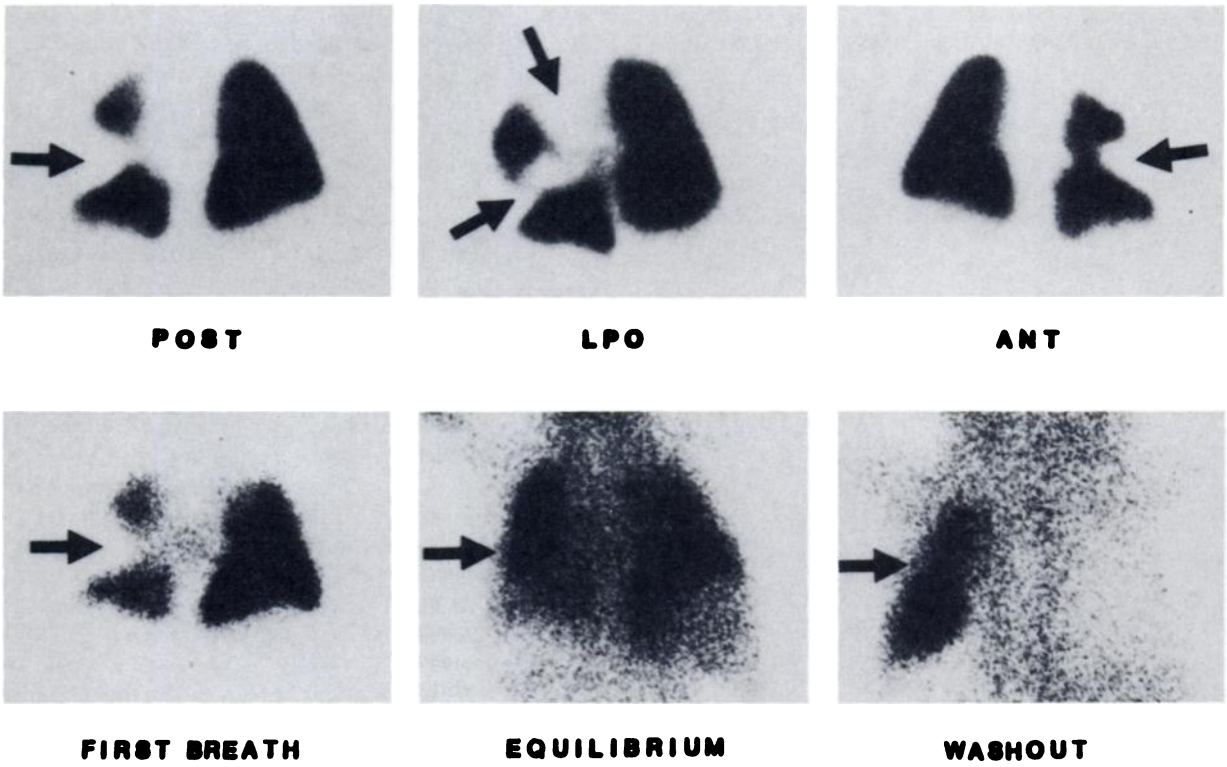

FIGURE 1
Perfusion study demonstrates segmental LUL defects (arrows) with sparing of anterior segment. Posterior ventilation images show corresponding segmental first breath defects (arrow) with prolonged retention of xenon

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Cost of Gamma Photon Absorptiometry in Management of Osteoporosis

TO THE EDITOR: The Office of Health Technology Assessment (OHTA) is currently evaluating techniques for bone mineral measurement. The real issue is whether photon absorptiometry or x-ray computed tomography (CT) is approved for reimbursement. It is thus unfortunate to see this issue obscured by debates that place single- and dual-photon absorptiometry in adversary positions, when in fact both have important clinical applications.

Before techniques can be compared, it is first essential to define their *clinical use.* For bone mineral measurements, there are at least two, distinctly different clinical applications: (a) *screening* for fracture risk prediction, and (b) *monitoring* of treatment effectiveness and side effects.

Once the clinical uses have been determined, we must next define, for each clinical use, the criteria for evaluating BMC measurement techniques. The criteria for evaluating a *screening* test are not identical to the evaluation criteria for a

treatment-monitoring test.

For a measurement to be useful as a *screening* test, it should accurately reflect risk (of fracture). True prospective evaluation of risk by accepted epidemiologic methods is wholly dependent upon fracture incidence data (*1*). To our knowledge, there is no published data which prospectively relates BMC to purely fracture incidence, and OHTA also indicates that they have not received such data. (It should be noted that previous comparisons of BMC for "fracture cases" compared with "normals" do not recognize that BMC, like blood pressure, is a continuum; in addition, age-related BMC does not define "normal.")

However, in October, 1984, we presented at the Western Regional Meeting of the SNM in Monterey, California data relating BMC measurements at four different skeletal sites to prospective fracture incidence (*2*). The good news is that we were able to predict future fracture risk from BMC measurements, and this is the essential message which OHTA needs to receive. However, our data indicates that the strongest determinant of successful risk prediction is the *skeletal site*, and not the specific technique used to measure BMC at that site. We have found that all four of our measurement sites (spine, os calcis, distal radius, proximal radius) predict risk to some degree, but that the os calcis does it best.

Thus, there is not good rationale for pitting dual- against single-photon absorptiometry. Once we know which skeletal site is most useful for screening (risk prediction), the next question is which technique is necessary to measure that site accurately. Of course, it is necessary to use dual photon technology for the spine, but it has no advantage over single-photon for most appendicular measurements.

We are concerned that an inappropriate distinction between the two gamma photon absorptiometry techniques has weakened the position of both, especially with respect to far more expensive x-ray CT techniques that have no proven advantage for this specific clinical use. There is no published data relating CT measurements to fracture incidence, and even if it can be done, it would have to be shown cost-effective.

If we are collectively able to present information on screening and monitoring to OHTA, and if we also take the lead in addressing *cost*, we believe that we would improve the chances of both types of gamma photon absorptiometry being approved for their proper, respective clinical applications.

The preventive management of osteoporosis would be greatly transformed by the availability of a practical technique which can prospectively screen for fracture risk. The impact upon national fracture incidence, and its associated costs, could begin within a few years. However, attempts to introduce x-ray CT for this purpose are inappropriate; even if it is found to be capable of risk prediction, its inherent higher cost would likely be a deterrent to its use, which would in turn delay initiation of rational osteoporosis prevention programs.

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Three Mile Island—Six Years Later

TO THE EDITOR: In the March 1985 *Newsline*, a report I prepared on radiation doses from the Three Mile Island (TMI) accident was discussed. One critic, Sydney Porter, was quoted as follows:

> *Essentially, what the Beyea report says is that the NRC, the DOE, the EPA, the FDA, the utility, and the states of Pennsylvania and Maryland didn't know what they were doing when they measured radiation in the environment. It impunes hundreds of scientists, and some of the finest health physicists in the country.*

These remarks are not an adequate characterization of my report. To make measurements of radiation, it is usually necessary to have equipment available and functioning. As is well known, this was not the case at the start of the Three Mile Island Accident. The situation was so unusual that the staff of the Kemeny Commission task force on health physics and dosimetry was moved to make the following criticisms:

> *The task group was disturbed repeatedly by general problem areas at TMI that are not subject to quantitative evaluation by NRC/I&E [Nuclear Regulatory Commission, Office of Inspection and Enforcement] and that, in general, should not need to be regulated in a formal manner; they are normally handled as an aspect of health physics professionalism. These problem areas include the following: An exceptional percentage (well over half) of health physics and monitoring instruments were not functional at the time of the accident . . . The staff of this task group is of the opinion that the high percentage of inoperable instruments could have contributed to the difficulties in getting data during the first several hours of the accident before the Radiological Assistance Program teams began to arrive . . .(1)*

If Sydney Porter, who was a consultant to the utility before the accident, has a complaint about criticism of health physicists, he is directing it at the wrong person. I made no *professional* criticism of him or anyone else who made analyses of radiation doses. In outlining the status of TMI dosimetry, I stated:

> *Problems remain, it should be emphasized, not because investigators have been incompetent. On the contrary, the investigators reviewed in this study were found to have been extremely clever in using a combination of inference and science to extract information from limited data. Problems remain because a great deal of crucial data does not exist. (2)*

If the critical part of my report, which represents the first peer review for most of the early studies, is to be condensed into one sentence, it would be this: The large uncertainty in the