

In Silico Analysis of miRNA Role in Resistance of Hepatocellular Carcinoma Bel-7402 Cells to TRAIL

Abstract

Context: To this date, the exact basics of microRNAs (miRNAs) mechanisms in inducing a resistance to tumor necrosis factor –related apoptosis-inducing ligand (TRAIL) signaling pathways remain unclear. **Aims:** The aim of this study was to analyze miRNA signaling pathways in TRAIL-resistant Bel-7402 cell line. **Materials and Methods:** The Gene Expression Omnibus (GEO) database was studied for miRNA expression profiling studies in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells. By searching through databases of DIANAmt, miRanda, miRDB, miRWalk, and PICTAR using the online tools of miRWalk and TargetScan, target genes of miRNAs were predicted to express differentially by up to 50% in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells. Afterwards, signaling pathways and biological functions of miRNA target genes in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells were analyzed by the DAVID database. **Results:** A total of 352 miRNAs (186 up- and 166 downregulated miRNAs) were obtained from GSE74130 GEO DataSets accession item. The upregulated miRNAs including hsa-mir-145, hsa-mir-188, hsa-mir-221, hsa-mir-4802-5p, hsa-mir-198, hsa-mir-1184, and hsa-mir-345-3p were significantly intensified in apoptotic signaling pathway and process. The downregulated miRNAs including hsa-mir-138, hsa-mir-375, hsa-mir-449, hsa-mir-637, hsa-mir-208-3p, hsa-mir-4783-5p, hsa-mir-548b-3p, hsa-mir-127-3p, hsa-mir-92b-5p, hsa-mir-375, hsa-mir-503-5p, hsa-mir-499a-3p, and hsa-mir-154-3p were significantly raised in expression in cancer stem cell pathways. **Conclusions:** Analysis of miRNA expression profile revealed that some of the upregulated miRNAs negatively contributed to the regulation of apoptosis signaling pathways and cell cycle arrest as well as promoting TRAIL-induced apoptosis resistance in TRAIL-resistant Bel-7402 cells. Also, down-regulated miRNAs were probably involved in cancer stem cell processing.

Keywords: Apoptosis, miRNA expression data, neoplasms, signaling pathways, TRAIL

Key messages: Upregulated miRNAs negatively affect apoptosis signaling pathways and promote TRAIL-induced apoptosis resistance in TRAIL-resistant Bel-7402 cells. Also, these miRNAs invigorate cancer stem cell signaling pathways and TRAIL-resistance of Bel-7402 cells in hepatocellular carcinoma.

Introduction

MicroRNAs (miRNAs), a new class of 22 nucleotides nonprotein-encoding RNAs, have been verified as important tumor suppressors or oncogenes in a wide range of cancers such as hepatocellular carcinoma (HCC).^[1-3] These nonprotein encoding RNAs regulate gene expression through interacting with the 3' untranslated region (3' UTR), 5' UTR, coding sequence, and also the gene promoter of targets in order to trigger mRNA degradation and, therefore, translational repression.^[1] MiRNAs are involved in numerous biological processes (BPs) including proliferation, differentiation, angiogenesis, migration, and carcinogenesis.^[4] In addition, different miRNA profiles may have diverse distributions and functions

in apoptosis signaling pathways.^[5] Among these are oncogenic miRNAs (oncomiRs) overexpressed in cancers and contribute to cancer phenotype by inhibiting the expression of tumor suppressors.^[6] In contrast, tumor suppressor miRNAs, which usually under-expressed in cancers, inhibit the expression of oncogenic proteins, leading to suppress the cancer phenotype.^[7]

Tumor necrosis factor (TNF)–related apoptosis-inducing ligand (TRAIL) is an anti-inflammatory agent and a member of the TNF superfamily, which is highly expressed in cancer. As a consequence, it is a selective killing ligand for treating cancer.^[8] This factor triggers a caspase cascade to induce cellular apoptosis by interacting with its death receptors of DR4 and DR5 in human.^[9] TRAIL and its receptors are expressed not only in

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Zohreh Salehi,
Homeyra Seydi,
Paria Hadadi,
Omid Tavallaei¹

Department of Pharmacognosy and Pharmaceutical Biotechnology, School of Pharmacy, ¹Pharmaceutical Sciences Research Center, Health Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran

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Address for correspondence:
Dr. Omid Tavallaei,
Pharmaceutical Sciences
Research Center, Health Institute,
Kermanshah University of
Medical Sciences, Kermanshah,
Iran.
E-mail: o.tavallaei@kums.ac.ir

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tumor cells but also in normal immune cell types such as natural killer cells (NK cells), T cells, dendritic cells (DCs), and macrophages.^[10] TRAIL receptors activate the initiator caspase-8 that can in turn trigger an apoptosis signal through a direct cleavage of downstream effector caspases such as caspase-3, -6, and -7. The effector caspases would activate certain kinases down the cascade.^[11] Various studies show that TRAIL is able to potently induce the extrinsic pathway of apoptosis in many cancer cell lines and, therefore, is a selective killing ligand for cancer therapy.^[12]

The sixth most common malignancy and the third principal cause of cancer deaths worldwide is HCC.^[13] The changes in miRNA expression pattern of HCC Bel-7402 cells treated with TRAIL-targeting agents were verified by noncoding RNA profiling that reported in GSE74130 accession item of Gene Expression Omnibus (GEO) DataSets.

Interestingly, several studies have clearly shown that miRNAs are involved in TRAIL-induced apoptosis in different cancers.^[14,15] The molecular basics of mechanisms miRNAs use to interfere with TRAIL-induced apoptosis resistance remain unknown. It could be hypothesized that modulating the miRNA profile might affect the sensitivity/resistancy in human cancer to TRAIL-induced apoptosis.

With all this in mind, our aim was to predict the miRNA target genes differentially expressed in TRAIL-resistant Bel-7402 cells and to analyze miRNA functions, apoptosis signaling, and BPs. We also examined the possible effects in cancer stem cell-related signaling with respect to cellular processes such as self-renewal, apoptosis, migration, and differentiation through Hedgehog, Wnt/ β -catenin, Notch, mTOR, EGF, TGF- β , MAPK, PI3k-Akt, and NF- κ B signaling pathways.

Materials and Methods

Data sources and preprocessing

The miRNA expression profile of TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells was obtained from the National Center for Biotechnology Information GEO with accession number of GSE74130 (<http://www.ncbi.nlm.nih.gov/geo/>). Using R version 3.4.1, we retained the fold change of differential miRNA expression higher than 50% when comparing TRAIL-resistant with TRAIL-sensitive Bel-7402 cells.

miRNA target prediction

Using the results from the analysis of differential miRNA expressions (TRAIL-resistant vs. TRAIL-sensitive), gene-miRNA interactions were predicted using miRNA target computational prediction methods including DIANAmt, miRanda, miRDB, miRWalk, PICTAR, and TargetScan through the online tools of miRWalk (<http://www.umm.uni-heidelberg.de/apps/zmf/mirwalk/>). MiRNA target genes common in these six databases in miRWalk tools were selected (P value < 0.05). The target genes of all miRNAs were also predicted using TargetScan database with context score < -0.2 (<http://www.targetscan.org>).

Functional enrichment analysis

Gene ontology (GO) was used to analyze the gene sets data for common descriptive framework and functional annotation and classification. GO functional analyses were performed to identify significantly enriched BPs in the targets of the deregulated miRNAs in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells using the online tool of the database for annotation, visualization, and integrated discovery (DAVID; <http://david.abcc.ncifcrf.gov/>), version 6.7, with P value < 0.01.^[16] All miRNA target genes were listed and uploaded into DAVID database, after selecting the “entire human genome,” as background control. We also filtered out the specific gene expressed in “human cancer biology” module of the DAVID database. Then, we classified genetic features screening in the DAVID database by the modules of GO BP analysis. In addition to DAVID, we repeat our analysis using GenCLIP 2.0 database, which is a web server for functional clustering of genes (<http://ci.smu.edu.cn/>).

Pathway enrichment analysis

A gene-centered database, DAVID tools, not only provides the GO BP of genes but also enriches the signaling pathways for an individual gene. In this case, Kyoto Encyclopedia of Genes and Genomes (KEGG), BioCarta, and Reactome were searched to identify significantly enriched pathways of miRNA target genes using the online tool of DAVID database (P value < 0.05).

Constructing regulatory network between miRNAs and their targets

We constructed a regulatory network for KEGG signaling pathway results of miRNAs and predicted target genes in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells with the identified miRNA-target gene interacting pairs and visualized the output with Cytoscape version 3.2.1 (<https://cytoscape.org/>).

Results

Differentially expressed miRNAs in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells

Herein, we collected the miRNA expression profiling from GEO database (accession number: GSE74130), consisting of 2076 miRNAs differentially expressed in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells. Using R software, we selected miRNAs with fold changes higher than 1.5 TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells. Finally, 186 and 166 miRNAs were found upregulated and downregulated, respectively, in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells [Table 1, Supplementary Table 1a and 1b]. Some of the up- and down regulated miRNAs that were reported in KEGG database in “pathway in cancer” item were deleted from Supplementary Table 1a and 1b.

Identification of differently expressed miRNA target genes

The numbers of miRNA target genes were 9,664 and 10,978 for upregulated and downregulated miRNAs in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells, respectively.

Table 1: ID, names, and fold changes of up- and downregulated miRNAs in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells

Upregulated miRNAs			Downregulated miRNAs		
ID	Name	Fold change	ID	Name	Fold change
11022	hsa-mir-221-3p	14.71000492	17325	hsa-mir-643	0.558137356
42786	hsa-mir-188-3p	3.627892814	11148	hsa-mir-515-3p	0.575856002
145839	hsa-mir-662	2.073081608	46803	hsa-mir-503-5p	0.518270402
17612	hsa-mir-555	2.073081608	169279	hsa-mir-499b-3p	0.518270402
11140	hsa-mir-508-3p	2.073081608	169131	hsa-mir-4724-3p	0.592309031
169309	hsa-mir-4802-5p	2.59135201	169292	hsa-mir-4717-5p	0.597137637
169322	hsa-mir-4534	2.267433009	169209	hsa-mir-4662b	0.518270402
145946	hsa-mir-449a	2.073081608	168616	hsa-mir-4536-3p	0.590347743
10947	hsa-mir-142-3p	2.174751878	169138	hsa-mir-4504	0.58046285
169082	hsa-mir-1275	2.474408945	146127	hsa-mir-449b-3p	0.571550537
46746	hsa-mir-1269a	2.073081608	42667	hsa-mir-302b-5p	0.582279894
46258	hsa-mir-1184	2.614008639	42717	hsa-mir-92b-5p	0.483719042
42528	hsa-mir-296-3p	1.943514007	46918	hsa-mir-375	0.409921189
11141	hsa-mir-509-3p	1.865773447	168749	hsa-mir-138-1-3p	0.473024573
42866	hsa-mir-451a	1.813552917	42829	hsa-mir-127-3p	0.444231773
169076	hsa-mir-345-3p	1.81923488	46779	hsa-mir-1206	0.498589247
42721	hsa-mir-503-3p	1.727568006	148677	hsa-mir-637	0.345513601
11063	hsa-mir-330-3p	1.766626066	169061	hsa-mir-548x-3p	0.388702801
148637	hsa-mir-198	1.776927092	17298	hsa-mir-548b-3p	0.39866954
42641	hsa-mir-145-5p	1.733232164	168618	hsa-mir-4783-5p	0.310962241
169050	hsa-mir-4787-5p	1.613447638	46729	hsa-mir-302d-5p	0.310962241
21498	hsa-mir-654-3p	1.54000348	168693	hsa-mir-651-5p	0.207308161
169028	hsa-mir-4708-3p	1.518512112	148089	hsa-mir-208a-3p	0.254887083
169245	hsa-mir-2467-3p	1.587892295	46696	hsa-mir-1234-3p	0.282692947

Functional enrichment of the predicted miRNA target genes

Further into the study, we performed a functional enrichment analysis to investigate the roles of miRNA target genes through DAVID online tools. This analysis was conducted in GO BP component. Those miRNAs with significantly changed expression levels between TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells could deregulate some signaling pathways and promote resistance to TRAIL. Therefore, those miRNAs not preserved from TRAIL-sensitive to TRAIL-resistant cells may promote resistance to TRAIL and cancer stem cell signaling pathways.

The GO BP results indicated that the target genes of upregulated miRNAs are enriched in neuron apoptotic process, intrinsic apoptotic signaling pathway in response to DNA damage, extrinsic apoptotic signaling pathway via death domain receptors, negative regulation of cell growth, negative regulation of canonical Wnt signaling pathway, and DNA damage response signal transduction by p53 class mediator resulting in the cell cycle arrest. For example, hsa-mir-509-3p, hsa-mir-584a/4445-3p, hsa-mir-555, hsa-mir-662, hsa-mir-234-5p, hsa-mir-654-3p, hsa-mir-92a-1-5p, hsa-mir-1275, hsa-mir-296-3p, and hsa-mir-662 are involved in apoptosis process by targeting CSNK1D, CDK2, CDKN2B, PLK4, and PRKACA. On the other hand, the target genes of downregulated miRNAs take part in cell division, proliferation and migration, vascular endothelial growth factor receptor (VEGFR) signaling

pathway, MAPK cascade, angiogenesis, positive regulation of phosphatidylinositol 3-kinase (PI3K) activity, and Wnt signaling pathway [Table 2, Supplementary Tables 1a and 1b for up- and downregulated miRNAs, respectively].

Signaling pathways enrichment analysis for differentially expressed miRNA target genes

We also performed KEGG, BioCarta, and Reactome pathways enrichment analysis for differentially expressed miRNA target genes. Hypergeometric test at P value < 0.05 was used as the criteria for pathway detection using the online tool of DAVID database.

KEGG pathway indicated that some of the downregulated miRNAs in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells such as hsa-mir-208-3p, hsa-mir-4783-5p, hsa-mir-548b-3p, hsa-mir-127-3p, hsa-mir-92b-5p, hsa-mir-375, hsa-mir-503-5p, hsa-mir-499a-3p, and hsa-mir-154-3p affected Wnt signaling pathway, a cancer stem cell signaling pathway, by targeting APC, WNT2, WNT7A, CSNK2A1, CCND2, MAPK8, and RHOA [Figure 1, Supplementary Table 2a for upregulated and Supplementary Table 2b for down-regulated miRNAs].

Reactome pathway showed that LTBR, PSMD11, PSMA8, PSMA4, PSMB4, NFKB1, SKP1, and PRKCB, as the target genes for hsa-mir-662, hsa-mir-2467-3p, hsa-mir-499a-3p, hsa-mir-146-5p, hsa-mir-4277, hsa-mir-508-3p, and hsa-mir-1269, were upregulated in TRAIL-resistant versus TRAIL-sensitive

Table 2: MicroRNAs, their target genes, and GO BP results of up- and downregulated miRNAs of TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells

Upregulated miRNAs			Downregulated miRNAs				
Signaling pathway	Target gene	miRNAs name	Signaling pathway	Target gene	miRNAs name		
Apoptosis	CSNK1D	mir-509-3p	Wnt	WNT2	mir-548b-3p		
	CDK2	mir-584a/4445-3p mir-509-3p		WNT	mir-127-3p		
	CDKN2B	mir-555, mir-662, mir-234-5p		XIAP	mir-377-3p, mir-606, mir-618, mir-34b, mir-450a		
	PLK4	mir-654-3p,		PMSC6	mir-302b-5p,		
	PRKACA	mir-92a-1-5p mir-1275 mir-296-3p mir-662		PSMD2	mir-802		
	E2F1	mir-330-3p		PSMA3	mir-4520-3p		
	CASP2	mir-4708-3p, mir-188-3p, mir-610		PMSA4	mir-4520-3p		
	CDKN1B	mir-221-3p/222-3p, mir-330-3p		RHOA	mir-154-3p		
	CAMK2G	mir-1184 mir-1246		APC	mir-208-3p, mir-4783-5p,		
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p		GSK3A	mir-887-3p		
	PPP3CA	mir-145-5p, mir-142-3p, mir-512-3p		MAPK14	mir-450b-3p		
	SKIL	mir-330-3p		XIAP	mir-127-3p		
	PRKAA2	mir-4636 mir-1246 mir-650 mir-409-3p mir-875-3p		CSNK2A1	mir-92b-5p		
	Cell Cycle	ABCB1		mir-188-3p	MAPK Cascade	CCNE1	mir-4524-5p mir-138
		CDC25A		mir-188-3p		GSK3A	mir-887-3p
CDKN1A		mir-662, mir-665	UBE2B	mir-302-3p			
CDKN2A		mir-675-5p/4466, mir-663b	MAPK1	mir-548b-3p, mir-518c, mir-534			
PSMB4		mir-4277	MAP3K5	mir-375, mir-4330,			
CCNA1		mir-4802-5p	MAPKAPK2	mir-4520-3p, mir-24,			
CCNH		mir-548at-5p	PSMC6	mir-302b-5p,			
CDK2		mir-584a/4445-3p mir-509-3p	PSMA2	mir-4782-5p/5706			
CDK6		mir-548at-5p, mir-555, mir-665, mir-234-5p	PSMA3	mir-4520-3p			
CDKN1B		mir-221-3p/222-3p, mir-330-3p	PSMA4	mir-4520-3p			
CDKN2D		mir-451	PSMB6	mir-4504			
MCM5		mir-4649-5p	PSMB7	mir-449b-3p			

Bel-7402 cells and found to influence the NF- κ B signaling pathway (R-HSA-5668541, R-HSA-1169091). Although, hsa-mir-302b-5p, one of the down-regulated miRNAs, is involved in Hedgehog signalling pathway (R-HSA-5358346 and R-HSA-5632684), it has also involved in MAPK6/MAP-K4 signalling (R-HSA-5687128), and VEGFR2 mediated cell proliferation (R-HSA-69017) by targeting PSMC6 (Table 3, Supplementary 3a and 3b for up- and down-regulated miRNAs, respectively).

Signaling pathways enrichment analysis by BioCarta pathway showed that PRKCA, PRKCB, PPP3CA, ARHGDI, CASP10, CASP2, PARP1, SOS1, CDKN1B, and PTEN were the target genes for hsa-mir-92a-1-5p, hsa-mir-1275, hsa-mir-296-3p, hsa-mir-662, hsa-mir-1237-3p, hsa-mir-449a, hsa-mir-330, hsa-mir-4534/8082, hsa-mir-555, hsa-mir-555, hsa-mir-4708-3p, hsa-mir-188-3p, hsa-mir-610, hsa-mir-1184, hsa-mir-512-3p, hsa-mir-198, and hsa-mir-534 as upregulated miRNAs in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells. These miRNAs were therefore found to be involved in the

apoptosis signaling pathway. On the other hand, many of the downregulated miRNAs in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells take part in cancer stem cell signaling pathways. For instance, miRNAs including hsa-mir-138, hsa-mir-875-3p, and hsa-mir-1206 play roles in AKT signaling pathway by targeting AKT1, EIF2S1, PPP2CA, and RPS6KB1 [Table 4, Supplementary Tables 4a and 4b for up- and down-regulated miRNAs, respectively].

Gene cluster with literature profiles

We used GenCLiP 2.0 database for functional clustering of genes with P value $\leq 1e-4$. The complete results were reported in Supplementary Tables 5a and 5b for up- and downregulated miRNAs, respectively.

Discussion and Conclusions

miRNAs have been established as an important tumor suppressors or oncogenes in a wide range of cancers and play crucial roles in a variety of BPs such as differentiation,

Table 3: MicroRNAs, their target genes, and Reactome pathway results of up- and downregulated miRNAs of TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells

Upregulated miRNAs			Downregulated miRNAs				
Signaling pathway	Target gene	miRNA name	Signaling pathway	Target gene	miRNA name		
FCERI mediated NF-κB (R-HSA-2871837)	TRAF6	mir-146-5p	Hedgehog ligand biogenesis (R-HSA-5358346)	PSMC6	mir-302b-5p		
	NFKB1	mir-508-3p		PSMD2	mir-802		
	PSMD11	mir-2467-3p		PSMA3	mir-4520-3p		
	PSMD8	mir-4636		PSMA4	mir-4520-3p		
	PSMA4	mir-146-5p		Sonic Hedgehog homolog (SHH) (R-HSA-5632684)	PTCH1	mir-637, mir-802	
	PRKCQ	mir-449a, mir-1246			PSMC6	mir-302b-5p	
	UBE2D2	mir-3200-3p, mir-3182, mir-193a-5p, mir-342-3p		PSMD2	mir-802		
	UBE2D1	mir-144-3p, mir-610		PSMA3	mir-4520-3p		
	NFKB1	mir-508-3p			PSMA4	mir-4520-3p	
	Activation of NF-κB in B cells (R-HSA-1169091)	PSMD11		mir-2467-3p	Hedgehog "on" state (R-HSA-5632684)	PSMB6	mir-4504
PSMD8		mir-4636	PSMB7	mir-449b-3p			
PSMA4		mir-146-5p	PTCH1	mir-637, mir-802			
PSMB4		mir-4277	PSMC6	mir-302b-5p			
SKP1		mir-145-5p	PSMD2	mir-802			
PSMA3		mir-1269	PSMA3	mir-4520-3p			
PSMB1		mir-509-3p	PSMA4	mir-4520-3p			
PSMD11		mir-2467-3p	PSMB6	mir-4504			
NIK-->noncanonical NF-κB signaling (R-HSA-5676590)		PSMD8	mir-4636	PIP3 activates AKT signaling (R-HSA-1257604)		PSMB7	mir-449b-3p
		PSMA4	mir-146-5p			AKT2	mir-564, mir-571, mir-511, mir-875-3p, mir-138
	PSMB4	mir-4277	AKT1		mir-138		
	SKP1	mir-145-5p	PIK3R1		mir-138		
	PSMA3	mir-1269	PDGFRA		mir-449b, mir-138		
	PSMB1	mir-509-3p	PDGFB		mir-138		

hsa-mir-17–92 cluster is found to be consistently upregulated and plays a role in the apoptotic pathway.^[22] Also, hsa-mir-221 inhibits normal erythropoiesis and erythroleukemic cell growth and controls CDKN1C/p57 and CDKN1B/p27 expression in human HCC.^[23,24]

The results from software analysis showed that many of the downregulated miRNAs are engaged in cancer stem cell signaling cascades such as Hedgehog, Wnt/b-catenin, PI3K-Akt, mTOR, EGF, and TGF-β signaling pathways along with promoting angiogenesis, invasion, and metastasis of the cancer cells. Our results also indicated that the target genes of hsa-mir-138 are responsible for regulating VEGF, MAPK, PI3K-Akt, TGF-β, and Wnt signaling pathways. The target genes of hsa-mir-138 that promote cancer stem cell signaling pathways were found to be upregulated upon downregulation of hsa-mir-138. Besides, hsa-mir-138 has been frequently studied in HCC as the overexpression of this miRNA has been associated with suppressed cell proliferation, migration, and invasion in HCC.^[8,25] Results of our analysis clearly showed that downregulation of hsa-mir-375 negatively affects Wnt,

MAPK, and proliferation pathways of cancer stem cell as it is responsible of upregulating target genes key to these signaling pathways. Similar to our results, recent studies on HCC indicate that hsa-mir-375 suppresses liver cancer cell growth both *in vitro* and *in vivo*.^[26,27] Our software analyses on downregulated miRNAs in TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells showed that hsa-mir-449 plays role in MAPK, VEGF, PI3K-Akt, and Hedgehog signaling pathways. So, as Buurman *et al.*^[28] have already shown in their research, down-expression of hsa-mir-449 activates hepatocyte growth factor signaling in HCC cells. Downregulated hsa-mir-637 was found to be involved in Hedgehog signaling pathway as Zhang *et al.*^[29] has stated that hsa-mir-637 inhibits tumorigenesis in HCC. Interestingly, our results pointed out that some up- and downregulated miRNAs have dual roles in cancer progression as oncogenes and tumor suppressor genes. These results are shown in Tables 2–4.

In conclusion, it could be interpreted from our results that up- and downregulated miRNAs could regulate apoptosis and cancer stem cell signaling in TRAIL-resistant versus

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Table 4: MicroRNAs, their target genes, and BioCarta pathway results of up- and downregulated miRNAs of TRAIL-resistant versus TRAIL-sensitive Bel-7402 cells

Signaling pathway	Upregulated miRNAs			Downregulated miRNAs					
	Target gene	miRNA name			Signaling pathway	Target gene	miRNA name		
Apoptosis	PRKCA	mir-92a-1-5p	mir-1275	mir-296-3p	mir-662	EGF	ELK1	mir-3150a-3p	
	PRKCB	mir-1237-3p	mir-449a	mir-330-			FOS	mir-802	
	PPP3CA	mir-145-5p,	mir-142-3p,	mir-512-3p			CSNK2A1	mir-92b-5p, mir-375,	
	ARHGDI1	mir-4534/8082,	mir-555				MAPK8	mir-499a-3p,	
	CASP10	mir-555					JUN	mir-3917,	
	CASP2	mir-4708-3p,	mir-188-3p,	mir-610			PIK3R1	mir-138	
	PARP1	mir-555					PRKCA	mir-487b, mir-937	
	SOS1	mir-1184,	mir-512-3p				STAT1	mir-875-3p,	
	CDKN1B	mir-221-3p/222-3p,	mir-330-3p				MAPK3	mir-486-3p	
	PTEN	mir-198	mir-534				EIF2S1	mir-875-3p	
	PIK3R1	mir-1184			VEGF		EIF2S1	mir-875-3p	
	CCNA1	mir-4802-5p					FLT4	mir-138	
	Cyclin Dependent Kinase	CCNH	mir-548at-5p					KDR	mir-138
		CDK2	mir-584a/4445-3p,	mir-509-3p,				PIK3R1	mir-138
CDKN1B		mir-221-3p/222-3p,	mir-330-3p			AKT	AKT1	mir-138	
CDKN2A		mir-675-5p/4466,	mir-663b				EIF2S1	mir-875-3p	
CDKN2D		mir-451					PIK3R1	mir-138	
CDC25A		mir-188-3p					PPP2CA	mir-1206	
CCND2		mir-185-5p					RPS6KB1	mir-875-3p	
CDK6		mir-548at-5p,	mir-555,	mir-665,	mir-234-5p		GH1	mir-138	
CDKN1A		mir-662,	mir-665			m-TOR	AKT1	mir-138	
CDKN2B		mir-555,	mir-662,	mir-234-5p			EIF2S1	mir-875-3p	
E2F1	mir-330-3p					PIK3R1	mir-138		

TRAIL-sensitive Bel-7402 cells. Moreover, we showed that the upregulated miRNAs probably negatively regulate apoptosis signaling pathways and cell cycle arrest and promote TRAIL-induced apoptosis resistance in TRAIL-resistant Bel-7402 cells. Downregulated miRNAs on the other hand are possibly involved in cancer stem cell cascades such as Hedgehog, Wnt/b-catenin, PI3K-Akt Notch, mTOR, EGF, and TGF- β signaling pathways and promote angiogenesis, invasion, and metastasis in HCC.

Although Bel-7402 cells are sensitive to TRAIL, they could become resistant after certain treatments. Some of the downregulated miRNAs target genes vital to cancer stem cells signaling pathways in TRAIL-resistant Bel-7402 cells. So, we expect the cancer stem cells signaling pathways to activate upon down-expression of these miRNAs. On the other hand, some of the upregulated miRNAs target apoptosis signaling pathways and therefore, we predict deactivation of apoptosis process in TRAIL-resistant Bel-7402 cells.

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Conflicts of interest

There are no conflicts of interest.

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Supplementary Table 1a: GO BP results for upregulated miRNAs

MAP CASCADE	ARAF	mir-1908-5p
	KIT	mir-221-3p/222-3p,
	CSF2	mir-663b, mir-4707-5p
	FGF7	mir-222-5p, mir-557,
	GRB2	mir-4440
	IL1B	mir-4276
	PSMA3	mir-1269
	PSMB1	mir-509-3p
	AKT2	mir-662
	FOS	mir-589-3p
	RASA1	mir-4530
	TRAF6	mir-146-5p
	CDC42	mir-4746-5p, mir-185-5p
	DUSP2	mir-520c-3p
	DUSP5	mir-4740-3p
	FGF5	mir-4277
	MAP2K1	mir-449a,
	MAP3K11	mir-199-5p, , mir-199b-5, mir-142-3p
	MAP3K13	mir-100-3p, mir-5095/7151-3p
	MAP3K3	mir-188-3p
	NRAS	mir-146-5p, mir-146-5p
	NFKB1	mir-508-3p
	PDGFRA	mir-449a mir-146b-5p mir-342-3p
	PDGFA	mir-106b-3p, mir-662
	PRKCA	mir-92a-1-5p mir-1275 mir- 296-3p mir-662
	RAC1	mir-509-3p, mir-142-3p
	RRAS	mir-5190, mir-34-5p, mir-4740-3p,
	TGFB2	mir-4535
	ARAF	mir-1908-5p
	CCL2	mir-4766-3p
	RASA1	mir-4530
	CSF2	mir-663b, mir-4707-5p
	DUSP5	mir-4740-3p
	ERBB3	mir-520c-3p, mir-512-3p
	ERBB4	mir-508-3p, mir-1246, mir-557,
	FGF5	mir-4277
	MAP2K1	mir-449a,
	MAP3K3	mir-188-3p
	NRAS	mir-146-5p
	PDGFRA	mir-449a mir-146b-5p mir-342-3p
	PDGFA	mir-106b-3p, mir-662
	PSMD8	mir-4636
	PSMA4	mir-146-5p
	PSMB4	mir-4277
	KITLG	mir-1246
	RAF1	mir-662, mir-649
	SOS1	mir-1184, mir-512-3p
	TEK	mir-649
	CAMK2G	mir-1184 mir-1246
	DUSP9	mir-1275,
	EGF	mir-198

Supplementary Table 1a: Continued

	ERBB3	mir-520c-3p, mir-512-3p
	ERBB4	mir-508-3p, mir-1246, mir-557,
	FGFR1	mir-610,
	TNF	mir-1184
	ERBB4	mir-508-3p, mir-1246, mir-557,
	FGF7	mir-222-5p, mir-557,
	NRAS	mir-146-5p mir-146-5p
	PDGFRA	mir-449a mir-146b-5p mir-342-3p
	PSMD12	mir-557
	PTPRA	mir-146b-5p
	ERBB4	mir-508-3p, mir-1246, mir-557,
	FGF7	mir-222-5p, mir-557,
	NRAS	mir-146-5p mir-146-5p
	PDGFRA	mir-449a mir-146b-5p mir-342-3p
	PSMD12	mir-557
	PTPRA	mir-146b-5p
WNT	APC	mir-570-3p,
	WNT10B	mir-1538/4745-3p
	WNT4	mir-4763-5p mir-4417
	UBE2B	mir-302-3p, mir-491-3p
	APC	mir-570-3p
	DDIT3	mir-663b
	SKP1	mir-145-5p
	WNT10B	mir-1538/4745-3p
	WNT4	mir-4763-5p mir-4417
	WNT4	mir-4763-5p mir-4417
	NFKB1	mir-508-3p
	PSMD11	mir-2467-3p
	PSMD8	mir-4636
	PSMA4	mir-146-5p
	PSMB4	mir-4277
	PPP2R3A	mir-449a, mir-512-3p
	WNT4	mir-4763-5p mir-4417
	CDH2	mir-199b-5p, mir-1246
	GSK3B	mir-199b-5p
	PSMD11	mir-2467-3p
	PSMD8	mir-4636
	PSMA4	mir-146-5p
	PSMB4	mir-4277
	PPP2R3A	mir-449a, mir-512-3p
	CDC42	mir-4746-5p, mir-185-5p
	PSMD11	mir-2467-3p
	PSMD8	mir-4636
	PSMA4	mir-146-5p
	PSMB4	mir-4277
	RAC1	mir-509-3p, mir-142-3p
	GRB2	mir-4440
EGF	PRKCA	mir-92a-1-5p mir-1275 mir- 296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
MIGRATION	CD44	mir-512-3p, mir-4535, mir-610
	SOS1	mir-1184, mir-512-3p

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Supplementary Table 1a: Continued

	TEK	mir-649, mir-649
	YES1	mir-193a-5p, mir-146b-5p
	ITGA3	mir-662 mir-198,
	ITGAV	mir-142-3p, mir-654-3p
	ITGB3	mir-650
	PIK3R1	mir-1184
	ADAM17	mir-507/557, mir-512-3p
	CCR1	mir-509-3p
	IGF1	mir-1275,
	INSR	mir-1205, mir-671-3p, mir-557
	ITGAV	mir-142-3p, mir-654-3p
	NTRK3	mir-650
	PIK3R1	mir-1184
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	CD44	mir-512-3p, mir-4535, mir-610
	CEACAM1	mir-4687-3p
	GAS6	mir-662
	ITGA3	mir-662 mir-198,
	ITGA4	mir-508-3p,
	NRAS	mir-146-5p
	FLT4	mir-662
	KDR	mir-662
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	CD34	mir-585-3p
	LCK	mir-3928-3p
	GRB2	mir-4440
	MIF	mir-451
JUNCTION	PIK3R2	mir-4787-5p
	CDH15	mir-665
	CDH2	mir-199b-5p, mir-1246
	CTNNA1	mir-9-5p, mir-1184
	CDC42	mir-4746-5p, mir-185-5p
APOPTOSIS	CSNK1D	mir-509-3p
	CDK2	mir-584a/4445-3p mir-509-3p
	CDKN2B	, mir-555, mir-662, mir-234-5p
	PLK4	mir-654-3p,
	PRKACA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	E2F1	mir-330-3p
	CASP2	mir-4708-3p, mir-188-3p, mir-610
	CDK2	mir-584a/4445-3p mir-509-3p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDK2	mir-584a/4445-3p mir-509-3p
	CAMK2G	mir-1184 mir-1246
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	PPP3CA	mir-145-5p, mir-142-3p, mir-512-3p
	SKIL	mir-330-3p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p

Supplementary Table 1a: Continued

	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDKN2B	, mir-555, mir-662, mir-234-5p
	PRKAA2	mir-4636 mir-1246 mir-650 mir-409-3p mir-875-3p
CELL CYCLE	ABCB1	mir-188-3p
	CDC25A	mir-188-3p
	CDKN1A	mir-662, mir-665
	CDKN2A	mir-675-5p/4466, mir-663b
	TUBB4A	mir-4706/4749-5p, mir-5194
	PSMD11	mir-2467-3p
	PSMD8	mir-4636
	PSMA4	mir-146-5p
	PSMB4	mir-4277
	PSMD11	mir-2467-3p
	PSMD8	mir-4636
	PSMA4	mir-146-5p
	PSMB4	mir-4277
	CCNA1	mir-4802-5p
	CCNH	mir-548at-5p
	CDK2	mir-584a/4445-3p mir-509-3p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDKN2A	mir-675-5p/4466, mir-663b
	CDKN2D	mir-451
	MCM5	mir-4649-5p
	PPP3CA	mir-145-5p, mir-142-3p, mir-512-3p
	CDK2	mir-584a/4445-3p mir-509-3p
	PSMA3	mir-1269
	PSMB1	mir-509-3p
	UBE2D1	mir-144-3p, mir-610
	SKP1	mir-145-5p
	PSMA3	mir-1269
	PSMB1	mir-509-3p
	UBE2D1	mir-144-3p, mir-610
	CDK2	mir-584a/4445-3p mir-509-3p
	PSMA3	mir-1269
	PSMB1	mir-509-3p
	UBE2D1	mir-144-3p, mir-610
CYCLIN	CDC25A	mir-188-3p
	CCNA2	mir-508-3p, mir-548ap-3p
	CDKN1A	mir-662, mir-665
	CDKN2B	mir-555, mir-662, mir-234-5p
	CDKN3	mir-3944-5p
G1/S	CCNA1	mir-4802-5p
	CCNH	mir-548at-5p
	CDK2	mir-584a/4445-3p mir-509-3p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDKN2A	mir-675-5p/4466, mir-663b
	CDKN2D	mir-451
	MCM5	mir-4649-5p

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Supplementary Table 1a: Continued

PROLIFERATION	PPP3CA	mir-145-5p, mir-142-3p, mir-512-3p
	ACVR1B	mir-4523
	CDC25A	mir-188-3p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1A	mir-662, mir-665
	CDKN3	mir-3944-5p
	IFNG	mir-4324
	IL1B	mir-4276
	IL23A	mir-1909-5p, mir-649
	IL4	mir-5011-5p
	TFRC	mir-570-3p, mir-1184, mir-518d-5p/519-5p, mir-5195-5p, mir-23-3p, mir-610, mir-4687-3p, mir-4523
	BCL2	mir-345-3p
	IFNA1	mir-631/3661
	IFNA4	mir-144-5p, mir-4636
	ANG	mir-144-5p
	PGF	mir-4743-5p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	VEGFA	mir-5011-5p
	CCL2	mir-4766-3p
	CAV2	mir-589-3p
	FLT4	mir-662
	HIF1A	mir-199b-5p,
	KDR	mir-662
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	THBS4	mir-3940-5p/4507
TRAF6	mir-146-5p	
IRAK1	mir-146-5p, mir-142-3p,	
STAT1	mir-188-3p	
PTGS2	mir-146b-5p	
RPS6KB1	mir-557	
ADAM17	mir-507/557, mir-512-3p	
ERBB4	mir-508-3p, mir-1246, mir-557,	
FGF7	mir-222-5p, mir-557,	
INSR	mir-1205, mir-671-3p, mir-557	
PDGFRA	mir-449a mir-146b-5p mir-342-3p	
RARB	mir-144-3p, mir-146-5p, mir-146-5p, mir-193a-5p	
DIFFERENTIATION	CDH15	mir-665
	CDH2	mir-199b-5p, mir-1246
	CTNNA1	mir-9-5p, mir-1184
	CDC42	mir-4746-5p, mir-185-5p

Supplementary Table 1b: GO BP results for downregulated miRNAs

Wnt signaling	Wnt2	Mir-548b-3p
	Wnt7a	mir-127-3p
	Xiap	mir-377-3p, mir-606, mir-618, mir-34b, mir-450a
	Psmc6	mir-302b-5p,
	Psmc2	mir-802
	Psma3	mir-4520-3p
	Psmb6	mir-4504
	Psmb7	mir-449b-3p
	Cdc42	mir-708-3p
	Psmc6	mir-302b-5p,
Psmc2	mir-802	
Psma3	mir-4520-3p	
Psma4	mir-4520-3p	
Psmb6	mir-4504	
Psmb7	mir-449b-3p	
RHOA	mir-154-3p	
APC	Mir-208-3p, mir-4783-5p,	
GSK3A	mir-887-3p	
MAPK14	mir-450b-3p	
PSMC6	mir-302b-5p,	
PSMD2	mir-802	
PSMA3	mir-4520-3p	
PSMA4	mir-4520-3p	
PSMB6	mir-4504	
PSMB7	mir-449b-3p	
APC	Mir-208-3p, mir-4783-5p,	
WNT2	mir-548b-3p	
WNT7A	mir-127-3p	
XIAP	mir-127-3p	
CSNK2A1	mir-92b-5p	
CCNE1	mir-4524-5p mir-138	
GSK3A	mir-887-3p	
UBE2B	mir-302-3p,	
MAPK CASCAD	FGF7	mir-580-3p, mir-520d-5p, mir-493
	IRS1	mir-487-3p
	IL2RA	mir-3942-5p
	MEN1	mir-762/4492/4498/5001-5p
	MAPK1	mir-548b-3p, mir-518c, mir-534
	MAP3K5	mir-375, mir-4330,
	MAPKAPK2	mir-4520-3p, mir-24,
	PSMC6	mir-302b-5p,
	PSMA2	mir-4782-5p/5706
	PSMA3	mir-4520-3p
PSMA4	mir-4520-3p	
PSMB6	mir-4504	
PSMB7	mir-449b-3p	
CSF2RB	mir-3917	
DUSP9	mir-637	
ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493	
FGF1	mir-760, mir-515-3p	
FGF7	mir-580-3p, mir-520d-5p, mir-493	
FGF9	mir-548b-3p, mir-493	

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Supplementary Table 1b: Continued

FGFR1	mir-564, mir-571, mir-515-3p, mir-511
MAPK1	mir-548b-3p, mir-518c, mir-534
MAPK3	mir-486-3p
MAPK3K5	-
MAPKAPK2	mir-4520-3p, mir-24
MAPKAPK3	mir-24
NCAM1	mir-515-3p
NRAS	mir-606
NF1	mir-24,
PDGFA	mir-3917
PSMA2	mir-4782-5p/5706
PSMB4	mir-4782-5p/5706
PPP5C	mir-637
KITLG	mir-534
KRAS	mir-511, mir-534
EGFR	mir-450a
ERBB3	mir-511
ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493
FGF2	mir-450b-3p, mir-450b-3p, mir-449b, mir-493
FGF4	mir-511
FGF5	mir-493
FGF7	mir-580-3p, mir-520d-5p, mir-493
FGF9	mir-548b-3p, mir-493
FGFR1	mir-564, mir-571, mir-515-3p, mir-511
MAPK1	mir-548b-3p, mir-518c, mir-534
PDGFRA	mir-449b, mir-138,
PDGFRB	mir-518c
PSMF1	mir-138,
PTK2	mir-138
CDH2	mir-520d-5p, mir-511, mir-534, mir-493, mir-1227
FLT4	mir-138
INSR	mir-34b, mir-511, mir-138
IL6R	mir-138
KDR	mir-138
LIF	mir-138
PDGFB	mir-138
ACTIVITY OF CDK1	mir-3688-3p
MAPK ACTIVITY	
DUSP9	mir-637
FGF1	mir-760, mir-515-3p
INSR	mir-34b, mir-511, mir-138
MAPK1	mir-548b-3p, mir-518c, mir-534
MAPK3	mir-486-3p
MAPKAPK2	mir-4520-3p, mir-24
MAPKAPK3	mir-24

Supplementary Table 1b: Continued

leukocyte migration	CD34	mir-138, mir-875-3p
	KRAS	mir-511, mir-534
	MERTK	mir-511, mir-534
	ANGPT2	mir-511, mir-534
	FN1	mir-511
	ITGA4	mir-511
	PROCR	mir-409-3p, mir-534
positive regulation of cell migration	AKT2	mir-564, mir-571, mir-511, mir-875-3p, mir-138
	ADRA2A	mir-493, mir-138
	INSR	mir-34b, mir-511, mir-138
	KDR	mir-138
	PIK3R1	mir-138
	PDGFRA	mir-449b, mir-138,
	PDGFB	mir-138
	PRKCA	mir-487b, mir-937
	RRAS2	mir-493, mir-875-3p
	FLT4	mir-138
	KDR	mir-138
	PRKCA	mir-487b, mir-937
	RHOB	mir-138
	FLT4	mir-138
	KDR	mir-138
	PRKCA	mir-487b, mir-937
	RHOB	mir-138
adherens junction organization	CDH11	,mir-534, mir-493, mir-534
	CDH13	mir-493, mir-449b,
	CDH2	mir-520d-5p, mir-511, mir-534, mir-493, mir-1227
	CDH6	mir-409-3p
	CTNNA1	mir-34b, mir-534
CELL CYCLE	CDK2	mir-548a/4445-3p
	PSMC6	mir-302b-5p,
	PSMD2	mir-802
	PSMA3	mir-4520-3p
	PSMA4	mir-4520-3p
	PSMB6	mir-4504
	PSMB7	mir-302b-5p,
	PSMC6	mir-302b-5p
	PSMD2	mir-802
	PSMA3	mir-4520-3p
	PSMA4	mir-4520-3p
	PSMB6	mir-4504
	PSMB7	mir-449b-3p
	RB1	mir-3942-5p, mir-643, mir-643
	CCNER	-
	PCNA	mir-708-3p
	BAX	mir-3663-3p
	MDM4	mir-371b-5p, mir-4662-5p, mir-30b-3p, mir-3612
	CDK2	mir-548a/4445-3p
	CDKN1A	mir-208-3p mir-493
	PCNA	mir-708-3p

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Supplementary Table 1b: Continued	
PML	mir-762/4492/4498/ 5001-5p
RB1	mir-3942-5p, mir-643, mir-643
CCNE1	mir-4524-5p mir-138
CDK2	mir-548al/4445-3p
CDKN1A	mir-208-3p mir-493
DHFR	mir-4724-3p
PCNA	mir-708-3p
WEE1	mir-503-5p
CDK2	mir-548al/4445-3p
CDKN1A	mir-208-3p mir-493
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
PLK4	mir-34b
TUBB4A	mir-5194
TUBB	mir-486-3p
YWHAE	mir-548b-3p
RB1	mir-3942-5p, mir-643, mir-643
CCNA4	
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDR4	
CDKN1B	mir-486-3p
RB1	mir-3942-5p, mir-643, mir-643
CCNA1	mir-606
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDK4	mir-548i
CDKN1B	mir-486-3p
E2F1	mir-486-3p
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDKN1B	mir-486-3p
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
PSMA2	mir-4782-5p/5706
PSMB4	mir-4782-5p/5706
RB1	mir-3942-5p, mir-643, mir-643
CCNA1	mir-606
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDK4	mir-548i
CDKN1B	mir-486-3p
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
PSMA2	mir-4782-5p/5706
PSMB4	mir-4782-5p/5706
CDK1	mir-3688-3p
PSMA2	mir-4782-5p/5706
PSMB4	mir-4782-5p/5706
ACVR1B	mir-518c

Supplementary Table 1b: Continued	
CCND1	MIR-511
CCNE1	mir-4524-5p mir-138
CDK2	mir-548al/4445-3p
CDKN1A	mir-208-3p mir-493
CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p
PLK3	mir-138
PRKACA	mir-138,
CDK2	mir-548al/4445-3p
CDKN1A	mir-208-3p mir-493
CDKN2A	mir-4261 mir-3160-3p mir-937 mir-487b
CDKN2D	mir-85-3p
PLK3	mir-138
RPS6KB1	mir-875-3p
CALR	mir-875-3p
CDKN1A	mir-208-3p mir-493
CDKN2A	mir-4 mir-937 261 mir- 3160-3p mir-487b
CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
PRKAA2	mir-409-3p mir-875-3p
CDK2	mir-548al/4445-3p
CDKN1A	mir-208-3p mir-493
PLK3	mir-138
CALR	mir-875-3p
CDKN2A	mir-4 mir-937 261 mir- 3160-3p mir-487b
CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p
PRKAA2	mir-409-3p mir-875-3p
CDKN1A	mir-208-3p mir-493
CDKN2BCDKN2D	
G1/S	RB1
RB1	mir-3942-5p, mir-643, mir-643
CCNE1	mir-4524-5p mir-138
CDK2	mir-548al/4445-3p
CDN1A	mir-208-3p mir-493
DHFR	mir-4724-3p
PCNA	mir-708-3p
RB1	mir-3942-5p, mir-643, mir-643
CCNE1	mir-4524-5p mir-138
DHFR	mir-4724-3p
PCNA	mir-708-3p
RB1	mir-3942-5p, mir-643, mir-643
CCNA1	mir-606
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDK4	mir-548i
CDKN1B	mir-486-3p
RB1	mir-3942-5p, mir-643, mir-643
CCNA1	mir-606

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Supplementary Table 1b: Continued

	CDK1	mir-3688-3p
	CDK2	mir-548al/4445-3p
	CDK4	mir-548i
	CDKN1B	mir-486-3p
	RB1	mir-3942-5p, mir-643, mir-643
	CCNA1	mir-606
	CDK1	mir-3688-3p
	CDK2	mir-548al/4445-3p
	CDK4	mir-548i
	CDKN1B	mir-486-3p
	ACVR1B	mir-518c
	CCND1	MIR-511
	CCNE1	mir-4524-5p mir-138
	CDKN1A	mir-208-3p mir-493
	CDKN3S	
	CDK2	mir-548al/4445-3p
	CDKN1A	mir-208-3p mir-493
	CDKN2A	mir-4 mir-937 261 mir- 3160-3p mir-487b
	CDKN2D	mir-85-3p
	PLK3	mir-138
	RPS6KB1	mir-875-3p
PROLIFERATION	SMAD4	mir-548b-3p mir-449b mir-138
	CDKN1A	mir-208-3p mir-493
	CDKN2A	mir-4 mir-937 261 mir- 3160-3p mir-487b
	CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
	CDKN2D	mir-85-3p
	LIF	mir-138
	NF2	mir-138 mir-875-3p
	AKT1	mir-138
	FLT4	mir-138
	KDR	mir-138
	PDGFB	mir-138
	PRKCA	mir-487b, mir-937
	AKT1	mir-138
	IL6R	mir-138
	PDGFB	mir-138
	RPS6KB1	mir-875-3p
	STAT1	mir-875-3p,
	BLK	mir-564, mir-937
	FES	mir-3134, mir-138
	ITK	mir-3134, mir-138
	TNFRSF1A	mir-937
	TXK	mir-875-3p
	PF4V1	mir-487b
	PF4	mir-875-3p
	TNK2	mir-127-3p, mir-138, mir-85-3p
	AKT1	mir-138
	FLT4	mir-138
	KDR	mir-138
	PDGFB	mir-138
	PRKCA	mir-487b, mir-937

Supplementary Table 1b: Continued

	ADRA2A	mir-493, mir-138
	CALR	mir-875-3p
	CDK2	mir-548al/4445-3p
	FLT3LG	mir-138
	FLT4	mir-138
	INSR	mir-34b, mir-511, mir-138
	IL6R	mir-138
	KDR	mir-138
	LIF	mir-138
	NAP1L1	mir-518c, mir-138
	PDGFRA	mir-449b, mir-138,
	PDGFB	mir-138
	ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493
	FGF2	mir-450b-3p, mir- 450b-3p, mir-449b, mir-493
	FGF9	mir-548b-3p, mir-493
	FGFR1	mir-564, mir-571, mir- 515-3p, mir-511
	TGFBR3	mir-511
	FASLG	mir-571, mir-534
	KRAS	mir-511, mir-534
	NKX3-1	mir-331-5p
	ADRA2A	mir-493, mir-138
	CSF1R	mir-449b
	EDNRB	mir-493
	EGFR	mir-450a
	CSF1R	mir-449b
	EDNRB	mir-493
	EGFR	mir-450a
	ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493
	FGF2	mir-450b-3p, mir- 450b-3p, mir-449b, mir-493
	FGF4	mir-511
	FGF5	mir-493
	FGF7	mir-580-3p, mir-520d-5p, mir-493
	FGF9	mir-548b-3p, mir-493
	FGFR1	mir-564, mir-571, mir- 515-3p, mir-511
	FN1	mir-511
	INSR	mir-34b, mir-511, mir-138
	MAPK1	mir-548b-3p, mir-518c, mir-534
	NAP1L1	mir-518c, mir-138
	PTEN	mir-534
	PDGFRA	mir-449b, mir-138,
	PDGFRB	mir-518c
	PTK2	mir-138
	RARAVIP	-
	CDK1	mir-3688-3p
	ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493

Supplementary Table 1b: Continued

FGF9	mir-548b-3p, mir-493
FGFR1	mir-564, mir-571, mir-515-3p, mir-511
NME1	
FGF1	mir-760, mir-515-3p
FGF7	mir-580-3p, mir-520d-5p, mir-493
FGF9	mir-548b-3p, mir-493
HYAL1	mir-24,
LAMC1	mir-24, mir-375, mir-548b-3p
FGF9	mir-548b-3p, mir-493
FGFR1	mir-564, mir-571, mir-515-3p, mir-511
PDGFA	mir-3917

Supplementary Table 2a: KEGG Pathway for Up-Regulated miRNAs

wnt signaling pathway	APC	mir-570-3p	
	SKP1	mir-145-5p	
	WNT4	mir-4763-5p mir-4417	
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662	
	PRKCB	mir-1237-3p mir-449a mir-330-3p	
	PRKACA	mir-4675/4741 mir-1275/4665-5p mir-1275	
	PPP3CA	mir-92a-1-5p mir-1275 mir-296-3p mir-662	
	RHOA	mir-662 mir-3200-3p mir-3182	
	CAMK2G	mir-1184 mir-1246	
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662	
	PRKCG	mir-198, mir-234-5p	
	PPP3CA	mir-92a-1-5p mir-1275 mir-296-3p mir-662	
	RAC1	mir-509-3p, mir-142-3p	
	PRKACA	mir-92a-1-5p mir-1275 mir-296-3p mir-662	
	CAMK2G	mir-1184 mir-1246	
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662	
	PRKCG	,mir-198, mir-234-5p	
	PRKACA	mir-92a-1-5p mir-1275 mir-296-3p mir-662	
	PPP3CA	mir-92a-1-5p mir-1275 mir-296-3p mir-662	
	RAC1	mir-509-3p, mir-142-3p	
	VEGF	AKT2	mir-662
		CDC42	mir-4746-5p, mir-185-5p
		KDR	mir-662
		MAP2K1	mir-449a,
NRAS		mir-146-5p	
PIK3CD		mir-4537, mir-199b-5p	
PRKCA		mir-92a-1-5p mir-1275 mir-296-3p mir-662	
RAC1		mir-509-3p, mir-142-3p	
AKT2		mir-662	
CDC42		mir-4746-5p, mir-185-5p	
KDR		mir-662	
MAP2K1		mir-449a,	
NRAS		mir-146-5p	
PIK3CD		mir-4537, mir-199b-5p	
PRKCA		mir-92a-1-5p mir-1275 mir-296-3p mir-662	
RAC1		mir-509-3p, mir-142-3p	
PIK3R2		mir-4787-5p	
PRKCA		mir-92a-1-5p mir-1275 mir-296-3p mir-662	
PRKCB		mir-1237-3p mir-449a mir-330-3p	
PPP3CA		mir-92a-1-5p mir-1275 mir-296-3p mir-662	
RAC1		mir-509-3p, mir-142-3p	
VEGFA		mir-5011-5p	

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Supplementary Table 2a: Continued

	PIK3R2	mir-4787-5p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	PPP3CA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	RAC1	mir-509-3p, mir-142-3p
	VEGFA	mir-5011-5p
	PIK3R2	mir-4787-5p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	PPP3CA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	RAC1	mir-509-3p, mir-142-3p
	VEGFA	mir-5011-5p
TGF	E2F5	mir-34-5p, mir-520c-3, mir-449ap,
	SKP1	mir-145-5p
	SMAD2	mir-190-5p, mir-512-3p
	IFNG	mir-4324
	LTBP1	mir-27a-5p
	RHOA	mir-662 mir-3200-3p mir-3182
	TGFB3	mir-649 mir-631 mir-631/3661,
	TGFBR2	mir-302-3p
	SMAD2	mir-190-5p, mir-512-3p
	SMAD7	mir-610
	CDKN2B	, mir-555, mir-662, mir-234-5p
	TGFB3	mir-649 mir-631 mir-631/3661,
	TNF	mir-1184
MTOR	PIK3R2	mir-4787-5p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	AKT2	mir-662
	PIK3CD	mir-4537, mir-199b-5p
	PRKAA2	mir-4636 mir-1246 mir-650 mir-409-3p mir-875-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	IGF1	mir-1275,
	PTEN	mir-198 mir-534
	PIK3R1	mir-1184
	PRKAA2	mir-4636 mir-1246 mir-650 mir-409-3p mir-875-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCG	,mir-198, mir-234-5p
	TNF	mir-1184
	IGF1	mir-1275,
	PTEN	mir-198 mir-534
	PIK3R1	mir-1184

Supplementary Table 2a: Continued

	PRKAA2	mir-4636 mir-1246 mir-650 mir-409-3p mir-875-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCG	,mir-198, mir-234-5p
	TNF	mir-1184
JAK-STAT	CSF2	mir-663b, mir-4707-5p
	CSF3	mir-3188, mir-662
	EPO	mir-1281
	GRB2	mir-4440
	IFNA1	mir-631/3661
	IFNA4	mir-144-5p, mir-4636
	IFNG	mir-4324
	IL13RA2	mir-4461
	IL13	mir-1306-3p, mir-3929/4419b/4478
	IL23A	mir-1909-5p, mir-649
	IL4	mir-5011-5p
	PIK3R2	mir-4787-5p
	CTNNA1	mir-9-5p, mir-1184
	CDC42	mir-4746-5p, mir-185-5p
	ITGA4	mir-508-3p,
	PIK3CD	mir-4537, mir-199b-5p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	RAC1	mir-509-3p, mir-142-3p
MIGRATION	PIK3R2	mir-4787-5p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	RHOA	mir-662 mir-3200-3p mir-3182
	RAC1	mir-509-3p, mir-142-3p
	PIK3R2	mir-4787-5p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	RHOA	mir-662 mir-3200-3p mir-3182
	RAC1	mir-509-3p, mir-142-3p
	PIK3R2	mir-4787-5p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	RHOA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	RAC1	mir-509-3p, mir-142-3p
	PIK3R2	mir-4787-5p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	RHOA	mir-662 mir-3200-3p mir-3182
	RAC1	mir-509-3p, mir-142-3p

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Supplementary Table 2a: Continued

JUNCTION	GNA11	mir-1306-3p
	GRB2	mir-4440
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	PRKACA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	PRK CZ	mir-1307-3p
	RHOA	mir-662 mir-3200-3p mir-3182
	RRAS	mir-5190, mir-34-5p, mir-4740-3p,
	GNA11	mir-1306-3p
	GRB2	mir-4440
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	PRKACA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	PRK CZ	mir-1307-3p
	RHOA	mir-662 mir-3200-3p mir-3182
	RRAS	mir-5190, mir-34-5p, mir-4740-3p,
	SMAD2	mir-190-5p, mir-512-3p
	WASL	mir-142-3p
	RHOA	mir-662 mir-3200-3p mir-3182
	RAC1	mir-509-3p, mir-142-3p
	TGFBR2	mir-302-3p
	SMAD2	mir-190-5p, mir-512-3p
	WASF3	mir-2467-3p, mir-662, mir-1246
	CTNNA1	mir-9-5p, mir-1184
	CDC42	mir-4746-5p, mir-185-5p
	RAC1	mir-509-3p, mir-142-3p
	ITPR2	mir-662
	MAP2K1	mir-449a,
	NRAS	mir-146-5p
	PDGFRA	mir-449a mir-146b-5p mir-342-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	TUBB4A	mir-4706/4749-5p, mir-5194
	ITPR2	mir-662
	MAP2K1	mir-449a,
	NRAS	mir-146-5p
	PDGFRA	mir-449a mir-146b-5p mir-342-3p

Supplementary Table 2a: Continued

	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	TUBB4A	mir-4706/4749-5p, mir-5194
	SMAD4	mir-662, mir-508-3p, mir-146b-5p
	WASF3	mir-2467-3p, mir-662, mir-1246
	CTNNA1	mir-9-5p, mir-1184
	CDC42	mir-4746-5p, mir-185-5p
	RAC1	mir-509-3p, mir-142-3p
	RAF1	mir-662, mir-649
	SOS1	mir-1184, mir-512-3p
	CSNK1D	mir-509-3p
	EGF	mir-198,
	ITPR3	mir-142-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCG	mir-198, mir-234-5p
	PRKACA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	EP300	mir-342-3p,
	IQGAP1	mir-296-3p ,mir-146b-5p,
	SMAD4	mir-662, mir-508-3p, mir-146b-5p
	YES1	mir-193a-5p, mir-146b-5p
	INSR	mir-1205, mir-671-3p, mir-557
	PTPRM	mir-491-3p, mir-557
APOPTOSIS	BAX	mir-4802-5p, mir-198
	BCL2	mir-345-3p,
	TRADD	mir-1184
	PIK3R2	mir-4787-5p
	BCL2	mir-345-3p
	PIK3R1	mir-1184
	TNF	mir-1184
CELL CYCLE	E2F1	mir-330-3p
	E2F2	mir-1184
	SMAD2	mir-190-5p, mir-512-3p
	CDK2	mir-584al/4445-3p mir-509-3p,
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDKN2B	mir-555, mir-662, mir-234-5p
	TGFB3	mir-649 mir-631 mir-631/3661,
	E2F5	mir-34-5p, mir-520c-3, mir-449ap,
	SKP1	mir-145-5p
	SMAD2	mir-190-5p, mir-512-3p
	CDC25B	mir-585-3p
	CCNA1	mir-4802-5p
	CCNA2	mir-548ap-3p mir-508-3p,
	CCNH	mir-548at-5p
	CDK2	mir-584al/4445-3p mir-509-3p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN2A	mir-675-5p/4466, mir-663b

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Supplementary Table 2a: Continued		
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDKN2A	mir-675-5p/4466, mir-663b
	CDKN2D	mir-451
	MCM5	mir-4649-5p
	TGFB3	mir-649 mir-631 mir-631/3661,
FOCAL ADHESION	BCL2	mir-345-3p
	CRK	mir-142-3p, mir-509-3p, mir-671-3p,
	GRB2	mir-4440
	ITGB8	mir-145-5p, mir-142-3p
	PIK3R2	mir-4787-5p
	PGF	mir-4743-5p
	PRKCA	mir-92a-1-5p, mir-296-3p, mir-662 mir-1275,
	PRKCB	mir-1237-3p mir-449a mir-330-3p
	RHOA	mir-662 mir-3200-3p mir-3182
	RAC1	mir-509-3p, mir-142-3p
	AKT2	mir-662
	CAV2	mir-589-3p
	CDC42	mir-4746-5p, mir-185-5p
	CCND2	mir-185-5p
	FLT4	mir-662
	GSK3B	mir-199b-5p
	ITGA3	mir-662 mir-198,
	ITGA4	mir-508-3p,
	KDR	mir-662
	LAMC1	mir-199b-5p
	MAP2K1	mir-449a,
	PIK3CD	mir-4537, mir-199b-5p
	PDGFRA	mir-449a mir-146b-5p mir-342-3p
	PDGFA	mir-106b-3p, mir-662
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
INVASION	RAC1	mir-509-3p, mir-142-3p
	CRK	mir-142-3p, mir-509-3p, mir-671-3p,
	WASL	mir-142-3p
	PIK3R2	mir-4787-5p
	RHOA	mir-662 mir-3200-3p mir-3182
	RAC1	mir-509-3p, mir-142-3p
	GAB1	mir-188-3p, mir-142-3p
	CTNNA1	mir-9-5p, mir-1184
	CAV2	mir-589-3p
	CDC42	mir-4746-5p, mir-185-5p
	PIK3CD	mir-4537, mir-199b-5p
	MET	mir-198
	ARPC2	mir-330-3p
	CTNNA2	mir-509-3p
ACT	AKT2	mir-662
	CSF1R	mir-662, mir-449a
	CSF1	mir-4736, mir-662
	CSF3	mir-3188, mir-662

Supplementary Table 2a: Continued		
	CCND2	mir-185-5p
	CDK6	mir-548at-5p, mir-555, mir- 665, mir-234-5p
	CDKN1A	mir-662, mir-665
	EFNA3	mir-662
	EPO	mir-1281
	FGF5	mir-4277
	FLT4	mir-662
	GSK3B	mir-199b-5p
	HSP90AB1	mir-589-3p
	iTGA3	mir-662
	ITGA4	mir-508-3p,
	ITGB5	mir-4708-3p
	IFNA4	mir-144-5p, mir-4636
	IFNB1	mir-507/557
	IL7	mir-4535, mir-1246
	MAP2K1	mir-449a,
	NRAS	mir-146-5p
	NFKB1	mir-508-3p
	PIK3CD	mir-4537, mir-199b-5p
	PDGFRA	mir-449a mir-146b-5p mir-342-3p
	PDGFA	mir-106b-3p, mir-662
	PRKAA2	mir-4636 mir-1246 mir-650 mir-409-3p mir-875-3p
	PRKCA	mir-92a-1-5p mir-1275 mir- 296-3p mir-662
	PPP2R3A	mir-449a, mir-512-3p
	RAC1	mir-509-3p, mir-142-3p
	THBS4	mir-3940-5p/4507
	COL2A1	mir-342-3p
	FGF7	mir-222-5p
	INSR	mir-1205, mir-671-3p, mir-557
	PDGFRA	mir-449a mir-146b-5p mir-342-3p
	RPS6KB1	mir-557
DIFFERENTIATION	AKT2	mir-662
	FOS	mir-589-3p
	TRAF6	mir-146-5p
	CAMK4	mir-1252-5p, mir-557
	CSF1R	mir-662, mir-449a
	CSF1	mir-4736, mir-662
	IFNB1	mir-507/557
	MAP2K1	mir-449a,
	NFKB1	mir-508-3p
	PIK3CD	mir-4537, mir-199b-5p
	RAC1	mir-509-3p, mir-142-3p
	STAT1	mir-188-3p
	TGFB2	mir-4535

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Supplementary Table 2b: KEGG Pathway for Down-Regulated miRNAs

WNT Signaling Pathway	APC	Mir-208-3p,mir-4783-5p,
	WNT2	Mir-548b-3p
VEGF	WNT7A	Mir-127-3p
	CSNK2A1	mir-92b-5p, mir-375,
	CCND2	mir-503-5p
	MAPK8	mir-499a-3p,
	RHOA	mir-154-3p
	CDC42	mir-708-3p
	MAPK14	mir-450b-3p
	MAPKAPK2	mir-4520-3p, mir-24
	AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
	MAPK1	mir-518c, mir-548b-3p,
	MAPK3	mir-486-3p
	MAPKAPK2	mir-4520-3p, mir-24
	MAPKAPK3	mir-24
	NRAS	mir-606
	PRKCG	mir-486-3p
	AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
	MAPK1	mir-518c, mir-548b-3p
	MAPK3	mir-486-3p
	MAPKAPK3	mir-24
	MAPKAPK2	mir-4520-3p, mir-24
	NRAS	mir-606
	PRKCG	mir-486-3p
	AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
	KRAS	mir-511, mir-534
	MAPK3	mir-486-3p
	PIK3R3	mir-450a
	PTGS2	mir-487b
	PRKCA	mir-487b, mir-937
PTK2	mir-138,	
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138	
KRAS	mir-511, mir-534	
MAPK1	mir-518c, mir-548b-3p	
PIK3R3	mir-450a	
PTGS2	mir-487b	
PRKCA	mir-487b, mir-937	
PTK2	mir-138	
AKT1	mir-138	
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138	
TGF-B	KDR	mir-138
	PIK3R3	mir-450a
	PRKCA	mir-487b, mir-937
	SMAD2	mir-606, mir-331-5p, mir-487b mir-534,
	SMAD4	mir-606, mir-449b, mir-138
	SMAD6	mir-637
	SP1	mir-548b-3p, mir-138
	CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,

Supplementary Table 2b: Continued

	MAPK1	mir-548b-3p, mir-518c, mir-534
	MAPK3	mir-486-3p
	TGFB2	mir-141-3p/200a-3p
	SMAD2	mir-606, mir-331-5p, mir-487b mir-534
	SMAD4	mir-606, mir-449b, mir-138
	SMAD6	mir-637
	SP1	mir-548b-3p, mir-138
	CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
	MAPK1	mir-548b-3p, mir-518c, mir-534
	MAPK3	mir-486-3p
	TGFB2	mir-141-3p/200a-3p
	AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
	CRKL	mir-4783-5p, mir-564, mir-571, mir-618,
	CRK	mir-4783-5p, mir-564, mir-571
	GNA12	,mir-564
	JUN	mir-3917,
	DUSP9	mir-637
	FGF1	mir-760, mir-515-3p,
	FGF7	mir-580-3p, mir-520d-5p, mir-493,
	FGF9	mir-548b-3p, mir-493
	FGFR1	mir-571, mir-515-3p, mir-511
	IL1A	mir-34b, mir-534,
	MAPK1	mir-518c, mir-548b-3p
	MAPK3	mir-486-3p
	MAPK3K5	
	MAPK3K8	
	MAPKAPK2	mir-4520-3p, mir-24,
	MAPKAPK3	mir-24
	NRAS	mir-606
	NF1	mir-24
	PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
	PDGFA	mir-3917
	PRKCG	mir-486-3p
	PPP5C	mir-637
	TGFB2	mir-141-3p/200a-3p
MAPK Signaling Patway	AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
	FASLG	mir-571, mir-534,
	GNA12	mir-564, mir-564, mir-534, mir-138
	KRAS	mir-511, mir-534
	EGFR	mir-450a
	FGF2	mir-450b-3p, mir-449b, mir-493
	FGF4	mir-511

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Supplementary Table 2b: Continued

MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p
NRAS	mir-606
PDGFA	mir-3917
SRD5A2	mir-760
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
JUN	mir-3917
SP1	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
DGKG	mir-760 mir-493
MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p
NRAS	mir-606
PLD1	mir-33b-3p, mir-515-3p, mir-487b
PDGFA	mir-3917
PRKCG	mir-486-3p
E2F1	mir-486-3p
RB1	mir-3942-5p, mir-643, mir-643
CCDK4	mir-548i
MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p
NRAS	mir-606
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
E2F1	mir-486-3p
RB1	mir-3942-5p, mir-643, mir-643
CDK4	mir-548i
MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p
NRAS	mir-606
PRKCG	mir-486-3p
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
E2F1	mir-486-3p
RB1	mir-3942-5p, mir-643, mir-643
SMAD2	mir-606, mir-331-5p, mir- 487b mir-534
SMAD4	mir-606, mir-449b, mir-138
CDK4	mir-548i
MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p
TFB2	
MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p
NRAS	mir-606
PAX8	mir-24, mir-511
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
JUN	mir-3917
CDK4	mir-548i
MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p

Supplementary Table 2b: Continued

MAP3K8	mir-450b-3p, mir-548b-3p
NRAS	mir-606
PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir- 511, mir-138
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
CTNNA1	mir-34b, mir-534
MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p
NRAS	mir-606
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
TIMP3	mir-486-3p
ERBB4	mir-493mir-520d-5p mir- 409-3p mir-450a
FGFR1	mir-571, mir-515-3p, mir-511
ITPR1	mir-618
ITPR2	mir-515-3p
IL12B	mir-34b mir-511
MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p
NRAS	mir-606
PRKCG	mir-486-3p
TGFB2	mir-141-3p/200a-3p
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
BCL2	mir-34b
SMAD2	mir-606, mir-331-5p, mir- 487b mir-534,
SMAD 4	mir-606, mir-449b, mir-138
MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p
TGFB2	mir-141-3p/200a-3p
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
BCL2	mir-34b
JUN	mir-3917
SMAD2	mir-606, mir-331-5p, mir- 487b mir-534
SMAD4	mir-606, mir-449b, mir-138
MAPK1	mir-518c, mir-548b-3p
MAPK3	mir-486-3p
TGFB2	mir-141-3p/200a-3p
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
KRAS	mir-511, mir-534
SP1	mir-548b-3p, mir-138
WASF3	mir-493 mir-138 mir-85-3p
WASL	mir-534
DGKG	mir-760 mir-493
EGFR	mir-450a
EGFR	mir-450a
MAPK1	mir-518c, mir-548b-3p
PIK3R3	mir-450a
PLD1	mir-33b-3p, mir-515-3p, mir-487b

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Supplementary Table 2b: Continued

PDGFRA	mir-449b, mir-138,
PDGFRB	mir-518c
PRKCA	mir-487b, mir-937
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
EP300	mir-511
KRAS	mir-511, mir-534
NKX3-1	mir-518c
CREB1	mir-450-5p, mir-548b-3p, mir-606, mir-450a, mir-493
CCND1	mir-511
CCNE1	mir-138, mir-4524-5p
CDKN1A	mir-208-3p mir-493
EGFR	mir-450a
FGFR1	mir-571, mir-515-3p, mir-511
MAPK1	mir-518c, mir-548b-3p
PTEN	mir-487b
PIK3R3	mir-450a
PDGFRB	mir-518c
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
KRAS	mir-511, mir-534
EGFR	mir-450a
FGFR1	mir-571, mir-515-3p, mir-511
MAPK1	mir-518c, mir-548b-3p
PTEN	mir-487b
PIK3R3	mir-450a
PDGFRA	mir-449b, mir-138,
PDGFRB	mir-518c
EP300	mir-511
KRAS	mir-511, mir-534
TIMP3	mir-486-3p
CCND1	mir-511
CCNE1	mir-138, mir-4524-5p
CDKN1A	mir-208-3p mir-493
CYP1B1	mir-409-3p
CYP24A1	mir-493
EGFR	mir-450a
ERBB3	mir-511
PTEN	mir-487b
PDGFRA	mir-449b, mir-138,
PDGFRB	mir-518c
PTGS2	mir-487b
PRKCA	mir-487b, mir-937
SERPINB5	mir-548b-3p mir-534
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
KRAS	mir-511, mir-534
CTNNA1	mir-34b, mir-534
CCND1	mir-511
EGFR	mir-450a
MAPK1	mir-518c, mir-548b-3p
PTEN	mir-487b
PIK3R3	mir-450a
KRAS	mir-511, mir-534
CCND1	mir-511

Supplementary Table 2b: Continued

MAPK1	mir-518c, mir-548b-3p
PAX8	mir-24, mir-511
RXRA	mir-138
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
KRAS	mir-511, mir-534
SMAD2	mir-606, mir-331-5p, mir-487b mir-534
SMAD4	mir-606, mir-449b, mir-138
CCND1	mir-511
MAPK1	mir-518c, mir-548b-3p
PIK3R3	mir-450a
TGFB3	mir-511
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
KRAS	mir-511, mir-534
SMAD2	mir-606, mir-331-5p, mir-487b mir-534
SMAD4	mir-606, mir-449b, mir-138
CCND1	mir-511
MAPK1	mir-518c, mir-548b-3p
PIK3R3	mir-450a
TGFB3	mir-511
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
KRAS	mir-511, mir-534
SMAD2	mir-606, mir-331-5p, mir-487b mir-534
SMAD4	mir-606, mir-449b, mir-138
CCND1	mir-511
EGFR	mir-450a
MAPK1	mir-518c, mir-548b-3p
PIK3R3	mir-450a
TGFB3	mir-511
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
KRAS	mir-511, mir-534
CCND1	mir-511
EGFR	mir-450a
MAPK1	mir-518c, mir-548b-3p
PIK3R3	mir-450a
PRKCA	mir-487b, mir-937
RXRA	mir-138
KRAS	mir-511, mir-534
CCND1	mir-511
CDKN1A	mir-208-3p mir-493
EGFR	mir-450a
MAPK1	mir-518c, mir-548b-3p
KRAS	mir-511, mir-534
CCND1	mir-511
CDKN1D	-
MAPK1	mir-518c, mir-548b-3p
ARAF	mir-138
AKT1	mir-138
AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
E2F2	mir-937
CDK2	mir-548a/4445-3p

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Supplementary Table 2b: Continued

CDKN1A	mir-208-3p mir-493
PIK3R1	mir-138
PDGFRA	mir-449b, mir-138,
PDGFB	mir-138
SRD5A2	mir-760
AKT1	mir-138
AKT2	mir-564, mir-571, mir-511
	mir-875-3p, mir-138
WASF3	mir-493 ,mir-138,
	mir-85-3p
PIK3R1	mir-138
PDGFRA	mir-449b, mir-138,
PRKCA	mir-487b, mir-937
PRS6KB1	-
ARAF	mir-138
AKT1	mir-138
ATK2	mir-564, mir-571, mir-511
	mir-875-3p, mir-138
E2F2	mir-937
SMAD4	mir-606, mir-449b, mir-138
CDKN2A	mir-937
PIK3R1	mir-138
STAT1	mir-875-3p
ARAF	mir-138
AKT1	mir-138
AKT2	mir-564, mir-571, mir-511
	mir-875-3p, mir-138
E2F2	mir-937
CDKN2A	mir-937
PIK3R1	mir-138
PRKCA	mir-487b, mir-937
ARAF	mir-138
AKT1	mir-138
AKT2	mir-564, mir-571, mir-511
	mir-875-3p, mir-138
IQGAP1	
CDKN1A	mir-208-3p mir-493
ESR1	mir-18-5p, mir-138,
KDR	mir-138
PIK3R1	mir-138
PRKCA	mir-487b, mir-937
RRAS2	mir-493, mir-875-3p,
RPS6KB1	mir-875-3p
ARAF	mir-138
AKT1	mir-138
AKT2	mir-564, mir-571, mir-511
	mir-875-3p, mir-138
E2F2	mir-937
GNA12	mir-534, mir-564, mir-138
MAX	mir-138, mir-937,
SMAD4	mir-606, mir-449b, mir-138
COL4A6	mir-493, mir-875-3p
CSF3R	mir-138
CDK2	mir-548a/4445-3p
CDKN1A	mir-208-3p mir-493
CDKN2A	mir-937

Supplementary Table 2b: Continued

CDKN2B	mir-450b-3p, mir-518c,
	mir-875-3p, mir-138,
	mir-85-3p,
FLT3LG	mir-138
ITGA3	mir-760, mir-138
PIK3R1	mir-138
PDGFRA	mir-449b, mir-138,
PDGFB	MIR-138
PRKCA	mir-487b, mir-937
PRKACA	mir-138
STAT1	mir-875-3p
ARAF	mir-138
E2F2	mir-937
CDKN1A	mir-208-3p mir-493
CDKN2A	mir-937
ARAF	mir-138
AKT1	mir-138
AKT2	mir-564, mir-571, mir-511
	mir-875-3p, mir-138
SMAD4	mir-606, mir-449b, mir-138
PIK3R1	mir-138
ABCC1	mir-138
E2F2	mir-937
CDKN1A	mir-208-3p mir-493
CDKN2A	mir-937
MMP16	mir-138
PDGFRA	mir-449b, mir-138,
PDGFB	MIR-138
PRKCA	mir-487b, mir-937
AKT1	mir-138
AKT2	mir-564, mir-571, mir-511
	mir-875-3p, mir-138
PIK3R1	mir-138
PDGFRA	mir-449b, mir-138,
ARAF	mir-138
AKT1	mir-138
AKT2	mir-564, mir-571, mir-511
	mir-875-3p, mir-138
PIK3R1	mir-138
RAP1A	mir-3942-5p
RAP1B	mir-4759
CDC42	mir-708-3p
MAPK14	mir-450b-3p
PTPN11	mir-431-3p
RHOA	mir-154-3p
RAP1A	mir-3942-5p
RAP1B	mir-4759
MAPK14	mir-450b-3p
PTPN11	mir-431-3p
RHOA	mir-154-3p
FLT4	mir-138
KDR	mir-138
PRKCA	mir-487b, mir-937
RHOB	
CDK1	mir-3688-3p
ITPR1	mir-618

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Supplementary Table 2b: Continued

	ITPR2	mir-515-3p
	MAPK1	mir-518c, mir-548b-3p
	NRAS	mir-606
	PDGFA	mir-3917
	PRKCG	mir-486-3p
	TUBB4A	mir-5194
	TUBB	mir-486-3p
	KRAS	mir-511, mir-534
	EGFR	mir-450a
	GJA1	mir-511
	MAPK1	mir-518c, mir-548b-3p
	PDGFRA	mir-449b, mir-138,
	PDGFRB	mir-518c
	PRKCA	mir-487b, mir-937
Apoptosis	AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
	BCL2	mir-34b
	XIAP	mir-618, mir-377-3p, mir-606, mir-34b ,mir-450a
	CSF2RB	mir-3917
	RIPK1	mir-24
	AKT1	mir-138
	AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
	TNFRSF1A	mir-937
	PIK3R1	mir-138
Cell Cycle	RB1	mir-3942-5p, mir-643, mir-643
	WEE1	mir-503-5p
	CCNA2	mir-548ay-3p, mir-548ap-3p
	CCND2	mir-503-5p
	CCNE1	mir-138, mir-4524-5p
	CDK2	mir-548al/4445-3p
	CDKN1A	mir-208-3p mir-493
	PCNA	mir-708-3p
	E2F1	mir-486-3p
	RB1	mir-3942-5p, mir-643, mir-643
	SMAD2	mir-606, mir-331-5p, mir-487b mir-534
	SMAD 4	mir-606, mir-449b, mir-138
	CCNA1	mir-606
	CCND3	mir-618
	CDK1	mir-3688-3p
	CDK2	mir-548al/4445-3p
	CDK4	mir-548i
	CDKN1B	mir-515-3p
	CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
	TGFB2	mir-141-3p/200a-3p
	YWHAE	mir-548b-3p
	YWHAZ	mir-134-5p
	E2F2	mir-937
	SMAD4	mir-606, mir-449b, mir-138
	CDK2	mir-548al/4445-3p
	CDKN1A	mir-208-3p mir-493

Supplementary Table 2b: Continued

	CDKN2A	mir-937
	CDKN2D	mir-85-3p
Focal Adhesion	CRKL	mir-4783-5p, mir-564, mir-571, mir-618
	CRK	mir-4783-5p, mir-564, mir-571
	ELK1	mir-3150a-3p
	RAP1A	mir-3942-5p
	RAP1B	mir-4759
	SOS2	mir-208-3p
	XIAP	mir-377-3p, mir-606, mir-618, mir-34b
	CAV2	mir-85-3p,mir-937,
	CDC42	mir-708-3p
	CCND2	mir-503-5p
	ITGA6	mir-127-3p, mir-487-3p
	MAPK8	mir-499a-3p,
	PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
	RHOA	mir-154-3p
	AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
	BCL2	mir-34b
	CRKL	mir-4783-5p, mir-564, mir-571, mir-618
	CRK	mir-4783-5p, mir-564, mir-571
	JUN	mir-3917
	ARHGAP5	mir-606
	XIAP	mir-377-3p, mir-606, mir-618, mir-34b
	CCND3	mir-618
	ITGA3	mir-760, mir-138
	ITGA9	mir-760, mir-511
	LAMS1	-
	MAPK1	mir-518c, mir-548b-3p
	PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
	PDGFA	mir-3917
	PRKCG	mir-486-3p
	AKT1	mir-138
	AKT2	mir-564, mir-571, mir-511 mir-875-3p, mir-138
	COL4A6	mir-493, mir-875-3p
	FLT4	mir-138
	ITGA3	mir-760, mir-138
	KDR	mir-138
	PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
	PIK3R1	mir-138
	PDGFRA	mir-449b, mir-138,
	PDGFB	MIR-138
	PRKCA	mir-487b, mir-937
	VAV2	mir-85-3p,mir-937,

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Supplementary Table 2b: Continued			Supplementary Table 2b: Continued		
Invasion	CRKL	mir-4783-5p, mir-564, mir-571, mir-618,	FGF7	mir-580-3p, mir-520d-5p, mir-493,	
	CRK	mir-4783-5p, mir-564, mir-571	FGF9	mir-548b-3p mir-493,	
AKT	CAV2	mir-85-3p, mir-937,	FGFR1	mir-571, mir-515-3p, mir-511	
	CDC42	mir-708-3p	FN1	mir-511	
	RHOA	mir-154-3p	INSR	mir-34b, mir-511, mir-138	
	AKT2	mir-564, mir-571, mir-511	ITGA4	mir-511	
	BCL2	mir-875-3p, mir-138	ITGA9	mir-760, mir-511	
	GNB3	mir-34b	ITGB8	mir-534	
	CREB1	mir-486-3p	MAPK1	mir-518c, mir-548b-3p	
	CCND3	mir-450-5p, mir-548b-3p, mir-606, mir-450a, mir-493	PTEN	mir-487b	
	CDK2	mir-618	PIK3R3	mir-450a	
	CDK4	mir-548al/4445-3p	PDGFRA	mir-449b, mir-138,	
	CDKN1B	mir-548i	PDGFRB	mir-518c	
	FGF1	mir-515-3p	PRKAA2	PRKAA2	
	FGF7	mir-760, mir-515-3p	PRKCA	mir-487b, mir-937	
	FGF9	mir-580-3p, mir-520d-5p, mir-493,	PKN2	mir-511	
	FGFR1	mir-548b-3p mir-493, mir-571, mir-515-3p, mir-511	PPP2R3A	mir-449b	
	INSR	mir-34b, mir-511, mir-138	PTK2	mir-138	
	ITGA3	mir-760, mir-138	RXRA	mir-138	
	ITGA9	mir-760, mir-511	AKT1	mir-138	
	IFNA2	mir-3134, mir-515-3p	AKT2	mir-564, mir-571, mir-511	
	IL4R	mir-637	COL4A6	mir-875-3p, mir-138	
	IL7	mir-802, mir-618	CSF3R	mir-493, mir-875-3p	
	LAMS1	-	CDK2	mir-138	
	MAPK1	mir-518c, mir-548b-3p	CDKN1A	mir-548al/4445-3p	
	MAPK3	mir-486-3p	FLT4	mir-208-3p mir-493	
	NRAS	mir-606	GH1	mir-138	
	PDGFA	mir-3917	INSR	mir-138	
	YWHAE		ITGA3	mir-34b, mir-511, mir-138	
	YWHAZ	mir-134-5p	IFNAR1	mir-760, mir-138	
	AKT2	mir-564, mir-571, mir-511	IL6R	mir-138	
	FASLG	mir-875-3p, mir-138	KDR	mir-138	
	KITLG	mir-571, mir-534,	PIK3R1	mir-138	
	KRAS	mir-534	PDGFRA	mir-138	
ANGPT2	mir-511, mir-534	PDGFB	mir-449b, mir-138,		
CREB1	mir-450-5p, mir-548b-3p, mir-606, mir-450a, mir-493	PRKAA2	MIR-138		
COL2A1	mir-493	PRKCA	PRKAA2		
COL4A6	mir-493, mir-875-3p	PPP2CA	mir-487b, mir-937		
CSF1R	mir-449b	RPSKB1	mir-1206		
CCND1	mir-511		-		
CCND3	mir-618				
CCNE1	mir-138, mir-4524-5p				
CDKN1A	mir-208-3p mir-493				
EFNA3	mir-3179, mir-493				
EGFR	mir-450a				
FGF2	mir-450b-3p, mir-449b, mir-493				
FGF4	mir-511				
FGF5	mir-493				

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Supplementary Table 3a: Reactome pathway for upregulated miRNAs

R-HSA-69656	Cyclin A:Cdk2-associated events at S phase entry	Max	mir-10b-3p,
		Cdc25b	mir-585-3p
		Ccna1	mir-4802-5p
		Ccna2	mir-508-3p, mir-548ap-3p
		Ccnh	mir-548at-5p
		Cdk2	mir-584al/4445-3p, mir-509-3p
		CDKN1B	mir-221-3p/222-3p, mir-330-3p
R-HSA-69202	Cyclin E associated events during G1/S transition	MAX	mir-10b-3p
		CCNH	mir-548at-5p
		CDK2	mir-584al/4445-3p, mir-509-3p
		CDKN1B	mir-221-3p/222-3p, mir-330-3p, mir-4802-5p
R-HSA-69563	p53-Dependent G1 DNA Damage Response	CCNA1	mir-4802-5p
		CCNA2	mir-548ap-3p, mir-508-3p, mir-584al/4445-3p, mir-509-3p
		CDK2	mir-584al/4445-3p, mir-509-3p
		CDKN1B	mir-221-3p/222-3p, mir-330-3p, mir-4802-5p
R-HSA-69231	Cyclin D associated events in G1	E2F1	mir-330-3p
		E2F2	mir-1184
		CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
		CDKN1B	mir-221-3p/222-3p, mir-330-3p
		CDKN2B	, mir-555, mir-662, mir-234-5p
		E2F5	mir-34-5p, mir-520c-3, mir-449ap,
		CCND2	mir-185-5p
		CDKN1A	mir-662, mir-665
		CDKN2B	, mir-555, mir-662, mir-234-5p
		SKP1	mir-145-5p
		CCNH	mir-548at-5p

Supplementary Table 3a: Continued

		CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
		CDKN1B	mir-221-3p/222-3p, mir-330-3p
		CDKN2A	mir-675-5p/4466, mir-663b
		CDKN2D	mir-451
R-HSA-69656	Cyclin A:Cdk2-associated events at S phase entry	MAX	mir-10b-3p
		CDC25B	mir-585-3p
		CCNA1	mir-4802-5p
		CCNA2	mir-548ap-3p, mir-508-3p, mir-548at-5p
		CCNH	mir-548at-5p
		CDK2	mir-584al/4445-3p, mir-509-3p
		CDKN1B	mir-221-3p/222-3p, mir-330-3p, mir-4802-5p
R-HSA-69563	53-Dependent G1 DNA Damage Response	CCNA1	mir-4802-5p
		CCNA2	mir-548ap-3p, mir-508-3p, mir-584al/4445-3p, mir-509-3p
		CDK2	mir-584al/4445-3p, mir-509-3p
		CDKN1B	mir-221-3p/222-3p, mir-330-3p, mir-4802-5p
R-HSA-176408	Regulation of APC/C activators between G1/S and early anaphase	CCNA1	mir-4802-5p
		CCNA2	mir-548ap-3p, mir-508-3p, mir-584al/4445-3p, mir-509-3p
		CDK2	mir-584al/4445-3p, mir-509-3p
		UBE2D1	mir-144-3p, mir-610,
R-HSA-68911	G2 Phase	CCNA1	mir-4802-5p
		CCNA2	mir-548ap-3p, mir-508-3p, mir-584al/4445-3p, mir-509-3p
		CDK2	mir-584al/4445-3p, mir-509-3p, mir-585-3p
R-HSA-69273	Cyclin A/B1/B2 associated events during G2/M transition	CDC25B	mir-585-3p
		CCNA1	mir-4802-5p
		CCNH	mir-548at-5p

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Supplementary Table 3a: Continued

		CDK2	mir-584a1/4445-3p
			mir-509-3p
R-HSA-1538133	G0 and Early G1	E2F5	mir-34-5p, mir-520c-3, mir-449ap, mir-4802-5p
		CCNA1	mir-548ap-3p
		CCNA2	mir-508-3p,
		CDK2	mir-584a1/4445-3p mir-509-3p
R-HSA-69017	CDK-mediated phosphorylation and removal of Cdc6	CDK2	mir-584a1/4445-3p mir-509-3p
		PSMA3	mir-1269
		PSMB1	mir-509-3p
		PSMD11	mir-2467-3p
		PSMD8	mir-4636
		PSMA4	mir-146-5p,
		PSMB4	mir-4277
R-HSA-5218921	VEGFR2 mediated cell proliferation	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
		PRKCB	mir-1237-3p mir-449a mir-330-3p
		PRKCZ	mir-1307-3p
		VEGFA	mir-5011-5p
R-HSA-1234176	Oxygen-dependent proline hydroxylation of Hypoxia-inducible Factor Alpha	UBE2D1	mir-144-3p, mir-610
		UBE2D2	mir-3200-3p, mir-3182, mir-193a-5p, mir-342-3p
		VHL	mir-1281, mir-5095/7151-3p
R-HSA-2871837	FCERI mediated NF-kB activation	TRAF6	mir-146-5p
		NFKB1	mir-508-3p
		PSMD11	mir-2467-3p
		PSMD8	mir-4636
		PSMA4	mir-146-5p
		PRKCQ	mir-449a, mir-1246
		UBE2D2	mir-3200-3p, mir-3182, mir-193a-5p, mir-342-3p
		UBE2D1	mir-144-3p, mir-610
R-HSA-1169091	Activation of NF-kappaB in B cells	NFKB1	mir-508-3p
		PSMD11	mir-2467-3p
		PSMD8	mir-4636

Supplementary Table 3a: Continued

		PSMA4	mir-146-5p
		PSMB4	mir-4277
		SKP1	mir-145-5p
		PSMA3	mir-1269
		PSMB1	mir-509-3p
		PRKCB	mir-1237-3p mir-449a mir-330-3p
R-HSA-5687128	MAPK6/MAPK4 signaling	PSMA3	mir-1269
		PSMB1	mir-509-3p
		PRKACA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
		RAC1	mir-509-3p, mir-142-3p
		DNAJB1	mir-508-3p, mir-1205,
		CDC42	mir-4746-5p, mir-185-5p
		PSMD11	mir-2467-3p
		PSMD8	mir-4636
		PSMA4	mir-146-5p
		PSMB4	mir-4277
R-HSA-5676590	NIK--> noncanonical NF-kB signaling	PSMD11	mir-2467-3p
		PSMD8	mir-4636
		PSMA4	mir-146-5p
		PSMB4	mir-4277
		SKP1	mir-145-5p
		PSMA3	mir-1269
		PSMB1	mir-509-3p
R-HSA-5607761	Dectin-1 mediated noncanonical NF-kB signaling	SKP1	mir-145-5p
		PSMA3	mir-1269
		PSMB1	mir-509-3p
		PSMD11	mir-2467-3p
		PSMD8	mir-4636
		PSMA4	mir-146-5p
		PSMB4	mir-4277
R-HSA-4420097	VEGFA-VEGFR2 Pathway	CRK	mir-142-3p, mir-509-3p, mir-671-3p,
		WASF3	mir-2467-3p, mir-662, mir-1246
		ABI2	mir-520c-3p, mir-662, mir-631, mir-1205,
		ITGAV	mir-142-3p, mir-654-3p
		ITGB3	mir-650
		PIK3R1	mir-1184
		PRKACA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
		RAC1	mir-509-3p, mir-142-3p,

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Supplementary Table 3a: Continued		
R-HSA-2871796	FCERI mediated MAPK activation	CDC42 mir-4746-5p, mir-185-5p
		KDR mir-662
		CRK mir-142-3p, mir-509-3p, mir-671-3p,
		PIK3R2 mir-4787-5p
		RHOA mir-662
		VEGFA mir-3200-3p mir-3182
		VEGFA mir-5011-5p
		GRB2 mir-4440
		MAP2K4 mir-1306-3p
		RAC1 mir-509-3p, mir-142-3p
R-HSA-5218921	VEGFR2 mediated cell proliferation	SOS1 mir-1184, mir-512-3p
		SYK
		PRKCA mir-92a-1-5p mir-1275 mir-296-3p mir-662
		PRKCB mir-1237-3p mir-449a
		PRKCZ mir-330-3p mir-1307-3p
R-HSA-109704	PI3K Cascade	VEGFA mir-5011-5p
		FGF7 mir-222-5p, mir-557,
		GRB2 mir-4440
		PIK3R2 mir-4787-5p
		GAB1 mir-188-3p, mir-142-3p
		FGFR1 mir-610,
		PIK3R1 mir-1184
		ERBB4 mir-508-3p, mir-1246, mir-557,
		FGF7 mir-222-5p, mir-557,
		PDGFRA mir-449a
R-HSA-2219530	Constitutive Signaling by Aberrant PI3K in Cancer	GAB1 mir-188-3p, mir-142-3p
		KITLG mir-1246
		EGF mir-198
		ERBB3 mir-520c-3p, mir-512-3p
		ERBB4 mir-508-3p, mir-1246, mir-557,
		FGFR1 mir-610,
		PIK3R1 mir-1184
		FGF5 mir-4277
		PIK3CD mir-4537, mir-199b-5p
		PDGFRA mir-146b-5p, mir-342-3p
		GAB1 mir-188-3p, mir-142-3p
		KITLG mir-1246
		EGF mir-198
		ERBB3 mir-520c-3p, mir-512-3p
		ERBB4 mir-508-3p, mir-1246, mir-557,

Supplementary Table 3a: Continued		
R-HSA-1257604	PIP3 activates AKT signaling	PDGFRA mir-449a
		mir-146b-5p
		mir-342-3p
		PDGFA mir-106b-3p, mir-662
		KIT mir-221-3p/222-3p,
		LCK mir-3928-3p
		FGF7 mir-222-5p, mir-557,
		GRB2 mir-4440
		PIK3R2 mir-4787-5p
		KIT mir-221-3p/222-3p,
R-HSA-5673001	RAF/MAP kinase cascade	LCK mir-3928-3p
		FGF7 mir-222-5p, mir-557,
		GRB2 mir-4440
		PIK3R2 mir-4787-5p
		AKT2 mir-662
		GAB1 mir-188-3p, mir-142-3p
		ERBB3 mir-520c-3p, mir-512-3p
		ERBB4 mir-508-3p, mir-1246, mir-557,
		FGF5 mir-4277
		PIK3CD mir-4537, mir-199b-5p
		PDGFA mir-106b-3p, mir-662
		KITLG mir-1246
		EGF mir-198
		FGFR1 mir-610,
		PTEN mir-198
PIK3R1 mir-1184		
FGF7 mir-222-5p, mir-557,		
ERBB4 mir-508-3p, mir-1246, mir-557,		
FGF7 mir-222-5p, mir-557,		
NRAS mir-146-5p		
PDGFRA mir-449a		
mir-146b-5p		
mir-342-3p		
PTPRA mir-146b-5p		
KITLG mir-1246		
SOS1 mir-1184, mir-512-3p		
TEK mir-649		
CAMK2G mir-1184		
mir-1246		
EGF mir-198		
ERBB3 mir-520c-3p, mir-512-3p		
ERBB4 mir-508-3p, mir-1246, mir-557,		

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Supplementary Table 3a: Continued

R-HSA-5668541	TNFR2 non-canonical NF-kB pathway	FGFR1	mir-610,
		CSF2	mir-663b,
			mir-4707-5p
		FGF7	mir-222-5p,
			mir-557,
		GRB2	mir-4440
		CSF2	mir-663b,
			mir-4707-5p
		FGF5	mir-4277
		PDGFA	mir-106b-3p,
R-HSA-1169091	Activation of NF-kappaB in B cells	LTBR	mir-662
		PSMD11	mir-2467-3p
		PSMA8	mir-499a-3p
		PSMA4	mir-146-5p
		PSMB4	mir-4277
		NFKB1	mir-508-3p
		PSMD11	mir-2467-3p
		PSMD8	mir-4636
		PSMDA4	-
		PSMB4	mir-4277
R-HSA-5358346	Hedgehog ligand biogenesis	SKP1	mir-145-5p
		PSMA3	mir-1269
		PSMB1	mir-509-3p
		PRKCB	mir-1237-3p mir-449a mir-330-3p
		P4HB	mir-188-3p
		PSMD11	mir-2467-3p
		PSMD8	mir-4636
		PSMA4	mir-146-5p
		PSMB4	mir-4277
		PSMA3	mir-1269
R-HSA-5687128	MAPK6/MAPK4 signaling	PSMB1	mir-509-3p
		PRKACA	mir-92a-1-5p
			mir-1275 mir-296-3p mir-662
		RAC1	mir-509-3p,
			mir-142-3p
		DNAJB1	mir-508-3p,
			mir-1205,
		CDC42	mir-4746-5p,
			mir-185-5p
		PSMD11	mir-2467-3p
R-HSA-5658442	Regulation of RAS by GAPs	PSMD8	mir-4636
		PSMA4	mir-146-5p
		PSMB4	mir-4277
		NRAS	mir-146-5p
		PSMD11	mir-2467-3p
		PSMD6	-
		PSMA4	mir-146-5p
		PSMB4	mir-4277

Supplementary Table 3a: Continued

R-HSA-1257604	PIP3 activates AKT signaling	KIT	mir-221-3p/222-3p,
		LCK	mir-3928-3p
		FGF7	mir-222-5p,
			mir-557,
		GRB2	mir-4440
		PIK3R2	mir-4787-5p
		AKT2	mir-662
		GAB1	mir-188-3p,
			mir-142-3p
		ERBB3	mir-520c-3p,
R-HSA-1963642	PI3K events in ERBB2 signaling	mir-512-3p	
		ERBB4	mir-508-3p, mir-1246, mir-557,
		FGF5	mir-4277
		PIK3CD	mir-4537,
			mir-199b-5p
		PDGFRA	mir-449a
			mir-146b-5p
			mir-342-3p
		PDGFA	mir-106b-3p,
			mir-662
R-HSA-5632684	sonic hedgehog homolog (SHH)	KITLG	mir-1246
		EGF	mir-198
		FGFR1	mir-610,
		PTEN	mir-198
		PIK3R1	mir-1184
		GAB1	mir-188-3p,
			mir-142-3p
		EGF	mir-198
		ERBB3	mir-520c-3p,
			mir-512-3p
R-HSA-5674135	MAP2K and MAPK activation	ERBB4	mir-508-3p, mir-1246, mir-557,
		PIK3R1	mir-1184
		PSMD11	mir-2467-3p
		PSMD8	mir-4636
		PSMA4	mir-146-5p
		PSMB4	mir-4277
		ARAF	mir-1908-5p,
		MAP2K1	mir-449a,
		NRAS	mir-146-5p
		CDH15	mir-665
R-HSA-418990	Adherens junctions interactions	CDH2	mir-199b-5p,
			mir-1246,
		CTNNA1	mir-9-5p,
			mir-1184
		CRK	mir-142-3p,
			mir-509-3p,
			mir-671-3p,
		PIK3R2	mir-4787-5p
		PRKACA	mir-92a-1-5p
			mir-1275 mir-296-3p mir-662

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Supplementary Table 3a: Continued		
		RHOA mir-662 mir-3200-3p mir-3182
		RAC1 mir-509-3p, mir-142-3p
		VEGFA mir-5011-5p
		WASF3 mir-2467-3p, mir-662, mir-1246
		ABI2 mir-520c-3p, mir-662, mir- 631, mir-1205,
		CDC42 mir-4746-5p, mir-185-5p
		KDR mir-662
		RAC1 mir-509-3p, mir-142-3p
		CRK mir-142-3p, mir-509-3p, mir-671-3p,
		ITGAV mir-142-3p, mir-654-3p
		PIK3R1 mir-1184
		PRKACA mir-92a-1-5p mir-1275 mir- 296-3p mir-662
R-HSA-399954	Sema3A PAK dependent Axon repulsion	LIMK1 mir-662
		HSP90AB1 mir-589-3p
		RAC1 mir-509-3p, mir-142-3p
R-HSA-1236394	Signaling by ERBB4	EGF mir-198
		ERBB3 mir-520c-3p, mir-512-3p
		ERBB4 mir-508-3p, mir- 1246, mir-557,
R-HSA-1963642	PI3K events in ERBB2 signaling	GAB1 mir-188-3p, mir-142-3p
		EGF mir-198
		ERBB3 mir-520c-3p, mir-512-3p
		ERBB4 mir-508-3p, mir- 1246, mir-557,
		PIK3R1 mir-1184
R-HSA-1236382	Constitutive Signaling by Ligand- Responsive EGFR Cancer Variants	GAB1 mir-188-3p, mir-142-3p
		SOS1 mir-1184, mir-512-3p
		EGF mir-198
		PIK3R1 mir-1184
R-HSA-4420097	VEGFA-VEGFR2 Pathway	CRK mir-142-3p, mir-509-3p, mir-671-3p,

Supplementary Table 3a: Continued		
		WASF3 mir-2467-3p, mir-662, mir-1246
		ABI2 mir-520c-3p, mir-662, mir- 631, mir-1205,
		ITGAV mir-142-3p, mir-654-3p
		ITGB3 mir-650
		RAC1 mir-509-3p, mir-142-3p
		CDC42 mir-4746-5p, mir-185-5p
		KDR mir-662
		RAC1 mir-509-3p, mir-142-3p
		PIK3R2 mir-4787-5p
		PRKACA mir-92a-1-5p mir-1275 mir- 296-3p mir-662
		RHOA mir-662 mir-3200-3p mir-3182
		RAC1 mir-509-3p, mir-142-3p
		VEGFA mir-5011-5p
R-HSA-5632684	Hedgehog 'on' state	PSMD11 mir-2467-3p
		PSMD8 mir-4636
		PSMA4 mir-146-5p
		PSMB4 mir-4277
R-HSA-5687128	MAPK6/MAPK4 signaling	DNAJB1 mir-508-3p, mir-1205,
		CDC42 mir-4746-5p, mir-185-5p
		PSMD11 mir-2467-3p
		PSMD8 mir-4636
		PSMA4 mir-146-5p
		PSMB4 mir-4277
		RAC1 mir-509-3p, mir-142-3p
		PSMA3 mir-1269
		PSMB1 mir-509-3p
		PRKACA mir-92a-1-5p mir-1275 mir- 296-3p mir-662
		RAC1 mir-509-3p, mir-142-3p
R-HSA-5687128	MAPK6/MAPK4 signaling	PSMA3 mir-1269
		PSMB1 mir-509-3p
		PRKACA mir-92a-1-5p mir-1275 mir- 296-3p mir-662
		RAC1 mir-509-3p, mir-142-3p

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Supplementary Table 3a: Continued

		DNAJB1	mir-508-3p, mir-1205,
		CDC42	mir-4746-5p, mir-185-5p
		PSMD11	mir-2467-3p
		PSMD8	mir-4636
		PSMA4	mir-146-5p
		PSMB4	mir-4277
		RAC1	mir-509-3p, mir-142-3p
R-HSA-109704	PI3K Cascade	GAB1	mir-188-3p, mir-142-3p
		FGFR1	mir-610,
		PIK3R1	mir-1184
		FGF7	mir-222-5p, mir-557,
		GRB2	mir-4440
		PIK3R2	mir-4787-5p
R-HSA-5654689	PI-3K cascade:FGFR1	GAB1	mir-188-3p, mir-142-3p
		FGFR1	mir-610,
		PIK3R1	mir-1184
R-HSA-5655253	Signaling by FGFR2 in disease	GAB1	mir-188-3p, mir-142-3p
		SOS1	mir-1184, mir-512-3p
		PIK3R1	mir-1184
R-HSA-1257604	PIP3 activates AKT signaling	KIT	mir-221- 3p/222-3p,
		LCK	mir-3928-3p
		FGF7	mir-222-5p, mir-557,
		GRB2	mir-4440
		PIK3R2	mir-4787-5p
		AKT2	mir-662
		GAB1	mir-188-3p, mir-142-3p
		ERBB3	mir-520c-3p, mir-512-3p
		ERBB4	mir-508-3p, mir- 1246, mir-557,
		FGF5	mir-4277
		PIK3CD	mir-4537, mir-199b-5p
		PDGFRA	mir-449a mir-146b-5p mir-342-3p
		PDGFA	mir-106b-3p, mir-662
		KITLG	mir-1246
		EGF	mir-198
		FGFR1	mir-610,
		PTEN	mir-198
		PIK3R1	mir-1184

Supplementary Table 3b: Reactome pathway for downregulated miRNAs

R-HSA-69202	Cyclin E associated events during G1/S transition	RB1	mir-3942-5p, mir-643, mir-643,
		WEE1	mir-503-5p
		CCNE1	mir-4524-5p, mir-138, mir-138, mir-548a/4445-3p
		CDK2	mir-208-3p mir-493
		CDKN1A	mir-3942-5p, mir-643, mir-643, mir-548a/4445-3p
		RB1	mir-515-3p
R-HSA-69563	p53-Dependent G1 DNA Damage Response	CDK2	mir-548ay-3p, mir-548ap-3p
		CDKN1B	
		CCNA2	
		CCNE1	mir-4524-5p, mir-138, mir-138, mir-548a/4445-3p
		CDK2	mir-208-3p mir-493
		CDKN1A	mir-3942-5p, mir-643, mir-643,
R-HSA-69231	Cyclin D associated events in G1	RB1	
		CCND2	mir-503-5p
		CDKN1A	mir-208-3p mir-493
		E2F5	mir-449b
		CCND1	mir-511
		CCND3	mir-618
		CDKN1A	mir-208-3p mir-493
		CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
		E2F2	
		CDKN1A	mir-208-3p mir-493
		CDKN2A	mir-937
		CDKN2B	mir-450b-3p, mir- 518c, mir-875-3p, mir-138, mir-85-3p,
		CDKN2D	mir-85-3p
		PPP2CA	mir-1206
R-HSA-69656	Cyclin A:Cdk2-associated events at S phase entry	RB1	mir-3942-5p, mir-643, mir-643,
		WEE1	mir-503-5p
		CCNA1	mir-606
		CDK2	mir-548a/4445-3p
		CDKN1A	mir-208-3p mir-493
		RB1	mir-3942-5p, mir-643, mir-643, mir-606
		CCNA1	mir-606
		CDK2	mir-548a/4445-3p
		CDKN1B	mir-515-3p
R-HSA-69563	53-Dependent G1 DNA Damage Response	CCNA2	mir-548ay-3p, mir-548ap-3p
		CCNE1	mir-4524-5p, mir-138, mir-138,

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Supplementary Table 3b: Continued				Supplementary Table 3b: Continued			
R-HSA-176408	Regulation of APC/C activators between G1/S and early anaphase	CDKN1A	mir-208-3p mir-493	R-HSA-5218921	VEGFR2 mediated cell proliferation	PSMB4	mir-4782-5p/5706
		CCNA1	mir-606			ITPR1	mir-618
		CDK2	mir-548al/4445-3p				
		CDKN1B	mir-515-3p				
R-HSA-68911	G2 Phase	CCNA1	mir-606	R-HSA-2871837	FCERI mediated NF-kB activation	ITPR2	mir-515-3p
		CDK1	mir-3688-3p			NRAS	mir-606
		CDK2	mir-548al/4445-3p			PSMC6	mir-302b-5p
R-HSA-69273	Cyclin A/B1/B2 associated events during G2/M transition	E2F1	mir-486-3p	R-HSA-1169091	Activation of NF-kappaB in B cells	PSMC6	mir-302b-5p
		CCNA1	mir-606			PSMD2	mir-802
		CDK2	mir-548al/4445-3p			PSMA3	mir-4520-3p
R-HSA-1538133	G0 and Early G1	WEE1	mir-503-5p	R-HSA-5687128	MAPK6/MAPK4 signaling	PSMA4	mir-4520-3p
		CCNA2	mir-548ay-3p, mir-548ap-3p			PSMA4	mir-4520-3p
		CDK2	mir-548al/4445-3p			PSMB4	mir-4782-5p/5706
		CCNA1	mir-606			PSMB6	mir-4504
		CDK1	mir-3688-3p			PSMB7	mir-449b-3p
		CDK2	mir-548al/4445-3p			CDC42	mir-708-3p
		CCNA2	mir-548ay-3p, mir-548ap-3p			MAPK4	mir-127-3p, mir-138
		CCNE1	mir-4524-5p, mir-138, mir-138,			PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
		CDK2	mir-548al/4445-3p				
		PCNA	mir-708-3p				
		E2F1	mir-486-3p				
		RBBP4	mir-1227-3p			PSMC6	mir-302b-5p
		CCNA1	mir-606			PSMD2	mir-802
		CDK1	mir-3688-3p			PSMA3	mir-4520-3p
		CDK2	mir-548al/4445-3p			PSMA4	mir-4520-3p
		E2F1	mir-486-3p			PSMB6	mir-4504
RBBP4	mir-1227-3p	PSMB7	mir-449b-3p				
CCNA1	mir-606	JUN	mir-3917,				
CDK1	mir-3688-3p	CCND3	mir-618				
CDK2	mir-548al/4445-3p	CDK1	mir-3688-3p				
E2F1	mir-486-3p	PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138				
RBBP4	mir-1227-3p						
CCNA1	mir-606						
CDK1	mir-3688-3p						
CDK2	mir-548al/4445-3p	PSMA2	mir-4782-5p/5706				
CDK2	mir-548al/4445-3p	PSMB4	mir-4782-5p/5706				
R-HSA-69017	CDK-mediated phosphorylation and removal of Cdc6					RAG1	mir-618, mir-138
						JUN	mir-3917,
						CCND3	mir-618
		PSMC6	mir-302b-5p			CDK1	mir-3688-3p
		PSMD2	mir-802			PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
		PSMA3	mir-4520-3p				
		PSMA4	mir-4520-3p				
		PSMB6	mir-4504				
		PSMB7	mir-449b-3p			PSMA2	mir-4782-5p/5706
		CDK2	mir-548al/4445-3p			PSMB4	mir-4782-5p/5706
PSMA2	mir-4782-5p/5706			RAG1	mir-618, mir-138		

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Supplementary Table 3b: Continued				Supplementary Table 3b: Continued			
R-HSA-5676590	NIK--> noncanonical NF-kB signaling	PSMC6	mir-302b-5p	R-HSA-69017	VEGFR2 mediated cell proliferation	CDK2	mir-548a/4445-3p
		PSMD2	mir-802			PSMC6	mir-302b-5p
		PSMA3	mir-4520-3p			PSMD2	mir-802
		PSMA4	mir-4520-3p			PSMA3	mir-4520-3p
		PSMB6	mir-4504			PSMA4	mir-4520-3p
		PSMB7	mir-449b-3p			PSMB6	mir-4504
R-HSA-5607761	Dectin-1 mediated noncanonical NF-kB signaling	PSMC6	mir-302b-5p			PSMB7	mir-449b-3p
		PSMD2	mir-802			CDK2	mir-548a/4445-3p
		PSMA3	mir-4520-3p	R-HSA-5218921	VEGFR2 mediated cell proliferation	PSMA2	mir-4782-5p/5706
		PSMA4	mir-4520-3p			PSMB4	mir-4782-5p/5706
		PSMB7	mir-449b-3p			ITPR1	mir-618
R-HSA-4420097	VEGFA- VEGFR2 Pathway	CRK	mir-4783-5p, mir-564, mir-571			ITPR2	mir-515-3p
		NCK1	mir-4264, mir-875-3p	R-HSA-2871837	FCERI mediated NF-kB activation	NRAS	mir-606
		CDC42	mir-708-3p			PSMC6	mir-302b-5p
		MAPK14	mir-450b-3p			PSMD2	mir-802
		MAPKAPK2	mir-4520-3p, mir-24			PSMA3	mir-4520-3p
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138			PSMA4	mir-4520-3p
		RHOA	mir-154-3p	R-HSA-1169091	Activation of NF-kappaB in B cells	PSMB6	mir-4504
R-HSA-2871796	FCERI mediated MAPK activation	JUN	mir-3917,			PSMB7	mir-449b-3p
		MAPK1	mir-518c, mir-548b-3p			UBE2D2	mir-382-3p
		MAPK3	mir-486-3p			PSMC6	mir-302b-5p
		NRAS	mir-606			PSMD2	mir-802
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138	R-HSA-5687128	MAPK6/MAPK4 signaling	PSMA3	mir-4520-3p
		JUN	mir-3917,			PSMA4	mir-4520-3p
		MAPK1	mir-518c, mir-548b-3p			PSMB6	mir-4504
		MAPK3	mir-486-3p			PSMB7	mir-449b-3p
		NRAS	mir-606			JUN	mir-3917,
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138			CCND3	mir-618
		KRAS	mir-511, mir-534			CDK1	mir-3688-3p
		MAPK1	mir-518c, mir-548b-3p			PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138			PSMA2	mir-4782-5p/5706
						PSMB4	mir-4782-5p/5706
						RAG1	mir-618, mir-138
						JUN	mir-3917,
						CCND3	mir-618
						CDK1	mir-3688-3p

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Supplementary Table 3b: Continued				Supplementary Table 3b: Continued			
R-HSA-5676590	NIK--> noncanonical NF-kB signaling	PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138	R-HSA-5218921	VEGFR2 mediated cell proliferation	Kras	mir-511, mir-534
		PSMA2	mir-4782-5p/5706			Mapk1	mir-518c, mir-548b-3p
		PSMB4	mir-4782-5p/5706			Pak2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
		RAG1	mir-618, mir-138			ITPR1	mir-618
		PSMC6	mir-302b-5p			ITPR2	mir-515-3p
		PSMD2	mir-802			NRAS	mir-606
		PSMA3	mir-4520-3p			FGF2	mir-450b-3p, mir-449b, mir-493
		PSMA4	mir-4520-3p			FGF4	mir-511
		PSMB6	mir-4504			FGF5	mir-493
		PSMB7	mir-449b-3p			FGF7	mir-580-3p, mir-520d-5p, mir-493, mir-548b-3p
R-HSA-5607761	Dectin-1 mediated noncanonical NF-kB signaling	PSMC6	mir-302b-5p	R-HSA-109704	PI3K Cascade	FGF9	mir-493, mir-571, mir-515-3p, mir-511
		PSMD2	mir-802			FGFR1	mir-760, mir-515-3p
		PSMA3	mir-4520-3p			FGF1	mir-580-3p, mir-520d-5p, mir-493, mir-548b-3p
		PSMA4	mir-4520-3p			FGF7	mir-493, mir-571, mir-515-3p, mir-511
		PSMB6	mir-4504			FGF7	mir-580-3p, mir-520d-5p, mir-493, mir-548b-3p
		PSMB7	mir-449b-3p			FGFR1	mir-571, mir-515-3p, mir-511
		CRP	mir-520d-5p, mir-409-3p, mir-450a, mir-493			FGF7	mir-580-3p, mir-520d-5p, mir-493, mir-580-3p, mir-520d-5p, mir-493, mir-548b-3p
		NCK1	mir-4264, mir-875-3p			FGF9	mir-548b-3p, mir-493, mir-571, mir-515-3p, mir-511
		CDC42	mir-708-3p			FGFR1	mir-571, mir-515-3p, mir-511
		MAPK14	mir-450b-3p			FGF7	mir-580-3p, mir-520d-5p, mir-493, mir-580-3p, mir-520d-5p, mir-493, mir-548b-3p
R-HSA-4420097	VEGFA-VEGFR2 Pathway	MAPKAPK2	mir-4520-3p, mir-24	R-HSA-2219530	Constitutive Signaling by Aberrant PI3K in Cancer	FGF7	mir-580-3p, mir-520d-5p, mir-493, mir-493, mir-580-3p
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138			IRS1	mir-487-3p
		RHOA	mir-154-3p			PTPN11	mir-431-3p
		Jun	ir-3917,			ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493
		Mapk1	mir-518c, mir-548b-3p			FGF1	mir-760, mir-515-3p
		Mapk3	mir-486-3p			FGF7	mir-580-3p, mir-520d-5p, mir-493, mir-548b-3p
		Nras	mir-606			FGF9	mir-548b-3p, mir-493, mir-571, mir-515-3p, mir-511
		Pak2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138			FGFR1	mir-571, mir-515-3p, mir-511
		Jun	mir-3917,			PDGFA	mir-3917
		Mapk1	mir-518c, mir-548b-3p			KITLG	mir-534
R-HSA-2871796	FCERI mediated MAPK activation	Mapk3	mir-486-3p	R-HSA-2871796	FCERI mediated MAPK activation	EGFR	mir-450a
		Nras	mir-606			ERBB3	mir-511
		Pak2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138			ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493
		Jun	mir-3917,			FGF2	mir-450b-3p, mir-449b, mir-493
		Mapk1	mir-518c, mir-548b-3p				
		Mapk3	mir-486-3p				
		Nras	mir-606				
		Pak2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138				
		Jun	mir-3917,				
		Mapk1	mir-518c, mir-548b-3p				

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Supplementary Table 3b: Continued			Supplementary Table 3b: Continued			
		FGF4	mir-511		PDGFA	mir-3917
		FGF5	mir-493		FGF7	mir-580-3p,
		FGF7	mir-580-3p, mir-520d-5p, mir-493,			mir-520d-5p, mir-493,
		FGF9	mir-548b-3p		IRS1	mir-487-3p
			mir-493,	R-HSA-5673001	PTPN11	mir-431-3p
		FGFR1	mir-571, mir-515-3p, mir-511		CSF2RB	mir-3917
		PIK3R3	mir-450a		ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493
		PDGFRA	mir-449b, mir-138,			
		PDGFR1	-		FGF1	mir-760, mir-515-3p
		PIK3R3	mir-450a		FGF7	mir-580-3p, mir-520d-5p, mir-493,
		PDGFRA	mir-449b, mir-138,		FGF9	mir-548b-3p
		PDGFB	MIR-138			mir-493,
R-HSA-1257604	PIP3 activates AKT signaling	AKT2	mir-564, mir-571, mir-511, mir-875-3p, mir-138		FGFR1	mir-571, mir-515-3p, mir-511
		AKT1	mir-138		MAPK1	mir-518c, mir-548b-3p
		PIK3R1	mir-138			
		PDGFRA	mir-449b, mir-138,		MAPK3	mir-486-3p
		PDGFB	MIR-138		NCAM1	mir-515-3p
		AKT2	mir-564, mir-571, mir-511, mir-875-3p, mir-138		NRAS	mir-606
		KITLG	mir-534		PDGFA	mir-3917
		EGFR	mir-450a		KITLG	mir-534
		ERBB3	mir-511		KRAS	mir-511, mir-534
		ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493		EGFR	mir-450a
		FGF2	mir-450b-3p, mir-449b, mir-493		ERBB3	mir-511
		FGF4	mir-511		ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493
		FGF5	mir-493			mir-450b-3p, mir-449b, mir-493
		FGF7	mir-580-3p, mir-520d-5p, mir-493,		FGF2	mir-450b-3p, mir-449b, mir-493
		FGF9	mir-548b-3p		FGF4	mir-511
			mir-493,		FGF5	mir-493
		FGFR1	mir-571, mir-515-3p, mir-511		FGF7	mir-580-3p, mir-520d-5p, mir-493,
		PTEN	mir-487b		FGF9	mir-548b-3p
		PIK3R3	mir-450a			mir-493,
		PDGFRA	mir-449b, mir-138,		FGFR1	mir-571, mir-515-3p, mir-511
		PDGFRB	mir-518c		MAPK1	mir-518c, mir-548b-3p
		AKT2	mir-564, mir-571, mir-511, mir-875-3p, mir-138	R-HSA-5668541		mir-449b, mir-138,
		ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493		PDGFRA	
		FGF1	mir-760, mir-515-3p		PDGFRB	
		FGF7	mir-580-3p, mir-520d-5p, mir-493,		PTK2	mir-138
		FGF9	mir-548b-3p		TNFRSF1B	
			mir-493,			
		FGFR1	mir-571, mir-515-3p, mir-511		PSMC6	mir-302b-5p
		MAPKAP1	mir-760		PSMD2	mir-802
					PSMA3	mir-4520-3p
					PSMA4	mir-4520-3p
					PSMB6	mir-4504
					PSMB7	
					PSMC6	mir-302b-5p
				R-HSA-1169091		
					Activation of NF-kappaB in B cells	
					PSMD2	mir-802

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Supplementary Table 3b: Continued				Supplementary Table 3b: Continued			
R-HSA-5358346	Hedgehog ligand biogenesis	PSMA3	mir-4520-3p	R-HSA-1963642	PI3K events in ERBB2 signaling	FGF7	mir-580-3p, mir-520d-5p, mir-493,
		PSMA4	mir-4520-3p			FGF9	mir-548b-3p
		PSMB6	mir-4504			FGFR1	mir-493,
		PSMB7	mir-449b-3p				mir-571, mir-515-3p,
		PSMC6	mir-302b-5p				mir-511
R-HSA-5687128	MAPK6/MAPK4 signaling	PSMD2	mir-802	R-HSA-5632684	sonic hedgehog homolog (SHH)	PTEN	mir-487b
		PSMA3	mir-4520-3p			PIK3R3	mir-450a
		PSMA4	mir-4520-3p			RDGFRA	mir-449b, mir-138
		CDC42	mir-708-3p			RDGFRB	mir-518c
		MAPK4	mir-127-3p, mir-138			AKT1	mir-138
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138			AKT2	mir-564, mir-571, mir-511, mir-875-3p, mir-138
		PSMC6	mir-302b-5p			PIK3R1	mir-138
		PSMD2	mir-802			PDGFA	mir-3917
		PSMA3	mir-4520-3p			PDGFB	MIR-138
		PSMA4	mir-4520-3p			EGFR	mir-450a
R-HSA-5658442	Regulation of RAS by GAPs	PSMB6	mir-4504	R-HSA-5674135	MAP2K and MAPK activation	ERBB3	mir-511
		PSMB7	mir-449b-3p			ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493
		JUN	mir-3917,				mir-637, mir-802
		CCND3	mir-618				
		CDK1	mir-3688-3p				
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138				
		PSMA2	mir-4782-5p/5706				
		PSMB4	mir-4782-5p/5706				
		RAG1	mir-618, mir-138				
		PSMC6	mir-302b-5p				
R-HSA-1257604	PIP3 activates AKT signaling	PSMD2	mir-802	R-HSA-418990	Adherens junctions interactions	CDH11	mir-493
		PSMA3	mir-4520-3p				
		PSMA4	mir-4520-3p				
		PSMB6	mir-4504				
		PSMB7	mir-449b-3p				
		NRAS	mir-606				
		NF1	mir-24				
		PSMA2	mir-4782-5p/5706				
		PSMB4	mir-4782-5p/5706				
		FGF7	mir-580-3p, mir-520d-5p, mir-493,			R-HSA-4420097	VEGFA-VEGFR2 Pathway
IRS1	mir-487-3p	CDH2	mir-1227, mir-520d-5p, mir-534,				
PTPN11	mir-431-3p		mir-409-3p				
AKT2	mir-564, mir-571, mir-511, mir-875-3p, mir-138		mir-34b, mir-534				
KITLG	mir-534		mir-4264,				
EGFR	mir-450a		mir-875-3p				
ERBB3	mir-511						
ERBB3	mir-511						
FGF2	mir-450b-3p, mir-449b, mir-493						
FGF4	mir-511						
FGF5	mir-493						
						WASF3	mir-493 mir-138
						KDR	mir-85-3p
						PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
						PIK3R1	mir-138
						PRKACA	mir-138
						VAV2	mir-85-3p, mir-937,
						NCK1	mir-4264, mir-875-3p

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Supplementary Table 3b: Continued			Supplementary Table 3b: Continued						
R-HSA-4420097	VEGFA-VEGFR2 Pathway	WASF3	mir-493 mir-138 mir-85-3p	R-HSA-5687128	MAPK6/MAPK4 signaling	PSMA4	mir-4520-3p		
		KDR	mir-138			PSMB6	mir-4504		
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138			JUN	mir-449b-3p mir-3917,		
		PIK3R1	mir-138			CCND3	mir-618		
		PRKACA	mir-138			PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138		
		VAV2	mir-85-3p, mir-937,			PSMA2	mir-4782-5p/5706		
		NCK1	mir-4264, mir-875-3p			PSMB4	mir-4782-5p/5706		
		WASF3	mir-493 mir-138 mir-85-3p			RAG1	mir-618, mir-138		
		KDR	mir-138			CDC42	mir-708-3p		
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138			MAPK4	mir-127-3p, mir-138		
		PIK3R1	mir-138			PSMC6	mir-302b-5p		
		PRKACA	mir-138			PSMD2	mir-802		
		VAV2	mir-85-3p, mir-937,			PSMA3	mir-4520-3p		
		NCK1	mir-4264, mir-875-3p			PSMA4	mir-4520-3p		
		WASF3	mir-493 mir-138 mir-85-3p			PSMB6	mir-4504		
		KDR	mir-138			PSMB7	mir-449b-3p		
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138			R-HSA-5687128	MAPK6/MAPK4 signaling	CDC42	mir-708-3p
		PIK3R1	mir-138			MAPK4	mir-127-3p, mir-138		
		PRKACA	mir-138			PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138		
		VAV2	mir-85-3p, mir-937,			PSMC6	mir-302b-5p		
WASF3	mir-493 mir-138 mir-85-3p	PSMD2	mir-802						
ABI2	mir-138	PSMA3	mir-4520-3p						
PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138	PSMA4	mir-4520-3p						
PTK2	mir-138	PSMB6	mir-4504						
CRK	mir-4783-5p, mir-564, mir-571	PSMB7	mir-449b-3p						
NCK1	mir-4264, mir-875-3p	JUN	mir-3917,						
CDC42	mir-708-3p	CCND3	mir-618						
MAPKAPK2	mir-4520-3p, mir-24	CDK1	mir-3688-3p						
PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138	PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138						
RHOA	mir-154-3p	PSMA2	mir-4782-5p/5706						
PTCH1	mir-637, mir-802	PSMB4	mir-4782-5p/5706						
PSMC6	mir-302b-5p	RAG1	mir-618, mir-138						
PSMD2	mir-802	JUN	mir-3917,						
PSMA3	mir-4520-3p	CCND3	mir-618						
		CDK2	mir-548a/4445-3p						
		PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138						
R-HSA-5632684	Hedgehog "on" state	PSMA2	mir-4782-5p/5706						
		PSMB4	mir-4782-5p/5706						
		RAG1	mir-618, mir-138						
		KRAS	mir-511, mir-534						
		R-HSA-2179392	EGFR Transactivation by Gastrin	EGFR	mir-450a				

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Supplementary Table 3b: Continued				Supplementary Table 3b: Continued			
R-HSA-5654720	PI-3K cascade:FGFR4	PRKCA	mir-487b, mir-937	R-HSA-5654689	PI-3K cascade:FGFR1	FGF7	mir-580-3p, mir-520d-5p, mir-493,
		FGF2	mir-450b-3p, mir-449b, mir-493			FGF7	mir-580-3p, mir-520d-5p, mir-493,
		FGF4	mir-511			FGF9	mir-548b-3p
		FGF9	mir-548b-3p			FGFR1	mir-571, mir-515-3p, mir-511
R-HSA-5654733	Negative regulation of FGFR4 signaling	FGF1	mir-493, mir-760, mir-515-3p	FGF1	mir-760, mir-515-3p	FGF7	mir-580-3p, mir-520d-5p, mir-493,
		FGF9	mir-548b-3p	FGF9	mir-548b-3p	FGFR1	mir-571, mir-515-3p, mir-511
		MAPK1	mir-518c, mir-548b-3p	FGF9	mir-493,	FGF7	mir-580-3p, mir-520d-5p, mir-493,
		MAPK3	mir-486-3p	FGFR1	mir-571, mir-515-3p, mir-511	FGF7	mir-580-3p, mir-520d-5p, mir-493,
		FGF2	mir-450b-3p, mir-449b, mir-493,	FGF9	mir-493,	FGFR1	mir-571, mir-515-3p, mir-511
		FGF4	mir-511	FGF7	mir-580-3p, mir-520d-5p, mir-493,	FGF7	mir-580-3p, mir-520d-5p, mir-493,
		FGF9	mir-548b-3p	IRS1	mir-487-3p	PTPN11	mir-431-3p
		MAPK1	mir-518c, mir-548b-3p	FGF1	mir-760, mir-515-3p	FGF9	mir-548b-3p
		KRAS	mir-511, mir-534	FGF9	mir-548b-3p	FGFR1	mir-571, mir-515-3p, mir-511
		FGF2	mir-450b-3p, mir-449b, mir-493	FGFR1	mir-571, mir-515-3p, mir-511	FGF2	mir-450b-3p, mir-449b, mir-493
R-HSA-5654719	SHC-mediated cascade:FGFR4	FGF4	mir-511	FGF4	mir-511	FGF5	mir-493
		FGF9	mir-548b-3p	FGF9	mir-548b-3p	FGF9	mir-548b-3p
		FGF1	mir-760, mir-515-3p	FGF9	mir-493,	FGFR1	mir-571, mir-515-3p, mir-511
		FGF9	mir-548b-3p	FGF9	mir-493,	FGFR1	mir-571, mir-515-3p, mir-511
R-HSA-190322	FGFR4 ligand binding and activation	NRAS	mir-606	R-HSA-5655253	Signaling by FGFR2 in disease	KRAS	mir-511, mir-534
		FGF2	mir-450b-3p, mir-449b, mir-493			FGF2	mir-450b-3p, mir-449b, mir-493
		FGF4	mir-511			FGF4	mir-511
		FGF9	mir-548b-3p			FGF5	mir-493
R-HSA-5654710	PI-3K cascade:FGFR3	FGF2	mir-450b-3p, mir-449b, mir-493	FGF7	mir-580-3p, mir-520d-5p, mir-493,	FGF7	mir-580-3p, mir-520d-5p, mir-493,
		FGF4	mir-511	FGF9	mir-548b-3p	FGF9	mir-548b-3p
		FGF5	mir-493	FGF9	mir-493,	FGF9	mir-493,
R-HSA-5654695	PI-3K cascade:FGFR2	FGF1	mir-760, mir-515-3p	FGF1	mir-760, mir-515-3p	FGF7	mir-580-3p, mir-520d-5p, mir-493,
		FGF7	mir-580-3p, mir-520d-5p, mir-493,	FGF7	mir-580-3p, mir-520d-5p, mir-493,	FGF9	mir-548b-3p
		FGF9	mir-548b-3p	FGF9	mir-548b-3p	NRAS	mir-606
		FGF2	mir-450b-3p, mir-449b, mir-493	FGF9	mir-493,	FGF7	mir-580-3p, mir-520d-5p, mir-493,
		FGF4	mir-511	FGF2	mir-450b-3p, mir-449b, mir-493	IRS1	mir-487-3p
		FGF5	mir-493	FGF9	mir-548b-3p	PTPN11	mir-431-3p
R-HSA-109704	PI3K Cascade	FGF1	mir-760, mir-515-3p	AKT2	mir-564, mir-571, mir-511, mir-875-3p, mir-138	ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493
		FGF2	mir-450b-3p, mir-449b, mir-493	ERBB4	mir-520d-5p, mir-409-3p, mir-450a, mir-493		
		FGF4	mir-511				
		FGF5	mir-493				

Supplementary Table 3b: Continued

FGF1	mir-760, mir-515-3p
FGF7	mir-580-3p, mir-520d-5p, mir-493,
FGF9	mir-548b-3p
	mir-493,
FGFR1	mir-571, mir-515-3p,
	mir-511
MAPKAP1	mir-760
PDGFA	mir-3917
FGF7	mir-580-3p, mir-520d-5p, mir-493,
IRS1	mir-487-3p
PTPN11	mir-431-3p

Supplementary Table 4a: BioCarta pathway results of upregulated miRNAs

MAPK SIGNALING PATHWAY	RAF1	mir-649
	SOS1	mir-1184, mir-512-3p
	NGFR	mir-296-3p
VEGF	EIF2S1	mir-520c-3p, mir-662, mir-193a-5p, mir-342-3p,
	FLT4	mir-662,
	HIF1A	mir-199b-5p,
	KDR	mir-662
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
EGF	VHL	mir-1281, mir-5095/7151-3p
	FOS	mir-589-3p
	RASA1	mir-4530
	FOS	mir-589-3p
	NFKB1	mir-508-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	EDNRA	mir-1237-3p mir-1178-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330- mir-4440
	GRB2	mir-4440
	MAP2K4	mir-1306-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330- RHOA
	RHOA	mir-662 mir-3200-3p mir-3182
VEGF	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330- VEGFA
	VEGFA	mir-5011-5p
	VHL	mir-1281, mir-5095/7151-3p
TGFB	APC	mir-570-3p
	SMAD2	mir-190-5p, mir-512-3p
	TGFB3	mir-631/3661, mir-631, mir-649
	TFGBR2	mir-302-3p
	FKBP1A	mir-142-3p, mir-650
	SKIL	mir-330-3p
	SMAD2	mir-190-5p, mir-512-3p
	CREB1	mir-509-3p
	TGFB3	mir-631/3661, mir-631, mir-649
	TGFBR3	mir-330-3p
ANGIOTENSIN	ATF2	mir-451
	GRB2	mir-4440 mir-548b-3p
	MAP2K1	mir-449a,
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330- RAC1
	RAC1	mir-509-3p, mir-142-3p

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Supplementary Table 4a: Continued

	ATF2	mir-451
	GRB2	mir-4440
	MAP2K4	mir-1306-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-
	RAC1	mir-509-3p, mir-142-3p
	MAP2K1	mir-449a,
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	RAC1	mir-509-3p, mir-142-3p
	RAF1	mir-649
	SOS1	mir-1184, mir-512-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	RAC1	mir-509-3p, mir-142-3p
	ARPC2	mir-330-3p
	PIK3R1	mir-1184
	RAC1	mir-509-3p, mir-142-3p
MIGRATION	CDC42	mir-4746-5p, mir-185-5p
	PDGFRA	mir-449a mir-146b-5p mir-342-3p
	RAC1	mir-509-3p, mir-142-3p
	WASL	mir-142-3p
	RHOA	mir-662 mir-3200-3p mir-3182
	RAC1	mir-509-3p, mir-142-3p
APOPTOSIS	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-
	PPP3CA	mir-145-5p, mir-142-3p, mir-512-3p
	ARHGDI1B	mir-4534/8082, mir-555
	CASP10	mir-555
	CASP2	mir-4708-3p, mir-188-3p, mir-610
	PARP1	mir-555
	SOS1	mir-1184, mir-512-3p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	PTEN	mir-198 mir-534
	PIK3R1	mir-1184
CELL CYCLE	SOS1	mir-1184, mir-512-3p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	PTEN	mir-198 mir-534
	PIK3R1	mir-1184
	E2F1	mir-330-3p
	CDK2	mir-584al/4445-3p, mir-509-3p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	E2F1	mir-330-3p
	CDK2	mir-584al/4445-3p, mir-509-3p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p

Supplementary Table 4a: Continued

	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	TGFB3	mir-631/3661, mir-631, mir-649
	CDC25A	mir-188-3p
	CCND2	mir-185-5p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1A	mir-662, mir-665
	CDKN2B	, mir-555, mir-662, mir-234-5p
	CDC25A	mir-188-3p
	CCND2	mir-185-5p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1A	mir-662, mir-665
	CDKN2B	, mir-555, mir-662, mir-234-5p
	CCNA1	mir-4802-5p
	CCNH	mir-548at-5p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDKN2A	mir-675-5p/4466, mir-663b
	CDKN2D	mir-451
	CCNA1	mir-4802-5p
	CCNH	mir-548at-5p
	CDK2	mir-584al/4445-3p, mir-509-3p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDKN2A	mir-675-5p/4466, mir-663b
	CDKN2D	mir-451
	CDK2	mir-584al/4445-3p, mir-509-3p
	CCNA1	mir-4802-5p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDKN2A	mir-675-5p/4466, mir-663b
	TGFB3	mir-631/3661, mir-631, mir-649
	CCNA1	mir-4802-5p
	CDK2	mir-584al/4445-3p, mir-509-3p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDKN2A	mir-675-5p/4466, mir-663b
	TGFB3	mir-631/3661, mir-631, mir-649
	CCNA1	mir-4802-5p
	CCNH	mir-548at-5p
CYCLIN	CDK2	mir-584al/4445-3p, mir-509-3p,

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Supplementary Table 4a: Continued

	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDKN2A	mir-675-5p/4466, mir-663b
	CDKN2D	mir-451
	CDC25A	mir-188-3p
	CCND2	mir-185-5p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN1A	mir-662, mir-665
	CDKN2B	, mir-555, mir-662, mir-234-5p
	E2F1	mir-330-3p
	CDKN1B	mir-221-3p/222-3p, mir-330-3p
	CDK6	mir-548at-5p, mir-555, mir-665, mir-234-5p
	CDKN2B	, mir-555, mir-662, mir-234-5p
PROLIFERATION	FOS	mir-589-3p
	MAP2K1	mir-449a,
	NFKB1	mir-508-3p
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	STAT1	mir-188-3p
	RAF1	mir-649
	SOS1	mir-1184, mir-512-3p
	PIK3R1	mir-1184
DIFFERENTIATION	CSF2	mir-663b, mir-4707-5p
	CSF3	mir-3188, mir-662
	EPO	mir-1281
	TGFB3	mir-631/3661, mir-631, mir-649
	PRKCA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	PRKCB	mir-1237-3p mir-449a mir-330-
	PPP3CA	mir-145-5p, mir-142-3p, mir-512-3p
	BCL2	mir-345-3p
	TNFRSF1B	mir-1306-3p, mir-4634
	MAP2K4	mir-1306-3p
	LCK	mir-3928-3p
	GRB2	mir-4440
	IFNG	mir-4324
	IL1B	mir-4276
	PIK3R2	mir-4787-5p
	PP3CA	mir-92a-1-5p mir-1275 mir-296-3p mir-662
	RAC1	mir-509-3p, mir-142-3p
	TGFBR2	mir-302-3p

Supplementary Table 4b: BioCarta pathway results of downregulated miRNAs

EGF	ELK1	mir-3150a-3p
	FOS	mir-802
	CSNK2A1	mir-92b-5p, mir-375, mir-499a-3p,
	MAPK8	mir-3917,
	JUN	mir-92b-5p, mir-375, mir-138
	CSNK2A1	mir-92b-5p, mir-375, mir-138
	PIK3R1	mir-487b, mir-937
	PRKCA	mir-875-3p,
	STAT1	mir-486-3p
	MAPK3	mir-875-3p
VEGF	EIF2S1	mir-875-3p
	FLT4	mir-138
	KDR	mir-138
	PIK3R1	mir-138
	PRKCA	mir-487b, mir-937
	ELK1	mir-3150a-3p
MAPKINASE SIGNALING PATHWAY	FOS	mir-802
	ATF2	mir-4764-5p, mir-85-3p
	CREB1	mir-450-5p, mir-548b-3p, mir-606, mir-450a, mir-493
	MAPK14	mir-450b-3p
	MAPK4	mir-127-3p, mir-138
	MAPK8	mir-499a-3p,
	MAP3K13	mir-548b-3p
	MAP3K5	mir-4330, mir-375
	MAPKAPK2	mir-4520-3p, mir-24
	PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
	JUN	mir-3917,
	SP1	mir-548b-3p, mir-138
	CREB1	mir-450-5p, mir-548b-3p, mir-606, mir-450a, mir-493
	MAPK1	mir-518c, mir-548b-3p
	MAPK3	mir-486-3p
	MAP3K5	mir-4330, mir-375
	MAP3K8	mir-450b-3p, mir-548b-3p
	MAPKAPK2	mir-4520-3p, mir-24
	MAPKAPK3	mir-24
	PAK2	mir-103-2-5p, mir-3179, mir-450b-3p, mir-606, mir-511, mir-138
	RIPK1	mir-24
MOTOR SIGNALING PATHWAY	AKT1	mir-138
	EIF2S1	mir-875-3p
	PIK3R1	mir-138
	PPP2CA	mir-1206

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Supplementary Table 4b: Continued		
	RPS6KB1	mir-875-3p
	AKT1	mir-138
	PIK3R1	mir-138
	PPP2CA	mir-1206
	RPS6KB1	mir-875-3p
Angiotensin II mediated activation of JNK Pathway via Pyk2 dependent signaling	Jun	mir-3917,
	MAPK1	mir-518c, mir-548b-3p
	MAPK3	mir-486-3p
	AGTR1	mir-493
	EGFR	mir-450a
	MAPK1	mir-518c, mir-548b-3p
	PRKCA	mir-487b, mir-937
	PTK2	mir-138
	AGTR1	mir-493
	EGFR	mir-450a
	MAPK1	mir-518c, mir-548b-3p
	PRKCA	mir-487b, mir-937
	PTK2	mir-138
	AGTR1	mir-493
	EGFR	mir-450a
	MAPK1	mir-518c, mir-548b-3p
	PRKCA	mir-487b, mir-937
	PTK2	mir-138
Induction of apoptosis through DR3 and DR4/5 Death Receptors	BCL2	mir-34b
	XIAP	mir-377-3p, mir-606, mir-618, mir-34b
	RIPK1	mir-24
CELL CYCLE	RB1	mir-3942-5p, mir-643, mir-643,
	CCND2	mir-503-5p
	CCNE1	mir-4524-5p, mir-138, mir-138,
	CDK2	mir-548al/4445-3p
	CDKN1A	mir-208-3p mir-493
	RB1	mir-3942-5p, mir-643, mir-643,
	CCNE1	mir-4524-5p, mir-138, mir-138,
	CDK2	mir-548al/4445-3p
	RB1	mir-3942-5p, mir-643, mir-643,
	CCNE1	mir-4524-5p, mir-138, mir-138,
	CDK2	mir-548al/4445-3p
	CDKNE1	mir-4524-5p, mir-138, mir-138,
	DHFR	mir-4724-3p
	E2F1	mir-486-3p
	RB1	mir-3942-5p, mir-643, mir-643,
	CCNA1	mir-606

Supplementary Table 4b: Continued	
CCND3	mir-618
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDK4	mir-548i
CDKN1B	mir-515-3p
CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p, mir-3688-3p
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDK4	mir-548i
E2F1	mir-486-3p
RB1	mir-3942-5p, mir-643, mir-643,
CCNA1	mir-606
CCND3	mir-618
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDK4	mir-548i
CDKN1B	mir-515-3p
CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p, mir-486-3p
E2F1	mir-486-3p
RB1	mir-3942-5p, mir-643, mir-643,
SMAD4	mir-606, mir-449b, mir-138
CCNA1	mir-606
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDK4	mir-548i
CDKN1B	mir-515-3p
CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p, mir-141-3p/200a-3p
TGFB2	mir-486-3p
E2F1	mir-486-3p
RB1	mir-3942-5p, mir-643, mir-643,
CDK2	mir-548al/4445-3p
CDKN1B	mir-515-3p
E2F1	mir-486-3p
RB1	mir-3942-5p, mir-643, mir-643,
SMAD4	mir-606, mir-449b, mir-138
CCNA1	mir-606
CDK1	mir-3688-3p
CDK2	mir-548al/4445-3p
CDK4	mir-548i
CDKN1B	mir-515-3p
CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p, mir-141-3p/200a-3p
TGFB2	mir-486-3p
CCND1	mir-511
CCND3	mir-618

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Supplementary Table 4b: Continued		
	CCNE1	mir-4524-5p, mir-138, mir-138,
	CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
	CDK2	mir-548al/4445-3p
	CDKN1A	mir-208-3p mir-493
	CDKN2A	mir-937
	CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
	CDKN2D	mir-85-3p
	SMAD4	mir-606, mir-449b, mir-138
	CDK2	mir-548al/4445-3p
	CDKN1A	mir-208-3p mir-493
	CDKN2A	mir-937
	CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
CYCLIN	RB1	mir-3942-5p, mir-643, mir-643,
	CCNE1	mir-4524-5p, mir-138, mir-138,
	CDK2	mir-548al/4445-3p
	RB1	mir-3942-5p, mir-643, mir-643,
	CCND2	mir-503-5p
	CCNE1	mir-4524-5p, mir-138, mir-138,
	CDK2	mir-548al/4445-3p
	CDKN1A	mir-208-3p mir-493
	E2F1	mir-486-3p
	RB1	mir-3942-5p, mir-643, mir-643,
	CCNA1	mir-606
	CCND3	mir-618
	CDK1	mir-3688-3p
	CDK2	mir-548al/4445-3p
	CDK4	mir-548i
	CDKN1B	mir-515-3p
	CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
	E2F1	mir-486-3p
	RB1	mir-3942-5p, mir-643, mir-643,
	CCNA1	mir-606
CCND3	mir-618	
CDK1	mir-3688-3p	
CDK2	mir-548al/4445-3p	
CDK4	mir-548i	
CDKN1B	mir-515-3p	
CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,	
E2F1	mir-486-3p	

Supplementary Table 4b: Continued		
	RB1	mir-3942-5p, mir-643, mir-643,
	CDK2	mir-548al/4445-3p
	CCND1	mir-511
	CCND3	mir-618
	CCNE1	mir-4524-5p, mir-138, mir-138,
	CDKN1A	mir-208-3p mir-493
	CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
	CDK2	mir-548al/4445-3p
	CDKN1A	mir-208-3p mir-493
	CDKN2B	mir-450b-3p, mir-518c, mir-875-3p, mir-138, mir-85-3p,
	CDKN2A	mir-937
	CDKN2D	mir-85-3p
AKT	AKT1	mir-138
	EIF2S1	mir-875-3p
	PIK3R1	mir-138
	PPP2CA	mir-1206
	RPS6KB1	mir-875-3p
	AKT1	mir-138
	GH1	mir-138
	PIK3R1	mir-138
	PPP2CA	mir-1206
	AKT1	mir-138
PROLIFERATION	PIK3R1	mir-138
	PPP2CA	mir-1206
	AKT1	mir-138
	PIK3R1	mir-138
	STAT1	STAT1
	JUN	mir-3917,
	MAPK1	mir-518c, mir-548b-3p
	MAPK3	mir-486-3p
	CRKL	mir-4783-5p, mir-564, mir-571, mir-618,
	JUN	mir-3917,
MAPK3	mir-486-3p	

Supplementary Table 5a: GeneClIP 2.0 results for Up-Regulated miRNAs

Keyword	Hit	Total	P-Value	Q-Value	Gene List
#cluster1	Enrichment Score: 217.18				
TYROSINE KINASE INHIBITOR	74	496	1.17E-240	1.92E-237	ABCB1;ADAM17;BAX;BCL2;CCL2;CCND2;CD34;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;E2F1;EGF;EPO;ERBB3;ERBB4;FGF7;FGFR1;FLT4;FOS;GAB1;GRB2;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;IL7;INSR;ITGA4;KDR;KIT;KITLG;LCK;MAP2K1;MET;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFA;PDGFRA;PGF;PIK3R1;PRKCA;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;SMAD2;STAT1;SYK;TEK;TNF;VEGFA;VHL;YES1
RECEPTOR TYROSINE KINASE	86	809	3.67E-195	1.72E-192	ABCB1;ADAM17;AKT2;APC;ARAF;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;E2F1;EFNA3;EGF;EPO;ERBB3;ERBB4;FGF7;FGFR1;FLT4;FOS;GAB1;GAS6;GNA11;GRB2;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;IL7;INSR;KDR;KIT;KITLG;LCK;MAP2K1;MAP2K4;MET;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PRKCA;PRKCQ;PTEN;PTGS2;PTPRA;RAC1;RAF1;RASA1;RHOA;RPS6KB1;SMAD2;SOS1;STAT1;SYK;TEK;TNF;TNFRSF1B;VEGFA;VHL;WASL;YES1
#cluster2	Enrichment Score: 169.52				
KINASE INHIBITOR	132	1587	6.17E-231	6.75E-228	ABCB1;ABI2;ACVR1B;ADAM17;AKT2;ANG;APC;ARAF;ATF2;BAX;BCL2;CAMK2G;CAMK4;CAV2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CSNK1D;CTNNA1;DDIT3;DUSP5;E2F1;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FKBP1A;FLT4;FOS;GAB1;GAS6;GNA11;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGA4;ITGAV;ITGB3;KDR;KIT;KITLG;LCK;LIMK1;MAP2K1;MAP2K4;MAP3K11;MAP3K13;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PRKAA2;PRKACA;PRKCA;PRKCB;PRKCG;PRKCQ;PRKCZ;PSMD6;PTEN;PTGS2;RAC1;RAF1;RARB;RASA1;RHOA;RPS6KB1;SKP1;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TNF;TNFRSF1B;TRAF6;VEGFA;VHL;YES1

Supplementary Table 5a: Continued

KINASE ACTIVITY	121	1693	3.65E-176	1.09E-173	ABCB1;ABI2;ACVR1B;ADAM17;AKT2;APC;ARAF;ATF2;BAX;BCL2;CAMK4;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CSNK1D;DDIT3;DUSP5;E2F1;E2F2;EGF;EIF2S1;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FKBP1A;FLT4;FOS;GAB1;GAS6;GRB2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;IL7;INSR;IRAK1;ITGAV;KDR;KIT;KITLG;LCK;LIMK1;MAP2K1;MAP2K4;MAP3K11;MAP3K13;MAP3K3;MET;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFA;PDGFRA;PIK3CD;PIK3R1;PIK3R2;PLK4;PRKAA2;PRKACA;PRKCA;PRKCB;PRKCG;PRKCQ;PRKCZ;PTEN;PTGS2;PTPRA;RAC1;RAF1;RASA1;RHOA;RPS6KB1;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TNF;TNFRSF1B;TRADD;TRAF6;VEGFA;WASL;YES1
MITOGEN ACTIVATED PROTEIN	133	2079	5.81E-171	1.59E-168	ABCB1;ABI2;ACVR1B;ADAM17;AKT2;ANG;APC;ARAF;ATF2;BAX;BCL2;CAMK2G;CAMK4;CASP2;CCL2;CCNA2;CCND2;CCNH;CCR1;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;COL2A1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;DDIT3;DUSP2;DUSP5;DUSP9;E2F1;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FLT4;FOS;GAB1;GAS6;GNA11;GRB2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IQGAP1;IRAK1;ITGAV;ITGB3;KDR;KIT;KITLG;LCK;MAP2K1;MAP2K4;MAP3K11;MAP3K13;MAP3K3;MAX;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PPP3CA;PRKAA2;PRKACA;PRKCA;PRKCB;PRKCQ;PRKCZ;PTEN;PTGS2;PTPRA;RAC1;RAF1;RASA1;RHOA;RPS6KB1;RRAS;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TNF;TNFRSF1B;TRADD;TRAF6;VEGFA;VHL;YES1
PROTEIN KINASE C	116	1749	6.34E-154	8.67E-152	ABCB1;ADAM17;AKT2;ANG;APC;ARAF;ATF2;BAX;BCL2;CAMK2G;CAMK4;CCL2;CCND2;CCNH;CD34;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;DUSP2;E2F1;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FKBP1A;FOS;GNA11;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGA4;ITGAV;ITGB3;ITPR2;KDR;KIT;KITLG;LCK;LTBR;MAP2K1;MAP2K4;MAP3K11;MAP3K13;MAP3K3;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PPP2R3A;PRKACA;PRKCA;PRKCB;PRKCG;PRKCQ;PRKCZ;PTEN;PTGS2;PTPRA;RAC1;RAF1;RARB;RASA1;RHOA;RPS6KB1;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TNF;TNFRSF1B;TRAF6;VEGFA;YES1

Supplementary Table 5a: Continued

SIGNAL TRANSDUCTION	161	3988	3.00E-119	1.76E-117	ABCB1;ABI2;ACVR1B;ADAM17;AKT2;ANG;APC;ARAF;ARHGDI2;ATF2;BAX;BCL2;CAMK2G;CAMK4;CASP10;CASP2;CAV2;CCL2;CCNA2;CCND2;CCNH;CCR1;CD34;CD44;CDC25A;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;DNAJB1;DUSP2;DUSP5;DUSP9;E2F1;EDNRA;EGF;EIF2S1;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FKBP1A;FLT4;FOS;GAB1;GAS6;GNA11;GRB2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IQGAP1;IRAK1;ITGA4;ITGAV;ITGB3;ITGB8;ITPR2;ITPR3;KDR;KIT;KITLG;LAMC1;LCK;LIMK1;LTBR;MAP2K1;MAP2K4;MAP3K11;MAP3K13;MAP3K3;MAX;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;P4HB;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PPP2R3A;PPP3CA;PRKAA2;PRKACA;PRKCA;PRKCB;PRKCG;PRKCC;PRKCZ;PSMB4;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RARB;RASA1;RHOA;RPS6KB1;RRAS;SKIL;SKP1;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2R2;TGFB3R3;TNF;TNFRSF1B;TRADD;TRAF6;TUBB4A;UBE2D1;VEGFA;VHL;WASL;WNT10B;WNT4;YES1
#cluster3	Enrichment Score: 156.94				
ANCHORAGE INDEPENDENT GROWTH	49	305	6.05E-171	1.53E-168	AKT2;APC;BAX;BCL2;CCL2;CCNA1;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CSF1;CSF1R;E2F1;EGF;ERBB3;ERBB4;FGFR1;FOS;GAB1;GRB2;HIF1A;IFNA1;IFNG;IGF1;INSR;KIT;MAP2K1;MET;NFKB1;NRAS;PARP1;PRKCA;PTEN;PTGS2;RAC1;RAF1;RHOA;SMAD2;SMAD4;STAT1;TGFB2;TNF;VEGFA
MAMMARY EPITHELIAL CELL	51	384	2.19E-144	2.25E-142	APC;BAX;BCL2;CCL2;CD44;CDC25A;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CSF1;CSF1R;E2F1;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FOS;GRB2;HIF1A;IFNG;IGF1;IL1B;IL4;INSR;MAP2K1;MET;NFKB1;PARP1;PRKCA;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;SMAD2;SMAD4;STAT1;TGFB2;TGFB2R2;TNF;VEGFA;WNT4
#cluster4	Enrichment Score: 153.06				
TYROSINE KINASE RECEPTOR	56	245	1.68E-286	5.50E-283	BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;CREB1;CSF1;CSF1R;CSF2;CSF3;EGF;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FLT4;FOS;GAB1;GAS6;GRB2;HIF1A;IFNA1;IGF1;IL1B;IL4;INSR;KDR;KIT;KITLG;MAP2K1;MET;NFKB1;NGFR;NTRK3;PDGFA;PDGFRA;PGF;PIK3R1;PIK3R2;PRKCA;PTEN;PTGS2;RAC1;RAF1;RHOA;SOS1;TEK;TNF;VEGFA

Supplementary Table 5a: Continued

PROTEIN TYROSINE KINASE	67	466	1.29E-208	8.44E-206	BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;DUSP9;EFNA3;EGF;EPO;ERBB3;ERBB4;FGFR1;FLT4;FOS;GAB1;GAS6;GRB2;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;IL7;INSR;KDR;KIT;KITLG;LCK;MAP2K1;MET;NFKB1;NGFR;NTRK3;PARP1;PDGFRA;PIK3R1;PIK3R2;PRKCA;PRKCB;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RASA1;RHOA;SOS1;STAT1;SYK;TEK;TFR;TNF;VEGFA;YES1
PROTEIN TYROSINE PHOSPHATASE	60	481	4.57E-159	7.89E-157	BAX;BCL2;CCL2;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;DUSP2;DUSP5;DUSP9;EGF;EPO;ERBB3;FOS;GAB1;GRB2;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KDR;KIT;KITLG;LCK;MAP2K1;MET;NFKB1;PARP1;PIK3CD;PIK3R1;PRKAA2;PRKCA;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RASA1;RHOA;SOS1;STAT1;SYK;TEK;TNF;VEGFA;YES1
SRC FAMILY KINASE	42	258	4.18E-148	4.57E-146	BCL2;CD44;CDC42;CDK2;CDKN1A;CRK;CSF1;CSF1R;CSF2;EGF;FGFR1;FOS;GAB1;GRB2;IFNG;IGF1;IL1B;IL4;INSR;KDR;KIT;KITLG;LCK;MAP2K1;MET;NFKB1;PIK3CD;PIK3R1;PIK3R2;PTEN;PTGS2;PTPRA;RAC1;RAF1;RASA1;RHOA;STAT1;SYK;TNF;VEGFA;WASL;YES1
PHOSPHATASE ACTIVITY	59	616	7.14E-118	3.90E-116	ABI2;BAX;BCL2;CAMK2G;CCL2;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;CREB1;CSF1;CSF2;CSF3;DUSP5;EGF;EIF2S1;EPO;FKBP1A;FOS;GAB1;GRB2;GSK3B;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KDR;KIT;KITLG;LCK;MAP2K1;MET;NFKB1;NGFR;PPP2R3A;PPP3CA;PRKCA;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RHOA;SMAD2;SMAD4;STAT1;SYK;TGFB2;TGFB3;TNF;VEGFA
PHOSPHOLIPASE C	65	860	2.40E-98	8.12E-97	BAX;BCL2;CAMK2G;CCL2;CCR1;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CREB1;CRK;CSF1;CSF1R;CSF2;EDNRA;EGF;EPO;FGFR1;FOS;GAB1;GNA11;GRB2;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;INSR;ITPR2;ITPR3;KDR;KIT;KITLG;LCK;MAP2K1;MET;NFKB1;NGFR;NTRK3;PARP1;PDGFA;PGF;PIK3CD;PIK3R1;PIK3R2;PRKCA;PRKCB;PRKCG;PRKCQ;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RASA1;RHOA;SOS1;STAT1;SYK;TFR;TNF;VEGFA
CATALYTIC ACTIVITY	62	1201	5.40E-58	7.90E-57	ABCB1;ABI2;ADAM17;ANG;BAX;BCL2;CAMK4;CCNH;CDC25B;CDC42;CDK2;CDK6;CDKN1A;CDKN2A;CREB1;CRK;CSF2;DUSP5;EGF;EP300;ERBB3;ERBB4;FOS;GRB2;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KDR;LCK;MAP2K1;MAP3K11;MET;MIF;NFKB1;P4HB;PARP1;PIK3CD;PIK3R1;PIK3R2;PRKACA;PRKCA;PRKCQ;PRKCZ;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RASA1;RHOA;RPS6KB1;SOS1;STAT1;SYK;TNF;VEGFA;YES1
#cluster5					Enrichment Score: 150.41

Supplementary Table 5a: Continued

GLYCOGEN SYNTHASE KINASE	55	407	4.76E-159	7.80E-157	AKT2;APC;BAX;BCL2;CCL2;CCND2;CD34;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CREB1;CSF2;CTNNA1;DDIT3;E2F1;EGF;EPO;FOS;GSK3B;HIF1A;IFNG;IGF1;IL1B;INSR;KDR;KIT;KITLG;MAP2K1;MAP3K11;MET;NFKB1;PARP1;PIK3CD;PIK3R1;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RPS6KB1;SKP1;SMAD2;SMAD4;STAT1;TNF;VEGFA;WNT10B;WNT4
TARGET OF RAPAMYCIN	60	528	3.25E-143	3.05E-141	ABCB1;AKT2;APC;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF2;DDIT3;E2F1;EGF;EIF2S1;EPO;ERBB3;FKBP1A;FOS;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KDR;KIT;KITLG;MAP2K1;MET;NFKB1;NRAS;PARP1;PDGFRA;PIK3CD;PIK3R1;PRKAA2;PRKCA;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;SMAD2;STAT1;SYK;TNF;VEGFA;VHL
#cluster6					
		Enrichment Score:			
		149.11			
VASCULAR ENDOTHELIAL CELL	63	562	7.57E-151	9.19E-149	ABCB1;ADAM17;ANG;BAX;BCL2;CAV2;CCL2;CD34;CD44;CDC42;CDK2;CDKN1A;CDKN2A;CREB1;CSF1;CSF2;CSF3;DDIT3;DUSP5;EDNRA;EGF;EPO;FGFR1;FLT4;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;INSR;ITGAV;ITGB3;ITGB8;KDR;KIT;KITLG;MAP2K1;MET;MIF;NFKB1;PARP1;PDGFA;PGF;PRKCA;PRKCB;PTEN;PTGS2;PTPRM;RAC1;RAF1;RHOA;SMAD2;SMAD4;STAT1;TEK;TGFB2;TNF;TNFRSF1B;VEGFA
HUMAN UMBILICAL VEIN	67	639	7.97E-149	9.01E-147	ABCB1;ADAM17;ANG;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CEACAM1;CREB1;CRK;CSF1;CSF2;CSF3;DDIT3;DUSP5;E2F1;EDNRA;EGF;EP300;EPO;FGFR1;FLT4;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;INSR;ITGA4;ITGAV;ITGB3;KDR;KIT;KITLG;LTBR;MAP2K1;MET;NFKB1;PARP1;PDGFA;PGF;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;RAC1;RHOA;SMAD2;STAT1;TEK;TFRC;TGFB2;TNF;TNFRSF1B;VEGFA
#cluster7					
		Enrichment Score:			
		145.33			
MAP KINASE	96	877	5.78E-226	4.74E-223	ADAM17;ARAF;ATF2;BAX;BCL2;CCL2;CCNH;CD34;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;DDIT3;DUSP2;DUSP5;DUSP9;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FOS;GAB1;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;IQGAP1;IRAK1;KDR;KIT;KITLG;LCK;MAP2K1;MAP2K4;MAP3K11;MAP3K13;MAP3K3;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFRA;PIK3CD;PIK3R1;PIK3R2;PPP3CA;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;PTPRA;RAC1;RAF1;RASA1;RHOA;RPS6KB1;RRAS;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TFRC;TNF;TNFRSF1B;TRADD;TRAF6;VEGFA

Supplementary Table 5a: Continued

SIGNAL TRANSDUCER	80	816	3.40E-165	6.98E-163	APC;ATF2;BAX;BCL2;CCL2;CCND2;CD34;CD44;CD25A;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;E2F1;EGF;EP300;EPO;ERBB3;ERBB4;FOS;GAB1;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IRAK1;KDR;KIT;KITLG;LCK;MAP2K1;MET;NFKB1;NGFR;PARP1;PDGFRA;PIK3CD;PIK3R1;PRKCA;PSMB4;PTEN;PTGS2;RAC1;RAF1;RASA1;RHOA;RPS6KB1;SKIL;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TNF;TNFRSF1B;TRADD;TRAF6;VEGFA
PLASMA MEMBRANE	113	3954	5.03E-47	5.97E-46	ABCB1;ABI2;ADAM17;AKT2;ANG;APC;ARAF;ARHGDI;ARPC2;BAX;BCL2;CAMK2G;CASP10;CASP2;CAV2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;DUSP9;EDNRA;EGF;EPO;ERBB3;ERBB4;FGF7;FGFR1;FKBP1A;FOS;GAB1;GNA11;GRB2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;INSR;IQGAP1;IRAK1;ITGA3;ITGAV;ITGB3;ITPR2;ITPR3;KDR;KIT;KITLG;LCK;LIMK1;MAP2K1;MAP2K4;MET;MIF;NFKB1;NGFR;NRAS;P4HB;PARP1;PIK3CD;PIK3R1;PIK3R2;PRKAA2;PRKCA;PRKCB;PRKCG;PRKCC;PRKCZ;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RASA1;RHOA;RPS6KB1;RRAS;SMAD2;SMAD4;SOS1;STAT1;SYK;TFRC;TGFB2;TNF;TNFRSF1B;TRADD;TRAF6;UBE2B;UBE2D2;VEGFA;VHL;WASL;YES1
#cluster8					Enrichment Score: 141.06
ENDOTHELIAL CELL PROLIFERATION	34	141	6.01E-182	1.97E-179	ANG;BAX;BCL2;CCL2;CD34;CD44;CDK2;CDKN1A;CDKN1B;CSF2;EGF;EPO;FGFR1;FLT4;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;ITGAV;KDR;KIT;MAP2K1;MET;NFKB1;PGF;PRKCA;PTGS2;RAC1;SMAD2;TEK;TNF;VEGFA
MICROVASCULAR ENDOTHELIAL CELL	46	327	1.85E-138	1.52E-136	ABCB1;ANG;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDKN1A;CREB1;CSF2;CSF3;DDIT3;EGF;EPO;FGFR1;FLT4;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;ITGAV;ITGB3;KDR;KIT;KITLG;MAP2K1;MET;NFKB1;PARP1;PGF;PRKCA;PTGS2;RAC1;RHOA;SMAD2;STAT1;TEK;TFRC;TNF;VEGFA
HYPOXIA INDUCIBLE FACTOR	53	557	5.79E-105	2.29E-103	ABCB1;ANG;BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CDKN2A;COL2A1;CREB1;CSF3;DDIT3;E2F1;EFNA3;EGF;EP300;EPO;FGFR1;FLT4;FOS;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KDR;KIT;KITLG;MAP2K1;MET;MIF;NFKB1;PARP1;PGF;PTEN;PTGS2;RAC1;RHOA;RPS6KB1;SMAD2;SMAD4;STAT1;TEK;TFRC;TNF;UBE2D1;VEGFA;VHL
#cluster9					Enrichment Score: 131.60
FOCAL ADHESION KINASE	50	334	1.61E-161	3.11E-159	BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;CREB1;CRK;EGF;ERBB3;FLT4;FOS;GRB2;GSK3B;HIF1A;IGF1;IL1B;INSR;ITGA3;ITGAV;ITGB3;KDR;KIT;KITLG;LCK;MAP2K1;MET;NFKB1;PARP1;PIK3R1;PRKCA;PTEN;PTGS2;PTPRA;RAC1;RAF1;RASA1;RHOA;SMAD2;STAT1;SYK;TEK;TNF;VEGFA;WASL;YES1

Supplementary Table 5a: Continued

FOCAL ADHESION	66	744	8.20E-121	5.17E-119	BAX;BCL2;CAMK2G;CAV2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CSF1;CSF2;CTNNA1;EGF;ERBB3;FLT4;FOS;GRB2;GSK3B;HIF1A;IGF1;IL1B;IL4;INSR;IQGAP1;ITGA3;ITGAV;ITGB3;ITGB5;KDR;KIT;KITLG;LAMC1;LCK;LIMK1;MAP2K1;MAP3K3;MET;NFKB1;PARP1;PIK3R1;PRKCA;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RASA1;RHOA;RRAS;SMAD2;SMAD4;SOS1;STAT1;SYK;TEK;TNF;VEGFA;WASL;YES1
CELL MOTILITY	65	756	1.17E-114	5.98E-113	AKT2;APC;ARHGDI3;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK6;CDKN1A;CDKN1B;CDKN2A;CRK;CSF1;CSF2;CTNNA1;EGF;EP300;ERBB3;ERBB4;FGF7;FGFR1;FOS;GAB1;GRB2;GSK3B;HIF1A;IFNG;IGF1;IL1B;IL4;INSR;IQGAP1;ITGA3;ITGAV;ITGB5;ITGB8;KDR;KIT;KITLG;LIMK1;MAP2K1;MET;NFKB1;NRAS;PARP1;PRKCA;PTEN;PTGS2;PTPRA;RAC1;RAF1;RASA1;RHOA;SMAD2;SMAD4;SOS1;STAT1;TNF;VEGFA;VHL;WASF3;WASL
#cluster10					
					Enrichment Score: 129.37
EPIDERMAL GROWTH FACTOR	123	1797	2.68E-170	6.28E-168	ABCB1;ACVR1B;ADAM17;AKT2;ANG;APC;ARAF;ATF2;BAX;BCL2;CAV2;CCL2;CCNA2;CCND2;CD34;CD44;CDC25A;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;DUSP5;E2F1;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FLT4;FOS;GAB1;GAS6;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL4;IL7;INSR;IQGAP1;ITGA3;ITGAV;ITGB3;KDR;KIT;KITLG;LAMC1;LCK;LIMK1;LTBP1;MAP2K1;MAP2K4;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;P4HB;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;PTPRA;RAC1;RAF1;RARB;RASA1;RHOA;RPS6KB1;RRAS;SKIL;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB3;THBS4;TNF;TNFRSF1B;TRADD;UBE2D2;VEGFA;VHL;WASL;YES1
GROWTH FACTOR RECEPTOR	113	1700	4.74E-150	5.55E-148	ABCB1;ADAM17;AKT2;ANG;APC;ARAF;BAX;BCL2;CCL2;CCND2;CD34;CD44;CDC25A;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;E2F1;E2F2;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FLT4;FOS;GAB1;GAS6;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL4;IL7;INSR;IQGAP1;ITGA3;ITGAV;KDR;KIT;KITLG;LCK;MAP2K1;MAP2K4;MAP3K3;MET;NFKB1;NGFR;NRAS;NTRK3;P4HB;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PRKCA;PRKCB;PRKCQ;PRKCZ;PTEN;PTGS2;PTPRA;RAC1;RAF1;RARB;RASA1;RHOA;RPS6KB1;SMAD2;SMAD4;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB3;TNF;TNFRSF1B;UBE2D2;VEGFA;VHL;WASL;YES1

Supplementary Table 5a: Continued

CELL SURFACE	135	4200	6.05E-70	1.12E-68	ABCB1;ACVR1B;ADAM17;AKT2;ANG;APC;ARAF;BAX;BCL2;CAMK2G;CASP10;CAV2;CCL2;CCND2;CCR1;CD34;CD44;CDC42;CDH15;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;DUSP2;E2F1;EDNRA;EFNA3;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FLT4;FOS;GAB1;GAS6;GNA11;GRB2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IQGAP1;IRAK1;ITGA3;ITGA4;ITGAV;ITGB3;ITGB5;ITGB8;KDR;KIT;KITLG;LAMC1;LCK;LTBP1;LTBR;MAP2K1;MAP2K4;MAP3K11;MAP3K13;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;P4HB;PARP1;PDGFA;PDGFR;PGF;PIK3CD;PIK3R1;PIK3R2;PRKCA;PRKCB;PRKCG;PRKCZ;PSMB4;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RARB;RASA1;RHOA;SKIL;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TGFB3;TNF;TNFRSF1B;TRADD;TRAF6;UBE2B;UBE2D2;VEGFA;WASL;YES1
#cluster11					Enrichment Score: 124.95
G1 PHASE	71	592	8.65E-184	3.15E-181	ABCB1;APC;BAX;BCL2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CREB1;CSF1;CSF1R;CSF2;CSF3;DDIT3;E2F1;E2F2;E2F5;EGF;EP300;EPO;FKBP1A;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;KDR;KIT;KITLG;MAP2K1;MAX;MCM5;MET;NFKB1;PARP1;PIK3R1;PRKCA;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;RPS6KB1;SKP1;SMAD2;SMAD4;STAT1;TFRC;TGFB2;TNF;VEGFA
S PHASE	84	1239	2.62E-112	1.30E-110	ABCB1;AKT2;APC;ARAF;BAX;BCL2;CASP2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CREB1;CSF1;CSF1R;CSF2;CSF3;DDIT3;E2F1;E2F2;E2F5;EGF;EP300;EPO;ERBB3;FGF7;FGFR1;FKBP1A;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;INSR;KDR;KIT;KITLG;MAP2K1;MAX;MCM5;MET;MIF;NFKB1;NRAS;PARP1;PIK3R1;PLK4;PRKCA;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;RPS6KB1;SKP1;SMAD2;SMAD4;SMAD7;STAT1;TFRC;TGFB2;TNF;UBE2B;VEGFA
CYCLIN DEPENDENT KINASE	81	862	2.43E-159	4.43E-157	ABCB1;APC;BAX;BCL2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CREB1;CSF1;CSF2;CSF3;DDIT3;E2F1;E2F2;E2F5;EGF;EP300;EPO;ERBB3;ERBB4;FGFR1;FKBP1A;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;IL7;INSR;KDR;KIT;KITLG;LIMK1;MAP2K1;MCM5;MET;NFKB1;NRAS;PARP1;PLK4;PPP2R3A;PRKCA;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;RPS6KB1;SKP1;SMAD2;SMAD4;SMAD7;STAT1;TFRC;TGFB2;TNF;VEGFA;VHL;YES1

Supplementary Table 5a: Continued

HUMAN BREAST CANCER	85	971	3.05E-154	4.35E-152	ABCB1;AKT2;APC;ARHGDI3;BAX;BCL2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF1;CSF1R;CSF2;CTNNA1;DDIT3;E2F1;E2F2;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FLT4;FOS;GRB2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;INSR;ITGAV;KDR;KIT;LIMK1;MAP2K1;MET;MIF;NFKB1;NRAS;PARP1;PIK3R1;PLK4;PRKCA;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;RPS6KB1;SMAD2;SMAD4;STAT1;TEK;TFRC;TGFB2;TGFB3;TGFB2;TNF;VEGFA;WASF3;WNT10B
M PHASE	58	539	5.44E-130	4.06E-128	ABCB1;APC;BAX;BCL2;CASP2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF2;CSF3;DDIT3;E2F1;EGF;EP300;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;KDR;KIT;KITLG;MAP2K1;MAP3K13;MCM5;MET;NFKB1;PARP1;PLK4;PRKCA;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;TFRC;TNF;VEGFA;YES1
BREAST CANCER CELL	115	2096	1.18E-120	7.30E-119	ABCB1;ADAM17;AKT2;ANG;APC;ARHGDI3;ATF2;BAX;BCL2;CASP10;CASP2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;DUSP5;E2F1;E2F2;E2F5;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FLT4;FOS;GAB1;GRB2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;INSR;IQGAP1;ITGA3;ITGAV;ITGB8;KDR;KIT;KITLG;LIMK1;MAP2K1;MAP2K4;MAP3K11;MET;MIF;NFKB1;NGFR;NRAS;PARP1;PGF;PIK3CD;PIK3R1;PLK4;PRKCA;PRKCZ;PSMD6;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RARB;RHOA;RPS6KB1;SKIL;SMAD2;SMAD4;SMAD7;STAT1;SYK;TFRC;TGFB2;TGFB3;TGFB2;TNF;TRADD;VEGFA;VHL;WASF3;WASL;WNT10B;YES1
ESTROGEN RECEPTOR	81	1232	4.00E-104	1.52E-102	ABCB1;AKT2;APC;ARAF;BAX;BCL2;CAV2;CCL2;CCNA1;CCNA2;CCND2;CD34;CD44;CDC25A;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF1;CSF2;CSF3;DDIT3;DUSP5;E2F1;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;INSR;ITGAV;KDR;KIT;KITLG;MAP2K1;MET;NFKB1;NGFR;P4HB;PARP1;PIK3R1;PRKCA;PTEN;PTGS2;PTPRA;RAC1;RAF1;RARB;RHOA;RPS6KB1;SKIL;SMAD2;SMAD4;STAT1;TFRC;TGFB2;TGFB3;TGFB2;TNF;VEGFA;VHL;WNT4

Supplementary Table 5a: Continued

SQUAMOUS CELL CARCINOMA	92	1776	4.55E-88	1.20E-86	ABCB1;ADAM17;AKT2;ANG;APC;BAX;BCL2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CREB1;CSF1;CSF2;CSF3;CTNNA1;DDIT3;E2F1;E2F5;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FLT4;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL4;INSR;IQGAP1;ITGA3;KDR;KIT;KITLG;MAP2K1;MAP3K3;MCM5;MET;MIF;NFKB1;NGFR;NRAS;PARP1;PDGFRA;PRKCA;PSMD6;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;SKIL;SMAD2;SMAD4;SMAD7;SOS1;STAT1;TFRC;TGFB2;TGFB2;TNF;TNFRSF1B;VEGFA;VHL;YES1
CELL DIVISION	73	1275	1.51E-78	3.21E-77	ABCB1;APC;BAX;BCL2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CREB1;CSF1;CSF1R;CSF2;CSF3;E2F1;E2F2;E2F5;EGF;EP300;EPO;FOS;GSK3B;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;IL7;INSR;ITGB8;KDR;KIT;KITLG;LCK;MAP2K1;MCM5;MET;NFKB1;NGFR;PARP1;PDGFA;PIK3R1;PLK4;PPP2R3A;PRKCA;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;SKP1;STAT1;TFRC;TNF;VEGFA;WASL
#cluster12	Enrichment Score: 120.61				
TRANSFORMING GROWTH FACTOR	119	1855	5.77E-152	7.56E-150	ABCB1;ACVR1B;ADAM17;AKT2;ANG;APC;ATF2;BAX;BCL2;CCL2;CCNA2;CCND2;CCR1;CD34;CD44;CDC25A;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;COL2A1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;DDIT3;E2F1;E2F2;E2F5;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FKBP1A;FLT4;FOS;GAB1;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGA3;ITGAV;ITGB3;ITGB5;ITGB8;KDR;KIT;KITLG;LAMC1;LIMK1;LTBP1;MAP2K1;MAP2K4;MAP3K3;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;RPS6KB1;SKIL;SMAD2;SMAD4;SMAD7;SOS1;STAT1;TEK;TFRC;TGFB2;TGFB3;TGFB2;TGFB3;THBS4;TNF;TNFRSF1B;TRAF6;VEGFA;VHL;WNT4
EXTRACELLULAR MATRIX	118	2260	1.54E-116	8.00E-115	ABCB1;ADAM17;AKT2;ANG;APC;ARPC2;ATF2;BAX;BCL2;CCL2;CCNA2;CCR1;CD34;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CEACAM1;COL2A1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;DUSP5;E2F1;EDNRA;EFNA3;EGF;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FLT4;FOS;GAS6;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL4;IL7;INSR;ITGA3;ITGA4;ITGAV;ITGB3;ITGB5;ITGB8;KDR;KIT;KITLG;LAMC1;LCK;LIMK1;LTBP1;MAP2K1;MET;MIF;NFKB1;NGFR;NTRK3;P4HB;PARP1;PDGFA;PDGFRA;PGF;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RARB;RHOA;SKIL;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TGFB3;THBS4;TNF;TNFRSF1B;TRAF6;VEGFA;VHL;WASL;WNT10B;WNT4

Supplementary Table 5a: Continued

CELL DIFFERENTIATION	117	2592	1.73E-95	5.61E-94	ABCB1;ACVR1B;ADAM17;AKT2;APC;BAX;BCL2;CCL2;CCNA1;CCND2;CD34;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;COL2A1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;DUSP5;E2F1;E2F2;E2F5;EGF;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FLT4;FOS;GRB2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;ITGA3;ITGA4;ITGAV;ITGB3;KDR;KIT;KITLG;LCK;LTBR;MAP2K1;MAP3K3;MAX;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFA;PDGFRA;PIK3CD;PIK3R1;PRKCA;PRKCB;PRKCG;PRKCQ;PRKZ;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RARB;RHOA;RPS6KB1;SMAD2;SMAD4;SMAD7;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TGFB3;THBS4;TNF;TNFRSF1B;TRAF6;VEGFA;VHL;WNT10B;WNT4;YES1
#cluster13					
	Enrichment Score:				
	120.34				
CELL MIGRATION	130	2398	4.84E-136	3.87E-134	ABCB1;ABI2;ACVR1B;ADAM17;AKT2;ANG;APC;ARAF;ARHGDI2;ARPC2;BAX;BCL2;CCL2;CCNA1;CCND2;CCR1;CD34;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;DUSP5;E2F1;EDNRA;EFNA3;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FLT4;FOS;GAB1;GAS6;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IQGAP1;ITGA3;ITGA4;ITGAV;ITGB3;ITGB5;ITGB8;KDR;KIT;KITLG;LAMC1;LCK;LIMK1;MAP2K1;MAP2K4;MAP3K11;MAP3K3;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;P4HB;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RASA1;RHOA;RPS6KB1;RRAS;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TGFB3;THBS4;TNF;TNFRSF1B;TRAF6;VEGFA;VHL;WASF3;WASL;WNT4;YES1
CELL ADHESION	124	2665	4.35E-106	1.83E-104	ABCB1;ADAM17;AKT2;ANG;APC;ARHGDI2;ARPC2;ATF2;BAX;BCL2;CCL2;CCND2;CCR1;CD34;CD44;CDC42;CDH15;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;CTNNA2;DUSP2;E2F1;EDNRA;EFNA3;EGF;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FLT4;FOS;GAB1;GAS6;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IQGAP1;IRAK1;ITGA3;ITGA4;ITGAV;ITGB3;ITGB5;ITGB8;KDR;KIT;KITLG;LAMC1;LCK;LIMK1;LTBR;MAP2K1;MAP2K4;MET;MIF;NFKB1;NGFR;PARP1;PDGFRA;PGF;PIK3R1;PRKCA;PRKCB;PRKCQ;PRKCZ;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RARB;RASA1;RHOA;RRAS;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TGFB3;THBS4;TNF;TNFRSF1B;TRAF6;VEGFA;VHL;WASL;WNT10B;WNT4;YES1
#cluster14					
	Enrichment Score:				
	119.35				

Supplementary Table 5a: Continued

WOUND HEALING	78	877	8.58E-144	8.28E-142	ADAM17;ANG;APC;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;EGF;EPO;FGF7;FGFR1;FLT4;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IQGAP1;ITGA3;ITGAV;ITGB3;ITGB5;KDR;KIT;KITLG;LTBP1;MAP2K1;MET;MIF;NFKB1;NGFR;PARP1;PDGFA;PGF;PRKCA;PTEN;PTGS2;RAC1;RAF1;RHOA;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TGFB3;THBS4;TNF;VEGFA;WASL
BASEMENT MEMBRANE	54	645	4.71E-92	1.40E-90	BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDKN1A;CDKN2A;CSF1;CSF2;CSF3;EGF;EPO;FGF5;FGF7;FGFR1;FLT4;FOS;GRB2;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;ITGA3;ITGAV;ITGB8;KDR;KIT;KITLG;LAMC1;MAP2K1;MET;MIF;NFKB1;NGFR;PRKCA;PTEN;PTGS2;RAC1;RHOA;SMAD2;SMAD4;SMAD7;TEK;TFRC;TGFB2;TGFB3;TGFB2;THBS4;TNF;VEGFA
SMOOTH MUSCLE ACTIN	54	489	2.13E-124	1.49E-122	ANG;BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CDKN1B;CDKN2A;CREB1;CSF1;CSF2;CSF3;EDNRA;EGF;EPO;FGFR1;FLT4;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;ITGAV;KDR;KIT;KITLG;MAP2K1;MET;NFKB1;NGFR;PARP1;PDGFA;PDGFRA;PTEN;PTGS2;RAC1;RHOA;SKIL;SMAD2;SMAD4;SMAD7;STAT1;TEK;TGFB2;TGFB3;TGFB2;TNF;VEGFA
#cluster15	Enrichment Score: 115.66				
PROTEIN PHOSPHORYLATION	47	353	3.69E-133	2.88E-131	ABI2;BAX;BCL2;CAMK2G;CAMK4;CCL2;CCND2;CDC42;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF2;CSNK1D;E2F1;EGF;EIF2S1;EPO;FOS;GSK3B;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KIT;LCK;MAP2K1;MET;NFKB1;PARP1;PRKACA;PRKCA;PRKCB;PTEN;PTGS2;RAC1;RAF1;RPS6KB1;STAT1;SYK;TNF;VEGFA
PROTEIN KINASE INHIBITOR	32	169	4.69E-132	3.58E-130	BAX;BCL2;CCL2;CDK2;CDKN1A;CDKN2A;CDKN3;CREB1;CSF2;EGF;FOS;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;INSR;KDR;KIT;MAP2K1;MET;NFKB1;NGFR;PARP1;PRKACA;PRKCA;PTGS2;RAF1;STAT1;TNF;VEGFA
PHOSPHATASE INHIBITOR	29	170	1.24E-106	5.28E-105	BAX;BCL2;CDC25A;CDC25B;CDK2;CDKN1A;CREB1;CSF2;EGF;EIF2S1;FOS;IFNA1;IFNG;IGF1;IL1B;INSR;LCK;MAP2K1;NFKB1;PRKACA;PRKCA;PRKCB;PTEN;PTGS2;RAF1;RHOA;STAT1;TNF;VEGFA
PROTEIN KINASE A	64	870	1.10E-93	3.37E-92	ABCB1;ATF2;BAX;BCL2;CAMK2G;CAMK4;CCL2;CCND2;CCNH;CD34;CD44;CDC25B;CDC42;CDK2;CDKN1A;CDKN1B;CDKN2A;CREB1;CSF1;CSF2;CSF3;EGF;EP300;EPO;ERBB3;FOS;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;INSR;ITPR2;ITPR3;KDR;LCK;MAP2K1;MET;NFKB1;PARP1;PIK3CD;PIK3R1;PPP2R3A;PPP3CA;PRKAA2;PRKACA;PRKCA;PRKCB;PRKCG;PRKCB;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;RRAS;SMAD4;STAT1;TNF;VEGFA
#cluster16	Enrichment Score: 110.68				

Supplementary Table 5a: Continued

ENDOTHELIAL GROWTH FACTOR	101	1246	1.01E-168	2.20E-166	ABCB1;ADAM17;ANG;APC;BAX;BCL2;CAV2;CCL2;CCNA1;CCR1;CD34;CD44;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;DDIT3;DUSP5;E2F1;EDNRA;EFNA3;EGF;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FLT4;FOS;GAB1;GAS6;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IQGAP1;ITGAV;ITGB3;ITGB5;ITGB8;KDR;KIT;KITLG;MAP2K1;MAP3K3;MET;MIF;NFKB1;NGFR;NRAS;PARP1;PDGFA;PDGFR;PGF;PIK3CD;PIK3R1;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;SMAD2;SMAD4;SMAD7;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TNF;TNFRSF1B;VEGFA;VHL
MECHANISM OF ACTION	86	1148	7.03E-130	5.13E-128	ABCB1;ANG;APC;BAX;BCL2;CCL2;CCND2;CCR1;CD34;CD44;CDC25A;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF1;CSF2;CSF3;DDIT3;DUSP5;E2F1;EGF;EIF2S1;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FKBP1A;FLT4;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;ITGAV;KDR;KIT;KITLG;MAP2K1;MAP2K4;MAP3K13;MET;MIF;NFKB1;NGFR;NRAS;PARP1;PGF;PIK3R1;PRKAA2;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;RPS6KB1;SMAD2;SMAD4;SMAD7;STAT1;SYK;TFRC;TGFB2;TNF;TNFRSF1B;VEGFA
SMOOTH MUSCLE CELL	108	1612	2.51E-144	2.49E-142	ABCB1;ADAM17;AKT2;ANG;ARPC2;ATF2;BAX;BCL2;CAMK2G;CAV2;CCL2;CCND2;CCR1;CD34;CD44;CDC42;CDH15;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF1;CSF1R;CSF2;CSF3;DDIT3;E2F1;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FKBP1A;FLT4;FOS;GAB1;GAS6;GNA11;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;INSR;IQGAP1;ITGAV;ITGB3;ITPR2;ITPR3;KDR;KIT;KITLG;LTBP1;MAP2K1;MAP2K4;MET;MIF;NFKB1;NGFR;P4HB;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PPP3CA;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RASA1;RHOA;RPS6KB1;RRAS;SMAD2;SMAD4;SMAD7;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TNF;TNFRSF1B;TRAF6;VEGFA;WNT4
QUANTITATIVE REAL TIME	99	2554	2.80E-64	4.74E-63	ABCB1;ACVR1B;ADAM17;AKT2;APC;ARHGDI1B;ARPC2;BAX;BCL2;CCL2;CCNA1;CCND2;CCR1;CD34;CD44;CDC25A;CDC25B;CDC42;CDH15;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;COL2A1;CREB1;CSF1;CSF1R;CSF2;CSF3;DDIT3;DUSP5;E2F1;E2F5;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FLT4;FOS;GAS6;HIF1A;HSP90A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;ITGA3;ITGB3;ITGB5;KDR;KIT;KITLG;MAP2K1;MET;MIF;NFKB1;NGFR;PARP1;PDGFA;PDGFRA;PGF;PIK3R1;PRKCA;PTEN;PTGS2;RAC1;RHOA;SMAD2;SMAD4;SMAD7;STAT1;TEK;TFRC;TGFB2;TGFB3;TGFB2;TGFB3;THBS4;TNF;TNFRSF1B;TRADD;TRAF6;TUBB4A;VEGFA;VHL;WNT4

Supplementary Table 5a: Continued

CENTRAL NERVOUS SYSTEM	97	2928	8.08E-50	1.01E-48	ABCB1;ADAM17;APC;BAX;BCL2;CAMK2G;CAMK4;CAV2;CCL2;CCR1;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF1;CSF1R;CSF2;CSF3;CTNNA2;DDIT3;E2F1;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF5;FGFR1;FOS;GAS6;GNA11;GRB2;GSK3B;HIF1A;IFNA1;IFNA4;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;ITGA4;ITGB8;ITPR2;ITPR3;KDR;KIT;KITLG;LIMK1;MAP2K1;MAP3K3;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFA;PDGFRA;PRKCA;PRKCG;PTEN;PTGS2;PTPRA;RAC1;RAF1;RARB;RHOA;RPS6KB1;SKIL;SMAD2;SMAD4;STAT1;TEK;TFRC;TGFB2;TGFB3;TNF;TNFRSF1B;TUBB4A;VEGFA;VHL;WNT4
#cluster17	Enrichment Score: 109.54				
RECEPTOR ACTIVATOR	37	237	2.92E-124	2.00E-122	BCL2;CAMK4;CCL2;CCR1;CD34;CD44;CDKN1A;CREB1;CSF1;CSF1R;CSF2;CSF3;EGF;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL23A;IL4;IL7;INSR;ITGAV;ITGB3;KDR;MAP2K1;NFKB1;PTGS2;RHOA;STAT1;TNF;TNFRSF1B;TRAF6;VEGFA
BONE RESORPTION	40	353	3.57E-94	1.12E-92	BAX;BCL2;CAMK4;CCL2;CCR1;CD44;CREB1;CSF1;CSF1R;CSF2;CSF3;EGF;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;ITGAV;ITGB3;KDR;KIT;MAP2K1;NFKB1;PPP3CA;PTGS2;RAC1;RHOA;STAT1;SYK;TGFB2;TNF;TNFRSF1B;TRAF6;VEGFA
OSTEOCLAST DIFFERENTIATION	29	162	2.38E-112	1.20E-110	BCL2;CAMK4;CCL2;CCR1;CDKN1A;CREB1;CSF1;CSF1R;CSF2;FOS;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;ITGAV;ITGB3;KIT;NFKB1;PTGS2;RAC1;RHOA;STAT1;SYK;TNF;TNFRSF1B;TRAF6;VEGFA
#cluster18	Enrichment Score: 109.31				
CYTOKINE RECEPTOR	47	338	9.70E-140	8.60E-138	ADAM17;BAX;BCL2;CCL2;CCR1;CD34;CD44;CDKN1A;CSF1;CSF1R;CSF2;CSF3;EGF;EPO;FOS;GAB1;GRB2;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;KDR;KIT;KITLG;LCK;MAP2K1;NFKB1;PIK3R1;PIK3R2;PTEN;PTGS2;RAF1;STAT1;SYK;TFRC;TNF;TNFRSF1B;TRADD;TRAF6;VEGFA
MONOCYTE CHEMOATTRACTANT PROTEIN	42	350	1.25E-105	5.08E-104	ANG;BAX;BCL2;CCL2;CCR1;CD34;CD44;CDKN1A;CSF1;CSF1R;CSF2;CSF3;DDIT3;EGF;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;KDR;KITLG;MAP2K1;MIF;NFKB1;PGF;PTGS2;RAC1;RHOA;SMAD2;STAT1;TNF;TNFRSF1B;TRAF6;VEGFA
MONOCYTE CHEMOTACTIC PROTEIN	30	199	1.81E-96	5.94E-95	ANG;BAX;BCL2;CCL2;CCR1;CD34;CSF1;CSF2;CSF3;EGF;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;KDR;KITLG;MIF;NFKB1;PGF;PTGS2;STAT1;TNF;VEGFA
MACROPHAGE INFLAMMATORY PROTEIN	34	249	2.61E-98	8.73E-97	ANG;BAX;BCL2;CCL2;CCR1;CD34;CD44;CSF1;CSF2;CSF3;EGF;EPO;FGF7;FOS;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;ITGA4;KIT;KITLG;MAP2K1;MIF;NFKB1;PTGS2;STAT1;TGFB2;TNF;VEGFA
#cluster19	Enrichment Score: 105.35				

Supplementary Table 5a: Continued

INDUCTION OF APOPTOSIS	74	634	6.05E-186	2.48E-183	ABCB1;AKT2;APC;BAX;BCL2;CASP10;CASP2;CCL2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF1;CSF2;CSF3;DDIT3;E2F1;E2F2;EGF;EIF2S1;EP300;EPO;ERBB3;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;KDR;KIT;KITLG;MAP2K1;MAP2K4;MAX;MET;NFKB1;NGFR;NRAS;PARP1;PRKCA;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;RPS6KB1;SMAD2;SMAD4;SMAD7;STAT1;TFRC;TNF;TNFRSF1B;TRADD;VEGFA
CELL CYCLE ARREST	85	1218	8.70E-118	4.68E-116	ABCB1;AKT2;APC;BAX;BCL2;CASP2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CREB1;CSF1;CSF2;CSF3;DDIT3;E2F1;E2F2;E2F5;EGF;EP300;EPO;ERBB3;FKBP1A;FOS;GNA11;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;IL7;INSR;KDR;KIT;KITLG;MAP2K1;MAP2K4;MAP3K3;MAX;MCM5;MET;MIF;NFKB1;NGFR;NRAS;PARP1;PIK3CD;PLK4;PRKCA;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;RPS6KB1;SKIL;SKP1;SMAD2;SMAD4;SMAD7;STAT1;TFRC;TNF;TRADD;VEGFA;VHL
HISTONE DEACETYLASE	74	1063	1.08E-101	3.94E-100	ABCB1;ABI2;APC;ATF2;BAX;BCL2;CAMK2G;CAMK4;CASP10;CASP2;CCL2;CCNA2;CCND2;CD34;CD44;CDC25A;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CREB1;CSF2;CSF3;DDIT3;E2F1;E2F2;E2F5;EGF;EP300;EPO;ERBB3;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;ITPR2;KDR;KIT;KITLG;MAP2K1;MAX;MET;NFKB1;NGFR;PARP1;PIK3CD;PTEN;PTGS2;RAC1;RAF1;RARB;RHOA;SKIL;SMAD2;SMAD4;SMAD7;STAT1;SYK;TNF;VEGFA;VHL
REACTIVE OXYGEN SPECIES	94	1832	5.25E-89	1.42E-87	ABCB1;ADAM17;AKT2;ANG;ATF2;BAX;BCL2;CASP10;CASP2;CCL2;CCND2;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CRK;CSF1;CSF2;CSF3;DDIT3;DNAJB1;DUSP2;E2F1;EDNRA;EGF;EIF2S1;EP300;EPO;FGF7;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;IQGAP1;IRAK1;ITGA4;KDR;KIT;KITLG;MAP2K1;MAP2K4;MAP3K11;MET;MIF;NFKB1;NGFR;P4HB;PARP1;PGF;PIK3CD;PRKAA2;PRKCA;PRKCB;PRKCZ;PTEN;PTGS2;PTPRA;RAC1;RAF1;RHOA;RPS6KB1;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TNF;TNFRSF1B;TRADD;TRAF6;VEGFA;VHL
RNA INTERFERENCE	100	2207	1.06E-80	2.43E-79	ABCB1;ADAM17;AKT2;APC;ARHGDI1B;BAX;BCL2;CASP2;CCL2;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH15;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CRK;CSF1;CSF2;CSNK1D;DDIT3;DUSP5;E2F1;E2F2;EGF;EP300;EPO;ERBB3;FGFR1;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;IQGAP1;IRAK1;ITGA3;KDR;KIT;KITLG;LIMK1;MAP2K1;MAP2K4;MAP3K11;MAP3K3;MAX;MET;MIF;NFKB1;NGFR;NRAS;PARP1;PIK3CD;PIK3R1;PLK4;PPP2R3A;PRKAA2;PRKCA;PRKCZ;PSMB1;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;RRAS;SKIL;SKP1;SMAD2;SMAD4;SMAD7;STAT1;SYK;TEK;TFRC;TNF;TRAF6;VEGFA;VHL;WASL

Supplementary Table 5a: Continued

DNA BINDING	104	2879	2.51E-61	3.96E-60	ABCB1;APC;ARAF;ATF2;BAX;BCL2;CAMK2G;CAS P2;CCL2;CCNA2;CCND2;CCNH;CD34;CD44;CDC25 A;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CD KN2A;CDKN2B;CDKN3;COL2A1;CREB1;CRK;CSF1; CSF1R;CSF2;CSF3;DDIT3;DNAJB1;E2F1;E2F2;E2F5; EGF;EP300;EPO;ERBB3;FGFR1;FOS;GRB2;GSK3B; HIF1A;HSP90AB1;IFNA1;IFNA4;IFNB1;IFNG;IGF1;I L13;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGB3;KDR;KI T;KITLG;LAMC1;LCK;LTBR;MAP2K1;MAP2K4;MA P3K11;MAX;MCM5;MET;MIF;NFKB1;NGFR; NRAS;PARP1;PDGFA;PIK3R1;PRKACA;PRKCA; PRKCB;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RARB;RH OA;SKIL;SMAD2;SMAD4;SMAD7;STAT1;SYK;TFRC; TGFBR2;TNF;TNFRSF1B;TRADD;TRAF6;UBE2B;V EGFA;VHL;WNT4
#cluster20					
		Enrichment Score:			
		105.23			
HEPATOCELLULAR CARCINOMA CELL	39	232	3.57E-142	3.25E-140	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDH2;CDK2;C DKN1A;CDKN1B;CDKN2A;CSF2;DDIT3;E2F1;EGF; EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4; KDR;KIT;MAP2K1;MET;NFKB1;PARP1;PTEN;PTGS 2;RAC1;RHOA;SMAD2;SMAD4;STAT1;TNF;VEGFA BAX;BCL2;CCL2;CD44;CDC42;CDH2;CDKN1A;CD KN2A;CSF1;CSF2;DDIT3;EGF;EPO;FOS;HIF1A;IFN A1;IFNG;IGF1;IL1B;IL4;KDR;MAP2K1;MET;NFKB1; PARP1;PTEN;PTGS2;RAC1;RHOA;SKIL;SMAD2;SM AD4;SMAD7;STAT1;TNF;VEGFA
TUBULAR EPITHELIAL CELL	36	235	2.43E-118	1.35E-116	ABCB1;BAX;BCL2;CD44;CDH2;CDK2;CDK6;C DKN1A;CDKN1B;CDKN2A;CDKN3;EGF;FGF5; FGFR1;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;KD R;MAP2K1;MET;NFKB1;PARP1;PTEN;PTGS2; RHOA;SMAD2;SMAD4;TNF;VEGFA
HUMAN PANCREATIC CANCER	32	187	2.31E-118	1.31E-116	BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CREB 1;EDNRA;EGF;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;I L1B;IL4;KDR;LTBP1;MET;NFKB1;NGFR;PARP1;PTE N;PTGS2;RAC1;RHOA;SMAD2;SMAD4;SMAD7;STA T1;TGFB3;TNF;VEGFA
HEPATIC STELLATE CELL	35	234	5.37E-112	2.63E-110	ABCB1;AKT2;APC;ARPC2;BAX;BCL2;CCL2;CCND 2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN2 A;CDKN2B;CDKN3;CREB1;CSF2;DDIT3;E2F1;EGF; EP300;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1 3;IL1B;IL23A;IL4;INSR;KDR;KIT;MAP2K1;NFKB1;P ARP1;PRKCA;PTEN;PTGS2;RAC1;RARB;RHOA;RR AS;SKP1;SMAD2;SMAD4;STAT1;TNF;VEGFA;VHL ABCB1;APC;BAX;BCL2;CD44;CDH2;CDK2;CDK6;C DKN1A;CDKN1B;CDKN2A;EGF;KDR;MET;NFKB1; PARP1;PTEN;PTGS2;SMAD4;TNF;VEGFA
GENE SILENCING	54	742	8.42E-78	1.75E-76	ABCB1;APC;BAX;BCL2;CD44;CDH2;CDK2;CDK6;C DKN1A;CDKN1B;CDKN2A;EGF;KDR;MET;NFKB1; PARP1;PTEN;PTGS2;SMAD4;TNF;VEGFA
CANCER RELATED DEATH	21	139	4.81E-67	8.61E-66	ABCB1;APC;BAX;BCL2;CD44;CDH2;CDK2;CDK6;C DKN1A;CDKN1B;CDKN2A;EGF;KDR;MET;NFKB1; PARP1;PTEN;PTGS2;SMAD4;TNF;VEGFA
#cluster21					
		Enrichment Score:			
		104.38			

Supplementary Table 5a: Continued

CELL ACTIVATION	86	1310	1.20E-110	5.54E-109	ABCB1;ADAM17;APC;BAX;BCL2;CCL2;CCND2;CCR1;CD34;CD44;CDC42;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;DUSP2;EGF;EP300;EPO;FKBP1A;FOS;GRB2;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGA4;ITGAV;KDR;KIT;KITLG;LCK;LTBR;MAP2K1;MAP3K3;MET;MIF;NFKB1;NGFR;PARP1;PGF;PIK3CD;PIK3R1;PIK3R2;PRKCA;PRKCB;PRKCQ;PRKCZ;PSMA4;PTEN;PTGS2;RAC1;RAF1;RASA1;RHOA;SMAD2;SMAD7;STAT1;SYK;TEK;TFRC;TGFB2;TNF;TNFRSF1B;TRAF6;VEGFA;WASL;YES1
T CELL ACTIVATION	60	734	1.47E-99	5.09E-98	ABCB1;APC;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDK2;CDKN1A;CDKN2A;CEACAM1;CREB1;CRK;CSF1;CSF2;CSF3;EP300;FKBP1A;FOS;GRB2;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;ITGA4;KDR;KIT;KITLG;LCK;LTBR;MAP2K1;MAP3K3;MIF;NFKB1;NGFR;PIK3CD;PIK3R1;PIK3R2;PRKCA;PRKCQ;PTEN;PTGS2;RAC1;RAF1;RASA1;RHOA;STAT1;SYK;TFRC;TGFB2;TNF;TNFRSF1B;TRAF6;VEGFA
#cluster22					Enrichment Score: 104.27
CELL ADHESION MOLECULE	78	1025	1.36E-119	8.27E-118	ABCB1;ADAM17;ANG;APC;BAX;BCL2;CCL2;CCR1;CD34;CD44;CDC42;CDH15;CDH2;CDKN1A;CDKN2A;CDKN3;CEACAM1;CREB1;CSF1;CSF2;CSF3;CTNNA1;CTNNA2;DUSP2;EGF;EP300;EPO;ERBB4;FGFR1;FLT4;FOS;GAB1;GAS6;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;IQGAP1;ITGA3;ITGA4;ITGAV;ITGB3;ITGB8;KDR;KIT;KITLG;LTBR;MAP2K1;MET;MIF;NFKB1;NGFR;PARP1;PGF;PRKCA;PTEN;PTGS2;PTPRM;RAC1;RHOA;SMAD2;SMAD4;STAT1;SYK;TEK;TFRC;TGFB2;TNF;TNFRSF1B;VEGFA
MESENCHYMAL STEM CELL	71	861	1.87E-119	1.11E-117	ABCB1;ANG;BAX;BCL2;CCL2;CCR1;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;COL2A1;CREB1;CSF1;CSF2;CSF3;DDIT3;EGF;EP300;EPO;FGF7;FGFR1;FLT4;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;ITGA3;ITGA4;ITGAV;ITGB3;ITGB8;KDR;KIT;KITLG;MAP2K1;MET;MIF;NFKB1;NGFR;NTRK3;PARP1;PDGFRA;PGF;PTEN;PTGS2;RAC1;RHOA;SMAD2;SMAD4;SMAD7;STAT1;TEK;TFRC;TGFB2;TGFB3;TNF;TNFRSF1B;VEGFA;WNT10B;WNT4
ALKALINE PHOSPHATASE	62	933	4.47E-80	1.02E-78	ABCB1;ADAM17;BAX;BCL2;CCL2;CD34;CD44;CDH2;CDK2;CDKN1A;CDKN2A;COL2A1;CREB1;CSF1;CSF1R;CSF2;CSF3;DDIT3;EGF;EP300;EPO;FGF5;FGFR1;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;INSR;ITGAV;ITGB3;KDR;KIT;KITLG;LTBP1;MAP2K1;MET;NFKB1;NGFR;PARP1;PRKACA;PRKCA;PTEN;PTGS2;RAC1;RHOA;SMAD2;SMAD4;SMAD7;TEK;TFRC;TGFB2;TGFB3;TNF;VEGFA;WNT10B;WNT4

Supplementary Table 5a: Continued

BONE MORPHOGENETIC PROTEIN	57	660	7.27E-101	2.59E-99	ACVR1B;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;COL2A1;CREB1;CSF1;CSF2;CSF3;EGF;EP300;EPO;FGF5;FGF7;FGFR1;FKBP1A;FOS;HIF1A;IFNG;IGF1;IL1B;KDR;KIT;KITLG;LIMK1;LTBP1;MAP2K1;MET;NFKB1;NGFR;NTRK3;PMSMB4;PTEN;PTGS2;RAC1;RHOA;SKIL;SMAD2;SMAD4;SMAD7;TEK;TFRC;TGFB2;TGFB3;TGFB2;TGFB3;TNF;VEGFA;WNT10B;WNT4
#cluster23	Enrichment Score: 97.63				
CASPASE INHIBITOR	33	226	1.08E-102	4.08E-101	BAX;BCL2;CASP10;CASP2;CCL2;CD34;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CSF2;DDIT3;E2F1;EGF;EPO;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;KDR;MAP2K1;NFKB1;PARP1;PTGS2;RHOA;TNF;TNFRSF1B;TRADD;VEGFA
DEATH RECEPTOR	35	274	5.10E-94	1.59E-92	ABCB1;ADAM17;BAX;BCL2;CASP10;CASP2;CCL2;CD34;CD44;CDK2;CDKN1A;CDKN2A;CSF2;DDIT3;EGF;EPO;FOS;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;MAP2K1;MAP2K4;NFKB1;NGFR;PARP1;PTEN;PTGS2;STAT1;TNF;TNFRSF1B;TRADD;VEGFA
#cluster24	Enrichment Score: 97.30				
NITRIC OXIDE SYNTHASE	71	958	3.81E-105	1.53E-103	ABCB1;ADAM17;AKT2;ANG;APC;ATF2;BAX;BCL2;CAMK4;CAV2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CREB1;CSF1;CSF1R;CSF2;CSF3;DDIT3;EDNRA;EGF;EP300;EPO;FGFR1;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;KDR;KIT;KITLG;MAP2K1;MAP3K3;MET;MIF;NFKB1;NGFR;PARP1;PGF;PIK3CD;PIK3R1;PRKAA2;PRKCA;PRKCB;PRKCG;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RHOA;SMAD2;STAT1;SYK;TEK;TFRC;TGFB2;TNF;TNFRSF1B;TRAF6;VEGFA
RECEPTOR ANTAGONIST	75	1193	6.45E-91	1.84E-89	ABCB1;ADAM17;AKT2;ANG;BAX;BCL2;CAMK2G;CCL2;CCR1;CD34;CD44;CDC42;CDK2;CDKN1A;CDKN1B;CDKN2A;CREB1;CSF1;CSF2;CSF3;DDIT3;EDNRA;EGF;EP300;EPO;FGF7;FGFR1;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGAV;ITPR3;KDR;KIT;KITLG;MAP2K1;MET;MIF;NFKB1;NGFR;PARP1;PDGFA;PGF;PIK3CD;PRKCA;PRKCB;PRKCG;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RHOA;SMAD2;SMAD7;STAT1;SYK;TEK;TGFB2;TNF;TNFRSF1B;TRAF6;VEGFA
#cluster25	Enrichment Score: 93.88				
INSULIN RECEPTOR SUBSTRATE	38	252	6.28E-123	4.12E-121	AKT2;BAX;BCL2;CCL2;CDC42;CREB1;CRK;EGF;FOS;GAB1;GRB2;GSK3B;IFNA1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL4;INSR;MAP2K1;NFKB1;PIK3CD;PIK3R1;PIK3R2;PRKAA2;PRKCA;PRKCB;PRKCG;PRKCZ;PTEN;PTPRA;RAC1;RAF1;RPS6KB1;STAT1;TNF;VEGFA
GLUCOSE TRANSPORT	26	212	2.82E-66	4.93E-65	AKT2;BCL2;CCL2;CSF2;EGF;EPO;FOS;GAB1;GSK3B;HIF1A;IFNG;IGF1;IL1B;INSR;MAP2K1;NFKB1;PIK3R1;PIK3R2;PRKAA2;PRKCA;PRKCB;PRKCG;PRKCZ;TFRC;TNF;VEGFA

Supplementary Table 5a: Continued

#cluster	Enrichment Score:				
#cluster26	90.66				
POLY ADP RIBOSE	41	349	1.30E-100	4.57E-99	ABCB1;APC;BAX;BCL2;CASP10;CASP2;CCL2;CDC25A;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF2;DDIT3;E2F1;EGF;EP300;FOS;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;KDR;KIT;MAP2K1;MAP2K4;MET;NFKB1;PARP1;PTEN;PTGS2;STAT1;TNF;VEGFA
MITOCHONDRIAL MEMBRANE POTENTIAL	40	407	5.35E-80	1.20E-78	ABCB1;BAX;BCL2;CASP10;CASP2;CCL2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF2;CSF3;DDIT3;E2F1;EPO;FOS;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;MAP2K1;NFKB1;PARP1;PRKAA2;PRKCA;PTEN;PTGS2;RAC1;STAT1;TNF;VEGFA
CYTOCHROME C RELEASE	31	218	1.50E-93	4.56E-92	ABCB1;BAX;BCL2;CASP10;CASP2;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;DDIT3;EGF;EPO;FOS;GSK3B;HIF1A;IFNG;IGF1;IL1B;MAP2K1;MAP2K4;MAP3K13;NFKB1;PARP1;PTEN;PTGS2;RAC1;RAF1;TNF;VEGFA
#cluster27	90.45				
CELL GROWTH	150	4205	1.84E-92	5.53E-91	ABCB1;ACVR1B;ADAM17;AKT2;ANG;APC;ARAF;ARHGDI1B;ARPC2;ATF2;BAX;BCL2;CAMK2G;CASP10;CASP2;CAV2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;CTNNA1;DDIT3;DNAJB1;DUSP5;E2F1;E2F2;E2F5;EDNRA;EGF;EIF2S1;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FKBP1A;FLT4;FOS;GAB1;GAS6;GRB2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IQGAP1;ITGA3;ITGA4;ITGAV;ITGB3;KDR;KIT;KITLG;LCK;LIMK1;MAP2K1;MAP2K4;MAP3K11;MAX;MCM5;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;P4HB;PARP1;PDGFA;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PLK4;PRKAA2;PRKCA;PRKCB;PRKCG;PRKCZ;PSMA4;PTEN;PTGS2;PTPRA;PTPRM;RAC1;RAF1;RARB;RASA1;RHOA;RPS6KB1;RRAS;SKIL;SKP1;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TGFB3;TNF;TNFRSF1B;TRADD;TRAF6;UBE2B;VEGFA;VHL;WNT10B;WNT4;YES1

Supplementary Table 5a: Continued

CELL DEATH	148	4184	6.88E-90	1.91E-88	ABCB1;ADAM17;AKT2;ANG;APC;ARAF;ARHGDI1B;ATF2;BAX;BCL2;CAMK2G;CAMK4;CASP10;CASP2;CAV2;CCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CD44;CDC25A;CDC25B;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;DDIT3;DNAJB1;DUSP5;E2F1;E2F2;E2F5;EDNRA;EFNA3;EGF;EIF2S1;EP300;EPO;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FKBP1A;FOS;GAS6;GRB2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGA3;ITGA4;ITGAV;ITGB3;ITPR2;ITPR3;KDR;KIT;KITLG;LAMC1;LCK;LIMK1;LTBR;MAP2K1;MAP2K4;MAP3K11;MAP3K13;MAP3K3;MAX;MCM5;MET;MIF;NFKB1;NGFR;NRAS;NTRK3;P4HB;PARP1;PDGFRA;PGF;PIK3CD;PIK3R1;PIK3R2;PLK4;PPP3CA;PRKAA2;PRKCA;PRKCB;PRKCG;PRKCQ;PRKCZ;PSMB1;PSMD8;PTEN;PTGS2;RAC1;RAF1;RARB;RASA1;RHOA;RPS6KB1;RRAS;SKP1;SMAD2;SMAD4;SMAD7;SOS1;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;TGFB2;TNF;TNFRSF1B;TRADD;TRAF6;UBE2B;VEGFA;VHL;WASF3;WNT4
#cluster28	Enrichment Score: 90.24				
LUNG EPITHELIAL CELL	36	187	1.10E-151	1.38E-149	ADAM17;BAX;BCL2;CCL2;CD44;CDKN1A;CDKN2A;CREB1;CSF2;EGF;EP300;FGF7;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;MAP2K1;NFKB1;PARP1;PTEN;PTGS2;RAC1;RHOA;SMAD2;SMAD4;STAT1;TGFB2;TGFB3;TGFB2;TNF;VEGFA
BRONCHIAL EPITHELIAL CELLS	32	244	2.42E-88	6.51E-87	ADAM17;BAX;BCL2;CCL2;CD44;CDKN1A;CDKN2A;CREB1;CSF2;CSF3;EGF;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;MAP2K1;MET;NFKB1;PARP1;PRKCA;PTGS2;RARB;SMAD2;STAT1;TGFB2;TNF;VEGFA
TISSUE GROWTH FACTOR	30	177	1.23E-109	5.46E-108	BAX;BCL2;CCL2;CD44;CDKN1A;CSF2;EGF;EP300;FOS;HIF1A;IFNG;IGF1;IL13;IL1B;IL4;KDR;MAP2K1;NFKB1;PTGS2;RAC1;RHOA;SMAD2;SMAD4;SMAD7;TGFB2;TGFB3;TGFB2;THBS4;TNF;VEGFA
TISSUE REMODELING	29	224	9.81E-79	2.10E-77	BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CSF1;CSF2;EGF;FOS;HIF1A;IFNG;IGF1;IL13;IL13RA2;IL1B;IL4;KDR;MAP2K1;MET;NFKB1;PTGS2;RAC1;SMAD2;STAT1;TGFB2;THBS4;TNF;VEGFA
UROKINASE PLASMINOGEN ACTIVATOR	19	114	2.78E-67	5.00E-66	BAX;BCL2;CCL2;CD44;CDKN1A;CSF1;EGF;FOS;IFNG;IGF1;IL1B;ITGAV;KDR;MAP2K1;MET;NFKB1;PTGS2;TNF;VEGFA
OSTEOBLAST DIFFERENTIATION	26	271	4.02E-50	5.07E-49	BAX;BCL2;CCL2;CD44;CDH2;CDKN1A;CREB1;CSF1;EGF;EP300;FGFR1;FOS;IGF1;IL1B;KDR;MAP2K1;NFKB1;PPP3CA;PTGS2;SMAD2;SMAD4;SMAD7;TGFB2;TNF;VEGFA;WNT10B
#cluster29	Enrichment Score: 89.79				

Supplementary Table 5a: Continued

DOMINANT NEGATIVE MUTANT	65	450	2.98E-203	1.63E-200	ABI2;ARAF;ATF2;BAX;BCL2;CASP10;CCL2;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CRK;CSF2;DDIT3;E2F1;EGF;EP300;FGFR1;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;INSR;IRAK1;KDR;LTBR;MAP2K1;MAP2K4;MET;NFKB1;PARP1;PIK3CD;PIK3R1;PRKAA2;PRKCA;PRKCQ;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;SMAD2;SMAD4;SMAD7;STAT1;TRFC;TGFB2;TNF;TRADD;TRAF6;VEGFA;WASL
MITOCHONDRIAL MEMBRANE	50	847	1.84E-55	2.53E-54	ABCB1;BAX;BCL2;CASP10;CASP2;CCL2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF2;CSF3;DDIT3;E2F1;EGF;EPO;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;KDR;LCK;MAP2K1;MAP2K4;MET;NFKB1;PARP1;PRKAA2;PRKCA;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;STAT1;TFRC;TNF;TRADD;VEGFA
PROGRAMMED CELL DEATH	58	582	2.76E-121	1.78E-119	ABCB1;BAX;BCL2;CASP10;CASP2;CCL2;CD34;CD44;CDC42;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF1;CSF2;CSF3;DDIT3;E2F1;EGF;EP300;EPO;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;IL7;ITGAV;KIT;KITLG;LCK;MAP2K1;MAP3K13;MAX;MET;NFKB1;NGFR;NTRK3;PARP1;PSMB1;PTEN;PTGS2;RAC1;RAF1;RARB;STAT1;TFRC;TGF2;TNF;TNFRSF1B;TRADD;VEGFA
HEAT SHOCK PROTEIN	64	1052	4.52E-74	8.94E-73	ABCB1;BAX;BCL2;CASP2;CCL2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF2;CSF3;DDIT3;DNAJB1;EGF;EIF2S1;EP300;EPO;ERBB3;FKBP1A;FOS;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;IL7;INSR;KDR;KIT;LCK;MAP2K1;MAP2K4;MAP3K13;MET;MIF;NFKB1;P4HB;PARP1;PRKCA;PSMB4;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;RRAS;SKP1;SMAD2;STAT1;TFRC;TNF;VEGFA;VHL
PROTEIN PROTEIN INTERACTION	76	1794	8.70E-55	1.18E-53	APC;ARAF;ATF2;BAX;BCL2;CCL2;CD44;CDC42;CDK2;CDK6;CDKN1A;CDKN2A;CDKN3;CREB1;CRK;CTNNA1;DDIT3;DNAJB1;E2F1;E2F2;EGF;EP300;ERBB3;ERBB4;FGFR1;FKBP1A;FOS;GAB1;GRB2;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;INSR;IQGAP1;IRAK1;KDR;LCK;LIMK1;MAP2K1;MAP3K11;MAP3K3;MAX;MET;NFKB1;PARP1;PIK3R1;PIK3R2;PRKCA;PRKCZ;PSMB1;PTEN;PTGS2;PTPRM;RAC1;RAF1;RASA1;RHOA;RPS6KB1;SKIL;SKP1;SMAD2;SMAD4;STAT1;SYK;TFRC;TNF;TRADD;TRAF6;UBE2B;VEGFA;WASL;YES1
ENDOPLASMIC RETICULUM	80	2675	3.04E-34	2.85E-33	ABCB1;ADAM17;BAX;BCL2;CAMK2G;CAMK4;CASP2;CAV2;CCL2;CCNA2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;CDKN3;COL2A1;CREB1;CSF1;CSF2;CSF3;DDIT3;DNAJB1;E2F1;EDNRA;EGF;EIF2S1;EP300;EPO;FKBP1A;FOS;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;IQGAP1;ITGB3;ITPR2;ITPR3;KDR;KIT;KITLG;MAP2K1;MET;NFKB1;NGFR;NRAS;P4HB;PARP1;PRKAA2;PRKCA;PSMB4;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;RRAS;SKP1;SMAD2;STAT1;SYK;TFRC;THBS4;TNF;UBE2B;UBE2D1;VEGFA;VHL

Supplementary Table 5a: Continued

#cluster	Enrichment Score:				
#cluster30	88.12				
FLOW CYTOMETRY ANALYSIS	40	270	4.67E-127	3.33E-125	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CSF1;CSF2;CSF3;E2F1;EGF;EPO;FOS;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;ITGA3;ITGA4;ITGB3;KDR;KIT;KITLG;NFKB1;NGFR;PARP1;PTEN;PTGS2;TFRC;TNF;VEGFA
UMBILICAL CORD BLOOD	32	236	1.11E-91	3.29E-90	ABCB1;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF1;CSF2;CSF3;EGF;EPO;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;ITGA4;ITGB3;KDR;KIT;KITLG;NFKB1;NGFR;PTGS2;TEK;TFRC;TNF;VEGFA
CELL FRACTION	30	167	9.06E-117	4.79E-115	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CSF1;CSF2;CSF3;EGF;EPO;IFNA1;IFNG;IGF1;IL1B;IL4;IL7;INSR;KDR;KIT;KITLG;NFKB1;NGFR;PARP1;PRKCA;PTGS2;TFRC;TNF;VEGFA
STEM CELL TRANSPLANTATION	34	419	4.19E-54	5.56E-53	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF1;CSF2;CSF3;EGF;EPO;FGF7;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;ITGA4;ITGB3;KDR;KIT;KITLG;NFKB1;NRAS;PTGS2;STAT1;TFRC;TNF;VEGFA
WHITE BLOOD CELL	31	350	1.27E-54	1.70E-53	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF1;CSF2;CSF3;EPO;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;IL7;ITGA4;KDR;KIT;KITLG;NFKB1;NRAS;PTGS2;TFRC;TNF;TNFRSF1B;VEGFA
#cluster31	87.38				
MARROW STROMAL CELLS	33	210	2.57E-111	1.24E-109	BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CREB1;CSF1;CSF2;CSF3;EGF;EPO;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;IL7;ITGA4;KDR;KIT;KITLG;MAP2K1;NFKB1;NGFR;PARP1;PTGS2;TGFB2;TGFB3;TNF;VEGFA
BONE MARROW STROMAL	35	237	1.95E-110	8.87E-109	BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CDKN2A;COL2A1;CREB1;CSF1;CSF2;CSF3;EGF;EPO;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;IL7;ITGA4;ITGAV;KDR;KIT;KITLG;MAP2K1;NFKB1;NGFR;PARP1;PTGS2;TGFB3;TNF;VEGFA
FOLLICLE STIMULATING HORMONE	22	228	1.47E-42	1.57E-41	ACVR1B;BAX;BCL2;CCND2;CDH2;CREB1;CSF2;EGF;EPO;FOS;IFNG;IGF1;IL1B;KIT;KITLG;PTGS2;SMAD2;SMAD4;TGFB2;TGFB3;TNF;VEGFA
#cluster32	86.28				
TISSUE REGENERATION	28	157	6.16E-108	2.66E-106	BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF2;CSF3;EGF;EPO;FGF7;FLT4;HIF1A;IFNG;IGF1;IL1B;IL4;KDR;KIT;MET;NFKB1;NGFR;PDGFA;PTGS2;SMAD2;TGFB3;TNF;VEGFA
MESENCHYMAL STROMAL CELL	25	147	2.97E-91	8.63E-90	BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CDKN2A;COL2A1;CSF2;CSF3;EGF;EPO;HIF1A;IFNG;IGF1;IL1B;IL4;KDR;KIT;KITLG;MET;NGFR;PTGS2;TNF;VEGFA
HUMAN MESENCHYMAL STEM	29	190	1.90E-94	6.04E-93	BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CDKN2A;COL2A1;EGF;FGF7;FLT4;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;KIT;KITLG;NFKB1;PTGS2;RHOA;SMAD2;TGFB3;TNF;VEGFA;WNT10B
ENDOTHELIAL PROGENITOR CELL	24	163	9.01E-75	1.80E-73	ANG;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF2;CSF3;EGF;EPO;FLT4;HIF1A;IGF1;IL1B;KDR;KIT;KITLG;PGF;PTGS2;TEK;TNF;VEGFA

Supplementary Table 5a: Continued

NEURAL STEM CELL	34	351	1.25E-66	2.21E-65	BAX;BCL2;CCL2;CCND2;CD34;CD44;CDH2;CDK2;CDKN1A;CDKN2A;CREB1;CSF3;EGF;EPO;ERBB4;FGFR1;HIF1A;IFNB1;IFNG;IGF1;IL1B;IL4;KDR;KIT;KITLG;NFKB1;NGFR;NTRK3;PDGFRA;PTEN;PTGS2;RHOA;TNF;VEGFA
#cluster33					Enrichment Score: 86.01
ACTIVATOR PROTEIN 1	36	249	4.86E-111	2.31E-109	ATF2;BAX;BCL2;CCL2;CDKN1A;CDKN2A;CREB1;CSF1;CSF2;EGF;EP300;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;IRAK1;MAP2K1;MAP2K4;NFKB1;PARP1;PRKCA;PTGS2;RAC1;RAF1;RARB;RHOA;SMAD2;STAT1;SYK;TNF;TRAF6;VEGFA
HUMAN BRONCHIAL EPITHELIAL	29	199	9.14E-90	2.52E-88	ADAM17;BAX;BCL2;CCL2;CD44;CDKN1A;CDKN2A;CREB1;CSF2;CSF3;EGF;FOS;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;MAP2K1;NFKB1;PARP1;PRKCA;PTGS2;RARB;RHOA;STAT1;TNF;VEGFA
AIRWAY EPITHELIAL CELL	27	251	2.12E-59	3.24E-58	ADAM17;BAX;BCL2;CCL2;CDKN1A;CREB1;CSF2;CSF3;EGF;EP300;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;MAP2K1;NFKB1;PRKCA;PTGS2;RHOA;STAT1;TNF;VEGFA
#cluster34					Enrichment Score: 84.97
TISSUE HOMEOSTASIS	33	215	1.75E-108	7.66E-107	APC;BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CDKN2A;CSF1;CSF2;E2F1;EGF;EP300;FGFR1;IFNG;IGF1;IL1B;IL4;KIT;MAP2K1;MET;NFKB1;PTEN;PTGS2;RAC1;RHOA;SMAD2;SMAD4;SMAD7;TGFB2;TNF;VEGFA
EPITHELIAL TO MESENCHYMAL	33	328	1.59E-67	2.88E-66	APC;BAX;BCL2;CCL2;CD44;CDC42;CDH2;CDKN1A;CDKN2A;EGF;EP300;ERBB3;FGFR1;HIF1A;IGF1;IL1B;KDR;KIT;MAP2K1;MET;NFKB1;PTEN;PTGS2;RAC1;RHOA;SMAD2;SMAD4;SMAD7;TGFB2;TGFB3;TNF;VEGFA
EPITHELIAL MESENCHYMAL TRANSITION	45	502	4.54E-81	1.05E-79	ABCB1;AKT2;APC;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;CREB1;CSF2;EGF;EP300;ERBB3;FGFR1;FOS;GSK3B;HIF1A;IGF1;IL1B;IL4;KDR;KIT;MAP2K1;MET;NFKB1;PARP1;PTEN;PTGS2;RAC1;RAF1;RHOA;SKIL;SMAD2;SMAD4;SMAD7;STAT1;TGFB2;TGFB3;TNF;VEGFA
#cluster35					Enrichment Score: 84.42
RENAL CELL CARCINOMA	57	608	4.92E-111	2.31E-109	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CDKN1B;CDKN2A;CDKN3;CSF1;CSF1R;CSF2;CSF3;DUSP9;E2F1;EGF;EP300;EPO;FGFR1;FLT4;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL4;IL7;ITGB8;ITPR2;KDR;KIT;KITLG;LCK;MAP2K1;MET;NFKB1;NRAS;PARP1;PDGFRA;PGF;PTEN;PTGS2;RAF1;RHOA;SMAD4;STAT1;TEK;TNF;VEGFA;VHL
HEMATOPOIETIC STEM CELL	55	716	1.29E-84	3.17E-83	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF1;CSF1R;CSF2;CSF3;EGF;EP300;EPO;FGF7;FGFR1;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;ITGA4;ITGB3;KDR;KIT;KITLG;LCK;MET;NFKB1;NGFR;NRAS;PARP1;PDGFRA;PTEN;PTGS2;RAC1;RHOA;STAT1;TEK;TFRC;TNF;VEGFA

Supplementary Table 5a: Continued

ACUTE MYELOID LEUKEMIA	56	735	2.50E-85	6.22E-84	ABCB1;BAX;BCL2;CCL2;CCNA1;CCNA2;CCND2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF1;CSF1R;CSF2;CSF3;DDIT3;E2F1;EP300;EPO;FGFR1;FLT4;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;IL7;ITGA4;ITGB3;KDR;KIT;KITLG;MAP2K1;MET;NFKB1;NRAS;PARP1;PDGFRA;PIK3CD;PTEN;PTGS2;RAF1;STAT1;TEK;TFRC;TNF;TNFRSF1B;VEGFA
CELL DEVELOPMENT	63	1034	5.04E-73	9.79E-72	ACVR1B;APC;BAX;BCL2;CCL2;CCNA2;CCND2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CREB1;CSF1;CSF1R;CSF2;CSF3;EGF;EP300;EPO;ERBB3;FGFR1;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;KDR;KIT;KITLG;LCK;MAP2K1;MET;NFKB1;NGFR;NRAS;NTRK3;PARP1;PIK3CD;PIK3R1;PRKCQ;PTEN;PTGS2;RAC1;SMAD2;STAT1;SYK;TFRC;TGFB2;TNF;TNFRSF1B;VEGFA
EMBRYONIC STEM CELL	67	1172	9.84E-72	1.87E-70	ABCB1;ACVR1B;APC;BAX;BCL2;CCL2;CCNA2;CCND2;CD34;CD44;CDC25A;CDC42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CREB1;CSF1;CSF2;CSF3;DUSP9;E2F1;EGF;EP300;EPO;FGF5;FGF7;FGFR1;FLT4;FOS;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL23A;IL4;IL7;KDR;KIT;KITLG;LAMC1;MAP2K1;MAP2K4;MET;NFKB1;NGFR;NTRK3;PARP1;PDGFRA;PRKCA;PTEN;PTGS2;RARB;RHOA;SMAD2;SMAD4;STAT1;TEK;TFRC;TGFB2;TNF;VEGFA;WNT4
#cluster36	Enrichment Score: 81.63				
HISTONE DEACETYLASE INHIBITOR	42	305	3.38E-123	2.26E-121	ABCB1;BAX;BCL2;CCL2;CCND2;CD34;CD44;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF2;CSF3;DDIT3;E2F1;EP300;EPO;FOS;HIF1A;IFNA1;IFNG;IL1B;IL4;KDR;KIT;MAP2K1;MET;NFKB1;PARP1;PTEN;PTGS2;RAF1;RARB;SMAD2;STAT1;TNF;VEGFA
B CELL LYMPHOMA	49	623	1.78E-77	3.67E-76	ABCB1;BAX;BCL2;CCL2;CCND2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF2;CSF3;DDIT3;E2F1;EGF;EP300;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;IL7;ITPR2;KDR;KIT;MAP2K1;MET;NFKB1;NGFR;NRAS;PARP1;PRKCB;PTEN;PTGS2;STAT1;SYK;TFRC;TNF;TRAF6;VEGFA
EPSTEIN BARR VIRUS	53	560	2.60E-104	1.00E-102	ABCB1;BAX;BCL2;CCL2;CCND2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;E2F1;EP300;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;KIT;LCK;MET;NFKB1;NGFR;NRAS;PARP1;PTEN;PTGS2;RRAS;SMAD4;STAT1;SYK;TFRC;TNF;TNFRSF1B;TRADD;TRAF6;UBE2B;VEGFA
DNA METHYLATION	53	1671	1.88E-24	1.47E-23	ABCB1;APC;ARHGDI3;BAX;BCL2;CCL2;CCNA1;CCND2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF2;CTNNA2;DUSP5;DUSP9;E2F1;EGF;EP300;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;INSR;KDR;KIT;MET;NFKB1;NRAS;PARP1;PDGFRA;PTEN;PTGS2;PTPRM;RARB;SMAD2;SMAD4;STAT1;TGFB2;TNF;VEGFA;VHL

Supplementary Table 5a: Continued

#cluster37	Enrichment Score:					
TUMOR NECROSIS FACTOR	81.13	113	2247	6.94E-106	2.88E-104	ABCB1;ADAM17;AKT2;ANG;APC;ATF2;BAX;BCL2; CASP10;CASP2;CCL2;CCND2;CCR1;CD34;CD44;CD C42;CDH2;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2 A;CDKN3;COL2A1;CREB1;CRK;CSF1;CSF1R;CSF2; CSF3;DDIT3;DUSP5;E2F1;EDNRA;EGF;EIF2S1;EP30 0;EPO;ERBB3;ERBB4;FGF7;FGFR1;FLT4;FOS;GAS6; GRB2;GSK3B;HIF1A;IFNA1;IFNA4;IFNB1;IFNG;IGF 1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IRAK1;IT GA4;ITGAV;ITGB3;KDR;KIT;KITLG;LCK;LTBR;MA P2K1;MAP2K4;MAP3K11;MAP3K13;MAP3K3;MET; MIF;NFKB1;NGFR;NRAS;NTRK3;PARP1;PDGFA;PD GFRA;PGF;PIK3CD;PIK3R1;PRKAA2;PRKCA;PRKC B;PRKCQ;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RHOA; RPS6KB1;SMAD2;SMAD4;SMAD7;STAT1;SYK;TEK; TFRC;TGFB2;TGFB3;TGFB2;TNF;TNFRSF1B;TRA DD;TRAF6;VEGFA;WNT10B
IMMUNE RESPONSE	111	111	3360	8.08E-58	1.18E-56	ABCB1;ADAM17;ANG;APC;ARHGDI;ATF2;BAX;B CL2;CASP10;CASP2;CCL2;CCND2;CCR1;CD34;CD4 4;CDC42;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A; CDKN3;CEACAM1;CREB1;CRK;CSF1;CSF1R; CSF2;CSF3;DDIT3;DNAJB1;DUSP2;DUSP5;E2F1;E GF;EP300;EPO;FGF7;FGFR1;FLT4;FOS;GAS6;GRB 2;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNA4;IFNB1;IF NG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;I RAK1;ITGA4;ITGAV;ITGB3;KDR;KIT;KITLG;LCK; LTBR;MAP2K1;MAP2K4;MAP3K3;MET;MIF;NFKB 1;NGFR;NRAS;P4HB;PARP1;PGF;PIK3CD;PIK3R1;P PP3CA;PRKCA;PRKCB;PRKCQ;PRKCZ;PTEN;PTG S2;RAC1;RAF1;RARB;RHOA;SKP1;SMAD2;SMAD 4;SMAD7;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;T GFBR2;TGFB3;THBS4;TNF;TNFRSF1B;TRADD;T RAF6;UBE2B;VEGFA;WASL
#cluster38	Enrichment Score:					
METASTATIC BREAST CANCER	81.11	31	151	2.02E-139	1.74E-137	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDH2;CDK6;C DKN1A;CSF1;CSF2;CSF3;EGF;EPO;ERBB3;HIF1A;IF NA1;IFNG;IGF1;IL4;KDR;KIT;MET;NFKB1;PARP1; PTEN;PTGS2;RAC1;SMAD2;TNF;VEGFA
EPITHELIAL OVARIAN CANCER	28	28	210	1.74E-78	3.67E-77	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1 A;CDKN2A;CSF1;CSF2;CSF3;EGF;HIF1A;IFNG;IGF1; IL1B;IL4;KDR;KIT;MET;NFKB1;PARP1;PTEN;PTGS2; SMAD2;TNF;VEGFA
PLURIPOTENT STEM CELL	25	25	414	1.38E-27	1.15E-26	ABCB1;BAX;BCL2;CD34;CD44;CDH2;CDKN1A;CD KN2A;CSF1;CSF2;CSF3;EGF;EPO;FGF5;IFNG;IGF1; IL1B;IL4;KDR;KIT;KITLG;PARP1;PTEN;SMAD2;V EGFA

Supplementary Table 5a: Continued

#cluster39	Enrichment Score: 77.35				
CYTOKINE PRODUCTION	63	843	5.74E-94	1.78E-92	ADAM17;ATF2;BAX;BCL2;CCL2;CCR1;CD34;CD44;CDKN1A;CREB1;CSF1;CSF1R;CSF2;CSF3;DDIT3;DUSP5;EGF;EP300;EPO;FOS;GAS6;GRB2;HIF1A;IFNA1;IFNA4;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;IRAK1;ITGA4;KIT;KITLG;LCK;LTBR;MAP2K1;MIF;NFKB1;PARP1;PIK3CD;PIK3R1;PRKCA;PRKCQ;PRKCZ;PTEN;PTGS2;RAC1;RAF1;SMAD2;SMAD7;STAT1;SYK;TFRC;TGFB2;TNF;TNFRSF1B;TRAF6;VEGFA
TOLL LIKE RECEPTOR	65	955	1.45E-86	3.66E-85	ABCB1;ADAM17;ATF2;BAX;BCL2;CCL2;CCR1;CD34;CD44;CDC42;CDKN1A;CDKN2A;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;DDIT3;EGF;EP300;EPO;FOS;GAS6;GSK3B;HIF1A;IFNA1;IFNA4;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IRAK1;KDR;KIT;MAP2K1;MAP2K4;MAP3K3;MIF;NFKB1;PARP1;PIK3CD;PIK3R1;PRKCA;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RHOA;SMAD2;STAT1;SYK;TFRC;TNF;TNFRSF1B;TRADD;TRAF6;VEGFA
INFLAMMATORY RESPONSE	89	1804	9.89E-80	2.18E-78	ABCB1;ADAM17;AKT2;ANG;APC;ARHGDI2;ATF2;BAX;BCL2;CCL2;CCR1;CD34;CD44;CDC42;CDKN1A;CDKN2A;CEACAM1;CREB1;CRK;CSF1;CSF1R;CSF2;CSF3;DDIT3;DUSP2;DUSP5;E2F1;EDNRA;EGF;EP300;EPO;FGF7;FOS;GAS6;GSK3B;HIF1A;IFNA1;IFNA4;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGA4;ITGAV;ITGB3;KDR;KIT;KITLG;LTBR;MAP2K1;MAP2K4;MAP3K11;MAP3K3;MET;MIF;NFKB1;NGFR;PARP1;PDGFA;PGF;PIK3CD;PRKCA;PTEN;PTGS2;RAC1;RAF1;RHOA;SMAD2;SMAD4;SMAD7;STAT1;SYK;TEK;TFRC;TGFB2;TGFB3;THBS4;TNF;TNFRSF1B;TRADD;TRAF6;VEGFA
IMMUNE SYSTEM	74	1776	4.89E-52	6.26E-51	ABCB1;ADAM17;APC;BAX;BCL2;CAMK4;CCL2;CCR1;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CEACAM1;CREB1;CSF1;CSF1R;CSF2;CSF3;DUSP5;E2F1;EDNRA;EGF;EP300;EPO;FGF7;FOS;HIF1A;IFNA1;IFNA4;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGA4;KDR;KIT;KITLG;LCK;LTBR;MAP2K1;MET;MIF;NFKB1;NGFR;PARP1;PIK3CD;PTEN;PTGS2;RAC1;RAF1;RHOA;SMAD2;SMAD7;STAT1;SYK;TFRC;TGFB2;TGFB3;TNF;TNFRSF1B;TRADD;TRAF6;UBE2B;VEGFA
#cluster40	Enrichment Score: 77.33				
EPITHELIAL CELL PROLIFERATION	28	117	7.51E-148	7.95E-146	APC;BAX;BCL2;CCL2;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN3;CSF2;EGF;ERBB3;FGF7;FOS;IFNG;IGF1;IL1B;IL4;MAP2K1;MET;NFKB1;PTEN;PTGS2;SMAD2;TGFB2;TGFB3;TNF;VEGFA
FIBROBLAST PROLIFERATION	21	93	8.23E-24	6.28E-23	BCL2;CCL2;CDKN1A;CSF2;EGF;FGF7;FOS;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;MAP2K1;NFKB1;PDGFA;PTGS2;SMAD2;SOS1;TNF;VEGFA
HEPARIN BINDING	30	293	1.63E-62	2.72E-61	ADAM17;BCL2;CCL2;CD44;CDKN1A;CSF2;EGF;ERBB3;ERBB4;FGF5;FGF7;FGFR1;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;ITGAV;KDR;KITLG;MAP2K1;MET;NFKB1;P4HB;PDGFA;PGF;PTGS2;TNF;VEGFA

Supplementary Table 5a: Continued

#cluster	Enrichment Score:				
#cluster41	76.69				
YEAR SURVIVAL RATE	26	180	1.76E-79	3.85E-78	ABCB1;BAX;BCL2;CD34;CD44;CDKN1A;CDKN1B;CDKN2A;CSF2;CSF3;EGF;EPO;HIF1A;IFNA1;IFNB1;IFNG;KDR;KIT;MET;NFKB1;PARP1;PTEN;PTGS2;SMAD4;TNF;VEGFA
LYMPH NODE METASTASES	29	233	2.41E-75	4.88E-74	ABCB1;BAX;BCL2;CD34;CD44;CDH2;CDKN1A;CDKN1B;CDKN2A;CSF3;CTNNA1;EGF;ERBB3;FGFR1;FLT4;HIF1A;IFNA1;IFNG;KDR;KIT;MET;NFKB1;NRAS;PDGFRA;PTEN;PTGS2;SMAD4;TNF;VEGFA
#cluster42	76.60				
IKAPPAB KINASE	27	149	8.76E-106	3.59E-104	BAX;BCL2;CCL2;CDKN1A;CSF2;EP300;FOS;IFNA1;IFNB1;IFNG;IL1B;IRAK1;LTBR;MAP2K1;MAP3K3;NFKB1;PARP1;PRKCA;PRKCQ;PTEN;PTGS2;RAF1;STAT1;TNF;TRADD;TRAF6;VEGFA
INTERFERON REGULATORY FACTOR	22	202	7.16E-49	8.80E-48	ATF2;BAX;BCL2;CCL2;CDKN1A;CREB1;CSF2;EP300;FOS;IFNA1;IFNA4;IFNB1;IFNG;IL1B;IL23A;IL4;IRAK1;NFKB1;PTGS2;STAT1;TNF;TRAF6
#cluster43	76.10				
LINES OF EVIDENCE	40	366	2.23E-90	6.26E-89	ABCB1;APC;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDK2;CDKN1A;CDKN2A;CREB1;CSF2;EGF;EPO;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;INSR;KIT;KITLG;MET;NFKB1;NGFR;PARP1;PRKCA;PTEN;PTGS2;RAC1;STAT1;TFRC;TNF;TNFRSF1B;VEGFA
BLOOD BRAIN BARRIER	40	534	5.33E-58	7.84E-57	ABCB1;BAX;BCL2;CAV2;CCL2;CD34;CD44;CDH2;CDKN1A;CDKN2A;CSF2;CSF3;EGF;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;INSR;KDR;MAP2K1;MET;NFKB1;NGFR;PARP1;PRKCA;PTEN;PTGS2;RAC1;RHOA;STAT1;TEK;TFRC;TNF;TNFRSF1B;VEGFA
TIGHT JUNCTION	43	456	4.20E-82	9.76E-81	ABCB1;BAX;BCL2;CCL2;CD44;CDC42;CDH2;CDKN1A;CDKN2A;CEACAM1;CSF2;CTNNA1;EGF;EPO;FGF7;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;INSR;KDR;MAP2K1;MET;NFKB1;PRKCA;PRKCZ;PTEN;PTGS2;RAC1;RHOA;SMAD2;SMAD4;TEK;TFRC;TGFB3;TNF;TNFRSF1B;VEGFA;WASL;YES1
#cluster44	76.09				
MECHANISMS OF ACTION	62	525	1.03E-154	1.54E-152	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF1;CSF2;CSF3;DDIT3;E2F1;EDNRA;EGF;EP300;EPO;ERBB3;FGF7;FGFR1;FKBP1A;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;KDR;KIT;KITLG;MAP2K1;MET;MIF;NFKB1;NGFR;PARP1;PRKCA;PTEN;PTGS2;RAC1;RAF1;RHOA;SKIL;SMAD2;SMAD4;STAT1;TNF;TNFRSF1B;VEGFA

Supplementary Table 5a: Continued

INDUCIBLE NITRIC OXIDE	49	424	1.50E-118	8.62E-117	ABCB1;ADAM17;APC;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CREB1;CSF1;CSF2;CSF3;DDIT3;EDNRA;EGF;EP300;EPO;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;KDR;MAP2K1;MET;MIF;NFKB1;PARP1;PRKCA;PTEN;PTGS2;RAC1;RHOA;SMAD2;STAT1;TFRC;TNF;TNFRSF1B;TRAF6;VEGFA
MODE OF ACTION	44	404	3.01E-99	1.03E-97	ABCB1;BAX;BCL2;CCL2;CD44;CDC42;CDK2;CDKN1A;CDKN2A;CREB1;CSF2;CSF3;DDIT3;EGF;EIF2S1;EP300;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL23A;IL4;INSR;KDR;KITLG;MAP2K1;MET;NFKB1;PARP1;PRKCA;PTEN;PTGS2;RAC1;RAF1;RHOA;SMAD2;STAT1;TFRC;TNF;VEGFA
MOUSE EMBRYONIC FIBROBLAST	48	436	7.57E-110	3.40E-108	ADAM17;BAX;BCL2;CASP2;CCL2;CD34;CD44;CDC42;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF2;DDIT3;E2F1;E2F2;EGF;EIF2S1;EP300;FOS;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;INSR;KITLG;MAP2K1;MAP3K3;NFKB1;PARP1;PTEN;PTGS2;RAC1;RAF1;RHOA;RPS6KB1;SMAD2;SMAD4;STAT1;TNF;TRADD;TRAF6;VEGFA
INTESTINAL EPITHELIAL CELL	44	436	6.15E-91	1.77E-89	ABCB1;APC;BAX;BCL2;CCL2;CD44;CDC42;CDK2;CDKN1A;CDKN2A;CREB1;CSF2;DDIT3;EGF;FGF7;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;IRAK1;KIT;KITLG;MAP2K1;MET;NFKB1;PARP1;PRKCA;PTGS2;RAC1;RHOA;SMAD2;SMAD4;STAT1;TFRC;TGFB2;TNF;TNFRSF1B;VEGFA
ELECTROPHORETIC MOBILITY SHIFT	55	750	5.36E-80	1.19E-78	ABCB1;ATF2;BAX;BCL2;CCL2;CD34;CDK2;CDKN1A;CDKN2A;CREB1;CSF1;CSF2;CSF3;DDIT3;E2F1;EGF;EP300;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;KDR;KIT;KITLG;MAP2K1;MAP3K3;MAX;MET;MIF;NFKB1;PARP1;PDGFA;PRKACA;PRKCA;PTEN;PTGS2;RAC1;RAF1;RAR;RHOA;SMAD2;SMAD4;SMAD7;STAT1;TFRC;TNF;VEGFA
BINDING PROTEIN 1	51	688	4.25E-75	8.55E-74	ABCB1;BAX;BCL2;CCL2;CD44;CDC42;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN3;CREB1;CSF2;DDIT3;EGF;EIF2S1;EP300;EPO;ERBB3;FOS;GAB1;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;INSR;KDR;KIT;LTBP1;MAP2K1;MET;NFKB1;PARP1;PRKAA2;PTEN;PTGS2;RAC1;RPS6KB1;SMAD2;STAT1;TFRC;TNF;TRAF6;TUBB4A;VEGFA;VHL
HUMAN IMMUNODEFICIENCY VIRUS	52	785	1.04E-66	1.84E-65	ABCB1;BAX;BCL2;CCL2;CCNH;CCR1;CD34;CD44;CDC42;CDK2;CDKN1A;CDKN2A;CDKN3;CREB1;CRK;CSF1;CSF2;CSF3;DDIT3;E2F1;EP300;EPO;FOS;GSK3B;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;KDR;KIT;KITLG;LCK;MAP2K1;MAP3K11;NFKB1;NGFR;PARP1;PTGS2;RAC1;RAF1;RHOA;STAT1;TFRC;TNF;TNFRSF1B;UBE2B;VEGFA
RECEPTOR AGONIST	53	834	1.42E-64	2.43E-63	ABCB1;ADAM17;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDKN1A;CDKN2A;CREB1;CSF2;CSF3;DDIT3;DUSP2;EDNRA;EGF;EP300;EPO;FGFR1;FOS;GRB2;GSK3B;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;KDR;KIT;KITLG;MAP2K1;MET;NFKB1;NGFR;PARP1;PGF;PRKCA;PRKCG;PRKCZ;PTGS2;RAC1;RAF1;RHOA;STAT1;SYK;TNF;VEGFA

Supplementary Table 5a: Continued

PROTEIN BINDING	42	583	1.05E-59	1.62E-58	ABCB1;BAX;BCL2;CCL2;CD44;CDC42;CDK2;CDKN1A;CDKN2A;CREB1;CRK;CSF2;E2F1;EGF;EP300;EPO;FOS;GRB2;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KDR;LCK;MAP2K1;MAX;NFKB1;PARP1;PRKCA;PTGS2;RAC1;RAF1;RHOA;SMAD4;STAT1;TFRC;TNF;UBE2B;VEGFA
LOW DENSITY LIPOPROTEIN	50	937	1.14E-48	1.39E-47	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CREB1;CSF1;CSF1R;CSF2;CSF3;DDIT3;DUSP2;EGF;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;INSR;ITGAV;ITGB3;KDR;KIT;MAP2K1;MIF;NFKB1;PARP1;PRKCA;PRKCB;PTEN;PTGS2;RAC1;RAF1;RHOA;SMAD2;STAT1;SYK;TEK;TFRC;THBS4;TNF;TNFRSF1B;VEGFA;WNT10B
TYPE 2 DIABETES	60	1319	2.78E-47	3.32E-46	ABCB1;ADAM17;AKT2;ANG;BAX;BCL2;CCL2;CCND2;CD34;CD44;CDKN1A;CDKN2A;CDKN2B;CREB1;CSF2;CSF3;DDIT3;DUSP2;DUSP9;EDNRA;EGF;EP300;EPO;FOS;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;INSR;ITGB3;KDR;MAP2K1;MIF;NFKB1;P4HB;PARP1;PIK3R1;PIK3R2;PRKAA2;PRKCA;PRKCB;PRKCZ;PSMD6;PTEN;PTGS2;RAC1;RHOA;RPS6KB1;SMAD2;STAT1;TEK;TFRC;TNF;TNFRSF1B;TRAF6;VEGFA
PROTEIN COMPLEX	56	1489	1.35E-33	1.25E-32	ABI2;APC;ARPC2;BAX;BCL2;CCL2;CCNH;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;CREB1;CRK;CSF2;E2F1;EGF;EP300;FKBP1A;FOS;GAB1;GNA11;GRB2;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;IQGAP1;LCK;MAP2K1;MAX;MCM5;NFKB1;PARP1;PSMA3;PSMD11;PTEN;PTGS2;RAC1;RASA1;RHOA;RPS6KB1;SKP1;SMAD2;SMAD4;STAT1;TFRC;TNF;VEGFA;VHL;WASL
C TERMINAL DOMAIN	44	1165	1.62E-26	1.32E-25	APC;BAX;BCL2;CCL2;CCNH;CD44;CDC42;CDK2;CDKN1A;CDKN2A;CDKN3;CREB1;DNAJB1;E2F1;EGF;EIF2S1;EP300;FOS;GRB2;IFNA1;IFNB1;IFNG;IGF1;IL1B;INSR;IQGAP1;KDR;MAP2K1;MET;NFKB1;PARP1;PTEN;RAC1;RAF1;RHOA;SKP1;SMAD2;SMAD4;STAT1;THBS4;TNF;UBE2B;UBE2D2;VEGFA
#cluster45	Enrichment Score: 74.10				
ENDOTHELIAL NITRIC OXIDE	34	280	3.12E-86	7.80E-85	BAX;BCL2;CAV2;CCL2;CD34;CDKN1A;CREB1;CSF3;EDNRA;EGF;EPO;FOS;HIF1A;IFNG;IGF1;IL1B;INSR;KDR;KIT;MAP2K1;NFKB1;PARP1;PGF;PRKAA2;PRKCA;PRKCB;PTEN;PTGS2;RAC1;RHOA;SMAD2;TEK;TNF;VEGFA
SPHINGOSINE 1 PHOSPHATE	27	224	1.47E-67	2.68E-66	BAX;BCL2;CCL2;CD34;CD44;CDC42;CDKN1A;CREB1;EGF;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;MAP2K1;NFKB1;PARP1;PRKCA;PTEN;PTGS2;RAC1;RHOA;TNF;VEGFA
ISCHEMIA REPERFUSION INJURY	37	391	1.08E-70	2.02E-69	BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CREB1;CSF3;DDIT3;EDNRA;EGF;EPO;FGFR1;FOS;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;KDR;KIT;MAP2K1;MIF;NFKB1;PARP1;PRKCA;PTEN;PTGS2;RAC1;RHOA;STAT1;TNF;VEGFA

Supplementary Table 5a: Continued

#cluster	Enrichment Score:				
#cluster46	71.67				
RECEPTOR BINDING	59	796	5.04E-87	1.28E-85	ABCB1;ACVR1B;ANG;BAX;BCL2;CCL2;CCR1;CD44;CDKN1A;CREB1;CSF1;CSF2;CSF3;EDNRA;EGF;EP300;EPO;ERBB3;ERBB4;FGF7;FGFR1;FLT4;FOS;GAB1;GAS6;GRB2;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;IL7;INSR;ITGAV;KDR;KIT;KITLG;MAP2K1;MET;MIF;NFKB1;NGFR;PDGFA;PGF;PIK3R1;PIK3R2;PTGS2;RARB;SMAD2;STAT1;TFRC;TGFB2;TGFB3;TGFB2;TNF;TNFRSF1B;VEGFA
TUMOR NECROSIS FACTOR	50	603	3.26E-84	7.75E-83	ABCB1;ADAM17;BAX;BCL2;CASP10;CCL2;CD34;CD44;CDKN1A;CREB1;CSF1;CSF2;CSF3;EGF;EPO;FGF7;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGA4;ITGAV;KDR;KIT;KITLG;LTBR;MAP2K1;MIF;NFKB1;NGFR;PARP1;PGF;PTGS2;STAT1;TFRC;TGFB2;TNF;TNFRSF1B;TRAF6;VEGFA
INFLAMMATORY BOWEL DISEASE	39	630	5.90E-46	6.89E-45	ABCB1;ADAM17;APC;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CSF1;CSF2;CSF3;EGF;EPO;FGF7;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;KDR;KIT;MIF;NFKB1;PARP1;PTGS2;SMAD4;SMAD7;STAT1;TFRC;TNF;TNFRSF1B;TRAF6;VEGFA
#cluster47	71.31				
INTRACELLULAR SIGNAL TRANSDUCTION	28	112	7.60E-155	1.19E-152	BCL2;CCL2;CDKN1A;CREB1;CSF2;EGF;EPO;FOS;GRB2;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KITLG;LCK;MAP2K1;NFKB1;PRKCA;PTEN;RAF1;SMAD2;SMAD4;STAT1;SYK;TNF;VEGFA
REPORTER GENE ASSAY	29	275	1.83E-62	3.02E-61	ABCB1;BAX;BCL2;CCL2;CDKN1A;CREB1;CSF2;E2F1;EGF;EP300;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;MAP2K1;NFKB1;PTEN;PTGS2;SMAD2;SMAD4;STAT1;SYK;TNF;VEGFA
MRNA TRANSCRIPTION	22	95	3.66E-25	2.91E-24	ABCB1;BAX;BCL2;CCL2;CDKN1A;CDKN2A;CREB1;CSF2;EGF;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;NFKB1;PTGS2;STAT1;TNF;VEGFA
HIGH MOBILITY GROUP	28	260	9.99E-62	1.61E-60	BAX;BCL2;CAMK4;CCL2;CDKN1A;CDKN2A;COL2A1;CREB1;CSF2;EP300;FOS;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL23A;IL4;INSR;KIT;MIF;NFKB1;PARP1;PTGS2;RAC1;STAT1;TNF;VEGFA
ADENO ASSOCIATED VIRUS	22	179	5.45E-56	7.57E-55	BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CREB1;CSF2;EPO;FGFR1;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;KDR;NFKB1;TNF;VEGFA
#cluster48	70.54				
TELOMERASE ACTIVITY	29	197	9.07E-91	2.56E-89	BAX;BCL2;CD34;CD44;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CSF2;CSF3;E2F1;EGF;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;KIT;KITLG;MAX;NFKB1;PARP1;PTEN;PTGS2;TNF;VEGFA
BETA GALACTOSIDASE	34	383	3.54E-60	5.47E-59	BAX;BCL2;CCL2;CD34;CD44;CDK2;CDKN1A;CDKN2A;CDKN3;CREB1;CSF2;CSF3;E2F1;EGF;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;INSR;KDR;KIT;KITLG;NFKB1;PARP1;PTGS2;TEK;TFRC;TNF;VEGFA

Supplementary Table 5a: Continued

THYMIDINE KINASE	27	183	1.44E-84	3.50E-83	ABCB1;BAX;BCL2;CCL2;CD34;CDK2;CDKN1A;CDKN2A;CREB1;CSF2;CSF3;E2F1;EGF;EPO;FOS;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;KDR;MAP3K11;NFKB1;NGFR;TNF;VEGFA
CELLULAR SENESENCE	25	208	3.03E-62	4.97E-61	BAX;BCL2;CCL2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;E2F1;EGF;EP300;FOS;IFNA1;IFNG;IGF1;IL1B;NFKB1;PARP1;PTEN;TNF;VEGFA
RETINOIC ACID RECEPTOR	30	310	1.41E-58	2.11E-57	BAX;BCL2;CCL2;CD34;CDK2;CDKN1A;CDKN2A;CDKN3;CREB1;CSF2;CSF3;E2F1;EGF;EP300;EPO;FOS;IFNA1;IFNG;IGF1;IL1B;IL23A;IL4;KITLG;NFKB1;PTGS2;RARB;STAT1;TGFB2;TNF;VEGFA
#cluster49	Enrichment Score: 67.36				
TYROSINE KINASE DOMAIN	23	112	1.40E-102	5.21E-101	CD34;CSF1;CSF1R;CSF2;EGF;EPO;ERBB3;ERBB4;FGFR1;FLT4;FOS;GRB2;IGF1;INSR;KDR;KIT;KITLG;MET;NGFR;NRAS;NTRK3;PDGFRA;VEGFA
LIGAND BINDING DOMAIN	21	256	1.35E-33	1.24E-32	CDKN1A;CREB1;CSF1;CSF1R;CSF2;CSF3;EGF;EP300;EPO;FOS;IFNG;IGF1;IL4;INSR;KDR;KIT;NFKB1;NGFR;RARB;TNF;VEGFA
#cluster50	Enrichment Score: 67.13				
CHRONIC MYELOID LEUKEMIA	33	262	3.81E-87	9.77E-86	ABCB1;BAX;BCL2;CD34;CD44;CDK2;CDKN1A;CDKN2A;CDKN2B;CSF1R;CSF2;CSF3;EPO;FGFR1;GRB2;IFNA1;IFNG;IL4;ITGB3;KDR;KIT;KITLG;MAP2K1;NFKB1;NRAS;PARP1;PDGFR A;PTEN;PTGS2;STAT1;TFRC;TNF;VEGFA
WORLD HEALTH ORGANIZATION	23	221	1.45E-48	1.76E-47	BCL2;CD34;CD44;CDKN1A;CDKN2A;CDKN2B;CSF2;CSF3;EPO;FGFR1;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;KIT;PDGFRA;PTEN;PTGS2;TFRC;TNF;VEGFA
#cluster51	Enrichment Score: 64.33				
QUANTITATIVE REVERSE TRANSCRIPTION	49	653	3.30E-73	6.44E-72	ABCB1;ADAM17;APC;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CDKN2B;COL2A1;CSF2;CSF3;DDIT3;E2F1;EDNRA;EGF;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;KDR;KIT;KITLG;MET;MIF;NFKB1;NGFR;PTEN;PTGS2;RARB;SMAD2;SMAD4;SMAD7;STAT1;TEK;TGFB2;TGFB2;TNF;VEGFA
STATISTICALLY SIGNIFICANT DIFFERENCE	40	555	6.68E-57	9.52E-56	ABCB1;APC;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF1;CSF2;CSF3;EGF;EP300;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;KDR;KIT;KITLG;MIF;NFKB1;PARP1;PTEN;PTGS2;SMAD4;TFRC;TGFB2;TNF;VEGFA
#cluster52	Enrichment Score: 63.94				
DISEASE FREE SURVIVAL	43	542	6.16E-67	1.10E-65	ABCB1;ANG;APC;BAX;BCL2;CCNA2;CD34;CD44;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CSF2;CSF3;E2F1;EGF;EPO;ERBB3;ERBB4;FGFR1;FLT4;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;KIT;MET;MIF;NFKB1;NRAS;PARP1;PDGFRA;PTEN;PTGS2;SMAD4;TNF;VEGFA

Supplementary Table 5a: Continued

LYMPH NODE METASTASIS	48	719	3.87E-62	6.31E-61	ABCB1;APC;ARHGDI B;BAX;BCL2;CCL2;CCND2;CD34;CD44;CDC42;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN3;CEACAM1;CSF3;CTNNA1;E2F1;EGF;EPO;ERBB3;ERBB4;FLT4;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;ITGA3;ITGB8;KDR;KIT;MET;MIF;NFKB1;NRAS;PARP1;PDGFRA;PTEN;PTGS2;RAC1;RHOA;SMAD4;TNF;VEGFA
BREAST CANCER PATIENTS	45	617	6.25E-65	1.08E-63	ABCB1;AKT2;APC;ARHGDI B;BAX;BCL2;CCL2;CCND2;CD34;CD44;CDH2;CDK2;CDKN1A;CDKN1B;CDKN2A;CSF1;CSF1R;CSF2;CSF3;E2F1;EGF;EPO;ERBB3;ERBB4;FGFR1;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;IL7;KDR;KIT;KITLG;MET;NFKB1;PARP1;PTEN;PTGS2;RARB;TFRC;TNF;VEGFA
#cluster53	Enrichment Score: 63.79				
RETINAL PIGMENT EPITHELIAL	26	158	1.15E-91	3.36E-90	BAX;BCL2;CCL2;CDH2;CDKN1A;CSF2;DDIT3;EGF;FOS;GAS6;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;KDR;MET;NFKB1;PTGS2;SMAD2;TFRC;TGFB2;TNF;VEGFA
RETINAL PIGMENT EPITHELIUM	23	277	2.25E-37	2.20E-36	APC;BAX;BCL2;CCL2;CD44;CDH2;CDKN1A;CDKN2A;EGF;FOS;GAS6;HIF1A;IFNA1;IFNG;IGF1;IL1B;KDR;NFKB1;PRKCA;PTGS2;TGFB2;TNF;VEGFA
#cluster54	Enrichment Score: 63.32				
REGULATION OF CELLULAR	26	143	3.96E-102	1.46E-100	BAX;BCL2;CDK2;CDKN1A;CDKN2A;CSF2;E2F1;E2F2;EGF;EP300;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;NFKB1;PARP1;PRKCA;PTEN;STAT1;TFRC;TNF;VEGFA
MOUSE EMBRYO FIBROBLASTS	22	88	5.70E-26	4.59E-25	BAX;BCL2;CDK2;CDKN1A;CDKN2A;CDKN3;E2F1;E2F2;EIF2S1;EP300;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;INSR;NFKB1;PTEN;RAC1;STAT1;TNF
#cluster55	Enrichment Score: 63.07				
COLONY FORMATION ASSAY	21	126	1.32E-74	2.62E-73	BAX;BCL2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN2A;CDKN3;CSF2;E2F1;EGF;HIF1A;IFNA1;MAP2K1;MET;NFKB1;PARP1;PTEN;PTGS2;VEGFA
PANCREATIC DUCTAL ADENOCARCINOMA	22	188	5.37E-53	6.99E-52	AKT2;BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CDKN2A;CSF2;EGF;HIF1A;IGF1;MAP2K1;MET;NFKB1;PARP1;PTEN;PTGS2;SMAD2;SMAD4;VEGFA
#cluster56	Enrichment Score: 62.83				
RECEPTOR COMPLEX	52	530	1.76E-104	6.87E-103	ACVR1B;BCL2;CCL2;CD34;CD44;CDKN1A;CREB1;CSF2;CSF3;EGF;EPO;ERBB3;ERBB4;FGFR1;FKBP1A;FOS;GRB2;IFNA1;IFNB1;IFNG;IGF1;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;INSR;IRAK1;ITGAV;KDR;KIT;LCK;MET;MIF;NFKB1;NGFR;RAC1;RHOA;SMAD2;SMAD4;SMAD7;STAT1;SYK;TFRC;TGFB2;TGFB3;TNF;TNFRSF1B;TRADD;TRAF6;VEGFA
SYSTEMIC LUPUS ERYTHEMATOSUS	39	624	1.64E-46	1.92E-45	ABCB1;BAX;BCL2;CAMK4;CCL2;CD34;CD44;CDKN1A;CSF1;CSF2;CSF3;EPO;FOS;GAS6;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;IRAK1;KIT;LCK;MIF;NFKB1;PARP1;PSMA4;PTGS2;STAT1;SYK;TFRC;TNF;TNFRSF1B;TRAF6;VEGFA

Supplementary Table 5a: Continued

INNATE IMMUNE RESPONSE	38	675	1.11E-39	1.15E-38	BAX;BCL2;CCL2;CD44;CDC42;CDKN1A;CREB1;CSF1;CSF2;CSF3;EPO;FOS;GAS6;HIF1A;IFNA1;IFNB1;IFNG;IL13;IL1B;IL23A;IL4;IL7;IRAK1;KIT;MAP2K1;MIF;NFKB1;PARP1;PTEN;PTGS2;RAC1;RHOA;STAT1;SYK;TNF;TNFRSF1B;TRAF6;VEGFA
#cluster57	Enrichment Score: 61.63				
CHRONIC LYMPHOCYTIC LEUKEMIA	40	459	1.64E-69	3.03E-68	ABCB1;BAX;BCL2;CASP10;CCND2;CD34;CD44;CDK2;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CSF2;CSF3;EPO;FOS;IFNA1;IFNG;IL13;IL1B;IL4;IL7;ITGA3;ITGA4;ITPR3;KDR;KIT;NFKB1;NRAS;PARP1;PIK3CD;PTEN;RHOA;STAT1;SYK;TFRC;TNF;TNFRSF1B;VEGFA
ACUTE LYMPHOBLASTIC LEUKEMIA	41	595	3.40E-55	4.65E-54	ABCB1;BAX;BCL2;CCND2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CSF2;CSF3;DDIT3;EP300;EPO;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;IL7;ITGA4;KIT;KITLG;LCK;MAP2K1;NFKB1;NRAS;PARP1;PPP2R3A;PTEN;STAT1;SYK;TFRC;TNF;VEGFA
#cluster58	Enrichment Score: 61.57				
SPINAL CORD INJURY	30	281	1.40E-65	2.43E-64	BAX;BCL2;CCL2;CD34;CD44;CREB1;CSF2;CSF3;DDIT3;EGF;EPO;FOS;HIF1A;IFNG;IGF1;IL13;IL1B;IL4;MAP2K1;MIF;NFKB1;NGFR;NTRK3;PARP1;PTEN;PTGS2;RHOA;TNF;TNFRSF1B;VEGFA
MIDDLE CEREBRAL ARTERY	30	308	5.12E-59	7.77E-58	ADAM17;BAX;BCL2;CCL2;CD34;CD44;CREB1;CSF2;CSF3;DDIT3;EGF;EP300;EPO;FOS;HIF1A;IFNG;IGF1;IL1B;IL4;KDR;MAP2K1;NFKB1;PARP1;PGF;PTEN;PTGS2;TEK;TFRC;TNF;VEGFA
#cluster59	Enrichment Score: 61.43				
RESPONSE TO HYPOXIA	23	127	1.22E-89	3.35E-88	BAX;BCL2;CCL2;CDKN1A;CREB1;EDNRA;EFNA3;EGF;EP300;EPO;FOS;HIF1A;IGF1;IL1B;KDR;NFKB1;PGF;PTEN;PTGS2;TEK;TNF;VEGFA;VHL
FOCAL CEREBRAL ISCHEMIA	19	129	8.08E-59	1.22E-57	BAX;BCL2;CCL2;CREB1;CSF3;DDIT3;EPO;FOS;HIF1A;IFNG;IGF1;IL1B;KDR;NFKB1;PARP1;PTGS2;TEK;TNF;VEGFA
LEFT ANTERIOR DESCENDING	21	138	1.41E-67	2.59E-66	BAX;BCL2;CCL2;CD34;CD44;CSF3;DDIT3;EDNRA;EPO;HIF1A;IGF1;IL1B;KDR;KIT;NFKB1;PARP1;PTGS2;SMAD2;TEK;TNF;VEGFA
TRAUMATIC BRAIN INJURY	23	216	7.55E-50	9.48E-49	BAX;BCL2;CCL2;CDKN1A;CREB1;CSF2;CSF3;EP300;EPO;FOS;HIF1A;IFNG;IGF1;IL1B;IL4;KDR;NFKB1;NGFR;PARP1;PTGS2;TNF;TNFRSF1B;VEGFA
AMYOTROPHIC LATERAL SCLEROSIS	28	342	7.03E-45	8.00E-44	ANG;BAX;BCL2;CCL2;CDK2;CDKN1A;CREB1;CSF2;CSF3;DDIT3;EP300;EPO;GSK3B;IFNG;IGF1;IL1B;IL4;ITPR2;KDR;NFKB1;NGFR;P4HB;PARP1;PTGS2;RAC1;TFRC;TNF;VEGFA
#cluster60	Enrichment Score: 61.00				
NORMAL CONTROL GROUP	21	130	4.06E-72	7.74E-71	BAX;BCL2;CCL2;CD34;EGF;EP300;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;NFKB1;PTGS2;SMAD2;SMAD7;TNF;VEGFA
BLOOD UREA NITROGEN	19	146	2.49E-51	3.16E-50	BAX;BCL2;CCL2;CD34;EDNRA;EPO;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;NFKB1;PARP1;PTGS2;SMAD2;SMAD7;TNF;VEGFA

Supplementary Table 5a: Continued

#cluster61	Enrichment Score: 58.80				
EXTRACELLULAR REGULATED KINASE	28	124	5.26E-139	4.42E-137	ADAM17;ARAF;BAX;BCL2;CCL2;CDKN1A;CREB1;EGF;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;INSR;KDR;KITLG;MAP2K1;MET;NFKB1;PARP1;PRKCA;PTGS2;RAF1;STAT1;TNF;VEGFA
CREATINE KINASE	21	337	4.32E-24	3.32E-23	BAX;BCL2;CCL2;CDKN1A;CSF3;EGF;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;NFKB1;PARP1;PRKCA;PTGS2;TNF;VEGFA
INSULIN SECRETION	37	655	8.08E-39	8.18E-38	AKT2;BAX;BCL2;CCL2;CCND2;CDC42;CDKN1A;CDKN2A;CDKN2B;CREB1;DDIT3;E2F1;EGF;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;ITPR2;MAP2K1;MIF;NFKB1;PARP1;PIK3R1;PRKAA2;PRKCA;PRKCZ;PTGS2;RAC1;RPS6KB1;STAT1;TNF;VEGFA
ENZYME INHIBITOR	22	262	3.35E-36	3.23E-35	ADAM17;ANG;BAX;BCL2;CCL2;CD34;CDKN1A;EDNRA;EGF;EPO;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;NFKB1;PARP1;PTGS2;TNF;VEGFA
#cluster62	Enrichment Score: 57.94				
CHRONIC LIVER DISEASE	29	202	2.69E-88	7.16E-87	BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF3;EGF;EPO;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;KDR;KIT;MET;NFKB1;PTGS2;SMAD2;SMAD7;STAT1;TFRC;TNF;UBE2B;VEGFA
RESPONSE TO TREATMENT	35	316	4.74E-80	1.07E-78	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF1;CSF2;CSF3;EGF;EP300;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;KDR;KIT;MET;NFKB1;PARP1;PDGFRA;PTEN;PTGS2;STAT1;TFRC;TNF;VEGFA
MAGNETIC RESONANCE IMAGING	40	695	5.96E-43	6.43E-42	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF2;CSF3;EGF;EP300;EPO;FGFR1;FLT4;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;KDR;KIT;KITLG;MET;NFKB1;PARP1;PDGFRA;PGF;PTEN;PTGS2;TEK;TFRC;TNF;TUBB4A;VEGFA;VHL
HEPATITIS B VIRUS	37	424	2.73E-64	4.63E-63	ABCB1;APC;BAX;BCL2;CCL2;CD34;CD44;CDK2;CDKN1A;CDKN2A;CREB1;CSF2;CSF3;E2F1;EGF;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;KIT;MET;NFKB1;NRAS;PARP1;PTEN;PTGS2;RAF1;STAT1;TNF;VEGFA
HEPATITIS C VIRUS	42	575	1.02E-60	1.60E-59	ABCB1;APC;BAX;BCL2;CCL2;CD34;CDK2;CDKN1A;CDKN2A;CRK;CSF2;CSF3;DDIT3;EGF;EIF2S1;EPO;FOS;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;KIT;LTBR;MAP2K1;NFKB1;PTEN;PTGS2;RAF1;RRAS;STAT1;TFRC;TNF;TNFRSF1B;TRADD;UBE2B;VEGFA
HERPES SIMPLEX VIRUS	35	423	4.90E-57	7.02E-56	BAX;BCL2;CCL2;CD34;CD44;CDK2;CDKN1A;CREB1;CRK;CSF2;CSF3;EGF;EIF2S1;EP300;EPO;FOS;IFNA1;IFNA4;IFNB1;IFNG;IL13;IL1B;IL23A;IL4;KDR;KIT;NFKB1;NGFR;PARP1;PTGS2;STAT1;TNF;UBE2B;UBE2D1;VEGFA
CHRONIC HEPATITIS C	24	245	2.55E-47	3.06E-46	BCL2;CCL2;CD34;CDKN1A;CSF2;CSF3;EGF;EPO;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;KIT;NFKB1;PTGS2;RAF1;STAT1;TFRC;TNF;TNFRSF1B;UBE2B;VEGFA
FRAGMENT LENGTH POLYMORPHISM	33	675	1.05E-28	8.82E-28	ABCB1;APC;BCL2;CCL2;CDKN1A;CDKN2A;COL2A1;CSF2;EGF;EPO;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;ITGB3;KIT;MET;MIF;NFKB1;NRAS;PARP1;PTEN;PTGS2;TNF;TNFRSF1B;VEGFA

Supplementary Table 5a: Continued

#cluster63	Enrichment Score: 57.84				
ANTI APOPTOSIS	24	124	1.35E-100	4.70E-99	ABCB1;BAX;BCL2;CCL2;CD44;CDKN1A;CDKN2A; CREB1;CSF2;CSF3;DDIT3;EPO;FOS;HIF1A;IGF1;IL1B;MET;NFKB1;PARP1;PTEN;PTGS2;TNF;TRADD; VEGFA
ANTI INFLAMMATORY DRUGS	26	241	2.41E-57	3.48E-56	ABCB1;APC;BAX;BCL2;CCL2;CDKN1A;CSF2;CSF3; DDIT3;EGF;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13; IL1B;IL4;MAP2K1;NFKB1;PARP1;PTEN;PTGS2;TN F;VEGFA
CELL KILLING	32	246	1.53E-87	4.01E-86	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDK2; CDKN1A;CSF1;CSF2;CSF3;DDIT3;E2F1;EGF;FOS;H IF1A;IFNA1;IFNB1;IFNG;IL13;IL13RA2;IL1B;IL4;M AP2K1;NFKB1;PARP1;PTEN;PTGS2;TFRC;TNF;TNF RSF1B;VEGFA
TRADITIONAL CHINESE MEDICINE	26	170	1.25E-84	3.09E-83	ABCB1;BAX;BCL2;CCL2;CDK2;CDKN1A;CREB1;C SF2;DDIT3;EGF;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1; IL13;IL1B;IL4;KDR;NFKB1;PARP1;PTGS2;SMAD7;T NF;VEGFA
REGULATION OF APOPTOSIS	23	158	1.11E-70	2.06E-69	BAX;BCL2;CASP10;CD34;CDKN1A;CSF2;CSF3;DDI T3;E2F1;EGF;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;MAP2 K1;NFKB1;PARP1;PTEN;PTGS2;TNF;VEGFA
GLUTATHIONE PEROXIDASE	24	371	7.41E-29	6.22E-28	ABCB1;BAX;BCL2;CCL2;CDKN1A;CREB1;CSF2;DD IT3;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INS R;NFKB1;PARP1;PSMA4;PTGS2;TFRC;TNF;VEGFA
COLONIC EPITHELIAL CELLS	20	95	4.59E-22	3.37E-21	ABCB1;APC;BAX;BCL2;CCL2;CD44;CDKN1A;CSF2; EGF;FOS;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;NFKB1;P TGS2;TNF;VEGFA
OUTER MEMBRANE	20	409	7.75E-17	4.85E-16	ABCB1;BAX;BCL2;CCL2;CDKN1A;CEACAM1;CSF2; IFNA1;IFNB1;IFNG;IL13;IL1B;IL4;NFKB1;PRKCA;P TGS2;TFRC;TNF;VEGFA;WASL
#cluster64	Enrichment Score: 56.81				
ACTIVATING TRANSCRIPTION FACTOR	26	185	4.08E-77	8.32E-76	ATF2;BAX;BCL2;CCL2;CDKN1A;CREB1;DDIT3;DU SP5;EGF;EIF2S1;EP300;FOS;HIF1A;IFNA1;IFNB1;IF NG;IL1B;IL4;MAP2K1;MAP2K4;NFKB1;PARP1;PTG S2;STAT1;TNF;VEGFA
ENHANCER BINDING PROTEIN	33	356	2.09E-61	3.33E-60	ATF2;BAX;BCL2;CCL2;CD34;CDK2;CDKN1A;CDKN2 A;CREB1;CSF2;CSF3;DDIT3;E2F1;EGF;EIF2S1;EP300;F OS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KIT;MAP2 K1;NFKB1;PARP1;PTGS2;STAT1;TNF;VEGFA;WNT10B
ENHANCER BINDING	38	409	4.14E-71	7.80E-70	ATF2;BAX;BCL2;CCL2;CD34;CDK2;CDKN1A;CDKN 2A;COL2A1;CREB1;CSF2;CSF3;DDIT3;E2F1;EGF;EI F2S1;EP300;EPO;FOS;GSK3B;HIF1A;IFNA1;IFNB1; IFNG;IGF1;IL1B;IL4;INSR;KIT;MAP2K1;NFKB1;PAR P1;PTGS2;SMAD4;STAT1;TNF;VEGFA;WNT10B
CAMP RESPONSE ELEMENT	30	350	7.89E-51	9.99E-50	ATF2;BAX;BCL2;CAMK4;CCL2;CDKN1A;CDK N2A;CREB1;CSF2;DDIT3;EGF;EP300;FOS;GSK 3B;HIF1A;IFNG;IGF1;IL1B;INSR;MAP2K1;NF KB1;PRKACA;PRKCA;PTGS2;RAF1;SMAD2;S MAD4;STAT1;TNF;VEGFA
TRANSCRIPTION FACTOR BINDING	20	279	3.13E-27	2.59E-26	ATF2;CDKN1A;CREB1;E2F1;EGF;EP300;FOS;HIF1A; IFNA1;IFNG;IGF1;IL1B;IL4;MAP2K1;MAX;NFKB1;P TGS2;STAT1;TNF;VEGFA

Supplementary Table 5a: Continued

#cluster	Enrichment Score:				
#cluster65	54.41				
LYMPHOCYTE PROLIFERATION	27	185	1.46E-83	3.44E-82	BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CSF1;CSF2;CSF3;FOS;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;IL7;LCK;MIF;NFKB1;PTGS2;STAT1;TFRC;TGFB2;TNF;VEGFA
CELL MATURATION	28	268	1.26E-59	1.93E-58	BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN1B;CSF2;CSF3;EGF;EPO;FOS;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;IL7;KIT;KITLG;LCK;NFKB1;STAT1;TFRC;TNF;VEGFA
T CELL PROLIFERATION	41	431	5.35E-79	1.15E-77	APC;BAX;BCL2;CCL2;CD34;CD44;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CREB1;CSF1;CSF1R;CSF2;CSF3;FOS;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;ITGA4;KIT;KITLG;LCK;MIF;NFKB1;PIK3CD;PRKCQ;PTGS2;STAT1;TFRC;TGFB2;TNF;TNFRSF1B;VEGFA
INTERLEUKIN 2 RECEPTOR	21	140	1.60E-66	2.81E-65	BCL2;CCL2;CD34;CD44;CSF2;CSF3;EPO;FOS;IFNA1;IFNB1;IFNG;IL1B;IL4;IL7;KIT;LCK;NFKB1;TFRC;TNF;TNFRSF1B;VEGFA
LYMPHOCYTE ACTIVATION	22	224	1.96E-43	2.16E-42	BCL2;CCL2;CD34;CD44;CSF2;FOS;IFNA1;IFNB1;IFNG;IL13;IL1B;IL4;IL7;ITGA4;LCK;MIF;NFKB1;PRKCB;SYK;TFRC;TNF;VEGFA
ANTIGEN PRESENTING CELLS	32	515	1.11E-36	1.08E-35	BAX;BCL2;CCL2;CCR1;CD34;CD44;CSF1;CSF1R;CSF2;CSF3;FLT4;IFNA1;IFNB1;IFNG;IL13;IL1B;IL23A;IL4;IL7;KIT;KITLG;LCK;LTBR;NFKB1;PRKCQ;PTGS2;STAT1;TFRC;TGFB2;TNF;TNFRSF1B;VEGFA
HUMAN LEUKOCYTE ANTIGEN	19	369	4.01E-17	2.55E-16	ABCB1;BCL2;CCL2;CD34;CD44;CSF2;CSF3;IFNA1;IFNB1;IFNG;IL13;IL1B;IL4;KIT;NFKB1;STAT1;TFRC;TNF;VEGFA
#cluster66	53.63				
EARLY GROWTH RESPONSE	22	123	1.76E-84	4.23E-83	BAX;BCL2;CCL2;CDKN1A;CREB1;DUSP5;EGF;EP300;FOS;HIF1A;IFNG;IGF1;IL13;IL1B;IL4;MAP2K1;NFKB1;PDGFA;PTEN;PTGS2;TNF;VEGFA
ESTROGEN RECEPTOR ALPHA	24	220	1.63E-53	2.13E-52	BAX;BCL2;CCL2;CDKN1A;CDKN2A;CREB1;E2F1;EGF;EP300;ERBB3;ERBB4;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;MAP2K1;NFKB1;PARP1;PTEN;PTGS2;TNF;VEGFA
GLUCOSE HOMEOSTASIS	22	355	4.55E-25	3.60E-24	AKT2;CCL2;CDKN1A;CDKN2A;CREB1;EP300;FOS;GSK3B;HIF1A;IFNG;IGF1;IL13;IL1B;IL4;INSR;MIF;NFKB1;PRKAA2;PTEN;RPS6KB1;TNF;VEGFA
#cluster67	52.12				
TERMINAL DEOXYNUCLEOTIDYL TRANSFERASE	37	285	2.44E-101	8.80E-100	BAX;BCL2;CASP2;CCL2;CD34;CD44;CDK2;CDKN1A;CDKN2A;CDKN3;CREB1;CSF2;CSF3;DDIT3;EGF;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;IL7;KDR;KIT;KITLG;MAP2K1;NFKB1;NGFR;PARP1;PTEN;PTGS2;SMAD2;TNF;TNFRSF1B;VEGFA
CLEAVED CASPASE 3	30	196	4.33E-98	1.43E-96	BAX;BCL2;CCL2;CD34;CD44;CDK2;CDKN1A;CDKN2A;CREB1;DDIT3;EGF;EPO;FOS;GSK3B;HIF1A;IFNG;IGF1;IL1B;KDR;KIT;MAP2K1;NFKB1;NGFR;PARP1;PTEN;PTGS2;SMAD2;STAT1;TNF;VEGFA
GROWTH FACTOR BINDING	32	247	3.80E-87	9.81E-86	ANG;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF2;EGF;EPO;ERBB3;FGF7;FGFR1;FOS;HIF1A;IFNG;IGF1;IL1B;INSR;KDR;LTBP1;MET;NFKB1;NGFR;PTEN;PTGS2;SMAD2;STAT1;TGFB2;TNF;VEGFA

Supplementary Table 5a: Continued

MYOSIN HEAVY CHAIN	27	326	7.55E-44	8.45E-43	BCL2;CCL2;CD34;CD44;CDH15;CDH2;CDKN1A;CDKN2A;EGF;EP300;FOS;GSK3B;HIF1A;IFNG;IGF1;IL1B;KDR;KIT;MAP2K1;NFKB1;PPP3CA;PRKCA;PTGS2;RHOA;SMAD2;TNF;VEGFA
MICROTUBULE ASSOCIATED PROTEIN	30	401	3.32E-43	3.63E-42	BAX;BCL2;CD34;CD44;CDH2;CDKN1A;CDKN2A;CREB1;DDIT3;EGF;EPO;FOS;GRB2;GSK3B;HIF1A;IFNG;IGF1;IL1B;INSR;MAP2K1;MET;NFKB1;NGFR;PARP1;PTEN;PTGS2;RAC1;RHOA;TNF;VEGFA
RETINAL GANGLION CELL	26	317	1.03E-41	1.09E-40	BAX;BCL2;CASP2;CCL2;CD44;CDH2;CDKN1A;CDKN2A;CREB1;DDIT3;EGF;EPO;FOS;IGF1;IL1B;KDR;NFKB1;NGFR;NTRK3;PARP1;PTEN;PTGS2;PTPRM;RHOA;TNF;VEGFA
DORSAL ROOT GANGLION	20	285	1.54E-26	1.26E-25	BAX;BCL2;CAV2;CCL2;CD44;CDH2;CREB1;ERBB3;FOS;IFNG;IGF1;IL1B;NFKB1;NGFR;NTRK3;PTGS2;RHOA;TNF;TNFRSF1B;VEGFA
BRAIN DEVELOPMENT	26	548	5.78E-21	4.10E-20	BAX;BCL2;CCL2;CDC42;CDH2;CDKN1A;CDKN2A;CREB1;EGF;EP300;EPO;ERBB4;FOS;GSK3B;IGF1;IL1B;INSR;LIMK1;NFKB1;NGFR;PTEN;PTGS2;RAC1;RHOA;TNF;VEGFA
SYNAPTIC TRANSMISSION	19	459	8.45E-13	4.53E-12	BAX;CAV2;CCL2;CDC42;CDH2;CDKN1A;CDKN2A;CREB1;FOS;IGF1;IL1B;ITPR2;NFKB1;NGFR;PRKCG;PTGS2;RAC1;RHOA;TNF
#cluster68	Enrichment Score: 51.97				
ACTIN CYTOSKELETON	58	1025	4.64E-61	7.29E-60	ABI2;APC;ARHGDI1B;ARPC2;BAX;BCL2;CAMK2G;CAV2;CCL2;CD44;CDC42;CDH2;CDKN1A;CDKN2A;CRK;CSF1;CTNNA1;CTNNA2;EGF;FGF7;FOS;GRB2;GSK3B;HIF1A;IFNG;IGF1;IL1B;INSR;IQGAP1;ITGAV;ITGB8;KDR;KIT;LCK;LIMK1;MAP2K1;MET;NFKB1;PARP1;PIK3R1;PIK3R2;PRKCA;PRKCQ;PTEN;PTGS2;RAC1;RAF1;RASA1;RHOA;RPS6KB1;SMAD2;SOS1;SYK;TFRC;TNF;VEGFA;WASF3;WASL
ACTIN FILAMENT	34	537	6.10E-40	6.31E-39	ABI2;APC;ARHGDI1B;ARPC2;BCL2;CAMK2G;CD44;CDC42;CDH2;CDKN1A;CDKN2A;CTNNA1;EGF;FOS;GRB2;IFNG;IGF1;IL1B;INSR;IQGAP1;KDR;LIMK1;MAP2K1;NFKB1;PRKCA;PTEN;PTGS2;RAC1;RHOA;TFRC;TNF;VEGFA;WASF3;WASL
STRESS FIBER	31	337	4.23E-57	6.09E-56	BCL2;CCL2;CD44;CDC42;CDH2;CDKN1A;CRK;CTNNA1;EGF;FOS;GRB2;IFNG;IGF1;IL1B;INSR;ITGAV;KDR;LIMK1;MAP2K1;MET;NFKB1;PRKCA;PTGS2;PTPRA;RAC1;RASA1;RHOA;SMAD2;TNF;VEGFA;WASL
#cluster69	Enrichment Score: 51.73				
ACUTE LUNG INJURY	29	225	2.41E-78	5.07E-77	BAX;BCL2;CCL2;CSF2;CSF3;EPO;FGF7;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;KDR;MAP2K1;MIF;NFKB1;PARP1;PTGS2;RAC1;RHOA;SMAD2;STAT1;TAK1;TNF;TNFRSF1B;VEGFA
SYSTEMIC INFLAMMATORY RESPONSE	19	155	4.94E-48	5.98E-47	BCL2;CCL2;CSF2;CSF3;EPO;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;IL7;MIF;NFKB1;PARP1;PTGS2;TNF;TNFRSF1B;VEGFA
HEALTHY CONTROL SUBJECTS	21	274	5.40E-31	4.76E-30	BCL2;CCL2;CD34;CSF2;CSF3;EP300;EPO;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;INSR;MIF;NFKB1;PTGS2;TNF;TNFRSF1B;VEGFA
#cluster70	Enrichment Score: 50.73				

Supplementary Table 5a: Continued

ALVEOLAR EPITHELIAL CELL	25	167	2.10E-79	4.57E-78	BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CSF2;CSF3;DDIT3;EGF;FGF7;FOS;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;MET;NFKB1;PTGS2;SMAD2;STAT1;TNF;VEGFA
HUMAN DERMAL FIBROBLAST	24	109	8.59E-27	7.06E-26	BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF2;EGF;FGF7;FOS;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;NFKB1;PTGS2;SMAD2;SMAD4;SMAD7;TNF;VEGFA
COLLAGEN TYPE I	27	197	5.81E-78	1.21E-76	BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;COL2A1;CSF2;EGF;FOS;IFNG;IGF1;IL13;IL1B;IL4;ITGA3;KIT;NFKB1;PTGS2;RHOA;SMAD2;SMAD4;SMAD7;TGF B2;TGFB3;TNF;VEGFA
IDIOPATHIC PULMONARY FIBROSIS	19	122	1.65E-62	2.73E-61	BCL2;CCL2;CD34;CDKN1A;CSF2;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;LTBP1;NFKB1;PTEN;PTGS2;SMAD2;SMAD7;TNF;VEGFA
BINDING PROTEIN 3	19	161	4.87E-46	5.70E-45	BAX;BCL2;CD44;CDKN1A;CDKN2A;EGF;EPO;IFNG;IGF1;IL13;IL1B;IL4;INSR;LTBP1;NFKB1;PTGS2;SMAD2;TNF;VEGFA
LASER DESORPTION IONIZATION	19	388	4.87E-16	2.98E-15	ABCB1;ARHGDI3;BCL2;CDKN1A;CDKN2A;EGF;EPO;HSP90AB1;IFNG;IGF1;IL1B;IL4;NFKB1;PSMA3;PSMA4;TFRC;TNF;TUBB4A;VEGFA
#cluster71	Enrichment Score: 49.93				
BONE REMODELING	20	158	1.80E-52	2.31E-51	BCL2;CCL2;CD44;CSF1;CSF1R;CSF2;CSF3;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;NFKB1;PTGS2;TGFB2;TNF;TRAF6;VEGFA
INTERLEUKIN 1 RECEPTOR	21	185	7.84E-49	9.60E-48	BCL2;CCL2;CSF1;CSF2;CSF3;FOS;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;IRAK1;MIF;NFKB1;PTGS2;TNF;TNFRSF1B;TRAF6;VEGFA
#cluster72	Enrichment Score: 49.24				
VON HIPPEL LINDAU	19	135	5.84E-56	8.08E-55	BCL2;CD34;CDKN1A;CDKN2A;EP300;EPO;HIF1A;IGF1;KDR;KIT;MAX;MET;NFKB1;PTEN;SKP1;TNF;UBE2D1;VEGFA;VHL
POSITRON EMISSION TOMOGRAPHY	23	241	5.72E-44	6.43E-43	ABCB1;BCL2;CD34;CDKN1A;CDKN2A;CSF2;CSF3;EP300;EPO;HIF1A;IFNA1;IFNG;IGF1;INSR;ITGAV;KDR;KIT;MET;PTEN;PTGS2;TNF;VEGFA;VHL
#cluster73	Enrichment Score: 49.15				
TO THE PROGRESSION	25	142	9.74E-95	3.13E-93	BAX;BCL2;CCL2;CD44;CDKN1A;CDKN2A;CSF2;EGF;EP300;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;KIT;NFKB1;PTEN;PTGS2;SMAD2;TNF;VEGFA
QUANTITATIVE REVERSE TRANSCRIPTASE	26	260	1.41E-52	1.82E-51	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF2;EGF;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;KDR;KIT;NFKB1;PTEN;PTGS2;STAT1;TNF;VEGFA
REGIONAL LYMPH NODE	20	131	1.71E-64	2.92E-63	BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CSF2;FLT4;HIF1A;IFNA1;IFNG;IL13;IL1B;IL4;KDR;KIT;MET;PTGS2;TNF;VEGFA
LASER CAPTURE MICRODISSECTION	19	130	2.53E-58	3.75E-57	BAX;BCL2;CCL2;CD44;CDKN1A;CDKN2A;FOS;HIF1A;IFNG;IGF1;IL1B;KDR;KIT;NFKB1;NRAS;PTEN;PTGS2;TNF;VEGFA
LASER SCANNING MICROSCOPY	20	149	5.40E-56	7.54E-55	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CSF2;EGF;FOS;IFNG;IGF1;IL1B;IL4;KDR;KIT;NFKB1;PRKCA;TNF;VEGFA

Supplementary Table 5a: Continued

ACTIVATED B CELL	22	183	1.27E-54	1.70E-53	BAX;BCL2;CCL2;CD44;CDKN1A;CDKN2A;CSF2;FO S;IFNA1;IFNG;IL13;IL1B;IL4;IL7;NFKB1;PTEN;PTG S2;STAT1;SYK;TFRC;TNF;VEGFA
RECEPTOR ACTIVITY	25	284	1.44E-43	1.59E-42	CCL2;CD44;CDKN1A;CREB1;EDNRA;EGF;EP300;E PO;ERBB3;FOS;IFNA1;IFNG;IGF1;IL1B;INSR;KDR; KIT;MET;NFKB1;NGFR;PTGS2;SMAD2;TFRC;TNF; VEGFA
DIFFERENTIAL GENE EXPRESSION	30	402	4.48E-43	4.85E-42	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CRE B1;CSF2;CSF3;DUSP5;E2F1;E2F5;EGF;ERBB3;FOS; HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;KIT;NFKB1; PTGS2;STAT1;TGFB2;TNF;VEGFA
TUMOR GROWTH INHIBITION	25	85	2.18E-31	1.94E-30	ABCB1;BAX;BCL2;CD44;CDK2;CDKN1A;CSF2;EG F;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;KIT;MAP 2K1;MET;NFKB1;PARP1;PTEN;PTGS2;STAT1;TNF; VEGFA
B CELL RECEPTOR	19	268	1.62E-25	1.30E-24	BAX;BCL2;CCND2;CD44;GAB1;GRB2;IFNA1;IFNG; IL4;IL7;LCK;NFKB1;PIK3CD;PIK3R1;PRKCB;PTEN; RAC1;SYK;TNF
MAXIMUM TOLERATED DOSE	21	88	2.30E-24	1.79E-23	ABCB1;BCL2;CD44;CDKN1A;CDKN3;CSF2;CSF3;IF NA1;IFNB1;IFNG;IGF1;IL1B;IL4;KDR;KIT;MET;PAR P1;PTEN;PTGS2;TNF;VEGFA
#cluster74	Enrichment Score: 48.84				
UBIQUITIN PROTEASOME PATHWAY	28	225	1.13E-72	2.16E-71	BAX;BCL2;CDK2;CDKN1A;CDKN1B;CDKN3;CREB 1;DDIT3;E2F1;EP300;FOS;HIF1A;IFNA1;IFNG;IGF1;I L1B;KITLG;NFKB1;PSMB1;PSMD11;SKIL;SKP1;STA T1;TNF;UBE2D1;UBE2D2;VEGFA;VHL
NUCLEAR EXPORT	31	413	7.57E-45	8.59E-44	APC;BAX;BCL2;CDK2;CDKN1A;CDKN1B;CD KN2A;CDKN3;CREB1;E2F1;EGF;EP300;FOS;G SK3B;HIF1A;IFNA1;IFNG;IGF1;IL1B;LIMK1;M AP2K1;NFKB1;PARP1;PTEN;SMAD2;SMAD4;S MAD7;STAT1;TNF;VEGFA;VHL
UBIQUITIN PROTEASOME SYSTEM	22	297	3.47E-31	3.07E-30	BAX;BCL2;CDKN1A;DDIT3;DNAJB1;HIF1A;IFNG;I GF1;NFKB1;PARP1;PSMB1;PSMB4;PSMD11;PSMD 6;PSMD8;PTEN;SKP1;TNF;UBE2D1;UBE2D2;VEGF A;VHL
#cluster75	Enrichment Score: 48.59				
SOFT TISSUE SARCOMA	22	123	1.76E-84	4.20E-83	ABCB1;BAX;BCL2;CD34;CD44;CDKN1A;CDKN2A;C SF2;CSF3;DDIT3;HIF1A;IFNG;IGF1;KDR;KIT;MET; NFKB1;PDGFRA;PTEN;PTGS2;TNF;VEGFA
TO TUMOR PROGRESSION	20	77	4.54E-24	3.48E-23	BAX;BCL2;CCL2;CD34;CD44;CDH2;CDKN1A;CDK N2A;CSF3;EGF;HIF1A;IFNG;KDR;KIT;MET;NFKB1; PTEN;PTGS2;TNF;VEGFA
INVASIVE BREAST CANCER	22	139	5.38E-74	1.06E-72	BAX;BCL2;CD34;CD44;CDC42;CDH2;CDKN1A;CD KN2A;EGF;ERBB3;ERBB4;HIF1A;IGF1;KDR;KIT;M ET;NFKB1;PTEN;PTGS2;RAC1;RHOA;VEGFA
PRIMARY BREAST CANCER	21	149	3.98E-62	6.46E-61	ABCB1;BCL2;CD34;CD44;CDKN1A;CDKN1B;CDKN 2A;CSF3;EGF;ERBB3;ERBB4;HIF1A;IFNG;IGF1;KD R;KIT;MET;PTEN;PTGS2;TNF;VEGFA
CARCINOMA IN SITU	22	177	1.07E-56	1.51E-55	APC;BAX;BCL2;CCND2;CD34;CD44;CDKN1A;CDK N1B;CDKN2A;EGF;ERBB3;IFNG;IGF1;KDR;KIT;KIT LG;MET;PTEN;PTGS2;RARB;TNF;VEGFA
METHYLATION SPECIFIC PCR	20	306	2.46E-24	1.91E-23	ABCB1;APC;BAX;BCL2;CCNA1;CCND2;CD44;CDK N1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;IFNG;ITG A4;PTEN;PTGS2;RARB;SMAD4;VEGFA;VHL

Supplementary Table 5a: Continued

HUMAN MAMMARY EPITHELIAL	19	107	1.61E-19	1.10E-18	BAX;BCL2;CD44;CDH2;CDK2;CDKN1A;CDKN2A;EGF;EP300;ERBB3;IGF1;MET;NFKB1;PARP1;PTEN;PTGS2;RAC1;RARB;VEGFA
#cluster76	Enrichment Score:				
	48.02				
CELL CELL ADHESION	30	334	1.05E-53	1.39E-52	APC;BCL2;CD34;CD44;CDC42;CDH15;CDH2;CDKN1A;CDKN2A;CEACAM1;CTNNA1;CTNNA2;EGF;GSK3B;IFNG;IGF1;IL1B;IQGAP1;ITGA3;KDR;MET;NFKB1;PRKCA;PTEN;PTPRM;RAC1;RHOA;SMAD4;TNF;VEGFA
ADHERENS JUNCTION	24	262	8.73E-44	9.74E-43	APC;CDC42;CDH2;CDKN1A;CRK;CTNNA1;CTNNA2;EGF;GSK3B;IFNG;IL1B;IQGAP1;KDR;MET;NFKB1;PRKCA;PTEN;PTPRM;RAC1;RHOA;SMAD2;TNF;VEGFA;YES1
#cluster77	Enrichment Score:				
	46.73				
SCANNING ELECTRON MICROSCOPY	27	248	3.22E-60	5.01E-59	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDH2;CDKN1A;CSF1;CSF2;CSF3;EGF;EPO;FLT4;IFNA1;IFNG;IGF1;IL1B;IL4;ITGB3;KDR;NFKB1;PTGS2;RHOA;TNF;VEGFA
TRANSMISSION ELECTRON MICROSCOPY	36	462	1.25E-54	1.68E-53	ABCB1;BAX;BCL2;CAV2;CCL2;CD34;CD44;CDC42;CDH2;CDKN1A;CDKN2A;CSF1;CSF2;CSF3;DDIT3;EGF;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;KIT;KITLG;NFKB1;PARP1;PTEN;PTGS2;RAC1;RHOA;TFRC;TNF;VEGFA
ADVANCED GLYCATION END	24	206	1.21E-57	1.75E-56	ABCB1;BAX;BCL2;CCL2;CD44;CDC42;CDKN1A;CSF2;EPO;IFNG;IGF1;IL1B;IL4;KDR;NFKB1;PARP1;PRKCB;PTGS2;RAC1;RHOA;SMAD2;STAT1;TNF;VEGFA
HIGH DENSITY LIPOPROTEIN	22	472	2.37E-17	1.51E-16	ABCB1;BAX;BCL2;CCL2;CD34;CSF1;CSF1R;CSF2;EGF;EPO;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KDR;NFKB1;PTGS2;TNF;TNFRSF1B;VEGFA
#cluster78	Enrichment Score:				
	45.97				
CANCER STEM CELL	30	338	5.84E-53	7.57E-52	ABCB1;APC;BAX;BCL2;CCL2;CD34;CD44;CDH2;CDK2;CDKN1A;CDKN2A;EGF;EP300;ERBB3;HIF1A;IGF1;IL4;KDR;KIT;KITLG;MET;NFKB1;NGFR;PARP1;PTEN;PTGS2;SMAD2;SMAD4;TNF;VEGFA
STEM CELL MARKER	23	259	1.93E-40	2.01E-39	ABCB1;APC;BAX;BCL2;CD34;CD44;CDH2;CDKN1A;CDKN2A;CSF3;EGF;HIF1A;IGF1;KDR;KIT;KITLG;MET;NGFR;PTEN;PTGS2;TFRC;TNF;VEGFA
#cluster79	Enrichment Score:				
	45.11				
PHOSPHOLIPASE A2	31	340	1.64E-56	2.31E-55	APC;BAX;BCL2;CCL2;CDKN1A;CREB1;CSF1;CSF2;EGF;EPO;FOS;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;KITLG;MAP2K1;NFKB1;PARP1;PRKCA;PRKCB;PRKCZ;PTGS2;RAC1;RAF1;SYK;TNF;TNFRSF1B;VEGFA
ADRENERGIC RECEPTOR	28	451	5.11E-32	4.60E-31	BAX;BCL2;CCL2;CDKN1A;CREB1;EDNRA;EGF;EPO;FOS;GNA11;IFNG;IGF1;IL13;IL1B;IL4;INSR;MAP2K1;NFKB1;PRKCA;PRKCB;PRKCZ;PTGS2;RAC1;RAF1;RHOA;TFRC;TNF;VEGFA
MEMBRANE FRACTION	35	480	5.52E-49	6.81E-48	ABCB1;BAX;BCL2;CAV2;CD44;CDC42;CDKN1A;CSF2;EDNRA;EGF;FOS;GRB2;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;LCK;NFKB1;PIK3R1;PRKCA;PRKCB;PRKCQ;PRKCZ;PTEN;PTGS2;RAC1;RAF1;RHOA;TFRC;TNF;VEGFA;YES1

Supplementary Table 5a: Continued

#cluster	Enrichment Score:				
#cluster80	44.97				
MACROPHAGE ACTIVATION	25	221	3.89E-58	5.75E-57	BCL2;CCL2;CSF1;CSF1R;CSF2;CSF3;EPO;FOS;IFNA1;IFNB1;IFNG;IL13;IL1B;IL23A;IL4;IRAK1;MAP2K1;MIF;NFKB1;PTGS2;STAT1;SYK;TNF;TNFRSF1B;VEGFA
INNATE IMMUNE SYSTEM	25	356	2.91E-33	2.66E-32	BAX;BCL2;CCL2;CD34;CD44;CSF1;CSF2;CSF3;IFNA1;IFNB1;IFNG;IL13;IL1B;IL23A;IL4;IRAK1;MIF;NFKB1;PTGS2;STAT1;SYK;TNF;TNFRSF1B;TRAF6;VEGFA
#cluster81	44.88				
DNA REPAIR	61	1246	3.84E-53	5.01E-52	ABCB1;APC;BAX;BCL2;CASP2;CCL2;CCNA1;CCNA2;CCNH;CD34;CD44;CDC25A;CDC25B;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;CREB1;CSF2;CSF3;CSNK1D;DDIT3;DUSP5;E2F1;E2F2;EGF;EP300;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KDR;KIT;MAP2K1;MCM5;MET;NFKB1;NRAS;PARP1;PPP3CA;PSMA8;PSMB4;PTEN;PTGS2;RAC1;RARB;STAT1;TNF;UBE2B;UBE2D1;UBE2D2;VEGFA
DNA REPLICATION	46	973	4.48E-38	4.51E-37	APC;BAX;BCL2;CCNA1;CCNA2;CCND2;CCNH;CD34;CDC25A;CDC25B;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN3;CREB1;CSF2;CSNK1D;E2F1;E2F2;E2F5;EGF;EP300;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL1B;IL4;MAP2K1;MAX;MCM5;NFKB1;PARP1;PTEN;PTGS2;SKP1;STAT1;TFRC;TNF;UBE2B;VEGFA
#cluster82	43.58				
ATP BINDING	42	678	1.65E-49	2.04E-48	ABCB1;ARPC2;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDK2;CDKN1A;CDKN2A;CSF1;CSF1R;CSF2;DNAJB1;E2F1;EGF;ERBB3;FGFR1;FOS;GSK3B;HIF1A;HSP90AB1;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KDR;KIT;LCK;MAP2K1;MET;NFKB1;PARP1;PRKCA;PTEN;PTGS2;RAF1;TNF;VEGFA
STRUCTURE ACTIVITY RELATIONSHIP	31	462	4.24E-39	4.32E-38	ABCB1;ADAM17;BAX;BCL2;CCL2;CCR1;CDK2;CDKN1A;CSF2;EDNRA;EGF;FGFR1;FOS;GSK3B;HIF1A;IFNA1;IFNG;IL1B;IL4;INSR;KDR;KIT;LCK;MET;NFKB1;PARP1;PRKCA;PTEN;PTGS2;TNF;VEGFA
#cluster83	42.24				
CORONARY ARTERY DISEASE	36	500	1.23E-49	1.53E-48	ABCB1;ANG;BAX;BCL2;CCL2;CD34;CDKN2A;CDKN2B;CSF1;CSF2;CSF3;DUSP2;EDNRA;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;INSR;ITGAV;ITGB3;KDR;KIT;MIF;NFKB1;PGF;PTGS2;TEK;THBS4;TNF;TNFRSF1B;VEGFA
C REACTIVE PROTEIN	33	549	2.74E-36	2.65E-35	BAX;BCL2;CCL2;CD34;CD44;CSF1;CSF2;CSF3;DUSP2;EPO;FOS;GAS6;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;KDR;KITLG;MIF;NFKB1;PGF;PTGS2;TEK;TFRC;THBS4;TNF;TNFRSF1B;VEGFA

Supplementary Table 5a: Continued

#cluster	Enrichment Score:				
#cluster84	42.03				
GRAFT VERSUS HOST	27	244	2.43E-61	3.85E-60	BCL2;CCL2;CD34;CD44;CSF1;CSF2;CSF3;EPO;FGF7;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;KIT;KITLG;LCK;NFKB1;NGFR;STAT1;TFRC;TNF;TNFRSF1B;VEGFA
HUMAN CORD BLOOD	22	92	1.68E-25	1.34E-24	BCL2;CCL2;CD34;CDKN1A;CSF1;CSF2;CSF3;EPO;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;IL7;KDR;KIT;KITLG;NFKB1;TFRC;TNF;VEGFA
T CELL DIFFERENTIATION	20	195	2.05E-41	2.15E-40	BCL2;CD34;CD44;CDKN2A;CSF2;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;KIT;KITLG;LCK;NFKB1;STAT1;TNF
#cluster85	41.46				
ENDOPLASMIC RETICULUM STRESS	27	310	1.57E-46	1.85E-45	BAX;BCL2;CASP2;CCL2;CDKN1A;CREB1;DDIT3;EIF2S1;EPO;FOS;GSK3B;HIF1A;IFNA1;IFNG;IGF1;IL1B;INSR;MAP2K1;NFKB1;P4HB;PARP1;PRKAA2;PTEN;PTGS2;THBS4;TNF;VEGFA
EUKARYOTIC INITIATION FACTOR	20	211	7.76E-38	7.76E-37	BAX;BCL2;CDKN1A;CREB1;DDIT3;EGF;EIF2S1;GSK3B;HIF1A;IFNA1;IFNG;IGF1;INSR;NFKB1;PARP1;PRKAA2;PTEN;RPS6KB1;TNF;VEGFA
#cluster86	40.67				
MONOCYTE DERIVED MACROPHAGE	23	179	1.41E-61	2.26E-60	BAX;BCL2;CCL2;CCR1;CSF1;CSF1R;CSF2;CSF3;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;ITGAV;MIF;NFKB1;PTGS2;STAT1;TNF;VEGFA
MIGRATION INHIBITORY FACTOR	19	96	1.81E-20	1.26E-19	BAX;BCL2;CCL2;CD44;CSF1;CSF2;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;MIF;NFKB1;PTGS2;TNF;VEGFA
EXPERIMENTAL AUTOIMMUNE ENCEPHALOMYELITIS	26	251	9.59E-55	1.30E-53	BAX;BCL2;CCL2;CCR1;CD44;CDKN2A;CSF2;CSF3;EPO;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;ITGA4;NFKB1;NGFR;PARP1;PTGS2;STAT1;TNF;VEGFA
TYPE 1 DIABETES	36	537	1.84E-45	2.12E-44	BAX;BCL2;CCL2;CD34;CD44;CDKN2A;CSF2;CSF3;DDIT3;EGF;EPO;ERBB3;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;INSR;ITPR3;KDR;KIT;MIF;NFKB1;NGFR;PARP1;PSMB1;PTGS2;STAT1;TFRC;TNF;TNFRSF1B;VEGFA
TUMOR ASSOCIATED MACROPHAGE	21	85	1.03E-24	8.09E-24	CCL2;CD34;CD44;CSF1;CSF1R;CSF2;FLT4;HIF1A;IFNA1;IFNG;IL13;IL1B;IL23A;IL4;KDR;NFKB1;PTGS2;STAT1;TEK;TNF;VEGFA
#cluster87	40.08				
AIRWAY SMOOTH MUSCLE	22	159	7.37E-64	1.24E-62	CCL2;CDKN1A;CREB1;CSF2;EDNRA;EGF;FOS;IFNG;IGF1;IL13;IL1B;IL4;KITLG;MAP2K1;NFKB1;PRKCA;PTGS2;RAC1;RHOA;SMAD2;TNF;VEGFA
ADENYLATE CYCLASE	27	447	8.13E-30	6.85E-29	BAX;BCL2;CCL2;CD44;CDKN1A;CREB1;CSF2;EDNRA;EGF;EPO;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;KITLG;MAP2K1;NFKB1;NGFR;PRKACA;PRKCA;PTGS2;RHOA;TNF;VEGFA
ACETYLCHOLINE RECEPTOR	28	345	2.04E-44	2.30E-43	BAX;BCL2;CCL2;CD44;CDC42;CDKN1A;CREB1;CSF2;EGF;EP300;ERBB3;ERBB4;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;MAP2K1;NFKB1;NGFR;PSMA4;PTGS2;RAC1;RHOA;TFRC;TNF;VEGFA

Supplementary Table 5a: Continued

MUSCLE CONTRACTION	20	298	3.88E-25	3.07E-24	CDKN1A;EDNRA;FOS;HIF1A;IGF1;IL13;IL1B;IL4;INSR;ITPR3;KIT;NFKB1;PRKAA2;PRKCA;PTGS2;RHOA;RPS6KB1;TNF;TUBB4A;VEGFA
#cluster88	Enrichment Score:				
	39.50				
RESONANCE ENERGY TRANSFER	27	296	4.05E-49	5.02E-48	ABCB1;BAX;BCL2;CD44;CDC42;CDKN1A;CREB1;EGF;EP300;ERBB3;FKBP1A;FOS;GRB2;HIF1A;IFNG;IGF1;INSR;LCK;MAP3K3;NFKB1;PRKCA;RAC1;RHOA;TFRC;TNF;VEGFA;WASL
HUMAN EMBRYONIC KIDNEY	33	494	1.98E-41	2.08E-40	ABCB1;BAX;BCL2;CCL2;CDC42;CDKN1A;CREB1;EGF;EPO;FOS;GNA11;GRB2;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;INSR;IRAK1;KIT;MAP2K1;NFKB1;PARP1;PRKCA;PTGS2;RAC1;RAF1;RHOA;TFRC;TNF;VEGFA
NUCLEOTIDE BINDING	32	617	3.97E-30	3.41E-29	ABCB1;ARPC2;BCL2;CCL2;CDC42;CDKN1A;CDKN2A;CSF2;DNAJB1;EGF;FOS;GNA11;IFNA1;IFNB1;IFNG;IL13;IL1B;IL4;INSR;IRAK1;MCM5;NFKB1;NRAS;PRKCA;PTGS2;RAC1;RAF1;RASA1;RHOA;TNF;TRAF6;VEGFA
#cluster89	Enrichment Score:				
	38.81				
CELLULAR COMPONENT	22	161	5.53E-63	9.25E-62	BCL2;CCL2;CD34;CD44;CDKN1A;CSF2;CSF3;EGF;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;KIT;NFKB1;PTGS2;TNF;VEGFA
PHOSPHATE BUFFERED SALINE	23	178	5.82E-62	9.40E-61	BAX;BCL2;CCL2;CD34;CD44;CSF2;CSF3;EGF;EPO;FGF7;FOS;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;KDR;KITLG;NFKB1;PTGS2;TNF;VEGFA
EVERY OTHER DAY	19	95	1.47E-20	1.02E-19	BAX;BCL2;CCL2;CD34;CSF2;CSF3;EGF;EPO;FOS;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL4;PTGS2;TNF;VEGFA
PROTEIN SECRETION	22	231	6.37E-42	6.76E-41	CCL2;CSF1;CSF2;CSF3;EGF;EPO;FOS;HIF1A;IFNA1;IFNG;IGF1;IL13;IL1B;IL4;MAP2K1;MIF;NFKB1;PTGS2;RAC1;TGFB2;TNF;VEGFA
SURFACE PLASMON RESONANCE	25	346	1.95E-34	1.84E-33	BCL2;CCL2;CD44;CDKN1A;CSF2;CSF3;EGF;EPO;FGFR1;GRB2;IFNA1;IFNG;IGF1;IL13RA2;IL1B;IL4;KDR;MET;NFKB1;PRKCA;PTGS2;SYK;TFRC;TNF;VEGFA
SIGNAL PEPTIDE	23	578	2.40E-15	1.43E-14	CD44;CDKN1A;CSF1;CSF2;CSF3;EGF;EPO;FGF5;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;INSR;LAMC1;MET;NFKB1;P4HB;PTGS2;TNF;VEGFA;WNT10B
#cluster90	Enrichment Score:				
	37.62				
CYTOKINE SECRETION	35	307	1.01E-82	2.37E-81	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CREB1;CSF1;CSF2;CSF3;EGF;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL13;IL1B;IL23A;IL4;IL7;IRAK1;KITLG;MAP2K1;NFKB1;PIK3CD;PTGS2;STAT1;SYK;TFRC;TNF;TRAF6;VEGFA
ADAPTIVE IMMUNE RESPONSE	28	395	9.90E-38	9.84E-37	BCL2;CCL2;CCR1;CD34;CD44;CSF1;CSF2;CSF3;FO S;IFNA1;IFNB1;IFNG;IL13;IL1B;IL23A;IL4;IL7;IRAK1;KIT;KITLG;MIF;NFKB1;PTGS2;STAT1;SYK;TNF;TRAF6;VEGFA
CYTOKINES	25	429	2.26E-26	1.83E-25	CCL2;CCR1;CSF1;CSF2;CSF3;FGF7;IFNA1;IFNB1;IFNG;IL13;IL13RA2;IL1B;IL23A;IL4;IL7;IRAK1;KITLG;LTBR;MIF;NFKB1;STAT1;TGFB2;TNF;TNFRSF1B;TRAF6

Supplementary Table 5a: Continued

INFECTION	20	806	1.41E-06	6.30E-06	CCL2;CCR1;CEACAM1;CRK;CSF3;EIF2S1;IFNA1;IFNA4;IFNB1;IFNG;IL13;IL23A;IL4;IL7;IRAK1;RRAS;STAT1;TNF;TRAF6;UBE2B
#cluster91	Enrichment Score: 37.44				
NUCLEOTIDE EXCHANGE FACTOR	35	587	2.21E-39	2.25E-38	APC;ARHGDI;BCL2;CD44;CDC42;CDH2;CDKN1A;CDKN2A;CREB1;CRK;DNAJB1;EGF;EIF2S1;GAB1;GRB2;IGF1;INSR;IQGAP1;LCK;MAP2K1;MAP3K11;NFKB1;NRAS;PIK3R1;PTEN;PTGS2;RAC1;RAF1;RASA1;RHOA;RRAS;SOS1;SYK;VEGFA;WASLARHGDI;BCL2;CD44;CDC42;CDKN1A;CDKN2A;CREB1;CRK;CSF2;EGF;FOS;GNA11;GRB2;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;IQGAP1;MAP2K1;NFKB1;NRAS;PRKCA;RAC1;RAF1;RASA1;RHOA;RRAS;TFRC;TNF;VEGFA;WASL
GTP BINDING	33	556	5.88E-37	5.74E-36	ARHGDI;BCL2;CD44;CDC42;CDKN1A;CDKN2A;CREB1;CRK;CSF2;EGF;FOS;GNA11;GRB2;IFNA1;IFNG;IGF1;IL1B;IL4;INSR;IQGAP1;MAP2K1;NFKB1;NRAS;PRKCA;RAC1;RAF1;RASA1;RHOA;RRAS;TFRC;TNF;VEGFA;WASL
#cluster92	Enrichment Score: 34.90				
GAP JUNCTION	21	233	1.64E-37	1.62E-36	BAX;BCL2;CD34;CDH2;CDKN1A;CREB1;CTNNA1;EGF;FOS;IFNG;IGF1;IL1B;KIT;MAP2K1;NFKB1;PRKCA;PRKCG;PTGS2;PTPRM;TNF;VEGFA
OPIOID RECEPTOR	21	255	9.43E-34	8.74E-33	ABCB1;BAX;BCL2;CCL2;CDKN1A;CREB1;EGF;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;MAP2K1;NFKB1;PIK3CD;PRKCA;PRKCG;PTGS2;TNF;VEGFA
#cluster93	Enrichment Score: 34.45				
HISTONE ACETYLTATION	26	308	3.68E-43	4.01E-42	ABCB1;ATF2;BAX;BCL2;CCL2;CDKN1A;CDKN2A;CREB1;CSF2;E2F1;EP300;FOS;HIF1A;IFNA1;IFNG;IL1B;IL4;NFKB1;PARP1;PSMA8;PTEN;PTGS2;RARB;STAT1;TNF;VEGFA
RETINOID X RECEPTOR	19	214	2.69E-33	2.47E-32	ABCB1;BAX;BCL2;CCL2;CDKN1A;CDKN2A;CSF2;EP300;FOS;IFNA1;IFNG;IGF1;IL1B;IL4;NFKB1;PTGS2;RARB;TNF;VEGFA
DNA METHYLTRANSFERASE	27	354	9.69E-40	9.99E-39	ABCB1;APC;BAX;BCL2;CD34;CD44;CDKN1A;CDKN2A;CDKN2B;CDKN3;CREB1;E2F1;EP300;FOS;IFNA1;IFNB1;IFNG;IL4;KIT;NFKB1;PARP1;PTEN;PTGS2;RARB;STAT1;TNF;VEGFA
HISTONE ACETYLTATION	19	277	1.62E-24	1.27E-23	BAX;BCL2;CDKN1A;CDKN2A;CREB1;E2F1;EP300;FOS;HIF1A;IFNG;IL1B;IL4;NFKB1;PARP1;PTGS2;SMAD2;SMAD4;TNF;VEGFA
#cluster94	Enrichment Score: 33.76				
CHRONIC KIDNEY DISEASE	28	338	1.64E-45	1.90E-44	ABCB1;BAX;BCL2;CCL2;CD34;CDKN1A;DDIT3;EDNRA;EPO;FGFR1;HIF1A;IFNG;IGF1;IL1B;IL4;INSR;KDR;NFKB1;PGF;PTGS2;RAC1;SMAD2;SMAD7;TEK;TFRC;TNF;TNFRSF1B;VEGFA
SYSTOLIC BLOOD PRESSURE	20	285	1.54E-26	1.25E-25	ANG;BAX;BCL2;CCL2;CD34;EDNRA;EPO;FOS;IFNG;IGF1;IL1B;IL4;INSR;KDR;NFKB1;PGF;PTGS2;TNF;TNFRSF1B;VEGFA
GLOMERULAR FILTRATION RATE	21	271	2.10E-31	1.87E-30	ABCB1;ANG;CCL2;CD34;CSF3;EDNRA;EGF;EPO;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;NFKB1;PGF;PRKCB;PTGS2;TNF;TNFRSF1B;VEGFA

Supplementary Table 5a: Continued

#cluster	Enrichment Score:				
#cluster95	32.82				
MOUSE EMBRYONIC STEM	27	332	6.56E-43	7.06E-42	BAX;BCL2;CD34;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;CREB1;DUSP9;EGF;EP300;EPO;FGF5;FOS;HIF1A;IGF1;KDR;KIT;KITLG;LAMC1;MAP2K4;NFKB1;PARP1;SMAD2;TEK;VEGFA
HUMAN EMBRYONIC STEM	21	336	3.51E-24	2.71E-23	ACVR1B;BAX;BCL2;CD34;CD44;CDH2;CDK2;CDKN1A;CDKN2A;EGF;EPO;IFNG;IGF1;KDR;KIT;KITLG;NGFR;PDGFRA;SMAD2;TNF;VEGFA
#cluster96	32.73				
TYPE 2 DIABETIC	24	299	1.73E-37	1.71E-36	AKT2;BAX;BCL2;CCL2;CD34;CDKN1A;CDKN2A;DDIT3;EPO;HIF1A;IFNG;IGF1;IL1B;IL4;INSR;KDR;NFKB1;PARP1;PIK3R1;PRKAA2;PTGS2;TNF;TNFRSF1B;VEGFA
2 DIABETES MELLITUS	24	395	1.10E-26	9.02E-26	BAX;BCL2;CCL2;CD34;CDKN2A;CDKN2B;CREB1;DDIT3;DUSP2;EPO;IFNG;IGF1;IL1B;IL4;INSR;KDR;NFKB1;PIK3R1;PTEN;PTGS2;RPS6KB1;TNF;TNFRSF1B;VEGFA
HIGH FAT DIET	36	659	3.50E-36	3.37E-35	AKT2;APC;BAX;BCL2;CCL2;CD34;CD44;CDKN1A;CDKN2A;CREB1;CSF2;CSF3;DDIT3;EPO;FOS;GSK3B;HIF1A;IFNG;IGF1;IL13;IL1B;IL4;INSR;KDR;NFKB1;PARP1;PIK3R1;PRKAA2;PRKCQ;PTEN;PTGS2;RPS6KB1;TNF;VEGFA;WNT10B
#cluster97	31.10				
NEURAL PROGENITOR CELL	19	156	1.09E-47	1.31E-46	BAX;BCL2;CCL2;CD34;CDH2;CDKN1A;CDKN1B;CDKN2A;CREB1;EGF;EPO;IFNG;IGF1;IL1B;KDR;PTEN;RAC1;TNF;VEGFA
NICOTINAMIDE ADENINE DINUCLEOTIDE SKELETAL MUSCLE CELLS	19	279	2.65E-24	2.05E-23	BAX;BCL2;CCL2;CD34;CDKN1A;CDKN2A;EPO;FOS;HIF1A;IFNG;IGF1;IL1B;NFKB1;PARP1;PTGS2;RAC1;RHOA;TNF;VEGFA
X CHROMOSOME	22	734	1.08E-09	5.07E-09	BAX;BCL2;CCL2;CD34;CDK2;CDKN1A;CDKN2A;FOS;IFNG;IGF1;IL1B;INSR;MAP2K1;NFKB1;PRKAA2;PRKCA;PRKCZ;PTGS2;TNF;VEGFA
#cluster98	31.02				
PLATELET AGGREGATION	24	339	3.09E-32	2.79E-31	ABCB1;CCL2;CD34;CSF2;CSF3;DUSP2;EPO;GAS6;IFNA1;IFNG;IGF1;IL1B;IL4;ITGAV;ITGB3;NFKB1;PGF;PRKCA;PTGS2;RAC1;RHOA;SYK;TNF;VEGFA
PLATELET ACTIVATION	21	272	2.89E-31	2.56E-30	BAX;BCL2;CCL2;CD34;CDC42;CSF3;DUSP2;EPO;IFNG;IGF1;IL1B;ITGAV;ITGB3;NFKB1;PRKCA;PTGS2;RAC1;RHOA;SYK;TNF;VEGFA
#cluster99	30.39				
ACID PHOSPHATASE	28	381	2.00E-39	2.05E-38	BCL2;CCL2;CD34;CD44;CSF1;CSF1R;CSF2;CSF3;EGF;FOS;IFNA1;IFNG;IGF1;IL1B;IL23A;IL4;INSR;ITGAV;ITGB3;KIT;KITLG;NFKB1;PPP3CA;PTGS2;TRFC;TNF;TRAF6;VEGFA

Supplementary Table 5a: Continued

MACROPHAGE DIFFERENTIATION	21	103	8.40E-23	6.26E-22	BCL2;CCL2;CD34;CDKN1A;CSF1;CSF1R;CSF2;CSF3;FOS;IFNA1;IFNG;IL13;IL1B;IL4;KIT;KITLG;NFKB1;PTGS2;TFRC;TNF;VEGFA
#cluster100	Enrichment Score: 30.25				
LONG TERM POTENTIATION	26	263	6.92E-52	8.83E-51	BAX;BCL2;CAMK2G;CAMK4;CDC42;CDH2;CREB1;EGF;ERBB4;FOS;IGF1;IL1B;IL4;ITPR2;NFKB1;NGFR;NTRK3;PPP3CA;PRKCA;PRKCG;PTEN;PTGS2;RAC1;RHOA;TNF;VEGFA
GLUTAMATE RECEPTOR	26	534	1.05E-21	7.67E-21	BAX;BCL2;CAMK2G;CAMK4;CDC42;CDH2;CDKN1A;CDKN2A;CREB1;EGF;FOS;IFNG;IGF1;IL1B;ITPR3;MAP2K1;MAP3K11;NFKB1;NGFR;PARP1;PRKCA;PRKCG;PTGS2;RAC1;TNF;VEGFA
INTERMEDIATE FILAMENT	21	318	6.98E-26	5.62E-25	BAX;BCL2;CD34;CD44;CDC42;CDH2;CDKN1A;CDKN2A;CTNNA1;EGF;FOS;IFNG;IL1B;KIT;MAP3K11;NFKB1;NGFR;RAC1;RHOA;TNF;VEGFA
MAP KINASE KINASE	22	102	2.02E-24	1.58E-23	BCL2;CDC42;CDKN1A;CREB1;CSF2;EGF;FOS;GRB2;IFNG;IGF1;IL1B;MAP2K1;MAP2K4;MAP3K11;MAP3K13;MAP3K3;NFKB1;PTGS2;RAC1;RAF1;TNF;VEGFA
#cluster101	Enrichment Score: 29.42				
CALCIUM CHANNEL	34	568	1.81E-38	1.83E-37	ABCB1;BAX;BCL2;CAMK4;CAV2;CCL2;CDH2;CDKN1A;CDKN2A;CREB1;CSF2;EDNRA;EGF;EPO;FKBP1A;FOS;IFNG;IGF1;IL1B;IL4;INSR;ITPR2;ITPR3;KDR;KIT;MAP2K1;NFKB1;PARP1;PRKCA;PTGS2;RHOA;TFRC;TNF;VEGFA
ION CHANNEL	33	823	7.94E-22	5.81E-21	ABCB1;ABI2;BAX;BCL2;CAMK2G;CAV2;CCL2;CDKN1A;CREB1;EGF;EPO;FKBP1A;FOS;HIF1A;IFNG;IGF1;IL1B;IL4;INSR;ITPR3;KDR;KIT;MAP2K1;NFKB1;NGFR;NTRK3;PARP1;PRKCA;PTEN;PTGS2;RHOA;TNF;VEGFA
#cluster102	Enrichment Score: 28.77				
CELL DIVISION CYCLE	19	133	6.95E-57	9.87E-56	APC;BAX;BCL2;CDC25A;CDC25B;CDC42;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CDKN3;E2F1;IGF1;MCM5;RAC1;RHOA
DNA DAMAGE RESPONSE	26	584	4.11E-20	2.84E-19	APC;BAX;BCL2;CASP2;CDC25A;CDC25B;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN3;E2F1;E2F2;EP300;FOS;HIF1A;IGF1;NFKB1;NRAS;PARP1;PLK4;PTEN;SKP1;VEGFA;VHL
DOUBLE STRAND BREAK	20	540	1.68E-11	8.54E-11	ABCB1;BAX;BCL2;CD34;CDC25A;CDK2;CDKN1A;CDKN2A;CDKN3;E2F1;EP300;FOS;HIF1A;MAP2K1;MET;NFKB1;PARP1;PSMA8;PTEN;VEGFA
#cluster103	Enrichment Score: 26.19				
NON HODGKIN LYMPHOMA	19	163	2.09E-45	2.39E-44	ABCB1;BAX;BCL2;CD34;CD44;CDKN1A;CDKN2A;CSF2;CSF3;EPO;IFNA1;IFNG;IL13;IL4;KDR;NFKB1;TFRC;TNF;VEGFA
RAT BONE MARROW	20	91	1.81E-22	1.33E-21	BAX;BCL2;CCL2;CD34;CD44;CSF1;CSF2;CSF3;EPO;IFNA1;IFNG;IGF1;IL1B;IL4;KDR;KIT;NFKB1;TFRC;TNF;VEGFA

Supplementary Table 5a: Continued

GOLGI APPARATUS	22	608	7.28E-13	3.92E-12	ABCB1;BAX;BCL2;CCL2;CD34;CD44;CDC42;CDKN2A;EGF;IFNA1;IFNG;IGF1;IL1B;INSR;IQGAP1;KIT;MAP2K1;NFKB1;NRAS;RHOA;TRFC;TNF
#single1	Enrichment Score: 23.31				
APOPTOSIS	51	1586	4.86E-24	3.72E-23	AKT2;ARAF;ARHGDI;ATF2;BAX;BCL2;CASP10;CASP2;CCNA1;CCNA2;CCND2;CCNH;CDC25A;CDC25B;CDK2;CDK6;CDKN1A;CDKN1B;CDKN2D;CDKN3;DDIT3;DUSP5;E2F1;E2F2;E2F5;EIF2S1;GAS6;GSK3B;HIF1A;HSP90AB1;ITGB8;LTBR;MAP2K1;MAP2K4;MAP3K11;MAP3K13;MAP3K3;MAX;NFKB1;NGFR;PARP1;PIK3CD;PTEN;PTGS2;RAF1;RARB;RPS6KB1;STAT1;TNFRSF1B;TRADD;TRAF6
#cluster104	Enrichment Score: 22.52				
RNA BINDING	41	1085	9.56E-25	7.54E-24	ABCB1;BAX;BCL2;CCL2;CCNH;CD34;CD44;CDK2;CDKN1A;CDKN2A;CDKN3;CREB1;CSF2;DDIT3;E2F1;EGF;EIF2S1;EP300;FOS;GRB2;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;IL4;INSR;KIT;NFKB1;NRAS;PARP1;PIK3R1;PTGS2;RAC1;RAF1;RRAS;TRFC;TNF;VEGFA;VHL
RNA BINDING PROTEIN	30	703	9.60E-22	7.01E-21	BAX;BCL2;CCL2;CCNH;CD44;CDKN1A;CDKN2A;CDKN3;CSF2;DDIT3;EGF;EIF2S1;FOS;HIF1A;IFNA1;IFNB1;IFNG;IGF1;IL1B;INSR;KIT;NFKB1;PARP1;PTGS2;RAC1;RRAS;TRFC;TNF;VEGFA;VHL
#single2	Enrichment Score: 19.01				
COMPARATIVE GENOMIC HYBRIDIZATION	27	631	9.71E-20	6.66E-19	ABCB1;AKT2;APC;BCL2;CCND2;CD34;CDK6;CDKN1A;CDKN1B;CDKN2A;CDKN2B;E2F1;FGFR1;GNA11;KIT;MET;NRAS;PARP1;PDGFRA;PTEN;RAF1;RPS6KB1;SKIL;SMAD4;VEGFA;VHL;YES1
#cluster105	Enrichment Score: 12.23				
HISTONE MODIFICATION	21	433	1.78E-17	1.14E-16	BAX;BCL2;CCL2;CD34;CDKN1A;CDKN2A;CREB1;E2F1;EP300;FOS;IFNA1;IFNG;IL13;IL4;NFKB1;PARP1;PTEN;SMAD4;STAT1;TNF;VEGFA
CHROMATIN REMODELING	22	558	1.54E-14	8.98E-14	BCL2;CDK2;CDKN1A;CDKN2A;CREB1;E2F1;EP300;FOS;HIF1A;IFNA1;IFNG;IL13;IL1B;IL4;NFKB1;PARP1;PSMA8;PTEN;STAT1;TNF;VEGFA;VHL
ZINC FINGER PROTEIN	19	727	7.25E-07	3.25E-06	BAX;BCL2;CCL2;CD34;CDKN1A;CDKN2A;CSF2;EGF;EP300;FOS;IFNG;IL1B;IL4;NFKB1;PARP1;SMAD4;TNF;TRAF6;VEGFA

Supplementary Table 5b: GeneChIP 2.0 results for Down-Regulated miRNAs

Keyword #cluster1	Hit Enrichment Score: 173.59	Total	P-Value	Q-Value	Gene List
KINASE INHIBITOR	137	1587	9.95E-212	1.69E-208	ABCC1;ABI2;ACVR1B;AGTR1;AKT1;AKT2;ANGPT2;APC;ARAF;ATF2;BAX;BCL2;BLK;CAV2;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CREB1;CRK;CRKL;CRP;CSF1R;CSNK2A1;CTNNA1;CYP1B1;DHFR;E2F1;EDNRB;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF7;FGF9;FGFR1;FLT3LG;FLT4;FOS;GJA1;GNA12;GSK3A;GTF2H4;IL1A;IL2RA;IL7;INSR;IRS1;ITGA4;ITK;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K13;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAP2;MAPKAP3;MDM4;MEN1;MERTK;NCAM1;NCK1;NF1;NF2;NKX3-1;NME1;NRAS;PAK2;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PIK3R1;PIK3R3;PKN2;PLD1;PLK3;PML;PRKAA2;PRKACA;PRKCA;PRKCG;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RHOA;RHOB;RIPK1;RPS6KB1;SMAD2;SMAD4;SP1;STAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TNK2;VAV2;WEE1;XIAP
KINASE ACTIVITY	133	1693	2.59E-183	2.19E-180	ABI2;ACVR1B;AGTR1;AK2;AKT1;AKT2;APC;ARAF;ATF2;BAX;BCL2;BLK;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRK;CRKL;CRP;CSF1R;CSF3R;CSNK2A1;DHFR;E2F1;E2F2;EGFR;EIF2S1;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FES;FGF1;FGF2;FGF7;FGFR1;FLT3LG;FLT4;FOS;GJA1;GSK3A;GTF2H4;IL1A;IL2RA;IL7;INSR;IRS1;ITK;ITPR1;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K13;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;MAPKAP1;MAPKAP2;MAPKAP3;MERTK;NCAM1;NCK1;NF2;NME1;NRAS;PAK2;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PIK3R1;PIK3R3;PKN2;PLD1;PLK3;PLK4;PML;PPP2CA;PRKAA2;PRKACA;PRKCA;PRKCG;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RHOA;RHOB;RIPK1;RPS6KB1;RRAS2;SMAD2;SMAD4;SMAD6;SOS2;SP1;STAT1;TNFRSF1A;TNFRSF1B;TNK2;TRAF1;TXK;VAV2;WASL;WEE1;XIAP
MITOGEN ACTIVATED PROTEIN	145	2079	2.96E-174	1.67E-171	ABCC1;ABI2;ACVR1B;AGTR1;AKT1;AKT2;ANGPT2;APC;ARAF;ATF2;BAX;BCL2;CALR;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH11;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;COL2A1;CREB1;CRK;CRKL;CRP;CSF1R;CSF3R;CSNK2A1;CYP1B1;DUSP9;E2F1;EDNRB;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF5;FGF7;FGF9;FGFR1;FLT4;FOS;GJA1;GNA12;GSK3A;IL12B;IL15RA;IL1A;IL2RA;IL6R;IL7;INSR;IQGAP1;IRS1;ITK;ITPR1;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K13;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;MAPKAP1;MAPKAP2;MAPKAP3;MAX;MERTK;NCAM1;NCK1;NF1;NF2;NME1;NRAS;PAK2;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PIK3R1;PKN2;PLD1;PML;PPP2CA;PPP5C;PRKAA2;PRKACA;PRKCA;PROCR;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;RHOB;RIPK1;RPS6KB1;RRAS2;RXRA;SMAD2;SMAD4;SMAD6;SOS2;SP1;STAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TRAF1;TXK;VAV2;WEE1;XIAP;YWHAE

Supplementary Table 5b: Continued

SIGNAL TRANSDUCTION	180	3988	5.65E-128	7.66E-126	ABCC1;ABI2;ACVR1B;ADRA2A;AGTR1;AKT1;AKT2;ANGPT2;APC;ARAF;ATF2;BAX;BCL2;BLK;CALR;CAV2;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRK;CRKL;CRP;CSF1R;CSF2RB;CSF3R;CSNK2A1;CTNNA1;CYP1B1;DGG;DHFR;DUSP9;E2F1;EDNRB;EGFR;EIF2S1;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FES;FGF1;FGF2;FGF4;FGF5;FGF7;FGF9;FGFR1;FLT3LG;FLT4;FN1;FOS;GHI1;GJA1;GNA12;GNB3;GSK3A;IFNA2;IFNAR1;IL10RA;IL12B;IL15RA;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IQGAP1;IRS1;ITGA4;ITGB8;ITK;ITPR1;ITPR2;JUN;KDR;KITLG;KRAS;LAMC1;LIF;MAP3K11;MAP3K13;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;MAPKAP1;MAPKAP2;MAPKAP3;MAX;MEN1;MERTK;NCAM1;NCK1;NF1;NF2;NME1;NRAS;PAK2;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PIK3R1;PIK3R3;PKN2;PLD1;PLK3;PML;PPP2CA;PPP2R3A;PPP5C;PRKAA2;PRKACA;PRKCA;PRKCG;PSMB4;PSMB7;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAG1;RAP1A;RAP1B;RB1;RBBP4;RHOA;RHOB;RIPK1;RPS6KB1;RRAS2;RXRA;SMAD2;SMAD4;SMAD6;SOS2;SP1;STAT1;TGFB2;TGFB3;TGFB3;TGFBR3;TIMP3;TNFRSF1A;TNFRSF1B;TNK2;TRAF1;TUBB;TUBB4A;TXK;VAV2;WASL;WEE1;WNT2;XIAP;YWHAE;YWHAZ
#cluster2	Enrichment Score: 162.40				
GROWTH FACTOR RECEPTOR	129	1700	4.08E-170	1.73E-167	ABCC1;AGTR1;AKT1;AKT2;ANGPT2;APC;ARAF;BAX;BCL2;CCND1;CCND2;CCND3;CD34;CDC42;CDH11;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRK;CRKL;CRP;CSF1R;CSF2RB;CSF3R;CSNK2A1;CTNNA1;CYP1B1;DHFR;E2F1;E2F2;EDNRB;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FES;FGF1;FGF2;FGF4;FGF5;FGF7;FGF9;FGFR1;FLT3LG;FLT4;FN1;FOS;GJA1;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IQGAP1;IRS1;ITGA3;ITGA6;ITK;JUN;KDR;KITLG;KRAS;LIF;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;MAPKAP2;MERTK;NCAM1;NCK1;NF1;NF2;NKX3-1;NME1;NRAS;PAK2;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PIK3R1;PIK3R3;PLD1;PML;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RHOA;RHOB;RPS6KB1;RRAS2;SERPINB5;SMAD2;SMAD4;SOS2;SP1;STAT1;TGFB2;TGFB3;TGFB3;TGFBR3;TIMP3;TNFRSF1A;TNFRSF1B;TNK2;UBE2D2;VAV2;WASL;XIAP

Supplementary Table 5b: Continued

EPIDERMAL GROWTH FACTOR	128	1797	3.86E-156	1.09E-153	ABCC1;ACVR1B;AGTR1;AKT1;AKT2;ANGPT2;APC;ARAF;ATF2;BAX;BCL2;CAV2;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CR EB1;CRK;CRKL;CRP;CSF1R;CSNK2A1;CTNNA1;CYP1B1;DGKG;DHFR;E2F1;EDNRB;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF5;FGF7;FGFR1;FLT4;FOS;GJA1;IFNA2;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IQGAP1;IRS1;ITGA3;ITGA6;JUN;KDR;KITLG;KRAS;LAMC1;LIF;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAPK2;MERTK;NCAM1;NCK1;NF1;NF2;NME1;NRAS;PAK2;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PIK3R1;PIK3R3;PLD1;PML;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RHOA;RHOB;RPS6KB1;RRAS2;SERPINB5;SMAD2;SMAD4;SOS2;SP1;STAT1;TGFB2;TGF B3;TIMP3;TNFRSF1A;TNFRSF1B;TNK2;UBE2D2;VAV2;WASL;WNT2;XIAP
#cluster3	Enrichment Score: 155.28				
ANCHORAGE INDEPENDENT GROWTH	52	305	1.22E-166	4.60E-164	AKT1;AKT2;APC;BAX;BCL2;CCNA1;CCND1;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRKL;CSF1R;E2F1;EGFR;ERBB3;ERBB4;ESR1;FGF2;FGFR1;FOS;GJA1;INSR;IRS1;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NF2;NKX3-1;NRAS;PCNA;PRKCA;PTEN;PTGS2;PTK2;PTPN11;RB1;RHOA;SMAD2;SMAD4;STAT1;TGFB2;WNT7A
MAMMARY EPITHELIAL CELL	55	384	2.21E-145	4.40E-143	AKT1;APC;BAX;BCL2;CCND1;CCNE1;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CSF1R;CYP1B1;E2F1;EGFR;EP300;ERBB3;ERBB4;ESR1;FGF1;FGF2;FGF7;FGFR1;FOS;GH1;GJA1;IL1A;INSR;IRS1;ITGA6;JUN;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PRKCA;PTEN;PTGS2;PTK2;PTPN11;RB1;RHOA;SERPINB5;SMAD2;SMAD4;SP1;STAT1;TGFB2;VAV2;WNT2
#cluster4	Enrichment Score: 149.99				
TYROSINE KINASE INHIBITOR	78	496	4.19E-234	1.42E-230	ABCC1;AGTR1;AKT1;ANGPT2;BAX;BCL2;BLK;CCND1;CCND2;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRKL;CRP;CSF1R;E2F1;EGFR;ELK1;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FLT3LG;FLT4;FOS;GJA1;IL1A;IL2RA;IL7;INSR;IRS1;ITGA4;ITK;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;MERTK;NCAM1;NF1;NRAS;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PIK3R1;PML;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RB1;RHOA;RPS6KB1;SMAD2;STAT1;XIAP
RECEPTOR TYROSINE KINASE	89	809	6.39E-179	4.33E-176	AGTR1;AKT1;AKT2;ANGPT2;APC;ARAF;BAX;BCL2;CCND1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRKL;CSF1R;E2F1;EDNRB;EFNA3;EGFR;ELK1;ERBB3;ERBB4;ESR1;FES;FGF1;FGF2;FGF4;FGF7;FGFR1;FLT3LG;FLT4;FOS;GJA1;GSK3A;IL7;INSR;IRS1;ITK;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;NCK1;NF1;NF2;NRAS;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PIK3R1;PIK3R3;PML;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RHOA;RPS6KB1;SMAD2;SOS2;SP1;STAT1;TNFRSF1B;TNK2;TXK;VAV2;WASL;XIAP

Supplementary Table 5b: Continued

MAP KINASE	91	877	4.66E-171	2.25E-168	AGTR1;AKT1;ARAF;ATF2;BAX;BCL2;CCND1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRKL;CRP;CSF1R;CSF3R;CSNK2A1;DUSP9;EDNRB;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FOS;GJA1;GSK3A;IL1A;INSR;IQGAP1;IRS1;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K13;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;MAPKAP1;MAPKAPK2;MAPKAPK3;NCK1;NF1;NRAS;PCNA;PDGFRA;PDGFRB;PIK3R1;PML;PRKCA;PROCR;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;RPS6KB1;RRAS2;SMAD2;SMAD4;SP1;STAT1;TNFRSF1A;TNFRSF1B;TNK2;VAV2;XIAP
PROTEIN KINASE C	116	1749	1.71E-128	2.42E-126	ABCC1;ADRA2A;AGTR1;AKT1;AKT2;ANGPT2;APC;ARAF;ATF2;BAX;BCL2;BLK;CALR;CCND1;CCND2;CCND3;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRP;CSF1R;CSNK2A1;CTNNA1;DGKG;E2F1;EDNRB;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FOS;GH1;GJA1;GNA12;GSK3A;IL1A;IL2RA;IL6R;IL7;INSR;IRS1;ITGA4;ITK;ITPR1;ITPR2;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K13;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAPK2;MERTK;NCAM1;NF1;NRAS;PAK2;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PIK3R1;PKN2;PLD1;PML;PPP2CA;PPP2R3A;PRKACA;PRKCA;PRKCG;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;RHOB;RPS6KB1;SMAD2;SMAD4;SP1;STAT1;TGFB2;TIMP3;TNFRSF1A;TNFRSF1B;XIAP;YWHAZ
PLASMA MEMBRANE	118	3954	5.47E-41	6.81E-40	ABCC1;ABI2;ADRA2A;AGTR1;AK2;AKT1;AKT2;APC;ARAF;BAX;BCL2;CALR;CAV2;CCND1;CD34;CDC42;CDH11;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRK;CRP;CSF1R;CSNK2A1;CTNNA1;DGKG;DHFR;DUSP9;EDNRB;EGFR;ELK1;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FOS;GH1;GJA1;GNA12;HYAL1;IL1A;IL2RA;IL6R;INSR;IQGAP1;IRS1;ITGA3;ITGA6;ITK;ITPR1;ITPR2;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MERTK;NCAM1;NCK1;NF1;NF2;NME1;NRAS;PAK2;PCNA;PDGFRB;PF4;PIK3R1;PKN2;PLD1;PML;PRKAA2;PRKCA;PRKCG;PROCR;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RHOA;RHOB;RIPK1;RPS6KB1;RRAS2;SMAD2;SMAD4;SOS2;SP1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B;TNK2;TRAF1;TXK;UBE2B;UBE2D2;VAV2;WASL;XIAP
#cluster5	Enrichment Score: 126.83				
FOCAL ADHESION KINASE	51	334	1.45E-144	2.74E-142	AKT1;BAX;BCL2;CCND1;CD34;CDC42;CDH2;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRK;CRKL;EGFR;ERBB3;FGF2;FLT4;FOS;GJA1;INSR;IRS1;ITGA3;JUN;KDR;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;NCK1;NF2;PCNA;PDGFRB;PIK3R1;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAP1B;RHOA;SMAD2;STAT1;TNK2;VAV2;WASL;XIAP

Supplementary Table 5b: Continued

FOCAL ADHESION	71	744	3.43E-120	3.52E-118	AGTR1;AKT1;BAX;BCL2;CALR;CAV2;CCND1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRKL;CTNNA1;EGFR;ERBB3;ESR1;FASLG;FES;FGF2;FLT4;FN1;FOS;GJA1;GNA12;INSR;IQGAP1;IRS1;ITGA3;ITGA6;JUN;KDR;KITLG;LAMC1;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;NCK1;NF2;NME1;PAK2;PCNA;PDGFRB;PIK3R1;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;RHOB;SMAD2;SMAD4;STAT1;TNK2;VAV2;WASL;XIAP
CELL MOTILITY	71	756	6.32E-118	6.11E-116	AKT1;AKT2;APC;BAX;BCL2;CALR;CCND1;CD34;CDC42;CDH11;CDH13;CDH2;CDK1;CDK4;CDKN1A;CDKN1B;CDKN2A;CRK;CRKL;CTNNA1;EGFR;EP300;ERBB3;ERBB4;ESR1;FGF1;FGF2;FGF7;FGFR1;FN1;FOS;GJA1;IL1A;INSR;IQGAP1;IRS1;ITGA3;ITGB8;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NCK1;NF2;NME1;NRAS;PAK2;PCNA;PDGFRB;PRKCA;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RHOB;SERPINB5;SMAD2;SMAD4;SP1;STAT1;VAV2;WASL;WASL;XIAP
#cluster6	Enrichment Score: 122.44				
TYROSINE KINASE RECEPTOR	49	245	9.49E-187	1.07E-183	AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;CREB1;CSF1R;EGFR;ERBB3;ERBB4;FGF1;FGF2;FGF4;FGF5;FGF7;FGFR1;FLT3LG;FLT4;FOS;INSR;IRS1;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCK1;PCNA;PDGFRA;PDGFRB;PIK3R1;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RHOA
PROTEIN TYROSINE PHOSPHATASE	51	481	2.49E-95	1.30E-93	AGTR1;AKT1;BAX;BCL2;BLK;CCND1;CD34;CDC42;CDH2;CDK1;CDK2;CDKN1A;CDKN2A;CREB1;CRK;CRKL;CSF1R;DUSP9;EGFR;ERBB3;FASLG;FGF2;FOS;GSK3A;IL2RA;INSR;IRS1;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCK1;PCNA;PDGFRB;PIK3R1;PRKAA2;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RHOA;SOS2;STAT1;VAV2
PROTEIN TYROSINE KINASE	62	466	2.93E-151	7.62E-149	AKT1;BAX;BCL2;BLK;CCND1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CREB1;CRK;CRKL;CSF1R;CSF3R;CSNK2A1;DUSP9;EFNA3;EGFR;ERBB3;ERBB4;ESR1;FASLG;FES;FGF2;FGFR1;FLT4;FOS;IL1A;IL2RA;IL7;INSR;IRS1;ITK;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCK1;PCNA;PDGFRB;PDGFRB;PIK3R1;PKN2;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RHOA;STAT1;TNK2;TXK;VAV2
TYROSINE KINASE DOMAIN	24	112	7.26E-97	3.91E-95	AKT1;CD34;CSF1R;EGFR;ERBB3;ERBB4;FGF2;FGFR1;FLT3LG;FLT4;FOS;INSR;IRS1;ITK;KDR;KITLG;KRAS;MAPK1;MAPK3;NRAS;PDGFRA;PDGFRB;PML;PTCH1
PHOSPHOLIPASE C	66	860	1.21E-85	4.81E-84	AGTR1;AKT1;BAX;BCL2;BLK;CALR;CCND1;CCND3;CD34;CDC42;CDH13;CDH2;CDK2;CDK4;CDKN1A;CREB1;CRK;CRP;CSF1R;EDNRB;EGFR;ESR1;FASLG;FGF1;FGF2;FGFR1;FOS;GJA1;GNA12;IL1A;IL2RA;INSR;IRS1;ITK;ITPR1;ITPR2;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NCK1;PDGFRA;PDGFRB;PF4;PIK3R1;PLD1;PRKCA;PRKCG;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RHOA;SOS2;STAT1;TXK;VAV2

Supplementary Table 5b: Continued

#cluster7	Enrichment Score: 113.63				
HUMAN UMBILICAL VEIN	68	639	9.21E-131	1.42E-128	AGTR1;AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDC42;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRP;E2F1;EDNRB;EGFR;EP300;ESR1;FASLG;FGF1;FGF2;FGFR1;FLT4;FOS;GJA1;GNA12;IL1A;INSR;IRS1;ITGA4;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;NCAM1;PCNA;PDGFA;PDGFB;PDGFRB;PF4;PML;PRKCA;PROCR;PSMA2;PSMC6;PTEN;PTGS2;PTK2;RAP1A;RHOA;SMAD2;SP1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B;XIAP
VASCULAR ENDOTHELIAL CELL	61	562	7.26E-120	7.23E-118	AGTR1;AKT1;ANGPT2;BAX;BCL2;CAV2;CCND1;CD34;CDC42;CDH13;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRP;EDNRB;EGFR;ESR1;FASLG;FGF1;FGF2;FGFR1;FLT4;FOS;GJA1;IL1A;IL2RA;INSR;ITGB8;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PCNA;PDGFA;PDGFB;PDGFRB;PF4;PF4V1;PRKCA;PROCR;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RHOA;SMAD2;SMAD4;SP1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B
WOUND HEALING	76	877	8.33E-115	7.43E-113	AGTR1;AKT1;ANGPT2;APC;BAX;BCL2;CALR;CCND1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRKL;CRP;CSF1R;EGFR;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FLT4;FN1;FOS;GJA1;HYAL1;IL1A;IL7;INSR;IQGAP1;IRS1;ITGA3;ITGA6;ITGA9;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NF1;PAK2;PCNA;PDGFA;PDGFB;PDGFRB;PF4;PF4V1;PLK3;PRKCA;PROCR;PTEN;PTGS2;PTK2;RB1;RHOA;SMAD2;SMAD4;SP1;STAT1;TGFB2;TGFB3;TGFB3;TIMP3;WASL;WNT2
CELL ADHESION MOLECULE	75	1025	5.45E-92	2.60E-90	AGTR1;AKT1;ANGPT2;APC;BAX;BCL2;CCND1;CD34;CDC42;CDH11;CDH13;CDH2;CDH6;CDKN1A;CDKN2A;CREB1;CRP;CTNNA1;EGFR;EP300;ERBB4;ESR1;FASLG;FGF1;FGF2;FGFR1;FLT4;FN1;FOS;GJA1;IL1A;IL2RA;IL6R;IL7;IQGAP1;ITGA3;ITGA4;ITGA6;ITGA9;ITGB8;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;NME1;PCNA;PDGFRB;PF4;PRKCA;PROCR;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;SMAD2;SMAD4;SP1;STAT1;TGFB2;TIMP3;TNFRSF1A;TNFRSF1B;VAV2
#cluster8	Enrichment Score: 110.94				
HUMAN BREAST CANCER	83	971	1.24E-123	1.50E-121	ABCC1;AKT1;AKT2;ANGPT2;APC;BAX;BCL2;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH11;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CSF1R;CSNK2A1;CTNNA1;CYP1B1;DHFR;E2F1;E2F2;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF7;FGFR1;FLT4;FOS;IL1A;INSR;IRS1;ITGA6;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NME1;NRAS;PCNA;PDGFRB;PIK3R1;PLK4;PML;PRKCA;PSMC6;PTEN;PTGS2;PTK2;RB1;RHOA;RPS6KB1;SERPINB5;SMAD2;SMAD4;SP1;STAT1;TGFB2;TGFB3;TIMP3;WASF3;WNT2;XIAP

Supplementary Table 5b: Continued

S PHASE	88	1239	1.41E-104	9.71E-103	ABCC1;AKT1;AKT2;APC;ARAF;BAX;BCL2;CCNA1;CNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CREB1;CSF1R;CSNK2A1;CYP1B1;DHFR;E2F1;E2F2;E2F5;EGFR;EP300;ERBB3;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FOS;GJA1;IL1A;IL2RA;INSR;IRS1;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MAX;NAP1L1;NCAM1;NME1;NRAS;PCNA;PDGFB;PDGFRB;PIK3R1;PLK3;PLK4;PML;PPP2CA;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RBBP4;RHOA;RPS6KB1;SMAD2;SMAD4;SP1;STAT1;TGFB2;UBE2B;WEE1;XIAP
BREAST CANCER CELL	120	2096	2.30E-110	1.90E-108	ABCC1;AGTR1;AKT1;AKT2;ANGPT2;APC;ATF2;BAX;BCL2;CALR;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH11;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRK;CRKL;CSF1R;CSNK2A1;CTNNA1;CYP1B1;CYP24A1;DHFR;E2F1;E2F2;E2F5;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF7;FGFR1;FLT4;FOS;GJA1;HYAL1;IL1A;INSR;IQGAP1;IRS1;ITGA3;ITGA6;ITGA9;ITGB8;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MDM4;MMP16;NCAM1;NME1;NRAS;PAK2;PCNA;PDGFRB;PIK3R1;PIK3R3;PLD1;PLK4;PML;PPP2CA;PRKCA;PSMB6;PSMB7;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RBBP4;RHOA;RHOB;RPS6KB1;RXR2;RXRA;SERPINB5;SMAD2;SMAD4;SP1;STAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;TRAF1;VAV2;WASF3;WASL;WEE1;XIAP;YWHAZ
ESTROGEN RECEPTOR	89	1232	4.31E-108	3.32E-106	ABCC1;AGTR1;AKT1;AKT2;APC;ARAF;BAX;BCL2;CAV2;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRP;CYP1B1;CYP24A1;DHFR;E2F1;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FOS;GJA1;IL1A;INSR;IRS1;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MEN1;NCAM1;NME1;PAX8;PCNA;PDGFRB;PIK3R1;PML;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;RB1;RBBP4;RHOA;RPS6KB1;RXRA;SERPINB5;SMAD2;SMAD4;SP1;SRD5A2;STAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;WNT7A;XIAP;YWHAZ
#cluster9	Enrichment Score: 108.18				
ENDOTHELIAL GROWTH FACTOR	108	1246	2.45E-165	8.29E-163	ABCC1;AGTR1;AKT1;ANGPT2;APC;BAX;BCL2;CALR;CAV2;CCNA1;CCND1;CD34;CDC42;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRP;CSF1R;CSF2RB;E2F1;EDNRB;EFNA3;EGFR;EP300;ERBB3;ERBB4;ESR1;FASLG;FES;FGF1;FGF2;FGF4;FGF5;FGF7;FGF9;FGFR1;FLT3LG;FLT4;FOS;GJA1;IFNA2;IL1A;IL2RA;IL6R;IL7;INSR;IQGAP1;IRS1;ITGA9;ITGB8;JUN;KDR;KITLG;KRAS;LIF;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MMP16;NCAM1;NCK1;NF1;NF2;NME1;NRAS;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PIK3R1;PML;PRKCA;PROCR;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RHOA;RPS6KB1;SERPINB5;SMAD2;SMAD4;SP1;STAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TRAF1;VAV2;WNT2;XIAP

Supplementary Table 5b: Continued

EXTRACELLULAR MATRIX	119	2260	7.11E-98	4.02E-96	AGTR1;AKT1;AKT2;ANGPT2;APC;ATF2;BAX;BCL2;CALR;CCNA2;CCND1;CD34;CDC42;CDH11;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;COL2A1;COL4A6;CREB1;CRK;CRKL;CRP;CSF1R;CTNNA1;CYP1B1;E2F1;EDNRB;EFNA3;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF5;FGF7;FGF9;FGFR1;FLT4;FN1;FOS;GJA1;HYAL1;IL1A;IL2RA;IL6R;IL7;INSR;IRS1;ITGA3;ITGA4;ITGA6;ITGA9;ITGB8;JUN;KDR;KITLG;KRAS;LAMC1;LIF;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MMP16;NCAM1;NCK1;NF1;NF2;NME1;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PML;PRKCA;PROCR;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RHOA;RHOB;SERPINB5;SMAD2;SMAD4;SMAD6;SP1;STAT1;TGFB2;TGFB3;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;VAV2;WASL;WNT2;WNT7A;XIAP;YWHAZ
TRANSFORMING GROWTH FACTOR	121	1855	1.12E-131	1.81E-129	ACVR1B;AGTR1;AKT1;AKT2;ANGPT2;APC;ATF2;BAX;BCL2;CALR;CCNA2;CCND1;CCND2;CCND3;CD34;CDC42;CDH11;CDH2;CDH6;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;COL2A1;CREB1;CRK;CRP;CSF1R;CYP1B1;E2F1;E2F2;E2F5;EDNRB;EGFR;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF5;FGF7;FGF9;FGFR1;FLT3LG;FLT4;FN1;FOS;GJA1;HYAL1;IFNA2;IL10RA;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;ITGA3;ITGA6;ITGB8;JUN;KDR;KITLG;KRAS;LAMC1;LIF;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP2;MEN1;MMP16;NCAM1;NKX3-1;NME1;NRAS;PAK2;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PIK3R1;PML;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAG1;RB1;RHOA;RHOB;RIPK1;RPS6KB1;RXRA;SMAD2;SMAD4;SMAD6;SP1;STAT1;TGFB2;TGFB3;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;WNT2;XIAP
SMOOTH MUSCLE CELL	103	1612	6.29E-108	4.73E-106	AGTR1;AKT1;AKT2;ANGPT2;ATF2;BAX;BCL2;CALR;CAV2;CCND1;CCND2;CD34;CDC42;CDH11;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;COL4A6;CREB1;CRP;CSF1R;CYP1B1;E2F1;EDNRB;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF5;FGF7;FGF9;FGFR1;FLT4;FOS;GJA1;HYAL1;IL1A;IL2RA;INSR;IQGAP1;IRS1;ITPR1;ITPR2;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAP2;MMP16;NCAM1;NF1;NKX3-1;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PIK3R1;PLD1;PRKCA;PROCR;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;RHOB;RPS6KB1;SMAD2;SMAD4;SMAD6;SP1;STAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;VAV2;WNT2;XIAP

Supplementary Table 5b: Continued

CELL DIFFERENTIATION	127	2592	2.09E-95	1.11E-93	ABCC1;ACVR1B;AGTR1;AK2;AKT1;AKT2;ANGPT2; APC;BAX;BCL2;BLK;CALR;CCNA1;CCND1;CCND2;CND3;CD34;CDC42;CDH11;CDH2;CDK1;CDK2; CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN 2D;COL2A1;CREB1;CRK;CRP;CSF1R;CSF3R;CTNNA 1;CYP1B1;CYP24A1;DHFR;E2F1;E2F2;E2F5;EGFR;E LK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2; FGF4;FGF5;FGF7;FGF9;FGFR1;FLT3LG;FLT4;FN1;FO S;GJA1;GSK3A;IL1A;IL2RA;IL6R;IL7;INSR;IRS1;ITG A3;ITGA4;ITGA6;ITK;JUN;KDR;KITLG;KRAS;LIF;M APK1;MAPK14;MAPK3;MAPK8;MAX;MEN1;NCAM1; NCK1;NF1;NF2;NKX3-1;NME1;NRAS;PAX8;PCNA;PD GFA;PDGFRA;PDGFRB;PF4;PIK3R1;PML;PRKCA;PR KCG;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAG 1;RAP1A;RB1;RHOA;RHOB;RPS6KB1;RXRA;SMAD2; SMAD4;SMAD6;SP1;STAT1;TGFB2;TGFB3;TGFB3;T NFRSF1A;TNFRSF1B;TXK;WNT2;WNT7A;XIAP; YWHAZ
CENTRAL NERVOUS SYSTEM	110	2928	3.22E-55	5.56E-54	ABCC1;ADRA2A;AGTR1;AKT1;APC;BAX;BCL2;CAL R;CAV2;CCND1;CD34;CDC42;CDH11;CDH2;CDH6;C DK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDK N2B;CREB1;CRP;CSF1R;CSF3R;DGKG;DHFR;E2F1;E DNRB;EGFR;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF 1;FGF2;FGF4;FGF5;FGF9;FGFR1;FOS;GH1;GJA1;IFN A2;IFNAR1;IL12B;IL1A;IL2RA;IL6R;IL7;INSR;IRS1;I TGA4;ITGB8;ITPR1;ITPR2;JUN;KDR;KITLG;KRAS;LI F;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MDM 4;MERTK;NCAM1;NF1;NF2;NRAS;PAX8;PCNA;PDGF A;PDGFB;PDGFRA;PDGFRB;PIK3R3;PML;PRKCA;PR KCG;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAG 1;RAP1A;RB1;RHOA;RPS6KB1;SMAD2;SMAD4;SP1;S TAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;T UBB;TUBB4A;WNT7A;XIAP;YWHAE;YWHAZ
#cluster10	Enrichment Score: 105.57				
ENDOTHELIAL CELL PROLIFERATION	31	141	1.61E-129	2.37E-127	AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDK2; CDK4;CDKN1A;CDKN1B;EGFR;FGF1;FGF2;FGFR1;F LT4;FOS;IL1A;JUN;KDR;MAPK1;MAPK14;MAPK3;M APK8;PCNA;PDGFRB;PF4;PF4V1;PRKCA;PTGS2;PTK 2;SMAD2
MICROVASCULAR ENDOTHELIAL CELL	39	327	4.45E-83	1.57E-81	ABCC1;AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CD C42;CDH2;CDKN1A;CREB1;EDNRB;EGFR;FASLG;FG F1;FGF2;FGFR1;FLT4;FOS;GJA1;IL1A;JUN;KDR;KITL G;MAPK1;MAPK14;MAPK3;MAPK8;PDGFB;PF4;PF4 V1;PRKCA;PSMC6;PTGS2;PTK2;RHOA;SMAD2;STAT 1;TNFRSF1A
#cluster11	Enrichment Score: 105.30				
DOMINANT NEGATIVE MUTANT	62	450	2.37E-157	7.29E-155	ABI2;AKT1;ARAF;ATF2;BAX;BCL2;CCND1;CDC42;C DH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A; CREB1;CRK;CRKL;CSNK2A1;E2F1;EGFR;ELK1;EP30 0;FASLG;FGF2;FGFR1;FOS;INSR;IRS1;JUN;KDR;KRA S;LIF;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;M APK8;PCNA;PDGFRB;PIK3R1;PKN2;PML;PRKAA2;P RKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB 1;RHOA;RIPK1;RPS6KB1;SMAD2;SMAD4;SP1;STAT1; TNFRSF1A;WASL

Supplementary Table 5b: Continued

MOUSE EMBRYONIC FIBROBLAST	50	436	2.38E-102	1.46E-100	AKT1;BAX;BCL2;CALR;CCND1;CD34;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;E2F1;E2F2;EGFR;EIF2S1;EP300;FASLG;FGF2;FGF4;FOS;INSR;IRS1;JUN;KITLG;LIF;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MDM4;PCNA;PDGFRB;PML;PTEN;PTGS2;PTK2;PTPN11;RB1;RHOA;RIPK1;RPS6KB1;SMAD2;SMAD4;STAT1;TNFRSF1A;XIAP
PROGRAMMED CELL DEATH	49	582	4.74E-71	1.22E-69	AKT1;BAX;BCL2;CALR;CCND1;CD34;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRP;E2F1;EGFR;EP300;FASLG;FGF2;FOS;IL1A;IL2RA;IL7;JUN;KITLG;KRAS;LIF;MAP3K13;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAX;NCAM1;PCNA;PML;PTEN;PTGS2;PTK2;PTPN11;RB1;RIPK1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B;XIAP
PROTEIN KINASE A	69	870	2.43E-93	1.18E-91	AGTR1;AKT1;ATF2;BAX;BCL2;CCND1;CCND2;CCND3;CD34;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CSNK2A1;EGFR;ELK1;EP300;ERBB3;ESR1;FASLG;FGF2;FOS;GJA1;IL1A;INSR;IRS1;ITPR1;ITPR2;JUN;KDR;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAP2;MEN1;NCAM1;NF1;NF2;PCNA;PIK3R1;PML;PPP2R3A;PRKAA2;PRKACA;PRKCA;PRKCG;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;RPS6KB1;SMAD4;SP1;STAT1;TNFRSF1A
#cluster12	Enrichment Score: 104.40				
GLYCOGEN SYNTHASE KINASE	55	407	3.73E-136	6.65E-134	AKT1;AKT2;APC;BAX;BCL2;CCND1;CCND2;CCND3;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CTNNA1;E2F1;EGFR;ESR1;FASLG;FGF2;FOS;GJA1;GSK3A;INSR;IRS1;JUN;KDR;KITLG;LIF;MAP3K11;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PIK3R1;PPP2CA;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RB1;RPS6KB1;SMAD2;SMAD4;STAT1;WNT2;XIAP
GENE SILENCING	50	742	6.95E-55	1.20E-53	ABCC1;AKT1;AKT2;APC;BAX;BCL2;CCND1;CCND2;CD34;CDC42;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CDKN2B;CREB1;E2F1;EGFR;EP300;ESR1;FASLG;FOS;GJA1;INSR;IRS1;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PRKCA;PTEN;PTGS2;PTK2;RB1;RBBP4;RHOA;SMAD2;SMAD4;SP1;STAT1;TIMP3;XIAP
TARGET OF RAPAMYCIN	60	528	2.51E-124	3.15E-122	AKT1;AKT2;APC;BAX;BCL2;CCND1;CCND3;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRP;E2F1;EGFR;EIF2S1;ERBB3;ESR1;FOS;GSK3A;IL2RA;INSR;IRS1;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;NF1;NRAS;PCNA;PDGFRA;PDGFRB;PIK3R1;PLD1;PML;PPP2CA;PRKAA2;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAP1B;RB1;RHOA;RPS6KB1;SMAD2;SP1;STAT1
#cluster13	Enrichment Score: 102.91				
ACUTE MYELOID LEUKEMIA	67	735	2.85E-107	2.10E-105	ABCC1;AKT1;ANGPT2;BAX;BCL2;CALR;CCNA1;CCNA2;CCND1;CCND2;CCND3;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRP;CSF1R;CSF2RB;CSF3R;E2F1;EGFR;EP300;ESR1;FASLG;FGF2;FGFR1;FLT3LG;FLT4;FOS;IL1A;IL2RA;IL7;ITGA4;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NF1;NRAS;PCNA;PDGFRA;PDGFRB;PF4;PML;PTEN;PTGS2;PTPN11;RB1;RBBP4;SP1;STAT1;TNFRSF1A;TNFRSF1B;WEE1;XIAP;YWHAE

Supplementary Table 5b: Continued

HEMATOPOIETIC STEM CELL	64	716	5.24E-100	3.06E-98	ABCC1;AKT1;ANGPT2;BAX;BCL2;CCND1;CCND3;CD34;CDC42;CDH2;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRP;CSF1R;CSF3R;DHFR;EGFR;EP300;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FLT3LG;FOS;GJA1;IL10RA;IL1A;IL2RA;IL7;ITGA4;ITGA6;ITK;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NF1;NRAS;PCNA;PDGFRA;PDGFRB;PF4;PML;PROCR;PTEN;PTGS2;PTPN11;RAG1;RHOA;STAT1;YWHAH
#cluster14	Enrichment Score: 98.22				
HUMAN PANCREATIC CANCER	35	187	3.67E-123	4.28E-121	AKT1;BAX;BCL2;CCND1;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;EGFR;FASLG;FGF2;FGF5;FGFR1;FOS;IL1A;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTCH1;PTEN;PTGS2;PTK2;RHOA;SMAD2;SMAD4;SP1;XIAP
HEPATOCELLULAR CARCINOMA CELL	37	232	2.66E-109	2.14E-107	ABCC1;AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;E2F1;EGFR;FASLG;FGF2;FOS;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;NME1;PCNA;PML;PTEN;PTGS2;PTK2;RB1;RHOA;SMAD2;SMAD4;SP1;STAT1;XIAP
CANCER RELATED DEATH	26	139	9.02E-91	4.02E-89	AKT1;APC;BAX;BCL2;CCND1;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;EGFR;ESR1;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PTEN;PTGS2;PTK2;SMAD4;XIAP
EPITHELIAL OVARIAN CANCER	29	210	1.50E-72	3.99E-71	ABCC1;AKT1;BAX;BCL2;CCND1;CCNE1;CD34;CDH2;CDK1;CDKN1A;CDKN2A;CRP;EGFR;ESR1;FASLG;FGF2;IL2RA;KDR;KRAS;MAPK1;MAPK3;NME1;PCNA;PTEN;PTGS2;PTK2;RB1;SMAD2;XIAP
#cluster15	Enrichment Score: 93.22				
CELL MIGRATION	135	2398	6.53E-123	7.13E-121	ABCC1;ABI2;ACVR1B;AGTR1;AKT1;AKT2;ANGPT2;APC;ARAF;ARHGAP5;BAX;BCL2;CALR;CCNA1;CCND1;CCND2;CCND3;CD34;CDC42;CDH11;CDH13;CDH2;CDH6;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRK;CRKL;CRP;CSF1R;CSNK2A1;CTNNA1;E2F1;EDNRB;EFNA3;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF7;FGFR1;FLT4;FN1;FOS;GJA1;GNA12;GSK3A;HYAL1;IL1A;IL2RA;IL7;INSR;IQGAP1;IRS1;ITGA3;ITGA4;ITGA6;ITGA9;ITGB8;JUN;KDR;KITLG;KRAS;LAMC1;LIF;MAP3K11;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;MAPKAP1;MAPKAP2;MMP16;NCAM1;NCK1;NF1;NF2;NME1;NRAS;PAK2;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PIK3R1;PKN2;PLD1;PML;PRKCA;PROCR;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;RHOB;RPS6KB1;RRAS2;SERPINB5;SMAD2;SMAD4;SOS2;SP1;STAT1;TGFB2;TGFB3;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TNK2;VAV2;WAS F3;WASL;WNT2;XIAP

Supplementary Table 5b: Continued

CELL ADHESION	125	2665	3.01E-88	1.26E-86	ABCC1;AGTR1;AKT1;AKT2;ANGPT2;APC;ATF2;BAX;BCL2;CALR;CCND1;CCND2;CCNE1;CD34;CDC42;CDH11;CDH13;CDH2;CDH6;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRK;CRKL;CRP;CSF1R;CSF2RB;CSNK2A1;CTNNA1;E2F1;EDNRB;EFNA3;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FES;FGF1;FGF2;FGF5;FGF7;FGF9;FGFR1;FLT4;FN1;FOS;GJA1;GNA12;IL1A;IL2RA;IL6R;IL7;INSR;IQGAP1;IRS1;ITGA3;ITGA4;ITGA6;ITGA9;ITGB8;ITK;JUN;KDR;KITLG;KRAS;LAMC1;LIF;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;MMP16;NCAM1;NCK1;NF1;NF2;NME1;PAK2;PCNA;PDGFB;PDGFRA;PDGFRB;PF4;PIK3R1;PKN2;PLD1;PML;PRKCA;PROCR;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;RHOB;RRAS2;SERPINB5;SMAD2;SMAD4;SP1;STAT1;TGFB2;TGFB3;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TNK2;VAV2;WASL;YWHAZ
CELL SURFACE	148	4200	1.08E-70	2.71E-69	ABCC1;ACVR1B;AGTR1;AKT1;AKT2;ANGPT2;APC;ARAF;BAX;BCL2;BLK;CALR;CAV2;CCND1;CCND2;CD34;CDC42;CDH11;CDH13;CDH2;CDH6;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRKL;CRP;CSF1R;CSF2RB;CSF3R;CSNK2A1;CTNNA1;DHFR;E2F1;EDNRB;EFNA3;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF7;FGFR1;FLT3LG;FLT4;FN1;FOS;GJA1;GNA12;HYAL1;IFNA2;IFNAR1;IL10RA;IL12B;IL13RA1;IL15RA;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IQGAP1;IRS1;ITGA3;ITGA4;ITGA6;ITGB8;ITK;JUN;KDR;KITLG;KRAS;LAMC1;LIF;MAP3K11;MAP3K13;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;MAPKAP1;MERTK;MMP16;NCAM1;NCK1;NF2;NME1;NRAS;PAK2;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PF4V1;PIK3R1;PLD1;PML;PRKCA;PRKCG;PROCR;PSMB4;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAG1;RAP1A;RAP1B;RB1;RHOA;RHOB;RIPK1;SERPINB5;SMAD2;SMAD4;SMAD6;SOS2;SP1;STAT1;TGFB2;TGFB3;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TRAF1;UBE2B;UBE2D2;VAV2;WASL;WNT2;WNT7A;XIAP
#cluster16	Enrichment Score: 92.05				
INDUCTION OF APOPTOSIS	72	634	1.92E-149	4.65E-147	ABCC1;AKT1;AKT2;APC;BAX;BCL2;CALR;CCND1;CCND2;CCND3;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRKL;CSNK2A1;DHFR;E2F1;E2F2;EGFR;EIF2S1;EP300;ERBB3;ESR1;FASLG;FGF2;FOS;IL1A;IL2RA;IRS1;JUN;KDR;KITLG;KRAS;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAX;NCAM1;NRAS;PCNA;PDGFRB;PF4V1;PML;PRKCA;PSMC6;PTEN;PTGS2;PTK2;RB1;RHOA;RIPK1;RPS6KB1;RXRA;SMAD2;SMAD4;SMAD6;SOS2;SP1;STAT1;TNFRSF1A;TNFRSF1B;TRAF1;WEE1;XIAP

Supplementary Table 5b: Continued

CELL CYCLE ARREST	83	1218	2.20E-93	1.08E-91	ABCC1;AKT1;AKT2;APC;BAX;BCL2;CALR;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CREB1;CSNK2A1;CYP1B1;DHFR;E2F1;E2F2;E2F5;EGFR;EP300;ERBB3;ESR1;FASLG;FGF2;FOS;GJA1;IL2RA;IL7;INSR;IRS1;JUN;KDR;KITLG;KRAS;LIF;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;MAX;MDM4;NRAS;PCNA;PDGFRB;PIK3R3;PLK3;PLK4;PML;PPP2CA;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RB1;RHOA;RHOB;RPS6KB1;SMAD2;SMAD4;SP1;STAT1;TNFRSF1A;WEE1;XIAP;YWHAZ
G1 PHASE	69	592	1.81E-147	3.84E-145	ABCC1;AKT1;APC;BAX;BCL2;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CREB1;CSF1R;CSNK2A1;DHFR;E2F1;E2F2;E2F5;EGFR;EP300;ESR1;FASLG;FGF1;FGF2;FOS;GJA1;IL2RA;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MAX;PCNA;PDGFRB;PIK3R1;PIK3R3;PML;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;RB1;RHOA;RPS6KB1;SMAD2;SMAD4;SP1;STAT1;TGFB2;WEE1;XIAP
CYCLIN DEPENDENT KINASE	81	862	4.82E-135	8.16E-133	AKT1;APC;BAX;BCL2;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CREB1;CSNK2A1;CYP1B1;DHFR;E2F1;E2F2;E2F5;EGFR;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF2;FGFR1;FOS;GJA1;GSK3A;GTF2H4;IL1A;IL2RA;IL7;INSR;JUN;KDR;KITLG;KRAS;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MDM4;MEN1;NME1;NRAS;PCNA;PDGFRB;PLK3;PLK4;PML;PPP2R3A;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RB1;RHOA;RPS6KB1;SMAD2;SMAD4;SP1;STAT1;TGFB2;WEE1;XIAP
M PHASE	57	539	1.38E-108	1.09E-106	ABCC1;AKT1;APC;BAX;BCL2;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;DHFR;E2F1;EGFR;EP300;ESR1;FASLG;FGF2;FOS;GJA1;IL2RA;JUN;KDR;KITLG;MAP3K13;MAPK1;MAPK14;MAPK3;MAPK8;NAP1L1;PCNA;PLK3;PLK4;PML;PRKCA;PSMC6;PTEN;PTGS2;PTK2;RB1;RHOA;RPS6KB1;SP1;TNFRSF1A;WEE1;XIAP
HISTONE DEACETYLASE	72	1063	5.36E-80	1.82E-78	ABCC1;ABI2;AKT1;APC;ATF2;BAX;BCL2;CCNA2;CCND1;CCND2;CCND3;CD34;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CREB1;CRP;CSNK2A1;DHFR;E2F1;E2F2;E2F5;EGFR;EP300;ERBB3;ESR1;FASLG;FGF2;FGF4;FOS;GJA1;IL2RA;INSR;ITPR2;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MAX;MEN1;NCAM1;PCNA;PDGFRB;PML;PTEN;PTGS2;PTK2;RB1;RBBP4;RHOA;RHOB;SERPINB5;SMAD2;SMAD4;SMAD6;SP1;STAT1;TIMP3;WEE1;XIAP;YWHAE

Supplementary Table 5b: Continued

CELL DIVISION	74	1275	2.82E-67	6.25E-66	AKT1;APC;BAX;BCL2;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CREB1;CSF1R;CSNK2A1;DHFR;E2F1;E2F2;E2F5;EGFR;EP300;ESR1;FASLG;FGF1;FGF2;FLT3LG;FOS;GJA1;IL1A;IL2RA;IL7;INSR;IRS1;ITGB8;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NAP1L1;NCAM1;PCNA;PDGFA;PIK3R1;PLK3;PLK4;PML;PPP2R3A;PRKCA;PTEN;PTGS2;PTK2;RAG1;RB1;RHOA;RPS6KB1;SP1;STAT1;WASL;WEE1;YWHAZ
RNA INTERFERENCE	96	2207	3.01E-59	5.66E-58	ABCC1;AGTR1;AKT1;AKT2;APC;BAX;BCL2;CALR;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH11;CDH2;CDH6;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRK;CSNK2A1;E2F1;E2F2;EGFR;ELK1;EP300;ERBB3;ESR1;FASLG;FGF2;FGFR1;FOS;GJA1;GSK3A;IL1A;IL2RA;INSR;IQGAP1;IRS1;ITGA3;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAX;NCK1;NF1;NF2;NRAS;PAK2;PCNA;PDGFRB;PIK3R1;PLD1;PLK4;PML;PPP2R3A;PRKAA2;PRKCA;PSMB7;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RHOA;RHOB;RIPK1;RPS6KB1;SMAD2;SMAD4;SMAD6;SP1;STAT1;TIMP3;TNFRSF1A;TNK2;VAV2;WASL;WEE1;XIAP
DNA BINDING	111	2879	4.71E-58	8.68E-57	ABCC1;AGTR1;AKT1;APC;ARAF;ATF2;BAX;BCL2;CALR;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;COL2A1;CREB1;CRK;CRKL;CRP;CSF1R;CSF3R;CSNK2A1;CYP11B1;CYP24A1;DHFR;E2F1;E2F2;E2F5;EGFR;ELK1;EP300;ERBB3;ESR1;FASLG;FGF2;FGF4;FGFR1;FOS;GTF2H4;IFNAR1;IL12B;IL1A;IL2RA;IL6R;IL7;INSR;IRS1;JUN;KDR;KITLG;KRAS;LAMC1;LIF;MAP3K11;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAPK2;MAX;MDM4;MEN1;NAP1L1;NKX3-1;NME1;NRAS;PAX8;PCNA;PDGFA;PDGFB;PDGFRB;PIK3R1;PML;PRKACA;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAG1;RB1;RBBP4;RHOA;RHOB;RIPK1;RXRA;SMAD2;SMAD4;SMAD6;SP1;STAT1;TIMP3;TNFRSF1A;TNFRSF1B;TRAF1;UBE2B;XIAP
APOPTOSIS	60	1586	3.18E-29	2.94E-28	AKT1;AKT2;ARAF;ATF2;BAX;BCL2;CALR;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2D;CRKL;CSNK2A1;E2F1;E2F2;E2F5;EIF2S1;FASLG;GSK3A;ITGB8;JUN;MAP3K11;MAP3K13;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;MAX;MDM4;MERTK;PAK2;PCNA;PLK3;PML;PPP2CA;PTEN;PTGS2;PTK2;RB1;RHOB;RIPK1;RPS6KB1;SERPINB5;STAT1;TNFRSF1A;TNFRSF1B;TRAF1;WEE1;XIAP;YWHAZ

Supplementary Table 5b: Continued

#cluster17	Enrichment Score: 90.41				
CELL GROWTH	172	4205	8.98E-106	6.34E-104	ABCC1;ACVR1B;AGTR1;AK2;AKT1;AKT2;ANGPT2; APC;ARAF;ATF2;BAX;BCL2;CALR;CAV2;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH11;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CREB1;CRK;CRKL;CRP;CSF1R;CSF3R;CSNK2A1;CTNNA1;CYP1B1;CYP24A1;DHFR;E2F1;E2F2;E2F5;EDNRB;EGFR;EIF2S1;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FES;FGF1;FGF2;FGF4;FGF5;FGF7;FGF9;FGFR1;FLT3LG;FLT4;FN1;FOS;GH1;GJA1;GNA12;GSK3A;HYAL1;IFNA2;IFNAR1;IL1A;IL2RA;IL6R;IL7;INSR;IQGAP1;IRS1;ITGA3;ITGA4;ITGA6;ITPR1;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAP2;MAX;MDM4;MEN1;MERTK;MMP16;NAP1L1;NCAM1;NCK1;NF1;NF2;NKX3-1;NME1;NRAS;PAK2;PAX8;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PF4V1;PIK3R1;PIK3R3;PLD1;PLK3;PLK4;PML;PPP2CA;PPP5C;PRKAA2;PRKCA;PRKCG;PSMA4;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAG1;RAP1A;RAP1B;RB1;RBBP4;RHOA;RHOB;RIPK1;RPS6KB1;RRAS2;RXRA;SERPINB5;SMAD2;SMAD4;SMAD6;SP1;STAT1;TGFB2;TGFB3;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TNK2;TRAF1;TUBB;UBE2B;VAV2;WEE1;WNT2;WNT7A;XIAP
CELL DEATH	152	4184	1.65E-76	5.18E-75	ABCC1;AGTR1;AK2;AKT1;AKT2;ANGPT2;APC;ARAF;ATF2;BAX;BCL2;CALR;CAV2;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRK;CRKL;CRP;CSF1R;CSF3R;CSNK2A1;CYP1B1;DHFR;E2F1;E2F2;E2F5;EDNRB;EFNA3;EGFR;EIF2S1;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF5;FGF7;FGFR1;FLT3LG;FOS;GJA1;GSK3A;IFNA2;IFNAR1;IL1A;IL2RA;IL6R;IL7;INSR;IRS1;ITGA3;ITGA4;ITGA6;ITK;ITPR1;ITPR2;JUN;KDR;KITLG;KRAS;LAMC1;LIF;MAP3K11;MAP3K13;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAP2;MAX;MDM4;MERTK;MMP16;NCAM1;NF1;NF2;NKX3-1;NME1;NRAS;PAK2;PAX8;PCNA;PDGFA;PDGFRB;PIK3R1;PLD1;PLK3;PLK4;PML;PPP2CA;PPP5C;PRKAA2;PRKCA;PRKCG;PSMC6;PSMF1;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAG1;RAP1A;RAP1B;RB1;RHOA;RHOB;RIPK1;RPS6KB1;RRAS2;RXRA;SERPINB5;SMAD2;SMAD4;SP1;STAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TRAF1;TXK;UBE2B;WASF3;WEE1;WNT2;WNT7A;XIAP;YWHAE;YWHAZ
#cluster18	Enrichment Score: 87.56				
PHOSPHATASE INHIBITOR	29	170	8.86E-92	4.17E-90	AKT1;BAX;BCL2;CCND1;CDK1;CDK2;CDKN1A;CREB1;EGFR;EIF2S1;FOS;GJA1;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PPP5C;PRKACA;PRKCA;PTEN;PTGS2;PTK2;PTPN11;RHOA;SP1;STAT1
PROTEIN PHOSPHORYLATION	41	353	8.48E-85	3.23E-83	ABI2;AKT1;BAX;BCL2;CCND1;CCND2;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CSNK2A1;E2F1;EGFR;EIF2S1;FGF2;FOS;GJA1;GSK3A;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP2;PPP5C;PRKACA;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RB1;RPS6KB1;STAT1

Supplementary Table 5b: Continued

#cluster	Enrichment Score					
#cluster19	Enrichment Score: 87.18					
EXTRACELLULAR REGULATED KINASE	26	124	9.72E-103	6.33E-101	AKT1;ARAF;BAX;BCL2;CCND1;CDKN1A;CREB1;EGFR;ESR1;FGF2;FOS;INSR;IRS1;JUN;KDR;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;PRKCA;PROCR;PSMC6;PTGS2;PTK2;STAT1	
INTRACELLULAR SIGNAL TRANSDUCTION	21	112	4.54E-73	1.28E-71	AKT1;BCL2;CDKN1A;CREB1;EGFR;FOS;GNB3;INSR;IRS1;JUN;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;PRKCA;PTEN;PTK2;SMAD2;SMAD4;STAT1	
#cluster20	Enrichment Score: 85.17					
TUMOR NECROSIS FACTOR	121	2247	1.02E-102	6.49E-101	ABCC1;AGTR1;AKT1;AKT2;ANGPT2;APC;ATF2;BAX;BCL2;CALR;CCND1;CCND2;CD34;CDC42;CDH11;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;COL2A1;CREB1;CRK;CRP;CSF1R;CSF2RB;CSF3R;CSNK2A1;CYP1B1;E2F1;EDNRB;EGFR;EIF2S1;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FLT3LG;FLT4;FOS;GJA1;HYAL1;IFNA2;IFNAR1;IL10RA;IL12B;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;ITGA4;ITGA6;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K13;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAP2;MAPKAP3;MERTK;MP16;NCAM1;NRAS;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PF4;PIK3R1;PLD1;PML;PPP2CA;PRKAA2;PRKCA;PROCR;PSMC6;PSMD2;PTEN;PTGS2;PTK2;PTPN11;RAG1;RB1;RHOA;RIPK1;RPS6KB1;RXRA;SMAD2;SMAD4;SMAD6;SP1;STAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TRAF1;WNT2;XIAP	
INFLAMMATORY RESPONSE	91	1804	4.55E-69	1.09E-67	ABCC1;AGTR1;AKT1;AKT2;ANGPT2;APC;ATF2;BAX;BCL2;CALR;CCND1;CD34;CDC42;CDK4;CDKN1A;CDKN2A;CREB1;CRK;CRP;CSF1R;CYP1B1;E2F1;EDNRB;EGFR;EP300;ESR1;FASLG;FGF1;FGF2;FGF7;FOS;GJA1;HYAL1;IFNA2;IFNAR1;IL10RA;IL12B;IL13RA1;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;ITGA4;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAP2;MERTK;NCAM1;PCNA;PDGFA;PDGFRB;PF4;PF4V1;PML;PRKCA;PROCR;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAG1;RAP1A;RHOA;RIPK1;SMAD2;SMAD4;SP1;STAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TRAF1;XIAP;YWHAZ	
#cluster21	Enrichment Score: 84.25					
LYMPH NODE METASTASES	36	233	1.32E-102	8.31E-101	AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDKN1A;CDKN1B;CDKN2A;CRP;CTNNA1;EGFR;ERBB3;ESR1;FASLG;FGF2;FGFR1;FLT4;IFNA2;KDR;KRAS;MAPK1;MAPK3;NCAM1;NKX3-1;NME1;NRAS;PCNA;PDGFRA;PTCH1;PTEN;PTGS2;PTK2;RB1;SERPINB5;SMAD4	
DISEASE FREE SURVIVAL	46	542	2.34E-67	5.26E-66	ABCC1;AKT1;APC;BAX;BCL2;CCNA2;CCND1;CD34;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CRP;E2F1;EGFR;ERBB3;ERBB4;ESR1;FASLG;FGF2;FGFR1;FLT4;IFNA2;IL2RA;KDR;KRAS;MAPK1;MAPK3;NCAM1;NME1;NRAS;PCNA;PDGFRA;PDGFRB;PML;PTCH1;PTEN;PTGS2;RB1;SERPINB5;SMAD4;TIMP3	

Supplementary Table 5b: Continued

#cluster	Enrichment Score				
#cluster22	Enrichment Score: 83.72				
FLOW CYTOMETRY ANALYSIS	39	270	2.85E-103	1.89E-101	ABCC1;AKT1;BAX;BCL2;CCND1;CCND3;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CRP;E2F1;EGFR;ESR1;FASLG;FGF2;FOS;IL1A;IL2RA;ITGA3;ITGA4;JUN;KDR;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PML;PTEN;PTGS2;RB1;TNFRSF1A;XIAP
CHRONIC LYMPHOCYTIC LEUKEMIA	42	459	1.25E-65	2.67E-64	AKT1;ANGPT2;BAX;BCL2;CCND1;CCND2;CCND3;CD34;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CRP;ESR1;FASLG;FGF2;FOS;IFNA2;IL1A;IL2RA;IL7;ITGA3;ITGA4;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NRAS;PCNA;PML;PTEN;RB1;RHOA;STAT1;TNFRSF1B;TRAF1;XIAP
#cluster23	Enrichment Score: 80.78				
PHOSPHATASE ACTIVITY	55	616	1.11E-85	4.46E-84	ABI2;AKT1;BAX;BCL2;CCND1;CD34;CDC42;CDH11;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRP;CSNK2A1;EGFR;EIF2S1;ESR1;FGF1;FGF2;FOS;GJA1;IL1A;INSR;IRS1;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PLK3;PPP2CA;PPP2R3A;PPP5C;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RB1;RHOA;SMAD2;SMAD4;SMAD6;STAT1;TGFB2;TGFB3
ALKALINE PHOSPHATASE	66	933	2.50E-77	8.05E-76	AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDH11;CDH2;CDK1;CDK2;CDKN1A;CDKN2A;COL2A1;CREB1;CRP;CSF1R;CSNK2A1;CYP24A1;DHFR;EGFR;EP300;ESR1;FASLG;FGF1;FGF2;FGF4;FGF5;FGFR1;FOS;GH1;GJA1;IFNA2;IL1A;IL2RA;IL6R;INSR;IRS1;ITGA6;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PML;PRKACA;PRKCA;PSMC6;PTCH1;PTEN;PTGS2;PTK2;RB1;RHOA;SMAD2;SMAD4;SMAD6;SP1;TGFB2;TGFB3;TIMP3
#cluster24	Enrichment Score: 80.50				
PROTEIN KINASE INHIBITOR	32	169	8.41E-114	7.12E-112	AKT1;BAX;BCL2;CCND1;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRP;CSNK2A1;EGFR;FGF2;FOS;IL1A;INSR;JUN;KDR;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;MAPKAPK3;PCNA;PRKACA;PRKCA;PSMC6;PTGS2;STAT1
HIGH MOBILITY GROUP	27	260	1.19E-48	1.75E-47	AKT1;BAX;BCL2;CALR;CCND1;CDK1;CDK4;CDKN1A;CDKN2A;COL2A1;CREB1;CRP;EGFR;EP300;FOS;IL1A;INSR;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTGS2;RAG1;SP1;STAT1
#cluster25	Enrichment Score: 80.49				
EPSTEIN BARR VIRUS	56	560	7.01E-100	4.02E-98	AKT1;BAX;BCL2;CCND1;CCND2;CCND3;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRP;CSF1R;E2F1;EGFR;EP300;ESR1;FASLG;FOS;IL10RA;IL12B;IL15RA;IL1A;IL2RA;IL7;INSR;ITK;JUN;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NME1;NRAS;PCNA;PML;PTEN;PTGS2;RAG1;RB1;RIPK1;SMAD4;SP1;STAT1;TNFRSF1A;TNFRSF1B;TRAF1;UBE2B;XIAP

Supplementary Table 5b: Continued

B CELL LYMPHOMA	52	623	1.27E-74	3.71E-73	ABCC1;AKT1;BAX;BCL2;CCND1;CCND2;CCND3;CCNE1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRP;E2F1;EGFR;EP300;ESR1;FASLG;FGF2;FOS;IFNA2;IL10RA;IL1A;IL2RA;IL7;ITPR2;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NRAS;PCNA;PML;PTEN;PTGS2;PTPN11;RAG1;RB1;RIPK1;SP1;STAT1;TRAF1;XIAP
ACUTE LYMPHOBLASTIC LEUKEMIA	49	595	3.71E-69	8.97E-68	ABCC1;AKT1;BAX;BCL2;CCND1;CCND2;CCND3;CD34;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CRKL;CRP;CSF3R;DHFR;EP300;ESR1;FASLG;FLT3LG;FOS;IL2RA;IL7;ITGA4;JUN;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;NF1;NRAS;PDGFRB;PML;PPP2R3A;PTEN;PTPN11;RAG1;RB1;RBBP4;SP1;STAT1;XIAP
#cluster26	Enrichment Score: 80.40				
EPITHELIAL CELL PROLIFERATION	28	117	8.59E-128	1.12E-125	AKT1;APC;BAX;BCL2;CCND1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;EGFR;ERBB3;ESR1;FGF1;FGF2;FGF7;FOS;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTEN;PTGS2;RB1;SMAD2;TGFB2
PROSTATE EPITHELIAL CELL	22	121	3.96E-74	1.15E-72	AKT1;BAX;BCL2;CCND1;CDK1;CDKN1A;CDKN1B;CDKN2A;EGFR;ESR1;FGF2;FGF7;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NKX3-1;PTEN;PTGS2;RB1
MISMATCH REPAIR	23	221	1.92E-41	2.41E-40	AKT1;APC;BAX;BCL2;CCND1;CDK1;CDKN1A;CDKN2A;CDKN2B;DHFR;EGFR;ESR1;JUN;KRAS;MAPK1;MAPK8;NF1;NRAS;PCNA;PTEN;PTGS2;RB1;SMAD4
#cluster27	Enrichment Score: 77.71				
HUMAN MAMMARY EPITHELIAL	24	107	9.71E-102	5.77E-100	AKT1;BAX;BCL2;CCND1;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CYP1B1;EGFR;EP300;ERBB3;ESR1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PTEN;PTGS2;RB1;SERPINB5
COLONY FORMATION ASSAY	23	126	6.24E-78	2.05E-76	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;E2F1;EGFR;FGF2;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTEN;PTGS2;RB1;XIAP
ACTIVATED CASPASE 3	22	103	2.98E-88	1.26E-86	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;EGFR;FASLG;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PTEN;PTGS2;TNFRSF1A;XIAP
DEATH RECEPTOR	34	274	1.38E-75	4.21E-74	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;EGFR;FASLG;FOS;IL2RA;JUN;KRAS;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PTEN;PTGS2;RIPK1;SP1;STAT1;TIMP3;TNFRSF1A;TNFRSF1B;TRAF1;XIAP
REGULATION OF APOPTOSIS	24	158	1.65E-66	3.56E-65	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDKN1A;E2F1;EGFR;FASLG;FOS;JUN;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PTEN;PTGS2;RB1;RIPK1;XIAP
CELL KILLING	29	246	1.32E-60	2.56E-59	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDKN1A;DHFR;E2F1;EGFR;FASLG;FOS;GJA1;IL1A;IL2RA;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PTEN;PTGS2;RB1;TNFRSF1A;TNFRSF1B;XIAP

Supplementary Table 5b: Continued

#cluster	Enrichment Score				
#cluster28	Enrichment Score: 77.13				
RENAL CELL CARCINOMA	56	608	1.42E-90	6.25E-89	ABCC1;AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDH2;CDH6;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CRP;CSF1R;DUSP9;E2F1;EGFR;EP300;ESR1;FASLG;FGF2;FGFR1;FLT4;FOS;IFNA2;IL1A;IL2RA;IL7;ITGB8;ITPR2;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NME1;NRAS;PAX8;PCNA;PDGFRA;PDGFRB;PML;PTEN;PTGS2;PTK2;RHOA;SMAD4;STAT1;TUBB
HYPOXIA INDUCIBLE FACTOR	46	557	3.79E-65	8.02E-64	ABCC1;AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDH2;CDK4;CDKN1A;CDKN2A;COL2A1;CREB1;CRP;E2F1;EDNRB;EFNA3;EGFR;EP300;ESR1;FGF2;FGFR1;FLT4;FOS;INSR;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PDGFRB;PML;PSMC6;PTEN;PTGS2;PTK2;RHOA;RPS6KB1;SMAD2;SMAD4;SP1;STAT1
#cluster29	Enrichment Score: 77.08				
BREAST CANCER PATIENTS	53	617	8.97E-79	2.98E-77	ABCC1;AKT1;AKT2;APC;BAX;BCL2;CCND1;CCND2;CCNE1;CD34;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CRP;CSF1R;CYP1B1;E2F1;EGFR;ERBB3;ERBB4;ESR1;FASLG;FGF2;FGFR1;FN1;FOS;IL2RA;IL7;IRS1;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NME1;PCNA;PTEN;PTGS2;PTK2;RB1;SERPINB5;SP1;TIMP3;TUBB
LYMPH NODE METASTASIS	57	719	7.80E-77	2.47E-75	ABCC1;AKT1;ANGPT2;APC;ARHGAP5;BAX;BCL2;CCND1;CCND2;CCNE1;CD34;CDC42;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CRP;CTNNA1;E2F1;EGFR;ERBB3;ERBB4;ESR1;FASLG;FGF2;FLT4;FOS;IL2RA;ITGA3;ITGB8;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;MMP16;NCAM1;NME1;NRAS;PCNA;PDGFRA;PTCH1;PTEN;PTGS2;PTK2;RB1;RHOA;SERPINB5;SMAD4;SP1;TIMP3
#cluster30	Enrichment Score: 77.05				
TERMINAL DEOXYNUCLEOTIDYL TRANSFERASE	39	285	3.58E-97	1.99E-95	AGTR1;AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;EGFR;FASLG;FGF1;FGF2;FOS;GJA1;IL2RA;IL7;JUN;KDR;KITLG;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PML;PTEN;PTGS2;RAG1;SMAD2;TNFRSF1A;TNFRSF1B;XIAP
CLEAVED CASPASE 3	30	196	2.82E-84	1.05E-82	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;EGFR;FASLG;FOS;GJA1;JUN;KDR;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTEN;PTGS2;PTK2;SMAD2;STAT1;TNFRSF1A;XIAP
ALVEOLAR EPITHELIAL CELL	22	167	6.97E-52	1.10E-50	AGTR1;AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;EGFR;FASLG;FGF7;FOS;GJA1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTGS2;SMAD2;STAT1;TNFRSF1A
#cluster31	Enrichment Score: 76.21				
HISTONE DEACETYLASE INHIBITOR	38	305	4.63E-85	1.78E-83	AKT1;BAX;BCL2;CCND1;CCND2;CD34;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;E2F1;EGFR;EP300;ESR1;FASLG;FOS;GJA1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PTEN;PTGS2;RB1;SMAD2;SP1;STAT1;XIAP;YWHA

Supplementary Table 5b: Continued

POLY ADP RIBOSE	37	349	1.12E-68	2.65E-67	AKT1;APC;BAX;BCL2;CCND1;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;E2F1;EGFR;EP300;ESR1;FASLG;FOS;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PCNA;PML;PTEN;PTGS2;PTK2;RB1;RIPK1;SP1;STAT1;TNFRSF1A;WEE1;XIAP
CASPASE INHIBITOR	31	226	4.47E-77	1.43E-75	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;E2F1;EGFR;FASLG;FGF2;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PML;PTGS2;PTK2;RB1;RHOA;RIPK1;TNFRSF1A;TNFRSF1B;WEE1;XIAP
#cluster32	Enrichment Score: 75.49				
SQUAMOUS CELL CARCINOMA	101	1776	8.19E-91	3.70E-89	ABCC1;AKT1;AKT2;ANGPT2;APC;BAX;BCL2;CALR;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH13;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CREB1;CRP;CTNNA1;CYP1B1;DHFR;E2F1;E2F5;EDNRB;EGFR;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF4;FGF7;FGFR1;FLT4;FN1;FOS;GJA1;HYAL1;IFNA2;IL1A;IL2RA;INSR;IQGAP1;IRS1;ITGA3;ITGA6;ITGA9;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NME1;NRAS;PAX8;PCNA;PDGFRA;PDGFRB;PML;PRKCA;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;RRAS2;RXRA;SERPINB5;SMAD2;SMAD4;SP1;STAT1;TGFB2;TIMP3;TNFRSF1A;TNFRSF1B;TUBB;WEE1;WNT2;XIAP;YWHAZ
QUANTITATIVE REAL TIME	106	2554	1.28E-61	2.54E-60	ABCC1;ACVR1B;AGTR1;AKT1;AKT2;ANGPT2;APC;BAX;BCL2;CALR;CCNA1;CCND1;CCND2;CCND3;CCNE1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;COL2A1;CREB1;CRP;CSF1R;CYP1B1;CYP24A1;DHFR;E2F1;E2F5;EDNRB;EGFR;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF7;FGF9;FGFR1;FLT4;FN1;FOS;GH1;GJA1;HYAL1;IL12B;IL1A;IL2RA;INSR;IRS1;ITGA3;ITGA6;ITGA9;JUN;KDR;KITLG;KRAS;LIF;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MDM4;MMP16;NCAM1;NF1;NME1;PCNA;PDGFA;PDGFRA;PDGFRB;PIK3R1;PML;PRKCA;PSMA2;PSMB6;PTCH1;PTEN;PTGS2;PTK2;RB1;RHOA;SMAD2;SMAD4;SMAD6;SP1;STAT1;TGFB2;TGFB3;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TUBB4A;WNT2;WNT7A;XIAP;YWHAZ
#cluster33	Enrichment Score: 75.09				
SIGNAL TRANSDUCER	82	816	4.96E-148	1.12E-145	AGTR1;AKT1;APC;ATF2;BAX;BCL2;CALR;CCND1;CCND2;CCND3;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRKL;CRP;CSF1R;CSF3R;E2F1;EGFR;EP300;ERBB3;ERBB4;ESR1;FASLG;FES;FGF1;FGF2;FOS;IFNA2;IFNAR1;IL10RA;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PDGFRA;PDGFRB;PIK3R1;PML;PRKCA;PSMB4;PSMC6;PTCH1;PTEN;PTGS2;PTK2;PTPN11;RB1;RHOA;RPS6KB1;SMAD2;SMAD4;SMAD6;SP1;STAT1;TNFRSF1A;TNFRSF1B;TNK2;TRAF1;XIAP

Supplementary Table 5b: Continued

MECHANISMS OF ACTION	58	525	2.78E-116	2.55E-114	ABCC1;AGTR1;AKT1;BAX;BCL2;CCND1;CD34;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CR EB1;CRP;CYP1B1;DHFR;E2F1;EGFR;EP300;ERBB3;ES R1;FASLG;FGF2;FGF7;FGFR1;FOS;GJA1;IL1A;IL2RA; IL7;INSR;IRS1;JUN;KDR;KITLG;KRAS;LIF;MAPK1;M APK14;MAPK3;MAPK8;PCNA;PDGFRB;PML;PRKCA; PTEN;PTGS2;PTK2;RB1;RHOA;SMAD2;SMAD4;SP1; STAT1;TNFRSF1B;XIAP
MECHANISM OF ACTION	90	1148	5.16E-121	5.46E-119	ABCC1;AGTR1;AKT1;APC;BAX;BCL2;CALR;CCND1; CCND2;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDK N1A;CDKN1B;CDKN2A;CREB1;CRP;CYP1B1;CYP24 A1;DHFR;E2F1;EGFR;EIF2S1;EP300;ERBB3;ERBB4;E SR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FLT4;FOS;GJA1; IFNA2;IL1A;IL2RA;IL7;INSR;IRS1;JUN;KDR;KITLG;K RAS;LIF;MAP3K13;MAPK1;MAPK14;MAPK3;MAPK8; MAPKAP1;MAPKAP2;MDM4;NCAM1;NME1;NRAS; PCNA;PDGFRB;PF4;PIK3R1;PKN2;PML;PRKAA2;PRK CA;PROCR;PSMC6;PTEN;PTGS2;PTK2; PTPN11;RAP1A;RB1;RHOA;RHOB;RPS6KB1;RXRA;S MAD2;SMAD4;SMAD6;SP1;STAT1;TGFB2;TIMP3;TNF RSF1A;TNFRSF1B;XIAP
MODE OF ACTION	42	404	2.22E-76	6.91E-75	ABCC1;AKT1;BAX;BCL2;CCND1;CDC42;CDK1;CDK2; CDK4;CDKN1A;CDKN2A;CREB1;CRP;DHFR;EGFR;E IF2S1;EP300;ESR1;FASLG;FGF2;FOS;IL1A;IL2RA;INS R;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAP K3;MAPK8;PCNA;PML;PRKCA;PTEN;PTGS2;PTK2;R HOA;SMAD2;STAT1
LINES OF EVIDENCE	43	366	3.28E-90	1.43E-88	AGTR1;AKT1;APC;BAX;BCL2;CCND1;CD34;CDC42;C DK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRP;DH FR;EGFR;ESR1;FASLG;FGF2;FOS;GJA1;IL1A;IL2RA;I NSR;JUN;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;N CAM1;PCNA;PML;PRKCA;PTEN;PTGS2;PTK2;RB1;SP 1;STAT1;TNFRSF1A;TNFRSF1B
ELECTROPHORETIC MOBILITY SHIFT	57	750	6.49E-73	1.77E-71	AGTR1;AKT1;ATF2;BAX;BCL2;CCND1;CD34;CDK1;C DK2;CDK4;CDKN1A;CDKN2A;CREB1;CRKL;CRP;E2 F1;EGFR;ELK1;EP300;ESR1;FASLG;FGF2;FOS;GJA1;I L1A;IL2RA;INSR;IRS1;JUN;KDR;KITLG;LIF;MAPK1; MAPK14;MAPK3;MAPK8;MAX;NKX3-1;PCNA;PDGF A;PDGFB;PML;PRKACA;PRKCA;PSMC6;PTEN;PTGS 2;PTK2;RB1;RHOA;RXRA;SMAD2;SMAD4;SP1;STAT1; TNFRSF1A;XIAP
HEAT SHOCK PROTEIN	68	1052	4.92E-71	1.25E-69	ABCC1;AKT1;BAX;BCL2;CALR;CCND1;CD34;CDK1; CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CR P;CSNK2A1;CYP1B1;DHFR;EGFR;EIF2S1;EP300;ERB B3;ESR1;FASLG;FGF2;FOS;GJA1;IL1A;IL2RA;IL7;INS R;IRS1;JUN;KDR;KRAS;MAP3K13;MAP3K5;MAPK1; MAPK14;MAPK3;MAPK8;MAPKAP2;MAPKAP3;N CAM1;NME1;PCNA;PML;PPP5C;PRKCA;PSMB4;PSM B7;PSMC6;PTEN;PTGS2;PTK2;RB1;RHOA;RIPK1;RPS 6KB1;SERPINB5;SMAD2;SP1;STAT1;TNFRSF1A;TUB B;XIAP;YWHAE;YWHAZ
QUANTITATIVE REVERSE TRANSCRIPTION	50	653	1.67E-64	3.52E-63	ABCC1;AGTR1;AKT1;ANGPT2;APC;BAX;BCL2;CCN D1;CD34;CDK1;CDK4;CDKN1A;CDKN2A;CDKN2B;C OL2A1;CRP;CYP1B1;E2F1;EDNRB;EGFR;ESR1;FASL G;FGF2;FOS;GJA1;IL1A;IL2RA;INSR;IRS1;JUN;KDR; KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;P CNA;PML;PTEN;PTGS2;RB1;SMAD2;SMAD4;SP1;STA T1;TGFB2;TIMP3;YWHAZ

Supplementary Table 5b: Continued

HEPATITIS B VIRUS	39	424	3.09E-61	6.05E-60	AKT1;APC;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRP;DHFR;E2F1;EGFR;ESR1;FASLG;FOS;IFNA2;IFNAR1;IL12B;IL2RA;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NRAS;PCNA;PML;PTEN;PTGS2;RB1;RXRA;SP1;STAT1
PROTEIN BINDING	42	583	3.22E-50	4.91E-49	AKT1;BAX;BCL2;CALR;CCND1;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRK;CRP;DHFR;E2F1;EGFR;ELK1;EP300;ESR1;FGF2;FOS;INSR;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MAX;NCK1;PCNA;PML;PRKCA;PTGS2;PTK2;RB1;RHOA;SMAD4;SP1;STAT1;UBE2B
BINDING PROTEIN 1	45	688	1.54E-47	2.19E-46	AKT1;BAX;BCL2;CALR;CCND1;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRP;EGFR;EIF2S1;EP300;ERBB3;ESR1;FGF2;FOS;INSR;IRS1;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;PCNA;PLK3;PML;PRKAA2;PTEN;PTGS2;PTK2;RB1;RPS6KB1;SMAD2;SP1;STAT1;TNFRSF1A;TUBB4A
C TERMINAL DOMAIN	54	1165	1.11E-35	1.20E-34	AKT1;APC;BAX;BCL2;CALR;CCND1;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRP;CSNK2A1;E2F1;EGFR;EIF2S1;EP300;ESR1;FGF2;FOS;GJA1;GTF2H4;INSR;IQGAP1;JUN;KDR;KRAS;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;NF1;NF2;PCNA;PML;PSMC6;PSMD2;PSMF1;PTEN;PTK2;RB1;RBBP4;RHOA;SMAD2;SMAD4;SOS2;SP1;STAT1;TIMP3;UBE2B;UBE2D2
DNA METHYLATION	63	1671	1.49E-30	1.43E-29	AGTR1;AKT1;APC;BAX;BCL2;CCNA1;CCND1;CCND2;CD34;CDH11;CDH13;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CRP;CYP1B1;CYP24A1;DHFR;DUSP9;E2F1;EDNRB;EGFR;EP300;ESR1;FASLG;FGF2;FGF4;FOS;GJA1;IL2RA;IL4R;INSR;ITGA9;JUN;KDR;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MEN1;NRAS;PCNA;PDGFRA;PML;PTEN;PTGS2;RB1;RBBP4;SERPINB5;SMAD2;SMAD4;SP1;STAT1;TIMP3;WNT2;YWHA
#cluster34	Enrichment Score: 74.62				
LUNG EPITHELIAL CELL	35	187	3.67E-123	4.14E-121	AKT1;BAX;BCL2;CCND1;CDK1;CDK4;CDKN1A;CDKN2A;CREB1;EGFR;EP300;FASLG;FGF2;FGF7;FOS;GJA1;IL1A;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTEN;PTGS2;RB1;RHOA;SMAD2;SMAD4;SP1;STAT1;TGFB2;TGFB3;TNFRSF1A
BRONCHIAL EPITHELIAL CELLS	27	244	2.20E-52	3.54E-51	AKT1;BAX;BCL2;CCND1;CDK4;CDKN1A;CDKN2A;CREB1;CYP1B1;EGFR;FASLG;FOS;IL1A;JUN;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PRKCA;PTGS2;SMAD2;SP1;STAT1;TGFB2
TISSUE HOMEOSTASIS	32	215	2.95E-87	1.22E-85	AKT1;APC;BAX;BCL2;CCND1;CD34;CDH2;CDKN1A;CDKN2A;E2F1;EGFR;EP300;FASLG;FGF2;FGFR1;GJA1;IL1A;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;PCNA;PTCH1;PTEN;PTGS2;RB1;RHOA;SMAD2;SMAD4;TNFRSF1A
INTESTINAL EPITHELIAL CELL	40	436	1.22E-62	2.44E-61	AKT1;APC;BAX;BCL2;CCND1;CDC42;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;EGFR;FASLG;FGF7;FOS;IL1A;IL2RA;IL7;JUN;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PRKCA;PSMB7;PTGS2;PTK2;RB1;RHOA;SMAD2;SMAD4;SP1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B;XIAP
HUMAN BRONCHIAL EPITHELIAL	24	199	2.68E-51	4.19E-50	AKT1;BAX;BCL2;CCND1;CDK4;CDKN1A;CDKN2A;CREB1;CYP1B1;EGFR;FOS;IL1A;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PRKCA;PTGS2;PTK2;RHOA;STAT1

Supplementary Table 5b: Continued

#cluster	Enrichment Score					
#cluster35	Enrichment Score: 73.52					
ACTIVATOR PROTEIN 1	36	249	2.90E-95	1.46E-93	AKT1;ATF2;BAX;BCL2;CCND1;CDK4;CDKN1A;CDKN2A;CREB1;EGFR;ELK1;EP300;ESR1;FASLG;FGF2;FOS;GJA1;IL1A;IL2RA;JUN;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PRKCA;PSMC6;PTGS2;PTK2;RHOA;SMAD2;SP1;STAT1;TNFRSF1A	
CAMP RESPONSE ELEMENT	33	350	3.21E-53	5.29E-52	AKT1;ATF2;BAX;BCL2;CCND1;CDKN1A;CDKN2A;CREB1;EGFR;ELK1;EP300;ESR1;FGF2;FOS;GJA1;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;PCNA;PRKACA;PRKCA;PSMC6;PTGS2;RAP1A;SMAD2;SMAD4;SP1;STAT1	
#cluster36	Enrichment Score: 73.30					
HUMAN DERMAL FIBROBLAST	23	109	3.47E-91	1.59E-89	AKT1;BAX;BCL2;CD34;CDKN1A;CDKN2A;EGFR;FGF2;FGF7;FOS;GJA1;HYAL1;IL1A;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PTGS2;PTK2;SMAD2;SMAD4;SP1	
HUMAN MESENCHYMAL STEM	28	190	2.75E-75	8.16E-74	AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDKN1A;CDKN2A;COL2A1;EGFR;FGF2;FGF7;FLT4;GJA1;IL1A;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PTGS2;PTK2;RHOA;SMAD2;TGFB3	
TISSUE REGENERATION	22	157	1.31E-55	2.29E-54	AKT1;BCL2;CCND1;CD34;CDKN1A;CDKN2A;EGFR;FGF2;FGF7;FLT4;GJA1;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PDGFA;PTGS2;PTK2;SMAD2;TGFB3	
#cluster37	Enrichment Score: 72.77					
MESENCHYMAL STEM CELL	68	861	1.75E-91	8.10E-90	AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDC42;CDH11;CDH2;CDK2;CDK4;CDKN1A;CDKN2A;COL2A1;CREB1;CRP;EGFR;EP300;ESR1;FASLG;FGF1;FGF2;FGF4;FGF7;FGF9;FGFR1;FLT3LG;FLT4;FOS;GJA1;IL1A;IL2RA;IL7;IRS1;ITGA3;ITGA4;ITGA6;ITGB8;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PDGFRA;PDGFRB;PML;PTCH1;PTEN;PTGS2;PTK2;RB1;RHOA;SMAD2;SMAD4;STAT1;TGFB2;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;WNT2;XIAP;YWHAZ	
BONE MORPHOGENETIC PROTEIN	52	660	1.64E-69	3.99E-68	ACVR1B;AKT1;BAX;BCL2;CCND1;CD34;CDC42;CDH2;CDK2;CDKN1A;CDKN2A;COL2A1;CREB1;CRP;EGFR;EP300;ESR1;FGF1;FGF2;FGF4;FGF5;FGF7;FGF9;FGFR1;FOS;GJA1;IL1A;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PSMB4;PTCH1;PTEN;PTGS2;PTK2;RHOA;SMAD2;SMAD4;SMAD6;SP1;TGFB2;TGFB3;TGFB3;WNT2;WNT7A	
EMBRYONIC STEM CELL	67	1172	1.66E-59	3.14E-58	ACVR1B;AKT1;APC;BAX;BCL2;CALR;CCNA2;CCND1;CCND2;CD34;CDC42;CDH11;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;DUSP9;E2F1;EGFR;EP300;ESR1;FASLG;FGF1;FGF2;FGF4;FGF5;FGF7;FGF9;FGFR1;FLT4;FOS;GJA1;IL2RA;IL7;ITGA6;JUN;KDR;KITLG;LAMC1;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;PCNA;PDGFRA;PDGFRB;PML;PRKCA;PTEN;PTGS2;PTK2;PTPN11;RAG1;RB1;RHOA;SMAD2;SMAD4;SP1;STAT1;WNT2	

Supplementary Table 5b: Continued

#cluster38	Enrichment Score: 72.72				
CELL DEVELOPMENT	73	1034	1.57E-85	6.20E-84	ACVR1B;AKT1;APC;BAX;BCL2;BLK;CCNA2;CCND1;CCND2;CCND3;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CSF1R;EGFR;EP300;ERBB3;ESR1;FASLG;FES;FGF2;FGF9;FGFR1;FLT3LG;FOS;GJA1;IFNAR1;IL15RA;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;ITK;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NCK1;NRAS;PCNA;PDGFRB;PIK3R1;PML;PTEN;PTGS2;PTK2;PTPN11;RAG1;RAP1A;RB1;SMAD2;SOS2;SP1;STAT1;TGFB2;TNFRSF1B;TXK;VAV2
CELL ACTIVATION	81	1310	2.48E-80	8.59E-79	AKT1;ANGPT2;APC;BAX;BCL2;BLK;CALR;CCND1;CCND2;CCND3;CD34;CDC42;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRKL;CRP;CSF1R;EGFR;EP300;ESR1;FASLG;FGF2;FLT3LG;FOS;IFNAR1;IL10RA;IL12B;IL1A;IL2RA;IL4R;IL7;INSR;ITGA4;ITGA6;ITK;JUN;KDR;KITLG;KRAS;LIF;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;NCK1;PAK2;PCNA;PDGFRB;PF4;PIK3R1;PRKCA;PSMA4;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAG1;RAP1A;RAP1B;RB1;RHOA;RIPK1;SMAD2;SP1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B;TRAF1;TXK;VAV2;WASL
T CELL ACTIVATION	52	734	7.47E-61	1.45E-59	AKT1;APC;BAX;BCL2;CALR;CCND3;CD34;CDC42;CDK2;CDKN1A;CDKN2A;CREB1;CRK;CRP;EGFR;EP300;ESR1;FASLG;FLT3LG;FOS;IL12B;IL1A;IL2RA;IL7;ITGA4;ITK;JUN;KDR;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NCK1;PAK2;PCNA;PIK3R1;PRKCA;PTEN;PTGS2;PTK2;PTPN11;RAG1;RAP1A;RHOA;STAT1;TGFB2;TNFRSF1A;TNFRSF1B;TRAF1;TXK
T CELL PROLIFERATION	41	431	4.37E-67	9.56E-66	AKT1;APC;BAX;BCL2;CCND1;CCND3;CD34;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRP;CSF1R;FASLG;FLT3LG;FOS;IL15RA;IL1A;IL2RA;IL7;ITGA4;ITK;JUN;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PTGS2;PTPN11;RAG1;RB1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B;TXK
#cluster39	Enrichment Score: 71.65				
GROWTH FACTOR BINDING	37	247	6.17E-102	3.73E-100	AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;CRP;EGFR;ERBB3;ESR1;FGF1;FGF2;FGF7;FGFR1;FOS;GH1;IL1A;INSR;IRS1;JUN;KDR;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTEN;PTGS2;RXRA;SMAD2;SP1;STAT1;TGFB2;TIMP3
TISSUE REMODELING	29	224	1.90E-67	4.32E-66	AGTR1;AKT1;BAX;BCL2;CD34;CDKN1A;CRP;EGFR;FASLG;FGF2;FOS;GJA1;IL1A;JUN;KDR;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MMP16;PCNA;PTGS2;PTK2;SMAD2;SP1;STAT1;TGFB2;TIMP3
COLLAGEN TYPE I	30	197	8.44E-84	3.11E-82	AGTR1;AKT1;BCL2;CD34;CDH2;CDKN1A;COL2A1;CRP;FGF2;FOS;GJA1;IL1A;ITGA3;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PDGFRB;PDGFRB;PTGS2;PTK2;RHOA;SMAD2;SMAD4;SP1;TGFB2;TGFB3;TIMP3
DIFFERENTIAL GENE EXPRESSION	30	402	2.47E-36	2.72E-35	AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDKN1A;CREB1;E2F1;E2F5;EGFR;ERBB3;ESR1;FASLG;FGF2;FOS;IL1A;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PTGS2;SP1;STAT1;TGFB2;TIMP3

Supplementary Table 5b: Continued

#cluster	Enrichment Score					
#cluster40	Enrichment Score: 69.76					
MAP KINASE KINASE	25	102	1.14E-116	1.07E-114	AKT1;BCL2;CCND1;CDC42;CDK1;CDKN1A;CREB1;EGFR;ELK1;FGF2;FOS;IRS1;JUN;MAP3K11;MAP3K13;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;MAPKAPK2;PSMC6;PTGS2	
RIBOSOMAL S6 KINASE	21	78	2.65E-24	2.18E-23	AKT1;BCL2;CCND1;CDK1;CREB1;EGFR;ELK1;FOS;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;MAPKAPK3;PSMC6;PTEN;PTGS2;RPS6KB1	
#cluster41	Enrichment Score: 67.61					
ANTI APOPTOSIS	22	124	3.57E-72	9.36E-71	AKT1;BAX;BCL2;CCND1;CDK1;CDK4;CDKN1A;CDKN2A;CREB1;EGFR;FASLG;FGF2;FOS;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PTEN;PTGS2;TNFRSF1A;XIAP	
CYTOCHROME C RELEASE	28	218	1.72E-64	3.59E-63	AK2;AKT1;BAX;BCL2;CCND1;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;EGFR;FASLG;FOS;JUN;MAP3K13;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;PML;PTEN;PTGS2;RB1;TNFRSF1A;XIAP	
#cluster42	Enrichment Score: 66.06					
CELL DIVISION CYCLE	23	133	1.85E-73	5.31E-72	AKT1;APC;BAX;BCL2;CCND1;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;E2F1;JUN;MAPK1;MAPK3;MAPK8;PCNA;RB1;RHOA;WEE1	
CELL CYCLE CHECKPOINT	25	187	4.13E-60	7.90E-59	AKT1;BAX;BCL2;CCND1;CCND3;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;E2F1;EGFR;FOS;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;PCNA;PLK3;RB1;WEE1	
#cluster43	Enrichment Score: 65.23					
SRC FAMILY KINASE	37	258	4.43E-97	2.42E-95	AKT1;BCL2;BLK;CCND1;CDC42;CDK2;CDKN1A;CRK;CRKL;CSF1R;EGFR;FGF2;FGFR1;FOS;INSR;ITK;JUN;KDR;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;NCK1;PDGFRB;PIK3R1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RHOA;STAT1;TNK2;TXK;VAV2;WASL	
STRESS FIBER	35	337	2.37E-63	4.87E-62	AKT1;BCL2;CCND1;CDC42;CDH2;CDKN1A;CRK;CTNNA1;EGFR;FGF2;FOS;GJA1;GNA12;INSR;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;NCK1;PAK2;PRKCA;PSMC6;PTGS2;PTK2;PTPN11;RAP1A;RHOA;RHOB;SMAD2;TNK2;VAV2;WASL	
P21 ACTIVATED KINASE	21	106	1.46E-77	4.75E-76	AKT1;BCL2;CCND1;CDC42;CDKN1A;EGFR;ESR1;ITPR1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NCK1;NF2;PAK2;PTK2;RHOA;TNK2;VAV2;WASL	
ACTIN FILAMENT	35	537	6.27E-37	7.08E-36	ABI2;AKT1;APC;BCL2;CCND1;CDC42;CDH2;CDK1;CDKN1A;CDKN2A;CTNNA1;EGFR;FGF2;FOS;GJA1;INSR;IQGAP1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;MAPKAPK3;NCK1;NF2;PRKCA;PTEN;PTGS2;PTK2;RHOA;RHOB;WASF3;WASL	
ACTIN CYTOSKELETON	60	1025	7.12E-55	1.22E-53	ABI2;AKT1;APC;ARHGAP5;BAX;BCL2;CAV2;CCND1;CDC42;CDH2;CDK1;CDKN1A;CDKN2A;CRK;CRKL;CTNNA1;EGFR;FASLG;FGF2;FGF7;FOS;GJA1;GNA12;IL1A;INSR;IQGAP1;IRS1;ITGB8;ITK;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;MAPKAPK3;NCK1;NF2;PRKCA;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RHOA;RHOB;RPS6KB1;SMAD2;TNK2;VAV2;WASF3;WASL	

Supplementary Table 5b: Continued

#cluster	Enrichment Score				
#cluster44	Enrichment Score: 64.08				
EPITHELIAL MESENCHYMAL TRANSITION	45	502	2.08E-70	5.19E-69	AKT1;AKT2;APC;BAX;BCL2;CCND1;CD34;CDC42;CDH11;CDH2;CDH6;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRKL;EGFR;EP300;ERBB3;ESR1;FGF1;FGF2;FGFR1;FN1;FOS;ITGA6;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PDGFRB;PTEN;PTGS2;PTK2;RHOA;SMAD2;SMAD4;SP1;STAT1;TGFB2
EPITHELIAL TO MESENCHYMAL	34	328	2.27E-61	4.46E-60	AKT1;APC;BAX;BCL2;CCND1;CDC42;CDH11;CDH2;CDKN1A;CDKN2A;EGFR;EP300;ERBB3;ESR1;FGF2;FGFR1;FN1;ITGA6;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PDGFRB;PTEN;PTGS2;PTK2;RHOA;SMAD2;SMAD4;TGFB2;TGFB3
OSTEOBLAST DIFFERENTIATION	31	271	1.18E-62	2.38E-61	AKT1;BAX;BCL2;CCND1;CDH11;CDH2;CDKN1A;CREB1;EGFR;EP300;ESR1;FGF2;FGFR1;FOS;GJA1;JUN;KDR;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PTCH1;PTGS2;PTK2;RB1;SMAD2;SMAD4;SMAD6;SP1;TGFB2
#cluster45	Enrichment Score: 63.89				
RECEPTOR BINDING	59	796	3.55E-73	1.01E-71	ACVR1B;ADRA2A;AGTR1;AKT1;BAX;BCL2;CCND1;CDKN1A;CREB1;CSF3R;EDNRB;EGFR;EP300;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FLT4;FOS;GH1;IFNA2;IFNAR1;IL10RA;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PDGFA;PDGFB;PDGFRB;PF4;PIK3R1;PTGS2;PTK2;PTPN11;RXRA;SMAD2;SP1;STAT1;TGFB2;TGFB3;TNFRSF1A;TNFRSF1B;WNT2
RECEPTOR ANTAGONIST	66	1193	4.64E-56	8.19E-55	ABCC1;AGTR1;AKT1;AKT2;ANGPT2;BAX;BCL2;CCND1;CD34;CDC42;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRP;CYP1B1;EDNRB;EGFR;EP300;ESR1;FASLG;FGF1;FGF2;FGF7;FGFR1;FOS;GH1;GJA1;IL10RA;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;NCAM1;PCNA;PDGFA;PDGFB;PDGFRB;PF4;PRKCA;PRKCG;PSMC6;PTEN;PTGS2;PTK2;RHOA;SMAD2;SP1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B
#cluster46	Enrichment Score: 63.51				
CANCER STEM CELL	38	338	1.44E-75	4.35E-74	ABCC1;AKT1;APC;BAX;BCL2;CCND1;CD34;CDH2;CDK2;CDK4;CDKN1A;CDKN2A;EGFR;EP300;ERBB3;ESR1;FGF2;ITGA6;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PDGFRB;PTEN;PTGS2;PTK2;SMAD2;SMAD4;XIAP
STEM CELL MARKER	28	259	6.59E-53	1.07E-51	AKT1;APC;BAX;BCL2;CCND1;CD34;CDH2;CDKN1A;CDKN2A;CSF2RB;EGFR;ESR1;FGF2;FGF4;GJA1;ITGA6;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK3;NCAM1;PCNA;PDGFRB;PTEN;PTGS2
#cluster47	Enrichment Score: 62.33				
SMOOTH MUSCLE ACTIN	53	489	7.36E-104	4.98E-102	AGTR1;AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDH11;CDH2;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRP;EDNRB;EGFR;FGF1;FGF2;FGFR1;FLT4;FN1;FOS;GJA1;IL1A;ITGA6;JUN;KDR;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PDGFA;PDGFB;PDGFRA;PDGFRB;PTCH1;PTEN;PTGS2;PTK2;RHOA;SERPINB5;SMAD2;SMAD4;SMAD6;SP1;STAT1;TGFB2;TGFB3

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Supplementary Table 5b: Continued

HEPATIC STELLATE CELL	33	234	9.20E-85	3.46E-83	AGTR1;AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDK4;CDKN1A;CREB1;EDNRB;EGFR;FASLG;FGF2;FOS;IL1A;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PDGFRB;PTEN;PTGS2;PTK2;RHOA;SMAD2;SMAD4;SP1;STAT1;TGFB3
TUBULAR EPITHELIAL CELL	30	235	1.02E-68	2.44E-67	AGTR1;AKT1;BAX;BCL2;CCND1;CDC42;CDH2;CDKN1A;CDKN2A;CRP;EGFR;FASLG;FGF2;FOS;IL1A;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTEN;PTGS2;RHOA;SMAD2;SMAD4;SP1;STAT1;TNFRSF1A
BASEMENT MEMBRANE	55	645	4.86E-81	1.70E-79	AGTR1;AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDC42;CDH2;CDKN1A;CDKN2A;COL4A6;CRP;EGFR;ESR1;FASLG;FGF1;FGF2;FGF5;FGF7;FGFR1;FLT4;FN1;FOS;GJA1;IL1A;IL2RA;ITGA3;ITGA6;ITGB8;JUN;KDR;KITLG;LAMC1;MAPK1;MAPK14;MAPK3;MAPK8;MMP16;NCAM1;PCNA;PDGFRB;PF4;PRKCA;PTEN;PTGS2;PTK2;RHOA;SERPINB5;SMAD2;SMAD4;SP1;TGFB2;TGFB3;TIMP3
TIGHT JUNCTION	36	456	7.32E-47	1.02E-45	ABCC1;AKT1;ANGPT2;BAX;BCL2;CCND1;CDC42;CDH2;CDKN1A;CDKN2A;CTNNA1;EGFR;FGF2;FGF7;GJA1;IL1A;INSR;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PRKCA;PTEN;PTGS2;PTK2;RAP1A;RHOA;SMAD2;SMAD4;TGFB3;TNFRSF1A;TNFRSF1B;WASL
TRANSMISSION ELECTRON MICROSCOPY	36	462	4.14E-46	5.59E-45	AGTR1;AKT1;BAX;BCL2;CALR;CAV2;CCND1;CD34;CDC42;CDH2;CDK1;CDKN1A;CDKN2A;CRP;EGFR;ESR1;FASLG;FGF2;FOS;GJA1;IL1A;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PML;PTEN;PTGS2;PTK2;RHOA
ADVANCED GLYCATION END	21	206	6.90E-37	7.74E-36	AGTR1;AKT1;BAX;BCL2;CCND1;CDC42;CDKN1A;CRP;FGF2;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PSMC6;PTGS2;RHOA;SMAD2;SP1;STAT1
SCANNING ELECTRON MICROSCOPY	23	248	3.44E-36	3.77E-35	AGTR1;AKT1;BAX;BCL2;CD34;CDC42;CDH2;CDKN1A;CRP;EGFR;FGF2;FLT4;GJA1;IL1A;KDR;LIF;MAPK1;MAPK3;PCNA;PF4;PTGS2;PTK2;RHOA
#cluster48	Enrichment Score: 62.02				
BONE MARROW STROMAL	31	237	4.82E-73	1.35E-71	AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDKN1A;CDKN2A;COL2A1;CREB1;EGFR;ESR1;FGF2;FLT3LG;FOS;GJA1;IL1A;IL7;ITGA4;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PTGS2;TGFB3
MARROW STROMAL CELLS	28	210	2.78E-67	6.21E-66	AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDKN1A;CREB1;ESR1;FGF2;FLT3LG;FOS;GJA1;IL1A;IL7;ITGA4;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PTGS2;TGFB2;TGFB3
FOLLICLE STIMULATING HORMONE	25	228	6.27E-48	9.00E-47	ACV1B;AKT1;BAX;BCL2;CCND2;CDH2;CREB1;CRP;EGFR;ESR1;FGF2;FOS;GH1;GJA1;IL1A;JUN;KITLG;MAPK1;MAPK3;PCNA;PTGS2;SMAD2;SMAD4;TGFB2;TGFB3
#cluster49	Enrichment Score: 61.11				
THYMIDINE KINASE	27	183	1.24E-72	3.32E-71	BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDKN1A;CDKN2A;CREB1;CRP;DHFR;E2F1;EGFR;ESR1;FASLG;FGF2;FLT3LG;FOS;GJA1;IL2RA;JUN;KDR;MAP3K11;MAPK1;PCNA;RB1;SP1

Supplementary Table 5b: Continued

BETA GALACTOSIDASE	34	383	4.94E-51	7.65E-50	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;DHFR;E2F1;EGFR;ESR1;FASLG;FGF2;FOS;GJA1;IL1A;INSR;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTGS2;RB1;SP1;WNT7A
#cluster50	Enrichment Score: 60.91				
INVASIVE BREAST CANCER	25	139	1.55E-83	5.63E-82	AKT1;BAX;BCL2;CCND1;CD34;CDC42;CDH2;CDKN1A;CDKN2A;EGFR;ERBB3;ERBB4;ESR1;JUN;KDR;MAPK1;MAPK14;MAPK3;NME1;PCNA;PTEN;PTGS2;PTK2;RB1;RHOA
PRIMARY BREAST CANCER	21	149	2.30E-53	3.81E-52	AKT1;BCL2;CCND1;CCNE1;CD34;CDKN1A;CDKN1B;CDKN2A;EGFR;ERBB3;ERBB4;ESR1;JUN;KDR;MAPK1;MAPK3;NME1;PCNA;PTEN;PTGS2;RB1
CARCINOMA IN SITU	26	177	1.53E-69	3.75E-68	AKT1;APC;BAX;BCL2;CCND1;CCND2;CD34;CDH13;CDK4;CDKN1A;CDKN1B;CDKN2A;EGFR;ERBB3;ESR1;KDR;KITLG;KRAS;MAPK1;NCAM1;NME1;PCNA;PTEN;PTGS2;RB1;SERPINB5
METHYLATION SPECIFIC PCR	27	306	4.19E-40	5.15E-39	AKT1;APC;BAX;BCL2;CCNA1;CCND1;CCND2;CDH13;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;EDNRB;EGFR;ESR1;ITGA4;ITGA9;KRAS;MAPK1;PTEN;PTGS2;RB1;SERPINB5;SMAD4;SP1;TIMP3
#cluster51	Enrichment Score: 59.28				
TISSUE GROWTH FACTOR	27	177	2.21E-75	6.61E-74	AGTR1;AKT1;BAX;BCL2;CCND1;CDKN1A;EGFR;EP300;FGF2;FN1;FOS;IL1A;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTGS2;PTK2;RHOA;SMAD2;SMAD4;TGFB2;TGFB3;TIMP3
RETINAL PIGMENT EPITHELIAL	24	158	1.65E-66	3.59E-65	AKT1;BAX;BCL2;CDH2;CDKN1A;EGFR;FASLG;FGF2;FOS;IL1A;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;PCNA;PDGFRB;PTGS2;PTK2;SMAD2;TGFB2;TIMP3
RETINAL PIGMENT EPITHELIUM	25	277	4.05E-38	4.71E-37	AKT1;APC;BAX;BCL2;CCND1;CDH2;CDKN1A;CDKN2A;FASLG;FGF2;FOS;GJA1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;PCNA;PRKCA;PTGS2;PTK2;TGFB2;TIMP3
#cluster52	Enrichment Score: 58.53				
TUMOR NECROSIS FACTOR	50	603	3.64E-71	9.40E-70	AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDKN1A;CREB1;CRP;EGFR;ESR1;FASLG;FGF2;FGF7;FOS;GJA1;IL12B;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;ITGA4;JUN;KDR;KITLG;LIF;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP2;MAPKAP3;NCAM1;PCNA;PSMC6;PTGS2;RIPK1;SP1;STAT1;TGFB2;TIMP3;TNFRSF1A;TNFRSF1B;TRAF1;XIAP
TOLL LIKE RECEPTOR	64	955	6.02E-70	1.49E-68	AGTR1;AKT1;ATF2;BAX;BCL2;CALR;CCND1;CD34;CDC42;CDKN1A;CDKN2A;CREB1;CRK;CRP;CSF1R;EGFR;EP300;ESR1;FASLG;FGF2;FLT3LG;FOS;GJA1;IFNA2;IFNAR1;IL12B;IL13RA1;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;JUN;KDR;KRAS;LIF;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP2;MERTK;NCAM1;PCNA;PIK3R1;PRKCA;PSMC6;PTEN;PTGS2;PTPN11;RAG1;RHOA;RIPK1;SMAD2;SP1;STAT1;TNFRSF1A;TNFRSF1B;TRAF1;XIAP

Supplementary Table 5b: Continued

CYTOKINE PRODUCTION	57	843	6.71E-63	1.37E-61	AKT1;ATF2;BAX;BCL2;CALR;CCND1;CD34;CDKN1A;CREB1;CRP;CSF1R;EGFR;EP300;ESR1;FASLG;FGF2;FLT3LG;FOS;IFNAR1;IL12B;IL1A;IL2RA;IL4R;IL7;IRS1;ITGA4;ITK;JUN;KITLG;KRAS;LIF;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAPK2;MERTK;NCAM1;PCNA;PF4;PIK3R1;PML;PRKCA;PSMC6;PTEN;PTGS2;PTPN11;RAG1;RIPK1;SMAD2;STAT1;TGFB2;TNFRSF1A;TNFRSF1B;TXK;XIAP
INNATE IMMUNE RESPONSE	38	675	5.27E-33	5.44E-32	AKT1;BAX;BCL2;CALR;CDC42;CDKN1A;CREB1;CRP;EGFR;ESR1;FASLG;FOS;IFNA2;IFNAR1;IL12B;IL1A;IL2RA;IL7;JUN;KRAS;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;PML;PTEN;PTGS2;PTPN11;RAG1;RHOA;RIPK1;STAT1;TNFRSF1A;TNFRSF1B
#cluster53	Enrichment Score: 57.49				
CYTOKINE RECEPTOR	46	338	2.58E-114	2.24E-112	AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;CRP;CSF1R;CSF2RB;CSF3R;EGFR;FASLG;FGF2;FLT3LG;FOS;IFNAR1;IL10RA;IL12B;IL13RA1;IL15RA;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;ITK;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PDGFRB;PIK3R1;PTEN;PTGS2;PTPN11;STAT1;TNFRSF1A;TNFRSF1B;TXK
CYTOKINE SECRETION	28	307	2.71E-43	3.51E-42	AKT1;BAX;BCL2;CD34;CDKN1A;CREB1;CRP;EGFR;FASLG;FGF2;FOS;IL12B;IL1A;IL2RA;IL7;ITK;JUN;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;PTGS2;STAT1;TNFRSF1A
RECEPTOR COMPLEX	50	530	3.59E-83	1.28E-81	ACV1B;AKT1;BCL2;BLK;CD34;CDKN1A;CREB1;CRP;CSF2RB;CSF3R;EGFR;ERBB3;ERBB4;ESR1;FASLG;FGF1;FGF2;FGFR1;FOS;IFNA2;IFNAR1;IL10RA;IL13RA1;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;JUN;KDR;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PTCH1;PTK2;PTPN11;RHOA;RIPK1;SMAD2;SMAD4;SMAD6;STAT1;TGFB3;TNFRSF1A;TNFRSF1B
ADAPTIVE IMMUNE RESPONSE	26	395	7.53E-27	6.59E-26	AKT1;BCL2;CD34;CRP;FASLG;FLT3LG;FOS;IFNAR1;IL12B;IL15RA;IL1A;IL2RA;IL7;ITK;JUN;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PTGS2;RAG1;STAT1;TXK
ANTIGEN PRESENTING CELLS	28	515	1.96E-23	1.57E-22	AKT1;BAX;BCL2;CALR;CD34;CRP;CSF1R;EGFR;FASLG;FLT3LG;FLT4;IL12B;IL1A;IL2RA;IL7;JUN;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PTGS2;RAG1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B
#cluster54	Enrichment Score: 56.79				
HERPES SIMPLEX VIRUS	41	423	1.34E-68	3.15E-67	AKT1;BAX;BCL2;CCND1;CCND3;CD34;CDK1;CDK2;CDK4;CDKN1A;CREB1;CRK;CRP;DHFR;EGFR;EIF2S1;EP300;ESR1;FASLG;FGF2;FLT3LG;FOS;GJA1;IFNA2;IL1A;IL2RA;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PML;PTGS2;RIPK1;SP1;STAT1;TNFRSF1A;UBE2B
HUMAN IMMUNODEFICIENCY VIRUS	48	785	1.96E-46	2.69E-45	ABCC1;AKT1;BAX;BCL2;CCND1;CD34;CDC42;CDK1;CDK2;CDKN1A;CDKN2A;CREB1;CRK;CRP;DHFR;EIF1;EGFR;EP300;ESR1;FASLG;FES;FGF2;FOS;GTF2H4;IFNA2;IL1A;IL2RA;IL7;JUN;KDR;KITLG;KRAS;MAP3K11;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PAK2;PCNA;PML;PTGS2;RHOA;SP1;STAT1;TNFRSF1A;TNFRSF1B;UBE2B

Supplementary Table 5b: Continued

#cluster	Enrichment Score				
#cluster55	Enrichment Score: 56.16				
MITOCHONDRIAL MEMBRANE POTENTIAL	41	407	8.27E-72	2.16E-70	ABCC1;AKT1;BAX;BCL2;CALR;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;E2F1;EGFR;FASLG;FGF2;FOS;IRS1;JUN;KDR;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PAK2;PCNA;PML;PRKAA2;PRKCA;PTEN;PTGS2;RB1;RIPK1;SP1;STAT1;TNFRSF1A;XIAP
MITOCHONDRIAL MEMBRANE	48	847	5.84E-42	7.40E-41	ABCC1;AK2;AKT1;BAX;BCL2;CALR;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;DHFR;E2F1;EGFR;FASLG;FGF2;FOS;GJA1;IRS1;JUN;KDR;KRAS;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PAK2;PCNA;PML;PRKAA2;PRKCA;PTEN;PTGS2;PTK2;RB1;RHOA;RIPK1;RPS6KB1;SP1;STAT1;TNFRSF1A;XIAP
#cluster56	Enrichment Score: 53.99				
TRADITIONAL CHINESE MEDICINE	28	170	3.50E-85	1.36E-83	ABCC1;AKT1;BAX;BCL2;CCND1;CDK1;CDK2;CDK4;CDKN1A;CREB1;CRP;EGFR;ESR1;FASLG;FGF2;FOS;IL2RA;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PTGS2;RB1
GLUTATHIONE PEROXIDASE	24	371	3.06E-24	2.50E-23	ABCC1;AKT1;BAX;BCL2;CCND1;CDKN1A;CREB1;CRP;EGFR;FASLG;FOS;IL1A;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PCNA;PML;PSMA4;PTGS2
#cluster57	Enrichment Score: 53.94				
CHRONIC MYELOID LEUKEMIA	39	262	8.21E-107	5.92E-105	ABCC1;AKT1;BAX;BCL2;CALR;CCND1;CD34;CDK1;CDK2;CDKN1A;CDKN2A;CDKN2B;CRKL;CSF1R;CSF3R;EGFR;ESR1;FASLG;FGFR1;IFNA2;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NRAS;PDGFRA;PDGFRB;PML;PTEN;PTGS2;PTPN11;RB1;STAT1;XIAP
RESPONSE TO TREATMENT	32	316	3.88E-56	6.89E-55	ABCC1;AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;CRP;EGFR;EP300;ESR1;FASLG;FGF2;FOS;IFNA2;IL1A;IL2RA;JUN;KDR;KRAS;MAPK1;MAPK3;NCAM1;PCNA;PDGFRA;PDGFRB;PML;PTEN;PTGS2;RB1;STAT1
YEAR SURVIVAL RATE	25	180	9.53E-63	1.93E-61	AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN1B;CDKN2A;CRP;EGFR;ESR1;FGF2;IFNA2;JUN;KDR;KRAS;MAPK1;MAPK3;NCAM1;NME1;PCNA;PML;PTEN;PTGS2;SMAD4
MAGNETIC RESONANCE IMAGING	39	695	1.04E-33	1.09E-32	AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;CRP;EGFR;EP300;ESR1;FGF2;FGFR1;FLT4;FOS;GJA1;IFNA2;IL1A;IL2RA;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MEN1;NCAM1;NF1;NF2;PCNA;PDGFRA;PDGFRB;PML;PTEN;PTGS2;TNFRSF1A;TUBB4A
PAPILLARY THYROID CARCINOMA	21	144	1.95E-55	3.39E-54	AKT1;APC;BCL2;CCND1;CD34;CDKN1A;CDKN1B;CDKN2A;EGFR;KDR;KRAS;MAPK1;MAPK3;NCAM1;NRAS;PAX8;PCNA;PDGFRB;PTCH1;PTEN;PTGS2
STATISTICALLY SIGNIFICANT DIFFERENCE	42	555	2.04E-53	3.40E-52	AGTR1;AKT1;APC;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;CRP;EGFR;EP300;ESR1;FASLG;FGF2;FOS;GJA1;GNB3;IFNA2;IL1A;IL2RA;IL7;INSR;JUN;KDR;KITLG;KRAS;LIF;MAPK1;MAPK14;MAPK3;NCAM1;NME1;PCNA;PF4;PML;PTEN;PTGS2;RB1;SMAD4;SRD5A2;TGFB2

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Supplementary Table 5b: Continued

QUANTITATIVE REVERSE TRANSCRIPTASE	27	260	1.19E-48	1.75E-47	ABCC1;AGTR1;AKT1;BAX;BCL2;CCND1;CD34;CDK4;CDKN1A;CDKN2A;EGFR;ESR1;FASLG;FGF2;FOS;IL1A;IL2RA;JUN;KDR;MAPK1;MAPK3;MAPK8;PCNA;PTEN;PTGS2;STAT1;TIMP3
FRAGMENT LENGTH POLYMORPHISM	31	675	1.96E-20	1.47E-19	ADRA2A;AGTR1;APC;BCL2;CCND1;CDKN1A;CDKN2A;COL2A1;CRP;CYP1B1;DHFR;EGFR;ESR1;FASLG;FOS;GNB3;IL12B;IL1A;IL4R;INSR;IRS1;KRAS;NME1;NRAS;PTEN;PTGS2;RB1;SP1;SRD5A2;TNFRSF1A;TNFRSF1B
#cluster58	Enrichment Score: 53.79				
ENHANCER BINDING	37	409	6.82E-57	1.23E-55	AKT1;ATF2;BAX;BCL2;CALR;CCND1;CD34;CDK2;CDK4;CDKN1A;CDKN2A;COL2A1;CREB1;CRP;CSF3R;E2F1;EGFR;EIF2S1;EP300;ESR1;FGF2;FOS;INSR;IRS1;JUN;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PTGS2;RXRA;SMAD4;SP1;STAT1
ENHANCER BINDING PROTEIN	33	356	3.78E-52	6.00E-51	AKT1;ATF2;BAX;BCL2;CALR;CCND1;CD34;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRP;CSF3R;E2F1;EGFR;EIF2S1;EP300;ESR1;FOS;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PTGS2;RXRA;SP1;STAT1
#cluster59	Enrichment Score: 53.31				
TELOMERASE ACTIVITY	31	197	7.12E-90	3.05E-88	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;E2F1;EGFR;ESR1;FGF2;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;MAX;PCNA;PML;PTEN;PTGS2;RB1;SP1
CELLULAR SENESCENCE	28	208	5.17E-68	1.18E-66	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CSNK2A1;E2F1;EGFR;EP300;FOS;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PTEN;RB1;SP1
DOUBLE STRAND BREAK	29	540	7.79E-24	6.30E-23	AKT1;BAX;BCL2;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CSNK2A1;E2F1;EGFR;EP300;FOS;IRS1;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PTCH1;PTEN;RAG1;RB1;WEE1
MOUSE EMBRYO FIBROBLASTS	28	88	2.02E-34	2.13E-33	AKT1;BAX;BCL2;CCND1;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CYP1B1;E2F1;E2F2;EGFR;EIF2S1;EP300;FOS;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PML;PTEN;PTK2;RB1;STAT1
#cluster60	Enrichment Score: 52.92				
PANCREATIC DUCTAL ADENOCARCINOMA	24	188	1.00E-54	1.70E-53	AKT1;AKT2;BAX;BCL2;CCND1;CD34;CDH2;CDK4;CDKN1A;CDKN2A;EGFR;FGF2;JUN;KRAS;MAPK1;MAPK14;MAPK3;PCNA;PTEN;PTGS2;PTK2;SERPINB5;SMAD2;SMAD4
METASTATIC BREAST CANCER	21	151	1.41E-52	2.28E-51	AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDK4;CDKN1A;CRP;EGFR;ERBB3;ESR1;JUN;KDR;MAPK1;MAPK14;MAPK3;PTEN;PTGS2;PTK2;SMAD2
#cluster61	Enrichment Score: 52.46				
TO THE PROGRESSION	24	142	7.81E-75	2.30E-73	AKT1;BAX;BCL2;CCND1;CDKN1A;CDKN2A;CRP;EGFR;EP300;FASLG;FGF2;FOS;IL2RA;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTEN;PTGS2;PTK2;SMAD2
EARLY GROWTH RESPONSE	22	123	8.15E-73	2.21E-71	AKT1;BAX;BCL2;CCND1;CDKN1A;CREB1;EGFR;ELK1;EP300;FASLG;FGF2;FOS;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PDGFA;PTEN;PTGS2;SP1

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Supplementary Table 5b: Continued

ACTIVATING TRANSCRIPTION FACTOR	21	185	9.00E-42	1.14E-40	AKT1;ATF2;BAX;BCL2;CALR;CCND1;CDKN1A;CREB1;EGFR;EIF2S1;EP300;FOS;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTGS2;SP1;STAT1
CHRONIC LIVER DISEASE	24	202	1.99E-50	3.05E-49	AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;CRP;EGFR;ESR1;FASLG;IFNA2;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTGS2;SMAD2;STAT1;UBE2B
INTERFERON REGULATORY FACTOR	23	202	5.48E-46	7.36E-45	AKT1;ATF2;BAX;BCL2;CCND1;CDKN1A;CREB1;EP300;FOS;IFNA2;IFNAR1;IL12B;IL1A;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PML;PTGS2;SP1;STAT1
CHRONIC HEPATITIS C	22	245	2.70E-33	2.80E-32	AKT1;BCL2;CD34;CDKN1A;CRP;ESR1;FASLG;IFNA2;IFNAR1;IL1A;IL2RA;JUN;KRAS;MAPK1;MAPK3;MAPK8;NCAM1;PCNA;PTGS2;STAT1;TNFRSF1B;UBE2B
#cluster62	Enrichment Score: 52.04				
CELL CELL ADHESION	36	334	4.32E-68	9.95E-67	AKT1;APC;BCL2;CCND1;CD34;CDC42;CDH11;CDH13;CDH2;CDH6;CDKN1A;CDKN2A;CTNNA1;EGFR;FGF2;GJA1;IL6R;IQGAP1;ITGA3;ITGA6;ITGA9;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PRKCA;PTEN;PTK2;RAP1A;RAP1B;RHOA;SMAD4;VAV2
ADHERENS JUNCTION	28	262	3.34E-52	5.33E-51	AKT1;APC;CCND1;CDC42;CDH11;CDH2;CDH6;CDKN1A;CRK;CTNNA1;EGFR;GJA1;IQGAP1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;NF2;PRKCA;PTEN;PTK2;PTPN11;RAP1A;RHOA;SMAD2;VAV2
CELL JUNCTION	22	219	5.17E-38	5.96E-37	AKT1;ANGPT2;CDC42;CDH11;CDH2;CDH6;CTNNA1;EGFR;GJA1;IQGAP1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PTK2;PTPN11;RAP1A;RAP1B;RHOA;WASL
#cluster63	Enrichment Score: 51.22				
UBIQUITIN PROTEASOME PATHWAY	29	225	4.16E-67	9.15E-66	AKT1;BAX;BCL2;CCND1;CDK1;CDK2;CDKN1A;CDKN1B;CREB1;E2F1;EGFR;EP300;ESR1;FOS;IRS1;JUN;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PSMB6;PSMC6;PSMD2;STAT1;UBE2D2;XIAP
RETINOIC ACID RECEPTOR	29	310	3.05E-46	4.15E-45	AKT1;BAX;BCL2;CCND1;CD34;CDH13;CDK2;CDKN1A;CDKN2A;CREB1;E2F1;EGFR;EP300;ESR1;FOS;JUN;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PML;PTGS2;RB1;RXRA;SP1;STAT1;TGFB2
DNA METHYLTRANSFERASE	30	354	1.72E-42	2.20E-41	ABCC1;AKT1;APC;BAX;BCL2;CCND1;CD34;CDH13;CDKN1A;CDKN2A;CDKN2B;CREB1;E2F1;EGFR;EP300;ESR1;FOS;JUN;KRAS;MAPK1;MAPK3;PCNA;PML;PTEN;PTGS2;RB1;SERPINB5;SP1;STAT1;TIMP3
#cluster64	Enrichment Score: 50.80				
INDUCIBLE NITRIC OXIDE	43	424	5.51E-76	1.70E-74	AGTR1;AKT1;APC;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;CREB1;CRP;EDNRB;EGFR;EP300;ESR1;FASLG;FGF2;FOS;GJA1;IL12B;IL1A;IL2RA;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PCNA;PRKCA;PSMC6;PTEN;PTGS2;PTK2;RHOA;SMAD2;STAT1;TIMP3;TNFRSF1A;TNFRSF1B
LOW DENSITY LIPOPROTEIN	46	937	5.40E-33	5.55E-32	AGTR1;AKT1;BAX;BCL2;CALR;CCND1;CD34;CDH13;CDKN1A;CREB1;CRP;CSF1R;EGFR;ESR1;FASLG;FGF1;FGF2;FOS;GJA1;IL1A;IL2RA;IL6R;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PCNA;PDGFRB;PF4;PRKCA;PTEN;PTGS2;PTK2;RHOA;SMAD2;SP1;STAT1;TIMP3;TNFRSF1B;WNT2;WNT7A

Supplementary Table 5b: Continued

NITRIC OXIDE SYNTHASE	65	958	3.38E-72	8.94E-71	AGTR1;AKT1;AKT2;ANGPT2;APC;ATF2;BAX;BCL2;CALR;CAV2;CCND1;CD34;CDK4;CDKN1A;CDKN2A;CREB1;CRP;CSF1R;DHFR;EDNRB;EGFR;EP300;ESR1;FASLG;FGF1;FGF2;FGFR1;FOS;GJA1;GNB3;IL12B;IL1A;IL2RA;INSR;IRS1;JUN;KDR;KITLG;LIF;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;NCAM1;PCNA;PIK3R1;PRKAA2;PRKCA;PRKCG;PROCR;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RHOA;SMAD2;SP1;STAT1;TGFB2;TIMP3;TNFRSF1A;TNFRSF1B
ISCHEMIA REPERFUSION INJURY	36	391	1.64E-56	2.92E-55	AGTR1;AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;CREB1;CRP;FASLG;FGF1;FGF2;FGFR1;FOS;GJA1;IL1A;IL2RA;JUN;KDR;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PCNA;PRKCA;PSMC6;PTEN;PTGS2;RAG1;RHOA;RIPK1;STAT1;TNFRSF1A;XIAP
BLOOD BRAIN BARRIER	41	534	4.19E-53	6.86E-52	ABCC1;AGTR1;AKT1;ANGPT2;BAX;BCL2;CAV2;CD34;CDH2;CDKN1A;CDKN2A;CRP;EGFR;ESR1;FASLG;FGF2;FOS;GJA1;IL1A;IL2RA;INSR;JUN;KDR;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PDGFB;PDGFRB;PRKCA;PROCR;PTEN;PTGS2;PTK2;RHOA;STAT1;TIMP3;TNFRSF1A;TNFRSF1B;WNT7A
RECEPTOR AGONIST	46	834	9.05E-39	1.08E-37	ADRA2A;AGTR1;AKT1;BAX;BCL2;CCND1;CD34;CD42;CDKN1A;CDKN2A;CREB1;CRP;CSF3R;CYP1B1;EDNRB;EGFR;EP300;ESR1;FASLG;FGF2;FGFR1;FOS;GH1;GJA1;IL1A;IL2RA;INSR;IRS1;JUN;KDR;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;NCAM1;PCNA;PRKCA;PRKCG;PSMC6;PTGS2;PTK2;RHOA;STAT1;XIAP
TYPE 2 DIABETES	55	1319	4.32E-31	4.28E-30	ADRA2A;AGTR1;AKT1;AKT2;ANGPT2;BAX;BCL2;CCND1;CCND2;CD34;CDK4;CDKN1A;CDKN2A;CDKN2B;CREB1;CRP;DUSP9;EGFR;EP300;ESR1;FASLG;FGF2;FOS;GJA1;GNB3;GSK3A;IL12B;IL1A;IL2RA;IL6R;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;NF2;PCNA;PIK3R1;PKN2;PRKAA2;PRKCA;PTEN;PTGS2;PTPN11;RHOA;RPS6KB1;SMAD2;SP1;STAT1;TIMP3;TNFRSF1A;TNFRSF1B
#cluster65	Enrichment Score: 50.41				
ESTROGEN RECEPTOR ALPHA	28	220	7.95E-64	1.64E-62	AKT1;BAX;BCL2;CCND1;CDKN1A;CDKN2A;CREB1;CRP;CYP1B1;E2F1;EGFR;EP300;ERBB3;ERBB4;ESR1;FOS;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTEN;PTGS2;RB1;SP1;WNT7A
REPORTER GENE ASSAY	25	275	1.89E-38	2.24E-37	AKT1;BAX;BCL2;CCND1;CDKN1A;CREB1;CYP1B1;E2F1;EGFR;ELK1;EP300;ESR1;FOS;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PML;PTEN;PTGS2;SMAD2;SMAD4;SP1;STAT1
#cluster66	Enrichment Score: 50.29				
WHITE BLOOD CELL	33	350	3.21E-53	5.31E-52	ABCC1;AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;CRP;CSF3R;EGFR;ESR1;FASLG;FGF2;IFNA2;IL1A;IL2RA;IL7;ITGA4;JUN;KDR;KITLG;KRAS;MAPK1;MAPK14;NCAM1;NRAS;PCNA;PF4;PML;PTGS2;PTPN11;TNFRSF1B
STEM CELL TRANSPLANTATION	35	419	8.18E-49	1.22E-47	AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;CRP;CSF3R;ESR1;FASLG;FGF2;FGF7;FLT3LG;GJA1;IL10RA;IL1A;IL2RA;IL7;ITGA4;KDR;KITLG;KRAS;LIF;MAPK1;NCAM1;NF1;NRAS;PCNA;PML;PTGS2;PTPN11;RAG1;STAT1

Supplementary Table 5b: Continued

#cluster	Enrichment Score				
#cluster67	Enrichment Score: 50.10				
PROTEIN PHOSPHATASE 1	22	162	1.09E-53	1.83E-52	AKT1;BAX;BCL2;CDK1;CDK2;CDKN1A;CREB1;EIF2S1;FOS;GSK3A;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PPP2CA;PPP2R3A;PRKCA;PTEN;RB1
SKELETAL MUSCLE CELLS	22	179	5.79E-48	8.37E-47	AKT1;BAX;BCL2;CDK3;CDK2;CDKN1A;CDKN2A;FGF2;FOS;GSK3A;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PRKAA2;PRKCA;PTGS2;RB1
#cluster68	Enrichment Score: 49.35				
IKAPPAB KINASE	24	149	5.69E-71	1.44E-69	AKT1;BAX;BCL2;CCND1;CDKN1A;EGFR;EP300;FOS;IL1A;IRS1;JUN;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;PRKCA;PTEN;PTGS2;RIPK1;STAT1;TNFRSF1A;TRAF1;XIAP
AIRWAY EPITHELIAL CELL	21	251	3.47E-29	3.19E-28	AKT1;BAX;BCL2;CDKN1A;CREB1;EGFR;EP300;FASLG;FOS;GJA1;IL1A;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PRKCA;PTGS2;RHOA;STAT1;TNFRSF1A
#cluster69	Enrichment Score: 49.33				
SOFT TISSUE SARCOMA	21	123	5.69E-66	1.22E-64	ABCC1;AKT1;BAX;BCL2;CCND1;CD34;CDK4;CDKN1A;CDKN2A;CRP;EGFR;KDR;KRAS;MAPK1;NCAM1;NF1;PDGFRA;PDGFRB;PTEN;PTGS2;RB1
AGE AT DIAGNOSIS	23	201	2.99E-46	4.08E-45	AKT1;APC;BCL2;CCND1;CD34;CDK4;CDKN1A;CDKN2A;CRP;EGFR;ESR1;KRAS;MEN1;NCAM1;NF1;NF2;NRAS;PCNA;PDGFRA;PML;PTEN;PTGS2;RB1
WORLD HEALTH ORGANIZATION	25	221	1.09E-49	1.65E-48	AKT1;BCL2;CALR;CCND1;CD34;CDKN1A;CDKN2A;CDKN2B;CRP;DHFR;EGFR;ESR1;FGFR1;IFNA2;IL2RA;KRAS;NCAM1;NF1;NF2;PCNA;PDGFRA;PDGFRB;PML;PTEN;PTGS2
COMPARATIVE GENOMIC HYBRIDIZATION	39	631	2.50E-38	2.95E-37	AKT1;AKT2;APC;BCL2;CCND1;CCND2;CCND3;CCNE1;CD34;CDH13;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CRKL;E2F1;EGFR;ESR1;FGF4;FGFR1;JUN;KRAS;MAPK1;MEN1;NCAM1;NF1;NF2;NKX3-1;NRAS;PDGFB;PDGFRA;PIK3R3;PML;PTCH1;PTEN;RB1;RPS6KB1;SMAD4
#cluster70	Enrichment Score: 49.19				
PROTEIN PROTEIN INTERACTION	86	1794	1.45E-60	2.80E-59	AKT1;APC;ARAF;ATF2;BAX;BCL2;CALR;CCND1;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRK;CRKL;CRP;CSNK2A1;CTNNA1;DHFR;E2F1;E2F2;EGFR;ELK1;EP300;ERBB3;ERBB4;ESR1;FASLG;FES;FGF2;FGFR1;FN1;FOS;GJA1;GNA12;INSR;IQGAP1;IRS1;JUN;KDR;KRAS;MAP3K11;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAX;MDM4;NAP1L1;NCK1;NME1;PAK2;PCNA;PIK3R1;PIK3R3;PKN2;PLD1;PLK3;PML;PPP2CA;PPP5C;PRKCA;PSMF1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RB1;RBBP4;RHOA;RPS6KB1;RXRA;SMAD2;SMAD4;SP1;STAT1;TNFRSF1A;TNK2;UBE2B;WASL;XIAP;YWHAZ
PROTEIN COMPLEX	58	1489	1.48E-29	1.39E-28	ABI2;AKT1;APC;BAX;BCL2;CCND1;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRK;CRKL;CRP;CSNK2A1;DHFR;E2F1;EGFR;EP300;ESR1;FGF2;FOS;GNA12;GTF2H4;INSR;IQGAP1;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;MAX;NAP1L1;NCK1;NME1;PCNA;PML;PPP5C;PSMA3;PTEN;PTGS2;PTK2;PTPN11;RAG1;RB1;RBBP4;RHOA;RPS6KB1;SMAD2;SMAD4;SOS2;SP1;STAT1;WASL

Supplementary Table 5b: Continued

CATALYTIC ACTIVITY	68	1201	1.21E-59	2.31E-58	ABCC1;ABI2;AKT1;BAX;BCL2;CCND1;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CRK;CRKL;CRP;CSNK2A1;CYP1B1;DHFR;EGFR;EP300;ERBB3;ERBB4;ESR1;FASLG;FES;FOS;GSK3A;INSR;IRS1;ITK;JUN;KDR;KRAS;MAP3K11;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;MAPKAP1;MAPKAPK2;NCK1;NF1;PAK2;PCNA;PIK3R1;PKN2;PLD1;PML;PPP2CA;PRKACA;PRKCA;PTEN;PTGS2;PTK2;PTPN11;RAG1;RB1;RHOA;RPS6KB1;SOS2;SP1;STAT1;VAV2;XIAP
#cluster71	Enrichment Score: 46.63				
IMMUNE SYSTEM	78	1776	3.78E-48	5.52E-47	ABCC1;AGTR1;AKT1;APC;BAX;BCL2;BLK;CALR;CCND1;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRP;CSF1R;DHFR;E2F1;EGFR;EP300;ESR1;FASLG;FGF2;FGF7;FLT3LG;FOS;GH1;GJA1;IFNA2;IFNAR1;IL10RA;IL12B;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;ITGA4;JUN;KDR;KITLG;KRAS;LIF;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;PCNA;PF4;PML;PROCR;PTEN;PTGS2;PTPN11;RAG1;RB1;RHOA;RIPK1;SMAD2;SP1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B;TRAF1;UBE2B;XIAP;YWHAZ
IMMUNE RESPONSE	112	3360	1.47E-46	2.02E-45	ABCC1;AGTR1;AKT1;ANGPT2;APC;ATF2;BAX;BCL2;BLK;CALR;CCND1;CCND2;CCND3;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRP;CSF1R;CSF2RB;CYP1B1;CYP24A1;DHFR;E2F1;EGFR;EP300;ESR1;FASLG;FES;FGF2;FGF7;FGFR1;FLT3LG;FLT4;FN1;FOS;GH1;GJA1;IFNA2;IFNAR1;IL10RA;IL12B;IL13RA1;IL15RA;IL1A;IL2RA;IL4R;IL6R;IL7;INSR;IRS1;ITGA4;ITGA6;ITK;JUN;KDR;KITLG;KRAS;LIF;MAP3K5;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAPK2;MERTK;NCAM1;NCK1;NRAS;PCNA;PF4;PF4V1;PIK3R1;PML;PRKCA;PROCR;PTEN;PTGS2;PTK2;PTPN11;RAG1;RAP1A;RB1;RHOA;RIPK1;SMAD2;SMAD4;SP1;STAT1;TGFB2;TGFB3;TGFB3;TIMP3;TNFRSF1A;TNFRSF1B;TRAF1;TXK;UBE2B;VAV2;WASL;XIAP;YWHAZ;YWHAZ
#cluster72	Enrichment Score: 45.44				
MONOCYTE CHEMOATTRACTANT PROTEIN	37	350	1.90E-68	4.43E-67	AGTR1;AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CDKN1A;CRP;CSF1R;EGFR;FASLG;FGF2;FOS;IL1A;IL2RA;IL7;INSR;IRS1;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PF4;PTGS2;PTK2;RHOA;SMAD2;SP1;STAT1;TNFRSF1A;TNFRSF1B
RECEPTOR ACTIVATOR	28	237	1.27E-58	2.36E-57	AKT1;BCL2;CCND1;CD34;CDKN1A;CREB1;CRP;CSF1R;EGFR;ESR1;FASLG;FGF2;FOS;IL1A;IL2RA;IL7;INSR;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PTGS2;RHOA;STAT1;TNFRSF1A;TNFRSF1B
ACUTE LUNG INJURY	25	225	1.14E-48	1.69E-47	AKT1;ANGPT2;BAX;BCL2;CRP;EGFR;FASLG;FGF7;FOS;IL1A;IL2RA;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PROCR;PTGS2;PTK2;RHOA;SMAD2;STAT1;TNFRSF1A;TNFRSF1B
BONE RESORPTION	31	353	7.28E-46	9.71E-45	AKT1;BAX;BCL2;CREB1;CRP;CSF1R;EGFR;ESR1;FASLG;FGF2;FOS;GJA1;IL1A;IL6R;IL7;JUN;KDR;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NF1;PTGS2;PTK2;RAP1A;RHOA;STAT1;TGFB2;TNFRSF1A;TNFRSF1B

Supplementary Table 5b: Continued

INFLAMMATORY BOWEL DISEASE	38	630	3.50E-36	3.82E-35	AKT1;APC;BAX;BCL2;CCND1;CD34;CDKN1A;CRP;EGFR;ESR1;FASLG;FGF2;FGF7;FOS;IL10RA;IL12B;IL1A;IL2RA;IL6R;IL7;JUN;KDR;KRAS;MAP3K8;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PTGS2;PTK2;RAG1;SMAD4;STAT1;TNFRSF1A;TNFRSF1B;XIAP
ACID PHOSPHATASE	22	381	3.47E-19	2.51E-18	AK2;AKT1;BCL2;CD34;CRP;CSF1R;EGFR;ESR1;FGF2;FOS;IL1A;IL2RA;INSR;JUN;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTGS2
#cluster73	Enrichment Score: 44.91				
REGULATION OF CELLULAR	27	143	2.53E-95	1.30E-93	AKT1;BAX;BCL2;CCND1;CDK2;CDKN1A;CDKN2A;E2F1;E2F2;EGFR;EP300;ESR1;FASLG;FGF2;FOS;INSR;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PRKCA;PTEN;RB1;SP1;STAT1
CHROMATIN REMODELING	27	558	2.68E-19	1.96E-18	AKT1;BCL2;CCND1;CDK1;CDK2;CDKN1A;CDKN2A;CREB1;E2F1;EGFR;EP300;ESR1;FOS;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NAP1L1;PCNA;PML;PTEN;RB1;RBBP4;SP1;STAT1
HISTONE ACETYLATION	28	308	3.99E-43	5.13E-42	AKT1;ATF2;BAX;BCL2;CCND1;CDK1;CDK4;CDKN1A;CDKN2A;CREB1;E2F1;EGFR;EP300;ESR1;FOS;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NAP1L1;PML;PTEN;PTGS2;RB1;RBBP4;SP1;STAT1
NUCLEAR LOCALIZATION SIGNAL	25	392	8.62E-25	7.24E-24	AKT1;BAX;BCL2;CCND1;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CSNK2A1;E2F1;E2F5;EP300;FGF2;FOS;JUN;MAPK1;MAPK3;NAP1L1;PCNA;PML;RB1;SP1;STAT1
#cluster74	Enrichment Score: 44.40				
CELL FRACTION	22	167	6.97E-52	1.10E-50	AKT1;BAX;BCL2;CD34;CDKN1A;EGFR;FGF2;IL1A;IL2RA;IL7;INSR;ITGA6;JUN;KDR;KITLG;LIF;MAPK1;MAPK3;NCAM1;PCNA;PRKCA;PTGS2
UMBILICAL CORD BLOOD	23	236	2.24E-38	2.66E-37	AKT1;BCL2;CD34;CDKN1A;CDKN2A;CRP;FASLG;FGF2;FGF4;FLT3LG;IL1A;IL2RA;IL7;ITGA4;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;NCAM1;PTGS2
#cluster75	Enrichment Score: 43.89				
ENDOTHELIAL NITRIC OXIDE	36	280	1.95E-83	7.03E-82	AGTR1;AKT1;ANGPT2;BAX;BCL2;CAV2;CCND1;CD34;CDKN1A;CREB1;CRP;DHFR;EDNRB;EGFR;ESR1;FGF2;FOS;GJA1;GNB3;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PRKAA2;PRKCA;PTEN;PTGS2;PTK2;RHOA;SMAD2;SP1
MIDDLE CEREBRAL ARTERY	27	308	8.63E-40	1.05E-38	AGTR1;AKT1;ANGPT2;BAX;BCL2;CCND1;CD34;CREB1;CRP;EDNRB;EGFR;EP300;ESR1;FASLG;FGF2;FOS;GJA1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTEN;PTGS2;TNFRSF1A
PHOSPHATE BUFFERED SALINE	24	178	3.28E-58	6.07E-57	AKT1;BAX;BCL2;CCND1;CD34;CRP;EGFR;FASLG;FGF1;FGF2;FGF7;FOS;GJA1;IL1A;IL2RA;JUN;KDR;KITLG;MAPK1;MAPK14;MAPK3;PCNA;PTGS2;TNFRSF1A
SPINAL CORD INJURY	25	281	1.80E-37	2.05E-36	AKT1;BAX;BCL2;CD34;CREB1;CRP;EGFR;FASLG;FGF1;FGF2;FOS;GJA1;JUN;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PTEN;PTGS2;RHOA;TNFRSF1A;TNFRSF1B
TRAUMATIC BRAIN INJURY	21	216	6.76E-35	7.20E-34	AKT1;BAX;BCL2;CDKN1A;CREB1;CRP;EP300;FGF2;FOS;GJA1;IL1A;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PTGS2;TNFRSF1B

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Supplementary Table 5b: Continued

RECEPTOR ACTIVITY	23	284	9.50E-31	9.25E-30	AGTR1;AKT1;CCND1;CDKN1A;CREB1;CRP;EDNRB;EGFR;EP300;ERBB3;ESR1;FGF2;FOS;INSR;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PDGFRB;PTGS2;SMAD2
DORSAL ROOT GANGLION	22	285	9.92E-28	8.87E-27	AKT1;BAX;BCL2;CAV2;CDH2;CREB1;EGFR;ERBB3;ESR1;FGF2;FOS;JUN;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PTGS2;RHOA;TNFRSF1A;TNFRSF1B
#cluster76	Enrichment Score: 41.49				
REACTIVE OXYGEN SPECIES	86	1832	8.69E-59	1.63E-57	ABCC1;AGTR1;AKT1;AKT2;ANGPT2;ATF2;BAX;BCL2;CALR;CCND1;CCND2;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;CRK;CRP;CSNK2A1;CYP1B1;DHFR;E2F1;EDNRB;EGFR;EIF2S1;EP300;ESR1;FASLG;FGF2;FGF7;FOS;GJA1;IL1A;IL2RA;INSR;IQGAP1;IRS1;ITGA4;ITPR1;JUN;KDR;KITLG;KRAS;LIF;MAP3K11;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MAPKAP2;NCAM1;PAK2;PCNA;PDGFRB;PLD1;PLK3;PML;PRKAA2;PRKCA;PSMC6;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RB1;RHOA;RIPK1;RPS6KB1;SMAD2;SMAD4;SP1;STAT1;TIMP3;TNFRSF1A;TNFRSF1B;VAV2;XIAP
ENDOPLASMIC RETICULUM	79	2675	1.23E-25	1.05E-24	ABCC1;AGTR1;AKT1;BAX;BCL2;CALR;CAV2;CCNA2;CCND1;CCND3;CD34;CDC42;CDH2;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;COL2A1;CREB1;CRP;CSNK2A1;DHFR;E2F1;EDNRB;EGFR;EIF2S1;EP300;ESR1;FASLG;FGF1;FGF2;FOS;GJA1;IFNAR1;IL1A;IL2RA;IL6R;INSR;IQGAP1;IRS1;ITPR1;ITPR2;JUN;KDR;KITLG;KRAS;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;NCAM1;NCK1;NRAS;PAK2;PCNA;PLD1;PLK3;PML;PRKAA2;PRKCA;PSMB4;PSMB6;PSMD2;PTEN;PTGS2;PTK2;RB1;RHOA;RIPK1;RPS6KB1;SMAD2;SP1;STAT1;TNFRSF1A;UBE2B;XIAP
#cluster77	Enrichment Score: 41.10				
DNA REPAIR	62	1246	2.01E-45	2.67E-44	ABCC1;AKT1;APC;BAX;BCL2;CCNA1;CCNA2;CCND1;CD34;CDH13;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CDKN2D;CREB1;CYP1B1;DHFR;E2F1;E2F2;EGFR;EP300;ESR1;FASLG;FGF2;FOS;GTF2H4;IL1A;INSR;IRS1;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP2;MDM4;MEN1;NKX3-1;NME1;NRAS;PCNA;PLK3;PML;PSMB4;PTCH1;PTEN;PTGS2;RAG1;RB1;RBBP4;SP1;STAT1;UBE2B;UBE2D2;WEE1;XIAP
DNA REPLICATION	50	973	3.16E-38	3.69E-37	AKT1;APC;BAX;BCL2;CCNA1;CCNA2;CCND1;CCND2;CCND3;CCNE1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CDKN2B;CREB1;CSNK2A1;DHFR;E2F1;E2F2;E2F5;EGFR;EP300;ESR1;FGF2;FOS;IRS1;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;MAX;NAP1L1;PCNA;PML;PPP2CA;PTEN;PTGS2;PTPN11;RB1;RBBP4;SP1;STAT1;UBE2B;WEE1
#cluster78	Enrichment Score: 41.00				
HEPATITIS C VIRUS	42	575	4.22E-51	6.56E-50	AKT1;APC;BAX;BCL2;CALR;CCND1;CD34;CDK2;CDK4;CDKN1A;CDKN2A;CRK;CRP;EGFR;EIF2S1;ESR1;FASLG;FOS;IFNA2;IFNAR1;IL10RA;IL1A;IL2RA;IL7;INSR;IRS1;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PKN2;PTEN;PTGS2;SP1;STAT1;TNFRSF1A;TNFRSF1B;UBE2B

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Supplementary Table 5b: Continued

SYSTEMIC LUPUS ERYTHEMATOSUS	36	624	2.39E-32	2.42E-31	AKT1;BAX;BCL2;BLK;CALR;CD34;CDKN1A;CRP;ESR1;FASLG;FOS;IFNA2;IFNAR1;IL10RA;IL1A;IL2RA;IL7;INSR;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MERTK;NCAM1;PCNA;PPP2CA;PROCR;PSMA4;PTGS2;RAG1;SP1;STAT1;TNFRSF1A;TNFRSF1B;TRAF1
#cluster79	Enrichment Score: 40.05				
MACROPHAGE INFLAMMATORY PROTEIN	26	249	4.03E-47	5.68E-46	AKT1;BAX;BCL2;CD34;CRP;FASLG;FGF2;FGF7;FOS;IL1A;IL2RA;IL7;ITGA4;JUN;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PF4;PTGS2;STAT1;TGFB2;TNFRSF1A
MONOCYTE CHEMOTACTIC PROTEIN	23	199	8.74E-47	1.22E-45	AGTR1;AKT1;BAX;BCL2;CD34;CRP;FGF2;FOS;IL1A;IL2RA;IL7;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PF4;PTGS2;STAT1;TNFRSF1A
LYMPHOCYTE PROLIFERATION	22	185	3.39E-46	4.60E-45	AKT1;BAX;BCL2;CD34;CDKN1A;CRP;FASLG;FOS;IL1A;IL2RA;IL7;JUN;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PTGS2;STAT1;TGFB2
CELL MATURATION	26	268	3.20E-43	4.13E-42	AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN1B;EGFR;FOS;GJA1;IL1A;IL2RA;IL7;ITK;JUN;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PML;RAG1;STAT1;TXK
ACTIVATED B CELL	21	183	2.69E-42	3.44E-41	AKT1;BAX;BCL2;CCND1;CDKN1A;CDKN2A;CRP;ESR1;FASLG;FOS;IL1A;IL2RA;IL7;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PTEN;PTGS2;STAT1
ANTI INFLAMMATORY DRUGS	21	241	1.20E-30	1.16E-29	ABCC1;AKT1;APC;BAX;BCL2;CCND1;CDKN1A;CRP;EGFR;ESR1;FGF2;FOS;IL1A;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTEN;PTGS2
EXPERIMENTAL AUTOIMMUNE ENCEPHALOMYELITIS	21	251	3.47E-29	3.20E-28	AKT1;BAX;BCL2;CDKN2A;ESR1;FASLG;IFNAR1;IL2RA;IL7;ITGA4;JUN;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PTGS2;RAG1;STAT1;TNFRSF1A
#cluster80	Enrichment Score: 39.56				
NUCLEOTIDE EXCHANGE FACTOR	47	587	4.44E-64	9.23E-63	AKT1;APC;BCL2;CCND1;CDC42;CDH2;CDK1;CDKN1A;CDKN2A;CREB1;CRK;CRKL;EGFR;EIF2S1;ELK1;GNA12;INSR;IQGAP1;IRS1;ITK;ITPR1;JUN;KRAS;MAP3K11;MAPK1;MAPK14;MAPK3;MAPK8;NCK1;NF1;NRAS;PAK2;PIK3R1;PLD1;PTEN;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RHOA;RHOB;RRAS2;SOS2;TNK2;VAV2;WASL
GTP BINDING	37	556	4.69E-40	5.73E-39	AKT1;BCL2;CCND1;CDC42;CDKN1A;CDKN2A;CREB1;CRK;EGFR;FOS;GNA12;INSR;IQGAP1;IRS1;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NF1;NME1;NRAS;PAK2;PLD1;PRKCA;PSMC6;PTK2;RAP1A;RAP1B;RHOA;RHOB;RRAS2;SOS2;TNK2;VAV2;WASL
NUCLEOTIDE BINDING	27	617	9.88E-17	6.79E-16	ABCC1;AGTR1;AKT1;BCL2;CDC42;CDKN1A;CDKN2A;EGFR;FOS;GNA12;GNB3;INSR;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NF1;NME1;NRAS;PRKCA;PTGS2;RAP1A;RAP1B;RHOA;XIAP
#cluster81	Enrichment Score: 39.40				
NEURAL STEM CELL	34	351	1.19E-56	2.13E-55	AKT1;BAX;BCL2;CCND1;CCND2;CD34;CDH2;CDK2;CDKN1A;CDKN2A;CREB1;EGFR;ERBB4;FGF2;FGFR1;GJA1;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NF1;PCNA;PDGFRA;PDGFRB;PTCH1;PTEN;PTGS2;RHOA;WNT7A
NEURAL PROGENITOR CELL	22	156	5.24E-56	9.20E-55	AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDKN1A;CDKN1B;CDKN2A;CREB1;EGFR;FGF2;GJA1;JUN;KDR;LIF;MAPK1;MAPK3;MAPK8;NCAM1;PCNA;PTEN

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Supplementary Table 5b: Continued

RETINAL GANGLION CELL	25	317	2.25E-32	2.29E-31	AKT1;BAX;BCL2;CCND1;CDH2;CDH6;CDKN1A;CDKN2A;CREB1;EGFR;FGF1;FGF2;FOS;GJA1;JUN;KDR;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PTEN;PTGS2;RHOA
MICROTUBULE ASSOCIATED PROTEIN	28	401	3.54E-31	3.51E-30	AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDK1;CDKN1A;CDKN2A;CREB1;CSNK2A1;EGFR;FGF2;FOS;GSK3A;INSR;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PPP2CA;PTEN;PTGS2;RHOA;TUBB
CONTACT INHIBITION	21	77	1.96E-24	1.61E-23	AKT1;BCL2;CCND1;CDC42;CDH2;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;EGFR;FGF2;FOS;GJA1;JUN;KDR;MAPK1;MAPK3;NF2;RB1;RHOA
#cluster82	Enrichment Score: 38.89				
ATP BINDING	42	678	2.32E-41	2.92E-40	ABCC1;AKT1;BAX;BCL2;CCND1;CD34;CDC42;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CRP;CSF1R;CSNK2A1;DHFR;E2F1;EGFR;ERBB3;ESR1;FGF2;FGFR1;FOS;INSR;IRS1;ITK;JUN;KDR;KRAS;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PDGFRB;PLK3;PRKCA;PTEN;PTGS2;PTK2;SP1
STRUCTURE ACTIVITY RELATIONSHIP	33	462	7.29E-38	8.37E-37	ABCC1;AGTR1;AKT1;BAX;BCL2;CCND1;CDK1;CDK2;CDK4;CDKN1A;CSNK2A1;DHFR;EDNRB;EGFR;ESR1;FGF2;FGFR1;FOS;INSR;ITK;JUN;KDR;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PDGFRB;PML;PRKCA;PTEN;PTGS2;TNK2
#cluster83	Enrichment Score: 37.28				
EUKARYOTIC INITIATION FACTOR	22	211	1.06E-39	1.29E-38	AKT1;BAX;BCL2;CALR;CCND1;CDKN1A;CREB1;EGFR;EIF2S1;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NCK1;PML;PRKAA2;PTEN;RPS6KB1;XIAP
ENDOPLASMIC RETICULUM STRESS	26	310	2.62E-36	2.89E-35	AKT1;BAX;BCL2;CALR;CCND1;CDK4;CDKN1A;CREB1;EGFR;EIF2S1;FASLG;FOS;INSR;IRS1;JUN;MAP3K5;MAPK1;MAPK14;MAPK3;MAPK8;PLK3;PRKAA2;PSMB6;PTEN;PTGS2;XIAP
#cluster84	Enrichment Score: 35.73				
GAP JUNCTION	25	233	9.74E-47	1.35E-45	AKT1;BAX;BCL2;CD34;CDH2;CDKN1A;CREB1;CTNNA1;EGFR;ESR1;FGF2;FOS;GJA1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PRKCA;PRKCG;PTGS2;PTK2;SP1
INTERMEDIATE FILAMENT	27	318	2.77E-38	3.25E-37	AKT1;BAX;BCL2;CD34;CDC42;CDH2;CDK1;CDKN1A;CDKN2A;CTNNA1;EGFR;FGF2;FOS;GJA1;ITGA6;JUN;MAP3K11;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PSMB6;PTK2;RHOA;SP1
MYOSIN HEAVY CHAIN	28	326	2.82E-40	3.48E-39	AGTR1;AKT1;BCL2;CCND1;CD34;CDH2;CDKN1A;CDKN2A;EGFR;EP300;ESR1;FGF2;FOS;GJA1;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PCNA;PRKCA;PTGS2;PTK2;RHOA;SMAD2
GLUTAMATE RECEPTOR	27	534	1.65E-20	1.24E-19	AKT1;BAX;BCL2;CCND1;CDC42;CDH2;CDKN1A;CDKN2A;CREB1;EGFR;ESR1;FGF2;FOS;GJA1;ITPR1;JUN;MAP3K11;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;NCAM1;PRKCA;PRKCG;PSMC6;PTGS2
#cluster85	Enrichment Score: 35.54				
HEPARIN BINDING	31	293	3.20E-57	5.83E-56	AKT1;BCL2;CCND1;CDKN1A;CRP;EGFR;ERBB3;ERBB4;FGF1;FGF2;FGF4;FGF5;FGF7;FGF9;FGFR1;FOS;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PDGFA;PDGFB;PF4;PF4V1;PTGS2;PTK2

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Supplementary Table 5b: Continued

FIBROBLAST PROLIFERATION	21	93	1.57E-22	1.24E-21	AGTR1;AKT1;BCL2;CCND1;CDKN1A;EGFR;FGF1;FGF2;FGF7;FOS;IL1A;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PDGFA;PDGFRB;PTGS2;SMAD2
SURFACE PLASMON RESONANCE	25	346	4.78E-29	4.38E-28	AKT1;BCL2;CALR;CDKN1A;CRP;CSNK2A1;DHFR;EGFR;ESR1;FGF1;FGF2;FGFR1;JUN;KDR;MAPK1;MAPK14;MAPK3;NCAM1;PCNA;PF4;PRKCA;PROCR;PTGS2;PTK2;PTPN11
#cluster86	Enrichment Score: 35.45				
INSULIN SECRETION	41	655	6.11E-41	7.58E-40	ADRA2A;AGTR1;AKT1;AKT2;BAX;BCL2;CCND1;CCND2;CDC42;CDK4;CDKN1A;CDKN2A;CDKN2B;CREB1;CRP;E2F1;EGFR;ESR1;FOS;GH1;GJA1;IL1A;INSR;IRS1;ITPR2;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PCNA;PIK3R1;PPP2CA;PRKAA2;PRKCA;PTGS2;RAP1A;RPS6KB1;SP1;STAT1
ADRENERGIC RECEPTOR	30	451	2.05E-31	2.05E-30	ADRA2A;AGTR1;AKT1;BAX;BCL2;CCND1;CDKN1A;CREB1;CRP;EGFR;FGF2;FOS;GH1;GJA1;GNB3;IL1A;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PRKCA;PSMC6;PTGS2;RAP1A;RAP1B;RHOA;SP1
#cluster87	Enrichment Score: 35.00				
SPHINGOSINE 1 PHOSPHATE	29	224	1.90E-67	4.29E-66	ABCC1;AKT1;BAX;BCL2;CD34;CDC42;CDKN1A;CREB1;EGFR;FGF2;FOS;GJA1;GNA12;IL2RA;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PDGFRB;PLD1;PRKCA;PROCR;PSMC6;PTEN;PTGS2;PTK2;RHOA
ION CHANNEL	28	823	8.53E-12	4.70E-11	ABCC1;ABI2;AGTR1;AKT1;BAX;BCL2;CALR;CAV2;CDKN1A;CREB1;EGFR;ESR1;FGF2;FOS;GJA1;INSR;ITPR1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PRKCA;PTEN;PTGS2;PTK2;RHOA
CALCIUM CHANNEL	32	568	6.01E-28	5.39E-27	AGTR1;AKT1;BAX;BCL2;CALR;CAV2;CDH2;CDKN1A;CDKN2A;CREB1;CRP;EDNRB;EGFR;ESR1;FGF2;FOS;GJA1;IL1A;INSR;ITPR1;ITPR2;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;NCAM1;PRKCA;PTGS2;RHOA
#cluster88	Enrichment Score: 33.00				
INSULIN RECEPTOR SUBSTRATE	32	252	5.98E-73	1.66E-71	AKT1;AKT2;BAX;BCL2;CCND1;CDC42;CREB1;CRK;CRP;EGFR;ESR1;FOS;GSK3A;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NCK1;PCNA;PIK3R1;PIK3R3;PRKAA2;PRKCA;PSMC6;PTEN;PTK2;PTPN11;RPS6KB1;STAT1
HIGH FAT DIET	30	659	1.47E-19	1.08E-18	AGTR1;AKT1;AKT2;APC;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;CREB1;CRP;EGFR;FGF2;FOS;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PIK3R1;PRKAA2;PTEN;PTGS2;RPS6KB1;TNFRSF1A
TYPE 2 DIABETIC	25	299	9.10E-35	9.66E-34	AGTR1;AKT1;AKT2;ANGPT2;BAX;BCL2;CD34;CDKN1A;CDKN2A;CRP;EGFR;GSK3A;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PIK3R1;PRKAA2;PTGS2;TNFRSF1A;TNFRSF1B
2 DIABETES MELLITUS	27	395	2.93E-29	2.71E-28	AGTR1;AKT1;ANGPT2;BAX;BCL2;CD34;CDKN2A;CDKN2B;CREB1;CRP;EGFR;ESR1;FGF2;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PIK3R1;PTEN;PTGS2;RPS6KB1;TNFRSF1B
CHRONIC KIDNEY DISEASE	23	338	8.86E-25	7.41E-24	AGTR1;AKT1;ANGPT2;BAX;BCL2;CD34;CDKN1A;CRP;CYP24A1;EGFR;ESR1;FGFR1;IL2RA;INSR;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PTGS2;SMAD2;TNFRSF1B

Supplementary Table 5b: Continued

GLUCOSE HOMEOSTASIS	22	355	4.89E-21	3.76E-20	ADRA2A;AKT1;AKT2;CCND1;CDK4;CDKN1A;CDKN2A;CREB1;CRP;EP300;ESR1;FOS;INSR;IRS1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PRKAA2;PTEN;RPS6KB1
#cluster89	Enrichment Score: 32.25				
MOUSE EMBRYONIC STEM	32	332	5.96E-53	9.70E-52	AKT1;BAX;BCL2;CCND1;CD34;CDC42;CDH2;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;DUSP9;EGFR;EP300;FGF2;FGF4;FGF5;FOS;GJA1;JUN;KDR;KITLG;LAMC1;LIF;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTK2;SMAD2
PLURIPOTENT STEM CELL	24	414	5.08E-21	3.90E-20	AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDKN1A;CDKN2A;ESR1;FGF2;FGF4;FGF5;GJA1;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PTEN;SMAD2
HUMAN EMBRYONIC STEM	23	336	5.77E-25	4.87E-24	ACVR1B;AKT1;BAX;BCL2;CCND1;CD34;CDH2;CDK2;CDKN1A;CDKN2A;FGF2;FGF4;GJA1;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;NCAM1;PDGFRA;PDGFRB;SMAD2
#cluster90	Enrichment Score: 31.82				
AIRWAY SMOOTH MUSCLE	22	159	7.96E-55	1.35E-53	AKT1;CCND1;CDKN1A;CREB1;EDNRB;EGFR;FGF2;FOS;JUN;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PCNA;PRKCA;PSMC6;PTGS2;PTK2;RHOA;SMAD2
ADENYLATE CYCLASE	28	447	3.99E-27	3.51E-26	AGTR1;AKT1;BAX;BCL2;CCND1;CDKN1A;CREB1;EDNRB;EGFR;FGF2;FOS;GH1;IL1A;INSR;JUN;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PRKACA;PRKCA;PSMC6;PTGS2;RAP1A;RHOA;SP1
PHOSPHOLIPASE A2	23	340	1.35E-24	1.12E-23	AGTR1;AKT1;APC;BAX;BCL2;CDKN1A;CREB1;CRP;EGFR;FASLG;FGF2;FOS;IL1A;JUN;KITLG;MAPK1;MAPK14;MAPK3;MAPK8;PRKCA;PSMC6;PTGS2;TNFRSF1B
MUSCLE CONTRACTION	21	298	1.21E-23	9.76E-23	AKT1;CDKN1A;EDNRB;EGFR;FOS;GJA1;GNA12;INSR;ITPR1;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PRKAA2;PRKCA;PTGS2;RHOA;RPS6KB1;TUBB4A
#cluster91	Enrichment Score: 31.07				
NUCLEAR EXPORT	29	413	1.58E-32	1.62E-31	AKT1;APC;BAX;BCL2;CALR;CCND1;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;CREB1;E2F1;EGFR;EP300;FOS;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP2;MDM4;PML;PTEN;SMAD2;SMAD4;STAT1
DNA DAMAGE RESPONSE	34	584	5.73E-31	5.63E-30	AKT1;APC;BAX;BCL2;CCND1;CDK1;CDK2;CDK4;CDKN1A;CDKN1B;CDKN2A;E2F1;E2F2;EGFR;EP300;FOS;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP2;MDM4;NKX3-1;NRAS;PCNA;PLK3;PLK4;PML;PTEN;RB1;SP1;WEE1
NUCLEAR IMPORT	22	254	6.88E-32	6.94E-31	AKT1;BCL2;CCND1;CDK1;CDK2;CDK4;CDKN1A;CREB1;CSNK2A1;EGFR;EP300;FOS;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NAP1L1;PCNA;SMAD2;SMAD4;STAT1
#cluster92	Enrichment Score: 30.96				
MEMBRANE FRACTION	33	480	4.53E-36	4.93E-35	ABCC1;AGTR1;AKT1;BAX;BCL2;CALR;CAV2;CCND1;CDC42;CDKN1A;EGFR;ESR1;FASLG;FOS;GJA1;INSR;IRS1;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PIK3R1;PLD1;PRKCA;PRKCG;PTEN;PTGS2;PTK2;PTPN11;RHOA

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Supplementary Table 5b: Continued

HUMAN EMBRYONIC KIDNEY	29	494	7.59E-27	6.63E-26	ABCC1;AGTR1;AKT1;BAX;BCL2;CALR;CCND1;CDC42;CDKN1A;CREB1;EGFR;ESR1;FOS;INSR;IRS1;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PRKCA;PSMC6;PTGS2;PTK2;PTPN11;RHOA;SP1;TNFRSF1A
RESONANCE ENERGY TRANSFER	24	296	3.85E-32	3.89E-31	AGTR1;AKT1;BAX;BCL2;CDC42;CDKN1A;CREB1;EGFR;EP300;ERBB3;ESR1;FOS;INSR;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PRKCA;PTK2;RHOA;WASL
#cluster93	Enrichment Score: 27.22				
BRAIN DEVELOPMENT	32	548	2.58E-29	2.39E-28	AKT1;BAX;BCL2;CCND1;CDC42;CDH2;CDK1;CDKN1A;CDKN2A;CREB1;CRKL;EGFR;EP300;ERBB4;ESR1;FGF2;FOS;GJA1;INSR;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;NF1;PCNA;PTEN;PTGS2;RHOA;SP1;YWHAE
ACETYLCHOLINE RECEPTOR	24	345	1.38E-26	1.20E-25	AKT1;BAX;BCL2;CCND1;CDC42;CDKN1A;CREB1;EGFR;EP300;ERBB3;ERBB4;ESR1;FGF2;FOS;IL2RA;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PSMA4;PTGS2;RHOA;SP1
#cluster94	Enrichment Score: 26.30				
PLATELET ACTIVATION	22	272	2.34E-29	2.18E-28	AKT1;BAX;BCL2;CD34;CDC42;CRP;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PF4;PF4V1;PRKCA;PROCR;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RHOA
PLATELET AGGREGATION	23	339	1.10E-24	9.15E-24	ADRA2A;AGTR1;AKT1;CALR;CD34;CRP;FGF2;JUN;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;MERTK;PF4;PF4V1;PRKCA;PTGS2;PTK2;PTPN11;RAP1A;RAP1B;RHOA
#cluster95	Enrichment Score: 26.28				
CORONARY ARTERY DISEASE	31	500	9.35E-31	9.13E-30	AGTR1;AKT1;ANGPT2;BAX;BCL2;CD34;CDKN2A;CDKN2B;CRP;EDNRB;EGFR;ESR1;FASLG;FGF2;FOS;GNB3;IL1A;IL2RA;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;MAPKAP1;PF4;PF4V1;PTGS2;TNFRSF1B
SYSTOLIC BLOOD PRESSURE	23	285	1.29E-30	1.24E-29	AGTR1;AKT1;BAX;BCL2;CD34;CRP;EDNRB;EGFR;ESR1;FOS;GJA1;GNB3;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PCNA;PTGS2;TNFRSF1B
ENZYME INHIBITOR	22	262	1.01E-30	9.81E-30	AGTR1;AKT1;BAX;BCL2;CD34;CDKN1A;CRP;DHFR;EDNRB;EGFR;ESR1;FGF2;FOS;GJA1;INSR;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK8;PTGS2
HIGH DENSITY LIPOPROTEIN	23	472	6.12E-16	4.10E-15	AGTR1;AKT1;BAX;BCL2;CD34;CDH13;CRP;CSF1R;EGFR;ESR1;IL1A;IL6R;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;PTGS2;SP1;TNFRSF1B
#cluster96	Enrichment Score: 24.87				
C REACTIVE PROTEIN	31	549	3.47E-27	3.06E-26	AKT1;ANGPT2;BAX;BCL2;CD34;CRP;EGFR;ESR1;FASLG;FGF2;FOS;IL1A;IL2RA;IL6R;IL7;INSR;IRS1;JUN;KDR;KITLG;LIF;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PF4;PROCR;PTGS2;TNFRSF1A;TNFRSF1B
TYPE 1 DIABETES	29	537	5.14E-24	4.18E-23	AGTR1;AKT1;BAX;BCL2;CD34;CDKN2A;CRP;EGFR;ERBB3;ESR1;FASLG;FGF2;IL12B;IL1A;IL2RA;IL7;INSR;IRS1;JUN;KDR;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PTGS2;STAT1;TNFRSF1A;TNFRSF1B
#cluster97	Enrichment Score: 19.75				
LONG TERM POTENTIATION	21	263	1.40E-27	1.25E-26	AKT1;BAX;BCL2;CDC42;CDH2;CREB1;EGFR;ERBB4;FOS;ITPR2;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PRKCA;PRKCG;PTEN;PTGS2;RHOA

Supplementary Table 5b: Continued

SYNAPTIC TRANSMISSION	21	459	2.31E-13	1.39E-12	AKT1;BAX;CAV2;CDC42;CDH2;CDKN1A;CDKN2A;CREB1;EGFR;FOS;GJA1;ITPR2;JUN;MAPK1;MAPK14;MAPK3;MAPK8;NCAM1;PRKCG;PTGS2;RHOA
#cluster98	Enrichment Score: 18.77				
HISTONE ACETYLTRANSFERASE	25	277	4.05E-38	4.70E-37	AKT1;BAX;BCL2;CCND1;CDK1;CDKN1A;CDKN2A;CREB1;E2F1;EP300;ESR1;FOS;JUN;MAPK1;MAPK14;MAPK8;NAP1L1;PCNA;PML;PTGS2;RB1;RBBP4;SMAD2;SMAD4;SP1
HISTONE MODIFICATION	27	433	5.29E-26	4.54E-25	AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;CREB1;E2F1;EGFR;EP300;ESR1;FOS;JUN;MAPK1;MAPK14;MAPK8;MEN1;NAP1L1;PCNA;PML;PTEN;RB1;RBBP4;SMAD4;SP1;STAT1
ZINC FINGER PROTEIN	21	727	5.37E-07	2.59E-06	AKT1;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;EGFR;EP300;ESR1;FOS;JUN;MAPK1;MAPK14;MAPK3;MAPK8;PML;PSMA2;RBBP4;SMAD4;SP1
X CHROMOSOME	21	734	6.96E-07	3.35E-06	AKT1;ARAF;BAX;BCL2;CCND1;CD34;CDKN1A;CDKN2A;COL4A6;DUSP9;ESR1;FGFR1;IL13RA1;JUN;LIF;MAPK1;MEN1;NRAS;PTGS2;SP1;XIAP
#single1	Enrichment Score: 15.64				
CYTOKINES	22	429	2.27E-16	1.54E-15	FGF7;FLT3LG;IFNAR1;IL10RA;IL12B;IL13RA1;IL15RA;IL1A;IL2RA;IL4R;IL6R;IL7;KITLG;LIF;MAP3K8;MAPK14;MAPKAPK2;PF4V1;STAT1;TGFB2;TNFRSF1A;TNFRSF1B
#cluster99	Enrichment Score: 9.58				
RNA BINDING	34	1085	2.63E-12	1.51E-11	ABCC1;AKT1;BAX;BCL2;CALR;CCND1;CD34;CDK1;CDK2;CDK4;CDKN1A;CDKN2A;CREB1;CSNK2A1;E2F1;EGFR;EIF2S1;EP300;FOS;INSR;IRS1;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;MAPKAPK2;NRAS;PIK3R1;PSMB7;PTGS2;SP1
RNA BINDING PROTEIN	22	703	2.59E-08	1.27E-07	AKT1;BAX;BCL2;CALR;CCND1;CDK1;CDKN1A;CDKN2A;EGFR;EIF2S1;FOS;INSR;JUN;KRAS;MAPK1;MAPK14;MAPK3;MAPK4;MAPK8;PSMB7;PTGS2;SP1