expected to be solved or overcome in the future.

Using easily maneuverable language (ex. BASIC) it is time consuming as a routine clinical test in some data processing, such as calculations on each matrix element of scintigrams due to the limited core size.

Using assembler language, on the other hand, one can use the core effectively and shorten the processing time markedly but it is rather laborious to construct a program and furthermore it takes a good deal of training to be used to use the language freely.

As a conclusion we propose that for data processing in nuclear medicine core size should be extended or/and reasonable operating system should be developed so that the data processing could be done quickly even using easily maneuverable languages.

Radioisotope Image Processing by Minicomputer

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The configuration of computer system should be suitable for the present state of our system and also for the further progress of data processing system of nuclear medicine and should be low cost. There is an apparent limitation in faculty of data processing by means of minicomputer as compared with more larger computer, so the gradual addition of peripheral units is required economically. Then the configuration of open ended system is required.

In the Shinshu University Hospital, the radioisotope image processing system is composed of minicomputer (core memory: 16 Kw), 2 magnetic tape recorders, 3 cassette tape recorders, graphic display (TEKTRONIX-4010), hard copy, matrix input controller and image file device. In the radioisotope laboratory, it is not desirable to occupy a long time for data processing. In the recent data processing system, the man machine processing by dialog with computer is performed generally. Therefore the real time processing by remote terminal system becomes necessary for the radioisotope diagnostic process in the distant clinic with more information including charts and roentgenograms. Such a remote terminal system is set up in our clinic at low price and composed of remote minicomputer (core memory: 8 Kw), remote teletypewriter, TV camera, color display unit, color TV monitor and light pen. These compose also an image observing system independently of the radioisotope image processing system.

Our operating system program is designed for a single job system, but not for multi-task processing system i.e. TSS. For the enhancement of utilization rate of these main and remote systems, an operating system program which controls the run of 2 jobs parallel by scheduling is developed. By this 2 job monitor, the image sampling program as a main program and the data processing program as a subprogram are able to run parallel.

The scintillation camera combined with computer is suitable for the dynamic study. Therefore the dynamic study may be a great subject to be processed by this system. As the dynamic studies, the subtraction of brain images recorded in different time and the functional imaging of pancreas are programmed and demonstrated.

By the use of the image observing system in the clinic, the disfocusing, the contrast enhancement and the color display of ITV images make the lesion readily visible. The observation of these static images should be done by original scintigram.

The quantitative measurement of images is necessary for the statistical management, Therefore it is attempted to extract objective data concerning the size and area of liver form as well as of defects in liver images by the image observing system.

Use of Minicomputer for Dynamic Radionuclide Studies—A Measuring System of Regional Cerebral Blood Flow Using Digital Autoflouroscope and Minicomputer

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Dynamic studies using radionuclides have proved useful for detecting abnormalities in the functioning of various organ of the body. However, the studies using γ camera give so enormous data that application of a digital computer is needed.

There are some problems in the application of a minicomputer for radionuclide dynamic studies.

1) Limited capacity of memory core.
2) Data sampling and input to a computer.
3) Distortion of data due to dead time loss and unevenness of detector system.
4) Mathematical base for data analysis.
5) Display of out put data.
6) Error due to statistical fluctuations.

For a sample of the dynamic radionuclide studies using a minicomputer, our measuring system of regional cerebral blood flow using the ^{133}Xe clearance method, a Autofluoroscope and a minicomputer JEC-7D was reported.

It was the feature of our measuring system that the data analysis for calculating of regional cerebral blood flow was performed on the base of our intensive study using digital model reported previously.

The data, obtained from each Xtal of the Autofluoroscope overlying the hemisphere, were recorded each second on a magnetic tape during 10 min.

The data were fed into the minicomputer (8 KW), while correction of dead time loss (24 μsec) and uneven counting efficiency of each Xtal of the Autofluoroscope were carried out.

Intravascular shunting spikes, which appeared at initial part of clearance curves overlysing the large cerebral vessels, were ejected. Data was accumulated in a magnetic drum in the period of 2 sec during the first 2 min and 30 sec during following 8 min for later analysis.

Flow value of each Xtal was calculated using the height over area method and initial slope method in consideration of errors. In order to eliminate statistical error, in the calculation by the height over area method, initial count rate (H_0) was given by average value of initial 4 sec count and count rate at 10 min (H_{10}) was also given by average value of 1 min. According to our digital model study, these procedures do not practically increase systemic error, but decrease statistical error to one half. As the result, statistical error of our system was ± 2–$\pm 6\%$ (% 1SD) in the initial slope method and ± 3–$\pm 7\%$ in the height over area method by 5 mCi ^{133}Xe injection.