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OBLIQUE-ANGLE MYOCARDIAL TOMOGRAMS RECONSTRUCTED FROM MULTISLICE TRANSAXIAL POSITRON COMPUTED TOMOGRAMS USING N-13 AMMONIA.

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We have developed a method to reconstruct oblique angle tomograms from multislice transaxial positron computed tomograms and made long-axis and short-axis myocardial tomograms using N-13 labeled ammonia. In order to compensate for the the coarser sampling in z-axis than xy-axes, we slided the patient half the slice interval to perform an interpolating scan. One transmission scan was sufficient to correct the photon attenuation in those two emission scans. In most cases the regional myocardial activities did not change significantly during the two scans, and the images of two scans were interlaced only with decay and sampling time correction.

Our method have yielded oblique-angle myocardial images of high quality and have made it easier not only to detect an inferior wall defect but also to understand the regional anatomy in the images.

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MYOCARDIAL IMAGING WITH F-18-FLUORODEOXY-GLUCOSE AND HEADTOME III.

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Myocardial imaging with F-18-fluoro-deoxyglucose and Headtome-III was performed to assess myocardial glucose metabolism. Three normal cases, four patients with angina pectoris, and two cases with myocardial infarction were studied. The lesions of myocardial infarction had a remarkable decrease in glucose metabolism. The areas of low glucose metabolism were larger than the lesions detected by ECG. The patients of angina pectoris revealed various glucose metabolism decrease in myocardium. A case with no abnormal ECG findings before exercise showed decrease of glucose metabolism in the lesion pointed out by ECG after exercise. From this preliminary study, it is suggested that positron CT with F-18-FDG is useful tool for the assessment of dysfunction of myocardium.

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BASIC AND CLINICAL EVALUATION OF N-13 AMMONIA MYOCARDIAL POSITRON CT IN COMPARISON WITH THALLIUM-201 SPECT.

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N-13 ammonia myocardial positron CT (PCT) was comparatively evaluated with thallium-201 SPECT.

In the hot spot phantom (Derenzo phantom) study, PCT delineated 2.5-3.0mm hot spots, while SPECT barely showed 5.0mm hot spots of the phantom. In the chest phantom study, accurate attenuation correction can be performed in PCT, whereas it was difficult in SPECT. Myocardial PCT images was obtained in 11 cases at rest after 10-20mCi of N-13 ammonia injection and they were compared with thallium-201 SPECT. Collected counts were 3-10 million counts in PCT with 5-10 minutes sampling, while they were only 10-18 kilo counts in SPECT for 16 minutes sampling. The myocardial images looked better in PCT because of the better spatial resolution and counts statistics. The myocardium looked thinner and the papillary muscle was visualized in each case. Perfusion defect was clearly seen in each case with myocardial infarction by PCT as well as SPECT. However, cardiac short-axis and long-axis sections which were easily obtained by SPECT were useful for the localization of the lesion.

We conclude that both PCT and SPECT were valuable for the assessment of coronary artery disease.

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EVALUATION OF CORONARY ARTERY DISEASE BY STRESS MYOCARDIAL POSITRON CT USING N-13 AMMONIA.

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N-13 ammonia myocardial positron CT (PCT) was performed at rest and during exercise in 21 cases, including 4 normal subjects. The exercise was done using supine bicycle ergometer with a graded load and N-13 ammonia was injected 30-60 seconds before the termination of the exercise. In normal cases tracer distribution was homogeneous in the left ventricular myocardium at rest and during exercise. Of 17 cases with coronary artery disease, decreased tracer uptake in regional myocar- dium was observed in 13 cases (76%) in resting images and 16 cases (94%) in exercise images. Furthermore, exercise induced ischemia was delineated in 10 of the 12 cases with angina. Segmental analysis of the PCT images detected 27 of 31 diseased vessels (84%). For quantitative analysis, tracer activity concentration was increased during exercise, whereas it was significantly decreased in the myocardium corresponding to the stenosed vessels. We conclude that qualitative and quantitative analysis of myocardial perfusion by N-13 ammonia PCT at rest and during exercise is a valuable technique for evaluation of coronary artery disease.