

**Table S1** Correlation coefficients between the risk score and infiltrating immune cells

Immune cells	Cor	P value
T-cell CD8 <sup>+</sup> _TIMER	-0.39914	6.60E-07
Neutrophil_TIMER	-0.28174	0.000597
Myeloid dendritic cell_TIMER	-0.22273	0.007087
T-cell CD8 <sup>+</sup> _CIBERSORT	-0.28095	0.000619
T-cell CD4 <sup>+</sup> memory activated_CIBERSORT	-0.42847	7.60E-08
T-cell regulatory (Tregs)_CIBERSORT	0.186963	0.024339
Macrophage M0_CIBERSORT	0.202361	0.014648
Macrophage M1_CIBERSORT	-0.371	4.35E-06
Myeloid dendritic cell resting_CIBERSORT	-0.25605	0.00188
B-cell naive_CIBERSORT-ABS	-0.20917	0.011574
T-cell CD8 <sup>+</sup> _CIBERSORT-ABS	-0.31351	0.000123
T-cell CD4 <sup>+</sup> memory resting_CIBERSORT-ABS	-0.1815	0.028901
T-cell CD4 <sup>+</sup> memory activated_CIBERSORT-ABS	-0.41914	1.55E-07
T-cell follicular helper_CIBERSORT-ABS	-0.27094	0.00098
Macrophage M1_CIBERSORT-ABS	-0.32518	6.58E-05
Macrophage M2_CIBERSORT-ABS	-0.22657	0.006137
Myeloid dendritic cell resting_CIBERSORT-ABS	-0.28225	0.000583
Macrophage M1_QUANTISEQ	-0.29362	0.000338
NK cell_QUANTISEQ	0.168425	0.042864
T-cell CD8 <sup>+</sup> _QUANTISEQ	-0.36219	7.59E-06
T-cell regulatory (Tregs)_QUANTISEQ	-0.25115	0.002311
Uncharacterized cell_QUANTISEQ	0.218745	0.008209
T-cell_MCPCOUNTER	-0.23548	0.004354
T-cell CD8 <sup>+</sup> _MCPCOUNTER	-0.2817	0.000598
Cytotoxicity score_MCPCOUNTER	-0.40233	5.26E-07
NK cell_MCPCOUNTER	-0.31932	9.05E-05
Monocyte_MCPCOUNTER	-0.16454	0.04796
Macrophage/Monocyte_MCPCOUNTER	-0.16454	0.04796
Myeloid dendritic cell_MCPCOUNTER	-0.24475	0.003008
Myeloid dendritic cell activated_XCELL	-0.23957	0.003705
B-cell_XCELL	-0.20232	0.014669
T-cell CD4 <sup>+</sup> memory_XCELL	-0.33775	3.26E-05
T-cell CD8 <sup>+</sup> naive_XCELL	-0.30493	0.000192
T-cell CD8 <sup>+</sup> _XCELL	-0.30167	0.000227
T-cell CD8 <sup>+</sup> central memory_XCELL	-0.38538	1.70E-06
T-cell CD8 <sup>+</sup> effector memory_XCELL	-0.16542	0.046771
Common lymphoid progenitor_XCELL	-0.22163	0.007383
Myeloid dendritic cell_XCELL	-0.25166	0.002263
Macrophage_XCELL	-0.17866	0.031555
Plasmacytoid dendritic cell_XCELL	-0.31592	0.000108
T-cell CD4 <sup>+</sup> Th2_XCELL	-0.35784	9.92E-06
Immune score_XCELL	-0.2406	0.003556
T-cell CD4 <sup>+</sup> _EPIC	-0.19828	0.016814
T-cell CD8 <sup>+</sup> _EPIC	-0.2376	0.004007
NK cell_EPIC	-0.1891	0.022729

Cor, correlation.

**Table S2** Potential target genes (top 100) of USP30-AS1 were identified by coexpression analysis

Genes	Cor	P value
<i>IL12RB1</i>	0.859	1.16E-43
<i>PDCD1</i>	0.856	4.5E-43
<i>LAG3</i>	0.853	1.86E-42
<i>CXCR6</i>	0.837	1.67E-39
<i>TBX21</i>	0.829	3.61E-38
<i>IRF1</i>	0.824	2.03E-37
<i>IL18BP</i>	0.818	2.09E-36
<i>SIRPG</i>	0.81	3.9E-35
<i>APOBEC3G</i>	0.807	8.03E-35
<i>SLA2</i>	0.807	1.07E-34
<i>ZBP1</i>	0.805	2E-34
<i>PTPN7</i>	0.804	2.99E-34
<i>APOL3</i>	0.803	3.8E-34
<i>CXCR3</i>	0.802	5.27E-34
<i>TBC1D10C</i>	0.801	7.23E-34
<i>PSMB9</i>	0.798	1.53E-33
<i>MYO1G</i>	0.797	2.74E-33
<i>ACAP1</i>	0.796	3.69E-33
<i>APOBEC3H</i>	0.795	5.23E-33
<i>GNLY</i>	0.794	5.59E-33
<i>ARHGAP9</i>	0.79	1.94E-32
<i>CD7</i>	0.789	2.71E-32
<i>CTLA4</i>	0.789	2.87E-32
<i>PSMB10</i>	0.789	2.91E-32
<i>CD3D</i>	0.788	4.21E-32
<i>PRF1</i>	0.785	1.05E-31
<i>RASAL3</i>	0.783	1.61E-31
<i>IL21R</i>	0.782	2.65E-31
<i>NKG7</i>	0.781	2.97E-31
<i>CIITA</i>	0.781	3.05E-31
<i>GZMA</i>	0.781	3.28E-31
<i>IL18RAP</i>	0.778	7E-31
<i>GZMB</i>	0.777	8.46E-31
<i>PSTPIP1</i>	0.777	1.04E-30
<i>SP140</i>	0.776	1.2E-30
<i>SIT1</i>	0.776	1.22E-30
<i>WAS</i>	0.775	1.53E-30
<i>GZMH</i>	0.775	1.54E-30
<i>IFNG</i>	0.773	3.14E-30
<i>UBASH3A</i>	0.771	4.84E-30
<i>VAV1</i>	0.771	5.58E-30
<i>CD2</i>	0.771	5.79E-30
<i>HLA-DMB</i>	0.77	7.14E-30
<i>GNGT2</i>	0.768	1.18E-29
<i>HCST</i>	0.768	1.33E-29
<i>CD247</i>	0.765	2.54E-29
<i>CD38</i>	0.765	2.55E-29
<i>C1QA</i>	0.765	2.79E-29
<i>GBP5</i>	0.765	2.98E-29
<i>FASLG</i>	0.764	3.9E-29

**Table S2** (continued)

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Genes	Cor	P value
<i>HLA-DMA</i>	0.763	3.97E-29
<i>NCF4</i>	0.762	5.32E-29
<i>CD27</i>	0.758	1.59E-28
<i>NLRC5</i>	0.756	3.01E-28
<i>IL2RG</i>	0.755	3.27E-28
<i>ZAP70</i>	0.755	3.59E-28
<i>ZNF683</i>	0.755	3.88E-28
<i>HSH2D</i>	0.754	4.47E-28
<i>CCL5</i>	0.754	4.62E-28
<i>GBP4</i>	0.753	5.43E-28
<i>SASH3</i>	0.753	5.6E-28
<i>GZMM</i>	0.752	6.72E-28
<i>STAC3</i>	0.752	8.49E-28
<i>ICOS</i>	0.75	1.12E-27
<i>SNX20</i>	0.75	1.13E-27
<i>C2</i>	0.75	1.18E-27
<i>CD3E</i>	0.749	1.71E-27
<i>NCF1</i>	0.749	1.73E-27
<i>HLA-DPB1</i>	0.748	1.94E-27
<i>FERMT3</i>	0.748	2.24E-27
<i>CD74</i>	0.747	2.48E-27
<i>CCL4</i>	0.746	2.95E-27
<i>C1QB</i>	0.745	4.66E-27
<i>MYO1F</i>	0.744	5.31E-27
<i>BATF2</i>	0.744	5.81E-27
<i>S1PR4</i>	0.743	6.93E-27
<i>LST1</i>	0.743	7.75E-27
<i>CYTIP</i>	0.742	8.33E-27
<i>TMEM150B</i>	0.739	1.76E-26
<i>CCR5</i>	0.739	1.97E-26
<i>SLAMF1</i>	0.738	2.08E-26
<i>CD72</i>	0.738	2.2E-26
<i>CYTH4</i>	0.738	2.35E-26
<i>XLCL2</i>	0.737	2.74E-26
<i>DOK2</i>	0.735	4.18E-26
<i>FLT3LG</i>	0.735	4.41E-26
<i>CD8A</i>	0.735	4.44E-26
<i>FUT7</i>	0.734	5.34E-26
<i>CD48</i>	0.733	6.94E-26
<i>FAM78A</i>	0.733	7.14E-26
<i>CORO1A</i>	0.733	7.42E-26
<i>CRTAM</i>	0.732	8.18E-26
<i>LCK</i>	0.73	1.3E-25
<i>ZBED2</i>	0.73	1.34E-25
<i>TMC8</i>	0.73	1.48E-25
<i>CD37</i>	0.729	1.8E-25
<i>ITGAL</i>	0.729	1.93E-25
<i>HLA-DRB1</i>	0.728	2.02E-25
<i>ITGB7</i>	0.728	2.22E-25
<i>RAC2</i>	0.728	2.23E-25

Cor, correlation.