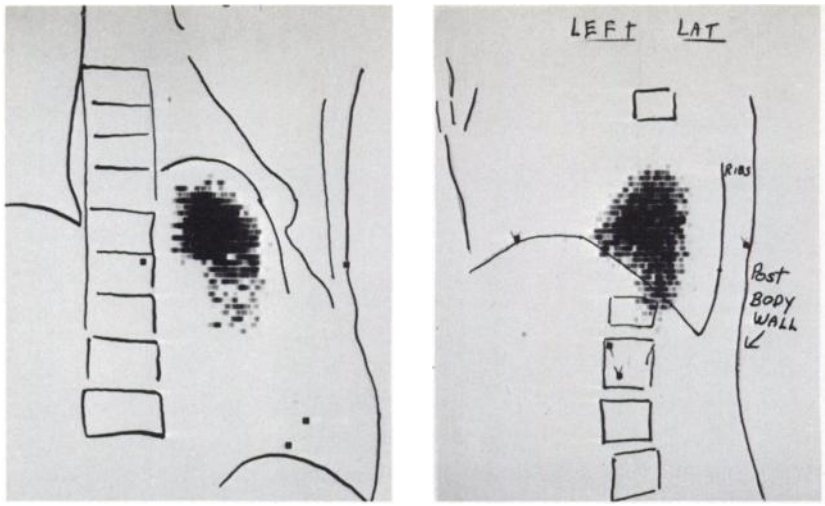

FIG. 3. Posterior and left lateral splenic scans show that spleen is located in hernia.

treated labeled red-blood-cell method using prone and left lateral positions (Fig. 3). These show that the spleen coincides with the shadow on the roentgenograms.

Because the patient was asymptomatic, she was discharged without operative intervention. Thus the splenic scan in this case convincingly showed that the "mass lesion" was the spleen. While we had considered this a strong possibility on the roentgenograms, the scan was so conclusive that the patient was spared a major thoracic surgical operation.

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AN ANSWER TO THE AEC ON ^{197}Hg-CHLORMERODRIN

In his March 18, 1968, letter to medical licensees, Mr. Cecil R. Buchanan of the Atomic Energy Commission announced the removal of kidney scanning with ^{203}Hg-chlormerodrin from the Commission's list of routine, well-established medical uses. Brain scanning with ^{203}Hg-chlormerodrin is considered justifiable only in patients suspected of having deep intracranial lesions (sic). This action was taken on the advice of AEC's Advisory Committee on the Medical Uses of Isotopes. The AEC recommends the use of ^{197}Hg-chlormerodrin and bases this change in policy on "the higher radiation dose to the kidney resulting from the use of ^{203}Hg" and on "reports on the comparability of brain or kidney scans with either agent."

Mr. Buchanan and his Advisory Committee are wrong! They have miscalculated the dose from ^{203}Hg; they have misjudged the importance of the relative dose between the two isotopes; and, most important of all, they are pushing an isotope which does not have equal efficacy in scanning.

Three "typical" estimates of the kidney dose from ^{203}Hg-chlormerodrin are quoted in the letter (*1–3*). Two of these (*1,3*) are truly typical of the dose estimates found in the literature, but the third (*2*) reports a dose of 223 rads per millicurie of ^{203}Hg-chlormerodrin. An examination of the document quoted shows no such kidney dose. The tables list a kidney cortex dose of 146 rads and a kidney medulla dose of 77 rads. The *sum* of these two numbers is curiously close to 223. Mr. Buchanan and his Advisory Committee need to do a little homework on the basic principles of radiation dosimetry. Presumably when the indoor temperature in Washington is 70° and the outdoor temperature is 80° the effective temperature in Mr. Buchanan's office is 150°. In any case, even the original, unembellished data in this ORNL progress report are in error because of wrong assumptions in the biological data. The authors have since issued a corrected report calculating the kidney cortex dose at 75 rads per millicurie in good agreement with most other estimates. This correction was available many months before the circulation of the AEC letter with its "typical" dose of 223 rads per millicurie.

The ratio of ^{203}Hg to ^{197}Hg dose is accurately quoted in the letter as about 8 to 1. This refers to dose over total decay. Since the dose from either isotope is well below any measurable effects, it is difficult to judge the relative harm to the patient, but this damage is more likely to be related to *dose rate* than to total dose. Because of the relative half-lives, 90% of the ^{197}Hg dose is delivered during the first week and 25% of the ^{203}Hg dose. This makes the ratio for the highest one-week dose only about twice as high with ^{203}Hg on a microcurie for microcurie basis. It is usual to administer 50% more ^{197}Hg than ^{203}Hg. This brings the comparable dose rates very close indeed.

Finally, there is the very obvious question of the diagnostic quality of scans done with ^{197}Hg. Mr. Buchanan refers us to these same three reports

(*1–3*) and implies that the authors consider ^{197}Hg and ^{203}Hg comparable for brain and kidney scanning. This is just not so. The first report (*1*) is a polemic *against* ^{197}Hg, clearly stating that it would not be expected to give comparable scans. In the second report (*2*), the only comment on scanning appears in the introduction and refers to mixed opinions on scan quality. The third paper (*3*) contains the most enthusiastic support for ^{197}Hg, and even this paper presents physical evidence that better contrast is achieved with ^{203}Hg. A limited series (about 50 with each agent) of brain scans showed almost as good localization with ^{197}Hg as ^{203}Hg. There is not one single reference to the usefulness of ^{197}Hg-chlormerodrin in kidney scanning in any of the reports cited.

Whenever studies have been done under carefully controlled laboratory conditions (*4–6*), it is quite obvious that the images with photons of ^{197}Hg energy (70–80 kev) are notably smeared by scatter. This effect is particularly evident when searching for an area of low activity in a pool as in kidney scanning. It is not restricted to deep voids but decreased contrast at any depth.

To summarize the efficacy question: The physics experiments are unanimous in condemnation of ^{197}Hg scanning, and the clinical results are meagre and far from uniformly pleasing. The burden of proof lies with Mr. Buchanan and his Advisory Committee. Let us see the evidence upon which they base the claim that scanning results are comparable with these two isotopes, particularly for kidney scanning.

In smaller laboratories it is inconvenient or economically impossible to use a material with the short shelf-life of ^{197}Hg. The AEC has always argued that the safety of the patient must come above these mundane considerations. We all envy them the luxury of so moral a position, but the *real* effect of this order is to deny patients these diagnostic procedures. This is not moral. The AEC also argues that these recommendations do not preclude the use of ^{203}Hg; it is always possible to apply for a special license. Unfortunately the imprimatur of the AEC and its Medical Advisory Committee carries a great deal of weight, and a physician would require courage (and a good lawyer) to follow anything but accepted procedures.

If Mr. Buchanan and his Advisory Committee are reviewing previously approved routine procedures, they would do well to reconsider the continued use of ^{131}I for thyroid uptakes and scans. The target organ radiation dose is quite high; higher by far than the dose to kidneys from ^{203}Hg-chlormerodrin in the kidney-scanning procedure removed from the list. If dose rate is considered, there is often an order of magnitude difference. In addition, there are many other available iodine isotopes, each supported by literature claims of low radiation dose and improved efficacy. It is true that some of these isotopes are expensive and/or inconvenient and the physicists claim that others give poor scans. But by the standards established for chlormerodrin, the AEC is remiss in its duty if it permits the continued wanton use of ^{131}I by its licensees.

Because of the radiation dose to the kidney, the amount of ^{203}Hg-chlormerodrin administered for scanning procedures must be limited. Obviously it is a scanning agent that will be replaced by a short-lived, low-dose, suitable-gamma-energy isotope in a compound of comparable biological properties. It has been quite clear to most of us for some years that ^{197}Hg is not that isotope. Why the AEC should engage in special pleading for ^{197}Hg at this late stage is not readily apparent.

I call on the AEC to return ^{203}Hg-chlormerodrin for kidney scanning to the list of routine procedures or to present the basis for removing it in a form which meets the usual scientific standards. Perhaps the upcoming Society of Nuclear Medicine Annual Meeting in St. Louis would be a suitable place and time for Mr. Buchanan or the members of his Advisory Committee to present this data for open discussion.

As one of the more lucid members (*7*) of the Advisory Committee has said, "The harm we do to our patients comes from bad diagnosis, not from the radiation dose." In this light, the action of the AEC will do more harm than good.

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