

Summary

Estimation and Optimization of the Use of Standard Arterial Input Function for Split-Dose Administration of N-Isopropyl-p[¹²³I]Iodoamphetamine

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Use of a standard arterial input function and calibrating it by a single blood sample or a continuous arterial blood sample has been researched for a repeat CBF assessment with split-dose administration of N-isopropyl-p[¹²³I]iodoamphetamine (IMP). **[Methods]** The study population consisted of 5 normal volunteers and 5 patients with cerebrovascular disease. IMP was injected twice (111 MBq/2 ml each) into the antecubital vein at a constant infusion speed for 1 min. The arterial input function was monitored during the study including a continuous measurement of radioactivity concentration of both the whole-blood and the octanol-soluble component (Real-Input Function, RIF). Standard input function was determined, and was calibrated either by a single blood sample or a continuous blood sample to estimate the Estimated-Input Function (EIF). Area-Under-the Curve (AUC)

was then compared between RIF and EIF. **[Results]** In case EIF was estimated with a single blood sample, the minimum error of estimated AUC was obtained when calibrated at 7 minutes after either the 1st or 2nd injections. Deviation of AUC for [0, 30] was $\pm 6.6\%$, and $\pm 5.0\%$, respectively. If calibrated with a continuous blood sample, the minimum error of AUC with the continuous blood sampling period of 10 min for [0, 30] and [30, 60] was $\pm 5.3\%$ and $\pm 4.0\%$, respectively. **[Conclusions]** AUC of EIF with either a single or continuous blood sampling appeared to have reasonably small errors, suggesting the validity of the use of standardized input function in the split-dose IMP SPECT.

Key words: Cerebral blood flow, N-isopropyl-p[¹²³I]iodoamphetamine, SPECT, Arterial input function, Flow reserve.