the non-uniformity of the camrea employing the high resolution and 1600 hole collimators.

(3) With window width of less than 20%, the non-uniformity is very sensitive to the relative position of a ^{99m}Tc 140 KeV peak within the window and a definite conclusion has not been reached.

Study on the Utility of Whole Body Scintillation Camera Table

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Hitherto, whole body scintiscanning had been practised by scintiscanner. However, we have felt inconveniences in the reason of occupying much times to gain scintigram.

On the other hand, we have known that whole body camera table could be controlled easily and shorten the imaging time. Then, we have studied on the general abilities of this table clinically and technically, i.e. on the resolving power, uniformity, linearity, image area and detectability.

Method:

Apparatus; pho/Gamma HP, Whole body camera table (Nuclear Chicago), bar pahntoms.

Collimeter: 40 KeV high resolution, Nuclear source; $^{99m}TcO_4^-$.

Clinically: 10–15 mCi were injected into the patients.

Results:

1) Scanning method was more splendid than stationary method.
2) Stationary method was excellent to some degree to the scanning method on the resolving power.
3) Image area was 25 cm in the stationary method, but 60 cm in the sacnning method.
4) Linearity was worse and incontinuous in the scanning method. But, there was not disturbance to clinical use considering from reduction rate 1/8.
5) We have noticed on the utility of this table.

A New Algorithm of Tomographic Imaging Using Plural Pinhole Scintigrams

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Lately tomographic imaging techniques which combine scintigraphy with computer image processing approach had become the center of wide interest. We propose a new algorithm of tomographic imaging using plural pinhole scintigrams. The following method is the technique to reconstruct tomographic images using plural pinole scintigrams taken from several different viewing angles

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by changing the position of the collimator and the screen. A distinctive feature of this algorithm is to use a deconvolution technique for the separation of the specific layer in the human body in the spatial frequency domain. We assume that the three dimentional object consists approximately of a finite number (N) of layers, and the intensity distribution of each layer can be given by f_i. We give an specified displacement for each scintigrams of different viewing angles in order to get overlapping intensity distribution of f_i. Then, we have a new intensity distribution

$$g_i = n f_i + \sum_{j=1}^{N} (1-\delta_{ij})\, h_{ij} * f_j \qquad (1)$$

where f_i is intensity distribution of the i-th layer, h_{ij} is the influence function between the i-thand the j-th layer, * is convolution operator, and δ_{ij} is Kronecker's delata. Taking the Fourier transform of eq. (1), we have

$$G_i = n F_i + \sum_{j=1}^{N} (1-\delta_{ij})\, H_{ij} \cdot F_j \qquad (2)$$

where the quantities G_i, F_i, H_{ij} are the Fourier transform of the corresponding small letters in eq. (1). Eq. (2) consists of a set of N equations including N variables f_i.

Then, eq. (2) can be solved for F_i and inverse Fourier transform gives the desired tomographic image f_i.

Qualities of reconstructed image f_i is determined by the number of n and h_{ij}. We report on the quantitative examination for the relations of these factors and basic experimentation using Radioisotopes.

A Basic Charactor of a Multicrystal Section Image Device

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We constructed a multicrystal section imaging device which has a high counting efficiency with reasonable spatial resolution. The device has four linear detectosr, each of which consists of 15 NaI (Tl) crystals (57×8×25 mm) and 8 1.5-inch photomultiplier tubes (PMTs). Each PMT views the full area of one crystal and the half-areas of the two neighboring crystals through a Lucite light guide. A crystal which detectors γ-ray is identified by an isolated signal from any one of the PMTs or two conicident signals from two adjacent PMTs. Four multicrystal linear detectors are mounted on a rotating ring so that the detectors view the patient's head positioned at the center of the ring.

The collimators are rectangular multihole types. Each crystal views 5 main holes of the collimator which are focused at 14 cm from the collimator. The full width at half maximum (FWHM) of the geometric response, which defines the thickness of the section to be measured, is 13.5 mm. In each main hole of the lead collimator, an additional tungsten septum 0.3 mm thick is insert to improve the spatial resolution of the section image. The FWHM of the geometric response at 14 cm is 13.0 mm.

In the section imaging, the ring on which the detectors are fixed is rotated stepwise at an interval of 11.25°(360/32) in the digital data accumulation so as to obtain data at 32 directions. Although a detector has 15 crystals, 15×4=60 position informations are made available for constructing a section image by staggering the positions of the 4

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