Considerations of Treating End Stage Renal Disease Patients with Lutetium-177 Dotatate

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INTRODUCTION

Lutetium-177 Dotatate (Lu-177 Dotatate) is a Peptide Receptor Radionuclide Therapy (PRRT) indicated for the treatment of somatostatin receptor-positive gastroenteropancreatic neuroendocrine tumors (GEP-NETs), including foregut, midgut, and hindgut neuroendocrine tumors in adults.

PURPOSE

This educational exhibit will review considerations Nuclear Medicine Physicians must be aware of when treating end stage renal disease patients with PRRT.

DISCUSSION

Neuroendocrine tumors are derived from amine precursor uptake and decarboxylation (APUD) system cells, including carcinoid, pituitary adenomas, pancreatic islet cell neoplasms, medullary carcinoma of the thyroid, and pheochromocytomas. Treatment of these tumors vary depending on the type and stage of disease. Traditional treatment options have included surgery, chemotherapy, and hormone therapy. There have been limited treatment options for progressive disease until the emergence of PRRT. Studies have shown that this treatment mainly improves progression free survival. However, like with any other therapy, there are potential side effects including radiation exposure, myelosuppression, secondary myelodysplastic syndrome and Leukemia, renal toxicity, hepatotoxicity, and hormonal crisis. These side effects are even more of a concern in patients with end stage renal disease and dialysis dependence. We will discuss these factors and the benefit of using dosimetry to assist with treatment dosing.

CONCLUSION

Lutetium-177 Dotatate has improved treatment of progressive neuroendocrine tumors. There are potential side effects that may be amplified in end stage renal disease patients. We will review these considerations and the role of dosimetry in these patients.

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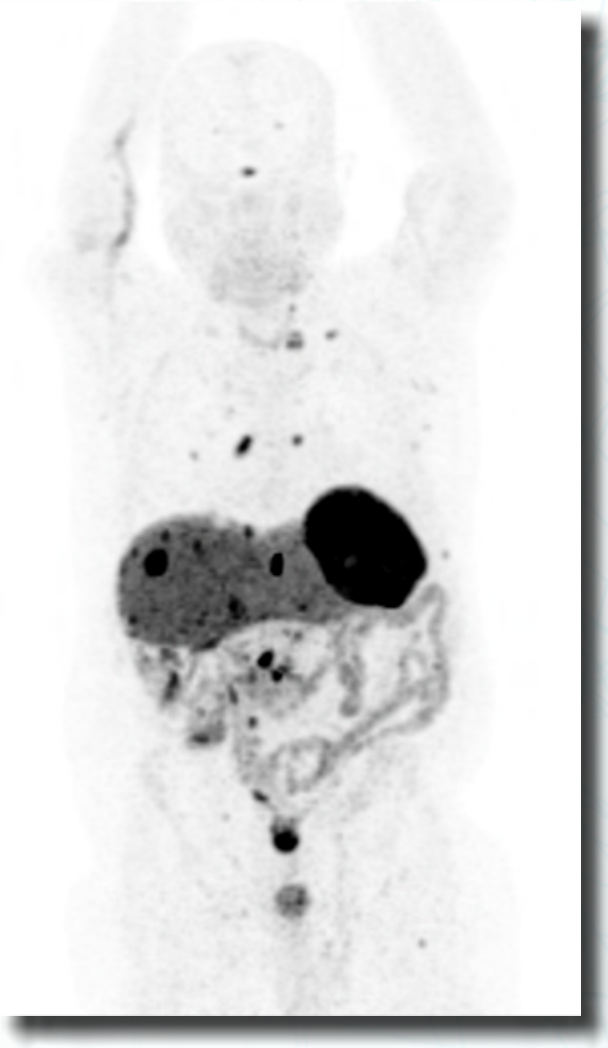
History

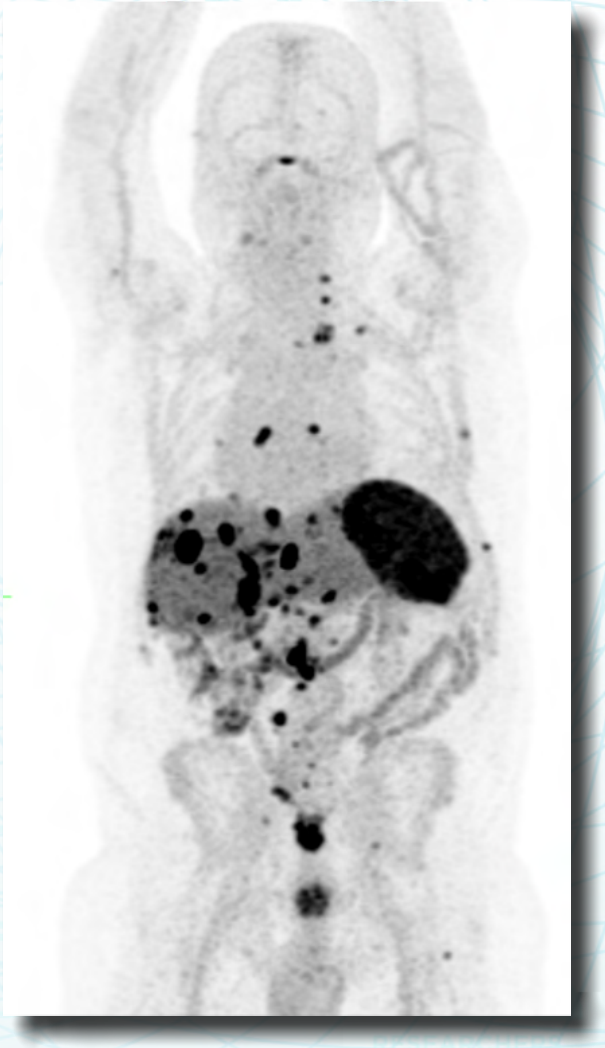
- Neuroendocrine tumor diagnosed in 1987; status post partial bowel resection at that time
- asymptomatic until approximately 2010 when he developed worsening abdominal pain and was found to have disease recurrence in the small bowel
- He underwent small bowel resection 4/13/2010.
- Received octreotide therapy from August 2011 through present

Ga68 Dotatate Scan 11/2018



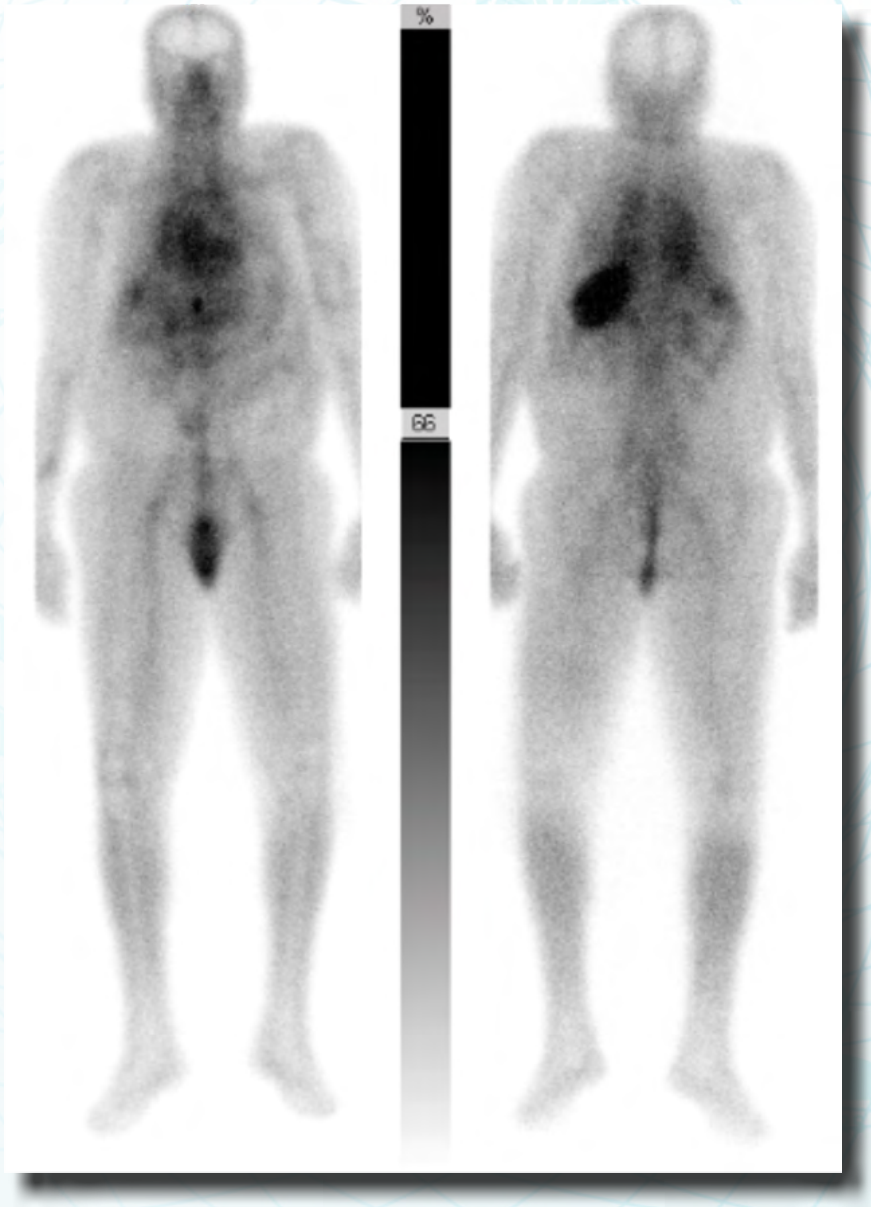
Baseline Imaging

Ga68 Dotatate Scan 12/2019

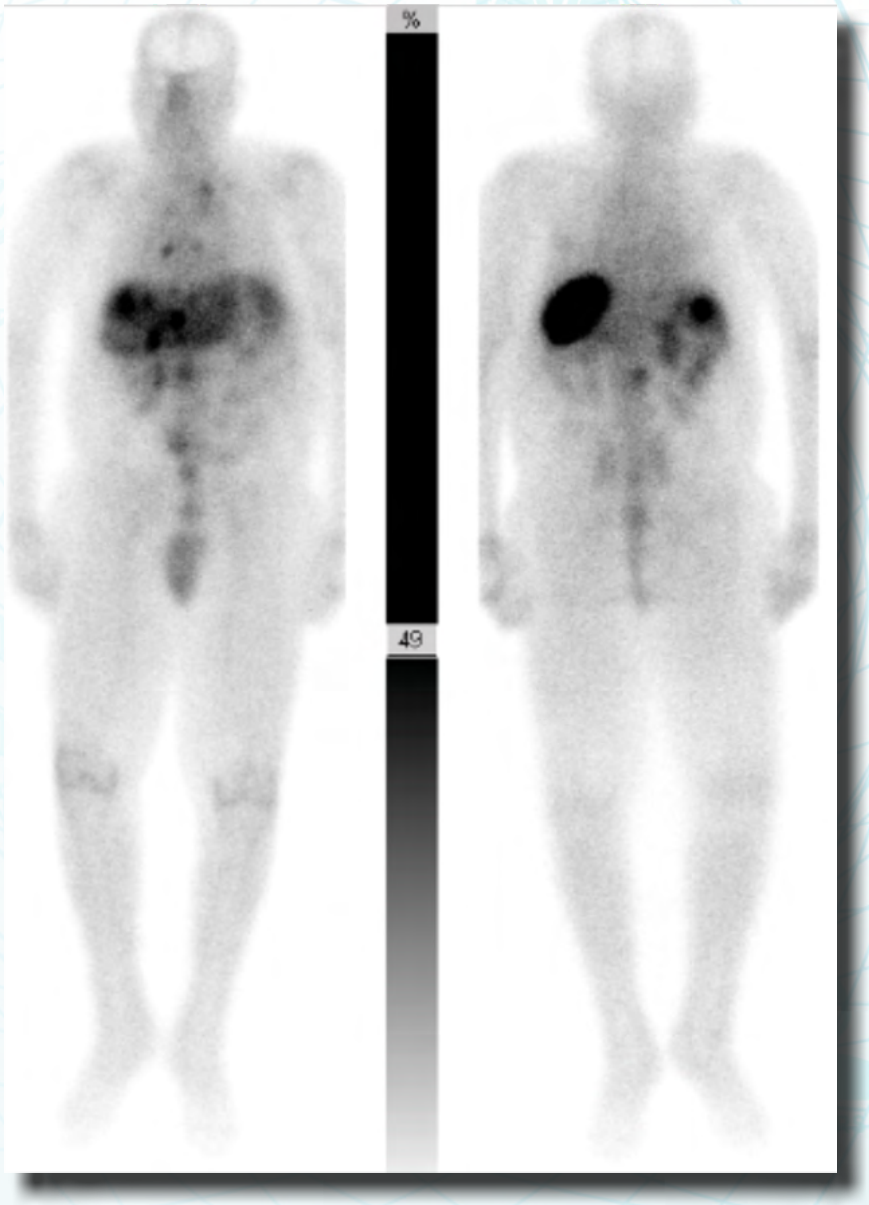


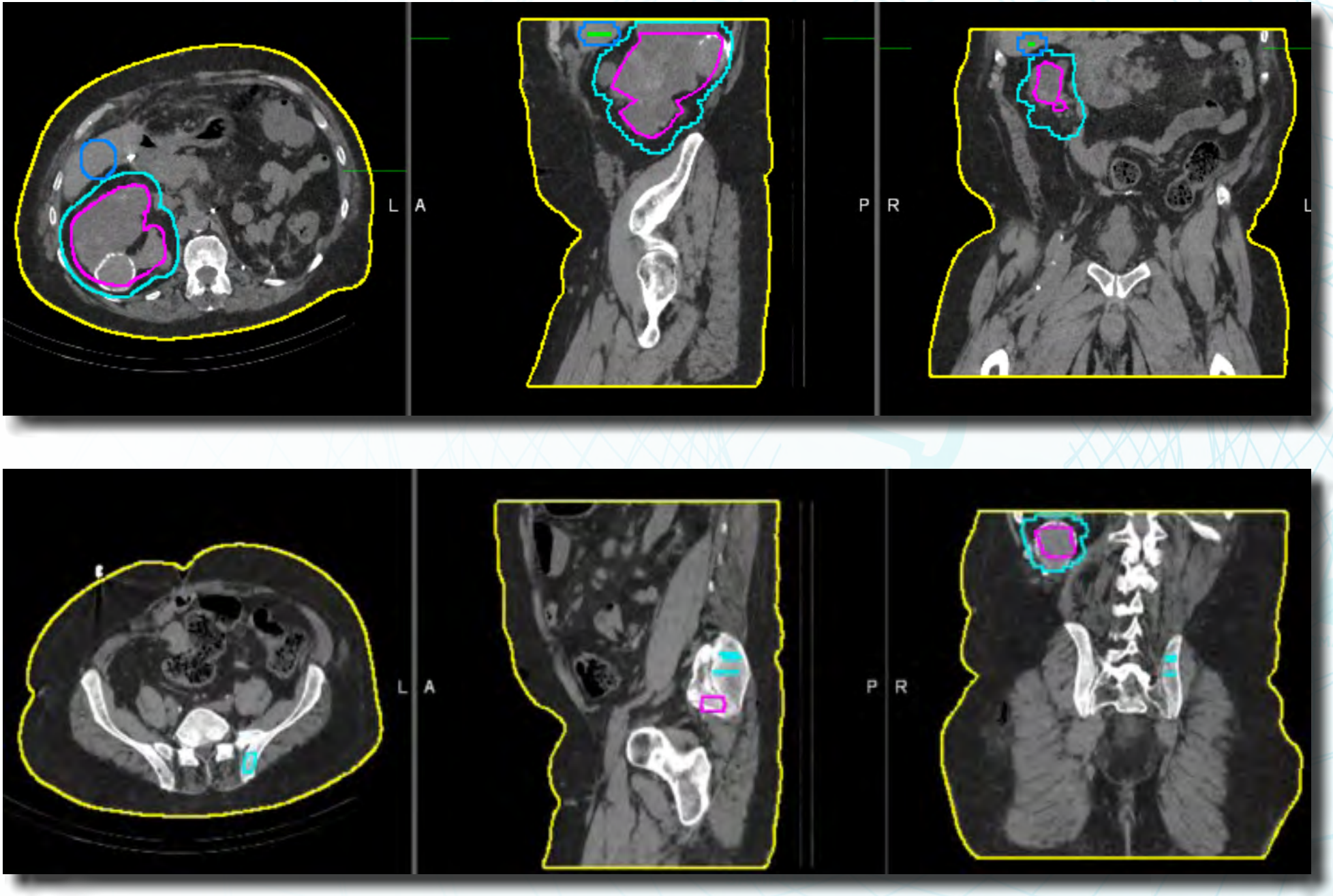
Disease Progression

Post Therapy Imaging at 2 hours



Post Therapy Imaging at 24 hours





Dosimetry can be performed after each treatment to calculate the radiation dose to each organ and determine if the treatment dose needs to be adjusted for subsequent therapies

Pre-Treatment Labs

WBC	HGB	HCT	PLT
6.6	11.3 L	36.3 L	155

Post-Treatment Labs

WBC	HGB	HCT	PLT
3.6 L	10.2 L	32.4 L	93 L

Table 3: Grading of thrombocytopenia

Grade	Platelet count	Number	Percentage
0	>150,000/mm^3	5	2.5%
1	75,000-150,000/mm^3	33	16.5%
2	50,000-75,000 /mm^3	57	28.5%
3	25,000-50,000/mm^3	72	36%
4	<25,000/mm^3	33	33%

CONSIDERATIONS	RECOMMENDATIONS
Multidisciplinary Treatment	Nuclear Medicine, Nephrology, Oncology, and Radiation Safety
Treating as inpatient vs Outpatient	Inpatient may be easier for coordination
Need for Amino Acid Infusion	Depends on function of kidneys
Need for Anti-nausea meds	Usually only needed if Amino Acids are infused
Radiotherapy Dose	Decreased dose of 100 mCi
Imaging Timeframe	24 hour Delayed Imaging
Timeframe for Hemodialysis	24 hours after treatment
Hemodialysis	Radiation Safety instructions needed for HD staff
Post Therapy Labs	Follow CBC frequently to increased risk of bone marrow suppression