

of abnormal uptake in the rest of the body. A diagnosis of thyrotoxicosis with low radioactive iodine uptake was made (6).

A thyroid fluorescent scan (Fig. 1b), part of an investigative protocol, showed a similar iodine distribution and thyroid size as were seen on the I-131 scan (Fig. 1a). Total iodine in the gland was estimated to be 13.4 mg by the use of a corrective factor for absorption by overlying tissues established in our laboratory. In addition, however, an area of high iodine content, which was not seen on the radioiodide scans, was noted in the left supraclavicular region (Fig. 1b). A chest roentgenogram revealed a radiopaque area consistent with an iodine-containing supraclavicular lymph node due to lymphangiography performed 2 yr previously (Fig. 1c).

Nijensohn et al. (7) should be credited with the first report on identification of extrathyroidal iodine. They described a similar situation observed a few days after lymphangiography, and again a month later. We show here that 2 yr later iodine can still be measurable by x-ray fluorescence.

This case stresses the fact that in fluorescence scanning of the thyroid, iodine concentration is the parameter being measured, rather than uptake and organification as in the conventional scan. Therefore, in interpretation, the information is not interchangeable.

ROBERT A. SWEET
HEINZ W. WAHNER
Mayo Clinic and Mayo Foundation
Rochester, Minnesota

REFERENCES

1. HOFFER PB, JONES WB, CRAWFORD RB, et al: Fluorescent thyroid scanning: A new method of imaging the thyroid. *Radiology* 90: 342-344, 1968
2. HOFFER PB, GOTTSCHALK A: Fluorescent thyroid scanning: Scanning without radioisotopes; Initial clinical results. *Radiology* 99: 117-123, 1971
3. HOFFER PB, BERNSTEIN J, GOTTSCHALK A: Fluorescent techniques in thyroid imaging. *Semin Nucl Med* 1: 379-389, 1971
4. HOFFER PB, BERNSTEIN J, BECK RN, et al: Fluorescent thyroid scanning: A progress report. *J Nucl Med* 12: 366, 1971 (Abst)
5. PATTON JA, HOLLIFIELD J, PATTON D, et al: The diagnosis of thyroid nodules by quantitative fluorescent scanning. *J Nucl Med* 16: 557, 1975 (Abst)
6. GLUCK FB, NUSYNOWITZ ML, PLYMATE S: Chronic lymphocytic thyroiditis, thyrotoxicosis, and low radioactive iodine uptake: Report of four cases. *N Engl J Med* 293: 624-628, 1975
7. NIJENSOHN E, MCCARTNEY W, HOFFER PB: Identification of iodine in a supraclavicular lymph node following lymphography: A fluorescent scan artifact. *J Nucl Med* 14: 179-180, 1973

Bone Scan as a Diagnostic Aid in Hodgkin's Disease

We wish to report a unique circumstance in which a positive bone scan was crucial in diagnosis of a case of Hodgkin's disease stage IV, nodular sclerosing type. The patient, a 21-year-old black male, presented with a 4-mo history of progressive weakness, night sweats, 45-lb. weight loss, and pain in the sacroiliac and right tibial regions. Physical examination was remarkable only for emaciation,

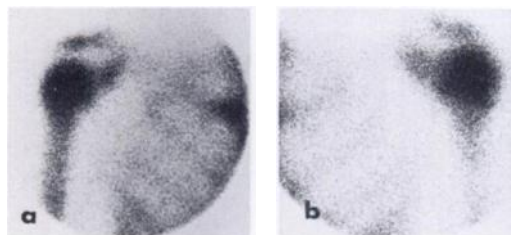


FIG. 1. Bone scintiphoto with Tc-99m pyrophosphate, showing increased uptake in proximal right humerus. (a) = right shoulder; (b) = left shoulder.

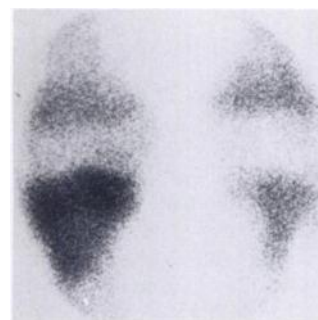


FIG. 2. Bone scintiphoto with Tc-99m pyrophosphate, showing increased uptake in proximal right upper tibial extremity (to viewer's left).

left axillary adenopathy, and splenomegaly. Chest x-ray and IVP were normal. A metastatic survey was interpreted initially as normal. Bone scintigrams (Tc-99m pyrophosphate) showed areas of radionuclide accumulation in proximal right humerus and proximal right tibia (Figs. 1 and 2).

Biopsy of a left axillary node was reviewed by several pathologists and found consistent only with dermatophytic hyperplasia. Using the bone scan as a guide, biopsies of both iliac spines and the right proximal tibia were performed. Although the biopsies were suggestive of Hodgkin's disease, in the absence of definitive lymph-node biopsies, a firm diagnosis could not be made. A laparotomy confirmed the diagnosis of Hodgkin's disease, nodular sclerosing type, involving spleen, a splenunculus, and iliac, paraortic, and splenic hilar nodes.

Nodular sclerosing Hodgkin's disease occurs most frequently among histologic types, constituting in one series 74%. This disorder is usually localized (stages I and II), with cervical and mediastinal presentation. Initial clinical findings limited to bone is almost unique. With respect to Hodgkin's disease, the bone scan is generally considered of limited value (1). In one series, bone biopsies, performed routinely in patients with nodular sclerosing Hodgkin's disease, were positive in only 4% of cases (2).

In our patient the bone scan was crucial, confirming patient's complaint and guiding site selection for diagnostic biopsy. Interpretation of bone biopsy findings in Hodgkin's disease is difficult (3), often only supporting lymph-node studies. Features suggested by the bone biopsies in this case mandated evaluation of abdominal lymph tissues to assure accurate diagnosis. Diagnosis in this instance would have

been significantly delayed without the guidance of a positive bone scan, and the information derived secondarily.

EARL WILLIAM CAMPBELL, JR.
Michigan State University
East Lansing, Michigan
JERROLD M. WEISS, M.D.
Ingham Medical Center
Lansing, Michigan

REFERENCES

1. GLATSTEIN E, GOFFINET R: Staging of Hodgkin's disease and other lymphomas. *Clin Haematol* 3: 77-89, 1974
2. DORFMAN F: Relationship of histology to site in Hodgkin's disease. *Canc Res* 31: 1786-1793, 1971
3. O'CARROLL I, MCKENNA W, BRUNNING RD: Bone marrow manifestations of Hodgkin's disease. *Cancer* 38: 1717-1728, 1976

"Hollow Spleen" in Histiocytic Lymphoma

Several causes of voids in Tc-99m sulfur colloid images of the spleen are known, including cysts, infarcts, trauma, and neoplasms (1). The appearance of the lesion can be suggestive of a particular diagnosis, but is not pathognomonic. We have recently had the opportunity to make spleen scintigrams in three patients who revealed similar findings—splenomegaly with a large nonfunctioning central portion—that created the appearance of a "hollow" spleen. All three patients had histiocytic lymphoma.

Case 1. A 49-year-old man was admitted to the hospital for evaluation of lymphadenopathy. He had left axillary tenderness with an enlarged node for 2 mo. A 1-cm left supraclavicular node and 2-cm tender matted left axillary nodes were palpated. The liver-spleen scintiphoto (Tc-99m sulfur colloid) showed a normal liver, but a large defect occupied the center of the spleen (Fig. 1). Axillary lymph-node biopsy was performed. Microscopically, broad sheet-like proliferation of undifferentiated, thin histiocytic cells was seen, and a diagnosis of histiocytic lymphoma was made.

Case 2. A 46-year-old woman was admitted to the hospital with a 2-mo history of a progressively enlarging left upper quadrant mass, as well as weight loss. A hard, rounded 8- by 8-cm mass, moveable with respiration, was palpable in the left upper quadrant. A liver-spleen radiocolloid scintiphoto revealed an enlarged spleen with a center that was "hollow." There was a suggestion of partitions or "septa" of functional tissue in the central splenic lesion (Fig. 2). A radiogallium scan was then performed; revealing intense left upper quadrant activity in an area corresponding to the enlarged spleen.



FIG. 1. Posterior scintiphoto of spleen in Case 1. Large defect is apparent. No abnormalities were noted in liver.

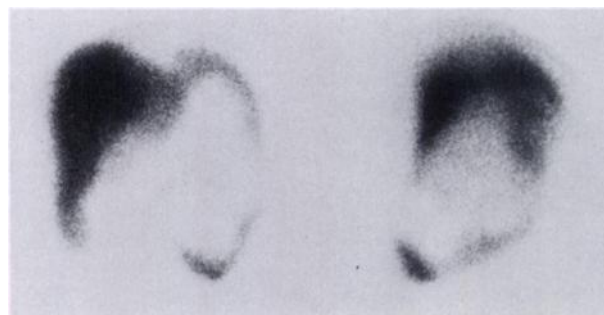


FIG. 2. Images are anterior (left) and left lateral abdominal (right) scintiphotos (Tc-99m sulfur colloid). On lateral view, anterior is to viewer's left. Massive splenic size (27 cm) and "hollow" center can be seen. There is a suggestion of "septa."

An exploratory laparotomy revealed a massive spleen (2060 g). Infiltration of tumor in the transverse mesentery and enlarged retroperitoneal nodes, up to the celiac axis, was noted. Microscopically, there was extensive tumor infiltrate. The overall appearance was that of a poorly differentiated malignant lymphoma of the histiocytic type.

Case 3. A 50-year-old man had been admitted to the hospital 8 yr previously for evaluation of a right submandibular mass that had been present for 2 mo. At surgery, a 3- by 5-cm irregular mass of tan tissue, partially encapsulated, was found. Microscopically, the specimen showed undifferentiated malignant cells suggesting histiocytic lymphoma. In addition to chemotherapy, the patient had radiation therapy to the midabdomen totaling 4,000 rads. A liver-spleen scan 2 yr later (thus 6 yr before the present admission) showed an enlarged liver with an absent left lobe (presumably due to radiation therapy) and a 5-cm rounded focal defect in the right hepatic lobe. The enlarged spleen showed an approximately 8-cm rounded focal defect in the superior-posterior region. Repeat scans in later years, the last being 6 yr after the first, showed a normal-appearing spleen (Fig. 3).

A defect on radiocolloid scan of the spleen does not establish an etiologic diagnosis. When combined with all available data, however, the nature of the lesion often becomes apparent. Silverman and coworkers noted that not all patients with histologically proven Hodgkin's disease in the spleen had a splenic defect on scanning (2). The three individuals we have seen all presented with splenomegaly and a "hollow" spleen on radiocolloid image; that is, the central portion of the spleen was apparently replaced by nonfunctioning tissue, the periphery of the organ being spared. All three had histiocytic lymphoma. Splenic involvement in lymphoma can be but one manifestation of the disease, although in some instances the spleen appears to be the principal organ involved (3).

Other causes for loss of reticuloendothelial tissue in the center of the spleen are known. For example, a splenic cyst can force functional reticuloendothelial cells to the far poles of the organ (4). Johnson and Muroff (5) described a case of histiocytic lymphoma ("reticulum-cell sarcoma") in which the spleen was encased by tumor in addition to having a central defect. The appearance was not dissimilar to those in our three cases. In Case 2, we had evidence for the probable lymphomatous nature of the splenic lesion because of its avid accumulation of radioactivity following administration of Ga-67 citrate. The findings of splenomegaly, and