

One Scan, Two Biomarkers: Early-phase Amyloid PET as a Functional Alternative to FDG-PET in Alzheimer's Disease

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BACKGROUND

Early diagnosis of Alzheimer's disease requires the integration of molecular and functional biomarkers. While amyloid positron emission tomography provides in vivo molecular characterization, cerebral glucose metabolism is traditionally assessed using fluorodeoxyglucose positron emission tomography, often requiring an additional scan.

Emerging evidence suggests that the early acquisition phase of amyloid positron emission tomography captures clinically relevant functional brain information.

We aimed to evaluate whether early-phase amyloid positron emission tomography provides functional information comparable to fluorodeoxyglucose positron emission tomography, supporting a one-scan diagnostic paradigm for Alzheimer's disease.

METHODS

We conducted a focused scoping review of human studies assessing early-phase amyloid positron emission tomography as a marker of cerebral perfusion or metabolism in cognitively unimpaired individuals, patients with mild cognitive impairment, and Alzheimer's disease. A PubMed search using the term "early phase amyloid PET" combined with Alzheimer's disease identified studies published between 2021 and 2025. Six clinical studies directly comparing early-phase amyloid positron emission tomography with fluorodeoxyglucose positron emission tomography or established perfusion-based measures were included in the core analysis. Data on radiotracers, early acquisition windows, study populations, comparators, and functional outcomes were systematically extracted.

RESULTS

Across six clinical studies using different amyloid tracers and heterogeneous early acquisition windows, early-phase amyloid positron emission tomography consistently reproduced fluorodeoxyglucose positron emission tomography-like functional patterns at both group and individual levels. High regional correlations were reported, particularly in Alzheimer's disease-vulnerable regions such as the posterior cingulate cortex, precuneus, and parietotemporal areas. Several studies demonstrated accurate patient-level functional pattern recognition comparable to fluorodeoxyglucose positron emission tomography, while others confirmed that early-phase amyloid positron emission tomography reflects true cerebral perfusion, supporting its biological validity as a functional biomarker.

CONCLUSIONS

Early-phase amyloid positron emission tomography provides clinically meaningful functional information comparable to fluorodeoxyglucose positron emission tomography.

These findings support a more efficient diagnostic approach, in which a single amyloid positron emission tomography scan delivers both molecular and functional insights, with particular relevance for early detection and diagnostic optimization in Alzheimer's disease.

