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A BASIC STUDY OF DATA ACQUISITION IN SPECT.
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To maximize both step and count numbers is a basic idea of data acquisition in SPECT. In practice, however, this idea is extremely difficult to follow because of limited time due to the patient's clinical conditions, etc.

It is, therefore, customary to change either step number or count number.

Using a Hitachi γ-camera (Gamma View T), we studied the effect of a change in step number or count number on images by acquiring data when the step number was changed to 64, 48, 32 and 24 and when the count number was subjected to a similar change, and obtained interesting results described below.

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EVALUATION OF THE METHOD FOR ORGAN VOLUME AND UPTAKE MEASURMENT WITH A SINGLE PHOTON EMISSION CT(SPECT).
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Estimation method for organ volume and activity with SPECT was developed and evaluated using the various size of phantom with background activity of 1,5,10,30% to the target.SPECT images of the phantom were taken by using rotating gamma camera(GE) with 360°/64 angle sampling and two types collimator(LEHR,HR).Reconstruction method of filterd back projection was used in this study with two kinds of attenuation correction methods,RPC(Tanaka) and PRE(Sorenson). The best equi-count level by which true volume of the phantom was estimated was investigated.A linear regression curve for the best equi-count level to the various phantom volume was calculated.The volume of all phantoms estimated from this regression curve were well correlated to the true volume(r=0.99 with RPC,r=0.98 with PRE). The activity in the target phantom was estimated from the relation ship between injected activity and the total counts in the region districted by the best equi-count level. Good correlation between true and estimated activity ($r > 0.98$) was obtained with two attenuation methods for the phantom volume of 113cc-1800cc.

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EFFECTS OF THE BODY CONTOUR ON QUANTITATIVE SPECT STUDY.
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The influence of the detected body contour on the density of the reconstructed image with the various attenuation correction techniques including the pre-correction method by Sorenson (1974) (Pre), the post-correction method by Chang (1978) (Post), the Weighted Backprojection method by Tanaka(1983) (WBP), and the Radial Post Correction method by Tanaka et al. (1984) (RPC) were evaluated by the phantom experiments. A cylindrical phantom with diameter of 20cm containing a 5 cm diameter plastic sphere filled with Tc-99m was imaged by the rotating camera SPECT system and reconstructed with various attenuation correction methods. About 1.5 cm change in the major axial length of the contour caused 15% counts decrease in the ROI including the sphere with the POST method, 12% with RPC, and 5% with PRE method. The images of another cylindrical phantom with 30 cm diameter reconstructed with the wrong body contours have shown the illegal shoulder at the slope and bulging of the counts at the center, which decreased the lesion contrast of the 'cold spot'. To improve the accuracy of the contours in our threshold based method reported at the annual meeting last year, new method which use the major axial length of the body measured from patients was proposed.

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AN ATTENUATION CORRECTION OF SPECT IMAGE USING TRANSMISSION DATA ACQUIRED WITH DUAL HEAD GAMMA CAMERA SYSTEM.
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The information about distribution of attenuation coefficient of gamma ray is very important for the reconstruction of a quantitative SPECT image. A special collimator was developped to measure the actual distribution of attenuation coefficients within a cross section. Transmission CT data and emission CT data were obtained at the same time using the characteristics of gamma camera system with dual heads(GMS-90BII). An attenuation correction was performed with Modified Correction Matrix (MCM) method that we proposed. Our fundamental experiments with a cylindrical phantom showed the validity of attenuation correction method, and we have also describe the possibility of application to the clinical study. From the results of experiments and clinical study, we confirmed the importance of utilization of the distribution of attenuation coefficients.