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DEVELOPMENT OF REAL-TIME CORRECTION EQUIPMENT FOR ENERGY-SIGNAL NONUNIFORMITY AND POSITION-CALCULATION NONLINEARITY IN GAMMA CAMERAS. M.Nishikawa,T.Kihara,H.Nishimura and M.Kakegawa (Toshiba, Nasu Works)

This new correction equipment stores, in the memory corresponding to the position of Gamma camera detector surface, correction coefficients used to correct nonuniformity of energy signals and the correction vector quantities used to correct nonlinearity in position calculation. Real-time correction can thus be made by the following sequence: (1) For each scintillation event that passes through PHA for which slightly broader window has been set, the energy signal is first corrected, followed by PHA processing once again, and (2) the correction vector is added to the scintillation position signal, which has passed through PHA, to achieve linearity correction. In order not to adversely affect the counting rate characteristics of the Gamma camera, two high-speed sum-of-products calcualtion modules are used in the correction calculation circuit (particularly interpolation calculation to perform smooth linearity correction) so that processing for each event can be completed in 2 microseconds.
Calibration for the energy correction is made using the data collected under uniform irradiation, while two slit phantom images (one vertical and one horizontal) and one uniformity image are used for linearity calibration. It is also possible to execute these processings on-site.

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ASSESSMENTS OF THE PERFORMANCE OF A 200 Kev COLLIMATOR FOR 67Ga IMAGING. T.Matumoto, T.A.Iinuma,F.Shishido, Y.Tateno. National Institute of Radiological Sciences. Chiba.

The performance of an imaging system with a 200 Kev collimator for 67Ga imaging is eva-luated by using physical parameters and ROC analysis on the lesion detectability of human observers. The specification of the designed collimator is as follows: max. energy; 200 Kev, hole size; hexagon, number of hole; 5700, septum thickness; 1.08 mm,system sensitivity; 280,98 (cpm/μCi)for 93, 184 Kev, geometric resolution; 14.0 mm and system resolution at 10 cm distance from the collimator- surface; 14.3 mm.
The first, by the phantom study,the basic performance (sensitivity and resolution) of the imaging system with the collimator is compared with the system attached the another collimator (max. energy;400 Kev, system sensitivity; 101,35,12 (cpm/μCi) for 93,184, 296 Kev, respectively, system resolution at 10cm;11.7 mm). The second, using a digital computer, a process of the imaging system with the collimator for the 200 and 400 Kev is simulated. Twenty observers are asked to see the X ray films of simulated image and to judge whether or not there are defects in the image. Results of the assessments of the lesion detectability for the imaging system by means of ROC analysis, it was obtained the fact that the performance of the system with 200 Kev-collimator was superior to that of the system with 400 Kev collimator.

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Two Detector Type Multipurpose Gamma Camera System; Use as Whole Body Imager. Y.Akiyama, N.Yui, M.Koakutsu and F.Kinoshita. Chiba Cancer Center Hospital. Chiba.

A gamma camera system which has ability of conventional imaging, whole body imaging and single photon radionuclide computed tomography was installed in our hospital. We presented the ability of this system as used for RCT several times. The use as a whole body imaging device was presented at this society.
The dose to a patient from a radiopharmaceutical is usually calculated with the equation published by the Society's Medical Internal Radiation Dose (MIRD) Committee. The equation of this calculation is $D = \tilde{A}s\ \Sigma\ \Delta \cdot \Phi$ where D is mean dose of each organ; $\tilde{A}s$ is cumulated activity in source organ; Δ is equilibrium dose constant; and Φ is the specific absorbed fraction. The value of Δ and Φ are tabulated in MIRD Pamphlet, but the knowledge of whole body RI distributions is necessary for the value of $\tilde{A}s$. And, these distributions were obtained by utilizing this system as a whole body imager.

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A METHOD FOR DERIVATIVE CALCULATION OF NOISY TIME-ACTIVITY CURVE AND ITS APPLICATION TO RADIOISOTOPE DYNAMIC ANALYSIS. K.Murase, M.Ishine,M.Koizumi,T.Mochizuki,S.Inastuki, A.Iio,K.Hamamoto and K.Yamamoto*).
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A method for calculating the slope or the derivative of time-activity curves that contain statistical fluctuations is proposed. The algorithm presented here is based on consideration of a digital differentiation as a digital filtering. For design of an effective differentiating filter, the Chebyshev-type min-max method is used and for minimization of the weighted Chebyshev error the Remez exchange algorithm is used. The usefulness of this method was investigated using the Monte Carlo technique
As an example of the application to the radioisotope dynamic analysis, a renogram-curve analysis was presented. The ratio between the bilateral slopes of the renogram's second segments determined by this method correlated well with the renal plasma flow ratio(r=0.97, n=16).
Finally, the functional images of the slope of the renogram's second segments were constructed and they were ascertained to be useful clinically.