

## **FIGURE LEGENDS FOR SUPPLEMENTAL FIGURES**

### **Figure S1 Immunophenotype of hBMSCs**

The immunophenotype of hBMSCs of the young and old donors was analysed by flow cytometry. Representative histograms from passage 4 are presented. Fluorescent intensities of surface antigens (filled grey histograms) are compared with appropriate isotype controls for each antibody (open light grey histograms). There were no age-associated differences in the immunophenotype of hBMSCs from the young or the old donors.

### **Figure S2 Measurement of telomere length of hBMSCs**

Southern plot of terminal restriction factors (TRF) in early and late passage hBMSCs. 2  $\mu$ g of DNA was digested with Hinf1/RsaI enzymes and separated on 0.8% agarose gel. DNA was transferred to a membrane and probed with a telomeric probe (TTAGGG repeats). Numbers on the left refers to molecular weight marker (MWM) in kb. Lane 1 contains internal reference standard. The autoradiogram was scanned by densitometry and TRF length was calculated using ImageJ analysis software according to  $TRF = \frac{\sum OD}{\sum (OD_i/L_i)}$ , where  $OD_i$  is optical density and  $L_i$  is the length of the TRF at position  $i$ . TRF signals between 3 and 20 kb were used for telomere length measurements.

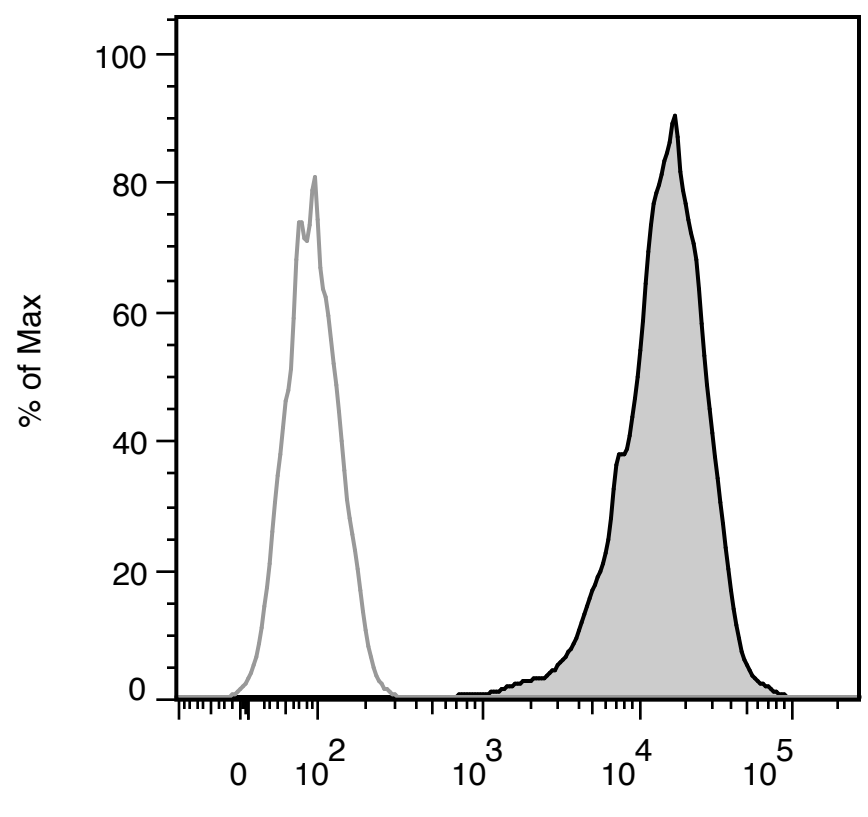
### **Figure S3 The proportion (mol%) of lysophosphatidylcholine (lysoPC) from early to late passages of the hBMSCs**

A. Young (n=5) and B. Old donors (n=5).

### **Figure S4 The proportion (mol%) of FAs from early to late passages of hBMSCs**

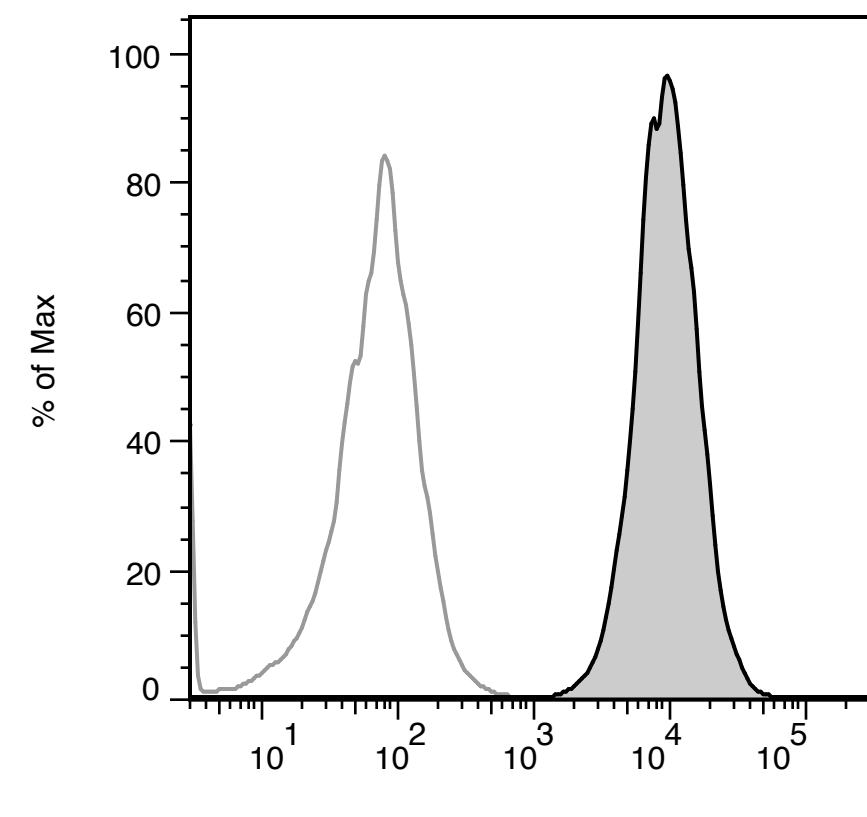
A. Young (n=5) and B. Old donors (n=5).

Old donor 271



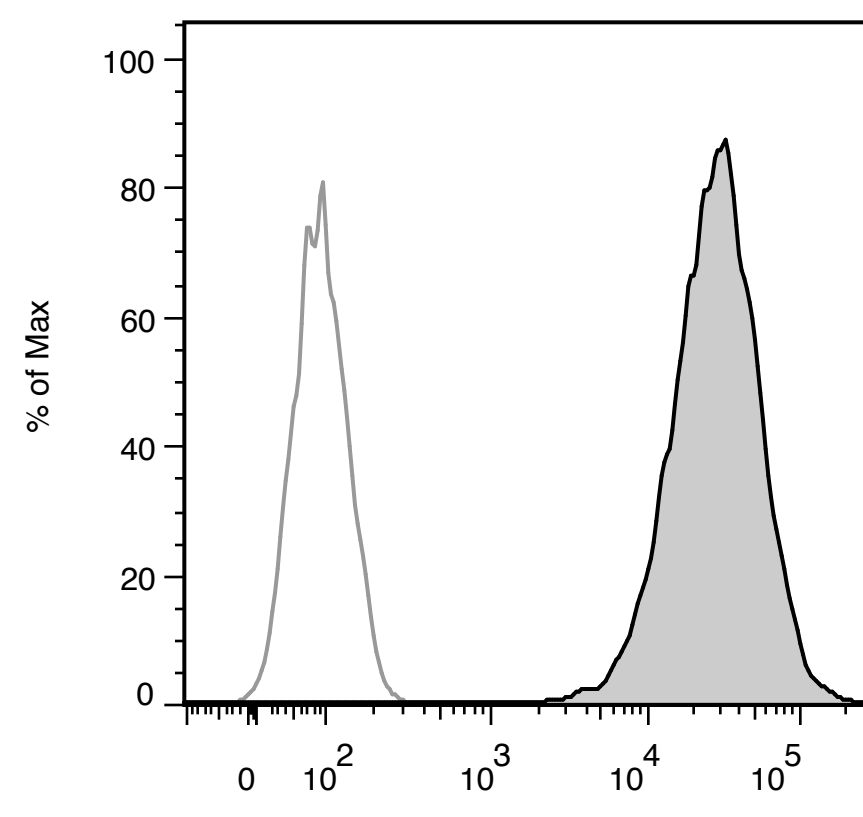
CD29-APC

Young donor 081



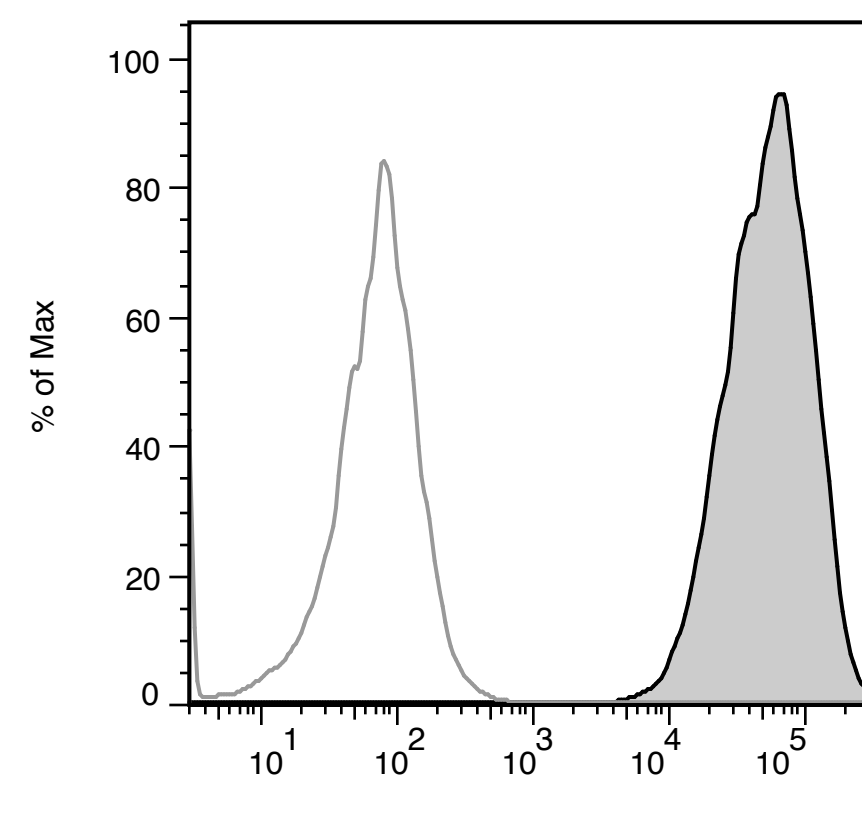
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Old donor 271

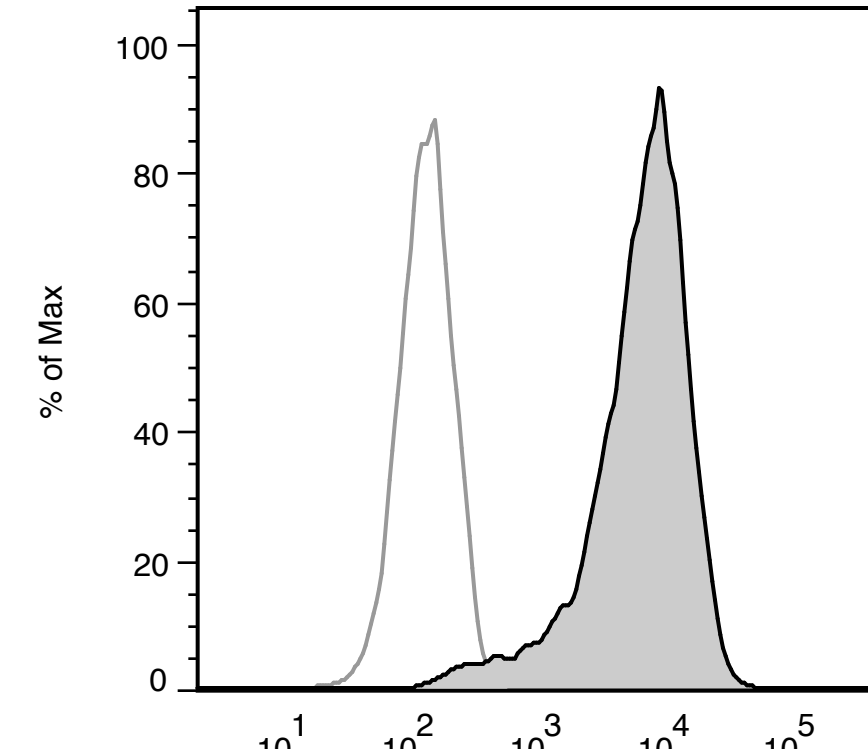


CD13-APC

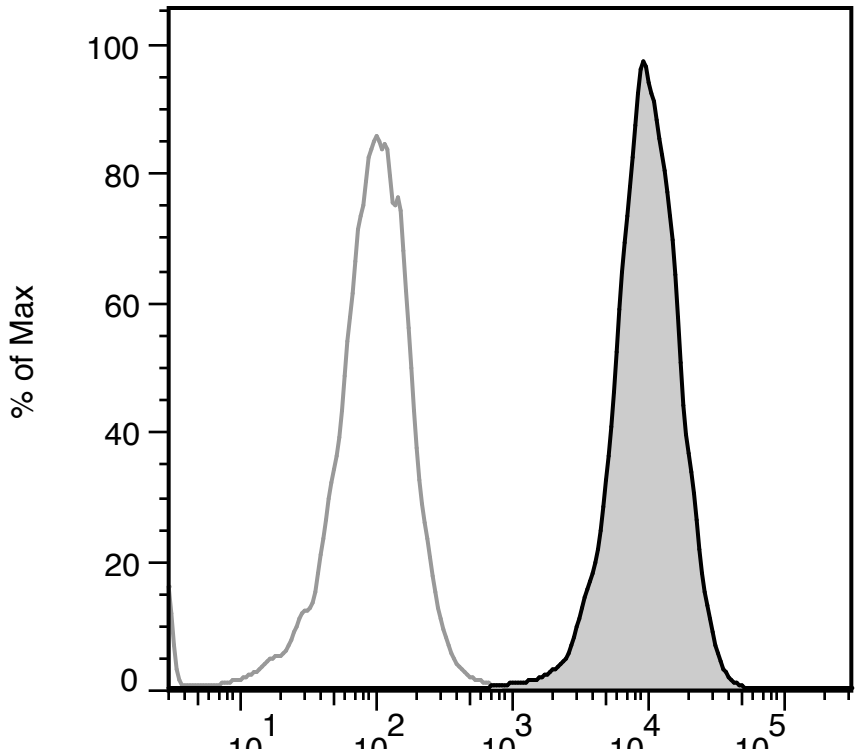
Young donor 081



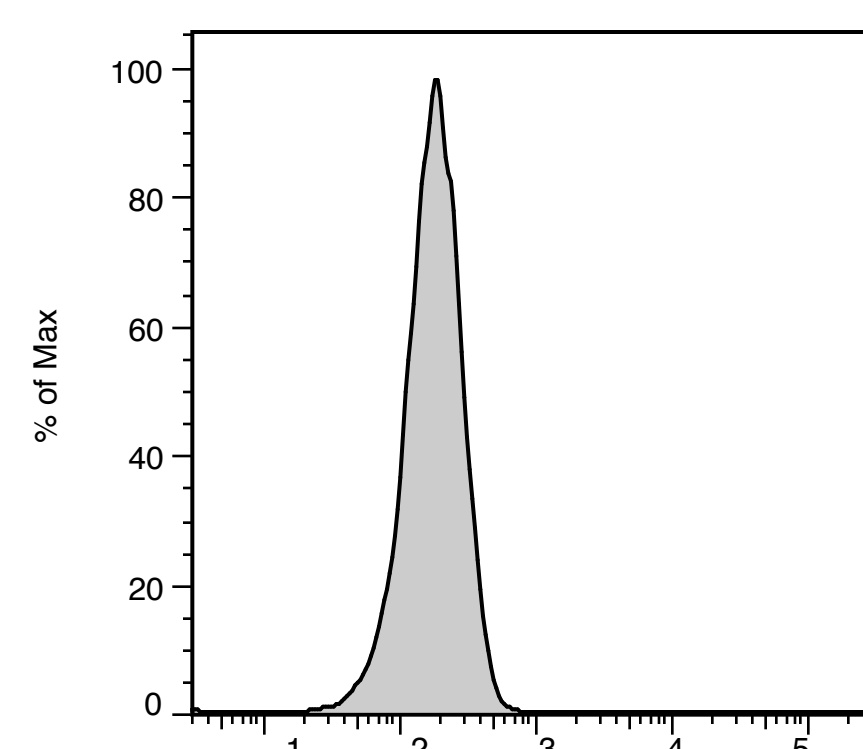
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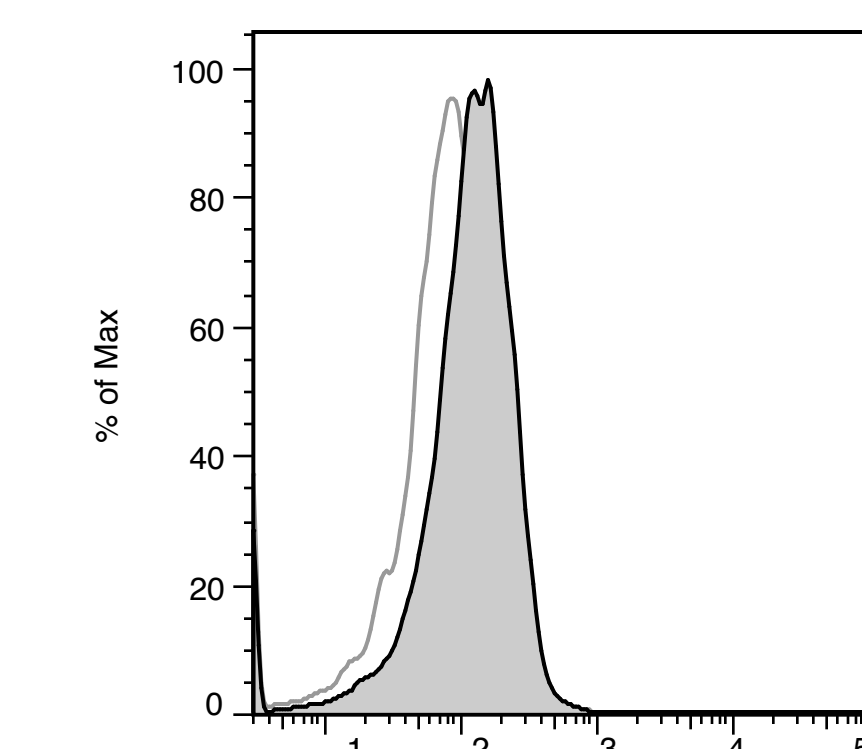
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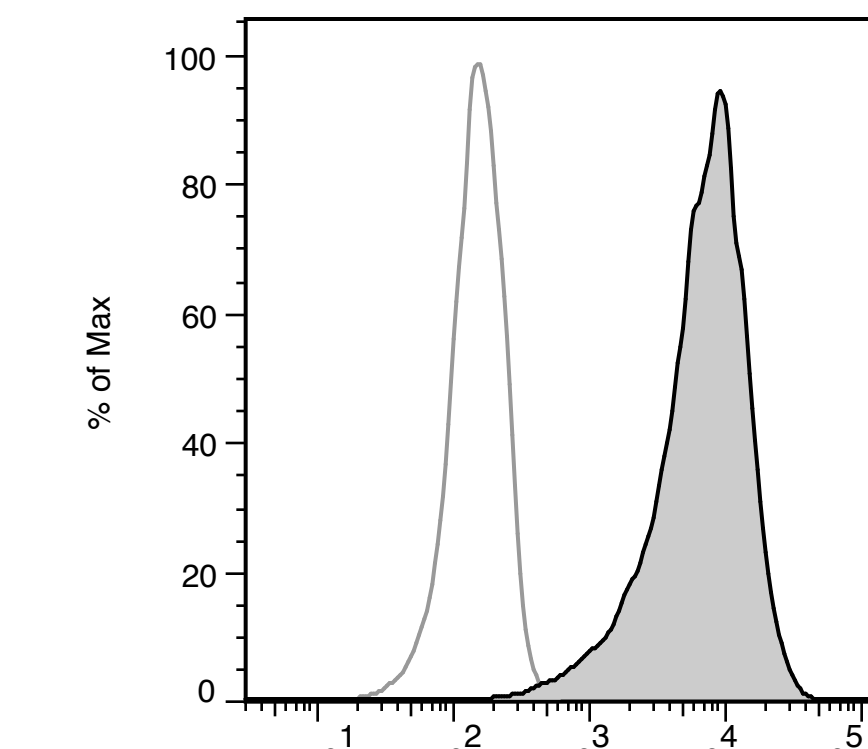
CD44-FITC



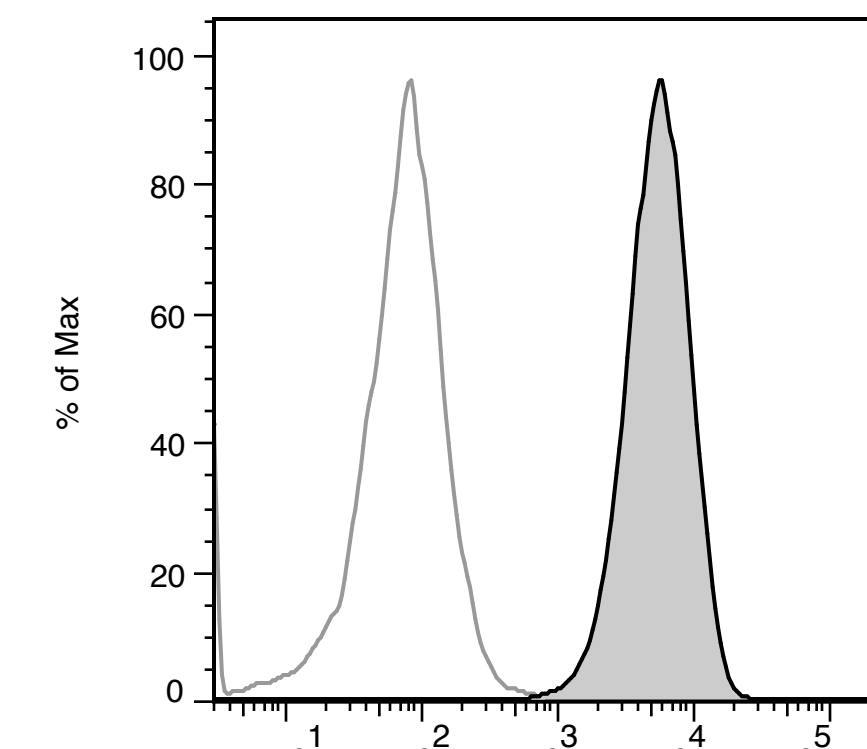
CD14-PE



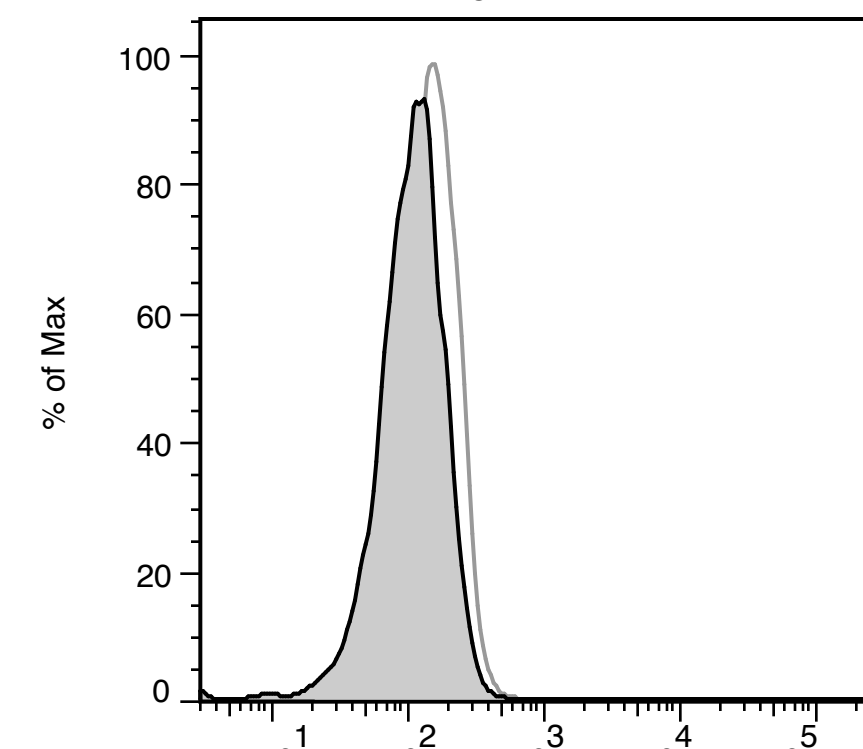
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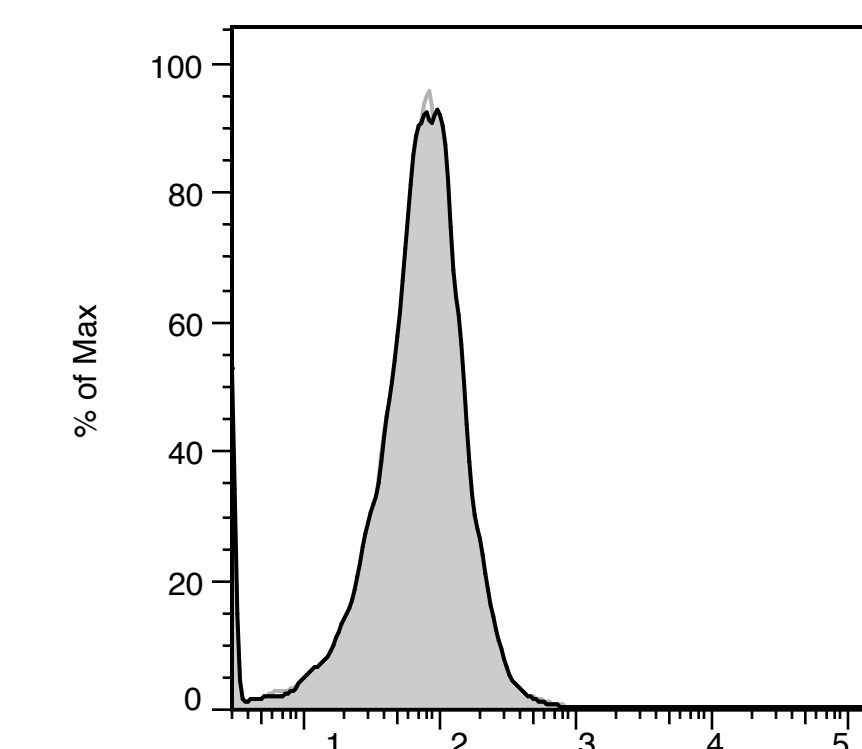
CD49e-PE



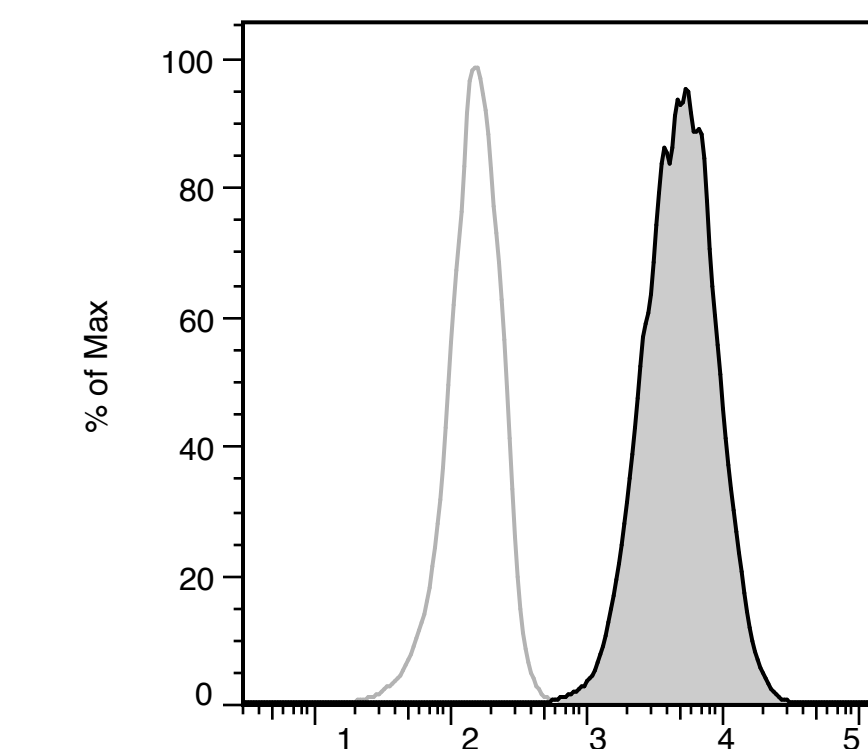
CD49e-PE



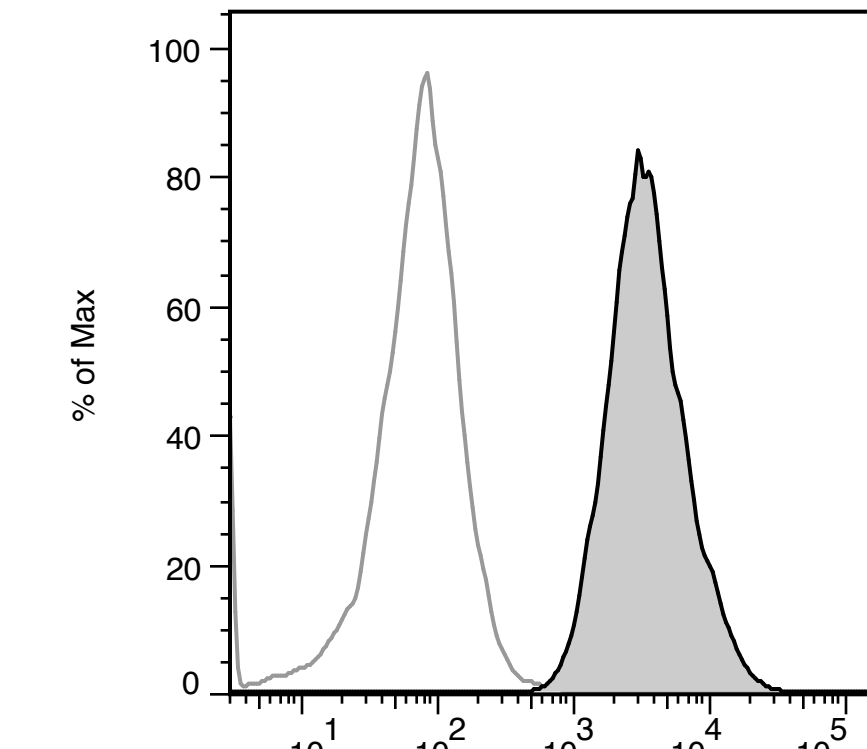
CD19-PE



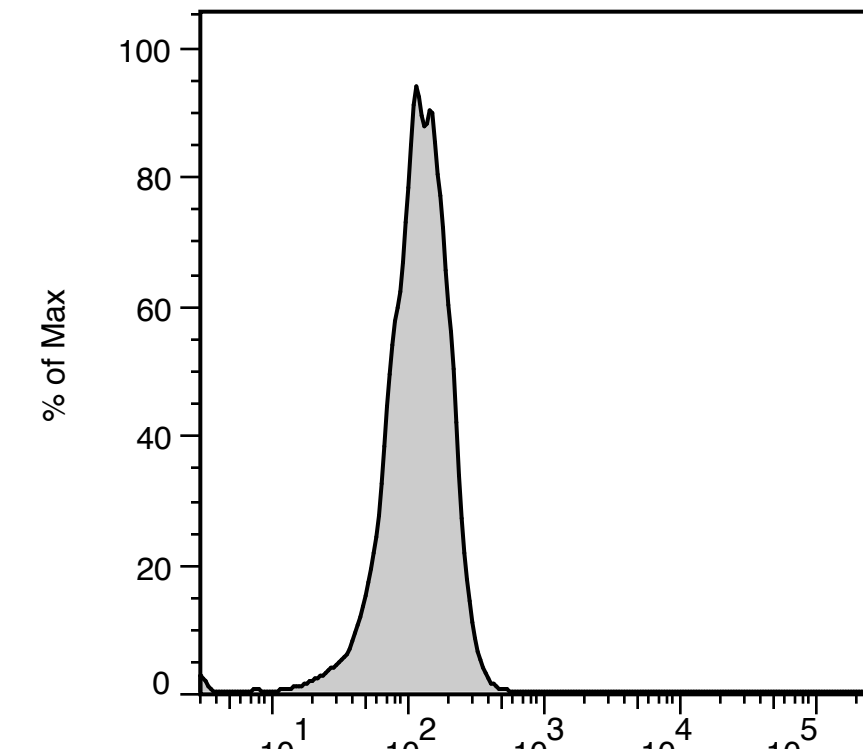
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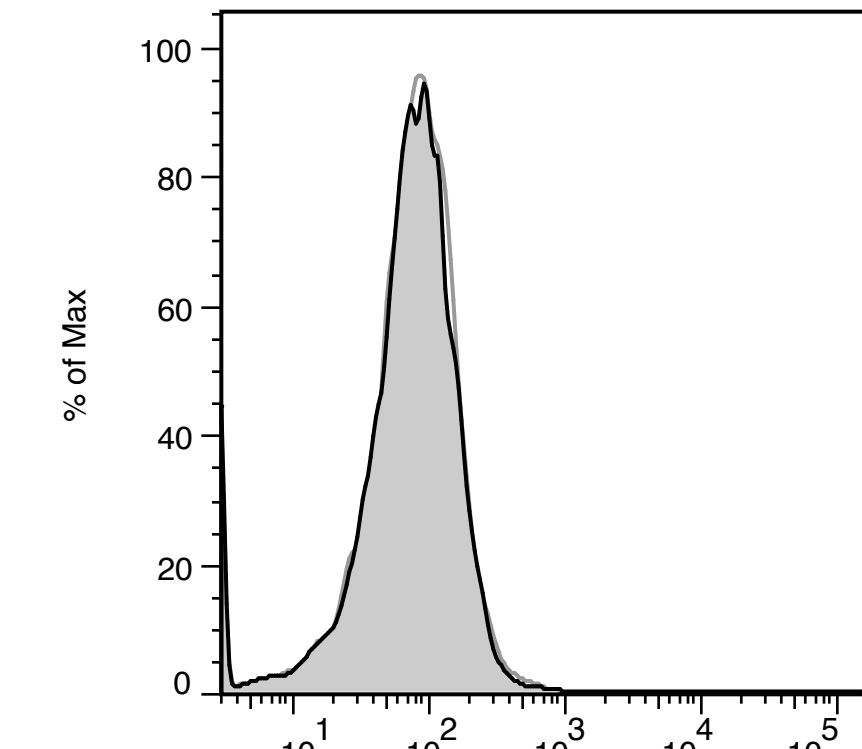
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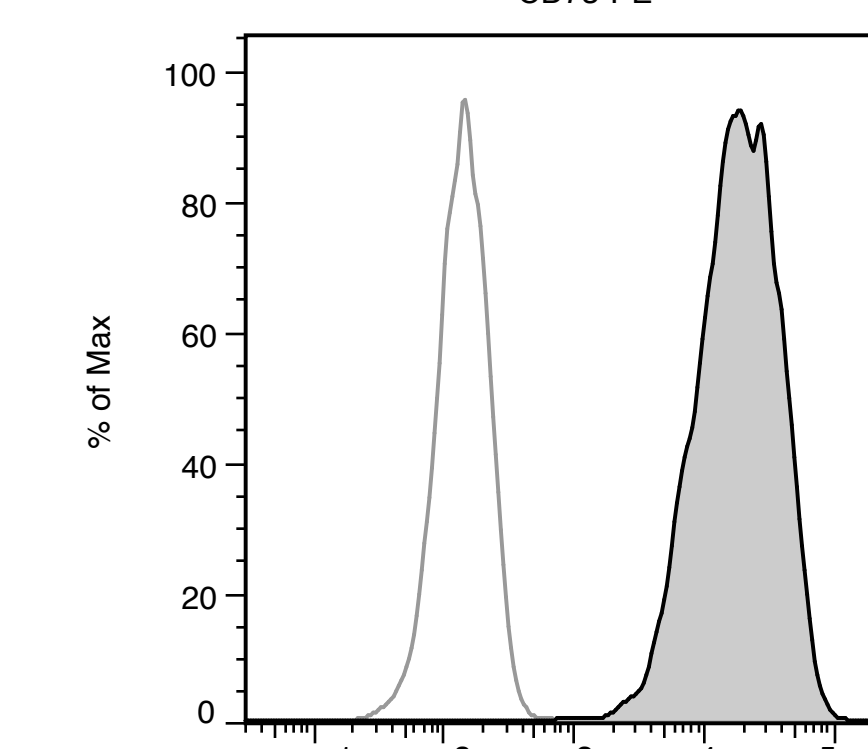
CD73-PE



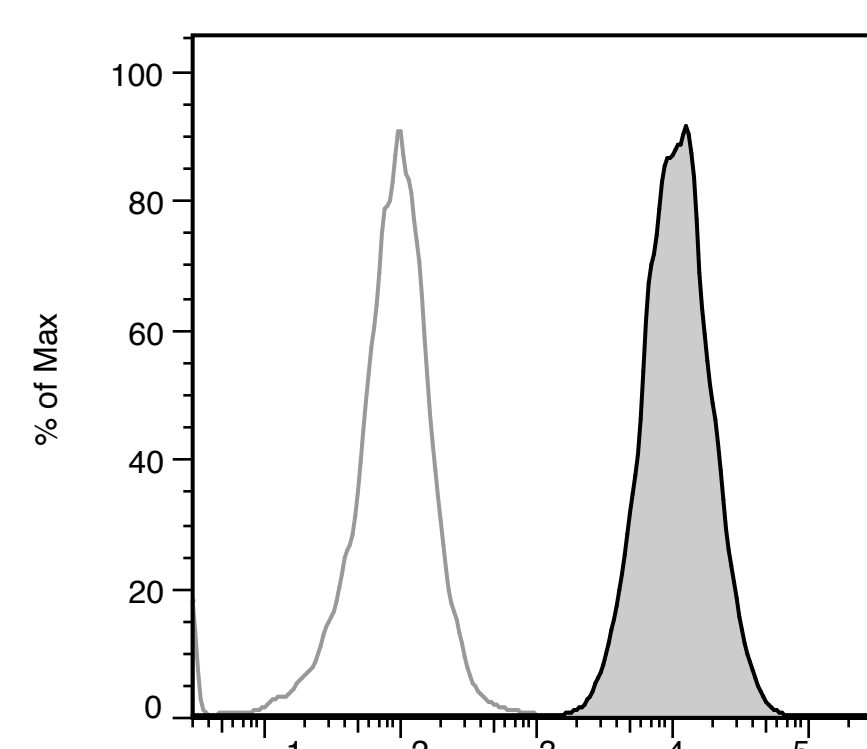
CD34-PE



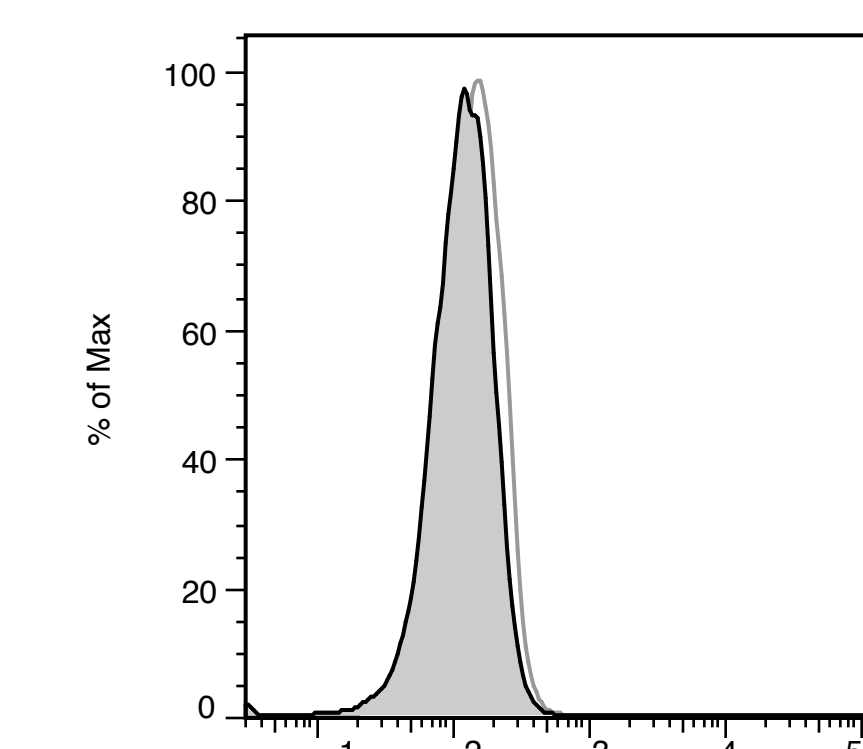
CD34-PE



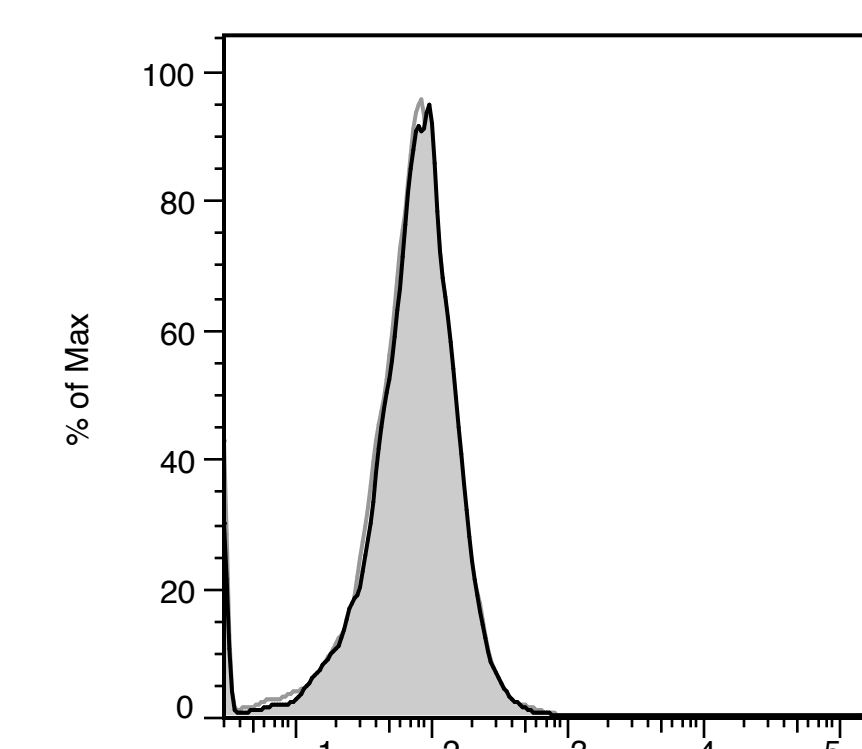
CD90-FITC



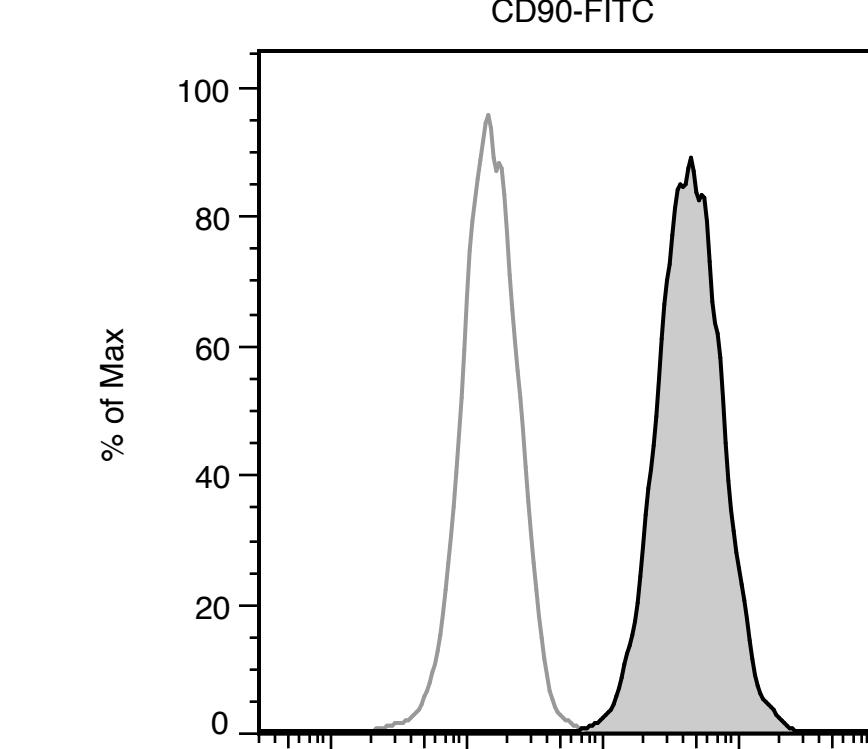
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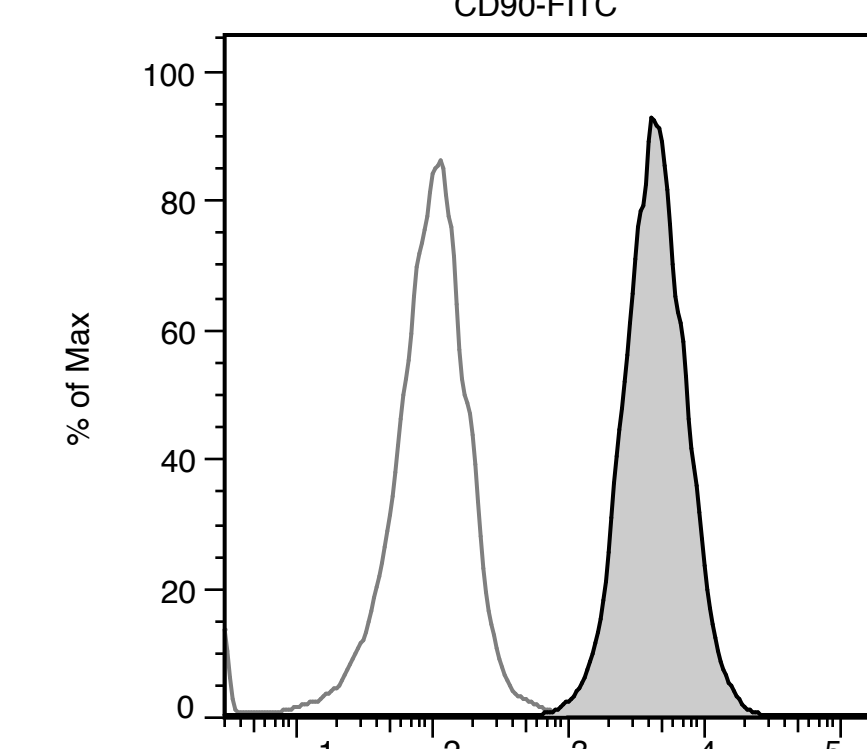
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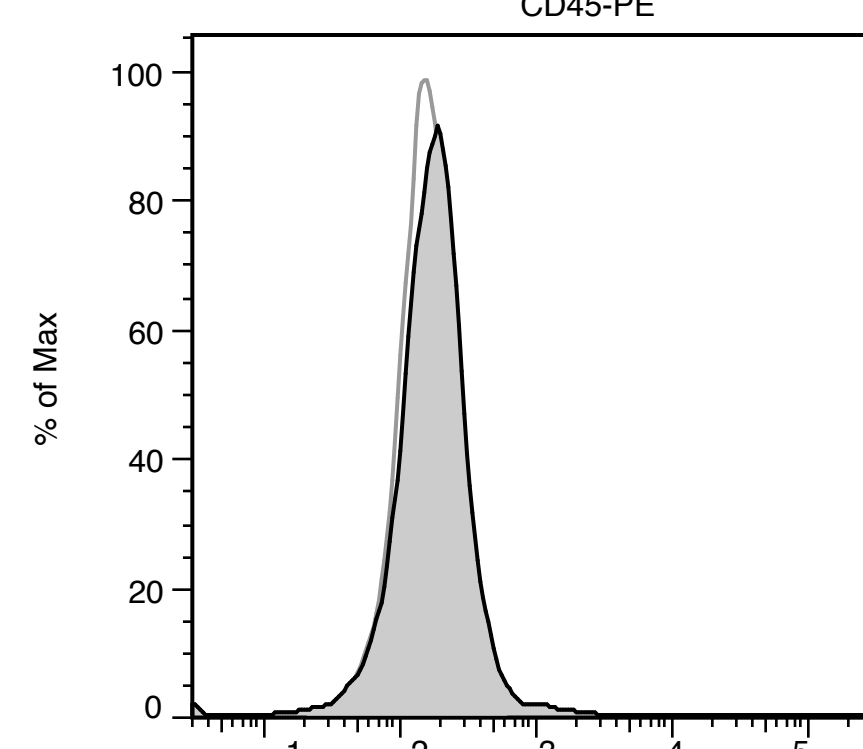
CD45-PE



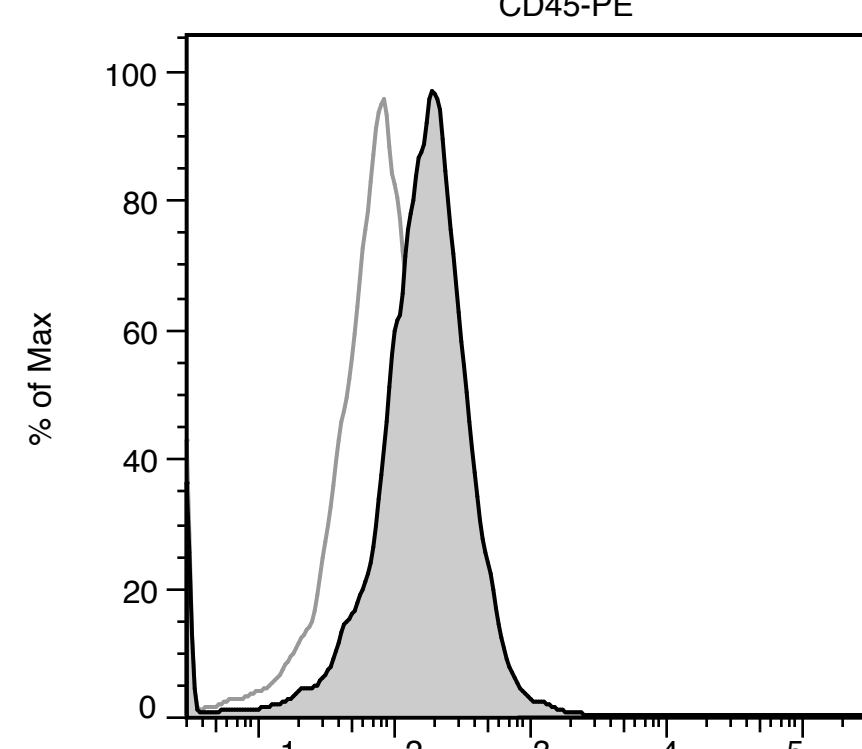
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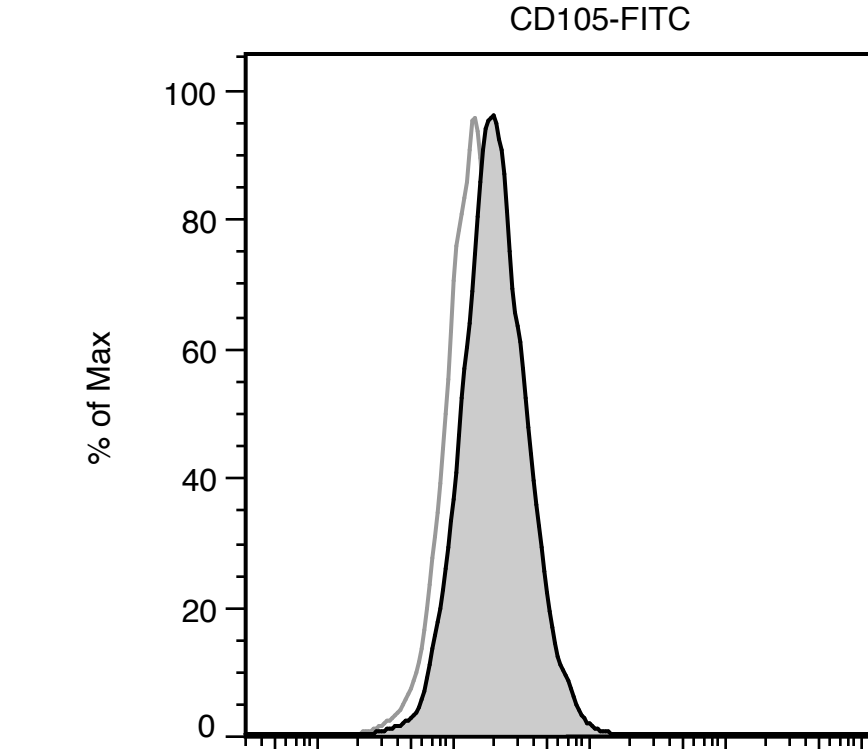
CD105-FITC



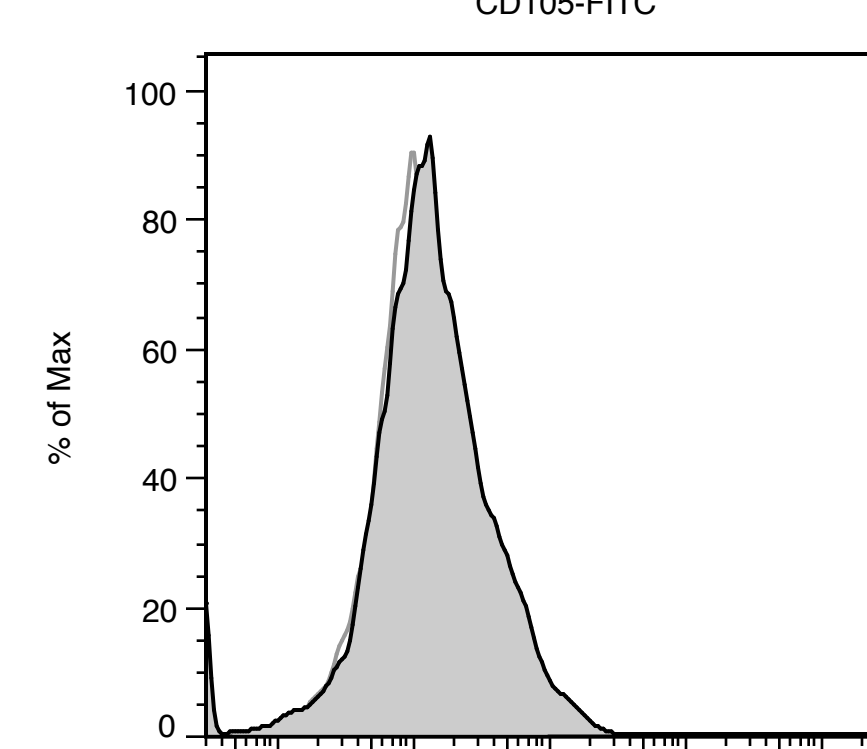
CD271-PE



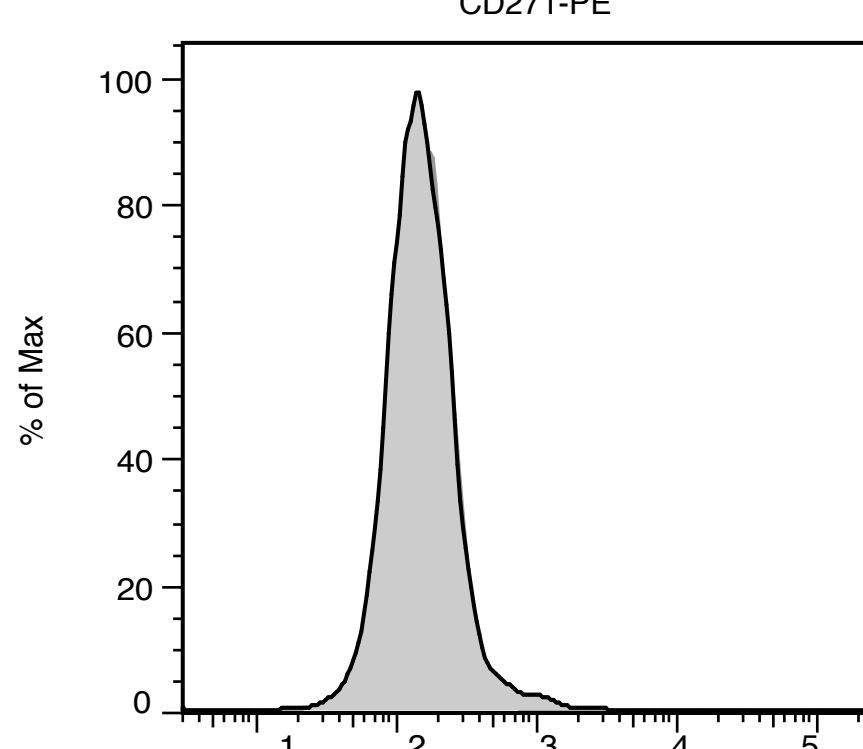
CD271-PE



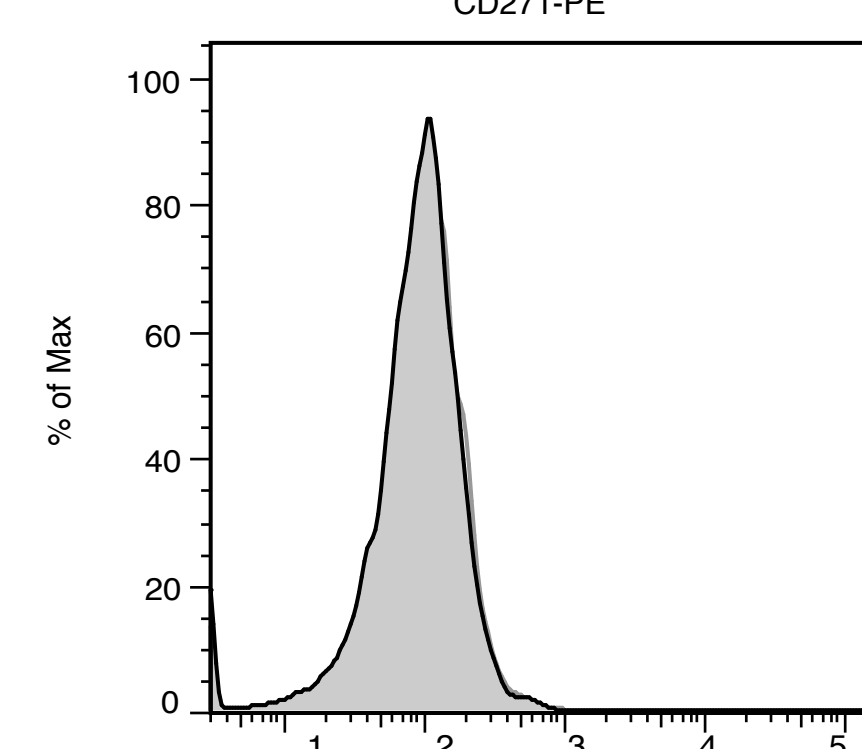
CD106-FITC



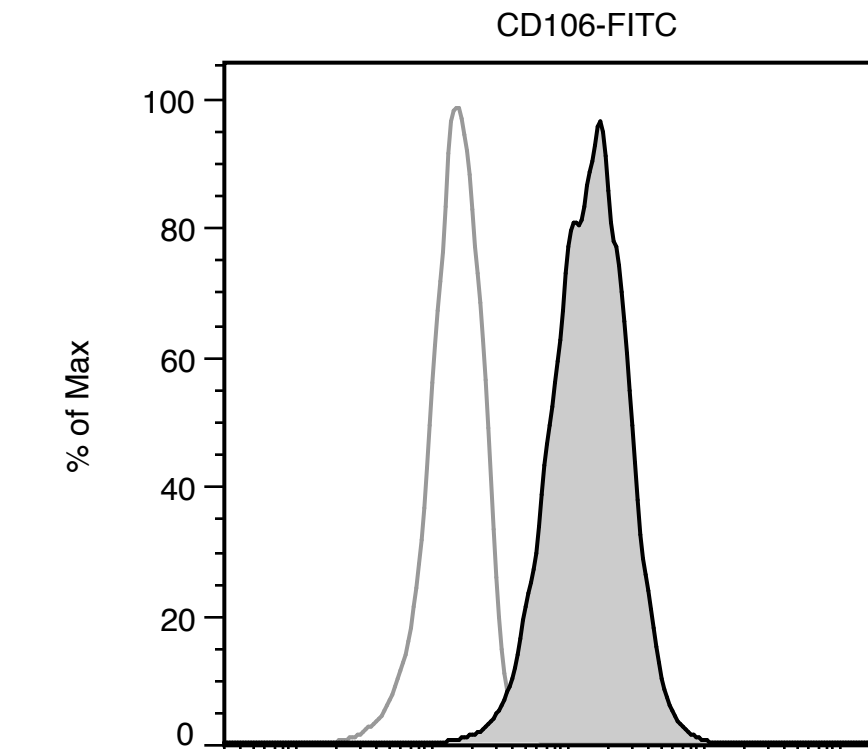
CD106-FITC



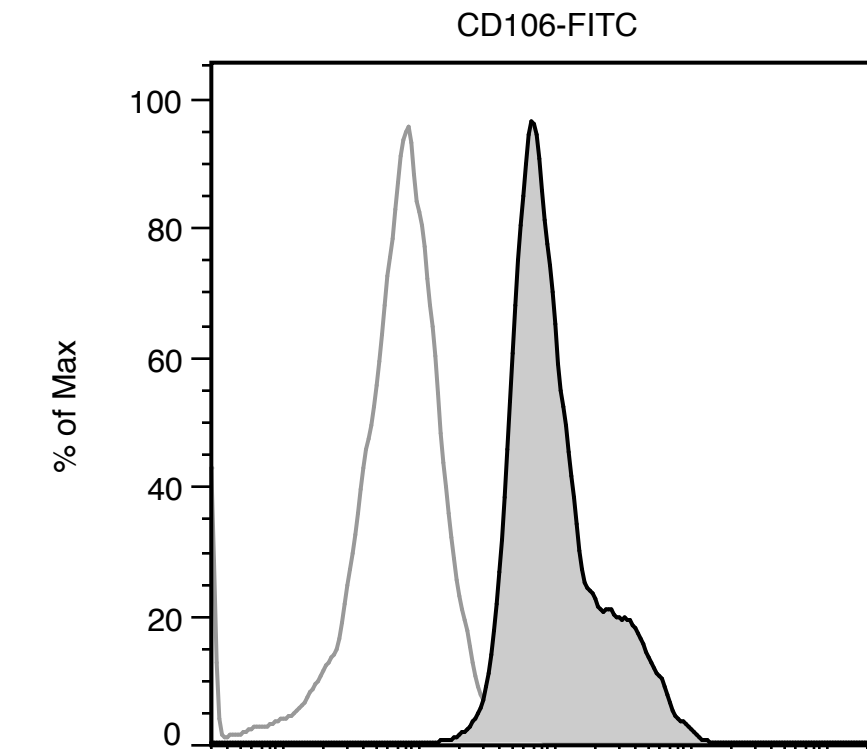
HLA-DR-FITC



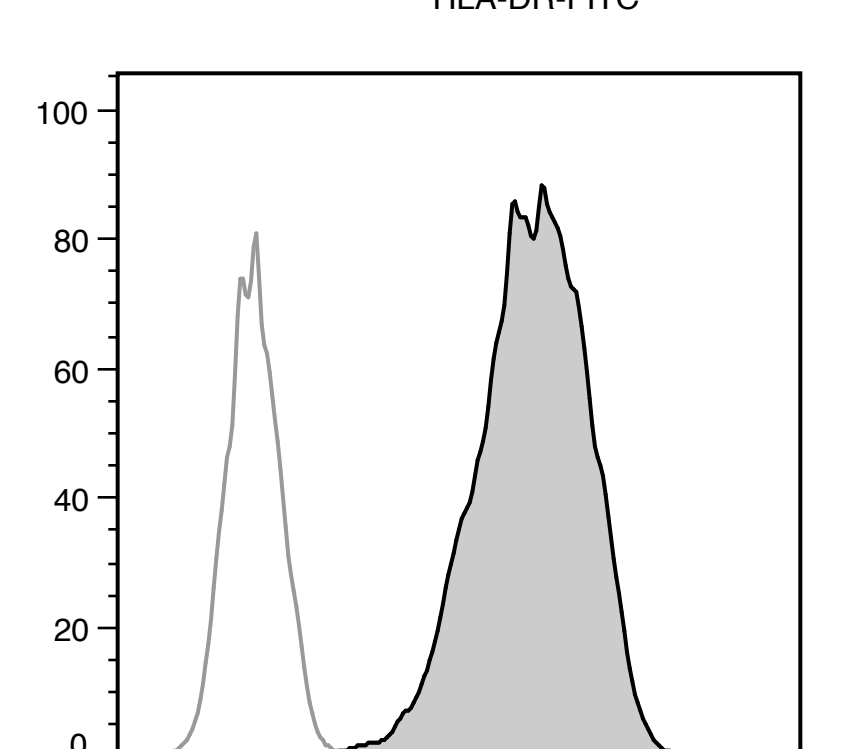
HLA-DR-FITC



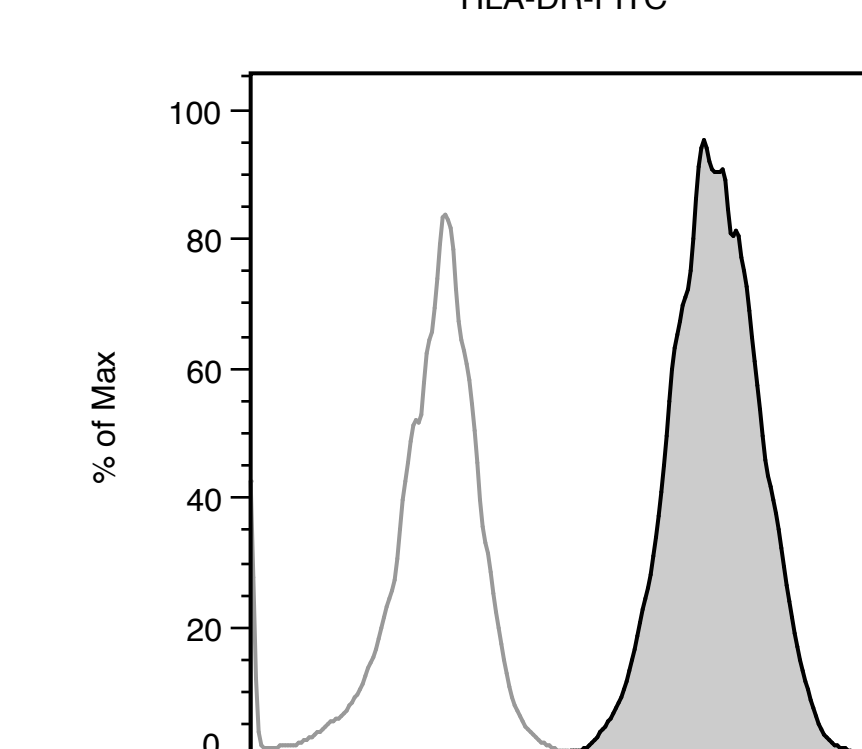
CD166-PE



CD166-PE

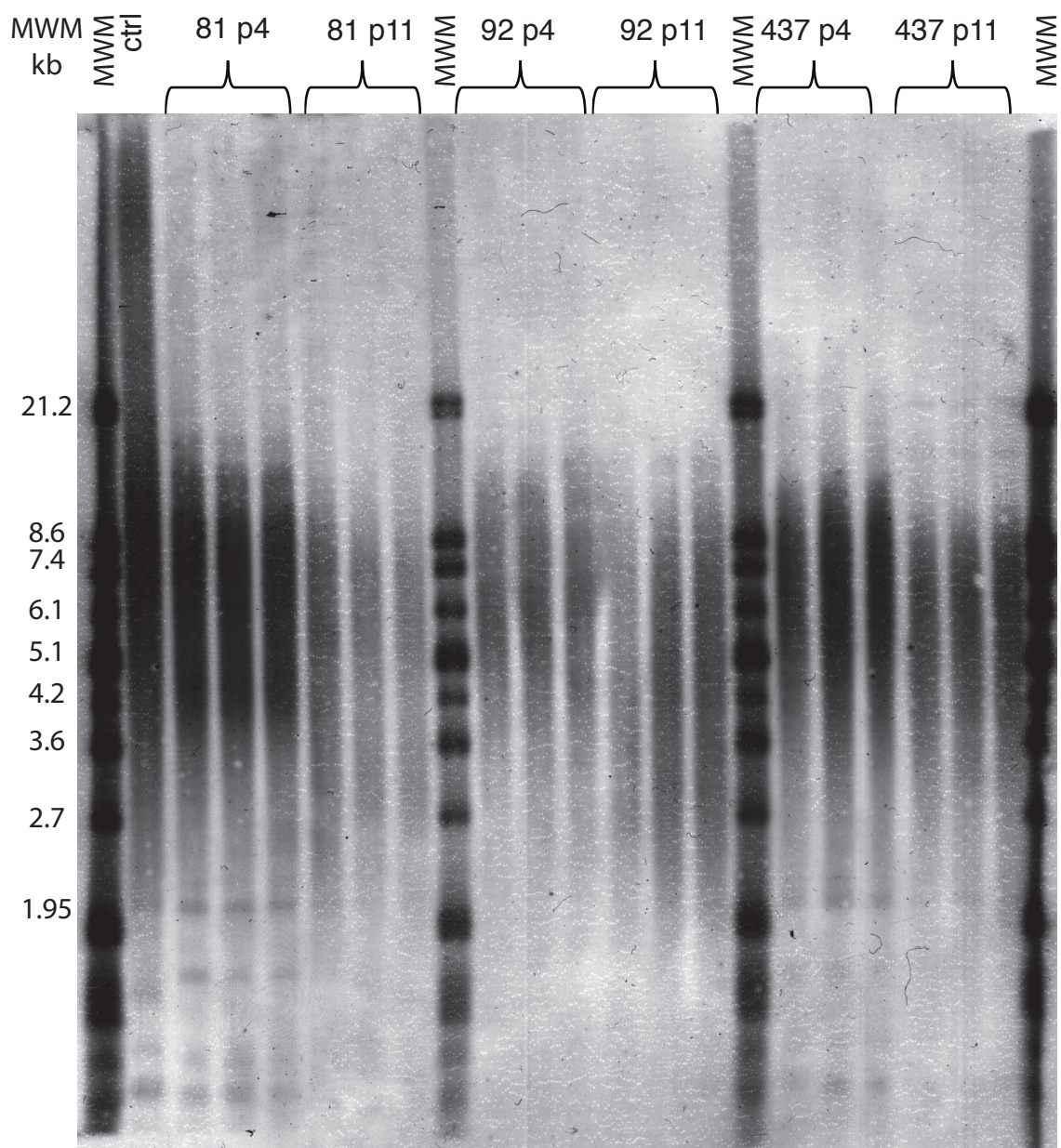


HLA-ABC-APC

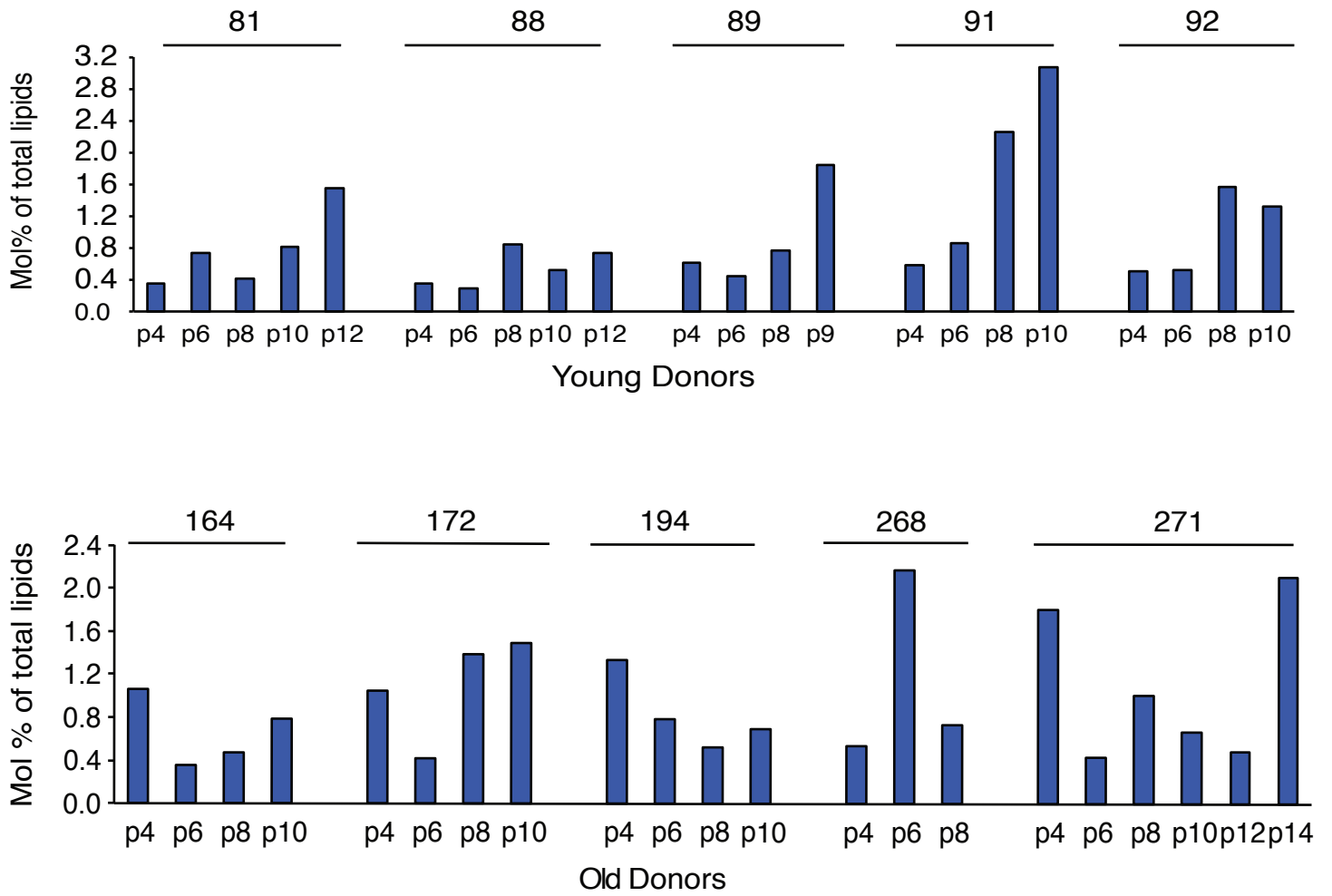


HLA-ABC-APC

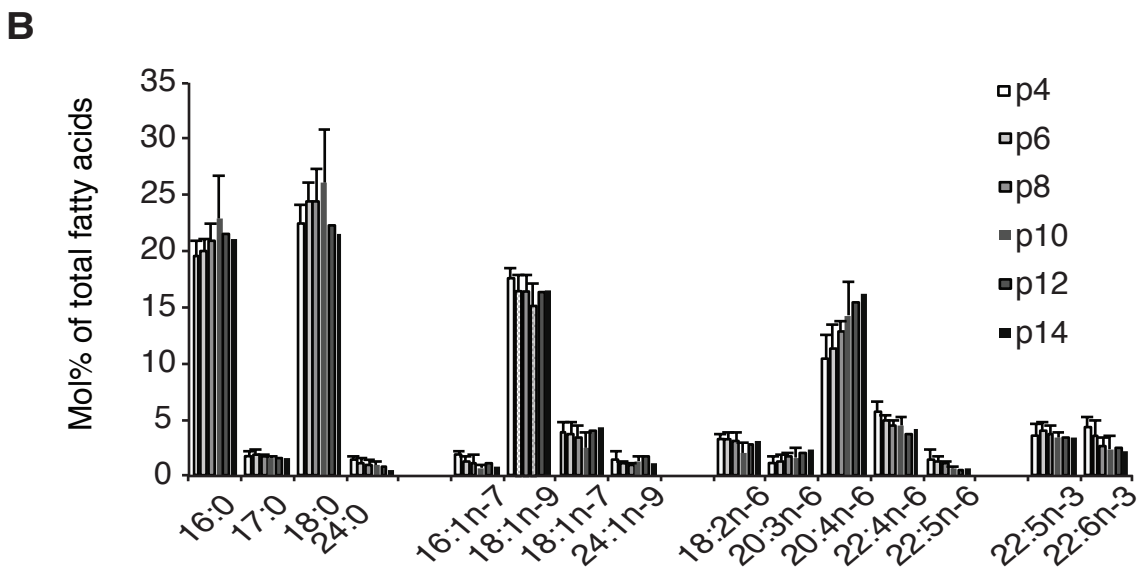
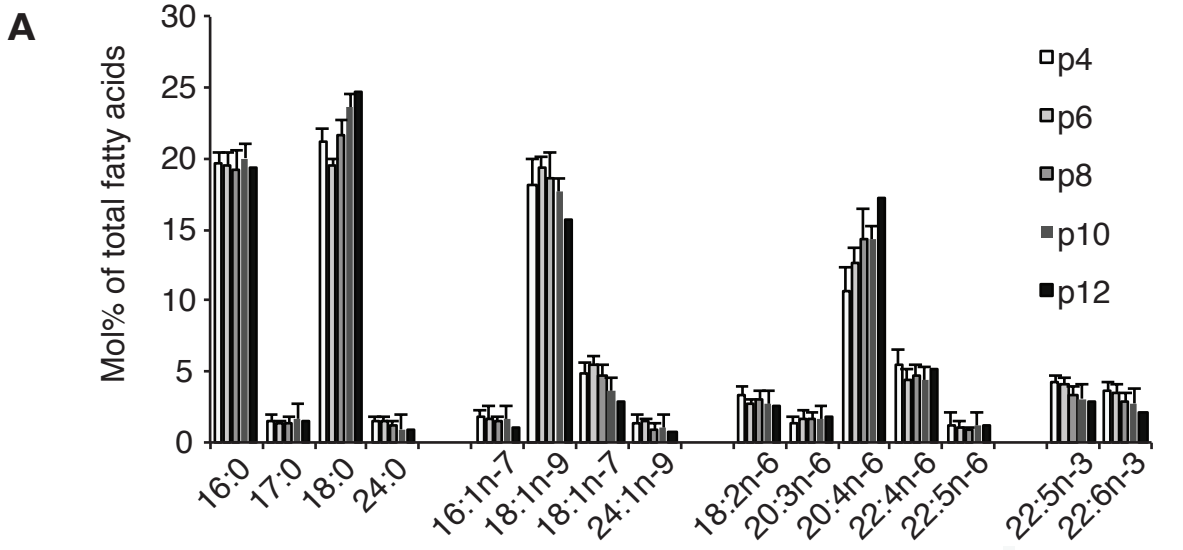
Laitinen Figure S2



**Lysophosphatidylcholine (LysoPC)**



Laitinen Figure S4



**Table S1.** Antibodies used in immunophenotype analysis. Abbreviations: FITC, fluorescein isothiocyanate; PE, R-phycoerythrin; APC, allophycocyanin

<b>Antigen</b>	<b>Fluorochrome</b>	<b>Isotype class</b>	<b>Source</b>
CD13	APC	IgG1 $\kappa$	Becton Dickinson (BD, San Jose, CA, USA)
CD14	PE	IgG2a $\kappa$	BD
CD19	PE	IgG1 $\kappa$	BD
CD29	APC	IgG1 $\kappa$	BD
CD34	PE	IgG2a $\kappa$	Miltenyi-Biotec (Bergisch Gladbach, Germany)
CD44	FITC	IgG2b $\kappa$	BD
CD45	PE	IgG1 $\kappa$	BD
CD49e	PE	IgG1 $\kappa$	BD
CD73	PE	IgG1 $\kappa$	BD
CD105	FITC	IgG2a $\kappa$	Abcam (Cambridge, UK)
CD106	FITC	IgG1 $\kappa$	BD
CD166	PE	IgG1 $\kappa$	BD
CD271	PE	IgG1 $\kappa$	BD
HLA-ABC	APC	IgG1 $\kappa$	BD
HLA-DR	FITC	IgG2a $\kappa$	BD

**Table S2.** Differentially expressed genes related to cell cycle, DNA replication and DNA packaging in old donors (o8-o4) and in young donors (y8-y4)

<b>Description</b>	<b>HGNC symbol</b>	<b>Gene ID</b>	<b>logFC o8-o4</b>	<b>logFC y8-y4</b>
<i>Cell cycle</i>				
cell division cycle 7 homolog ( <i>S. cerevisiae</i> )	CDC7	8317	-1,050166332	-0,77852524
structural maintenance of chromosomes 4	SMC4	10051	-1,381994327	-0,862654045
geminin, DNA replication inhibitor	GMNN	51053	-0,98319783	-0,706259586
meiosis-specific nuclear structural 1	MNS1	55329	-0,60404867	-0,577089566
<i>DNA replication</i>				
replication factor C (activator 1) 4, 37kDa	RCF4	5984	-1,05515218	-0,730045794
RMI1, RecQ mediated genome instability 1, homolog ( <i>S. cerevisiae</i> )	RMI1	80010	-0,724077548	-0,658016878
high-mobility group box 2	HMGB2	3148	-1,443530416	-0,992866666
<i>DNA packaging</i>				
histone cluster 1, H1c	HIST1H1C	3006	1,566321608	1,559514346
histone cluster 1, H2bb	HIST1H2BB	3018	0,767098144	0,621343412
histone cluster 1, H2bc	HIST1H2BC	8347	1,010995135	0,716544147
histone cluster 1, H2bd]	HIST1H2BD	3017	0,799076916	0,596075278
histone cluster 1, H2bg	HIST1H2BG	8339	0,885130645	0,714649993
histone cluster 1, H2bh	HIST1H2BH	8345	0,876980458	0,670824907
histone cluster 1, H2bi	HIST1H2BI	8346	0,763839261	0,575273425
histone cluster 1, H2bk	HIST1H2BK	85236	1,13349313	0,811198885
histone cluster 1, H2bl	HIST1H2BL	8340	0,821055941	0,721918279
histone cluster 1, H2bm	HIST1H2BM	8342	0,839795175	0,655667088
histone cluster 1, H2bo	HIST1H2BO	8348	0,796644051	0,696613671
histone cluster 2, H2aa4	HIST2H2AA4	723790	1,051616292	0,724300039

**Table S3 Differentially expressed genes o4-y4**

<b>Gene Symbol</b>	<b>Gene ID</b>	<b>logFC</b>	<b>p-value</b>
ATP1A3	478	5.843937716	6.93E-08
FMO3	2328	4.65085585	0.000950293
CD36	948	4.444790731	0.009646239
NGEF	25791	3.97449324	5.05E-05
COL13A1	1305	3.907506278	0.001650942
IRX1	79192	3.818714009	3.26E-05
GALNT6	11226	3.773176895	2.87E-05
KRT34	3885	3.434711336	0.000292247
EGFLAM	133584	3.421423467	0.000151402
SERPINA9	327657	3.247502657	0.000201432
RAB3B	5865	3.027723715	0.00083397
KCNN4	3783	2.985630115	0.001404004
CAMK2N1	55450	2.934913789	0.002127559
NOV	4856	2.877698346	0.000784612
TWIST2	117581	2.855883202	3.34E-05
PTER	9317	2.845489497	1.31E-06
FAM43A	131583	2.833828498	0.006000349
CCNO	10309	2.82219656	0.008734535
MARVELD2	153562	2.711024867	0.000198005
RGS20	8601	2.598269473	0.000355791
PAMR1	25891	2.594478719	0.001000333
HOXA13	3209	2.510082674	0.000608131
LOC100130938	100130938	2.471762448	6.67E-05
ABI3BP	25890	2.460789022	0.000103576
GBP3	2635	2.447750153	0.002340745
PORCN	64840	2.403811642	6.59E-05
MARCH4	57574	2.34964548	2.98E-05
BARX1	56033	2.312031063	0.007160783
SYT7	9066	2.310917106	0.005223975
GRB14	2888	2.289712099	0.004121021
FAM174B	400451	2.254966897	0.000385326
EYA4	2070	2.233735241	0.00070453
TMEM30B	161291	2.190376107	0.003971745
RN5-8S1	100008587	2.150718712	0.006579456
ADRA2C	152	2.127908488	0.003555595
GSTT2	2953	2.119208344	0.007637639
C11orf87	399947	2.092238455	0.002579185
FLJ22447	400221	2.071291969	0.002253893
COBLL1	22837	2.039082788	0.002011536
PCOLCE2	26577	1.946844803	0.008085738
KBTBD11	9920	1.928863909	0.00703936



AFAP1L1	134265	1.91586146	0.001775718
REEP4	80346	1.893593157	0.001016914
NAAA	27163	1.887604335	0.003673204
LINC00341	79686	1.852134793	0.000337672
SLC39A7	7922	1.814903944	7.33E-06
APBB1IP	54518	1.814588872	1.88E-05
CDH18	1016	1.806972874	0.001749813
E2F7	144455	1.793975821	0.000270512
LOC284998	284998	1.781050554	0.002161332
C15orf23	90417	1.764309046	0.001970249
MOCOS	55034	1.760692515	0.008129694
STXBP6	29091	1.726580352	0.000226044
ERCC6	2074	1.726501043	0.004197306
ZSWIM7	125150	1.695753123	0.003929242
IL3RA	3563	1.684376118	0.002653174
CALB2	794	1.680692007	0.000103136
SLC12A6	9990	1.656696394	0.003227542
CHCHD10	400916	1.639287245	0.000302909
CTPS1	1503	1.602001032	0.004806935
SLC7A5	8140	1.596228695	0.008489139
COX7A1	1346	1.583197532	0.002262548
CD59	966	1.576569475	0.001854681
MFSD7	84179	1.545797361	0.009599763
NCF2	4688	1.529160928	0.000258015
CCIN	881	1.517728761	0.001280525
TMEM65	157378	1.509201793	3.98E-05
EDN1	1906	1.503964796	0.000242524
TMEM171	134285	1.500171686	0.002252021
MAFF	23764	1.470286891	0.000110229
FLJ45684	400666	1.457379674	0.0012148
NGF	4803	1.417972105	0.003514051
NPAS2	4862	1.416203699	2.78E-05
INCENP	3619	1.393523661	0.0085496
LRP8	7804	1.374177096	0.002447909
ABLIM3	22885	1.359186119	3.71E-05
CCDC81	60494	1.337091008	0.00178355
TMEM191A	84222	1.324806756	0.000221415
LOC100507421	100507421	1.312345525	0.006944646
CLDN14	23562	1.303764392	0.002871601
LRRC8D	55144	1.289799411	0.006007342
LINC00294	283267	1.285180668	0.000220437
TMCO7	79613	1.281512634	0.000261369
C15orf52	388115	1.27522483	0.008777434
ZDHHC14	79683	1.274002281	0.009912024
MFSD6	54842	1.26535299	0.009487817

HINT3	135114	1.25818886	0.003196429
EMP3	2014	1.255433148	0.001965526
SLC22A23	63027	1.229470844	0.009779431
CDK6	1021	1.221576536	0.005981086
PPP1R14A	94274	1.219576951	0.008723018
NIPAL3	57185	1.21944789	0.000797469
OSR1	130497	1.215045948	0.000629878
TIAM1	7074	1.209717832	0.000265275
ATP2B4	493	1.201013069	0.000498045
MGLL	11343	1.200607789	0.001007136
RRAS2	22800	1.191618781	0.001582765
FTSJ1	24140	1.185684518	0.000450064
ATP7B	540	1.182090759	0.008327283
TCP11L1	55346	1.175278315	0.004955901
PYROXD1	79912	1.1677614	0.007723044
PINK1	65018	1.164698498	0.000573746
AFAP1	60312	1.160263892	0.009522546
SYTL3	94120	1.155770863	0.001322466
LYSMD4	145748	1.140633801	0.003388825
LOX	4015	1.129540888	0.002736021
NDRG1	10397	1.120465747	0.003758158
ADCY9	115	1.106596091	0.00791175
STYK1	55359	1.105376191	0.001068828
MAD1L1	8379	1.104753891	0.008587846
CD4	920	1.096644599	0.00015167
PLEK2	26499	1.089802243	0.003286628
KCNC4	3749	1.081344871	0.000986384
METRNL	284207	1.078091225	0.009652356
AHSA2	130872	1.070322424	0.001067408
LOC100128737	100128737	1.066933515	0.000381991
LENG9	94059	1.060294901	0.00159677
TUBA3D	113457	1.056800622	0.005819519
ASAP2	8853	1.049941314	0.00291403
CD44	960	1.046422887	0.002458585
SYNGR4	23546	1.046400909	0.00406272
STBD1	8987	1.04489003	0.00425349
ASCL5	647219	1.037635731	0.006386537
ETV5	2119	1.037158139	0.005706976
CD163L1	283316	1.027302034	0.000667832
SLC12A2	6558	1.027206251	0.00108782
DSP	1832	1.026880924	0.004362291
FAM50B	26240	1.024413697	0.00043957
FLJ46066	401103	0.994857149	0.001100674
RGS19	10287	0.993687729	0.00547341
CLCN5	1184	0.988124661	0.008000219

C3AR1	719	0.985789454	0.007353018
DUSP1	1843	0.985493059	0.002690617
SGTB	54557	0.985250941	0.001683042
MAP3K6	9064	0.983864395	0.000136901
CCT3	7203	0.982276176	0.00972584
KATNAL1	84056	0.979356766	0.001917085
BVES	11149	0.975829774	0.001436951
TERC	7012	0.965437381	0.000483157
CLSTN2	64084	0.958957537	0.00675423
PBX3	5090	0.955919252	0.00025579
GCOM1	145781	0.950914567	0.00343115
SLCO2A1	6578	0.948997126	0.001170067
PPP1R3D	5509	0.948024491	0.006745713
SMAGP	57228	0.943090708	0.003600624
ADPRH	141	0.942968699	0.00306738
PRKCA	5578	0.94036901	0.002783349
PYCR2	29920	0.935964093	4.03E-05
LOC284242	284242	0.927872425	0.004192354
SLC2A14	144195	0.922880619	0.009718805
NDFIP2	54602	0.919648846	0.006668289
PROSAP1P1	9762	0.919402362	0.000325212
ZDHHC8	29801	0.916387413	0.001404335
KCNJ14	3770	0.912949607	0.005612952
CNTD1	124817	0.898162468	0.00020519
RABAC1	10567	0.894044964	2.76E-05
AZU1	566	0.892563478	0.001504715
IAPP	3375	0.888461373	0.003163678
SPATA5	166378	0.88310192	0.00029185
AP1S1	1174	0.878512521	3.28E-05
LOC100133286	100133286	0.877545561	0.001727397
FBXL19	54620	0.876532965	0.008891382
PARD6G	84552	0.86666124	0.006398161
GPN3	51184	0.864512595	2.17E-05
OR10H4	126541	0.862378506	0.005074688
GFOD1	54438	0.860204546	0.008754561
DNMBP	23268	0.858371202	0.007442821
GFPT1	2673	0.855937536	0.00863888
MAP3K10	4294	0.851904556	0.002202475
KRT42P	284116	0.848725962	0.002578266
KCTD7	154881	0.845626482	0.002330176
POLR3G	10622	0.829934985	0.000558557
NTM	50863	0.828463394	0.002328378
MOP-1	643616	0.821274152	0.002574126
GLYATL1	92292	0.81925627	0.00426594
FAM59B	150946	0.813114998	0.00445548

POLR2A	5430	0.810595634	0.000650279
BAX	581	0.809804665	0.001039809
HTRA2	27429	0.807450453	0.000690879
FLJ25694	100128202	0.797876922	0.000761409
PIEZO1	9780	0.79474337	0.00503364
OR11A1	26531	0.794076481	0.008526796
TOMM20L	387990	0.792499688	0.005940121
NYX	60506	0.790574646	0.000761402
CAMK2N2	94032	0.787661981	0.006950052
SYNE1	23345	0.785330689	0.003514997
LOC100289143	100289143	0.784437742	0.000240591
CPEB4	80315	0.782300167	0.009475125
HMX3	340784	0.77759008	0.003066288
CLTB	1212	0.775881156	6.42E-05
TMEM48	55706	0.775448433	0.005738235
ANKRD28	23243	0.774070151	0.007888079
TAL1	6886	0.772361146	0.002525857
PKD1	5310	0.771895061	0.003724418
KRTAP4-11	653240	0.76735162	0.001000933
ABHD15	116236	0.764822587	0.004894648
OCRL	4952	0.76275214	0.0081469
MGAT5	4249	0.759545405	0.007829115
CRY1	1407	0.758286822	0.000611774
GNAZ	2781	0.757621928	0.004774456
FANCM	57697	0.755914208	0.00654609
LOC100128191	100128191	0.751401358	0.002238798
MAP3K3	4215	0.750235872	0.001883645
LOC100131599	100131599	0.748484494	0.005663484
FAM19A5	25817	0.748252521	0.001499074
SLC25A19	60386	0.748225879	2.14E-05
SLC16A8	23539	0.746634826	0.001828622
GTPBP4	23560	0.739464507	0.009267838
ITPRIPL2	162073	0.738246508	0.003006174
DNAJC5	80331	0.735126887	0.002571191
ATP10A	57194	0.732563833	0.003535488
C1orf200	644997	0.728983031	0.005967335
FITM2	128486	0.727410224	0.008758957
TBX1	6899	0.725760152	0.004204618
C22orf29	79680	0.725058892	0.005573881
SFI1	9814	0.723779213	0.006362887
WRN	7486	0.718837223	0.00068279
PPT2	9374	0.717666146	0.002426802
NCAPD3	23310	0.71072719	0.007184074
KIAA0284	283638	0.71034175	0.003663928
EMILIN3	90187	0.709393102	0.000592806

DOCK3	1795	0.709000739	0.000708977
RRP15	51018	0.708013854	0.003426336
TOX	9760	0.707728171	0.001357572
VASN	114990	0.70456126	0.009923681
MMS22L	253714	0.702300904	0.003391173
TAF15	8148	0.702180437	0.001361206
HYAL3	8372	0.692572332	0.009935371
UCK2	7371	0.689840026	0.001465848
PHOSPHO1	162466	0.68832603	0.007161783
RAP1GDS1	5910	0.687947708	0.000312756
SFMBT1	51460	0.684795312	0.001800858
TYROBP	7305	0.683755813	0.000190881
ABCC1	4363	0.682207322	0.009908584
LARP6	55323	0.680984896	0.004084723
POU3F1	5453	0.678046725	0.002782344
NUP205	23165	0.670688682	0.004932121
FAM214B	80256	0.669855253	0.005075368
MAS1L	116511	0.666579501	0.003013736
TARSL2	123283	0.664318796	0.000607058
PRG4	10216	0.661377762	0.000303021
RBMX2EP	159125	0.661063556	0.004485554
GSK3A	2931	0.660219717	0.001823166
SPIRE1	56907	0.655718745	0.005468483
SERPINA6	866	0.654923097	0.00507507
CCDC96	257236	0.653567866	0.002435983
PLCD1	5333	0.652928202	0.000335521
DDA1	79016	0.651821237	0.003664563
ERGIC1	57222	0.651697581	0.004761205
PHKG1	5260	0.650114149	0.008337758
LOC340508	340508	0.649217639	0.004891001
DVL1	1855	0.648749831	0.008171628
MYBBP1A	10514	0.648617094	0.00676404
RTN3	10313	0.647781392	0.00068834
NSUN6	221078	0.646823764	0.00420176
ITPKA	3706	0.63909297	0.003639158
SMARCAL1	50485	0.638806374	0.005456788
SHANK3	85358	0.638711225	0.007677551
FBXL18	80028	0.636820039	0.001355313
EBNA1BP2	10969	0.63632372	0.00073162
NDST2	8509	0.635588987	0.003591964
KIAA1715	80856	0.634948235	0.009075118
SCRN1	9805	0.634046877	0.002789776
CDC42BPB	9578	0.629120656	0.006146381
PCMT1	5110	0.62866627	0.002572748
ARRDC1	92714	0.625360091	0.005365768

GGT1	2678	0.624831513	9.44E-05
APLP1	333	0.624053957	0.002273336
SLX4	84464	0.620195919	0.00171452
HRAS	3265	0.618341271	4.98E-05
C1orf140	400804	0.615130973	0.006747593
DEPDC5	9681	0.614822875	0.003754343
HIST1H2BN	8341	0.614605542	0.00198038
JUN	3725	0.613899594	0.00316845
FAM115C	285966	0.612147872	0.006959587
ZNF474	133923	0.611123102	0.0075293
ADAMTS19	171019	0.610200794	0.002671373
SPTLC2	9517	0.609811883	0.007188956
MGC2752	65996	0.606963667	0.006487666
TUBGCP2	10844	0.605723089	0.006513732
ZAK	51776	0.60283442	0.0041148
TMEM191B	728229	0.602124076	0.000548347
DLST	1743	0.601233695	0.008886989
ST14	6768	0.600720526	0.004589544
ZHX3	23051	0.600453718	0.001315736
ANO10	55129	0.598459767	0.005688085
SPRN	503542	0.597650388	0.006062958
-	100288549	0.597450095	0.000761934
SPTAN1	6709	0.596026181	0.009340006
OR8B8	26493	0.594230661	0.005725226
SNPH	9751	0.594198061	0.000859899
RNASE13	440163	0.59400607	0.008310456
LINGO4	339398	0.592992759	0.002299872
C21orf58	54058	0.590827706	0.006826534
LOC440525	440525	0.589610421	0.003183649
RAB21	23011	0.589206961	0.000313308
ANK2	287	0.588984236	0.007663658
KLC2	64837	0.587540491	0.000330485
CDYL2	124359	0.583288304	0.009470716
RASA3	22821	0.580048603	0.0099215
ESD	2098	-0.58139295	0.000874973
ZNF286B	729288	-0.58162173	0.004566006
ZNF812	729648	-0.58801905	0.00235297
LOC401397	401397	-0.58946068	0.004006899
SMARCE1	6605	-0.59037136	0.001082047
MIER1	57708	-0.59733313	0.001357594
ZNF280C	55609	-0.59942406	0.003146996
IGBP1	3476	-0.60017144	0.00011372
CD99	4267	-0.60027352	0.000791856
RPL15	6138	-0.60045468	0.0064755
RBBP4	5928	-0.60165727	0.001588872

SERTAD2	9792	-0.60181964	0.009045543
ZNF417	147687	-0.60381207	0.002535079
HERC6	55008	-0.60782005	0.000109514
TCEAL8	90843	-0.60946514	0.003146219
OR4F29	729759	-0.6114134	0.000520677
SHC1	6464	-0.61154036	0.00226663
ZBTB25	7597	-0.61262946	0.001933864
BMF	90427	-0.61595491	0.009286197
GTF2H5	404672	-0.61670574	0.005310627
STAT3	6774	-0.61756399	0.005068204
SSR2	6746	-0.61817272	0.009593582
GBAS	2631	-0.61937596	0.008477203
SARM1	23098	-0.62182313	0.002323799
RASSF4	83937	-0.62788906	3.97E-05
SEPT7P2	641977	-0.6281423	0.004833442
TRIM5	85363	-0.63111184	0.000443982
MAP3K12	7786	-0.63226297	0.004116446
FAM13C	220965	-0.63634759	0.004160291
SDR39U1	56948	-0.63697148	0.002597525
DUSP10	11221	-0.63764787	0.000650773
MYOZ3	91977	-0.6387182	0.000891924
POU5F1	5460	-0.64052653	0.009198246
SOCS1	8651	-0.64128106	0.002200681
SCMH1	22955	-0.6418867	0.007291998
COA5	493753	-0.64373578	0.009547622
GABARAP	11337	-0.64670221	0.003692612
ZNF300	91975	-0.64816536	0.000329374
CROCC	9696	-0.64930223	0.002611195
FHL1	2273	-0.64955305	0.003783878
LOC100240734	100240734	-0.64973158	0.004236802
DLEU2L	79469	-0.65377048	0.007981604
DTX3L	151636	-0.65571918	0.009462876
BZRAP1	9256	-0.65597101	0.002943798
MPHOSPH10	10199	-0.65964161	0.001379333
NARS2	79731	-0.66085647	0.000427472
-	100130966	-0.66269389	0.003358516
TMEM39A	55254	-0.66511783	0.006676263
ZNF323	64288	-0.66531062	0.0015639
SNTG2	54221	-0.66640371	0.000354904
PRKCI	5584	-0.66750478	0.009099157
C14orf43	91748	-0.6676367	0.00610657
SF1	7536	-0.67448513	0.005165111
LOC100240735	100240735	-0.67490259	0.006246293
RBM4B	83759	-0.67714559	0.00084608
LOC142937	142937	-0.67722608	0.002143672

RRAGB	10325	-0.68762947	0.005835086
CD74	972	-0.68843653	0.001314502
PP12613	100192379	-0.68932485	0.001737561
RNASEH2C	84153	-0.69161045	0.005145533
PFN2	5217	-0.69313135	0.000952382
UBXN4	23190	-0.69615372	0.000192473
ATAT1	79969	-0.69632369	0.000101021
TMEM133	83935	-0.70186308	0.000269511
CCNG1	900	-0.70211619	0.009390265
ZBTB1	22890	-0.70397905	0.002259877
VHL	7428	-0.70506486	0.00961722
CLK2	1196	-0.70539396	0.000621427
FAM63B	54629	-0.70561241	0.001232777
POM121L9P	29774	-0.7090069	0.00424095
EFNA4	1945	-0.70931326	0.001264539
C14orf159	80017	-0.71122813	0.002595055
MPLKIP	136647	-0.71132761	0.007688009
POU5F2	134187	-0.7130808	4.66E-05
NICN1	84276	-0.71321609	0.00695154
-	100510356	-0.71636074	0.004102617
MTHFS	10588	-0.71855054	0.000955784
ZNF334	55713	-0.72099244	0.000756425
H3F3A	3020	-0.72381664	0.002070349
RNASET2	8635	-0.72786368	0.000223273
HIST1H3A	8350	-0.73031788	0.002590566
PTBP2	58155	-0.73127102	0.001790847
LTBP3	4054	-0.73214095	0.003957501
NSA2	10412	-0.7329937	0.001114049
PER1	5187	-0.73590589	0.00037731
CCNI	10983	-0.73701257	0.002995666
LPCAT3	10162	-0.73743269	0.003619047
PCCA	5095	-0.73785761	0.008213216
PKIB	5570	-0.7401592	0.000908083
RNF114	55905	-0.7412537	0.000861012
BCL6	604	-0.74334607	0.001117251
DNMT3A	1788	-0.74679985	0.0011845
LOC641746	641746	-0.74872293	0.000563502
WISP1	8840	-0.75122667	0.000387906
GNPDA1	10007	-0.7536383	0.000696236
ZCCHC24	219654	-0.76145388	0.008491957
TRIM22	10346	-0.76397571	0.009770883
MCU	90550	-0.76510928	0.008565544
DNAH11	8701	-0.77019054	0.009298548
ETNK2	55224	-0.77164047	0.003217638
SRP9	6726	-0.77565626	0.003241443



GCLM	2730	-0.77804896	0.009818797
NLGN2	57555	-0.78195318	0.002017856
ABI2	10152	-0.78457595	0.003234995
EXT1	2131	-0.78590099	0.001190153
PARP9	83666	-0.78659591	0.000896811
SH2B1	25970	-0.78830911	0.005103154
ARL2	402	-0.79182132	0.001879607
CCDC102B	79839	-0.79202461	0.000267104
EPB41L1	2036	-0.79268074	0.003819119
EIF3L	51386	-0.79397325	0.002044796
ECH1	1891	-0.7950003	0.001398588
TRGV7	6981	-0.79515562	0.000440707
ZP1	22917	-0.79538624	0.000229192
TMEM200B	399474	-0.8006403	0.003089955
LOC100126784	100126784	-0.80169715	0.000266254
SRSF6	6431	-0.80218927	0.006144654
IRF2BP2	359948	-0.80418105	0.002203909
B3GALNT1	8706	-0.80595061	0.002643886
PLIN4	729359	-0.80620909	0.004136529
PGD	5226	-0.81372907	0.00555388
VGLL4	9686	-0.81467844	0.005209212
ZNF627	199692	-0.81668111	0.006592867
HIST1H4J	8363	-0.81766992	0.00021433
MECOM	2122	-0.81827497	0.005471923
IRF7	3665	-0.81878827	0.002634346
MRPS25	64432	-0.81894017	0.009751386
ACSF2	80221	-0.81908823	0.005139048
PLXNA4	91584	-0.81943146	0.000901248
CCNG2	901	-0.82183669	0.009400456
LRRC37A2	474170	-0.82251943	0.002273946
C2orf28	51374	-0.82472144	0.000838053
CASP6	839	-0.82582576	0.005016329
CD164	8763	-0.83171553	8.49E-06
PHYH	5264	-0.83185096	0.00257391
-	55525	-0.83480078	0.008725002
ATP8B4	79895	-0.83755905	0.001041096
LMAN2L	81562	-0.84130961	0.0001527
CLK1	1195	-0.84420611	0.007179823
FLJ90757	440465	-0.8461202	0.007560958
CCDC23	374969	-0.84669929	0.008980745
EIF2A	83939	-0.85049727	0.008126562
LAT2	7462	-0.85225544	0.004763956
STK17B	9262	-0.85321221	0.004256262
RDM1	201299	-0.85389875	0.000203258
IFNAR2	3455	-0.85423557	0.007627953

LOC100133050	100133050	-0.85512658	0.002003027
PLSCR1	5359	-0.85954251	0.008478388
ZSWIM4	65249	-0.86256572	0.00160815
MED4	29079	-0.86277161	0.003495727
ZNF561	93134	-0.86442669	0.0013339
SPG21	51324	-0.87217249	0.00091747
HIST1H4K	8362	-0.87475154	0.003583476
MCEE	84693	-0.87553964	0.006686572
HOXB7	3217	-0.87593065	1.08E-06
GSTA4	2941	-0.88374943	0.002364924
SLC43A1	8501	-0.88644677	0.005395706
MYL6B	140465	-0.89106968	0.004722051
MMD	23531	-0.89184873	0.003931447
EVL	51466	-0.89270448	0.006960628
NFYB	4801	-0.89296483	0.004398345
HEXB	3074	-0.89366478	0.001550536
ATP11B	23200	-0.89421097	0.001197964
FAM118A	55007	-0.89711025	0.004902781
HNMT	3176	-0.90074538	0.005043631
NUCB2	4925	-0.90408079	0.000242846
ARHGEF19	128272	-0.90742179	7.11E-05
EFNB3	1949	-0.90971224	0.000514224
DLK2	65989	-0.91010874	0.001872275
NAT14	57106	-0.91484001	0.00799707
FZD2	2535	-0.92531718	0.005721034
MKRN3	7681	-0.93027685	0.008794353
ST5	6764	-0.93144959	0.000223953
FRMD7	90167	-0.93187258	0.000500212
PPP2R3B-AS1	283981	-0.93499008	0.007539146
ZNF462	58499	-0.93585973	0.006064535
ZNF22	7570	-0.93838418	1.70E-05
FOXL1	2300	-0.94110339	0.000308806
EPSTI1	94240	-0.94749357	0.000228834
ZNF512	84450	-0.94789835	1.55E-05
WDYHV1	55093	-0.9537301	0.004080555
KRT8	3856	-0.95882398	0.00424147
KDM1A	23028	-0.96318716	0.00715351
LOC100192378	100192378	-0.96377048	0.008205298
SRSF5	6430	-0.96871248	0.004391307
RUNX2	860	-0.96930293	0.000192526
ELOVL3	83401	-0.96999108	0.008840604
CD320	51293	-0.97107928	0.006232038
RGMA	56963	-0.97257286	0.000810215
ZFHX4	79776	-0.97563464	0.001223284
IFNGR2	3460	-0.97745594	0.001175539

PDP2	57546	-0.98245741	0.000965136
IRX5	10265	-0.98747457	0.002267402
SREBF2	6721	-0.98946701	0.003861689
RNASE4	6038	-0.99132503	0.002982042
DAAM2	23500	-0.99200587	0.001424588
GLI3	2737	-0.99645312	0.005725647
LOC100131829	100131829	-0.99832191	0.008230979
SLC16A5	9121	-1.00057423	0.001631647
ZRANB2	9406	-1.00592505	0.004692937
KLF10	7071	-1.00930734	0.002497261
CLCA4	22802	-1.01404594	2.46E-06
ACOT1	641371	-1.01549573	0.000533109
ANKRD10	55608	-1.02245962	0.001434398
SOCS3	9021	-1.02900174	0.006968406
HCG22	285834	-1.03642838	0.001629995
CIRBP	1153	-1.03892325	0.006667245
TRANK1	9881	-1.04035423	0.005718745
AIG1	51390	-1.04062692	6.84E-06
HOXA6	3203	-1.04721687	0.001631307
GLTSCR2	29997	-1.0699097	0.001352643
SAT2	112483	-1.07170481	0.000238171
LOC100506191	100506191	-1.07334271	0.004280838
LACTB2	51110	-1.07588863	0.0098384
CEP70	80321	-1.07858852	0.000878687
G6PD	2539	-1.0869083	0.002198229
HMGN1	3150	-1.089208	0.001367525
EIF4B	1975	-1.08983613	9.90E-05
SALL4	57167	-1.09571089	0.00660811
H2BFM	286436	-1.10066077	0.000143029
KCNE3	10008	-1.10067719	0.004103713
CXCL16	58191	-1.10729194	0.000883231
LOC645166	645166	-1.10872238	0.002663621
STOM	2040	-1.11130707	0.008282561
AGPAT4-IT1	79992	-1.11895397	0.003338394
CCDC152	100129792	-1.12228	0.000519138
BIVM	54841	-1.12245788	0.002029738
MMAB	326625	-1.12319873	0.000129684
LYPD6	130574	-1.12510647	0.001874653
LOC388796	388796	-1.12631225	0.008477646
FIGNL2	401720	-1.12681099	0.003473339
ID3	3399	-1.1272233	0.004626588
IL1R1	3554	-1.12756396	0.004123972
PON3	5446	-1.12869738	0.002976761
C1QTNF6	114904	-1.12919153	0.003556799
DUSP2	1844	-1.13265584	0.000143265

SOX9	6662	-1.13501656	0.005578633
IRF9	10379	-1.13598929	0.000413756
FKBP7	51661	-1.1374893	0.000208092
UBA7	7318	-1.13777903	0.008650642
IL11RA	3590	-1.13931206	3.00E-06
OASL	8638	-1.14026844	0.004296257
ATF7IP2	80063	-1.14307043	0.000976688
HOXA5	3202	-1.15529238	0.004799331
MAFB	9935	-1.15740061	0.001688355
CDK14	5218	-1.17002488	0.001595989
SLC16A4	9122	-1.17343782	0.00608257
MAP2K6	5608	-1.17546303	3.43E-05
THBS3	7059	-1.19624035	0.003630524
TMEM25	84866	-1.20059087	6.55E-05
OLFML3	56944	-1.20165161	0.001924458
ASB2	51676	-1.20915214	0.000202715
HOXB3	3213	-1.21037084	4.03E-08
TMEM121	80757	-1.21180644	0.005726706
FPR1	2357	-1.21705822	0.003273461
DTWD1	56986	-1.21758392	0.000545453
LOC100130876	100130876	-1.21778853	0.005800384
PARP14	54625	-1.21887854	0.005835325
CHKB	1120	-1.22485241	0.007685608
LRIG3	121227	-1.22534331	0.002584162
STGC3	474171	-1.23449686	0.009347992
CA11	770	-1.25814646	1.49E-06
TRO	7216	-1.26647948	0.004667759
BLID	414899	-1.26847783	0.001263684
KIAA0895L	653319	-1.26907792	0.005501874
ARL9	132946	-1.26999429	0.000565763
SLC44A1	23446	-1.28023025	0.001119422
BNC2	54796	-1.2816454	5.98E-06
GSDMD	79792	-1.28508	0.001738583
EBLN2	55096	-1.2861291	0.004399473
ARL17B	100506084	-1.28714715	0.000344415
TET1	80312	-1.28815182	0.000340513
ARHGEF3	50650	-1.29268914	0.004204586
CHRNE	1145	-1.29420677	0.000412193
LTC4S	4056	-1.29709371	0.000813156
CEP95	90799	-1.30274155	0.001373354
GLT8D2	83468	-1.30689101	8.99E-05
LINC00340	401237	-1.31308508	0.007390322
PDGFRA	5156	-1.31580733	0.006999418
TIA1	7072	-1.32364657	0.000414702
GYG2	8908	-1.32660552	0.000552677

GPRASP1	9737	-1.32884972	0.001605723
ARSI	340075	-1.3309127	0.00017445
FES	2242	-1.33097722	0.007300273
BCL3	602	-1.34823074	0.008261545
LOC153684	153684	-1.34982497	0.000787809
IL26	55801	-1.35442219	0.009143639
FAM46A	55603	-1.35541086	0.000517919
FADS1	3992	-1.39343734	0.006329085
ANXA2R	389289	-1.39715947	0.001613171
TG	7038	-1.41006929	0.00483972
TRAPPC6A	79090	-1.42788053	0.000820581
FAM46B	115572	-1.44769582	0.000542293
HIST2H2BF	440689	-1.47271408	0.001056512
SPATA22	84690	-1.48042739	0.005287952
MGC24103	158295	-1.50580815	0.003939922
PIM1	5292	-1.51531215	0.006848851
FAM110A	83541	-1.51636988	0.000104188
LOC283050	283050	-1.53937626	0.008275229
SPEG	10290	-1.54745096	0.001409044
GCHFR	2644	-1.57985083	2.05E-05
FGFR2	2263	-1.58626982	0.000906132
ALX1	8092	-1.58880388	6.85E-05
HOXA3	3200	-1.59532383	0.005807129
TMEM155	132332	-1.60251183	0.002747805
FADS2	9415	-1.60530003	0.000102284
SUSD2	56241	-1.62862196	0.004932642
ARAP3	64411	-1.63147329	0.005007311
FAM20C	56975	-1.66676027	0.004399477
LDLR	3949	-1.66704895	3.22E-05
RGS2	5997	-1.67341748	0.007586636
C4B	721	-1.67378275	0.000848385
PTPRU	10076	-1.69993414	0.000485067
EFNB2	1948	-1.71160929	0.009350461
LBP	3929	-1.75648535	0.000924305
LBR	3930	-1.76406829	0.001207085
DIRAS3	9077	-1.76619683	0.001100028
SLC25A29	123096	-1.79158142	0.000135268
PRRX1	5396	-1.80501933	0.000504507
LCTL	197021	-1.83120354	0.002950946
CLSTN3	9746	-1.86061601	1.87E-06
SCARB1	949	-1.87734717	0.000346998
BGN	633	-1.895935	0.000201398
C1QTNF5	114902	-1.90516332	0.002840008
DAPK2	23604	-1.92031793	2.63E-05
CRISPLD2	83716	-1.92398487	0.005080723

HLA-DMB	3109	-1.93958857	7.65E-05
HLA-DMA	3108	-1.96244777	0.001603052
EPHB4	2050	-2.01800257	0.002242699
RTP4	64108	-2.02132531	0.000530825
NLGN4X	57502	-2.02775867	0.00072999
LINC00537	203274	-2.0311517	0.000439646
PRRT2	112476	-2.03424408	0.002013923
NINJ1	4814	-2.08237993	1.91E-06
MEX3A	92312	-2.0912254	5.67E-05
SALL2	6297	-2.0997793	0.001891203
HLA-DRA	3122	-2.11067145	0.000679094
B4GALT5	9334	-2.11369822	0.002013471
CLDN23	137075	-2.15172437	0.001834931
CD82	3732	-2.15380802	0.002268749
LPCAT2	54947	-2.1583298	0.004119007
CECR7	100130418	-2.16062338	0.002174221
QPRT	23475	-2.16073244	0.003226824
KCNJ2	3759	-2.17037533	0.003753219
DDIT4L	115265	-2.18288362	0.00036771
ZFPM2	23414	-2.21129775	6.85E-05
DPYSL3	1809	-2.24195114	0.002152659
OSBPL7	114881	-2.25082411	5.21E-05
TMSB15B	286527	-2.25101827	0.000346397
SGK223	157285	-2.27567216	0.000133146
PRUNE2	158471	-2.27792568	0.000183914
ANGPT1	284	-2.30886574	0.005629818
SOX4	6659	-2.33594395	0.000171966
FAM198B	51313	-2.34237176	0.009324107
MILR1	284021	-2.34393312	6.84E-05
SERINC2	347735	-2.34795072	0.003880812
SCD	6319	-2.36146949	5.46E-05
MX1	4599	-2.36522633	0.008567268
INSIG1	3638	-2.39612646	0.001102918
LAMA4	3910	-2.41302926	0.003526554
TSPAN18	90139	-2.4166583	0.003026347
OLFML2B	25903	-2.47318639	0.004624003
PDE7B	27115	-2.54485972	0.000566493
SELENBP1	8991	-2.57149067	0.001000492
SNAI1	6615	-2.60617699	6.86E-05
CEBPA	1050	-2.60936458	4.73E-05
NFE2	4778	-2.61653154	0.000164902
LSP1	4046	-2.64107157	0.000623037
TPD52L1	7164	-2.65415057	0.005698671
GXYLT2	727936	-2.65827134	0.000665306
RASD1	51655	-2.66140963	0.001253357

LRRC17	10234	-2.6670589	2.75E-05
ITGA10	8515	-2.67359291	0.006076972
MFAP2	4237	-2.70749384	0.000109299
SOX11	6664	-2.74402671	0.000750752
SLC1A3	6507	-2.77431771	0.007214163
EVI2A	2123	-2.80395855	7.28E-05
LEPREL1	55214	-2.82078193	0.000932461
GAS1	2619	-2.83675578	0.000385498
MARCKSL1	65108	-2.85247512	0.000126069
RARRES3	5920	-2.89255753	0.001604633
CECR1	51816	-2.9743813	0.003572506
S100A4	6275	-2.9989826	0.005860374
NETO2	81831	-3.04040622	0.000205988
COLEC12	81035	-3.04793665	0.000313906
KRT18P55	284085	-3.07001994	0.008007004
KRT18	3875	-3.20727024	0.003875396
GABRE	2564	-3.25998595	0.006883817
CLIC3	9022	-3.51467744	8.78E-05
HOXB5	3215	-3.56619466	1.79E-07
CHI3L1	1116	-3.62096426	0.008584458
RBP4	5950	-3.62514502	0.007420069
HAPLN1	1404	-3.65329591	0.001880694
BDKRB2	624	-3.66134895	0.006936445
CDKN1C	1028	-3.74402937	0.000130451
PTN	5764	-3.74500877	0.006359698
A2M	2	-3.78427694	0.001732923
IFITM1	8519	-3.81919053	0.000721663
BDKRB1	623	-3.917766	0.003673944
FAM20A	54757	-4.03922119	1.99E-05
PITX2	5308	-4.07876928	0.000122716
SCRG1	11341	-4.09800409	0.001415874
HOXB4	3214	-4.43603317	5.03E-07
SUSD3	203328	-4.58407134	0.000677915
HOXB2	3212	-4.90609799	3.17E-05
GGT5	2687	-5.62311445	0.000281689
HOXB6	3216	-6.71605634	1.60E-05

**Table S4 Differentially expressed genes o8-o4**

<b>Gene Symbol</b>	<b>Gene ID</b>	<b>logFC</b>	<b>p-value</b>
IGFBP2	3485	3.58812777	0.00185627
NTF3	4908	2.272742492	0.000934243
TNFRSF11B	4982	2.241457155	0.00067049
CACNB4	785	2.170279048	0.001810112
EGR2	1959	1.977989108	0.002693097
TNS3	64759	1.921564525	0.007133874
BHLHE41	79365	1.874450112	0.003674915
LUM	4060	1.861998859	0.004426424
LIMCH1	22998	1.672198804	0.006892034
EPDR1	54749	1.59874427	0.007826259
ITGA11	22801	1.586363992	0.002439436
MFAP5	8076	1.575001684	0.000722107
HIST1H1C	3006	1.566321608	0.001539674
FNIP2	57600	1.549523261	0.007421094
SYT12	91683	1.529691033	0.009192308
TM4SF20	79853	1.479003006	0.003364446
STK38L	23012	1.40132438	0.000622039
EFEMP1	2202	1.376318392	0.008803179
SAMD5	389432	1.342970852	0.00273421
BST1	683	1.330750812	0.007759965
C11orf96	387763	1.322299824	0.002345648
ANTXR1	84168	1.314691507	0.005811314
UACA	55075	1.31456524	0.000371347
OCLN	100506658	1.30010259	0.001354151
KIAA1462	57608	1.291125544	0.008075084
PMEPA1	56937	1.284490614	0.00972049
LOC100507421	100507421	1.271945775	0.00022935
CRYAB	1410	1.270782286	0.008858956
TGFB3	7043	1.269652779	0.006796896
LOC284998	284998	1.269360213	0.000665789
GLS	2744	1.258634341	0.000884256
SNORA28	677811	1.242692719	0.003474238
IGFBP7	3490	1.228202879	6.49E-05
C1QTNF5	114902	1.219239951	0.002010275
SORBS2	8470	1.214589103	0.006586365
TGFBR1	7046	1.210927766	0.008816987
C21orf7	56911	1.199690996	0.000493793
GRAMD3	65983	1.161645967	0.002392159
HAPLN3	145864	1.150635615	0.00573585
CMAHP	8418	1.146075133	0.003198057
EPAS1	2034	1.145418337	0.00472347



RNF141	50862	1.143345456	0.000693771
HIST1H2BK	85236	1.13349313	0.000270741
SERPINE2	5270	1.130381305	0.000459067
CYB5R1	51706	1.125720516	0.004996946
ABTB2	25841	1.122645857	0.001218819
TSPAN3	10099	1.115300831	0.000287802
SERPINI1	5274	1.104648577	0.002011882
MRVI1	10335	1.100421434	0.002275723
C1orf198	84886	1.099284883	0.004961309
RUNX1	861	1.094901982	0.002901509
SCD	6319	1.094348811	0.000584738
CYP27A1	1593	1.087853477	0.00238493
C15orf48	84419	1.073999526	0.002358686
PLSCR4	57088	1.073006618	0.008167942
SSPN	8082	1.071752892	0.002619864
GSG1	83445	1.062220912	3.34E-05
HIST2H2AA4	723790	1.051616292	0.000599444
TIMP1	7076	1.046112877	0.000538151
SGK223	157285	1.041759841	0.001367735
ITPR1	3708	1.019807364	0.008504653
ACTA2	59	1.019287193	0.000935898
MEF2A	4205	1.019017956	0.002649631
CYP2U1	113612	1.018164569	0.009110113
HIST1H2BC	8347	1.010995135	0.000511118
CCPG1	9236	1.001263481	0.0077068
DRAM1	55332	0.993651374	0.006516136
PKD2	5311	0.992581801	0.003175066
TBC1D12	23232	0.990594283	0.006852778
ASAH1	427	0.988261551	0.009154517
ASB5	140458	0.981258938	0.008121717
TANC1	85461	0.977707353	0.004387676
SCN9A	6335	0.97357403	0.002113454
ANGPTL4	51129	0.958248466	0.001847484
OSBPL10	114884	0.946069501	0.008228362
PNPLA3	80339	0.942729078	0.008863258
SYNGR2	9144	0.927593245	0.001925404
CALD1	800	0.925074155	0.000328099
ZNF219	51222	0.919521308	0.002805089
SH3PXD2A	9644	0.90826866	0.008891516
ADAMTS14	140766	0.907180624	0.008996804
LOC283070	283070	0.904871599	0.002924895
KCTD20	222658	0.90395439	7.85E-05
LAMP2	3920	0.899005008	0.006149277
CAND2	23066	0.896903484	0.009834523
LHFP	10186	0.896612536	0.009137589

CMTM4	146223	0.895736897	0.000374842
LRP5	4041	0.895038739	0.005638034
HIST1H2BG	8339	0.885130645	0.000657723
KLHL24	54800	0.882837135	0.004274831
HIST1H2BH	8345	0.876980458	0.001122111
OSTM1	28962	0.869242781	0.003740734
MSMO1	6307	0.862192223	0.001648416
SLC36A1	206358	0.859561947	0.003219309
TMEM66	51669	0.85645388	0.005050499
LATS2	26524	0.85538667	0.006320596
PPP1R14A	94274	0.85470962	0.003641797
MAN2A2	4122	0.854544332	0.000953951
COL4A2	1284	0.850890291	0.003255037
PACS2	23241	0.846422122	0.000142341
ITM2B	9445	0.841779403	0.003875048
LOC100129550	100129550	0.84112941	0.008481967
HIST1H2BM	8342	0.839795175	0.000521508
TSC22D1	8848	0.834600372	0.008973047
CDK6	1021	0.834348535	0.002836483
MFSD6	54842	0.827575811	0.006211937
DSTN	11034	0.821986529	0.000499642
HIST1H2BL	8340	0.821055941	0.001845634
CLN5	1203	0.813528599	0.001342421
JAZF1	221895	0.811823704	0.007600501
KPNA1	3836	0.810479195	0.000299245
FAM26E	254228	0.805493901	0.004523412
FLJ43663	378805	0.80527331	0.002005049
HIST1H2BD	3017	0.799076916	0.001335265
GLRX	2745	0.798475945	3.93E-05
HIST1H2BO	8348	0.796644051	0.002181089
HGD	3081	0.794544584	0.007660633
GABARAPL1	23710	0.790396624	0.004344725
NUAK1	9891	0.781559559	0.003106952
COX7A1	1346	0.781487322	0.008719858
RFTN1	23180	0.775992436	0.000778446
ULK2	9706	0.774668075	0.007883575
LOC283454	283454	0.770912504	0.003753561
JAM3	83700	0.768953623	0.002446679
SPG20	23111	0.768069426	0.00737594
HIST1H2BB	3018	0.767098144	0.001395387
HIST1H2BI	8346	0.763839261	0.00103403
IDI1	3422	0.754627049	0.000302925
SNX1	6642	0.753037889	0.001054872
CLN8	2055	0.749436918	0.004762517
IL6	3569	0.735884618	0.003666364

OPTN	10133	0.73348467	7.63E-05
NDFIP2	54602	0.726246138	0.001134625
AK4	205	0.723688482	0.004692996
ZMYM6NB	100506144	0.721180638	0.001579801
CNN3	1266	0.717768176	0.00338163
ATP6V1G1	9550	0.709535322	0.002352876
CCND1	595	0.704206586	0.00673791
CMTM3	123920	0.700625305	0.000454689
SPARC	6678	0.69948814	0.003405316
TPST2	8459	0.69929907	0.007282383
RNF11	26994	0.693333121	0.002096412
GRAMD4	23151	0.693167108	0.002149864
SLC2A14	144195	0.693070268	0.002589691
SYNPO2	171024	0.6913938	0.005644573
RCN2	5955	0.691052508	0.001660689
COX3	4514	0.69047682	0.003520416
PTTG1IP	754	0.690456594	0.008845955
LOC100216545	100216545	0.690250427	0.002762226
EIF4A2	1974	0.686420253	0.006765792
TRAPPC6A	79090	0.68381279	0.004532759
SQRDL	58472	0.682297063	0.003951195
RCBTB2	1102	0.677208535	0.006611575
IER3	8870	0.673859981	0.007271139
PTPRM	5797	0.673650751	0.009802064
PTGIR	5739	0.673151252	0.007256615
IGIP	492311	0.670285207	0.004459348
FEZ1	9638	0.667576331	0.002426549
ATP11B	23200	0.666758404	0.000235267
RNF130	55819	0.662613294	0.001797467
ME1	4199	0.66195783	0.00981745
ICAM4	3386	0.660750007	0.000955117
FSTL1	11167	0.656525582	0.00368595
B3GALNT1	8706	0.648157852	0.000314652
ARL6IP5	10550	0.639049034	0.000293816
SLC1A7	6512	0.636993987	0.001642731
STX12	23673	0.636792095	0.000312113
HRK	8739	0.636661602	0.003729642
SGCB	6443	0.635601914	0.002428916
COX1	4512	0.633437337	0.005592642
LYSMD4	145748	0.632111474	0.00620864
MANBA	4126	0.630594678	0.00597419
KCTD10	83892	0.627123603	0.00225528
CYTB	4519	0.626139876	0.006723263
PLEKHA1	59338	0.625486446	0.000940835
ACYP2	98	0.624076718	4.84E-05

SPRY1	10252	0.623481722	0.006549089
FAP	2191	0.623377603	0.001242482
PPP1R3B	79660	0.621853603	0.005135811
CYLD	1540	0.615658803	0.005071024
TP53INP2	58476	0.614002295	0.001242183
ACSL3	2181	0.602250887	0.005023082
C5orf15	56951	0.59953353	0.006177723
AHCYL2	23382	0.598162148	0.002565514
TMEM80	283232	0.592377107	0.001274481
KLHL3	26249	0.591946212	0.004405237
ATP6V0E1	8992	0.591243387	0.004319673
TIMP2	7077	0.590962651	0.002165644
RBMS1	5937	0.589976301	0.001807491
TWSG1	57045	0.589623783	0.000257384
FAM18B2	201158	0.588284538	0.00230413
TRIM22	10346	0.587393446	0.002212235
SLC35F5	80255	0.586855241	0.00589764
AGPAT2	10555	0.586779054	0.00140361
ITPRIPL2	162073	0.586145509	0.000409137
YPEL5	51646	0.585914973	0.001901595
SQSTM1	8878	0.582147448	0.008564873
CAMK1D	57118	0.581580302	0.008007691
APITD1	378708	-0.580834104	0.000661354
KHDRBS1	10657	-0.580913359	0.002580456
DBF4	10926	-0.582692205	0.002047139
AZI1	22994	-0.584211661	0.003253157
C20orf72	92667	-0.587674761	0.0028858
LOC100127983	100127983	-0.589305536	0.000466804
NRIP1	8204	-0.589685678	0.002231987
HMBS	3145	-0.589857849	0.004923388
RPS6KA4	8986	-0.590801747	0.002255236
TUBG1	7283	-0.59654917	0.003113043
ARHGAP11A	9824	-0.596946109	0.00635246
NT5C	30833	-0.597371661	0.009905926
IFRD2	7866	-0.599028635	7.02E-05
TOX	9760	-0.60212939	8.51E-05
OSR1	130497	-0.602458066	0.002881327
ARPC1A	10552	-0.603036917	0.005673845
MNS1	55329	-0.60404867	0.003561448
SRSF3	6428	-0.605578177	0.000285286
-	100508996	-0.608833919	0.005687329
CDK2	1017	-0.61110077	0.006625624
CBLB	868	-0.613097143	0.004512411
WEE1	7465	-0.616452737	0.00268392
DERA	51071	-0.619427402	0.00770063

HIRIP3	8479	-0.619621757	0.001418126
CEP128	145508	-0.619712228	0.005599671
LSM2	57819	-0.619999331	0.009717348
RPL36A	6173	-0.620671905	0.006553921
PPARG	5468	-0.621311113	0.00716305
HIST2H3D	653604	-0.622054854	0.005676556
POLD3	10714	-0.622223961	0.003435541
BRIP1	83990	-0.62444485	0.006048135
SPTLC3	55304	-0.625316552	0.003382476
CSE1L	1434	-0.628843643	0.000789135
HIST1H3E	8353	-0.633297331	0.006507755
NASP	4678	-0.635312341	0.001348714
ALYREF	10189	-0.63794788	0.004819735
BCL2L12	83596	-0.638489512	0.007080638
LOC81691	81691	-0.643314767	0.005729407
RGMB	285704	-0.643448623	0.006012444
RPLP0	6175	-0.644711139	0.002518001
SUV39H1	6839	-0.645208867	0.005635866
-	100508181	-0.648930326	0.001403484
THAP10	56906	-0.651480165	0.000727241
HNRNPH1	3187	-0.65341093	0.00239848
NR2C2AP	126382	-0.655877441	0.000442433
PTGS1	5742	-0.660420787	0.001589099
FANCA	2175	-0.669120583	0.003236936
RPSA	3921	-0.669189295	0.002708495
CDCA4	55038	-0.674891922	0.002881876
CBX5	23468	-0.675189168	0.009346077
TARBP2	6895	-0.676438555	0.007652133
RPS8	6202	-0.67715384	0.002096189
MCM6	4175	-0.679901796	0.003323898
TELO2	9894	-0.680369223	0.002614422
FAM72A	729533	-0.684069757	0.000445778
PAQR4	124222	-0.685136733	0.009852718
RPLP0P3	122589	-0.687699405	0.004746001
BUB3	9184	-0.688445052	0.004451076
TMEM194A	23306	-0.689016674	0.000371524
CLSPN	63967	-0.696382137	0.000641496
HNRNPD	3184	-0.696723563	0.001588811
RPLP0P5	643779	-0.697903634	0.002209406
PLEK2	26499	-0.698742514	0.002310087
RHEBL1	121268	-0.700562156	0.003198056
SNRPB	6628	-0.701320102	0.004232815
VIM	7431	-0.70411585	0.000176752
SLC25A5	292	-0.709965047	0.001049383
SGOL2	151246	-0.714246081	0.000705083

RPSAP52	204010	-0.714787917	0.000784918
HIST1H2AL	8332	-0.717874196	0.004175303
THOP1	7064	-0.718690507	0.002755463
MIS18BP1	55320	-0.719064759	0.000343202
BRCA2	675	-0.720622288	0.000300506
RMI1	80010	-0.724077548	6.24E-06
HMGN2	3151	-0.725421409	0.004510832
WHSC1	7468	-0.727939439	0.005942831
VRK1	7443	-0.729112849	0.00397416
MYPN	84665	-0.733341841	0.008933863
E2F8	79733	-0.735536431	0.002313034
FAM110A	83541	-0.73687625	0.000702332
PLK4	10733	-0.7378172	0.00551516
RPS2P32	256355	-0.741031619	0.001084007
CCNE2	9134	-0.743601999	0.002461108
LOC147727	147727	-0.744203649	0.000319492
IFI16	3428	-0.744333638	0.00295728
HPDL	84842	-0.74735944	0.002678115
EIF5A	1984	-0.751277825	0.009191231
C18orf54	162681	-0.754598087	0.001476362
TMEM121	80757	-0.75494546	0.004966282
WWC1	23286	-0.755282333	0.007764474
PSIP1	11168	-0.755352108	0.002015782
FANCC	2176	-0.756775919	0.000757189
NCAPH2	29781	-0.757983679	0.006002264
HIST1H2AM	8336	-0.762936266	0.008059259
TUBB6	84617	-0.765832748	0.000961389
STIL	6491	-0.766722443	0.00437611
GJC1	10052	-0.77214882	0.002629791
FANCD2	2177	-0.777860005	0.002184876
SUV39H2	79723	-0.778986591	0.004998302
FAM46B	115572	-0.78226011	0.001367919
TMPO	7112	-0.782606064	9.98E-05
SRM	6723	-0.783377458	0.002950236
WDR76	79968	-0.788577427	0.000930809
SOCS3	9021	-0.793784842	0.001426664
RPS2	6187	-0.796814205	0.000549611
PCNA	5111	-0.80427776	0.000241065
EXOSC8	11340	-0.806893715	0.005569719
RFC3	5983	-0.807203433	0.002843827
CSF1R	1436	-0.813092074	0.003179216
HIST1H2BE	8344	-0.813135742	0.003141283
FBL	2091	-0.813426324	0.002032671
NRM	11270	-0.820207599	0.005610064
BLVRB	645	-0.822063946	0.007744326

ENTPD6	955	-0.83311931	0.005822067
WDR34	89891	-0.8333859	0.000638621
POLA2	23649	-0.836787513	0.006422252
RAD51AP1	10635	-0.837181411	0.003370957
SMC2	10592	-0.842436275	0.00061567
DEPDC1B	55789	-0.842554973	0.007085235
TDP1	55775	-0.845333997	0.008606102
NEIL3	55247	-0.848157112	0.002231017
DOCK10	55619	-0.848926771	0.004330574
USP1	7398	-0.850744117	0.000161008
RIBC2	26150	-0.851366328	0.000570752
CHAF1A	10036	-0.852837279	0.004318838
LOC100130111	100130111	-0.857353657	0.00191294
CTSC	1075	-0.860387619	0.005481697
HIST1H2BF	8343	-0.8614009	0.001291913
DDX39A	10212	-0.863302105	0.004444169
TUBB4B	10383	-0.865010037	0.004160457
BAALC	79870	-0.865650248	0.001270493
CHEK1	1111	-0.870563619	0.001752062
HAUS8	93323	-0.87191634	0.001586223
CENPO	79172	-0.873249351	0.004100343
SGOL1	151648	-0.87416019	0.007201349
CDC25A	993	-0.877325762	0.003618326
C15orf23	90417	-0.880580663	0.007276484
TUBA1A	7846	-0.883237369	0.002604235
DNMT1	1786	-0.884885182	0.001686532
CENPJ	55835	-0.886996313	0.002562897
RPL39L	116832	-0.887698439	0.008075003
TMSB15B	286527	-0.892400773	0.007530196
ASB10	136371	-0.898050537	0.007571626
OLFML3	56944	-0.90277063	0.000380648
RPA3	6119	-0.903637796	0.000767872
POLA1	5422	-0.904521419	0.000274939
CALB2	794	-0.904823563	0.000301986
C4orf46	201725	-0.91249443	0.000200212
TEX30	93081	-0.913003043	0.002344575
NEURL1B	54492	-0.913590288	0.006793279
TUBB	203068	-0.914406654	0.001483839
WDR62	284403	-0.918648885	0.003069366
WDHD1	11169	-0.924093865	0.000872461
HIST1H3H	8357	-0.930781738	0.000999098
C1orf112	55732	-0.931497951	0.000433057
HMGB1	3146	-0.934152292	0.001753528
ISM1	140862	-0.935790828	0.008163354
EMP2	2013	-0.93803477	0.006899447

MIOS	54468	-0.949069348	0.009419222
C14orf80	283643	-0.951030902	0.00291484
HNRNPA1L2	144983	-0.96098271	0.000427447
MT1F	4494	-0.961991178	2.58E-05
HIST1H3G	8355	-0.963952326	0.006416012
STMN1	3925	-0.965407801	0.00362028
LOC100289388	100289388	-0.975338632	0.001996316
AURKAPS1	6791	-0.976915816	0.007921482
DSN1	79980	-0.97692135	0.000517749
DNAJC9	23234	-0.978445061	0.001707967
CCDC99	54908	-0.982774023	0.001499348
GMNN	51053	-0.98319783	0.000525749
RFC5	5985	-0.986844151	0.002025769
PKN3	29941	-0.999387525	0.004230054
TUBA1C	84790	-1.008819014	0.00146884
FEN1	2237	-1.008844637	0.000630245
NCAPD2	9918	-1.011946183	0.00035324
RANBP1	5902	-1.011948384	0.000703121
KNTC1	9735	-1.019401337	0.00075168
MYO19	80179	-1.019706575	0.000163436
HN1	51155	-1.025232686	0.009943271
AXL	558	-1.029531602	0.000765874
RFC2	5982	-1.032639036	0.002547922
INCENP	3619	-1.037337127	0.002359915
POLD1	5424	-1.049285988	0.001118489
CDC7	8317	-1.050166332	0.00023504
RFC4	5984	-1.05515218	0.000383939
CKS1B	1163	-1.058130674	0.001923888
KIF20B	9585	-1.05824731	0.00117645
MCM3	4172	-1.060461498	0.000934832
FAM72D	728833	-1.061436626	0.000614915
GPSM2	29899	-1.077755515	0.009593268
KPNA2	3838	-1.083214576	0.001923823
MCM8	84515	-1.089614267	0.00235876
ADAMTS1	9510	-1.091299469	0.00964706
TUBA1B	10376	-1.103366928	7.51E-05
POLE2	5427	-1.107436457	0.001061359
ARHGAP11B	89839	-1.107908793	0.004166868
LBR	3930	-1.108585906	0.000951567
NCAPG2	54892	-1.113884973	0.003294731
MCM10	55388	-1.125457708	0.002196509
IRS1	3667	-1.131081206	0.000663241
ANPEP	290	-1.135554238	0.001972825
TIMELESS	8914	-1.138555934	3.37E-05
NCAPG	64151	-1.142841365	0.000709568



HELLS	3070	-1.151587427	0.001779392
HIST1H4D	8360	-1.152978144	0.003212423
SPC24	147841	-1.162797488	0.006882059
ZWILCH	55055	-1.163213716	0.00063583
MIR31HG	554202	-1.163255515	0.001032349
PSMC3IP	29893	-1.175503939	0.008496606
BRCA1	672	-1.18276621	0.000146704
GALNT6	11226	-1.185159542	0.005744284
DTYMK	1841	-1.187340866	0.000487326
CDKN2C	1031	-1.191854611	0.004097021
PRIM1	5557	-1.194550241	5.52E-05
GINS3	64785	-1.199783245	0.001669776
NETO2	81831	-1.2140947	0.004938505
SAPCD2	89958	-1.215669083	0.009325334
GAS2L3	283431	-1.219045638	0.004315233
C19orf48	84798	-1.220312794	0.003585174
ERCC6L	54821	-1.225645817	0.002257376
EXO1	9156	-1.229850167	0.002642517
PCOLCE	5118	-1.231848213	0.004436996
RRM1	6240	-1.234348612	6.66E-05
ORC6	23594	-1.234811985	0.002442079
CENPH	64946	-1.23604987	0.00124801
UBE2T	29089	-1.238943912	0.003192209
LMNB1	4001	-1.239083488	0.000315583
NEK2	4751	-1.246155227	0.003470451
C1orf135	79000	-1.251408898	0.001738774
MT1X	4501	-1.25164562	0.00339119
H2AFX	3014	-1.256578095	0.005382729
CENPK	64105	-1.257800822	0.00068645
ATAD2	29028	-1.25821065	0.00036521
C11orf87	399947	-1.259715099	0.002790734
BARD1	580	-1.265029722	0.000712319
HIST1H1A	3024	-1.26965125	0.003840335
PTTG3P	26255	-1.276995257	0.005025955
TCF19	6941	-1.287344879	4.19E-05
CDCA5	113130	-1.291358424	0.00212835
MCM4	4173	-1.299421884	0.000167146
HIST1H4L	8368	-1.308078575	0.0006909
AIM1	202	-1.31120297	0.000304186
FANCG	2189	-1.328831906	9.10E-05
H2AFZ	3015	-1.330025716	0.000794165
IGFBP3	3486	-1.337379569	0.008566336
KIF18A	81930	-1.342081084	0.002489007
CDC25C	995	-1.3501068	0.002266877
RNASEH2A	10535	-1.353570873	0.002620034

ESCO2	157570	-1.354960638	0.000500742
E2F2	1870	-1.363377552	0.009564445
SMC4	10051	-1.381994327	0.000240573
MCM2	4171	-1.402642111	0.001767387
HIST1H2AI	8329	-1.406988957	0.00480992
PSRC1	84722	-1.430407112	0.002260821
HMGB2	3148	-1.443530416	0.000412417
KIF22	3835	-1.447333679	0.00205646
TRIP13	9319	-1.448529012	0.002027209
CASC5	57082	-1.457859709	0.001655006
CENPM	79019	-1.45828374	0.009709911
CIT	11113	-1.461842972	0.000563347
ID1	3397	-1.462048999	0.006813549
POLQ	10721	-1.469151482	0.000396958
C16orf59	80178	-1.484263232	0.001440546
KIF4A	24137	-1.489548527	0.003164573
LIG1	3978	-1.504180542	0.000864575
POC1A	25886	-1.505845063	0.001587044
APOBEC3B	9582	-1.516341615	0.002718937
TRAIP	10293	-1.525233463	0.000594329
AURKB	9212	-1.539084503	0.002748659
ASF1B	55723	-1.559259112	0.00616575
KCNJ8	3764	-1.561932559	0.008457651
RMI2	116028	-1.565880301	0.003404514
EZH2	2146	-1.568511418	0.000310899
CENPW	387103	-1.56901378	0.004013989
MCM7	4176	-1.573639101	7.80E-05
PTGER2	5732	-1.575969531	0.001784089
UHRF1	29128	-1.59024531	0.001651282
FBXO5	26271	-1.609452902	0.000453703
C11orf82	220042	-1.609893279	0.000292734
FAM54A	113115	-1.611715995	0.000711294
SLC38A5	92745	-1.613850326	0.004322671
MCM5	4174	-1.621514427	0.001563992
SKA1	220134	-1.630522648	0.001437988
RAD51	5888	-1.635287414	0.003444201
E2F1	1869	-1.643864333	0.002297361
CHAF1B	8208	-1.649103609	0.000277659
HIST1H3D	8351	-1.68096322	0.004688398
BLM	641	-1.68889919	0.000283637
HIST1H3F	8968	-1.697743145	0.003120513
ZWINT	11130	-1.702734164	0.003341039
CHTF18	63922	-1.703678612	0.000116707
MAD2L1	4085	-1.710744628	0.00078803
DEPDC1	55635	-1.713576313	0.001097817

RACGAP1	29127	-1.72456543	0.000798057
GIN54	84296	-1.726633599	0.002175475
SKA3	221150	-1.727208384	0.001318188
RPL22L1	200916	-1.73460876	0.003057885
HIST1H4B	8366	-1.740197395	0.000334988
GIN51	9837	-1.760323849	0.004150324
KIFC1	3833	-1.77579159	0.004146034
KITLG	4254	-1.788875516	0.001892422
FANCI	55215	-1.803619963	0.000313314
KIF23	9493	-1.806968127	0.001026633
MT1A	4489	-1.82053761	0.004832416
CENPE	1062	-1.822177006	0.00112845
TPX2	22974	-1.832600722	0.004463657
TACC3	10460	-1.83749735	0.002518183
CDKN3	1033	-1.856951125	0.007115311
MKI67	4288	-1.86201852	0.003346781
MLF1IP	79682	-1.874486565	0.003673338
MT1M	4499	-1.886204081	0.004229128
CKS2	1164	-1.930290494	0.003924253
RRM2	6241	-1.938510533	0.001057182
MELK	9833	-1.951014897	0.00057157
RECQL4	9401	-1.952105376	0.000635896
CCNA2	890	-1.966161366	0.001429133
SERPINA9	327657	-1.97159352	0.000206994
HIST1H4C	8364	-1.984841537	0.000214177
RAD54L	8438	-1.992661191	0.000748328
HAS2	3037	-1.999407843	0.007812271
F2RL2	2151	-1.999635431	0.004274791
KIF11	3832	-2.007974985	0.001806004
GIN52	51659	-2.015896572	0.003742685
S1PR3	1903	-2.02232105	0.009971822
FOXM1	2305	-2.028119513	0.003853165
CCNB1	891	-2.03744571	0.003306053
NUF2	83540	-2.054583674	0.000729505
GTSE1	51512	-2.05903212	0.003125884
TTK	7272	-2.064627723	0.000742692
MND1	84057	-2.072200184	0.000378894
KIF15	56992	-2.073502307	0.000279872
CENPA	1058	-2.075777394	0.00211765
KIF14	9928	-2.077927383	0.00083613
CDC20	991	-2.079584574	0.00466933
PRC1	9055	-2.11003192	0.005178582
OIP5	11339	-2.129082732	0.001002884
MT1E	4493	-2.147371475	0.002721111
MMP1	4312	-2.149089606	0.004413531

MT1L	4500	-2.190360555	0.003140983
HIST1H1B	3009	-2.199161379	0.000942284
CEP55	55165	-2.21241068	0.00184561
CKAP2L	150468	-2.226629685	0.000893097
PTTG2	10744	-2.265265006	0.005031919
DTL	51514	-2.265383662	0.000637108
PTTG1	9232	-2.269400851	0.007900283
MT1B	4490	-2.316534232	0.002141562
CENPF	1063	-2.319085843	0.000618507
FAM83D	81610	-2.34702184	0.001288893
NUSAP1	51203	-2.376805175	0.00232285
ANLN	54443	-2.409379488	0.001603387
PKMYT1	9088	-2.409716678	0.004343686
BUB1	699	-2.437358525	0.001304642
DLGAP5	9787	-2.439058591	0.002260316
CCNB2	9133	-2.479020953	0.005029069
MT2A	4502	-2.498059666	4.23E-05
SHCBP1	79801	-2.530690488	0.000853659
TOP2A	7153	-2.609904336	0.000436102
ASPM	259266	-2.619294004	0.00068986
BUB1B	701	-2.626176577	0.000726711
HIST1H3B	8358	-2.639067078	0.001683706
CDCA2	157313	-2.640938023	0.001049724
SPAG5	10615	-2.654236891	0.001726194
CDC45	8318	-2.665312798	0.000780816
TYMS	7298	-2.676786249	0.000989529
KIF2C	11004	-2.688348373	0.00383838
TFPI2	7980	-2.763196065	0.001390473
CDK1	983	-2.820253079	0.00039738
SPC25	57405	-2.865355104	0.001032095
HIST2H3A	333932	-2.900042209	0.001173042
CDCA8	55143	-2.90365038	0.001247398
HJURP	55355	-2.913131487	0.001281274
NDC80	10403	-3.122725818	0.000534444
PBK	55872	-3.174156991	0.00061894
KIAA0101	9768	-3.257597822	0.001937735
BIRC5	332	-3.26589343	0.004319621
HMMR	3161	-3.33551709	0.000634237
TK1	7083	-3.35122648	0.002337127
UBE2C	11065	-3.552112042	0.001653501

**Table S5 Differentially expressed genes y8-y4**

<b>Gene Symbol</b>	<b>Gene ID</b>	<b>logFC</b>	<b>p-value</b>
COL4A4	1286	2.775425969	0.002428801
GREM1	26585	2.413316514	0.003297844
DPP4	1803	2.331557288	0.004782886
PCDH10	57575	2.189433346	0.000506655
OXTR	5021	1.972045329	0.005649192
MGARP	84709	1.89348281	0.001528563
BHLHE41	79365	1.809188653	0.004629083
LOC100507421	100507421	1.776044382	1.03E-05
SPP1	6696	1.706906057	0.000554851
TMEM130	222865	1.701759833	0.003320903
GPRC5B	51704	1.673445219	0.000104653
TNFRSF11B	4982	1.655984195	0.005713973
HIST1H1C	3006	1.559514346	0.001589465
CAMK2N1	55450	1.550198295	0.005495593
CNIH3	149111	1.54148918	0.003321814
EPHA5	2044	1.479887981	0.001955426
THEMIS	387357	1.463707925	0.001284814
NR3C2	4306	1.367270421	0.000788215
MYO1D	4642	1.327571219	0.00338965
OSBPL8	114882	1.310527499	0.000255345
CDKN2A	1029	1.260502441	0.001598076
MME	4311	1.205851715	0.006108295
ITGA4	3676	1.191938055	0.002381832
ARMC9	80210	1.183146879	0.009128027
SLC7A14	57709	1.180324696	0.002391492
NR2F1	7025	1.170782284	0.003889915
FHOD3	80206	1.163508328	0.004289562
ABCA3	21	1.130006586	0.006851439
C21orf7	56911	1.115702392	0.000877461
SERPINB2	5055	1.085770181	0.001900588
CALB2	794	1.083068134	6.16E-05
LRP12	29967	1.066645758	0.006325618
SDPR	8436	1.045012855	0.000776189
ANKH	56172	1.024162337	0.002287455
CACNA2D1	781	1.009056259	0.000619972
RSPO3	84870	1.00823341	0.009078013
NADKD1	133686	0.955969299	0.00375042
PHACTR2	9749	0.951819541	3.22E-05
FRMPD4	9758	0.935279035	0.002865617
SLC9A7P1	121456	0.933589817	0.00089318
FGFR1	2260	0.917930649	3.95E-06

SLC16A6	9120	0.907410641	0.005396236
TXNRD1	7296	0.900965819	0.007596424
CSGALNACT2	55454	0.892407064	0.00028377
HIST1H1E	3008	0.882412078	0.006660187
ADAM10	102	0.852514078	0.000193668
SCN9A	6335	0.84863489	0.005292539
MECOM	2122	0.845382968	9.28E-05
PGRMC2	10424	0.839496823	0.007897643
LOC100134240	100134240	0.825364267	0.008558774
SLC43A2	124935	0.814405395	0.009136759
HIST1H2BK	85236	0.811198885	0.003437926
HSD17B12	51144	0.807597149	0.001907308
SLC2A10	81031	0.788025635	0.000642805
DNAJB4	11080	0.776661002	0.000954087
MYO5A	4644	0.774503453	0.001031679
PUM2	23369	0.773440675	0.000795941
ATP13A3	79572	0.773083367	0.000919646
ZNF219	51222	0.769600645	0.008663195
SLC9A7	84679	0.76398086	0.004589057
CHPF	79586	0.761962087	0.001193229
CCND1	595	0.758916176	0.004210991
RHOQ	23433	0.757413457	0.000439064
SNX18	112574	0.756756137	0.006447969
SERPINE2	5270	0.756109826	0.007847628
SCYL2	55681	0.753520854	0.004670513
SAMD12	401474	0.750774171	0.00084056
MYOF	26509	0.746298262	0.004547112
ASCC3	10973	0.730415727	0.004963853
GOLIM4	27333	0.725589484	0.001724781
HIST2H2AA4	723790	0.724300039	0.008026254
REST	5978	0.724195511	0.001132982
HIST1H2BL	8340	0.721918279	0.004436893
GSG1	83445	0.720526271	0.000954345
HIST1H2BC	8347	0.716544147	0.00599014
HIST1H2BG	8339	0.714649993	0.003163229
LYN	4067	0.706710167	0.007568564
SLC17A5	26503	0.701055865	0.006808267
HIST1H2BO	8348	0.696613671	0.005335763
SH3KBP1	30011	0.695139684	0.002629092
CLDN14	23562	0.687161651	0.00725488
NBEAL1	65065	0.677720405	0.005615853
CMTM4	146223	0.677273919	0.003084292
FNIP1	96459	0.676521893	0.002211184
FRYL	285527	0.674747534	0.000934136
UBL3	5412	0.674645905	0.004533551

HIST1H2BH	8345	0.670824907	0.006945383
ANTXR2	118429	0.669185605	0.001965068
EDEM3	80267	0.666823026	0.001541002
BMPER	168667	0.664848201	0.009624986
DLG1	1739	0.658223866	7.82E-05
ATP10D	57205	0.657414972	0.004294166
DYNLT3	6990	0.656194629	0.008393284
MAGT1	84061	0.655881678	0.001877699
HIST1H2BM	8342	0.655667088	0.003261765
MMP14	4323	0.654764493	0.003481385
FAM177A1	283635	0.651462784	7.53E-05
SON	6651	0.645246955	0.002435465
TOB1	10140	0.643812238	0.002653282
CHST2	9435	0.641226803	0.003515695
SSR3	6747	0.6376272	0.006036747
SLITRK1	114798	0.63547848	0.005384918
HIST1H2AD	3013	0.63199627	0.006074243
ND4L	4539	0.626611367	0.009742962
FICD	11153	0.625461125	0.001628179
MAN1A2	10905	0.621500095	0.005619643
HIST1H2BB	3018	0.621343412	0.005848641
KIAA1143	57456	0.620054318	0.003677715
LMTK2	22853	0.619205083	0.001556086
NAMPT	10135	0.614015148	0.006991905
CYLD	1540	0.611106689	0.005314121
RRM2B	50484	0.609764801	0.002178918
SUN1	23353	0.607837348	0.001068177
NEXN	91624	0.60535261	0.000424475
DPEP3	64180	0.604241552	0.008221546
PAGE2	203569	0.603789508	0.002799735
MBNL1	4154	0.602079083	0.004262623
SECISBP2L	9728	0.596952144	0.000993891
KLHL11	55175	0.596623018	0.003418268
LOC100129447	100129447	0.596147402	0.004985234
HIST1H2BD	3017	0.596075278	0.009238323
GPC1	2817	0.593213775	0.007341147
HSP90AA1	3320	0.592880412	0.009960367
PPP1R2	5504	0.591869804	0.007786729
PAWR	5074	0.589346146	0.002903041
LOC285178	285178	0.587891489	0.000264328
ATP2B4	493	0.585610382	0.002644698
-	652191	0.58358861	8.84E-05
GNPTAB	79158	0.582628049	0.005231889
ZNF365	22891	0.582051487	0.008942916
MARCH9	92979	0.581539698	0.007048183

HMGN4	10473	-0.582671813	0.008440337
C5orf54	63920	-0.588170066	0.000224279
CEP192	55125	-0.58978134	0.002911419
HEYL	26508	-0.593635005	0.002729481
AADAT	51166	-0.595116424	0.002503892
ZRANB2	9406	-0.597532871	0.005496127
RPS8	6202	-0.600057362	0.004732613
C5	727	-0.600200537	0.000193002
CCDC14	64770	-0.611862103	0.002362572
ARL6IP6	151188	-0.617634243	0.006638375
FAM46B	115572	-0.621268473	0.006493704
WDYHV1	55093	-0.623327332	0.002538461
KAT2A	2648	-0.626726518	0.005805754
UGDH	7358	-0.629443274	0.003154039
GDF6	392255	-0.632556435	0.008912144
DDX5	1655	-0.636999604	0.008503356
RPS3A	6189	-0.637706586	0.004424148
RMI1	80010	-0.658016878	1.62E-05
PTPLAD2	401494	-0.66673421	0.000128985
PIF1	80119	-0.67484199	0.003386396
GBP1	2633	-0.68645745	0.004078499
PTX3	5806	-0.699559683	0.00794913
HOXC4	3221	-0.701480185	0.005132006
GMNN	51053	-0.706259586	0.005631567
RFC4	5984	-0.730045794	0.005597717
EEF1A1	1915	-0.733024855	0.000714429
H2BFM	286436	-0.737462966	6.03E-05
HNRNPH1	3187	-0.742592918	0.000939111
SOCS3	9021	-0.762916881	0.001903239
CDC7	8317	-0.77852524	0.002414075
MEX3A	92312	-0.781402299	0.002968507
POLG2	11232	-0.784916517	0.002295783
LBR	3930	-0.798675324	0.008714255
SMC4	10051	-0.862654045	0.007473776
OSBPL7	114881	-0.929035562	0.001371432
HMGB2	3148	-0.99286666	0.006127742
TMSB15B	286527	-0.996689619	0.003762001
OLFML3	56944	-1.005367141	0.000151804
SNHG1	23642	-1.025509832	0.004342439
LCTL	197021	-1.040764971	0.004658326
ADCY3	109	-1.090822861	0.007969221
MEOX2	4223	-1.165840526	0.003338562
PPAP2B	8613	-1.417181117	0.001913285
SCRG1	11341	-1.885796801	0.008979601



**Table S6 Gene ontology enrichment analysis****o4-y4 downregulated differentially expressed genes**

<b>GO ID</b>	<b>GO Term</b>	<b>-log10 (p-value)</b>
GO:0048704	bone marrow development	9.954498008
GO:0009952	pentose-phosphate shunt, oxidative branch	3.732629998
GO:0009051	cranial nerve development	3.314690725
GO:0015920	icosanoid biosynthetic process	3.314690725
GO:0002504	cartilage development	3.255570841
GO:0048592	morphogenesis of an epithelial sheet	3.101467573
GO:0021615	negative regulation of transcription from RNA polymerase II promoter	2.843958595
GO:0019322	response to virus	2.843958595
GO:0048539	mRNA splice site selection	2.843958595
GO:0000122	phagocytosis, recognition	2.843261579
GO:0030878	transmembrane receptor protein tyrosine phosphatase signaling pathway	2.813802273
GO:0034097	positive regulation of smoothened signaling pathway	2.721693693
GO:0031100	thyroid gland development	2.691955972
GO:0006376	positive regulation of chondrocyte differentiation	2.589130796
GO:0035024	pentose biosynthetic process	2.549306147
GO:0045880	palate development	2.549306147
GO:0040007	anterior/posterior pattern formation	2.348074064
GO:0051216	lipopolysaccharide transport	2.339564605
GO:0006910	protein targeting to membrane	2.33382333
GO:0032490	detection of molecule of bacterial origin	2.33382333
GO:0006646	T-helper 2 cell differentiation	2.33382333
GO:0009615	antigen processing and presentation of peptide or polysaccharide antigen via MHC class II	2.314188032
GO:0032355	glossopharyngeal nerve morphogenesis	2.250522885
GO:0021545	eye morphogenesis	2.248992486
GO:0008283	regulation of transcription	2.24310108
GO:0060021	phosphatidylethanolamine biosynthetic process	2.242059359
GO:0046456	response to estradiol stimulus	2.242059359
GO:0032496	response to lipopolysaccharide	2.210497597
GO:0006612	response to cytokine stimulus	2.195169021
GO:0060216	nucleosome disassembly	2.164086353
GO:0006337	negative regulation of Rho protein signal transduction	2.164086353
GO:0045879	definitive hemopoiesis	2.164086353
GO:0045449	cell proliferation	2.129610309
GO:0007185	growth	2.02430091
GO:0002011	rhombomere development	2.02430091
GO:0032332	organ regeneration	2.02430091
GO:0045064	negative regulation of smoothened signaling pathway	2.02430091
GO:0021546	embryonic skeletal system morphogenesis	2.02430091

**o4-y4 upregulated differentially expressed genes**

<b>GO ID</b>	<b>GO Term</b>	<b>-log10 (p-value)</b>
GO:0007257	negative regulation of glucose import	3.461440883
GO:0009612	wound healing	3.313343248
GO:0006884	potassium ion transport	3.129024927
GO:0046627	regulation of neuron apoptosis	2.850951329
GO:0046325	activation of JUN kinase activity	2.53110174
GO:0048703	positive regulation of smooth muscle cell proliferation	2.53110174
GO:0008629	positive regulation of cell-matrix adhesion	2.381524947
GO:0006284	embryonic viscerocranium morphogenesis	2.278485974
GO:0050930	negative regulation of insulin receptor signaling pathway	2.268236671
GO:0043523	induction of apoptosis by intracellular signals	2.239094211
GO:0018209	response to mechanical stimulus	2.190503059
GO:0048661	base-excision repair	2.183180368
GO:0001954	peptidyl-serine modification	2.16318591
GO:0042060	induction of positive chemotaxis	2.138633722
GO:0006813	cell volume homeostasis	2.071513398

**o8-o4 downregulated differentially expressed genes**

<b>GO ID</b>	<b>GO Term</b>	<b>-log10 (p-value)</b>
GO:0051301	DNA ligation	49.62117451
GO:0007067	cell cycle	37.54296902
GO:0006260	G2/M transition DNA damage checkpoint	29.95785791
GO:0007059	mitosis	14.58070067
GO:0006297	anaphase-promoting complex-dependent proteasomal ubiquitin-dependent protein catabolic process	12.56021579
GO:0007049	female meiosis I	10.62142193
GO:0007018	meiosis	9.950277541
GO:0006270	microtubule polymerization	9.111418711
GO:0008283	histone exchange	8.723138512
GO:0006281	interspecies interaction between organisms	8.328359696
GO:0006268	regulation of S phase	8.25893056
GO:0007126	lagging strand elongation	8.253440019
GO:0007051	spindle organization	7.867818721
GO:0007076	regulation of mitosis	7.431877304
GO:0000070	phosphoinositide-mediated signaling	6.97187414
GO:0000724	negative regulation of ubiquitin-protein ligase activity during mitotic cell cycle	6.952717699
GO:0007093	double-strand break repair	6.764339469
GO:0048015	DNA strand elongation during DNA replication	6.708212917
GO:0000079	organ regeneration	6.61604112
GO:0007052	mitotic spindle organization	6.445423823
GO:0006334	mitotic metaphase	6.283456781
GO:0007094	DNA recombination	6.014250744
GO:0007080	mitotic chromosome condensation	6.014250744
GO:0008608	DNA damage checkpoint	5.549278043
GO:0000085	deoxyribonucleotide biosynthetic process	5.177070815
GO:0000731	regulation of ubiquitin-protein ligase activity during mitotic cell cycle	4.635428655
GO:0006310	G1/S transition of mitotic cell cycle	4.445980755
GO:0051382	meiotic spindle organization	4.426999048
GO:0034501	microtubule-based movement	4.426999048
GO:0051258	centrosome separation	4.219871426
GO:0001556	deoxyribonucleoside diphosphate metabolic process	4.063147666
GO:0000089	maintenance of DNA methylation	4.03595971
GO:0006302	oocyte maturation	3.791302015
GO:0010212	female gonad development	3.761183256
GO:0000132	response to organophosphorus	3.741823315
GO:0031145	nucleosome assembly	3.481854497
GO:0071173	cell cycle checkpoint	3.360945703
GO:0006271	regulation of DNA metabolic process	3.352399921
GO:0051987	chromosome organization	3.346649198
GO:0006335	establishment of mitotic spindle orientation	3.346649198
GO:0007079	mitotic cell cycle checkpoint	3.346649198
GO:0000022	regulation of microtubule polymerization or depolymerization	3.346649198
GO:0006288	positive regulation of mitotic metaphase/anaphase transition	3.346649198
GO:0051782	regulation of chromosome segregation	3.346649198
GO:0000082	pyrimidine deoxyribonucleotide biosynthetic process	3.294824033
GO:0033205	regulation of cyclin-dependent protein kinase activity	3.139212125
GO:0007019	meiosis I	3.130782026
GO:0051276	cell division	3.097195065
GO:0007140	nucleotide-excision repair, DNA gap filling	3.046279122

GO:0007096	DNA damage response, signal transduction by p53 class mediator resulting in transcription of p21 class mediator	2.991175204
GO:0046785	spindle assembly checkpoint	2.991175204
GO:0000086	response to ionizing radiation	2.966391257
GO:0031110	chromatin assembly or disassembly	2.890674151
GO:0034508	microtubule depolymerization	2.884294327
GO:0048478	mitotic sister chromatid segregation	2.875683467
GO:0046599	double-strand break repair via homologous recombination	2.875683467
GO:0031055	DNA repair	2.875683467
GO:0045842	base-excision repair, DNA ligation	2.875683467
GO:0007144	mismatch repair	2.875683467
GO:0010216	attachment of spindle microtubules to kinetochore	2.875683467
GO:0006273	spindle assembly	2.875683467
GO:0009221	centrosome organization	2.875683467
GO:0031572	positive regulation of cell cycle process	2.859730332
GO:0007127	regulation of DNA replication	2.775234738
GO:0030261	mitotic spindle elongation	2.766330606
GO:0007088	mitotic chromosome movement towards spindle pole	2.765319927
GO:0031100	DNA unwinding during replication	2.750270821
GO:0051436	mitotic cell cycle spindle assembly checkpoint	2.739205048
GO:0006333	G2/M transition of mitotic cell cycle	2.624823289
GO:0007050	cell cycle arrest	2.623002427
GO:0043486	DNA replication-dependent nucleosome assembly	2.580798268
GO:0046683	traversing start control point of mitotic cell cycle	2.580798268
GO:0009186	cell proliferation	2.580798268
GO:0000212	protein localization to kinetochore	2.580798268
GO:0051299	replication fork protection	2.580798268
GO:0051329	cytokinesis	2.464867585
GO:0000075	chromosome condensation	2.438628547
GO:0051297	regulation of centriole replication	2.418334926
GO:0000077	chromatin remodeling at centromere	2.412554649
GO:0009263	centromere complex assembly	2.370711345
GO:0051567	inner cell mass cell proliferation	2.365083554
GO:0001833	male meiosis	2.365083554
GO:0045070	negative regulation of cell division	2.365083554
GO:0090068	DNA replication initiation	2.357303977
GO:0051052	positive regulation of viral genome replication	2.353198444
GO:0044419	G2 phase of mitotic cell cycle	2.339188705
GO:0006298	positive regulation of protein ubiquitination	2.213324599
GO:0051225	S phase	2.213324599
GO:0051439	regulation of exit from mitosis	2.208817757
GO:0051983	DNA replication	2.200763672
GO:0007089	mitotic metaphase plate congression	2.195115535
GO:0000910	histone H3-K9 methylation	2.13352929
GO:0031398	kinetochore assembly	2.1251883
GO:0006275	protein polymerization	2.066075171
GO:0051320	DNA synthesis during DNA repair	2.062434456
GO:0006266	cytokinesis during cell cycle	2.060707075
GO:0006978	positive regulation of attachment of spindle microtubules to kinetochore	2.055099912
GO:0007276	gamete generation	2.027847743
GO:0008585	interphase of mitotic cell cycle	2.024654164
GO:0033261	chromosome segregation	2.021538026

**o8-o4 upregulated differentially expressed genes**

GO ID	GO Term	-log10 (p-value)
GO:0006334	regulation of cell size	6.828841934
GO:0043627	regulation of collagen biosynthetic process	3.205271533
GO:0045765	cellular component movement	3.146254413
GO:0006123	regulation of osteoblast differentiation	2.947672182
GO:0015807	cell death	2.789766173
GO:0032026	aging	2.631610543
GO:0051491	negative regulation of epithelial cell differentiation	2.631610543
GO:0060391	response to estrogen stimulus	2.631610543
GO:0030857	sterol biosynthetic process	2.509746715
GO:0008219	extracellular matrix organization	2.492225612
GO:0030198	positive regulation of filopodium assembly	2.422986447
GO:0032965	regulation of transporter activity	2.403674534
GO:0060021	mitochondrial electron transport, cytochrome c to oxygen	2.27793879
GO:0032409	positive regulation of SMAD protein nuclear translocation	2.205703807
GO:0007568	nucleosome assembly	2.157006854
GO:0008361	response to glucocorticoid stimulus	2.145261203
GO:0006928	palate development	2.076379907
GO:0007422	peripheral nervous system development	2.07429423
GO:0016126	response to magnesium ion	2.07429423
GO:0051384	L-amino acid transport	2.060640908
GO:0045667	regulation of angiogenesis	2.014214784

**y8-y4 downregulated differentially expressed genes**

GO ID	GO Term	-log10 (p-value)
GO:0006334	G1/S transition checkpoint	11.1757476
GO:0030514	positive regulation of synapse structural plasticity	3.511966725
GO:0016584	hemopoietic stem cell proliferation	3.135825183
GO:0030889	negative regulation of collateral sprouting of intact axon in response to injury	2.991707006
GO:0032026	positive regulation of nitric-oxide synthase biosynthetic process	2.991707006
GO:0006986	response to anoxia	2.989607308
GO:0001953	negative regulation of odontogenesis of dentine-containing tooth	2.76164031
GO:0050851	regulation of cell adhesion	2.614457979
GO:0002688	sialic acid transport	2.504415596
GO:0030866	response to estrogen stimulus	2.504415596
GO:0045124	localization	2.368923907
GO:0051179	response to organic nitrogen	2.323770841
GO:0034605	antigen receptor-mediated signaling pathway	2.308777267
GO:0051963	positive regulation of glial cell proliferation	2.308777267
GO:0043627	negative regulation of cell-matrix adhesion	2.304335058
GO:0031575	cortical actin cytoskeleton organization	2.20042695
GO:0090005	nucleosome assembly	2.149721696
GO:0051089	response to unfolded protein	2.149721696
GO:0015739	purine ribonucleoside triphosphate metabolic process	2.149721696
GO:0042489	nucleosome positioning	2.149721696
GO:0071425	negative regulation of B cell proliferation	2.149721696
GO:0060612	response to magnesium ion	2.149721696
GO:0034059	cellular response to heat	2.149721696
GO:0060252	regulation of bone resorption	2.149721696
GO:0051770	dermatan sulfate proteoglycan biosynthetic process, polysaccharide chain biosynthetic process	2.149721696
GO:0050652	constitutive protein ectodomain proteolysis	2.149721696
GO:0048685	regulation of synaptogenesis	2.149721696
GO:0051835	negative regulation of establishment of protein localization in plasma membrane	2.149721696
GO:0030155	regulation of leukocyte chemotaxis	2.143000885
GO:0010243	adipose tissue development	2.137651151
GO:0009205	negative regulation of BMP signaling pathway	2.0332297

**y8-y4 upregulated differentially expressed genes**

GO ID	GO Term	-log10 (p-value)
GO:0006261	UDP-glucuronate biosynthetic process	3.291711322
GO:0001702	somite specification	3.03623168
GO:0006414	glycyl-tRNA aminoacylation	2.80541015
GO:0006323	gastrulation with mouth forming second	2.64907609
GO:0010760	DNA replication	2.622433831
GO:0006260	UDP-glucose metabolic process	2.326775762
GO:0006288	base-excision repair, DNA ligation	2.321906455
GO:0006426	translational elongation	2.321906455
GO:0001878	negative regulation of macrophage chemotaxis	2.321906455
GO:0051276	DNA packaging	2.232378041
GO:0006065	response to yeast	2.146317646
GO:0001757	chromosome organization	2.021881188
GO:0006011	DNA-dependent DNA replication	2.021881188