A stickier situation exists in regard to the use of other tumor-seeking agents for nonthyroid cancer imaging. Nuclear medicine physicians have noted that increasing the quantity of gallium administered to a patient appears to improve the chances of imaging a tumor. As a consequence, the dose of Ga-67 administered to patients has increased in certain laboratories. This practice obviously has its problems, and risk against benefit questions arise that will eventually have to be addressed.

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Reply

We are not quite convinced that the differences in tumor differentiation and/or in the regional blood flow would fully explain the phenomenon studied. The rate of egress (measured by us as t_{eff}) also did not seem to explain the differences detected, since only the destruction of normal thyroid tissue would be followed by a sharp decrease of t_{eff}. On the other hand, we believe that some role is played by plasma iodide level and that it would be further enhanced by liberation of radioiodine compounds in the course of thyroid destruction by I-131.

The explanation might be of some theoretical interest, and further studies with direct measurements of plasma iodide levels may be important, but the most important concern seems to be the necessity for careful detection of possible changes in radioiodide distribution following therapeutic doses.

In this point, there seems to be a full agreement.

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Moiré Patterns in Gamma Camera Images

I was interested in reading the technical note on the distortions of bar-phantom images (*1*). It has been a concern of myself and colleagues that bar-phantom tests can give misleading impressions of camera resolution as alluded to by the author. We have been misled ourselves even while carrying out studies on moiré patterns, and were alerted to the possible distortions. The unwary could be even more easily deceived. I would also like to compliment Dr. Yeh on the comparison between his photographically produced moiré patterns and the scintiphotos. His Fig. 2 is indeed a very clear and well-done presentation of this phenomenon.

In our own investigations of the moiré patterns we wondered why we saw the patterns only with higher-energy collimators. A moiré pattern is generated as an interference pattern between two slightly different spatial frequencies. Periodically the maxima will coincide, and the frequency of coincidences is the beat frequency. The difference in spatial frequency of holes and septa for a low-energy collimator, and for bars and spaces of a bar phantom do indeed generate beat frequencies, but these are too high to be resolved by our present cameras.

Because the design of a high-energy collimator requires a large septum thickness, the septum-and-hole frequency is small and corresponds closely to that of the bars in the bar phantom. The difference in frequency between the collimator and bar phantom becomes slight and the beat wavelength (1/frequency) becomes large enough to be visible.

It is also interesting that we don't see moiré patterns in patients. The region most likely to generate a moiré pattern would be the ribs. The wavelength of the ribs is on the order of 2 to 3 cm, which is considerably larger than the wavelength of collimator holes (typically ~0.3 cm). The difference in frequency is therefore large, and this would correspond to a beat wavelength on the order of a millimeter, which is not resolvable with our present camera.

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REFERENCE

1. YEH E-L: Distortion of bar-phantom image by collimator. *J Nucl Med* 20: 260–261, 1979

Re: Distortion of Bar-Phantom Image by Collimator

The technical note by E. Yeh (*1*) concerning moiré-pattern distortion of bar phantoms by a medium-energy gamma-camera collimator does not point out that such effects may also be observed with very fine bar phantoms on low-energy Tc-99m collimators with some of the portable gamma cameras currently available (*2*). As Yeh points out, this is not an indication of poor camera performance, but rather an indication of the improved resolution of these cameras, which can easily resolve 2.5-mm bars at the face of the high-resolution collimator. In fact, the use of this phenomenon has been suggested for quality control of gamma-camera resolution (*3*). Figure 1 shows Tc-99m scintiphotos of a sextant bar phantom (1.8, 2.1, 2.5, 2.8, 3.2, and 4.0 mm) intrinsically (left) and at the face of the high-resolution low-energy collimator (right). The moiré-pattern distortion is observed by comparing the intrinsic and extrinsic scintiphotos. The intrinsic image does not exhibit distortion because of the absence of a collimator; it is a true representation of the phantom. In the extrinsic image it is difficult to discern which bars are real and which are distorted; it is helpful to note that each sextant of the phantom has a cold area down the center, and that the largest bars are at the bottom of the image, with clockwise rotation to smaller bars. Thus in the extrinsic image