

**SUPPLEMENTARY TABLES**

**Supplementary Table 1. The correlation between TFAP2A expression and infiltrating immune cells in ACC, CHOL, DLBC, ESCA, GBM, HNSC, LUAD, LUSC, OV, PAAD, SKCM, THCA, UCEC, UVM.**

	ACC	CHOL	DLBC	ESCA	GBM	HNSC	LUAD	LUSC	OV	PAAD	SKCM	THCA	UCEC	UVM
aDC	-0.0119	0.0311	0.076	-0.0429	-0.2658***	0.1248**	0.1132**	-0.1847***	0.1571**	-0.0249	-0.2668***	0.1249**	0.0103	-0.3809***
B cells	-0.1997	-0.1109	-0.1792	-0.3292***	-0.0836	-0.1491***	-0.1241**	-0.3088***	0.1075*	-0.2144**	-0.1579***	0.1317**	-0.0686	-0.2074
CD8 T cells	-0.3361**	-0.2129	-0.2765	-0.2376**	0.0499	-0.0894*	-0.125**	-0.2204***	0.1387**	-0.2137**	-0.096*	0.1965***	-0.0891*	-0.002
Cytotoxic cells	-0.2947**	-0.2311	-0.1711	-0.0456	-0.2981***	-0.1564***	-0.0685	-0.3204***	0.1611**	-0.291***	-0.2006***	0.0771	-0.2009***	-0.3821***
DC	-0.2205	-0.1367	0.0129*	-0.1264	-0.2132**	-0.16***	-0.172***	-0.2476***	0.1614**	-0.195**	-0.1626***	0.1437**	-0.1017*	-0.1835
Eosinophils	-0.157	-0.512**	-0.2054	-0.5642***	-0.1447	0.0128	-0.1992***	-0.3001***	0.0172	-0.3718***	-0.1179*	0.3074***	-0.0648	-0.2331*
iDC	-0.2167	-0.0093	-0.1399	-0.0392	-0.187*	-0.1435**	-0.1737***	-0.3792***	0.0715	-0.2377**	-0.3453***	0.185***	-0.0881*	-0.2789*
Macrophages	-0.227*	-0.0193	-0.0486*	-0.0386	-0.2506**	-0.119**	-0.0855*	-0.3176***	0.0575	-0.0766	-0.3864***	0.1079*	-0.0583	-0.4255***
Mast cells	-0.1284	-0.0955	0.045*	-0.2941***	-0.0718	-0.1265**	-0.2024***	-0.3157***	0.0277	-0.3485***	-0.2279***	0.1346**	-0.0255	-0.3164**
Neutrophils	-0.1552	0.0414	0.0062**	-0.2031**	-0.1833*	0.093*	-0.0236	-0.1975***	0.146**	-0.1496*	-0.2375***	0.0678	0.0408	-0.3409**
NK														
CD56bright cells	-0.3455**	0.0324	-0.0601	-0.3471***	-0.1915*	-0.2606***	0.0275	0.0136	0.053	0.2771***	-0.1525***	0.0753	-0.0977*	-0.2395*
NK														
CD56dim cells	-0.092	-0.1115	0.1701	0.25**	-0.2563***	0.0227	0.1073*	-0.1439**	0.1732***	-0.0856	-0.3123***	0.0948*	-0.1049*	-0.4691***
NK cells	-0.0647	0.4293**	0.0084**	0.1271	-0.2709***	-0.1462**	0.079	0.0708	-0.0414	-0.1085	-0.1512**	0.0165	0.009	-0.204
pDC	-0.2412*	-0.3959*	-0.0856	-0.514***	0.0094	-0.3327***	-0.1099*	-0.1987***	0.0461	-0.3113***	-0.3251***	0.0817	-0.122**	-0.2523*
T cells	-0.2983**	-0.1876	-0.1779	-0.2887***	-0.2323**	-0.1025*	-0.0766	-0.3223***	0.1656**	-0.322***	-0.2327***	0.1255**	-0.1476***	-0.4195***
T helper cells	0.025	-0.2633	-0.0424*	-0.16*	-0.1086	0.1407**	-0.0194	-0.1176**	0.1232*	-0.0956	-0.2449***	0.2024***	-0.0034	-0.1389
Tem	0.0653	-0.2232	-0.1659	0.402***	0.1082	0.2179***	-0.0571	0.0592	0.1172*	-0.084	-0.1351**	0.1837***	0.1377**	0.0207
Tem	-0.0886	-0.1104	-0.1344	-0.5188***	0.0941	-0.1586***	-0.1342**	-0.1038*	0.1313*	-0.1389	-0.0322	0.0322	-0.0873*	-0.1192
TFH	-0.211	-0.0165	-0.2302	-0.174*	0.0984	-0.0307	-0.1301**	-0.2556***	0.0294	-0.349***	-0.3006***	0.2019***	-0.0548	-0.3773***
Tgd	-0.0889	-0.0082	0.0038**	0.0793	0.0311	0.1851***	0.0317	-0.2336***	-0.1038*	-0.1999**	-0.2453***	0.1336**	-0.0131	-0.5756***
Th1 cells	-0.11	-0.0206	0.0319*	-0.0735	-0.0521	0.1011*	-0.0253	-0.2637***	0.1208*	-0.0619	-0.341***	0.2395***	-0.1164**	-0.5636***
Th17 cells	-0.0772	-0.2342	-0.0299*	-0.5629***	-0.1172	0.0138	-0.0981*	-0.1642***	0.1109*	-0.2741***	-0.1342**	0.0729	-0.0152	0.3918***
Th2 cells	0.3564**	0.0625	-0.0725	0.1119	0.118	0.1258**	0.2262***	-0.1154**	0.0834	0.2516***	-0.1307**	0.1733***	0.1428***	-0.5833***

(Spearman correlation coefficient and P-Value, \*p < 0.05, \*\*p < 0.01, and \*\*\*p < 0.001.)

**Supplementary Table 2. Sequence of primers.**

<b>Primer name</b>	<b>Sequence</b>
TFAP2A-F	GACCTCTCGATCCACTCCTTAC
TFAP2A-R	GAGACGGCATTGCTGTTGGACT
PD-L1-F	TGCCGACTACAAGCGAATTACTG
PD-L1-R	CTGCTTGTCCAGATGACTTCGG
GAPDH-F	CGGAGTCAACGGATTTGGTCGTAT
GAPDH-R	AGCCTTCTCCATGGTGGTGAAGAC
IDO1-F	GCCTGATCTCATAGAGTCTGGC
IDO1-R	TGCATCCCAGAACTAGACGTGC
LAG3-F	GCAGTGTACTIONCACAGAGCTGTC
LAG3-R	AAGCCAAAGGCTCCAGTCACCA
IL12A-F	TGCCTTCACCACTCCCAAACC
IL12A-R	CAATCTCTTCAGAAGTGCAAGGG
CCL5-F	ACACACTTGGCGGTTCTTTTCGG
CCL5-R	CCTGCTGCTTTGCCTACATTGC
PRF1-F	ACTCACAGGCAGCCAACTTTGC
PRF1-R	CTCTTGAAGTCAGGGTGCAGCG
ICAM1-F	AGCGGCTGACGTGTGCAGTAAT
ICAM1-R	TCTGAGACCTCTGGCTTCGTCA

**Supplementary Table 3. The sequences of five PD-L1 promoter region and predicted binding sites.**

Site	Sequences
P1 (-2400 to +100 bp)	<p>ATGACTCACCTGAGGACAATGTTAAAAATGTTGACCTCCAAGACCCTGCCCAAGTTGGATCCCAGGCAGAACCTGGAA  ATCTGTATTTTAAACATTAACCCCAAGTCGAGTGAATGCAAGTAACCATCAGAGACACTCTGAGAAACAGCACATTGGCA  ATGATGAATTTATATGTCTAAAAATGAATAGAGTAGATGTTACATGAATAGGAAAGTGGTGGTATTCAAGATGACCATAGTATC  TAGCTCTTCAGCCCTGGCTCCCCACTGCTCTTCTCCCATCTCAGCACTTCTCCATCTATTTTCGTCAAAATAAAAAAATTCACA  CAGAGTTTCAGGACTTAACCCCACTATTAACCATCTGTTTGTCTTTACATATTTTCTGAGGTAATAAAAAATTTCTCTTTT  CTAAACACAGCCTGTTTTCAATCTCCGGGTAGTTGATCAATTGTATGGGAAAATGAATGGCTGAAGGGTAGAAAACAGGTG  GGAAAGATGAACAAAAACGAATCCTCACATTAATAACGCAAATCACTGAGCAGCAAGCTGAGCAAATACCCCTCAAT  TCCCATCAGCAACTTTAGAGAAAGGCAAATCCGTTTGCCTCATTGATCATTAGGTAGACCCTGAACACTGCTTTCATAAA  ACAAAAACAAAATACCCATCCCAAGTTTAAAAAATTTATCATAGATCATCCAGGCCATCTAGGAGGATATGATTTAATCCTG  GCTACTTGGTAAATTTTGCCTCAAGTTAACTCAGCTAGTTAGTGGTAGATGGCTCTGAAGCCAGTTGTTTTTTTTTGTGTTT  TTTTTGCAGACCTCAAGAGTCATGATGAACCTAGCAGATCATAAAGTTTATGCCCTGGTCTTGACCATTTTAGAAAAATA  AAACATTAATAAATATCAGAGGCATTGCAGATAGTAGATCTAAGTATTTTTTCATGAAACTTGTGTACATGTGTGTGT  CATACACAGACTATATATATGCAGTACCTGTAACCTGATTGCCACATAATGTCTATATTTTCTAGAGGTACACAGTCACCAA  AGTTGGGAAGTCACCAACTTCGGGAAGTGGGAAGTCACCCAACTTACAGTCACCAAAATGCTCTATTCTACTATGT  GACCTCAAAAGTGATTTGAAAGAAAGGAACATCTGAGCTGGGCCAAACCTATTGCAATTTATTGGGGCCAAAGAGAAC  TCCATGCTCCTGCCAAATCAAGGCAGTGTGACGCTCAATAATTTCCAGATAAAAAATAAAAAATCTGTGATAACAATCAGAATG  TGAATTTCTTATTTTGAAGCAAATGTCATAACCAATGCAAGGGCTATCTCAATATTCATTATTGAGTATTTTGAATTTGAACT  GCAGTTGAAATGAATAAGAAAGGAAAGGCAAACAACGAAAGAGTCCAATTTCTCAATTTAGAAAAAGAAAAAAAAGAAAA  AGGGAGCACACAGGCACGGTGGCTCAAGCCTGTAATATCAGCACTTTGGCGGATCACTTGAGGTCAAGGAGTTCGAGAAA  AGAGAGCACCTAGAAGTTCAGCGCGGGATAATACTTAAGTAAATTATGACACCATCGTCTGTCATCTTGGGCCCATCTACTA  ACCCAAAGCTTTCAAAAGGGCTTTCTTAACCCTCCTAGAAATAGGCTTCCGACGCTTAATCCTTAGGGTGGCAGAATATC  AGGGACCTGAGCATTCTAAAAAGATGAGCTCGGGATGGGAAGTCTTTAATGACAAAAGCAAATGAAGTTTCATTATGT  CGAGGAATTTGAGGAAGTCACAGAATCCACGATTTAAAAATATTTTCCATTATACACCCATACACACACACACACACACT  ACTTTCTAGAATAAAAAACCAAGCCATATGGGTCTGCTGACTTTTTATATGTTGTAGAGTTATATCAAGTTATGTGTAAGA  TGTTCAAGTACCTTGAAGAGGCTTTTATCAGAAAGGGGACGCTTTCTGATAAAGGTTAAGGGGTAACCTTAAGCTCTTA  CCCCTGAAAGGTAATAAAGGTTGCGTTGAGATGTTGGCTTGTGTAAATTTCTTTTTTATTAATAACATACTAAATGTGG  ATTTGCTTTAATCTCGAACTCTTCCCGGTGAAAATCTCATTACAAGAAAAGTGGACTGACATGTTTCACTTTCTGTTTCA  TTTCTATACACAGCTTTATCCTAGGACACCAACTAGATACCTAAACTGAAAGCTTCCGCGGATTTACCGAAGGTCAGG  AAAGTCCAACGCGCGCAAACCTGGATTTGCTGCTTGGGCAGAGTGGGCGGGACCCCGCTCCGGCCTGGCGCAACG  CTGAGCAGCTGGCGCGTCCCGCGCGCCCAAGTTCTGCGCAGCTTCCCGAGGCTCCGACACCGCGCTTCTGTCCGCC  TGCAGGTAGGGAGCGTTTCTCCCGGGTGCCACGGCCAGTATCTC</p>
P2 (-1900 to +100 bp)	<p>GAACAAAACACGAATCCTCACATTAATAACGCAAATCACTGAGCAGCAAGCTGAGCAAATACCCCTCAATTTCCATCAG  CAACTTTAGAGAAAGGCAAATCCGTTTGCCTCATTGATCATTAGGTAGACCCTGAACACTGCTTTCATAAAAACAAAAAC  AAAATACCCATCCCAAGTTTAAAAAATTTATCATAGATCATCCAGGCCATCTAGGAGGATATGATTTAATCCTGGCTACTTGG  TAAATTTTGCCTCAAGTTAACTCAGCTAGTTAGTGGTAGATGGCTGAAAGCCAGTTGTTTTTTTTTGTGTTTTTGTGTTT  GACCTCAAGATCATGATGAACCTAGCAGATCATAAAGTTTATGCCCTGGTCTTGACCATTTTAGAAAAATAAAAAACATTA  ATGAAAATATCAGAGGCATTGCAGATAGTAGATCTAAGTATTTTTTCATGAAACTTGTGTACAACTTGTGTACATGTGTGT  ACTATATATATGCAGTACCTGTAACCTGATTGCCACATAATGTCTATATTTTCTAGAGGTACACAGTCACCAAAAGTTGGGAA  GTCACCCAACTTCGGGAAGTGGGAAGTCACCCAACTTACAGTCACCAAAATGCTCTATTCTACTATGTGACCTCAAA  AGTGATTTGAAAGAAGGAACATCTGAGCTGGGCCAAACCTATTGCAATTTATTGGGGCCAAAGAGAATCCATGCTCC  TGCCAAATCAAGGCAGTGTGACGCTCAATAATTTCCAGATAAAAAATAAAAAATCTGTGATAACAATCAGAATGTGAAAATTT  TATTTGGAAGCAAATGTCATAACCAATGCAAGGGCTATCTCAATTTCAATTTAGAAAAAGAAAAAAAAGAAAAAGGAGCAC  TGAATAAGAAAGGAAAGCAAACAACGAAGTCCAATTTCTCAATTTAGAAAAAGAAAAAAAAGAAAAAGGAGCAC  ACAGGCACGGTGGCTCAAGCCTGTAATATCAGCACTTTGGCGGATCACTTGAGGTCAAGGAGTTCGAGAAAAAGAGAGCAC  CTAGAAGTTCAGCGCGGGATAATACTTAAGTAAATTATGACACCATCGTCTGTCATCTTGGGCCATTCTACTAACCCAAAGC  TTTCAAAAGGGCTTTCTTAACCCTCCTAGAAATAGGCTTCCGACGCTTAATCCTTAGGGTGGCAGAATATCAGGGACCT  GAGCATTCTAAAAGATGAGCTCGGGATGGGAAGTCTTTAATGACAAAAGCAAATGAAGTTTCATTATGTGAGGAACT  TTGAGGAAGTACAGAATCCACGATTTAAAAATATTTTCCATTATACACCCATACACACACACACACTTTCTAGA  ATAAAAACCAAGCCATATGGGTCTGCTGACTTTTTATATGTTGTAGAGTTATATCAAGTTATGTAAGTATGTCAGTCA  CCTTGAAGAGGCTTTTATCAGAAAGGGGACGCTTTCTGATAAAGGTTAAGGGGTAACCTTAAGCTCTTACCCTCTGAA  GGTAAAATCAAGGTGCGTTCAGATGTTGGCTTGTGTAAATTTCTTTTTTATTAATAACATACTAAATGTGGATTGCTTTAA  TCTTCGAAACTCTTCCCGGTGAAAATCTCATTACAAGAAAAGTGGACTGACATGTTTCACTTTCTGTTTCAATTTCTATACA  CAGCTTTATCCTAGGACACCAACTAGATACCTAAACTGAAAGCTTCCGCGGATTTACCGAAGGTCAGGAAAAGTCCAA  CGCCCGGCAAACCTGGATTTGCTGCTTGGGCAGAGTGGGCGGGACCCCGCTCCGGCCTGGCGCAACGCTGAGCAGC  TGGCGCGTCCCGCGCGCCCAAGTTCTGCGCAGCTTCCCGAGGCTCCGACACCGCGCTTCTGTCCCGCTGCAGGTAG  GGAGCGTTGTTCTCCCGGGTGCCACGGCCAGTATCTC</p>
P3 (-1400 to +100 bp)	<p>ATATGCAGTACCTGTAACCTGATTGCCACATAATGTCTATATTTTCTAGAGGTACAGTCACCAAAGTTGGGAAGTCACC  CAACTTCGGGAAGTTTGGGAAGTCACCCAACTTACAGTCACCAAAATGCTCTATTCTACTATGTGACCTCAAAGTGAT  TTGAAAGAAAGGAACATCTGAGCTGGGCCAAACCTATTGCAATTTATTGGGGCCAAAGAGAATCCATGCTCCTGCCAA  ATCAAGGCAGTGTGACGCTCAATAATTTCCAGATAAAAAATAAAAAATCTGTGATAACAATCAGAATGTGAAAATTTCTATTT  GGAAGCAAATGTCATAACCAATGCAAGGGCTATCTCAATTTCAATTTAGAAAAAGAAAAAAAAGAAAAAGGAGCACACAGGC  AGAAGGAAAGGCAAACAACGAAGAGTCCAATTTCTCAATTTAGAAAAAGAAAAAAAAGAAAAAGGAGCACACAGGC  ACGGTGGCTCAAGCCTGTAATATCAGCACTTTGGCGGATCACTTGAGGTCAAGGAGTTCGAGAAAAAGAGAGCACCTAGAA  GTTCAAGCGCGGATAATACTTAAGTAAATTATGACACCATCGTCTGTCATCTTGGGCCATTCTACTAACCCAAAGCTTTCAA</p>

AAGGGCTTTCTTAACCCCTACCTAGAATAGGCTTCCGCAGCCTTAATCCTTAGGGTGGCAGAATATCAGGGACCCTGAGCA  
 TTCTTAAAAAGATGTAGCTCGGGATGGGAAGTTCTTTAATGACAAAAGCAAATGAAGTTTCATTATGTCGAGGAACTTTGAG  
 GAAGTCACAGAATCCACGATTTAAAAATATATTTCCATTATACACCCATACACACACACACACCTACTTTCTAGAATAAA  
 AACCAAAGCCATATGGGTCTGCTGCTGACTTTTTATATGTTGTAGAGTTATATCAAGTTATGTCAAGATGTTTCAGTCACCTTG  
 AAGAGGCTTTTATCAGAAAAGGGGACGCCTTTCTGATAAAGGTTAAGGGGTAACCTTAAGCTCTTACCCCTCTGAAGGTAA  
 AATCAAGGTGCGTTCAGATGTTGGCTTGTTGTAATTTCTTTTTTATTAATAACATACTAAATGTGGATTTGCTTAAATCTTC  
 GAAACTCTTCCCGGTGAAAATCTCATTACAAGAAAACCTGGACTGACATGTTTCACCTTTCTGTTTCATTTCTATACACAGCT  
 TTATTCTAGGACACCAACACTAGATACCTAAACTGAAAGCTTCCGCCGATTTACCGAAGGTCAGGAAAGTCCAACGCC  
 GGCAAACCTGGATTTGCTGCCTTGGGCAGAGGTGGGCGGGACCCCGCTCCGGGCCTGGCGCAACGCTGAGCAGCTGGCG  
 CGTCCCGCGCGGCCAGTTCTGCGCAGCTTCCCGAGGCTCCGCACCAGCCGCGCTTCTGTCCGCTGCAGGTAGGGAGC  
 GTTGTTCCTCCGCGGTGCCACGGCCAGTATCTC

CCTGTAATATCAGCACTTTGGCGGATCACTTGAGGTCAAGGAGTTCGAGAAAAGAGACACCTAGAAGTTCAGCGGGGA  
 TAATACTAAGTAAATTATGACACCATCGTCTGTCATCTTGGGCCATTCACTAACCCAAAGCTTTCAAAGGGCTTTCTTA  
 ACCCTCACCTAGAATAGGCTTCCGCAGCCTTAATCCTTAGGGTGGCAGAATATCAGGGACCCTGAGCATTCTTAAAAGATGT  
 AGCTCGGGATGGGAAGTTCTTTAATGACAAAAGCAAATGAAGTTTCATTATGTCGAGGAACTTTGAGGAAGTCACAGAATC  
 CACGATTTAAAAATATATTTCCATTATACACCCATACACACACACACACCTACTTTCTAGAATAAAAAACCAAAGCCATAT  
 GGGTCTGCTGCTGACTTTTTATATGTTGTAGAGTTATATCAAGTTATGTCAAGATGTTTCAGTCACCTTGAAGAGGCTTTTATC  
 AGAAAGGGGACGCCTTTCTGATAAAGGTTAAGGGGTAACCTTAAGCTCTTACCCCTCTGAAGGTAAATCAAGGTGCGT  
 TCAGATGTTGGCTTGTGTAATTTCTTTTTTATTAATAACATACTAAATGTGGATTTGCTTAAATCTCGAAACTCTCCCG  
 GTGAAAATCTCATTACAAGAAAACCTGGACTGACATGTTTCACCTTTCTGTTTCATTTCTATACACAGCTTTATTCTAGGACA  
 CCAACACTAGATACCTAAACTGAAAGCTTCCGCCGATTTACCGAAGGTCAGGAAAGTCCAACGCCCGGCAAACCTGGATT  
 TGCTGCCTTGGGCAGAGGTGGGCGGGACCCCGCTCCGGGCCTGGCGCAACGCTGAGCAGCTGGCGCGTCCCGCGCGGC  
 CCCAGTTCTGCGCAGCTTCCCGAGGCTCCGCACCAGCCGCGCTTCTGTCCGCTGCAGGTAGGGAGCGTTGTTCTCCCG  
 GGGTGCCACGGCCAGTATCTC

P4 (-900 to  
 +100 bp)

P5 (-400 to  
 +100 bp)

GACGCCTTTCTGATAAAGGTTAAGGGGTAACCTTAAGCTCTTACCCCTCTGAAGGTAATAATCAAGGTGCGTTCAGATGTTG  
 GCTTGTGTAATTTCTTTTTTATTAATAACATACTAAATGTGGATTTGCTTAAATCTCGAAACTCTCCCGGTGAAAATCT  
 CATTACAAGAAAACCTGGACTGACATGTTTCACCTTTCTGTTTCATTTCTATACACAGCTTTATTCTAGGACACCAACACTAG  
 ATACCTAAACTGAAAGCTTCCGCCGATTTACCGAAGGTCAGGAAAGTCCAACGCCCGGCAAACCTGGATTTGCTGCCTTG  
 GGCAGAGGTGGGCGGACCCCGCTCCGGGCCTGGCGCAACGCTGAGCAGCTGGCGCGTCCCGCGCGGCCAGTTCTG  
 CGCAGCTTCCCGAGGCTCCGCACCAGCCGCGCTTCTGTCCGCTGCAGGTAGGGAGCGTTGTTCTCCCGGGTGCCAC  
 GGCCAGTATCTC

Site	Sequences
-2354 to -2343 bp	TGCCCCAAGTT
-2301 to -2290 bp	AACCCCAAGTCG
-2165 to -2137 bp	GCCCTGGCT
-1930 to -1919 bp	TGGCTGAAGGGT
-1530 to -1519 bp	TGCCCTGGGTCT
-1183 to -1175 bp	GCCAAAGAG
-923 to -912 bp	AGCACACAGGCA
-908 to -897 bp	TGGCTCAAGCCT
-766 to -756 bp	AACCCAAAGCT
-711 to -695 bp	GCCTTAATCCTTAGGGT
-498 to -490 bp	GCCATATGG
-371 to -361 bp	AACCTTAAGCT
-80 to -67 bp	GCTGCCTTGGGCAG
54 to -33 bp	CCCCGCCTCCGGGCCTGGCGCA
-13 to +4 bp	TCCCGCGCGGCCAGTT
+14 to +24 bp	TTCCCGAGGCT
+47 to +58 bp	CGCCTGCAGGTA
+81 to +92 bp	TGCCACGGCCC