

## Summary

### Estimation by Static SPECT of the Radioactivity Remaining after the First Dose of Two-fractionated $^{123}\text{I}$ -IMP Administration: The Rate of Increase in Cerebral Blood Flow by ARG and the Rate of Increase in SPECT Count

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We devised a method for estimating the radioactivity remaining after the first dose of two-fractionated tracer administration in the acetazolamide activation study in a facility where static SPECT is used for  $^{123}\text{I}$ -IMP cerebral blood flow scintigraphy. Three static SPECT scans were obtained over 9-min periods beginning 10 min after the first  $^{123}\text{I}$ -IMP administration, to estimate the remaining activity until after 60 min. In 72 patients at rest, 9-min SPECT was performed 6 times, and 11 different patterns of distribution and the fitting coefficient were obtained. The correlation between the actual measurement and the estimation at the mid scan time of 59.5 min could be expressed as  $y = 1.0064x - 1.9656$ , and  $r = 0.9972$  ( $p < 0.01$ ). The correlation between the first and second measurements of cerebral blood flow in 5 patients given two-fractionated administration at rest could be expressed as  $y = 0.9919x + 0.2978$ ,  $r = 0.9976$  ( $p < 0.01$ ), indicating the

usefulness of this method for estimating the radioactivity remaining after the first dose. In 57 patients with unilateral cerebrovascular disease, the cerebral blood flow on the unaffected side increased by  $55.4 \pm 13.1\%$ , whereas the blood flow in 19 regions exhibiting severe stenosis on the affected side was increased only  $1.4 \pm 10.5\%$  ( $p < 0.01$ ). In addition, the correlation between the rate of increase in cerebral blood flow and the rate of increase in SPECT count could be expressed as  $y = 0.8415x + 0.291$ , and  $r = 0.9979$  ( $p < 0.01$ ). Thus, with this method, the cerebral hemodynamic reserve test using the rate of increase in cerebral blood flow by the ARG method or the rate of increase in SPECT count can be completed within a day while maintaining the image quality of static SPECT.

**Key words:**  $^{123}\text{I}$ -IMP, SPECT, Acetazolamide, Cerebral perfusion reserve, Brain radioactivity.