REPLY: We thank Drs. Osmanagaoglu and Foulon for their interest in our case of inadvertent radioiodine treatment of a pregnant woman in her 20th week of gestation. This case raises several important ethical questions.

We first presented this case in 1996 at the International Symposium on Radioiodine (Mayo Clinic, Rochester, MN), with the hope of stimulating discussions about safety aspects of radioiodine treatment and the necessity of precautions to ensure absence of adverse effects. The use of radioiodine in adults is increasing, and it is possible that radioiodine treatment in pregnancy may be performed in single cases. We were thus encouraged to publish this carefully studied case.

The clinical situation was complicated. A woman with a strong wish to have a child finally became pregnant at an age when further pregnancies appeared unlikely and at the same time she suffered from the mental stress of hyperthyroidism. Under these circumstances it appeared cruel to leave the decision entirely to the patient—the decision was difficult enough for the physicians involved in the case. Had the risk for a congenital abnormality been high—Drs. Osmanagaoglu and Foulon suggest it to be around 8% in analogy with congenital hypothyroidism—we would have been more hesitant in our advice to our patient to fulfill her pregnancy. However, this parallel is an oversimplification since ectopia or dysplasia of the thyroid gland (the most common cause of congenital hypothyroidism in our part of the world) may be just one of several manifestations of an unknown primary developmental defect. Therefore, our case cannot be compared with the common case of congenital hypothyroidism. Instead, we gave clinical advice carefully based on the information given in our article.

The neuropsychological tests were carried out by an experienced psychologist with special interest in neuropsychology. The WISC 3, Token-test, figure ground and position in space, VMI, Rey complex figure, Knox cubes, motor function according to HR and Rugland tests were given.

As clearly indicated in the text, the child has no major problems and in fact now leads a completely normal life with no difficulties. We conclude that we were fortunate in giving the mother correct advice in this ethically complicated situation.

Drs. Osmanagaoglu and Foulon state that there is very little current experience on this subject. We agree fully, and this is the reason why we published this case.

Gertrud E.B. Berg
Ernst H. Nyström
Lars Jacobsson
Sture Lindberg
R. Göran Lindstedt
C. Aimon Niklasson
A. Håkan Norén
Otto G.A. Westphal
University Hospital Gothenburg
University of Göteborg
Gothenburg, Sweden

Sören Mattsson
Malmö University Hospital
University of Lund
Malmö, Sweden

Failure to Detect Drainage to the Popliteal and Epitrochlear Lymph Nodes on Cutaneous Lymphoscintigraphy in Melanoma Patients

TO THE EDITOR: We have been performing preoperative cutaneous lymphoscintigraphy (LS) with ^{99m}Tc-antimony sulphide colloid in patients with melanoma for 13 years. Initially, the purpose of the investigation was to detect draining lymph node fields in patients with truncal melanomas and who were thought to have ambiguous drainage. Since 1992 we have been using LS to locate sentinel lymph nodes in all patients with intermediate-thickness cutaneous melanomas. We have therefore studied patients with melanoma sites all over the skin.

Axillary and groin node fields were routinely scanned for 10 min during delayed imaging to detect the sentinel lymph nodes. Other node fields were scanned at the same time if they were thought to be possible drainage sites in the individual patient. However, in patients with melanoma sites on the foot, leg, hand or forearm, where drainage to the popliteal or epitrochlear nodes was possible, a high-sensitivity persistence scope was used to determine whether these node fields contained activity before acquisition of a 10-min image. If no activity was seen on the persistence scope, then no delayed images of these areas were acquired. Over about 5 yr using this approach, we detected sentinel nodes in the popliteal region in 4 of 177 patients (2.3%) with leg or foot primary melanoma sites and sentinel nodes in the epitrochlear region in 4 of 73 patients (5.5%) with melanoma sites on the forearm and hand.

Just over 1 yr ago we became concerned that we could possibly be missing nodes in these areas. We therefore altered our imaging protocol so that all patients with melanoma sites located on the foot, leg, hand or forearm had the appropriate popliteal or epitrochlear area scanned for 10 min during delayed imaging. Since changing our imaging protocol in this way, we have detected sentinel nodes in the popliteal fossa in 8 of 50 patients (16%) with foot and leg melanoma sites and in the epitrochlear region in 5 of 24 patients (21%) with hand and forearm melanoma sites.

It is quite clear from these results that we had been failing to identify sentinel nodes in the popliteal fossa and epitrochlear regions during LS over the 5 yr before our change in imaging protocol. Our estimate is that sentinel nodes were missed in 24 patients with direct drainage to the popliteal fossa and 11 patients with direct drainage to the epitrochlear region.

These findings indicate that using the persistence scope to check for activity in node fields is inadequate to detect sentinel nodes. A formal 10-min acquisition should therefore be obtained over every node field that could possibly drain a primary melanoma site to ensure that all sentinel nodes are detected in every patient. Imaging protocols should be checked if fewer than 15%–20% of patients with melanomas on the foot, leg, hand and forearm show popliteal or epitrochlear sentinel nodes on LS.

Roger F. Uren
Robert B. Howman-Giles
Missenden Medical Centre
Camperdown, Australia

John F. Thompson
Sydney Melanoma Unit, RPAH
Camperdown, Australia

Somatostatin Receptor Scintigraphy in Small-Cell Lung Cancer

TO THE EDITOR: The results of a multicenter study on somatostatin receptor scintigraphy (SRS) in small-cell lung cancer (SCLC) were recently published in your journal (*1*).

The authors reported that SRS has a high sensitivity in the detection of the primary tumor but fails in the detection of metastases. They concluded that SRS may be used to follow up on the course of SCLC.

We wish to bring to readers' attention that we published on the same topic in 1996 (*2*) but this report was not referenced. We concluded that "[SRS] is a highly effective method for detecting SCLC primary tumor and supra clavicular nodes [but] the procedure is of limited value for distant metastasis .... It might help in the detection of recurrence or guide the physician's decision to intensify therapy."

REFERENCES

1. Reisinger I, Bohuslavitzki KH, Brenner W, et al. Somatostatin receptor scintigraphy in small-cell lung cancer: results of a multicenter study. *J Nucl Med* 1998;39:224–227.
2. Berenger N, Moretti J-L, Boaziz C, Vigneron N, Morere J-F, Breau J-L. Somatostatin receptor imaging in small cell lung cancer. *Eur J Cancer* 1996;32A:1429–1431.

Jean-Luc Moretti
Nadine Caillat-Vigneron
CHU Bobigny
Service de Médecine Nucléaire et de Biophysique
Bobigny, France

Role of Health Economics in Nuclear Medicine

TO THE EDITOR: I read with interest the invited commentary by Gambhir (*1*) regarding the role of health economics in nuclear medicine. We have just completed an economic appraisal of the question, "Does PET have a clinical role?" We sought to determine the economic and clinical arguments for introducing a PET scanning facility in the West Midlands Region in the United Kingdom (*2*).

Effective cost-effectiveness analysis (CEA) stems from a common alliance among health economists, physicists and clinicians such that the cost-effectiveness of diagnostic imaging technology can be truly determined. This requires each to have a role in enumerating the relevant costs and benefits. The key point in a CEA is the treatment algorithm of both cost and benefits (*3*), not merely the costs. If the CEA is to be meaningful, costs and benefits should not cease to be enumerated at the end of diagnosis but continue through treatment. We sought to find the costs for treatments at each arm after the implementation of a diagnostic strategy, in an effort to more clearly link this to the outcome of life-years saved. CEA is not merely the evaluation of a single piece of technology. It is the relationship of a new or existing technology compared to its alternatives. We sought to compare the cost per life-year of clinical PET in a number of areas to conventional diagnostic technology in each area.

A word of caution surrounding the use of decision tree technology. In our work, we used TreeAge (TreeAge Software, Inc., Williams, MA). Although extremely useful for structuring the problem, decision tree packages are not a substitute for the hard work required to model the diagnostic and treatment algorithms. Indeed, it should be noted that once constructed, such trees are highly demanding of data upon which to furnish the model.

REFERENCES

1. Gambhir SS. Cost-effectiveness analysis in nuclear medicine. *J Nucl Med* 1998;39: 17N–18N.
2. James M, Hunt K. Diagnostic imaging in cancer the economics of positron emission tomography. *Eur J Cancer* 1997;33:5–6.
3. Drummond MF. *Principles of economic appraisal in health care*. Oxford: Oxford University Press; 1980.

Marilyn James
Centre for Health Planning and Management
University of Keele
Keele, United Kingdom

Sigmoidal Curves

TO THE EDITOR: Zanzonico and Sgouros (*1*) would have us believe that a sigmoidally shaped curve "characteristic of nonstochastic radiogenic effects" (Fig. 1) is necessarily deterministic. Not so. The most familiar example would be the cumulative Gaussian frequency distribution, which is the paradigm of stochasm yet is sigmoidal.

The nub of the problem goes deeper, however. In biomedicine, the behavior of the elements of a set ("compartment") can be described in either of two ways: deterministically, in which case each element behaves according to some rule; or stochastically, in which case each element behaves independently, but the overall behavior of the set can be described by a central tendency (the mean) and a spread (the variance). For exponential transfer, it turns out that the mean of the stochastic approach is identical to the deterministic rule (*2*), so that first-order transfer can be described either way. For example, radioactive decay is usually thought of in probabilistic terms, but one looks up decay tables to find the "true value" for some half-life of interest. In the Poisson distribution (a classic stochastic formulation), the probability of a nonoccurrence is unity multiplied by an exponential, which can be interpreted deterministically. In the physical world, a photon can be considered as a "packet" or a wave, again depending on the context.

So it is with sigmoidal curves—it depends on the context and one's viewpoint.

REFERENCES

1. Zanzonico P, Sgouros G. Predicting myelotoxicity in radioimmunotherapy: what does dosimetry contribute [Editorial]? *J Nucl Med* 1997;38:1753–1754.
2. Thakur AK. Some statistical principles in compartmental analysis. In: Robertson JS, ed. *Compartmental distribution of radiotracers*. Boca Raton, FL: CRC Press, Inc.; 1983:143–176.

N. David Charkes
Section of Nuclear Medicine
Temple University Hospital
Philadelphia, Pennsylvania

REPLY: In our Editorial, we ignored the subtleties discussed by Dr. Charkes and concentrated on the derivation of clinically useful (i.e., predictive) dose-response relationships for planning radioimmunotherapy. We had no intention of claiming that a sigmoidal dose-response function is necessarily indicative of a deterministic effect. If such a claim were inferred, however, we stand corrected. We thank Dr. Charkes for the opportunity to emphasize that a sigmoidal dose-response function does not necessarily imply a deterministic effect.

Pat Zanzonico
George Sgouros
Memorial Sloan-Kettering Cancer Center
New York, New York