NEIL REPLIES

Hušák's analysis of the hand radiation exposure problem appears to be a refinement of that reported by us in the *Journal of Nuclear Medicine* of December 1969. On theoretical grounds, at least, an "extended source" analysis has more accuracy than the "point source" method. However, Hušák's letter lacks numerical details supporting his statements. Some parts of his analysis could not be checked due to unavailable data (Gusev's "G_1").

While the "point source" method is less accurate, it may be adequate for its intended use, and circumstances would determine this. It offers readily available data, simplicity, and ease of calculation. Husak's advice to "entirely avoid" it is not warranted by the facts and is not supported by information in the letter.

Despite differences in experimental conditions among three values for hand radiation exposure from ^{99m}Tc recorded in the literature, disagreement of values is not great. Husak reports 13 mR/mCi-min; McEwan 12 mrad/mCi-min; and Neil 10 mrem/mCi-min. The most pertinent experimental difference is that the Husak and McEwan measurements were made at the surface of the syringe, whereas our value is at the hand. For most laboratories the use of any of these values for health-physics purposes permits evaluation of operations and adjustment of techniques. A table of hand radiation exposure rates for various isotopes in common use would appear to have value in nuclear medicine laboratories as well as in chemistry and physics laboratories.

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VALUE OF POSTERIOR LIVER SCANS

We concur with Blum's and George's conclusion (*J Nucl Med* 11: 753, 1970) that multiple views are necessary for optimum detection of space-occupying masses by liver scan. However, we do not agree with their assumption that only the anterior and right lateral projections are required. In particular, we feel that the posterior view is an essential part of the complete liver study. With the availability in most laboratories of rapid imaging devices such as the gamma camera or multiprobe scanners, all three views can be obtained within a reasonable time.

Since 1967 we have routinely performed anterior, posterior, and right lateral views of the liver using either the Dynapix or the gamma camera. Although

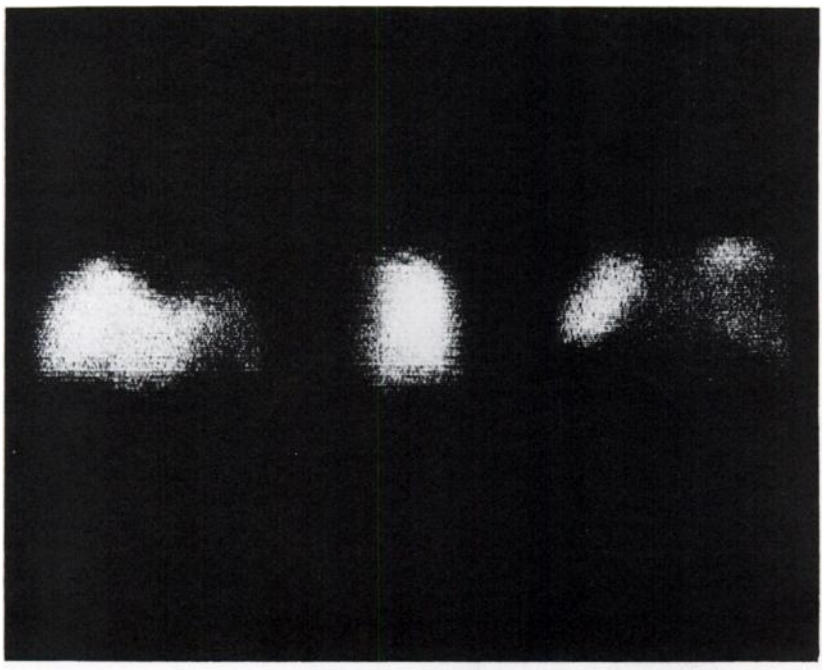

FIG. 1. Anterior, right lateral, and posterior views from ^{99m}Tc-sulfur colloid liver scan. Large defect is conclusively seen only on posterior view.

a detailed review of our series of several thousand scans has not been done, we have been impressed with the usefulness of the posterior view. Recently within a span of 1 week we encountered two patients with normal anterior views and either normal or only faintly suspicious lateral views on whom a definite defect was detected on the posterior scan.

Example Case. This 68-year-old male was admitted with weight loss, fever of unknown origin, and vague right chest pain. A liver scan (Fig. 1) revealed a large defect in the medial posterior portion of the right lobe seen conclusively only on the posterior view. At surgery a 10 × 15-cm "ball-like" mass was found involving the posterior right lobe near the midline. Biopsy yielded anaplastic adenocarcinoma.

This observation of the importance of the posterior view of the liver is not original to our laboratory, but we feel that it should be reemphasized at this time.

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TECHNETIUM-LABELED RED BLOOD CELLS

The concise communication entitled "Technetium Labeled Red Blood Cells" by Eckelman et al (*J Nucl Med* 12: 12, 1970) was read with great interest. The authors' suggestion that tin chloride functions as a reducing agent after the complexing of pertechnetate to hemoglobin is at odds with our experimental findings. Tin chloride with a tracer of ^{119m}Sn can be added to saline-washed red cells before the introduction of sodium pertechnetate. The tin can subsequently be chelated with EDTA and washed with several volumes of isotonic saline. It can be demonstrated that all of the tracer and presumably all of the stable tin has been removed. This procedure markedly enhances the complexing of pertechnetate to the red cell. One can reverse the binding efficiency of pertechnetate by re-exposing the saline-washed red cells to bubbling oxygen after the tin treatment. Inert nitrogen exposure does not reverse the effect of tin treatment.

In contrast to the authors' findings, we consistently have higher labeling when cells are collected in heparin compared with ACD. Furthermore, a brief exposure of cells to carbon monoxide enhances pertechnetate binding to red cells.

This procedure results in an irreversibly labeled red cell if one defines irreversibility as the results of repetitive in vitro saline washing. However, after the intravenous injection of cells so labeled into a human recipient, there is a relatively rapid loss of radioactivity from the cell into the plasma.

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THE AUTHORS' REPLY

In his letter Weinstein makes two major points, one dealing with our explanation of the mechanism of the red-cell labeling with technetium, and the other dealing with the differences between our procedure and his.

Concerning the interpretation of the mechanism, we did not state that "the tin functions as a reducing agent after the complexing of pertechnetate to hemoglobin." Rather, our statement was: "the problem of labeling involves two steps: introducing the technetium into the cells, and irreversibly binding the technetium within the cell . . . to improve the reproducibility of the reducing step, we have added . . . a solution of 1 mg/ml $SnCl_2 \cdot 2H_2O$ in ACD."

In a private communication, Weinstein has informed us that his procedure is similar to that of Nouel and Brunelle (*1*). In that procedure the stannous ion is removed by EDTA washes before the pertechnetate is added. That stannous ion remains with the cells after the EDTA washes is a moot question. The small amount of stannous ion necessary to reduce carrier-free technetium can escape measurement even in tracer experiments.

The point of concern to us in Weinstein's procedure is the preparation of stannous solution. Although care is taken to dissolve all the stannous chloride in HCl, the resulting citrate complex is not stable at pH 7.4 (*2*). Because the preparation of the stannous citrate solution could be critical, we prefer to add solid stannous chloride to an ACD solution and filter this solution directly into the suspension of the blood cells. Besides assuring sterility of the stannous solution, we also filter out any large (>0.22 micron) particles of undissolved tin.

With this point in mind, we do not feel that Weinstein's data are at odds with our postulated mecha-