

Spectral analysis applied to dynamic single photon emission computed tomography studies with N-isopropyl-p-(¹²³I)iodoamphetamine

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This study was performed to evaluate the usefulness of spectral analysis (SA) applied to dynamic single photon emission computed tomography studies with N-isopropyl-p-(¹²³I)iodoamphetamine (IMP). The unidirectional clearance of IMP from the blood to the brain tissue (K_1) obtained by SA (y (ml/g/min)) agreed well with that obtained from a two-compartment model using the nonlinear least-squares (NLSQ) method (x (ml/g/min)) ($y = 0.994x + 0.003$, $r = 0.999$, standard error of the estimate (SEE) = 0.005 ml/g/min). The rate constant for back diffusion of IMP from the brain tissue to the blood (k_2) obtained by SA (y (min⁻¹)) also agreed well with that obtained by the NLSQ method (x (min⁻¹)) ($y = 0.985x + 0.000$, $r = 0.948$, SEE = 0.001 min⁻¹). The brain vascular volume (V_0) obtained by SA (y (ml/g)) correlated well with that obtained by the NLSQ method (x (ml/g)) ($y = 1.138x + 0.000$, $r = 0.867$, SEE = 0.012 ml/g). These results indicate that SA is applicable and useful for quantification of the kinetic parameters of IMP in the human brain, and can be an alternative approach to compartment analysis.

Key words: spectral analysis, compartment analysis, dynamic SPECT studies, N-isopropyl-p-(¹²³I)iodoamphetamine