

Supplementary material for Pettersson N, et al. A method to estimate composite doses for organs at risk in prostate cancer patients treated with EBRT in combination with HDR BT. Acta Oncol 2014;53:815–21.

Supplementary Table I. Reference dose-volume histogram parameter values for organs at risk in the 30 investigated prostate cancer patients.

Organ at risk (volume)	Parameter	EBRT 25 × 2.0 Gy	BT 2 × 10.0 Gy	EBRT + BT* 25 × 2.0 + 2 × 10.0 Gy
Anal sphincter (10.7 ± 4.5 cm ³)	D _{2%} (Gy)	48.5 ± 6.6	13.5 ± 6.3	61.6 ± 11.1
	D _{2cm3} (Gy)	41.3 ± 10.4	7.0 ± 2.8	48.0 ± 12.8
	mean dose (Gy)	29.0 ± 7.4	4.8 ± 1.7	33.8 ± 8.8
	mean EQD ₂ (Gy)	25.7 ± 8.0	6.7 ± 4.0	32.4 ± 11.3
Rectum (45.1 ± 25.9 cm ³)	D _{2%} (Gy)	50.7 ± 0.8	18.5 ± 2.8	68.6 ± 3.0
	D _{2cm3} (Gy)	50.4 ± 0.9	15.0 ± 2.2	65.0 ± 2.5
	mean dose (Gy)	32.0 ± 6.4	5.7 ± 1.7	37.7 ± 8.0
	mean EQD ₂ (Gy)	29.0 ± 7.1	8.9 ± 3.9	37.9 ± 10.6
Sigmoid colon (140.5 ± 51.2 cm ³)	D _{2%} (Gy)	18.4 ± 11.0	2.7 ± 1.1	20.7 ± 12.0
	D _{2cm3} (Gy)	19.2 ± 10.9	2.7 ± 1.2	21.5 ± 11.9
	mean dose (Gy)	3.0 ± 2.4	0.9 ± 0.3	4.0 ± 2.7
	mean EQD ₂ (Gy)	2.2 ± 2.0	0.7 ± 0.3	2.9 ± 2.3
Sigmoid colon 4 cm (25.9 ± 13.5 cm ³)	D _{2%} (Gy)	18.9 ± 10.7	2.4 ± 1.0	20.9 ± 11.6
	D _{2cm3} (Gy)	14.7 ± 7.9	2.1 ± 0.8	16.4 ± 8.6
	mean dose (Gy)	7.4 ± 4.8	1.3 ± 0.5	8.6 ± 5.2
	mean EQD ₂ (Gy)	5.3 ± 3.8	1.0 ± 0.5	6.3 ± 4.2
Urinary bladder (216.4 ± 106.4 cm ³)	D _{2%} (Gy)	50.7 ± 0.7	15.5 ± 3.4	65.6 ± 3.7
	D _{2cm3} (Gy)	50.8 ± 0.7	18.8 ± 3.1	68.9 ± 3.4
	mean dose (Gy)	27.4 ± 8.8	3.8 ± 1.2	31.2 ± 9.9
	mean EQD ₂ (Gy)	25.3 ± 8.7	5.3 ± 2.4	30.6 ± 10.9
Pubic bone (65.2 ± 11.3 cm ³)	D _{2%} (Gy)	51.7 ± 0.6	13.7 ± 3.1	64.7 ± 3.2
	D _{2cm3} (Gy)	51.6 ± 0.6	12.5 ± 2.7	63.5 ± 2.8
	mean dose (Gy)	40.4 ± 3.8	4.6 ± 1.0	45.1 ± 4.6
	mean EQD ₂ (Gy)	38.2 ± 4.5	6.1 ± 1.9	44.2 ± 6.2
Right femoral head (69.1 ± 9.4 cm ³)	D _{2%} (Gy)	34.5 ± 1.7	1.8 ± 0.3	35.2 ± 1.6
	D _{2cm3} (Gy)	34.3 ± 1.7	1.7 ± 0.3	35.0 ± 1.6
	mean dose (Gy)	26.9 ± 4.4	0.8 ± 0.2	27.7 ± 4.5
	mean EQD ₂ (Gy)	22.5 ± 4.2	0.6 ± 0.1	23.1 ± 4.2
Left femoral head (66.8 ± 8.9 cm ³)	D _{2%} (Gy)	34.3 ± 1.5	1.9 ± 0.3	35.0 ± 1.5
	D _{2cm3} (Gy)	34.1 ± 1.6	1.8 ± 0.2	34.9 ± 1.5
	mean dose (Gy)	26.6 ± 4.5	0.9 ± 0.2	27.5 ± 4.6
	mean EQD ₂ (Gy)	22.3 ± 4.2	0.6 ± 0.1	22.9 ± 4.3
Corpora cavernosa (10.8 ± 4.5 cm ³)	D _{2%} (Gy)	42.8 ± 7.4	5.0 ± 1.3	47.3 ± 8.5
	D _{2cm3} (Gy)	31.5 ± 4.5	2.9 ± 0.8	33.8 ± 5.2
	mean dose (Gy)	28.0 ± 5.3	1.9 ± 0.6	30.0 ± 5.6
	mean EQD ₂ (Gy)	23.7 ± 5.2	1.7 ± 0.6	25.3 ± 5.6
Penile bulb (6.1 ± 1.4 cm ³)	D _{2%} (Gy)	50.3 ± 0.6	14.1 ± 6.2	63.8 ± 6.0
	D _{2cm3} (Gy)	49.0 ± 1.2	8.6 ± 2.8	57.3 ± 3.6
	mean dose (Gy)	46.6 ± 4.1	7.7 ± 2.4	54.2 ± 5.8
	mean EQD ₂ (Gy)	45.6 ± 4.8	11.9 ± 6.8	57.5 ± 10.1

BT, brachytherapy; D_{av}, the highest dose after excluding av cm³ of the volume receiving the highest dose; D_{rv}, the highest dose after excluding rv % of the volume receiving the highest dose; EBRT, external beam radiation therapy; EQD₂, equieffective dose in 2-Gy fractions. Data are given as mean ± one standard deviation. *The mean EQD₂ value is calculated as the sum of the EBRT value and the BT value.

Supplementary Table II. Step one in the method: the model and associated parameter (cut-off) that best predicted the linear relationship for each combination of organ at risk and sought brachytherapy parameter and its corresponding squared Pearson's product-moment correlation coefficient (R^2) for organs at risk.

Organ at risk	Parameter	Model	Cut-off	R^2
Anal sphincter	$D_{2\%}$ (Gy)	D_{rV}	$rV = 23\%$	0.60
	D_{2cm^3} (Gy)	aV_D	$D = 34.5$ Gy	0.81
	mean dose (Gy)	D_{rV}	$rV = 29\%$	0.80
	mean EQD ₂ ₃ (Gy)	D_{rV}	$rV = 33\%$	0.65
Rectum	$D_{2\%}$ (Gy)	rV_D	$D = 25.5$ Gy	0.49
	D_{2cm^3} (Gy)	D_{aV}	$aV = 10$ cm ³	0.57
	mean dose (Gy)	rV_D	$D = 26.0$ Gy	0.81
	mean EQD ₂ (Gy ₃)	rV_D	$D = 35.0$ Gy	0.76
Sigmoid colon	$D_{2\%}$ (Gy)	rV_D	$D = 22.0$ Gy	0.83
	D_{2cm^3} (Gy)	aV_D	$D = 21.0$ Gy	0.83
	mean dose (Gy)	D_{rV}	$rV = 63\%$	0.84
	mean EQD ₂ (Gy ₃)	D_{rV}	$rV = 60\%$	0.88
Sigmoid colon 4 cm	$D_{2\%}$ (Gy)	D_{rV}	$rV = 1\%$	0.72
	D_{2cm^3} (Gy)	aV_D	$D = 17.5$ Gy	0.69
	mean dose (Gy)	rV_D	$D = 25.0$ Gy	0.72
	mean EQD ₂ ₃ (Gy)	rV_D	$D = 25.0$ Gy	0.76
Urinary bladder	$D_{2\%}$ (Gy)	D_{rV}	$rV = 32\%$	0.69
	D_{2cm^3} (Gy)	D_{aV}	$aV = 22$ cm ³	0.66
	mean dose (Gy)	rV_D	$D = 32.0$ Gy	0.84
	mean EQD ₂ ₃ (Gy)	rV_D	$D = 32.0$ Gy	0.78
Pubic bone	$D_{2\%}$ (Gy)	rV_D	$D = 42.0$ Gy	0.60
	D_{2cm^3} (Gy)	aV_D	$D = 46.5$ Gy	0.57
	mean dose (Gy)	rV_D	$D = 40.0$ Gy	0.76
	mean EQD ₂ ₃ (Gy)	rV_D	$D = 40.0$ Gy	0.75
Right femoral head	$D_{2\%}$ (Gy)	TRAK	n.a.	0.65
	D_{2cm^3} (Gy)	TRAK	n.a.	0.66
	mean dose (Gy)	TRAK	n.a.	0.65
	mean EQD ₂ ₃ (Gy)	TRAK	n.a.	0.65
Left femoral head	$D_{2\%}$ (Gy)	TRAK	n.a.	0.53
	D_{2cm^3} (Gy)	TRAK	n.a.	0.61
	mean dose (Gy)	TRAK	n.a.	0.57
	mean EQD ₂ ₃ (Gy)	TRAK	n.a.	0.57
Corpora cavernosa	$D_{2\%}$ (Gy)	rV_D	$D = 43.0$ Gy	0.66
	D_{2cm^3} (Gy)	aV_D	$D = 35.0$ Gy	0.59
	mean dose (Gy)	rV_D	$D = 36.0$ Gy	0.68
	mean EQD ₂ ₃ (Gy)	rV_D	$D = 36.0$ Gy	0.71
Penile bulb	$D_{2\%}$ (Gy)	rV_D	$D = 49.0$ Gy	0.42
	D_{2cm^3} (Gy)	aV_D	$D = 48.5$ Gy	0.69
	mean dose (Gy)	rV_D	$D = 48.0$ Gy	0.59
	mean EQD ₂ ₃ (Gy)	rV_D	$D = 49.0$ Gy	0.52

aV_D , the absolute volume receiving at least dose D ; D_{av} , the highest dose after excluding av cm³ of the volume receiving the highest dose; D_{rV} , the highest dose after excluding rv % of the volume receiving the highest dose; EQD₂₃, equieffective dose in 2-Gy fractions; n.a., not applicable; rV_D , the relative volume receiving at least dose D ; TRAK, total reference air kerma. Data are given as mean \pm one standard deviation.

Supplementary Table III. Differences between the estimated and reference dose-volume histogram parameter values for organs at risk.

Organ at risk	Parameter	BT	EBRT+BT
		2×10.0 Gy	$25 \times 2.0 + 2 \times 10.0$ Gy
Anal sphincter	$D_{2\%}$ (Gy)	0.0 ± 4.0	0.4 ± 3.6
	$D_{2\text{cm}^3}$ (Gy)	0.0 ± 1.2	0.3 ± 1.1
	mean dose (Gy)	0.0 ± 0.7	0.0 ± 0.7
	mean EQD ₂ (Gy)	0.0 ± 2.4	0.0 ± 2.4
Rectum	$D_{2\%}$ (Gy)	0.0 ± 2.0	0.6 ± 2.0
	$D_{2\text{cm}^3}$ (Gy)	0.0 ± 1.5	0.4 ± 1.5
	mean dose (Gy)	0.0 ± 0.8	0.0 ± 0.7
	mean EQD ₂ (Gy)	0.0 ± 1.9	0.0 ± 1.9
Sigmoid colon	$D_{2\%}$ (Gy)	0.0 ± 0.5	0.4 ± 0.5
	$D_{2\text{cm}^3}$ (Gy)	0.0 ± 0.5	0.5 ± 0.5
	mean dose (Gy)	0.0 ± 0.1	0.0 ± 0.1
	mean EQD ₂ (Gy)	0.0 ± 0.1	0.0 ± 0.1
Sigmoid colon 4 cm	$D_{2\%}$ (Gy)	0.0 ± 0.5	0.5 ± 0.5
	$D_{2\text{cm}^3}$ (Gy)	0.0 ± 0.4	0.4 ± 0.4
	mean dose (Gy)	0.0 ± 0.3	0.0 ± 0.3
	mean EQD ₂ (Gy)	0.0 ± 0.2	0.0 ± 0.2
Urinary bladder	$D_{2\%}$ (Gy)	0.0 ± 1.9	0.5 ± 1.9
	$D_{2\text{cm}^3}$ (Gy)	0.0 ± 1.8	0.8 ± 1.7
	mean dose (Gy)	0.0 ± 0.5	0.0 ± 0.5
	mean EQD ₂ (Gy)	0.0 ± 1.1	0.0 ± 1.1
Pubic bone	$D_{2\%}$ (Gy)	0.0 ± 1.9	0.8 ± 2.0
	$D_{2\text{cm}^3}$ (Gy)	0.0 ± 1.8	0.6 ± 1.8
	mean dose (Gy)	0.0 ± 0.5	0.0 ± 0.5
	mean EQD ₂ (Gy)	0.0 ± 0.9	0.0 ± 0.9
Right femoral head	$D_{2\%}$ (Gy)	0.0 ± 0.2	1.1 ± 0.1
	$D_{2\text{cm}^3}$ (Gy)	0.0 ± 0.1	1.1 ± 0.1
	mean dose (Gy)	0.0 ± 0.1	0.0 ± 0.1
	mean EQD ₂ (Gy)	0.0 ± 0.1	0.0 ± 0.1
Left femoral head	$D_{2\%}$ (Gy)	0.0 ± 0.2	1.1 ± 0.1
	$D_{2\text{cm}^3}$ (Gy)	0.0 ± 0.1	1.1 ± 0.1
	mean dose (Gy)	0.0 ± 0.1	0.0 ± 0.1
	mean EQD ₂ (Gy)	0.0 ± 0.1	0.0 ± 0.1
Corpora cavernosa	$D_{2\%}$ (Gy)	0.0 ± 0.8	0.4 ± 0.9
	$D_{2\text{cm}^3}$ (Gy)	0.0 ± 0.5	0.7 ± 0.6
	mean dose (Gy)	0.0 ± 0.3	0.0 ± 0.3
	mean EQD ₂ (Gy)	0.0 ± 0.3	0.0 ± 0.3
Penile bulb	$D_{2\%}$ (Gy)	0.0 ± 4.7	0.5 ± 4.4
	$D_{2\text{cm}^3}$ (Gy)	0.0 ± 1.5	0.2 ± 1.5
	mean dose (Gy)	0.0 ± 1.6	0.0 ± 1.5
	mean EQD ₂ (Gy)	0.0 ± 4.7	0.0 ± 4.7

BT, brachytherapy; D_{av} , the highest dose after excluding av cm³ of the volume receiving the highest dose; D_{rv} , the highest dose after excluding rv % of the volume receiving the highest dose; EBRT, external beam radiation therapy; EQD₂, equieffective dose in 2-Gy fractions. Data are given as mean \pm one standard deviation.