Published in final edited form as:

Eur J Nucl Med Mol Imaging. 2013 December ; 40(12): . doi:10.1007/s00259-013-2507-7.

Multi-tracer PET imaging of bone metastases from paraganglioma: peripheral halo of uptake on ^{18}F -FLT PET mismatching with central uptake of ^{18}F -FDOPA, ^{18}F -F Dopamine, and ^{18}F -FDG

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Keywords

pheochromocytoma and paraganglioma; bone metastases; PET/CT; ^{18}F -fluorothymidine; ^{18}F -fluorodeoxyglucose; cell proliferation

A 70-year-old man with a history of a right adrenal paraganglioma (24 cm) surgically removed 2 years before was referred for lower back pain, palpitations, and increased plasma catecholamine levels suspicious for recurrent paraganglioma. The patient underwent a multi-tracer PET imaging evaluation consisting of four different radiopharmaceuticals, each performed on different days in the same week: ^{18}F -F Dopamine and ^{18}F -FDOPA to specifically detect the presence of paraganglioma [1], ^{18}F -FDG to assess glycolytic activity, and ^{18}F -fluorothymidine (^{18}F -FLT) to assess cell proliferation [2].

The scans revealed retroperitoneal masses, bilateral lung lesions, and bone lesions, with high and variable avidity for ^{18}F -F Dopamine (A), ^{18}F -FDOPA (B), and ^{18}F -FDG (C). The inter-lesion and inter-tracer tracer avidity variability illustrates the metastatic metabolic heterogeneity. All lesions had low ^{18}F -FLT uptake (D), suggesting a low rate of cellular proliferation.

However, the bone lesions (green arrows) showed an interesting pattern on ^{18}F -FLT PET. High ^{18}F -FLT uptake is known to occur in normal bone, due to hematopoietic cells in the bone marrow compartment that are continually replacing circulating peripheral blood cells and are highly proliferative [3]. In this patient, bone lesions detected and delineated by T2-weighted MRI (E) and CT (F) showed low cellular proliferation, contrasting with their high catecholamine metabolism and high glycolytic activity. High non-specific peri-tumoral ^{18}F -FLT uptake was seen (higher than the normal bone), most likely corresponding to the

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reactive proliferation of hematopoietic cells around the lesion. This should elicit caution when interpreting focal uptake (higher than the constitutively high bone marrow background uptake) of ^{18}F -FLT in bone.

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