

XXV CONGRESSO NAZIONALE
AIRO 2015

PALACONGRESSI - Rimini, 7-10 novembre



SALA DELLA PIAZZA

14.00 - 15.30 WORKSHOP

Intensificazione dei trattamenti neoadiuvanti nel carcinoma del retto e fattori predittivi di risposta

Moderatori: V. Valentini, F. Valvo

Cosa i pazienti si aspettano dall'intensificazione del trattamento - **M.A. Gambacorta**

L'intensificazione della chemioterapia - **A. De Paoli**

L'intensificazione della radioterapia: quali volumi irradiare e la verifica della loro corretta irradiazione durante la terapia - **G. Mantello**

L'intensificazione della radioterapia: la scelta della dose e del frazionamento - **M. Lupattelli**

Fattori predittivi e modellistica della risposta al trattamento - **V. Valentini**

Discussione

**“L'intensificazione della radioterapia:
quali volumi irradiare e la verifica della loro corretta
irradiazione durante la terapia“**

GIOVANNA MANTELLO
SOD RADIOTERAPIA



XXV CONGRESSO NAZIONALE
AIRO 2015

PALACONGRESSI - Rimini, 7-10 novembre



DICHIARAZIONE

Relatore: GIOVANNA MANTELLO

Come da nuova regolamentazione della Commissione Nazionale per la Formazione Continua del Ministero della Salute, è richiesta la trasparenza delle fonti di finanziamento e dei rapporti con soggetti portatori di interessi commerciali in campo sanitario.

- Posizione di dipendente in aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Consulenza ad aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Fondi per la ricerca da aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazione ad Advisory Board **(NIENTE DA DICHIARARE)**
- Titolarità di brevetti in compartecipazione ad aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazioni azionarie in aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Altro **(NIENTE DA DICHIARARE)**



LINEE GUIDA

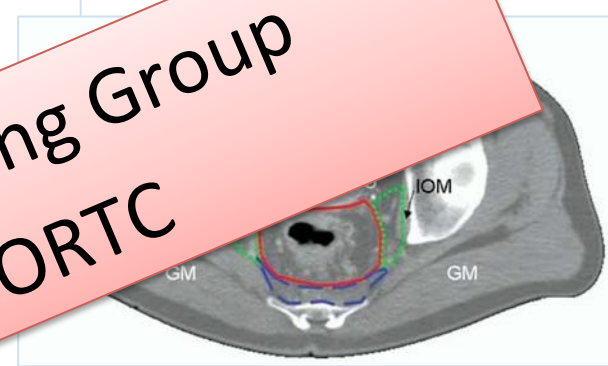
CLINICAL INVESTIGATION

Rectum

DEFINITION AND DELINEATION OF THE CLINICAL TARGET VOLUME FOR RECTAL CANCER

SARAH ROELS, M.D.,* WIM DUTHOY, M.D.,§ KARIN HAUSTERMANS, M.D., Ph.D.,*
FREDDY PENNINGCKX, M.D., Ph.D.,† VINCENT VANDECAVEYE, M.D.,‡ TOM BOTERBERG, M.D.,
AND WILFRIED DE NEVE, M.D., Ph.D.§

Departments of *Radiotherapy, †Surgery, and ‡Radiology, University Hospital Gasthuisberg, Leuven, Belgium; §Radiotherapy, Ghent University Hospital, Ghent, Belgium

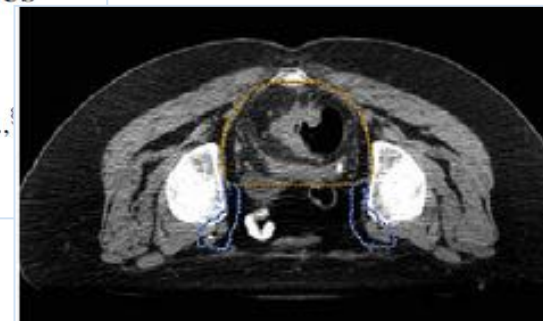


CLINICAL INVESTIGATION

Rectum

DEFINITION AND DELINEATION OF THE CLINICAL TARGET VOLUME FOR CONFORMAL THERAPY IN RECTAL CANCER: ESTRO-ASTRO-TROG-EORTC RADIATION THERAPY ONCOLOGY GROUP CONSENSUS DOCUMENTATION AND TREATMENT PLANNING OUTLINING ATLAS

ROELS, S., Ph.D.,* MICHAEL C. GAROFALO, M.D.,† ISSAM EL NAQA, Ph.D.,*
DUTHOY, W., Ph.D.,‡ ADITYA APTE, Ph.D.,* WALTER R. BOSCH, Ph.D.,* PRAJAN DAS, M.D.,
AND L. GUNDERSON, M.D.,§ THEODORE S. HONG, M.D.,¶ J. J. JOHN KIM, M.D.,#
CHRISTOPHER G. WILLETT, M.D.,** AND LISA A. KACHNIC, M.D.††



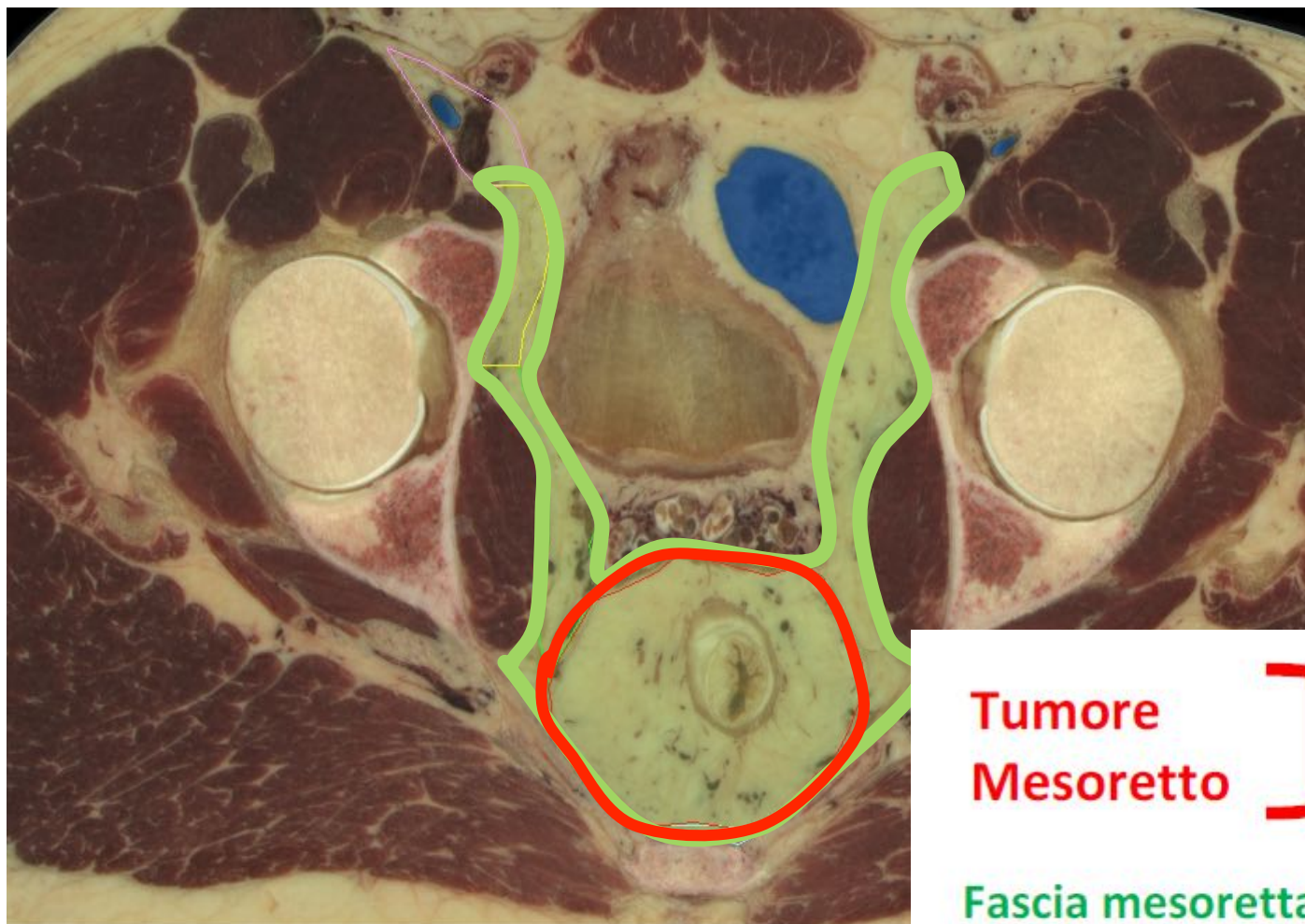
Guidelines 2016 - Join Working Group
ESTRO-ASTRO-TROG-EORTC

Roels S (2006)- *Int J Radiat Oncol Biol Phys* 65:1129–1142

Myerson RJ (2009) - *Int J Radiat Oncol Biol Phys* 74:824–830



Quale bersaglio

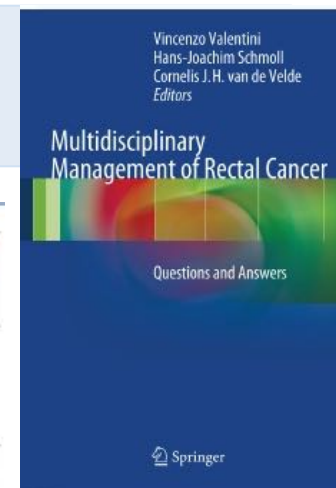


Tumore
Mesoretto] S

Fascia mesorettale
Regione presacrale
N extra mesorettali] RT



CTV



	<u>Presacral space</u>	<u>Mesorectum</u>	<u>Internal iliac nodes</u>	<u>Obturator nodes</u>	<u>External iliac nodes</u>	<u>Sphincter complex</u>	<u>Ischio-rectal fossa</u>
cT3 hi the pe reflec							
cT3 mi (below perito reflect							
Any cT massiv intern nodes							
Any cT massiv obtur nodes							
cT4 wi anteri organ							

1. Mesoretto
2. Spazio pre-sacrato
3. Linfonodi iliaco interni
4. Linfonodi otturatori
5. Linfonodi iliaco esterni
6. Complesso sfinteriale
7. Fossa ischio-rettale



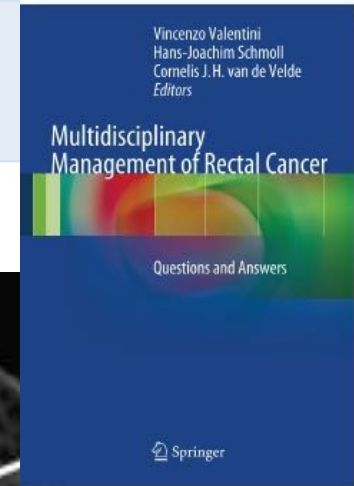
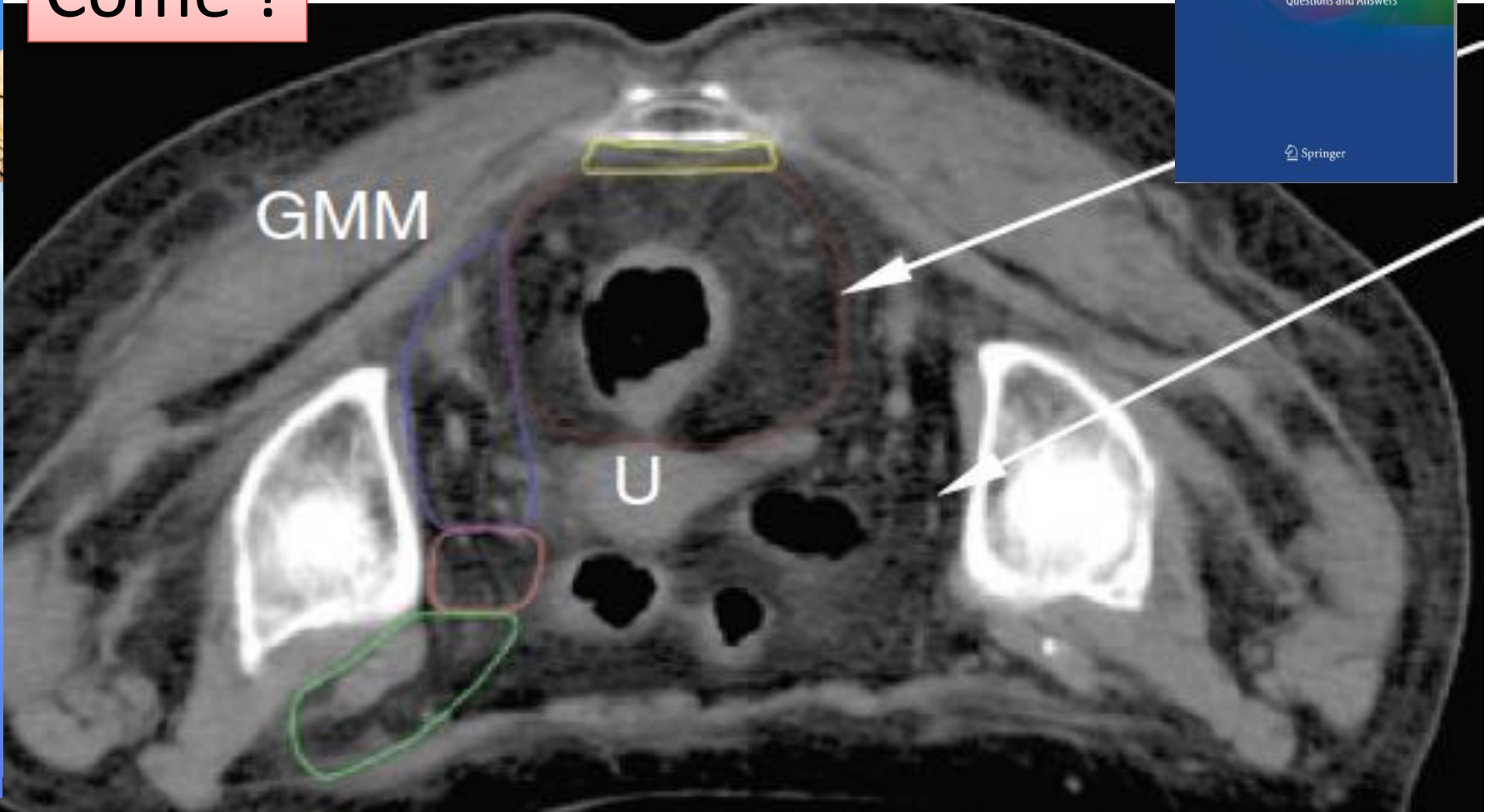
Gambacorta MA and Valentini V :Should We Tailor the Delineation of Pelvic Structures According to Tumor Presentation? Multidisciplinary Management of Rectal Cancer : Questions and Answers (2012) Springer-Verlag Berlin Heidelberg



XXV CONGRESSO NAZIONALE
AIRO 2015
PALACONGRESSI - Rimini, 7-10 novembre

CTV: contouring

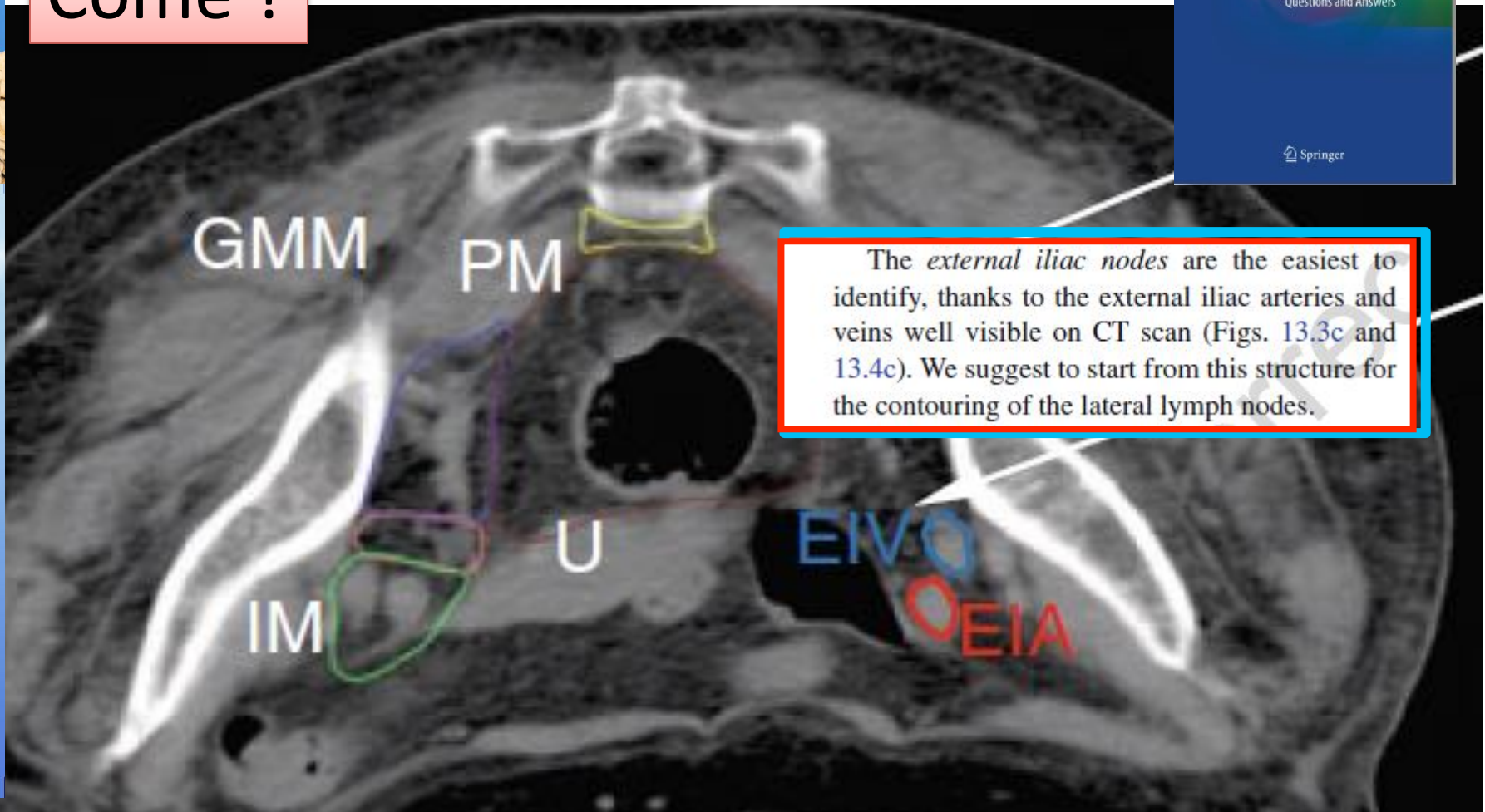
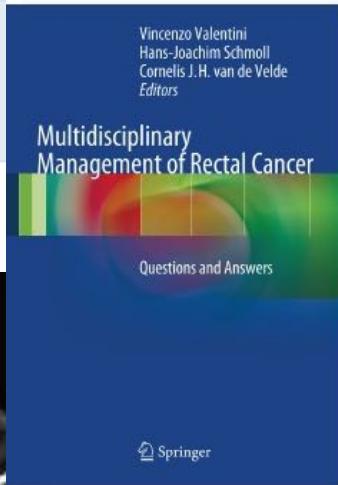
Come ?



Gambacorta MA and Valentini V :Should We Tailor the Delineation of Pelvic Structures According to Tumor Presentation? Multidisciplinary Management of Rectal Cancer : Questions and Answers (2012) Springer-Verlag Berlin Heidelberg

CTV: contouring

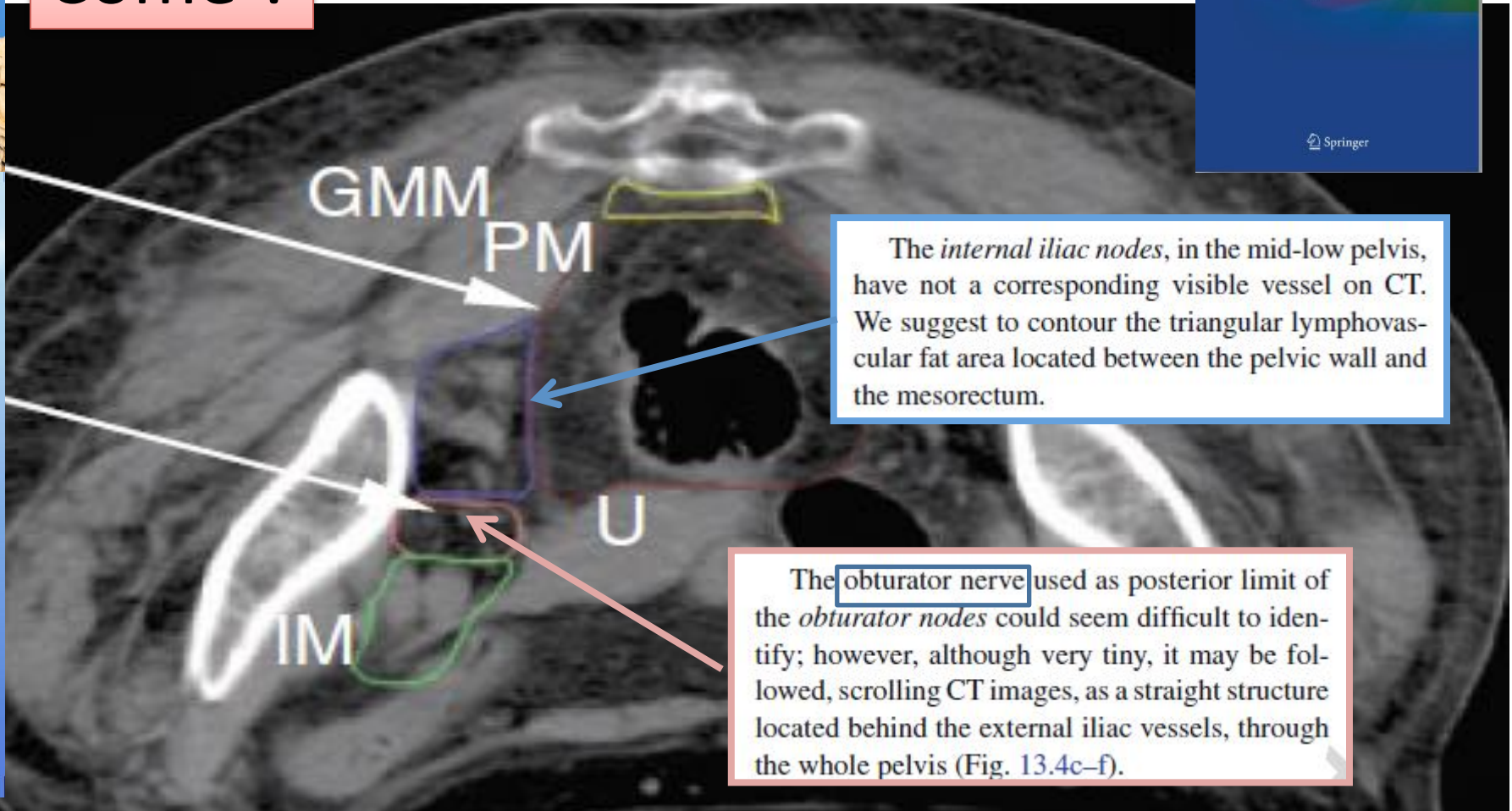
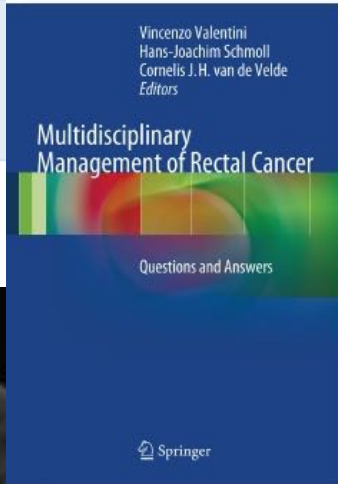
Come ?



The *external iliac nodes* are the easiest to identify, thanks to the external iliac arteries and veins well visible on CT scan (Figs. 13.3c and 13.4c). We suggest to start from this structure for the contouring of the lateral lymph nodes.

CTV: contouring

Come ?

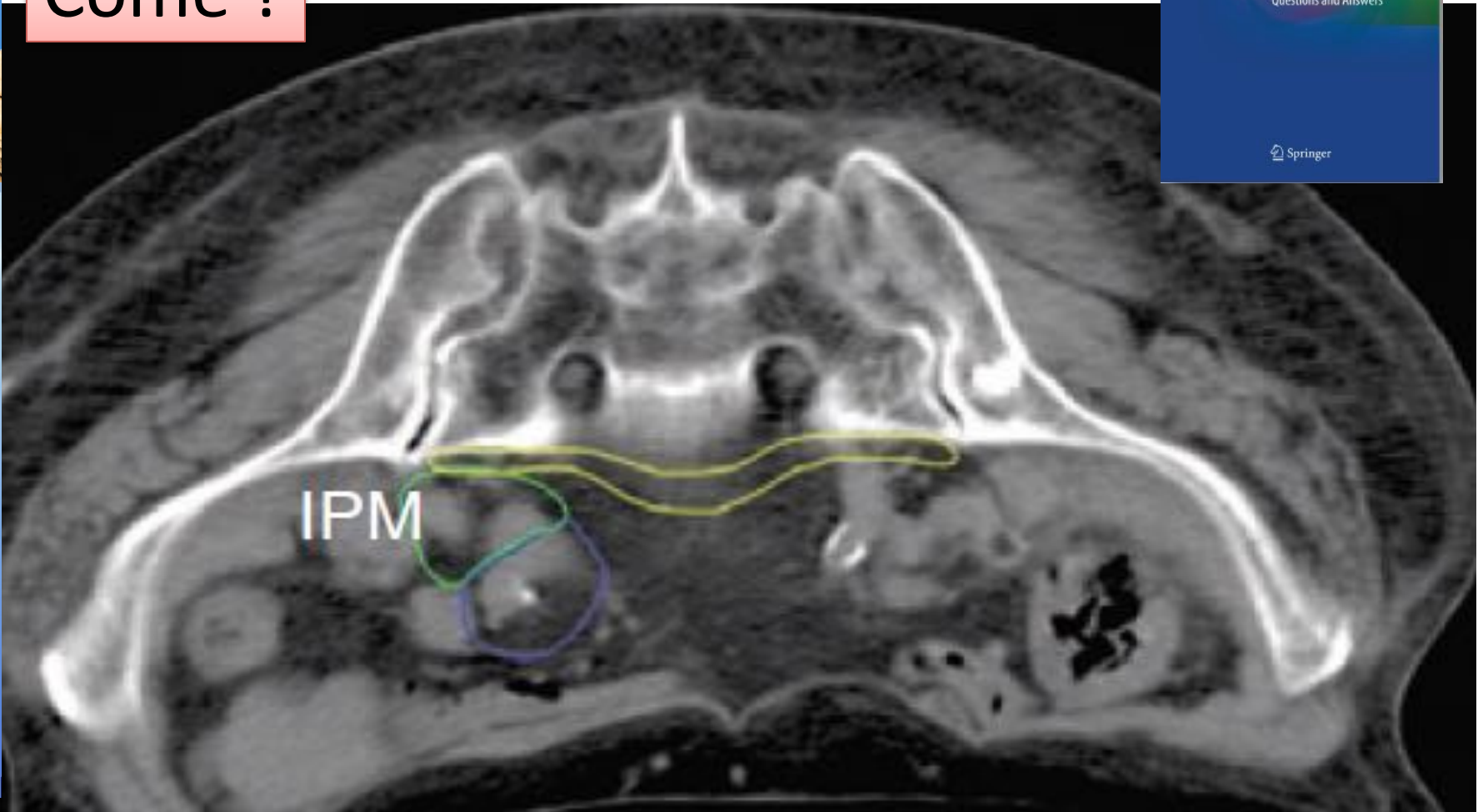
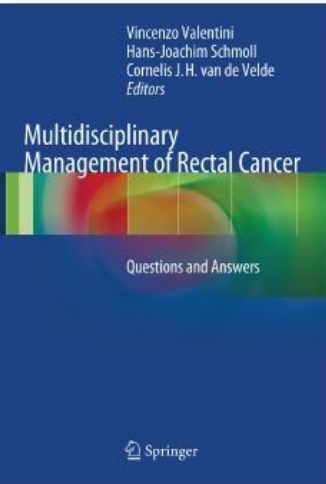


The *internal iliac nodes*, in the mid-low pelvis, have not a corresponding visible vessel on CT. We suggest to contour the triangular lymphovascular fat area located between the pelvic wall and the mesorectum.

The **obturator nerve** used as posterior limit of the *obturator nodes* could seem difficult to identify; however, although very tiny, it may be followed, scrolling CT images, as a straight structure located behind the external iliac vessels, through the whole pelvis (Fig. 13.4c-f).

CTV: contouring

Come ?



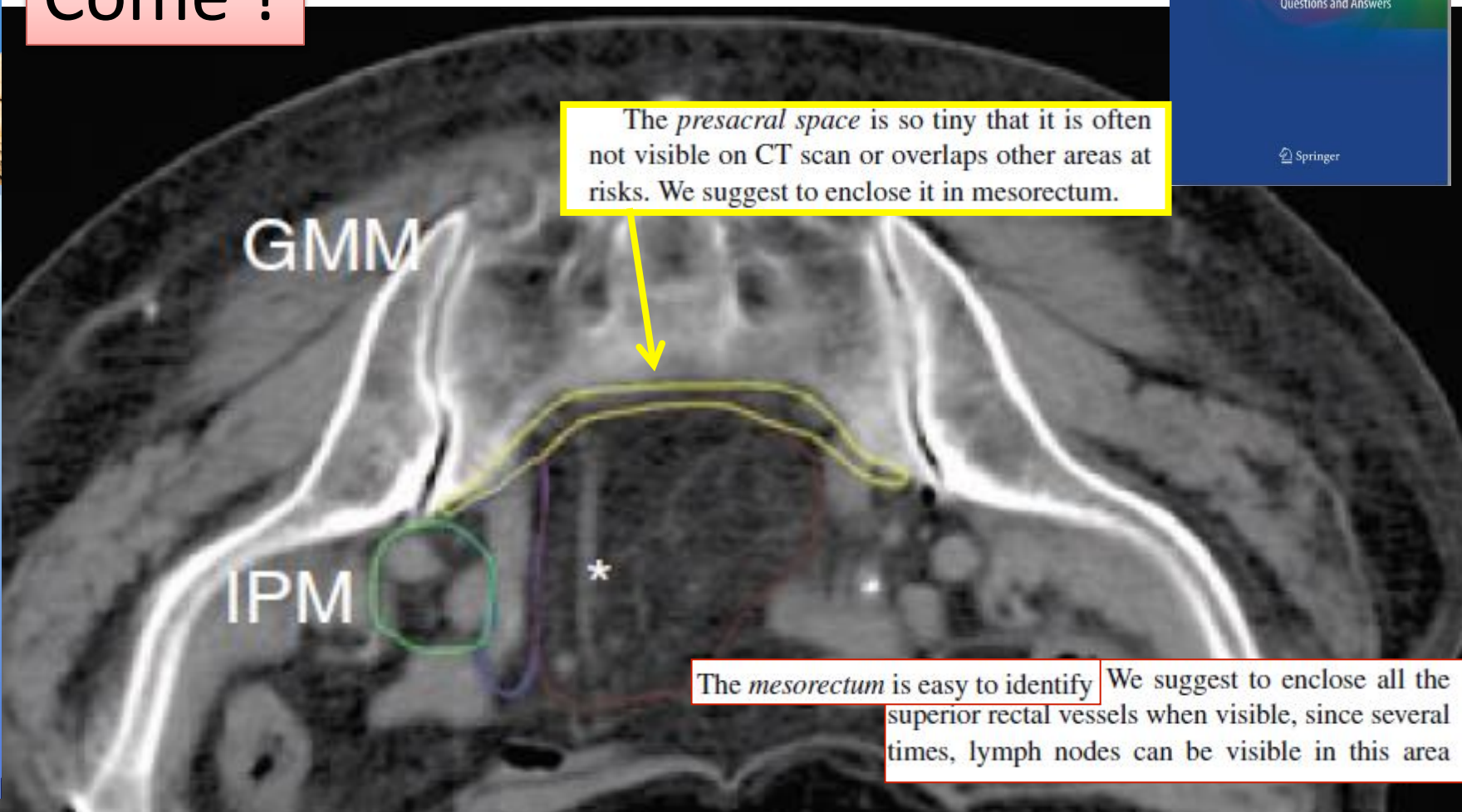
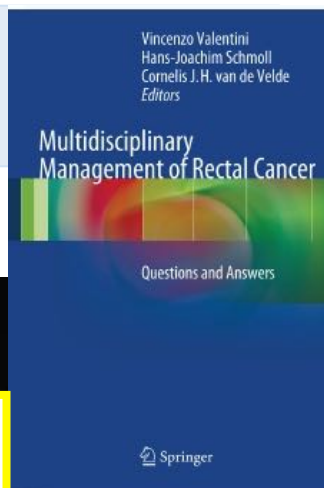
XXV CONGRESSO NAZIONALE
AIRO 2015
PALACONGRESSI - Rimini, 7-10 novembre

Gambacorta MA and Valentini V :Should We Tailor the Delineation of Pelvic Structures According to Tumor Presentation? Multidisciplinary Management of Rectal Cancer : Questions and Answers (2012) Springer-Verlag Berlin Heidelberg



CTV: contouring

Come ?



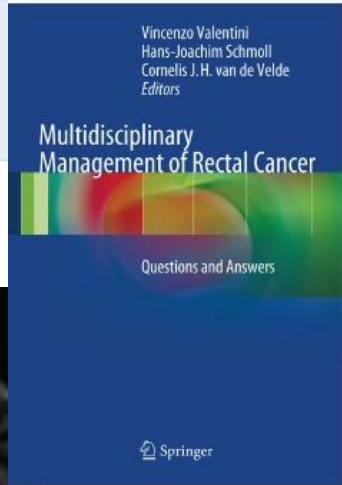
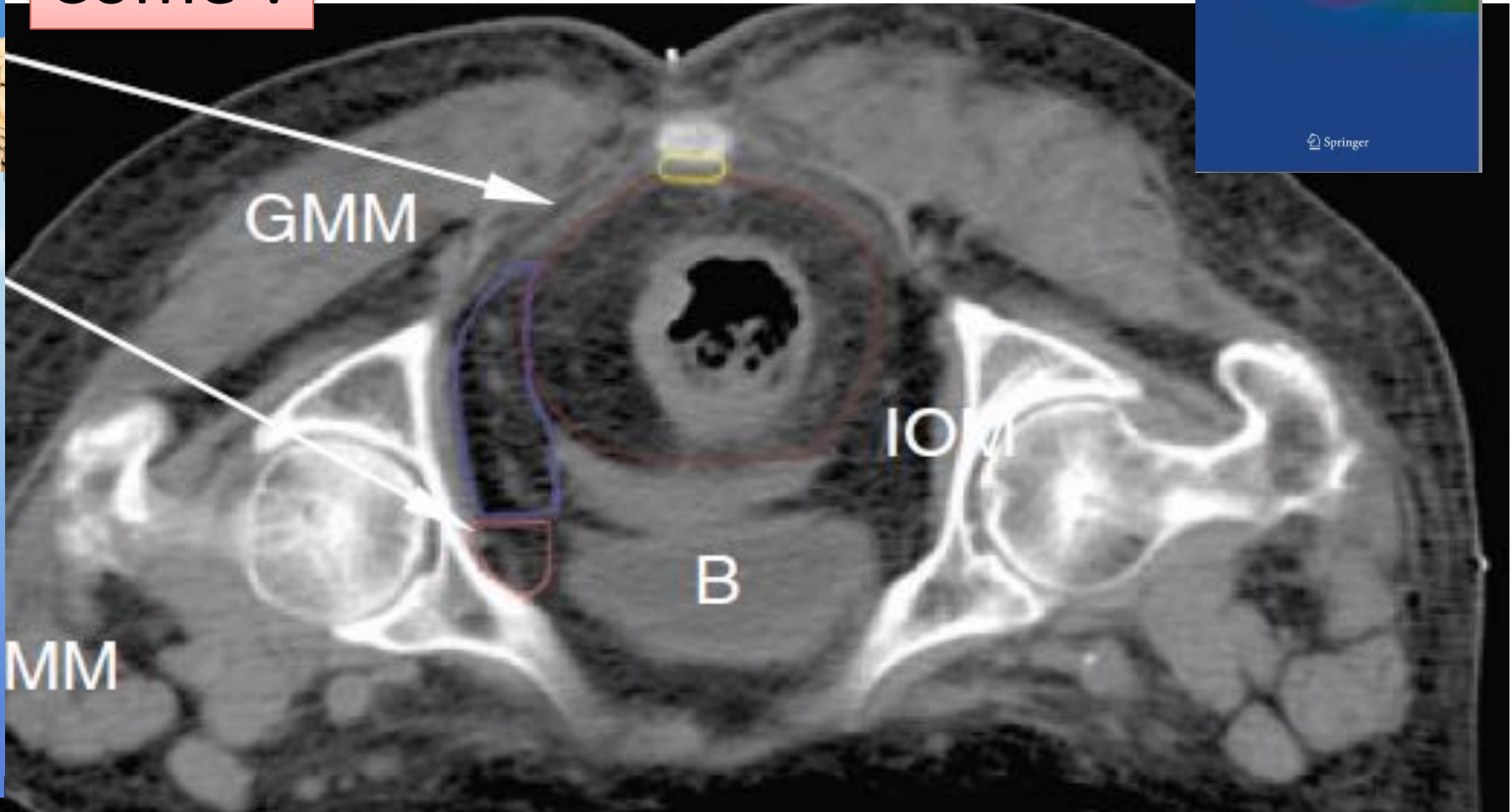
The *presacral space* is so tiny that it is often not visible on CT scan or overlaps other areas at risks. We suggest to enclose it in mesorectum.

The *mesorectum* is easy to identify. We suggest to enclose all the superior rectal vessels when visible, since several times, lymph nodes can be visible in this area

Gambacorta MA and Valentini V :Should We Tailor the Delineation of Pelvic Structures According to Tumor Presentation? Multidisciplinary Management of Rectal Cancer : Questions and Answers (2012) Springer-Verlag Berlin Heidelberg

CTV: contouring

Come ?

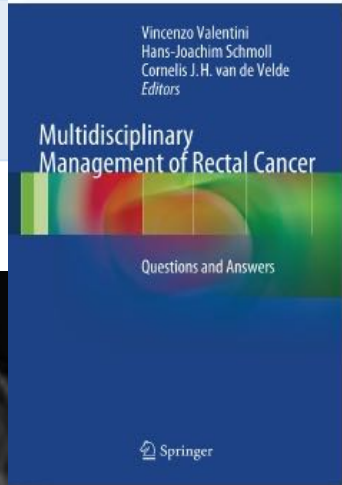
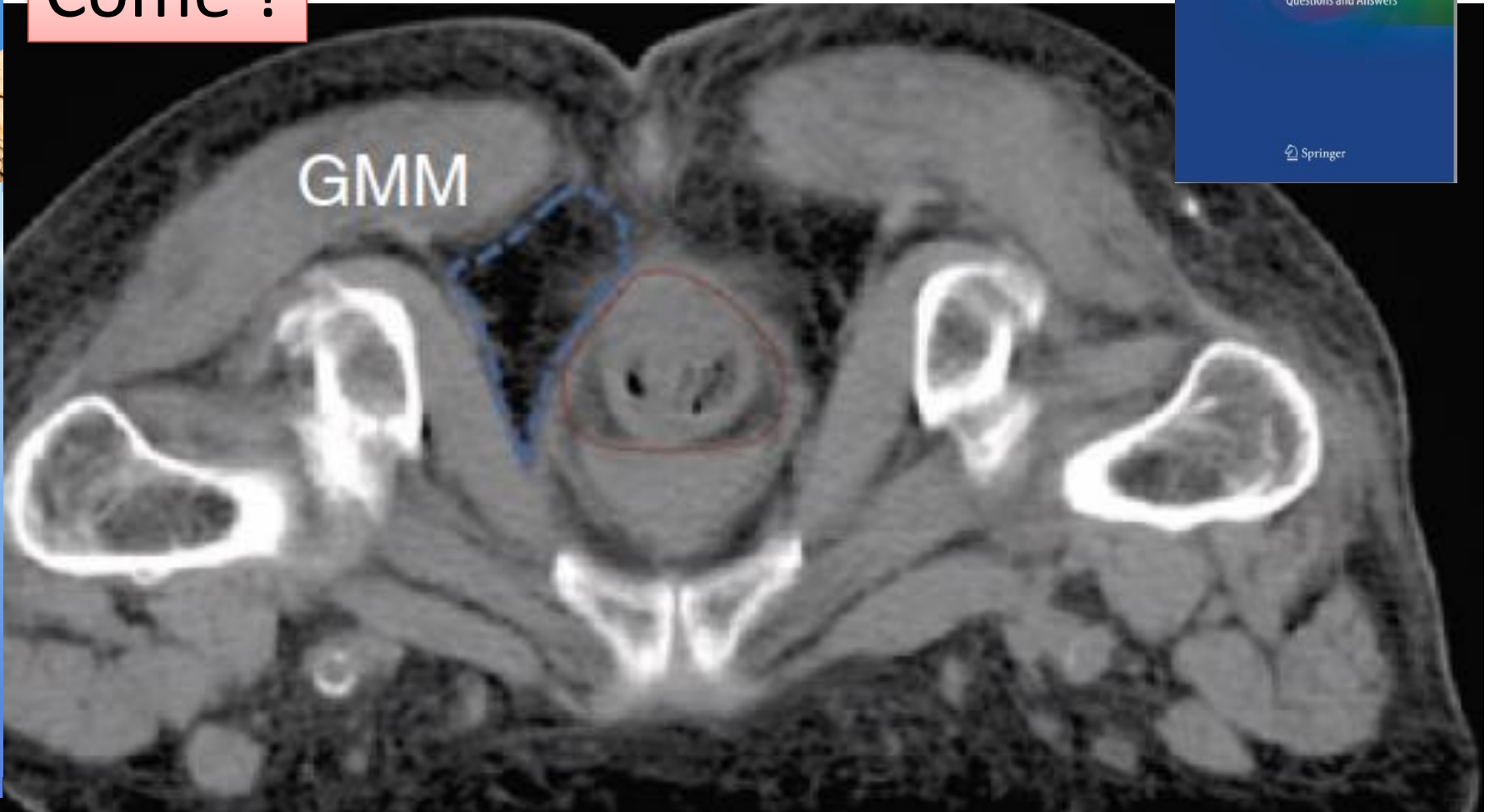


XXV CONGRESSO NAZIONALE
AIRO 2015
PALACONGRESSI - Rimini, 7-10 novembre

Gambacorta MA and Valentini V :Should We Tailor the Delineation of Pelvic Structures According to Tumor Presentation? Multidisciplinary Management of Rectal Cancer : Questions and Answers (2012) Springer-Verlag Berlin Heidelberg

CTV: contouring

Come ?



XXV CONGRESSO NAZIONALE
AIRO 2015
PALACONGRESSI - Rimini, 7-10 novembre

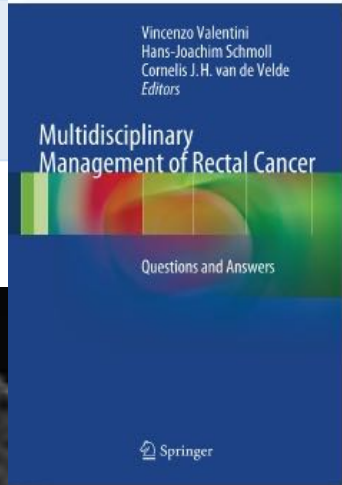
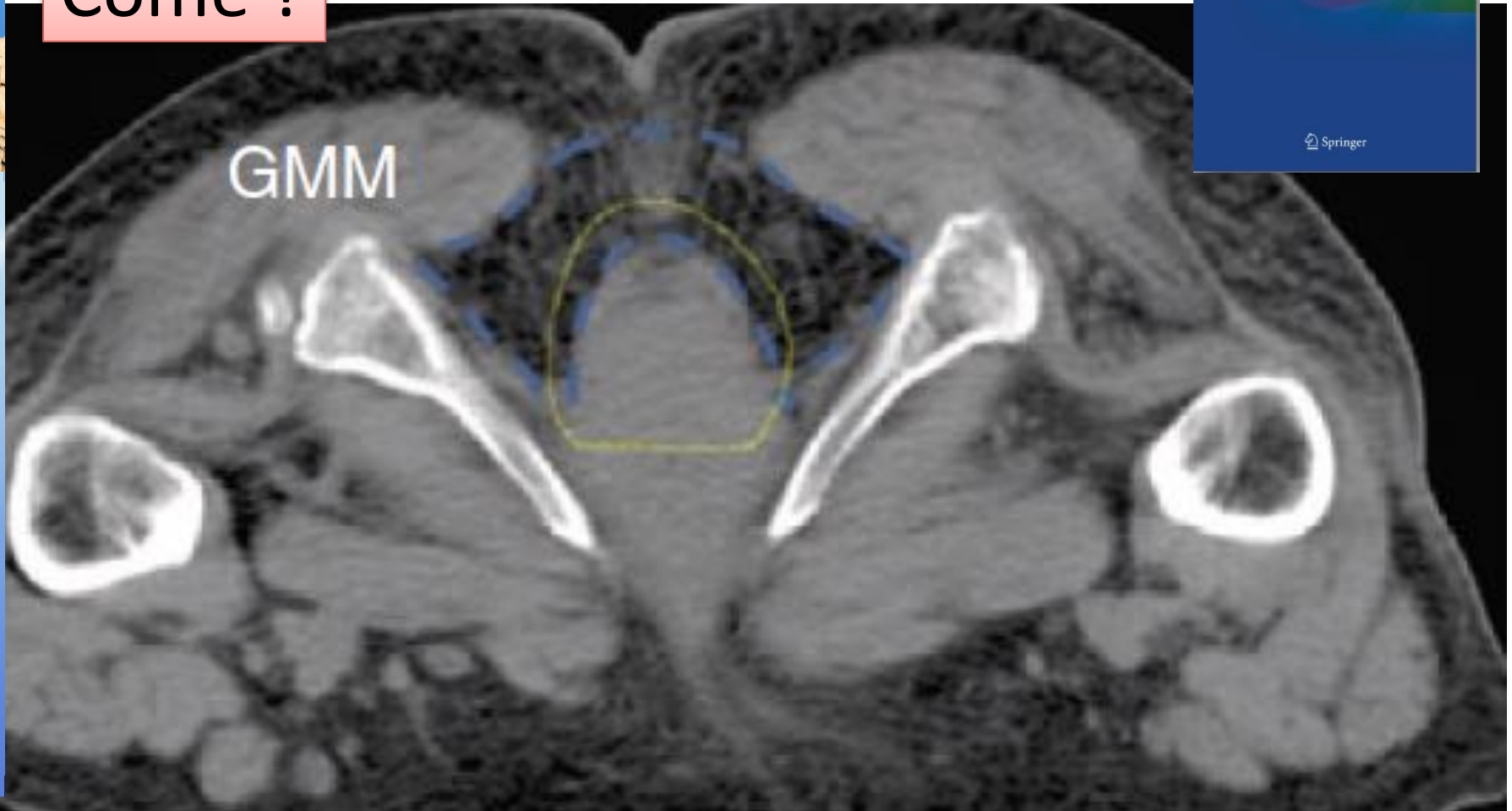
Gambacorta MA and Valentini V :Should We Tailor the Delineation of Pelvic Structures According to Tumor Presentation? Multidisciplinary Management of Rectal Cancer : Questions and Answers (2012) Springer-Verlag Berlin Heidelberg



XXV CONGRESSO NAZIONALE
AIRO 2015
PALACONGRESSI - Rimini, 7-10 novembre

CTV: contouring

Come ?



Gambacorta MA and Valentini V :Should We Tailor the Delineation of Pelvic Structures According to Tumor Presentation? Multidisciplinary Management of Rectal Cancer : Questions and Answers (2012) Springer-Verlag Berlin Heidelberg

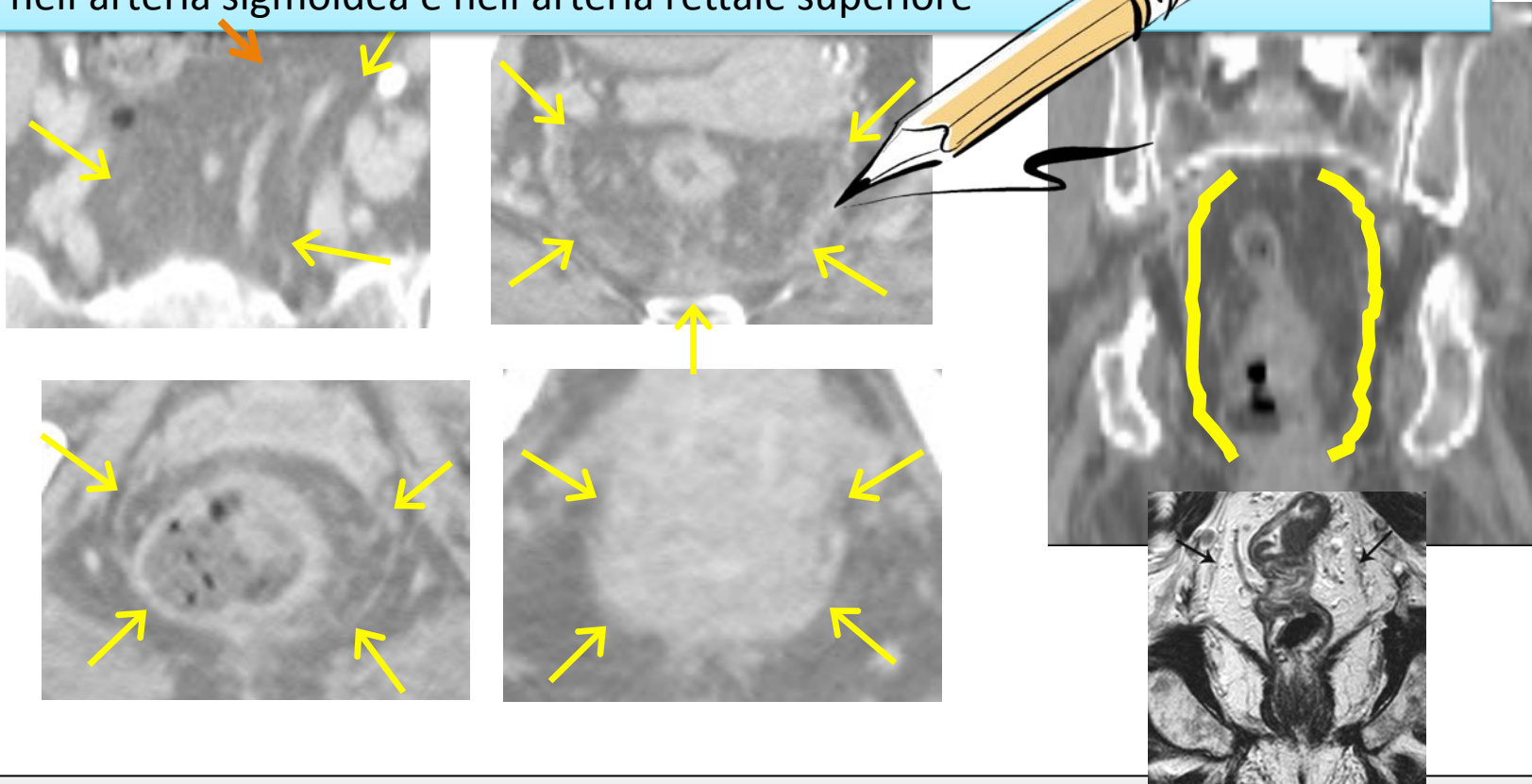


CTV: contouring

Come ?

MESORETTO + FASCIA MESORETTALE

LIMITE SUPERIORE: alla biforcazione dell'arteria mesenterica inferiore nell'arteria sigmoidea e nell'arteria rettale superiore

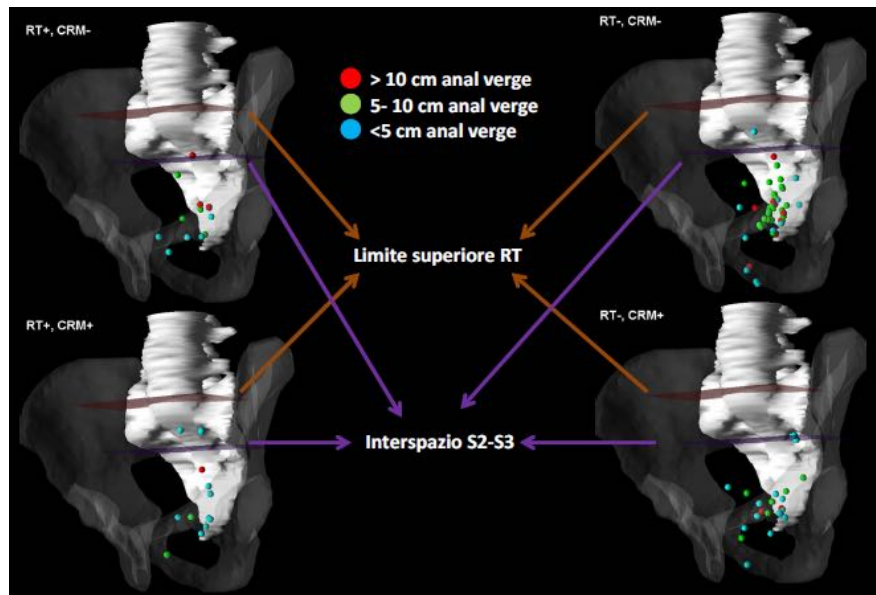




CTV: contouring

Come ?

MESORETTO + FASCIA MESORETTALE



limite superiore



CTV: contouring

Come ?

MESORETTO + FASCIA MESORETTALE



limite inferiore

- Distal mesorectal deposits: **10-15%**

Syc E IJROBP 2008
Kusters M EJCO 2010
Chen W Eur Surg Res 2007
Martijnse I 2012



CTV: contouring

Come ?

Complesso sfinteriale - fossa ischiorettale

Limite inferiore T	Limite caudale CTV
> 1.5.cm da OAI	Limite caudale mesoretto
<= 1.5 cm da OAI	1 cm di canale (parte craniale)
Invasione canale anale	Tutto il complesso sfinteriale
Invasione fossa ischio- rettale	Entrambe le fosse

Roels S et al IJROBP 2006
Myerson RJ IJROBP 2009
Ippolito E et al Acta Oncol 2008
Gambacorta MA 2012



CTV: PRESCRIZIONE

Quali aree includere
nel CTV e quando?

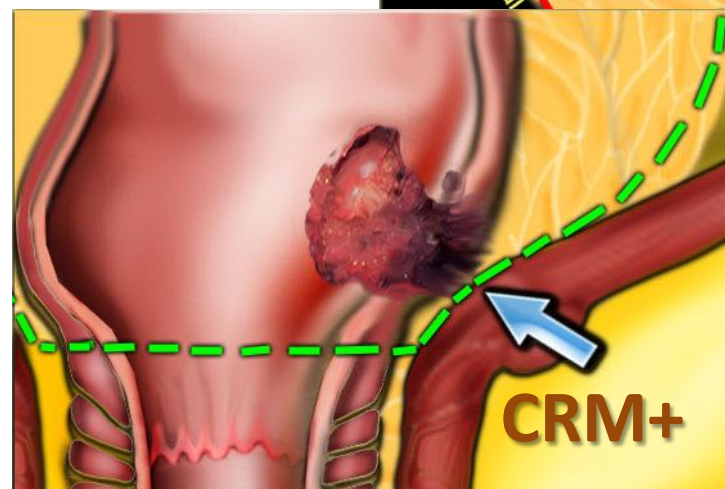
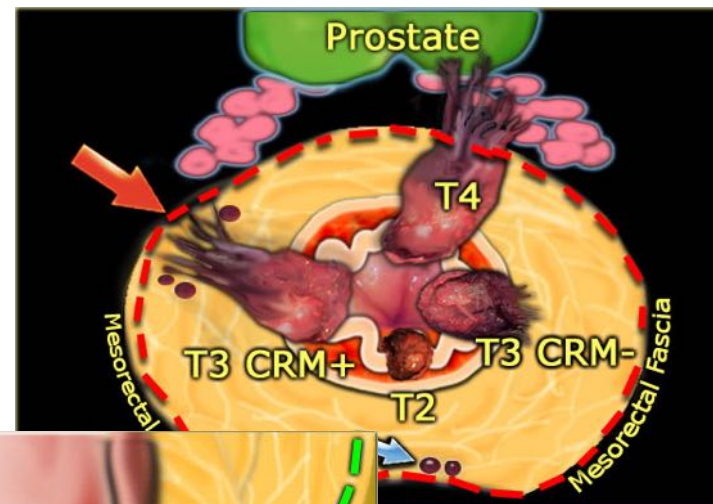


CTV: PRESCRIZIONE

quando ?

MESORETTO + FASCIA MESORETTALE

SEMPRE





CTV: PRESCRIZIONE

quando ?

MESORETTO + FASCIA MESORETTALE

SEMPRE

JOURNAL OF CLINICAL ONCOLOGY REVIEW ARTICLE

What Is the Role for the Circumferential Margin in the Modern Treatment of Rectal Cancer?

Iris D. Nagtegaal and Phil Quirke

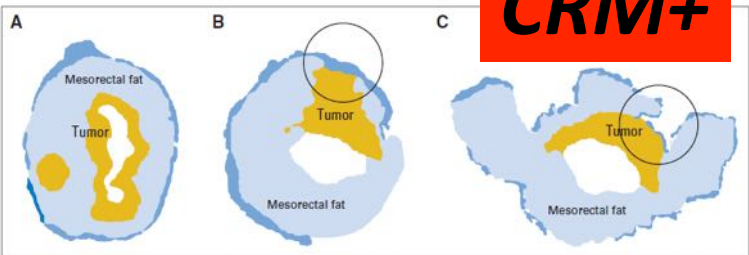
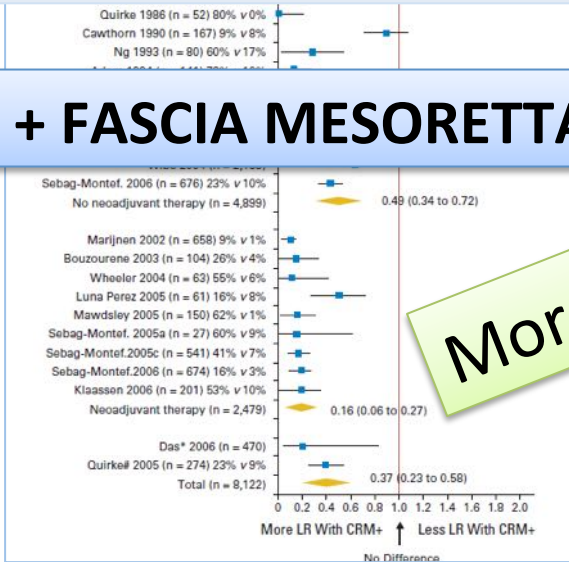
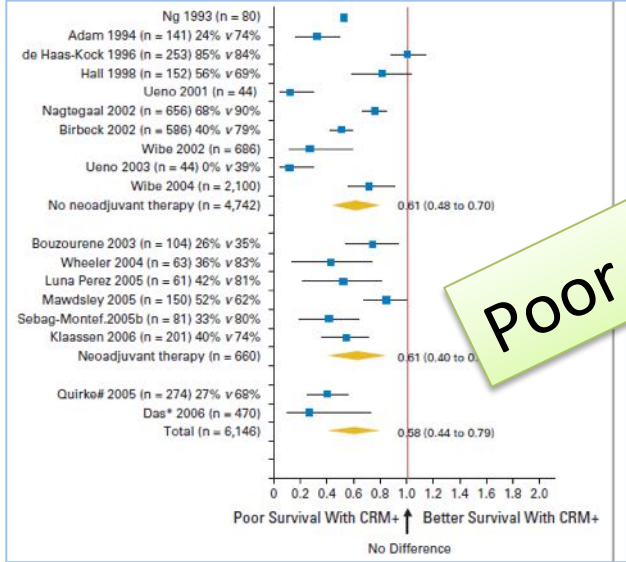


Fig 1. Schematic representation of the circumferential resection margin (CRM); the margin is marked with black ink. (A) Negative CRM. (B) Locally advanced tumor growth, directly into the circumferential margin. (C) Small tumor growing into the circumferential margin as a result of incomplete removal of the surrounding mesorectum. The plane of resection is onto the muscularis propria.

CRM+



More LR



Poor SV

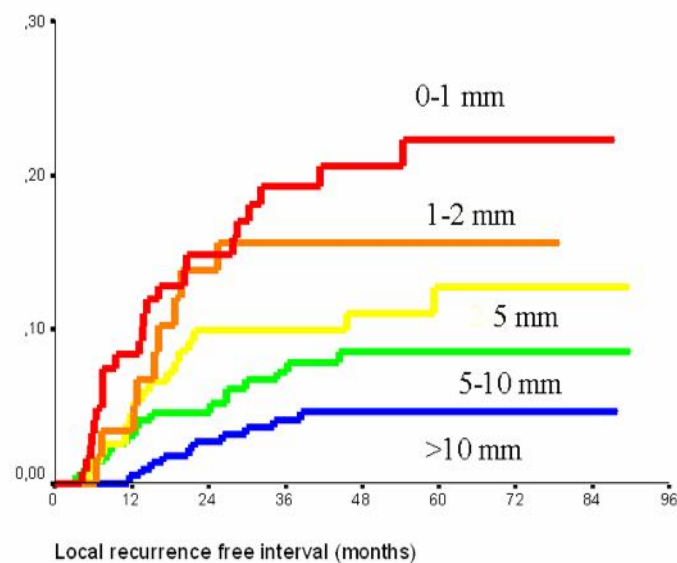


CTV: PRESCRIZIONE

quando ?

MESORETTO + FASCIA MESORETTALE

SEMPRE



Stocchi L. J Clin Oncol 2001

Marks CG, Colorectal Dis 2000

Birbeck KF, Ann Surg 2002

Wibe A, Br J Surg 2002

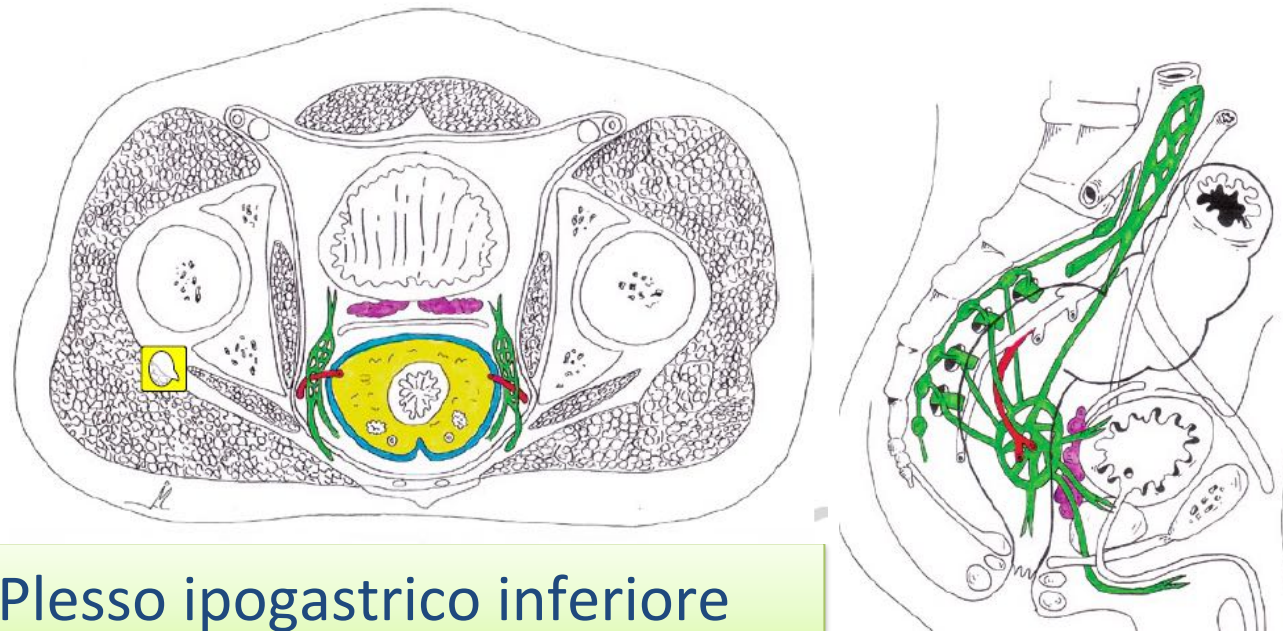
Nagtegaal ID, Am J Surg Pathol 2002

Marijnen CAM, Int J Radiat Oncol Biol Phys 2003

MESORETTO + FASCIA MESORETTALE

indicazione ad includere SEMPRE nel CTV l'intera fascia mesorettale (sia viscerale che parietale), anche se non infiltrata

M.M. Lange and C.J.H. van de Velde



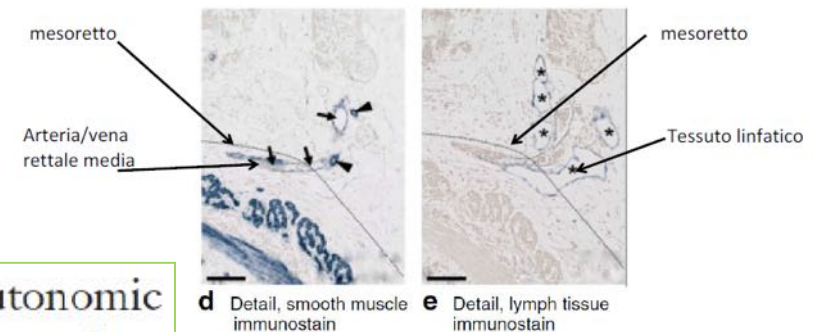
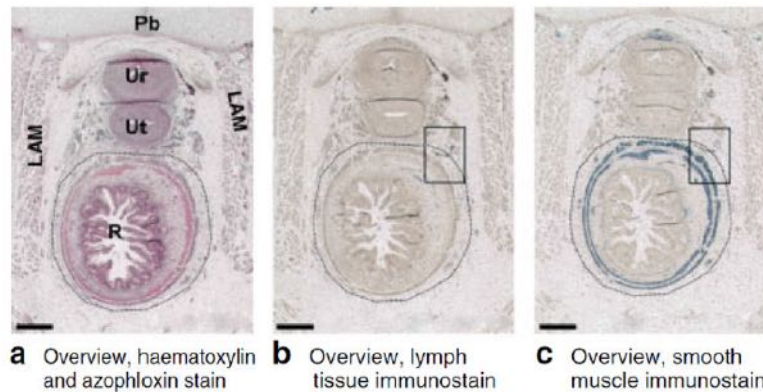
Plesso ipogastrico inferiore

connessione tra i linfatici del mesoretto e quelli extra- mesorettali (sotto la riflessione peritoneale) attraverso i vasi rettali medi ed il plesso nervoso

MESORETTO + FASCIA MESORETTALE

indicazione ad includere **SEMPRE** nel CTV l'intera fascia mesorettale (sia viscerale che parietale), anche se non infiltrata

Studi anatomici su 10 feti hanno confermato la presenza di **linfatici intorno alla parte mediale del plesso ipogastrico inferiore**, anatomicamente situato lateralmente alla fascia parietale del mesoretto e solitamente **non rimosso con TME**



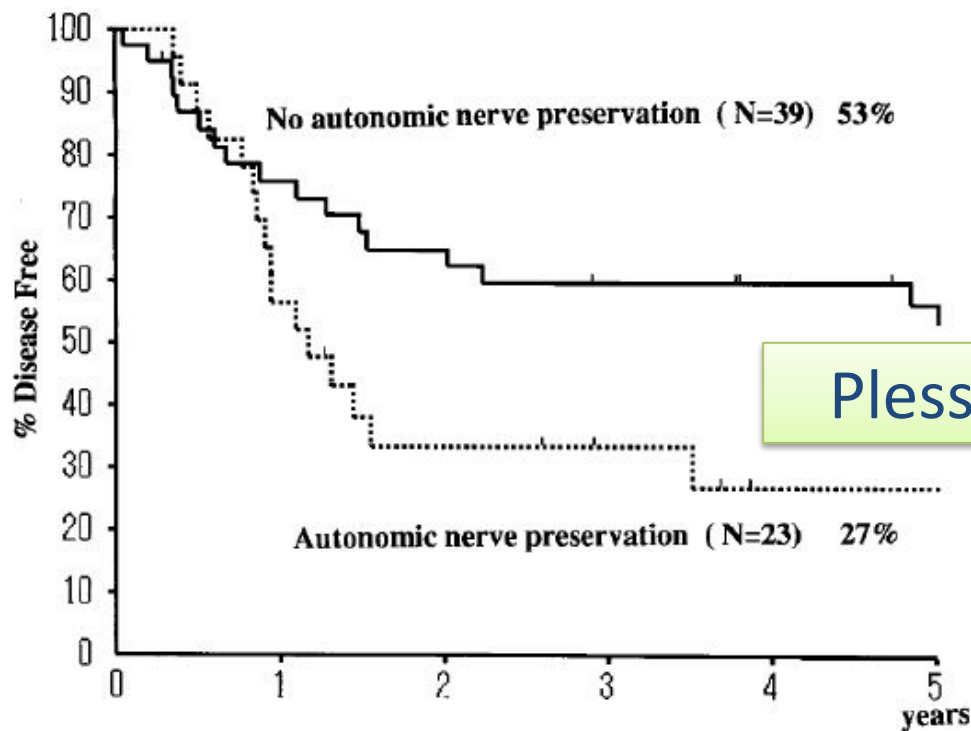
In the proximity of the mesorectum, the autonomic nervous system and the lymph vessels had a very close relationship.

Plesso ipogastrico inferiore

MESORETTO + FASCIA MESORETTALE

indicazione ad includere SEMPRE nel CTV l'intera fascia mesorettale (sia viscerale che parietale), anche se non infiltrata

Moriya, registra risultati migliori in termini di DFS nei pazienti sottoposti a dissezione linfonodale laterale senza preservazione del plesso nervoso



Plesso ipogastrico inferiore

CTV: PRESCRIZIONE

quando ?

Spazio presacrale

SEMPRE

Subsites of local recurrence.

	RT + (n = 713)	RT - (n = 704)
Presacral	15 (2.0)	25 (3.6)
Lateral	9 (1.1)	14 (1.9)
Anterior	6 (0.7)	14 (1.9)
Anastomosis	5 (0.7)	19 (2.7)
Perineum	0 (0)	4 (0.6)
Unknown	1 (0.1)	2 (0.3)
TOTAL	36 (4.6)	78 (11.0)

Values in parenthesis are 5-year LR-rates, by competing risks analysis.
RT = preoperative radiotherapy.

CTV: PRESCRIZIONE

quando ?

N extra - mesorettali

Nelle neoplasie del retto basso: **10-25%** rischio di interessamento
Nei tumori T3-4 localizzati a meno di 4 cm dal margine anale, indifferenziati,
con linfonodi mesorettali megalici : alto tasso di interessamento

SEDE	INCLUSIONE NEL CTV
N. ILIACI INTERNI	SEMPRE
N.OTTURATORI	T SOTTO FLESSURA PERITONEALE N+ ILIACO INTERNO MASSIVO
N. ILIACI ESTERNI	T4 ANTERIORI N+ OTTURATORIO MASSIVO

- Sato H, et al (2006) Dis Colon Rectum 49(10 Suppl):S3–S12
- Steup WH et al (2002) Eur J Cancer 38:911–918
- Ueno M et al (2005) Br J Surg 92:756–763

CTV adattato per presentazione di malattia

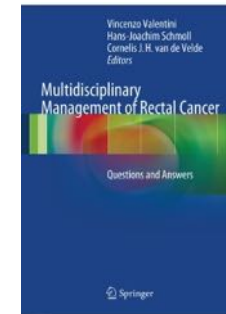
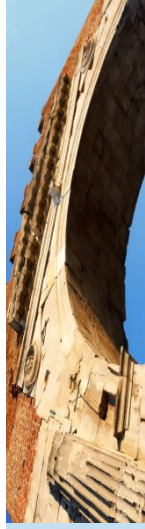


Table 13.2 Target volume delineation according to tumor stage and location

	Presacral space	Mesorectum	Internal iliac nodes	Obturator nodes	External iliac nodes	Sphincter complex	Ischio-rectal fossae
cT3 high (above the peritoneal reflection)	+	+	+				
cT3 mid-low (at the peritoneal reflection)	+	+	+	+		+ (when anal canal invasion)	+ (when direct tumor infiltration)
Any cT with massive positive internal iliac nodes	+	+	+	+		+ (when anal canal invasion)	+ (when direct tumor infiltration)
Any cT with massive positive obturator nodes	+	+	+	+	+	+ (when anal canal invasion)	+ (when direct tumor infiltration)
cT4 with for anterior pelvic organ	+	+	+	+	+	+ (when anal canal invasion)	+ (when direct tumor infiltration)

XXV CONGRESSO NAZIONALE
AIRO 2015
PALACONGRESSI - Rimini, 7-10 novembre

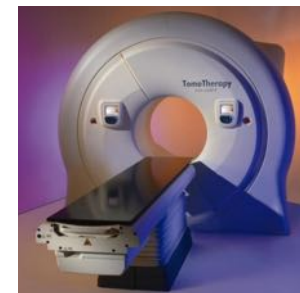


Intensificare:dove?



XXV CONGRESSO NAZIONALE
AIRO 2015
 PALACONGRESSI - Rimini, 7-10 novembre

Intensificare:dove?

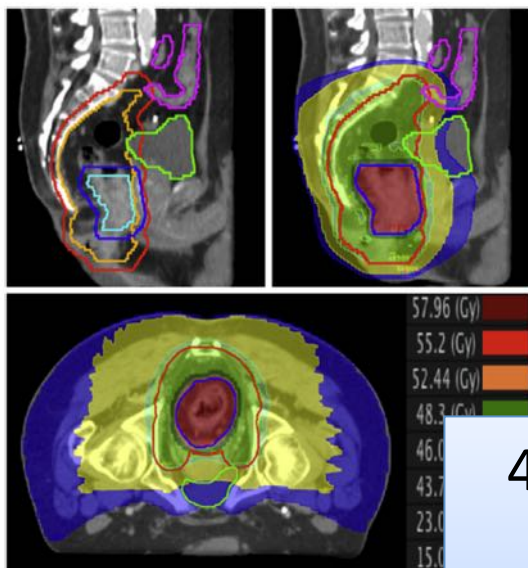


Original article

Preoperative intensity-modulated and image-guided radiotherapy with a simultaneous integrated boost in locally advanced rectal cancer: Report on late toxicity and outcome

Benedikt Engels^{a,*}, Nele Platteaux^a, Robbe Van den Begin^a, Thierry Gevaert^a, Alexandra Semeus^b, Guy Storme^a, Dirk Verellen^a, Mark De Ridder^a

^aDepartment of Radiotherapy; and ^bDepartment of Gastroenterology, UZ Brussel, Vrije Universiteit Brussel, Belgium



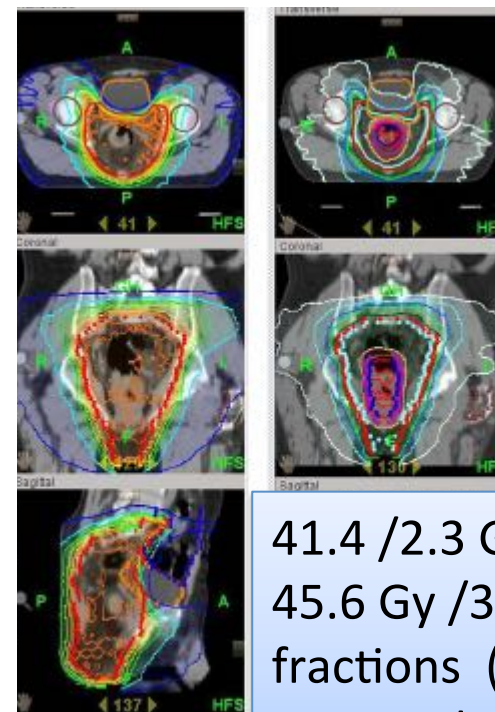
46 Gy /2 Gy
 +/-
 SIB to the tumor
 up
 55.2 Gy/2.4 Gy

Clinical Investigation: Gastrointestinal Cancer

Feasibility of an Adaptive Strategy in Preoperative Radiochemotherapy for Rectal Cancer With Image-Guided Tomotherapy: Boosting the Dose to the Shrinking Tumor

Paolo Passoni, MD,* Claudio Fiorino, PyD,¹ Najla Slim, MD,* Monica Ronzoni, MD,² Vincenzo Ricci, MD,³ Saverio Di Palo, MD,³ Paola De Nardi, MD,³ Elena Orsenigo, MD,³ Andrea Tamburini, MD,³ Francesco De Cobelli, MD,⁴ Claudio Losio, MD,⁵ Nicola A. Iacovelli, MD,* Sara Broggi, PyD,¹ Carlo Staudacher, MD,³ Riccardo Calandrino, PhD,¹ and Nadia Di Muzio, MD*

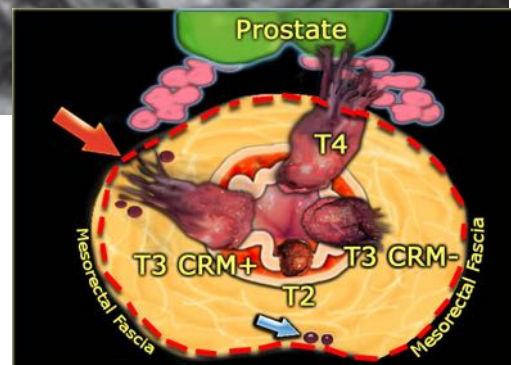
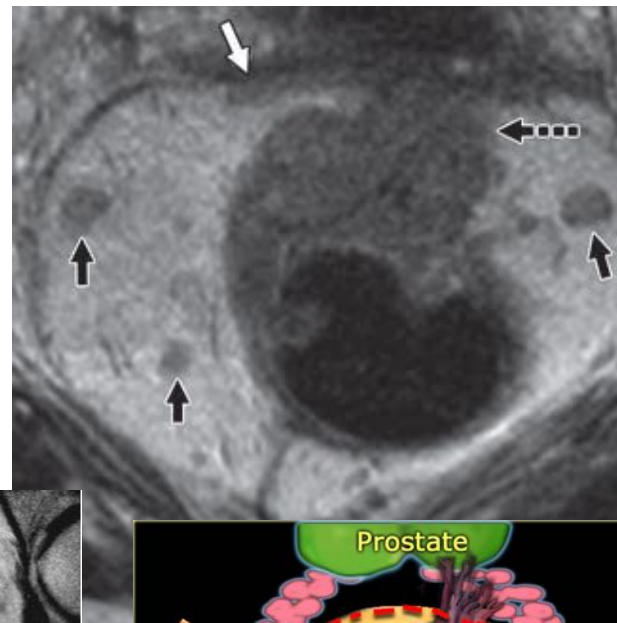
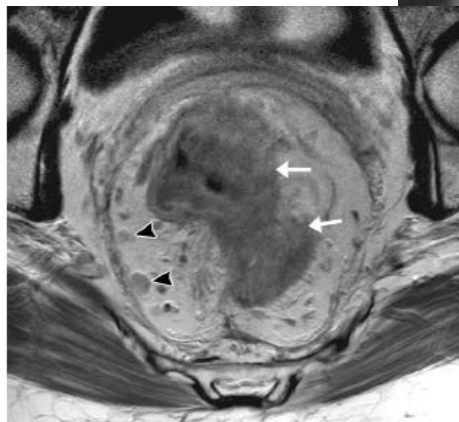
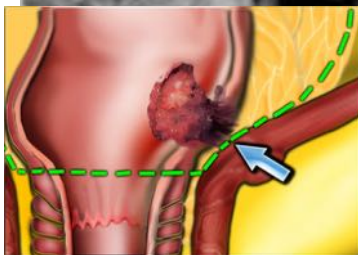
Departments of *Radiation Oncology, ¹Medical Physics, ²Medical Oncology, ³Surgery, and ⁵Radiology, San Raffaele Scientific Institute, Milan, Italy



41.4 /2.3 Gy 5FU+OX
 45.6 Gy /3.0 Gy last 6 fractions (FR 13-18)
 to PTVadapt

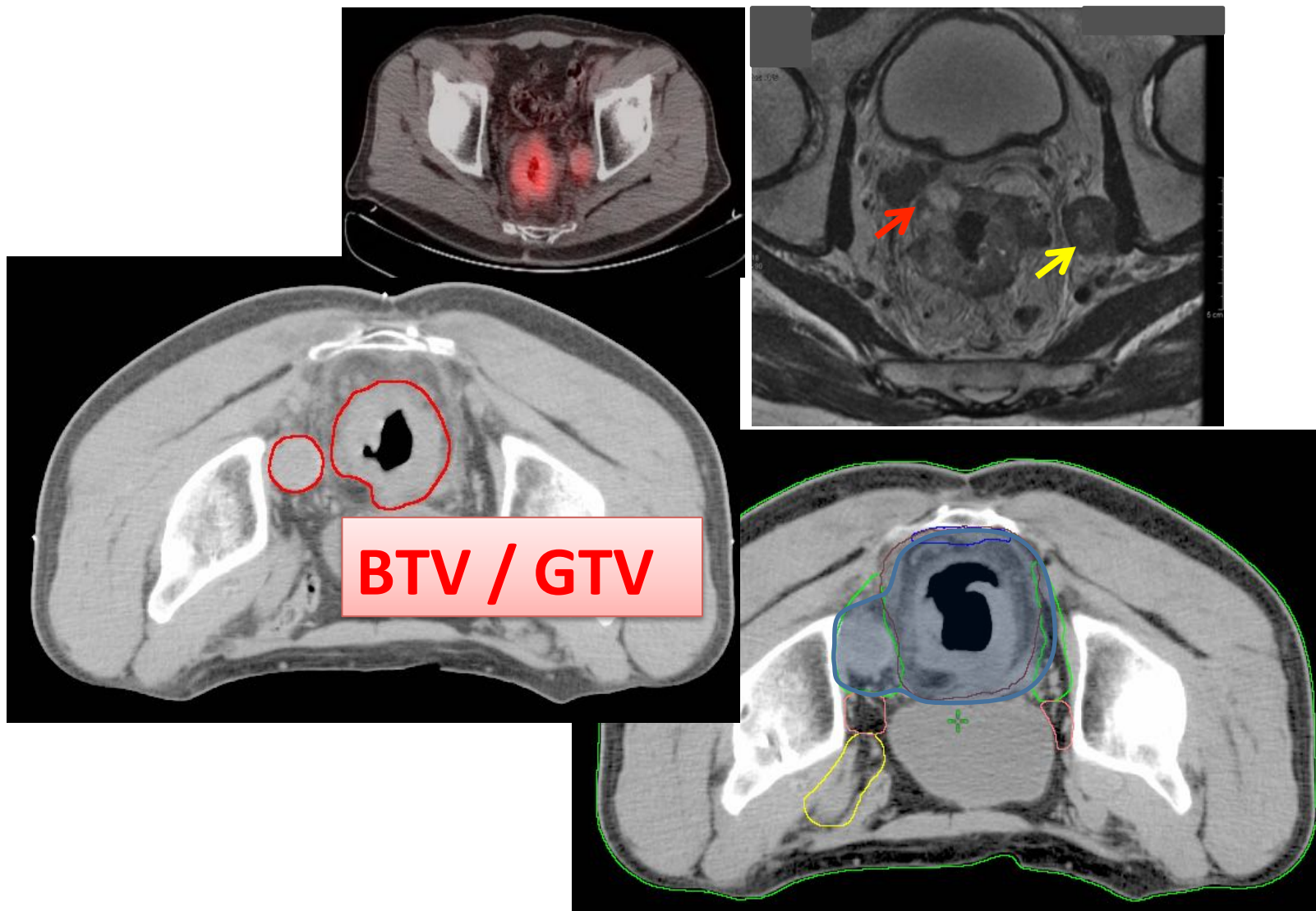


Intensificare:dove?



Intensificare:dove?

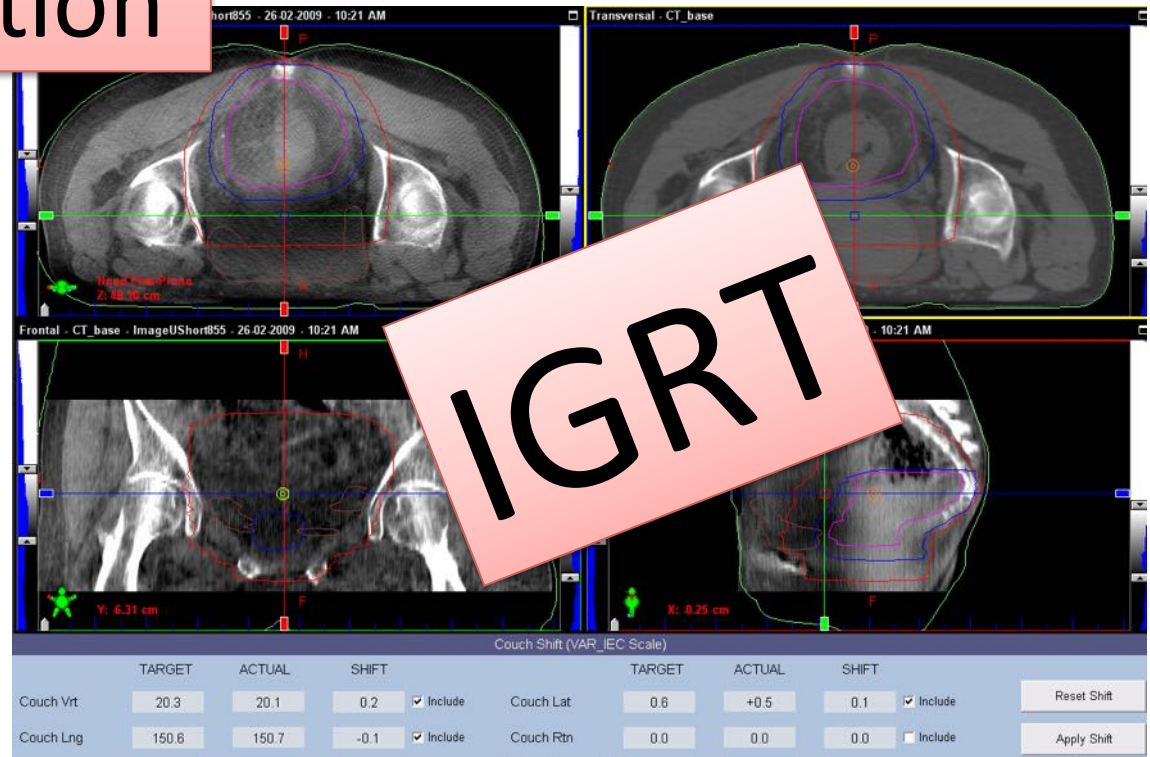
XXV CONGRESSO NAZIONALE
AIRO 2015
PALACONGRESSI - Rimini, 7-10 novembre



verifica della corretta irradiazione durante la terapia

INCERTEZZE

- set up
- OM intrafraction



INCERTEZZA IN FASE DI DELIVERY

XXV CONGRESSO NAZIONALE
AIRO 2015
PALACONGRESSI - Rimini, 7-10 novembre

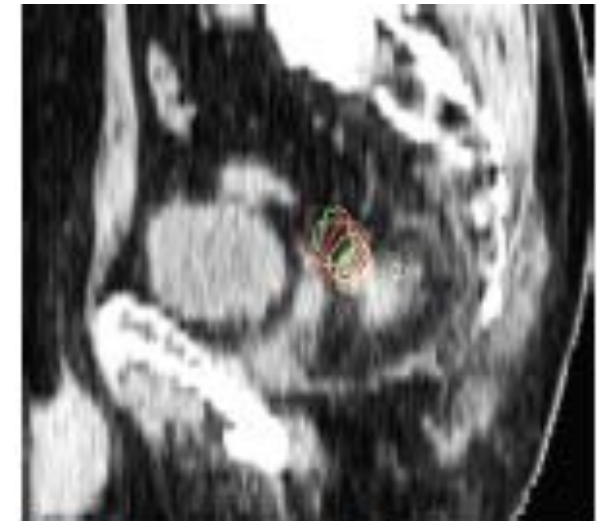
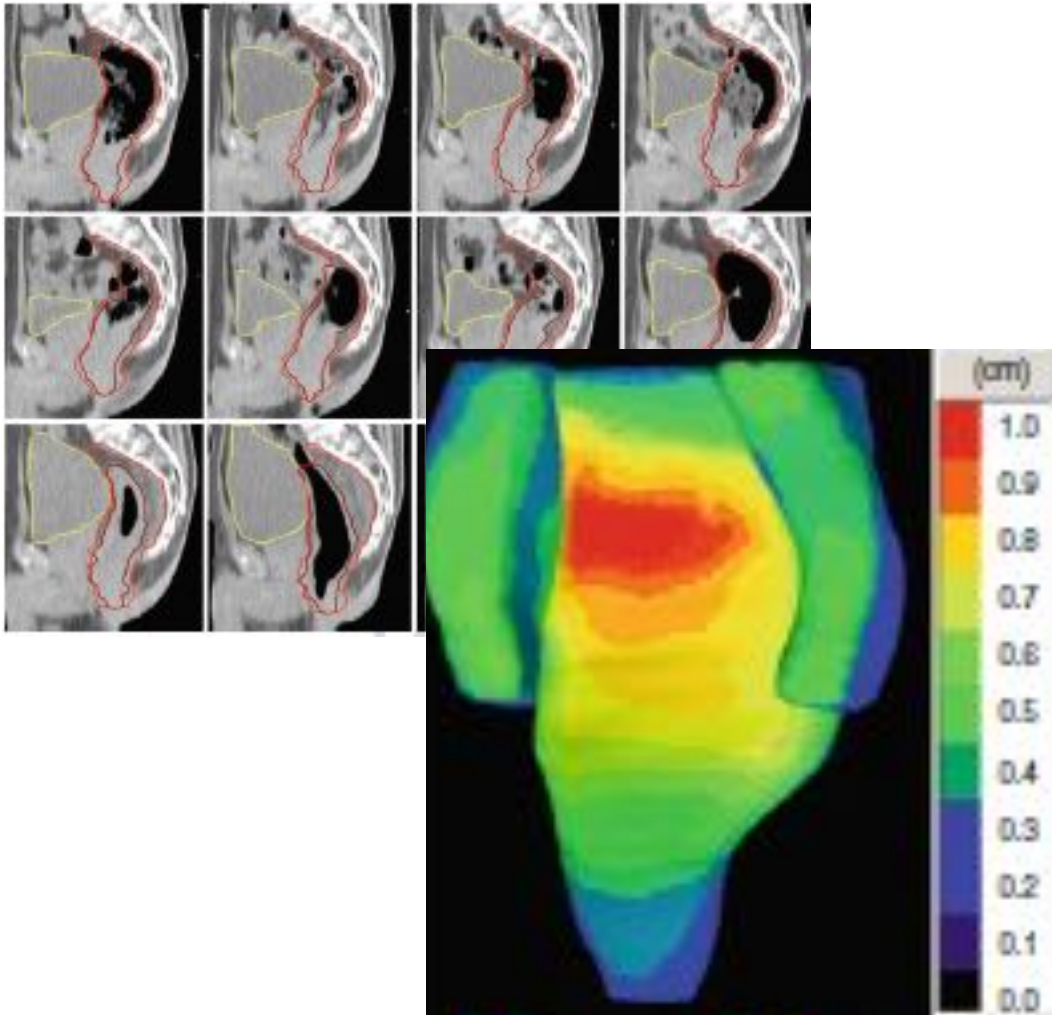
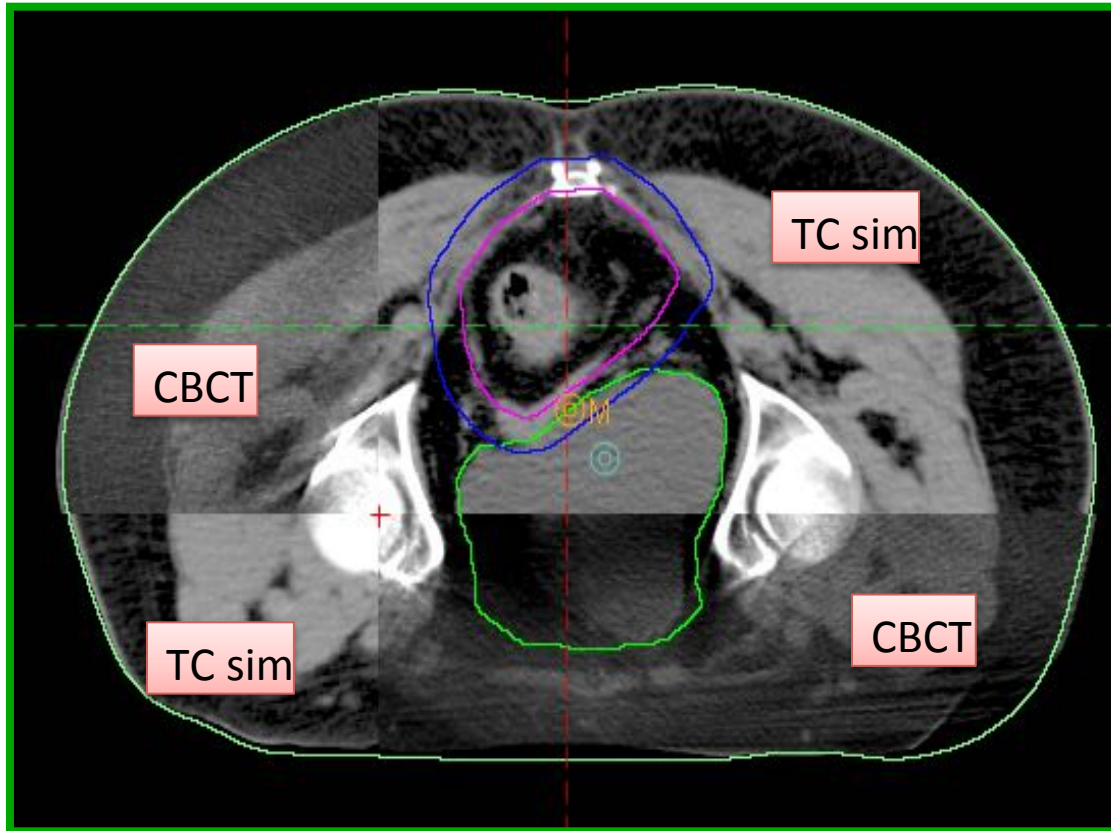


Fig. 14.10 Sagittal view of a locally advanced rectal cancer patient, with different positions of a pathologically enlarged lymph node within repeat CT scans. The measurement bar denotes 1 cm

Nijkamp J et al 2012

Correzione set up: su reperi ossei



kV

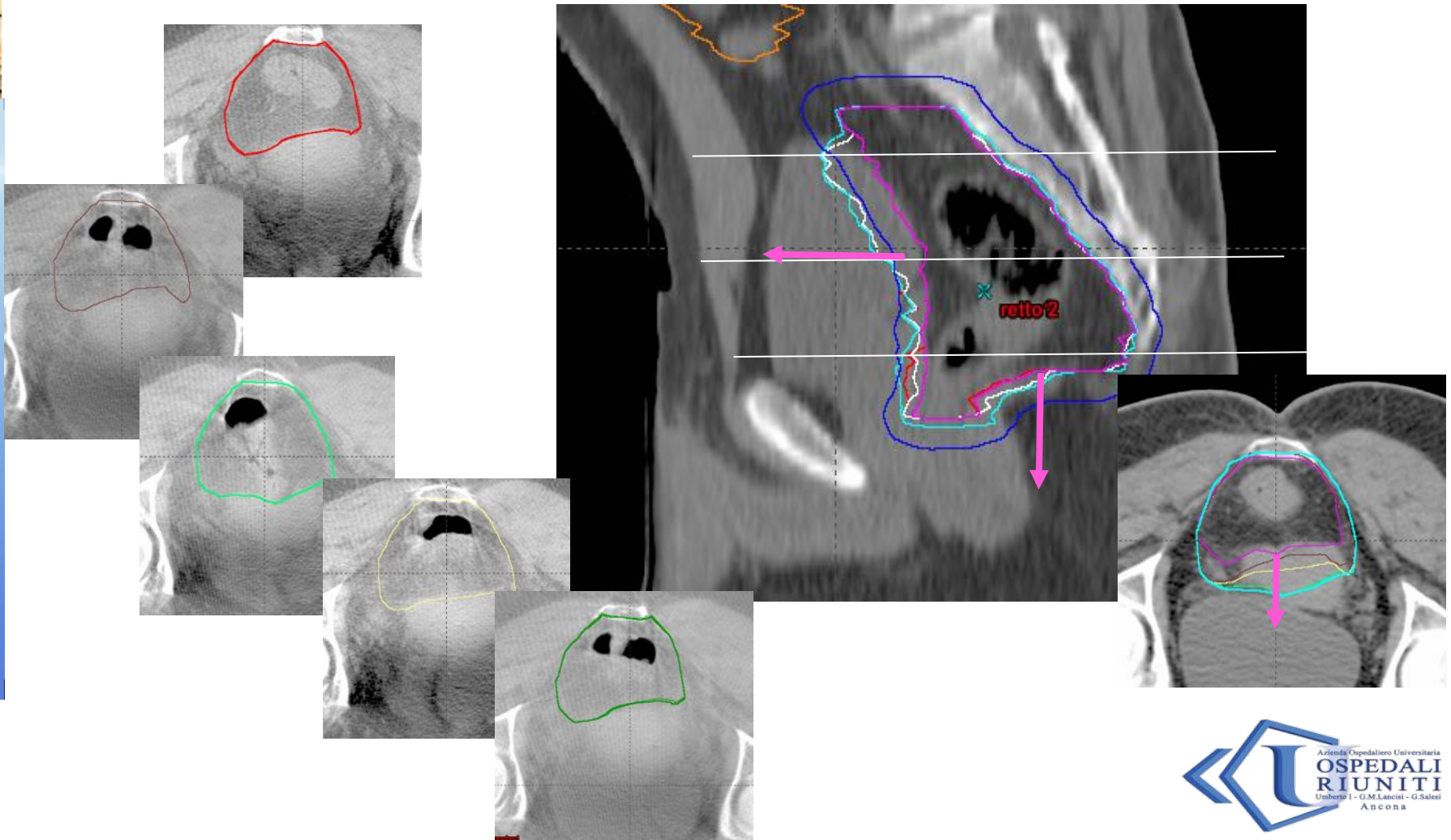
CBCT

MVCT

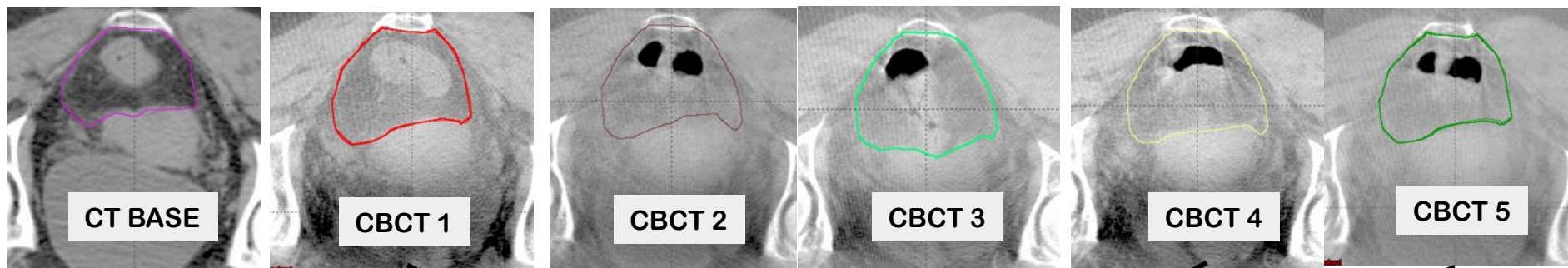
Facile!

STUDIO/COMPENSAZIONE OM INTRAFRACTION: PROTOCOLLO ADAPTIVE OFFLINE

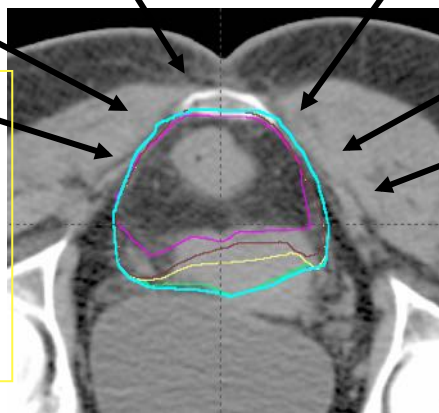
XXV CONGRESSO NAZIONALE
AIRO 2015
PALACONGRESSI - Rimini, 7-10 novembre



STUDIO/COMPENSAZIONE OM INTRAFRACTION: PROTOCOLLO ADAPTIVE OFFLINE



co-registrazione su strutture ossee tra CTsim e CBCT. Contornazione daily CTV sul TPS;



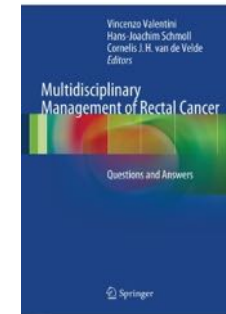
definizione di un "ITV" personalizzato, che racchiude movimento e deformazione dei limiti del mesoretto studiati sulle prime 5 CBCT di ogni paziente in esame.

REPLANNING

STUDIO/COMPENSAZIONE OM
INTRAFACTION:
PROTOCOLLO ADAPTIVE OFFLINE

- Acquisizione CBCT 1-5
- Correzione set up daily
- Contornazione CTV 1-5
- DEFINIZIONE ITV
- **REPLANNING**
- Correzione set up daily + verifica adeguatezza
ITV

CTV adattato per presentazione di malattia

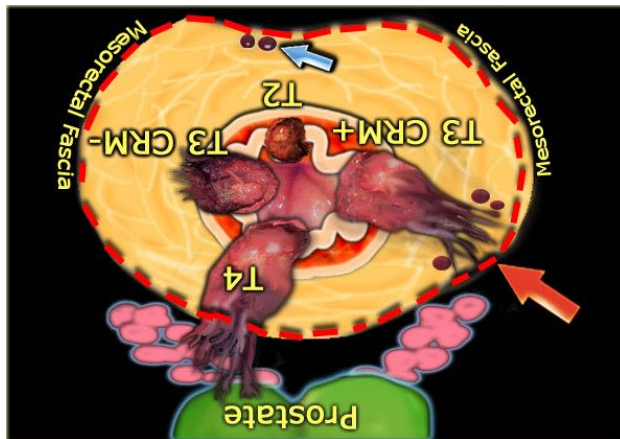
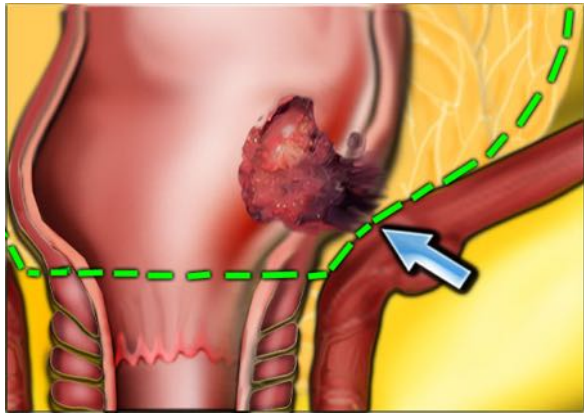


CONCLUSIONI

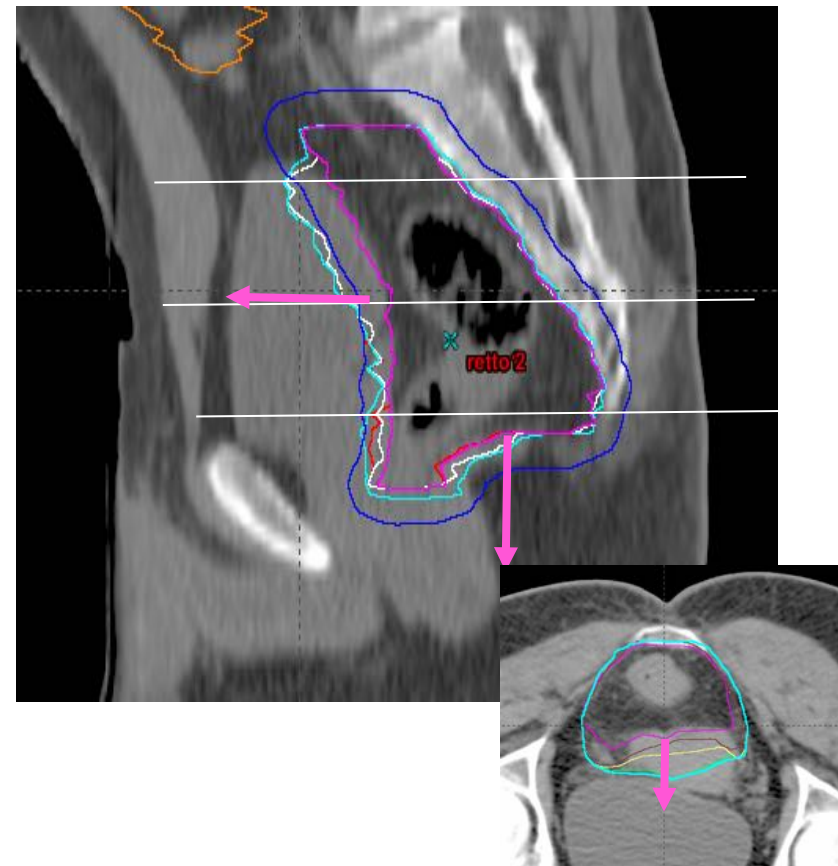
Table 13.2 Target volume delineation according to tumor stage and location


	Presacral space	Mesorectum	Internal iliac nodes	Obturator nodes	External iliac nodes	Sphincter complex	Ischio-rectal fossae
cT3 high (above the peritoneal reflection)	+	+	+				
cT3 mid-low (at the peritoneal reflection)	+	+	+	+		+ (when anal canal invasion)	+ (when direct tumor infiltration)
Any cT with massive positive internal iliac nodes	+	+	+	+		+ (when anal canal invasion)	+ (when direct tumor infiltration)
Any cT with massive positive obturator nodes	+	+	+	+	+	+ (when anal canal invasion)	+ (when direct tumor infiltration)
cT4 with for anterior pelvic organ	+	+	+	+	+	+ (when anal canal invasion)	+ (when direct tumor infiltration)

INTENSIFICARE



STUDIARE E
COMPENSARE
DEFORMAZIONE





verifica della corretta irradiazione durante la terapia

CONCLUSIONI

- Prevenire con educazione paziente:
retto vuoto, vescica piena
- Correzione set up su reperi ossei
- Studio e Compensazione OM/
deformazione CTV

Protocolli di Adaptive Off line