

## 2-i

FUNCTIONAL IMAGING OF MYOCARDIAL AND CARDIAC POOL SCINTIGRAM.  
NORINARI HONDA, DEPARTMENT OF RADIOLOGY, SAITAMA MEDICAL CENTER, SAITAMA MEDICAL SCHOOL

The significance of cardiac functional images using radioisotopes will be reported. Discussion will be limited especially on the washout ratio image of myocardial SPECT, 2 dimensional polar coordinate display of gated cardiac pool ECT, and factor analysis of gated pool scintigram, although many methods have been utilized in clinical practice.

Myocardial SPECT images were reconstructed from the data obtained by 180-degree rotation (RAO40-LPO50) of a gamma camera (32 projections/rotation, 30 seconds /projection). Exercise stress was loaded whenever possible by an ergometer. Three mCi of Tl-201 was injected intravenously after the end point was reached, and scintigrams were taken within 10 minutes after the end of exercise and 3 - 4 hours after Tl-201 injection. The end point was decided by Michigan criteria. The exercise stress was discontinued 1 minute after the Tl-201 injection. ECG gated cardiac pool ECT images were reconstructed from the data obtained by 180-degree rotation (RAO40-LPO50),

32 projection, 60 sec/projection, 10 frames/RR, 50 ms/frame. ECG gated cardiac pool scintigram was performed at LAO 30-40 accumulating data for 500 beats with 20 frames/RR and 40 ms/frame. Transverse images were reconstructed by Shepp-Logan filtered back projection method without absorption correction. The equipments used were ZLC 7500 gamma camera and Scintipac 2400. Subjects of this study were neurocirculatory asthenia, angina pectoris, myocardial infarction, and other heart diseases.

The two dimensional polar coordinate display (2DPD) Tl-201 washout ratio was superior to conventional circumferential analysis for recognition of whole myocardial perfusion status. Redistribution of Tl-201 was more easily detected by 2DPD than visual comparison of early and delayed images.

ECG gated cardiac pool ECT was useful for the observation of wall motion because of its capability evaluate left ventricles from multiple directions. The 2DPD of gated cardiac pool ECT seemed to be useful for correlation of ischemic areas with abnormal wall motion. Factor analysis of ECG gated cardiac pool scan will also be discussed.

## 2-ii

FUNCTIONAL IMAGING OF THE HEART.  
Y. Yonekura. Kyoto University School of Medicine, Kyoto.

During the past decade, radionuclide methods have played a major role in clinical cardiology with great contribution in two major fields, measurement of ventricular function by gated blood pool scan and assessment of regional myocardial perfusion using Tl-201.

Functional imaging aims to display regional function of the various organs as a two- or three-dimensional map, which has been the case in the most of the images used in nuclear cardiology. For example, multi-gated cardiac pool images, which are obtained by adding many images in the same phase of a cardiac cycle, represent a pattern of regional contraction of the right and left ventricles. Furthermore, these serial cardiac pool images provide additional parametric images regarding systolic and diastolic function of the left ventricle by means of sophisticated technique, such as a phase analysis.

On the other hand, Tl-201 has been popularly used as a myocardial perfusion agent. The exercise stress study with Tl-201 has been proved to be an accurate means for diagnosis of coronary artery disease. It utilizes the images of the initial distribution as blood flow, the delayed images as an index of viable tissue, and the ratio of these images.

The kinetics of Tl-201, however, have not been clarified yet, and these images do not have same characteristics as the functional images calculated based on the mathematical model.

In addition to these images, positron emission tomography (PET) has introduced a new exciting field in nuclear cardiology. PET can evaluate regional myocardial energy metabolism by measuring the kinetics of the labeled substrates or their analogs, such as C-11 palmitate and F-18 fluorodeoxyglucose. This technique has great advantage in diagnosis of various cardiac diseases. It will be an important tool to connect two major function, which are routinely measured in nuclear cardiology, i.e. myocardial perfusion and ventricular function.

In order to re-evaluate the functional images in nuclear cardiology, their basic problems and the clinical roles were studied focusing on the myocardial kinetics of Tl-201 measured by serial dynamic SPECT and relation of the left ventricular function and myocardial metabolism measured by PET.