

Things Are Perhaps Not Quite So Simple ...

TO THE EDITOR: In the article by Trujillo et al. (1), the authors draw attention to the value of diethylenetriamine pentaacidic acid aerosols in ventilation scans. Several other similar ventilation techniques used to obtain multiple images of good quality are also reported in the literature (2–5).

The authors attribute the excellent diagnostic performance of pulmonary scintigraphy to the technique and to the specific interpretation criteria. A point not discussed in their article was patient selection, a factor of particular importance.

In our hospital, a prospective study was conducted over a 13-month period (6). The study's purpose was not specifically to redefine the sensitivity and specificity of pulmonary scintigraphy but to determine the value and limits of this type of examination as part of an overall strategy for diagnosing pulmonary embolism. The study involved 1819 patients, comprising 23% outpatients and 77% inpatients, with an overall mean age of 66 yr, of which 54% were female patients (mean age 69) and 46% male patients (mean age 63). Ventilation scans using phytate technetium aerosol coupled with pulmonary perfusion scans were performed on these patients and interpreted according to modified Biello criteria.

Our investigation involved an older population with a greater proportion of inpatients than in the study of Trujillo et al. The results were similar to those reported in the literature with other methods for ventilation scans (2–5). Thirty percent of the scans were normal or high-probability (14% and 16%, respectively). However, more detailed analysis showed that the results of the scans were closely related to the age of the patients and to the existence of underlying cardiac or lung disease, two factors that are often related. Stein (7) has clearly shown the influence of pre-existing cardiac or lung disease on scintigraphy results, with an increase in the proportion of nondiagnostic scans in such cases, but with no reduction in negative or positive predictive values (7).

Our study demonstrated an unequivocal reduction in the performance of the examination with increasing patient age. Without entering into a discussion of methods and interpretation criteria, we would note that the lung scans in our study gave a normal or high-probability of pulmonary embolism for 54% of the 90 patients under age 30, for 48% of the 286 patients aged between 30 and 50 (thus an efficiency for this group of 48/54 = 89%, compared with the under-30 yr age group), 30% of the 554 patients aged 50–70 yr (efficiency = 56%), 26% of the 627 patients aged 70–85 yr (efficiency = 48%) and only 19% of the 262 patients over age 85 (efficiency = 35% only).

This letter does not call into question the findings of Trujillo et al. which are remarkable in a great many respects. However, without taking into account such important parameters as age, the origin of the patients and the pre-existence of heart or lung disease, comparisons of the diagnostic utility of the techniques reported in different studies may be inconclusive. In fact, we feel it is probable that the very good results obtained by Trujillo et al. are at least in part attributable to patient selection. It would therefore be interesting to ascertain whether, in the population used, their technique and specific criteria provide exactly the same results according to different age groups.

REFERENCES

1. Trujillo NJ, Pratt JP, Talusani S, Quafe RA, Kumpe D, Lear JL. DTPA aerosol in ventilation/perfusion scintigraphy for diagnosing pulmonary embolism. *J Nucl Med* 1997;38:1781–1783.
2. The PLOPED investigators. Value of the ventilation/perfusion scan in acute pulmonary embolism. Results of the prospective investigation of pulmonary embolism diagnosis (PLOPED). *JAMA* 1990;263:2753–2759.
3. Bernard EJ, Nour R, Butler P, Quinn RJ. Incidence of pulmonary embolism in single segmental mismatch on lung scanning. *J Nucl Med* 1994;35:1928–1931.
4. Ramanna L, Alderson PO, Waxman AD, et al. Regional comparison of technetium-99m

- DTPA aerosol and radioactive gas ventilation (xenon and krypton) studies in patients with suspected pulmonary embolism. *J Nucl Med* 1986;27:1391–1396.
5. Alderson PO, Biello DR, Gottschalk A, et al. Technetium-99m-DTPA aerosol and radioactive gases compared as adjuncts to perfusion scintigraphy in patients with suspected pulmonary embolism. *Radiology* 1994;153:515–521.
6. Bosson JL, Buffaz PD, Brut A, et al. Contribution and limits of the combination of lung scan and venous duplex in the management of pulmonary embolism. *Rev Méd Interne* 1997;18:695–701.
7. Stein PD, Coleman E, Gottschalk A, Saltzman S, Terrin ML, Weg JG. Diagnostic utility of ventilation/perfusion lung scan in acute pulmonary embolism is not diminished by pre-existing cardiac or pulmonary disease. *Chest* 1991;100:604–606.

Pierre-Denis Buffaz

Service de Biophysique et de Médecine Nucléaire

Jean-Luc Bosson

*Service d'Information et d'Informatique Médicales
Centre Hospitalier Universitaire de Grenoble
France*

What is a False-Positive Somatostatin Receptor Scintigraphy?

TO THE EDITOR: I read with interest the paper by Lebtahi et al. (1) describing incidental visualization by Octreoscan of an accessory spleen but not of the tumor itself in a patient with Zollinger-Ellison syndrome.

This study did not evaluate with *in vitro* assays whether the visualized accessory spleen expressed specific somatostatin receptors. However, as correctly stated by the authors, normal human spleens usually show a physiological uptake of ¹¹¹In-diethylenetriamine pentaacidic acid (DTPA)-octreotide *in vivo*; this uptake is due to the presence of specific somatostatin receptors localized in the red pulp of the spleen, as has been clearly demonstrated earlier with an *in vitro* autoradiography method on tissue sections (2). One can be almost certain, therefore, that the visualization by Octreoscan of this accessory spleen is due to the presence of specific somatostatin receptors in this tissue.

From a clinical point of view, it is understandable that the authors speak of “false-positive” somatostatin receptor scintigraphy in that they were searching for the tumor site responsible for Zollinger-Ellison syndrome in this patient but were only able to detect a “normal” organ, namely the accessory spleen. From a biological point of view, however, the visualization of the somatostatin receptor-positive accessory spleen is not a false-positive result since it is due to the presence of specific somatostatin receptors in this tissue. The same is also true for other somatostatin-receptor-expressing normal tissues such as the pituitary, and possibly the thyroid (3), which should not, biologically speaking, be considered false-positive when visualized on scans. Truly false-positive Octreoscans do exist however; these are hot spots that are not related to the presence of somatostatin-receptor-expressing tissue. For example, a hot spot was reportedly found in a tissue lacking somatostatin receptors but characterized by a local production of antibodies raised against octreotide as a consequence of multiple local octreotide injections (4). By calling the visualization of somatostatin-receptor-expressing normal organs false-positive, even those ectopically localized, one cannot distinguish such cases from the truly false-positive cases mentioned above. It may be worth recommending to use the term “false-positive” more restrictively to describe only those receptor scintigraphic findings with Octreoscan that are evidently not caused by the presence of somatostatin receptors.

Accessory spleens are common and have been encountered singly or multiply in one-fifth to one-third of all postmortem examinations. They are usually small spherical structures that are histologically and functionally identical to the normal spleen (5). In patients with splenectomy, in particular splenectomy performed after traumatic injury of the spleen, the

occurrence of residual splenic tissue is an even more frequent observation, due to the compensatory growth of residual splenic cells, including accessory spleens. An important message of the paper by Lebtahi et al. is that the nuclear physician performing Octreoscan, in particular in splenectomized patients, should be aware that a positive somatostatin receptor scintigraphy in the abdominal region arising from the presence of accessory spleens may be much more common than previously thought and is, therefore, of considerable differential-diagnostic relevance.

REFERENCES

1. Lebtahi R, Cadiot G, Marmuse JP, et al. False-positive somatostatin receptor scintigraphy due to an accessory spleen. *J Nucl Med* 1997;38:1979-1981.
2. Reubi JC, Waser B, Horisberger U, et al. In vitro autoradiographic and in vivo scintigraphic localization of somatostatin receptors in human lymphatic tissue. *Blood* 1993;82:2143-2151.
3. Reubi JC, Waser B, Friess H, Krenning EP, Büchler M, Laissue J. Regulatory peptide receptors in goiters of the human thyroid. *J Nucl Med* 1997;38:266P.
4. Kwekkeboom DJ, Assies J, Hofland LJ, Reubi JC, Lamberts SWJ, Krenning EP. A case of antibody formation against octreotide visualized with ¹¹¹In-octreotide scintigraphy. *Clin Endocrinol* 1993;39:239-243.
5. Robbins SL. *Robbins pathologic basis of disease*. 5th ed. Philadelphia, PA: W.B. Saunders; 1994.

Jean Claude Reubi
Institute of Pathology
University of Berne
Berne, Switzerland

REPLY: We agree that the visualization of an accessory spleen is due to the presence of specific somatostatin receptors in this tissue and that the hot spot due to such an ectopic organ is physiological. We discussed this point in our paper. However, when the results of somatostatin receptor scintigraphy lead to surgery, they must be considered false positive for a tumoral site. The "false positive" designation refers to clinical data management and not to biological considerations.

R. Lebtahi
D. Le Guludec
Nuclear Medicine Department

G. Cadiot
M. Mignon
Gastroenterology Department
Hôpital Bichat
Paris, France

Costs Versus Charges

TO THE EDITOR: The *Newsline* article "Future of Nuclear Medicine, Part 2: Assessment of the U.S. Diagnostic Radiopharmaceuticals Market (2001-2020)" (1) is very important but repeats a fundamental error regarding the costs of nuclear medicine procedures. On page N23 in the discussion of market restraints on the growth of the field, the article states that "Nuclear Medicine procedures are not inexpensive Prices for Nuclear Medicine diagnostic procedures range from \$1500 to \$6000. This compares to about \$50 for an x-ray, for example." The article then proceeds to try to justify the high cost of the nuclear medicine procedures.

A basic problem with this analysis is that most nuclear medicine procedures are not very expensive and do not need this form of justification. According to the 1997 fee schedule, Medicare pays \$204.03 for a bone scan (78306: professional AND technical components combined). Even a stress/redistribution thallium scan is only reimbursed \$515.96 (plus a small amount for the radiopharmaceutical).

The root of the problem is the failure to distinguish between *charges* and *costs*. I may charge \$1,500 for a stress thallium scan; but I accept \$500 as full payment. If I try to explain why a study is worth \$1500, my reasoning

becomes tortuous and not very effective. It is much easier to provide the cost/benefit justification for a test if I say that it only "costs" \$515.

I recognize that there are nuclear medicine procedures that will need payments of more than \$1000, but this is not the bulk of our work. We must recognize that the "cost" of a nuclear medicine procedure is the payment we receive, not the bill we send out. It will be very hard for us in a cost conscious world to justify our continued existence if we use the wrong numbers in our self-analysis.

P. Todd Makler, Jr.
University of Medicine and Dentistry of New Jersey
Stratford, New Jersey

REFERENCES

1. Future of Nuclear Medicine, Part 2: assessment of the U.S. radiopharmaceuticals market. *J Nucl Med* 1998;39(3):N20-N25.

Concerns About Risks of Irradiation During Pregnancy

TO THE EDITOR: We read with interest the article by Berg et al. (1). They describe the case of a pregnant woman who underwent, at 8 and 20 wk gestation, radiodiagnostic tests with ^{99m}Tc and with ¹³¹I followed by 500 MBq ¹³¹I for thyroid ablation to treat hyperthyroidism. As the authors mention, "data on Japanese atomic bomb-survivors exposed in utero at fetal ages 8-15 weeks suggest the possibility of a non-threshold-type response for the induction of severe mental retardation by radiation" (2).

The fetal thyroid was ablated because of a 600 Gy absorbed dose. The mother was brought to a slightly hyperthyroid situation with substitutional therapy. It is known that fetal hypothyroidism cannot be excluded even with substitutional therapy (3). It is reported that 8% of 449 patients with congenital hypothyroidism have major congenital anomalies (4).

Considering these two major complications, our duty is to inform the patient clearly about the uncertainty of the outcome and to leave the choice between continuation or interruption of her pregnancy to the patient. We have no right to encourage the patient to continue her pregnancy, with the actual knowledge on the influence of radioactivity on fetal and child development.

Moreover, we find it difficult to accept the decision of the Swedish National Board of Health that states that none of the physicians involved should be accountable, since the physicians had four opportunities to perform a simple pregnancy test on this woman.

It would also be interesting to know which neuropsychological tests were carried out to evaluate the mental capacity of the child involved. Without this reference, the mere reporting of the outcome lacks persuasiveness.

Most importantly, we disagree with the conclusion of the article that after three radiodiagnostic tests and radioiodine therapy, in the 8th and 20th wk of gestation, termination of pregnancy is not justifiable. Currently, there is very limited experience on this subject.

REFERENCES

1. Berg GEB, Nyström EH, Jacobsson L, et al. Radioiodine treatment of hyperthyroidism in a pregnant woman. *J Nucl Med* 1998;39:357-361.
2. Recommendations of the international commission on radiological protection. *Ann ICRP* 1991;21:1-201.
3. Sugrue D, Drury MI. Hyperthyroidism complicating pregnancy: results of treatment by antithyroid drugs in 77 pregnancies. *Br J Obstet Gynaecol* 1980;87:970-975.
4. Grant DB, Smith IK, Fuggle PN, et al. Congenital hypothyroidism detected by neonatal screening: relationship between biochemical severity and early clinical features. *Arch Dis Child* 1992;67:87-90.

Kaan Osmanagaoglu
Walter Foulon
Department of Gynaecology and Obstetrics
Brussels Free University, Belgium