

GO_BP enrichment of marker genes of MSCs subpopulations from ADMSCs,AMMSCs,UCMSCs and CMMSCs				
cluster	Gene_In _GO	Description	LogP	Hits
C0	3	regeneration	-4.84817	ADM CD81 POSTN
C0	3	growth	-3.5362	ADM CD81 POSTN
C0	3	development al growth	-3.5362	ADM CD81 POSTN
C1	18	cell division	-26.3793	BIRC5 CCNB1 CDC20 CENPE CENPF CKS2 PLK1 AURKA CCNB2 PTTG1 KIF20B SMC4 TPX2 CKAP2 UBE2S NUSAP1 CEP55 NUF2
C1	18	mitotic cell cycle process	-26.2419	BIRC5 CCNB1 CDC20 CDKN3 CENPE CENPF CKS2 PLK1 AURKA CCNB2 DLGAP5 SMC4 TPX2 CKAP2 UBE2S NUSAP1 CEP55 NUF2
C1	18	mitotic cell cycle	-25.0267	BIRC5 CCNB1 CDC20 CDKN3 CENPE CENPF CKS2 PLK1 AURKA CCNB2 DLGAP5 SMC4 TPX2 CKAP2 UBE2S NUSAP1 CEP55 NUF2
C1	15	nuclear division	-23.4195	BIRC5 CCNB1 CDC20 CENPE CKS2 PLK1 AURKA CCNB2 PTTG1 DLGAP5 SMC4 TPX2 UBE2S NUSAP1 NUF2
C1	14	nuclear chromosome segregation	-23.288	BIRC5 CCNB1 CDC20 CENPE CENPF PLK1 AURKA CCNB2 PTTG1 DLGAP5 SMC4 TPX2 NUSAP1 NUF2
C1	15	organelle fission	-22.895	BIRC5 CCNB1 CDC20 CENPE CKS2 PLK1 AURKA CCNB2 PTTG1 DLGAP5 SMC4 TPX2 UBE2S NUSAP1 NUF2
C1	14	chromosome segregation	-20.9624	BIRC5 CCNB1 CDC20 CENPE CENPF PLK1 AURKA CCNB2 PTTG1 DLGAP5 SMC4 TPX2 NUSAP1 NUF2
C1	12	mitotic nuclear division	-20.7209	BIRC5 CCNB1 CDC20 CENPE PLK1 AURKA DLGAP5 SMC4 TPX2 UBE2S NUSAP1 NUF2
C1	11	regulation of mitotic nuclear division	-20.0844	BIRC5 CCNB1 CDC20 CENPF MKI67 PLK1 AURKA KIF20B DLGAP5 NUSAP1 NUF2
C1	11	regulation of nuclear division	-19.0313	BIRC5 CCNB1 CDC20 CENPF MKI67 PLK1 AURKA KIF20B DLGAP5 NUSAP1 NUF2
C1	10	microtubule cytoskeleton organization involved in mitosis	-17.3382	BIRC5 CCNB1 CDC20 CENPE PLK1 AURKA DLGAP5 TPX2 NUSAP1 NUF2

C1	10	regulation of chromosome segregation	-17.3039	BIRC5 CCNB1 CDC20 CENPE CENPF MKI67 PLK1 DLGAP5 SMC4 NUF2
C1	10	mitotic sister chromatid segregation	-17.1364	BIRC5 CCNB1 CDC20 CENPE PLK1 DLGAP5 SMC4 TPX2 NUSAP1 NUF2
C1	10	sister chromatid segregation	-17.007	BIRC5 CCNB1 CDC20 CENPE PLK1 DLGAP5 SMC4 TPX2 NUSAP1 NUF2
C1	13	chromosome organization	-16.8208	BIRC5 CCNB1 CDC20 CENPE CENPF HMGB2 PLK1 PTTG1 DLGAP5 SMC4 TPX2 NUSAP1 NUF2
C1	9	mitotic spindle organization	-16.4107	BIRC5 CCNB1 CDC20 CENPE PLK1 AURKA DLGAP5 TPX2 NUF2
C1	13	regulation of mitotic cell cycle	-16.3816	BIRC5 CCNB1 CDC20 CENPE CENPF CKS2 MKI67 PLK1 AURKA KIF20B DLGAP5 NUSAP1 NUF2
C1	10	spindle organization	-16.2495	BIRC5 CCNB1 CDC20 CENPE PLK1 AURKA CCNB2 DLGAP5 TPX2 NUF2
C1	14	regulation of cell cycle process	-16.0426	BIRC5 CCNB1 CDC20 CENPE CENPF MKI67 PLK1 AURKA KIF20B DLGAP5 SMC4 TPX2 NUSAP1 NUF2
C1	8	regulation of chromosome separation	-15.0482	BIRC5 CCNB1 CDC20 CENPF PLK1 DLGAP5 SMC4 NUF2
C1	8	regulation of mitotic metaphase/anaphase transition	-14.3404	BIRC5 CCNB1 CDC20 CENPE CENPF PLK1 DLGAP5 NUF2
C1	8	regulation of metaphase/anaphase transition of cell cycle	-14.2225	BIRC5 CCNB1 CDC20 CENPE CENPF PLK1 DLGAP5 NUF2

C1	8	regulation of sister chromatid segregation	-13.8219	BIRC5 CCNB1 CDC20 CENPE CENPF PLK1 DLGAP5 NUF2
C1	7	regulation of mitotic sister chromatid separation	-13.4647	BIRC5 CCNB1 CDC20 CENPF PLK1 DLGAP5 NUF2
C1	9	regulation of chromosome organization	-12.6018	BIRC5 CCNB1 CDC20 CENPE CENPF PLK1 DLGAP5 SMC4 NUF2
C1	11	microtubule cytoskeleton organization	-12.5866	BIRC5 CCNB1 CDC20 CENPE PLK1 AURKA CCNB2 DLGAP5 TPX2 NUSAP1 NUF2
C1	6	regulation of mitotic sister chromatid segregation	-11.3824	BIRC5 CCNB1 CDC20 CENPF PLK1 NUF2
C1	9	regulation of mitotic cell cycle phase transition	-11.1868	BIRC5 CCNB1 CDC20 CENPE CENPF PLK1 AURKA DLGAP5 NUF2
C1	9	regulation of cell cycle phase transition	-10.2194	BIRC5 CCNB1 CDC20 CENPE CENPF PLK1 AURKA DLGAP5 NUF2
C1	4	mitotic spindle assembly checkpoint signaling	-8.07395	CDC20 CENPF PLK1 NUF2
C1	4	spindle assembly checkpoint signaling	-8.07395	CDC20 CENPF PLK1 NUF2

C1	4	mitotic spindle checkpoint signaling	-8.07395	CDC20 CENPF PLK1 NUF2
C1	4	spindle checkpoint signaling	-8.01205	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of sister chromatid segregation	-7.89454	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of mitotic sister chromatid segregation	-7.89454	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of mitotic metaphase/anaphase transition	-7.89454	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of mitotic sister chromatid separation	-7.89454	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of chromosome segregation	-7.78455	CDC20 CENPF PLK1 NUF2

C1	4	negative regulation of metaphase/anaphase transition of cell cycle	-7.78455	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of chromosome separation	-7.78455	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of mitotic nuclear division	-7.49139	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of nuclear division	-7.20266	CDC20 CENPF PLK1 NUF2
C1	6	negative regulation of organelle organization	-6.52682	CDC20 CENPF PLK1 TPX2 CKAP2 NUF2
C1	4	negative regulation of chromosome organization	-6.30719	CDC20 CENPF PLK1 NUF2
C1	4	mitotic cell cycle checkpoint signaling	-5.48638	CDC20 CENPF PLK1 NUF2
C1	4	cell cycle checkpoint signaling	-5.07209	CDC20 CENPF PLK1 NUF2

C1	4	negative regulation of mitotic cell cycle phase transition	-4.84084	CDC20 CENPF PLK1 NUF2
C1	6	negative regulation of cellular component organization	-4.68702	CDC20 CENPF PLK1 TPX2 CKAP2 NUF2
C1	4	negative regulation of mitotic cell cycle	-4.4281	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of cell cycle phase transition	-4.33592	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of cell cycle process	-4.04641	CDC20 CENPF PLK1 NUF2
C1	4	negative regulation of cell cycle	-3.60655	CDC20 CENPF PLK1 NUF2
C1	8	cell cycle phase transition	-11.96	CCNB1 CDC20 CDKN3 CKS2 PLK1 AURKA CCNB2 UBE2S
C1	8	meiotic cell cycle process	-11.7289	CDC20 CKS2 PLK1 AURKA CCNB2 PTTG1 SMC4 NUF2
C1	8	meiotic cell cycle	-10.7219	CDC20 CKS2 PLK1 AURKA CCNB2 PTTG1 SMC4 NUF2
C1	7	mitotic cell cycle phase transition	-10.2763	CCNB1 CDKN3 CKS2 PLK1 AURKA CCNB2 UBE2S

C1	7	meiotic nuclear division	-10.2026	CKS2 PLK1 AURKA CCNB2 PTTG1 SMC4 NUF2
C1	6	meiotic chromosome segregation	-10.0989	PLK1 AURKA CCNB2 PTTG1 SMC4 NUF2
C1	6	meiosis I cell cycle process	-9.13982	CDC20 CKS2 PLK1 AURKA CCNB2 PTTG1
C1	5	meiosis I	-7.29646	CKS2 PLK1 AURKA CCNB2 PTTG1
C1	4	cell cycle G2/M phase transition	-6.92307	CCNB1 PLK1 AURKA CCNB2
C1	4	regulation of cyclin-dependent protein serine/threonine kinase activity	-6.2196	CCNB1 CDKN3 PLK1 CCNB2
C1	4	regulation of cyclin-dependent protein kinase activity	-6.15675	CCNB1 CDKN3 PLK1 CCNB2
C1	4	regulation of G2/M transition of mitotic cell cycle	-5.80512	CCNB1 CENPF PLK1 AURKA
C1	4	regulation of cell cycle G2/M phase transition	-5.61567	CCNB1 CENPF PLK1 AURKA

C1	3	female meiotic nuclear division	-5.38672	PLK1 AURKA CCNB2
C1	3	G2/M transition of mitotic cell cycle	-5.02344	CCNB1 PLK1 AURKA
C1	4	regulation of protein serine/threo nine kinase activity	-4.08134	CCNB1 CDKN3 PLK1 CCNB2
C1	3	female gamete generation	-3.53168	PLK1 AURKA CCNB2
C1	5	gamete generation	-3.37282	HMGB2 PLK1 AURKA CCNB2 PTTG1
C1	4	cellular process involved in reproduction in multicellular organism	-3.29195	HMGB2 PLK1 AURKA CCNB2
C1	3	regulation of binding	-2.894	HMGB2 PLK1 AURKA
C1	8	regulation of transferase activity	-7.26372	CCNB1 CDC20 CDKN3 CENPE PLK1 CCNB2 TPX2 UBE2S
C1	6	regulation of protein kinase activity	-5.56071	CCNB1 CDKN3 CENPE PLK1 CCNB2 TPX2
C1	6	regulation of kinase activity	-5.20169	CCNB1 CDKN3 CENPE PLK1 CCNB2 TPX2

C1	4	regulation of microtubule-based process	-4.2487	PLK1 AURKA TPX2 CKAP2
C1	3	regulation of microtubule cytoskeleton organization	-3.50773	PLK1 TPX2 CKAP2
C1	4	positive regulation of protein phosphorylation	-2.83814	BIRC5 CENPE PLK1 TPX2
C1	4	positive regulation of phosphorylation	-2.70778	BIRC5 CENPE PLK1 TPX2
C1	4	positive regulation of phosphorus metabolic process	-2.55347	BIRC5 CENPE PLK1 TPX2
C1	4	positive regulation of phosphate metabolic process	-2.55347	BIRC5 CENPE PLK1 TPX2
C1	3	regulation of cytoskeleton organization	-2.06831	PLK1 TPX2 CKAP2
C1	5	kinetochore organization	-11.6731	CENPE CENPF DLGAP5 SMC4 NUF2
C1	5	chromosome localization	-7.79313	CCNB1 CENPE CENPF DLGAP5 NUF2
C1	3	kinetochore assembly	-6.74608	CENPE CENPF DLGAP5

C1	7	organelle localization	-6.68872	CCNB1 CENPE CENPF PLK1 DLGAP5 NUSAP1 NUF2
C1	4	metaphase chromosome alignment	-6.30719	CCNB1 CENPE CENPF NUF2
C1	6	establishment of organelle localization	-6.10549	CCNB1 CENPE CENPF PLK1 NUSAP1 NUF2
C1	4	establishment of chromosome localization	-6.05691	CCNB1 CENPE CENPF NUF2
C1	3	centromere complex assembly	-6.00333	CENPE CENPF DLGAP5
C1	3	mitotic metaphase chromosome alignment	-4.99734	CCNB1 CENPE NUF2
C1	4	protein-DNA complex assembly	-4.465	CENPE CENPF HMGB2 DLGAP5
C1	3	microtubule-based movement	-2.41048	CENPE KIF20B DLGAP5
C1	8	positive regulation of cell cycle process	-10.5732	BIRC5 CCNB1 CDC20 AURKA KIF20B DLGAP5 SMC4 NUSAP1
C1	8	positive regulation of cell cycle	-9.73516	BIRC5 CCNB1 CDC20 AURKA KIF20B DLGAP5 SMC4 NUSAP1
C1	4	positive regulation of chromosome separation	-8.07395	BIRC5 CDC20 DLGAP5 SMC4

C1	4	positive regulation of mitotic nuclear division	-7.3205	CDC20 AURKA DLGAP5 NUSAP1
C1	4	positive regulation of nuclear division	-6.76901	CDC20 AURKA DLGAP5 NUSAP1
C1	3	positive regulation of mitotic sister chromatid separation	-6.39644	BIRC5 CDC20 DLGAP5
C1	4	positive regulation of mitotic cell cycle	-5.4454	CCNB1 CDC20 AURKA DLGAP5
C1	5	positive regulation of organelle organization	-4.29403	CDC20 AURKA DLGAP5 SMC4 NUSAP1
C1	3	positive regulation of mitotic cell cycle phase transition	-4.14492	CCNB1 CDC20 DLGAP5
C1	3	positive regulation of cell cycle phase transition	-3.89454	CCNB1 CDC20 DLGAP5
C1	3	positive regulation of ubiquitin protein ligase activity	-7.38172	CDC20 PLK1 UBE2S

C1	3	regulation of ubiquitin protein ligase activity	-6.39644	CDC20 PLK1 UBE2S
C1	3	positive regulation of ubiquitin-protein transferase activity	-6.12155	CDC20 PLK1 UBE2S
C1	3	regulation of ubiquitin-protein transferase activity	-5.35219	CDC20 PLK1 UBE2S
C1	5	positive regulation of transferase activity	-4.71056	CDC20 CENPE PLK1 TPX2 UBE2S
C1	3	positive regulation of proteasomal ubiquitin-dependent protein catabolic process	-4.2127	CDC20 PLK1 AURKA
C1	3	positive regulation of protein ubiquitination	-3.99578	CDC20 PLK1 UBE2S

C1	3	positive regulation of ubiquitin-dependent protein catabolic process	-3.96112	CDC20 PLK1 AURKA
C1	3	positive regulation of proteasomal protein catabolic process	-3.91634	CDC20 PLK1 AURKA
C1	3	positive regulation of protein modification by small protein conjugation or removal	-3.76144	CDC20 PLK1 UBE2S
C1	3	positive regulation of proteolysis involved in protein catabolic process	-3.69526	CDC20 PLK1 AURKA
C1	3	regulation of proteasomal ubiquitin-dependent protein catabolic process	-3.65898	CDC20 PLK1 AURKA

C1	3	positive regulation of post-translational protein modification	-3.52365	CDC20 PLK1 UBE2S
C1	3	regulation of ubiquitin-dependent protein catabolic process	-3.38018	CDC20 PLK1 AURKA
C1	3	regulation of proteasomal protein catabolic process	-3.25825	CDC20 PLK1 AURKA
C1	3	regulation of protein ubiquitination	-3.23273	CDC20 PLK1 UBE2S
C1	3	positive regulation of protein catabolic process	-3.17121	CDC20 PLK1 AURKA
C1	3	regulation of proteolysis involved in protein catabolic process	-3.0299	CDC20 PLK1 AURKA

C1	3	regulation of protein modification by small protein conjugation or removal	-2.98799	CDC20 PLK1 UBE2S
C1	4	regulation of proteolysis	-2.81214	CDC20 PLK1 AURKA ARL6IP1
C1	3	regulation of post-translational protein modification	-2.79375	CDC20 PLK1 UBE2S
C1	3	proteasome-mediated ubiquitin-dependent protein catabolic process	-2.53619	CDC20 AURKA UBE2S
C1	3	positive regulation of proteolysis	-2.53619	CDC20 PLK1 AURKA
C1	3	regulation of protein catabolic process	-2.48824	CDC20 PLK1 AURKA
C1	3	proteasomal protein catabolic process	-2.42308	CDC20 AURKA UBE2S
C1	3	ubiquitin-dependent protein catabolic process	-2.0569	CDC20 AURKA UBE2S

C1	3	modification-dependent protein catabolic process	-2.03443	CDC20 AURKA UBE2S
C1	3	modification-dependent macromolecule catabolic process	-2.01025	CDC20 AURKA UBE2S
C1	8	non-membrane-bounded organelle assembly	-9.70442	BIRC5 CDC20 CENPE CENPF AURKA CCNB2 DLGAP5 TPX2
C1	5	spindle assembly	-7.70543	BIRC5 CDC20 AURKA CCNB2 TPX2
C1	3	mitotic spindle assembly	-5.05007	BIRC5 CDC20 TPX2
C1	5	mitotic cytokinesis	-8.18531	BIRC5 PLK1 CKAP2 NUSAP1 CEP55
C1	5	cytoskeleton-dependent cytokinesis	-7.52041	BIRC5 PLK1 CKAP2 NUSAP1 CEP55
C1	5	cytokinesis	-7.4814	BIRC5 PLK1 CKAP2 NUSAP1 CEP55
C1	3	mitotic chromosome condensation	-6.47538	PLK1 SMC4 NUSAP1
C1	3	chromosome condensation	-5.25386	PLK1 SMC4 NUSAP1
C1	4	regulation of cytokinesis	-5.99971	BIRC5 PLK1 AURKA KIF20B
C1	4	regulation of cell division	-4.80372	BIRC5 PLK1 AURKA KIF20B

C1	4	protein localization to organelle	-2.52159	KPNA2 PLK1 AURKA KIF20B
C1	3	protein phosphorylation	-2.11761	BIRC5 PLK1 AURKA
C1	3	positive regulation of chromosome segregation	-5.84413	BIRC5 CCNB1 SMC4
C1	4	DNA metabolic process	-2.48427	CENPF HMGB2 KPNA2 PTTG1
C2	5	extracellular matrix organization	-5.68285	LOXL1 TGFB1 FBLN5 POSTN GREM1
C2	5	extracellular structure organization	-5.67505	LOXL1 TGFB1 FBLN5 POSTN GREM1
C2	5	external encapsulating structure organization	-5.66728	LOXL1 TGFB1 FBLN5 POSTN GREM1
C2	5	blood vessel development	-4.31273	CCN2 LOXL1 TGFB1 SPHK1 GREM1
C2	5	vasculature development	-4.2355	CCN2 LOXL1 TGFB1 SPHK1 GREM1
C2	3	angiogenesis	-2.63819	CCN2 TGFB1 GREM1
C2	3	blood vessel morphogenesis	-2.33992	CCN2 TGFB1 GREM1
C2	3	response to activity	-4.60013	CDK1 FOS POSTN
C2	3	regeneration	-3.64339	CD81 CDK1 POSTN

C2	3	biological process involved in interaction with host	-3.58554	CD81 CDK1 ALYREF
C2	3	striated muscle cell differentiation	-3.18317	CD81 CDK1 GREM1
C2	4	muscle structure development	-3.1779	CD81 CDK1 FOS GREM1
C2	3	biological process involved in symbiotic interaction	-2.91384	CD81 CDK1 ALYREF
C2	3	muscle cell differentiation	-2.85505	CD81 CDK1 GREM1
C2	3	muscle tissue development	-2.62002	CDK1 FOS GREM1
C2	3	regulation of DNA metabolic process	-2.09331	CDK1 ALYREF GREM1
C2	3	regulation of chromosome segregation	-3.82533	CDK1 KIF2C UBE2C
C2	4	regulation of cell cycle process	-2.58468	CDK1 SPHK1 KIF2C UBE2C
C2	3	chromosome organization	-2.20221	CDK1 H4C3 KIF2C
C2	3	cell division	-2.12532	CDK1 KIF2C UBE2C
C2	3	mitotic cell cycle process	-2.10463	CDK1 KIF2C UBE2C

C2	3	positive regulation of mitotic cell cycle	-3.85507	CDK1 SPHK1 UBE2C
C2	3	cellular response to reactive oxygen species	-3.79628	CDK1 FOS SPHK1
C2	5	DNA metabolic process	-3.55017	CDK1 CCN2 FOS SPHK1 ALYREF
C2	3	response to reactive oxygen species	-3.4126	CDK1 FOS SPHK1
C2	4	positive regulation of organelle organization	-3.20661	CDK1 CCN2 SPHK1 UBE2C
C2	3	cellular response to oxidative stress	-3.12646	CDK1 FOS SPHK1
C2	3	positive regulation of cell cycle process	-2.94675	CDK1 SPHK1 UBE2C
C2	3	cellular response to chemical stress	-2.86391	CDK1 FOS SPHK1
C2	3	positive regulation of cell cycle	-2.64555	CDK1 SPHK1 UBE2C

C2	3	response to oxidative stress	-2.5332	CDK1 FOS SPHK1
C2	3	regulation of mitotic cell cycle	-2.1092	CDK1 SPHK1 UBE2C
C2	3	response to inorganic substance	-2.10463	CDK1 FOS SPHK1
C2	4	cellular response to growth factor stimulus	-3.26907	CCN2 FOS SPHK1 POSTN
C2	3	response to tumor necrosis factor	-3.23054	FOS SPHK1 POSTN
C2	4	response to growth factor	-3.16845	CCN2 FOS SPHK1 POSTN
C2	4	regulation of MAPK cascade	-2.74506	CD81 CCN2 TIMP3 SPHK1
C2	3	positive regulation of MAPK cascade	-2.21978	CD81 CCN2 SPHK1
C2	3	positive regulation of cytokine production	-2.15829	CD81 SPHK1 POSTN
C2	4	supramolecular fiber organization	-2.97987	LOXL1 FBLN5 KIF2C GREM1

C3	4	collagen fibril organization	-6.79873	COL1A2 COL3A1 COL5A1 LUM
C3	4	connective tissue development	-4.45755	ACTA2 COL3A1 COL5A1 SELENOM
C3	4	extracellular matrix organization	-4.15975	COL1A2 COL3A1 COL5A1 LUM
C3	4	extracellular structure organization	-4.15359	COL1A2 COL3A1 COL5A1 LUM
C3	4	external encapsulating structure organization	-4.14744	COL1A2 COL3A1 COL5A1 LUM
C3	3	cellular response to transforming growth factor beta stimulus	-3.49202	ACTA2 COL1A2 COL3A1
C3	3	response to transforming growth factor beta	-3.44605	ACTA2 COL1A2 COL3A1
C3	4	response to wounding	-3.42564	COL3A1 COL5A1 MDK SERPINE2
C3	4	blood vessel development	-3.07993	ACTA2 COL1A2 COL3A1 COL5A1
C3	4	vasculature development	-3.01938	ACTA2 COL1A2 COL3A1 COL5A1
C3	4	tissue morphogenesis	-2.94984	ACTA2 COL3A1 COL5A1 CTHRC1

C3	4	supramolecular fiber organization	-2.91073	COL1A2 COL3A1 COL5A1 LUM
C3	3	skin development	-2.82473	COL1A2 COL3A1 COL5A1
C3	3	wound healing	-2.65783	COL3A1 COL5A1 SERPINE2
C3	3	cellular response to growth factor stimulus	-2.13945	ACTA2 COL1A2 COL3A1
C3	3	response to growth factor	-2.06602	ACTA2 COL1A2 COL3A1
C3	3	negative regulation of canonical Wnt signaling pathway	-3.68609	MDK DKK2 CTHRC1
C3	3	negative regulation of Wnt signaling pathway	-3.41634	MDK DKK2 CTHRC1
C3	3	regulation of canonical Wnt signaling pathway	-2.894	MDK DKK2 CTHRC1
C3	3	regulation of Wnt signaling pathway	-2.57895	MDK DKK2 CTHRC1

C3	3	positive regulation of cytokine production	-2.10805	LUM MDK SPON2
C3	4	response to virus	-3.60655	ACTA2 IFITM3 SPON2 IFITM2
C3	3	defense response to virus	-2.85195	IFITM3 SPON2 IFITM2
C3	3	defense response to symbiont	-2.84737	IFITM3 SPON2 IFITM2
C3	4	inflammatory response	-2.9842	MDK PLD3 PRDX5 LXN
C3	4	positive regulation of cell motility	-2.85927	ACTA2 MDK SPARC MALAT1
C3	4	positive regulation of locomotion	-2.82248	ACTA2 MDK SPARC MALAT1
C3	3	regulation of angiogenesis	-2.53969	DCN MDK SPARC
C3	3	regulation of vasculature development	-2.52228	DCN MDK SPARC
C3	3	growth	-2.32027	COL3A1 MDK SELENOM
C3	3	developmental growth	-2.32027	COL3A1 MDK SELENOM
C3	3	muscle structure development	-2.07291	COL3A1 UCHL1 PLD3
C4	3	regulation of morphogenesis of an epithelium	-4.67896	FGF7 GJA1 HGF

C4	3	positive regulation of osteoblast differentiation	-4.50963	CEBPD HGF IL6ST
C4	3	regulation of osteoblast differentiation	-3.59794	CEBPD HGF IL6ST
C4	3	epithelial cell proliferation	-3.45359	COL8A1 FGF7 HGF
C4	3	positive regulation of peptidyl-tyrosine phosphorylation	-3.45359	FGF7 HGF IL6ST
C4	3	regulation of peptidyl-tyrosine phosphorylation	-3.05142	FGF7 HGF IL6ST
C4	4	positive regulation of cell motility	-2.85927	FGF7 HGF IL1R1 MALAT1
C4	4	positive regulation of locomotion	-2.82248	FGF7 HGF IL1R1 MALAT1
C4	4	enzyme-linked receptor protein signaling pathway	-2.8173	FGF7 HGF IL6ST ARID5B

C4	3	transmembrane receptor protein tyrosine kinase signaling pathway	-2.32606	FGF7 HGF ARID5B
C4	3	gland development	-2.31451	FGF7 HGF ARID5B
C4	3	regulation of inflammatory response	-2.30023	HGF IL1R1 IL6ST
C4	3	positive regulation of cytokine production	-2.10805	HGF IL1R1 IL6ST
C4	4	positive regulation of neurogenesis	-4.35673	VCAN EIF4G2 IL6ST MME
C4	4	positive regulation of nervous system development	-4.05218	VCAN EIF4G2 IL6ST MME
C4	4	regulation of neurogenesis	-3.55931	VCAN EIF4G2 IL6ST MME
C4	4	positive regulation of cell development	-3.34624	VCAN EIF4G2 IL6ST MME
C4	4	regulation of nervous system development	-3.26726	VCAN EIF4G2 IL6ST MME
C4	3	skeletal system development	-2.10567	VCAN GJA1 ARID5B

C4	5	cellular response to cytokine stimulus	-3.53988	IL1R1 IL6ST KRT18 MME ARID5B
C4	3	cytokine-mediated signaling pathway	-2.44223	IL1R1 IL6ST KRT18
C4	3	regulation of cell growth	-2.32316	EIF4G2 GJA1 IGFBP7
C4	3	regulation of autophagy	-2.51883	DCN EIF4G2 HGF
C4	4	response to hormone	-2.45792	FHL2 IGFBP7 MME FIBIN
C4	3	growth	-2.32027	FGF7 PTX3 ARID5B
C4	3	developmental growth	-2.32027	FGF7 PTX3 ARID5B
C4	3	regulation of membrane potential	-2.25846	DCN GJA1 GLRX
C5	16	cell division	-22.1936	BUB1 CCNA2 CDK1 CENPF KIF11 AURKA TOP2A KIF2C UBE2C TPX2 NCAPH FBXO5 NUSAP1 ANLN CDCA8 ASPM
C5	14	mitotic cell cycle	-17.2597	BUB1 CCNA2 CDK1 CENPF HGF KIF11 AURKA KIF2C UBE2C TPX2 NCAPH NUSAP1 ANLN CDCA8
C5	12	chromosome segregation	-16.95	BUB1 CENPF KIF11 AURKA TOP2A KIF2C TPX2 NCAPH FBXO5 NUSAP1 CDCA8 ASPM
C5	11	nuclear chromosome segregation	-16.8558	CENPF KIF11 AURKA TOP2A KIF2C TPX2 NCAPH FBXO5 NUSAP1 CDCA8 ASPM
C5	13	mitotic cell cycle process	-16.36	BUB1 CCNA2 CDK1 CENPF KIF11 AURKA KIF2C UBE2C TPX2 NCAPH NUSAP1 ANLN CDCA8
C5	14	regulation of cell cycle process	-16.0426	BUB1 CDK1 CENPF KIF11 MKI67 AURKA KIF2C UBE2C TPX2 NCAPH FBXO5 NUSAP1 ANLN CDCA8
C5	11	nuclear division	-15.2981	KIF11 AURKA TOP2A KIF2C UBE2C TPX2 NCAPH FBXO5 NUSAP1 CDCA8 ASPM

C5	11	organelle fission	-14.9181	KIF11 AURKA TOP2A KIF2C UBE2C TPX2 NCAPH FBXO5 NUSAP1 CDCA8 ASPM
C5	8	mitotic nuclear division	-12.2295	KIF11 AURKA KIF2C UBE2C TPX2 NCAPH NUSAP1 CDCA8
C5	7	sister chromatid segregation	-10.7617	KIF11 TOP2A KIF2C TPX2 NCAPH NUSAP1 CDCA8
C5	8	non-membrane-bounded organelle assembly	-9.70442	CENPF KIF11 AURKA TPX2 FBXO5 ANLN CDCA8 ASPM
C5	6	spindle assembly	-9.67645	KIF11 AURKA TPX2 FBXO5 CDCA8 ASPM
C5	9	microtubule cytoskeleton organization	-9.45217	CDK1 KIF11 AURKA KIF2C TPX2 FBXO5 NUSAP1 CDCA8 ASPM
C5	6	microtubule cytoskeleton organization involved in mitosis	-9.03672	CDK1 KIF11 AURKA TPX2 NUSAP1 CDCA8
C5	6	mitotic sister chromatid segregation	-8.91828	KIF11 KIF2C TPX2 NCAPH NUSAP1 CDCA8
C5	6	spindle organization	-8.39701	KIF11 AURKA TPX2 FBXO5 CDCA8 ASPM
C5	4	mitotic spindle organization	-5.96262	KIF11 AURKA TPX2 CDCA8
C5	3	mitotic spindle assembly	-5.05007	KIF11 TPX2 CDCA8
C5	13	chromosome organization	-16.8208	BUB1 CDK1 CENPF HMGB2 KIF11 TOP2A H4C3 H1-10 KIF2C TPX2 NCAPH NUSAP1 CDCA8

C5	5	chromosome condensation	-9.68192	CDK1 TOP2A H1-10 NCAPH NUSAP1
C5	9	regulation of chromosome segregation	-15.1145	BUB1 CDK1 CENPF MKI67 KIF2C UBE2C NCAPH FBXO5 CDCA8
C5	8	regulation of mitotic nuclear division	-13.3717	BUB1 CENPF MKI67 AURKA UBE2C FBXO5 NUSAP1 CDCA8
C5	8	regulation of nuclear division	-12.6174	BUB1 CENPF MKI67 AURKA UBE2C FBXO5 NUSAP1 CDCA8
C5	10	regulation of mitotic cell cycle	-11.2782	BUB1 CDK1 CENPF MKI67 AURKA UBE2C FBXO5 NUSAP1 ANLN CDCA8
C5	8	regulation of chromosome organization	-10.7776	BUB1 CDK1 CENPF TOP2A UBE2C NCAPH FBXO5 CDCA8
C5	6	regulation of chromosome separation	-10.5314	BUB1 CENPF UBE2C NCAPH FBXO5 CDCA8
C5	6	regulation of sister chromatid segregation	-9.62504	BUB1 CDK1 CENPF UBE2C FBXO5 CDCA8
C5	8	regulation of mitotic cell cycle phase transition	-9.5257	BUB1 CDK1 CENPF AURKA UBE2C FBXO5 ANLN CDCA8
C5	5	regulation of mitotic sister chromatid segregation	-9.11452	BUB1 CDK1 CENPF FBXO5 CDCA8
C5	5	regulation of mitotic sister chromatid separation	-8.91622	BUB1 CENPF UBE2C FBXO5 CDCA8

C5	8	regulation of cell cycle phase transition	-8.67022	BUB1 CDK1 CENPF AURKA UBE2C FBXO5 ANLN CDCA8
C5	5	regulation of mitotic metaphase/anaphase transition	-7.98021	BUB1 CENPF UBE2C FBXO5 CDCA8
C5	5	regulation of metaphase/anaphase transition of cell cycle	-7.90811	BUB1 CENPF UBE2C FBXO5 CDCA8
C5	6	negative regulation of organelle organization	-6.52682	BUB1 CENPF HGF TOP2A TPX2 FBXO5
C5	4	negative regulation of chromosome organization	-6.30719	BUB1 CENPF TOP2A FBXO5
C5	4	regulation of G2/M transition of mitotic cell cycle	-5.80512	CDK1 CENPF AURKA FBXO5
C5	3	negative regulation of sister chromatid segregation	-5.61596	BUB1 CENPF FBXO5
C5	3	negative regulation of mitotic sister chromatid segregation	-5.61596	BUB1 CENPF FBXO5

C5	3	negative regulation of mitotic metaphase/anaphase transition	-5.61596	BUB1 CENPF FBXO5
C5	3	negative regulation of mitotic sister chromatid separation	-5.61596	BUB1 CENPF FBXO5
C5	4	regulation of cell cycle G2/M phase transition	-5.61567	CDK1 CENPF AURKA FBXO5
C5	3	negative regulation of chromosome segregation	-5.53492	BUB1 CENPF FBXO5
C5	3	negative regulation of metaphase/anaphase transition of cell cycle	-5.53492	BUB1 CENPF FBXO5
C5	3	negative regulation of chromosome separation	-5.53492	BUB1 CENPF FBXO5
C5	3	negative regulation of mitotic nuclear division	-5.31857	BUB1 CENPF FBXO5

C5	3	negative regulation of nuclear division	-5.10507	BUB1 CENPF FBXO5
C5	4	negative regulation of mitotic cell cycle phase transition	-4.84084	BUB1 CDK1 CENPF FBXO5
C5	6	negative regulation of cellular component organization	-4.68702	BUB1 CENPF HGF TOP2A TPX2 FBXO5
C5	3	metaphase chromosome alignment	-4.44107	CENPF KIF2C CDCA8
C5	4	negative regulation of mitotic cell cycle	-4.4281	BUB1 CDK1 CENPF FBXO5
C5	4	negative regulation of cell cycle phase transition	-4.33592	BUB1 CDK1 CENPF FBXO5
C5	3	establishment of chromosome localization	-4.25519	CENPF KIF2C CDCA8
C5	5	organelle localization	-4.14879	CENPF KIF2C NUSAP1 CDCA8 ASPM
C5	3	chromosome localization	-4.14492	CENPF KIF2C CDCA8

C5	4	negative regulation of cell cycle process	-4.04641	BUB1 CDK1 CENPF FBXO5
C5	3	mitotic cell cycle checkpoint signaling	-3.83133	BUB1 CDK1 CENPF
C5	4	negative regulation of cell cycle	-3.60655	BUB1 CDK1 CENPF FBXO5
C5	3	cell cycle checkpoint signaling	-3.52365	BUB1 CDK1 CENPF
C5	4	establishment of organelle localization	-3.49712	CENPF KIF2C NUSAP1 CDCA8
C5	3	positive regulation of mitotic nuclear division	-5.19226	AURKA UBE2C NUSAP1
C5	3	positive regulation of nuclear division	-4.78378	AURKA UBE2C NUSAP1
C5	8	positive regulation of cell cycle process	-10.5732	BUB1 CDK1 AURKA UBE2C NCAPH FBXO5 NUSAP1 CDCA8
C5	8	positive regulation of cell cycle	-9.73516	BUB1 CDK1 AURKA UBE2C NCAPH FBXO5 NUSAP1 CDCA8
C5	3	positive regulation of chromosome segregation	-5.84413	CDK1 NCAPH CDCA8

C5	3	positive regulation of chromosome separation	-5.74796	UBE2C NCAPH CDCA8
C5	6	positive regulation of organelle organization	-5.55079	BUB1 CDK1 AURKA UBE2C NCAPH NUSAP1
C5	3	positive regulation of chromosome organization	-4.00756	BUB1 CDK1 NCAPH
C5	6	female gamete generation	-8.52588	PTX3 AURKA TOP2A NCAPH FBXO5 ASPM
C5	4	female meiotic nuclear division	-7.58366	AURKA TOP2A NCAPH FBXO5
C5	7	cellular process involved in reproduction in multicellular organism	-7.17816	HMGB2 PTX3 AURKA TOP2A NCAPH FBXO5 ASPM
C5	3	meiotic spindle assembly	-6.96428	AURKA FBXO5 ASPM
C5	5	meiotic nuclear division	-6.62054	AURKA TOP2A NCAPH FBXO5 ASPM
C5	5	meiotic cell cycle process	-6.37829	AURKA TOP2A NCAPH FBXO5 ASPM
C5	3	meiotic spindle organization	-6.32204	AURKA FBXO5 ASPM

C5	4	meiotic chromosome segregation	-6.1161	AURKA NCAPH FBXO5 ASPM
C5	5	meiotic cell cycle	-5.75993	AURKA TOP2A NCAPH FBXO5 ASPM
C5	7	gamete generation	-5.57307	HMGB2 PTX3 AURKA TOP2A NCAPH FBXO5 ASPM
C5	3	oogenesis	-4.08061	PTX3 FBXO5 ASPM
C5	3	meiosis I	-3.85205	AURKA TOP2A FBXO5
C5	3	meiosis I cell cycle process	-3.83133	AURKA TOP2A FBXO5
C5	4	germ cell development	-3.73842	HMGB2 PTX3 FBXO5 ASPM
C5	3	regulation of cell division	-3.32447	AURKA CDCA8 ASPM
C5	3	regulation of reproductive process	-3.18934	AURKA FBXO5 ASPM
C5	3	gonad development	-3.08445	HMGB2 PTX3 ASPM
C5	3	development of primary sexual characteristics	-3.05686	HMGB2 PTX3 ASPM
C5	3	sex differentiation	-2.80693	HMGB2 PTX3 ASPM
C5	3	reproductive structure development	-2.74666	HMGB2 PTX3 ASPM
C5	3	reproductive system development	-2.72999	HMGB2 PTX3 ASPM
C5	3	growth	-2.32027	PTX3 AURKA ASPM

C5	3	developmental growth	-2.32027	PTX3 AURKA ASPM
C5	4	positive regulation of mitotic cell cycle	-5.4454	CDK1 AURKA UBE2C FBXO5
C5	6	regulation of DNA metabolic process	-5.44432	CCNA2 CDK1 HGF KPNA2 H1-10 FBXO5
C5	3	G2/M transition of mitotic cell cycle	-5.02344	CCNA2 CDK1 AURKA
C5	4	mitotic cell cycle phase transition	-5.019	CCNA2 CDK1 AURKA UBE2C
C5	4	cell cycle phase transition	-4.89812	CCNA2 CDK1 AURKA UBE2C
C5	3	cell cycle G2/M phase transition	-4.89799	CCNA2 CDK1 AURKA
C5	3	animal organ regeneration	-4.69924	CCNA2 CDK1 AURKA
C5	3	centrosome cycle	-4.2267	CDK1 KIF11 AURKA
C5	3	positive regulation of mitotic cell cycle phase transition	-4.14492	CDK1 UBE2C FBXO5
C5	3	microtubule organizing center organization	-4.00756	CDK1 KIF11 AURKA

C5	3	positive regulation of cell cycle phase transition	-3.89454	CDK1 UBE2C FBXO5
C5	3	regulation of DNA replication	-3.84165	CCNA2 CDK1 FBXO5
C5	3	regeneration	-3.58946	CCNA2 CDK1 AURKA
C5	3	positive regulation of DNA metabolic process	-2.73414	CCNA2 CDK1 HGF
C5	3	response to wounding	-2.30592	CDK1 F3 AURKA
C5	3	regulation of viral life cycle	-3.65898	KPNA2 PTX3 TOP2A
C5	5	DNA metabolic process	-3.46228	CDK1 CENPF HMGB2 KPNA2 TOP2A
C5	3	regulation of viral process	-3.45359	KPNA2 PTX3 TOP2A
C5	3	rhythmic process	-2.87045	CDK1 PTX3 TOP2A
C5	4	DNA damage response	-2.4966	CDK1 HMGB2 TOP2A FBXO5
C5	4	cellular component disassembly	-3.87716	CDK1 AURKA TOP2A KIF2C
C5	4	protein localization to organelle	-2.52159	CDK1 KPNA2 AURKA H4C3
C5	6	chromatin remodeling	-5.02897	BUB1 CDK1 HMGB2 AURKA H4C3 H1-10

C5	6	chromatin organization	-4.50652	BUB1 CDK1 HMGB2 AURKA H4C3 H1-10
C5	4	protein-DNA complex assembly	-4.465	CENPF HMGB2 H4C3 H1-10
C5	3	nucleosome assembly	-3.90539	HMGB2 H4C3 H1-10
C5	3	nucleosome organization	-3.7045	HMGB2 H4C3 H1-10
C5	3	microtubule polymerization or depolymerization	-4.80582	KIF2C TPX2 FBXO5
C5	3	protein polymerization	-4.10594	UBE2C TPX2 FBXO5
C5	4	regulation of transferase activity	-2.63307	CCNA2 UBE2C TPX2 FBXO5
C5	3	positive regulation of osteoblast differentiation	-4.50963	CEBPD HGF FBXO5
C5	3	regulation of osteoblast differentiation	-3.59794	CEBPD HGF FBXO5
C5	4	negative regulation of molecular function	-2.42617	HGF PTX3 AURKA FBXO5

C5	3	negative regulation of catalytic activity	-2.15426	HGF PTX3 FBXO5
C5	3	mitotic cytokinesis	-4.37602	NUSAP1 ANLN CDCA8
C5	3	cytoskeleton-dependent cytokinesis	-3.98412	NUSAP1 ANLN CDCA8
C5	3	cytokinesis	-3.96112	NUSAP1 ANLN CDCA8
C5	3	hematopoietic progenitor cell differentiation	-4.1188	CEBPD TOP2A ANLN
C5	4	regulation of hydrolase activity	-2.45391	F3 HGF HMGB2 PTX3
C5	3	positive regulation of cytokine production	-2.10805	F3 HGF HMGB2