

Comparison of FDG PET to Amyloid-beta (Aβ) PET in Patients with Mild Cognitive Impairment or Mild Dementia due to Alzheimer’s Disease



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Compared to Aβ PET as gold standard for the in vivo diagnosis of amyloid pathology, FDG PET shows reduced diagnostic sensitivity for those with mild cognitive impairment and older adults. A negative FDG PET does not exclude AD pathology. Relying on FDG PET alone for AD diagnosis misses 22% of amyloid positive patients.

INTRODUCTION AND METHODS

- FDG PET and amyloid (Aβ) PET are key biomarkers within the A/T/N framework.
- In the era of anti-amyloid therapies, accurate etiological confirmation is imperative.
- This study examined the diagnostic accuracy of FDG PET compared to quantitative Aβ PET as gold standard in retrospective cohort of 204 participants from the AIBL study of ageing with clinically diagnosed MCI (n=128) or mild dementia (n=76) due to presumed AD.
- FDG PET with Neurostat 3D-SSP outputs were visually interpreted by an expert radiologist for typical pattern of AD hypometabolism.

- Aβ PET was assessed visually and quantified by standard CL method (positivity set at CL > 25).
- Three further readers (novice, advanced beginner and proficient) independently reviewed Aβ PET scans for inter-observer analysis.
- We explored the influence of age and CL thresholds on diagnostic accuracy, and inter-observer agreement for Aβ PET.

Table 1. Concordance between FDG and Aβ PET

Clinical diagnosis	True positive	False positive	True negative	False negative
	Aβ + FDG +	Aβ - FDG +	Aβ - FDG -	Aβ + FDG -
All (n=204)	128 (62.7%)	13 (6.4%)	30 (14.7%)	33 (16.2%)
MCI (n=128)	70 (54.7%)	8 (6.3%)	26 (20.3%)	24 (18.7%)
Dementia (n=76)	58 (76.3%)	5 (6.6%)	4 (5.3%)	9 (11.8%)

RESULTS

Using quantitative Aβ PET as gold standard, FDG PET had:

- Lower sensitivity for detecting AD in people with MCI (74% vs 87% mild dementia).
- Discordant cases (Aβ+ FDG -) had lower CL (MCI: 84.1 vs 105.9; mild dementia 75.2 vs 105.9) and higher MMSE in dementia only (25.2 vs 22.5).
- Lower sensitivity for detecting AD in people aged ≥76 years (73% vs 82% aged ≤75 years).
- Increased sensitivity (83.2% vs 79.5%) and NPV (60.3% vs 47.6%) with AB PET positivity threshold of 50CL vs 25CL.

Inter-observer agreement for AB PET was fair (Aβ κ=0.294). Poor concordance in mild cases.

CONCLUSIONS

- These findings support AβPET as the preferred diagnostic modality for amyloid pathology particularly in MCI and older patients.
- It reinforces the role of FDG PET in disease staging which should be aligned with clinical diagnostic pathways and funding for diagnostic tests.

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Figure 1. Discordant case with false negative FDG PET (top) and positive AB PET (below)

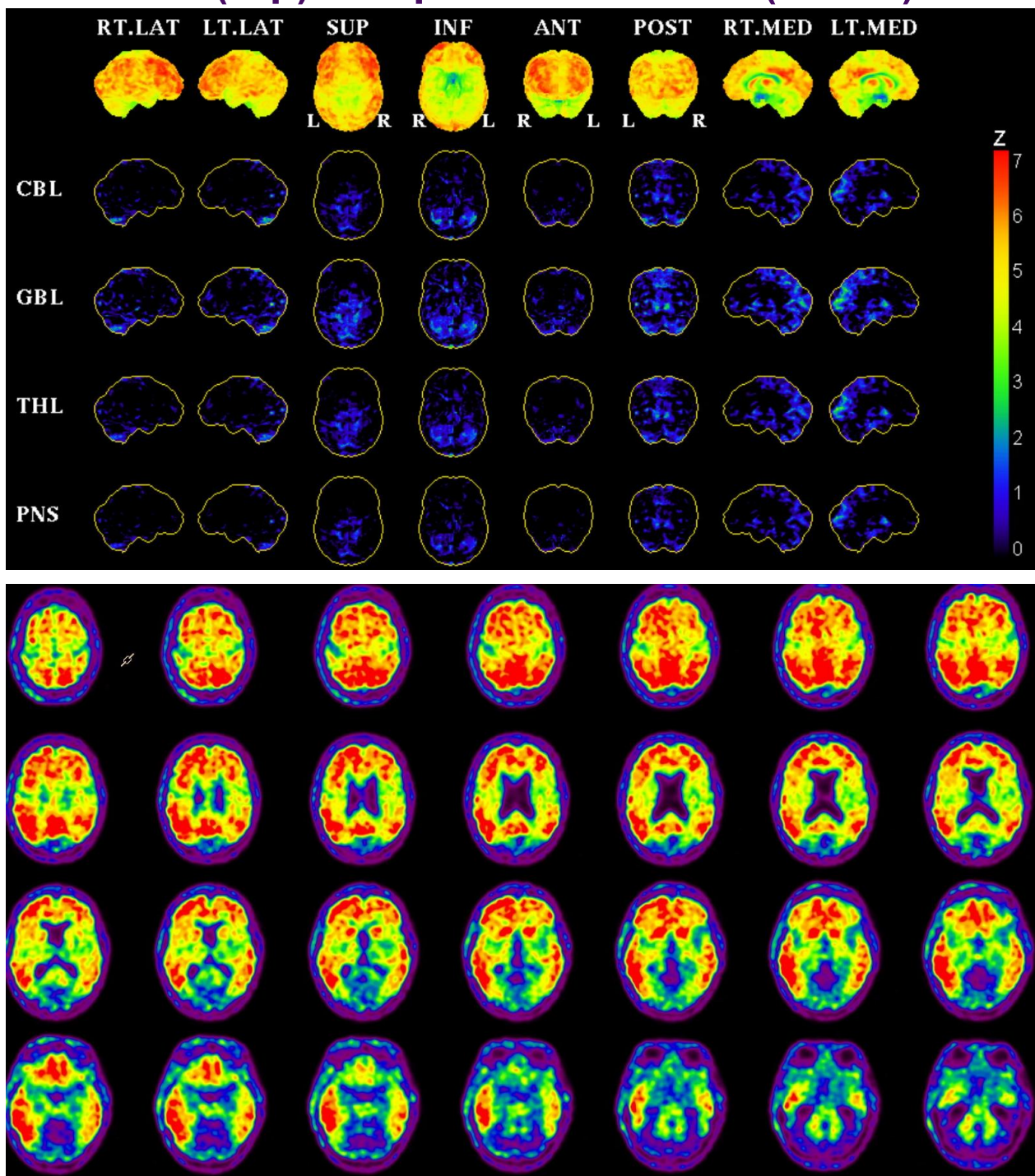


Table 2. FDG PET findings for discordant cases

	MCI	Dementia
Normal	11 (45.8%)	2 (22.2%)
FTD	3 (12.5%)	3 (33.3%)
Semantic Dementia	4 (16.7%)	1 (11.2%)
Non-specific	6 (25%)	3 (33.3%)