

TABLE 1. CALCULATED STABLE IODINE UPTAKE FOR RATS RECEIVING 5 OR 10 μg OF IODINE DAILY (n = 16)

	$\mu\text{g}/\text{day}$ (S \pm Δ S)	Radioiodine % uptake (U _r \pm Δ U _r)	Stable iodine uptake $\mu\text{g}/\text{day}$ (U _s \pm Δ U _s)
Exercise	5 \pm 1	9.5 \pm 1.0	0.475 \pm 0.095
Nonexercise	5 \pm 1	14.0 \pm 1.1	0.700 \pm 0.149
Exercise	10 \pm 1	9.5 \pm 1.0	0.950 \pm 0.138
Nonexercise	10 \pm 1	14.0 \pm 1.1	1.400 \pm 0.172

TABLE 2. COMPARISON OF NORMALIZED STABLE IODINE UPTAKE CALCULATION FOR EXERCISING AND NONEXERCISING MAN AND RATS

Test group	Exercise (U _s \pm Δ U _s)	Nonexercise (U _s \pm Δ U _s)
Man	1.0 \pm 0.5568	1.5455 \pm 0.8387
Rats (5 $\mu\text{g}/\text{day}$)	1.0 \pm 0.2000	1.4737 \pm 0.3137
Rats (10 $\mu\text{g}/\text{day}$)	1.0 \pm 0.1311	1.4737 \pm 0.1811

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REFERENCE

1. RHODES BA: Effect of exercise on the thyroid gland. *Nature* 216:917-918, 1967 (Letter to Editor)

Tc-99m Sulfur Colloid Scintigraphy of Multiple Liver-Cell Adenomas

The liver-cell adenoma is usually solitary and appears photopenic on a radiocolloid scan. We describe a patient with multiple liver-cell adenomas whose Tc-99m SC liver/spleen scintigram suggests cirrhosis of the liver.

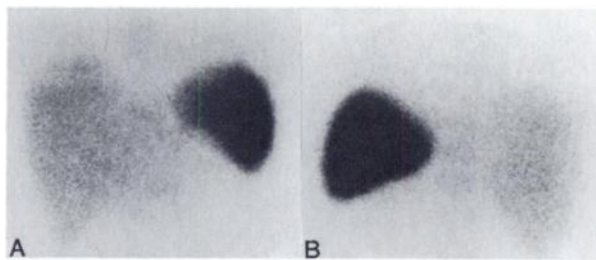


FIG. 1. Tc-99m sulfur colloid scintigrams: (A) anterior and (B) posterior views showing markedly decreased radioactivity with slight heterogeneity throughout both hepatic lobes and shift of radiocolloid to spleen, with visualization of bone marrow in sternum and vertebrae.

A 33-yr-old woman with a 6-mo history of idiopathic thrombocytopenic purpura was hospitalized for splenectomy. During the past 5 yr she has been taking contraceptive pills. Physical examination revealed no evidence of hepatosplenomegaly or of hemorrhagic conditions of the skin. The liver function tests were within normal limits. A liver/spleen scintigram (Fig. 1) revealed a liver of normal size and shape, but with markedly decreased radiocolloid uptake and some patchiness in both hepatic lobes. The spleen was normal in size and configuration but its scan density was much more than that of the liver. The bone marrow of the sternum and spine were faintly visualized.

At surgery, multiple greyish-white nodules ranging from 5-12 mm in size were scattered throughout the liver. A wedge liver biopsy and splenectomy were done. The liver was confirmed microscopically to contain liver-cell adenomas (Fig. 2). The spleen weighed 133 g, a normal weight, but microscopically it showed congestion of the red pulp and slight hypertrophy of the sinusoid stroma. The patient's postoperative course was uneventful and she was discharged in good condition on the fifth postoperative day.

An adenoma of the liver is usually solitary and related to oral contraceptive administration (1-3), whereas focal nodular hyperplasia frequently occurs with multiple lesions (3). Histologically the adenoma is encapsulated, with homogeneous hepatocyte proliferation in only a few ducts and absence of Kupffer cells. Consequently, there is little or no colloid tracer uptake in a Tc-99m SC scan (3). On the other hand, focal nodular hyperplasia has no capsule; Kupffer cells and hepatocytes are present and there is proliferation of the bile ducts; phagocytic function is not impaired and in some cases scans are even abnormally dense in appearance (3). Recently, Biersack et al. (4) described a normal radiocolloid scan in one of three patients with focal nodular hyperplasia.

In our case the liver/spleen showed diffuse decrease in radioactivity, with heterogeneity throughout the normal size and con-

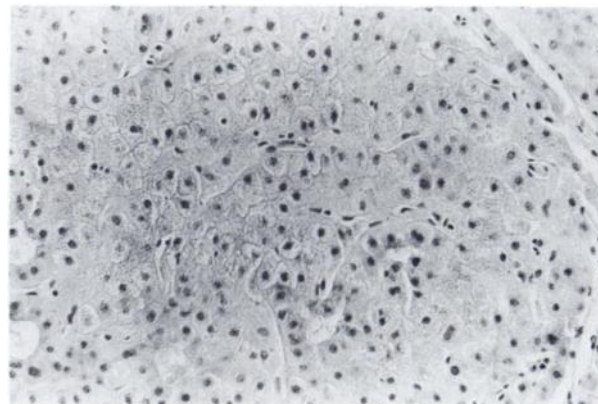


FIG. 2. Photomicrograph of the resected liver wedge, interpreted as hepatic adenomas.

figuration of the liver. Consequently the colloidal tracer shifted to the reticulo endothelial system outside the liver, such as spleen and bone marrow (Fig. 1). The reason for diffuse and very low radiocolloid uptake throughout in the liver scan in our case might be explained by the replacement of normal liver parenchyma by multiple small adenomas of fairly uniform size, containing no Kupffer cells. This finding is probably at least somewhat similar to that occurring in the mild, early phase of alcoholic cirrhosis (5), in which there is fatty metamorphosis with slight increase in fibrous tissue, with or without interspersed regenerative nodules. Although not done in this patient, the use of hepatobiliary scintigraphic agents such as Tc-99m HIDA would be worth an evaluation. In fact, uptake of Tc-99m HIDA and I-131 rose bengal in two patients with focal nodular hyperplasia has been reported (3,6). Increased activity in liver-cell carcinoma has been reported using I-131 rose bengal as well as Tc-99m-labeled hepatobiliary agents (7); also, uptake of Tc-99m PIPIDA in a pulmonary metastasis from a hepatoma was observed (8). It would be expected that the normal accumulation of hepatobiliary agents in adenomas of the liver is due to persistently functional adenoma cells.

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REFERENCES

1. VANA J, MURPHY GP, ARONOFF BL, et al: Primary liver tumors and oral contraceptives. Results of a survey. *J Am Med Assoc* 238:2154-2158, 1977
2. EDMONDSON HA, HENDERSON B, BENTON B: Liver-cell adenomas associated with use of oral contraceptives. *N Engl J Med* 294:470-472, 1976
3. CASARELLA WJ, KNOWLES DM, WOLFF M, et al: Focal nodular hyperplasia and liver-cell adenoma: Radiologic and pathologic differentiation. *Am J Roentgenol* 131:393-402, 1978
4. BIERSACK HJ, THELEN M, TORRES JF, et al: Focal nodular hyperplasia of the liver as established by ^{99m}Tc sulfur colloid and HIDA scintigraphy. *Radiology* 137:187-190, 1980
5. DRUM DE, BEARD JO: Liver scintigraphic features associated with alcoholism. *J Nucl Med* 19:154-160, 1978
6. SHOOP JD: Functional hepatoma demonstrated with rose bengal scanning. *Am J Roentgenol* 107:51-53, 1969
7. UENO K, HASEDA Y: Concentration and clearance of Tc-99m-pyridoxylidene isoleucine by a hepatoma. *Clin Nucl Med* 5:196-199, 1980
8. CANNON JR, LONG RF, BERENS SV, et al: Uptake of Tc-99m-PIPIDA in pulmonary metastases from a hepatoma. *Clin Nucl Med* 5:22-24, 1980

Gallium-67 Citrate Imaging of Pyomyositis

Pyomyositis, or staphylococcal infection of striated muscle, is rare in the United States (1-5). While *Staphylococcus aureus* can produce abscesses in a variety of organs, striated muscle is apparently highly resistant to it. The clinical presentation is usually confusing. Gamma imaging and ultrasonography have proved helpful in diagnosing a case of pyomyositis.

A 27-year-old white female, previously in good health, was hospitalized with a one-week history of pain in the right knee and thigh. She denied injury or travel outside the United States. Her thigh was extremely tender, but no swelling or erythema was noted. On admission she was afebrile but had a white blood count of 15,500 cells/cu mm (73% neutrophils, 7% band forms). Her sedimentation rate was 57 mm/hr (normal < 20); lactic dehydrogenase, 217 IU/l (normal < 200). Iodinated contrast venography and soft-tissue radiography of the leg were normal.

Five days after admission her temperature spiked as high as 103°F. On the seventh day, Ga-67 images of the chest and abdomen (3 mCi + 48 hr) were normal. Abdominal transmission computed tomography (TCT) and cerebrospinal fluid examinations were negative. Neither TCT nor gallium imaging of the thigh was done owing to lack of clinical suspicion. A blood culture was positive for *Staphylococcus aureus*. After an infectious disease consultant suggested pyomyositis of the thigh, repeat gallium imaging of the thigh was obtained seven days after the original administration of 3 mCi of gallium-67 citrate (Fig. 1). This showed intense uptake of gallium in the medial and posterior soft tissues of the right thigh. Ultrasonography of this area showed a large sonolucent mass interdigitating with normal muscle bundles (Fig. 2). The thigh was incised and drained of about 110 cc of dull cream-colored purulent material, which upon culture revealed *Staphylococcus aureus*. Following methicillin treatment, she recovered uneventfully.

Tropical pyomyositis is extremely rare in temperate climates and therefore was not considered in differential diagnosis. Faber et al. (6) studied 201 cases of proven staphylococcal septicemia but found no muscle abscesses. Smith and Vickers (7) found two muscle abscesses among 327 fatal cases of staphylococcal septicemia. Despite the apparent resistance to infection by skeletal muscle, pyomyositis is fairly common in tropical countries, accounting for 3% to 4% of surgical admissions in the University Teaching Hospital in Kampala, Uganda (8).

Clinically the disease occurs in major muscle masses, most commonly the quadriceps and trunk muscles. The onset is marked by pain followed by swelling and erythema. The subcutaneous tissues are uninvolved, and the erythema and swelling may be minimal or absent. Fever and toxemia may or may not occur, and blood cultures are positive in only 5% of patients (1).



FIG. 1. Anterior (left) and lateral (right) gallium-67 scans of pelvis and thighs show intense radiogallium accumulation in the soft tissues of the posterior aspect of the right thigh.