

Early Scan and Delayed Scan with ^{67}Ga Citrate in the Differential Diagnosis of Hepatic Mass Lesions

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A comparative study of ^{67}Ga citrate, early scan (blood pool scan) at 5-minutes and delayed scan (tumor scan) at 48-hours later from intravenous injection of 35-microcuries per kg of ^{67}Ga citrate, was performed in 93 patients with focal defects on $^{99\text{m}}\text{Tc}$ phytate liver scan. In 50 of 93 patients, the final histologic diagnosis of the lesions was obtained by closed biopsy, surgery, or autopsy. There were 21 patients with metastatic tumor, 10 with primary hepatoma, 8 with liver cirrhosis, 5 with cyst, 3 with abscess, 2 with hemangioma, and 1 with radiation hepatitis.

The amount of ^{67}Ga activity in the lesions was graded as follows: in early scan, (1) avascular or relatively hypovascular, (2) vascularity approaching or equal to that of normal liver, and (3) more

vascular than normal liver; in delayed scan, (–) no uptake, (+) uptake less than normal liver, and (++) uptake greater than or equal to normal liver.

Seven of 10 primary hepatomas were classified into (2)-(++), while 11 of 21 metastatic tumors were classified into (1)-(+). All of 8 liver cirrhosis and 5 cysts were classified into (1)-(–). All of 3 intrahepatic abscess and of 2 hemangiomas were classified into (1)-(++) and (3)-(–) respectively. These results are summarized Table 1.

Differential diagnostic accuracy of hepatic mass lesions was improved by a comparative study of ^{67}Ga citrate scan. This study is very simple and useful as initial screening test.

Table 1. Results of early and delayed scan with ^{67}Ga citrate

	No. of Cases	Early scan			Delayed scan		
		3	2	1	++	+	–
Metastases	21		1	20	5	11	5
Hepatoma	10		7	3	9	1	
Liver cirrhosis	8			8			8
Cyst	5			5			5
Abscess	3			3	3		
Hemangioma	2	2					2
Radiation hepatitis	1			1			1
Total	50						

Liver Scintigraphy in Patients with Malignant Lymphoma

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Fifty patients with malignant lymphoma were studied, (Hodgkins disease: 12 patients, reticulo-sarcoma: 26 patients, lymphosarcoma: 12 patients.)

Out of those patients, liver enlargement in 37 patients, increased spleen uptake of radioisotope in 40 patients, focal filling defect in 13 patients were observed on scintigraphy.

Autopsy in 25 patients including 13 patients noted focal filling defect on scintigraphy were performed. In 17 patients of 18 patients with both right and left lobe enlargement of the liver including 12 patients with focal filling defect no scintigraphy, liver infiltration was positive. In 14 patients of 18 patients with increased spleen

uptake of radioisotope, spleen involvement was positive. 13 patients with focal filling defect on scintigraphy were always associated with liver infiltration of malignant lymphoma. In general, both right and left lobe enlargement and non-homogenous uptake of radioactivity in the liver

are the most common sign of liver disease. However those findings may indicate possibility of liver infiltration in patients with malignant lymphoma. Increased spleen uptake of radioisotope may also indicate spleen involvement.

Binding of ^{131}I BSP-Albumin with Hepatic Plasma Membrane

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There are many unknown mechanisms which involve the selective uptake of bilirubin and organic anions such as BSP from blood to hepatic cell. Plasma membrane was isolated from rat liver by differential centrifugation and the ability of plasma membrane to bind BSP was investigated in vitro which contained serum protein.

Materials and Methods

Plasma membrane was isolated from rat liver according to the method of Ray, but the final sucrose gradient of ultracentrifugation for selecting plasma membrane was between 69% ($d=1.22$) and 37% ($d=1.16$) according to the method of Neville. The final membrane preparations were free from nuclei, mitochondria and microsome when examined by the electron microscopy and enzymes. BSP binding by plasma membrane in vitro containing serum protein was investigated in an aliquot of solution containing 10 mM CaCl_2 in 0.05 M Tris-HCl buffer at pH 7.5. The mixture was incubated at room temperature for 30 minutes and centrifuged at 3000 rpm for 30 minutes. The supernatant was discarded and the radioactivity of the pellets was determined using scintillation counter.

Results

1) 0.2 μg BSP was almost completely bound per mg of membrane protein. Competitive inhibi-

tion was observed in ^{131}I BSP, cold BSP and ICG for binding by hepatic plasma membrane in vitro.

2) Addition of serum protein to incubation medium inhibited the binding of ^{131}I BSP for plasma membrane. The non-specific binding which was not displaced by serum albumin represented approximately 10% of total ^{131}I BSP which was bound to the liver plasma membrane.

3) The binding activity of ^{131}I BSP was decreased at pH higher than 7.5. The binding activity of ^{131}I BSP was not influenced after preincubation of aliquots of plasma membrane at 40°C for 5 hours. The binding activity of ^{131}I BSP for plasma membrane was investigated at room temperature for different periods of incubation. Equilibrium is reached at instance and was stable for least 5 hours.

4) The plasma membrane isolated from kidney demonstrated similar binding activity of ^{35}S BSP to that of liver plasma membrane.

Summary. In our experiments, about 70% of ^{131}I BSP bound to the isolated plasma membrane under the simultaneous existence of the same amount of serum protein and plasma membrane. These findings indicated that the plasma membrane play a important role of hepatic uptake of organic anions.