photogram of anterior view during 5 to 10 minutes after the injection. MBF/CO(%) was calculated by ratio of the myocardial uptake to the activity of total injected dose. The mean value of MBF/CO(%) was 3.35% in normals, 3.02% in myocardial infarction and 3.10% in angina pectoris, respectively. There was no significant difference between three groups. Cardiac output (CO) by a dye-dilution method was measured, and myocardial blood flow (MBF) was calculated by the following formula:

\[ \text{MBF} = \text{MBF/CO(%) × CO} \]

The mean value of MBF (cc/min/m²) was 95.1 in normals, 92.0 in myocardial infarction and 77.3 in angina pectoris, respectively. No significant difference were found between three groups, too. However, in 7 of 9 patients with low value, the findings of ST depression in ECG by Master’s test or the experience of congestive heart failure were observed. It is concluded that the MBF (cc/min/m²) value is more useful than the relative value as MBF/CO(%) for the expression in reserve of coronary blood flow or status of cardiac function.

Measurement of Mass Change of Regional Myocardium by ECG-GATED Thallium SCAN

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The purpose of the present study is to estimate the mass change of regional ventricular myocardium with cardiac motion. High temporal resolution ECG gated analysis was performed after intravenous injection of 4mCi of 201Tl-chloride to obtain sequential images of left ventricular myocardium during cardiac motion. Using scintillation camera-computer system and LIST mode data acquisition, sequential events at each 40 msec intervals were recorded continuously for 1500 cardiac cycles. On the myocardial image at end-diastolic phase, ROIs with adequate size were placed upon left ventricular free wall, apex and intraventricular septum. Then time activity curves for the three regions were obtained throughout the cardiac cycle. The curve, which indicates the mass change of regional myocardium with cardiac motion, showed maximum at end-systole and minimum at end-diastole. In healthy control group rate of mass change of apex and septum were larger than that of ventricular free wall. On the other hand, in the group with hyperthyroidism rates of mass changes of the three regions increased respectively compared with those of control group. However, in this hyperkinetic state change of myocardial mass of free wall remained still lesser than those of apex and septum as were observed in control group. The curves of regional mass change showed several characteristic patterns in various cardiac disorders. The method proved to be of value for the evaluation of regional myocardial motion and myocardial mass change during cardiac cycle.

Thallium-201 Myocardial Perfusion Imaging at Rest and During Exercise in Patients with Ischemic Heart Disease

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Myocardial perfusion imaging (MPI) using Thallium-201 injected both at rest and during exercise was compared to stress electrocardiography (ECG) for detection of transient ischemia in 2

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control subjects and 16 patients with ischemic heart disease documented by selective coronary arteriography (10 angina, 6 infarction).

Methods; All images were performed in the anterior, left anterior oblique and left lateral views using scintillation camera (TOSHIBA GCA-202) with high resolution collimator equipped with computer system (DAP 5000N). A total fo 300,000 counts per image was directly photographed on Polaroid film and stored on magnetic tape. MPI was begun 10 minutes after injection of 2 mCi of Thallium-201 at rest, and apart from at least a week, for exercise study Thallium-201 was injected 2 minutes prior to termination of Masters two-step exercise. Original images were processed with contrast enhancement by 55% cut off (documented by phantom study) after nine point smoothing. Region of interests were selected on non-ischemic (ROI 1) and ischemic (ROI 2) area by lightpen.

Results; 2 control subjects showed normal images and ROI 2/ROI 1 mean activity ratio did not change both at rest and exercise. 10 patients with angina had normal rest MPI and positive stress MPI. Stress ECGs were all positive. The ratio dropped from 0.82 to 0.67. 6 patients with infarction had abnormal rest MPI and 5 showed positive stress MPI. Stress ECGs were all positive. The ratio changed from 0.64 to 0.51. Thallium-201 MPI was more sensitive and specific for detection of transient ischemic area than stress ECG.

Studies on Coronary Circulation and 201TI Scintigraphy in Experimental Chronic Myocardial Infarction

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Ten mongrel dogs each weighing 10 to 15 Kg with chronic myocardial infarction caused by ligation of the left anterior descending branch were used in this study of coronary circulation by the fluorescein Na method. The results of 201TI scintigraphy were studied on correlation with the findings of the fluorescein Na method.

In the heart exercised after one to seven days of coronary ligation, the fluorescein Na in the myocardium was decreased in the ischemic area, especially more marked in the endocardial side of the ischemic myocardium than in the epicardial side. The area of cold imaging in 201TI scintigraphy is wider than that of the ischemic myocardium by the fluorescein Na method. In this study, ischemic area in 201TI scintigraphy revealed almost same in width in spite of long period of coronary ligation.

On the other hand, although the coronary artery was ligated for five days, in only one case, the ischemic area of the myocardium shows neither decrease of fluorescein Na nor cold imaging in 201TI scintigraphy. The reasons for these phenomenon must be studied further.