Dopamine D₂ receptor SPECT imaging: Basic *in vivo* characteristics and clinical applications of ¹²³I-IBZM in humans

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The purposes of this study are to evaluate the utility of kit formulation, the basic *in vivo* characteristics, and clinical usefulness of dopamine D₂ receptor imaging with ¹²³I-(S)-(–)-3-iodo-2-hydroxy-6-methoxy-N-[(1-ethyl-2-pyrrodinyl)methyl]-benzamide (¹²³I-IBZM). We studied 22 normal controls, 3 early symptomatic Huntington's disease patients, and 1 patient with visual hallucination on and off neuroleptics. ¹²³I-IBZM could be conveniently prepared with a high degree of purity from a kit, but with relatively low radiochemical yield. We demonstrated ¹²³I-IBZM receptor binding equilibrium by performing serial SPECT scanning in a normal volunteer. The basal ganglia/frontal cortex (BG/FC) ratios plateaued after the specific binding reached equilibrium approximately 60 minutes after injection. The BG/FC ratio declined significantly with age. The ratios for the Huntington's disease patients were significantly lower than those for normal controls. The images of the patient off neuroleptic therapy showed dramatically increased BG activity compared with those obtained while on therapy. The BG/FC ratio provides an estimate of B_{max}/K_d and hence the receptor density. It appears important to perform SPECT early in the equilibrium phase and at a fixed time after injection to obtain significantly high signal to noise ratios. ¹²³I-IBZM is an ideal tracer for SPECT including a rotating gamma camera type which can provide estimates of the receptor density objectively by calculating the BG/FC ratio, and is a promising agent for the investigation of dopamine D₂ receptors in clinical conditions.

Key words: single photon emission computed tomography (SPECT), ¹²³I-(S)-(–)-3-iodo-2-hydroxy-6-methoxy-N-[(1-ethyl-2-pyrrodinyl)methyl]-benzamide (¹²³I-IBZM), dopamine D₂ receptor, Huntington's disease, equilibrium analysis