

Supplemental Table S1. Antibodies used in flow cytometry

Antibody	Format	Research Resource Identifiers (RRIDs)	Source
Anti-human antibodies			
CD24	FITC	RRID:AB_10562033	BD Biosciences, Franklin Lakes, NJ, USA
CD29	PE	RRID:AB_395836	“
CD44	APC	RRID:AB_398683	“
CD117	APC	RRID:AB_398461	“
CD126	PE	RRID:AB_394271	“
CD130	FITC	RRID:AB_868803	Abcam, Cambridge, UK
CD133	PE	RRID:AB_2726287	Miltenyi Biotec, Bergisch Gladbach, Germany
CXCR3	APC	RRID:AB_398481	BD Biosciences, Franklin Lakes, NJ, USA
IL23R	PE	RRID:AB_2124780	R&D Systems, Minneapolis, MN, USA
IL30	eFluor660	RRID:AB_11149127	Thermo Fisher Scientific, Waltham, MA, USA
Anti-mouse antibodies			
CD24	PE	RRID:AB_2656574	Miltenyi Biotec, Bergisch Gladbach, Germany
CD29	FITC	RRID:AB_2660691	“
CD44	FITC	RRID:AB_2658178	“
CD49f	BV650	RRID:AB_2744415	BD Biosciences, Franklin Lakes, NJ, USA
CD126	PE	RRID:AB_996658	Thermo Fisher Scientific, Waltham, MA, USA
CD130	APC	RRID:AB_10670874	“
CD133	APC	RRID:AB_2660069	Miltenyi Biotec, Bergisch Gladbach, Germany
CXCR3	PE	RRID:AB_10897140	BD Biosciences, Franklin Lakes, NJ, USA
IL-12R β 1	PE	RRID:AB_394310	“
IL23R	PerCP-Cy	RRID:AB_2738972	“

Supplemental Table S2. Gene list of the RT² Profiler Human Cancer Inflammation & Immunity Crosstalk PCR Array (#PAHS-181Z)

Gene categories	Gene symbols
Immune & Inflammatory Responses	<p><i>Immunostimulatory Factors:</i> IFNG, IL12A, IL12B, IL15, IL2, TNF</p> <p><i>Immunosuppressive Factors:</i> CD274 (PD-L1), CSF2 (GM-CSF), CTLA4, CXCL12 (SDF1), CXCL5 (ENA-78, LIX), CXCL8 (IL8), IDO1 (IDO), IL10, IL13, IL4, MIF, NOS2 (iNOS), PDCD1 (PD1), PTGS2 (COX2), TGFB1, VEGFA</p> <p><i>Pro-Inflammatory Genes:</i> CCL2 (MCP-1), CCL20 (MIP-3A), IFNG, IL12A, IL12B, IL17A, IL1A, IL1B, IL2, IL23A, IL6, PTGS2 (COX2), TLR4, TNF, VEGFA</p> <p><i>Anti-Inflammatory Genes:</i> IL10, IL13, IL4, TGFB1</p> <p><i>Enzymatic Modulators of Inflammation & Immunity:</i> AICDA (AID), GZMA, GZMB, IDO1 (IDO), NOS2 (iNOS), PTGS2 (COX2)</p>
Antigen Presentation	HLA-A, HLA-B, HLA-C, MICA, MICB
Chemokines	CCL18 (PARC), CCL2 (MCP-1), CCL20 (MIP-3A), CCL21 (MIP-2), CCL22 (MDC), CCL28, CCL4 (MIP-1B), CCL5 (RANTES), CXCL1 (GRO1, GROa, SCYB1), CXCL10 (INP10), CXCL11 (I-TAC, IP-9), CXCL12 (SDF1), CXCL2 (GRO2, GROb, SCYB2), CXCL5 (ENA-78, LIX), CXCL9 (MIG)
Chemokine Receptors	ACKR3, CCR1, CCR10, CCR2, CCR4, CCR7, CCR9, CXCR1, CXCR2, CXCR3, CXCR4, CXCR5
Interleukins	CXCL8 (IL8), IL10, IL12A, IL12B, IL13, IL15, IL17A, IL1A, IL1B, IL2, IL23A, IL4, IL6
Other Cytokines	KITLG (SCF), MIF, SPP1, TNF, TNFSF10 (TRAIL)
Growth Factors & Receptors	CSF1 (MCSF), CSF2 (GM-CSF), CSF3 (GCSF), EGF, EGFR (ERBB1), IGF1, TGFB1, VEGFA
Signal Transduction	<p><i>Interferon Signaling:</i> GBP1, IFNG, IL6, IRF1</p> <p><i>Interferon-Responsive Genes:</i> CCL2 (MCP-1), CCL5 (RANTES), CXCL10 (INP10), CXCL9 (MIG), GBP1, IRF1, MYD88, STAT1, TLR3, TNFSF10 (TRAIL)</p> <p><i>NFκB Targets:</i> BCL2L1 (BCLXL), CCL2 (MCP-1), CCL5 (RANTES), CSF1 (MCSF), CSF2 (GM-CSF), CSF3 (GCSF), CXCL8 (IL8), IFNG, TNF</p> <p><i>STAT Targets:</i> CCL2 (MCP-1), CCL4 (MIP-1B), CCL5 (RANTES), CSF1 (MCSF), CSF2 (GM-CSF), CSF3 (GCSF), CXCL10 (INP10), CXCL11 (I-TAC, IP-9), CXCL12 (SDF1), CXCL8 (IL8), CXCL9 (MIG), IL10, IL17A, IL1B, IL23A, IL6, MYC</p> <p><i>Toll-Like Receptor Signaling:</i> MYD88, TLR2, TLR3, TLR4</p> <p><i>Transcription Factors:</i> FOXP3, HIF1A, IRF1, MYC, NFKB1, STAT1, STAT3, TP53 (p53)</p>
Apoptosis	<p><i>Pro-Apoptotic:</i> FASLG (TNFSF6), TNF, TNFSF10 (TRAIL), TP53 (p53)</p> <p><i>Anti-Apoptotic:</i> BCL2, BCL2L1 (BCLXL), MYC, STAT3</p>

Supplemental Table S3. Gene list of the RT² Profiler Mouse Cancer Inflammation & Immunity Crosstalk PCR Array (#PAMM-181Z)

Gene categories	Gene symbols
Immune & Inflammatory Responses	<p><i>Immunostimulatory Factors:</i> Ifng, Il12a, Il12b, Il15, Il2, Tnf.</p> <p><i>Immunosuppressive Factors:</i> Cd274 (Pdl1), Csf2 (GMCSF), Ctla4, Cxcl12, Cxcl5 (ENA-78, LIX), Ido1 (Ido), Il10, Il13, Il4, Il5, Mif, Nos2 (iNos), Pdc1 (PD-1), Ptgs2 (Cox2), Tgfb1, Vegfa</p> <p><i>Pro-Inflammatory Genes:</i> Ccl2 (MCP-1), Ccl20 (Mip-3a), Ifng, Il12a, Il12b, Il17a, Il1a, Il1b, Il2, Il22, Il23a, Il6, Ptgs2 (Cox2), Tlr4, Tnf, Vegfa</p> <p><i>Anti-Inflammatory Genes:</i> Il10, Il13, Il4, Tgfb1</p> <p><i>Enzymatic Modulators of Inflammation & Immunity:</i> Aicda (Aid), Gzma, Gzmb, Ido1 (Ido), Nos2 (iNos), Ptgs2 (Cox2)</p>
Antigen Presentation	H2-D1, H2-K1
Chemokines	Ccl2 (MCP-1), Ccl20 (Mip-3a), Ccl22 (Mdc), Ccl28, Ccl4 (Mip-1b), Ccl5 (Rantes), Cxcl1 (Gro1), Cxcl10 (Inp10), Cxcl11 (Itac, Ip9), Cxcl12, Cxcl2 (Gro2), Cxcl5 (ENA-78, LIX), Cxcl9 (Mig)
Interleukins	Il10, Il12a, Il12b, Il13, Il15, Il17a, Il1a, Il1b, Il2, Il22, Il23a, Il4, Il5, Il6
Chemokine & Interleukin Receptors	Ackr3, Ccr1, Ccr10, Ccr2, Ccr4, Ccr5, Ccr7, Ccr9, Cxcr1, Cxcr2, Cxcr3, Cxcr4, Cxcr5, Il1r1
Other Cytokines	Kitl (Scf), Mif, Spp1, Tnf, Tnfsf10 (Trail)
Growth Factors & Receptors	Csf1 (Mcsf), Csf2 (GMCSF), Csf3 (Gcsf), Egf, Egfr, Igf1, Tgfb1, Vegfa
Signal Transduction	<p><i>Interferon Signaling:</i> Gbp2b, Ifng, Il6, Irf1</p> <p><i>Interferon-Responsive Genes:</i> Ccl2 (MCP-1), Ccl5 (Rantes), Cxcl10 (Inp10), Cxcl9 (Mig), Gbp2b, Irf1, Myd88, Stat1, Tlr3, Tnfsf10 (Trail)</p> <p><i>NFκB Targets:</i> Bcl2l1 (Bcl-XL), Ccl2 (MCP-1), Ccl5 (Rantes), Csf1 (Mcsf), Csf2 (GMCSF), Csf3 (Gcsf), Ifng, Tnf</p> <p><i>STAT Targets:</i> Ccl2 (MCP-1), Ccl4 (Mip-1b), Ccl5 (Rantes), Csf1 (Mcsf), Csf2 (GMCSF), Csf3 (Gcsf), Cxcl10 (Inp10), Cxcl11 (Itac, Ip9), Cxcl12, Cxcl9 (Mig), Il10, Il17a, Il1b, Il23a, Il6, Myc</p> <p><i>Toll-Like Receptor Signaling:</i> Myd88, Tlr2, Tlr3, Tlr4, Tlr7, Tlr9</p> <p><i>Transcription Factors:</i> Foxp3, Hif1a, Irf1, Myc, Nfkb1, Stat1, Stat3, Trp53 (p53)</p>
Apoptosis	<p><i>Pro-Apoptotic:</i> Fasl, Tnf, Tnfsf10 (Trail), Trp53 (p53)</p> <p><i>Anti-Apoptotic:</i> Bcl2, Bcl2l1 (Bcl-XL), Myc, Stat3</p>

Supplemental Table S4. Clinical and pathological characteristics of TNBC patients

Baseline characteristics	Overall sample (n=32)
Mean age (in years) ± SD	57.0 ± 9.3
Histotypes (%)	
- <i>Ductal carcinoma</i>	75.3
- <i>Lobular carcinoma</i>	7.5
- <i>Others</i>	17.2
Stage (%)	
- <i>IA</i>	42.8
- <i>IIA or IIB</i>	30.4
- <i>IIIA, IIIB or IIIC</i>	26.8
Lymph node metastases (%)	57.2

Supplemental Table S5. Antibodies used in immunostaining

Antibody	Clone	Origin	Research Resource Identifiers (RRIDs)	Source
ATP1A1 ^c	ST0533	Rabbit	RRID:AB_2809472	Thermo Fisher, Waltham, MA, USA
CD3		Rabbit	RRID:AB_2335677	Agilent, Santa Clara, CA, USA
CD4	YTS191.1.2	Rat	RRID:AB_323559	Bio-Rad, Hercules, CA, USA
CD8	YTS169.4	Rat	RRID:AB_322770	"
CD11b	EPR1344	Rabbit	RRID:AB_2650514	Abcam, Cambridge, UK
CD31	SZ31	Rat	RRID:AB_2631039	Dianova, Hamburg, Germany
CD133	CMab-43	Mouse	RRID:AB_2869872	BD Biosciences, Franklin Lakes, NJ, USA
CXCL10 ^{a,c}		Rabbit	RRID:AB_308792	Abcam, Cambridge, UK
F4/80	Cl:A3-1	Rat	RRID:AB_323279	Bio-Rad, Hercules, CA, USA
Foxp3	FJK-16s	Rat	RRID:AB_467575	Thermo Fisher, Waltham, MA, USA
Gr-1	RB6-8C5	Rat	RRID:AB_394638	BD Biosciences, Franklin Lakes, NJ, USA
IL23 ^{a,c}		Rabbit	RRID:AB_1015843	LifeSpan BioScience, Seattle, WA, USA
IL30 ^b		Rabbit	RRID:AB_10898806	Abcam, Cambridge, UK
IL30 ^c		Rabbit	RRID:AB_838475	Novus Biologicals, Centennial, CO, USA
IL30		Goat	RRID:AB_355012	R&D Systems, Minneapolis, MN, USA
KLF4	EPR3550	Rabbit	RRID:AB_2721027	Abcam, Cambridge, UK
LAG3	EPR20261	Rabbit	RRID:AB_2883982	Abcam, Cambridge, UK
Ly-6G	1A8	Rat	RRID:AB_1089179	BioLegend, San Diego, CA, USA
Myc	9E10	mouse	RRID:AB_627268	Santa Cruz Biotechnology, Dallas, TX, USA
NKp46		Rabbit	RRID:AB_10767953	Biorbyt, Cambridge, UK
PCNA	PC10	Mouse	RRID:AB_2160651	Agilent, Santa Clara, CA, USA
ROR γ t	AFKJS-9	Rat	RRID:AB_1834475	Thermo Fisher, Waltham, MA, USA
TCR δ	H41	Mouse	RRID:AB_1130061	Santa Cruz Biotechnology, Dallas, TX, USA

^a Antibodies used for immunohistochemistry on both human and murine tissues.

^b Antibody used only for immunohistochemistry on human tissue.

^c Antibody used for immunofluorescence on human cells.

Supplemental Table S6. Profiling of tumor infiltrating immune cells with CIBERSORTx

	IL30 ^{high} BCs ^a	IL30 ^{low} BCs ^a
<i>B cells naïve</i>	6.29%	6.44%
<i>B cells memory</i>	0.44%	0.56%
<i>Plasma cells</i>	3.59%	3.24%
<i>T cells CD8⁺</i>	4.75%	4.72%
<i>T cells CD4⁺ naïve</i>	0.01% ^b	0.07%
<i>T cells CD4⁺ memory resting</i>	10.00% ^b	12.93%
<i>T cells CD4⁺ memory activated</i>	0.77%	0.58%
<i>T cells follicular helper</i>	8.83%	7.76%
<i>T cells regulatory (Tregs)</i>	3.98%	3.29%
<i>T cells gamma delta</i>	0.00% ^b	0.27%
<i>NK cells resting</i>	2.65%	2.31%
<i>NK cells activated</i>	1.41%	0.66%
<i>Monocytes</i>	0.90%	1.25%
<i>Macrophages M0</i>	20.79%	17.28%
<i>Macrophages M1</i>	7.11%	6.26%
<i>Macrophages M2</i>	21.55%	23.41%
<i>Dendritic cells resting</i>	0.08% ^b	0.49%
<i>Dendritic cells activated</i>	1.19%	1.01%
<i>Eosinophils</i>	0.02%	0.01%
<i>Neutrophils</i>	0.28%	0.17%

^a Values are expressed as mean percentages of total tumor infiltrating cells.

^b $p < 0.05$, Student's *t*-test versus IL30^{low} BCs.

Supplemental Table S7. List of immune exhaustion genes analyzed with CIBERSORTx

Gene symbol	Protein name
<i>BATF</i>	Basic Leucine Zipper ATF-Like Transcription Factor
<i>CR2 (CD21)</i>	Complement C3d Receptor 2
<i>CTLA4</i>	Cytotoxic T-Lymphocyte Associated Protein 4
<i>EOMES</i>	Eomesodermin
<i>FCRL4</i>	Fc Receptor Like 4
<i>FOXO1</i>	Forkhead Box O1
<i>FOXP1</i>	Forkhead Box P1
<i>HAVCR2 (TIM3)</i>	Hepatitis A Virus Cellular Receptor 2 (T Cell Immunoglobulin Mucin 3)
<i>IDO1</i>	Indoleamine 2,3-Dioxygenase 1
<i>IFNA1</i>	Interferon Alpha 1
<i>IFNB1</i>	Interferon Beta 1
<i>IL10</i>	Interleukin 10
<i>IL22</i>	Interleukin 22
<i>LAG3</i>	Lymphocyte Activation Gene 3
<i>LAIR1</i>	Leukocyte Associated Immunoglobulin Like Receptor 1
<i>NFATC1</i>	Nuclear Factor of Activated T Cells 1
<i>NR4A1</i>	Nuclear Receptor Subfamily 4 Group A Member 1
<i>PDCD1 (PD-1)</i>	Programmed Cell Death 1
<i>PDCD1LG2 (PD-L2)</i>	Programmed Cell Death 1 Ligand 2
<i>PD-L1 (CD274)</i>	Programmed Cell Death 1 Ligand 1
<i>PRDM1 (BLIMP-1)</i>	PR domain zinc finger protein 1 (B lymphocyte induced maturation protein-1)
<i>SIGLEC6</i>	Sialic Acid Binding Ig Like Lectin 6
<i>SIRT1</i>	Sirtuin 1
<i>TBX21 (T-bet)</i>	T-Box Transcription Factor 21 (T-box expressed in T cells)
<i>TGFB1</i>	Transforming Growth Factor Beta 1
<i>TIGIT</i>	T Cell Immunoreceptor with Ig and ITIM Domains
<i>TOX</i>	Thymocyte Selection Associated High Mobility Group Box
<i>TOX2</i>	TOX High Mobility Group Box Family Member 2
<i>TRAF1</i>	TNF Receptor Associated Factor 1
<i>VHL</i>	Von Hippel-Lindau Tumor Suppressor
<i>VSIR (VISTA)</i>	V-Set Immunoregulatory Receptor (V-domain Ig suppressor of T cell activation)
<i>VTCN1 (B7-H4)</i>	V-Set Domain Containing T Cell Activation Inhibitor 1 (B7 Family Member H4)

Supplemental Table S8. Expression of CXCL10 and IL23 by CD133⁺IL30⁺BCSCs in TNBC samples

Patient's number	CD133 ⁺ IL30 ⁺ CXCL10 ⁺ cells (%) ^a	CD133 ⁺ IL30 ⁺ IL23 ⁺ cells (%) ^b
1	57.43	49.69
2	51.30	45.45
3	56.80	49.76
4	63.97	55.84
5	59.57	55.61
6	61.44	46.68
7	61.79	47.07
8	67.39	48.48
9	58.74	61.76
10	59.40	56.71
11	54.88	61.21
12	59.74	49.59
13	57.16	47.84
14	58.12	56.98
15	53.43	39.33
16	63.36	59.21
17	51.89	62.61
18	66.36	50.90
19	59.09	61.09
20	57.43	42.39
21	55.27	50.63
22	62.34	46.64
23	64.99	34.23
24	50.36	38.96
25	62.81	34.05
26	57.41	55.55
27	55.24	40.90
28	51.93	61.02
29	64.72	56.46
30	54.67	56.68
31	54.50	62.06
32	53.42	55.74

^a Mean \pm SD of CXCL10 positive cells/total number of CD133⁺IL30⁺cells per field.

^b Mean \pm SD of IL23 positive cells/total number of CD133⁺IL30⁺cells per field.