

Supplementary Table

Supplementary Table S1. Primers of the risk gene sequence. F: Forward primer, R: Reverse primer

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Supplementary Figure

Supplementary Figure S1. Correlation analysis of risk gene expression and immune infiltration. A. PRKACA. B. ST3GAL2. C. PTGES. D. SLCO1B3.

Supplementary Figure S2. Prognostic nomogram for the 1-, 3- and 5-year PFI times of PAADs patients. Nomogram model in the ICGC(A) and merge cohort(B). Calibration curves of the nomogram for predicting 1-, 3-, and 5-year PFI in the the ICGC(C) and merge cohort(D).

Supplementary Case. A case for explored the potential clinical applications of the nomogram

Name	Sequence: F	Sequence: R
SLCO1B3	CAACAGCTGTGGAGCACAAG	GCCCAAGTAGACCCTTCCAA
PRKACA	TGGCCATGGAATGTCGTGAA	CTGTGTTCTGAGCGGGACTT
ST3GAL2	ACAGGTGGACAGAGCATCAC	CCCGTACACGTTACCTCAT
PTGES	TACGTGGTGGCCATCATCAC	TTCCGGTGGGCCCTGA

Table S1 Primers of the risk gene sequence

Supplementary Table S1. Primers of the risk gene sequence. F: Forward primer, R: Reverse primer

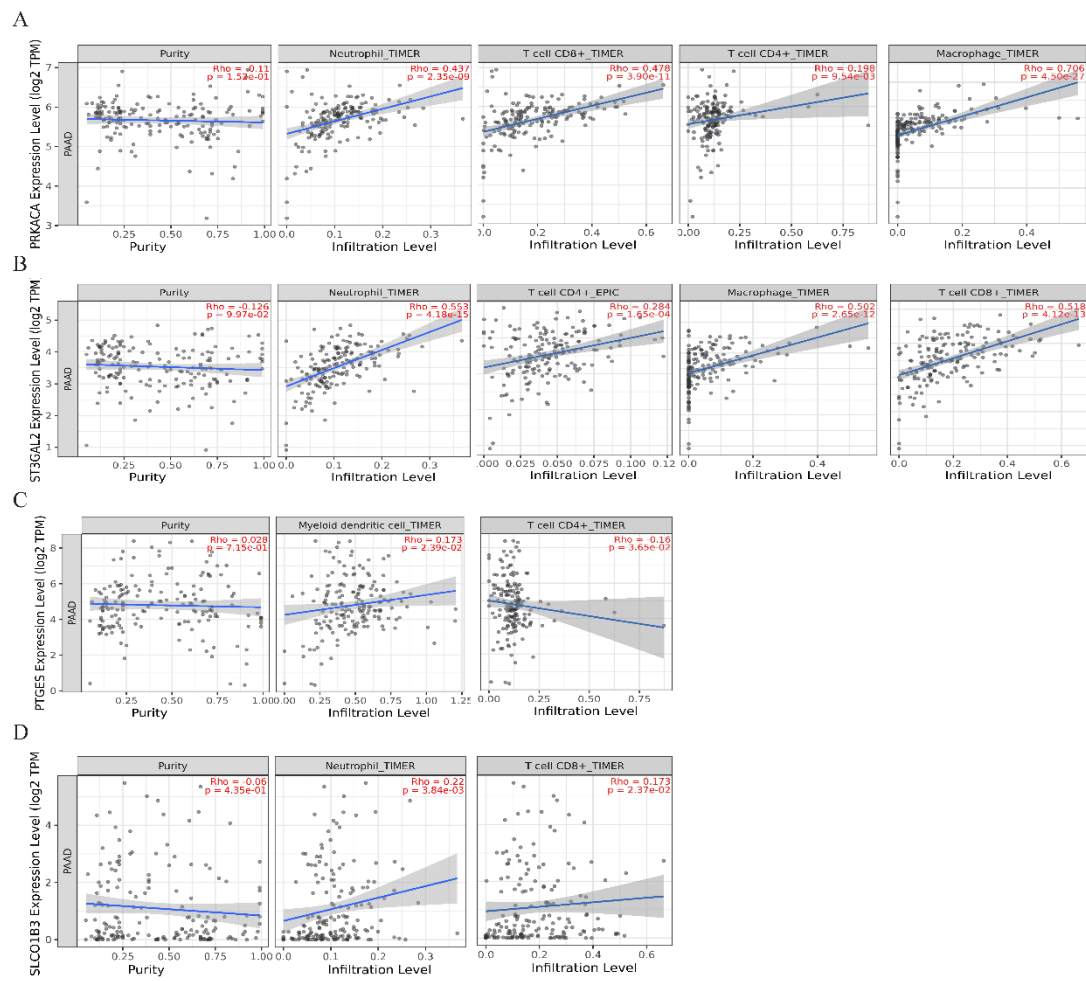
Characteristics	high risk	low risk	P value
n	37	38	
donor_sex, n (%)			0.107
male	17 (23%)	25 (33.8%)	
female	19 (25.7%)	13 (17.6%)	
donor_vital_status, n (%)			1.000
deceased	33 (44%)	33 (44%)	
alive	4 (5.3%)	5 (6.7%)	
disease_status_last_followup, n (%)			0.274
relapse	26 (35.1%)	22 (29.7%)	
progression	7 (9.5%)	11 (14.9%)	
partial remission	2 (2.7%)	0 (0%)	
complete remission	2 (2.7%)	4 (5.4%)	
donor_relapse_type, n (%)			0.170
local recurrence and distant metastasis	5 (7.7%)	9 (13.8%)	
local recurrence	4 (6.2%)	7 (10.8%)	
distant recurrence/metastasis	24 (36.9%)	16 (24.6%)	
donor_age_at_diagnosis, mean $\pm$ sd	66.135 $\pm$ 10.904	62.237 $\pm$ 12.465	0.154
donor_relapse_interval, median (IQR)	189 (137, 344)	397 (245.25, 656)	< 0.001
donor_survival_time, median (IQR)	330 (271, 628)	687 (447, 1079.2)	0.001
donor_interval_of_last_followup, median (IQR)	326 (239, 609)	678 (392.25, 1086.8)	0.001
prior_malignancy, n (%)			0.332
unknown	13 (18.1%)	17 (23.6%)	
no	15 (20.8%)	17 (23.6%)	
yes	7 (9.7%)	3 (4.2%)	
cancer_history_first_degree_relative, n (%)			0.823
unknown	5 (6.9%)	4 (5.6%)	
yes	18 (25%)	18 (25%)	
no	12 (16.7%)	15 (20.8%)	

Table S2 ICGC cohort baseline data table.

Characteristics	high risk	low risk	P value
n	49	49	
age, median (IQR)	55 (46, 68)	58 (49, 68)	0.318
gender, n (%)			0.683
female	25 (26%)	23 (24%)	
male	23 (24%)	25 (26%)	
Site, n (%)			0.551
Head of pancreas	40 (40.8%)	42 (42.9%)	
Body of pancreas	3 (3.1%)	4 (4.1%)	
Tail of pancreas	6 (6.1%)	3 (3.1%)	
Recurrence time, median (IQR)	472 (307, 587)	366 (268, 532)	0.127
TNM Stage, n (%)			0.964
III	11 (11.2%)	11 (11.2%)	
II	29 (29.6%)	29 (29.6%)	
IV	3 (3.1%)	2 (2%)	
I	6 (6.1%)	7 (7.1%)	
threapy, n (%)			0.034
chemotherapy	22 (22.4%)	12 (12.2%)	
no treament	27 (27.6%)	37 (37.8%)	
risk_score, median (IQR)	-6.6269 (-6.6818, -6.4663)	-6.8748 (-6.9753, -6.8229)	< 0.001

Table S3 Merge cohort baseline data table.

Figure S1 Correlation analysis of risk gene expression and immune infiltration



Supplementary Figure S1. Correlation analysis of risk gene expression and immune infiltration. A. PRKACA. B. ST3GAL2. C. PTGES. D. SLCO1B3.

Figure S2 Prognostic nomogram for the 1-, 3- and 5-year PFI times of PAADs patients.

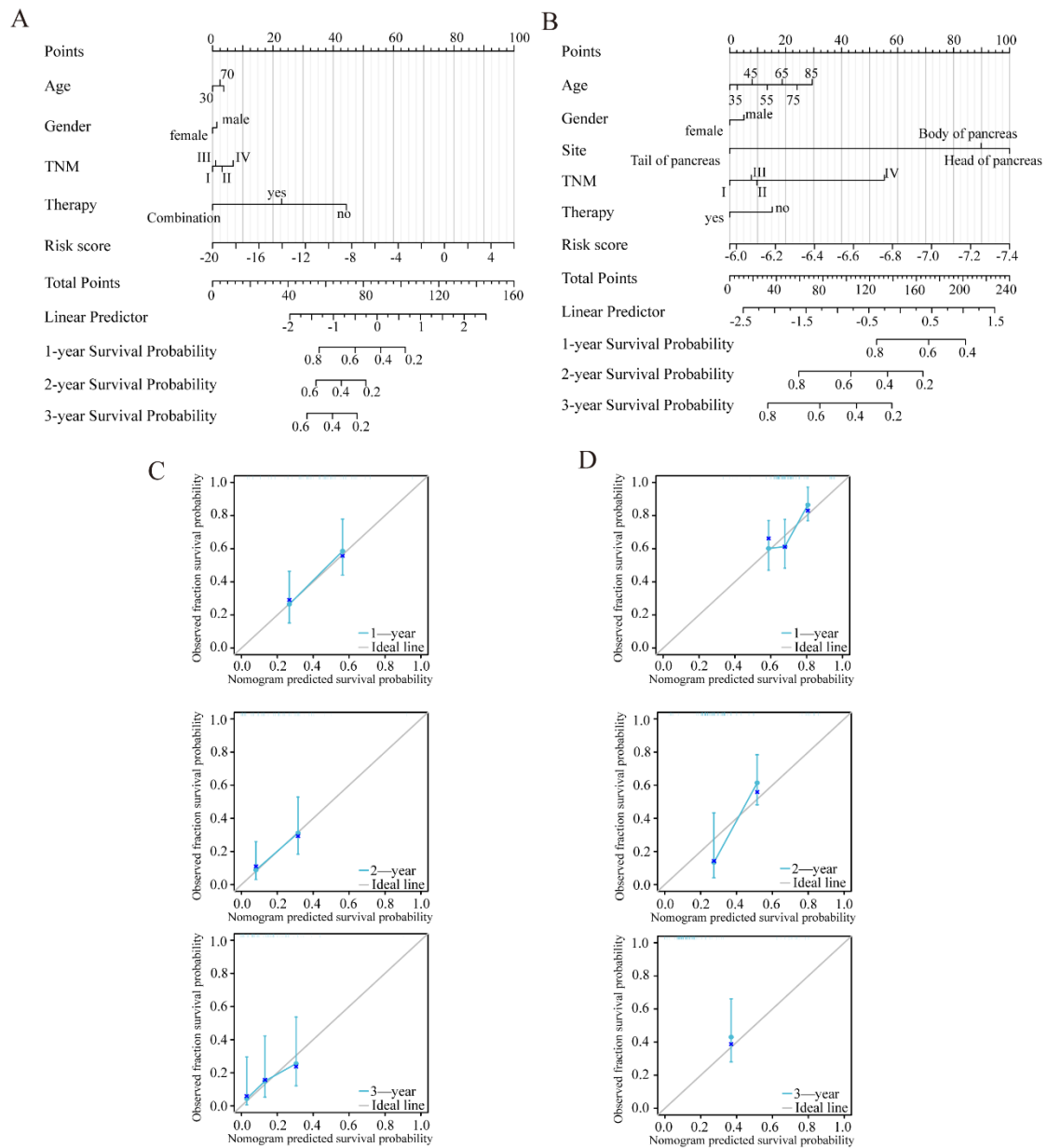


Figure S2 Prognostic nomogram for the 1-, 3- and 5-year PFI times of PAADs patients. Nomogram model in the ICGC(A) and merge cohort(B). Calibration curves of the nomogram for predicting 1-, 3-, and 5-year PFI in the the ICGC(C) and merge cohort(D).

Supplementary Case

Case background

The patient, a 65-year-old male, was diagnosed with Site (Head of pancreas) pancreatic ductal adenocarcinoma with stage IV TNM (distant metastasis). The patient had underlain cardiovascular disease and a physical status score of ECOG 2. The clinical team needs to decide whether to recommend systemic chemotherapy combined with immunotherapy or to switch to palliative care. The prognosis was assessed by nomogram

1. Variable input

- Age: 65 years → corresponds to 65 years in the "Age" axis, which is about 40 Points.
- Gender: male → "Gender" axis selects "male", get about -3.5 Points.
- Tumor Site: Head of pancreas → "Site" axis selected "Head of pancreas", about 20 Points were obtained.
- TNM stage: Stage IV → Corresponding to the highest risk, about 80 Points.
- Treatment: Assuming "yes" (chemotherapy + immunotherapy) → about -2 Points.
- Risk score: 2 Points based on patient genetic test results (e.g., PTGES mutation, SLCO1B3 deletion).

2. Total score calculation

- Total Points = 40 (Age) -3.5 (Gender) +20 (Site) +80 (TNM) -2 (Therapy) +2 (Risk) = 136.5 Points.
- According to the Linear Predictor axis, 136.5 Points corresponds to a linear forecast value of approximately 3.2.

3. Survival probability prediction

- 1 year survival probability: corresponding 0.4 (40%).
- 2-year survival probability: corresponding 0.2 (20%).
- 3-year survival probability: Less than 0.2 (model does not show a specific value).

4. Clinical decision support

Evaluation of treatment options

- If you choose "no therapy":

Total Points = 40-3.5 +20 +80 +0 (Therapy=no) +2 = 138.5 Points → 1-year survival probability <30%.

- Comparison results: Active treatment (Therapy=yes) improved 1-year survival by about 10%, but weighed against chemotherapy toxicity (patient ECOG 2).

5. Patient communication and individualized programs

- Patients were shown the difference in probability of survival: "Aggressive treatment may extend survival by 3-6 months, but side effects such as fatigue and nausea need to be tolerated".
- According to the patient's wishes (which tend to prioritize quality of life), the final adjustment plan is selected:
- Reduced chemotherapy (e.g., 20% reduction in FOLFIRINOX dose)
- Combined with CD36 inhibitors (targeting lipid metabolism, refer to previous lipid metabolism studies^{1,2})

6. Dynamic monitoring and model validation

- Review after 3 months of treatment: If CA19-9 decreased by >50%, the risk score was recalculated (adjusted to -1 Point) → the 1-year survival probability was updated to 50%

- If new liver metastases (TNM progression) occur, the score should be re-scored and the predicted value adjusted.

7. Clinical application value of nomogram

- Quantitative prognosis stratification

For patients with stage IV pancreatic cancer, a total score of >120 Points indicates very high risk (3-year survival <10%) and can be prioritized for inclusion in clinical trials (such as targeting lipid metabolism drugs [135]).

- Multidisciplinary collaboration tools

Scores shared by oncology, surgery and nutrition departments: Total score >100 with malnutrition (Risk score↑) → preoperative intensive nutritional support. Total score <80 and young patients → Evaluate the possibility of surgical resection

- Optimal allocation of resources

In areas with limited medical resources, second-line therapy (such as PARP inhibitors) is prioritized for patients with a total score of 80-100 Points because of its higher potential benefit.

References

1. Pascual G, Avgustinova A, Mejetta S, et al. Targeting metastasis-initiating cells through the fatty acid receptor CD36. *Nature*. Jan 5 2017;541(7635):41-45. doi:10.1038/nature20791
2. Ma X, Xiao L, Liu L, et al. CD36-mediated ferroptosis dampens intratumoral CD8(+) T cell effector function and impairs their antitumor ability. *Cell Metab*. May 4 2021;33(5):1001-1012.e5. doi:10.1016/j.cmet.2021.02.015