is the observed digital image, $[H(u, v)]$ is the Hadamard matrix of order 64. Here, a weighting operation to $[G'(u, v)]$, is performed, and its result is transformed by means of the inverse Hamadard transformation. As a result, the high frequency compornents are moderately b intensified and can be enhanced the information in RI image.

It was confirmed that this image procedure was useful by applying to RI image of the liver phamtome containing plastic cold bolle or liver image of 11 patients with hepatoma. With this method, calculation time was shorten in comparison with conventional methods for image processing. Diagnosis of the primary liver tumors were improved by this method and serial determination of AFP.

Comparative Study Between a Conventional Gamma Camera and PHO/CON on Liver Scintigraphy

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Materials and methods

Liver scintigraphies were performed on 250 patients by a gamma camera and PHO/CON. A comparative study was performed on 50 patients of them, who had suspicious impressions of space occupying lesion (SOL) in the liver.

20 or 30 minuts after injection of 2 or 3 mCi of ^{99m}Tc-phytate, anterior, posterior and right lateral views were taken by a HP type gamma camera (Searle Radiographics Inc.) with a parallel colimator. Soon after, anterior and postrior views on supine position and lateral views on left decubitas position were taken by multiplane tomographic scanner (PHO/CON, Searle Radiographics Inc.).

Result

Two cases had no impression of SOL by gamma camera, but was discriminated single SOL by PHO/CON. In 4 cases, PHO/CON detected multiple SOL although the gamma camera discriminated single SOL. In 8 cases, single SOL was suspicious by the gamma camera, and by PHO/CON, single SOL was clearly seen. In 25 cases, multiple SOL were seen by the gamma camera, and the number and shape of SOL were more clearly seen by PHO/CON than by the gamma camera.

Discussion

PHO/CON is more excellent than a gamma camera for detectability of SOL in liver scintigraphy.

Functional Imaging of Liver by ^{13}N-Ammonia

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Ammonia has been known to be an inducing agent of hepatic coma associated with liver cirrhosis.

In order to establish a non-invasive method of investigating the portal circulation and the metablism of ammonia at liver the following

studies were performed, by using cyclotron produced ^{13}N-labeled ammonia and delayed line γ-camera interphased with on-line computer system.

1) Animal experiment: Dynamic scintigraphy of thoraco-abdominal region of a rabbit after intrasigmoidal as well as intravenous administration of ^{13}N-ammonia were performed.
2) Theoretical consideration of the functional image of liver: According to the results of the animal experiment, a model of ammonia metabolism having the minimal complexity necessary to represent data in the case of intrasigmoidal administration was proposed. Starting from the solution to the differential equation describing the model, relevant parameters characterizing the dynamic curve of liver were deduced. The relationship between these parameters and the intrahepatic portal blood flow as well as rate constant of uptake of ammonia by hepatic cells was investigated.
3) Clinical application: Dynamic scintigraphy of liver and heart of a patient barign liver cirrhosis after intrasigmoidal administration of ^{13}N-ammonia (pH 8.1) were performed. Simultanously, continuous measurements of radioactivity at the left side abdomen and the left temporal region were done by using a scintillation detectors for renography. Successive measurement of radioactivity of blood was also carried out.
4) Construction of functional images of liver and heart: By using digital radioisotope image of liver and heart of the patient after intrasigmoidal administration of ^{13}N-ammonia, the maps of above described parameters on the liver and heart (Functional image) were constructed.

Studies on Portohepatic-Hemodynamics by Method of Injection of ^{99m}Tc-Pertechnetate into Small Intestine under the Scintillation Camera

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After a bolus of ten mCi of ^{99m}Tc-pertechnetate in a volume of 1～5 m*l* was injected into upper-small intestine through Bilbao-Dotter tube, RI image of the liver, spleen and the heart were recorded in VTR by scintillation camera. Time-activity curves of the liver and the heart were taken up from data-store/play-back system produced by Toshiba and Nuclear Chicago, setting up ROI (regeon of interest) on the both lobes of the liver and on the heart respectively.

In various liver diseases, studies of portohepatic-hemodynamics were performed with this method. Time-activity curves were analyzed, and following results were obtained.

①Time-activity curves (TAC) were classified into following 3 types.

Type 1 has high-tidal wave in TAC.

Type 2 has not high-tidal wave, but has peak value.

Type 3 is gradually increasing curve.

And then, patterns of TAC in various liver diseases could be described as follows.

In normal cases, TAC were L1 > H2.

In chronic hepatitis, TAC were L2 ≒ H2.

In liver cirrhosis with marked esophageal varices L3 ≪ H3, and this results suggest that there were many current portocardiac bypass.

(Here L and H represent TAC of liver and heart. 1, 2, 3 mean types of TAC.

>, < mean comparison of values of TAC in each peak)

— Palameter-analysis was made in this TAC.

Values of KL/KH, PL/PH and tc were decreased with progress from the cases of chronic hepatitis to the cases of liver cirrhosis compared to normal cases.

(Here indicates K; initial velosity in TAC P; peak value in TAC tc; crossing time)

We want to develop this method and clarify the portohepatic-hemodynamics in detail.