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QUANTITATIVE ESTIMATION OF LIVER AND SPLEEN UPTAKE USING EMISSION COMPUTED TOMOGRAPHY.
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Quantitative estimation of liver and spleen uptake was made in various hepatobiliary diseases using emission computed tomography based on opposed gamma camera.

Ten min. after administration of 3m Ci of Tc-99m-phytate, image data were collected 3 min. by continuous rotation mode. Following reconstruction, attenuation correction was made by Chang's method. Uptake images were constructed by displaying in color the quotient of the counts for each of the elements divided by the dose. Total liver or spleen uptake was calculated by the sum of the regional uptake over the organs.

In 6 adult normals, total liver uptake was 74.3±6.4% (mean±S.D) and spleen-liver ratio (S/L ratio) was 6.9±1.7. Total uptake of liver and S/L ratio in liver cirrhosis was 33.5±7.5% and 29.8±23.5, providing useful information on liver function. In various hepato-biliary diseases, total liver and spleen uptake correlated well with liver blood flow (γ=0.694) and lipid emulsion test Tl/2 (γ=0.767), while, the correlation between total liver uptake and ICG Rmax was poor.

Although a regional mean liver uptake was correlated well with total liver uptake (γ= 0.903), slight discrepancy was found in some cases who had decreased liver volume with normal mean uptake.

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ESTIMATION OF THE VOLUME OF ORGANS BY EMISSION COMPUTED TOMOGRAPHY (ECT) -- WITH SPECIAL REFERRENCE TO THE SPLEEN.--
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To estimate the volume of organs, preliminary phantom study was performed by using volumeric program of Maxi Star(GE Co.) newly combined with ECT unit(Maxi 400T/61). Such method principally based on ECT images (ECT method) was compared in accuracy with the formerly-used and called "Planimetric Method" by means of calculation converted from two scintigraphic areas of an organ which were taken at a right angle.

Cutoff level (CL) was first testified on various ratios in radioactivity of Organ to Background (2 - 50 to 1), so as to get more accurate value, in each method, which was given by the phantom volume.

We applied these data (CL) to clinical cases with special attention to the spleen on two methods. Two kinds of radionuclides, Tc-99m Heat RBC and Tc-99m-S colloid,were employed for imaging. The former provided more precise results in volumetry with good correlation between ECT and Planimetric Method. The latter left some problems on splenic volumetry by Planimetric Method because of causing inevitable superimposition of the liver and the spleen, especially in the cases with an unexpected deformity of the spleen. However, ECT image allows clear separation of these two organs. A new volumetric program being set by each ROI has been developed for facilitating this purpose.

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ANALYSIS OF HEPATIC FLOW CURVE BY Tc-99m-Sn COLLOID.
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In the liver scintigraphy by Tc-99m-Sn colloid, using the rapid intravenous injection of colloid, we estimate the hepatic and splenic flow curves, by which the differential diagnosis of the several liver diseases is performed. There are 75 cases consisted of hepatitis 15, liver cirrhosis 10, hepatoma 11, metastatic liver tumor 8 and normal 31 cases as control. Following as Sarper's method, we determined arterialization index (AI). By the same way, the splenic index (SI) is determined from the ratio between the slope of arterial phase in splenic flow curve and that of arterial phase in liver. AIs and SIs are 0.65±0.19 and 0.31±0.18 in normal, 1.02±0.42 and 0.34 ±0.23 in hepatitis, 2.65±2.01 and 0.82±0.29 in liver cirrhosis, 1.90±0.73 and 0.51±0.19 in hepatoma, 0.92±0.11 and 0.30±0.15 in metastatic liver tumor, respectively. AI and SI of liver cirrhosis and hepatoma are significantly higher ($p<0.05$) to that of normal cases. In other liver diseases AI and SI are insignificant to that of normal. In routine treatment of liver scintigraphy, by adding the above mentioned method, the increased information of circulation dynamics in liver seems to be useful for diagnosis of the liver diseases.

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QUANTITATIVE ASSESSMENT OF PORTAL VENOUS FLOW RATIO BY 1ST PASS HEPATIC ANGIOGRAPHY WITH Tc-99m Sn COLLOID, USING HEIGHT RATIO TECHNIQUE.
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A new technique for quantitative assessment of the portal venous ratio to the total hepatic flow was established and its clinical value was discussed in 11 normal subjects and 34 patients with diffuse hepatic diseases.

Radionuclide angiography was performed to generate 1st pass time-activity curves for the left ventiricle [H(t)], right hepatic lobe [L(t)], right lung [Lu(t)], spleen [S(t)], and kidney [R(t)], following rapid intravenous bolus injection of 10 mCi of Tc-99m Sn colloid. Data aquisition by computer (DECK: PDP 11/34A) was started simultaneously with injection and 100 one-second images were obtaind.

For analysis, two time points were determined: (a) ta, when Tc-99m was maximal in abdominal organs (the renal peak); and (b) tp, when Tc-99m was maximal in the 1st portal venous phase (second peak of the left ventricle). Analysis was based on the height of the ends of two phases of the hepatic curve. The portal venous ratio (Qp)= [L(tp)-L(ta)]×100/L(tp) (%). The mean Qp for the normal subjects (n=11) was 73.3 ± 5.4 %; for the diffuse hepatic disease group (n=24) was 60.6 ± 9.9 % ($p < 0.001$); for the liver cirrhosis group (n=10) was 30.1 ± 16.2 % ($p < 0.001$).