LETTERS TO THE EDITOR

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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REFERENCES

Re:

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 nearly identical 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

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
FIG 1. Sextant bar-phantom scintigrams, intrinsic on left, and with high-resolution collimator on right. Bar sizes are 1.8, 2.1, 2.5, 2.8, 3.2, and 4.0 mm. Largest bars are at bottom and bars get smaller in clockwise direction. Scintiphoto with collimator has all but two largest bars distorted by moiré pattern.

only the largest and next-to-largest bars are accurately represented; the other four sextants show moiré patterns. The images shown here are from a General Electric Porta Camera IIC; similar results were obtained with other low-energy collimators and with the Picker mobile camera. These distortions are interesting, but are not expected to appear in clinical images because no clinical study accumulates activity in the required repetitive pattern.

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REFERENCES


Color Modification of Syringe Shields to Enhance the Visibility of Syringe Contents and Calibrations

A number of reports (1–8) have alerted the nuclear medicine community about the need to reduce hand and finger exposure resulting from handling radionuclide-loaded syringes. This has led to the development of a variety of commercially available syringe shields. Some of these shields incorporate leaded glass windows to facilitate viewing of the syringe markings and contents; however, it is often difficult to see through the glass.

We have found that the visibility through the leaded-glass of the syringe calibrations and the contents can be markedly improved by merely coloring the inner surface of the barrel of the shield opposite the window. This can be done by simply inserting a strip of colored plastic tape, or alternatively, painting. We have found that yellow or white is the most effective.

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Scintigraphy in Acute Lymphocytic Cell Leukemia

In children, acute lymphocytic leukemia will relapse in the CNS even in the presence of hematologic remission. Leptomeningeal infiltration is the most common form of CNS involvement. Parenchymal brain lesions are rare (1).

The following case describes the scintigraphic CNS abnormalities in a child with acute lymphocytic leukemia who developed leptomeningeal as well as parenchymal brain lesions.

The patient was admitted on May 11, 1971 at the age of 3 yr for joint pain and fever. A diagnosis of acute lymphocytic leukemia was established by bone-marrow biopsy. The cerebrospinal fluid (CSF) examination was normal.

She was treated with vincristine, prednisone, and methotrexate. She promptly went into remission, but later developed CNS relapse (April 20, 1973). The CSF contained lymphocytic leukemia cells. She received 2,400 R to the cranial vault, as well as intrathecal methotrexate.

After April 20, 1973 the patient had three recurrences of CNS leukemia. The therapy consisted of an additional 3,000 R to the craniospinal axis, intrathecal methotrexate, as well as systemic methotrexate and 6-mercaptopurine.

On Oct. 7, 1977 a bone-marrow biopsy demonstrated the first hematologic relapse of leukemia. She was started on vincristine, prednisone, and L-asparaginase for reinduction; and cytoxan, adriamycin, vincristine, and prednisone for maintenance. The CSF was normal at this time.

FIG 1. To-99m glucoheptonate brain images. (2-hr delayed). Note multifocal cerebral masses.