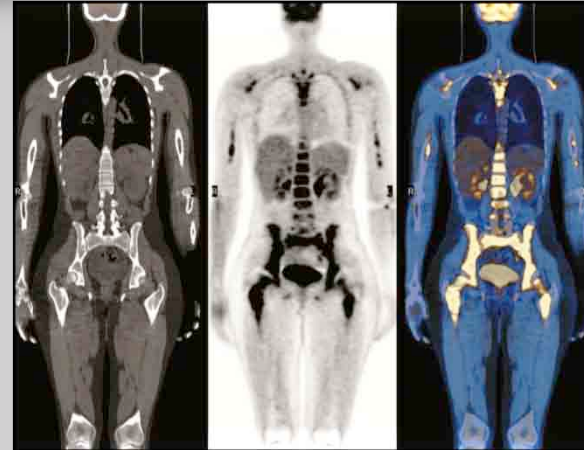


FUP del CDT a rischio intermedio-alto

Ruolo dell'Imaging "pesante"



Massimo Salvatori
 Istituto di Medicina Nucleare
 Università Cattolica del Sacro Cuore
 Policlinico Universitario A. Gemelli, Roma
msalvatori@rm.unicatt.it



Imaging "pesante"



Bari,
7-10 novembre 2013

- Pratica clinica
 - ^{131}I DxWBS e TxWBS
 - ^{18}F -FDG PET/TC
 - TC e RM con e senza m.d.c
- Sperimentazione clinica
 - ^{124}I PET/TC
 - ^{68}Ga dotatoc/dotatate PET/TC
 - DW RM

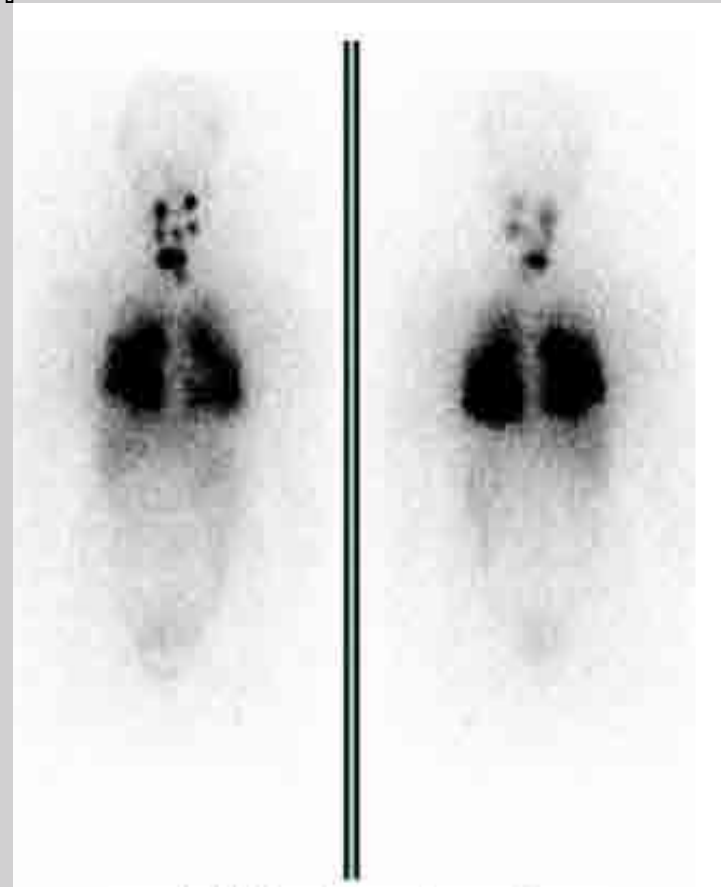
^{131}I WBS planare



Bari,
7-10 novembre 2013



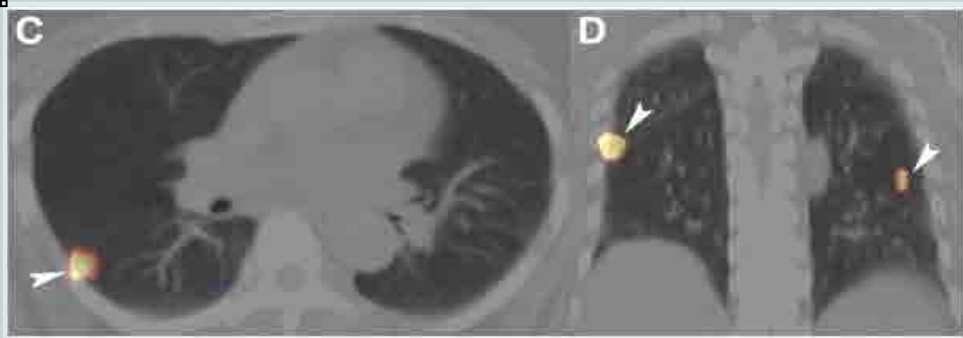
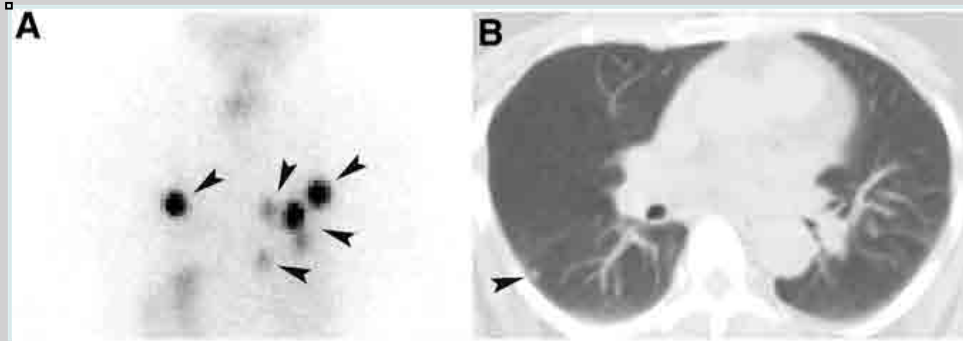
^{131}I DxWBS
(5 mCi)



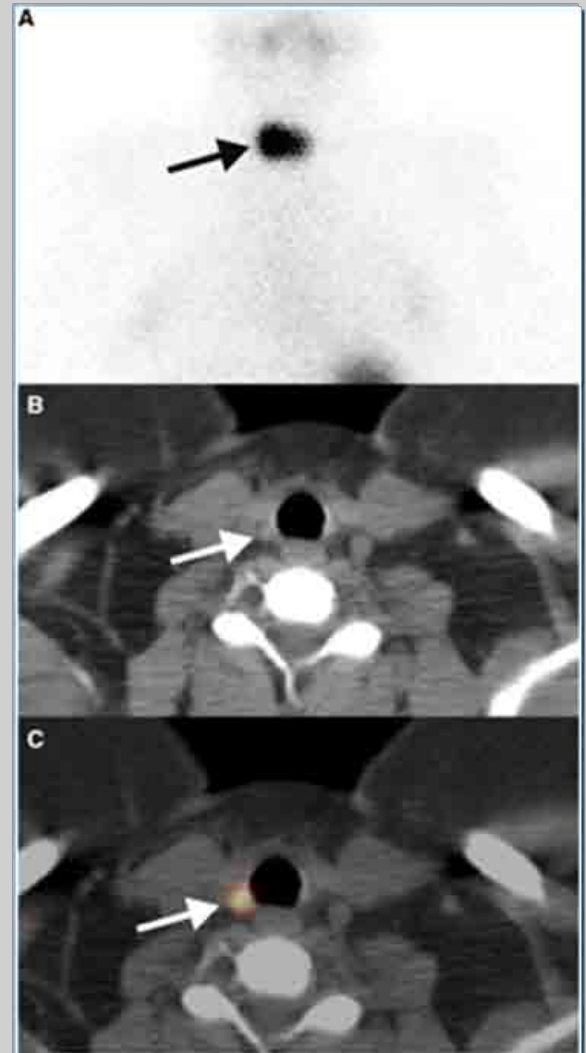
^{131}I TxWBS
(150 mCi)

^{131}I WBS SPECT-TC

Metastasi polmonari



Metastasi linfonodali

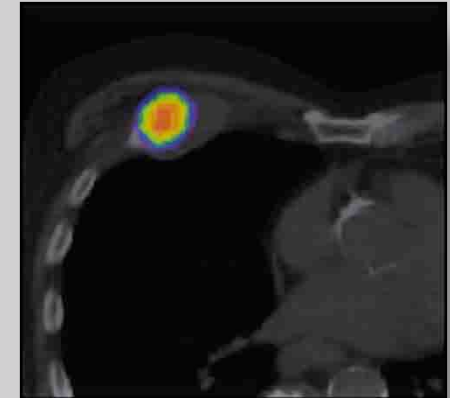
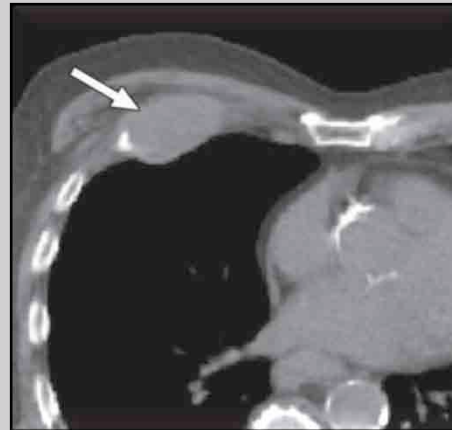
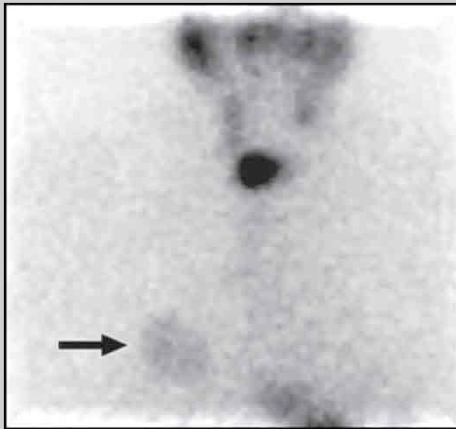


^{131}I WBS SPECT-TC

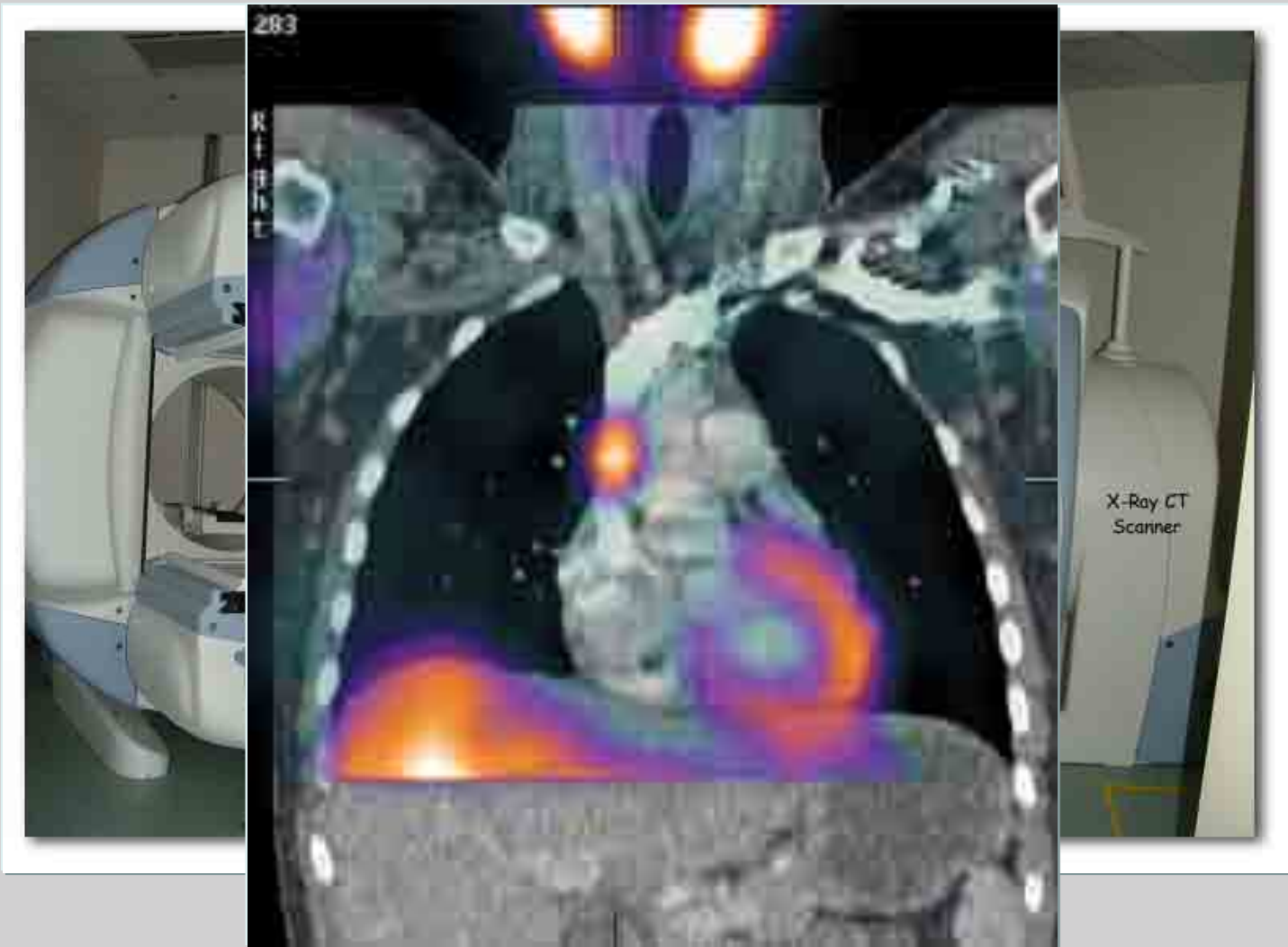


Bari,
7-10 novembre 2013

Metastasi Scheletriche



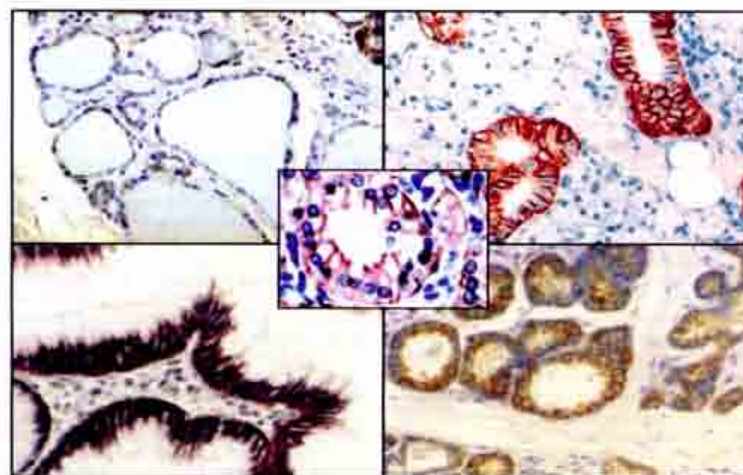
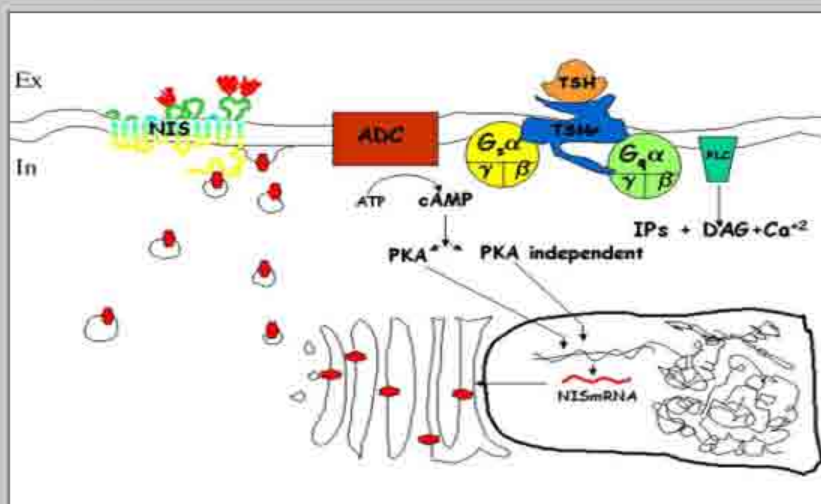
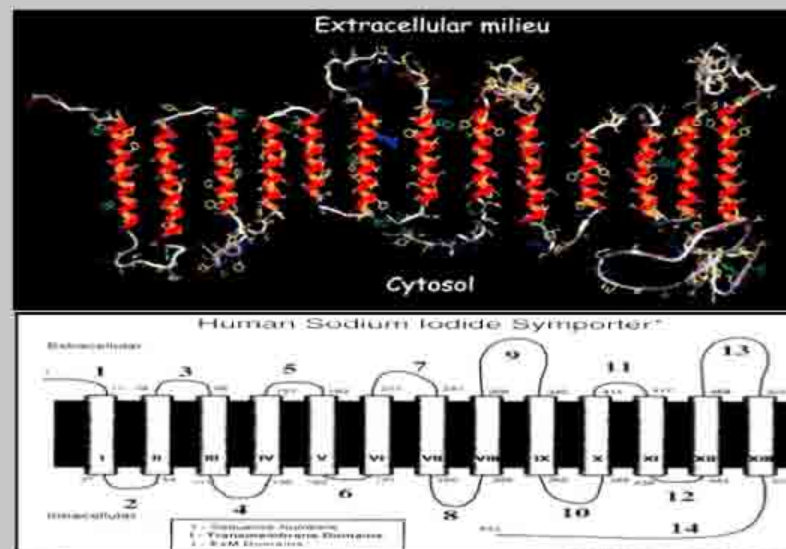
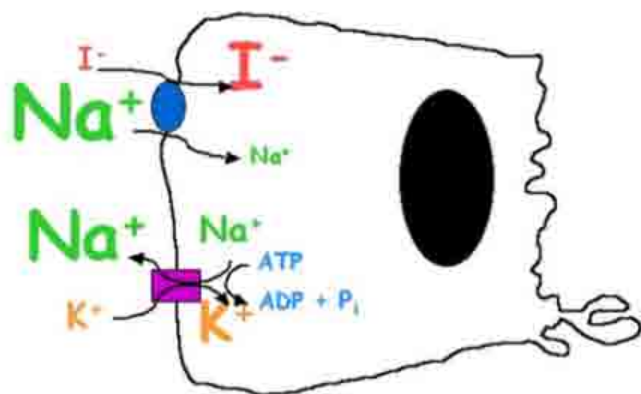
SPECT-TC



“The whole is greater than the sum of its parts”

^{131}I WBS e NIS

NIS mediates active I^- transport

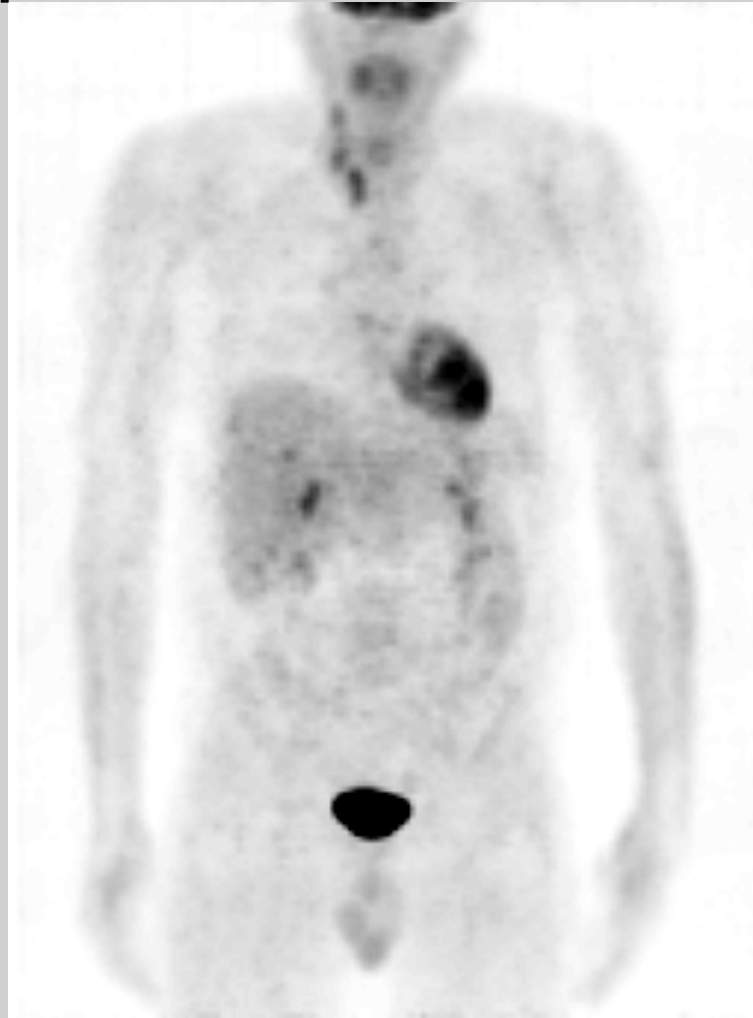




PET/TC con ^{18}F -FDG



Bari,
7-10 novembre 2013



Fluorine-18-FDG and Iodine-131-Iodide Uptake in Thyroid Cancer

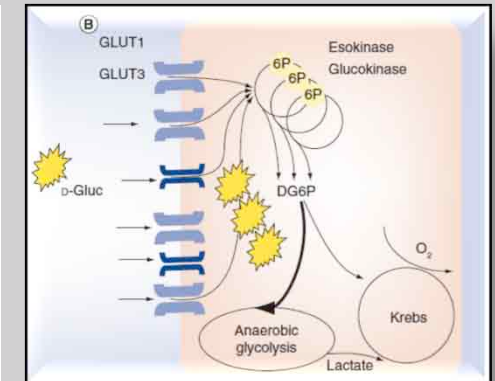
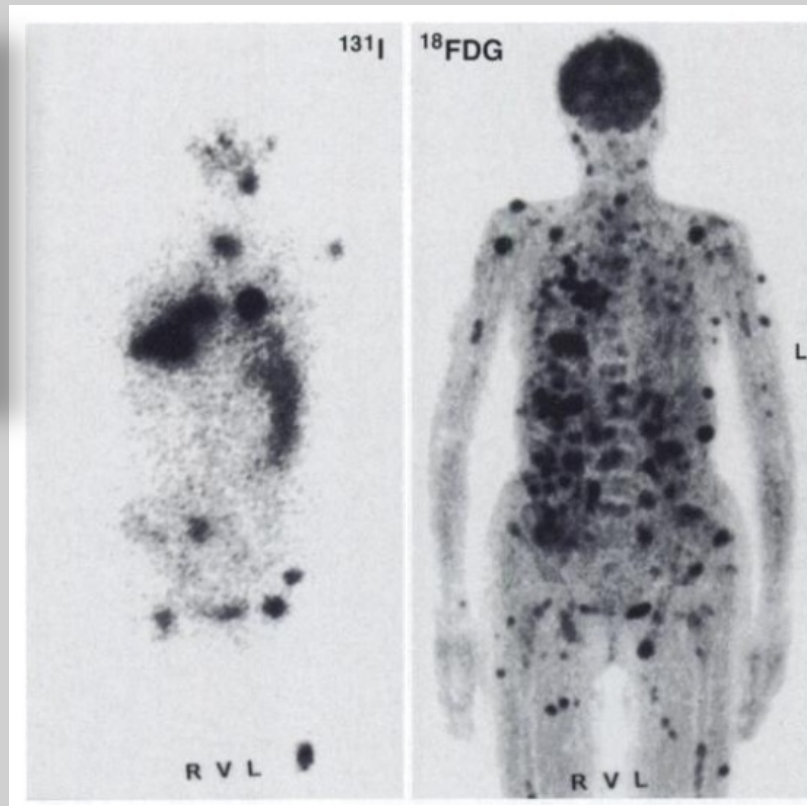
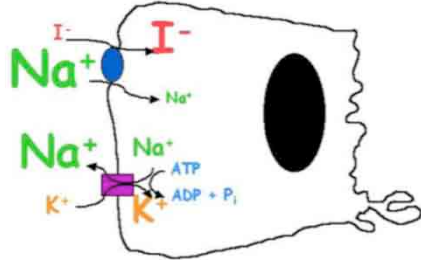
Ulrich Feine, Roland Lietzenmayer, Jacek-P. Hanke, Jürgen Held, Helmut Wöhrle and Wolfgang Müller-Schauenburg
Department of Nuclear Medicine, Eberhard Karls University, Tuebingen, Germany



Bari,
7-10 novembre 2013

J Nucl Med 1996; 37:1468-1472

NIS mediates active I^- transport



flip-flop phenomenon

Glucose Transporter 1 Expression, Tumor Proliferation, and Iodine/Glucose Uptake in Thyroid Cancer With Emphasis on Poorly Differentiated Thyroid Carcinoma

Florian Grabellus, MD,* James Nagarajah, MD,† Andreas Bockisch, MD,† Kurt Werner Schmid, MD,* and Sien-Yi Sheu, MD*

(Clin Nucl Med 2012;37: 121–127)

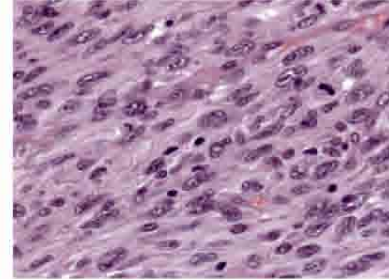
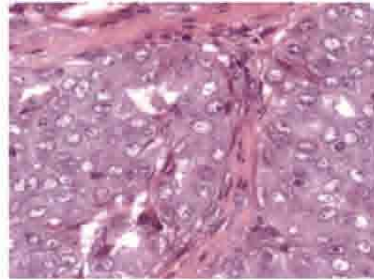
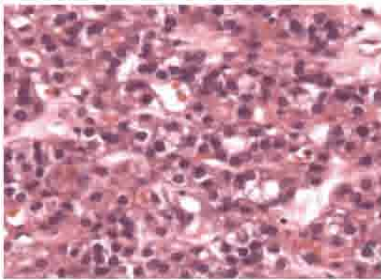
THYROID ADENOMA

DIFFERENTIATED THYROID CANCER

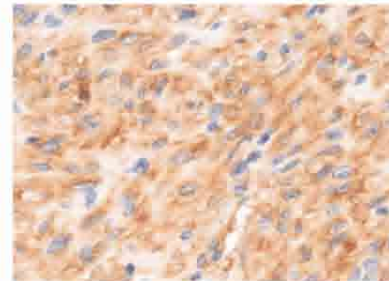
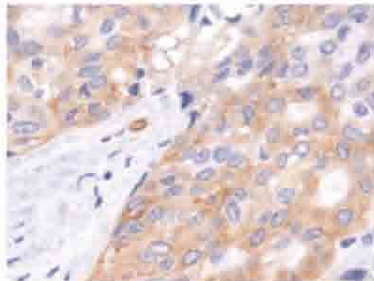
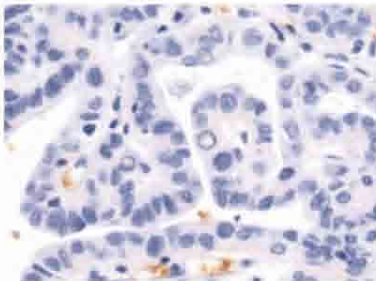
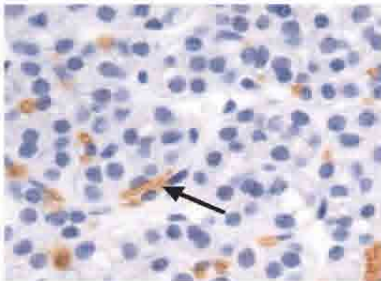
POORLY-DIFFERENTIATED THYROID CANCER

ANAPLASTIC THYROID CANCER

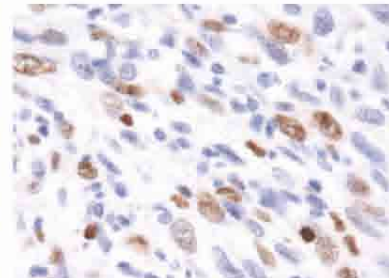
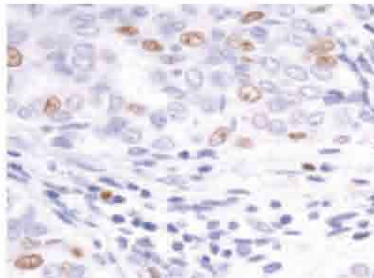
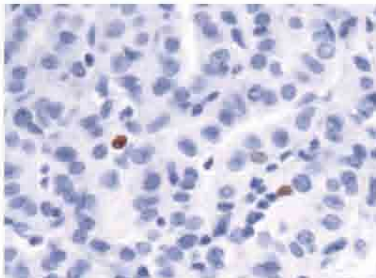
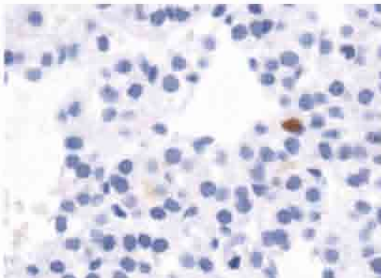
H&E



GLUT1



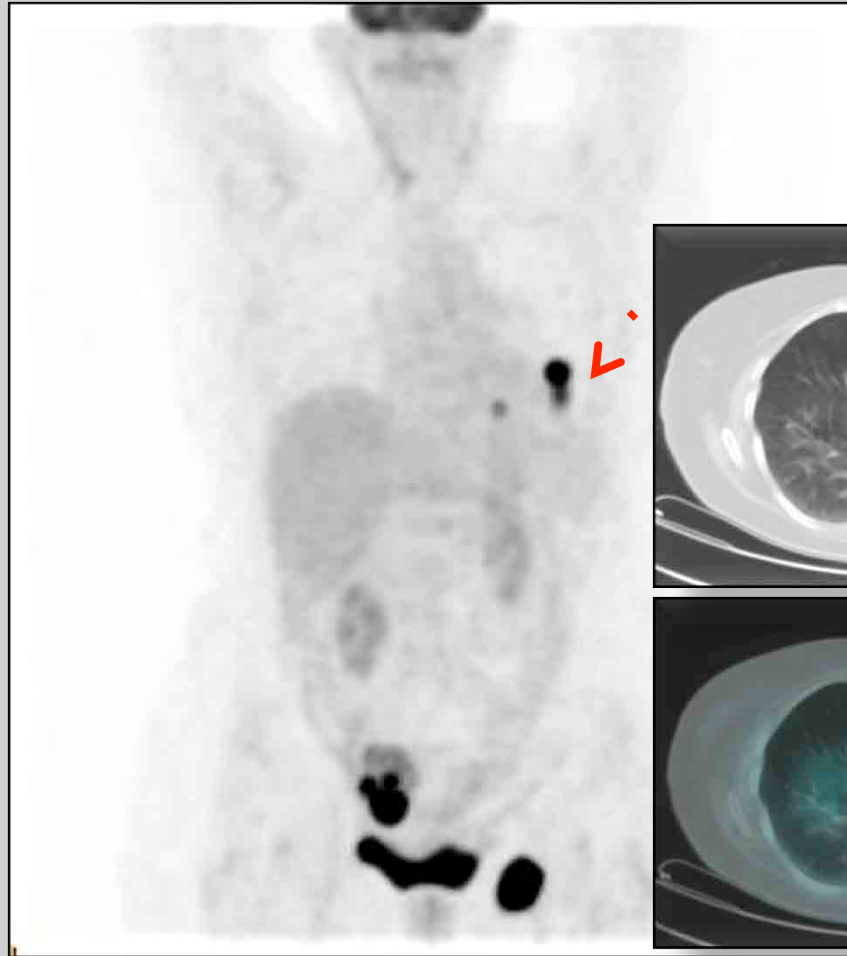
Ki-67



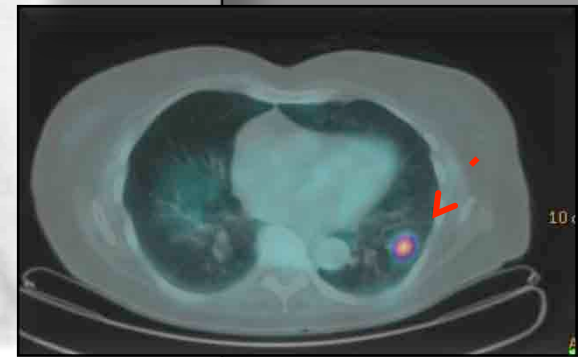
Metastasi Polmonari



^{131}I -TxWBS neg.
Tg elevata



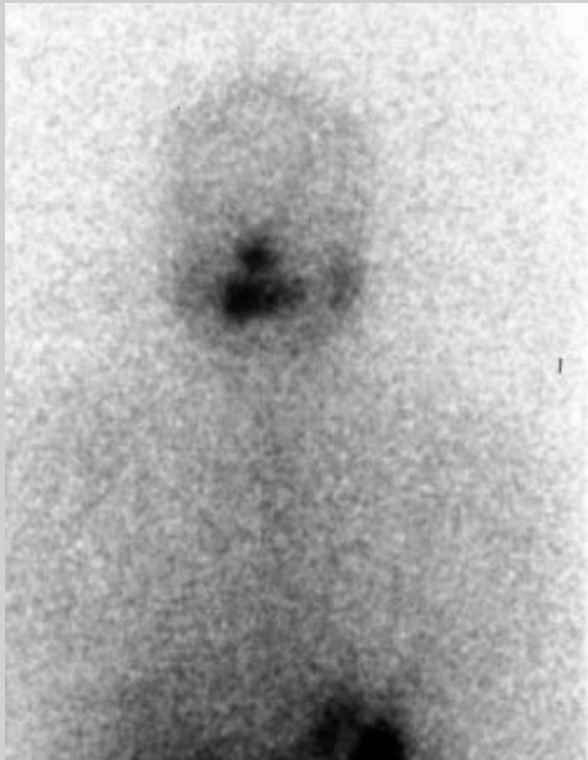
^{18}F -FDG PET/TC



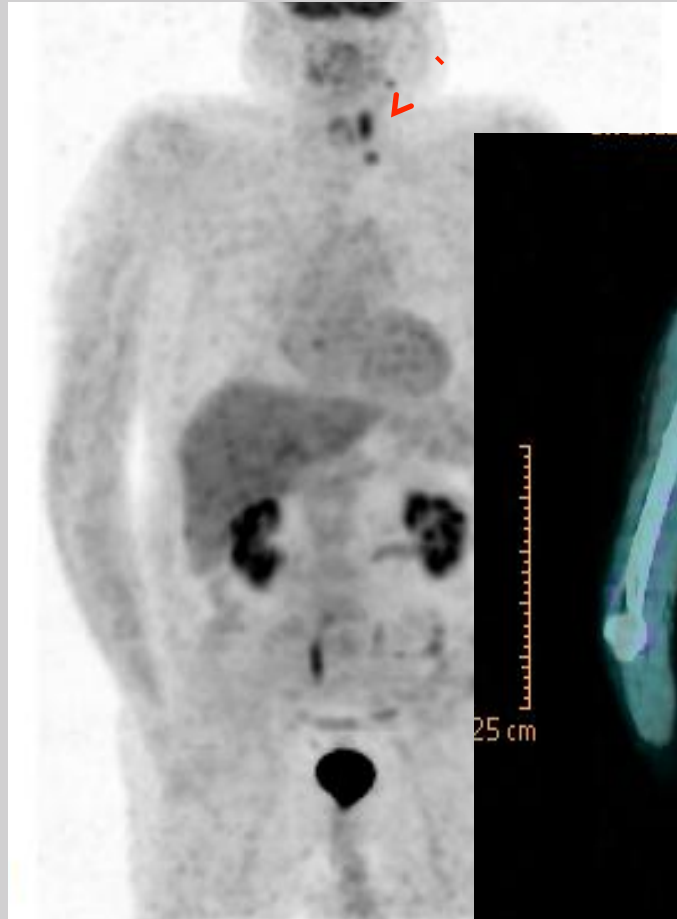
Recidiva nel Letto Tiroideo



Bari,
7-10 novembre 2013



^{131}I -Tx WBS neg.
Tg elevata



^{18}F -FDG PET/TC



^{131}I WBS e FDG PET/TC in pts. a rischio intermedio-alto



Bari,
7-10 novembre 2013

1. E' ancora utile eseguire il ^{131}I DxWBS ?

2. In pazienti con Tg elevata ed imaging strutturale negativo:

- trattamento empirico con ^{131}I (TxWBS) ?
- PET/TC con FDG ?

3. Per quali valori di Tg eseguire FDG PET/TC o trattamento empirico con ^{131}I ?

1. ^{131}I DxWBS e Linee Guida ATA

■ RECOMMENDATION 46

After the first RxWBS performed following RAI remnant ablation, low-risk patients with an undetectable Tg on thyroid hormone with negative antithyroglobulin antibodies and a negative US do not require routine DxWBS during follow-up. Recommendation rating: F

■ RECOMMENDATION 47

DxWBS, either following thyroid hormone withdrawal or rhTSH, 6–12 months after remnant ablation may be of value in the follow-up of patients with high or intermediate risk of persistent disease (see risk stratification system under AJCC/UICC TNM staging), but should be done with ^{123}I or low activity ^{131}I . Recommendation rating: C



Bari,
7-10 novembre 2013

The Role of Routine Diagnostic Radioiodine Whole-Body Scintigraphy in Patients with High-Risk Differentiated Thyroid Cancer

Siegrid G. de Meer¹, Menno R. Vriens¹, Pierre M. Zelissen², Inne H. Borel Rinkes¹, and Bart de Keizer³

¹Department of Surgery, University Medical Center Utrecht, Utrecht, The Netherlands; ²Department of Endocrinology, University Medical Center Utrecht, Utrecht, The Netherlands; and ³Department of Nuclear Medicine, University Medical Center Utrecht, Utrecht, The Netherlands

THYROID
Volume 22, Number 11, 2012
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DOI: 10.1089/thy.2012.0026

THYROID RADIOLOGY AND NUCLEAR MEDICINE

Value of Diagnostic Radioiodine Whole-Body Scanning After Initial Therapy in Patients with Differentiated Thyroid Cancer at Intermediate and High Risk for Recurrence

Pedro Wesley Rosario,^{1,2} Mariana de Souza Furtado,^{1,3} Augusto Flávio Campos Mineiro Filho,¹
Rafaela Xavier Lacerda,¹ and Maria Regina Calsolaro²

CDT a rischio intermedio-alto



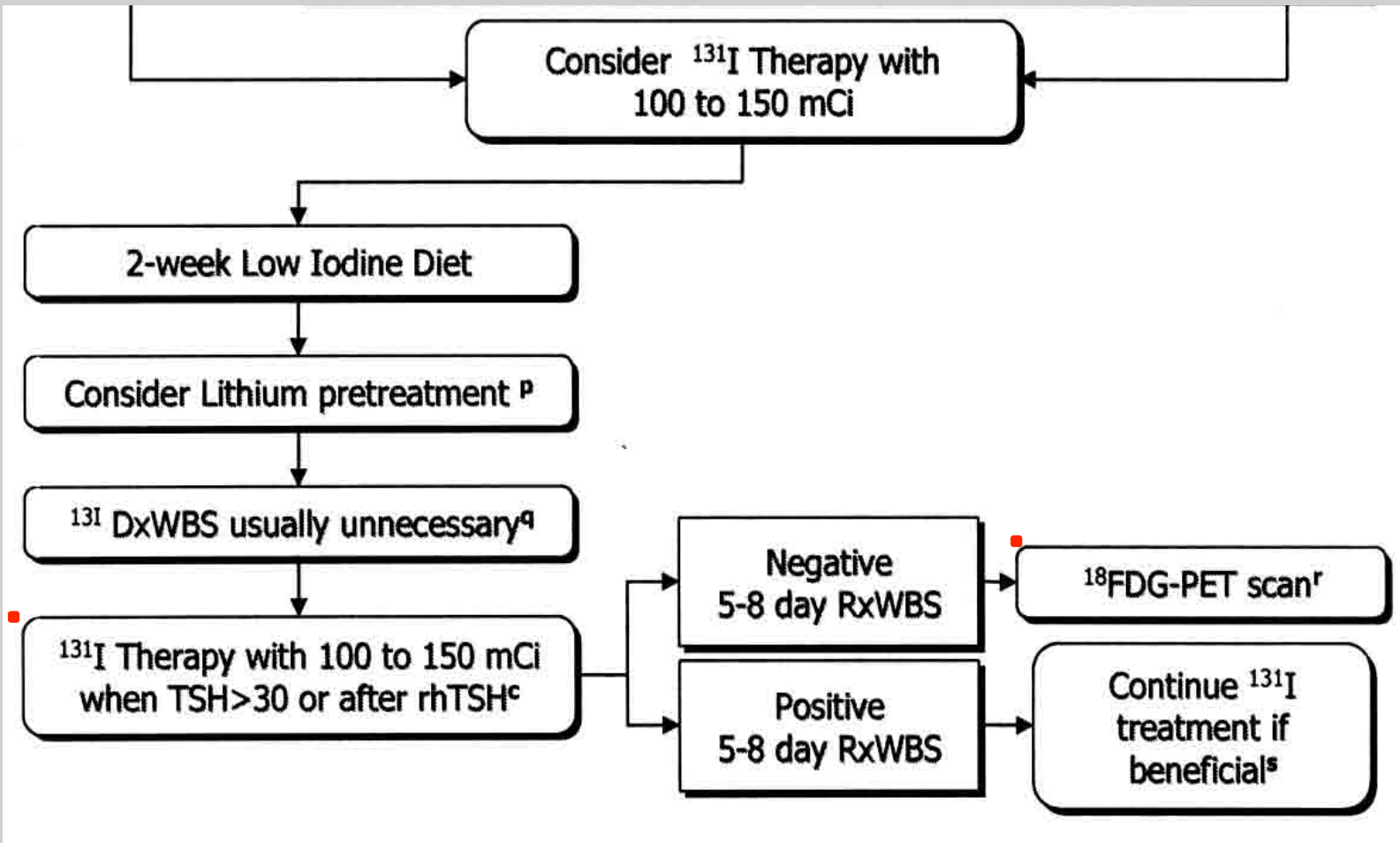
Bari,
7-10 novembre 2013

Dopo chirurgia e trattamento ablativo, il ^{131}I DxWBS a 8-12 mesi può essere omesso se:

- ^{131}I TxWBS all'ablazione non mostrava metastasi
- uptake di ^{131}I nel letto tiroideo era $< 2\%$
- Tg on LT4 < 1 ng/ml con AbTg negativi
- ecografia del collo negativa

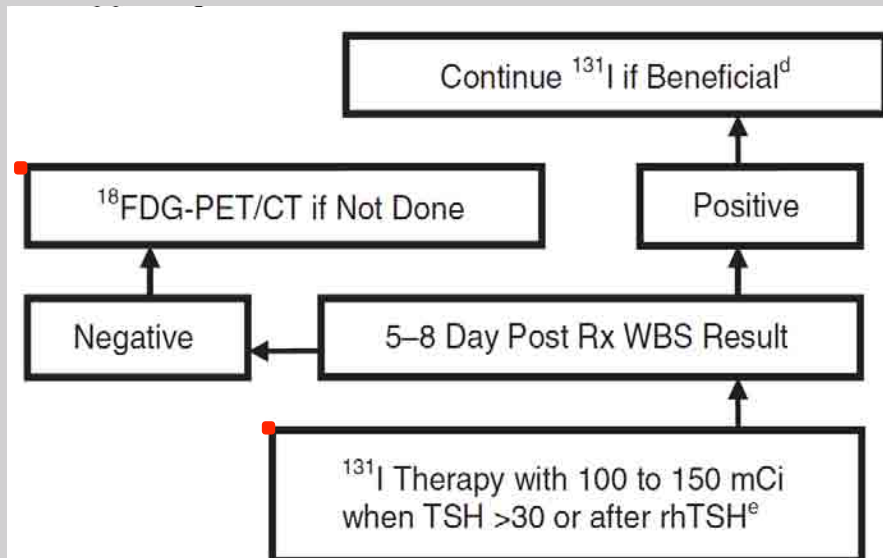
2. Tg elevata e imaging strutturale negativo: FDG PET/TC o terapia empirica con ^{131}I ?

- 2006, Linee Guida ATA
Eseguire prima terapia empirica con ^{131}I ; FDG PET/TC solo in caso di TxWBS negativo
- 2009, Linee Guida ATA
Tendenza ad eseguire prima PET/TC e riservare la terapia empirica con ^{131}I solo ai casi con PET/TC negativa
- Recenti evidenze scientifiche confermano la correttezza di tale nuovo approccio
 - Kim WG et al. J Clin Endocrinol Metab 95: 1169-1173, 2010
 - Leboulleux S et al. Thyroid, 22:832,2012
 - Rosario PW et al. Thyroid, doi: 10.1089/thy.2013.0427



Some have argued that ^{18}F FDG-PET scanning should be performed prior to empiric RAI therapy, since tumors that are ^{18}F FDG-PET positive do not generally concentrate RAI, and RAI therapy is unlikely to alter the poorer outcome in such patients.

If the ^{18}F FDG PET scan is negative, then empiric therapy with RAI (100-200 mCi) should be considered to aid localization or for therapy of surgically incurable disease



THYROID
Volume 19, Number 11, 2009
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DOI: 10.1089/thy.2009.0110

ORIGINAL STUDIES, REVIEWS,
AND SCHOLARLY DIALOG
THYROID CANCER AND NODULES

Revised American Thyroid Association Management
Guidelines for Patients with Thyroid Nodules
and Differentiated Thyroid Cancer

The American Thyroid Association (ATA) Guidelines Taskforce
on Thyroid Nodules and Differentiated Thyroid Cancer



Original article

**Nuclear
Medicine**
Communications



Bari,
7-10 novembre 2013

Value of ^{18}F -FDG-PET/PET-CT in differentiated thyroid carcinoma with radioiodine-negative whole-body scan: a meta-analysis

Meng-Jie Dong, Zhen-Feng Liu, Kui Zhao, Ling-Xiang Ruan, Guo-Lin Wang, Shu-Ye Yang, Fang Sun and Xu-Guang Luo

Nuclear Medicine Communications 2009, 30:639–650

SENSIBILITA' (%)

SPECIFICITA' (%)

Studi «patient-based»
17 studi; 571 pazienti

83.5

84.3

Studi «lesion-based»
6 studi; 237 lesioni

91.6

77.5

Studi con Tg elevata
8 studi; 217 pazienti

88.5

84.7

Studi con PET/TC
6 studi; 165 pazienti

93.5

83.9



Empiric High-Dose 131 -Iodine Therapy Lacks Efficacy for Treated Papillary Thyroid Cancer Patients with Detectable Serum Thyroglobulin, but Negative Cervical Sonography and 18 F-Fluorodeoxyglucose Positron Emission Tomography Scan

Won Gu Kim,* Jin-Sook Ryu,* Eui Young Kim, Jeong Hyun Lee, Jung Hwan Baek, Jong Ho Yoon, Suck Joon Hong, Eun Sook Kim, Tae Yong Kim, Won Bae Kim, and Young Kee Shong

J Clin Endocrinol Metab 2010



Bari,
7-10 novembre 2013

Postradioiodine Treatment Whole-Body Scan in the Era of 18 -Fluorodeoxyglucose Positron Emission Tomography for Differentiated Thyroid Carcinoma with Elevated Serum Thyroglobulin Levels

Sophie Leboulleux,¹ Intidhar El Bez,¹ Isabelle Borget,² Manel Elleuch,³ Désirée Déandreis,¹ Abir Al Ghuzlan,⁴ Cécile Chougnet,¹ François Bidault,³ Haitham Mirghani,⁵ Jean Lumbroso,¹ Dana Hartl,⁵ Eric Baudin,¹ and Martin Schlumberger¹

Thyroid 2012

Is empirical radioiodine therapy still a valid approach to patients with thyroid cancer and elevated thyroglobulin?

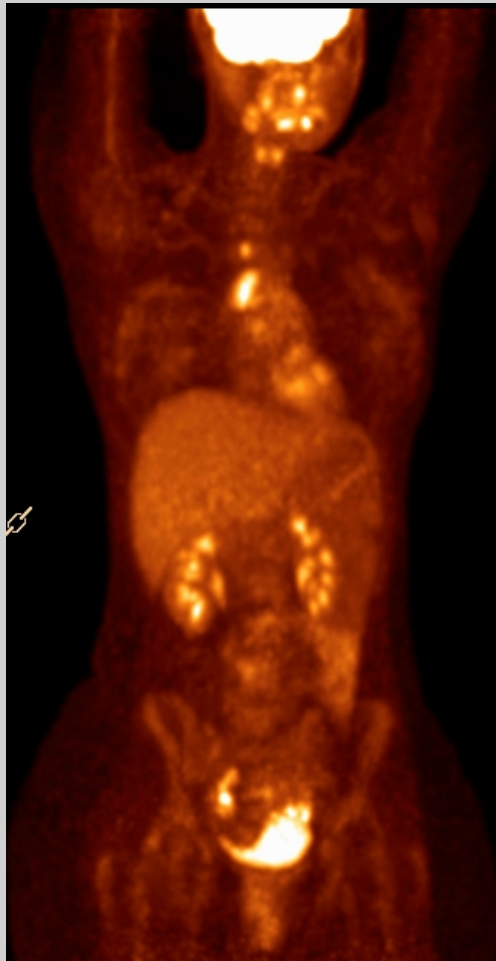
Pedro Wesley Rosario^{1,2}, M.D.; Gabriela Franco Mourão^{1,2}, M.D.; Juan Bernard Nascimento dos Santos¹; Maria Regina Calsolari², M.D.

Thyroid 2013

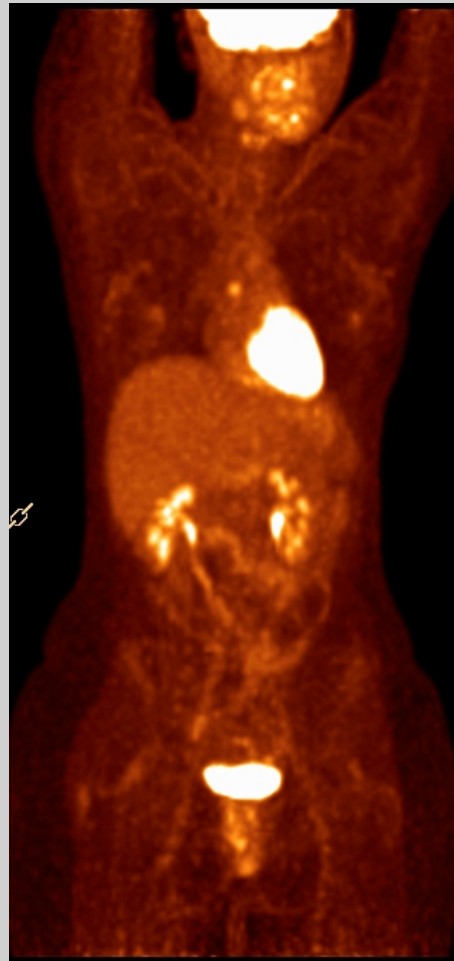
¹⁸F- FDG PET-TC prima e dopo ¹³¹I Terapia in paziente con Tg elevata e ¹³¹I WBS negativo



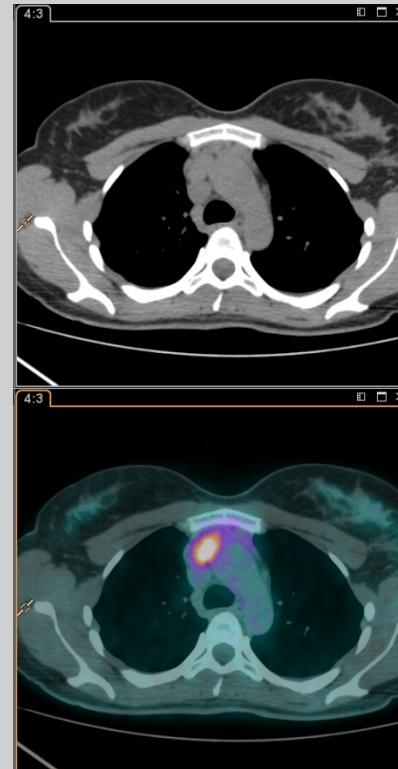
Bari,
7-10 novembre 2013



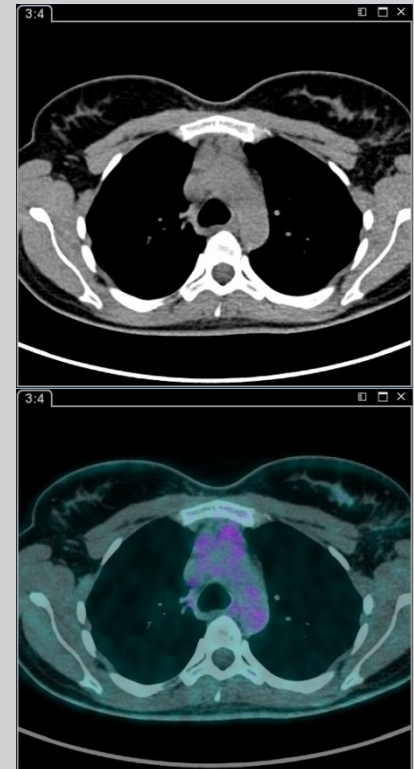
maggio 2013



agosto 2013



maggio 2013



agosto 2013

Terapia empirica con ^{131}I (TxWBS)

^{18}F -FDG PET/TC

Necessità di ricovero protetto

Indagine in regime
ambulatoriale

Alta dose di radiazioni al
paziente

Dose di radiazioni al paziente
contenuta

Bassa sensibilità

18% (per pts.)
16 % (per lesioni)

Accettabile sensibilità

65% (per pts.)
88% (per lesioni)

Costo maggiore

~ 3.000 €

Costo minore

~ 1.200 €

Effetto terapeutico

Riduzione dei valori di Tg ???
Significato clinico della riduzione ???

Effetto terapeutico

Assente

Dose di radiazioni ricevuta dal paziente



Bari,
7-10 novembre 2013

Radiofarmaco	Attività	Dose Efficace
--------------	----------	---------------

^{131}I -NaI

185 MBq (5mCi)

11mSv

^{131}I -NaI

5.550 (150 mCi)

330 mSv

^{18}F -FDG

300 MBq (8 mCi)

5.7 mSv

^{124}I -NaI

74 MBq (2 mCi)

7 mSv

3.

Per quali valori di Tg eseguire una PET/TC o un trattamento empirico con ^{131}I ?



Bari,
7-10 novembre 2013

- Tg > 2 ng/ml on L-T4
- Tg > 5 ng/ml dopo rhTSH
- Tg > 10 ng /ml off L-T4

■ RECOMMENDATION 78

- (a) If an empiric dose (100–200 mCi) of RAI fails to localize the persistent disease, ^{18}F FDG-PET/CT scanning should be considered, especially in patients with unstimulated serum Tg levels >10–20 ng/mL or in those with aggressive histologies, in order to localize metastatic lesions that may require treatment or continued close observation (425,426). Recommendation rating: B



Thyroid Cancer	October 1, 2003	Restaging of recurrent or residual thyroid cancers of follicular cell origin that have been previously treated by thyroidectomy and radioiodine ablation and have a serum thyroglobulin >10ng/ml and negative I-131 whole body scan performed
----------------	-----------------	---

- L'indicazione ad eseguire una PET/TC o un trattamento empirico con ^{131}I dovrebbe tener conto anche delle caratteristiche cliniche ed istopatologiche individuali
- Il tempo di raddoppio della Tg (DT-TG) è un parametro fondamentale che dovrebbe avere maggiore risalto
- E' di fondamentale importanza:
 - *conoscere la metodologia di dosaggio utilizzata*
 - *conoscere le cause di possibili interferenze*
 - *considerare le variabilità intra e inter-lab*
 - *ricordare la frequente possibilità di spontanea riduzione dei valori di Tg*

Conclusioni 1.



Bari,
7-10 novembre 2013

- Il ^{131}I WBS, eseguito con attività terapeutiche di ^{131}I e con tecnica SPECT-TC, rappresenta una metodica di insostituibile valore nel management del paziente a rischio intermedio-elevato.
- Oltre a preziosi dati di ordine diagnostico, fornisce:
 - importanti informazioni di tipo prognostico
 - elementi per definire uno score di rischio
 - dati indispensabili a fini dosimetrici

Conclusioni 2.



Bari,
7-10 novembre 2013

- La ^{18}F -FDG PET, a fini diagnostici, è metodica di prima istanza in pazienti con Tg elevata e ^{131}I WBS negativo
- A tale scopo va eseguita in pazienti tiroidectomizzati ed ablati, a rischio intermedio-elevato e solo in caso di evidente e progressivo innalzamento dei valori di Tg con indagini strutturali negative
- A scopo prognostico è complementare al ^{131}I WBS, identificando le forme scarsamente differenziate ad elevato rischio di mortalità tumore-specifica



Vi ringrazio per l'attenzione



Bari,
7-10 novembre 2013

