

*IAEA Regional Training Course (AFRA) on the Role of Nuclear
Medicine in Endocrine Disease and Infection/Inflammation*

Imaging Neuroendocrine tumors with PET Radiopharmaceuticals

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Pretoria, South Africa, Dec. 6-10, 2010

PET with [¹⁸F]FDG in NET-(GEP)

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PET for the imaging of neuroendocrine
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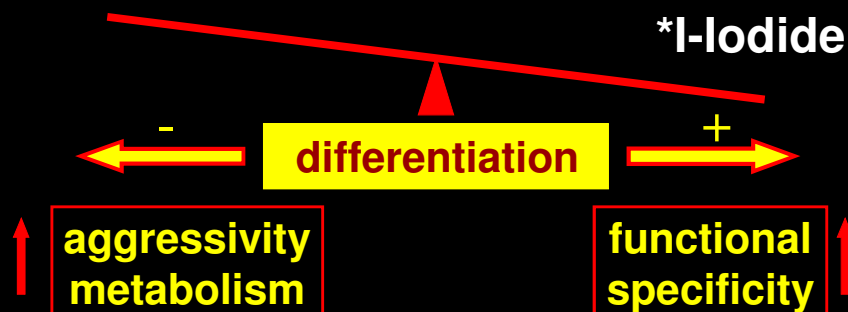


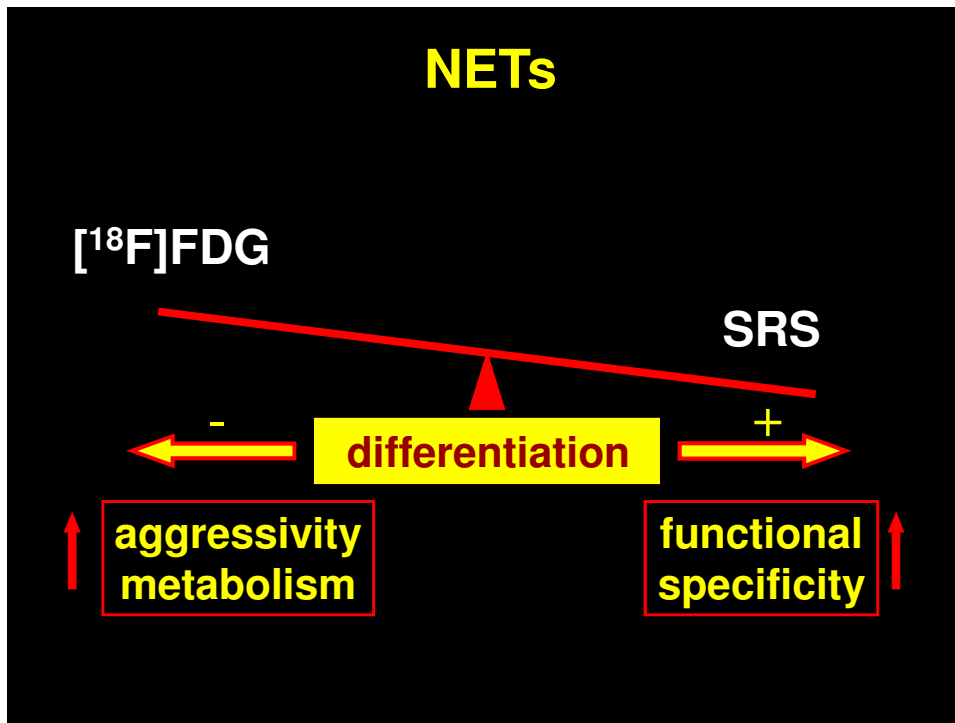
Garin et al. Predictive value of [¹⁸F]FDG-PET and SRS in metastatic NETs. *J Nucl Med* 2009; 50: 858-864.

Differentiated Follicular Thyroid Carcinoma

[¹⁸F]FDG

*I-Iodide





Functional Imaging of Neuroendocrine Tumors: A Head-to-Head Comparison of Somatostatin Receptor Scintigraphy, ¹²³I-MIBG Scintigraphy, and ¹⁸F-FDG PET

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Key Words: neuroendocrine tumors; somatostatin receptor scintigraphy; ¹²³I-MIBG scintigraphy; ¹⁸F-FDG PET

J Nucl Med 2010; 51:704–712

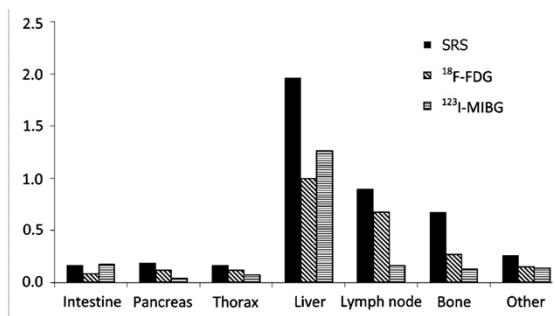


FIGURE 1. Comparison of average number of foci identified by SRS, ¹²³I-MIBG scintigraphy, and ¹⁸F-FDG PET in different regions of body.

TABLE 5. Sensitivity of Functional Imaging Results Based on Origin of Tumor

Origin of tumor	SRS	¹²³ I-MIBG	¹⁸ F-FDG
Ileal neuroendocrine (n = 45)	91% (41)	71% (32)	36% (16)
Pancreaticoduodenal neuroendocrine (n = 29)	90% (26)	31% (9)	79% (23)
Neuroendocrine of lung (n = 7)	86% (6)	57% (4)	71% (5)
Colonic neuroendocrine (n = 6)	67% (4)	17% (1)	83% (5)
Unknown or rare origin (n = 9)	89% (8)	44% (4)	78% (7)
Total	89% (85)	52% (50)	58% (56)

Data in parentheses are numbers of patients.

⁶⁸Ga-DOTANOC PET/CT Clinical Impact in Patients with Neuroendocrine Tumors

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Key Words: ⁶⁸Ga-DOTANOC; PET/CT; neuroendocrine tumors; clinical impact

J Nucl Med 2010; 51:669-673

Conclusion: ⁶⁸Ga-DOTANOC PET/CT either affected stage or caused a therapy modification in more than half the patients, thus confirming the clinical role of PET in the management of NET.

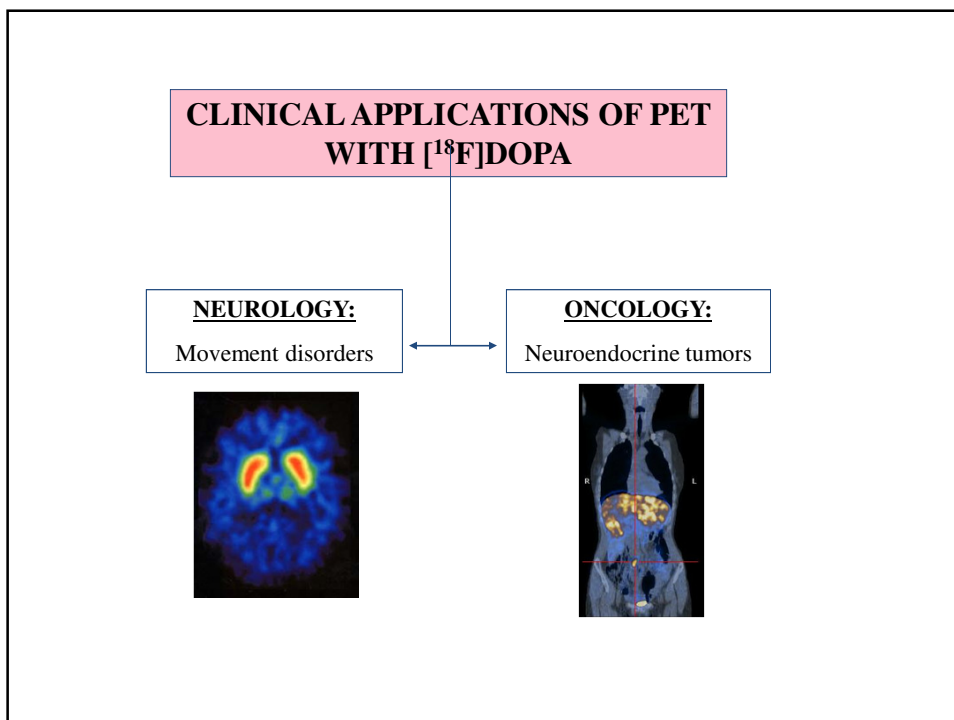
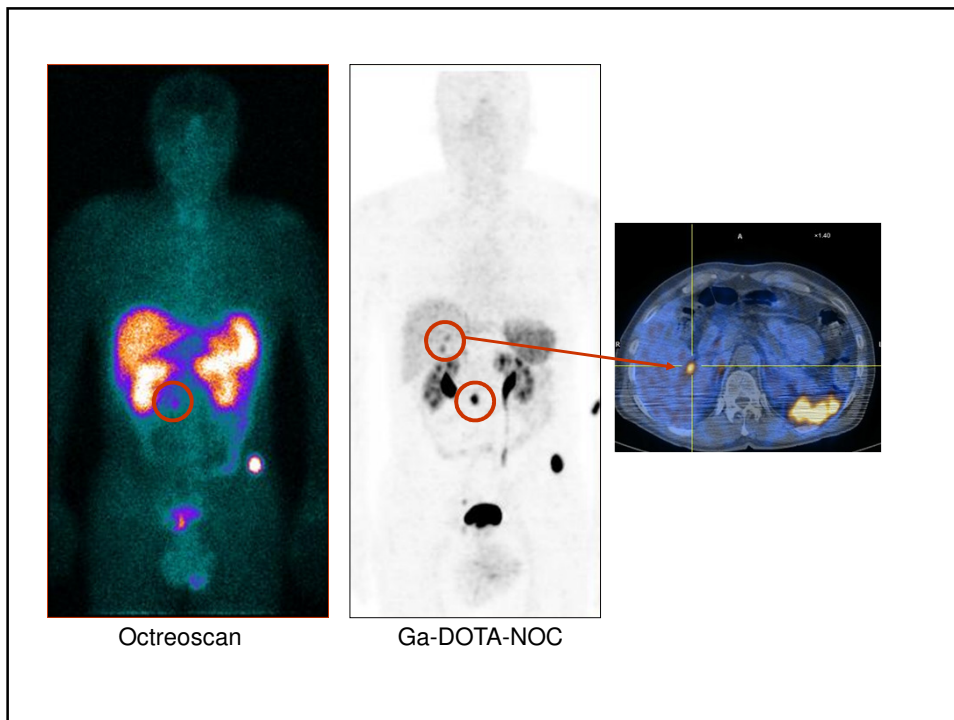
TABLE 2. Comparison of ^{68}Ga -DOTANOC PET/CT and CI Findings and Their Impact on Stage or Therapy Modifications

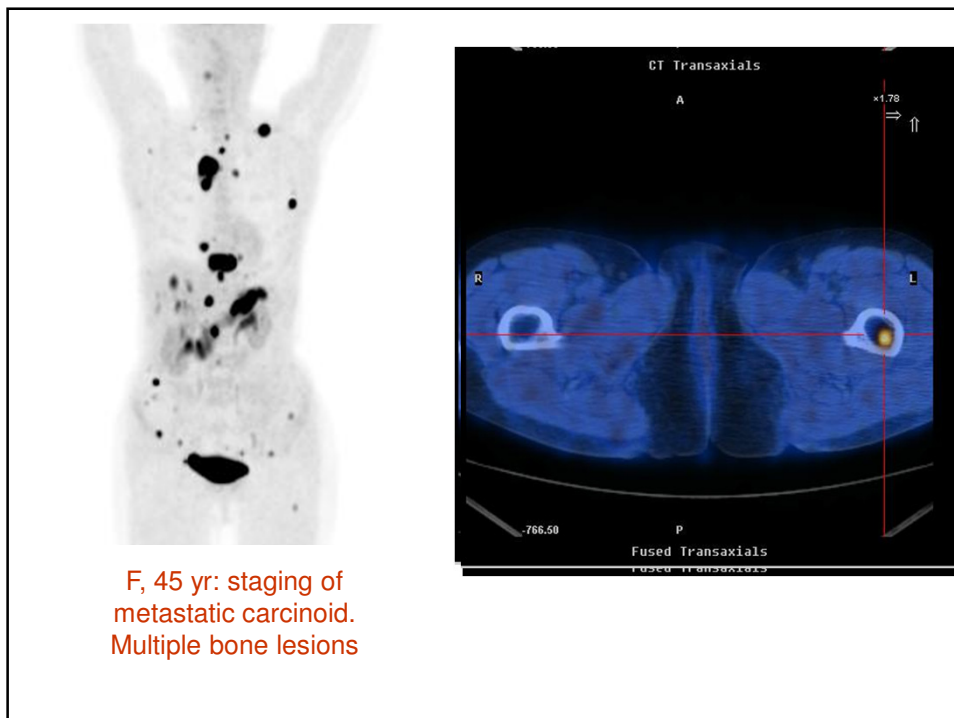
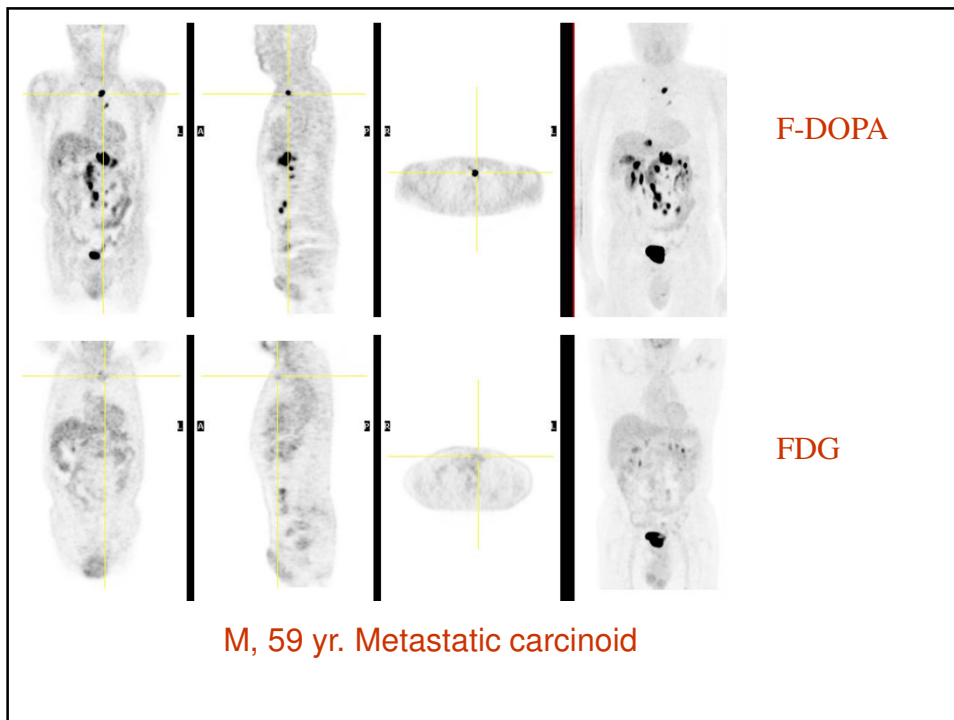
Finding	<i>n</i>	%
PET and CI in concordance	47/90	52.2
PET impact on stage	None	
PET impact on therapy	17/47	36.2
PET and CI in discordance	42/90	46.7
PET impact on stage	12/42	28.6
PET impact on therapy	32/42	76.2
PET and CI equivocal	1	1.1
PET impact	1	100.0

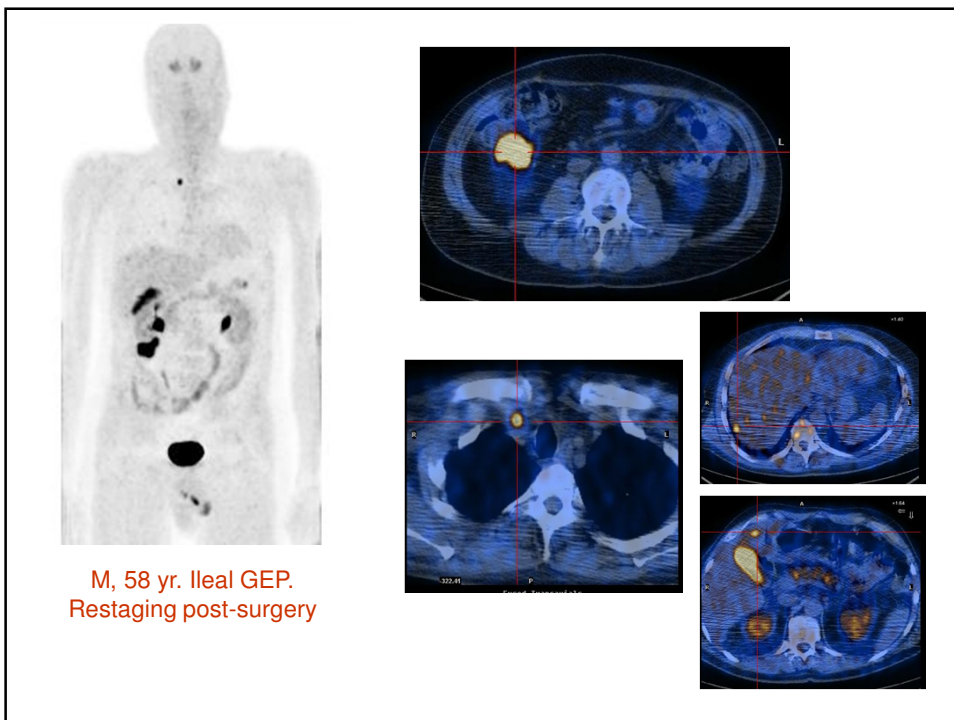
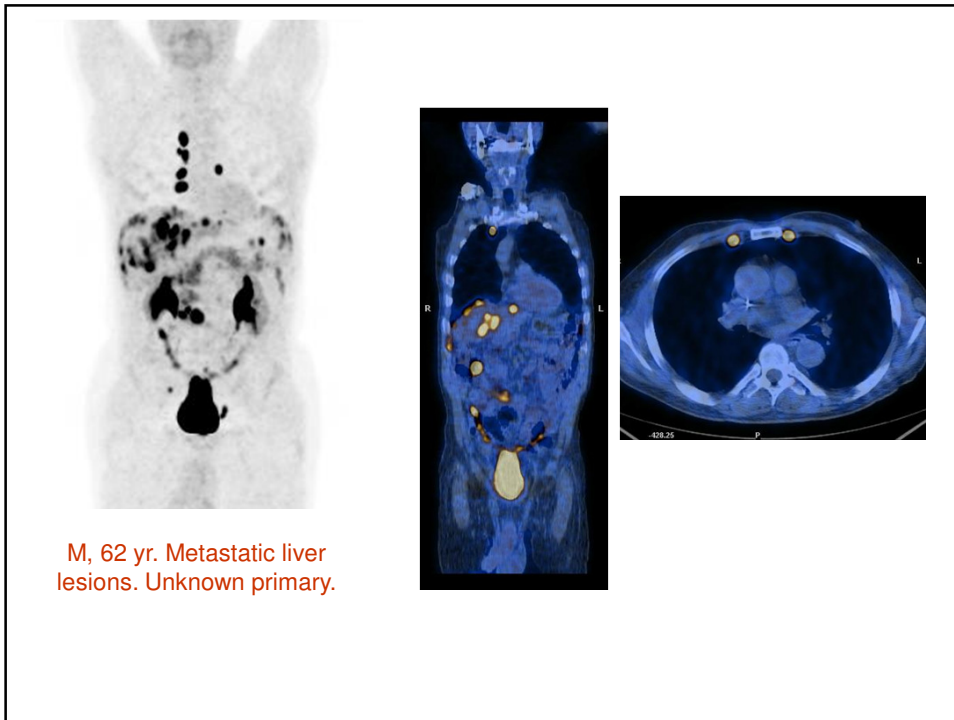
TABLE 3. Overall Impact of PET on Clinical Management

Impact	<i>n</i>
SSA medical therapy started or continued	3/4
SSA medical therapy prevented	2
PRRT started or continued	26*/1
PRRT prevented	0
Radiotherapy started	1
Surgery initiated	6*
Surgery prevented	6
Indication for further diagnostic procedure	1
Indication for liver transplantation	1
Total	51*

*One patient received combined PRRT and surgery based on PET report.







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

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

Parameter	Bone		Mediastinum		Lungs		Liver		Pancreas		Lymph nodes	
	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 (21-87)	100.0 (73-100)	42.9 (9-85)	100.0 (59-100)	0.0 (0-87)	20.0 (0-89)	75.0 (47-93)	81.3 (54-98)	66.7 (9-91)	100.0 (29-100)	81.8 (48-95)	90.9 (58-97)
Specificity (%)	100.0 (71-100)	90.9 (56-99)	100.0 (79-100)	100.0 (79-100)	94.4 (72-99)	94.4 (72-99)	100.0 (59-100)	85.7 (42-99)	100.0 (83-100)	100.0 (83-100)	100.0 (73-100)	100.0 (73-100)
PPV	100.0 (54-100)	92.3 (63-99)	100.0 (29-100)	100.0 (59-100)	0.0 (0-99)	50.0 (1-99)	100.0 (73-100)	92.9 (66-99)	100.0 (15-100)	100.0 (29-100)	100.0 (66-100)	100.0 (69-100)
NPV	64.7 (38-85)	100.0 (69-100)	80.0 (56-94)	100.0 (79-100)	77.3 (54-92)	81.0 (58-94)	63.7 (30-89)	66.7 (29-92)	95.2 (47-99)	100.0 (83-100)	85.7 (51-97)	90.9 (63-99)

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

^{68}Ga -DOTA-Tyr³-Octreotide PET in Neuroendocrine Tumors: Comparison with Somatostatin Receptor Scintigraphy and CT

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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.

