

Advances in Brachytherapy for Prostate Cancer

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Prostate Cancer Brachytherapy 2013

- Careful selection of patients to reduce the morbidity of therapy.
- Improved accuracy of seed delivery with enhancements in image guidance and sophisticated intraoperative planning systems has resulted in excellent long-term outcomes.
- Use of combined treatment of brachytherapy with external beam radiotherapy to provide dose escalation for intermediate and high risk patients.

Considerations for **NOT** Selecting Brachytherapy

- EBRT is preferred over BRT for:
 - Higher IPSS scores > 17
 - Large prostate volumes > 70 grams
 - Presence of co-morbidities
 - Large TURP defect or prior prostate surgery, HIFU or cryotherapy

Brachytherapy for Low Risk Disease

- 10 year biochemical tumor control outcomes of $\geq 90\%$.
- Results achieved with permanent interstitial I-125 or Pd-103 or HDR monotherapy.
- Optimal tumor control outcomes seen with **proper application of dose**
 - $D_{90} > 140$ Gy (for I-125) to the prostate associated with improved long-term tumor control outcomes

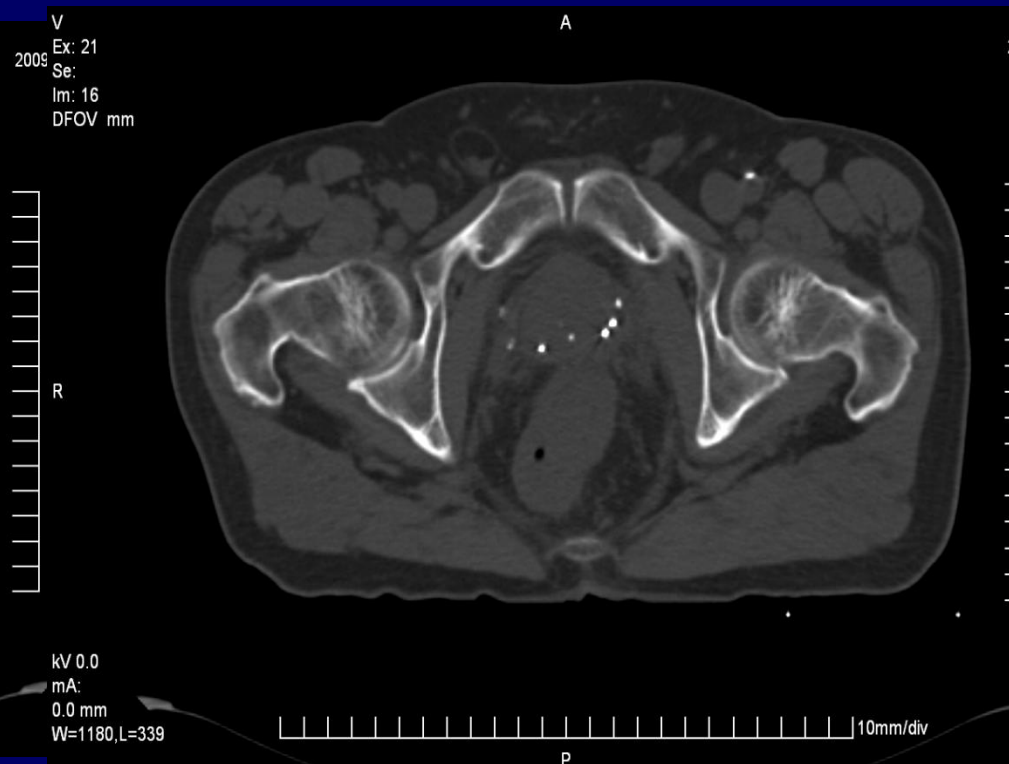
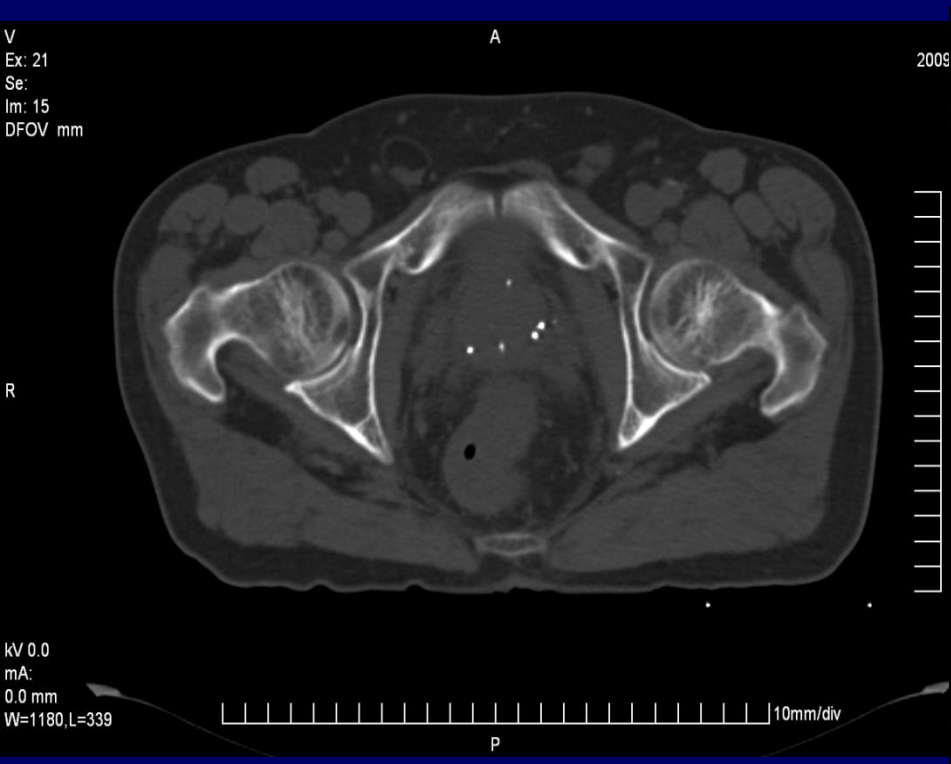
Making Sure We Get the Dose in the Right Location

- Significant improvements have been made in the accuracy of seed placement with the help of **TRUS-guidance**.
- Further enhancements have been made **intraoperative-planning treatment planning software** where seed loading patterns are determined based on the intraoperative geometry of the prostate in the operating room.
- During the last 3 years we have routinely used intraoperative CT scanning to evaluate the seed placement during the procedure and to assess the implant quality after the procedure

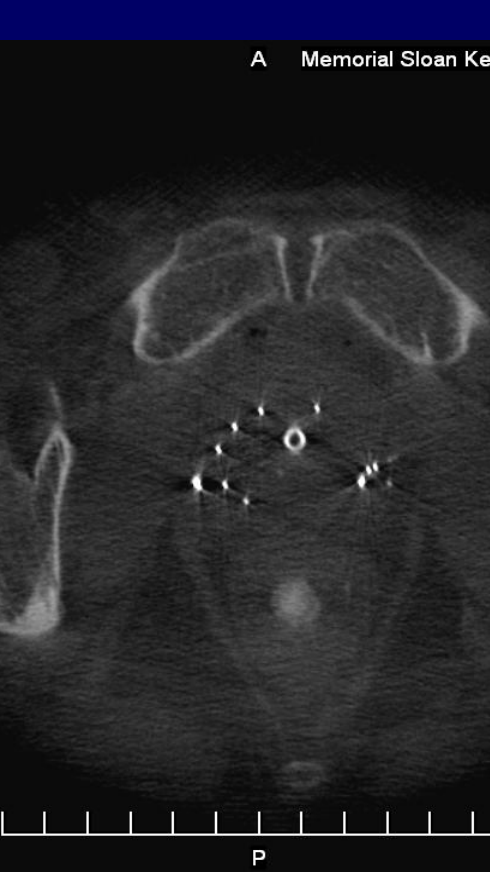
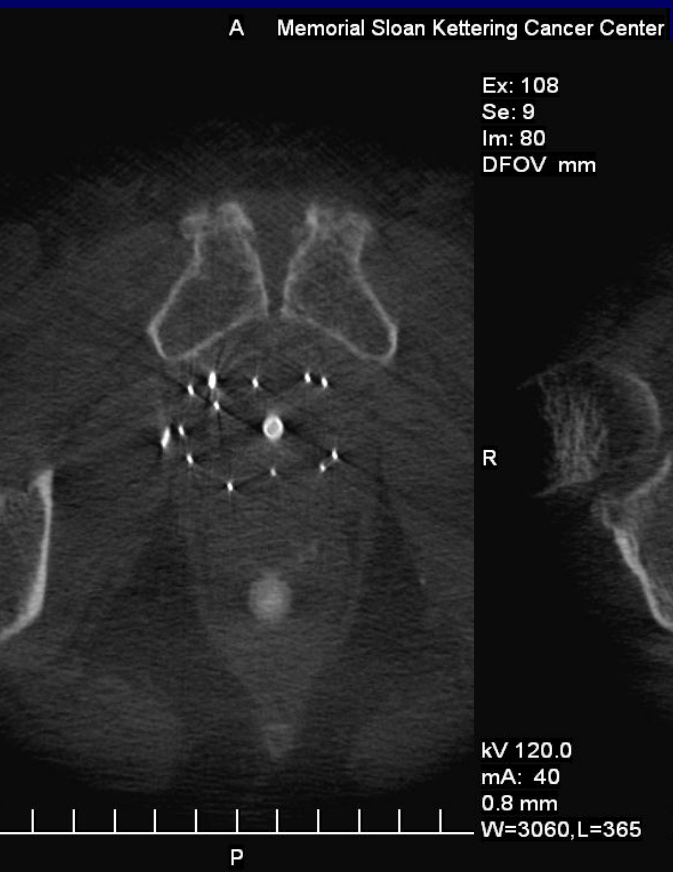
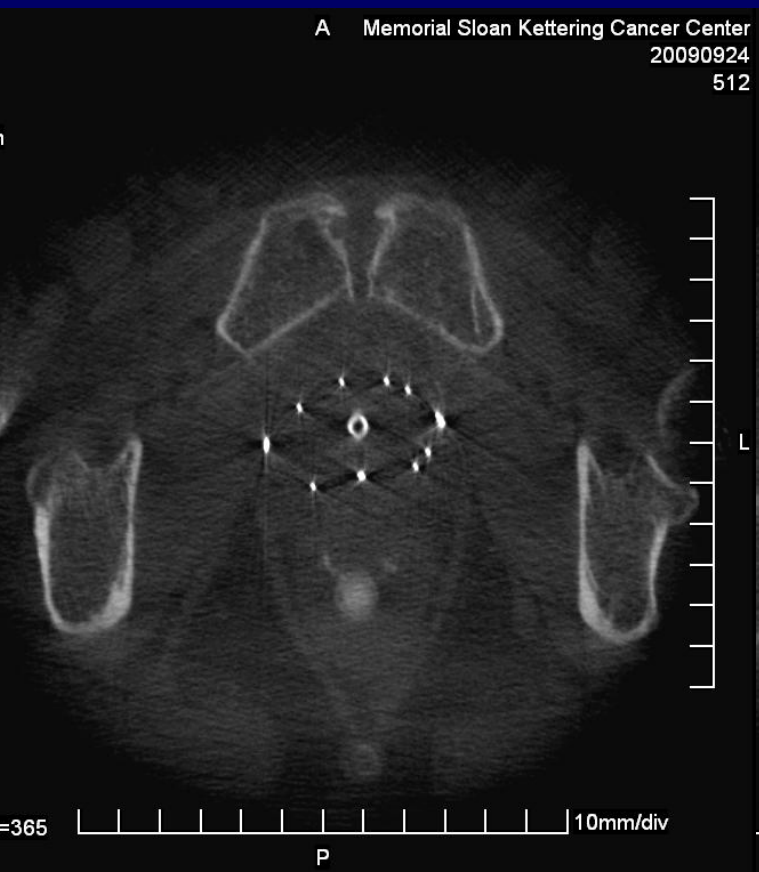
Intraoperative CT for Acquisition of Deposited Seed Coordinates To Use for True Real Time Planning



Intraoperative Corrections of Inadequately Treated Regions

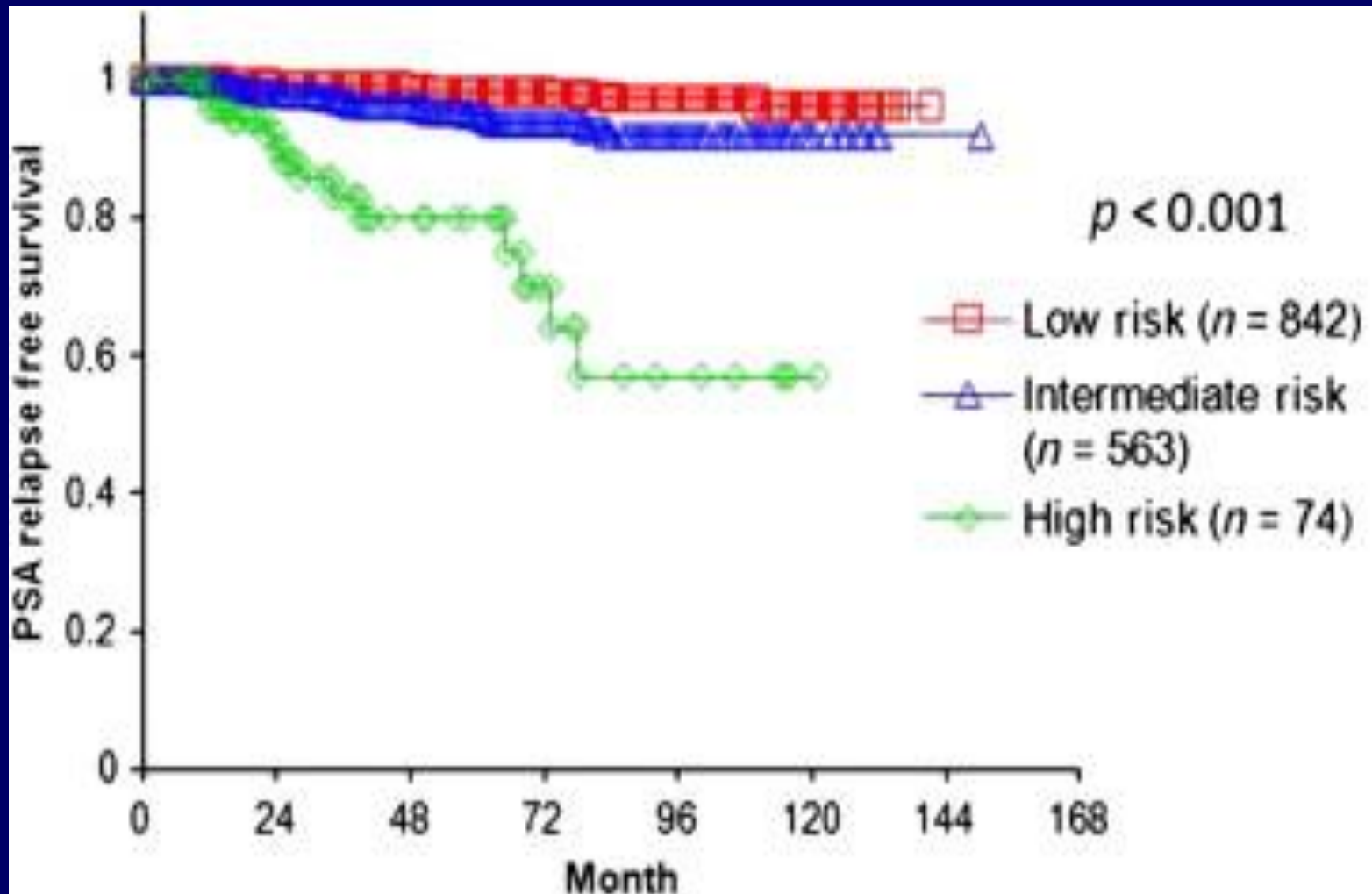


Focal Correction of Cold Spot with Intraoperative Real Time CT-Guidance



Intra-operative Planning LDR Brachytherapy PSA Relapse-Free Survival

(Zelevsky et al -Brachytherapy 2011)



Contemporary Series Reporting Proctitis Rates after Prostate Brachytherapy

Series	# pts	Median F/U	Grade 2	Grade 3
Phan 2008	263	5.5 yrs	3.7%	0.4%
Zelefsky 2010	448	6.5 yrs	5.1%	1.1%
Shiraishi 2011	458	4 yrs	9.7%	NS
Keyes 2012	1006	5 yrs	7.3%	0.9%

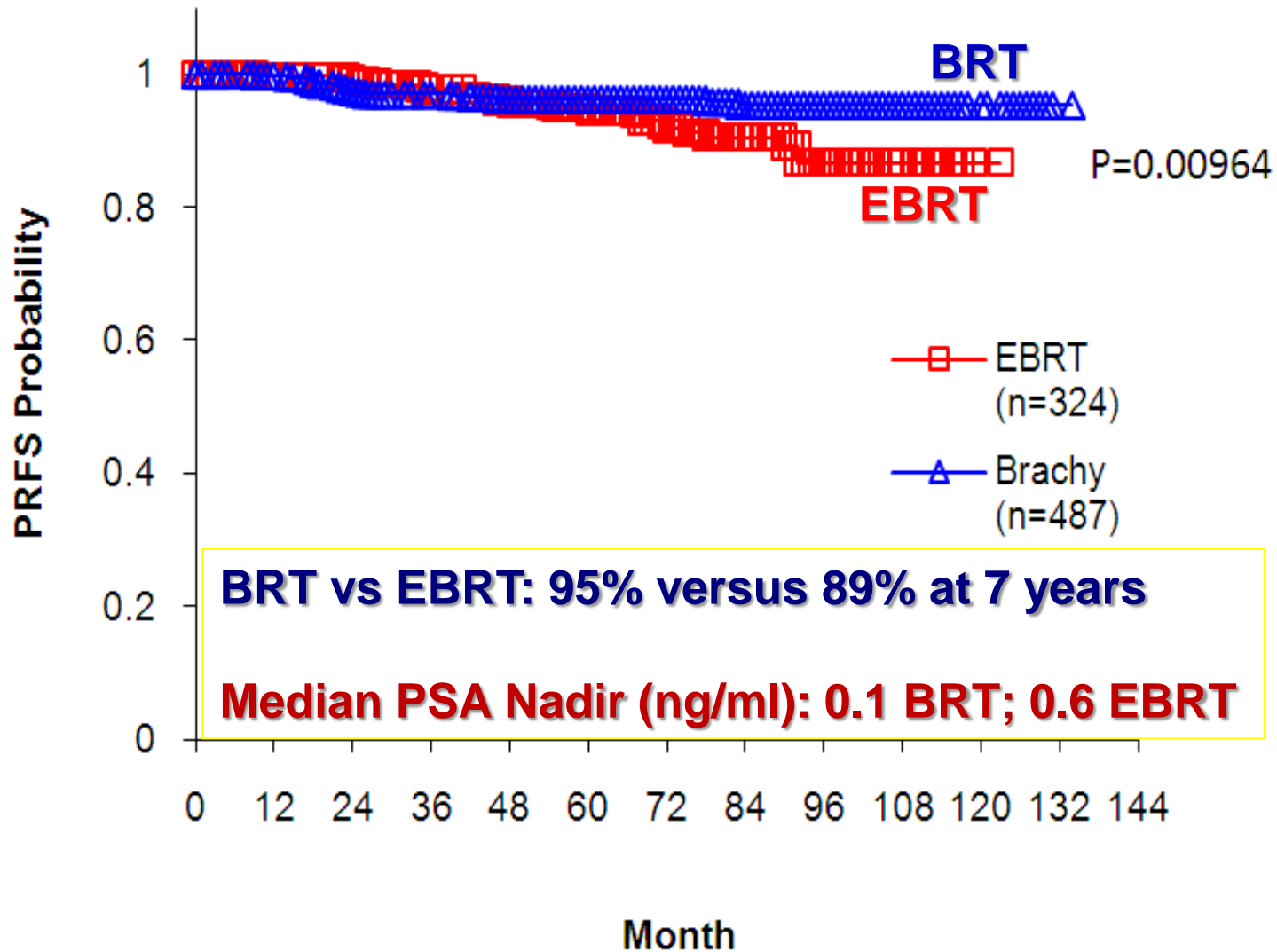
Late Urinary Toxicity after Prostate Brachytherapy

Series	# pts	Median F/U	% G-2	% G-3	% G-4
Anderson (2009)	351	5.7 yrs	6.5%	1.7%	0.5%
Keyes (2009)	712	5 yrs	24%	6%	0.1%
Zelevsky (2010)	448	6.5 yrs	15.6%	2.2%	0%
Zilli (2011)	250	3 yrs	22%	1%	-----

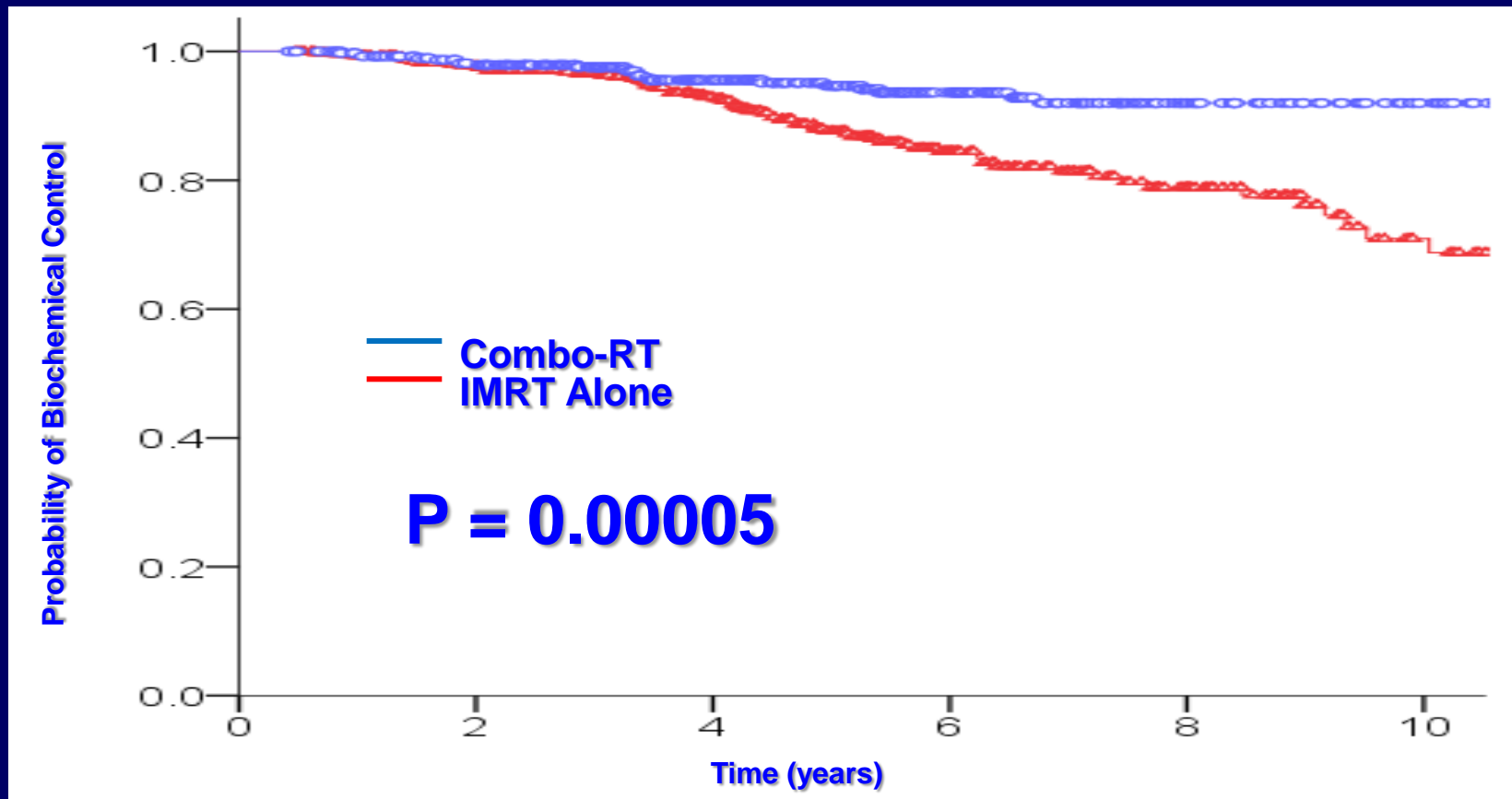
Dose Escalation for Low and Intermediate Risk Cancer

- Dose escalation may benefit low risk and intermediate risk prostate cancer.
- Dose escalation incorporating brachytherapy achieves a higher delivered dose to the prostate.
- These higher doses should be associated with improved tumor control outcomes.

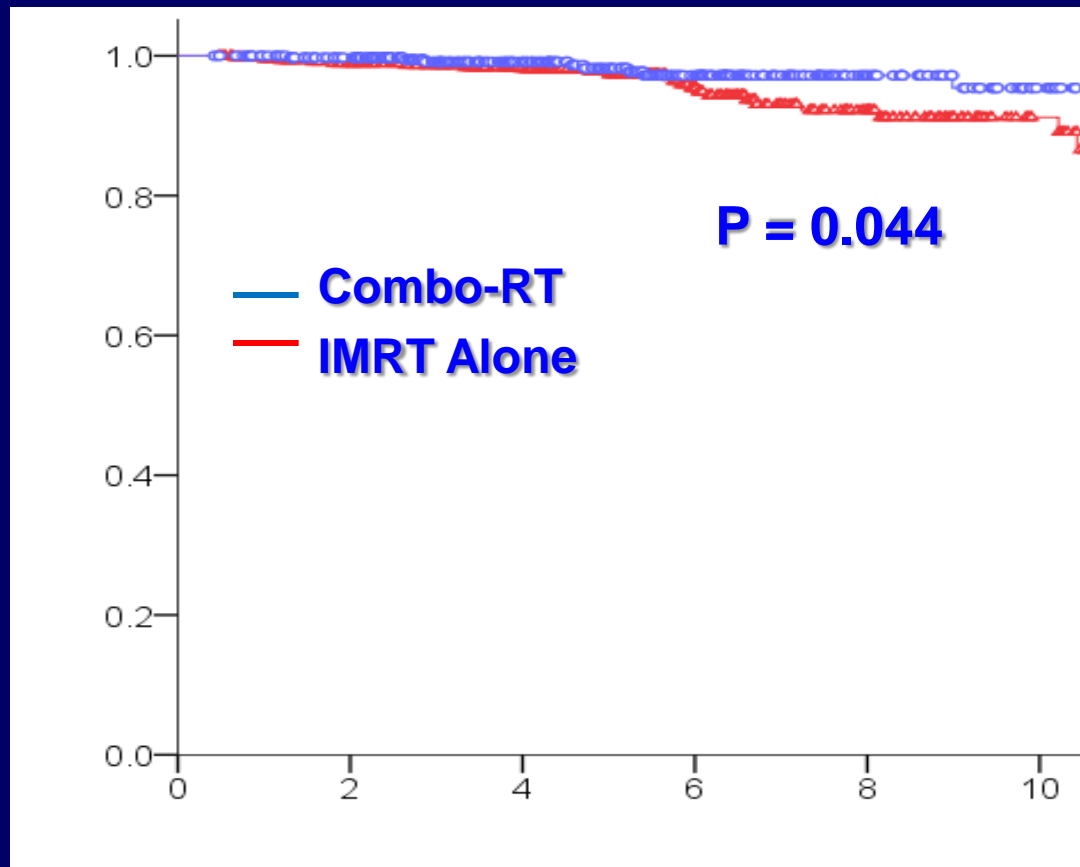
PSA-Relapse Free Survival Favorable Risk Patients (Zelefsky et al Urology 2011)



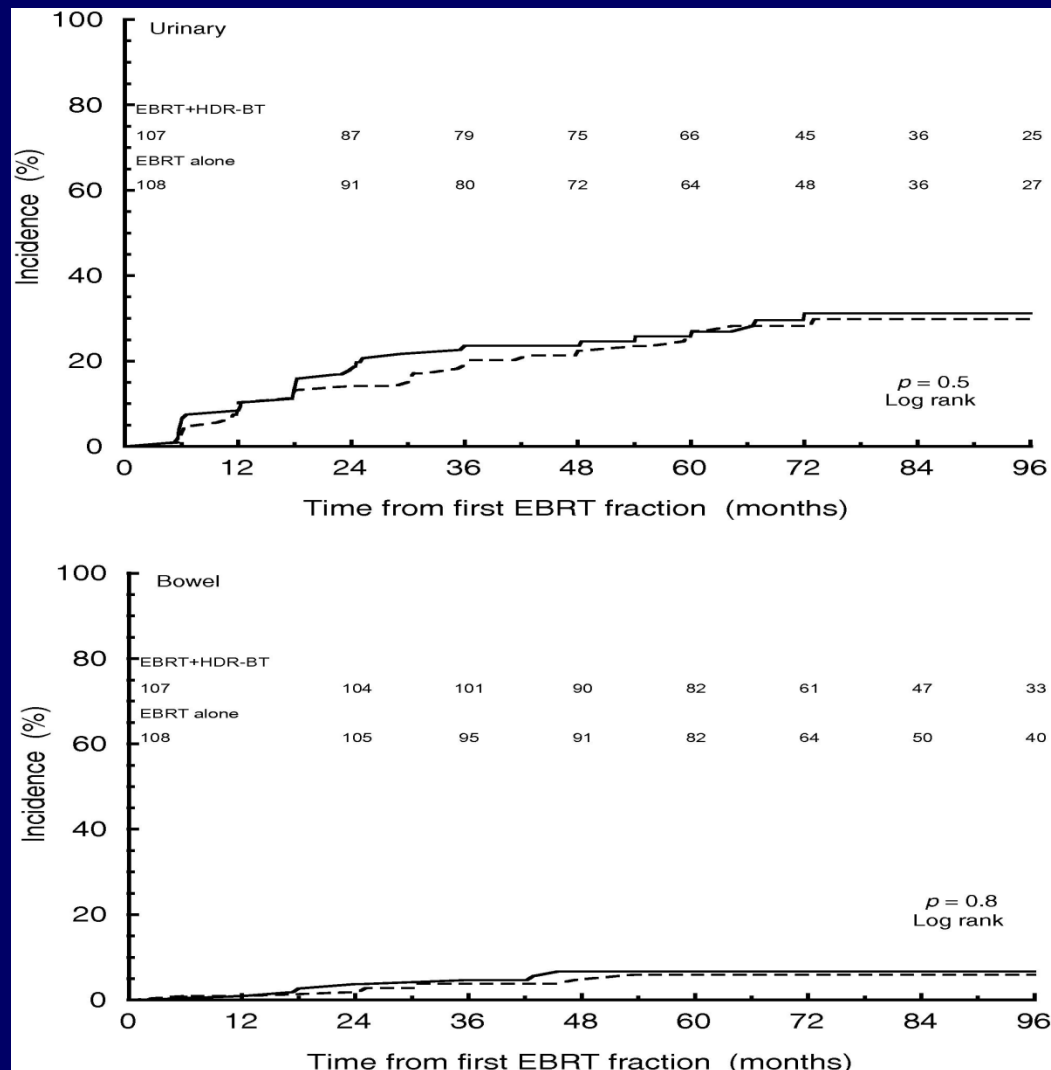
Intermediate Risk Disease: Biochemical Control Combination Brachytherapy +IMRT vs IMRT



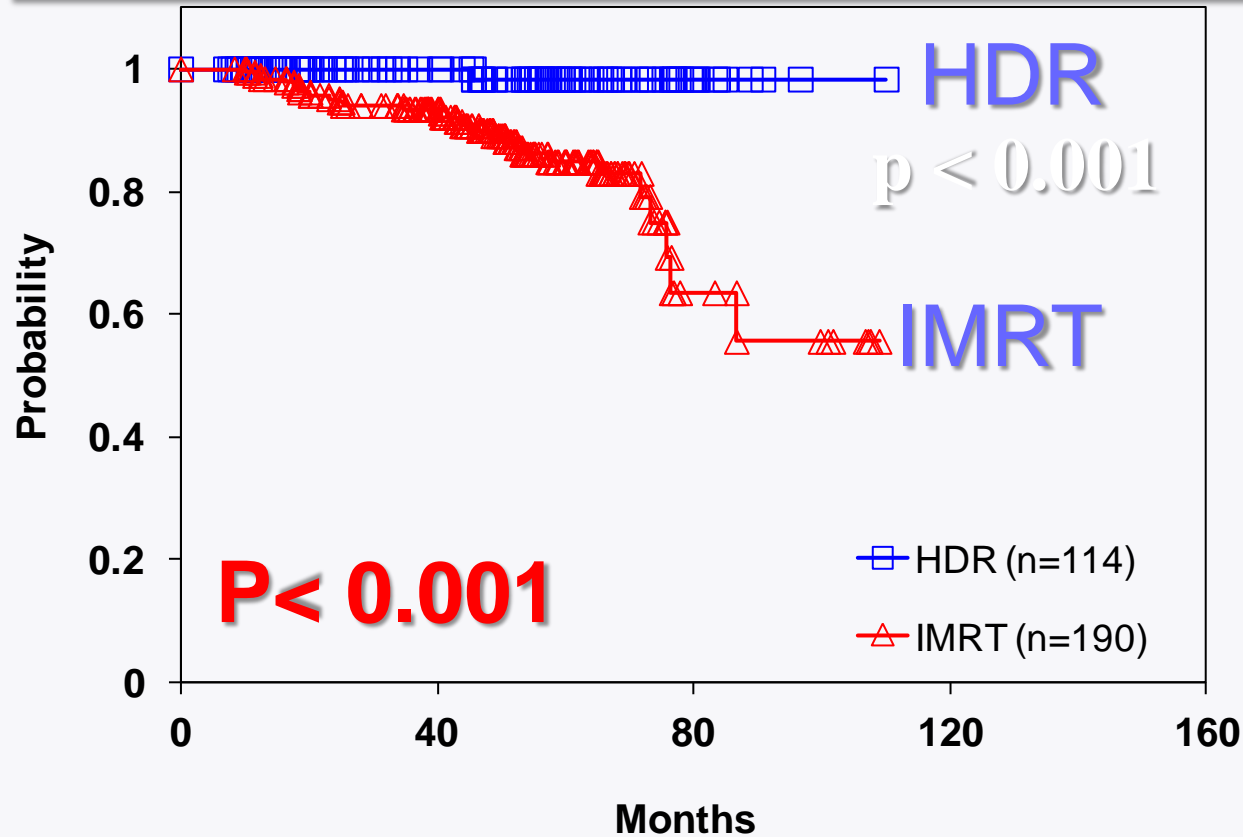
Intermediate Risk Disease: Distant Metastases Free Survival Combination Brachytherapy +IMRT vs IMRT



Phase III Randomized Trial of HDR and EBRT vs EBRT alone for Localized Prostate Cancer (Hoskin et al Radioth Oncol 2012)



Intermediate Risk

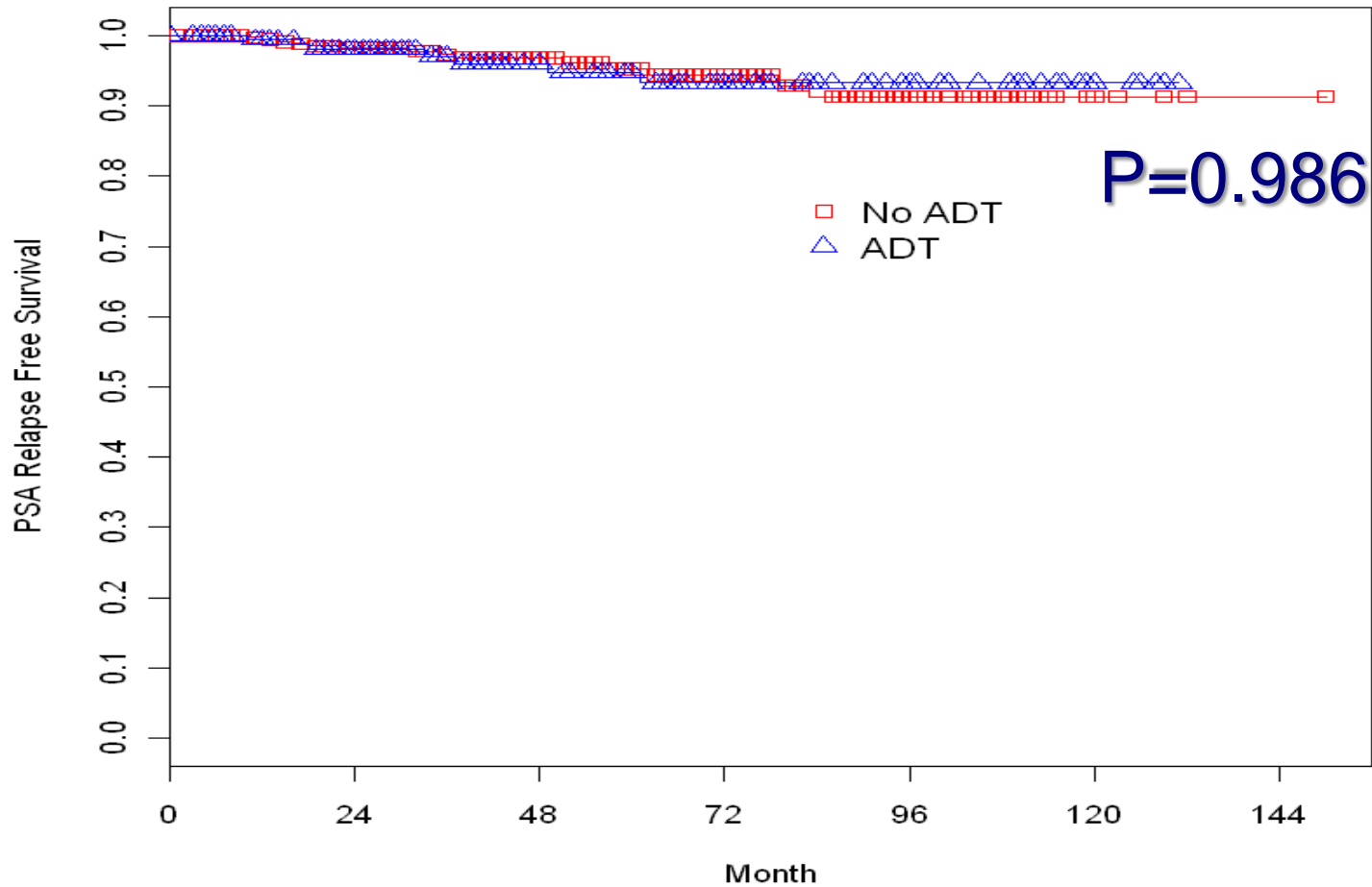


Do We Need to Use Hormonal Therapy When Using Brachytherapy-based Interventions?

- No role for using ADT in conjunction with low risk disease with EBRT or BRT
- Data suggest benefit for using ADT with intermediate risk disease when using **EBRT** at dose levels of 81 Gy or higher
- Data suggest that when using escalated intra-prostatic doses with **BRT** the use of ADT is not established

Lack of Benefit of ADT When Using Brachytherapy

Intermediate Risk Disease



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