

Ring-Shaped FDG Uptake in the Right Lower Lung: Is It Always a Tumor?

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Abstract: We present 2 patients with right lung cancer whose F-18 FDG PET images showed a ring-shaped lesion in the right lower lung, suggestive of neoplastic lung mass with central necrosis. Only after correlation with the patient's history, chest radiographs, and computed tomography was it found that the ring-shaped lesion was a false-positive as a result of normal myocardial activity (from mediastinal shift secondary to a previous right pneumonectomy) in 1 patient, while a true-positive lung lesion was seen in the other.

Key Words: FDG- PET, myocardium uptake, lung cancer, artifact, false-positive

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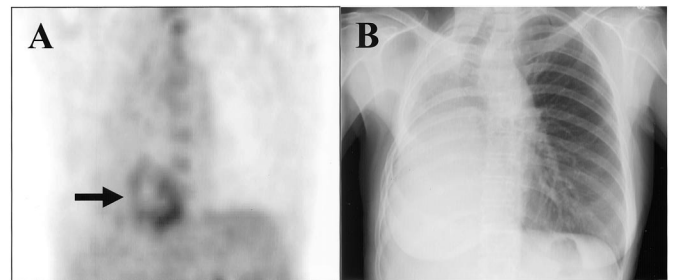
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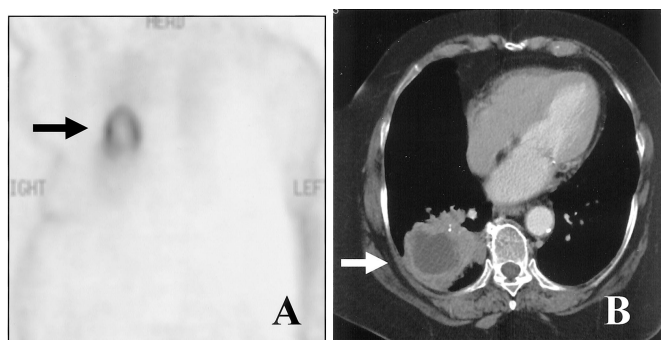
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PET: Projection Image

Chest X-ray

FIGURE 1. (A) The attenuation-corrected FDG-PET image of a 67-year-old man with a history of nonsmall cell right lung cancer and a right pneumonectomy 5 years ago. PET was requested to evaluate for recurrence of disease and metastasis. The image showed a ring-shaped lesion in the anterior right lower lung (arrow), suggestive of a neoplastic lung mass with central necrosis. (B) Chest radiograph showed a right mediastinal shift resulting from a prior right pneumonectomy. The ring-shaped lesion on PET was reported as a normal variant of myocardial activity seen on the right side of the chest from a mediastinal shift.



PET: Coronal Image

Chest CT

FIGURE 2. (A) The nonattenuation-corrected FDG-PET image of a 60-year-old woman with a recently diagnosed mass in the right lung is seen. F-18 FDG PET was requested to evaluate the lung mass and stage the disease. The image shows a ring-shaped lesion in the right lung (arrow), suggestive of a neoplastic lung mass with central necrosis. (B) Chest computed tomography shows a large mass with central necrosis (arrow) in the right lung. This finding corresponds to the ring-shaped lesion seen on the F-18 FDG PET image. Whole-body FDG PET scan has emerged as the standard of care in the management of lung cancer.^{1,2} Squamous cell cancer frequently presents as a ring/donut-shaped focus of intense FDG activity with central photopenia.³ The normal distribution of FDG, the common variants and some of the artifacts on FDG-PET imaging have been described in the literature.⁴⁻⁸ Frequently, patients who undergo PET imaging have already had surgical intervention before the PET scan. These interventional procedures can affect the distribution of FDG and produce artifacts on PET images. For example, chest tube insertion can cause false-positive interpretation of FDG-PET imaging.⁹ Almost always, the FDG uptake in normal myocardium is seen in the left lower lobe but rarely, myocardial uptake can be seen in the right lower lung in patients with dextrocardia or mediastinal shift to the right from right lung collapse, fibrosis, left pleural effusion, or a mass in the left lung. The pattern of myocardial FDG uptake in Figure 1 is similar to that of the malignant lesion seen in Figure 2. It has been reported that ring-shaped uptake in the left lower lung cannot always be attributed to cardiac uptake.¹⁰ Similarly, our case indicated that a ring-shaped lesion in the right lower lung cannot always be attributed to malignant lesions. The importance of a detailed clinical history and other correlative imaging while reporting lung lesions cannot be overstated.