

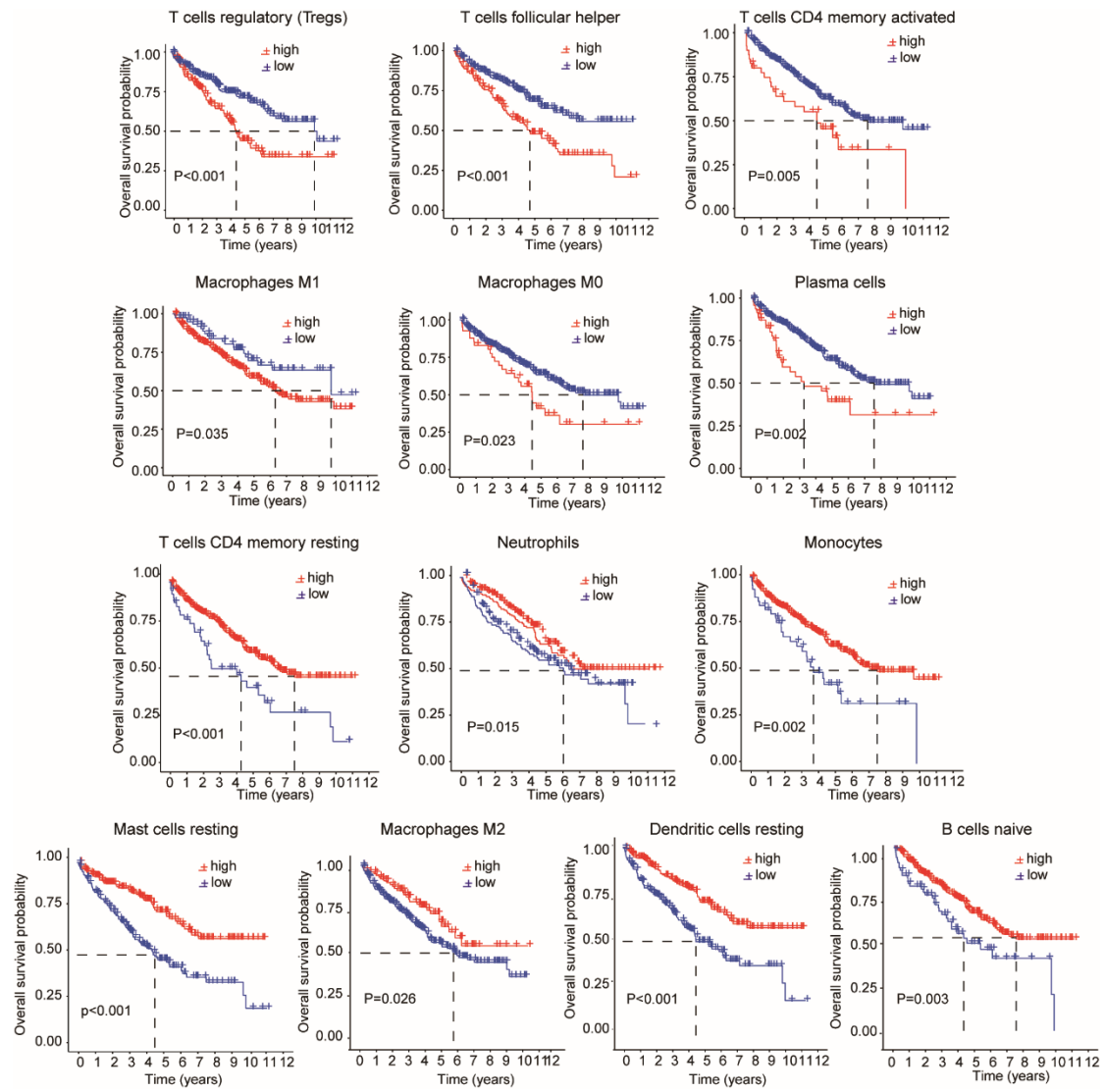


Figure S1. The relationships between OS and immune cells. OS, overall survival rate.

Table S1 Clinical characteristics of patients with ccRCC in training, testing and entire TCGA cohorts

Characteristic	training TCGA cohorts (n=342)	Testing TCGA cohorts (n=171)	Entire TCGA cohorts (n=513)
Age, years	60.32±12.275	60.16±11.66	60.27±12.062
Gender, n (%)			
Female	114 (33.33)	62 (36.26)	176 (34.31)
Male	228 (66.67)	109 (63.74)	337 (65.69)
Grade, n (%)			
Grade 1	9 (2.63)	3 (1.75)	12 (2.34)
Grade 2	143 (41.81)	76 (44.44)	219 (42.69)
Grade 3	138 (40.35)	63 (36.84)	201 (39.18)
Grade 4	46 (13.45)	27 (15.79)	73 (14.23)
Unknow	6 (1.75)	2 (1.17)	8 (1.56)
Stage, n (%)			
Stage I	166 (48.54)	89 (52.05)	255 (49.71)
Stage II	42 (12.28)	14 (8.19)	56 (10.92)
Stage III	83 (24.27)	34 (19.88)	117 (22.81)
Stage IV	49 (14.33)	33 (19.30)	82 (15.98)
Unknow	2 (0.58)	1 (0.58)	3 (0.58)
T stage, n (%)			
T1	172 (50.29)	89 (52.05)	261 (50.88)
T2	50 (14.62)	18 (10.53)	68 (13.26)
T3	114 (33.33)	59 (34.50)	173 (33.72)
T4	6 (1.75)	5 (2.92)	11 (2.14)
N stage, n (%)			
N0	158 (46.20)	71 (41.52)	229 (44.64)
N1	11 (3.22)	5 (2.92)	16 (3.12)
Unknow	173 (50.58)	95 (55.56)	268 (52.24)
M stage, n (%)			
M0	275 (80.41)	132 (77.19)	407 (79.34)
M1	48 (14.04)	30 (17.54)	78 (15.20)
Unknow	19 (5.56)	9 (5.26)	28 (5.46)

Table S2. Differently expressed immune-related genes between normal and ccRCC

samples						
SEMG2	TSLP	FPR2	IL18RAP	CAV1	TRBV6-6	ATF3
GP2	CEACAM1	B2M	TRGV3	HLA-DOB	IGHV1-18	PTGS2
KNG1	FGF7	CEBPB	IGKV6-21	CD36	DOK3	TKFC
ESRRB	RLN1	HLA-C	IGHV4-61	IGLV8-61	IGLV5-52	APOM
EGF	IL13RA2	GFAP	IGHV1-58	IGLV6-57	LTA	CTF1
CHP2	TNC	XCR1	EDN1	IGKV1D-16	IL21R	CCN2
PTGER1	HDAC11	PLXNA3	TLR6	BTK	TYROBP	TLR5
F11	RORB	CLEC4E	IGHA1	IGHV4-4	LAIR1	TP63
NOS1	BACH2	FSTL1	IGLJ2	TRAV36DV7	IGLC3	MTOR
WNT9B	ANGPTL7	HLA-DRB5	GJA1	IGHV3-33	RETN	NR4A2
FGF1	ACO1	NDRG1	IGLV3-1	HLA-DQA1	CD3E	BLNK
FAM3B	GAL	MAP3K12	FFAR2	TRDC	IL12RB2	NTS
HSPA2	C5	NLRC3	CD53	IGHV3-53	TRBV5-6	OGN
SSTR5	MMP7	C5AR1	CD4	LCP2	PRF1	TNFRSF11B
RBP2	PPARA	PGLYRP1	IGHE	LTB4R2	TRAV3	HAMP
OLFM4	PRKX	NLRP3	VCAM1	TRGV4	CCL4	TNFSF14
CR2	OPRL1	CSF2RB	NLRC4	TRAV35	NCR1	AVPR1B
CHGB	ANOS1	AEN	CD40	TNFAIP8L2	TRAV5	INHBB
S100A2	TRAF1	ICAM1	GMFG	IGLV3-12	IGHV2-26	SCARB1
AVPR2	CXCR2	SERPINB9	NCR3	LST1	IGLC7	IGLV3-16
IL11	CSF1	DUSP10	CYBB	PTGDR	SLAMF8	HLA-G
FREM1	CCDC88A	TRIM22	SLC15A4	IGHV5-51	TRAV4	IGLV7-46
TDGF1	CX3CL1	IGKV1D-13	CCL3	IL10RA	IGHV1-24	BST2
C7	RFTN1	ANGPTL2	ANXA4	IGHV3-66	P2RX7	IL18R1
PTH1R	IL10RB	MAP3K14	BMP1	ACKR3	AMH	TRIM15
BMP7	NOS2	STAB2	IL2RG	IL2RA	RUNX3	INSR
PLG	ATG12	APLNR	HLA-DPA1	NLRC5	CD72	SHC2
NR0B2	GNRHR	TNFRSF1B	OSM	CD1D	ADM	TNFAIP3
ESRRG	ULBP2	HLA-DOA	IGLV1-36	TRAV9-2	TRBV19	ANXA1
FGF9	DDX41	INSL3	ACAP1	IGKV3-11	TRAV25	MICB
TAC1	CALCRL	LMBR1L	NGFR	TRBV5-4	CXCR6	CFP
SEMA6D	IL1RAP	CRHR2	TNFSF8	TRAV8-1	TRBJ2-7	S100A12
MTNR1A	IL15	RPS19	FABP5	EBI3	TRGV2	IL10
CALCA	C1R	NAIP	IGKV2D-24	ARG1	TRAV17	WNT2B
GCGR	TRAF2	IFI27	HAVCR2	HLA-DQB1	TRAV12-1	IGKV2-30
LGR5	TRIM55	SAMHD1	TLR10	IGHV3-23	IGKV3-15	OAS2
ANGPTL1	STING1	PTAFR	FCGR2A	SIGLEC9	TRAV26-2	IL20RB
DCN	OGFR	BMP8A	PDGFD	MARCO	IGKV1D-43	PGF
CCL11	NR1H3	CD28	PTPRC	S100Z	IGKV1-39	TFR2
PLXNA4	TNIP1	IL3RA	IGHV3-35	BIRC3	C1QC	TRAJ18
GREM1	LTB	KLKB1	IGKV1-27	IGLC6	TRPM2	STC2

NR1I3	BGN	TAF4	IGHV3-43	IGLV3-9	REG1A	GATA4
PDGFRA	RARA	IGKV1D-17	STAT4	IFI30	CSF3R	SCG2
BPI	SDC3	IGLV2-33	IGKV1-6	APOBEC3G	CXCR4	MMP9
ACKR2	S100A9	OAS1	IGHV3-11	VAV1	TRBV2	SH3BP2
AQP3	ERAP2	TRBV20-1	IL16	TRGC2	TRAV10	C4B
HRG	CCL22	TRIM7	IGLV5-45	CD244	UTS2	CD14
GDF3	SHC1	IL15RA	C3AR1	XCL1	PSTPIP1	HLA-DRA
TYRO3	NLRP11	TRADD	LILRA2	NCKAP1L	CD1A	C4A
PLAU	HLA-E	MSTN	CARD16	ISG20	IGHV3-21	IRF7
BMPR1B	IGHV2-5	NLRP6	BTN3A1	TRAV20	TRBC2	HLA-H
S100A14	CKLF	EGFR	TNFRSF25	SPI1	TRBV5-5	CASP1
CHGA	CD300E	CCRL2	IGLV2-11	IGLC2	CCR8	CD74
BMP6	LRRK2	CCR4	KLRC1	TRBV18	PIK3R5	NLRP12
PTGER3	IRF8	TUBB3	TRAV23DV6	HMOX1	TRBV12-5	IRF9
BMP3	NRP1	IL4R	PDK1	KLRD1	GNRH1	TRGV5
CBLC	FCN1	AKNA	CTSS	TRBV3-1	IGHV6-1	CD79A
DEFB1	RASGRP3	CLEC9A	HLA-B	TRBV24-1	TRBJ2-1	C8G
NR3C2	BID	CMTM3	IGLV10-54	IGKV1-16	SLAMF7	TREM2
IL1RL1	HLA-DMB	BTN3A3	TAP1	SLC11A1	TRAV34	PGLYRP2
UCHL1	PF4	HLA-DMA	RHBDF2	IGHV3-20	KIR2DS4	TNFRSF9
ARG2	IFNGR2	OSMR	FLT1	CLEC7A	TRIM9	CXCL13
THRB	CCL16	CD40LG	SEMA6A	TRAT1	TRBC1	IGKV2-28
PROC	IFNAR2	CARD9	LECT2	ITGB2	APOBEC3H	CD70
CMTM4	APOBEC3F	CIITA	CSF2RA	F2RL3	TRAV21	TRAJ1
USP2	RELB	FCGR3B	IL32	KLRC4	TRBV7-9	NR2E1
BTC	AGT	ARRB2	CCNA2	IGHV4-28	IGHV3-48	IGLV2-18
SELE	CXCR1	IGKV3D-15	VENTX	IGLV2-23	CD3D	LGALS9
RAET1E	FGF14	S100A8	IGHG2	KIR2DL4	TNFRSF18	ITK
GDNF	IL24	TNFRSF10B	CD48	IGKV1-17	ZBP1	VIP
AGRP	VEGFC	CAMP	IGLV2-8	JAK3	IGLV4-60	TNFRSF14
SLPI	EDIL3	FGR	IGKV2D-30	TRAV13-2	CCR5	TLR8
PRLR	PDCD1LG2	IGKV1D-42	MEFV	RNASE2	ZAP70	TNFSF11
AZGP1	SEMA3F	CCL28	GBP2	KIR2DL1	TYMP	AQP9
PPARGC1A	IRF1	PLAUR	HCST	IGHV4-59	TRBV11-1	IGLV3-21
ANGPTL3	CD19	TLR3	TRPV2	TRAV8-6	C1QB	C2
VDR	MIF	SLAMF1	IGKV1D-12	TRAV16	TRBV28	SERPINE1
NLRP2	SEMA3A	WDR62	NRG3	SLAMF9	IGKV1-33	WAS
PRKCQ	CCR1	SIRPA	IGLV1-51	TRBV5-1	IGKJ5	IGHV3-15
KITLG	P2RY14	SYTL1	FCGR2B	BIRC5	IGHV2-70	TRAV1-2
TMSB4Y	TSC22D3	BMX	IGLV4-3	TRAV13-1	IGLV4-69	SIGLEC8
IRF6	MET	ISG15	BTN3A2	IL27	TRBV7-7	OBP2A
PTGFR	PROS1	PLXNC1	PLXNB3	TRBV6-1	CTLA4	IFNG
MUC1	IGHG4	TGFB1	PLK1	TRDV1	IGHG1	CXCL5
PLA2G4A	RBCK1	OASL	IRF4	RNASE3	CD300A	PMCH

SEMA3G	MIR23A	TRAV18	PYCARD	DLL4	TRBV7-6	IGLV9-49
LGR6	TAP2	RARRES2	ITGAM	TSHR	TRBV27	ORM1
S100A5	SIGLEC6	SCARF1	IGHM	IGHV4-34	SIGLEC10	AICDA
SEMA4A	IGHD	IL22RA1	PF4V1	TRAV6	CD300LF	TRAV1-1
TGFBR3	TRIM14	PROCR	IGLV2-14	HLA-DQA2	IGHV1-3	CD3G
SYP	NFATC2	FPR1	MASP1	IGKV1-9	IL2RB	TRBV12-4
DES	CMTM2	MC1R	RAC2	TRBV12-3	TRBV7-4	TRAV41
SORT1	FLT4	ABCA1	TRBV10-3	LILRB3	AIM2	IGKV2-24
KL	IL7R	TNFRSF17	HCK	HLA-F	TRIB3	TRBV11-3
BPHL	ETS1	TAPBP	HSPA6	LYZ	TP73	C1QA
SHC3	APOBEC3A	AXL	TMSB10	IGHJ2	FCGR1A	CD247
CDH1	CYSLTR1	IFI16	GZMM	TRBV14	TRBV9	TRBV11-2
EDN3	TNFRSF13C	SEMA6B	HLA-DPB1	NOD2	IGLV3-19	IGKC
TRAV8-2	PDGFRL	TRAV22	CARD11	LY86	MIR499A	IL12RB1
APOD	NFKBIE	PSMB8	NPPA	TRBJ2-2	IGLV3-10	PRTN3
GDF7	IGHV1-2	IGHV3-7	TMPRSS6	APLN	GNLY	TRAV12-2
CCL23	IL7	CXCL2	LGALS1	TRBV30	IGHV3-30	TRAV29DV5
IL17RE	TCF4	PLXND1	IGHV1-45	IGLV1-47	TRAV19	CDKN2A
SCTR	KDR	TLR2	APOBEC3C	TNFSF13B	CXCR3	ANGPTL4
AMFR	PML	CCR7	MSR1	TRAV14DV4	TRBV6-5	CD5L
LCN2	MYDGF	LCN1P1	TRAV8-4	SH2D1A	EPO	CHIT1
ADRB1	NFKB2	IGHV3-72	IGLV1-44	IGHV4-39	ADCY8	ORM2
CTNNAL1	TRBV7-3	NODAL	IGKV3D-11	IGHV1-69	IGKV1D-39	PTHLH
PLXNB1	PLAAT4	CSF1R	IGLV1-50	CCL20	UBD	FABP6
TACR1	FAS	HLA-DRB1	LY9	IGHV3-49	IGHG3	CCL18
TEK	ZC3HAV1L	ARHGAP15	IGKV4-1	IGHV1-46	PDIA2	VEGFA
VAV3	CYBA	TRBV6-4	TLR7	TRAV38-1	CCL5	FASLG
SEMA3B	BMP8B	TRGJP2	TRAC	BCL2A1	TRBV13	CXCL11
ALB	NLRP1	SCGB3A1	AGER	TRBV29-1	IGKV5-2	GDF6
WNT5A	FLI1	IGLV5-37	TRAV8-3	LILRA4	ITGAX	IGHV3-73
CNTFR	CD22	SPHK1	IGKV1-8	FCER1G	TRBJ2-3	TRBV4-2
CTSH	CASP4	LY96	SIGLEC7	IGHV3-64	TNFRSF4	LGALS4
CAT	SH2D1B	TGFA	IL9R	NMB	TRAJ3	ESM1
BMP5	EDNRA	JAG2	TREM1	IGHV3-38	TRAV24	CD8A
FGFR2	CASP12	MDK	IGLV5-48	LTB4R	TRBV10-2	TRBJ2-4
SREBF2	CYTIP	CCR10	IGHA2	VIM	IDO1	CXCL9
NOX4	IGKV1-12	IGKV3-7	SPINK5	CTSE	CD27	TNIP3
PTGDS	CETP	CD200	BDNF	IGKV2D-29	C3	IGLV1-40
NR4A3	WFIKKN1	HLA-A	NGF	IGHJ3	TRBV10-1	SEMA5B
GNAI1	IL34	TPSB2	IGKV2D-40	ITGAL	FCGR3A	MCHR1
TNFSF15	LCK	DEFA3	IGKV3-20	TRAV2	TRAV27	FABP7
CXCL12	ABCG1	SPON2	E2F1	XCL2	INHBE	LCN1
CLDN4	C1S	INPP5D	CD180	SLAMF6	PDCD1	CRP
GDF15	TRIM36	IL12B	FGF20	TRAV26-1	LAT	HP

BDKRB2	NR5A2	NRP2	YJEFN3	TRAV12-3	ICOS	PAEP
TRAJ35	PIK3CG	IGKV1-5	CD37	GZMB	TNFSF9	
HIF1A	GRK5	IGKV1D-8	IGKV6D-21	SIGLEC1	KLRK1	
SLIT2	ACHE	CCL3L3	IGLV7-43	CCR6	CD8B	
WFDC2	CFB	CX3CR1	IGLV3-27	CCL4L2	TRBV4-1	
PRKCA	LGALS3	IGKV3D-20	CD86	IGHV4-31	CXCL10	
PELI2	FZD1	GRAP2	IGLV3-25	UCN	TRBV15	
