

Establishing a prediction model for prostate cancer bone metastasis

Supplementary Tables

Supplementary Table S1. Chi-square test for PI-RADS score of BM-negative and BM-positive patients (n=80).

	PI-RADS score	
	1-4	5
BM-negative group	22	17
BM-positive group	2	39
χ^2	25.275	
p value	<0.001***	

Supplementary Table S2. Univariate regression logistic analysis for BM-negative and BM-positive patients (n=308).

Variables	B	S.E	p value	OR (95% CI)
BGS ($\leq 3+4$; $\geq 4+3$)	1.729	0.300	<0.001	5.633 (3.128-10.141)
BGS (≤ 7 ; 8-10)	1.639	0.269	<0.001	5.150 (3.041-8.720)
cTx (T1-T2; T3-T4)	2.948	0.305	<0.001	19.071 (10.497-34.649)
cTx (T1-T3; T4)	2.979	0.453	<0.001	19.667 (8.086-47.834)
tPSA	0.010	0.002	<0.001	1.010 (1.007-1.013)
fPSA	0.107	0.014	<0.001	1.112 (1.082-1.143)
fPSA/tPSA	-1.051	1.368	0.442	0.350 (0.024-5.103)
Prostate volume	0.005	0.003	0.152	1.005 (0.998-1.012)
ALP	0.026	0.004	<0.001	1.026 (1.017-1.035)

Supplementary Table S3. The NRI of model E compared with the model C.

BM-negative group (n=183)	Model E			BM-positive group (n=125)	Model E		
	Negative	positive	Total		Negative	positive	Total
Model C	149	9	158	Model C	4	18	22
Negative	12	13	25	Negative	8	95	103
positive	161	22	183	positive	12	113	125
Total				Total			

$$\text{NRI} = (12-9)/183 + (18-8)/125 = 0.0964 = 9.64\%$$

$$Z = 0.0964 / \sqrt{[(12+9)/183^2 + (18+8)/125^2]} = 2.014$$

$$p = 0.044$$

Supplementary Table S4. Cross validation of the prediction model.

	Negative discriminant	Positive discriminant	Total
Bone scan negative	27	5	32
Bone scan positive	4	15	19
Total	31	20	51

Sensitivity = $15/(15+4)=78.9\%$

Specificity = $27/(27+5)=84.4\%$

Supplementary Table S5. External data validation of the prediction model.

	Negative discriminant	Positive discriminant	Total
Bone scan negative	24	5	29
Bone scan positive	3	11	14
Total	27	16	43

Sensitivity = $11/(11+3)=78.6\%$

Specificity = $24/(24+5)=82.8\%$

Supplementary Table S6. Comparison of all published prediction models.

Model name	AUC	95% CI	p value
Fudan CART model [26]	0.813	0.770-0.855	<0.010
Briganti CART model [12]	0.691	0.646-0.736	<0.050
SRE model [25]	0.645	0.607-0.683	<0.050
Wang Yiwei model [6]	0.900	0.870-0.930	<0.001
Present model	0.910	0.878-0.942	<0.001

Supplementary Table S7. Criteria for the bone scan in current guidelines.

EAU [6]	(i) Bone pain irrespective of serum tPSA level. (ii) Poorly differentiated tumours and locally advanced disease irrespective of the serum tPSA level.	(i) Asymptomatic patients, with a tPSA <20 ng/ml, and with a BGS \leq 3+4.
AUA [30]	(i) Clinically localized PCa and tPSA >20 ng/ml. (ii) Locally advanced disease. (iii) BGS \geq 8.	(i) Clinically localized PCa with a tPSA <20 ng/ml.
ESMO [31]	(i) Men with high-risk disease: T3-T4 or BGS >7 or tPSA >20 ng/ml. (ii) Men at intermediate risk: BM are suspected clinically or BGS \geq 4+3 or tPSA \geq 15 ng/ml.	(i) Men with low-risk disease: T1-T2a and BGS <7 and tPSA <10 ng/ml.
NCCN [29]	(i) T1 disease with a tPSA >20 ng/ml. (ii) T2 disease with a tPSA >10 ng/ml. (iii) BGS \geq 8. (iv) T3-T4 tumours or symptomatic disease.	-
CUA [13]	(i) Once diagnosed, especially for those with a tPSA \geq 20 ng/ml and a BGS >7.	-