kernel''.

The choice of the correction function is closely related to the character of noise, and it has already been shown that, when the point spread function of the reconstructed image is Gaussian, the ratio of the one-dimensional signal power to noise power is maximized for a given r.m.s. resolution width. Such an optimized correction function has already been reported (Phy. Med. Biol. **20**, 789).

The error kernel was evaluated with the optimized correction function. The error kernel is presented as a function of r/σ where 2.35 σ is the resolution (FWHM) of the reconstructed image. Some applications of this formula are also presented. For instance, the variance at the center of a ring source having a constant activity density is nearly independent of the diameter of the ring, while that of a disc source is nearly proportional to the diameter.

Some Experimental Result Of Perception

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Since the image of the distribution of radioisotope contains statistics noise, we are not perceptible the hot region where target counts are close to background counts, even if only one hot resion exists in the uniform background.

Therefore, it is the purpose of present experiment that we are just visible the target how the differences of counts between target and backgrond are. These studies were done by computer simulation method.

First, in respect of the recognition of target with line printer, distinct display is the most available by using the threshold counts at $B+\sqrt{B}$ Second, the perception of this display is related to the formula, $T-B/\sqrt{B}$, and the value of 1.2 in this formula shows fifty percent distinguishable.

(T, Target count; B, Background count)

This value is considerd to be not so different with other display systems that collecting suitable output method line printer is available for simple RI image as one target area exist in the uniform background.

The Third "Intercomparison of Computer-Assisted Scintigraphic Techniques"

Sponsored by IAEA

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This report discribes some results of the third study of IAEA co-ordinated research programme on "Intercomparison of Computer-assisted Scintigraphic Techniques'' which was initiated in 1970. The first and second intercomparison which was reported on the special lecture of the 13th annual meeting of J.S.N.M. at 1973 by T. Nagai, employed mathematically simulated phantoms produced by computer, but there were some opinions that they are not suitable representation of clinical situations, since shape of the simulated phantom is too simple to simulate the clinical scans. Therefore, in the third programme, gamma-camera images of dead human liver filled with 99m-Tc solution were applied. Their images were produces in Hannover, recorded on magnetic tape in IAEA and send to 19 participating institutes including NIRS.

The specification of the scitigrams is as follows;

(1) 96 images were record on M.T., 46 of which contain cold lesions and 50 contain hot lesions.
(2) The liver-scan contains up to 6 sherical lesions.
(3) For the 128×128 matrix the sample size is 3.44×3.44 cm, but the scans normally lie between X-channels 20 and 90 and Y-channels

30 and 100 (71×71 matrix and effective area is about 24.4×24.4 cm).

(4) The outer diameters of the lesions were between 1.2 and 3.5 cm, and wall thickness was 0.1 cm.

(5) The uniformity within the firld of interest was confirmed to be ±5% or better and the energy window used was 10%.

(6) Average of total counts of the images was 18,400±1,200 counts.

An suitable processing techniques and display method was applied to the digital scintigrams in each institute and the displayed images were read by plural observers. The results of reading was recorded on work-sheet as position co-ordinates of the recognized lesions and rating of the observer's confidence in five levels. These were sent to IAEA.

Some results of the intercomparison arrieve on the simposium of IAEA at Oct. 24, 1976 as following;

(1) While there may still be considerable disperson in the results obtained by different observers with same techniques, those evaluating with different techniques is considerably greater.

(2) When digital techniques are used for evaluations, the results obtained with processed data are superior to those obtained with unprocessed data, but display methods may have a greater influence on the evaluations.

(3) The results obtained with medium-frequency enhancing filters are in general superior to those obtained by simple smoothing filters, however, in case of lower S/N images, the results of the two pocessing methods were almost same.

Computer Aid for The Removal of Influence of Respratory Movement on Liver Imaging by Gamma-Camera

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The purpose of this paper is to reduce the influence of respiratory motion on the liver imaging by using scintilation camera and computer system. Two hundreds frames of liver image which was consisted by 64×64 pixcels were obtained at time interval of a second. After smoothing each image by points averaging method, ROI was selected in the marginal region of the liver and the time activity curve of this region was generated. From this time activity curve, upper level, corresponding with expiration phase, and lower level, corresponding with inspration phase, were defined as threshold levels. Some files having higher counts than upper level were picked up and summed up, to construct the expiratory phase image. Some files having lower counts than lower level was also picked up to generate the inspiratory phased image. These two phased images were compared with conventional image regarding displacement and deformity of the liver image using contour line method which was determined from gray level histogram.

By this method, liver phantom was analysed which was moved at 16 cycles per minute with a motion amplitude of 3 cm. As a result, the displacement due to mechanical movement of the phased image was corrected as 2.2 cm. After administration of ^{99m}-Tc-phytate, the time activity curve of liver movement was obtained at both level normal, and the ratio of difference between upper or lower level was culculated. In the normal case which had respiratory movement, the ratio was 40%. On the other hand, the ratio were 16% in polycystic liver and 10.5% in liver tumor. In the normal case with forced respiration, the ratio became twice of that of conventional respiration. Moreover, different shapes of the liver were noted in expiratory and inspiratory phases. In conclusion, respiratory motion of normal one of case with SOL due to elasticity of normal liver tissue.

In the past breath hold method has been used to reduce respiratory movement of liver after larger doses administration of radioistope. However, this method is not feasible to the aged