

Figure S1 Assessment of data distribution and marker gene annotation in a quality-controlled single-cell public datasets. Assessment of the quality control measures including feature, count, mitochondrial genes, and annotation genes of all samples in the GSE117570 (A), GSE131907 (B), GSE123902 (C), and GSE149655 (D) datasets was conducted.

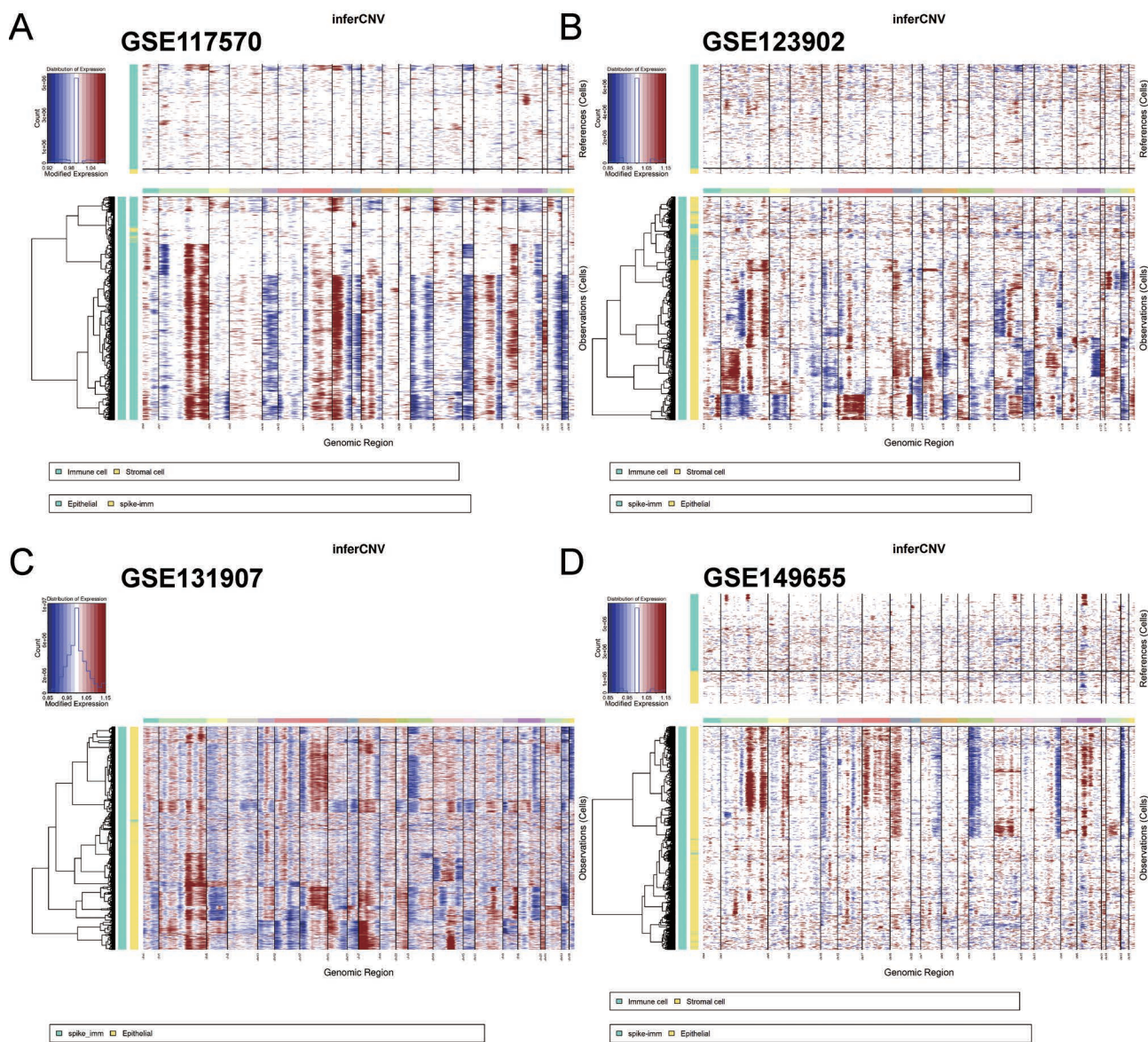


Figure S2 InferCNV heatmaps. InferCNV was utilized to generate GSE117570 (A), GSE123902 (B), GSE131907 (C), and GSE149655 (D) heatmaps for comparison of copy number differences in all cells, with amplification and deletion represented by red and blue colors, respectively. The intensity of the color, with darker red indicating greater copy number amplification and darker blue indicating greater copy number deletion, is used to illustrate the degree of copy number alteration. The 4 data sets used “spik-immune” as the reference.

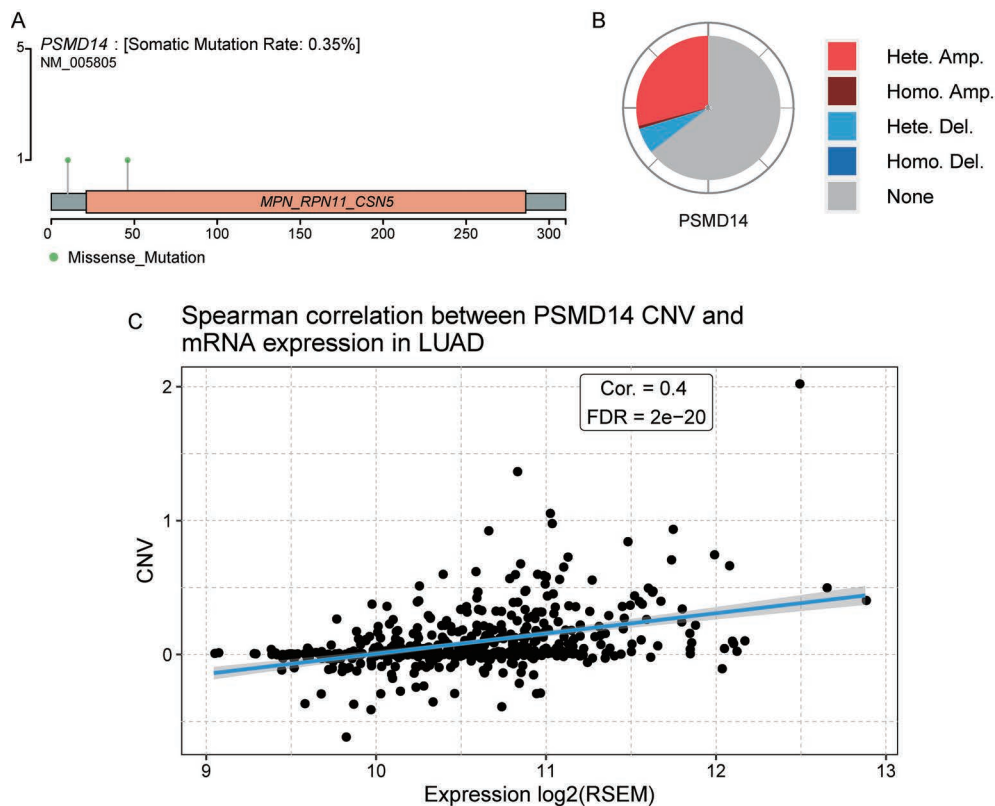


Figure S3 Identification of *PSMD14* gene alterations in LUAD. (A) The visualization of single nucleotide site mutations in *PSMD14*, with missense mutations represented by green dots. (B) A pie chart depicting the distribution of copy number alterations in *PSMD14*. (C) The Spearman rank correlation test was employed to assess the correlation between copy number alterations and expression levels of *PSMD14*.

Table S1 Cell annotation used in this study

Cell type	Signature genes
Endothelial cells	<i>CLDN5, VWF, PECAM1</i>
Epithelial cells	<i>CAPS, SNTN</i>
Alveolar cells	<i>CLDN18, AQP4, FLOR1</i>
Fibroblasts	<i>COL1A1, COL1A2, DCN</i>
T cells	<i>CD2, CD3D, CD3E, CD3G</i>
B cells	<i>CD79A, CD79B</i>
Myeloid cells	<i>CD14, LYZ</i>
Neutrophils	<i>CSF3R, S100A8, S100A9</i>
Follicular dendritic cells	<i>FDCSP</i>
Mast cells	<i>GATA2, TPSAB1, TPSB2</i>

Table S2 Primer sequences

Description	Sequence
<i>PSMD14</i> forward	5'-AAGTTATGGGTTTGATGCTTGGA-3'
<i>PSMD14</i> reverse	5'-ATACCAACCAACAACCATCTCC-3'
GAPDH forward	5'-GGAGCGAGATCCCTCCAAAAT-3'
GAPDH reverse	5'-GGCTGTTGTCATACTTCTCATGG-3'
Si-AGR2	5'-CAAGACAAGCAACAAACCCTT-3'
sh <i>PSMD14</i> #1	5'-CAAGCCATCTATCCAGGCATT-3'
sh <i>PSMD14</i> #2	5'-CATGGACTAAACAGACATTAT-3'

Table S3 Top 100 interacting proteins of PSMD14 screened based on BioGRID database

#BioGRID interaction ID	Official Symbol interactor A	Official symbol interactor B	Experimental system	Experimental system type
241710	PAAF1	<i>PSMD14</i>	Affinity Capture-MS	Physical
241776	PSMD13	<i>PSMD14</i>	Affinity Capture-MS	Physical
241992	PSMD6	<i>PSMD14</i>	Affinity Capture-MS	Physical
335425	<i>PSMD14</i>	<i>PSMD10</i>	Affinity Capture-Western	Physical
423721	PSMD7	<i>PSMD14</i>	Affinity Capture-MS	Physical
423722	UCHL5	<i>PSMD14</i>	Affinity Capture-MS	Physical
423723	USP14	<i>PSMD14</i>	Affinity Capture-MS	Physical
559078	PSMA1	<i>PSMD14</i>	Affinity Capture-Western	Physical
561140	UBC	<i>PSMD14</i>	Affinity Capture-MS	Physical
589823	INSIG2	<i>PSMD14</i>	Affinity Capture-MS	Physical
607404	SHFM1	<i>PSMD14</i>	Affinity Capture-MS	Physical
607549	MITF	<i>PSMD14</i>	Two-hybrid	Physical
609536	PCK1	<i>PSMD14</i>	Affinity Capture-MS	Physical
664574	PSMA6	<i>PSMD14</i>	Co-fractionation	Physical
664580	PSMD4	<i>PSMD14</i>	Affinity Capture-Western	Physical
664581	TXNL1	<i>PSMD14</i>	Affinity Capture-Western	Physical
666088	RAD23A	<i>PSMD14</i>	Affinity Capture-MS	Physical
666227	PSMD3	<i>PSMD14</i>	Affinity Capture-Western	Physical
668989	FKBP8	<i>PSMD14</i>	Affinity Capture-MS	Physical
684072	PSMA2	<i>PSMD14</i>	Affinity Capture-MS	Physical
726228	GRB2	<i>PSMD14</i>	Affinity Capture-MS	Physical
740927	PSMC1	<i>PSMD14</i>	Co-fractionation	Physical
740928	PSMC2	<i>PSMD14</i>	Co-fractionation	Physical
740929	PSMD12	<i>PSMD14</i>	Co-fractionation	Physical
740978	PSMD11	<i>PSMD14</i>	Co-fractionation	Physical
740980	PSMD10	<i>PSMD14</i>	Co-fractionation	Physical
741152	PSMC6	<i>PSMD14</i>	Co-fractionation	Physical
741451	PSMC3	<i>PSMD14</i>	Co-fractionation	Physical
741560	PSMC5	<i>PSMD14</i>	Co-fractionation	Physical
742798	PSMC4	<i>PSMD14</i>	Co-fractionation	Physical
743561	PSMB1	<i>PSMD14</i>	Co-fractionation	Physical
743681	PSMA7	<i>PSMD14</i>	Co-fractionation	Physical
743698	PSMB6	<i>PSMD14</i>	Co-fractionation	Physical
743725	PSMB2	<i>PSMD14</i>	Co-fractionation	Physical
743732	PSMA5	<i>PSMD14</i>	Co-fractionation	Physical
743751	PSMB4	<i>PSMD14</i>	Co-fractionation	Physical
743769	PSMB3	<i>PSMD14</i>	Co-fractionation	Physical
743770	PSMB7	<i>PSMD14</i>	Co-fractionation	Physical
744000	PSMA4	<i>PSMD14</i>	Co-fractionation	Physical
746235	PSMA8	<i>PSMD14</i>	Co-fractionation	Physical
748223	NUDCD2	<i>PSMD14</i>	Co-fractionation	Physical
833377	NOS2	<i>PSMD14</i>	Affinity Capture-MS	Physical
855950	PARK2	<i>PSMD14</i>	Affinity Capture-MS	Physical
874469	RNF11	<i>PSMD14</i>	Affinity Capture-MS	Physical
895351	OLIG1	<i>PSMD14</i>	Two-hybrid	Physical
924245	AHNAK2	<i>PSMD14</i>	Co-fractionation	Physical
924246	KIAA0368	<i>PSMD14</i>	Co-fractionation	Physical
924251	PSMD2	<i>PSMD14</i>	Co-fractionation	Physical
935975	PSME1	<i>PSMD14</i>	Affinity Capture-Western	Physical
1029747	HUWE1	<i>PSMD14</i>	Affinity Capture-MS	Physical
1040271	MEOX2	<i>PSMD14</i>	Two-hybrid	Physical
1066792	AMFR	<i>PSMD14</i>	Affinity Capture-MS	Physical

Table S3 (continued)

Table S3 (continued)

#BioGRID interaction ID	Official Symbol interactor A	Official symbol interactor B	Experimental system	Experimental system type
1173194	ABCE1	<i>PSMD14</i>	Affinity Capture-MS	Physical
1182169	CCDC74B	<i>PSMD14</i>	Affinity Capture-MS	Physical
1185705	CCDC92	<i>PSMD14</i>	Affinity Capture-MS	Physical
1193052	ADRM1	<i>PSMD14</i>	Affinity Capture-MS	Physical
1195490	PSMB9	<i>PSMD14</i>	Affinity Capture-MS	Physical
1268118	APOB	<i>PSMD14</i>	Co-fractionation	Physical
1268119	PDIA5	<i>PSMD14</i>	Co-fractionation	Physical
1268121	PSMA3	<i>PSMD14</i>	Co-fractionation	Physical
1268125	PSMB5	<i>PSMD14</i>	Co-fractionation	Physical
1268131	PSMD1	<i>PSMD14</i>	Co-fractionation	Physical
1268136	PSMD5	<i>PSMD14</i>	Co-fractionation	Physical
1268138	PSMD9	<i>PSMD14</i>	Co-fractionation	Physical
1268139	SPDL1	<i>PSMD14</i>	Co-fractionation	Physical
1275792	NTRK1	<i>PSMD14</i>	Affinity Capture-MS	Physical
1430209	OFD1	<i>PSMD14</i>	Proximity Label-MS	Physical
1432674	CNTRL	<i>PSMD14</i>	Proximity Label-MS	Physical
1433051	NPHP1	<i>PSMD14</i>	Proximity Label-MS	Physical
1433517	DCTN1	<i>PSMD14</i>	Proximity Label-MS	Physical
1433766	POC5	<i>PSMD14</i>	Proximity Label-MS	Physical
1435074	TMEM67	<i>PSMD14</i>	Proximity Label-MS	Physical
1509540	E2F1	<i>PSMD14</i>	Affinity Capture-Western	Physical
1512514	MID1	<i>PSMD14</i>	Affinity Capture-MS	Physical
1512935	Ksr1	<i>PSMD14</i>	Affinity Capture-MS	Physical
2214649	UBLCP1	<i>PSMD14</i>	Affinity Capture-MS	Physical
2361743	HSD17B10	<i>PSMD14</i>	Affinity Capture-MS	Physical
2362331	SOD1	<i>PSMD14</i>	Affinity Capture-MS	Physical
2383909	BRCA1	<i>PSMD14</i>	Affinity Capture-MS	Physical
2391347	MCM9	<i>PSMD14</i>	Affinity Capture-MS	Physical
2448111	CFTR	<i>PSMD14</i>	Affinity Capture-MS	Physical
2460399	ZNF598	<i>PSMD14</i>	Affinity Capture-MS	Physical
2462251	EHMT2	<i>PSMD14</i>	Affinity Capture-MS	Physical
2462339	L3MBTL1	<i>PSMD14</i>	Affinity Capture-MS	Physical
2463633	HIF1AN	<i>PSMD14</i>	Affinity Capture-MS	Physical
2465374	EGLN3	<i>PSMD14</i>	Affinity Capture-MS	Physical
2466370	MAPK6	<i>PSMD14</i>	Affinity Capture-MS	Physical
2473046	MAP2K1	<i>PSMD14</i>	Affinity Capture-MS	Physical
2496165	USP15	<i>PSMD14</i>	Affinity Capture-MS	Physical
2515229	UBE3A	<i>PSMD14</i>	Affinity Capture-MS	Physical
2515936	BPLF1	<i>PSMD14</i>	Affinity Capture-MS	Physical
2516041	FGF11	<i>PSMD14</i>	Affinity Capture-MS	Physical
2522041	HEXIM1	<i>PSMD14</i>	Affinity Capture-MS	Physical
2522886	MEPCE	<i>PSMD14</i>	Affinity Capture-MS	Physical
2527627	SNAI1	<i>PSMD14</i>	Affinity Capture-MS	Physical
2528468	AGR2	<i>PSMD14</i>	Proximity Label-MS	Physical
2531793	RECQL4	<i>PSMD14</i>	Affinity Capture-MS	Physical
2532270	ALDH1L1	<i>PSMD14</i>	Affinity Capture-MS	Physical
2533310	UBE2V1	<i>PSMD14</i>	Reconstituted Complex	Physical
2542401	UBQLN4	<i>PSMD14</i>	Affinity Capture-MS	Physical