

TandNK	NK_FCGR3A	7.901	4.678	5.126	5.902	3.639	11.831	4.586	6.685
	CD4NaiveT_CCR7	3.284	3.905	2.429	3.206	3.791	5.313	1.706	3.604
	CD4Tmem_CD40LG	3.351	2.135	3.633	3.040	6.207	2.268	2.120	3.532
	CD4Treg_CTLA4	0.750	0.264	1.738	0.918	0.382	0.306	0.253	0.314
	CD8MAIT_KLRB1	4.384	5.552	3.766	4.568	5.443	8.786	15.985	10.071
	CD8MAIT_SLC4A10	4.234	3.559	1.783	3.192	4.953	9.256	22.010	12.073
	CD8Teff_GZMH	6.801	12.691	8.491	9.328	12.766	6.007	7.386	8.720
	CD8Teff_GZMK	3.684	4.068	5.505	4.419	10.228	7.295	8.785	8.769
	CD8Teff_ISG15	0.100	0.000	0.022	0.041	0.015	0.041	0.013	0.023
	CD8Teff_MT1X	1.234	1.607	0.646	1.162	0.810	0.143	0.160	0.371

Supplementary File 1b

gene_id	Cluster	gene_id	Cluster	gene_id	Cluster
1 ACTB	1	757 ARMC6	1	1517 EGR2	2
2 RPS26	1	758 DHPS	1	1518 BTG3	2
3 GIMAP7	1	759 ELP3	1	1519 HIC1	2
4 IGKC	1	760 MR11	1	1520 GZF1	2
5 FCER1G	1	761 CD38	1	1521 PTGES3	2
6 GSTP1	1	762 AC022021.1	1	1522 HMGCS1	2
7 ACTG1	1	763 PNKD	1	1523 ARG2	2
8 CCL5	1	764 C12orf10	1	1524 SLC25A33	2
9 AC007952.4	1	765 FBXL6	1	1525 CNOT2	2
10 KLRD1	1	766 CLUAP1	1	1526 UBE2B	2
11 CLIC3	1	767 OFD1	1	1527 AHSA1	2
12 CD7	1	768 COX5A	1	1528 OAZ1	2
13 TMSB4X	1	769 ANKRD10	1	1529 HNRNPC	2
14 GZMA	1	770 ATP5S	1	1530 AMD1	2
15 RSRP1	1	771 TBC1D10A	1	1531 CHD4	2
16 GAPDH	1	772 METTL26	1	1532 MIDN	2
17 MYL12A	1	773 TARSL2	1	1533 SERP1	2
18 KLRC1	1	774 TAF9	1	1534 NAA50	2
19 CD247	1	775 ADD1	1	1535 MOB3A	2
20 ID2	1	776 DEXI	1	1536 KBTBD2	2
21 XIST	1	777 SYNJ2BP	1	1537 YME1L1	2
22 PFN1	1	778 TMEM106C	1	1538 SLC2A3	2
23 CLIC1	1	779 TMOD3	1	1539 MAT2A	2
24 SOCS1	1	780 CLNS1A	1	1540 AC103591.3	2
25 GZMK	1	781 STUB1	1	1541 BIRC2	2
26 CORO1A	1	782 DPM3	1	1542 TNFSF14	2
27 HCST	1	783 ATP6V1F	1	1543 POLR2K	2
28 HLA-B	1	784 ZNF567	1	1544 EHD1	2
29 TXK	1	785 ECHS1	1	1545 CLK1	2
30 CITED2	1	786 NAGLU	1	1546 KPNA2	2
31 ATP5F1E	1	787 MAF1	1	1547 PABPC4	2
32 TYROBP	1	788 ATP5F1C	1	1548 SUB1	2
33 IFITM2	1	789 LBR	1	1549 CCT4	2
34 LY6E	1	790 TEFM	1	1550 TSC22D2	2
35 SESN1	1	791 APH1A	1	1551 RPLP1	2
36 LSP1	1	792 POLR2I	1	1552 MIR222HG	2
37 CD63	1	793 CAMK1	1	1553 SFPQ	2
38 CTSD	1	794 RTRAF	1	1554 RPL35	2
39 EVL	1	795 BTF3L4	1	1555 TIFA	2
40 PSME1	1	796 ZFP14	1	1556 SKP1	2
41 FKBP5	1	797 METTL23	1	1557 TMEM263	2
42 CFL1	1	798 FAM50B	1	1558 NBEAL1	2
43 TMIGD2	1	799 COMMD9	1	1559 UBE2A	2
44 GADD45G	1	800 CSK	1	1560 ZBTB21	2
45 GABPB1-A	1	801 SDAD1	1	1561 LEPROTL1	2
46 RAC2	1	802 TNF2	1	1562 ZBTB10	2
47 ARPC3	1	803 IMP3	1	1563 FAM107B	2
48 GADD45B	1	804 SF3B5	1	1564 TAF13	2
49 ARRDC3	1	805 APEX1	1	1565 GOLGB1	2
50 CD160	1	806 ZNF428	1	1566 SERTAD3	2
51 ETS1	1	807 METTL3	1	1567 SLC1A5	2
52 MYL12B	1	808 CFAP97	1	1568 RFX1	2
53 PTGDR	1	809 TERF2IP	1	1569 AZIN1	2
54 AC104506.1	1	810 STX10	1	1570 ZDBF2	2
55 ZBTB16	1	811 RALY	1	1571 NSMCE3	2
56 MAPK1	1	812 TRAPPC2L	1	1572 MKNK2	2
57 IGHA1	1	813 CENPT	1	1573 BCL2L11	2
58 RARRES3	1	814 SLC7A6OS	1	1574 NFKB2	2
59 INTS6	1	815 C11orf58	1	1575 H2AFJ	2
60 FUS	1	816 ZNF75A	1	1576 NFKBIE	2
61 ILF3-DT	1	817 TUBB	1	1577 UBE2D3	2
62 TRAPPC1	1	818 VPS26A	1	1578 RHOH	2
63 GZMM	1	819 BCL2	1	1579 THUMPD3-	2
64 RASA2	1	820 PDCD6	1	1580 IFITM1	2
65 EIF3G	1	821 SP110	1	1581 TOB2	2
66 AL355075.4	1	822 ITGA4	1	1582 EGR3	2

67	SERF2	1	823	MLEC	1	1583	NASP	2
68	GIMAP4	1	824	ASAH1	1	1584	SIRT1	2
69	ITM2C	1	825	TMEM203	1	1585	NAMPT	2
70	TMA7	1	826	C8orf59	1	1586	RIPK2	2
71	TRDC	1	827	DDIT4	1	1587	ICAM4	2
72	C4orf3	1	828	TMEM42	1	1588	ALG13	2
73	CXCR6	1	829	CLNK	1	1589	THAP2	2
74	NDUFA4	1	830	PGBD4	1	1590	GCH1	2
75	TLN1	1	831	SPCS1	1	1591	IFNGR1	2
76	GIMAP1	1	832	CDC16	1	1592	HIST2H2AC	2
77	PSME2	1	833	TSPAN5	1	1593	PDE7A	2
78	UQCR11	1	834	TRMT10B	1	1594	SRSF7	2
79	PIIB	1	835	AUTS2	1	1595	PNPLA8	2
80	ELOB	1	836	TBRG4	1	1596	MMP9	2
81	GGNBP2	1	837	PLP2	1	1597	RBM38	2
82	SPCS2	1	838	XRCC5	1	1598	ATG101	2
83	CHST12	1	839	AC243829.1	1	1599	NLRP3	2
84	RHOC	1	840	NIFK	1	1600	CASP3	2
85	PRELID1	1	841	ZNF302	1	1601	JPT1	2
86	ARHGDIB	1	842	ARSK	1	1602	TANK	2
87	AP001160.1	1	843	SNAPC5	1	1603	ISG20L2	2
88	AL627171.1	1	844	GHITM	1	1604	CNOT6L	2
89	RHOA	1	845	COMMD2	1	1605	SIK1B	2
90	ENO1	1	846	COMTD1	1	1606	RHEB	2
91	IKZF1	1	847	WDR1	1	1607	LIF	2
92	AC108134.2	1	848	DNMT3A	1	1608	SC5D	2
93	PPPICA	1	849	SYK	1	1609	MAP1LC3A	2
94	PPP1R14B	1	850	TMEM126B	1	1610	USP36	2
95	ATP5MC2	1	851	U2AF1L5	1	1611	RAB21	2
96	IGHM	1	852	TMCO1	1	1612	RYBP	2
97	CDC42	1	853	MPC1	1	1613	TFRC	2
98	ACAP1	1	854	CIR1	1	1614	DDX21	2
99	IFI16	1	855	RBL2	1	1615	ELOVL5	2
100	OST4	1	856	CCDC124	1	1616	DBF4	2
101	PNISR	1	857	SFXN1	1	1617	KDM2A	2
102	PLEKHF1	1	858	TSNAX	1	1618	RNF168	2
103	DAD1	1	859	M6PR	1	1619	DUSP6	2
104	PYHIN1	1	860	MRPS5	1	1620	SIK2	2
105	PRDX5	1	861	DCP2	1	1621	DNAJB9	2
106	CAP1	1	862	CCDC85B	1	1622	AKIRIN1	2
107	ALOX5AP	1	863	SH2D1B	1	1623	RARA	2
108	APMAP	1	864	RCBTB2	1	1624	LRIF1	2
109	BST2	1	865	H6PD	1	1625	MAP2K3	2
110	EOMES	1	866	RBM43	1	1626	EIF1AY	2
111	SET	1	867	SUMO2	1	1627	PPP1CB	2
112	LAT2	1	868	OGT	1	1628	CRYBG1	2
113	ARGLU1	1	869	PSMF1	1	1629	RASL11A	2
114	FASLG	1	870	ZNF439	1	1630	MOB4	2
115	CD53	1	871	VDAC1	1	1631	DYNLL2	2
116	TBC1D10C	1	872	PARK7	1	1632	CYSLTR2	2
117	IFIT2	1	873	A1BG	1	1633	CCNT1	2
118	MSN	1	874	EMC1	1	1634	ISCA1	2
119	TMEM141	1	875	CKLF	1	1635	CMC1	2
120	ARL6IP4	1	876	PAK2	1	1636	SRSF5	2
121	EIF5A	1	877	FNTA	1	1637	SNHG8	2
122	HMGB1	1	878	UBE2D2	1	1638	TRA2A	2
123	PSMB8	1	879	PIGBOS1	1	1639	LUZP1	2
124	PTPRC	1	880	NDUFAB1	1	1640	NKRF	2
125	IGHG3	1	881	CHRNB1	1	1641	PPP2CA	2
126	C19orf66	1	882	COX14	1	1642	PIM2	2
127	PIK3IP1	1	883	AL451085.1	1	1643	ISG15	2
128	HMG1	1	884	CTBP1	1	1644	EGR4	2
129	ANXA6	1	885	BUB3	1	1645	MORF4L2	2
130	ECH1	1	886	NUTF2	1	1646	NDUFS5	2
131	HSD17B10	1	887	HINT2	1	1647	TOPORS	2
132	CSKMT	1	888	MRPL28	1	1648	AL359915.2	2
133	PAXX	1	889	RTP4	1	1649	ZNF571	2
134	ATP5MD	1	890	ENPP4	1	1650	AURKA	2

135 VAMP8	1	891 FARSA	1	1651 GADD45A	2
136 GMFG	1	892 AC017083.1	1	1652 CCDC117	2
137 WDR83OS	1	893 MLH3	1	1653 TRIM39	2
138 GTF3A	1	894 NIFK-AS1	1	1654 TGIF2	2
139 MYL6	1	895 BOD1	1	1655 ATP1A1	2
140 ITGB2	1	896 SASH3	1	1656 IRF2BP2	2
141 TRAF3IP3	1	897 ZDHHC24	1	1657 TMEM217	2
142 PSMB3	1	898 C19orf24	1	1658 EMD	2
143 COX6B1	1	899 CNDP2	1	1659 ZFAS1	2
144 NT5C	1	900 NOL7	1	1660 SLC35A2	2
145 GPATCH8	1	901 CCDC28A	1	1661 CD72	2
146 ARPC4	1	902 ARHGDI A	1	1662 SRSF3	2
147 IGLC2	1	903 ARL6IP5	1	1663 BTBD7	2
148 CAPZB	1	904 IER3IP1	1	1664 RABGEF1	2
149 MDH2	1	905 IFI35	1	1665 ELMSAN1	2
150 COX6C	1	906 LYPLA2	1	1666 ZNF570	2
151 AC243965.1	1	907 POLR2L	1	1667 FOSL1	2
152 TCIRG1	1	908 TMEM156	1	1668 EIF4G2	2
153 FKBP8	1	909 EIF3K	1	1669 DCUN1D3	2
154 PHYKPL	1	910 HAGHL	1	1670 MEF2D	2
155 1-Sep	1	911 NCOR1	1	1671 RSL24D1	2
156 NDUFB2	1	912 BRI3	1	1672 TRAF4	2
157 LCP1	1	913 JMJD8	1	1673 MRPL1	2
158 CD81	1	914 TPR	1	1674 CBX4	2
159 APBB1IP	1	915 VEGFB	1	1675 FABP5	2
160 COTL1	1	916 OSTF1	1	1676 RPL22L1	2
161 AC243960.1	1	917 WDR77	1	1677 NSUN6	2
162 HLA-DQB1	1	918 SH3BGRL	1	1678 STIP1	2
163 S100A11	1	919 UTP25	1	1679 SLC35D1	2
164 SYNGR1	1	920 ORMDL2	1	1680 GLS	2
165 SSBP4	1	921 PKN1	1	1681 SNU13	2
166 UQCR10	1	922 PEPD	1	1682 NDEL1	2
167 ITM2A	1	923 BABAM1	1	1683 WDR47	2
168 COG2	1	924 DNAJC1	1	1684 SPATA2L	2
169 MRPS34	1	925 G6PD	1	1685 AC058791.1	2
170 MATK	1	926 SDHAF2	1	1686 TARS	2
171 IFITM3	1	927 NUDCD2	1	1687 NUDT4	2
172 PPP1R18	1	928 PARP16	1	1688 SERPINH1	2
173 UBE2L6	1	929 SRP72	1	1689 LMNB1	2
174 APRT	1	930 LZTR1	1	1690 SS18L2	2
175 GSTK1	1	931 TMA16	1	1691 IL23R	2
176 TESC	1	932 GNG5	1	1692 UBR1	2
177 YWHAB	1	933 NAPEPLD	1	1693 SLC25A3	2
178 SLFN5	1	934 C19orf53	1	1694 CD27	2
179 RASA1	1	935 MTERF4	1	1695 TMEM88	2
180 NEDD8	1	936 CUTA	1	1696 DNTTIP2	2
181 DYNLT1	1	937 VSTM4	1	1697 STMN1	2
182 AP3S1	1	938 NAXE	1	1698 LETM2	2
183 PARP8	1	939 AC110769.2	1	1699 MASTL	2
184 AC023157.3	1	940 MIF4GD	1	1700 UBE2D1	2
185 ATP5F1A	1	941 MZT2A	1	1701 CHIC2	2
186 ARPC5	1	942 PDLIM1	1	1702 AL021707.6	2
187 ATP5F1D	1	943 NELFB	1	1703 MAZ	2
188 RNF187	1	944 CUEDC2	1	1704 TOP1	2
189 LAMTOR4	1	945 EXOSC7	1	1705 SPRY1	2
190 COPE	1	946 FGD4	1	1706 VEGFA	2
191 PLEKHJ1	1	947 SNRPD3	1	1707 TP53INP2	2
192 TMED9	1	948 POLR2J	1	1708 CYLD	2
193 EID1	1	949 STK17A	1	1709 FAM222A	2
194 NDUFC2	1	950 MESD	1	1710 PDCL3	2
195 ANP32A	1	951 RASAL3	1	1711 INPP4B	2
196 PSMB1	1	952 MEA1	1	1712 TESK1	2
197 PSMB9	1	953 DYNC112	1	1713 ALB	2
198 ATP5MC3	1	954 VPS36	1	1714 STARD7	2
199 ATP5ME	1	955 ABHD14B	1	1715 RNF138	2
200 MMP25-AS	1	956 MRPL44	1	1716 PER2	2
201 FBXW5	1	957 RNF167	1	1717 AH11	2
202 IPCEF1	1	958 CCDC127	1	1718 AC009404.1	2

203	TGFBR2	1	959	PRR13	1	1719	SNHG15	2
204	PEBP1	1	960	PSIP1	1	1720	UBAP1	2
205	PKM	1	961	SH3GLB2	1	1721	INTS6L	2
206	TP11	1	962	TMEM258	1	1722	CYGB	2
207	IGHG1	1	963	MGAT4B	1	1723	CH25H	2
208	SNTB2	1	964	SUMF2	1	1724	B3GALNT2	2
209	LAMTOR1	1	965	SDHAF1	1	1725	ADRA2B	2
210	LINC00324	1	966	SRSF10	1	1726	PHLDB2	2
211	MIEN1	1	967	HEXDC	1	1727	SEC24A	2
212	LAPTM5	1	968	TAF15	1	1728	CDC37	2
213	CALM3	1	969	OTUD6B-A:	1	1729	CTDP1	2
214	CCT7	1	970	VKORC1	1	1730	CCNYL1	2
215	NME1	1	971	C14orf119	1	1731	ATF4	2
216	RFLNB	1	972	FO393401.1	1	1732	ARL4D	2
217	COX8A	1	973	LINC02084	1	1733	DUSP10	2
218	C19orf70	1	974	TMEM134	1	1734	KCNQ10T1	2
219	RSBN1L	1	975	TBCE	1	1735	KLF16	2
220	DERL1	1	976	DCTPP1	1	1736	ARHGEF39	2
221	POLR2G	1	977	TFB1M	1	1737	SPAG4	2
222	ATP5MPL	1	978	EPS8L2	1	1738	EZH2	2
223	BCAP31	1	979	EMC6	1	1739	STAG2	2
224	TGOLN2	1	980	AC026471.1	1	1740	F12	2
225	UBL5	1	981	PPIE	1	1741	MED13	2
226	HBB	1	982	CRAMP1	1	1742	RAB11FIP1	2
227	ATP5MF	1	983	THUMPD3	1	1743	EML4	2
228	RNF213	1	984	AKT1	1	1744	RNMT	2
229	CEBPD	1	985	MIGA1	1	1745	IRGQ	2
230	HMOX2	1	986	SEC22B	1	1746	GEM	2
231	LINC01970	1	987	DENND6A-	1	1747	TENT4B	2
232	CHMP2A	1	988	ADGRG3	1	1748	WDR26	2
233	COPS9	1	989	LPIN2	1	1749	TGIF1	2
234	NUCKS1	1	990	NAP1L4	1	1750	WDR45B	2
235	ACTR2	1	991	ZNF326	1	1751	NFAT5	2
236	FERMT3	1	992	AL358472.4	1	1752	IL27RA	2
237	FIS1	1	993	FANCF	1	1753	HELB	2
238	NABP1	1	994	MAPKAPK:	1	1754	ARID4B	2
239	CSTB	1	995	STXBP2	1	1755	SKI	2
240	TRBC2	1	996	HIGD1A	1	1756	CGAS	2
241	6-Sep	1	997	GYPC	1	1757	RNF125	2
242	HIST1H2BN	1	998	COA1	1	1758	BRMS1L	2
243	ADH5	1	999	TMEM179B	1	1759	EIF3J	2
244	PSMB10	1	1000	VPS13C	1	1760	CCL20	2
245	HIFX	1	1001	FEZ2	1	1761	HBP1	2
246	AP2M1	1	1002	RNPC3	1	1762	BRD1	2
247	MCTP2	1	1003	SRSF8	1	1763	RPL8	2
248	ACTR3	1	1004	JCHAIN	1	1764	PNP	2
249	SDF2L1	1	1005	KLRF1	1	1765	NRBF2	2
250	COQ7	1	1006	TMEM256	1	1766	SEN2	2
251	ATP5PO	1	1007	RBM25	1	1767	CXCL2	2
252	ETFB	1	1008	FYN	1	1768	CYB5D1	2
253	TSTD1	1	1009	ARL16	1	1769	WHRN	2
254	ATP6V0E1	1	1010	DRG2	1	1770	TRA2B	2
255	AL645728.1	1	1011	LUC7L3	1	1771	STAT4	2
256	DBNL	1	1012	ANGEL2	1	1772	S1PR2	2
257	DENND2D	1	1013	AP1M1	1	1773	RBBP6	2
258	TMEM109	1	1014	SPSB3	1	1774	MAGOH	2
259	NDUFA3	1	1015	CCDC115	1	1775	RHOB	2
260	IGFBP2	1	1016	PLD3	1	1776	STX17-AS1	2
261	GNAI2	1	1017	AC099778.1	1	1777	N4BP2L1	2
262	AL135925.1	1	1018	AC012360.3	1	1778	PLEKHA2	2
263	SRM	1	1019	SEM1	1	1779	LTA	2
264	TMEM230	1	1020	VTI1B	1	1780	LYSMD3	2
265	APOBEC3G	1	1021	THOC7	1	1781	IL1R2	2
266	HNRNPD	1	1022	AK9	1	1782	MRFAP1	2
267	MZT2B	1	1023	PPCS	1	1783	HIST1H1A	2
268	HCLS1	1	1024	MRPS33	1	1784	LINC00513	2
269	PPP1R2C	1	1025	PCYT2	1	1785	KANSL2	2
270	BSG	1	1026	ATP5PB	1	1786	AC144831.1	2

271	TWF2	1	1027	TMX3	1	1787	DRAM1	2
272	RBM3	1	1028	MBD2	1	1788	RBM12	2
273	TMED4	1	1029	PPP1R3E	1	1789	SNAPC1	2
274	ABI3	1	1030	PDZD11	1	1790	BEX5	2
275	BRK1	1	1031	SLC35B1	1	1791	CXorf40A	2
276	SMC1A	1	1032	PMS1	1	1792	TXLNG	2
277	PSMA5	1	1033	RNASEH2C	1	1793	G0S2	2
278	DDX46	1	1034	EIF4A2	1	1794	CD44	2
279	CD74	1	1035	TMEM14C	1	1795	NARF	2
280	PYCARD	1	1036	SPATC1L	1	1796	C2orf40	2
281	PHPT1	1	1037	PEX13	1	1797	PPP2R2A	2
282	MINOS1	1	1038	HIPK3	1	1798	NSD3	2
283	CFLAR	1	1039	AAK1	1	1799	ALAS1	2
284	PIP4K2A	1	1040	BOD1L1	1	1800	SPAG1	2
285	PREX1	1	1041	CBWD3	1	1801	DDX18	2
286	PRTN3	1	1042	THEMIS2	1	1802	INSIG1	2
287	SP100	1	1043	AL391121.1	1	1803	MYLIP	2
288	ATP5PF	1	1044	CABIN1	1	1804	HES1	2
289	ATP5MC1	1	1045	SAP18	1	1805	PAF1	2
290	IL18	1	1046	TLK1	1	1806	CAAP1	2
291	AC012306.2	1	1047	SMG6	1	1807	RGS13	2
292	IKZF3	1	1048	STOM	1	1808	AC016831.1	2
293	C9orf16	1	1049	PPP1CC	1	1809	COX7B	2
294	MAP4	1	1050	MRPS12	1	1810	CRY1	2
295	SNX17	1	1051	VAMP4	1	1811	BUD31	2
296	IL2RB	1	1052	H2AFY	1	1812	PTS	2
297	RPA2	1	1053	LYRM2	1	1813	RNF19B	2
298	VAMP2	1	1054	HACL1	1	1814	AL021707.1	2
299	AL021453.1	1	1055	DDX39B	1	1815	ASTE1	2
300	PSMB8-AS1	1	1056	ATP6AP2	1	1816	RLF	2
301	ABRACL	1	1057	LINC00847	1	1817	SYTL3	2
302	EPS8	1	1058	PIM1	1	1818	AL731571.1	2
303	MPHOSPH8	1	1059	SLAMF6	1	1819	BAIAP2	2
304	NCR1	1	1060	PPM1G	1	1820	CKAP2	2
305	RCS1	1	1061	UBASH3B	1	1821	HNRNPU	2
306	GNPTAB	1	1062	TOMM40	1	1822	TUFT1	2
307	DRAP1	1	1063	LINC00476	1	1823	PPP1R13B	2
308	TMBIM4	1	1064	CRELD2	1	1824	EIF4A1	2
309	STMP1	1	1065	GART	1	1825	ZRANB1	2
310	COX7A2L	1	1066	TMEM161B	1	1826	SREBF1	2
311	H3F3A	1	1067	SRSF4	1	1827	SLC45A4	2
312	TRGC1	1	1068	ERV3-1	1	1828	HP	2
313	KLRC4	1	1069	MX1	1	1829	RBMX	2
314	LAMTOR2	1	1070	Z93930.2	1	1830	HIIST1H3B	2
315	RPP38	1	1071	PSMD3	1	1831	MED31	2
316	MRPL51	1	1072	QTRT1	1	1832	STRAP	2
317	RAD23A	1	1073	ZNF429	1	1833	UBE2H	2
318	WAS	1	1074	C11orf71	1	1834	RPP21	2
319	TXN2	1	1075	MFNG	1	1835	WAC	2
320	PNN	1	1076	ARHGEF1	1	1836	APOA2	2
321	PARP1	1	1077	SEPHS2	1	1837	PHF1	2
322	TMEM14B	1	1078	SLC16A1-A	1	1838	SHOC2	2
323	COX5B	1	1079	DEF6	1	1839	ZNF165	2
324	GFI1	1	1080	TTC13	1	1840	CXCL8	2
325	ZNF844	1	1081	NDUFB5	1	1841	YTHDC1	2
326	SKAP1	1	1082	PILRB	1	1842	HSPA5	2
327	HMG2	1	1083	STX7	1	1843	APOA1	2
328	NDUFB3	1	1084	LBH	1	1844	SMARCA5	2
329	PPAN	1	1085	AAMP	1	1845	CDK5RAP1	2
330	ARPC1B	1	1086	CASP2	1	1846	CHKA	2
331	ITGB1BP1	1	1087	ZNF83	1	1847	ZPR1	2
332	TUFM	1	1088	RPS19BP1	1	1848	REV3L	2
333	PHB2	1	1089	CIDEB	1	1849	MIR194-2H	2
334	DYNLRB1	1	1090	SCML4	1	1850	AC104116.1	2
335	ZNHIT6	1	1091	RMRP	1	1851	EIF1AX	2
336	GOLGA8A	1	1092	COMMD10	1	1852	GPM6B	2
337	NDUFAF3	1	1093	POLDIP2	1	1853	HIVEP2	2
338	TBCB	1	1094	C6orf226	1	1854	CCDC59	2

339	AC020911.2	1	1095	UNG	1	1855	ZNF706	2
340	CELF2	1	1096	UQCRC2	1	1856	ABCF1	2
341	FADD	1	1097	COX18	1	1857	DSCR9	2
342	PYCARD-A	1	1098	GPANK1	1	1858	SNRPB	2
343	AC005332.5	1	1099	FOPNL	1	1859	ZNF10	2
344	FAM45A	1	1100	DNAJC4	1	1860	RAB1A	2
345	TIMM8B	1	1101	GPSM3	1	1861	H2AFX	2
346	TRIM14	1	1102	ANAPC4	1	1862	AC026979.2	2
347	ADM	1	1103	SNRNP200	1	1863	ERO1B	2
348	THRAP3	1	1104	AC027644.3	1	1864	SOCS4	2
349	P4HB	1	1105	LINC00891	1	1865	KMT5C	2
350	SRP14	1	1106	SPA17	1	1866	ELOC	2
351	SNRNP70	1	1107	AL136040.1	1	1867	RAB5A	2
352	EDF1	1	1108	HTATIP2	1	1868	UQCRH	2
353	CAPN1	1	1109	ARL17A	1	1869	EFNB2	2
354	HPGD	1	1110	MCTS1	1	1870	AC124798.1	2
355	COPZ1	1	1111	HDCC3	1	1871	JMY	2
356	SMDT1	1	1112	BRD9	1	1872	FXR1	2
357	ZAP70	1	1113	UBE2G2	1	1873	TCF7	2
358	ERAP2	1	1114	MYBL1	1	1874	GPR35	2
359	GIMAP6	1	1115	RHOBTB3	1	1875	WSB1	2
360	LSM7	1	1116	CTSA	1	1876	AHR	2
361	METTL9	1	1117	NDUFA13	1	1877	FEZ1	2
362	NME3	1	1118	HDAC10	1	1878	CERK	2
363	ARPC5L	1	1119	LMF2	1	1879	ATF3	3
364	ZMAT2	1	1120	FAAP20	1	1880	CCL4	3
365	TNFRSF1A	1	1121	SIRT7	1	1881	CCL4L2	3
366	NEMF	1	1122	CDK5RAP3	1	1882	TNFAIP3	3
367	ATP5F1B	1	1123	CASP6	1	1883	GRASP	3
368	POLR2E	1	1124	MRPL52	1	1884	KLF2	3
369	SSR4	1	1125	GPR174	1	1885	CREM	3
370	TMBIM6	1	1126	ZCRB1	1	1886	NFE2L2	3
371	FNBP4	1	1127	USP48	1	1887	GNLY	3
372	GUK1	1	1128	TRIM13	1	1888	KLF6	3
373	CYB5D2	1	1129	AZI2	1	1889	PTGER4	3
374	COA3	1	1130	NDUFS3	1	1890	TXNIP	3
375	MYDGF	1	1131	NIT2	1	1891	NKG7	3
376	TIA1	1	1132	SRP9	1	1892	BHLHE40	3
377	COMMD6	1	1133	CTSG	1	1893	PMAIP1	3
378	PA2G4	1	1134	YARS	1	1894	HLA-E	3
379	ZNF160	1	1135	AC093462.1	1	1895	CRIP1	3
380	MDFIC	1	1136	PDCD2	1	1896	ISG20	3
381	SNX10	1	1137	RIPK3	1	1897	RPS4Y1	3
382	SSH2	1	1138	AKAP12	1	1898	CD3E	3
383	PPP1R7	1	1139	OGA	1	1899	ZFP36L2	3
384	TALDO1	1	1140	SNRPC	1	1900	ANXA1	3
385	CTDSP1	1	1141	PDLIM2	1	1901	PER1	3
386	7-Sep	1	1142	PTPN18	1	1902	SQSTM1	3
387	ZBTB38	1	1143	TRNAU1AP	1	1903	RPS3A	3
388	TRNT1	1	1144	AC245014.3	1	1904	PRF1	3
389	ATP5MG	1	1145	ORMDL1	1	1905	FTH1	3
390	IQGAP1	1	1146	TRIP11	1	1906	RGS2	3
391	KLHL6	1	1147	EIF3I	1	1907	CYBA	3
392	PHB	1	1148	SLA2	1	1908	IL32	3
393	BLOC1S1	1	1149	AC142472.1	1	1909	RPL14	3
394	DMAC1	1	1150	ADAM28	1	1910	MT-CYB	3
395	ORAI2	1	1151	ARFGAP2	1	1911	HLA-C	3
396	ATF6B	1	1152	C9orf64	1	1912	RILPL2	3
397	ICAM3	1	1153	DDX43	1	1913	CYTIP	3
398	CXorf38	1	1154	NUDT16L1	1	1914	VIM	3
399	EIF3J-DT	1	1155	OTUB1	1	1915	SH3BGRL3	3
400	NAA10	1	1156	PGP	1	1916	TAGLN2	3
401	SF3B2	1	1157	PIGS	1	1917	BRD2	3
402	IFI27L2	1	1158	PPOX	1	1918	GPR65	3
403	TADA3	1	1159	ST3GAL1	1	1919	IER3	3
404	NUCB1	1	1160	C8orf33	1	1920	CTSW	3
405	ATRAID	1	1161	ENOPH1	1	1921	PIM3	3
406	BANF1	1	1162	GTF2A2	1	1922	GZMH	3

407	GPA1	1	1163	SNX14	1	1923	HSPB1	3
408	UQCRQ	1	1164	ARFIP2	1	1924	RPS4X	3
409	DGCR6L	1	1165	CTBS	1	1925	RUNX3	3
410	NDUFB8	1	1166	RAD9A	1	1926	SAT1	3
411	CMTM3	1	1167	POP4	1	1927	LMNA	3
412	FAM50A	1	1168	MUS81	1	1928	CD2	3
413	RANGRF	1	1169	CHMP1A	1	1929	CDKN1A	3
414	HP1BP3	1	1170	UR11	1	1930	IVNS1ABP	3
415	CISD3	1	1171	ZNF253	1	1931	NEAT1	3
416	TMEM223	1	1172	RTL8A	1	1932	CD55	3
417	HNRNPA3	1	1173	LSM8	1	1933	PHLDA1	3
418	ILK	1	1174	DPYSL2	1	1934	PRDM1	3
419	ANKRD36	1	1175	CSRP1	1	1935	TMSB10	3
420	PCSK7	1	1176	ZDHHC12	1	1936	MTRNR2L1	3
421	POLR3GL	1	1177	AP001462.1	1	1937	UAP1	3
422	ITM2B	1	1178	ATXN7L3B	1	1938	ITGB7	3
423	NDUFA12	1	1179	PPP1R3D	1	1939	RPL7A	3
424	CHURC1	1	1180	CLASP1	1	1940	MT-CO2	3
425	CYBC1	1	1181	ATL3	1	1941	UCP2	3
426	PTPN12	1	1182	KDELRL1	1	1942	RPS21	3
427	CCNL2	1	1183	NSUN5	1	1943	CD3D	3
428	XRCC6	1	1184	R3HCC1	1	1944	PPP1R10	3
429	YPEL1	1	1185	NUDCD3	1	1945	LITAF	3
430	RAB30-AS1	1	1186	LIG1	1	1946	RPL28	3
431	SCP2	1	1187	CLINT1	1	1947	CARD16	3
432	NDUFS2	1	1188	SDHD	1	1948	TMEM173	3
433	RAP1GDS1	1	1189	PCNX1	1	1949	SLFN11	3
434	AC083973.1	1	1190	HGH1	1	1950	RPS5	3
435	VPS28	1	1191	ERGIC2	1	1951	NEU1	3
436	B4GALT4	1	1192	SF3A3	1	1952	RNF19A	3
437	MRPL57	1	1193	UGP2	1	1953	RPL21	3
438	ZRANB2	1	1194	KIN	1	1954	TNF	3
439	UROS	1	1195	YIF1A	1	1955	SH3BP5	3
440	ARHGEF9	1	1196	RNPEP	1	1956	HOPX	3
441	GATAD1	1	1197	UBE2L3	1	1957	KLF13	3
442	PSMA1	1	1198	RPUSD3	1	1958	GNG2	3
443	TXN	1	1199	TMEM183A	1	1959	S100A4	3
444	ATP5PD	1	1200	ASCC1	1	1960	CST7	3
445	ELANE	1	1201	OARD1	1	1961	CD3G	3
446	ZNHIT1	1	1202	COA6	1	1962	RPS27	3
447	FKBP1A	1	1203	TBC1D1	1	1963	B2M	3
448	TTC14	1	1204	VMP1	1	1964	SPON2	3
449	PSMD8	1	1205	DNPEP	1	1965	AES	3
450	LSM10	1	1206	PRPSAP2	1	1966	TLE4	3
451	NDUFV1	1	1207	YIPF2	1	1967	RPS14	3
452	RBCK1	1	1208	ZNF701	1	1968	RPS9	3
453	GCHFR	1	1209	ARHGAP30	1	1969	TNFRSF18	3
454	BCL7C	1	1210	ZNF708	1	1970	RPL39	3
455	B3GALT4	1	1211	DBI	1	1971	ANXA2	3
456	COX4I1	1	1212	NHLRC2	1	1972	COQ10B	3
457	TMEM101	1	1213	LEPROT	1	1973	MT-CO1	3
458	CREBZF	1	1214	LINC00685	1	1974	ADGRG1	3
459	CCM2	1	1215	LRPAP1	1	1975	RPSA	3
460	SNF8	1	1216	C18orf21	1	1976	MLF1	3
461	NDUFS6	1	1217	EIF2B1	1	1977	COX7C	3
462	GYG1	1	1218	SMARCE1	1	1978	SNRPD2	3
463	GPS1	1	1219	AL137077.2	1	1979	TNFRSF1B	3
464	NHP2	1	1220	PRPF38B	1	1980	BAZ1A	3
465	HNRNPA2E	1	1221	CEBPZOS	1	1981	NDUFB7	3
466	MRPL41	1	1222	MPPE1	1	1982	S100A6	3
467	TAPBP	1	1223	MRPL49	1	1983	RPS3	3
468	CPNE1	1	1224	IWS1	1	1984	AC091271.1	3
469	SLC25A11	1	1225	YPEL3	1	1985	EMP3	3
470	AP2S1	1	1226	ARIH2OS	1	1986	BX284668.6	3
471	MAGED2	1	1227	RBM6	1	1987	FCCGR3A	3
472	TMEM59	1	1228	PSMD13	1	1988	MRPS6	3
473	DPH7	1	1229	RTCB	1	1989	SLC5A3	3
474	ANAPC16	1	1230	CRELD1	1	1990	MBP	3

475	ISCU	1	1231	CPT2	1	1991	PTPN6	3
476	P2RX5	1	1232	PSME3	1	1992	AC087239.1	3
477	EAPP	1	1233	SNX3	1	1993	MIR22HG	3
478	HIST1H2BF	1	1234	ZNF688	1	1994	RPS15	3
479	NDUFA11	1	1235	TMEM9B	1	1995	RPL13	3
480	PGLS	1	1236	OCIAD2	1	1996	BAG3	3
481	NCBP2-AS2	1	1237	EIF2B2	1	1997	ID3	3
482	ARHGAP4	1	1238	KLHL23	1	1998	RPS25	3
483	MRPS18B	1	1239	RNF181	1	1999	STK4	3
484	COPS6	1	1240	NDUFB11	1	2000	RPS29	3
485	MZB1	1	1241	IFRD2	1	2001	RPL18A	3
486	NCK2	1	1242	PAFAH2	1	2002	RPL19	3
487	RPN2	1	1243	GTF3C5	1	2003	LDHB	3
488	UBL4A	1	1244	NFATC2IP	1	2004	SMAP2	3
489	MAPK13	1	1245	ASB8	1	2005	BIN1	3
490	S100BPB	1	1246	GEMIN6	1	2006	LIMD2	3
491	TSPAN31	1	1247	RGPD2	1	2007	IL7R	3
492	TMEM219	1	1248	SCAPER	1	2008	OSM	3
493	SERPINB6	1	1249	MTERF3	1	2009	AVPI1	3
494	SDHC	1	1250	TTL3	1	2010	RPL37	3
495	FYB1	1	1251	C16orf58	1	2011	RPL29	3
496	NDUFS8	1	1252	WDR61	1	2012	CD8A	3
497	CCNDBP1	1	1253	COMMD8	1	2013	CD8B	3
498	FBXO2	1	1254	AL606760.3	1	2014	RPS15A	3
499	PIIH	1	1255	URM1	1	2015	RPL6	3
500	MCRIP1	1	1256	AC064807.1	1	2016	TNFRSF9	3
501	KLRB1	1	1257	DDX28	1	2017	CDC42SE1	3
502	MRPS23	1	1258	METTTL18	1	2018	DUSP8	3
503	PDIA3	1	1259	RNF130	1	2019	GZMB	3
504	RPE	1	1260	PFDN2	1	2020	LDLR	3
505	C11orf68	1	1261	RAC1	1	2021	RPL23A	3
506	TRAPP6A	1	1262	NECAP2	1	2022	ARL4C	3
507	COX7A2	1	1263	MBIP	1	2023	ERRF1	3
508	CTSZ	1	1264	SRSF1	1	2024	ITPRIP	3
509	ZNF224	1	1265	PPM1M	1	2025	CCND3	3
510	AKR1B1	1	1266	SCCPDH	1	2026	MT-ND1	3
511	SRI	1	1267	FUCA1	1	2027	RACK1	3
512	AGTRAP	1	1268	VPS4B	1	2028	HLA-DRB1	3
513	HNRNPR	1	1269	NKILA	1	2029	TTC38	3
514	ARFRP1	1	1270	RAB37	1	2030	SOX4	3
515	MRPL23	1	1271	CENPX	1	2031	RPL10	3
516	MED7	1	1272	ESF1	1	2032	RABAC1	3
517	LAMP1	1	1273	MRPS14	1	2033	RPS28	3
518	NDUFA9	1	1274	COA5	1	2034	TPST2	3
519	NCAM1	1	1275	ANXA11	1	2035	HSH2D	3
520	C9orf78	1	1276	ACPI	1	2036	RPL35A	3
521	GFOD1	1	1277	CTSC	1	2037	RPL27A	3
522	SRSF11	1	1278	RWDD1	1	2038	HEXIM1	3
523	CHMP4A	1	1279	MZF1-AS1	1	2039	TMEM71	3
524	LENG8	1	1280	AL031708.1	1	2040	CASP8	3
525	EPSTI1	1	1281	MED8	1	2041	OAT	3
526	SMIM7	1	1282	SNRPA1	1	2042	RPL30	3
527	CNBP	1	1283	MIR4435-2f	1	2043	KLRG1	3
528	SELENOH	1	1284	TNFSF10	1	2044	PPDPF	3
529	PRSS21	1	1285	ELP5	1	2045	JAK1	3
530	METTTL17	1	1286	PPP1R12A	1	2046	ATP2B1-AS	3
531	LINC02256	1	1287	AC137767.1	1	2047	RPS24	3
532	ACAA2	1	1288	ABHD11	1	2048	RPL34	3
533	GRK2	1	1289	C22orf39	1	2049	ZC3HAV1	3
534	IGHG4	1	1290	PIN1	1	2050	DDIT3	3
535	PLA2G16	1	1291	AP4B1	1	2051	MT-ATP6	3
536	DPM2	1	1292	SELENOT	1	2052	SELPLG	3
537	PSMC5	1	1293	ELF2	1	2053	ARPC2	3
538	TNFSF12	1	1294	SPNS3	1	2054	CD52	3
539	REEP5	1	1295	LINC02001	1	2055	SAMHD1	3
540	DCAF7	1	1296	C2orf68	1	2056	RASGRP2	3
541	OSTC	1	1297	KEAP1	1	2057	MALAT1	3
542	RCCD1	1	1298	CHKB	1	2058	CAPG	3

543	PYURF	1	1299	DNASE1	1	2059	PRDX2	3
544	FAM173A	1	1300	SSU72	1	2060	NCR3	3
545	IAH1	1	1301	B3GAT3	1	2061	TTY15	3
546	AC025164.1	1	1302	NME6	1	2062	RPLP2	3
547	GON4L	1	1303	AREG	2	2063	LGALS1	3
548	AL355472.1	1	1304	ATP1B3	2	2064	HIF1A	3
549	APOBEC3C	1	1305	CD69	2	2065	PPIA	3
550	RPL7L1	1	1306	DNAJA1	2	2066	XBP1	3
551	SHISA5	1	1307	DNAJB1	2	2067	SGK1	3
552	CD151	1	1308	DNAJB6	2	2068	RPS16	3
553	ACP5	1	1309	DUSP1	2	2069	MT-ND4	3
554	TLE1	1	1310	DUSP2	2	2070	RPS19	3
555	AC245297.3	1	1311	FAM177A1	2	2071	UPP1	3
556	SUPT16H	1	1312	FOSB	2	2072	RPL10A	3
557	HENMT1	1	1313	HSP90AA1	2	2073	RPS18	3
558	CDK2AP2	1	1314	HSP90AB1	2	2074	SYNE2	3
559	IL16	1	1315	HSPA1A	2	2075	LINC00861	3
560	TSR2	1	1316	HSPA1B	2	2076	ULBP2	3
561	PRDX6	1	1317	HSPA8	2	2077	SOD1	3
562	TRIM73	1	1318	HSPD1	2	2078	GLA	3
563	COX17	1	1319	HSPE1	2	2079	GBP5	3
564	RCN2	1	1320	HSPH1	2	2080	TRBC1	3
565	EIF2S3	1	1321	IRF1	2	2081	Z93241.1	3
566	CRACR2B	1	1322	JUN	2	2082	IQCN	3
567	PSMD4	1	1323	JUNB	2	2083	NACA	3
568	FGR	1	1324	JUND	2	2084	CLEC2B	3
569	TMEM140	1	1325	METRNL	2	2085	C12orf57	3
570	P2RY11	1	1326	NFKBIA	2	2086	MT-CO3	3
571	NUTM2B-A	1	1327	NR4A1	2	2087	SUN2	3
572	PGAM1	1	1328	NR4A2	2	2088	MT2A	3
573	SURF6	1	1329	PABPC1	2	2089	SSR2	3
574	NUBP2	1	1330	PDE4B	2	2090	UTY	3
575	DGUOK	1	1331	PPP1R15A	2	2091	CLCF1	3
576	TAF8	1	1332	REL	2	2092	BIN2	3
577	IFI44	1	1333	RGCC	2	2093	GLIPR2	3
578	COA4	1	1334	TIPARP	2	2094	RPS8	3
579	HMGB2	1	1335	TWISTNB	2	2095	LCK	3
580	RFC1	1	1336	UBB	2	2096	S1PR5	3
581	KRT10	1	1337	YPEL5	2	2097	RPL11	3
582	KRT81	1	1338	ZFP36	2	2098	RPS23	3
583	SUGP2	1	1339	ZNF331	2	2099	RPL37A	3
584	IARS2	1	1340	CD83	2	2100	UBA52	3
585	LAT	1	1341	CHMP1B	2	2101	MTHFD2	3
586	TRABD	1	1342	HSPA6	2	2102	MT1X	3
587	AC005837.1	1	1343	UBC	2	2103	AL450998.2	3
588	SSNA1	1	1344	CEMIP2	2	2104	KLF9	3
589	PSMA7	1	1345	NFKBIZ	2	2105	RPL36AL	3
590	C19orf25	1	1346	ARL5B	2	2106	KMT2E-AS	3
591	THUMP2	1	1347	ARL4A	2	2107	CDC42EP3	3
592	FIBP	1	1348	KDM6B	2	2108	MAPRE2	3
593	GSDMD	1	1349	CCL3	2	2109	TRGV4	3
594	SNRPA	1	1350	BTG2	2	2110	RPL26	3
595	TPM3	1	1351	MCL1	2	2111	BPGM	3
596	COX6A1	1	1352	NR4A3	2	2112	CD300A	3
597	SPAG7	1	1353	CSRNP1	2	2113	AC074044.1	3
598	CYC1	1	1354	ICAM1	2	2114	RPL41	3
599	PWWP2A	1	1355	SELENOK	2	2115	SYTL1	3
600	HEBP2	1	1356	TUBA4A	2	2116	ADRB2	3
601	MDM4	1	1357	TNFSF9	2	2117	MPV17	3
602	NKTR	1	1358	CXCR4	2	2118	RPS27A	3
603	PNKP	1	1359	UBE2S	2	2119	HNRNPL	3
604	GUSB	1	1360	CHORDC1	2	2120	AL139274.2	3
605	TSPO	1	1361	TSC22D3	2	2121	INTS6-AS1	3
606	CCS	1	1362	IFNG	2	2122	PRMT5-AS1	3
607	MRPL43	1	1363	MAFF	2	2123	RPL38	3
608	NDUFAF8	1	1364	JMJD6	2	2124	HLA-DRA	3
609	DUSP23	1	1365	H2AFZ	2	2125	KLRC2	3
610	ALDH9A1	1	1366	IFRD1	2	2126	MT-ND2	3

611 PDIA6	1	1367 DDX3Y	2	2127 MFSD10	3
612 ZNF91	1	1368 FOS	2	2128 MT-ND5	3
613 CSNK2B	1	1369 NFKB1	2	2129 FTL	3
614 ZNF652	1	1370 ZFAND5	2	2130 RPL9	3
615 BCO2	1	1371 SPTY2D1	2	2131 SNHG25	3
616 CAPNS1	1	1372 RGS1	2	2132 TOMM7	3
617 SLC25A45	1	1373 IDI1	2	2133 YWHAQ	3
618 DHRS3	1	1374 SERTAD1	2	2134 HLA-DPB1	3
619 ANKRD36C	1	1375 FOSL2	2	2135 ADAP1	3
620 CORO1B	1	1376 SKIL	2	2136 TRAC	3
621 PSMD7	1	1377 CCNH	2	2137 MT-ATP8	3
622 TP53TG1	1	1378 RASGEF1B	2	2138 SLA	3
623 TSTA3	1	1379 ELF1	2	2139 LACTB	3
624 UQCC3	1	1380 ZC3H12A	2	2140 PTPN4	3
625 TMEM273	1	1381 CACYBP	2	2141 SP140	3
626 TMED2	1	1382 VPS37B	2	2142 B4GALT1	3
627 HDAC3	1	1383 CKS2	2	2143 ABHD17A	3
628 USP28	1	1384 PPP1R2	2	2144 PFDN5	3
629 IDH2	1	1385 MYADM	2	2145 RPL36A	3
630 SELENOF	1	1386 MRPL18	2	2146 LYST	3
631 PYCR2	1	1387 DUSP5	2	2147 STAT3	3
632 DPP7	1	1388 RANBP2	2	2148 AHNAK	3
633 CDK5R1	1	1389 PIK3R1	2	2149 RGS19	3
634 2-Mar	1	1390 ARF4	2	2150 AC023509.4	3
635 REX1BD	1	1391 ELL2	2	2151 NFKBIB	3
636 DDX17	1	1392 EGR1	2	2152 MLLT11	3
637 SH2D1A	1	1393 DYNLL1	2	2153 U2AF1	3
638 TRIM44	1	1394 EIF1	2	2154 AKAP13	3
639 SNRPE	1	1395 H3F3B	2	2155 GLRX	3
640 MDH1	1	1396 XCL2	2	2156 MTRNR2L1	3
641 PDHB	1	1397 IER5	2	2157 DOK1	3
642 GIMAP2	1	1398 MAP3K8	2	2158 ZFP36L1	3
643 GLOD4	1	1399 SCX	2	2159 RPS7	3
644 LMAN2	1	1400 SYAP1	2	2160 AC009812.1	3
645 CCR1	1	1401 ID1	2	2161 RPL36	3
646 CNPY3	1	1402 TPT1	2	2162 AZU1	3
647 OXNAD1	1	1403 ANKRD37	2	2163 CD37	3
648 PFKL	1	1404 LDHA	2	2164 EIF3D	3
649 NDUFA8	1	1405 NAF1	2	2165 NDUFS7	3
650 TSEN54	1	1406 EIF4A3	2	2166 CIB1	3
651 WDR74	1	1407 ZBTB1	2	2167 GPR108	3
652 HEXA	1	1408 GTF2B	2	2168 JAKMIP1	3
653 POLM	1	1409 SRSF2	2	2169 FGFBP2	3
654 WASHC1	1	1410 ETV3	2	2170 TBRG1	3
655 AKR7A2	1	1411 NINJ1	2	2171 MRPS21	3
656 AIP	1	1412 SARAF	2	2172 RPL27	3
657 ACADVL	1	1413 HES4	2	2173 CAPN2	3
658 JPX	1	1414 IRF8	2	2174 ARHGEF37	3
659 TMED10	1	1415 PLIN2	2	2175 RPS12	3
660 TCEAL8	1	1416 RAB8B	2	2176 ZMYND8	3
661 CDK9	1	1417 AC020916.1	2	2177 ANP32B	3
662 CDK10	1	1418 GNL3	2	2178 ZBP1	3
663 PRPF31	1	1419 NXT1	2	2179 PLK2	3
664 LSM3	1	1420 DNAJB4	2	2180 SSBP1	3
665 DUT	1	1421 RALGAPA1	2	2181 SNAI1	3
666 FAM118A	1	1422 PPP1R15B	2	2182 TXNL4A	3
667 CBLB	1	1423 SIK1	2	2183 HAVCR2	3
668 NDUFA1	1	1424 FKBP4	2	2184 HSPA2	3
669 PDIA4	1	1425 PRR7	2	2185 CCDC173	3
670 SCAMP1-A:	1	1426 ZFAND2A	2	2186 RALGDS	3
671 MRPL15	1	1427 STX11	2	2187 RPS11	3
672 PIN4	1	1428 PFKFB3	2	2188 SCLT1	3
673 JTB	1	1429 CCDC107	2	2189 DAZAP2	3
674 SMIM27	1	1430 YWHAZ	2	2190 SAMD3	3
675 SMIM20	1	1431 PTMA	2	2191 ABHD5	3
676 UBE2I	1	1432 CYCS	2	2192 S1PR4	3
677 RNF135	1	1433 BCL2A1	2	2193 BCL11B	3
678 PEF1	1	1434 IER2	2	2194 MX2	3

679	CHMP6	1	1435	GPBP1	2	2195	RPS2	3
680	WASHC3	1	1436	EIF5	2	2196	BTN3A2	3
681	ANAPC11	1	1437	ARIH1	2	2197	DHRS7	3
682	OGG1	1	1438	ADGRE5	2	2198	RND1	3
683	LSM4	1	1439	BCAS2	2	2199	PYM1	3
684	MYH9	1	1440	EZR	2	2200	ANKRD9	3
685	TCTA	1	1441	CALM1	2	2201	HINT1	3
686	N4BP2L2	1	1442	AC044849.1	2	2202	RYK	3
687	VASP	1	1443	NOCT	2	2203	POLR2A	3
688	PPP1R35	1	1444	SDCBP	2	2204	AL356488.3	3
689	YDJC	1	1445	NFIL3	2	2205	CD99	3
690	GADD45GII	1	1446	SRGN	2	2206	RPS6	3
691	PET100	1	1447	STK17B	2	2207	TSPAN32	3
692	SLC2A4RG	1	1448	DCTN6	2	2208	CRABP2	3
693	FBXO22	1	1449	TCP1	2	2209	SLC38A2	3
694	DCAF11	1	1450	ETF1	2	2210	AL451165.2	3
695	PUF60	1	1451	FAM53C	2	2211	ZNF276	3
696	RINL	1	1452	DDX24	2	2212	HNRNPA1	3
697	CLSTN3	1	1453	SLC7A5	2	2213	PRDX1	3
698	UHMK1	1	1454	DDX5	2	2214	POLG2	3
699	ING4	1	1455	NFKBID	2	2215	UBL3	3
700	SELENOW	1	1456	AC016831.7	2	2216	EHD4	3
701	TYMP	1	1457	DDX3X	2	2217	RPL4	3
702	NOP10	1	1458	SOCS3	2	2218	RIPOR2	3
703	ATIC	1	1459	RBBP8	2	2219	C12orf75	3
704	SMC3	1	1460	TSPYL2	2	2220	MRPL16	3
705	ZNF677	1	1461	CHD1	2	2221	PRRG2	3
706	PSMB2	1	1462	DEDD2	2	2222	SELL	3
707	HLA-F	1	1463	BIRC3	2	2223	TMEM238	3
708	AC246785.3	1	1464	HCG18	2	2224	MXD1	3
709	C22orf46	1	1465	CCND2	2	2225	FXYD5	3
710	PDAP1	1	1466	RELB	2	2226	SURF1	3
711	AUP1	1	1467	PTP4A1	2	2227	FAM129A	3
712	DDT	1	1468	ODC1	2	2228	RPL15	3
713	NUDT18	1	1469	BCL3	2	2229	TAP1	3
714	CCDC90B	1	1470	KMT2E	2	2230	TRAT1	3
715	DCTN3	1	1471	NEK1	2	2231	XPA	3
716	RNF146	1	1472	RRAD	2	2232	C7orf50	3
717	NDUFB9	1	1473	BZW1	2	2233	HECA	3
718	ANKRD49	1	1474	KLF10	2	2234	AC106739.2	3
719	COMMD7	1	1475	MARCKSL1	2	2235	AC104695.3	3
720	NMT2	1	1476	DNAJA4	2	2236	RPL22	3
721	NMUR1	1	1477	ANKRD28	2	2237	RPLP0	3
722	AC008105.3	1	1478	IFFO2	2	2238	BAMBI	3
723	TRIM52	1	1479	ERF	2	2239	LINC02446	3
724	CCNT2	1	1480	XCL1	2	2240	C1QA	3
725	ELOVL6	1	1481	BTG1	2	2241	ZRSR2	3
726	DDOST	1	1482	TAGAP	2	2242	TKT	3
727	ZNF43	1	1483	CALM2	2	2243	RPS13	3
728	VAMP5	1	1484	SBDS	2	2244	ZNF584	3
729	AL135791.1	1	1485	HIST1H4C	2	2245	FCGR3B	3
730	MRPL11	1	1486	TENT5C	2	2246	TUBB2A	3
731	ARHGEF10	1	1487	CSF2	2	2247	HLA-DRB5	3
732	CD96	1	1488	CRTAM	2	2248	HAX1	3
733	NMRAL1	1	1489	SAMSN1	2	2249	KLRC3	3
734	GRAMD1C	1	1490	ZNF184	2	2250	PCID2	3
735	CINP	1	1491	YES1	2	2251	RECQL	3
736	NDUFB4	1	1492	NUFIP2	2	2252	HMBOX1	3
737	MRPL40	1	1493	G3BP2	2	2253	DIP2A	3
738	RNPEPL1	1	1494	BRAF	2	2254	SLC27A3	3
739	CCDC66	1	1495	CCL3L1	2	2255	GHDC	3
740	RGL4	1	1496	NPM1	2	2256	LINC02076	3
741	ITGAE	1	1497	ZFY	2	2257	SNHG12	3
742	NDUFC1	1	1498	MIR155HG	2	2258	SLCO3A1	3
743	XPO1	1	1499	OTULIN	2	2259	CRBN	3
744	DCTN2	1	1500	RBM8A	2	2260	NIPSNAP2	3
745	UBLCP1	1	1501	B3GNT7	2	2261	IQGAP2	3
746	TMX4	1	1502	PRMT9	2	2262	ARRB2	3

747 DCTD	1	1503 CCNL1	2	2263 RPL18	3
748 SPG7	1	1504 TPM4	2	2264 DTHD1	3
749 FDPS	1	1505 DOK2	2	2265 SP140L	3
750 ANAPC15	1	1506 RGS16	2	2266 ERP29	3
751 DENR	1	1507 JOSD1	2	2267 CCDC25	3
752 IFI6	1	1508 TUBB4B	2	2268 ARHGEF2	3
753 ZNF766	1	1509 IDS	2	2269 AC018653.3	3
754 AC112907.3	1	1510 RORA	2	2270 RUFY2	3
755 MRPL17	1	1511 MAP1LC3B	2	2271 STOML2	3
756 AUH	1	1512 PNRC1	2	2272 CLK2	3
		1513 ERN1	2	2273 ILKAP	3
		1514 RNF139	2	2274 SMCHD1	3
		1515 SMAD7	2		
		1516 DENND4A	2		

Supplementary File 1c

Pro-inflammatory signature	Immune regulatory signature	Interferon responded signature	Lipid metabolism signature
CCL3	CD274	ISG20	ACP5
CCL4	CD40	ISG15	LPL
CCL20	CD80	IFI44L	TREM2
CCL3L1	CD86	GBP1	CCL18
CCL4L2	IDO1	CASP1	CTSB
CXCL1	ICOSLG	CASP4	CTSD
CXCL2	IL10	CXCL9	CTSL
CXCL3	TGFB1	CXCL10	FABP5
CXCL5		CXCL11	FABP4
CXCL8		IFIT1	ALOX5 AP
IL1B		IFIT2	
AREG		IFIT3	
EREG		IFITM1	
HBEGF		IFITM3	

Neutrophil maturation	Neutrophil chemotaxis	Phagocytosis	Type I interferon signaling pathway	Chemokine activity
SELPLG	BSG	A0A087WW49	STAT2	C5
SAT1	C1QBP	MYH9	IFNAR1	CCL1
GRINA	C3AR1	IGHV4-59	CDC37	CCL11
CCL23	C5AR1	IGHV4-39	H7C3V1	CCL13
CCL15	C5AR2	IGHV2-5	PTPN6	CCL14
CCL14	CAMK1D	IGHV3OR16-9	IFNA8	CCL15
CEBPB	CCL1	TREM2	IFIT5	CCL16
ANXA2	CCL11	IGHV2-70	TBK1	CCL17
GDA	CCL13	IGKC	GBP2	CCL18
CLEC4D	CCL14	TRBC1	PTPN2	CCL19
CLEC4E	CCL15	IGHG1	MX2	CCL2
MMP9	CCL16	IGHM	MX1	CCL20
TMCC1	CCL17	IGHA1	SAMHD1	CCL21
AC068580.4	CCL18	IGHV1-69-2	ISG20	CCL22
CTSD	CCL19	RAB31	HLA-F	CCL23
ARG2	CCL2	TRBC2	IP6K2	CCL24
FPR1	CCL20	CDC42	YTHDF2	CCL25
SLC16A3	CCL21	THBS1	ZBP1	CCL26
JUNB	CCL22	IGLL5	LSM14A	CCL27
DUSP1	CCL23	IGLC2	CNOT7	CCL28
RDH12	CCL24	IGHV4-30-4	IRF3	CC3
SLC7A11	CCL25	IGHV3-43D	TYK2	CCL3L1
ASPRV1	CCL26	IGHV3-30-5	IKBKE	CCL4
S100A11	CCL3	IGHV3-30-3	HLA-G	CCL4L1
TIMP2	CCL3L1	IGHV1-8	STAT1	CCL5
MXD1	CCL4	ARHGAP25	IRF1	CC7
CYP4F3	CCL4L1	IGLL1	HLA-C	CCL8
MAP1LC3B2	CCL5	GULP1	PTPN11	CKLF
MAP1LC3B	CCL7	TRDC	ISG15	CX3CL1
YPEL3	CCL8	RHOG	USP18	CXCL1
CCR1	CCR7	PPARG	TREX1	CXCL10
FTL	CD300H	IGHV4-31	IRF8	CXCL11
IL36G	CD74	IGHV4-38-2	IRF6	CXCL12
SLPI	CKLF	IGLC3	IFIT3	CXCL13
RETNLB	CSF3R	ABCA1	IRF9	CXCL14
CSTA	CX3CL1	STAP1	IFNA16	CXCL16
CD300LF	CXADR	XKR6	IFNA4	CXCL2
FTH1	CXCL1	XKR7	IFNA6	CXCL3
HACD4	CXCL10	XKR9	TTL12	CXCL5
MSRB1	CXCL11	IGHV2-70D	HLA-E	CXCL6
IFITM1	CXCL13	IGHV3-66	HLA-H	CXCL8
IFITM2	CXCL2	IGHV4-61	HLA-B	CXCL9
IFITM3	CXCL3	IGHV1-58	IFI27	GPR15L
MMP8	CXCL5	IGHV5-51	IRF2	PF4
S100A6	CXCL6	IGHV3-38	PTPN1	PF4V1
CXCR2	CXCL8	IGHV3-35	C9JQL5	PPBP
IL1B	CXCL9	IGHV4-28	JAK1	XL1
STK17B	CXCR1	IGHV1-24	IRF5	XL2
	CXCR2	IGHV3-20	ADAR	
	DAPK2	IGHV1-18	BST2	

DNMIL	IGHV3-16	RNASEL
DPEP1	IGHV1-3	EGR1
DPP4	ITGA2	IFNA14
EDN1	MARCO	IFNA7
EDN2	CD300A	IFNA1
EDN3	VAMP7	IFI35
FCER1G	S4R3C0	HSP90AB1
GBF1	HAVCR1	MAVS
ITGA1	RAC1	MYD88
ITGB2	ARHGAP12	IRF4
JAML	BIN2	CACTIN
LBP	APPL2	IRF7
LGALS3	MFGES	RSAD2
MCU	MEGF10	MMP12
MDK	FCGR1A	OASL
MOSPD2	IGLC7	IFNAR2
NCKAP1L	XKR5	PSMB8
PDE4B	XKR4	SP100
PF4	A0A0J9YWU9	HOY3Z8
PF4V1	GSN	ABCE1
PIK3CD	IGHV4-4	HLA-A
PIK3CG	IGHV1-2	NLRC5
PIKFYVE	C3	WNT5A
PIP5K1C	ITGAM	METTL3
PLA2G1B	IGHV5-10-1	IFIT1
PPBP	A0A0J9YY99	IFIT2
PPIA	ABCA7	IFI6
PPIB	SH3BP1	IRAK1
PREX1	MSR1	IFNA2
RAC1	IGLC1	IFNA10
RAC2	ALOX15	IFNA21
RIPOR2	ELMO1	IFNA5
S100A12	IGHV1-69	IFNA17
S100A8	NCKAP1L	IFNB1
S100A9	RHOBTB2	IFITM1
SAA1	IGHV1-69D	UBE2K
SLIT2	IGHV4-34	FADD
SRP54	RHOBTB1	TRIM6
SYK	IGHV3-64D	OAS2
TGFB2	IGLC6	XAF1
THBS4	IGHV3-9	MUL1
TIRAP	IGHV3-7	DCST1
URS00000B7E30_9606	IGHV3-33	IFITM2
VAV1	IGHV3-30	IFITM3
VAV3	IGHV3-53	YTHDF3
XCL1	IGHV3-13	OAS1
XCL2	IGHV3-23	OAS3
	IGHV3-48	
	IGHV3-11	
	IGHV1-46	
	IGHV6-1	
	IGHV3-21	
	IGHV2-26	
	IGHV3-73	
	IGHV7-4-1	
	A0A0J9YW62	
	ITGB2	
	FCER1G	
	IGHV1OR21-1	
	GATA2	
	ADGRB1	
	IGHV3-15	
	IGHV7-81	
	DOCK1	
	XKR8	
	IGHV3-43	
	IGHD	
	IGHA2	

IGHG4
 IGHG3
 IGHG2
 IGHE
 RAC2
 IGHV1OR15-9
 IGHV2OR16-5
 IGHV3-72
 IGHV3-74
 IGHV4-30-2
 IGHV3-49
 IGHV1-45
 FCGR2B
 IGHV3OR16-8
 IGHV3OR16-10
 IGHV3OR16-13
 IGHV3OR15-7
 IGHV1OR15-1
 IGHV3OR16-12
 IGHV4OR15-8
 ANO6
 F2RL1
 AIF1
 RHOH
 CD36
 IGHV3-64

Exhaustion	Cytotoxicity	Treg
TIGIT	KLRG1	IL2RA
PDCD1	KLRD1	FOXP3
CTLA4	GZMK	
CD160	GZMB	
KLRC1	GZMA	
BTLA	GNLY	
HAVCR2	PRF1	
LAG3	GZMM	
	NKG7	
	TBX21	
	ZEB2	
	HOPX	
	GZMH	
	KLRK1	
	IFNG	
	CCL3	
	CST7	
	ADGRG1	
	IL32	
	CRTAM	
	CX3CR1	
	KLRC1	
	FGFBP2	
	FCGR3A	
	NCR3	
	CCL4	

Supplementary File 1d

Celltype	Abbreviation	Markers	Reference
Hepatocytes	Hepatocytes	ALB,TTR,APOA1	10.1186/s13059-020-02210-0,10.1016/j.cell.2020.11.041,10.1016/j.cell.2020.11.041
Cholangiocytes	Cholangiocytes	KRT19,KRT7,CFTR	10.1186/s13059-020-02210-0,10.1186/s13059-020-02210-0,10.1186/s13059-020-02210-0
Endothelial cells	ECs	PECAM1,VWF,CDH5	10.7150/thno.54917,10.1158/1078-0432.CCR-19-3231,10.1038/s41556-019-0446-7
Hepatic stellate cells	HepSCs	PDGFRB,ACTA2,RGS5	10.1172/JC1146987,10.1016/j.cell.2020.11.041,10.1016/j.cell.2020.11.041
Proliferating cells	ProliferatingCells	MKI67, TOP2A, STMN1	10.1158/1078-0432.CCR-19-3231,10.1681/ASN.2019080832,10.1038/s41467-019-14256-1
B cells	BCells	CD79A,MS4A1,CD19	10.1038/s41467-021-21795-z,10.1038/s41467-021-21795-z,10.1038/s41422-020-0378-6
Plasma cells	PlasmaCells	JCHAIN,CD79A,MZB1	10.1038/s41467-021-21795-z,10.1038/s41467-021-21795-z,10.1038/s41467-019-14256-1
T and NK cells	TandNK	CD3D,CD3E,NKG7	10.1038/s41467-021-21795-z,10.1016/j.immuni.2019.09.008,10.1530/ERC-22-0325
Neutrophils	Neutrophils	FCGR3B,S100A9,S100A8	10.1038/s41467-021-22801-0,10.1038/s41467-021-22801-0,10.1038/s41467-021-22801-0
Mast cells	MastCells	TPSAB1,TPSB2,CPA3	10.1158/1078-0432.CCR-19-3231,10.1038/s41467-021-22801-0,10.1016/j.immuni.2019.09.008
Mononuclear phagocytes	MPs	CD14,CSF1R,HLA-DRA	10.1038/s41586-019-1631-3,10.1038/s41586-019-1631-3,10.1038/s41586-019-1631-3
Plasmacytoid dendritic cells	pDCs	IL3RA,CLEC4C,LILRA4	10.1158/1078-0432.CCR-19-3231,10.1158/1078-0432.CCR-19-3231,10.1038/s41593-020-00789-y

Celltype	Abbreviation	Markers	Reference
Proliferating cells	ProliferatingCells	MKI67, TOP2A, STMN1	10.1158/1078-0432.CCR-19-3231,10.1681/ASN.2019080832,10.1038/s41467-019-14256-1
Macrophages	Macrophages	CD14,C1QA,CSF1R	10.1158/1078-0432.CCR-19-3231,10.1016/j.immuni.2019.09.008,10.1038/s41556-019-0446-7
Monocytes	Monocytes	LYZ,FCN1,VCAN	10.1038/s41467-019-11049-4,10.1038/s41467-021-22801-0,10.1038/s41467-021-22801-0
Mature dendritic cells	MatureDCs	LAMP3,CCR7,CD83	10.1158/2159-8290.CD-19-0138,10.1038/s41591-021-01323-8,10.1158/2159-8290.CD-19-0138
Conventional type 1 dendritic cells	cDC1	CLEC9A,XCR1,IRF8	10.1038/s41586-019-1652-y,10.1038/s41586-019-1652-y,10.1038/s41422-020-0374-x
Conventional type 2 dendritic cells	cDC2	CD1C,CLEC10A,FCER1A	10.1038/s41586-019-1652-y,10.1038/s41586-019-1652-y,10.1038/s41593-020-00789-y
Kupffer cells	KCs	MARCO,CD5L,VCAM1	10.1016/j.cell.2020.11.041,10.1016/j.cell.2020.10.048,10.1038/s41586-019-1631-3

Celltype	Abbreviation	Markers	Reference
Group 3 innate lymphoid cells	ILC3	IL1R1,IL23R,KIT	10.1038/s41590-019-0425-y,10.1038/s41590-019-0425-y,10.1038/s41586-021-03852-1
NK T cells	NKT	NKG7,CD3D,GNLY	10.7150/thno.48201,10.7150/thno.48201,10.7150/thno.48201
Natural killer cells	NK	NKG7,GNLY,NCAM1	10.1038/s41392-020-00248-x,10.1038/s41467-021-21795-z,10.1126/science.aad0501
CD4+ naive T cells	CD4NaiveT	CCR7,SELL,LEF1	10.1038/s41467-021-22164-
CD4+ memory T cells	CD4Tmem	CD4,IL7R,CD40LG	10.1182/blood-2018-08-862292,10.1016/j.immuni.2020.12.011,10.1038/s41467-022-33170-7
CD4+ regulatory T cells	CD4Treg	CTLA4,FOXP3,IL2RA	10.1038/s41421-020-0157-z,10.1038/s41421-020-0157-z,10.1038/s41421-020-0157-z
CD8+ mucosal-associated invariant T cells	CD8MAIT	KLRB1,SLC4A10,NCR3	10.1016/j.cell.2021.05.013,10.1186/s13059-019-1906-x,10.1038/s41392-020-00263-y
CD8+ effector T cells	CD8Teff	CD8A,GZMK,CD3D	10.1038/s41467-021-22801-0,10.1038/s41591-019-0590-4,10.1016/j.cell.2020.06.001