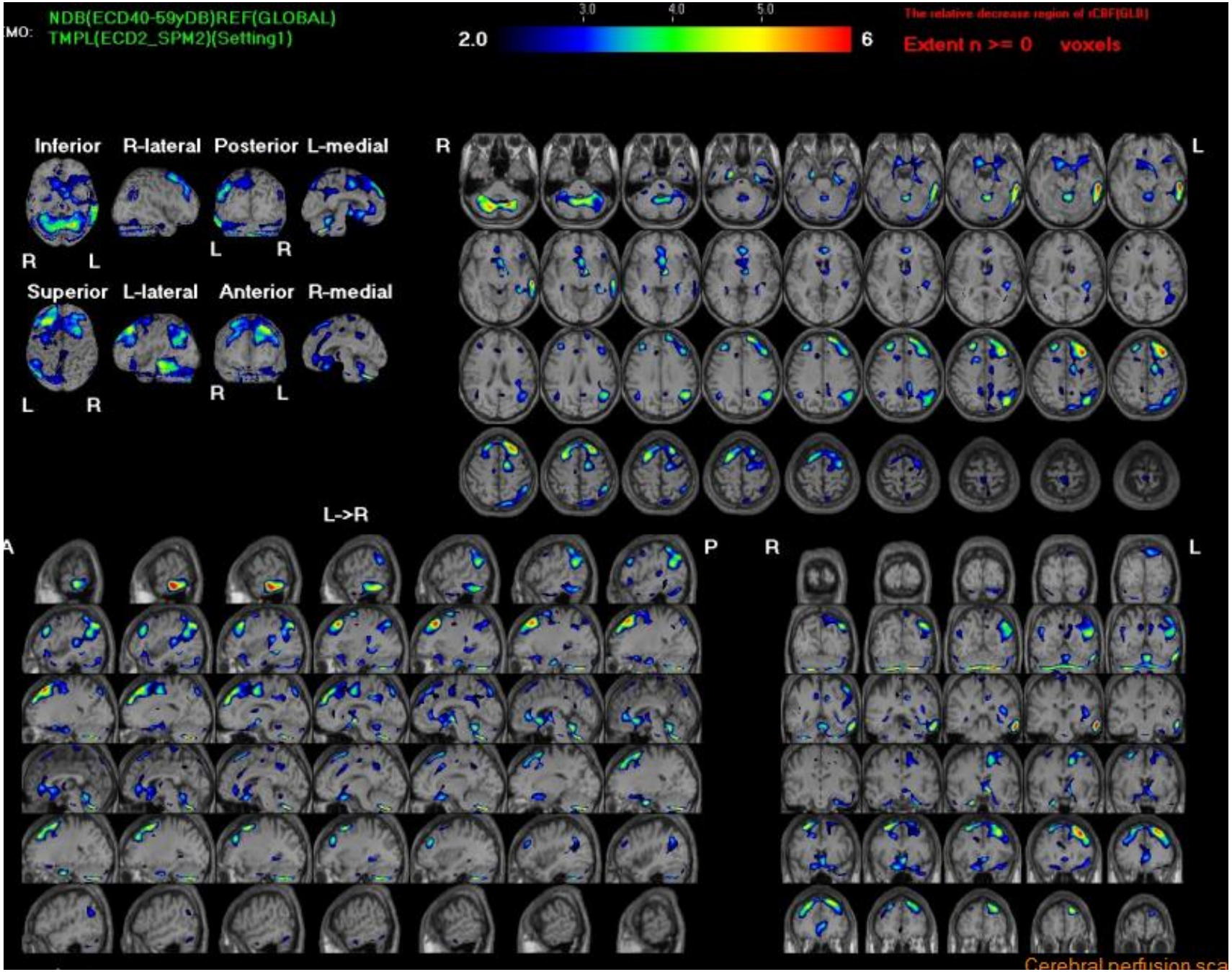


2016-5-27 Brain CT: no significant abnormal finding



2016-11-16



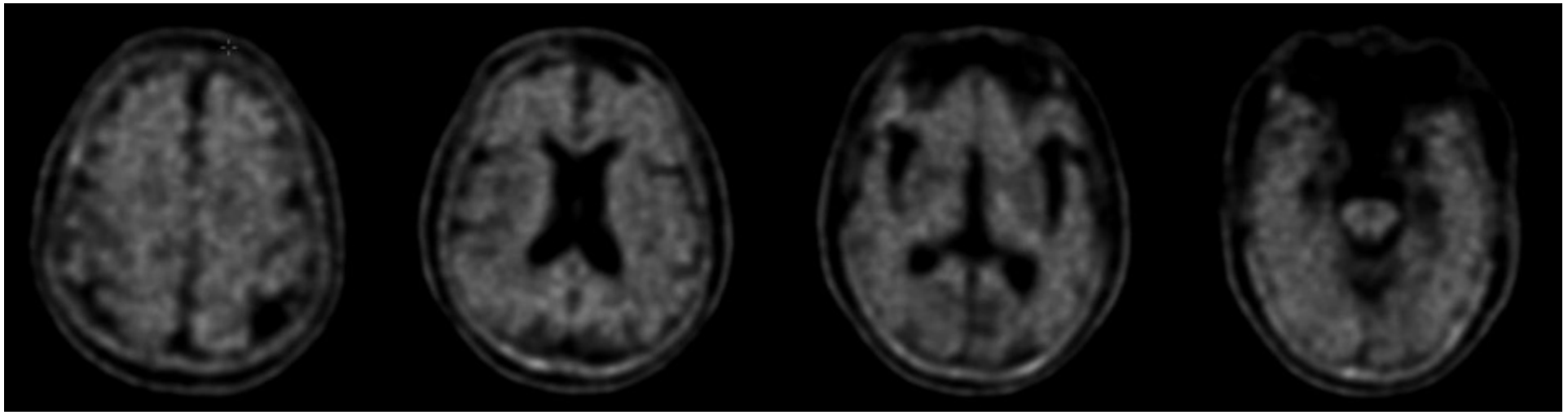

NDB(ECD40-59yDB)REF(GLOBAL)
TMPL(ECD2_SPM2)(Setting1)
2.0
3.0
4.0
5.0
6
Extent n >= 0 voxels
Inferior
R-lateral
Posterior
L-medial
Superior
L-lateral
Anterior
R-medial
R
L
L->R
A
P

- MMSE-psychophysiological exam: 12/30 (moderately)

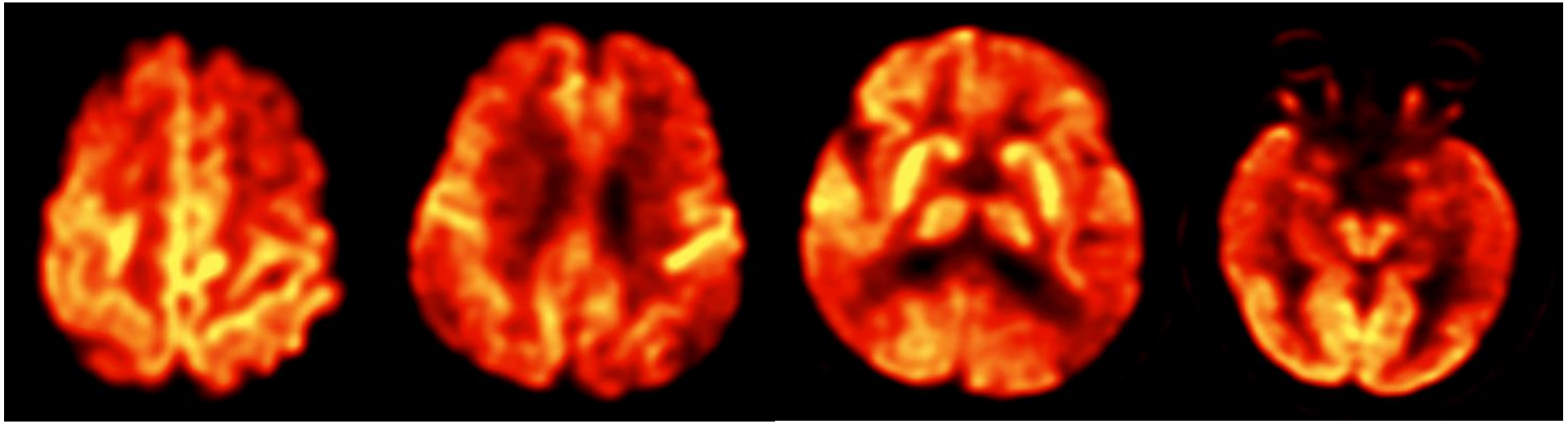
- Clinical impression:
  - Presenile dementia, suspected AD
    - Intolerance advance effect with nausea, vomiting
    - ECD showed mild hypoperfusion over frontal cortex
    - Progressive cognitive impairments

FBB PET scan: positive

2017-10-20



2017-10-23



FDG PET scan: Symmetrical and marked hypometabolism over the bilateral parietal, temporal and frontal lobes (left side predominant).

Medications

- Rivastigmine 4.5mg (Exelon) BID po since 2016-07
  - Favor AD, keep using cholinesterase inhibitor
- Shifted to Rivastigmine 10mg patch, due to intolerance GI side effects

Case 5 : 64/F

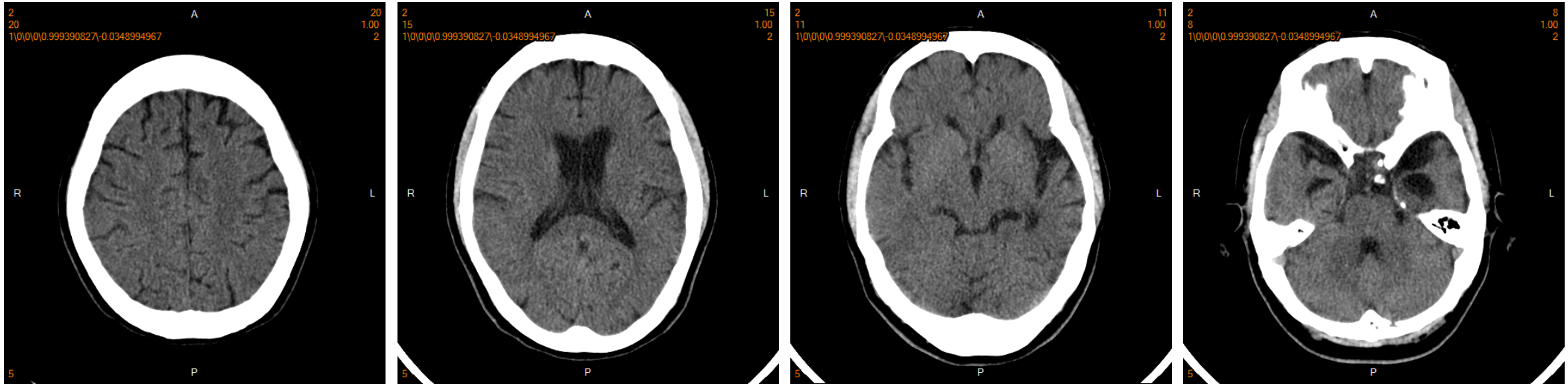
2017-7

- Symptom:
  - 最近半年來記性持續減退，方向感及社交能力變差
- Education level:高中
- History:
  - HTN, Dyslipidemia
  - Family history with dementia: -

- MMSE-psychophysiological exam: 19/30 (moderately)

2017-8-1 Brain CT

1. mild senile atrophy
2. old brain insults or marked atrophic change at left anterior temporal lobe



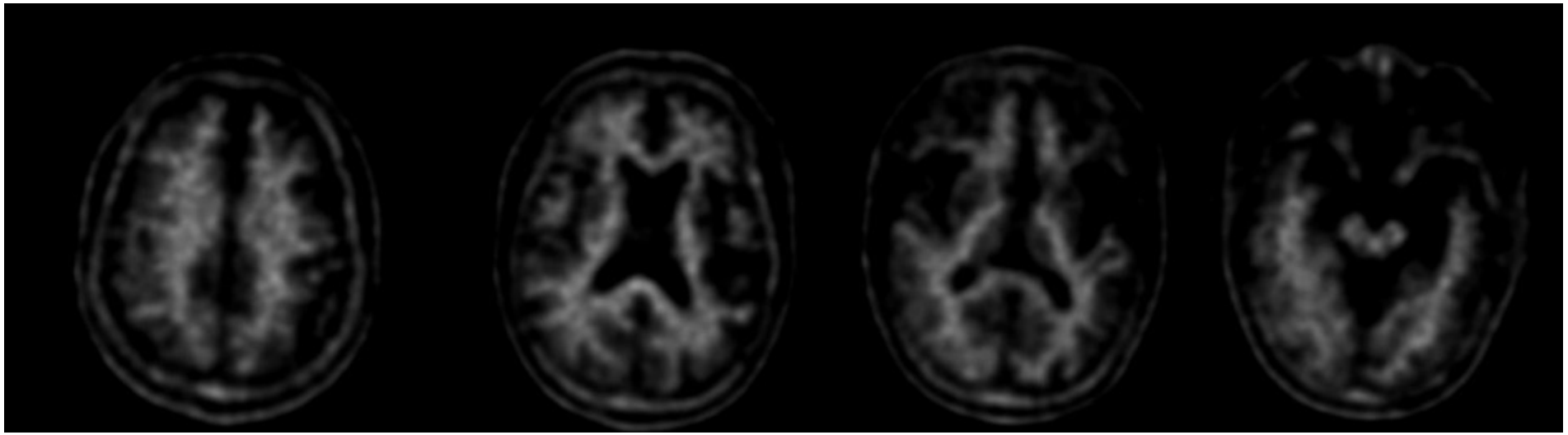
Clinical impression:

suspected Dementia

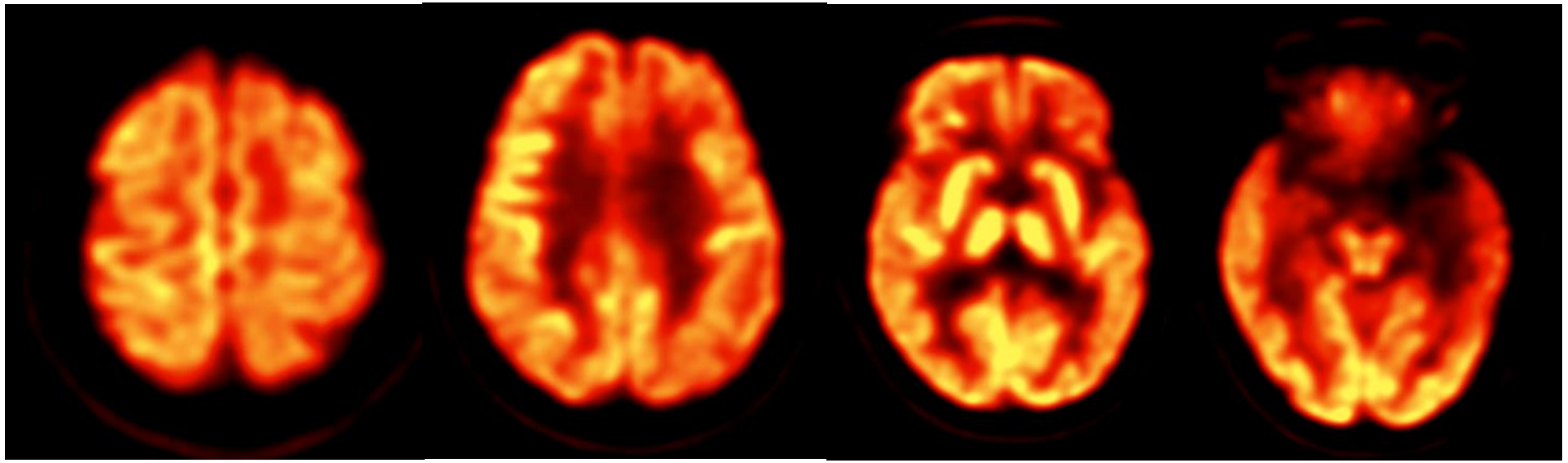
r/o AD or VD

FBB PET scan: negative

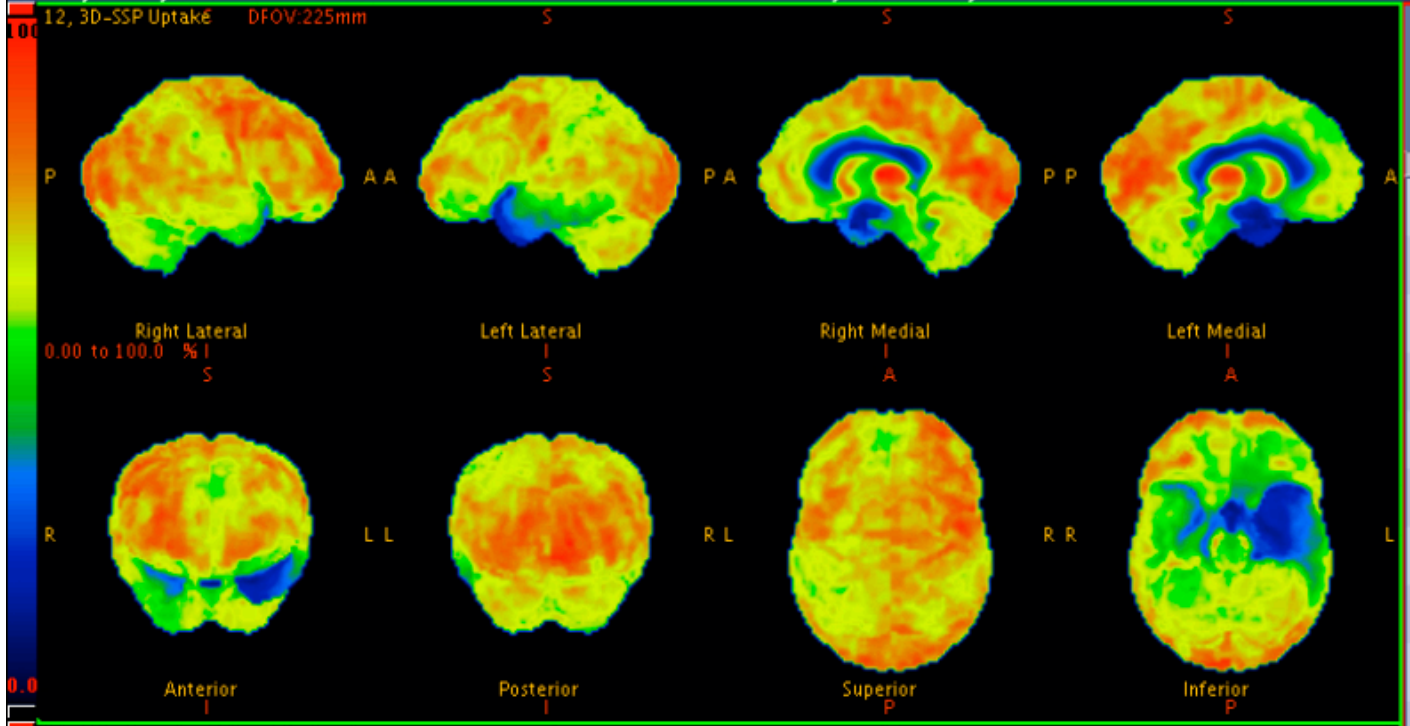
2017-10-2

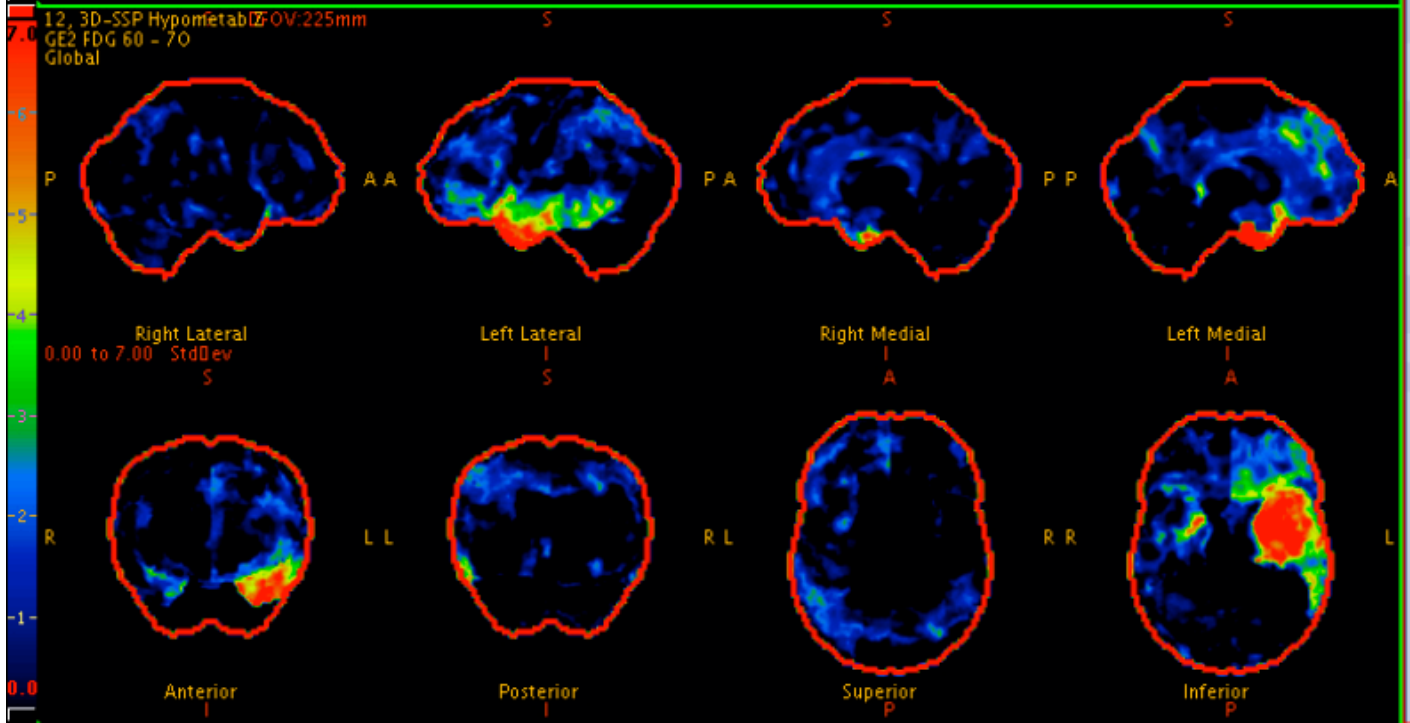


2017-10-23



FDG PET scan: An area of markedly decreased FDG uptake over the left anterior temporal lobe, probably due to old brain insults or atrophic change
r/i Dementia due to vascular disorder





3D-SSP Regional Hypometabolism (Z-Score)

Normals File: GE2 FDG 60 - 70

Normalized By: Global

Cortical Regions	R/L	Mean
Parietal Association	R	0.47
	L	1.24
Temporal Association	R	-0.08
	L	2.90
Frontal Association	R	-0.60
	L	0.99
Occipital Association	R	-0.99
	L	-0.75
Posterior Cingulate	R	0.30
	L	1.05
Anterior Cingulate	R	0.65
	L	1.36
Medial Frontal	R	-0.94
	L	0.12
Medial Parietal	R	-0.00
	L	0.39
Sensorimotor	R	-1.35
	L	-0.56
Visual	R	-1.15
	L	-0.47
Caudate Nucleus	R	0.11
	L	0.17
Cerebellum	R	-0.34
	L	-0.99
Vermis	R	-0.96
	L	-0.99
Pons		-1.96
Average Association	R	-0.28
	L	1.64
Averaged Cerebral		0.16
Global Average		0.05

Medications

- Rivastigmine 4.5mg (Exelon) BID po since 2017-10~11
  - DC due to less likelihood of AD

- Piracetam 1200 MG for VD
- Control hypertension and dyslipidemia

Case 6 : 49/M

2018-3

- Symptom:
  - 家屬(太太)陳述病患一年前開始有記性變差(短期記憶)，但病患本人覺得還好。

- Education level: 碩士

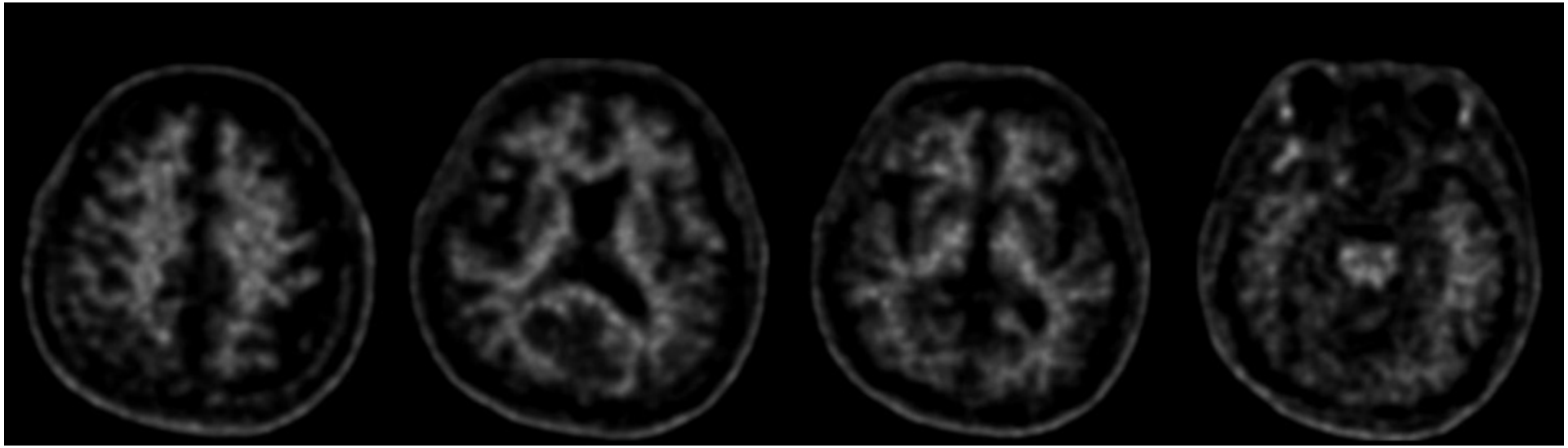
- History:
  - Spontaneous intraventricular hemorrhage, right thalamic AVM with acute hydrocephalus on 2015/11
  - AVM (4.5x4x5.3cm) at right parieto-occipital lobe s/p embolization on 2016/1, 2016/3
  - Denies head injury、HTN、DM、drugs abuse、CNS medications
  - Family history with dementia: -

- MMSE-psychophysiological exam: 27/30

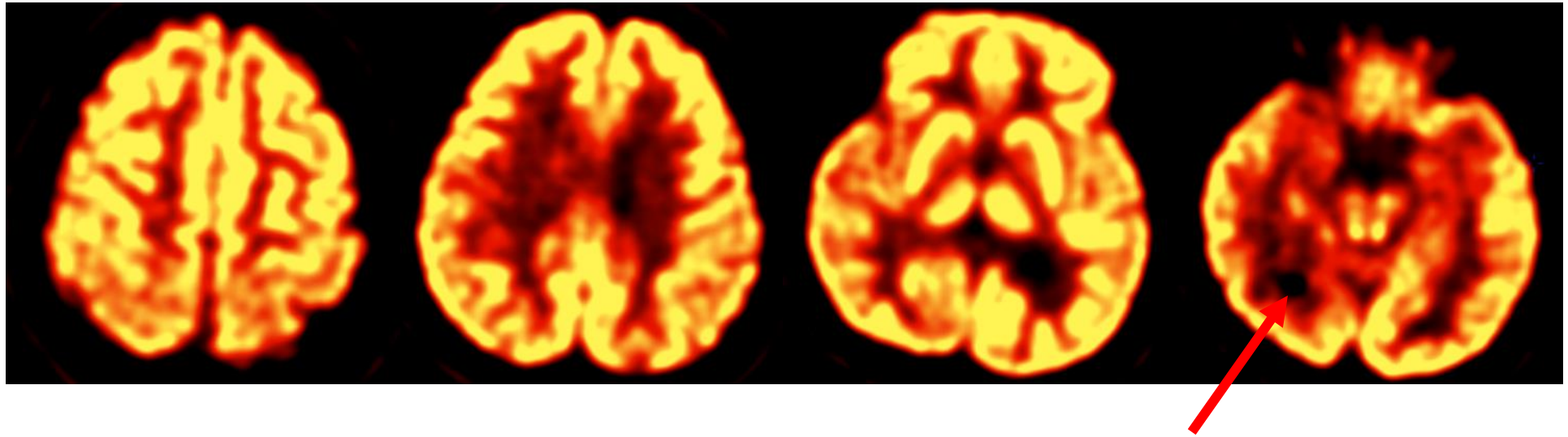
- Clinical impression:
  - Mild cognitive impairment
    - r/o **early AD** or **sequelae of AVM**

FBB PET scan: negative

2018-6-4

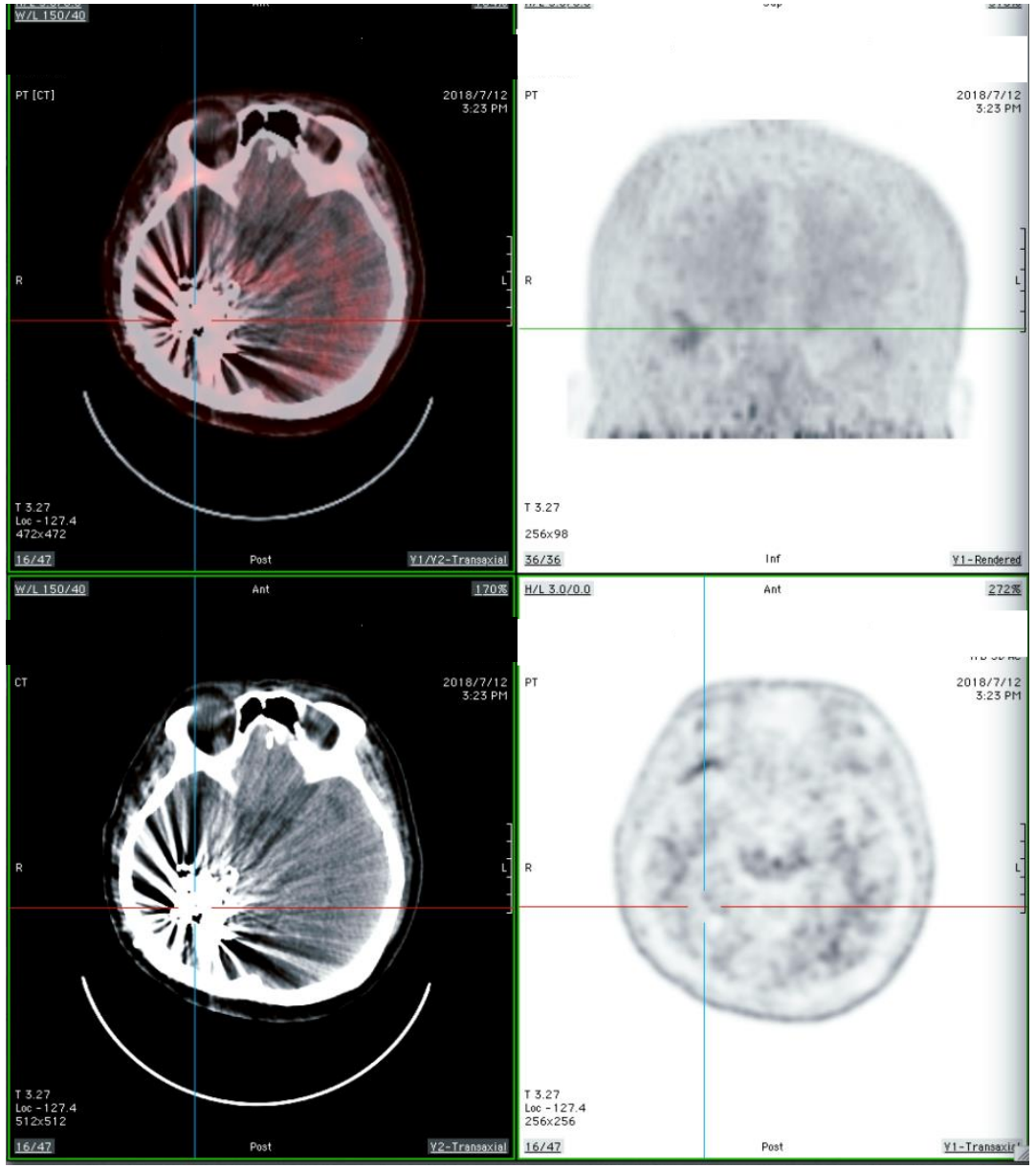


2018-5-28



FDG PET scan: right parieto-occipital lobe

AD less likely, CVA sequelae?


W/L 150/40
PT [CT]
2018/7/12
3:23 PM
R
T 3.27
Loc -127.4
472x472
16/47
Post
Y1/Y2-Transaxial
PT
2018/7/12
3:23 PM
R
T 3.27
256x98
36/36
Inf
Y1-Rendered
W/L 150/40
Ant
170%
CT
2018/7/12
3:23 PM
R
T 3.27
Loc -127.4
512x512
16/47
Post
Y2-Transaxial
H/L 3.0/0.0
Ant
272%
PT
2018/7/12
3:23 PM
R
T 3.27
Loc -127.4
256x256
16/47
Post
Y1-Transaxial

FBB PET

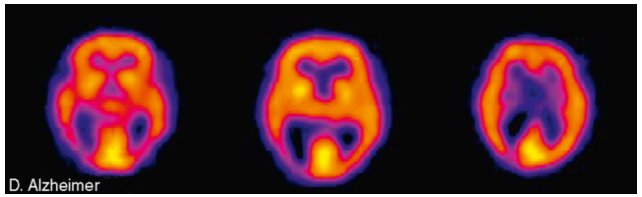
Summary

To evaluate MCI/dementia patients

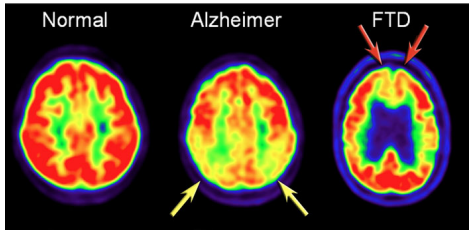
- Neuropsychological tests: MMSE, CDR…etc.
- Laboratory tests: NE, CSF tests…etc.
- **Neuroimaging:** Anatomical/Functional imaging

Nuclear Medicine in **Alzheimer's Disease**

- Brain Perfusion SPECT



- FDG PET



- Amyloid PET