

Supplementary Tables

primers	sequence	annealing temperature [° C]
b-actin fwd	tcc tgt ggc atc cac gaa act	58
b-actin rev	gaa gca ttt gcg gtg gac gat	
hTAP1 fwd	gga atc tct ggc aaa gtc ca	60
hTAP1 rev	tgg gtg aac tcg atc tgg ta	
hTAP2 fwd	cca aga teg ctc ctt tgc at	60
hTAP2 rev	ttc atc cag cag cac ctgn tc	
hLMP2 fwd	tgc tgc atc caca ta acc at	60
hLMP2 rev	tgt gca ctc tct ggt tca gc	
htpn fwd	tgg gta agg gac atc tgc tc	60
htpn rev	acc tgt cct tgc agg tat gg	
hb2m fwd	ctc gcg cta ctc tct ctt	60
hb2m rev	aag acc agt cct tcg tga	
HLA-ABC fwd	gcc tac cac ggc aag gat tac	60
HLA-ABC rev	ggg ggc ctc atg gtc aga ga	

Supplementary Table S1. Primers used for qPCR analysis

Supplementary Table S2. Patient and tumor characteristics												
Patient no.	Sex/age	RCC histology	pTNM	Fuhrman grade	Leibovich score	Prior systemic therapy	Tumor size (mm)	TCL ^a	Y-TIL days in culture	Y-TIL (n) x10 ⁶	RFS Months	OS Months
RCC2	M/62	clear cell	pT1b, pNX, M0	1	3	no	70	yes	22	100	43.9+	43.9+
RCC3	M/67	clear cell	pT2a, pNX, M0	2	3	no	90	no	60	293	43.7+	43.7+
RCC4	M/78	clear cell	pT3a, pNX, M1	3	6	no	45	yes	43	102	0	43.7+
RCC5	F/62	clear cell	pT3a, pNX, M0	2	4	no	81	no	51	216	43.7+	43.7+
RCC6	M/64	clear cell	pT3a, pN0, M0	3	7	no	110	yes	20	140	27.4	41.0+
RCC8	M/50	clear cell	pT1b, pNX, M0	1	2	no	65	no	14	134	39.7+	39.7+
RCC10	F/66	clear cell	pT1b, pN0, M0	2	2	Pazo	68	no	28	106	37.9+	37.9+
RCC11	F/69	clear cell	pT3a, pNX, M1	2	5	no	70	no	25	162	0	26.0
RCC12	F/70	clear cell	pT2a, pNX, M0	2	4	Pazo	90	yes	17	150	37.5+	37.5+
RCC14	M/59	clear cell	pT2a, pNX, M0	3	5	no	95	yes	49	161	25.7	35.9+
RCC16	F/70	clear cell	pT3a, N0, M0	2	4	no	85	yes	26	230	22.9	34.0+
RCC17	F/78	clear cell	pT3a, N0, M0	1	4	no	55	yes	26	270	19.6	34.0+
RCC18	M/69	chrom	pT2b, N0, M0	2	4	no	110	yes	28	263	33.8+	33.8+
RCC19	M/50	clear cell	pT3a, pN0, M1	3	6	no	65	yes	23	264	0	33.1+
RCC21	M/67	clear cell	pT4, pN0, M1	3	3	no	140	yes	30	198	0	22.6+
RCC22	M/65	clear cell ^b	pT4, pN1, M1	4	4	no	140	yes	30	336	0	14.6
RCC23	F/50	clear cell	pT2b, pN0, M1	3	3	no	110	yes	21	144	0	21.4+
RCC24	F/77	clear cell	pT3a, NX, M1	7	3	no	135	yes	53	142	0	21.1+
RCC25	M/60	clear cell	pT3a, pN0, M0	6	3	no	90	yes	18	266	20.9+	20.9+
RCC26	F/49	clear cell	pT3a, pN0, M0	6	3	no	82	yes	30	191	4.4	20.5+
RCC27	M/54	clear cell	pT1b, NX, M0	3	2	no	62	yes	35	298	16.4	20.7+
RCC28	F/77	clear cell	pT3a, N0, M0	6	3	no	75	yes	28	105	20.4+	20.4+
Median	66			3	3.5		83.5		28	177	NR	NR
Range	49-78			1-7	2-7		45-140		14-60	100-336	NR	NR
Patients with unsuccessful Y-TIL establishment												
RCC7	M/69	clear cell	pT1b, pNX, M0	3	3	no	60	yes	94	56	40.6+	40.6+
RCC9	M/74	clear cell	pT2a, pNX, M0	1	4	Pazo	95	no	61	35	39.0+	39.0+

Supplementary Table S2. Patient and tumor characteristics

Abbreviations: M, male; F, female; RCC, renal cell carcinoma; pTNM, pathological tumor-node-metastasis; Y-TIL, Young tumor-infiltrating lymphocytes, TCL, tumor cell line; coll. duct, collecting duct; chrom, chromophobe; pazo, pazopanib; RFS, recurrence free survival; OS, overall survival. ^aTCL established; ^bsarcomatoid differentiation; NR, not reached

Supplementary Table S3. Phenotypic characteristics of RCC TILs										
Patient no.	Y-TIL					REP-TIL				
	% CD3	% CD8	% CD4	CD4/CD8	% CD3 ⁺ CD56 ⁺	Fold expansion	% CD3	% CD8	% CD4	CD4/CD8
RCC2	92	25	58	2.3	7.9	2785	100	36	56	1.6
RCC3	88	2.9	19	6.5	13	2365	98	3	78	26.0
RCC4	39	25	44	1.7	53	1270	100	13	63	4.7
RCC5	96	52	19	0.4	4.4	3430	100	5	91	20.1
RCC6	91	15	80	5.2	7.7	1310	100	24	74	3.1
RCC8	78	31	60	1.9	11	1000	97	1	67	56.1
RCC10	80	28	54	1.9	20	875	100	53	44	0.8
RCC11	92	16	78	4.8	3.1	1915	100	20	73	3.6
RCC12	89	23	74	3.3	7.5	995	100	22	77	3.6
RCC14	95	68	21	0.3	3.5	1315	100	9	68	7.2
RCC16	69	21	72	3.4	27	1470	100	39	60	1.5
RCC17	80	29	45	1.5	15	1945	96	30	54	1.8
RCC18	58	54	31	0.6	38	730	99	30	48	1.6
RCC19	68	23	67	2.9	29	530	99	19	78	4.1
RCC21	53	35	42	1.2	36	3190	95	9	87	9.9
RCC22	95	6.9	87	12.7	1.7	3200	99	5	93	18.5
RCC23	88	15	66	4.4	7.6	2770	95	8	83	11.1
RCC24	95	63	36	0.6	1.3	1235	100	23	76	3.3
RCC25	68	13	81	6.4	23	2485	100	15	83	5.6
RCC26	96	56	17	0.3	3.0	4395	100	64	31	0.5
RCC27	83	22	63	2.8	15	2840	100	35	63	1.8
RCC28	88	53	35	0.7	4.4	1165	100	21	68	3.2
Median	88	25	56	2.1	9.6	1693	99.8	21	71	3.6
Range	39-96	2.9-68	17-87	0.3-12.7	1.3-53	530-4395	95-100	1.2-64	31-93	0.5-56

Supplementary Table S3. Phenotypic characteristics of RCC-TILs

The table shows phenotypic characteristics of RCC-TILs from individual patients before and after massive expansion. Abbreviations: Y-TIL, Young tumor-infiltrating lymphocytes; REP, rapid expansion protocol.

Supplementary Table S4. Summary of tumor-reactivity and HLA expression on RCC tumor cell lines (TCL)

Patient no.	HLA class I ^a	HLA class I + IFN γ ^b	CD8 ⁺ Y-TILs			CD8 ⁺ REP-TIL			HLA class II ^a	HLA class II + IFN γ ^b	CD4 ⁺ Y-TILs			CD4 ⁺ REP-TIL		
			FTD	TCL	TCL + IFN γ ^c	FTD	TCL	TCL + IFN γ ^c			FTD	TCL	TCL + IFN γ ^c	FTD	TCL	TCL + IFN γ ^c
RCC2	Yes	Yes	0.71	0.66	NR	4.46	NR	NR	No	Yes	0.52	NR	NR	7.71	NR	NR
RCC3			0.75			5.67					1.32			11.59		
RCC4			14.21	4.44	7.00	5.39	NR	NR			2.21	NR	1.33	8.56	NR	NR
RCC5			1.64			3.97					1.14			29.52		
RCC6	Yes	Yes	1.00	0.70	NR	NR	NR	NR	Yes	Yes	NR	NR	1.05	NR	NR	NR
RCC8			0.91			0.51					0.81			0.62		
RCC10			NR			0.71					0.74			1.51		
RCC11			NR			NR					0.9			2.80		
RCC12	Yes	Yes	1.12	1.47	1.27	NR	NR	NR	No	Yes	0.52	NR	NR	NR	NR	NR
RCC14	Yes	Yes	1.08	NR	NR	0.93	NR	NR	No	Yes	1.77	NR	1.98	0.91	NR	NR
RCC16	Yes	Yes	NR	0.92	0.84	0.74	NR	NR	No	Yes	1.2	NR	1.60	1.60	NR	NR
RCC17	Yes	Yes	5.05	2.94	8.33	4.16	2.58	16.99	No	Yes	3.88	NR	NR	1.81	NR	NR
RCC18			0.60	NR	NR	NR	NR	NR			0.73	NR	NR	3.67	NR	NR
RCC19			NR	4.54	6.76	0.59	2.65	1.74			6.6	4.86	4.42	8.01	2.37	2.01
RCC21	Yes	Yes	NR	NR	NR	NR	NR	NR	No	Yes	NR	NR	NR	NR	NR	NR
RCC22	Yes	Yes	0.53	2.12	1.31	NR	5.68	4.50	No	Yes	NR	NR	NR	NR	NR	NR
RCC23			8.43	5.71	5.13	1.23	0.75	0.77			0.55	NR	NR	NR	NR	NR
RCC24	Yes	Yes	NR	NR	NR	NR	NR	NR	No	No	NR	NR	NR	NR	NR	NR
RCC25	yes	Yes	1.62	2.86	2.70	0.93	NR	1.20	No	Yes	3.83	NR	1.66	4.03	NR	2.2
RCC26	yes	Yes	2.96	2.37	5.35	NR	0.86	3.59	Yes	Yes	NR	NR	NR	NR	NR	NR
RCC27			NR	NR	NR	NR	NR	NR			NR	NR	NR	NR	NR	NR
RCC28			0.64	1.87	1.66	2.62	9.81	7.06			0.7	NR	NR	1.61	NR	NR

Supplementary Table S4. Summary of tumor-reactivity and HLA expression on RCC tumor cell lines (TCL)

The table shows percentage tumor-reactive of CD8⁺ and CD4⁺ T cells after co-culture with autologous tumor cells. T cell responses below 0.5% (limit of sensitivity) are shown as no response (NR). Abbreviations: FTD, fresh tumor digests; TCL, tumor cell line; IFN γ , interferon-gamma; ^aHLA class I/II constitutive expression on tumor cells; ^bHLA class I/II up-regulation on tumor cells after IFN γ exposure; ^cTCL treated with IFN γ before evaluation of tumor-reactivity.