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SIGNIFICANCE OF REDISTRIBUTION IN INFARCTED MYOCARDIUM IN EXERCISE Tl SINTIGRAPHY.

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This study was perfomed to obtain clinical interpretation on the redistribution (RD) in infarcted area in exercise Tl scintigraphy (ETS). Fifty patients with old myocardial infarction(MI) were studied with ETS, and redistribution images were obtained 2 hrs after exercise. Resting Tl images were also obtained in most of the patients. Exercise was performed using bicycle ergometer and Tl was injected at the end point generally accepted. Redistribution was quantitatively defined by the following two methods; 1) changes in relative Tl activity (RTA), a ratio of Tl activity in infarcted area to that of normal area, 2) sequential Tl activity (STA), a ratio of Tl activity in infarcted area in redistribution image to that in exercise image. In patients with anterior MI, RD was minimal in cases with severly impaired (dys or akinetic) left ventricular (LV) wall motion with no collaterals but RD was observed in other cases. The extent of RD was correlated to RTA at rest in infarcted area, indicating that RD is related to the amount of viable myocardium in infarcted area.RD was also correlated with the severity of coronary stenosis responsible for the infarcted area. However in cases with 99-100% stenosis with no collaterals, most of whom had dyskinetic LV wall motion, RD was less compared to those with good collaterals. These findings indicated that RD to the infarcted area was defined by two factors, the extent of viable myocardium in infarcted area and the severity of stenosis responsible for the area.

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ADVANTAGE OF ECG SYNCHRONIZATION ON SEVEN-PINHOLE TOMOGRAPHY.

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ECG synchronized sevenpinhole tomography has required too long acquisition time for clinical use. In order to put it to routine work, a new process was contrived within a limitation of 10 min.for data acquisition, and compared with non-synchronized method.

Patient's data were acquired in the rate of 10 frames per a heart beat with 64x64 matrix mode. Using 2 mCi of Tl-201, about 190 kilo events on each frame and 161 events per a pixel at the normal myocardium were counted in 10 min. The matrix size of the data were converted from 64x64 to 128x128 with filterd interpolation-method. Tomograms were reconstructed at end-diastolic, end-systolic and any other selected phase. These data processing could be performed within 8 min.

In phantom study, the minority of counted events and large sized pixel in this method might deteriorate the spacial resolution, but artifact and blur due to myocardial motion diminished markedly in clinical study. Furthermore the information about the left ventricular wall motion could be obtained simultaneously.

ECG synchronized sevenpinhole tomography by our process was very valuable for clinical use.

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CLINICAL EVALUATION OF MYOCARDIAL INFARCTION BY THALLIUM EMISSION COMPUTED TOMOGRAPHY.

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Single-photon emission computed tomography (SPECT) for thallium myocardial imaging using rotatable gamma camera was clinically evaluated in comparison with planar imaging (PLAN). Twenty-three cases with non-IHD and 46 cases with myocardial infarction were examined at rest for PLAN and SPECT imaging.

In the detection of the perfusion defect, transaxial section was superior in the cases with anterior myocardial infacrtion (sensitivity: transaxial 93%; frontal 72%; sagittal 59%), while frontal and sagittal sections were superior in those with inferior infarction (65%, 94%, 76%, respectively).

ROC analysis was done by the three independent observers. Each ROC curve demonstrated better efficacy in the SPECT than the PLAN. In the study of 69 cases, the SPECT showed better sensitivity (SPECT 92%, PLAN 72%, $p<0.02$) with similar specificity (91%, 83%, respectively), and therefore improved accuracy was well demonstrated (92%, 75%, respectively, $p<0.02$).

We conclude that our SPECT for thallium myocardial imaging providing transaxial, frontal, and sagittal sections, is valuable in the evaluation of myocardial infarction.

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CLINICAL ESTIMATION OF INFARCT SIZE BY EMISSION COMPUTED TOMOGRAPHY OF THE MYOCARDIUM WITH TL-201.

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We evaluated Tl-201 emission computed tomography (ECT) in estimating infarct size. In 22 patients with transmural myocardial infarction, planar Tl-201 scintigraphy and Tl-201 ECT, using a rotating gamma camera were performed. Infarct size was determined from the extent of a perfusion defect, expressed as a %Tl defect on planar images and the volume of infarcted myocardium was calculated from reconstructed tomographic images by a computerized planimetry. In 11 patients with the first myocardial infarction, the volume of infarcted myocardium determined from ECT correlated closely with the accumulated CK-MB isoenzyme release and with peak measured CK-MB(r=0.90,0.88); whereas %Tl defect on planar images correlated less satisfactory with these enzymatic infarct size(r=0.68,0.67). In 17 patients with infarction in whom the extent of asynergy was quantified as a % abnormally contracting segment(%ACS) from the left ventriculography, the ECT infarct size well predicted the %ACS(r=0.81). On the other hand, the planar scintigraphic infarct size relatively poorly predicted the %ACS(r=0.64). Although planar imaging is useful for detection and localization of infarction, quantification of ischemic injury with this 2-dimensional technique has inherent limitations. Tl-201 ECT can provide the capacity for more accurate 3-dimensional quantification of infarcted myocardium as well as improved diagnostic sensitivity.