

Table S1 Datasets used in the current study

Accession number/ source	Cancer	Therapy	Platform	Number of samples	Reference
TCGA-KIRC	KIRC	Surgery	RNA-seq	533	https://xenabrowser.net/
TCGA-KIRP	KIRP	Surgery	RNA-seq	286	https://xenabrowser.net/
TCGA-KICH	KICH	Surgery	RNA-seq	63	https://xenabrowser.net/
Checkmate	Metastatic ccRCC	Nivolumab	RNA-seq	181	NCT01354431; NCT01668784
Javelin	Advanced RCC	Avelumab + axitinib	RNA-seq	354	NCT02684006

TCGA, The Cancer Genome Atlas; KIRC, kidney renal clear cell carcinoma; KIRP, kidney renal papillary cell carcinoma; KICH, kidney chromophobe; ccRCC, clear cell RCC; RCC, renal cell carcinoma; RNA-seq, RNA sequencing.

Table S2 Clinicopathological information of patients with different RCC subtypes from TCGA

Parameters	TCGA-KIRC	TCGA-KIRP	TCGA-KICH
Platform		Illumina RNAseq	
Sample, n [%]	528 [100]	287 [100]	64 [100]
Age (years), n [%]			
<65	331 [63]	172 [60]	50 [78]
≥65	197 [37]	113 [39]	14 [22]
Not available	0 [0]	2 [1]	0 [0]
Gender, n [%]			
Female	186 [35]	76 [26]	26 [41]
Male	342 [65]	211 [74]	38 [59]
Not available	0 [0]	0 [0]	0 [0]
pT, n [%]			
T0	0 [0]	0 [0]	0 [0]
Ta	0 [0]	0 [0]	0 [0]
Tis	0 [0]	0 [0]	0 [0]
T1	270 [51]	192 [67]	19 [30]
T2	68 [13]	32 [11]	25 [39]
T3	179 [34]	59 [21]	18 [28]
T4	11 [2]	2 [1]	2 [3]
TX	0 [0]	2 [1]	0 [0]
Not available	0 [0]	0 [0]	0 [0]
pN, n [%]			
N0	239 [45]	49 [17]	38 [59]
N1	16 [3]	24 [8]	3 [5]
N2	0 [0]	4 [1]	2 [3]
N3	0 [0]	0 [0]	0 [0]
NX	273 [52]	209 [73]	21 [33]
Not available	0 [0]	1 [0]	0 [0]
pM, n [%]			
M0	418 [79]	95 [33]	26 [41]
M1	78 [15]	9 [3]	0 [0]
MX	30 [6]	169 [59]	13 [20]
Not available	2 [0]	14 [5]	25 [39]
Stage, n [%]			
I	264 [50]	171 [60]	19 [30]
II	56 [11]	21 [7]	25 [39]
III	123 [23]	51 [18]	14 [22]
IV	82 [16]	15 [5]	6 [9]
No	3 [1]	29 [10]	0 [0]

RCC, renal cell carcinoma; TCGA, The Cancer Genome Atlas; TCGA, The Cancer Genome Atlas; KIRC, kidney renal clear cell carcinoma; KIRP, kidney renal papillary cell carcinoma; KICH, kidney chromophobe; pT, pathological T stage; pN, pathological N stage; pM, pathological M stage.

Table S3 Detailed sequences of siRNAs targeted CDCA3

No.	Sequence
si-1	GTACCCAGTTATCTGTTGA
si-2	GCACCTTTATCTTCTGAAT
si-3	GCACGGACACCTATGAAGA

siRNA, small interfering RNA; CDCA3, cell division cycle-associated 3.

Table S4 Univariate Cox regression analysis of *CDCA3* expression and other clinicopathological characteristics

Characteristics	Hazard ratio (95% CI)	P
KIRC (OS)		
Gender	0.955 (0.701, 1.302)	0.772
pT	1.919 (1.629, 2.261)	<0.001
Stage	1.864 (1.635, 2.124)	<0.001
Age	1.029 (1.016, 1.042)	<0.001
<i>CDCA3</i>	1.111 (1.085, 1.138)	<0.001
KIRC (PFI)		
Gender	1.550 (1.092, 2.202)	0.014
pT	2.448 (2.052, 2.920)	<0.001
Stage	2.675 (2.290, 3.124)	<0.001
Age	1.006 (0.994, 1.019)	<0.001
<i>CDCA3</i>	1.099 (1.073, 1.125)	<0.001
KIRP (OS)		
Gender	0.617 (0.320, 1.189)	0.149
pT	2.073 (1.549, 2.776)	<0.001
Stage	2.048 (1.608, 2.607)	<0.001
Age	1.004 (0.9773, 1.031)	0.791
<i>CDCA3</i>	1.264 (1.177, 1.357)	<0.001
KIRP (PFI)		
Gender	0.5278 (0.301, 0.925)	0.026
pT	2.361 (1.821, 3.063)	<0.001
Stage	2.106 (1.683, 2.634)	<0.001
Age	0.9918 (0.969, 1.016)	0.495
<i>CDCA3</i>	1.268 (1.182, 1.360)	<0.001
KICH (OS)		
Gender	1.528 (0.381, 6.125)	0.55
pT	2.216 (1.008, 4.873)	0.048
Stage	7.692 (2.646, 22.360)	<0.001
Age	1.057 (1.000, 1.118)	0.051
<i>CDCA3</i>	1.253 (1.115, 1.409)	<0.001
KICH (PFI)		
Gender	0.924 (0.281, 3.034)	0.896
pT	2.090 (1.051, 4.156)	0.036
Stage	6.041 (2.327, 15.680)	<0.001
Age	1.037 (0.991, 1.085)	0.121
<i>CDCA3</i>	1.281 (1.126, 1.456)	<0.001

CDCA3, cell division cycle-associated 3; CI, confidence interval; KIRC, kidney renal clear cell carcinoma; OS, overall survival; pT, pathological T stage; PFI, progression-free interval; KIRP, kidney renal papillary cell carcinoma; KICH, kidney chromophobe.

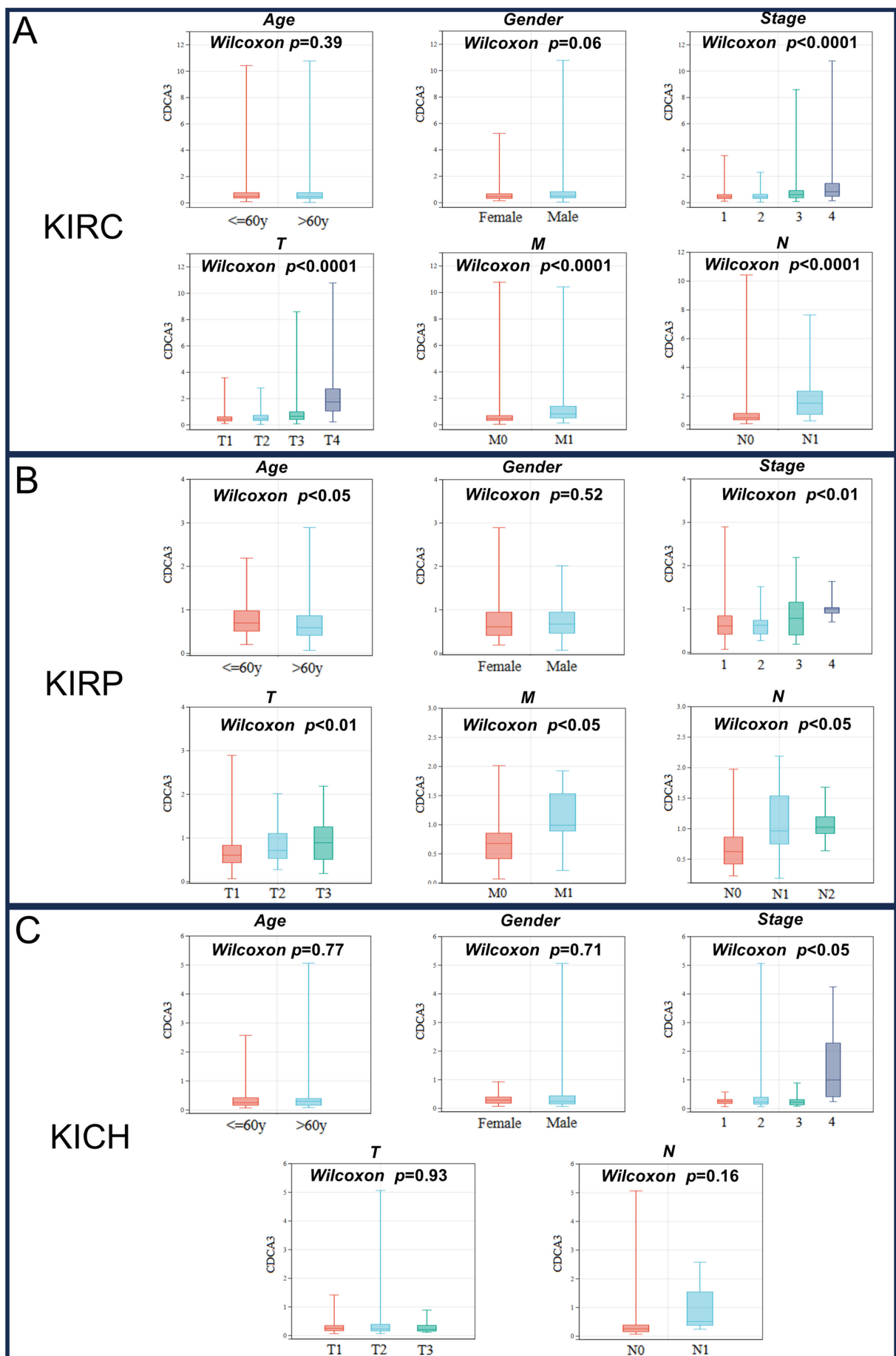


Figure S1 *CDCA3* expression across different subgroups based on age, gender, stage, T, M, and N in (A) KIRC, (B) KIRP, and (C) KICH (M stage not included for KICH). *CDCA3*, cell division cycle-associated 3; KIRC, kidney renal clear cell carcinoma; KIRP, kidney renal clear cell carcinoma; KICH, kidney chromophobe.

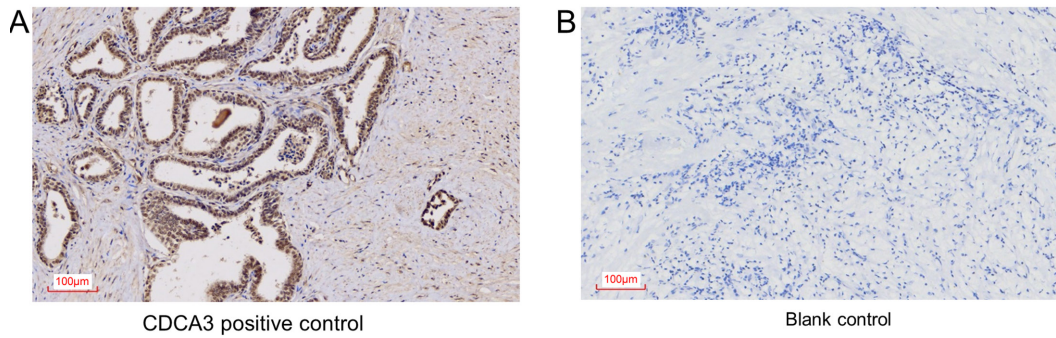


Figure S2 Isotype control for *CDCA3* expression in IHC. (A) Positive staining for *CDCA3*; (B) isotype control (blank) for *CDCA3*. *CDCA3*, cell division cycle-associated 3; IHC, immunohistochemistry.

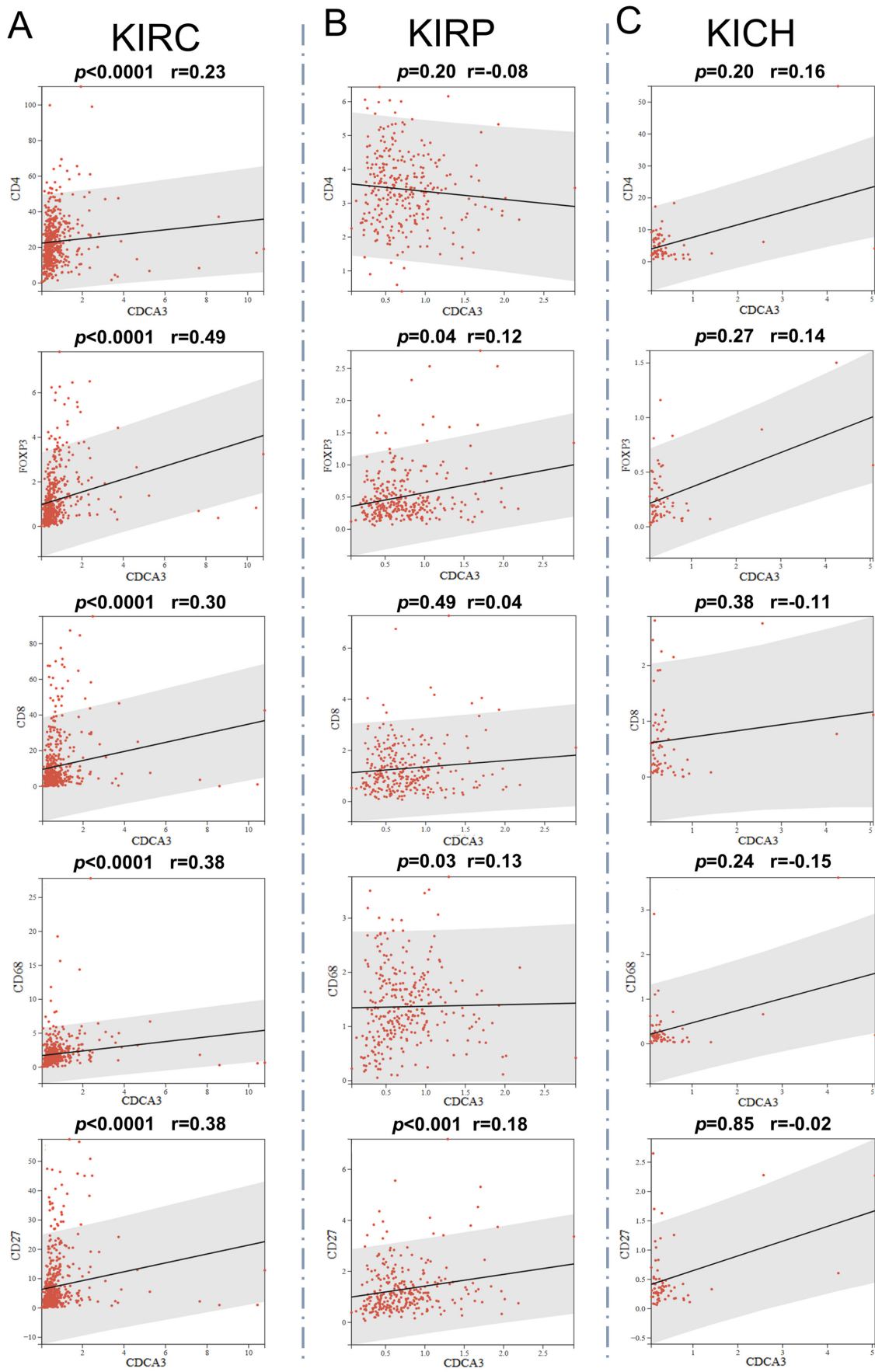


Figure S3 Correlation between *CDCA3* expression and the expression of CD4, CD8, FOXP3, CD68, and CD27 in (A) KIRC, (B) KIRP, and (C) KICH. *CDCA3*, cell division cycle-associated 3; KIRC, kidney renal clear cell carcinoma; KIRP, kidney renal clear cell carcinoma; KICH, kidney chromophobe.