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Validation of a three gene signature based-risk score for predicting distant metastasis in Chinese prostate cancer patients – a retrospective pilot study

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Aim

The objective is to retrospectively validate the prognostic value of a three stem cell gene-based risk score (P-score) for distant metastasis prediction in a cohort of Chinese prostate cancer (PCa) patients.

Method

In this study, we included 108 patients who were diagnosed with localized PCa and treated with radical prostatectomy (RP) in Affiliated Drum Tower Hospital, Medical School of Nanjing University between 2014 and 2018. The median follow-up time was 5.3 years. RNA was extracted from core needle biopsy and followed with gene expression analysis by Prostatype® RT-qPCR test. P-score was calculated for each patient by incorporating gene expression with clinical parameters such as Gleason score (GS) at diagnosis , PSA at diagnosis, and clinical T-stage at diagnosis. P-score ranged from interval 0 to 15 with 1 as the smallest unit and was categorised into three risk groups: low (0-2), intermediate (3-5), and high (6-15) as previously defined.

Results

Figure 1： The flow-chart of cohort selection in the study.

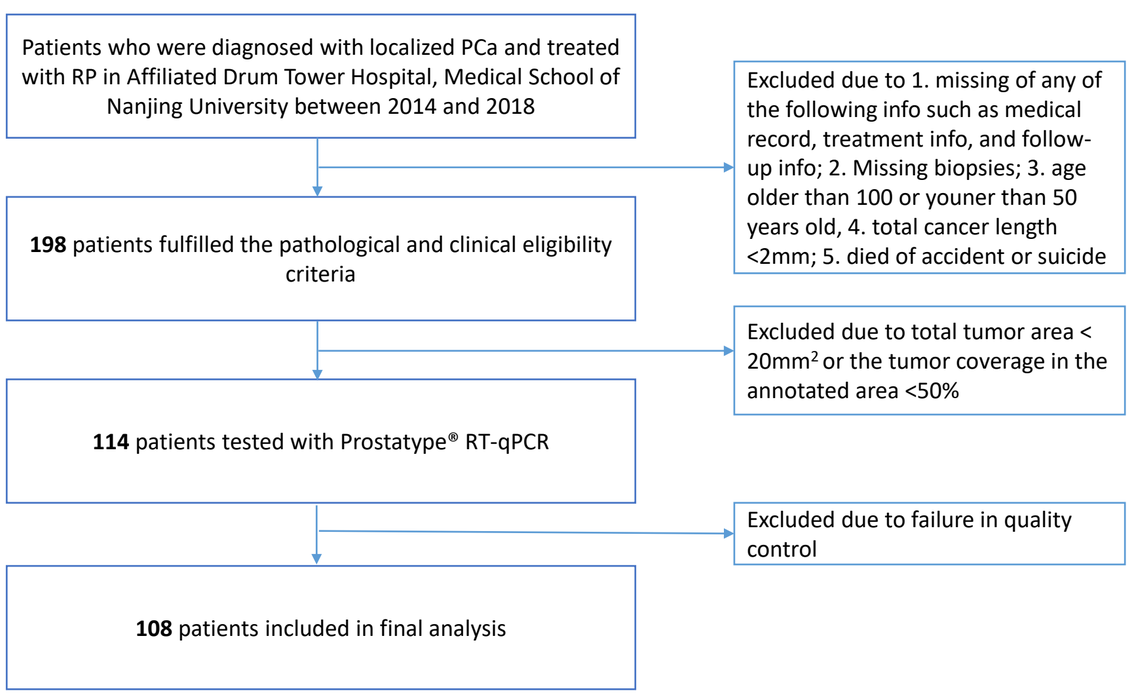


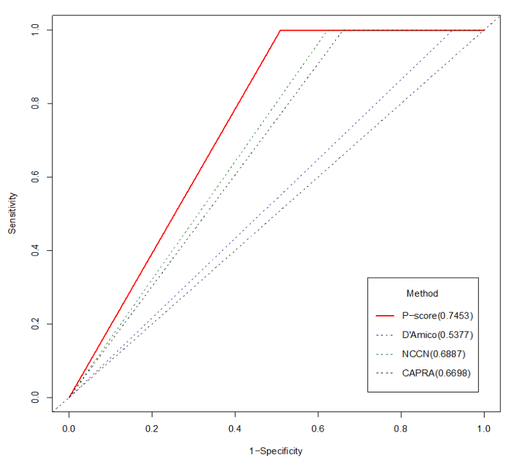
Table 1. Reclassification of the 108 patients who were initially assigned to D'Amico risk groups, using the P-score risk groups. As compared to D'Amico, P-score has downgraded 28 (26%) of patients into either intermediate-risk group or low-risk group.

Damico risk groups	P-score risk groups	Number of patients	Percentage in each group	Overall survival	Metastasis
Low	low	0	/	/	/
	intermediate	0	/	/	/
	high	0	/	/	/
Intermediate	low	0	/	/	/
	intermediate	6	100%	0	0
	high	0	/	/	/
High	low	4	3.92%	0	0
	intermediate	24	23.53%	0	0
	high	74	72.55%	9*	10**

*: Three out of the 9 patients were with PCa-specific mortality
**: Seven out of the 10 patients were with distant metastasis

Figure 2. (A). Comparison of P-score, D'Amico, NCCN, and CAPRA score by receiver Operator Curve analysis for 5 years distant metastasis prediction. P-score showed the highest area under curve (AUC) comparing to the other three score systems. (B) The net benefit was assessed by decision curves analysis for P-score, D'Amico, NCCN, and CAPRA score in predicting 5 years distant metastasis. P-score has the highest net-benefit.

2A



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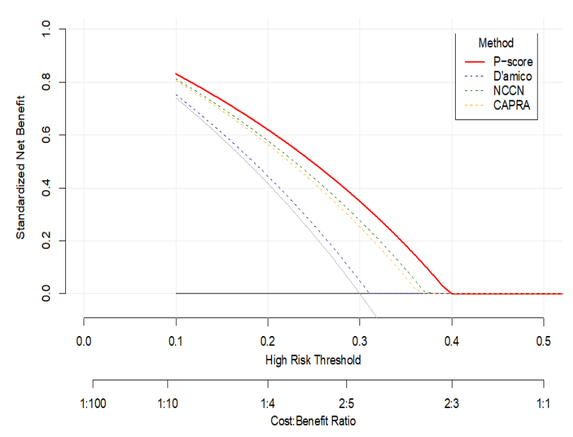
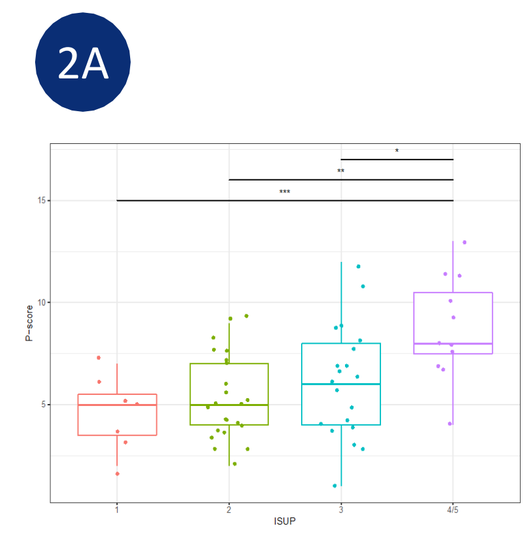


Figure 3. Association of core needle biopsy-based P-score with pathological features in RP samples (A) GS-ISUP grades and (B) pathological T-stage group. For 61 patients whose clinical T-stage were available, their P-score has shown a significant correlation with GS-ISUP grades and pathological T-stage in RP specimens.

2A



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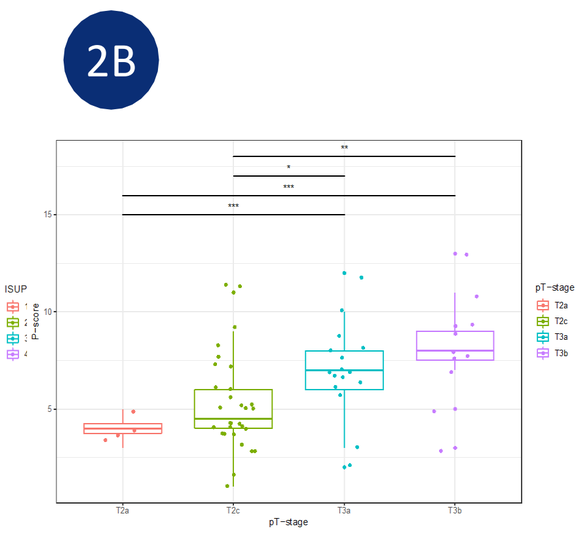

Conclusion

This is the first study to investigate whether if P-score, which was developed in Caucasian PCa population[1,2], could also serve as a prognostic tool in Asian PCa population. P-score reliably identified PCa patients with distant metastasis by assigning them with high risk. This suggests that patients identified with a high P-score did have an increased risk of distant metastasis even after radical prostatectomy. These patients may therefore benefit from a tighter and more intense post-surgery surveillance. P-score could potentially improve the stratification of PCa patients into relevant risk groups. This pilot study was based on a small cohort, therefore, further study with an enlarged cohort is needed to strengthen the prognostic value of the P-score.

Refer: [1]Söderdahl F *et al.*, Res Rep Urol 2022; [2]Xu LD *et al.*, The Journal of Urology 2021