Place de l'IRM dans le bilan d'extension initial des tumeurs rectales

Valérie CROISE-LAURENT

Quand faire une IRM rectale ?

- **Dans tous les cas de tumeurs rectales** (sauf si contre indication à une exploration par IRM)
  - Thésaurus National de Cancérologie Digestive
  - Mise à jour du 17/01/2012
- Echo endoscopie indispensable si
  - Stades T1-T2
  - doute sur T3a-T3b
  - PTH bilatérale (artéfacts majeurs, vide de signal)

Préparation patient

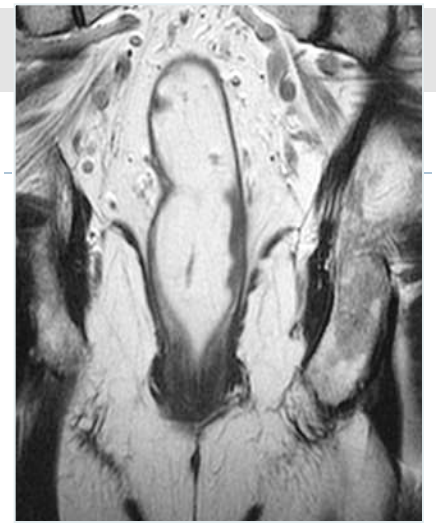
- Evacuation rectale
- Distension avec du gel d'échographie 100 ml

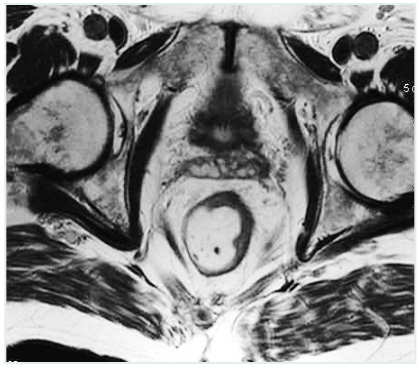
- Antipéristaltiques si tumeurs de la charnière

Kim MJ et al. AJR 2004 ; 183 : 1469-1476

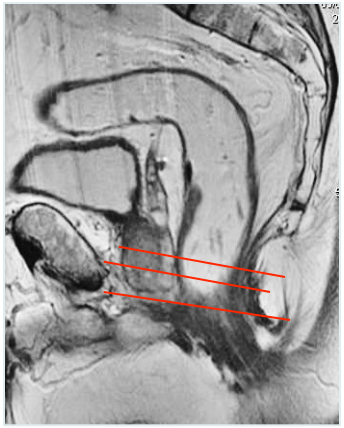
Preoperative MRI of Rectal Cancer with and without rectal water filling.

Durée de l' examen 30 à 40 mn





- **3 plans FSE (TSE) T2**
  - Sagittal
  - Frontal
  - **Axial : perpendiculaire à la tumeur**

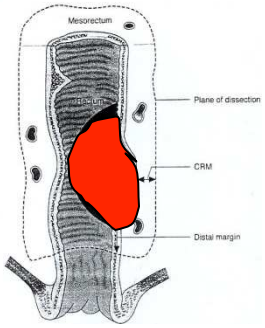


EG T1 ap inj haute résolution dans deux plans orthogonaux

-Séquence DWI : pas d' intérêt pour diagnostic initial

-Intérêt pour le suivi après radioCHimioT , protocoles : bons répondeurs

-Mise en évidence de récidives locales

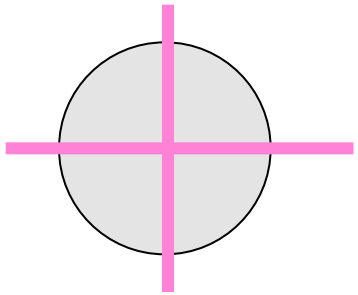


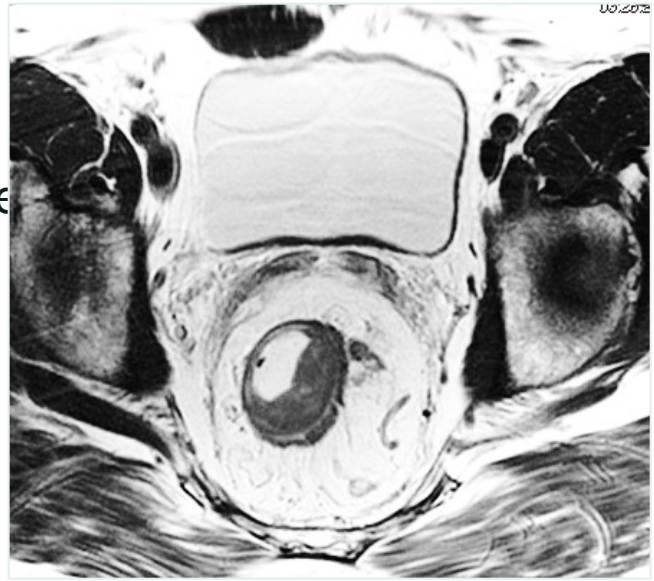
Localisation en hauteur et sur la circonférence

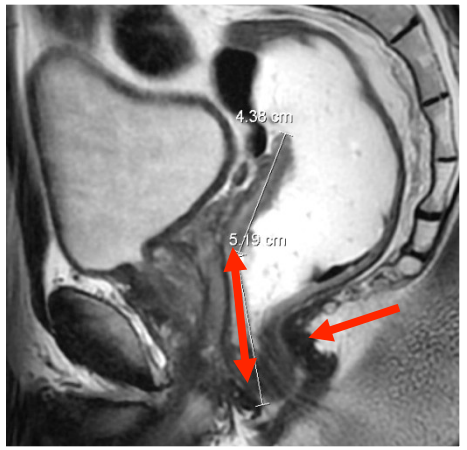
- Localisation

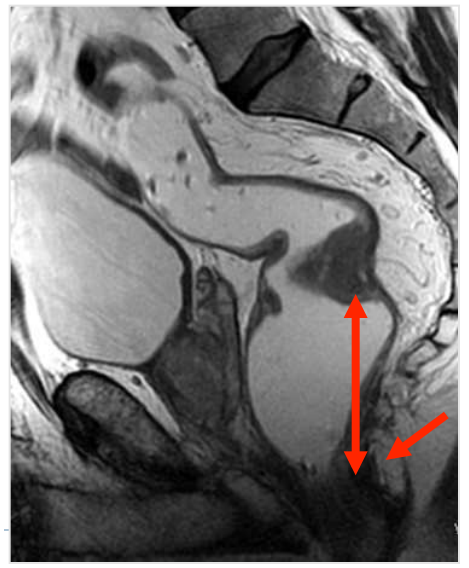
1-Par rapport à la circonférence

- Siège sur la circonférence



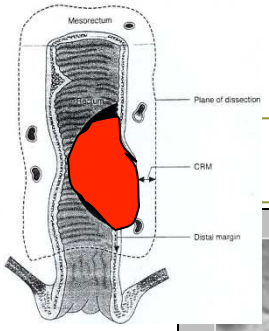




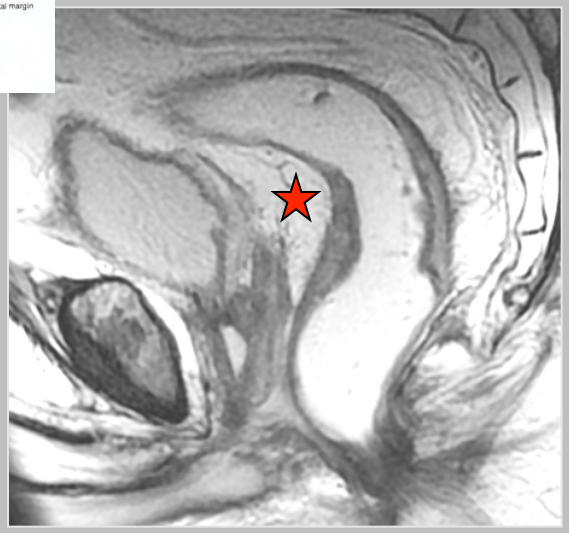
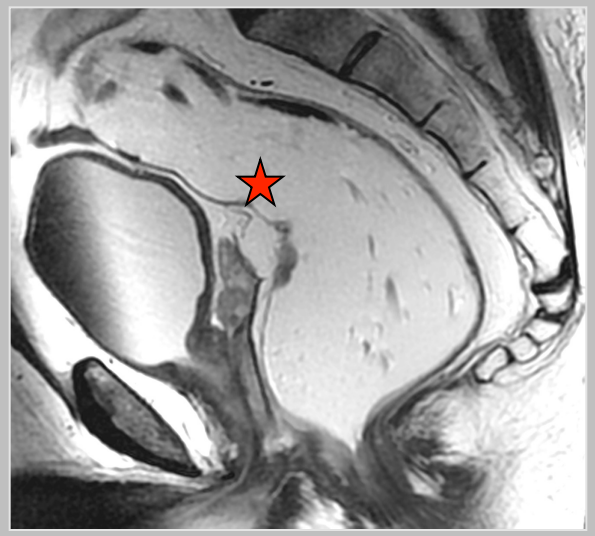
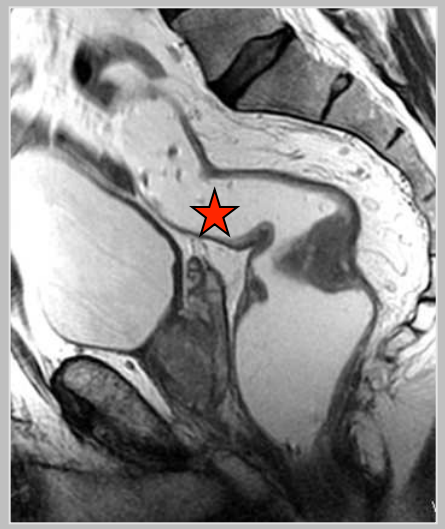


2-Distance entre le pôle inférieur et le bord sup du puborectal.

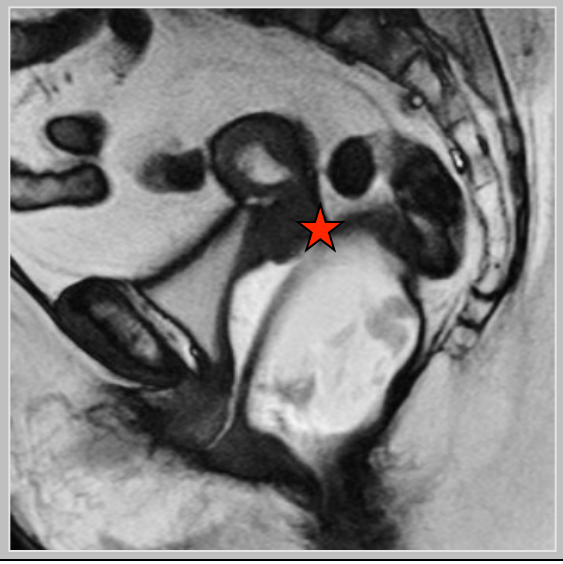
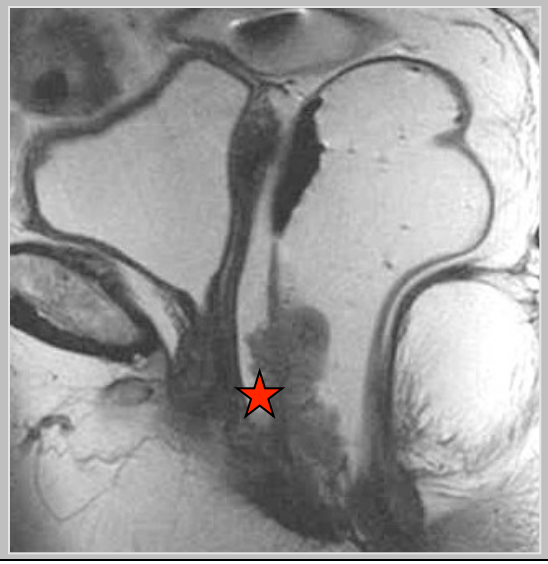
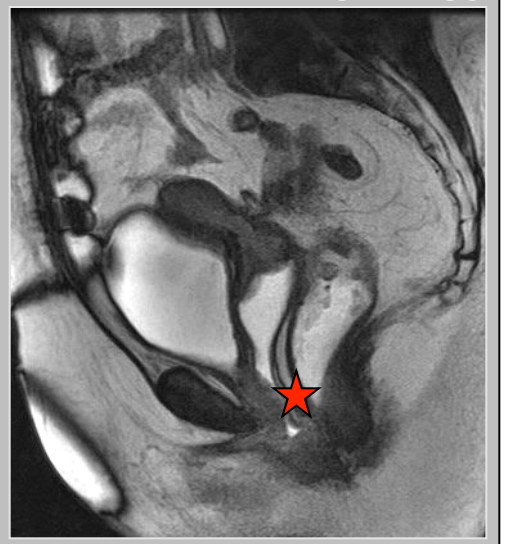
- Dimensions en mm: hauteur, largeur, antéro-postérieur ou épaisseur moyenne pour les lésions circonférentielles. Projection du bord sup de la tumeur par rapport au rachis

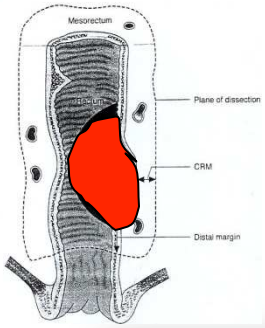


Localisation sus ou sous péritonéale

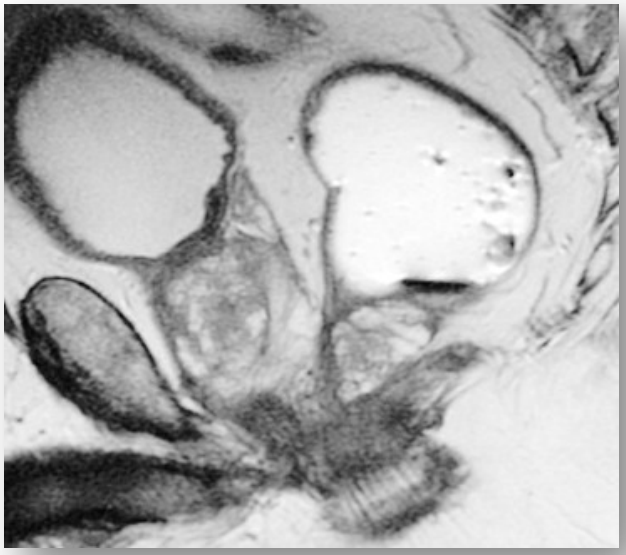




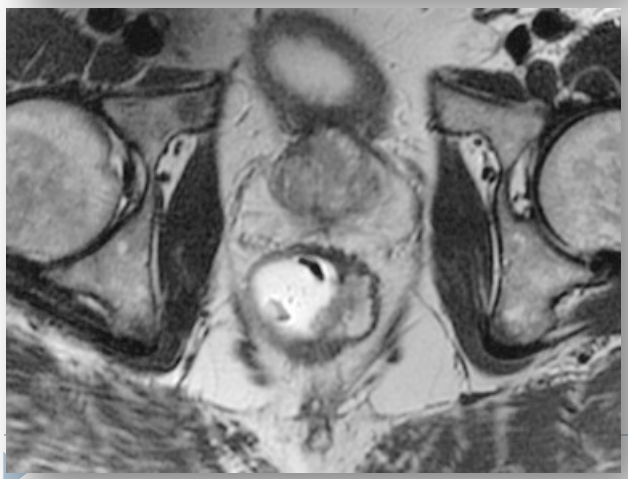
Femmes

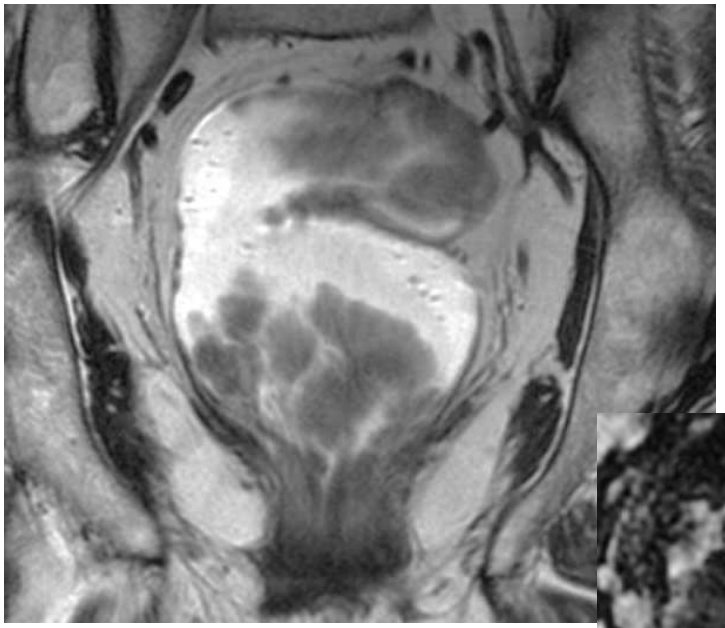




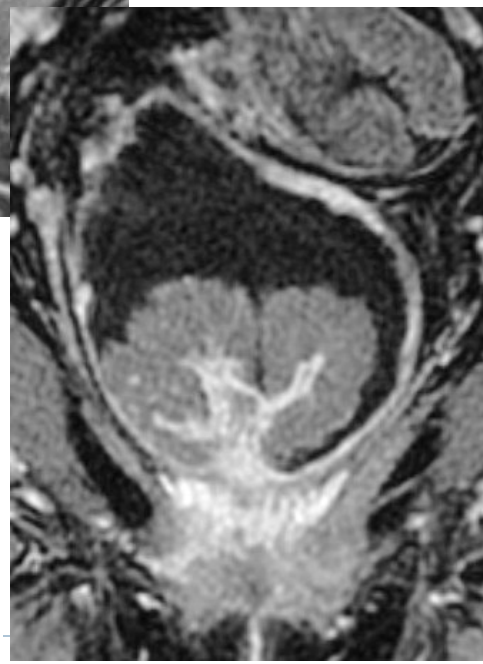


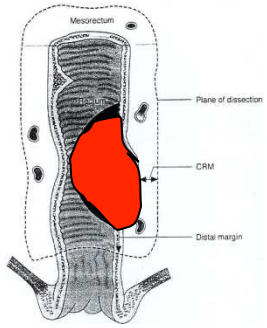
Caractéristiques morphologiques



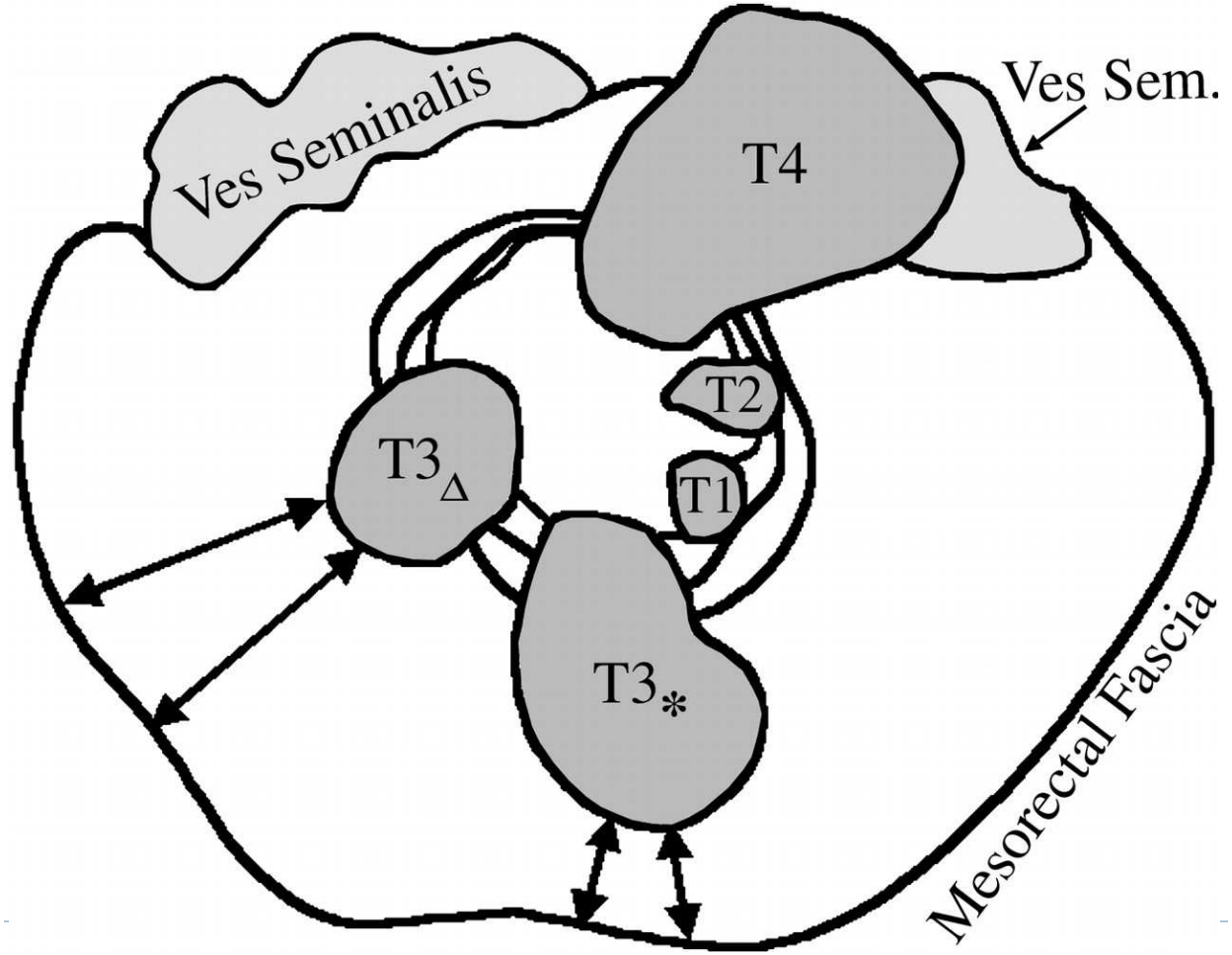


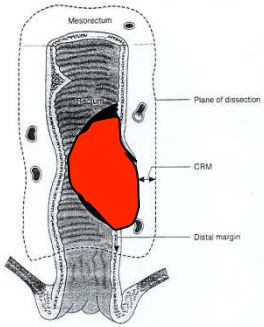




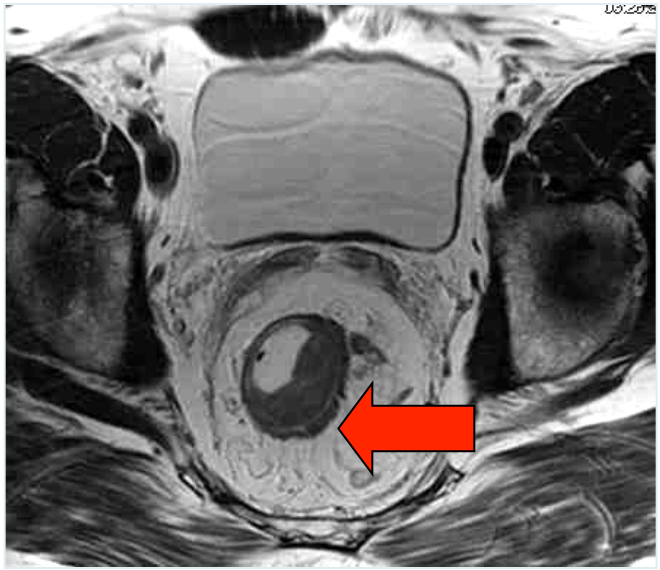


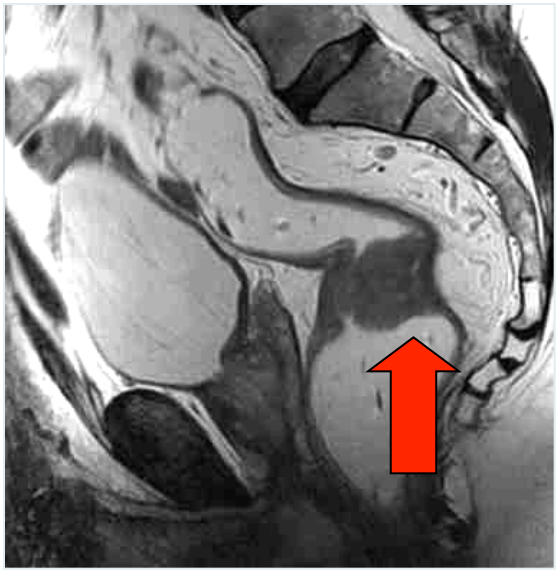
Degré d' infiltration pariétale : T staging

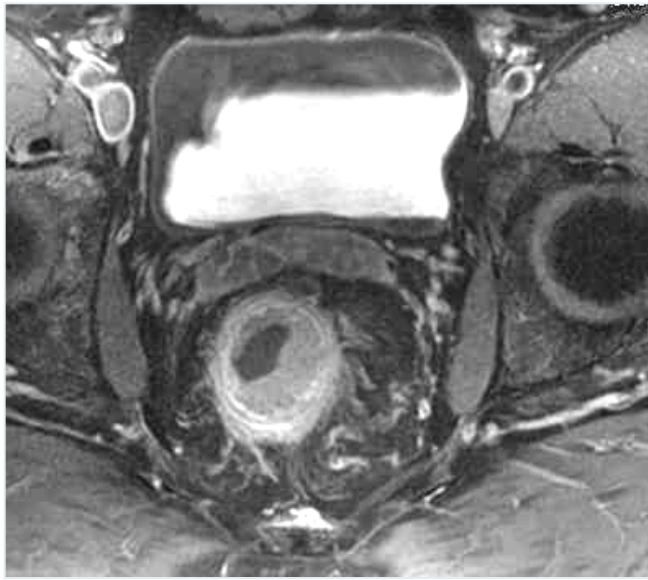




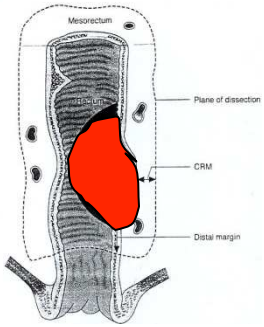
Degré d' infiltration pariétale : T staging



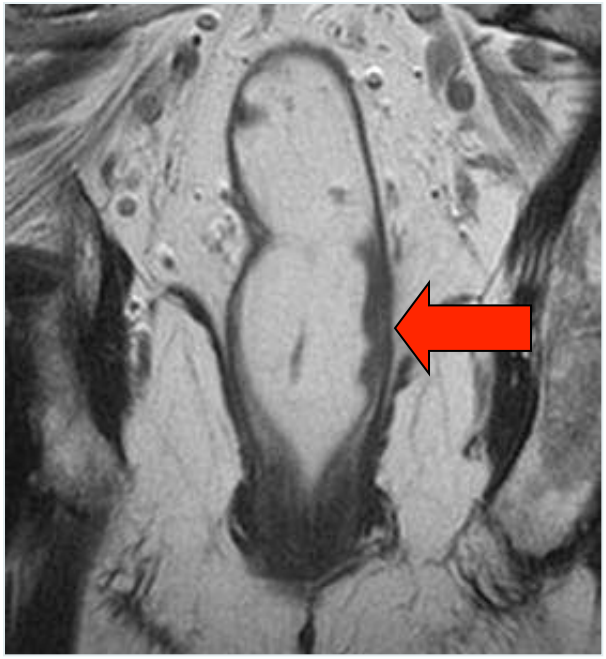


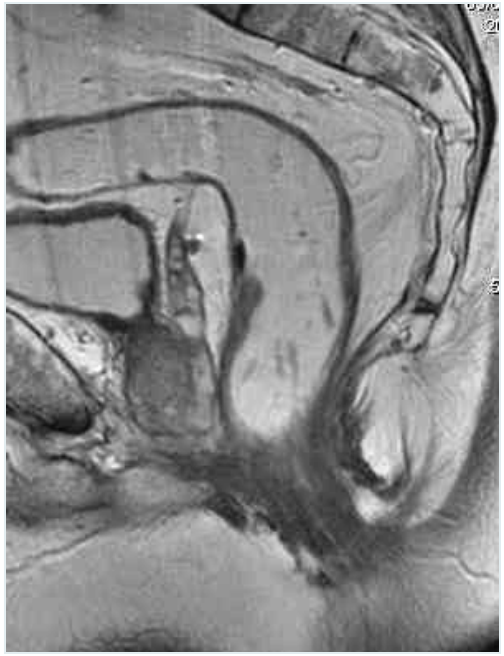


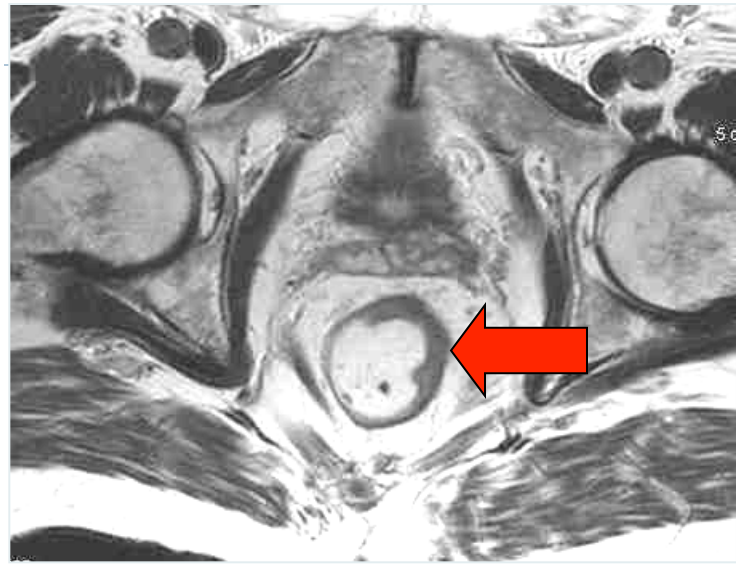
pT1 N0 Mx

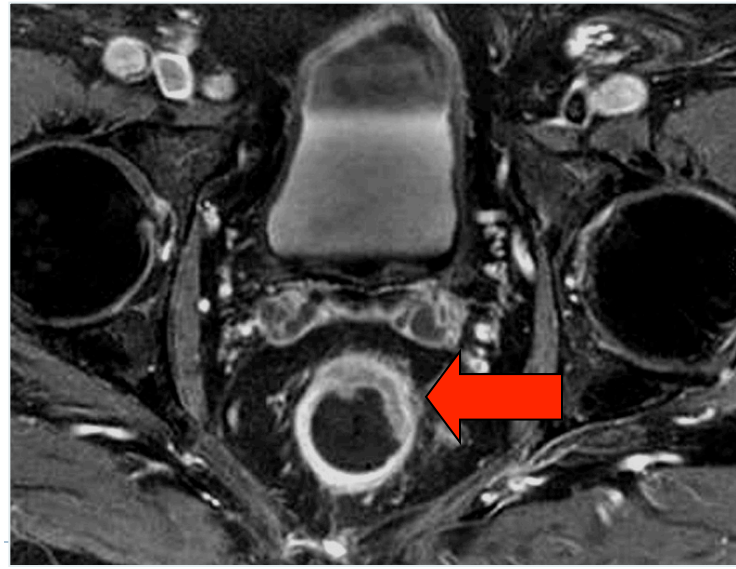


Degré d'infiltration pariétale : T staging

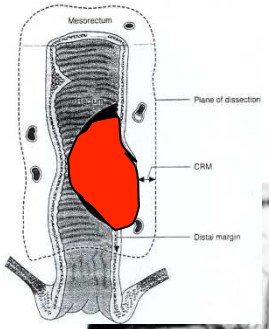


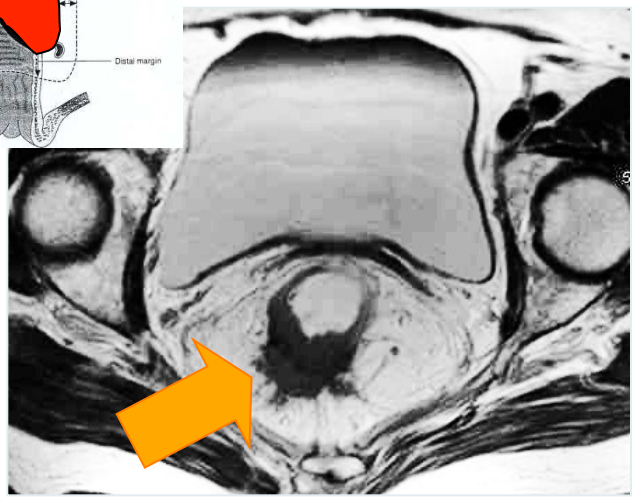




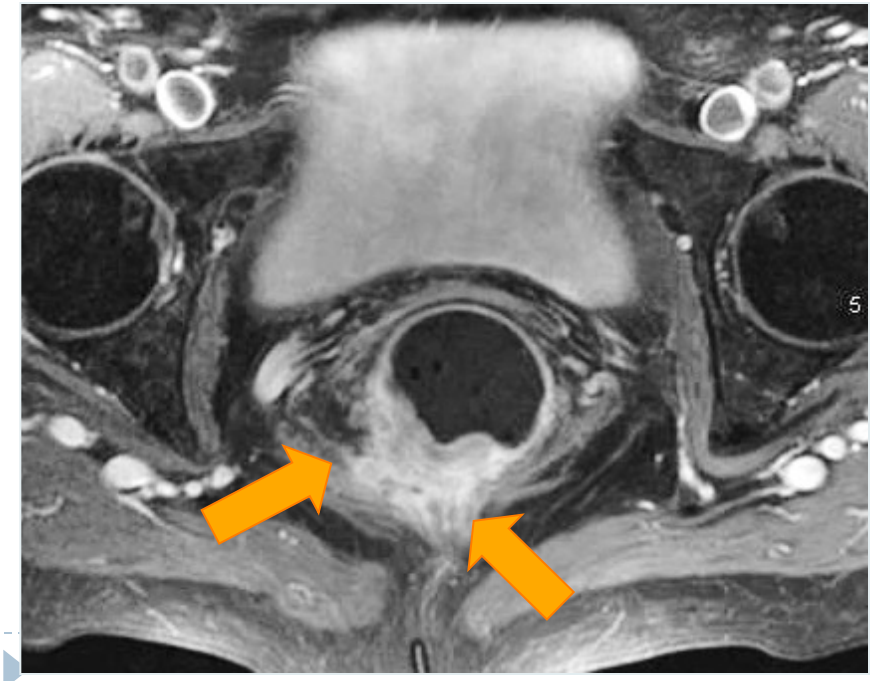


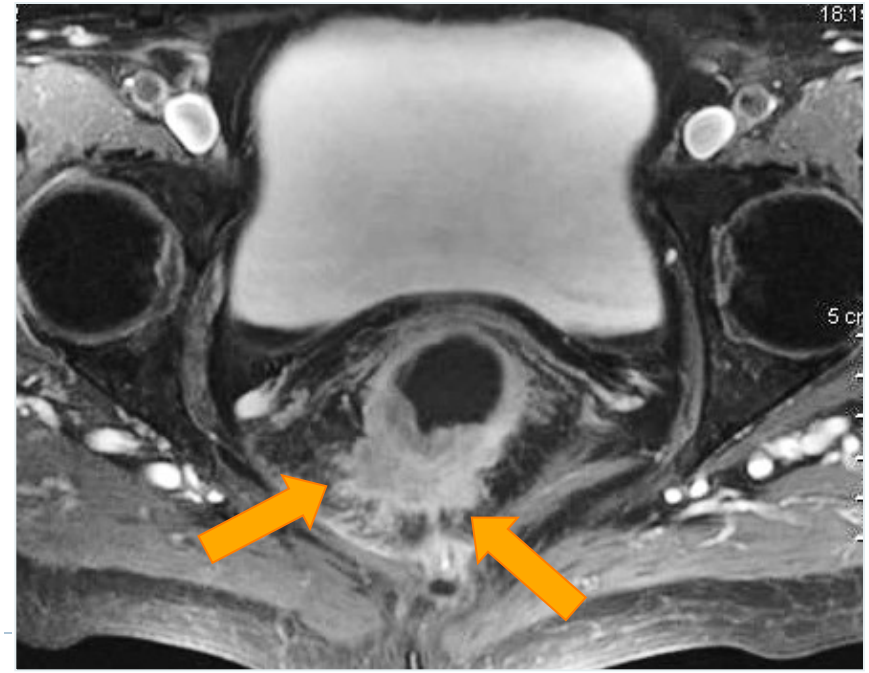
pT2 N0 Mx

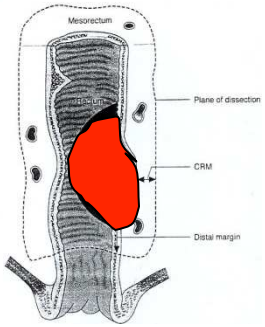




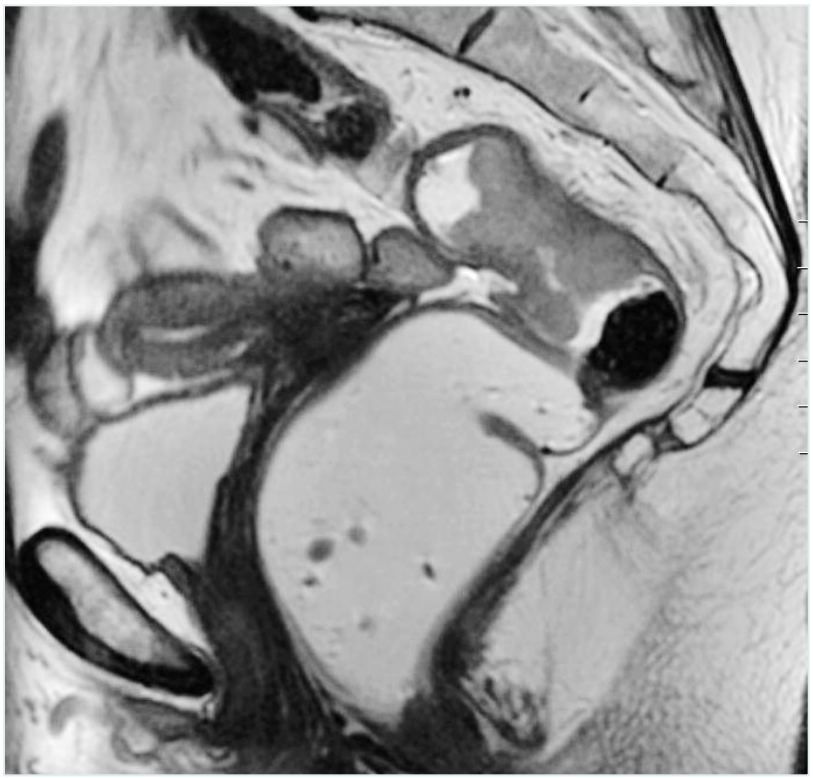
Degré d' infiltration pariétale : T staging

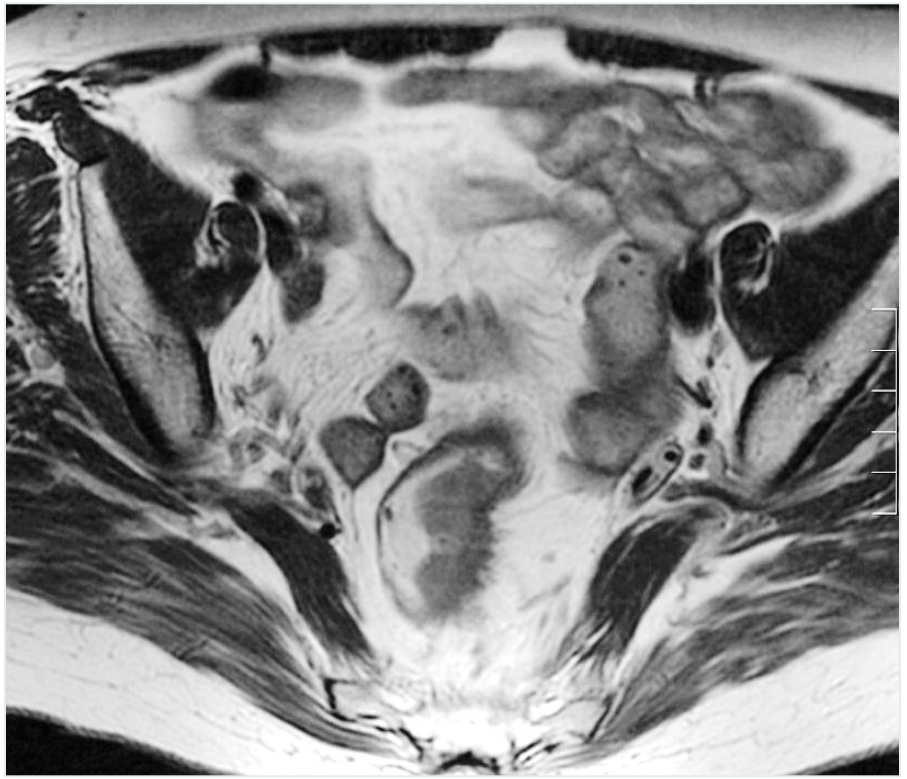






Degré d' infiltration pariétale : T staging





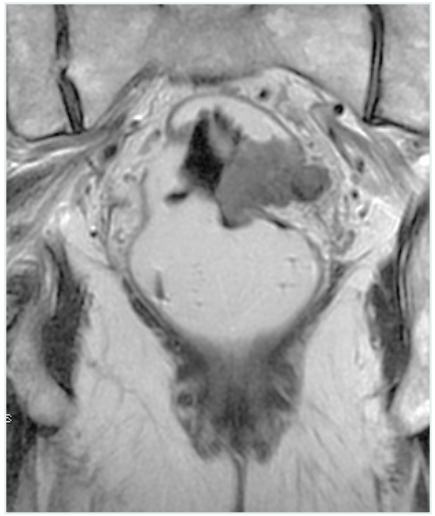
mT3

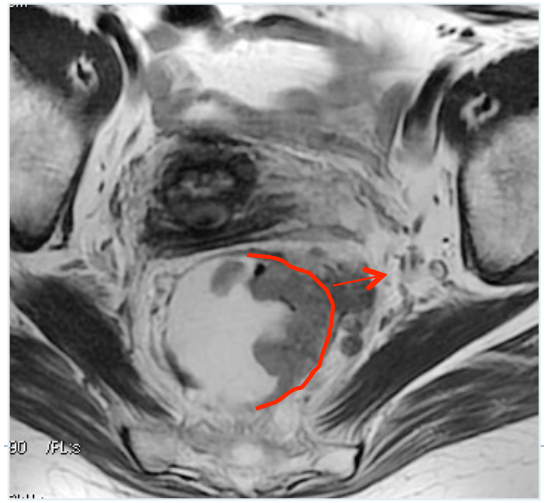
Mesure par rapport à la musculeuse

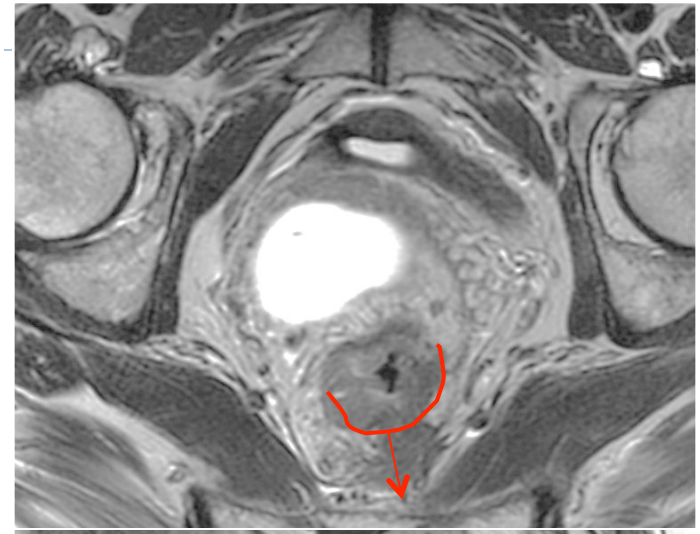
(Extramural spread)

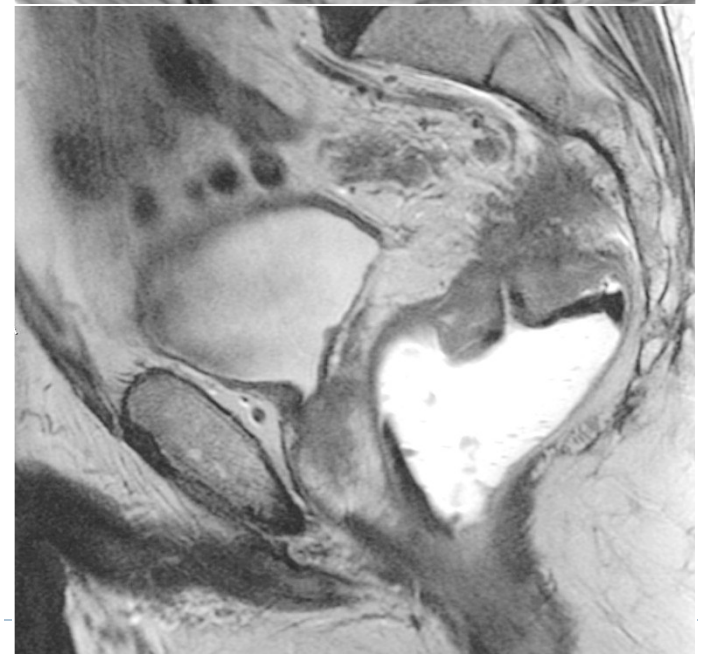
T3c >5-15 mm

T3d > 15 mm







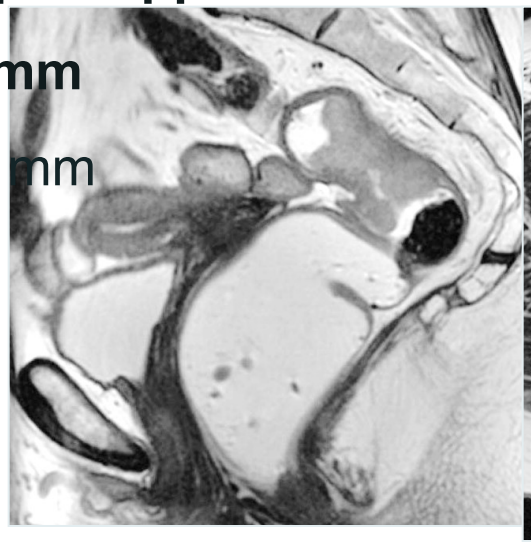


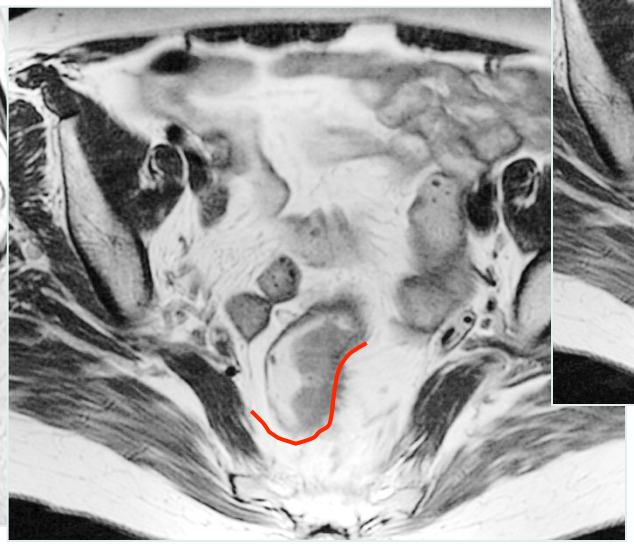
T3 faible

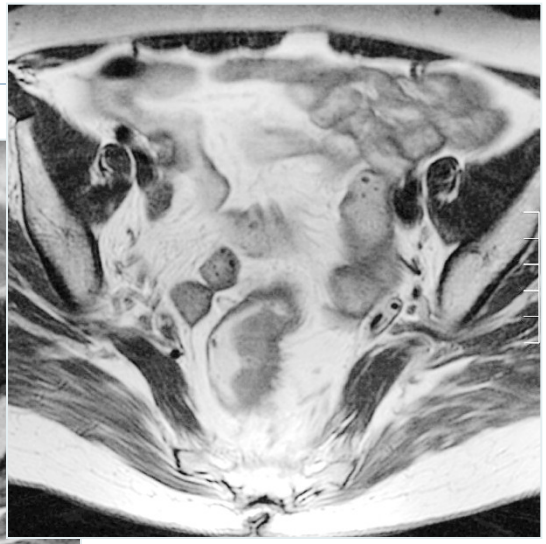
Mesure par rapport à la musculeuse

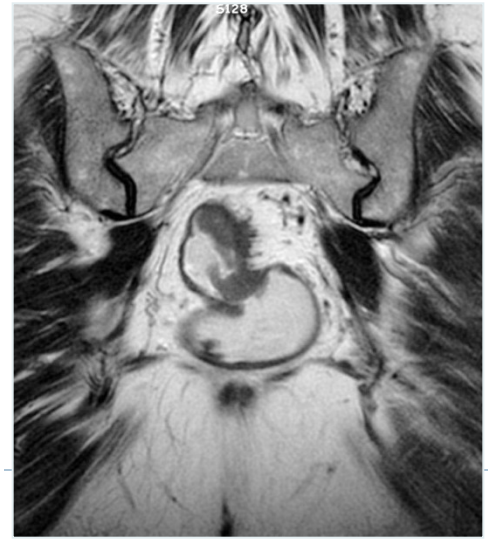
T3a < 1 mm

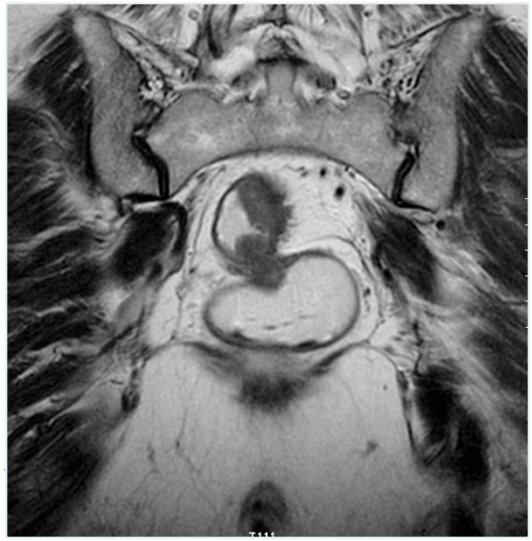
T3b 1-5 mm

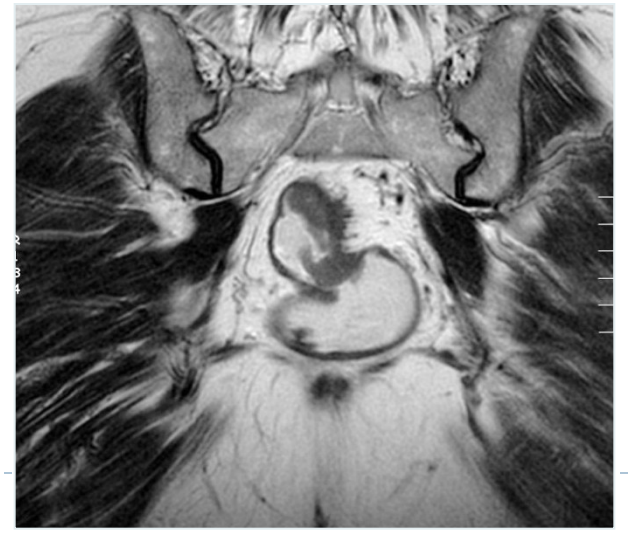


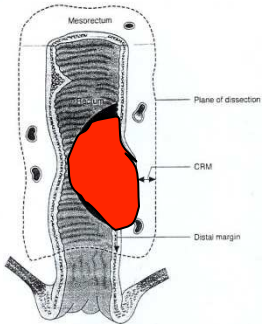






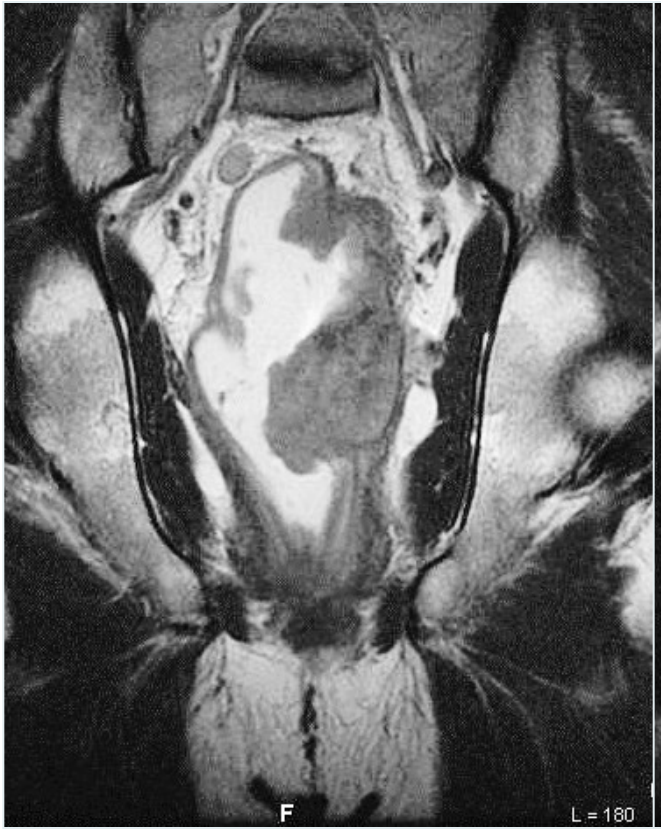


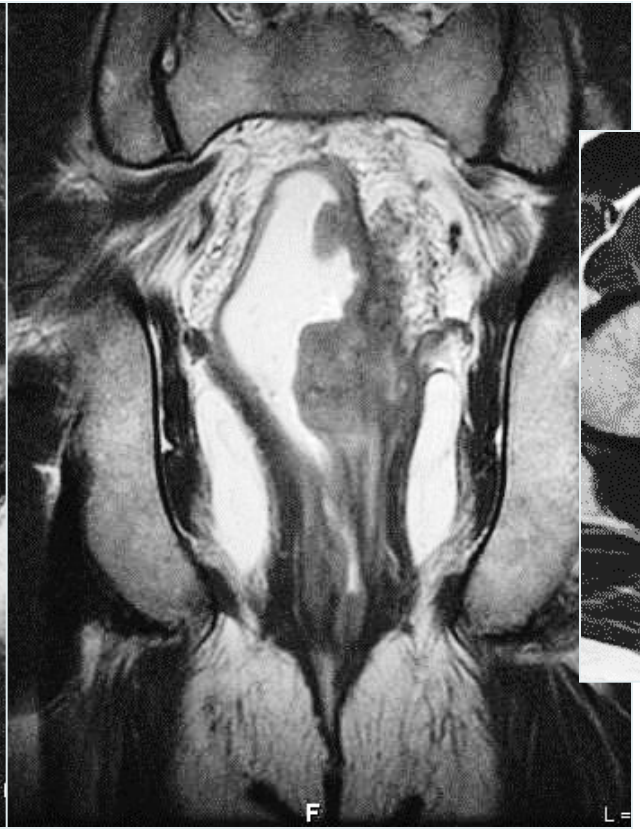


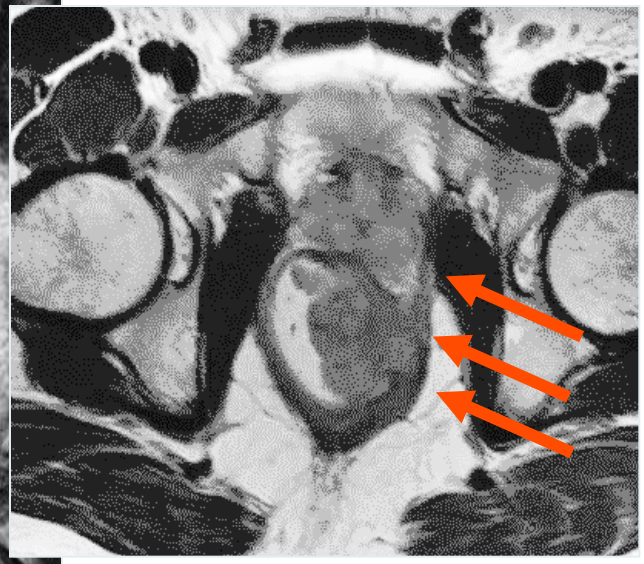


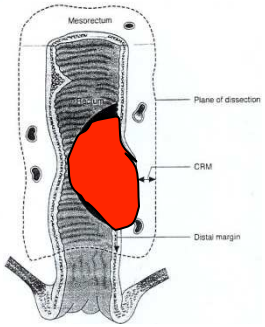
Degré d'infiltration pariétale : T staging

Extension releveurs de l'anus



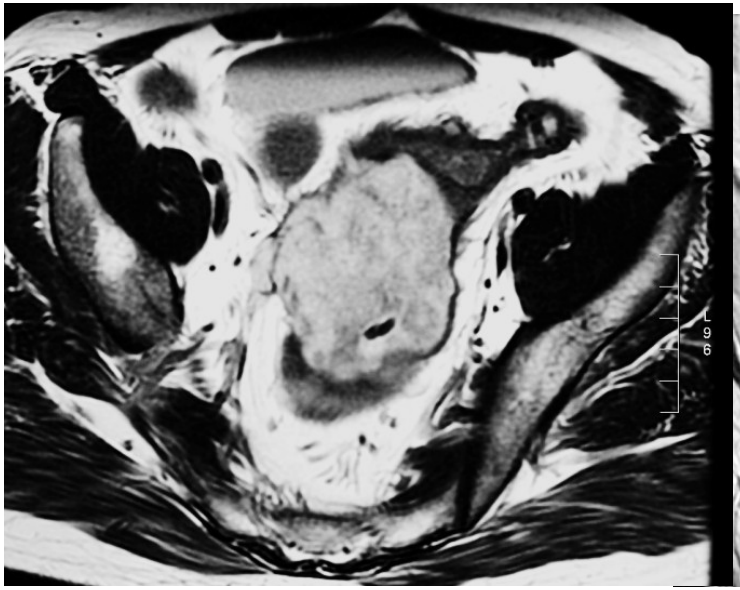


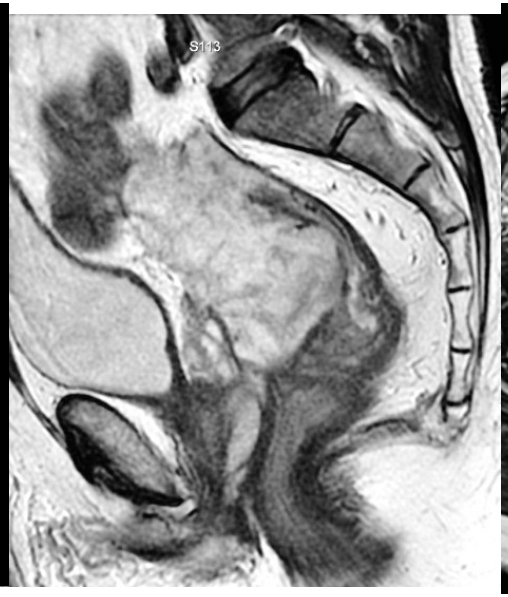


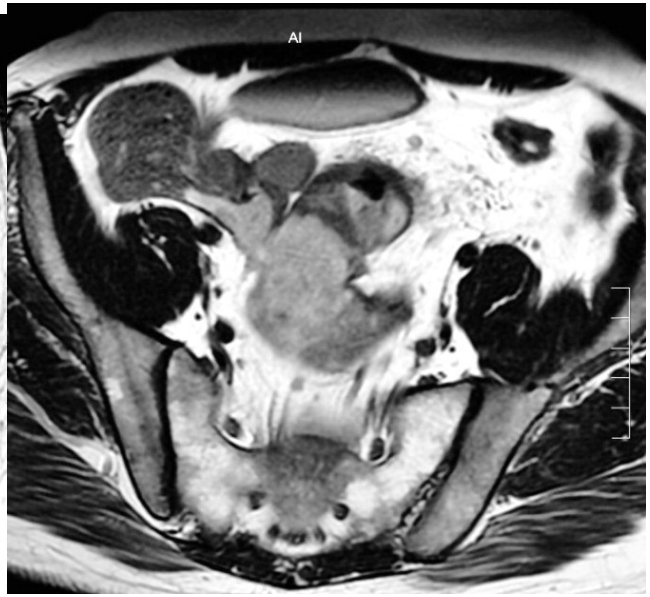


Degré d' infiltration pariétale : T staging

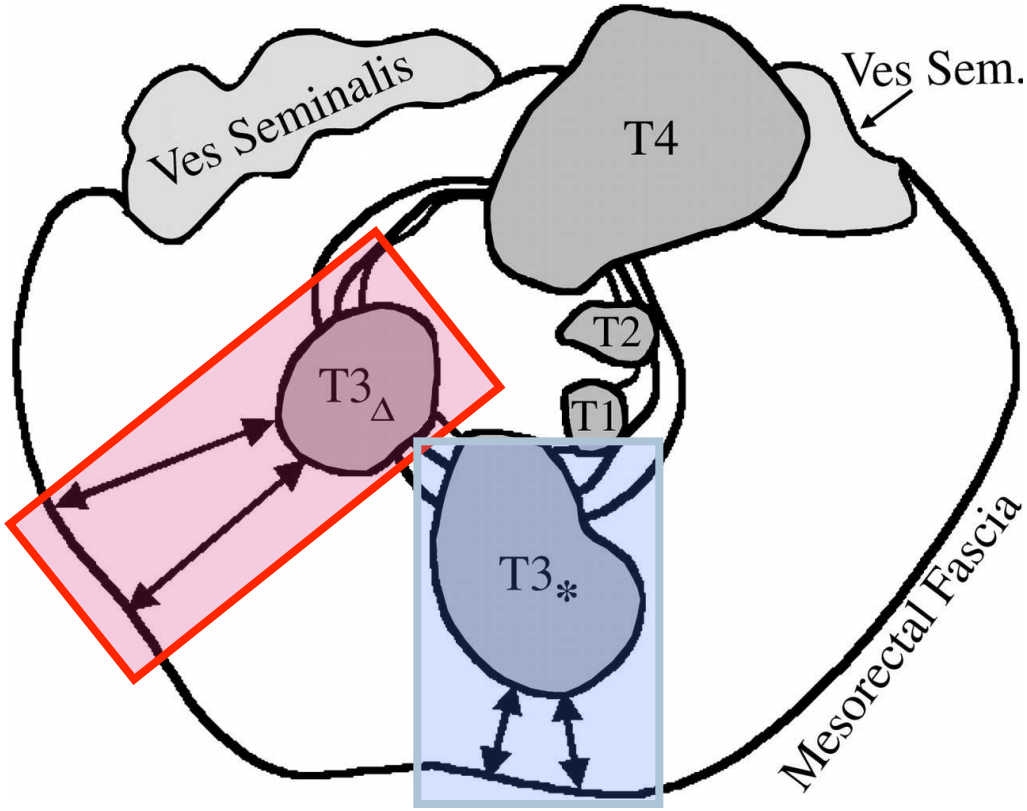
Extension à la dernière anse grêle



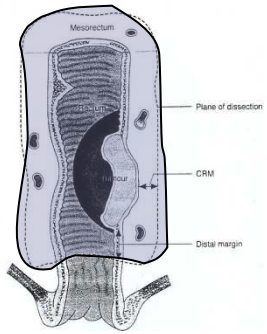




T-Stage et marges latérales de résection



Beets-Tan RG, Beets G. Radiology 2004 ; 232 : 335-346

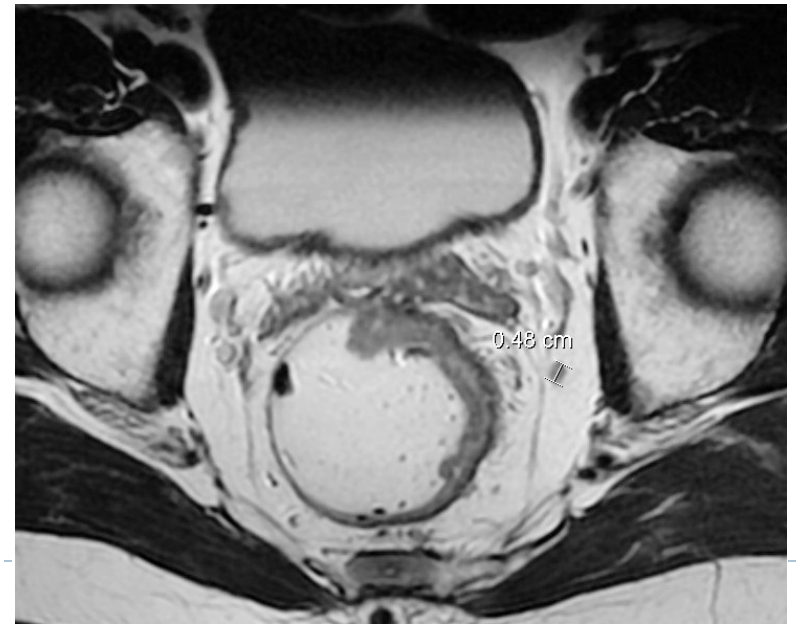


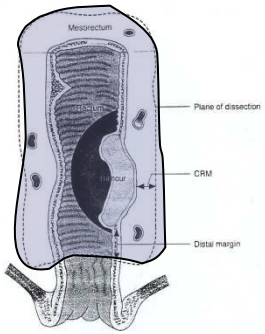
Marges latérales de résection

Identifier le fascia recti

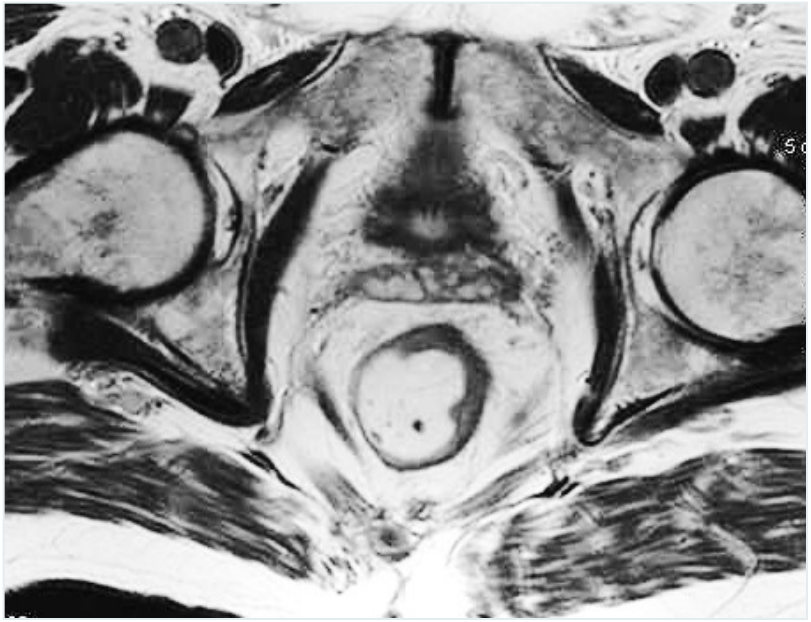
- Evaluer la distance la plus courte entre tumeur et fascia

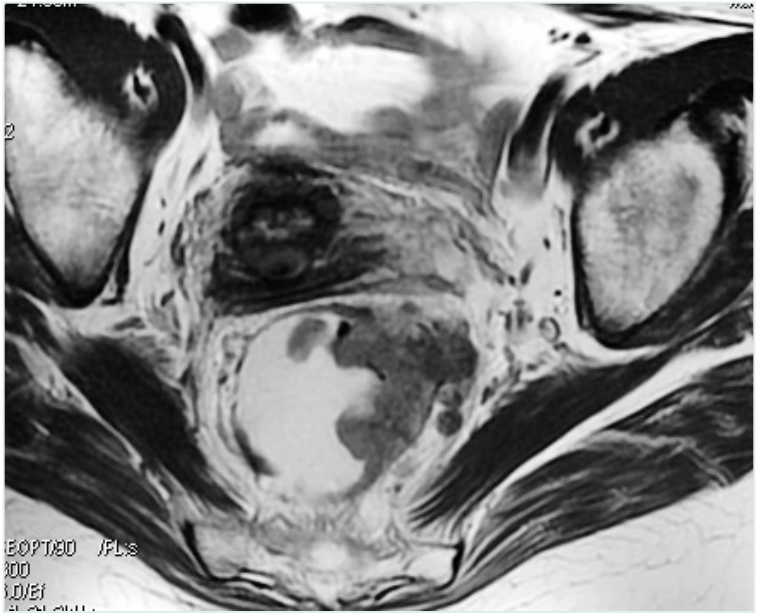
Beets-Tan RG, Beets GL, Vliegen RF et al. Accuracy of Magnetic Resonance Imaging in Prediction of Tumor-free Resection Margin in Rectal Cancer Surgery. Lancet 2001 ; 17 : 497-504





Marges latérales de résection

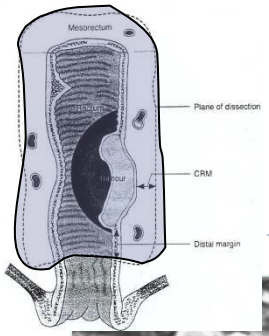




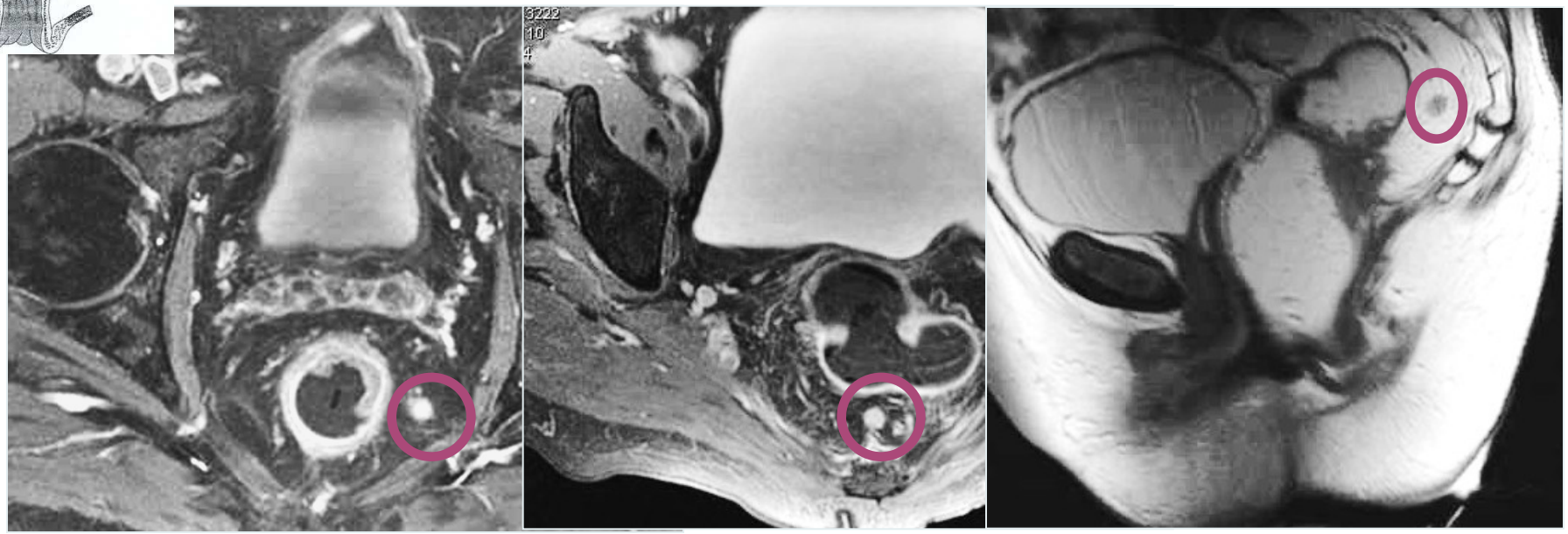
latérales : 5 mm

Correspond en Anapath = 1 mm

- Beets-Tan RG, Beets GL, Vliegen RF et al. Accuracy of Magnetic Resonance Imaging in Prediction of Tumor-free Resection Margin in Rectal Cancer Surgery. Lancet 2001 ; 17 :

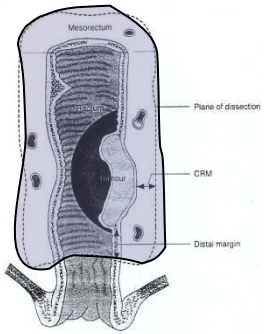


Statut ganglionnaire : détection et caractérisation



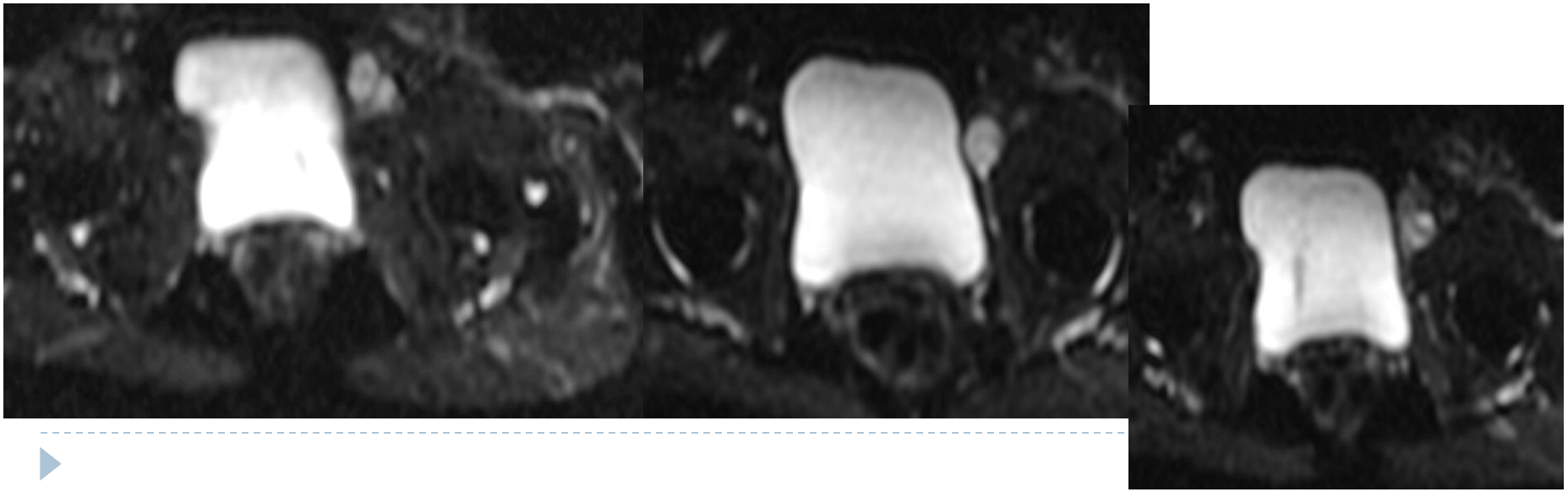
Bellin MF, Roy C, Kinkel K et al. Lymph nodes metastases. Safety and effectiveness of MR Imaging with ultrasmall superparamagnetic iron oxide particles-Initial Clinical Experience.Radiology 1998 , 207 : 799-808.
Bellin MF, Beigelman C, Precetti-Morel S et al. Iron Oxyde –enhanced MR lymphography : initial experience. Eur J radiol 2000; 34 : 257-264.
Bipat S, Glas A, Slors et al. Radiology 2004; 232 : 773-783. Rectal Cancer : Local Staging and Assessment of Lymph Node Involvement with endoluminal US, CT and MT Imaging – A Meta-Analysis

Limites : -Critères morphologiques insuffisants (taille, contours)
Gde taille : diag.différentiel ADP infl./ADP métastatiques
Petite taille : micrométastases



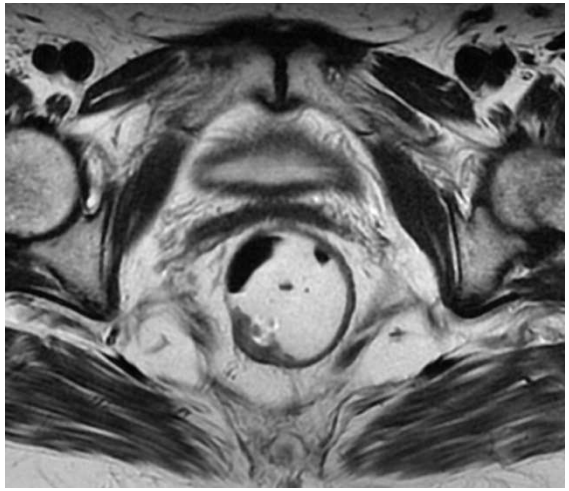
Statut ganglionnaire : détection et caractérisation

- Séquence de diffusion ???
  - **Détection : OUI**
  - **Caractérisation de leur probable envahissement : NON**

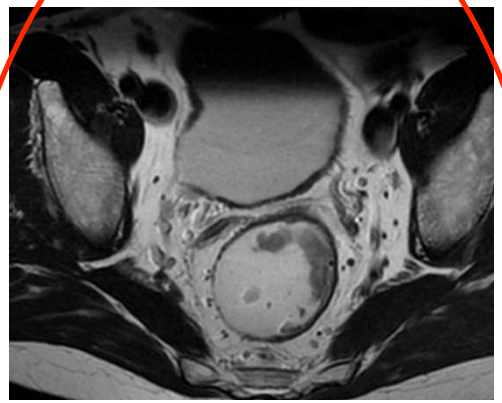


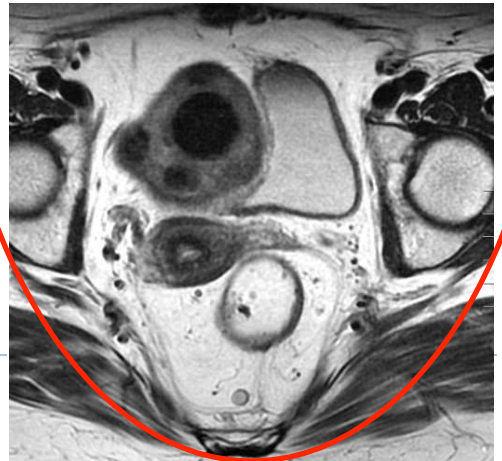
Statut ganglionnaire

Pas de ganglion

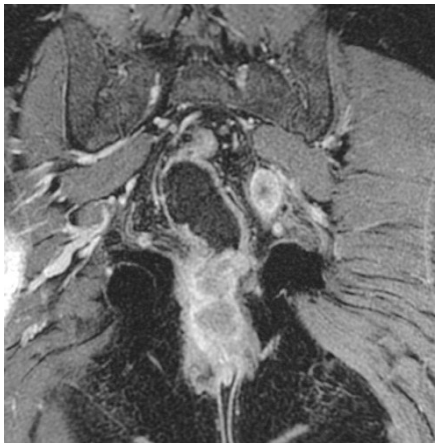


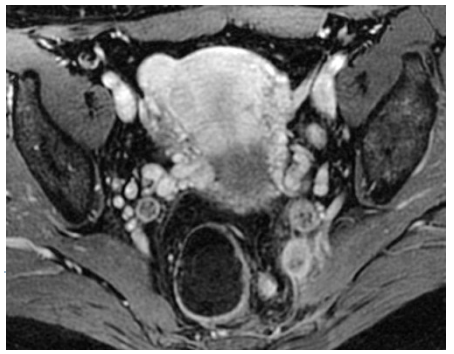
GG ou ADP



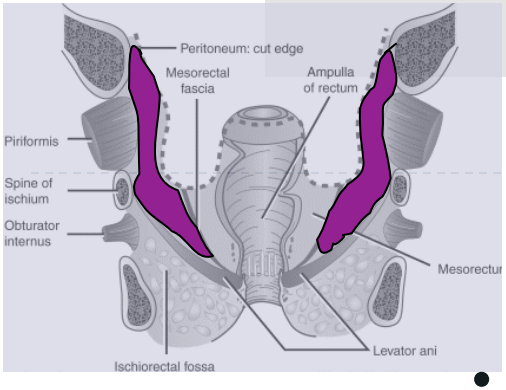


ADP très suspectes





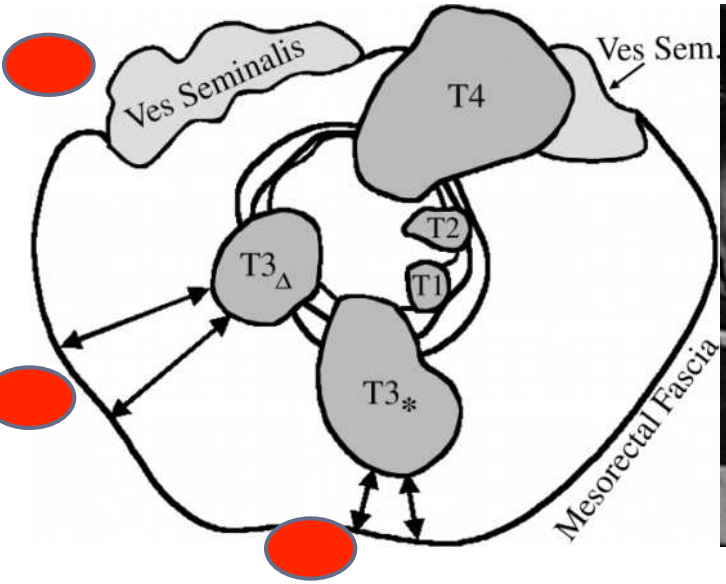
3. Espace extra Mésorectal

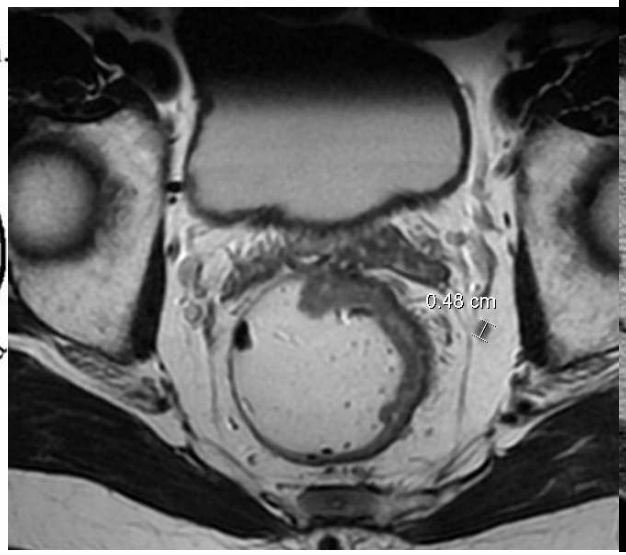


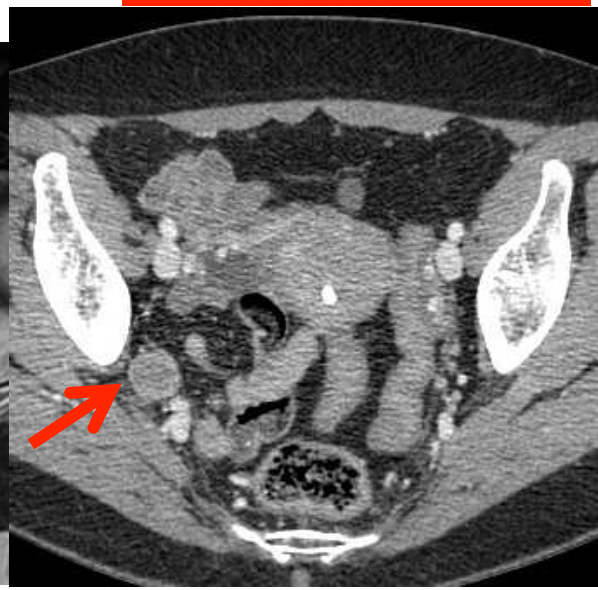
Statut ganglionnaire

- Décrire topographie exacte des ADP
- La plus haute située
- Dans l' espace extramésorectal

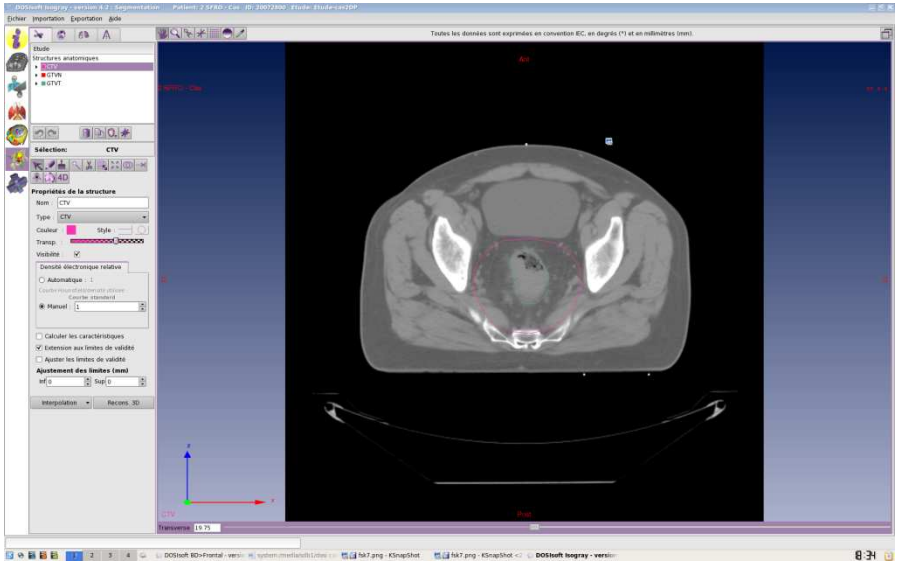
CAPITAL
les champs d' irradiation

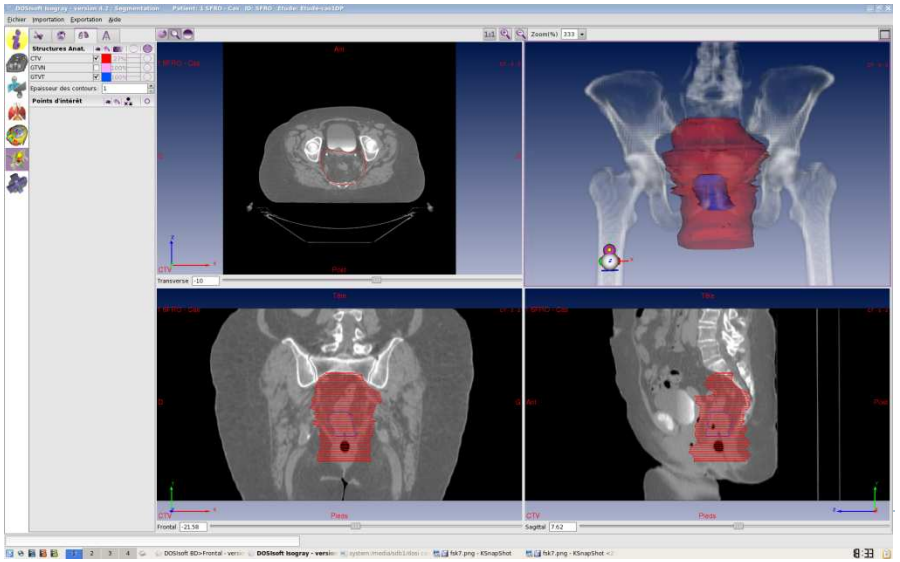


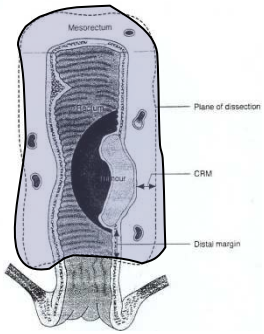




3. Espace extra Mésorectal

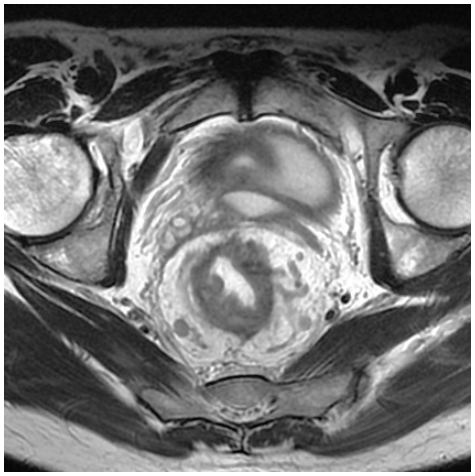


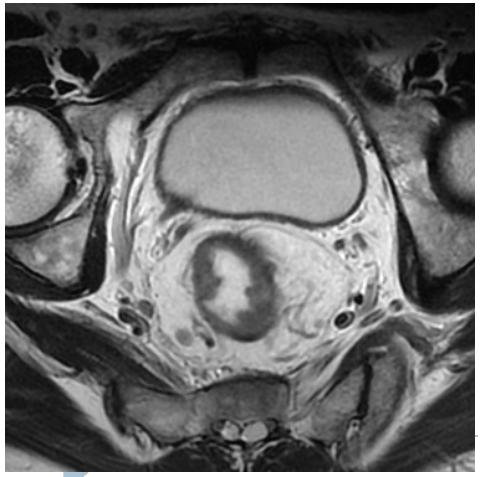


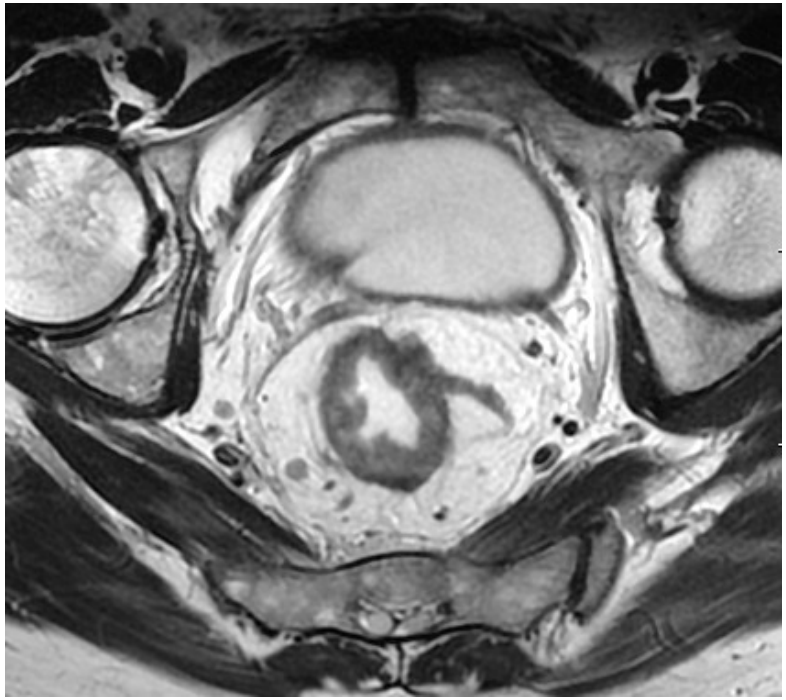


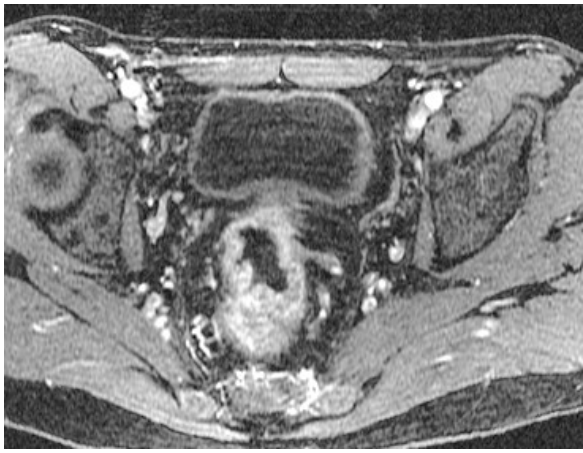
2. Mésorectum

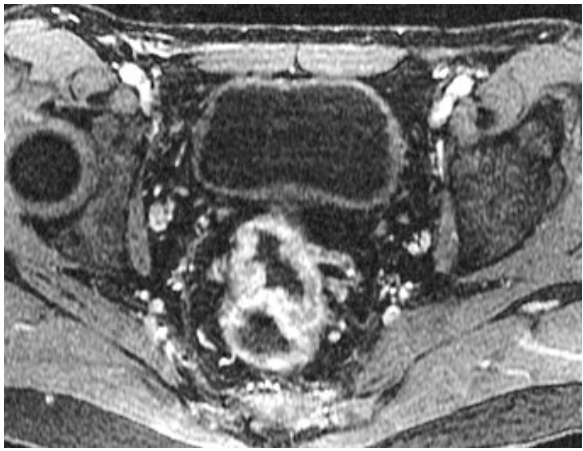
Invasion vasculaire périlésionnelle





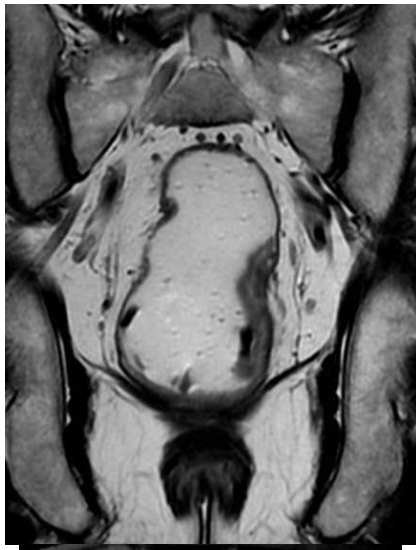


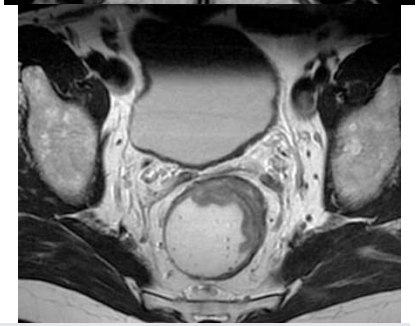




Trois situations différentes

T1-T2-N0



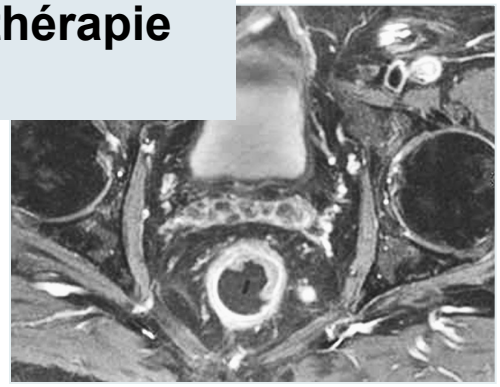


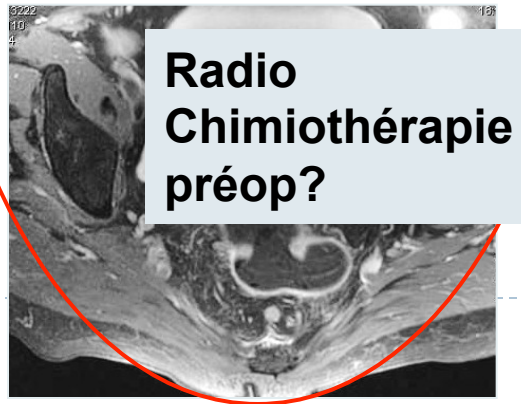
Pas de radio
Chimiothérapie

T2? / T3a/b ?

GG ? / ADP ?

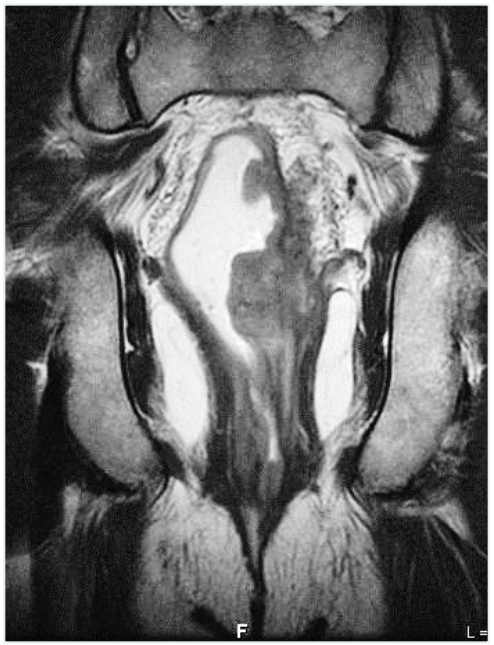
Pas de radio
Chimiothérapie
préop ?





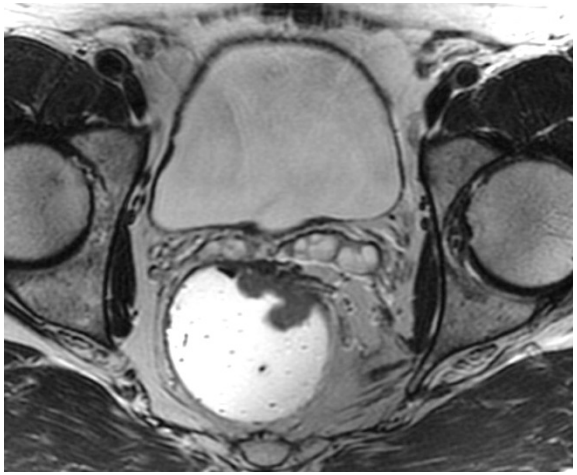
Radio
Chimiothérapie
préop?

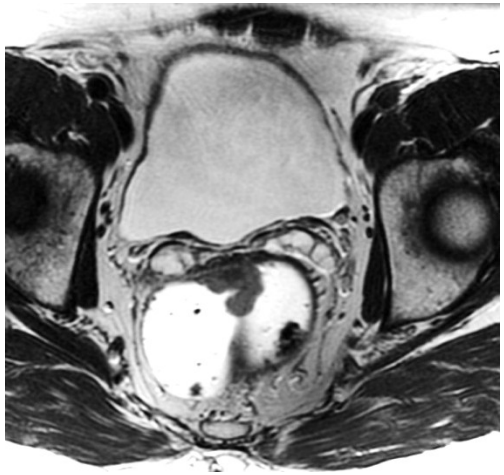
T3-T4

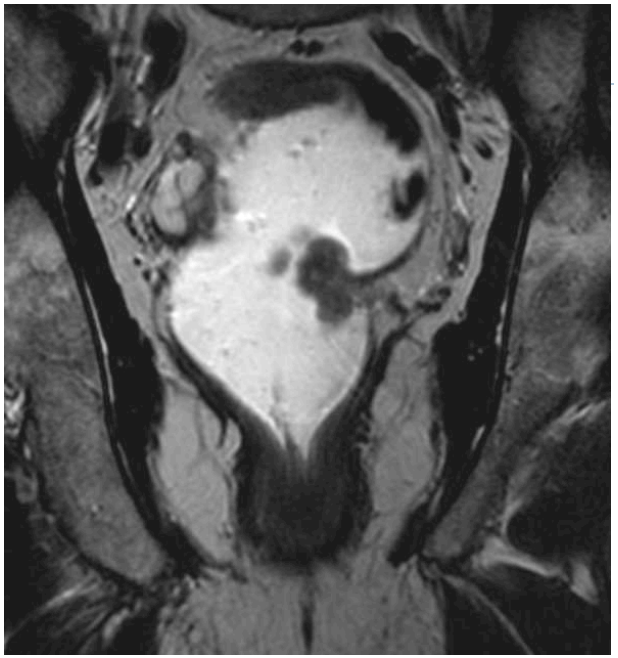


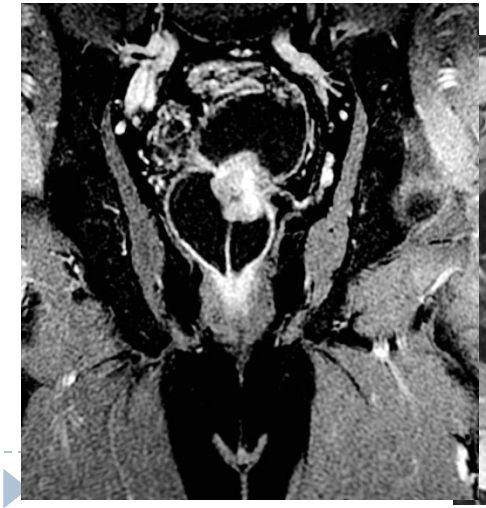
Radio
Chimiothérapie

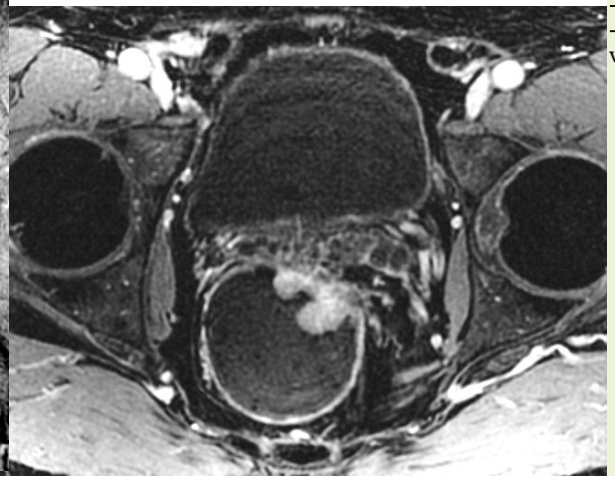
En pratique





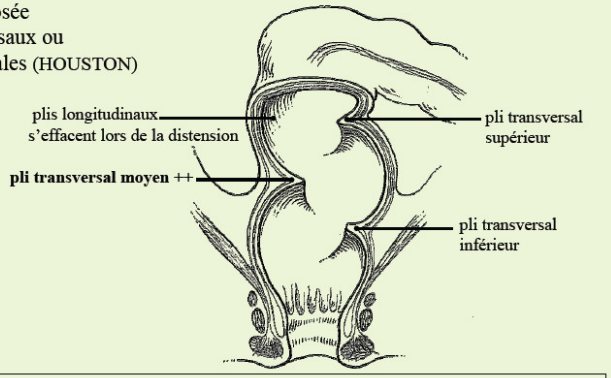






Ampoule rectale

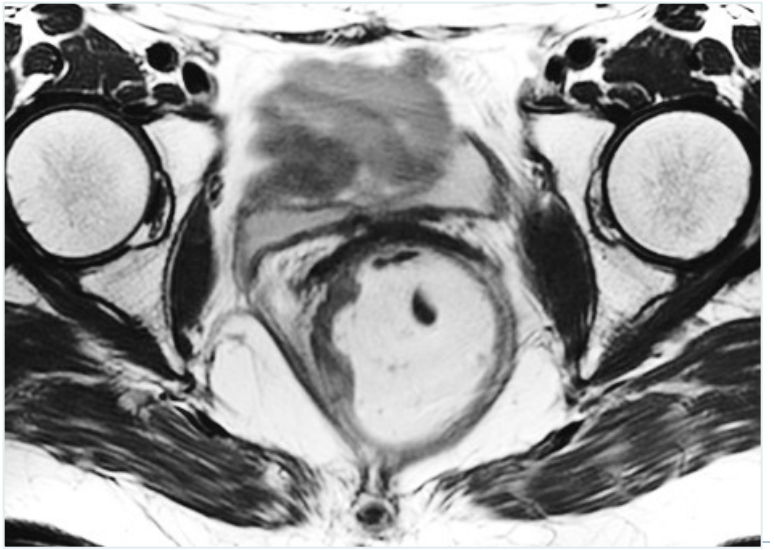
- muqueuse rosée
- plis transversaux ou valvules rectales (HOUSTON)

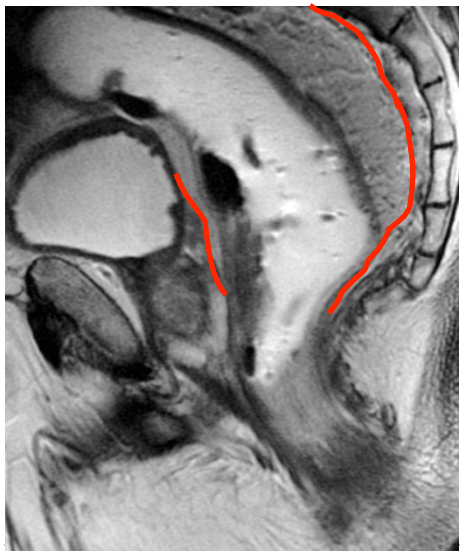


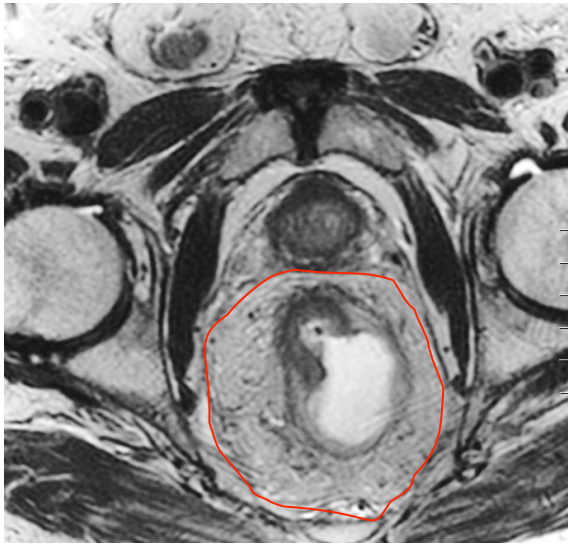
Endoscopie :
Le pli transversal moyen est le plus constant.
Il subdivise l'ampoule en partie haute supra-péritonéale distensible (dérive de l'intestin postérieur) et partie basse sous-péritonéale peu distensible (dérive de la région cloacale).

Cas particulier : interprétation cancers du bas rectum

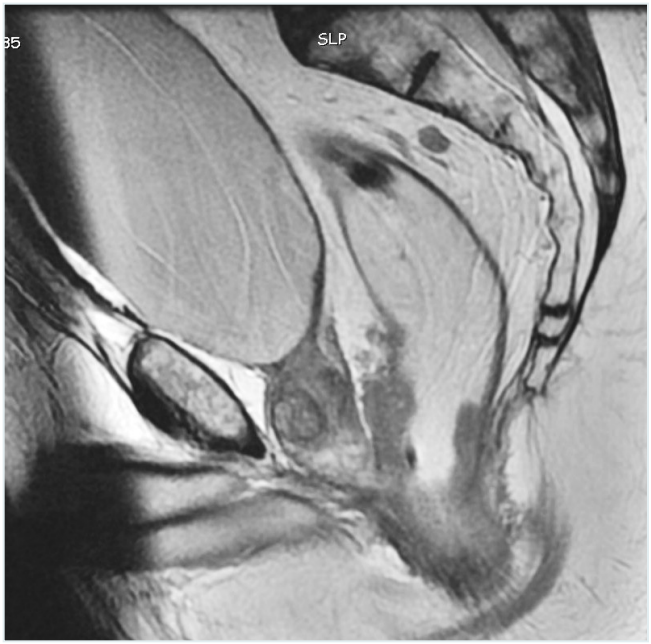
- Deux questions clés :
  - Atteinte sphincter interne ?
  - MLR : distances pour présager en IRM de l'envahissement du fascia recti ne sont pas adpatées car fascia recti antérieur proche de la paroi rectale **IRM après radiochimioT indispensable +++++**

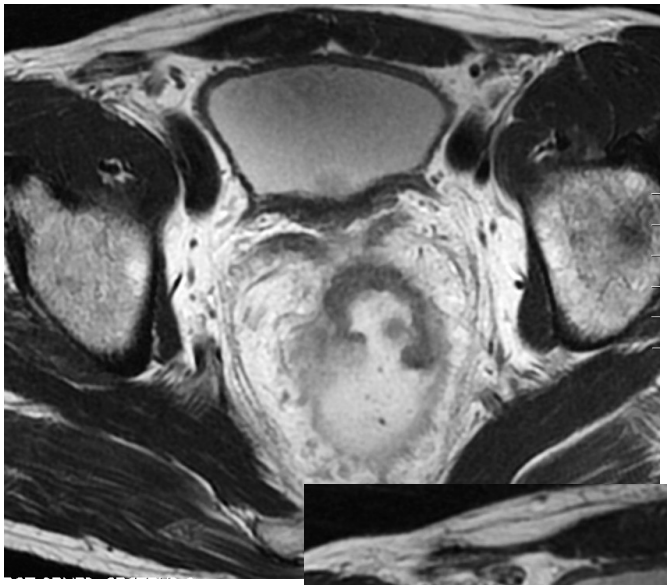


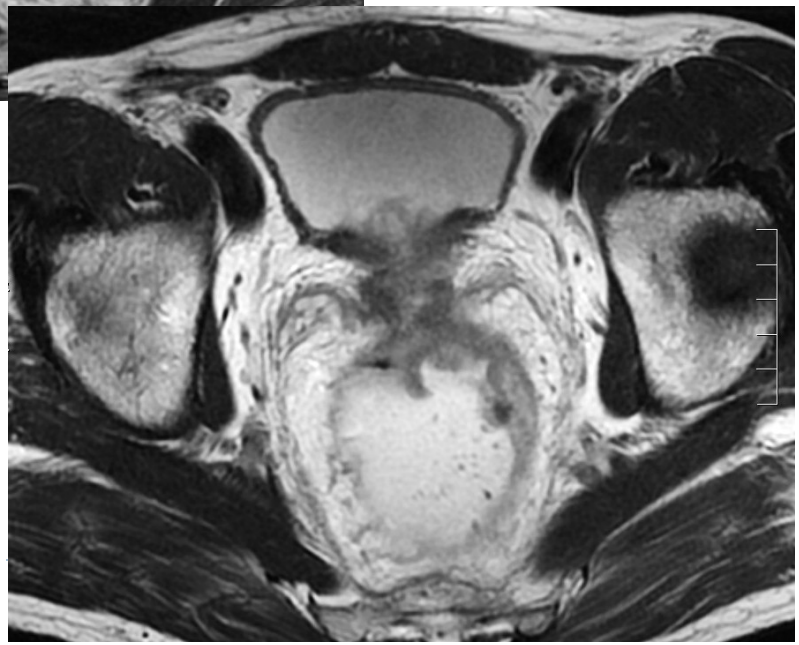




Cas particulier : interprétation cancers du bas rectum

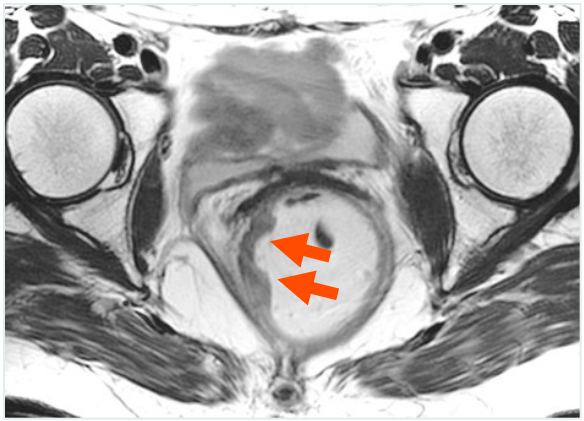




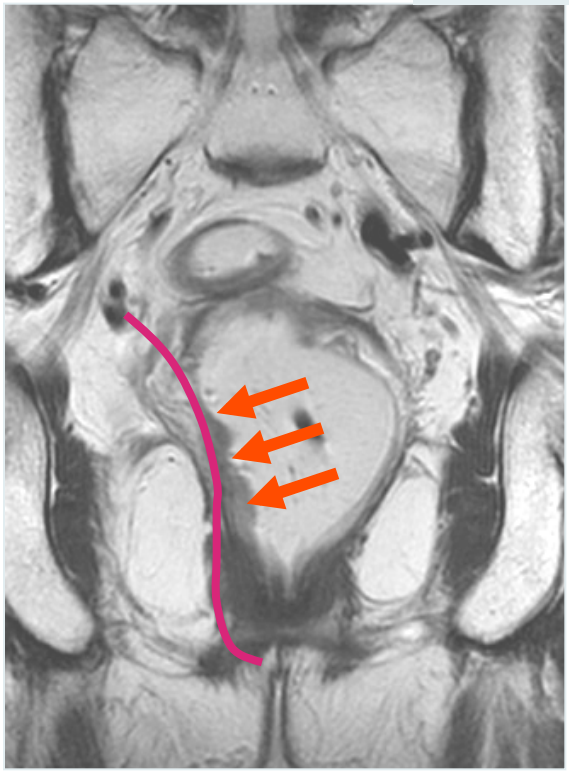


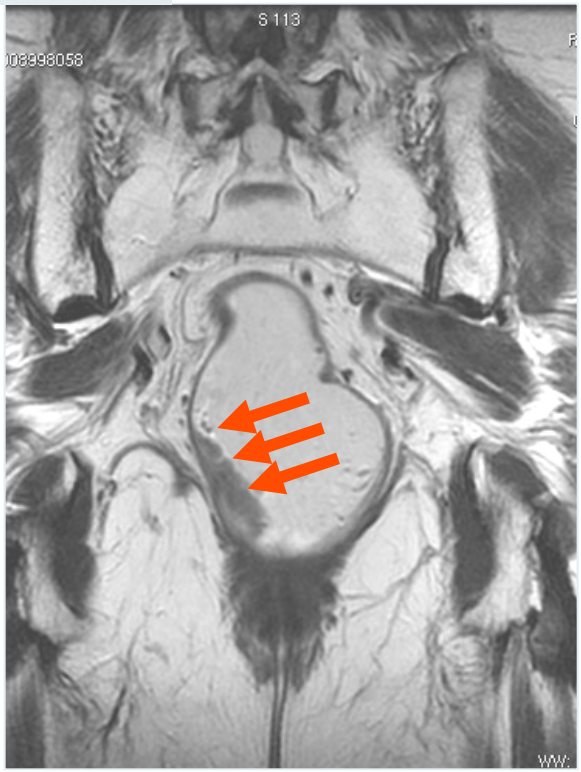
Cas particulier : interprétation cancers du bas rectum

Axiales



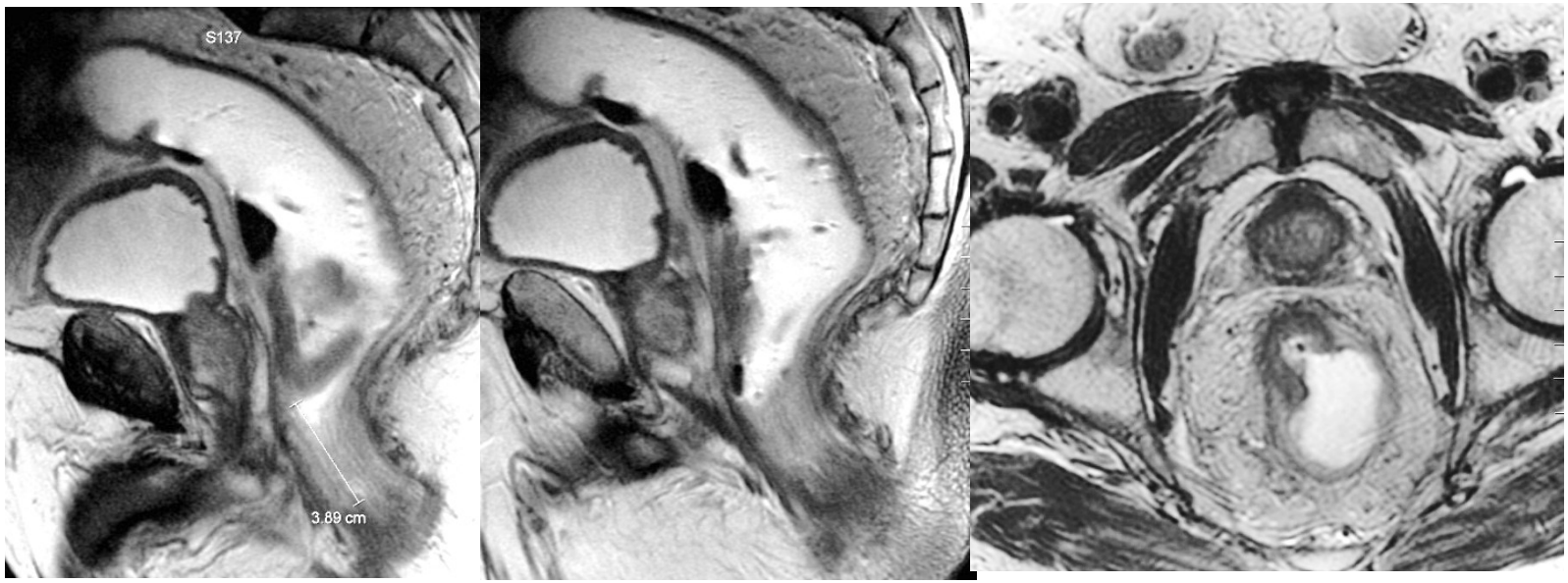
Frontales

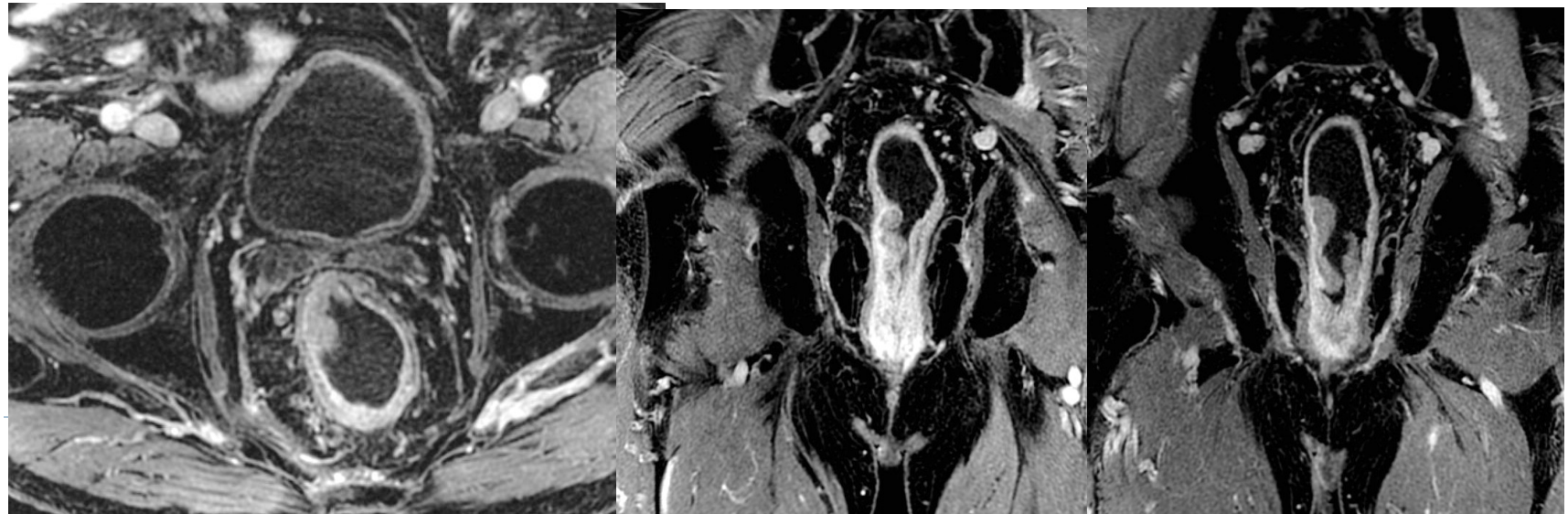




Holzer B, Urban M, Höbling N, Feil W, Novi G, Hruby W, Rosen H, Schiessel H. Magnetic resonance imaging predicts sphincter invasion of low rectal cancer and influences selection of operation. Surgery 2003, 133 : 656-661.

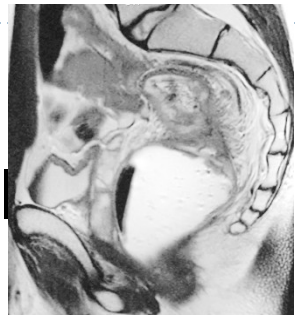
Cas particulier : interprétation cancers du bas rectum





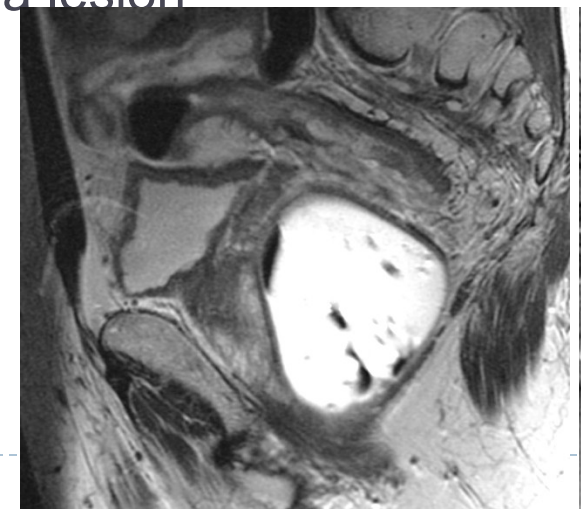
Réévaluation des tumeurs rectales par IRM après radiochimiothérapie

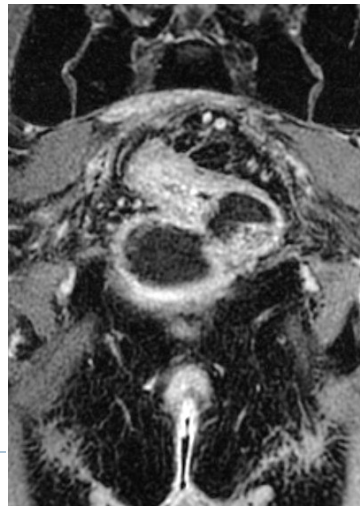
Aspects post RCT des tumeurs rectales



- Effets de la RCT sur les tumeurs rectal
  - Infiltration de la graisse mésorectale
  - Epaississement de la paroi rectale siégeant dans les champs d'irradiation
  - Réduction du volume tumoral
  - Réduction du volume tumoral étendu dans la graisse mésorectale

    Voire disparition complète de la lésion
  - Evolution des ADP :
    - Stables
    - Régression
    - Voire même disparition





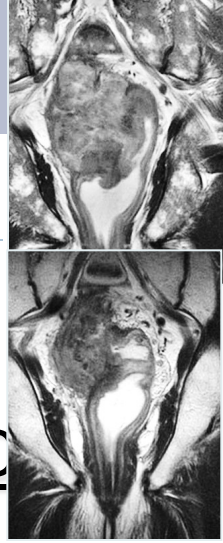
Connaître l'évolution post RCT, pourquoi ?

- Long term outcome in patients with a pathological complete response after chemoradiation for rectal cancer : a pooled analysis of individual patients data

  Maas et al Lancet Oncol 2010

- 27 articles
- 484/3105 patients : réponse complète
- **Survivants à 5 ans : RC 83,3%**
- Survivants à 5 ans: Pas de RC : 65,6%

Connaître l'évolution post RCT, pourquoi ?



Nouveaux concepts de stratégie thérapeutique

- Adapter le traitement chirurgical à la réponse post RC
  - Volumineuses lésions tumorales
  - Lésions tumorales proches du bas rectum
- Remettre en cause l'éxérèse totale du mésorectum pour les patients en réponse complète (CR)
  - Très controversé
- Adapter le traitement radiochimioT à la réponse d'un premier traitement d'induction
  - Etude phase II randomiséé
  - GRECCAR 4
  - Réévaluation volume tumoral après 4 cures de Folfirinox
    - Patients bons répondeurs/mauvais répondeurs

Connaître l'évolution post RCT, pourquoi ?

Nouveaux concepts de stratégie thérapeutique

- GRECCAR 4 (TTT à la carte), (Pr Ph Rouanet-CHU Montpellier)
  - Phase II randomisée
  - T3B , 4 cycles de Folfirinox
  - **Evaluation de la réponse tumorale à l'IRM**
    - Patient bon répondeur : réduction du volume tumoral de 75% àl'IRM
    - Bons répondeurs
      - CAP 50 et chir
      - Chir immédiate
    - Mauvais répondeurs : intensification du traitement
      - CAP 50 et chir
      - CAP 60 et chir

Connaître l'évolution post RCT, pourquoi ?

CA CANCER J CLIN 2012;00:000-000

Shifting Concepts in Rectal Cancer Management

A Review of Contemporary Primary Rectal Cancer Treatment Strategies

Lauren Kosinski, MD, MS[1]; Angelita Habr-Gama, MD, PhD[2]; Kirk Ludwig, MD[3]; Rodrigo Perez, MD, PhD[4]

The management of rectal cancer has transformed over the last 3 decades and continues to evolve. Some of these changes parallel progress made with other cancers: refinement of surgical technique to improve organ preservation, selective use of neoadjuvant (and adjuvant) therapy, and emergence of criteria suggesting a role for individually tailored therapy. Other changes are driven by fairly unique issues including functional considerations, rectal anatomic features, and surgical technical issues. Further complexity is due to the variety of staging modalities (each with its own limitations), neoadjuvant treatment alternatives, and competing strategies for sequencing multimodal treatment even for nonmetastatic disease. Importantly, observations of tumor response made in the era of neoadjuvant therapy are reshaping some traditionally held concepts about tumor behavior. Frameworks for prioritizing and integrating complex data can help to formulate treatment plans for patients. CA Cancer J Clin 2012;000:000-000. ©2012 American Cancer Society.

TTT à la carte : rechercher réponse complète et proposer autre stratégie fonction des données sur l'IRM de réévaluation

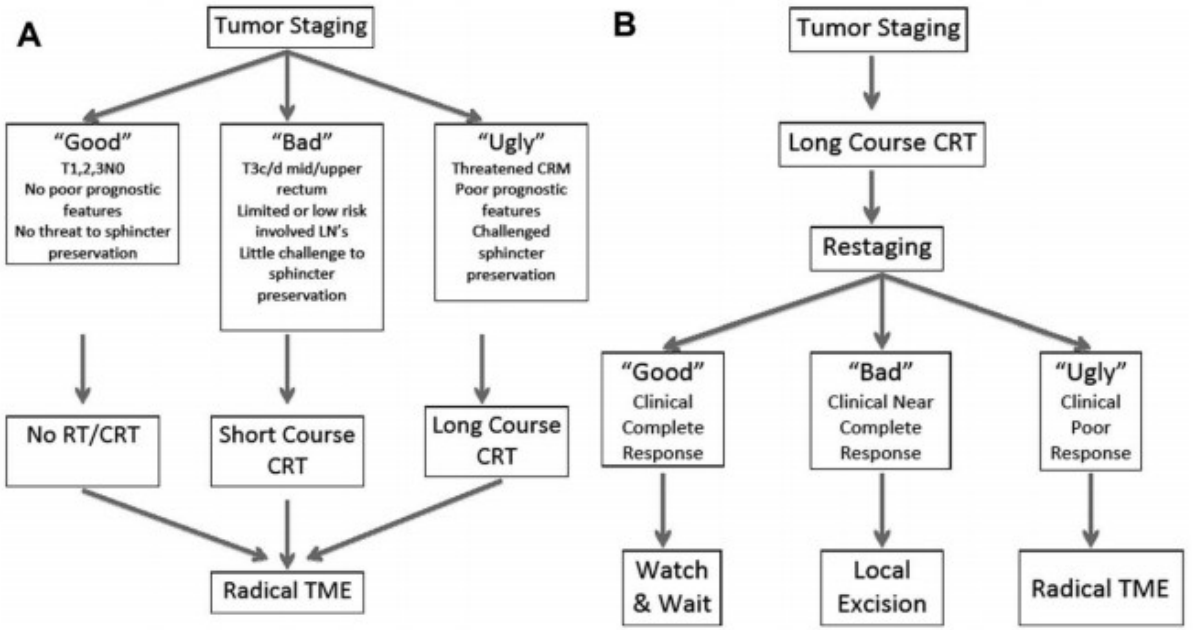
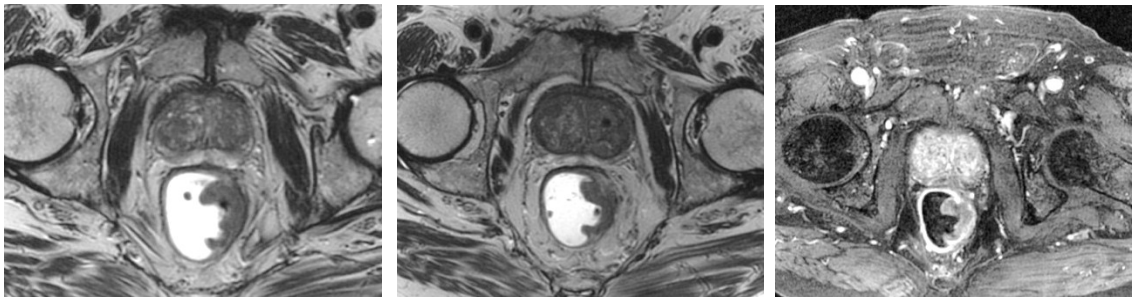


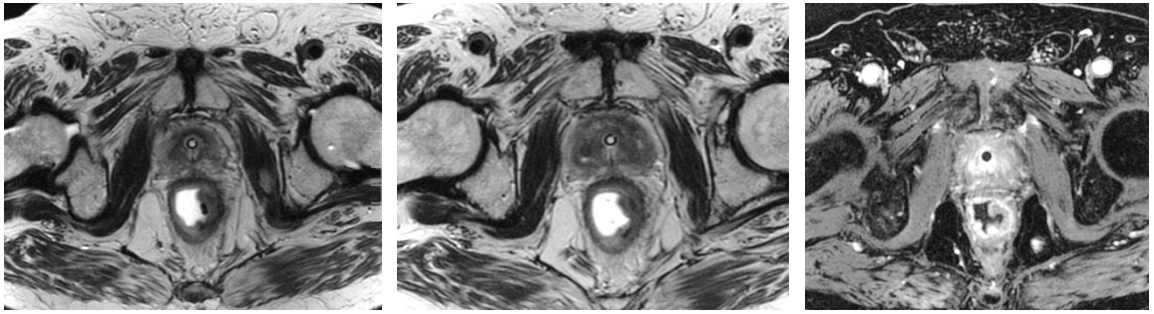
FIGURE 10. "The Good, the Bad and the Ugly." (A) Selection of neoadjuvant regimen. (B) Selection of surgical approach. LNs indicates lymph nodes; CRM, circumferential (radial) resection margins; RT, radiation therapy; CRT, chemoradiation therapy; TME, total mesorectal excision.

Comment faire contrôle post RCT ?

- Même imageur
- Disposer de l'imagerie initiale préRCT
- Mêmes séquences (avec imagerie de diffusion)
- **Délai** : 6 à 8 semaines après fin de la RCT

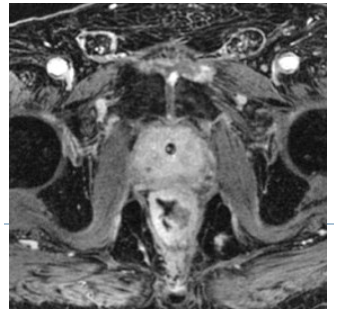


12/2011



Fin de la RCT
02/2012

Date IRM :
04/03/2012



Date IRM
04/2012

Critères pour l'évaluation de la réponse ?

- Critères qualitatifs : morphologiques
- Critères quantitatifs : volumétriques (RECIST)
- Critères fonctionnels : Diffusion et perfusion (peu répandus avec résultats très aléatoires)

Critères pour l'évaluation de la réponse

- Réponse :
  - **Répondeur** :
    - **Dowstaging**
      - Diminution du stade T ou N par rapport au prétraitement
        - T3 T2
        - N1 N0
      - Réponse complète ypCR = ypT0N0
    - **Dowsizing** :
      - Diminution en volume
  - **Non répondeur**
    - Stabilité, voire progression

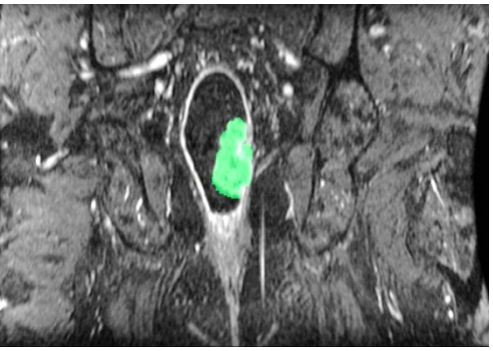
Critères pour l'évaluation de la réponse

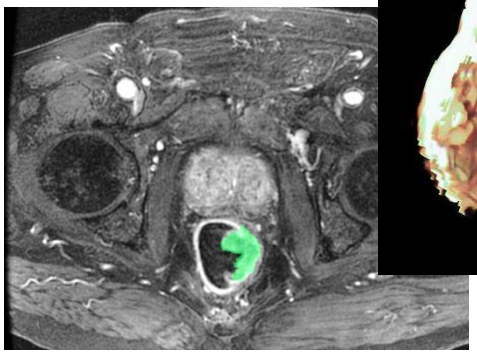
- **Critères morphologiques**
  - Disparition de la tumeur
  - Remplacement de la tumeur par du tissu en hyposignal T2

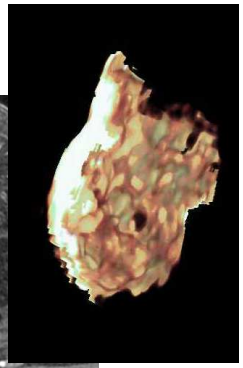
    - **Résultats médiocres**
      - Bcp d'overstaging
        - Surestimation du stade
        - Sous estimation de la réponse
    - **Limites**
      - Ilôts tumoraux ds la fibrose
      - Réponse colloïde
        - Production de mucine à considérer comme une réponse
        - Remplacement complet de la tumeur par de la mucine : à considérer comme une réponse complète
        - Aspect très en hypersignal T2 , pas de diffusion possible

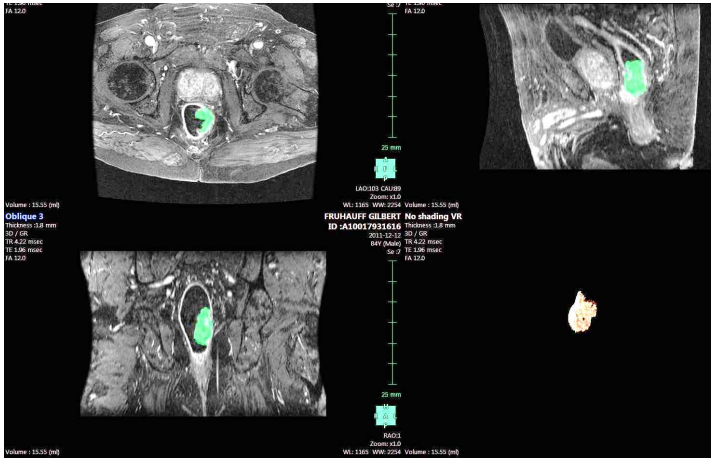
Critères pour l’évaluation de la réponse

- **Critères volumétriques**

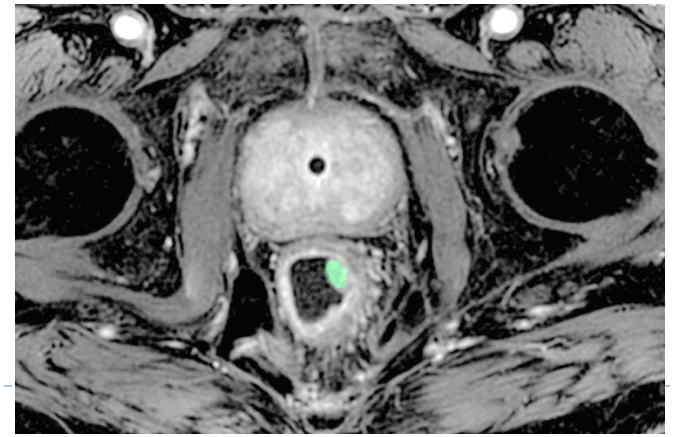


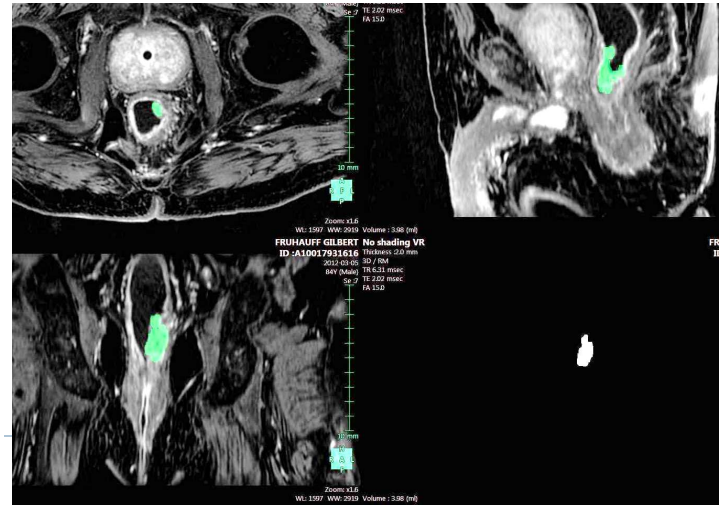






Evaluation : après radiochimiothérapie





Critères pour l'évaluation de la réponse ?

- **Critères volumétriques**

MR Volumetric Measurement of Low Rectal Cancer Helps Predict Tumor Response and Outcome after Combined Chemotherapy and Radiation Therapy[1]

Stephanie Nougaret, MD
Philippe Rouanet, MD, PhD
Nicolas Molinari, PhD
Marie Ange Pierredon, MD
Frederic Bibeau, MD
David Azria, MD, PhD
Claire Lemanski, MD
Eric Assenat, MD, PhD
Jacqueline Duffour, MD, PhD
Marc Ychou, MD, PhD
Caroline Reinhold, MD, PhD
Benoit Gallix, MD, PhD

Purpose: To retrospectively determine whether magnetic reso (MR) volumetry of rectal cancer is a reproducible m for predicting disease-free survival (DFS) in patient locally advanced low or midrectal tumors who un combined chemotherapy and radiation therapy (CR fore total mesorectal excision.

Materials and Methods: The institutional review board does not require ap for the use of patient data obtained for an observa retrospective study. Fifty-eight patients were inclu the study; 42 patients had low-lying tumors. Two ra gists independently measured tumor volumes befor after CRT with use of semiautomated software. The

Figure 2

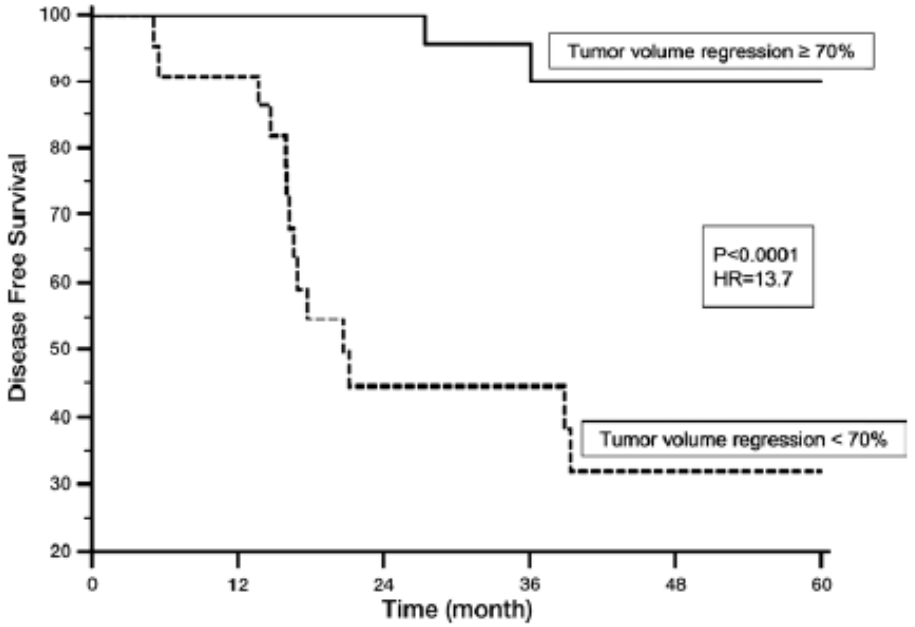
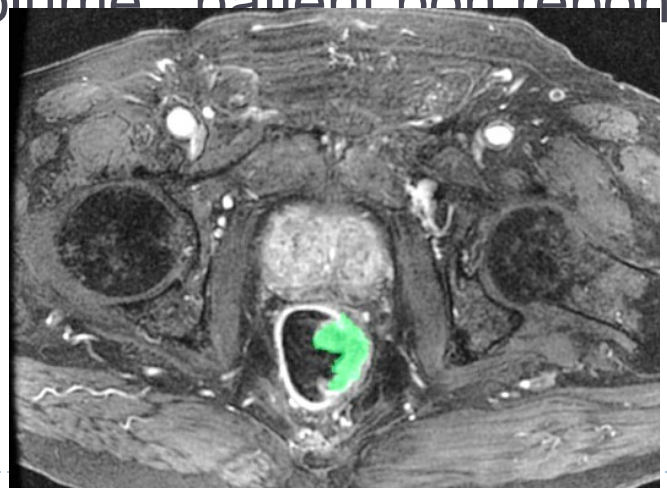
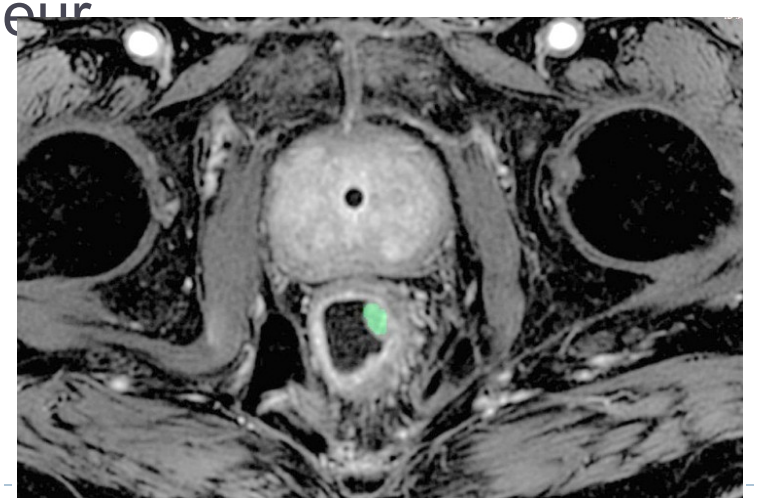


Figure 2: DFS according to MR volumetric measurement. A volume reduction ratio of at least 70% was associated with a higher rate of DFS (HR, 13.7; 95% CI: 3.98, 31.93; $P < .0001$).

Critères pour l'évaluation de la réponse ?

- **Critères volumétriques**
  - Diminution de 75% : bonne VPP
  - Application des critères RECIST pour l'analyse du volume
    - RECIST : Maladie en régression : diminution de la somme des plus grands diamètres de 30%
  - Analogie pour les volumes : qd diminution de 65% en volume, patient bon répondeur





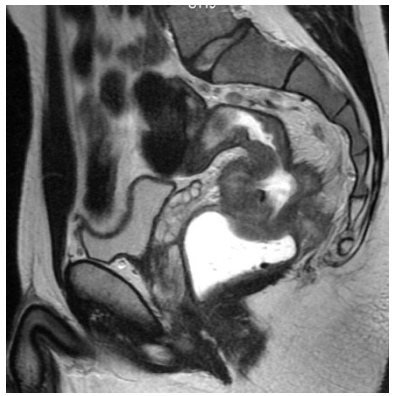
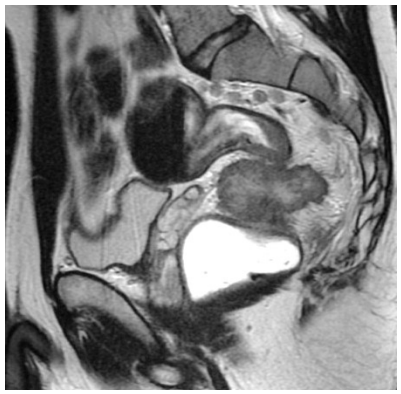
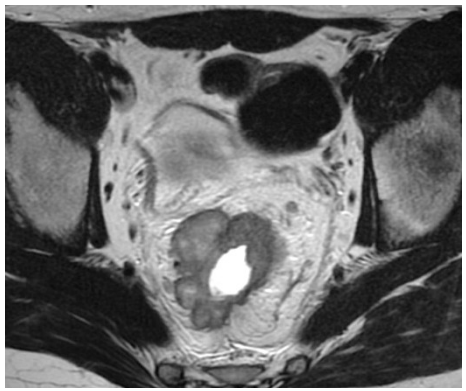
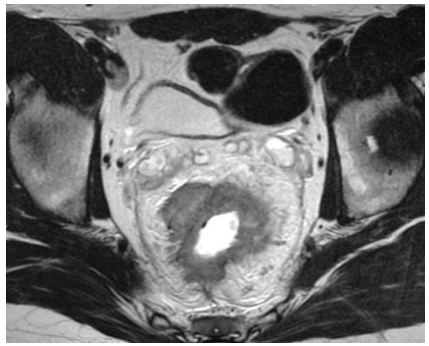
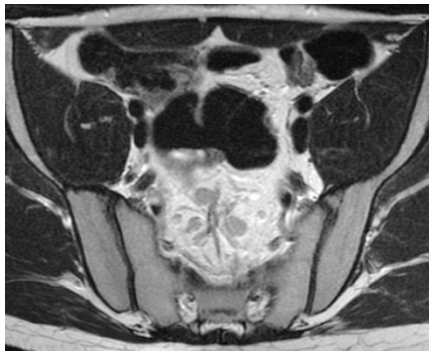
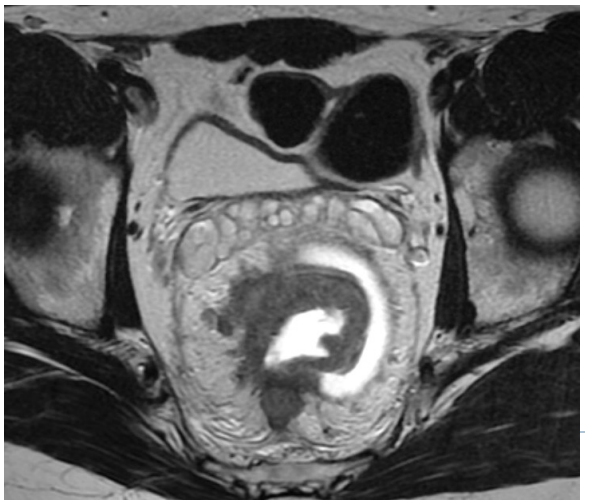
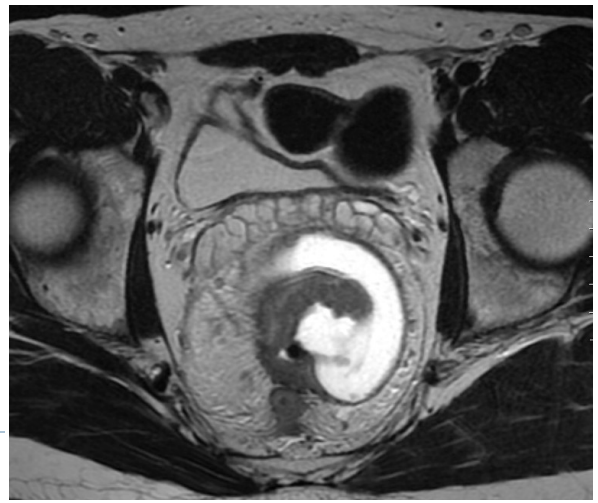
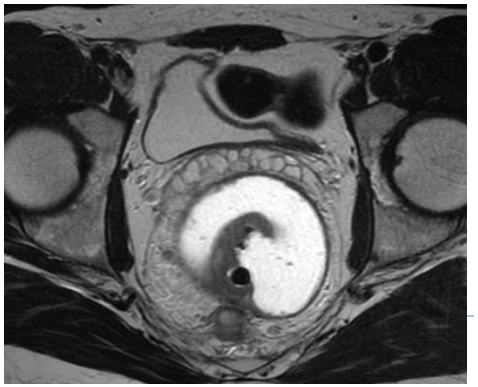
En pratique : questions importantes ?

- Objectifs :
  - Déterminer les bons des mauvais répondeurs
    - Modifier la stratégie opératoire ou le traitement néoadjuvant
- **Performances de l'IRM sur des points essentiels pour une éventuelle modification de la stratégie thérapeutique :**
  - 1-Réévaluation de la marge circonférentielle (Volumineuses tumeurs)
  - 2-Réévaluation des tumeurs du bas rectum pour une éventuelle conservation sphinctérienne
  - 3-Reconnaître les yT0-T2
  - 4-Reconnaître les ypT0 (complète réponse)

Performances de l'IRM post RCT

1-Réévaluation de la marge latérale circonférentielle

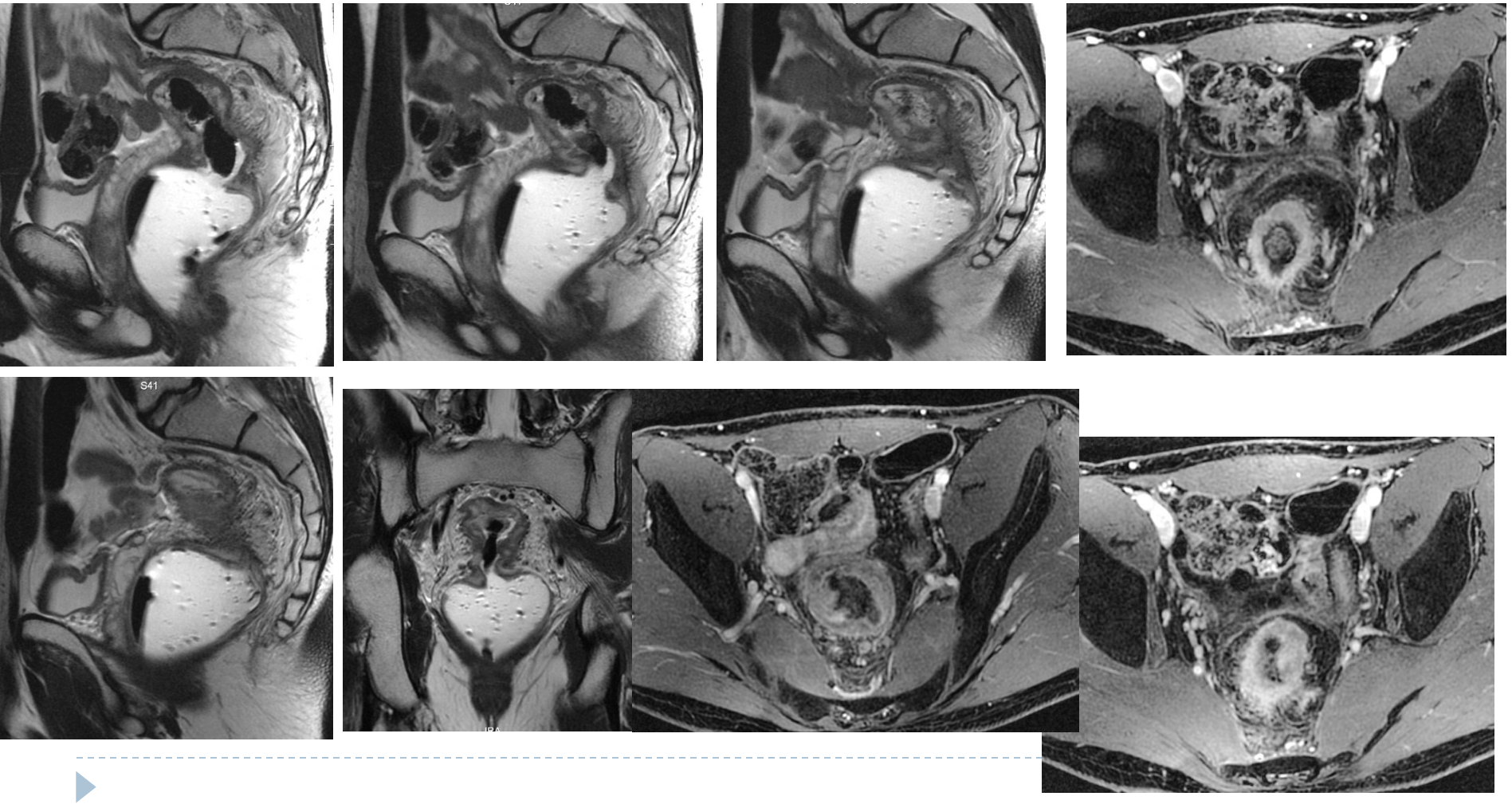
Homme, 29 ans- IRM bilan initial
Tumeur sous péritonéale T3 d N+, CRM 0 mm
Extension tumorale dans la graisse mésorectale > 15 mm

Performances de l’ IRM post RCT

1-Réévaluation de la marge latérale circonférentielle

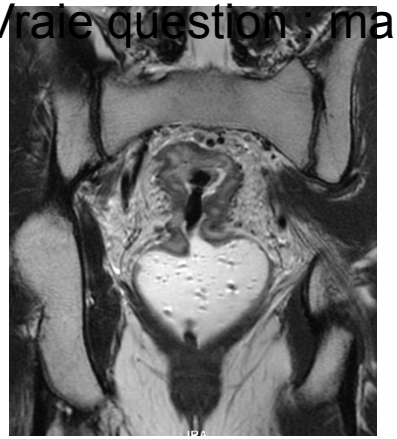
Homme, 29 ans-IRM après RCT

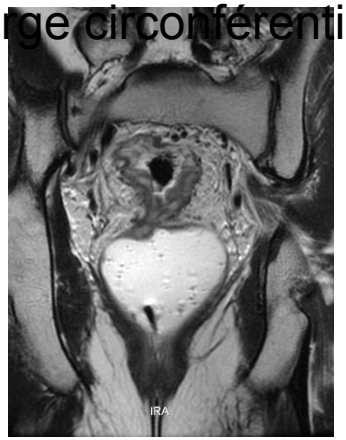


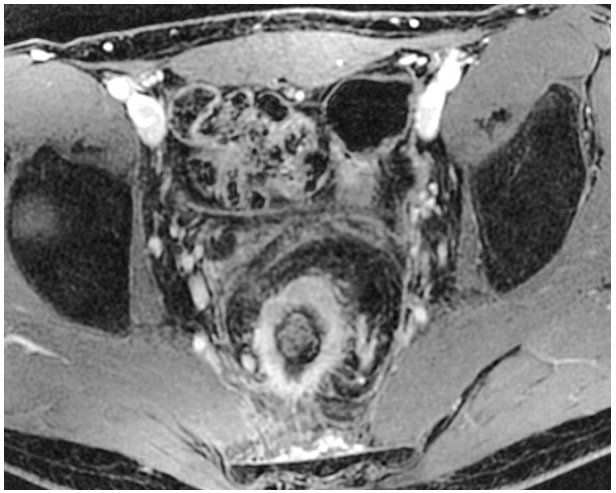
Performances de l'IRM post RCT

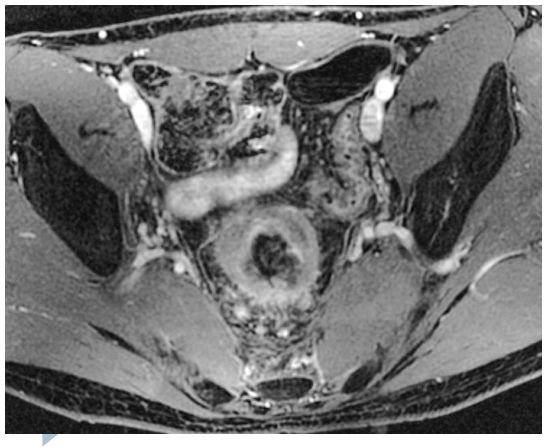
1-Réévaluation de la marge latérale circonférentielle

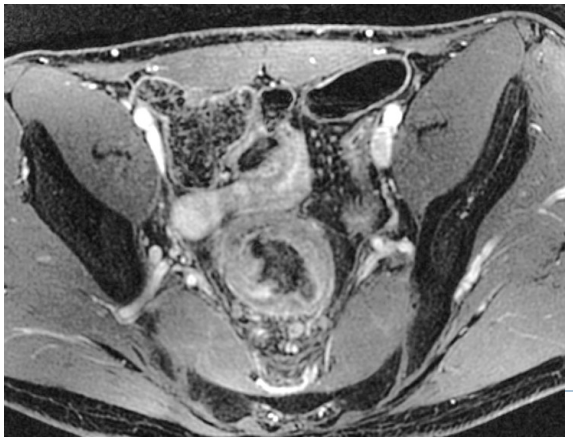
Homme, 29 ans
IRM après RCT, downsizing, sans downstaging (T3,N+)
Vrale question : marge circonférentielle ??

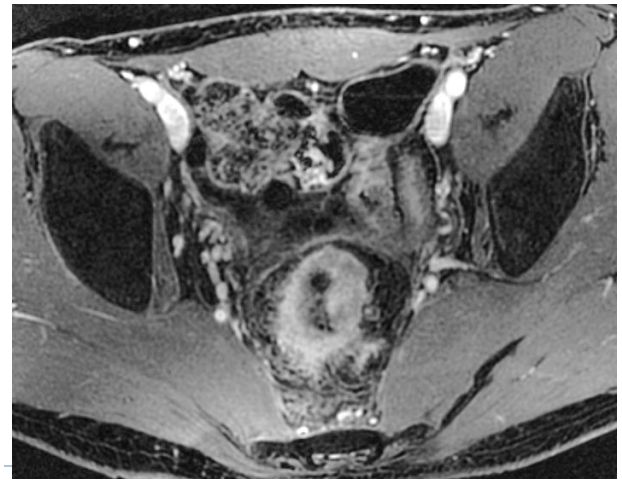












Performances de l'IRM post RCT

1-Réévaluation de la marge latérale circonférentielle : invasion fascia recti

Mesorectal Fascia Invasion after Neoadjuvant Chemotherapy and Radiation Therapy for Locally Advanced Rectal Cancer: Accuracy of MR Imaging for Prediction[1]

Roy F. A. Vliegen, MD
Geerard L. Beets, MD, PhD
Guido Lammering, MD, PhD
Raphaela C. Dresen, MD
Harm J. Rutten, MD, PhD
Alfons G. Kessels, MSc
Toon-Khiam Oei, MD
Adriaan P. de Brune, MD, PhD
Jos M. A. van Engelshoven, MD, PhD
Regina G. H. Beets-Tan, MD, PhD

Purpose: To retrospectively assess sensitivity and specificity of magnetic resonance (MR) imaging after chemotherapy and radiation therapy for predicting tumor invasion of the mesorectal fascia (MRF) in locally advanced primary rectal cancer, by using results of histologic examination and surgery as the reference standard, and to determine morphologic MR imaging criteria for MRF invasion.

Materials and Methods: The Ethical Committee of University Hospital Maastricht approved this study and waived informed consent. Two observers independently scored postchemoradiation MR images in 64 patients with rectal cancer (38 male [mean age, 60 years] and 26 female [mean age, 64 years] patients) for MRF tumor invasion with a confidence level scoring system defined by subjective

Table 1

Prediction of Invasion of MRF with Subjective Criteria at Postchemoradiation MR Imaging by Observers 1 and 2 Compared with Histologic Findings

Observer and Prediction at MR Imaging	Histologic Finding	
	Invasion	No Invasion
Observer 1		
Invasion	30	23
No invasion	0	11
Observer 2		
Invasion	30	14
No invasion	0	20

Note.—Data are numbers of patients. Cutoff level for definition of tumor invasion was between confidence level scores 1 and 2 (indicating no tumor invasion) and 3–5 (indicating tumor invasion of the MRF).

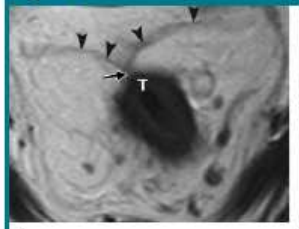
Table 2

AUC, Sensitivity, Specificity, PPV, and NPV of Postchemoradiation MR Imaging for Prediction of Tumor Invasion

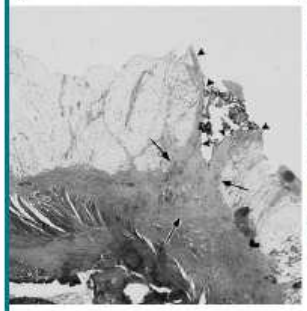
Parameter	Observer 1	Observer 2
AUC*	0.81 (0.71, 0.92)	0.82 (0.71, 0.92)
Sensitivity (%)	100 (30/30)	100 (30/30)
Specificity (%)	32 (11/34)	59 (20/34)
PPV (%)	57 (30/53)	68 (30/44)
NPV (%)	100 (11/11)	100 (20/20)

Note.—Unless otherwise specified, numbers in parentheses are raw data.
* Data in parentheses are 95% confidence intervals.

Figure 1



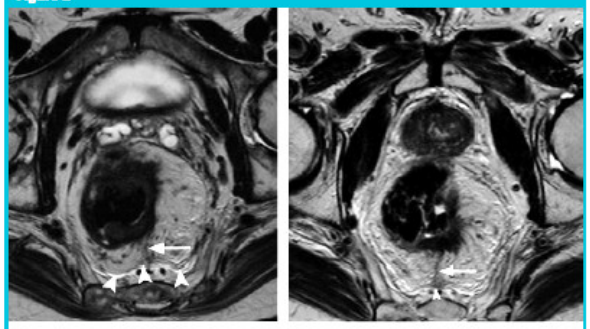
a. b.



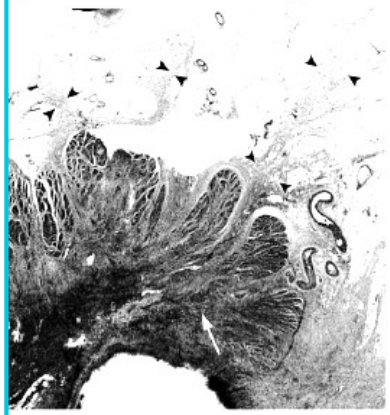
c.

Figure 1: Spiculations at pre- and postchemoradiation MR imaging correlated with tumor-free MRF. **(a, b)** Transverse T2-weighted fast spin-echo MR images (3427/150). **(a)** Prechemoradiation image shows spiculations (arrow) that reach a minimally thickened and retracted MRF (arrowheads). *T* = tumor. **(b)** Postchemoradiation image shows that these spiculations (arrow) remain unchanged; some tumor shrinkage can be noticed. Arrowheads = MRF. **(c)** Corresponding histologic slice shows fibrotic spiculations (arrows) (without residual tumor tissue) in perirectal fat that project into the circumferential resection margin (arrowheads). (Hematoxylin-eosin stain; original magnification, ×2.5.)

Figure 2



a. b.



c.

Figure 2: Spiculations at pre- and postchemoradiation MR imaging were associated with tumor-free MRF. **(a, b)** Transverse T2-weighted fast spin-echo MR images (3427/150). **(a)** Prechemoradiation image shows spiculations (arrow) projecting into the MRF (arrowheads). **(b)** Postchemoradiation image shows that spiculations (arrow) remain unchanged. Arrowhead = MRF. **(c)** Corresponding histologic slice shows residual tumor (arrow) limited to the rectal wall and fibrotic spiculations (arrowheads) projecting into the circumferential resection margin. (Hematoxylin-eosin stain; original magnification, ×5.)

Performances de l’ IRM post RCT

2-Réévaluation réduction volume tumoral tumeurs du bas rectum

CA CANCER J CLIN 2012;00:000-000

Shifting Concepts in Rectal Cancer Management

A Review of Contemporary Primary Rectal Cancer Treatment Strategies

Lauren Kosinski, MD, MS[1]; Angelita Habr-Gama, MD, PhD[2]; Kirk Ludwig, MD[3]; Rodrigo Perez, MD, PhD[4]

The management of rectal cancer has transformed over the last 3 decades and continues to evolve. Some of these changes parallel progress made with other cancers: refinement of surgical technique to improve organ preservation, selective use of neoadjuvant (and adjuvant) therapy, and emergence of criteria suggesting a role for individually tailored therapy. Other changes are driven by fairly unique issues including functional considerations, rectal anatomic features, and surgical technical issues. Further complexity is due to the variety of staging modalities (each with its own limitations), neoadjuvant treatment alternatives, and competing strategies for sequencing multimodal treatment even for nonmetastatic disease. Importantly, observations of tumor response made in the era of neoadjuvant therapy are reshaping some traditionally held concepts about tumor behavior. Frameworks for prioritizing and integrating complex data can help to formulate treatment plans for patients. CA Cancer J Clin 2012;000:000-000. ©2012 American Cancer Society.

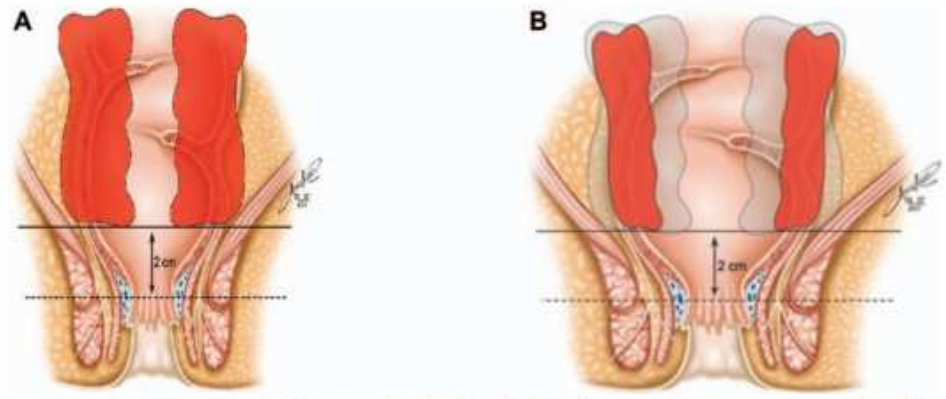
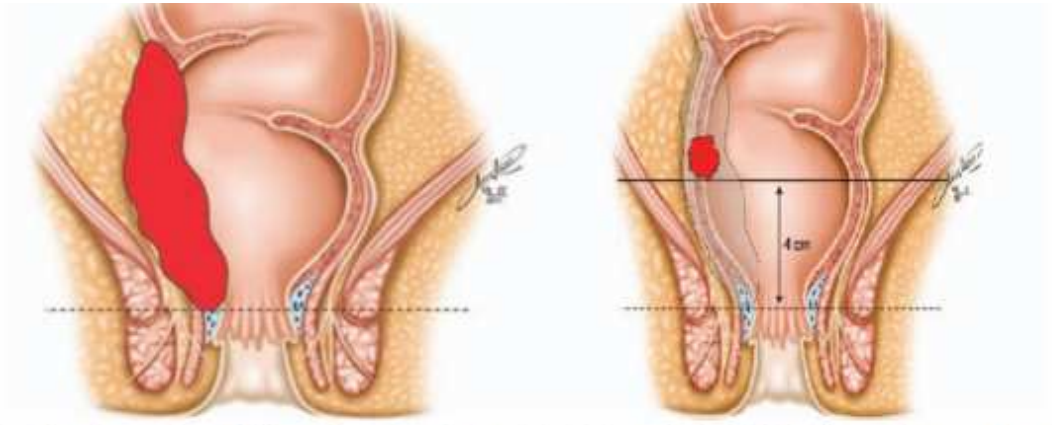
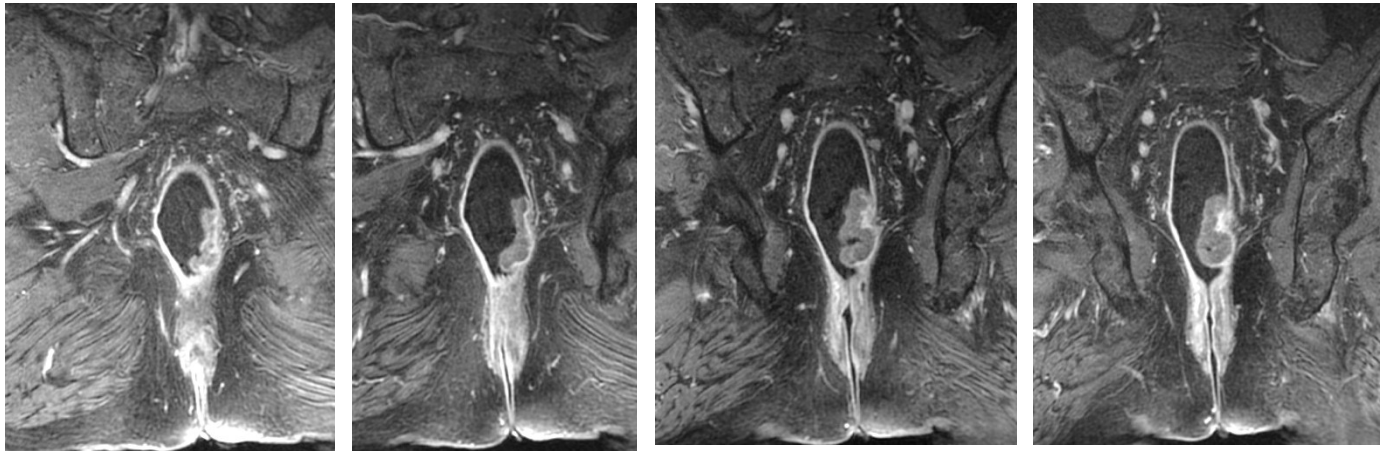


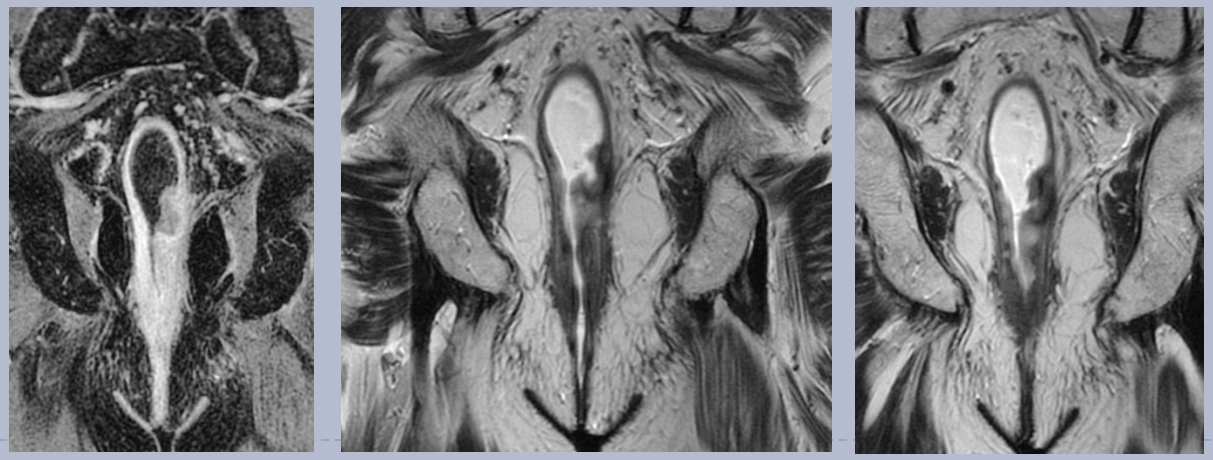
FIGURE 8. Downsizing, Downstaging, and Sphincter Preservation After Neoadjuvant Chemoradiation. (A) A bulky low rectal tumor such as that shown here has sufficient length distally to achieve an acceptable longitudinal margin, but the tumor size would impede mobilization of the rectum and distal transection (B) The same tumor after neoadjuvant chemoradiation is less bulky but as shown did not recede from the original distal margin and is the same T category (area of fibrosis within the black line). However, the reduced bulk enables mobilization and controlled distal transection so that sphincter-preserving surgery can be performed. (C) The tumor before treatment is not bulky but approaches the anorectal ring and threatens sphincter preservation. (D) Tumor regression leaves a smaller focus of invasive cancer (red), which may be the same T category as before treatment, and an area of fibrosis (within the black line). The transection line (dashed line) is now 4 cm from the invasive component but very close to (or even across) the original tumor bed.



Performances de l’ IRM post RCT

2-Réévaluation réduction volume tumoral tumeurs du bas rectum





IRM

Post radiochimiothérapie

Performances de l'IRM post RCT

2-Réévaluation réduction volume tumoral tumeurs du bas rectum

Gerard JP, Rostom Y, Gal J et al.

Can we increase the chance of sphincter saving surgery in rectal cancer with neo adjuvant treatments : lessons from a systematic review of recent randomized trials

Critical reviews in Oncology Hematology, 2012; 81 : 21-28

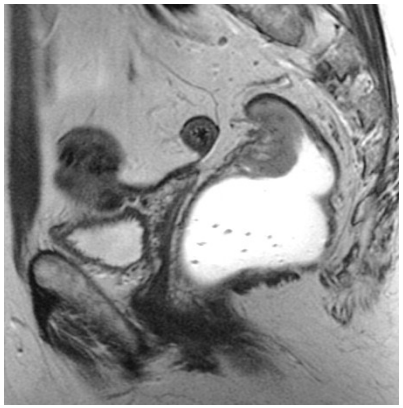
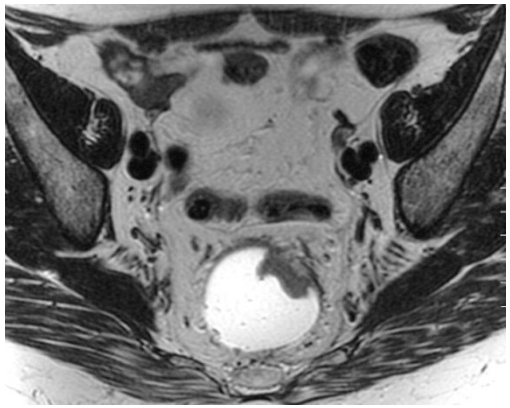
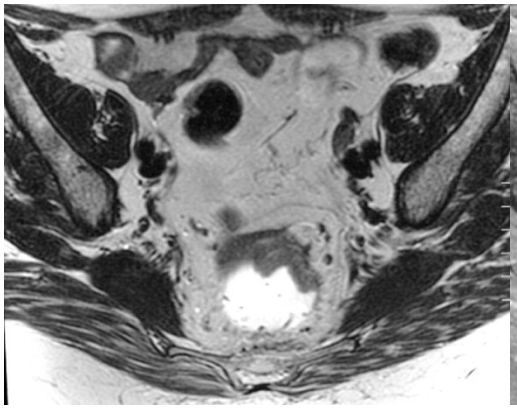
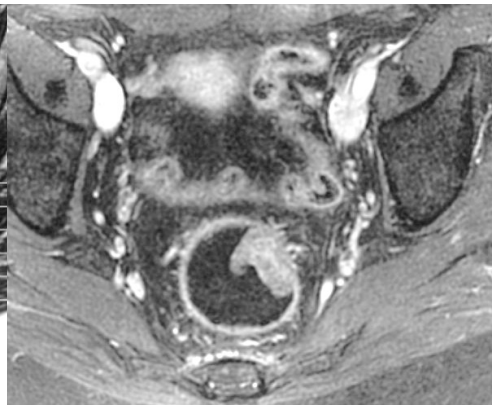
Le taux de résection avec conservation sphinctérienne a augmenté de 20% à 75% depuis 1976. 17 essais pris en compte, pas de mise en évidence du bénéfice de la RCT préopératoire (quelle qu'elle soit)

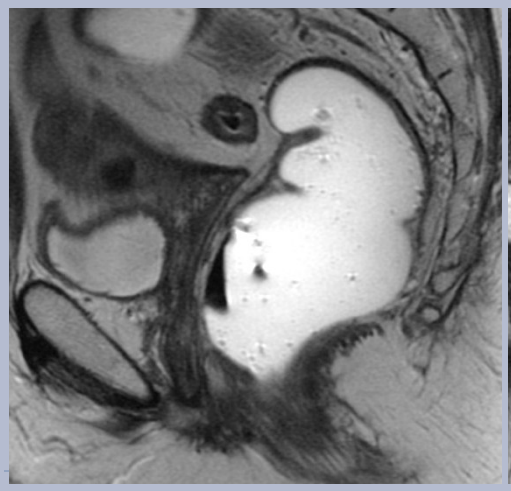
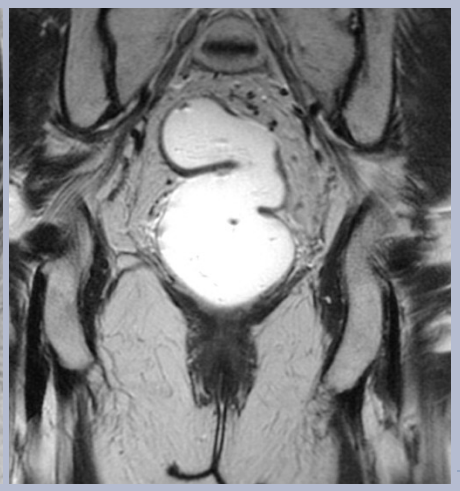
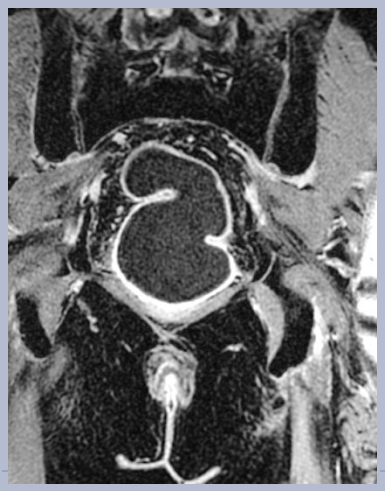
Augmentation : amélioration des techniques opératoires

Propose de faire un essai sur l'impact des TTT néoadjuvants sur la conservation sphinctérienne

Performances de l’ IRM post RCT

3-Reconnaître les tumeurs ypT0-T2

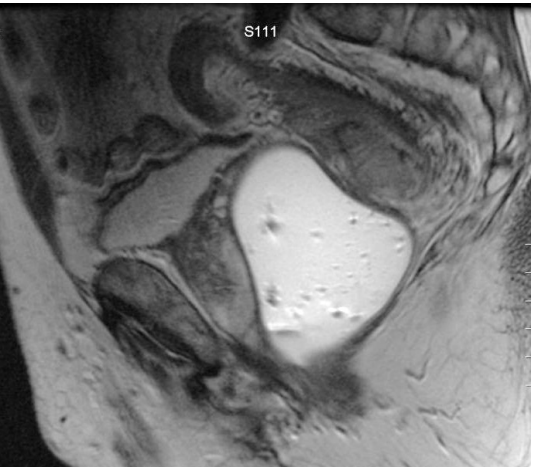





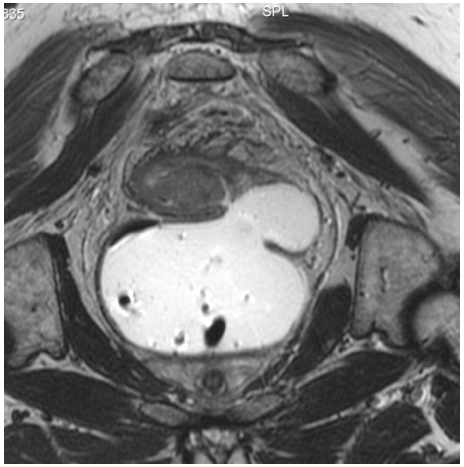




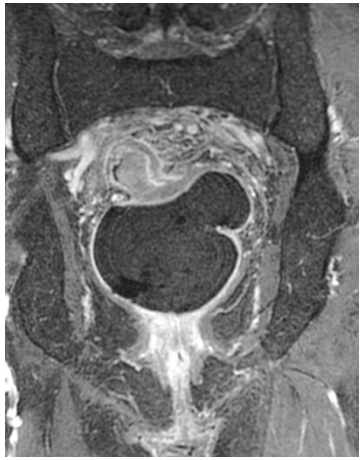
Après RCT

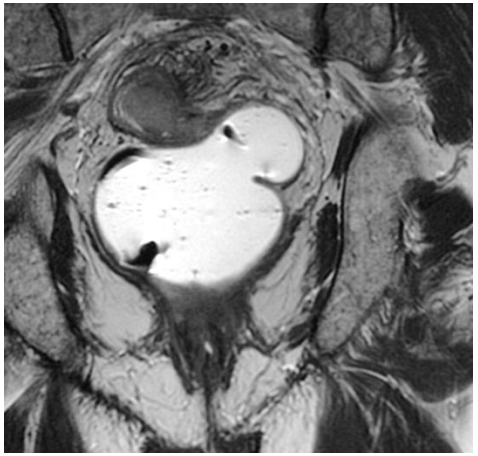
Performances de l’ IRM post RCT

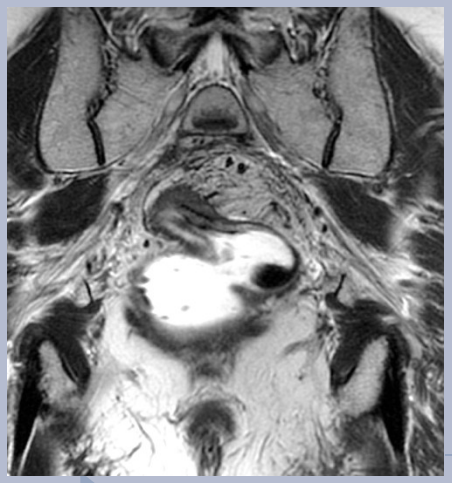
3-Reconnaître les tumeurs ypT0-T2

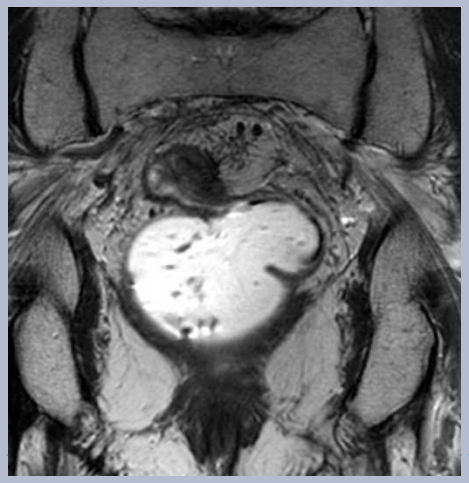


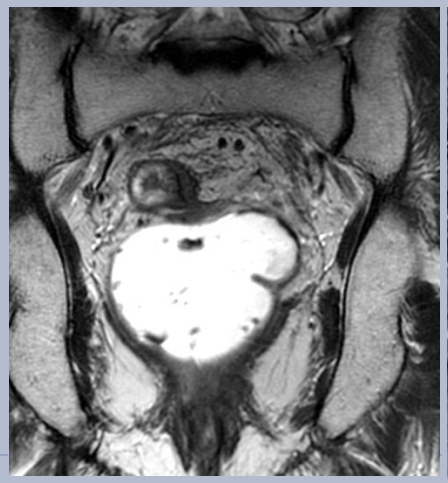


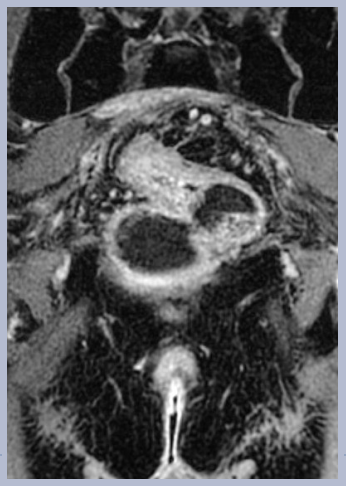








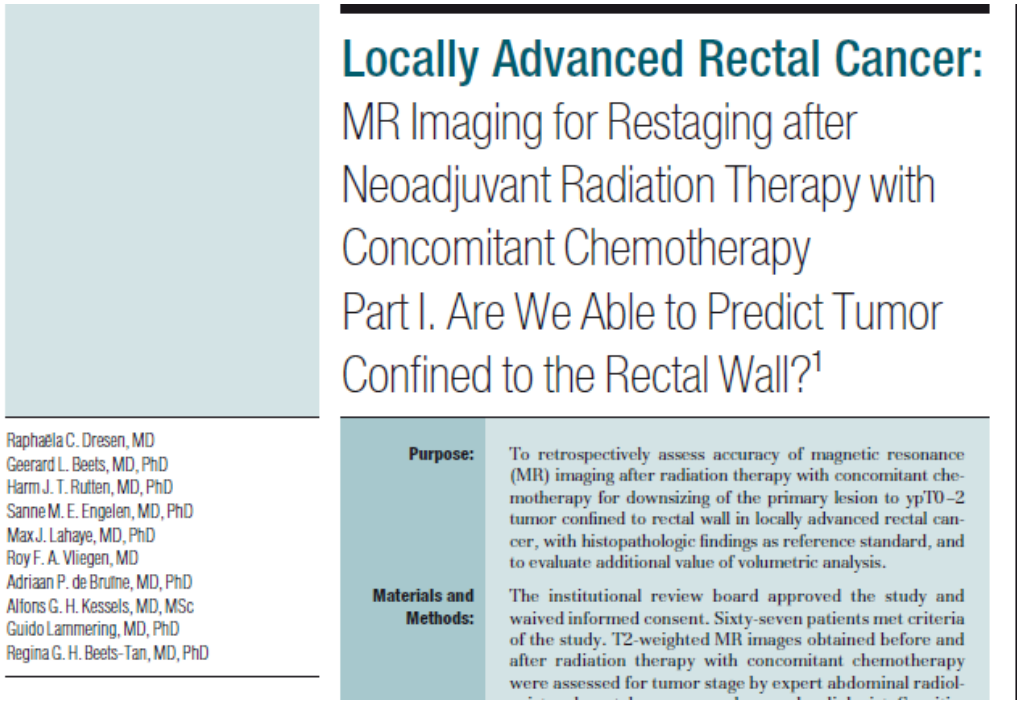




Après

Performances de l'IRM post RCT

3-Reconnaître les tumeurs ypT0-T2



Locally Advanced Rectal Cancer:
MR Imaging for Restaging after Neoadjuvant Radiation Therapy with Concomitant Chemotherapy
Part I. Are We Able to Predict Tumor Confined to the Rectal Wall?[1]

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Geerard L. Beets, MD, PhD
Harm J. T. Rutten, MD, PhD
Sanne M. E. Engelen, MD, PhD
Max J. Lahaye, MD, PhD
Roy F. A. Vliegen, MD
Adriaan P. de Brutne, MD, PhD
Alfons G. H. Kessels, MD, MSc
Guido Lammering, MD, PhD
Regina G. H. Beets-Tan, MD, PhD

Purpose: To retrospectively assess accuracy of magnetic resonance (MR) imaging after radiation therapy with concomitant chemotherapy for downsizing of the primary lesion to ypT0–2 tumor confined to rectal wall in locally advanced rectal cancer, with histopathologic findings as reference standard, and to evaluate additional value of volumetric analysis.

Materials and Methods: The institutional review board approved the study and waived informed consent. Sixty-seven patients met criteria of the study. T2-weighted MR images obtained before and after radiation therapy with concomitant chemotherapy were assessed for tumor stage by expert abdominal radiol-

-VPP : 91%, sensibilité de 42%
-Volume avant RCT des ypT0-2 < ypT3-T4
-Taux de réduction volume tumoral > ypT0-2

Performances de l'IRM post RCT

4-Reconnaître les tumeurs ypT0 (réponse complète)

Clinical Colorectal Cancer
Volume 10, Issue 4, December 2011, Pages 291–297

Regular content

Nonoperative Approach to Locally Advanced Rectal Cancer After Neoadjuvant Combined Modality Therapy: Challenges and Opportunities From a Surgical Perspective

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Received 22 October 2010. Revised 16 December 2010. Accepted 21 December 2010. Available online 15 August 2011.
http://dx.doi.org/10.1016/j.clcc.2011.06.001, How to Cite or Link Using DOI
Cited by in Scopus (0)
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Abstract

This review contains a surgical perspective on the evolution of the nonoperative approach to patients with locally advanced rectal cancer who have a clinical complete response after neoadjuvant combined modality therapy, including accuracy of pathologic complete response identification, the timing between neoadjuvant combined modality therapy and assessment of response, the extent of long-term follow-up, and the likelihood of surgical salvage after an initial nonoperative approach.

Table 1. Imaging Modalities' Ability to Predict 'T0' Status After Combined Modality Therapy for Rectal Cancer

Modality	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy (%)
PE/DRE/Endoscopy [9], [28] and [35]	5-46	56-99	19-67	61-93	49-81
ERUS [36], [37], [38], [39], [44], [49], [50] and [51]	10-33	77-100	36-100	74-100	0-92
CT [36], [39], [43] and [44]	0	100	—	74-96	0-96
MRI [36], [43], [44], [45], [46] and [47]	0-25	93-100	17-75	77-96	77-96
FDG-PET [52], [53] and [54]	75-80	45-62	29-43	80-94	53-65

Abbreviations: CT = computed tomography; DRE = digital rectal examination; ERUS = endorectal ultrasound; MRI = magnetic resonance imaging; NPV = negative predictive value; PE = physical examination; FDG-PET = fluorodeoxyglucose-positron emission tomography; PPV = positive predictive value.

Table 2. Imaging Modalities' Ability to Predict 'NO' Status Aftter Combined Modality Therapy for Rectal Cancer

Modality	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy (%)
ERUS [36], [37], [38], [39], [44], [50] and [51]	67-90	25-64	81-86	21-50	61-81
CT [36], [39], [43] and [44]	58	78	91	32	62-85
MRI [36], [43], [44], [45], [46] and [47]	68-96	22-67	80-87	25-63	65-79

Abbreviations: CT = computed tomography; ERUS = endorectal ultrasound; MRI = magnetic resonance imaging; PPV = positive predictive value; NPV = negative predictive value.

Performances de l'IRM post RCT

4-Reconnaître les tumeurs ypT0 (réponse complète)

Annals of Surgical Oncology 14(2):455–461
DOI: 10.1245/s10434-006-9269-4

The Potential of Restaging in the Prediction of Pathologic Response After Preoperative Chemoradiotherapy for Rectal Cancer

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[2]Department of Diagnostic Sciences and Special Therapies, Radiology Unit, Istituto Oncologico Veneto, Istituto di Ricovero e Cura a Carattere Scientifico (IRCCS), University of Padua, Via Giustiniani, 2, 35128, Padua, Italy
[3]Department of Diagnostic Sciences and Special Therapies, Pathology Unit, Istituto Oncologico Veneto, Istituto di Ricovero e Cura a Carattere Scientifico (IRCCS), University of Padua, Via Gabelli, 61, 35128, Padua, Italy

TABLE 3. *Sensitivity, specificity, PPV, NPV, and accuracy of restaging after preoperative CRT for 46 mid to low rectal cancer patients*

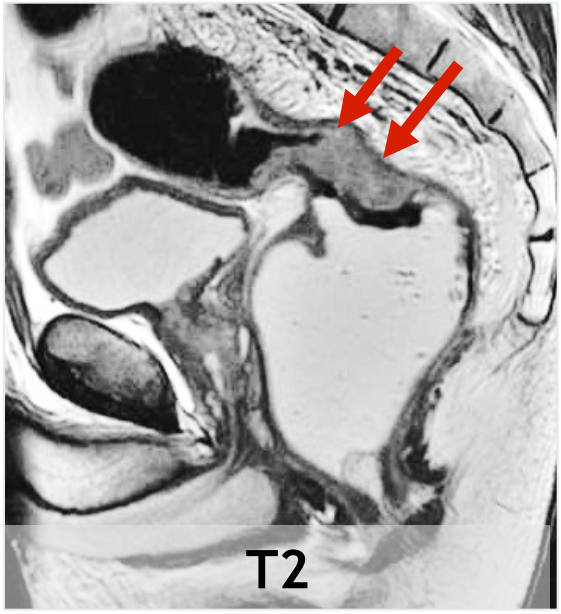
	T staging (T0 vs. T ≥ 1)			N staging (N-negative vs. N-positive)		
Variable	CT	MRI	TRUS	CT	MRI	TRUS
Sensitivity	100	100	77	78	33	37
Specificity	0	0	33	58	74	67
PPV	74	77	74	32	25	21
NPV	—	—	36	91	81	81
Accuracy	74	77	64	62	65	61

All data are reported as percentages.
PPV, positive predictive value; NPV, negative predictive value; CRT, chemoradiotherapy; CT, computed tomography; MRI, magnetic resonance imaging; TRUS, transrectal ultrasonography.

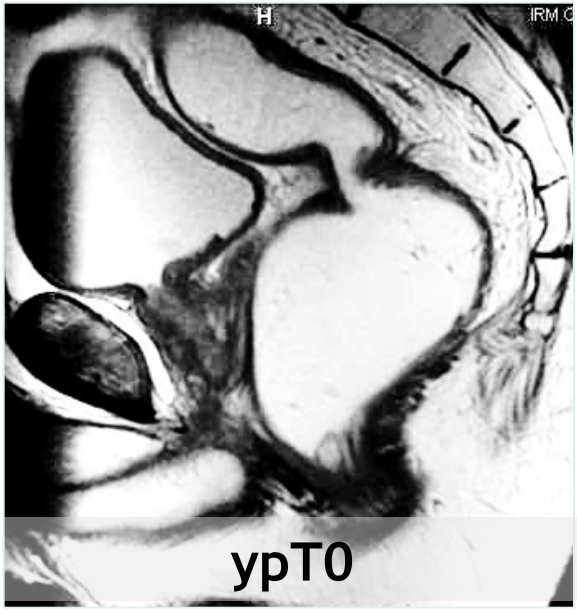
Performances de l'IRM post RCT

4-Reconnaître les tumeurs ypT0 (réponse complète)

Avant Radiothérapie



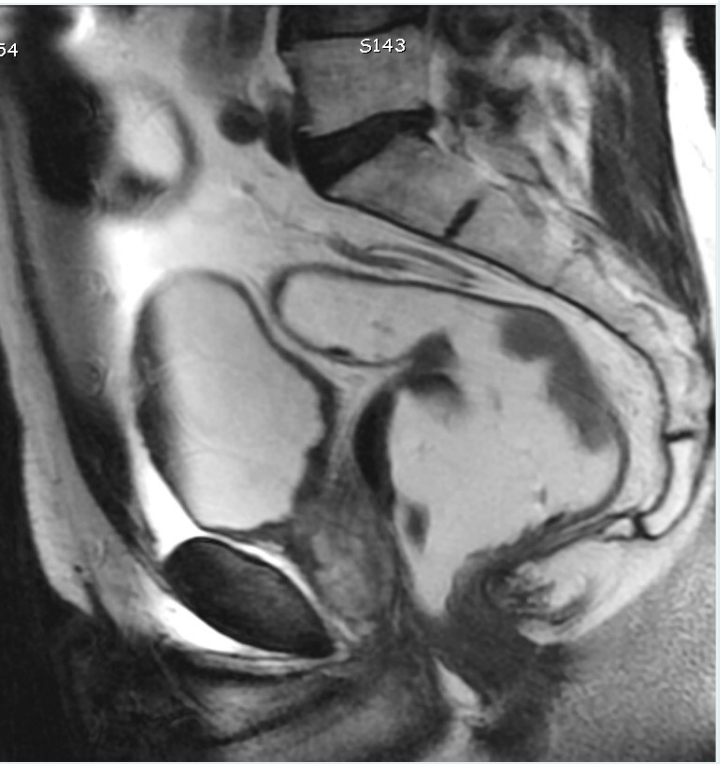
Après Radiothérapie

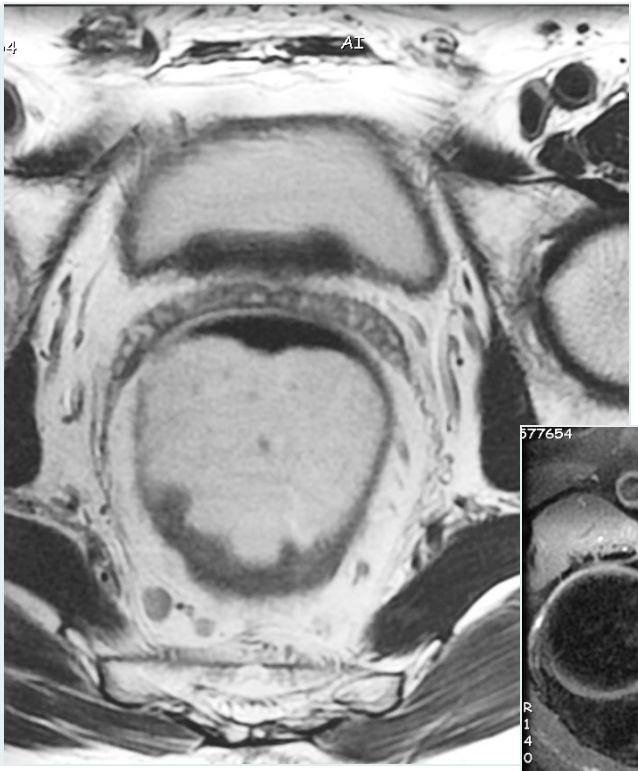


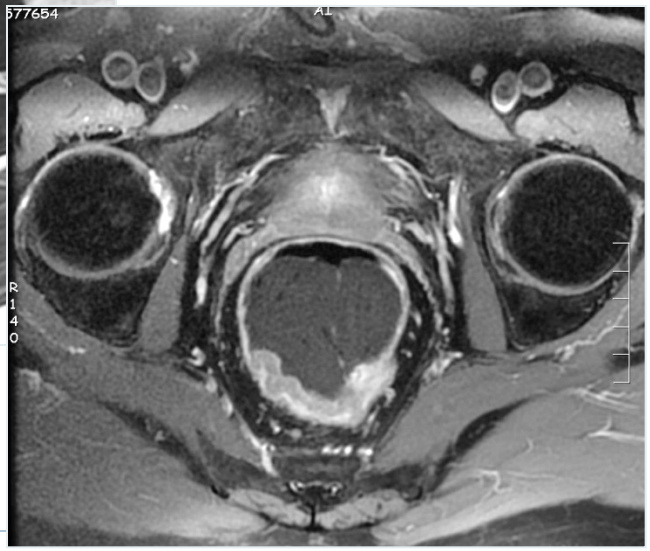
Kuo LJ et al. Interpretation of magnetic resonance imaging for locally advanced rectal carcinoma after preoperative chemoradiation therapy. Dis Colon Rectum 2005 ; 48 : 23-28

Performances de l’ IRM post RCT

4-Reconnaître les tumeurs ypT0 (réponse complète)







Avant Radiothérapie

Performances de l'IRM post RCT

3-Reconnaître les tumeurs ypT0 (réponse complète)

- Intérêt de l'imagerie de diffusion en association aux autres séquences ?

Intérêt de l'imagerie de diffus

OFFICIAL JOURNAL OF THE SOCIETY OF SURGICAL ONCOLOGY

ORIGINAL ARTICLE – COLORECTAL CANCER

Diffusion-Weighted MRI for Selection of Complete Responders After Chemoradiation for Locally Advanced Rectal Cancer: A Multicenter Study

Doenja M. J. Lambregts, MD[1,2], Vincent Vandecaveye, MD[3], Brunella Barbaro, MD[4], Frans C. H. Bakers, MD[1], Maarten Lambrecht, MD[5], Monique Maas, MD[1,2], Karin Haustermans, MD[5], Vincenzo Valentini, MD[6], Geerard L. Beets, MD[2], and Regina G. H. Beets-Tan, MD[1]

[1]Department of Radiology, Maastricht University Medical Center, Maastricht, The Netherlands; [2]Department of Surgery, Maastricht University Medical Center, Maastricht, The Netherlands; [3]Department of Radiology, University Hospitals Leuven, Leuven, Belgium; [4]Department of Radiology, Università Cattolica del Sacro Cuore, Rome, Italy; [5]Department of Radiation Oncology, University Hospitals Leuven, Leuven, Belgium; [6]Department of Radiation Oncology, Università Cattolica del Sacro Cuore, Rome, Italy

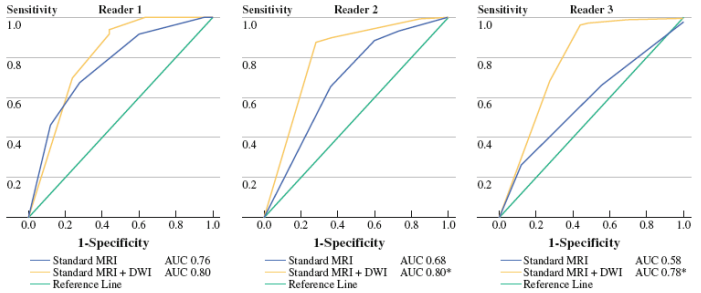


FIG. 4 Receiver operator characteristics curves and areas under the curve (*AUC*) of the three readers for identification of a complete tumor response after CRT using only standard MRI and standard MRI + DWI, respectively. Diagnostic performance improved significantly (*) for reader 2 ($P = 0.02$) and reader 3 ($P = 0.002$). For reader 1, there was no significant improvement ($P = 0.39$)

TABLE 1 Diagnostic performance for the prediction of a complete response (ypT0)

	Standard MRI only			Standard MRI + DWI		
	R1	R2	R3	R1	R2	R3
Sensitivity	40 (10/25)	28 (7/25)	0 (0/25)	56 (14/25)	64 (16/25)	52 (13/25)
95% CI	26–53	16–40	0–0	41–67	48–77	39–60
Specificity	92 (87/95)	93 (88/95)	98 (93/95)	94 (89/95)	89 (85/95)	97 (92/95)
95% CI	88–95	89–96	98–99	90–97	85–93	93–99
PPV	56 (10/18)	50 (7/14)	0 (0/2)	70 (14/20)	62 (16/26)	81 (13/16)
95% CI	36–73	28–71	0–0	52–84	46–74	60–93
NPV	85 (87/102)	83 (88/106)	79 (93/118)	89 (89/100)	90 (85/94)	88 (92/104)
95% CI	82–88	80–86	79–80	85–92	86–94	85–90
AUC	0.76	0.68	0.58	0.80	0.80	0.78
95% CI	0.65–0.86	0.56–0.8	0.47–0.69	0.69–0.91	0.7–0.91	0.67–0.9

R1 reader 1, GI radiologist with 13 years experience in pelvic MRI; *R2* reader 2, GI radiologist with 3 years experience in pelvic MRI; *R3* reader 3, GI radiologist with 2 years experience in pelvic MRI and 5 years experience in reading DWI; *PPV* positive predictive value; *NPV* negative predictive value; *AUC* area under the ROC curve; *CI* confidence interval

Numbers are percentages; absolute numbers are given in parentheses

Performances de l'IRM post RCT

3-Reconnaître les tumeurs ypT0 (réponse complète)

- Intérêt de l'imagerie de diffusion en association aux autres séquences ?

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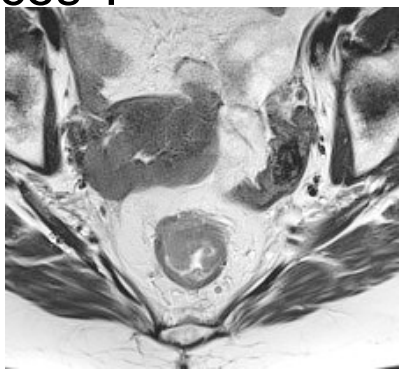

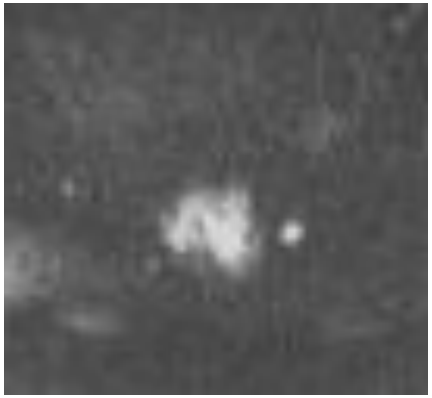

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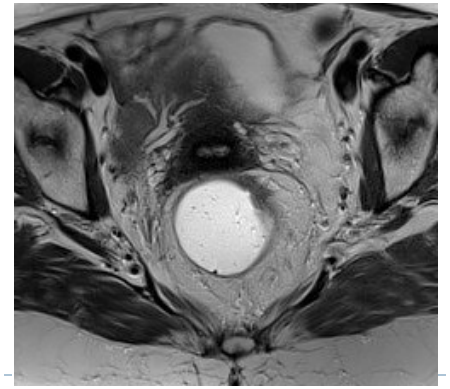
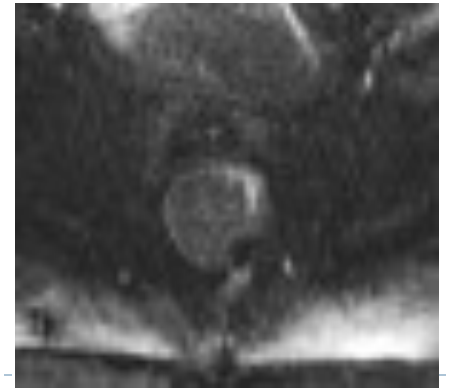


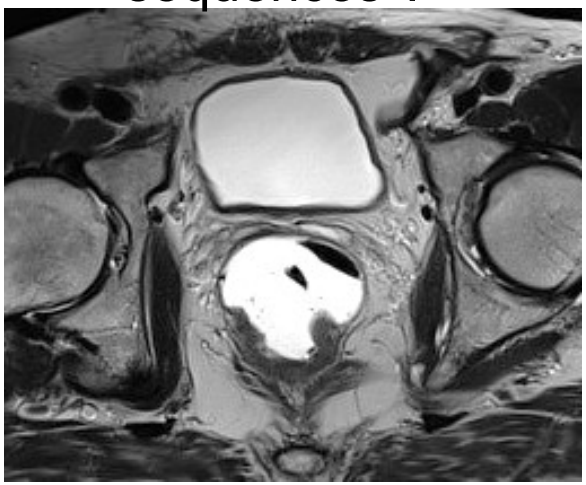
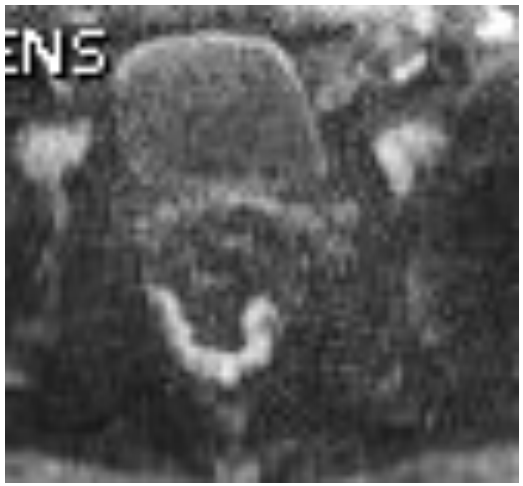
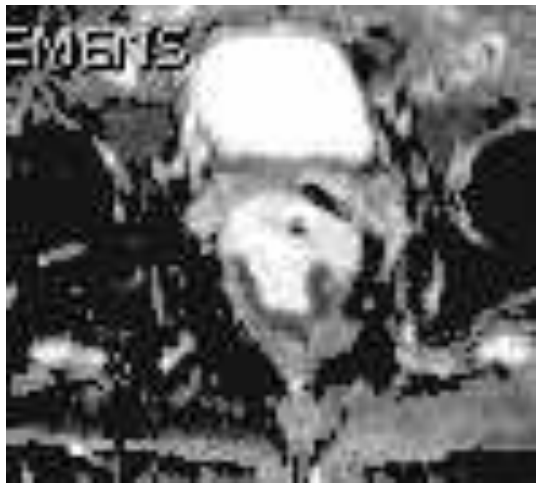
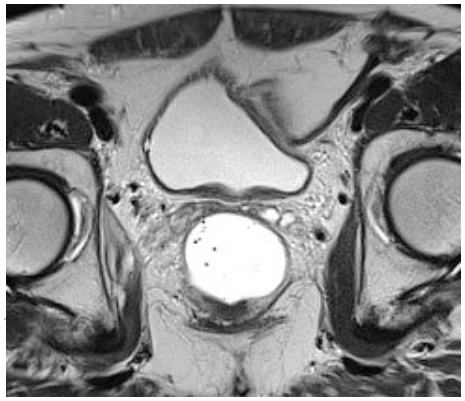
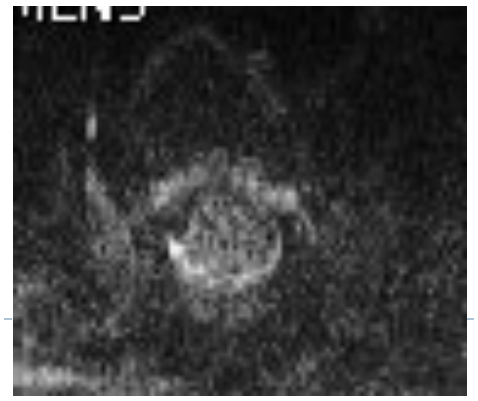


Obs Pr Christine Hoeffel-CHU

Performances de l'IRM post RCT

4-Reconnaître les tumeurs ypT0 (réponse complète)

- Intérêt de l'imagerie de diffusion en association aux autres séquences ?

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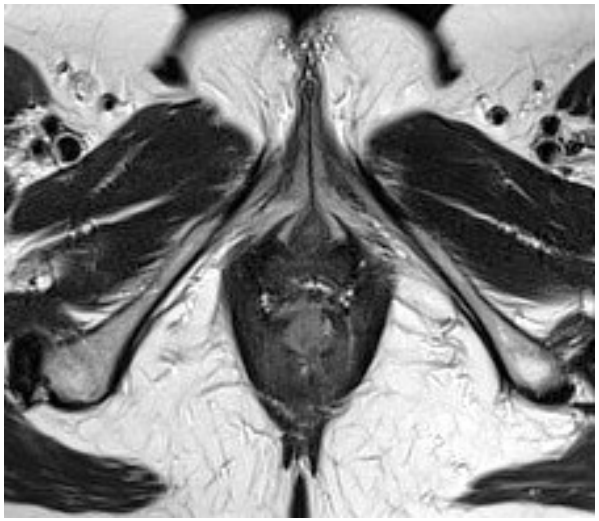
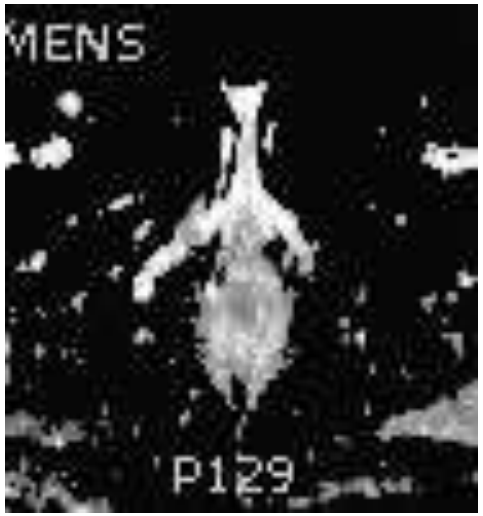
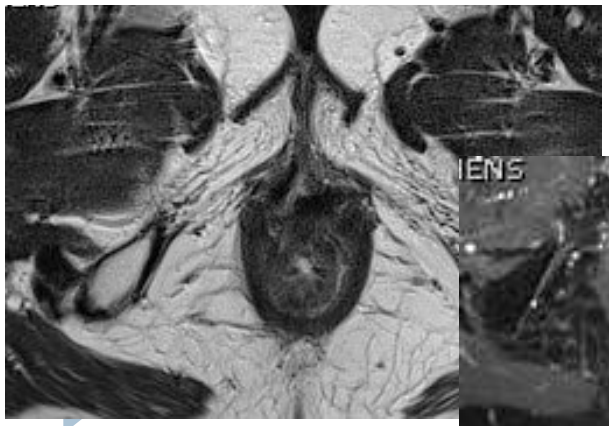
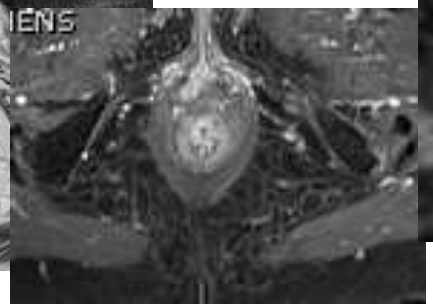
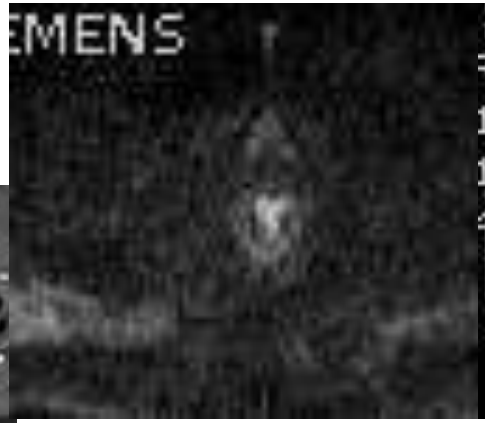
4-Reconnaître les tumeurs ypT0 (réponse complète)

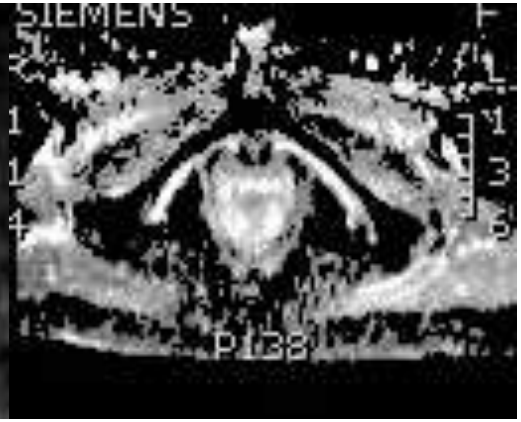












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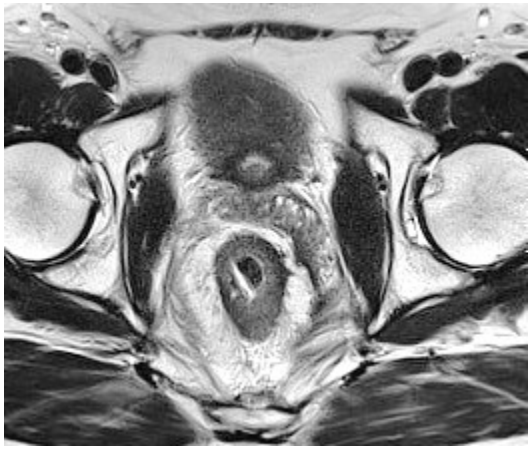
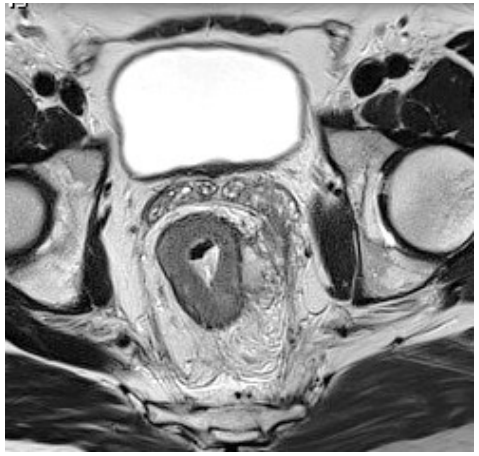
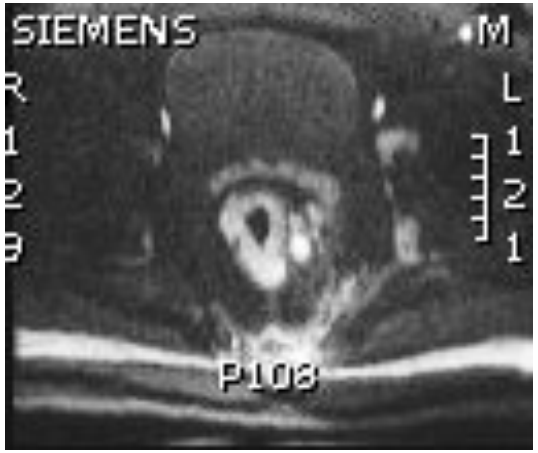
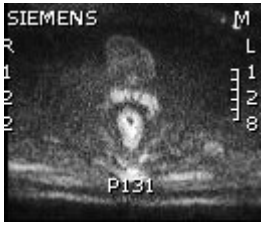
Performances de l'IRM post RCT

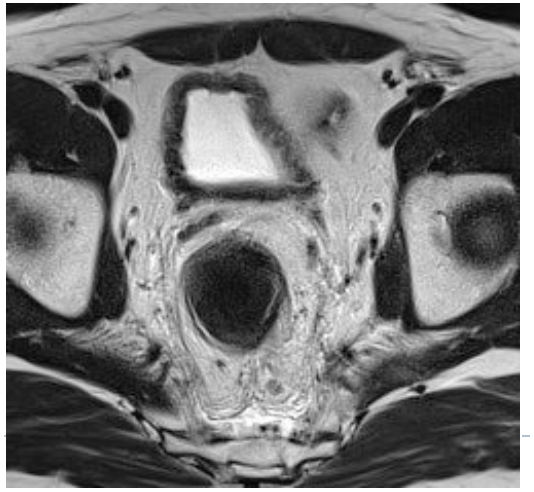
4-Reconnaître les tumeurs ypT0 (réponse complète)

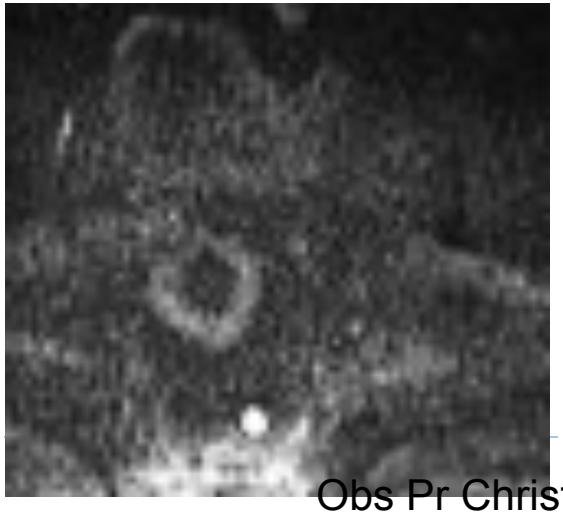












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Performances de l'IRM post RCT

5-Et les adénopathies ???

- Et les ganglions : pas de réponse +++++

Conclusion

- **IRM post radiochimiothérapie**
  - Résultats satisfaisants pour la réduction tumorale des T4 et l'évaluation de la persistance ou non de l'extension au fascia recti
  - Intérêt pour les tumeurs du bas rectum : conservation sphinctérienne
  - Pour la modification thérapeutique , et l'abstention chirurgicale : très controversée
  - En évaluation : adaptation traitement radiochimioT bons répondeurs/mauvais répondeurs fonction de la réponse initiale
  - Pb des ganglions : pas encore résolu