recent ones? His point about the need for an evaluation of present commercial TLD services is a good one. I endorse it.

(B) Good scientific methodology requires that Mr. Vandergrift argue this point along one or more of the following lines: "After carefully studying the *total* available *comparative* literature I conclude that the evidence is not sufficient to warrant condemnation of film as a personnel dosimeter;" or, "Due to the fact that Raeside has overlooked certain *published* comparative studies which endorse film as a personnel dosimeter, his inferences may not be valid;" or, "After careful and extensive comparative studies, which we intend to publish, we conclude that film is an excellent choice as a personnel dosimeter." Instead we are faced with private comparisons which Mr. Vandergrift himself feels are inadequate.

(C) Without a statement of specific advantages and disadvantages, this point is without substance.

Let me conclude by stating that I feel that Mr. Vandergrift's case "for" the film badge is weak. It will take more substantial evidence than he has presented to convince me that film is the optimal personnel dosimeter.

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RECTILINEAR SCANNERS

In response to the article, "Comparison of 5:1 Rectilinear Scans with Scintillation Camera Images in Bone Scanning," by Charles H. Mandell and Herta M. Houle (*JNMT* 3:43–44, 1975), we would like to raise several serious issues concerning the techniques employed in bone scanning. We feel this article presents a distorted image of the resolving capabilities of the rectilinear scanner.

Agents, doses, and equipment used are the same as those available to this institution. Scanning times are approximately the same. However, the methods employed in establishing techniques differ considerably.

The article gives the impression that the tomographic effect of the scanner is a drawback when, in truth, used to its full capabilities, it is a definite asset. The geometric focal depth of the collimator and proper selection of the collimator for the best visualization of the organ of interest must be taken into consideration. We assume that a low-energy collimator with a 5-in. geometric focal depth was used in the study presented, which would seem to be the proper selection to visualize the viscera. The skeletal system, for the most part, however, is not at this depth within the body. This suggests that a collimator with a shorter geometric focal depth should be employed. No mention is made of the distance of the probes from the patient. One must keep in mind not only the geometric focal depth of the collimator but also the distance from the patient's body in order to always be visualizing the proper focal plane.

Another question in our minds is the combination of slit mask and line spacing, which seems to be an inappropriate match for this scan-to-image ratio. We feel this combination of slit mask and line spacing at this ratio has caused an erroneously high background erase of 45%. This high background erase could conceivably remove valuable information from the scan and thus present this washed-out look.

Although our method takes a few minutes longer (15 min at most), it presents the physician with a much finer

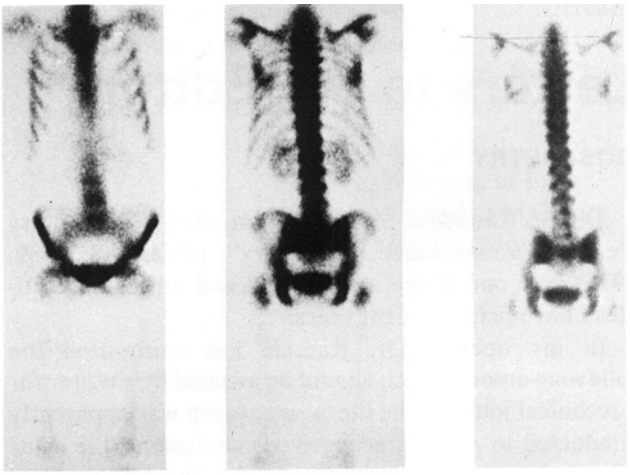

FIG. 1. Normal anterior (A) and posterior (B and C) bone scans.

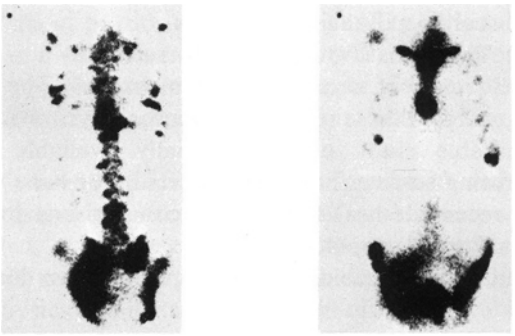

FIG. 2. Abnormal anterior (A) and posterior (B) bone scans.

image to interpret, with good visualization of bony structures (Figs. 1 and 2). Information density (ID) employed at this institution is virtually the same, but ID is only one factor in the production of a good quality image. Outlined below is a description of the technique

arrived at by this department, which appears to have produced a very fine quality image for interpretation.

Under the assumption that a low-energy, 5-in. geometric focal depth collimator was used in this study, we utilize a low-energy collimator with a 3.5-in. geometric focal depth. When using this, however, care must be taken to position the probe at the proper distance from the patient. We have found that for the lower probe a position approximately 3.2 cm below the surface of the table places the area of interest in the proper focal plane. The upper probe must necessarily follow the contours of the patient's body at a distance of approximately 4 cm from the skin surface.

When setting up the patient, we hand scan, looking for areas of increased concentration. Except in rare cases (e.g., Paget's disease) we find our setup point in the lower third of the sternum anteriorly and in the mid-thoracic region posteriorly.

In order to avoid excessive bladder activity obscuring the details of the pelvic structures, we scan from the symphysis pubis to the shoulders immediately after the patient has voided. For this portion of the scan, we use a 30% background erase, which is sufficient to remove soft-tissue activity without disturbing the detail of the skeletal system. After this, the probes are returned to their starting positions to scan the lower extremities with a reduction of background erase to 15%.

We amend our rectilinear study with additional camera views: four projections of the skull, both humeri, lateral projections of the pelvis, and special views of areas of interest.

When performing scans at a 5:1 image ratio, we use the 5:1 slit mask and a line spacing of 3 ($\frac{1}{8}$ in.).

To summarize, we feel rectilinear bone scanning using the technique outlined above provides the physician with images of equal if not better quality than that obtained with the scintillation camera.

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THE AUTHORS' REPLY

We very much appreciate the comments on our article but feel that some corrections require explanation. It was not our intention in this article to decribe an ideal rectilinear scanning procedure but to compare the relative efficacy of two approaches within similar and limited time frame considerations. Given a busy nuclear medicine department, with equal time allotted for either a camera or rectilinear scan examination, we continue to feel the camera offers the preferred imaging technique.

Our selection of 5-in. focusing collimators, standard with our instrument, was based on patient convenience as well as practical utility. Our patients lie supine on a noninterfering sponge pad, and to select the proper focusing distance we frequently require the 5-in. focal depth. We see no advantage in a $3\frac{1}{2}$-in. focal depth unless the isoresponse characteristics of the collimator are substantially different from the routine 5-in. model. We agree that a slight improvement in resolution is possible with closer line spacing and a 5:1 rather than a 2:1 slit mask. As Senecal, et al indicate, however, substantially more examination time is required, and the camera and scanner examinations do not remain comparable. We have utilized a lower background subtraction ratio as they have suggested. Routinely we reduce our subtraction ratio over the extremities. The selection of a 45% ratio is a reflection of general physician preference not statistical analysis.

Utilizing the tomographic capabilities of the scanner can be rewarding in examining the spine and extremities. Collimator distance, however, requires extremely careful monitoring, particularly in the lumbar spine and pelvis. Rib activity is often lost completely, and we continue to believe that day-to-day reproducibility is considerably more limited than with the scintillation camera. Thus while some of the suggestions may be valid, we wonder why they feel the need to supplement their own rectilinear scan examinations with regional camera images in suspicious cases.

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