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NEW METHOD OF BACKGROUND SUBTRACTION IN GATED EQUILIBRIUM BLOOD POOL SCANS.

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This study was attempted to assess the availability of variable interpolative back ground subtraction (VIBS),our new method of background subtraction. Simultaneous measurements of cardiac output(CO) with the thermodilution technique and gated blood pool scans were performed in 20 patients without arrhythmias,regurgitation or shunt. End-diastolic and phase images were illustrated on the same CRT screen during constructing the region of interest at end-diastole,while end-systolic image and our new composite subtraction image were illustrated at end-systole,to allow the operator to confirm the border line. Dehmer's method was employed to estimate left ventricular volumes,and both scintigraphic measurements of CO after VIBS and after conventional background subtraction (CBS) were performed. CO by VIBS correlated better with thermodilution technique ($r=0.954$) than that by CBS,and there was significant difference between the correlation coefficients ($P<0.05$). We conclude that our VIBS is more accurate for the measurements of scintigraphic CO and left ventricular volumes than CBS.

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DEVELOPMENT OF A LEFT VENTRICULAR FUNCTION ANALYZING METHOD BY AUTOMATIC EDGE DETECTION OF LEFT VENTRICLE.

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It is widely known that gated blood pool imaging is utilized for assessment of cardiac function. Ejection fraction, left vetricular volume and quantitative wall motion are derived as parameters, and the reproducibility of these parameters has great significance for agent motion load and preoperative/postoperative high accuracy appreciation. However, the derivation of these parameters commonly involves ROI setting operations, and the conventional threshold method needs manual operations and has problems about the processing producibility and processing accuracy. Therefore an automatic edge recognition program for the left ventricle has been developed and a study has been made on the accuracy and reproducibility of different parameters. The ejection fraction by this program has less inter-observer/intra-observer variation as compared with the conventional threshold method, and the processing producibility has been verified. The correlation with the ejection fraction by the contrast left ventricular radiography has been improved and the processing accuracy has been improved as well. A study has been made on the limit of recognition by this program through execution of this program under various image conditions.

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AUTOMATICALLY DRAWN LEFT VENTRICULAR AREA OF INTEREST OF A CYCLIC GATED CARDIAC IMAGE—BY COMBINATION WITH TEMPORAL FILTER—.

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Edge detection of left ventricle(LV) is important to calculate and analyze the LV function, such as LV wall motion and LV regional ejection fraction.
Nevertheless, the detection of LV edge is difficult because of the high noise level of scintillation in comparison with LV angiography. The purpose of this study is to improve the edge detection method by combination with temporal filter.
A cyclic gated cardiac image was acquired with 32frame/cycle and the time-activity curve(TAC) was transformed in Fourier series. The LV image was filtered temporally by construct the initial three harmonics of each pixel. Then, LV edge detection was performed by using variable region of interest method(2EDGE, ADAC).
The accuracy of LV edge detection was higher by using 2EDGE method combinated with temporal filter than by using 2EDGE method only, and the noise of LVTAC was reduced.

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CLINICAL EVALUATION OF A NEW METHOD FOR THE DETERMINATION OF LEFT VENTRICULAR EJECTION FRACTION USING A FULLY AUTOMATED COMPUTER EDGE DETECTION.

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We have developed a new software program (FAME) to process multi-gated scintigraphic data using a fully automated computer edge detection based on second derivative and threshhold criteria. Using this method we can obtain LV ejection fraction(EF) without any manual operation for edge detection. In this study we examined the accuracy of LVEF (FAME-EF) obtained with this new method and compared with LVEF derived from contrast angiography(LVG-EF) and conventional processing of scintigraphic data(MUGA-EF). The latter has been proved to be a highly accurate method for the determination of LVEF in our laboratory. There was a fairly good correlation between FAME-EF and LVG-EF in 30 patients($Y=1.1X+3.0, r=0.95$). There was also an excellent correlation between FAME-EF and MUGA-EF at rest in consecutive 70 patients ($Y=1.1X-0.6, r=0.95$). A good correlation was observed between FAME-EF and MUGA-EF even during exercise($Y=0.97+5.0, r=0.90$).

These results indicate that this new method, which automatically constructs left ventricular region of interest, may be utilized for the determination of LVEF.