Imaging Nigrostriatal Dopaminergic Deficit in Holmes Tremor with ^{18}F-PR04.MZ-PET/CT

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Abstract: Holmes tremor is an infrequent clinical syndrome characterized by unilateral rest, postural, and action tremor often secondary to a brain lesion. We herein report an interesting case of Holmes tremor studied with PET and ^{18}F-PR04.MZ, a new high-affinity radioligand for dopamine transporters, currently under investigation at our center. ^{18}F-PR04.MZ-PET can be useful to study the integrity of the nigrostriatal dopaminergic system to improve diagnosis and therapeutic outcome in patients with Holmes tremor and Parkinson disease.

Key Words: ^{18}F, dopamine transporters, PET imaging, Holmes tremor, movement disorders

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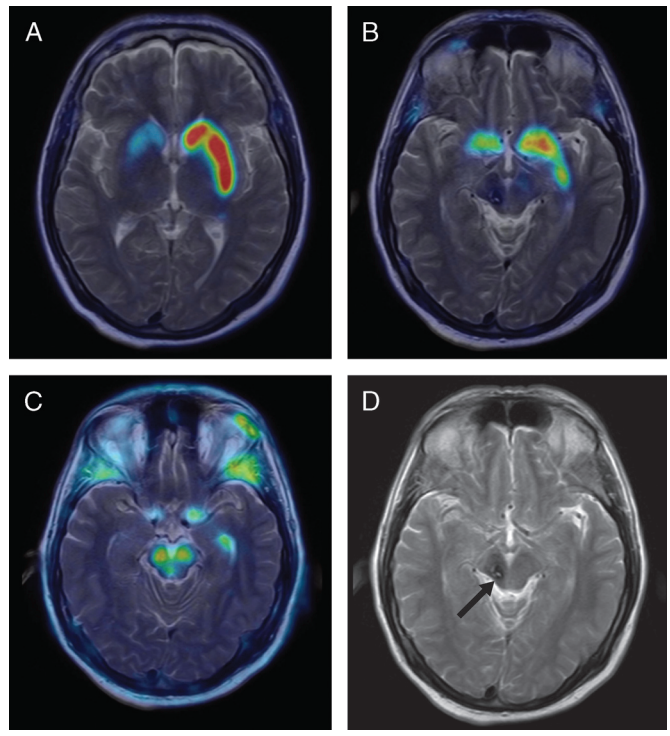

FIGURE 1. Holmes tremor is an infrequent clinical syndrome characterized by unilateral rest, postural, and action tremor often secondary to a brain lesion.[1] Some of these patients present a nigrostriatal pathway dopaminergic deficiency,[1–3] and they usually respond to dopaminergic (ie, levodopa) therapy.[2,3] The nigrostriatal dopaminergic deficiency is also apparent in patients with Parkinson disease, which has been extensively studied by PET.[4,5] ^{18}F-PR04.MZ is a new, high-affinity radioligand for dopamine transporters,[6] currently under human investigation at our center.[7] It provides an excellent visualization of the dopaminergic nigrostriatal pathway, including the midbrain region.[8,9] The following 51-year-old male patient presented a sudden-onset left hemiplegia secondary to mesencephalic hemorrhage from a cavernoma. Six months after, he developed a progressive left-side, low-frequency rest, postural, and action tremor. He exhibited a marked reduction of tremor with levodopa/carbidopa. The patient was referred to our center to determine the extent of the lesion and its impact on dopaminergic innervation by ^{18}F-PR04.MZ PET/CT. The PET/MRI fusion image shows marked dopaminergic depletion in the striatal region (**A**) caused by the brain lesion in the nigrostriatal pathway (**B**). In contrast, dopaminergic activity from the substantia nigra was not reduced as demonstrated in axial view of the midbrain region (**C**). The MRI image (**D**) shows the sequelae of midbrain hemorrhage. ^{18}F-PR04.MZ-PET can be useful to study the integrity of the nigrostriatal dopaminergic system to improve diagnosis and therapeutic outcome in patients with Holmes tremor and Parkinson disease.