TABLE 1. ADENOMA

	Ultrasonic scan results	Scintigraphic result	Surgical result
MB	Adenoma, RUP	Negative	1.1-cm adenoma, RUP
RW	Adenoma, RLP	Negative	1.8-cm adenoma, RLP
CH	Adenoma, LLP	Negative	Hyperplasia of four glands
BM	Mass, embedded RLP of thyroid	Negative	Colloid cyst RLP; 11-mm adenoma RUP
JC	Negative	Negative	Adenoma embedded in thymus
MS	Adenoma, RLP	Negative	Adenoma, RLP
LH	Negative	Negative	Not found
MS	Large cystic area RLP, behind thyroid	Negative	Borderline enlarged gland, rt side

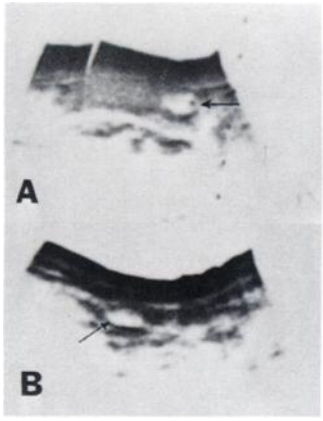

FIG. 1. (A) Longitudinal echogram reveals small colloid cyst embedded in lower pole of thyroid lobe. (B) Longitudinal echogram reveals parathyroid adenoma in usual location on posterior surface of thyroid lobe.

At present, it can be recommended as an adjunct to help the surgeon locate an adenoma, but it should not be relied upon to distinguish hyperparathyroidism from other possible causes of hypercalcemia.

The complete failure of radiotracer scanning in this series contrasts with previous reports in which it was found moderately successful. The reason is unclear but probably relates to earlier discovery in recent years, with adenomas of smaller size.

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The Bone Scan in Thyroid Cancer

It has been reported that the bony metastases from thyroid cancer give false-negative bone scan (*1–2*). The explanation offered is that it is a slow-growing tumor, causing only minimal increase in osteoblastic activity and new bone formation.

However, our experience with bone scans in thyroid cancer is contrary to earlier reports.

Six patients having follicular thyroid cancer with multiple bony metastases had bone scans done before radioiodine therapy. Each was given 15–20 mCi of Tc-99m pyrophosphate intravenously and a whole-body scan was obtained 3 hr later on a dual-head scanner. A post-therapy radioiodine scan was obtained on the same instrument for comparison. All six patients are still alive, 1½–3 yr following the radioiodine therapy.

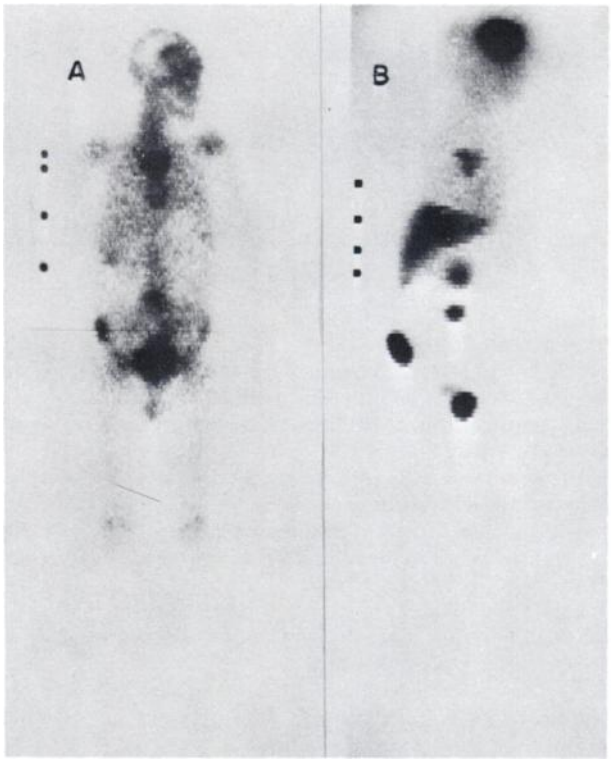

FIG. 1. (A) Technetium pyrophosphate skeletal scan shows abnormal concentration in frontal bone, sternum, D_{12}-L_1, L_4-L_5, and right ilium. (B) I-131 whole-body scan of the same patient shows localization of radioiodine in the corresponding areas.

TABLE 1. RADIONUCLIDE SCAN APPEARANCES IN 32 BONY LESIONS

Radionuclide scan appearances	Total No.	Radiograph appearance
Bone scan + ve I-131 scan + ve	27	Not done
Bone scan + ve I-131 scan − ve	3	Met. + ve in one Osteoarthritis in two
Bone scan − ve I-131 scan + ve	2	Met. + ve in one Normal in one

Any accumulation of radioactivity at a nonphysiologic site on either of the radionuclide scans was considered pathologic, and an explanation for discrepancies between the scans was aided by radiographs of the respective regions.

Although metastases appear better delineated on radioiodine scans, as seen in Fig. 1B, they are nevertheless seen on the bone scan. The difference in scan quality could be due to the dose of radiopharmaceutical and/or the timing of the scan. Radioiodine scans were obtained 5–6 days after the therapeutic dose of 150–200 mCi of I-131.

Of 32 bony lesions, 27 were seen on both the scans (Table 1). Of three lesions detected only on bone scan, diagnosis of metastases was supported by radiograph in one instance. This rib metastasis did not show on the radioiodine scan because of functioning pulmonary metastases. The other two lesions were corroborated by osteoarthritic changes in the radiographs.

Of two focal concentrations seen on the radioiodine scan alone, metastatic involvement of bone was confirmed by radiograph in one. In the other, the possibility of fecal excretion was raised because of its pelvic location. In this case not only were the bone scan and pelvic radiographs normal, but so were the physical findings. The only divergent feature was persistence of uptake in the same place on the repeat radioiodine scan.

To find out whether thyroxine replacement would effect a change of Tc-99m pyrophosphate localization, bone scans were repeated in two patients while they were on thyroxine. The number and distribution of the metastases were similar on both the scans.

Evidence of metastatic seeding in more than one study was obtained in 29 cases, of which one was missed on the bone scan. Thus the incidence of false-negative bone scans due to thyroid metastases works out to be 3.4%, which is less than that reported for all metastases (*3*).

The question is whether the increased incidence of positive bone-scan lesions in our series is due to the follicular type of cancer of thyroid, which grows more rapidly than the other differentiated cancers, or rather is related to relative iodine deficiency and subsequently raised T.S.H. levels. It would be interesting to know the rate of positive bone scans in skeletal metastatic thyroid cancer in iodinc-rich areas like the U.S.A.

Bone scanning does not score over the iodine scan in specificity. It is nevertheless a useful tool in the skeletal survey for thyroid metastases, the more so since it does not necessitate withdrawal of thyroxine.

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Regional Delivery of Radioaerosol

In a recent publication, Raikar et al. (*1*) compared the dry aerosol delivery system with ultrasonic nebulizer using compressed-air pressure for delivery of dry or wet aerosol. They indicate that the wet aerosol from the nebulizer tends to produce heavier deposition in the major bronchi. The results of our study on human subjects were similar for liquid radioaerosol deposition. It would be of clinical interest, however, to compare the quantitative distribution of the wet and dry aerosols on the regional basis and to determine the percentage of aerosol delivered to the lungs.

We report the results of the regional quantitative delivery of liquid aerosols to the lungs administered by spontaneous breathing (SB) and by intermittent positive pressure breathing (IPPB). A Monaghan nebulizer was used for SB and IPPB. The radioaerosol, nitrogen-13-labeled ammonia dissolved in saline, was nebulized and delivered by the two techniques (SB and IPPB) in five normal subjects at matched tidal volume (1000 ml) and breathing rate (6 per minute). The subjects were studied upright and the positron scintigrams were obtained after 5, 10, 15, and 20 min of aerosolization. Both single breath and equilibrated volume scintigrams were taken with the MGH positron camera with gaseous N-13 to define the lung boundaries. The scintigrams were divided into peripheral (P), intermediate (I), and central (C) regions for each lung.

The largest fraction of activity by either technique was deposited in the mouth and oropharynx. Of the activity reaching the intrathoracic airways, the regional distribution was similar for SB and IPPB with 58% (±1 s.e.m.) of the activity present in the trachea and main bronchi (C). Progressively less activity was found in the peripheral lung with 36% present in intermediate zone and only 7% present in peripheral zone. In conclusion, there was no significant difference in the intrapulmonary regional distribution of aerosol delivered by either spontaneous breathing or intermittent positive pressure breathing.

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