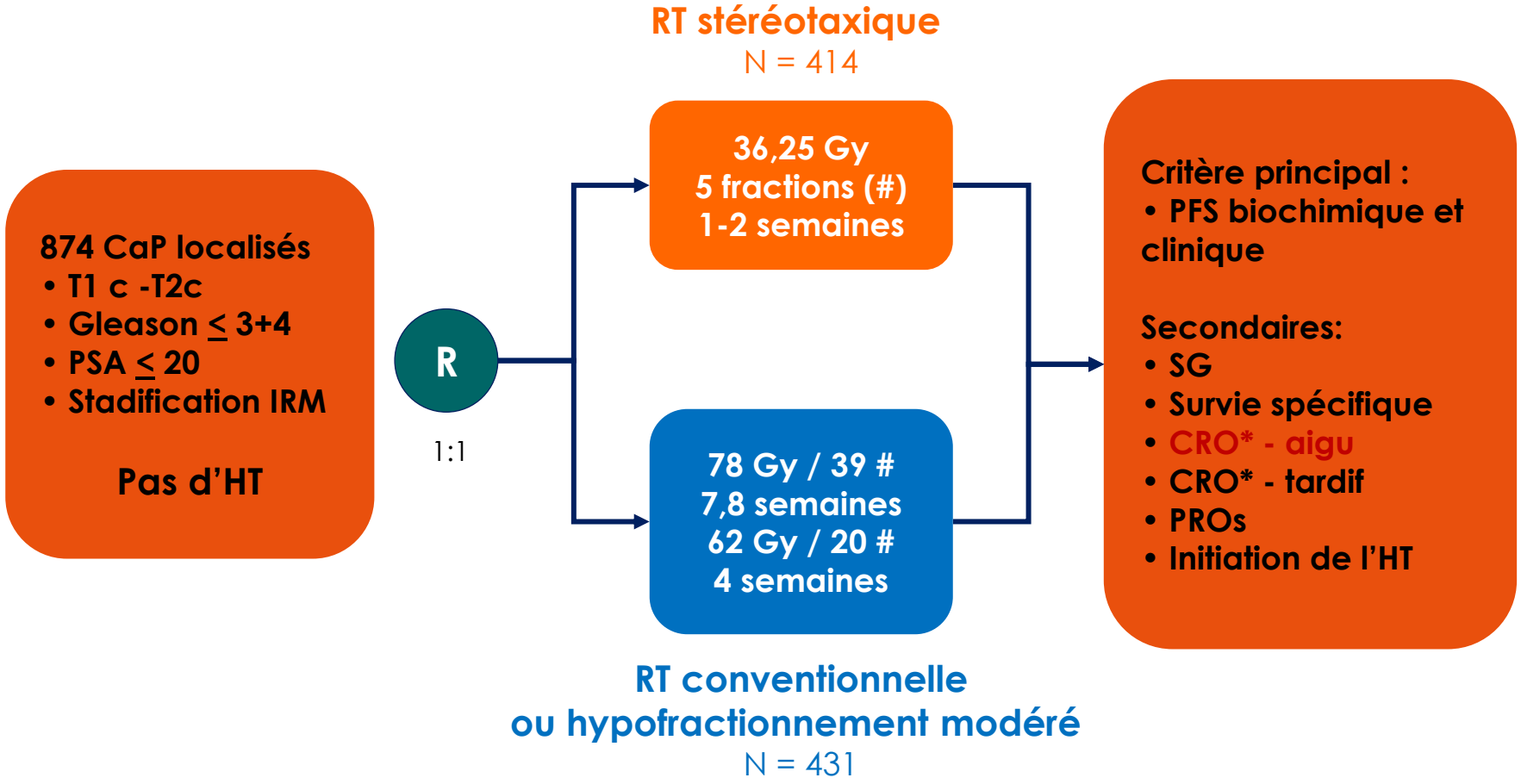
Radiothérapie Stéréotaxique: Cancer de la prostate!

Dr Paul Sargos, Bergonié, Bordeaux

Radiothérapie Stéréotaxique: LA PROSTATE EN PLACE!

Dr Paul Sargos, Bergonié, Bordeaux

CANCERS DE RISQUE FAIBLE ET INTERMÉDIAIRE PACE B



*CRO : Clinician Reported Outcomes

Van As N et al. ASCO GU 2019. Abst 1

CANCERS DE RISQUE FAIBLE ET INTERMÉDIAIRE PACE B

- Essentiellement des patients à risque intermédiaire

CFMHRT
91,4% risque Intermédiaire

T2b-T2c = 52%
Gleason 3+4 = 81%
PSA 10-20 ng/mL = 31%

SBRT
92,1% risque Intermédiaire

T2b-T2c = 54%
Gleason 3+4 = 83%
PSA 10-20 ng/mL = 31%

RT stéréotaxique
73% utilisation fiduciaires
VMAT (58%), Cyberknife (41%) et Step/Shoot IMRT (<1%)

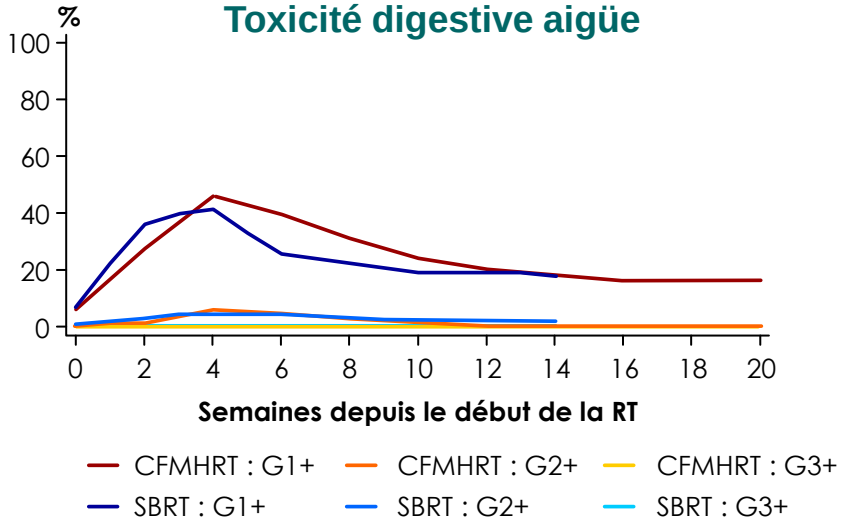
RT conventionnelle
ou hypofractionnement modéré
57% utilisation fiduciaires
VMAT (74%) Step et shoot IMRT (25%), Tomo (1%)

Van As N et al. ASCO GU 2019. Abst 1

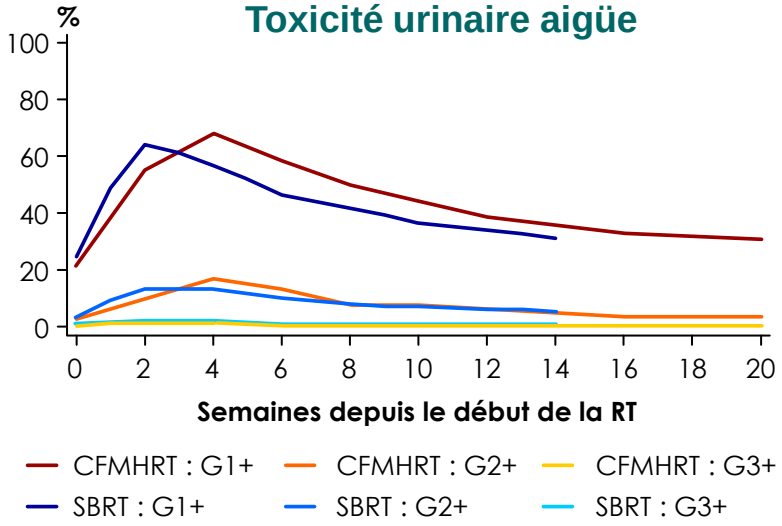
PACE : TOXICITÉS DIGESTIVE ET URINAIRE

PROSTATE

Toxicité digestive aigüe



Toxicité urinaire aigüe



Pires EI digestifs de grade ≥ 2

G2+ GI RTOG : CFMHRT 12% vs SBRT 10,3%

	CFMHRT	SBRT
Grade	%	%
0	26,7	36,7
1	61,3	52,9
2	**11,1**	**10,1**
3	**0,9**	**0,2**
4	**0,0**	**0,0**

- p = 0,440
- Pas de différence significative

Pires EI urinaires de grade ≥ 2

G2+ GU RTOG : CFMHRT 27,5% vs SBRT 23,2%

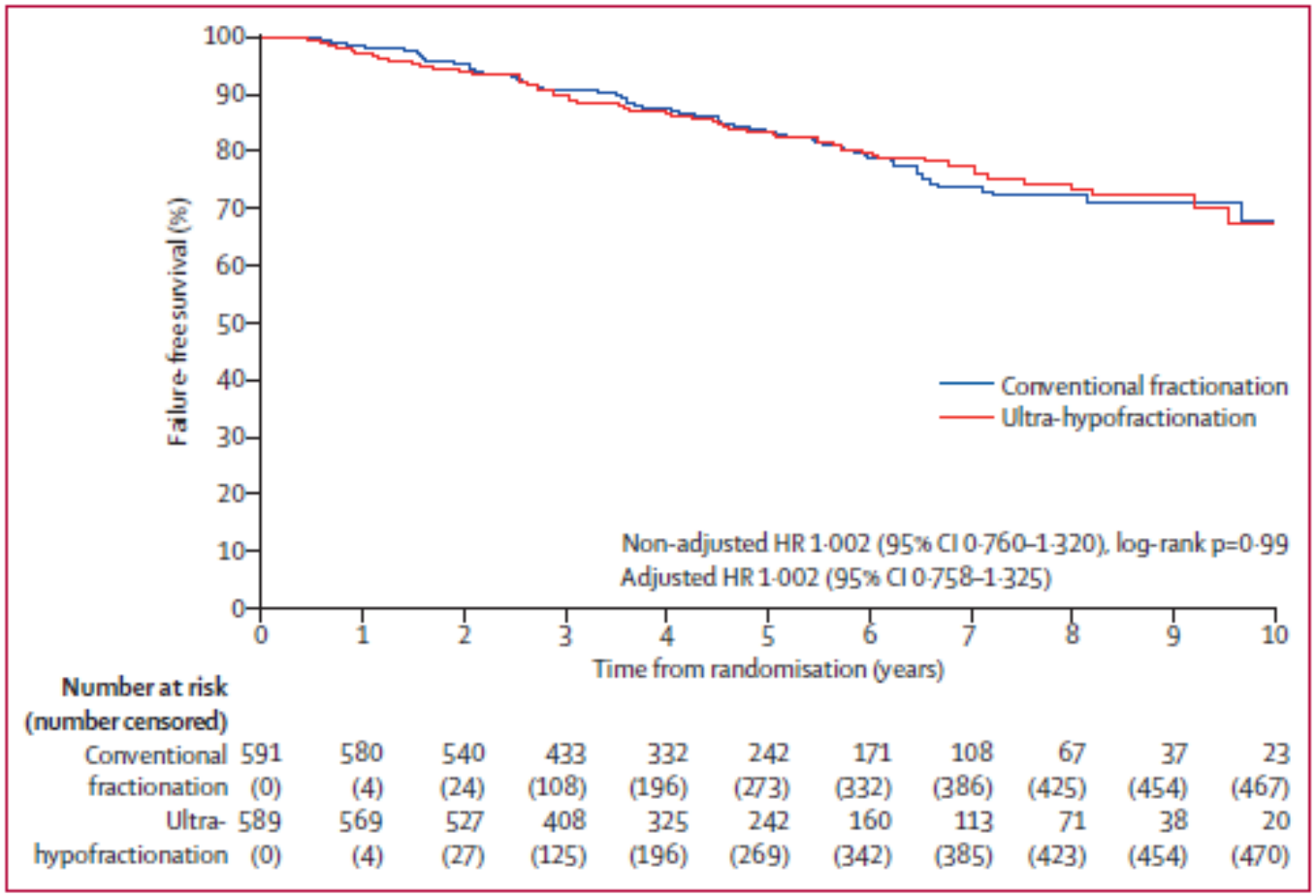
	CFMHRT	SBRT
Grade	%	%
0	13,9	19,8
1	58,7	57,0
2	**25,8**	**20,8**
3	**1,2**	**1,9**
4	**0,5**	**0,5**

- **p = 0,162**
- **Pas de différence significative**

Van As N et al. ASCO GU 2019. Abst

Ultra-hypofractionated versus conventionally fractionated radiotherapy for prostate cancer: 5-year outcomes of the HYPO-RT-PC randomised, non-inferiority, phase 3 trial

Anders Widmark, Adalsteinn Gunnlaugsson, Lars Beckman, Camilla Thellenberg-Karlsson, Morten Hoyer, Magnus Lagerlund, Jon Kindblom, Claes Ginman, Bengt Johansson, Kirsten Björnlinger, Mihajl Seke, Måns Agrup, Per Fransson, Björn Tavelin, David Norman, Björn Zackrisson, Harald Anderson, Elisabeth Kjellén, Lars Franzén, Per Nilsson



Number at risk (number censored)											
Conventional fractionation	591 (0)	580 (4)	540 (24)	433 (108)	332 (196)	242 (273)	171 (332)	108 (386)	67 (425)	37 (454)	23 (467)
Ultra-hypofractionation	589 (0)	569 (4)	527 (27)	408 (125)	325 (196)	242 (269)	160 (342)	113 (385)	71 (423)	38 (454)	20 (470)

Figure 2: **Failure-free survival**
HR=hazard ratio.

Ultra-hypofractionated versus conventionally fractionated radiotherapy for prostate cancer: 5-year outcomes of the HYPO-RT-PC randomised, non-inferiority, phase 3 trial

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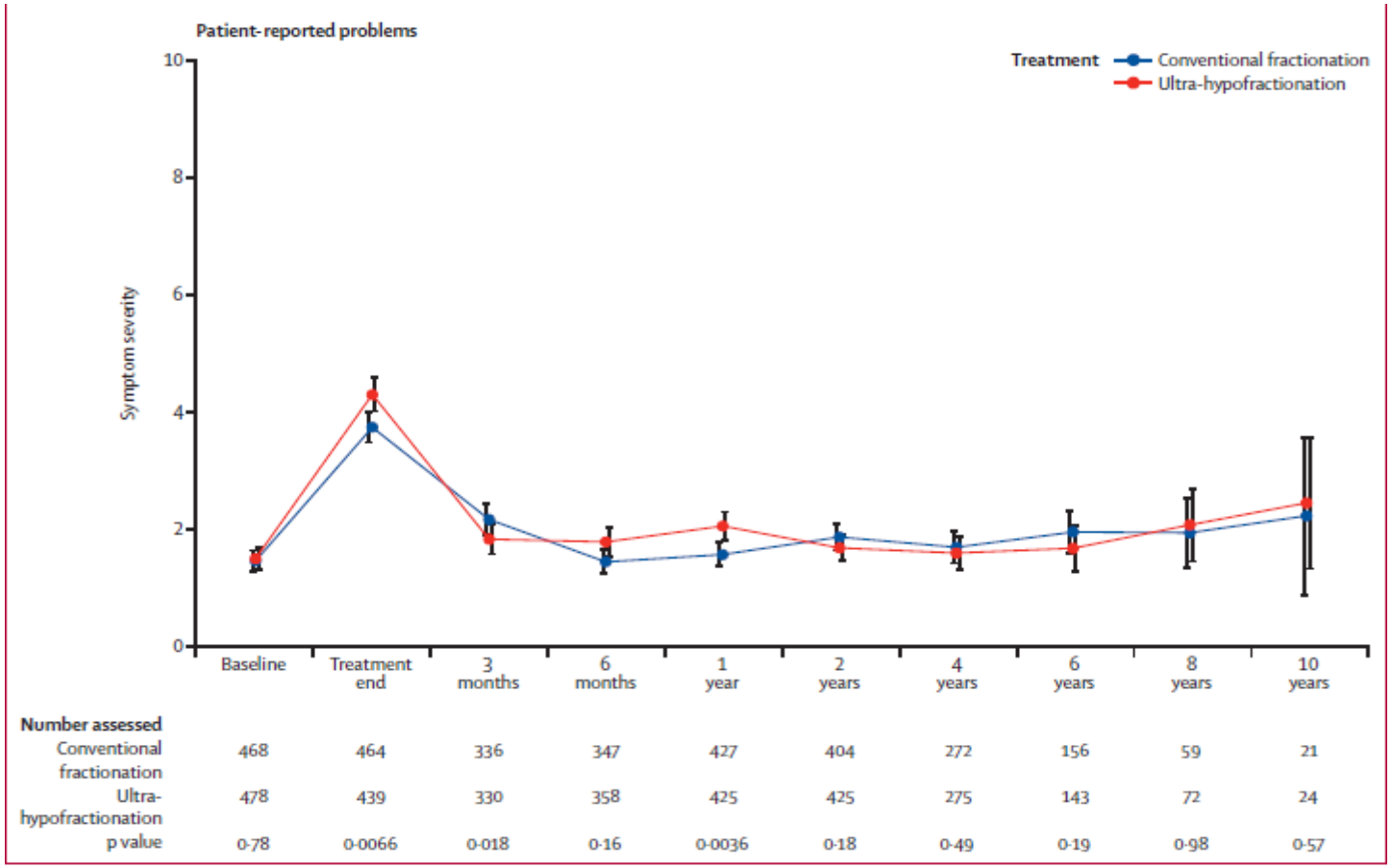

Number assessed										
Conventional fractionation	468	464	336	347	427	404	272	156	59	21
Ultra-hypofractionation	478	439	330	358	425	425	275	143	72	24
p value	0·78	0·0066	0·018	0·16	0·0036	0·18	0·49	0·19	0·98	0·57

***Figure 3*: Urinary toxicity and patient-reported problems**
Physician-recorded urinary toxicity was measured according to the RTOG morbidity scale; p values correspond to comparisons of grade 2 or worse toxicities by treatment group, by Fisher's exact test. The corresponding patient-reported problem was measured with the question "Do you have problems with your urinary tract?" in the PCSS questionnaire; higher values indicate more symptoms. The Wilcoxon rank sum test, adjusted for ties, was used for comparisons between treatment groups. C=conventional fractionation. U=ultra-hypofractionation. RTOG=Radiation Therapy Oncology Group. PCSS=Prostate Cancer Symptom Scale.

Ultra-hypofractionated versus conventionally fractionated radiotherapy for prostate cancer: 5-year outcomes of the HYPO-RT-PC randomised, non-inferiority, phase 3 trial

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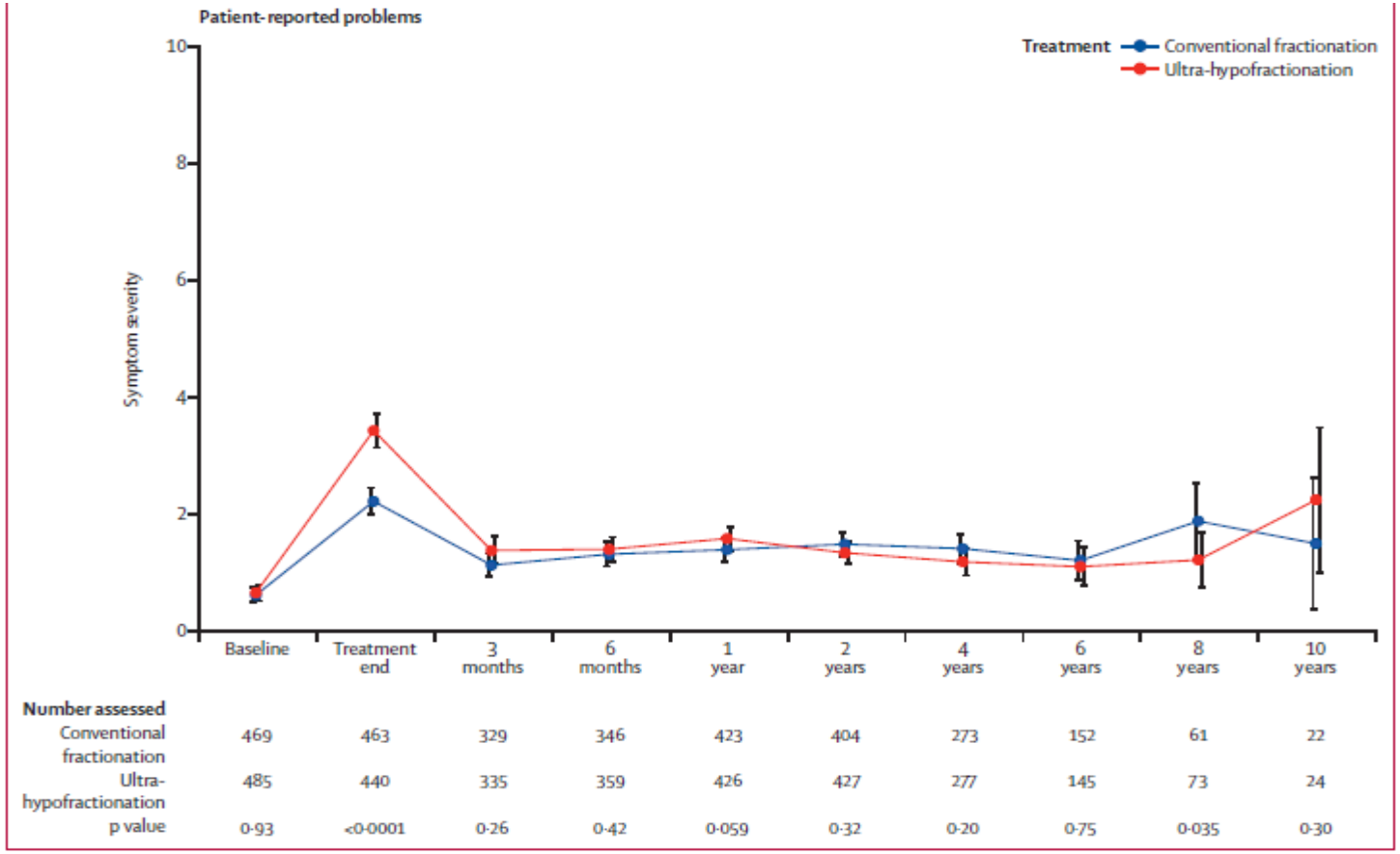


Number assessed	Baseline	Treatment end	3 months	6 months	1 year	2 years	4 years	6 years	8 years	10 years
Conventional fractionation	469	463	329	346	423	404	273	152	61	22
Ultra-hypofractionation	485	440	335	359	426	427	277	145	73	24
p value	0·93	<0·0001	0·26	0·42	0·059	0·32	0·20	0·75	0·035	0·30

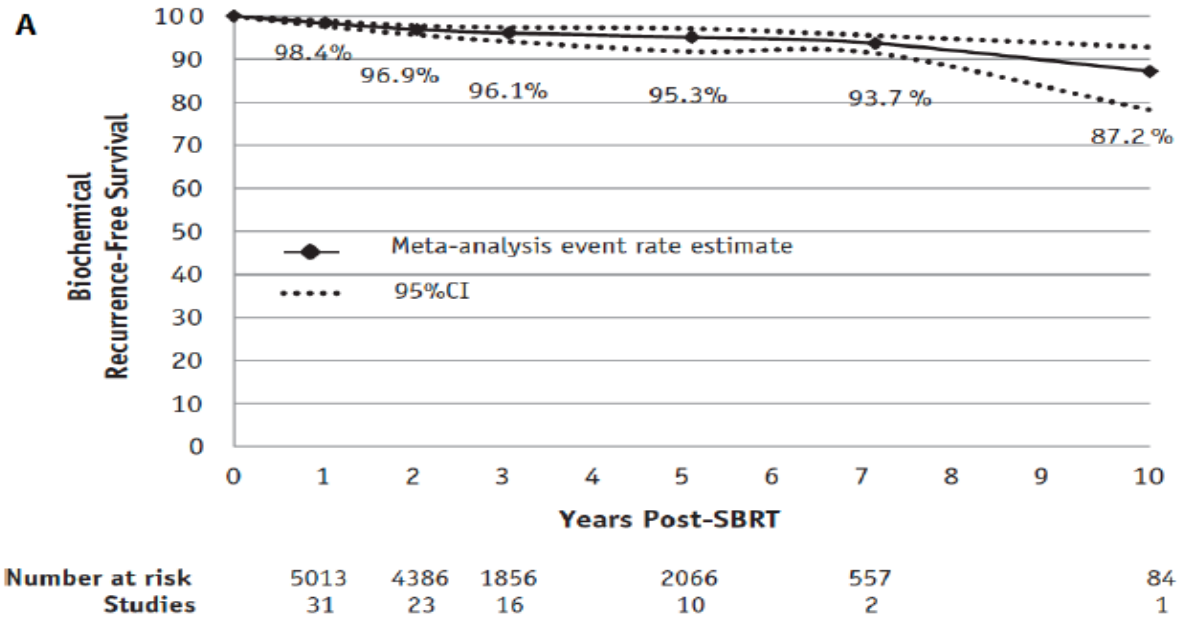
Figure 4: **Bowel toxicity and patient-reported problems**
Physician-recorded bowel toxicity was measured according to the RTOG morbidity scale; p values correspond to comparisons of grade 2 or worse toxicities by treatment group, by Fisher's exact test. The corresponding patient-reported problem was measured with the question "Do you have problems with your stool?" in the PCSS questionnaire; higher values indicate more symptoms. The Wilcoxon rank sum test, adjusted for ties, was used for comparisons between treatment groups. C=conventional fractionation. U=ultra-hypofractionation. RTOG=Radiation Therapy Oncology Group. PCSS=Prostate Cancer Symptom Scale.

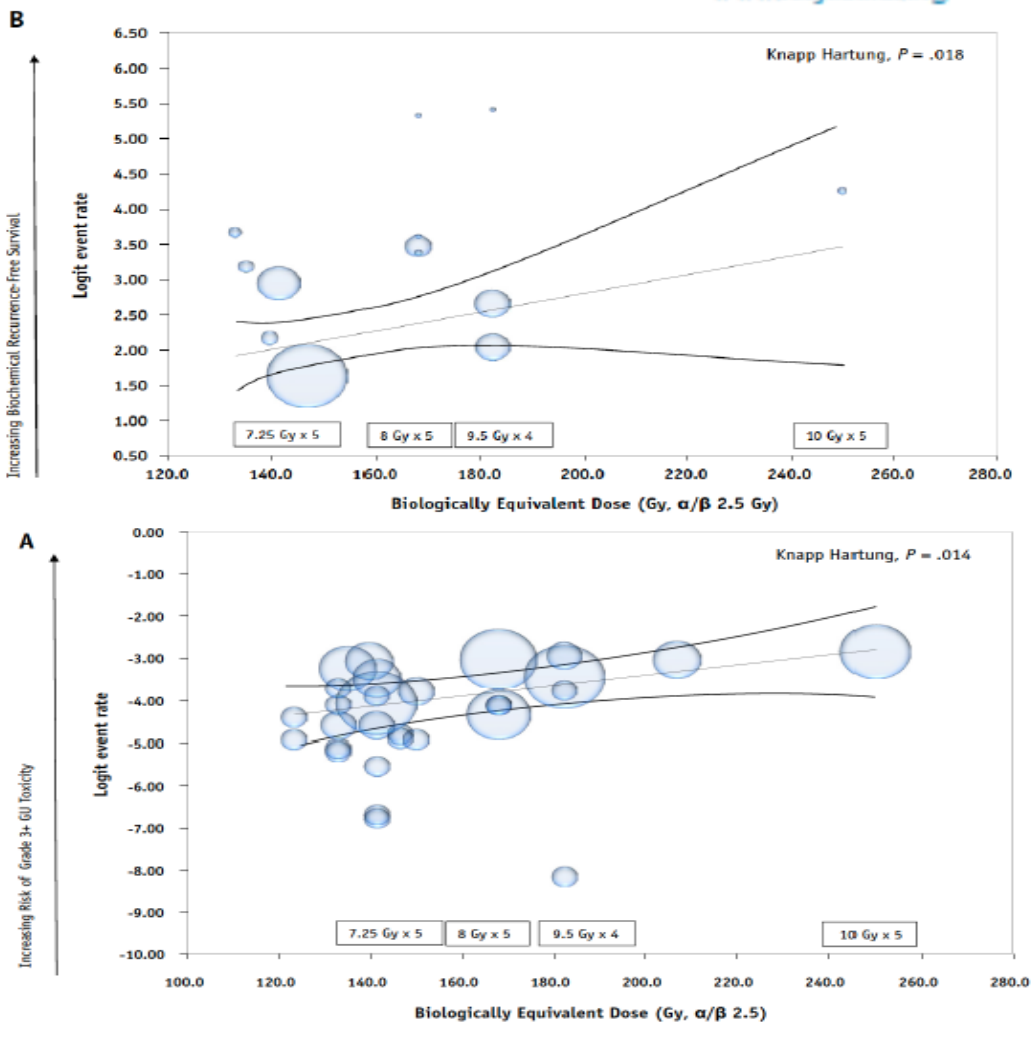
Stereotactic Body Radiation Therapy for Localized Prostate Cancer: A Systematic Review and Meta-Analysis of Over 6,000 Patients Treated on Prospective Studies

International Journal of Radiation Oncology biology • physics
www.redjournal.org

- ✓ 38 études dont 2 phases III et 15 phases II
- ✓ 6116 patients
- ✓ Suivi moyen = 39 mois

- ✓ Taux de tox G3+ GI = **2.0%** et GU= **1.1%**

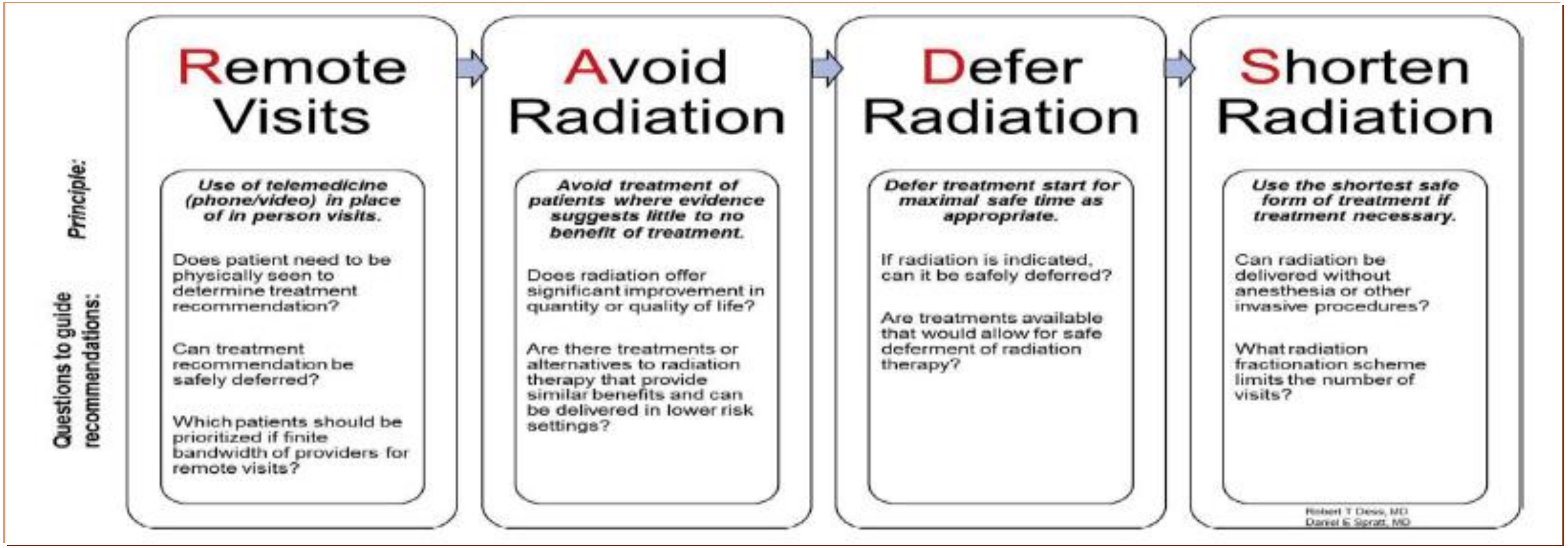




Espace réservé au texte des références - si besoin

Prostate Cancer Radiation Therapy Recommendations in Response to COVID-19

Nicholas G. Zaorsky, MD,[a] James B. Yu, MD,[b] Sean M. McBride, MD,[c] Robert T. Dess, MD,[d] William C. Jackson, MD,[d] Brandon A. Mahal, MD,[e] Ronald Chen, MD,[f] Ananya Choudhury, MD,[g] Ann Henry, MD,[h] Isabel Syndikus, MD,[i] Timur Mitin, MD,[j] Alison Tree, MD,[k] Amar U. Kishan, MD,[l] and Daniel E. Spratt, MD[d,*]



Zaorsky, Adv Radiat Oncol. 2020

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Table 1 Recommendations

Disease state	Visits		Simulation/preparation			If treatment is warranted during pandemic			
	New consults*	RVs*	Fiducials†	Rectal spacers†	Simulation scans	Preferred treatment during pandemic	Brachytherapy‡	EBRT type	ADT
Localized/locally advanced									
Very low/low	Delay until safe	Delay until safe	Delay until safe	Delay until safe	Delay until safe	AS	Do not use	Do not use	Do not use
FIR	Delay 3 mo	Delay until safe	Delay until safe	Delay until safe	Delay until safe	AS	Delay until safe	Delay until safe	Do not use
UIR	Delay 1-3 mo	Delay 4 mo	Consider if performing SBRT	Consider if performing SBRT	Delay up to 4-6 mo if ADT given	RT + ADT	Delay until safe	5 fx (preferred) or 20 fx	Can use ADT to delay RT 4-6 mo Consider 6-mo depot
High/very high	Delay up to 1 mo	Delay 3 mo	Consider if performing SBRT	If experienced to place, consider only if performing SBRT	Delay 4-6 mo if ADT given	RT + ADT	Delay until safe	5 fx (preferred) Or 20 fx	Can use ADT to delay RT 4-6 mo Consider 6-mo depot

Zaorsky, et al. Adv Radiat Oncol. 2020 ; 5(4):659-665

Prostate Cancer Radiation Therapy Recommendations in Response to COVID-19

Nicholas G. Zaorsky, MD,[a] James B. Yu, MD,[b] Sean M. McBride, MD,[c] Robert T. Dess, MD,[d] William C. Jackson, MD,[d] Brandon A. Mahal, MD,[e] Ronald Chen, MD,[f] Ananya Choudhury, MD,[g] Ann Henry, MD,[h] Isabel Syndikus, MD,[i] Timur Mitin, MD,[j] Alison Tree, MD,[k] Amar U. Kishan, MD,[l] and Daniel E. Spratt, MD[d,*]

- Very low risk
- Low risk
- FIR

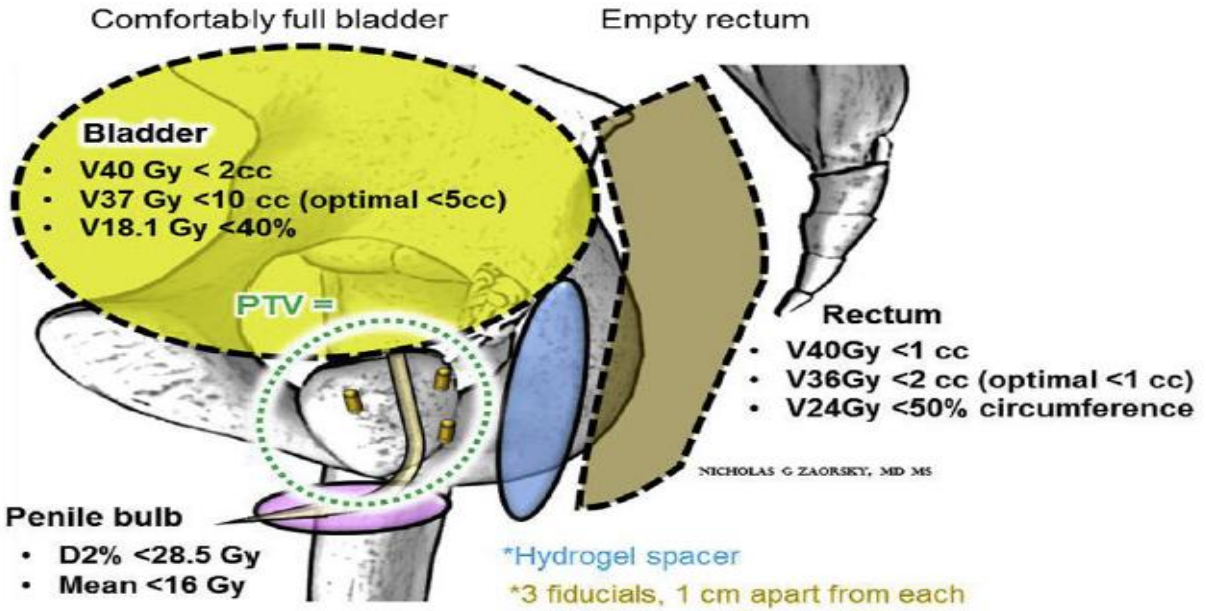
→ Defer treatment until safe

- UIR
- High risk
- Very high risk

→ Delay RT with ADT as needed → CT sim

→ *MRI → *Fiducials and/or hydrogel spacer

*Optional, depending on staffing and personal protective equipment availability



GTV = CTV = prostate +/- seminal vesicles
PTV = CTV + 5mm (3mm optional posterior)
Dose: 7.25-8 Gy x 5 fractions over 2-5 weeks

Délai RTUP
Large Prostate

Figure 2 workflow of prostate stereotactic body radiation therapy (SBRT). Please see Appendix E1 for more details on dose constraints.

POUR TOUS?

Practical Radiation Oncology (2018) 8, 185–202

practical radiation oncology
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www.practicalradonc.org

Critical Review

Stereotactic body radiation therapy (SBRT) for high-risk prostate cancer: Where are we now?

Alejandro Gonzalez-Motta MD [a,b,*], Mack Roach III MD FACR FASTRO [c]

Results: Our search yielded 8862 articles. Of these, 20 studies with a median follow-up from 1.6 to 7 years were included in this review. The 5-year bDFS was 81% to 91% in monotherapy studies and 90% to 98% in boost studies. For reference, 19 studies that reported treating HR patients with HDR monotherapy or boost were selected. The 5-year bDFS in HDR monotherapy studies and boost studies was 85% to 93% and 72% to 93%, respectively. The incidence of late grade 3 genitourinary toxicity was 0% to 4.4% and 0% to 2.3% in SBRT monotherapy and SBRT boost studies, respectively.

Conclusion: The evidence for SBRT in HR patients in this review is based on observational studies with relatively few patients and short follow-up (level III evidence). Based on these data and the principles surrounding treatment, SBRT boost should ideally be validated in clinical trials. SBRT monotherapy should be used cautiously in highly selected HR patients outside of a clinical trial.

cancers

MDPI

Systematic Review

Stereotactic Body Radiotherapy for High-Risk Prostate Cancer: A Systematic Review

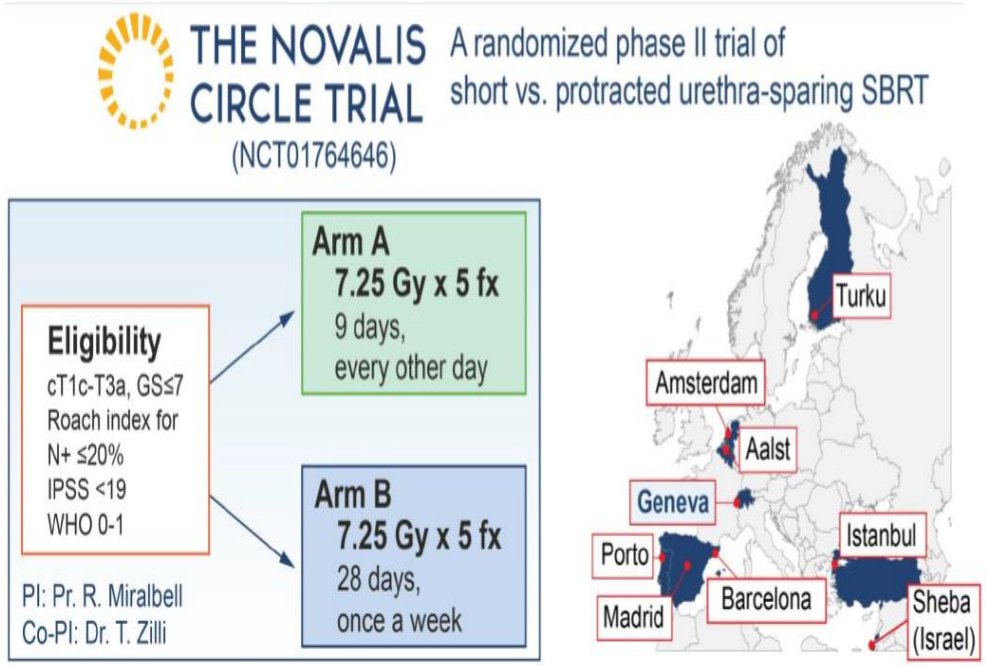
Robert Foerster [1,2,*], Daniel Rudolf Zwahlen [1,2], Andre Buchali [3], Hongjian Tang [1], Christina Schroeder [1,3,4], Paul Windisch [1], Erwin Vu [5], Sati Akbaba [6], Tilman Bostel [6], Tanja Sprave [7], Constantinos Zamboglou [7], Thomas Zilli [8], Jean-Jacques Stelmes [9], Tejshri Telkhade [10] and Vedang Murthy [10]

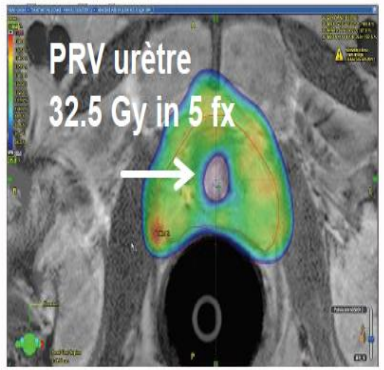
Conclusion: At this point, SBRT with or without pelvic ENI cannot be considered the standard of care in HR PCA, due to missing level 1 evidence. Treatment may be offered to selected patients at specialized centers with access to high-precision RT. While concomitant ADT is the current standard of care, the necessary duration of ADT in combination with SBRT remains unclear. Ideally, all eligible patients should be enrolled in clinical trials.

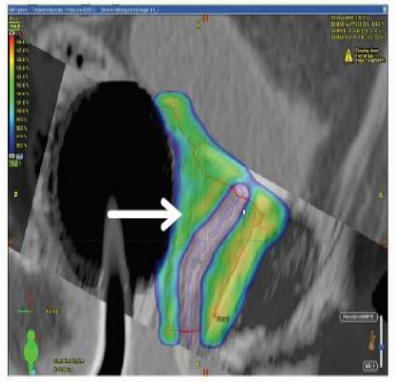
Espace réservé au texte des références - si besoin

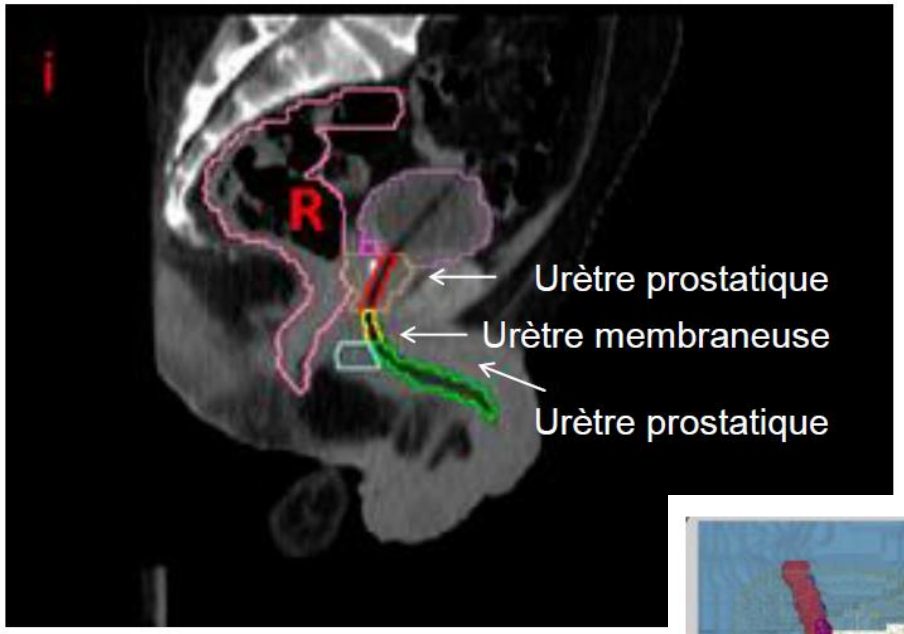
OPTIMISATION: URETRE

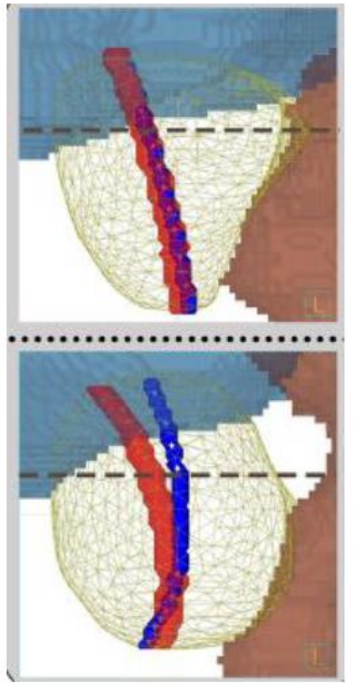
FUSION IRM ++











Vessel-sparing Radiotherapy for Localized Prostate Cancer to Preserve Erectile Function: A Single-arm Phase 2 Trial

Daniel E. Spratt [a,†], Jae Y. Lee [a,†], Robert T. Dess [a], Vrinda Narayana [a], Cheryl Evans [a], Adam Liss [a], Raymond Winfield [b], Matthew J. Schipper [a,c], Theodore S. Lawrence [a], Patrick W. McLaughlin [a,d,]*

[a] Department of Radiation Oncology, University of Michigan, Ann Arbor, MI, USA; [b] Department of Urology, Providence Cancer Center, Southfield, MI, USA; [c] Department of Biostatistics, University of Michigan, Ann Arbor, MI, USA; [d] Department of Radiation Oncology, Providence Cancer Center, Southfield, MI, USA

PROSTQA Model to Predict Erectile Dysfunction after Nerve Sparing RP or Conventional EBRT

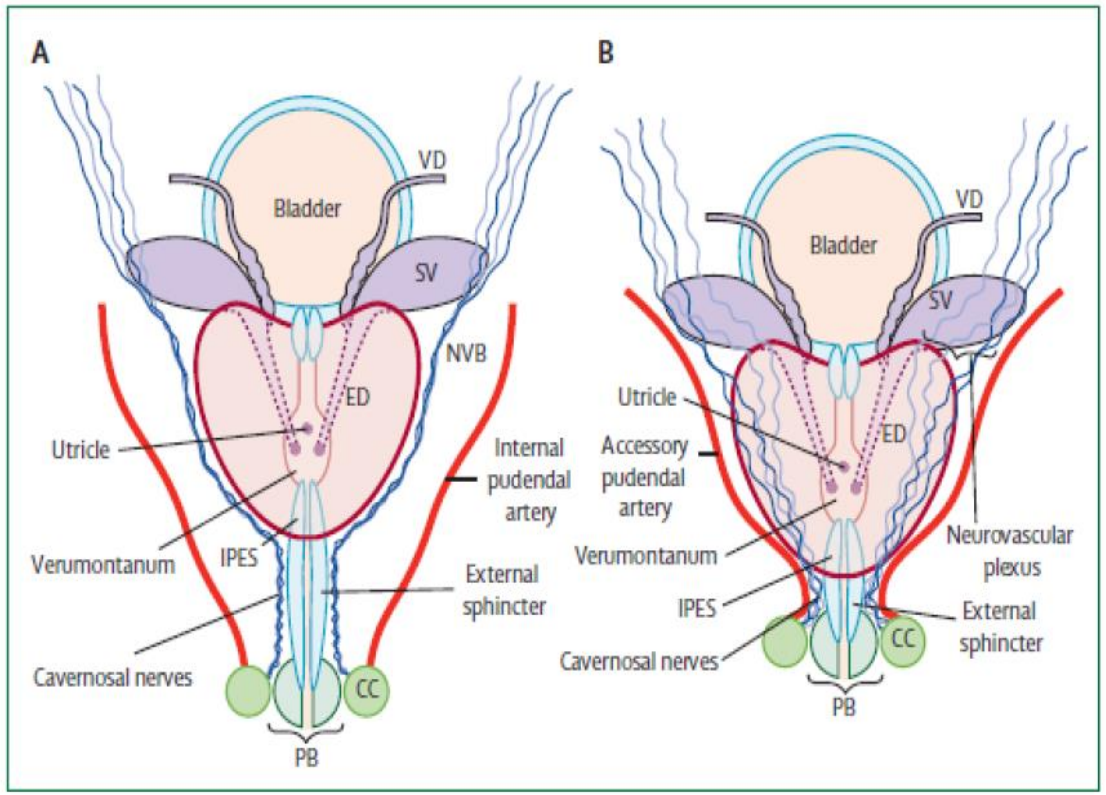
Table 3 – Expected model-predicted probability of men having functional erections suitable for intercourse at 2 yr after treatment compared to observed rates

	Patients with Erections Suitable for Intercourse, % (95% confidence interval)			*p* value[a]
	Nerve-sparing prostatectomy	Conventional EBRT	Vessel-sparing radiotherapy	
	Expected	Expected	Observed	
Total cohort	24 (22–27)	42 (38–45)	78 (71–85)	<0.001
Top quartile BEF	35 (32–38)	55 (51–59)	87 (77–97)	<0.001
Bottom quartile BEF	13 (8–18)	26 (21–31)	69 (55–83)	<0.001
Age <65 yr	31 (28–34)	44 (40–48)	81 (72–90)	<0.001
Age ≥65 yr	15 (13–17)	38 (33–43)	73 (61–85)	<0.001
No ADT	26 (23–29)	51 (48–54)	84 (76–92)	<0.001
ADT[b]	21 (18–24)	22 (19–25)	66 (52–80)	<0.001

EBRT = external beam radiotherapy; BEF = baseline erectile function; ADT = androgen deprivation therapy.
[a] Comparison is between conventional external beam radiotherapy and vessel-sparing radiotherapy.
[b] ADT use is not included in the prostatectomy model so does not impact expected potency rates for surgically treated patients.

OPTIMISATION: ARTERES PUDENDALES

Fusion IRM
Radiologue
Bulbe= surrogate



P TEN-C

UTSouthwestern Medical Center

Vessel-Sparing RT Randomized Trial = POTEN-C

Phase II randomized controlled trial of stereotactic ablative body radiotherapy (SAbR) with or without neurovascular sparing for erectile function preservation in localized prostate cancer: a study of prostate oncologic therapy while ensuring neurovascular conservation (SAbR POTEN-C)

Multi-center randomized trial of: ~25% enrolled

SBRT +/- Vessel-Sparing RT

All patients get:
- IGRT
- 5 fractions of SBRT
- Rectal Spacer

PERSPECTIVES: SPACERS

- Patients sélectionnés

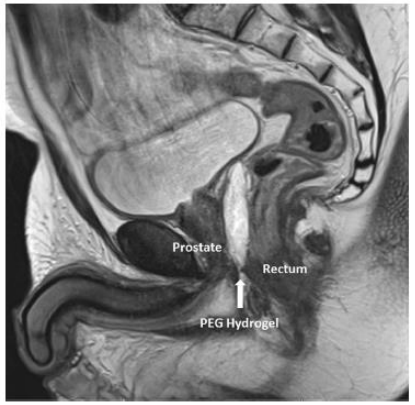


Fig. 1. Image IRM en vue sagittale et pondération T2 d'un patient implanté avec un *spacer* de type hydrogel de polyéthylène-glycol (PEG).

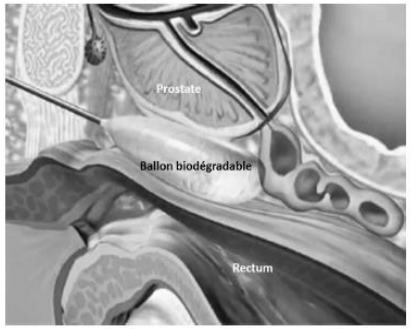
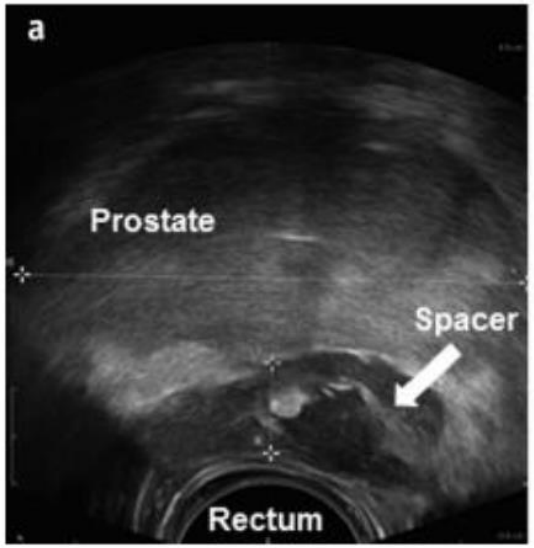
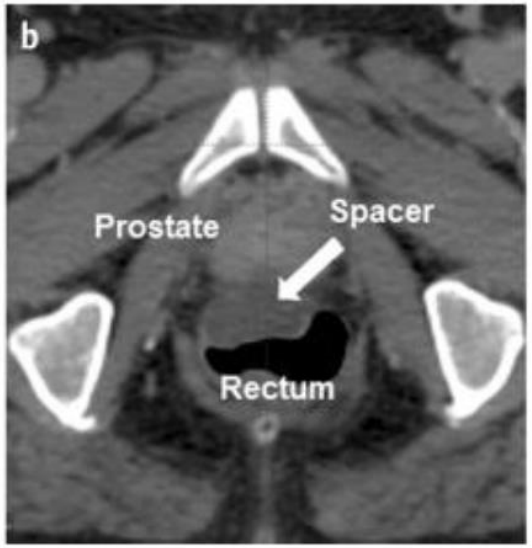
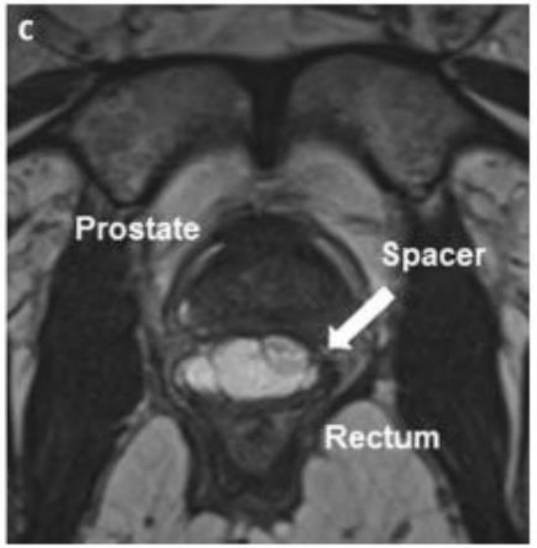
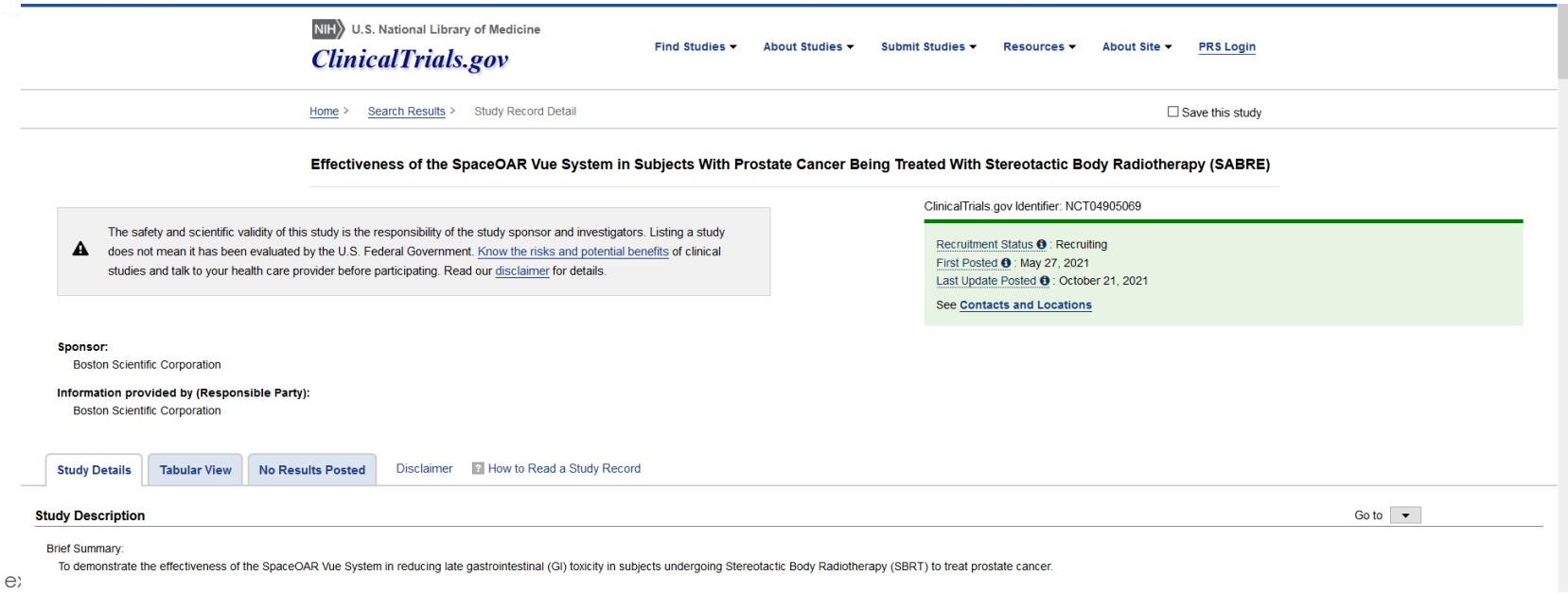


Fig. 3. Image anatomique en vue sagittale illustrant la mise en place du *spacer* de type ballon biodégradable dans l'espace rectoprostatique.
D'après [41].









Cette présentation peut contenir des données issues d'analyses ex

JAMA Oncology | Original Investigation

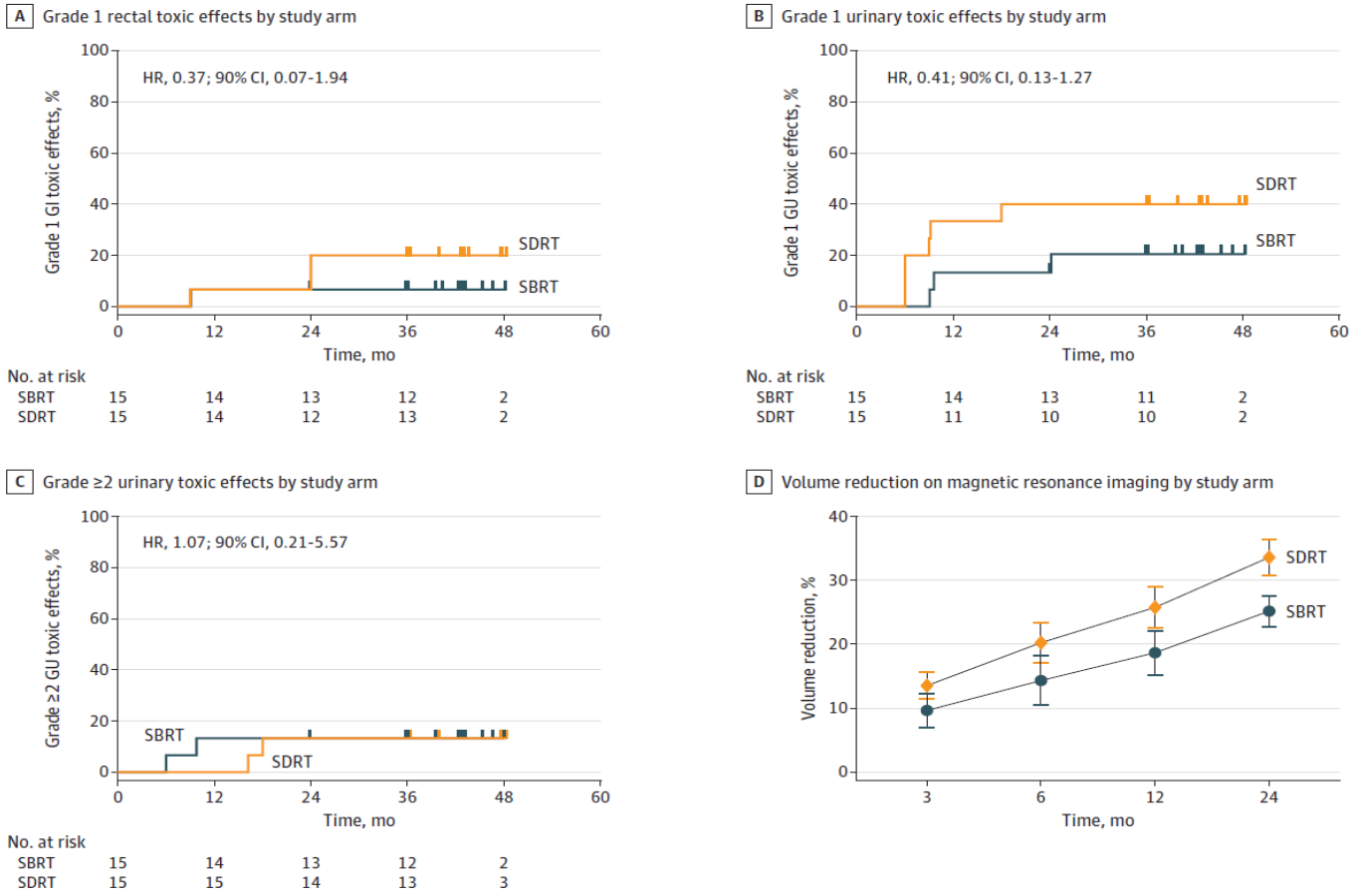
Safety and Efficacy of Virtual Prostatectomy With Single-Dose Radiotherapy in Patients With Intermediate-Risk Prostate Cancer

Results From the PROSINT Phase 2 Randomized Clinical Trial

Carlo Greco, MD; Oriol Pares, MD; Nuno Pimentel, MD; Vasco Louro, MD; Inês Santiago, MD; Sandra Vieira, PhD; Joep Stroom, PhD; Dalila Mateus; Ana Soares; João Marques; Elda Freitas; Graça Coelho; Manuela Seixas; Antonio Lopez-Beltran, MD; Zvi Fuks, MD

Pas de grade 2 et + GI

Figure 2. Clinical Outcomes of Stereotactic Body Radiotherapy (SBRT) vs Single-Dose Radiotherapy (SDRT) Stratified by Treatment Arm



A, Cumulative incidence of bowel grade 1 gastrointestinal (GI) toxic effects. B, Cumulative incidence of genitourinary (GU) grade 1 toxic effects. C, Cumulative incidence of urinary grade ≥2 toxic effects. D, Percentage volume reductions compared to baseline measured by magnetic resonance imaging. Error bars indicate SE; HR, hazard ratio.

Espace réservé au texte des références - s

Radiothérapie Stéréotaxique: RE-IRRADIATION??

Dr Paul Sargos, Bergonié, Bordeaux

Cancer Treatment Reviews 98 (2021) 102206

Contents lists available at ScienceDirect

Cancer Treatment Reviews

journal homepage: www.elsevier.com/locate/ctrv

Hot Topic

Salvage stereotactic body radiotherapy (SBRT) for intraprostatic relapse after prostate cancer radiotherapy: An ESTRO ACROP Delphi consensus

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Table 2

Summary of the survey results divided in the three sections, the color code indicates the agreement on the topic: green = consensus (agreement > 80%), orange = major agreement (65% < agreement < 80%), red = divided opinion (agreement < 65%).

Initial evaluation

Patients' characteristics

- **No maximum age**
- Exclusion for life expectancy < 5 years
- **Recommended ECOG: 0-1**

Primary treatment

- **Previous ADT represents no contraindication**
- Maximum acceptable T-classification at primary treatment: any T
- Maximum Gleason score at primary treatment: 9-10 (ISUP 5)
- Acceptable PSA at primary treatment: no limit

Salvage treatment

- Maximum acceptable T-classification at secondary treatment: T2
- Maximum Gleason score at salvage treatment: 9-10 (ISUP 5)
- Acceptable PSA at salvage treatment: < 20 ng/dl
- **IPSS should be known**
- Maximum IPSS at salvage: 15
- Should maximal urinary flow (Qmax) be known: not certain
- **Maximum Qmax at salvage: no minimum inferior value**
- Should PVRV be known: not certain
- Maximum PVRV at salvage: no maximum
- **CTV: GTV defined on mpMRI plus adaptive margin**
- No salvage SBRT in case of G2+ urinary/rectal toxicity at primary treatment
- Re-irradiation of seminal vesicles not a contraindication

Diagnostic tests

Metastatic disease

- **Metastatic disease should be evaluated**
- **Imaging for metastatic disease evaluation: Choline-PET**

Biopsy

- For local recurrence imaging (MRI, PET) is enough for diagnosis, no biopsy needed
- MRI-US fusion as imaging device for guiding biopsies
- Number of biopsies at recurrence for whole gland treatment: between 12 and 18
- Number of biopsies at recurrence for partial gland treatment: between 12 and 18
- Gleason score as reliable parameters at re-biopsy: not certain

Salvage treatment

General indications

- **2 years the minimum interval first RT – salvage RT**
- **ADT should not be delivered concomitantly with re-irradiation**
- **Phoenix definition of biochemical relapse is valid for re-treated patients**

Dosimetric considerations – target volume

- **Primary treatment dose should be always considered when deciding salvage SBRT dose**
- SBRT dose should be higher respect to the primary treatment dose
- Median EQD2 for effective SBRT with an a/β of 1.5 Gy should be > 35Gy in 5 fractions
- Dose should be prescribed at the isodose with a percentage < 80%
- Recommended fractionation schedule is 35 Gy in 5 fractions

Dosimetric considerations – OARs

- Dose to OARs should be adjusted considering previous dose and time interval between primary and salvage treatment
- Recommended EQD2 range for 2cc of the rectum: 95 – 105 Gy
- Recommended EQD2 range for 2cc of the bladder: 95 – 105 Gy
- Recommended EQD2 range for femoral heads: no maximum
- Recommended EQD2 range for 2cc of the penile bulb: no maximum

List of abbreviations: **CTV** = clinical target volume; **ECOG** = Eastern Cooperative Oncology Group; **EQD2** = 2 Gy equivalent dose; **GTV** = gross tumor volume; **IPSS** = international prostate symptom score; **ISUP** = International Society of Urological Pathology; **mpMRI** = multi-parametric magnetic resonance imaging; **OARs** = organs at risk; **PET** = positron emission tomography; **PVRV** = Post-Voiding Residual Volume; **Qmax** = maximal urinary flow; **RT** = radiotherapy; **SBRT** = stereotactic body RT.

QUELLES CONTRAINTES?

Table 2: Recommended/accepted re-irradiation normal tissue tolerances in late reacting tissues

Organ/tissue	Accepted re-irradiation dose-fractionated (Gy)	Accepted re-irradiation dose-stereotactic (Gy)	Accepted time interval between RT courses	Extent of OAR recovery
Urinary bladder	Can tolerate point cumulative doses of up to 120 Gy3[25]		>6 months-1 year	
Pelvic ureter	Can tolerate point cumulative doses of up to 110 Gy3[26]		>24 months	Ureteric stenosis
Rectal mucosa and wall	Total cumulative doses 70-100 Gy with a median total dose of 85 Gy[27,28]	IORT dose of 10-20 Gy[26,28]		Peripheral neuropathy most commonly seen with IORT
Femoral heads	Blood supply to the femoral head is defining point of action. Constraint similar to blood vessels; cumulative BED should not exceed 90-100 Gy2		>2-3 years gap can help recovery	Avascular necrosis of the head is the catastrophic event

Das S, Patro KC, Mukherji A. Recovery and tolerance of the organs at risk during re-irradiation. J Curr Oncol 2018;1:23-8

- Intestin grêle : pas plus de 10 cm3 reçoit une dose > 110 Gy (EQD2, $\alpha/\beta = 3$)

Abusaris et al. Technol Cancer Res Treatment 2012

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European Association of Urology

Platinum Priority – Review – Prostate Cancer
Editorial by XXX on pp. x–y of this issue

A Systematic Review and Meta-analysis of Local Salvage Therapies After Radiotherapy for Prostate Cancer (MASTER)

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Table 3 – Covariate-adjusted meta-regression comparing efficacy and toxicity between salvage modalities and radical prostatectomy

	2-yr RFS	5-yr RFS	Severe GU toxicity	Severe GI toxicity
Radical prostatectomy				
Adjusted percent[a] (95% CI)	72% (66–78%)	53% (46%–59%)	21% (16%–26%)	1.5% (0.4%–3.2%)
Odds ratio (95% CI)	1.0	1.0	NA	NA
p value	Reference	Reference	Reference	Reference
R^2 (%)	0.0	0.0	0.0	0.0
Cryotherapy				
Adjusted percent[a] (95% CI)	66% (59–72%)	57% (49–65%)	15% (8–23%)	0.9% (0.3–1.8%)
Odds ratio (95% CI)	0.74 (0.49–1.12)	1.20 (0.80–1.79)	NA	NA
p value	0.2	0.4	0.2	0.5
R^2 (%)	25	0.0	8.2	27
HIFU				
Adjusted percent[a] (95% CI)	52% (45%–59%)	46% (37%–55%)	23% (17%–30%)	0.8% (0.1%–2.1%)
Odds ratio (95% CI)	0.42 (0.28–0.64)	0.76 (0.48–1.21)	NA	NA
p value	**<0.001**	0.2	0.5	0.4
SBRT				
Adjusted percent[a] (95% CI)	58% (46–69%)	56% (37–73%)	5.6% (1.4–12%)	0.0% (0.0–1.2%)
Odds ratio (95% CI)	0.52 (0.30–0.93)	1.13 (0.50–2.58)	NA	NA
p value	0.03	0.8	**<0.001**	0.07
R^2 (%)	55	4.2	0.00	0.0
HDR				
Adjusted percent[a] (95% CI)	77% (69–83%)	58% (52–64%)	9.6% (6.0–13.9%)	0.0% (0.0–0.3%)
Odds ratio (95% CI)	1.26 (0.77–2.09)	1.25 (0.88–1.78)	NA	NA
p value	0.4	0.2	**0.002**	**0.003**
R^2 (%)	0.0	91	0.0	0.0
LDR				
Adjusted percent[a] (95% CI)	79% (72–85%)	53% (43–63%)	9.1% (5.2–14%)	2.1% (0.6–4.0%)
Odds ratio (95% CI)	1.49 (0.89–2.50)	1.02 (0.63–1.67)	–	–
p value	0.13	0.9	**0.001**	0.6
R^2 (%)	4.3	5.2	12	20%

CI = confidence interval; GI = gastrointestinal; GU = genitourinary; HDR = high-dose-rate brachytherapy; HIFU = high-intensity focused ultrasound; LDR = low-dose-rate brachytherapy; NA = not available; RFS = recurrence-free survival; SBRT = stereotactic body radiotherapy.
Significant p-values after Bonferroni correction appear in bold.
[a] Back-transformed regression coefficients for ease of interpretation.

Conclusions: Large differences in 5-yr outcomes were not uncovered when comparing all salvage treatment modalities against RP. Reirradiation with SBRT, HDR brachytherapy, or LDR brachytherapy appears to result in less severe GU toxicity than RP, and reirradiation with HDR brachytherapy yields less severe GI toxicity than RP. Prospective studies of local salvage for radiorecurrent disease are warranted.

Clinical Investigation

Salvage Stereotactic Body Radiation Therapy for Local Prostate Cancer Recurrence After Radiation Therapy: A Retrospective Multicenter Study of the GETUG

David Pasquier, MD, PhD,*,† Geoffrey Martinage, MD,* Guillaume Janoray, MD,‡,§ Damaris Patricia Rojas, MD,‖ Dario Zerini, MD,‖ Flora Goupy, MD,¶ Renaud De Crevoisier, MD, PhD,¶,#,** Emilie Bogart, MSc,†† Gilles Calais, MD, PhD,†,§ Alain Toledano, MD,‡‡ Laurent Chauveinc, MD, PhD,†† Nathaniel Scher, MD,‡‡ Pierre Yves Bondiau, MD, PhD,§§ Jean Michel Hannoun-Levi, MD, PhD,§§ Marlon Silva, MD,‖‖ Emmanuel Meyer, MD,‖‖ Philippe Nickers, MD, PhD,* Thomas Lacornerie, MSc,¶¶ Barbara Alicja Jereczek-Fossa, MD, PhD,‖ and Eric Lartigau, MD, PhD*,†

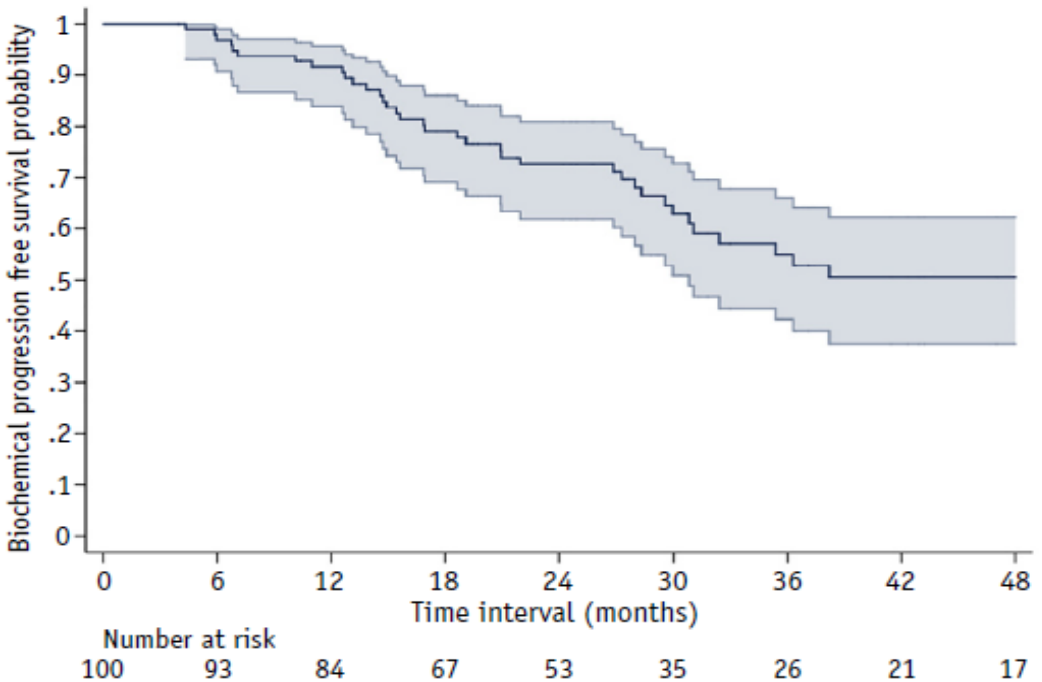


Fig. 1. Biochemical recurrence-free survival (95% confidence interval) after salvage stereotactic body radiation therapy for prostate cancer.

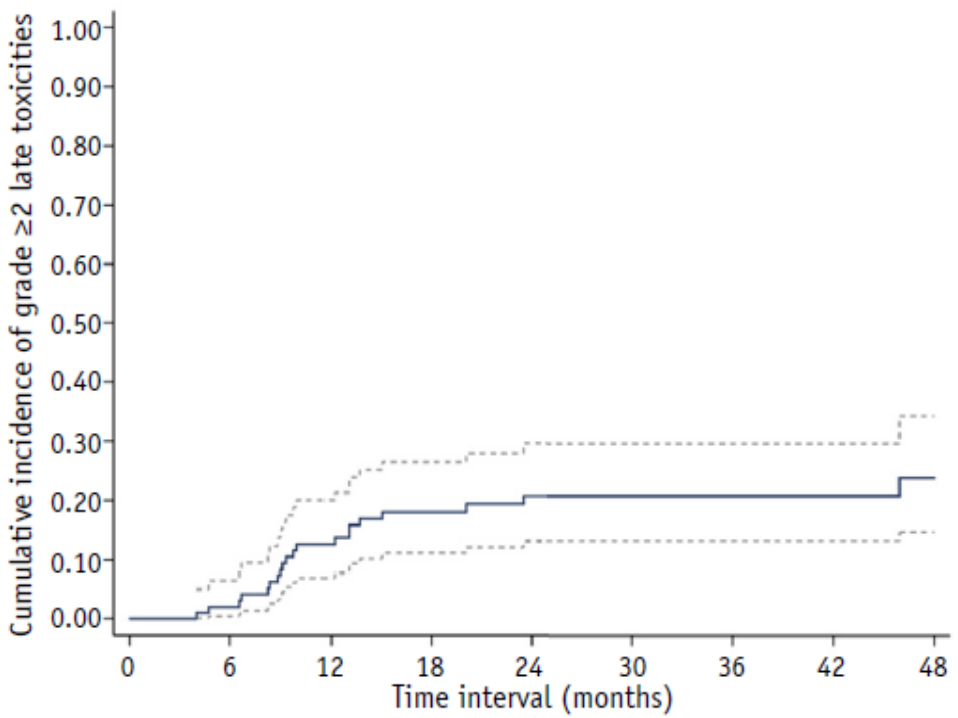


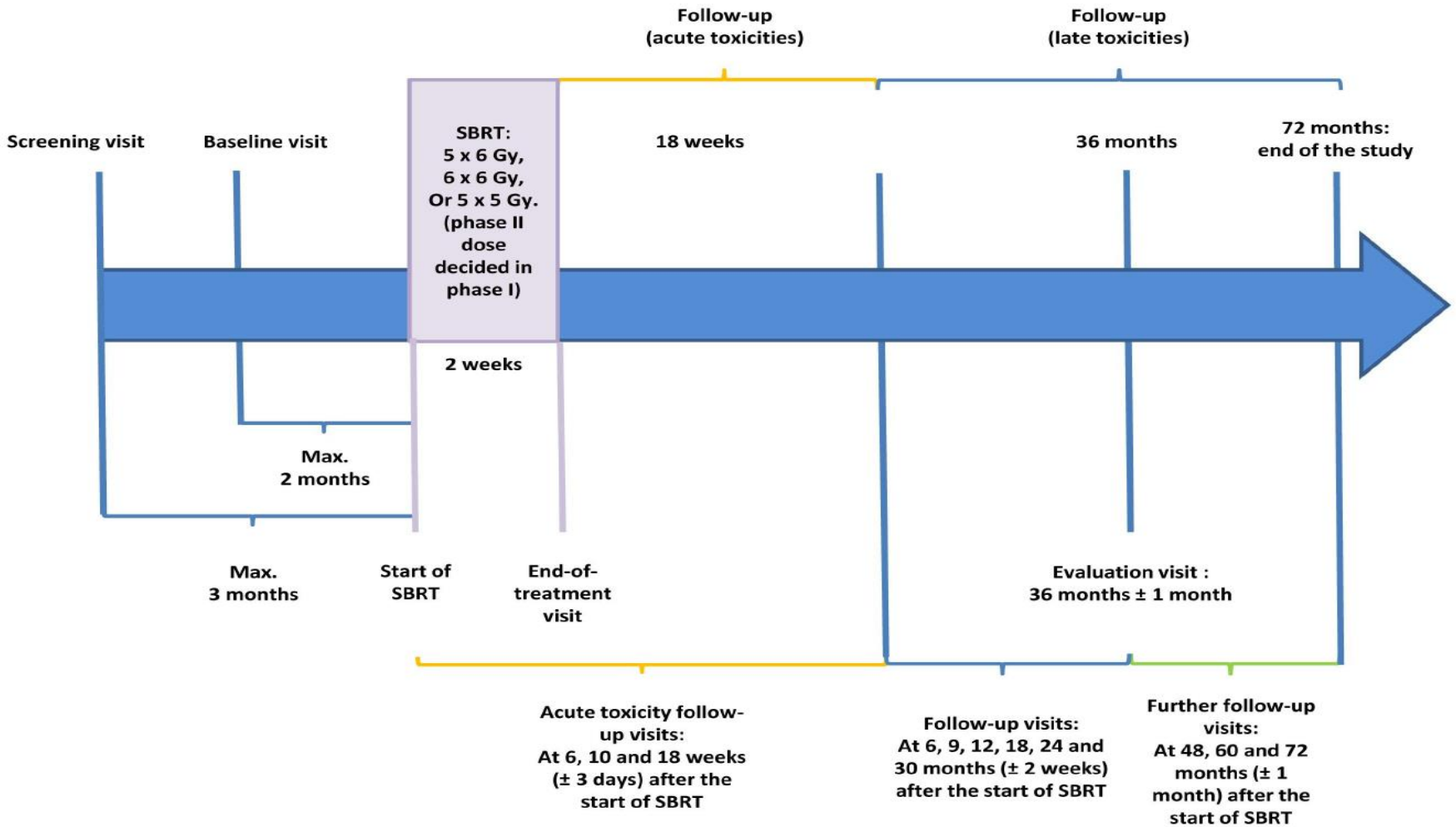
Fig. 3. Actuarial grade ≥2 genitourinary toxicity.

Open access Protocol

BMJ Open

GETUG-AFU 31: a phase I/II multicentre study evaluating the safety and efficacy of salvage stereotactic radiation in patients with intraprostatic tumour recurrence after external radiation therapy—study protocol

David Pasquier,[1,2] Marie-Cécile Le Deley,[3] Emmanuelle Tresch,[3] Luc Cormier,[4] Martine Duterque,[5] Soazig Nenan,[6] Eric Lartigau[1,2]



Espace réserv

Stereotactic Re-Irradiation for Local Recurrence after Radical Prostatectomy and Radiation Therapy: A Retrospective Multicenter Study

Tanguy Perennec [1], Loig Vaugier [1], Alain Toledano [2], Nathaniel Scher [2], Astrid Thomin [3], Yoann Pointreau [4], Guillaume Janoray [3], Renaud De Crevoisier [5] and Stéphane Supiot [1,6,*]

- N=48
- FU=22 mois

Table 2. Characteristics at re-irradiation.

Characteristics	Available Data	Overall
Delay since first irradiation (month)	47	102 (33–210)
PSA prior to SBRT (ng/mL)	48	2.6 (0.2–10.4)
ADT during SBRT	48	15 (31.2%)
Among which . . .		
Long term ADT (>3 months before SBRT)		9 (18.8%)
ADT beginning along the SBRT		6 (12.5%)
Exams before SBRT	47	
Choline PET-CT alone		11 (23%)
Choline PET-CT + MRI		28 (59%)
Choline PET-CT + PSMA PET/CT		4 (8.5%)
Choline PET-CT + PSMA PET/CT + MRI		2 (4.2%)
PSMA PET-CT + MRI		1 (2.1%)
MRI + CT scan + bone scintigraphy		1 (2.1%)
Total dose (Gy)	48	31.5 (20–37.2)
Fractionation (days)	48	5 (3–6)
SBRT course	48	
30 Gy in 5 fractions		18 (37.5%)
36 Gy in 6 fractions		16 (33.3%)
Other		13 (27.1%)

ADT—androgen deprivation therapy; Gy—gray; SBRT—stereotactic body radiation therapy.

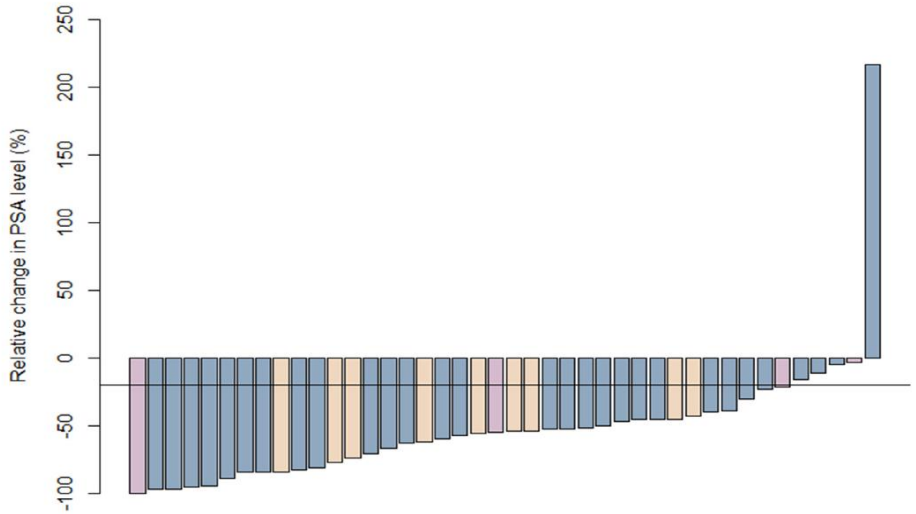


Figure 1. Relative PSA decline at three months after SBRT. Patients with a new ADT prescription are purple, and patients with ADT for more than three months are yellow. The horizontal line stands for −20% in the change of PSA. SBRT—stereotactic body radiation therapy; PSA—prostate specific antigen.

Table 3. Acute and late toxicity associated with stereotactic body radiation therapy.

	Available Data	Grade 1	Grade 2	Grade 3
Acute rectal toxicity	47	2 (4.3%)	1 (2.1%)	-
Acute bladder toxicity	47	5 (10.6%)	2 (4.3%)	-
Late proctitis	44	4 (9.1%)	3 (6.8%)	-
Late cystitis	44	8 (18.2%)	4 (9.1%)	5 (11.4%)
Late urinary incontinence	45	7 (15.6%)	3 (6.7%)	3 (6.7%)
Chronic abdominal pain	44	3 (6.8%)	-	1 (2.3%)

Bacuit , Philippines