A. Instrument, Computer

1 DEVELOPMENT OF REAL-TIME CORRECTION EQUIPMENT FOR ENERGY-SIGNAL NONUNIFORMITY AND POSITION-CALCULATION NONLINEARITY IN GAMMA CAMERAS. M.Nishikawa, T.Ikai, 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 calculation 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 processes on-site.

4 Two Detector Type Multipurpose Gamma Camera System; Use as Whole Body Imager. Y.Akiyama, N.Yui, M.Kakutani and F.Kinosita. 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 = A \delta \Delta \phi where D is mean dose of each organ; A is cumulated activity in source organ; \delta is equilibrium dose constant; and \phi is the specific absorbed fraction. The value of \Delta and \phi are tabulated in MIRD Pamphlet, but the knowledge of whole body RI distributions is necessary for the value of A. And, these distributions were obtained by utilizing this system as a whole body imager.


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.