

The who, when, why, and how of PET Amyloid imaging in management of Alzheimer's disease—review of literature and interesting images

ABSTRACT

Amyloid imaging using positron emission tomography (PET) has an emerging role in the management of Alzheimer's disease (AD). The basis of this imaging is grounded on the fact that the hallmark of AD is the histological detection of beta amyloid plaques ($A\beta$) at post mortem autopsy. Currently, there are three FDA approved amyloid radiotracers used in clinical practice. This review aims to take the readers through the array of various indications for performing amyloid PET imaging in the management of AD, particularly using 18F-labelled radiopharmaceuticals. We elaborate on PET amyloid scan interpretation techniques, their limitations and potential improved specificity provided by interpretation done in tandem with genetic data such as apolipoprotein E (APO) 4 carrier status in sporadic cases and molecular information (e.g., cerebral spinal fluid (CSF) amyloid levels). We also describe the quantification methods such as the standard uptake value ratio (SUVr) method that utilizes various cutoff points for improved accuracy of diagnosing AD, such as a threshold of 1.122 (area under the curve 0.894), which has a sensitivity of 92.3% and specificity of 90.5%, whereas the cutoff points may be higher in APOE ϵ 4 carriers (1.489) compared to non-carriers (1.313). Additionally, recommendations for future developments in this field are also provided.

Keyword : Alzheimer's disease; Diagnostic imaging; Molecular imaging; Precision medicine; Quantification; Nuclear medicine; 18F-FDG; PET; Neurocognitive disorder