

Supplementary Materials

Table S1. Definitions of clinical target volumes (CTVs) and planning target volumes (PTVs).

Organ	Target	Definition
Prostate	CTV _{prostate}	Included the entire prostate gland for all patients with the addition of proximal two-thirds of seminal vesicles for patients with intermediate- or high-risk prostate cancer.
	PTV _{prostate}	An anisotropic expansion of CTV _{prostate} with a 6-mm margin posteriorly and 1-cm margin in all other directions.
Lymph nodes	CTV _{LN}	Included the distal common iliac lymphatics, external iliac lymphatics, internal iliac lymphatics, presacral lymphatics and obturator lymphatics.
	PTV _{LN}	An isotropic expansion of CTV _{LN} with a 5-mm margin.

Table S2. Acceptance criteria and organs at risk constraints.

Volume	Acceptance criteria or constraints
PTV	Dose _{minimum} ≥ 95% of prescribed dose ≤ 3% received > 107% of prescribed dose ≤ 3% received < 93% of prescribed dose
Rectum	Volume _{75Gy} ≤ 15% Volume _{70Gy} ≤ 20% Volume _{65Gy} ≤ 25% Volume _{60Gy} ≤ 35% Volume _{50Gy} ≤ 50%
Bladder	Volume _{80Gy} ≤ 15% Volume _{75Gy} ≤ 25% Volume _{70Gy} ≤ 35% Volume _{65Gy} ≤ 50%
Femoral head	Volume _{50Gy} ≤ 50%
Bowel space	Volume _{45Gy} ≤ 200 cc
Penile bulb	Dose _{70%} ≤ 70 Gy Dose _{90%} ≤ 50 Gy
Normal tissue	Dose _{maximum} ≤ 110% of prescribed dose

Table S3. Number of extracted radiomic features.

Extracted radiomic features (n=651)							
	Shape	First-order	Texture				
			GLCM	GLSZM	NGTDM	GLRLM	GLDM
Original	14	18	0	0	0	0	0
Discretized	0	0	22	16	5	16	14
LoG _{0.5mm}	0	18	0	0	0	0	0
LoG _{2mm}	0	18	0	0	0	0	0
LoG _{3mm}	0	18	0	0	0	0	0
LoG _{4mm}	0	18	0	0	0	0	0
LoG _{4.5mm}	0	18	0	0	0	0	0
LoG _{5mm}	0	18	0	0	0	0	0
LoG _{0.5mm} + Discretized	0	0	22	16	5	16	14
LoG _{2mm} + Discretized	0	0	22	16	5	16	14
LoG _{3mm} + Discretized	0	0	22	16	5	16	14
LoG _{4mm} + Discretized	0	0	22	16	5	16	14
LoG _{4.5mm} + Discretized	0	0	22	16	5	16	14
LoG _{5mm} + Discretized	0	0	22	16	5	16	14
Sub-total	14	126	154	112	35	112	98

Shape features (3-dimensional)		First-order features	
1. Mesh volume	8. Maximum 2D diameter (column)	1. Energy	10. Interquartile range
2. Voxel volume	9. Maximum 2D diameter (row)	2. Total energy	11. Range
3. Surface area	10. Major axis length	3. Entropy	12. Mean absolute deviation
4. Surface area to volume ratio	11. Minor axis length	4. Minimum	13. Robust mean absolute deviation
5. Sphericity	12. Least axis length	5. 10th percentile	14. Root mean squared
6. Maximum 3D diameter	13. Elongation	6. 90th percentile	15. Skewness
7. Maximum 2D diameter (slice)	14. Flatness	7. Maximum	16. Kurtosis
		8. Mean	17. Variance
		9. Median	18. Uniformity
Gray level co-occurrence matrix (GLCM) features		Gray level size zone matrix (GLSZM) features	
1. Auto correction	12. Joint entropy	1. Small area emphasis	9. Zone variance
2. Joint average	13. Informational measure of correlation 1	2. Large area emphasis	10. Zone entropy
3. Cluster prominence	14. Informational measure of correlation 2	3. Gray level non-uniformity	11. Low gray level zone emphasis
4. Cluster shade	15. Inverse difference moment	4. Gray level non-uniformity normalized	12. High gray level zone emphasis
5. Cluster tendency	16. Inverse difference moment normalized	5. Size-zone non-uniformity	13. Small area low gray level emphasis
6. Contrast	17. Inverse difference	6. Size-zone non-uniformity normalized	14. Small area high gray level emphasis
7. Correlation	18. Inverse difference normalized	7. Zone percentage	15. Large area low gray level emphasis
8. Difference average	19. Inverse variance	8. Gray level variance	16. Large area high gray level emphasis
9. Difference entropy	20. Maximum probability	Gray level run length matrix (GLRLM) features	
10. Difference variance	21. Sum squares	1. Short run emphasis	9. Run variance
11. Joint energy	22. Sum entropy	2. Long run emphasis	10. Run entropy
Neighbouring gray tone difference matrix (NGTDM) features		3. Gray level non-uniformity	11. Low gray level run emphasis
1. Coarseness		4. Gray level non-uniformity normalized	12. High gray level run emphasis
2. Contrast		5. Run length non-uniformity	13. Short run low gray level emphasis
3. Busyness		6. Run length non-uniformity normalized	14. Short run high gray level emphasis
4. Complexity		7. Run percentage	15. Long run low gray level emphasis
5. Strength		8. Gray level variance	16. Long run high gray level emphasis
Gray level dependence matrix (GLDM) features			
1. Small dependence emphasis	6. Gray level variance	11. Small dependence low gray level emphasis	
2. Large dependence emphasis	7. Dependence variance	12. Small dependence high gray level emphasis	
3. Gray level non-uniformity	8. Dependence entropy	13. Large dependence low gray level emphasis	
4. Dependence non-uniformity	9. Low gray level emphasis	14. Large dependence high gray level emphasis	
5. Dependence non-uniformity normalized	10. High gray level emphasis		

Figure S1. Shape features, first-order features and texture features extracted from the $CTV_{prostate}$. Texture features include grey level co-occurrence matrix (GLCM) features, grey level size zone matrix (GLSZM) features, neighbouring grey tone difference matrix (NGTDM) features, grey level run length matrix (GLRLM) features and grey level dependence matrix (GLDM) features.