ORIGINAL ARTICLE

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Regional differences in distribution volume of I-123 IMP in the human brain: Effect on CBF calculated by ARG method

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Objective: Two methods of quantitating cerebral blood flow (CBF) with iodine-123-labeled *N*-isopropyl-*p*-iodoamphetamine (I-123 IMP) and a two-compartment model had been proposed; one is the table look-up (TLU) method and the other is the autoradiographic (ARG) method. The TLU method provides values of the cerebral blood flow (CBF) values and distribution volume of I-123 IMP (Vd) independently. In the ARG method, a fixed Vd is applied for the entire brain to calculate CBF. Our purpose was to evaluate regional differences in Vd in the human brain, or possible effects of regional differences in Vd on CBF calculated by the ARG method. ***Methods:*** In the present study, two SPECT scans were acquired from each of eight normal subjects (aged 44.0 ± 16.7) at 40 min and 180 min of mid-scan-time after intravenous 1 min infusion of 111 MBq IMP. A single arterial blood sampling was performed 10 min after the IMP infusion. All images were anatomically normalized and analyzed with SPM99 and Matlab. We generated CBF and Vd images for each subject by the TLU method and evaluated differences in Vd among brain structures. We subsequently generated another set of CBF images by the ARG method and examined differences between CBF calculated by the TLU method and that by the ARG method. ***Results:*** Significant main effects of subject and brain structure in Vd were observed (two-way ANOVA). Vd values were higher in the deep gray matter than in the cerebral cortical regions. Among the cerebral cortical regions, no significant difference in Vd was observed. In spite of the significant differences in Vd among the brain structures, the voxel-by-voxel analyses as well as the ROI analyses revealed no statistically significant difference between CBF calculated by the TLU method and that by the ARG method. ***Conclusions:*** Although regional differences in Vd were observed, the present results support the assumption that a fixed Vd does not cause significant error in the calculation of CBF by the ARG method.

Key words: iodine-123 IMP, ARG, cerebral blood flow, anatomical standardization, distribution volume