by fixing the shadowgram to-pinhole-distance and also the pinhole-to-decoded image distance. By this method we are able to obtain MPCA image by a single exposure. There arise, however, few problems, such as how to eliminate the multiple noise images superimposed on the focused final decoded image. In this study, in addition to the optical decoding, RI-tomograms were obtained using a min.-computer. In decoding, floating computations were done, and using coordinsted transformation formula by linear obbildung. Computed with optically decoded images, the computer made level cutting, Background cutting, Smoothing, Oblique display etc. far easier, and tomogram at each depth are identical as those theoretically expected.

Image Processing for Correction of Septum Penetration of Collimator

E. TANAKA and N. NOHARA
National Institute of Radiological Sciences, Chiba-shi

In imaging high energy γ-ray emitters with a conventional multi-hole collimator designed for medium energy γ-rays, the point spread function of the system is often associated with a starlike broad response due to the septum penetration, and the obtained images show appreciable artifacts. This paper presents a method of removing such artifacts by computer processing.

The image processing is made by convolution of a measured image and a correction function, the latter being determined by an iterative method from the point spread function as follows. If we assume that the point spread function is expressed by

$$p(x, y)=ka(x, y)+(1-k)b(x, y)$$

where $a(x, y)$ is a sharp peak and $b(x, y)$ the broad response and $k(<1)$ a constant, the correction function, $F(x, y)$ is given by

$$F(x, y) = \frac{1}{k}\delta - \frac{1-k}{k^2}b + \frac{(1-k)^2}{k^3}b^{(2)} - \frac{(1-k)^3}{k^4}b^{(3)} + \cdots$$

where $\delta(x, y)$ is the Dirac delta function and $b^{(n)}$ is the n-time convolution of $b(x, y)$ by itself.

The signal to noise ratio in detecting a small lesion of A dps in a uniform background activity of B dps/cm^2 is given by

$$S/N=(A^2B/T)^{1/2}(\varepsilon k)^{1/2}$$

where T is the counting time and ε the efficiency of the collimator assuming no septum penetration. $(\varepsilon k)^{1/2}$ is a "figure of merit" of the collimator.

Formulation of the septum penetration of parallel multi-hole collimator is presented, and the figure of merit of the collimator for positron annihilation radiation (0.51 MeV) is evaluated.

Computer Processing of the Scintigraphic Image Using Digital Filtering Techniques —Examination of cut off frequency—

M. MATSUO*, Y. HIRATA*, K. USHIO*, T. KATSURA*, Y. INOUE*, K. ITO*, S. NISHIYAMA*, I. NARABAYASHI**, K. HIRANO*** and S. NISHIMURA***
**Department of Radiology, Kobe University, **Department of Radiology, Kinki University, ***Department of Technology, Kobe University*

Removing noise and extracting necessary information is undoubtedly important for increasing diagnostic ability. We have clinically utilized digital filtering techniques of FIR digital filters with good success.

In this paper, we examined the correlation between the cut off frequency of a digital filter and the processed image, especially about the detectability of the space occupying lesions. Using a phantom, which contains round space occupying lesions of 1 cm and 2 cm diameter and is filled with ^{198}Au-colloid 300 μCi, a radionuclide image is obtained by a scintillation camera. The image is then processed with FIR and IIR digital