



Radioterapia São Sebastião
Liga Catarinense de combate ao câncer

Câncer de Próstata – Fracionamento e indicações



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CRM-SC 6963



CaP - Fracionamento e indicações

- Segunda neoplasia mais frequente no homem (a mais frequente quando excluímos as neoplasias de pele)
- 1 a cada 8 homens terá o diagnóstico
- 1 a cada 40 homens morrerá pela doença
- 60% dos casos acima de 65 anos
- Raro antes dos 40 anos de idade



CaP - Fracionamento e indicações

- PSA como marcador: solução? Problema?
- PSA para todos: aumenta o risco de diagnósticos “desnecessários” e tratamentos desnecessários
- Sugestão: PSA para homens >50 anos, >45 anos se história familiar positiva e >40 anos para portadores de mutação BRCA1/2
- Sugestão: dosar PSA aos 40 anos e aos 60 anos. Se >1 aos 40 anos e/ou >2 aos 60 anos, maior risco de morte por CaP



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- Diagnóstico: idade, raça, PSA total e livre, história familiar, TR
- RM multiparamétrica da próstata para casos suspeitos (antes de indicar biópsias)
- Calculadoras de risco caso não seja possível RM
- Quando indicar biópsia? RM com laudo PI-RADS 3 ou mais
- Biópsia guiada e randômica



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- Diagnóstico anátomo-patológico: critérios ISUP

NOVAS ESCALAS DE DEFINIÇÃO HISTOLÓGICA		
GRUPO	GLEASON	CARACTERÍSTICAS
Grau 1	≤ 6	Apenas glândulas individuais bem formadas e discretas
Grau 2	$3 + 4 = 7$	Glândulas predominante bem formadas com menor componente de glândulas mal formadas/fundidas/cribriformes
Grau 3	$4 + 3 = 7$	Glândulas predominante mal formadas/fundidas /cribriformes com menor componente de glândulas bem formadas*
Grau 4	$4 + 4 = 8$	Apenas glândulas mal formadas/fundidas /cribriformes ou Glândulas predominantemente bem formadas e componentes menor sem glândulas ** ou predominantemente falta de glândulas e menor componente de glândulas bem formadas**
	$3 + 5 = 8$	
	$5 + 3 = 8$	
Grau 5	$9 - 10$	Falta formação de glândulas (ou com necrose) com ou sem glândulas mal formadas/fundidas/ cribriformes*



CaP - Fracionamento e indicações

INITIAL RISK STRATIFICATION AND STAGING WORKUP FOR CLINICALLY LOCALIZED DISEASE^d

Risk Group	Clinical/Pathologic Features See Staging (ST-1)		Additional Evaluation ^{g,h}	Initial Therapy
Very low ^e	Has all of the following: • cT1c • Grade Group 1 • PSA <10 ng/mL • Fewer than 3 prostate biopsy fragments/cores positive, ≤50% cancer in each fragment/core • PSA density <0.15 ng/mL/g		• Consider confirmatory mpMRI ± prostate biopsy if MRI not performed initially. All patients should undergo a confirmatory prostate biopsy within 1-2 years of their diagnostic biopsy.	See PROS-3
Low ^e	Has all of the following but does not qualify for very low risk: • cT1–cT2a • Grade Group 1 • PSA <10 ng/mL		• Consider confirmatory mpMRI ± prostate biopsy and/or molecular tumor analysis if MRI not performed initially to establish candidacy for active surveillance. All patients should undergo a confirmatory prostate biopsy within 1-2 years of their diagnostic biopsy.	See PROS-4
Intermediate ^e	Has all of the following: • No high-risk group features • No very-high-risk group features • Has one or more intermediate risk factors (IRFs): ▶ cT2b–cT2c ▶ Grade Group 2 or 3 ▶ PSA 10–20 ng/mL	Favorable intermediate	Has all of the following: • 1 IRF • Grade Group 1 or 2 • <50% biopsy cores positive (eg, <6 of 12 cores) • Consider confirmatory mpMRI ± prostate biopsy and/or molecular tumor analysis if MRI not performed initially for those considering active surveillance. All patients should undergo a confirmatory prostate biopsy within 1-2 years of their diagnostic biopsy.	See PROS-5
		Unfavorable intermediate	Has one or more of the following: • 2 or 3 IRFs • Grade Group 3 • ≥ 50% biopsy cores positive (eg, ≥ 6 of 12 cores) • Bone and soft tissue imaging^{i,j} • If regional or distant metastases are found, see PROS-8 or PROS-12	See PROS-6
High	Has no very-high-risk features and has exactly one high-risk feature: • cT3a OR • Grade Group 4 or Grade Group 5 OR • PSA >20 ng/mL		• Bone and soft tissue imaging^{i,j} • If regional or distant metastases are found, see PROS-8 or PROS-12	See PROS-7
Very high	Has at least one of the following: • cT3b–cT4 • Primary Gleason pattern 5 • 2 or 3 high-risk features • >4 cores with Grade Group 4 or 5		• Bone and soft tissue imaging^{i,j} • If regional or distant metastases are found, see PROS-8 or PROS-12	See PROS-7



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MANEJO: atenção para expectativa de vida (escores) e qualidade de vida (anseios do paciente sempre são levados em conta)

- Radioterapia
- Cirurgia
- Hormonioterapia
- Quimioterapia

CaP - Fracionamento e indicações



Clinically Localized Prostate Cancer: AUA/ASTRO Guideline 2022

Endorsed by SUO

James A. Eastham, MD; Gregory B. Aufferberg, MD, MS; Daniel A. Barocas, MD, MPH; Roger Chou, MD; Tony Crispino; John W. Davis, MD, Scott Eggener, MD; Eric M. Horwitz, MD; Christopher J. Kane, MD; Daniel W. Lin, MD; Sean M. McBride, MD, MPH; Alicia K. Morgans, MD, MPH; Phillip M. Pierorazio, MD; George Rodrigues, MD; William W. Wong, MD; Stephen A. Boorjian, MD

RISK-BASED MANAGEMENT

8. Clinicians should inform patients that all prostate cancer treatments carry risk. The risks of treatment, in particular to patients' urinary, sexual, and bowel function, must be incorporated with the risk posed by the cancer, patient life expectancy, comorbidities, pre-existing medical conditions, and patient preferences to facilitate a shared decision-making approach to management. (Clinical Principle)
10. For patients with low-risk prostate cancer, clinicians should recommend active surveillance as the preferred management option. (Strong Recommendation; Evidence Level: Grade A)
12. For patients with favorable intermediate-risk prostate cancer, clinicians should discuss active surveillance, radiation therapy, and radical prostatectomy. (Strong Recommendation; Evidence Level: Grade A)
14. For patients with unfavorable intermediate- or high-risk prostate cancer and estimated life expectancy greater than 10 years, clinicians should offer a choice between radical prostatectomy or radiation therapy plus androgen deprivation therapy (ADT). (Strong Recommendation; Evidence Level: Grade A)

CaP - Fracionamento e indicações

MODELO LINEAR QUADRÁTICO

- descreve a curva de sobrevida de células tumorais relacionadas a uma determinada dose de radiação
- Mais seguro para frações diárias de até 5-6Gy
- Baseado na relação alfa-beta: radiosensibilidade
- Quanto maior for a relação alfa-beta, mais sensível é a célula ao fracionamento convencional (1,8-2Gy/dia)



CaP - Fracionamento e indicações

Table 1 Normal tissue tolerance-linear quadratic model. What are the α/β -values (Gy)?

Tissue	End point	α/β (Gy)	Range*	Reference
Early responding tissue/organ				
Skin	Erythema	8.8	6.9-11.6	(3)
	Erythema	12.3	1.8-22.8	(4)
	Desquamation		9.4-21	(5)
	Desquamation	11.2	8.5-17.6	(3)
Jejunal mucosa	Clones	13	7-13	(6)
Late responding tissue/organ				
Spinal cord	Paresis/myelopathy	<3	1.6-5	(5)
	Pneumonitis	4.0	2.2-5.8	(7)
	Pneumonitis		1.6-4.5	(5)
	Fibrosis	2.3		(5)
Lung	Fibrosis	3.1	-0.2-8.5	(8)
	Contraction		5.8-11	(5)
Bladder	Organ function	3.5	1-4.9	(5)
Most human	Tumors		6-25	(5)

*, 90% confidence limit (Gy) (for some of the data).

Rectum	3.9	Emami <i>et al</i> , 1991 [52]
Bladder	6.0	Emami <i>et al</i> , 1991 [52]

CaP - Fracionamento e indicações

van Leeuwen et al. *Radiation Oncology* (2018) 13:96
<https://doi.org/10.1186/s13014-018-1040-z>

Radiation Oncology

REVIEW

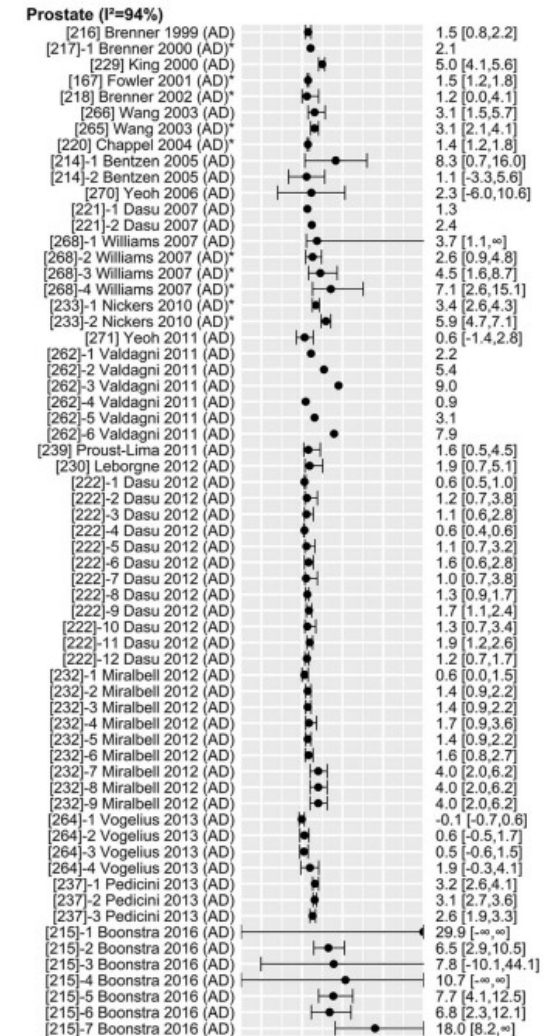
Open Access

The alfa and beta of tumours: a review of parameters of the linear-quadratic model, derived from clinical radiotherapy studies

C. M. van Leeuwen¹, A. L. Oei^{1,2}, J. Crezee¹, A. Bel¹, N. A. P. Franken^{1,2}, L. J. A. Stalpers¹ and H. P. Kok^{1*}

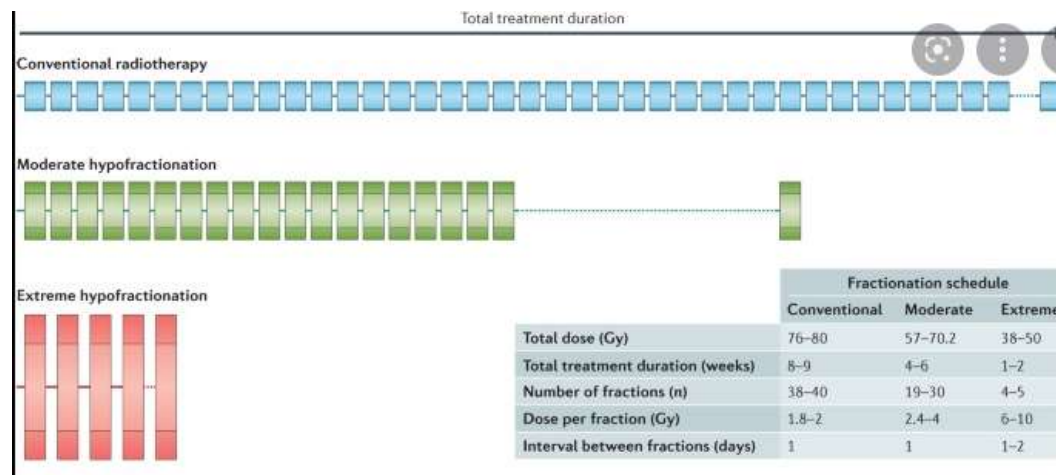
CaP

Alfa/Beta = 1,5



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Regimen	Preferred Dose/Fractionation	NCCN Risk Group (✓ indicates an appropriate regimen option if radiation therapy is given)					
		Very Low and Low	Favorable Intermediate	Unfavorable Intermediate	High and Very High	Regional N1	Low Volume M1 ^a
EBRT							
Moderate Hypofractionation (Preferred)	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	1.8–2 Gy x 37–45 fx	✓	✓	✓	✓	✓	
Ultra-Hypofractionation	7.25–8 Gy x 5 fx 6.1 Gy x 7 fx	✓	✓	✓	✓		
	6 Gy x 6 fx						✓



CaP - Fracionamento e indicações



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PII S0360-3016(02)02857-2

CLINICAL INVESTIGATION

Prostate

HIGH-DOSE INTENSITY MODULATED RADIATION THERAPY FOR PROSTATE CANCER: EARLY TOXICITY AND BIOCHEMICAL OUTCOME IN 772 PATIENTS

MICHAEL J. ZELEFSKY, M.D.,* ZVI FUKS, M.D.,* MARGIE HUNT, B.A.,† YOSHIYA YAMADA, M.D.,*
CHRISTINE MARION, B.A.,* C. CLIFTON LING, PH.D.,† HOWARD AMOLS, PH.D.,†
E. S. VENKATRAMAN, PH.D.,‡ AND STEVEN A. LEIBEL, M.D.†

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beam intensity profiles were delivered by dynamic multileaf collimation. A total of 698 patients (90%) were treated to 81.0 Gy, and 74 patients (10%) were treated to 86.4 Gy. Acute and late toxicities were scored by the

45 x 1,8Gy

48 x 1,8Gy



CaP - Fracionamento e indicações

VOLUME 34 • NUMBER 20 • JULY 10, 2016

JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

Randomized Phase III Noninferiority Study Comparing Two Radiotherapy Fractionation Schedules in Patients With Low-Risk Prostate Cancer

W. Robert Lee, James J. Dignam, Mahul B. Amin, Deborah W. Bruner, Daniel Low, Gregory P. Swanson, Amit B. Shah, David P. D'Souza, Jeff M. Michalski, Ian S. Dayes, Samantha A. Seaward, William A. Hall, Paul L. Nguyen, Thomas M. Pisansky, Sergio L. Faria, Yuhchyan Chen, Bridget F. Koontz, Rebecca Paulus, and Howard M. Sandler

See accompanying editorial on page 2323

73,8Gy @ 1,8Gy

X

70Gy @ 2,5Gy

1115 pacientes

Prospetivo e randomizado



Int. J. Radiation Oncology Biol. Phys., Vol. 68, No. 5, pp. 1424–1430, 2007
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0360-3016/07/\$—see front matter

doi:10.1016/j.ijrobp.2007.01.067

CLINICAL INVESTIGATION

Prostate

HYPOFRACTIONATED INTENSITY-MODULATED RADIOTHERAPY (70 GY AT 2.5 GY PER FRACTION) FOR LOCALIZED PROSTATE CANCER: CLEVELAND CLINIC EXPERIENCE

PATRICK A. KUPELIAN, M.D.,* TWYLA R. WILLOUGHBY, M.S.,* CHANDANA A. REDDY, M.S.,[†]
ERIC A. KLEIN, M.D.,[‡] AND ARUL MAHADEVAN, M.D.[†]

*Department of Radiation Oncology, M.D. Anderson Cancer Center Orlando, Orlando, FL; [†]Department of Radiation Oncology and [‡]Glickman Urologic Institute, Cleveland Clinic Foundation, Cleveland, OH

770 pacientes

Prospetivo mas não randomizado

70Gy@2,5



CaP - Fracionamento e indicações

VOLUME 31 • NUMBER 31 • NOVEMBER 1 2013

JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

Randomized Trial of Hypofractionated External-Beam Radiotherapy for Prostate Cancer

Alan Pollack, Gail Walker, Eric M. Horwitz, Robert Price, Steven Feigenberg, Andre A. Konski, Radka Stoyanova, Benjamin Movsas, Richard E. Greenberg, Robert G. Uzzo, Charlie Ma, and Mark K. Buyyounouski

76Gy @ 2Gy

X

300 pacientes

70,2Gy @ 2,7Gy

26 fx



CaP - Fracionamento e indicações

Conventional versus hypofractionated high-dose intensity-modulated radiotherapy for prostate cancer: 5-year outcomes of the randomised, non-inferiority, phase 3 CHHiP trial

Lancet Oncol 2016; 17: 1047-60

David Dearnaley, Isabel Syndikus, Helen Mossop, Vincent Khoo, Alison Birtle, David Bloomfield, John Graham, Peter Kirkbride, John Logue, Zafar Malik, Julian Money-Kyrle, Joe M O'Sullivan, Miguel Panades, Chris Parker, Helen Patterson, Christopher Scrase, John Staffurth, Andrew Stockdale, Jean Tremlett, Margaret Bidmead, Helen Mayles, Olivia Naismith, Chris South, Annie Gao, Clare Cruickshank, Shama Hassan, Julia Puah, Clare Griffin, Emma Hall, on behalf of the CHHiP Investigators*

74Gy @ 2Gy

X

60Gy @ 3Gy

(57Gy @ 3Gy)

3200 pacientes



CaP - Fracionamento e indicações

VOLUME 35 • NUMBER 17 • JUNE 10, 2017

JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

Randomized Trial of a Hypofractionated Radiation Regimen for the Treatment of Localized Prostate Cancer

Charles N. Catton, Himu Lukka, Chu-Shu Gu, Jarad M. Martin, Stéphane Supiot, Peter W.M. Chung, Glenn S. Bauman, Jean-Paul Bahary, Shahida Ahmed, Patrick Cheung, Keen Hun Tai, Jackson S. Wu, Matthew B. Parliament, Theodoros Tsakiridis, Tom B. Corbett, Colin Tang, Ian S. Dayes, Pdraig Warde, Tim K. Craig, Jim A. Julian, and Mark N. Levine

78Gy @ 2Gy

X

60Gy @ 3Gy

1200 pacientes



CaP - Fracionamento e indicações

Critical Reviews in Oncology / Hematology 165 (2021) 103432



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Critical Reviews in Oncology / Hematology

journal homepage: www.elsevier.com/locate/critrevonc



Toxicity after moderately hypofractionated versus conventionally fractionated prostate radiotherapy: A systematic review and meta-analysis of the current literature

G. Francolini^a, B. Detti^{a,*}, C. Becherini^a, S. Caini^b, G. Ingrosso^c, Vanessa Di Cataldo^a,
G. Stocchi^a, V. Salvestrini^a, A. Lancia^d, D. Scartoni^e, I. Giacomelli^e, A. Sardaro^f, R. Carbonara^g,
S. Borghesi^h, C. Aristei^c, L. Livi^a

Discussion: Overall, majority of trials included in our meta-analysis suggested that moderately hypofractionated RT is equivalent, in terms of GI and GU adverse events, to conventional fractionation. Pooled analysis showed a trend to increased GI toxicity after hypofractionated treatment, but this might be related to dose escalation rather than hypofractionation.



CaP - Fracionamento e indicações

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

Anders Widmark, Adalsteinn Gunnlaugsson, Lars Beckman, Camilla Thellenberg-Karlsson, Morten Hoyer, Magnus Lagerlund, Jon Kindblom, Claes Ginman, Bengt Johansson, Kirsten Björnlinger, Mihajl Seke, Måns Agrup, Per Fransson, Björn Tavelin, David Norman, Björn Zackrisson, Harald Anderson, Elisabeth Kjellén, Lars Franzén, Per Nilsson

Interpretation Ultra-hypofractionated radiotherapy is non-inferior to conventionally fractionated radiotherapy for intermediate-to-high risk prostate cancer regarding failure-free survival. Early side-effects are more pronounced with ultra-hypofractionation compared with conventional fractionation whereas late toxicity is similar in both treatment groups. The results support the use of ultra-hypofractionation for radiotherapy of prostate cancer.

78Gy @ 2Gy

X

1200 pacientes

42,7Gy @ 6,1Gy

7 fx 3x/semana



CaP - Fracionamento e indicações

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



Douglas H Brand*, Alison C Tree*, Peter Ostler, Hans van der Voet, Andrew Loblaw, William Chu, Daniel Ford, Shaun Tolan, Suneil Jain, Alexander Martin, John Staffurth, Philip Camilleri, Kiran Kancharla, John Frew, Andrew Chan, Ian S Dayes, Daniel Henderson, Stephanie Brown, Clare Cruickshank, Stephanie Burnett, Aileen Duffton, Clare Griffin, Victoria Hinder, Kirsty Morrison, Olivia Naismith, Emma Hall, Nicholas van As, on behalf of the PACE Trial Investigators



Interpretation Previous evidence (from the HYPO-RT-PC trial) suggested higher patient-reported toxicity with ultrahypofractionation. By contrast, our results suggest that substantially shortening treatment courses with stereotactic body radiotherapy does not increase either gastrointestinal or genitourinary acute toxicity.

78Gy @ 2Gy ou

60Gy @ 3Gy

X

36,25Gy @ 7,25Gy

5fx / em até 2 semanas

874 pacientes



CaP - Fracionamento e indicações

PLOS MEDICINE

RESEARCH ARTICLE

Radiotherapy to the prostate for men with metastatic prostate cancer in the UK and Switzerland: Long-term results from the STAMPEDE randomised controlled trial

Chris C. Parker^{1*}, Nicholas D. James¹, Christopher D. Brawley², Noel W. Clarke^{3,4}, Adnan Ali³, Claire L. Amos², Gerhardt Attard⁵, Simon Chowdhury⁶, Adrian Cook², William Cross⁷, David P. Dearnaley¹, Hassan Douis⁸, Duncan C. Gilbert², Clare Gilson², Silke Gillesen^{9,10}, Alex Hoyle^{3,4}, Rob J. Jones¹¹, Ruth E. Langley², Zafar I. Malik¹², Malcolm D. Mason¹³, David Matheson¹⁴, Robin Millman², Mary Rauchenberger², Hannah Rush^{2,6}, J Martin Russell¹¹, Hannah Sweeney², Amit Bahl¹⁵, Alison Birtle^{16,17}, Lisa Capaldi¹⁸, Omar Din¹⁹, Daniel Ford⁸, Joanna Gale²⁰, Ann Henry²¹, Peter Hoskin^{3,22}, Mohammed Kagzi²³, Anna Lydon²⁴, Joe M. O'Sullivan²⁵, Sangeeta A. Paisey²⁶, Omi Parikh²⁷, Delia Pudney²⁸, Vijay Ramani^{3,29}, Peter Robson¹², Narayanan Nair Srihari³⁰, Jacob Tanguay³¹, Mahesh K. B. Parmar²⁴, Matthew R. Sydes^{24*}, for the STAMPEDE Trial Collaborative Group¹



- >2000 pacientes
- CaP metastático
- HT com ou sem QT
- Pacientes com pouca doença metastática se beneficiaram de RT na próstata
- Maior sobrevida global

36Gy @ 6Gy

1 fx por semana

X

55Gy @ 2,5Gy

4 semanas



CaP - Fracionamento e indicações

Phuong et al. *Radiation Oncology* (2022) 17:12
<https://doi.org/10.1186/s13014-021-01976-2>

Radiation Oncology

RESEARCH

Open Access

Safety of accelerated hypofractionated whole pelvis radiation therapy prior to high dose rate brachytherapy or stereotactic body radiation therapy prostate boost



Christina Phuong^{1†}, Jason W. Chan^{1†}, Lisa Ni¹, Phillip Wall¹, Osama Mohamad¹, Anthony C. Wong¹, I.-Chow Hsu¹ and Albert J. Chang^{2,3*} 

**Prospectivo
observacional**

22 pacientes

**41,25Gy @ 2,75Gy
15 fx**

CaP - Fracionamento e indicações

International Journal of
Radiation Oncology
biology • physics

www.redjournal.org

Scientific Letter

Acute Toxicity Profiles of Hypofractionated Adjuvant and Salvage Radiation Therapy After Radical Prostatectomy: Results of a Prospective Study

Simonetta Saldi, MD,^{*} Rita Bellavita, MD,^{*}
Valentina Lancellotta, MD,^{*} Isabella Palumbo, MD,^{*}
Marco Lupattelli, MD,^{*} Sara Chierchini, MD,^{*} Lorenzo Falcinelli, MD,^{*}
Claudio Zucchetti, Phys,[†] Vittorio Bini, DS,[‡] and Cynthia Aristei, MD^{*}

Sections of ^{*}Radiation Oncology and [†]Medical Physics and [‡]Department of Medicine, Section of Internal Medicine, Endocrinology & Metabolism, University of Perugia and Santa Maria della Misericordia Hospital, Perugia, Italy



**Prospectivo
observacional**

**62,25Gy @ 2,25Gy
29 fx**

112 pacientes



CaP - Fracionamento e indicações

TÉCNICAS DE PLANEJAMENTO E LIBERAÇÃO DE DOSES

- **Radioterapia 3D** – planejamento baseado em TC. Arranjos de campos baseados em ângulos de mesa, colimador e gantry.
- **IMRT** – planejamento baseado em TC. Arranjos de campos baseados em ângulos de mesa, colimador e gantry, mas com a vantagem da fluência das lâminas modulando o feixe de irradiação.
- **SBRT** – tratamento focal, com rápida queda de dose ao redor da lesão, liberado em uma a cinco frações.



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Regimen	Preferred Dose/Fractionation	NCCN Risk Group (✓ indicates an appropriate regimen option if radiation therapy is given)					
		Very Low and Low	Favorable Intermediate	Unfavorable Intermediate	High and Very High	Regional N1	Low Volume M1 ^a
EBRT							
Moderate Hypofractionation (Preferred)	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	1.8–2 Gy x 37–45 fx	✓	✓	✓	✓	✓	
Ultra-Hypofractionation	7.25–8 Gy x 5 fx 6.1 Gy x 7 fx	✓	✓	✓	✓		
	6 Gy x 6 fx						✓

CaP - Fracionamento e indicações

PROTOCOLO RTSS

COM IGRT

Radioterapia 3D ou IMRT

- **SBRT** = 5 fx / riscos baixo e intermediário
- **Hipofracionamento focal** = 20 fx de 3Gy / todos os riscos
- **Hipofracionamento pelve + focal** = 20 fx de 3Gy e de 2,2Gy / risco alto
- **Hipofracionamento focal M1** = 20 fx de 2,75Gy (Stampede)



CaP - Fracionamento e indicações

PROTOCOLO RTSS

SEM IGRT

Radioterapia 3D ou IMRT (step-and-shoot)

- **Hipofracionamento focal** = 20 fx de 3Gy / todos os riscos
- **Hipofracionamento focal** = 28 fx de 2,5Gy / todos os riscos
- **Hipofracionamento focal M1** = 20 fx de 2,75Gy (Stampede)
- **Fracionamento convencional pelve + focal** = 25 fx de 2Gy + boost hipo / risco alto





Obrigado!

