Summary

A Simple Method for Regional Cerebral Blood Flow Measurement by One-Point Arterial Blood Sampling and ^{123}I-IMP Microsphere Model (Part 2): A Study of Time Correction of One-Point Blood Sample Count

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In our previous paper regarding determination of the regional cerebral blood flow (rCBF) using the ^{123}I-IMP microsphere model, we reported that the accuracy of determination of the integrated value of the input function from one-point arterial blood sampling can be increased by performing correction using the 5 min : 29 min ratio for the whole-brain count. However, failure to carry out the arterial blood collection at exactly 5 minutes after ^{123}I-IMP injection causes errors with this method, and there is thus a time limitation. We have now revised our method so that the one-point arterial blood sampling can be performed at any time during the interval between 5 minutes and 20 minutes after ^{123}I-IMP injection, with addition of a correction step for the sampling time. This revised method permits more accurate estimation of the integral of the input functions. This method was then ap-plied to 174 experimental subjects: one-point blood samples collected at random times between 5 and 20 minutes, and the estimated values for the continuous arterial octanol extraction count (COC) were determined. The mean error rate between the COC and the actual measured continuous arterial octanol extraction count (OC) was 3.6%, and the standard deviation was 12.7%. Accordingly, in 70% of the cases, the rCBF was able to be estimated within an error rate of 13%, while estimation was possible in 95% of the cases within an error rate of 25%. This improved method is a simple technique for determination of the rCBF by ^{123}I-IMP microsphere model and one-point arterial blood sampling which no longer shows a time limitation and does not require any octanol extraction step.

Key words: Cerebral blood flow, ^{123}I-IMP, Microsphere model, SPECT.