

curve necessary for the accurate analysis of RCG are determined experientially; the width at the half of a peak value should be within 0.8sec and the height at fifth second from the build-up of the input curve should be less

than 8% of the peak value.

It is concluded that a good input curve with a sharp peak and a steep single-exponential down slope is necessary for the analysis of the configuration of radiocardiogram.

An Attempt at Heart Beat-Linked Scintigraphy with Cardiophax

A. ASAHARA, H. UEDA, S. TACHIBANA, and Y. HONMA

Central Hospital of J.N.R., Tokyo, Japan.

T. FUJITA, and Y. YOSHIKAWA

Shimadzu Seisakusho, Ltd. Kyoto, Japan.

Recently, a variety of methods for cardiac function tests with radioisotopes have been reported. Among others, the so-called ECG-gated cardioscintiphotography has become popular, and the criteria for unclommedically indicating the cardiac function have been estimated in addition to the morphological examination of the heart.

In our recent study, the heart beat-linking apparatus primarily developed for roentgenographic X-ray apparatus (namely, Cardiophax) was modified so that it would be connected with the scintillation camera and data-store playback apparatus; the data so obtained were processed by rescanning, planimeter, digital color analyzer and medical computer, and clinically examined; and as the result, the device proved of clinical value.

10 mCi of ^{99m}Tc albumin was infused into the medial cubital vein; the start signals were set at certain phases on electrocardiogram (ED: P wave; ES: bundle branch of T wave) and the exposure was made for 0.1 second, to record the patterns of the systolic and diastolic phases. The subjects were placed in a 30° right oblique position. The record of five to ten beats was sufficient for the proce-

ssing by the computer, but the exposure was made over about 30 beats for the processing by other methods.

The area and longitudinal axis of the left ventricle were estimated from the patterns, and its volume was then estimated, to calculate the ejection fraction.

The results obtained by the respective volume methods (planimetry, rescan-planimetry, and digital color analysis) were approximate to one another, with the EF's of ten normal subjects being in a range of 55 to 75%. The EF's of the subjects with cardiac dysfunction were low, being below 25%. In processing the data by the medical computer, the EF's were estimated from the activities in the left ventricle in the systolic and diastolic phases.

The EF's so estimated were slightly larger (by a maximum of 5%) than those obtained by the volume methods, but were very closely correlated with the latter.

In determining the border between the left ventricle and the left atrium, the RI cardiograms were recorded with a time lapse camera for about 20 seconds from immediately after the infusion of the radioisotope, for use

as reference data. The same method was employed for processing the data by the computer.

As compared with the heart beat-linking

apparatus that have hitherto been reported, the apparatus devised by us featured in that it clinically gives the same data, but economically is less expensive.

Determination of Left Ventricular Volume and Ejection Fraction by ECG-Gated RI Angiocardiography

M. KINOSHITA, T. HOSHINO, G. TOMONAGA, I. MASHIRO,
Y. SHIMONO, and R. KUSUKAWA.

Division of Cardiology, Tenri Hospital

M. KUWAHARA, K. HACHIMURA, H. TANEMO, and H. KITAGAWA

Department of Engineering, Kyoto University

Left ventricular volume and ejection fraction were determined in patients with various heart diseases using ECG-gated RI angiocardiography. The angiocardiography was performed by injecting 15mCi of pertechnetate-^{99m}Tc into peripheral vein, using an Anger scintillation camera with a high resolution collimator. Camera images were recorded in "real time" on magnetic tape using a Nuclear Chicago Data/Storage Accessory. Rectangular pulses obtained from R-wave of ECG were recorded simultaneously on the audio-track of the tape using a frequency modulator. With the use of the ECG gating device left ventricular images displayed on the persistence scope at either end-systole or at end-diastole during levophase of the angiocardiography were photographed on polaroid film, after the persistence scope was adjusted so as to

yield clear left ventricular contour. The area of the images was determined by planimetry. Phantom study with a simple syringe model showed good correlation ($r=0.99$) between known and calculated volume. The enddiastolic volume and ejection fraction of 11 patients obtained by this technic were in excellent correlation with those by a cineangiographic method ($r=0.98$ and 0.91 , respectively.). The peculiar appearance of left ventricular cavity in patients with idiopathic hypertrophic subaortic stenosis was demonstrated by the RI angiographic as well as a cineangiographic method. In addition dyskinesia of left ventricle was easily demonstrated in patients with myocard infarction by this technic.

The technic is noninvasive and was found to be very useful for evaluating left ventricular function in critically ill patients.