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EVALUATION OF REGIONAL BLOOD FLOW DISTRIBUTION IN MAN BY CONSECUTIVE DOUBLE DOSE TL-201 SCINTIGRAPHY. H. Sugihara, H. Adachi, H. Miyano, Y. Torii, H. Katsume, H. Ijichi, K. Miyao, H. Kotera, M. Murata, 2nd Department Of Medicine, Kyoto Prefectural University Of Medicine, Kyoto 2nd Red Cross Hospital. Kyoto

The initial distribution of Tl in tissue is mainly dependent on blood flow. In an attempt to evaluate regional blood flow distribution in human organ by Tl, we have studied the method to administrate two consecutive doses in short interval. Approximate 10 minutes after the first administration of Tl, second dose was employed without positional change between a subjective and a camera. Data were acquired 20 frames per 20 minutes, and time activity curves were generated from ROIs on myocardium, lung, liver, kidney and GI tract. Because the activity from the second dose ( $C_2$ ) is predicted from both that from the first dose ( $C_1$ ) and the dose ratio (R), the difference between predicted activity ( $C_2 = R \cdot C_1$ ) and measured activity ( $C_2'$ ) which was variable according to loading condition means the change in regional blood flow distribution caused by the loading. And the rate of change in distribution is given as  $C_2' - C_2 / C_2$ . To verify the above rationale, second dose was injected in no loading condition in 10 subjects. The rate of change was  $-0.95 \pm 5.56\%$  in background subtracted myocardium and converged to near zero in other organs. Thus this method is useful to evaluate regional blood flow distribution in various organs and even intra myocardium, and then is applicable in pharmacologic or exercise intervention to diagnose myocardial ischemia.

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THE KINETICS OF THALLIUM-201 IN EXERCISE MYOCARDIAL IMAGING. T. TSUDA, Y. AIZAWA, A. SHIBATA, \*H. HAMA, \*T. MITANI The First Department of Internal Medicine, Niigata University School of Medicine, Niigata. \* Kido Hospital, Niigata.

The kinetics of thallium-201 was evaluated in the data of the stress scintigraphy in man. The myocardial uptake and the background counts were obtained immediately after exercise by ergometer and 2.5 hrs later, on the myocardium and in the lung field of the imaging. The myocardial uptake counts were then interrelated with the background counts by the term blood myocardium partition coefficient. The myocardial uptake counts and the background counts declined significantly in normal and ischemic heart, but in a similar manner. However, in normal hearts, the ratio of the partition coefficient immediately after exercise over that of 2.5 hrs was 1.0 in the average. The ratio were about 0.8 in the patients of angina pectoris and in the patients with old myocardial infarction. For the difference in the ratio, the background counts could not be responsible. This result suggests a depressed uptake activity in the ischemic hearts immediately after exercise. The present method may be useful for the evaluation of the blood-myocardium transport activity in man.

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IS THE REGIONAL MYOCARDIAL Tl CLEARANCE DEPENDENT UPON THE REGIONAL MYOCARDIAL BLOOD FLOW?. M. OZAKI, T. YAMAGISHI, T. IKEZONO, Y. MATSUDA, T. KUMADA and R. KUSUKAWA. 2nd. Dept. of Internal Med. Yamaguchi Univ., Ube.

If the regional myocardial Tl clearance (Cr-Tl) depends on the washout by the regional myocardial blood flow (RMBF), the time course of Cr-Tl is expressed as an exponential curve ( $C = C_0 \cdot e^{-\lambda t}$ ).  $\lambda$  depends on RMBF, and the time constant ( $t_s$ ) is defined by  $1/\lambda$ .

To study whether Cr-Tl curve is exponential, whether  $t_s$  at rest is different between an ischemic (IR) and non ischemic (NR) regions and whether the  $t_s$  ratio (IR/NR) is different between at rest and after exercise-induced angina, Tl myocardial imaging was performed in LAO-45 in 9 patients with effort angina who had a LAD lesion. The Tl concentration was computed in IR (interventricular septum: IVS) and NR (posterolateral: PL) 10, 60, 120, 180 and 240 minutes after Tl injection. The Cr-Tl curves were nearly exponential ( $r > 0.94$ ). At rest,  $t_s$  of IVS and PL were  $8.6 \pm 1.1$  (M $\pm$ SE) and  $6.7 \pm 0.7$  hours, respectively ( $p < 0.02$ ). If Cr-Tl depends on only RMBF, the  $t_s$  ratio (IVS/PL) at rest is the same as that after exercise. However the result showed that the  $t_s$  ratio (IVS/PL) was  $1.28 \pm 0.07$  at rest and  $1.67 \pm 0.17$  after exercise-induced angina, respectively ( $p < 0.05$ ). Thus, Cr-Tl may depend on RMBF at rest, but after transient severe myocardial ischemia induced by exercise, it may be dependent not only on RMBF but also on other factors for several hours.

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LUNG TL-201 UPTAKE AND ITS CLEARANCE RATE AFTER STRESS TESTING IN PATIENTS WITH CORONARY ARTERY DISEASE. K. Minamiji, S. Kajiyama, Y. Toki, Y. Nakashima, K. Fujitani, K. Maeda, H. Fukusaki, I. Narabayashi, Y. Inoue and T. Fukukawa Department of Internal Medicine Division I and Radiology, Kobe University School of Medicine, Kobe, Japan

The present study was undertaken to elucidate hemodynamic implication of increased initial Tl-201 lung activity and its clearance rate after stress myocardial scintigraphy (SMS). In 22 patients with angiographically documented coronary artery disease, both hemodynamic study by supine bicycle exercise and SMS were performed. Regions of interest were placed over left lung field (ROI B) and over myocardium with the highest count density (ROI M) in computer generated initial and 2.5 hour delayed image and Tl-201 activities per picture element of both ROI B and M were computed. Thus, initial B/M ratio as an index of initial Tl-201 lung activity and initial B/delayed B ratio as an index of Tl-201 lung clearance were obtained. Both indexes were compared with mean PCWP during exercise. There were good correlations between mean PCWP and initial B/M ratio ( $r = 0.81$ ,  $p < 0.001$ ) and between mean PCWP and initial B/delayed B ratio ( $r = 0.69$ ,  $p < 0.001$ ). From these results, it was proved that both indexes well reflected the severity of exercise-induced left ventricular dysfunction which resulted in elevation of mean PCWP.