

METHODOLOGY IN CARDIOVASCULAR NUCLEAR MEDICINE  
(BASIC AND CLINICAL ASPECTS)

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In order to evaluate the left ventricular function, three methods, that is, a first pass method, a equilibrium blood pool method and myocardial imaging method, were evaluated and compared each other.

The first pass method, which is based on left and or right ventricular time activity curves obtained after intravenous injection of  $^{99m}\text{Tc}$ -HSA bolusly, has following advantages. 1) RAO projection image is obtainable, that is, it is convenient projection to compare two methods, radionuclide cardiography and contrast angiography. 2) Ejection fractions of both left and right ventricle are estimated. There are two types of devices, a single probe and a gamma camera with computer system for the first pass method analysis. The single probe is cheap, simple and handy. And it is useful especially for monitoring of a patient, since reproducibility of EF for a patient is good. Using  $\gamma$ -camera computer system and moving image system, regional wall motion and contraction pattern are measured besides global function such as EF.

In the equilibrium blood pool method, examination is usually performed at LAO projection. Using a single probe, volume curves of the left ventricle is estimated beat by beat and EF could be easily obtainable during at rest and under stress. Furthermore, using  $\gamma$ -camera computer system, we obtained a high temporal resolution sequential gated images. Recent technical progress of electronics and computer makes it possible to collect the data at the short time interval of 40 or 60 msec. not by list mode, but by image mode. Thus the blood pool study does not require long imaging and data processing time. But in case requiring high temporal resolution analysis of the left ventricular function is required, it is necessary to collect the data by list mode with the time interval of 10 msec. Data processing time, however, could become shorter even in this case by the recent aid of high speed and large capacity of magnetic disc.

In the myocardial imaging, multigated imaging study is useful for diagnosis of asynergy and measurement of regional myocardial volume change quantitatively. Clinical usefulness of  $^{201}\text{Tl}$  scan for the location of ischemic heart disease is

already well established. Furthermore it is prospect that coronal and axial tomography of  $^{201}\text{Tl}$  scan would give more sensitive information about the location of ischemic heart disease.

In conclusion, standardization of following process for the routine cardiovascular examination would be suggested. Firstly, using a first pass method, time activity curves of LV and RV are depicted in the RAO projection and EF of LV and RV are calculated. Secondly, using a equilibrium blood pool method, multigated image and beat by beat volume curve are depicted in the LAO projection. Global and regional left ventricular function is evaluated at rest or under stress.

It is also more convenient to adopt single probe procedure for daily monitoring to a patient.