DIFFERENTIAL DIAGNOSIS OF BRAIN LESIONS WITH ^{99m}Tc-LABELED PHARMACEUTICALS

We read with considerable interest the article by Fischer et al on the use of ^{99m}Tc-pertechnetate and ^{99m}Tc(Sn)-diphosphonate in brain scanning (*1*). Since we have presented similar work (*2*), we would like to comment on certain aspects of the paper by Fischer et al.

If one needs to compare analog camera images, we feel that the *preset count* mode is not the best way to record comparable data. As it is very difficult to guarantee that the camera is seeing equal "amounts of brain" if one studies the same patient several times, it follows that variable areas of "non-brain regions" will contribute to the total number of counts collected. For instance, in Fig. 2 of Fischer's article the jaw contributes counts to the brain image with the diphosphonate study and also, to a different degree, with the pertechnetate study. We therefore feel that the *preset time* mode is more relevant to analog comparisons since it avoids these problems.

From our experience the kind of display used is critical. For most analog work standard Polaroid pictures are not sufficiently reproducible. Since the intensity variation is quite important, we prefer to use 70-mm film for analog studies.

From our studies of 20 patients with cerebral vascular accidents or metastatic brain disease we arrived at results similar to those presented by Fischer. The ^{99m}Tc-HEDP produced better images for infarcts than $^{99m}TcO_4^-$. (In two cases the infarcted area was imaged with HEDP after a completely negative $^{99m}TcO_4^-$ study.) This pattern recurred throughout the investigation (all the patients were studied on the 1st and 2nd, 6th and 7th, and 13th and 14th days after admission). In none of the ten cases with proved metastasis to the brain did HEDP yield a better image than did $^{99m}TcO_4^-$. Thus, we feel that HEDP is the agent of choice for the imaging of infarcted areas of the brain and that $^{99m}TcO_4^-$ is the tracer of choice in the visualization of neoplastic disease.

Although this double-scanning method helps in the differential diagnosis of cerebral lesions, it doubles patients' examination time, which is not ideal. As Fischer et al clearly state, this method has several pitfalls. For instance, certain tumors, like meningiomas, are imaged better with HEDP (this is certainly explained by the vicinity of osseous structures and intratumor calcifications).

When the diagnostician is fortunate to be able to confirm brain lesions with computerized axial tomography, we doubt that this double-scanning method will impress its usefulness on the clinicians responsible for the patient's management.

PETER JOSEF ELL
KARL HEINZ LOTRITSCH
Landesunfallkrankenhaus
Feldkirch, Austria

REFERENCES

1. FISCHER KC, MCKUSICK KA, PENDERGRASS HP, et al: Improved brain scan specificity utilizing ^{99m}Tc-pertechnetate and ^{99m}Tc(Sn)-diphosphonate. *J Nucl Med* 16: 705–708, 1975

2. ELL PJ, LOTRITSCH KH, HILLBRAND E, et al: Non-invasive differential diagnosis of brain lesions with ^{99m}Tc-labelled pharmaceuticals. *Proceedings of the 13th Annual Meeting of the Society of Nuclear Medicine, Copenhagen, 1975*, ISBN 87-7437-493-1, Society of Nuclear Medicine

REPLY

Since our article was accepted for publication, Grames et al (*1*) reported 43 cases in which cerebral lesions were evaluated with both ^{99m}Tc-pertechnetate and ^{99m}Tc-HEDP. Their data, our results, and now the data of Ell and Lotritsch all indicate that the majority of infarcts are better shown with a bone-seeking radionuclide whereas the majority of tumors are more apparent with the standard pertechnetate brain scan. Unique in Ell and Lotritsch's data are two infarcts that accumulated ^{99m}Tc-HEDP but did not visualize with ^{99m}Tc-pertechnetate over a 2-week period. This implies more specificity of HEDP for infarcts than indicated by our experience or that of Grames. Of 35 infarcts studied by the two latter groups, 34 were shown to some degree by both agents, while one (GD in Grames' data) did not visualize with the bone agent.

As Ell and Lotritsch reiterate, "pitfalls" in diagnosis can arise in cerebral scanning with bone agents. However, the situation with meningiomas is not as clear-cut as they indicate. In our experience with nine meningiomas studied with both ^{99m}Tc-pertechnetate and ^{99m}Tc(Sn)-diphosphonate, the meningiomas which showed a greater target-to-background intensity ratio with the bone agent also demonstrated radiographically visible bone changes in the same areas. In meningiomas without adjacent bone changes, however, the demonstration of the tumors was equal or reversed with the two agents. In Grames' series, two out of two meningiomas were shown better with ^{99m}Tc-pertechnetate than with ^{99m}Tc-HEDP.

We maintain that computed tomography and radionuclide brain imaging are complementary studies,