POSITRON EMISSION TOMOGRAPHY IMAGING WITH A NOVEL VESICULAR MONOAMINE TRANSPORTER 2 LIGAND (\(^{18}\)F-FP-(+)-DTBZ) IN PATIENTS WITH PARKINSON DISEASE AND HEALTHY SUBJECTS

Y.H. Weng\(^1\), K.J. Lin\(^2\), H.C. Kang\(^2\), C.S. Lu\(^1\), W.Y. Lin\(^1\), T.C. Yen\(^2\)

\(^1\)Department of Neurology, \(^2\)Department of Nuclear Medicine, Chang Gung Memorial Hospital and University, Taoyuan, Taiwan R.O.C.

Introduction: Parkinson's disease (PD) is the secondary most common neurodegenerative disease in the elderly population. PD is caused by the apoptosis of nigral dopaminergic neurons and the consequent loss of dopaminergic terminals in the striatum. Vesicular monoamine transporter type 2 (VMAT2), mainly located on synaptic vesicles at monoamine-containing nerve terminals, is responsible for the vesicular packaging and storage of dopamine. Previous PET studies with \(^{11}\)C-labeled dihydrotetrabenazine had proved that the striatal VMAT2 density was significantly decreased in PD patients. A novel VMAT2 ligand with longer half-life, \(^{18}\)F-(+)-fluoropropyldihydrotetrabenazine (\(^{18}\)F-FP-(+)-DTBZ, \(^{18}\)F-AV-133), has been recently developed. Our previous study had demonstrated that \(^{18}\)F-FP-(+)-DTBZ was safe, with appropriate biodistribution and radiation dosimetry for imaging VMAT2 sites in humans.

Aims: Expand our previous study to test the usefulness of \(^{18}\)F-FP-(+)-DTBZ PET imaging in the diagnosis and monitoring of PD.

Methods: 30 PD patients and 15 age- and gender-matched healthy subjects were enrolled. The standard uptake value ratios (SUVR) of \(^{18}\)F-FP-(+)-DTBZ were calculated using volume-of-interest-based (VOI) analyses.

Results: In PD patients, the SUVR of \(^{18}\)F-FP-(+)-DTBZ in the caudate nucleus and putamen were significantly decreased than those of healthy subjects (all p< 0.01). The reduction of VMAT2 density was most obvious (61%) in the contralateral posterior putamen (the hemisphere opposite to the dominantly symptomatic limbs). The SUVR in the caudate and ipsilateral putamen significantly correlated with the disease duration and motor scores.

Conclusions: PET imaging with \(^{18}\)F-FP-(+)-DTBZ is a useful tool in the differential diagnosis of PD from healthy subjects.