approximation method (Nagai and Iinuma) and 8) limited sampling least square method (Fukuda). According to phantom and clinical experiments, weighted smoothing and non-linear matched filtering with 13 data points size were chosen as standard processing method. Display on the CRT was photographed on Polaroid film as a map view with 5 levels of brightness and also 4 isometric presentations with different direction. Fifty one computer processed scans out of 216 digital scans were retrospectively compared, in terms of detectability of cold or hot lesion, with simultaneous photoscans and the patient's clinical findings. In 42 patients, no further information was added to the photoscan results by the computer processing and agreement with clinical findings was obtained. There were 6 cases in which the computed scan was diagnostically superior to the photoscan. In 2 cases, however, the computed scan showed false positive lesions while the photoscan and clinical findings excluded the lesion. Since the lesions on the photoscan were mainly blurred by poor count statistics, smoothing was effective in all instances resulting better S/N ratio. In some cases, however, mottle appearances were enhanced by smoothing or other processing methods and may cause false positives. Although focusing methods to improve the resolution of collimators showed better detectability of small lesion in phantom experiments with good count statistics, no definite improvement was obtained in the present series of clinical scans.

Quantitative Evaluation of Radioisotope Distribution in Vivo by Isosensitive Scanner Plus 4,096 Word Multi-Channel Analyzer Coupling

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The concept of isosensitive radioisotope scanning was advocated by us in 1966. The essential feature is the adaptation of two opposed detectors snychronized and moved in a rectilinear scanning system with the output of the two detectors combined to a single recording. The delineation of the radioisotope distribution is completely independent of depth so that any deposition of radioactivity has an equal opportunity to be visualized. For the quantitative evaluation of radioisotope distribution in vivo, isosensitive scanning is a prerequisite. Instead of analogue recording, digital acquisition of scan data is more suitable and flexible for data manipulation.

For this reason, the CDS-4,096 multi-channel analyzer (Nuclear Chicago Co.) was coupled to isosensitive scanning system with an aid of proper interface. Data obtained from the scanning detectors were stored in a 64×64 digital matrix. The digital image on a CRT screen was processed in a real time just by simple operation of selectors and switches. Various data manipulations and displays such as smoothing, thresholding, isocount display, profile histogram etc. were executed on line program for the convenience of visual interpretation.

One of the most useful function in CDS-4,096 analyzer is the integration of all of the data within selected area. Validity of quantitative evaluation method was proved using Alderson Research Laboratory Organ scanning phantom. The ratio of known amounts of radiogold ^{198}Au in the phantoms of the liver and spleen could be detected very precisely.

In the clinical application, area must be selected according to variable contours of the organ and light-pen system is more desirable.

From ^{198}Au colloid liver scanning data, spleen/liver ratio can be obtained and this seems to be a good parameter which is closely related with portal pressure except for special diseases. Likewise, pancreas/liver ratio in ^{75}Se-selenomethionine pancreas scan, the ratio of pulmonary blood perfusion between both entire lungs or regional perfusion rate in ^{131}I-MAA lung scan can be obtained and in brain scan the microcuries present in the brain tumor in vivo and percent of administered dose could be calculated.

A New Device for Calculation of the Ratio of Splenic to Hepatic Radioactivity with the Isosensitive Photoscintigram

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Splenic uptake is often increased on scintigram with ^{198}Au-colloid or ^{131}I-Microaggregated Albumin (^{131}I-MiAA) in the cases of liver cirrhosis and chronic hepatitis etc.

We attempted to produce an apparatus that calculates the ratio of splenic to hepatic radioactivity (S/L ratio) and to apply it to clinical cases.

Methods: Isosensitive measurement with the wide range is obtained with dual probes (five inches) scintiscanner A-107-4 (Toshiba) by following conditions; the distances between the two collimator with 85 holes and focal length 10 cm setting to opposite direction are 29-30 cm and 27 cm using ^{131}I and ^{198}Au respectively as radioactive source.

Correlation between film density and frequency (photo recording signal) are straight up to 120 cps by 40 cm/min. of scanning speed and 200 cps by 70 cm/min. with the following conditions; density A 5, B 70 and Contrast A 50, B 1.

Film density is measured by Film Scanner MRA-201-2 that including the photomultiplier, tungsten light and the logarithmic amplifier. Output of Film Scanner is converted to digital signal by A-D converter and there counts the area of liver or spleen by counter.

Results: When the liver and spleen phantoms contained ^{198}Au-colloid with ratio of radioactivity 2:1, S/L ratio showed 57%. S/L ratios were obtained in 70 cases of various diseases as follows: A) S/L ratio using ^{198}Au-colloid; Hospital controls (4 cases) 0-0.1%, Liver cirrhosis (15) 0-195%, Chronic hepatitis (19) 0-22.2%, Intrahepatic cholestasis 0%, Acute hepatitis (4) 2.6-11.2%, Liver cancer (2) 0 and 89.7%, Banti's syndrome 5%, SLE (2) 0 and 2.8%, Multiple myeloma 0.1%. B) S/L ratio using ^{131}I-MiAA; Hospital controls (4) 1.4-9.5%, Liver cirrhosis (18) 12.7-806.6%, Chronic hepatitis (17) 2.5-43.4%, Subacute hepatitis 28.6%, Acute hepatitis (2) 10.7 and 66.2%, Liver cancer (2) 14.6 and 68.6%, Banti's syndrome 92.6%, Cholecystopathy (3) 30.9-44.2%, SLE 30%, Multiple myeloma 5.1%.

S/L ratio using ^{131}I-MiAA were on the average 12.5 times higher than that using ^{198}Au-colloid.