TABLE 1
Patient Population and Regional Uptake Ratio of Tumor to Contralateral Normal Tissue

Patient	Age	Sex	Ratios of tumor to contralateral normal brain tissue: C-11 methionine L-	D-	Diagnosis
1*	21	F	1.01	0.98	calcified microangioma
2*	58	M	1.28	1.28	metastatic brain tumor
3†	39	M	1.40	1.30	Grade 1 astrocytoma
4	63	M	1.86		metastatic brain tumor
5	33	F	1.88	1.50	meningioma
6	59	F		1.82	glioblastoma
7	60	F	2.40	2.60	Grade 4 astrocytoma

* Blood-brain barrier (BBB) break down in Tc-99m DTPA image.
† No BBB break down.

(*10*). However, using S-methyl-labeled C-11 methionine, the problem of trans- and demethylation has to be taken into account, e.g., by chromatographic analysis of plasma constituents. It remains questionable whether either of these models can be applied to pathological states where BBB breakdown must be considered. We are currently working on the development of a procedure to differentiate accumulation by BBB breakdown from other active processes, by measurement of such factors as blood volume, perfusion, and free diffusible volume of brain tumors.

References

1. Kuhl DE: Mapping Local Cerebral Glucose Utilization in Normal Aging and in Cerebrovascular, Degenerative, and Epileptic Disorders. In *Positron Emission Tomography of the Brain.* Heiss WD, Phelps ME, eds. Springer Verlag, Berlin, Heidelberg New York, 1983 pp 128–138
2. Di Chiro G, DeLaPaz RL, Brooks RA, et al: Glucose utilization of cerebral gliomas measured by [^{18}F]fluorodeoxyglucose and positron emission tomography. *Neurology* (NY) 32:1323–1329, 1982
3. Patronas NJ, Di Chiro G, Smith BH, et al: Depressed cerebellar glucose metabolism in supratentorial tumors. *Brain Res* 291:93–101, 1984
4. Rhodes CG, Wise RJS, Gibbs JM, et al: In vivo disturbance of the oxidative metabolism of glucose in human cerebral gliomas. *Ann Neurol* 14:614–626, 1983
5. Hübner KF, Purvis JT, Mahaley SM, et al: Brain tumor imaging by positron emission computed tomography using ^{11}C-labeled amino acids. *J Comput Assist Tomogr* 6:544–550, 1982
6. Bergström M, Collins VP, Ehrin E, et al: Case Report: Discrepancies in brain tumor extent as shown by computed tomography and positron emission tomography using [^{68}Ga]EDTA, [^{11}C]glucose, and [^{11}C]methionine. *J Comput Assist Tomogr* 7:1062–1066, 1983
7. Shibasaki T, Uki J, Kanoh T, et al: Composition of free amino acids in brain tumors. *Acta Neurol Scandinav* 60:301–311, 1979
8. Gadisseux P, Ward JO, Young HF, et al: Nutrition and the neurosurgical patient. *J Neurosurg* 60:219–232, 1984
9. Meyer G-J, Schober O, Gielow P, et al: Functional imaging of the pancreas by positron emission tomography: Routine production of C-11-L-methionine, quality control, methodology. *Nuclear Medicine and Biology—Proceedings of the Third World Congress of Nuclear Medicine and Biology*, Raymond C, Ed. Pergamon, Paris, 1982, pp 1977–1980
10. Bustany P: Correlation between clinical or psychometric score and PET measurement of local brain protein synthesis in various disease. In *Proceedings Seventh Nobel Conference*, Stockholm, 1983

Otmar Schober
Geerd-J. Meyer
Dietmar Stolke
Heinz Hundeshagen
Medical School Hannover
D-3000 Hannover 61, West Germany

New Perspectives in Localizing Enlarged Parathyroids by Technetium-Thallium Subtraction Scan

TO THE EDITOR: Ferlin et al. (*1*) have introduced a very practical and beneficial method for parathyroid localization by technetium-thallium subtraction. We applied this method to 18 cases with a few modifications and our results were quite satisfactory.

In our studies we used 500 μCi of technetium and 2 mCi of thallium. After acquiring an initial technetium image of 50k counts in 128 × 128 × 16 matrix, we acquired 2 static thallium images of 50k counts each in the same matrix beginning 2 min after injection.

After completing the study in the classical anterior position, we repeated the study in the right and left anterior oblique positions to obtain a better view of the posterior surface of the thyroid. An example is seen in Fig. 1, where the image obtained in the left anterior oblique position displayed the intrathyroideal parathyroid adenoma more precisely than the image obtained in the anterior position. Surgery revealed a parathyroid adenoma embedded in the left lobe extending to its upper pole which was similar in shape and location to the image obtained in the left oblique position.

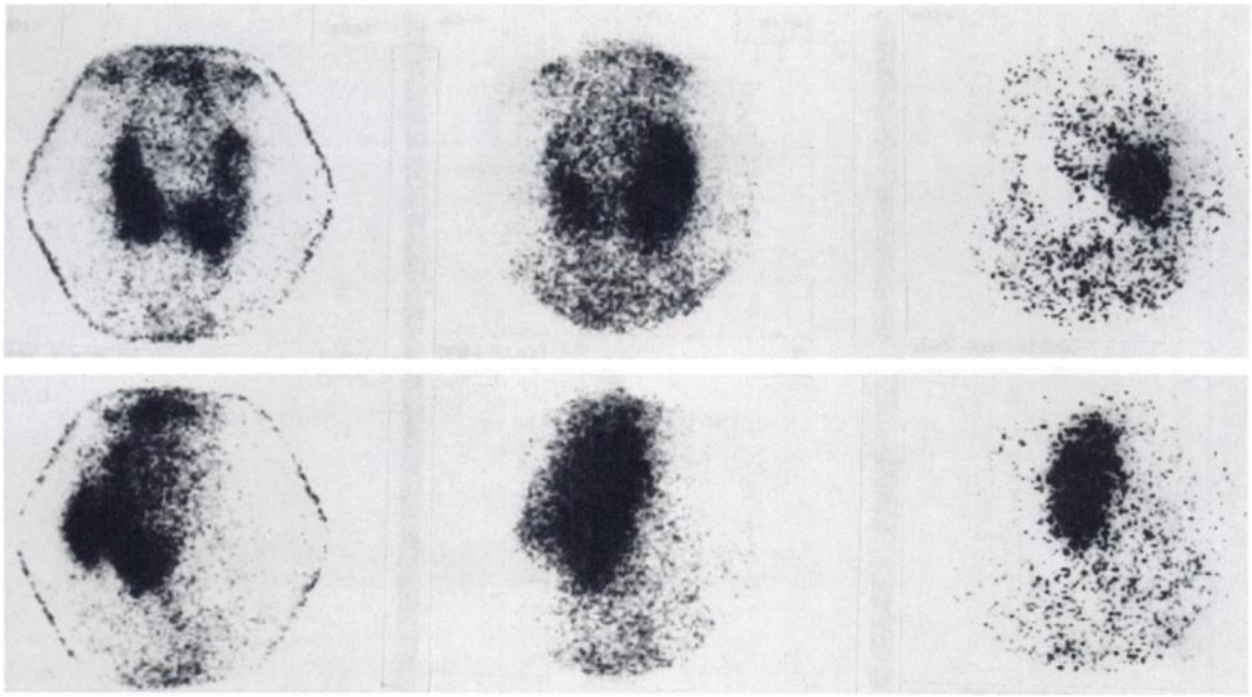

FIGURE 1
Top row: The technetium scan (left) is subtracted from the thallium scan (center) and a round hot area is seen in the subtracted image (right). Bottom row: In the left anterior oblique view, the technetium scan (left) which revealed a large cold area in the left thyroid lobe is subtracted from the thallium image (center) and an ovoid hot area, larger than that obtained in the anterior position, is seen in the subtracted image (right).

We believe that oblique views will increase the imaging quality of this method.

Reference

1. Ferlin G, Borsato N, Camerani M, et al: New perspectives in localizing enlarged parathyroids by technetium-thallium subtraction scan. *J Nucl Med* 24:438-441, 1983

Irfan Urgancioğlu
Hüsrev Hatemi
Vensan Seyahi
Tarik Kapicioglu
Mari Benli
University of Istanbul
Cerrahpaşa Medical School
Cerrahpaşa, Turkey

Use of Oral Phosphate to Enhance Visualization of Enlarged Parathyroids on Scanning

TO THE EDITOR: During the past two years, several reports have appeared in the nuclear medicine literature from across the world, about parathyroid imaging using thallium-201 (Tl), and technetium 99^m pertechnetate (Tc), subtraction scanning (*1-3*). This has led to a resurgence of interest in parathyroid imaging which had been abandoned in the past because of poor detectability. In the earlier studies with Se-75 selenomethionine, only tumors weighing more than 2 g could be consistently visualized (*4*), whereas, with Tl-Tc subtraction, tumors as small as 0.25 g can be detected (*2*).

Oral phosphate therapy is sometimes used in the treatment of patients with primary hyperparathyroidism. It reduces circulating 1, 25 dihydroxy Vitamin D and serum calcium leading to elevation of serum PTH by feed back mechanism (*5*). It was reasoned that phosphate therapy by increasing PTH secretion might increase the thallium uptake in the parathyroid glands, thus improving the detectability of adenomas on scanning. Three patients with primary hyperparathyroidism, scheduled for surgical exploration were scanned before and after oral phosphate therapy to assess its effectiveness.

The first patient was a 74-year-old woman with serum calcium of 12.2 mg/dl (normal range 8.5-10.5). Serum PTH was 140 nl Eq/ml (normal less than 25). A subtraction scan was performed using 3 mCi Tc, and 2 mCi Tl, and showed a slight uptake on both sides of the lower right thyroid lobe. She received oral phosphate* 1 g/day in divided doses for 3 wk. A repeat serum calcium dropped to 11.2 and PTH rose to 205. A repeat dual isotope scan with 3 mCi Tc and 2 mCi Tl clearly demonstrated enhancement of the uptake laterally as well as medially (Fig. 1). At surgery a 450 mg. parathyroid adenoma located lateral to the right thyroid lobe was removed. The uptake medially was associated with a co-existing thyroid adenoma. In a second patient (a 72-yr-old male), there was slight reduction of serum calcium from 11.1 to 10.8 with an increase of serum PTH from 78 to 135, 3 wk after 1 g/day therapy with oral phosphate. A repeat subtraction scan demonstrated enhancement of left inferior parathyroid adenoma as compared to pre-phosphate stimulation scan. On surgery an adenoma weighing 620 mg was excised. The third patient, a 62-yr-old female, received oral phosphate 1 g/day for only 10 days. There was no drop in serum calcium level of 11 md/dl and no increase in PTH level which was 98 and 68 units pre and post therapy,