

PET Bytes

News from *The Positron Imaging Facility* at UT Southwestern Medical Center at Dallas

September 2005

PET Imaging in Gastrointestinal Stromal Tumors (GIST)

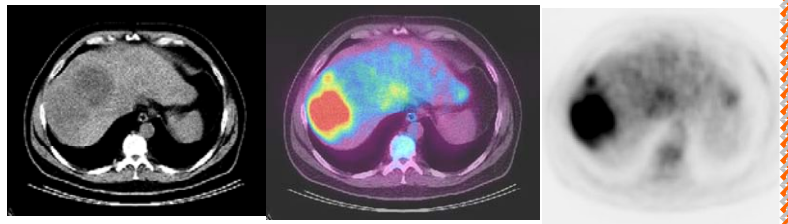
GIST are rare tumors originating from anywhere in the gastrointestinal tract, most commonly the stomach or small bowel, and arise from the cells of Cajal. They are distinguishable from leiomyomas or leiomyosarcomas because they express KIT protein (CD117 stem cell factor). Many are benign but some have malignant potential and tend to metastasize as bulky tumors involving the liver, omentum and mesentery¹.

These mesenchymal tumors are resistant to most chemotherapeutic agents. In the last several years, impressive success has been achieved in malignant GIST with the tyrosine kinase inhibitor imatinib mesylate (Gleevec)². However, even after successful treatment, many of these tumors shrink slowly based upon conventional CT and MRI imaging.

Recently, FDG PET and PET/CT have been shown to be useful in both prognosis and measurement of therapeutic response in these tumors. Many GISTs respond dramatically in just days to Gleevec therapy with marked reduction in FDG uptake on PET imaging. Several studies have shown that absence of FDG uptake on the post treatment PET scan predicted a better outcome and a longer disease free interval.

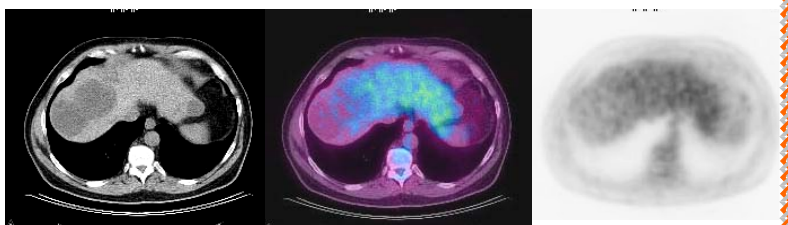
Unfortunately, not all GISTs demonstrate FDG uptake, even among those tumors with malignant potential. A recent study for MD Anderson has suggest that as many as 20% of known lesions may not demonstrate FDG uptake prior to therapy, so a staging PET scan is essential before beginning therapy³. Because of the CT portion of the study, PET/CT performs better than PET alone in these tumors. Factors contributing to increased FDG uptake include large tumor size, increased mitotic rate and location.

Figure 1. The patient was a 48 year old man in whom a workup for anemia revealed multiple large metastatic lesions in the liver, omentum and mesentery, but no clear primary site. Biopsy revealed spindle cell tumor which was c KIT positive, consistent with the diagnosis of GIST. PET/CT was obtained prior to treatment with Gleevec and two months into therapy.



The three axial images demonstrate large masses in the liver on CT which show elevated FDG uptake on the fused and PET images.

Figure 2. Following two months of therapy, the patient returned for additional imaging. With the exception of uptake associated with a loop of colon, which had been present on the prior scan as well, all lesions showed absent FDG uptake, with some reduction in lesion size.



References:

1. Hersh MR, Choi J, Garrett C and Clark R. Imaging gastrointestinal Stromal tumors. *Cancer Control*, 2005; 12:111-115.

- Goerres GW, Stupp R, Barghouth G, et al. The value of PET, CT and in line Pet/CT in patients with gastrointestinal Stromal tumors: long-term outcome of treatment with imatinib mesylate. **Eur J Nucl Med Mol Imaging**, 2005;32: 153-162.
- Choi H, Charnsangavej C, De Castro Faria, S et al. CT evaluation of the response of gastrointestinal stromal tumors after imatinib mesylate treatment: A quantitative analysis correlated with FDG PET findings. **AJR** , 2004; 183: 1619-1628.

Post Transplant Lymphoproliferative Disorders (PTLD)

PTLD are uncommon but life threatening disorders seen following both solid organ transplant (SOT) and hematopoietic stem cell transplant (HSCT). These lymphoproliferative abnormalities range from reactive, polyclonal hyperplasia to non Hodgkin's lymphomas. More than 90% of PLTD are Epstein Barr positive and thought to be due to deficient cellular immune response induced by either immunosuppression in the case of SOT and chemo- and or radiation therapy. Most occur in the first year after transplant, but can occur at much longer intervals (1).

Treatment of PLTD includes reduction of immunosuppression in SOT but additional treatment may include the use of the anti CD 20 monoclonal antibodies such as rituximab which has proven effective in PLTD seen following either SOT or HSCT¹. FDG PET imaging has proven useful in staging PLTD and in evaluating response to therapy, although there have as yet been few reports on this latter indication².

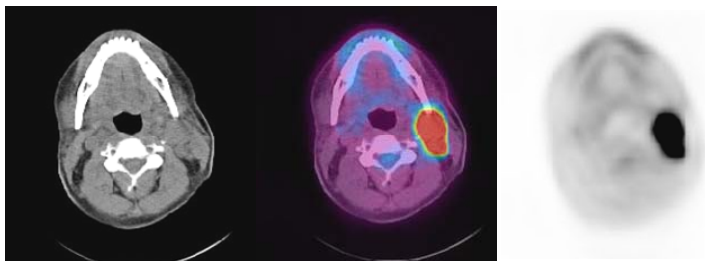


Figure 1. The patient was a 45 year old man who underwent a kidney and pancreatic transplant twelve years prior to presentation with neck discomfort and swelling. A tonsillectomy resulted in diagnosis of polymorphic PLTD. His initial PET/CT demonstrated two soft tissue masses in the left neck.

CT (left), fused images (middle) and Axial PET (right) show mass at the angle of the mandible with elevated FDG uptake consistent with PLTD.

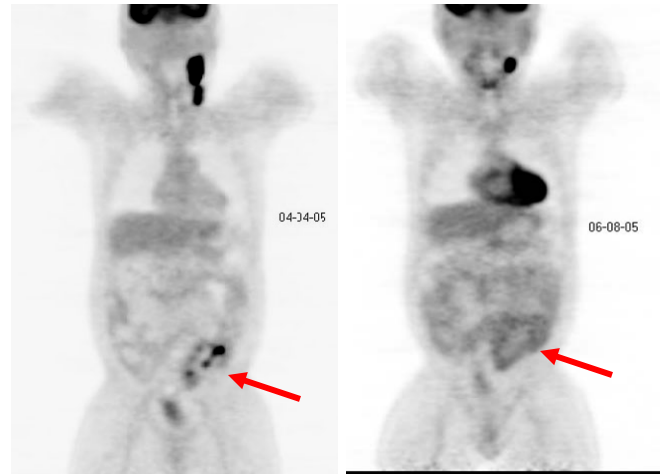


Figure 2. Pretreatment Coronal whole body PET (left) shows masses in neck. Arrow points to transplanted kidney in left pelvis with radioactive urine in the collecting system.

Following treatment with Rituxan (right), there has been a decrease in FDG accumulation in the left cervical adenopathy. On this scan, there is no radioactive urine seen in the pelvic kidney.

References:

- Gottshalk S, Rooney CM, Heslop HE. Post transplant lymphoproliferative disorders. **Ann Revu Med** 2005.56:29-44.
- Marom EM, McAdams HP, Butnor KJ, and Coleman RJ. Positron emission tomography with Fluoro-2-deoxy-D-glucose (FDG-PET) in staging of post transplant lymphoproliferative disorders in lung transplant recipients. **J Thorac Imaging** 2004. 19: 74-78.

Positron Imaging Facility
1311 Record Crossing
Dallas, TX 75235
214-267-1513

Faculty:

Dana Mathews, PhD, MD...Medical Director
William Erdman, MD
Orhan K Oz, MD, PhD