

MEASUREMENT OF REGIONAL MYOCARDIAL BLOOD FLOW BY
INTRACORONARY ARTERIAL INJECTION OF Xe-133

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Although myocardial perfusion imaging with Tl-201 has been established to reveal the myocardial blood flow (MBF) distribution, it is also affected by the myocardial mass. The purpose of this study is the measurement of the regional MBF distribution using Xe-133 and a multicrystal gamma camera.

After selective coronary angiography, Xe-133 (5 mCi) in saline solution were introduced into a right and left coronary artery and its washout process were recorded for 4 minutes in left anterior oblique position using a computerized multi-crystal gamma camera (System 77). The data were transferred to a minicomputer by a magnetic tape to be analyzed. The slopes of the initial 30 seconds of the multiple Xe-133 curves obtained from 294 crystals were calculated by the least squares method using a monoexponential model, and MBF rates in the cardiac regions were obtained. The functional image of MBF was also constructed in each study.

In a normal case, MBF distribution was homogenous in the left coronary artery region (mean MBF was 78 ml/min/100g), whereas that of the right coronary artery region was separated into two regions, which were right atrium of low MBF and inferior wall of the ventricle of high MBF (mean MBF was 71 ml/min/100g). In a case of old myocardial infarction, decreased MBF was revealed in the infarcted area, but no regional difference was detected in a coronary artery disease without myocardial infarction. MBF was also decreased in the hypertrophied septum of hypertrophic cardiomyopathy with normal coronary arteries.

This approach to the quantitative assessment of the regional myocardial perfusion with Xe-133 is to measure the myocardial capillary perfusion directly, and is not affected by the myocardial mass. It seems to be useful for the clinical assessment of the myocardial ischemia if used together with selective coronary angiography.

EVALUATION OF THALLIUM-201 MYOCARDIAL IMAGING TO
ASSESS THE SITE AND SIZE OF MYOCARDIAL INFARCT

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Myocardial infarct site and size are of clinical importance as a determinant of prognosis of the patients with this disease. In the present study, clinical reliability of thallium-201 myocardial imaging to assess the site and size of myocardial infarct was evaluated in 53 patients with myocardial infarction. The diagnosis of myocardial infarction was made by clinical history, typical electrocardiographic changes which were compatible with myocardial infarction and rise of serum CPK level. Myocardial image was obtained by an anger camera after the intravenous injection of thallium-201 (2 mCi) and the data was processed by an on-line minicomputer system (Toshiba DAP-5000N).

The regional image defects were detected in 50 of 53 patients (94%) except for 2 patients with subendocardial infarction and one patient with inferior infarction. The site of myocardial defect coincided with the electrocardiographically determined site of infarct in all patients with anterior and/or inferior infarction. In 3 patients, however, myocardial image demonstrated the defect in posterior wall although electrocardiograms failed to suggest the infarct of this site. Left ventriculography which was done in 40 patients also confirmed that the akinetic region on left ventricular wall corresponds well with the site of image defect in myocardial scintigram. The size of infarct obtained from processed schematic drawing of image defect correlated well with the size assessed by total CPK released ($r=0.86$ in 18 patients with anterior infarction and $r=0.76$ in 12 patients with inferior infarction). The size of image defect also correlated well with the sum of ST-segment elevation in precordial 39 leads (ST) obtained 48 hours after the onset of infarction.

These results strongly suggest that the thallium-201 scintigraphy provides more precise location of

myocardial infarct than the electrocardiography and the size of image defect in myocardial scintigram directly reflects in myocardial scintigram directly reflects the extent of myocardial infarction.

A CLINICOPATHOLOGICAL STUDY ON THE LOCATION OF MYOCARDIAL INFARCTION IDENTIFIED BY THALLIUM-201 SCINTISCAN

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Clinicopathological study was performed to evaluate the sensitivity & accuracy of the scintigraphic location of the myocardial infarction with Thallium-201. The scintiscan were obtained in five different views (right anterior oblique, anterior, left anterior oblique 30° & 60°, posterior). The location of the perfusion defect was classified into four parts (anterior, inferior, lateral, posterior).

There was mismatch of diagnosis in 24% between scintigraphic and ECG method. In 3 cases, no diagnostic ECG changes were observed in spite of the positive Thallium scan. In 8 cases of negative Thallium scan, ECG showed false positive readings due to abnormal ventricular activation pattern such as iCLBBB, left anterior hemiblock and OS pattern in V₁₋₄. At postmortem study in this group it was also revealed no evidence of myocardial necrosis. There was correlation of 90% between scintigraphic and postmortem diagnosis of myocardial infarction and poor correlation of 68% between ECG and postmortem findings. In our experience posterior wall MI is frequently difficult to be diagnosed. This is likely to be due to individual variation of the location of the posterior wall. Autopsy cases were scored of their coronary stenosis (1 for 10% stenosis, 5 for 100% stenosis). Eight cases with positive rest Thallium scan showed high total stenotic index (3 branch) of 11 as compared with 6 of the normal cases.

It is concluded that Thallium-201 scintigraphy could provide more precise location of infarction than ECG, especially in such cases as with abnormal ventricular activation pattern. The postmortem study revealed that myocardial perfusion defect in rest scan indicated the presence of 75% or more coronary stenosis.