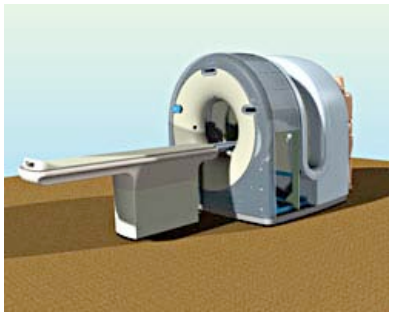
Azienda Ospedaliero-Universitaria di Bologna
Policlinico S.Orsola-Malpighi

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

OCTREOSCAN, PET E PET/TC E NUOVI TRACCIANTI

Stefano Fanti

STATE OF THE ART



PET/CT

+

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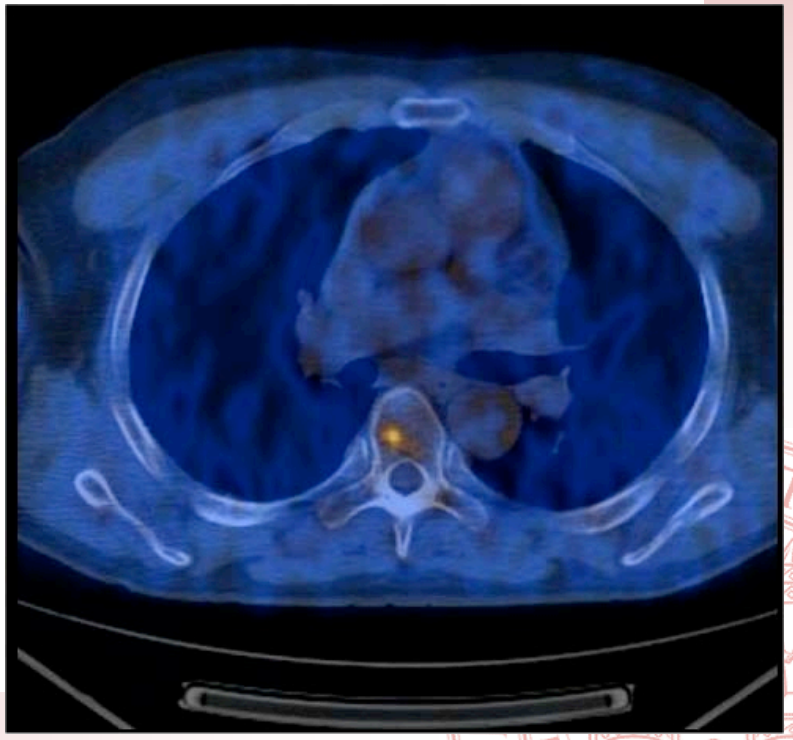


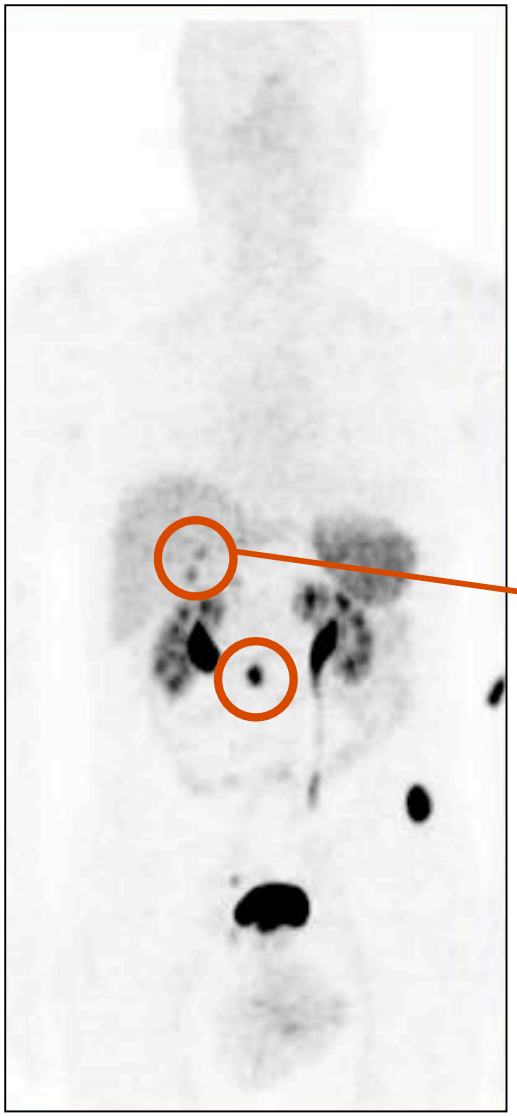
OCTREOSCAN

^{18}F-DOPA PET

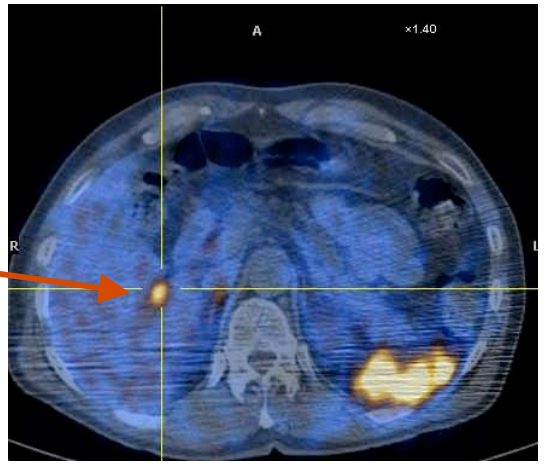
Somatostatin Receptor PET

OCTREOSCAN

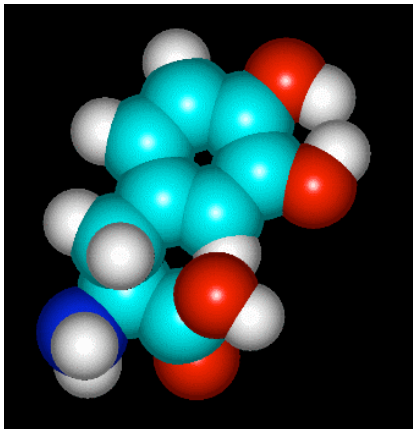
Octreoscan

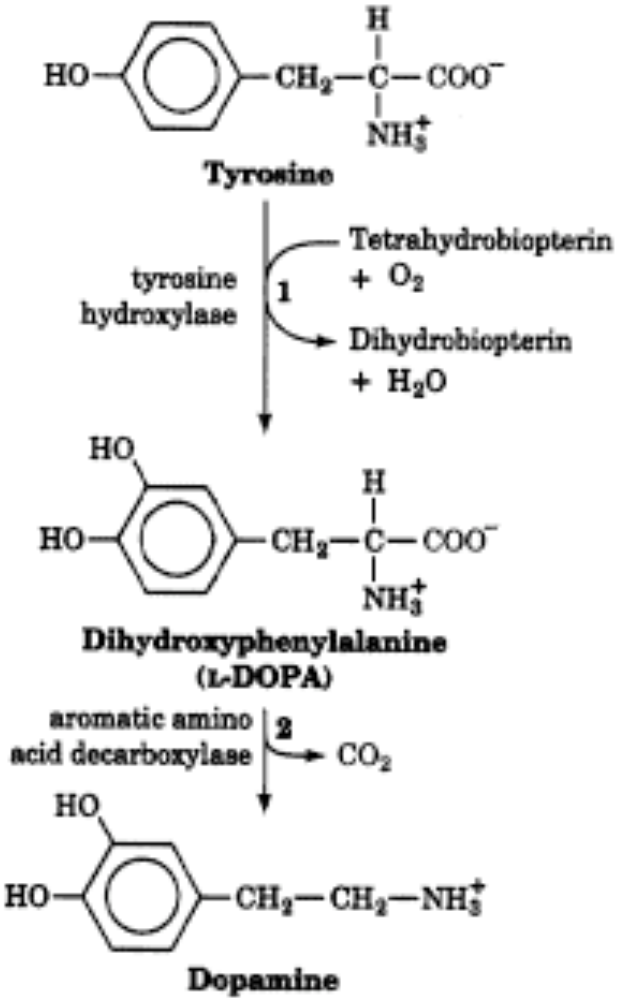


Ga-DOTA-NOC



^{18}F-DOPA PET

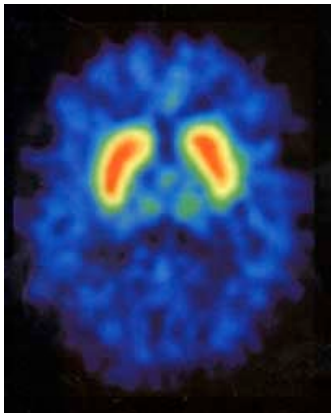



HO
CH2
C
COO−
H
NH3+
Tyrosine
tyrosine hydroxylase
1
Tetrahydrobiopterin + O2
Dihydrobiopterin + H2O
HO
HO
CH2
C
COO−
H
NH3+
Dihydroxyphenylalanine (L-DOPA)
aromatic amino acid decarboxylase
2
CO2
HO
HO
CH2
CH2
NH3+
Dopamine

CLINICAL APPLICATIONS

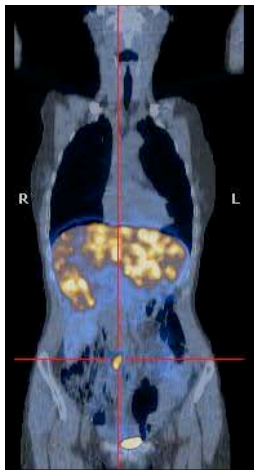
NEUROLOGY:

Movement disorders



ONCOLOGY:

Neuroendocrine tumors



Stefan Hoegerle, MD
Egbert Nitzsche, MD
Carsten Altehoefer, MD
Nadir Ghanem, MD
Tanja Manz, MD
Ingo Brink, MD
Martin Reincke, MD
Ernst Moser, MD, PhD
Hartmut P. H. Neumann,

Pheochromocytomas: Detection with ^{18}F DOPA Whole-Body PET—Initial Results[1]

508 · Radiology · February 2002

Stefan Hoegerle, MD
Carsten Altehoefer, MD
Nadir Ghanem, MD
Gabriele Koehler, MD
Cornelius F. Waller, MD
Hans Scheruebl, MD
Ernst Moser, MD, PhD
Egbert Nitzsche, MD

Whole-Body ^{18}F Dopa PET for Detection of Gastrointestinal Carcinoid Tumors[1]

374 · Radiology · August 2001

PURPOSE: To evaluate fluorin

^{18}F-DOPA positron emission tomography for tumour detection in patients with medullary thyroid carcinoma and elevated calcitonin levels

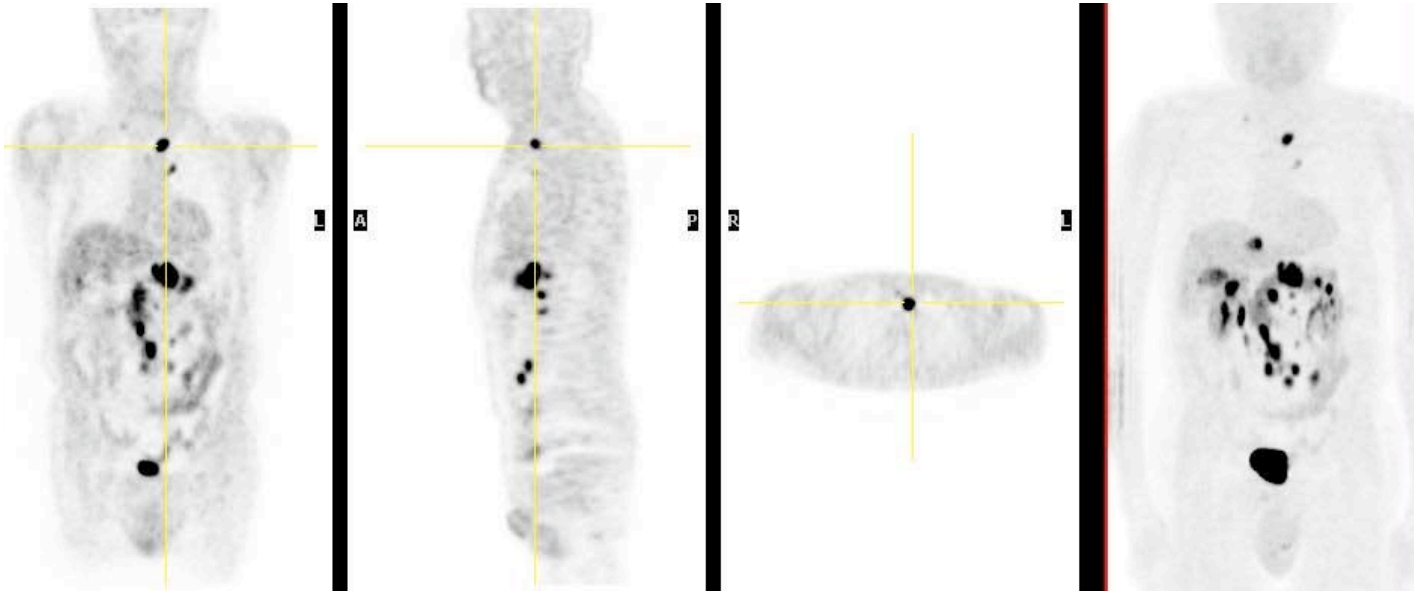
Eur J Nucl Med (2001) 28:64–71

Stefan Hoegerle[1], Carsten Altehoefer[2], Nadir Ghanem[2], Ingo Brink[1], Ernst Moser[1], Egbert Nitzsche[1]

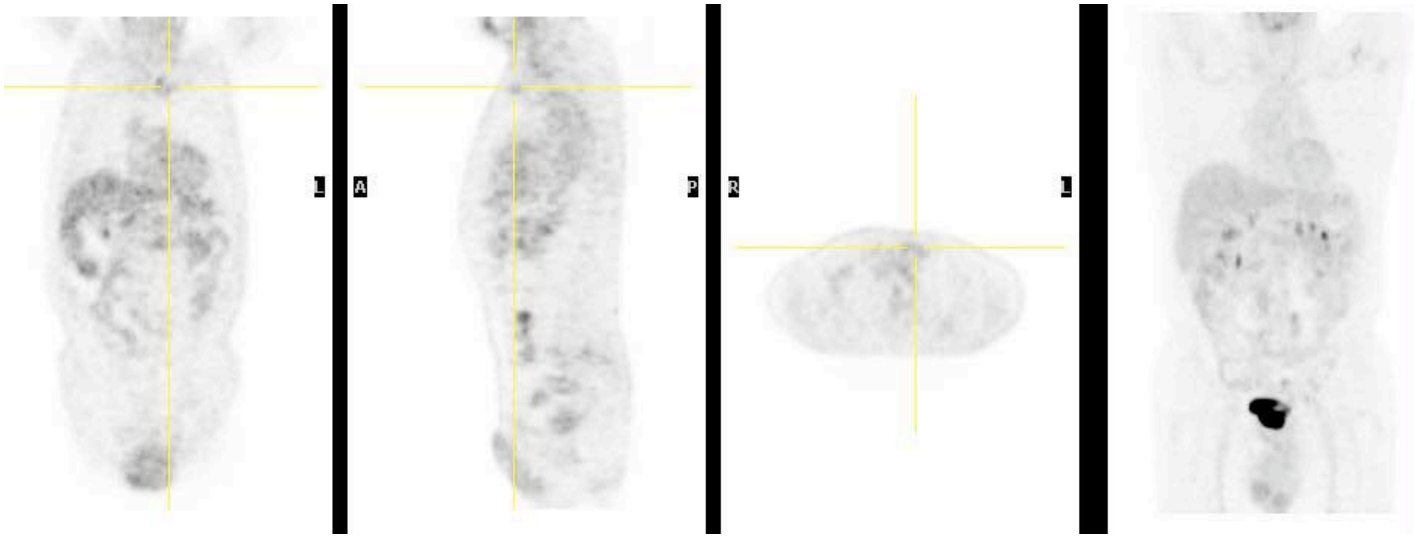
Positron emission tomography with [^{18}F]FDOPA and [^{18}F]FDG in the imaging of small cell lung carcinoma: preliminary results

Thierry Jacob, Dany Grahek, Nassima Younsi, Khaldoun Kerrou, Nicolas Aide, Françoise Montravers, Sonia Balogova, Cecile Colombet, Virginie de Beco, Jean N. Talbot

Eur J Nucl Med Mol Imaging (2003) 30:1266–1269

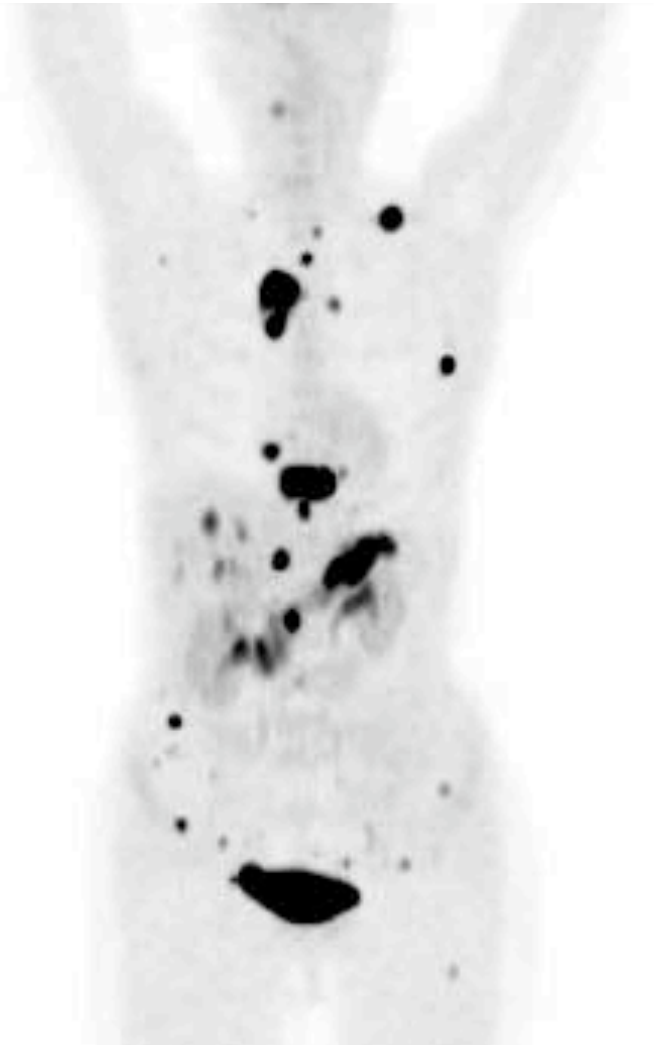


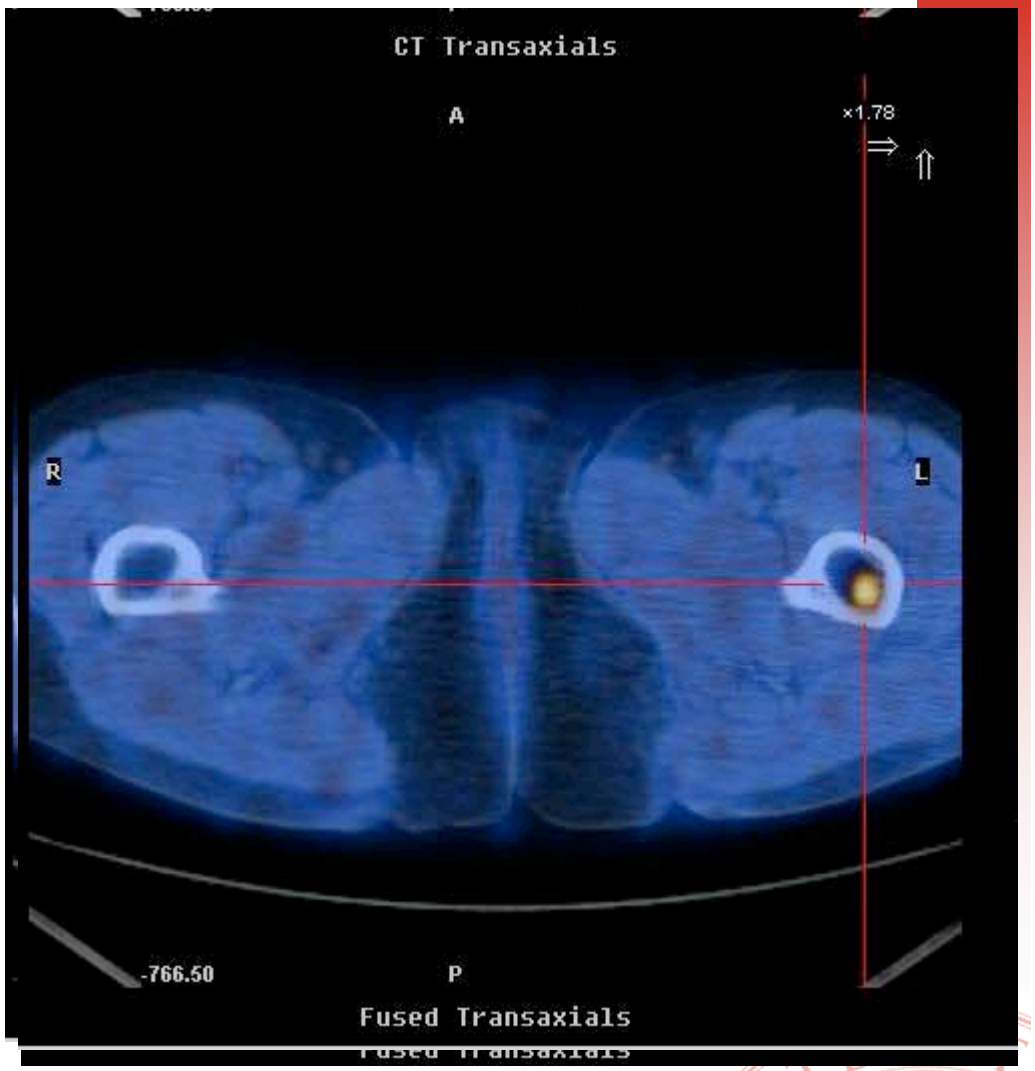
F-DOPA



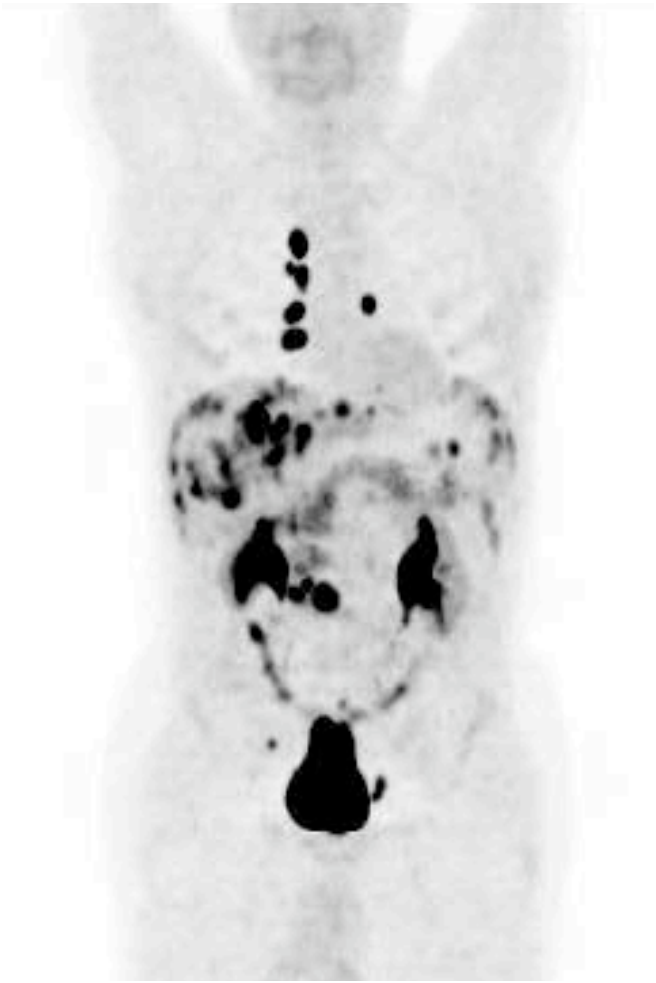
FDG

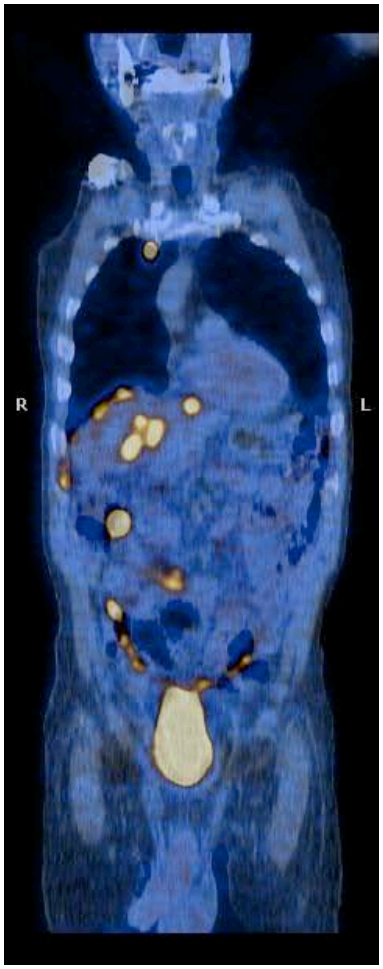
M, 59yo. Metastatic carcinoid.



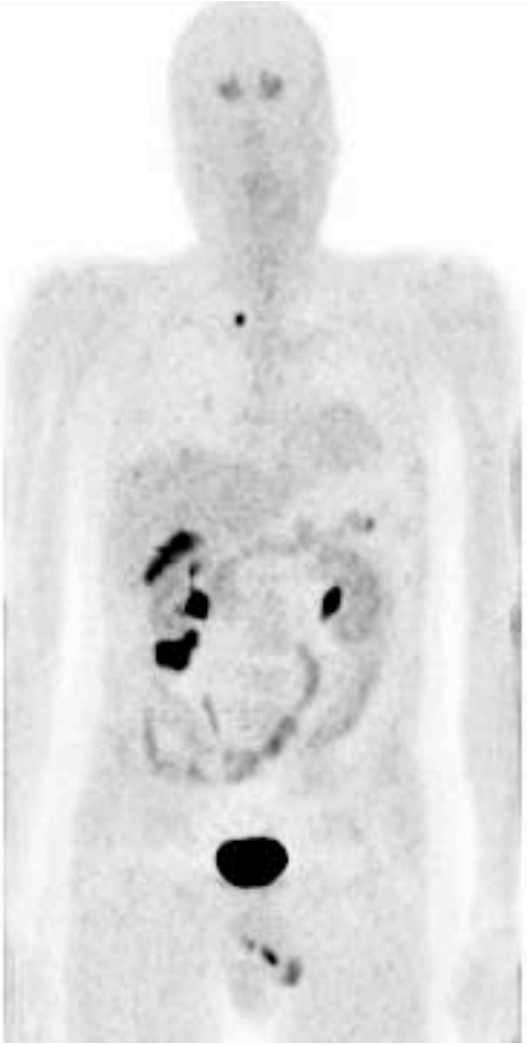


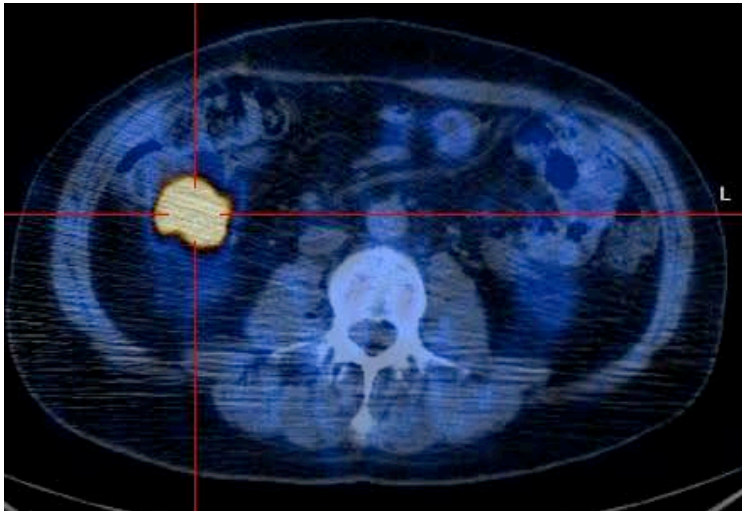
F 45yo: staging of metastatic carcinoid. Several bone lesions

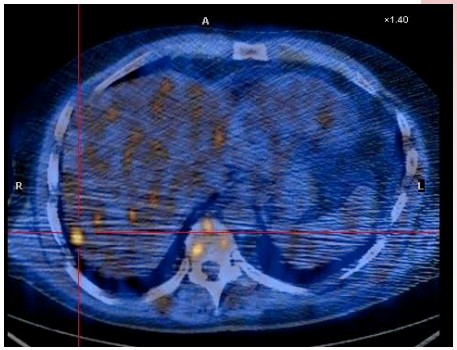


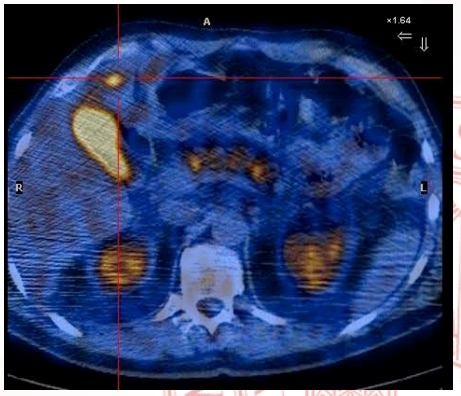


Male,62yo. Secondary lesions within the liver. Unknown primary.









Male,58yo. Ileum NET already operated (2004). Restaging

Imaging of Advanced Neuroendocrine Tumors with ^{18}F-FDOPA PET

Alexander Becherer, MD[1,2]; Monica Szabó, MD[1]; Georgios Karanikas, MD[1]; Patrick Wunderbaldinger, MD[3]; Peter Angelberger, PhD[4]; Markus Raderer, MD[5]; Amir Kurtaran, MD[1]; Robert Dudczak, MD[1,2]; and Kurt Kletter, MD, PhD[1]

[1]Department of Nuclear Medicine, University of Vienna, Medical School, Vienna, Austria; [2]Ludwig Boltzmann Institute of Nuclear Medicine, Vienna, Austria; [3]Department of Radiology, University of Vienna, Medical School, Vienna, Austria; [4]Department of Radiopharmaceuticals, Austrian Research Centers Seibersdorf, Seibersdorf, Austria; and [5]Department of Oncology, University of Vienna, Medical School, Vienna, Austria

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Imaging of Advanced Neuroendocrine Tumors with ^{18}F-FDOPA PET

Alexander Becherer, MD[1,2]; Monica Szabó, MD[1]; Georgios Karanikas, MD[1]; Patrick Wunderbaldinger, MD[3]; Peter Angelberger, PhD[4]; Markus Raderer, MD[5]; Amir Kurtaran, MD[1]; Robert Dudczak, MD[1,2]; and Kurt Kletter, MD, PhD[1]

[1]Department of Nuclear Medicine, University of Vienna, Medical School, Vienna, Austria; [2]Ludwig Boltzmann Institute of Nuclear Medicine, Vienna, Austria; [3]Department of Radiology, University of Vienna, Medical School, Vienna, Austria; [4]Department of Radiopharmaceuticals, Austrian Research Centers Seibersdorf, Seibersdorf, Austria; and [5]Department of Oncology, University of Vienna, Medical School, Vienna, Austria

TABLE 3
Sensitivity and Specificity of SRS and PET in Different Organs and Regions

	Bone		Mediastinum		Lungs		Liver		Pancreas		Lymph nodes	
Parameter	SRS	PET	SRS	PET	SRS	PET	SRS	PET	SRS	PET	SRS	PET
True-negative	11	10	16	16	17	17	7	6	20	20	12	12
True-positive	6	12	3	7	0	1	12	13	2	3	9	10
False-negative	6	0	4	0	5	4	4	3	1	0	2	1
False-positive	0	1	0	0	1	1	0	1	0	0	0	0
Prevalence	52.2		30.3		21.7		69.7		13.0		47.8	
Sensitivity (%)	50.0	100.0	42.9	100.0	0.0	20.0	75.0	81.3	66.7	100.0	81.8	90.9
	(21–87)	(73–100)	(9–85)	(59–100)	(0–87)	(0–89)	(47–93)	(54–98)	(9–91)	(29–100)	(48–95)	(58–97)
Specificity (%)	100.0	90.9	100.0	100.0	94.4	94.4	100.0	85.7	100.0	100.0	100.0	100.0
	(71–100)	(56–99)	(79–100)	(79–100)	(72–99)	(72–99)	(59–100)	(42–99)	(83–100)	(83–100)	(73–100)	(73–100)
PPV	100.0	92.3	100.0	100.0	0.0	50.0	100.0	92.9	100.0	100.0	100.0	100.0
	(54–100)	(63–99)	(29–100)	(59–100)	(0–99)	(1–99)	(73–100)	(66–99)	(15–100)	(29–100)	(66–100)	(69–100)
NPV	64.7	100.0	80.0	100.0	77.3	81.0	63.7	66.7	95.2	100.0	85.7	90.9
	(38–85)	(69–100)	(56–94)	(79–100)	(54–92)	(58–94)	(30–89)	(29–92)	(47–99)	(83–100)	(51–97)	(63–99)

PPV = positive predictive value; NPV = negative predictive value.
95% confidence intervals are in parentheses.

Somatostatin Receptor PET

Somatostatin Receptor PET

1: Horm Metab Res Suppl. 1993;27:12-7.

New octreotide derivatives for in vivo targeting of somatostatin receptor-positive tumors for single photon emission computed tomography (SPECT) and positron emission tomography (PET).

Macke HR, Smith-Jones P, Maina T, Stolz B, Albert R, Bruns C, Reist H.

Institute of Nuclear Medicine, Kantonsspital Basel, Switzerland.

Two new modifications of the somatostatin analog octreotide, designed to hold the gallium isotopes 67Ga and 68Ga (DFO-SMS, Fig. 1a) and 99mTc (PnAO-SMS, Fig. 1b) have been synthesized and evaluated in vitro and in vivo in tumor bearing rats. DFO-SMS can be labeled with 67Ga3+ and 68Ga3+ with high specific activity within less than 30 minutes in a "cold kit" type formulation. The labeled conjugate is stable under physiological conditions. Moreover the binding affinity to somatostatin receptors on rat brain cortex membranes was shown to be retained. In vivo fast tumor localization was demonstrated and the pharmacokinetics proved to be favourable as the main excretion route was via the kidneys. First PET studies with [68Ga]-DFO-SMS showed a rapid accumulation in the tumor and a residence half-life at the tumor site of about 6 hours. PnAO-SMS can be labeled with 99mTc with high radiochemical purity. In vivo the radiotracer accumulates well in the tumor but due to its high lipophilicity, its main excretion route is via the hepatobiliary system.

Somatostatin Receptor PET

1: J Nucl Med. 1995 Dec;36(12):2315-25.

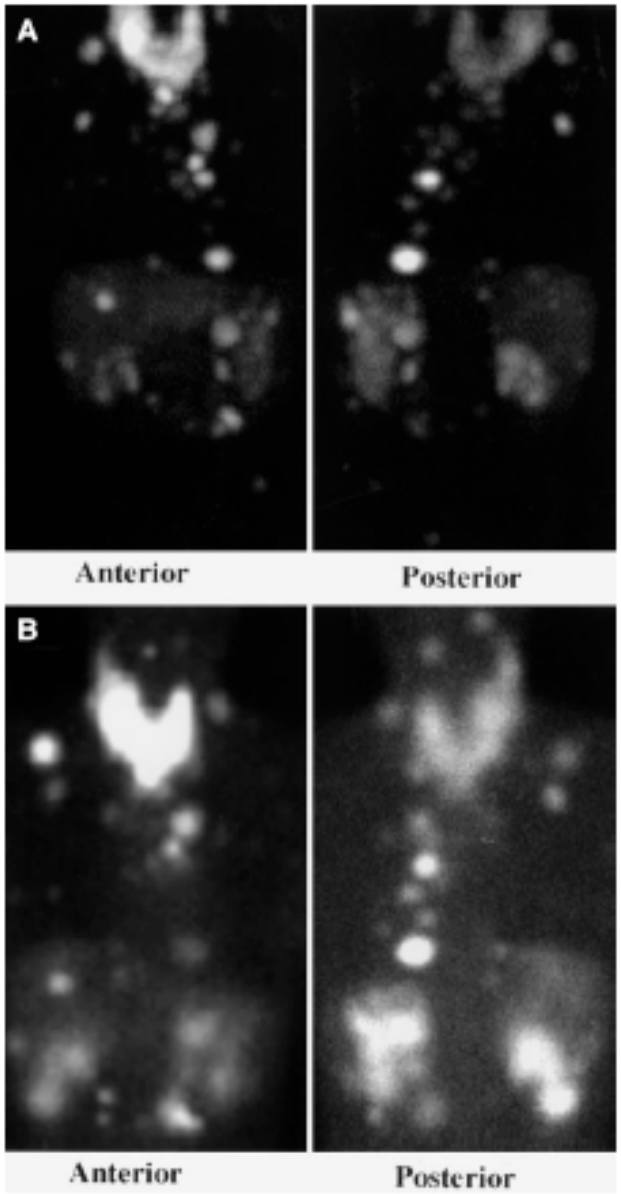
In vitro and in vivo evaluation of copper-64-octreotide conjugates.

Anderson CJ, Pajeau TS, Edwards WB, Sherman EL, Rogers BE, Welch MJ.

Washington University School of Medicine, Mallinckrodt Institute of Radiology, St. Louis, Missouri.

Copper-64 (T1/2 = 12.8 hr) is a reactor-produced radionuclide that has applications in both nuclear medicine imaging by PET and radiotherapy. Octreotide, a somatostatin receptor ligand, has been conjugated with TETA and CPTA, labeled with 64Cu, evaluated both in vitro and in vivo and compared to 111In-DTPA-D-Phe1-octreotide. METHODS: The carboxylic acid moieties on the T bifunctional chelates were conjugated to the N-terminal amine of D-Phe using the linking agents hydroxybenzotriazol (HOBT) and diisopropylcarbodiimide (DIC). Receptor binding assays on all three radiolabeled octreotide conjugates were accomplished in AtT20 mouse pituitary carcinoma cell membranes. In vivo biodistribution was performed using normal Sprague-Dawley rats and Lewis rats carrying a somatostatin receptor-positive rat pancreatic tumor. RESULTS: The binding affinities of 64Cu-CPTA-D-Phe1-octreotide and 64Cu-TETA-D-Phe1-octreotide in AtT20 cell membranes were both greater than 111In-DTPA-D-Phe1-octreotide (Kd, 78.5 pM, 314 pM and 3.28 nM, respectively). In normal rats, 64Cu-CPTA-D-Phe1-octreotide was localized primarily in the liver. Copper-64-TETA-D-Phe1-octreotide, similar to 111In-DTPA-D-Phe1-octreotide, had moderate uptake in the kidneys; the hepatobiliary uptake was negligible. In rats bearing CA 20948 pancreatic tumors, both 64Cu-CPTA-D-Phe1-octreotide and 64Cu-TETA-D-Phe1-octreotide had uptake in tumors comparable to better than 111In-DTPA-D-Phe1-octreotide. CONCLUSION: Of the two 64Cu-labeled octreotide conjugates evaluated, 64Cu-CPTA-D-Phe1-octreotide has the highest affinity for the somatostatin receptor; however, the clearance was hepatobiliary with slow excretion. Copper-64-TETA-D-Phe1-octreotide binds to the somatostatin receptor with five times the affinity of 111In-octreotide, has desirable clearance properties (renal clearance with rapid excretion) and is a potential agent for PET imaging of somatostatin receptors.

Somatostatin Receptor PET



^{64}Cu-TETA-Octreotide as a PET Imaging Agent for Patients with Neuroendocrine Tumors

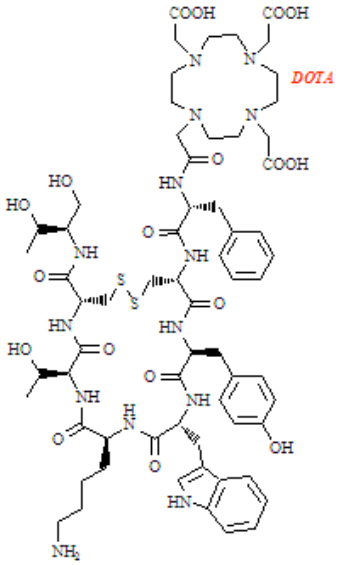
Carolyn J. Anderson, Farrokh Dehdashti, P. Duffy Cutler, Sally W. Schwarz, Richard Laforest, Laura A. Bass, Jason S. Lewis, and Deborah W. McCarthy

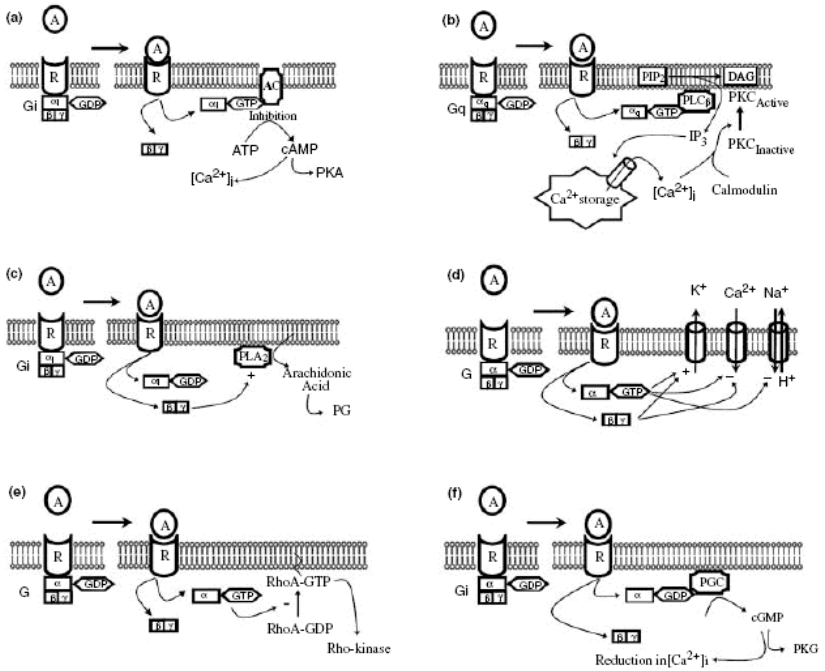
Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, Missouri

THE JOURNAL OF NUCLEAR MEDICINE • Vol. 42 • No. 2 • February 2001

^{68}Gallium

^{68}Ga-DOTA-SSA TOC/NOC/TATE





Biokinetics and imaging with the somatostatin receptor PET radioligand ^{68}Ga-DOTATOC: preliminary data

M. Hofmann[1], H. Maecke[3], A.R. Börner[1], E. Weckesser[1], P. Schöffski[2], M.L. Oei[1], J. Schumacher[4], M. Henze[4], A. Heppeler[3], G.J. Meyer[1], W.H. Knapp[1]

DOTA-NOC, a high-affinity ligand of somatostatin receptor subtypes 2, 3 and 5 for labelling with various radiometals

Damian Wild[1], Jörg S. Schmitt[1], Mihaela Ginj[1], Helmut R. Mäcke[1], Bert F. Bernard[2], Eric Krenning[2], Marion de Jong[2], Sandra Wenger[3], Jean-Claude Reubi[3]

Value of ^{111}In-DOTA-lanreotide and ^{111}In-DOTA-DPhe^{1}-Tyr^{3}-octreotide in differentiated thyroid cancer: results of in vitro binding studies and in vivo comparison with ^{18}F-FDG PET

Margarida Rodrigues[1, 2], Tatjana Traub-Weidinger[2, 3], Maria Leimer[3], Shuren Li[3], Fritz Andreae[2], Peter Angelberger[4], Robert Dudczak[3], Irene Virgolini[1, 2]

DOTA-WHAT ?

Compound	R1	R2
DOTA-OC	Phe	Thr(ol)
DOTA-TOC	Tyr	Thr(ol)
DOTA-TATE	Tyr	Thr
DOTA-NOC	Nal-1	Thr(ol)
DOTA-NOC-ATE	Nal-1	Thr
DOTA-BOC	BzThi	Thr(ol)
DOTA-BOC-ATE	BzThi	Thr

Are radiogallium-labelled DOTA-conjugated somatostatin analogues superior to those labelled with other radiometals?

P. Antunes · M. Ginj · H. Zhang · B. Waser · R. P. Baum · J. C. Reubi · H. Maecke

Eur J Nucl Med Mol Imaging
DOI 10.1007/s00259-006-0317-x

ORIGINAL ARTICLE

Conclusion This study demonstrates that $^{67/68}$Ga-DOTA-octapeptides show distinctly better preclinical, pharmacological performances than the ^{111}In-labelled peptides, especially on sst2-expressing cells and the corresponding animal models. They may be excellent candidates for further development for clinical studies.

Are radiogallium-labelled DOTA-conjugated somatostatin analogues superior to those labelled with other radiometals?

P. Antunes · M. Ginj · H. Zhang · B. Waser · R. P. Baum · J. C. Reubi · H. Maecke

Table 1 Affinity profiles of DOTA-octapeptides (IC_{50}) for hsst1–5 receptors

Compound	hsst1	hsst2	hsst3	hsst4	hsst5
Somatostatin-28	3.8±0.3 (10)	2.5±0.3 (11)	5.7±0.6 (10)	4.2±0.3 (11)	3.7±0.4 (11)
Ga-DOTA-NOC	>10,000 (3)	1.9±0.4 (3)	40.0±5.8 (3)	260±74 (3)	7.2±1.6 (3)
In-DOTA-NOC	>10,000 (3)	2.9±0.1 (3)[b]	8.0±2.0 (3)[b]	227±18 (3)	11.2±3.5 (3)
Lu-DOTA-NOC	>10,000 (3)	3.4±0.4 (3)[b]	12.0±3.3 (3)[b]	747±47 (3)[b]	14.0±3.5 (3)[b]
In-DOTA-BOC	>1,000 (2)	4.4±0.4 (3)[b]	6.8±0.3 (3)[b]	ND	10.5±1.5 (3)[b]
Lu-DOTA-BOC	>1,000 (2)	4.0±0.4 (3)[b]	6.3±0.2 (3)[b]	591±88 (2)	6.5±0.1 (3)[b]
Ga-DOTA-BOC	700±300 (2)	1.7±0.2(3)	10.5±0.5 (3)	ND	4.4±1.2 (3)
Y-DOTA-NOC-ATE	>1,000 (2)	4.2±2.0 (3)	47±1 (3)	ND	12±1 (3)[b]
Lu-DOTA-NOC-ATE	>1,000 (2)	3.6±0.3 (3)[b]	30±2 (3)	ND	15±1 (3)[b]
Ga-DOTA-NOC-ATE	>1,000 (2)	2.6±0.3 (3)	113±80 (2)	53±30 (2)	25±4 (3)
Y-DOTA-BOC-ATE	>1,000 (2)	2.9±0.3 (3)[b]	23±1 (3)	ND	7.8±2.0 (3)
Ga-DOTA-BOC-ATE	>1,000 (2)	2.0±0.2 (3)	33±23 (2)	35±24 (2)	19.5±13.0 (2)
Somatostatin-28[a]	5.2±0.3 (19)	2.7±0.3 (19)	7.7±0.9 (15)	5.6±0.4 (19)	4.0±0.3 (19)
Ga-DOTA-TOC[a]	>10,000	2.5±0.5	613±140	>1,000	73±21
Y-DOTA-TOC[a]	>10,000	11.0±1.7[b]	389±135	>10,000	114±29
Ga-DOTA-OC[a]	>10,000	7.3±1.9	120±45	>1,000	60±14
Y-DOTA-OC[a]	>10,000	20±2[b]	27±8[b]	>10,000	57±22
Ga-DOTA-TATE[a]	>10,000	0.20±0.04	>1,000	300±140	377±18
Y-DOTA-TATE[a]	>10,000	1.6±0.4[b]	>1,000	523±239	187±50[b]

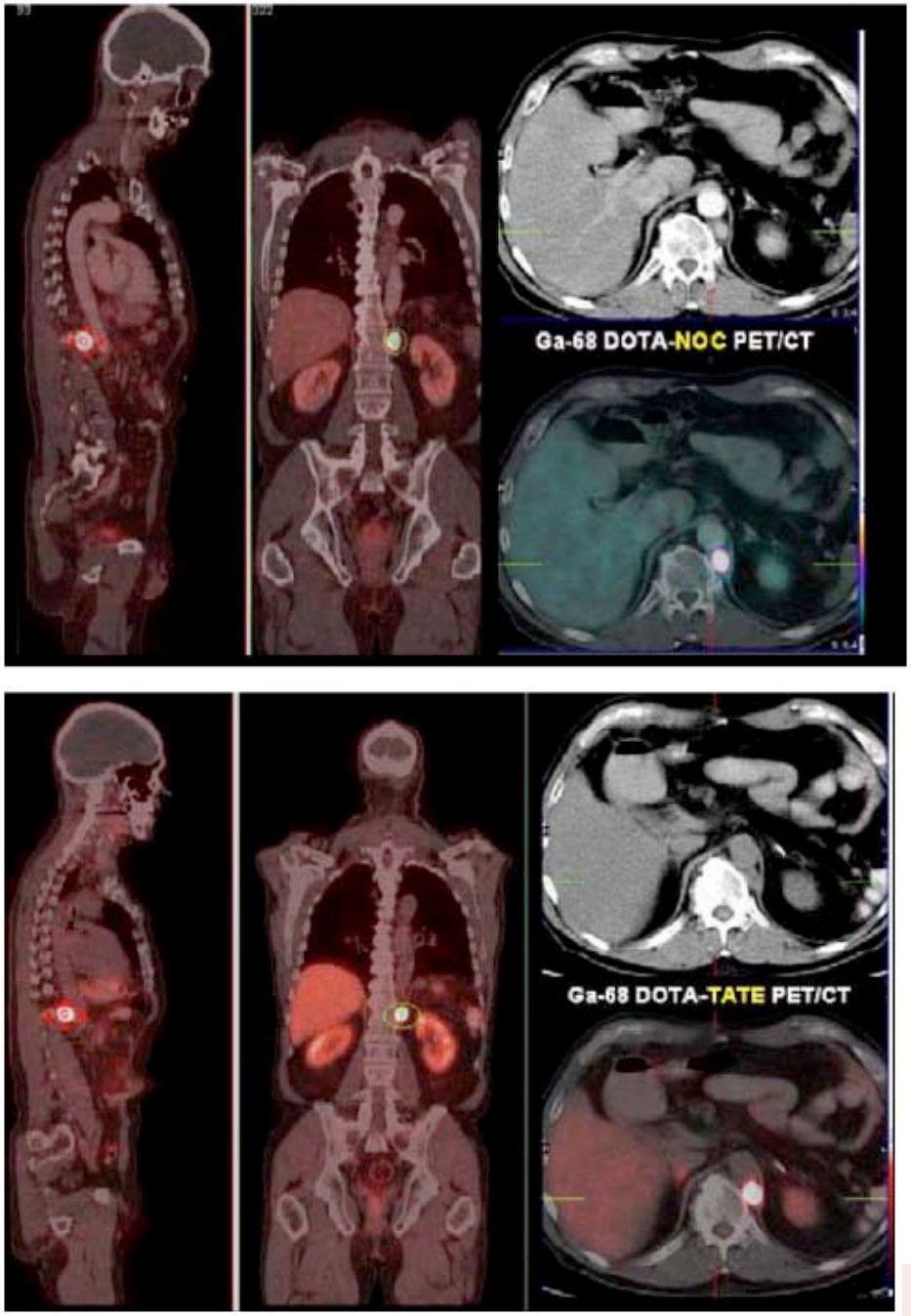


Fig. 3 Comparison between ^{68}Ga-DOTA-NOC and ^{68}Ga-DOTA-TATE in the same patient (with a metastatic neuroendocrine pancreatic tumour), along with an [^{18}F]FDG PET/CT scan. The first whole-body PET/CT study (Siemens biograph duo) was performed after i.v. injection of 85 MBq ^{68}Ga-DOTA-NOC and revealed very intense uptake (SUV_{max} of 152) in a left retrocrural lymph node metastasis (**A**. In addition, a liver metastasis (about 10 mm in diameter on MRI) in the right inferior liver segment (S VI) (SUV 11.6, **C: a**) and a very small parapancreatic lymph node metastasis (**C: c**) were detected. The second PET/CT scan was performed 3 weeks later after i.v. injection of 130 MBq of ^{68}Ga-DOTA-TATE. Again, very high uptake (SUV_{max} 103) was seen in the retrocrural metastasis (**B**), but no other lesions were detectable (**C: b,d**). There was no increased glucose metabolism (normal ^{18}F-FDG PET/CT, **D**) in any of the lesions shown by receptor PET/CT

Are radiogallium-labelled DOTA-conjugated somatostatin analogues superior to those labelled with other radiometals?

P. Antunes · M. Ginj · H. Zhang · B. Waser · R. P. Baum · J. C. Reubi · H. Maecke

Biokinetics and imaging with the somatostatin receptor PET radioligand ^{68}Ga-DOTATOC: preliminary data

M. Hofmann[1], H. Maecke[3], A.R. Börner[1], E. Weckesser[1], P. Schöffski[2], M.L. Oei[1], J. Schumacher[4], M. Henze[4], A. Heppeler[3], G.J. Meyer[1], W.H. Knapp[1]

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Molecular Imaging and Biology
Vol. 5, No. 1, 42–48, 2003

1536-1632/03 $–see front matter

ARTICLE

Evaluation of Positron Emission Tomography Imaging Using [^{68}Ga]-DOTA-D Phe^{1}-Tyr^{3}-Octreotide in Comparison to [^{111}In]-DTPAOC SPECT. First Results in Patients with Neuroendocrine Tumors

Jörg Kowalski, MD[1], Marcus Henze, MD[1,2], Jochen Schuhmacher, PhD[2], Helmut R. Mäcke, PhD[3], Michael Hofmann, MD, MS[4], Uwe Haberkorn, MD, PhD[1,2]

[1]Department of Nuclear Medicine, University of Heidelberg, Heidelberg, Germany, [2]German Cancer Research Center (DKFZ), Heidelberg, Germany, and [3]University Hospital, Basel, Switzerland, [4]Medical School, Hannover, Germany

DOTA-TOC

^{68}Ga-DOTA-Tyr^{3}-Octreotide PET in Neuroendocrine Tumors: Comparison with Somatostatin Receptor Scintigraphy and CT

Michael Gabriel[1], Clemens Decristoforo[1], Dorota Kendler[1], Georg Dobrozemsky[1], Dirk Heute[1], Christian Uprimny[1], Peter Kovacs[2], Elisabeth Von Guggenberg[1], Reto Bale[2], and Irene J. Virgolini[1]

[1]Department of Nuclear Medicine, Innsbruck Medical University, Innsbruck, Austria; and [2]Division of Diagnostic Radiology I, Department of Diagnostic Radiology, Innsbruck Medical University, Innsbruck, Austria

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^{68}Ga-DOTA-Tyr^{3}-Octreotide PET in Neuroendocrine Tumors: Comparison with Somatostatin Receptor Scintigraphy and CT

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DOTA-TOC

TABLE 5
Comparison of 3 Imaging Modalities: PET, SPECT, and CT

Parameter	PET (%)	SPECT (%)	CT (%)
Sensitivity	97 (69/71)	52 (37/71)	61 (41/67)
Specificity	92 (12/13)	92 (12/13)	71 (12/17)
Accuracy	96 (81/84)	58 (49/84)	63 (53/84)

Number of patients is in parentheses.

DOTA-TOC

Ga-DOTA-TOC

Octreoscan

^{68}Ga-DOTA-Tyr^{3}-Octreotide PET in Neuroendocrine Tumors: Comparison with Somatostatin Receptor Scintigraphy and CT

Michael Gabriel[1], Clemens Decristoforo[1], Dorota Kendler[1], Georg Dobrozemsky[1], Dirk Heute[1], Christian Uprimny[1], Peter Kovacs[2], Elisabeth Von Guggenberg[1], Reto Bale[2], and Irene J. Virgolini[1]

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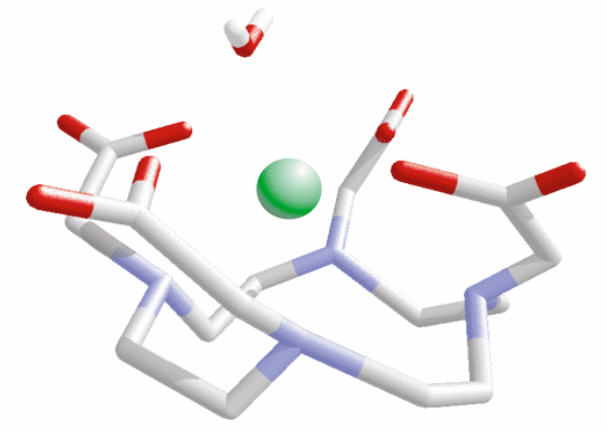
^{68}Ga-DOTA-NOC



DOTA-NOC, a high-affinity ligand of somatostatin receptor subtypes 2, 3 and 5 for labelling with various radiometals

Damian Wild[1], Jörg S. Schmitt[1], Mihaela Ginj[1], Helmut R. Mäcke[1], Bert F. Bernard[2], Eric Krenning[2], Marion de Jong[2], Sandra Wenger[3], Jean-Claude Reubi[3]

[1] Division of Radiological Chemistry, Institute of Nuclear Medicine, Department of Radiology, University Hospital Basel, Basel, Switzerland
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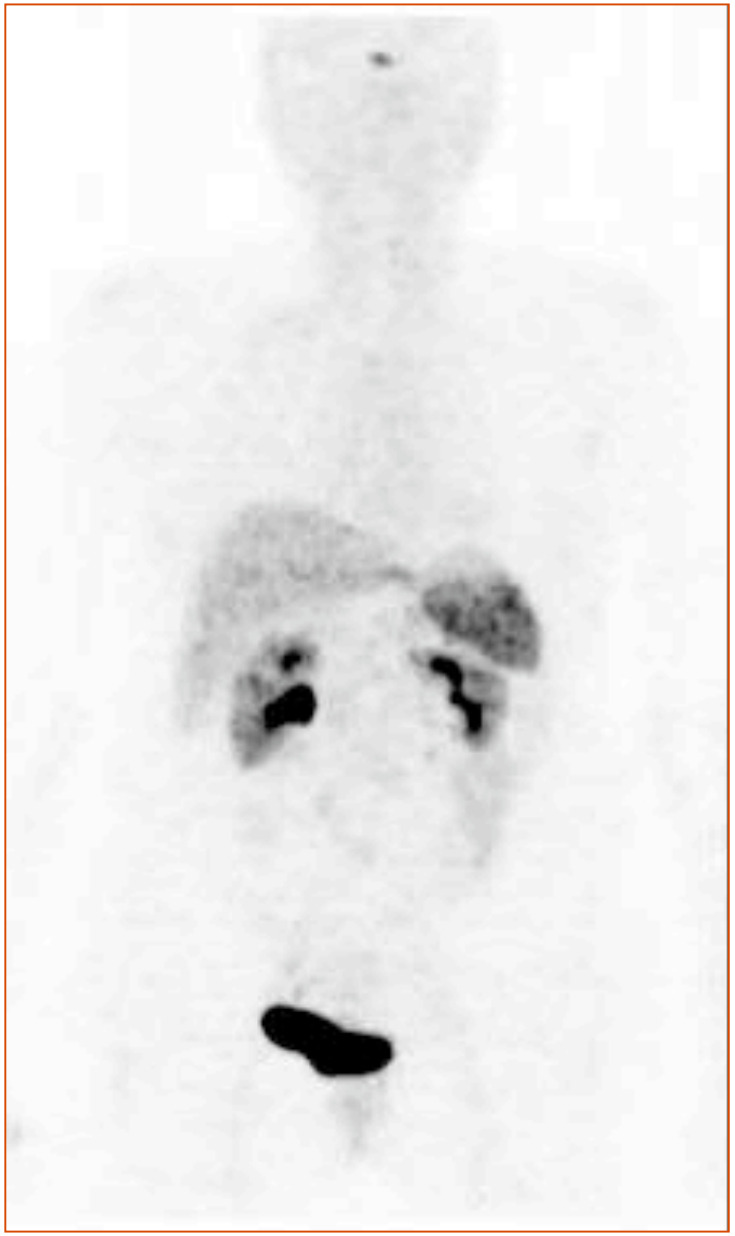
^{68}Ga-DOTANOC: a first compound for PET imaging with high affinity for somatostatin receptor subtypes 2 and 5

Damian Wild[1], Helmut R. Mäcke[1], Beatrice Waser[2], Jean Claude Reubi[2], Mihaela Ginj[1], Helmut Rasch[1], Jan Müller-Brand[1], Michael Hofmann[3]

[1] Clinic and Institute of Nuclear Medicine, University Hospital Basel, Petersgraben, 4, 4031, Basel, Switzerland
[2] Institute of Pathology, University of Bern, 3010, Bern, Switzerland
[3] Department of Nuclear Medicine, Hannover University Medical School, Hannover, Germany

Published online: 18 November 2004



^{68}Ga-DOTA-NOC

Normal biodistribution 60 min after iv injection

Eur J Nucl Med Mol Imaging
DOI 10.1007/s00259-007-0587-y

ORIGINAL ARTICLE

^{68}Ga-DO … affected …nts

C. Pettinato · A.
C. Nanni · G. M
M. Marengo · C

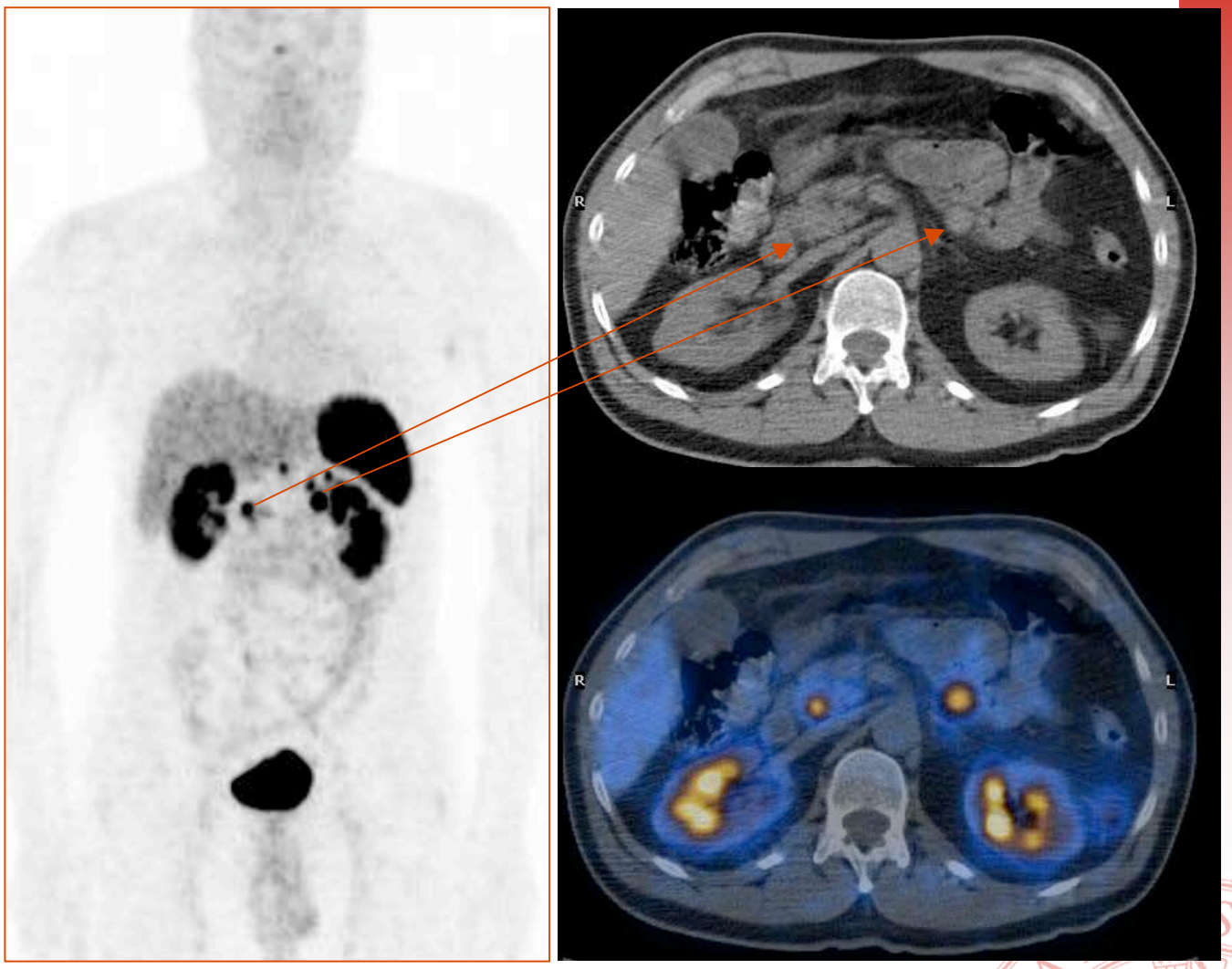
Table 5 Comparison of absorbed dose of selected organs among ^{68}Ga-DOTANOC, ^{111}In-DTPAOC, ^{111}In-DOTATOC

Organs	^{68}Ga-DOTANOC (mGy/MBq)	111In-DTPAOC[a] (mGy/MBq)	111In-DOTATOC[a] (mGy/MBq)
Kidneys	8.97E−02	4.70E−01	5.00E−01
Liver	3.38E−02	7.00E−02	5.00E−02
Spleen	7.25E−02	3.60E−01	4.70E−01
Urinary bladder wall	8.36E−02	1.90E−01	1.60E−01
ED (mSv/MBq)	1.67E−02	5.00E−02	5.00E−02

[a] Data from Kwekkeboom et al. *J Nucl Med. 1999;40: 762–767*

Staging small NET of the pancreas:

GaDOTANOC shows the primary NET and some secondary peripancreatic lymph nodes

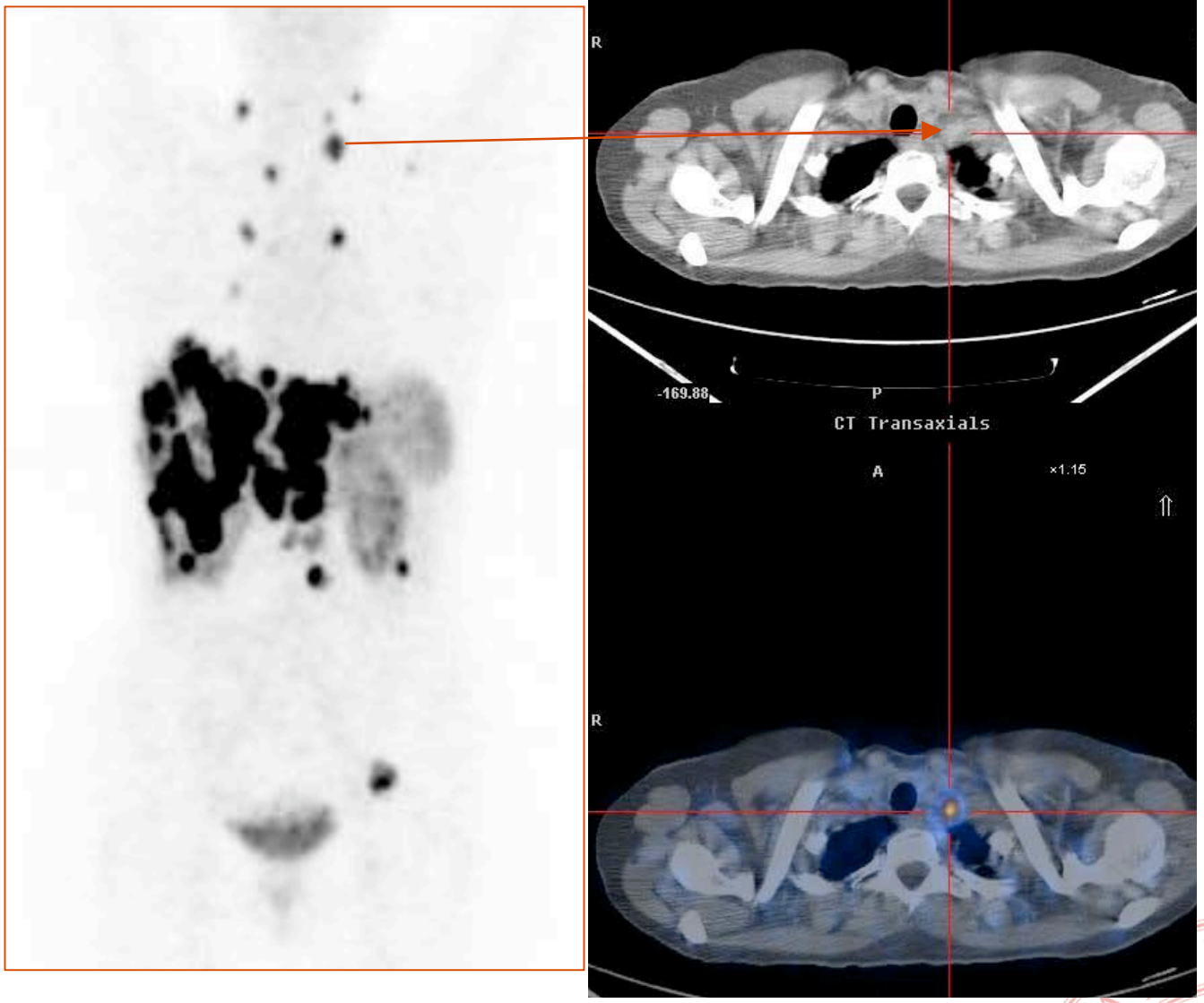


High sensitivity for small primary lesions (T).

Staging of NET of the pancreas

CT lung, liver, bone lesions

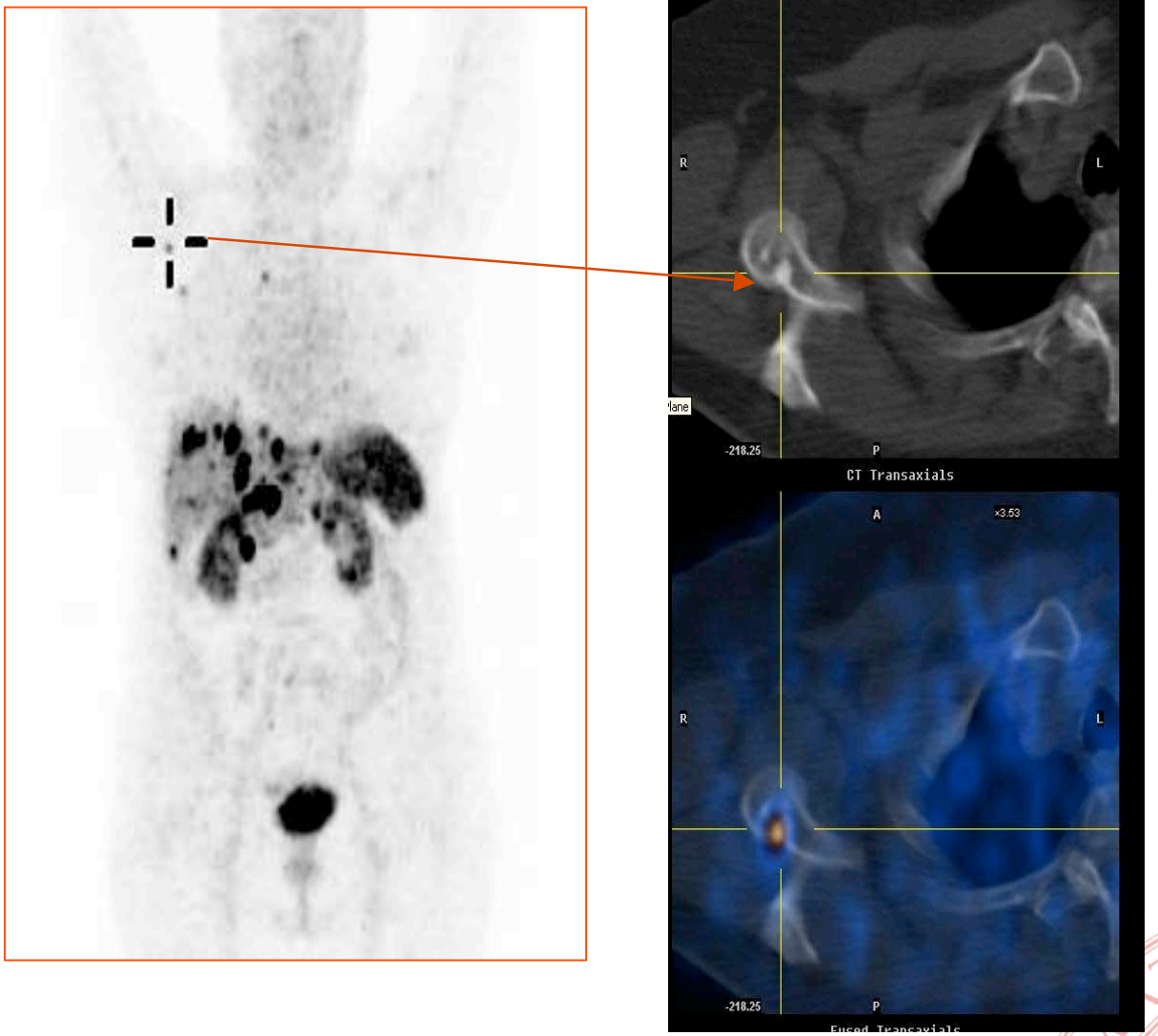
Ga-DOTANOC: lung, lymph node, liver, multiple bone, abdominal



High sensitivity for lymph nodes lesions (N)

Staging of NET of the pancreas

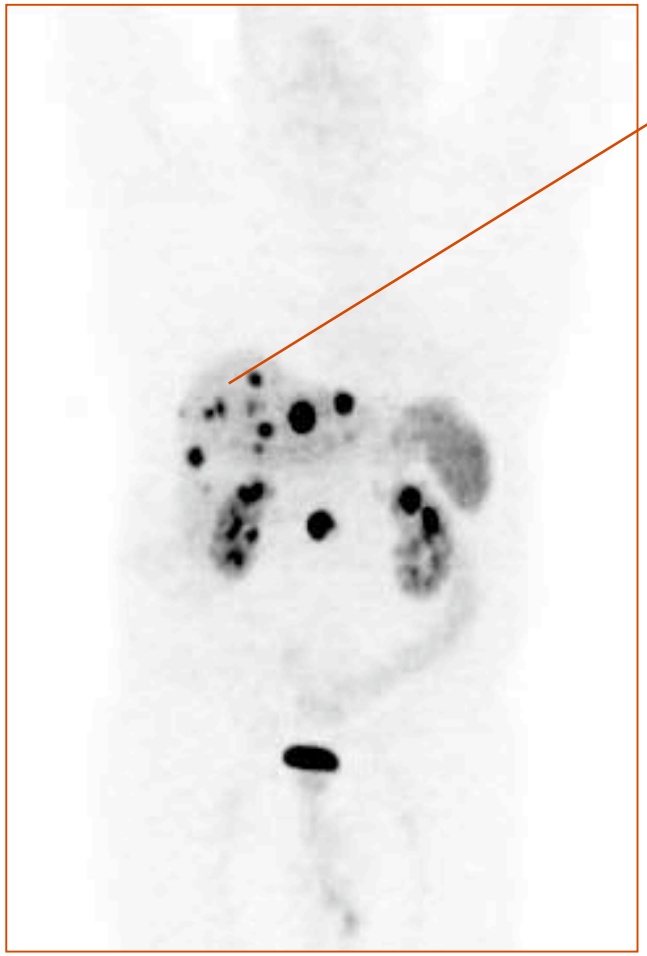
Ga-DOTANOC SHOWS pancreas, lymph nodes, liver, multiple small bone lesions.

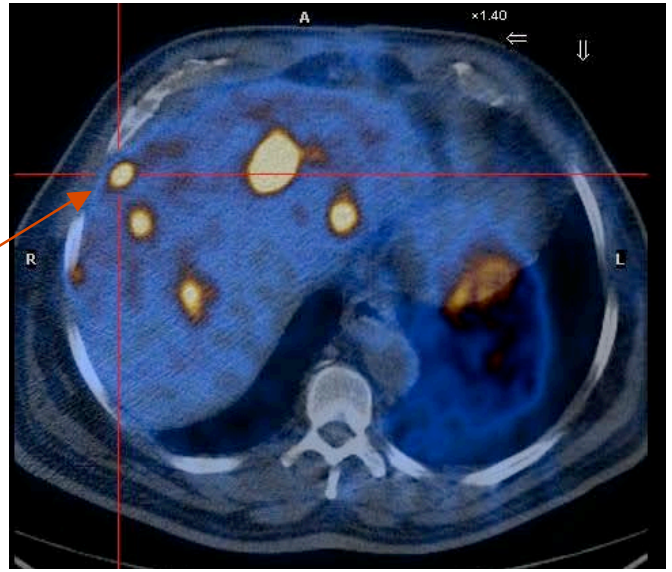


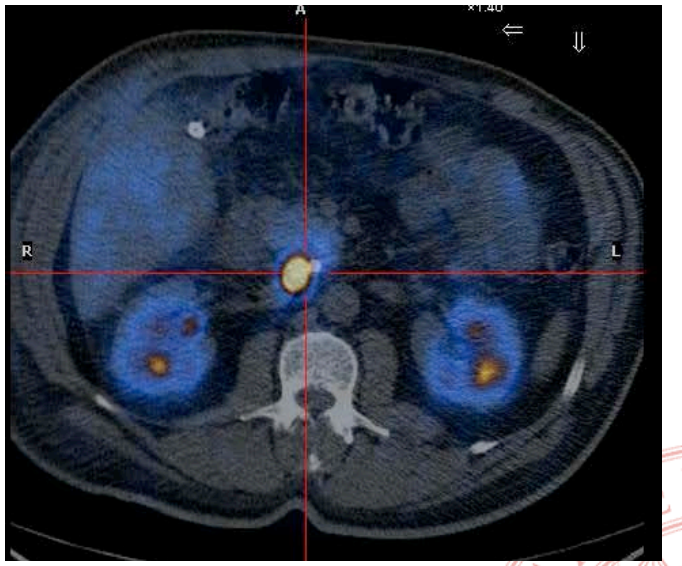
High sensitivity for small bone lesions (M)

Staging of NET of the pancreas

Ga-DOTANOC SHOWS pancreas, lymph nodes, multiple liver lesions.



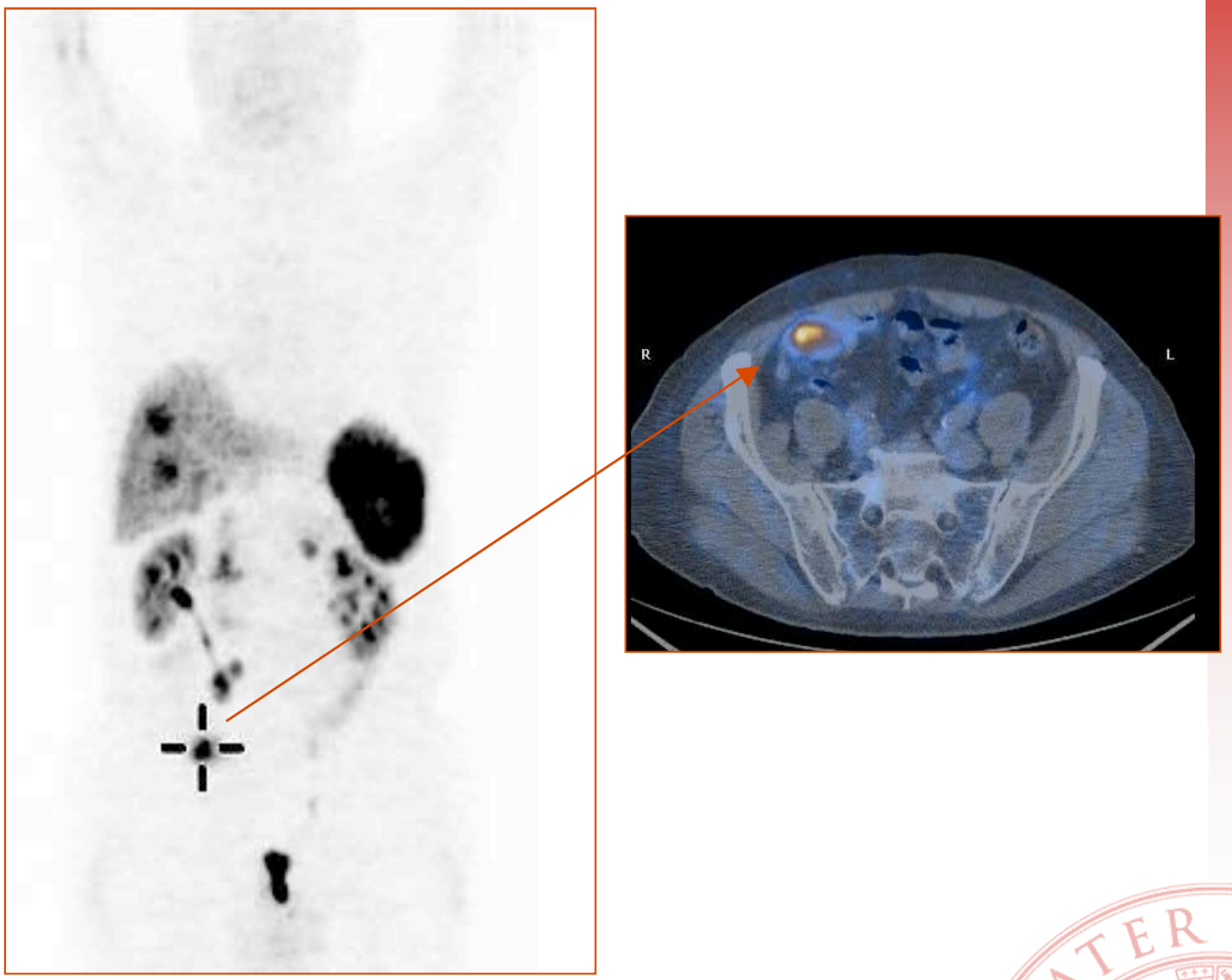




High sensitivity for small liver lesions (M)

NET with multiple liver and lymph-node lesions: **Unknown primary**

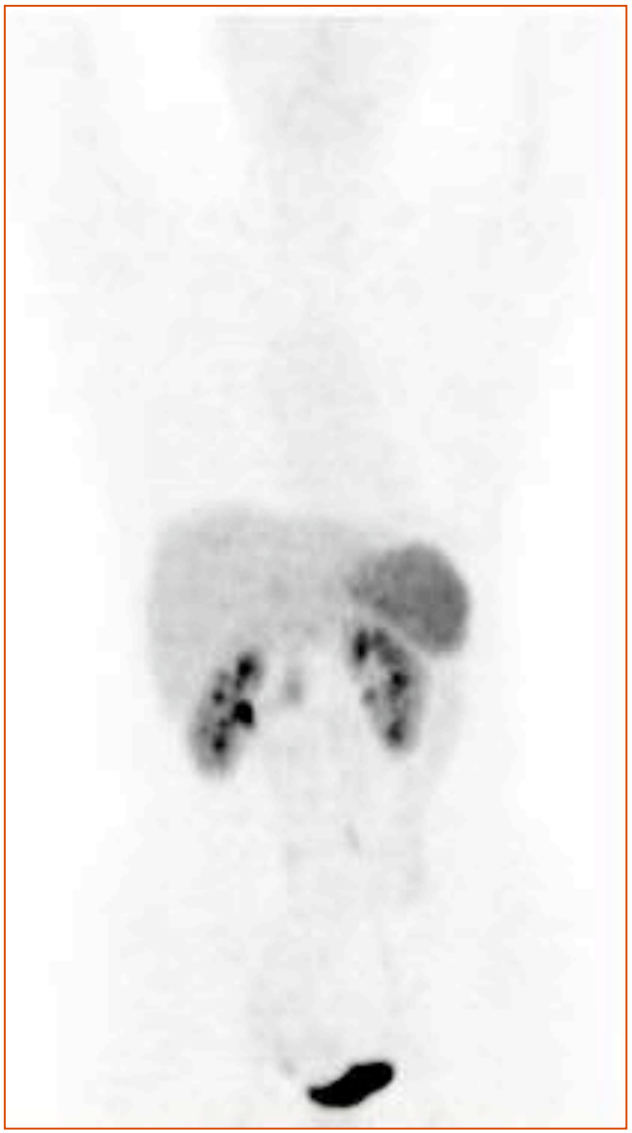
Pathologic Ga-DOTA-NOC uptake in the **ileum.**

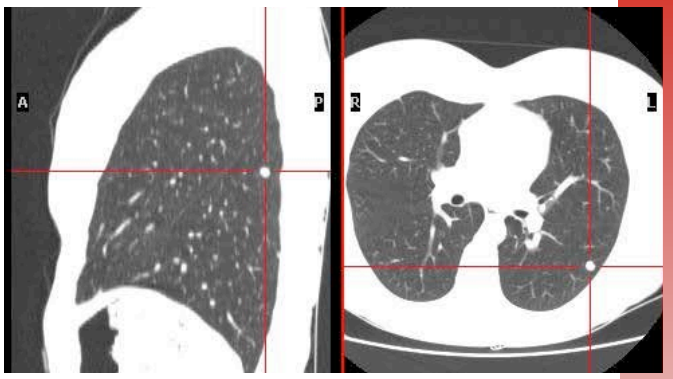


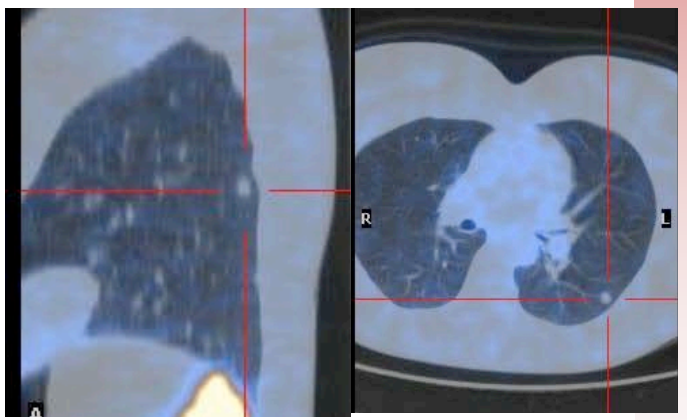
Identification of unknown primary NET

Young patient with suspect carcinoid at CT.

Ga-DOTA-NOC ruled out the presence of SSR, negative follow-up.





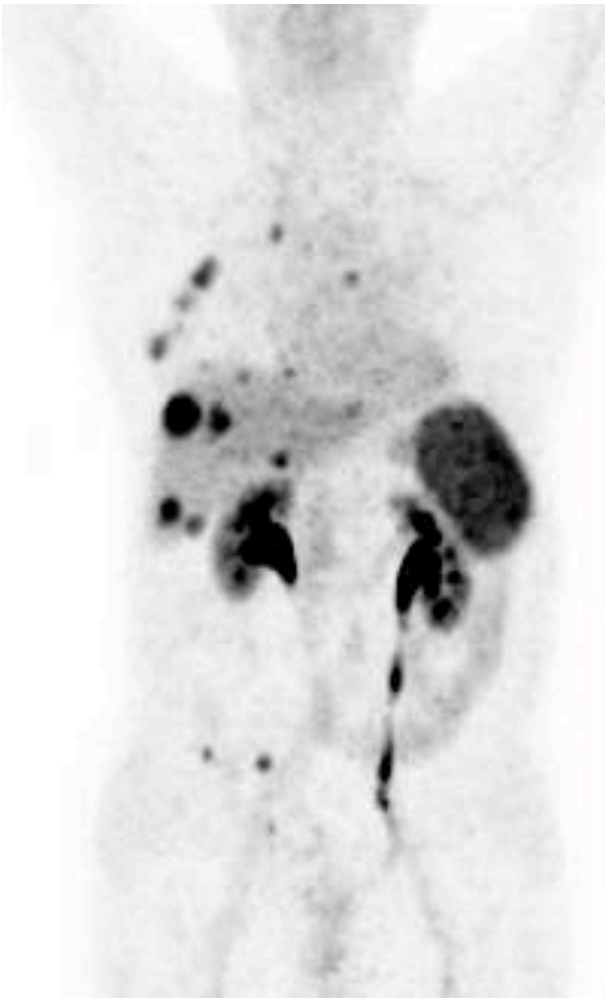


Evaluation of suspect findings at CI

Somatostatin Receptor PET

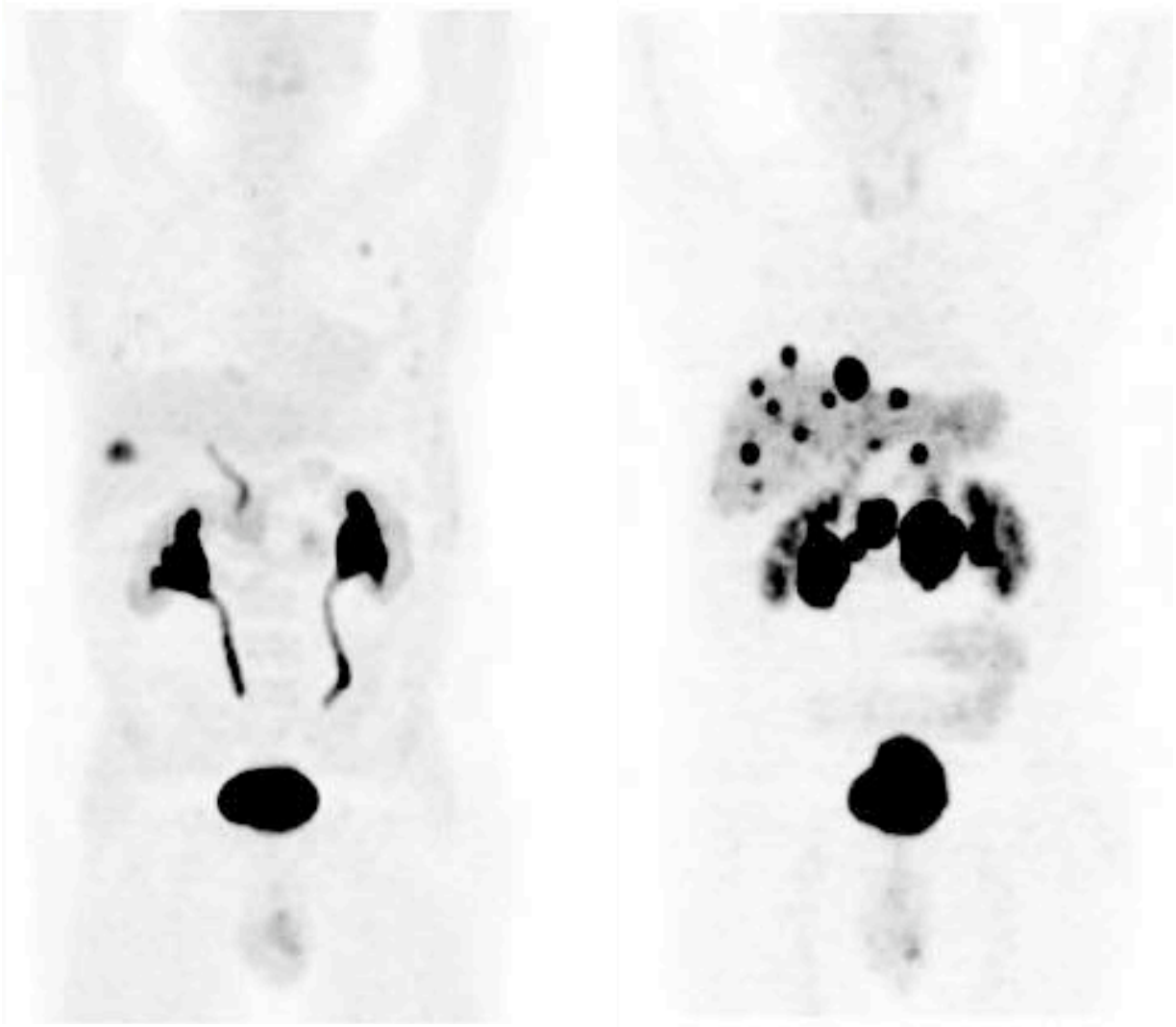
^{18}F-DOPA PET

^{18}F-DOPA



^{68}Ga-DOTA-NOC

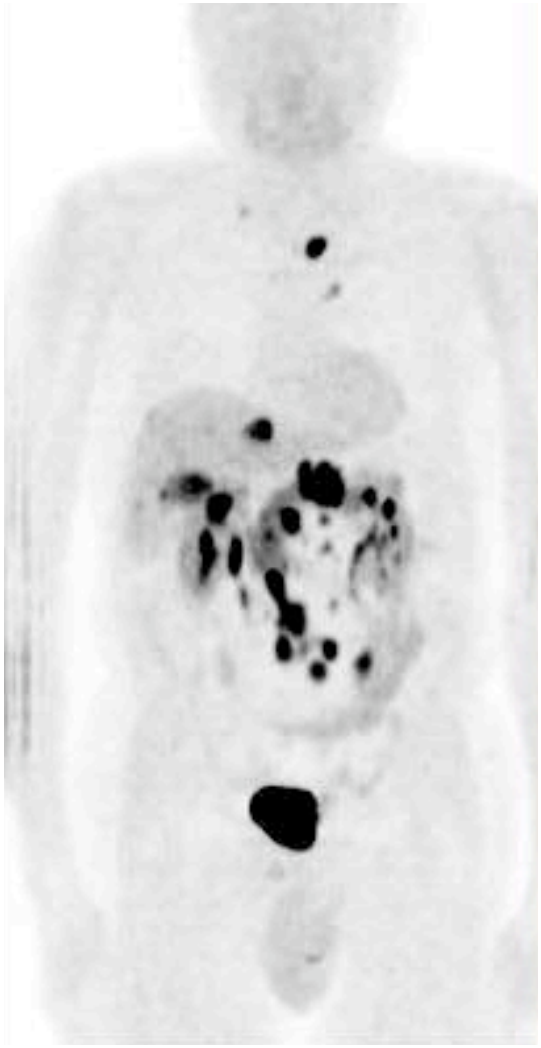
Metastatic
Bronchal
Carcinoid



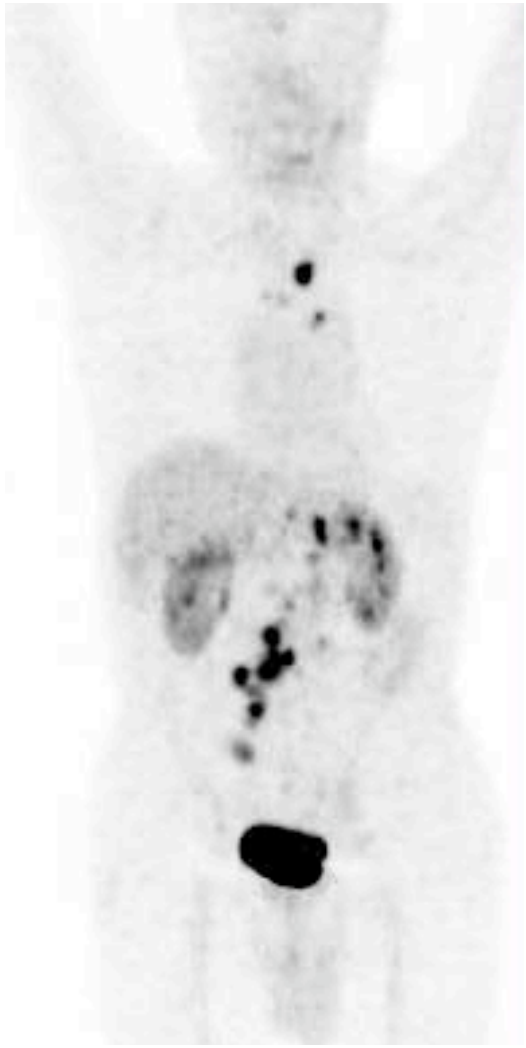
^{18}F-DOPA

^{68}Ga-DOTA-NOC

MEN 1



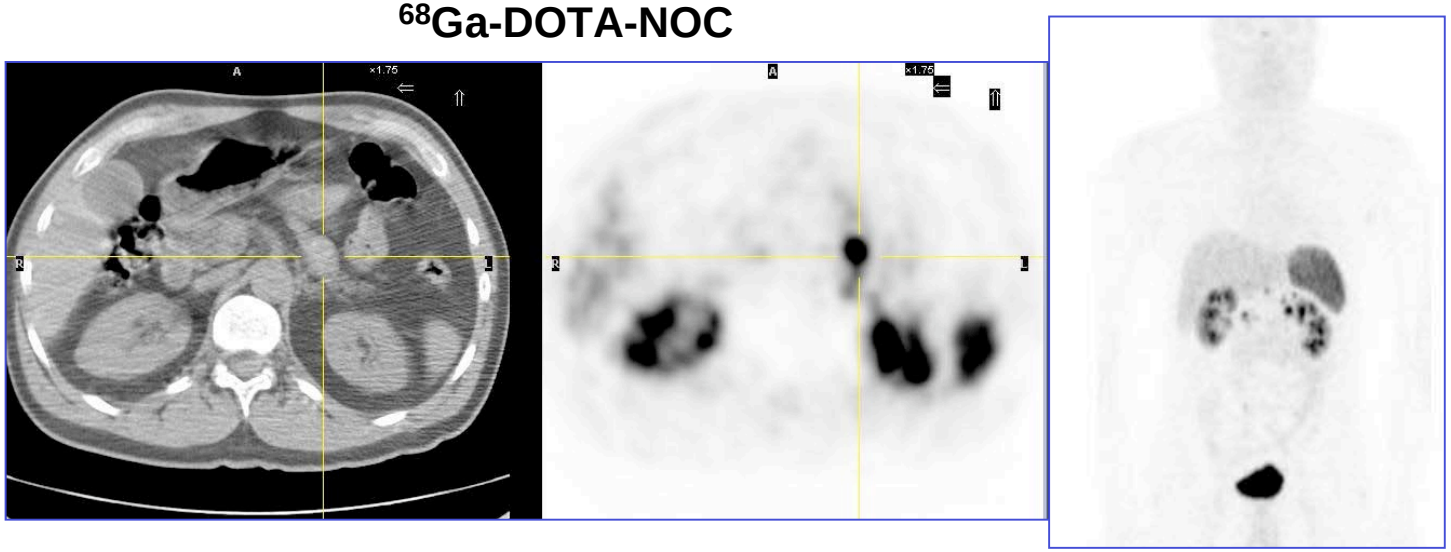
^{18}F-DOPA



^{68}Ga-DOTA-NOC

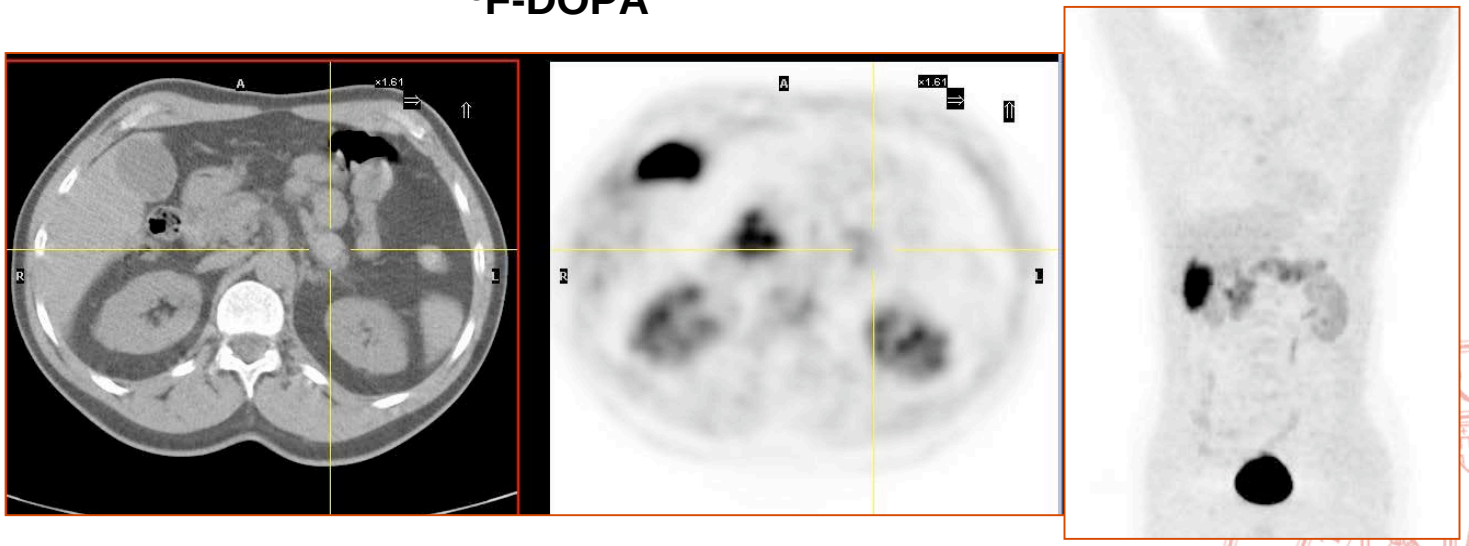
Metastatic Carcinoid

^{68}Ga-DOTA-NOC



Restaging MEN 1

^{18}F-DOPA



Eur J Nucl Med Mol Imaging
DOI 10.1007/s00259-008-0769-2

ORIGINAL ARTICLE

Comparison between ^{68}Ga-DOTA-NOC and ^{18}F-DOPA PET for the detection of gastro-entero-pancreatic and lung neuro-endocrine tumours

Valentina Ambrosini · Paola Tomassetti · Paolo Castellucci · Davide Campana · Giancarlo Montini · Domenico Rubello · Cristina Nanni · Anna Rizzello · Roberto Franchi · Stefano Fanti

Table 2 Number of lesions detected by the different imaging modalities

Lesion site	68Ga-DOTA-NOC PET	18F-DOPA PET	CT–US
Lymph nodes	25	21	23
Liver	40	22	34
Lung	6	2	10
Bone	10	10	5

CONCLUSIONS

Somatostatin Receptor PET

More Accurate than CI (incl SRS)

Less Expensive (2 pts/week)

Less Complicated

Predictive of Response to Therapy

^{18}F-DOPA PET

Useful in SSR negative tumours

Accurate but expensive

^{18}F-FDG PET

Useful in indifferentiated NET

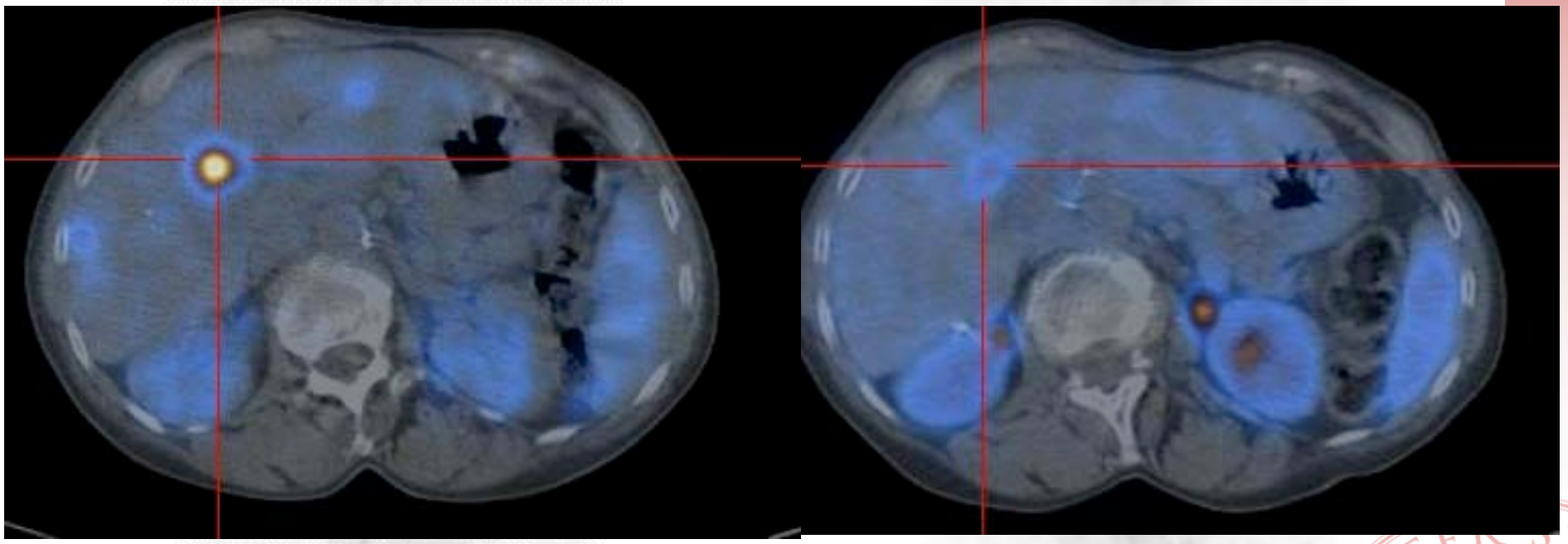
INTERESSE IN RAPIDA CRESCITA

PROBLEMI LEGATI A NORMATIVE E DISPONIBILITA' DEI TRACCIANTI

ULTERIORI APPLICAZIONI POSSIBILI

NET Receptor Radionuclide Therapy:

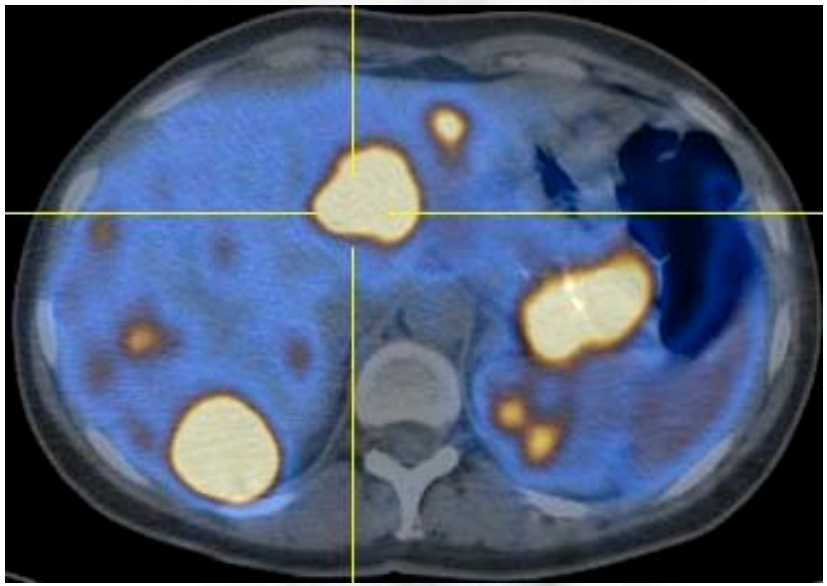
pre-therapy post therapy evaluation

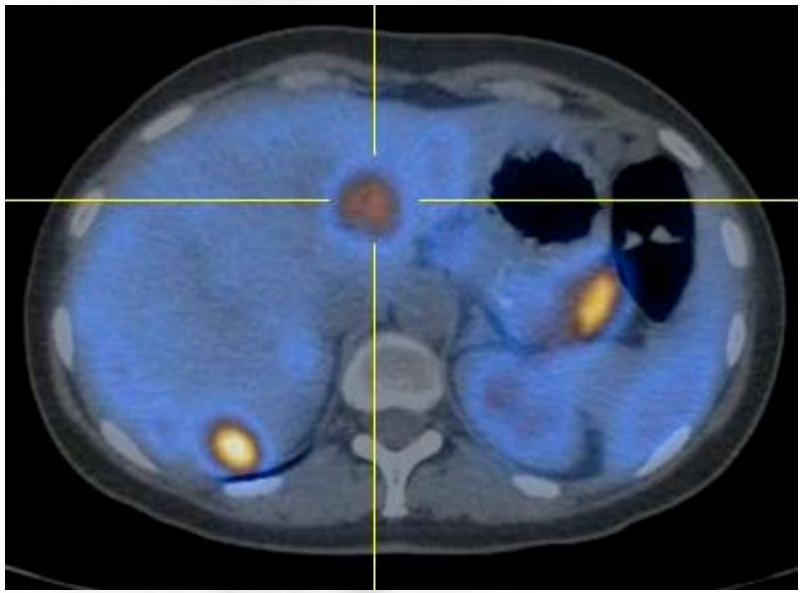


NET Receptor Radionuclide Therapy:

pre-therapy

post therapy evaluation

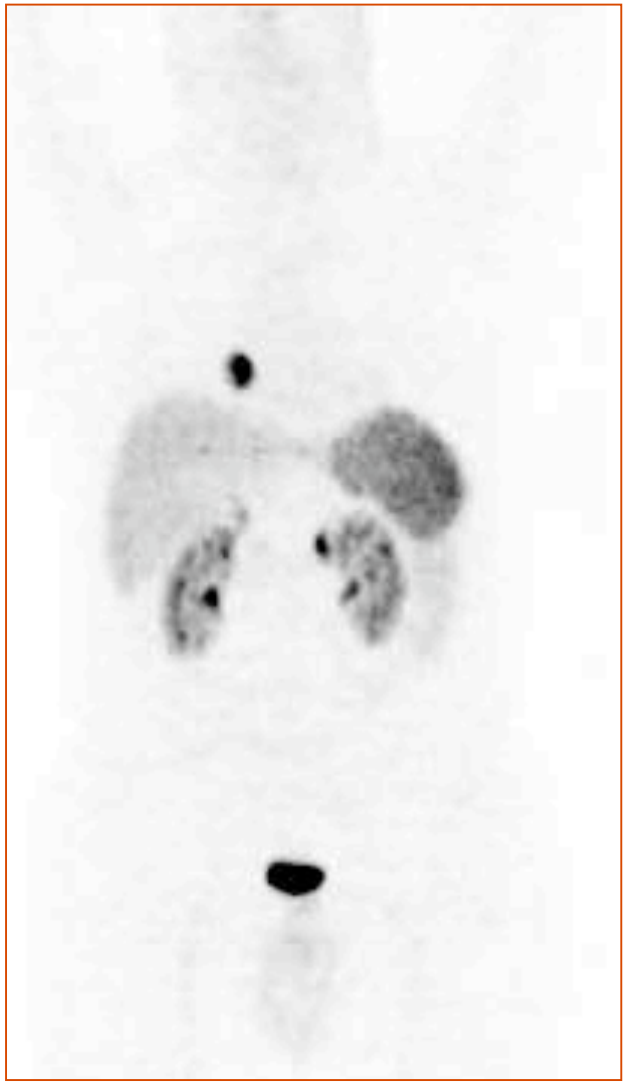


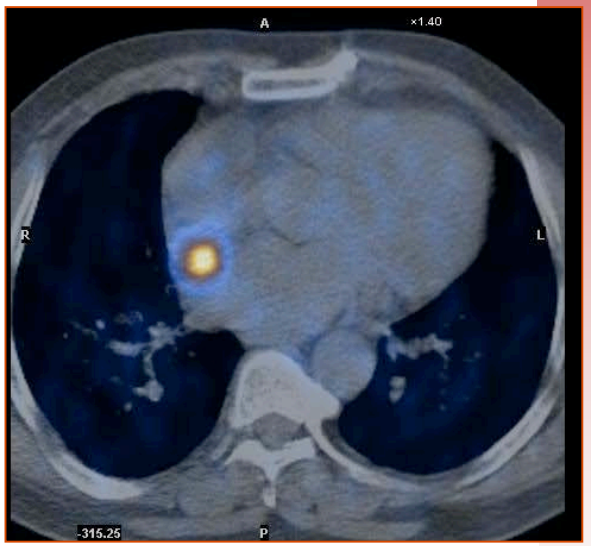


Excision of a para-renal paraganglioma in 2005. Suspect relapse.

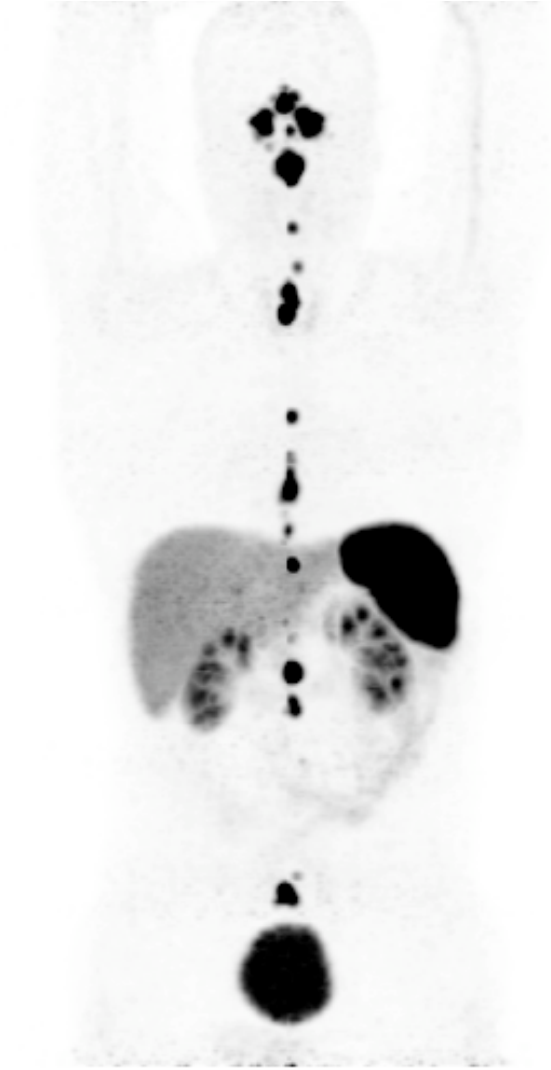
Ga DOTA-NOC shows a **paraganglioma** close to the cava superior.

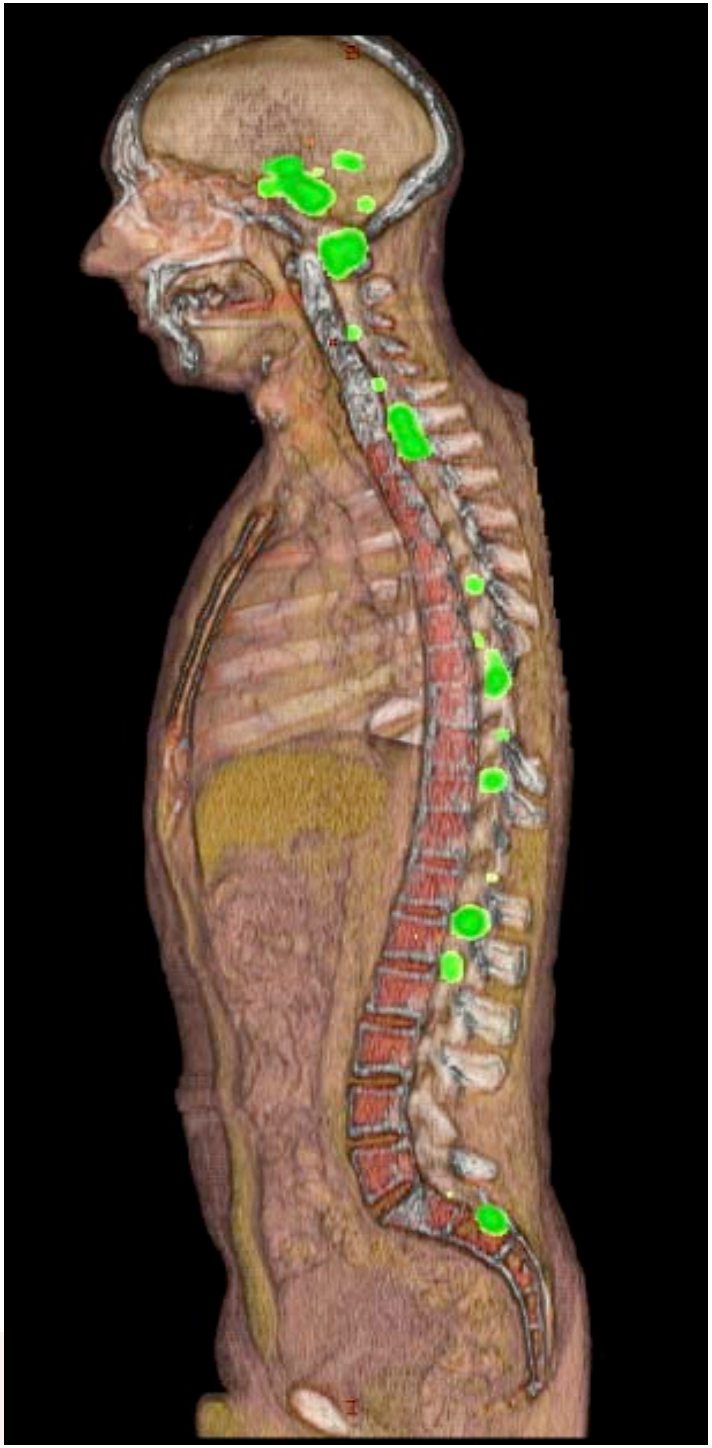
Surgery confirmed the PET finding.





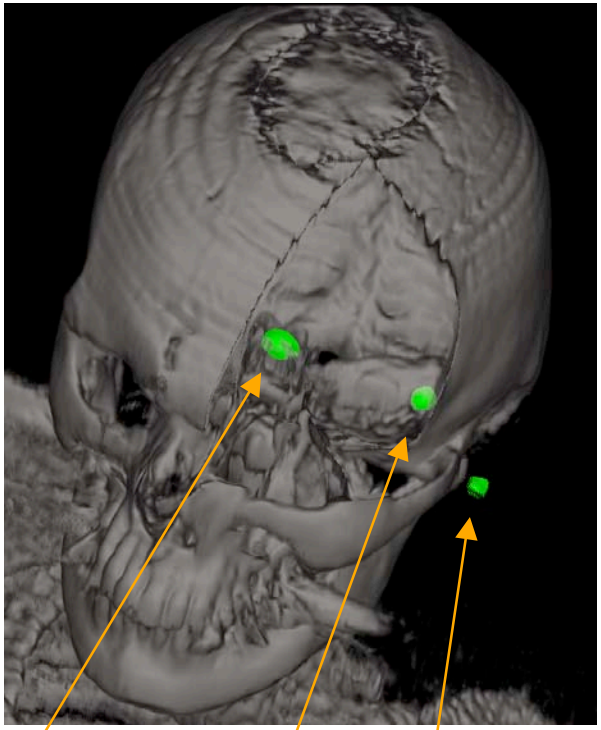
Multiple vertebral paraganglioma





Suspect relapse of NET at left ear

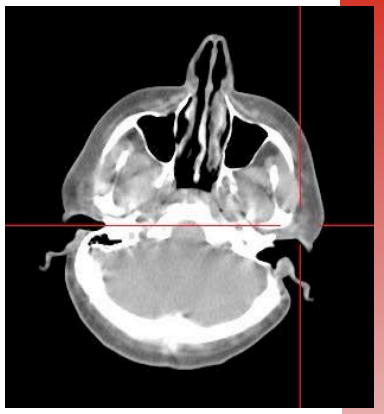
PET confirmed local relapse and nodal involvement

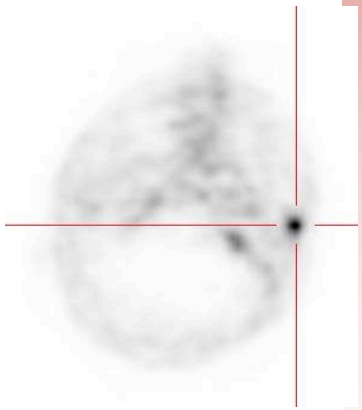


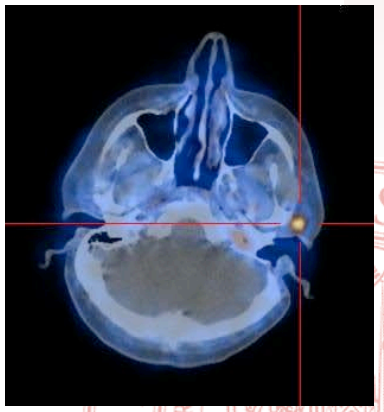
PITUITARY GLAND

LEFT EAR RELAPSE

NODAL INVOLVEMENT







SNM Image of the Year 2008