LETTERS TO THE EDITOR

Early Brain Images, an Important Definition

I enjoyed the recent paper of D. E. Tanasescu, et al. (*1*) and I hope that many of my colleagues in Germany and Europe have read it. The authors compare early and delayed Tc-99m glucoheptonate brain images, performed with an Anger camera, and conclude that early Tc-99m GH brain images are inferior to the delayed ones and cannot give much additional information to the physician. I welcome this paper and the former presentations of this group demonstrating the effectiveness of brain scanning when 3- or 4-hr delayed images are made. But I think that the first problem in this connection is to define what an early brain image is. We can agree that delayed scans are superior compared with 20- to 30-min photos. And I believe, further, that there is no difference between 30- and 60-min images.

Beginning in 1968 our brain studies have been carried out following a multiple step approach: first a dynamic study, followed by early images 1 to 5 min after injection in three planes. Then we perform 1- and 3-hr delayed brain scans (*2*). Some years ago we postulated that delayed images (after 3 or more hours) are the most important in arriving at a diagnosis. But we have also found the early pictures to be necessary in patients having an AV malformation, i.e., angiomas, aneurysm, etc. In the detection and differentiation of meningiomas, the 1- to 5-min scintiphotos are very important, because they permit correct diagnosis of meningiomas (*3,4*). Photos made 1 hr after injection are not very informative and can therefore be omitted. In my opinion 20- to 30-min images will not demonstrate a high level of vascular radioactivity in a lesion.

Our earlier studies were performed using Tc-99m as pertechnetate, and we concluded, in agreement with H. Rösler, that with this tracer the nuclide at 1 to 5 min after injection must be intravascular, therefore demonstrating highly vascularized lesions at such a time. Using Tc-99m complexed (Sn^{2+}) with citrate, DTPA and glucoheptonate, we observed, in the early photos, the same effects as with pertechnetate. We conclude, therefore, that images at 1-5 min also permit the demonstration of high vascularity if Tc-99m chelates are used. For some years all our brain studies have been performed using these tracers.

I think, therefore, that we must make really early photos immediately after tracer injection, but that images at 20, 30, or 60 min can be dispensed with. I would be happy to find other writers agreeing, for without such an agreement, we cannot compare the results of our studies.

Finally, I must discourage the use of a second tracer dose, after the delayed scintigrams are done, in order to get very early images. This doubles the radiation dose to the patient, and it is not at all necessary. I think early images immediately following a dynamic study are not so expensive that they cannot be performed routinely. In our department we have been doing this for many years.

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REFERENCES

1. TANASESCU DE, WOLFSTEIN RS, BRACHMAN MB, et al: Early and delayed Tc-99m glucoheptonate brain scintigraphy: Are routine early images indicated? *J Nucl Med* 20: 287-290, 1979
2. SAUER J: *Die hirndiagnostischen Möglichkeiten der Szintillationskamera nach Anger. Results of Clinical Nuclear Medicine. Diagnostic, Therapy, Research.* Stuttgart, New York, F. K. Schattauer, 1971, pp 1053-1060
3. SAUER J: *Hirntumordiagnostik durch szintigraphische Verfahren heute. Gem. Kongreß der Deutschen und der Österreichischen Röntgengesellschaft 1973.* Thieme, Stuttgart 1974, pp 68-76
4. SAUER J: *Wie ist die szintigraphische Hirndiagnostik für die Routine zu optimieren? Nuklearmedizin. Quality Factors in Nuclear Medicine.* Stuttgart, New York, F. K. Schattauer, 1977, pp 593-597

Reply

The points made by Dr. Sauer have been covered in our paper. We mentioned in the text that early brain images are inferior to delayed ones in detecting CNS lesions, but we also stated that the use of both may be of help. In our table it is shown that in 2% of cases the early studies contained diagnostic information not demonstrated in the delayed images. In addition, in 6% the early study showed more radioactivity in the abnormality than did the delayed images. We discussed the superiority of earlier images in demonstrating vascular abnormalities. We also obtained a routine early static image in the projection in which the flow study was performed. Currently we are not performing routine early studies except in patients with scalp or skull lesions and in those suspected of having AV malformation or meningioma. The purpose of our paper was to publish the statistics of a large series, comparing both early and delayed Tc-99m glucoheptonate brain images. Our final conclusion was that the early TcGH brain scintigram is not a substitute for a delayed study. However, early scintigraphy was helpful in our series in 8% of the cases studied. Thus, if the logistics in a given institution permit early studies to be done routinely, we feel this approach to be warranted.

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Accuracy Requires Precision: A Comment on Understanding and Using Statistics in Nuclear Medicine

In a recent article, Levin (*1*) reviewed some of the fundamental principles of statistics as they apply to the estimation of measurement uncertainties. Although efforts to get practitioners of nuclear medicine to understand and use statistics are laudable, Levin, unfortunately, has reinforced a common misunderstanding of the meaning of "accuracy." The distinction between *precision* and *accuracy* is frequently misunderstood (*2*). Accuracy is not independent of precision. Accuracy requires precision. The problem goes beyond mere definitional semantics, but leads directly to a misunderstanding of the measurement process and the requirements necessary for obtaining accurate measurements.