

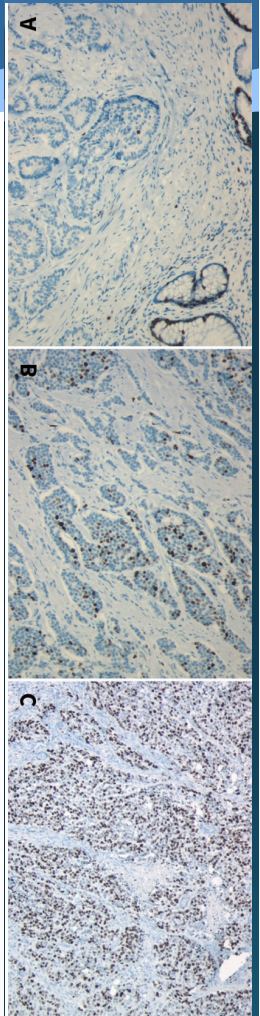
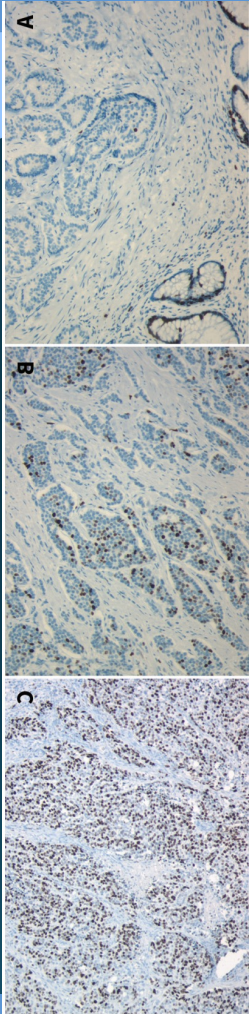
Preparing for PRRT: What Patients Need to Know?

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HEALTHCARE



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None



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The Focus of my Talk

- What is PRRT (Peptide Receptor Radionuclide Therapy)
- Role of Nuclear medicine (from nuclear medicine consult to PRRT administration and follow-up)
- What to expect on the day of the treatment
- Side-Effects (early and late)
- Radiation safety



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Let's start with a case.....

65-year-old female; stage IV PNET (metastasis to liver and bones); s/p resection 9/26/2016, developed recurrence in liver in 2017 and progressed on Lanreotide in 2019. **Referred to Nuclear medicine division by medical oncology for LU-177 DOTATATE Therapy (PRRT).**



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PRRT MDC APPROACH

Multidisciplinary team assessment with experts from:

Medical oncology

Surgical oncology

Radiology

Nuclear medicine

Radiation oncology

Pathology

Take active part in treatment decision making and sequencing of therapy.



"Can someone please remind me which important member I'm missing from this MDC team?"



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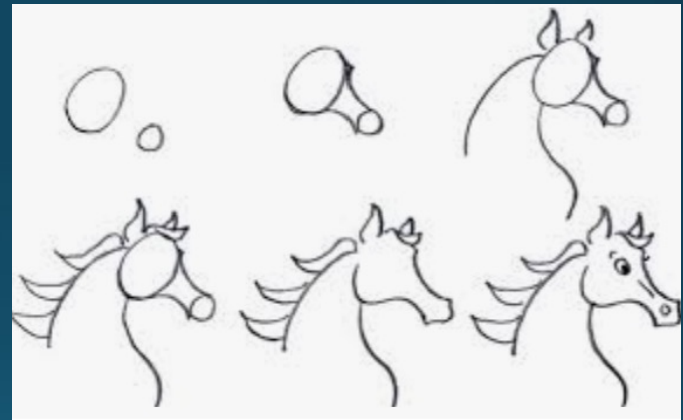
NM consult: Primarily focused on patient evaluation for their suitability for PRRT/Lutathera
Based on: clinical, laboratory and imaging findings.

Dose calculation: prescribing optimum radionuclide therapy dose

Patient education:

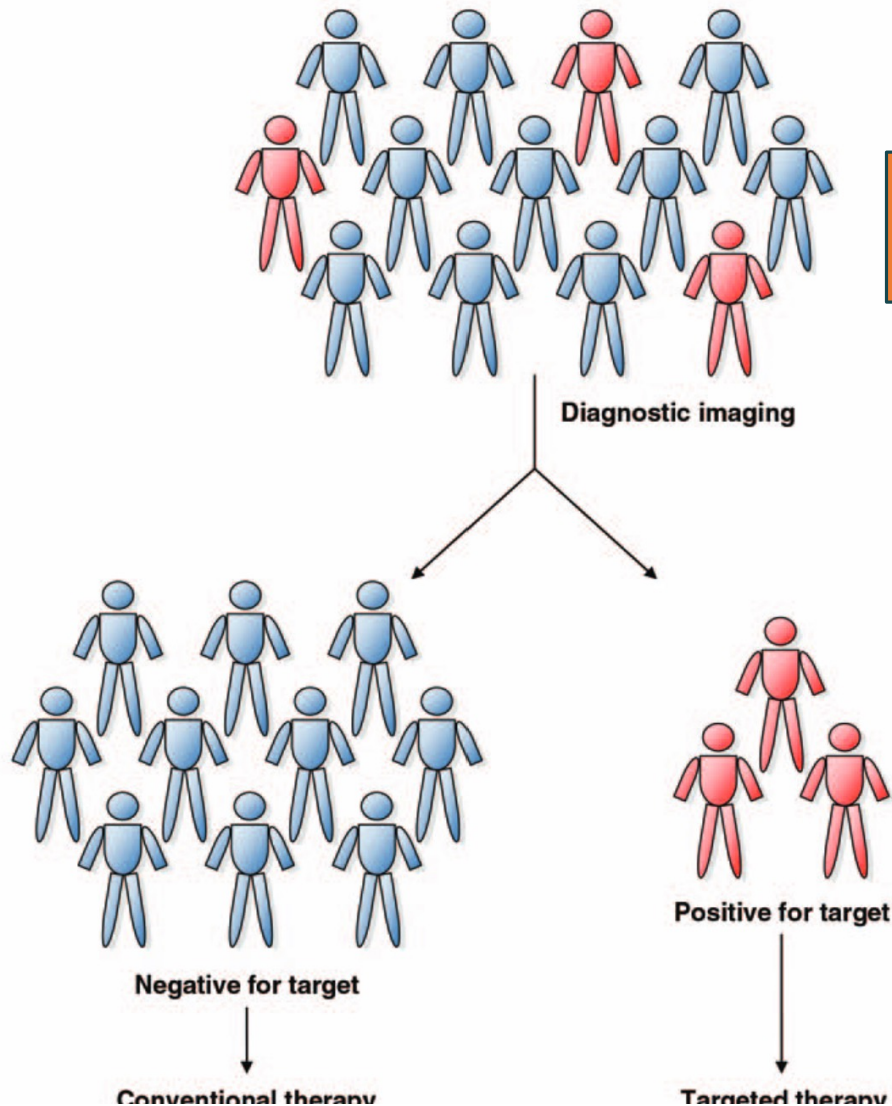
about the upcoming radionuclide therapy, ensuring optimum pre-procedure/therapy preparation, what to expect in terms of early and late side-effects,
radiation safety protection guidelines, addressing patients' questions and concerns and going over the consent forms

Step by Step through NM Consult & Theranostics (DIAGNOSIS+THERAPY)



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Step 1: To determine suitability for PRRT/Lutathera
Based on: clinical, laboratory, and imaging findings.

The cardinal rule of Theranostics is
"see it, treat it".

Diagram shows how Theranostic systems use diagnostic imaging to identify the presence of a target

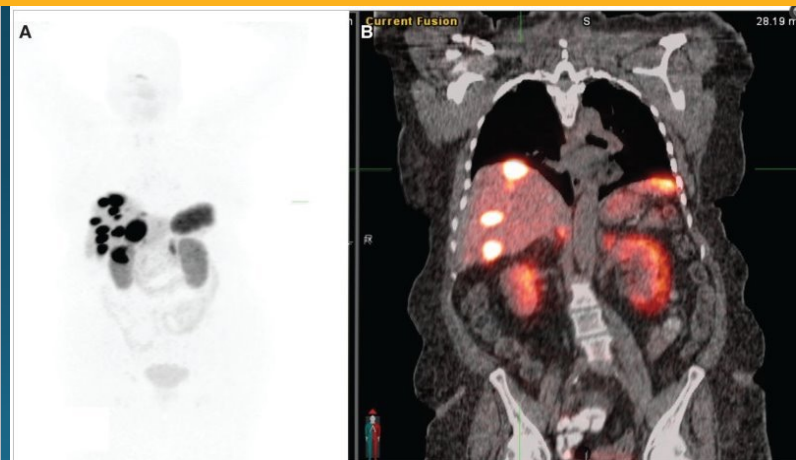


Figure 4

A 74-year-old female with advanced and inoperable metastatic ileal NET. A. ^{68}Ga -DOTATATE (SSTR PET) MIP image and B. Fused coronal image show multiple intensely somatostatin receptor-rich tumors in the liver and portocaval lymph node.

Muzahir et al. Molecular Imaging and Therapy of Neuroendocrine Tumors.



Labs:
 Hb: 14
 ANC: 2.5
 Platelets: 340
 GFR: 95
 Albumin:
 Bilirubin:
 CBC, GFR, LFTs
 within normal limits

Negative for target

Conventional therapy

Targeted therapy

Step 1: To determine suitability for PRRT/Lutathera
 Based on: clinical, laboratory, and imaging findings.

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Diagram shows how Theranostic systems use diagnostic imaging to identify the presence of a target

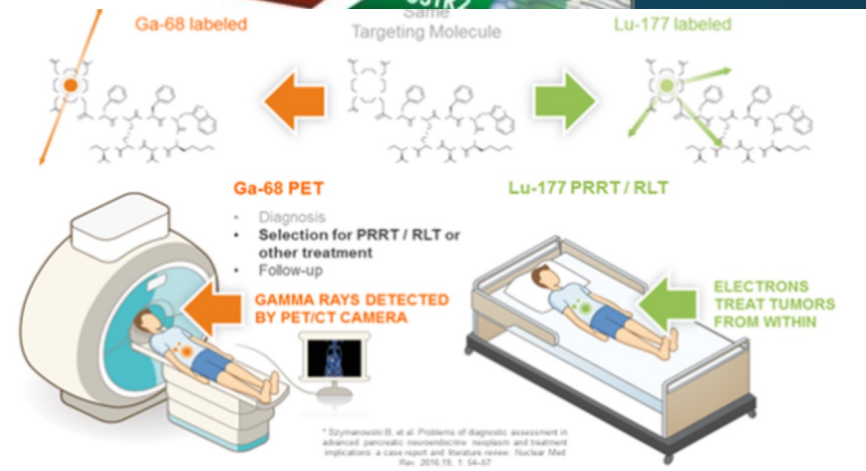
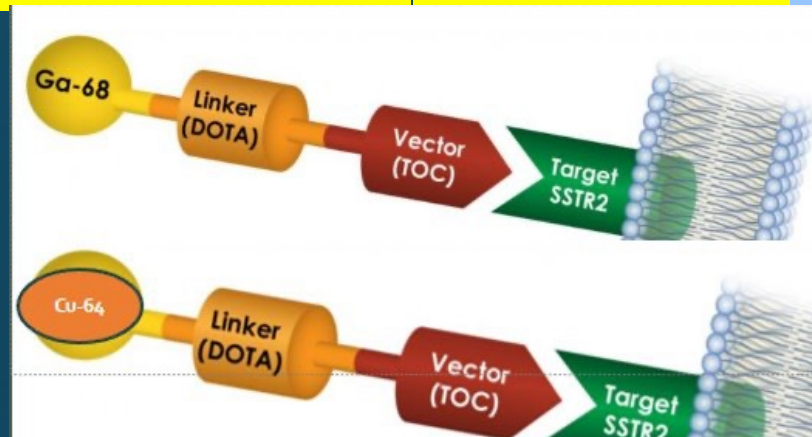
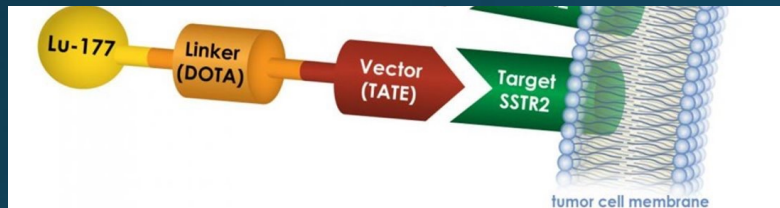
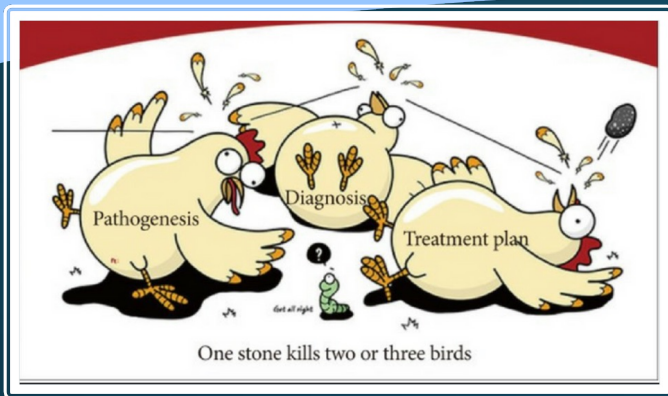


Figure 4

A 74-year-old female with advanced and inoperable metastatic ileal NET. A. ^{68}Ga -DOTATATE (SSTR PET) MIP image and B. Fused coronal image show multiple intensely somatostatin receptor-rich tumors in the liver and portocaval lymph node.

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THERANOSTIC APPROACH



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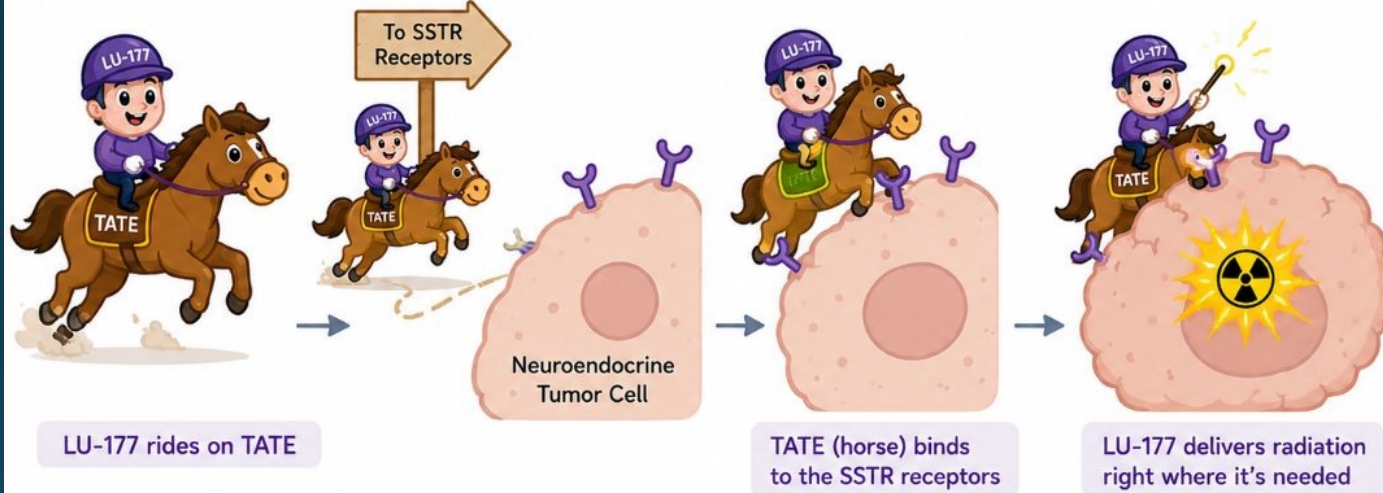


LU-177-TATE: The Jockey (LU-177) on the Horse (TATE)

TATE = synthetic somatostatin analog peptide

TATE (the horse) knows the way to SSTR receptors

- 1 LU-177 is the jockey
TATE is the horse
- 2 TATE (the horse) knows the way to SSTR receptors
- 3 TATE binds to SSTR receptors and brings LU-177 close
- 4 LU-177 (the jockey) delivers targeted radiation and kills the tumor cell



LU-177
The jockey
(the radioisotope)

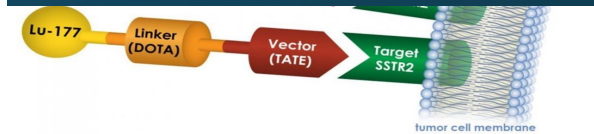


TATE
The horse
(synthetic somatostatin
analog peptide that
knows the way)



SSTR receptors
The docking stations
on tumor cells

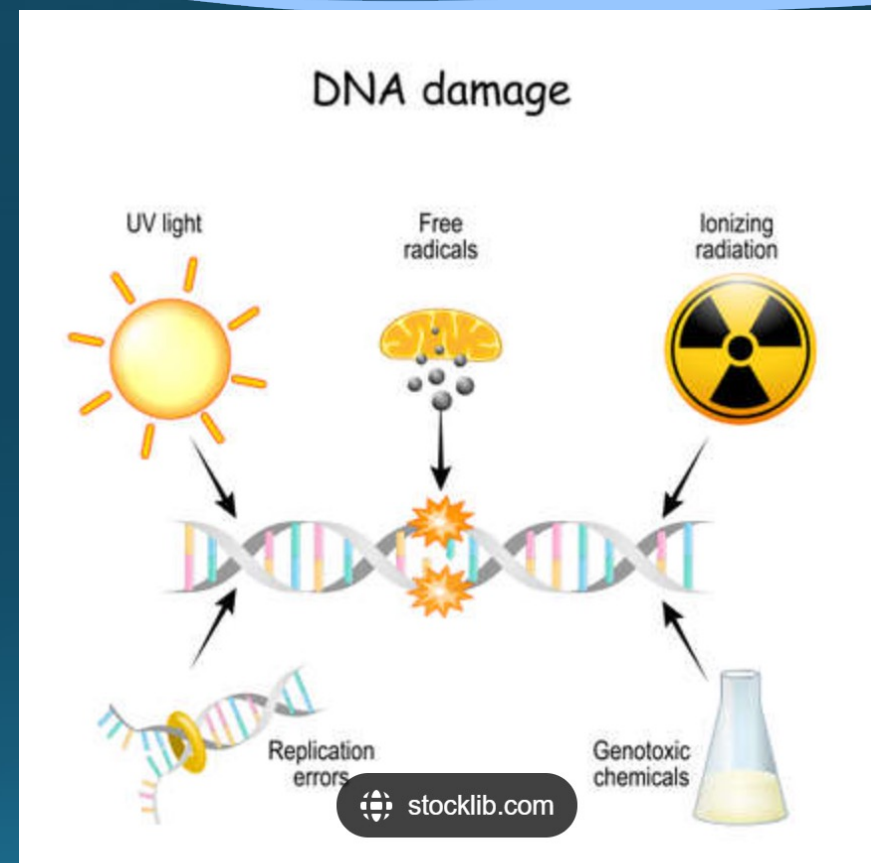
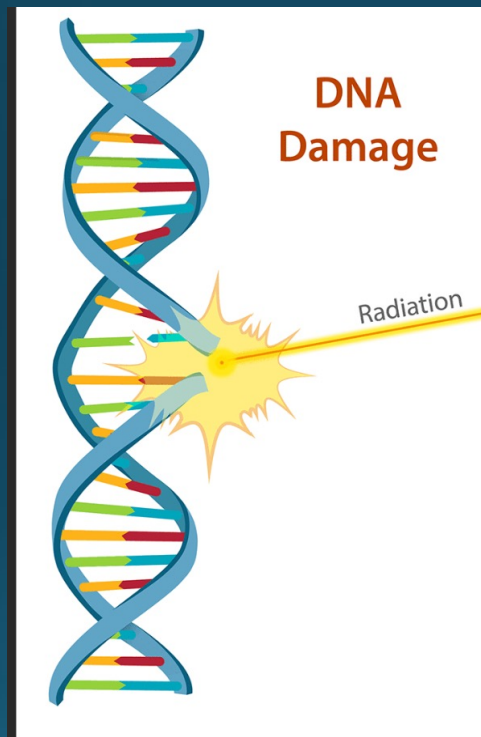
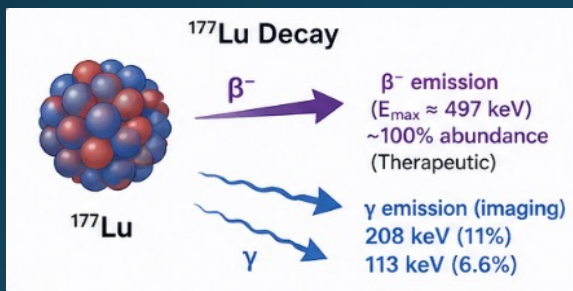
Horse and jockey story



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How does LU-177 DOTATE work



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<https://us.lutathera.com/treatment-process>



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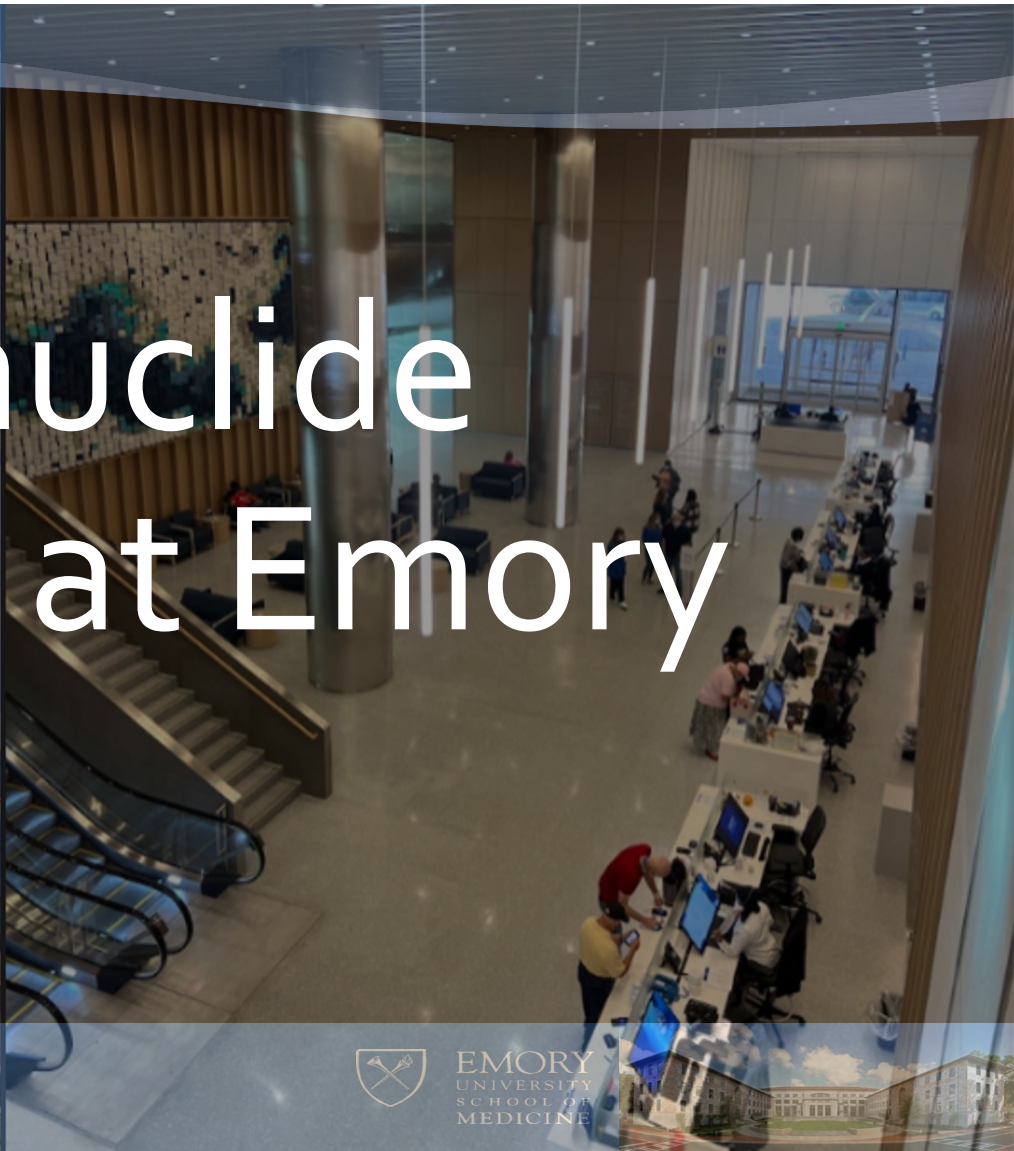
Who can administer these therapies?

These can only be administered under the authority **AUTHORIZED USERS** as defined by NRC.

These are providers who have specific authorization and training for the use of radioactive material(RAM) in medicine.



Radionuclide Therapies at Emory



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On the day of Lu-177 DOTATATE Therapy

No need to be NPO

Good hydration

Bring a book/tablet



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Radiation precautions on the day of the treatment and for 3 days following each treatment cycle are primarily based on clearance pathway and half life of radionuclide treatment.

Clearance Pathways



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Properties of Lu-177 based Therapies

Therapy	Type, energy, and yield (%) of emitted radiation	Physical half-life	Whole-body effective half-life
^{177}Lu based therapies (7–11)	β^- : 497 keV (78.6%); γ : 208 keV (11.1%) and 113 keV (6.6%)	6.7 d	$[^{177}\text{Lu}]\text{Lu-PSMA}$: 35–42 h; $[^{177}\text{Lu}]\text{Lu-DOTATATE}$: ~ 55 h (both with rapid early phase followed by slow phase)



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^{177}Lu -DOTATATE is primarily excreted in urine, with a cumulative excretion:
44% within 5 h,
58% within 24 h,
and 65% within 48 h after administration.

The main focus for individual patients for the first 3 d after therapy is on preventing urinary contamination.

^{177}Lu -DOTATATE Therapy: Urinary Precautions



Focus on Preventing Urinary Contamination for 3 Days After Treatment



Hydrate Well



Use Toilet Sitting Down



Frequent Bathroom Visits

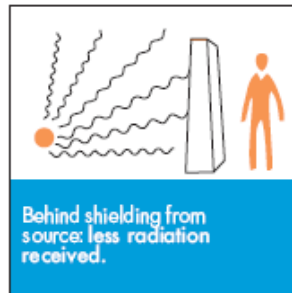
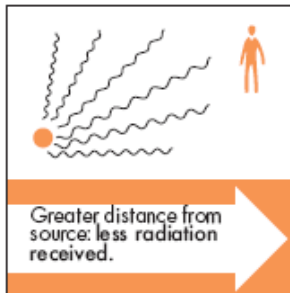
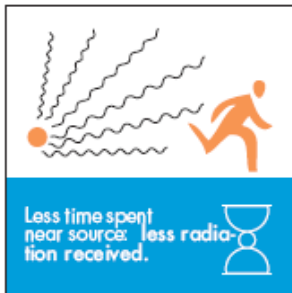


Safe Handling of Waste



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- Time
- Distance
- Shielding
- Contamination control



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Exposure estimate from patient treated with [¹⁷⁷Lu]Lu-PSMA or DOTATATE (7.4 GBq [200 mCi]) (16–20)

For 1-h encounter at 1-m distance

Immediately after infusion, 0.02 mSv; 2 h, 0.014 mSv; 24 h, 0.0064 mSv

TABLE 1
Regulatory Dose Limits and Recommendations

Dose limit (TEDE)	Regulation or recommendation source	Affected group	Notes
1 mSv annually	NRC	General public	Excludes exposure from patients administered radioactive material
5 mSv	NRC regulatory guide 8.39, revision 1	Anyone who may come into contact with individual administered radioactive material	No time frame specified for limit
5 mSv per administration	NRC regulatory guide 8.39, revision 2 (under review)	Anyone who may come into contact with individual administered radioactive material	Time frame specified: 5-mSv limit per administration
50 mSv annually	NRC	Radiation workers	Excludes background radiation and worker's own medical imaging or radiation therapy
1 mSv annually	ICRP 94	Sensitive groups (children, pregnant women) who may come into contact with individual administered radioactive material	Recommendation, not regulatory limit; may apply if HCP is pregnant

TEDE = total effective dose equivalent; NRC = Nuclear Regulatory Commission; ICRP = International Commission on Radiological Protection. U.S. limits above may differ from international regulatory limits.

Comparison of Exposures from ¹⁷⁷Lu- and ¹³¹I-Based Therapies to Other Common Sources of Radiation

Source of radiation	Time frame	Average effective radiation dose
Worldwide background radiation (4)	Year	2.4 mSv
Background radiation in United States (higher radon levels) (4)	Year	3 mSv
Trans-Atlantic flight, New York to Paris* (4)	Flight	0.036 mSv
Chest radiograph (4)	Examination	0.08 mSv
Chest, abdomen, and pelvis CT scan	Examination	12 mSv
[¹⁸ F]FDG PET (without CT component)	Examination	8 mSv
Exposure estimate from patient treated with [¹⁷⁷ Lu]Lu-PSMA or DOTATATE (7.4 GBq [200 mCi]) (16–20)	For 1-h encounter at 1-m distance	Immediately after infusion, 0.02 mSv; 2 h, 0.014 mSv; 24 h, 0.0064 mSv
Exposure estimate from patient treated with [¹³¹ I]NaI (7.4 GBq [200 mCi]) (21)	For 1-h encounter at 1-m distance	Immediately after infusion, 0.34 mSv; 24 h, 0.14 mSv; 48 h, 0.067 mSv

Trans-Atlantic Flight (US to Paris): 0.036 mSv
Chest X ray: 0.08 mSv

Fun Facts

Who are the People
with Highest Radiation
Exposure?



Pilots and
Air
Stewardesses



Nuclear Power
Plant
Technicians



Astronauts



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Department of Radiology
and Imaging Sciences

Emory University Hospital; Atlanta, Georgia; USA
Department of Radiology and Imaging Sciences Division
of Nuclear Medicine and Molecular Imaging

Radionuclide Treatment Record

Mr/MS _____ has received radionuclide therapy (NaI-131, Lu-177 DOTATATE/Lutathera, LU-177 PSMA/Pluvicto, Ra-223/Xofigo) at Emory University Hospital on _____.
(mm/dd/yyyy)

Summary of Radiation Precautions to the Patient

Avoid close contact (at least 3 feet away/about an arm's length) with adults until _____.
(mm/dd/yyyy)

Avoid close contact with children and pregnant women until _____.
(mm/dd/yyyy)

Avoid extended time in public places until _____.
(mm/dd/yyyy)

Sleep in a separate bedroom until _____.
(mm/dd/yyyy)

Sleep in a separate bedroom from infants or children until _____.
(mm/dd/yyyy)

Sleep in a separate bedroom from pregnant partners until _____.
(mm/dd/yyyy)

You may return to work on _____.
(mm/dd/yyyy)

Physician Signature: _____ Date: _____

Patient Signature: _____ Date: _____

If you have a question specifically about radiation exposure, call the Emory University Hospital Radiation Safety Office during business hours (8 am - 4:30 pm) at 404-508-5922 (day); after business hours contact the Emory Operator to page the Nuclear Medicine Resident or Attending Physician on call at 404-686-1000.

PASSPORT



LU-177 DOTATE
Therapy



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Side- Effects

Early (Acute and subacute):

Fatigue (40%)

Abdominal pain (26%)

Temporary hair loss (11%–60%) .

Decrease in blood counts: It may occur 4–8 weeks after therapy, mostly in the form of anemia, thrombocytopenia, or leukopenia. These conditions are mostly mild or reversible.

G₃, G₄ (severe but temporary) after PRRT with ¹⁷⁷Lu-DOTATATE occurs in 4-11% of patients.

Persistent decrease in blood counts has been reported in as many as 4% of patients treated with ¹⁷⁷Lu DOTATATE.

Renal toxicity: acute nephrotoxicity still occurs in 1%–5% of patients.

However, long term renal dysfunction is observed in only <1% of patients

Liver toxicity: approximately 1%–4% of patients and depends highly on the liver tumor burden



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Late effects

Temporary or permanent infertility

Treatment-related cancers in the form of myelodysplastic syndrome and acute leukemia have been reported in 1–4% of patients.



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Radiopharmaceutical
Therapy Center
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Become a Clinical
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Become
**Registered
Therapy**



No of RNT: Multiple
Equipment

Find a Designated Radiopharmaceutical Therapy Center of Excellence

Locate an SNMMI-designated Radiopharmaceutical Therapy Center of Excellence.



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specialists, techs)

trial

\$1500/\$2500 (non-member)

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\$900 member/\$1,500 non-member
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Does not require an application fee

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LUTATHERA®
(lutetium Lu 177 dotatate)
injection, for intravenous use

FIND A TREATMENT SITE

Home

Understanding GEP-
NETs



About LUTATHERA



Side effects and
radiation safety



What to expect with
LUTATHERA

Patient support



Stay connected

Find a treatment site



Type in your location to find the LUTATHERA treatment centers that are nearest to you.

Name

Center/Practice

Location

Birmingham, Alabama, USA

🔍 Search



Donna's LUTATHERA Story

<https://us.lutathera.com/patient-support/find-a-treatment-site>



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