be used for diagnosis. On the other hand, the method of measuring regional cerebral blood flow is established and the way of calculating the result of measurement is about the same practised internationally. It is considered that minicomputer, if used in this field, will enable to obtain data quicker and more accurately, and will contribute to dispense with labor.

Regional cerebral blood flow measuring system is composed to a detecting unit consisted of eight 1″ detectors which can be slidden, a measuring unit provided with eight channels of PHA's and data processing unit provided with mini-computer.

The data processing unit is composed of a mini-computer provided with core memory having capacity of 7 kW, a CRT, a light pen, an XY recorder, and a teletypewriter used for printing out the result of measurement and for holding conversation between the system and operator.

The data processing unit stars acquiring eight channel data by synchronizing with injection of RI after confirming automatically that the system is operating properly, and display the uptake curve logarithmically on CRT after erasing the background ten minutes after measuring the regional cerebral blood flow. The typewriter prints on the teletypewriter the RCBF10, ISI, SMSI and PH of each channel the moment the operator points the intersecting point of fast component and slow component with the light pen. The number of detectors can be increased by installing more data counters and by modifying the program a little.

It is possible to obtain sufficient clinical cases in a short period of time, for this system did not require much man power and the time required from start of measurement of obtaining prints of final result was able to be shortened by far when compared with the customary hand calculation.

Measurement of Regional Cerebral Hemodynamics Using Tc-99m Pertechnetate and Xe-133

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The measurement of regional transit time through the vascular bed by non-diffusible indicator was performed in combination with the technique using diffusible indicator. The relation between regional cerebral blood flow (r-CBF) and regional cerebral blood mean transit time (r-MTT) was studied in the various pathophysiological states of the brain.

5 mCi of Xe-133 in 2 ml saline was injected into the internal carotid artery through the teflon catheter. 15 minutes after the measurement of Xe-133 clearance, 4 mCi of Tc-99m pertechnetate was also administered through the same catheter.

The date processing system consisted of a gamma scintillation camera, a cathode ray tube (CRT) and an online minicomputer assisted by a magnetic tape. The details of this system had been reported in the last convention of this society. Serial radioisotope data was fed into the computor memory and was stored in the magnetic tape. The area of interest was determined on the brain scintigram displayed on the CRT.

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.