Disappearance Rates of ICG, ^{131}I-BSP, ^{131}I-Rose Bengal and ^{198}Au-Colloid in the Cases with Various Liver Diseases

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Hepatic clearance of dye was investigated in various liver diseases. Indocyanine green (ICG), ^{131}I-sulfobromophthalein (^{131}I-BSP), ^{131}I-rose bengal (^{131}I-RB) and ^{198}Au-colloid were injected simultaneously and their disappearance rates (K_{ICG}, K_{I-BSP}, K_{RB} and K_{AU}) were determined.

^{198}Au-colloid was uptaken and stored by the hepatic reticuloendotherial system and other dyes were cleared from the blood by the hepatic cells and excreted into the alimentary tract. Non-radioactive sulfobromophthalein (BSP) was also used and its disappearence rate (K_{BSP}) was measured in a small number of patients. The subjects were as follows; 16 cases with acute hepatitis, 30 cases with chronic hepatitis, 13 cases with liver cirrhosis, 11 cases with congenital jaundice, 4 cases with so-called ICG abnormality, 12 other cases and a normal control group of 16. $K_{ICG'}$, $K_{I-BSP}$and K_{RB} decreased relative to the progress of the hepatic disease; however, the value of K_{AU} was significantly low only in cases with liver cirrhosis.

The correlation coefficients between K_{I-BSP} and K_{ICG} ($r=+0.84$, $p<0.005$), K_{RB} and K_{ICG} ($r=+0.80$, $p<0.005$), K_{BSP} and K_{ICG} ($r=+0.76$, $p<0.005$) were higher than that of K_{AU} and K_{ICG} ($r=+0.47$, $p<0.005$).

This fact showed that ICG, ^{131}I-BSP and ^{131}I-RB were uptaken and metabolized similarly in the hepatic cells, while K_{AU} showed a different hepatic function.

Among the cases of congenital jaundice and so-called ICG abnormality, a dissociation between $K_{I-BSP'}$, K_{RB} and K_{ICG} was found. Cases with Rotor's hyperbilirubinemia showed a very low value of $K_{ICG'}$, K_{I-BSP} and $K_{RB'}$, but in the cases with ICG abnormality, K_{I-BSP} and K_{RB} were within the normal range. The cases with Gilbert's disease showed a normal disapperance rate with all the dyes used, and the cases with Dubin-Johnson syndrome showed a low K_{BSP} value only.

The Determination of Liver Volume and Surface area from Liver Scintigraphy.

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We have developed a new computer program which assesses liver volume and surface area from liver scintigrams obtained by using scintillation camera. The nuclide used for the scintigraphy was ^{198}Au colloid. The radioisotopic images were recorded on magnetic tape in a digital image of 64×64 matrices using an on-line minicomputer system. The contour of the liver was determined by the setting of the cut off count level, that is, 25% of the maximum count. The maximum count in the anterior view is considered to reflect the maximum thickness, which can be determined from right lateral view. Since the relation of count and thickness can be obtained in the maximum thickness, another count in the anterior view also can be transformed to the thickness. Thus the liver volume was calculated by multiplying the sum of the thickness by matrix point area (0.16 cm^2). The surface area was calculated by summing up the matrix point area within the liver contour. Good correlation was obtained between calculated liver volume and surface area in the same patient ($r=0.891$, $P<0.01$). Repeat examination was performed in 8 patients within 2 month and the differences between double determination were less than 11%. Whether or not these calculated

liver volume and surface area demonstrate the actual volume and area, remains the problem. However, our results suggest that this method is very useful in following the clinical course of patients with liver diseases.

Evaluation of Scintigraphic Technique for Liver Imaging

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Scintigraphic technique for liver imaging employed at Hokkaido University Hospital during Janualy, 1968 to August, 1976 were evaluated.

The material reviewed consists of 4552 examinations. The radionuclides used were ^{198}Au-colloid, ^{99m}Tc-S-colloid, ^{99m}Tc-Sn-colloid and ^{99m}Tc-phytate.

One-third of the scanned images obtained by using ^{198}Au-colloid showed poorer resolution compared with the images of scinticamera with or without blended filter using ^{99m}Tc-phytate.

It was rather diffidult to find optimal settings when obtaining blended images, and more than a half of which appeared to be unsatisfactory for diagnostic purpose.

Whereas, the images without blended filter produced relatively satisfactory result in cases that the focussing were correct. No significant difference, however, was seen among these three methods, as far as the diagnostic accuracy was concerned.

The phantom experiments demonstrated no observable difference between scanned images with ^{198}Au and these with ^{99m}Tc, but the images by scinticamera revealed superior result with ^{99m}Tc probably due to the different use of collimator.

It was revealed that the images by camera showed better resolution when increasing radioactivity, and that 300,000 counts appeared to be optimal for routine use.

We are routinely performing scintigraphic examinations for the liver from A-P, P-A, right lateral and left lateral directions, either with rectilinear scanner using ^{198}Au-colloid or with scinticamera using ^{99m}Tc-phytate. ^{99m}Tc-Sn-colloid is also used in cases of studying the more detail the spleen.

The blended filter is not in use at present.

Diagnosis of Primary Hepatoma by Radioisotope Image Processing with a Digital Filter and Estimation of Serum AFP

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Recently digital computer system is commonly used for scintillation camera data processing. Correction of scintillation camera field inequality is one of important problem. But, clinical evaluation of the correction system is not established. In order to reduce the effect of the deteriorating cases or to enhance the information contained in image, a digital filter using the high speed Hadamard transform of RI image is presented.

The observed image is expressed by the convolution of true radioisotope distributions and the impulseresponse of instruments. For improving the resolving power of the system, the Hadamard transform of observed digital image is performed as follow:

$[G'(u, v)]=[H(u, v)][g'(u, v)][H(u, v)]$, where $g'(u, v)$