Remodeling of Scintiscanner for Subtraction

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Purpose: Recent diffusion of nuclear medicine is striking and various data of nuclear medicine have been applied to clinical use extensively. Hepatic scintigram in 'in vivo' measurement is indispensable. However, pancreatic scintigraphy which is relatively easy has hardly been employed in routine test probably due to diagnostic and reading problem. We attempted to devise subtraction scintigraphy using simultaneous double tracer method to facilitate the reading of pancreatic scintigram and to develop new diagnostic capacity.

Method: Upon incorporating two kinds of tracers simultaneously (e.g., ^{198}Au-colloid and ^{75}Se-selenomethionin), the count of one tracer was properly reduced with use of the divider circuit of the dot controller in the double probe type 2-channel scintiscanner, and subtraction was made at one to one pulse rate. The result was processed by the rate meter and scintiphoto controller to produce a subtraction scintiphotogram. The other photo controller was used to select and record either the divisor or the divident. Moreover, the scanner was remodeled so as to be usable as an ordinary scanner by means of the change-over of switch.

Results: With ^{198}Au and ^{75}Se placed under the detector, reasonable subtraction was possible but statistical variation became an issue when the result of subtraction approached zero. Though there were some difficulties in clinical application such as setting of conditions, this method was tested anyhow and subtraction scintigram became available.

Conclusion: Though subtraction is unavailable with most of the 2-channel scintiscanner, it becomes available by simple change of wiring. (In our case, only coaxial cables and a rotary switch were added.)

Scinti-roentgenphotofluorography

(RIX photofluorography)

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In order to get anatomical information the trial was made to overlap the image of scinticamera with photofluorogram. The thyroid of the patient intaken with radioactive isotope laid on the scintigraphic table was imaged with Polaroid camera with parallel collimeter of the scinti-

camera. The table was then changed its position without changing the position of his body to be under the X-ray tube. The Polaroid camera was attached as the lens camera of photofluorography and the thyroid was photoroentgenographed. The central X-ray directed to get the same X-ray image of the thyroid. This new method is termed the scinti-roentgenphotofluorography or, for short, RIX-photofluorography. The accordance of scinticamera image with photofluorograph was confirmed by means of the model of lead chart. The magnification ratio of both images are also made practically the same. After injecting ^{131}I-MAA into the femoral artery, the foot was taken with RIX-fluorophotography and shown. The thyroid cancer was also taken by this method.

Color scintiphotoroentgenography taken with Polaroid attached with color film will be available in advance.

A New Type of the Photo-recording System of Scintiscanner

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The photo-recording system of scintiscanner in use suffers in a respect. It is that dots to be recorded often tend to fall out under the influence of the random nature of radiation, and it is not preferable phenomenon for diagnosis. Some approaches to improve this drawback are as follows.

(1) If the scan interval of interest has no input, average the input counts in the interval before and after that of interest, and record the averaged counts as equivalent input counts on the scan interval of interest.

(2) Lengthen the width of the scan interval, and make an interval have some input counts, then the variation of radiation can be smaller.

But these approaches have a demerit that scallop will grow large due to the reverse of scan direction. This makes the quality of scintigram worse. Therefore, we have attempted to have scallop be the same as former type's or less, to compensate statistical variations of radiation, and finally to get smoothed scintigram. The electrically improved point is that the device has been attached four integrators and by controling the reset time of each integrator, it gets four times wider integration interval than exposure interval, and by means of adding four integrator outputs in exposuring, the effective input counts increase. This means scanning speed can become faster.

Results

1) Scintigrams are smoothed.
2) The "fall-out" of scintiphotos is reduced and scintigram becomes readily understandable.
3) Speed-up of scanning becomes possible.