

language and have 14 kinds of function elements which covered all faculties of analog computer.

Results

The simulated RI angiocardioqram was in good agreement with the serrated curves obtained from serial scintiphotos of cardioac chambers. The main results obtained were (1) decrease of ejection fraction resulted in the diminution of both

ascending and descending slope of RI angiocardioqram in RV and LV, (2) prolongation of pulmonary circulation time resulted in a dominant peak delay of RI curve in LV with diminution of the slopes, and (3) studies on a program to calculate hemodynamic parameters from the serrated RI angiocardioqram were made.

A Method for Analytical Studies on the Circulation Function Using a Minicomputer System

H. AKAGI

Department of Radiology, Osaka Medical School, Takatsuki

Complicated procedure and inaccurate results of the examination have made the RI dynamic studies, difficult to use in the field of routine examination, and several trials have been tested to improve this problem in our department using a minicomputer system.

Estimation of disappearance rates by the ordinary graphic measurement were proved inaccurate, especially when the model was two com-

partments or more.

A computer system including a 12K words CPU, disk memory, CRT display, MT and a hard copy unit, which connected to a scintillation camera was tested and the results were presented.

In conclusion, the computer system in the test have made the RI dynamic studies more reliable and more convenient in routine examination.

First Order System Component and Transportation Lag Component in Cerebral Mean Transit Time

N. YAMADA, N. IWAI, A. HIRAKAWA, K. OGINO and M. TAKAYASU

Third medical clinic, Kyoto university, Kyoto

Radioencephalogram (REG), which obtained by intravenous nondifusible R.I. injection and external collimation method, has much clinical values for it's safety, naturalness and facility. But some problems remain in REG analysis. The input pattern of indicator to cerebral circulation system has been distorted by hearts and lung functions. And the distribution function of cerebral circulation system has not been obvious.

As previously reported, we have used the Radiocardiogram (RCG), which obtained by simultaneous external collimation on the heart, as the input to REG. Cerebral circulation system was

approximated by composition of a first order system and a transportation lag.

In our several hundred experience, almost all cases have been simulated successfully by our method. We believe our approximation method to have sufficient clinical property.

The ratio of transportation lag (τ_h) in cerebral mean transit time (MTc) was distributed between 40 to 90% in each cases. In most cases of severe arteriosclerosis, such as cerebral thrombosis, SLE or diabetes melitus, this ratio revealed more than 80%. In cases of right heart failure or intracranial tumor the ratio was less than 60%.

It revealed 70 to 80% in normal control.

There seems to be some correspondence between $\tau h/MTc$ and cerebral vascular state.

For the wide distribution of $\tau h/MTc$, 40 to 90%, we think that the use of transportation lag

only (mode transit time) or first order system only (decrement slope) as a substitution of cerebral mean transit time can not avoid a indefinit deviation of measurement in each cases.

Intrarenal Distribution of Blood Flow in Patients with Heart Disease

M. KINOSHITA, S. SASAYAMA, Y. SHIRAHAMA, H. KIM,
G. TOMONAGA and R. KUSUKAWA

Cardiac Unit

M. INADA

Isotope Division

Tenri Hospital, Tenri

The mechanisms by which patients with congestive heart failure show reduced renal plasma flow and increased filtration fraction are still not well understood.

Materials and Methods:

In twenty-five subjects with valvular heart disease, ^{133}Xe washout curves were performed. Six hundred microcuries to one millicurie of ^{133}Xe in saline were injected into a renal artery through a red Kifa catheter. The resultant curves were analyzed into four components in normal and three to four ones in patients with heart disease. Auto-radiograph in dogs with heart failure was undertaken to relate each component to the anatomical background of the kidney.

Results

Total renal blood flow derived from ^{133}Xe washout curves was in good correlation with cardiac output ($r = 0.60$ p less than 0.01). Instead RBF derived from renal clearance didn't show any correlated with cardiac output ($r = 0.51$, p less than 0.01). There is a positive correlation between total renal blood flow and

RBF ($r = 0.51$, p less 0.01), and no significant relation between total renal blood flow and GFR ($r = 0.32$ p more than 0.10). The means and SD of total renal blood flow in control and in patients with heart disease are 369 ± 49 ml/min/100 g and 209 ± 67 ml/min/100 g, respectively (p less than 0.01). The percent distribution to outer cortex and the flow rate in controls and subjects with heart disease is $88 \pm 3\%$ and $66 \pm 22\%$, respectively (p less than 0.001), and 414 ± 71 ml/min/100 g and 307 ± 73 ml/min/100 g (mean \pm SD). The renin secretion rate is inversely related to the percent distribution to outer cortex.

Conclusion

Total renal blood flow and outer cortical flow were decreased in parallel with cardiac output. Total renal blood flow showed a greater correlation with cardiac output than RBF and PSP test did. The washout curve has an advantage over the conventional clearance method as it is possible to easily perform the ^{133}Xe washout curve in oliguric patients with severe heart failure during diagnostic cardiac catheterization.