

Diffuse Lung Uptake of ^{111}In Octreotide from Chronic Emphysema*

Sumina Goel¹ and Ramesh Gadiraju²

¹Division of Nuclear Medicine, Hospital of University of Pennsylvania, Philadelphia, Pennsylvania; and ²Division of Nuclear Medicine, St. Luke's-Roosevelt Hospital, New York, New York

A 62-y-old woman was found to have a lung mass and a brain mass. The brain mass was resected, and the histopathologic findings were suggestive of a gastrointestinal primary tumor with neuroendocrine features. She was referred for an ^{111}In -octreotide SPECT/CT scan to evaluate for somatostatin-avid disease.

After injection of 222 MBq (6 mCi) of ^{111}In -octreotide, planar SPECT images (Fig. 1A) and correlative CT images (Fig. 1B) of the chest were acquired in the anterior and posterior projections at the end of 4 h and 24 h. SPECT of the chest was also performed at the end of 24 h. An ^{18}F -FDG PET/CT scan (Fig. 1C) had been obtained 2 wk previously.

QUESTION 1

On the basis of the ^{111}In -octreotide scan and correlative CT, what is the best interpretation of this study?

- A. ^{111}In -octreotide-avid tumor in the right lung and inflammatory changes bilaterally.
- B. Inflammatory changes.
- C. Normal findings.
- D. None of the above.

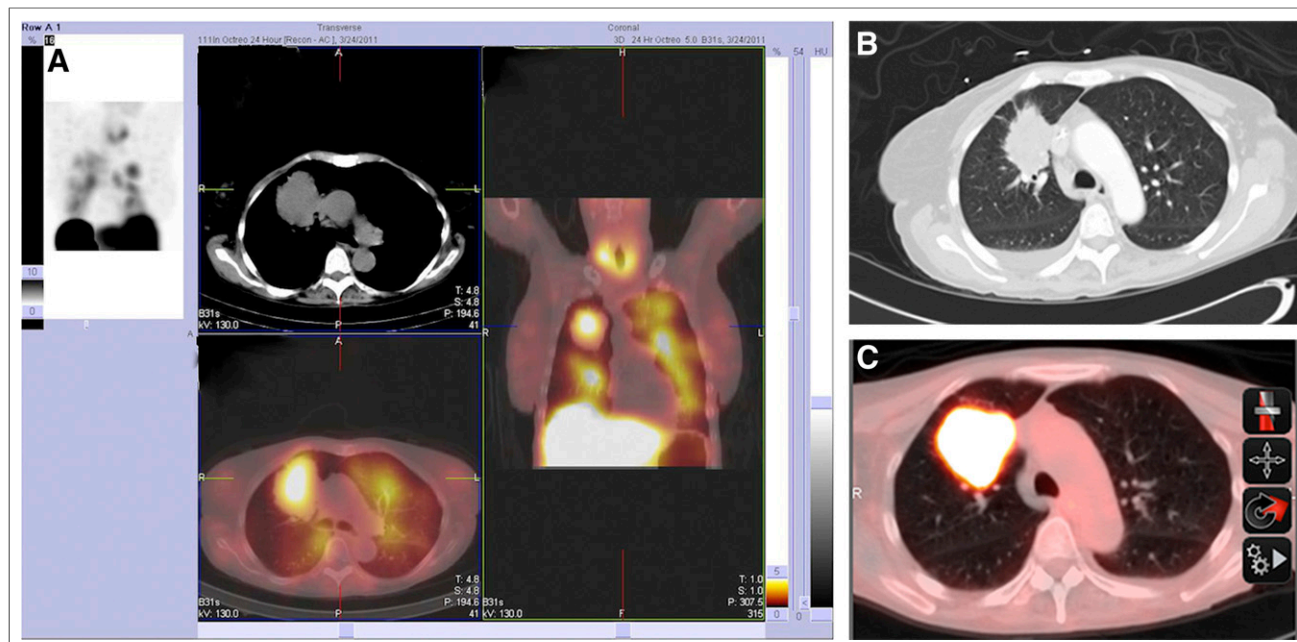


FIGURE 1. (A) SPECT/CT scan obtained 24 h after injection of 222 MBq of ^{111}In -octreotide. (B) Correlative CT scan of chest. (C) ^{18}F -FDG PET/CT scan obtained 2 wk before ^{111}In -octreotide SPECT/CT scan.

Published online Apr. 23, 2013.
DOI: 10.2967/jnmt.113.123414
COPYRIGHT © 2013 by the Society of Nuclear Medicine and Molecular Imaging, Inc.

QUESTION 2

What are the causes of abnormal ^{111}In -octreotide uptake in the lungs in addition to ^{111}In -octreotide-avid tumors?

- A. Infections.
- B. Sarcoidosis.
- C. Inflammatory conditions.
- D. All of the above.

CASE DISCUSSION

The scan of this patient showed a single focus of intense uptake in the right lung and diffuse mild uptake in the rest of the lung tissue bilaterally. The corresponding CT scan showed a tumor in the region of intense uptake and centrilobular emphysema in the rest of the lungs bilaterally. The previously obtained ^{18}F -FDG PET/CT scan showed intense uptake within the tumor but did not demonstrate abnormal diffuse uptake bilaterally within the emphysema.

Somatostatin is a naturally occurring neuropeptide. Somatostatin receptors are found in many tumors, including pituitary adenomas, islet cell tumors, neuroblastomas, pheochromocytomas, small cell carcinoma of the lung, paragangliomas, carcinoid, medullary carcinoma of the thyroid, meningiomas, astrocytomas, lymphoma, Merkel cell tumors, and breast cancer. Also, somatostatin receptors are found in activated leukocytes in granulomatous processes such as sarcoid, tuberculosis, and chronic inflammatory processes (inflammatory bowel disease, rheumatoid arthritis).

A ^{111}In -octreotide scan normally shows activity in the thyroid gland, liver, gallbladder, spleen, bowel, kidneys, and urinary bladder. ^{111}In -octreotide uptake in the lung previously has been reported in infections (lung abscess, pneumonia), sarcoidosis, hypersensitivity pneumonitis from pigeon antigens, and radiation fibrosis, in addition to ^{111}In -octreotide-avid tumors. The uptake is possibly due to activated cells, mainly macrophages within the granulomas and in the alveoli, expressing somatostatin receptors.

BIBLIOGRAPHY

Cascini GL, Cuccurullo V, Mansi L. The non tumour uptake of ^{111}In octreotide creates new clinical indications in benign diseases, but also in oncology. *Q J Nucl Med Mol Imaging* 2010;54:24–36.

Ha L, Mansberg R, Nguyen D, Bui C. Increased activity on In-111 octreotide imaging due to radiation fibrosis. *Clin Nucl Med* 2008;33:46–48.

Kwekkeboom DJ, Krenning EP, Siang Kho G, et al. Somatostatin receptor imaging in patients with sarcoidosis. *Eur J Nucl Med* 1998;25:1284–1292.

Valero M, Boan JF, Rodriguez-Spiteri N, et al. False positive In-111 DTPA octreotide scintigraphy resulting from lung abscess in a patient with metastatic neuroendocrine pancreatic neoplasm. *Clin Nucl Med* 2006;31:20–22.

Yenson T, Khalil T, Larcos G. Pneumonia can cause ^{111}In indium octreotide uptake. *Aust Radiol.* 2006;50:218–221.

*For the answers, see page 120.

Erratum

In the continuing education test for “Small-Animal PET: What Is It, and Why Do We Need It?” by Yao et al. (*J Nucl Med Technol.* 2013;40:157–165), question 7 contained an error. The corrected question appears below. The authors regret the error.

- 7.** *The total blood volume of a small animal to be imaged is estimated to be 7.5 mL. The volume of the dose of radiopharmaceutical should be less than...*
- A. 0.25 mL.
 - B. 1 mL.
 - C. 0.75 mL.
 - D. 2.5 mL.