

New semiquantitative assessment of ^{123}I -FP-CIT by an anatomical standardization method

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We evaluated a new semiquantitative procedure to more easily and objectively estimate the striatal uptake of ^{123}I -FP-CIT in patients with Parkinsonian syndrome (PS) and essential tremor (ET), using an anatomical standardization method, the Neurostat. **Methods:** Eleven patients with PS and 8 with ET were examined by clinical assessment and ^{123}I -FP-CIT SPECT imaging. The modified Hoehn and Yahr Staging Scale and Unified Parkinson's Disease Rating Scale (UPDRS) were used to assess the stage and severity of the disease. The co-registered MR and SPECT images were created with fusion software included in Neurostat. On the cross section, which shows the largest area of striate, irregular shaped regions of interest corresponding to the striate and occipital cortex were drawn. Then the ratio of specific striatal uptake to non-specific occipital cortex, $V3''(\text{F})$, was calculated. Another calculation was done by VOIClassic, which is a software included in Neurostat to estimate the counts per voxel of anatomically defined regions such as caudate nucleus, putamen, occipital cortex, and total cortex. Using these count data, the ratio of specific striatal uptake to non-specific occipital cortex, $V3''(\text{OC})$, and total cortex, $V3''(\text{TC})$, was calculated. **Results:** A fair linear correlation was observed between $V3''(\text{OC})$ and $V3''(\text{F})$ ($y = 1.53x + 1.40$; $r = 0.756$; $p < 0.01$), as well as between $V3''(\text{TC})$ and $V3''(\text{F})$ ($y = 1.24x + 1.43$; $r = 0.713$; $p < 0.01$). Both $V3''(\text{OC})$ and $V3''(\text{TC})$ yielded similar tendencies. Concerning discrimination between ET and PS, there was a significant difference between the mean $V3''$ of PS and ET ($p < 0.01$). Concerning the correlation between $V3''$ value and the severity of PS, the UPDRS motor score significantly correlated with the $V3''(\text{F})$ value ($r_s = -0.816$). However, $V3''(\text{OC})$ and $V3''(\text{TC})$ correlated less with UPDRS ($r_s = -0.667$ and -0.645 , respectively). **Conclusions:** Semiquantitative parameters, $V3''(\text{OC})$ and $V3''(\text{TC})$, calculated by VOIClassic including the Neurostat system are useful and easily calculable parameters as well as $V3''(\text{F})$ for the differential diagnosis of PS from ET.

Key words: ^{123}I -FP-CIT, Parkinson's disease, dopamine transporters, single-photon emission computed tomography, anatomical standardization