M. Brain and Nervous System

Quantitative and Dynamic Study on Brain Scintigraphy in Patients with Cerebrovascular Accidents

T. Nukada and Y. Sugitani
*First Department of Internal Medicine, Osaka University Medical School, Osaka*

The brain scintigraphy has been applied as a routine clinical examination for detecting intracranial lesions. In cerebrovascular accidents, the peak incidence of positive brain scintigrams was observed during the second to third week after the onset. At the stage except above duration after the onset or in mild cerebrovascular accidents, equivocal brain scintigrams were often observed.

One of the purpose of this study was to evaluate brain scintigrams quantitatively and objectively. The bilateral collation method was applied for equivocal brain scintigrams. The results of the bilateral collation method could be displayed on CRT within one second. By using this method, the equivocal brain scintigrams were evaluated more exactly and objectively.

The dynamic study on brain scintigraphy consisted of the determination of distribution ratios of $^{99m}$Tc in lesion to control area, the analysis of focal RI-dilution curve and the measurement of brain blood mean transit time. The distribution ratios of $^{99m}$Tc in lesion to control area were less than 2.0. The focal RI-dilution curves obtained in cases of A-V malformation showed the shunt peak. The focal RI-dilution curves in early stage of cerebral infarction revealed the characteristic features involving prolonged arms to brain circulation time and prolonged mean transit time. The regional blood mean transit time were 6 to 7 seconds in normal subjects, 5 seconds in A-V malformation and 9 to 14 seconds in cerebral infarction respectively. The hemodynamic study on brain scintigraphy contributed to differential diagnosis of positive lesions and assumption of prognosis of cerebrovascular disease.

Regional Cerebral Blood Flow Measurement by Using Mini-Computer

K. Asahina, K. Saito and Y. Sato
*Medical Electronics Department, Toshiba Tamagawa Works, Kanagawa*

H. Kanaya
*Cerebral Nerve Surgery, Iwate Medical College, Iwate*

Data processing system for nuclear medicine using mini-computer is used generally for many purposes but it can not be said that it is practically used in routine work. It is mostly used for research purpose. For example, image processing of scintigram seems yet to be solved before it can
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 practiced internationally. It is considered that mini-computer, 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

T. Aoyama, Y. Yamauchi, Y. Sugitani, K. Tada, S. Yoneda and T. Nukada

First Department of Internal Medicine, Osaka University, Osaka

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 computer memory and was stored in the magnetic tape. The area of interest was determined on the brain scintigram displayed on the CRT.