Extrahepatic Uptake of Technetium-99m-Phytate

TO THE EDITOR: The April 1990 issue of *The Journal of Nuclear Medicine* contains a report by Picard et al. (*1*) on the phenomenon of extrahepatic uptake of technetium-99m-phytate (^{99m}Tc-phytate). They state that "the advantage of ^{99m}Tc-phytate over ^{99m}Tc-sulfur colloid is its gradual redistribution from liver to spleen and bone marrow in the presence of increasing impairment of liver function." The truth is that all colloids used in scintigraphy of the reticuloendothelial system (RES) will show redistribution when the RES cells in the liver have a decreased capacity to handle colloids (*2*). Another fact is that patients with advanced cirrhosis have a decrease in the total phagocytic and metabolic functions of the RES (*3*).

In order to get exact information regarding uptake in the bone marrow, the best way is to record the uptake in the pelvic region during a constant time and with the same administered activity (*4*). To get objective information regarding the uptake in the spleen and the liver, it is best to record spleen/liver (S/L) ratios on computerized images. Another important factor is that the colloid is constant from batch to batch; albures is such a colloid. It is a human serum albumin colloid that is metabolized in the RES cells and has a narrow particle size distribution. The uptake of albures is rather similar to sulphur colloid but the uptake in the spleen is somewhat lower (*4*). We have made a similar study of the uptake of ^{99m}Tc-albures (*5*). Although the distributions of albures and phytate are different, our results should be of interest. Gamma camera planar studies and emission computed tomography (ECT) were performed on selected patients.

The S/L ratio was measured from computerized planar pictures over two central parts of maximal uptake over the liver and the spleen. The thickness of the liver and the spleen were measured from ECT for the two regions. Regarding the observed ratios of the planar pictures, the thickness of the liver seemed to be of minor importance. However, the ratios were strongly correlated to the thickness of the spleen.

A formula was derived, which calculated the volume of and the spleen and corrected for increasing attenuation with distance in the body. Most observations from the patient measurements appeared along the graph of the calculated formula. In cases with splenomegaly, the S/L ratio derived from the posterior registration was about the same as from ECT. In cases without splenomegaly, the S/L ratios found by ECT were significantly higher and more correct than the values recorded from posterior registration.

REFERENCES

1. Picard D, Infante-Rivard C, Villeneuve J-P, Chartrand R, Picard M, Carrier L. Extrahepatic uptake of technetium-99m-phytate: a prognostic index in patients with cirrhosis. *J Nucl Med* 1990;31:436–440.
2. Friman L. Distribution of the extrahepatic uptake in liver diseases as recorded by scintigraphy. *Acta Radiol Diagn* 1981;22:103–120.
3. Lahnborg G, Friman L, Berghem L. Reticuloendothelial function in patients with alcoholic liver cirrhosis. *Scand J Gastroenterol* 1981;16:481–489.
4. Friman L, Persson U, Udén R. Recording of the bone marrow activity in liver-spleen (RES) scintigraphy. *Acta Radiol Diagn* 1984;25:477–480.
5. Friman L, Söderborg B. Spleen/liver ratio in RES scintigraphy. *Acta Radiol* 1987;28:439–441.

L. Friman
B. Söderborg
Södersjukhuset Hospital
Stockholm, Sweden

Influence of Region of Interest Selection on the Scatter Multiplier Required for Quantification in Dual-Window Compton Correction

TO THE EDITOR: During discussion after the presentation "Dual-Window Compton-Scatter Correction in Phantoms: Errors and Multiplier Dependence on Energy" (*1*) at the 1990 Society of Nuclear Medicine Annual Meeting, the question arose as to why our scatter multiplier, k, is so large compared to that of others. In published work on the matter (*2*), we list a k value of 1.30 in the subtracted-image mode with maximum likelihood (ML) reconstruction. On the other hand, with similar windows, Jaszczak et al. (*3*) found a k value of 0.5. Now, one usually thinks of k as the ratio of the scattered counts within the photopeak window over the scattered counts within the scatter window for a given pixel. Thus, it could be defined to be spatially variant. In practice, however, it is usually defined to be a single weighting factor in the subtraction part of a complex procedure designed to produce a desired end. In our case, the desired end is quantification of a spatially-restricted hot object in a series of tomograms relative to a known-activity version of the same. We then write a proportionality:

$$\frac{A_U}{A_R} = \frac{C_U}{C_R}, \qquad (1)$$

where A_U is the activity for the unknown object, A_R is that for the reference object, C_U is the tomogram strength for the unknown, and C_R that for the reference. Moreover,

$$C_U = C_P - k \cdot C_S, \qquad (2)$$

where C_P is the total strength within given regions of interest (ROIs) for the tomograms reconstructed from the photopeak-window data and C_S is the same from the scatter-window data. Since we choose k in a calibration so that the calculated A_U agrees with the true value, k cannot have a prior definition and, in fact, its value obviously depends on the ROIs involved in the quantification procedure.

Recognizing that the Compton-scatter image has poorer resolution than the photopeak image because second-order