LETTERS TO THE EDITOR

Classification of Liver Tumors by Radionuclide Imaging

The treatment of a liver tumor depends on its morphology: a nongrowing hemangioma or follicular nodular hyperplasia (FNH) without mechanical problems will need no treatment, whereas adenomas must, and single metastases should be, excised. The pretreatment diagnosis therefore must be accurate and should be noninvasive. Several diagnostic tools have been emphasized: nuclear magnetic resonance (*1*) as well as computerized tomography (*2*). We propose the use of radionuclide techniques as an accurate, noninvasive, and inexpensive diagnostic procedure for the classification of liver tumors as "benign" or "possibly malignant" and report here our initial experience.

Twenty-four of 26 FNH patients were correctly classified by three-step cholescintigraphy (*3*). The characteristic signs are: (a) hyperperfusion (focus of increased uptake in the inflow images) (b) normal uptake during the parenchymal phase, and (c) delayed excretion of labeled bile (area of increased uptake in the outflow images). Hemangiomas, on the contrary, are seldom hyperfused (three of 29 cases) and had no uptake in the parenchymal phase (photon-deficient area). The same findings are seen in cases of metastases; they can be differentiated by a blood-pool image (*4*). Hemangiomas had a high uptake 2-4 hr after application of labeled erythrocytes (Table 1). The classification of "hemangioma" was correct in 17 of our 19 patients with this disease. Adequate techniques, however, are necessary for a correct diagnosis (*5*).

If there are neither cholescintigraphic signs of a FNH nor a hemangioma-like focus increased uptake in the blood-pool image, the character of the tumor must be classified as "questionable." Up to now all 48 malignant or semimalignant liver tumors have been classified correctly, while four of 55 benign tumors were classified false-positive as "possibly malignant."

Sonographically proven liver tumors should be differentiated by radionuclide techniques. The procedure is accurate and inexpensive, without risk to the patient. Other, more invasive or expensive techniques should be used only if there is a doubtful outcome from scintigraphy (*6*).

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REFERENCES

1. SMITH FW, MALLARD JR, REID A, et al: NMR tomographic imaging in liver disease. *Lancet* 1:963-966, 1981
2. MAJEWSKI A, DOEHRING W, GRATZ KF, et al: Focal nodular hyperplasia of the liver-is a radiologic diagnosis possible? *Röntg Bl* 35:229-235, 1982
3. GRATZ KF, CREUTZIG H, BROELSCH CH, et al: Scintigraphic diagnosis of focal nodular hyperplasia of the liver. *Chirurg:* in press.
4. FRONT D, ISRAEL O, KLEINHAUS U, et al: Tc-99m-labeled red blood cells in the evaluation of hemangiomas of the skull and orbit: Concise communication. *J Nucl Med* 23:1080-1084, 1982
5. CREUTZIG H, KROHN HP: Scintigraphic imaging of renal angioma. *Pediat Radiol:* in press
6. CREUTZIG H: Nuklearmedizinische Leberdiagnostik. In *Klinik der Gegenwart, Lebererkrankungen.* Schmidt FW, ed. Munich, Urban & Schwarzenberg: in press

Re: Clinical Assessment of a Radioimmunoassay for Free Thyroxine Using a Modified Tracer

The *Journal*'s report by Chan et al. (*1*) on free T_4 (FT_4) measurements by the Amerlex RIA concluded that "either the free-T_4 index (FTI), the product of total T_4 and T_3 uptake, or the Amerlex FT_4 RIA were suitable for routine measurement of thyroid function in a variety of patients." Although the correlation coefficient between these two methods in patients with nonthyroidal illnesses (NTI) was only 0.675, the authors suggested that the "FT_4 measurements may constitute a saving in time and resources to the use of the FTI."

This current trend towards the faster and easier-to-use one-step FT_4 RIAs is also reflected in the 1982 Basic Ligand Assay Survey conducted by the College of American Pathologists (*2*). Of all participating laboratories that measured total T_4 routinely, approximately one in five performed FT_4 assays. At the beginning of 1982, 49% of the laboratories involved in FT_4 measurements used one-step FT_4 kits based on T_4 derivatives as tracer (Amerlex by Amersham, GammaCoat one-step by Clinical Assays, and Coat A Count by Diagnostic Products Corp.), whereas 18% used a two-step FT_4 procedure (GammaCoat two-step by Clinical As-

TABLE 1. SCINTIGRAPHIC FINDINGS IN LIVER TUMORS [adapted from Ref. (*6*)]

	Cholescintigraphy			
	Inflow	Parenchyma	Outflow	Blood-pool image
FNH	+++	N	++	N
Hemangioma	N	—	—	+++
Metastasis	N	—	—	N
Adenoma/Ca	N	—	++	N

++ Focus of increased uptake.
— Focus of decreased uptake.
N = Similar to normal liver tissue.