

# Studies on Scintigraphy, Sonography and CT of Hepatocellular Carcinoma

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Regarding Imaging Diagnosis (Scintigraphy, Sonography & CT) of Hepatocellular Carcinoma, numerous papers have reported on the diagnostic values of the three imaging methods, but there have been few studies to compare these diagnostic values<sup>1~16</sup>.

Many studies emphasize that sonography and scintigraphy are complementary. Technologic improvement in gray scale sonography reported high accuracy in diagnosis. Concerning the efficacy of CT studies they have shown still conflicting results<sup>6~16</sup>.

## Subjects and Methods

Imaging studies on histologically proved 27 cases of hepatocellular carcinoma, including two cases of hemangioma and 10 cases of metastatic neoplasm, were carried out at Pusan National University Hospital between Jan. 1983 and Oct. 1984 (Table 1).

Scintigraphy was performed after injection of 5 mCi <sup>99m</sup>Tc phytate with siemens Gamma Camera.

Ultrasonography was done with a Real-time Scanner, Toshiba, B-model, and in some cases, checked by Compound B Scanner, Picker Echo view system 80 L-D.

CT was carried out with fourth generation CT Scans, General Electrics after infusion of 100~150

cc of iodinated intravascular agents.

## Results

In each imaging finding, sensitivity, specificity, false negative interpretation, false positive interpretation and overall accuracy were observed (Table 2).

The cases were divided into three groups according to the size of tumors. A group; tumor size less than 2 cm, B group; tumor size 2~5 cm, and C group; tumor size greater than 5 cm. Then sensitivity was compared in each group (Table 3).

## Scintigraphy Findings

Scintigraphy showed a sensitivity of 82.1%, and false positive results in 17.9% of cases.

The specificity was found to be 82.1%, with false negative results in 17.9% of the cases. Overall accuracy proved to be 82.1% (Table 2).

Table 1. Distribution of Histologically Proven Diagnosis

Histologic diagnosis	No.
Neoplastic involvement :	39
Primary neoplasms :	
Hepatoma	27
Hemangioma	2
Metastatic neoplasms :	
Adenocarcinoma of the stomach	4
Carcinoma of the pancreas	2
Lymphoma	2
Carcinoma of the gallbladder	1
Adenocarcinoma, unknown primary	1

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**Table 2. Comparison of Screening Methods for Hepatic Tumors**

Performance standards	Examination/results (%)		
	Sonography	Scintigraphy	CT
Sensitivity	76.5 (30/39)	82.1 (32/39)	94.9 (37/39)
False positive interpretations	17.9 ( 5/28)	17.1 ( 5/28)	3.6 ( 1/28)
Specificity	82.1 (23/28)	82.1 (23/28)	96.4 (27/28)
False negative interpretations	23.1 ( 9/39)	17.9 ( 7/39)	5.1 ( 2/39)
Overall accuracy	79.1 (53/67)	82.1 (55/67)	95.5 (64/67)

**Table 3. Sensitivity of Screening Methods in Various Sizes of Tumors**

Screening methods	Tumor size			Total
	< 2 cm	2 – 5 cm	> 5 cm	
Sonography	1/3 (33.3%)	12/17 (70.6%)	17/19 (89.5%)	30/39 (76.9%)
Scintigraphy	0/3 ( 0.0%)	15/17 (88.2%)	17/19 (89.5%)	32/39 (82.1%)
CT	3/3 (100 %)	16/17 (94.1%)	18/19 (94.7%)	37/39 (94.9%)

**Table 4. Serum  $\alpha$ -Fetoprotein Levels in Patients with Hepatocellular Carcinoma**

Tumor size	AFP levels (ng/ml)		Total
	0 – 100	> 100	
< 2 cm	0	1	1
2 – 5 cm	5	6	11
> 5 cm	7	8	15
Total	12 (44.4%)	15 (55.6%)	27

### Sonographic Findings

The sensitivity of sonography was 76.9% with a false-positive rate of 17.9%. False negative interpretation was 23.1% and overall accuracy was 79.1% (Table 2).

### CT Findings

CT showed a sensitivity of 94.9%, a false positive interpretation of 3.6%, a specificity of 96.4%, a false negative interpretation of 5.1%, and overall accuracy was 95.5% (Table 2, 3-I-II-III).

Sensitivity of Screening methods in various sizes of tumors. In A group scintigraphy was less sensi-

tive than CT & Sonography. In both B & C groups, Sensitivity was highest in CT, then scintigraphy and Ultrasonography (Table 3).

Serum alfa-fetoprotein levels in various sized tumors (hepatocellular carcinoma) were elevated in 15 out of 27 cases (55.6%) (Table 4). HBsAg positivity was shown in 10 out of 27 cases (37.0%).

### Discussion

Hepatocellular Carcinoma (HCC) is very prevalent and highly associated with HBsAg in Korea. Its association with cirrhosis is frequent and early detection is difficult<sup>17-22</sup>.

In our comparative studies of the three imaging diagnosis, CT scan was proven to be emphasized as the procedure to differentiate extra from intrahepatic masses, but clarification of portal region, biliary anatomy or edge defect are also pointed out as advantages of CT<sup>7</sup>.

In the cases of isodense hepatoma, it will be confused with regenerating macronodules in cirrhosis<sup>7</sup>. This time it is also emphasized that CT plays very important roles in checking tumor extent

and resectability.

Scintigraphy was also found to be sensitive, however, sometimes it is difficult to differentiate hepatic tumors from extrinsic mass, anatomic variants & diffuse hepatopathies. It was reported that these difficulties were seen frequently in the left lobe of the liver. Further difficulties were found in the dilated bile ducts and variations in the porta hepatis<sup>10</sup>.

In Scintigraphic findings on hepatoma, sometimes it is difficult to differentiate from hepatic abscess and focal nodular hyperplasia<sup>7</sup>.

Sonography was less sensitive and less specific in this series. Interference by abdominal gas made it difficult to interpret an inhomogeneous sonographic artifact<sup>5,7</sup>.

Recently small lesions missed by radionuclide imaging may be delineated by ultrasonography through repeated examinations<sup>8</sup>.

However, ultrasonography is limited by obesity and difficulty in visualizing abdominal structures high under the rib cage e.g. posteriosuperior lesion of right lobe of the liver<sup>9,10</sup>.

Gallium scanning for initial evaluation of the hepatocellular carcinoma suspected cases is also recommended<sup>13</sup>.

For the purpose of early detection of hepatoma, periodic sonographic checks with alpha fetoglobulin examinations are also emphasized<sup>8</sup>.

Findings from these imaging methods sometimes provide complementary rather than identical information.

### Conclusions

Studies on Imaging Diagnosis (Scintigraphy Ultrasonography and CT (computed tomography) of Primary Hepatocellular Carcinoma (HCC) and Metastatic Neoplasms were carried out at Pusan National University Hospital, from Jan. 1983 to Oct. 1984.

The results were as follows:

Distributions of histologic diagnosis were 27 cases of Primary Hepatocellular carcinoma (HCC), 2 cases of Hemangioma and 10 cases of metastatic neoplasm.

1) The sensitivity, specificity and overall accuracy of each imaging finding in the diagnosis of HCC and metastatic cancer were as follows: in Ultrasonography, sensitivity 76.9%, specificity 82.1% and overall accuracy 79.1%; in Scintigraphy, sensitivity 82.1%, specificity 82.1% and overall accuracy 82.1%; in CT, sensitivity 94.9%, specificity 96.4% and overall accuracy 95.5%.

2) Comparison of these three imaging diagnostic methods in HCC revealed that the results of Sensitivity and overall accuracy were highest in CT, then scintigraphy and then Ultrasonography, and specificity was higher in CT than in ultrasonography and Scintigraphy.

3) In comparison of sensitivity of screening methods in various sizes of HCC & metastatic neoplasms in groups less than 2 cm in diameter, Ultrasonography was more sensitive than scintigraphy but in groups between 2 and 5 cm in diameter Scintigraphy was more sensitive than Ultrasonography. CT was more highly sensitive than Ultrasonography and Scintigraphy in all groups of HCC and metastatic neoplasms.

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