

Error analysis of table look-up method for cerebral blood flow measurement by ^{123}I -IMP brain SPECT: Comparison with conventional microsphere model method

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While N-isopropyl-p-[^{123}I]iodoamphetamine (IMP) is commonly used as a flow tracer, significant clearance from the brain causes underestimation of CBF as compared with true CBF when conventional microsphere model analysis is applied. We previously reported a simple "table look-up" method for CBF measurement using IMP taking into account this clearance effect. The method is based on a two-compartment model, the K_1 (corresponding to CBF) and k_2 constants being obtained from a table from the ratio of the 1st SPECT (40 min) to the 2nd SPECT (180 min) counts. Arterial input data used were obtained by one point blood sampling 10 min after IMP infusion against the standard input function. In the present study, this approach was compared with conventional microsphere model analysis. For 30 subjects, the latter method entailed 8 min continuous arterial blood sampling after IMP infusion and the use of SPECT data at the end of this period, calibrated by a count ratio of 8 min/40 min planar images of whole brains. A good correlation was observed between the two methods ($r = 0.88$), but an overestimation of table look-up method CBF as compared with microsphere model CBF was observed contrary to theoretical predictions. Limitations in the estimation of SPECT data at 8 min, obtained with SPECT data at 40 min for calibration of the count ratio of 8 min/40 min whole brain planar images, might be responsible for this.

Key words: IMP, SPECT, cerebral blood flow, table look-up method