

▶ New PET Tracers in Neurology

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Oncological PET applications have grown rapidly over the last two decades. However, with development of new PET tracers, specifically A β tracers for Alzheimer Disease (AD), molecular neuroimaging with PET expected to become more widely available in clinical practice over the next few years.

Amyloid Imaging:

18F-FDG is initially developed for neuroimaging and still the most commonly used radiotracer for AD. After development of C-11 labelled Pittsburgh Compound B (PiB), amyloid PET become one of the major elements in research of Alzheimer Disease¹. Short half-life of C-11 limited usage of Amyloid PET outside of research studies for years. However, F-18 labelled amyloid PET tracers have long half-life and can be used in any hospital which has a PET scanner. Three amyloid PET tracers (18F-florbetapir, 18F-flutemetamol, and 18F-florbetaben) were approved by FDA within the last couple of years².

A positive amyloid imaging increases confidence in the diagnosis of AD and allows early and appropriate symptomatic treatment, which is helpful in atypically young-onset dementia[2]. According to Amyloid Imaging Task Force the appropriate clinical indications of amyloid PET includes patients with persistent or progressive unexplained mild cognitive impairment, patients satisfying core clinical criteria for possible AD, and patients with atypically young-onset dementia[1]. Indications are expected to grow by development of new therapies for AD.

Academic Neuroimaging Tracers:

The development of PET probes for molecular neuroimaging is one of the most active areas in research and many radiopharmaceuticals are under way in academic laboratories. The biochemical integrity of presynaptic dopamine neurons can be assessed in Parkinson Disease with the PET tracers, 6-18F-fluoro-L-DOPA ([18F]FDOPA) or 6-18F-fluoro-meta-tyrosine ([18F] FMT)³. 11C-acetate showed promising results and can be a useful clinical examination for Multiple Sclerosis⁴. 11C-Choline is a useful tool for distinguishing recurrent brain tumor from radionecrosis compared to F-18 FDG PET/CT and MRI.⁵ Changes of 18F-FLT uptake in brain tumors are highly predictive of progression-free and overall survival in patients with recurrent malignant⁶. 2[18F]-fluoro-A85380 and [11C]PK11195 bind to α 4 β 2 which has a key role in the inflammatory reaction underlying cerebral ischemia⁷. [18F]fluoro-ethyl-L-tyrosine (FET) and [11C]methionine (MET) may have a role in imaging of gliomas⁸.

Conclusion:

PET is broadening its indications by development of new radiotracers for cardiology, neurology, and oncology. Switching to [18F]-labelled tracers overcome logistical problems and decrease costs with wider availability of 18F. Obtaining high quality evidence for indications and appropriate use of radiotracers remains the primary objective.

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