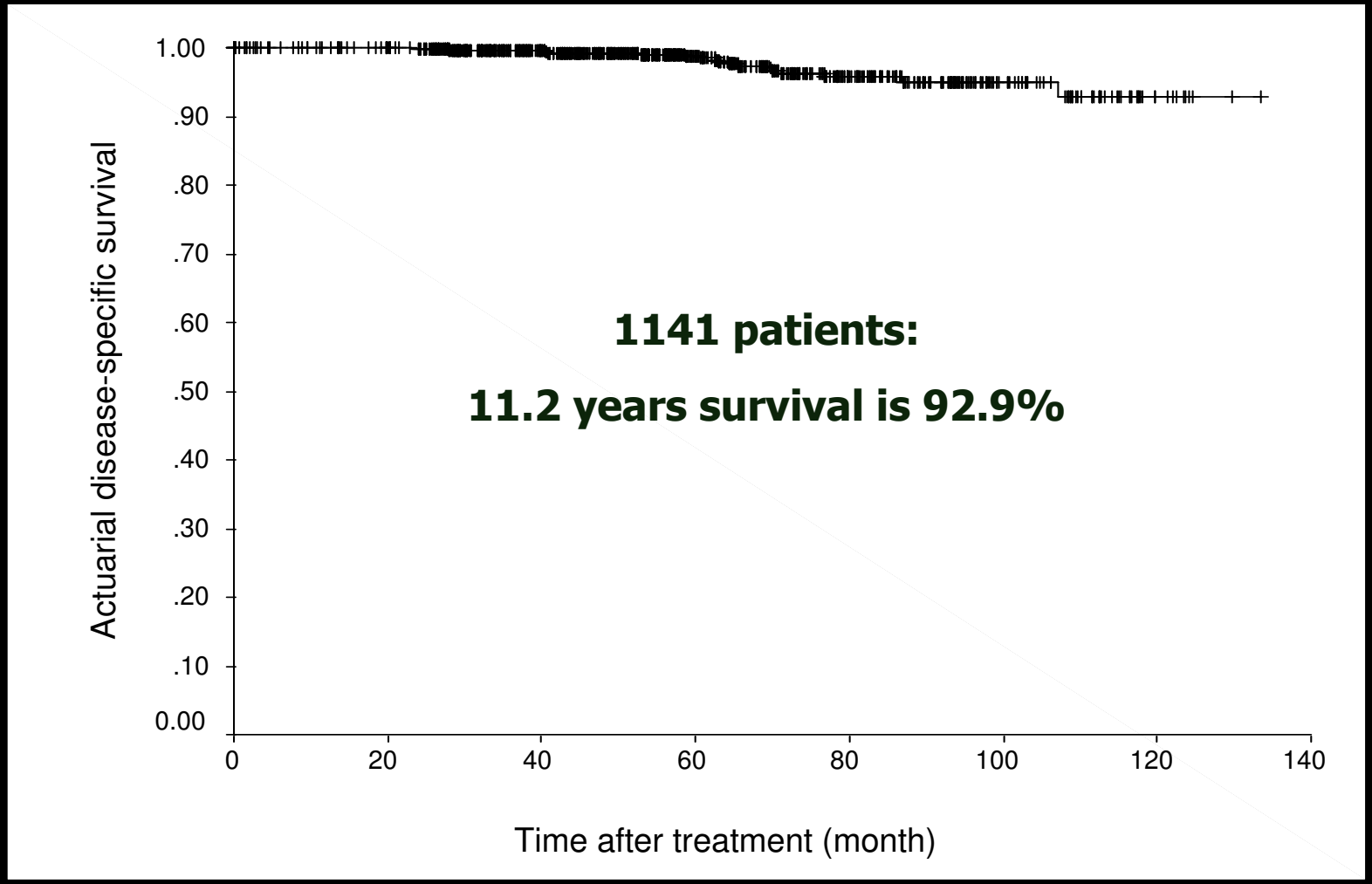
Over the next decade permanent seeds will remain the optimal brachytherapy treatment for early prostate cancer ?

- Evidence base
- HDR dose fractionation
- Radiobiology
- Patient selection

LDR Prostate Brachytherapy



BJUI
BJU INTERNATIONAL

Long-term toxicity and quality of life up to 10 years after low-dose rate brachytherapy for prostate cancer

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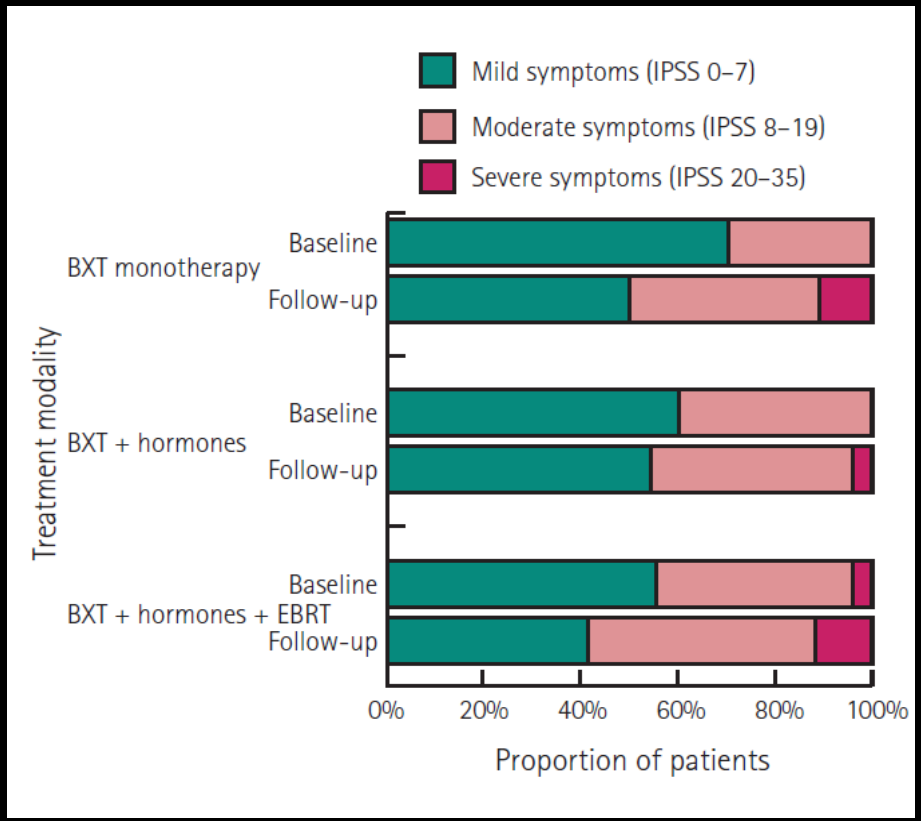
Ather Mohamed Abdelbaky, Robert W. Laing* and Stephen E.M. Langley

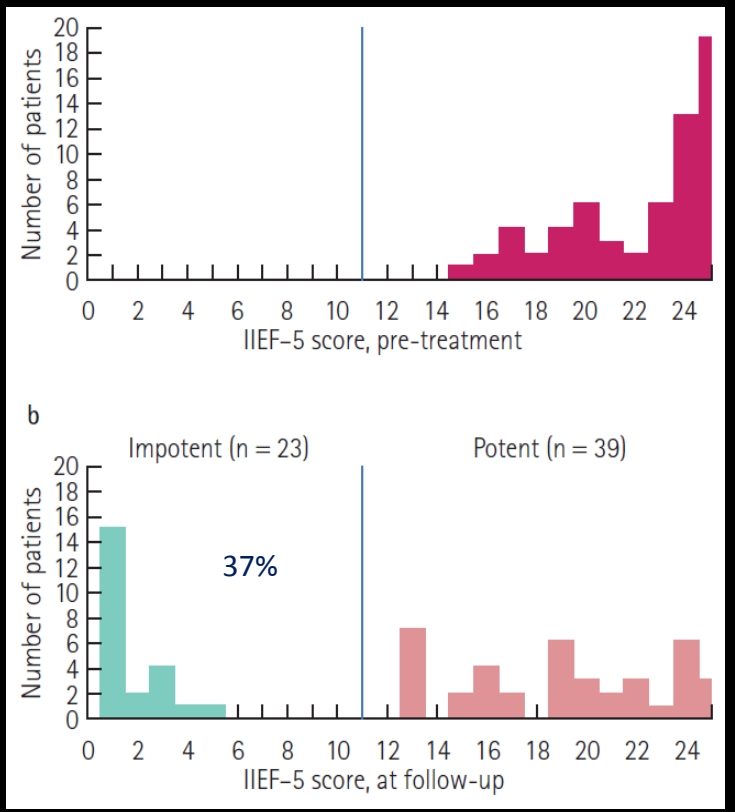
*Royal Surrey County Hospital – Department of Urology, *St Luke's Cancer Centre – Department of Oncology, Guildford, Surrey, UK*

N=174: mean follow up 94.5mo (72.9-124.4)

IPSS



IIEF



HDR monotherapy: the evidence

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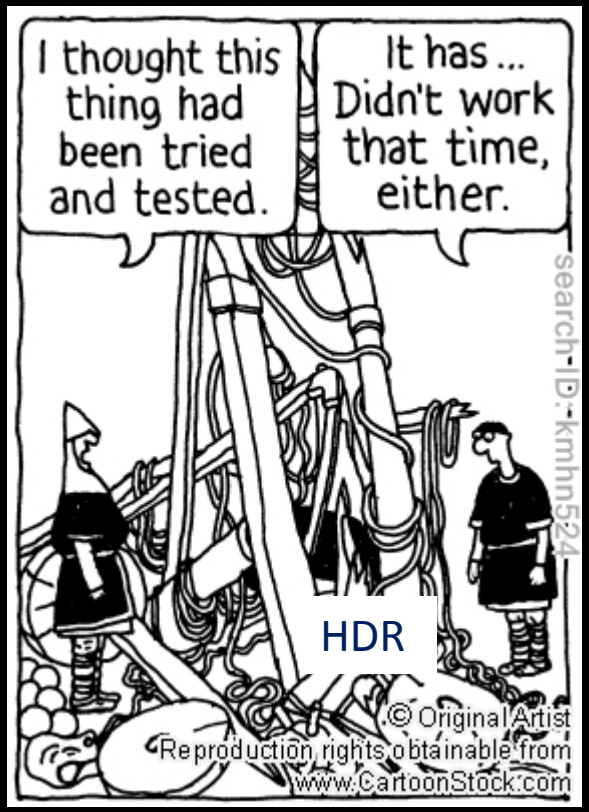

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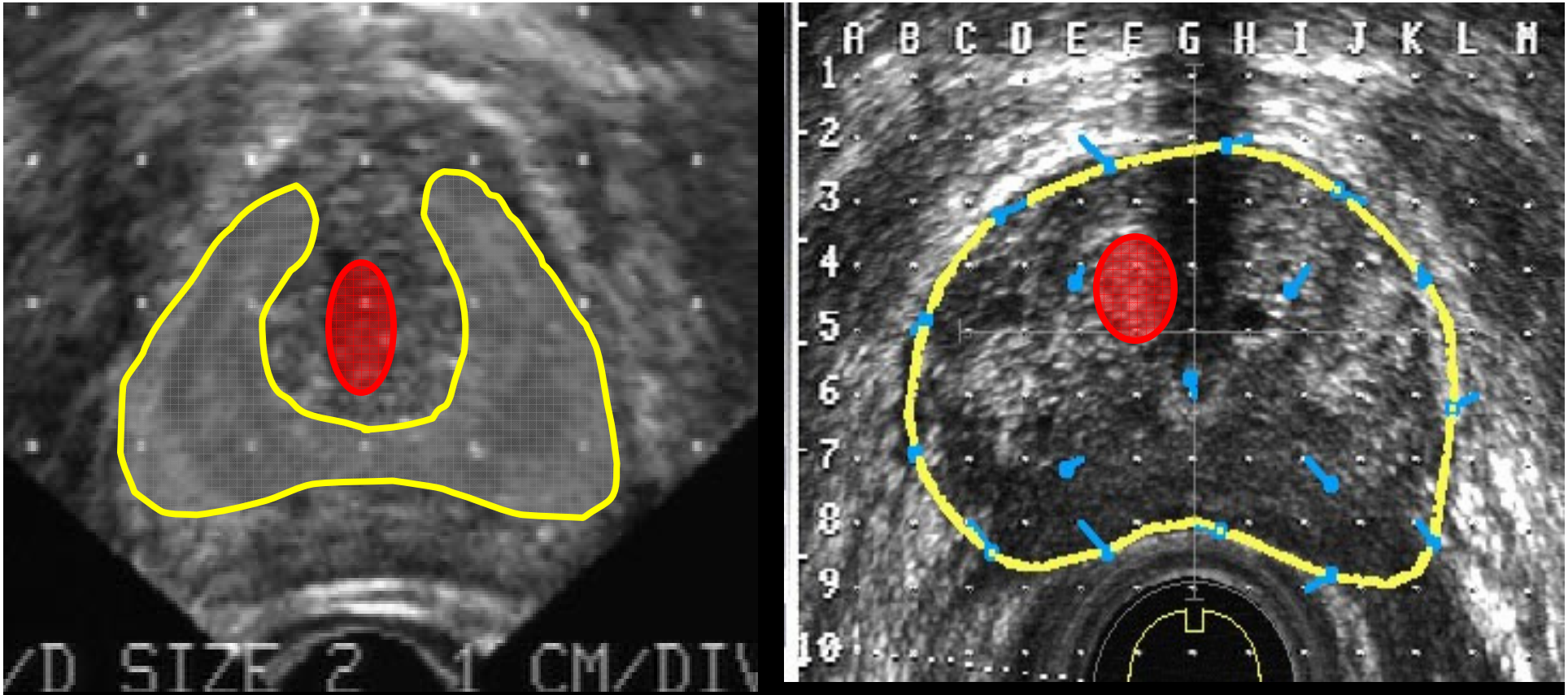
Current dose fractionation schedules

Institution	Dose fractionation	Bladder	Urethra	Rectum
MSKCC	~~Boost 7Gyx3~~ Mono 9.5Gyx4 ~~Salvage 8Gyx4~~		<120% prescription	$D_{2\ cc} < 70\%$
UCSF	~~Boost 15Gyx1~~ Mono 10.5Gyx3 ~~Salvage 8Gyx4*~~	$V_{75} < 1$ cc	$V_{125} < 1$ cc, $V_{150} = 0$ cc *(dose tunnel whenever possible)	$V_{75} < 1$ cc
WBH	~~Boost 10.5Gyx2~~ Mono 4 × 9.5 Gy (historical) 12–13.5Gyx2 (current) ~~Salvage 7Gyx4~~ combined with hyperthermia	No constraint (intra-op TRUS-based dosi)	$V_{100} < 90\%$ of prescription $V_{115} < 1\%$ of prescription	$V_{75} < 1\%$ of prescription
TCC	Boost 6Gyx2 ×2 implants	<80% of Rx	<125% of prescription	<80% of Rx to outer wall
GW	~~Boost 6.5Gyx3~~ Mono two sessions of 6.5Gyx3	<100% prescription	<110% prescription	mucosa <60%, outer wall <100%
Toronto	~~Boost 15Gyx1~~	n/a	$D_{10} < 118\%$ Max < 125%	$V_{80} < 0.5$ cc
UCLA-CET	~~Boost 6Gyx4~~ Mono7.25Gyx6	90–100% wall 80% balloon	120% combo 105% any TUR 110% mono	Rectal wall 80% Rectal wall 80–85%

GEC/ESTRO-EAU recommendations on temporary brachytherapy using stepping sources for localised prostate cancer

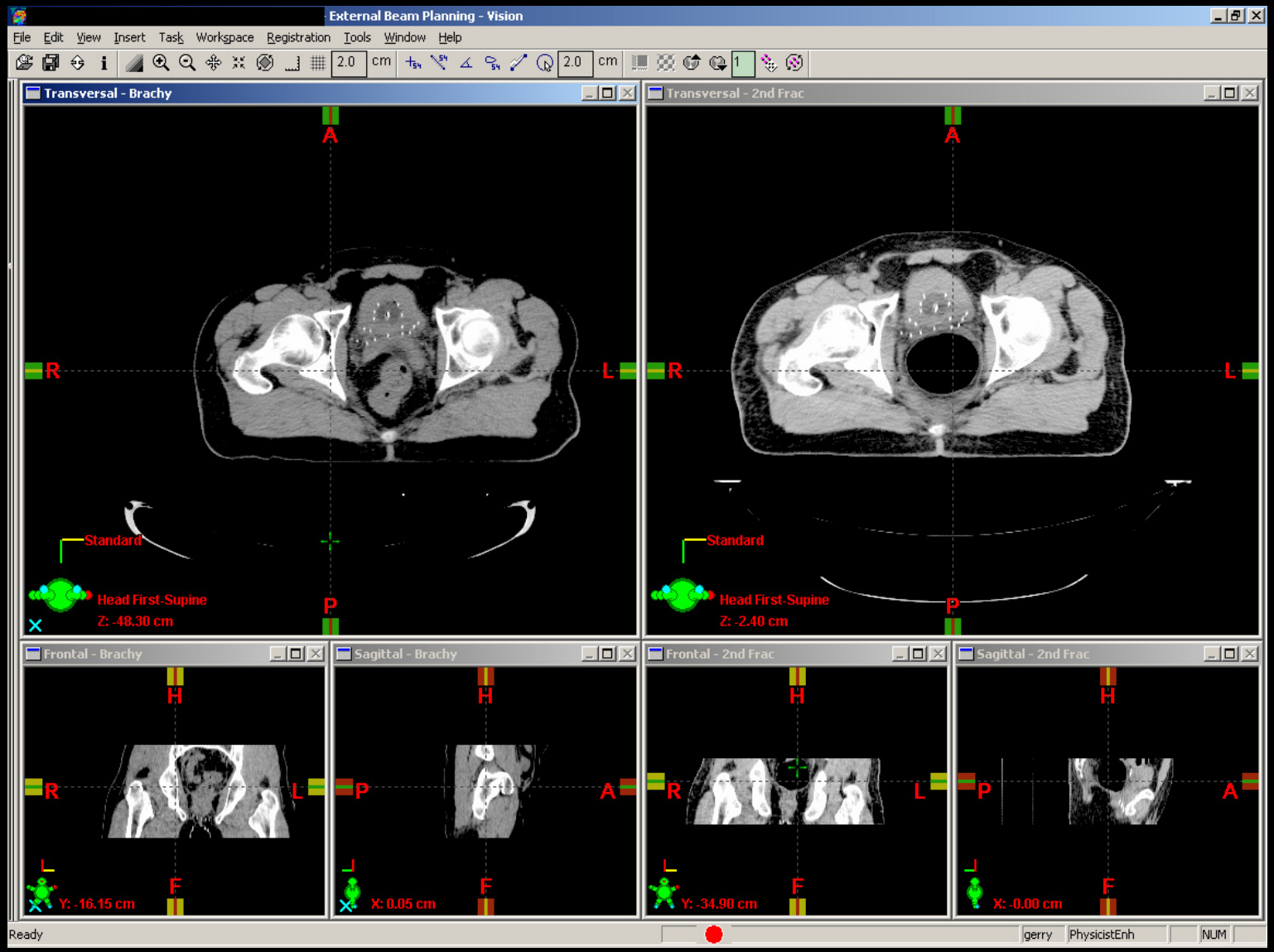
Different fractionation schemes with different target volumes (prostate capsule, peripheral zone, TRUS visible tumour volume) are reported in literature (Table 3). The most common prescribed temporary BT fraction doses covering the whole prostate are 6–10 Gy per fraction (range 3–10) to the prostate surface with a total brachytherapy dose of 12–20 Gy in 2–4 fractions combined with a conventional fractionated EBRT of 45–54 Gy, applied in 6–7 weeks.

Urethral doses < 10 Gy/fraction and rectal doses < 6 Gy/-fraction are well tolerable at a certain point or in a limited volume, which should be precisely stated. They have to be kept within the accepted overall tolerance levels of these



Peripheral loading

Homogeneous loading



HDR: only a f**t from disaster!!

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P-EBRT	BED (α/β ratio of 1.2)	HDR	BED (α/β ratio of 1.2)	Total BED	Total BED (α/β ratio of 3.0)
23 x 2 Gy = 46 Gy	122.67	5.5 Gy x 3	92.13	215	123
23 x 2 Gy = 46 Gy	122.67	6.0 Gy x 3	108.00	231	131
23 x 2 Gy = 46 Gy	122.67	6.5 Gy x 3	125.13	248	138
23 x 2 Gy = 46 Gy	122.67	8.25 Gy x 2	129.94	253	139
23 x 2 Gy = 46 Gy	122.67	8.75 Gy x 2	145.10	268	145
23 x 2 Gy = 46 Gy	122.67	9.50 Gy x 2	169.42	292	156
23 x 2 Gy = 46 Gy	122.67	10.50 Gy x 2	204.75	327	171
23 x 2 Gy = 46 Gy	122.67	11.50 Gy x 2	243.42	366	188

Int. J. Radiation Oncology Biol. Phys., Vol. 79, No. 2, pp. 363–370, 2011

αβ ratio for prostate cancer

NCIC RCT: 1.12 (95% CI 3.3,5

Brenner and Hall, Fowler……1.5

King……3.1

van Gellekom, ……4

Italian NonRCT: 8.3 (95% CI 0.7,16)

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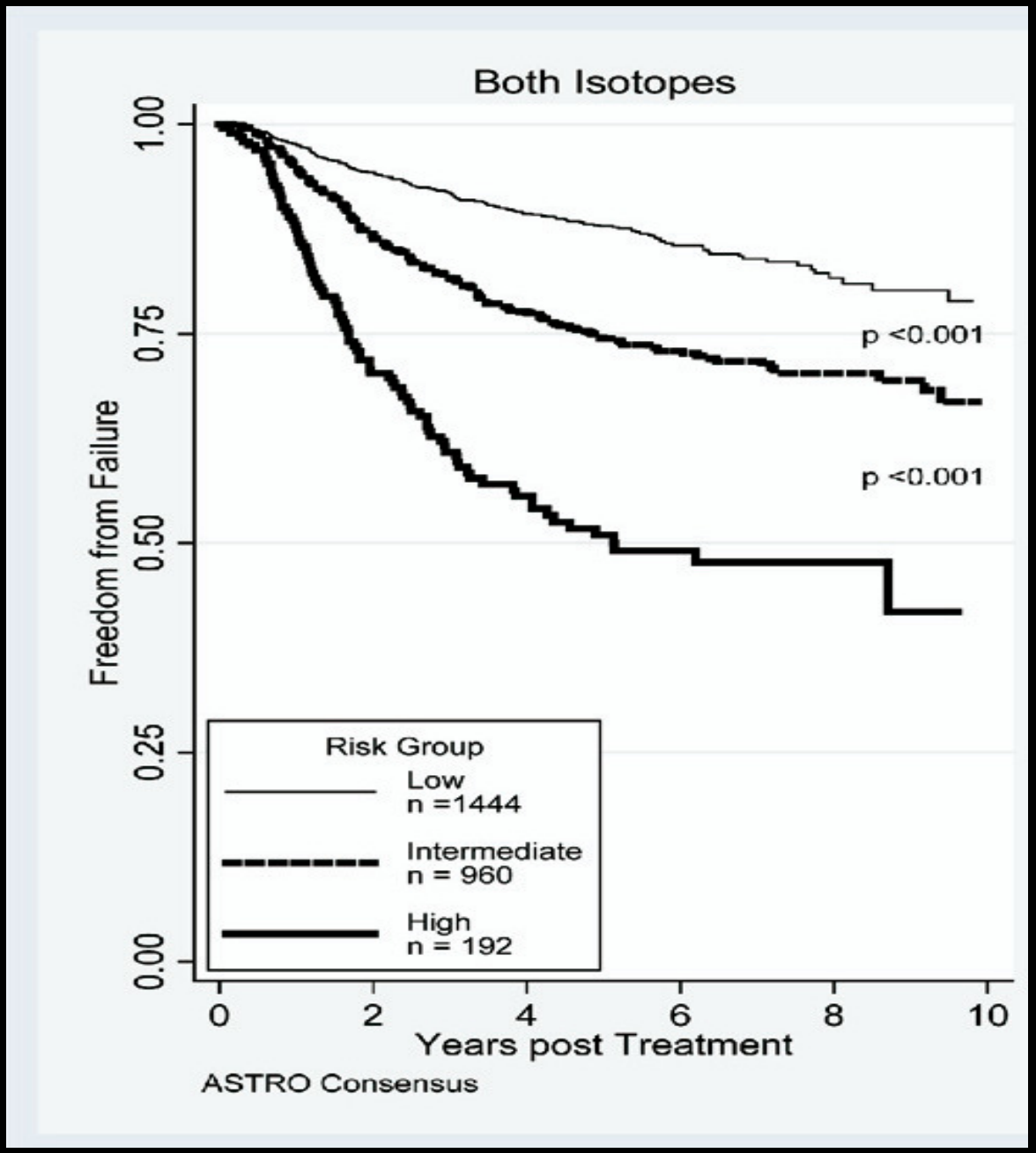


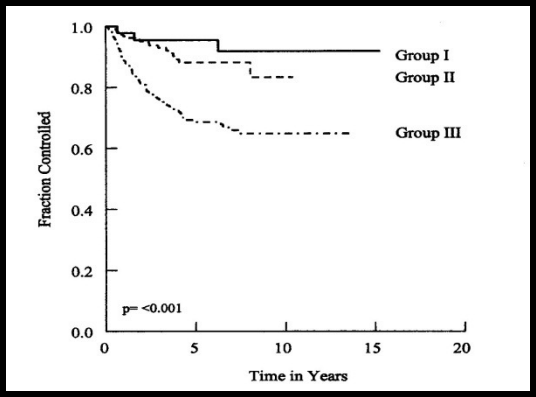
11 US institutions

2693 patients

1831 I125: 144Gy
862 Pd103: 130Gy

Zelefsky 2007

HDR



Over the next decade permanent seeds will remain the optimal brachytherapy treatment for early prostate cancer ?

YES!