

## B) Measurement A

### (Data Processing)

#### Analysis of the left ventricular performance with the pulse-synchronized scintiphotocardiograph

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Left ventricular end-diastolic volume (EDV), end-systolic volume (ESV), ejection fraction (EF), and stroke volume which may be calculated from EDV and ESV are important parameters of the left ventricular performance. A previous report has been made by the present authors on their success in measuring these parameters with pulse-synchronized scintiphotocardiography. Scintiphotocardiograms were recorded with Pho/Gamm HP and all information were recorded in Data Store Play Back system. With play back, dilution curves were inscribed for 3 Areas of Interest (AOI), i.e., the right heart, lung on the left, in order to find out a period of time where the left ventricular dilution curve was at the least influenced by the radioactivity from the right heart and the lung. Scintiphotocardiograms were then photographed with numerous superimpositions only for the above period of time to make the left ventricular contour to record out. Superimpositions were repeated until the total count of radioactivity reached  $7 \times 10^4$ . Left ventricular image was photographed with unity magnification on X-ray films by means of Photo/Scope III, and left ventricular volume was calculated by Green's formula.

The pulse-synchronizing apparatus was such that both interval and exposure time was variable. Gate was opened by a triggering mechanism using

R-wave of ECG and for recording DEV, gate was opened at the summit of R-wave for 0.05 sec. For recording ESV, it was opened, also for 0.05 sec, with interval time extending just 0.02 sec before the 2nd heart sound. As RI,  $^{99m}\text{TcO}_4^-$  (10–20 mCi) and  $^{99m}\text{Tc}$ -albumin (5–10 mCi) was used, with patients in the 2nd oblique position.

#### Results

1) With the employed AOI, the left ventricle gave a mean count of 18900 at ED and 1190 at ES, of a total of  $7 \times 10^4$  counts.

2) Studies with phantom, using ellipsoid shaped bottles of 60, 100, and 200 ml capacity, showed that there was a linear relationship between the degree of X-ray film and the number of count (5, 10, 15, 20  $\times 10^3$  count), independently of the bottle's size.

3) With AOI set in the area of the right heart, right heart dilution curves were recorded. The stroke volume calculated from such dilution curves averaged  $52.2 \pm 18.3 \text{ ml/M}^2$ . The stroke volume calculated EDV-SV averaged  $49.4 \pm 19.0 \text{ ml/M}^2$ .

4) With gate opened at several points of time during one cardiac cycle, the left ventricular volume curves were obtained. From these curves and the almost simultaneously recorded arterial pulse curves, mean circumferential shortening rate (MCSR) was calculated.