

Personalized Medicine: Integrating Diagnostic Imaging and Therapeutic Approaches („Theranostics“)

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IAEA Scientific Forum

**Nuclear Techniques
in Human Health**

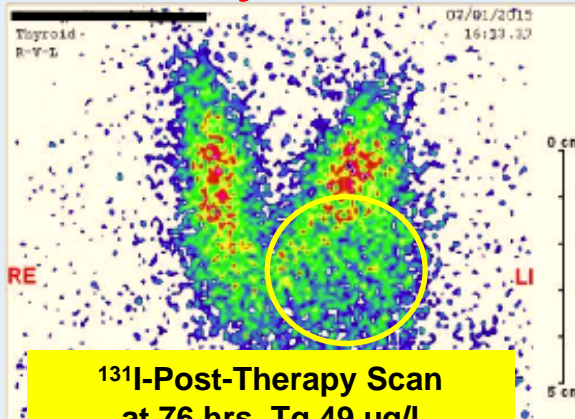
Prevention, Diagnosis, Treatment

Nuclear Medicine Department, Medical University Innsbruck



“Theranostic” Approach in Thyroid Cancer

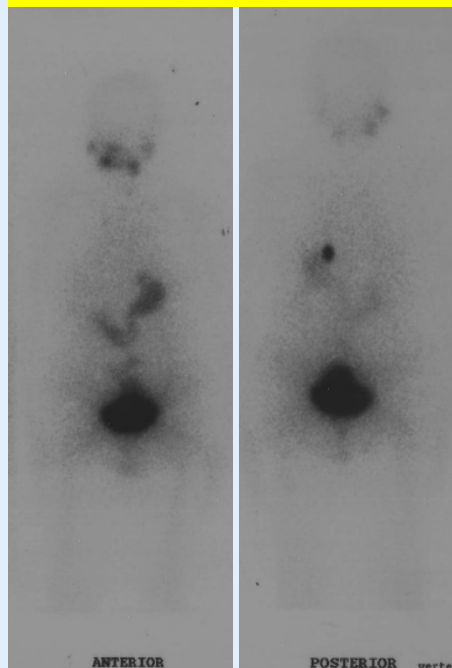
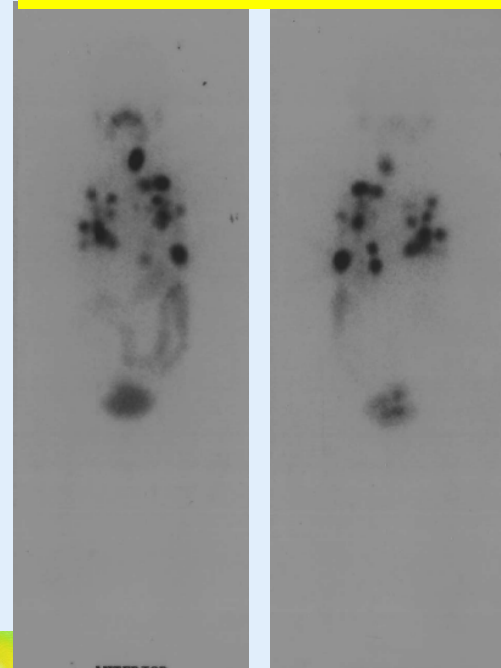
My Dear Old Friend Radioiodine – ^{131}I



^{131}I -Post-Therapy Scan
at 76 hrs, Tg 49 µg/l

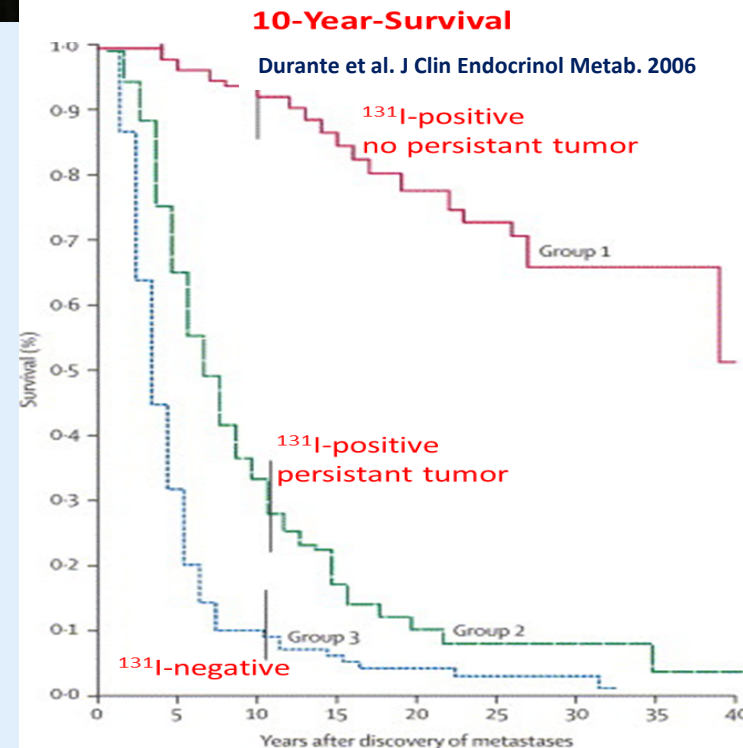


^{131}I -Follow-up Scan after
6 months, Tg 3.7 µg/l



Treatment Strategy:

- Radical Thyroidectomy
- High-dose ^{131}I -Therapy
- Thyroid Hormone Substitution

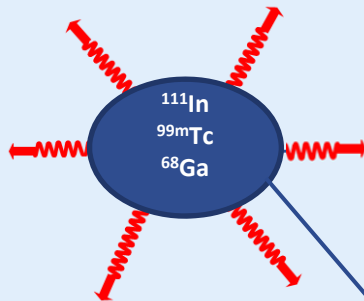


Basic Principle

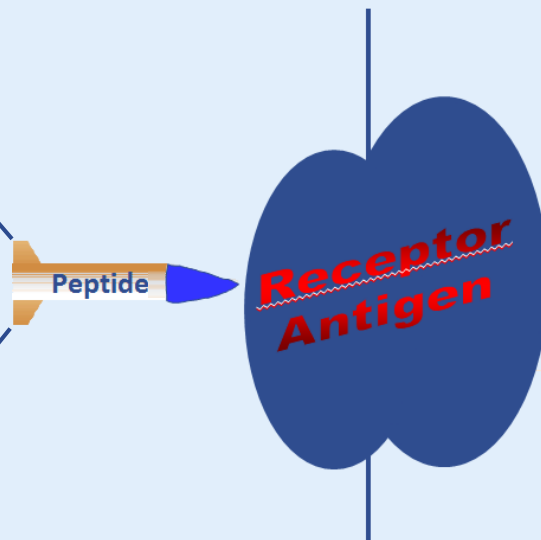
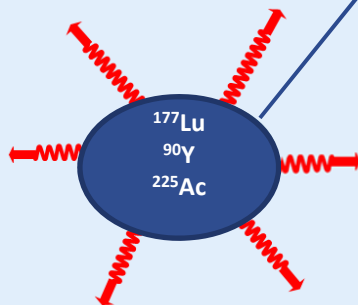


Peptide Receptor Radionuclide Therapy (PRRT) Peptide Ligand Radionuclide Therapy (PLRT)

Diagnosis



Therapy



Peptide's Rap

You are a receptor / antigen,
I am a peptide / ligand,
I want to interact with you!

I want to be labelled,
smoothly radiolabelled to find you,

I want to be labelled,
roughly radiolabelled to kill you,

You are a receptor,
I am a peptide,
I love - and I hate you!

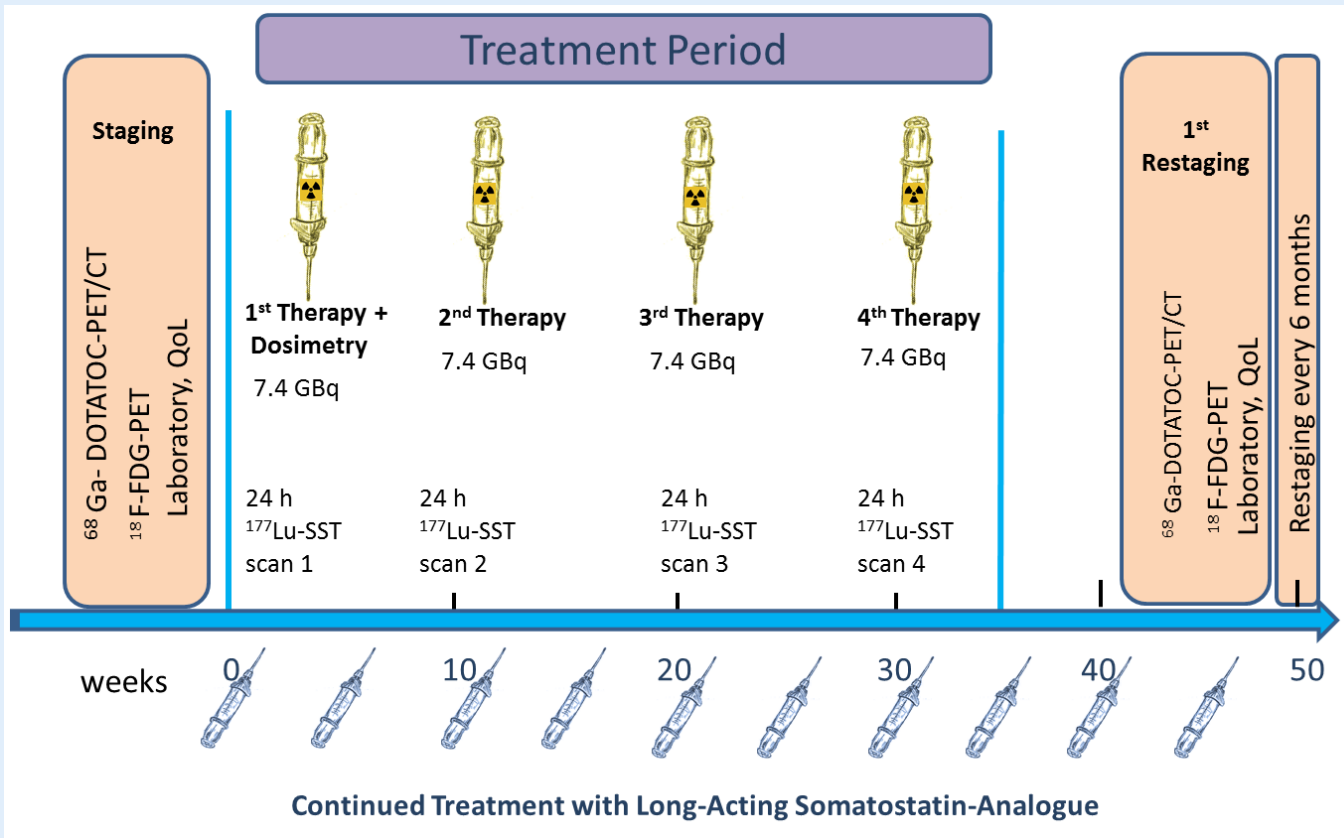
**Diagnosis and Therapy are Walking Together
on Radiopeptides' Avenue: "Theranostics"**

EDITORIAL. EJNMMI 2011 Apr;38(4):605-12
L. Mansi & I. Virgolini



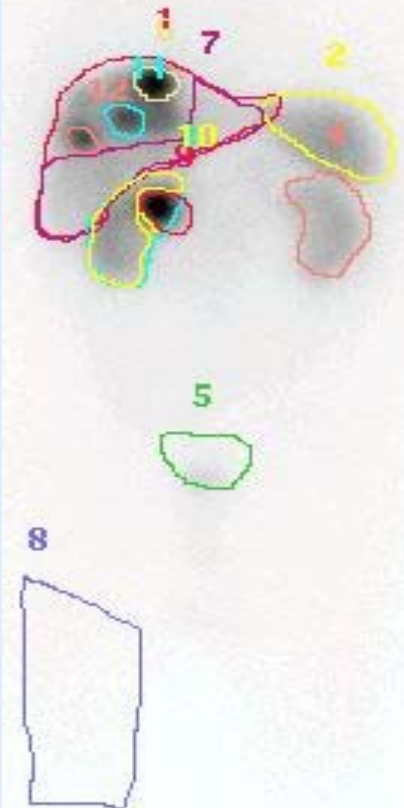
INNSBRUCK - PRRT Treatment Scheme

(Individually Adapted Doses and Time Intervals Depending on Tumor Stage, Age, Tracer Uptake, Biochemical Response, Karnofsky Index, QoL)



¹¹¹In-DOTA-TOC Dosimetry

- Estimation of Benefit / Risk
- Estimation of Tumour Dose
- Estimation of Organ Dose

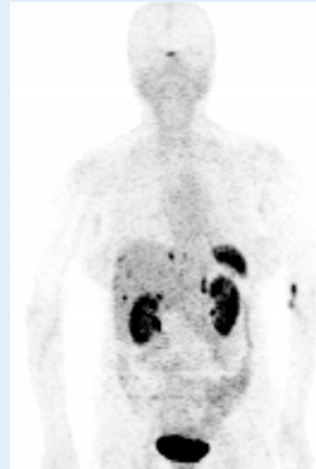


⁶⁸Ga-DOTA-Tyr³-OCTREOTIDE PET

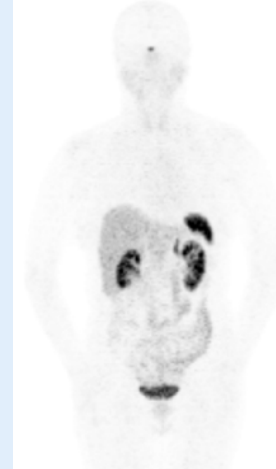
Long-term Follow-Up after 1st PRRT (10 GBq ⁹⁰Y-DOTA-TOC) and 2nd PRRT (29 GBq ¹⁷⁷Lu-DOTATATE) in a Patient with Pancreatic Neuroendocrine Tumor



10/2005



07/2006



11/2006

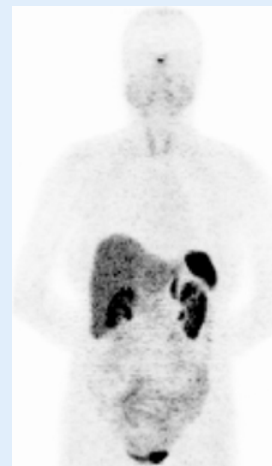
Complete Remission



09/2007



03/2008



09/2008

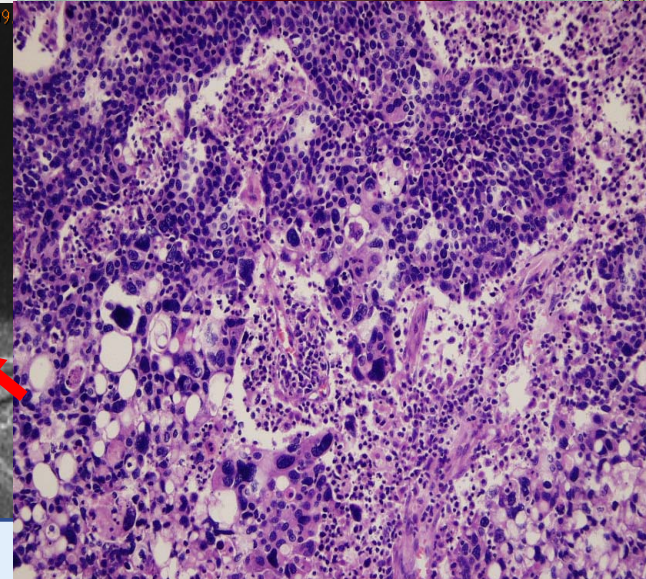
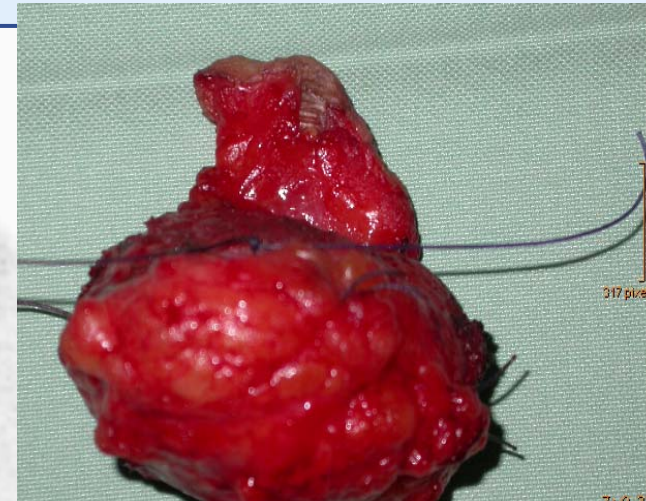
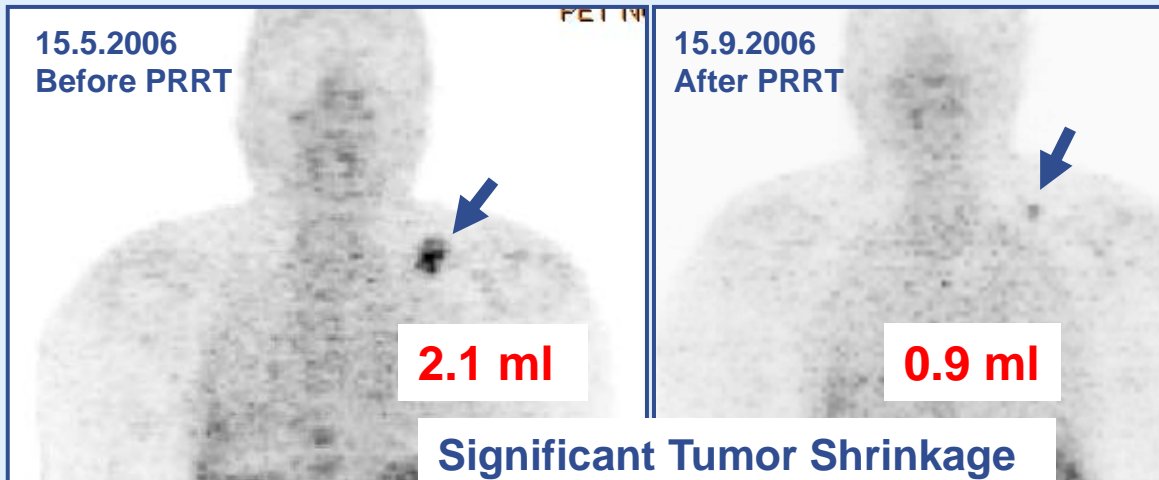


03/2009



^{68}Ga -DOTA-LANREOTIDE PET

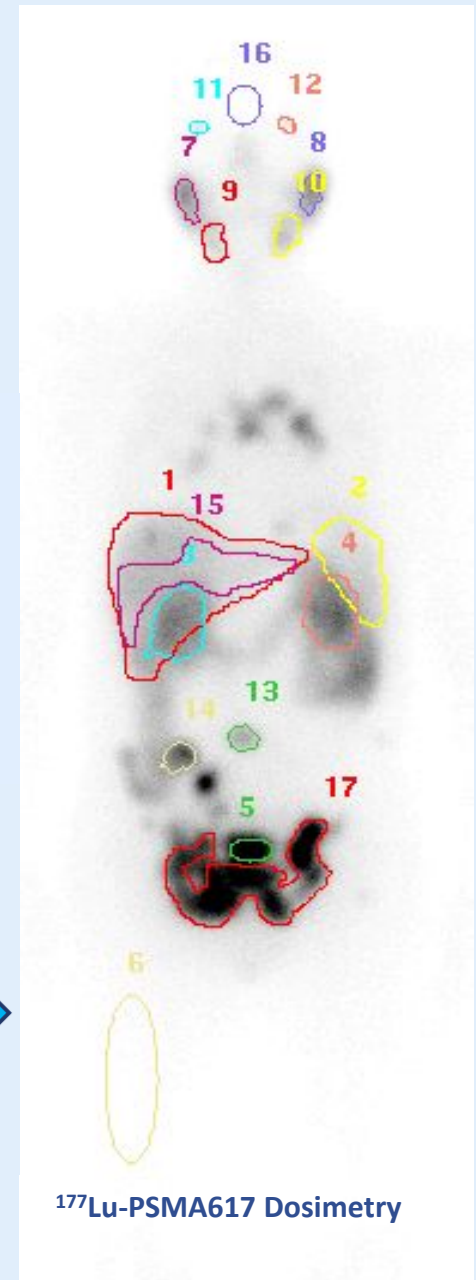
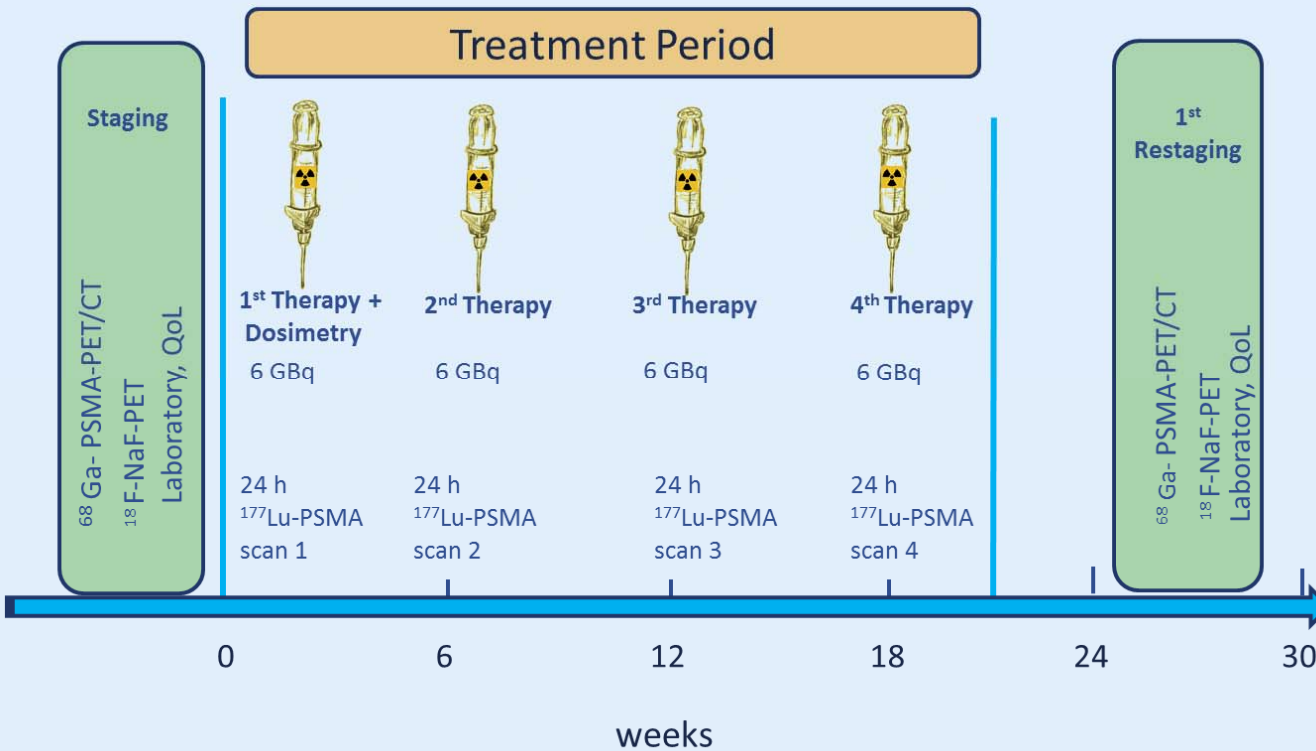
Therapy Monitoring after 3.5 GBq ^{90}Y -DOTA-LANREOTIDE (Tumor Dose 63 Gy) in a Patient with Urothelial Cell Cancer



„Prostanostics“:

PSMA-directed Theranostics

INNSBRUCK - PLRT Treatment Scheme



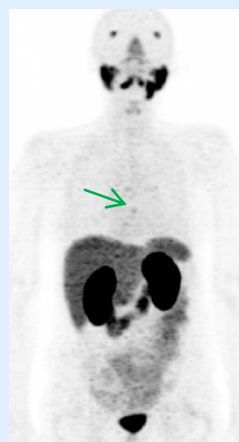
^{68}Ga -PSMA-11 PET/CT in Prostate Cancer Treatment Monitoring after ^{177}Lu -PSMA-617 Therapy



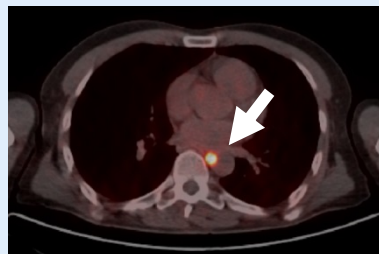
before



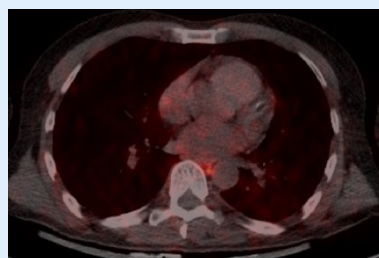
1st restaging
after 2 months



2nd restaging
after 6 months



before therapy
PSA: 0.64 ng/ml



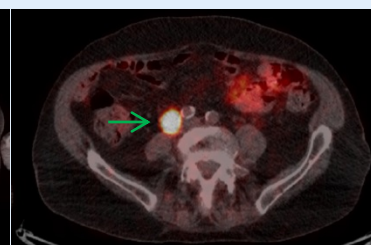
after 2 cycles i.e. 12 GBq
(tumor dose: 40 Gy)
PSA: 0.04 ng/ml



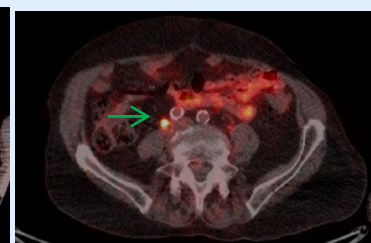
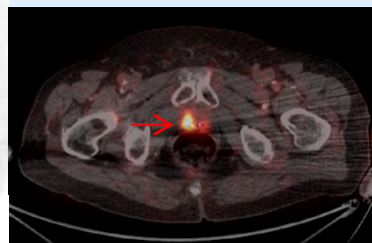
before



1st restaging
after 2 months

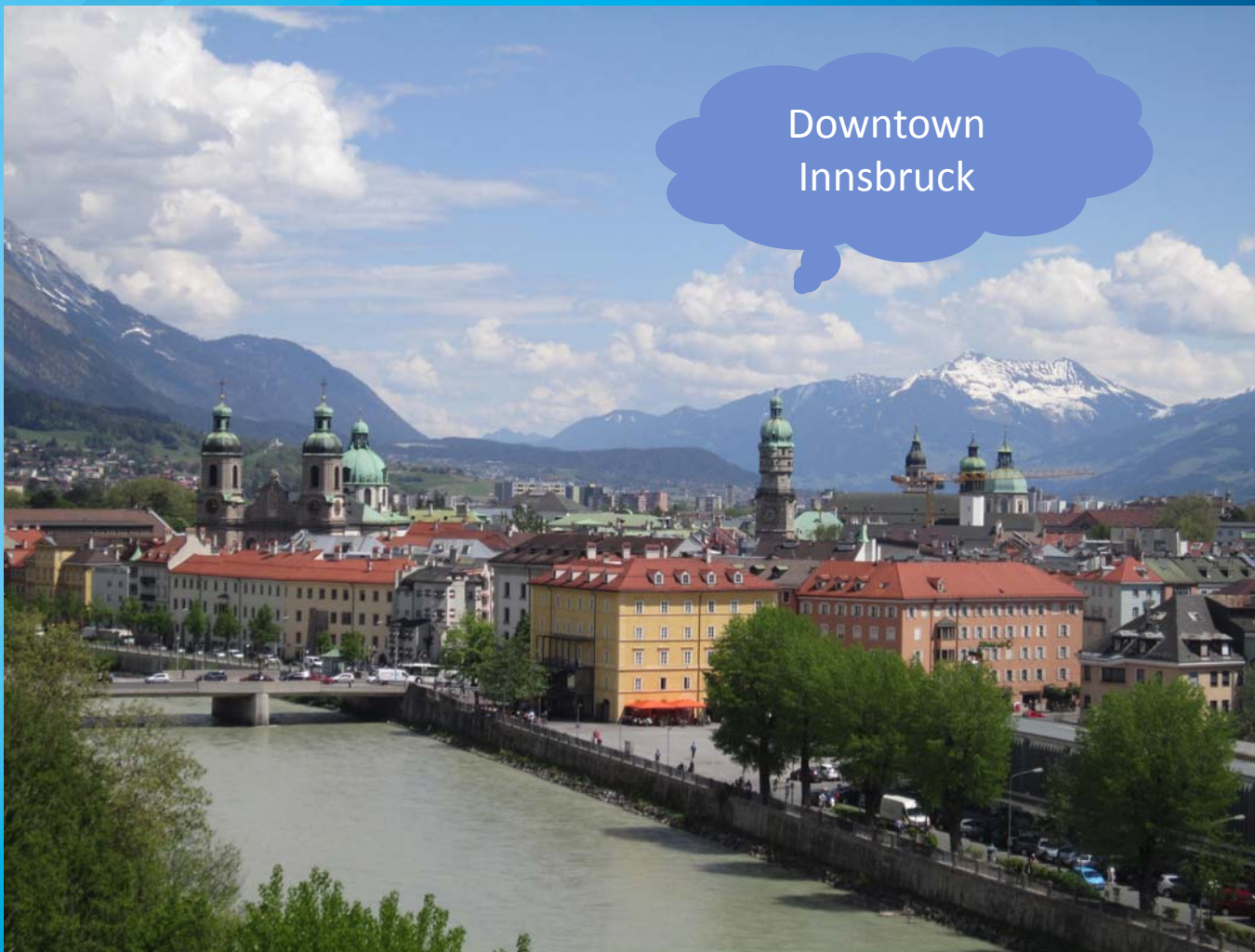


before therapy
PSA: 77 ng/ml



after 4 cycles i.e. 24 GBq
(tumor dose: 75 Gy)
PSA: 0.81 ng/ml

Thank you!



Downtown
Innsbruck