

# Positron emission tomography: useful in detecting metastatic cancer of unknown primary site

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## ABSTRACT

**Metastatic cancer of unknown primary site represents approximately three percent of all new cancer diagnoses. Expensive and invasive diagnostic procedures are often performed although the primary tumour is detected in less than 25 percent of cases. We present a 63-year-old woman presenting with low back pain and was found on positron emission tomography (PET) to have lung cancer. The pros and cons of PET in the diagnostic process of patients with metastatic cancer of unknown primary site are reviewed. PET should be considered in the diagnostic process of patients with unknown primaries, and unnecessary invasive procedures may be avoided.**

**Keywords:** cancer, metastases, positron emission tomography, unknown primary neoplasm

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## INTRODUCTION

Metastatic cancer of unknown primary site (CUPS) represents approximately 3% of all new cancer diagnoses. Primary tumour is found in less than 25% of cases, although expensive and invasive diagnostic procedures are indicated. New diagnostic tools have led to a better diagnosis, although median survival rates continue to be poor in the majority of the cases<sup>(1)</sup>. Several authors have reported the use of positron emission tomography (PET) for detection of CUPS<sup>(2,3)</sup>. We present a case in which the use of PET helped avoid invasive procedures.

## CASE REPORT

A 63-year-old woman was admitted to the hospital due to low back pain during the last four months that did not improve with Ibuprofen. Pelvis radiograph showed an osteolytic lesion in the right iliac bone, suggestive of metastases. Bone biopsy revealed metastasis from a poorly-differentiated adenocarcinoma. In the search for primary tumour, endoscopic studies, abdominal computed tomography (CT), bronchoscopy,

mammography and gynaecological examination were performed but no definite result was obtained. Chest radiograph and CT revealed atelectasis and fibrosis in right upper lobe, compatible with previous tuberculosis. No mass or lymphadenopathy was found and Mycobacterium tuberculosis cultures were negative. PET with fluorine-18-fluorodeoxyglucose (FDG) showed areas of increased uptake in the right upper lobe, mediastinal lymph nodes, and also pelvic ring that was coincident with the lytic lesion described in the radiograph (Fig. 1). The standardised uptake values (SUVs) of these lesions were 5.0, 5.0 and 8.2, respectively. Thus, lung cancer was diagnosed and chemotherapy was indicated.

## DISCUSSION

Diagnosis of CUPS often includes a large number of procedures, some of them invasive. PET is a sensitive tool for the detection of CUPS, identifying the primary tumour in two-thirds of patients. In addition, PET is useful in identifying tumour spread, leading to different therapeutic strategies<sup>(4)</sup>. In our patient, studies searching the primary tumour were negative. Chest radiograph and CT showed a benign lesion and potentially harmful and invasive procedures (fine-needle aspiration biopsy or pulmonary biopsy) would have been the next rational step to confirm the diagnosis.

However, "benign" diseases, such as Paget's disease of the bone, sarcoidosis, non-specific or reactive inflammation and tuberculosis may result in an uptake that mimics malignancy<sup>(5,6)</sup>. Different studies have described that sensitivity, specificity and accuracy of FDG-PET to differentiate between benign and malignant pulmonary lesions were 81.3%, 78.9% and 80.9%, respectively. Moreover, the uptake rates of FDG presented as the standardised uptake value help to establish a diagnosis<sup>(7)</sup>. SUVs higher than 3.5 are suggestive of malignancy, whereas SUVs lesser than 3.0 are associated with benign lesions. In our case, negative cultures to Mycobacterium and the high value of SUVs almost certainly excluded tuberculosis and suggested malignancy.

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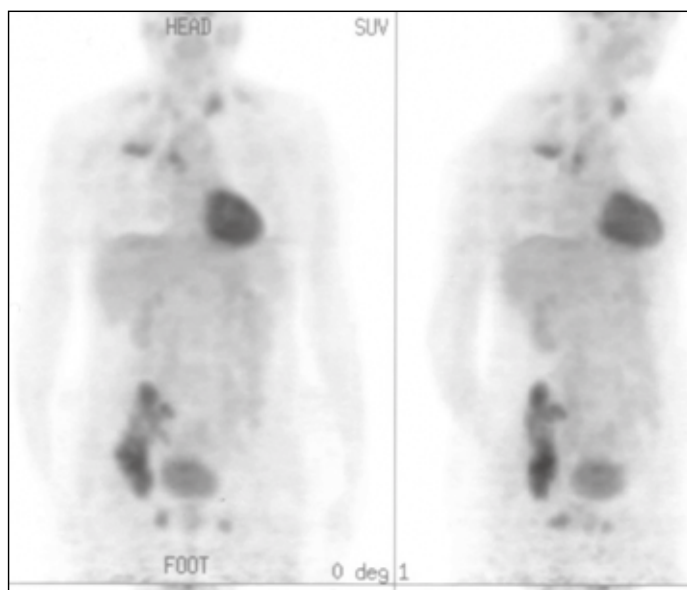
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**Fig. 1** PET images show areas of increased uptake in right upper lobe, mediastinal lymph nodes, and pelvic ring.

The cost-effectiveness of PET has been evaluated in different types of cancer. In fact, in patients with non-small-cell lung cancer, PET reduces the overall diagnostic cost<sup>(8)</sup>. Retrospective analysis of our case shows two aspects to be taken in consideration. First, if PET had been the initial procedure performed, unpleasant exploratory tests (i.e. endoscopy) would have been avoided. Second, the cost would have been much lower. In conclusion, PET should be considered as a first-line diagnostic tool in patients with CUPS, and may frequently help avoidance of

unnecessary invasive and unpleasant procedures. However, cost-effectiveness studies on the use of PET in unknown primary neoplasm are needed.

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