

**Table S1.** Reaction conditions for each panel of antibodies. The order of antibodies and buffer used for epitope retrieval (AR) are indicated as well as the reaction conditions for the primary antibody and OPAL fluorophore staining. For all slides, Opal Polymer HRP Ms+Rb as the secondary antibody and DAPI as the final nuclei counterstain were used.

Panel 1							Panel 2						
#	AR	Marker	Antibody Diln.	Incubation	OPAL $\lambda$ [nm]	Diln.	#	AR	Marker	Antibody Diln.	Incubation	OPAL $\lambda$ [nm]	Diln.
1	9	CD3e	1:500	1 h/RT	620	1:100	1	9	PD-1	1:50	OVN/4°C	520	1:50
2	9	CD4	1:200	OVN/4°C	540	1:100	2	9	CD4	1:200	OVN/4°C	620	1:100
3	9	CD8- $\alpha$	1:500	1 h/RT	650	1:100	3	9	CTLA4	1:100	OVN/4°C	540	1:100
4	6	FoxP3	1:50	1 h/RT	520	1:100	4	9	CD8- $\alpha$	1:500	1 h/RT	650	1:100
5	6	CK	1:800	1 h/RT	690	1:200	5	6	CK	1:800	1 h/RT	690	1:200
Panel 3							Panel 4						
#	AR	Marker	Antibody Diln.	Incubation	OPAL $\lambda$ [nm]	Diln.	#	AR	Marker	Antibody Diln.	Incubation	OPAL $\lambda$ [nm]	Diln.
1	9	CD3e	1:400	1 h/RT	620	1:100	1	9	CD4	1:200	OVN/4°C	540	1:100
2	9	VEGF	1:50	OVN/4°C	520	1:100	2	9	ICOS	1:50	OVN/4°C	520	1:50
3	6	Ki67	1:100	1 h/RT	540	1:100	3	6	FoxP3	1:50	1 h/RT	570	1:100
4	6	CK	1:800	1 h/RT	690	1:200	4	6	CCR4	1:200	1 h/RT	620	1:100
							5	6	CK	1:800	1 h/RT	690	1:200

Abbreviations: # - serial No. of antibodies, AR – antigen retrieval buffer pH, Diln. – dilution, RT – room temperature, OVN – overnight

**Table S2.** Cell counts/Mpx in the parenchyma and stroma of HNSCC tumors.

Panel	Cell population	Parenchyma				Stroma				Parenchyma-Stroma correlation (r)
		Zeros* (%)	Min. nonzero value	Median	Max.	Zeros* (%)	Min. nonzero value	Median	Max.	
1	CD3+CD4+ (Th)	6	0.27	5.01	264.2	1	0.46	53.85	1912.8	0.71
	CD3+CD8+ (Tc)	3	0.17	29.42	714.56	1	0.28	52.42	899.09	0.83
	CD3+CD4+FOXP3+(Treg)	9	0.21	8.24	135.58	2	0.69	35.6	507.13	0.68
	Th + Tc + Treg sum	0	0.17	53.42	1094.88	0	2.77	205.95	2205.32	0.76
2	CD4+	2	0.17	7.95	213.54	0	1.63	134.67	1563.11	0.70
	PD-1+CD4+	7	0.22	4.62	607.33	9	0.53	37.76	1630.56	0.80
	CTLA4+CD4+	11	0.17	2.09	48.85	6	0.45	9.23	1148.64	0.73
	CD8+	14	0.18	4.94	318.1	5	0.54	41.91	907.32	0.81
	PD-1+CD8+	23	0.2	2.55	709.31	21	0.25	6.41	1445	0.85
	CTLA4+CD8+	79	0.16	0	9.85	76	0.24	0	96.14	0.49
3	CD3+	2	0.48	35.46	465.77	0	0.46	192.92	1628.73	0.64
	Ki67+	27	0.18	0.82	684.08	47	0.21	0.3	656.79	0.69
	VEGF+	14	0.19	5.9	446.56	29	0.29	1.25	904.2	0.44
4	CD4+	6	0.2	4.47	599.06	0	0.33	117.77	2055.96	0.71
	FOXP3+CD4+	7	0.19	5.98	252.41	1	2.11	46.83	596.52	0.77
	ICOS+CD4+	10	0.17	2.99	125.25	8	0.25	10.64	668.6	0.76
	ICOS+FOXP3+CD4+	15	0.17	3.25	67.54	6	0.28	10.16	198.21	0.77