

of $^{201}\text{TlCl}$ following irradiation is not yet known, and further investigation is needed to evaluate doses required to produce diminished distribution

and to assess its permanence and functional recovery.

Myocardial Scintigraphy with 201-Thallium Studies of Some Pediatric Cases by ECGgated Imaging Method

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Twenty eight children with cardiac diseases, ages between 4 month and 16 years old were examined by scintigraphy with intravenous injection of $^{201}\text{TlCl}$.

The purposes of this study are to find out (1) similarities and differences between the scintigrams of adults and those of children, (2) the correlation between electrocardiogram of right ventricular hypertrophy and scintigraphic visualization of right ventricle free wall, and (3) the relation between the coronary artery diseases and the scintigraphic images.

The scintigrams of the life sized myocardium at left anterior oblique position, taken between 10 min. to 60 min. after ^{201}Tl injection, were studied in the method described by Cohen, and the ones which have RI activities of RV free wall more than +1, were selected. Then, we summed up 500 frames of scintigraphic images, of 30 msec to 50 msec in enddiastolic phase and calculated the total counts at each ROI, which were placed at the outside of the LV free wall, the LV free wall, the septum, the right ventricular free wall

and at the lung fields. The ratio of RV to LV (RV/LV ratio) was also discussed.

(Results)

(1) In two cases with functional murmur, the horse shoe shaped image was seen, which was seen, which was common in adult cases, and on the right hand side of that image, the right ventricle was visualized as the shape of half horse shoe.

(2) The cases with RVH electrocardiogram have definite scintigraphic visualization of RV, and RV/LV ratio is between 0.5 and 1.6.

The highest RV/LV ratio is found in a child with post operative TI, who received the radical operation of VSD, PH and CHF, and the RV/LV ratio in 4 cases with T/F come next.

(3) One case with obstruction and stenosis of three coronary artery branches, whose ECG is normal, showed the cold area at apex and RV was also visualized because of the ischemic image.

The relationship between the ECG findings of the cardiac hypertrophy and the images of myocardium, visualized by scintigraphy is of great interest.

Resting and Exercise Stress Scintigram with ^{201}Tl : Two Approaches for Management of Background Activity

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Myocardial scintigram with ^{201}Tl is useful for the detection of coronary heart disease. But inherent low myocardial-to-background ratios ob-

scure the detailed evaluation of images. Therefore, we made background-free myocardial images and calculated regional myocardial Tl -uptake index,

and we evaluated their validity.

The scintillation camera equipped with parallel-hole collimator (pinhole collimator in case of rabbits) was interfaced to the minicomputer. For myocardial imaging, $^{201}\text{TlCl}$ (1-2mCi) was injected intravenously. Exercise stress was done by bicycle ergometer. RI-angiocardigraphy ($^{99\text{m}}\text{Tc-HSA}$) was performed by Ecg-synchronous method.

We processed background-free myocardial image by using interpolative background subtraction method described by Goris. We used three rabbits for basic investigation of background subtraction method. The animals were sacrificed fifteen minutes later of Tl injection. After the initial myocardial image, the heart was removed and imaging was repeated (true background). True heart image was constructed by subtraction of true background from initial image.

Excellent agreement between true heart and background subtracted image was shown by comparison of profile curves and myocardial

counts.

Tl-uptake index was calculated as ratio between background count-rate at upper mediastinum and ROI count-rate which was set at various parts of myocardium. In normals, Tl-uptake index became twice of resting value by exercise of 85% of maximal predicted heart rates. In eleven old myocardial infarctions, sites of asynergy were well coincided with locations of cold area in myocardial scintigram. The greater the degree and extent of asynergy, the smaller was Tl-uptake index.

We performed exercise stress scintigram in 23 patients of effort angina. We diagnosed exercise induced hypoperfusion in 74% by comparing routine resting and exercise scintigrams. But by using these two methods with routine scintigrams, we could raise diagnostic rate to 86%.

In the clinical application of myocardial scintigraphy, the procedures seem to be helpful in the interpretation of the data.

Quantitative Assessment of Myocardial Blood Flow Using ^{201}Tl Evaluation of Values on Exercise Loading

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Quantification of myocardial blood flow on exercise loading with bicycle ergometer was attempted using a myocardial imaging radionuclide, ^{201}Tl . A bolus of ^{201}Tl was injected intravenously and its rapid transport phase was recorded during initial three minutes by a scintillation camera and stored into a mini-computer. Quantification of myocardial blood flow was accomplished according to the indicator fractionation principle. Total activities of administered $^{201}\text{Tl(A)}$ were obtained from the counts during the initial passage through the heart and lung, and myocardial uptake (B) was counted three minutes later with subtraction of the background. The ratio of B/A is assumed to be proportional with fractional myocardial blood flow to cardiac output.

Mean value of normal subjects was $3.5 \pm 0.6\%$, that of HCM $6.2 \pm 1.2\%$, that of angina pectoris $4.9 \pm 1.5\%$, and that of myocardial infarction $4.4 \pm 0.8\%$, whereas normalized values by LV mass using echocardiography showed no significant difference between these groups. However, on exercise loading, myocardial uptake ratio increased in all normal cases, whereas slightly increased in HCM and no increment was noted in ischemic heart disease.

While the stress ^{201}Tl myocardial scintigraphy has become accepted to be more sensitive than the stress electrocardiography, present data substantiated clearly that quantification of myocardial blood flow was appeared to be superior adjunct to the simple stress scintigraphy.