



Prostate SBRT Essentials: What Every RTT Should Know

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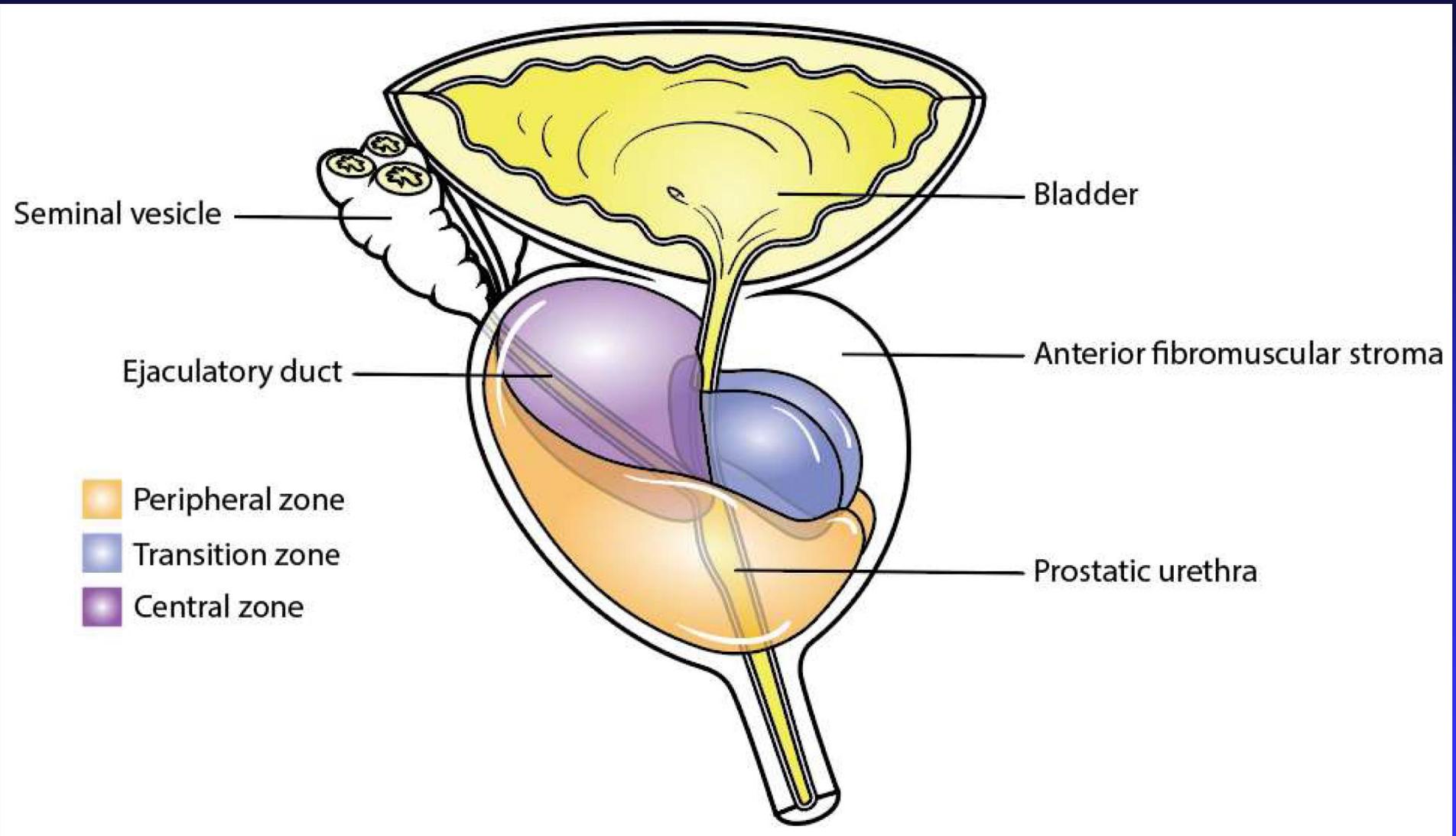
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Disclosures

Accuray Consultant

Anatomy, Risk Factors and Common Symptoms



Prostate Cancer: Work-up

- **PSA (+ testosterone)**
- **DRE**
- **Gleason score**
- **MRI**
- **± PSMA PET Scan**
- **AUA/SHIM**
- **Recent colonoscopy**
- **Important medical history that may impact life expectancy, potential risk of side effects and/or treatment choice:**
 - **BPH (finasteride use, prior TURP)**
 - **Anti-coagulant use**
 - **Crohn's/ulcerative colitis**
 - **Hip prosthesis**

Gleason Grade, Score and Group

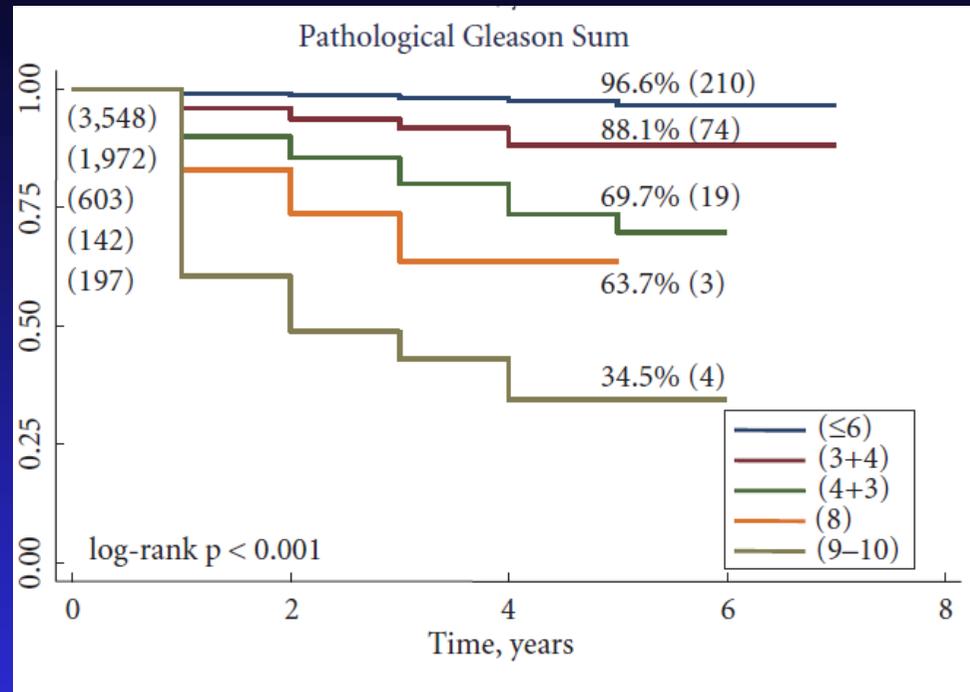


Table 5 Reporting of Gleason score Prognostic Grade Groups.

The overall Gleason score for this case is based on the core with the highest Gleason score. Gleason scores can be grouped and range from Prognostic Grade Group I (most favorable) to Prognostic Grade Group V (least favorable).

Gleason score ≤ 6 :	Prognostic Grade Group I
Gleason score 3 + 4 = 7:	Prognostic Grade Group II
Gleason score 4 + 3 = 7:	Prognostic Grade Group III
Gleason score 8:	Prognostic Grade Group IV
Gleason score 9-10:	Prognostic Grade Group V

10-Year Outcomes after Monitoring, Surgery, of Radiotherapy in Localized Prostate Cancer

□ PCSS (10 yr)

□ AS 99%

□ RRP 99%

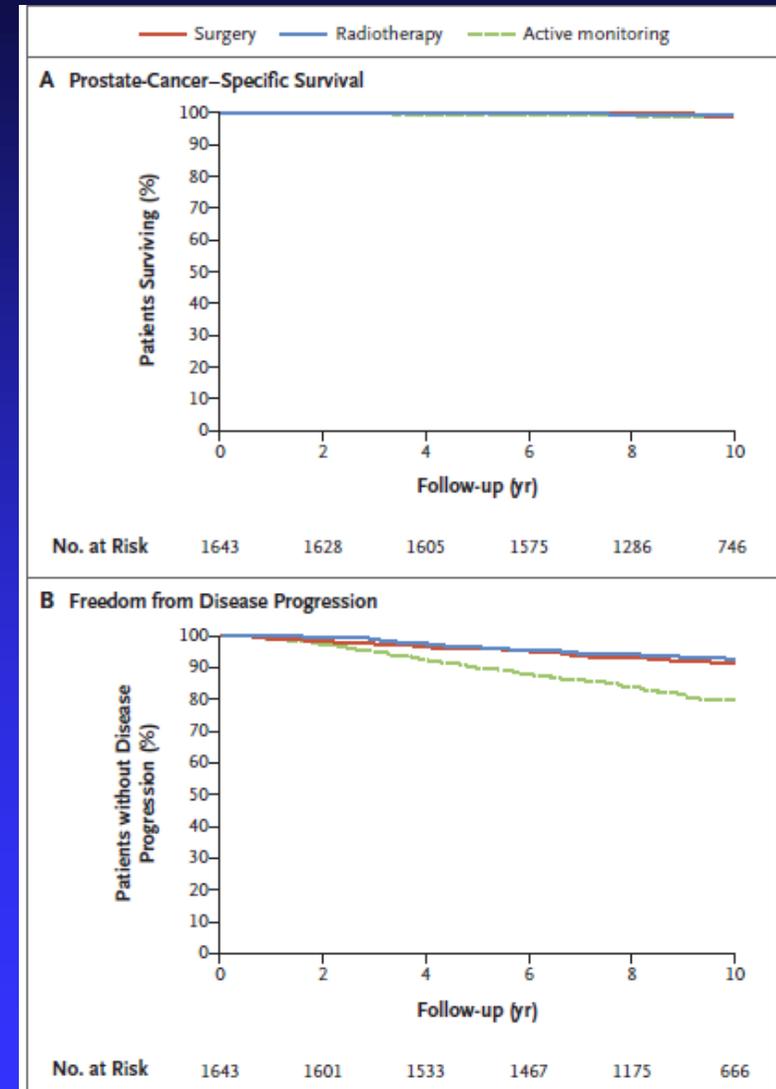
□ RT 99%

□ FFDP (10 yr)

□ AS 23%

□ RRP 9%

□ RT 9%



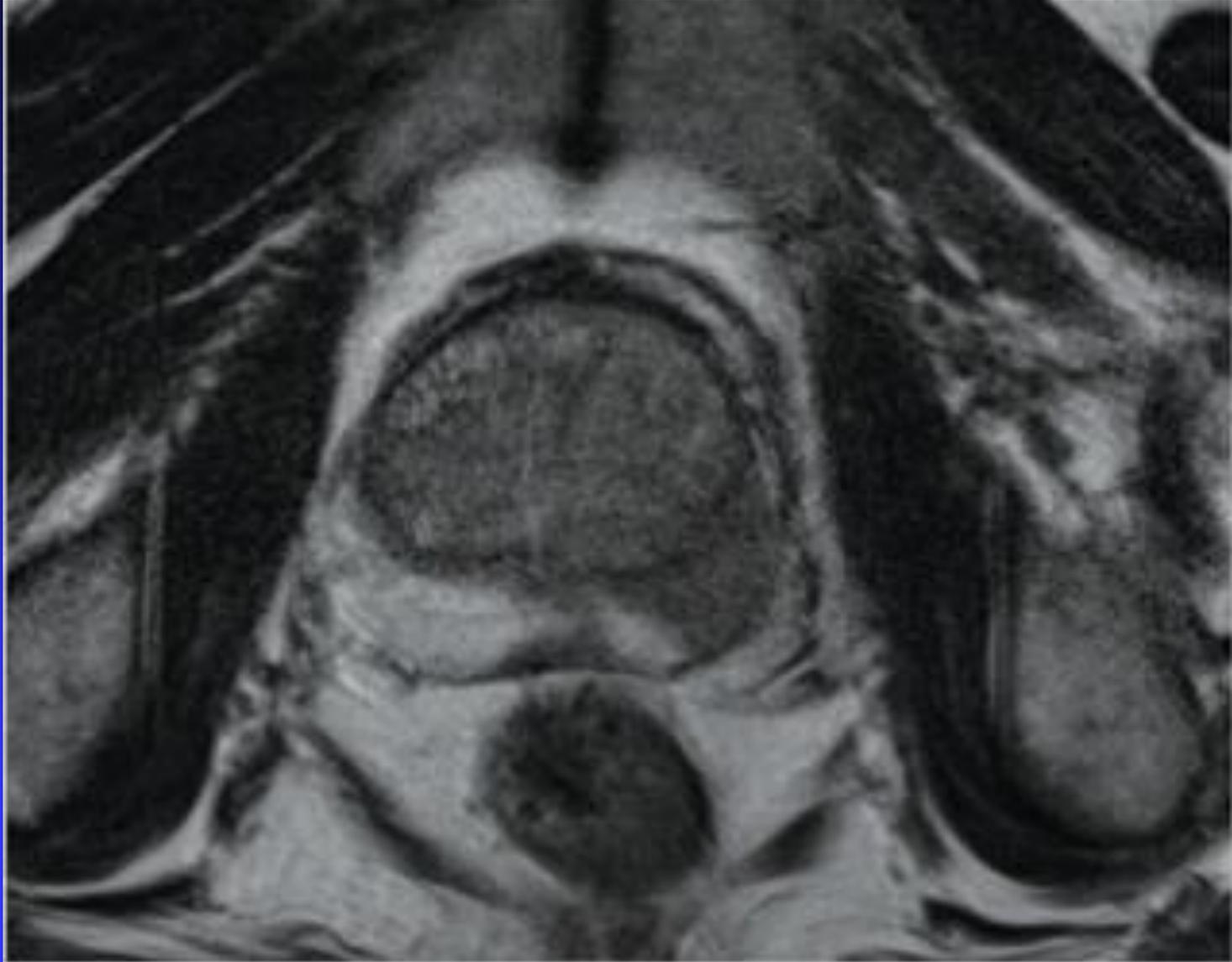
Hamdy *et al.* NEJM. 2016

10-Year Outcomes after Monitoring, Surgery, of Radiotherapy in Localized Prostate Cancer

□ ProtecT Study Conclusions

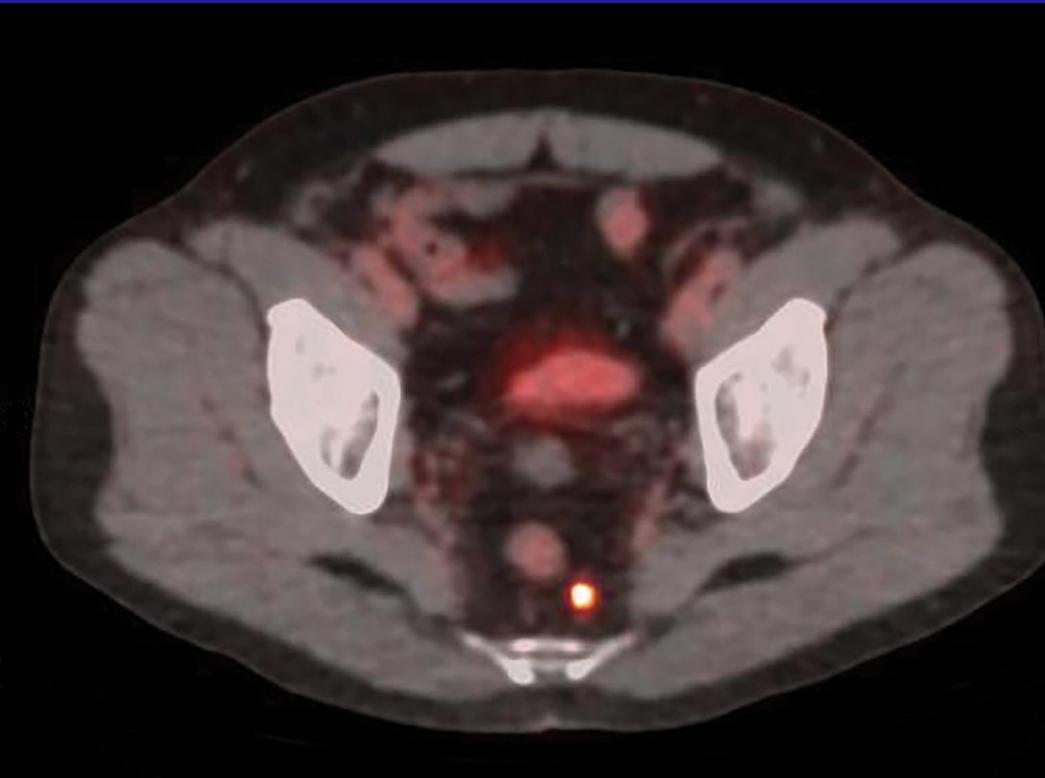
- Prostate cancer specific mortality was low irrespective of the treatment assigned, with no significant difference between treatments
- Surgery and radiotherapy were associated with a lower incidence of disease progression and metastases than was active monitoring.

Sample MRI

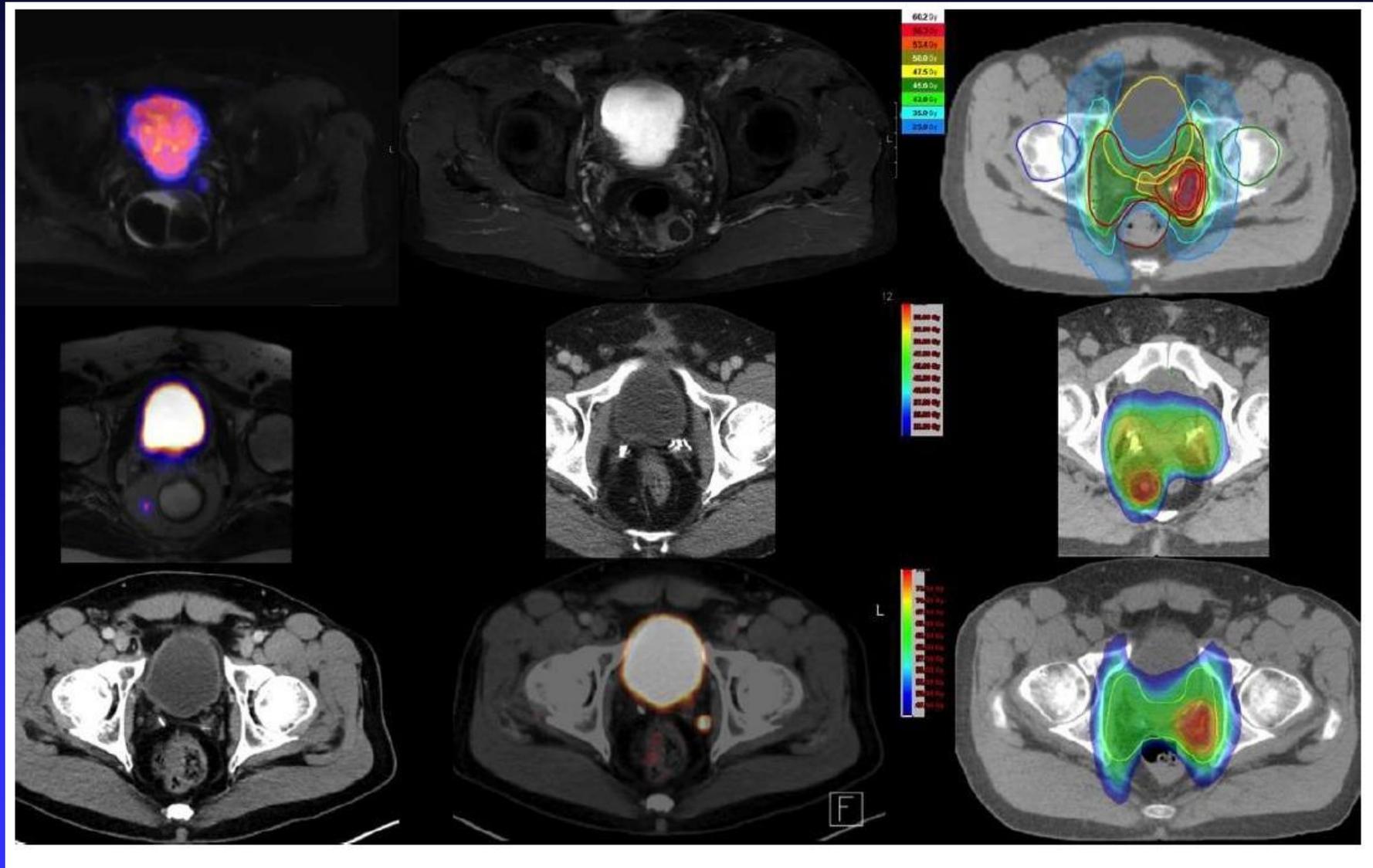


PSMA-PET Staging

- ❑ 69 yo with a Rising PSA following RP
- ❑ Recent PSA was 0.3 ng/ml
- ❑ PSMA-PET Scan Shows:



PSMA Scans May Aid In Patient Specific Design of Pelvic Treatment Volumes



Habl et al, Prostate. 2017

Intensity Modulated Radiation Therapy (IMRT)

□ Simulation

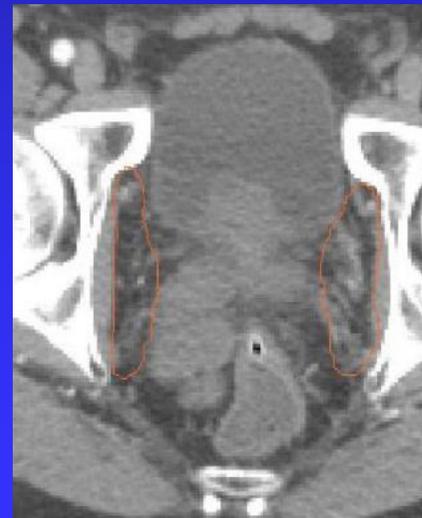
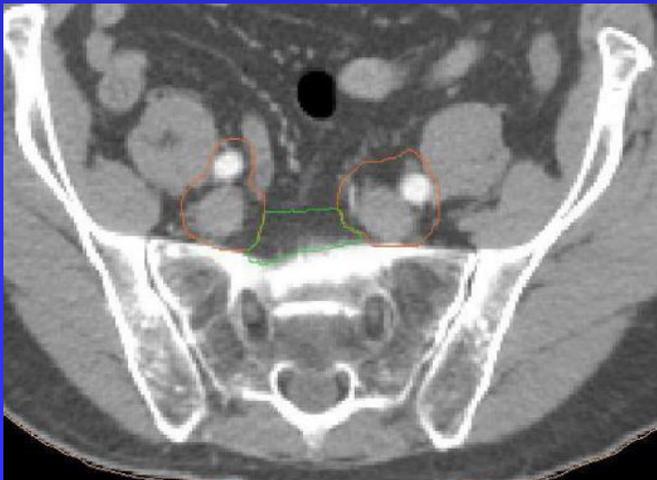
- ≥ 3 properly spaced fiducials \pm rectal spacer
 - Decrease PTV margins to escalate dose
 - Increase gap between prostate and rectum
- Supine with leg immobilization
- Comfortably full bladder
- Empty rectum

Intensity Modulated Radiation Therapy (IMRT)

- **Treatment planning**
 - **Contouring**
 - **Rectum**
 - **Bladder**
 - **CTV**
 - **Low risk = prostate**
 - **Inter. risk = prostate plus proximal SVs**
 - **High risk = prostate plus SVs**
 - **CTV-PTV expansion: 5-7 mm**
 - **Pelvic nodes for high risk**
 - **RTOG consensus**

Intensity Modulated Radiation Therapy (IMRT)

- **RTOG Consensus guidelines**
 - **Vessels plus 7 mm margin**
 - **Superior: L4/L5**
 - **Include:**
 - **Presacral (S1-S3)**
 - **Distal common iliacs**
 - **External iliacs**
 - **Internal Iliacs**
 - **Obturators**
 - **Do not include bone or bowel**



Intensity Modulated Radiation Therapy (IMRT)

□ Dose Constraints for 78 Gy in 39 fractions

□ CTV V78Gy 100%

□ PTV V78Gy > 95%

□ Rectum

□ V70Gy < 15-20%

□ V60Gy < 30%

□ V45Gy < 50%

□ Bladder

□ V70Gy < 25%

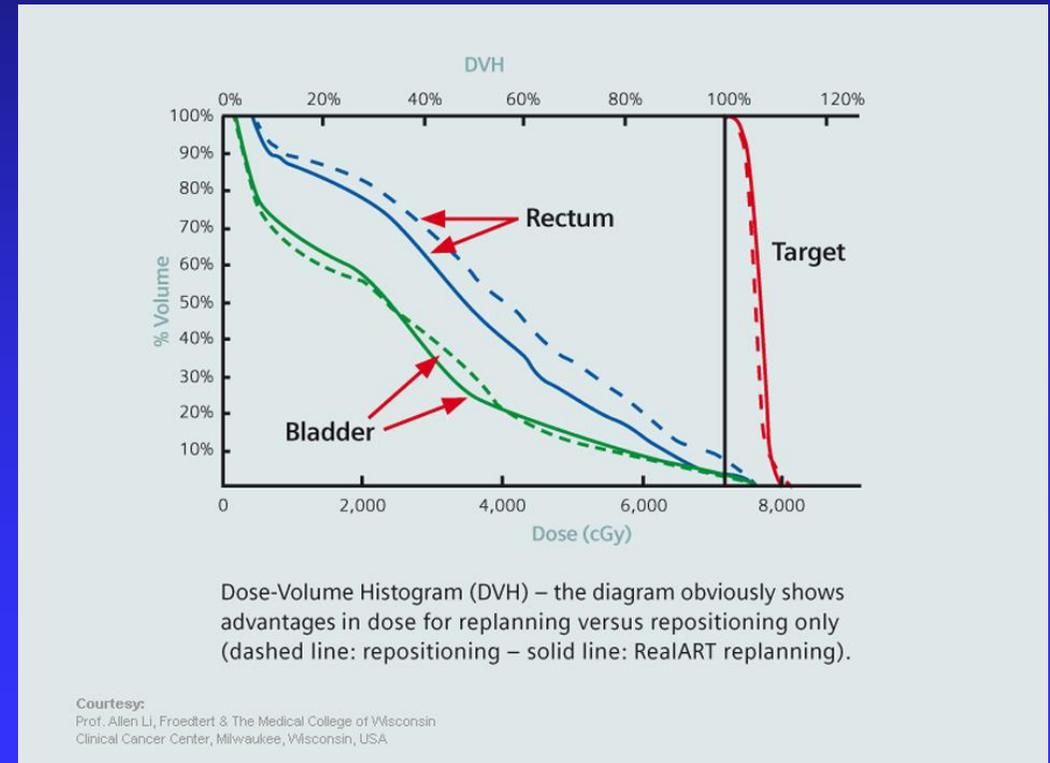
□ V60Gy < 35%

□ Femoral heads

□ V50Gy < 5%

□ Small Bowel

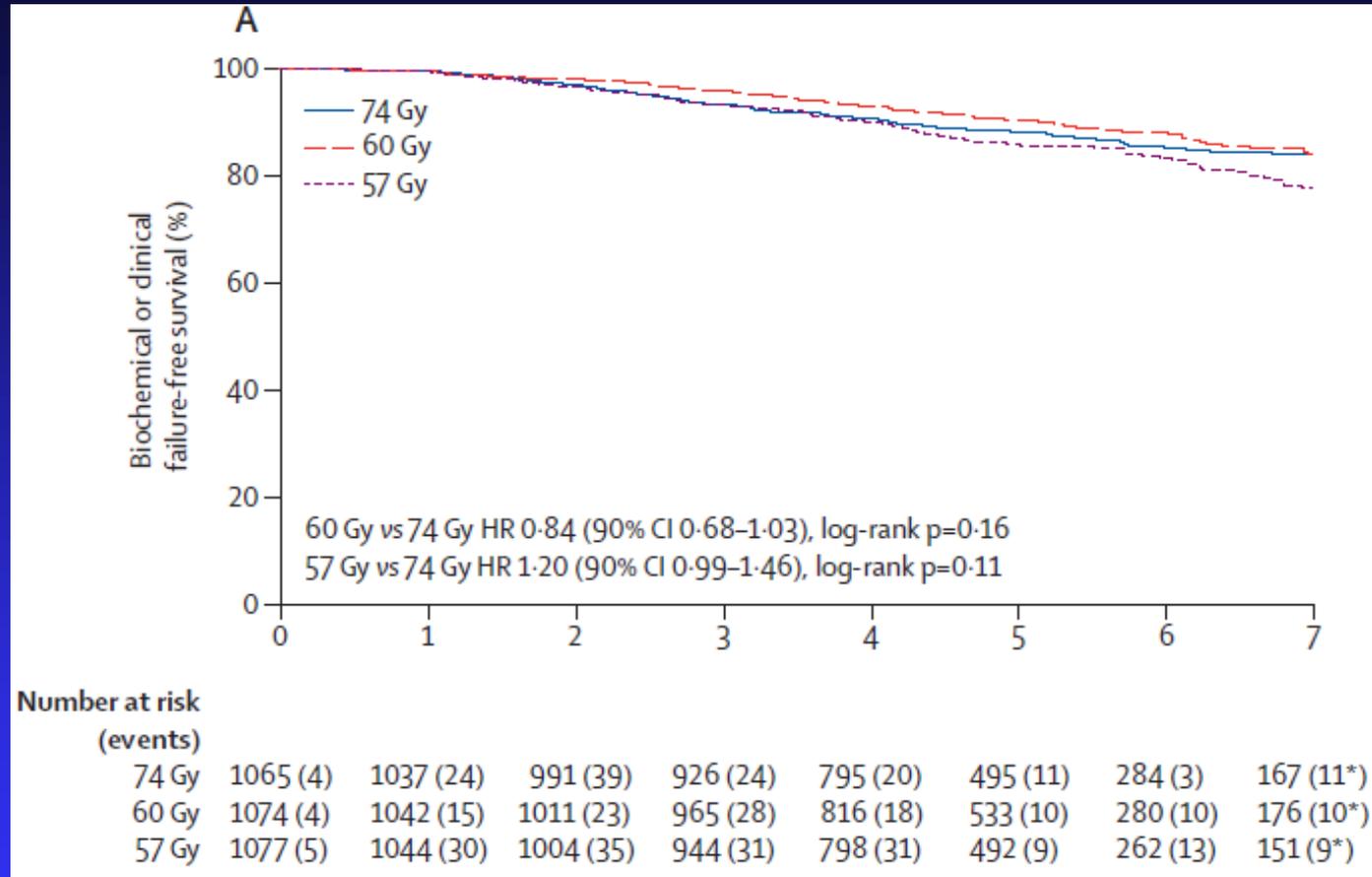
□ Max point dose < 52 Gy



IMRT: Hypofractionation?

- CHHiP
- 3216 pts
- IMRT
- ADT (6 mo)
- Arms
 - 74 Gy/ 37 fxs
 - 60 Gy/ 20 fxs
 - 57 Gy/ 19 fxs
- Primary endpoint

- 74 Gy 88.3%
- 60 Gy 90.6%
- 57 Gy 85.9%



Dearnaley, D. *et al.* Lancet. 2016

60 Gy is non-inferior to 74 Gy

Androgen Deprivation Therapy (ADT) Summary:

- **Low Risk and Favorable Intermediate Risk**
 - **None**
- **Unfavorable Intermediate Risk (4 + 3 = 7, > 50% cores, bulky T2b, etc.)**
 - **4-6 months**
- **High Risk**
 - **18-36 months**
- **Very High Risk**
 - **At least 36 months**

5-year outcomes from PACE-B: An international phase III randomized controlled trial comparing stereotactic body radiotherapy (SBRT) vs conventionally fractionated or moderately hypofractionated external beam radiotherapy for localised prostate cancer

Nicholas van As, Alison Tree, Jaymini Patel, Peter Ostler, Hans van der Voet, Andrew Loblaw, William Chu, Daniel Ford, Shaun Tolan, Suneil Jain, John G Armstrong, Philip Camilleri, Kiran Kancharla, John Frew, Andrew Chan, Olivia Naismith, Georgina Manning, Stephanie Brown, Clare Griffin, Emma Hall

Prof Nicholas van As
on behalf of the PACE Trial Investigators



@nickva1

ASTRO 65TH ANNUAL MEETING | October 1-4, 2023

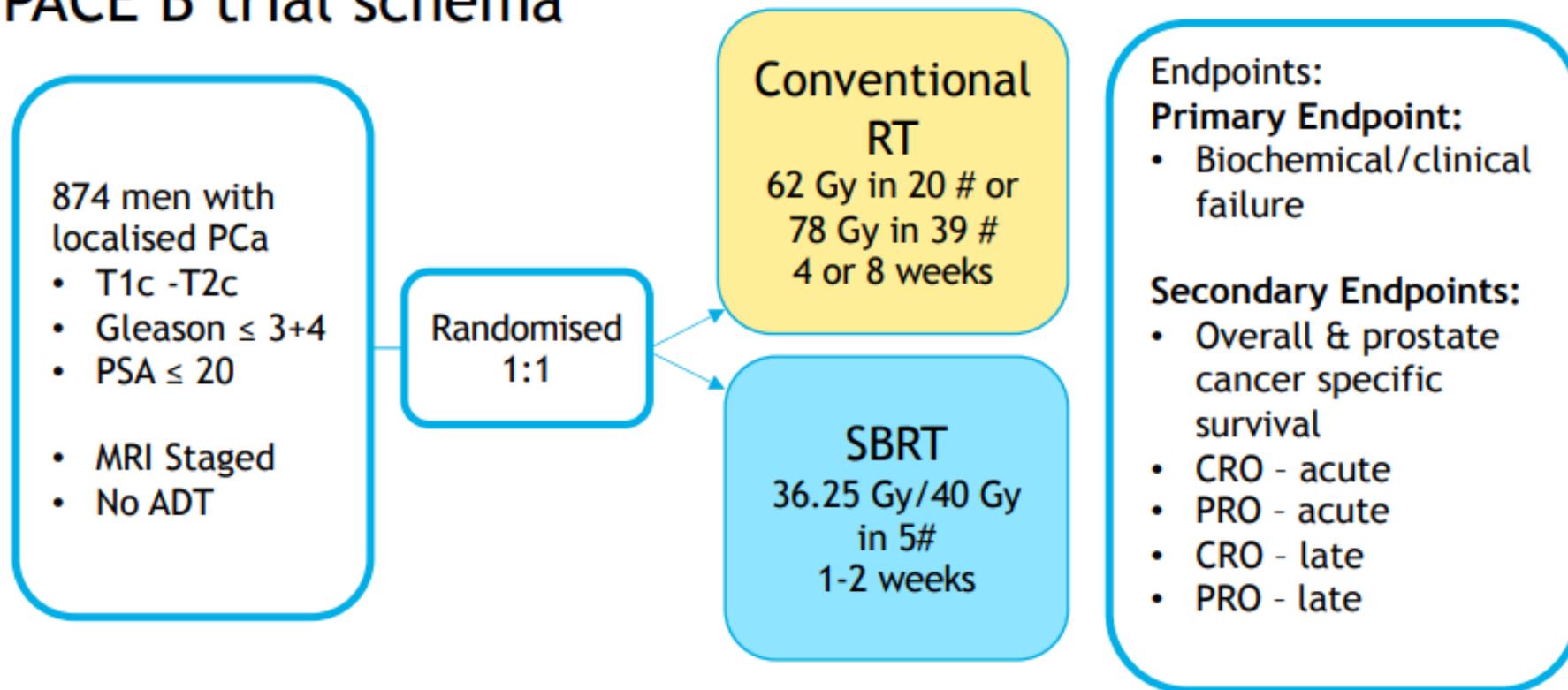


#ASTRO23

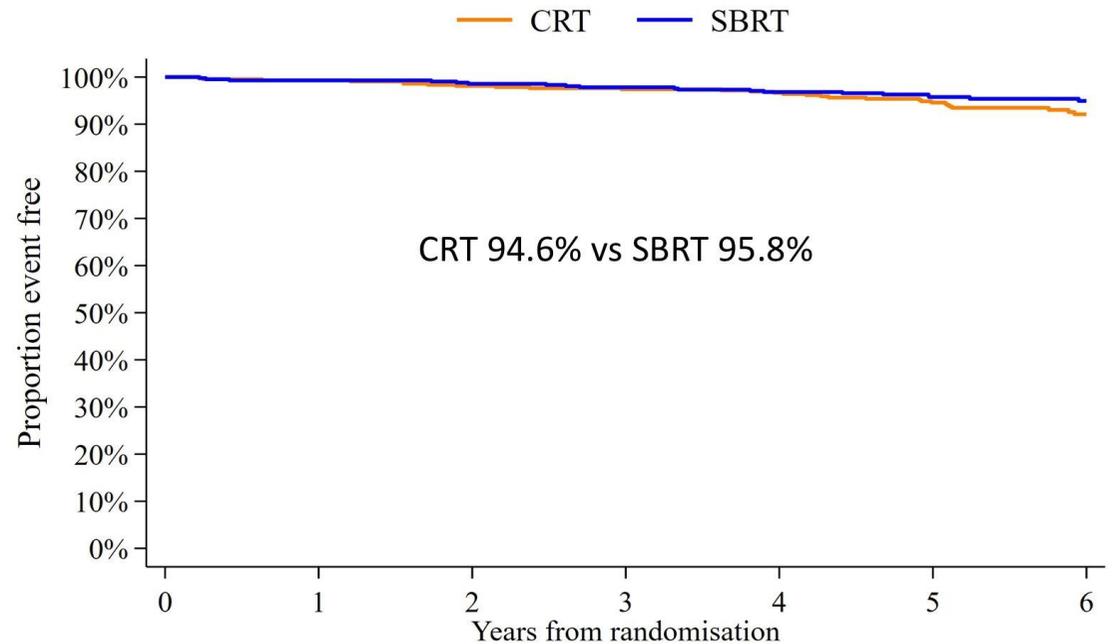
PACE B: Extreme Hypofractionation Versus Conventionally Fractionated Radiotherapy for Intermediate Risk Prostate Cancer

ESTRO 2021

PACE B trial schema



Biochemical/clinical failure – primary endpoint



Number at risk (events)

	0	1	2	3	4	5	6
CRT	441 (3)	423 (5)	412 (3)	403 (3)	387 (8)	351 (7)	191
SBRT	433 (3)	418 (3)	405 (3)	396 (4)	380 (4)	350 (2)	203



@nickva1

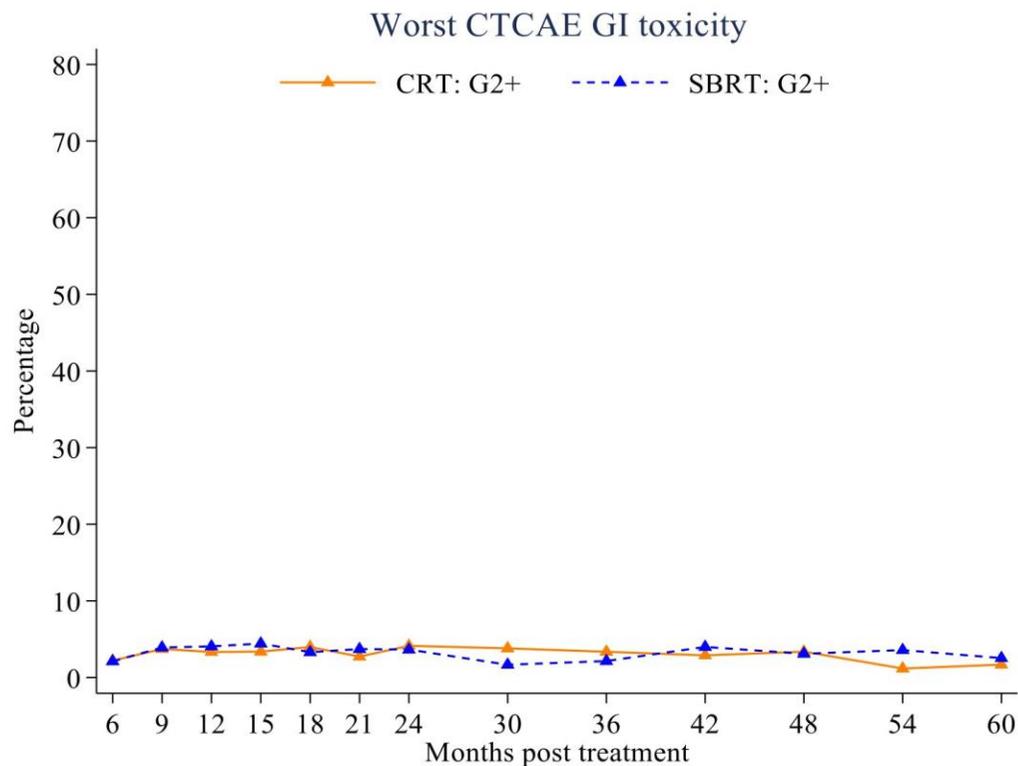
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#ASTRO23

CTCAE GI toxicity – up to 5 years

CTCAE GI at 5 years	CRT N (%)	SBRT N (%)	P-value
Grade 0/1	350 (98.3)	346 (97.5)	0.43
Grade 2+	6 (1.7)	9 (2.5)	



Number of patients

SBRT-	379	383	394	316	363	323	384	360	372	351	355	335	355
CRT-	408	403	390	326	377	329	387	368	387	346	356	341	356



@nickva1

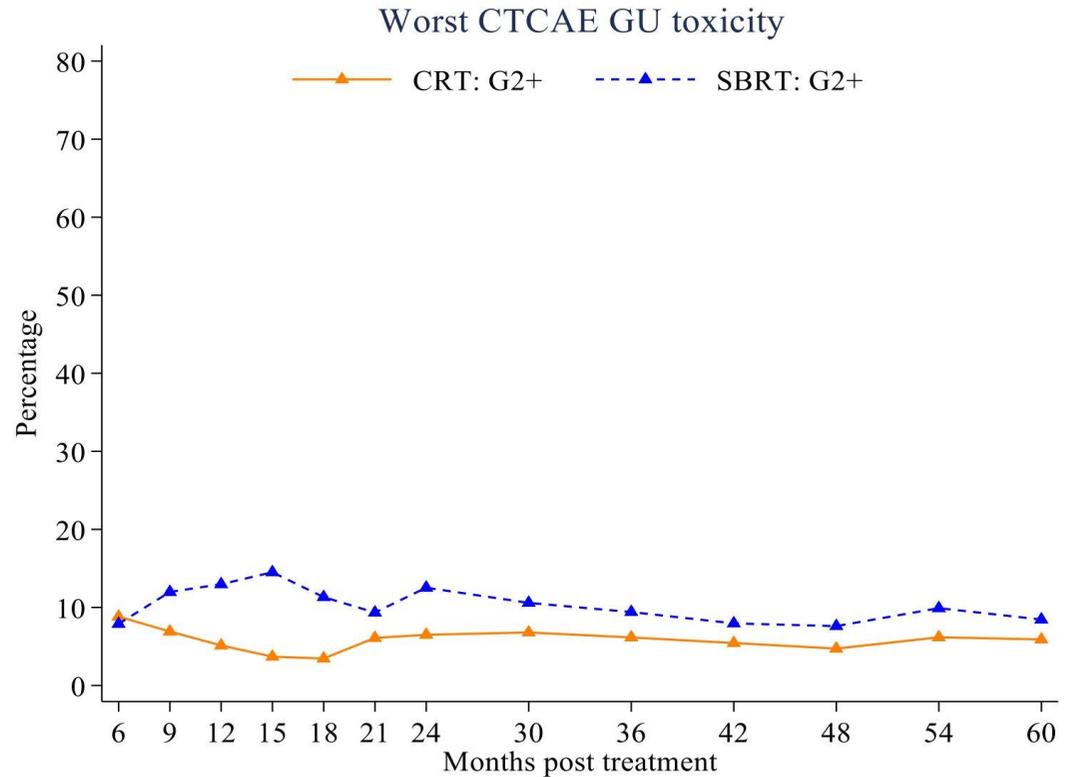
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#ASTRO23

CTCAE GU toxicity – up to 5 years

CTCAE GU at 5 years	CRT N (%)	SBRT N (%)	P-value
Grade 0/1	335 (94.1)	325 (91.5)	0.19
Grade 2+	21 (5.9)	30 (8.5)	



Number of patients

SBRT-	380	384	393	317	362	321	383	359	372	352	355	333	355
CRT-	408	405	390	325	377	328	385	368	390	349	360	340	356



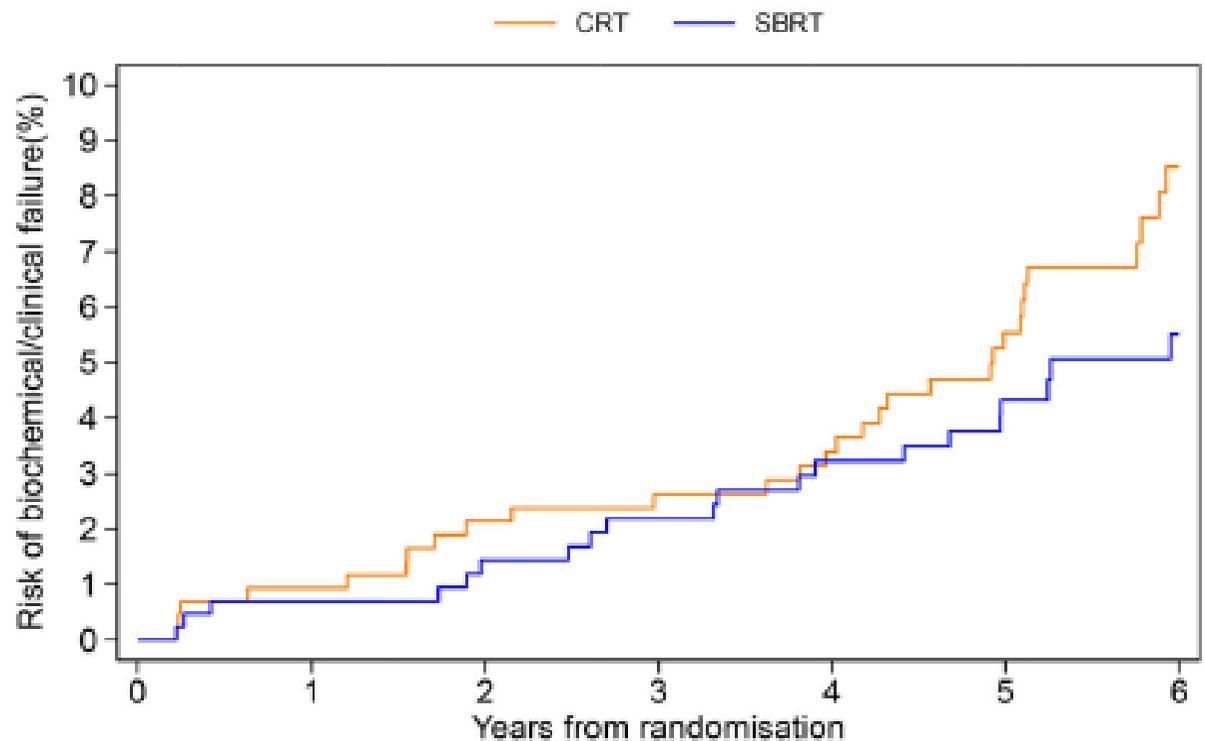
@nickva1

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#ASTRO23

(B) Nelson Aalen cumulative incidence plot for biochemical or clinical failure by randomised treatment group



Number at risk (events)

CRT	441	(4)	422	(5)	411	(2)	403	(3)	387	(8)	352	(8)	206
SBRT	433	(3)	418	(3)	405	(3)	396	(4)	380	(4)	352	(3)	217

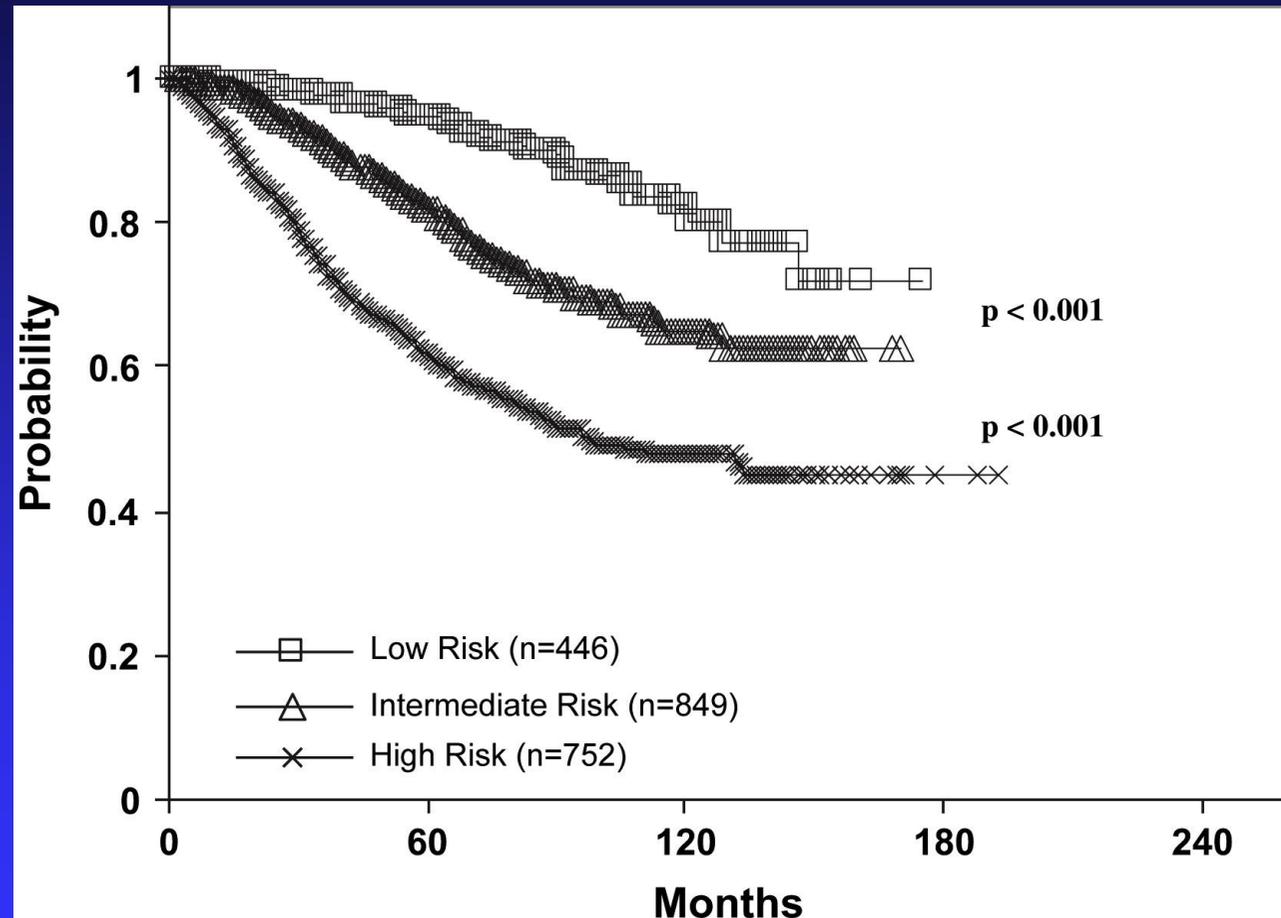
PSA Failures Following Conventional Radiation Therapy

□ BDFS (5 yrs)

□ Low 95%

□ Inter. 82%

□ High 62%



□ Zelefsky et al, IJROBP 2008

Primary Reasons for Radiation Therapy Failures

□ Missed the Cancer

- The prostate moves during treatment
- **SBRT** can minimize this problem

□ Radiation Dose Inadequate

- Post-treatment positive biopsy rate 30-40%
- Dose limited by surrounding normal tissue tolerance
- **SBRT** may allow for safer dose escalation

Stereotactic Body Radiation Therapy

□ **ASTRO Definition:**

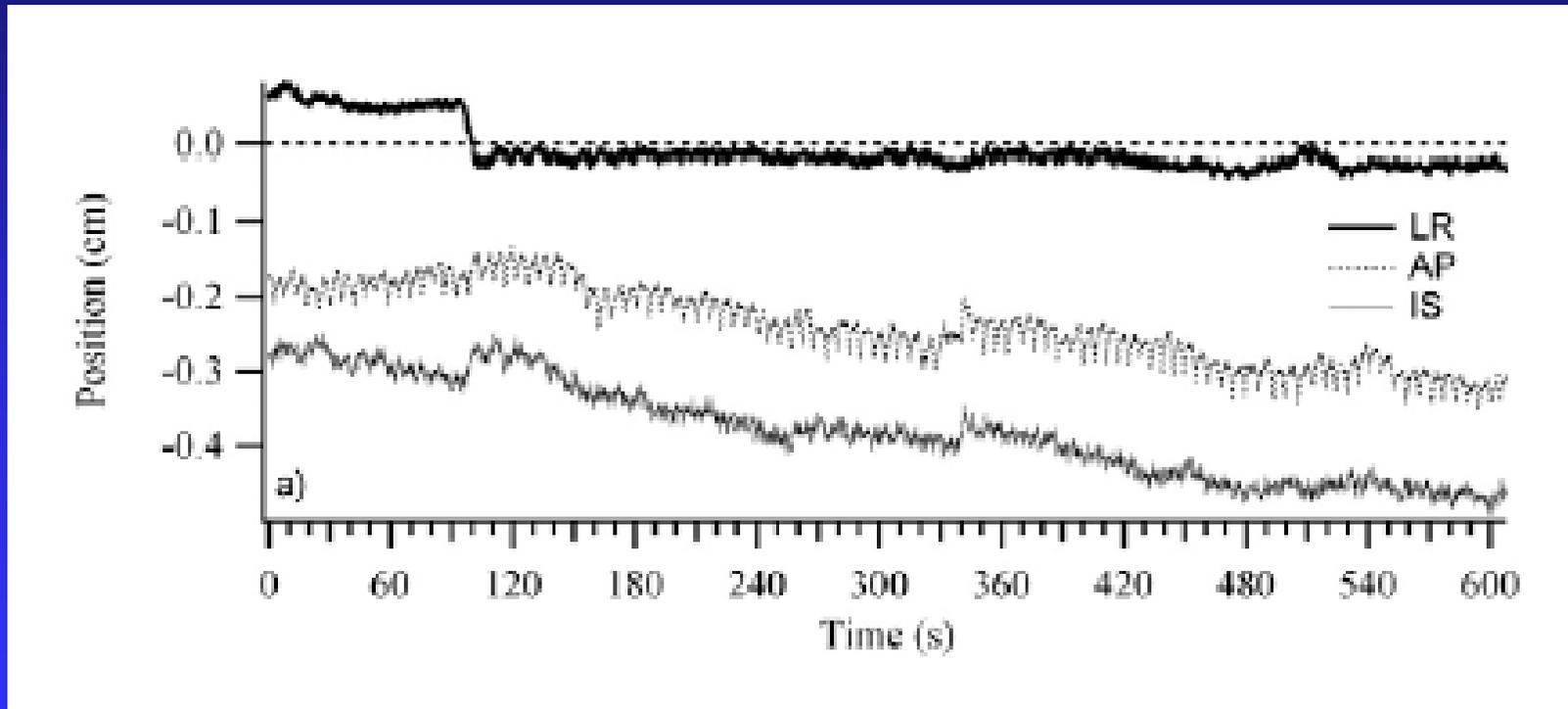
□ **An external beam radiation therapy method used to very precisely deliver a high dose of radiation to an extracranial target within the body using a small number of fractions.**

□ **Specialized treatment planning results in high target dose and steep dose gradients beyond the target.**

□ *Potters et al, IJROBP 2010*

Prostate Motion During a Radiation Treatment

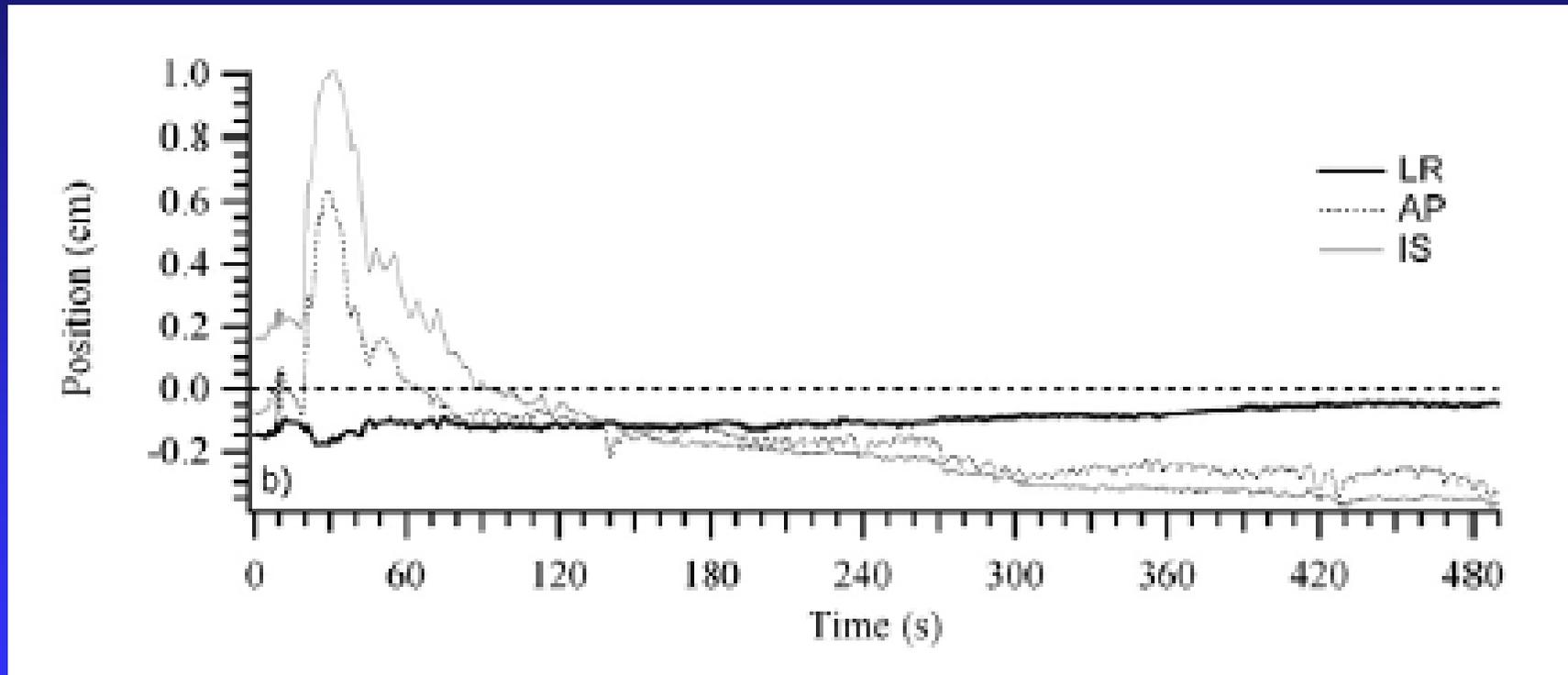
- Intra-fraction motion varies from 1 to 10 mm over seconds to minutes
- Commonly, a drift in the prostate position over course of single treatment



□ *Litzenberg et al, IJROBP 2006*

Prostate Motion During a Radiation Treatment

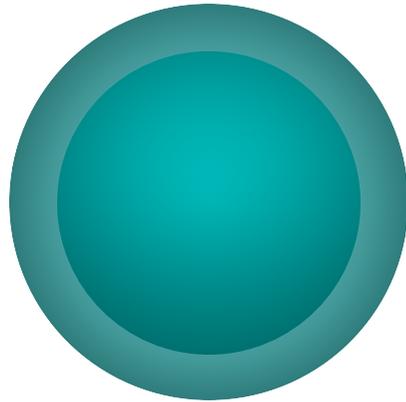
- However, large early motions seen in 20-30% treatments



□ *Litzenberg et al, IJROBP 2006*

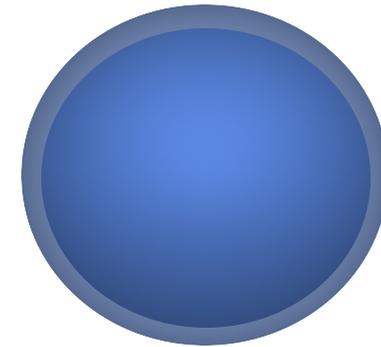
Comparison of IMRT and SBRT

IMRT



- Expand Treated Volume
- More Radiation to Normal Structures
- Limit Total Dose
- Limit Daily Dose

SBRT



- Smaller Treatment Volume
- Requires Continuous Tracking
- Allows for Higher Total Dose
- Allows for Higher Daily Dose

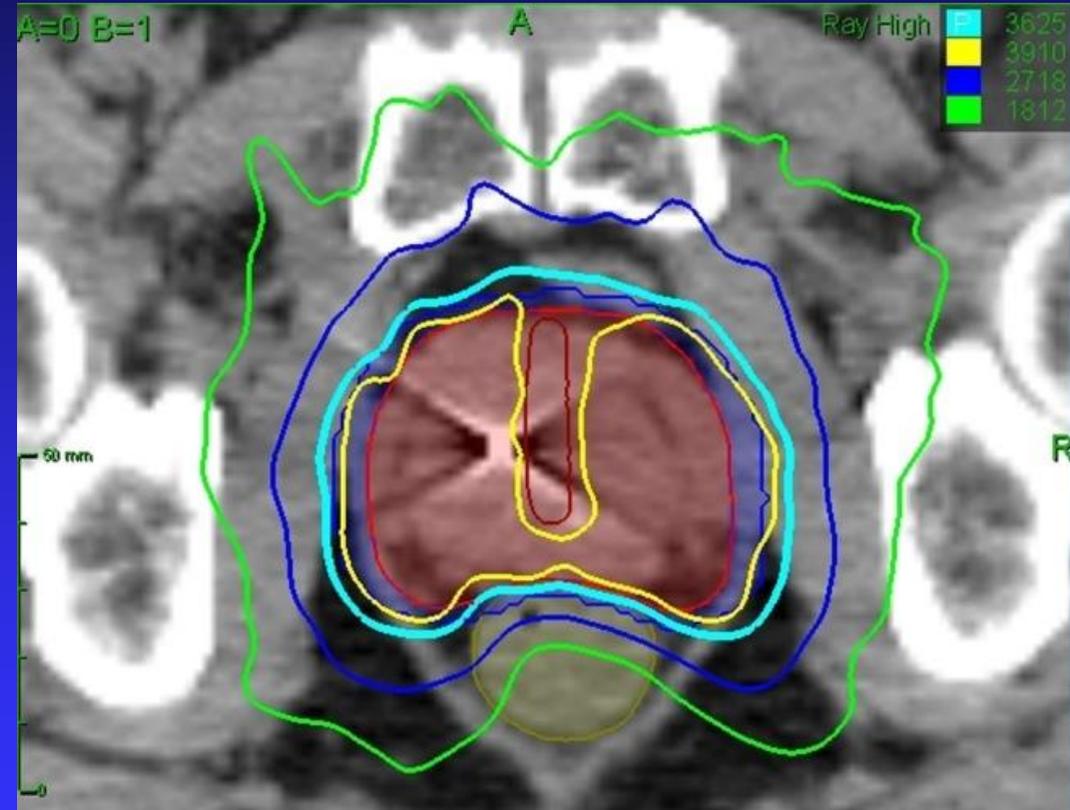
Continuous Motion Synchronization Allows for Smaller Treatment Margins

□ Prostate apex abuts rectum!

□ **Motion Synchronization** improves target accuracy allowing for reduced planning treatment margins

- Posterior 3 mm
- All others 5 mm

□ Reduced treatment margins allow for safer delivery of fewer high dose fractions

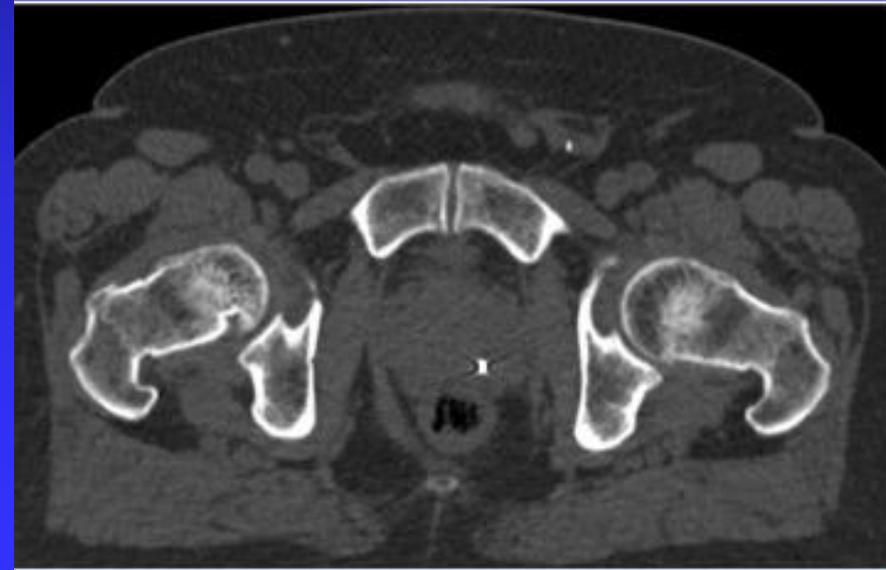


□ *Repka et al, Front Oncol 2016*

Role of Magnetic Resonance Imaging In Reducing Late Toxicity

□ MRI scan better defines:

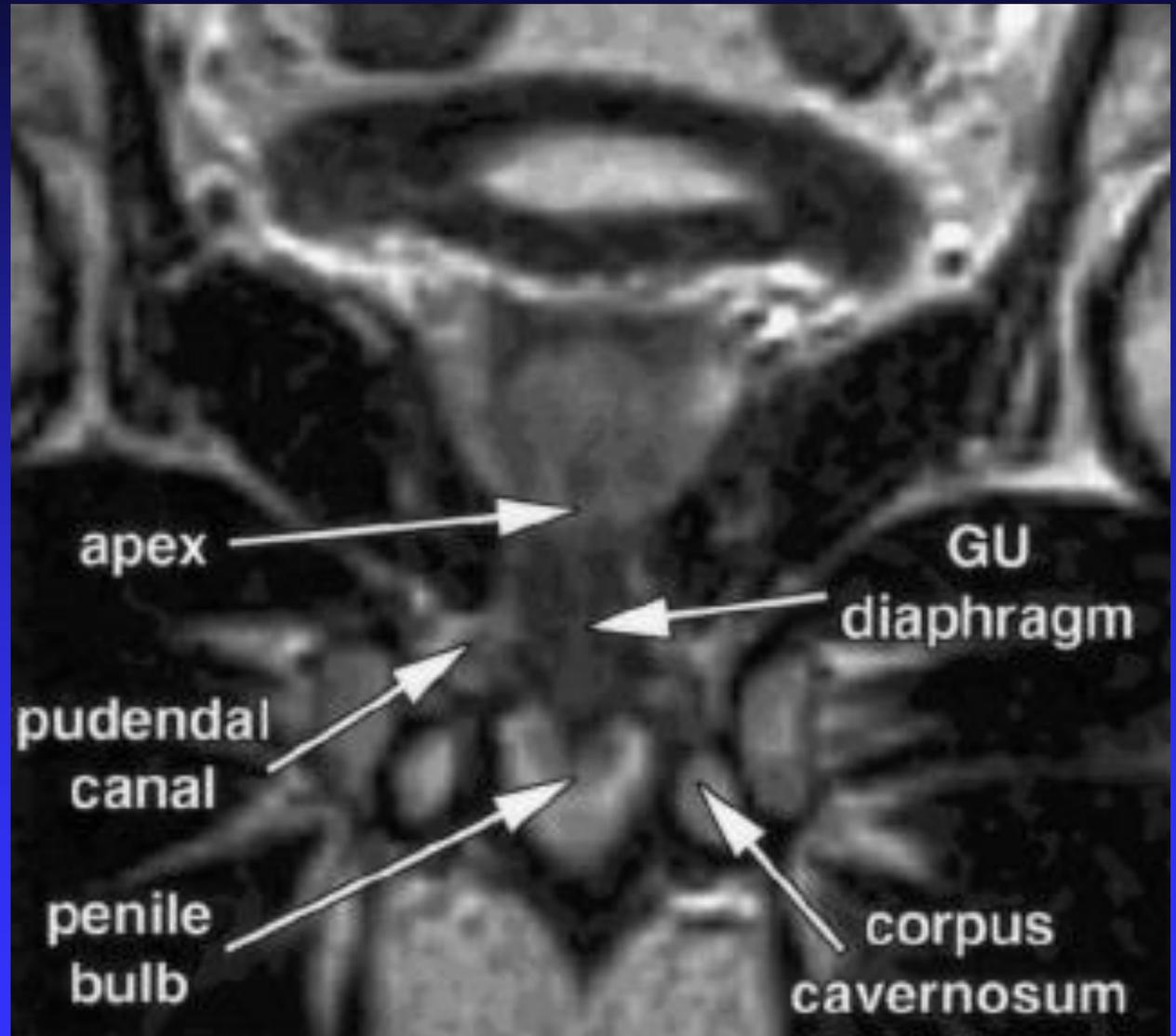
- Bladder neck
- Prostate apex
- Penile bulb
- Membranous urethra
- **Prostate rectal interface**



Role of Magnetic Resonance Imaging In Reducing Late Toxicity

□ MRI scan better defines:

- Bladder neck
- Prostate apex
- Penile bulb
- Membranous urethra
- Prostate rectal interface



The α/β Value

- One solution to inadequate radiation dose could be to take advantage of prostate cancer's unique radiobiology
- An estimate of the relative fraction size sensitivity
 - High dose fractions relative to lower dose fractions
- A low α/β value (1-3) indicates a tumor that is very sensitive to fraction size
 - Larger fraction sizes are more effective at treating the tumor
- A high α/β value (8-10) indicates relative insensitivity to fraction size

The α/β Value of Prostate Carcinoma

- The α/β value of prostate carcinoma was once thought to be 6-10 Gy⁻¹
- Analysis from recent treatment sets shows that the α/β value is closer to 1.5 Gy⁻¹
- The current highly fractionated treatment paradigm may be flawed and a few high-dose fractions might be preferable

□ *Fowler, Acta Oncol, 2005*

Comparison of Fractionation Schemes

□ IMRT (2 Gy x 39 fractions)

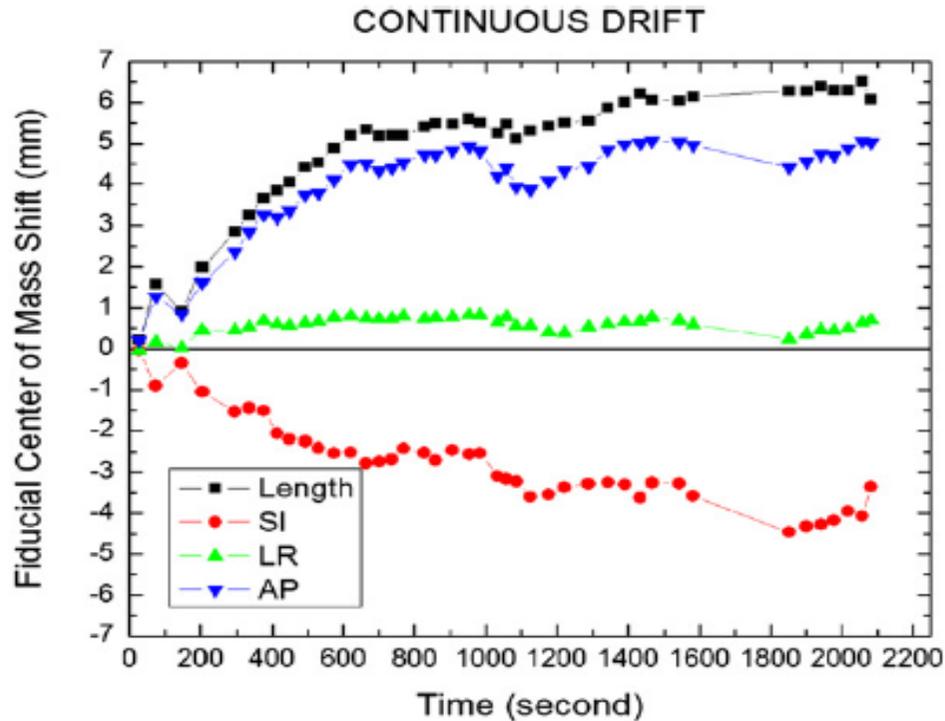
- Total dose 78 Gy

□ SBRT (7.25 Gy x 5 fractions)

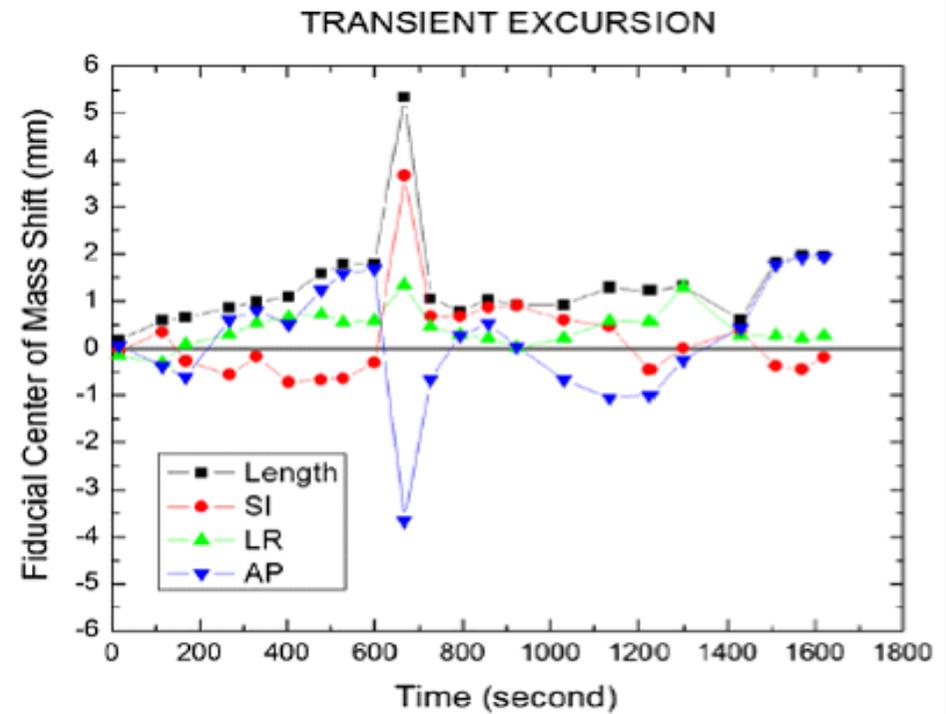
- Total dose 36.25 Gy
- Equivalent dose (tumor control) 90.6 Gy
- Equivalent dose (acute toxicity) 52.2 Gy
- Equivalent dose (late toxicity) 74.3 Gy

Motion Synchronization During Robotic SBRT Treatment Always Requires Well Placed Fiducials

- Real-time tracking system that provides updated prostate position and corrects the targeting of the therapeutic beam during treatment



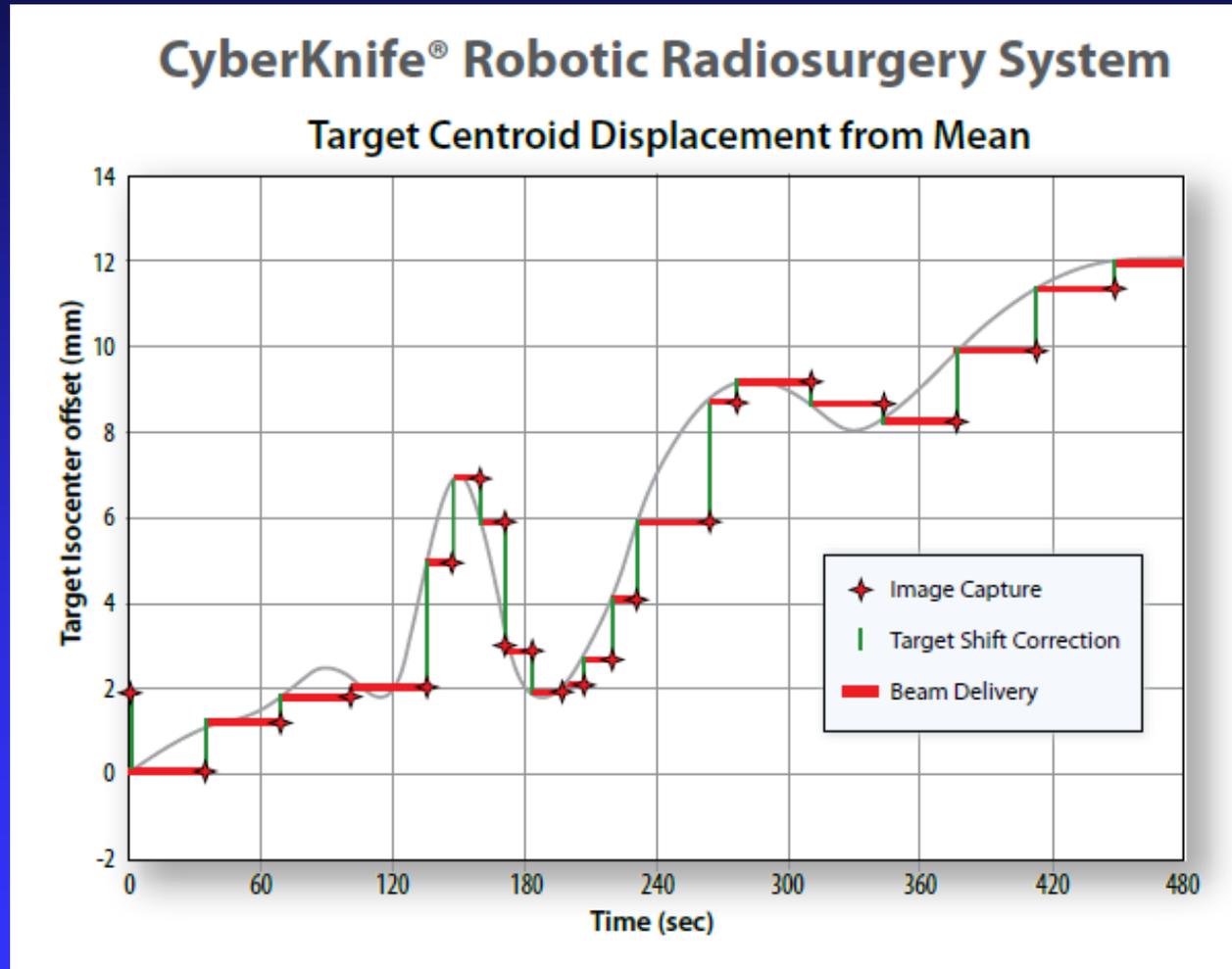
(b)



(c)

Motion Synchronization

- Verifies target accuracy numerous times during single treatment!



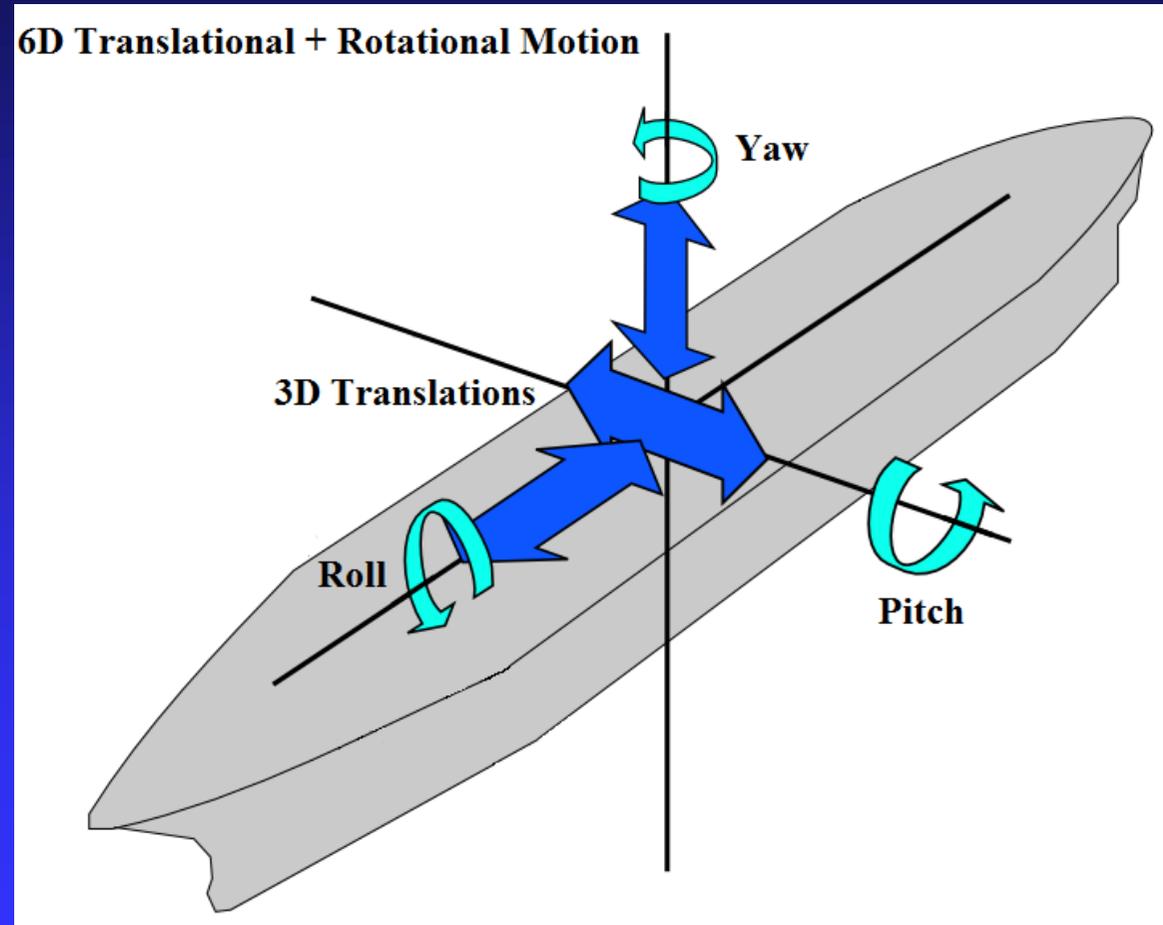
□ Accuracy

Intra-Prostatic Fiducials Allow for Motion Synchronization During Robotic SBRT Treatment

□ Fiducials

□ Gold (0.8 mm x 5 mm)

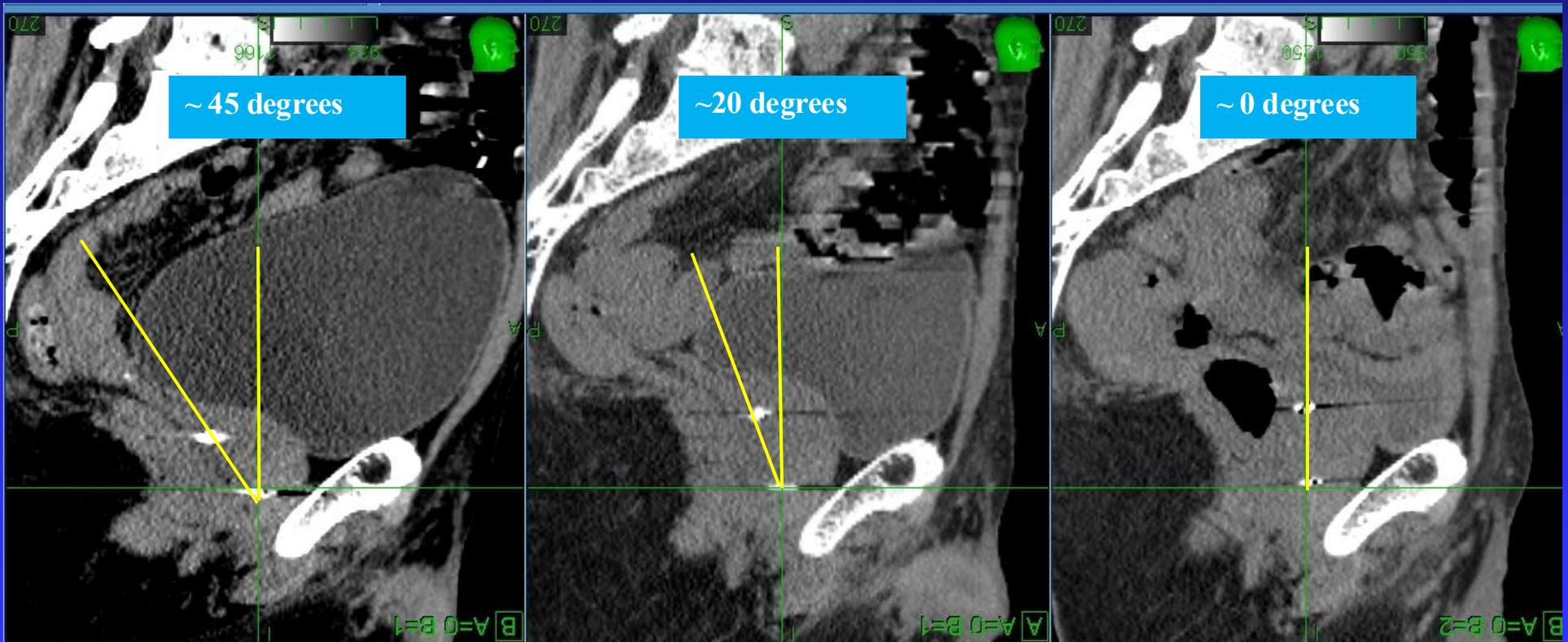
□ Spacer (2 cm)



□ 1013- 2-2, Best Medical International, Inc., Springfield, VA, USA

Importance of Correcting for Prostatic Pitch During Robotic SBRT Treatment

- Rotations around left-right axis at apex is the dominant form of motion

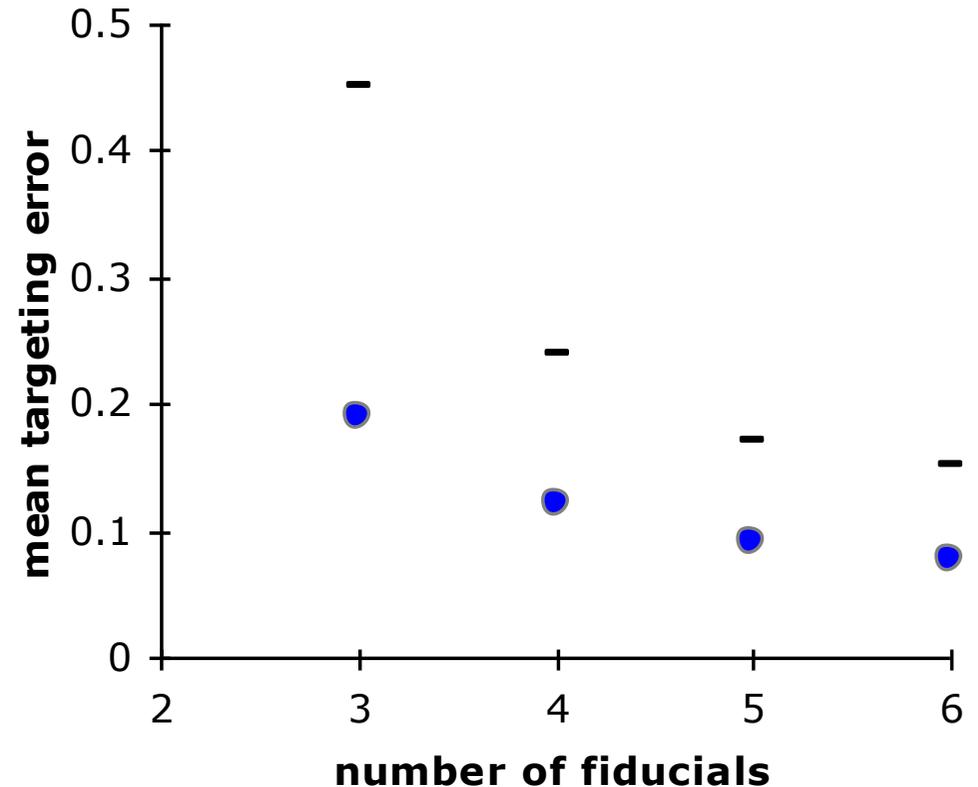


□ Debra Freeman, M.D.

Accuracy of Fiducial Targeting

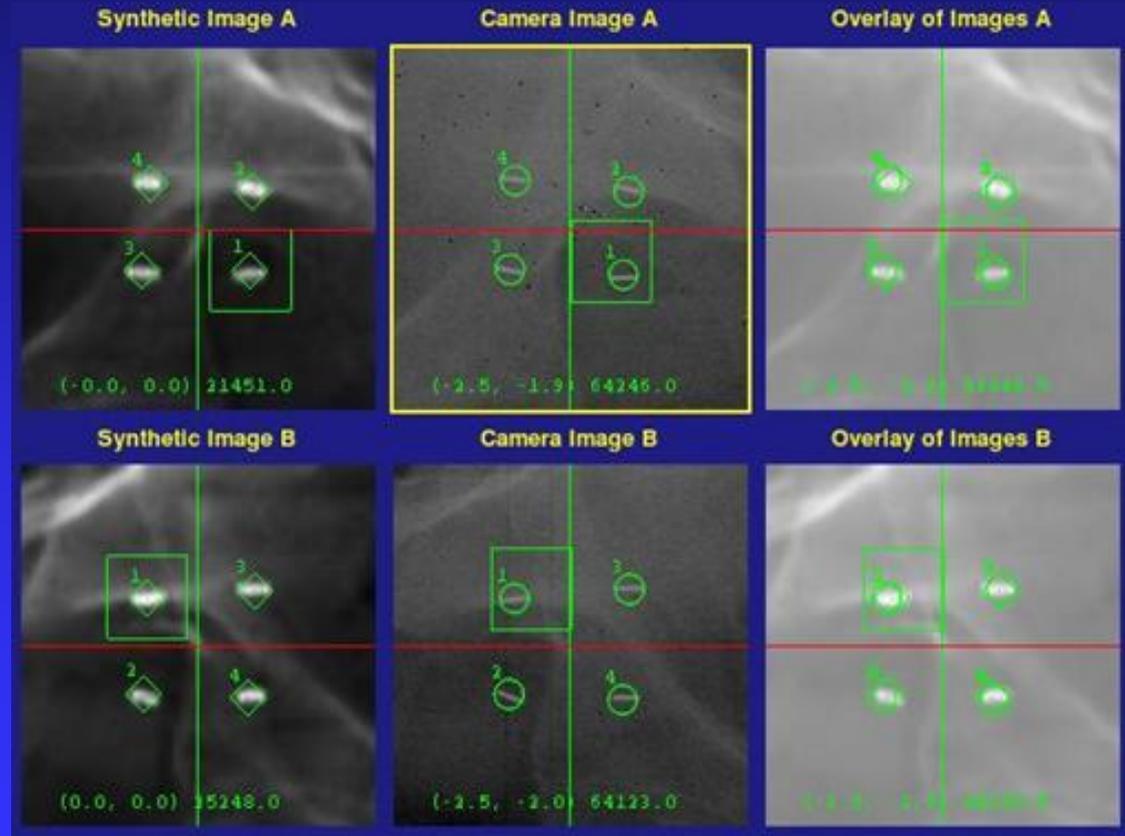
□ **> 3 Well Placed Fiducials Significantly Improves Targeting Accuracy**

□ **> 6 Fiducials Adds Little to No Improvement**



Transperineal Fiducial Placement

- 2 cm separation so they can be recognized as independent entities by orthogonal kilovolt detector



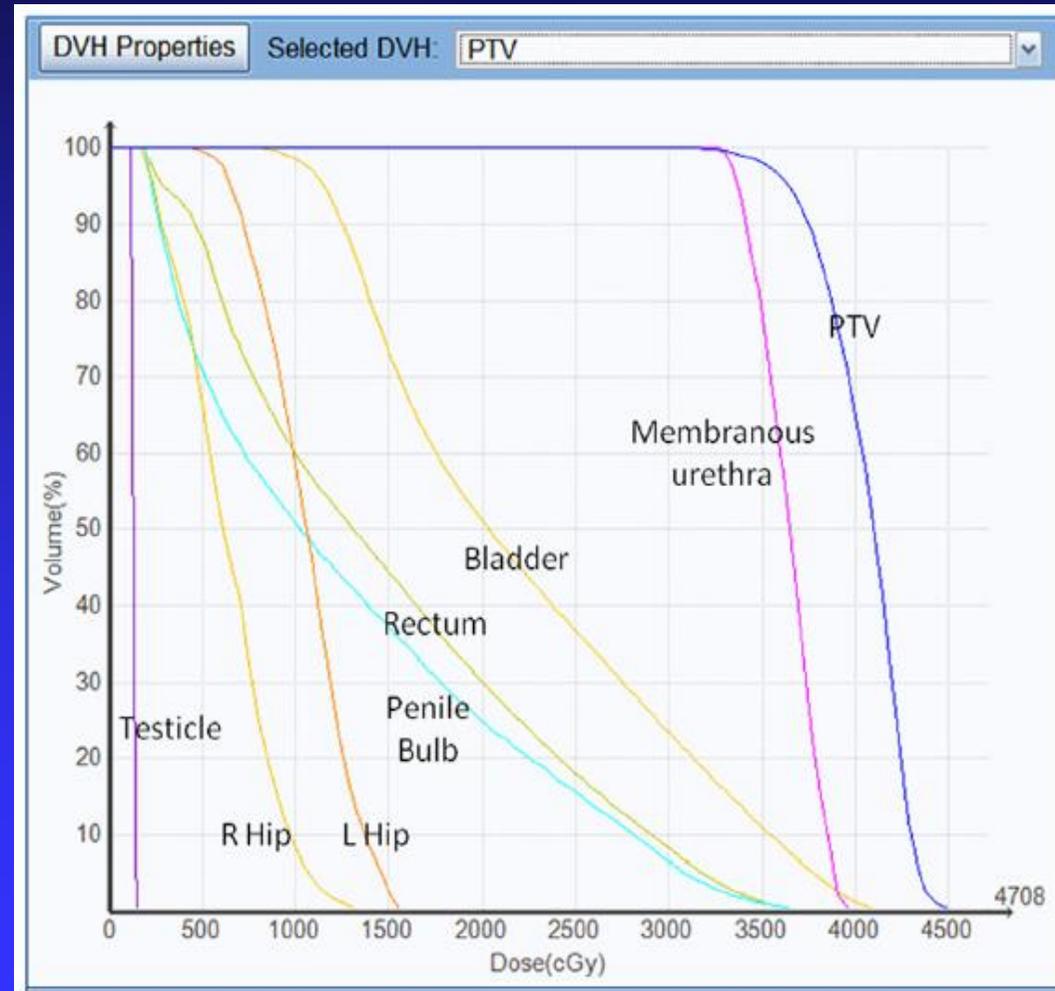
□ *Lei et al, Front Oncol 2011*

SBRT Dose Constraints and Targets

□ The prescription isodose line was limited to > 75 % to limit the maximum prostatic urethra dose to 133% of the prescription dose

36.25 Gy plan constraints

Global Max Dose	48.33 Gy
PTV	V (36.25 Gy) ≥ 95%
Rectum	V (36 Gy) < 1 cc V (100%) < 5% V (90%) < 10% V (80%) < 20% V (75%) < 25% V (50%) < 50%
Bladder	V (37 Gy) < 5 cc V (100%) < 10% V (50%) < 40%
Penile Bulb	V (29.5 Gy) < 50%
Membranous urethra	V (37 Gy) < 50%
Sigmoid colon	V (30 Gy) < 1 cc
Testicles	D (20%) < 2 Gy

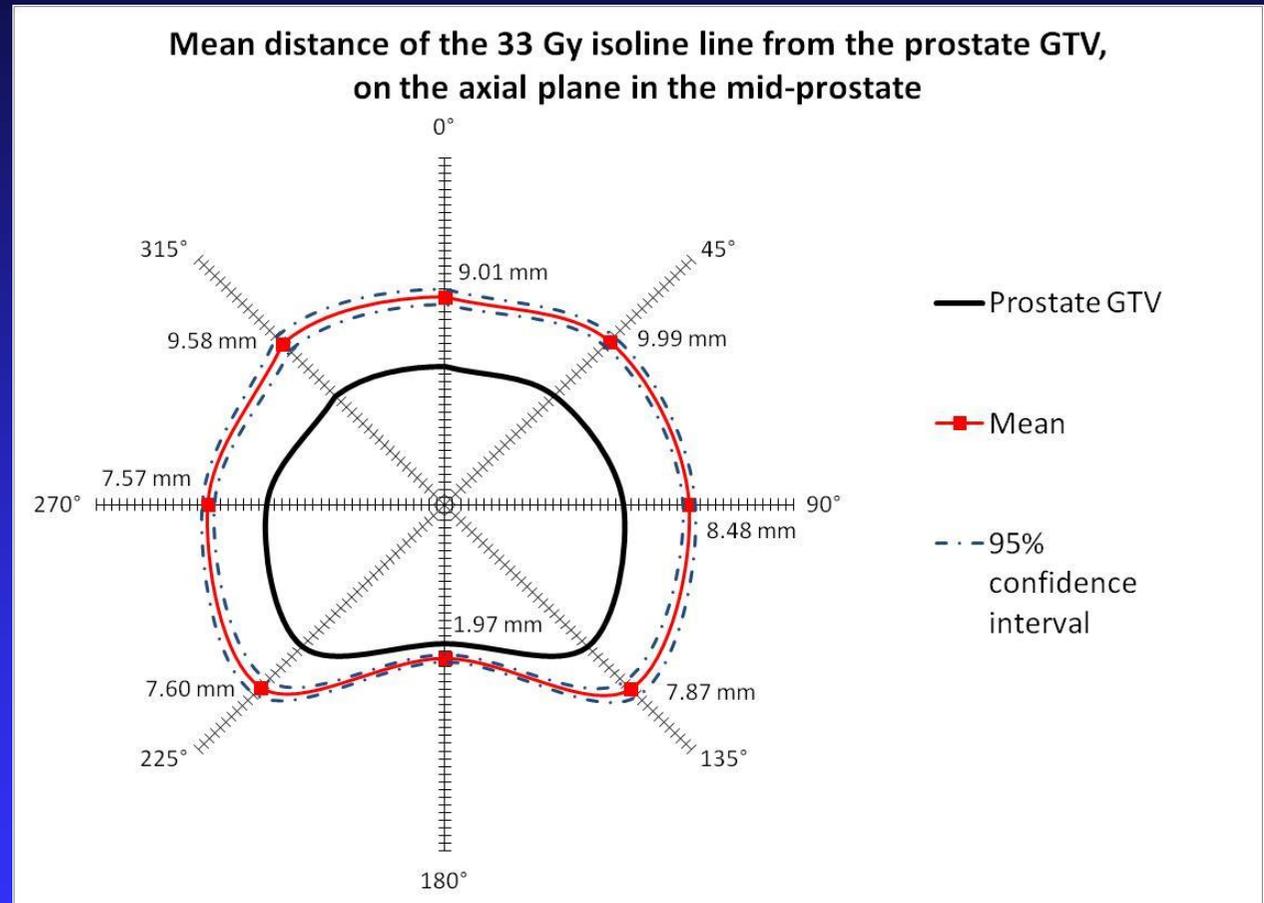


SBRT Dose Distribution

- Rectal Goals

- < 1cc receiving 36 Gy
- < 20% receiving 80% of proscribed dose
- < 50% receiving 50% of proscribed dose

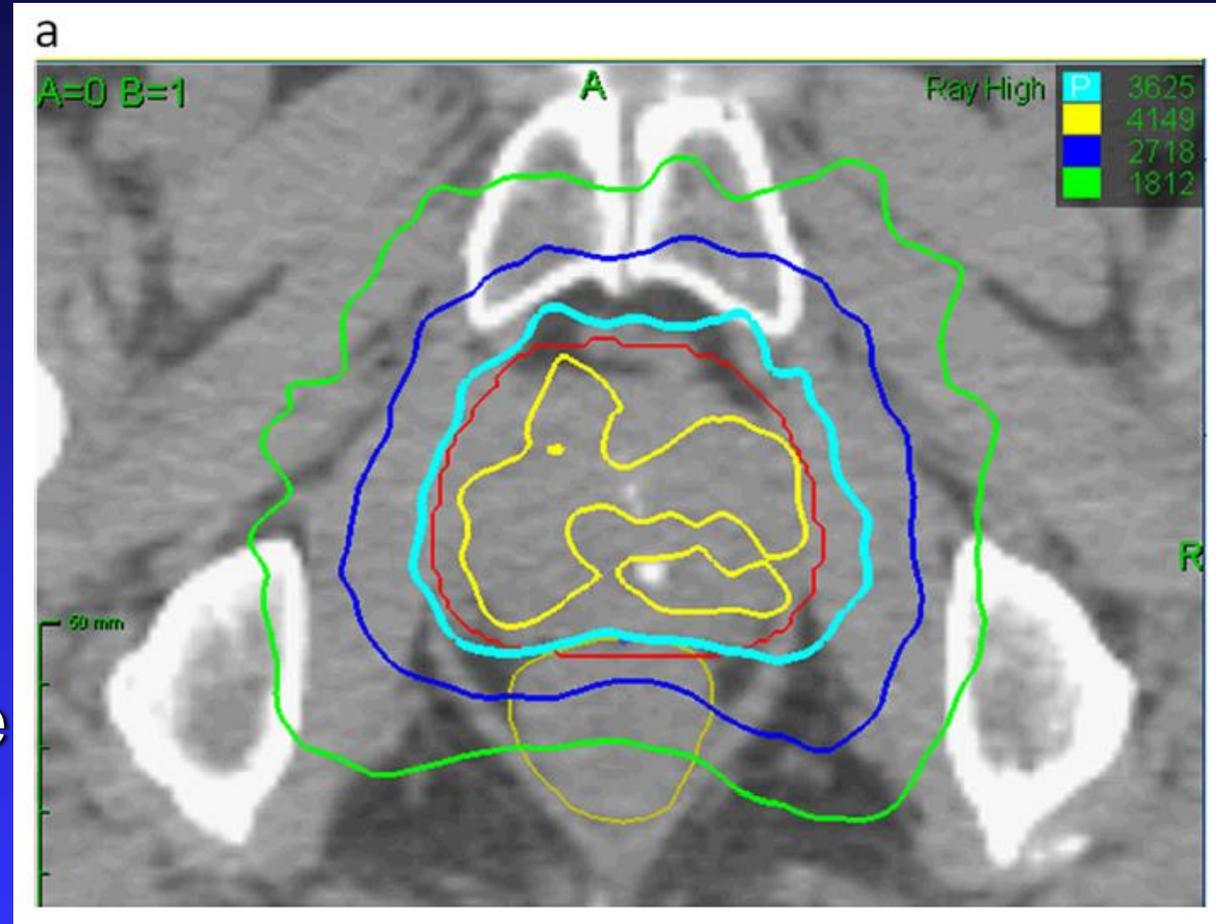
- **Tight posterior margin!**



Late Urinary Toxicity Following Robotic SBRT

□ Etiology

- Central hot spot?
- Late inflammatory response?
- Prostatic urethral dose reduction may limit toxicity



□ Chen *et al*, *Rad. Onc.*, 2013

Urethral Identification Via Foley Catheter

❑ Never!

- ❑ Patient Discomfort
- ❑ Prostatic Rotation
- ❑ Urethral Distortion
- ❑ Iatrogenic Strictures

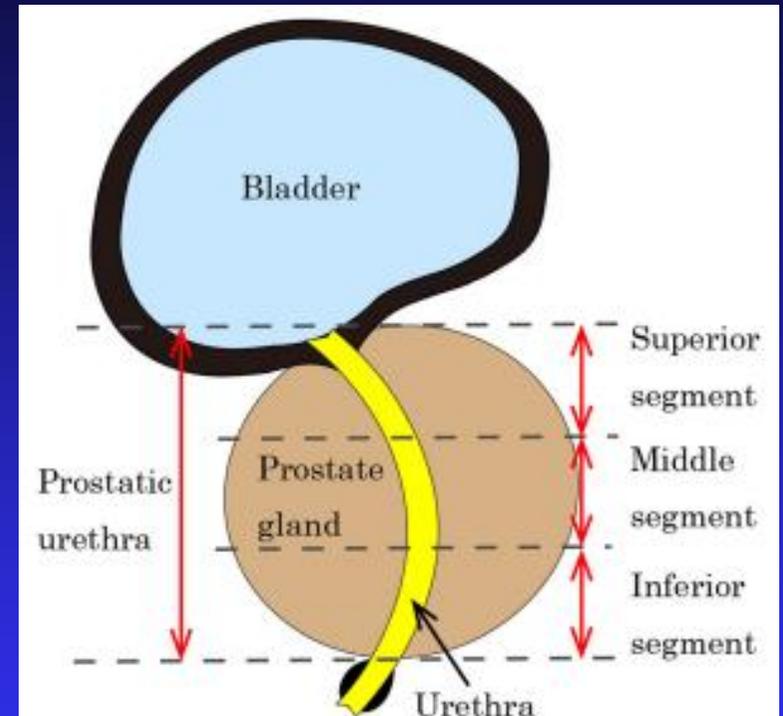


Fig. 1 Illustration of the normal anatomy and three segments of prostatic urethra as defined and used in this study. The prostatic urethra is defined as the urethra in the prostate, i.e., from the bladder to the prostate/pelvic floor border, as shown on computed tomography. The superior segment is defined one-third of all prostatic urethra to the bladder side, and the inferior segment is the portion to the pelvic floor side. Each segment is divided evenly

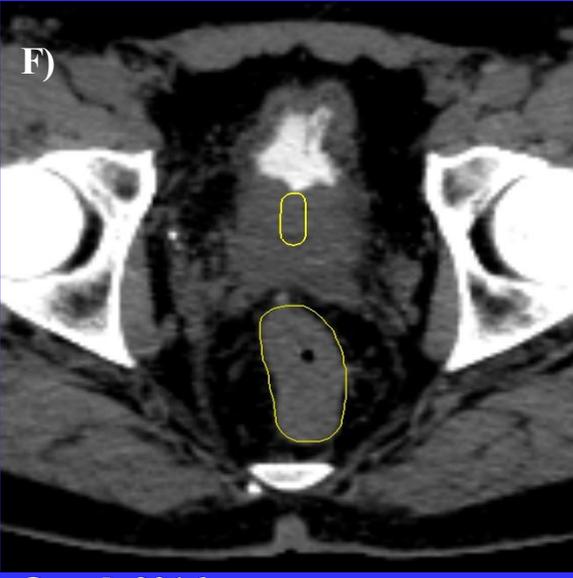
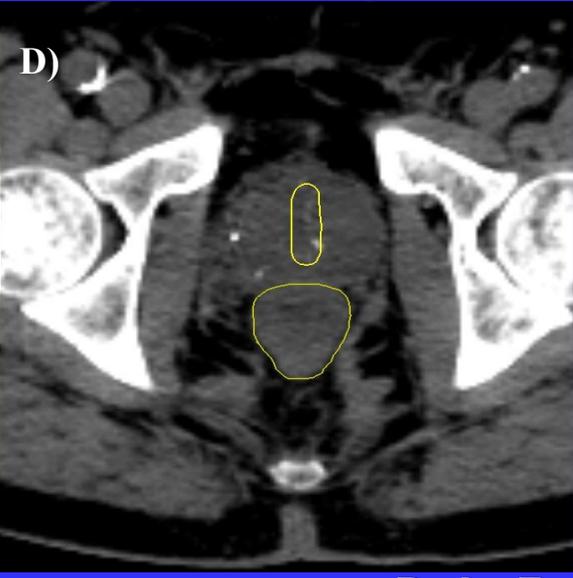
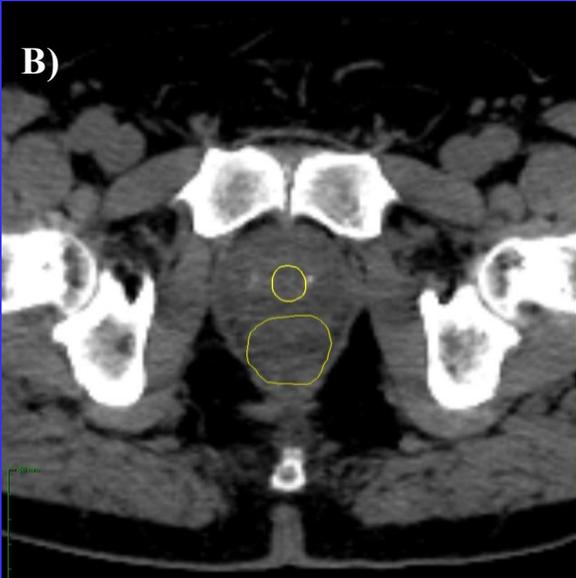
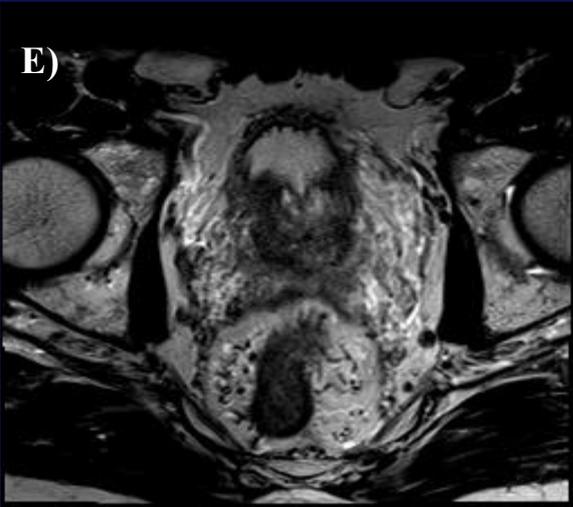
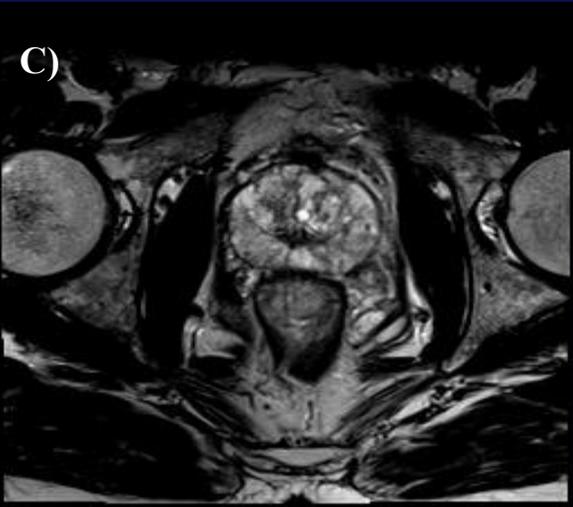
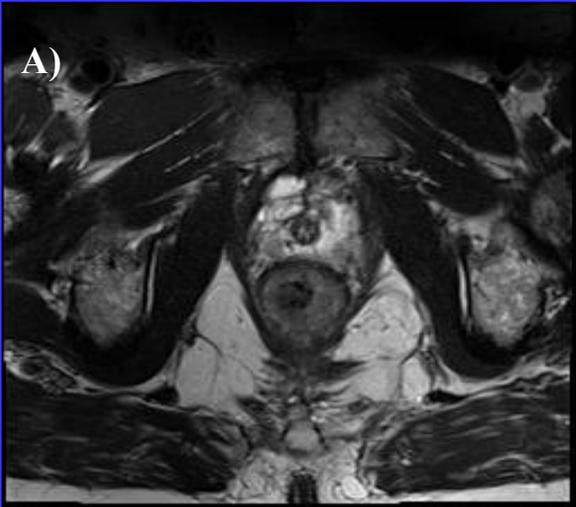
❑ Dekura *et al*, *Rad. Onc.*, 2019

Contouring the Prostatic Urethra with 3 Tesla MRI

Apex

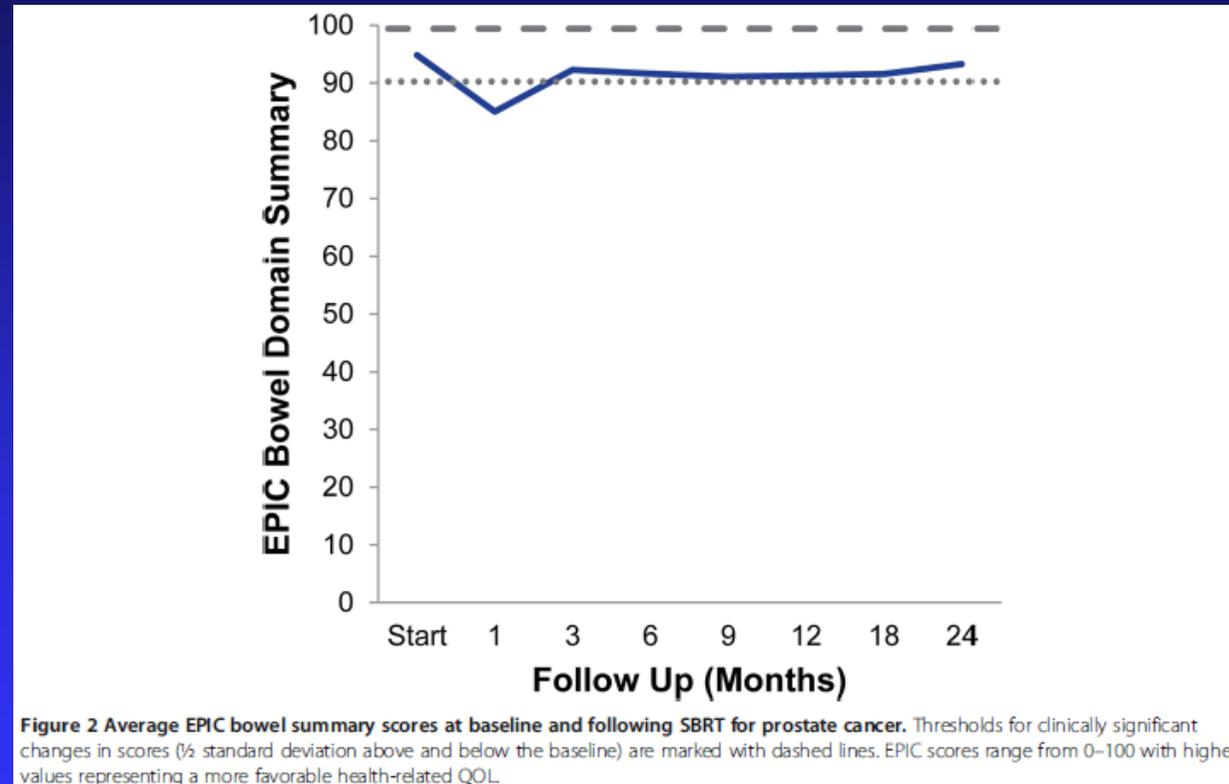
Mid

Base



Bowel Quality of Life Following Robotic SBRT Treatment

- Minimal Bowel Toxicity
- Grade 2 rectal bleeding
 - 1.5%
- EPIC Bowel Score
 - Dip at one month
 - Recovery at 3 months



Joh et al. Radiat. Oncol. 2014

Predictors of Symptomatic Rectal Bleeding Following Linac-Based SBRT

- Posterior PTV Margin 4-5 mm

- Dose/Treatment volume

 - 35 Gy/prostate 5%

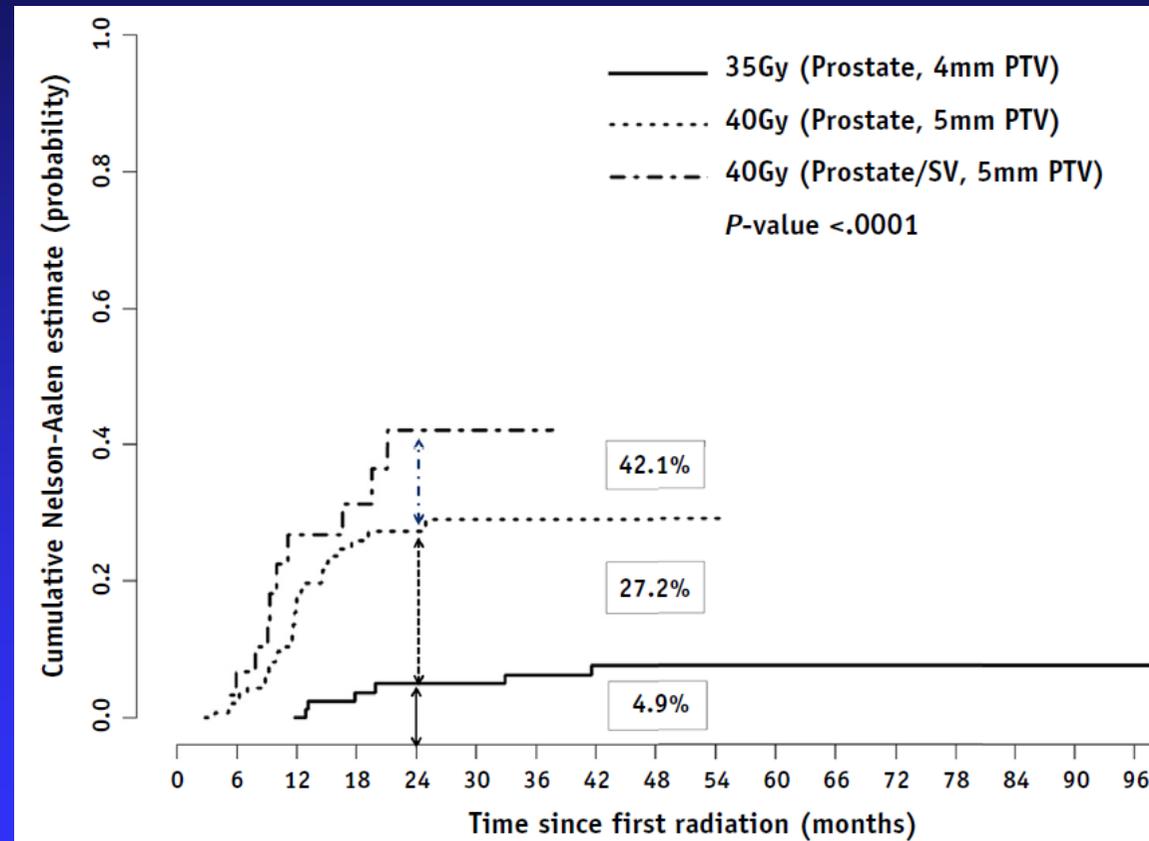
 - 40 Gy/prostate 27%

 - 40 Gy/prostateSV 42%

- Rectal Volume > 38 Gy

 - < 2 cc 9%

 - ≥ 2 cc 28%

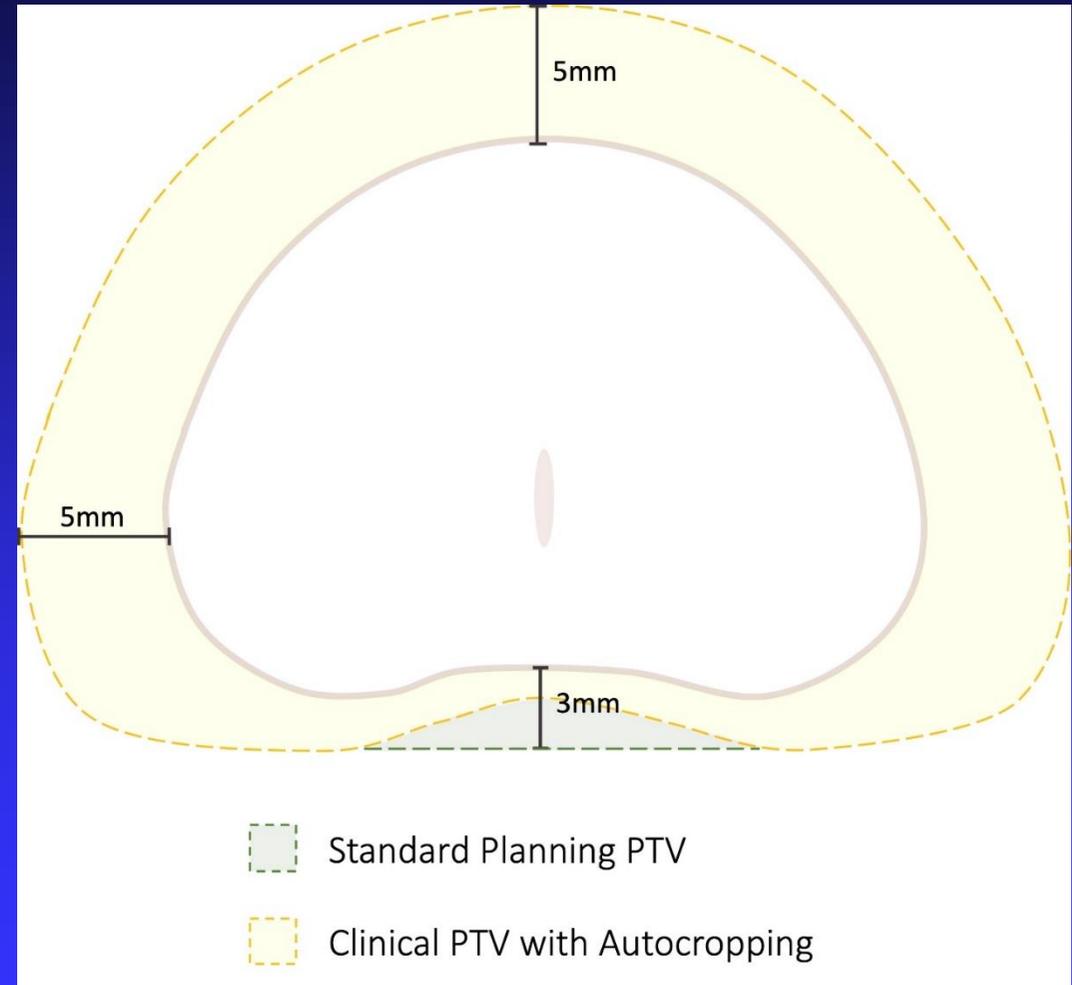


□ *Musunura, IJROBP, 2016*

Cropping of the Planning Target Volume (PTV) Secondary to Stringent Rectal Dose Constraints

Rectal Goals

- < 1 cc receiving 36 Gy
- < 20% receiving 80% of proscribed dose
- < 50% receiving 40% of proscribed dose



Tips for Minimizing Bowel Symptoms

- Low Residue Diet (**Always**)
 - Start five days prior to treatment
 - Maximize distance between the prostate and the rectal wall
 - Minimize intrafraction prostate motion
- Pretreatment Enema (**Always**)
 - Prior to simulation and each treatment
- Rectal dose reduction
 - $V_{36} \text{ Gy} < 1 \text{ cc}$
 - Posterior PTV expansion 3 mm
- Rectal Spacer (**Sometimes**)
 - For high-risk patients or if considering dose escalation

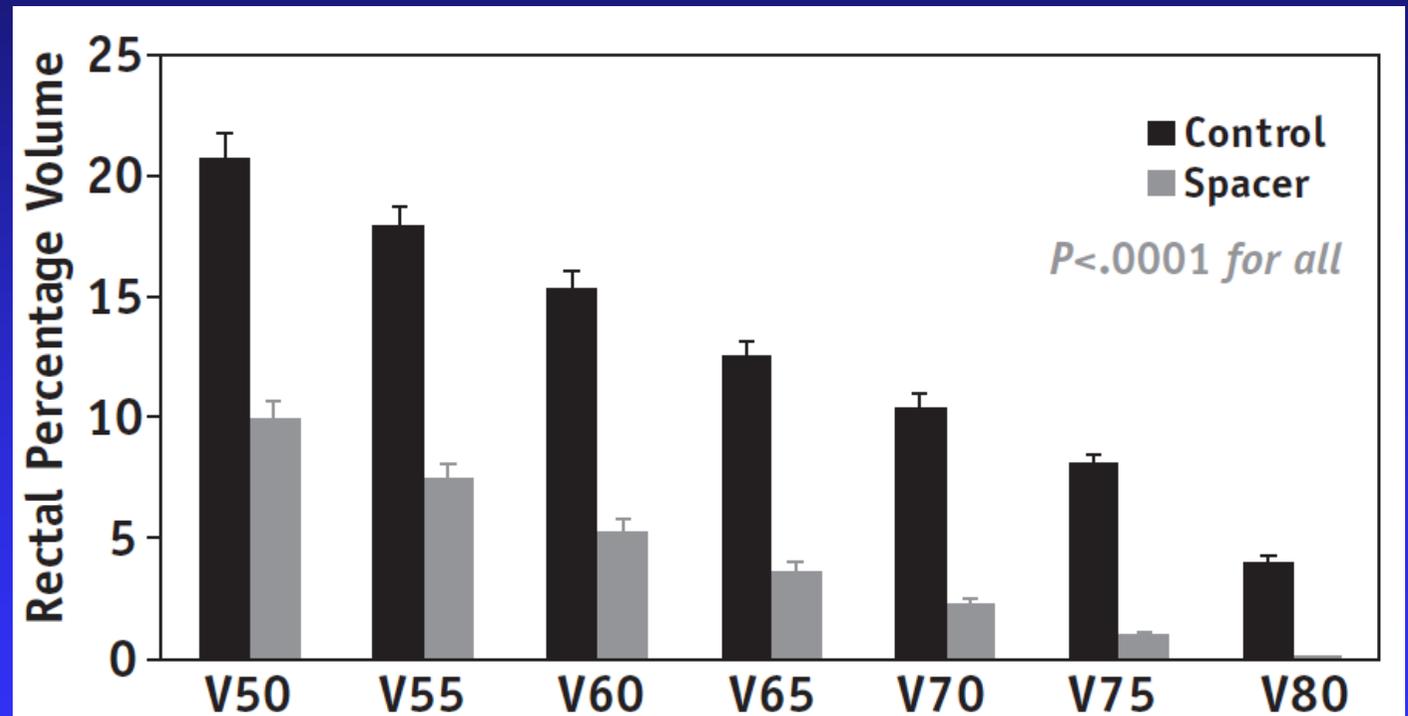
Impact of Rectal Spacer on IMRT Rectal Dosimetry

□ Percent reduction in volume of rectum treated

□ V80 Gy 96%

□ V70 Gy 79%

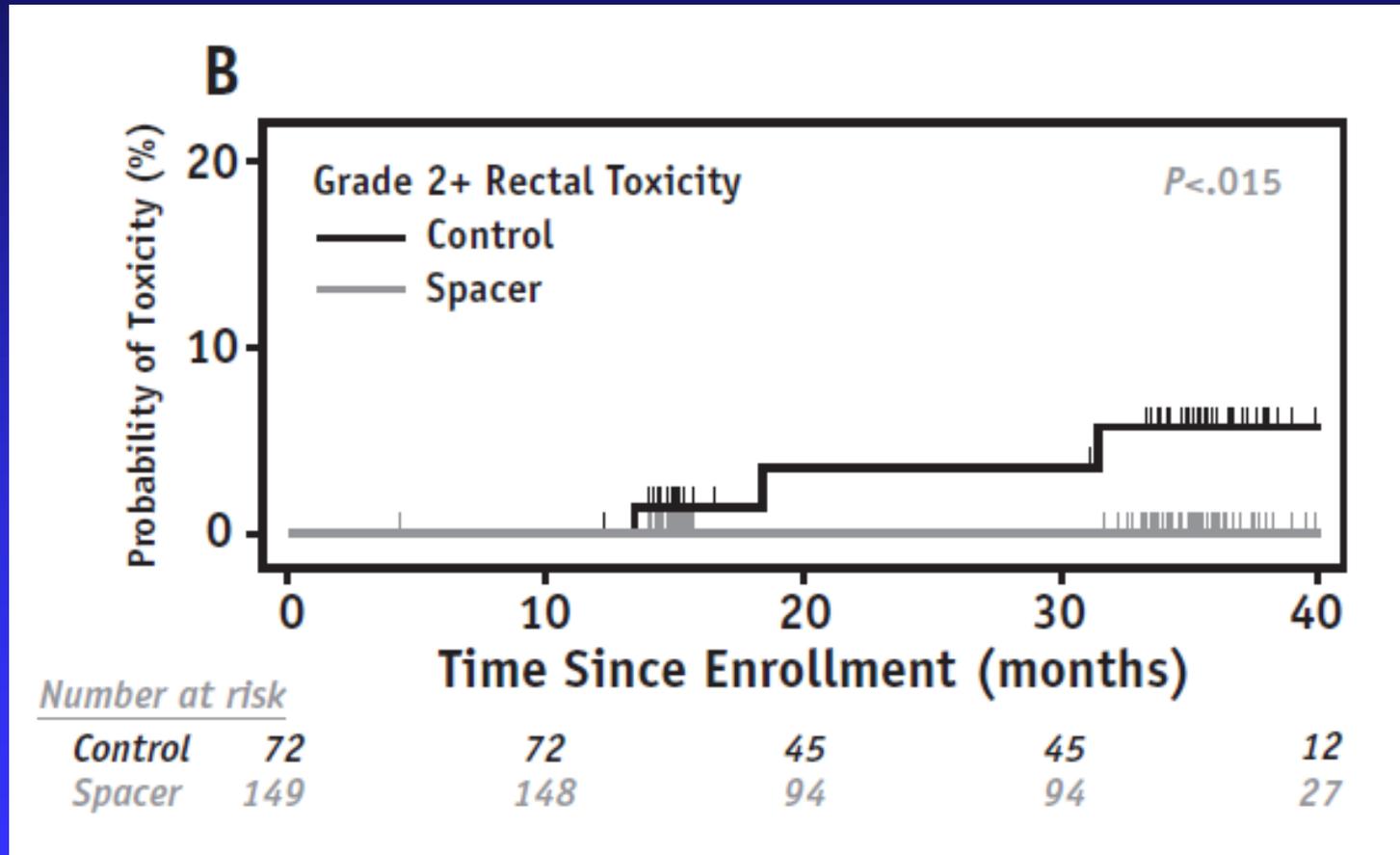
□ V50 Gy 54%



Hamstra et al. Pivotal Trial. IJROBP 2017

Rectal Spacer Reduces the Risk of Rectal Toxicity Following Conventionally Fractionated IMRT

- No Grade 2 or higher rectal toxicity in Rectal Spacer Arm



Hamstra et al. Pivotal Trial. IJROBP 2017

Rationale for **Rectal Spacer** Utilization with Robotic SBRT

□ Improve Target Coverage

- The Posterior Margin is tight in Robotic SBRT Plans
- **Rectal Spacers** can improve CTV/PTV coverage

□ Patients at High Risk for Late Rectal Toxicity

- Dose limited by increased normal tissue sensitivity
- **Rectal Spacers** may allow for safer treatment

□ Intraprostatic Dose Escalation Trials

- Dose limited by surrounding normal tissue tolerance
- **Rectal Spacers** may allow for safer treatment

Impact of Rectal Spacer on Rectal Dosimetry with Robotic SBRT

□ Mean perirectal distance

- 1.1 cm

□ Mean rectal dose

- V32.7 Gy

- Minus 6.4%

- Plus 3.4%

- V18.1 Gy

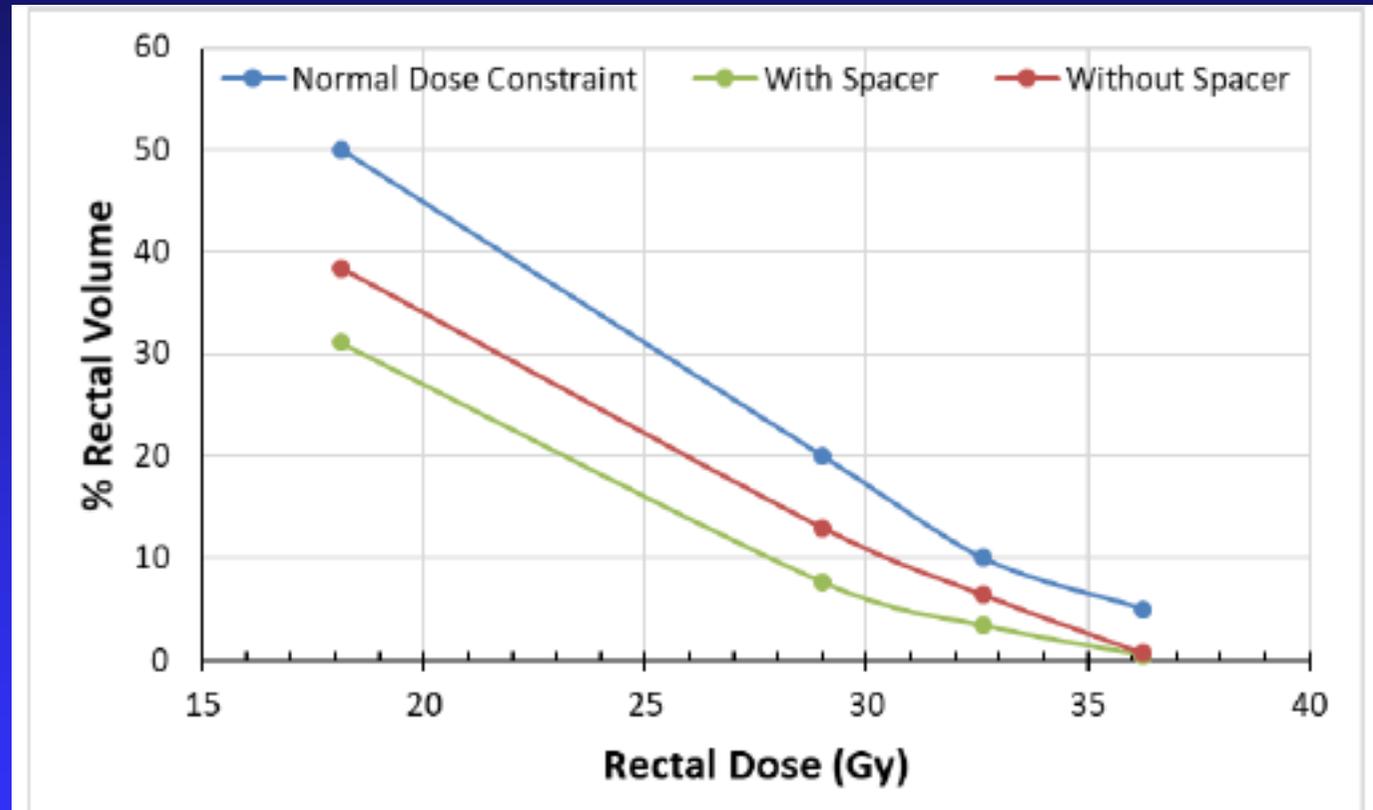
- Minus 38.4%

- Plus 31.1%

□ Mean prostate 40 Gy

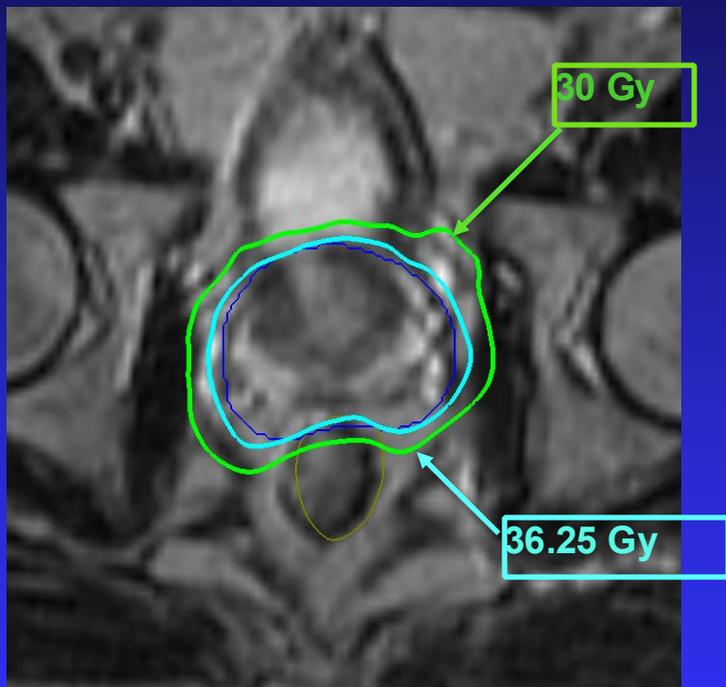
- Minus 91%

- Plus 99%

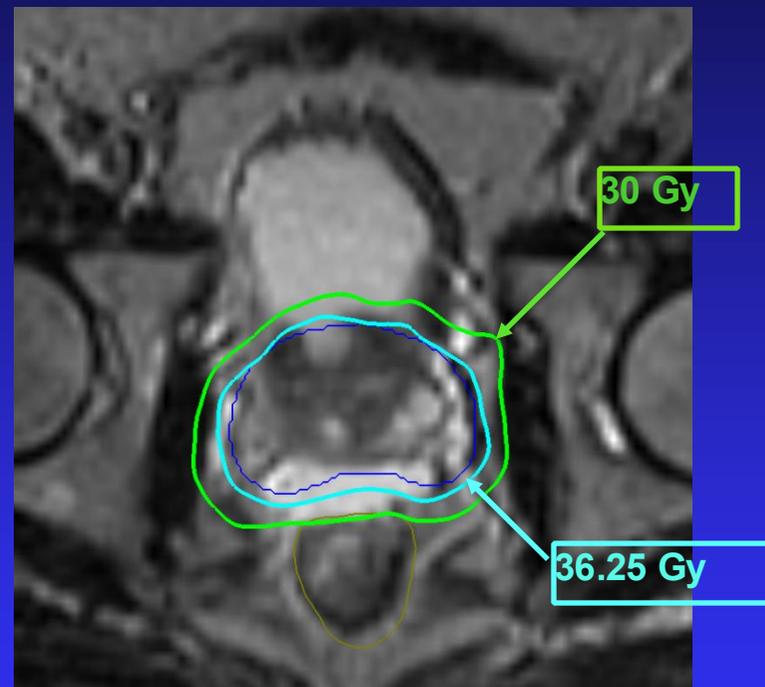


Kataria et al. ASTRO Presentation 2017

Impact of Rectal Spacer on Robotic SBRT Plans



Pre-Rectal Spacer



Post-Rectal Spacer

Impact of Rectal Spacer on Robotic SBRT Plans

- **Clinical Significance:**
 - **Improved GTV V40Gy and PTV V36.25Gy**
 - **Larger posterior margin**
 - **Inadequate margins may lead to treatment failure in some patients**
 - **Possible role in dose escalation**

Predictors Of Rectal Toxicity Following Radiation Therapy

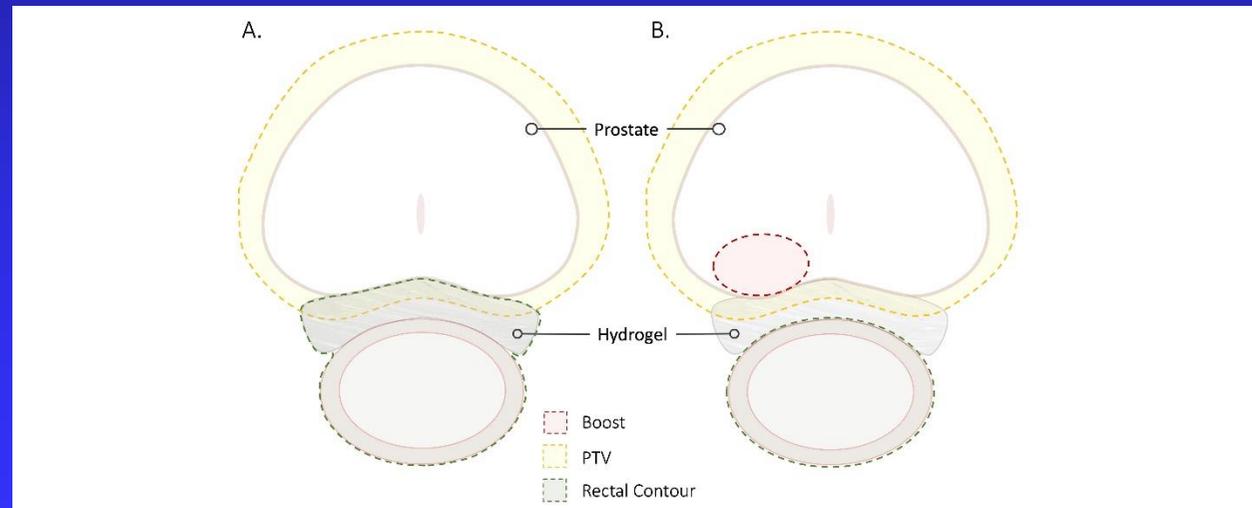
- Inflammatory Bowel Disease (IBD)
- Anticoagulant use (*Musunuru et al IJROBP 2016*)
- Prior Radiation Therapy

TABLE 6. Summary of Studies Reporting Toxicity in IBD Patients Undergoing Abdominal/Pelvic Radiotherapy

References	Years of Treatment	n	Area Treated	Radiation Technique	Dose (Gy)*	Median Follow-up (mo)	Acute Severe Toxicity (%)	Late Severe Toxicity (%)
Peters et al ⁶	1992-2004	24	Prostate	LDR brachytherapy +/- EBRT	45†	48.5	0	0
Song et al ⁴	1979-1996	24	Abdomen/ pelvis	Not specified	45	11	21	8
Willett et al ³	1970-1999	28	Abdomen/ pelvis	“Specialized techniques” (57%) vs. conventional (43%)	45.6	32	21	29
Green et al ²	1960-1994	15	Rectal	4-field, 3-field, or A/P	50.4	24	20	0
This study	1997-2012	19	Abdomen/ pelvis	IMRT (76%) vs. 3D-CRT (24%)	54	32.5	11	5

Impact of Rectal Spacer on Robotic SBRT Dosimetry in Patients with Risk Factors for Late Rectal Toxicity

- The rectal dose tolerances are unknown in these patients
 - ALARA
 - Treatment planning tip
 - Include **Spacer** in rectal contour



Repka et al. Front Oncol (Under Review)

Local Failure After Prostate SBRT Predominantly Occurs in the Dominant Intraprostatic Lesion (DIL)

□ Men with PI-RADS 4-5 DILs have a Higher Risk of Recurrence

EUROPEAN UROLOGY ONCOLOGY xxx (2022) xxx

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journal homepage: euoncology.europeanurology.com



European Association of Urology



Prostate Cancer

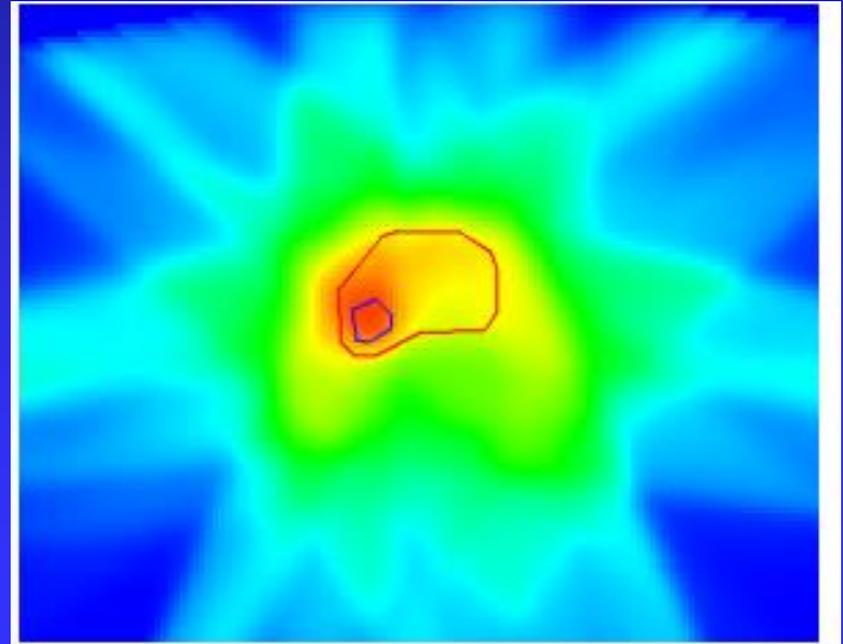
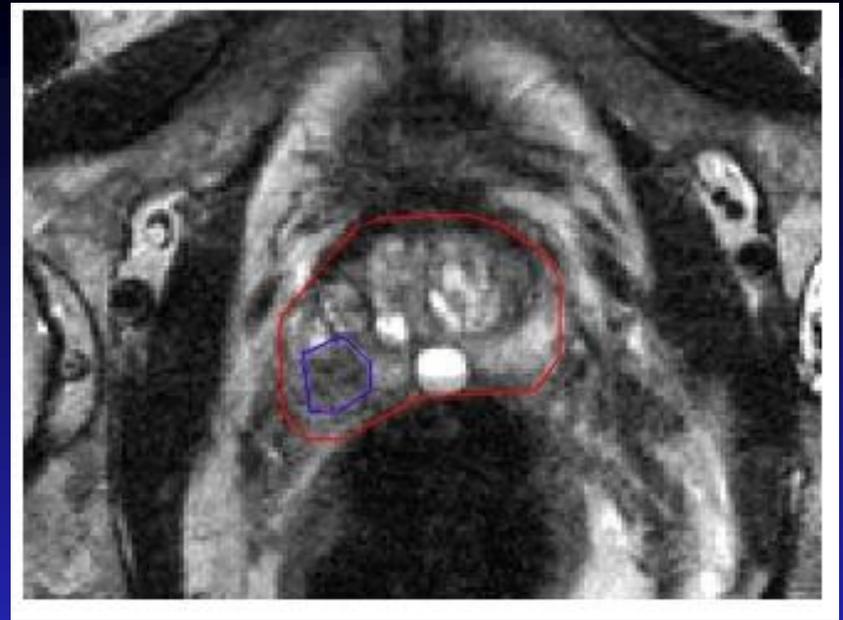
Local Failure after Prostate SBRT Predominantly Occurs in the PI-RADS 4 or 5 Dominant Intraprostatic Lesion

Daniel Gorovets^{a,}, Andreas G. Wibmer^b, Assaf Moore^{a,c}, Stephanie Lobaugh^d, Zhigang Zhang^d, Marisa Kollmeier^a, Sean McBride^a, Michael J. Zelefsky^a*

^a Department of Radiation Oncology, Memorial Sloan Kettering Cancer Center, New York, NY, USA; ^b Department of Radiology, Memorial Sloan Kettering Cancer Center, New York, NY, USA; ^c Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel; ^d Department of Epidemiology and Biostatistics, Memorial Sloan Kettering Cancer, New York, NY, USA

FLAME Trial

- Phase III
- Intermediate and high risk patients
- Boost to MRI-identified gross tumor
- Arms
 - I
 - 77 Gy/ 35 fxs to entire prostate
 - II
 - 77 Gy/ 35 fxs to entire prostate
 - Integrated boost to 95 Gy/35 fxs



□ *Lips et al, Trials. 2011*

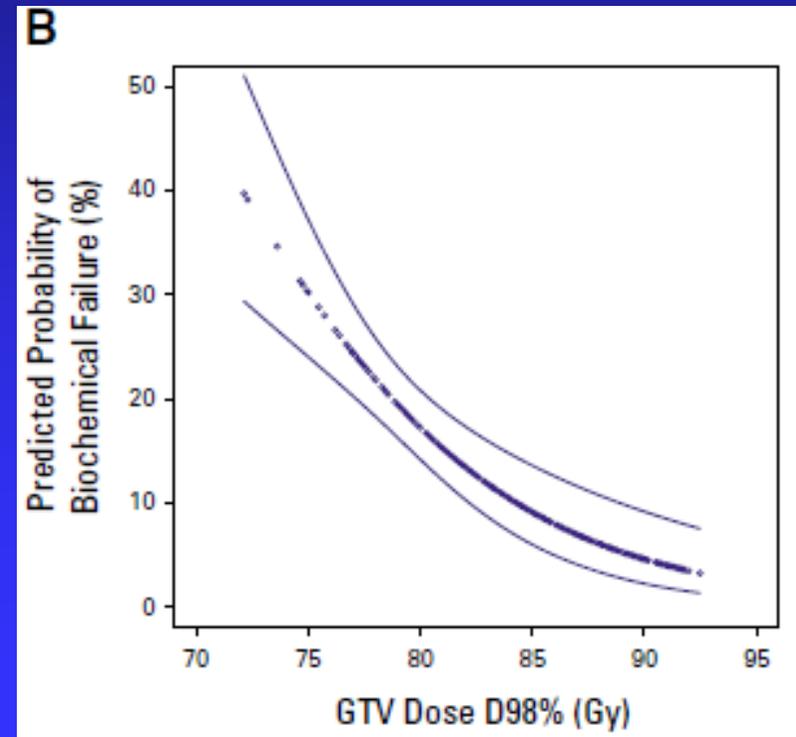
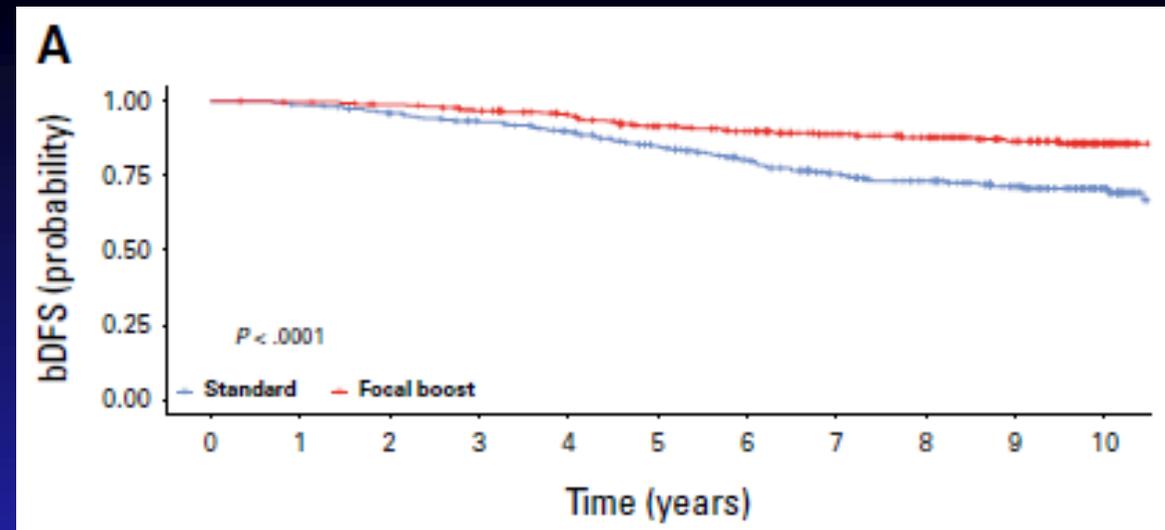
FLAME Trial:

□ BDFS (10 year)

□ Standard 71%

□ Focal Boost 86%

□ $P < 0.001$



□ *Mena Guricova et al, JCO. 2025*

HYPO-FLAME Trial

- Phase II
- Intermediate/high risk patients
- Boost to MRI-identified gross tumor
- Arms
 - I
 - 35 Gy/ 5 fxs to entire prostate
 - II
 - 35 Gy/ 5 fxs to entire prostate
 - Integrated boost to 50 Gy/5 fxs

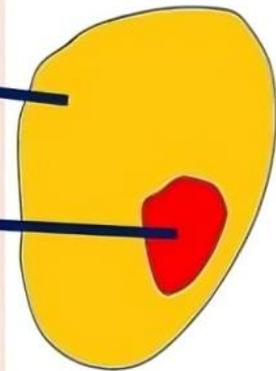
hypo-FLAME trial

OTT = 29 days

5 sessions, 1x/week

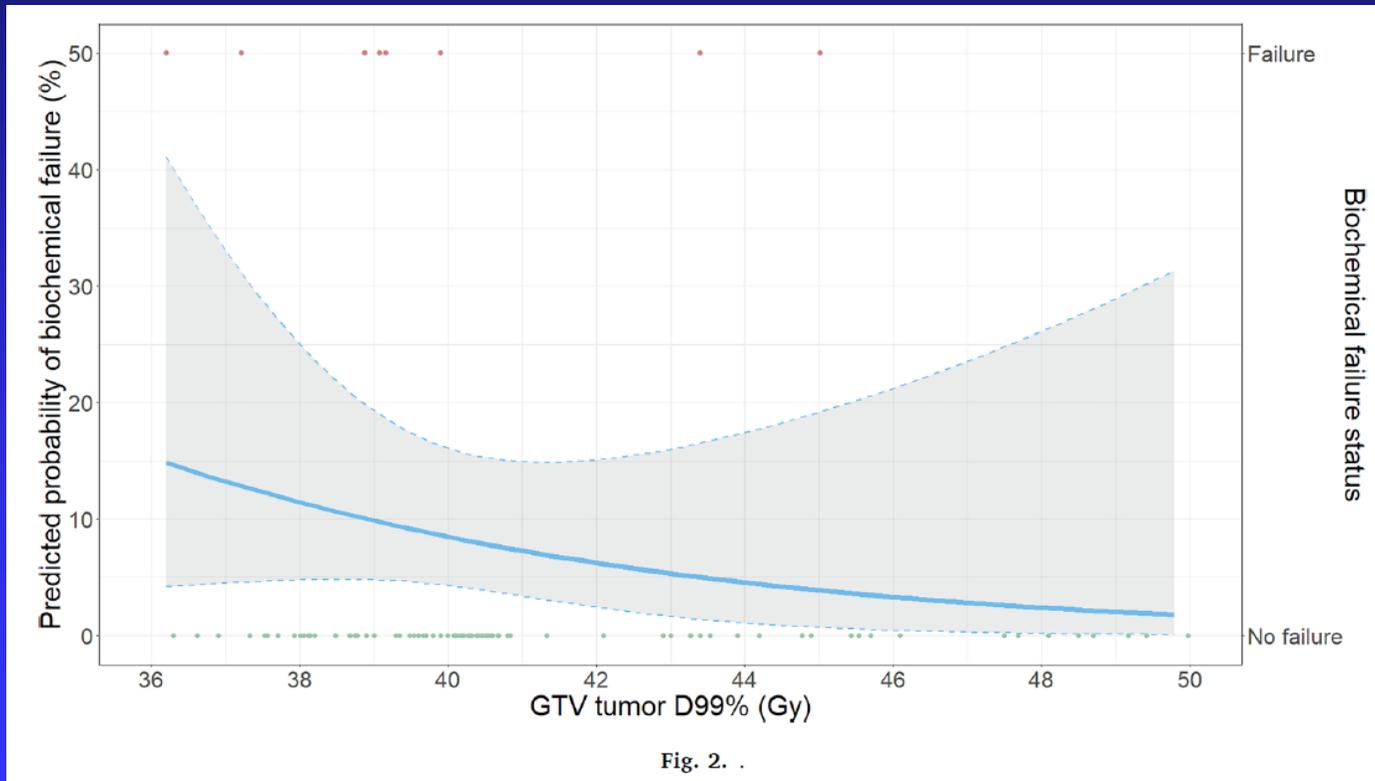
Whole-gland irradiation
+ focal tumor boost

Prostate
(35 Gy / 7 Gy)
Tumor
(50 Gy / 10 Gy)



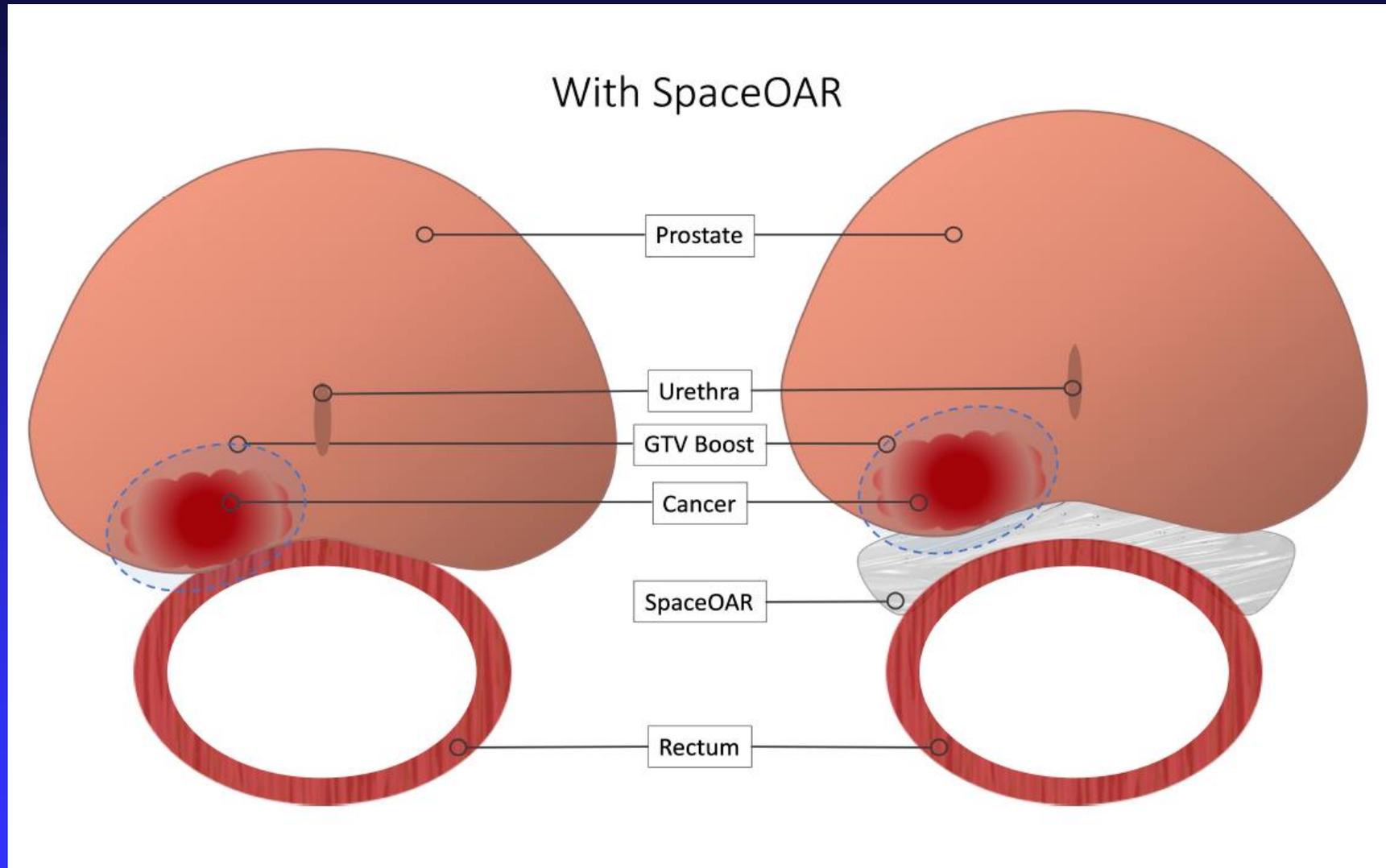
HYPO-FLAME Trial

- No Margin Added to Focal Boost
- Boost Dose Reduced to Make Dose Constraints



□ *Draulans et al, Radiother and Oncol. 2024*

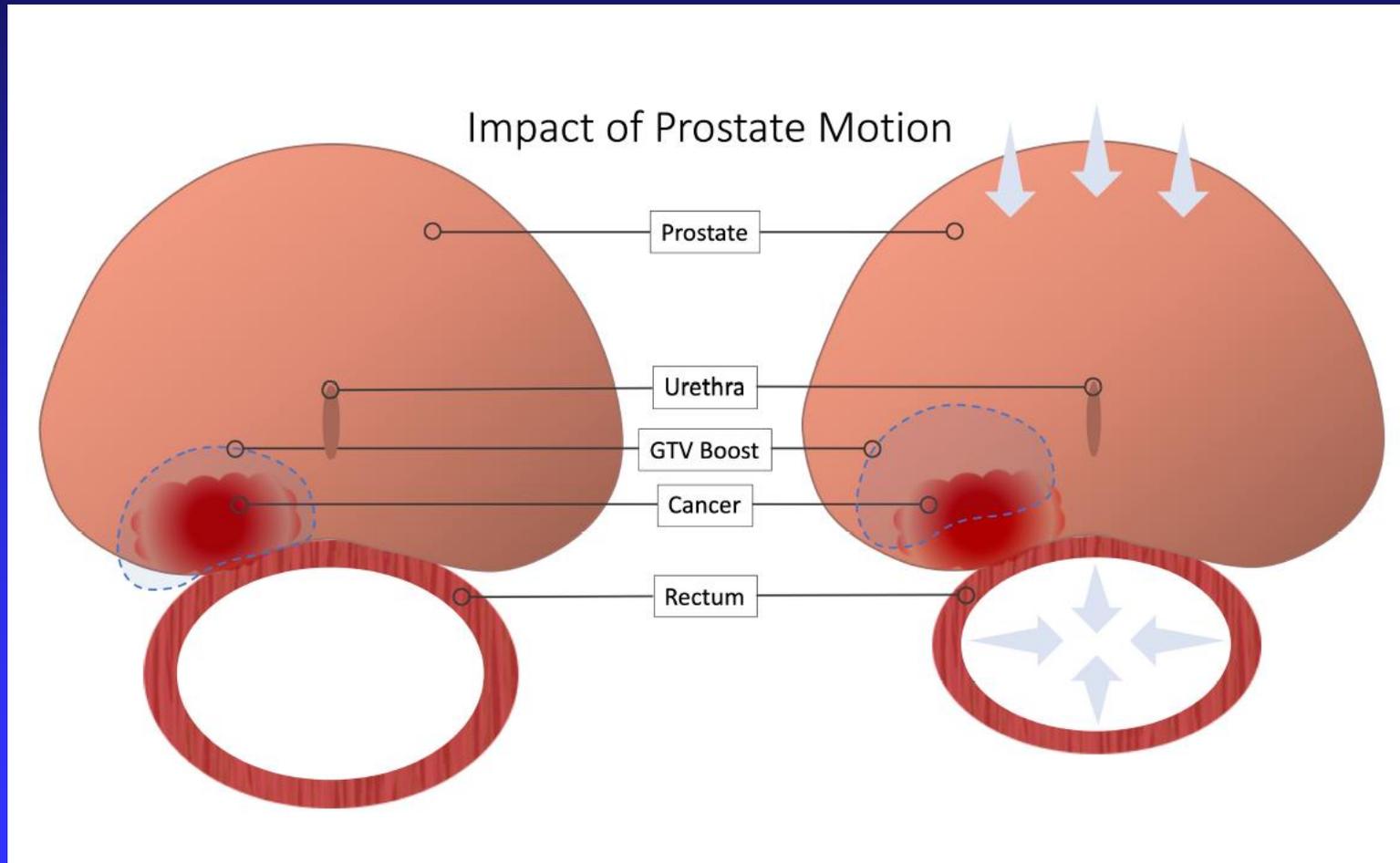
Robotic SBRT Dose Escalation Prostate Cancer



Repka et al. Front Oncol (Under Review)

Stop the Crop!

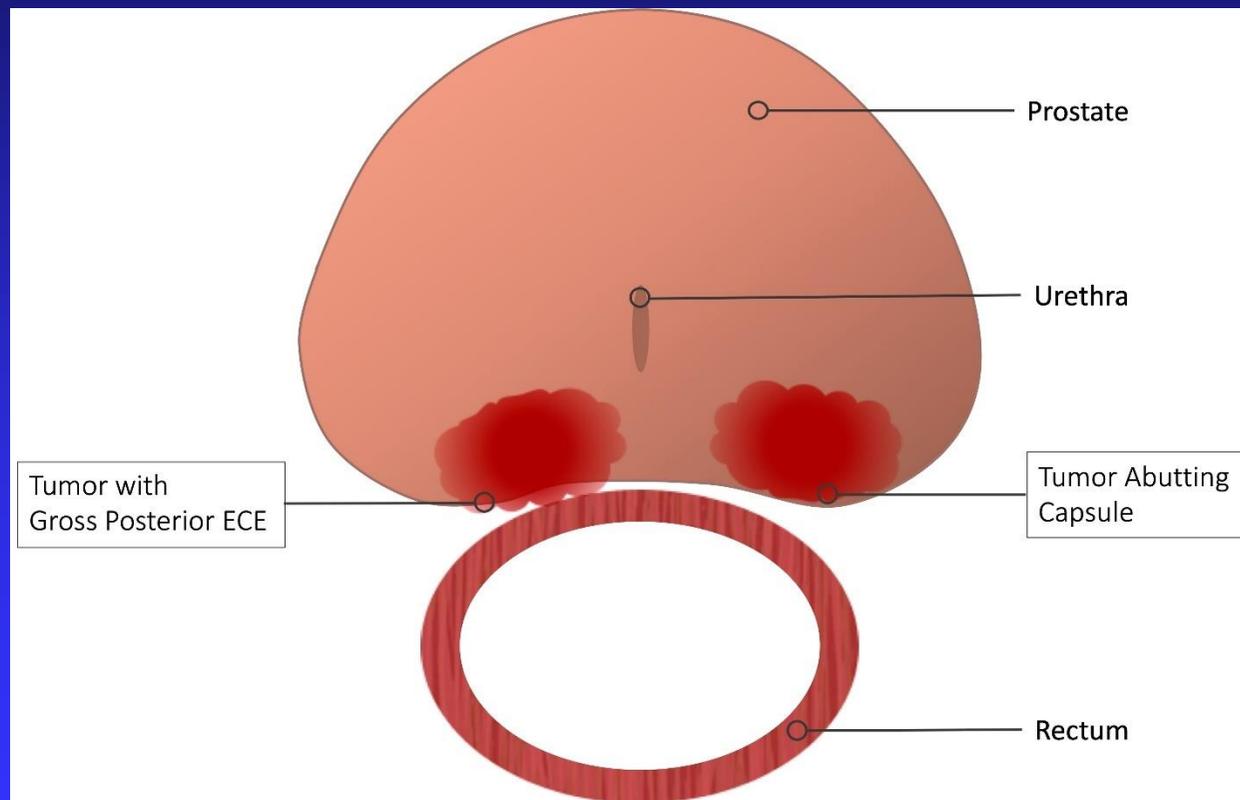
- PTV Margin is Required to Account for Uncertainties in Beam Alignment, Organ Motion and Prostate Deformation.



Courtesy of Michael Creswell, B.S.

Contraindications to Rectal Spacer Placement

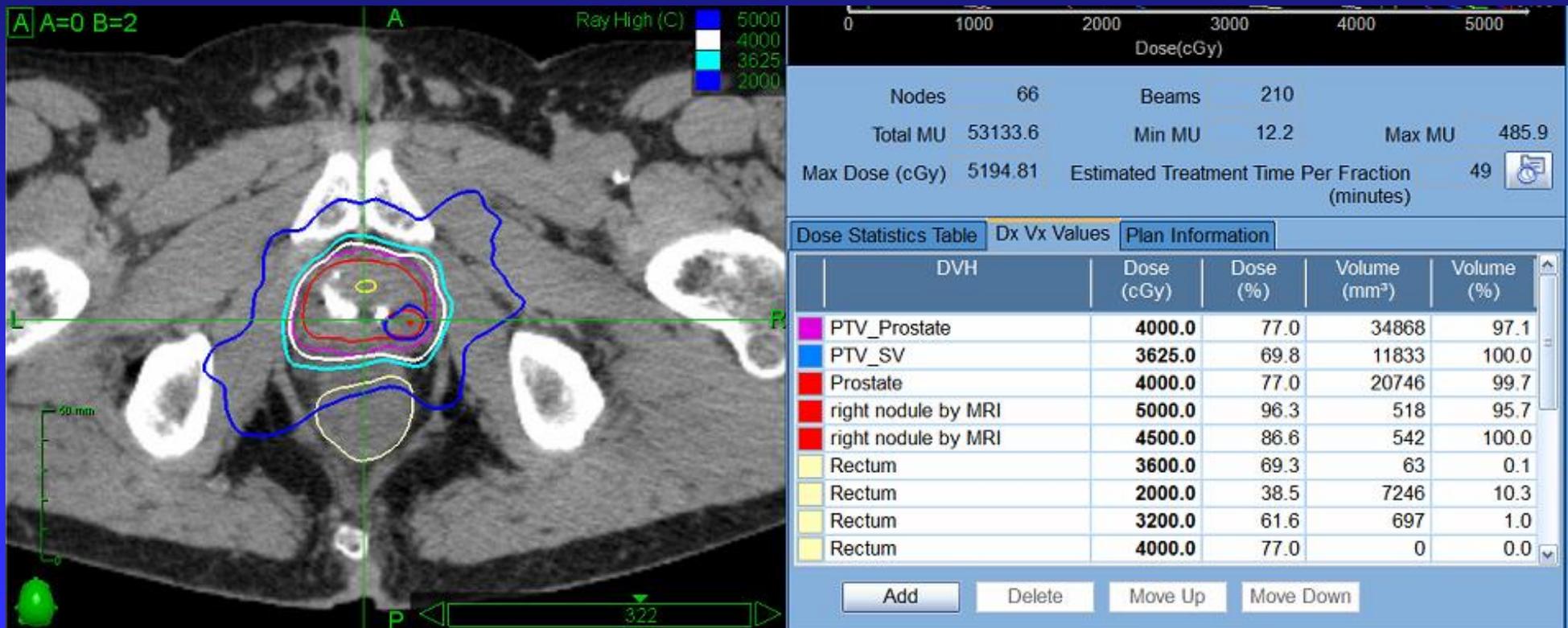
- **Gross Radiographic Posterior ECE is a Contraindication to Spacer Placement.**
- **Spacer Placement May Be Acceptable with Capsular Abutment.**



Repka et al. Front Oncol (Under Review)

Robotic SBRT Dose Escalation Prostate Cancer

□ Unfavorable Prostate Cancer



Courtesy from Olusola Obayomi-Davies, M.D.

Utilization of Supplemental Pelvic IMRT to Increase the Size of the Posterior Margin in Unfavorable Patients

Robotic SBRT

19.5 Gy

PTV 6.5 Gy x 3 fx

GTV 7.0 Gy x 3 fx



Pelvic IMRT

45 Gy

PTV 1.8 Gy x 25 fx

Robotic SBRT with Pelvic IMRT for Unfavorable Prostate Cancer

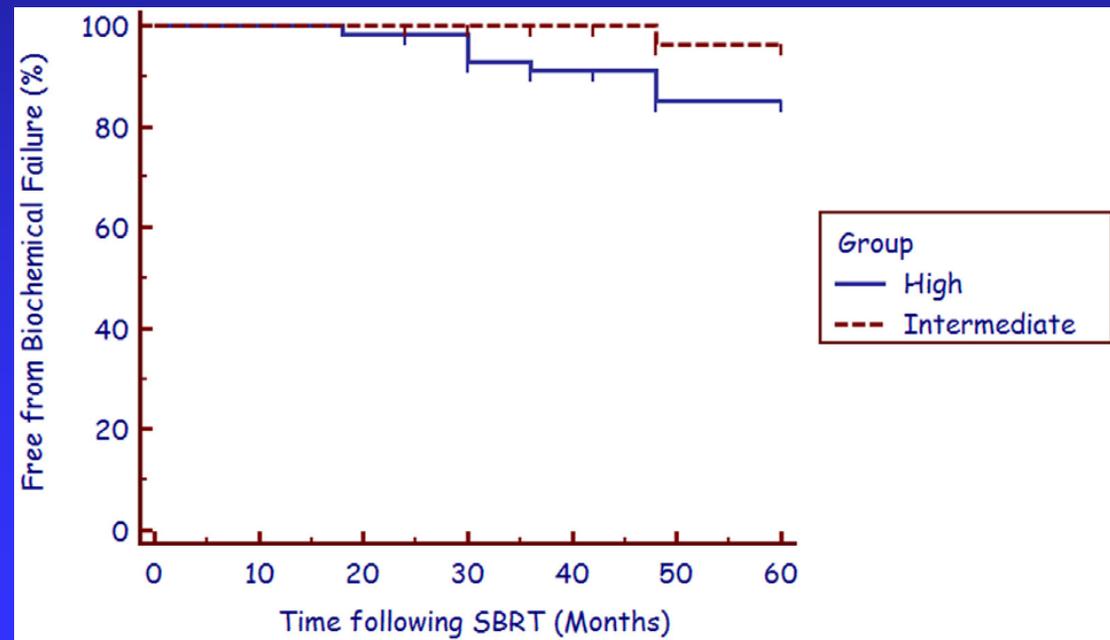
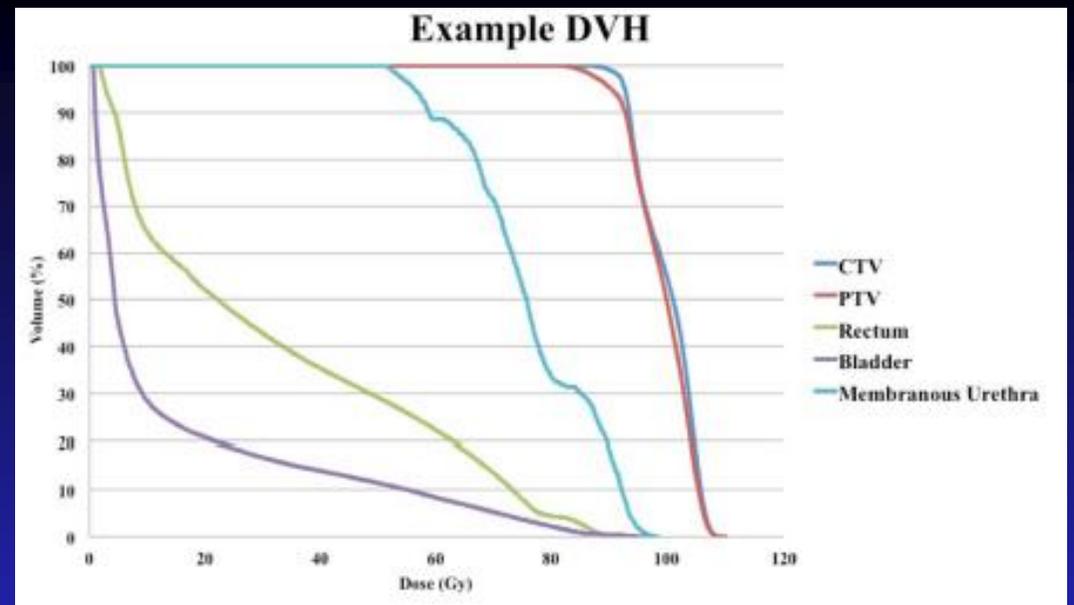
□ Phase II

□ Median FU = 4.4 years

□ BDFS (3 yrs)

□ Inter. Risk 100%

□ High Risk 90%



□ *Mercado et al, Front. Oncol. 2016*

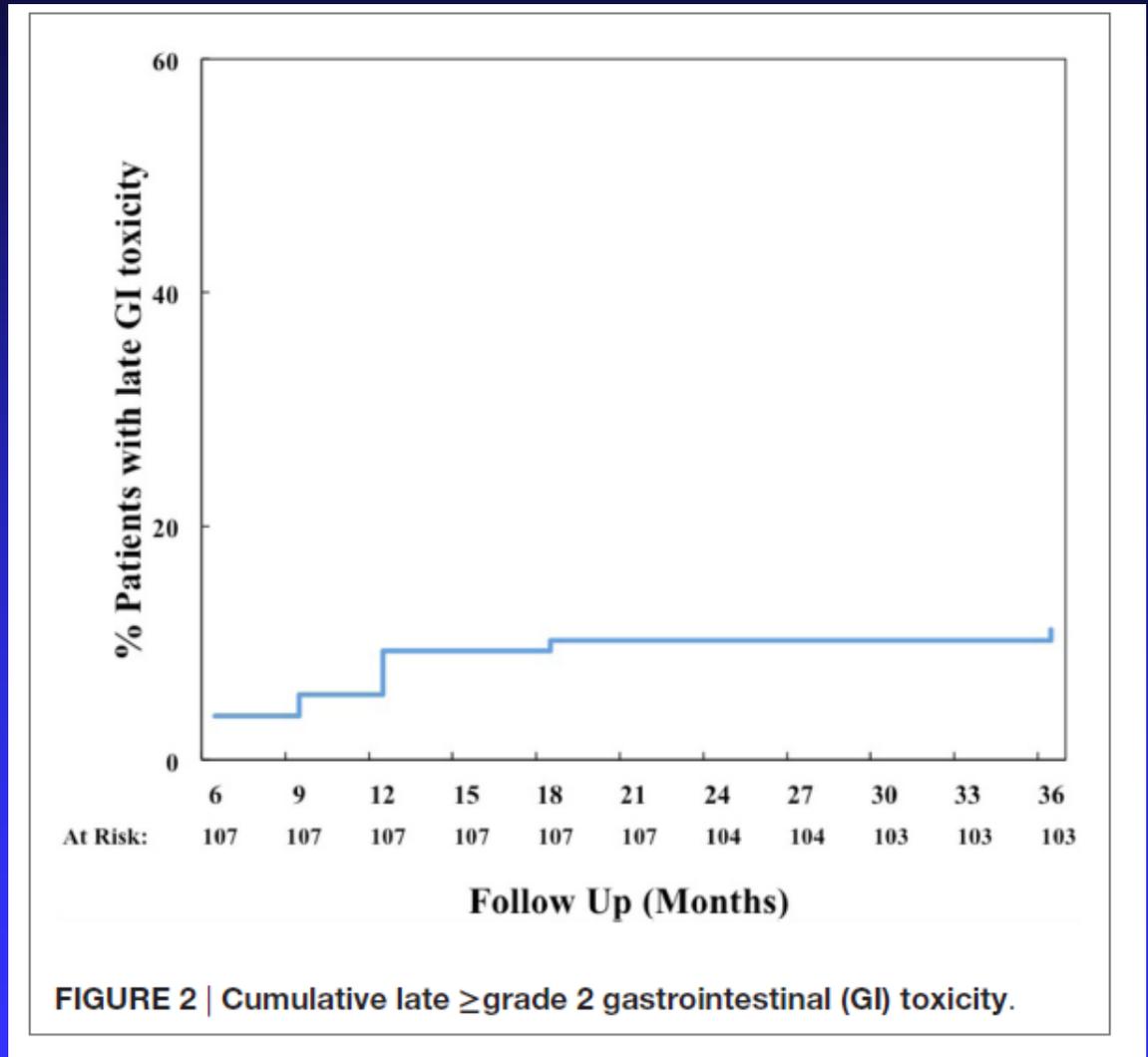
Significant Toxicities Can Occur When a Rectal Spacer is Not Utilized

□ Median FU = 4.2 yrs

□ Gastrointestinal (GI)

□ \geq Grade 2 12%

□ APC 6%



□ *Paydar et al, Front. Oncol. 2017*

CLINICAL INVESTIGATION

Pelvic Regional Control With 25 Gy in 5 Fractions in Stereotactic Radiation Therapy for High-Risk Prostate Cancer: Pooled Prospective Outcomes From the SHARP Consortium



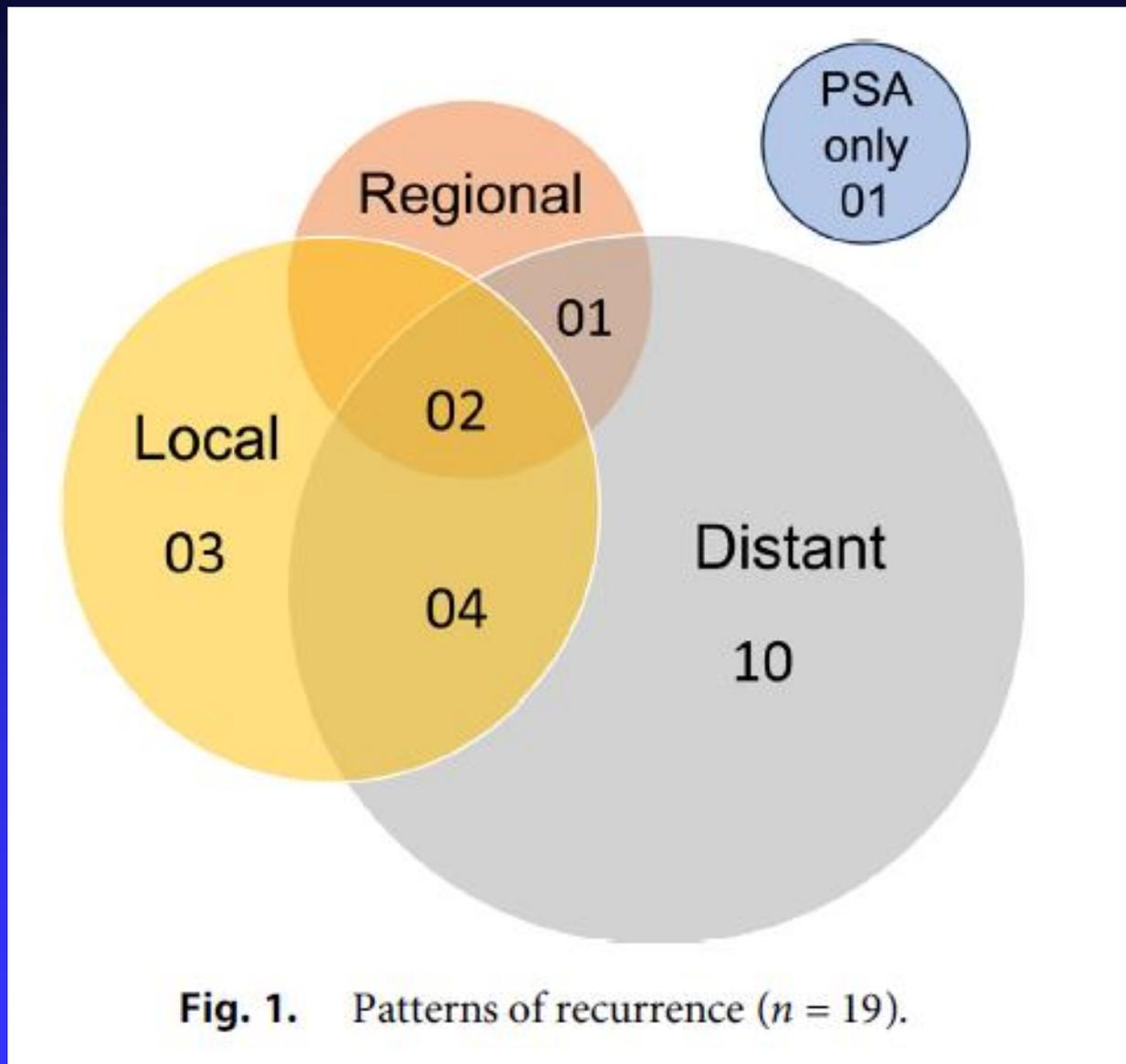
Vedang Murthy, MD,^a Indranil Mallick, MD, DNB,^b Priyamvada Maitre, MD,^a Gargee Mulye, MD,^a Moses Arunsingh, MD, FRCR,^b Luca Valle, MD,^{c,d} Michael Steinberg, MD,^c Thomas Kennedy, MD,^e Andrew Loblaw, MD,^e and Amar U. Kishan, MD^c

^aDepartment of Radiation Oncology, Tata Memorial Hospital and Advanced Centre for Treatment Research and Education in Cancer (ACTREC), Homi Bhabha National Institute (HBNI), Mumbai, India; ^bDepartment of Radiation Oncology, Tata Medical Center, Kolkata, India; ^cDepartment of Radiation Oncology, University of California, Los Angeles, California; ^dDepartment of Radiation Oncology, Veterans Affairs Greater Los Angeles Healthcare System, Los Angeles, California; and ^eDepartment of Radiation Oncology, University of Toronto, Toronto, Ontario, Canada

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SHARP Consortium: Rationale for Prophylactic Hypofractionated Pelvic Nodal Radiation

- Pelvic Control (5 yrs)
 - 98.2%
- No isolated Pelvic Failures



PRINCIPLES OF RADIATION THERAPY

Table 1: Below are examples of regimens that have shown acceptable efficacy and toxicity. The optimal regimen for an individual patient warrants evaluation of comorbid conditions, voiding symptoms and toxicity of therapy. Additional fractionation schemes may be used as long as sound oncologic principles and appropriate estimate of BED are considered.

See [PROS-3](#), [PROS-4](#), [PROS-5](#), [PROS-6](#), [PROS-7](#), [PROS-8](#), [PROS-13](#), and [Principles of ADT \(PROS-G\)](#) for other recommendations, including recommendations for neoadjuvant/concomitant/adjuvant ADT.

Regimen	Preferred Dose/Fractionation	NCCN Risk Group (✓ indicates an appropriate regimen option if RT is given, ☼ indicates a regimen useful in certain circumstances)					
		Low	Favorable Intermediate	Unfavorable Intermediate	High and Very High	Regional N1 ^f	Low Metastatic Burden M1 ^f
EBRT							
Moderate Hypofractionation ^c	3 Gy x 20 fx 2.7 Gy x 26 fx 2.5 Gy x 28 fx	✓	✓	✓	✓	✓	☼
	2.75 Gy x 20 fx						✓
Conventional Fractionation ^c	1.8–2 Gy x 37–45 fx			✓	✓	✓	☼
SBRT Ultra-Hypofractionation	9.5 Gy x 4 fx 7.25–8 Gy x 5 fx ^c 6.1 Gy x 7 fx ^c	✓	✓	✓	✓	☼	☼
	6 Gy x 6 fx ^c						✓
EBRT Boost Techniques							
EBRT + Micro-Boost ^d	See footnote d.		✓	✓	✓		☼
EBRT + SBRT Boost ^e	1.8–2 Gy x 23–28 fx (45–50.4 Gy) to whole prostate plus 6 Gy x 3 fx			✓	✓	☼	

Thank You for Your Attention!

