TABLE 1. PARAMETRIC EVALUATION

Parameter	ON 410	Searle LFOV	Picker 4/15	Picker 15
Production year	2/77	9/77	6/76	11/78
Uniformity*	4.5%	7.9%	14%	5%†
Line spread function at surface of collimator:				
FWHM (mm)	5.2	6.6	6.8	5.8
Line spread function 2 in. of Plexiglas scatter: FWHM (mm)	8.0	9.2	9.8	8.2
Paralyzable deadtime 35,000 counts/sec	6.2	5.6	4.7	6.3
Counts/sec for 3 mCi Tc-99m	9.5K	11.5K	15K	12.8K

* Total percentage of pixels in the field that varied by more than ± 10% of the mean.

† 1978 Picker Camera with Micro-Z has an integral uniformity difference of ± 5% on any given area of the crystal and a differential uniformity of ± 2.5 compared with percentage of pixel deviations that were greater than a 10% spread in the other three cameras.

contrast detectability. After all, the advantages (if any) of improved system performance will not be in the delineation of high-contrast well-focused abnormalities, but rather in the early detection of low-contrast abnormalities. This fact is almost always overlooked in the parametric evaluation of gamma cameras. From the user standpoint, this represents the "proof of the pudding."

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REFERENCES

1. CHAPMAN DR, BRACHMAN MB, TANASESCU DE, et al: Clinical and parametric evaluation of three large field-of-view cameras. *J Nucl Med* 21:161-164, 1980
2. ENOS GW: A phantom for clinical evaluation of total system resolution. *J Nucl Med Tech* 7:160-162, 1979

Reply

We agree with Dr. Lurus and Mr. Budzier on the importance of evaluating the state of the art equipment, the importance of low-contrast imaging performance, and the improvements made in imaging equipment during the period from 1976 to late 1979. However, in a rapidly changing field such as that of nuclear medicine, it is not uncommon in studies involving equipment performance to see major improvements in the equipment during the period between the initial gathering of performance data and final presentation or publication of the data.

We included the approximate manufacture date of each camera in our publication so that there would be no mistakes made by readers as to the vintage of the cameras. Also included in the text was the fact that the Ohio Nuclear camera was uniformity-corrected but the Picker was not.

It was not the point of our article to make an absolute comparison of just the parametric performance of these cameras. The point of the article was to show that for the "range" of parametric values established for these three cameras, we could see "no clinical differences" at the viewbox. We also stated that the parametric differences measured were, for the most part, no greater than those one may see in manufacturers' cameras of the same production run. Or, restated, if three cameras of the same manufacturer were measured, the parametric results could be different.

We did not quantitate performance of low-contrast detectability on the cameras. However, 11 of the 22 clinical studies subjectively evaluated were liver images, which do involve low-contrast detectability. All cameras performed equally well on clinical studies, as indicated by the viewers' ratings of 9.6 for Ohio Nuclear, 9.8 for Searle, and 9.7 for Picker, on a scale of 10.

The addition of your newer Picker camera to the parametric evaluation chart is of added interest. However, it falls within the range of values we previously measured and may or may not improve the evaluation of clinical images relative to the cameras tested.

Even now the camera you describe is not state of the art when compared with large field-of-view cameras using 1/4- to 3/8-in. detectors and 61-75 photomultiplier tubes. If these are added to the chart of parametric evaluations, further improvements would be demonstrated. If the new cameras shift the "range" of measured values by significant amounts, at some level of improvement clinical differences are sure to be seen. It would be interesting to repeat our work, adding low-contrast detectability, on the 1980-generation cameras. Unfortunately, we do not have the equipment to do so.

We re-emphasize that the purpose of our publication was to evaluate the clinical relevance of measured parameters. Over the ranges we measured, no significant differences were observed clinically.

We did not intend to imply that improvements in instrumentation, or measurements of these improvements, are not worthwhile. We believe that significant parametric improvements in instrumentation will result in improved clinical images.

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Re: A Comparison of Four Standard Scintigraphic TV Displays

I applaud Dr. Houston's contribution to the badly needed quantitative characterization of the performance of various display modalities in nuclear medicine. He usefully notes that different display devices and/or intensity representations may be best suited for different classes of images. As he says, this is because the two devices and/or representations may provide not only different overall sensitivities to intensity change in the recorded image but also different sensitivities to changes in different parts of the intensity scale.

I cannot agree with the attempt to compare, across a range of images, displays with different sensitivity curves. These displays are essentially not comparable, because simple contrast mappings (monotonic functions of recorded intensity applicable by listing in a table or by an amplifier) can reverse the result of the comparison for any image or class of images.

Rather, to allow comparison one must first normalize each device by preceding it with a contrast mapping that makes equal changes in intensity in the recorded image equally perceivable. (We have developed a straightforward method for determining such