

Matched Pair Analysis of Patients with Prostate Cancer Treated with IMRT or 3-D CRT

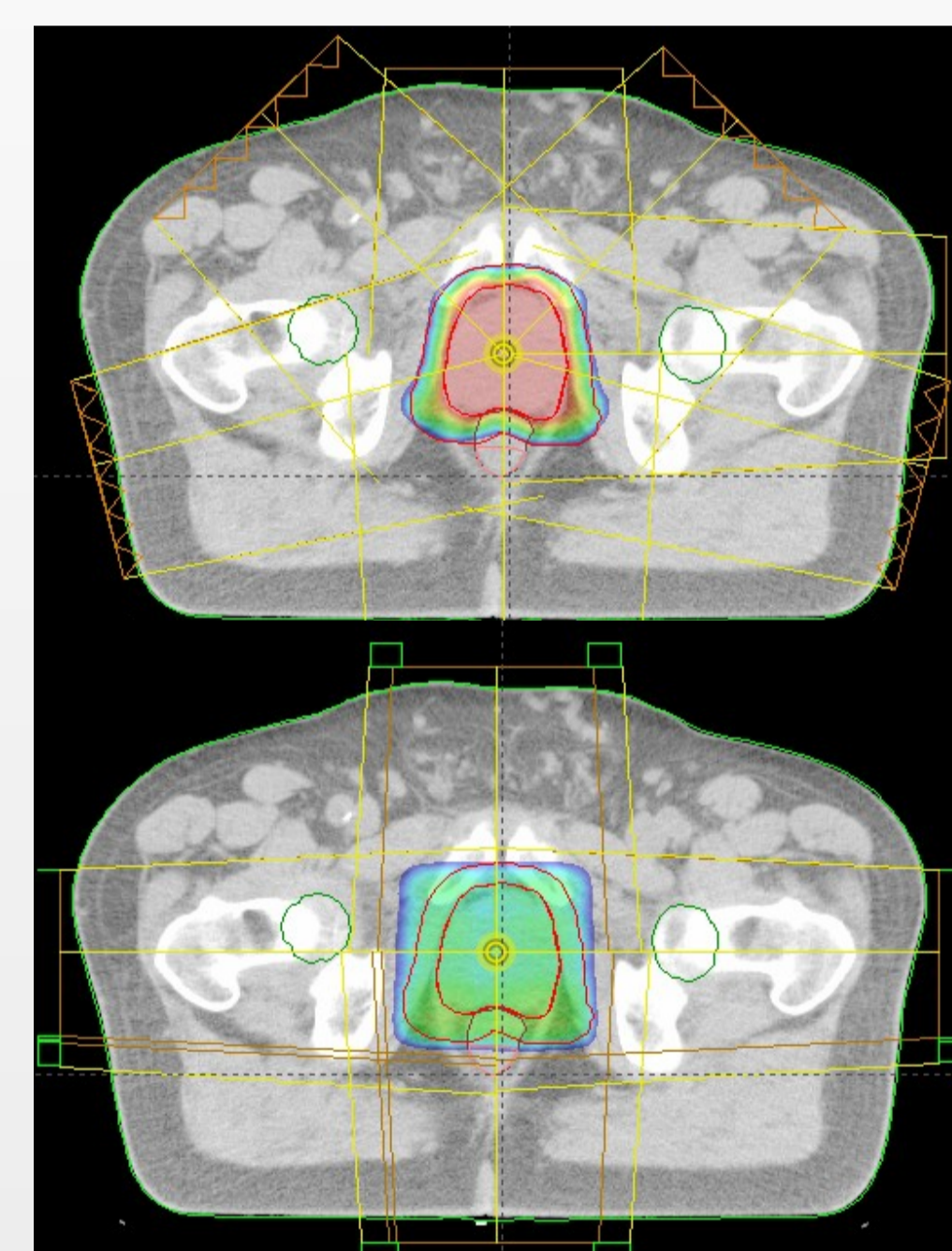
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Purpose: Matched pair analysis to evaluate differences of acute and late toxicity in prostate cancer patients treated either with 3D conformal- or intensity modulated radiotherapy.

Methods: From Dec. 2000 until Dec. 2003 ninety-six consecutive patients treated with IMRT (integrated boost, 2.0 Gy covering CTV=prostate + 5mm, see fig. 1) for prostate cancer were matched to a cohort of 91 patients treated with 3-D conformal RT (4-fields, 1.8 Gy, see fig. 2) during the same period. Five patients could not be matched. Patient characteristics are summarized in table 1. Ninety-two percent of all patients responded to a questionnaire that allowed for an evaluation of late GU and GI late toxicities. Acute toxicities were evaluated from patient's charts (according to CTCAE 3.0). Statistical evaluation included a non-parametric multivariate analysis for repeated observations to evaluate differences in type of radiotherapy, acute- and late toxicities, respectively. Univariate post-hoc analyses were performed in the form of McNemar tests for paired observations, after overall testing. Accounts for multiple comparisons were carried out using the sequentially rejecting Bonferroni-Holm procedure. Exact Chi-square tests were applied in order to test for differences in radiation toxicities between patients with and without risk factors (e.g. diabetes).

	IMRT-group	3D-CRT-group	p-value
Initial PSA (mean)	8,92 ng/ml	9,77 ng/ml	n. s.
Gleason sum			} n. s.
2-6	72	72	
7	19	14	
8-10	5	5	
T-Stage (AJCC 2002)			} n. s.
T1b	38	36	
T1c	27	26	
T2a	17	14	
T2b	2	5	
T2c	11	7	
T3a	0	1	
T3b			
low risk	36 (37,1%)	36 (37,1%)	} n. s.
intermed. risk	42 (43,3%)	43 (44,3%)	
high risk	19 (19,6%)	12 (12,4%)	
mean age	65.5	67.0	<0.001
mean CTV dose	79.8 Gy	72.2	<0.01
mean Follow-up	20.0 mo.	19.1 mo.	n. s.



IMRT
5-fields
+ SIB

3-D
CRT
4-fields

symptom ^{grade}	acute tox. IMRT			acute tox. 3DCRT			p-value
	1	2	3	1	2	3	
diarrhea	34	2	1	21	4	0	0.316
rect. bleeding	13	1	0	13	2	0	0.692
rect. pain	45	5	0	32	5	0	0.246
proctitis	33	4	0	12	2	0	0.002
urin. frequ.	31	9	2	40	11	1	0.468
nocturia	44	7	0	40	6	1	0.816
(dysuria)	42	11	0	35	3	0	0.045)
	late tox. IMRT			late tox. 3DCRT			p-value
	1	2	3	1	2	3	
diarrhea	21	1	0	16	1	0	0.513
rect. bleeding	19	3	0	13	2	1	0.293
rect. pain	10	3	2	12	1	1	0.695
proctitis	7	0	0	4	0	0	1.000
urin. frequ.	19	4	1	18	8	1	0.514
nocturia	19	2	0	18	5	1	0.353
dysuria	11	3	0	13	2	1	0.731

Table 2: Results of acute and late toxicities for both groups

Results: The comparison of acute and late toxicities of both treatment groups is shown in table 2. Dysuria was significantly different even before RT but failed to show significance on further follow-up. The descent of mean PSA for both groups is presented in figure 3.

Conclusions: The comparison of IMRT and 3-D CRT revealed no significant differences with respect to late toxicity. If the small but significant advantage of 3-D CRT on acute symptoms of proctitis and dysuria translates into less late toxicities remains unanswered until data from longer follow-up will be available. Dose escalation using IMRT with doses of 80 Gy may be accomplished without increasing long term toxicities.

Figures 1+2: RT techniques applied to the IMRT- and the 3-DCRT group, respectively. SIB=simultaneous integrated boost.

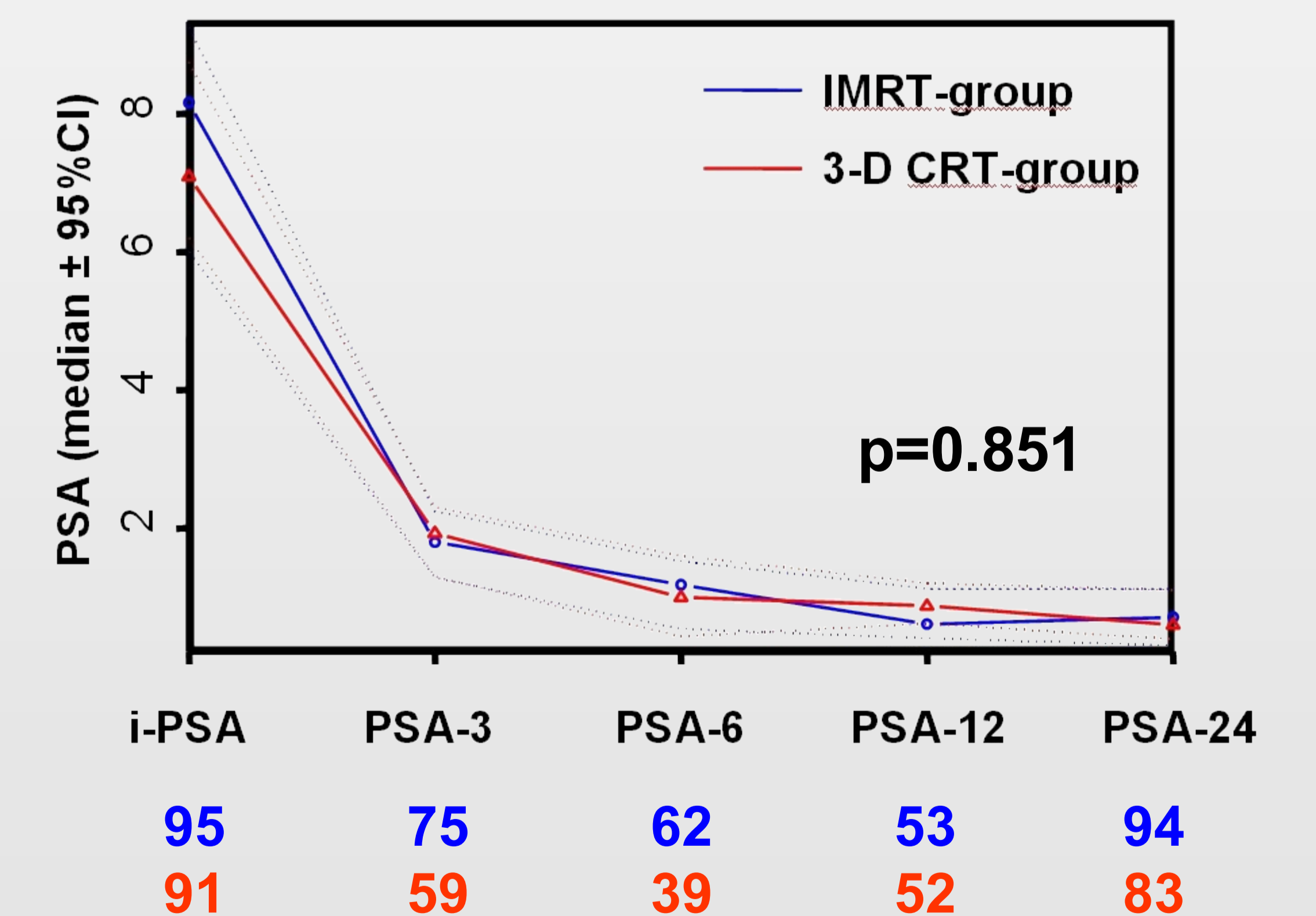


Figure 3: Mean PSA for all patients at 3, 6, 12, and 24 months after RT. Numbers represent available PSA values. iPSA = initial PSA value before RT.

Table 1: Patient characteristics.