

# Case Reports

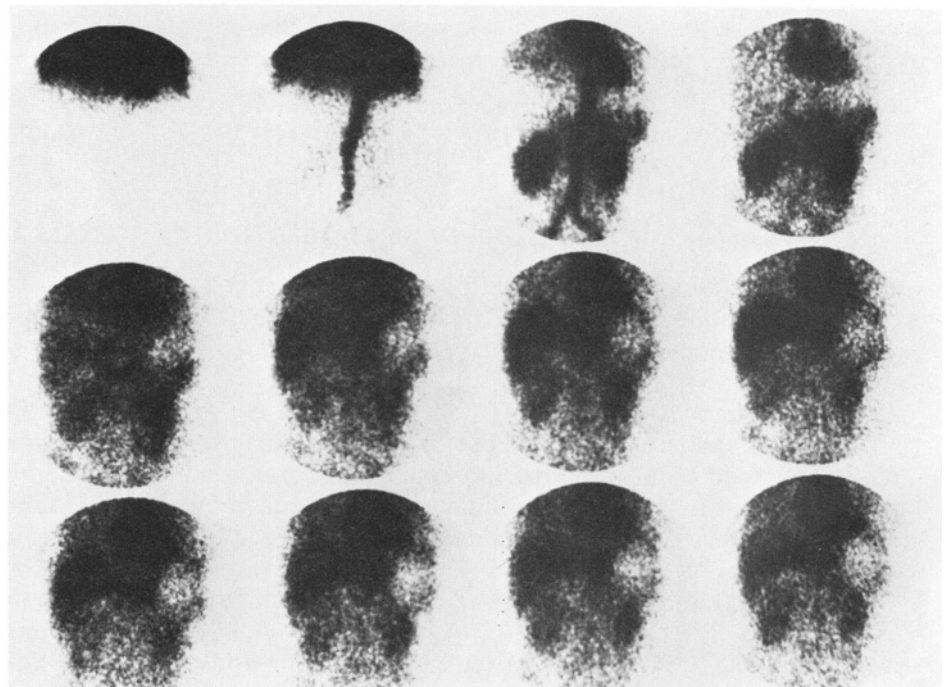
## Photon-Deficient Area with Tc-99m DTPA

Thomas W. Crucitti and Virgilio A. Valdez

*Danbury Hospital, Danbury, Connecticut*

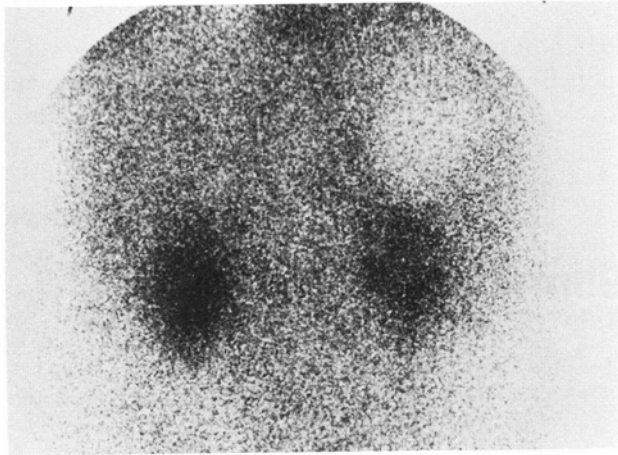
The patient is a 53-year-old white woman with a 12-year history of controlled hypertension. However, a routine check of her blood pressure, which had been somewhat erratic for about one year, revealed diastolic levels up to 120 with systolic levels of 200. It was decided to admit the patient for further evaluation. Her past medical history included an appendectomy in 1950 and a hysterectomy in 1965. The physical examination was essentially unremarkable. Blood pressure was 148/102 mm Hg; there were no palpable masses or tender areas. Laboratory studies, chest x-ray, intravenous pyelogram, and EKG were within normal limits.

The day after admission and immediately following a heavy lunch, the patient was injected with 12.1 mCi of Tc-99m DTPA for a renal study. Sequential scintiphotos of the abdomen in the anterior position revealed visualization of the abdominal aorta with symmetrical flow through both kidneys. There was a photon-deficient area above the left kidney (Fig. 1). The images obtained 15 min after injection showed both kidneys to be of approximately equal size. The photon-deficient area was also present (Fig. 2). The possibility of a cyst on the left side of the abdomen or left retroperitoneum was raised. The next day following the i.v. administration of 10 mCi



**FIG. 1.** Anterior sequential view at 4-sec intervals immediately after the i.v. injection of 12 mCi of Tc-99m DTPA. Note visualization of the abdominal aorta, liver, and both kidneys. Throughout the study there is a "cold" area above the left kidney.

For reprints contact: T.W. Crucitti, Div. of Nuclear Medicine, Danbury Hospital, Danbury, CT 06810.



**FIG. 2.** Anterior static image 15 min after injection. Both kidneys are visualized; the photon-deficient area is clearly visible.

of Tc-99m DTPA, a repeat perfusion study was performed. This time the patient was maintained in a fasting state.

The sequential views again revealed uniform visualization of the abdominal aorta and both kidneys. The photon-deficient area, however, was no longer present (Fig. 3). Six days after admission the patient was discharged with the diagnosis of essential hypertension.

The localized photon-deficient area can be explained as the result of one of the following causes:

1. Presence of a cystic structure;

2. Presence of another pathologic process such as an abscess;
3. Air- or barium-filled loops of bowel; or
4. Food or air in the gastric cavity.

### Conclusion

Technetium-99m combined with the chelating agent DTPA is a useful radiopharmaceutical in studies of brain, kidneys, and vasculature. Following intravenous injection, Tc-99m DTPA is primarily distributed in the extracellular space. It is rapidly cleared without retention by the kidneys; about 5% is excreted in the feces (1).

Avascular and hypovascular lesions appear "cold" in contrast to surrounding structures that contain radionuclides. Lesions thus identified include renal, hepatic, adrenal, and ovarian cysts, and hematomas, abscesses, and hypovascular or necrotic neoplasms. Photon-deficient areas adjacent to transplanted kidneys have also been noted. The causes in these cases include hematoma, urinoma, and lymphocele (2). Other causes include air, and fluid- or barium-filled loops of bowel.

In the given list of possible causes, Nos. 1 and 2 can be eliminated because the area did not appear on the repeated scintigraphic images. A real lesion would have been visible on the repeat study. Explanation No. 3 can also be eliminated because the patient did not have any barium air studies.

Careful examination of the patient's clothing and abdomen did not reveal the presence of any source that



**FIG. 3.** Repeated sequential views demonstrate absence of photon-deficient area.

could explain the abnormality. Just before the study was performed, the patient had a heavy lunch; the following day, when the patient fasted, the abnormality did not show. We postulate, therefore, that food within the gastric cavity was the cause of the photon-deficient area.

It is also noted that posterior scintiphotos are less likely to be influenced by anterior structures such as a distended stomach. Because of this, such artifacts will most likely occur in the anterior imaging position.

## References

1. Hauser W, Atkins HL, Nelson KG, et al: Technetium 99m DTPA: A new radiopharmaceutical for brain and kidney scanning. *Radiology* 94: 679-684, 1970.
2. Corcoran RJ, Thrall JH, Kaminski RJ, et al: Body-background defects with Tc-99m DTPA after renal transplantation: Case reports. *J Nucl Med* 17: 696-698, 1976.