**Supplementary Table S1. List of antibodies.**

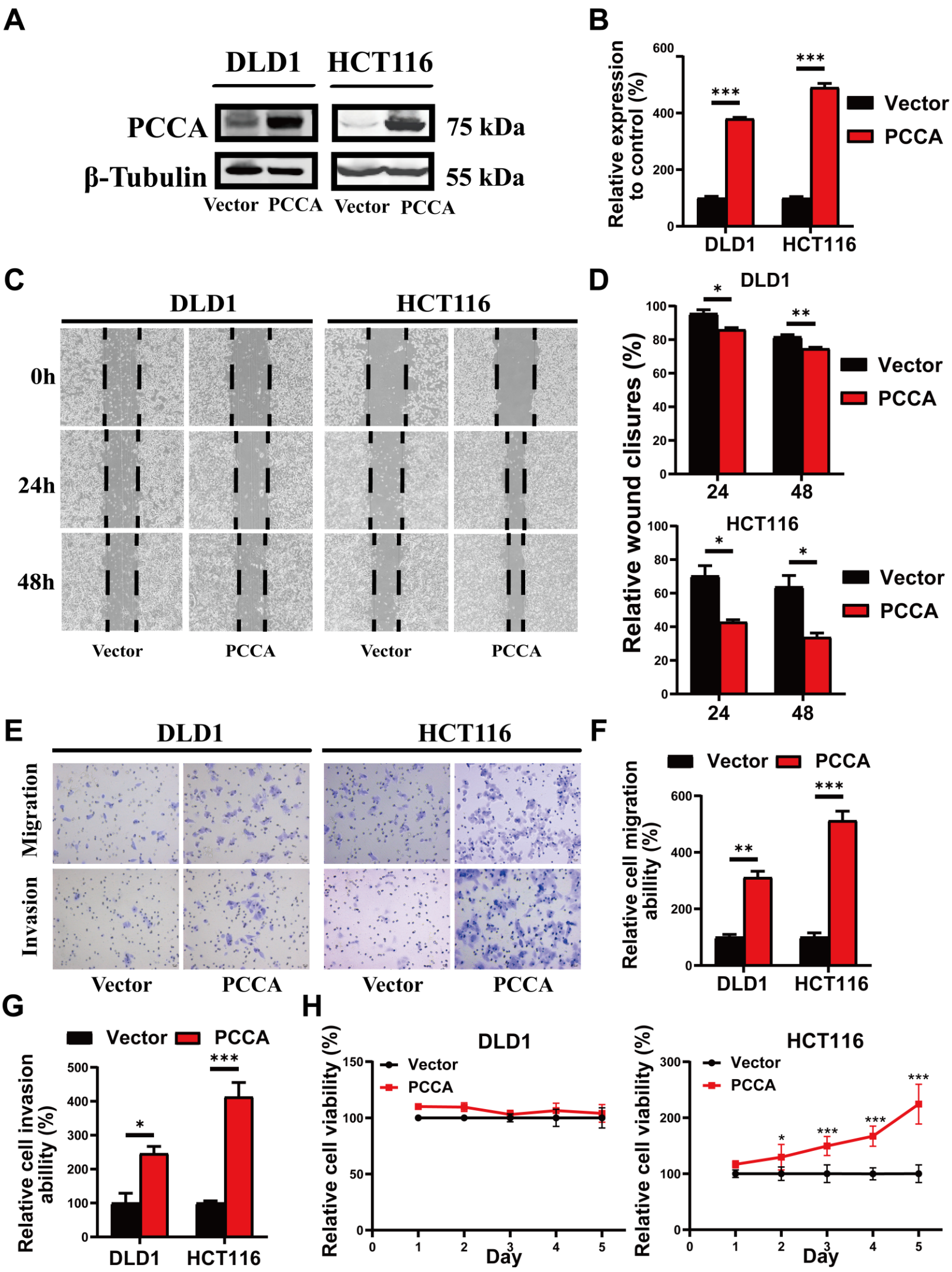
| Antigens | Species antibodies raised in | Dilution (WB) | Supplier |
|---|---|---|---|
| PCCA | Rabbit, Polyclonal | 1:3000 | Proteintech, China, Cat. #21988-1-AP |
| CDH1/E-Cadherin | Rabbit, polyclonal | 1:3000 | Boster, China, Cat. # PB9561 |
| CDH2/N-Cadherin | Rabbit, monoclonal | 1:1000 | Boster, China, Cat. # BM3921 |
| Vimentin | Mouse, monoclonal | 1:2000 | Boster, China, Cat. # BM0135 |
| Fibronectin | Rabbit, monoclonal | 1:3000 | Cell Signaling Technology, USA, Cat. #26836 |
| p44/42 MAPK (Erk1/2) | Rabbit, monoclonal | 1:3000 | Cell Signaling Technology, USA, Cat. #4695 |
| Phospho-p44/42 MAPK (Erk1/2) | Rabbit, monoclonal | 1:3000 | Cell Signaling Technology, USA, Cat. # 4370 |
| GSK-3β | Rabbit, monoclonal | 1:3000 | Cell Signaling Technology, USA, Cat. #12456 |
| Phospho-GSK-3β | Rabbit, monoclonal | 1:3000 | Cell Signaling Technology, USA, Cat. # 5558 |
| β-actin | Mouse, monoclonal | 1:2000 | Boster, China, Cat. # BM0627 |
| β-tubulin | Mouse, monoclonal | 1:3000 | Beyotime, China, Cat. #AF2835 |

**Supplementary Table S2. List of primers for quantitative PCR.**

| Gene | Primer | Sequence (5'-3') |
|---|---|---|
| m*Nos2* | Forward | CCACCTCTATCAGGAAGAAA |
| | Reverse | CTGCACCGAAGATATCTTCA |
| m*Il1b* | Forward | TGCCACCTTTTGACAGTGAT |
| | Reverse | TGTCCTCATCCTGGAAGGTC |
| m*Il6* | Forward | TGATGGATGCTACCAAACTGGA |
| | Reverse | GGAGAGCATTGGAAATTGGGG |
| m*Tnfa* | Forward | CCGATGGGTTGTACCTTGTC |
| | Reverse | CGGACTCCGCAAAGTCTAAG |
| m*Arg1* | Forward | CAACCAGCTCTGGGAATCTG |
| | Reverse | AATCGGCCTTTTCTTCCTTC |
| m*Tgfb* | Forward | ACGTCAGACATTCGGGAAGC |
| | Reverse | TGTATTCCGTCTCCTTGGTTCAG |
| m*Vegfa* | Forward | CGGGCCTCGGTTCCAG |
| | Reverse | TGAACTTGATCACTTCATGGGACT |
| m*Ccl22* | Forward | GTCCTTCTTGCTGTGGCAAT |
| | Reverse | ACGGTTATCAAAACAACGCC |
| m*B-actin* | Forward | GCCACTGTCGAGTCGCGT |
| | Reverse | GGAGTCCTTCTGACCCATTCC |
| *hNOS2* | Forward | CAAGTTCCATCTTTCACCCAC |
| | Reverse | CCCAGCCTCAAGTCTTATTTC |
| *hGAPDH* | Forward | GGAGCGAGATCCCTCCAAAAT |
| | Reverse | GGCTGTTGTCATACTTCTCATGG |

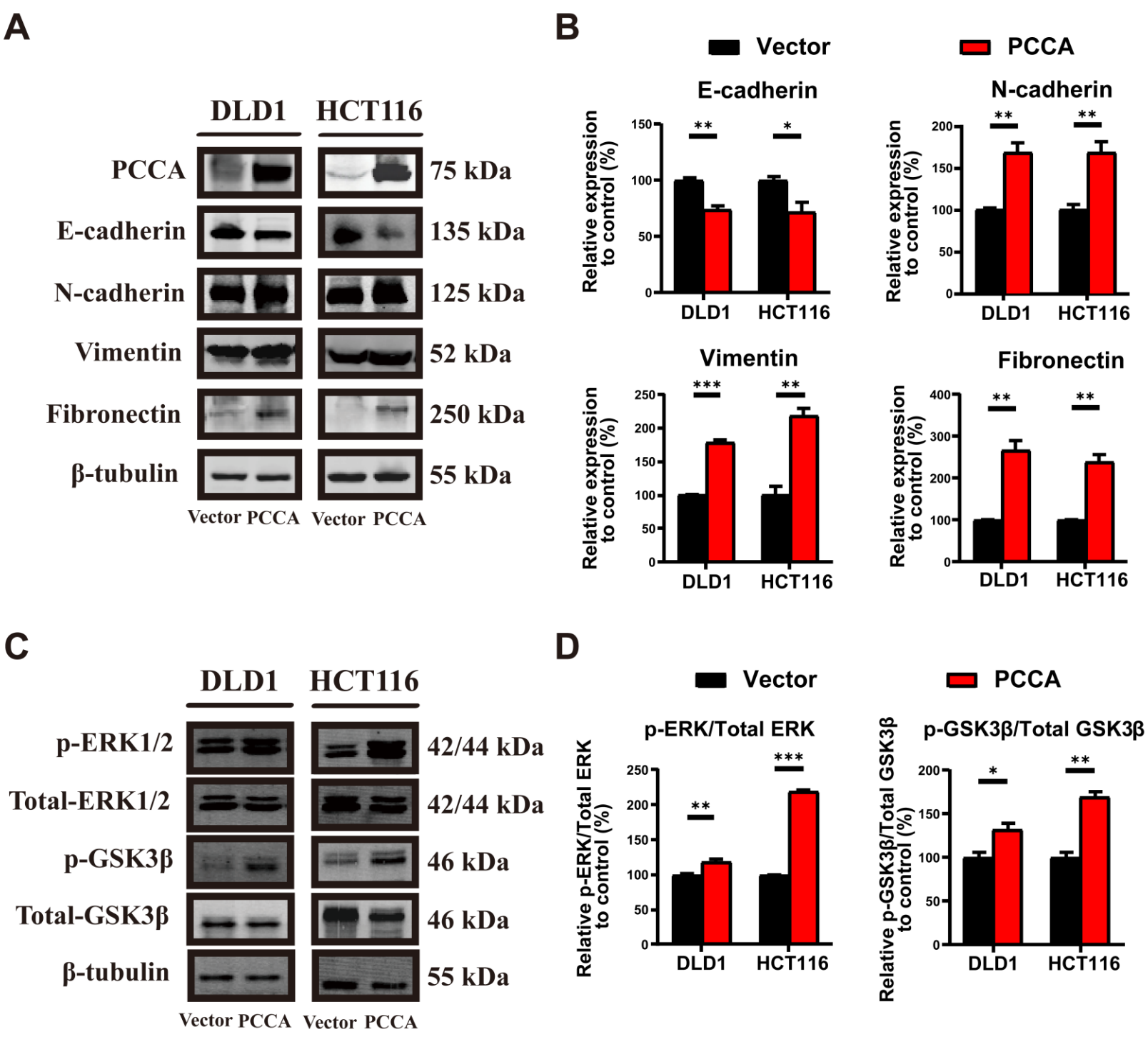
**Supplementary Figure S1. Overexpression PCCA promoted the migration, invasion, and proliferation of CRC cells**

**(A-B)** The representative WB images and the quantification of PCCA expression in DLD1 and HCT116 cells transfected with PCCA cDNA and vector plasmid. **(C-D)** The representative images at indicated time points (0 hr, 24 hrs, 48 hrs) and the analysis of wound healing assays conducted on DLD1 and HCT116 cells transfected with *PCCA* cDNA and vector plasmid. **(E-F)** The representative images and the analysis of transwell migration and invasion assays were performed on DLD1 and HCT116 cells transfected with PCCA cDNA and vector plasmid. **(G)** The proliferation of DLD1 and HCT116 cells transfected with PCCA cDNA and vector plasmid was measured by CCK8 assays. Data are from one experiment representative of two **(E-G)** or three **(A-D, H)** independent experiments with similar results. PCCA, CRC cells transfected with *PCCA* cDNA plasmid; Vector, CRC cells transfected with vector plasmid. The data are presented as Means ± SEM (*$P < 0.05$; ** $P < 0.01$; ***$P < 0.001$).



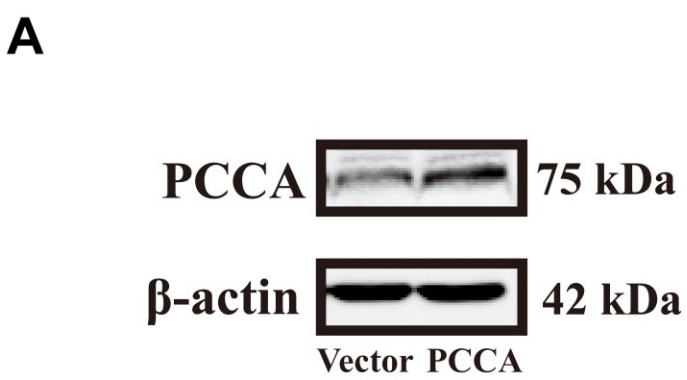
**Supplementary Figure S2. Overexpression PCCA promoted the EMT and activated the ERK1/2 and GSK3β signaling in CRC cells**

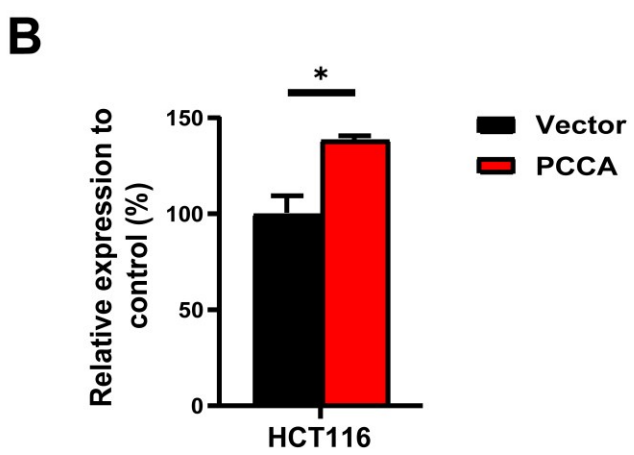
**(A-B)** The representative WB images and the quantification of the expression of epithelioid markers (E-cadherin) and mesenchymal markers (N-cadherin, Vimentin, and Fibronectin) in DLD1 and HCT116 cells transfected with *PCCA* cDNA and vector plasmid. **(C-D)** The representative WB images and the quantification of the phosphorylation of ERK1/2 and GSK3β in DLD1 and HCT116 cells transfected with *PCCA* cDNA and vector plasmid. Data are from one experiment representative of three independent experiments with similar results. PCCA, CRC cells transfected with *PCCA* cDNA plasmid; Vector, CRC cells transfected with vector plasmid. The data are presented as Means ± SEM (*$P < 0.05$; ** $P < 0.01$; ***$P < 0.001$).

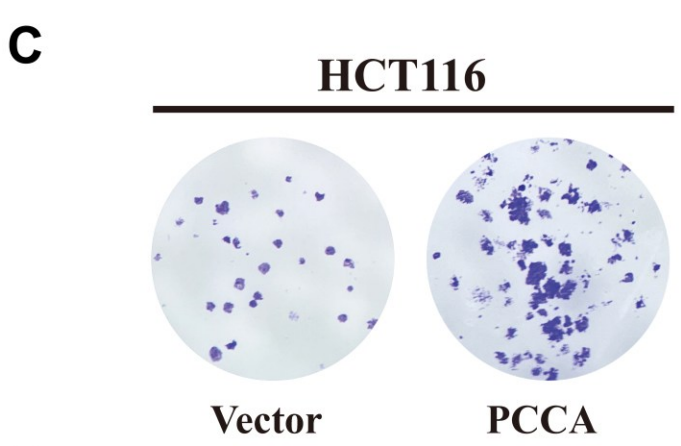


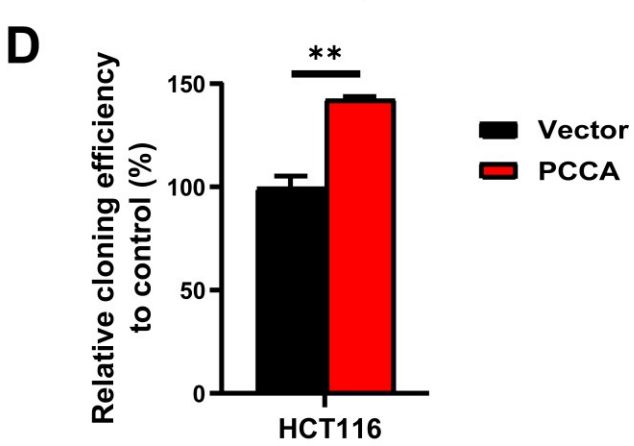
**Supplementary Figure S3. Overexpression PCCA promoted tumor growth and lung metastasis of CRC**

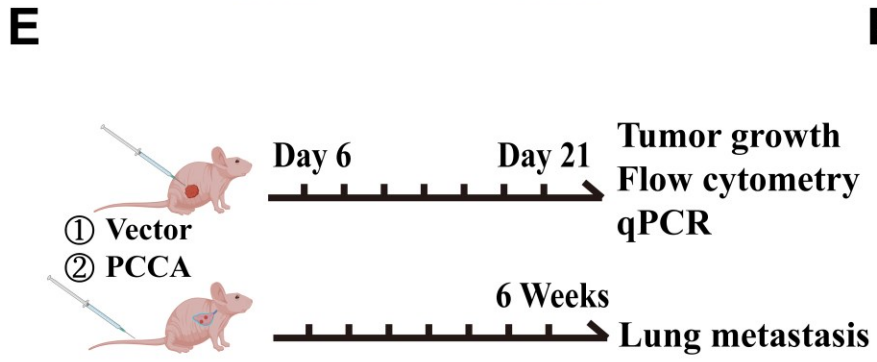
**(A-B)** The representative WB images and the quantification of PCCA expression in HCT116-PCCA or Vector. **(C-D)** The representative images and the quantification of colony formation in HCT116-PCCA or Vector. **(E)** The diagram of the subcutaneous tumor and lung metastasis models. **(F)** The tumor growth curves of HCT116-PCCA or Vector in nude mice (n=7). **(G-H)** The images and results of lung metastasis after 6 weeks of tumor cell tail vein injection (n=9). Data are from one experiment representative of two (**E-H**) or three (**A-D**) independent experiments with similar results. PCCA, stable transformation strain of HCT116 with *PCCA* cDNA plasmid; Vector, stable transformation strain of HCT116 with vector plasmid. The data are presented as Means ± SEM (**P* < 0.05; ** *P* < 0.01; ****P* < 0.001).

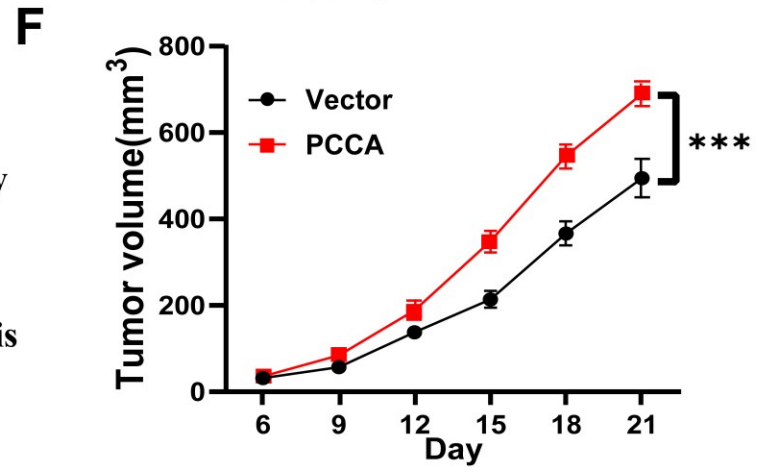


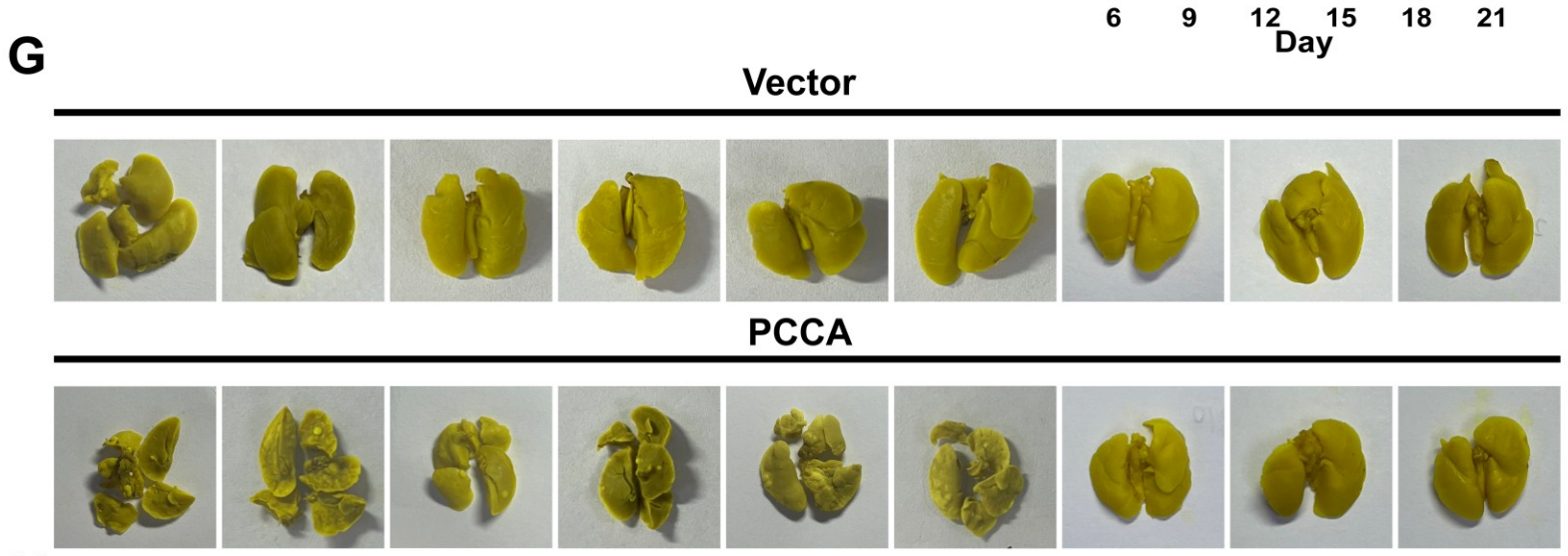




H

| Group | Lung metastasis | Total | Lung metastasis/Total | *P* |
|---|---|---|---|---|
| Vector | 1 | 9 | 1/9 | 0.025 |
| PCCA | 6 | 9 | 6/9 | |

**Supplementary Figure S4. Overexpression PCCA decreased the proportions of M1-like TAMs**

**(A-B)** The representative flow cytometry dot plots depicting the polarization of TAMs and the statistical analysis of the proportions of myeloid cells ($CD11b^+$) and TAMs in leukocytes ($CD45^+$), as well as the fold changes of M1-like ($CD11c^+CD206^-$) and M2-like ($CD11c^-CD206^+$) TAMs in the tumor tissues of HCT116-PCCA or Vector (n=7). **(C)** The heatmap showing the transcription levels of M1 and M2 marker genes in the tumor tissue of HCT116-PCCA or Vector (n=7). **(D)** The transcription levels of *Nos2* (from mice) and *NOS2* (from humans) in the tumor tissues of HCT116-PCCA or Vector (n=7). **(E)** The transcription levels of M1 and M2 marker genes in bone marrow-derived macrophages co-cultured with the conditioned media from HCT116-PCCA or Vector tumor cell cultures. The experiment was conducted in triplicates. PCCA, stable transformation strain of HCT116 with *PCCA* cDNA plasmid; Vector, stable transformation strain of HCT116 with vector plasmid. The data are presented as Means ± SEM (*$P < 0.05$; ** $P < 0.01$; ***$P < 0.001$).