

# Treatment Response Evaluation by F-18 FDG PET/CT in Radioiodine Refractory Differentiated Carcinoma in a Case with Multiple Unusual Metastatic Lesions

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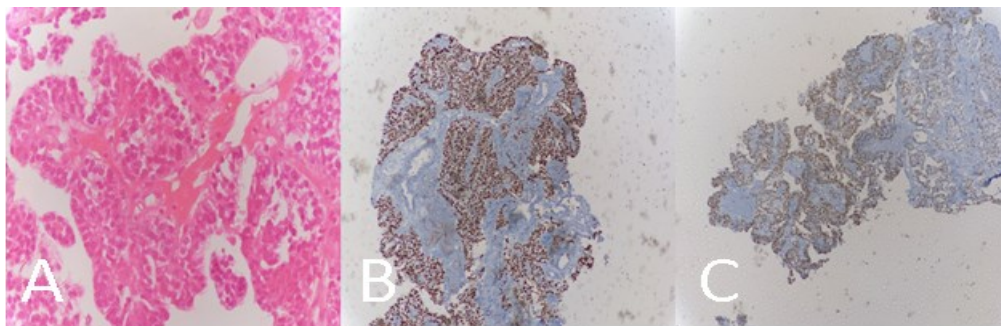
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## Abstract

F-18 FDG PET/CT has a documented role in diagnosis of the patients with radioiodine refractory differentiated thyroid carcinoma (RAIR-DTC) and there are ongoing studies about the treatment response evaluation for tyrosine kinase inhibitor treatment response evaluation. This case report is about the treatment response evaluation of a unique patient with multiple unusual metastatic lesions of RAIR-DTC.

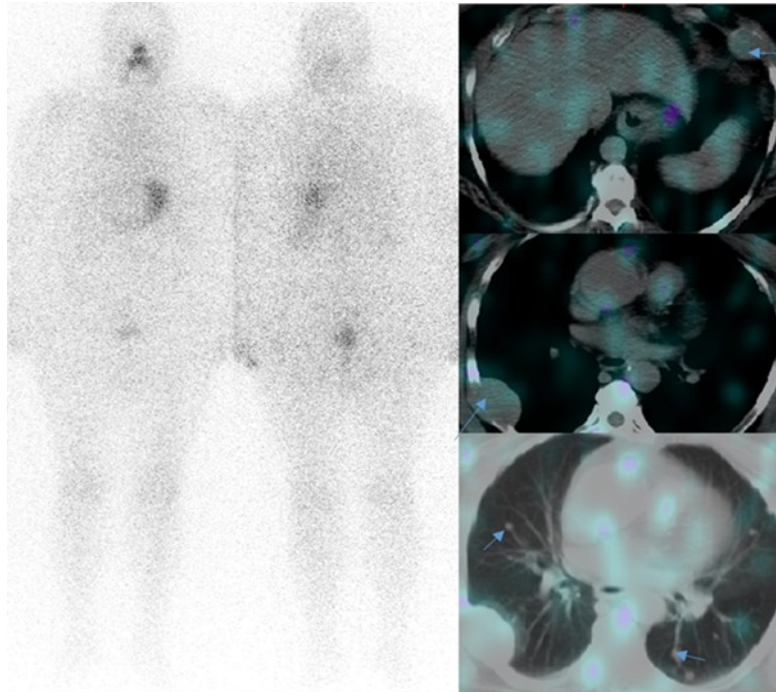
**Keywords:** Radioiodine refractory, treatment response, fluorodeoxyglucose.



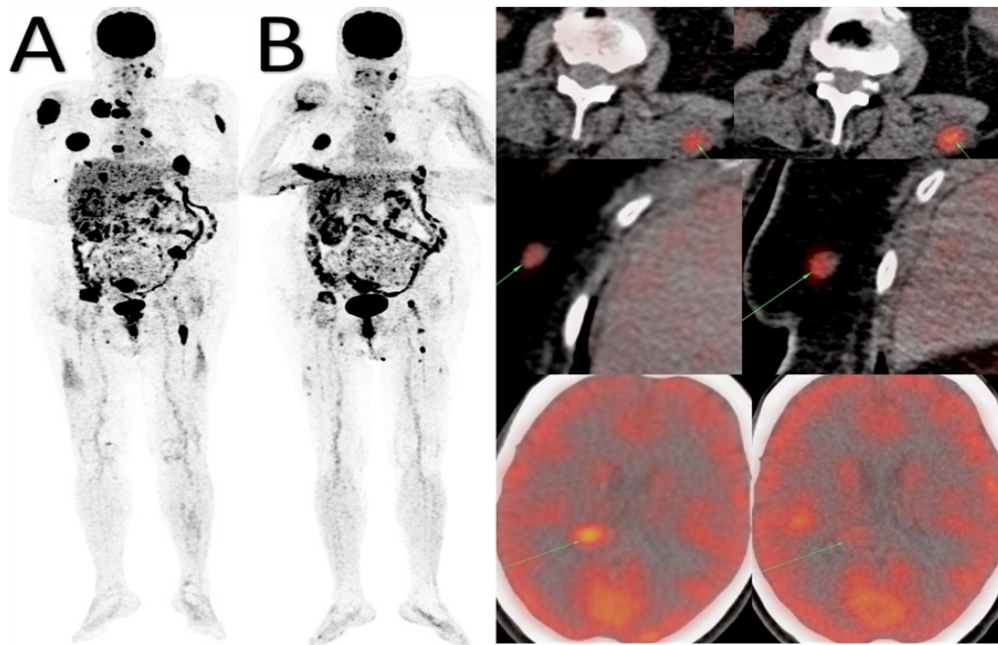
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**Figure 1.:** A 66-year-old female patient with diagnosis of Papillary thyroid carcinoma who had anamnesis of multiple fractures at both arms which was due to metastatic disease according to soft tissue pathology results with hematoxylin eosin (A), pax (B) and TTF-1 immunostaining (C).



**Figure 2.** Radioiodine resistance was documented based on the last post-treatment seventh day scan after 200 mCi treatment showing non iodine accumulating metastatic sites; lung, right 6th costae metastases and iodine accumulating site at left supraclavicular region. The blood Thyroglobulin level was 450 ng/mL prior to the last treatment. Thyroglobulin level in suppression showed persistence in the follow up (300 ng/MI). When the differentiation of the primary thyroid carcinoma is lost the tumor and its metastases do not respond to iodine treatment and imaging of the tumor by I-131 whole body imaging is not possible. There are several radiopharmaceuticals that could show the metastatic lesions of the patients (1). The basis of the fluorodeoxyglucose uptake in dedifferentiated thyroid tissue is the upregulation of GLUT (2). The meaning of FDG accumulation in metastatic thyroid lesion is the potential of iodine treatment resistance and worse prognosis. According to American Thyroid Association guideline the F-18 FDG PET/CT imaging is indicated in case of high blood Thyroglobulin levels (>10 ng/ml) and negative radioiodine imaging in differentiated thyroid carcinoma (3). Recent studies indicate the potential role in response evaluation of RAI-DTC to tyrosine kinase inhibitors (4).



**Figure 3.** The patient was referred for the Sorafenib treatment and F-18 FDG PET/CT was performed for treatment response evaluation. The multiple intensity projection (MIP) image of the patient before (A) and after 5 months of treatment (B) revealed partial response. The axial PET/CT images showed multiple bone lytic metastatic lesions, lung metastasis with significant FDG accumulation as well as metastatic lesions of unusual metastatic sites at brain, adrenal gland and subcutaneous- intramuscular metastases (left column before and right after the treatment). The lesions located at brain, lung and bone responded to treatment with decrease in maximum standardized uptake values (14.7 versus 16.1) but left servical lymph node (23.6 versus 21.6) and right adrenal (16.9 versus 14.1) as well as right breast (15.3 versus 14.2) and left lumbar spinal muscle metastasis (18.5 versus 18.7) showed metabolic progression. The bone metastasis of thyroid carcinoma might have heterogeneous tumor radioactive iodine response and recent reports shows that FDG uptake in bone lesions is associated with nonresponsive disease and poor overall survival especially in case of existence of skeletal events (5). There are limited results about the unusual metastatic sites of thyroid carcinoma in the literature which was reported to mimic breast and lung carcinoma (6,7). In a recent study the evaluation of the unusual metastatic sites in differentiated thyroid carcinoma was performed (8) which showed that although these lesions are rare they are usually radioiodine resistant and associated with poor survival. This unique case with multiple unusual metastatic sites verified that these lesions are radioiodine resistant and demonstrated that additionally chemo resistant.

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