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Construction of a novel lncRNA-miRNA-mRNA competing endogenous RNA network in muscle in response to exercise training

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Abstract. Physical inactivity has evidently been a hazard factor for many diseases, including cardiovascular disease, diabetes, cancer, etc. Rising evidence indicates that RNA, as competitive endogenous RNA (ceRNA), plays an important role in adaptive changes in skeletal muscle in response to exercise training. Although the effects of exercise-induced fitness on skeletal muscle have been well established, the mechanisms underlying are not fully understood. The purpose of this study is to construct a novel ceRNA network in skeletal muscle in response to exercise training. Skeletal muscle gene expression profiles were downloaded from the GEO database. Then, we identified differentially expressed lncRNAs, miRNAs, and mRNAs between the pre-exercise and post-exercise samples. Subsequently, we constructed lncRNA-miRNA-mRNA regulatory networks based on the ceRNA theory. 1153 mRNAs (687 upregulated and 466 downregulated), 7 miRNAs (3 upregulated and 4 downregulated), and 5 lncRNAs (3 upregulated and 2 downregulated) were identified as differentially expressed genes. 3 lncRNAs, 5 miRNAs and 227 mRNAs were obtained to build miRNA-mediated ceRNA networks. We constructed a novel ceRNA regulatory network in muscle in response to exercise training, which provides insights into molecular mechanisms underlying the health benefits brought by physical activity.

Key words: ceRNA— Muscle — Exercise Training — Hub Genes — PPI

Introduction

Lack of physical activity is a leading hazard factor all over the world for numerous chronic diseases, such as type 2 diabetes, obesity, hypertension, and depression. Regular physical exercise can improve muscle strength and enhance recognition memory, which will bring dramatic benefits to people of all ages, including the promotion of health and lifespan (Vina et al. 2012). Moreover, exercise training is also able to delay the progression of chronic diseases through increasing glucose uptake and insulin sensitivity as well as attenuating inflammation and oxidative stress in muscle (Bonadonna et al. 1993; Goodyear and Kahn 1998; Joyner and Green 2009; Stanford et al. 2015; Galicia-Garcia et al. 2020). Although the effects of exercise-induced fitness on skeletal muscle have been well established, the mechanisms underlying such benefits are not fully understood.

Noncoding RNAs (ncRNAs) occupied the very major part of the transcriptome that do not have apparent protein-coding roles, but they have been verified to play important roles in numerous disease pathogenesis through regulating gene expression and protein functions (Winkle et al. 2021). MicroRNAs (miRNAs) and long noncoding RNAs (lncRNAs) are two major classes of non-protein-coding transcripts. The miRNAs are small RNAs with a length of 19–25 nucleotides,

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which can guide the posttranscriptional inhibition of protein-coding genes *via* binding to their mRNAs (He and Hannon 2004). lncRNAs are transcribed RNA molecules longer than 200 nucleotides that are not translated into functional proteins. LncRNAs containing a miRNA response element can compete for miRNA targeting and binding to RNA-induced silencing complexes (RISC), leading to sequestration of the microRNA-RISC and preventing RISC-mediated degradation of mRNAs and improving mRNA expression (Salmena et al. 2011). Thus, the network composed of lncRNAs and mRNAs competing to bind to the same miRNAs is known as the competitive endogenous RNA (ceRNA) network (Kartha and Subramanian 2014). Over the past decades, the ceRNAs have been considered to participate in essential biological processes and play crucial roles in the occurrence and development of various human disease, including diabetes, cancer and cardiovascular disease (Huarte 2015; Uchida and Dimmeler 2015; Leung and Natarajan 2018; Cava et al. 2019; Zhu et al. 2019; Feng et al. 2020). However, to our knowledge, the ceRNA network based on skeletal muscle in response to exercise training has not been reported.

The purpose of this research is to investigate the effect of exercise training on the expression levels of lncRNA, miRNA, and mRNA and build a ceRNA network in human skeletal muscles in response to exercise training. Our study may increase insights into molecular mechanisms underlying the health benefits brought from physical activity and also provides target genes used as potential therapeutic targets for individuals for whom regular exercise is not possible, such as in patients with cachexia, paralysis, or in the severely obesity.

Materials and Methods

Acquisition of expression data

The gene expression profiles (GSE156247) were downloaded from Gene Expression Omnibus (GEO) database (Nascimento et al. 2020). This gene set was collected with Affymetrix Human Gene 1.1 ST Array platform (GPL11532), and included gene expression data of *m. vastus lateralis* from 18 healthy overweight middle-aged male volunteers (at baseline: age 59 ± 4 year, BMI 29.7 ± 3.6 kg/m^2, VO$_2$ max 28.8 ± 4.3 ml·kg^{-1}·min^{-1}; average ± SD) before and after a 12 weeks exercise training intervention· The experimental protocol of the exercise training was described in the previous study (Meex et al. 2010).

Identifying differentially expressed lncRNAs, miRNAs and mRNAs

We performed Robust Multichip Average (RMA) normalization with R package "Affy". We then filtered out the probe sets that received "Absent" calls in more than 90% of the samples. Then, we used "limma" package of R software (Version 4.1.0) to obtain differentially expressed lncRNAs, miRNAs and mRNAs among 18 healthy overweight middle-aged male volunteers before and after 12 weeks combined exercise training intervention. The differentially expressed gene screening criteria used in this study is that p-value is less than 0.05. For visualization, heat maps and volcano maps were generated by employing the "ggplot2" and "pheatmap" packages in the R software (Version 4.1.0).

Construction of the lncRNA-miRNA-mRNA network

The lncRNA-miRNA-mRNA network was constructed according to ceRNA theory as follows: (1) We gathered miRNA-target interaction from miRDB, TargetScan and miRTarBase; (2) We obtained miRNA-lncRNAs interaction from StarBase; (3) Among the interaction pairs, if both the lncRNA and mRNA were negatively co-expressed with a common miRNA, the lncRNA-miRNA-mRNA ceRNA network was determined as a co-expression competing triplet. (4) The ceRNA networks are visualized using Cytoscape software (Version 3.8.0).

Gene ontology (GO) and KEGG enrichment analyses

We performed GO and KEGG enrichment analysis of mRNAs in ceRNA network using "clusterprofiler" package in the R software (Version 4.1.0). An adjusted p-value <0.05 was considered statistically significant. For visualization of the results, we use "ggplot" and "GOplot" package.

Construction of protein-protein interaction (PPI) network and screening of hub genes

Differentially expressed genes are uploaded to STRING website (www.string-db.org) for assessment of protein-protein interactions, including physical and functional associations. Only interactions with a combined score greater than 0.4 are considered significant. The hub genes were predicted with Cytoscape (v.3.7.2) plug-in CytoHubba and the genes with the top 30 values analyzed with Edge Percolated Component (EPC) algorithm were considered as Hub genes. The ceRNA network is visualized by Cytoscape software and ''ggalluvial" package in R software (Version 4.1.0).

Results

Identification of differentially expressed mRNAs, miRNAs and lncRNAs

A genome-wide (or large scale) lncRNA-mediated triple ceRNA network (lncRNA-miRNA-mRNA) was established according to the method displayed in Figure 1. To screen out the potential differentially expressed mRNAs, miRNAs and lncRNAs in skeletal muscle in response to exercise training we performed bioinformatic analysis on *m. vastus lateralis* muscle gathered from human subjects before and after 12-week high-intensity interval training. We used the $p < 0.05$ as the cutoff value for significant difference. A total of 1153 mRNAs (687 upregulated and 466 downregulated), 7 miRNAs (3 upregulated and 4 downregulated) and 5 lncRNAs (3 upregulated and 2 downregulated) were identified as differentially expressed genes in response to a 12-week exercise training intervention (Supplementary Table S1). The heatmap and volcano plot were used to demonstrate the differentially expressed mRNAs, miRNAs and lncRNAs (Fig. 2). These data indicate that 12-week exercise training intervention induces changes in the expression profiles of mRNAs, lncRNAs, and miRNAs in skeletal muscle.

Construction of the ceRNA network

Based on the ceRNA theory, the common miRNA as a junction was used to build a lncRNA-miRNA-mRNA ceRNA network. After combining upregulated miRNAs with downregulated lncRNAs and mRNAs, and downregulated miRNAs, accompany with upregulated lncRNAs and mRNAs in the miRNA-mRNA and miRNA-lncRNA interaction pairs. We finally established a ceRNA network consisting of 283 interactions, including 5 miRNAs, 3 lncRNAs and 227 mRNAs (Table S2). The regulatory network was visualized with Cytoscape in Figure 3. These data indicated that training-induced changes in arteriolar gene expression patterns differ. These data indicated that lots of genes expression level changes in muscle after exercise training intervention

GO and KEGG enrichment analysis of differentially expressed mRNA (DE-mRNA) in ceRNA network

In order to further understand the in apparent functions related to our ceRNA network, GO and KEGG enrichment analysis was performed in R software. The analysis of GO enrichment suggested that 107 terms were significantly enriched ($p < 0.05$), including 20 cellular component terms, 5 molecular function terms, and 61 biological process terms (Fig. 4A) (Table S3). The result indicated that the differentially expressed mRNAs involving in our ceRNA network were especially related to biological processes, which include extracellular matrix organization, extracellular structure organization, and connective tissue development. In the molecular function pathway, the top three terms were extracellular matrix structural constituent, cell adhesion molecule binding and extracellular matrix structural constituent conferring tensile strength. Moreover, collagen-containing extracellular matrix, endoplasmic reticulum lumen and cell leading edge were the top three significant terms in the cellular component category. KEGG pathway analysis identified 31 significantly enriched pathways such as PI3K-Akt signaling pathway, ECM-receptor interaction, and Focal adhesion (Fig. 4B; Table S4).

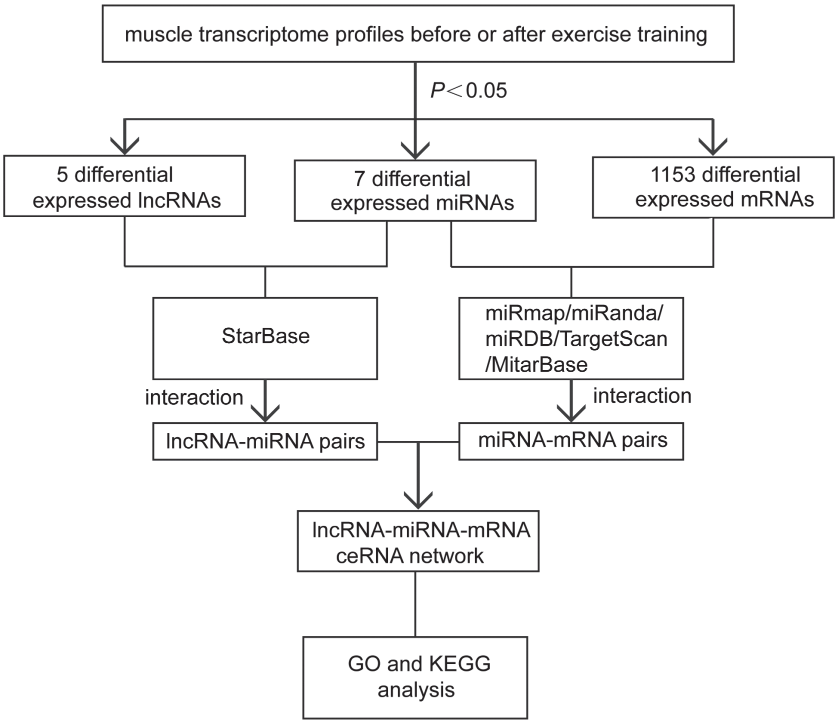


Figure 1. Flowchart of construction and analysis of ceRNA networks. GO, Gene Ontology; KEGG, Kyoto Encyclopedia of Genes and Genomes.

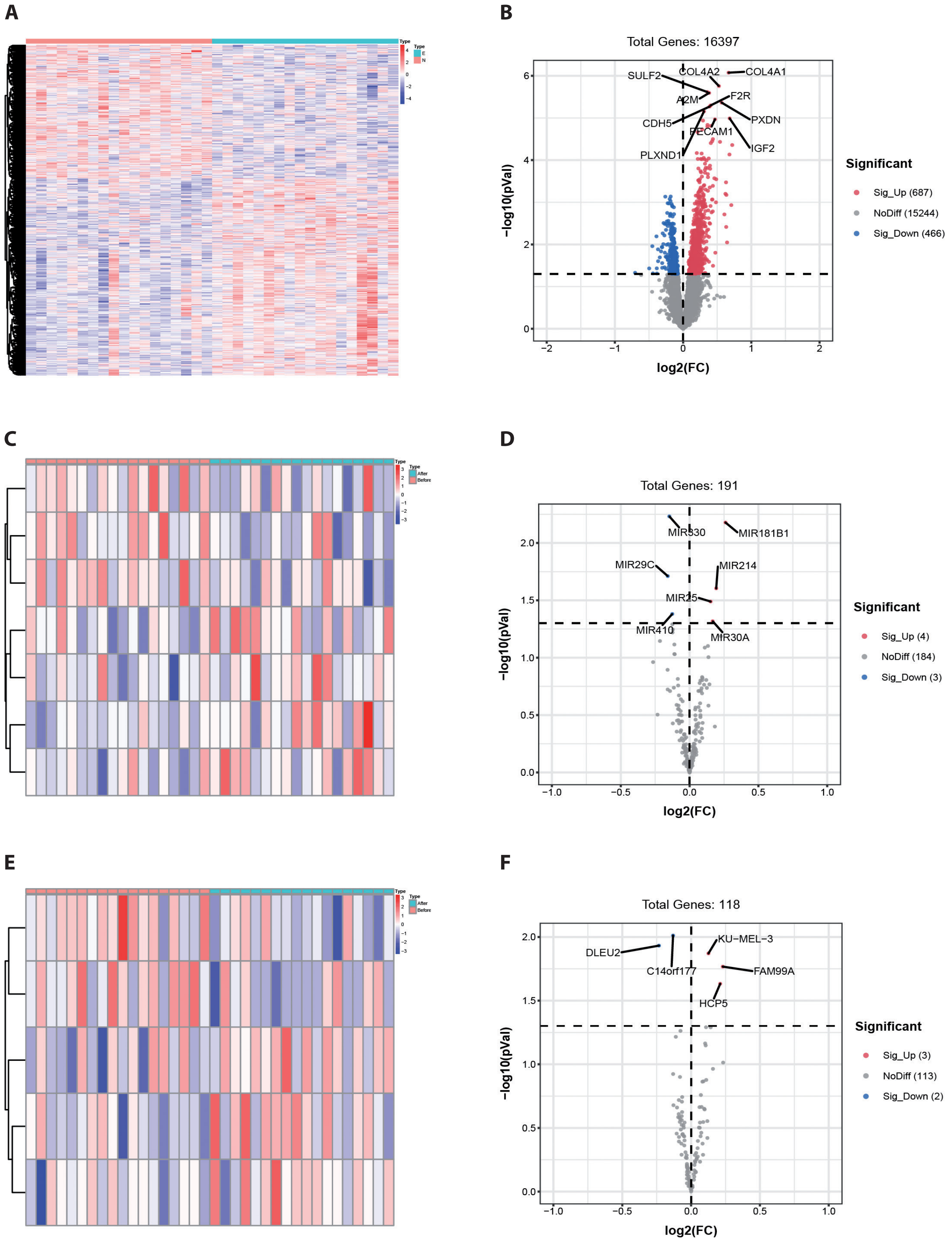


Figure 2. Heatmap plots (left) and volcano diagram (right) of differentially expressed mRNAs, miRNAs and lncRNAs in response to exercise training in skeletal muscle from human volunteers. Heatmaps of differentially 1153 expressed mRNAs (**A**), 7 differentially expressed miRNAs (**C**) and 5 differentially expressed lncRNAs (**E**). Volcano plots of 1153 differentially expressed mRNAs (**B**), of 7 differentially expressed miRNAs (**D**) and of 5 differentially expressed lncRNAs (**F**). Red dots indicate upregulated genes and blue dots suggest downregulated genes. FC, fold change. The color intensity in heatmap represented the value of z-score.

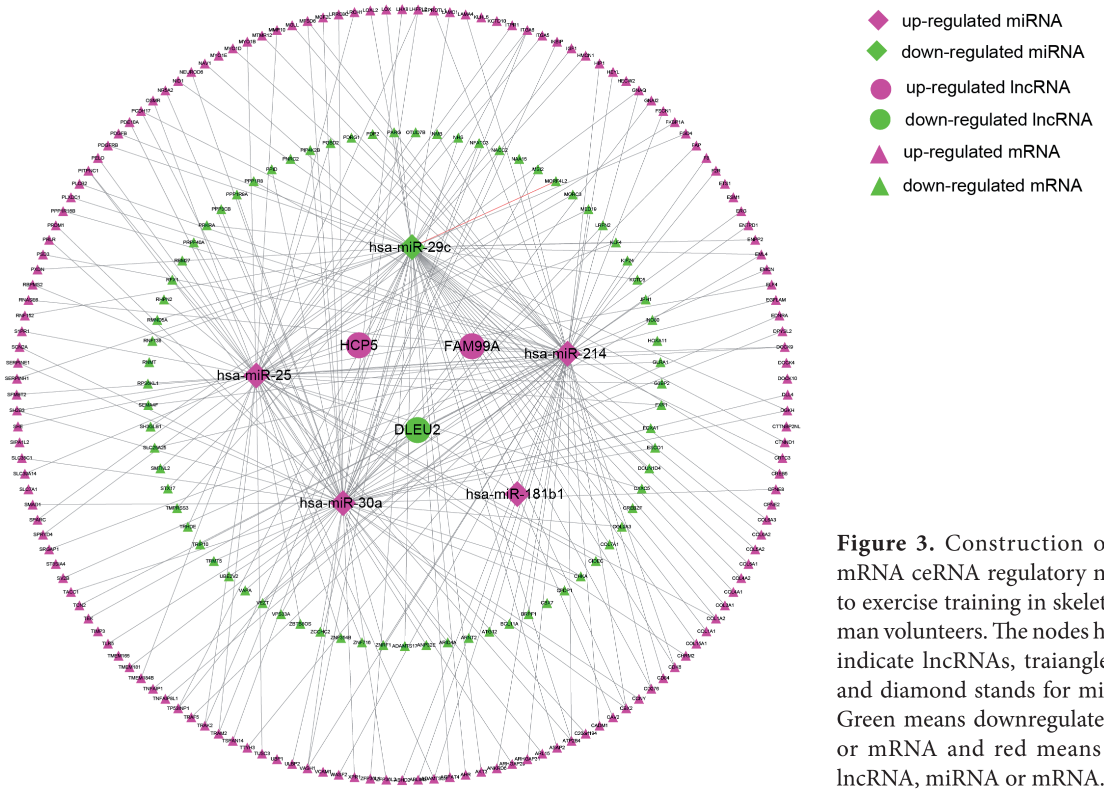


Figure 3. Construction of lnRNA-miRNA-mRNA ceRNA regulatory network in response to exercise training in skeletal muscle from human volunteers. The nodes highlighted in ellipse indicate lncRNAs, traiangle indicates mRNAs and diamond stands for miRNAs, respectively. Green means downregulated lncRNA, miRNA or mRNA and red means upregulated RNA lncRNA, miRNA or mRNA.

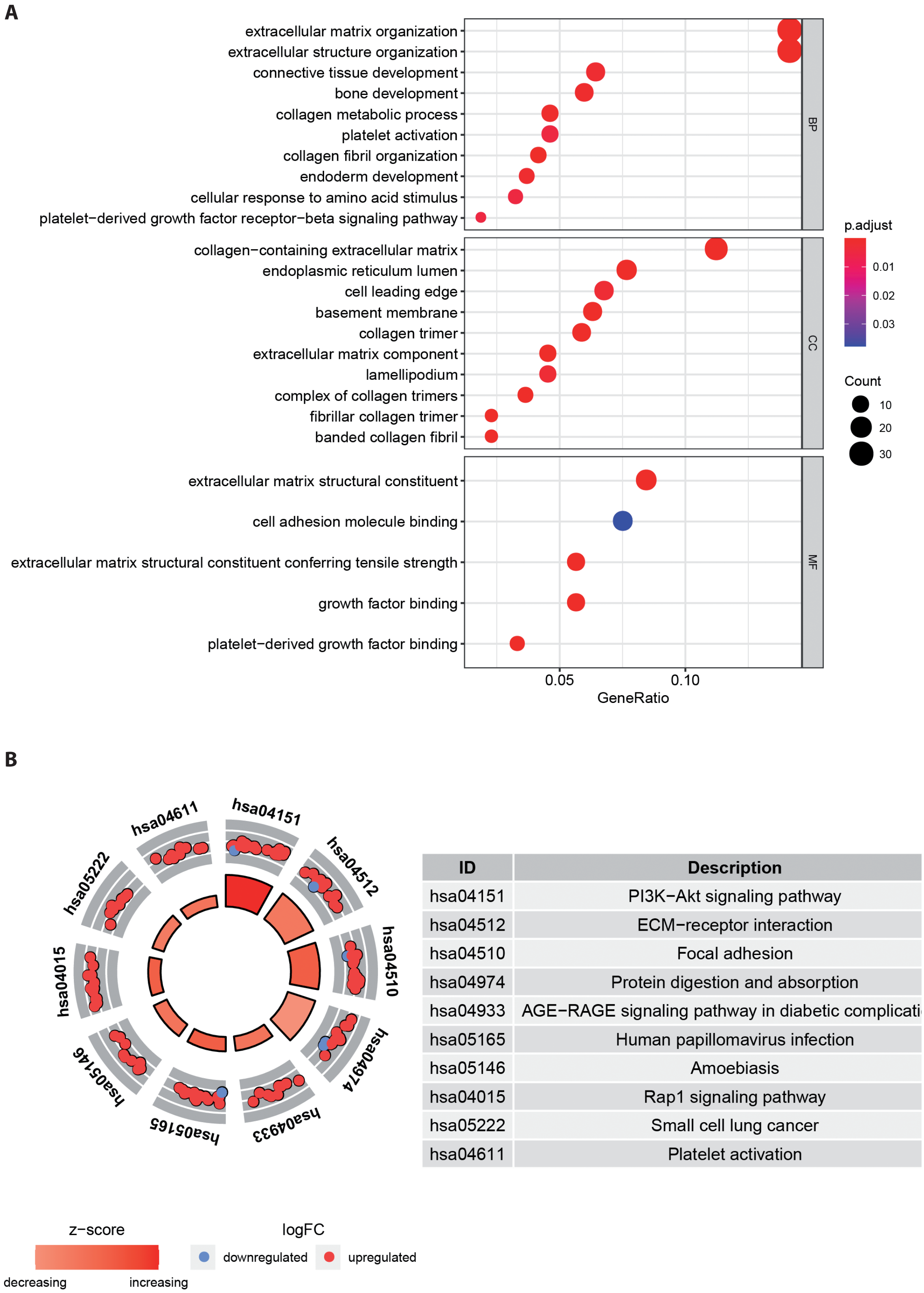
Screening hub genes based on PPI networks

In order to screen key genes in response to exercise training in skeletal muscle, PPI networks were constructed based on these differentially expressed mRNAs involving in this ceRNA network (Fig. 5A). Top 30 hub genes from PPI network were visualized with cytohubba application in Cytoscape using the EPC method. These genes may encode core proteins with important biological regulatory functions (Fig. 5B). Based on the top 100 hub genes, we constructed the sankey diagram to reveal the relationship among the pivotal lncRNAs, miRNAs and mRNAs. Thus, these genes were considered the most significant genes among the lncRNAs, miRNAs, and mRNAs, respectively (Fig. 5C).

Discussion

Physical exercise causes a large number of adaptations of our bodies, which has positive impacts for health. Regular exercise not only benefits cardiovascular health but also takes precautions against or puts off the onset of type 2 diabetes, obesity, and metabolic disease. Although impacts on exercise-induced adaptations to skeletal muscle have been well established in various diseases, the ceRNA network based on skeletal muscle in response to exercise training has not been constructed. In this study, we used microarray data obtained from muscle biopsies collected from human volunteers before and after exercise training intervention for 12 weeks to discover the effect of exercise training on the expression levels of lncRNA, miRNA, and mRNA as well as build a novel ceRNA network in human skeletal muscles in response to exercise training.

We constructed a lncRNA-miRNA-mRNA ceRNA networks according to the ceRNA theory, containing 5 miRNAs, 3 lncRNAs and 227 mRNAs, forming 283 lncRNA-miRNA-mRNA ceRNA interactions. HLA Complex P5 (HCP5) is an RNA Gene, and is affiliated with the lncRNA class. Diseases related to HCP5 contain Acquired immunodeficiency syndrome and thyroid gland follicular carcinoma (Liang et al. 2018; Zhao C et al. 2020). A recent research suggested that HCP5 promoted fatty acid oxidation *via* miR-3619-5p/AMPK/PGC1α/CEBPB axis to improve dryness and drug resistance of gastric cancer, which indicated that HCP5 may play an important role in fatty acid oxidation in muscle in response to exercise (Wu et al. 2020). Previous study indicated that FAM99A play an important role in migration of hepatocellular carcinoma through negatively regulating miR-92a (Zhao B et al. 2020). In a xenograft model of liver cancer, FAM99A inhibit GLUT1-mediated glycolysis by blocking the JAK2/STAT3 pathway (Zheng et al. 2021). DLEU2 is the only



ID	Description
hsa04151	PI3K−Akt signaling pathway
hsa04512	ECM−receptor interaction
hsa04510	Focal adhesion
hsa04974	Protein digestion and absorption
hsa04933	AGE−RAGE signaling pathway in diabetic complicati
hsa05165	Human papillomavirus infection
hsa05146	Amoebiasis
hsa04015	Rap1 signaling pathway
hsa05222	Small cell lung cancer
hsa04611	Platelet activation

Figure 4. GO and KEGG enrichment analysis of differentially expressed mRNAs in ceRNA networks. **A.** GO analyses of differentially expressed mRNAs. **B.** KEGG pathway analyses of differentially expressed mRNA. BP, biological process; CC, cellular component; MF, molecular function; GO, gene ontology.

one down regulated gene in the ceRNA network, which is strongly associated with tumor progression in various cancer through regulating glycolysis and AKT pathway (Li et al. 2020; Dong et al. 2021). As a tumor suppressor miRNA, hsa-miR-29c can inhibit the growth of cancers in certain types of cancer through targeting oncogenic genes, such as SIRT1 and WIP1 (Bae et al. 2014; Wang et al. 2015; Vidal et al. 2016). The expression of miR-30a-5p is positively correlated with the level of HDL cholesterol, whereas negatively associated with fasting insulin levels (Clément et al. 2021). The hsa-miR-25 is a well-represented miRNA playing a crucial part in the development of many diseases containing tumors, diabetes and heart failure (Nielsen et al. 2012; Dirkx et al. 2013; Peng et al. 2015). Suppression of miR-25 ameliorates cardiac contractility for heart and induces KLF4 expression in airway smooth muscle (Kuhn et al. 2010; Wahlquist et al. 2014). Recently, miR-214 was reported as a key regulator of musculoskeletal metabolism. In detail, miR-214 is able to mediate skeletal muscle myogenesis and vascular smooth muscle cell proliferation, migration, and differentiation. Importantly, there is an association between dysregulation of miR-214 expression and pathological bone conditions such as osteoporosis, osteosarcoma, multiple myeloma, and osteolytic bone metastases of breast cancer (Sun et al. 2018). Given that knowledge of the functions of these ncRNA in the skeletal muscle is limited, the deeper investigation of these genes is essential to elucidate their function in response to exercise training. Our study confirmed that ncRNAs in our ceRNA participated in the glycolysis and lipid metabolism, which may provide the therapy candidates for metabolism syndrome.

Then, we carried out the GO enrichment analysis and KEGG analysis base on the mRNAs in ceRNA network. The most significantly enriched GO terms are involved in extracellular matrix, of which underlying molecular mechanism remains unclear. However, it is conceivable that the changes of extracellular matrix related genes may reflect the transformation of skeletal muscle structure and organization after exercise training. Several previous researches have investigated the relationship between the transcriptome profile of human skeletal muscle and exercise training (Keller et al. 2011; Damas et al. 2018).Although the type of exercise are different, studies draw the same conclusion that exercise training contributes to the changes in the expression of many genes participated in extracellular matrix, particularly different collagen coding genes (Hyldahl et al. 2017). Our results, broadly consistent across exercise training types, suggest that exercise training induces muscle remodelling. KEGG pathway analysis indicated that mRNA in the ceRNA network are mainly enriched in the PI3K/AKT/mTOR signaling pathway, which is crucial for regulating signal transduction and biological processes, such as cell proliferation, apoptosis, metabolism and angiogenesis (Vivanco and Sawyers 2002). Previous studies indicate that PI3K-AKT signaling pathway is tightly associated with exercise training, which contribute to the skeletal muscle remodeling and development (Bassel-Duby and Olson 2006; Wang and Baek 2018; Wu et al. 2018). Besides, the growth factor-related pathways are highly enriched by mRNAs in ceRNA network. Growth factor, such as Fibroblast growth factor, insulin, insulin-like growth factor, is commonly considered as inducers or modulators of myogenesis both *in vivo* and *in vitro*, which plays key role in promoting both cell proliferation and differentiation in skeletal muscle cells (Allen and Boxhorn 1989; Husmann et al. 1996; Adams 1998).

Finally, we identified top 30 hub genes through cytoscape using EPC method. Based on these hub genes, we constructed the Sankey diagram to reveal the connections among the pivotal lncRNAs, miRNAs and mRNAs. Endothelin Receptor Type A (ENDRA) is a protein coding gene, which expressed mainly on vascular smooth muscle and cardiac muscle cells. The activation of ENDRA leads to vasoconstriction and cell proliferation of vascular smooth muscle through a phospholipase C-dependent pathway (Clément et al. 2021). G protein subunit alpha i1 (GNAI2) belongs to the "inhibitory" class of α subunits. A lack of GNAI2 in smooth muscle cells results in insulin resistance, while homozygous GNAI2^{G184S} knock-in mice are more insulin sensitive (Huang et al. 2008). The activation of GNAI2 signaling may aid in muscle regeneration and repair. Overexpression of Gnai2 increases muscle fiber size and abundance in a mouse model (Minetti et al. 2014). Insulin-like growth factor 1 (IGF-1) is one of the key growth factors, which is highly involved in both anabolic and catabolic signaling pathways in skeletal muscle. IGF-1 may enhance skeletal muscle protein synthesis through regulating PI3K/Akt pathways, whereas decreases protein degradation *via* regulating ubiquitin proteasome system (UPS). What's more, IGF-1 signaling pathway is usually suppressed in many chronic disease conditions, such as chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), and aging. Under these conditions, skeletal muscle atrophy may develop inevitably (Yoshida and Delafontaine 2020). Platelet-derived growth factor subunit beta (PDGFB) and platelet derived growth factor receptor beta (PDGFRB) signaling pathway has been established in angiogenesis and early hematopoiesis (Andrae et al. 2008). Kristoffer found that PDGFB signaling is necessary for fiber hypertrophy, extracellular matrix production, and angiogenesis during muscle growth (Sugg et al. 2017). The expression of Integrin subunit alpha 5 (ITGA5) and Integrin subunit alpha 6 (ITGA6 is related to active regeneration of skeletal muscle in patients with muscular dystrophy (Gullberg et al. 1995). Suppressor of mothers against decapentaplegic (SMAD1), a central mediator in TGF-β signaling, is associated with lots of biological process including cell growth, development, apoptosis, and immune response. Knockdown of Smad1 and Smad5 significantly reduce myofiber size by 20% after 2 weeks in a mouse model (Sartori et al. 2013). These results indicated that genes in Sankey diagram are mainly related to muscle growth.

This study has several limitations. First, the number of miRNA and lncRNA in the microarray data used in our study is not as much as mRNA. Second, further studies are necessary to understand the role of genes in ceRNA and its potential molecular mechanisms.

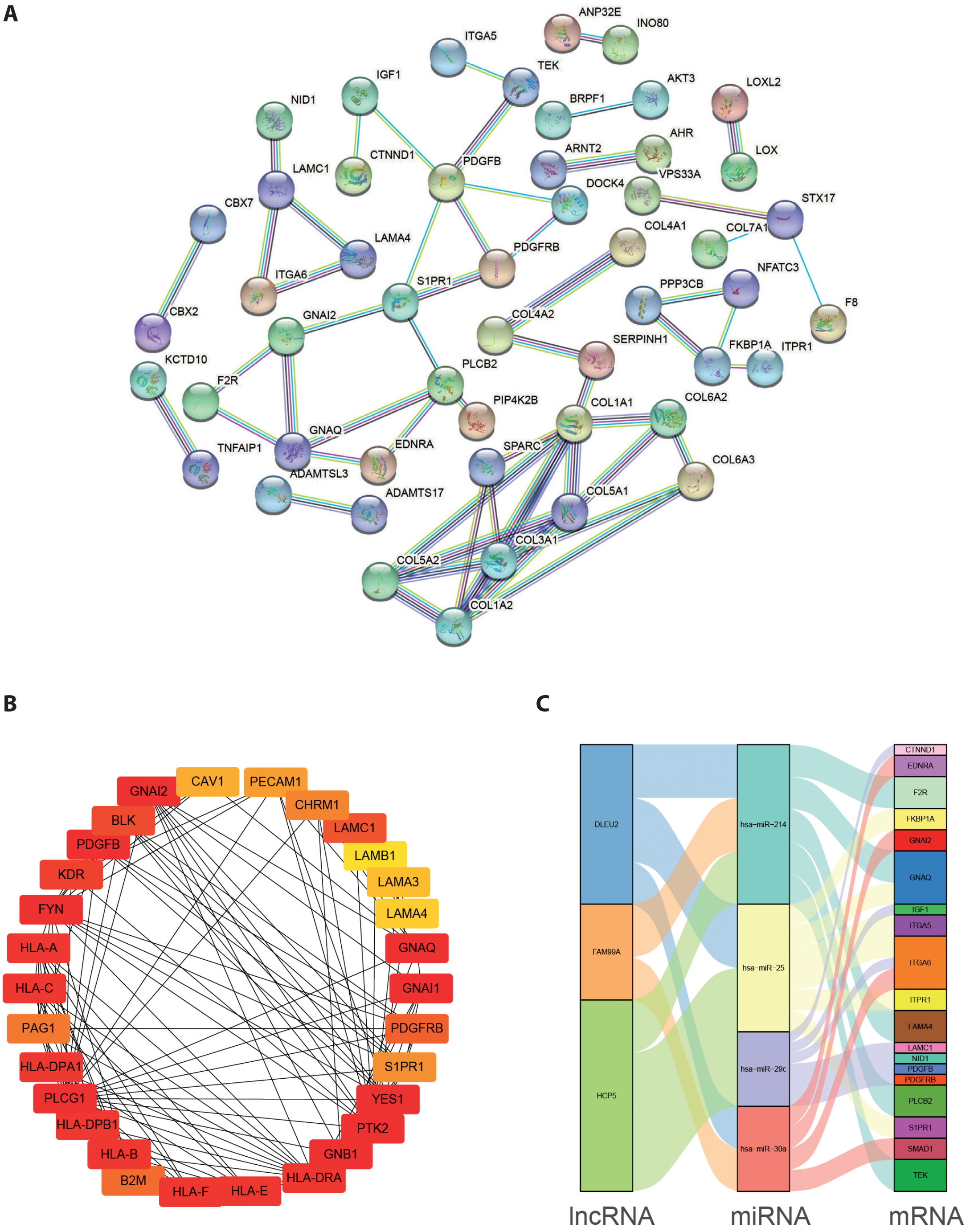


Figure 5. Identification of hub genes based on PPI interaction networks. **A.** PPI networks constructed with differentially expressed mRNAs participating in our ceRNA network. **B**. Top 30 hub genes network construction using the EPC method. **C**. Sankey diagram for the ceRNA network.

Conclusions

In conclusion, we built a novel lncRNA-mediated ceRNA network (lncRNA-miRNA-mRNA) in response to exercise training, which contains 5 miRNAs, 3 lncRNAs and 227 mRNAs. The mRNAs in ceRNA network may be mainly enriched in extracellular matrix and PI3K-AKT pathway. Based on these results, we provided novel insights on ceRNA regulatory networks in skeletal muscle in response to physical activity.

Ethics approval. Ethical approval for our research is waived by ethics committee of Xinxiang University as this study is based on database there is no need of ethics for this study.

Consent for publication. All authors agreed with the publication of this research.

Conflict of interest. The authors declare that they have no competing interests.

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Author contribution. Cheng Yan designed the research and wrote the paper. Mingkun Nie and Qingling Liu downloaded and analyzed the data. All authors agreed with the manuscript.

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Availability of data and materials. GSE156247 datasets is downloaded from the GEO database (https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE156247). All data and R script in this study are available from the corresponding author upon reasonable request.

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Supplementary Material

Construction of a novel lncRNA-miRNA-mRNA competing endogenous RNA network in muscle in response to exercise training

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Supplementary Tables

Table S1. Differentially expressed mRNA

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
COL4A1	0.666779	6.491292	5.839971	8.41E-07	0.010436	5.291945
COL4A2	0.525128	6.429218	5.611782	1.75E-06	0.010436	4.671822
SULF2	0.354322	6.412992	5.51013	2.42E-06	0.010436	4.395322
A2M	0.381007	9.476327	5.494639	2.55E-06	0.010436	4.353183
PXDN	0.564828	6.547709	5.328993	4.32E-06	0.012574	3.902706
F2R	0.403601	4.885428	5.28151	5.03E-06	0.012574	3.773656
CDH5	0.387787	7.878649	5.261114	5.37E-06	0.012574	3.718244
PLXND1	0.30561	6.385985	5.177596	7.00E-06	0.014354	3.49147
IGF2	0.68204	7.036633	5.058654	1.02E-05	0.017147	3.169003
PECAM1	0.467328	8.482912	5.042406	1.08E-05	0.017147	3.125009
TBC1D9	0.291417	4.866345	5.021294	1.15E-05	0.017147	3.067868
LDB2	0.358114	6.712512	4.946358	1.46E-05	0.018965	2.865266
KDR	0.409698	6.218787	4.928519	1.54E-05	0.018965	2.817093
INS-IGF2	0.355807	5.316345	4.91316	1.62E-05	0.018965	2.775633
DACH1	0.280883	5.344161	4.867082	1.87E-05	0.020469	2.651362
SH3KBP1	0.212328	8.854301	4.819381	2.18E-05	0.022299	2.522896
LOXL2	0.436791	4.947161	4.69919	3.17E-05	0.030602	2.200127
MYO1B	0.426048	6.543914	4.662361	3.56E-05	0.031843	2.101519
EDNRB	0.540834	5.68383	4.650899	3.69E-05	0.031843	2.070861
RAPGEF5	0.406265	5.338632	4.629695	3.94E-05	0.032321	2.014185
PRND	0.720003	3.769894	4.595421	4.39E-05	0.034252	1.922684
GRK5	0.200458	5.054279	4.45468	6.79E-05	0.049769	1.548523
ABLIM3	0.27115	7.850737	4.445674	6.98E-05	0.049769	1.524673
LOX	0.67956	3.745477	4.428772	7.36E-05	0.050251	1.479947
LOXHD1	0.302023	3.186169	4.369047	8.84E-05	0.052378	1.322245
CD93	0.375403	7.038047	4.358705	9.13E-05	0.052378	1.294993
ROBO4	0.259196	6.414478	4.349717	9.38E-05	0.052378	1.271323
CDH23	0.215751	5.589607	4.349708	9.38E-05	0.052378	1.2713
ERG	0.274914	5.882098	4.345408	9.51E-05	0.052378	1.259979

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
CDK6	0.315427	5.500264	4.342849	9.58E-05	0.052378	1.253246
TSPAN18	0.343378	6.397212	4.323898	0.000102	0.053724	1.203404
SASH1	0.320943	7.003054	4.265696	0.000121	0.062198	1.05071
JAM2	0.393141	7.2979	4.230349	0.000135	0.067185	0.958269
PDGFRB	0.332415	7.671126	4.193066	0.000151	0.070967	0.861011
PKD1L1	0.358805	5.889687	4.188667	0.000154	0.070967	0.849552
LRRC8C	0.224199	5.843542	4.179881	0.000158	0.070967	0.826679
HECW2	0.396132	5.458031	4.17476	0.00016	0.070967	0.813352
PTPRB	0.319432	7.598019	4.154116	0.00017	0.073567	0.759685
ARHGAP31	0.256032	6.318549	4.131466	0.000183	0.076773	0.700903
FAR2	0.263187	4.723651	4.109499	0.000195	0.079632	0.643987
DOCK1	0.320598	6.040009	4.102841	0.000199	0.079632	0.626757
HSPG2	0.361887	8.064078	4.079136	0.000214	0.083502	0.565486
FXYD5	0.275632	6.223865	4.032846	0.000246	0.093756	0.44618
CD74	0.36436	8.77825	4.022485	0.000254	0.094521	0.419539
SPARC	0.458169	10.09463	4.002078	0.00027	0.098255	0.367139
GUCY1A2	0.246294	6.530746	3.985583	0.000283	0.099372	0.324852
C1QTNF9	0.485534	4.967277	3.983786	0.000285	0.099372	0.320248
SPINK9	0.224132	2.219956	3.966263	0.0003	0.101138	0.2754
ADAM15	0.223904	6.21737	3.963962	0.000302	0.101138	0.269517
TCF4	0.236751	8.689099	3.955527	0.00031	0.101644	0.24796
SCN11A	0.241344	2.508055	3.927827	0.000337	0.106203	0.177282
THY1	0.629258	4.872759	3.927663	0.000337	0.106203	0.176864
SLC16A12	0.309032	4.416916	3.876974	0.000392	0.121142	0.048011
TM4SF18	0.436046	6.359036	3.863125	0.000408	0.122003	0.012914
ELMO1	0.301083	5.805272	3.862084	0.000409	0.122003	0.010279
NID2	0.390873	6.278959	3.833859	0.000445	0.128524	-0.06109
FXYD6	0.258537	7.493536	3.832402	0.000447	0.128524	-0.06476
ELK3	0.278298	5.914131	3.804955	0.000484	0.13673	-0.13396
MYCT1	0.24873	6.682521	3.797955	0.000495	0.13673	-0.15157
ADCY4	0.330518	6.238874	3.794011	0.0005	0.13673	-0.16149
IL34	0.258295	5.945752	3.781412	0.000519	0.139565	-0.19315
CAV1	0.363651	9.973368	3.771894	0.000534	0.140562	-0.21704
LPAR4	0.238578	2.954632	3.768007	0.00054	0.140562	-0.22679
THSD1	0.230685	4.747615	3.750788	0.000568	0.145533	-0.26992
EHD2	0.277633	7.070326	3.738304	0.000589	0.14773	-0.30114
TACC1	0.222891	7.243857	3.735164	0.000595	0.14773	-0.30899
BGN	0.620973	7.192495	3.71597	0.000629	0.153923	-0.35689
DOCK9	0.299553	7.298563	3.704433	0.00065	0.156599	-0.38564
THBS4	0.634059	7.253233	3.694392	0.00067	0.156599	-0.41063
SH2B3	0.209773	5.825632	3.689018	0.00068	0.156599	-0.42399
ACE	0.186009	5.566588	3.681405	0.000696	0.156599	-0.4429
RHOJ	0.299687	7.498938	3.678968	0.000701	0.156599	-0.44895
GPRIN3	0.241829	5.586416	3.675303	0.000708	0.156599	-0.45805
EPAS1	0.25187	8.963788	3.670569	0.000718	0.156599	-0.46979
CEP63	-0.18219	5.346257	-3.66464	0.00073	0.156599	-0.48449
BACE2	0.229382	6.135657	3.663314	0.000733	0.156599	-0.48777
YRDC	-0.26103	4.951757	-3.66229	0.000735	0.156599	-0.49031

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
FGD5	0.287652	4.915642	3.646385	0.00077	0.161626	-0.52968
GNAI2	0.224717	7.524489	3.642563	0.000779	0.161626	-0.53913
CTTNBP2NL	0.240579	5.602544	3.633732	0.000799	0.163741	-0.56095
PPP1R9A	-0.19697	6.147524	-3.61832	0.000835	0.168954	-0.59897
HLA-DPB1	0.429464	8.613257	3.608957	0.000858	0.168954	-0.62203
GNG11	0.307663	6.941966	3.606105	0.000865	0.168954	-0.62905
KIT	0.424583	4.650994	3.606019	0.000866	0.168954	-0.62926
PPP1R16B	0.247197	5.54854	3.594449	0.000895	0.172585	-0.65772
RNF125	0.308743	5.399196	3.590491	0.000905	0.172585	-0.66744
TRIM10	-0.18529	3.037124	-3.57882	0.000936	0.176432	-0.69607
IQCK	0.200453	5.860406	3.574592	0.000948	0.176565	-0.70645
PDE2A	0.296441	5.660234	3.567764	0.000966	0.176658	-0.72318
PITPNC1	0.269013	5.730309	3.565536	0.000973	0.176658	-0.72863
PRKCH	0.249063	6.96484	3.556074	0.000999	0.176658	-0.75179
PCDHB14	0.48143	4.956174	3.55505	0.001002	0.176658	-0.75429
EHD4	0.223037	5.2483	3.553756	0.001006	0.176658	-0.75745
DLL4	0.288003	6.112048	3.543272	0.001037	0.176658	-0.78307
MCF2L	0.19945	5.736289	3.539039	0.001049	0.176658	-0.7934
TSSC4	-0.22592	4.380825	-3.53845	0.001051	0.176658	-0.79484
PODXL	0.259518	7.895294	3.537527	0.001054	0.176658	-0.79709
NR1H2	-0.20941	7.086525	-3.53317	0.001067	0.176658	-0.80771
TTC28	0.171675	6.317385	3.531943	0.001071	0.176658	-0.8107
F11R	0.320859	5.362519	3.529867	0.001077	0.176658	-0.81576
UBE2V2	-0.16972	7.097363	-3.52512	0.001092	0.177147	-0.82732
TIE1	0.305061	5.932844	3.521981	0.001102	0.177147	-0.83497
ASAP1	0.214749	6.966247	3.515709	0.001122	0.178601	-0.85024
HLA-E	0.249468	9.261521	3.508775	0.001144	0.178884	-0.8671
NID1	0.295244	6.33151	3.508423	0.001146	0.178884	-0.86795
COL3A1	0.706546	6.39438	3.501956	0.001167	0.180498	-0.88366
UTP23	-0.16165	6.146794	-3.49421	0.001193	0.181799	-0.90245
IGFBP4	0.284843	7.894626	3.485486	0.001223	0.181799	-0.92361
COL15A1	0.401388	7.340229	3.484812	0.001225	0.181799	-0.92524
CLIC4	0.326274	8.150913	3.47836	0.001248	0.181799	-0.94086
MFAP1	-0.15809	5.105861	-3.47764	0.001251	0.181799	-0.94261
MYO1D	0.333153	5.156819	3.477437	0.001251	0.181799	-0.9431
RBPMS	0.287573	5.818623	3.476992	0.001253	0.181799	-0.94417
PREX2	0.287283	6.663287	3.461717	0.001308	0.186447	-0.9811
GDF5	-0.13604	2.603911	-3.46046	0.001313	0.186447	-0.98414
SH3BGRL2	0.298931	5.911581	3.456807	0.001327	0.186447	-0.99295
HLA-G	0.218738	10.00399	3.455867	0.00133	0.186447	-0.99522
MGLL	0.202034	7.1622	3.428609	0.001437	0.19971	-1.06086
SYCP2	0.200964	3.228962	3.423047	0.00146	0.201171	-1.07422
MFSD6	0.185925	5.822673	3.416731	0.001486	0.201976	-1.08938
ITGA5	0.26943	6.392488	3.415734	0.00149	0.201976	-1.09177
TSPAN4	0.15353	6.52075	3.402133	0.001549	0.207819	-1.12437
SNAI2	0.368281	7.032899	3.399816	0.001559	0.207819	-1.12992
ETS1	0.250137	6.927715	3.394094	0.001584	0.208961	-1.14361
FBXL7	0.191641	5.214437	3.392146	0.001593	0.208961	-1.14827

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
BTNL9	0.326651	6.906547	3.386755	0.001617	0.210472	-1.16115
LAMA4	0.434184	6.638925	3.380961	0.001644	0.212247	-1.17499
DPYSL2	0.200562	7.72382	3.373736	0.001678	0.214012	-1.19223
LCE3D	0.248026	3.533256	3.372455	0.001684	0.214012	-1.19528
LAMB1	0.416553	7.097376	3.361387	0.001737	0.219066	-1.22164
HOXA11	-0.23279	3.429514	-3.34999	0.001793	0.224453	-1.24875
CLEC14A	0.2048	5.804876	3.342599	0.001831	0.227145	-1.2663
TCN2	0.252818	4.827141	3.340315	0.001842	0.227145	-1.27172
NRF1	-0.18472	5.805068	-3.33389	0.001876	0.227161	-1.28696
VASH1	0.219159	5.387976	3.333032	0.00188	0.227161	-1.28899
PSMB1	-0.13346	7.73156	-3.32668	0.001914	0.227161	-1.30404
HLA-C	0.206235	9.32518	3.325418	0.001921	0.227161	-1.30702
TEK	0.307042	6.513165	3.325227	0.001922	0.227161	-1.30747
ENG	0.263228	7.982176	3.321962	0.001939	0.227161	-1.3152
MXRA5	0.605687	5.805159	3.321932	0.00194	0.227161	-1.31527
CENPH	-0.18671	2.409023	-3.31727	0.001965	0.228026	-1.32629
DGKH	0.254801	5.500217	3.315485	0.001975	0.228026	-1.33051
S1PR1	0.173918	4.746178	3.310889	0.002	0.22867	-1.34137
ADCYAP1R1	0.27884	3.825307	3.309456	0.002008	0.22867	-1.34476
ASAP2	0.272739	5.818645	3.293863	0.002097	0.237126	-1.38153
NHS	-0.19245	3.791361	-3.29145	0.002111	0.237126	-1.38721
ZNRF1	-0.15434	5.36417	-3.28144	0.002171	0.240645	-1.41076
PCDHB1	0.196036	2.118395	3.281248	0.002172	0.240645	-1.41121
CD34	0.297105	8.620386	3.276538	0.002201	0.242175	-1.42228
ICAM2	0.219762	6.943872	3.257945	0.002317	0.251616	-1.46589
CD163L1	0.285033	3.771443	3.256032	0.002329	0.251616	-1.47037
MAML2	0.275489	5.593402	3.255535	0.002332	0.251616	-1.47154
ENPP2	0.327057	5.800875	3.251174	0.002361	0.25251	-1.48174
B3GNT2	0.163732	2.968826	3.249524	0.002372	0.25251	-1.4856
C1QTNF9B	0.372927	4.649437	3.24665	0.00239	0.252882	-1.49232
IGFBP3	0.227998	5.351967	3.229005	0.00251	0.263344	-1.53351
CSGALNACT1	0.26334	4.879217	3.226842	0.002525	0.263344	-1.53855
FMNL3	0.211512	5.721034	3.225005	0.002538	0.263344	-1.54283
PEA15	0.244165	7.6965	3.222334	0.002556	0.26362	-1.54905
NLRC5	0.189608	5.193334	3.21801	0.002587	0.265109	-1.55911
ACSL5	0.216327	5.419939	3.198713	0.002728	0.277165	-1.60394
RSL24D1	-0.2164	6.239638	-3.1947	0.002758	0.277165	-1.61325
SGIP1	0.155685	5.145947	3.19275	0.002773	0.277165	-1.61776
ZNF35	0.187929	4.935192	3.192678	0.002773	0.277165	-1.61793
TRAM2	0.23403	6.370414	3.190612	0.002789	0.277165	-1.62271
BOLL	-0.23834	5.438019	-3.184	0.00284	0.28053	-1.63801
RHOC	0.221376	7.148924	3.175557	0.002906	0.283737	-1.65753
CYYR1	0.29346	7.053648	3.1754	0.002908	0.283737	-1.65789
KCTD12	0.265044	7.043418	3.173303	0.002924	0.283737	-1.66274
PKP4	0.167087	6.030184	3.168066	0.002967	0.286135	-1.67482
EPHB3	0.173692	3.613239	3.160819	0.003026	0.288468	-1.69153
NDUFA4L2	0.194756	5.350983	3.15577	0.003068	0.288468	-1.70316
STEAP4	0.317824	7.075004	3.153689	0.003085	0.288468	-1.70795

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
RNASE1	0.256077	9.553027	3.152232	0.003098	0.288468	-1.7113
ZNF716	-0.28594	3.024775	-3.15143	0.003104	0.288468	-1.71314
FSCN1	0.388207	6.437386	3.148945	0.003125	0.288468	-1.71886
ARRB1	0.199278	6.521762	3.146506	0.003146	0.288468	-1.72447
CTRL	-0.15466	3.95361	-3.14142	0.00319	0.288468	-1.73615
PDC	-0.20174	2.440167	-3.13849	0.003216	0.288468	-1.74289
MS4A6A	0.394382	5.372682	3.13737	0.003226	0.288468	-1.74545
DEFB104A	0.153564	1.977634	3.137324	0.003226	0.288468	-1.74555
SETD6	-0.19174	5.657876	-3.13499	0.003246	0.288468	-1.75091
LAMC1	0.194036	7.916583	3.133974	0.003255	0.288468	-1.75324
MLC1	-0.13706	3.838028	-3.13302	0.003264	0.288468	-1.75543
ABCC2	-0.2665	4.089615	-3.13186	0.003274	0.288468	-1.75809
SGK2	-0.24329	2.730478	-3.13169	0.003276	0.288468	-1.75848
CAMK2N1	0.24597	6.860963	3.127889	0.00331	0.288468	-1.76719
CRY2	-0.16454	7.742836	-3.12711	0.003317	0.288468	-1.76897
TSPAN14	0.181849	6.820001	3.12619	0.003325	0.288468	-1.77107
EGFLAM	0.152212	6.594754	3.121952	0.003364	0.28984	-1.78078
NETO2	0.303915	5.792824	3.120564	0.003376	0.28984	-1.78395
CPE	0.263301	6.279719	3.117596	0.003403	0.290662	-1.79074
PRCP	0.275292	6.022794	3.114429	0.003433	0.291649	-1.79798
KLHDC7A	-0.17747	4.292551	-3.1093	0.003481	0.294209	-1.8097
KCNJ8	0.249704	6.056952	3.106892	0.003504	0.294613	-1.81519
SH3BGRL	0.31963	7.840127	3.097082	0.003598	0.300994	-1.83756
ADAM20	-0.22662	5.387255	-3.09032	0.003664	0.304987	-1.85295
ADAMTSL3	0.220504	5.656715	3.085161	0.003716	0.306991	-1.86468
BTBD8	0.298498	4.300647	3.084156	0.003726	0.306991	-1.86697
COL5A2	0.329016	4.74537	3.080434	0.003763	0.30777	-1.87542
EHD3	0.239911	4.953345	3.078708	0.003781	0.30777	-1.87934
VWF	0.25588	7.511706	3.076878	0.0038	0.30777	-1.8835
CD276	0.215228	5.0189	3.075835	0.00381	0.30777	-1.88586
ASPN	0.631706	5.62092	3.072184	0.003848	0.309289	-1.89415
TUSC2	-0.15481	7.002606	-3.06392	0.003935	0.314704	-1.91287
RCBTB1	0.216903	5.704484	3.060813	0.003968	0.315805	-1.9199
RD3	-0.17618	2.38777	-3.0575	0.004003	0.317092	-1.9274
BLK	-0.15102	3.058747	-3.05048	0.004079	0.321401	-1.94325
VCAM1	0.264159	3.680243	3.048843	0.004097	0.321401	-1.94696
ANAPC2	-0.16057	5.200957	-3.04658	0.004122	0.321401	-1.95207
PSD3	0.242829	3.639684	3.045343	0.004136	0.321401	-1.95486
RBM27	-0.15942	6.916516	-3.03692	0.00423	0.327187	-1.97384
ISX	-0.12376	3.143516	-3.03338	0.004271	0.328759	-1.98182
MNX1	-0.16803	4.715991	-3.02911	0.00432	0.330981	-1.99142
TNFSF10	0.366421	8.196203	3.019695	0.00443	0.33784	-2.01258
TLR5	0.208834	4.196997	3.0124	0.004517	0.33847	-2.02895
PHLDA1	0.197817	4.17731	3.012221	0.004519	0.33847	-2.02935
C2orf76	-0.25076	4.078861	-3.01162	0.004526	0.33847	-2.0307
EPB41L2	0.215288	7.216195	3.009385	0.004553	0.33847	-2.03571
PRKRA	-0.13886	8.0781	-3.00559	0.0046	0.33847	-2.04422
ARAP3	0.169462	5.515125	3.004532	0.004613	0.33847	-2.04657

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
HCRT	-0.1812	3.962635	-3.00452	0.004613	0.33847	-2.04661
BCL2L10	-0.14958	2.22973	-3.00247	0.004638	0.33847	-2.05118
ATP2B4	0.208515	7.555547	3.002317	0.00464	0.33847	-2.05153
TSPAN13	0.162945	5.271762	3.001767	0.004647	0.33847	-2.05276
HLA-DRA	0.350501	8.411192	3.000291	0.004665	0.33847	-2.05606
CCDC54	0.134078	1.923156	2.996993	0.004706	0.339671	-2.06344
PTPRE	0.273237	5.114083	2.995652	0.004723	0.339671	-2.06643
AVPR1A	0.188174	4.214945	2.989749	0.004798	0.343239	-2.07962
TAF7	-0.12419	6.624697	-2.98844	0.004815	0.343239	-2.08254
C1orf54	0.240447	3.864959	2.980914	0.004912	0.348011	-2.09932
SNRNP48	-0.1729	6.602735	-2.97972	0.004927	0.348011	-2.10199
CERCAM	0.260656	4.948009	2.973859	0.005005	0.348011	-2.11503
KLHDC1	-0.15547	6.68461	-2.97041	0.005051	0.348011	-2.1227
LHX5	-0.16701	3.253477	-2.96949	0.005063	0.348011	-2.12474
MYADM	0.280172	7.346625	2.969442	0.005064	0.348011	-2.12485
FAM47B	-0.16526	2.902663	-2.96739	0.005091	0.348011	-2.12942
DCC	-0.13297	2.696769	-2.96523	0.00512	0.348011	-2.13422
TMSB10	0.29078	8.947051	2.964843	0.005126	0.348011	-2.13507
UBP1	0.154855	7.189809	2.964646	0.005128	0.348011	-2.13551
PTPRM	0.125871	9.081716	2.964201	0.005134	0.348011	-2.1365
ELF4	0.216648	4.511965	2.964066	0.005136	0.348011	-2.1368
SCAMP5	0.215942	3.039827	2.960518	0.005185	0.349849	-2.14467
CDH6	0.33382	5.652688	2.953501	0.005282	0.35169	-2.16023
TAF3	-0.14125	6.636046	-2.94944	0.005339	0.35169	-2.16923
SIPA1L2	0.234328	5.711562	2.948145	0.005357	0.35169	-2.17209
ANKRD29	0.287529	5.216748	2.947749	0.005363	0.35169	-2.17297
TXNDC8	-0.1385	1.798481	-2.94757	0.005365	0.35169	-2.17336
MAB21L1	-0.18106	5.108072	-2.94577	0.005391	0.35169	-2.17735
SART1	-0.17745	5.667724	-2.94392	0.005417	0.35169	-2.18145
COLEC12	0.259337	5.701923	2.943616	0.005422	0.35169	-2.18211
MYLK2	-0.29893	9.505796	-2.94091	0.00546	0.35169	-2.18809
SPRR1B	0.1543	2.780106	2.940335	0.005469	0.35169	-2.18937
LRG1	-0.14709	3.824832	-2.93948	0.005481	0.35169	-2.19125
NOTCH4	0.224718	6.041095	2.939336	0.005483	0.35169	-2.19158
DHRS7B	-0.18366	7.612219	-2.9388	0.005491	0.35169	-2.19276
IGFBP2	0.270612	6.123089	2.934953	0.005547	0.353895	-2.20126
MYH10	0.240272	5.245802	2.932647	0.005581	0.354671	-2.20635
MUC6	-0.19581	3.968572	-2.93074	0.005609	0.355085	-2.21056
MYO1E	0.18973	5.910026	2.928367	0.005644	0.355932	-2.21579
STK11	-0.16532	6.644644	-2.92493	0.005695	0.356492	-2.22337
CHRM2	0.142165	2.623434	2.924857	0.005696	0.356492	-2.22352
LRRC53	-0.16188	2.265663	-2.9234	0.005718	0.356499	-2.22673
TMEM88	0.283856	7.554627	2.919112	0.005783	0.359177	-2.23617
LIPA	0.264345	5.830802	2.917145	0.005813	0.359676	-2.2405
IMP3	-0.16257	5.285111	-2.91104	0.005907	0.362968	-2.25392
ACR	0.191652	4.014506	2.910812	0.00591	0.362968	-2.25442
PCDH12	0.234173	4.633809	2.906879	0.005972	0.364029	-2.26305
SHANK3	0.17133	6.044468	2.906855	0.005972	0.364029	-2.2631

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
TJP1	0.160497	8.420436	2.90483	0.006004	0.364611	-2.26755
PELO	0.241135	6.827511	2.901876	0.006051	0.365827	-2.27403
CLDN5	0.194241	5.773109	2.8991	0.006095	0.365827	-2.28011
PDP2	-0.27397	4.834256	-2.89789	0.006114	0.365827	-2.28276
TNFRSF21	0.171655	5.178621	2.89728	0.006124	0.365827	-2.2841
NOTCH3	0.213888	7.307576	2.896556	0.006135	0.365827	-2.28568
PAMR1	0.349371	4.036992	2.890339	0.006236	0.369987	-2.29929
CPT1C	0.136896	3.49003	2.889466	0.00625	0.369987	-2.3012
PLEKHG2	0.186632	4.922521	2.882002	0.006373	0.375917	-2.31751
CYP4B1	-0.39088	6.000717	-2.87793	0.006441	0.378502	-2.32639
LAMA3	0.234491	4.586518	2.876154	0.006471	0.378502	-2.33027
OR8B8	0.19247	2.392559	2.875264	0.006486	0.378502	-2.33221
TSSK4	0.206972	3.23509	2.872122	0.00654	0.379925	-2.33905
ARL15	0.223555	4.989538	2.871106	0.006557	0.379925	-2.34127
OR2L8	0.378895	2.171189	2.865562	0.006653	0.383292	-2.35334
LONP1	-0.18152	5.747896	-2.86329	0.006692	0.383292	-2.35827
APLNR	0.305395	6.345117	2.8611	0.00673	0.383292	-2.36304
PLS3	0.265777	6.544193	2.861055	0.006731	0.383292	-2.36314
KLF3	0.202424	6.813671	2.860993	0.006732	0.383292	-2.36327
XPR1	0.124701	6.33325	2.858379	0.006778	0.384573	-2.36895
SPTLC2	0.210474	5.77182	2.856851	0.006805	0.384671	-2.37227
SREK1IP1	-0.16269	5.453073	-2.85563	0.006827	0.384671	-2.37492
TAGLN2	0.25103	7.202438	2.853365	0.006867	0.385616	-2.37984
SOCS2	0.181338	3.975979	2.849968	0.006928	0.387706	-2.3872
GPR176	0.15328	3.708832	2.844261	0.007031	0.392154	-2.39957
UNC5B	0.159607	5.105989	2.841777	0.007077	0.393352	-2.40495
CELA2B	-0.14228	2.728016	-2.84029	0.007104	0.393533	-2.40816
RBMS2	0.203385	6.639527	2.838703	0.007133	0.393829	-2.4116
RTP3	0.145263	2.805044	2.828614	0.007322	0.401386	-2.4334
LRCH1	0.19254	5.615034	2.827592	0.007342	0.401386	-2.4356
CEBPE	-0.13699	3.153818	-2.82686	0.007356	0.401386	-2.43717
PDXP	-0.15071	5.397492	-2.82585	0.007375	0.401386	-2.43935
HLA-A	0.226262	10.05034	2.824913	0.007393	0.401386	-2.44138
DDX19A	-0.13693	6.501683	-2.82278	0.007434	0.40227	-2.44597
NIPAL2	0.23712	5.196659	2.820708	0.007474	0.40255	-2.45044
KIF5C	-0.15712	3.187946	-2.81997	0.007488	0.40255	-2.45204
ITIH5	0.251355	6.862447	2.811617	0.007651	0.408743	-2.47
OR7C2	-0.16667	2.928012	-2.81152	0.007653	0.408743	-2.47021
ZNF354B	-0.16834	4.960685	-2.8077	0.007729	0.411454	-2.47843
EPB41L4A	0.224234	5.48333	2.804251	0.007798	0.413781	-2.48583
NLRP1	0.161496	5.070707	2.802553	0.007832	0.414254	-2.48947
SPRED1	0.216317	5.636594	2.799517	0.007893	0.4157	-2.49598
NRN1	0.205193	7.081427	2.798702	0.00791	0.4157	-2.49773
ATP8B4	0.256776	3.287006	2.797158	0.007941	0.416021	-2.50104
LHX8	0.178488	2.361176	2.794358	0.007999	0.417694	-2.50704
NUP54	-0.14001	6.058471	-2.79092	0.00807	0.419524	-2.51439
PTPRR	0.121921	3.067473	2.789999	0.008089	0.419524	-2.51637
VSIG4	0.289709	4.636234	2.788331	0.008124	0.419524	-2.51994

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
GNG2	0.200561	5.215818	2.787626	0.008138	0.419524	-2.52144
S100A16	0.261569	6.195777	2.786509	0.008162	0.419524	-2.52383
E2F6	-0.13569	6.325223	-2.78213	0.008254	0.422644	-2.53319
LEPROTL1	0.134577	6.589103	2.781187	0.008274	0.422644	-2.5352
STOM	0.165252	8.770354	2.774875	0.008409	0.427247	-2.54867
PCDH17	0.20414	4.639783	2.774539	0.008416	0.427247	-2.54938
SMNDC1	-0.13561	6.943981	-2.77117	0.008489	0.428964	-2.55657
GBP4	0.341519	5.569177	2.770564	0.008502	0.428964	-2.55786
SHE	0.167181	6.008577	2.763673	0.008654	0.433981	-2.57252
GIMAP5	0.274834	6.645269	2.763622	0.008655	0.433981	-2.57263
ESAM	0.19255	5.752255	2.761839	0.008694	0.434239	-2.57642
TMEM165	0.138886	6.355	2.75868	0.008765	0.434239	-2.58313
CD109	0.221934	4.486898	2.757626	0.008788	0.434239	-2.58537
ITPR1	0.206366	4.821292	2.757623	0.008788	0.434239	-2.58538
NR5A2	0.203388	4.155324	2.757452	0.008792	0.434239	-2.58574
PRPF40A	-0.12815	7.099128	-2.75614	0.008822	0.434389	-2.58853
KIF20A	0.142733	1.963783	2.749795	0.008966	0.439006	-2.60198
COL1A1	0.644671	6.216302	2.74965	0.008969	0.439006	-2.60229
NRM	0.239749	4.799023	2.746987	0.00903	0.440682	-2.60794
RFTN1	0.113466	4.235102	2.743116	0.00912	0.442439	-2.61613
ZNF829	0.156659	3.137631	2.743097	0.00912	0.442439	-2.61617
TUSC3	0.304228	5.724377	2.740225	0.009187	0.443197	-2.62225
ACTN4	0.231458	9.210225	2.739337	0.009208	0.443197	-2.62413
TRERF1	0.137178	3.712344	2.738641	0.009224	0.443197	-2.6256
DYNLT3	0.229418	5.861139	2.735996	0.009287	0.443197	-2.63119
BRPF1	-0.12843	5.85939	-2.73593	0.009288	0.443197	-2.63132
ADAMTS12	0.193909	4.69827	2.735513	0.009298	0.443197	-2.63221
ZNF304	-0.16503	4.97042	-2.73052	0.009417	0.446802	-2.64276
TADA1	-0.12826	5.798355	-2.72924	0.009448	0.446802	-2.64546
NAV1	0.16554	6.524202	2.728736	0.00946	0.446802	-2.64651
UIMC1	0.245694	8.310022	2.727777	0.009483	0.446802	-2.64853
PCDH1	0.18152	6.270635	2.725137	0.009546	0.44852	-2.6541
EMCN	0.221216	7.554012	2.721292	0.00964	0.451623	-2.6622
SLC43A3	0.228802	7.097975	2.719466	0.009685	0.452428	-2.66604
EXOC3	-0.14219	6.803285	-2.71699	0.009746	0.453979	-2.67124
ZNF669	-0.21784	3.782776	-2.71434	0.009811	0.455502	-2.67682
IGFBP6	-0.2898	5.489016	-2.71344	0.009834	0.455502	-2.67872
FKBP1A	0.148294	6.725892	2.709693	0.009928	0.458546	-2.68659
F8	0.197453	7.429485	2.706644	0.010005	0.4608	-2.69299
SYT11	0.192564	4.739463	2.704569	0.010057	0.461927	-2.69734
C8orf48	-0.14156	2.690385	-2.70188	0.010126	0.463783	-2.70298
THAP2	-0.24074	3.778463	-2.69967	0.010183	0.463844	-2.70761
THUMPD2	-0.16654	5.463208	-2.69948	0.010188	0.463844	-2.70801
FAM117B	0.196623	6.603011	2.698523	0.010212	0.463844	-2.71001
GIMAP1	0.242164	5.469549	2.696658	0.01026	0.464746	-2.71391
THAP1	-0.15632	6.261396	-2.69528	0.010296	0.465078	-2.71679
CYP3A4	0.181379	1.893653	2.691886	0.010385	0.467246	-2.72389
RPL4	-0.16274	2.689875	-2.69126	0.010401	0.467246	-2.7252

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
NOD1	0.147779	5.094449	2.68965	0.010443	0.467868	-2.72856
GPHA2	0.162625	3.350123	2.687484	0.010501	0.469148	-2.73309
OR4K5	0.178386	2.22347	2.682655	0.010629	0.473371	-2.74317
FLI1	0.170462	5.329683	2.68103	0.010673	0.473371	-2.74656
SLC37A2	0.197148	3.40099	2.679712	0.010708	0.473371	-2.7493
BID	0.149841	5.310178	2.679623	0.010711	0.473371	-2.74949
LPAR6	0.23446	5.539614	2.677047	0.01078	0.475169	-2.75486
LEFTY1	0.246214	3.362632	2.67554	0.010821	0.475694	-2.75799
ZFP36L2	0.176674	7.588516	2.673532	0.010876	0.476824	-2.76217
SHISA3	-0.4515	3.65213	-2.6689	0.011003	0.481115	-2.7718
SEL1L3	0.194828	4.773796	2.666904	0.011059	0.482252	-2.77596
GGN	0.168654	3.598916	2.665368	0.011101	0.482378	-2.77915
TMEM120B	-0.18792	6.587823	-2.66409	0.011137	0.482378	-2.78181
CDCP1	0.159871	2.856946	2.663572	0.011151	0.482378	-2.78288
RSBN1L	-0.13701	5.186092	-2.66258	0.011179	0.482378	-2.78493
ZNF239	-0.15796	3.429567	-2.66153	0.011209	0.482381	-2.78711
CYB5D1	0.142745	6.40715	2.6588	0.011286	0.484426	-2.79278
TRAF5	0.237181	3.696506	2.657172	0.011332	0.484471	-2.79615
TRIM16	0.219227	6.318653	2.656679	0.011346	0.484471	-2.79717
RNF152	0.241572	5.36623	2.654308	0.011413	0.484828	-2.80209
MYO5C	0.215624	4.771452	2.652103	0.011477	0.484828	-2.80665
ODF3	-0.15511	3.010987	-2.65145	0.011495	0.484828	-2.80799
DLC1	0.167573	5.974258	2.651285	0.0115	0.484828	-2.80834
KCNIP2	-0.31169	4.146572	-2.6505	0.011523	0.484828	-2.80997
HSD3B1	0.176735	2.581617	2.648736	0.011574	0.484828	-2.81362
ZNF765	0.12805	6.953028	2.648345	0.011585	0.484828	-2.81443
ATG12	-0.15259	4.91956	-2.64815	0.011591	0.484828	-2.81483
TNFAIP8L1	0.225673	4.691179	2.645031	0.011681	0.485377	-2.82128
TAS2R19	-0.30731	4.966322	-2.64448	0.011698	0.485377	-2.82242
ANO2	0.228971	5.514822	2.644439	0.011699	0.485377	-2.8225
MOV10	0.158152	6.048198	2.643121	0.011737	0.485377	-2.82522
DCUN1D4	-0.13832	6.753768	-2.64263	0.011752	0.485377	-2.82624
CASP4	0.241168	4.810458	2.640889	0.011803	0.486265	-2.82983
WNT8A	-0.16306	2.923434	-2.63773	0.011896	0.48836	-2.83634
PKP1	0.23708	4.786482	2.63716	0.011913	0.48836	-2.83753
ZSWIM2	-0.09914	1.819834	-2.6347	0.011987	0.489033	-2.84259
EPHB4	0.185859	5.653632	2.634533	0.011992	0.489033	-2.84294
CASP10	0.207208	3.95137	2.632774	0.012044	0.489033	-2.84657
DCHS1	0.168433	5.208762	2.63136	0.012087	0.489033	-2.84948
LTN1	-0.12183	6.900852	-2.6311	0.012095	0.489033	-2.85
PPP6R3	-0.10132	7.984679	-2.62877	0.012165	0.489033	-2.85482
XAF1	0.34181	7.205368	2.628678	0.012168	0.489033	-2.855
USP17L2	0.239417	3.925965	2.628668	0.012168	0.489033	-2.85502
DTL	0.196435	2.736019	2.627524	0.012203	0.489229	-2.85737
MORC3	-0.12924	7.208265	-2.6263	0.01224	0.489524	-2.85989
NAT10	-0.12034	6.315721	-2.62461	0.012292	0.490399	-2.86337
PDGFB	0.176199	5.509946	2.622376	0.012361	0.490892	-2.86796
SPATA9	0.140864	1.891828	2.622104	0.012369	0.490892	-2.86852

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
NMUR1	-0.15511	4.247203	-2.62128	0.012394	0.490892	-2.87021
TGFB1	0.199764	5.364095	2.619711	0.012443	0.491618	-2.87343
CPLX3	-0.13869	3.458409	-2.61875	0.012473	0.491618	-2.8754
CPNE8	0.191278	5.201754	2.616849	0.012532	0.492762	-2.8793
LHFPL2	0.163886	5.164106	2.613612	0.012633	0.495554	-2.88594
PLEKHO1	0.159159	6.172424	2.611238	0.012708	0.495585	-2.89081
STARD9	0.193197	5.508787	2.61057	0.012729	0.495585	-2.89218
TEDDM1	0.12648	2.14451	2.610396	0.012734	0.495585	-2.89253
IFI16	0.266934	6.43672	2.609751	0.012755	0.495585	-2.89385
ARHGEF15	0.166573	5.815934	2.608125	0.012806	0.496413	-2.89718
ADAMTS17	-0.16706	4.398383	-2.60103	0.013034	0.504037	-2.9117
C1orf158	-0.36826	3.134875	-2.59963	0.013079	0.50459	-2.91454
TMEM81	-0.18238	4.423556	-2.59598	0.013198	0.50538	-2.92201
BPHL	0.163505	6.237312	2.595674	0.013208	0.50538	-2.92263
HLA-B	0.217423	10.01735	2.59541	0.013216	0.50538	-2.92317
IGFBP7	0.313834	9.749979	2.594773	0.013237	0.50538	-2.92447
EML4	0.194323	5.811914	2.594278	0.013253	0.50538	-2.92548
YEATS2	0.161955	5.850007	2.590484	0.013378	0.508391	-2.93321
FAP	0.259943	4.492763	2.590001	0.013394	0.508391	-2.93419
ENTPD1	0.331205	5.80476	2.587681	0.013471	0.510134	-2.93892
CDH15	-0.18815	6.705602	-2.58541	0.013547	0.511829	-2.94355
CPNE2	0.186281	6.409211	2.581425	0.013681	0.515061	-2.95165
TMC3	0.133919	2.266792	2.580993	0.013696	0.515061	-2.95252
TTC7B	0.160913	8.111911	2.576311	0.013855	0.519852	-2.96203
WASF2	0.169701	6.779213	2.574024	0.013933	0.520388	-2.96668
PPID	-0.14368	6.537423	-2.574	0.013934	0.520388	-2.96673
MMP16	0.203656	2.639681	2.572985	0.013969	0.520388	-2.96879
VWA5A	0.251804	4.130183	2.572196	0.013996	0.520388	-2.97038
PAG1	0.198211	5.342976	2.570581	0.014052	0.52128	-2.97366
PRLR	0.141802	2.324387	2.56917	0.014101	0.521914	-2.97652
DUOX1	-0.1492	3.000518	-2.56683	0.014182	0.523745	-2.98126
CD44	0.322004	7.097863	2.563218	0.014309	0.526484	-2.98857
YES1	0.132029	5.876312	2.562453	0.014336	0.526484	-2.99012
KAZALD1	0.20366	4.933534	2.561972	0.014353	0.526484	-2.99109
GJC1	0.1834	5.781762	2.559565	0.014438	0.528426	-2.99596
PGBD1	0.177292	3.783584	2.555374	0.014587	0.531188	-3.00442
ZNF25	-0.1177	7.643799	-2.55481	0.014607	0.531188	-3.00556
TPRG1	-0.32383	4.846831	-2.55472	0.01461	0.531188	-3.00573
USP27X	-0.19371	3.994561	-2.55132	0.014733	0.531508	-3.0126
TACR2	-0.14468	4.118913	-2.5512	0.014737	0.531508	-3.01285
TMEM184B	0.144319	7.498047	2.549876	0.014785	0.531508	-3.01551
MED19	-0.14659	3.745652	-2.54869	0.014828	0.531508	-3.0179
SFMBT2	0.160508	6.046136	2.548442	0.014837	0.531508	-3.0184
ANO1	0.189506	6.178805	2.548062	0.014851	0.531508	-3.01917
KCNK15	-0.13524	4.606276	-2.54707	0.014887	0.531508	-3.02116
IL10RA	0.255954	4.881331	2.545468	0.014946	0.531508	-3.02439
CCDC9	-0.12189	5.219151	-2.54542	0.014948	0.531508	-3.0245
GIN1	-0.18416	5.176624	-2.5438	0.015007	0.531508	-3.02774

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
C1QL1	-0.1567	5.332601	-2.54293	0.015039	0.531508	-3.0295
TRIL	0.173507	4.395971	2.542431	0.015057	0.531508	-3.0305
ACIN1	-0.11038	5.970409	-2.54141	0.015095	0.531508	-3.03255
SCN2A	0.103097	2.253948	2.541401	0.015095	0.531508	-3.03257
CAP1	0.184309	7.200213	2.541131	0.015105	0.531508	-3.03312
ZNF143	-0.14079	5.961855	-2.53815	0.015216	0.534258	-3.03912
PDE8A	0.157604	6.26796	2.53561	0.015311	0.536078	-3.04421
GAD2	-0.11124	2.403744	-2.53501	0.015333	0.536078	-3.04542
MSN	0.20993	7.635915	2.530578	0.0155	0.540759	-3.05431
SEMA6A	0.202863	5.456926	2.528973	0.015561	0.541729	-3.05753
CEP250	-0.12612	3.917607	-2.52731	0.015624	0.542779	-3.06086
LGALS12	-0.26791	3.439679	-2.52545	0.015695	0.543216	-3.06458
PLXDC1	0.191394	7.108095	2.525161	0.015706	0.543216	-3.06516
COL1A2	0.47275	6.997291	2.524311	0.015739	0.543216	-3.06686
PTH1R	-0.1485	4.84362	-2.52334	0.015776	0.543216	-3.0688
NT5C2	-0.14807	8.742809	-2.52194	0.01583	0.543216	-3.0716
PDE7B	0.167417	6.737852	2.521803	0.015836	0.543216	-3.07188
CD40	0.121983	4.356102	2.520108	0.015901	0.544325	-3.07527
DIRAS3	-0.1487	3.248975	-2.51806	0.015981	0.545187	-3.07937
HIP1	0.177539	5.38366	2.517749	0.015993	0.545187	-3.07999
TRMT5	-0.14606	5.281496	-2.51615	0.016055	0.545895	-3.08317
ZNF281	-0.14509	6.01128	-2.51538	0.016085	0.545895	-3.08472
TGFB1I1	0.174803	5.936564	2.514662	0.016114	0.545895	-3.08615
HMMR	-0.14818	2.909096	-2.51255	0.016197	0.547581	-3.09038
TCEANC	-0.11289	4.106032	-2.51063	0.016272	0.549007	-3.0942
INO80	-0.09369	6.996192	-2.50862	0.016352	0.549641	-3.09821
ZNF706	-0.10654	7.328594	-2.50847	0.016358	0.549641	-3.09851
C1QTNF3	0.285269	4.485395	2.505713	0.016468	0.551196	-3.104
STAB1	0.229877	5.66161	2.505621	0.016472	0.551196	-3.10418
OR52E8	-0.10592	2.137412	-2.50345	0.016559	0.551922	-3.10851
OR52K2	-0.16604	2.8719	-2.5034	0.016561	0.551922	-3.1086
MYNN	-0.10307	6.219339	-2.50189	0.016622	0.552084	-3.11161
CRX	-0.13032	2.910074	-2.50161	0.016633	0.552084	-3.11216
MAP2	0.231154	3.993609	2.497296	0.016808	0.554935	-3.12074
PPP2R5A	-0.11302	7.364938	-2.49675	0.01683	0.554935	-3.12182
STEAP3	-0.11891	6.769753	-2.4961	0.016857	0.554935	-3.12312
GIMAP7	0.211726	6.162535	2.495628	0.016876	0.554935	-3.12405
OSTF1	0.182359	5.143195	2.495335	0.016888	0.554935	-3.12463
TSHZ2	0.268833	4.79053	2.492319	0.017012	0.556757	-3.13062
ZNF474	0.129831	2.277951	2.491108	0.017062	0.556757	-3.13302
HHIPL2	0.132641	3.32087	2.490834	0.017073	0.556757	-3.13357
CASP14	-0.12918	2.924005	-2.48822	0.017181	0.556757	-3.13874
OR1J1	0.10517	2.031377	2.48771	0.017203	0.556757	-3.13976
SRGAP1	0.2269	4.257351	2.486962	0.017234	0.556757	-3.14124
RCAN3	0.169155	4.729313	2.486732	0.017244	0.556757	-3.1417
FGD2	0.120984	4.034086	2.486349	0.01726	0.556757	-3.14246
AIF1L	0.162847	5.348388	2.48594	0.017277	0.556757	-3.14327
AEBP1	0.279141	5.235268	2.483929	0.017361	0.556757	-3.14725

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
HPD	-0.22207	3.378708	-2.48392	0.017361	0.556757	-3.14726
UTRN	0.195085	7.605863	2.482671	0.017414	0.556757	-3.14974
RASGRF2	0.202997	6.165874	2.482007	0.017442	0.556757	-3.15105
CCDC126	-0.15835	4.777655	-2.47954	0.017546	0.556757	-3.15593
C8orf58	-0.10883	5.015697	-2.47817	0.017604	0.556757	-3.15864
ITGA6	0.236719	7.869463	2.478085	0.017608	0.556757	-3.15881
RRP36	-0.18086	5.876282	-2.4776	0.017628	0.556757	-3.15976
FRMD4B	0.235415	5.480205	2.476676	0.017668	0.556757	-3.16159
ESCO1	-0.14493	5.829619	-2.47653	0.017674	0.556757	-3.16188
CD84	0.27477	3.568965	2.476523	0.017674	0.556757	-3.16189
ST7L	-0.13137	5.065301	-2.47627	0.017685	0.556757	-3.1624
EPHA8	-0.15383	3.369805	-2.4756	0.017714	0.556757	-3.16372
DOCK6	0.13254	4.700966	2.473401	0.017808	0.556757	-3.16806
G3BP2	-0.1406	8.452973	-2.47295	0.017827	0.556757	-3.16894
PGA5	-0.16058	3.632379	-2.4729	0.017829	0.556757	-3.16904
ICA1	0.196354	4.056435	2.47169	0.017882	0.556757	-3.17143
SHROOM4	0.17506	5.661537	2.471289	0.017899	0.556757	-3.17222
FXR1	-0.11075	10.32066	-2.47112	0.017906	0.556757	-3.17255
OR7G3	-0.16192	2.916092	-2.47061	0.017928	0.556757	-3.17356
RYK	-0.10826	8.095326	-2.46551	0.01815	0.562573	-3.1836
SH3TC2	0.208655	3.707061	2.461051	0.018346	0.567044	-3.19239
S100A7L2	-0.14082	1.99542	-2.46066	0.018363	0.567044	-3.19316
SPRYD4	0.197897	6.184617	2.458219	0.018471	0.568273	-3.19795
GAST	0.231861	4.119838	2.458101	0.018476	0.568273	-3.19818
OSBP2	-0.14581	4.881813	-2.45673	0.018538	0.568273	-3.20088
SCML1	-0.14857	6.641933	-2.45664	0.018542	0.568273	-3.20106
MKX	-0.11954	3.013759	-2.45502	0.018614	0.569418	-3.20423
HELQ	-0.13868	5.726225	-2.45319	0.018696	0.5704	-3.20782
IFNA6	-0.14558	2.527016	-2.45275	0.018715	0.5704	-3.20868
PRDM1	0.246787	4.641909	2.451034	0.018793	0.571295	-3.21206
CST2	0.121727	3.447607	2.448955	0.018887	0.571295	-3.21613
SGPP2	0.124386	2.309022	2.448688	0.018899	0.571295	-3.21665
PSG3	-0.19093	2.162325	-2.44819	0.018922	0.571295	-3.21764
ENTPD3	0.31168	3.816127	2.44757	0.01895	0.571295	-3.21885
FZD6	0.174506	5.329378	2.446873	0.018981	0.571295	-3.22021
KCTD5	-0.14324	6.021489	-2.44672	0.018989	0.571295	-3.22052
NUP98	-0.08514	7.947082	-2.44566	0.019037	0.571688	-3.22259
GMEB1	-0.17385	5.748833	-2.4449	0.019071	0.571688	-3.22407
SPARCL1	0.211619	9.486729	2.443658	0.019128	0.572348	-3.2265
OR2H1	-0.12736	2.599521	-2.44264	0.019175	0.572702	-3.2285
FAM200A	-0.18921	4.479233	-2.43977	0.019308	0.574388	-3.23412
MSC	0.206779	4.374127	2.439676	0.019312	0.574388	-3.23429
AGPAT4	0.158759	4.044111	2.439053	0.01934	0.574388	-3.23551
MCAT	-0.13817	5.892306	-2.43838	0.019372	0.574388	-3.23682
PRPF39	-0.14671	6.059419	-2.43648	0.01946	0.575134	-3.24054
RAE1	-0.10949	5.547543	-2.43511	0.019524	0.575134	-3.24321
CD24	-0.25543	4.859989	-2.43506	0.019526	0.575134	-3.24331
SQLE	0.170051	3.387416	2.434827	0.019537	0.575134	-3.24376

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
CLASRP	-0.13859	5.437461	-2.43268	0.019637	0.575308	-3.24794
MMRN2	0.187554	6.172311	2.431948	0.019672	0.575308	-3.24938
SNRK	0.12777	7.089387	2.431445	0.019696	0.575308	-3.25036
SIK2	-0.1618	6.601136	-2.43064	0.019734	0.575308	-3.25193
HORMAD1	-0.24239	2.414145	-2.42991	0.019768	0.575308	-3.25334
C17orf80	-0.12512	5.97793	-2.4293	0.019797	0.575308	-3.25453
TMEM204	0.142899	7.521506	2.429241	0.0198	0.575308	-3.25465
VAPA	-0.10872	7.755185	-2.42836	0.019842	0.575308	-3.25638
EFNA1	0.165269	4.714138	2.427789	0.019869	0.575308	-3.25748
RBKS	-0.14847	4.996733	-2.42726	0.019894	0.575308	-3.25852
SAFB2	-0.12882	6.145451	-2.42635	0.019937	0.575541	-3.26029
MTX1	0.171496	5.324401	2.422108	0.02014	0.579332	-3.26854
WWTR1	0.185486	6.70609	2.421699	0.020159	0.579332	-3.26933
TMEM69	0.130166	7.05052	2.420977	0.020194	0.579332	-3.27074
PPP3CB	-0.10962	9.326017	-2.41981	0.02025	0.579332	-3.27301
CIITA	0.142547	4.537674	2.419372	0.020272	0.579332	-3.27386
S100B	-0.34166	3.312506	-2.41876	0.020301	0.579332	-3.27505
THPO	0.140074	4.162936	2.418461	0.020316	0.579332	-3.27563
PMPCB	0.129684	8.372219	2.417468	0.020364	0.579697	-3.27755
CHKA	-0.14417	5.492263	-2.41635	0.020418	0.580229	-3.27972
TPRKB	-0.23788	4.478045	-2.41425	0.020521	0.581843	-3.2838
OLFM4	-0.21833	3.542269	-2.41254	0.020604	0.581843	-3.28712
MAP3K11	0.113864	6.396892	2.411544	0.020653	0.581843	-3.28905
RCL1	-0.1568	6.872895	-2.41142	0.020659	0.581843	-3.28928
B2M	0.203278	8.843533	2.411024	0.020679	0.581843	-3.29005
ACTR5	-0.11595	5.31576	-2.41084	0.020688	0.581843	-3.29041
SIRT4	-0.12522	4.470242	-2.40996	0.020731	0.582067	-3.29212
TTC33	-0.14772	6.003971	-2.40816	0.02082	0.583369	-3.29561
TYR	-0.10949	1.900303	-2.40648	0.020903	0.583369	-3.29885
FBXO42	-0.15389	6.674346	-2.40551	0.020951	0.583369	-3.30073
UTP20	-0.09232	5.724728	-2.40497	0.020978	0.583369	-3.30177
RRM1	-0.12478	7.113746	-2.40437	0.021009	0.583369	-3.30294
RAB31	0.271458	6.309112	2.403521	0.021051	0.583369	-3.30458
GNAI1	0.153691	5.027491	2.402829	0.021085	0.583369	-3.30592
COL6A2	0.231512	7.098785	2.402264	0.021114	0.583369	-3.30701
HLA-DMA	0.240388	6.977748	2.401528	0.021151	0.583369	-3.30843
SH2D6	-0.12258	3.79714	-2.40151	0.021152	0.583369	-3.30847
ELL	-0.15126	5.603914	-2.40117	0.021169	0.583369	-3.30913
MCAM	0.329217	6.533713	2.399857	0.021235	0.583383	-3.31166
REG1A	-0.12291	2.171741	-2.39974	0.02124	0.583383	-3.31188
TP53I11	0.129517	5.227227	2.398983	0.021279	0.58346	-3.31335
TMPRSS11D	0.109447	1.900369	2.398278	0.021314	0.583462	-3.31471
CENPI	0.182599	2.530207	2.397106	0.021374	0.584111	-3.31697
ZNF366	0.174971	5.502112	2.395837	0.021438	0.584649	-3.31942
BBS5	-0.12812	5.650831	-2.39531	0.021465	0.584649	-3.32043
NCK2	0.126392	7.882847	2.393517	0.021556	0.586171	-3.32389
ANP32E	-0.12605	5.827889	-2.39246	0.02161	0.586665	-3.32593
BPY2	0.11515	2.922467	2.391603	0.021654	0.586889	-3.32758

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
HSD3B2	-0.14862	2.346289	-2.3907	0.021701	0.587065	-3.32932
IFITM2	0.272432	7.275599	2.390083	0.021733	0.587065	-3.33051
PPAN-P2RY11	-0.12526	4.402906	-2.38919	0.021778	0.587338	-3.33223
TMC4	0.175089	4.401865	2.386084	0.021939	0.58983	-3.33821
HPS6	-0.15409	4.912348	-2.38602	0.021943	0.58983	-3.33834
C2orf66	0.133863	2.276356	2.384876	0.022002	0.590454	-3.34053
GZMK	0.260069	2.663811	2.38371	0.022063	0.591116	-3.34277
RNF43	0.140682	3.31591	2.382564	0.022123	0.591528	-3.34498
GUCA1A	-0.10689	2.781645	-2.38204	0.02215	0.591528	-3.34599
TMPRSS13	-0.12236	3.020028	-2.37942	0.022288	0.594225	-3.35101
GLRA1	-0.14335	2.159251	-2.37819	0.022352	0.594989	-3.35337
HMOX1	0.308713	5.514389	2.375938	0.022472	0.59717	-3.3577
TM4SF4	-0.1171	2.405943	-2.37527	0.022507	0.59717	-3.35898
GIMAP8	0.212731	5.429031	2.37234	0.022663	0.599814	-3.36459
RBP1	0.218027	4.076028	2.371766	0.022694	0.599814	-3.36569
TRPV2	0.138195	4.153704	2.371329	0.022717	0.599814	-3.36653
KLHL5	0.177198	5.751657	2.37037	0.022769	0.599814	-3.36836
DOCK10	0.267925	4.787766	2.369978	0.02279	0.599814	-3.36911
USP54	-0.17859	8.491825	-2.36812	0.02289	0.600546	-3.37267
RIN3	0.158279	5.548468	2.367096	0.022945	0.600546	-3.37463
COL6A3	0.286053	7.315072	2.366847	0.022959	0.600546	-3.3751
TGFBR2	0.222559	7.49287	2.366744	0.022964	0.600546	-3.3753
CBX7	-0.15217	7.222699	-2.36574	0.023019	0.601013	-3.37723
DYRK3	0.152767	3.367436	2.364306	0.023096	0.60132	-3.37996
MCTP1	0.277817	4.935873	2.36417	0.023104	0.60132	-3.38022
CLIP4	-0.12032	7.560535	-2.36271	0.023184	0.601768	-3.38302
PKNOX1	-0.11102	5.172185	-2.36251	0.023194	0.601768	-3.3834
SOX21	-0.14573	4.146349	-2.36084	0.023285	0.601866	-3.38657
TYROBP	0.335075	6.567032	2.359836	0.023341	0.601866	-3.3885
PRSS16	0.140203	2.656766	2.359592	0.023354	0.601866	-3.38896
CYP2D6	-0.22445	4.588628	-2.35913	0.023379	0.601866	-3.38984
OLFML2B	0.352976	5.455392	2.359088	0.023382	0.601866	-3.38993
AHR	0.270873	6.378622	2.358333	0.023423	0.60199	-3.39136
TOMM40	-0.14173	5.408198	-2.35684	0.023506	0.602716	-3.39422
ANKRD37	-0.22013	5.669977	-2.35611	0.023546	0.602716	-3.39561
CHRM1	-0.1203	3.253051	-2.35582	0.023562	0.602716	-3.39615
CBX2	0.164617	3.867549	2.353795	0.023674	0.603847	-3.40001
HSD17B2	0.127926	2.467578	2.35342	0.023695	0.603847	-3.40073
PPIB	0.198153	7.505135	2.353016	0.023718	0.603847	-3.4015
ASPDH	-0.14116	4.177115	-2.35238	0.023753	0.603847	-3.40271
SPTBN1	0.167586	9.169533	2.35148	0.023803	0.604184	-3.40442
OTUD7B	-0.131	6.06346	-2.35026	0.023872	0.604652	-3.40674
PRAMEF1	0.086894	1.938009	2.349833	0.023895	0.604652	-3.40756
UBFD1	-0.10191	7.408854	-2.34866	0.023962	0.60539	-3.4098
FYN	0.163787	5.625146	2.34674	0.024069	0.60718	-3.41344
ARHGAP12	-0.11557	6.585107	-2.34391	0.024229	0.610277	-3.41881
S100A11	0.270536	6.946902	2.342419	0.024314	0.610678	-3.42164
KCNG2	-0.171	4.62381	-2.34232	0.02432	0.610678	-3.42183

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
PRAMEF13	0.099792	2.068524	2.340686	0.024413	0.611673	-3.42493
LHX3	0.096342	3.57941	2.339892	0.024459	0.611673	-3.42644
SPTAN1	0.175444	6.965221	2.339333	0.024491	0.611673	-3.4275
CAMK2G	-0.11639	8.826149	-2.33696	0.024627	0.611673	-3.43199
POP1	-0.15372	3.386855	-2.33639	0.02466	0.611673	-3.43308
MSI2	-0.08793	7.240311	-2.33602	0.024681	0.611673	-3.43378
NRP1	0.218888	7.775648	2.334925	0.024745	0.611673	-3.43585
MITF	-0.11703	8.074662	-2.33469	0.024758	0.611673	-3.4363
KIR3DL2	0.117283	3.139319	2.334419	0.024774	0.611673	-3.43681
ITPKB	0.133936	5.305929	2.333763	0.024812	0.611673	-3.43805
SERPINE1	0.250754	4.121773	2.331796	0.024926	0.611673	-3.44177
RANBP17	0.162969	3.077408	2.331671	0.024933	0.611673	-3.44201
VWC2L	0.139726	1.887427	2.33068	0.024991	0.611673	-3.44388
DNALI1	-0.17396	4.741229	-2.33053	0.025	0.611673	-3.44417
CNST	-0.13803	6.207063	-2.33047	0.025004	0.611673	-3.44428
PEAR1	0.210187	5.519876	2.330352	0.02501	0.611673	-3.4445
ALKBH1	-0.1452	5.884237	-2.3301	0.025025	0.611673	-3.44497
PLIN4	-0.36667	8.72816	-2.33	0.025031	0.611673	-3.44517
SIGLEC6	-0.12873	3.700526	-2.32764	0.025169	0.614134	-3.44963
FAM13C	0.172883	7.638102	2.321289	0.025545	0.622375	-3.46161
CCDC102B	0.187479	2.927932	2.318362	0.02572	0.624471	-3.46713
PTGES	-0.17717	4.177531	-2.31814	0.025733	0.624471	-3.46755
HLA-DPA1	0.378669	8.498672	2.317202	0.025789	0.624471	-3.46932
OR51E2	0.169398	2.676219	2.31634	0.025841	0.624471	-3.47094
C20orf194	0.152624	6.755284	2.314619	0.025945	0.624471	-3.47418
HMCN1	0.287973	5.675418	2.314547	0.025949	0.624471	-3.47431
CST3	0.186919	9.685308	2.314534	0.02595	0.624471	-3.47434
OSR2	-0.15662	5.140622	-2.31425	0.025967	0.624471	-3.47487
RPF2	-0.13081	6.801882	-2.31414	0.025974	0.624471	-3.47508
TMPRSS3	-0.13384	2.226543	-2.31314	0.026034	0.625004	-3.47695
LRFN2	-0.12378	2.649693	-2.31223	0.026089	0.625412	-3.47866
SPECC1	0.142081	5.612043	2.309997	0.026225	0.627324	-3.48287
SYNGAP1	0.080386	4.060908	2.309666	0.026245	0.627324	-3.48349
TNFAIP1	0.114108	7.022174	2.309019	0.026285	0.627352	-3.4847
PON3	0.164111	4.251081	2.304235	0.026578	0.632844	-3.49368
GRIP2	-0.15751	6.445193	-2.30401	0.026592	0.632844	-3.49409
KIF24	-0.10699	2.624001	-2.30275	0.02667	0.633785	-3.49647
FABP5	0.167261	5.962481	2.300578	0.026805	0.633986	-3.50054
LIG1	-0.1123	4.504175	-2.2997	0.026859	0.633986	-3.50218
ICAM1	0.185995	5.216071	2.299137	0.026895	0.633986	-3.50323
SIAH1	-0.11174	5.521122	-2.29827	0.026948	0.633986	-3.50485
OR1L8	0.194618	2.867966	2.296626	0.027052	0.633986	-3.50793
GAB3	0.142444	5.088991	2.295824	0.027102	0.633986	-3.50943
CPA4	0.120653	2.36934	2.295411	0.027128	0.633986	-3.5102
AXIN1	-0.14341	5.675689	-2.29296	0.027282	0.633986	-3.51479
LEAP2	-0.14167	4.378867	-2.29254	0.027309	0.633986	-3.51558
FAIM2	0.229503	4.833047	2.290203	0.027457	0.633986	-3.51993
B3GALNT1	0.166024	3.583541	2.289529	0.0275	0.633986	-3.52119

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
CASP7	0.15024	5.008394	2.289467	0.027504	0.633986	-3.52131
CAV2	0.219026	6.810318	2.289382	0.027509	0.633986	-3.52147
JSRP1	-0.14422	6.960907	-2.28928	0.027516	0.633986	-3.52166
JKAMP	-0.11146	6.114893	-2.28902	0.027532	0.633986	-3.52214
GCNT7	0.102356	3.084164	2.287679	0.027618	0.633986	-3.52464
RAPGEF6	-0.10639	5.738482	-2.28688	0.027668	0.633986	-3.52613
FCGRT	0.110988	6.760254	2.286292	0.027706	0.633986	-3.52723
MOB2	-0.11261	4.935546	-2.28617	0.027714	0.633986	-3.52747
FAT1	0.315459	4.989196	2.285908	0.027731	0.633986	-3.52795
CYP4Z1	-0.30672	3.373366	-2.28582	0.027737	0.633986	-3.52812
CNOT10	-0.14996	5.078975	-2.28468	0.027809	0.633986	-3.53023
ZW10	-0.10234	5.782707	-2.28383	0.027864	0.633986	-3.53182
AKT3	0.173649	6.311243	2.283136	0.027909	0.633986	-3.53311
NACC2	-0.19451	5.951285	-2.2828	0.027931	0.633986	-3.53374
RIN2	0.164845	7.154071	2.282459	0.027953	0.633986	-3.53437
IMPDH2	-0.13361	7.836253	-2.28193	0.027987	0.633986	-3.53537
SERPINA12	0.122038	2.314967	2.281442	0.028018	0.633986	-3.53626
HLA-F	0.147278	6.396242	2.280803	0.02806	0.633986	-3.53745
RDH10	-0.12632	5.888569	-2.28027	0.028094	0.633986	-3.53845
TMEM50A	0.143091	8.127972	2.279966	0.028114	0.633986	-3.53901
TTC3	-0.11591	7.860679	-2.27984	0.028122	0.633986	-3.53924
CD1C	0.19145	3.453292	2.279264	0.02816	0.633986	-3.54032
TP53INP1	0.191249	6.352788	2.279002	0.028177	0.633986	-3.54081
PPP4R1	0.152721	6.099718	2.278877	0.028185	0.633986	-3.54104
FAM72D	0.131615	2.388145	2.27887	0.028185	0.633986	-3.54105
NOG	-0.1759	3.915515	-2.27855	0.028206	0.633986	-3.54165
BCL7B	-0.11523	8.06329	-2.27829	0.028223	0.633986	-3.54213
CYTL1	-0.11704	3.58895	-2.2782	0.028229	0.633986	-3.5423
DENND5A	0.125316	6.803484	2.277875	0.02825	0.633986	-3.5429
SOAT1	0.133018	4.817184	2.27766	0.028264	0.633986	-3.5433
ZNF257	0.221321	2.95964	2.275261	0.028421	0.635309	-3.54776
CETN3	-0.20779	4.356456	-2.27503	0.028436	0.635309	-3.54819
RPA1	-0.12023	7.018316	-2.27498	0.028439	0.635309	-3.54828
DAB2	0.28143	7.053231	2.27355	0.028533	0.636536	-3.55094
RAMP2	0.269575	5.37172	2.272828	0.02858	0.63673	-3.55228
MYH9	0.231228	7.571835	2.26869	0.028854	0.641953	-3.55995
FCAMR	0.138115	3.406393	2.266143	0.029024	0.643856	-3.56467
PDGFA	-0.13592	4.651811	-2.26586	0.029043	0.643856	-3.56521
ITPRIPL1	0.127661	3.514626	2.264597	0.029127	0.643856	-3.56753
FBXO9	-0.10068	5.092108	-2.26398	0.029168	0.643856	-3.56867
TMSB4X	0.219888	8.713999	2.262907	0.02924	0.643856	-3.57066
FAM185A	-0.15621	7.05322	-2.26135	0.029345	0.643856	-3.57354
PTK2	0.086142	7.582273	2.260927	0.029374	0.643856	-3.57432
HMGXB4	-0.12329	6.037594	-2.26034	0.029413	0.643856	-3.57541
ZKSCAN5	-0.12804	5.23515	-2.26011	0.029429	0.643856	-3.57584
GFRA2	0.287378	4.831639	2.25923	0.029488	0.643856	-3.57746
TRIM35	-0.12094	5.323524	-2.25887	0.029513	0.643856	-3.57812
OR51V1	0.123895	2.361611	2.258257	0.029554	0.643856	-3.57926

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
SNX5	-0.1254	6.198492	-2.2575	0.029605	0.643856	-3.58065
AGFG2	0.100079	4.501927	2.256801	0.029653	0.643856	-3.58195
RPA3	-0.13826	4.243448	-2.2567	0.02966	0.643856	-3.58214
CTNND1	0.133893	8.018606	2.256217	0.029693	0.643856	-3.58303
GTPBP4	-0.1052	5.767547	-2.25502	0.029775	0.643856	-3.58524
CAPN2	0.146694	8.366118	2.254703	0.029796	0.643856	-3.58582
RAB9A	-0.122	5.507069	-2.2544	0.029817	0.643856	-3.58639
SUSD4	0.114286	4.170427	2.254384	0.029818	0.643856	-3.58641
AMN	-0.13007	4.130622	-2.25381	0.029857	0.643856	-3.58747
SRGN	0.267536	7.079137	2.251349	0.030026	0.643856	-3.59201
DOCK4	0.151279	7.06725	2.251265	0.030032	0.643856	-3.59216
METTL14	-0.10268	6.21673	-2.25119	0.030037	0.643856	-3.5923
SMAD1	0.162169	6.751518	2.249064	0.030184	0.643856	-3.59622
TMEM8B	-0.12956	5.457136	-2.24902	0.030187	0.643856	-3.5963
PLEKHG5	0.132196	4.848527	2.248995	0.030189	0.643856	-3.59634
ADAM28	0.200289	3.773332	2.248641	0.030213	0.643856	-3.59699
HSPA1B	-0.18279	8.47353	-2.24857	0.030218	0.643856	-3.59712
PHAX	-0.12088	5.820325	-2.24834	0.030234	0.643856	-3.59754
DNAJB8	-0.14425	3.470639	-2.24751	0.030292	0.643856	-3.59908
OR6C6	-0.09916	1.900338	-2.24745	0.030295	0.643856	-3.59918
SPATA17	-0.17979	2.137178	-2.24743	0.030297	0.643856	-3.59922
TMC7	0.215254	4.901063	2.247046	0.030324	0.643856	-3.59993
MOGAT1	-0.14375	2.805322	-2.24649	0.030362	0.643856	-3.60095
USP4	0.093463	7.370393	2.246066	0.030392	0.643856	-3.60173
SLC17A2	0.097629	2.512463	2.246055	0.030392	0.643856	-3.60175
CMTM3	0.194356	5.428046	2.245025	0.030464	0.644542	-3.60365
RHBDD3	-0.1364	4.46514	-2.24398	0.030537	0.64525	-3.60557
PDE10A	0.136397	2.831726	2.242997	0.030606	0.645873	-3.60738
TP53BP1	0.120876	5.867065	2.241852	0.030686	0.645952	-3.60948
STX1A	-0.12856	3.879854	-2.24182	0.030688	0.645952	-3.60954
FGF22	-0.16228	4.119572	-2.23967	0.030839	0.647764	-3.61349
JPH1	-0.11408	10.43804	-2.23947	0.030853	0.647764	-3.61385
UBR5	-0.08055	7.075822	-2.23831	0.030936	0.647976	-3.61599
C1orf216	-0.11795	4.326631	-2.23778	0.030973	0.647976	-3.61695
CXXC5	-0.10466	8.510154	-2.23743	0.030998	0.647976	-3.61761
POLR2C	-0.10332	7.323358	-2.23709	0.031022	0.647976	-3.61822
SLC25A35	0.151332	3.530849	2.233942	0.031245	0.651717	-3.62399
MPV17	0.144419	7.536861	2.233454	0.03128	0.651717	-3.62489
CARD6	0.203516	3.634063	2.232535	0.031346	0.652256	-3.62657
LAMP1	0.110336	7.392728	2.22911	0.031592	0.655708	-3.63284
NAIF1	-0.15358	4.426283	-2.22868	0.031623	0.655708	-3.63363
WDFY4	0.13997	3.948253	2.228553	0.031632	0.655708	-3.63386
ZNF689	-0.14527	5.135305	-2.22729	0.031723	0.656002	-3.63617
SLC4A8	0.105984	2.329152	2.22698	0.031745	0.656002	-3.63674
PLVAP	0.213105	5.671539	2.226683	0.031767	0.656002	-3.63728
ROPN1L	-0.16041	3.699051	-2.22547	0.031854	0.656002	-3.63949
SNRPF	-0.18637	3.6052	-2.22533	0.031865	0.656002	-3.63975
ARID4A	-0.14108	5.510653	-2.22504	0.031886	0.656002	-3.64029

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
GUCA1B	-0.18427	3.706599	-2.22376	0.031979	0.656775	-3.64262
DEFB119	-0.12839	2.630606	-2.22334	0.032009	0.656775	-3.64338
SPIN2A	-0.12438	2.224866	-2.22287	0.032044	0.656775	-3.64425
INPP1	0.131836	5.081471	2.221689	0.03213	0.657035	-3.6464
HLA-DQA1	0.438351	6.936635	2.221598	0.032137	0.657035	-3.64657
UBR3	-0.0867	9.600228	-2.21982	0.032267	0.658353	-3.64981
PRELID1	0.15818	7.664678	2.219178	0.032314	0.658353	-3.65098
WNT10B	-0.14599	4.291308	-2.21884	0.032339	0.658353	-3.65159
C12orf65	-0.1233	5.276431	-2.21766	0.032426	0.658353	-3.65375
ANO8	-0.144	5.336645	-2.21705	0.03247	0.658353	-3.65485
HSPA1A	-0.1699	9.842996	-2.21643	0.032516	0.658353	-3.65599
OSMR	0.24329	5.477781	2.216377	0.03252	0.658353	-3.65609
TM4SF1	0.203614	8.245467	2.215986	0.032549	0.658353	-3.6568
URB2	-0.14327	5.053251	-2.21533	0.032597	0.658353	-3.65799
RNF114	-0.09726	7.801036	-2.21526	0.032602	0.658353	-3.65811
TIMP2	0.195073	5.6666	2.213624	0.032724	0.658836	-3.6611
CSF1R	0.241132	5.362129	2.212803	0.032785	0.658836	-3.66259
ZXDC	-0.11761	6.134697	-2.2123	0.032823	0.658836	-3.66351
UNC119	0.117698	4.441554	2.212205	0.03283	0.658836	-3.66368
PRAME	-0.1119	2.530541	-2.21115	0.032908	0.658836	-3.66559
SOCS6	-0.10988	6.16784	-2.21111	0.032912	0.658836	-3.66568
SCN4B	0.233667	6.397095	2.210449	0.032961	0.658836	-3.66687
WTAP	-0.07491	8.108103	-2.21028	0.032973	0.658836	-3.66717
SERPINH1	0.253271	6.664532	2.210084	0.032988	0.658836	-3.66754
SFTPC	-0.13942	3.425943	-2.20777	0.033162	0.661266	-3.67174
GNAQ	0.131782	7.668752	2.207387	0.03319	0.661266	-3.67243
TRMT2A	-0.12057	5.663112	-2.2065	0.033257	0.661799	-3.67405
TMSB15B	0.136147	3.511407	2.205349	0.033344	0.662716	-3.67613
GPR26	-0.12319	2.529933	-2.2038	0.033461	0.663529	-3.67895
EPB41L5	-0.14043	6.736236	-2.20299	0.033523	0.663529	-3.68042
NUP205	-0.1159	5.904766	-2.20261	0.033551	0.663529	-3.6811
TMEM181	0.123563	6.384778	2.202518	0.033558	0.663529	-3.68127
ZCCHC2	-0.15291	6.099974	-2.20214	0.033587	0.663529	-3.68196
ACVR1C	-0.20879	4.723419	-2.20092	0.03368	0.664397	-3.68416
PARG	-0.18078	5.488692	-2.19951	0.033788	0.664397	-3.68673
ARHGDIB	0.268277	7.323861	2.199375	0.033798	0.664397	-3.68696
SLC25A43	0.11743	4.17588	2.199264	0.033806	0.664397	-3.68717
SLC7A1	0.22254	4.037235	2.198907	0.033834	0.664397	-3.68781
PGA4	-0.16379	3.6413	-2.19782	0.033917	0.665234	-3.68978
SLCO2B1	0.226206	5.915502	2.196106	0.034049	0.666413	-3.69288
GDF2	-0.14325	3.701701	-2.19598	0.034058	0.666413	-3.69311
CD1E	0.154701	3.058454	2.193448	0.034254	0.668459	-3.69769
SLC23A2	0.145061	4.836088	2.193278	0.034267	0.668459	-3.69799
BCL11A	-0.14911	2.808134	-2.19304	0.034285	0.668459	-3.69842
DPH3	-0.14648	7.058318	-2.19196	0.034369	0.669301	-3.70038
ANKRD23	-0.11219	10.57955	-2.1911	0.034436	0.6698	-3.70192
NOC2L	-0.12262	6.498538	-2.18968	0.034546	0.669831	-3.70449
SPATA2L	0.140963	3.923879	2.189294	0.034576	0.669831	-3.70519

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
CREBZF	-0.13382	6.048728	-2.18919	0.034584	0.669831	-3.70537
ADA	0.175558	5.454377	2.188983	0.034601	0.669831	-3.70575
BMP1	0.133939	5.145846	2.188441	0.034643	0.669859	-3.70673
PTPN7	0.175517	3.240559	2.185102	0.034905	0.67373	-3.71275
FIBIN	-0.27194	4.334091	-2.18484	0.034925	0.67373	-3.71322
DAPK3	-0.154	5.883629	-2.18249	0.035111	0.676515	-3.71745
SEMA4F	-0.10767	3.769977	-2.18172	0.035172	0.67654	-3.71884
GIP	-0.13688	2.506062	-2.18116	0.035216	0.67654	-3.71985
OR10J5	0.104745	1.751223	2.180875	0.035239	0.67654	-3.72036
UBA7	0.158985	6.007283	2.180389	0.035277	0.67654	-3.72123
RFX1	-0.14387	4.934815	-2.1793	0.035364	0.677038	-3.7232
FRMD4A	0.146161	4.801845	2.179023	0.035386	0.677038	-3.72369
NMB	-0.16238	4.099579	-2.17782	0.035481	0.678076	-3.72584
OR10J1	0.113282	1.944483	2.177254	0.035527	0.678156	-3.72687
MORF4L2	-0.1034	7.800164	-2.17581	0.035643	0.679247	-3.72947
TIMP3	0.212178	7.759353	2.175505	0.035667	0.679247	-3.73001
AR	-0.11831	6.789704	-2.17427	0.035766	0.680111	-3.73223
SPATA1	-0.09546	2.481239	-2.1732	0.035853	0.680111	-3.73416
PEX13	-0.09712	6.441524	-2.17245	0.035913	0.680111	-3.73549
CFDP1	-0.10837	5.296294	-2.17244	0.035914	0.680111	-3.73551
SLC25A25	-0.30597	5.484239	-2.17233	0.035922	0.680111	-3.73571
LYSMD3	-0.10731	7.082453	-2.17185	0.035961	0.680111	-3.73657
C9orf50	-0.13128	3.192764	-2.171	0.03603	0.680121	-3.73809
ENPP3	0.149099	2.871731	2.170453	0.036074	0.680121	-3.73908
FCN3	0.185085	4.439258	2.169747	0.036131	0.680121	-3.74034
LPIN2	0.158586	4.844929	2.168886	0.036201	0.680121	-3.74188
KEAP1	-0.1173	8.089072	-2.16886	0.036203	0.680121	-3.74193
MTHFSD	-0.1015	4.528275	-2.16842	0.036239	0.680121	-3.74272
MATK	-0.09895	3.828122	-2.16826	0.036252	0.680121	-3.743
PDHA2	0.119501	3.549758	2.166813	0.03637	0.681553	-3.7456
CCT8	-0.11581	6.224572	-2.16433	0.036573	0.682471	-3.75005
TSPAN2	0.213211	4.680642	2.164127	0.03659	0.682471	-3.7504
ENSA	-0.09165	5.129518	-2.16407	0.036595	0.682471	-3.75051
ZNF526	-0.11009	4.966108	-2.16379	0.036617	0.682471	-3.751
PPP1R8	-0.11231	5.675833	-2.16215	0.036752	0.682471	-3.75393
CNBP	-0.09601	9.574749	-2.16206	0.03676	0.682471	-3.7541
BUD13	-0.12383	5.097456	-2.16156	0.036801	0.682471	-3.75499
SV2B	0.209604	4.962949	2.161186	0.036832	0.682471	-3.75566
PRG2	0.117867	2.660774	2.16084	0.03686	0.682471	-3.75628
DNAJC10	0.138521	6.584162	2.159917	0.036936	0.682471	-3.75793
HS3ST2	-0.13003	4.690774	-2.15969	0.036955	0.682471	-3.75833
CIDEC	-0.38604	3.639341	-2.15956	0.036966	0.682471	-3.75857
LSR	0.162118	4.759764	2.159466	0.036974	0.682471	-3.75873
CRTC3	0.109984	6.701567	2.159129	0.037002	0.682471	-3.75934
PLIN1	-0.49737	5.120474	-2.15816	0.037082	0.682969	-3.76106
TNRC6C	-0.11437	6.976538	-2.15711	0.037169	0.682969	-3.76294
TUBA1B	0.207625	6.935678	2.156091	0.037254	0.682969	-3.76476
TUBA1A	0.228761	5.652025	2.155957	0.037265	0.682969	-3.765

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
UBE2J2	-0.11625	5.224541	-2.15546	0.037307	0.682969	-3.76588
HOXB6	0.175194	3.2668	2.154863	0.037356	0.682969	-3.76695
RNASE6	0.273223	3.35968	2.152895	0.037521	0.682969	-3.77045
USO1	-0.13274	10.09382	-2.15258	0.037548	0.682969	-3.77102
SPAG11B	0.112929	2.173098	2.152143	0.037584	0.682969	-3.77179
OR4A47	0.102809	1.802948	2.151974	0.037599	0.682969	-3.77209
NDUFS2	0.132645	9.769443	2.151659	0.037625	0.682969	-3.77266
COL7A1	-0.0967	4.122057	-2.15083	0.037695	0.682969	-3.77414
FRMD3	0.162305	6.75557	2.150814	0.037696	0.682969	-3.77416
PFKP	0.288892	4.97569	2.149881	0.037775	0.682969	-3.77582
OR2B11	0.123368	2.779421	2.14955	0.037803	0.682969	-3.77641
ARNT2	-0.17668	5.757135	-2.14937	0.037818	0.682969	-3.77674
SMTNL2	-0.16831	8.369931	-2.14878	0.037868	0.682969	-3.77778
RNF112	-0.11129	2.731581	-2.14865	0.037879	0.682969	-3.77801
FLNB	0.216669	6.377621	2.148405	0.037899	0.682969	-3.77845
NINL	0.155068	4.728792	2.148203	0.037917	0.682969	-3.77881
APP	0.172798	8.443797	2.148069	0.037928	0.682969	-3.77905
MANSC1	0.206554	4.874198	2.147583	0.037969	0.682969	-3.77991
KLF4	-0.25165	4.590927	-2.14738	0.037987	0.682969	-3.78028
CACNG1	-0.12492	8.361933	-2.14646	0.038064	0.683311	-3.78191
ANKRD22	-0.09498	2.046783	-2.14617	0.038089	0.683311	-3.78242
ZNF416	-0.17363	4.695157	-2.14531	0.038162	0.683866	-3.78394
LYL1	-0.12431	4.703388	-2.14319	0.038343	0.686371	-3.78772
GNB1	0.121212	9.044813	2.142292	0.03842	0.686527	-3.78931
RRP8	-0.13151	5.174599	-2.14187	0.038456	0.686527	-3.79006
CAPSL	-0.08129	2.504421	-2.14105	0.038526	0.686527	-3.79151
NPL	0.226447	4.040734	2.140718	0.038555	0.686527	-3.7921
KCTD10	0.119986	5.714191	2.140256	0.038594	0.686527	-3.79292
SFT2D2	0.204654	6.187057	2.13972	0.038641	0.686527	-3.79387
SST	-0.152	3.675696	-2.13967	0.038645	0.686527	-3.79396
TRPC3	-0.0955	2.643751	-2.13914	0.03869	0.686583	-3.79489
OR10T2	0.112204	1.8651	2.138508	0.038745	0.686813	-3.79602
DDX49	-0.112	6.199122	-2.13766	0.038818	0.687361	-3.79751
CFL1	0.137176	8.191037	2.13671	0.0389	0.68808	-3.79921
SNRNP35	-0.10841	5.579095	-2.1362	0.038944	0.688115	-3.8001
MED28	-0.11025	7.794205	-2.13566	0.038992	0.688211	-3.80107
SERPINE2	0.249098	4.528787	2.134679	0.039077	0.688966	-3.8028
SNX15	-0.11604	5.664196	-2.1339	0.039144	0.689422	-3.80418
CCDC66	-0.14195	5.556769	-2.13305	0.039219	0.689595	-3.80569
S1PR3	0.117557	4.582337	2.131776	0.03933	0.689595	-3.80794
MAPKAPK5	-0.10749	7.501422	-2.13117	0.039383	0.689595	-3.80901
MTMR2	0.124292	6.40933	2.13046	0.039445	0.689595	-3.81026
SLC15A5	0.09216	2.19196	2.130283	0.03946	0.689595	-3.81058
SLC35C1	0.136584	4.763317	2.130221	0.039466	0.689595	-3.81068
FGD4	0.146894	7.603018	2.129983	0.039487	0.689595	-3.81111
MAML3	0.162466	5.122833	2.129476	0.039531	0.689595	-3.812
RAB5C	0.13196	8.020949	2.128324	0.039632	0.689595	-3.81404
CCNY	0.092689	7.340965	2.128141	0.039649	0.689595	-3.81436

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
HNMT	0.176072	4.472473	2.128024	0.039659	0.689595	-3.81457
PRM2	-0.12424	3.583869	-2.12802	0.039659	0.689595	-3.81457
ATP6V1E2	0.14026	2.991293	2.126424	0.0398	0.690389	-3.81739
ZBED4	-0.12758	5.301254	-2.12558	0.039875	0.690389	-3.81888
TMED7	-0.09041	6.095976	-2.12522	0.039906	0.690389	-3.81951
GIMAP6	0.186833	5.638495	2.125125	0.039915	0.690389	-3.81968
N6AMT1	-0.15991	5.324374	-2.12474	0.039949	0.690389	-3.82036
FOLR3	-0.11811	4.016689	-2.12377	0.040035	0.690389	-3.82207
SYT5	-0.11728	3.860868	-2.12364	0.040047	0.690389	-3.8223
SUN5	-0.12124	3.164393	-2.12288	0.040114	0.690389	-3.82364
ZNF385A	0.161364	5.422657	2.122825	0.040119	0.690389	-3.82374
FAM120AOS	0.116989	6.63699	2.122713	0.040129	0.690389	-3.82393
LMNB2	-0.15306	6.375031	-2.12228	0.040168	0.690389	-3.8247
DMGDH	-0.20302	4.568016	-2.11925	0.040438	0.692591	-3.83003
CD300LG	0.178798	5.793278	2.118382	0.040516	0.692591	-3.83156
MTMR12	0.085969	6.34532	2.118065	0.040544	0.692591	-3.83212
TCOF1	-0.09214	5.251349	-2.11801	0.040549	0.692591	-3.83222
SIVA1	-0.20498	7.063813	-2.11786	0.040563	0.692591	-3.83248
CHD3	0.177096	5.119167	2.117395	0.040605	0.692591	-3.8333
DNMT1	0.13413	5.920844	2.117261	0.040617	0.692591	-3.83353
ARHGAP29	0.133468	6.865924	2.11707	0.040634	0.692591	-3.83387
PNRC2	-0.11676	8.687607	-2.11617	0.040715	0.692929	-3.83545
VEZT	-0.09579	7.644052	-2.11591	0.040738	0.692929	-3.8359
DEFB108B	0.156962	3.087283	2.114577	0.040859	0.693525	-3.83825
LRFN4	-0.13498	4.800411	-2.11408	0.040903	0.693525	-3.83912
PDILT	-0.11436	2.34342	-2.11375	0.040933	0.693525	-3.8397
FOXA1	-0.1355	3.78644	-2.11332	0.040973	0.693525	-3.84047
STK38	0.120396	7.163353	2.113186	0.040985	0.693525	-3.8407
TANC1	0.187716	5.505021	2.112382	0.041058	0.69369	-3.84211
ARSB	0.139682	5.199434	2.111804	0.04111	0.69369	-3.84312
RBPMS2	0.1342	5.661558	2.111299	0.041156	0.69369	-3.84401
ADAMTS13	-0.08608	4.326721	-2.11121	0.041164	0.69369	-3.84416
PDRG1	-0.15263	4.67378	-2.10991	0.041282	0.694096	-3.84644
ANAPC10	-0.15161	4.611472	-2.10977	0.041295	0.694096	-3.84668
PPT1	0.180054	6.779744	2.109503	0.04132	0.694096	-3.84716
IKBIP	0.181053	3.349161	2.107785	0.041477	0.694096	-3.85017
POLD1	-0.12649	4.379287	-2.10694	0.041554	0.694096	-3.85165
CYP7B1	0.120025	4.197421	2.10678	0.041569	0.694096	-3.85193
CD164L2	0.125814	3.335808	2.106484	0.041596	0.694096	-3.85245
CFI	0.20103	3.456839	2.105176	0.041716	0.694096	-3.85474
ZFP36L1	0.183966	7.317782	2.105014	0.041731	0.694096	-3.85502
P4HB	-0.10223	8.927821	-2.10483	0.041748	0.694096	-3.85534
ZNF775	-0.17523	4.87906	-2.10383	0.04184	0.694096	-3.85709
UCP2	0.261955	8.061375	2.103813	0.041842	0.694096	-3.85713
TRHDE	-0.15989	2.786139	-2.1038	0.041843	0.694096	-3.85715
VPS33A	-0.10854	5.600862	-2.10372	0.041851	0.694096	-3.85729
DBI	-0.19658	5.908343	-2.10355	0.041866	0.694096	-3.85758
GABBR1	0.195664	5.875207	2.103138	0.041904	0.694096	-3.85831

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
CNGB1	-0.09702	3.475388	-2.10311	0.041907	0.694096	-3.85836
SLC39A14	0.140642	5.53593	2.100742	0.042126	0.694148	-3.8625
EXO1	-0.0941	2.278365	-2.10051	0.042148	0.694148	-3.86291
AGRN	0.120649	4.589962	2.099432	0.042248	0.694148	-3.86479
C10orf99	-0.13177	3.925665	-2.0994	0.042251	0.694148	-3.86484
HEYL	0.1544	5.226994	2.099161	0.042273	0.694148	-3.86526
IFT80	0.124955	5.083033	2.098849	0.042303	0.694148	-3.86581
C1orf74	-0.16399	4.643512	-2.09848	0.042337	0.694148	-3.86645
YIPF7	-0.09596	7.345705	-2.09841	0.042344	0.694148	-3.86658
PIP4K2B	-0.11649	8.642482	-2.09837	0.042348	0.694148	-3.86665
KRT7	0.092555	3.063704	2.098234	0.04236	0.694148	-3.86688
NFX1	-0.08034	7.048104	-2.09758	0.042421	0.694148	-3.86803
PGM2	0.159619	5.336518	2.097369	0.042441	0.694148	-3.86839
ZSCAN16	-0.16166	3.914282	-2.09681	0.042493	0.694148	-3.86937
STX17	-0.08937	7.0607	-2.09552	0.042614	0.694148	-3.87162
RPS6KL1	-0.12347	4.723405	-2.09535	0.04263	0.694148	-3.87192
MUC3A	0.116854	4.144826	2.094621	0.042698	0.694148	-3.87319
ST8SIA4	0.231133	4.832265	2.094469	0.042712	0.694148	-3.87345
FABP4	0.25823	7.283952	2.093921	0.042764	0.694148	-3.87441
THAP3	-0.18682	4.00438	-2.09325	0.042827	0.694148	-3.87557
CADPS2	0.190664	4.210594	2.093118	0.04284	0.694148	-3.87581
LCMT2	-0.12574	5.155191	-2.09305	0.042846	0.694148	-3.87592
MS4A15	-0.11961	3.01728	-2.09304	0.042847	0.694148	-3.87595
ZBTB32	-0.10643	3.803673	-2.09258	0.04289	0.694148	-3.87675
DNASE1L2	-0.17239	3.366795	-2.0922	0.042926	0.694148	-3.87741
ANKRD6	0.131239	5.402358	2.089311	0.0432	0.697879	-3.88244
CYGB	0.162081	6.219844	2.087411	0.043381	0.700108	-3.88575
MYL9	0.217252	6.806425	2.085313	0.043581	0.702221	-3.88939
TEX12	-0.17985	3.568017	-2.08502	0.043609	0.702221	-3.8899
PLAGL1	0.167877	5.818856	2.08458	0.043651	0.702221	-3.89067
PLEKHG1	0.200945	4.820119	2.084249	0.043683	0.702221	-3.89124
COL9A3	-0.13526	4.918223	-2.08335	0.043769	0.702375	-3.8928
OR8H1	0.130911	2.048972	2.083256	0.043778	0.702375	-3.89297
KALRN	0.118484	6.544044	2.082664	0.043835	0.702601	-3.89399
PLCG1	0.100694	6.802019	2.081181	0.043978	0.704202	-3.89657
XYLB	0.143861	4.943699	2.079333	0.044156	0.705287	-3.89978
OGDHL	0.122185	3.753126	2.078923	0.044196	0.705287	-3.90049
SLC39A10	0.169274	4.509313	2.076112	0.044469	0.705287	-3.90536
HIVEP3	0.143714	4.218334	2.075764	0.044503	0.705287	-3.90596
KDM3B	-0.10696	7.831192	-2.07482	0.044595	0.705287	-3.9076
C3orf52	0.105911	2.477038	2.074299	0.044646	0.705287	-3.9085
PNP	0.159164	4.275209	2.072937	0.044779	0.705287	-3.91085
IRAK3	0.148423	5.524312	2.072588	0.044813	0.705287	-3.91146
C9orf24	-0.13904	4.721492	-2.07257	0.044816	0.705287	-3.9115
BRIX1	-0.11682	4.959809	-2.07229	0.044842	0.705287	-3.91196
NOC3L	-0.13035	5.402665	-2.07209	0.044862	0.705287	-3.91232
TRAK2	0.117655	7.392826	2.072021	0.044869	0.705287	-3.91244
FBXL3	-0.1004	6.973137	-2.07133	0.044937	0.705287	-3.91363

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
CCDC127	-0.13835	6.793296	-2.07106	0.044963	0.705287	-3.91409
NAA15	-0.10677	7.183185	-2.07085	0.044984	0.705287	-3.91447
EIF3J	-0.09986	8.270866	-2.07048	0.04502	0.705287	-3.91509
XPA	-0.11045	6.730906	-2.07028	0.04504	0.705287	-3.91544
CTSK	0.267181	5.780277	2.070038	0.045064	0.705287	-3.91587
CARD8	0.10804	6.990351	2.069736	0.045094	0.705287	-3.91639
OGFOD2	-0.11174	4.920853	-2.06963	0.045104	0.705287	-3.91658
NKX3-1	-0.12327	5.066379	-2.06867	0.045198	0.705287	-3.91822
NFKBIB	-0.11767	5.781515	-2.06846	0.045219	0.705287	-3.91859
SYT1	0.173398	2.909468	2.068055	0.04526	0.705287	-3.91929
TMEM128	-0.11768	5.320461	-2.06697	0.045367	0.705287	-3.92116
MEOX1	0.176837	5.427917	2.066523	0.045411	0.705287	-3.92194
RRP1B	-0.08374	5.968022	-2.06631	0.045432	0.705287	-3.9223
DENND2A	0.123456	4.817254	2.065713	0.045492	0.705287	-3.92333
CCDC71	-0.14768	5.892696	-2.06529	0.045534	0.705287	-3.92406
RHPN2	-0.14558	3.577969	-2.06519	0.045543	0.705287	-3.92423
ADAD1	0.085362	1.963278	2.064209	0.045641	0.705287	-3.92593
ANO3	-0.10436	2.1893	-2.06368	0.045694	0.705287	-3.92684
BRD3	-0.10102	6.134139	-2.0634	0.045722	0.705287	-3.92733
CCND3	0.128161	6.526902	2.063146	0.045747	0.705287	-3.92776
OR6C3	0.13203	2.167117	2.062905	0.045771	0.705287	-3.92818
CALML5	-0.1249	2.885096	-2.06176	0.045886	0.705287	-3.93014
IYD	-0.11265	2.567523	-2.06157	0.045905	0.705287	-3.93048
CSH2	-0.18152	3.468484	-2.06079	0.045983	0.705287	-3.93182
CCDC85A	0.11772	5.167725	2.059039	0.046159	0.705287	-3.93483
OR4M1	0.174434	2.13946	2.058484	0.046215	0.705287	-3.93579
RNMT	-0.13556	5.383343	-2.05821	0.046243	0.705287	-3.93626
SRP68	-0.0922	8.174432	-2.05808	0.046255	0.705287	-3.93648
GUSB	0.10102	5.373377	2.058067	0.046257	0.705287	-3.93651
RFTN2	0.19978	5.798437	2.057493	0.046315	0.705287	-3.93749
GRN	0.178536	8.275801	2.057343	0.04633	0.705287	-3.93775
MS4A7	0.218216	4.221184	2.056807	0.046384	0.705287	-3.93867
GUCY2F	0.109297	2.549372	2.056457	0.046419	0.705287	-3.93927
IL13RA2	0.085293	1.748379	2.056269	0.046438	0.705287	-3.9396
PARVA	0.202943	6.747829	2.056185	0.046447	0.705287	-3.93974
FXYD1	-0.10725	10.49432	-2.05566	0.0465	0.705287	-3.94064
RNF138	-0.19934	5.070839	-2.05557	0.046509	0.705287	-3.9408
LASP1	0.168903	6.362327	2.055009	0.046566	0.705287	-3.94176
DDX53	-0.11811	2.517435	-2.05498	0.046569	0.705287	-3.94182
PMPCA	-0.11865	6.571399	-2.05421	0.046647	0.705287	-3.94314
OR4S1	-0.12044	2.298066	-2.05393	0.046676	0.705287	-3.94363
PI4KB	-0.09301	6.820156	-2.053	0.046771	0.705287	-3.94522
GAB2	0.209858	5.539771	2.051778	0.046895	0.705287	-3.94731
PGBD2	-0.17109	2.991653	-2.0512	0.046954	0.705287	-3.94831
PARD3	-0.10961	7.032275	-2.05071	0.047004	0.705287	-3.94915
INTS8	-0.15739	5.170109	-2.05043	0.047032	0.705287	-3.94962
ADIPOQ	-0.70419	4.535914	-2.05039	0.047036	0.705287	-3.94969
ASB10	-0.15275	6.743718	-2.04972	0.047105	0.705287	-3.95084

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
PLK2	0.244347	5.187964	2.049405	0.047137	0.705287	-3.95138
NUP50	-0.16051	4.592466	-2.04921	0.047158	0.705287	-3.95172
RMND5A	-0.12304	8.391691	-2.04883	0.047196	0.705287	-3.95236
SLFN14	-0.11665	2.773361	-2.0488	0.047199	0.705287	-3.95241
ATF7	-0.1028	6.515689	-2.04829	0.047252	0.705287	-3.95329
AKAP4	0.121423	2.520794	2.048199	0.047261	0.705287	-3.95345
BAG5	-0.11456	5.167456	-2.04741	0.047342	0.705287	-3.95481
TINAGL1	0.15384	6.563873	2.047391	0.047344	0.705287	-3.95483
TP53INP2	0.153333	7.016522	2.047252	0.047358	0.705287	-3.95507
SLC7A2	-0.11599	10.03352	-2.04714	0.047369	0.705287	-3.95526
CASP2	0.092908	6.190173	2.04706	0.047378	0.705287	-3.9554
TRIP10	-0.07815	9.059002	-2.04689	0.047395	0.705287	-3.95569
CREB5	0.167173	6.224983	2.046749	0.04741	0.705287	-3.95593
CADM1	0.144241	5.140893	2.046687	0.047416	0.705287	-3.95604
MYD88	0.176813	5.523135	2.046507	0.047435	0.705287	-3.95635
LCA5L	-0.12984	4.478729	-2.046	0.047487	0.705287	-3.95721
IGF1	0.324938	6.160234	2.045879	0.0475	0.705287	-3.95742
SLC40A1	0.143691	8.080996	2.045605	0.047528	0.705287	-3.95789
TAPBP	0.125258	7.841964	2.045473	0.047542	0.705287	-3.95812
WSCD2	-0.09242	3.203848	-2.04518	0.047572	0.705287	-3.95863
COL5A1	0.138837	5.267419	2.04492	0.047599	0.705287	-3.95907
ABHD2	0.155822	6.093622	2.044758	0.047616	0.705287	-3.95934
ASPM	0.096981	2.136741	2.044261	0.047667	0.705411	-3.96019
S100A7A	-0.1162	3.430482	-2.04282	0.047816	0.705505	-3.96265
NXT1	-0.15357	5.023579	-2.04208	0.047893	0.705505	-3.96392
PDLIM3	-0.13398	11.31963	-2.04163	0.04794	0.705505	-3.96469
CABP7	-0.09757	3.333152	-2.04148	0.047955	0.705505	-3.96495
HGSNAT	0.10952	7.062334	2.041383	0.047966	0.705505	-3.96511
VCPIP1	-0.11898	6.87785	-2.04138	0.047966	0.705505	-3.96512
DNAJB1	-0.14463	6.791255	-2.0413	0.047975	0.705505	-3.96526
RPUSD4	-0.14318	7.468851	-2.03972	0.048139	0.705594	-3.96796
PLXNB2	0.234832	5.484585	2.039417	0.04817	0.705594	-3.96847
DDIT4L	0.227349	9.702438	2.039243	0.048189	0.705594	-3.96877
NFATC3	-0.08828	8.35003	-2.03863	0.048252	0.705594	-3.96981
ITGB5	0.105742	6.798869	2.038229	0.048295	0.705594	-3.9705
EDNRA	0.310405	6.290577	2.038103	0.048308	0.705594	-3.97072
OR14I1	-0.16272	2.22927	-2.03804	0.048315	0.705594	-3.97083
NUP153	-0.08867	7.852235	-2.03709	0.048414	0.705594	-3.97245
RHEBL1	0.101349	2.380028	2.036699	0.048455	0.705594	-3.97311
SH3GLB1	-0.09118	8.896908	-2.03652	0.048474	0.705594	-3.97342
CUL1	-0.07868	8.578936	-2.03646	0.04848	0.705594	-3.97353
FAM83B	-0.44249	5.641257	-2.03508	0.048625	0.705594	-3.97587
ANXA10	0.090648	2.024345	2.034413	0.048696	0.705594	-3.97701
ARX	-0.13371	5.530437	-2.03426	0.048712	0.705594	-3.97728
TPP1	0.135548	6.611944	2.033917	0.048748	0.705594	-3.97786
FCER1A	0.195091	3.896059	2.033753	0.048765	0.705594	-3.97814
MATN3	-0.09498	2.15549	-2.03366	0.048775	0.705594	-3.9783
MGST1	-0.38389	4.40043	-2.03299	0.048846	0.705594	-3.97944

(continued)

Table S1. (continued)

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
LCN15	-0.14486	3.571699	-2.03268	0.048879	0.705594	-3.97997
ART3	-0.14927	8.986976	-2.03255	0.048892	0.705594	-3.98019
NEUROD6	0.103495	2.284853	2.032115	0.048938	0.705594	-3.98093
PGA3	-0.16281	3.745014	-2.03202	0.048948	0.705594	-3.98109
ZBTB8OS	-0.15506	6.029956	-2.03181	0.04897	0.705594	-3.98144
ULBP2	0.151296	2.175856	2.03119	0.049036	0.705925	-3.9825
PTDSS2	-0.12548	6.091962	-2.02906	0.049262	0.708407	-3.98612
TTYH3	0.141994	5.13025	2.028331	0.04934	0.708407	-3.98737
ESM1	0.098155	2.440397	2.028015	0.049374	0.708407	-3.9879
HSD17B3	0.139012	2.688965	2.027692	0.049409	0.708407	-3.98845
MMP10	0.114978	2.163692	2.027541	0.049425	0.708407	-3.98871
DAP	0.134074	5.784682	2.02696	0.049487	0.708677	-3.9897
COIL	-0.13116	7.115444	-2.02553	0.04964	0.709534	-3.99213
ZNF625	0.10939	3.677537	2.025308	0.049664	0.709534	-3.9925
BRMS1L	-0.16501	4.384598	-2.02482	0.049716	0.709534	-3.99334
ALAD	-0.11831	5.957987	-2.02434	0.049768	0.709534	-3.99416
PLCB2	0.18283	4.495097	2.024032	0.049801	0.709534	-3.99467
PHF20	-0.09094	6.843912	-2.02368	0.049838	0.709534	-3.99527
C2orf73	-0.07998	2.076576	-2.02358	0.04985	0.709534	-3.99544
PCYOX1	-0.10974	9.274481	-2.02256	0.04996	0.710382	-3.99718

Differentially expressed lncRNA

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
C14orf177	-0.13105	2.905981	-2.7146	0.009735	0.504052	-2.79379
DLEU2	-0.23364	6.181622	-2.6421	0.01169	0.504052	-2.90975
KU-MEL-3	0.126044	2.116699	2.585698	0.013455	0.504052	-2.99863
FAM99A	0.230243	3.233509	2.488272	0.017087	0.504052	-3.1493
HCP5	0.211352	5.459582	2.358748	0.023293	0.549725	-3.34372

Differentially expressed miRNA

ID	logFC	AveExpr	t	*p* value	adj.*p* val.	B
MIR330	0.147269	4.414325	2.916728	0.005861	0.633567	-2.4909
MIR181B1	-0.26084	3.966641	-2.86922	0.006634	0.633567	-2.56864
MIR29C	0.158484	6.504367	2.438388	0.01945	0.981913	-3.23962
MIR214	-0.1934	4.990899	-2.33411	0.024879	0.981913	-3.39168
MIR25	-0.15267	4.105887	-2.21936	0.032398	0.981913	-3.55378
MIR410	0.125847	2.030207	2.107849	0.041577	0.981913	-3.70576
MIR30A	-0.16762	2.8729	-2.04129	0.048087	0.981913	-3.79375

Table S2.

Interaction Pairs of ceRNA Network	
DLEU2	hsa-miR-181b1
HCP5	hsa-miR-29c
DLEU2	hsa-miR-214
FAM99A	hsa-miR-214
HCP5	hsa-miR-214
HCP5	hsa-miR-25
DLEU2	hsa-miR-25
DLEU2	hsa-miR-30a
FAM99A	hsa-miR-30a
hsa-miR-25	C20orf194
hsa-miR-29c	LOXL2
hsa-miR-30a	ARID4A
hsa-miR-29c	CD276
hsa-miR-30a	VAPA
hsa-miR-214	CDK6
hsa-miR-29c	COL1A2
hsa-miR-30a	NR5A2
hsa-miR-25	ELF4
hsa-miR-30a	CFDP1
hsa-miR-181b1	RNMT
hsa-miR-25	SH2B3
hsa-miR-29c	ZFP36L1
hsa-miR-29c	TP53INP1
hsa-miR-29c	LOX
hsa-miR-181b1	HOXA11
hsa-miR-214	LEPROTL1
hsa-miR-30a	DPYSL2
hsa-miR-30a	ESCO1
hsa-miR-30a	SERPINE1
hsa-miR-181b1	DPYSL2
hsa-miR-181b1	ARNT2
hsa-miR-214	ABLIM3
hsa-miR-25	MMP10
hsa-miR-25	TRHDE
hsa-miR-214	ZNRF1
hsa-miR-214	SEMA4F
hsa-miR-214	RNASE6
hsa-miR-29c	IGF1
hsa-miR-29c	VASH1
hsa-miR-214	HEYL
hsa-miR-29c	COL4A1
hsa-miR-25	OSMR
hsa-miR-181b1	AKT3
hsa-miR-25	S1PR1
hsa-miR-214	DOCK9
hsa-miR-25	PITPNC1
hsa-miR-29c	SH3GLB1
hsa-miR-29c	COL3A1
hsa-miR-30a	NEUROD6
hsa-miR-181b1	MSI2
hsa-miR-30a	FAP
hsa-miR-181b1	HECW2
hsa-miR-181b1	ESM1
hsa-miR-30a	MCF2L
hsa-miR-25	TUSC3
hsa-miR-181b1	KCTD10
hsa-miR-181b1	CBX7
hsa-miR-214	LAMA4
hsa-miR-25	CHRM2
hsa-miR-214	HIP1
hsa-miR-214	JPH1
hsa-miR-30a	UBE2V2
hsa-miR-214	MED19
hsa-miR-214	ATG12
hsa-miR-30a	PIP4K2B
hsa-miR-214	TRAF5
hsa-miR-214	TRIP10
hsa-miR-25	CXXC5
hsa-miR-214	TCN2
hsa-miR-181b1	PNRC2
hsa-miR-30a	CBX2
hsa-miR-30a	LHFPL2
hsa-miR-181b1	INO80
hsa-miR-214	MYO1D
hsa-miR-214	KIF24
hsa-miR-29c	PXDN
hsa-miR-214	F8
hsa-miR-29c	COL4A2
hsa-miR-30a	FXR1
hsa-miR-29c	NAV1
hsa-miR-214	ABHD2
hsa-miR-214	MGLL
hsa-miR-29c	CBX2
hsa-miR-29c	MORF4L2
hsa-miR-25	ITGA6
hsa-miR-181b1	TNFAIP1
hsa-miR-30a	FOXA1
hsa-miR-214	SFMBT2
hsa-miR-214	GNAQ
hsa-miR-25	FXR1
hsa-miR-29c	TMPRSS3
hsa-miR-214	BRPF1
hsa-miR-181b1	DOCK4
hsa-miR-181b1	TIMP3
hsa-miR-181b1	MYO1E
hsa-miR-29c	COL6A2

(continued)

Table S2. (continued)

Interaction Pairs of ceRNA Network		Interaction Pairs of ceRNA Network	
hsa-miR-30a	LHX8	hsa-miR-181b1	ZFP36L2
hsa-miR-30a	PRDM1	hsa-miR-30a	PPP3CB
hsa-miR-25	RBM27	hsa-miR-214	PLXDC1
hsa-miR-30a	SH2B3	hsa-miR-30a	CCNY
hsa-miR-29c	ASAP2	hsa-miR-25	CIDEC
hsa-miR-214	WASF2	hsa-miR-29c	RMND5A
hsa-miR-30a	ZCCHC2	hsa-miR-29c	SERPINH1
hsa-miR-214	ANKRD6	hsa-miR-214	PDRG1
hsa-miR-214	ATP2B4	hsa-miR-30a	EML4
hsa-miR-214	CD84	hsa-miR-29c	NFATC3
hsa-miR-214	TNFAIP8L1	hsa-miR-30a	VPS33A
hsa-miR-25	ARHGAP29	hsa-miR-25	ITGA5
hsa-miR-30a	TACC1	hsa-miR-29c	LAMC1
hsa-miR-181b1	SLC7A1	hsa-miR-181b1	ST8SIA4
hsa-miR-25	PGBD2	hsa-miR-214	SLC25A25
hsa-miR-214	F2R	hsa-miR-214	PPP1R16B
hsa-miR-29c	AHR	hsa-miR-30a	ZNRF1
hsa-miR-214	PDP2	hsa-miR-214	ADAMTSL3
hsa-miR-29c	SPARC	hsa-miR-29c	CREB5
hsa-miR-29c	PDGFRB	hsa-miR-30a	TMEM181
hsa-miR-29c	COL1A1	hsa-miR-30a	COL9A3
hsa-miR-25	PELO	hsa-miR-29c	ULBP2
hsa-miR-214	ENTPD1	hsa-miR-29c	AKT3
hsa-miR-30a	MFSD6	hsa-miR-25	DOCK9
hsa-miR-181b1	LOX	hsa-miR-30a	ERG
hsa-miR-30a	VASH1	hsa-miR-25	TMEM184B
hsa-miR-30a	SCN2A	hsa-miR-29c	PARG
hsa-miR-214	FSCN1	hsa-miR-29c	PDGFB
hsa-miR-25	GLRA1	hsa-miR-25	MYO1B
hsa-miR-25	TRAM2	hsa-miR-30a	CHKA
hsa-miR-214	RPS6KL1	hsa-miR-181b1	CPNE2
hsa-miR-30a	SMAD1	hsa-miR-29c	COL6A3
hsa-miR-29c	KLF4	hsa-miR-29c	COL5A2
hsa-miR-181b1	ETS1	hsa-miR-25	RBPMS2
hsa-miR-30a	PRLR	hsa-miR-214	SV2B
hsa-miR-29c	TSPAN14	hsa-miR-29c	COL15A1
hsa-miR-214	EGFLAM	hsa-miR-30a	NHS
hsa-miR-181b1	FKBP1A	hsa-miR-30a	PRPF40A
hsa-miR-25	LRCH1	hsa-miR-181b1	SLC25A25
hsa-miR-30a	TP53INP1	hsa-miR-214	CBX2
hsa-miR-29c	NID1	hsa-miR-29c	ITGA6
hsa-miR-214	NAA15	hsa-miR-30a	LRFN2
hsa-miR-29c	COL7A1	hsa-miR-25	SPRYD4
hsa-miR-25	OTUD7B	hsa-miR-29c	DGKH
hsa-miR-25	G3BP2	hsa-miR-25	SLC39A14
hsa-miR-214	CADM1	hsa-miR-25	MORC3
hsa-miR-214	BCL11A	hsa-miR-181b1	S1PR1
hsa-miR-214	EMCN	hsa-miR-214	SRGAP1

(continued)

Table S2. (continued)

Interaction Pairs of ceRNA Network	
hsa-miR-181b1	NAA15
hsa-miR-214	PLCB2
hsa-miR-29c	STX17
hsa-miR-29c	ATP2B4
hsa-miR-214	TTYH3
hsa-miR-29c	RNF138
hsa-miR-25	ZNF716
hsa-miR-30a	PCDH17
hsa-miR-29c	FGD4
hsa-miR-181b1	VCAM1
hsa-miR-30a	SLC35C1
hsa-miR-25	ADAMTSL3
hsa-miR-25	KLF4
hsa-miR-181b1	PRLR
hsa-miR-25	TRAK2
hsa-miR-214	TEK
hsa-miR-181b1	CTTNBP2NL
hsa-miR-181b1	G3BP2
hsa-miR-214	PPP1R8
hsa-miR-181b1	TMEM181
hsa-miR-29c	CTNND1
hsa-miR-181b1	ZFP36L1
hsa-miR-30a	PITPNC1
hsa-miR-30a	CPNE8
hsa-miR-181b1	CREBZF
hsa-miR-29c	HMCN1
hsa-miR-214	CRTC3
hsa-miR-25	LHFPL2
hsa-miR-29c	KCTD5
hsa-miR-25	RFX1
hsa-miR-30a	PPP1R9A
hsa-miR-30a	NACC2
hsa-miR-30a	DLL4
hsa-miR-29c	TRAK2
hsa-miR-29c	PCDH17
hsa-miR-29c	AGPAT4
hsa-miR-30a	ZFP36L2
hsa-miR-214	TNFAIP1
hsa-miR-30a	DGKH
hsa-miR-30a	GNAI2
hsa-miR-29c	ENPP2
hsa-miR-181b1	MTMR12
hsa-miR-30a	ITGA6
hsa-miR-30a	ARL15
hsa-miR-214	PSD3
hsa-miR-181b1	TMEM165

Interaction Pairs of ceRNA Network	
hsa-miR-30a	LRRC8C
hsa-miR-181b1	SIPA1L2
hsa-miR-181b1	UBP1
hsa-miR-181b1	PRDM1
hsa-miR-25	RHPN2
hsa-miR-29c	DCUN1D4
hsa-miR-25	COL1A2
hsa-miR-214	MTMR12
hsa-miR-29c	PRKRA
hsa-miR-30a	XPR1
hsa-miR-214	NMB
hsa-miR-214	ARHGAP31
hsa-miR-25	GNAQ
hsa-miR-25	ATP2B4
hsa-miR-30a	TRMT5
hsa-miR-181b1	KLHL5
hsa-miR-30a	IKBIP
hsa-miR-25	ZNF354B
hsa-miR-29c	CDK6
hsa-miR-214	CD276
hsa-miR-29c	TRAM2
hsa-miR-25	FKBP1A
hsa-miR-25	MED19
hsa-miR-30a	EDNRA
hsa-miR-25	ANP32E
hsa-miR-25	PDE10A
hsa-miR-214	MFSD6
hsa-miR-29c	SMTNL2
hsa-miR-214	VASH1
hsa-miR-214	TLR5
hsa-miR-25	CHKA
hsa-miR-30a	PPID
hsa-miR-29c	ADAMTS17
hsa-miR-214	VEZT
hsa-miR-30a	MSI2
hsa-miR-25	ITPR1
hsa-miR-25	ZBTB8OS
hsa-miR-29c	COL5A1
hsa-miR-181b1	MFSD6
hsa-miR-29c	EML4
hsa-miR-29c	CAV2
hsa-miR-29c	RNF152
hsa-miR-30a	NFATC3
hsa-miR-181b1	DOCK10
hsa-miR-25	SHE

Table S3.

ONTOLOGY	Description	GeneRatio	*p* value	*p*.adjust	Count
BP	extracellular matrix organization	31/221	8.35E-18	2.39E-14	31
BP	extracellular structure organization	31/221	4.01E-16	5.73E-13	31
BP	collagen fibril organization	9/221	1.30E-08	1.24E-05	9
BP	collagen metabolic process	10/221	1.11E-06	0.000795	10
BP	bone development	13/221	1.98E-06	0.001134	13
BP	endoderm development	8/221	3.21E-06	0.001529	8
BP	connective tissue development	14/221	4.93E-06	0.002015	14
BP	platelet activation	10/221	1.45E-05	0.004785	10
BP	cellular response to amino acid stimulus	7/221	1.56E-05	0.004785	7
BP	platelet-derived growth factor receptor-beta signaling pathway	4/221	1.74E-05	0.004785	4
BP	cartilage development involved in endochondral bone morphogenesis	6/221	1.84E-05	0.004785	6
BP	endochondral bone morphogenesis	7/221	2.49E-05	0.005927	7
BP	collagen biosynthetic process	6/221	3.71E-05	0.00816	6
BP	blood coagulation	14/221	5.00E-05	0.00972	14
BP	regulation of small GTPase mediated signal transduction	14/221	5.33E-05	0.00972	14
BP	hemostasis	14/221	5.87E-05	0.00972	14
BP	coagulation	14/221	6.05E-05	0.00972	14
BP	phosphatidylinositol-mediated signaling	10/221	6.12E-05	0.00972	10
BP	phosphatidylinositol 3-kinase signaling	9/221	6.85E-05	0.010041	9
BP	inositol lipid-mediated signaling	10/221	7.02E-05	0.010041	10
BP	glomerulus development	6/221	9.09E-05	0.012381	6
BP	formation of primary germ layer	8/221	9.71E-05	0.012622	8
BP	regulation of phosphatidylinositol 3-kinase signaling	8/221	0.000115	0.014332	8
BP	regulation of vasculature development	15/221	0.00016	0.019071	15
BP	chondrocyte development involved in endochondral bone morphogenesis	4/221	0.000169	0.019284	4
BP	endodermal cell differentiation	5/221	0.000185	0.01956	5
BP	collagen-activated tyrosine kinase receptor signaling pathway	3/221	0.000185	0.01956	3
BP	negative regulation of cAMP-mediated signaling	4/221	0.000199	0.020225	4
BP	calcineurin-mediated signaling	5/221	0.000205	0.020225	5
BP	trabecula morphogenesis	5/221	0.000227	0.020971	5
BP	pri-miRNA transcription by RNA polymerase II	5/221	0.000227	0.020971	5
BP	second-messenger-mediated signaling	15/221	0.000245	0.021893	15
BP	calcium-mediated signaling	10/221	0.000281	0.024365	10
BP	endoderm formation	5/221	0.000305	0.025661	5
BP	sprouting angiogenesis	9/221	0.00034	0.027805	9
BP	response to amino acid	7/221	0.000396	0.028513	7
BP	negative regulation of vasculature development	9/221	0.000399	0.028513	9
BP	chondrocyte differentiation involved in endochondral bone morphogenesis	4/221	0.000411	0.028513	4
BP	response to acetylcholine	4/221	0.000411	0.028513	4
BP	cellular response to acetylcholine	4/221	0.000411	0.028513	4
BP	bone morphogenesis	7/221	0.000417	0.028513	7
BP	collagen-activated signaling pathway	3/221	0.000429	0.028513	3
BP	protein heterotrimerization	3/221	0.000429	0.028513	3
BP	regulation of fibroblast proliferation	6/221	0.000454	0.02948	6
BP	endothelial cell proliferation	9/221	0.000465	0.02948	9
BP	inositol phosphate-mediated signaling	5/221	0.000477	0.02948	5
BP	fibroblast proliferation	6/221	0.000484	0.02948	6
BP	heart trabecula morphogenesis	4/221	0.00053	0.031561	4

(continued)

Table S3. (continued)

ONTOLOGY	Description	GeneRatio	*p* value	*p*.adjust	Count
BP	platelet-derived growth factor receptor signaling pathway	5/221	0.000564	0.032907	5
BP	regulation of GTPase activity	15/221	0.00061	0.03427	15
BP	aorta development	5/221	0.000611	0.03427	5
BP	filopodium assembly	5/221	0.000661	0.036318	5
BP	regulation of angiogenesis	13/221	0.000673	0.036318	13
BP	epithelial cell proliferation	14/221	0.000694	0.036761	14
BP	Rho protein signal transduction	9/221	0.000721	0.037486	9
BP	divalent inorganic cation transport	15/221	0.000754	0.038494	15
BP	response to acid chemical	12/221	0.00083	0.041132	12
BP	platelet degranulation	7/221	0.000834	0.041132	7
BP	cellular response to acid chemical	9/221	0.000886	0.042966	9
BP	positive regulation of sprouting angiogenesis	5/221	0.00096	0.045769	5
BP	regulation of extracellular matrix disassembly	3/221	0.000984	0.046147	3
CC	basement membrane	14/225	3.82E-12	1.33E-09	14
CC	collagen-containing extracellular matrix	25/225	7.94E-12	1.38E-09	25
CC	complex of collagen trimers	8/225	1.72E-11	1.66E-09	8
CC	collagen trimer	13/225	1.91E-11	1.66E-09	13
CC	extracellular matrix component	10/225	2.60E-10	1.81E-08	10
CC	fibrillar collagen trimer	5/225	8.09E-08	4.01E-06	5
CC	banded collagen fibril	5/225	8.09E-08	4.01E-06	5
CC	endoplasmic reticulum lumen	17/225	1.04E-07	4.53E-06	17
CC	cell leading edge	15/225	6.47E-05	0.002496	15
CC	lamellipodium	10/225	7.77E-05	0.002695	10
CC	actin-based cell projection	10/225	0.000144	0.004545	10
CC	platelet alpha granule	6/225	0.000614	0.01776	6
CC	autophagosome	6/225	0.000689	0.018397	6
CC	sarcolemma	7/225	0.000965	0.023272	7
CC	platelet alpha granule lumen	5/225	0.001006	0.023272	5
CC	filopodium	6/225	0.001237	0.026828	6
CC	integral component of presynaptic membrane	5/225	0.001481	0.030221	5
CC	glutamatergic synapse	11/225	0.002321	0.042964	11
CC	cell-cell junction	13/225	0.002461	0.042964	13
CC	intrinsic component of presynaptic membrane	5/225	0.002476	0.042964	5
MF	extracellular matrix structural constituent conferring tensile strength	12/216	4.65E-14	2.04E-11	12
MF	extracellular matrix structural constituent	18/216	1.45E-12	3.19E-10	18
MF	platelet-derived growth factor binding	7/216	1.16E-11	1.70E-09	7
MF	growth factor binding	12/216	1.17E-07	1.29E-05	12
MF	cell adhesion molecule binding	16/216	0.000432	0.037896	16

Table S4.

ID	Description	GeneRatio	BgRatio	*p* value	*p* adjust.	q value	Count
hsa04151	PI3K-Akt signaling pathway	22/108	354/8095	1.01E-09	1.50E-07	1.04E-07	22
hsa04512	ECM-receptor interaction	12/108	88/8095	1.51E-09	1.50E-07	1.04E-07	12
hsa04510	Focal adhesion	16/108	201/8095	7.85E-09	4.74E-07	3.28E-07	16
hsa04974	Protein digestion and absorption	12/108	103/8095	9.52E-09	4.74E-07	3.28E-07	12
hsa04933	AGE-RAGE signaling pathway in diabetic complications	9/108	100/8095	6.63E-06	0.000222	0.000154	9
hsa05165	Human papillomavirus infection	16/108	331/8095	7.04E-06	0.000222	0.000154	16
hsa05146	Amoebiasis	9/108	102/8095	7.81E-06	0.000222	0.000154	9
hsa04015	Rap1 signaling pathway	12/108	210/8095	2.12E-05	0.000527	0.000365	12
hsa05222	Small cell lung cancer	8/108	92/8095	2.85E-05	0.000629	0.000436	8
hsa04611	Platelet activation	9/108	124/8095	3.79E-05	0.000734	0.000509	9
hsa04218	Cellular senescence	10/108	156/8095	4.06E-05	0.000734	0.000509	10
hsa04926	Relaxin signaling pathway	9/108	129/8095	5.18E-05	0.000859	0.000596	9
hsa04022	cGMP-PKG signaling pathway	10/108	167/8095	7.24E-05	0.001109	0.000768	10
hsa04924	Renin secretion	6/108	69/8095	0.000297	0.004227	0.002929	6
hsa04725	Cholinergic synapse	7/108	113/8095	0.000749	0.009939	0.006887	7
hsa05163	Human cytomegalovirus infection	10/108	225/8095	0.000807	0.010032	0.006951	10
hsa04935	Growth hormone synthesis, secretion and action	7/108	119/8095	0.001018	0.011916	0.008257	7
hsa04540	Gap junction	6/108	88/8095	0.001096	0.012115	0.008395	6
hsa04730	Long-term depression	5/108	60/8095	0.001174	0.0123	0.008523	5
hsa04020	Calcium signaling pathway	10/108	240/8095	0.001319	0.013128	0.009097	10
hsa05143	African trypanosomiasis	4/108	37/8095	0.00141	0.013363	0.00926	4
hsa05131	Shigellosis	10/108	247/8095	0.001637	0.014804	0.010259	10
hsa05215	Prostate cancer	6/108	97/8095	0.001814	0.015219	0.010546	6
hsa04728	Dopaminergic synapse	7/108	132/8095	0.001859	0.015219	0.010546	7
hsa05231	Choline metabolism in cancer	6/108	98/8095	0.001912	0.015219	0.010546	6
hsa05218	Melanoma	5/108	72/8095	0.002652	0.020296	0.014064	5
hsa04922	Glucagon signaling pathway	6/108	107/8095	0.002981	0.021971	0.015225	6
hsa05214	Glioma	5/108	75/8095	0.00317	0.022527	0.01561	5
hsa04072	Phospholipase D signaling pathway	7/108	148/8095	0.003544	0.024322	0.016854	7
hsa04934	Cushing syndrome	7/108	155/8095	0.004571	0.030319	0.021009	7
hsa05205	Proteoglycans in cancer	8/108	205/8095	0.005962	0.038274	0.026521	8