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EDITORIAL

Collection on molecular imaging in neurodegeneration

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The prevalence and incidence of neurogenerative diseases, such as Alzheimer's disease (AD), Parkinson's disease (PD), and amyotrophic lateral sclerosis (ALS) are rapidly increasing with the aging society [1, 2]. Clinical assessment and traditional FDG imaging offer limited accuracy in the early and differential diagnosis of neurodegenerative diseases. Molecular imaging, including positron emission tomography (PET) and single photon emission computed tomography (SPECT), along with functional and structural imaging by magnetic resonance imaging, provides precision approaches to facilitate the diagnosis of neurogenerative diseases [3–5].

Extracellular aggregations of β-amyloid (Aβ) plaques, intracellular hyperphosphorylated tau as neurofibrillary tangles, and neurodegeneration are considered the "A/T/N" pathological hallmark of AD [6–8]. Amyloid and tau PET imaging has demonstrated the clinical utility, providing tools to evaluate the disease stages, improve the diagnostic accuracy, and monitor the efficacy of interventions. Moreover, amyloid PET is expected to have greater utility after the approval of anti-Aβ immunotherapies, such as lecanemab and aducanumab by FDA [9, 10].

α-Synuclein plays an important role in PD, PD dementia (PDD), dementia with Lewy bodies (DLBs), and multiple system atrophy (MSA). PET tracer development targeting α-synuclein is challenging, partly due to the low availability, intraneuronal location, and co-morbidity with Aβ and tau. Recently, [^{18}F]F-0502B was developed as a promising lead compound for imaging α-synuclein; however, the clinical data is yet to be reported [11]. Therefore, it is also important to present the latest results of α-synuclein molecular imaging, especially when compared with routinely used DATscan and FDG PET imaging.

Beyond these targets, several novel tracers for TAR DNA-binding protein 43 in ALS, synaptic markers including synaptic vesicle glycoprotein 2A, metabotropic glutamate receptor 5, and N-methyl-D-aspartate receptor, as well as astrocytosis have being developed. It is essential to further investigate their involvement and roles in the disease development, and their association with plasma and cerebro-spinal fluid markers.

Therefore, this collection aims to present the results of molecular imaging in neurodegeneration, including the development of radiotracers, interesting results from new tracers, new methods for data analysis, and new findings in neurodegeneration with molecular imaging approaches. We invited researchers to submit original research articles, case series, or reviews for this collection issue.

Data availability Data availability statement is not applicable for this editorial.

Declarations

Ethical approval Institutional Review Board approval was not required because the paper is an editorial.

Informed consent Not applicable

Conflict of interest The authors declare no competing interests.

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