



Ordine dei
Medici Chirurghi
e degli Odontoiatri
della provincia di
FERRARA

Il tumore della prostata a Ferrara

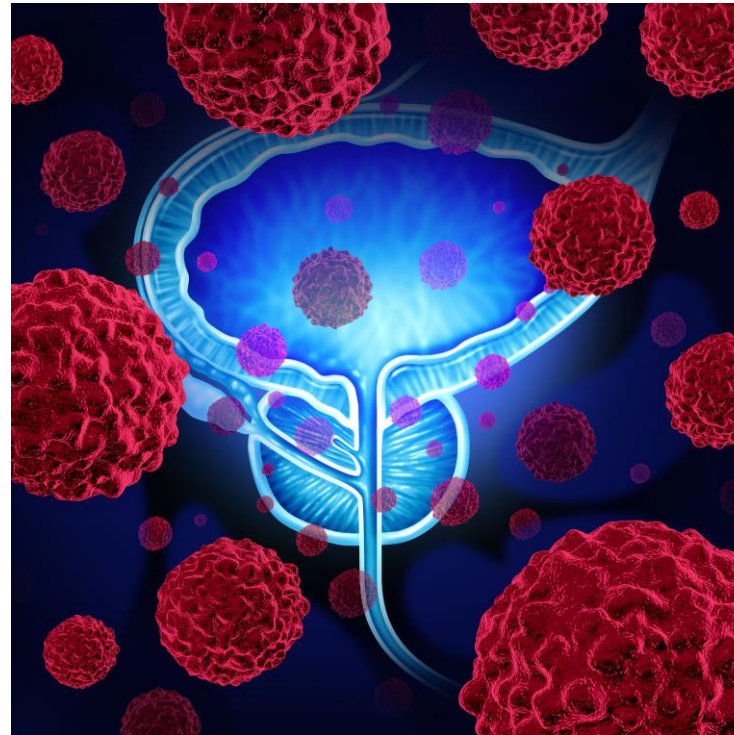
Incontro con il Team Multidisciplinare



La stadiazione radiologica: limiti

Dott. Mauro Gagliano

Az. Ospedaliero-Universitaria di Ferrara - U.O. Radiagnostica



Ferrara – 10 febbraio 2023



Il tumore della prostata a Ferrara

Sistema TNM

T	N	M
<u>T0</u> – no evidence of <u>PCa</u>	<u>N0</u> – no spread to lymph nodes	<u>M0</u> – no spread beyond regional lymph nodes
<u>T1</u> – clinically inapparent <u>PCa</u>	<u>N1</u> – regional lymph nodes over 5mm in short axis are involved (below the iliac artery bifurcations)	<u>M1</u> – distant metastases: a – distant lymph nodes involvement b – bone metastases c – other organ involvement
<u>T2</u> – tumor confined within prostate: a – less than a half of one lobe is involved b – more than a half of one lobe is involved c – both lobes of the prostate are involved		
<u>T3</u> – extracapsular extension: a – extracapsular extension b – seminal vesicle invasion		
<u>T4</u> – adjacent organs invasion		

Stadiazione



Valore prognostico
e predittivo

Patient
MANAGEMENT



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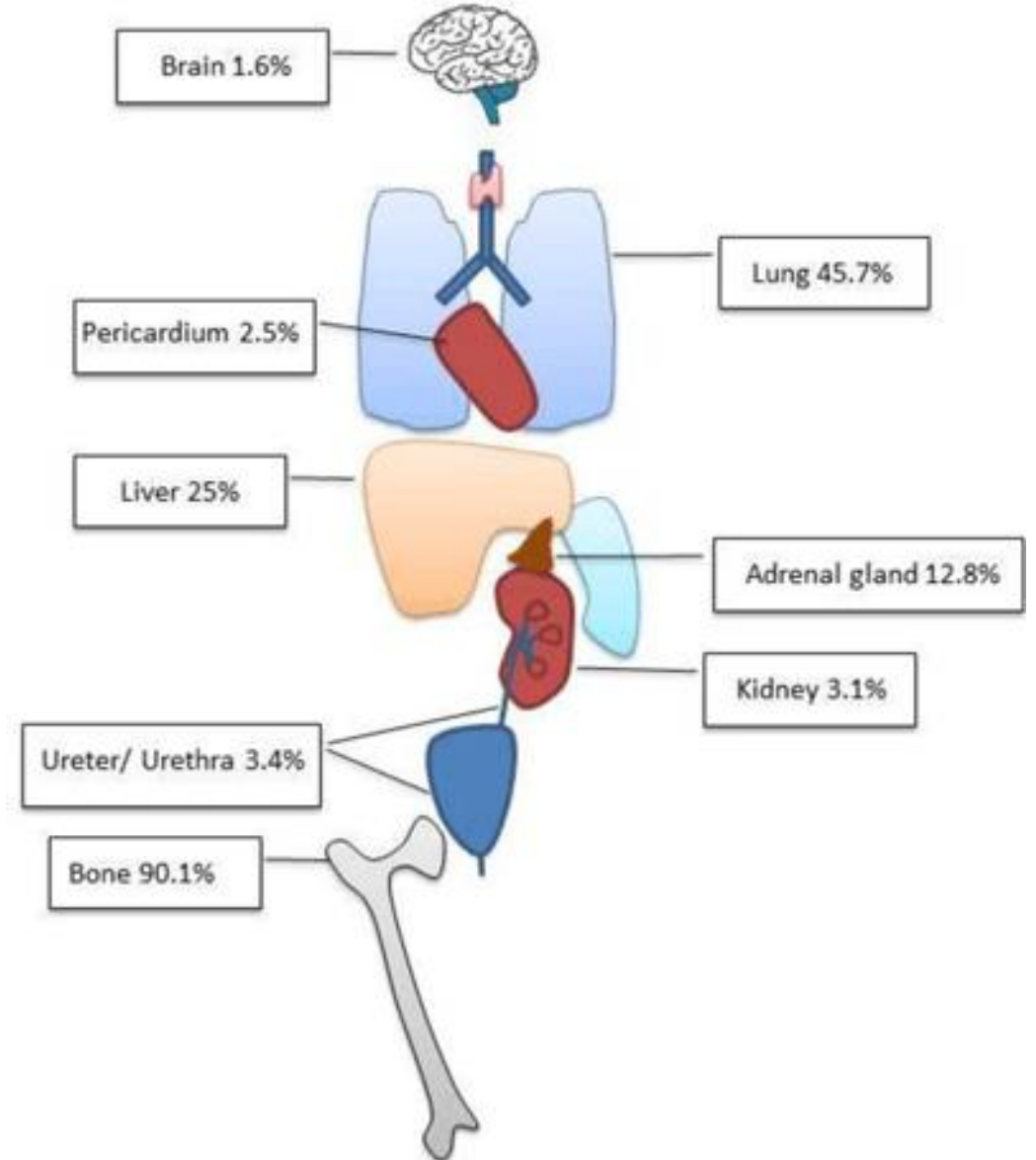
Recommendations	Strength rating
Any risk group staging	
Use pre-biopsy MRI for local staging information.	Weak
Low-risk localised disease	
Do not use additional imaging for staging purposes.	<u>Strong</u>
Intermediate-risk disease	
In ISUP grade 3, include at least cross-sectional abdominopelvic imaging and a bone-scan for metastatic screening.	Weak
High-risk localised disease/locally advanced disease	
Perform metastatic screening including at least cross-sectional abdominopelvic imaging and a bone-scan.	<u>Strong</u>
When using PSMA PET or whole body MRI to increase sensitivity, be aware of the lack of outcome data of subsequent treatment changes.	<u>Strong</u>



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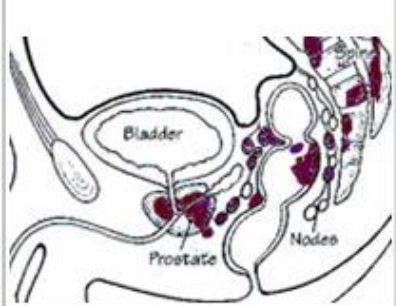
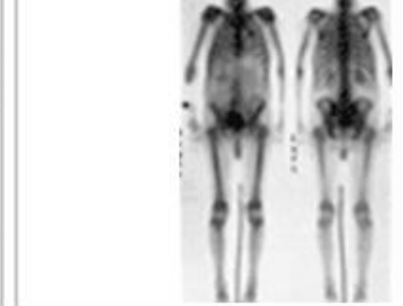
Alto rischio per malattia metastatica

- PSA > 20 ng/ml
- Gleason score >7
- Clinical stage T3 o T4





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<p>T1</p> 	<p>T2</p> 	<p>T3</p> 	<p>T4</p> 
<p>T1 Clinically inapparent; tumor not palpable or visible by imaging</p> <p>T1a Incidental finding during transurethral resection of prostate; < 5% of tissue resected</p> <p>T1b Incidental finding during transurethral resection of prostate; > 5% of tissue resected</p> <p>T1c Tumor identified by needle biopsy (e.g. because of elevated PSA)</p>	<p>T2 Tumor confined within prostate (palpable or visible on TRUS)</p> <p>T2a Involves half of a lobe or less</p> <p>T2b Involves more than half of a lobe one lobe but not both lobes</p> <p>T2c Tumor involves both lobes</p>	<p>T3 Tumor extends through prostatic capsule, bladder neck or seminal capsule</p> <p>T3a Unilateral extracapsular extension</p> <p>T3b Bilateral extracapsular extension</p> <p>T3c Tumor invades seminal vesicle(s)</p>	<p>T4 The tumor has spread or attached to tissues next to the prostate (other than the seminal vesicles).</p> <p>T4a The tumor has spread to the neck of the bladder, the external sphincter (muscles that help control urination), or the rectum.</p> <p>T4b The tumor has spread to the floor and/or the wall of the pelvis.</p>
<p>N0-3</p> 	<p>M0-1</p> 	<p>N0 Cancer has not spread to any lymph nodes.</p> <p>N1 Cancer has spread to a single regional lymph node (inside the pelvis) and is not larger than 2 centimeters</p> <p>N2 Cancer has spread to one or more regional lymph nodes and is larger than 2 centimeters (¾ inch), but not larger than 5 centimeters</p> <p>N3: Cancer has spread to a lymph node and is larger than 5 centimeters</p> <p>M0: The cancer has not metastasized (spread) beyond the regional lymph nodes</p> <p>M1: The cancer has metastasized to distant lymph nodes (outside of the pelvis), bones, or other distant organs such as lungs, liver, or brain</p>	

Obiettivi Imaging Radiologico



- Estensione intra- ed extraprostatica (T)
- Presenza e localizzazione metastasi linfonodali (intra VS extra pelvic) (N-M)
- Mestastasi ossee (M)
- Metastasi altri organi (M)
- Individuare complicazioni ostruttive del tratto urinario



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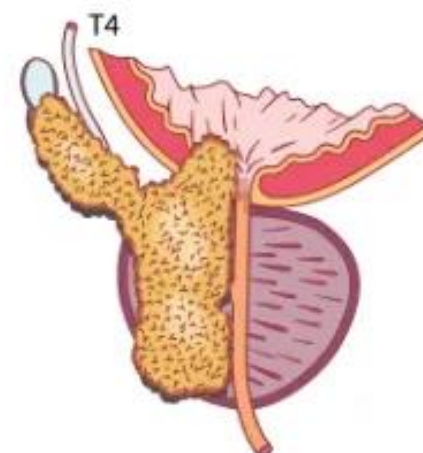
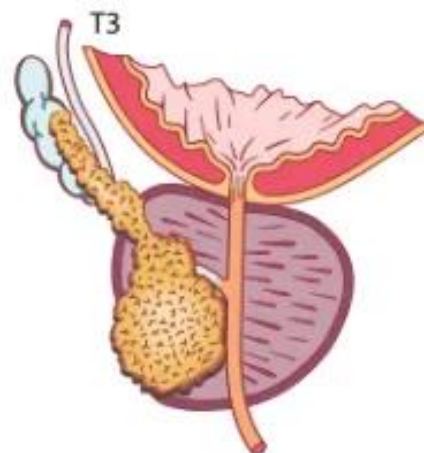
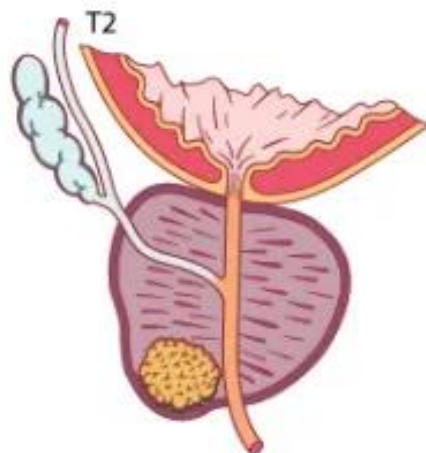
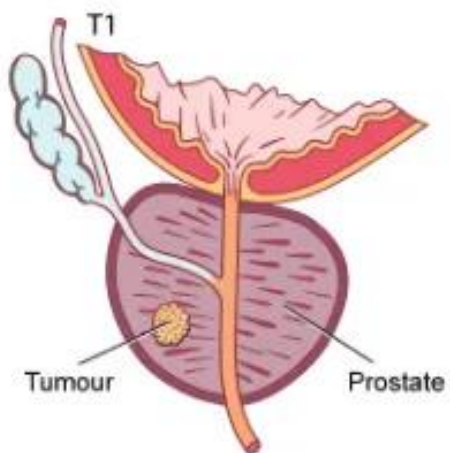
T Staging

RISONANZA
MAGNETICA



ESTENSIONE EXTRA-PROSTATICA (EPE):

- Ampia superficie di contatto (>12-14mm)
 - Bulging capsulare
- Obliterazione angolo retroprostatico
 - Asimmetria del vascio VN
- Infiltrazione vescichette seminali



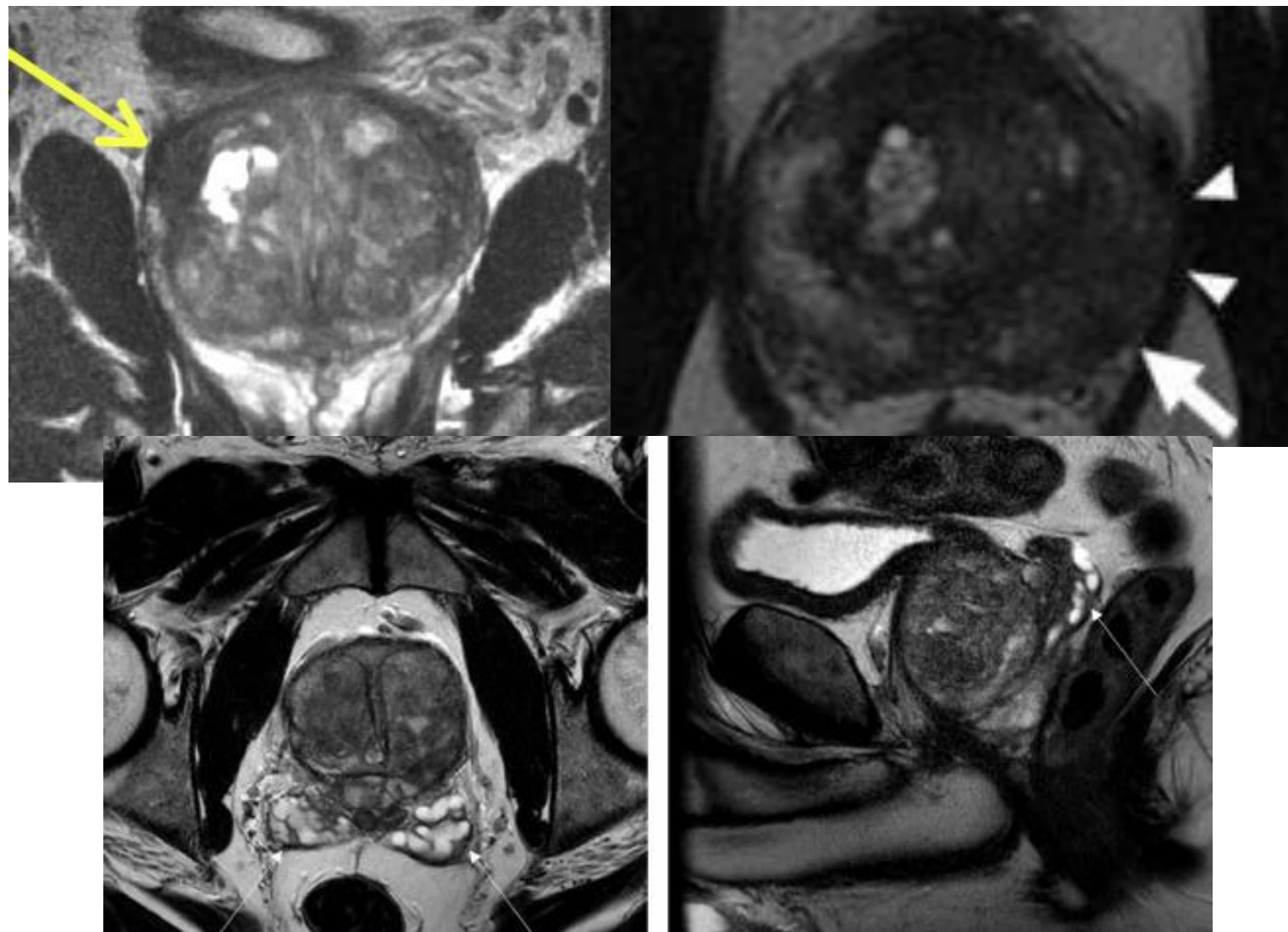


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RISONANZA MAGNETICA

Imaging in Prostate Cancer Staging: Present Role and Future Perspectives

Authors	Pa- tients	Local staging	ECE	SVI	Sens, %	Spec. %
Sala et al. [30]	356	-	-	V	63	97
Bartolozzi et al. [34]	73	V	-	V	95 80	82 93
Cornud et al. [35]	175	-	V	-	69	95
Ikonen et al. [36]	51	V - -	- V -	- - V	60 13 59	63 97 84
Ikonen et al. [37]	44	V - -	- V -	- - V	50 22 50	65 99 90
May et al. [38]	54	- -	V -	- V	80 58	97 95
Perrotti et al. [39]	56	- -	V -	- V	22 23	84 93





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Infiltrazione vescichette seminali

- Tumore base
- Estensione oltre la capsula
- Ridotto segnale vescichette in T2

References	Type of imaging	Number of patients	Se (%)	Sp (%)
Grivas et al. (19)	MRI	527	75.9	94.7
Pinaquy et al. (20)	Choline-PET/CT	47	36	98
Fendler et al. (21)	PSMA-PET/CT	21	73	100

Imaging for Metastasis in Prostate Cancer: A Review of the Literature





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Limiti

Meta-analisi
38 studi (4000 PZ):

Stadio T3

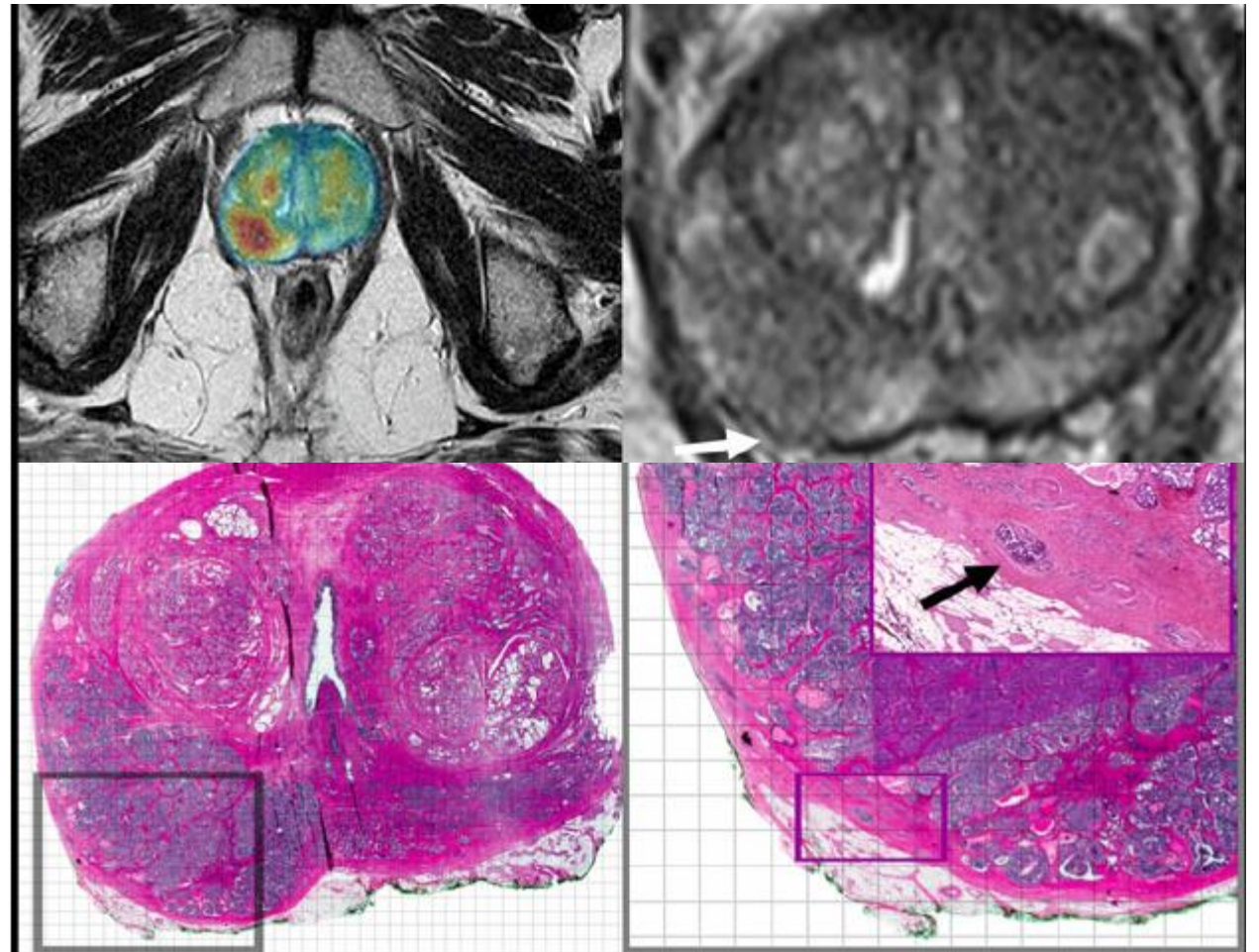


Sensibilità 0,61

Specificità 0,88

Bassa sensibilità per EPE

Livello di esperienza!





Il tumore della prostata a Ferrara

T Staging

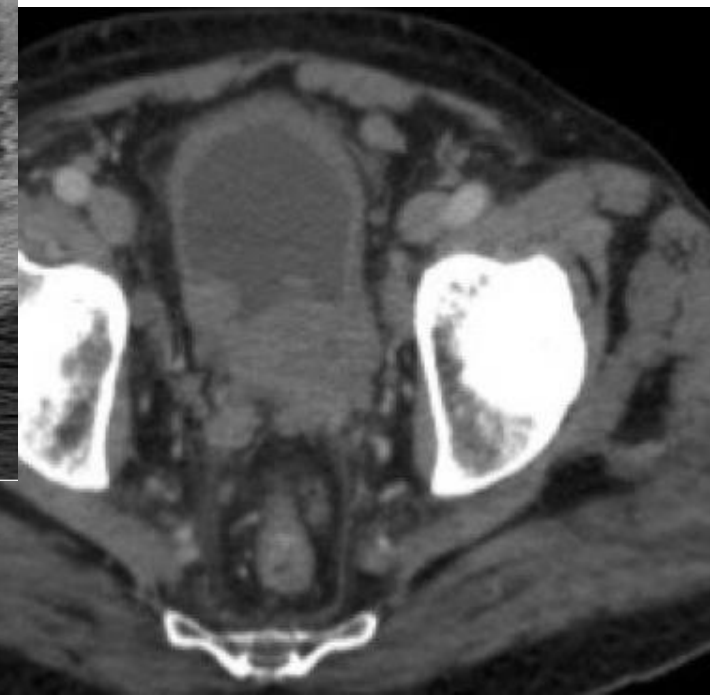
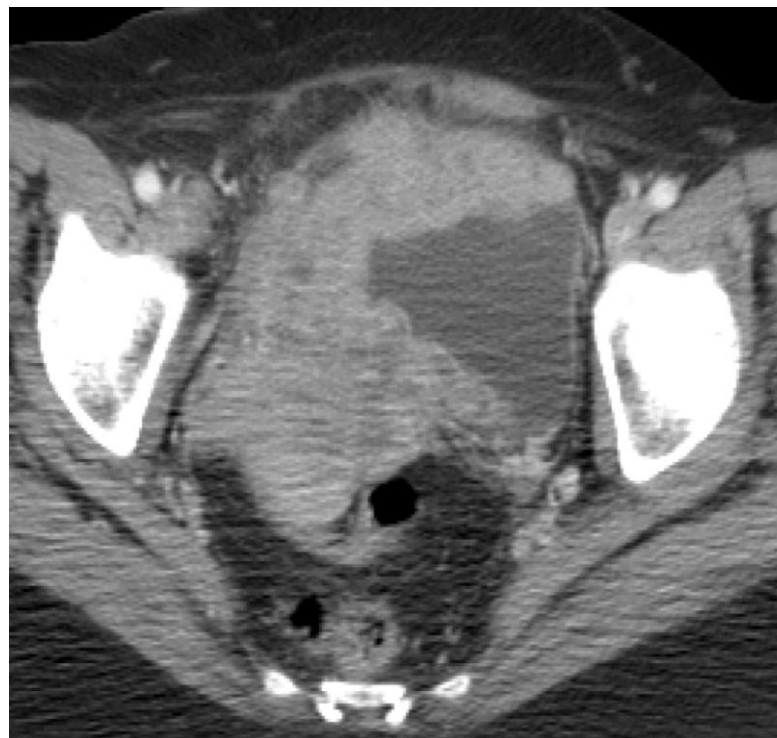
TOMOGRAFIA COMPUTERIZZATA

Ruolo più limitato (bassa
risoluzione di contrasto)



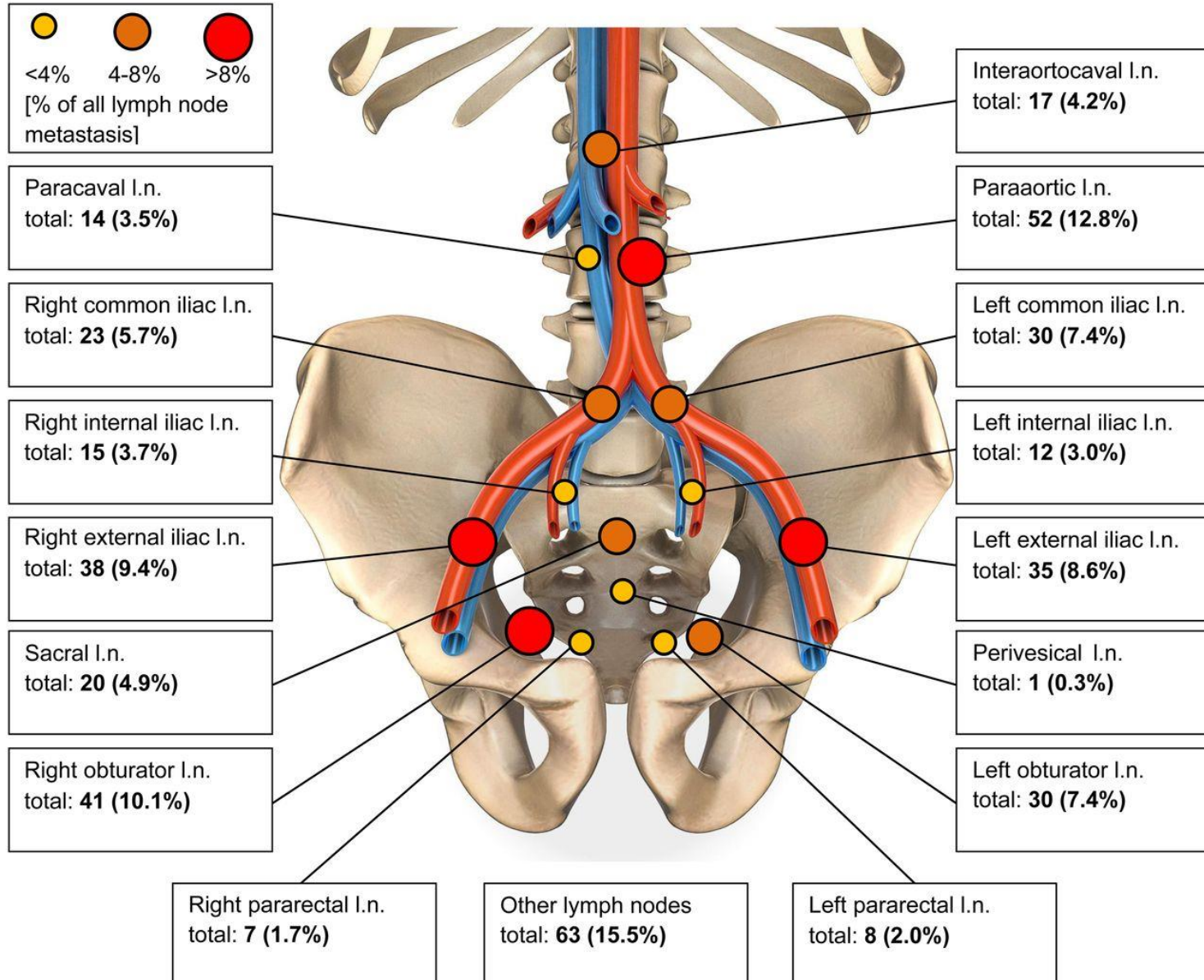
Malattia localmente molto
avanzata

- Grossolana estensione extracapsuale
 - Pz molto anziani – NO RM
- Infiltrazione organi pelvici (vescica, retto, pavimento pelvico, etc)
- Individuare complicazioni ostruttive del tratto urinario





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N Staging

Alto rischio per malattia metastatica

- PSA > 20 ng/ml
- Gleason score >7
- Clinical stage T3 o T4



Imaging

Imaging in Prostate Cancer Staging: Present Role and Future Perspectives

Authors	Patients	Sens, %	Spec, %
CT			
Hricak	85	25	99
Engeler	160	5	100
Van Poppel	285	77	96
Flanigan	173	27	97
Weinermann	19	68	75
MRI			
Bezzi	51	68	94
Rifkin	185	6	95
Jager	63	59	97
Perotti	56	13	90
Harisinghani	80	46	78

TC e RM sens 40% - spec 80%



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N Staging

Contribution of Radiology to staging of prostate cancer

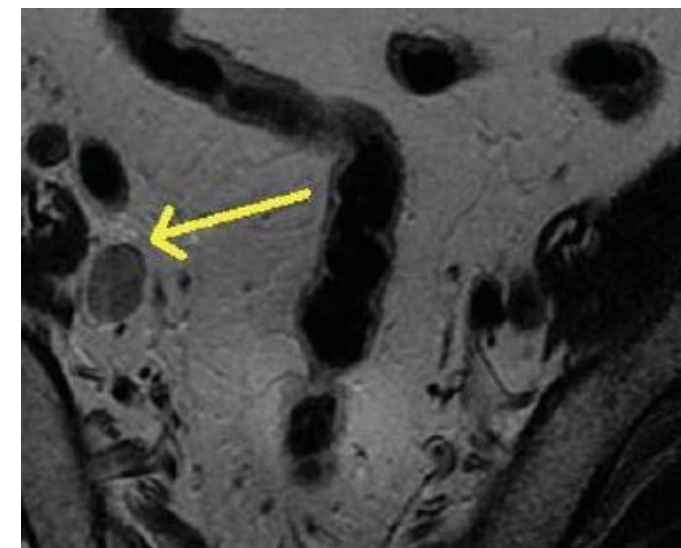
Sungmin Woo, MD¹, Soleen Ghafoor, MD², Hebert Alberto Vargas, MD²

¹Department of Radiology, Seoul National University College of Medicine, 101 Daehak-ro, Jongno-gu, Seoul, 110-744, Korea

²Department of Radiology, Memorial Sloan Kettering Cancer Center, 1275 York Ave, Room C278, New York, NY 10065

Semin Nucl Med 2019 July ; 49(4): 294–301. doi:10.1053/j.semnuclmed.2019.02.007.

to assess lymph node metastasis. For example, one of the most commonly used criteria for metastatic lymph nodes from prostate cancer is a round lymph node with short axis diameter greater than 8 mm or an oval node with larger than 10 mm (26). With use of such size and shape criteria, both the sensitivity and specificity are low with reported pooled estimates of 0.42 (95% CI, 0.26–0.56) and 0.82 (95% CI, 0.8–0.83), respectively according to a meta-analysis of 24 studies based on CT and MRI (27). The low sensitivity of using cross-

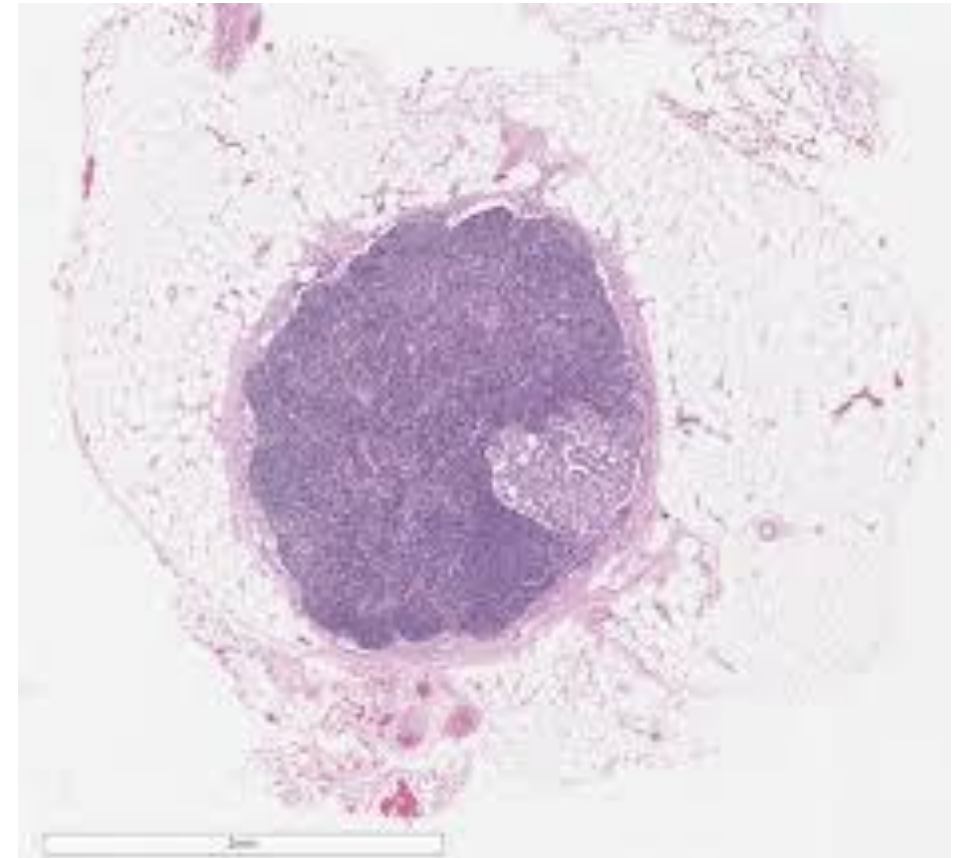
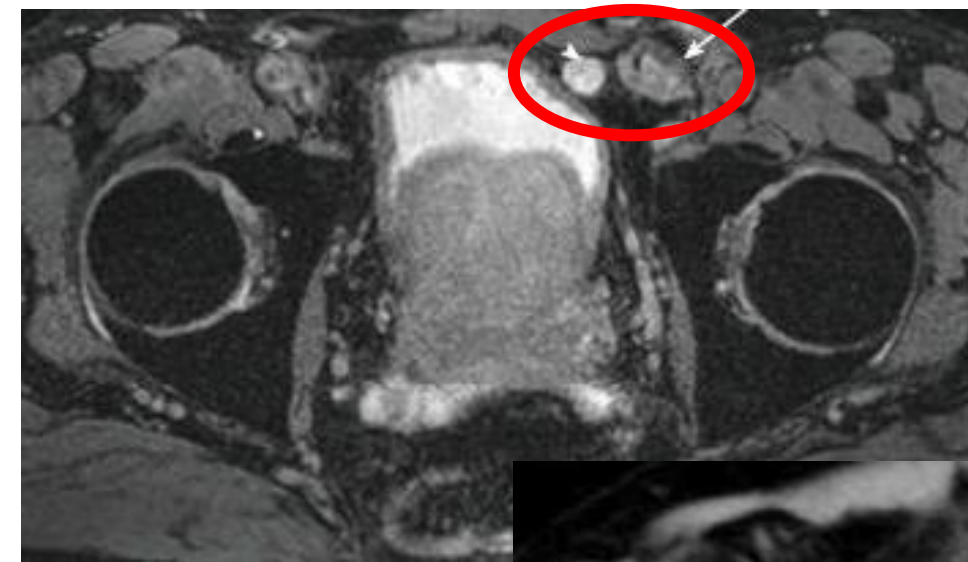




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N Staging



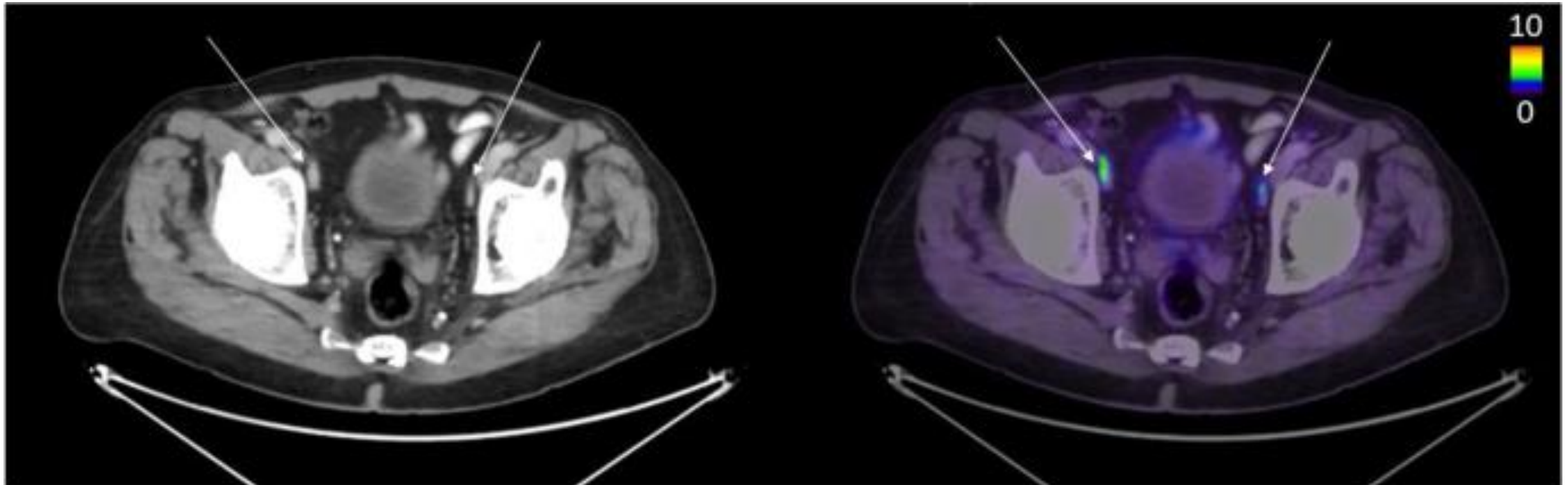


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N Staging

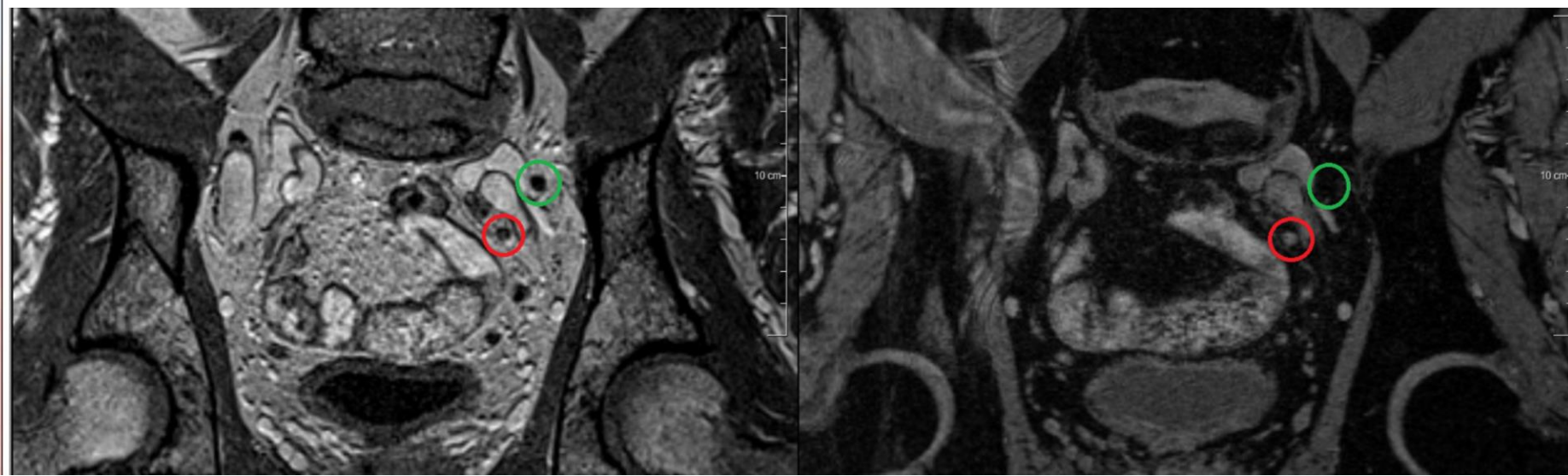
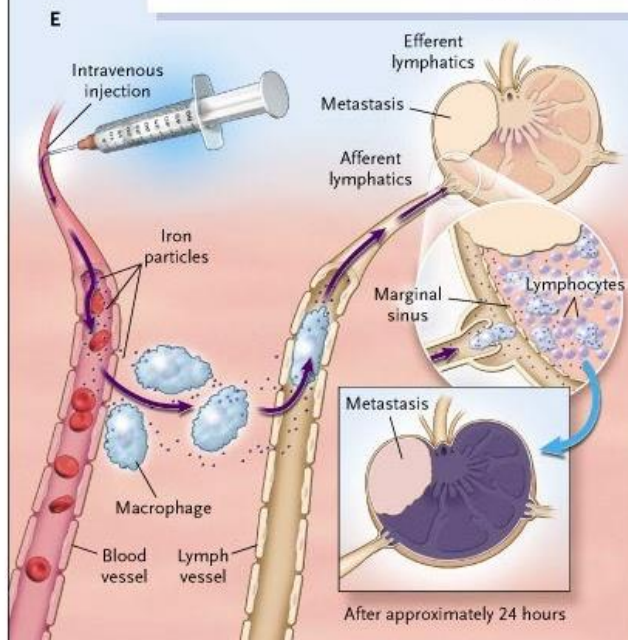
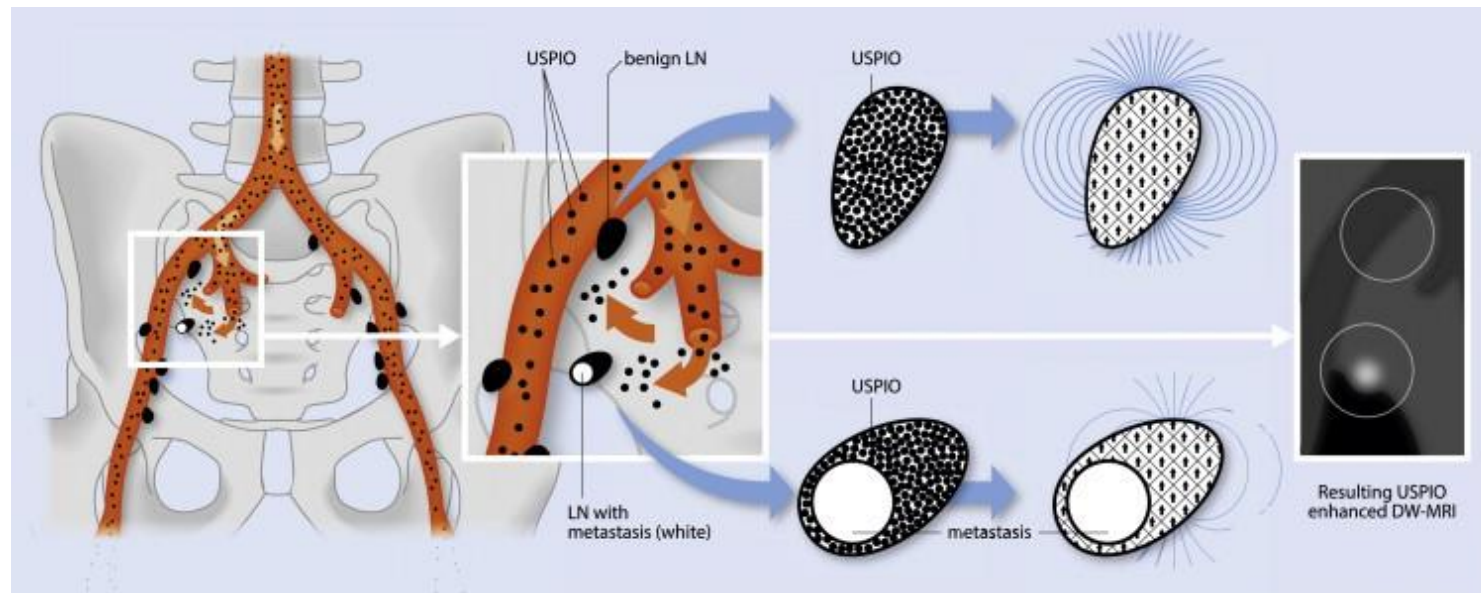
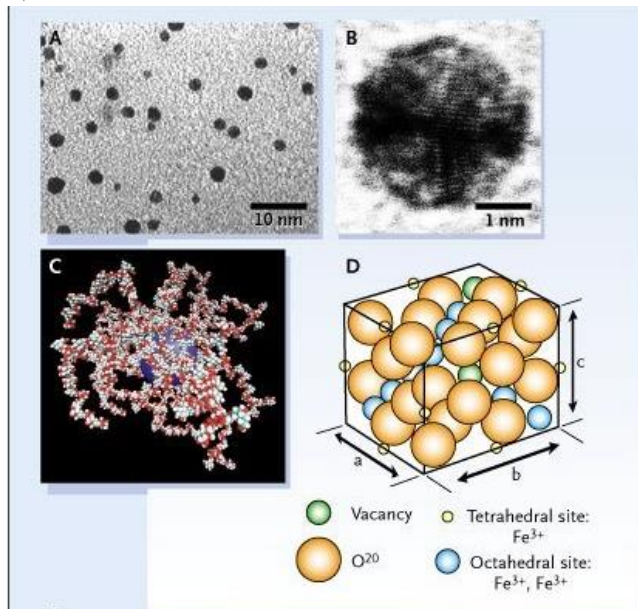
10-20% linfonodi non ingranditi metastatici

30% linfonodi ingranditi benigni





Il tumore della prostata a Ferrara



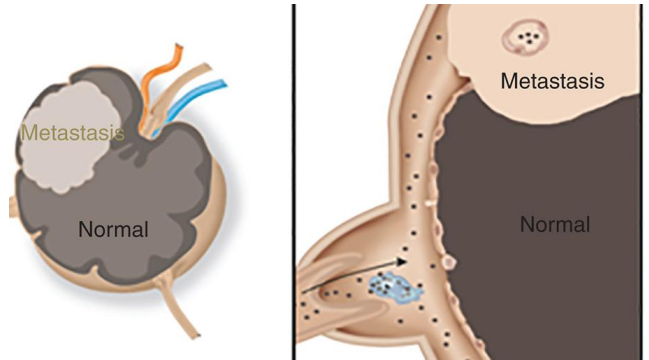


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RM con USPIO

Fattori limitanti reale utilizzo nella
pratica clinica:

- Ridotta disponibilità commerciale
- Approvazioni regolatorie sull'utilizzo
- Necessità di due sessioni di acquisizione delle immagini (base e a 24-36H)
- Variabilità interlettore legata all'esperienza
- Potenziali reazioni avverse da indagare

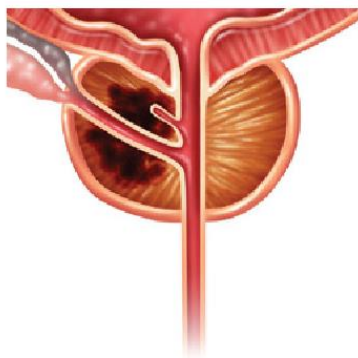




Il tumore della prostata a Ferrara

M Staging

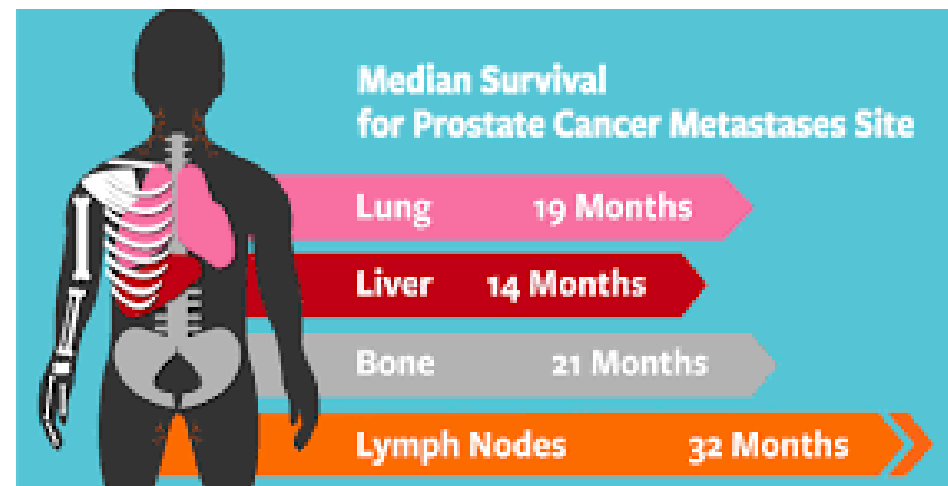
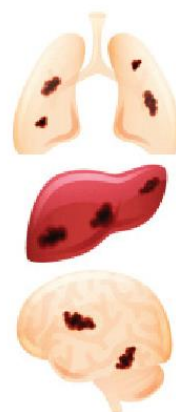
Primary
Prostate Cancer



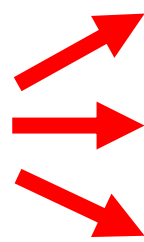
Bone
Metastases



Visceral
Metastases



Paziente metastatico



90% osso

45,7% polmone

25% fegato



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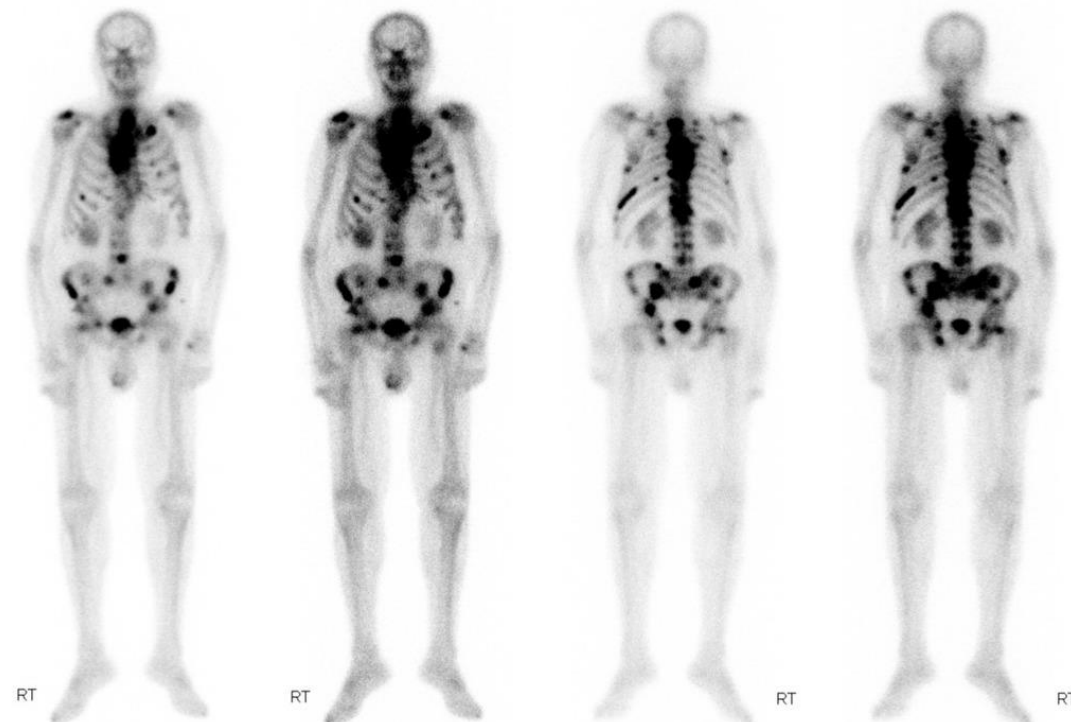
Recommendations	Strength rating
Any risk group staging	
Use pre-biopsy MRI for local staging information.	Weak
Low-risk localised disease	
Do not use additional imaging for staging purposes.	Strong
Intermediate-risk disease	
In ISUP grade 3, include at least cross-sectional abdominopelvic imaging and a bone-scan for metastatic screening.	Weak
High-risk localised disease/locally advanced disease	
Perform metastatic screening including at least cross-sectional abdominopelvic imaging and a bone-scan.	Strong
When using PSMA-PET or whole body MRI to increase sensitivity, be aware of the lack of outcome data of subsequent treatment changes.	Strong



Il tumore della prostata a Ferrara

Metastasi ossee

Type of imaging	Reference and type	Number of patients	Se (%)	Sp (%)
Bone scan	Shen et al. (25) (meta-analysis)	18 studies, N > 2,291	79	82
Choline-PET/CT			87	97
MRI			95	96
SPECT-CT	Behesti et al. (26) (Review)	Review	87-92	91
Bone CT	O'Sullivan et al. (27) (Review)	Review	56	74
NaF-PET/CT	Behesti et al. (28) (Review)	Review	100	100



Imaging for Metastasis in Prostate Cancer: A Review of the Literature

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doi: 10.3389/fonc.2020.00055

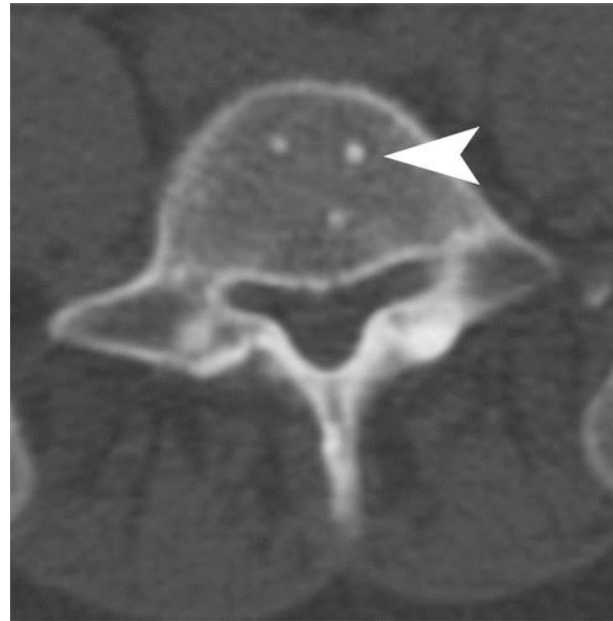
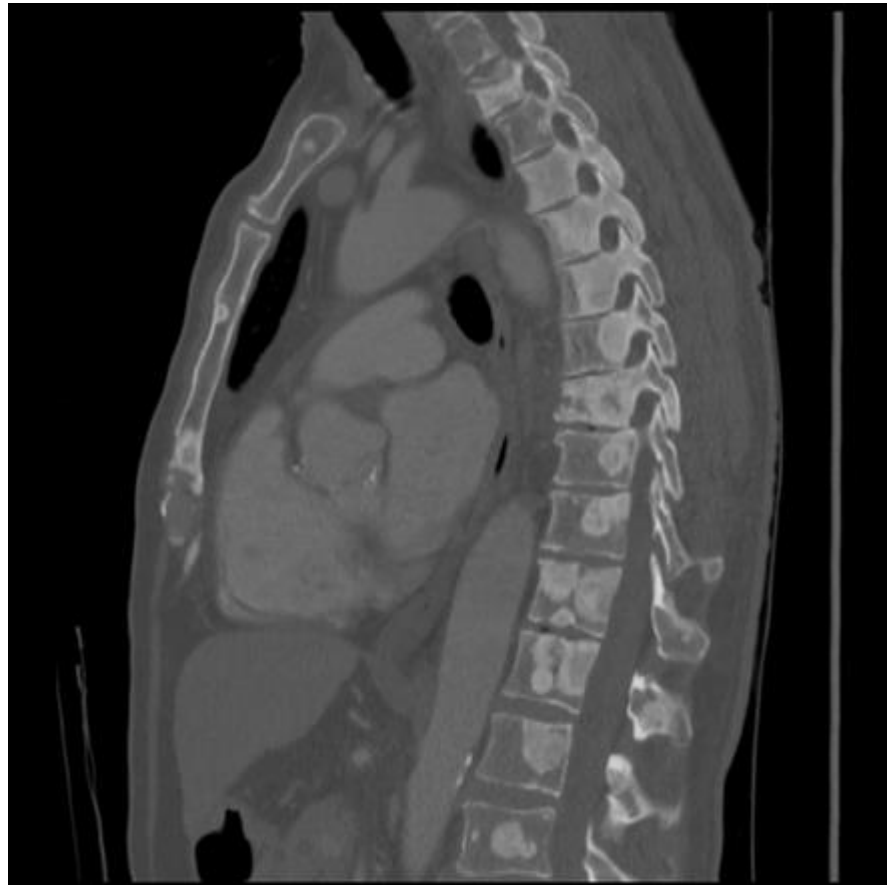


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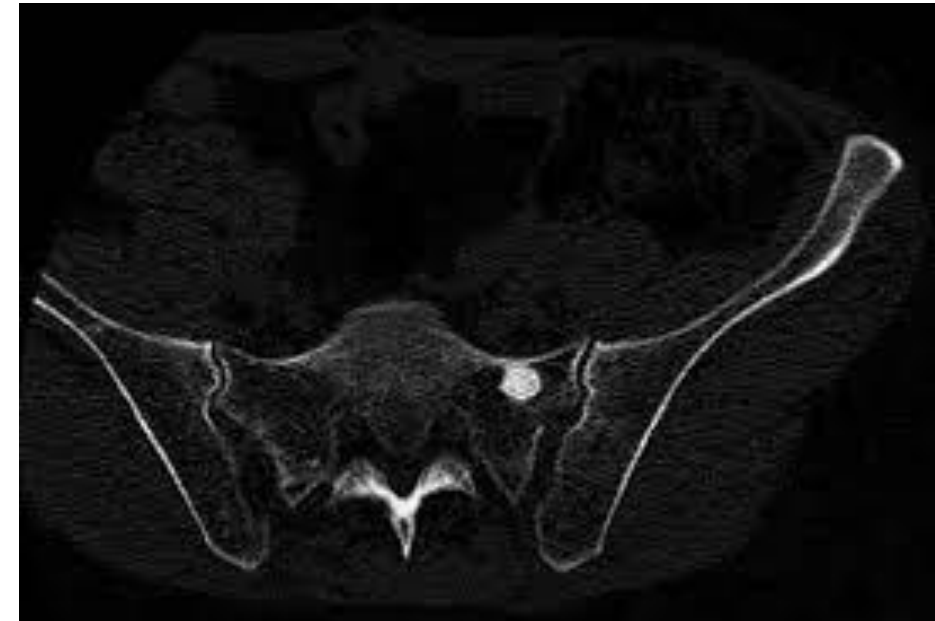
Il tumore della prostata a Ferrara

Metastasi ossee

TOMOGRAFIA COMPUTERIZZATA



METASTASI



ENOSTOSI





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Metastasi ossee

TOMOGRAFIA COMPUTERIZZATA

AJR:207, August 2016

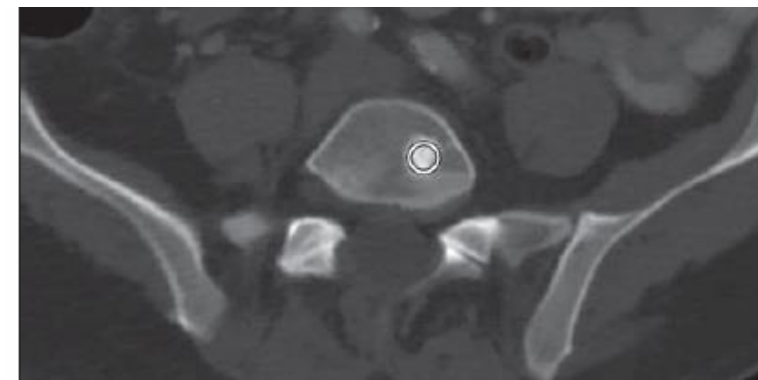
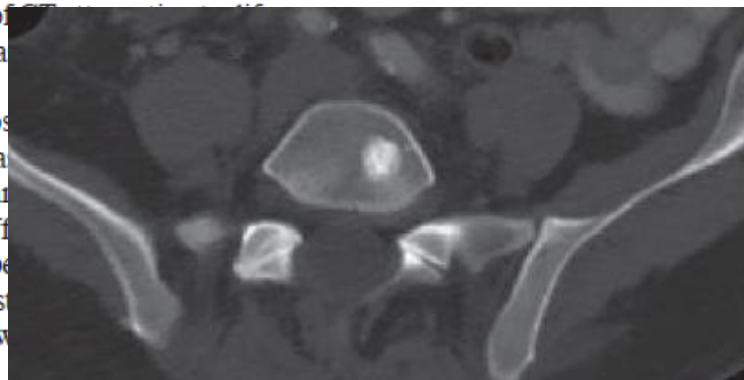
Distinguishing Untreated Osteoblastic Metastases From Enostoses Using CT Attenuation Measurements

OBJECTIVE. The purpose of this study was to determine whether CT attenuation measurements can be used to distinguish untreated osteoblastic metastases from enostoses.

MATERIALS AND METHODS. The study included 126 patients with sclerotic bone lesions found at CT (126 enostoses and 126 metastases). The cause of sclerotic lesions was assessed by histopathologic examination and clinical follow-up. None of the patients had undergone prior treatment for the metastases. The mean and maximum attenuation were measured in Hounsfield units. ROC analysis was performed to determine sensitivity, specificity, AUC, 95% CIs, and cutoff values of CT attenuation to differentiate metastases from enostoses. Interreader reproducibility was assessed with a kappa class correlation coefficient with 95% CI.

RESULTS. The mean and maximum CT attenuation values of enostoses were 787 ± 194 HU and 1323 ± 234 HU, respectively, and those of osteoblastic metastases were 654 ± 176 HU and 1060 ± 234 HU, respectively. Using a cutoff of 885 HU for mean attenuation, the AUC was 0.982, sensitivity was 95%, and specificity was 96%. Using a cutoff of 1060 HU for maximum CT attenuation, the AUC was 0.976, sensitivity was 95%, and specificity was 96%. The mean attenuation intraclass correlation coefficient was 0.987 for enostoses and 0.980 for metastases.

CONCLUSION. CT attenuation measurements can be used to distinguish untreated osteoblastic metastases from enostoses. A mean attenuation of 885 HU and a maximum attenuation of 1060 HU provide reliable thresholds below which a metastatic lesion is the favored diagnosis.

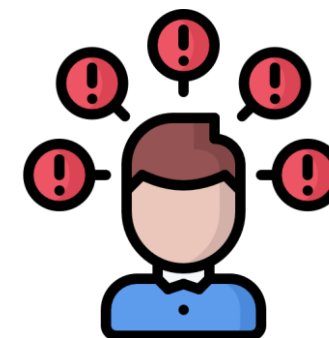
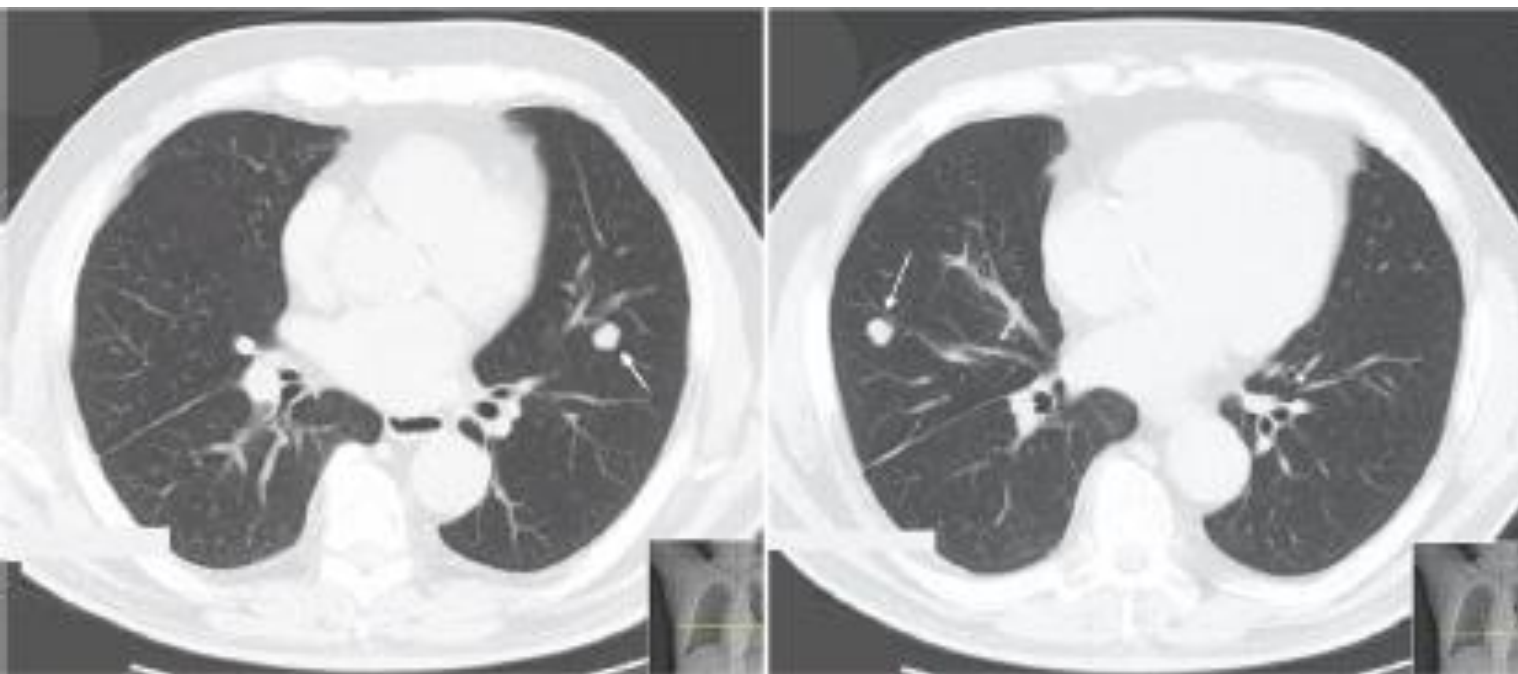




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Metastasi viscerali



NODULI
5mm



FOLLOW UP





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Metastasi viscerali





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Recommendations	Strength rating
Any risk group staging	
Use pre-biopsy MRI for local staging information.	Weak
Low-risk localised disease	
Do not use additional imaging for staging purposes.	Strong
Intermediate-risk disease	
In ISUP grade 3, include at least cross-sectional abdominopelvic imaging and a bone-scan for metastatic screening.	Weak
High-risk localised disease/locally advanced disease	
Perform metastatic screening including at least cross-sectional abdominopelvic imaging and a bone-scan.	Strong
When using PSMA PET or whole body MRI to increase sensitivity, be aware of the lack of outcome data of subsequent treatment changes.	Strong



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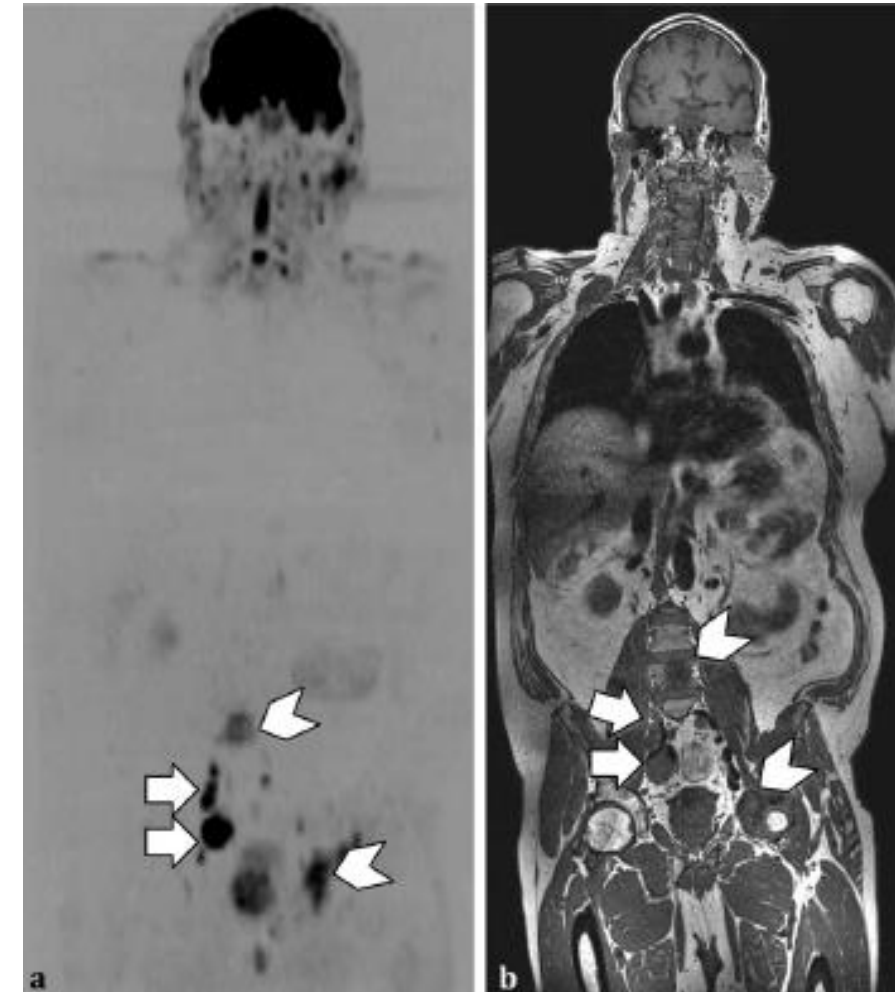
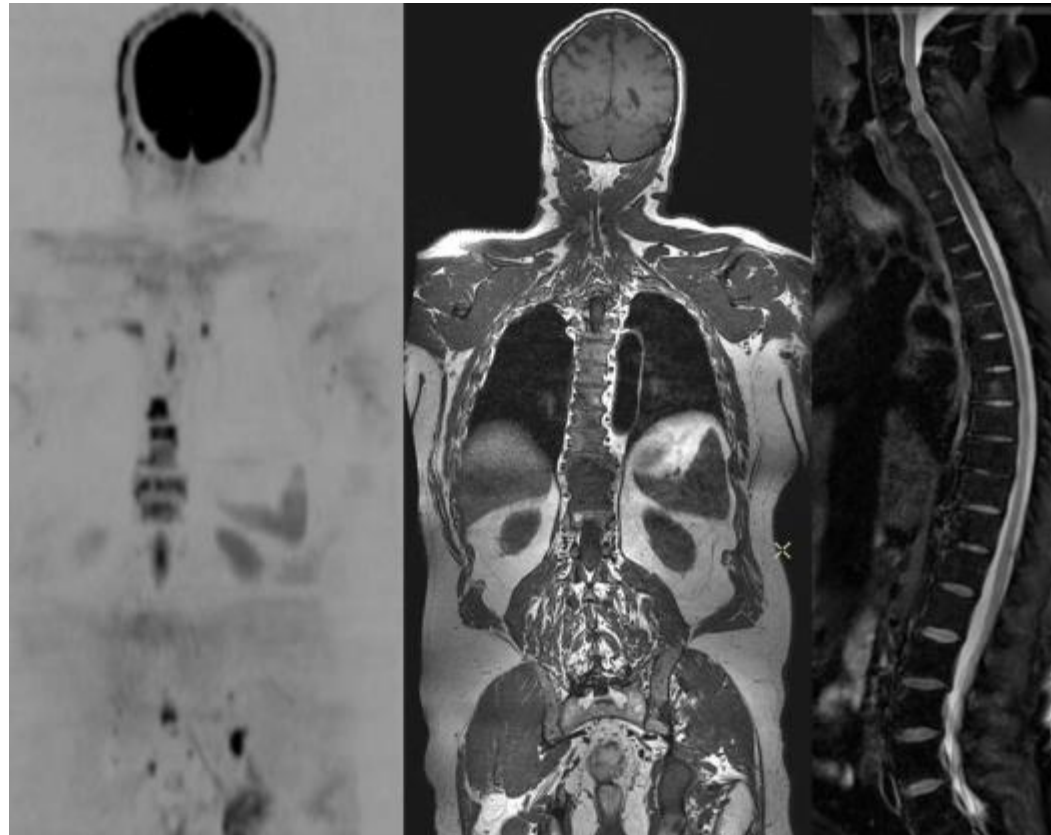
Il tumore della prostata a Ferrara

Whole-Body MRI



Protocollo:

- T1
anatomiche
- STIR
- DWI





Il tumore della prostata a Ferrara

Whole-Body MRI

Optimising TNM Staging of Patients with Prostate Cancer Using WB-MRI

Vassiliki Pasoglou, Nicolas Michoux, Bertrand Tombal and Frédéric Lecouvet

Limitations of current staging methods

Accurate distant and local staging of PCa patients is crucial in order to adapt treatment to the actual stage of the disease. Patients with bone metastasis cannot receive local treatment (surgery or radiation therapy), hence accurate detection of bone disease is essential. The development of clinical trials evaluating novel compounds and local treatment in the so-called oligo-metastatic patients has rendered the accurate evaluation of the metastatic burden indispensable [29, 30, 31].

ity algorithm necessitates multiple hospital visits and appointments in different departments (radiology and nuclear medicine), leading to additional times and discomfort for this group of patients (who are mostly elderly with multiple comorbidities). The delays for the interpretation

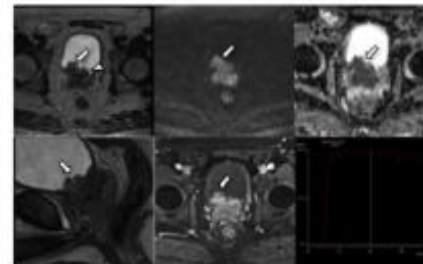
of all these examinations also have to be considered.

Multimodality algorithms would advantageously be replaced by one step modalities (WB-MRI and PET) protocols which have suggested their superiority and allow the rapid assessment of total tumor and all organ evaluation [35].

ALL IN ONE MRI Pca STAGING report sheet

PATIENT NAME: _____ DOB: _____ ID: _____

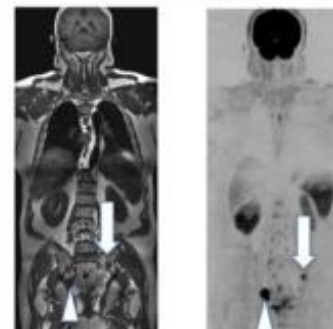
LOCAL STATUS (T STAGING)



	ESUR Score
Extra capsular	5
Seminal vesicles	4
Distal sphincter	4
Bladder neck	4
Other organ	rectum

Multiparametric MRI of the prostate : summary
Cancer location: Diffuse infiltration of the prostate
Extracapsular spread: 17

GENERAL STATUS (N AND M STAGING)



	0/1
Bone mets	1
Node mets	1

Whole body MRI T1 and DWI : summary (Arrow=bone met; arrowhead=node met)
Nodes:
Bone metastasis:

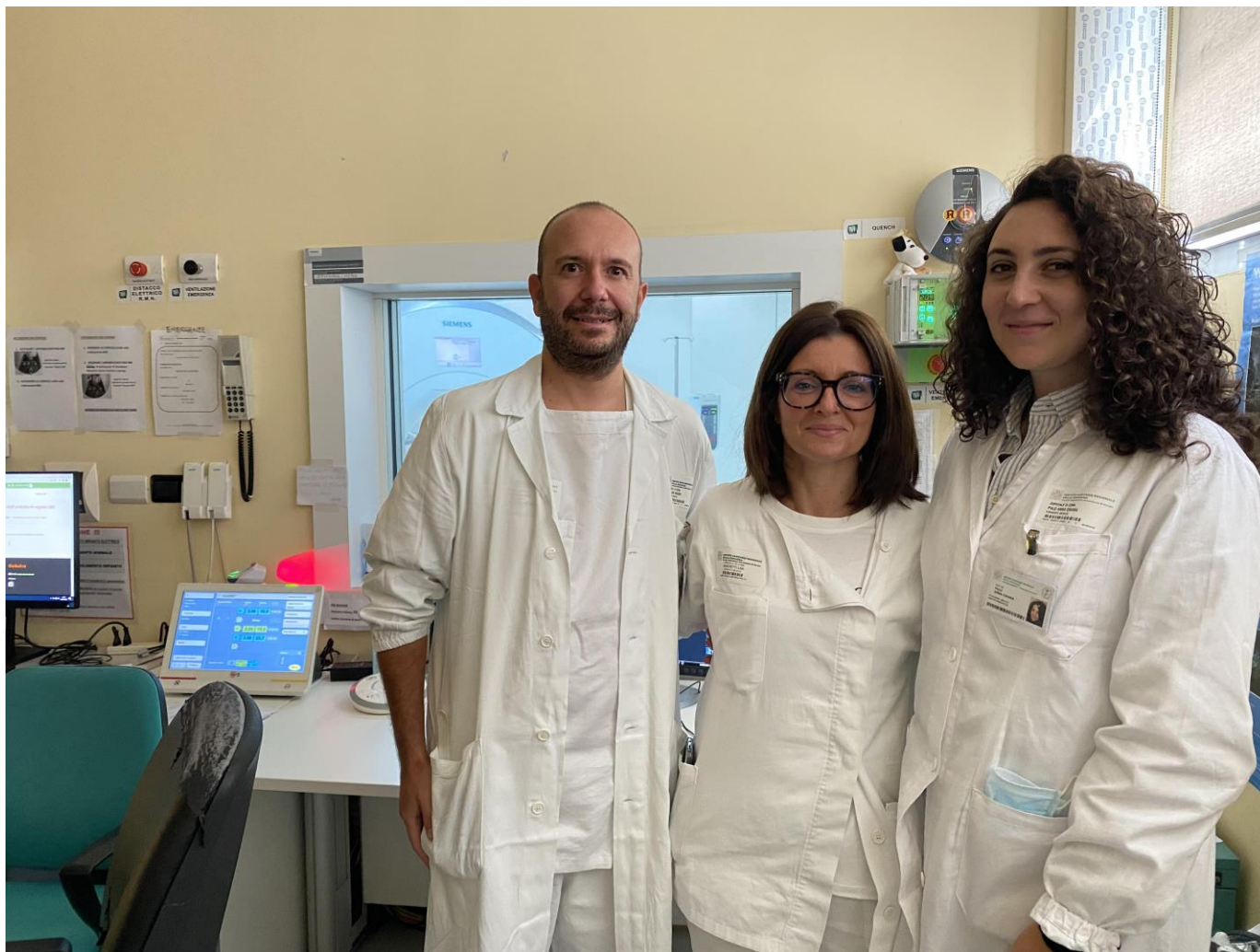
CONCLUSION: T4 N1 M1



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Grazie per l'attenzione



Team Radiologia Azienda
Ospedaliero-Universitaria:

- Dott. Mauro Gagliano
- Dott.ssa Lisa Marchetti
- Dott.ssa Anna Chiara Palo

