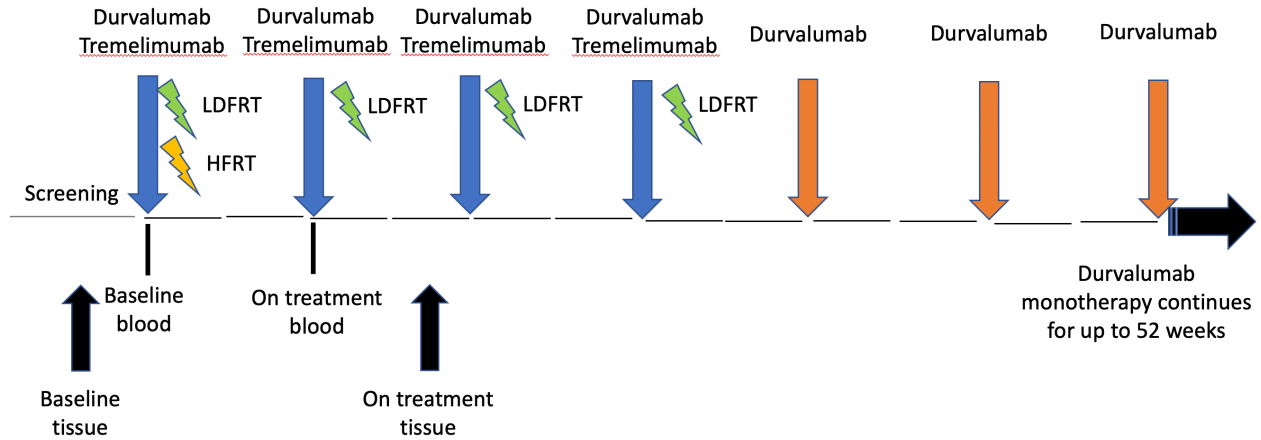


Supplementary Data and Methods

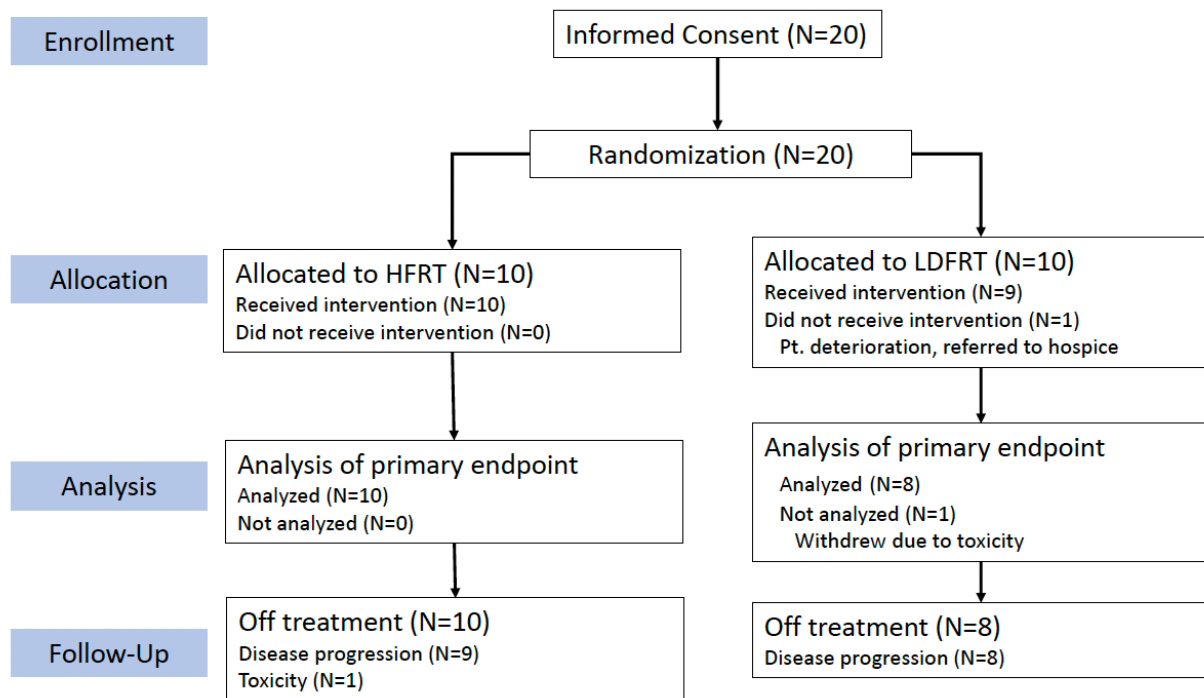
Supplemental Figure 1



Supplemental Figure 1. Study treatment and biomarker collection. Timing of treatment and correlative blood and tissue collections. Dashed black lines represent 2-week intervals.

Hypofractionated radiation (HFRT) administered to arm 1 only. Low dose fractionated radiation (LDFRT) administered to arm 2 only.

Supplemental Figure 2



Supplementary Figure 2: Flow diagram.

Supplemental Table 1

Characteristic	Arm A: HFRT, n=10	Arm B: LDFRT, n=10	Overall, n=20
Gender, female (%)	6 (60)	5 (50)	11 (55)
Median age, years (range)	58 (38-79)	56 (29, 77)	59 (29, 79)
Prior surgery (%)	10 (100)	10 (100)	20 (100)
Prior radiation (%)	2 (20)	3 (30)	5 (25)
Number of lines of prior therapy (range)	4 (2, 7)	3.5 (1, 7)	4 (1, 7)

Supplemental Table 1. Patient Characteristics. Abbreviations: HFRT (hypofractionated radiation); LDFRT (low-dose fractionated radiation therapy).

Supplemental Table 2

Toxicity	Arm A: HFRT, n=10		Arm B: LDFRT, n=10	
	Grade 3	Grade 4	Grade 3	Grade 4
Hyponatremia		1	1	1
Diarrhea		1		
Nausea			1	
Vomiting			1	
Lymphopenia	2		1	
Confusion			1	
Acute kidney injury			1	
Elevation in liver enzymes			1	
Hypophosphatemia			1	
Hypokalemia	1			

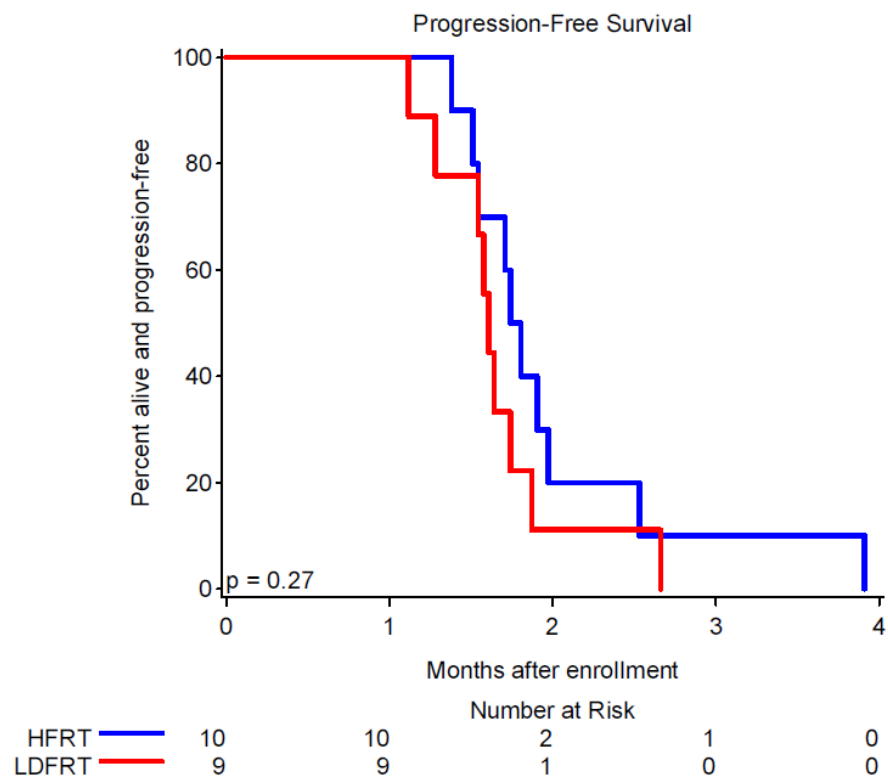
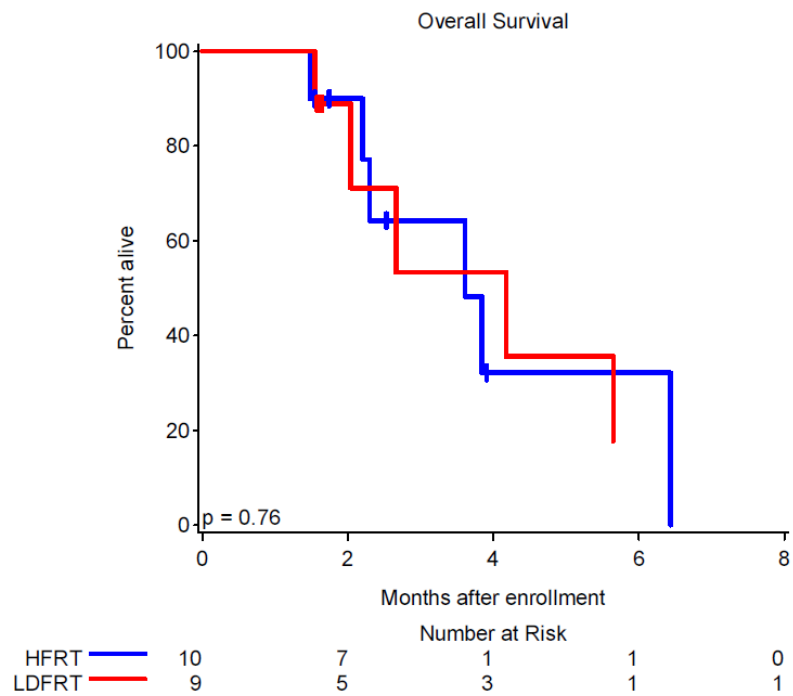
Supplemental Table 2. Grade 3-5 at least possibly related toxicities

Supplemental Figure 3



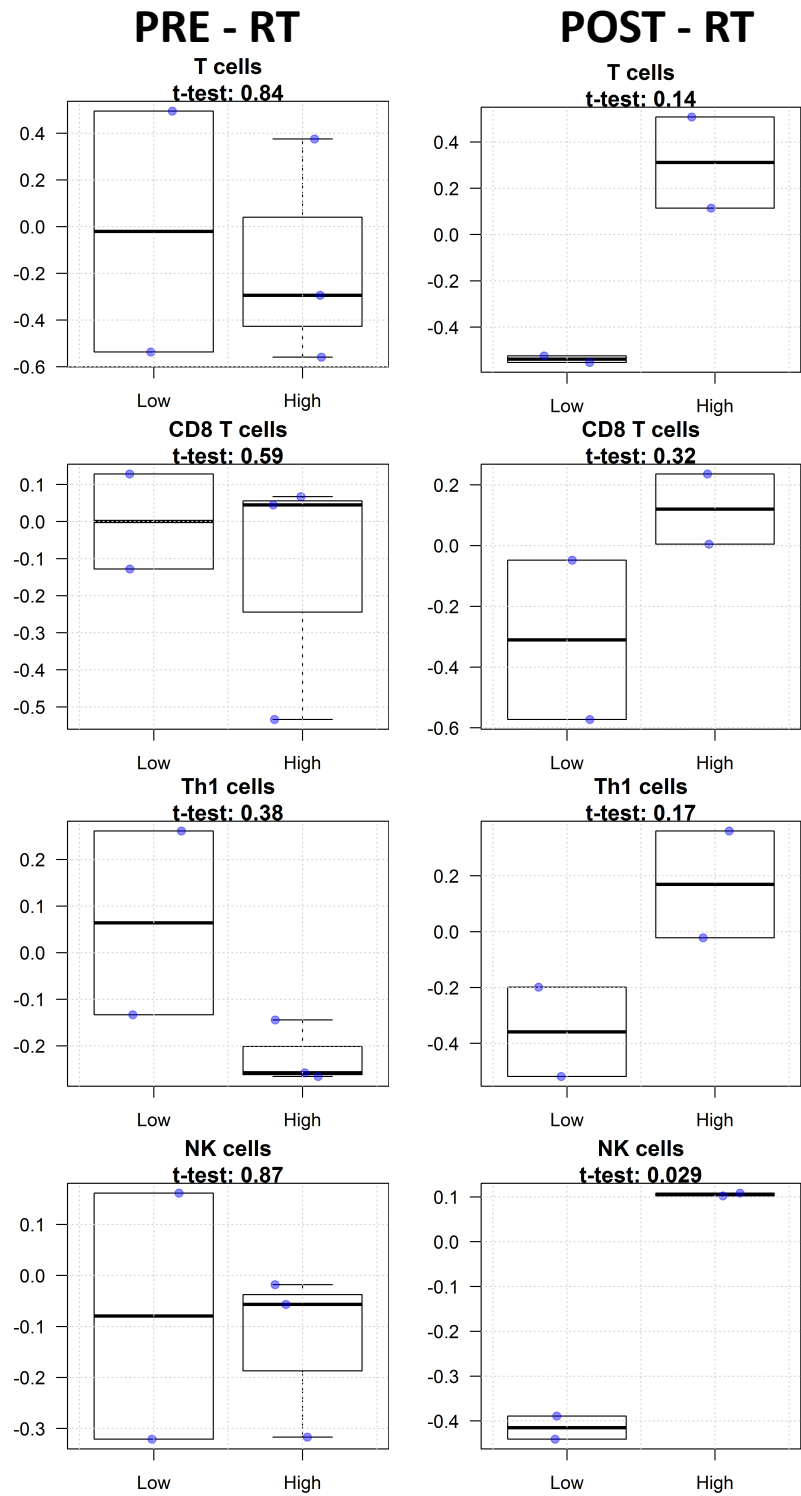
Supplemental Figure 3. Response outside of the radiation treatment field. A subject with metastatic microsatellite stable colorectal cancer to the liver, chest, and porta hepatis lymph nodes who had progressed on 6 prior lines of therapy was irradiated to the liver (**A**) in combination with durvalumab and tremelimumab on protocol and demonstrated an out of field response in an unirradiated porta hepatis lymph node (pre – (**B**), post treatment – (**C**)) with an overall decrease in un irradiated tumor burden of 37% as per immune related response criteria. Maximum total dose received by a portion of the porta lymph node was <15 Gy over 3 fractions; most of the mass received less than 6 Gy.

Supplemental Figure 4



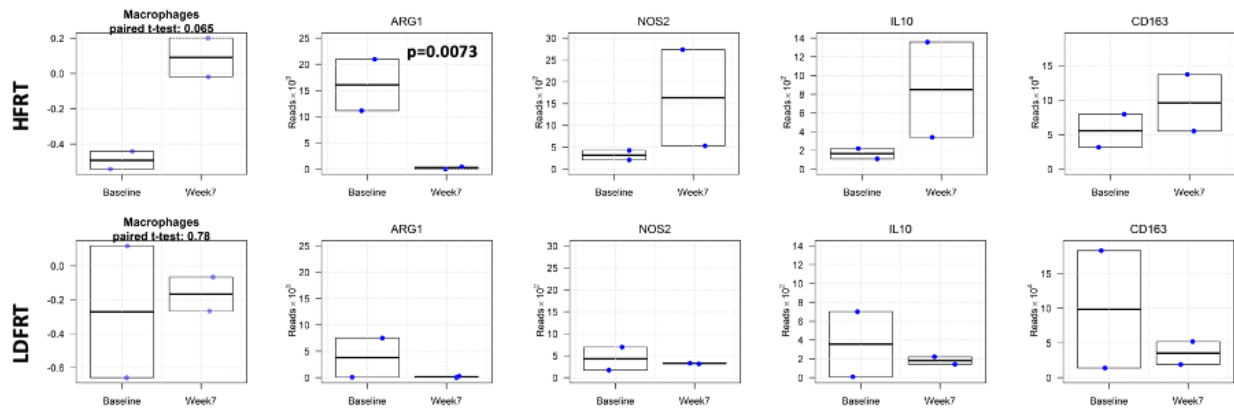
Supplemental Figure 4. Clinical outcomes. Overall survival (**A**) and progression-free survival (**B**) did not differ between HFRT and LDFRT

Supplemental Figure 5



Supplemental Figure 5. Gene set variation analysis evaluating expression of marker gene sets for immune cell types in patient biopsies pre-treatment and post-radiotherapy. Differences in gene set expressions between patients treated with LDFRT (low) vs. HFRT (high) were evaluated pre- (left) and post- (right) therapy. Results are depicted as box-and-whisker plots where the box edges mark the first and third quartile boundaries within each distribution. The dark horizontal line represents the median.

Supplemental Figure 6



Supplemental Figure 6. Gene set variation analysis evaluating expression of marker gene sets for macrophages in patient biopsies pre-treatment and post-radiotherapy. Differences in gene set expressions between patients treated with LDFRT vs. HFRT were evaluated pre- and post-therapy. This is followed by examination of macrophage polarization genes ARG1, NOS2, IL10, and CD163 in pre- vs. post therapy biopsies from patients treated with LDFRT vs. HFRT. Results are depicted as box-and-whisker plots where the box edges mark the first and third quartile boundaries within each distribution. The dark horizontal line represents the median. Macrophage gene set was evaluated using a paired t-test, polarization genes were evaluated using a false discovery rate method to correct for multiple testing.

Supplemental Table 3

<i>Change in hematologic parameter</i>		<i>N</i>	<i>Mean</i>	<i>Std</i>	<i>Min</i>	<i>Median</i>	<i>Max</i>
WBC	All	19	1.7	4.9	-2.5	0.0	18.0
	HFRT	10	3.2	6.4	-1.2	0.6	18.0
	LDFRT	9	0.1	1.9	-2.5	-0.5	3.7
Percent lymphocyte	All	16	-7.2	6.6	-23.6	-6.2	2.1
	HFRT	9	-9.0	6.5	-23.6	-6.4	-2.3
	LDFRT	7	-4.8	6.5	-16.0	-2.0	2.1
Number of lymphocytes	All	16	-0.3	0.3	-1.0	-0.3	0.2
	HFRT	9	-0.4	0.3	-0.7	-0.4	0.0
	LDFRT	7	-0.3	0.4	-1.0	-0.2	0.2

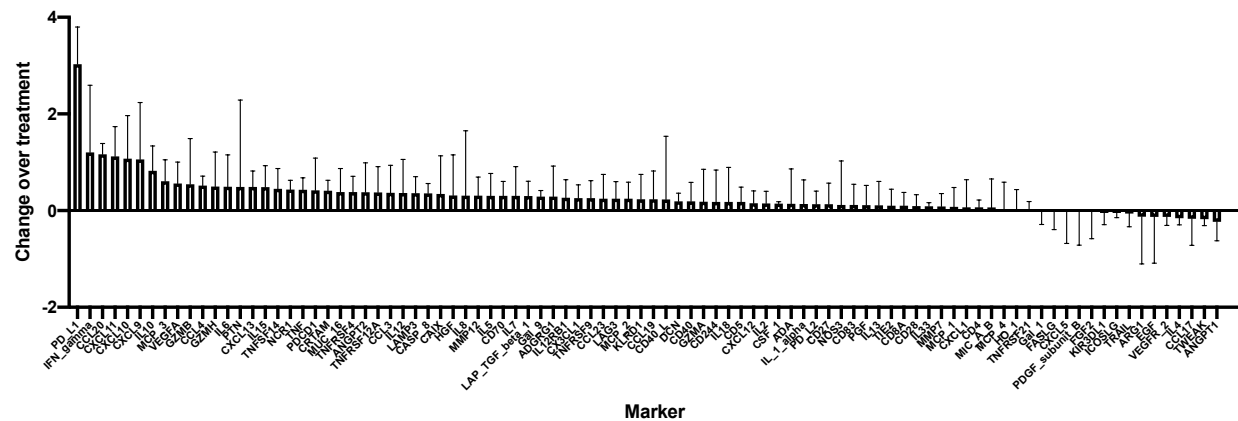
Supplemental Table 3. Changes in hematologic parameters (week 5 – pre-treatment). Number of

lymphocytes = WBC * percent lymphocytes.

Exact Wilcoxon rank-sum p-values: WBC, p=0.27; Percent lymphocytes, p=0.24;

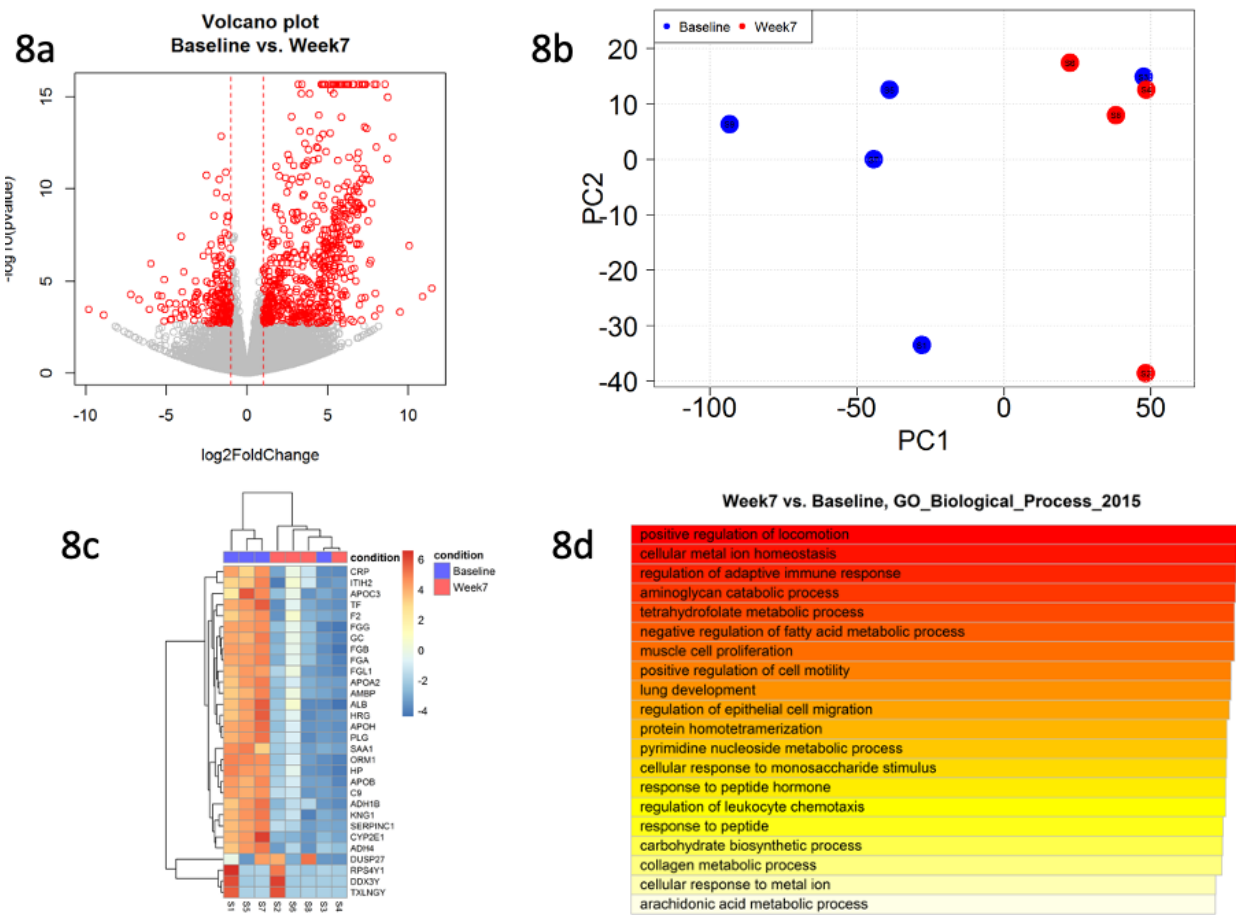
Number lymphocytes, p=0.41

Supplemental Figure 7



Supplemental Figure 7. Changes in circulating biomarkers on treatment (on-treatment samples obtained week 5). Median (95% confidence interval) changes for both HFRT and LDFRT are plotted. Comparisons of changes between week-5 and pre-treatment by assigned intervention arm using longitudinal mixed models with intervention arm, time, and the interaction of intervention and time as independent predictors. Increases over time independent of treatment were noted for interferon-gamma ($p=0.01$), CCL20 ($p=0.002$), CXCL-9, 10, 11 ($p=0.001$, $p=0.0001$, and $p=0.030$, respectively). A suggested interaction of treatment and time was observed for PD-L1, with a larger increase among patients with HFRT ($p<0.0001$) than LDFRT($p=0.0006$).

Supplemental Figure 8



Supplemental Figure 8. Therapy induced gene expression differences were also observed in the tumor microenvironment. Volcano plot (A) demonstrates differentially expressed genes in the tumor microenvironment comparing post treatment to baseline samples. Principal component analysis (B) separates baseline from on treatment samples.

Supplementary Materials / Methods

Supplemental Methods:

Multiplex Immunofluorescence: For on treatment comparisons of T-cell populations, for each patient, the variance at each time point was estimated by [number of frames analyzed * SEM²] and the variance of the difference (post-baseline) was estimated by the sum of the time point variances. The standard deviation of the difference is the square root of the variance. The p-value for each patient is based on the normal distribution. For each patient, the comparison of primary nuclear rupture (PNR) or PNR + micronuclei (MN) formation is based on Poisson regression. The dependent variable is the number of PNR (or PNR+MN) for each field of view. The only predictor in the model is time (post or pre). The p-value compares whether there is evidence that the numbers of PNR or PNR+MN change over time. P-values are based on the chi-squared test.

CytoTOF: Briefly, samples from baseline and cycle 2 (PBMCs not collected from future cycles) were thawed, washed, stained and run on a Helios mass cytometer (Fluidigm). A 36+ marker antibody panel was optimized prior to sample testing and is described in Thrash et al.

(Supplemental Table 6).(1) CyTOF data was obtained in the form of .fcs files from the Helios instrument. Data was normalized using EQ Four Element Beads, concatenated, and debarcoded using Fluidigm CyTOF Software version 6.7.1016 , and cell population frequencies were determined by manual gating in FlowJo (version 10.1 for Mac, FlowJo LLC, Ashland, OR) as previously described (2,3). A total of 55 manually gated cell populations and their population frequencies were analyzed for statistical differences. Baseline pretreatment levels were compared for each of the 55 cellular populations by assigned intervention arm using a non-parametric, exact Wilcoxon rank-sum test. A second analysis was performed to compare the changes of

pretreatment timepoints to week-5 by assigned intervention arm over time. This analysis was based on longitudinal mixed models with intervention arm, time and the interaction of intervention and time as independent predictors. The dependent variable is the log₂ transform of the marker.

Olink: An incubation master mix containing pairs of oligonucleotide-labeled antibodies to each protein, was added to the samples and incubated for 16 hours at 4 °C. Each protein was targeted with two different epitope-specific antibodies increasing the specificity of the assay. Presence of the target protein in the sample brought the partner probes in close proximity, allowing the formation of a double strand oligonucleotide polymerase chain reaction (PCR) target. On the following day, the extension master mix in the sample initiated the specific target sequences to be detected and generated amplicons using PCR in 96 well plate. For the detection of the specific protein, Dynamic array integrated fluidic Circuit (IFC) 96x96 chip was primed, loaded with 92 protein specific primers and mixed with sample amplicons including three inter-plate controls (IPS) and three negative controls (NC). Real time microfluidic qPCR was performed in Biomark (Fluidigm) for the target protein quantification. Data were analyzed using Real time PCR analysis software via $\Delta\Delta C_t$ method and Normalized Protein Expression (NPX) manager. Data were normalized using internal controls in every single sample, inter-plate control (IPC) and negative controls and correction factor and expressed as Log₂ scale which is proportional to the protein concentration. One NPX difference equals to the doubling of the protein concentration.

RNA sequencing: Samples were stabilized by addition of RNAlater (Ambion). Homogenization was performed using a TissueLyzer II (Qiagen) at 20 Hz for 1 minute at -80 °C. Total RNA was extracted using the RNeasy plus mini kit (Qiagen). RNA concentrations were then quantified using a Qubit Fluorometer and RNA integrity was assessed using the Agilent TapeStation

(Agilent). Samples with RIN (RNA integrity number) ≥ 8 were used for this study. Indexed libraries were constructed from 1000 ng of total RNA using the TruSeq Stranded mRNA Sample Prep Kit (Illumina) following the manufacturer's instruction. The quantity and quality of the libraries were also assessed by Qubit and Agilent 2100 Bioanalyzer, respectively. The average library size was 400 bp. Libraries molar concentration were validated by qPCR for library pooling. Sequencing was performed on the Illumina HiSeq 4000 platform using PE150 chemistry (Illumina).

Gene differential expression analysis was carried out by using DESeq2 bioconductor R package.(4) Differential expression p-values were corrected for multiple testing using the false discovery rate (FDR) method. Genes with FDR-adjusted p values <0.05 , and fold change >2 or <0.5 were considered differentially expressed. Data for gene expression heatmap and PCA plot was normalized and log transformed with DESeq2 bioconductor R package. Clustered heatmaps were created with R package "pheatmap" (Raivo Kolde (2015). pheatmap: Pretty Heatmaps. R package version 1.0.8.). Go Gene enrichment analysis was performed using lists of differentially expressed genes that meets criteria 1) fold change more than 2 and 2) FDR less than 0.05. Enrichment analysis performed using the web-based tool "Enrichr."(5) The R package "gsva" was used for gene set variation analysis (1) and the marker gene set for immune cell types was obtained from a previously validated data set (2).(6,7) MiXCR (8) was used to identify unique complementarity-determining region 3 (CDR3) sequences from RNA-Seq data. R package "plotly" was used for creating TCR pie charts.(9) To present TCR repertoire as a 2D plot we used parasail aligner(10) to calculate score of CDR3 region difference between each TCR clone pairs and the "Rtsne" R package (<https://github.com/jkrijthe/Rtsne>) to present clones on the 2D image according to the differences between clones. To calculate the number of

expanded/contracted clones we performed statistical analysis of each TCR clones abundance for each patients before and after treatment using “fisher.test” R function. Clones which showed p-value less than 0.05 in the test were counted as contracted or expanded.

References for Supplementary Methods

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Supplemental Table 4. List of therapy-induced differential expression of PBMC genes

Gene Name	Mean Count	FC	P value	FDR
S100A12	14270.63	2.04	1.30e-18	2.56e-14
ACSL1	11166.41	2.10	2.26e-11	2.22e-07
LBH	4559.38	0.44	8.82e-11	3.58e-07
DSC1	105.18	0.00	9.11e-11	3.58e-07
FKBP5	39408.62	2.24	1.99e-10	6.51e-07
S1PR1	3573.90	0.43	5.13e-10	1.12e-06
MCEMP1	5728.31	2.31	9.08e-10	1.62e-06
LHFPL2	2833.53	2.27	1.40e-09	2.30e-06
MYBL1	2662.40	0.32	2.83e-09	4.28e-06
KIT	204.82	0.02	1.86e-08	2.28e-05
CCDC141	81.96	0.00	1.98e-08	2.29e-05
CCR6	388.54	0.16	5.21e-08	4.65e-05
SUSD4	78.03	0.00	6.33e-08	5.21e-05
MLLT6	13787.17	0.46	6.36e-08	5.21e-05
CD3D	2520.41	0.38	7.07e-08	5.56e-05
GYLTL1B	100.93	0.02	1.03e-07	7.43e-05
FCMR	9634.81	0.42	1.29e-07	8.76e-05
FRMPD3	326.95	0.02	1.56e-07	1.02e-04
C10RF177	95.42	0.01	2.86e-07	1.65e-04
LINGO2	122.66	0.01	3.65e-07	2.05e-04
THEMIS	1919.77	0.40	3.78e-07	2.06e-04
TCF7	9684.77	0.28	5.60e-07	2.76e-04
TRAF1	1154.05	0.39	5.77e-07	2.76e-04
SH3PXD2B	1167.70	3.04	6.08e-07	2.78e-04
NR3C2	460.53	0.03	7.50e-07	3.35e-04
HIVEP2	4959.55	0.49	8.71e-07	3.81e-04
C19ORF71	63.51	0.00	1.08e-06	4.42e-04
C2ORF15	67.96	0.01	1.49e-06	5.65e-04
CREB3L4	149.75	0.01	1.58e-06	5.85e-04
TNFRSF13C	68.11	0.01	1.74e-06	6.00e-04
ZEB1	1132.13	0.37	1.91e-06	6.38e-04
DRAM1	1925.01	2.03	2.17e-06	6.78e-04

P2RY13	8835.31	2.06	2.61e-06	7.77e-04
RHOH	1136.35	0.37	2.89e-06	8.36e-04
OSBP2	1312.15	6.76	3.04e-06	8.52e-04
USP51	136.22	0.02	3.45e-06	9.43e-04
CD163	70388.21	2.17	3.55e-06	9.57e-04
RALY-AS1	66.28	0.02	3.93e-06	1.04e-03
SPOCK2	10454.81	0.39	4.23e-06	1.08e-03
COL5A3	44.11	0.04	4.26e-06	1.08e-03
LRRC48	93.61	0.01	4.31e-06	1.08e-03
NKG7	10910.50	0.47	4.33e-06	1.08e-03
ADGRG6	119.72	0.05	4.60e-06	1.12e-03
RNLS	60.22	0.01	4.74e-06	1.12e-03
CD6	4796.61	0.36	4.74e-06	1.12e-03
CCDC85C	106.21	0.04	4.76e-06	1.12e-03
NETO2	791.42	2.22	4.79e-06	1.12e-03
NOG	33.88	0.00	4.99e-06	1.15e-03
CLEC4E	5493.74	2.07	5.10e-06	1.17e-03
E2F1	490.00	4.11	5.20e-06	1.17e-03
PGAM2	77.60	0.02	5.52e-06	1.19e-03
SARDH	66.13	0.04	5.52e-06	1.19e-03
RPGRIP1L	80.94	0.02	5.69e-06	1.21e-03
GATA3	1970.61	0.40	5.79e-06	1.21e-03
LOC101928673	59.77	0.00	5.92e-06	1.21e-03
SP4	1685.25	0.43	5.93e-06	1.21e-03
IL7R	19157.38	0.44	6.01e-06	1.21e-03
DDX12P	118.55	0.04	6.05e-06	1.21e-03
CD3E	12029.97	0.39	6.30e-06	1.24e-03
IL32	10108.40	0.46	6.43e-06	1.25e-03
ZNF285	107.29	0.01	6.59e-06	1.26e-03
CD34	335.07	0.14	6.95e-06	1.30e-03
LEF1	3141.21	0.37	6.98e-06	1.30e-03
GLDC	69.85	0.05	7.03e-06	1.30e-03
LCK	5636.18	0.33	7.39e-06	1.32e-03
KANK3	55.37	0.01	7.46e-06	1.32e-03
ETS1	36441.76	0.41	7.63e-06	1.34e-03

CACNB4	60.00	0.02	8.74e-06	1.47e-03
OLFM2	112.78	0.01	9.06e-06	1.50e-03
FAM117A	4239.02	0.49	9.35e-06	1.52e-03
MS4A1	1650.11	0.38	1.05e-05	1.66e-03
ANTXRLP1	74.96	0.01	1.10e-05	1.71e-03
PTGER3	50.78	0.00	1.17e-05	1.78e-03
ALPK3	30.19	0.02	1.20e-05	1.78e-03
CNTNAP2	100.01	0.07	1.26e-05	1.83e-03
GNLY	13820.76	0.41	1.26e-05	1.83e-03
RASGRP1	4484.35	0.48	1.36e-05	1.96e-03
SIAE	1805.97	2.10	1.37e-05	1.96e-03
ALX3	60.33	0.01	1.38e-05	1.96e-03
CCDC144CP	75.92	0.01	1.43e-05	2.01e-03
DOK6	161.39	0.01	1.47e-05	2.02e-03
THBD	1428.40	2.69	1.49e-05	2.03e-03
CD8B	1309.24	0.39	1.53e-05	2.07e-03
LY9	1606.55	0.30	1.54e-05	2.07e-03
TRABD2A	1182.05	0.35	1.61e-05	2.16e-03
CD22	1083.47	0.20	1.81e-05	2.38e-03
CD79A	2270.92	0.27	1.84e-05	2.38e-03
LINC00999	226.00	0.05	1.92e-05	2.45e-03
KCNE1	509.75	2.29	2.05e-05	2.58e-03
FICD	83.29	0.02	2.13e-05	2.66e-03
FCRL3	1354.27	0.42	2.43e-05	2.91e-03
SEPT3	61.67	0.01	2.65e-05	3.10e-03
LINC00342	243.17	0.05	2.74e-05	3.19e-03
CARD11	4400.09	0.46	2.87e-05	3.28e-03
ZNF280B	109.44	0.02	2.91e-05	3.29e-03
PAX5	1560.11	0.33	3.00e-05	3.35e-03
LOC100132111	120.72	0.02	3.44e-05	3.76e-03
SKAP1	2026.18	0.31	3.92e-05	4.01e-03
PTCH1	1234.98	0.23	3.93e-05	4.01e-03
CECR7	85.50	0.01	3.94e-05	4.01e-03
IFITM1	5924.18	0.48	3.98e-05	4.01e-03
ANKEF1	170.06	0.04	4.02e-05	4.03e-03

SEMA6C	79.28	0.01	4.09e-05	4.06e-03
PI16	170.32	0.03	4.20e-05	4.10e-03
P2RY12	841.72	3.20	4.25e-05	4.13e-03
PDE9A	42.91	0.06	4.27e-05	4.13e-03
OSBPL10	127.88	0.09	4.30e-05	4.14e-03
IZUMO4	52.39	0.02	4.37e-05	4.17e-03
ZAP70	2814.89	0.38	4.38e-05	4.17e-03
ZEB1-AS1	83.87	0.02	4.61e-05	4.33e-03
ADGRG1	9467.63	0.49	4.70e-05	4.33e-03
FCGBP	103.69	0.06	5.02e-05	4.57e-03
CACNA1H	72.95	0.03	5.21e-05	4.69e-03
RORA	3700.30	0.31	5.27e-05	4.72e-03
CLEC5A	994.33	2.16	5.30e-05	4.74e-03
C7ORF13	51.48	0.01	5.35e-05	4.76e-03
BCL2	4377.04	0.49	5.46e-05	4.80e-03
ZBTB32	41.54	0.01	5.46e-05	4.80e-03
GLS2	40.96	0.03	5.47e-05	4.80e-03
ST6GALNAC1	105.94	0.08	5.57e-05	4.87e-03
MCOLN2	138.36	0.02	5.71e-05	4.96e-03
HIST1H2BJ	543.81	6.98	6.15e-05	5.27e-03
SEPT1	1663.45	0.24	6.41e-05	5.47e-03
NRXN2	145.64	0.02	6.52e-05	5.54e-03
CD247	7976.71	0.49	6.56e-05	5.54e-03
LOC152225	232.66	0.04	6.57e-05	5.54e-03
NLRC3	3533.02	0.37	6.99e-05	5.82e-03
TMEM176A	1293.74	2.87	7.14e-05	5.92e-03
PBX1	558.91	4.95	7.45e-05	6.12e-03
SLC14A1	159.79	0.05	7.59e-05	6.22e-03
FAM169A	474.29	0.32	7.85e-05	6.40e-03
KLF12	4295.13	0.50	8.04e-05	6.50e-03
NMUR1	649.73	0.18	8.14e-05	6.55e-03
PLEKHG1	237.86	0.05	8.24e-05	6.58e-03
RGMB	108.64	0.12	8.73e-05	6.83e-03
DGKK	112.27	0.09	8.78e-05	6.83e-03
ITGA6	3492.00	0.50	8.80e-05	6.83e-03

CNTNAP1	135.80	0.04	8.83e-05	6.83e-03
WNT2B	41.06	0.00	8.98e-05	6.88e-03
ANGPTL6	36.32	0.02	8.99e-05	6.88e-03
LTBP1	2244.12	4.08	9.29e-05	7.02e-03
XK	1154.67	6.23	9.66e-05	7.25e-03
INPP4B	1384.80	0.26	9.67e-05	7.25e-03
LOC101927156	131.57	0.03	1.03e-04	7.56e-03
ATP8B2	4101.51	0.49	1.03e-04	7.56e-03
GATSL2	88.39	0.01	1.05e-04	7.62e-03
ITK	4709.19	0.48	1.05e-04	7.62e-03
GPC2	27.35	0.01	1.05e-04	7.63e-03
E2F8	50.26	0.02	1.09e-04	7.86e-03
CD3G	2062.38	0.41	1.11e-04	7.95e-03
TLR10	694.76	0.40	1.12e-04	7.95e-03
LOC100996286	267.97	0.13	1.15e-04	8.13e-03
ZNF599	82.47	0.02	1.18e-04	8.23e-03
GDF11	497.17	0.37	1.21e-04	8.38e-03
FBXL8	28.96	0.01	1.21e-04	8.38e-03
C2ORF44	316.31	0.34	1.22e-04	8.44e-03
BTLA	399.93	0.27	1.23e-04	8.46e-03
CDC42P3	89.00	0.02	1.25e-04	8.51e-03
PP2D1	68.09	0.01	1.28e-04	8.67e-03
PARVB	3497.60	2.16	1.28e-04	8.67e-03
THAP7-AS1	134.02	0.06	1.31e-04	8.80e-03
LIN7B	39.45	0.01	1.31e-04	8.80e-03
CD28	1527.17	0.42	1.31e-04	8.80e-03
SPTSSB	79.35	0.03	1.32e-04	8.80e-03
GPR68	289.53	0.31	1.41e-04	9.28e-03
LOC441666	45.80	0.00	1.42e-04	9.28e-03
CLEC4F	169.85	0.03	1.43e-04	9.33e-03
LZTS3	88.45	0.02	1.44e-04	9.37e-03
HAVCR1	50.80	0.03	1.48e-04	9.59e-03
ANKRD36C	409.47	0.28	1.50e-04	9.71e-03
ITGB5	2014.13	3.75	1.51e-04	9.72e-03
ZNF507	945.30	0.34	1.51e-04	9.73e-03

LTB4R2	59.42	0.02	1.52e-04	9.74e-03
NCAM1	2212.08	0.41	1.53e-04	9.74e-03
TOP1P1	35.04	0.02	1.62e-04	1.03e-02
GBAP1	153.90	0.05	1.63e-04	1.03e-02
CD96	6124.71	0.47	1.68e-04	1.05e-02
MS4A3	79.25	0.06	1.68e-04	1.05e-02
GPLD1	22.46	0.01	1.73e-04	1.08e-02
COMMD3	92.81	0.02	1.75e-04	1.09e-02
SNORD45A	44.01	0.01	1.76e-04	1.09e-02
IKZF3	7339.33	0.48	1.77e-04	1.09e-02
FGFBP2	7664.03	0.45	1.81e-04	1.10e-02
FAM219A	799.55	0.49	1.85e-04	1.12e-02
SLC39A13	404.95	0.24	1.87e-04	1.13e-02
EFHD1	20.58	0.02	1.91e-04	1.14e-02
ZNF135	61.86	0.01	1.93e-04	1.15e-02
LAMA2	84.09	0.09	1.98e-04	1.17e-02
ADNP2	1182.55	0.46	1.98e-04	1.17e-02
SYDE2	21.04	0.01	2.00e-04	1.18e-02
MID2	305.55	0.10	2.03e-04	1.19e-02
CXCR2P1	4989.99	2.45	2.05e-04	1.20e-02
SLC29A2	93.33	0.07	2.09e-04	1.22e-02
DUSP8	103.74	0.03	2.09e-04	1.22e-02
GPR171	697.95	0.32	2.18e-04	1.26e-02
A2M-AS1	60.22	0.04	2.18e-04	1.26e-02
NT5E	158.41	0.13	2.33e-04	1.34e-02
FLT3	4780.67	2.21	2.33e-04	1.34e-02
CPM	1790.43	2.01	2.41e-04	1.38e-02
MAPT	31.24	0.01	2.45e-04	1.40e-02
STX16-NPEPL1	44.17	0.01	2.47e-04	1.40e-02
STAG3	71.21	0.01	2.48e-04	1.40e-02
CHI3L2	347.77	0.08	2.49e-04	1.40e-02
CELSR3	115.37	0.06	2.50e-04	1.40e-02
TSPAN9	823.70	4.16	2.54e-04	1.43e-02
SYT17	87.45	0.02	2.57e-04	1.43e-02
KLRB1	1711.95	0.43	2.68e-04	1.49e-02

RHOBTB1	1053.46	3.11	2.74e-04	1.50e-02
ARL4C	10400.83	0.46	2.77e-04	1.51e-02
SSTR3	68.70	0.02	2.86e-04	1.54e-02
OLFM1	415.24	0.28	2.90e-04	1.56e-02
CLEC2D	2479.17	0.49	3.00e-04	1.60e-02
OBSCN	1020.50	0.23	3.04e-04	1.61e-02
ZNF365	128.40	0.15	3.06e-04	1.62e-02
CTNNAL1	272.80	4.55	3.14e-04	1.65e-02
TPI1P3	63.88	0.03	3.14e-04	1.65e-02
CELF6	69.52	0.02	3.15e-04	1.65e-02
IFITM10	54.05	0.01	3.25e-04	1.69e-02
KLRF1	2226.88	0.41	3.26e-04	1.69e-02
INE1	77.48	14.02	3.29e-04	1.70e-02
SNORA68	57.83	0.02	3.34e-04	1.72e-02
CPA3	84.28	0.09	3.35e-04	1.72e-02
FCER1A	1242.81	0.30	3.40e-04	1.74e-02
SCARNA17	42.21	0.01	3.41e-04	1.74e-02
PLA2G4A	1038.12	2.07	3.43e-04	1.74e-02
TRAF3IP2-AS1	160.68	0.06	3.49e-04	1.76e-02
TPM1	1828.97	3.00	3.54e-04	1.77e-02
BMP6	1226.18	5.07	3.55e-04	1.77e-02
SLC25A42	334.96	0.29	3.60e-04	1.79e-02
TM7SF2	95.90	0.09	3.64e-04	1.81e-02
SPAG8	57.46	0.02	3.73e-04	1.82e-02
ADCY10P1	61.44	0.02	3.76e-04	1.82e-02
SCN8A	64.68	0.02	3.77e-04	1.82e-02
ZFP2	41.23	0.03	3.80e-04	1.83e-02
LINC00944	77.29	0.02	3.81e-04	1.83e-02
MTA3	766.86	0.39	3.82e-04	1.83e-02
CFLAR-AS1	81.00	0.02	3.91e-04	1.86e-02
CCR7	1868.38	0.28	3.99e-04	1.88e-02
SPON1	87.54	0.05	4.14e-04	1.94e-02
ZNF850	77.47	0.04	4.16e-04	1.94e-02
NEO1	873.15	0.28	4.16e-04	1.94e-02
RNASE1	684.23	2.03	4.32e-04	2.00e-02

FAM157A	43.38	0.01	4.33e-04	2.00e-02
LMO7	420.56	0.45	4.35e-04	2.01e-02
RGS18	12614.89	2.21	4.40e-04	2.02e-02
AGFG2	619.57	0.27	4.41e-04	2.02e-02
CLSTN3	2310.98	0.34	4.41e-04	2.02e-02
TRAF5	1373.67	0.49	4.51e-04	2.05e-02
MAGED1	1404.60	0.37	4.63e-04	2.10e-02
RBM44	96.44	0.04	4.69e-04	2.12e-02
KLRC4-KLRK1	23.68	0.01	4.70e-04	2.12e-02
MAGI2	36.63	0.02	4.76e-04	2.14e-02
ABCA2	2481.65	0.38	4.81e-04	2.15e-02
PSMC3IP	62.86	0.05	4.84e-04	2.16e-02
ZNF540	40.26	0.02	4.87e-04	2.16e-02
TMC4	67.54	0.08	4.97e-04	2.20e-02
HILPDA	51.39	0.07	5.02e-04	2.22e-02
KLRC2	103.14	0.03	5.03e-04	2.22e-02
ENPP1	32.96	0.05	5.13e-04	2.25e-02
ZNF662	41.43	0.03	5.16e-04	2.26e-02
LOC101927018	57.81	0.02	5.30e-04	2.30e-02
AZIN1-AS1	26.74	34.10	5.30e-04	2.30e-02
ARL15	1177.74	2.10	5.34e-04	2.32e-02
ZNF582	67.46	0.01	5.58e-04	2.37e-02
ADGRA3	86.77	0.12	5.59e-04	2.37e-02
DUSP2	1037.96	0.25	5.60e-04	2.37e-02
OSBPL7	752.96	0.45	5.62e-04	2.38e-02
COL6A2	956.29	0.24	5.96e-04	2.49e-02
CATSPER2	52.82	0.03	6.00e-04	2.49e-02
LAX1	1366.33	0.40	6.02e-04	2.49e-02
BCL11B	3624.23	0.45	6.08e-04	2.51e-02
CD207	35.87	0.01	6.36e-04	2.60e-02
ZNF658B	39.98	0.02	6.39e-04	2.60e-02
LYPD3	29.81	0.00	6.42e-04	2.61e-02
NR2C2AP	237.75	0.17	6.45e-04	2.61e-02
BFSP1	78.73	0.03	6.59e-04	2.65e-02
KIAA2022	51.98	0.01	6.61e-04	2.65e-02

IQCK	82.10	0.05	6.62e-04	2.65e-02
CLEC17A	122.19	0.05	6.70e-04	2.68e-02
ZNF442	22.08	0.02	6.79e-04	2.70e-02
ANKHD1	98.94	0.04	6.80e-04	2.70e-02
DTL	103.17	0.15	6.82e-04	2.70e-02
PROS1	1208.76	3.52	6.93e-04	2.73e-02
VMAC	182.32	0.29	6.94e-04	2.73e-02
CELSR1	115.73	0.12	7.05e-04	2.76e-02
USP11	1183.83	0.46	7.11e-04	2.78e-02
LOC100233156	107.67	0.05	7.12e-04	2.78e-02
CABP5	539.36	3.91	7.12e-04	2.78e-02
WDR76	556.34	0.36	7.19e-04	2.79e-02
SMIM3	2072.36	2.01	7.32e-04	2.81e-02
LOC728730	49.34	0.03	7.32e-04	2.81e-02
PLLP	38.76	0.02	7.35e-04	2.82e-02
SNX22	161.38	0.12	7.71e-04	2.94e-02
PRSS23	1309.68	0.42	7.76e-04	2.95e-02
KIF21A	584.41	0.29	7.80e-04	2.95e-02
VASH2	37.38	0.02	7.81e-04	2.95e-02
LOC100499484	34.60	0.03	7.89e-04	2.96e-02
MSX2P1	47.57	0.01	7.89e-04	2.96e-02
GPRC5B	19.05	0.04	7.90e-04	2.96e-02
CD5	4368.27	0.44	8.03e-04	2.98e-02
PRR7-AS1	44.54	0.01	8.04e-04	2.98e-02
RNF144A	740.03	0.33	8.16e-04	3.02e-02
FAM86C1	111.03	0.11	8.24e-04	3.03e-02
KCTD7	721.22	0.49	8.25e-04	3.03e-02
ESAM	1160.41	4.98	8.45e-04	3.09e-02
TTC16	241.70	0.13	8.48e-04	3.10e-02
AMT	208.36	0.14	8.61e-04	3.14e-02
METTL7B	1197.20	2.76	8.67e-04	3.14e-02
LOC81691	43.44	0.04	8.68e-04	3.14e-02
CIRBP-AS1	64.46	0.02	8.68e-04	3.14e-02
B3GAT1	297.38	0.18	8.69e-04	3.14e-02
PRR16	110.38	8.39	8.72e-04	3.14e-02

NR1D1	468.73	0.49	8.79e-04	3.16e-02
TLR3	114.51	0.08	8.87e-04	3.17e-02
ZGLP1	161.58	6.99	8.90e-04	3.18e-02
NFATC2	5765.47	0.47	8.94e-04	3.18e-02
APBB1	608.25	0.36	8.94e-04	3.18e-02
TBC1D32	80.56	0.04	8.95e-04	3.18e-02
ANK3	436.80	0.33	8.96e-04	3.18e-02
NIM1K	32.70	0.03	9.01e-04	3.18e-02
ZNF74	214.36	0.30	9.03e-04	3.18e-02
DDO	82.94	0.04	9.13e-04	3.20e-02
FCRL1	507.39	0.17	9.13e-04	3.20e-02
SLC27A5	76.11	0.04	9.21e-04	3.23e-02
CACNA1I	353.17	0.28	9.35e-04	3.26e-02
UCKL1-AS1	30.35	0.02	9.46e-04	3.29e-02
TMEM88	51.49	0.02	9.48e-04	3.29e-02
PLOD2	425.64	3.97	9.64e-04	3.32e-02
HEATR4	57.87	0.02	9.64e-04	3.32e-02
CLEC4C	153.24	0.09	9.65e-04	3.32e-02
BIN1	2562.05	0.49	9.66e-04	3.32e-02
P3H4	142.80	0.13	9.75e-04	3.35e-02
MAP9	171.57	0.06	9.82e-04	3.37e-02
EBF1	54.34	0.03	9.85e-04	3.37e-02
HSD17B8	52.22	0.02	9.87e-04	3.37e-02
RNF157	932.55	0.43	1.00e-03	3.40e-02
POLD2	1083.85	0.44	1.02e-03	3.44e-02
PRF1	16392.62	0.50	1.02e-03	3.45e-02
LRFN4	58.38	0.04	1.03e-03	3.47e-02
LINC00861	2159.41	0.41	1.04e-03	3.48e-02
LOC100288162	37.22	0.03	1.04e-03	3.48e-02
DENND5B	303.15	0.20	1.05e-03	3.50e-02
UGDH-AS1	50.93	0.01	1.05e-03	3.50e-02
SCML2	65.49	0.03	1.05e-03	3.50e-02
POU2AF1	909.48	0.42	1.05e-03	3.50e-02
CARD17	28.82	0.01	1.05e-03	3.50e-02
FHDC1	52.36	0.12	1.06e-03	3.50e-02

PGBD4	41.56	0.06	1.06e-03	3.50e-02
SPAG16	67.37	0.03	1.06e-03	3.50e-02
SLC4A3	52.52	0.03	1.07e-03	3.53e-02
LY6G5C	106.58	0.06	1.08e-03	3.53e-02
CLIC5	71.05	0.11	1.08e-03	3.53e-02
SPTA1	42.03	0.03	1.09e-03	3.55e-02
ZNF521	63.34	0.03	1.09e-03	3.56e-02
AXIN2	209.57	0.21	1.12e-03	3.64e-02
HOXB-AS1	17.01	0.00	1.14e-03	3.67e-02
LOC441204	26.08	0.02	1.15e-03	3.71e-02
MYRF	57.07	0.06	1.16e-03	3.73e-02
FAM72B	96.88	0.08	1.17e-03	3.74e-02
CCDC171	56.57	0.03	1.17e-03	3.74e-02
SYNC	53.34	0.04	1.17e-03	3.74e-02
PGAP1	122.81	0.11	1.18e-03	3.74e-02
PLD6	108.82	0.05	1.18e-03	3.74e-02
BEX2	310.29	0.24	1.21e-03	3.83e-02
GARNL3	25.34	0.02	1.24e-03	3.88e-02
MACC1	86.41	0.16	1.24e-03	3.90e-02
INADL	497.92	0.31	1.25e-03	3.90e-02
RUFY1	7890.95	2.07	1.27e-03	3.97e-02
OTUD7B	525.43	0.39	1.27e-03	3.97e-02
CHRM4	47.69	0.02	1.28e-03	3.98e-02
LOC100652768	130.86	0.08	1.30e-03	4.03e-02
C1ORF186	140.58	0.04	1.31e-03	4.04e-02
LINC01011	476.18	4.17	1.33e-03	4.09e-02
AQP10	690.34	3.60	1.34e-03	4.12e-02
PIK3C2B	767.41	0.50	1.35e-03	4.13e-02
CD160	788.47	0.44	1.35e-03	4.13e-02
HOXC4	36.91	0.01	1.37e-03	4.19e-02
CCDC173	35.75	0.01	1.38e-03	4.19e-02
RUNDC3B	34.33	0.03	1.40e-03	4.24e-02
TTC24	50.87	0.02	1.43e-03	4.32e-02
HLA-DOA	2410.03	0.47	1.44e-03	4.35e-02
HGF	1353.17	2.21	1.50e-03	4.48e-02

HEXIM2	306.96	2.92	1.50e-03	4.48e-02
AP1M2	91.44	7.33	1.50e-03	4.48e-02
PKIB	52.71	0.01	1.50e-03	4.49e-02
SIRPG	607.23	0.45	1.51e-03	4.51e-02
TMSB15B	15.51	0.00	1.52e-03	4.52e-02
ZNF251	338.17	0.11	1.53e-03	4.53e-02
EFHC2	316.30	3.72	1.54e-03	4.56e-02
ROBO1	62.66	0.14	1.55e-03	4.57e-02
PA2G4P4	129.74	4.56	1.56e-03	4.58e-02
PPP1R14A	53.24	0.02	1.61e-03	4.72e-02
LOC100506321	14.93	0.00	1.61e-03	4.73e-02
BBS12	64.77	0.01	1.61e-03	4.73e-02
FLJ20021	113.49	0.07	1.62e-03	4.75e-02
EXPH5	121.71	0.10	1.64e-03	4.78e-02
PHGDH	107.70	0.13	1.65e-03	4.79e-02
HCG4B	67.70	0.04	1.65e-03	4.79e-02
CLEC1A	57.95	0.02	1.65e-03	4.79e-02
SLC6A9	21.39	0.02	1.66e-03	4.80e-02
LINC01215	705.12	0.34	1.66e-03	4.80e-02
SLC47A1	33.08	0.03	1.69e-03	4.88e-02
FKBP11	438.36	0.43	1.71e-03	4.92e-02
HIST1H2BG	249.22	3.78	1.73e-03	4.97e-02
ACSM1	22.60	0.00	1.74e-03	4.97e-02
AQP3	1322.11	0.46	1.74e-03	4.97e-02
FAM53A	26.44	0.02	1.75e-03	4.99e-02

Supplemental Table 5. List of therapy-induced differential expression of tumor genes.

	Mean count	Fold change	pvalue	FDR
ASPG	330.82	2806.91	2.42e-05	1.30e-03
ENPP7	146.99	1886.96	7.15e-05	3.31e-03
LINC01370	683.64	1054.39	1.23e-07	1.20e-05
SPIC	116.42	717.29	4.73e-04	1.58e-02
SPP2	1358.57	526.19	1.56e-13	7.22e-11
AKR1C6P	126.43	415.12	1.11e-15	6.61e-13
UGT2B11	154.36	410.76	2.30e-12	8.67e-10
SLC22A10	507.01	377.99	2.22e-16	1.52e-13
RHBG	52.68	303.72	3.18e-04	1.14e-02
ANXA10	2464.47	259.63	5.58e-13	2.38e-10
GCGR	314.08	257.43	2.22e-16	1.52e-13
LINC01488	98.10	246.19	4.81e-05	2.35e-03
THCAT158	14.33	243.51	8.11e-04	2.47e-02
LOC728040	248.89	234.86	2.22e-16	1.52e-13
CFHR4	2528.91	213.51	5.82e-10	1.16e-07
LINC01152	57.08	204.51	7.74e-07	6.15e-05
BMP10	149.32	195.84	3.30e-11	8.79e-09
LINC00844	81.53	192.07	1.11e-06	8.40e-05
ETNPPL	971.74	181.23	5.64e-09	7.98e-07
ADH4	25607.48	172.59	3.04e-11	8.27e-09
CHRNA4	279.29	168.71	5.55e-14	2.92e-11
GDF2	1026.28	162.11	2.22e-16	1.52e-13
ACSM2A	7677.77	160.97	1.74e-11	5.26e-09
SPATA21	15.21	159.01	8.12e-05	3.67e-03
RTP3	719.36	155.80	4.44e-14	2.39e-11
CYP7A1	238.08	153.84	2.22e-16	1.52e-13
LINC01018	2189.98	149.84	8.21e-12	2.54e-09
AKR1D1	3196.36	147.56	1.30e-09	2.31e-07
THRSP	1014.68	145.03	1.29e-09	2.31e-07
LECT2	1842.17	144.40	2.22e-16	1.52e-13
UGT2B10	4645.93	143.81	2.99e-11	8.27e-09
GREM2	780.25	142.25	2.22e-16	1.52e-13
MPPED1	337.33	140.55	2.22e-16	1.52e-13
CD5L	3986.25	137.97	1.24e-09	2.24e-07
IL24	19.56	136.99	1.31e-03	3.62e-02
UROC1	768.15	136.00	8.50e-05	3.79e-03
CYP2E1	144665.13	128.69	4.85e-11	1.23e-08
CYP1A2	3651.84	127.78	8.06e-10	1.53e-07
FGF21	121.49	127.43	9.93e-08	1.02e-05

ZIC4	43.65	123.56	1.92e-04	7.53e-03
CA5A	544.78	121.61	2.22e-16	1.52e-13
ADH1A	13229.97	120.20	1.12e-12	4.43e-10
CFHR3	9376.48	119.00	1.44e-10	3.32e-08
F13B	2375.67	118.45	6.22e-10	1.22e-07
SLC22A7	2205.27	115.64	5.68e-10	1.15e-07
LOC101927269	160.47	115.19	2.38e-12	8.75e-10
FAM99B	75.66	115.01	9.19e-08	9.53e-06
CYP8B1	27455.29	113.28	7.30e-12	2.29e-09
GBP7	2097.50	113.22	2.51e-09	3.98e-07
ACMSD	1751.78	111.89	1.04e-07	1.05e-05
CPN1	2318.22	111.49	1.27e-08	1.69e-06
BHMT	16624.72	110.20	9.86e-11	2.35e-08
CFHR2	12074.48	108.20	6.91e-11	1.70e-08
SRD5A2	362.90	107.71	5.36e-10	1.11e-07
GLYAT	2581.80	106.54	1.90e-09	3.16e-07
MYO3A	24.42	106.48	1.03e-05	6.03e-04
F11	5396.26	105.80	1.63e-08	2.07e-06
APOF	11195.01	100.97	1.23e-10	2.90e-08
CCL16	1663.88	100.46	2.06e-06	1.45e-04
CYP2A6	3035.17	98.47	1.43e-09	2.49e-07
DAO	1360.64	97.25	2.22e-16	1.52e-13
SLC2A2	20506.46	95.00	1.39e-09	2.46e-07
LOC101929448	242.05	94.78	1.67e-03	4.27e-02
HAO1	12021.88	93.55	1.70e-09	2.88e-07
ACOT12	1165.59	93.55	2.22e-16	1.52e-13
CYP2C9	13788.64	91.20	1.60e-09	2.74e-07
ACSM2B	7367.95	90.13	5.51e-10	1.12e-07
SLC22A9	712.90	89.07	2.27e-06	1.58e-04
CYP4A11	14887.92	88.44	1.91e-08	2.39e-06
WISP2	122.81	88.34	4.01e-10	8.48e-08
CES5A	65.12	86.33	6.52e-07	5.25e-05
HGFAC	225.23	84.82	1.24e-03	3.46e-02
PROZ	333.33	82.98	1.30e-10	3.03e-08
TF	84858.71	82.92	5.65e-06	3.60e-04
MBL2	13181.88	82.59	5.13e-08	5.77e-06
AFM	3928.45	82.41	4.50e-09	6.61e-07
AGXT2	2814.10	81.84	6.06e-08	6.62e-06
EPO	173.56	79.93	1.94e-12	7.45e-10
LRAT	385.20	79.76	2.89e-10	6.22e-08
SLC17A3	241.96	78.74	3.28e-08	3.90e-06
GNMT	478.98	77.94	8.01e-10	1.53e-07

HFE2	1479.05	77.74	2.22e-16	1.52e-13
G6PC	7776.54	75.66	4.57e-11	1.18e-08
SLC25A47	1879.89	75.42	2.22e-16	1.52e-13
TTR	16793.10	74.98	2.72e-10	5.93e-08
UGT1A1	4551.87	70.98	2.22e-16	1.52e-13
SLC28A1	1082.73	70.45	2.22e-16	1.52e-13
ACKR1	44.00	70.44	5.62e-05	2.69e-03
LOC101927843	91.59	70.17	2.27e-09	3.65e-07
LOC100507389	331.15	70.05	2.22e-16	1.52e-13
ADH1C	13894.57	68.04	3.50e-09	5.25e-07
UGT1A9	610.17	67.32	7.17e-11	1.75e-08
SERPINA11	17782.94	66.32	2.25e-09	3.63e-07
CLEC1B	618.87	65.87	2.22e-16	1.52e-13
ZIC1	107.33	65.80	7.46e-06	4.61e-04
UGT1A4	1369.61	65.53	6.12e-07	4.98e-05
DIO1	1747.72	65.46	2.22e-16	1.52e-13
C8ORF46	46.57	65.15	3.77e-05	1.94e-03
GYS2	3062.27	64.97	3.19e-07	2.89e-05
SULT2A1	37577.63	62.93	1.11e-09	2.05e-07
CFHR5	17962.35	62.78	2.87e-09	4.48e-07
APOH	77158.81	62.45	1.29e-08	1.70e-06
UPP2	133.89	62.15	3.16e-06	2.15e-04
C3P1	5299.04	61.82	5.83e-10	1.16e-07
GPR182	94.35	61.75	6.87e-05	3.18e-03
C14ORF180	29.24	61.32	1.96e-03	4.88e-02
HPR	9914.84	61.02	1.49e-09	2.58e-07
KNG1	84698.88	60.83	9.81e-09	1.34e-06
CNDP1	674.83	59.85	5.56e-05	2.66e-03
ORM1	747813.89	59.77	1.22e-03	3.42e-02
INHBC	10861.90	59.64	1.63e-07	1.55e-05
SERPINC1	31228.46	59.49	3.77e-08	4.40e-06
C1ORF168	562.33	58.00	1.31e-14	7.23e-12
F2	25580.78	56.58	2.02e-07	1.88e-05
FTCD	958.09	56.55	5.54e-05	2.66e-03
KLKB1	4154.91	56.54	8.01e-10	1.53e-07
NPPA	14.41	56.49	7.27e-04	2.25e-02
ABCB11	6352.02	56.00	3.57e-06	2.37e-04
RDH16	7069.50	55.59	3.82e-08	4.44e-06
UPB1	3876.70	55.11	2.22e-16	1.52e-13
CYP3A4	7939.35	54.71	2.22e-16	1.52e-13
CFHR1	25369.97	54.63	2.68e-08	3.28e-06
SCARA5	166.17	54.31	1.20e-07	1.19e-05

PAQR9-AS1	76.78	53.86	1.67e-06	1.20e-04
TAT	34008.01	53.85	5.51e-10	1.12e-07
PON1	4705.07	53.66	1.78e-06	1.27e-04
C8A	26801.69	53.31	1.24e-08	1.67e-06
UGT3A1	4054.22	53.09	8.43e-08	8.83e-06
PLG	98450.64	51.28	5.69e-08	6.28e-06
LINC00890	1761.56	50.71	5.70e-07	4.71e-05
HCFC1-AS1	15.96	49.98	3.80e-04	1.31e-02
PAQR9	329.25	49.49	2.22e-16	1.52e-13
DMGDH	4560.00	49.43	2.22e-16	1.52e-13
C7ORF76	27.51	49.29	1.01e-03	2.93e-02
GBA3	924.00	49.29	9.69e-11	2.33e-08
IZUMO1	42.14	49.28	4.82e-04	1.60e-02
APOA2	55035.78	49.16	6.12e-09	8.55e-07
CYP4A22	1079.61	48.97	2.90e-12	1.01e-09
SLC12A1	60.62	48.82	1.94e-04	7.56e-03
CYP2C8	10056.77	48.46	5.50e-09	7.83e-07
ACSM4	23.42	48.40	3.47e-04	1.22e-02
SAA2	35092.16	48.07	2.75e-08	3.33e-06
ARMC4	45.85	47.95	1.62e-04	6.52e-03
CDO1	3564.71	47.38	5.71e-07	4.71e-05
APOC3	70694.04	47.12	1.35e-08	1.76e-06
HPX	89945.28	46.49	7.88e-08	8.37e-06
C6	28265.48	46.43	2.06e-09	3.36e-07
SLC38A3	7356.70	46.04	2.22e-16	1.52e-13
C9	75784.79	46.01	1.22e-08	1.66e-06
PGLYRP2	1011.23	45.83	2.19e-05	1.18e-03
F9	18761.77	45.79	1.07e-07	1.07e-05
AHSG	20458.49	45.54	5.96e-07	4.91e-05
SERPINA7	8113.76	44.69	1.61e-06	1.17e-04
SERPINA10	17446.94	44.54	2.22e-16	1.52e-13
HPD	32531.45	44.48	2.71e-09	4.26e-07
ADH1B	178669.38	44.44	4.09e-10	8.57e-08
C19ORF80	151.92	44.28	4.54e-09	6.63e-07
ORM2	49193.49	43.81	6.24e-09	8.66e-07
TFR2	17958.01	43.76	1.40e-09	2.46e-07
APOA5	5388.47	43.71	5.66e-06	3.60e-04
ABCG8	2083.50	43.58	5.50e-07	4.61e-05
TTC6	94.65	43.01	2.15e-06	1.51e-04
APOB	250604.33	42.60	3.59e-09	5.34e-07
ITLN1	184.35	42.49	1.79e-09	3.03e-07
ALDH8A1	6486.81	42.45	1.90e-07	1.78e-05

HSD17B13	3973.19	41.45	6.66e-16	4.07e-13
TAT-AS1	4241.25	41.40	2.22e-16	1.52e-13
HRG	58481.70	41.28	1.61e-06	1.17e-04
PZP	4700.64	41.15	2.75e-08	3.33e-06
GC	82290.97	40.78	1.30e-08	1.70e-06
PRODH2	538.48	40.03	2.22e-16	1.52e-13
ANGPTL3	29213.13	39.59	7.19e-08	7.74e-06
C8B	21588.15	39.55	1.30e-07	1.26e-05
PRR18	106.26	39.33	2.94e-06	2.02e-04
CPS1	60558.47	38.44	6.28e-07	5.10e-05
AOX1	83999.12	38.42	1.35e-08	1.76e-06
FRMD7	21.73	38.05	1.05e-03	3.03e-02
UGT2B7	6750.17	38.02	3.46e-07	3.12e-05
SLCO1B1	8360.57	37.95	1.24e-07	1.21e-05
LOC101929337	243.85	37.53	6.35e-06	3.99e-04
LINC00885	41.48	37.42	6.81e-05	3.16e-03
ZNF385B	275.54	37.38	1.41e-05	8.02e-04
HORMAD2-AS1	101.23	36.72	7.51e-05	3.45e-03
LPA	3258.37	36.15	4.44e-16	2.96e-13
HAO2	2455.57	36.13	9.54e-06	5.66e-04
PLIN5	209.83	35.89	5.33e-08	5.95e-06
PIK3C2G	986.03	35.47	9.84e-14	4.84e-11
CREB3L3	21482.70	35.39	2.22e-16	1.52e-13
LOC101929372	38.95	35.01	1.49e-03	3.93e-02
FCN2	1611.95	34.94	1.22e-06	9.07e-05
AOC4P	128.03	34.69	1.62e-04	6.53e-03
ITIH1	47496.48	34.64	1.28e-07	1.24e-05
SLC17A2	1799.06	33.95	4.57e-06	2.96e-04
SYT9	267.05	33.76	1.82e-06	1.29e-04
CNTFR	75.35	33.64	2.93e-05	1.54e-03
LOC157273	80.75	33.54	4.13e-04	1.41e-02
ADRA1A	2785.20	33.11	3.37e-05	1.75e-03
F12	9098.89	32.77	3.64e-07	3.25e-05
TPPP2	69.35	32.46	8.48e-04	2.56e-02
AMBP	52542.94	32.44	1.50e-07	1.43e-05
EYA4	14.63	32.26	1.44e-03	3.85e-02
OTC	4241.48	32.00	4.72e-08	5.37e-06
MAT1A	46885.59	31.61	1.11e-07	1.11e-05
APOA4	1824.80	30.61	5.86e-11	1.47e-08
CPB2	17993.70	30.40	2.49e-07	2.29e-05
ABCB4	7607.36	30.28	7.84e-08	8.37e-06
LOC100506388	48.53	30.03	3.86e-04	1.32e-02

HSD17B6	25629.39	29.97	8.50e-07	6.68e-05
ATP2B2	1635.28	29.92	9.62e-13	3.89e-10
ALB	455742.39	29.84	7.74e-04	2.37e-02
CYP2A7	49.27	29.63	1.87e-03	4.69e-02
APOC1P1	839.95	29.59	1.63e-08	2.07e-06
FETUB	1034.63	29.47	2.05e-04	7.88e-03
C4BPA	55491.73	29.15	1.68e-07	1.59e-05
SLC1A2	2453.39	28.98	2.61e-06	1.81e-04
CYP2B7P	474.37	28.98	8.30e-08	8.74e-06
DNASE1L3	2367.01	28.94	1.91e-06	1.35e-04
RBP4	37733.02	28.89	3.44e-08	4.06e-06
PAH	22223.20	28.74	7.99e-08	8.45e-06
LEAP2	4170.89	28.74	6.99e-06	4.36e-04
LOC101928565	29.97	28.57	1.19e-03	3.36e-02
NDST3	357.91	28.48	3.87e-07	3.43e-05
FGL1	142571.99	28.45	1.45e-07	1.39e-05
APCS	38097.13	28.36	1.64e-06	1.19e-04
ZNF730	129.59	28.32	4.16e-05	2.09e-03
HULC	14341.73	28.23	2.22e-16	1.52e-13
NUGGC	1568.60	27.99	1.53e-04	6.22e-03
CYP3A43	54.04	27.78	4.28e-05	2.14e-03
FLJ42393	54.90	27.71	1.24e-04	5.31e-03
ADH6	11503.29	27.58	4.30e-07	3.75e-05
NPFF	51.48	27.51	8.39e-05	3.76e-03
VTN	77687.75	27.47	1.61e-08	2.06e-06
LOC101927972	172.50	27.44	9.37e-07	7.34e-05
NR1I3	1334.95	27.26	1.23e-09	2.24e-07
ARG1	16151.89	27.13	1.65e-06	1.19e-04
MTTP	12096.59	27.01	2.22e-16	1.52e-13
ACADL	561.01	26.54	9.98e-08	1.02e-05
UGT1A3	313.11	26.27	1.12e-13	5.38e-11
VNN3	633.52	26.26	2.33e-10	5.14e-08
MEI4	28.50	25.89	1.33e-03	3.66e-02
LOC100130075	42.14	25.86	4.55e-04	1.52e-02
UGT2B4	23467.41	25.85	2.21e-06	1.54e-04
CUX2	563.95	25.82	1.49e-03	3.93e-02
CHRM2	64.94	25.76	2.49e-05	1.33e-03
ALDOB	73352.35	25.69	4.34e-07	3.77e-05
GFRA1	2232.90	25.65	2.22e-16	1.52e-13
UGT2B15	7505.08	25.61	1.00e-06	7.79e-05
SERPIND1	16847.75	25.36	3.18e-08	3.83e-06
TTC39C-AS1	46.01	25.31	7.54e-05	3.45e-03

AGXT	9979.18	25.20	9.40e-06	5.61e-04
DPYS	5167.56	25.18	1.38e-06	1.02e-04
ASPDH	96.52	25.10	1.37e-05	7.80e-04
ST8SIA3	78.35	24.93	1.65e-04	6.61e-03
KCND3	552.63	24.76	8.37e-10	1.58e-07
ADCY10	190.85	24.68	1.29e-05	7.44e-04
MS4A3	130.14	24.62	2.77e-05	1.46e-03
IGFALS	64.28	24.55	2.59e-04	9.61e-03
C8G	471.66	24.52	2.22e-16	1.52e-13
CCDC73	37.94	24.42	3.04e-04	1.10e-02
APOA1	35958.13	23.61	8.75e-06	5.31e-04
CALCA	48.61	23.55	2.57e-04	9.56e-03
LOC101927211	14.37	23.37	1.79e-03	4.54e-02
GPM6A	625.77	22.81	5.93e-08	6.52e-06
SLC13A5	13215.56	22.65	3.90e-06	2.57e-04
ITIH4	82126.19	22.55	6.57e-07	5.28e-05
CYP11A1	78.45	22.48	8.74e-06	5.31e-04
CRHBP	3547.59	22.44	1.82e-13	8.22e-11
ITIH2	39487.65	22.32	2.54e-05	1.36e-03
ABCG5	793.18	22.28	1.54e-03	4.02e-02
SLC6A13	92.92	22.26	1.56e-05	8.74e-04
LBP	37247.18	22.05	2.69e-07	2.45e-05
ITIH3	113746.56	22.03	1.04e-14	6.06e-12
CNTNAP3	61.22	21.97	2.33e-05	1.25e-03
LINC01127	158.70	21.76	3.70e-11	9.73e-09
KLB	2160.85	21.53	1.46e-05	8.23e-04
SALL1	3538.22	21.52	2.40e-12	8.75e-10
PON3	4224.93	21.36	2.72e-04	1.00e-02
PLGLA	790.75	21.01	1.20e-03	3.36e-02
PTCHD2	16.10	20.90	1.86e-03	4.67e-02
HSP90AB4P	18.79	20.75	1.95e-03	4.87e-02
ALDH1L1	11036.33	20.66	6.16e-13	2.58e-10
HEPACAM	94.81	20.04	8.53e-04	2.56e-02
MASP1	10231.26	19.99	5.37e-13	2.34e-10
CLDN14	151.77	19.98	1.80e-04	7.12e-03
CYP2C19	276.97	19.86	5.98e-09	8.40e-07
KCNB1	400.48	19.61	7.64e-10	1.49e-07
SNORD96A	113.21	19.31	5.31e-04	1.73e-02
LINC01093	779.20	18.79	4.75e-07	4.07e-05
SERPINF2	21938.35	18.59	1.40e-06	1.03e-04
CPN2	11555.58	18.14	2.30e-04	8.75e-03
ARID3C	85.74	17.94	4.13e-05	2.08e-03

SHBG	438.85	17.85	5.99e-07	4.91e-05
TRIM55	1388.03	17.81	2.34e-04	8.88e-03
SERPINA6	14895.25	17.45	1.06e-06	8.12e-05
BMPER	578.99	17.38	2.91e-12	1.01e-09
FADS6	79.59	17.36	5.36e-04	1.75e-02
SMLR1	987.13	17.29	3.17e-09	4.79e-07
SCARNA27	75.52	16.76	6.45e-04	2.04e-02
SYCP3	107.45	16.21	7.77e-04	2.38e-02
PRG4	14928.28	16.12	8.11e-05	3.67e-03
PLA2G2A	62017.49	15.93	5.18e-05	2.51e-03
PLIN1	310.85	15.77	1.30e-08	1.70e-06
TENM1	222.48	15.76	1.60e-05	8.90e-04
SNORA52	22.80	15.46	1.78e-03	4.50e-02
KRT222	96.39	14.98	4.27e-04	1.45e-02
CYP2C18	3837.20	14.90	7.79e-14	3.92e-11
CRYM-AS1	77.24	14.89	1.50e-04	6.15e-03
LOC101929516	150.36	14.87	9.96e-04	2.90e-02
ENAM	84.66	14.69	1.71e-04	6.79e-03
GCKR	4360.90	14.56	6.66e-16	4.07e-13
SLC22A1	3473.01	14.32	8.28e-09	1.14e-06
ABCC11	232.50	14.24	1.24e-05	7.18e-04
LOC100288123	86.99	14.24	2.89e-04	1.05e-02
SERPINA5	5603.80	14.16	3.41e-04	1.21e-02
EGFR-AS1	51.93	14.15	7.26e-04	2.25e-02
BHMT2	11784.79	14.06	7.57e-13	3.11e-10
LINC01554	2648.45	14.02	2.83e-04	1.03e-02
ST3GAL6-AS1	35.93	13.95	9.96e-04	2.90e-02
RRS1-AS1	29.98	13.91	7.62e-04	2.35e-02
SH2D7	43.87	13.86	2.00e-03	4.96e-02
SELE	599.43	13.80	4.17e-05	2.09e-03
SNORD44	178.19	13.58	5.15e-04	1.69e-02
FAM169B	337.35	13.54	9.62e-06	5.70e-04
NR1H4	3464.51	13.50	4.72e-05	2.31e-03
HABP2	19104.35	13.45	2.98e-12	1.02e-09
RTN4RL1	95.25	13.23	1.10e-03	3.16e-02
GSTA1	2183.80	13.23	1.77e-08	2.22e-06
EFCAB5	86.18	13.23	1.28e-03	3.56e-02
F7	2807.90	13.16	2.09e-11	6.07e-09
PKLR	1266.52	13.09	4.83e-07	4.12e-05
CHRNA2	45.03	12.91	1.62e-03	4.18e-02
AKR1C4	4129.79	12.78	4.35e-12	1.47e-09
PLIN4	1302.20	12.69	1.18e-07	1.17e-05

ADHFE1	724.71	12.53	1.85e-07	1.74e-05
STAG3	135.18	12.31	6.76e-04	2.12e-02
GSTA2	470.27	12.18	3.57e-04	1.24e-02
C5	32174.79	12.16	3.45e-13	1.53e-10
MT1G	2254.32	12.01	1.51e-08	1.95e-06
SLC17A1	157.82	11.97	7.63e-06	4.69e-04
ANGPTL6	242.14	11.94	5.37e-12	1.78e-09
ONECUT1	607.14	11.83	5.96e-05	2.83e-03
MAPK4	394.27	11.82	1.94e-07	1.81e-05
C4BPB	6448.32	11.68	6.42e-04	2.03e-02
AGTR1	1589.57	11.61	8.04e-07	6.34e-05
ASGR1	5788.07	11.40	1.95e-10	4.37e-08
GLDC	3551.53	11.36	5.50e-12	1.78e-09
MSS51	289.43	11.28	5.84e-04	1.87e-02
SLC10A1	3125.58	11.23	9.93e-04	2.90e-02
PCK1	27096.55	11.19	3.04e-09	4.66e-07
AADAC	7497.01	11.11	7.89e-05	3.58e-03
NAT8	451.07	11.10	9.25e-06	5.55e-04
MASP2	4049.34	11.01	2.34e-10	5.14e-08
CHST9	347.09	10.97	3.83e-07	3.41e-05
CCL19	653.83	10.80	1.60e-06	1.16e-04
A1BG	1343.19	10.63	3.88e-07	3.43e-05
SLC30A10	1419.21	10.56	6.44e-06	4.03e-04
RGN	1897.15	10.44	2.22e-16	1.52e-13
PIPOX	13293.88	10.41	6.66e-16	4.07e-13
HS1BP3-IT1	235.26	10.36	2.47e-04	9.31e-03
CES1P2	279.42	10.24	7.72e-04	2.37e-02
PCDHA11	180.77	10.20	6.53e-04	2.05e-02
BAAT	29387.40	10.14	1.40e-04	5.83e-03
DMRTA1	484.29	10.14	1.68e-04	6.72e-03
NACAD	151.10	10.06	8.23e-04	2.49e-02
ACSM5	6571.68	10.03	2.41e-11	6.90e-09
WNK3	461.40	10.02	9.09e-06	5.47e-04
ASGR2	11061.54	9.70	7.26e-14	3.73e-11
CASC10	52.87	9.66	8.30e-04	2.51e-02
CLEC4G	434.96	9.66	5.08e-04	1.67e-02
CLU	65162.89	9.56	4.36e-11	1.13e-08
TRIM54	54.84	9.53	8.27e-04	2.50e-02
FNDCC5	182.60	9.33	1.42e-04	5.88e-03
KLF15	893.41	9.08	2.22e-16	1.52e-13
MT1M	297.48	8.98	1.66e-03	4.27e-02
BMP5	216.34	8.97	1.25e-06	9.30e-05

CFAP57	472.87	8.91	7.19e-04	2.24e-02
BCHE	1775.84	8.81	1.83e-09	3.07e-07
LOC101927311	60.03	8.78	7.22e-04	2.24e-02
FMO5	12260.42	8.76	4.32e-09	6.39e-07
CLEC4M	743.09	8.51	4.78e-04	1.59e-02
SCARNA17	285.77	8.47	2.65e-05	1.41e-03
CYP4F2	2197.33	8.43	9.06e-06	5.47e-04
FAM35DP	137.89	8.36	3.83e-05	1.97e-03
OGDHL	2562.08	8.31	2.03e-09	3.33e-07
PPP4R4	151.99	8.31	8.58e-04	2.57e-02
GLYATL1	6745.91	8.15	5.17e-09	7.45e-07
KNDC1	377.41	8.08	3.60e-04	1.25e-02
LOC100506085	95.42	8.07	1.39e-03	3.76e-02
DSG1	372.09	8.01	6.41e-06	4.02e-04
ESPNL	93.60	7.99	6.17e-04	1.97e-02
MT1H	277.86	7.95	9.25e-04	2.73e-02
ELOVL2	1565.04	7.77	3.01e-07	2.74e-05
TMEM82	59.59	7.64	1.54e-03	4.02e-02
COL25A1	159.00	7.51	1.84e-03	4.63e-02
CD1C	320.86	7.50	1.02e-03	2.95e-02
LRG1	34821.68	7.47	5.42e-12	1.78e-09
GPD1	4489.19	7.46	4.62e-09	6.70e-07
CES1	51500.69	7.42	2.57e-07	2.35e-05
GPT	346.49	7.16	3.83e-04	1.32e-02
CES1P1	490.94	7.10	1.58e-03	4.10e-02
TMEM27	453.58	7.09	9.51e-04	2.80e-02
TFPI2	664.82	7.06	1.99e-09	3.29e-07
GRB14	960.37	7.05	1.99e-04	7.72e-03
SLC25A18	664.35	7.00	1.13e-06	8.50e-05
H19	16557.65	6.99	3.03e-11	8.27e-09
FCER1A	961.46	6.97	1.15e-06	8.59e-05
IGSF23	98.88	6.85	5.59e-04	1.81e-02
TM4SF4	10296.96	6.78	1.27e-14	7.16e-12
MIA2	1018.66	6.69	1.97e-04	7.68e-03
HAL	3492.22	6.66	3.41e-06	2.28e-04
ADRA2B	109.67	6.47	9.35e-05	4.13e-03
ZBED9	220.58	6.43	1.70e-03	4.33e-02
MYOM1	4983.97	6.33	4.98e-07	4.23e-05
CP	212109.78	6.29	1.56e-03	4.05e-02
VNN1	13560.44	6.29	1.01e-07	1.03e-05
TMPRSS6	871.71	6.28	5.52e-07	4.61e-05
ABCC2	5631.51	6.19	3.45e-08	4.06e-06

NGFR	1636.89	6.17	3.90e-05	1.99e-03
SLC27A5	3552.49	6.17	2.72e-12	9.78e-10
HLF	3304.44	6.11	6.22e-11	1.55e-08
PFKFB1	528.63	6.02	3.35e-04	1.19e-02
LINC01314	1080.16	5.97	1.37e-04	5.78e-03
GPB1	221.59	5.87	3.21e-04	1.15e-02
TRPM8	1119.72	5.80	1.46e-12	5.69e-10
HOGA1	703.36	5.76	1.24e-03	3.45e-02
MST1P2	738.58	5.74	3.92e-07	3.46e-05
CFB	191679.36	5.66	1.05e-06	8.11e-05
GPLD1	1511.65	5.60	3.56e-07	3.20e-05
GFRA2	112.76	5.58	1.18e-04	5.07e-03
RELN	5093.83	5.55	1.56e-10	3.58e-08
F5	27495.81	5.55	3.35e-06	2.26e-04
HAMP	9026.64	5.54	1.04e-07	1.05e-05
ABCA8	2671.13	5.48	4.37e-07	3.79e-05
C14ORF105	780.85	5.46	2.28e-05	1.23e-03
BCO2	2567.55	5.40	1.79e-04	7.11e-03
NEU4	169.92	5.29	2.20e-04	8.43e-03
SERPINA4	3372.99	5.25	2.49e-11	7.04e-09
UGT1A6	2368.34	5.12	1.58e-04	6.40e-03
MST1	4744.64	4.97	5.39e-07	4.55e-05
AGT	23786.36	4.86	1.52e-08	1.95e-06
GATM	31128.27	4.81	3.51e-06	2.34e-04
CFP	433.91	4.78	5.16e-06	3.31e-04
ANG	1963.41	4.72	8.14e-05	3.67e-03
FMO3	13420.91	4.70	1.42e-04	5.88e-03
NTN1	306.61	4.68	1.04e-03	3.00e-02
LHX6	148.24	4.60	9.63e-04	2.83e-02
PROC	1797.60	4.55	5.18e-05	2.51e-03
GHR	7533.37	4.54	2.90e-05	1.53e-03
PDZK1	4506.42	4.53	5.32e-09	7.62e-07
SHISA3	191.38	4.52	1.32e-03	3.64e-02
SMOC1	3066.84	4.47	3.91e-04	1.34e-02
TTPA	6587.03	4.43	1.99e-04	7.72e-03
COLEC10	4068.18	4.42	1.02e-06	7.93e-05
ADCY1	3701.79	4.40	4.10e-05	2.08e-03
GLT1D1	1046.36	4.32	6.14e-06	3.89e-04
CFI	41614.69	4.28	3.92e-06	2.58e-04
PAPPA2	2854.07	4.19	4.21e-04	1.43e-02
FCN3	3779.01	4.16	2.48e-09	3.94e-07
ACSS3	7321.87	4.15	5.17e-06	3.31e-04

PBLD	9547.42	4.09	2.31e-06	1.60e-04
MUC6	635.25	4.09	1.35e-05	7.73e-04
FOXA1	1659.07	4.04	5.59e-07	4.65e-05
PALM3	1432.47	4.03	3.43e-06	2.29e-04
MAOB	11455.16	4.01	7.12e-06	4.42e-04
SLC7A2	16690.26	4.00	1.92e-11	5.64e-09
TMOD1	1115.02	3.97	9.41e-05	4.15e-03
RBP5	2932.02	3.95	7.29e-04	2.25e-02
SCARNA9	365.13	3.94	9.82e-05	4.30e-03
AR	6682.38	3.92	2.13e-05	1.16e-03
NR0B2	640.77	3.89	3.54e-04	1.24e-02
AKR1C1	9394.63	3.85	1.23e-04	5.29e-03
TNFSF14	2155.97	3.82	2.33e-04	8.86e-03
ALPL	4080.03	3.80	1.55e-05	8.71e-04
ABAT	30506.26	3.78	3.02e-06	2.06e-04
PC	9799.33	3.73	6.76e-08	7.31e-06
ECHDC3	2118.35	3.70	8.12e-04	2.47e-02
KANK4	259.96	3.68	3.36e-04	1.19e-02
SLC23A1	623.48	3.66	1.32e-05	7.58e-04
SLC17A4	977.76	3.62	1.62e-04	6.52e-03
C1ORF115	6320.67	3.57	1.11e-06	8.40e-05
CBS	4125.26	3.47	6.04e-12	1.92e-09
RAP1GAP	2786.90	3.46	9.04e-10	1.69e-07
HOMER2	1255.17	3.45	4.86e-04	1.61e-02
STEAP4	5979.06	3.45	1.17e-09	2.16e-07
LINC00261	7830.80	3.44	1.47e-05	8.25e-04
EPHB6	316.07	3.42	1.33e-03	3.67e-02
LYVE1	6010.68	3.36	3.44e-05	1.78e-03
F10	2828.60	3.32	7.63e-04	2.35e-02
CFH	98180.02	3.30	1.41e-05	7.99e-04
FGGY	5694.92	3.27	1.56e-04	6.35e-03
SLC13A3	2205.67	3.19	8.14e-06	4.99e-04
DHODH	6625.06	3.18	5.43e-07	4.57e-05
ACAT1	31821.70	3.17	1.02e-05	6.00e-04
AQP3	5062.94	3.16	2.00e-04	7.73e-03
FST	745.52	3.14	9.05e-08	9.44e-06
C2ORF72	5076.20	3.14	2.80e-04	1.03e-02
SLC34A2	1319.54	3.13	1.67e-05	9.27e-04
PLCXD3	669.99	3.13	3.54e-04	1.24e-02
ST6GAL1	77284.70	3.07	9.80e-08	1.01e-05
RUNDC3B	461.21	3.05	1.37e-04	5.78e-03
CLGN	458.85	3.00	6.27e-08	6.82e-06

CYP4F3	4950.31	2.99	7.19e-05	3.32e-03
HSD11B1	13778.73	2.98	1.35e-04	5.71e-03
ANO5	371.58	2.98	1.79e-05	9.85e-04
PNPLA3	845.69	2.96	1.16e-03	3.30e-02
ATF5	19022.32	2.95	8.33e-05	3.74e-03
DNAH5	1133.11	2.89	8.76e-04	2.61e-02
FAM149A	731.27	2.89	1.28e-07	1.24e-05
GAMT	1353.73	2.87	1.35e-03	3.69e-02
MPO	1487.39	2.85	1.17e-03	3.31e-02
PKN3	570.34	2.84	9.52e-05	4.19e-03
ART4	1300.74	2.83	1.16e-03	3.30e-02
ONECUT2	3064.75	2.82	6.91e-07	5.50e-05
ALDH6A1	11398.96	2.81	5.33e-05	2.57e-03
ANPEP	27101.47	2.78	3.40e-05	1.76e-03
RORC	2645.78	2.75	3.46e-05	1.79e-03
LRRC2	1829.47	2.75	8.69e-04	2.60e-02
MARC2	6841.09	2.74	1.06e-06	8.12e-05
GCNT2	1463.21	2.74	8.46e-05	3.78e-03
EXOC3L4	371.55	2.73	1.67e-03	4.28e-02
HGD	9536.72	2.70	1.57e-03	4.08e-02
HYAL1	3723.09	2.69	1.72e-03	4.36e-02
LEPR	13847.84	2.69	8.54e-05	3.80e-03
PI15	1968.04	2.68	1.13e-05	6.51e-04
IL33	7011.03	2.67	7.73e-05	3.53e-03
TMEM220	1840.39	2.66	9.66e-05	4.24e-03
IL1RL2	568.62	2.66	1.70e-03	4.33e-02
GNA14	406.51	2.66	2.35e-04	8.88e-03
CETP	1355.32	2.65	1.49e-03	3.93e-02
SEPP1	14519.53	2.65	8.10e-04	2.47e-02
GOS2	879.18	2.63	6.40e-04	2.03e-02
ABCC6	2006.92	2.61	2.27e-04	8.66e-03
CTH	3697.91	2.60	3.40e-04	1.21e-02
GPAM	9801.23	2.60	6.18e-06	3.91e-04
CYB5A	20775.86	2.59	2.98e-06	2.04e-04
A1CF	21961.86	2.58	6.58e-05	3.08e-03
LGALS2	720.32	2.56	6.25e-05	2.94e-03
ALDH1A1	33315.52	2.56	2.03e-08	2.53e-06
MLXIPL	3900.54	2.53	1.12e-03	3.20e-02
ADAMTS15	694.79	2.52	8.58e-05	3.81e-03
DCDC2	1692.34	2.51	4.36e-05	2.17e-03
SHMT1	10052.15	2.49	1.30e-04	5.53e-03
TFPI	13739.39	2.49	5.18e-04	1.70e-02

STAB2	1853.16	2.49	1.32e-03	3.65e-02
MFSD2A	3350.00	2.48	9.50e-06	5.66e-04
CNTNAP2	3853.57	2.48	1.01e-04	4.41e-03
SLC16A2	4756.00	2.46	9.05e-04	2.68e-02
PECR	2693.45	2.46	1.37e-04	5.78e-03
ISX	1458.84	2.45	6.44e-04	2.04e-02
ALDH4A1	13494.89	2.43	1.15e-03	3.29e-02
ADAMTSL3	1716.12	2.39	2.87e-04	1.04e-02
NNMT	44714.18	2.38	9.25e-04	2.73e-02
NPC1L1	1540.04	2.38	1.10e-03	3.16e-02
ITIH5	2277.33	2.36	3.92e-08	4.51e-06
LILRA1	996.72	2.34	1.54e-03	4.02e-02
KLHDC7A	681.86	2.34	1.68e-05	9.31e-04
THSD7A	455.30	2.34	4.89e-04	1.62e-02
SDS	2170.99	2.32	1.34e-03	3.68e-02
AZGP1	40916.49	2.32	3.67e-05	1.89e-03
ACADSB	17305.02	2.30	2.98e-04	1.08e-02
ANXA13	1376.23	2.26	6.80e-04	2.12e-02
MT1X	4578.04	2.26	1.73e-04	6.87e-03
NR5A2	3717.66	2.26	1.81e-04	7.14e-03
PHGDH	8859.37	2.24	4.32e-04	1.46e-02
PDE2A	1740.80	2.24	1.94e-03	4.84e-02
SLC9B2	2105.31	2.23	1.70e-06	1.22e-04
EPHX1	19066.89	2.21	2.79e-04	1.03e-02
TCEA3	5864.69	2.20	4.46e-04	1.50e-02
SYT13	1031.96	2.17	1.02e-05	6.00e-04
TGFBR3	4050.98	2.16	3.77e-06	2.50e-04
TNC	24630.57	2.16	1.60e-03	4.14e-02
CGNL1	13597.95	2.15	2.43e-08	3.01e-06
CCDC150	732.26	2.15	1.45e-03	3.85e-02
ALDH2	40537.76	2.14	4.44e-04	1.50e-02
ADGRD1	923.59	2.13	2.68e-05	1.42e-03
DHCR24	51988.37	2.12	1.72e-03	4.37e-02
FABP6	1257.76	2.11	2.20e-06	1.54e-04
ADGRG6	8301.33	2.10	1.09e-03	3.13e-02
EHHADH	12739.74	2.10	1.33e-03	3.67e-02
RPS4Y1	6980.98	2.08	1.41e-03	3.79e-02
SCARNA7	560.03	2.08	2.71e-05	1.44e-03
ECHDC2	3214.48	2.06	3.53e-04	1.24e-02
SLC5A9	473.02	2.05	3.47e-04	1.22e-02
ABCC9	5328.60	2.04	1.55e-03	4.03e-02
SORBS2	6435.85	2.03	2.71e-06	1.87e-04

ACACB	7991.87	2.01	8.79e-04	2.62e-02
HRSP12	12620.45	2.01	8.40e-04	2.54e-02
CDKN1A	8377.12	0.50	1.38e-06	1.02e-04
IGFBP7	17582.08	0.49	2.42e-04	9.13e-03
PHLDA3	933.37	0.49	7.88e-05	3.58e-03
PNMA2	1325.29	0.49	9.53e-07	7.44e-05
RNASE1	37612.30	0.48	2.05e-04	7.88e-03
COL1A2	223506.44	0.48	1.52e-06	1.11e-04
PIGZ	3069.89	0.48	3.81e-04	1.31e-02
MX1	18002.94	0.48	1.72e-07	1.62e-05
ATP10A	1864.06	0.48	2.16e-04	8.26e-03
CTHRC1	7990.19	0.47	1.81e-05	9.97e-04
RAD51B	749.70	0.47	2.55e-04	9.52e-03
PRKY	1778.48	0.47	5.99e-04	1.92e-02
CALB1	2226.51	0.46	1.51e-03	3.97e-02
IL20RB	404.85	0.46	3.67e-04	1.27e-02
WNT5A	1799.79	0.46	4.34e-04	1.47e-02
SLC6A4	717.28	0.46	1.80e-03	4.54e-02
MEGF6	2613.84	0.46	4.10e-05	2.08e-03
DDX60	6828.80	0.46	3.16e-09	4.79e-07
HAVCR1	1500.73	0.45	2.15e-04	8.25e-03
ENO2	5783.04	0.45	3.23e-08	3.87e-06
LINC01132	238.04	0.45	1.54e-03	4.02e-02
LUCAT1	810.35	0.45	4.38e-06	2.86e-04
SLC26A2	9470.80	0.45	5.49e-04	1.78e-02
ISLR	3793.90	0.45	1.43e-03	3.82e-02
PPFIA4	1247.81	0.44	2.56e-04	9.56e-03
EFR3B	229.79	0.44	5.85e-04	1.87e-02
IFI27	12435.54	0.44	1.95e-05	1.06e-03
TXNIP	82839.07	0.44	8.96e-06	5.42e-04
PRDM1	2683.23	0.44	4.42e-05	2.19e-03
SAMD9L	8965.34	0.43	1.65e-03	4.25e-02
UNC5C	1580.01	0.43	1.12e-03	3.21e-02
GDPD2	227.77	0.43	8.79e-04	2.62e-02
APOD	261.64	0.43	1.46e-03	3.88e-02
C14ORF37	515.33	0.43	6.97e-04	2.17e-02
IFI44	5320.91	0.43	3.03e-09	4.66e-07
ZMYND15	432.94	0.43	1.30e-03	3.62e-02
BMP7	1102.71	0.43	1.37e-03	3.72e-02
CSPG4	1240.24	0.42	8.76e-04	2.61e-02
PLXDC1	1928.73	0.42	1.02e-04	4.43e-03
FFAR4	571.20	0.42	1.99e-06	1.40e-04

TCF21	660.77	0.42	4.02e-04	1.38e-02
MX2	6219.13	0.42	6.34e-09	8.75e-07
COL12A1	17587.11	0.42	1.38e-04	5.79e-03
CATSPER1	260.49	0.42	4.70e-04	1.57e-02
GREM1	18397.33	0.41	2.56e-04	9.56e-03
KIAA1549L	650.67	0.41	4.39e-05	2.18e-03
SPARCL1	8503.83	0.41	2.50e-04	9.38e-03
IFIT3	11986.25	0.41	2.91e-10	6.22e-08
APOBEC1	804.44	0.41	1.16e-04	5.01e-03
TFF1	660.96	0.40	1.59e-03	4.12e-02
BTBD11	480.86	0.40	4.47e-05	2.20e-03
LINC00654	1178.02	0.40	4.66e-04	1.56e-02
OAS2	14999.86	0.40	1.26e-11	3.84e-09
CDH11	12116.69	0.40	1.98e-04	7.69e-03
IFIT1	7951.52	0.39	5.00e-04	1.65e-02
RNF186	827.89	0.39	7.03e-06	4.37e-04
LINC01559	4210.47	0.39	1.39e-04	5.83e-03
CHIT1	558.22	0.39	5.41e-04	1.76e-02
EGLN3	8446.40	0.39	5.23e-04	1.71e-02
IGF2BP3	714.18	0.38	2.50e-08	3.07e-06
ANKRD37	340.78	0.38	4.18e-05	2.09e-03
LY6G6D	2768.96	0.38	3.02e-04	1.09e-02
LCN15	18356.78	0.38	1.67e-03	4.28e-02
ITGB7	2088.33	0.38	1.98e-05	1.08e-03
ANTXR1	63921.46	0.38	1.20e-03	3.37e-02
COL11A1	20461.99	0.37	1.62e-05	9.00e-04
PKIA	255.93	0.37	1.43e-03	3.83e-02
SPAG4	1033.36	0.37	2.92e-05	1.54e-03
CELF6	284.19	0.36	2.75e-04	1.01e-02
SSPN	2043.51	0.36	6.53e-04	2.05e-02
HOPX	1970.41	0.36	3.12e-05	1.63e-03
MAGI2	578.27	0.36	2.65e-04	9.79e-03
LOC648987	346.49	0.36	3.07e-05	1.61e-03
GLI1	659.66	0.36	1.44e-03	3.84e-02
MXRA5	24964.41	0.35	4.96e-06	3.20e-04
PDPN	3583.26	0.35	3.06e-04	1.10e-02
HTRA3	2556.08	0.35	1.08e-06	8.21e-05
TRAPPC2B	251.07	0.34	1.25e-04	5.35e-03
TFF3	7700.61	0.34	1.48e-04	6.08e-03
LUM	46894.13	0.34	1.82e-05	9.97e-04
ANGPT2	4204.83	0.34	3.15e-06	2.15e-04
ROR2	666.07	0.34	4.18e-04	1.42e-02

ITGBL1	12331.74	0.34	5.64e-04	1.81e-02
DKK3	5655.25	0.34	1.52e-04	6.20e-03
CCL3	970.39	0.33	1.20e-07	1.19e-05
CPZ	877.51	0.33	1.07e-04	4.64e-03
TMEM119	1666.90	0.33	1.32e-03	3.65e-02
CD80	448.56	0.33	7.28e-08	7.80e-06
IFI6	8515.19	0.33	1.44e-13	6.80e-11
OASL	1976.79	0.33	4.07e-07	3.57e-05
ZNF418	293.61	0.33	4.14e-04	1.41e-02
ADORA3	780.31	0.33	1.88e-04	7.40e-03
SERPINI1	1041.42	0.33	5.26e-08	5.90e-06
GPR68	389.43	0.32	7.37e-04	2.27e-02
COLEC12	2898.60	0.32	5.15e-05	2.51e-03
PDGFD	1627.49	0.32	4.73e-04	1.58e-02
LINC00996	122.42	0.32	1.35e-03	3.69e-02
ENTHD1	190.22	0.32	1.81e-03	4.57e-02
ISM2	462.32	0.31	6.09e-07	4.97e-05
FER1L4	2656.70	0.31	6.76e-04	2.12e-02
PPAPDC1A	350.12	0.31	4.40e-05	2.18e-03
TENM4	517.07	0.31	8.95e-04	2.66e-02
ACAN	1038.86	0.30	1.50e-04	6.14e-03
WNT2	891.82	0.30	1.36e-03	3.70e-02
NTRK2	2236.54	0.30	1.73e-03	4.40e-02
EGFL6	558.53	0.30	5.06e-07	4.29e-05
HIST1H4H	182.66	0.30	6.18e-05	2.91e-03
CKB	2655.27	0.30	3.07e-11	8.27e-09
SAMD3	353.40	0.30	1.14e-03	3.24e-02
CEACAM8	206.75	0.29	3.08e-05	1.61e-03
ISG15	1252.10	0.29	2.49e-04	9.35e-03
NDUFA4L2	3406.72	0.29	3.25e-04	1.16e-02
TNNT1	717.07	0.28	1.03e-05	6.04e-04
PODNL1	641.52	0.28	1.42e-04	5.88e-03
NPR3	4489.18	0.28	8.53e-04	2.56e-02
CTSK	7875.32	0.28	4.52e-06	2.94e-04
SFRP4	1655.57	0.27	4.60e-05	2.26e-03
RSAD2	3403.73	0.27	1.63e-10	3.70e-08
F2RL2	558.82	0.27	1.45e-03	3.86e-02
COL10A1	15553.12	0.27	2.49e-04	9.35e-03
COL24A1	462.07	0.27	1.47e-06	1.08e-04
TMIGD3	1050.52	0.27	7.57e-06	4.67e-04
KAZALD1	251.26	0.26	4.25e-06	2.78e-04
SMIM2-AS1	296.48	0.26	5.09e-06	3.27e-04

OPRK1	190.65	0.26	6.10e-05	2.89e-03
ESM1	1728.28	0.25	5.75e-05	2.74e-03
CAND1.11	78.54	0.25	1.64e-03	4.24e-02
HAP1	229.66	0.25	9.70e-04	2.84e-02
MMP11	6173.21	0.25	8.02e-07	6.34e-05
CEACAM7	2033.58	0.25	4.66e-07	4.01e-05
LOC440300	132.62	0.24	8.17e-04	2.48e-02
STMN2	1451.82	0.24	1.43e-03	3.84e-02
C1ORF204	125.08	0.24	2.01e-04	7.76e-03
IFI44L	8400.50	0.24	2.98e-09	4.62e-07
TLE6	167.11	0.24	3.44e-04	1.22e-02
SERPINB9P1	277.11	0.23	6.18e-04	1.97e-02
C17ORF77	246.35	0.23	4.06e-05	2.06e-03
KCNK10	69.79	0.23	1.20e-03	3.36e-02
CCL8	1456.42	0.23	1.43e-05	8.10e-04
COMP	6375.12	0.22	4.13e-05	2.08e-03
GSTM5	273.34	0.22	1.93e-03	4.84e-02
ELFN2	85.66	0.22	1.12e-04	4.84e-03
CXCL11	2465.49	0.21	1.71e-04	6.81e-03
COL4A5	996.15	0.21	1.09e-07	1.10e-05
IGSF21	243.53	0.21	1.39e-05	7.94e-04
CORIN	891.32	0.20	1.10e-04	4.79e-03
ELF5	487.53	0.20	1.64e-04	6.59e-03
DLX6	88.81	0.20	4.55e-04	1.52e-02
LOC100131496	64.02	0.19	1.90e-03	4.77e-02
DIRAS2	195.66	0.19	2.40e-07	2.22e-05
RGS13	81.68	0.19	1.49e-03	3.93e-02
FAM66C	56.89	0.18	6.62e-05	3.08e-03
IBSP	1629.00	0.18	1.12e-05	6.47e-04
ERMN	139.86	0.18	9.31e-05	4.12e-03
SOX11	59.02	0.18	7.61e-05	3.48e-03
MFAP5	480.27	0.17	1.90e-11	5.64e-09
FALEC	225.59	0.16	1.40e-03	3.78e-02
IGFL2	484.95	0.15	4.50e-07	3.88e-05
RHCE	45.02	0.15	2.62e-04	9.70e-03
APOBEC2	99.48	0.12	4.89e-05	2.39e-03
RNF212B	124.74	0.12	6.64e-04	2.09e-02
C6ORF52	68.53	0.12	4.03e-04	1.38e-02
TMEM130	608.87	0.12	3.90e-05	1.99e-03
LINC01602	213.68	0.11	5.70e-05	2.72e-03
SNTN	68.43	0.11	1.33e-04	5.65e-03
KLRC2	60.39	0.11	1.04e-05	6.05e-04

GRIK5	84.15	0.11	3.53e-04	1.24e-02
FMR1-AS1	55.84	0.11	7.25e-05	3.34e-03
AQP8	49.79	0.10	1.35e-03	3.69e-02
CNTN1	209.60	0.10	5.42e-04	1.76e-02
PPP1R14A	165.02	0.10	1.44e-04	5.95e-03
CAPN14	25.43	0.10	3.25e-04	1.16e-02
SNORD116-24	65.36	0.09	1.94e-04	7.56e-03
HRAT92	41.41	0.07	1.57e-04	6.36e-03
SMC1B	36.91	0.07	8.04e-04	2.45e-02

	Metal	Target	Clone	Staining
1	89Y	CD45	HI30	Surface
2	103Rh	<i>dead cells</i>	<i>n/a</i>	<i>n/a</i>
3	140Ce	<i>beads</i>	<i>n/a</i>	<i>n/a</i>
4	141Pr	CD45	HI30	Surface
5	142Nd	CD19	HIB19	Surface
6	143Nd	CD3	UCHT1	Surface
7	144Nd	CD69	FN50	Surface
8	145Nd	CD4	RPA-T4	Surface
9	146Nd	CD8a	RPA-T8	Surface
10	147Sm	CD11c	Bu15	Surface
11	148Nd	PD-L1	29E.2A3	Surface
12	149Sm	CD25	2A3	Surface
13	150Nd	OX40	ACT35	Surface
14	151Eu	ICOS	C398.4A	Surface
15	152Sm	CD95	DX2	Surface
16	153Eu	CD45RA	HI100	Surface
17	154Sm	TIM-3	F38-2E2	Surface
18	155Gd	PD-1	EH12.2H7	Surface
19	156Gd	CD183 (CXCR3)	G025H7	Surface
20	158Gd	CD137 (4-1BB)	4B4-1	Surface
21	159Tb	CD357 (GITR)	108-17	Surface
22	160Gd	T-bet	4B10	Intracellular
23	161Dy	CD40L	24-31	Surface
24	162Dy	CD14	M5E2	Surface
25	163Dy	CRTH2	BM16	Surface
26	164Dy	TIGIT	MBSA43	Surface
27	165Ho	CD223 (LAG3)	11C3C65	Surface
28	166Er	CD28	CD28.8	Surface
29	167Er	CCR7	G043H7	Surface
30	168Er	CD127	A019D5	Surface
31	169Tm	CD33	WM53	Surface
32	170Er	CTLA-4	14D3	Intracellular
33	171Yb	CXCR5	51505	Surface
34	172Yb	PD-L2	24F.10C12	Surface
35	173Yb	Granzyme B	GB11	Intracellular
36	174Yb	CD123	6H6	Surface
37	175Lu	<i>HLA-DR</i>	<i>L243</i>	Surface
38	176Yb	<i>CD56</i>	<i>NCAM16.2</i>	Surface
39	191Ir	<i>DNA1</i>	<i>n/a</i>	<i>n/a</i>
40	193Ir	<i>DNA2</i>	<i>n/a</i>	<i>n/a</i>
41	209Bi	CD16	3G8	Surface

Supplemental Table 6. CyTOF marker antibody panel.