among original scintigram, the non-smoothed digital printed by the computer, and the smoothed digital. By smoothing the original, the image of lung scans were improved remarkably and appeared to be useful in clinical use. The computer displayed the each point in 10 different marks according to the number of counts, which enabled us to recognize the radio-activity of the points semiquantatively.

Furthermore the integral counts of the both lung fields were calculated. The normal anterior values were 43.2±4.9% (N=10) in the left and 56.8±4.9% in the right; posterior values were 46.7±2.7% (N=6) in the left and 53.3±2.7 in the right.

The ratio of each level of the counts between left and right lung was also compared. All these data were obtained very easily by the computer and expected to be useful clinically.

1) H. Yasukochi, S. Tada, K. Machida, F. Kumura and M. Ohshima: Acta radiologica japonica 34 : 33, 1974.

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## The Influence of the Input Curve on the Configuration of Radiocardiogram

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The influences of the inflow process of injected radioisotopes into the heart (input curve) on the configuration of radiocardiogram(RCG) are reported. The input curve is recorded bya scintillation counter placed over the axilla of the injection side simultaneously with RCG. $^{131}I$ human serum albumin is injected into an arm vein by a cuff releasing method. A good input curve with a sharp peak and a steep single-exponential down slope is obtained as the results of complete bolus injection of radioisotopes. However, a poor input curve with a steep down slope followed by a gentle down slope (diphasic) is sometimes obtained according to a poor injection technique and/or conditions of the vein.

The input curves thusly obtained are simulated by two different analog models; single mixing chamber model (model 1) and two mixing chamber model with different time constants (model 2). The parameters obtained by the simulation of the input curve are used for the analysis of RCG by the analog simulation circuit previously reported. When a poor input curve is analyzed with the usage of model 1, the overestimation of the left heart volume is resulted. The over-estimation of the left heart volume is corrected when the model 2 is applied. However, the accuracy of the simulation results is insufficient even when the model 2 is used because of the deterioration of the configuration of RCG. Concequently, the conditions of the input

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

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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 uncleomedically 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 diastolyc phases. The subjects were placed in a 30° right oblique position. The record of five to ten beats was sufficient for the processing 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,r but were very closely corrleated with the latter.

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