Minicomputer has been commonly used for processing data in nuclear medicine, and its main memory is used as buffers for data acquisition, process and display. But such an approach has a few defects. As follows: First memory units costs a lot. And yet does not have enough capacity to handle the image data. Secondly, because the system requires magnetic disc, it has some disadvantages for high speed data acquisition, process, display etc. Thirdly, the system can not avoid to be big. In order to solve these problems, we have developed the new system. The outline of this system is described below. 1) Not only for data acquisition, but for ROI and for display, we use LSI memory. Especially for acquisition memory we use 64 K bits chip dynamic ram. It can be extended to 12 bits, 1M words. As a result, it allows gated image acquisition in image mode 2) Multi-microcomputer system "SHIP-9" that we developed utilizing 16 bits microcomputer chip (TMS-9900) is used as CPU. 3) Hardwear image processor is built in. 4) Special DMA circuit has been developed. It makes both static and dynamic image processing much easier, and makes it possible to form functional image with high speed. 5) Image interpolator that can display image with high resolution and high speed is built in. 6) High resolutional CRT display with 64 gray or color levels at maximum is used. 7) As operating system, we have developed "BICOMS" which is based on BASIC. This system is useful for both static and dynamic study and is available for routine clinical diagnosis.

Recently, a multiplaner emission tomography using a multi- pinhole collimator, has been developed. It uses a wide-field scintillation camera and a multi-pinhole collimator. Multiple planers are reconstructed from the original multi view data through the use of the reconstruction algorithm. Two methods of the reconstruction are comparably studied. Experimental date of computer-simulation phantom and radio isotope phantom are reconstructed by these method. And also clinical images are shown. Shimadzu-Scintillation Camera LFOV with a 7 pin-hole collimator of our own making and Scintipac using Data General's minicomputer Eclipse AP-130 with an array processor are used. Various computer simulation phantoms such as disc, point, ring etc. have been reconstructed and the resolution, accuracy etc. are tested. As a cardiac application, multi-gated cardiac tomogram-images of cardiac muscle and pool, have been excised.

A positron CT having a ring detector array is now in development. The 64 scintillation detectors, each of which consist of a 1x20x26mm³ BGO crystal and a 1-1/8" diameter photomultiplier tube, are arranged on a circle with non-uniform spacing. The detector array makes an endless rotation around the object. The rotating non-uniformly spaced detector array enables us to get flat sampling density. Each spacing between the adjacent detectors is selected so that the coincidence pair lines are most uniformly scattered within the field of view. The result of calculation computed by an iteration method gives 11 to 12 samples per 2mm distance within the 160mm diameter circle and in the rest region within the field of view (240mm in diameter) 10 to 15 samples per 2mm distance.

Aperture ratio of this machine is 0.53. This relatively small value is caused by rather practical reason than by theoretical limitation resulting from the non-uniformly spaced detectors. Theoretically, the aperture ratio of this machine can be increased as large as 0.969.