LETTERS TO THE EDITOR

Re: Single-Photon Emission Computed Tomography (SPECT) for Assessment of Hepatic Lesions: Its Role in the Diagnostic Work-Up.

In their thorough study, Strauss et al. (*1*) compared conventional liver scintigraphy (CLS), single-photon emission CT (SPECT), and transmission CT (TCT) in patients for assessing hepatic involvement in malignant disease. For liver metastases the authors reported an accurracy of 92% for SPECT and of 82% CLS, using TCT as reference (100%). However, in our opinion these data should be completed for clinical use by considering the rate of correct type-specific classification of detected lesions and the role of ultrasound (US).

We investigated 89 patients (42 with and 47 without focal alterations of the liver) to compare the results from CLS, SPECT, TCT, and US. The purpose of the study was to detect focal lesions and to assess diagnostic accurracy and the rate of type-specific diagnoses by applying either one technique alone or a combination of the above techniques (*2*). The nuclear medicine study group was not informed of the results of TCT and US. Diagnoses in these selected patients were available from autopsy, biopsy, follow-up, or from combination with various other diagnostic procedures. The findings included metastasis (in 27 patients), cyst, hemangioma, echinococcus disease, and primary liver cancer. Results are summarized in Table 1. A correct type-specific diagnosis from either radioactive method (50%) was limited to multiple metastases, since the diagnosis was based on the pattern typical for multifocal lesions.

From these results, we consider a combination of US and SPECT as a preferable diagnostic tool for the assessment of focal hepatic lesions, if a TCT examination cannot be performed. Ultrasound should be applied first, since it resulted in a correct type-specific diagnosis in 85% of cases. SPECT should be used subsequently if results of US are not conclusive. Because SPECT provides data in a reproducible form, it may be a preferable diagnostic procedure for follow-up studies of confirmed liver metastases.

TABLE 1. DIAGNOSTIC ACCURRACY (LESION DETECTION) AND RATE OF CORRECT DIAGNOSES (TYPE-SPECIFIC) IN FOCAL LIVER DISEASE* OBTAINED FROM VARIOUS IMAGING MODALITIES AND COMBINATIONS THEREOF

Imaging modality	Diagnostic accurracy (%)	Correct type-specific diagnosis (%)
Conventional liver scintigraphy	86	50†
Single-photon ECT	92	50†
Transmission CT	92	86‡
Ultrasound	92	85‡
Conv. liver scintigraphy and ultrasound	92	85
Single-photon ECT and ultrasound	95	85

* Selected patients (n = 89).
† versus ‡: $p < 0.01$.

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2. BUELL U, KIRSCH CM, ROEDLER HD: Single photon emission computed tomography: principles, results, future aspects. *Fortschr Roentgenstr* 138:391-402, 1983

Reply

For the evaluation of hepatic lesions, numerous diagnostic modalities are used besides those of radiology and nuclear medicine. Ultrasound as well as other approaches such as laparascopy may achieve importance in arriving at a final diagnosis. To assess the relative importance of the different procedures, it does appear useful to compare several approaches with each other, as Buell and associates have done (*1*). It appears that the required brevity of a letter has caused the terms "diagnostic accuracy" and "correct type-specific diagnosis" to be used. To compare our results (*2*) with those of Buell would have required information about the rate of true positives, true negatives, false positives, and false negatives. Bayes' Theorem could then have been used to obtain a direct comparison of the information content of each procedure.

Furthermore, the correct type-specific diagnosis in subgroups of different sizes is not without difficulties. Metastases were found in 27 patients, whereas 15 suffered from cysts, hydatid cysts, hemangioma, or primary liver cancer. The numbers of patients contained in each subgroup were not specified. We assume that each subgroup contained three or four patients. The problem with diagnostic accuracy, type-specific diagnosis, and subgroups of different sizes is easily demonstrated. For example, if 26 of 27 metastases were correctly diagnosed with a diagnostic modality, the sensitivity, $TP = (26/27) \times 100$, would be 96%. Using the same diagnostic procedure in a small subpopulation of four patients having hemangioma, two of which were correctly diagnosed, would result in a sensitivity of 50%. Combining both groups to determine overall diagnostic accuracy would give a value of 90% [$TP = 100 \times (26 + 2)/(27 + 4)$]. This value would fail to do justice to the achieved results—indeed it would be misleading.

Lastly, we feel that "the correct type-specific diagnosis" as used may cause the value of scintigraphy to be underestimated. Cysts