Radioisotope Tomography by Gamma Camera (PHO/GAMMA III)

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In order to obtain the radioisotope tomography, a gamma camera (PHO/GAMMA III) and usual parallel collimeter were used.

METHOD: The object layer was obtained by moving the detector of the gamma camera for vertical direction. The movement of the detector was calculated using the following equation.

Tan $\theta = I/d + 22$

θ: Angle of the detector, I: Distance of the detector, d: Distance of the object layer, 22: Distance between surface of the collimeter and the revolving shaft of the detector.

The fault of this method was a strain of the image which depends on the revolving angle (θ) of the detector. Due to take off this strain, we used an electric amplifier.

It was very difficult to move and revolve same time the detector, so we constructed the tomographic image with combination of each images (0, ±10, ±20).

The suitable angle of this method was 40 degrees (±20).

Reconstruction of RI Transaxial Tomography (2)

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Studies on the reconstruction of transaxial tomography from multiple projection images with positron emitter was attemted using scintiscanner and minicomputer.

Projection data from acryl phantom with Rb-81 were collected by a pair scanner system with cylindrical (9 mm ϕ, 7 cm thikness) lead collimators and with coincidence circuit (1.3 μ sec) by rotating the phantom around a axis at each angle of 6 degrees. Each data consists of 64 elements with sampling resolution of 3 mm. Acquisition time for all data (30 projection) was approximately thirty minutes with 20 cm/min scan speed. Maximum counts of each projection were about 350 counts. The image reconstruction were accomplished by fast Fourier transform (FFT) method and one dimensional convolution method with high pass filter proposed by Ramachandran et al.

Considering sensitivity loss with depth caused by photon attenuation, scattering of beam and statistical fluctuation of data due to insufficient counting. RI transaxial tomography is marred in comparison with the X-ray transmission type. However, the tomography with positron emitter might be solve the problem of attenuation. In order to discuss effects caused by these disadvantageous condition, computer simulation were done with simulated phantom consisted of various hot and cold spots. The simulation were carried out on the assumption that the phantom consisting of sources with I-131 or Tc-99m in water mediam was measured by scinticamera. Projection data were obtained by taking account of the attenuation coefficient and LSF to value of the each pixel, and were given Poisson random noise. Then, the section images were reconstructed by various method above mentioned. Discrepancy between true and reconstruction image were evaluated by cross correlation coefficient. Section images on various condition concerning kind of filter, cpu time, number of projection required, noise level of data and so on were compared.

It was concluded that (1) the convolution method