Fundamental Studies of Liver Scintigram

—Colloidal Size and Spleen-Liver Ratio—

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Spleen image in liver scintigram changes with different size of radiocolloidal particles. Spleen image is not so well revealed in normal liver scintigram with 198-Au-colloid, but with ^{99m}Tc-Sn-colloid.

Spleen-liver ratios of radiocolloid incorporated in mice were compared in radioactivity per gram at 30 minutes after i.v. injection of four kinds of clinical agents.

The S/L ratio were 0.09 ± 0.24 in ^{198}Au-colloid (50Å), 0.083 ± 0.26 in ^{198}Au-colloid (300Å), 0.321 ± 0.090 in ^{99m}Tc-Sn-colloid(500 Å) and 0.150 ± 0.021 in ^{99m}Tc-Sn-phytate (colloidal size unknown).

As the results of these experiments. The colloids of the lager particles are more incorporated in the spleen. However, there is no significant difference in S/L ratio between 50Å and 300Å colloid. These are corresponding to clinical reports of other authers.

Respective Measurement of Liver-and Spleen-Clearance Rate and Delineation of the Spleen by Simultaneous Administration of ^{99m}TC-SN and ^{198}AU Colloids

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In the measurement of liver clearance with radiocolloid, extrahepatic uptake makes the result sometimes uncertain. The usage of ^{99m}Tc-Sn and ^{198}Au colloids, which showed differnt uptake rate in the liver and the extrahepatic component, made it possible to differenciate respective uptake rate of the radiocolloids in each organs. Following the intravenous administration of the mixture of these colloids, measurements of radioactivities were made with a scinticamera, connected to a video-recorder and CDS 4096, until liver-

spleen accumulation became plateau. The blood samples were taken for measurement of their radioactivies. Then the images of the liver-spleen area by the two radio-colloids in the same preset counts were recorded. The radioactivities of ^{99m}Tc were subtracted by those of ^{198}Au until the liver counts became zero in order to delineate the splenic image. The rate constant of ^{99m}Tc-Sn colloid clearance was 2 to 2.5 times that of ^{198}Au in normals, and 2 to 3.5 times in splenomegaly. Significant reduction was not necessarily obsered in the clearance rate of ^{99m}Tc. In order to obtain the clearance rate attributable to the liver and the spleen respectively, the following dual simultaneous equations were proposed and solved.

$$X_1+Y_1=1 \quad (1) \qquad X_2+Y_2=1 \quad (2)$$

$$\frac{X_1}{X_2}=a \qquad \frac{Y_1}{Y_2}=b$$

Where X_1, Y_1=Fractional amount of ^{198}Au colloid in the liver and the spleen (unkown). X_2, Y_2=Fractional amount of ^{99m}Tc-Sn colloid in the liver and the spleen (unkown). a, b =ratio obtained from counts of each radiocolloid in the same chosen area of the liver and the spleen. These analysis revealed that significant reduction in hepatic uptake rate actually exists among those cases in which blood clearance rate were not considerably reduced due to copensatory uptake of the colloid by the spleen. Therefore, this study is thought to be useful on diagnostic as well as therapeutic aspects.

Use of RADIOACTIVE MICROSPHERES to Asssess Distribution of Cardiac Output in Eeperimental Liver Cirrhosis

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In order to clarify the homodynamic mechanisms in liver cirrhosis, regional blood flow and arteriovenous shunting volume of each organ were measured in rabbits with CCl_4 induced liver cirrhosis by means of Rudolf's technique. The resional blood flow and the shunting blood flow were estimated by using two differently labeled batches microspheres of 15-μ-diameter with ^{141}Ce and 50-μ-diameter with ^{85}Sr. Cardiac output was calculated by RISA dilution method.

In cirrhotic rabbits, the cardiac output value was 5% higher than that in the control. In comparison with the control, the cirrhotic rabbits showed 10—24 percent decrease in blood flow (including shunting volume passing through the arterivenous anastomoses between 15 and 50 diameters) to the total splanchnic, kidney, heart and brain; while, there were increases in organ blood flow to the lung, adrenal and limbs.

Even in the control rabbits, slight degree of arteriovenous anastomosis with 15—50μ diameters was found in didney, brain, heart, small intestine, colon and cecum-appendix. In the cirrhotic rabbits, significant increases of shunting were found in the stomach, colon, spleen and limbs.

Thus, various hemodynamic changes occurred in each organ with liver cirrhosis. These data suggest that dysfunction of the various organs in liver cirrhosis is correlated with