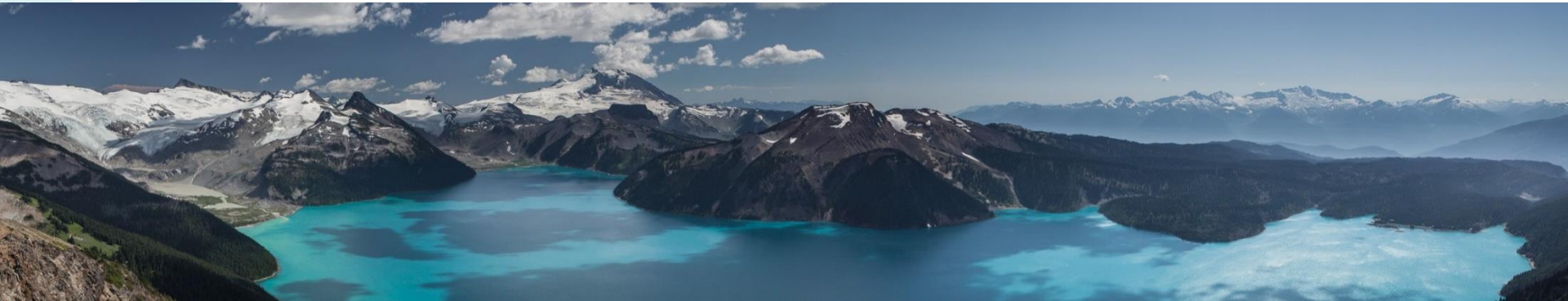
Which is best LDR or HDR for the boost

Leeds UK

March 22 2019

Mira Keyes MD FRCPC
Clinical Professor Radiation Oncology
Department of Surgery UBC
Head, BCCA prostate Brachytherapy Program
Vancouver Cancer Centre, BC Cancer Canada



Why Brachytherapy? Radiation Oncology 101

There is no radio-resistant tumors

Failure to cure localized cancer is due to:

- Inadequate dose
- Geographic miss

Surgery:

- Eliminate **bulk** – most common cause of RT failure

EBRT:

- Eliminate **microscopic** disease – most common cause of surgical failure

BRACHYTHERAPY
Very high dose
Eliminate tumor **bulk**

EBRT and Brachytherapy
Eliminate both

PB is the most effective (radiation) treatment for localized PC

SACRED GROUND
Bev Doolittle

HDR vs LDR?

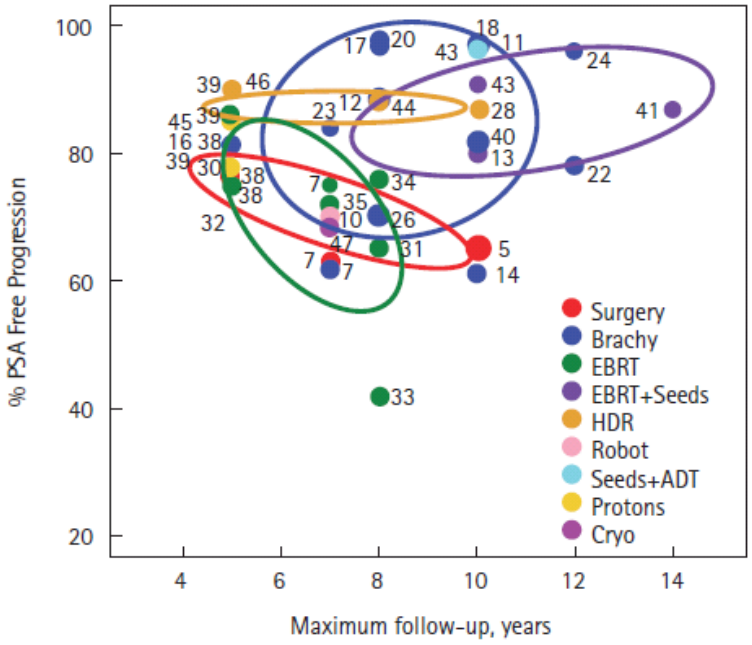
HDR – Shorter follow up than LDR, smaller studies
Are the long term outcomes equivalent?
HDR – Various fractionation schedule
Are they equivalent?
HDR – Toxicity is less? - Is this correct?
HDR – Less expensive? - Is this correct?

Comparative analysis of prostate-specific antigen free survival outcomes for patients with low, intermediate and high risk prostate cancer treatment by radical therapy. Results from the Prostate Cancer Results Study Group

BJUI SUPPLEMENTS

Peter Grimm[1], Ignace Billiet[2], David Bostwick[3], Adam P. Dicker[4], Steven Frank[5], Jos Immerzeel[6], Mira Keyes[7], Patrick Kupelian[8], W. Robert Lee[9], Stefan Machtens[10], Jyoti Mayadev[11], Brian J. Moran[12], Gregory Merrick[13], Jeremy Millar[14], Mack Roach[15], Richard Stock[16], Katsuto Shinohara[15], Mark Scholz[17], Ed Weber[18], Anthony Zietman[19], Michael Zelefsky[20], Jason Wong[21], Stacy Wentworth[22], Robyn Vera[23] and Stephen Langley[24]

Majority LDR studies
Longer FU



Int. Risk PSA RFES @ **10y**

10y PSA RFS

LDR – 70-95%

HDR+EBRT – 85-90%

LDR+ EBRT~ 85-90%

EBRT <40-60%

Surgery ~65%

http://www.pctrf.org/low-risk-results/

BJUI SUPPLEMENTS

Comparative analysis of prostate-specific antigen free survival outcomes for patients with low, intermediate and high risk prostate cancer treatment by radical therapy. Results from the Prostate Cancer Results Study Group

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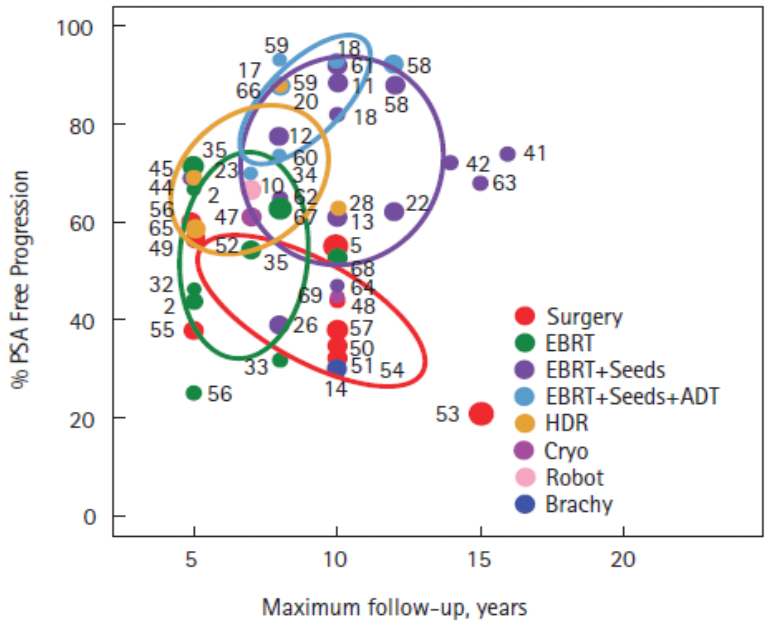
Majority LDR studies
Longer FU with LDR



High Risk PSA RFES @ 10y

LDR	<50%
LDR+ EBRT	60-70%
HDR+EBRT	85%
LDR +EBRT+ADT	85%
EBRT+ADT	<50%
Surgery	20-40%

http://www.pctrf.org/low-risk-results/

ACENDE RT - RTC 400 pts: 12 m ADT + EBRT ± LDR PB

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

Clinical Investigation

Androgen Suppression Combined with Elective Nodal and Dose Escalated Radiation Therapy (the ASCENDE-RT Trial): An Analysis of Survival Endpoints for a Randomized Trial Comparing a Low-Dose-Rate Brachytherapy Boost to a Dose-Escalated External Beam Boost for High- and Intermediate-risk Prostate Cancer

W. James Morris, MD, FRCPC,*,† Scott Tyldesley, MD, FRCPC,*,† Sree Rodda, MBBS, MRCP, FRCR,* Ross Halperin, MD, FRCPC,*,‡ Howard Pai, MD, FRCPC,*,§ Michael McKenzie, MD, FRCPC,*,† Graeme Duncan, MB, ChB, FRCPC,*,† Gerard Morton, MB, MRCPI, FRCPC, FFRRCSI,‖ Jeremy Hamm, MSC,¶ and Nevin Murray, MD, FRCPC†,#

Clinical Investigation

ASCENDE-RT: An Analysis of Health-Related Quality of Life for a Randomized Trial Comparing Low-Dose-Rate Brachytherapy Boost With Dose-Escalated External Beam Boost for High- and Intermediate-Risk Prostate Cancer

Sree Rodda, MBBS, MRCP, FRCR,* W. James Morris, MD, FRCPC,*,† Jeremy Hamm, MSC,‡ and Graeme Duncan, MB, ChB, FRCPC*,†

*BC Cancer Agency, Vancouver Centre, Vancouver, British Columbia, Canada; †Department of Surgery, University of British Columbia, Vancouver, British Columbia, Canada; ‡Department of Population Oncology, BC Cancer Agency, Vancouver Centre, Vancouver, British Columbia, Canada

Received Dec 14, 2016, and in revised form Feb 6, 2017. Accepted for publication Feb 14, 2017.

ELSEVIER

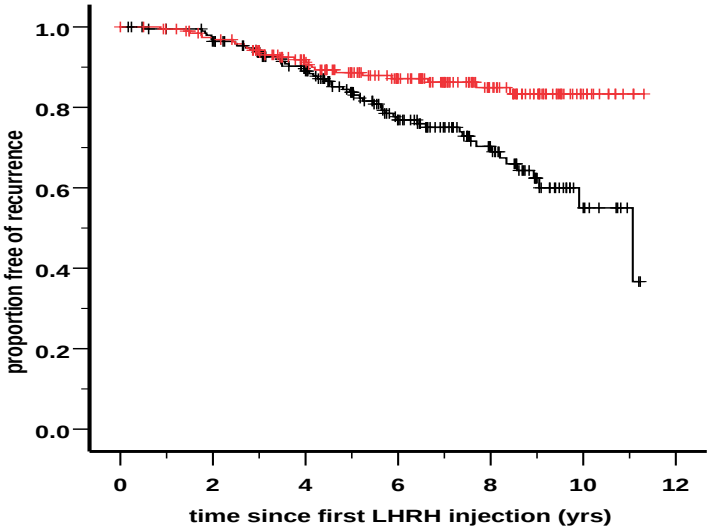
Brachytherapy 17 (2018) 837–844

BRACHYTHERAPY

Clinical Investigation

ASCENDE-RT: An Analysis of Treatment-Relate Morbidity for a Randomized Trial Comparing a Low-Dose-Rate Brachytherapy Boost with a Dose-Escalated External Beam Boost for High- and Intermediate-Risk Prostate Cancer

Sree Rodda, MBBS, MRCP, FRCR,* Scott Tyldesley, MD, FRCPC,*,† W. James Morris, MD, FRCPC,*,† Mira Keyes, MD, FRCPC,*,† Ross Halperin, MD, FRCPC,†,‡ Howard Pai, MD, FRCPC,†,§ Michael McKenzie, MD, FRCPC,*,† Graeme Duncan, MB, ChB, FRCP Gerard Morton, MB, MRCPI, FRCPC, FFRRCSI,‖,¶ Jeremy Hamm, MS and Nevin Murray, MD, FRCPC*,**



gen threshold of >0.2 ng/mL to
ate- and high-risk prostate cancer
n therapy in the ASCENDE-RT
ıtrol trial

kles[1], Mira Keyes[1]

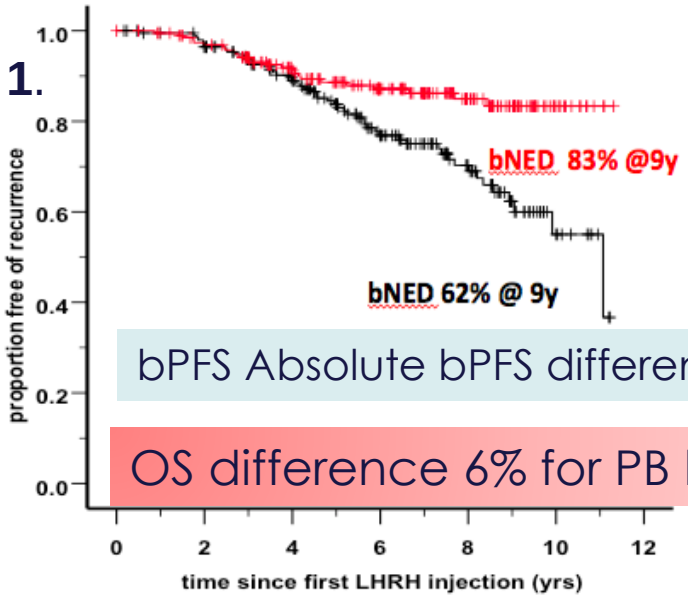
Columbia, Vancouver, British Columbia, Canada
ancouver, British Columbia, Canada

BC CANCER UBC

PB RTCs

1. Morris at al IJROBP 2017
2. Hoskins at al Radiot. Oncol. 2007
3. Sathya at all JCO 2005

1.



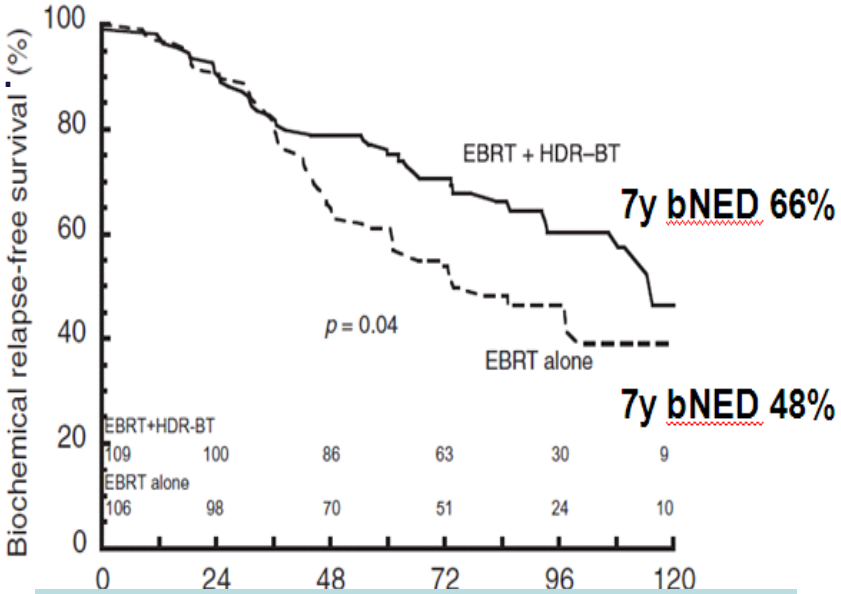
bPFS Absolute bPFS difference 20%

OS difference 6% for PB boost - NS

Absolute difference
In PSA RFS is 20-40%

No difference in OS
Trials not powered to show OS difference

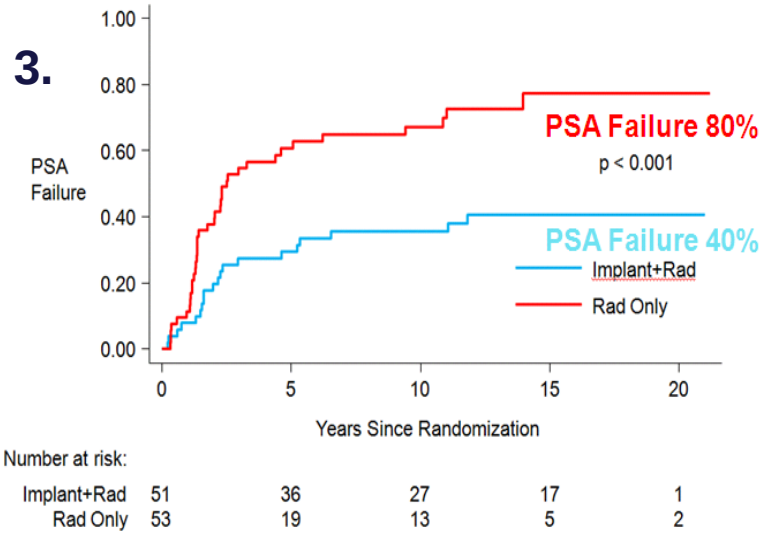
2.



bPFS Absolute bPFS difference 18%

igure 4. Probability of PSA Failure by Treatment Group

3.



bPFS Absolute bPFS difference 40%

Significant association of brachytherapy boost with reduced prostate cancer-specific mortality in contemporary patients with localized, unfavorable-risk prostate cancer

2016

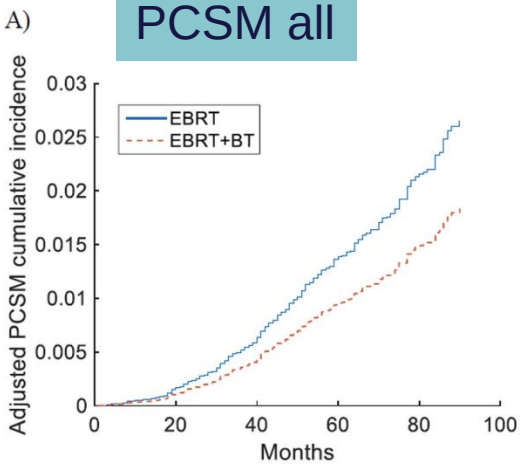
Michael Xiang[1,*] and **Paul L. Nguyen**[1]

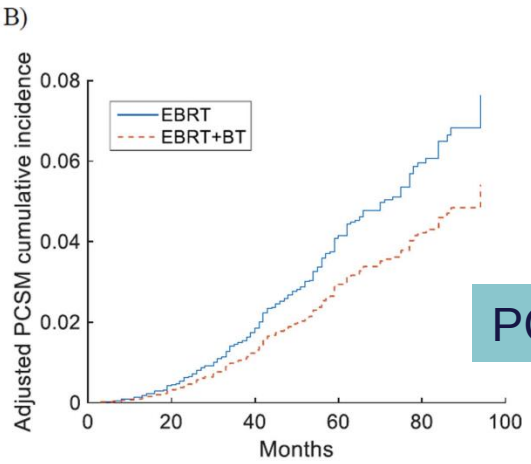
[1]Department of Radiation Oncology, Brigham and Women's Hospital/Dana-Farber Cancer Institute, Boston, MA

SEER database: 52,535 pth
19.6% had EBRT + BT (1/3 HR)

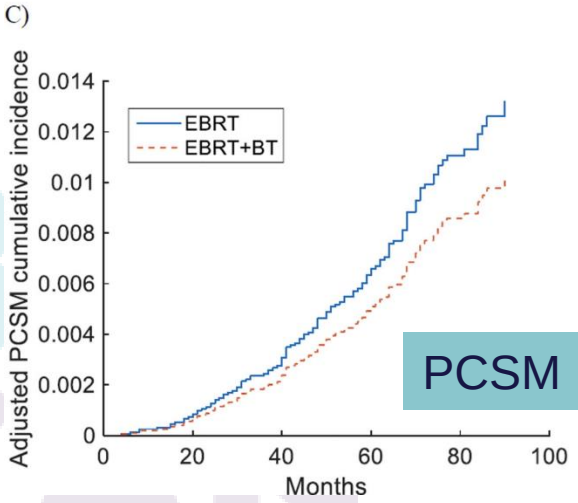
Benefit for younger and HR only

PCSM all





PCSM HR



PCSM IR

PB boost increase **PCSS, MFS and OS**

Brachytherapy. 2015 ; 14(6): 773–780. 2015

European Association of Urology

2017

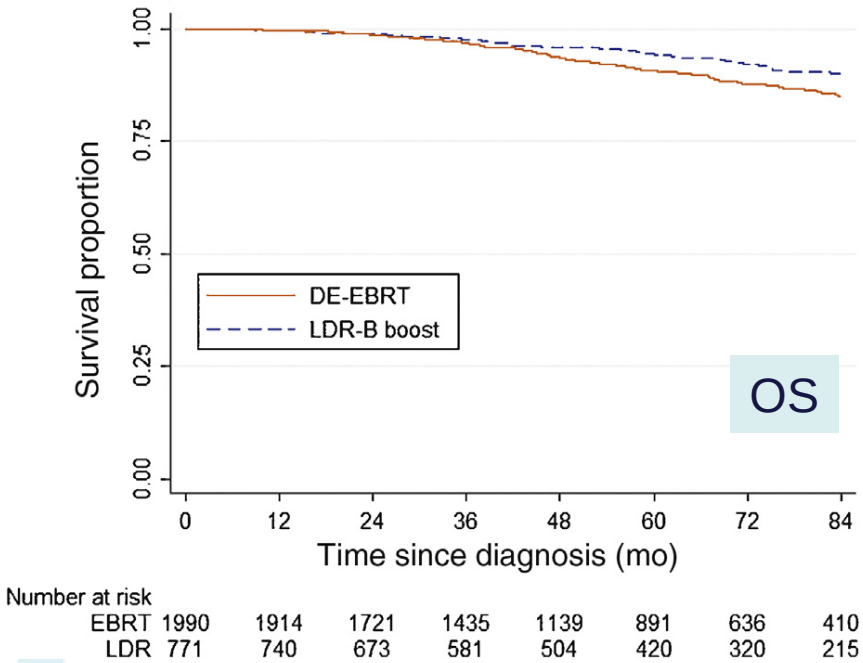
Platinum Priority – Prostate Cancer
Editorial by Juanita Crook on pp. 745–746 of this issue

Brachytherapy Boost Utilization and Survival in Unfavorable-risk Prostate Cancer

Skyler B. Johnson [a], Nataniel H. Lester-Coll [a], Jacqueline R. Kelly [a], Benjamin H. Kann [a], James B. Yu [a,b], Sameer K. Nath [a,]*

[a] Department of Therapeutic Radiology, Yale School of Medicine, New Haven, CT, USA; [b] Cancer Outcomes, Public Policy, and Effectiveness Research Center, Yale School of Medicine, New Haven, CT, USA

25 038 men in NCDB
2004 and 2012 with EBRT vs. EBRT+PB



OS

PB boost
5% increase in OS
at 7 y

~2000 ptss KM OS <60 y - no comorbidities
7-yr OS 85% vs 90%;p < 0.001

Survival Outcomes of Dose-Escalated External Beam Radiotherapy versus Combined Brachytherapy for Intermediate and High Risk Prostate Cancer Using the National Cancer Data Base

Arya Amini,* Bernard Jones, Matthew W. Jackson, Norman Yeh, Timothy V. Waxweiler, Paul Maroni, Brian D. Kavanagh and David Raben

From the Department of Radiation Oncology and Division of Urology, Department of Surgery (PM), University of Colorado School of Medicine, Aurora, Colorado

20,279 US NCDB - 2004 - 2006

- EBRT - 71% (75-81 Gy)
- EBRT + PB 29%

- 12,617 IR, 7,662 HR
- **Median follow-up was 82 months**

MVA

EBRT + PB - ↑ OS (HR 0.75, p <0.001).
IR and HR - HR 0.73/0.76, <0.001).

Brachy Boost
Increase OS ~ 5%

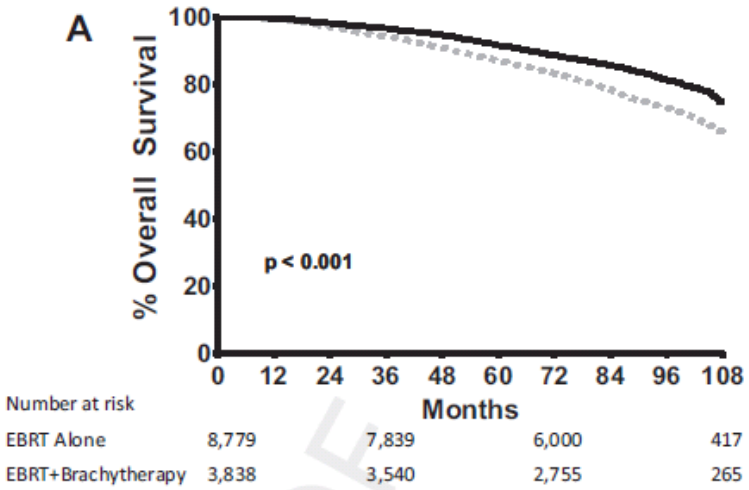


Figure 1. Kaplan-Meier curves show survival outcomes between high dose EBRT (dotted curves) vs EBRT plus brachytherapy (solid curves) in patients with prostate cancer at intermediate (*A*) and high (*B*) risk.

European Association of Urology 2017

Platinum Priority – Prostate Cancer
Editorial by Wesley W. Ludwig, Ashley E. Ross and Philip M. Pierorazio on pp. 774–775 of this issue

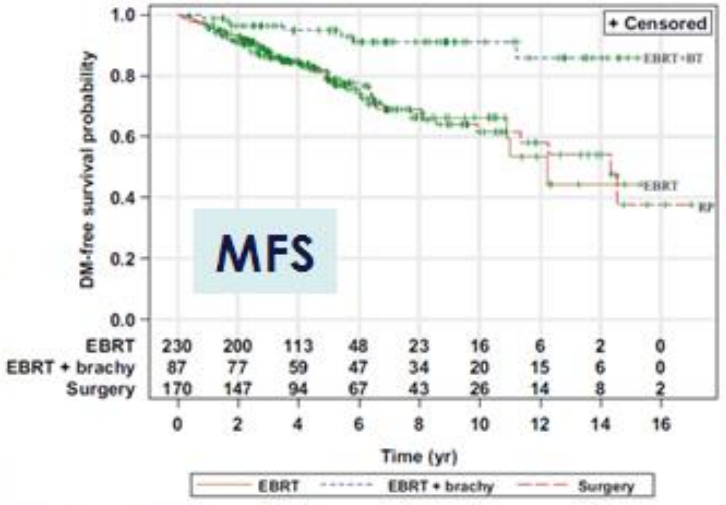
Clinical Outcomes for Patients with Gleason Score 9–10 Prostate Adenocarcinoma Treated With Radiotherapy or Radical Prostatectomy: A Multi-institutional Comparative Analysis

Amar U. Kishan[a,], Talha Shaikh[b], Pin-Chieh Wang[a], Robert E. Reiter[c], Jonathan Said[d], Govind Raghavan[a], Nicholas G. Nickols[a,e], William J. Aronson[c,f], Ahmad Sadeghi[e], Mitchell Kamrava[a], David Jeffrey Demanes[a], Michael L. Steinberg[a], Eric M. Horwitz[b], Patrick A. Kupelian[a], Christopher R. King[a]*

487 pts GS 9–10 (2000 -2013)
Med FU 4.6 y
230 - EBRT, 87-EBRT + BT, 170 - RP

RT and RP -same CSS and OS
PB boots +ADT - increase MFS (40%).

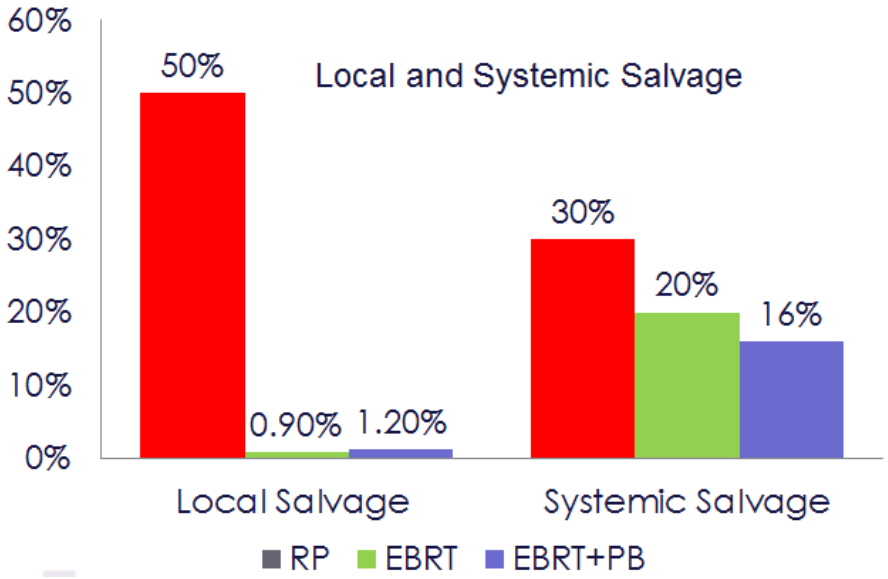
RT+PB +ADT might be the **optimal** upfront treatment for pts with GS 9–10.



EBRT+PB

EBRT

RP



Research

JAMA 2018

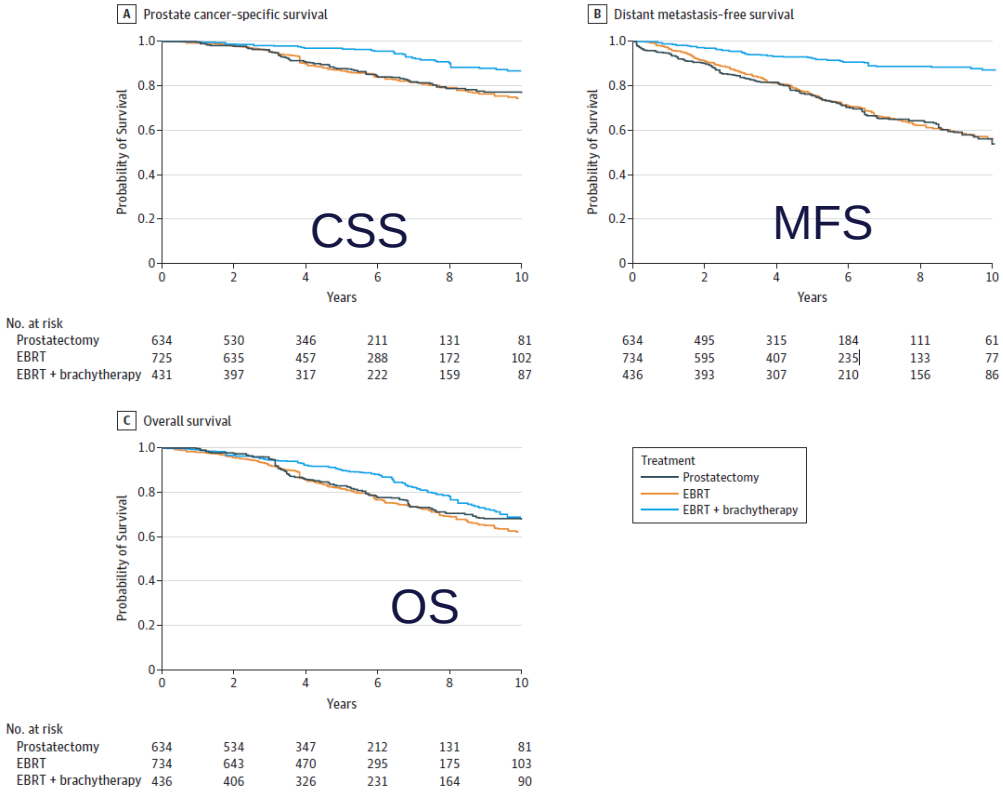
JAMA | Original Investigation

Radical Prostatectomy, External Beam Radiotherapy, or External Beam Radiotherapy With Brachytherapy Boost and Disease Progression and Mortality in Patients With Gleason Score 9-10 Prostate Cancer

Amar U. Kishan, MD; Ryan R. Cook, MSPH; Jay P. Ciezki, MD; Ashley E. Ross, MD, PhD; Mark M. Pomerantz, MD; Paul L. Nguyen, MD; Talha Shaikh, MD; Phuoc T. Tran, MD, PhD; Kiri A. Sandler, MD; Richard G. Stock, MD; Gregory S. Merrick, MD; D. Jeffrey Demanes, MD; Daniel E. Spratt, MD; Eyad I. Abu-Isa, MD; Trude B. Wedde, MD; Wolfgang Lilleby, MD, PhD; Daniel J. Krauss, MD; Grace K. Shaw, BA; Ridwan Alam, MPH; Chandana A. Reddy, MS; Andrew J. Stephenson, MD; Eric A. Klein, MD; Daniel Y. Song, MD; Jeffrey J. Tosoian, MD; John V. Hegde, MD; Sun Mi Yoo, MD, MPH; Ryan Fiano, MPH; Anthony V. D'Amico, MD, PhD; Nicholas G. Nickols, MD, PhD; William J. Aronson, MD; Ahmad Sadeghi, MD; Stephen Greco, MD; Curtiland Deville, MD; Todd McNutt, PhD; Theodore L. DeWeese, MD; Robert E. Reiter, MD; Johnathan W. Said, MD; Michael L. Steinberg, MD; Eric M. Horwitz, MD; Patrick A. Kupelian, MD; Christopher R. King, MD, PhD

1809 pts 12 US &Norway (2000 -2013)
639 RP, 734 EBRT, 436 EBRT+BT
med fu 4.2- 6.3y **GS 9-10**
43% RP pts had Salvage RT!

Figure. Adjusted Survival Curves for Prostate Cancer–Specific Survival, Distant Metastasis–Free Survival, and Overall Survival by Treatment Group, Weighted by the Inverse Probability of Treatment



PB boost increase
CS ~10%
MFS ~25%

Mostly LDR

PB boost increase

OS by ~ 5% (ASCENDE RT 6%)
MFS ~25-40% (GS 9-10)
CSS ~10%

PCa has a long natural history
New treatments that increase OS
Competing risk of dying – effect of comorbidities

2017 ASCO and CCO guidelines

VOLUME 35 · NUMBER 15 · MAY 20, 2017

JOURNAL OF CLINICAL ONCOLOGY

ASCO SPECIAL ARTICLE

Brachytherapy for Patients With Prostate Cancer: American Society of Clinical Oncology/Cancer Care Ontario Joint Guideline Update

Joseph Chin, R. Bryan Rumble, Marisa Kollmeier, Elisabeth Heath, Jason Efstathiou, Tanya Dorff, Barry Berman, Andrew Feifer, Arthur Jacques,† and D. Andrew Loblaw

LR and Low IR	**High - Intermediate Risk**	**HR**
LDR	**LDR/HDR** + EBRT ± ADT	**LDR/HDR** + EBRT + ADT

Pts in all risk groups shod be offered PB if eligible
HR pts receiving EBRT and ADT, should be offered PB boost (LDR/ HDR)

J Clin Oncol 35:1737-1743.

JOURNAL OF CLINICAL ONCOLOGY | COMMENTS AND CONTROVERSIES

Optimal Radical Therapy for Localized Prostate Cancer: Recreation of the Self-Fulfilling Prophecy With Combination Brachytherapy?

Daniel E. Spratt, *University of Michigan, Ann Arbor, MI*
Peter R. Carroll, *University of California San Francisco, San Francisco, CA*

Self-fulfilling prophecy - now turned in a new direction: the benefit of adding brachytherapy to EBRT, and its superiority over EBRT.

1. Bias with population based studies
2. **PSA RFS is not a clinically meaningful end** ★
4. **Salvage local treatment** is always an option with 5% gr 3 toxicity vs. 20% ASCENDE RT
5. **Isolated clinical local failures is only 10% with EBRT+ADT** - over treating patients with PB
6. **Quality of life and toxicity must be a high priority** ★

PSA RFS is not a clinically meaningful end toxicity is important

The optimal approach to treatment, may not necessarily be the one that is associated with the least morbidity, but instead the one that is most effective in preventing the need for subsequent treatment, anxiety, costs, and adverse effects of salvage.

Prevalence 5-year **GU GR3 8.6%** and **GI Gr3 2.2%**

ADT
QOL
ED
hot flashes
fatigue
Anemia
Loss of muscle m
Cognitive dysfun
Depression
Psychiatric illness
osteoporosis
fractures

ADT
Metabolic syndrome
Central and peripheral obesity
Increase in cholesterol
Increase in triglycerides
HDL decreased
Elevated blood pressure
Elevated fasting glucose
Elevated fasting insulin
Decrease insulin sensitivity
Increase diabetes by 44%
Increase cardiovascular
Sudden cardiac death
Decrease OS?

Abiraterone
Anemia
Fatigue
Back pain
Arthralgia
Nausea
Vomiting
Diarrhea
Hot Flushes
UTI
Fluid retention
Hypertension
Hypokalemia
Hepatotoxicity
Atrial Fibrillation

Docetaxel
Cabazitaxel
Ra 223

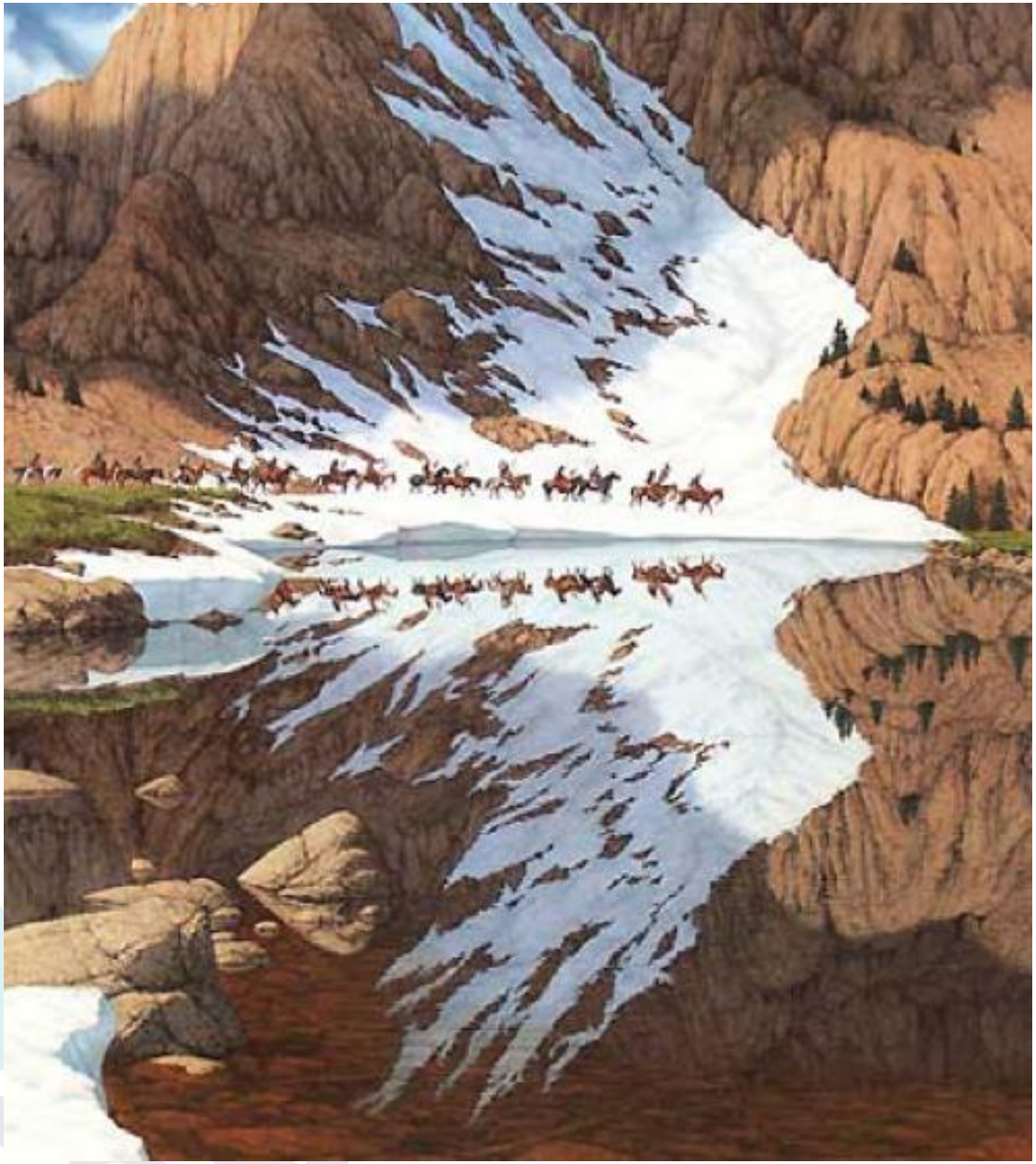
$$$ cost
PSMA PET

Enzalutamide
Fatigue (Grade 3/4)
diarrhea
musculoskeletal pain
headache
hypertension
hot flashes
peripheral edema
seizures

Prevalence of Incontinence RP
RTCs 17-60%

PIVOT 40%
PROTECT 17%
PCOS 18%
SPCG RTC 60%

PSA control may be a meaningful outcome?



BCCA Brachytherapy Program

>6500 implants

LDR BCCA Prostate Brachytherapy Program

July 20, 1998

THURSDAY, JANUARY 29, 2009 | FINAL EDITION

'Likely cure' fo

WESTCOAST NEWS

Prostate cancer 'cure' disputed

Experts criticize B.C. Cancer Agency, saying it is exaggerating effects of its brachytherapy program

BY PAMELA FAYERMAN

Some prostate cancer experts are criticizing a B.C. Cancer Agency announcement for exaggerating a treatment's effects by describing it as a "likely cure."

cure." But he praised the brachytherapy program and the study.

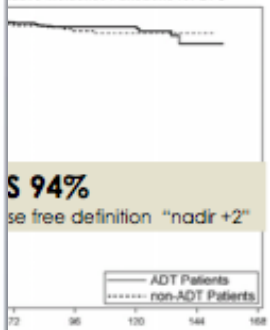
"The radiation oncologists are to be congratulated for implementing this program and delivering results on par with many other major centres in North America," he said.

Population-Based 10-Year Oncologic Outcomes After Low-Dose-Rate Brachytherapy for Low-Risk and Intermediate-Risk Prostate Cancer

Mira Keyes, MD, FRCPC[1,2]; Ingrid Spadinger, PhD[2,3]; Winkle Kwan, MD, FRCPC[2,4]; el McKenzie, MD, FRCPC[1,2]; Howard Pai, MD, FRCPC[2,5]; Tom Pickles, MD, FRCPC[1,2]; and Scott Tyldesley, MD, FRCPC[1,2]

nes in 1006 pts – Low and IR risk

lative Incidence Functions for DFS



Gray competing risks estimate of for the androgen-deprivation = 658) and the non-ADT sub-

theguardian

Prostate cancer

Trial of radioactive implants offers improved prostate cancer survival

A trial comparing the treatment with dose-escalated external beam radiotherapy found that it was much more successful at banishing cancer.

Men who underwent LDR-PB were twice as likely to be cancer-free five years later.

Scientists studied 398 men with cancer that had not spread outside the prostate gland who were judged to be at high risk of treatment failure based on standard test results.

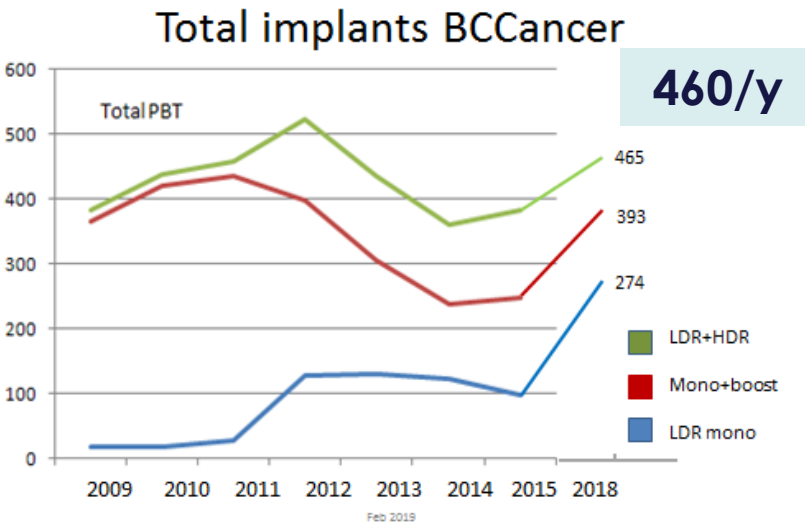
Lead researcher Professor James Morris, from Vancouver Cancer Centre in Canada, said: "At five years follow-up, we saw a large advantage in progression-free survival in the LDR-PB group.

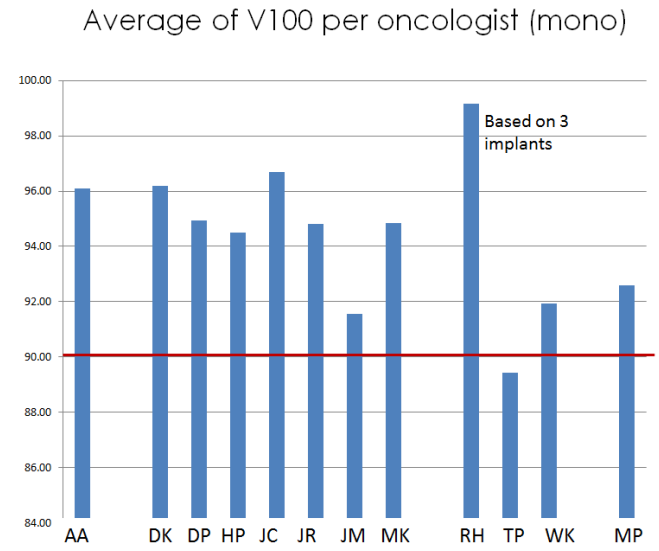
"Although, to date, overall survival and prostate cancer-specific survival do not appear to differ between the two groups, existing trends favour LDR-PB and an overall survival advantage is likely to emerge with longer follow-up."

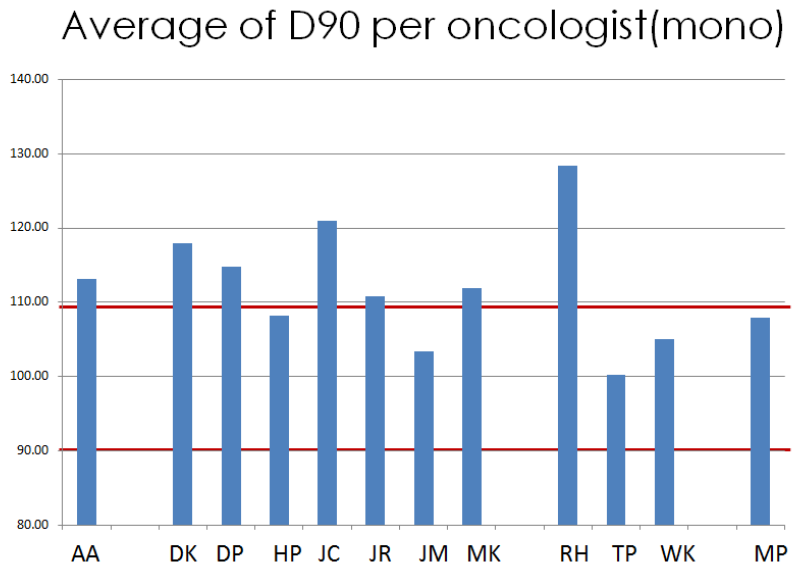
ACENDE RT - RTC 400 pts: 12 m ADT + EBRT ± LDR PB

Morris at al Cancer 2013

BCCA Prostate Brachytherapy Program







Changes in the program

Improvement in imaging and planning

- MRI for planning
- High quality new generation US

- Planning - Reducing the dose to membranous urethra
- Dose painting - DIL

Reduction of

- prescription dose to 100Gy
- Intra-prostatic volume receiving >150% of prescription

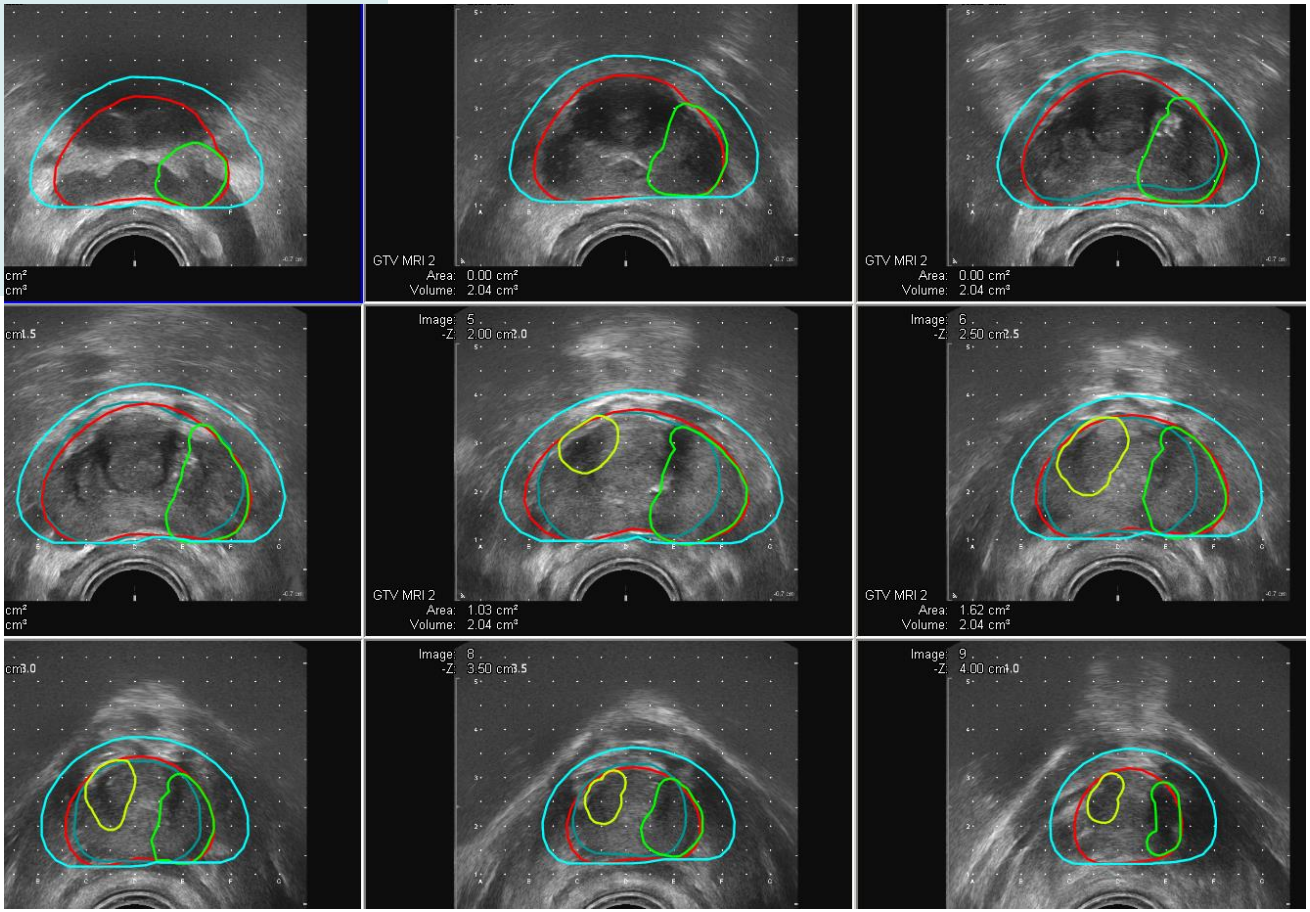
Patient selection

- Good baseline urinary function
- Comorbidity
- Age

Dose Painting

56y old man
PSA 15, T3a? N0 M0
GS 3+4=7/10, in 7/13 cores
EBRT and PB boost July 31 2018
MRI used for planning

Jan 2019
PSA - 0.81
IPSS - 7
SHIM - 25/25



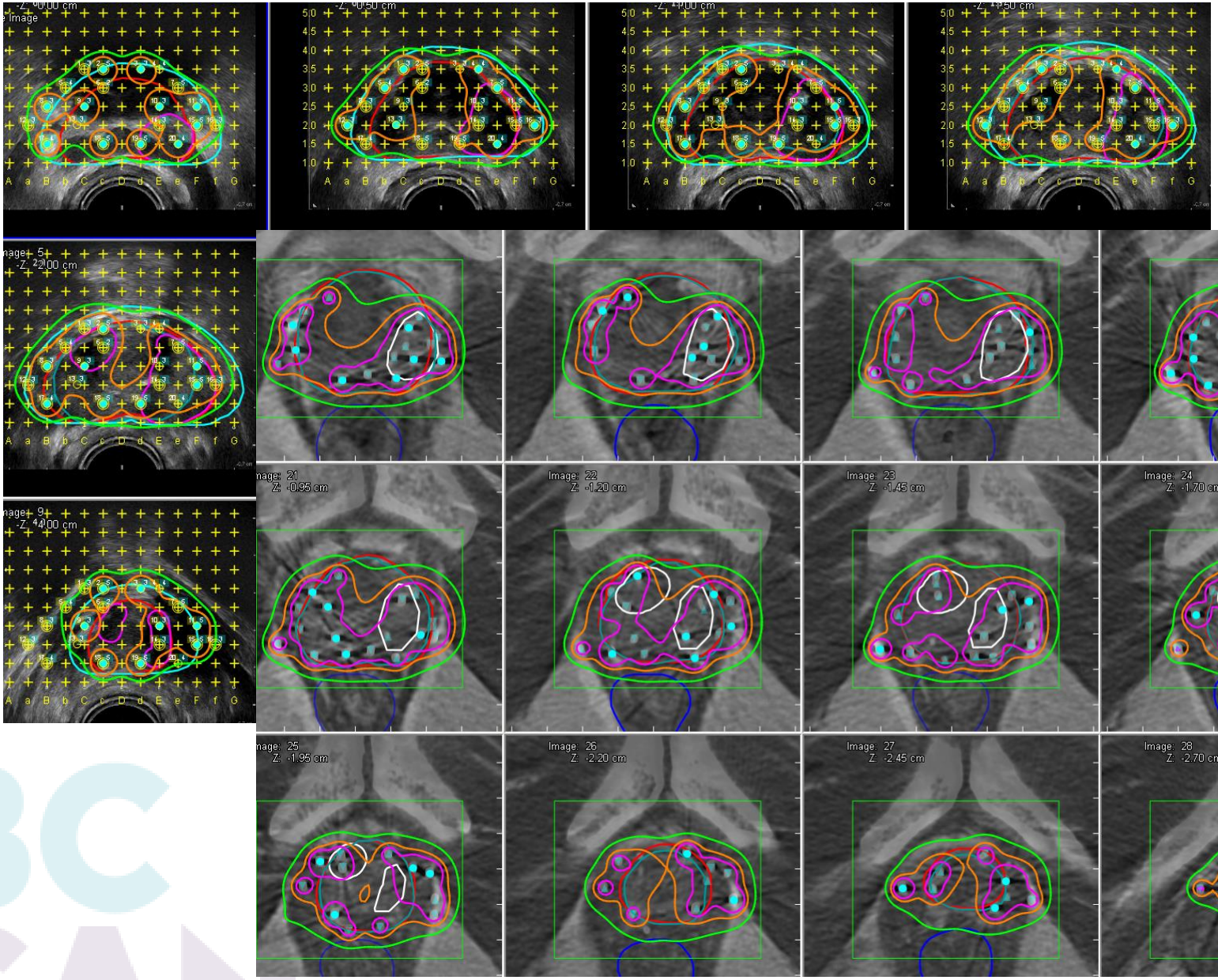

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Image: 27
Z: -2.45 cm
Image: 28
Z: -2.70 cm

ASCENDE RT update – REDUCING TOXICITY

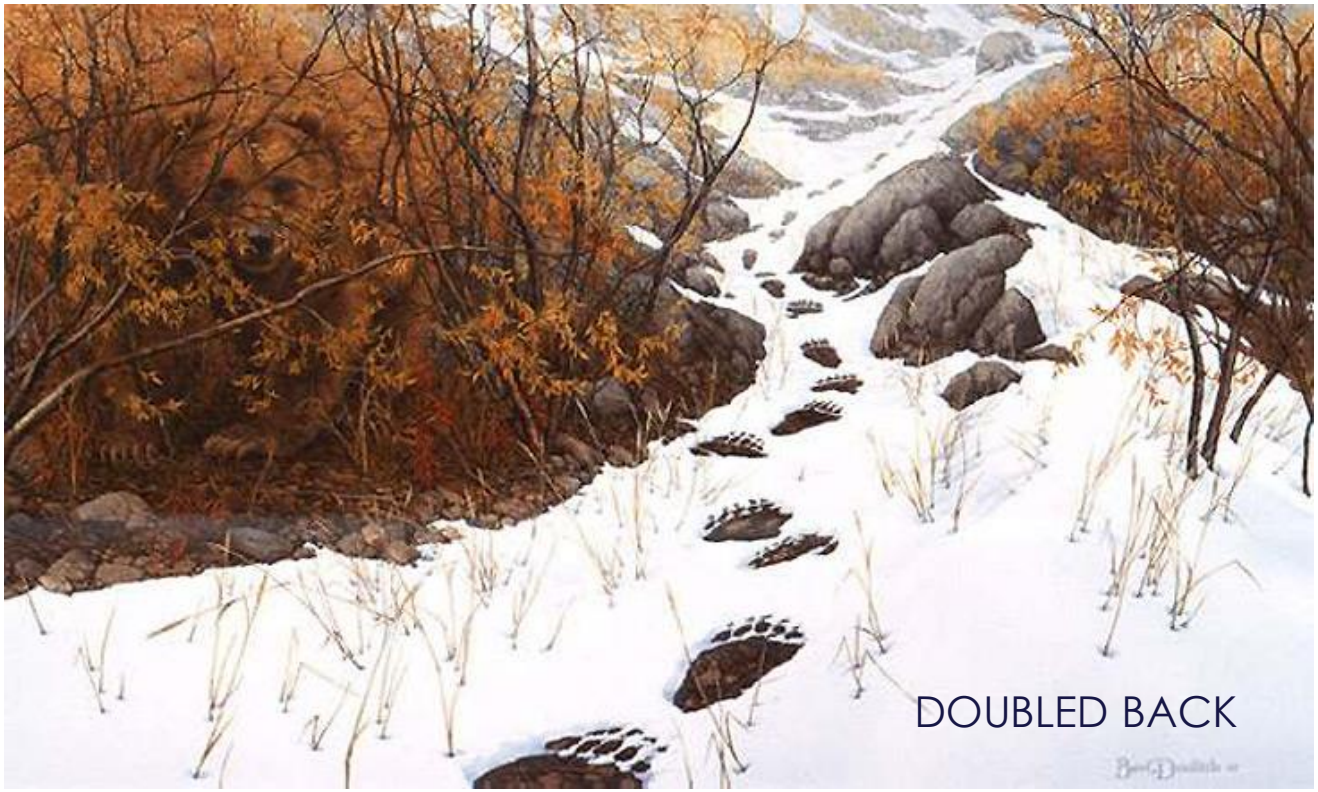
Update on OS and PSA RFS will be done late 2019

OPTiMAL [Optimizing Prostate cancer Treatment in Men with Advanced Local disease] – **reduced toxicity**

105 ASCENDE RT eligible pts:

- PSMA PET staging
- mpMRI
- Trans-prinneal saturation biopsy

- IMRT (pelvis)
- focus the ultra-high doses (150-200%) to the regions of highest tumor burden.



PSA failure definition
PSMA PET

PSA failure definition?

ASRO
Phoenix

A BIOCHEMICAL DEFINITION OF CURE FOLLOWING BRACHYTHERAPY FOR PROSTATE CANCER: A MULTI-INSTITUTION INTERNATIONAL STUDY

Crook J, Tang C, Thames H, Blanchard [3], Sanders J, Ciezki J, Keyes M, Merrick G, Catton C, Sullivan F, Stock R, Anscher M, Frank SJ

Objective: can the *cure be defined* based 10-15y FU after LDR BT using surgical PSA definition of biochemical failure.

7 international institutions - 14,496 pts

LDR BT n=11,578
ADT+ LDR n=1,965
EBRT + LDR n=498
EBRT + ADT + LDR =455

LR - 39%
IR - 52%
Hr - 9%

PSA range	Number of patients in PSA range after 4 years	10 y bNED (238 CFs)	15 y bNED (195 CFs)
PSA≤0.2	7407	99.3	98.2
0.2<0.5	811	96.0	86.8
0.5≤1.0	306	88.6	81.9
PSA>1.0	487	61.0	50.1

Patients with a PSA ≤ 0.2 ng/ml at 4 years post LDR BT have >98% chance of remaining disease free beyond 15 years. This applies to more than 80% of patients

We suggest that PSA ≤ 0.2 ng/ml be adopted as the biochemical definition of *cure* for LDR BT patients with ≥ 4 years' follow-up.

Not validated for HDR

PATTERNS OF PROSTATE CANCER RECURRENCE AFTER BRACHYTHERAPY IMAGED WITH PSMA-TARGETING 18F-DCFPYL PET/CT

Ettienne Rousseau, Srinivas Raman, Mira Keyes, Andra Krauze, Don Wilson, Francois Benard

Objective:
evaluate patterns of recurrence after brachytherapy with PSMA PET

Eligible:
PSA failure (Nadir +2)
Candidates for salvage local therapy
No recurrence on CT or bone scan.

PSAM PET
March 2017 - August 2018,
208 - enrolled in the study open for 13 m: 35 had PB

PB - July 20, 1998 - August, 2018, 6380 patients had PB at the BCCA

1349 had follow up PSA recorded during the same time
81 had PSA recurrence. (35/81 recurrences had PSMA PET)

Med FU was 7y
Med time to recurrence 50 m

RESULTS

68.6% - local recurrence

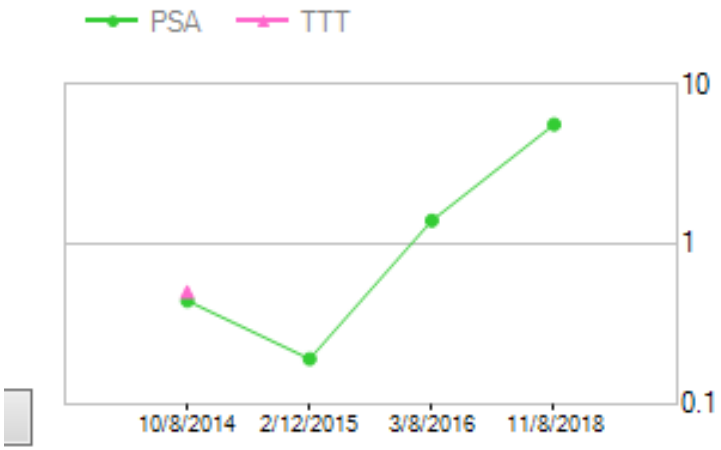
80% base, 31% mid prostate and 11% apex

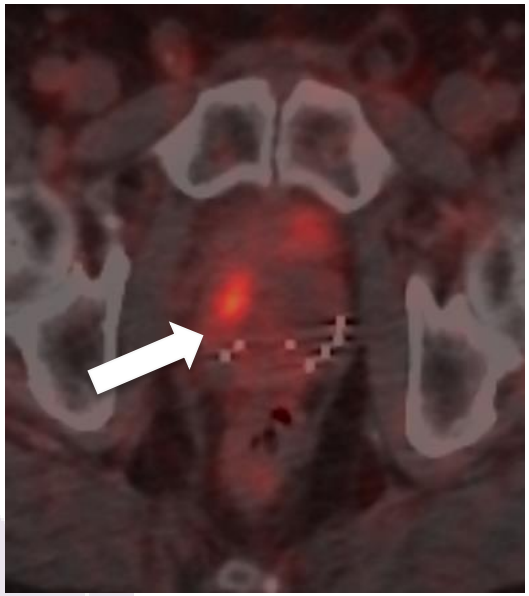
37.1% had SV recurrence

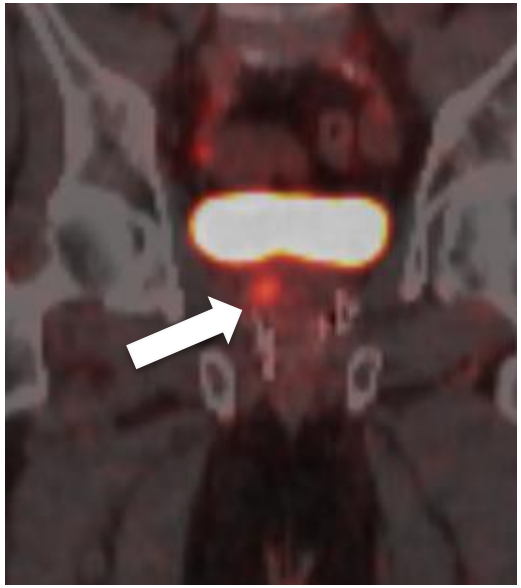
34.3% had nodal recurrence and
28.6% had distant metastases.

70 y IR PCa 2012
T1c, GS (3+4) = 7 (6/10 cores) iPSA 9.4.
LBL, LML, RB RA
The delay: thymoma treatment.
LDR PB 2014.

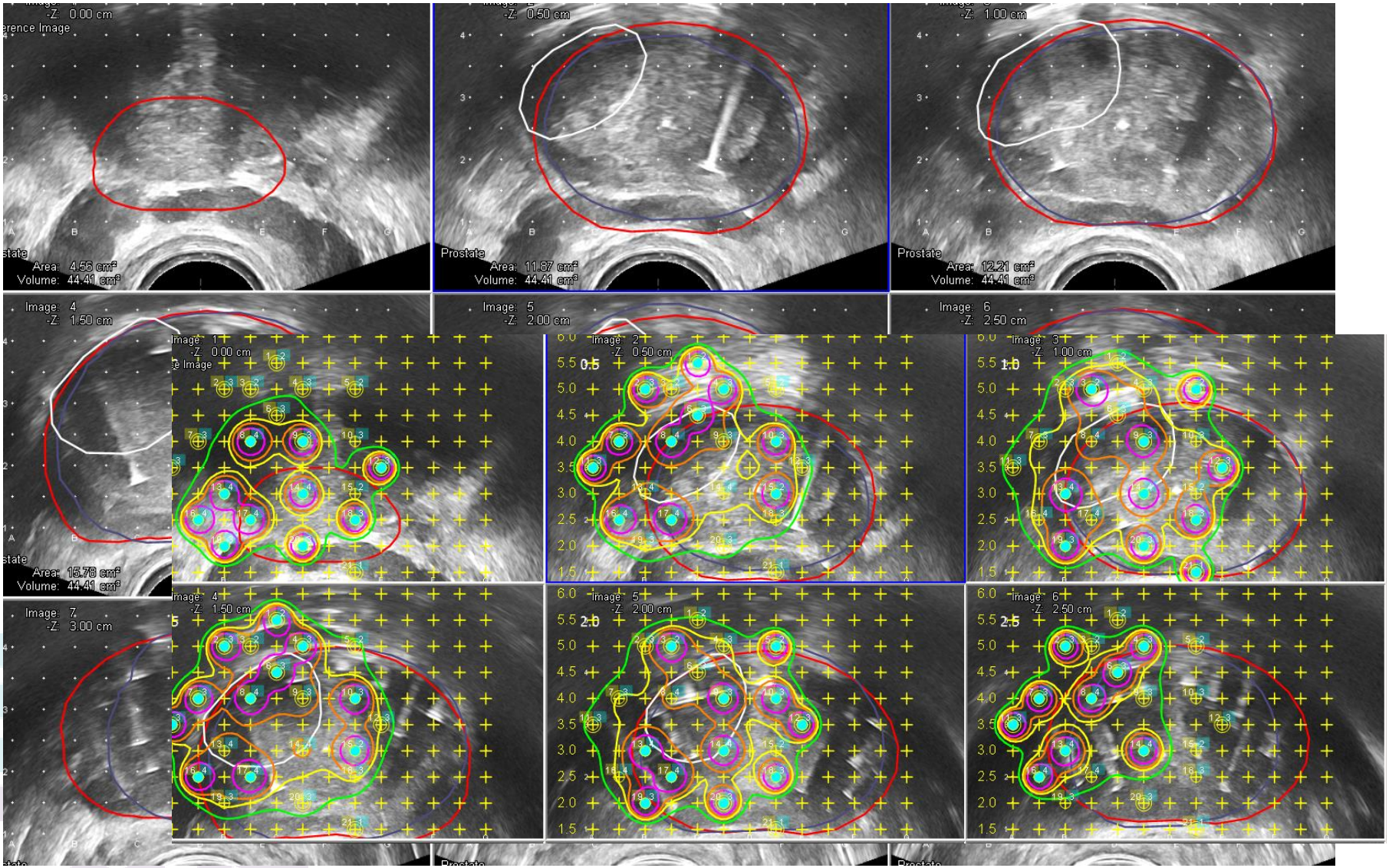
PSA nadir 2015
PSA failure 2016
PSA Nov 2018 - 5.6.
PSMA PET scan shows local recurrence



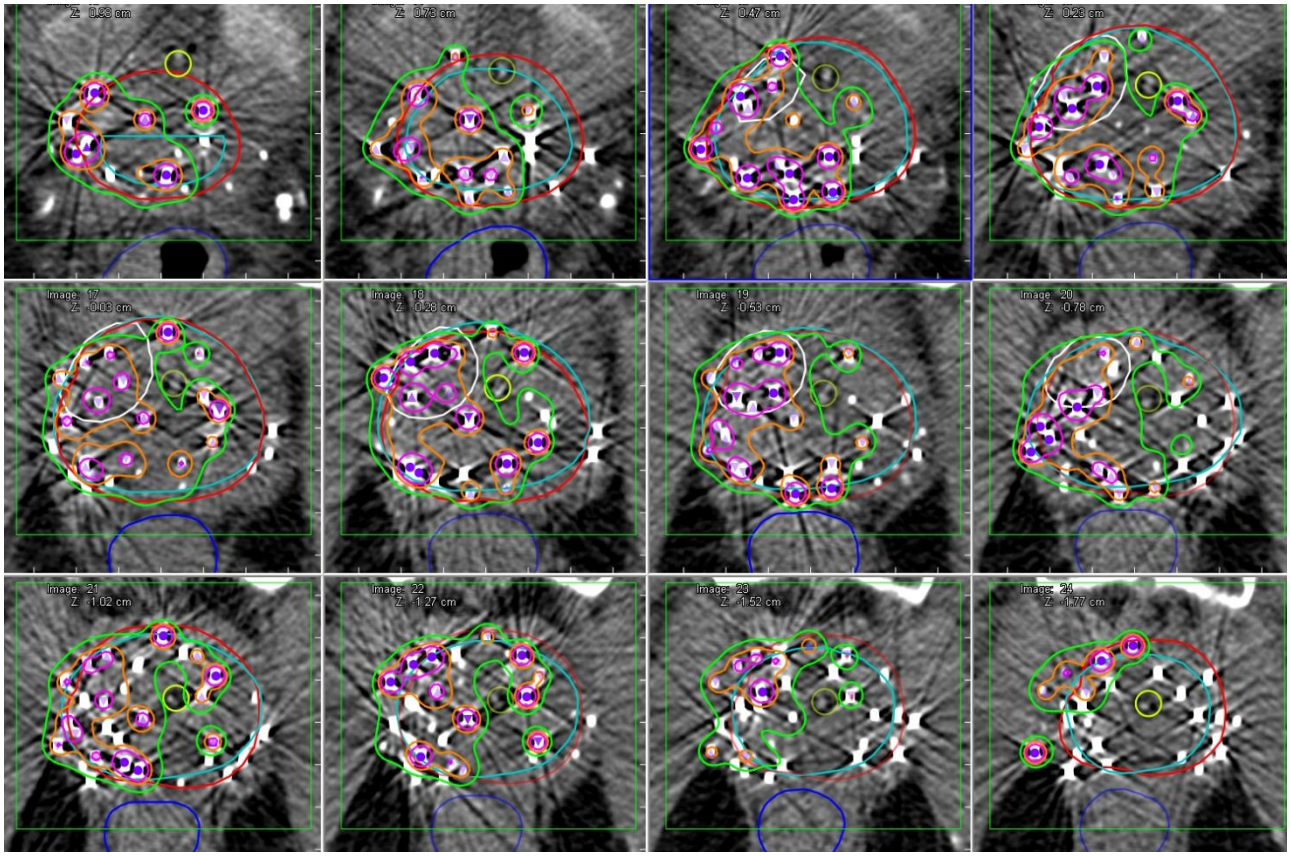




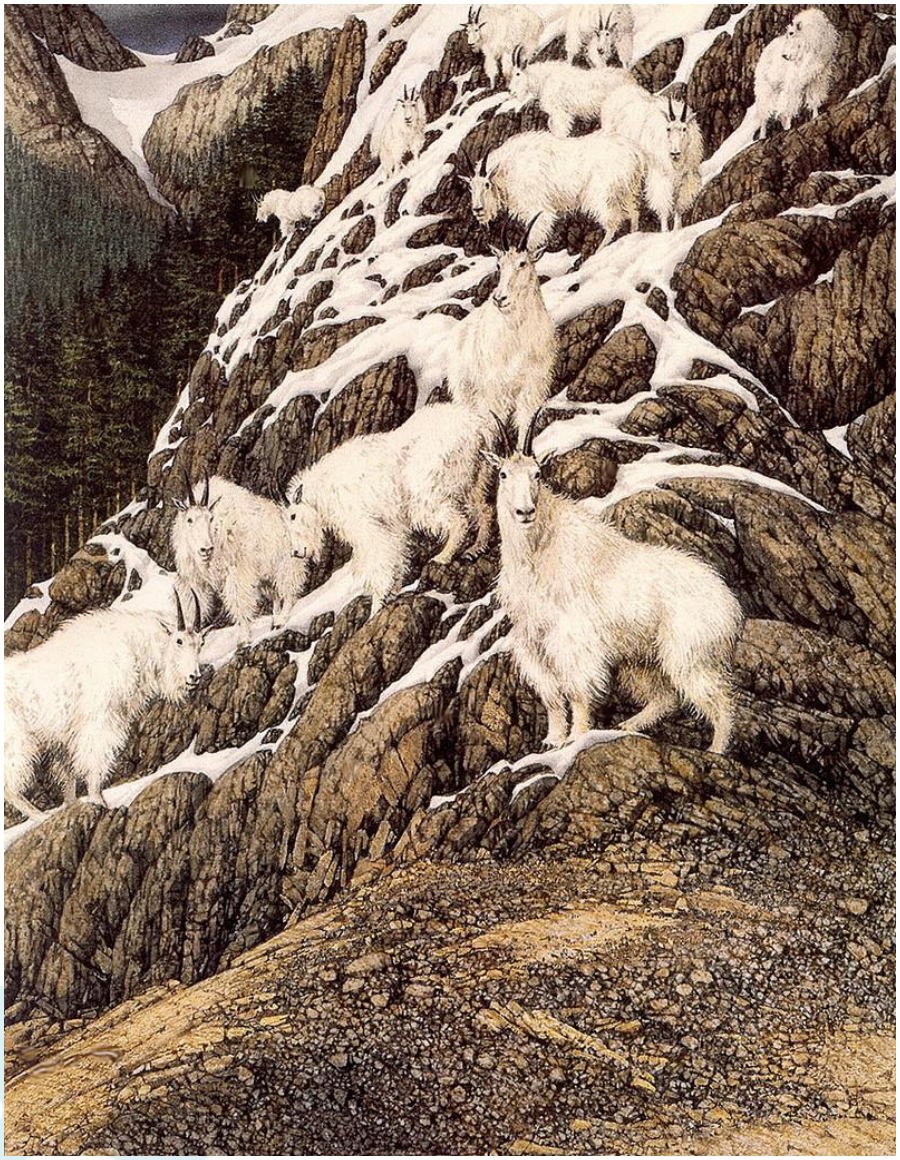
US – MR- PSMA PET fusion



Post op CT



LDR salvage - excellent dose distribution



The call of the buffalo

Conclusions

Long term outcomes in PB are mostly based on LDR

New definition of PSA PB failure - based on LDR

LDR is evolving with imaging (MRI and US)

Planning and Dose painting with LDR is feasible

Toxicity can be reduced with careful planning

OR skills will be important for both LDR and HDR

LDR or HDR boost?

Institutional preference

Cost
Cost of seeds
Cost of replacing the source
Cost of OR
OR time
Cost of Staff
Physicist in the OR

Technique
Toxicity
Dose control
Disease bulk (SV involvement)

Have both?
LDR monotherapy
HDR Boost

Perception that
HDR is easier to do?
Less toxicity?

A Phase III Randomized Study of Low Dose Rate compared to High Dose Rate Prostate Brachytherapy for Favorable Risk and Low Tier Intermediate Risk Prostate Cancer

LDR PSA PFS ~ 90-95% at **5-10** years

HDR x4: PSA RFS at **5** years > 93%
HDR x1-2 - immature results

HDR advantages
Dose optimization
Critical organ doses control
Radioprotection - patients and staff
Low α/β ratio HDR is cost-effective

HDR disadvantages
Efficacy equivalent has not been established in clinical trials
HDR shorter fu

Objective:
QOL

PSA nadir
Biopsy at 36Mo

27Gy/2#

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Clinical Investigation

Time Course and Accumulated Risk of Severe Urinary Adverse Events After High- Versus Low-Dose-Rate Prostate Brachytherapy With or Without External Beam Radiation Therapy

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Haitao Chu, MD, PhD,† Cameron Thorpe, BS,*
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Received Jan 26, 2016, and in revised form Mar 16, 2016. Accepted for publication Mar 30, 2016.

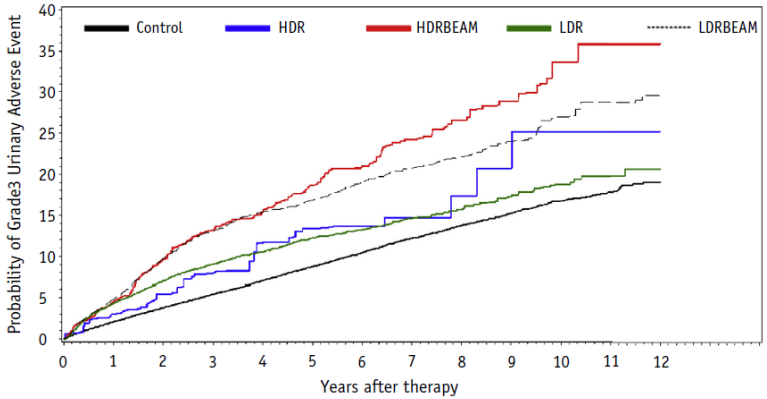
LDR vs. HDR toxicity in SEER Database

LDR ~12000
HDR ~680
LDR + EBR~ 8500
HDR +EBRT~ 2400

FU 4.3 y
Greatest risk at 2y,
No new toxicity beyond 4 years

NNT to Harm:

LDR	52
HDR	**26**
LDR+EBRT	12
HDR+EBRT	**8**



Number at Risk Years After Therapy

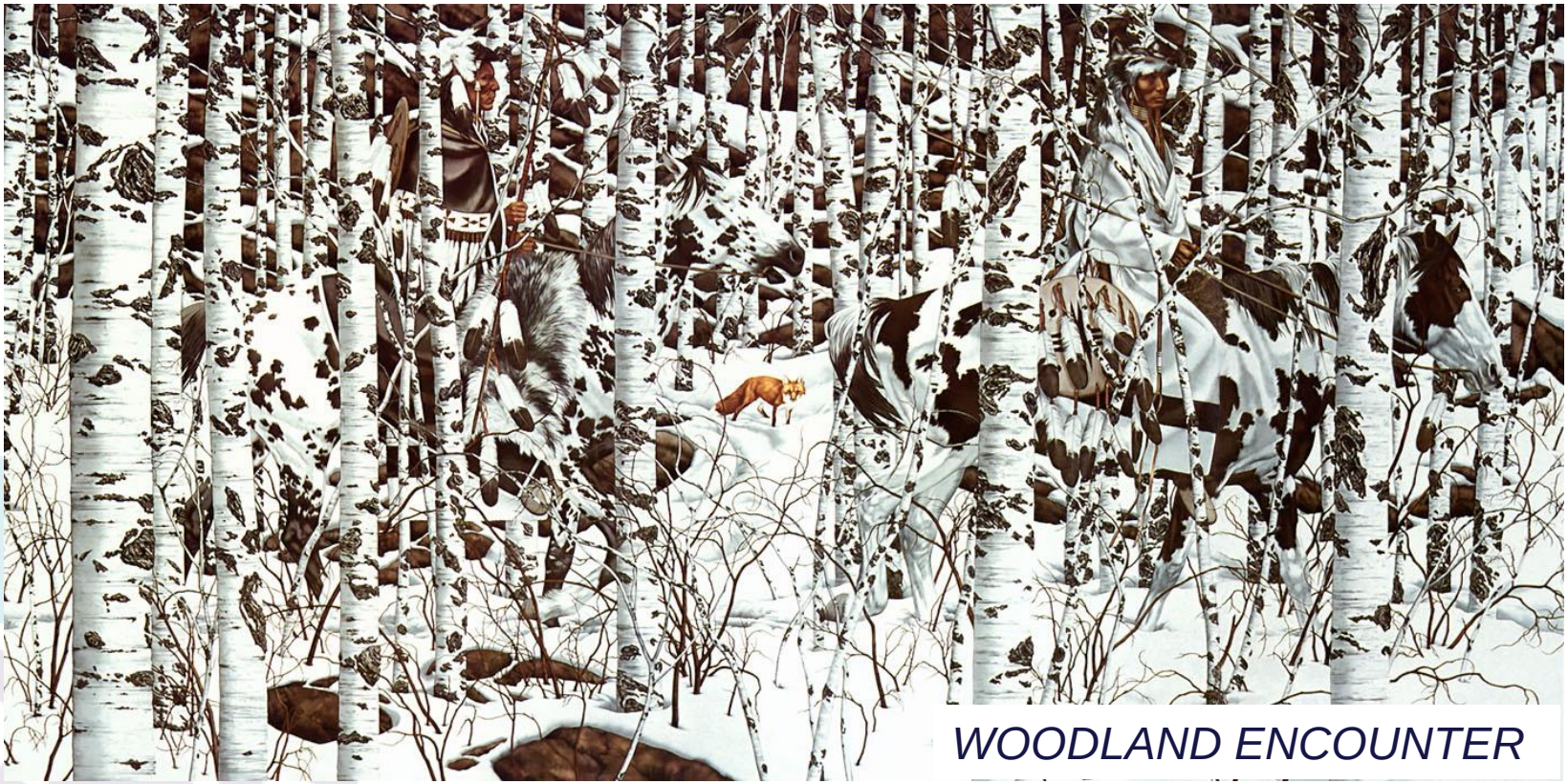
	0	1	2	3	4	5	6	7	8	9	10
Control	93748	66008	48863	36338	26615	19075	13121	8662	5695	3275	1522
HDR	493	381	298	235	193	164	132	84	51	24	13
HDRBEAM	1842	1434	1091	829	645	477	339	240	162	93	46
LDR	11765	9239	7123	5576	4263	3211	2303	1597	1017	574	273
LDRBEAM	6971	5413	4275	3378	2644	2040	1456	991	628	363	173

Fig. 1. Weighted cumulative incidence of grade 3 urinary adverse events by treatment. *Abbreviations:* HDR = high-dose-rate brachytherapy; HDRBEAM = high-dose-rate brachytherapy with external beam radiation therapy; LDR = low-dose-rate brachytherapy; LDRBEAM = low-dose-rate brachytherapy with external beam radiation therapy.

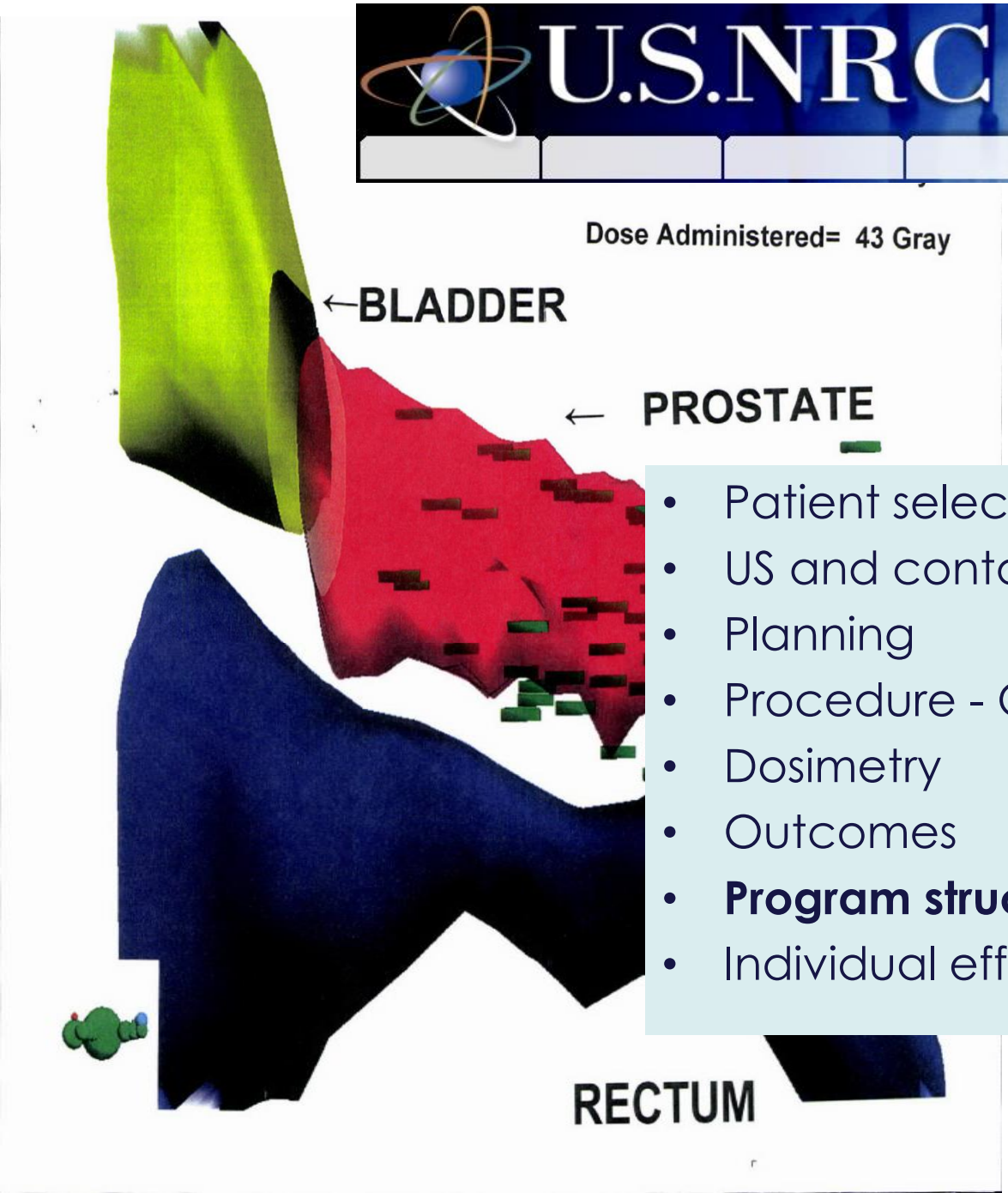
QUALITY - To furnish with the knowledge, skill or other accomplishments necessary for a purpose……A high level of value or excellence

Undetectable PSA (cure)
No/minimal side effect

Quality is easy to conceptualize, but difficult to quantitate



WOODLAND ENCOUNTER



U.S.NRC

Department of VA
Office of Inspector General
Report No. 09-02815-143

- Patient selection
- US and contouring
- Planning
- Procedure - OR
- Dosimetry
- Outcomes
- **Program structure and procedures**
- Individual efforts

May 3, 2010 VA

ROYAL COLLEGE
OF PHYSICIANS AND SURGEONS OF CANADA

APPLICATION FOR ACCREDITATION OF AN AREA OF FOCUSED COMPETENCE PROGRAM IN BRACHYTHERAPY

This questionnaire is to provide the Royal College with a complete description of the AFC program. The completed questionnaire must be signed by the AFC director and submitted to the decanal unit within the faculty of medicine responsible for oversight of AFC programs.

RESIDENT SCHOLARSHIP **PROGRAM**

American Brachytherapy Society

Highlights from the 2017 HDR LDR Prostate Workshop

Anna Likhacheva, MD, MPH
Banner MD Anderson Cancer Center

PINTOS

LDR vs. HDR?

Training Education and Quality

The voyage of discovery is not in seeking new landscape but in having new eyes

Marcel Proust