The r-CBF values were calculated by the method of area over height from Xe-133 clearance data. The r-MTT was determined by the method of the Zierler's theory.

In the non-focal areas there was significant linear correlation between r-CBF value and r-MTT value (Pr.<0.001). In the patients with arteriovenous malformation, the degree of the arteriovenous shunt was evaluated quantitatively.

Analysis of ^{131}Xe-clearance Curve in the Brain by Digital Simulation Method

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There are some differences between values for regional cerebral blood flow (rCBF) determined from ^{131}Xe-clearance curve by the various analytic methods. Statistical fluctuations convoluted on ^{131}Xe-clearance curve are said to be a cause for errors in rCBF values. We tried to elucidate these problems by means of digital simulation method.

Method: Based on two compartment theory of the brain, a model clearance curve without any fluctuations was constructed as a sum of two exponential curves which were related to the fast (fg) and the slow (fw) components respectively, where the weight ratio of the two components was assumed equal to 1.

At first, rCBF values were calculated from these simulated curves by stochastic analysis, initial slope analysis and two compartmental analysis in the varied settings of fg (30–50 ml/min/100g) and fw (10–40 ml/min/100b). These values for rCBF obtained by such procedures were compared.

Then, rCBF values were also calculated by the each analytic method from 100 model clearance curves with fluctuations, which were obtained by repeating the convolution of Poisson random numbers on one model clearance curve without fluctuations. The mean and the standard deviation (s.d.) were determined from these 100 values. The correlation between maximum counts (Ho) and errors (s.d./mean) was graphically shown.

Results:

1. Stochastic analysis gave usually 10–20% higher values than two compartmental analysis in the varied settings of fg and fw. It was difficult to find constant relationship between values obtained by initial slope analysis and two compartmental analysis. The differences between these values were 10–30%.

2. Errors due to statistical fluctuations were within 10% at 100 cps of the maximum counts (Ho), and within 2% at 1000 cps.