*Supplementary Material*

SPP1 as a potential prognostic and immunotherapy biomarker in human cancer

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**Supplementary Figure 1.** Differentiation, Proliferation, CA20, TP53, and RB signature scores for TCGA samples.



**Supplementary Figure 2.** Analysis of the association between overall survival and *SPP1* expression in different cancer types.

**Supplementary Figure 3.** Disease-specific survival analysis of the *SPP1* expression in different cancer types.



**Supplementary Figure 4.** Disease-free interval analysis of the *SPP1* expression in different cancer types.



**Supplementary Figure 5.** Progression-free survival analysis of the *SPP1* expression in different cancer types.



**Supplementary Figure 6.** The association of *SPP1* expression with histological grade for 16 cancer types.



**Supplementary Figure 7.** The association of *SPP1* expression with pathological stages for 21 cancer types.



**Supplementary Figure 8.** Correlation of *SPP1* expression with sex and age in different cancer types. **(a, b** The association of *SPP1* expression with sex differences in ESCA and SARC. **(c-j)** The association of *SPP1* expression with age differences in BLCA, CESC, HNSC, LIHC, PRAD, SARC, SKCM, and THYM. Only P<0.05 is shown.

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**Supplementary Figure 9.** GO functional analysis of low *SPP1* expression.

**Supplementary Table 1**. *SPP1* expression in cancers versus normal tissue in oncomine database. (P-value:0.001, Fold change:2, Gene rank: top 10%, Data Type: all)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Cancer | Cancer Type | P-value | Fold change | Rank (%) | Sample | Reference (PMID) |
| Bladder Cancer | Infiltration Bladder Urothelial Carcinoma | 1.19e-14 | 6.229 | 2% | 129 | 16432078 |
| Infiltration Bladder Urothelial Carcinoma | 1.08e-6 | 9.055 | 2% | 27 | 15173019 |
| Infiltration Bladder Urothelial Carcinoma | 6.22e-6 | 2.583 | 2% | 130 | 20421545 |
| Brain and CNS Cancer | Glioblastoma | 1.10e-7 | 5.740 | 1% | 15 | TCGA |
| Glioblastoma | 1.03e-6 | 2.346 | 4% | 31 | 16204036 |
| Glioblastoma | 2.21e-4 | 129.293 | 5% | 25 | 16697959 |
| Breast Cancer | Invasion Ductal Breast Carcinoma Stroma | 2.87e-5 | 16.337 | 1% | 22 | 17914389 |
| Ductal Breast Carcinoma in Situ | 7.62e-5 | 7.786 | 2% | 154 | 22522925 |
| Invasion Breast Carcinoma | 7.36e-6 | 4.068 | 5% | 163 | 22522925 |
| Mucinous Breast Carcinoma | 4.48e-13 | 4.116 | 6% | 190 | 22522925 |
| Tubular Breast Carcinoma | 4.30e-19 | 4.813 | 6% | 211 | 22522925 |
| Invasion Ductal and Invasion Lobular Breast Carcinoma | 5.72e-19 | 3.676 | 7% | 234 | 22522925 |
| Invasion Ductal Breast Carcinoma | 1.69e-48 | 3.980 | 9% | 1700 | 22522925 |
| Invasion Breast Carcinoma Type: Basal-Like Subtype of Invasion Breast Carcinoma | 1.17e-4 | 2.601 | 4% | 43 | 15897907 |
| Invasion Breast Carcinoma | 7.15e-15 | 4.740 | 6% | 137 | TCGA |
| Cervical Cancer | Cervical Squamous Cell Carcinoma | 1.93e-15 | 18.837 | 1% | 56 | 18506748 |
| High Grade Cervical Squamous Intraepithelial Neoplasia Epithelia | 2.37e-5 | 2.442 | 1% | 17 | 17974957 |
| Cervical Squamous Cell Carcinoma Epithelia | 3.43e-7 | 5.294 | 2% | 31 | 17974957 |
| Cervical Cancer | 2.55e-8 | 11.438 | 4% | 42 | 17510386 |
| Colorectal Cancer | Colon Mucinous Adenocarcinoma | 7.35e-11 | 35.194 | 1% | 18 | 17615082 |
| Cecum Adenocarcinoma | 5.54e-10 | 18.063 | 1% | 22 | 17615082 |
| Colon Adenocarcinoma | 1.50e-11 | 13.170 | 2% | 46 | 17615082 |
| Colon Mucinous Adenocarcinoma | 1.20e-14 | 35.002 | 1% | 44 | TCGA |
| Colon Adenocarcinoma | 4.11e-20 | 5.250 | 3% | 123 | TCGA |
| Rectal Adenocarcinoma | 1.66e-12 | 3.688 | 8% | 82 | TCGA |
| Colon Adenocarcinoma | 1.79e-04 | 4.988 | 4% | 36 | 11306497 |
| Colorectal Carcinoma | 9.44e-12 | 14.795 | 2% | 60 | 20957034 |
| Colon Carcinoma | 1.56e-9 | 44.932 | 2% | 15 | 20957034 |
| Colon Carcinoma Epithelia | 6.89e-6 | 31.724 | 9% | 15 | 20957034 |
| Colorectal Carcinoma | 1.91e-12 | 4.127 | 3% | 82 | 20143136 |
| Esophageal Cancer | Esophageal Squamous Cell Carcinoma | 1.99e-22 | 9.154 | 1% | 106 | 21385931 |
| Esophageal Squamous Cell Carcinoma | 3.89e-9 | 24.630 | 1% | 34 | 20955586 |
| Esophageal Adenocarcinoma | 4.58e-4 | 5.257 | 3% | 16 | 15833844 |
| Esophageal Adenocarcinoma | 3.28e-11 | 3.515 | 5% | 103 | 21152079 |
| Gastric Cancer | Gastric Cancer | 2.52e-10 | 4.042 | 1% | 160 | 20965966 |
| Diffuse Gastric Adenocarcinoma | 5.07e-10 | 5.999 | 1% | 50 | 21447720 |
| Gastric Intestinal Type Adenocarcinoma | 1.71e-4 | 3.587 | 4% | 39 | 21447720 |
| Gastric Intestinal Type Adenocarcinoma | 2.58e-13 | 15.519 | 1% | 57 | 19081245 |
| Gastric Cancer | 8.32e-5 | 7.611 | 2% | 27 | 21132402 |
| Head and Neck Cancer | Head and Neck Squamous Cell Carcinoma | 13.1e-20 | 43.614 | 1% | 54 | 14729608 |
| Oral Cavity Squamous Cell Carcinoma | 8.04e-24 | 11.215 | 1% | 79 | 21853135 |
| Head and Neck Squamous Cell Carcinoma | 3.81e-6 | 25.599 | 1% | 38 | 21853135 |
| Tongue Squamous Cell Carcinoma | 2.16e-6 | 2.576 | 1% | 38 | 18254958 |
| Tongue Squamous Cell Carcinoma | 2.52e-9 | 15.528 | 4% | 57 | 19138406 |
| Salivary Gland Adenoid Cystic Carcinoma | 1.78e-5 | 83.241 | 4% | 22 | 12368205 |
| Oral Cavity Squamous Cell Carcinoma Epithelia | 1.79e-5 | 4.598 | 3% | 20 | 15381369 |
| Tongue Squamous Cell Carcinoma | 7.68e-8 | 5.325 | 7% | 59 | 15833835 |
| Floor of the Mouth Carcinoma | 8.17e-5 | 10.398 | 5% | 27 | 17510386 |
| Kidney Cancer | Papillary Renal Cell Carcinoma | 1.11e-8 | 2.740 | 6% | 34 | 16115910 |
| Clear Cell Sarcoma of the Kidney | 3.07e-5 | -3.934 | 3% | 17 | 16299227 |
| Clear Cell Renal Cell Carcinoma | 6.91e-4 | -2.319 | 6% | 18 | 14641932 |
| Liver Cancer | Hepatocellular Carcinoma | 1.66e-10 | 7.505 | 2% | 57 | 19098997 |
| Cirrhosis | 5.68e-9 | 5.397 | 9% | 67 | 19098997 |
| Hepatocellular Carcinoma | 3.46e-6 | 3.002 | 4% | 45 | 17393520 |
| Hepatocellular Carcinoma | 1.53e-9 | 4.016 | 6% | 179 | 12058060 |
| Hepatocellular Carcinoma | 5.24e-6 | 8.999 | 7% | 43 | 21159642 |
| Lung Cancer | Lung Adenocarcinoma | 6.73e-38 | 20.616 | 1% | 107 | 18297132 |
| Lung Adenocarcinoma | 8.84e-23 | 16.376 | 1% | 110 | 20421987 |
| Squamous Cell Lung Carcinoma | 1.72e-23 | 21.100 | 1% | 92 | 20421987 |
| Large Cell Lung Carcinoma | 4.79e-7 | 9.093 | 4% | 84 | 20421987 |
| Squamous Cell Lung Carcinoma | 1.02e-18 | 20.369 | 1% | 62 | 20421987 |
| Lung Adenocarcinoma | 3.98e-16 | 14.731 | 1% | 57 | 17540040 |
| Lung Adenocarcinoma | 8.56e-13 | 15.011 | 1% | 39 | 16314486 |
| Lung Adenocarcinoma | 1.55e-5 | 23.783 | 1% | 149 | 11707567 |
| Squamous Cell Lung Carcinoma | 5.67e-7 | 60.245 | 2% | 38 | 11707567 |
| Lung Adenocarcinoma | 6.79e-24 | 10.445 | 1% | 116 | 22613842 |
| Squamous Cell Lung Carcinoma | 1.49e-4 | 26.391 | 2% | 10 | 16188928 |
| Squamous Cell Lung Carcinoma | 8.91e-5 | 14.452 | 3% | 19 | 11707590 |
| Lung Adenocarcinoma | 4.18e-4 | 9.467 | 5% | 46 | 11707590 |
| Lung Adenocarcinoma | 2.43e-4 | 6.877 | 9% | 96 | 12118244 |
| Lung Adenocarcinoma | 2.07e-9 | 15.546 | 9% | 246 | 22080568 |
| Lymphoma | Cutaneous Follicular Lymphoma | 1.41e-4 | 2.905 | 1% | 14 | 12713594 |
| Primary Effusion Lymphoma | 6.97e-8 | 137.979 | 2% | 34 | 15778709 |
| Centroblastic Lymphoma | 2.99e-9 | 12.803 | 6% | 53 | 15778709 |
| Diffuse Large B-Cell Lymphoma | 5.55e-18 | 12.096 | 3% | 64 | 19412164 |
| Germinal Center B-Cell-Like Diffuse Large B-Cell Lymphoma | 3.92e-4 | 5.406 | 10% | 29 | 19412164 |
| Unspecified Peripheral T-Cell Lymphoma | 1.31e-9 | 8.739 | 7% | 48 | 17304354 |
| Melanoma | Cutaneous Melanoma | 6.43e-8 | 13.322 | 3% | 52 | 16243793 |
| Melanoma | 4.19e-4 | 37.604 | 5% | 9 | 15833814 |
| Ovarian Cancer | Ovarian Serous Adenocarcinoma | 3.12e-5 | 25.623 | 1% | 10 | 14760385 |
| Ovarian Serous Adenocarcinoma | 6.61e-7 | 31.013 | 4% | 53 | 19486012 |
| Pancreatic Cancer | Pancreatic Ductal Adenocarcinoma | 1.31e-4 | 2.700 | 2% | 14 | 16103885 |
| Pancreatic Ductal Adenocarcinoma | 4.26e-11 | 6.619 | 3% | 78 | 19260470 |
| Prostate Cancer | Prostate Adenocarcinoma | 1.23e-4 | 2.185 | 4% | 35 | 12873976 |
| Prostate Carcinoma | 1.95e-5 | 3.004 | 5% | 87 | 22722839 |
| Sarcoma | Pleomorphic Liposarcoma | 2.88e-4 | 33.671 | 3% | 18 | 15994966 |
| Malignant Fibrous Histiocytoma | 9.15e-4 | 9.821 | 10% | 24 | 15994966 |
| Clear Cell Sarcoma of the Kidney | 3.07e-5 | -3.934 | 3% | 17 | 16299227 |
| Other Cancer | Adrenal Cortex Carcinoma | 2.55e-8 | 2.044 | 2% | 39 | 19147773 |
| Pleural Malignant Mesothelioma | 1.46e-4 | 11.128 | 6% | 49 | 15920167 |
| Vulvar Intraepithelial Neoplasia | 4.39e-4 | 6.552 | 6% | 19 | 17471573 |
| Malignant Fibrous Histiocytoma | 9.15e-4 | 9.821 | 10% | 24 | 15994966 |
| Teratoma, NOS | 1.69e-6 | 14.032 | 8% | 20 | 16424014 |
| Yolk Sac Tumor, NOS | 8.85e-5 | 7.717 | 9% | 15 | 16424014 |

**Supplementary Table 2**. The clinicopathological features of cancer patients

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | COAD | LIHC | STAD | BRCA |
| Age |  |  |  |  |
| ＞60 | 9 | 12 | 11 | 8 |
| ≤60 | 11 | 8 | 9 | 12 |
| Gender |  |  |  |  |
| Male | 14 | 17 | 15 | 0 |
| Female | 6 | 7 | 5 | 20 |
| TNM stage |  |  |  |  |
| Ⅰ+Ⅱ | 12 | 11 | 14 | 11 |
| Ⅲ+Ⅳ | 8 | 9 | 6 | 9 |
| Tumor differentiation |  |  |  |  |
| Well+moderate | 11 | 13 | 11 | 13 |
| Poor | 9 | 7 | 9 | 7 |
|  | | | | |

**Supplementary Table 3**. The SPP1 expression level between tumor and para-tumor tissues

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Samples | n=20 | COAD | | p**a** | LIHC | | p**a** | STAD | | p**a** | BRCA | | P**a** |
| Low | High | Low | High | Low | High | Low | High |
| Tumor | 20 | 6 | 14 | 0.027 | 8 | 12 | 0.028 | 7 | 13 | 0.011 | 5 | 15 | 0.004 |
| Para-tumor | 20 | 13 | 7 |  | 14 | 6 |  | 15 | 5 |  | 14 | 6 |  |
| a: **χ**2 test. | | | | | | | | | | | | | |

**Supplementary Table 4.** The association of *SPP1* expression with gender and age for 33 cancer types.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Cancer Type | Gender | | | Age | | |
| **Female(n)** | **Male(n)** | **P value** | **<60y(n)** | **≥60y(n)** | **P value** |
| ACC | 60 | 32 | 0.64 | 68 | 24 | 0.26 |
| BLCA | 119 | 317 | 0.14 | 95 | 341 | **0.013** |
| BRCA | 1223 | 13 | 0.81 | 667 | 568 | 0.44 |
| CESC | 312 | 0 | - | 245 | 67 | **0.0018** |
| CHOL | 23 | 22 | 0.4 | 13 | 32 | 0.52 |
| COAD | 261 | 284 | 0.19 | 145 | 400 | 0.64 |
| DLBC | 26 | 22 | 0.6 | 26 | 22 | 0.36 |
| ESCA | 33 | 171 | **0.045** | 89 | 115 | 0.8 |
| GBM | 234 | 368 | 0.54 | 314 | 288 | 0.76 |
| HNSC | 164 | 440 | 0.93 | 263 | 340 | **0.012** |
| KICH | 39 | 52 | 0.61 | 64 | 27 | 0.38 |
| KIRC | 237 | 617 | 0.67 | 431 | 513 | 0.39 |
| KIRP | 95 | 257 | 0.082 | 144 | 205 | 0.69 |
| LAML | 91 | 109 | 0.16 | 108 | 92 | 0.97 |
| LGG | 238 | 291 | 0.49 | 459 | 70 | 0.26 |
| LIHC | 146 | 292 | 0.14 | 191 | 246 | **0.029** |
| LUAD | 349 | 292 | 0.9 | 168 | 454 | 0.56 |
| LUSC | 165 | 458 | 0.084 | 112 | 502 | 0.66 |
| MESO | 16 | 71 | 0.63 | 27 | 60 | 0.82 |
| OV | 604 | 0 | - | 321 | 283 | 0.27 |
| PAAD | 87 | 109 | 0.94 | 62 | 134 | 0.86 |
| PCPG | 103 | 84 | 0.052 | 145 | 42 | 0.67 |
| PRAD | 0 | 566 | - | 229 | 337 | **0.035** |
| READ | 86 | 97 | 0.66 | 60 | 123 | 0.74 |
| SARC | 149 | 122 | **0.026** | 120 | 151 | **0.0028** |
| SKCM | 183 | 296 | 0.47 | 248 | 223 | **0.00052** |
| STAD | 190 | 321 | 0.55 | 146 | 360 | 0.24 |
| TGCT | 0 | 139 | - | 137 | 2 | 0.54 |
| THCA | 423 | 157 | 0.12 | 443 | 137 | 0.68 |
| THYM | 62 | 64 | 0.34 | 62 | 63 | **0.035** |
| UCEC | 583 | 0 | - | 195 | 385 | 0.65 |
| UCS | 57 | 0 | - | 6 | 51 | 0.93 |
| UVM | 35 | 45 | 0.56 | 36 | 44 | 0.7 |

**Supplementary Table 5.** Correlation analysis of *SPP1* expression with TMB and MSI for 33 cancer types.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Cancer Type | TMB | | MSI | |
| cor | pValue | cor | pValue |
| ACC | 0.263482 | 0.018967 | 0.142431 | 0.210507 |
| BLCA | 0.08316 | 0.093443 | -0.03536 | 0.476277 |
| BRCA | 0.045208 | 0.158599 | -0.01541 | 0.621069 |
| CESC | 0.182628 | 0.001928 | 0.108837 | 0.05887 |
| CHOL | 0.211259 | 0.216149 | 0.054311 | 0.752393 |
| COAD | 0.193104 | 0.00011 | 0.288664 | 1.22E-09 |
| DLBC | 0.405168 | 0.013431 | 0.09141 | 0.536635 |
| ESCA | -0.16148 | 0.041349 | 0.030629 | 0.700623 |
| GBM | -0.12777 | 0.12173 | -0.18947 | 0.019803 |
| HNSC | 0.073128 | 0.105211 | -0.05347 | 0.234569 |
| KICH | -0.00836 | 0.947324 | -0.14604 | 0.245732 |
| KIRC | 0.15283 | 0.005261 | 0.065978 | 0.228439 |
| KIRP | 0.086133 | 0.152054 | 0.008983 | 0.879984 |
| LAML | 0.16353 | 0.200325 | 0.023271 | 0.850592 |
| LGG | 0.102873 | 0.021281 | -0.0471 | 0.289352 |
| LIHC | 0.000628 | 0.99054 | 0.072546 | 0.164324 |
| LUAD | 0.039525 | 0.376381 | -0.14428 | 0.001073 |
| LUSC | -0.07522 | 0.096973 | -0.21147 | 2.17E-06 |
| MESO | 0.06491 | 0.569803 | -0.16279 | 0.143944 |
| OV | 0.124389 | 0.040364 | -0.1258 | 0.038132 |
| PAAD | -0.11676 | 0.153366 | -0.16119 | 0.033092 |
| PCPG | -0.06301 | 0.404716 | 0.017464 | 0.817019 |
| PRAD | 0.203449 | 6.73E-06 | 0.032165 | 0.475228 |
| READ | -0.00953 | 0.913671 | 0.125704 | 0.122803 |
| SARC | 0.286246 | 8.26E-06 | 0.202047 | 0.001233 |
| SKCM | -0.02208 | 0.634856 | 0.013746 | 0.766787 |
| STAD | 0.183639 | 0.000399 | 0.060231 | 0.245249 |
| TGCT | 0.025773 | 0.758301 | 0.159715 | 0.050904 |
| THCA | -0.04773 | 0.29566 | -0.01555 | 0.731051 |
| THYM | 0.30189 | 0.00094 | -0.06897 | 0.458043 |
| UCEC | 0.055538 | 0.203917 | 0.036698 | 0.395596 |
| UCS | 0.152844 | 0.260756 | -0.11754 | 0.388291 |
| UVM | -0.07442 | 0.511757 | -0.11676 | 0.302344 |

**Supplementary Table 6.** Correlation analysis of *SPP1* expression with immune and stromal score for 23 cancer types (Data for presentation only P < 0.001).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Cancer types | Immune Score | | Stromal Score | |
| R | P value | R | P value |
| BLCA | 0.42 | <2.2E-16 | 0.48 | <2.2E-16 |
| BRCA | 0.15 | 1.30E-06 | 0.23 | 3.50E-14 |
| CESC |  |  | 0.26 | 5.50E-06 |
| COAD | 0.5 | <2.2E-16 | **0.69** | <2.2E-16 |
| ESCA |  |  | 0.39 | 3.10E-07 |
| GBM | 0.6 | <2.2E-16 | 0.52 | <2.2E-16 |
| HNSC |  |  | 0.3 | 1.60E-11 |
| LGG | **0.69** | <2.2E-16 | **0.63** | <2.2E-16 |
| LIHC | 0.26 | 3.10E-07 |  |  |
| LUAD | 0.17 | 5.80E-05 | 0.32 | 7.60E-14 |
| LUSC | 0.16 | 0.00034 | 0.26 | 2.10E-09 |
| OV | **0.62** | <2.2E-16 | 0.52 | <2.2E-16 |
| PAAD |  |  | 0.25 | 0.00087 |
| PCPG | 0.33 | 6.40E-06 | 0.32 | 1.50E-05 |
| PRAD | 0.21 | 3.30E-06 | 0.28 | 3.80E-10 |
| READ | 0.46 | 5.50E-10 | **0.66** | <2.2E-16 |
| SARC | 0.28 | 5.50E-06 | 0.29 | 2.00E-06 |
| SKCM |  |  | 0.16 | 4.10E-04 |
| STAD |  |  | 0.25 | 1.50E-06 |
| TGCT |  |  | 0.43 | 3.10E-08 |
| THCA | **0.62** | <2.2E-16 | 0.37 | <2.2E-16 |
| THYM |  |  | 0.34 | 1.70E-04 |
| UCEC | 0.24 | 2.20E-08 |  |  |

**Supplementary Table 7.** Correlation analysis of *SPP1* expression with immune and stromal cells score for different tumor stages and grades (Data for presentation only P < 0.05).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Cancer types | Immune Score | | Stromal Score | |
| R | P value | R | P value |
| COAD-Stage1 | 0.42 | 0.00017 | 0.69 | <2.2e-16 |
| COAD-Stage2 | 0.57 | <2.2e-16 | 0.67 | <2.2e-16 |
| COAD-Stage3 | 0.46 | 5.8e-08 | 0.65 | <2.2e-16 |
| COAD-Stage4 | 0.5 | 3e-05 | 0.77 | <2.2e-16 |
| LGG-G2 | 0.56 | <2.2e-16 | 0.55 | <2.2e-16 |
| LGG-G3 | 0.74 | <2.2e-16 | 0.67 | <2.2e-16 |
| OV-G2 | 0.52 | 0.00034 | 0.52 | 0.00027 |
| OV-G3 | 0.65 | <2.2e-16 | 0.52 | <2.2e-16 |
| OV-Stage2 | 0.53 | 0.0098 | 0.64 | 0.0013 |
| OV-Stage3 | 0.63 | <2.2e-16 | 0.52 | <2.2e-16 |
| OV-Stage4 | 0.59 | 2.8e-06 | 0.48 | 2e-04 |
| READ-Stage1 |  |  | 0.53 | 0.0031 |
| READ-Stage2 | 0.35 | 0.012 | 0.63 | 1.6e-06 |
| READ-Stage3 | 0.52 | 0.00013 | 0.74 | <2.2e-16 |
| READ-Stage4 | 0.55 | 0.0057 | 0.62 | 0.0014 |
| THCA-Stage1 | 0.63 | <2.2e-16 | 0.37 | 1.4e-10 |
| THCA-Stage2 | 0.62 | 1.8e-06 | 0.39 | 0.0044 |
| THCA-Stage3 | 0.63 | <2.2e-16 | 0.48 | 1e-07 |
| THCA-Stage4 | 0.31 | 0.019 |  |  |

**Supplementary Table 8.** Correlation of *SPP1* expression with immunocytes in 33 cancer types.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Immune cell types** | **Gene** | **CancerType** | **R** | **p value** |
| Macrophages M0 | SPP1 | BLCA | 0.22 | 7.30E-05 |
| BRCA | 0.39 | 2.20E-16 |
| COAD | 0.22 | 2.50E-06 |
| DLBC | 0.63 | 2.70E-06 |
| GBM | 0.34 | 1.20E-05 |
| HNSC | 0.2 | 7.20E-06 |
| KIRP | 0.19 | 1.10E-05 |
| LGG | 0.24 | 4.30E-06 |
| LIHC | 0.32 | 1.80E-08 |
| PRAD | 0.39 | 3.10E-15 |
| SARC | 0.37 | 3.80E-09 |
| STAD | 0.33 | 9.00E-11 |
| TGCT | 0.28 | 0.00052 |
| THCA | 0.22 | 1.20E-05 |
| Macrophages M1 | SPP1 | COAD | 0.19 | 9.30E-05 |
| GBM | -0.31 | 5.20E-05 |
| HNSC | -0.17 | 8.50E-05 |
| SARC | -0.22 | 0.00054 |
| Macrophages M2 | SPP1 | BLCA | 0.21 | 0.00017 |
| BRCA | 0.18 | 5.60E-09 |
| CESC | 0.33 | 4.30E-09 |
| COAD | 0.43 | 2.20E-16 |
| ESCA | 0.41 | 2.40E-07 |
| GBM | -0.29 | 0.00022 |
| HNSC | 0.27 | 9.90E-10 |
| LGG | -0.19 | 0.00024 |
| LUAD | 0.17 | 9.40E-05 |
| LUSC | 0.32 | 1.60E-13 |
| READ | 0.53 | 6.10E-13 |
| SARC | 0.38 | 1.20E-09 |
| STAD | 0.38 | 2.50E-14 |
| TGCT | 0.48 | 5.10E-10 |
| THYM | 0.35 | 1.00E-04 |
| UCEC | 0.22 | 1.70E-06 |
| Mast cells resting | SPP1 | ACC | -0.53 | 3.00E-04 |
| BRCA | -0.19 | 1.70E-10 |
| CESC | -0.23 | 9.60E-05 |
| GBM | -0.28 | 0.00038 |
| LIHC | -0.21 | 0.00029 |
| SARC | -0.28 | 8.50E-06 |
| STAD | -0.17 | 0.00076 |
| Mast cells activated | SPP1 | COAD | 0.19 | 8.10E-05 |
| LGG | -0.19 | 0.00034 |
| STAD | 0.19 | 0.00024 |
| Neutrophils | SPP1 | BLCA | 0.21 | 0.00011 |
| BRCA | 0.33 | 2.20E-16 |
| LIHC | 0.28 | 1.00E-06 |
| LUAD | 0.25 | 8.60E-09 |
| OV | 0.38 | 4.70E-13 |
| STAD | 0.29 | 1.20E-08 |
| UCEC | 0.27 | 4.80E-09 |
| UCS | 0.51 | 0.00096 |
| STAD | 0.29 | 1.20E-08 |
| KIRC | 0.32 | 1.40E-13 |
| B cells naïve | SPP1 | BRCA | -0.24 | 3.50E-16 |
| ESCA | -0.33 | 4.60E-05 |
| LUAD | -0.18 | 4.60E-05 |
| SARC | -0.28 | 1.10E-05 |
| TGCT | -0.56 | 9.20E-14 |
| STAD | -0.27 | 1.70E-07 |
| Dendritic cells activated | SPP1 | BRCA | 0.13 | 9.20E-06 |
| LIHC | 0.19 | 0.00088 |
| OV | 0.23 | 3.40E-05 |
| PRAD | 0.25 | 1.40E-06 |
| TGCT | 0.29 | 0.00024 |
| Plasma cells | SPP1 | BRCA | -0.2 | 1.10E-11 |
| COAD | -0.2 | 2.60E-05 |
| ESCA | -0.3 | 0.00024 |
| PRAD | -0.17 | 0.00096 |
| T cells CD4 memory activated | SPP1 | COAD | -0.26 | 4.60E-08 |
| HNSC | -0.18 | 7.80E-05 |
| THCA | 0.2 | 5.30E-05 |
| T cells CD8 | SPP1 | BRCA | -0.33 | 2.20E-16 |
| KIRP | -0.24 | 7.20E-05 |
| LUAD | -0.16 | 0.00037 |
| PRAD | -0.31 | 6.50E-10 |
| SARC | -0.3 | 2.60E-06 |
| T cells gamma delta | SPP1 | BRCA | -0.13 | 1.20E-05 |
| T cells regulatory (Tregs) | SPP1 | BLCA | -0.21 | 0.00012 |
| SKCM | -0.17 | 0.00047 |
| T cells follicular helper | SPP1 | GBM | -0.29 | 0.00021 |
| LUAD | -0.2 | 4.40E-06 |
| OV | -0.21 | 0.00017 |
| Monocytes | SPP1 | CESC | 0.24 | 2.90E-05 |
| LUAD | 0.16 | 0.00033 |
| LUSC | 0.2 | 5.00E-06 |
| TGCT | 0.31 | 8.90E-05 |
| UCEC | 0.19 | 4.20E-05 |
| Eosinophils | SPP1 | GBM | 0.28 | 0.00037 |
| LGG | 0.22 | 1.90E-05 |
| LUSC | 0.15 | 0.00082 |
| STAD | 0.24 | 3.50E-06 |
| NK cells activated | SPP1 | KIRC | -0.16 | 0.00024 |
| PCPG | -0.45 | 3.10E-05 |
| THYM | 0.37 | 3.90E-05 |
| NK cells resting | SPP1 | LIHC | -0.25 | 1.10E-05 |