

## CASE REPORT

# Chronic bronchitis mimicking metastases from thyroid medullary carcinoma demonstrated by indium-111 pentetreotide scintigraphy

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### Abstract

We present a case of medullary thyroid carcinoma (MTC) with pulmonary symptoms, elevated calcitonin and CEA levels. Both [<sup>111</sup>In]pentetreotide (Octreoscan) scintigraphy and 2-deoxy-2-[<sup>18</sup>F]fluoro-D-glucose positron emission tomography/computed tomography (FDG-PET/CT) scan revealed mild increased uptake of radionuclides in the upper lobe of the right lung compatible with metastases. Histopathological analysis showed it to be chronic bronchitis. The patient was followed without any treatment. Three months later, no pathological uptake on [<sup>111</sup>In]pentetreotide (Octreoscan) was observed. False positive [<sup>111</sup>In]pentetreotide uptake in the lungs was likely related to acute exacerbation of the chronic bronchitis.

**Keywords:** Indium-111 pentetreotide scintigraphy; chronic bronchitis; medullary thyroid carcinoma.

### Introduction

Medullary thyroid carcinoma (MTC) is a neuroendocrine tumour originating from the parafollicular cells (C cells) of the thyroid, which is derived from the neural crest and secretes calcitonin as well as other polypeptides such as carcinoembryonic antigen (CEA). High serum calcitonin and CEA levels that had previously been low following total thyroidectomy are the indicators of residual tumour or recurrence.

[<sup>111</sup>In]Pentetreotide localizes to somatostatin receptors found on the cell membranes of neuroendocrine tumours and is used to evaluate MTC. The expression of somatostatin receptors is not specific for neuroendocrine tumoral pathologies and may lead to the visualization of the various infectious and inflammatory processes due to the presence of somatostatin receptors on the surface membranes of white blood cells.<sup>[1,2]</sup>

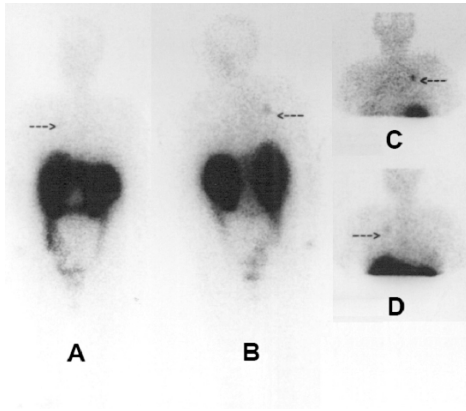
A number of studies show that 2-deoxy-2-[<sup>18</sup>F]fluoro-D-glucose positron emission tomography (FDG-PET) is a sensitive method for the detection of metastases or recurrence of MTC<sup>[3,4]</sup>. A wide range of infectious

or inflammatory processes can cause diffuse or focal FDG uptake in the lungs.

We present the case of a 57-year-old female patient with MTC who had a false positive [<sup>111</sup>In]pentetreotide (Octreoscan) scintigraphy result in the lung which was likely related to acute exacerbation of chronic bronchitis.

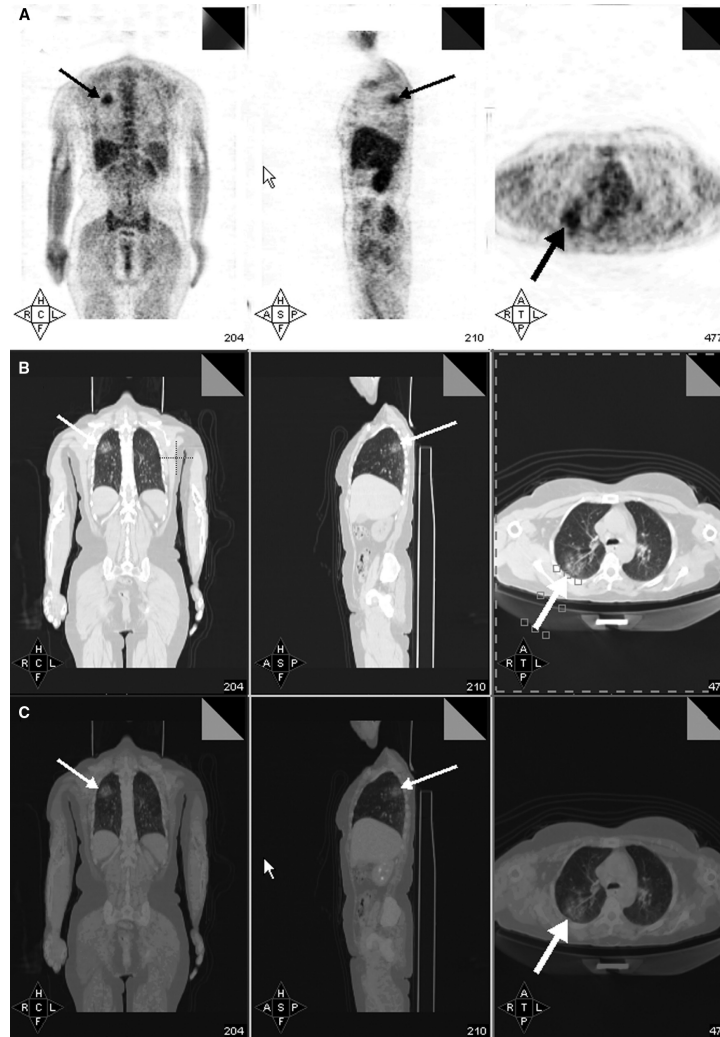
### Case report

A 57-year-old female patient who had total thyroidectomy and bilateral modified cervical lymph node dissection because of MTC was referred to our clinic with coughing and dyspnoea ongoing for the last 10 days. Elevated plasma calcitonin and CEA levels were found but without abnormalities in the leukocyte count. [<sup>111</sup>In]Pentetreotide (Octreoscan) scintigraphy was performed for 4–24 h after intravenous administration of 3 mCi of radionuclide. The anterior–posterior scan of the whole body at 4 h (Fig. 1A,B) and anterior–posterior static thorax images at 24 h (Fig. 1C,D) (clearer on the posterior images) revealed mild increased uptake

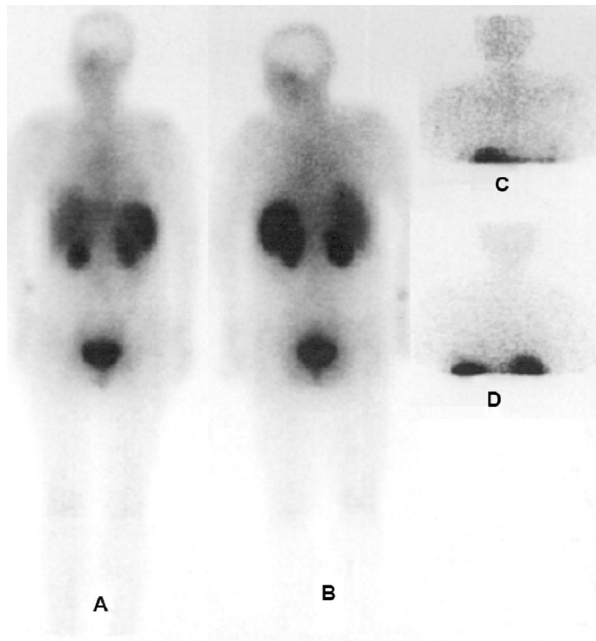


**Figure 1** [<sup>111</sup>In]Pentetreotide (Octreoscan) scintigraphy. The anterior–posterior whole body scans at 4 h (A,B) and the anterior–posterior static thorax images at 24 h (C,D) (clearer in the posterior images) revealed mild increased uptake corresponding to the upper lobe of the right lung (arrow).

corresponding to the upper lobe of the right lung (arrow). One week later, a positron emission tomography (PET)/computed tomography (CT) scan was performed an hour after 15 mCi of FDG were injected intravenously. The composite PET/CT scan (sequence: PET (Figure 2A), CT (Figure 2B), fused PET/CT in coronal, sagittal and axial view (Fig. 2C)) revealed mild increased uptake of FDG corresponding to a consolidation zone in the upper lobe of the right lung (black and white arrows, standardized uptake value (SUV) 3.5) compatible with pathologic uptake of [<sup>111</sup>In]pentetreotide (Octreoscan). Sputum lavages and cultures were negative. Bronchoscopy with transbronchial biopsy was done. Histopathological analysis showed it to be chronic bronchitis. The patient was followed without any treatment. Three months later, [<sup>111</sup>In]pentetreotide (Octreoscan) scintigraphy was performed for 4–24 h after intravenous administration of 3 mCi of the radionuclide. There was no pathological uptake on either the anterior–posterior scan of the whole body at 4 h (Fig. 3A,B) and the



**Figure 2** Composite PET/CT scan (sequence: (A) PET, (B) CT, (C) fused PET/CT in coronal, sagittal, axial view) revealed mild increased uptake of FDG corresponding to a consolidation zone in the upper lobe of the right lung (black and white arrow, SUV 3.5).



**Figure 3** [ $^{111}\text{In}$ ]Pentetreotide (Octreoscan) scintigraphy. There was no pathological uptake on both anterior–posterior scan of the whole body at 4 h (A,B) and the anterior–posterior static thorax images at 24 h (C,D).

anterior–posterior static thorax images at 24 h (Fig. 3C,D). The false positive result on [ $^{111}\text{In}$ ]pentetreotide (Octreoscan) scintigraphy in the lung was likely related to acute exacerbation of the chronic bronchitis.

## Discussion

The expression of somatostatin receptors is not specific for neuroendocrine tumoral pathologies<sup>[1]</sup>. Somatostatin receptors are expressed by many neuroendocrine and non-neuroendocrine cells of the body<sup>[1]</sup>. In patients with MTC, the sensitivity of somatostatin receptor scintigraphy to detect tumour localizations is 50–70%<sup>[5,6]</sup>. Comparing FDG-PET results with somatostatin receptor scintigraphy in MTC patients in the literature, the sensitivity of FDG-PET was found to be superior to somatostatin receptor scintigraphy<sup>[7]</sup>. Patients with respiratory infections (e.g. various pneumonias, lung abscess) and

non-neuroendocrine lung tumours (e.g. pulmonary hamartoma) show accumulation most probably due to radiopharmaceutical accumulation in the lymphocytes<sup>[1,2,8]</sup>. These cells express a specific somatostatin membrane receptor which is recognized and specifically bound by the radiotracer<sup>[9–11]</sup>. False positive [ $^{111}\text{In}$ ]pentetreotide (Octreoscan) scintigraphy results due to respiratory infections and inflammatory processes like chronic bronchitis must be considered in the diagnosis and follow up of MTC patients.

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