

## Supplementary

**Table S1** Prognostic analysis of CNV in *CENPL*, *DARS2*, and *PAICS* genes

Cancer type	Symbol	sur_type	log_rank_p
LUAD	<i>CENPL</i>	OS	0.98
LUAD	<i>CENPL</i>	PFS	0.63
LUAD	<i>CENPL</i>	DSS	0.94
LUAD	<i>CENPL</i>	DFI	0.39
LUAD	<i>DARS2</i>	OS	0.98
LUAD	<i>DARS2</i>	PFS	0.64
LUAD	<i>DARS2</i>	DSS	0.95
LUAD	<i>DARS2</i>	DFI	0.39
LUAD	<i>PAICS</i>	OS	0.87
LUAD	<i>PAICS</i>	PFS	0.50
LUAD	<i>PAICS</i>	DSS	0.45
LUAD	<i>PAICS</i>	DFI	0.35

LUAD, lung adenocarcinoma; OS, overall survival; PFS, progression-free survival; DSS, disease-free survival; DFI, disease-free interval; *CENPL*, centromere protein L; *DARS2*, aspartyl-tRNA synthetase 2; *PAICS*, phosphoribosylaminoimidazole carboxylase; CNV, copy number variation.

**Table S2** Differential methylation analysis of *CENPL*, *DARS2* and *PAICS*

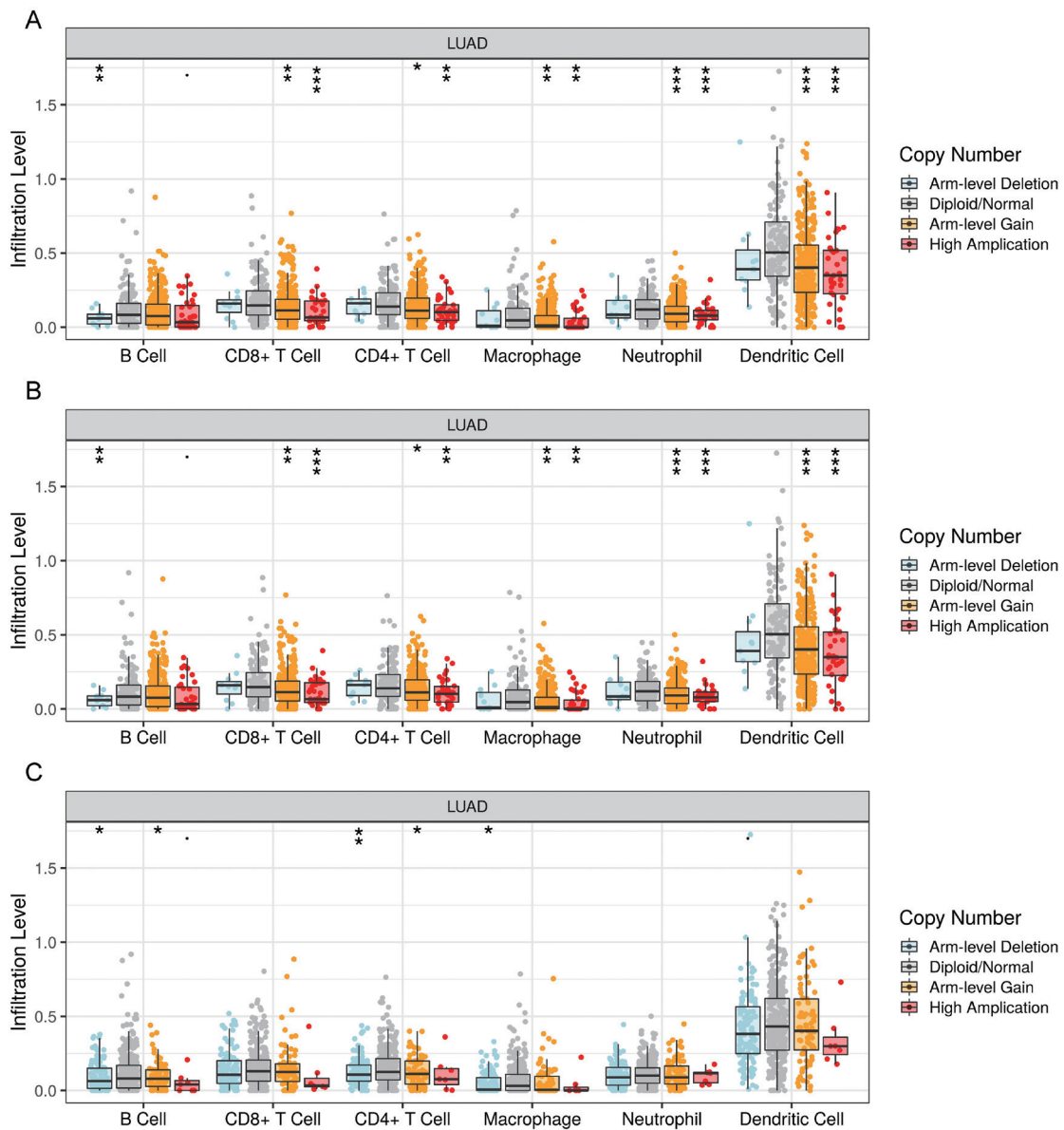
Cancer type	Symbol	gene_tag	FC	trend	P value	FDR
LUAD	<i>CENPL</i>	cg24405650_CENPL	-0.022325558	Down	0.001	0.00056928
LUAD	<i>DARS2</i>	cg25061451_DARS2	-0.020325127	Down	0.02	0.023238023
LUAD	<i>PAICS</i>	cg12370884_PAICS	-0.006104501	Down	0.02	0.018903187

LUAD, lung adenocarcinoma; FC, fold change; FDR, false discovery rate; *CENPL*, centromere protein L; *DARS2*, aspartyl-tRNA synthetase 2; *PAICS*, phosphoribosylaminoimidazole carboxylase.

**Table S3** Results of methylation prognostic analysis of *CENPL*, *DARS2* and *PAICS*

Cancer type	Symbol	Meth tag	Survival type	Log-rank P value	Cox P value	HR
LUAD	<i>CENPL</i>	cg24405650	OS	0.18528469	0.19	1.233523698
LUAD	<i>CENPL</i>	cg24405650	PFS	0.462739792	0.46	1.101747619
LUAD	<i>CENPL</i>	cg24405650	DSS	0.111492068	0.11	1.376169952
LUAD	<i>CENPL</i>	cg24405650	DFI	0.444527174	0.44	1.192596472
LUAD	<i>DARS2</i>	cg25061451	OS	0.425125375	0.43	1.134137806
LUAD	<i>DARS2</i>	cg25061451	PFS	0.808484917	0.81	0.968593358
LUAD	<i>DARS2</i>	cg25061451	DSS	0.878326496	0.88	1.031373297
LUAD	<i>DARS2</i>	cg25061451	DFI	0.368185694	0.37	1.229848846
LUAD	<i>PAICS</i>	cg12370884	OS	0.929258282	0.93	0.985972398
LUAD	<i>PAICS</i>	cg12370884	PFS	0.405418837	0.41	1.116363234
LUAD	<i>PAICS</i>	cg12370884	DSS	0.396993812	0.40	0.841732874
LUAD	<i>PAICS</i>	cg12370884	DFI	0.100709472	0.10	1.45821878

LUAD, lung adenocarcinoma; OS, overall survival; PFS, progression-free survival; DSS, disease-free survival; DFI, disease-free interval; HR, hazard ratio; *DARS2*, aspartyl-tRNA synthetase 2; *PAICS*, phosphoribosylaminoimidazole carboxylase.



**Figure S1** Copy number changes and immune cell infiltration analysis of *CENPL*, *DARS2*, and *PAICS*. (A) Correlation between *CENPL* CNV and B cells, CD4<sup>+</sup> T cells, CD8<sup>+</sup> T cells, macrophages, neutrophil, and dendritic cells; (B) Correlation between *DARS2* CNV and B cells, CD4<sup>+</sup> T cells, CD8<sup>+</sup> T cells, macrophages, neutrophil, and dendritic cells; (C) Correlation between *PAICS* CNV and B cells, CD4<sup>+</sup> T cells, CD8<sup>+</sup> T cells, macrophages, neutrophil, and dendritic cells. \*, P<0.05; \*\*, P<0.01; \*\*\*, P<0.001. *CENPL*, centromere protein L; *DARS2*, aspartyl-tRNA synthetase 2; *PAICS*, phosphoribosylaminoimidazole carboxylase; CNV, copy number variation.