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Edited by Dr. Bhavin Jankharia

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68Ga- DOTATOC in Neuroendocrine Tumors

by- Dr. Nusrat Shaikh

Neuroendocrine tumors (NETs) are a class of slow-growing tumors that arise from cells of nervous and endocrine origin distributed mainly in the lungs, gastrointestinal tract, or pancreas that show overexpression of somatostatin receptors (SSTRs). 68Ga-DOTATOC PET/CT targets the somatostatin receptors on NETs for imaging.

The recommended indications for patients with NETs according to EANM Guidelines for 68Ga-DOTA-conjugated somatostatin PET/CT imaging (1) are as follows:

1 Localizing primary tumors and detect sites of metastasis (staging)
2 Monitoring patients with known disease in the detection of residual, recurrent or progressive disease (re-staging)
3 Determine SSTR status (patients with SSTR positive tumors are more likely to respond to targeted therapy with somatostatin analogues)
4 Select patients with metastasis for peptide receptor radionuclide therapy (PRRT) (177Lu or 90Y–DOTA-labelled peptides).

Well-differentiated NETs tend to have greater SSTR expression and decreased glycolytic activity and hence greater 68Ga-DOTATOC uptake and lower FDG uptake. Conversely, poorly differentiated NETs tend to have decreased SSTR expression and greater glycolytic activity, thus, lower 68Ga-DOTATOC uptake and greater FDG uptake (1). These characteristics are referred to as the “flip-flop” phenomenon. This can be used as a surrogate for whole-body (primary and metastatic sites) tumor histopathologic grading and characterization (2). Dual Tracer PET/CT (68Ga-DOTATOC and 18F-FDG) can be performed on the same day, especially if the DOTA-PET/CT does not show significant uptake.

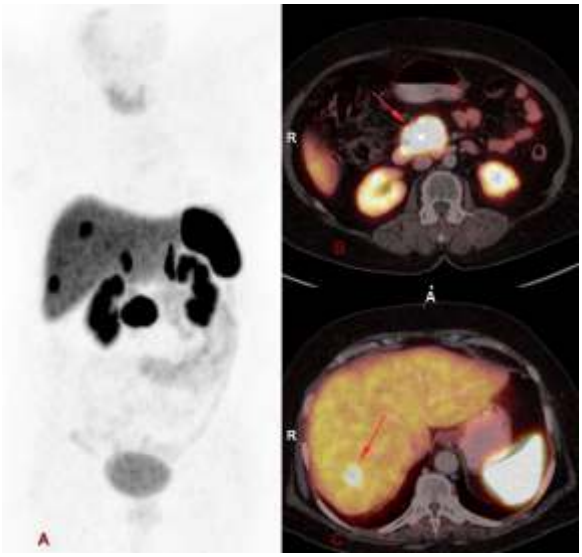

Fig 1 (A-C): 50-years old lady who was recently diagnosed as neuroendocrine tumor of the pancreas and was referred for staging. MIP image (A) shows focal uptake in the pancreas and two foci of uptake in the liver. Axial fused PET/CT images (B, C) show somatostatin tracer uptake in the pancreatic mass (arrow in B) and

At a glance:

- 68Ga-DOTATOC PET/CT targets the somatostatin receptors on NETs for diagnosis and imaging in various stages of the disease as well as to plan therapy.
- Dual Tracer PET/CT (68Ga-DOTATOC and 18F-FDG) can be performed on the same day and can be of significant value because it allows whole-body tumor grading and assessment of tumor heterogeneity in well-differentiated intermediate and high grade tumors to plan appropriate therapy and response evaluation.

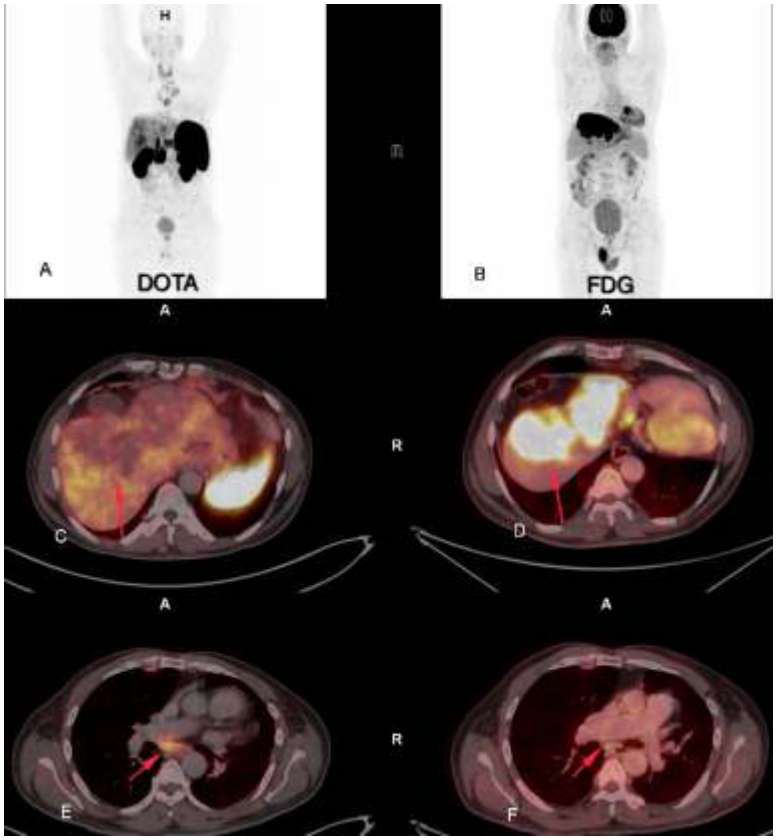

Fig 2 (A-F): 70-years man, a known case of well differentiated NET (G3) underwent dual tracer imaging with 68Ga-DOTATOC and 18F-FDG. MIP images (A and B) show subtle somatostatin uptake in the liver and higher somatostatin uptake in the mediastinum (A) and higher FDG uptake in the liver and subtle uptake in the mediastinum (B). Axial fused PET/CT images (C, D) show subtle somatostatin tracer uptake (arrow in C) and higher FDG uptake (arrow in D) in the liver lesions. Axial fused PET/CT images (E, F) show higher somatostatin uptake (arrow in E) and subtle FDG uptake (arrow in F) in the subcarinal mediastinal lymph node.

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2 Sanli Y, Garg I, Kandathil A, Kendi T et al. Neuroendocrine Tumor Diagnosis and Management: 68Ga-DOTATATE PET/CT. AJR Am J Roentgenol. 2018 Aug;211(2):267-277.

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