Brachytherapy in The United States (North America)

Louis Potters, MD FACR FASTRO
Professor and Chairman
Department of Radiation Medicine
North Shore-LIJ Cancer Institute
Hofstra North Shore–LIJ School of Medical
Lake Success, New York

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Long Term Data: 2003

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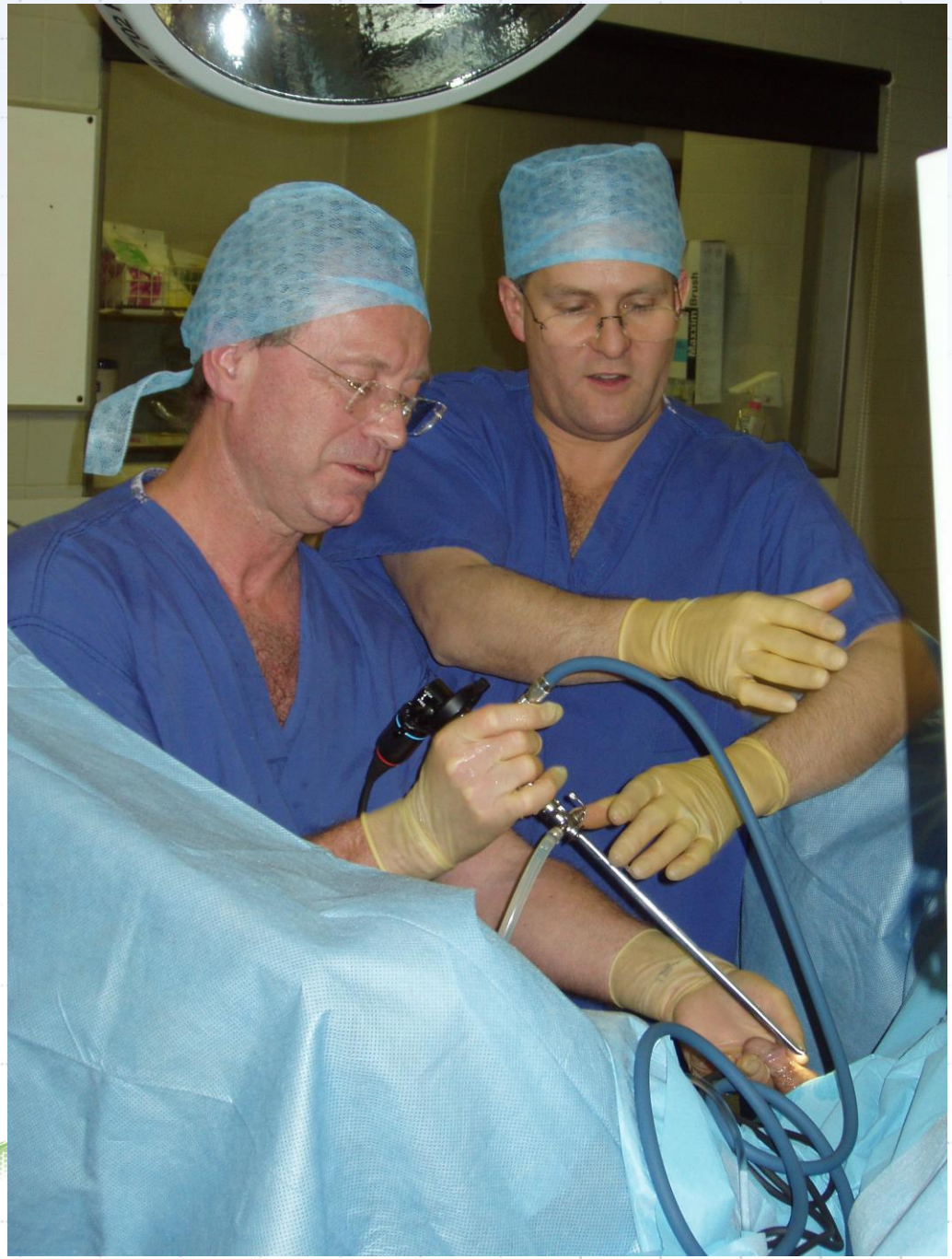

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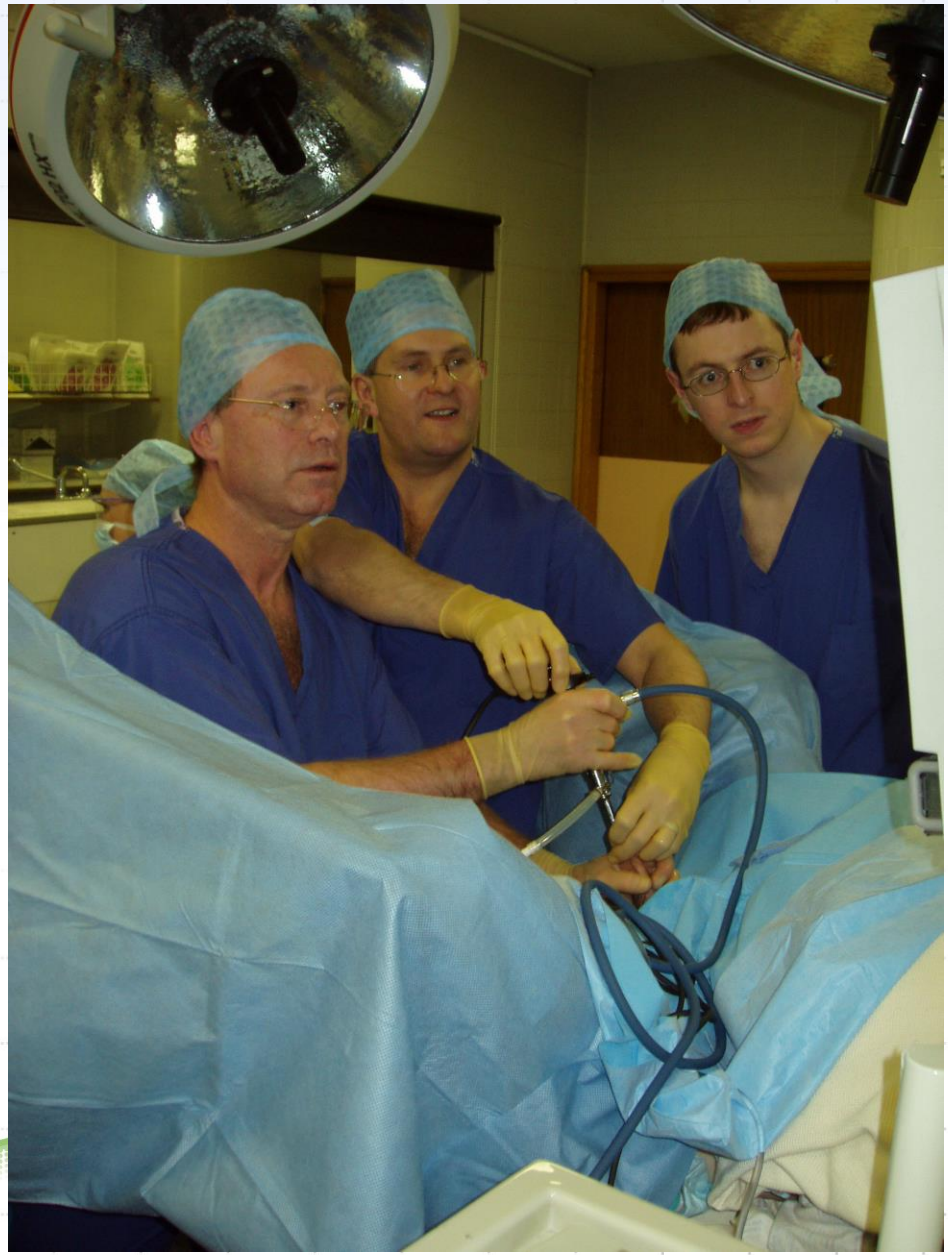

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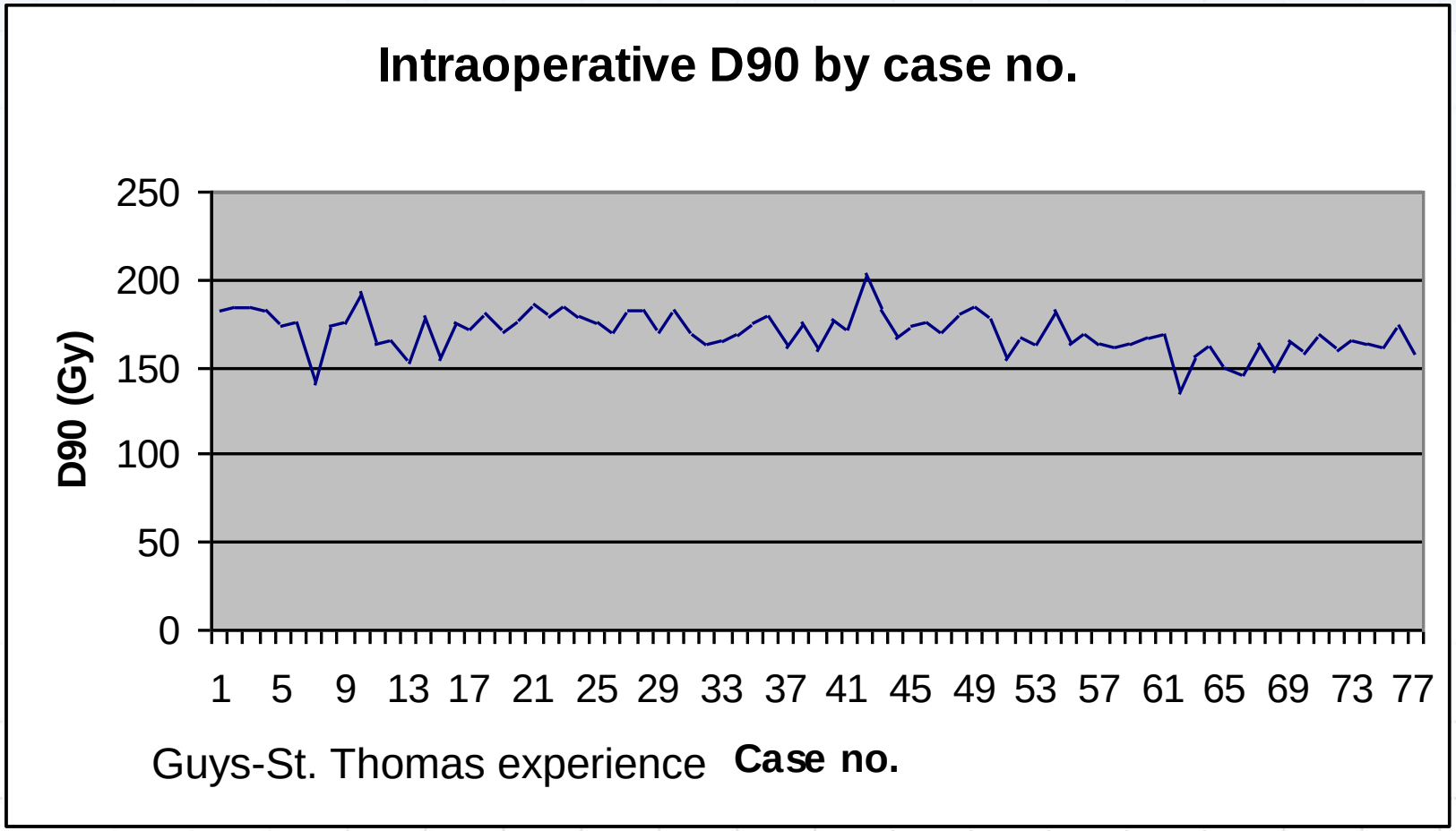
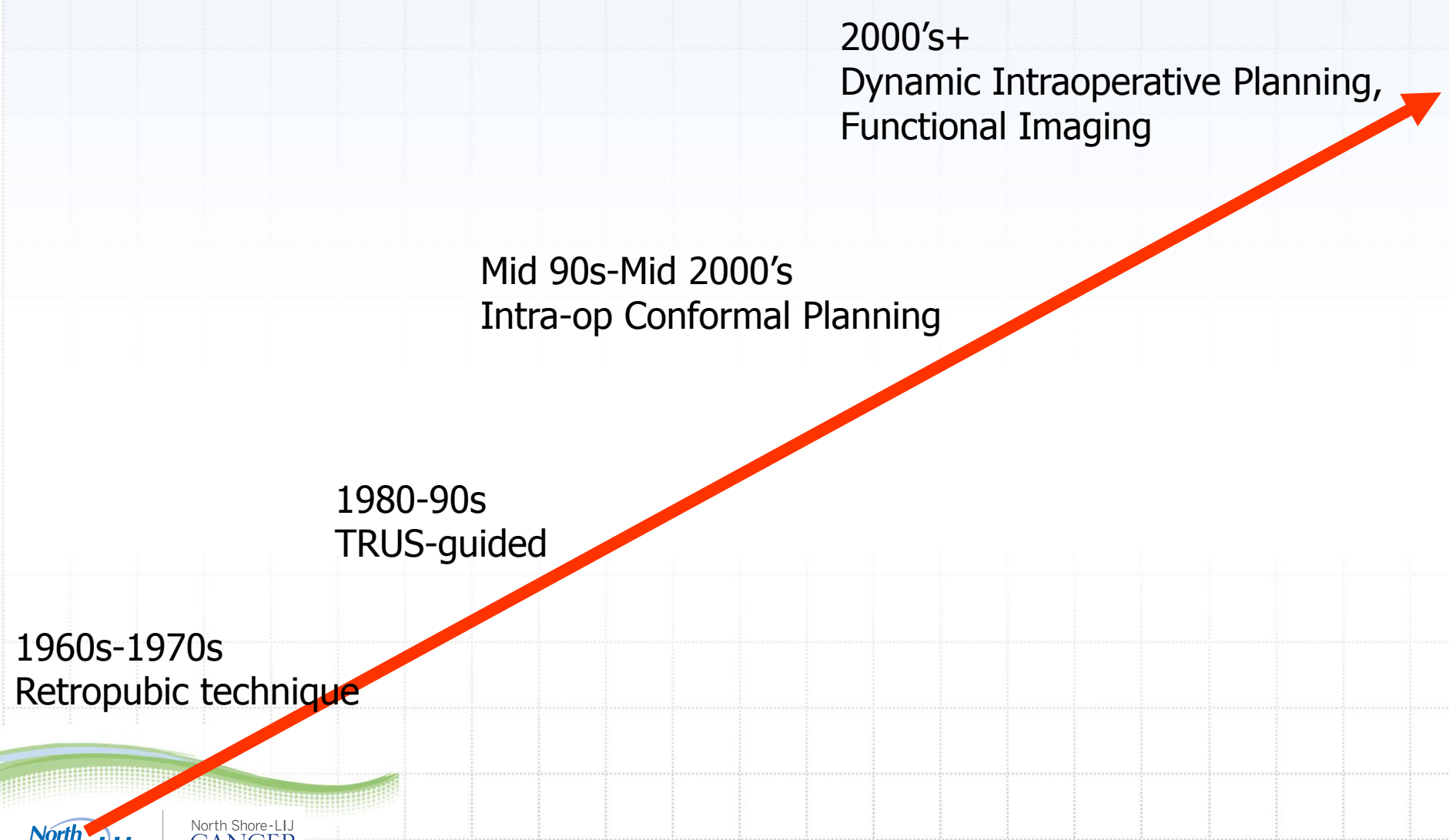
UK Perspectives on Prostate Cancer
Dr R P Beaney

Learning curve with dynamic brachytherapy

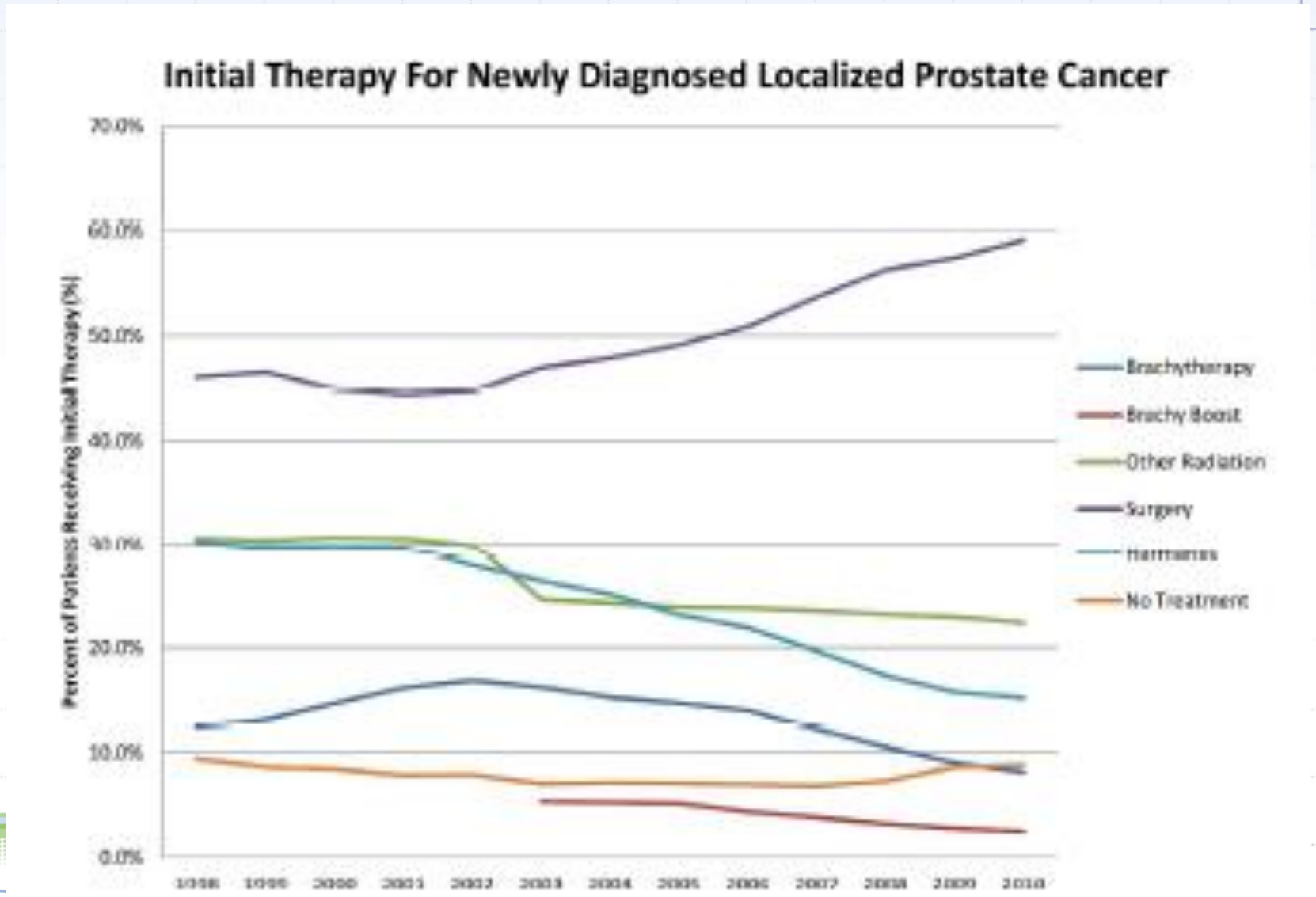


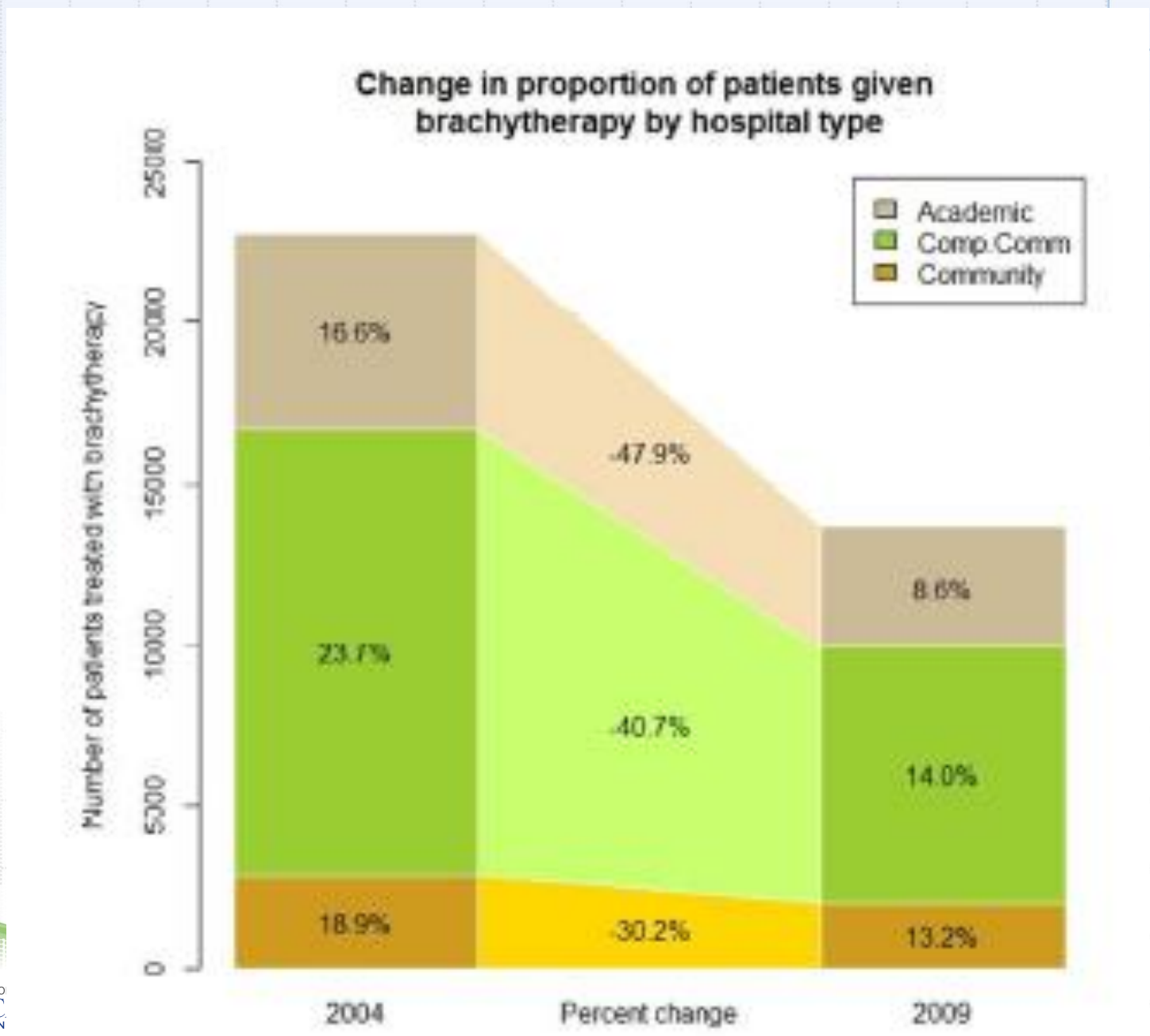
Acher, Popert, Nichol, et al. IJROBP

The Evolution of Modern Brachytherapy



Trends in the US




Change in proportion of patients given brachytherapy by hospital type
Number of patients treated with brachytherapy
0
5000
10000
15000
20000
25000
Academic
Comp.Comm
Community
16.6%
23.7%
18.9%
-47.9%
-40.7%
-30.2%
8.6%
14.0%
13.2%
2004
Percent change
2009

A state of decline

- Increase in robotic prostatectomies
- Increase in technological advances with external beam radiotherapy
  - IMRT, IGRT, SBRT
- Reimbursement for IMRT
- Negative press
- Volume of brachy cases is suboptimal for training residents

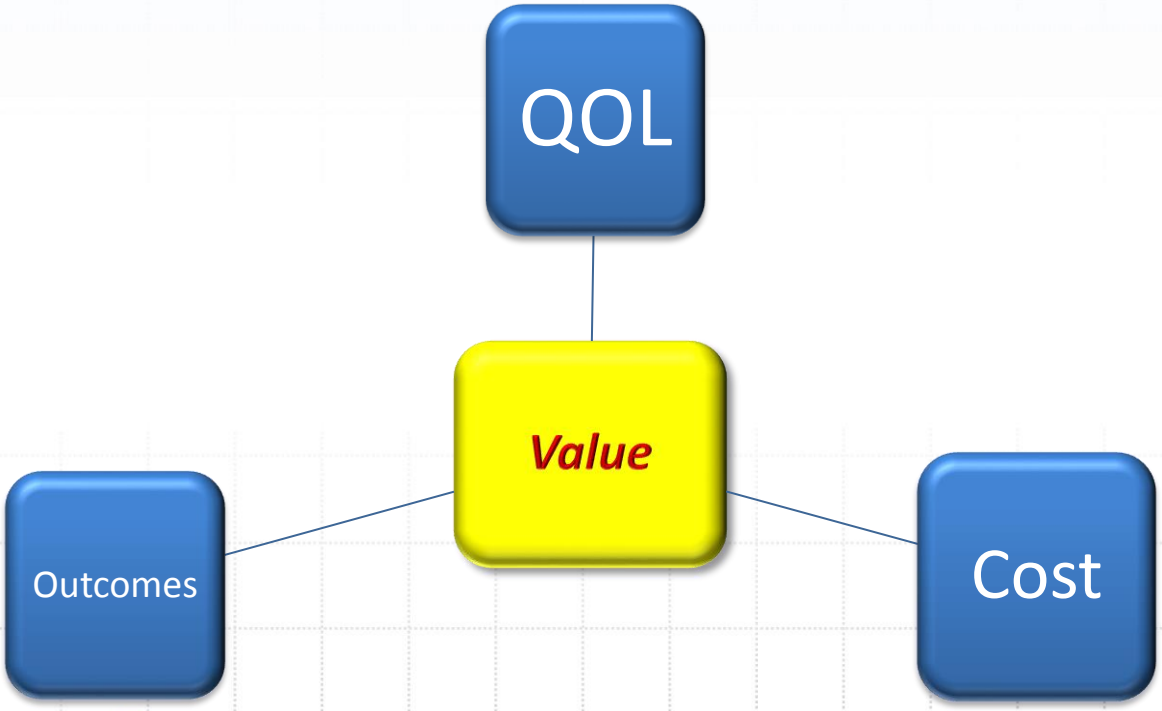
Michael Porter's Definition of Value

Revealed over time and manifest in longer term outcomes

Value = $\frac{\text{Health Outcomes Achieved}}{\text{Cost (Dollars Spent)}}$

Condition-specific and multi dimensional

Total cost for full cycle of care for patient's condition – not cost of individual services



I will propose to demonstrate

- Quality of life outcomes are as good or better than other modalities
- Outcomes with LDR brachytherapy better other modalities
- And cost is considerably favorable (at least in the US)

Quality of Life Comparisons

- Prospective Study of 4 cohorts: (n=310)
  - Nerve sparing surgery
  - Non-nerve sparing surgery
  - External Beam Radiation
  - Seed implant (Brachytherapy)

Chen et al JCO 2009; 27(24), 3916-3922

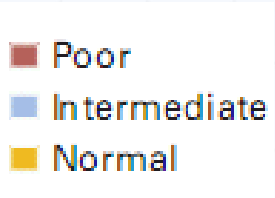
QOL after Primary Treatment

Prospective Study of 4 cohorts: (n=310)

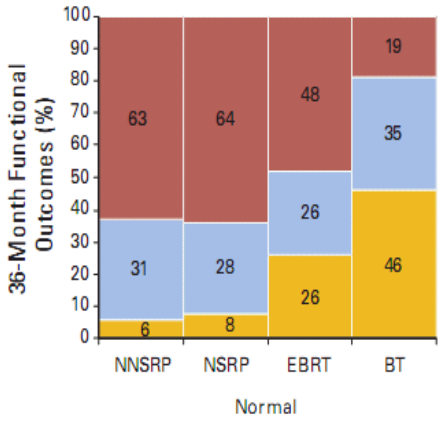
- Nerve sparing surgery (NSRP)
- Non-nerve sparing surgery (NNSRP)
- External Beam Radiation (EBRT)
- Seed implant (BT)

3 Year Outcomes

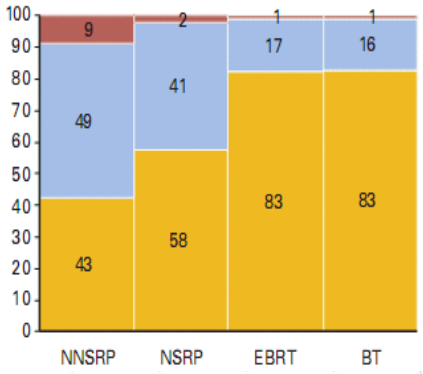
ED: Cohort of normal based on pre-therapy



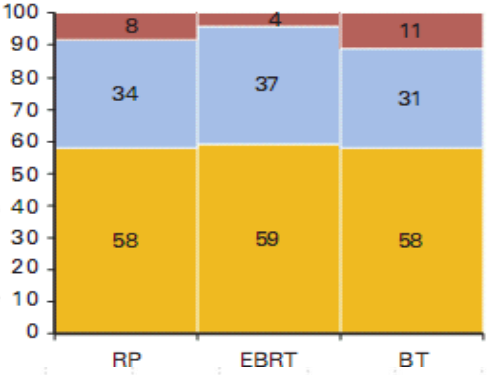
Sexual Function



Urinary Incontinence



Urinary Obstruction/Irritation



Chen et al JCO 2009; 27(24), 3916-3922

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Quality of Life and Satisfaction with Outcome among Prostate-Cancer Survivors

Martin G. Sanda, M.D., Rodney L. Dunn, M.S., Jeff Michalski, M.D., Howard M. Sandler, M.D., Laurel Northouse, R.N., Ph.D., Larry Hembroff, Ph.D., Xihong Lin, Ph.D., Thomas K. Greenfield, Ph.D., Mark S. Litwin, M.D., M.P.H., Christopher S. Saigal, M.D., M.P.H., Arul Mahadevan, M.D., Eric Klein, M.D., Adam Kibel, M.D., Louis L. Pisters, M.D., Deborah Kuban, M.D., Irving Kaplan, M.D., David Wood, M.D., Jay Ciezki, M.D., Nikhil Shah, D.O., and John T. Wei, M.D.

Table 4. Problems Reported by 543 Patients and Their Partners Regarding Symptoms and the Association between Changes in Patients' Quality-of-Life Scores and Levels of Distress Reported by Their Partners 1 Year after Treatment.*

Quality-of-Life Domain and Reported Level of Domain-Specific Distress	Patient			Spouse or Partner			Association between Change in Patient's Quality of Life and Distress for Partner			
	Prostatectomy	Radiotherapy	Brachytherapy	Prostatectomy	Radiotherapy	Brachytherapy	Prostatectomy	Radiotherapy	Brachytherapy	All Groups
	number (percent)						*correlation coefficient*			
Sexual function							0.35†	0.11	0.22‡	0.36†
No. of responses	268	113	116	279	126	122				
No problem or very small problem	78 (29)	53 (47)	61 (53)	114 (41)	83 (66)	83 (68)				
Small problem	55 (21)	25 (22)	20 (17)	42 (15)	16 (13)	23 (19)				
Moderate problem	65 (24)	17 (15)	16 (14)	65 (23)	15 (12)	9 (7)				
Big problem	70 (26)	18 (16)	19 (16)	58 (21)	12 (10)	7 (6)				

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	Prostatectomy	Radiotherapy	Brachytherapy	Prostatectomy	Radiotherapy	Brachytherapy	Prostatectomy	Radiotherapy	Brachytherapy	All Groups
	number (percent)						*correlation coefficient*			
Urinary incontinence							0.44†	0.03	0.04	0.27†
No. of responses	281	124	124	285	129	129				
No problem or very small problem	213 (76)	106 (85)	106 (85)	257 (90)	119 (92)	118 (91)				
Small problem	44 (16)	13 (10)	12 (10)	15 (5)	7 (5)	5 (4)				
Moderate problem	18 (6)	4 (3)	5 (4)	8 (3)	2 (2)	5 (4)				
Big problem	6 (2)	1 (1)	1 (1)	5 (2)	1 (1)	1 (1)				
Urinary irritation or obstruction							0.01	0.14	0.26†	0.13†
No. of responses	280	122	123	285	128	129				
No problem or very small problem	206 (74)	83 (68)	80 (65)	270 (95)	118 (92)	112 (87)				
Small problem	41 (15)	21 (17)	20 (16)	8 (3)	6 (5)	8 (6)				
Moderate problem	25 (9)	15 (12)	19 (15)	5 (2)	3 (2)	4 (3)				
Big problem	8 (3)	3 (2)	4 (3)	2 (1)	1 (1)	5 (4)				

Comparison of Health-Related Quality of Life 5 Years After SPIRIT: Surgical Prostatectomy Versus Interstitial Radiation Intervention Trial

Juanita Mary Crook, Alfonso Gomez-Iturriaga, Kris Wallace, Clement Ma, Sharon Fung, Shabbir Alibhai, Michael Jewett, and Neil Fleshner

The ACOSoG Surgical Prostatectomy Versus Interstitial Radiation Intervention Trial comparing radical prostatectomy (RP) and brachytherapy (BT) closed after 2 years due to poor accrual.

This report looks at health-related quality of life (HRQOL) at a mean of 5.3 years for 168 trial-eligible men who either chose or were randomly assigned to RP or BT.

Table 1. Summary Statistics by Intervention

Domain	Intervention	Mean	SD	*P*
Urinary	BT	91.82	8.53	.02
	RP	88.15	11.47	
Bowel	BT	93.0	11.62	.34
	RP	94.37	8.91	
Sexual	BT	62.64	24.06	.001
	RP	39.22	25.35	
Hormonal	BT	93.52	8.27	.1
	RP	89.88	12.79	
Patient satisfaction	BT	93.63	12.03	< .001
	RP	76.89	27.49	
SF-12 PCS	BT	55.88	9.69	.38
	RP	56.42	8.86	
SF-12 MCS	BT	44.72	5.28	.04
	RP	43.19	5.81	

Abbreviations: SD, standard deviation; BT, brachytherapy; RP, radical prostatectomy; SF-12 PCS, Short Form 12 Physical Component Score; SF-12 MCS, Short Form 12 Mental Component Score.

Conclusions: Quality

- QOL data (strongly) leans toward brachytherapy
- Quality brachythrapy starts with the program, not the implant
- Dynamic brachytherapy is most reporducible

Prostate Brachytherapy Evidence-Based Medicine

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Levels of Medical Evidence: US Preventative Services Task Force

Level I: Evidence obtained from at least one properly designed randomized controlled trial.

Level II-1: Evidence obtained from well-designed controlled trials without randomization.

Level II-2: Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.

Level II-3: Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled trials might also be regarded as this type of evidence.

Level III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Brachytherapy: Low Risk Group

TABLE 1. Results of Low-Dose Rate Brachytherapy for Patients With Low-Risk Prostate Cancer

Author	Patient Numbers	Definition	Median Follow-up	Years	Rate (%)
Ellis et al[30]	239 (all risk groups)	ASTRO	47 mo	7	96%
Zelefsky et al[31]	319	ASTRO	63 mo	5	96
Zelefsky et al[32]	1,444	ASTRO	63 mo	8	82
Block et al[33]	118	ASTRO	49 mo	5	94.7
Khaksar et al[34]	146	ASTRO	45 mo	5	96
Guedea et al[35]	241	ASTRO	30 mo	3	93
Stock et al[15]	589	ASTRO	4.2 y	10	94
Prada et al[36]	275	ASTRO	31 mo	5	96
Potters et al[37]	481	ASTRO-Kattan	82 mo	12	89
Sharkey et al[38]	? of 1,707	ASTRO	?	12	89
Joseph et al[39]	? of 667	ASTRO	31 mo	8	84.3
Critz and Levinson[40]	? of 1,469	>0.2	6 y	10	93
Bladou et al[41]	177	ND	29 mo	3	98
Battermann et al[42]	114	ASTRO	48 mo	5	89
D'Amico et al[43]	196	ASTRO	3.9 y	5	95
Sylvester et al[44]	63	2 PSA rises	63 mo	10	89
Kwok et al[45]	41	ASTRO	7 y	5	85
Grimm et al[46]	125	2 PSA rises	81 mo	10	87
Wallner et al[47]	126	>0.5	2.9 y	3	89–91
Martin et al[48]	273	Houston	5 y	12	90
Merrick et al[24]	120	ASTRO	31 mo	5	97

ND, not determined.

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Cesaretti, JA, et al. Brachytherapy for the Treatment of Prostate Cancer. The Cancer Journal 2007; 13(5): 302-312

Brachytherapy monotherapy series

	N=	Med f/u	% bRFS		
			Low	Intermediate	High
D'Amico et al	66	3.4y	85%	35%	0%
Blasko et al	230	4.8y	87%	84%	54%
Potters et al	493	3.4y	92%	74%	55%
Zelefsky et al	226	4.0y	88%	77%	38%
Merrick et al	262	4.4y	97%	97%	80%
Kollmeier et al	243	6.3y	88%	81%	65%

Highest Level Evidence Supporting Use of LDR Brachytherapy

- Essentially all Level 2 at best

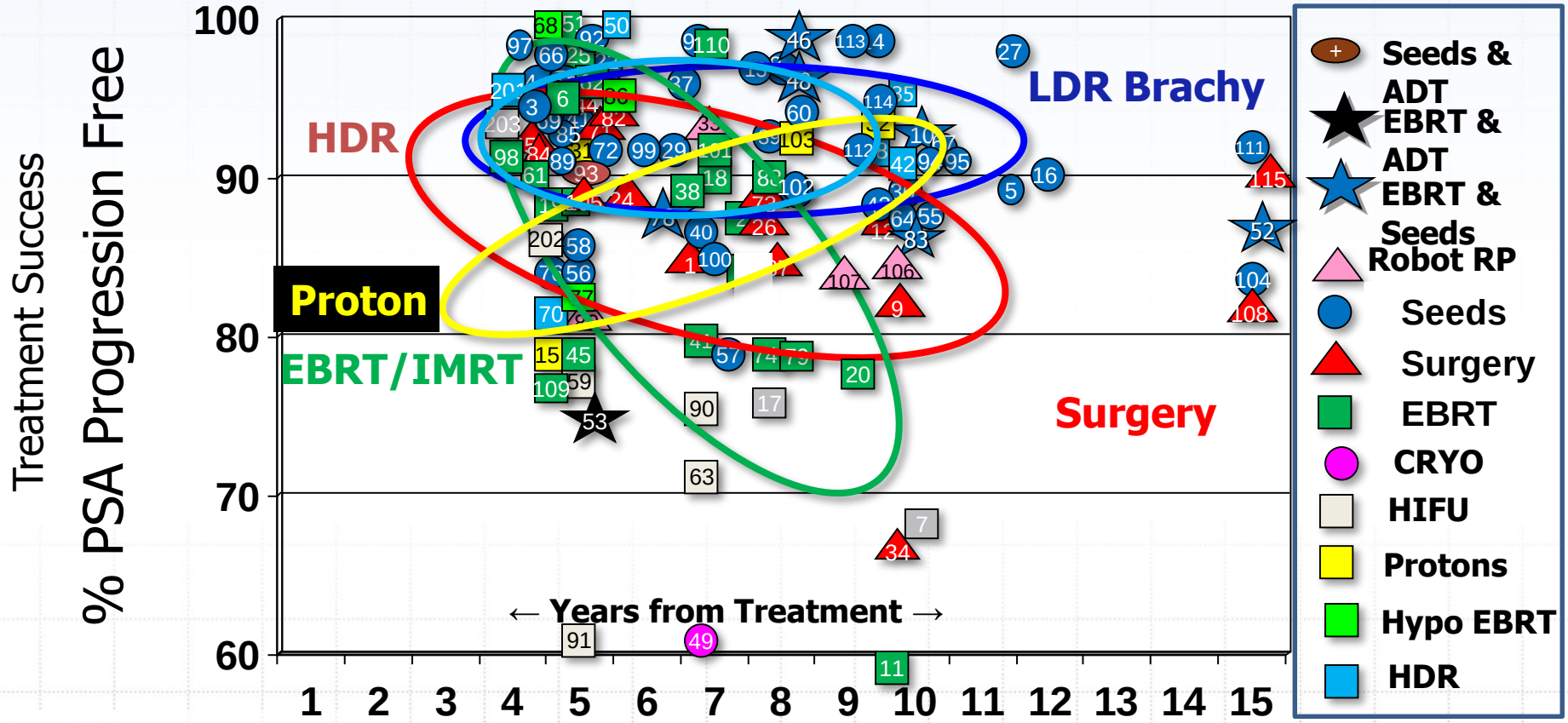
Outcomes: CER

- 28,000+ prostate studies were published between 2000 and June 2013
- 1,127 of those studies featured treatment results
- 233 of those met the criteria to be included in this review study. (*1st & 2nd group)
- Some treatment methods are under-represented due to failure to meet criteria

LOW RISK RESULTS

>40 months follow-up or less than 100 patients

Weighted

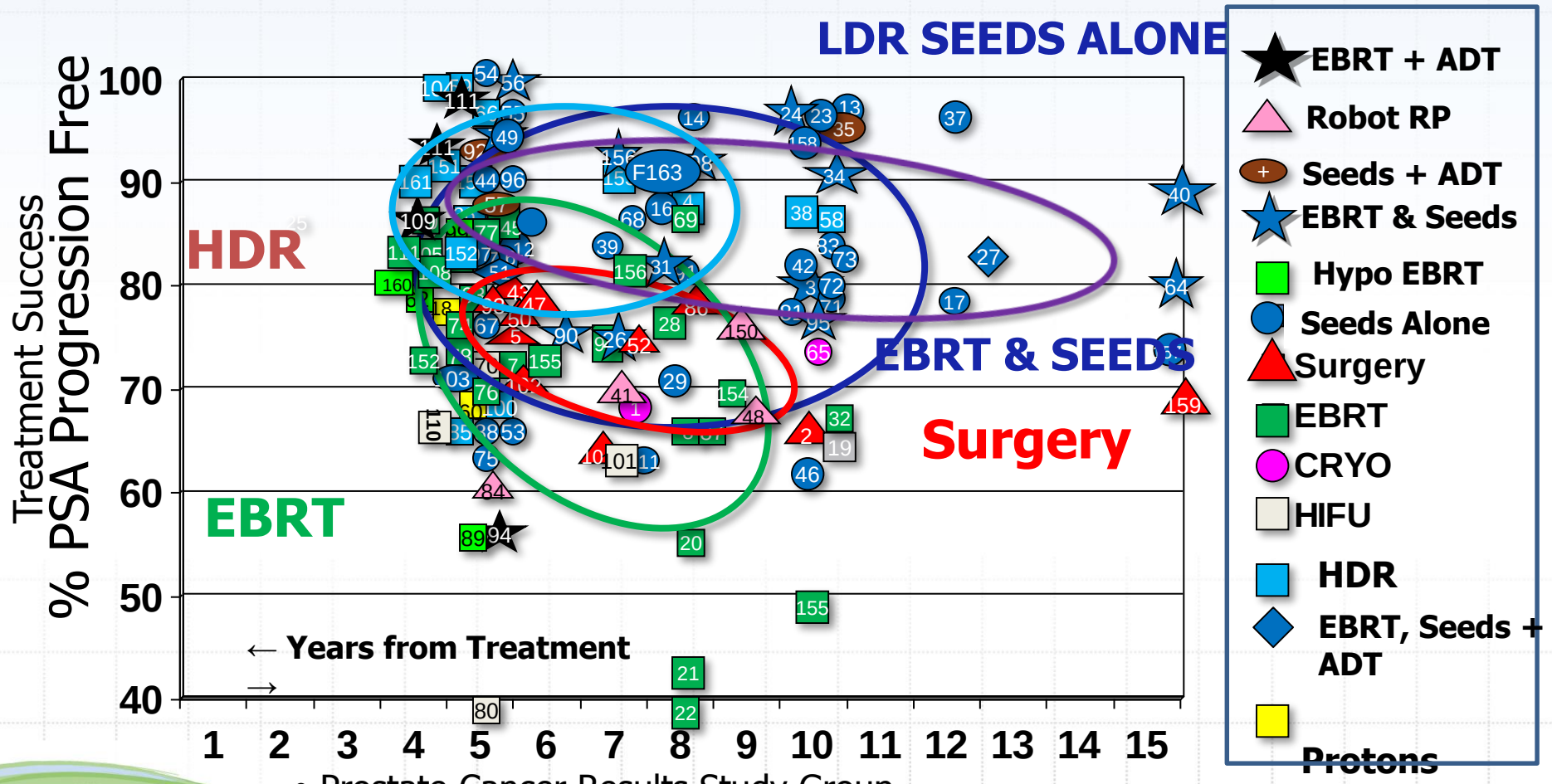


- Prostate Cancer Results Study Group
- Numbers within symbols refer to references

BJU Int. 2012, Vol

INTERMEDIATE RISK RESULTS

>40 months follow-up or less than 100 patients



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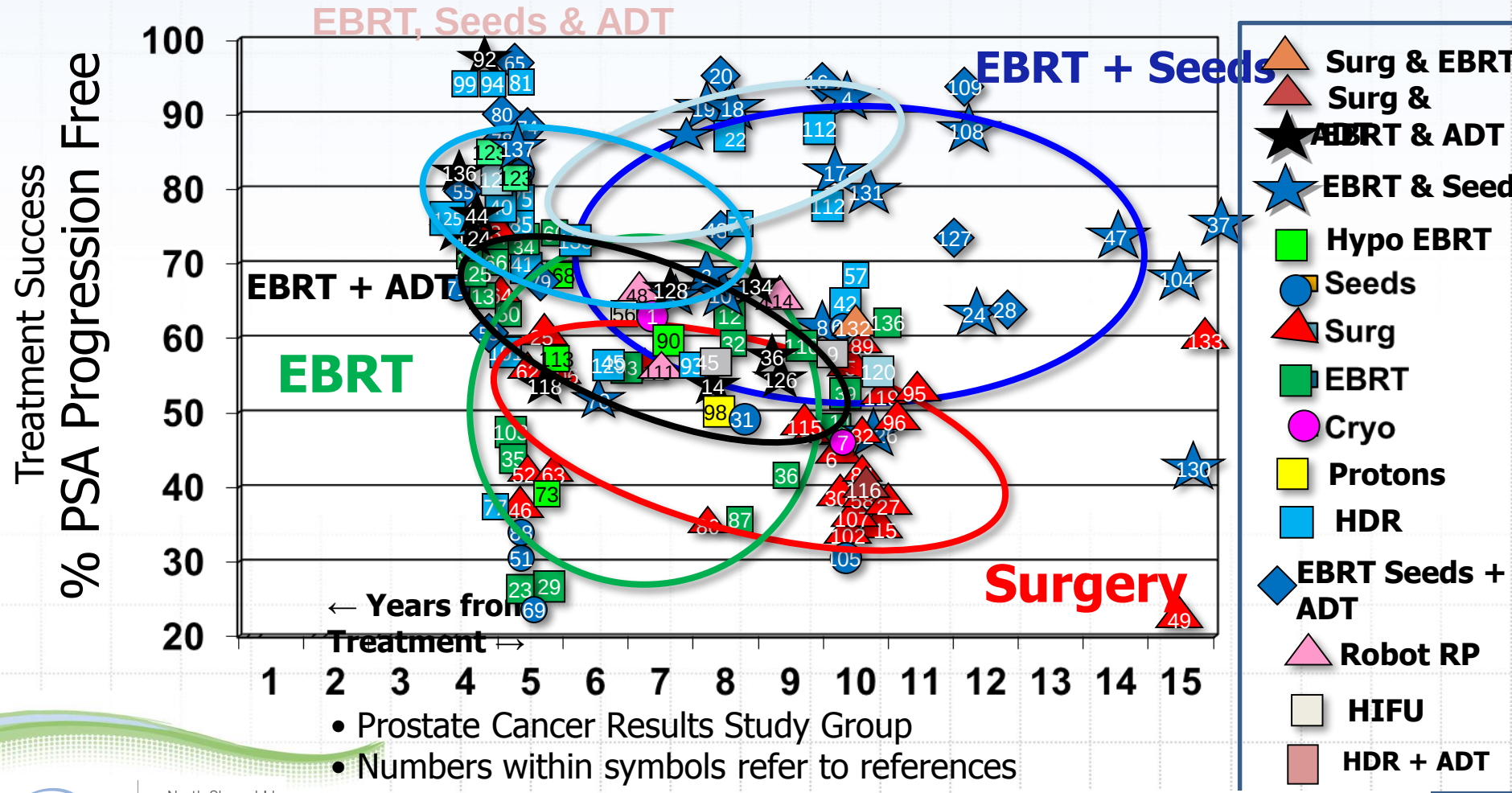
HIGH RISK RESULTS

>40 months follow-up or less than 100 patients

Weighted



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Prostate Cancer: Alternative Therapy

Comparison of Tumor Control and Toxicity Outcomes of High-dose Intensity-modulated Radiotherapy and Brachytherapy for Patients With Favorable Risk Prostate Cancer

Michael J. Zelefsky[a], Yoshiya Yamada[a,b,c], Xin Pei[a,b,c], Margie Hunt[a,b,c], Gilad Cohen[a,b,c], Zhigang Zhang[a,b,c], Marco Zaider[a,b,c]

[a] Department of Radiation Oncology, Memorial Sloan-Kettering Cancer Center, New York, New York

[b] Department of Medical Physics, Memorial Sloan-Kettering Cancer Center, New York, New York

[c] Department of Epidemiology-Biostatistics, Memorial Sloan-Kettering Cancer Center, New York, New York

Received 27 April 2010, Accepted 17 July 2010, Available online 31 December 2010

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doi:10.1016/j.urology.2010.07.539

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Table 2.

Univariate and multivariate analyses for predictors of PSA relapse

	Univariate		Multivariate	
Factor	HR	*P* Value	HR	*P* Value
Treatment mode (brachytherapy vs EBRT)	0.43	.005	0.416	.004
Pretreatment PSA	1.18	.027	1.18	.025
Age (continuous)	0.966	.09	0.955	.025
Age (>65 vs ≤65 y)	0.767	.37		
Hormonal therapy (yes vs no)	0.783	.47		

HR, hazard ratio; other abbreviations as in Table 1.

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Received 27 April 2010, Accepted 17 July 2010, Available online 31 December 2010

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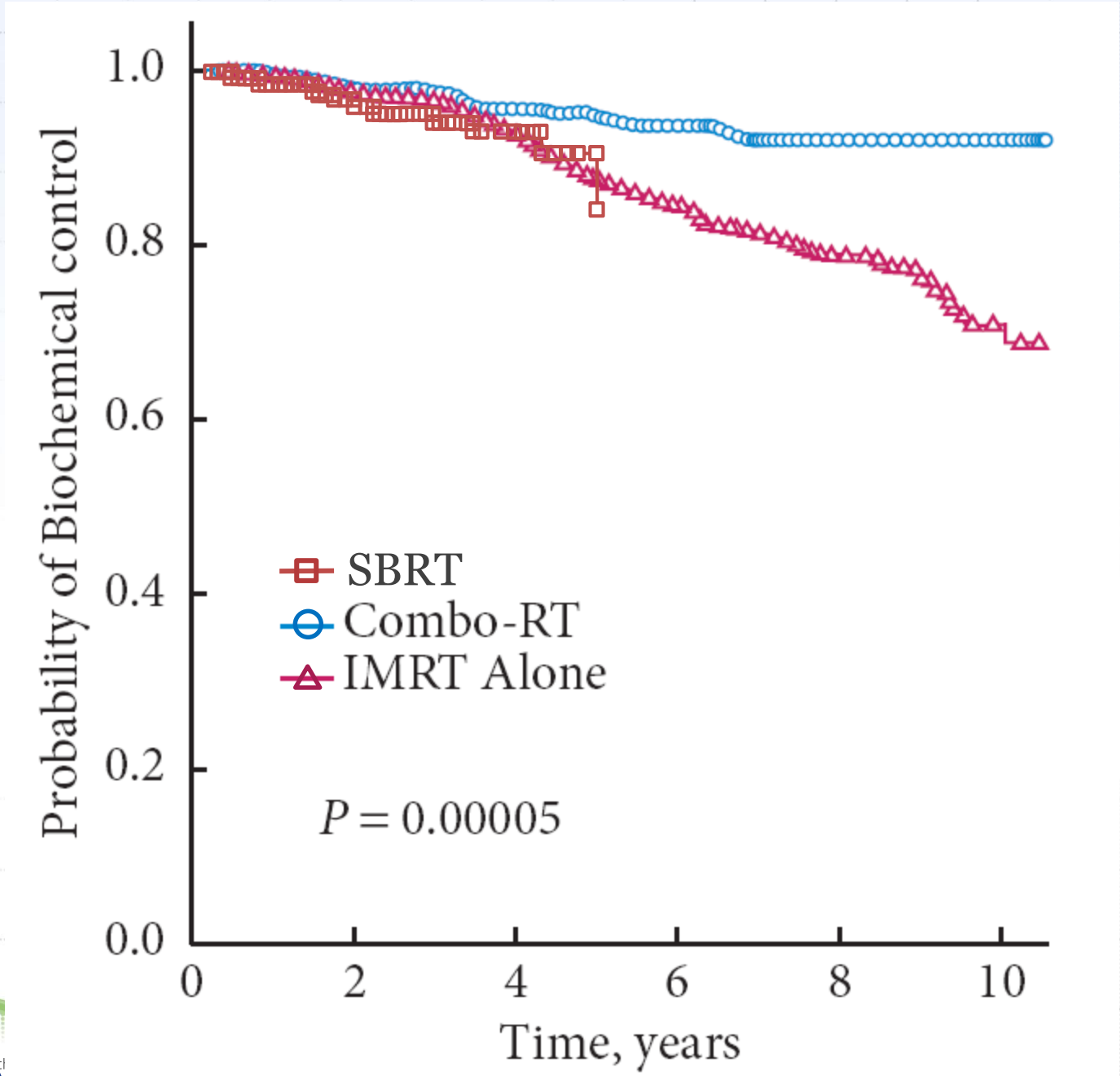
- Post treatment nadir:
  - BT: 0.1ng/ml
  - EBRT 0.6ng/ml (p<0.001)
- 7-Year RFS
  - BT: 95%
  - EBRT 89% (p=0.004)


Probability of Biochemical control
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
Time, years
SBRT
Combo-RT
IMRT Alone
P = 0.00005

International Journal of Radiation Oncology*Biology*Physics

Volume 76, Issue 1, January 2010, Pages 43–49

Clinical Investigation

Brachytherapy or Conformal External Radiotherapy for Prostate Cancer: A Single-Institution Matched-Pair Analysis

Presented orally at the Canadian Association of Radiation Oncology Annual Meeting, Montreal, September 2008.

Tom Pickles, M.D., Mira Keyes, M.D., W. James Morris, M.D., Prostate Outcomes and Provincial Prostate Brachytherapy Program

Prostate Outcomes and Provincial Prostate Brachytherapy Program, BC Cancer Agency, Vancouver, BC, Canada

Received 18 September 2008, Revised 27 January 2009, Accepted 27 January 2009, Available online 29 June 2009

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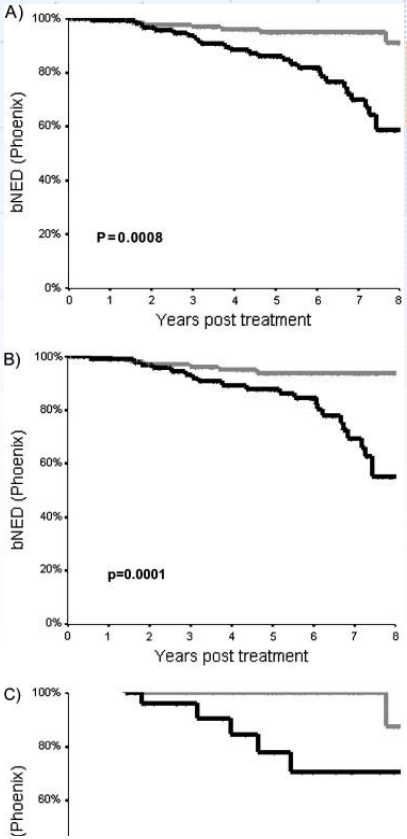
doi:10.1016/j.ijrobp.2009.01.081



Kaplan-Meier plots of biochemical control by treatment and risk group. Biochemical control rates at 5 years are as follows:
(A) all patients: brachytherapy 95%, external-beam radiation therapy 85%
(B) low risk: brachytherapy 94%, external-beam radiation therapy 88%
(C) intermediate risk: brachytherapy 100%, external beam radiation therapy 78%

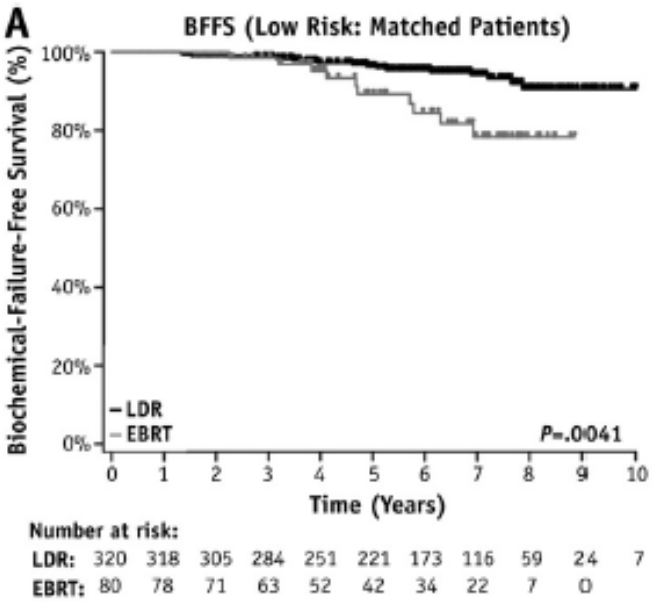
Log rank test *p* values are shown in the figures.
Gray = BT; black = ERBT

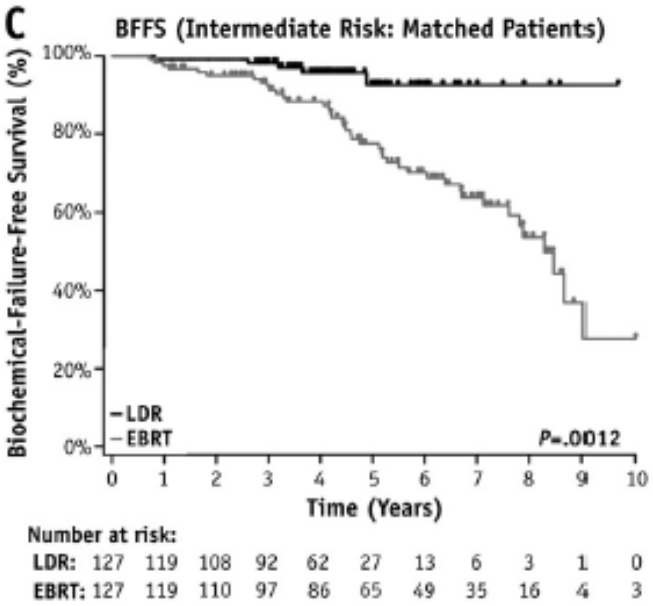
Brachytherapy Improves Biochemical Failure—Free Survival in Low- and Intermediate-Risk Prostate Cancer Compared With Conventionally Fractionated External Beam Radiation Therapy: A Propensity Score Matched Analysis

Graham D. Smith, MRT(T), MSc,* Tom Pickles, MD,† Juanita Crook, MD,‡ Andre-Guy Martin, MD,§ Eric Vigneault, MD,§ Fabio L. Cury, MD,‖ Jim Morris, MD,† Charles Catton, MD,¶ Himu Lukka, MD,# Andrew Warner, MSc,** Ying Yang, MSc,†† and George Rodrigues, MD, PhD*,**

**University of Western Ontario, London, Ontario, Canada; †Department of Radiation Oncology, British Columbia Cancer Agency, Vancouver, British Columbia, Canada; ‡Department of Radiation Oncology, Kelowna General Hospital, Kelowna, British Columbia, Canada; §Department of Radiation Oncology, L'Hotel Dieu de Quebec, Quebec City, Quebec, Canada; ‖Department of Radiation Oncology, Montreal General Hospital, Montreal, Quebec, Canada; ¶Radiation Medicine Program, Princess Margaret Cancer Centre, Toronto, Ontario, Canada; #Department of Radiation Oncology, Juravinski Cancer Centre, Hamilton, Ontario, Canada; **Department of Radiation Oncology, London Health Sciences Center, London, Ontario, Canada; and ††University of Waterloo, Waterloo, Ontario, Canada*

Received Sep 10, 2014, and in revised form Nov 6, 2014. Accepted for publication Nov 11, 2014.





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Radiation vs Surgery?
That has been tested in retrospective series but not in a randomized study

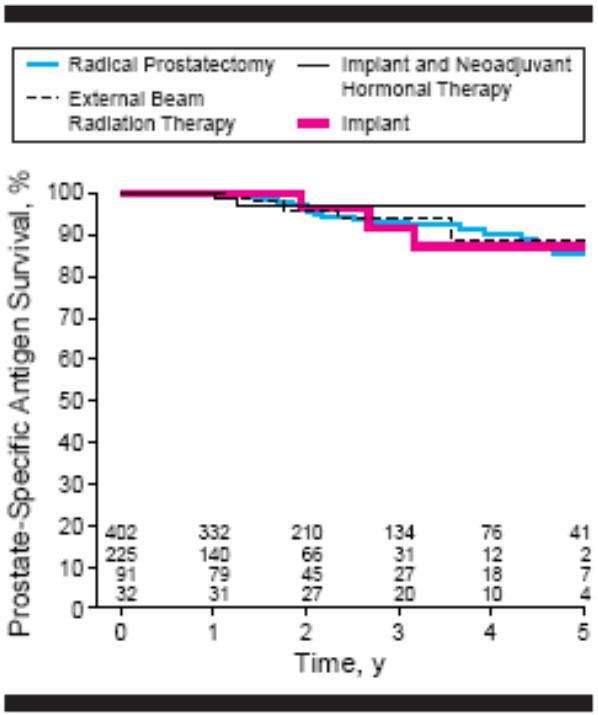

Figure 1.—Estimated prostate-specific antigen outcome for low-risk patients stratified by treatment modality. All pairwise *P* values are more than .25.

JAMA®
Online article and related content current as of May 24, 2010.

Biochemical Outcome After Radical Prostatectomy, External Beam Radiation Therapy, or Interstitial Radiation Therapy for Clinically Localized Prostate Cancer

Anthony V. D'Amico; Richard Whittington; S. Bruce Malkowicz; et al.

JAMA. 1998;280(11):969-974 (doi:10.1001/jama.280.11.969)

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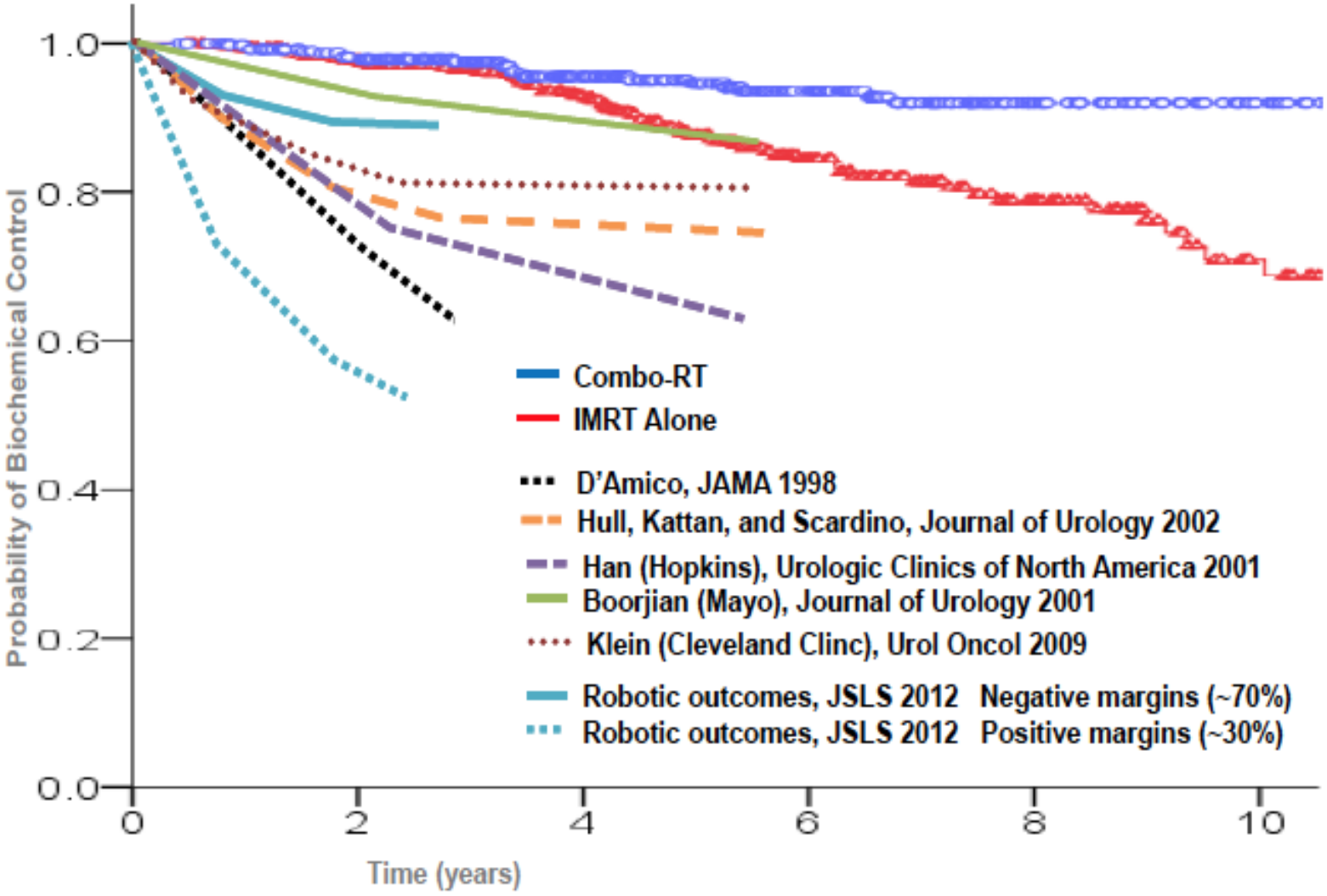
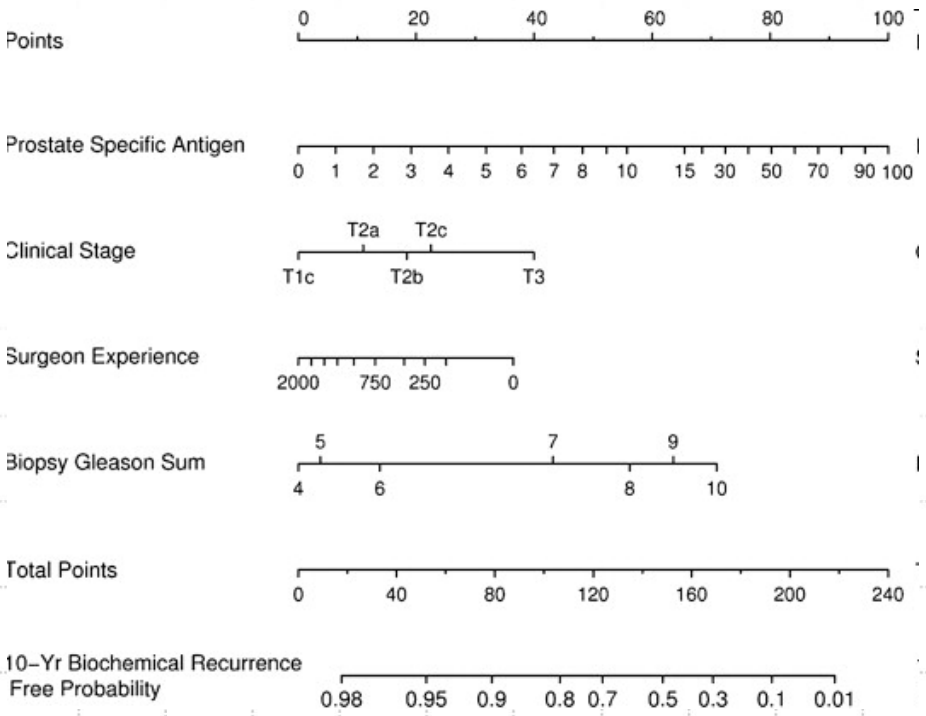
Intermediate Risk Patients: Biochemical Control: Combined Brachy + EBRT vs Dose Escalated EBRT vs Surgery



BT versus RP

Pickles et al.

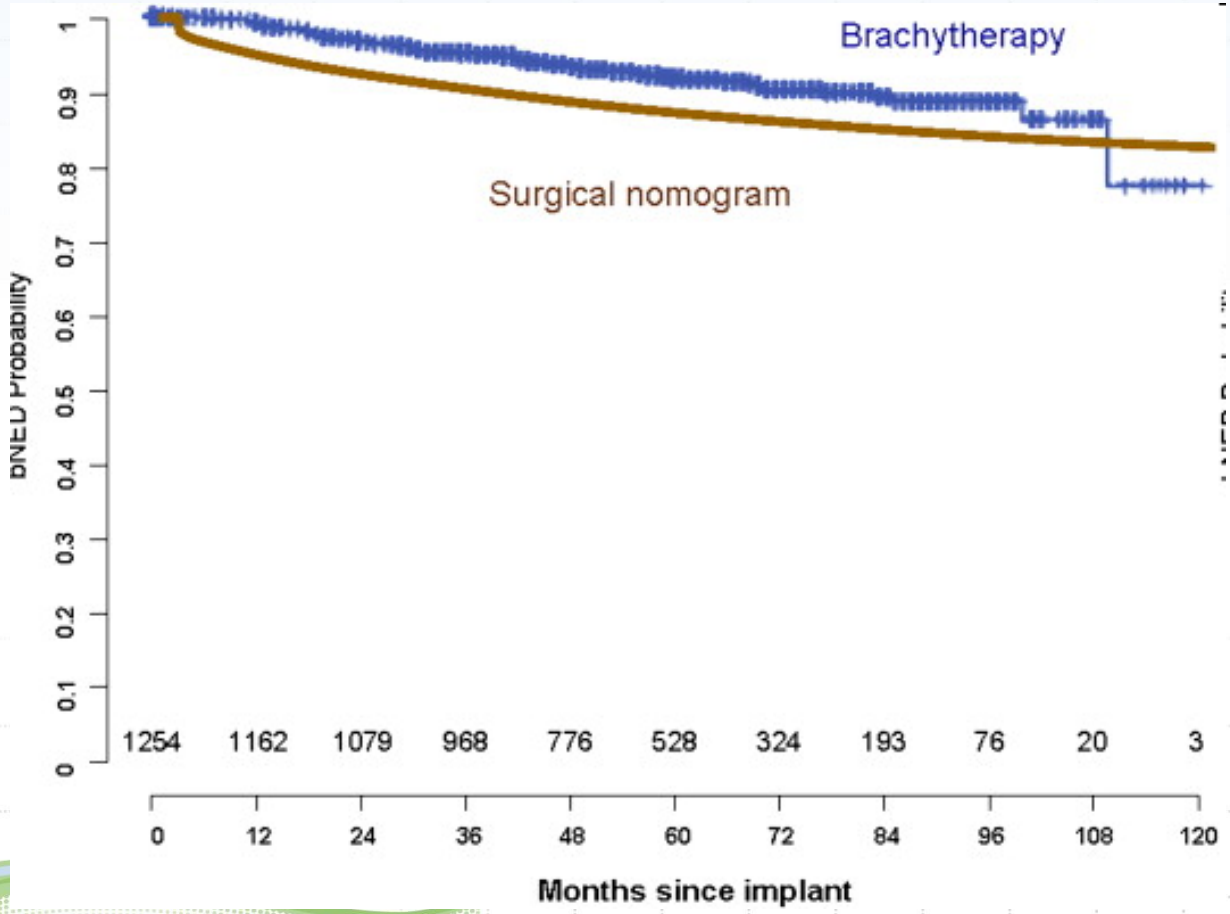
- N=1254
- BT patients w/ typical mix of risk stratification
- Experience considered
- Surgical outcome definition:
  - PSA > 0.4 ng/ml



Apples to Apples

1. Use the same outcome definition from the surgical nomogram
2. They account for both surgical and BT experience as a component of the analysis
3. Use the nomogram as the root of their analysis
4. Next, they inject their BT cohort outcomes into the surgical model to create a level-field comparison of BT and RP
5. Lastly, their study cohort is of a robust enough size that these outcomes are meaningful.

Pickles et al.



Biochemical Outcome

- BT: 90.6%
- RRP: 86.8%

P=0.003

Brachytherapy and IG-IMRT for Intermediate and High-risk Patients

- Encompass "at-risk" sites: extracapsular disease extension, seminal vesicle involvement and/or pelvic lymph nodes
- Dose escalation: Combined modality programs deliver higher dose than implant alone or EBRT alone
- However, toxicity is greater with combination approach
- No mature modern randomized trials
- Little agreement as to which patients are appropriate candidates

A national phase 2 study of external beam radiation combined with brachytherapy showed that 15% of patients experienced grade 1 to 3 urinary or rectal toxicity, while 81% remained free of biochemical progression 4 years after treatment (intermediate risk)

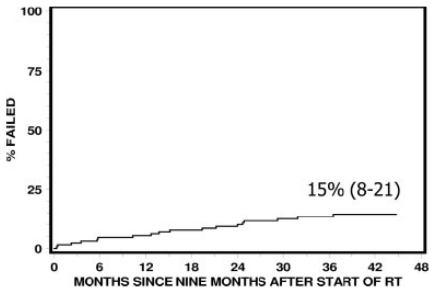


FIGURE 1. Time to late grade ≥3 genitourinary/gastrointestinal toxicity. RT indicates radiotherapy.

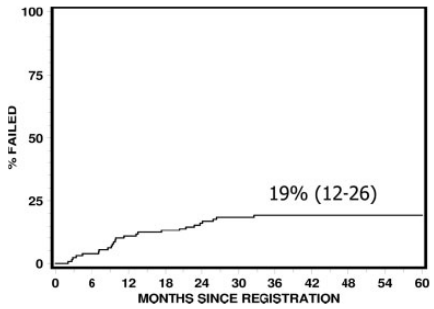


FIGURE 2. Time to biochemical recurrence (American Society for Therapeutic Radiology and Oncology definition).

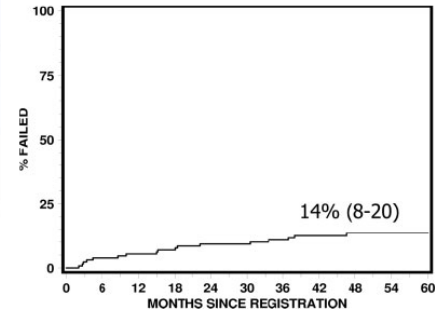


FIGURE 3. Time to biochemical recurrence (Phoenix definition).

Late Toxicity and Biochemical Recurrence After External-beam Radiotherapy Combined With Permanent-source Prostate Brachytherapy

Analysis of Radiation Therapy Oncology Group Study 0019

W. Robert Lee, MD, MS, MEd[1]
Kyoungwha Bae, PhD[2]
Colleen Lawton, MD[3]
Michael Gillin, PhD[4]
Gerard Morton, MD[5]
Selim Firat, MD[6]
Madhava Baikadi, MD[6]
Michael Kuettel, MD[7]
Kathryn Greven, MD[8]
Howard Sandler, MD[9]

DOI 10.1002/cncr.22560
Published online 5 March 2007 in Wiley InterScience (www.interscience.wiley.com).

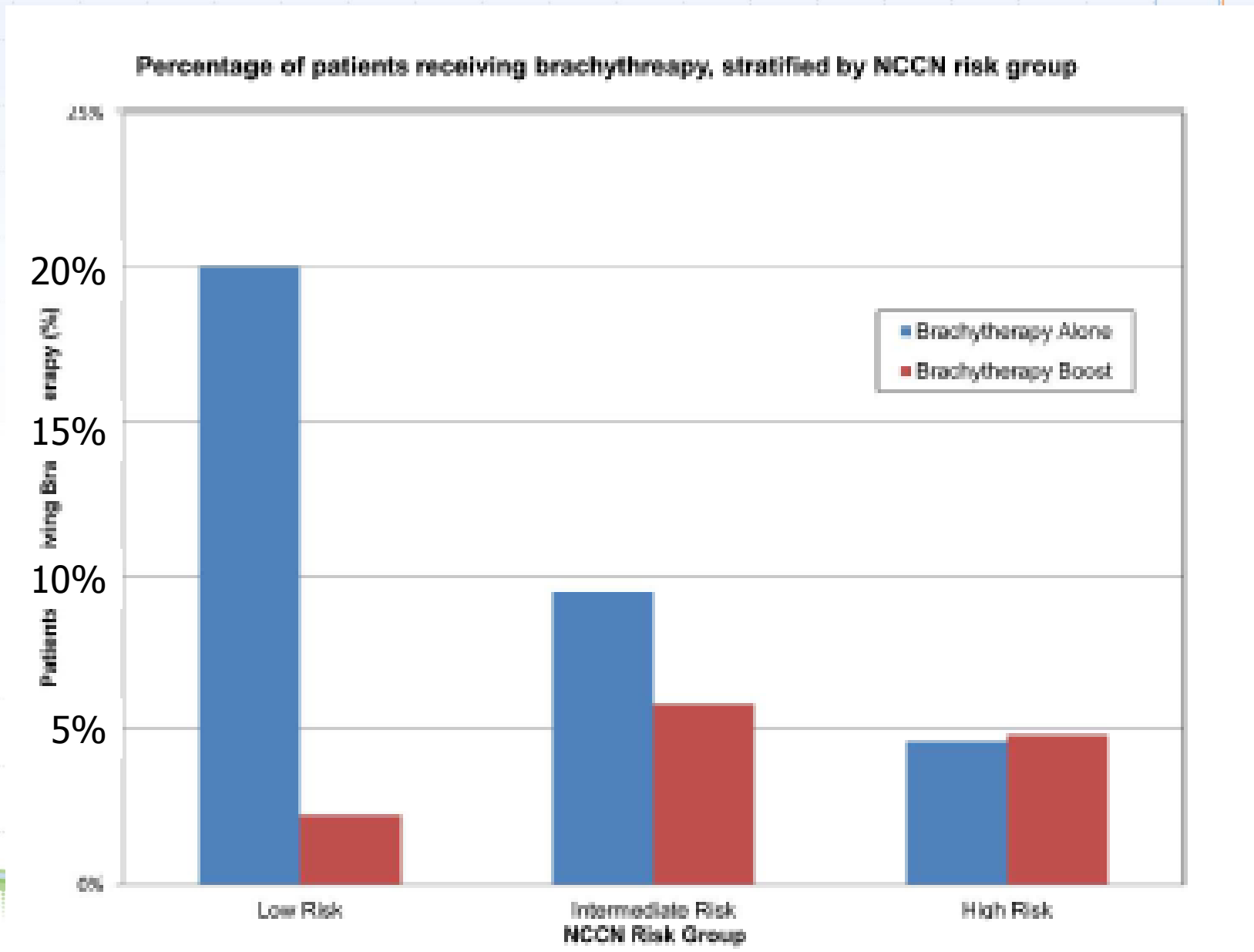
Cooperative Trials for Combined Treatment

Table 2 Summary of cooperative group trials.

Trial	Phase	Design and isotopes	Key results
LDR boost			
RTOG 0019	II	EBRT (45 Gy) and LDR brachytherapy (108 Gy, ^{125}I)	Overall grade 3 gastrointestinal and/or genitourinary toxic event rate 15% at 4 years Biochemical recurrence rate 19% at 4 years Median follow-up 49 months
CALGB 99809	II	EBRT (45 Gy, ^{125}I) and LDR brachytherapy (100 Gy, ^{125}I or 90 Gy, ^{103}Pd)	Short-term grade 2 and 3 gastrointestinal and/or genitourinary toxic event rates of 21% and 7% Long-term grade 2 and 3 gastrointestinal and/or genitourinary toxic event rates of 13% and 3% No treatment failures Median follow-up 38 months
RTOG 0232	III	EBRT (45 Gy) and LDR brachytherapy (110 Gy, ^{125}I or 100 Gy, ^{103}Pd) versus LDR brachytherapy alone (145 Gy, or 125 Gy, ^{103}Pd)	Enrollment ongoing
HDR boost			
RTOG 0321	II	EBRT and HDR brachytherapy (45 Gy and 19 Gy in two fractions)	Enrollment completed but results not yet reported

Abbreviations: CALGB, Cancer and Leukemia Group B; EBRT, external-beam radiation therapy; HDR, high-dose rate; LDR, low-dose rate; RTOG, Radiation Therapy Oncology Group.

The relative efficacy of brachytherapy as monotherapy compared with its combination with external beam is not known, but it is being evaluated in an ongoing randomized clinical study


Percentage of patients receiving brachytherapy, stratified by NCCN risk group
20%
15%
10%
5%
0%
Brachytherapy Alone
Brachytherapy Boost
Low Risk
Intermediate Risk
High Risk
NCCN Risk Group

Using Prostate Cancer as example

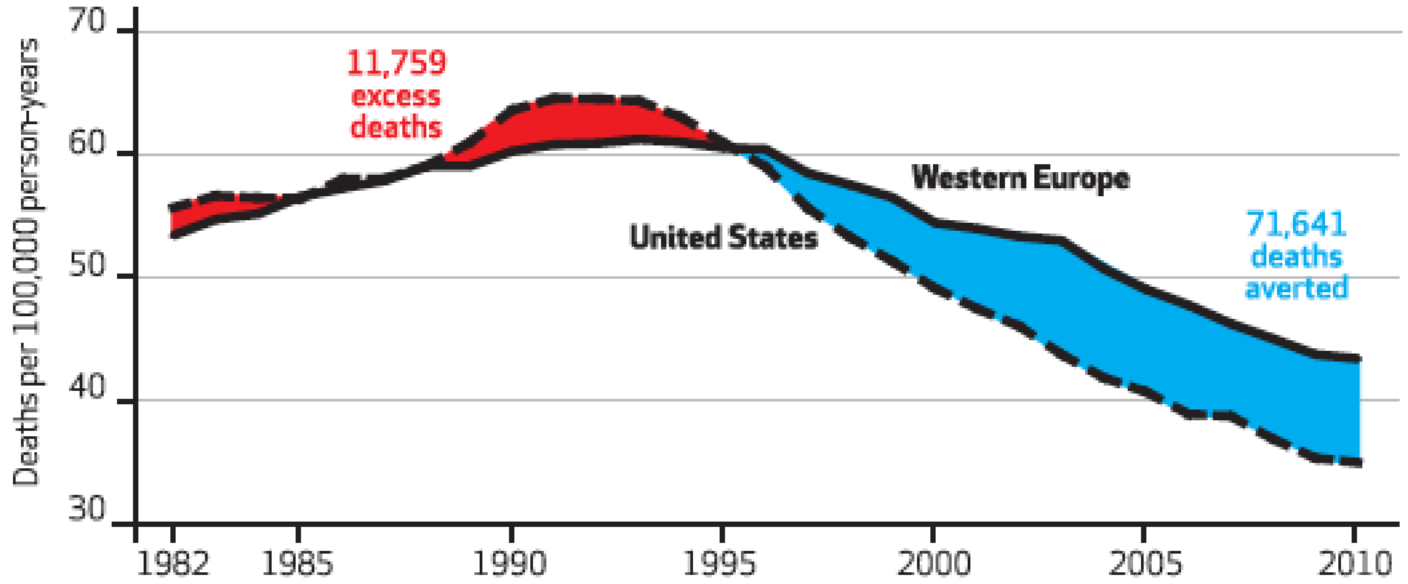
- Delivering cost effective care has become a critical consideration in prostate cancer treatment due to:
  - Deficiencies in available comparative effectiveness analyses
  - Affordable Care Act redefining the health care landscape
  - Medicare assuming burden for baby boomers' health care costs
  - Growth of the provider as insurer model

By Samir Soneji and JaeWon Yang

New Analysis Reexamines The Value Of Cancer Care In The United States Compared To Western Europe

EXHIBIT 3

Excess And Averted Prostate Cancer Deaths In The United States, Compared to Western Europe,1982–2010



SOURCE Authors' analysis of data from the World Health Organization Cancer Mortality Database and the Human Mortality Database (see Note 13 in text).

EXHIBIT 4

Ratio Of Incremental Costs To Total And Quality-Adjusted Life-Years Saved For Twelve Cancer Types In The United States, Compared To Western Europe

Type of cancer	Deaths averted	Life-years saved	Incremental cost ($ millions)	Incremental cost divided by life-years saved ($)	Incremental cost divided by QALYs saved ($)
Breast	66,797	1,420,249	435,369	306,544	402,369
Cervix uteri	4,354	–41,090	29,287	–712,751	–855,019
Colorectal	264,632	3,860,194	325,866	84,417	110,009
Hodgkin's lymphoma	4,859	161,074	19,526	121,224	156,045
Leukemia	–64,530	–1,370,884	32,620	–23,795	–30,790
Lung	–1,119,599	–28,311,995	405,872	–14,336	–18,815
Melanoma	–39,144	–1,025,066	109,773	–107,089	–136,592
Non-Hodgkin's lymphoma	164,429	3,696,336	117,692	31,840	41,362
Prostate	59,882	294,273	434,642	1,477,003	1,978,542
Stomach	621,820	13,705,501	49,015	3,576	4,655
Testis	3,372	100,832	17,714	175,674	222,839
Thyroid gland	18,320	482,902	51,593	106,840	139,681

SOURCE Authors' analysis of data from the World Health Organization Cancer Mortality Database and the Human Mortality Database (see Note 13 in text). **NOTES** Negative deaths averted represent excess cancer deaths. Incremental costs are expressed in 2010 dollars.

Cost Effectiveness of Brachytherapy

Modality	n =	Calculated Medicare Reimbursement	Less Costly than IMRT?	Less Costly than HDR?
IMRT	869	$ 29,356	---	---
HDR	252	$ 17,514	Yes ($p < 0.001$)	---
LDR	207	$ 9,938	Yes ($p < 0.001$)	Yes ($p = 0.01$)

Shah C et al. Brachytherapy provides comparable outcomes and improved cost effectiveness in the treatment of low/intermediate prostate cancer. *Brachytherapy,* 2012 11(6): 441-5

Active Surveillance Compared With Initial Treatment for Men With Low-Risk Prostate Cancer

A Decision Analysis

Julia H. Hayes, MD
Daniel A. Ollendorf, MPH, ARM
Steven D. Pearson, MD, MSc, FRCP
Michael J. Barry, MD
Philip W. Kantoff, MD
Susan T. Stewart, PhD
Vibha Bhatnagar, MD
Christopher J. Sweeney, MBBS
James E. Stahl, MD
Pamela M. McMahon, PhD

Table 3. Probabilistic Sensitivity Analysis

Strategy	QALYs (95% Confidence Interval)	Incremental QALY
Active surveillance	11.00 (6.93-13.90)	
Brachytherapy	10.65 (5.57-14.29)	−0.35
IMRT	10.54 (5.55-14.27)	−0.09
Radical prostatectomy	10.30 (4.89-14.36)	−0.24

Abbreviations: IMRT, intensity-modulated radiation therapy; QALY, quality-adjusted life-year.

Hayes, J. H. et al. JAMA 2010;304:2373-2380

Cost Effectiveness

- Institute for Clinical And Economic Review (ICER) analysis of PB versus IMRT versus proton beam therapy
- N=166 studies
- Found large differences in lifetime cost favoring brachytherapy
  - 30% and 60% lower costs than IMRT and proton beam therapy, respectively

	Cost	QALY
– Brachytherapy	$29,575	13.90
– IMRT	$41,591	13.81
– Proton beam therapy	$72,789	13.70

http://www.icer-review.org/index.php/mgmtoptionlrpc.html

ICER Cost & QALY

- Institute for Clinical And Economic Review (ICER) analysis of PB versus IMRT versus proton beam therapy
- N=166 studies
- Found large differences in lifetime cost favoring brachytherapy

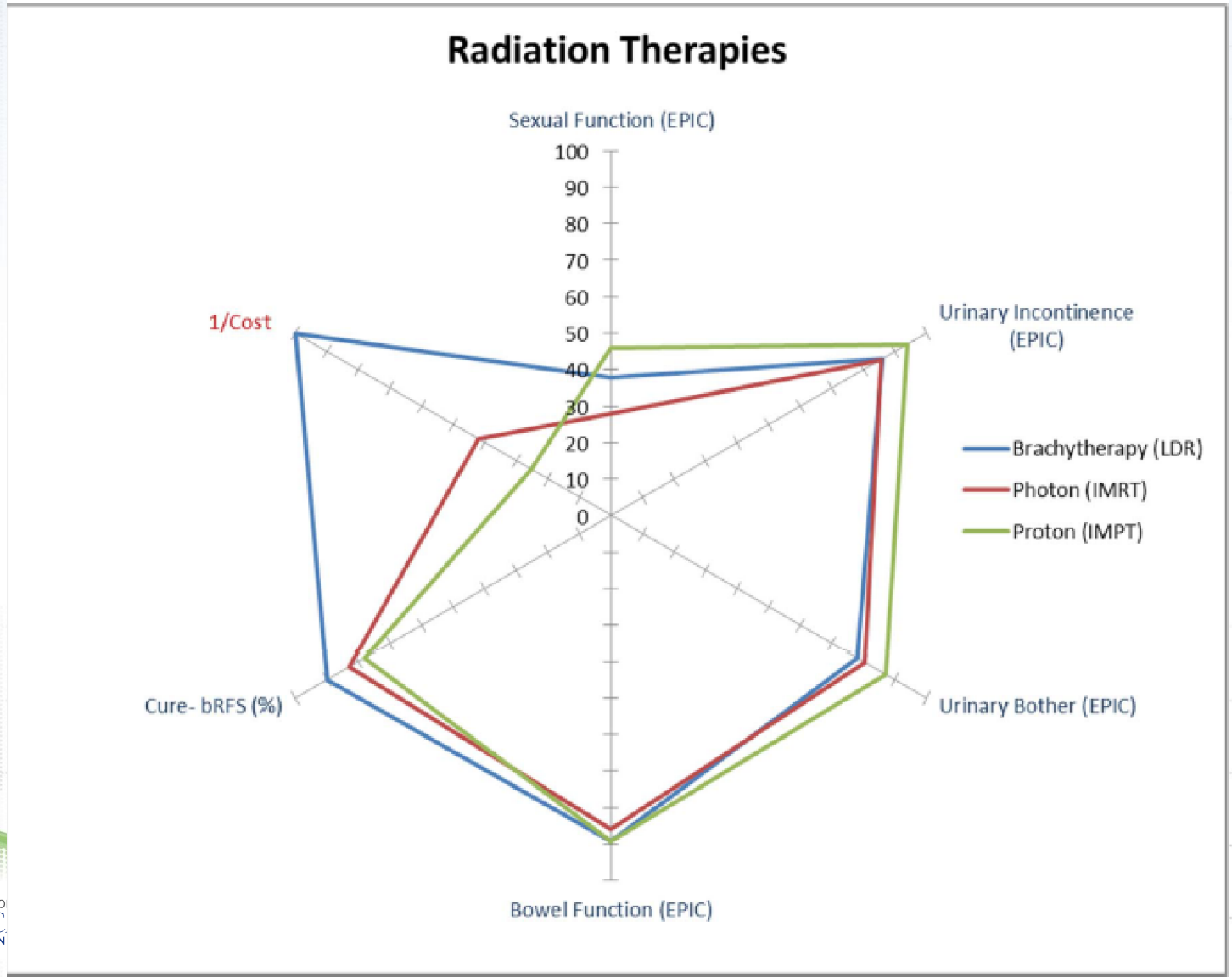
Table 5. Lifetime quality-adjusted life expectancy and costs for 65-year-old men with clinically-localized, low-risk prostate cancer, by treatment type.

Strategy	QALYs	Incremental QALYs	Cost	Incremental Cost
AS	8.97	1.15	$30,422	$2,074
Brachytherapy	8.12	0.30	$25,484	($2,864)
IMRT	8.09	0.27	$37,861	$9,513
Proton Beam	7.97	0.15	$53,828	$25,480
RP	7.82	Reference	$28,348	Reference

All incremental values calculated relative to radical prostatectomy; strategies appear in alphabetical order
NOTES: RP: radical prostatectomy; AS: active surveillance; IMRT: intensity-modulated radiation therapy
QALY: quality-adjusted life years.
*Incremental cost-effectiveness ratios presented for purposes of transparency; findings of the ICER systematic review do NOT support substantial differences in overall effectiveness.
†Strategy is less costly and more effective than reference strategy

http://www.icer-review.org/index.php/mgmtoptionlrpc.html

Defining Value in CaP

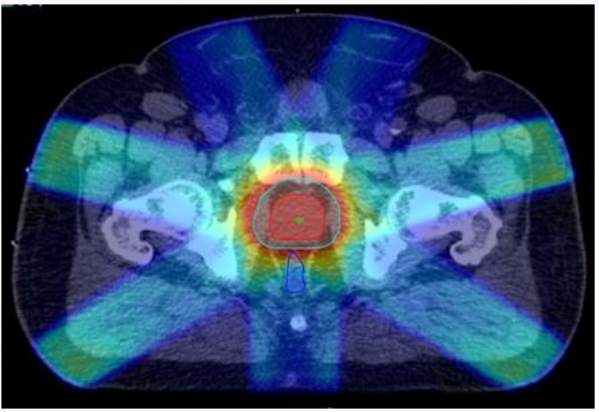
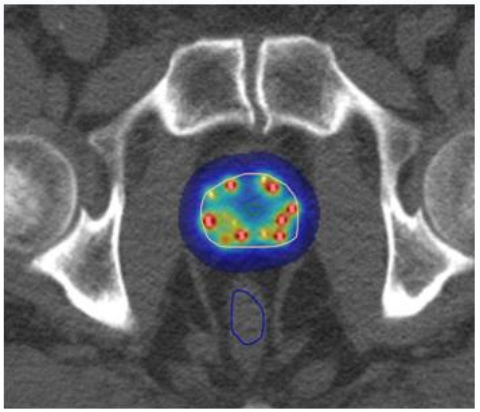
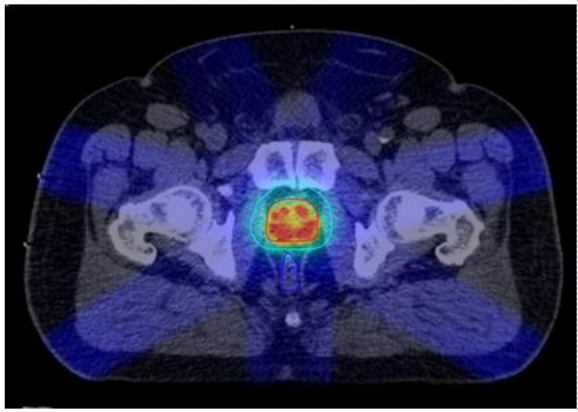


Prostate Options

Prostate Directive	N=	%
EBRTT Alone	84	24%
LDR Brachytherapy	124	36%
EBRT+Brachy	25	7%
RTOG 0815 EBRT	8	2%
RTOG 0815 EBRT+Brachy	12	3%
Post Prostatectomy	30	9%
SBRT	5	1%
0415 28Fx	2	1%
0415 41Fx	0	0%
Active Surveillance	53	15%
non-compliant	4	1%

Conclusions

- At least as good, if not better than other approaches regarding
  - Quality of life outcomes
  - Disease free outcomes
  - Cost
- If your facility is not doing brachytherapy, you are not offering optimal cost effective care nor optimizing value.

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