FIGURE 2
Bone scintigram demonstrating a fusiform focal increase in the upper third of the right humerus consistent with a bony metastasis, and corresponding to a permeative bone lesion on plain radiography.

of cases reviewed, and it was emphasised that recognition of the sign was important to prevent bone scan misinterpretation. In the present case, attributing the initial scan appearance to the "delta sign" may have caused incorrect staging of the breast tumor, as the focal uptake of tracer could have been the earliest manifestation of a bony metastasis. We would therefore advise caution in describing a solitary focal lesion as a normal variant in patients with proven malignancy, especially where the primary tumor has a predilection for bony spread.

References

1. Fink-Bennett D, Vicuna-Rios J. The deltoid tuberosity—a potential pitfall (the "delta sign") in bone-scan interpretation: concise communication. *J Nucl Med* 1980; 21:211–212.

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Failure of Iodine-131 MIBG Imaging in Small Cell Lung Carcinoma

Iodine-131-labeled MIBG metaiodobenzylguanidine ([^{131}I] MIBG), an analog of nor-adrenalin, has been successfully employed as an imaging agent for the adrenal medulla (*1*) and its neoplasms including neuroblastoma and pheochromocytoma (*2,3*). It also localizes in some other APUD tumors including paraganglioma (*4*), thyroid medullary carcinoma (*5*), and carcinoid tumors (*6*).

Small cell lung cancer (SCLC) has some similar APUD properties including neurosecretory ("dense core") granules and the enzymes dopa-decarboxylase and neurone-specific enolase (*7*). We have therefore evaluated [^{131}I]MIBG as a diagnostic imaging and potential therapeutic agent in this tumor, with negative results.

Between August and October 1986, ten SCLC patients (age 48–69 yr; eight untreated, two relapsed; four limited disease, six extensive—liver, node, brain, skin, and adrenal metastases) underwent [^{131}I]MIBG imaging, using a gamma camera. Each patient was given a 0.5 mCi dose of [^{131}I]MIBG, with Lugol's iodine before and after to prevent thyroid uptake. Planar, anterior, and posterior images of the chest were obtained 24 and 48 hr following i.v. injection of the radiopharmaceutical using a data acquisition time of 20 min. In patients with known disease in other areas, such as the liver, additional selected anterior and posterior planar views were obtained.

Physiological activity was seen in the liver, spleen, urinary bladder, heart and to a lesser extent in the lung fields, but no tumor concentration of the radiopharmaceutical was seen in any patient. Unlike other tumors with similar APUD characteristics, [^{131}I]MIBG does not appear to be taken up selectively by small cell lung carcinoma using current imaging techniques.

References

1. Wieland DM, et al. Imaging the primate adrenal medulla with (^{123}I) and (^{131}I) meta-iodobenzyl guanidine: concise communication. *J Nucl Med* 1981; 22:358–364.
2. Sisson JC, et al. Scintigraphic localization of phaeochromocytoma. *N Engl J Med* 1981; 305:12–17.
3. Kimmig B, et al. Scintigraphy of a neuroblastoma with I^{131} meta-iodobenzyl guanidine. *J Nucl Med* 1984; 25:772–775.
4. Smit AJ, et al. Meta-(I^{131})-iodobenzyl guanidine uptake in a non-secreting paraganglioma. *J Nucl Med* 1984; 25:984–986.
5. Sone T, Fukunaga M, Otsuka N, et al. Metastatic medullary thyroid cancer: localization with I^{131} metaiodobenzyl guanidine. *J Nucl Med* 1985; 26:604–608.
6. Fisher H, et al. Scintigraphic imaging of carcinoid tumours with I^{131}-MIBG. *Lancet* 1985; ii:165.
7. Carney DN. Small cell lung cancer. Clinics in oncology. Vol 4, No 1. In: Spiro SG, ed. London: W.B. Saunders Company, 1985: 31–43.

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Thallium-201 Imaging of Auto-Transplanted Parathyroid Glands

TO THE EDITOR: We wish to offer a short addendum to an otherwise comprehensive yet succinct review of noninva-

sive thyroid and parathyroid imaging in the January 1987 issue (*1*). Parathyroid auto-transplantation into the muscles of the neck or forearm has emerged as a routine surgical technique in the past decade (*2–4*). Indications include (a) devascularization of parathyroid glands during thyroidectomy and (b) total parathyroidectomy either following unsuccessful partial resection or initially, when no solitary adenoma is identified as a target for removal.

One hundred seventy-five patients comprising 12 series in the current literature had a cumulative 14% incidence of recurrent hyperparathyroidism following graft placement (*5, 6*). Scintigraphy is an ideal method to determine whether such recurrence is graft dependent, since thallium can localize and functionally characterize the re-implanted gland. Sternomastoid and forearm graft sites can be identified by thallium especially if the auto-transplant is responsible for disease recurrence. McCall and associates, in the November 1986 issue of Surgery (*6*), in fact, recommended thallium imaging as an integral feature in the workup of such patients. The medical imaging community will become increasingly more familiar with parathyroid auto-transplantation and should be aware of the benefit of thallium scintigraphy when graft dependent recurrence is suspected.

References

1. Sandler MP, Patton JA. Multimodality imaging of the thyroid and parathyroid glands. *J Nucl Med* 1987; 28:122–129.
2. Wells SA, Ellis GJ, Gunnells JC, et al. Parathyroid autotransplantation in primary parathyroid hyperplasia. *N Engl J Med* 1976; 295:57.
3. Mallette LE, Eisenberg K, Wilson H, et al. Generalized primary parathyroid hyperplasia: studies of the evaluation of autogenous parathyroid graft function. *Surgery* 1983; 93:254.
4. Calandra C, Paloyan E, Oslapas R, et al. Successful autotransplantation of parathyroid adenomas in seven patients. *Am Surg* 1983; 49:324.
5. Brennan MF, Brown EM, Marx SJ, et al. Recurrent hyperparathyroidism from an autotransplanted parathyroid adenoma. *N Engl J Med* 1978; 299:1057.
6. McCall AR, Calandra D, Lawrence AM, et al. Parathyroid autotransplantation in forty-four patients with primary hyperparathyroidism: the role of thallium scanning. *Surgery* 1986; 4:614–619.

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REPLY: We would like to thank Goldfarb et al. for emphasizing the role of thallium imaging in the evaluation of parathyroid autotransplantation and the diagnosis of recurrent hyperparathyroidism secondary to autotransplanted parathyroid tissue. As noted by the authors, scintigraphic evaluation of autotransplanted parathyroid tissue has significant potential (*1*). We agree that the value of this technique should be more widely recognized.

References

1. McCall AR, Calandra D, Lawrence AM, et al. Parathyroid autotransplantation in forty-four patients with primary hyperparathyroidism: the role of thallium scanning. *Surgery* 1986; 4:614–619.

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