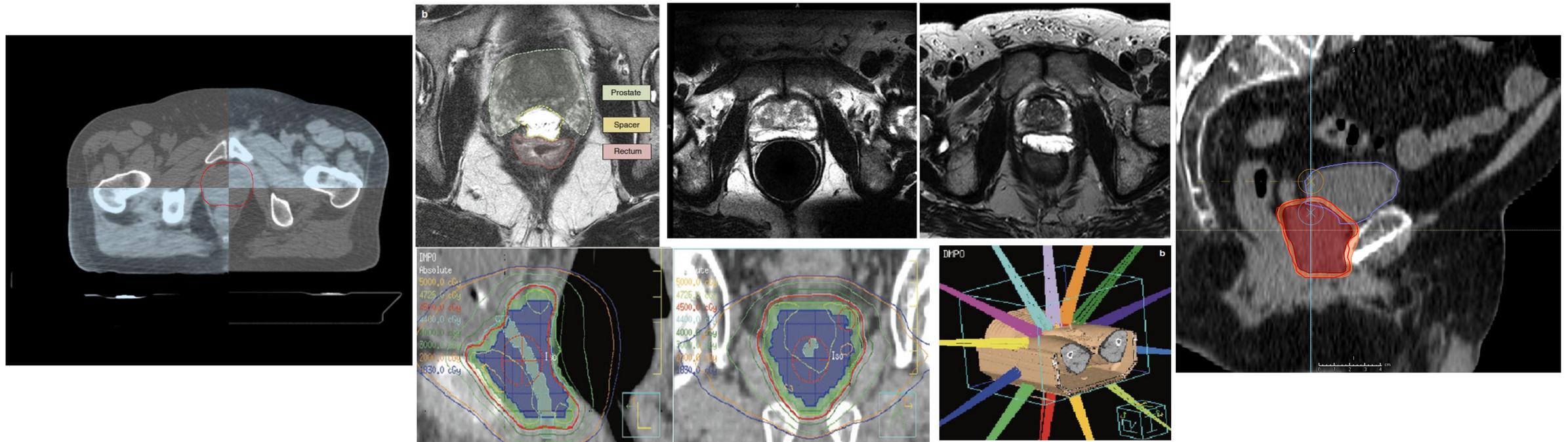


**Prostate Cancer**  
**RT:**  
**when less is more**

*GC Iorio*

# *The journey towards the SBRT advent*



**Table 1 – Phase 3 randomized trials of moderate hypofractionation for intact prostate cancer**

Study	Median FU, mo	Risk, GS, or NCCN	Technique	Regimen	BED, Gy	n	Outcome	Toxicity
Lukka et al. [15]	68	60% GS ≤6 31% GS 7 9% GS 8–10	3DCRT No IGRT	52.5 Gy/20 fx	62	466	5 yr FFBF 40% (NS)	Gr ≥3 2% (NS)
Yeoh et al. [17]	90	n.s.	2D/3DCRT No IGRT	66 Gy/33 fx	66	470	5 yr FFBF 43%	Gr ≥3 1%
				55 Gy/20 fx	66.8	108	7.5 yr FFBF 53% (p < 0.05)	Late GU; HR: 1.58 (95% CI, 1.01–2.47) favoring hypofractionation
Deamaley et al. [18]	51	n.s.	3D/IMRT No IGRT 3–6 mo ADT	64 Gy/32 fx	64	109	7.5 yr FFBF 34%	Gr ≥2 GU 0% (NS)
				57 Gy/19 fx	73.4	151	n.s.	Gr ≥2 GI 1% (NS)
				60 Gy/20 fx	77	153		Gr ≥2 GU 2%
Kuban et al. [14]; Hoffman et al. [19]	60	28% low 71% intermediate 1% high	IMRT IGRT 21% ADT	72 Gy/30 fx	80.2	102	5 yr FFBF 96% (NS)	5 yr Gr ≥2 GU 16% (NS)
				75.6 Gy/42 fx	71.4	101	5 yr FFBF 92%	5 yr Gr ≥2 GI 10% (NS)
								5 yr Gr ≥2 GU 17%
Arcangeli et al. [12,13]	70	26% GS ≤7 74% GS >7	3DCRT No IGRT 100% 9 mo ADT	62 Gy/20 fx	81.4	83	5 yr FFBF 85% (p = 0.065) *p ss for GS ≥4 + 3	5 yr Gr ≥2 GI 5%
				80 Gy/40 fx	80	85	5 yr FFBF 79%	3 yr Gr ≥2 GU 16% (NS) 3 yr Gr ≥2 GI 17% (NS)
Pollack et al. [16]	68	34% GS ≤6 47% GS 7 19% GS 8–10	IMRT IGRT	70.2 Gy/26 fx	84	151	5 yr BCDF 23% (NS)	3 yr Gr ≥2 GU 11% 3 yr Gr ≥2 GI 14%
				78 Gy/36 fx	78	152	5 yr BCDF 21%	5 yr Gr ≥2 GU 13% (p = 0.16) 5 yr Gr ≥2 GI 9% (NS)

3DCRT = three-dimensional conformal radiotherapy; ADT = androgen-deprivation therapy; BCDF = biochemical or clinical disease failure; BED = biologically equivalent dose, calculated to be equivalent in 2 Gy fractions using an  $\alpha/\beta$  of 1.5 Gy; CI = confidence interval; FFBF = freedom from biochemical failure; FU = follow-up; fx = fractions; GI = gastrointestinal; Gr = grade; GS = Gleason score; GU = genitourinary; HR = hazard ratio; IGRT = image-guided radiation therapy; IMRT = intensity-modulated radiation therapy; NCCN = National Comprehensive Cancer Network; NS = not significant; n.s. = not stated; ss = statistically significant.

**Table 2 – Prospective studies of extreme hypofractionation for intact prostate with at least 50 participants**

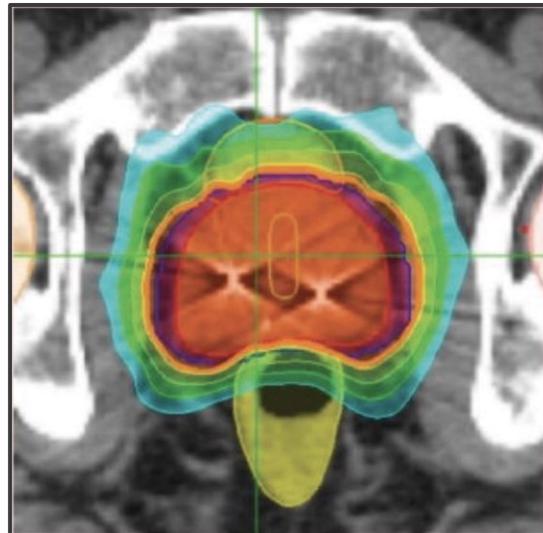
	<i>n</i>	Median FU, mo	Risk, NCCN	Technique	Regimen	BED, Gy	Outcome	Toxicity
Aluwini et al. [46]	162	28	Low/intermediate	n.s.	38 Gy/4 fx	119.6	3 yr BC 98%	Gr 2 GU 15% Gr 2 GI 3%
Bolzicco et al. [27]	100	36	41% low 42% intermediate 17% high	Robotic IGRT	35 Gy/5 fx 29% ADT	85	BC 96%	Gr 1/2/3 GU 4%/3%/1% Gr 1/2/3 GI 2%/1%
Chen et al. [47]	100	28	37% low 55% intermediate 8% high	Robotic IGRT	35–36.25 Gy/5 fx 11% ADT	85–90.6	2 yr BRFS 99%	2 yr Gr ≥2 GU 31% 2 yr Gr ≥2 GI 1%
D’Alimonte et al. [48]	84	50	100% low	IMRT/IGRT	35 Gy/5 fx	85	BC 98%	Gr 2/≥3 GU 5/1% Gr 2/≥3 GI 5/1%
Fuller et al. [39]	260	20	45% low 55% intermediate	n.s.	38 Gy/4 fx	119.6	3 yr BRFS 98%	Gr 3 GU 2% (any Gr 44%) Gr 3 GI 0% (any Gr 11%)
Katz and Kang [24]	515	54	67% low 26% intermediate 7% high	Robotic IGRT	35–36.25 Gy/5 fx	85–90.6	6 yr FFBF 97% 92% 70%	Gr ≥2 GU 9% Gr ≥2 GI 4%
King et al. [34]	67	32	100% low	Robotic IGRT	36.25 Gy/5 fx	90.6	4 yr BRFS 94%	Gr ≥2 GU 7% Gr ≥2 GI 12%
Loblaw et al. [25]	84	55	100% low	IMRT/IGRT	35 Gy/5 fx	85	5 yr BC 98%	5 yr Gr ≥2 GU 5% 5 yr Gr ≥2 GI 7%
Meier et al. [38,49]	129	30	100% intermediate	Robotic IGRT	40 Gy/5 fx No ADT	108.8	3 yr BRFS 99%	Gr 2 GU 10% Gr 2 GI 2%
Menkarios et al. [29]	80	33	100% low	IMRT/IGRT	45 Gy/5 fx	135	3 yr BC 97%	Gr ≥2 GU 14% Gr ≥2 GI 16%
Ouon et al. [50]	84	18	100% low	IMRT/IGRT	35 Gy/5 fx	85	n.s.	Gr 2 GU 2% Gr 2 GI 5%

ADT = androgen-deprivation therapy; BC = biochemical control; BED = biologically equivalent dose, calculated to be equivalent in 2 Gy fractions using an  $\alpha/\beta$  of 1.5 Gy; BRFS = biochemical relapse-free survival; FFBF = freedom from biochemical failure; FU = follow-up; fx = fractions; GI = gastrointestinal; Gr = grade; GU = genitourinary; IGRT = image-guided radiation therapy; IMRT = intensity-modulated radiation therapy; NCCN = National Comprehensive Cancer Network; n.s. = not stated.

# SBRT, for the win!



*Daily Mirror, 18/9/19*



Nigogosyan Z, RG 2022

## *HYPO RT PC, Widmark et al. Lancet 2019*

Ultra-hypofractionated versus conventionally fractionated radiotherapy for prostate cancer: 5-year outcomes of the HYPO-RT-PC randomised, non-inferiority, phase 3 trial



## *PACE B, Brand et al. Lancet Oncol 2019*

Intensity-modulated fractionated radiotherapy versus stereotactic body radiotherapy for prostate cancer (PACE-B): acute toxicity findings from an international, randomised, open-label, phase 3, non-inferiority trial



# SBRT, for the win!



National  
Comprehensive  
Cancer  
Network®

## NCCN Guidelines Version 1.2025 Prostate Cancer

[NCCN Guidelines Index](#)  
[Table of Contents](#)  
[Discussion](#)

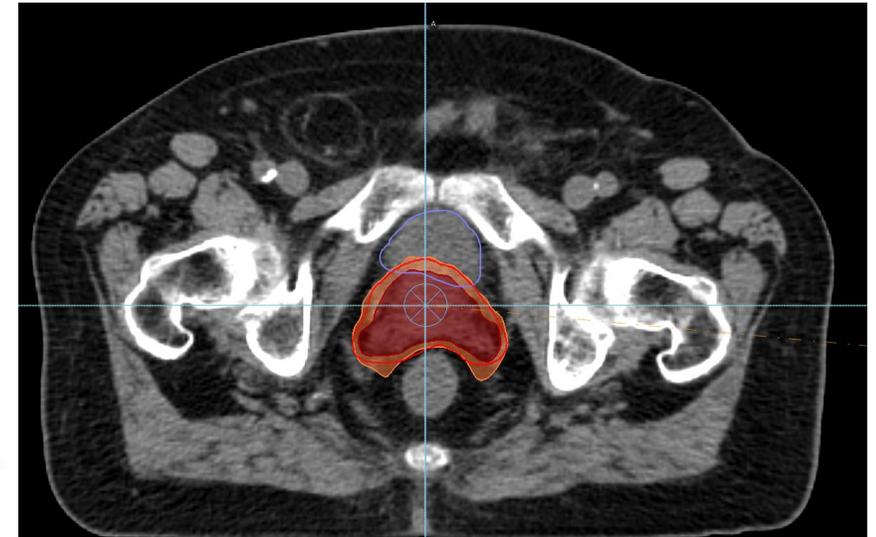
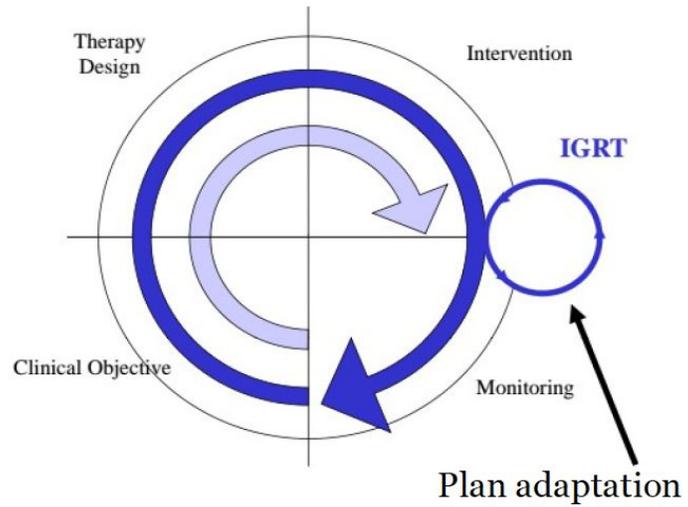
### PRINCIPLES OF RADIATION THERAPY

Table 1: Below are examples of regimens that have shown acceptable efficacy and toxicity. The optimal regimen for an individual patient warrants evaluation of comorbid conditions, voiding symptoms and toxicity of therapy. Additional fractionation schemes may be used as long as sound oncologic principles and appropriate estimate of BED are considered.

See [PROS-3](#), [PROS-4](#), [PROS-5](#), [PROS-6](#), [PROS-7](#), [PROS-8](#), [PROS-13](#), and [Principles of ADT \(PROS-G\)](#) for other recommendations, including recommendations for neoadjuvant/concomitant/adjuvant ADT.

Regimen	Preferred Dose/Fractionation	NCCN Risk Group (✓ indicates an appropriate regimen option if RT is given, ✨ indicates a regimen useful in certain circumstances)					
		Low	Favorable Intermediate	Unfavorable Intermediate	High and Very High	Regional N1 <sup>f</sup>	Low Metastatic Burden M1 <sup>f</sup>
<b>EBRT</b>							
Moderate Hypofractionation <sup>c</sup>	3 Gy x 20 fx 2.7 Gy x 26 fx 2.5 Gy x 28 fx	✓	✓	✓	✓	✓	✨
	2.75 Gy x 20 fx						✓
Conventional Fractionation <sup>c</sup>	1.8–2 Gy x 37–45 fx			✓	✓	✓	✨
SBRT Ultra-Hypofractionation	9.5 Gy x 4 fx 7.25–8 Gy x 5 fx <sup>c</sup> 6.1 Gy x 7 fx <sup>c</sup>	✓	✓	✓	✓	✨	✨
	6 Gy x 6 fx <sup>c</sup>						✓
<b>EBRT Boost Techniques</b>							
EBRT + Micro-Boost <sup>d</sup>	See footnote d.		✓	✓	✓		✨
EBRT + SBRT Boost <sup>e</sup>	1.8–2 Gy x 23–28 fx (45–50.4 Gy) to whole prostate plus 6 Gy x 3 fx			✓	✓	✨	

# Tomotherapy applications: PCa and extreme hypofractionation



**Thank you!**