False-positive uptake of radioidine WBS in a patient with papillary thyroid cancer due to a vertebral hemangioma

E. Triantafillou¹, F. Kanouta¹, G. Papadakis¹, I. Tzaves¹, E. Panagiotidi¹, E. Trivizaki², V. Kaltzidou¹, A. Tertipi¹, A. Drosou¹, A. Pappas¹

Endocrinology Department¹ and Department of Nuclear Medicine², Metaxa Anticancer Hospital, Pireaus, Athens, Greece

Introduction:
Diagnostic and post-therapy radioidine whole body scan (WBS) has traditionally been used as an integral diagnostic procedure in the follow-up of differentiated thyroid carcinoma (DTC) for the detection of local recurrence or remote metastasis (1). Regularly therapeutic decisions are based on radioidine WBS results. Its utility relies on the ability of DTC cells to accumulate iodine through Na-I-sympporter, exactly as normal thyroid cells capture iodine from the blood. Other tissues such as the salivary glands, nasopharynx, gastric mucosa of the mammary gland possess the same sympporter. Hence, a rather faint visualization of these organs on radioidine WBS is considered normal. However, there are several reports in the literature of false positive uptake of radioidine WBS in patients with DTC due to physiologic or pathologic conditions unrelated to DTC. We report a case of a 37-year old female patient with papillary thyroid cancer who presented with an abnormal radioidine uptake on eighth thoracic vertebra due to an atypical vertebral hemangioma.

Case Report:
A 37-year-old female patient underwent subtotal thyroidectomy for multinodular goiter and histology revealed multifocal papillary thyroid carcinoma, of follicular type with three foci of major diameter 1.35 mm. Post-operative radioidine uptake of 24 hours was 2.7% and thyroglobulin (Tg) levels were 35 ng/ml. Neck ultrasound was negative for pathologic lymph nodes and chest X-ray was unremarkable. An ablation dose of 70mCi radioidine was administered and the post-therapy WBS demonstrated multiple thyroid remnants on the anterior cervical region, increased uptake on the anterior upper mediastinum and a third large focus in the middle of the chest most evident on the posterior views suggesting vertebral metastatic involvement (Figure 1). Chest CT scan, cervical and mediastinal MRI were negative. In the 99Tc-bone scan a small focus of increased uptake was observed at the 8th thoracic vertebrae with no other pathologic findings of the skeleton. MRI of the spine showed a high intensity pathologic signal in the 8th thoracic vertebrae with a major frontal diameter of 14.6 mm, which is most likely attributed to an atypical hemangioma and not to metastatic disease, in line with the rather mild elevation of Tg levels. Bone metastases in DTC are known to cause higher Tg concentrations, usually >100 ng/ml. Radioidine uptake by a vertebral hemangioma in a patient with DTC has been reported in the literature in very few cases (3,4). Assumptions regarding the functional-pathological mechanisms suggest pooling of the iodine-laden blood in the hemangioma vessels, an obvious mode, since other vessel dilating conditions may show radioidine uptake (5). Further, hypothyroidism is associated with increased capillary permeability leading to transcapsular escape of iodine and interstitial retention. Finally, hemangioma vessels may have abnormal structure, facilitating exudation of radioidine in the interstitial space. These false positive results may mislead the physician to the presence of distant metastasis and erroneously change the stage of the disease and the therapeutic approach.

Discussion:
Vertebral hemangiomas are common and autopsy studies report a prevalence of approximately 10% in the general population, with females affected more often (2). Histopathologically, vertebral hemangiomas are benign tumors with a predilection for the thoracic region of the spine. We believe that the radioidine uptake at the 8th thoracic vertebra in our patient was due to a vertebral hemangioma and not to metastatic disease, in consent with the rather mild elevation of Tg levels. Bone metastasis in DTC are known to cause higher Tg concentrations, usually >100 ng/ml. Radioidine uptake by a vertebral hemangioma in a patient with DTC has been reported in the literature in very few cases (3,4). Assumptions regarding the functional-pathological mechanisms suggest pooling of the iodine-laden blood in the hemangioma vessels, an obvious mode, since other vessel dilating conditions may show radioidine uptake (5). Further, hypothyroidism is associated with increased capillary permeability leading to transcapsular escape of iodine and interstitial retention. Finally, hemangioma vessels may have abnormal structure, facilitating exudation of radioidine in the interstitial space. These false positive results may mislead the physician to the presence of distant metastasis and erroneously change the stage of the disease and the therapeutic approach.

References
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