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EVALUATION OF RIGHT AND LEFT VENTRICULAR VOLUMES AND VALVULAR REGURGITATION BY GATED SPECT.

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For the evaluation of right and left(RV & LV) ventricular volume and valvular regurgitation by SPECT we performed phantom and clinical studies. Absolute ventricular volumes were calculated by threshold method developed by us. In phantom study optimal threshold(OT) level had linear correlation with background(BG) ;that was :OT= 0.47BG+44.2(%),(r=0.99). Using this equation,end-diastolic and end-systolic volumes of RV and LV(n=43) were calculated. There were good correlation of LV volumes obtained by SPECT and left ventriculography(LVG): Vol(SPECT)=0.98VOL(LVG)+3.0(ml), r=0.95. In 22 controle patients, LV to RV stroke volume ratio(SVR) was 1.03 ± 0.09(SD) by SPECT and 1.30±0.19 by planar gated blood pool(GBP). On the other hand, in 21 patients with valvular regurgitation SVR was 1.82±0.63 by SPECT and 2.28±0.91 by GBP. The sensitivity and specificity for the diagnosis of regurgitation was 95% and 100% by SPECT and 76% and 95% by GBP. In conclusion our method of ventricular volume measurement by gated SPECT is reliable and useful not only for calculation of absolute ventricular volume but also for evaluation of valvular regurgitation.

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DETERMINATION OF RIGHT AND LEFT VENTRICULAR VOLUME BY SINGLE-PHOTON EMISSION COMPUTED TOMOGRAPHY.

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Right ventricular and left ventricular volumes(RV and LV) were measured by ECG gated Single-Photon Emission Computed Tomography(SPECT).
Ventricular volume was calculated from serial vertical long axial slices by counting up the number of voxels within the ventricle and multiplying them by the known volume of a voxel. From phantom studies,the voxels containing more than 45% of maximam ventricular counts were used as the ventricle. Volumes and ejection fractions(EF) calculated from SPECT were compared with these from contrast angiography. There were significant good correlations between the result of SPECT and contrast angiography. The difference between RV volume and LV volume measured by SPECT was examined. Both RV end-diastolic volumes and end-systolic volumes were significantly greater than these of LV. But EF was significantly lower in RV. It was concluted that SPECT was useful for estimation of ventricular volumes.

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THE ERROR OF 180° DATA COLLECTION AND RADIOISOTOPE (RI) DECAY CORRECTION IN CARDIAC BLOOD POOL SCANNING USING SPECT.

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In cardiac blood pool scanning using SPECT,Tc-99m decay and half 180° data collection (HD) vs full 360° data collection (FD) are problems.
In our results of 6 patients, the half-life of Tc-99m labeled albumin in blood varied from 2-4 hr (3.03 ± 0.59 hr, mean ± s.d.). Using a program for RI decay correction, we studied the change in the ejection count(EC) (end-diastolic count - end-systolic count) of both ventricles and regurgitant fraction (RF) (1 - RVEC/LVEC) in 11 cases. When RI decay correction was performed using a half-life of 3.0 hr, LVEC increased 7.5%, RVEC increased 8.7% and RF decreased 0.8% on the average in HD scans of 8 cases (LPO to RAO, 32 views, 60 beat/1 view), while LVEC and RVEC increased by 6-8%, and RF changed 0.2-3% in 32 view-FD scans of 3cases.
We also studied the change produced by altering the starting position of data sampling in HD scans. In our results of 3 cases, the peak LVEC and RVEC were obtained when scanning was started between LPO 45° and 67.5°. The smaller the LPO angle was, the larger the RF was. The change in RF was 1-4% with 45° - 67.5° LPO starting points and 5-8% when LPO 22.5° - 90° LPO starting position were used.

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QUANTITATIVE ANALYSIS OF THE REGIONAL WALL MOTION BY PHASE ANALYSIS USING BLOOD POOL EMISSION COMPUTED TOMOGRAPHY -PHANTOM STUDY AND CLINICAL TRIAL-.

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The quantitative analysis of regional wall motion by phase analysis applied to gated blood pool ECT was tried in this study.In the sagittal section in the middle of the left ventricule,the amplitude (AMP) and peak ejection rate(PER) in the anterior and inferior portions were respectively calculated.And inferior-anterior ratio(I/A) of AMP and PER were also estimated. I/a of AMP and PER had a good correlation with one of the % radial shortening value(%RS) in the same sections acquired from contrast left ventriculography (RAO 30 deg. view). This method enabled to detect the wall motion abnormalities three dimentionally and to estimate the effect of A-C bypass grafting. And using a cardiac dynamic phantom, the problem of the time resolution power was examined. SPECT endiastolic volume estimated in 100 msec. sampling interval was inferior to one calculated in non gated data acquisition.