Original research

Gene coexpression networks reveal novel molecular endotypes in alpha-1 antitrypsin deficiency

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ABSTRACT

Background Alpha-1 antitrypsin deficiency (AATD) is a genetic condition that causes early onset pulmonary emphysema and airways obstruction. The complete mechanisms via which AATD causes lung disease are not fully understood. To improve our understanding of the pathogenesis of AATD, we investigated gene expression profiles of bronchoalveolar lavage (BAL) and peripheral blood mononuclear cells (PBMCs) in AATD individuals.

Methods We performed RNA-Seq on RNA extracted from matched BAL and PBMC samples isolated from 89 subjects enrolled in the Genomic Research in Alpha-1 Antitrypsin Deficiency and Sarcoidosis (GRADS) study. Subjects were stratified by genotype and augmentation therapy. Supervised and unsupervised differential gene expression analyses were performed using Weighted Gene Co-expression Network Analysis (WGCNA) to identify gene profiles associated with subjects' clinical variables. The genes in the most significant WGCNA module were used to cluster AATD individuals. Gene validation was performed by NanoString nCounter Gene Expression Assay.

Result We observed modest effects of AATD genotype and augmentation therapy on gene expression. When WGCNA was applied to BAL transcriptome, one gene module, ME31 (2312 genes), correlated with the highest number of clinical variables and was functionally enriched with numerous immune T-lymphocyte related pathways. This gene module identified two distinct clusters of AATD individuals with different disease severity and distinct PBMC gene expression patterns.

Conclusions We successfully identified novel clusters of AATD individuals where severity correlated with increased immune response independent of individuals' genotype and augmentation therapy. These findings may suggest the presence of previously unrecognised disease endotypes in AATD that associate with T-lymphocyte immunity and disease severity.

Key messages

What is the key question?

► What are the effects of alpha-1 antitrypsin genotype and augmentation therapy on bronchoalveolar lavage (BAL) and peripheral blood mononuclear cells (PBMCs) gene expression profiles?

What is the bottom line?

► While these effects of genotype and augmentation therapy are not strong, we identified a signature of genes that distinguish two clusters of patients that differ in extent of emphysema, and lymphocytic infiltration, but not in therapy or genotype, potentially reflecting novel endotypes of disease driven by inflammation.

Why read on?

► This is the largest study that describes the transcriptome of BAL or PBMC samples from well-characterised individuals with alpha-1 antitrypsin deficiency and the first study that aims to use PBMC and BAL gene expression to understand the effects of the causal genetic variant and augmentation therapy on their connection to patient clinical characteristics.

INTRODUCTION

Alpha-1 antitrypsin deficiency (AATD) is a genetic condition that causes early-onset airway obstruction, emphysema and liver cirrhosis. It is estimated that 60 000–100 000 individuals in the USA have AATD.[1] AATD is caused by a mutation in the gene that encodes the alpha-1 antitrypsin protein (AAT), serpin peptidase inhibitor, clade A, member 1 (*SERPINA1*). Multiple AATD mutations have been identified that associate with low AAT serum levels, but the Z-allele is the most common point mutation in SERPINA1 (rs28929474) associated with COPD. This mutation results in a substitution of glutamic acid for lysine at position 342 in the AAT protein,[2] and in the homozygous state produces an 85%–90% serum and lung reduction in this antiprotease that neutralises neutrophil elastase.[3] As a consequence, there is an inability of AAT to neutralise neutrophil elastase, and this contributes to tissue destruction and matrix remodelling that underlie the pathogenesis of COPD.[4]

Currently, the only specific treatment for AAT-related lung diseases is augmentation therapy. The rationale for the AAT augmentation therapy is that replenishing AAT in patients deficient for this protein protects the lungs from excessive neutrophil elastase activity.[2] While augmentation therapy has been shown to slow the decline in CT lung tissue density, it is not a cure for this disease.[5–9] Augmentation therapy does not fully reverse accelerated lung function decline and has no proven effect on COPD exacerbations.[5] Therefore, identifying other mechanisms by which AATD causes COPD and emphysema is necessary to develop therapies to better treat this disease[10–12] while taking into consideration highly heterogenous AATD clinical presentations.[13 14]

To determine the extent and diversity of effects that AAT genotype and augmentation therapy have on gene expression, we analysed gene expression profiles of paired bronchoalveolar lavage (BAL) and peripheral blood mononuclear cell (PBMC) samples based on the Genomic Research in Alpha-1 Antitrypsin Deficiency and Sarcoidosis Study (GRADS). This multicentre cohort study provided clinical data and RNAseq profiling of BAL cells and PBMC on a well-characterised cohort of AATD individuals.[13]

METHODS

Study participants

The GRADS Alpha-1 Study was a prospective, multicentre study of adults older than age 35 years with PiZZ or PiMZ alpha-1 antitrypsin genotypes.[13] The study protocol, including study design, recruitment and measurements of clinical data, has been previously described.[13] Briefly, 130 individuals with AATD were recruited through the Alpha-1 Foundation Research Registry at the Medical University of South Carolina and directly through physician offices. Written informed consent for genomic research was obtained from all participants. Figure 1 shows the overview of the study design, enrolment process and the computational analysis flow. The final population consists of 89 individuals with matched BAL and PBMC samples,[13] including individuals with PiZZ not receiving augmentation therapy (n=29), individuals with PiZZ receiving augmentation therapy (n=22) and individuals with PiMZ not receiving augmentation therapy (n=38, see table 1). All patients with pulmonary diseases were more than 6 weeks from an exacerbation and 4 weeks from any antibiotics.

RNAseq

Detailed RNA isolation, library construction, sequencing, normalisation and analysis methods are described in an online supplement. After sequencing, reads were mapped to human genome (hg38) as described[15 16] and normalised to address systematic variation that resulted from the sequencing process.[17 18] Differential gene expression analyses were performed to evaluate the association of PiZ genotype and augmentation therapy status on BAL and PBMC gene expression patterns. For the test of augmentation therapy effect, due to possible confounding between treatment and disease severity that requires treatment, we adjusted for age, sex and disease severity as measured by the FEV_1 % predicted. See the online supplemental data for additional details on differential expression analyses.

Weighted Gene Co-expression Network Analysis (WGCNA) and clustering analysis

We performed WGCNA[19] on BAL to identify gene modules and gene networks significantly correlated with clinical

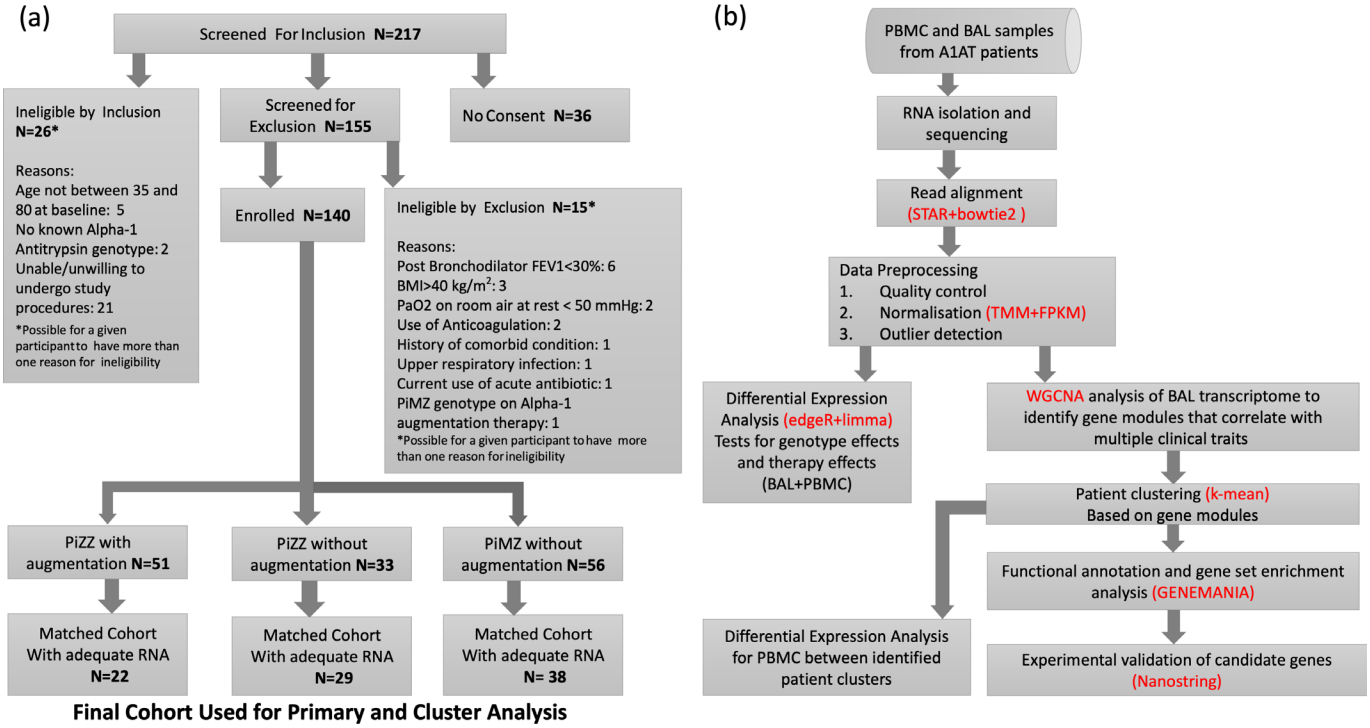

Figure 1 Overview of the study design and computational analysis. (A) The CONSORT Diagram of the GRADS Alpha-1 Study. (B) Diagram of an overview of the computation analysis flow. A1AT, alpha-1 antitrypsin protein; BAL, bronchoalveolar lavage; BMI, body mass index; CONSORT, Consolidated Standards of Reporting Trials; FPKM, fragments per kilobase of transcript per million mapped reads; GRADS, Genomic Research in Alpha-1 Antitrypsin Deficiency and Sarcoidosis; PBMC, peripheral blood mononuclear cell; TMM, trimmed mean of M-values.

Table 1 GRADS A1AT cohort characteristics

				P values*			
	PiZZ off therapy group 1	PiZZ on therapy group 2	PiMZ group 3	ANOVA	1 versus 2	1 versus 3	2 versus 3
N	29	22	38				
Age, mean±SD	50.0±9.8	61.8±10.3	52.8±10.0	0.0023	0.0025	0.4587	0.0128
Female (N, %)	16 (55)	16 (73)	27 (71)	0.4033	0.3651	0.4587	1.0000
White (N, %)	28 (97)	22 (100)	38 (100)	0.6048	1.0000	0.6853	1.0000
Ever smoking (N, %)	6 (21)	11 (50)	19 (50)	0.0549	0.0931	0.1012	1.0000
FVC (L), mean±SD	4.13±1.09	3.44±1.18	3.79±1.00	0.1147	0.0931	0.4587	0.2853
FVC % predicted, mean±SD	98.50±14.03	91±17	93±14	0.2768	0.1106	0.7124	0.4004
FEV_1 (L), mean±SD	3.10±1.04	2.01±0.82	2.92±0.82	0.0006	0.0025	0.6644	0.0005
FEV_1% Predicted, mean±SD	89.96±21.25	67±20	91±16	0.0011	0.0069	1.0000	0.0005
DLCO, mean±SD	25.06±9.21	19.33±5.78	25.5±8.7	0.0408	0.0931	1.0000	0.0128
DLCO % predicted, mean±SD	81±23	71.29±16.15	89±19	0.0104	0.0766	0.6276	0.0039
Emphysema presence (N, %)	14 (50)	14 (67)	4 (11)	0.0002	0.4535	0.0133	0.0002
PD15, mean±SD	−931±17	−943±19	−917±20	0.0002	0.0931	0.0285	0.0002
Bronchiectasis (N, %)	21 (75)	15 (71)	36 (97)	0.0252	0.8876	0.1012	0.0169
Airway internal perimeter, mean±SD	1.15±0.24	1.09±0.22	1.13±0.35	0.4363	0.3795	0.4587	1.0000
Airway wall area, mean±SD	40.50±3.36	41.70±4.09	40.76±3.51	0.6048	0.4144	0.7904	0.5555
Alveolar macrophage %, mean±SD	90.38±7.29	85.31±12.06	89.91±7.91	0.3408	0.1881	1.0000	0.2860
BAL eosinophil %, mean±SD	0.31±1.13	1.12±2.98	0.71±1.92	0.2330	0.1106	0.4587	0.6470
BAL lymphocyte %, mean±SD	7.88±6.75	10.00±8.29	8.19±7.72	0.6111	0.4903	0.9288	0.5369
BAL neutrophil %, mean±SD	1.10±1.20	2.88±3.47	0.90±0.86	0.0966	0.1264	0.7124	0.0444

Statistically significant ($p<0.05$) and borderline signifcant ($0.05<p<0.06$); p-values are marked in red and yellow, respectively.
*P values are based on non-parametric Kruskal and Wilcoxon tests for numerical variables and χ^2 tests for binary variables. All p values are adjusted for FDR.
A1AT, alpha-1 antitrypsin protein; ANOVA, analysis of variance; BAL, bronchoalveolar lavage; DLCO, diffusing capacity of the lungs for carbon monoxide; GRADS, Genomic Research in Alpha-1 Antitrypsin Deficiency and Sarcoidosis Study; PD15, Pixel value (HU) at the 15th percentile of HU value histogram.

phenotypes (demographics, pulmonary function tests, chest CT findings and augmentation therapy effects). Genes expressed in over 5% of total BAL samples, and with coefficients of variation greater than 1 (n=10 718), were analysed in WGCNA.[19] The default WGCNA setting was applied for data cleaning, outlier detection, network construction and module detection. A Module was defined as a group of co-expressed genes across the samples.[20] Module eigengenes (first principle component of the gene expressions within the module) were taken as the representative of the module and were correlated with AATD health data. Table 2 shows the variables used in WGCNA. Gene module network functional annotation and gene set enrichment analysis were performed using GeneMANIA.[21] GeneMANIA searches large publicly available data sets for connectivity patterns within a module based on coexpression, protein–protein interaction, pathways and other connections that might suggest any functional relations. Gene Ontology pathway enrichment analysis was performed based on FDR-corrected hypergeometric tests. K-means clustering analysis was performed using genes from the chosen WGCNA gene module to create a heatmap and reveal visually distinct clusters. Additional details for our clustering analysis are provided in the online supplemental data.

NanoString validation

To validate the results from WGCNA analysis, we measured the gene expression of 14 genes in BAL by NanoString nCounter Gene Expression Assay, which is generally considered a more accurate technology, in particular for low-quality RNA samples.[22] Among the genes selected were 14 genes with the highest expression level and fold change from WGCNA clustering analysis (CCL5, IL32, LY9, IFITM1, CD3E, PDCD1, ZAP70, LCK, TGFBR3, FOXP3, IL12RB2, IL18RAP, PRF1 and GZMA) and genes related to genotype (EGR3) and therapy effect (CCDC40, MORN2 and SPA17) in BAL and PBMC samples. Analysis was performed on 77 available samples following manufacturer instructions. nSolver V.3.0 digital analyser software was used to analyse data (see online supplemental material).

RESULTS

Supervised analysis for genotypes and augmentation therapy

The subject demographics are provided in table 1. There were no significant differences between the three groups (PiZZ on therapy, PiZZ off therapy and PiMZ) in basic demographic characteristics other than age (table 1, also see table 2), but individuals not on augmentation therapy (group 1, PiZZ off) were younger, healthier and had better lung function than individuals on AAT augmentation therapy (group 2, PiZZ on). BAL cell counts were similar among three groups, although a trend for PiZZ on having more neutrophils was seen.

We examined the genotype effects in gene expression profiles in BAL and PBMC isolated from individuals with PiZZ off therapy and PiMZ (group 1 vs 3, table 1). Overall, we did not observe significant changes in gene expression profiles. A total of 113 genes in BAL and 181 in PBMC were differentially expressed between PiZZ off therapy and PiMZ (FDR <0.05, see online supplemental tables 2 and

Table 2 Clinical traits used in WGCNA

Genotype	PiMZ versus PiZZ off therapy	
Augmentation therapy	PiZZ on therapy versus PiZZ off therapy	
Baseline variable	Gender	0 female; 1 male
	Age	(Date enrolled – birthday)/365
Pulmonary function test	FVC	Prebronchodilator FVC
	FVC % PRED	FVC % predicted
	FEV_1	Postbronchodilator FEV_1
	FEV_1 % PRED	Postbronchodilator FEV_1 % predicted
	DLCO	Diffusing capacity of the lungs for carbon monoxide
	DLCO % PRED	Diffusing capacity of the lungs for carbon monoxide % predicted
CT variables	Emphysema presence	Fraction of lung voxels less than −950 HU. Dichotomised as 0 when FRAC950 ≤0.05 and 1 when FRAC950 >0.05.
	PD15	Pixel value (HU) at the 15th percentile of HU value histogram. Dichotomised based on the median value.
	Bronchiectasis	Visual scoring for presence as a categorical variable.
	Airway wall area	Mean airway wall area (mm^2) across all airways automatically detected. Dichotomised based on the median value.
	Airway internal perimeter	Mean airway lumen perimeter (mm) across all airways automatically detected as a continuous variable.
BAL cell differential	Alveolar macrophage %	
	BAL eosinophil %	
	BAL lymphocyte %	
	BAL neutrophil %.	

BAL, bronchoalveolar lavage; WGCNA, Weighted Gene Co-expression Network Analysis.

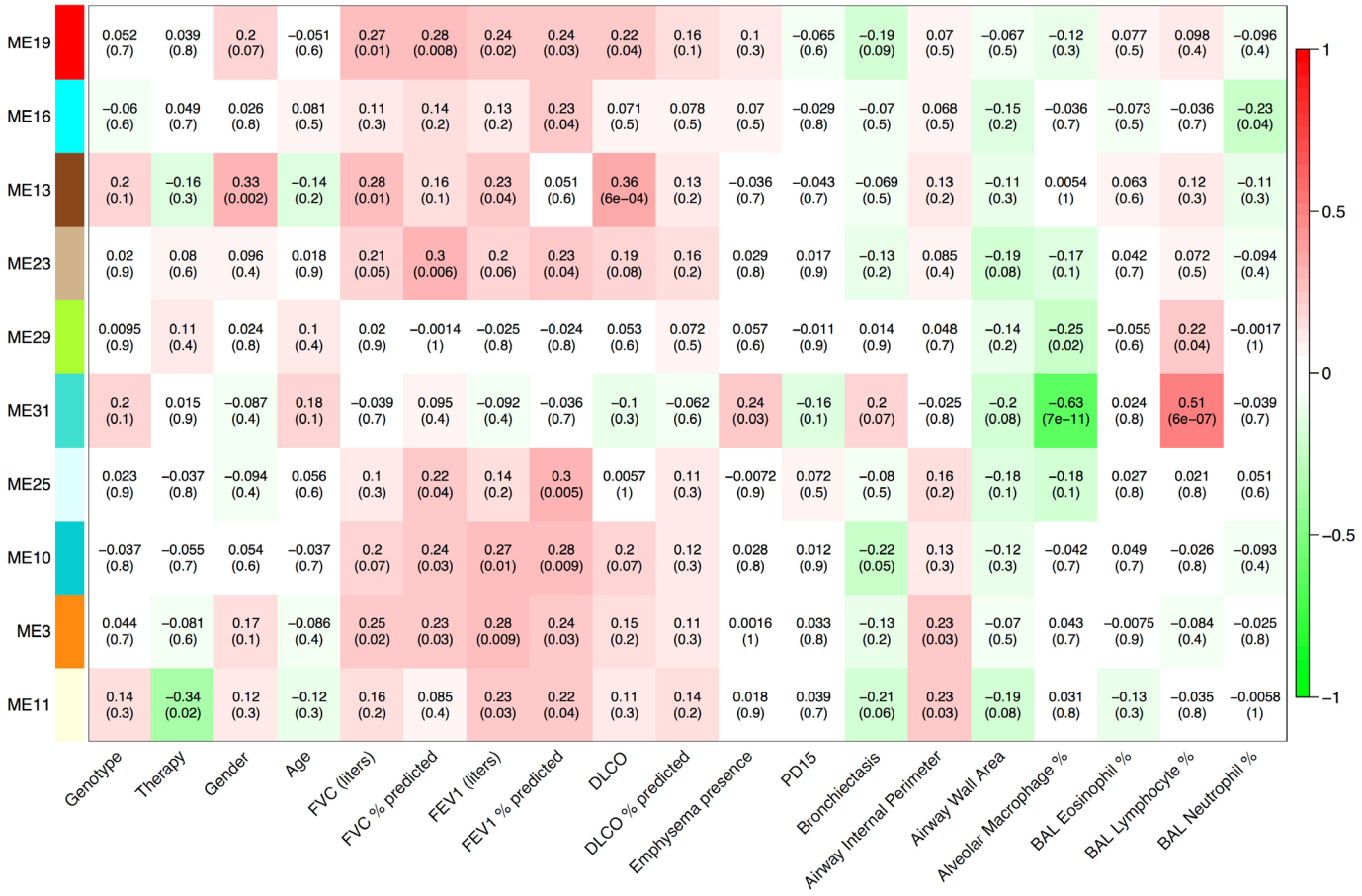

Figure 2 Module–trait relationship from WGCNA for 10 selected modules with the strongest correlations. The numbers in each cell represent the correlation coefficients and p values between each clinical trait and module eigengenes. The module–trait relationship for all 31 modules are presented in online supplemental figure 4). WGCNA, Weighted Gene Co-expression Network Analysis.

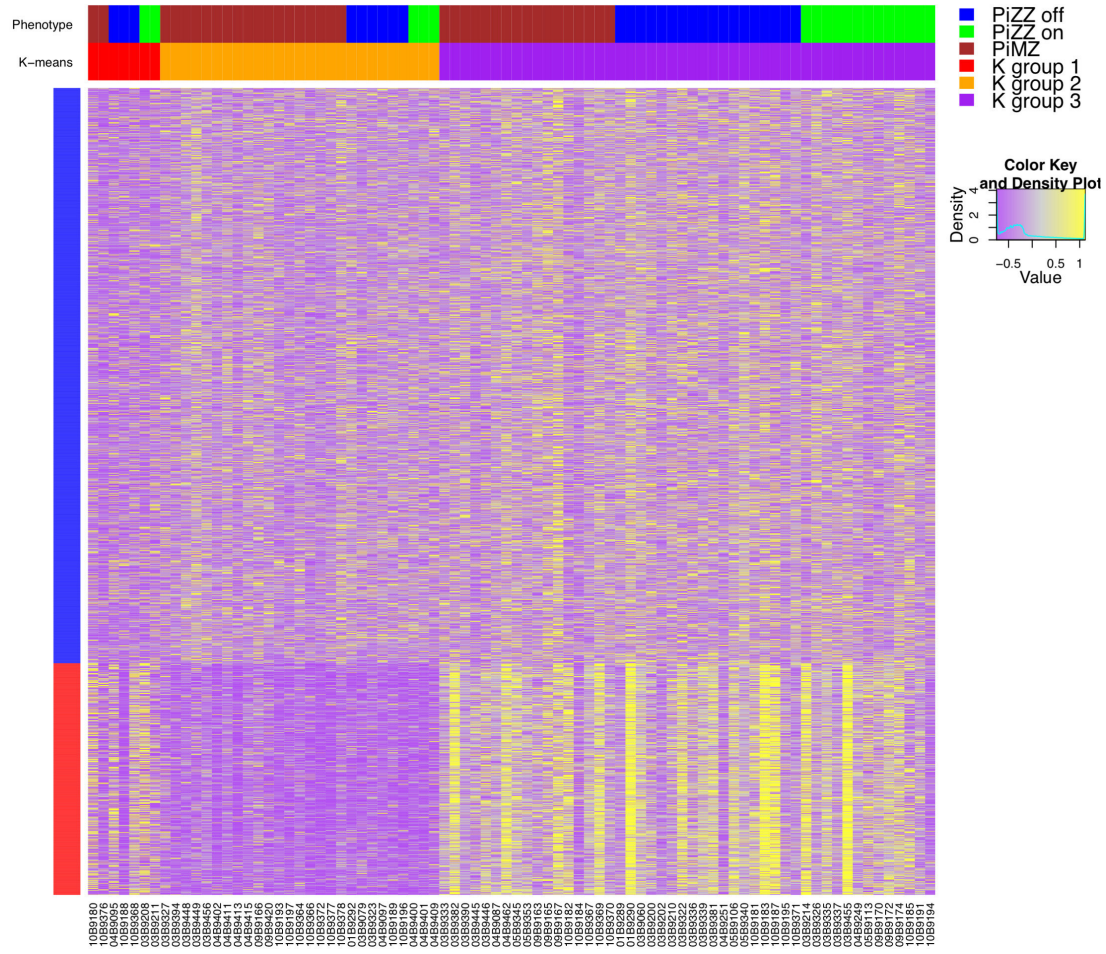

Figure 3 Heatmap for module 31 expression based on K-mean clustering of samples. The colour bar (K-means) indicates the three clusters (1, 2 and 3 from left to right). The colour bar (phenotype) indicates the three groups from the original design (PiZZ on therapy, PiZZ off therapy and PiMZ off therapy). The two subgroups of genes (red and blue bars from the left) are from hierarchical clustering, with the red group visually differentiating clusters 2 and 3.

3 and online supplemental figure 1). The 113 BAL genes were enriched for inflammatory, cellular chemotaxis and antiviral responses (online supplemental table 3). In addition, miR-5010–3 p, miR-6807–3 p and miR-6797–3 p were significantly downregulated in PiMZ group in our BAL data set, while their predicted target genes (RNF11, SUMO2, CYCS and MCMDC2) were significantly upregulated (online supplemental table 4). Downregulated miRs: -let-7b, -9, -30, -34, -3653, -4537, 5196 and 6516 were also identified in PBMC data set. While miR-9 expression is downregulated, its target gene BIK expression was shown upregulated in PiMZ (online supplemental table 5).

We also compared gene profiles of individuals with PiZZ not receiving augmentation therapy (group 1) with PiZZ receiving augmentation therapy (group 2, table 1) the majority of differentially expressed genes were low expressed genes (see online supplemental figure 1 and online supplemental tables 6 and 7). A total of 733 and 64 genes were found to be differentially expressed in BAL and PBMC data set, respectively. These genes were enriched for cilium morphogenesis, chemotaxis and inflammatory response (online supplemental table 8). Many of these genes were predicted to be target genes of following significantly differentially expressed miRs: miR-155-5 p, miR-27-3 p, miR-10b-5p, miR-5001-5 p, miR-1909-5 p, miR-3605-5 p (online supplemental table 9).

To investigate commonality between gene expression profiles in lung and blood within genotypes and therapy effect, we performed comparisons of all expressed genes in BAL and PBMC samples (online supplemental figure 1). While we observed high overall correlation in gene expression between BAL and PBMC (r=0.91, see online supplemental figure 2), the overlap of differentially expressed genes across the two tissues was minimal, with only five and six genes (FPKM >1) significantly differentially expressed in both BAL and PBMC for genotype effect and therapy effect, respectively (online supplemental figure 1 and online supplemental tables 10 and 11).

Weighted Gene Co-expression Network Analysis

Since we observed rather low effect of genotype and therapy on BAL and PBMC gene expression in clinically defined groups, we applied an unsupervised approach to analyse gene expression patterns from BAL, the more disease-relevant tissue compartment in the study of AATD lung diseases. We performed WGCNA analysis on 89 BAL samples to identify gene networks and modules associated with AATD genotypes and augmentation therapy samples. A total of 10 718 genes (CV >1%) were included in the WGCNA. This analysis aimed at identifying modules that are significantly correlated with the measured clinical traits for AATD individuals. Online supplemental figure 3

Table 3 Clinical phenotypes and module 31 sample clustering

		Cluster 1	Cluster 2	Cluster 3	P value* 2 versus 3
Prevalence, n		7	27	48	
Age, year, mean±SD		51.89±7.50	48.43±9.97	57.03±10.40	0.0073
Female sex, n (%)		5 (71)	16 (59)	32 (67)	0.7094
Ever smoker, n (%)		2 (29)	13 (48)	18 (38)	0.6160
Genotype	PiZZ off, n (%)	3 (60)	6 (25)	18 (51)	0.1331
	PiMZ, n (%)	2 (40)	18 (75)	17 (49)	
Therapy	PiZZ on, n (%)	2 (40)	3 (33)	13 (42)	0.7548
	PiZZ off, n (%)	3 (60)	6 (67)	18 (58)	
FVC (L), mean±SD		3.62±1.23	4.06±0.98	3.84±1.11	0.5079
FVC % predicted, mean±SD		89.71±17.49	95.15±13.29	96.55±16.33	0.9373
FEV_1 (L) mean±SD		2.37±1.10	3.21±0.89	2.65±0.90	0.0660
FEV_1 % predicted, mean±SD		71.86±28.70	91.30±16.16	85.51±21.32	0.5447
DLCO, mean±SD		19.60±4.23	27.06±7.41	23.18±8.28	0.0739
DLCO % predicted, mean±SD		74.71±11.57	87.81±17.41	83.28±19.33	0.5447
Emphysema presence, n (%)		4 (57)	2 (7)	22 (48)	0.0020
PD15, mean±SD		−939.00±24.39	−915.89±20.21	−932.11±19.69	0.0204
Bronchiectasis, n (%)		7 (100)	27 (100)	44 (96)	0.6160
Airway internal perimeter, mean±SD		1.07±0.20	1.16±0.36	1.14±0.26	0.6160
Airway wall area, mean±SD		41.40±1.27	41.99±3.99	40.35±3.58	0.1154
Alveolar macrophage %, mean±SD		90.64±5.10	95.92±2.34	85.72±9.29	8.71E-07
BAL eosinophil %, mean±SD		0.36±0.48	0.40±1.08	0.85±2.58	0.7094
BAL lymphocyte %, mean±SD		7.79±5.60	2.79±2.27	11.02±7.56	2.35E-06
BAL neutrophil %, mean±SD		1.21±0.99	0.79±0.64	1.81±2.55	0.2520

*P values are based on non-parametric Kruskal and Wilcoxon tests for numerical variables and χ^2 tests for binary variables. All p values are adjusted for FDR.
BAL, bronchoalveolar lavage; DLCO, diffusing capacity of the lungs for carbon monoxide.

shows the cluster dendrogram. Thirty-one modules were identified, of which 10 were significantly correlated with multiple clinical variables (figure 2 and online supplemental figure 4). Some of the strongest correlations were identified for the module ME 31 (2312 genes) that correlated with emphysema presence (dichotomised variable; emphysema present defined as greater than 5% of lung voxels less than a −950 HU threshold, r=0.24, p=0.03), bronchiectasis presence as measured by a visual scoring system, r=0.2, p=0.07), alveolar macrophage %, r=−0.6, p=1E-08) and alveolar lymphocyte % (r=0.57, p=6E-08).

Clustering analysis

To examine if the genes in gene module ME31 (2312 genes) could cluster AATD individuals into clinically meaning groups, we performed K-means clustering (figure 3) that distinguished three clusters of AATD individuals. Analysis of individuals' demographics, clinical and CT chest data (table 3) among the three clusters revealed a small group of seven individuals in cluster 1 with slightly increased emphysema. Cluster 2 had younger individuals (p=0.007) compared with cluster 3, as well as slightly higher FEV_1 and diffusing capacity of the lungs for carbon monoxi (DLCO). Cluster 3 had more subjects with a PD15 value above the median and emphysema presence than observed in cluster 2. Cluster 3 had higher BAL lymphocyte % than cluster 2 (11.0±7.6 vs 2.8±2.3) as well as lower macrophage % (85.7±9.3 vs 95.9±2.3), while neutrophil % was not significantly different. There was no significant difference in genotype, therapy, gender or smoking status between clusters 2 and 3 (table 3). Despite the strong associations between these clusters and non-transcriptomic variables, our attempt to cluster patients based on non-transcriptomic variables did not replicate these clusters (data not shown). These findings all together suggest the gene expression signature from module ME31 identified two well-separated groups of individuals in clusters 2 and 3 with distinct clinical emphysema characteristics that are not primarily driven by either AATD genotype or therapy.

Network analysis and functional enrichment analysis

As the WGCNA module ME 31 (2312 genes) showed significant correlation with key AATD clinical variables and identified two well-defined clusters of AATD individuals, we aimed to further investigate the biological function of these genes. We focused on a subset of 666 genes that were downregulated in cluster 2 and visually differentiated clusters 2 and 3 (marked in red in the lower half of figure 3, online supplemental tables 12 and 13). Figure 4 shows 135 genes in the module that belong to the multiple T cell and immune response enriched pathways (exp: PDCD1, CD3, LCK, ZAP70, CCL5, BTLA, GRAP2 and CD247). Functional enrichment analysis revealed that several immune system pathways were over-represented in this module, including T cell activation, regulation of immune response and antigen receptor-mediated and plasma membrane signalling pathways (see figure 4 and online supplemental table 14). Together these findings suggest an active immune T cell response related to presence of emphysema in AATD individuals.

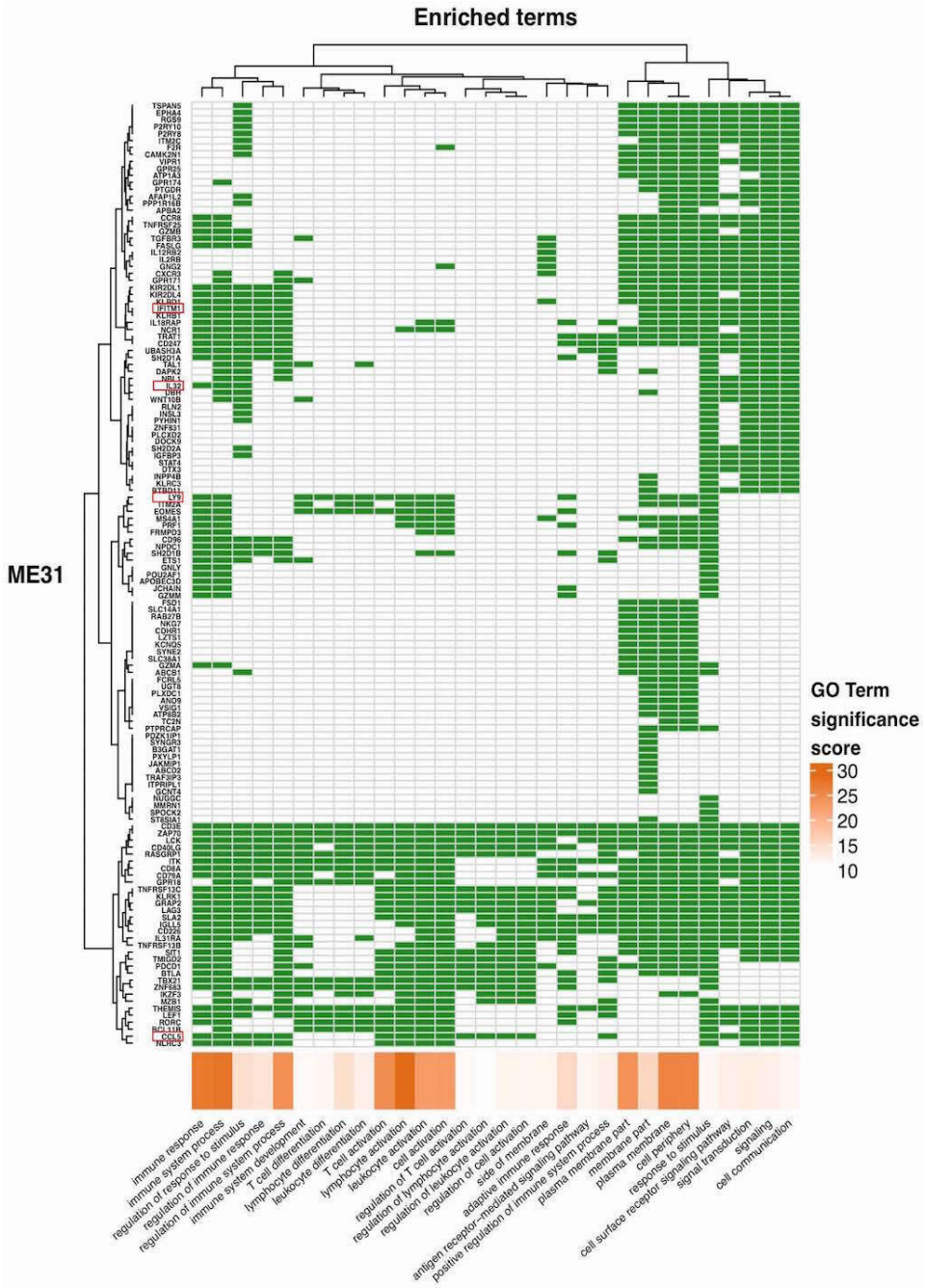

Figure 4 The gene network and functional enrichment analysis of the module 31. Heatmap for the most enriched pathways (FDR <0.05) and their corresponding 135 genes in module 31, and the GO Term significance score ($-\log_{10}$(FDR)) for each pathway. GO, Gene Ontology.

Differential gene expression for PBMC between newly identified AATD clusters

To better understand biological differences between the individuals in clusters 2 and 3, we performed differential gene expression analysis on PBMC expression profiles using *edgeR*. We found 125 differentially expressed genes between clusters 2 and 3 (see figure 5 and online supplemental table 15). These genes were enriched for plasma lipoproteins, lipid transport and inflammatory responses (online supplemental table 16). Most notably, some of these genes, including CCL18, FABP4, FN1 and miR-9, have been implicated in COPD and were indeed highest in cluster 3 characterised by more severe disease.

NanoString validation

Validation by NanoString confirmed that EGR3, a key negative regulator of T cell activation,[23] was upregulated in PiZZ versus PiMZ in both BAL and PBMC (figure 6), and CCDC40, MORN2 and SPA17 genes related to cilia dysfunction in lung disease[24] were upregulated in PiZZ on therapy in BAL (figure 6). In addition, validation of genes associated with emphysema (CCL5[25] and IL32[26]), IFN pathway (IFITM1)[27] and T cell activation and PD1- immune signalling (LY9,[28] CD3E, PDCD1, ZAP70, LCK, TGFBR3, FOXP3, IL12RB2, IL18RAP, PRF1 and GZMA)[29] revealed complete concordance with RNA-Seq data (figure 6).

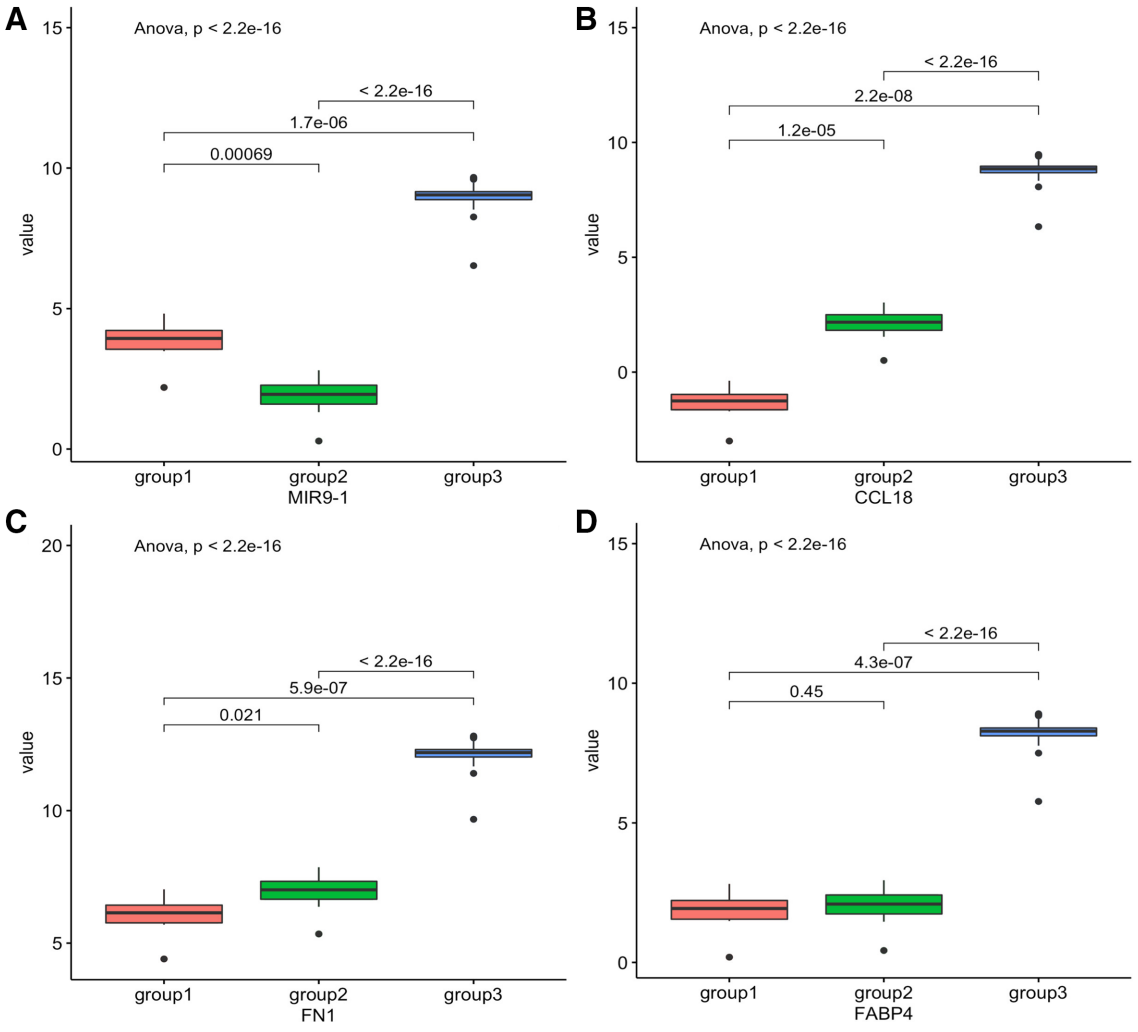

Figure 5 Box plots for selected differentially expressed genes in peripheral blood mononuclear cell samples across the clusters characterised by module ME31 (A) MIR9-1, (B) CCL18, (C) FN1 and (D) FABP4.

DISCUSSION

In this study, we applied supervised and unsupervised methods on gene expression profiling of BAL isolated from AATD individuals, and we identified genes associated with genotype and augmentation therapy as well as a gene module enriched for T cell pathways and immune response that correlated with severity of disease independent of genotype and therapy in AATD affected individuals.

Our most impressive finding was a previously unrecognised endotype of individuals with AATD that regardless of genotype or augmentation therapy had more severe respiratory disease and an altered pulmonary inflammatory and immune response driven by lymphocytic influx (cluster 3, table 3). Although this AATD cluster had individuals with increased alveolar lymphocyte %, the cluster was not significantly correlated with AATD therapy or changes in lungs such as: FEV_1 % predicted, DLCO, bronchiectasis or airway wall thickness. Instead, the chest CT analysis using PD15 and emphysema presence were the most informative[30–32] of disease severity.[33] We show that lymphocyte % was elevated in individuals with PD15 lower than the median ($p=0.05$) and in individuals with emphysema presence ($p=0.009$, data not shown) suggesting that increase in lymphocyte % is a biological signal of AATD disease severity.

A potential mechanistic clue of AATD lies in the genes that characterised this cluster. Among the most expressed and upregulated BAL genes from cluster 3 were genes implicated in immune responses via T cell activation and PD-1 signalling suggesting the presence of a PD1 immunosuppressive and proinflammatory endotype.[29] Recently, it has been suggested that alpha-1 antitrypsin protein (A1AT) has roles that extend beyond its antiproteolytic effects. For instance, it can regulate inflammatory milieu by inhibiting proliferation of T helper cells and by controlling antigen presentation.[34–36] While our study did not study T cell functions, the identification of an AATD individual cluster characterised by emphysema and T cells suggest the need for detailed immunophenotyping of AATD patients and exploration of specific therapies. This is also supported by our PBMC gene expression analysis. The PBMC of the individuals in cluster 3 exhibited distinct gene expression patterns with increased expression of genes such as CCL18, FABP4, FN1 and miR-9, which were previously associated with COPD. CCL18 was shown to be upregulated in COPD and predict risk for exacerbations.[37 38] FABP4 was shown increased in COPD and was negatively correlated with lung function.[39] FN1 was also show to be a gene correlated with progression of COPD.[40] Mir-9 was shown to be associated with the loss of muscle force in patients during an acute exacerbation of COPD.[41] Our unsupervised analysis may have revealed a subgroup of AATD individuals that cluster together based on gene expression and segregates a group of individuals with biological changes in lungs and lung

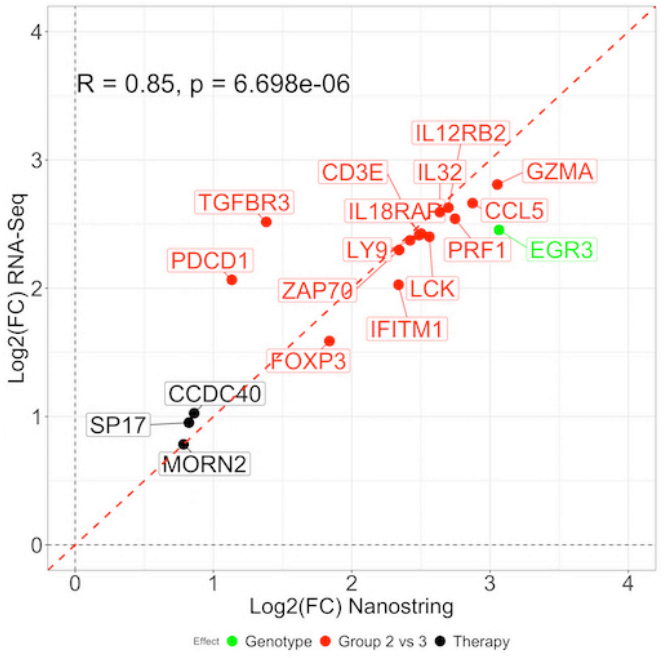

Figure 6 Validation of selected differentially expressed genes using NanoString nCounter. NanoString $\log_2$(FC) between cluster 2 and cluster 3 on x axis and RNA-seq $\log_2$(FC) between cluster 2 and cluster 3 on y axis. Gene names are labelled. FC, fold change.

function during development of emphysema that goes beyond clinical phenotyping described previously.[42] The challenge will be to develop and validate diagnostic parameters that characterise these individuals that could be used in the clinic. There also will need to be much work done to exclude environmental stimuli that correlate with these genomic signatures of AATD.

Our study has several limitations that should be considered when interpreting the results. The first is that it contains a relatively small cohort of individuals with AATD, with no independent replication. While this is true, our study in fact represents the first and largest study that describes the BAL and PBMC transcriptome in a carefully phenotyped cohort of AATD individuals. We believe that our findings will encourage others to follow-up on our results and potentially focus on the subgroup we identified to get detailed mechanistic understanding of the mechanisms regulating emphysema in A1AT. Another limitation is the lack of PiMM individuals in the cohort. While we did not find significant difference between gene expression profiles of PiMZ and PiZZ individuals, more difference might have been detected had PiMM individuals been included. Finally, the obvious limitation of bulk RNAseq of BAL cells and PBMC is that we do not necessarily know whether the changes we observed are derived from changes in cell content, transcriptional regulation or both. For example, it appears that the separation between subphenotypes clusters 2 and 3 is primarily driven by lymphocyte %. However, a comparison with lymphocyte marker genes in single cell RNAseq data from control BAL (data not shown) suggests that there are signals specific to the subphenotypes not explained by lymphocyte %. While gene expression values could have been normalised for cell proportions, doing so would have hidden potentially relevant signals. Therefore, we decided to consider the cell counts as clinical phenotypic attributes. The fact that we found very few differential expression genes for genotype and therapy effects suggests that the changes in gene expression here were not primary driven by differences in cell counts. As detailed immunophenotyping was beyond the scope of our study, we believe that we have shown convincingly that gene expression associated with T cell inflammation is common in patients with emphysema. We hope that this work will motivate other more detailed studies as well as the development of interventions that target the immune aberrations that we observed.

In conclusion, using unsupervised data analysis methods, we identified a subgroup of AATD individuals characterised by more severe disease, and increased T cell inflammation, that is independent of genotype or augmentation therapy. This finding may represent a novel endotype in AATD. Further studies that apply advanced immunophenotyping approaches, including longer follow-up, and focus on emphysema may help to validate this endotype and potentially identify specific interventions.

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Gene Co-expression Networks Reveal Novel Molecular Endotypes in Alpha-1 Antitrypsin Deficiency

Online Methods Supplement

RNA isolation and sequencing

Total RNA was extracted from PBMC and BAL samples using Qiazol following Qiagen's miRNeasy protocol (Qiagen 217004) and using QiaCube. RNA quantity and quality were assessed using NanoDrop (Thermo Scientific) and TapeStation 2200 (Agilent). cDNA libraries were made from 1ug of total RNA that had RNA Integrity Number (RIN^e) over 6.5 upon Poly-A selection using Dynabeads® mRNA DIRECT™ Micro Purification Kit (Ambion 61021) and fragmentation using the AB Library Builder™ System (Life Technologies 4463592) with the Ion Total RNA-Seq Kit for AB Library Builder™ System (Life Technologies 4482416). The cDNA was amplified and barcoded using the Ion Xpress™ RNA-Seq Barcode 1-16 Kit (Life Technologies 4475485). cDNA was loaded onto Ion PI™ Chip Kit v2 BC (Life Technologies 4484270) using the Ion Chef™ System (Life Technologies 4484177) with the Ion PI™ IC 200 Kit (Life Technologies 4488377). Sequencing was performed using Ion Proton™ System for Next-Generation Sequencing (Life Technologies 4476610) using the Ion PI™ IC 200 Kit (Life Technologies 4488377) to obtain RNA-Seq depth of ~ 30 million single-end reads/sample with average read length of 150bps. Reads were mapped to human genome (hg38) using a 2-stage mapping strategy (STAR+bowtie2)[1 2].

Data Normalization and Quality Control

We normalized RNA-seq data before analysis to account for the systematic variation natured in sequencing process, including between-sample differences such as library size or sequencing depth, within-sample gene-specific effects related to gene length and GC-content[3]. Although a number of normalization methods for RNA-seq data have been developed, there is no consensus on the appropriate normalization method and the impact of each methods on the downstream analysis[3]. In this study, we performed two normalization methods for the RNA-seq data: Trimmed Mean of M values (TMM) implemented in the *edgeR* Bioconductor package[4]; and Fragments Per Kilobase of transcript per Million mapped reads (FPKM).

After normalization, we used PCA plots on normalized samples to detect outliers and mislabeled samples (eg. PBMC samples labeled as BAL, or vice versa). A total of four samples (two pairs of matched PBMC and BAL samples) were removed for being outliers or mislabeled.

Differential Expression Analysis

We examined whether genotype and/or augmentation therapy would affect BAL and PBMC gene expression patterns[5]. For therapy effects, we compared PiZZ on vs PiZZ off using: *edgeR* on TMM normalization, *limma* method on FPKM normalization with or without regression for confounding factors (age, gender and disease severity (FEV1PRED) following with Wilcoxon rank-sum test to calculate FDR adjusted p value. Only *limma* method using regression upon adjusting for age,

gender and severity of disease revealed significantly differentially expressed genes (FDR<0.05). Therefore, we assume that that the therapy effect is of moderate significance.
For genotype effects, we compared group PIZZ off vs PIMZ using *edgeR* with TMM normalization and *limma* on FPKM normalization. There is no confounding between genotype and disease severity therefore we have not done any adjustment of analysis. Only *edgeR* with TMM normalization identified significantly differentially expressed genes (FDR< 0.05) following appropriate adjustment for multiple comparisons.

Weighted Gene Co-expression Network Analysis

We applied Weighted Gene Co-expression Network Analysis (WGCNA)[6] on BAL samples s to identify gene networks and modules associated with AATD and its specific characteristics (i.e. pulmonary function tests, augmentation therapy effect), potentially identifying underlying biological processes. All genes expressed in BAL (n=30,130 genes) were normalized by FPKM and input into weighted gene co-expression network analysis. To select the genes with the highest variations among samples, we considered a subset of 10,718 genes with coefficient of variation greater than 1 and to be expressed in at least 5% across all samples. Data cleaning was performed to identify and remove genes and samples with excessive numbers of missing sample or far away from other samples according to the default WGCNA pipeline. We used the automatic function for network construction and detection of modules. Modules (co-expression genes) are defined as groups of genes where we observe their transcription level fall and rise together across samples [7]. Module eigengenes were calculated (first principle component of the gene expressions within the module) as a representative of gene expression profiles in the module[7]. After detecting modules, we correlated these modules with AATD disease-related traits to determine the relationships between groups of genes and AATD disease characteristics (See Table 2).

Clustering Analysis

For selected modules of interest (ME19, ME16, ME13, ME23, ME29, ME31, ME25, ME10, ME3 and ME11, See Figure 2) that had several clinical and demographics variables correlated with gene expression in WGCNA we performed K means sample clustering to identify well separated groups of AATD patients. We selected k values based on visualization of heatmaps. We performed chi-square test, fisher exact test or one-way ANOVA for clinical traits between sample groups. Only module ME31 revealed k=3 that corresponded to 3 well separated clusters of patients (see Table 3).

Gene Validation using NanoString

nSolver 3.0 digital analyzer software was used to analyze data. Following housekeeping genes were used to normalize gene expression signal: DHX16, HPRT1, PGK1, POLR2A and TBP. Background correction of the signal was done by subtracting of NanoString negative and positive assay controls background subtraction and positive controls. Geometric mean of housekeeping

genes was used to compute for normalization factor. Differential gene expression analysis between groups of samples was performed as previously described.

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Figure Legends

Supplementary Figure 1: Venn Diagrams of Overlapping Differentially Expressed Genes between PBMC and BAL (Genotype and Therapy Effects)

Supplementary Figure 2: Comparison of gene expression patterns between BAL (x-axis) and PBMC (y-axis)

Supplementary Figure 3: Cluster dendrogram from WGCNA.

Supplementary Figure 4: Module-trait relationship from WGCNA for all 31 modules. The numbers in each cell represent the correlation coefficients and p-values between each clinical trait and module eigengenes.

Supplementary Table 1: List of 113 differentially expressed genes in BAL for genotype effects test by edgeR

	PiMZ.off.avg	PiMZ.off.sd	PiMZ.off.cv	PiZZ.off.avg	PiZZ.off.sd	PiZZ.off.cv	FC	logFC	logCPM	PValue	FDR
SCN10A	204.656917	405.053239	1.97918177	12.8455855	8.21292296	0.63935762	15.9320816	-3.9938629	2.52872095	2.72E-15	4.47E-11
TNFSF15	14.280638	8.83072711	0.61837063	175.512884	818.091292	4.66114666	12.2902691	3.6194446	1.93675841	1.40E-13	1.15E-09
CXCL8	360.27726	337.236652	0.93604757	5772.75738	29095.2728	5.04009971	16.0230967	4.00208109	6.97304097	5.74E-13	3.14E-09
PI3	6.79003427	9.32915881	1.37394871	156.883446	709.977612	4.52551006	23.1049564	4.53013046	1.69934714	8.02E-11	3.29E-07
G0S2	49.0383721	38.8420672	0.79207497	431.3571	1917.99491	4.44642016	8.79631771	3.13689971	3.30035043	1.37E-10	4.49E-07
PROK2	14.6129297	21.0056991	1.4374735	128.92163	599.877258	4.65303811	8.82243555	3.14117699	1.50119945	1.82E-10	4.52E-07
RNU5A-1	0.4865785	1.2706269	2.61135028	38.5653337	182.423624	4.73024882	79.2581957	6.30848822	-0.1345192	1.93E-10	4.52E-07
ADGRG3	26.8559981	19.9454638	0.74268191	158.245876	614.410895	3.88263449	5.89238483	2.55885166	1.92568167	2.55E-10	5.23E-07
EGR3	32.46861	18.7852373	0.57856611	177.972335	746.461659	4.1942567	5.48136602	2.45453547	2.11841186	1.59E-09	2.90E-06
AKAP12	476.864626	851.910472	1.78648284	105.792169	119.568023	1.1302162	4.50756073	-2.1723469	3.89467862	2.04E-08	3.35E-05
RNU2-1	31.6308104	29.0069623	0.91704771	191.957658	698.553346	3.63910122	6.06869236	2.60138569	2.26661204	2.61E-08	3.90E-05
CCL3L1	182.355215	103.573995	0.56797934	606.36064	1635.30121	2.69691187	3.32516205	1.73342465	4.08164548	4.26E-08	5.83E-05
BMPER	15.4383387	11.2800735	0.73065332	43.923662	44.3075955	1.00874093	2.84510288	1.50848082	0.4553928	9.52E-08	0.00011326
CCL3L3	35.9266346	35.9968669	1.00195488	165.678609	487.897202	2.94484125	4.61158165	2.20526164	2.0843916	1.00E-07	0.00011326
RNU2-2P	11.4803745	33.793025	2.94354728	119.963279	432.224025	3.60296941	10.4494221	3.38535125	1.51294102	1.03E-07	0.00011326
CCL4L2	413.771517	214.177387	0.51762236	1146.38513	2953.18742	2.57608665	2.77057525	1.47018555	5.07226675	3.95E-07	0.00040571
CXCR1	32.9497939	32.7889841	0.99511955	119.362223	400.417459	3.35464143	3.62254841	1.85700497	1.66102733	4.41E-07	0.00042611
CCL3	132.723945	85.0951424	0.64114386	424.250605	1132.18221	2.66866374	3.19648881	1.67648804	3.58511618	4.74E-07	0.00043248
CYP4F3	5.66813932	7.2544191	1.279859	25.357979	109.191479	4.30600086	4.47377483	2.16149265	-0.6468801	5.90E-07	0.00050961
CCL4L1	413.725533	212.067184	0.5125794	1117.20395	2875.65121	2.57397157	2.70035051	1.43314668	5.04461587	6.69E-07	0.00054906
NRXN2	61.6009587	34.4068294	0.55854373	136.659225	116.209936	0.85036291	2.21845938	1.14955814	2.14491938	8.20E-07	0.00064108
RNF126P1	46.3688961	20.8209853	0.44902913	84.4891886	49.3101529	0.58362678	1.82210912	0.86560936	1.56798664	1.03E-06	0.00076931
SLAMF7	300.161073	292.245045	0.9736274	716.010463	1208.77655	1.68821074	2.38542078	1.25424378	4.40506845	1.10E-06	0.00078269
ADORA2A	52.8535186	121.262171	2.2943065	112.474491	301.010649	2.67625704	2.12804169	1.08952642	1.65005028	1.21E-06	0.00082512
CHST15	88.5986393	277.927553	3.13692801	127.883744	300.91094	2.35300384	1.44340528	0.52947644	1.89169149	1.55E-06	0.00100707
IRAK2	118.78061	39.1240178	0.32938051	295.862591	851.775333	2.87895584	2.49083239	1.31662795	3.15588097	1.59E-06	0.00100707
CXCL1	32.3555189	33.1030971	1.02310512	130.131158	512.679146	3.93971094	4.02191534	2.00788271	1.79099213	2.07E-06	0.00125897
MIR6807	15.3749681	11.4366335	0.74384763	29.0571469	17.949735	0.61773908	1.88989966	0.91830964	0.05692405	2.76E-06	0.00161885
KCNJ15	39.6463612	31.4073402	0.79218721	127.109416	407.488788	3.20581118	3.20608027	1.68081055	1.82381255	3.76E-06	0.00212897
RNF11	1535.9032	356.715081	0.23225102	1214.13456	201.847847	0.16624833	1.26501893	-0.339159	6.00155091	4.01E-06	0.00219646
KCNH6	11.9137544	6.06078067	0.5087213	33.817952	100.94844	2.98505479	2.83856381	1.50516117	0.14030713	5.34E-06	0.00269665
FFAR2	139.342054	78.4381693	0.56291814	305.980672	486.920209	1.59134303	2.1958961	1.13480979	3.28838748	5.36E-06	0.00269665
CCL4	268.719071	137.285125	0.51088717	651.857901	1618.05656	2.48222283	2.42579694	1.27845879	4.31695777	5.42E-06	0.00269665
ZNF691	288.490866	72.7647064	0.25222534	414.696572	198.219094	0.47798585	1.43746864	0.52353048	3.98716009	7.60E-06	0.00367134
EXD2	1008.82322	196.909372	0.19518719	848.315355	138.237205	0.16295497	1.18920778	-0.2500008	5.44535682	9.42E-06	0.0044221
NKG7	302.466054	1371.6911	4.53502496	221.9731	388.543075	1.75040613	1.36262481	-0.4463884	2.7158737	9.98E-06	0.0045536
ALPL	27.2557969	31.2105911	1.1450992	101.311692	380.211671	3.75289037	3.71706951	1.89416567	1.43966698	1.34E-05	0.00595064
TNFRSF8	16.0579501	48.7887293	3.03829125	19.6569282	27.4560918	1.39676411	1.22412438	0.29175015	-0.5681207	1.43E-05	0.00616386
MMP25	47.0499826	64.1899473	1.36429269	86.5090302	201.162771	2.32533842	1.83866232	0.87865655	1.44296296	1.91E-05	0.00806084
IFITM2	543.539122	661.947925	1.2178478	792.79926	1009.86607	1.27379794	1.4585873	0.54457174	4.76841906	2.28E-05	0.00936706
CD8B	93.8812369	313.945808	3.34407405	113.089351	195.297058	1.72692703	1.20460014	0.26855433	1.79047157	2.63E-05	0.01052116
NFKB2	493.384075	466.233695	0.94497111	685.905394	596.678097	0.86991311	1.39020578	0.47529845	4.62583062	3.13E-05	0.01223621
TNIP1	1350.77031	739.595707	0.54753625	1755.88389	989.228932	0.56337947	1.299913	0.37841507	6.06881794	3.42E-05	0.01307434
SPHK1	31.435843	35.8941893	1.14182366	53.9567798	50.9772937	0.94478014	1.71640951	0.7793938	0.86425282	3.56E-05	0.01327324
HMOX1	3830.05356	1152.87665	0.30100797	5525.95229	3513.17229	0.63575871	1.44278721	0.52885854	7.71608393	3.74E-05	0.01361529
GAMT	12.823383	41.2015269	3.2129998	14.9258358	13.3926976	0.89728293	1.16395461	0.2190348	-0.8658555	3.81E-05	0.01361529
CCDC73	393.425625	89.1934408	0.22670979	302.916959	87.6262577	0.28927485	1.29879036	-0.3771686	4.0356634	4.00E-05	0.01398247
C5orf45	233.837833	77.8668904	0.33299526	340.650618	197.461823	0.57966084	1.45678146	0.54278446	3.6796416	4.82E-05	0.01649077
ISG20	228.819061	615.141741	2.6883326	273.156069	303.745722	1.11198599	1.19376449	0.25551824	3.15122109	5.15E-05	0.01724758
APOBEC3A	96.5114759	227.707894	2.35938671	137.554809	232.998966	1.69386274	1.42526894	0.51123418	2.12135158	5.60E-05	0.01839441
CXCR4	945.693147	638.503883	0.67517026	1597.09528	2792.72485	1.74862757	1.6888092	0.75600634	5.76480135	5.74E-05	0.01847039
CYCS	1945.41891	517.914039	0.26622237	1587.4053	322.026739	0.20286359	1.22553384	-0.2934103	6.37495051	6.98E-05	0.02202776
TNFRSF10C	123.92044	55.9473722	0.45147816	219.588533	381.137033	1.73568732	1.77201221	0.82538854	2.9041889	7.69E-05	0.02381902
BPNT1	795.71052	187.669595	0.2358516	647.506865	135.456655	0.20919725	1.22888353	-0.2973482	5.08238397	8.43E-05	0.02529457
HLA-E	39667.6722	14375.261	0.36239235	49194.3706	12984.1623	0.26393594	1.24016278	0.3105295	10.9419855	8.49E-05	0.02529457
UBALD2	856.356568	493.398447	0.57616006	1105.32124	552.576582	0.49992397	1.29072547	0.36818218	5.40779874	8.74E-05	0.02529457
BAG4	828.787277	203.349435	0.24535782	684.948499	119.013722	0.17375572	1.20999941	-0.2750063	5.15184358	8.81E-05	0.02529457
SDS	66.6005813	76.4063372	1.14723229	174.085639	308.521278	1.77223854	2.61387566	1.38619052	2.40080604	9.04E-05	0.02529457
ADORA2A-AS	18.3042393	37.9202615	2.07166553	34.3292828	92.1661815	2.68476863	1.87548263	0.9072619	0.05807168	9.09E-05	0.02529457
MCMDC2	139.388888	34.1087423	0.24470202	102.598093	30.4801939	0.29708344	1.35859141	-0.4421116	2.51815986	9.26E-05	0.02535284
DECR1	2317.44487	632.308701	0.27284736	1898.91505	362.20907	0.19074527	1.22040471	-0.2873597	6.62874802	0.00010122	0.02695905
TSPAN7	89.1044082	62.9412218	0.70637607	44.4670862	28.1502533	0.6330582	2.00382836	-1.0027589	1.71297436	0.00010178	0.02695905
FCF1	779.186011	183.815921	0.23590763	621.921966	137.972111	0.22184795	1.25286781	-0.3252342	5.03667117	0.00010475	0.02730527
FAM212A	32.5023539	28.3390687	0.87190819	15.1577484	10.3265177	0.6812699	2.14427322	-1.1004887	0.27729827	0.00010762	0.0274892
TNFRSF1B	2139.23291	2811.97988	1.31448047	2399.18848	1611.52918	0.67169761	1.12151812	0.16545293	6.51819115	0.00010928	0.0274892
NTNG2	23.2938303	45.5832139	1.95687928	29.4961935	20.8475113	0.7067865	1.26626635	0.3405809	0.1158186	0.00011048	0.0274892
SPA17	123.931599	53.6000592	0.43249712	83.8395707	35.6321428	0.42500388	1.47819935	-0.5638408	2.33624758	0.00011969	0.02933685
MOB3B	3793.16616	1123.50503	0.29619189	3114.45916	681.310282	0.21875717	1.21792131	-0.2844209	7.34372297	0.0001244	0.03004239

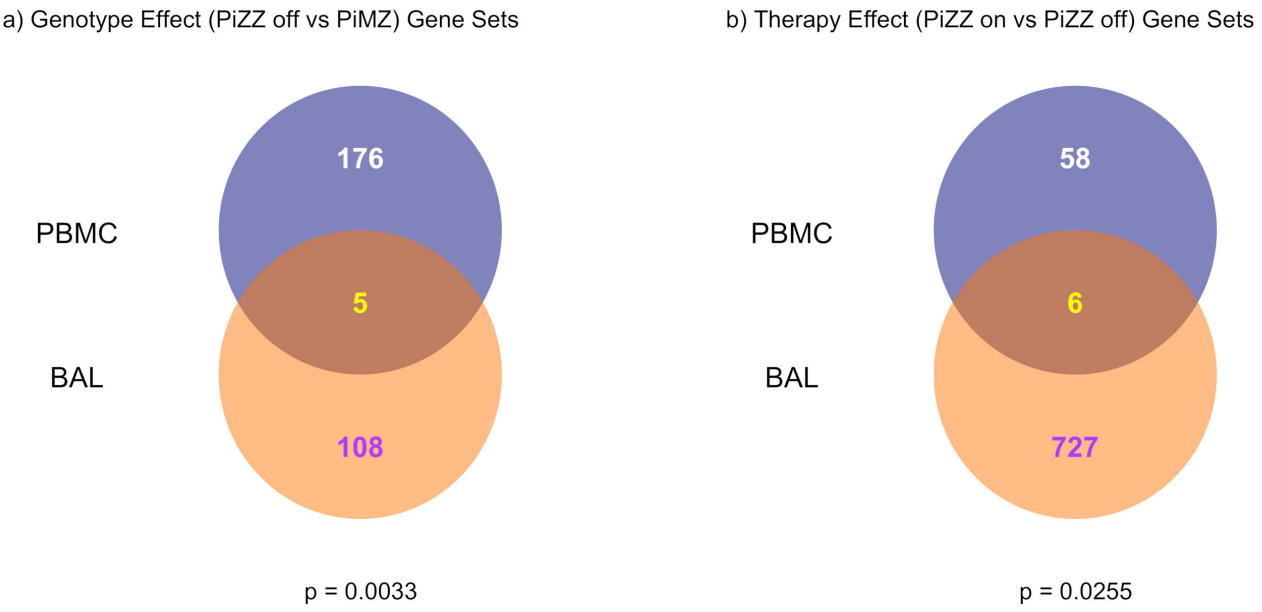
C20orf202	87.9651047	61.4753315	0.69886044	49.4391187	29.5275939	0.59725162	1.77926118	-0.8312783	1.7614212	0.00012994	0.03054596
SUMO2	2902.03721	608.841171	0.20979785	2417.75706	472.287934	0.19534135	1.20030141	-0.2633967	6.95465889	0.0001302	0.03054596
PRSS36	226.193493	84.9510242	0.37556794	340.268602	155.270406	0.45631717	1.50432534	0.58911661	3.68108458	0.00013394	0.03058739
ADAM8	334.128124	870.697108	2.60587794	351.053159	356.714714	1.01612734	1.05065433	0.07128809	3.59774151	0.00013411	0.03058739
TLR9	25.5535521	27.5000601	1.07617368	37.1166574	22.7610222	0.61322931	1.45250481	0.53854295	0.47007775	0.00014659	0.03245545
FAM107B	3432.39458	871.287274	0.2538424	2693.21938	667.821793	0.24796413	1.27445785	-0.3498837	7.15150046	0.00014736	0.03245545
AQP12B	6.52904232	5.42376072	0.83071306	14.7602513	14.3682789	0.97344405	2.26070695	1.17677399	-0.8376206	0.00014967	0.03245545
APOBEC3B-A	41.1069409	85.3728012	2.07684638	60.4655	95.359742	1.57709342	1.47093164	0.5567302	0.97806623	0.00015132	0.03245545
FOXL1	11.1461145	8.08487306	0.72535349	21.6248361	17.8777009	0.82672076	1.94012327	0.95614832	-0.2714364	0.00015218	0.03245545
TNFAIP6	94.0291468	71.1272434	0.75643825	219.587428	557.56583	2.53915188	2.33531235	1.22361552	2.7900676	0.00015521	0.032678
DYSF	273.657592	424.276163	1.55039062	450.075164	600.590578	1.33442284	1.64466537	0.71779408	3.86025779	0.00017271	0.03590096
AMDHD2	507.064658	132.335509	0.2609835	681.458354	268.941335	0.39465557	1.34392792	0.42645577	4.73768082	0.00018832	0.03811233
GRIP2	287.962504	153.107124	0.53169118	177.343398	96.282127	0.54291351	1.62375655	-0.6993353	3.4951768	0.00018928	0.03811233
ADAMDEC1	18.6852431	26.3611165	1.41079869	60.9467318	167.069495	2.74123796	3.2617575	1.70564953	0.81367588	0.00019138	0.03811233
CNIH1	1051.77219	288.469128	0.27426959	829.922981	210.40198	0.25351989	1.26731301	-0.3417729	5.46538944	0.00019281	0.03811233
LAMB3	39.7948713	34.2702752	0.86117316	90.2374439	205.176565	2.27374088	2.26756466	1.18114369	1.52196594	0.00019495	0.03811233
MIR6797	136.213674	147.39558	1.08209092	258.6882	257.668992	0.99606009	1.89913532	0.92534271	3.06459992	0.00019941	0.03843322
FOLR3	1655.09042	3186.73208	1.92541268	4820.47904	7541.21139	1.5644112	2.91251703	1.54226649	7.13852024	0.00020127	0.03843322
TREML4	7.92390702	10.6945894	1.34966114	17.7163029	23.4762922	1.32512367	2.23580398	1.16079371	-0.7014185	0.00020783	0.0391851
LAG3	61.1561562	69.3391168	1.13380436	116.239035	173.830923	1.49546083	1.9006923	0.92652499	1.91689001	0.00020998	0.0391851
TAP1	2936.8782	1034.84379	0.35236183	3813.73706	1562.43527	0.40968615	1.29856834	0.37692194	7.22393888	0.0002143	0.03927634
PFKFB3	907.057761	225.069739	0.24813165	1212.13014	599.575728	0.49464633	1.33633181	0.41827827	5.57365172	0.00021525	0.03927634
RGL1	108.293	53.060028	0.48996729	179.076576	181.383335	1.01288141	1.65363021	0.72563665	2.68378485	0.00022346	0.03995248
FEZ2	1424.84252	343.066142	0.24077478	1193.05437	253.155429	0.21219102	1.19428129	-0.2561427	5.94071013	0.00022382	0.03995248
MMP23A	20.0643067	56.5976838	2.82081433	22.1125728	22.5179774	1.01833367	1.10208507	0.14023559	-0.2771502	0.00023057	0.0407149
SH3D21	55.753962	30.2115837	0.54187331	106.035703	163.141177	1.53854949	1.90185054	0.92740388	1.84729028	0.00023493	0.04097865
VAPA	3711.84502	921.87269	0.24835969	3036.14605	724.368923	0.23858171	1.22255154	-0.2898953	7.30346705	0.00023706	0.04097865
PTGS2	129.265595	65.0723223	0.50340017	289.337308	1028.538	3.55480602	2.23831645	1.16241402	3.18517398	0.00024193	0.04138521
DBN1	30.4004831	58.665515	1.92975601	39.3582334	29.5412104	0.75057257	1.29465816	0.37257122	0.48301954	0.00025078	0.04221217
SLAIN2	1661.46346	344.61239	0.20741497	1405.75503	249.785776	0.17768798	1.18190113	-0.2411094	6.16104831	0.00025409	0.04221217
KRT13	17.5099741	57.3628503	3.27601	4.24421051	4.08931786	0.96350496	4.12561396	-2.0446088	-0.7069425	0.00025564	0.04221217
PSMB9	1421.32287	574.52216	0.4042165	2019.18173	1363.50076	0.67527392	1.4206355	0.50653645	6.2533148	0.00025705	0.04221217
HIST1H2BC	22.3158129	16.5846083	0.74317742	39.281733	29.5760053	0.75292007	1.76026449	0.81579222	0.48160309	0.00027218	0.04425475
LAD1	21.5803238	13.6079429	0.63057177	40.6921989	29.5671367	0.72660455	1.88561577	0.91503573	0.54111249	0.00027693	0.04441484
MPP2	9.56203699	7.38897586	0.77274077	15.3926573	11.0561538	0.71827454	1.6097676	0.68685242	-0.7268561	0.00027857	0.04441484
IFITM1	607.073215	1682.16879	2.77094878	607.218244	578.905807	0.95337354	1.0002389	0.00034462	4.3872623	0.00028259	0.04462213
HBZ	21.0090788	93.296755	4.44078277	23.0909608	63.5542228	2.75234206	1.0990944	0.1363153	-0.5087941	0.00028683	0.0447022
HDGFL1	29.755752	19.4035278	0.65209335	16.0681881	9.61110453	0.59814489	1.8518424	-0.8889613	0.24384006	0.00028854	0.0447022
CD8A	337.175134	797.78308	2.36607923	464.203607	752.824706	1.6217554	1.3767433	0.46125959	3.88926119	0.00029724	0.0456063
HOOK3	1684.44893	472.017672	0.28022083	1358.53199	298.688073	0.21986091	1.23990377	-0.3102282	6.15327777	0.00029993	0.0456063
MIR5010	76.4784163	35.1510775	0.45962089	121.276555	60.9068238	0.50221433	1.58576185	0.66517612	2.17497406	0.00030283	0.0456239
GPX3	1871.81886	1242.0252	0.66353921	3036.17097	2145.57671	0.7066719	1.62204316	0.69781221	6.78635412	0.00032185	0.04804919
RPF1	988.206488	218.960962	0.2215741	804.192266	195.153444	0.24267013	1.22881869	-0.2972721	5.38922294	0.00032478	0.04805061
BRE-AS1	33.7316602	15.5340786	0.46051924	52.918232	48.6552936	0.91944292	1.5688001	0.64966154	0.97000764	0.00033737	0.04946666
TRIQK	1488.57272	508.691856	0.34173128	1158.12984	325.777665	0.28129632	1.28532456	-0.3621327	5.96327465	0.00034383	0.04996725

Supplementary Table 2: List of 181 differentially expressed genes in PBMC for genotype effects test by edgeR

	PiMZ.off.avg	PiMZ.off.sd	PiMZ.off.cv	PiZZ.off.avg	PiZZ.off.sd	PiZZ.off.cv	FC	logFC	logCPM	PValue	FDR
RNY1	22.5903013	22.1546907	0.98071692	1761.40216	7880.97083	4.47425978	77.9716097	6.28487701	5.29595351	3.78E-18	3.27E-14
LINC00461	6.95971281	9.65865444	1.38779497	663.615974	3468.31524	5.22638903	95.3510572	6.57517703	3.88269199	4.02E-18	3.27E-14
SNORD99	23.5621042	14.6171549	0.62036713	695.341826	3370.64772	4.84746867	29.5110241	4.88318208	3.99616808	1.22E-17	5.39E-14
SNORD95	18.9485336	17.5693089	0.92721206	835.203297	4087.81288	4.89439265	44.0774635	5.4619693	4.23767183	1.32E-17	5.39E-14
SNORD42A	6.50365262	10.6899189	1.64367926	313.107819	1584.76992	5.06141918	48.14338	5.58926553	2.82060832	2.28E-17	7.41E-14
SNORD33	13.7859092	12.1149536	0.8787925	537.275452	2036.10322	3.78968221	38.9727979	5.2843956	3.61359344	2.14E-15	5.80E-12
SNORD83B	18.1168234	17.0787372	0.94270043	368.150996	1357.06736	3.68617054	20.3209464	4.34489569	3.11847202	6.56E-13	1.52E-09
RNY3	63.6881907	88.9211613	1.39619544	1543.65547	6042.33412	3.91430227	24.2377034	4.5991811	5.15887659	1.38E-12	2.80E-09
SNORD71	6.22022694	7.19054472	1.15599395	229.424812	1115.36901	4.86158842	36.8836723	5.2049104	2.39860834	3.03E-11	5.24E-08
SNORD57	9.22482283	7.79439332	0.84493691	187.091552	935.070895	4.9979322	20.2813166	4.34207941	2.14946301	3.22E-11	5.24E-08
SNORD94	13.3581336	11.5355865	0.86356275	160.464012	620.119654	3.86454037	12.0124575	3.58645943	1.99253522	5.52E-11	8.16E-08
SNORD79	25.5808044	18.8219498	0.73578412	244.151021	1113.76491	4.56178683	9.54430582	3.25464027	2.61233445	1.47E-10	2.00E-07
MIR30B	2.79933455	3.18752514	1.13867245	64.8576646	328.04639	5.05794329	23.168958	4.53412125	0.6579958	1.91E-10	2.38E-07
SNORD46	11.0685145	13.529852	1.22237288	218.770259	888.93924	4.06334593	19.7650966	4.3048831	2.37619245	2.39E-10	2.77E-07
MIR34A	2.20655932	2.72517743	1.23503475	106.806372	547.560163	5.12666194	48.404034	5.59705538	1.30882935	4.44E-10	4.81E-07
SNORD104	12.3351172	19.1792203	1.55484703	160.95869	564.487059	3.50703066	13.0488173	3.70584714	1.98297556	9.21E-10	9.37E-07
SNORD26	22.2642935	17.7229878	0.7960274	160.111687	696.490909	4.35003166	7.19141109	2.84627488	2.0832489	1.16E-09	1.11E-06
SNORD32A	47.3317785	41.2315694	0.87111811	321.366868	1250.08311	3.88989419	6.78966391	2.76334016	3.08854997	1.24E-09	1.12E-06
RNU2-2P	55.6603932	105.065668	1.88761994	858.208746	2995.70729	3.49065109	15.4186612	3.9466056	4.36176893	1.83E-09	1.57E-06
CGNL1	10.8223054	9.37590747	0.86635029	73.5541346	326.495503	4.43884636	6.79653104	2.76479858	1.00028967	2.17E-09	1.72E-06
MIR9-2	3.97537871	9.51700957	2.39398816	660.15192	3467.78288	5.25300734	166.060134	7.37556196	3.86659497	2.22E-09	1.72E-06
SNORA45B	9.69105828	7.18834337	0.74175009	103.373416	424.084337	4.10245065	10.6668862	3.41506719	1.38941786	2.55E-09	1.89E-06
MIR9-3	3.96542787	9.56877845	2.41305069	659.971971	3467.3368	5.25376373	166.431465	7.3787844	3.8661824	4.87E-09	3.44E-06
MIR9-1	4.03445684	9.52403098	2.36067242	660.109482	3467.79023	5.25335619	163.617931	7.35418706	3.86668454	5.54E-09	3.76E-06
RN7SL2	41433.1874	87967.6548	2.12312063	9072.66674	5492.21186	0.60535805	4.56681466	-2.1911882	10.4528172	5.78E-09	3.76E-06
GLT8D2	5.16367628	5.22387869	1.01165883	46.8547951	216.363368	4.61774227	9.07392187	3.18172624	0.34505355	8.33E-09	5.21E-06
SNORA7B	12.7295968	9.15735911	0.71937543	87.0314386	289.734122	3.32907426	6.83693599	2.77334992	1.23121454	9.19E-09	5.53E-06
SNORD41	1.63187263	2.528037	1.54916318	60.5802048	314.21153	5.186703	37.1231208	5.21424609	0.54277839	1.12E-08	6.49E-06
SNORD69	5.38448867	5.21860766	0.9691928	42.9248925	124.470943	2.89973802	7.97195335	2.99493327	0.22435964	1.16E-08	6.50E-06
ARHGAP20	7.24419359	5.69654069	0.78635953	37.7853095	136.624659	3.61581421	5.21594419	2.38292843	0.15687055	1.53E-08	8.30E-06
MIR30C1	98.1491817	206.485533	2.10379271	9943.37696	52417.012	5.27155032	101.308812	6.66261585	7.77754532	1.90E-08	9.78E-06
SNORD50B	10.4676886	7.50823565	0.71727732	69.8474944	311.536303	4.46023591	6.67267597	2.73826545	0.92995944	1.92E-08	9.78E-06
SNORD48	5.45243409	5.19733317	0.95321339	54.0507223	233.211198	4.31467311	9.9131363	3.30934157	0.51535065	2.21E-08	1.09E-05
IFITM5	3.18586658	3.65782304	1.14814069	43.4782329	222.858376	5.12574593	13.6472234	3.77053555	0.1424639	2.31E-08	1.11E-05
RN7SL1	35625.0267	71412.1169	2.00454915	8646.49266	5870.95152	0.67899803	4.12017082	-2.0427042	10.2566182	2.55E-08	1.19E-05
LOC1002878	3.32976517	5.784322	1.73715614	25.8457056	111.681078	4.32106901	7.76202054	2.95643225	-0.4606189	3.61E-08	1.63E-05
SNORD83A	9.04299176	8.23488028	0.91063671	95.7966088	321.068735	3.35156682	10.5934641	3.40510253	1.28580393	3.71E-08	1.63E-05
SNORD75	1.09472192	2.89669514	2.64605566	49.3633239	204.819687	4.14922804	45.0921123	5.49480319	0.24025072	4.21E-08	1.80E-05
MIR30C2	97.7607048	207.199565	2.11945654	9946.90236	52437.2102	5.27171257	101.747449	6.66884882	7.77793364	5.42E-08	2.26E-05
SNORD55	16.5295243	15.0803617	0.91232884	117.025632	410.90091	3.51120436	7.07979434	2.82370745	1.63928875	5.57E-08	2.26E-05
TAS1R3	19.7608658	12.3975535	0.62737907	93.0931655	267.088763	2.86904803	4.71098617	2.2360291	1.43194753	7.09E-08	2.81E-05
SNORD6	6.64975828	7.01742698	1.05529054	58.0899277	276.085562	4.75272689	8.73564501	3.12691423	0.62763369	7.72E-08	2.99E-05
SNORD35B	63.5732885	30.606338	0.48143393	259.316559	811.037168	3.12759498	4.07901754	2.02822171	2.92948197	1.10E-07	4.14E-05
RNU5A-1	2.02689691	5.07138348	2.50204313	54.4742258	260.821164	4.78797376	26.8756766	4.74822917	0.37296142	1.47E-07	5.44E-05
SNORD45C	4.85173393	5.08700548	1.04849226	42.0763813	181.25883	4.30785216	8.67244203	3.11643829	0.18536975	1.72E-07	6.22E-05
SNORD62B	35.8603713	20.9937968	0.58543166	168.258078	718.663539	4.27119785	4.69203389	2.23021344	2.26453591	1.99E-07	6.89E-05
SNORD62A	35.8603713	20.9937968	0.58543166	168.258078	718.663539	4.27119785	4.69203389	2.23021344	2.26453591	1.99E-07	6.89E-05
SNORD3B-2	280.570683	291.62144	1.03938671	1431.95974	5847.3875	4.08348596	5.10373973	2.35155476	5.30864737	2.93E-07	9.72E-05
SNORD3B-1	280.570683	291.62144	1.03938671	1431.95974	5847.3875	4.08348596	5.10373973	2.35155476	5.30864737	2.93E-07	9.72E-05
LOC151475	5.83692888	4.91703544	0.84240112	29.8183293	107.303237	3.59856636	5.10856479	2.35291803	-0.1346382	3.23E-07	0.00010498
SNORD3A	288.567166	343.01253	1.18867484	1450.86619	5804.47485	4.00069619	5.0278284	2.32993541	5.32813285	3.84E-07	0.00012242
SNORD3D	135.157514	142.7767	1.05637264	681.707869	2888.21095	4.2367282	5.04380294	2.33451191	4.2439823	4.48E-07	0.00014025
SNORD116-9	5.76320095	8.97970689	1.55811102	77.4877618	395.439512	5.10325119	13.4452646	3.74902624	0.95116258	5.46E-07	0.00016451
SNORD116-3	5.76320095	8.97970689	1.55811102	77.4877618	395.439512	5.10325119	13.4452646	3.74902624	0.95116258	5.46E-07	0.00016451
SNORD58C	23.0487018	15.2845261	0.66314043	87.7238093	277.073059	3.15847044	3.80601954	1.92828297	1.39882754	6.50E-07	0.00019227
RNU4-2	18.2198249	43.9752598	2.41359399	227.194278	846.314497	3.7250696	12.4696192	3.6403455	2.48003049	6.81E-07	0.00019775
SNORD125	17.5312158	16.551899	0.94413868	71.784261	263.001252	3.6637732	4.09465388	2.03374151	1.0998532	7.16E-07	0.00020423
SNORD67	2.88227368	5.782477	2.00622066	69.2332161	344.805342	4.98034558	24.0203477	4.58618513	0.74354463	7.38E-07	0.00020699
SNORA54	1.80512925	3.60631316	1.99781438	73.0694265	375.943796	5.14502185	40.4787783	5.33909384	0.76873191	8.47E-07	0.00023351
RNY4	99.3444375	101.442312	1.02111718	495.06664	1762.06514	3.55924839	4.98333528	2.31711164	3.78156662	8.83E-07	0.00023924
SNORA12	12.0472895	13.248469	1.09970538	59.1284384	204.792801	3.46352459	4.90802837	2.29514359	0.75241714	9.94E-07	0.000265
NRG4	12.4868516	9.30896422	0.74550131	56.7547309	240.678305	4.24067388	4.54515939	2.18433089	0.7396109	1.03E-06	0.00027138
SNORD73A	17.8073192	9.80739245	0.55075064	60.7748971	167.216992	2.75141547	3.41291671	1.77100521	0.9286068	1.50E-06	0.00038747
SNORD50A	8.81654099	8.58860316	0.97414657	42.1562386	162.507238	3.85487993	4.78149408	2.25746149	0.33376244	1.86E-06	0.00047249
THEGL	24.6124728	18.1318613	0.73669401	102.777403	313.066335	3.04606193	4.17582597	2.06206159	1.60887855	1.98E-06	0.00049576
SNORA61	24.129979	16.5393149	0.685426	85.3164706	231.035967	2.70798786	3.53570431	1.82199763	1.40532803	2.20E-06	0.00054148
SNORA43	22.9990857	14.4882835	0.62995041	97.5094801	293.887423	3.01393693	4.23971115	2.08396598	1.52514101	2.42E-06	0.00058828
TREML3P	19.8238567	16.9945805	0.85727922	76.423727	213.751837	2.79693029	3.85513919	1.94678295	1.2037477	3.43E-06	0.00082158

DPP6	7.02696832	6.61766241	0.94175213	24.2458912	78.8438492	3.25184373	3.45040565	1.78676598	-0.2992096	3.64E-06	0.00085823
MIR3653	21.8537574	16.8414121	0.77064149	74.2979837	262.525226	3.53340983	3.39978075	1.76544171	1.2130906	3.86E-06	0.0008962
SNORD16	15.4549182	11.3340318	0.73336084	68.6993345	283.323363	4.12410637	4.44514385	2.15223011	1.02343332	4.15E-06	0.00094726
RNY5	5.65994493	6.04497523	1.06802722	36.3131429	122.356982	3.36949579	6.41581206	2.68163188	0.03714202	4.19E-06	0.00094726
SFRP1	4.03619585	2.54767739	0.63120758	16.3079373	66.9612394	4.10605206	4.04042269	2.01450623	-0.7824284	4.54E-06	0.00101122
LINC00896	6.87080195	5.47538012	0.79690554	27.9253185	115.877754	4.14955891	4.06434631	2.02302333	-0.1652563	5.53E-06	0.00121565
NACAD	9.83760392	5.94673894	0.60449058	36.0585341	140.713283	3.90235729	3.6653777	1.87396187	0.2172008	6.48E-06	0.00140439
SNORA64	30.2432983	21.3984264	0.70754275	118.60654	500.323438	4.21834613	3.92174619	1.97149617	1.83866318	7.53E-06	0.0016115
MIRLET7B	15.2774171	10.4201753	0.68206394	60.5209337	255.011686	4.21361123	3.96146374	1.9860336	0.88320717	8.17E-06	0.00171836
KCNG2	5.90549078	5.44135048	0.9214053	26.6560741	117.157371	4.39514725	4.51377797	2.17433545	-0.2697988	8.24E-06	0.00171836
SNORD42B	3.99776837	4.29962076	1.07550522	30.1424895	146.37104	4.85597051	7.5398289	2.91453179	-0.2051565	8.55E-06	0.00176002
LINC01271	9.49615067	8.33205692	0.87741414	44.9920752	206.988056	4.60054477	4.73792769	2.24425618	0.40153337	1.19E-05	0.00241378
FRMPD1	8.01946424	22.155576	2.76272521	40.5316304	175.825722	4.33798791	5.05415688	2.33747045	0.27961445	1.29E-05	0.00258518
MIRLET7F1	7.7081695	6.68315573	0.86702242	29.995608	120.931545	4.03164174	3.89140483	1.96029107	-0.0703027	1.45E-05	0.00286972
SNORA19	2.37600796	4.61640055	1.94292302	41.6341377	216.629168	5.20316212	17.5227266	4.13115537	0.05048415	1.47E-05	0.00288925
SND1-IT1	22.9240482	40.434586	1.76385016	7.43921691	4.70356142	0.63226566	3.08151361	-1.6236392	-0.1318638	1.92E-05	0.00371246
SNORD80	22.7125385	16.3818755	0.72127013	68.2788352	165.913806	2.42994488	3.0062177	1.58794949	1.1742483	2.10E-05	0.00401322
SNORD89	144.050859	64.7489821	0.44948696	307.522581	578.297871	1.88050539	2.13481949	1.09411409	3.46496356	2.30E-05	0.00435831
LOC1019281	8.48769904	7.78176999	0.91682916	29.0136532	86.8733928	2.99422456	3.41831785	1.77328655	-0.0561996	2.37E-05	0.00443627
KRT18	34.3730935	16.5186242	0.48056845	110.070102	382.561701	3.47561868	3.20221692	1.67907104	1.80030597	2.42E-05	0.00444672
SOX14	7.32872763	4.64935794	0.63440179	16.1508124	15.2335065	0.94320373	2.20376759	1.13997208	-0.5740102	2.43E-05	0.00444672
MSLN	21.7184936	70.242672	3.23423316	6.81017581	4.71634786	0.69254422	3.18912377	-1.6731601	-0.1721808	2.50E-05	0.00452597
LRGUK	8.49795798	6.63644624	0.780946	29.4366516	85.2258928	2.89523055	3.46396766	1.79242546	-0.017351	2.97E-05	0.00530392
SNORD14C	17.6597544	18.0033421	1.01945597	69.3228697	212.263157	3.06194994	3.9254719	1.9728661	1.08456416	3.05E-05	0.00538446
SNORD22	84.9472209	37.769411	0.44462209	188.704063	390.50055	2.06938073	2.22142715	1.15148683	2.7297392	3.26E-05	0.00568821
SNORD52	14.2401715	7.71396349	0.5417044	42.0085142	106.700403	2.53997089	2.95000058	1.56071524	0.51993352	3.29E-05	0.00568821
SNORD13	4.61446606	6.74712262	1.46216757	50.4024992	258.107434	5.12092531	10.9227153	3.44925964	0.40191704	3.41E-05	0.00583154
FBXL13	8.78275521	7.52944547	0.8572988	31.0128654	119.481456	3.85264161	3.53110893	1.82012133	0.02208373	3.56E-05	0.0060272
SNORA72	14.9699394	11.7039719	0.78183161	60.0934808	244.69616	4.07192522	4.01427682	2.00514011	0.87046821	3.71E-05	0.00621697
NEURL3	7.61571038	5.55801791	0.72980952	28.8955777	123.986472	4.29084592	3.79420648	1.92379819	-0.1104428	4.12E-05	0.00684046
SNORA65	15.1297875	11.716852	0.77442278	46.8362214	156.279459	3.33672218	3.09562983	1.63023297	0.62073611	4.37E-05	0.007175
ZNF732	12.419962	7.74098412	0.62326955	37.0501528	133.437042	3.60152474	2.98311322	1.57681874	0.33562584	4.42E-05	0.00718947
SNORD105B	2.97402738	7.4252779	2.49670799	47.5910254	255.017547	5.35852178	16.002215	4.00019971	0.25660622	4.57E-05	0.00735544
ARL6	31.8015525	15.4783795	0.48671773	76.5258873	181.448564	2.37107429	2.40635696	1.26685067	1.42569018	5.03E-05	0.00801906
SNORD65	10.0165835	11.6385424	1.16192736	33.1502045	96.7400326	2.91823336	3.30953209	1.72662726	0.06632361	5.49E-05	0.00866419
RNA5-8S5	10545.594	11798.5356	1.11881186	40799.3716	127899.452	3.13483876	3.86885476	1.95190657	10.2376141	5.59E-05	0.00874577
BIK	42.095531	31.4381071	0.74682767	20.6490699	14.7601946	0.7148116	2.03861632	-1.0275903	0.83158875	6.14E-05	0.00951811
NR4A3	21.1045082	18.2647947	0.86544517	65.7515933	240.366982	3.655683	3.1155236	1.63947465	1.10665984	6.49E-05	0.00995608
CKAP2L	20.6894129	19.2284552	0.92938622	65.9683889	185.693107	2.81488013	3.18850947	1.67288217	1.10822464	7.03E-05	0.010681
FGF14-AS2	9.86097051	6.99337623	0.70919756	31.1630822	122.757936	3.93921035	3.16024494	1.66003638	0.07102217	7.91E-05	0.01191239
LINC01465	8.35103317	4.32135466	0.51746348	22.9575181	71.2772379	3.10474493	2.74906321	1.45894008	-0.2673251	8.45E-05	0.01260199
SNORA57	24.7426917	20.6705591	0.83542079	90.2767981	311.842571	3.45429366	3.64862478	1.86735279	1.47000554	8.64E-05	0.01278236
ABCA6	17.5569025	9.74181936	0.55487119	40.5999734	81.2547242	2.0013492	2.3124793	1.20944045	0.58558089	8.81E-05	0.01289597
SNORD116-5	5.45663247	7.34712178	1.34645715	32.4527976	151.145848	4.6574058	5.94740397	2.57226007	-0.090981	8.96E-05	0.01289597
SNORD116-7	5.45663247	7.34712178	1.34645715	32.4527976	151.145848	4.6574058	5.94740397	2.57226007	-0.090981	8.96E-05	0.01289597
CNR1	12.1867609	9.15269775	0.75103613	29.2833641	47.9681416	1.638068	2.4028833	1.26476658	0.13895563	9.17E-05	0.01308379
BIN3-IT1	14.7158759	14.4657462	0.98300273	6.2447384	5.77959932	0.92551504	2.356524	-1.2366604	-0.5965013	9.26E-05	0.01309694
MIR6774	14.8456226	10.9977996	0.74081094	52.429037	211.567855	4.03531835	3.53161592	1.82032845	0.73546615	9.35E-05	0.01310812
STARD13	27.4325324	14.7683221	0.53835067	66.4751118	151.156884	2.27388687	2.42322184	1.27692649	1.23325454	0.00010103	0.01404553
ATP11A-AS1	14.5935413	20.3479155	1.39430965	5.27212662	4.54548282	0.86217254	2.76805591	-1.4688731	-0.6774895	0.0001125	0.01550688
FGFR4	15.210352	11.9912572	0.78836158	7.18162385	4.40086138	0.61279475	2.11795443	-1.0826715	-0.519066	0.0001158	0.01574675
ADGRG7	35.5882429	104.5939	2.93900152	4.09550726	8.12915475	1.9848957	8.68958121	-3.1192866	-0.1755209	0.00011618	0.01574675
RNVU1-7	19.2371837	17.8635816	0.92859651	75.8174256	236.031678	3.1131587	3.94119154	1.97863187	1.18824519	0.00011809	0.01587396
CDC25C	16.9443163	13.1926456	0.77858825	47.7336705	164.39556	3.44401673	2.81709039	1.49420585	0.67369425	0.00011962	0.01594775
NLRP9	12.2090158	11.1465809	0.91297948	38.7821594	150.439064	3.87907911	3.17651808	1.66744623	0.37532579	0.00012437	0.01644561
KIAA1549	18.8093319	10.1108206	0.53754278	46.211636	148.961703	3.22346742	2.45684622	1.29680756	0.72698248	0.00013279	0.01741805
SNORD31	99.9528036	49.9551852	0.49978773	213.449894	425.413048	1.99303471	2.13550683	1.09457851	2.93883775	0.00014529	0.01879718
EGR3	44.8550445	48.5911131	1.08329205	142.404904	579.748266	4.07112572	3.17478013	1.66665668	2.19580013	0.00014562	0.01879718
SNORD78	5.93009343	9.22201295	1.55512102	25.7076689	108.348995	4.21465654	4.33512038	2.11607206	-0.3056823	0.00014986	0.01917624
RNU2-1	123.039606	325.972183	2.64932727	625.966792	2463.39587	3.93534593	5.08752273	2.34696333	4.1245575	0.00015091	0.01917624
ORM1	16.2389346	12.1019739	0.74524433	43.7575947	143.783635	3.28591267	2.69460995	1.43007646	0.59073165	0.00015453	0.01947651
SPA17	25.1471467	14.7801816	0.58774786	61.513848	164.452066	2.67341536	2.44615617	1.29051651	1.12010429	0.00015581	0.01947651
MIR5196	30.7236715	21.5188141	0.70039852	77.5068374	180.857613	2.33344075	2.52270753	1.33497296	1.41327363	0.00015687	0.01947651
ST8SIA5	24.3530012	20.5002021	0.84179367	12.479917	7.46359958	0.59804881	1.95137524	-0.9644912	0.09811144	0.00016346	0.0201409
MAOA	11.9025886	8.51801378	0.7156438	29.5427931	81.9435772	2.77372478	2.48204773	1.31153086	0.09677699	0.00017956	0.02176875
SNORD27	16.8067132	13.9835957	0.83202441	51.0665505	138.737485	2.71679767	3.03846146	1.603341	0.7687251	0.00018137	0.02176875
LINC01270	14.0934121	11.6456187	0.82631648	49.2027004	206.304143	4.1929435	3.49118439	1.80371656	0.63524665	0.00018141	0.02176875
MIR6516	13.0554884	11.3468493	0.86912484	39.3646003	123.701282	3.14244984	3.01517637	1.59224239	0.41866606	0.00018202	0.02176875
PSMB8	6351.29892	8077.0362	1.27171407	17123.5029	46820.02	2.73425479	2.69606315	1.43085429	9.12754837	0.0001841	0.0218565
RAD51B	83.4595507	31.9600978	0.38294117	156.214054	218.837098	1.4008797	1.87173371	0.9043752	2.56452157	0.00019057	0.02235925

PALLD	248.666196	86.9313337	0.34959048	392.780386	330.100926	0.84042111	1.57954878	0.65951249	3.99045904	0.00019108	0.02235925
LOC1019288	26.5767394	21.4160854	0.80582065	70.5840882	203.553939	2.88385023	2.65585959	1.40917888	1.27505028	0.00021703	0.02521414
LOC1005056	55.2740168	23.518521	0.42548963	103.699496	192.947621	1.86064185	1.87609842	0.90773551	1.97925304	0.00022743	0.02623497
LINC00189	20.5035182	24.178444	1.17923392	55.8854619	123.734351	2.21407048	2.72565232	1.44660155	0.90677629	0.00023097	0.02645566
COL19A1	51.9537456	50.2380038	0.96697559	120.585191	196.078692	1.62605947	2.32101054	1.21475307	2.07417484	0.00023351	0.02656015
PIWIL2	12.9063287	9.34941533	0.72440549	34.2708543	118.618057	3.46119347	2.65535268	1.40890349	0.26962323	0.0002481	0.02802272
RORB-AS1	749.323194	656.076538	0.87555883	2183.83882	6213.86902	2.84538812	2.91441509	1.54320637	6.12146758	0.00025889	0.02904037
ZNF583	84.6977601	27.5438554	0.3252017	151.88023	255.963712	1.68529974	1.79320244	0.84253837	2.54580188	0.00033389	0.03719665
KCNQ1OT1	374.07237	297.515268	0.79534147	241.968754	92.3261473	0.38156227	1.54595321	-0.6284967	4.02151498	0.00035161	0.03871642
EEF1DP3	20.331933	15.1995494	0.7475703	55.6187887	197.398468	3.54913282	2.73553865	1.45182494	0.90614626	0.00035636	0.03871642
FAM21EP	90.1114835	34.4445347	0.38224357	161.732211	298.189714	1.84372495	1.79480134	0.84382417	2.64386496	0.00035652	0.03871642
ZNF639	542.501054	123.16309	0.2270283	722.307067	281.818958	0.39016503	1.33143901	0.41298635	4.9819571	0.00035706	0.03871642
SLC39A5	14.6924677	11.191945	0.76174712	7.14949244	5.99863729	0.83902981	2.05503647	-1.039164	-0.5422852	0.00035943	0.03871642
EFCAB11	33.7975163	19.0726476	0.56432098	72.3650007	189.391654	2.61717201	2.14113369	1.09837488	1.4019426	0.00036645	0.03921276
MAGT1	1457.53832	416.042289	0.28544175	2018.67741	1288.77801	0.63842693	1.38499097	0.46987657	6.42452394	0.00037092	0.03929837
TRIM10	22.0723033	32.9811335	1.49423162	61.8793823	200.573655	3.24136485	2.8034855	1.48722161	1.05400104	0.00037208	0.03929837
MIR4537	21.5532105	26.2374447	1.21733348	68.5662403	222.110408	3.23935522	3.18125415	1.66959563	1.12452478	0.00037736	0.03959887
WNT2B	11.9877434	8.63520395	0.72033607	30.6504383	99.4822656	3.2457045	2.55681467	1.35434759	0.15311526	0.00038077	0.03970011
TMEM178B	27.2374272	25.7747185	0.94629784	13.9006151	8.75460589	0.62979989	1.95944043	-0.9704417	0.18618915	0.00039874	0.04112094
KRT23	22.1763727	18.1669469	0.81920281	56.8110075	158.455388	2.78916702	2.56178087	1.35714708	0.99598334	0.00040296	0.04112094
RNVU1-18	738.148162	797.441485	1.08032713	2772.44001	8652.81514	3.12101078	3.75593972	1.90917391	6.3664347	0.00041714	0.04112094
RNU1-27P	738.148162	797.441485	1.08032713	2772.44001	8652.81514	3.12101078	3.75593972	1.90917391	6.3664347	0.00041714	0.04112094
RNU1-1	738.148162	797.441485	1.08032713	2772.44001	8652.81514	3.12101078	3.75593972	1.90917391	6.3664347	0.00041714	0.04112094
RNU1-28P	738.148162	797.441485	1.08032713	2772.44001	8652.81514	3.12101078	3.75593972	1.90917391	6.3664347	0.00041714	0.04112094
RNU1-3	738.148162	797.441485	1.08032713	2772.44001	8652.81514	3.12101078	3.75593972	1.90917391	6.3664347	0.00041714	0.04112094
RNU1-2	738.148162	797.441485	1.08032713	2772.44001	8652.81514	3.12101078	3.75593972	1.90917391	6.3664347	0.00041714	0.04112094
RNU1-4	738.148162	797.441485	1.08032713	2772.44001	8652.81514	3.12101078	3.75593972	1.90917391	6.3664347	0.00041715	0.04112094
SRD5A3	203.936012	93.8672378	0.46027789	298.145132	114.4345	0.38382146	1.46195432	0.54789823	3.64729325	0.00044621	0.04372051
MAGIX	30.0035617	17.276995	0.57583147	81.4085393	317.869324	3.90461893	2.71329585	1.44004636	1.45612118	0.00045413	0.04423053
LAMA1	23.384643	84.3640152	3.60766744	9.55484021	4.87786714	0.51051269	2.4474133	-1.2912578	-0.0163213	0.00047954	0.04620624
VGLL3	27.7358522	137.27693	4.94943978	7.72068593	14.3577631	1.85964864	3.59240778	-1.8449511	0.11412192	0.0004801	0.04620624
LOC1019293	13.5088305	10.9935644	0.81380578	41.934478	164.700852	3.92757607	3.10422711	1.63423411	0.48459285	0.00049382	0.04724719
MORN2	26.6272111	16.352776	0.61413777	63.7558031	195.223341	3.06204819	2.39438531	1.25965533	1.18289179	0.00050856	0.04797834
SNORA27	16.6026312	12.7455637	0.76768336	43.7419448	131.16008	2.99849676	2.63463932	1.39760547	0.60401647	0.00051034	0.04797834
C20orf195	13.6427612	12.4959074	0.91593683	38.9665791	153.095249	3.92888604	2.85620914	1.51410162	0.42900987	0.00051229	0.04797834
SENP8	20.0277043	11.1197841	0.5552201	50.8527565	166.731697	3.27871502	2.53912059	1.34432892	0.83108542	0.00051326	0.04797834
DIAPH3	12.9418249	11.4607334	0.88555776	34.1309169	118.358341	3.46777502	2.6372569	1.39903811	0.28816324	0.00051623	0.04798006
LILRB4	1753.79785	536.63506	0.30598456	3185.32027	6822.73705	2.14193126	1.8162414	0.86095597	6.91353841	0.00052362	0.04830506
RPS15AP10	48.6598853	29.2235601	0.6005678	30.98658	11.766646	0.37973361	1.57035353	-0.6510894	1.12805956	0.00052664	0.04830506
LOC641367	24.3534163	11.5554803	0.47449114	53.2880497	164.521853	3.08740616	2.18811395	1.12968787	0.9622641	0.00052864	0.04830506
NCAPG2	247.004236	99.5996641	0.40323059	411.24234	518.496316	1.2608048	1.66492019	0.73545302	4.01947251	0.00053171	0.04831388
MACROD2	36.0466382	34.9356694	0.96917969	83.2714847	106.536674	1.27938963	2.31010405	1.20795783	1.57350269	0.00054354	0.04911456
TMEM163	21.6675721	17.1647307	0.79218524	58.5595422	213.568406	3.64702998	2.70263516	1.43436677	0.99154813	0.00054755	0.04920363


a) Genotype Effect (PiZZ off vs PiMZ) Gene Sets
PBMC
BAL
176
5
108
p = 0.0033
b) Therapy Effect (PiZZ on vs PiZZ off) Gene Sets
PBMC
BAL
58
6
727
p = 0.0255

Supplementary Table 3: List of enriched pathways for 113 differentially expressed genes in BAL for genotype effects

Function	FDR	Genes in network	Genes in genome
inflammatory response	6.13E-14	20	684
cell chemotaxis	2.28E-11	12	293
leukocyte chemotaxis	6.36E-10	11	215
positive regulation of response to external stimulus	6.12E-09	10	296
negative regulation of viral process	2.09E-08	8	90
positive regulation of inflammatory response	3.26E-08	7	135
regulation of viral genome replication	5.18E-08	7	89
negative regulation of multi-organism process	1.09E-07	8	169
negative regulation of viral genome replication	1.09E-07	6	53
regulation of inflammatory response	1.09E-07	10	321
leukocyte migration	2.37E-07	12	476
viral genome replication	2.63E-07	7	116
regulation of viral process	7.90E-07	9	174
chemokine receptor binding	9.31E-07	6	66
regulation of symbiosis, encompassing mutualism thro	1.32E-06	9	202
myeloid leukocyte migration	1.82E-06	9	200
chemokine activity	3.88E-06	6	49
cytokine receptor binding	1.94E-05	8	282
granulocyte migration	2.07E-05	9	136
MHC protein binding	7.31E-05	4	35
lymphocyte chemotaxis	0.00013979	5	62
granulocyte chemotaxis	0.000252009	8	120
MHC class I protein binding	0.000529168	3	16
chemokine-mediated signaling pathway	0.000658133	8	87
neutrophil chemotaxis	0.000921607	8	103
neutrophil migration	0.000921607	9	115
cellular response to tumor necrosis factor	0.00175818	10	239
response to tumor necrosis factor	0.003894631	11	259
eosinophil migration	0.006964945	4	26
CCR chemokine receptor binding	0.010603936	4	43

Supplementary Table 4: List of differentially expressed MiRNAs in BAL for genotype effects and their target genes

database	mature_mirna_acc	mature_mirna_id	target_symbol	target_entrez	target_ensembl	experiment	support_type	pubmed_id	type
mirtarbase	MIMAT0021044	hsa-miR-5010-3p	RNF11	26994	ENSG00000123091	PAR-CLIP	Functional MTI (Weak)	20371350	validated
mirtarbase	MIMAT0021044	hsa-miR-5010-3p	RNF11	26994	ENSG00000123091	PAR-CLIP	Functional MTI (Weak)	21572407	validated
mirtarbase	MIMAT0021044	hsa-miR-5010-3p	RNF11	26994	ENSG00000123091	PAR-CLIP	Functional MTI (Weak)	23446348	validated
mirtarbase	MIMAT0027514	hsa-miR-6807-5p	SUMO2	6613	ENSG00000188612	HITS-CLIP	Functional MTI (Weak)	23313552	validated
mirtarbase	MIMAT0027495	hsa-miR-6797-3p	CYCS	54205	ENSG00000172115	PAR-CLIP	Functional MTI (Weak)	23446348	validated
mirtarbase	MIMAT0027495	hsa-miR-6797-3p	MCMDC2	157777	ENSG00000178460	HITS-CLIP	Functional MTI (Weak)	23824327	validated

Supplementary Table 5: List of differentially expressed MiRNAs in PBMC for genotype effects and their target genes

database	mature_mirna_acc	mature_mirna_id	target_symbol	target_entrez	target_ensembl	experiment	support_type	pubmed_id	type
mirtarbase	MIMAT0000255	hsa-miR-34a-5p	CDC25C	995	ENSG00000158402	Microarray	Functional MTI (Weak)	19461653	validated
mirtarbase	MIMAT0000063	hsa-let-7b-5p	NCAPG2	54892	ENSG00000146918	pSILAC//Proteomics;Other	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000063	hsa-let-7b-5p	KIAA1549	57670	ENSG00000122778	CLASH	Functional MTI (Weak)	23622248	validated
mirtarbase	MIMAT0000441	hsa-miR-9-5p	BIK	638	ENSG00000100290	Microarray	Functional MTI (Weak)	17612493	validated
mirtarbase	MIMAT0000442	hsa-miR-9-3p	FBXL13	222235	ENSG00000161040	PAR-CLIP	Functional MTI (Weak)	22012620	validated
mirtarbase	MIMAT0000442	hsa-miR-9-3p	FBXL13	222235	ENSG00000161040	PAR-CLIP	Functional MTI (Weak)	23446348	validated
mirtarbase	MIMAT0004589	hsa-miR-30b-3p	RAD51B	5890	ENSG00000182185	PAR-CLIP	Functional MTI (Weak)	22100165	validated
mirtarbase	MIMAT0004550	hsa-miR-30c-2-3p	NRG4	145957	ENSG00000169752	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0004674	hsa-miR-30c-1-3p	NRG4	145957	ENSG00000169752	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0021128	hsa-miR-5196-5p	NR4A3	8013	ENSG00000119508	HITS-CLIP	Functional MTI (Weak)	23313552	validated
mirtarbase	MIMAT0019080	hsa-miR-4537	NLRP9	338321	ENSG00000185792	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0021129	hsa-miR-5196-3p	SPA17	53340	ENSG00000064199	HITS-CLIP	Functional MTI (Weak)	19536157	validated
mirtarbase	MIMAT0032110	hsa-miR-3653-5p	SENP8	123228	ENSG00000166192	HITS-CLIP	Functional MTI (Weak)	23824327	validated
mirtarbase	MIMAT0032110	hsa-miR-3653-5p	WNT2B	7482	ENSG00000134245	HITS-CLIP	Functional MTI (Weak)	23824327	validated
mirtarbase	MIMAT0030417	hsa-miR-6516-5p	NLRP9	338321	ENSG00000185792	PAR-CLIP	Functional MTI (Weak)	23592263	validated
tarbase	MIMAT0000063	hsa-let-7b-5p	NCAPG2	54892	ENSG00000146918	Proteomics	positive	NA	validated
tarbase	MIMAT0000441	hsa-miR-9-5p	BIK	638	ENSG00000100290	Microarray	positive	NA	validated

Supplementary Table 6: List of 733 differentially expressed genes in BAL for therapy effects test by Wilcoxon rank sum test with average FPKM >1

	PiZZ.off.avg	PiZZ.off.sd	PiZZ.off.cv	PiZZ.on.avg	PiZZ.on.sd	PiZZ.on.cv	FC	logFC	PValue	FDR
FGFR3	0.02172573	0.02849815	1.31172353	1.81121144	8.36487008	4.61838409	83.3671232	6.3814066	0.0002653	0.0060873
MIR205HG	0.04736052	0.09699429	2.04799881	3.29340046	15.3771294	4.66907369	69.5389411	6.1197492	0.0002653	0.0060873
CAPN13	0.05806388	0.09768852	1.68243189	3.19993504	14.6935691	4.59183356	55.1106	5.7842579	0.0002438	0.0060873
SERPINB4	0.03743182	0.07607715	2.03241919	1.9385308	9.03051112	4.65843057	51.7883117	5.6945546	0.000224	0.0060873
SPARCL1	0.02264419	0.03441656	1.5198846	1.08154936	5.03051712	4.65121361	47.762769	5.5778146	0.000224	0.0060873
ID1	0.10938598	0.20453501	1.86984666	4.98590934	23.1337435	4.63982434	45.5808813	5.5103569	0.0002653	0.0060873
TNC	0.03971392	0.05082601	1.27980338	1.76879116	8.19216847	4.6315069	44.538314	5.476975	0.0002438	0.0060873
FMO2	0.02442606	0.02796386	1.14483701	1.05694835	4.84293945	4.58200201	43.2713431	5.43534	0.0002653	0.0060873
LCN2	3.11332959	3.50506597	1.12582554	123.039469	566.440426	4.60372943	39.5202197	5.3045191	0.0002653	0.0060873
EGFR	0.0345771	0.03957615	1.14457666	1.35448617	6.24973521	4.61410043	39.1729225	5.2917849	0.0002653	0.0060873
MSLN	0.06934574	0.08575257	1.23659471	2.51736273	11.482147	4.56118099	36.3016215	5.1819621	0.0002653	0.0060873
CYP2J2	0.04282693	0.06899105	1.61092698	1.36262962	5.96863845	4.38023536	31.817123	4.9917315	0.000173	0.0060873
NR2F2	0.03549379	0.04821718	1.35846834	1.11013506	5.05583397	4.55425122	31.276886	4.967025	0.0002438	0.0060873
TRIM29	0.15142147	0.18114513	1.19629751	4.72115711	21.7302819	4.60274492	31.178915	4.9624988	0.0002653	0.0060873
WFDC2	6.04679842	5.90767644	0.97699246	186.779745	854.398429	4.5743634	30.8890312	4.9490227	0.0002438	0.0060873
MUC5B	0.11136542	0.10125026	0.90917145	3.36170736	15.3682361	4.57155678	30.1862755	4.9158209	0.0002438	0.0060873
CX3CL1	0.05468223	0.0710898	1.30005308	1.63995813	7.55634654	4.60764602	29.9906973	4.9064432	0.000224	0.0060873
GABRP	0.09010472	0.15455387	1.71526943	2.66884601	12.0497608	4.51497041	29.6193807	4.8884696	0.0002653	0.0060873
ADH1C	0.1468354	0.17762213	1.20966833	4.30199985	19.4976556	4.53223065	29.2981117	4.8727358	0.0002653	0.0060873
MSMB	5.49259259	7.47899775	1.36165165	148.152022	670.377589	4.5249304	26.9730587	4.7534472	0.000224	0.0060873
KRT19	1.67621093	1.29263623	0.77116561	44.1392538	199.717001	4.5247027	26.3327562	4.7187866	0.0002653	0.0060873
IL33	0.08448654	0.14112888	1.67043033	2.22442043	9.84506885	4.42590291	26.3286966	4.7185642	0.0002653	0.0060873
SOX2	0.11906483	0.16749517	1.40675607	2.9934864	13.4910084	4.50678794	25.1416517	4.6520075	0.000224	0.0060873
LRIG3	0.05403247	0.057871	1.07104106	1.33175172	6.00277778	4.50743009	24.6472483	4.6233547	0.000224	0.0060873
ATP12A	0.05117769	0.06187748	1.20907157	1.24165528	5.71447082	4.6023006	24.2616539	4.600606	0.0001886	0.0060873
CXCL17	0.81010579	0.7754533	0.95722474	17.6186025	77.8115076	4.4164404	21.7485206	4.4428454	0.0002653	0.0060873
YAP1	0.04694427	0.04819996	1.02674844	1.01293486	4.56809156	4.50975848	21.5773892	4.4314484	0.0002653	0.0060873
TSPAN8	0.24207164	0.27689036	1.14383643	5.03468971	22.4431365	4.45770005	20.7983458	4.3783969	0.0002438	0.0060873
SIX2	0.05317558	0.05979325	1.12444933	1.10543489	5.02652043	4.5470977	20.7883925	4.3777063	0.000224	0.0060873
ADH7	0.16674816	0.28906348	1.73353329	3.42151199	15.3654078	4.4908239	20.5190391	4.3588913	0.0002653	0.0060873
TMPRSS4	0.09377873	0.11439352	1.21982365	1.88516792	8.59654085	4.56009291	20.1022964	4.3292884	0.0002438	0.0060873
ITGB4	0.09915536	0.12071403	1.21742317	1.94343981	8.63996122	4.44570559	19.5999472	4.2927779	0.0002653	0.0060873
AGR2	1.41556845	1.57332871	1.11144658	27.280584	122.869145	4.50390451	19.2718226	4.2684211	0.0002653	0.0060873
PPL	0.10901819	0.08580494	0.78706995	2.07310419	9.28925571	4.48084363	19.0161307	4.2491518	0.0002653	0.0060873
GSTA2	1.22257583	1.70887533	1.39776633	23.0741105	105.429984	4.56918951	18.8733573	4.2382792	0.0002056	0.0060873
MUC16	0.11882227	0.1052658	0.88590971	2.2308454	9.96009814	4.46471914	18.7746412	4.2307134	0.0002056	0.0060873
KRT7	0.35356656	0.23759174	0.6719859	6.52860087	29.1593994	4.46640865	18.4649841	4.2067201	0.000224	0.0060873
SCNN1B	0.12142275	0.11738219	0.96672319	2.23273246	10.2621398	4.59622457	18.3880903	4.2006998	0.0002056	0.0060873
EPPIN	0.17412641	0.37601443	2.15943371	3.11009261	14.274804	4.58983246	17.8611198	4.1587506	0.0001585	0.0060873
ERN2	0.09102096	0.10894188	1.19688773	1.61491661	7.34951225	4.55101659	17.7422489	4.149117	0.000173	0.0060873
CYP4X1	0.1081086	0.14994183	1.38695559	1.9016494	8.57001165	4.50662023	17.5901764	4.136698	0.0002056	0.0060873
CP	0.18461662	0.1715527	0.92923755	3.18362106	13.9709533	4.38838449	17.2444983	4.1080642	0.000224	0.0060873
GRHL2	0.06784477	0.07418629	1.09347087	1.16937008	5.23967509	4.48076719	17.2359639	4.1073501	0.0002653	0.0060873
MISP	0.06224183	0.07792982	1.25204886	1.06146451	4.47087347	4.21198584	17.0538756	4.0920277	0.0002653	0.0060873
CYP4B1	1.08872501	1.68021547	1.5432873	18.5110347	83.4979349	4.51071138	17.0024888	4.087674	0.0002438	0.0060873
EPCAM	0.11188773	0.14608653	1.30565277	1.89058468	8.33937777	4.41100463	16.8971576	4.0787087	0.000224	0.0060873
APOD	0.12141548	0.16929346	1.3943317	2.0190158	9.19164857	4.55253921	16.6289813	4.0556279	0.0001886	0.0060873
CHST9	0.35006339	0.40651606	1.16126412	5.72547521	25.9704972	4.53595488	16.3555382	4.0317073	0.000173	0.0060873
SDC1	0.14363058	0.18169247	1.26499856	2.34435692	10.3197723	4.40196296	16.3221298	4.0287574	0.0002653	0.0060873
GSTA1	1.37421747	1.74951686	1.27310044	22.4075685	99.277945	4.43055413	16.3056933	4.0273039	0.0002653	0.0060873
CNN3	0.14293796	0.13777331	0.9638679	2.31604872	10.2802472	4.43870074	16.2031747	4.0182046	0.0002056	0.0060873
EFEMP1	0.10588195	0.1347287	1.27244258	1.71469855	7.85635028	4.58176762	16.1944376	4.0174265	0.000173	0.0060873
ABCA13	0.11641221	0.12862059	1.10487192	1.87712068	8.40090693	4.47542186	16.1247743	4.0112071	0.0001585	0.0060873
TMC5	0.36362319	0.29679199	0.81620754	5.73247957	25.3255354	4.41790243	15.7648898	3.9786432	0.000224	0.0060873
PLEKHS1	0.24334019	0.25602525	1.05212892	3.80982626	16.9177581	4.44055896	15.6563793	3.9686787	0.0002653	0.0060873
ELF3	0.83485569	0.78652281	0.9421063	13.030788	58.0961504	4.45837585	15.6084316	3.9642537	0.0001585	0.0060873
PIGR	0.96954632	0.89932081	0.92756869	15.016224	66.0907071	4.4012867	15.4878872	3.9530684	0.0002056	0.0060873
MAL2	0.1364021	0.11225711	0.82298662	2.07683064	9.15841531	4.40980365	15.2257964	3.9284458	0.0002438	0.0060873
ADGRF1	0.07990624	0.11164508	1.39720105	1.21471272	5.49565107	4.52423932	15.2017261	3.9261632	0.000173	0.0060873
PROM1	0.25446812	0.31028162	1.21933396	3.84605707	16.9751496	4.41364996	15.1141016	3.9178233	0.000173	0.0060873
CTGF	0.25886326	0.24564606	0.9489414	3.90546804	17.395294	4.45408691	15.0869925	3.9152333	0.0002056	0.0060873
SYBU	0.07248469	0.09805582	1.35277982	1.08914814	4.79216896	4.39992392	15.0259068	3.9093802	0.0002056	0.0060873
ALG1L	0.17121312	0.23619294	1.3795259	2.55999564	11.2478683	4.39370604	14.9520994	3.9022762	0.000224	0.0060873

CLDN4	0.44778996	0.51405312	1.14797822	6.67479298	29.7856355	4.46240589	14.9060802	3.897829	0.000173	0.0060873
RHPN2	0.0764094	0.09906813	1.29654384	1.10456802	4.7436581	4.29458216	14.4559184	3.8535884	0.0002056	0.0060873
C1orf110	0.13607199	0.19571716	1.4383354	1.96109822	8.66363859	4.41774844	14.4122113	3.8492198	0.0001585	0.0060873
FXYD3	1.11670303	1.09852545	0.98372209	15.7815121	69.8074138	4.42336663	14.1322371	3.820918	0.000173	0.0060873
DNAH5	0.18973408	0.22567689	1.18943778	2.62213817	11.6760101	4.45285844	13.8200692	3.7886929	0.000224	0.0060873
C11orf88	1.38433758	1.85014298	1.33648253	19.0303846	85.3225581	4.48349102	13.7469248	3.781037	0.0001886	0.0060873
CD24	1.43830886	1.62888407	1.1324995	19.6990224	86.4901079	4.3905787	13.6959612	3.7756786	0.0002056	0.0060873
LYPD6B	0.11994473	0.17546489	1.46288123	1.63728258	7.49981434	4.58064748	13.6503089	3.7708617	0.0001111	0.0060873
ALOX15	0.95465863	1.40758512	1.47443817	12.8388497	56.8985303	4.43174674	13.448629	3.7493872	0.000224	0.0060873
C1orf106	0.0753376	0.07915405	1.05065786	1.00887396	4.47182129	4.43248757	13.3913732	3.743232	0.0001452	0.0060873
TNFRSF19	0.10081639	0.11737806	1.16427552	1.33777176	5.75176941	4.29951475	13.2693871	3.7300298	0.0002056	0.0060873
SFN	0.08681509	0.14943711	1.7213264	1.14469366	5.0451097	4.40738854	13.1854222	3.7208719	0.000224	0.0060873
GPX2	0.21259246	0.26950859	1.26772414	2.74779748	12.242876	4.45552342	12.9251879	3.6921134	0.0002056	0.0060873
TACC2	0.14284281	0.15800655	1.10615686	1.83150654	8.20576781	4.48033772	12.8218325	3.6805306	0.0001886	0.0060873
STOML3	0.32866986	0.60155616	1.83027479	4.17861617	18.6185648	4.45567719	12.7137187	3.6683142	0.0002653	0.0060873
TSPAN1	2.93352179	3.03775243	1.03553089	36.9792516	162.774601	4.40178193	12.6057531	3.6560104	0.0002056	0.0060873
SLC7A2	0.10120653	0.12636331	1.24856875	1.27217104	5.52854349	4.34575489	12.5700486	3.6519183	0.0002438	0.0060873
SLPI	10.5576347	14.3991962	1.36386573	131.720202	585.272966	4.44330449	12.4762985	3.6411181	9.26E-05	0.0060873
SLC34A2	0.38614675	0.34812455	0.90153435	4.80404606	20.7039955	4.30969961	12.4409855	3.6370289	0.0002056	0.0060873
ASS1	0.21852868	0.31218011	1.42855439	2.71479397	11.8305158	4.35779508	12.4230556	3.6349482	0.0002438	0.0060873
CYP2F1	0.3208512	0.32894772	1.0252345	3.92324157	17.3093209	4.41199467	12.2276043	3.6120699	0.0002438	0.0060873
C11orf16	0.21869376	0.24218342	1.10740891	2.62623771	11.5389229	4.3937085	12.0087454	3.5860135	0.0001585	0.0060873
CFAP221	0.17370584	0.21293615	1.22584336	2.07856834	9.00584187	4.33271387	11.9660247	3.580872	0.000224	0.0060873
DUOXA1	0.09609908	0.14932635	1.553879	1.14962247	4.99565689	4.34547601	11.962887	3.5804937	0.0001886	0.0060873
PTPRF	0.23020343	0.21102969	0.91670957	2.69441969	11.5395935	4.2827751	11.7045158	3.5489933	0.0001886	0.0060873
DUOX1	0.17526299	0.19272497	1.09963305	2.04710284	8.9131431	4.35402802	11.6801778	3.5459903	0.0001585	0.0060873
PFN2	0.33994171	0.3239788	0.95304223	3.92060641	16.2743664	4.15098194	11.5331727	3.5277175	0.0002438	0.0060873
PPAP2C	0.34826921	0.46926276	1.34741386	3.99833158	17.0432565	4.26259206	11.4805773	3.5211233	0.000173	0.0060873
C11orf97	0.22431365	0.37282344	1.66206308	2.56997332	11.6037454	4.51512291	11.4570527	3.5181641	0.0001452	0.0060873
ALDH1A3	0.09353276	0.0943901	1.0091662	1.06859074	4.60597178	4.3103235	11.4247748	3.5140938	0.0002438	0.0060873
STK33	0.11823934	0.19695332	1.66571735	1.34694684	5.85447078	4.34647501	11.3916978	3.5099109	0.0001111	0.0060873
HYDIN	0.09356403	0.10156632	1.0855275	1.06329285	4.68906873	4.40995039	11.3643342	3.5064413	0.000173	0.0060873
MB	0.18231412	0.21829457	1.19735414	2.06451101	8.92384493	4.32249812	11.3239225	3.5013019	0.0002056	0.0060873
MUC4	0.24778098	0.30547402	1.23283887	2.7972449	12.1305439	4.33660417	11.2891833	3.4968692	0.0002438	0.0060873
CAPN9	0.09977623	0.19766696	1.98110273	1.12382852	4.94824049	4.40302094	11.2634898	3.493582	0.0001886	0.0060873
TACSTD2	0.71302186	0.59981595	0.84123079	8.02788189	34.4292948	4.28871467	11.2589562	3.4930012	0.000224	0.0060873
NWD1	0.21231842	0.26541113	1.25006174	2.3713651	10.3384021	4.35968382	11.1689091	3.4814164	0.0002653	0.0060873
DNAH2	0.11365264	0.13948917	1.22732889	1.26539468	5.54297288	4.38043006	11.133878	3.4768843	0.0002056	0.0060873
EFCAB1	0.36056072	0.40521426	1.12384474	3.98167796	16.6335415	4.17752054	11.0430165	3.4650624	0.0002653	0.0060873
C6orf118	0.16701315	0.21992574	1.31681689	1.81682396	7.86746072	4.33033739	10.8783289	3.443385	0.0001585	0.0060873
WFDC6	0.27145107	0.44272827	1.630969	2.92119899	12.6649874	4.33554423	10.7614202	3.4277966	0.0001585	0.0060873
EFHC2	0.12491441	0.16205346	1.29731603	1.33490191	5.74384798	4.30282402	10.6865328	3.417722	0.0001111	0.0060873
SPAG6	0.53707055	0.58377906	1.08696903	5.71182307	25.0408052	4.38403027	10.6351448	3.4107678	0.0001585	0.0060873
APOBEC4	0.11479574	0.14877563	1.29600308	1.21992233	5.3995614	4.4261518	10.6268953	3.4096483	0.0001328	0.0060873
ERICH3	0.17630933	0.1988274	1.12771914	1.87189573	7.98214238	4.26420245	10.6171112	3.4083194	0.0001886	0.0060873
TEKT4	0.19278153	0.23336244	1.21050205	2.03920311	8.98668417	4.40695883	10.5777927	3.4029667	0.0001328	0.0060873
WDR78	0.24288277	0.30765082	1.26666386	2.56677954	11.3171886	4.40910037	10.5679772	3.4016274	0.000173	0.0060873
TTC29	0.11915408	0.16590195	1.39233127	1.24974991	5.51727579	4.41470391	10.48852	3.3907392	0.0001886	0.0060873
SIX1	0.11878699	0.18345557	1.54440799	1.24464781	5.52250537	4.43700246	10.4779811	3.3892889	0.0001585	0.0060873
CFAP45	0.43352573	0.52697982	1.21556758	4.526889	19.9192268	4.40020217	10.4420307	3.3843304	0.0001452	0.0060873
SLC44A4	1.25464741	1.45538272	1.1599934	13.0779919	56.8772423	4.34908072	10.4236392	3.3817871	0.0002438	0.0060873
CCDC60	0.11520625	0.15832947	1.37431318	1.19927219	5.13815414	4.28439363	10.4097843	3.3798683	0.0002056	0.0060873
CDHR3	0.39670831	0.48159809	1.21398538	4.09542077	17.6887769	4.31915984	10.3235063	3.3678611	0.000224	0.0060873
AP1M2	0.23437262	0.29368683	1.25307654	2.41249959	10.7199767	4.44351443	10.2934362	3.3636528	0.0001215	0.0060873
ARMC3	0.26627817	0.32143924	1.20715581	2.73598232	11.8946708	4.34749548	10.2749029	3.3610529	0.000224	0.0060873
FAM183A	0.81042551	0.84852556	1.0470124	8.32476818	35.519899	4.26677335	10.2720954	3.3606586	0.0001886	0.0060873
STOX1	0.10653372	0.1257005	1.17991279	1.08828434	4.64051809	4.26406771	10.2153977	3.3526735	0.0002056	0.0060873
HSD17B13	0.1867987	0.200475	1.07321411	1.90223337	8.34579951	4.38736888	10.1833329	3.3481379	0.0001886	0.0060873
ANKUB1	0.11397762	0.24480066	2.14779594	1.15006981	5.11137115	4.44440075	10.0903128	3.334899	0.0002438	0.0060873
EFNA1	0.16244608	0.21234631	1.30718026	1.63689237	7.37444842	4.50515169	10.0765272	3.3329266	0.0001452	0.0060873
UMODL1-AS1	0.12759506	0.15711639	1.23136739	1.28235713	5.48057088	4.27382571	10.0502103	3.3291538	0.0002056	0.0060873
MS4A8	1.31915395	1.78682813	1.35452585	13.2184495	57.0455922	4.3156039	10.0203995	3.3248681	0.000224	0.0060873
PLXNB1	0.16164151	0.16256593	1.00571895	1.61198002	6.81867186	4.22999775	9.97256212	3.3179642	0.000224	0.0060873
BCAS1	0.15969424	0.21860606	1.36890383	1.58619154	7.07663959	4.46140295	9.93267816	3.3121828	0.0001452	0.0060873
TUSC3	0.10196494	0.15132951	1.48413284	1.01032341	4.5035242	4.45750753	9.90853745	3.3086721	0.0001886	0.0060873

DNAH10	0.13353791	0.13959757	1.04537782	1.31321154	5.74904628	4.37785239	9.8339979	3.297778	0.0001585	0.0060873
DNAI1	0.27604901	0.39321003	1.42442109	2.71453075	11.5650282	4.26041525	9.83351027	3.2977065	0.0002438	0.0060873
FAM216B	0.47673079	0.56171002	1.17825414	4.68457063	20.5779032	4.39269783	9.82644873	3.2966701	0.0001328	0.0060873
AK7	0.17351046	0.20198289	1.16409634	1.70353977	7.40741701	4.34825013	9.81808097	3.2954411	0.000173	0.0060873
CFAP57	0.17421451	0.2613604	1.50022173	1.70178304	7.46169178	4.38463166	9.76831966	3.2881104	0.0002056	0.0060873
PIFO	0.794828	0.77538434	0.97553727	7.70746199	33.0553587	4.28874755	9.69701867	3.2775413	0.0001452	0.0060873
CFAP43	0.22627795	0.29269306	1.29351119	2.18854214	9.43672019	4.31187503	9.67191956	3.2738022	0.0001215	0.0060873
CAPSL	0.80981793	1.12527712	1.38954335	7.73130056	33.7949948	4.37119144	9.54696148	3.2550416	0.0001452	0.0060873
APCDD1	0.12717898	0.15095675	1.18696303	1.21416145	5.1207262	4.21750024	9.54687177	3.2550281	0.0001015	0.0060873
C5orf49	0.28026173	0.36026669	1.28546516	2.67547466	11.3586205	4.24545996	9.54634326	3.2549482	0.0002438	0.0060873
DRC1	0.24074653	0.28039806	1.16470241	2.2935116	10.1349924	4.41898456	9.5266652	3.2519713	0.0001328	0.0060873
WDR66	0.32976944	0.40707602	1.23442616	3.14160088	13.5886445	4.32538855	9.52665869	3.2519703	0.0001585	0.0060873
ATP2C2	0.25320016	0.27056729	1.06859053	2.40891111	10.390625	4.31341156	9.51386104	3.250031	0.000224	0.0060873
F3	0.88995	0.60680853	0.68184565	8.46462376	35.0264052	4.13797544	9.51134755	3.2496498	0.0001886	0.0060873
PACRG	0.27421598	0.35208133	1.28395629	2.59528826	11.2448668	4.33280072	9.46439468	3.2425102	0.0002653	0.0060873
FAM81B	0.38715268	0.40777088	1.053256	3.64043137	15.6409972	4.29646808	9.4030897	3.2331349	0.0001328	0.0060873
KIF19	0.1467952	0.18226357	1.24161805	1.37710051	5.93987185	4.31331759	9.38110062	3.2297572	0.0001886	0.0060873
AGBL2	0.21508601	0.17688527	0.82239318	1.99353822	8.49416098	4.26084681	9.26856278	3.2123456	0.0001585	0.0060873
ZBBX	0.15635976	0.2186955	1.3986687	1.44568481	6.39268996	4.42191128	9.24588816	3.2088119	8.45E-05	0.0060873
C6orf165	0.25415636	0.31249112	1.22952311	2.3425172	10.1056237	4.31400192	9.21683479	3.2042714	0.000224	0.0060873
CCDC114	0.22843459	0.28006695	1.22602689	2.10191909	9.08194271	4.32078606	9.20140449	3.2018541	0.0001585	0.0060873
MAP6	0.180763	0.18185234	1.00602632	1.65908282	7.08524488	4.27057938	9.17822131	3.1982146	0.0001886	0.0060873
C1orf158	0.28539362	0.34285344	1.20133531	2.61860469	11.4538478	4.37402708	9.17541413	3.1977733	0.0002653	0.0060873
FAM92B	0.36680207	0.60695483	1.65472029	3.34425243	14.4943994	4.33412241	9.11732153	3.1886101	0.000173	0.0060873
TEKT1	0.62552507	0.77403276	1.23741285	5.66482289	24.9498807	4.40435319	9.05610849	3.1788912	0.0001328	0.0060873
LRRC71	0.15920575	0.2148024	1.34921261	1.43920074	6.0263442	4.18728537	9.03987925	3.1763035	0.0002056	0.0060873
CSF3	0.11719184	0.3158412	2.69507848	1.05457486	4.84834361	4.59743902	8.99870569	3.1697175	2.94E-05	0.0060873
C1orf87	0.2349576	0.31512668	1.34120657	2.11370549	9.14429922	4.32619362	8.99611445	3.169302	0.000173	0.0060873
ZNF474	0.16031439	0.16088159	1.00353804	1.44090891	6.20898382	4.3090745	8.98801978	3.1680033	0.000173	0.0060873
SAA1	0.77129441	0.78235572	1.01434123	6.92951718	30.0205785	4.33227564	8.9842699	3.1674013	0.0001111	0.0060873
C11orf70	0.60522097	1.00712811	1.66406678	5.43428851	23.9863009	4.41388065	8.97901559	3.1665573	0.000173	0.0060873
FAM166B	0.57563752	0.54195473	0.94148611	5.16809479	22.7456956	4.40117617	8.97803675	3.1664	9.26E-05	0.0060873
ALDH3A1	0.79869624	0.68236351	0.85434671	7.15234371	30.9548741	4.32793436	8.95502362	3.1626972	0.0001452	0.0060873
DNAH3	0.17184629	0.16667467	0.96990557	1.53641487	6.57682184	4.28062886	8.94063471	3.1603773	0.0001886	0.0060873
SLC27A2	0.50607355	0.54998003	1.0867591	4.51621281	18.4171769	4.07801352	8.92402468	3.1576945	0.0002653	0.0060873
PERP	0.48329887	0.3781832	0.78250379	4.30406203	17.8109707	4.13817705	8.90559101	3.1547114	0.000173	0.0060873
GAS2L2	0.14847526	0.23742356	1.59907833	1.3192027	5.61475087	4.25616993	8.88500039	3.1513718	0.0001886	0.0060873
LRRIQ1	0.14570012	0.15555451	1.06763474	1.2944246	5.69130692	4.39678519	8.88417004	3.151237	7.02E-05	0.0060873
FAM83H-AS1	0.1266563	0.12895805	1.0181732	1.12352277	4.80601201	4.27762761	8.87064258	3.1490386	0.0001452	0.0060873
ARMC4	0.13031441	0.18396649	1.41171254	1.15217348	5.03062414	4.36620374	8.84148916	3.1442894	0.0001328	0.0060873
SAXO2	0.32669804	0.36713649	1.12377929	2.88787475	12.3923921	4.29118062	8.83958399	3.1439785	0.0002653	0.0060873
CRYM	0.12337758	0.13952172	1.1308515	1.07555914	4.77160053	4.43639068	8.71762205	3.1239347	0.0001111	0.0060873
DTHD1	0.23811098	0.24293351	1.0202533	2.05518786	8.13014149	3.95591159	8.63121852	3.1095642	0.0002653	0.0060873
C1orf194	0.63463311	0.93646775	1.47560493	5.46790421	22.8656623	4.18179643	8.61585078	3.1069933	0.0001886	0.0060873
SNTN	0.76580872	0.72119917	0.94174844	6.57815955	28.4370208	4.32294483	8.58982059	3.102628	0.0001111	0.0060873
RSPH1	1.05944479	1.2709436	1.19963175	9.04225416	38.2014004	4.22476516	8.53489892	3.0933741	0.0001215	0.0060873
C10orf107	0.15573537	0.23053604	1.48030619	1.31845703	5.86770296	4.45043171	8.46600876	3.081682	5.81E-05	0.0060873
FOXJ1	0.5664735	0.67388506	1.18961443	4.79081125	20.2881092	4.23479619	8.45725567	3.0801896	0.0001585	0.0060873
ECT2L	0.19349137	0.21717368	1.12239463	1.63635916	6.79345629	4.15156799	8.45701353	3.0801483	0.000224	0.0060873
PLS1	0.15631098	0.1003483	0.64197855	1.31835164	5.5405914	4.20266584	8.43415892	3.0762442	0.0001328	0.0060873
AKAP14	0.42609749	0.49926584	1.17171739	3.58909314	14.8538374	4.1386046	8.42317363	3.0743639	0.0002056	0.0060873
RSPH4A	0.39782147	0.40508622	1.01826132	3.32467621	14.5519227	4.37694435	8.35720654	3.0630208	7.70E-05	0.0060873
CFAP126	1.50249117	1.22041381	0.81226022	12.4968686	54.1651699	4.33429937	8.31743232	3.0561382	0.0001111	0.0060873
MAATS1	0.14910563	0.14266011	0.95677214	1.23799439	5.36534053	4.3338973	8.30280102	3.0535981	0.0001452	0.0060873
DNAH9	0.25089192	0.30500594	1.21568657	2.07839214	9.04187843	4.35041985	8.28401371	3.0503299	0.0001328	0.0060873
AGR3	0.87192252	1.01602013	1.16526424	7.22206119	30.5039061	4.22371194	8.28291626	3.0501388	0.0001015	0.0060873
KRT8	1.27934317	0.86970216	0.67980365	10.5916691	44.5047286	4.20186167	8.27898985	3.0494548	0.0002653	0.0060873
VWA3B	0.21897311	0.27501536	1.2559321	1.79460603	7.74286853	4.31452274	8.19555438	3.0348415	0.0002438	0.0060873
VWA3A	0.20266152	0.27453202	1.35463316	1.65751686	7.23352348	4.36407234	8.17874484	3.0318795	0.0001585	0.0060873
CACNG6	0.18895389	0.18945775	1.00266656	1.5452863	6.53586202	4.22954765	8.17811318	3.031768	5.81E-05	0.0060873
LRRC48	0.65506417	0.57299575	0.87471697	5.34284905	21.7992817	4.08008564	8.15622236	3.0279011	0.0001015	0.0060873
MUC15	0.15451491	0.16832282	1.08936293	1.25788056	5.50234745	4.3743004	8.14083612	3.025177	0.0001328	0.0060873
CLDN1	0.19960616	0.16794818	0.8413978	1.62070589	6.94826428	4.28718396	8.11951858	3.0213942	0.0002056	0.0060873
CCDC37	0.3810092	0.54258321	1.42406853	3.09098135	13.5739383	4.3914656	8.11261612	3.0201672	0.000173	0.0060873
C9orf24	1.35445476	1.22790703	0.90656925	10.9377298	45.6623952	4.17475986	8.07537476	3.0135292	0.0002653	0.0060873

SELENBP1	0.42851308	0.43888048	1.02419389	3.44406896	14.8476439	4.31107626	8.0372551	3.0067029	5.81E-05	0.0060873
CDHR4	0.4571371	0.56400288	1.23377184	3.6627509	15.9536645	4.35565097	8.01236846	3.0022288	8.45E-05	0.0060873
EFHB	0.1285261	0.14922616	1.16105722	1.0263761	4.19342967	4.08566574	7.98574043	2.9974262	0.000224	0.0060873
ANKRD65	0.18635729	0.2336759	1.25391337	1.48807769	6.40449077	4.30386855	7.98507906	2.9973067	0.0001328	0.0060873
CCDC33	0.27748841	0.44035009	1.58691344	2.20772512	9.70149512	4.39434015	7.95609847	2.9920611	0.0001585	0.0060873
FZD6	0.1340197	0.11378191	0.84899393	1.06413727	4.48714735	4.21669975	7.94015551	2.9891673	0.0001886	0.0060873
NME5	0.24839114	0.30505226	1.22811248	1.96830383	8.75149005	4.44620893	7.92421116	2.9862673	4.36E-05	0.0060873
DYDC2	0.19175065	0.26390109	1.37627225	1.51250209	6.61212477	4.37164671	7.88785919	2.9796338	0.0001111	0.0060873
LRRC10B	0.29495459	0.36686052	1.24378644	2.32597556	9.90286925	4.25751218	7.8858767	2.9792712	0.0001328	0.0060873
C20orf85	3.27040553	3.69574638	1.13005753	25.7827122	108.104769	4.19291688	7.88364379	2.9788626	0.0001452	0.0060873
C9orf171	0.2160824	0.31418807	1.45401971	1.698359	7.42302311	4.3707032	7.85977479	2.974488	0.0001585	0.0060873
S100A2	0.27285285	0.25061871	0.91851233	2.13860256	8.55987374	4.00255472	7.83793377	2.9704734	0.0002056	0.0060873
TRIM2	0.23187486	0.35512822	1.53155123	1.81413028	7.83327701	4.31792419	7.82374733	2.9678598	0.0001585	0.0060873
ERBB3	0.17524135	0.2027525	1.1569901	1.37059975	5.48941923	4.00512202	7.82121205	2.9673922	0.0001585	0.0060873
OR7E47P	0.17823327	0.31188092	1.74984677	1.38411661	6.19168033	4.47338056	7.76575883	2.9571269	5.28E-05	0.0060873
TSPAN6	0.29768221	0.21023909	0.70625345	2.24989374	9.2137123	4.09517665	7.55803889	2.9180119	0.0001886	0.0060873
CLDN3	0.17374765	0.26215072	1.50880152	1.30535021	5.70108432	4.36747495	7.51290862	2.9093716	0.000173	0.0060873
DNAAF1	0.46919349	0.58304087	1.24264482	3.52009921	14.6530364	4.16267713	7.50244675	2.9073612	0.0001111	0.0060873
DDR1	0.65016059	0.42467959	0.65319185	4.87516921	20.0787024	4.11856523	7.4984078	2.9065843	0.0002438	0.0060873
C16orf89	0.16460175	0.18532362	1.12589101	1.21612904	5.40552436	4.44486086	7.38831194	2.8852448	3.96E-05	0.0060873
CFAP52	0.3982197	0.40249739	1.01074203	2.92826044	12.7068813	4.33939587	7.35337909	2.8784074	0.0001111	0.0060873
LMO7	0.21332629	0.10774436	0.50506838	1.56428405	6.28487669	4.01773366	7.3328236	2.8743688	0.0001585	0.0060873
C9orf116	1.8720029	1.53162033	0.81817199	13.720898	56.6098021	4.12580883	7.32952818	2.8737203	0.000173	0.0060873
TCTE1	0.22148656	0.33993984	1.53481028	1.60984382	7.1288576	4.42829144	7.2683591	2.8616297	6.39E-05	0.0060873
CCDC42B	0.39968287	0.60591681	1.51599397	2.90424041	12.2098924	4.20416036	7.26636207	2.8612333	0.0002653	0.0060873
LOC10192741	0.76847395	0.74205933	0.96562718	5.52757361	23.9930911	4.34061901	7.19292257	2.8465781	0.0001328	0.0060873
CD164L2	0.17571626	0.27394384	1.55901243	1.25950511	5.43568689	4.3157323	7.16783463	2.8415374	0.0001585	0.0060873
DYNLRB2	0.29664572	0.33358086	1.12450926	2.11723939	8.74128671	4.12862464	7.13726583	2.8353715	0.0001585	0.0060873
AK8	0.27917364	0.24575446	0.88029252	1.99125985	8.16715751	4.10150263	7.13269299	2.8344469	0.0002056	0.0060873
RIBC1	0.345375	0.32577489	0.94324977	2.46227611	10.2393147	4.15847543	7.12928292	2.833757	0.0002438	0.0060873
CCDC81	0.21742524	0.25364437	1.16658198	1.54513206	6.6606327	4.31072068	7.10649805	2.8291388	0.0002653	0.0060873
CCDC74B	0.19097229	0.26181448	1.37095538	1.34316017	5.64267092	4.20104097	7.03327273	2.8141962	0.0001215	0.0060873
CCDC181	0.16335011	0.23314174	1.42725183	1.14695456	4.80138337	4.1862019	7.02144958	2.8117689	0.0001215	0.0060873
C9orf135	0.40815901	0.54847508	1.34377794	2.85423606	11.8468549	4.15062196	6.99295123	2.8059014	5.28E-05	0.0060873
TSPAN19	0.32670281	0.46191435	1.41386705	2.27740866	9.27219975	4.07138162	6.9708878	2.8013424	0.0001215	0.0060873
CFAP53	0.27199677	0.24761157	0.91034748	1.88923488	7.87464656	4.16816705	6.94579906	2.7961407	0.0001585	0.0060873
LRRC4	0.24762498	0.24366003	0.98398808	1.70729828	7.01346989	4.10793472	6.89469319	2.7854864	9.26E-05	0.0060873
LAMC2	0.1915932	0.18298398	0.95506512	1.31492012	5.61743535	4.27207346	6.86308359	2.7788569	0.0001215	0.0060873
C22orf15	0.36117766	0.46377062	1.28405125	2.47331914	10.3853071	4.19893533	6.84792955	2.7756679	8.45E-05	0.0060873
LDLRAD1	0.81689105	0.91880916	1.12476341	5.58922425	23.9184549	4.27938724	6.84206818	2.7744325	0.000224	0.0060873
TMEM45B	0.29265144	0.33238772	1.13578023	1.97653486	8.22451347	4.16107687	6.75388738	2.7557181	0.0001328	0.0060873
RAB36	0.24823905	0.30064051	1.21109272	1.66971333	7.00444261	4.19499711	6.7262316	2.7497985	0.0001328	0.0060873
WDR63	0.15512415	0.17219586	1.1100519	1.0301542	4.21280453	4.08948927	6.64083708	2.7313651	5.28E-05	0.0060873
TPPP3	3.68878031	4.06773141	1.10273073	24.4231442	103.365555	4.23227878	6.62092674	2.7270332	0.0001585	0.0060873
DNAI2	0.36254278	0.43166457	1.19065829	2.3661368	9.89070345	4.18010635	6.52650371	2.7063103	0.0001015	0.0060873
KCNRG	0.29535674	0.38154125	1.291798	1.9249672	8.28923975	4.30617194	6.51743106	2.7043034	0.0001886	0.0060873
CFAP70	0.359072	0.33405567	0.9303306	2.31923907	9.15806504	3.94873696	6.45898051	2.6913065	0.000224	0.0060873
LRRC46	1.11625038	1.10388143	0.98891919	7.14880305	29.7409645	4.16027191	6.40430064	2.679041	0.0001328	0.0060873
RIPK4	0.16691712	0.13862118	0.83047911	1.06754295	4.21079861	3.94438334	6.39564695	2.6770903	0.0002056	0.0060873
CCDC78	1.15250335	0.95740234	0.83071545	7.08345088	28.8514474	4.07307793	6.14614345	2.6196814	0.000173	0.0060873
DMKN	0.37382697	0.53821462	1.43974262	2.29173723	9.99128716	4.35970016	6.13047591	2.6159991	0.0001328	0.0060873
SCGB2A1	0.26919565	0.64623292	2.40060682	1.64846432	7.33666892	4.45060827	6.12366622	2.6143956	8.45E-05	0.0060873
DLEC1	0.67659597	0.48774541	0.72088135	4.14322909	16.8697357	4.07163961	6.12363845	2.6143891	0.0002438	0.0060873
C16orf71	0.25496887	0.24425926	0.9579964	1.5538171	6.25306639	4.02432589	6.09414438	2.6074237	0.0001328	0.0060873
BAIAP3	0.25285313	0.1957455	0.77414704	1.53645186	6.10356788	3.97250838	6.07645969	2.603231	0.0002653	0.0060873
RRAD	0.64062883	0.68296485	1.0660851	3.88447905	16.2306431	4.17833198	6.06354079	2.6001605	7.02E-05	0.0060873
C9orf117	0.70139178	0.57141546	0.81468799	4.23623586	17.6208851	4.15956186	6.03975691	2.5944905	0.0001015	0.0060873
KIAA1324	0.30266707	0.45364301	1.49881853	1.80864825	7.29023338	4.03076352	5.9757022	2.5791083	7.70E-05	0.0060873
KLF5	0.86669921	0.32703757	0.37733687	4.97794218	19.9084448	3.99933227	5.74356379	2.5219462	0.0001886	0.0060873
MAPK15	0.8402401	0.68748035	0.81819512	4.81726381	19.1066045	3.96627739	5.73319911	2.5193404	0.0001215	0.0060873
WDR38	0.68621442	0.85201967	1.24162309	3.8324509	15.371052	4.01076294	5.58491743	2.481536	8.45E-05	0.0060873
C11orf52	0.27427885	0.43254896	1.5770409	1.5002335	6.67891537	4.45191724	5.46973828	2.4514718	7.02E-05	0.0060873
TSNAXIP1	0.32466746	0.25642752	0.78981588	1.75244091	7.16077946	4.08617456	5.39764871	2.4323311	0.000173	0.0060873
SAA2	0.51637757	0.69386704	1.34372034	2.74649813	12.0641436	4.39255482	5.31877896	2.4110951	7.02E-05	0.0060873
CCND1	0.42987518	0.24387018	0.56730464	2.24797653	8.03125813	3.57266103	5.22937042	2.3866373	0.0001886	0.0060873

TMC4	0.6136397	0.48135617	0.78442801	3.19436375	13.0177038	4.07521022	5.20560148	2.3800649	0.0001015	0.0060873
CNGA4	0.19596396	0.24239664	1.236945	1.01035976	4.13654447	4.09413026	5.15584481	2.3662088	0.0001215	0.0060873
LOC730101	0.2267186	0.1550637	0.68394786	1.16218851	4.48931304	3.86280969	5.12612784	2.3578695	0.0001886	0.0060873
CCDC113	0.32806018	0.24937902	0.76016243	1.65706936	6.61665294	3.99298491	5.05111398	2.3366016	0.0001585	0.0060873
TTC25	0.49215799	0.43896683	0.8919226	2.46282408	9.81099569	3.98363642	5.00413312	2.3231202	0.0001585	0.0060873
SPATA18	0.8274801	0.56691073	0.68510497	4.092145	15.9514681	3.89807011	4.94530924	2.3060607	0.0001886	0.0060873
MNS1	0.35413488	0.2442215	0.68962849	1.73506834	6.42395999	3.70242476	4.89945618	2.2926216	0.0002653	0.0060873
EPS8L2	0.27785819	0.25397246	0.91403628	1.35213584	5.03457598	3.72342469	4.86628038	2.2828194	0.0001886	0.0060873
PTPRU	0.29704345	0.17468579	0.58808163	1.44101391	5.46267185	3.79085296	4.85118906	2.2783384	0.0002653	0.0060873
CCDC17	0.97243377	0.68786222	0.70736151	4.66629732	18.5822558	3.98222714	4.79857597	2.2626063	6.39E-05	0.0060873
SCNN1A	0.67104535	0.31636113	0.47144523	3.21752246	12.3754304	3.84626079	4.79479139	2.261468	0.0001452	0.0060873
TCTEX1D2	0.86203955	0.82306301	0.95478567	4.08416259	14.8846608	3.64448291	4.73779028	2.2442143	9.26E-05	0.0060873
HES1	1.07445327	0.70050859	0.65196748	5.07230914	20.8479487	4.11014946	4.72082806	2.2390399	9.26E-05	0.0060873
CCDC180	0.26921144	0.2054731	0.76324062	1.22705385	4.31368372	3.51548036	4.55795588	2.188387	0.0002653	0.0060873
SLC22A23	0.31371398	0.18128602	0.57787039	1.42122238	5.39765035	3.79789287	4.53031261	2.1796106	0.0001111	0.0060873
C1orf189	0.64407025	0.7621257	1.18329593	2.8845214	11.4015084	3.9526517	4.47858197	2.163042	5.28E-05	0.0060873
C7orf57	0.43691184	0.38294191	0.8764741	1.94955223	7.51940976	3.85699324	4.46211808	2.1577287	0.0001585	0.0060873
C16orf93	0.23236065	0.1957085	0.8422618	1.02295207	3.99936554	3.90963141	4.40243256	2.1383009	0.000173	0.0060873
CAPS	5.37379976	3.57680872	0.66560141	23.6089186	86.5141023	3.66446696	4.39333799	2.1353175	0.0002653	0.0060873
FAM47E	0.35102963	0.26121853	0.74414952	1.49570275	5.54981663	3.71050774	4.2609017	2.0911588	0.0001015	0.0060873
ADAM28	0.32122017	0.21079433	0.65623007	1.3394427	4.96595952	3.70748188	4.16985868	2.0599985	0.000224	0.0060873
RSPH9	0.72215138	0.8644046	1.19698531	2.96839672	11.2153683	3.77825788	4.11049095	2.0393107	0.0001886	0.0060873
SLC15A2	0.38514841	0.16947712	0.44003069	1.56684879	5.45051571	3.47864819	4.06816888	2.0243796	0.0002438	0.0060873
FBXO36	0.29934756	0.17840456	0.59597799	1.2134879	4.492539	3.70217042	4.05377584	2.0192663	0.0001452	0.0060873
DRC7	0.26578692	0.24781977	0.93240019	1.0730846	3.88471062	3.62013455	4.03738676	2.0134218	0.0002056	0.0060873
CCDC146	0.89502	0.4322282	0.48292574	3.61215038	12.9579307	3.58731761	4.03583202	2.0128661	0.0001886	0.0060873
CELSR1	0.48875124	0.43347378	0.88690062	1.96279039	7.71479127	3.93052224	4.01592921	2.0057338	0.000173	0.0060873
SGPP2	0.2929337	0.44031017	1.50310522	1.1490461	4.56012712	3.96861982	3.92254668	1.9717906	1.96E-05	0.0060873
DNAAF3	0.52889202	0.45026635	0.85133889	2.02945573	7.6504029	3.76968209	3.83718346	1.9400477	8.45E-05	0.0060873
FAM179A	0.40885602	0.32463324	0.79400381	1.55253051	5.30366947	3.4161451	3.79725481	1.9249568	7.02E-05	0.0060873
FABP6	0.71465317	0.91585178	1.28153324	2.71077191	10.4575111	3.85776135	3.79312937	1.9233886	0.0001886	0.0060873
CDH26	0.3101241	0.29539102	0.95249297	1.16551016	4.43511502	3.80529932	3.75820574	1.910044	0.0002653	0.0060873
KRT18	3.33433124	2.48036462	0.74388669	11.8239988	43.151164	3.64945606	3.54613802	1.8262487	0.0001111	0.0060873
EPHA2	0.49442183	0.22511887	0.45531742	1.70341991	5.77214885	3.38856486	3.44527651	1.7846198	0.000173	0.0060873
TMEM231	1.70840762	0.62686671	0.36693041	5.87418356	20.2328625	3.44437015	3.43839695	1.7817361	0.000173	0.0060873
EFHC1	1.53288473	0.67671878	0.44146749	5.00226405	16.4095995	3.28043449	3.26330086	1.706332	0.000173	0.0060873
DNALI1	1.12296214	0.54446362	0.48484593	3.53755459	12.1898133	3.44583044	3.15019935	1.6554431	0.0001328	0.0060873
PRR29	0.86824238	0.43039171	0.49570456	2.70033932	9.7199804	3.59954037	3.11012153	1.636971	0.0001215	0.0060873
KRT23	0.32703809	0.71764128	2.19436603	1.00536599	4.1321706	4.11011575	3.07415565	1.6201902	1.16E-05	0.0060873
PODXL	0.37347421	0.1746446	0.46762158	1.05083551	3.63788765	3.46190021	2.81367625	1.4924563	7.70E-05	0.0060873
BIK	0.52327047	0.44120496	0.84316808	1.43941898	5.30889537	3.68822103	2.75081255	1.4598578	3.96E-05	0.0060873
CFH	0.4579365	0.43198393	0.94332715	1.25190413	3.70490388	2.95941501	2.73379419	1.4509046	0.0002056	0.0060873
ARHGAP39	0.3962176	0.23153953	0.58437469	1.08240868	3.64664245	3.36900702	2.73185415	1.4498805	0.000224	0.0060873
EVA1C	0.93008057	0.41560639	0.44684988	2.383766	7.01954433	2.94472877	2.56296721	1.357815	0.000224	0.0060873
KIAA1211L	0.77366579	0.28953016	0.37423157	1.95494196	6.08460135	3.11242046	2.52685588	1.3373434	0.0001452	0.0060873
LAMB3	0.60498973	1.42279663	2.35176987	1.52452713	5.46798806	3.58667809	2.51992232	1.3333793	2.17E-05	0.0060873
LRRC23	3.00136621	1.12340732	0.37429865	7.25995546	22.5327817	3.10370798	2.41888359	1.2743413	7.02E-05	0.0060873
SERPINF1	6.32510586	2.44720011	0.38690263	14.8018636	40.1180591	2.71033838	2.34017643	1.2266173	0.0001886	0.0060873
C3	5.69516245	5.12255368	0.89945699	12.5265866	41.4950026	3.31255466	2.19951348	1.1371844	7.02E-05	0.0060873
C21orf58	0.88961593	0.27163696	0.30534184	1.80710759	5.02369685	2.77996555	2.03133457	1.0224279	0.0002056	0.0060873
KCTD1	0.71572369	0.3277139	0.45787768	1.38512586	3.86488916	2.79028012	1.93528017	0.9525424	9.26E-05	0.0060873
ABHD17C	0.7291176	0.2845317	0.39024116	1.39543216	3.87828106	2.77926881	1.91386431	0.9364886	0.0001886	0.0060873
EPS8	0.93381959	0.31048079	0.33248477	1.74477644	4.77508056	2.73678647	1.86842991	0.9018264	1.44E-05	0.0060873
LRRC6	1.23018445	0.51892223	0.42182474	2.22983568	4.74339885	2.12724143	1.81260272	0.8580628	0.0002056	0.0060873
KIAA1161	0.61118879	0.25039221	0.40968064	1.09322205	2.67937465	2.450897	1.78868144	0.8388965	0.0001215	0.0060873
LOC10050695	0.75191017	0.53973329	0.71781618	1.29254723	3.5952068	2.7814897	1.71901814	0.7815848	0.0001215	0.0060873
FAM188B	0.65108628	0.2819911	0.43310865	1.10800823	2.83497696	2.55862446	1.70178404	0.767048	0.000173	0.0060873
CXCL1	3.99187237	16.2688017	4.07548143	6.72067209	26.4945101	3.94224116	1.68358892	0.7515399	3.96E-05	0.0060873
SLC22A4	2.42281938	0.82201768	0.33928145	4.00711732	8.4066455	2.09792847	1.65390675	0.7258779	0.0001328	0.0060873
CCDC96	0.97805393	0.40305774	0.41210175	1.54466347	3.06830237	1.9863889	1.57932341	0.6593066	0.0001452	0.0060873
S100P	26.4755938	16.5648924	0.62566651	41.7034455	82.8733087	1.98720532	1.57516563	0.6555035	0.0001452	0.0060873
IQCK	1.33963555	0.4689742	0.35007596	2.07114063	4.51641887	2.18064327	1.54604783	0.6285849	0.0001886	0.0060873
IFT140	1.8818731	0.36108999	0.19187797	2.84556986	5.60858226	1.97098737	1.51209444	0.5965483	0.000224	0.0060873
ALPL	1.36506059	5.10220732	3.7377149	1.91894134	5.95071043	3.10103822	1.40575543	0.4913456	7.70E-05	0.0060873
SLC9A3R2	2.15921528	1.1159276	0.51682091	3.00997855	6.20464456	2.0613584	1.39401503	0.4792461	0.000173	0.0060873

KIAA1522	5.04469586	0.91729748	0.18183405	6.52998636	10.1223197	1.55012877	1.29442617	0.3723127	0.0001328	0.0060873
RFX2	4.59598828	1.00612025	0.21891271	5.76734437	8.33708657	1.44556767	1.2548649	0.3275321	0.0001111	0.0060873
CC2D2A	4.18514517	1.2317156	0.29430654	5.19230291	8.44677629	1.62678804	1.24065061	0.3110969	7.02E-05	0.0060873
IFT46	4.11621759	0.74044378	0.17988451	4.77027682	7.0997296	1.48832654	1.15889812	0.2127537	1.04E-05	0.0060873
MKS1	2.78535103	0.66699437	0.2394651	3.07346182	3.75589659	1.22204108	1.10343787	0.1420054	0.0002653	0.0060873
LRG1	3.12885114	7.83536173	2.50422963	3.39497318	8.72001044	2.56850643	1.08505424	0.1177672	0.0001328	0.0060873
CCL3L1	2.36494648	4.93052458	2.08483558	2.52014289	3.02553711	1.20054189	1.06562365	0.091698	7.02E-05	0.0060873
IL1R1	1.94687593	2.51135538	1.28994115	1.81222583	3.21399891	1.77350905	1.07430095	-0.1033982	7.70E-05	0.0060873
VEGFA	5.46029621	10.1991837	1.86788102	4.68176182	5.69221107	1.21582671	1.1662909	-0.2219277	0.000224	0.0060873
MXD1	7.35938483	13.1313343	1.78429782	4.99843364	3.1422923	0.6286554	1.47233821	-0.5581091	0.0002056	0.0060873
HCAR3	33.5957862	63.9314266	1.90295968	20.6514682	9.25700236	0.44824912	1.62679892	-0.7020359	0.0001215	0.0060873
MIR1909	4.9007931	11.81717	2.41127707	2.12853636	6.89226993	3.2380325	2.30242395	-1.2031535	1.29E-05	0.0060873
CCL3	17.103481	49.8397709	2.91401328	7.30334759	7.41228115	1.01491557	2.34186869	-1.2276602	0.000224	0.0060873
ADGRG3	2.06807125	7.94214934	3.84036544	0.86691621	1.23261117	1.42183426	2.38554916	-1.2543214	0.0001328	0.0060873
MIR6869	6.47627931	21.1777345	3.27004651	2.36369546	11.0867144	4.69041576	2.73989583	-1.454121	0.0001886	0.0060873
EGR3	1.40559439	6.06870679	4.3175377	0.462658	0.66587733	1.43924308	3.03808514	-1.6031623	2.17E-05	0.0060873
PI3	13.9443812	62.0314199	4.44848855	4.00017932	8.96156495	2.24029081	3.48593902	-1.8015473	3.59E-05	0.0060873
MIR155	13.4453632	57.0580994	4.24370086	2.53289765	11.8782553	4.68959148	5.30829312	-2.408248	0.0001452	0.0060873
CXCL8	126.375311	633.06233	5.00938296	23.2890936	43.7760563	1.87968055	5.42637309	-2.4399882	2.17E-05	0.0060873
G0S2	18.3081045	80.0450132	4.37210816	3.17077464	6.23100219	1.96513562	5.77401633	-2.5295752	4.82E-06	0.0060873
SLC6A14	0.01932551	0.0301646	1.56086925	1.16519338	5.34928629	4.59090003	60.29301	5.9139188	0.0002884	0.0061067
KRT5	0.26873448	0.43638389	1.62384781	15.6026266	72.087418	4.62021043	58.0596386	5.8594637	0.0002884	0.0061067
SLITRK6	0.02362869	0.05027643	2.12777101	1.12417303	5.1414199	4.57351293	47.5766211	5.5721809	0.0002884	0.0061067
CHL1	0.03142279	0.03766181	1.19855089	1.46660207	6.75734718	4.6074851	46.6732043	5.5445226	0.0002884	0.0061067
CXCL6	0.10136848	0.16586632	1.63627121	4.72337478	21.9391554	4.64480513	46.59609	5.542137	0.0002884	0.0061067
MUC13	0.05521645	0.09363522	1.6957851	2.54555756	11.5686974	4.54466149	46.1014389	5.5267399	0.0002884	0.0061067
FGFR2	0.03970769	0.0647966	1.63184009	1.44818102	6.54993012	4.52286698	36.4710453	5.1886796	0.0002884	0.0061067
CEACAM6	0.29208678	0.30110513	1.03087559	6.57643907	28.8537321	4.38744005	22.5153603	4.4928377	0.0002884	0.0061067
TMEM98	0.1168211	0.13606974	1.16477018	1.81266716	7.78730716	4.29604911	15.5166071	3.9557412	0.0002884	0.0061067
ERICH5	0.23755655	0.26459057	1.11380035	3.26344983	13.8195873	4.23465597	13.7375703	3.780055	0.0002884	0.0061067
NCKAP1	0.09238574	0.08465679	0.91634045	1.22256435	5.0920318	4.16504196	13.2332577	3.7260964	0.0002884	0.0061067
CCNO	0.15968817	0.19326076	1.21023847	1.8705249	8.17343737	4.36959561	11.71361	3.5501139	0.0002884	0.0061067
ITGA2	0.1055178	0.07809536	0.74011545	1.15814045	4.79260304	4.13818811	10.9757824	3.4562519	0.0002884	0.0061067
IGFBP5	0.22951046	0.29323962	1.27767431	2.40511559	10.3830601	4.31707322	10.4793289	3.3894744	0.0002884	0.0061067
CCDC108	0.18078321	0.22945305	1.26921659	1.82584008	7.67455087	4.2032985	10.0996111	3.3362278	0.0002884	0.0061067
EPB41L4B	0.11535873	0.12581514	1.09064257	1.07848703	4.63904139	4.30143458	9.34898484	3.2248097	0.0002884	0.0061067
TEKT2	0.45327868	0.69866284	1.54135385	4.09911481	17.954605	4.38011763	9.0432552	3.1768422	0.0002884	0.0061067
MDH1B	0.15039952	0.13147048	0.87414162	1.34499799	5.66376929	4.21098718	8.94283429	3.1607321	0.0002884	0.0061067
DNAJB13	0.15533603	0.17212318	1.10806987	1.30391577	5.53461842	4.24461346	8.39416155	3.0693862	0.0002884	0.0061067
IQCD	0.15818057	0.23638262	1.49438465	1.15438594	4.81460646	4.17070781	7.29789963	2.8674813	0.0002884	0.0061067
FBXO15	0.23589633	0.21107197	0.89476582	1.21140798	4.69284648	3.87387781	5.13534055	2.36046	0.0002884	0.0061067
DSP	0.50943135	0.85922315	1.68663188	2.48051087	10.2425879	4.12922515	4.86917595	2.2836776	0.0002884	0.0061067
SPAG8	0.86143741	0.56467915	0.65550804	3.90991127	14.9969241	3.83561749	4.53882222	2.182318	0.0002884	0.0061067
MUC20	1.10453391	0.86180472	0.78024288	4.58244432	16.7106244	3.64666175	4.14875837	2.0526796	0.0002884	0.0061067
ARL4D	0.44102748	0.31768578	0.72033102	1.68681409	6.0465237	3.58458216	3.82473694	1.9353605	0.0002884	0.0061067
TRAF4	0.58236327	0.47210972	0.81067907	2.20480251	7.74838819	3.51432301	3.78595735	1.9206582	0.0002884	0.0061067
CCDC176	0.70788838	0.34408611	0.48607396	2.42495582	7.91254027	3.26296265	3.42561891	1.7763647	0.0002884	0.0061067
GRAMD3	1.15609493	0.49072484	0.4244676	2.31904627	6.10915855	2.63434095	2.00593066	1.0042717	0.0002884	0.0061067
FFAR2	5.40977903	8.08143273	1.49385634	3.53448432	1.83679749	0.51967906	1.53057095	-0.6140699	0.0002884	0.0061067
DAPL1	0.02523514	0.07955117	3.15239692	1.766522	8.18598585	4.63395636	70.0024706	6.1293339	0.0003134	0.0061869
UGT2A1	0.0627279	0.13910559	2.21760329	3.28671479	15.2425314	4.63761913	52.3963813	5.7113953	0.0003134	0.0061869
SLC5A8	0.02558177	0.05599033	2.18868132	1.08665715	4.957737	4.56237463	42.4778016	5.4086372	0.0003134	0.0061869
RHOV	0.03865973	0.07659923	1.9813699	1.48433164	6.66222706	4.4883683	38.3947706	5.2628379	0.0003134	0.0061869
CHP2	0.03504525	0.06013191	1.71583636	1.34529416	6.11322642	4.54415592	38.3873485	5.262559	0.0003134	0.0061869
AQP5	0.09422961	0.14913215	1.58264634	3.60676014	16.5600296	4.59138646	38.2762926	5.2583792	0.0003134	0.0061869
COLCA2	0.03914289	0.07788498	1.9897605	1.37933494	6.2766399	4.55048279	35.2384546	5.1390788	0.0003134	0.0061869
SEMA3F	0.03502247	0.05401501	1.54229608	1.11961717	5.15099788	4.60067781	31.9685408	4.998581	0.0003134	0.0061869
BPIFB1	12.3749211	12.7660568	1.03160713	370.266743	1672.313	4.51650878	29.9207357	4.9030737	0.0003134	0.0061869
SERPINB3	0.79718509	0.87040832	1.09185223	23.6229681	108.268014	4.58316727	29.6329778	4.8891317	0.0003134	0.0061869
SCGB1A1	95.4334834	84.341255	0.88377006	2175.26275	9881.53608	4.5426862	22.7934963	4.5105503	0.0003134	0.0061869
ST6GALNAC1	0.17027715	0.24045415	1.41213402	3.12892586	13.8675537	4.43204933	18.3754893	4.1997108	0.0003134	0.0061869
CYP2B7P	0.20571822	0.20409239	0.99209683	3.65358422	16.3173625	4.46612464	17.7601394	4.150571	0.0003134	0.0061869
ROPN1L	1.05271482	1.25446717	1.19164958	16.2613835	72.1849841	4.43904322	15.4470928	3.9492634	0.0003134	0.0061869
PCDH1	0.07904362	0.09831806	1.2438456	1.14413362	4.93894773	4.31675782	14.4747115	3.8554627	0.0003134	0.0061869
PSCA	1.17856817	1.47368204	1.25040034	16.3482328	72.7928344	4.45264239	13.8712662	3.7940276	0.0003134	0.0061869

CGN	0.09882707	0.12693601	1.28442551	1.29507561	5.67349513	4.38082153	13.1044624	3.7119863	0.0003134	0.0061869
VSTM2L	0.19655802	0.23211311	1.18088847	2.48236851	10.4530506	4.21091813	12.6291894	3.6586901	0.0003134	0.0061869
CCDC74A	0.29861067	0.40435285	1.35411387	3.67216938	15.9959646	4.35599858	12.2975157	3.620295	0.0003134	0.0061869
IRX3	0.16801965	0.20262198	1.20594217	1.84200565	7.98344738	4.33410582	10.9630374	3.4545757	0.0003134	0.0061869
MYH14	0.18932966	0.18339798	0.96867009	1.66089698	6.90296309	4.15616573	8.77251345	3.1329903	0.0003134	0.0061869
RSPH14	0.12999907	0.17785806	1.36814873	1.03825583	4.47837892	4.31336746	7.98664052	2.9975888	0.0003134	0.0061869
RIBC2	0.18248317	0.18250877	1.00014033	1.38380836	5.67450771	4.10064564	7.58321106	2.9228089	0.0003134	0.0061869
PPOX	4.7582031	1.13501393	0.23853835	6.67569091	12.1791812	1.8244076	1.4029857	0.4885003	0.0003134	0.0061869
RNF145	6.44066724	1.51159313	0.23469511	8.199695	7.74588041	0.9446547	1.27311266	0.3483601	0.0003134	0.0061869
RNU1-1	6.39773379	20.6005135	3.2199704	5.36701909	8.1537389	1.51923046	1.19204603	-0.2534399	0.0003134	0.0061869
BPIFA1	3.38598937	3.9539675	1.16774362	908.496043	4250.43398	4.67853879	268.310365	8.067759	0.0003404	0.0062516
KRT15	0.0656195	0.07834847	1.19398143	16.8212256	78.4744987	4.66520697	256.344921	8.0019425	0.0003404	0.0062516
TMEM213	0.01118196	0.01855512	1.65937962	1.26359639	5.87131199	4.64650899	113.003119	6.8202188	0.0003404	0.0062516
NTS	0.05469329	0.15844911	2.89704819	4.96583521	23.0836905	4.64850112	90.7942259	6.5045286	0.0003404	0.0062516
SCGB3A1	14.9291328	16.6123095	1.11274444	897.249505	4166.11522	4.64320704	60.1005776	5.909307	0.0003404	0.0062516
SCNN1G	0.02754778	0.04398682	1.59674652	1.2137931	5.64221957	4.64841955	44.0613834	5.4614429	0.0003404	0.0062516
CYP2A13	0.05541324	0.14360717	2.59156772	1.49622796	6.89961571	4.6113399	27.0012713	4.7549554	0.0003404	0.0062516
SERPINB11	0.08560155	0.15979678	1.86675093	1.74868921	7.92996749	4.53480666	20.428242	4.3524931	0.0003404	0.0062516
PITX1	0.06667778	0.0883344	1.32479517	1.09851711	4.90264056	4.46296239	16.4750113	4.0422076	0.0003404	0.0062516
FOXA1	0.17857917	0.21273129	1.19124362	2.8208459	12.6526663	4.48541564	15.7960527	3.9814922	0.0003404	0.0062516
KLK11	0.28875498	0.46503107	1.61046943	4.28306297	19.0640697	4.45103653	14.8328625	3.8907251	0.0003404	0.0062516
DEGS2	0.23683484	0.35012929	1.47836901	2.80669931	12.376347	4.40957353	11.8508717	3.5669213	0.0003404	0.0062516
TUBA4B	0.23143388	0.34441389	1.48817402	2.54253532	10.8197319	4.25548932	10.9860118	3.4575958	0.0003404	0.0062516
TTC39A	0.13628823	0.12826299	0.94111564	1.11173656	4.38557249	3.9447947	8.15724529	3.028082	0.0003404	0.0062516
PTPRN2	0.22416546	0.18173253	0.81070711	1.51649653	5.88069542	3.87781661	6.76507664	2.7581063	0.0003404	0.0062516
KIF21A	0.32948915	0.32053342	0.97281937	2.12055922	8.07278086	3.8069113	6.43590007	2.6861419	0.0003404	0.0062516
ZMYND10	1.3234051	1.27143493	0.96072996	7.45569546	29.1779525	3.91351185	5.63372125	2.4940882	0.0003404	0.0062516
PIH1D2	0.43158347	0.29482961	0.68313462	2.17539651	8.25707474	3.79566424	5.04050007	2.3335669	0.0003404	0.0062516
HS3ST1	0.61809455	0.38914064	0.62958109	2.07046936	7.02258076	3.39178202	3.34976155	1.7440584	0.0003404	0.0062516
LARP6	0.5304065	0.61345271	1.15657086	1.63425402	6.19973726	3.79361909	3.08113496	1.6234619	0.0003404	0.0062516
PPP1R36	0.3517836	0.27496349	0.7816268	1.03070627	3.15781309	3.06373714	2.92994404	1.5508731	0.0003404	0.0062516
TTC26	0.43730808	0.19648012	0.44929452	1.01469336	2.9553219	2.91252709	2.32031698	1.2143219	0.0003404	0.0062516
C9orf3	0.80419238	0.31214571	0.38814806	1.64607268	4.59373519	2.79072439	2.04686431	1.0334155	0.0003404	0.0062516
CCL15	0.63917741	0.80457218	1.25876192	1.28901869	3.85085078	2.98742821	2.01668375	1.0119849	0.0003404	0.0062516
IFT22	2.08431207	0.47113699	0.22603956	3.258545	6.93190721	2.12730136	1.56336714	0.6446566	0.0003404	0.0062516
ZBED5-AS1	7.57976552	2.01667135	0.26605986	8.16498818	8.4289245	1.03232538	1.07720855	0.1072976	0.0003404	0.0062516
KRT17	0.0377213	0.0612202	1.62296099	6.3009373	29.0501669	4.61045168	167.039225	7.3840431	0.0003694	0.0064897
MMP10	0.03280443	0.07504756	2.28772648	4.45334622	20.6495084	4.63685224	135.754425	7.0848554	0.0003694	0.0064897
CYP26A1	0.01837466	0.04803073	2.6139651	1.60195884	7.45336666	4.65265803	87.1830369	6.4459756	0.0003694	0.0064897
DNAH12	0.11304464	0.14889709	1.31715308	1.43555596	6.15450888	4.28719539	12.6990184	3.6666451	0.0003694	0.0064897
CLIC6	0.18967336	0.20587737	1.08543112	1.89348435	7.9340804	4.1902012	9.98286913	3.3194545	0.0003694	0.0064897
MORN5	0.61000764	0.82601081	1.35409913	5.84422977	22.9310367	3.92370553	9.58058459	3.2601137	0.0003694	0.0064897
IQCA1	0.35478359	0.26352256	0.74276989	1.21038031	4.54395316	3.75415324	3.41160177	1.7704493	0.0003694	0.0064897
CDS1	1.10230852	0.41345969	0.37508527	3.31977786	10.3401052	3.11469792	3.01165945	1.5905586	0.0003694	0.0064897
IFT81	0.68874938	0.24513737	0.35591664	1.55366149	4.24392409	2.7315629	2.25577189	1.1736212	0.0003694	0.0064897
NEK11	1.37455759	0.46056904	0.33506711	2.74575309	6.7001183	2.44017509	1.99755406	0.9982346	0.0003694	0.0064897
TREML2	1.00993114	1.26527343	1.25283138	0.7303595	0.560245	0.76708114	1.38278634	-0.4675783	0.0003694	0.0064897
CCL4	34.2816659	88.696128	2.5872759	21.2124014	14.3023348	0.67424402	1.61611433	-0.6925293	0.0003694	0.0064897
PROK2	3.02406083	14.0449303	4.64439412	1.41117025	2.17607166	1.54203341	2.14294543	-1.0995951	0.0003694	0.0064897
FCGBP	0.10654969	0.08097404	0.75996504	3.18599969	13.9822821	4.38866399	29.9015377	4.9021478	0.0004008	0.0067357
PRSS23	0.27450687	0.18249384	0.66480609	7.70383611	33.0389557	4.28863688	28.0642741	4.8106628	0.0004008	0.0067357
RAB25	0.0928177	0.12700803	1.36836004	2.06603596	9.09073335	4.40008477	22.2590729	4.4763216	0.0004008	0.0067357
CLCA2	0.06716981	0.10492379	1.56206787	1.34551133	5.94456594	4.418072	20.0314909	4.3241979	0.0004008	0.0067357
SLC23A1	0.12902366	0.11636518	0.90189023	1.42959204	6.18585523	4.32700732	11.0800765	3.4698959	0.0004008	0.0067357
TJP3	0.20916883	0.24478805	1.17028934	2.22184316	9.24639282	4.16158665	10.622248	3.4090172	0.0004008	0.0067357
PPIL6	0.19724274	0.12950018	0.6565523	1.23129521	4.79674194	3.89568797	6.24253749	2.6421326	0.0004008	0.0067357
RIIAD1	0.514796	0.81505695	1.58326202	3.11660968	11.0531308	3.54652393	6.0540674	2.5979047	0.0004008	0.0067357
BAIAP2L1	0.48842221	0.23873468	0.48878753	2.00523205	6.92049111	3.45121709	4.10553005	2.0375685	0.0004008	0.0067357
ERBB2	0.58740097	0.32172923	0.54771655	2.28531627	8.12984631	3.55742722	3.89055587	1.9599763	0.0004008	0.0067357
TOM1L1	0.54972094	0.36747905	0.6684829	1.0749833	2.89909716	2.69687648	1.95550727	0.9675429	0.0004008	0.0067357
PKP4	2.20595241	0.35197121	0.15955521	2.91591818	4.08677629	1.40154011	1.32184093	0.4025486	0.0004008	0.0067357
SNORA7A	9.91658414	45.7980428	4.61832846	9.37335682	33.1784744	3.53965767	1.05795441	-0.0812775	0.0004008	0.0067357
FAM3D	0.16538436	0.22443568	1.35705508	3.57265277	15.7353578	4.40439048	21.6021205	4.433101	0.0004345	0.0070771
TP63	0.0735851	0.05087966	0.69143971	1.36892742	6.06425769	4.42993369	18.6033248	4.2174886	0.0004345	0.0070771
CEACAM5	0.07518733	0.08416565	1.11941274	1.04954386	4.36865156	4.16242876	13.9590528	3.8031291	0.0004345	0.0070771

TMEM190	1.41436332	2.115862	1.49598195	17.6208592	76.1726222	4.32286652	12.4585097	3.6390596	0.0004345	0.0070771
FANK1	0.22742247	0.20025963	0.88056221	1.58217268	6.39257819	4.04037958	6.9569761	2.7984604	0.0004345	0.0070771
LOC10013098	0.35098675	0.34257589	0.97603653	1.03182384	3.49752169	3.38965002	2.93978004	1.5557082	0.0004345	0.0070771
NUCB2	9.32935103	1.87635377	0.20112372	16.6579946	31.3568438	1.88239009	1.78554698	0.8363661	0.0004345	0.0070771
TP53INP2	3.36854138	1.19286105	0.35411797	3.34275955	2.74415951	0.82092638	1.00771274	-0.0110844	0.0004345	0.0070771
SNORD104	255.40281	805.346811	3.15324178	87.3657591	216.125307	2.47379877	2.92337425	-1.5476345	0.0004345	0.0070771
MIR4700	2.44E-05	0.00011394	4.67846608	3.55570778	16.6777319	4.69041129	146001.055	17.155619	0.0004708	0.00746
BCAM	0.04596154	0.07064154	1.53697073	2.30892464	10.303108	4.4622972	50.2360141	5.6506501	0.0004708	0.00746
DAW1	0.11357599	0.13706809	1.2068403	1.47566692	6.39452721	4.33331338	12.9927714	3.6996373	0.0004708	0.00746
LOC10192731	0.2185513	0.46978197	2.14952728	2.33856282	9.71164533	4.15282637	10.7002926	3.4195783	0.0004708	0.00746
FXYD1	0.41386983	0.64573417	1.56023494	3.0513105	12.6993935	4.16194729	7.37263337	2.88218	0.0004708	0.00746
TMEM54	0.27939032	0.46147296	1.65171421	1.22827373	4.44144741	3.61600783	4.39626442	2.1362782	0.0004708	0.00746
C2orf40	0.62546197	0.951197	1.52079109	1.69512046	5.83478164	3.44210443	2.71018948	1.4383937	0.0004708	0.00746
IRAK2	3.03852441	8.37526333	2.75635874	1.66146932	1.16652758	0.702106	1.82881765	-0.8709112	0.0004708	0.00746
C4orf22	0.06230159	0.11078086	1.77813871	1.32483894	5.85631942	4.42040103	21.2649311	4.4104043	0.0005098	0.0078925
SULT2B1	0.10885417	0.20790181	1.9099114	1.44945976	6.0989982	4.2077734	13.3156113	3.7350468	0.0005098	0.0078925
STEAP4	0.49069386	0.91530889	1.86533593	3.39835082	11.8068658	3.4742928	6.92560287	2.7919397	0.0005098	0.0078925
TTLL10	0.40874765	0.38162834	0.93365268	1.61859961	5.78539133	3.574319	3.9598995	1.9854638	0.0005098	0.0078925
PDLIM4	0.45675903	0.46089836	1.0090624	1.3877697	4.48187463	3.22955216	3.03829726	1.603263	0.0005098	0.0078925
TNKS1BP1	0.4121243	0.15233809	0.36964112	1.03808041	2.90180101	2.79535283	2.51885271	1.3327668	0.0005098	0.0078925
CFAP44	0.52045893	0.21794986	0.41876476	1.30590455	3.74931804	2.87105061	2.50914043	1.3271932	0.0005098	0.0078925
CENPM	4.14536862	2.76563677	0.66716305	7.06736955	18.7358886	2.6510413	1.70488326	0.769673	0.0005098	0.0078925
TUBB4B	79.7120862	23.1819044	0.29082045	116.546623	183.583234	1.57519136	1.46209475	0.5480368	0.0005098	0.0078925
EFCAB10	0.16924629	0.24677393	1.45807586	2.82022352	11.5810448	4.10642801	16.6634288	4.0586134	0.0005518	0.0083214
ANKRD66	0.21492886	0.35785906	1.66501172	3.20046256	13.8441789	4.32568063	14.8907999	3.8963493	0.0005518	0.0083214
EHF	0.45071243	0.355484	0.78871576	4.53352323	18.4683339	4.07372653	10.0585715	3.3303535	0.0005518	0.0083214
ENKUR	0.16712685	0.19075218	1.14136173	1.48555977	6.09845395	4.10515556	8.88881598	3.1519913	0.0005518	0.0083214
FAM229B	0.37657503	0.20764842	0.55141314	1.43457613	4.63520608	3.23106316	3.80953601	1.9296153	0.0005518	0.0083214
GPR162	1.67852486	0.74177365	0.44191997	3.79931555	10.2680883	2.7026153	2.26348482	1.1785456	0.0005518	0.0083214
DENND6B	0.82534724	0.3684845	0.44645997	1.85573543	5.04616158	2.71922468	2.24842991	1.1689179	0.0005518	0.0083214
PIK3R3	0.51142262	0.20824258	0.40718297	1.06088364	2.68042596	2.52659751	2.0743776	1.0526785	0.0005518	0.0083214
MIR22	3.37255862	18.161784	5.38516481	34.8483636	163.453314	4.69041576	10.3329156	3.3691755	0.0005969	0.0088214
GOLGA2P10	0.14608318	0.19131056	1.3096002	1.45503597	5.93349553	4.07790299	9.96032542	3.3161929	0.0005969	0.0088214
GPC1	0.61622641	0.29393883	0.47699811	1.3012974	3.44846106	2.65001764	2.1117196	1.0784183	0.0005969	0.0088214
MYO1D	0.74572979	0.56966313	0.76390019	1.5246842	4.5487235	2.98338732	2.04455315	1.0317856	0.0005969	0.0088214
ELL3	1.39895328	0.30830726	0.22038424	1.76982296	2.27303326	1.28432805	1.26510512	0.3392573	0.0005969	0.0088214
OSM	6.54277583	19.1412538	2.9255555	4.39076859	7.38482021	1.68189693	1.49012085	-0.5754293	0.0005969	0.0088214
TFF3	1.9621021	1.5605871	0.79536488	9.85509048	35.1768556	3.5694097	5.02272051	2.328469	0.0006453	0.0093074
UBXN10	2.05271117	0.88576282	0.43150874	5.88294586	18.4658719	3.13888184	2.86593942	1.5190081	0.0006453	0.0093074
CRNDE	0.51034858	0.32798256	0.64266379	1.45884548	4.30894469	2.95366765	2.85852754	1.5152722	0.0006453	0.0093074
CD55	40.2972931	14.0178319	0.34786039	39.5030182	19.1202848	0.48402086	1.02010669	-0.02872	0.0006453	0.0093074
NR4A3	1.72253409	3.03449611	1.76164648	0.96881104	0.85365003	0.88113161	1.77798768	-0.8302453	0.0006453	0.0093074
ADIRF	0.34266508	0.37591717	1.09703962	4.88242823	20.4082207	4.17993255	14.2483974	3.8327278	0.0006973	0.0097523
MTSS1L	0.29485366	0.25844554	0.87652138	1.23739423	4.46680977	3.60985179	4.19663849	2.0692342	0.0006973	0.0097523
PLEKHA5	0.50849416	0.27882817	0.54834096	1.87702055	5.74519244	3.06080424	3.69133158	1.8841413	0.0006973	0.0097523
KLHDC9	0.57958042	0.62421438	1.0770108	1.81616959	6.48783798	3.57226441	3.13359374	1.6478182	0.0006973	0.0097523
ZDHHC1	0.49544696	0.28137768	0.56792694	1.34946095	4.21362611	3.12245131	2.72372434	1.4455807	0.0006973	0.0097523
CEP126	0.38261677	0.21211538	0.55438077	1.03345432	2.66269812	2.57650297	2.70101677	1.4335026	0.0006973	0.0097523
MORN2	5.81677862	1.93045385	0.3318768	9.90480546	21.3738032	2.15792257	1.70279911	0.7679082	0.0006973	0.0097523
SNORD105B	3.64006552	16.1091486	4.42551062	4.49755909	17.9723128	3.99601483	1.23557092	0.3051778	0.0006973	0.0097523
PTK2	2.54524448	0.72688226	0.28558446	2.88059836	3.87853663	1.34643436	1.13175704	0.1785643	0.0006973	0.0097523
RNU2-2P	245.52478	931.026353	3.79198529	76.994485	157.954156	2.05149961	3.1888619	-1.6730416	0.0006973	0.0097523
MUC5AC	0.31459818	0.29829316	0.9481719	2.62551039	10.1309725	3.85866785	8.34559939	3.0610157	0.000753	0.0103491
ZNF295-AS1	0.21539029	0.37682275	1.74948814	1.13557777	4.4109651	3.88433554	5.27218656	2.3984014	0.000753	0.0103491
TSPAN13	1.20611261	1.1630318	0.96428127	4.01750046	11.7900903	2.93468301	3.33094971	1.7359336	0.000753	0.0103491
CATIP	0.62166662	0.25560261	0.41115704	1.97503346	6.42156546	3.25137048	3.17699775	1.6676641	0.000753	0.0103491
IRF6	0.53071115	0.27271529	0.51386765	1.47292409	4.55462832	3.09223561	2.77537807	1.4726843	0.000753	0.0103491
ATP6V1C2	0.49645002	0.22150473	0.44617729	1.01134708	2.94141119	2.90840924	2.03715789	1.0265578	0.000753	0.0103491
IFT172	1.71873597	0.38558579	0.22434265	2.67437318	5.27515547	1.97248294	1.55601165	0.6378529	0.000753	0.0103491
RNU1-27P	0.99906448	3.61552145	3.618907	1.26790864	2.64123191	2.08314056	1.2690959	0.3438011	0.000753	0.0103491
RNY3	246.667791	813.551725	3.29816764	191.778841	536.883294	2.79949181	1.28620962	-0.3631258	0.000753	0.0103491
SMIM22	0.51186138	0.58876751	1.15024797	6.20944718	25.0072152	4.02728528	12.1311109	3.6006398	0.0008127	0.0109331
STMND1	0.11451603	0.19635254	1.71462935	1.1108304	4.42948866	3.9875472	9.70021772	3.2780171	0.0008127	0.0109331
SPEF1	0.23516555	0.30796281	1.30955751	1.68975931	6.43193611	3.80642146	7.18540333	2.8450691	0.0008127	0.0109331
PPP1R32	0.40357277	0.3850258	0.95404306	1.76696929	6.51143925	3.6850891	4.3783164	2.1303762	0.0008127	0.0109331

GALNT3	0.40783638	0.31761077	0.77877008	1.58926119	4.81668251	3.03076834	3.89681079	1.9622939	0.0008127	0.0109331
ELK3	3.00879448	1.27973717	0.4253322	4.07820046	5.69113815	1.39550231	1.35542673	0.4387471	0.0008127	0.0109331
P4HTM	6.97638552	1.19815977	0.17174506	8.90387909	11.1215151	1.24906403	1.27628828	0.3519542	0.0008127	0.0109331
C2orf81	1.41031393	0.64890392	0.4601131	1.67727741	2.8251216	1.68434965	1.18929365	0.250105	0.0008127	0.0109331
SNORD2	130.23559	417.098741	3.20264792	66.2910318	136.098101	2.05303941	1.96460345	-0.9742381	0.0008127	0.0109331
WDR86-AS1	1.16259683	1.17902582	1.01413129	7.74518951	28.7440339	3.71121119	6.66197367	2.7359497	0.0008768	0.0115904
C9orf9	3.61555866	2.46788942	0.68257485	9.08217327	27.0881529	2.98256289	2.51196956	1.328819	0.0008768	0.0115904
HN1L	6.25948517	1.07202309	0.17126378	8.26644182	10.2169318	1.23595278	1.32062647	0.4012225	0.0008768	0.0115904
C15orf26	0.17498932	0.21659536	1.23776332	1.21438601	4.6011479	3.78886767	6.93977228	2.7948883	0.0009453	0.012227
DCDC2B	0.5315787	0.31065906	0.5844084	2.33929473	8.10734735	3.46572292	4.40065547	2.1377184	0.0009453	0.012227
VNN3	0.24462474	0.42504282	1.73752999	1.02661322	3.15060827	3.06893406	4.19668602	2.0692505	0.0009453	0.012227
ISYNA1	0.44424251	0.29019258	0.65323009	1.56815418	5.02649667	3.20535871	3.52995072	1.819648	0.0009453	0.012227
EGR1	2.70275276	1.84642231	0.6831636	8.30841686	22.2983585	2.6838276	3.07405731	1.6201441	0.0009453	0.012227
NAT14	0.52987357	0.3229715	0.6095256	1.54269811	4.7630387	3.08747295	2.9114457	1.5417357	0.0009453	0.012227
CCDC40	1.22726791	0.67779946	0.55228321	2.54095418	7.20115754	2.83403675	2.07041523	1.0499201	0.0009453	0.012227
SLC20A2	2.62358438	0.67578988	0.25758267	3.87467727	7.41422878	1.91350873	1.47686398	0.562537	0.0009453	0.012227
CREB3L4	1.71538997	0.69843653	0.40715904	2.24374932	3.27812148	1.46100166	1.30801122	0.3873749	0.0009453	0.012227
RUVBL1	8.53614241	1.78095057	0.20863646	10.1386696	10.4262296	1.0283627	1.18773435	0.2482122	0.0009453	0.012227
S100A14	0.10297945	0.20457161	1.9865285	1.22735739	4.80132622	3.91192188	11.9184692	3.575127	0.0010187	0.0129495
IL5RA	0.16120811	0.18751164	1.16316506	1.09071106	4.0058287	3.67267634	6.76585733	2.7582728	0.0010187	0.0129495
CXCL11	2.56140697	2.17865226	0.85056857	3.4470115	6.15270592	1.78493919	1.34574925	0.4284096	0.0010187	0.0129495
SCARNA22	2.65655276	8.6816577	3.26801629	3.26126727	9.89607757	3.03442703	1.22763128	0.2958773	0.0010187	0.0129495
C11orf49	5.92284345	0.9592651	0.16196023	6.84014911	7.34294345	1.07350634	1.15487589	0.2077378	0.0010187	0.0129495
C22orf23	1.67231324	0.78771911	0.47103562	1.57099923	2.10300392	1.33864097	1.06449017	-0.0901626	0.0010187	0.0129495
SNORD12	12.1542828	38.2019497	3.14308548	6.35918182	12.5648907	1.97586593	1.91129663	-0.9345517	0.0010187	0.0129495
SNORD67	31.3761931	97.1361556	3.09585536	14.5160686	54.7364507	3.77074896	2.16148007	-1.1120195	0.0010187	0.0129495
KRT4	0.1264938	0.15321093	1.21121291	1.20224551	4.70894565	3.91679203	9.50438267	3.2485929	0.0010972	0.0137116
LY6D	0.1552733	0.48675503	3.13482753	1.2023415	5.15449513	4.28704751	7.74338842	2.952965	0.0010972	0.0137116
CCDC65	0.35713407	0.34943251	0.97843511	2.60220216	9.54996451	3.66995488	7.2863454	2.8651954	0.0010972	0.0137116
SPEF2	0.39133228	0.28483233	0.72785291	1.310631	3.75860953	2.86778624	3.34915129	1.7437955	0.0010972	0.0137116
ANKRD37	1.4357169	1.04584863	0.72845046	3.48716896	8.93413892	2.56200346	2.42886948	1.280285	0.0010972	0.0137116
MUC1	0.4353279	0.35378346	0.81268272	2.27203369	7.59529197	3.34294866	5.21913184	2.3838098	0.0011812	0.014459
B9D1	1.19038382	0.90196832	0.75771218	5.21995968	17.9711151	3.44276895	4.38510636	2.1326118	0.0011812	0.014459
ECE1	2.87479179	2.76114761	0.96046873	5.60040196	10.5705145	1.8874564	1.94810698	0.9620729	0.0011812	0.014459
KIAA1407	1.0929991	0.37028532	0.33877916	1.75153368	3.55833904	2.03155616	1.6025024	0.6803265	0.0011812	0.014459
SNORD12C	35.1290069	139.654545	3.97547661	34.11915	149.368974	4.37786328	1.02959795	-0.0420811	0.0011812	0.014459
GBP1P1	1.36218987	1.0647891	0.78167451	0.99743001	1.1087942	1.11165114	1.36569971	-0.4496403	0.0011812	0.014459
SNORD58A	26.1361897	116.502425	4.45751376	17.8741364	83.8371309	4.69041576	1.46223511	-0.5481753	0.0011812	0.014459
GPRC5C	0.14924384	0.15557154	1.0423984	1.36633991	5.15876647	3.77560989	9.15508424	3.1945732	0.0012709	0.0152537
LRRC18	0.1833764	0.15675564	0.85482996	1.20955291	3.92203578	3.24254998	6.59601188	2.721594	0.0012709	0.0152537
LOC10192768	0.30544031	0.44000416	1.44055693	1.13904277	3.65825053	3.21168846	3.72918287	1.8988595	0.0012709	0.0152537
C10orf95	0.51721455	0.32810741	0.63437389	1.17028416	3.1807631	2.71794082	2.26266674	1.1780241	0.0012709	0.0152537
CCDC170	3.36771362	1.46519351	0.4350707	7.02160141	18.1248492	2.5812985	2.0849758	1.0600306	0.0012709	0.0152537
TPBG	0.99476307	1.05806106	1.06363123	1.52667332	3.24804656	2.12753215	1.53471049	0.6179665	0.0012709	0.0152537
IFT27	8.79779276	2.08221514	0.23667472	9.77134046	11.0162884	1.12740811	1.11065818	0.1514149	0.0012709	0.0152537
SNORA49	6.61736897	24.9297429	3.76731946	1.84448091	7.80809955	4.23322329	3.58765923	-1.8430429	0.0012709	0.0152537
NT5DC2	0.55629676	0.37262546	0.66983215	1.24092235	3.08454332	2.48568602	2.23068412	1.1574862	0.0013667	0.0161329
CCL8	0.86301001	1.26371052	1.46430574	1.60646855	4.32401474	2.69162738	1.86147151	0.8964435	0.0013667	0.0161329
ATP8B1	0.85751903	0.49961805	0.58263202	1.23603919	2.86345	2.31663366	1.44141313	0.5274839	0.0013667	0.0161329
MIRLET7F2	2.60191724	7.82735649	3.0083034	6.90005	15.6412169	2.26682661	2.65190987	1.4070317	0.0014689	0.0170318
SPA17	3.27501666	1.63068695	0.49791715	6.26787182	13.9408612	2.22417778	1.91384426	0.9364734	0.0015781	0.0179959
BASP1	5.86583517	10.786956	1.83894632	6.94561046	13.3426839	1.92102393	1.1840787	0.243765	0.0015781	0.0179959
IL1B	37.1078966	60.2729849	1.62426304	24.2701477	12.0003321	0.49444825	1.52895223	-0.6125433	0.0015781	0.0179959
CKB	1.09153684	1.05914923	0.97032843	9.89417196	36.3523344	3.67411589	9.0644416	3.1802181	0.0016944	0.0190293
LINC00094	2.27262172	0.43353027	0.19076218	2.4586265	2.16357056	0.87999156	1.0818459	0.113495	0.0016944	0.0190293
SNORA54	10.0396176	37.6208747	3.7472418	4.26899091	14.5202193	3.40132355	2.35175427	-1.2337373	0.0016944	0.0190293
SNORA12	2.80905552	5.47010873	1.94731243	22.2209773	86.0696458	3.87335106	7.91047992	2.9837652	0.0018185	0.0200965
CDH1	1.74228579	5.45680645	3.13198127	2.68564433	8.74769753	3.25720626	1.5414488	0.624287	0.0018185	0.0200965
ARL3	1.89896279	0.45693614	0.24062406	2.53890318	3.11790924	1.22805362	1.3369947	0.4189937	0.0018185	0.0200965
PTGS2	2.1784651	7.5556954	3.46835733	1.26438746	1.23209721	0.97446175	1.72294109	-0.7848734	0.0018185	0.0200965
NEBL	0.06457547	0.08003742	1.23944012	1.07481482	3.817176	3.55147317	16.6443215	4.0569582	0.0019506	0.0211251
NBL1	0.41213736	0.54974277	1.33388239	1.70061954	5.6037026	3.29509479	4.1263416	2.0448633	0.0019506	0.0211251
NPHP1	0.43145817	0.17907336	0.41504223	1.68210732	5.1730565	3.07534272	3.89865676	1.9629771	0.0019506	0.0211251
LRIG1	1.21544052	0.65800358	0.54137045	4.66796209	14.062627	3.0125838	3.84055166	1.9413136	0.0019506	0.0211251
IGFBP7	2.21761035	1.1597317	0.5229646	6.56567914	16.3576805	2.491392	2.96070009	1.5659384	0.0019506	0.0211251

MT1X	6.05353345	3.17460022	0.52442103	13.6353555	35.3339607	2.59134871	2.25246223	1.1715029	0.0019506	0.0211251
TMEM67	1.22031835	0.52183339	0.4276207	1.85471282	3.41550851	1.84152958	1.51985982	0.6039383	0.0019506	0.0211251
TRAF3IP1	1.6787431	0.44439423	0.26471843	2.47330518	4.79394903	1.93827639	1.47330773	0.5590588	0.0019506	0.0211251
CFB	4.72563828	1.49935342	0.31728062	5.97726	7.97784525	1.33469939	1.26485771	0.3389751	0.0019506	0.0211251
IER3	10.2432662	20.1175161	1.96397474	10.807155	14.9632571	1.38456949	1.05504971	0.077311	0.0019506	0.0211251
MIR10B	2.05669345	4.37409871	2.1267626	2.08382	6.3552383	3.04980195	1.0131894	0.0189039	0.0019506	0.0211251
CXCR4	38.1775035	62.7343412	1.64322796	30.6805268	22.6147554	0.73710453	1.24435619	-0.3153995	0.0019506	0.0211251
SOD2	80.4146931	135.930676	1.69037114	62.9322409	27.1796558	0.43188762	1.27779802	-0.3536598	0.0019506	0.0211251
TNFAIP6	5.877234	14.2408314	2.42304993	3.64372486	3.19244941	0.87614996	1.61297415	-0.6897233	0.0019506	0.0211251
CCL4L1	14.1475774	43.0738625	3.04461049	7.53136409	6.44565477	0.85584161	1.87848804	-0.9095719	0.0019506	0.0211251
IGFBP3	0.15079468	0.19077909	1.26515792	3.70209452	12.7672361	3.44865211	24.5505644	4.6176843	0.0020913	0.0222042
DUSP14	1.53275241	1.17694792	0.76786564	4.25501191	12.6779943	2.97954378	2.77605951	1.4730385	0.0020913	0.0222042
CYB5D1	1.79669266	0.49367718	0.27476997	3.14962273	5.25572893	1.66868523	1.75301141	0.8098354	0.0020913	0.0222042
RBKS	0.963252	0.56960206	0.59133234	1.52925296	3.84985138	2.51747193	1.58759385	0.6668419	0.0020913	0.0222042
ODF3B	16.9594135	6.71700583	0.39606357	19.5783986	25.4520086	1.30000461	1.15442664	0.2071765	0.0020913	0.0222042
KCNJ15	1.55208658	4.86279872	3.13307182	1.17410712	1.82111777	1.55106612	1.32192928	-0.402645	0.0020913	0.0222042
NDRG2	1.70698259	0.74039012	0.43374205	4.63780133	13.2369078	2.85413429	2.71695878	1.4419927	0.0022411	0.0234239
RARRES1	3.94463255	4.61204723	1.16919565	10.3486252	29.6743501	2.86746786	2.62347001	1.3914763	0.0022411	0.0234239
SPATA33	1.7209639	0.50439925	0.29309113	1.9751695	2.66343433	1.34845862	1.14771118	0.1987596	0.0022411	0.0234239
RNU4-1	9.08256172	29.1724597	3.21191979	6.93514773	14.2713343	2.057827	1.30964214	-0.3891727	0.0022411	0.0234239
SNORA2A	0.24785035	0.94958713	3.83129234	9.11923818	39.9565563	4.38156735	36.7933246	5.2013721	0.0024004	0.0247159
LYPD2	0.31823928	0.52431367	1.64754544	7.75971555	24.8771563	3.20593663	24.3832743	4.60782	0.0024004	0.0247159
C19orf33	0.23445548	0.38546497	1.64408598	3.99991259	15.9661281	3.99161925	17.0604353	4.0925826	0.0024004	0.0247159
TTC16	0.26101747	0.32944424	1.26215398	1.24078604	3.94045102	3.17576996	4.75365132	2.2490361	0.0024004	0.0247159
DPCD	4.22907517	1.56122803	0.36916535	7.06668991	15.4405668	2.18497868	1.67097761	0.7406924	0.0024004	0.0247159
SNORD84	27.7354035	82.0028415	2.95661254	23.5658227	56.5340654	2.39898543	1.17693338	-0.2350327	0.0024004	0.0247159
SNORD90	7.85513448	26.0704865	3.31891027	3.94287636	7.83207885	1.98638713	1.99223454	-0.9943875	0.0024004	0.0247159
RNU2-1	24.1715513	91.7602379	3.79620806	3.24393182	6.23188213	1.92108912	7.451313	-2.8974947	0.0024004	0.0247159
MIR4674	1.84159655	5.81549205	3.15785347	73.1195455	342.961068	4.69041576	39.7044322	5.3112282	0.0025697	0.0259772
TTC21A	0.87110963	0.3284731	0.37707436	1.63877169	3.83187032	2.33825758	1.8812462	0.9116887	0.0025697	0.0259772
RHOD	4.55420103	2.88963723	0.63449927	4.51888764	5.89991416	1.30561205	1.00781462	-0.0112303	0.0025697	0.0259772
SNORA37	4.61952207	17.8313479	3.85999842	3.75369682	10.1852214	2.71338413	1.23065935	-0.2994315	0.0025697	0.0259772
SNORA7B	27.2834	72.1219467	2.64343691	18.1676773	42.3657218	2.33192835	1.50175499	-0.5866495	0.0025697	0.0259772
SNORD89	1030.54771	2356.76981	2.28690994	488.969796	600.909749	1.2289302	2.10758972	-1.075594	0.0025697	0.0259772
SNORD46	38.4140783	109.149294	2.84138782	15.9013046	61.3165108	3.85606795	2.41578156	-1.27249	0.0025697	0.0259772
CMTM4	0.17804036	0.10512537	0.59045808	1.17672352	3.83411036	3.25829329	6.60930769	2.7244992	0.0027497	0.0272986
CH25H	0.28038765	0.30288699	1.08024372	1.48435532	5.14206042	3.46417085	5.29393982	2.4043418	0.0027497	0.0272986
SEMA4B	2.61366517	0.75740847	0.28978787	4.38958436	6.61313494	1.50655151	1.67947464	0.74801	0.0027497	0.0272986
PHGDH	1.52030141	0.88935315	0.58498475	1.42287	2.05344825	1.44317348	1.06847527	-0.0955535	0.0027497	0.0272986
IL1R2	2.01250855	5.49832319	2.73207445	1.85598786	2.27744845	1.22708155	1.08433282	-0.1168076	0.0027497	0.0272986
ADORA2A	1.62917388	4.58998451	2.81736932	1.31732633	2.11258578	1.60369206	1.23672764	-0.3065278	0.0027497	0.0272986
HLA-DPB2	12.0030298	18.5165529	1.54265658	7.56374714	10.7292525	1.4185102	1.58691579	-0.6662256	0.0027497	0.0272986
SNORD83B	367.251072	1466.58545	3.99341367	40.0085046	70.5907437	1.76439346	9.17932516	-3.1983881	0.0027497	0.0272986
LOC10028815	0.36565727	0.33224225	0.90861658	1.61460518	5.45122042	3.37619407	4.41562449	2.1426175	0.0029409	0.0286575
CCDC151	0.40745255	0.34909487	0.8567743	1.28455883	3.82348843	2.97649928	3.15265872	1.656569	0.0029409	0.0286575
NBEA	0.3527784	0.17311521	0.49071942	1.02052536	3.04887414	2.98755353	2.89282272	1.5324779	0.0029409	0.0286575
PKIB	0.48791777	0.33888618	0.69455594	1.22494224	2.89721552	2.36518543	2.5105506	1.3280038	0.0029409	0.0286575
HSPA2	0.6295301	0.20998544	0.33355901	1.39228306	3.22764815	2.31824135	2.21162268	1.1451053	0.0029409	0.0286575
S100A16	2.49274269	1.46691592	0.58847467	4.77790478	11.8066229	2.47108794	1.91672602	0.9386441	0.0029409	0.0286575
STAP2	0.75873586	0.53162657	0.7006741	1.30153912	2.976552	2.28694778	1.71540478	0.778549	0.0029409	0.0286575
WDR90	0.76408783	0.32128393	0.42048037	1.15631552	2.40637463	2.08107094	1.51332802	0.5977247	0.0029409	0.0286575
DHRS9	13.5975193	5.56819375	0.40950071	20.1123256	36.3710204	1.80839457	1.47911727	0.5647364	0.0029409	0.0286575
SNORD13	17.8695748	57.9372815	3.24223055	6.72067727	28.9124037	4.30200746	2.65889495	-1.4108268	0.0029409	0.0286575
KIR2DS4	0.00816559	0.03925175	4.80696879	1.70411552	7.89038554	4.63019404	208.694639	7.7052497	0.0031438	0.0300409
OCLM	0.17408789	0.18679942	1.07301786	1.0692166	4.62231014	4.32308118	6.14182065	2.6186664	0.0031438	0.0300409
HES4	0.55230485	1.53645329	2.78189352	1.99550914	6.17999616	3.09695207	3.61305742	1.8532202	0.0031438	0.0300409
GSTA4	0.894342	0.42249139	0.47240473	2.97348627	6.79083302	2.28379498	3.32477539	1.7332569	0.0031438	0.0300409
RFX3	0.7153954	0.26628454	0.37222009	1.62401877	4.03753025	2.48613521	2.27009954	1.1827556	0.0031438	0.0300409
MAP7	0.61074414	0.28274149	0.4629459	1.15848344	2.6405164	2.27928714	1.89683922	0.9235974	0.0031438	0.0300409
PKIG	6.57385035	2.12864856	0.32380545	8.75356773	13.48642	1.54067694	1.33157393	0.4131325	0.0031438	0.0300409
CASZ1	1.61789659	0.46894835	0.28985063	1.72287091	1.67204008	0.97049644	1.06488321	0.0906952	0.0031438	0.0300409
BCL6	14.1373721	8.43999805	0.59699908	14.6415473	8.78228424	0.59981941	1.03566258	0.0505541	0.0031438	0.0300409
ANXA3	1.40950579	1.54066246	1.09305153	1.13235968	1.34208214	1.18520834	1.24475095	-0.3158571	0.0031438	0.0300409
MIR1244-3	37.532231	41.3177087	1.10085938	28.26485	32.177555	1.13843006	1.32787653	-0.409121	0.0031438	0.0300409
SCARNA3	12.2948928	41.1731509	3.34880114	5.03212909	14.2466963	2.83114683	2.44327849	-1.2888183	0.0031438	0.0300409

RNU12	39.8798635	141.335735	3.54403759	2.55533136	6.5066053	2.54628632	15.6065331	-3.9640782	0.0031438	0.0300409
MIR3618	2.99E-195	0	0	89.9381818	421.847465	4.69041576	3.01E+196	652.68896	0.0033592	0.0315147
LOC10192912	0.10794061	0.16911526	1.56674365	6.19952134	28.693315	4.62831136	57.4345607	5.8438472	0.0033592	0.0315147
LOC1019278[5]	0.2181221	0.39024736	1.78912346	3.57913612	15.7881989	4.41117586	16.4088654	4.0364036	0.0033592	0.0315147
FSTL1	0.12066542	0.14296967	1.18484375	1.33110045	4.5668705	3.43089848	11.0313328	3.4635352	0.0033592	0.0315147
CERS4	0.60645273	0.46454859	0.76600955	4.03115853	10.8949921	2.70269501	6.64711081	2.7327274	0.0033592	0.0315147
KRTCAP3	0.46683223	0.35926386	0.76957809	1.41298128	4.2713223	3.022915	3.02674319	1.5977663	0.0033592	0.0315147
MIR631	3.83868621	13.3198208	3.4698905	9.35567727	28.1942497	3.01359793	2.43720814	1.2852295	0.0033592	0.0315147
LOC1005068[4]	2.07655176	1.0437685	0.50264507	3.70366336	6.97023535	1.88198404	1.78356419	0.8347631	0.0033592	0.0315147
LRP11	2.1148749	0.59439864	0.28105617	3.67067571	7.72742928	2.10517896	1.73564674	0.7954733	0.0033592	0.0315147
NUDT7	0.82211324	0.57879392	0.70403186	1.219843	2.55469644	2.09428298	1.48378951	0.5692864	0.0033592	0.0315147
CCDC24	2.61172241	0.80837442	0.30951774	3.75144496	6.98686378	1.86244603	1.43638732	0.5224448	0.0033592	0.0315147
CXCR1	1.70407991	5.81201087	3.41064455	1.72966766	2.79932115	1.61841561	1.01501558	0.0215019	0.0033592	0.0315147
GNA11	9.4690931	2.02905588	0.21428197	8.59941409	6.8021305	0.7909993	1.10113236	-0.1389879	0.0033592	0.0315147
FCGR3B	9.35469552	12.7704734	1.36514046	7.95266636	5.40268138	0.67935471	1.17629674	-0.234252	0.0033592	0.0315147
MIR3605	2.87484759	8.4868316	2.95209793	2.40193636	8.87209615	3.69372656	1.19688749	-0.2592875	0.0033592	0.0315147
MIR4523	20.6786207	56.784219	2.74603514	15.3987364	39.2280259	2.54748344	1.34287777	-0.425328	0.0033592	0.0315147
MIR27A	14.7899414	56.2425004	3.80275344	776.174096	3549.83438	4.57350278	52.4798629	5.713692	0.0035876	0.033111
SPATA17	0.11480118	0.13450532	1.17163702	1.92528159	5.8065057	3.01592543	16.7705728	4.0678601	0.0035876	0.033111
WDR54	3.03961969	1.62155654	0.5334735	9.69500182	22.1495188	2.28463276	3.18954435	1.6733503	0.0035876	0.033111
IFT57	3.19152138	0.75488594	0.23652855	5.43130682	8.70308128	1.60239176	1.7017924	0.7670551	0.0035876	0.033111
TNFAIP8L1	1.89372276	0.59511806	0.31425828	3.10677873	6.25635181	2.01377451	1.64056682	0.7141944	0.0035876	0.033111
NQO1	4.37289035	1.6622134	0.38011779	7.15062591	13.4259559	1.87759171	1.63521729	0.7094824	0.0035876	0.033111
GOLM1	3.94110069	1.96255312	0.49797081	5.74799	9.88323842	1.71942513	1.45847327	0.5444589	0.0035876	0.033111
SNORD76	5.94213793	24.6926787	4.15552096	7.30295455	22.7979406	3.12174209	1.22901128	0.2974982	0.0035876	0.033111
RABL2B	5.61094483	0.88232962	0.15725152	6.55417664	7.40647402	1.13003882	1.1681057	0.2241708	0.0035876	0.033111
C5orf58	1.03153977	1.02868402	0.99723157	1.02301498	1.58320504	1.54758735	1.00833301	-0.0119722	0.0035876	0.033111
RNU1-2	6.26736241	21.3669828	3.4092464	5.05734046	9.34764213	1.84833159	1.23926053	-0.3094795	0.0035876	0.033111
CCNB2	3.22352069	0.7647966	0.23725506	2.52534868	1.18955614	0.4710463	1.27646559	-0.3521546	0.0035876	0.033111
SNORA11	1.21163414	3.79468174	3.13187093	4.24798636	16.7682176	3.94733319	3.50599759	1.809825	0.0038297	0.0348525
DLG5	0.65707852	0.26667038	0.40584249	1.57713518	3.7082603	2.35126344	2.40022332	1.2631686	0.0038297	0.0348525
C20orf96	3.34400345	0.94222851	0.28176661	5.97769546	12.8780161	2.15434463	1.78758651	0.8380131	0.0038297	0.0348525
NR4A2	1.19617931	1.64193098	1.37264619	2.09811607	4.54934551	2.1683002	1.75401468	0.8106608	0.0038297	0.0348525
TSPYL4	1.85540917	0.44974316	0.24239567	2.51769836	3.57434857	1.41968896	1.35695048	0.4403681	0.0038297	0.0348525
MAP1LC3A	4.64086552	3.08224523	0.6641531	4.33496409	4.4690731	1.03093659	1.07056608	-0.0983738	0.0038297	0.0348525
SNORD25	13.0949103	56.760281	4.33452995	5.80765909	14.9907685	2.5812067	2.25476567	-1.1729775	0.0038297	0.0348525
SNORA5C	12.5823748	31.4332435	2.4981964	5.22807091	7.84731377	1.50099605	2.40669552	-1.2670536	0.0038297	0.0348525
KIAA1671	0.3530263	0.35850175	1.01551005	1.63480877	4.95952816	3.03370537	4.63084131	2.2112743	0.0040863	0.0366161
PLK2	0.76452159	0.41722028	0.54572727	1.359455	2.97623302	2.18928396	1.77817739	0.8303993	0.0040863	0.0366161
LRTOMT	1.8300621	0.64181358	0.3507059	3.15077818	6.70255331	2.12726918	1.72167828	0.7838156	0.0040863	0.0366161
CRIP2	2.65453355	2.04359644	0.76985143	4.46794851	9.9281215	2.22207608	1.68313883	0.7511542	0.0040863	0.0366161
CXCL10	30.0290703	25.5669376	0.85140623	44.3617437	67.4937012	1.52143932	1.47729328	0.5629563	0.0040863	0.0366161
C14orf79	2.06934531	0.86951431	0.42018812	2.76194786	5.06830603	1.83504768	1.33469646	0.4165117	0.0040863	0.0366161
USP54	1.44778015	0.3953306	0.27305983	1.81871509	2.47999531	1.36359748	1.25620944	0.329077	0.0040863	0.0366161
C15orf41	1.41119383	0.62846308	0.44534144	1.17205191	1.17979626	1.00660751	1.20403697	-0.2678797	0.0040863	0.0366161
SNORA44	77.5049955	242.182709	3.12473677	32.2564841	29.1715611	0.9043627	2.40277258	-1.2647001	0.0040863	0.0366161
LINC00506	0.05939873	0.08844202	1.48895457	2.0398387	9.19622857	4.50831166	34.3414504	5.1018791	0.004358	0.0385216
AREG	0.76070646	1.31452345	1.72802982	1.48718894	4.15896936	2.79653059	1.95501026	0.9671762	0.004358	0.0385216
NDFIP2	1.46132745	0.57391763	0.39273719	2.571397	4.20467503	1.63517148	1.75963095	0.8152729	0.004358	0.0385216
CDC42EP2	1.3676431	2.88377935	2.10857595	1.51974114	2.14333322	1.41032783	1.11121179	0.1521338	0.004358	0.0385216
FUBP3	9.87885517	2.03965567	0.20646681	10.4971686	3.14521594	0.29962517	1.06258959	0.0875845	0.004358	0.0385216
SNORD35B	89.0135345	261.761541	2.94069371	77.8805773	258.685704	3.32156891	1.14294908	-0.1927611	0.004358	0.0385216
LINC00539	1.07100766	0.81839049	0.76413132	6.42968432	25.1708649	3.91479016	6.00339716	2.5857791	0.0046456	0.040372
PPP1R14C	0.27055076	0.23247373	0.85926105	1.17997071	3.61095599	3.06020816	4.36136531	2.1247798	0.0046456	0.040372
RAPGEFL1	0.73211619	0.34610843	0.47275069	1.49845118	3.78285669	2.52451113	2.04673959	1.0333276	0.0046456	0.040372
PIAS3	4.16773069	0.81404773	0.19532158	4.98011071	5.84617782	1.17390519	1.19492143	0.2569158	0.0046456	0.040372
TCTN1	8.43334138	1.75799408	0.2084576	9.11387636	8.63776325	0.94775954	1.08069577	0.1119604	0.0046456	0.040372
TTLL5	2.47995069	0.41556024	0.16756795	2.424652	1.69208021	0.69786518	1.02280686	-0.0325337	0.0046456	0.040372
ADCY3	22.9861259	9.38888484	0.40845878	14.2785318	9.0235746	0.63196796	1.60983819	-0.6869157	0.0046456	0.040372
MIR5001	2.57078276	8.65684989	3.36739846	0.78519364	2.54930418	3.24672038	3.27407488	-1.7110873	0.0046456	0.040372
TMOD4	0.16590987	0.2347681	1.41503394	1.26647925	5.43542729	4.29176182	7.6335376	2.9323518	0.00495	0.0426159
JHDM1D-AS1	0.20117752	0.16986853	0.84437134	1.25527796	3.44950683	2.74800239	6.23965319	2.6414658	0.00495	0.0426159
MOK	1.27341135	0.75211798	0.59063238	2.16119468	4.79541718	2.2188733	1.69716933	0.7631305	0.00495	0.0426159
SNORD35A	18.8348931	81.8784414	4.34716783	29.1527727	136.738625	4.69041576	1.54780665	0.6302253	0.00495	0.0426159
FUZ	4.45258241	1.25979288	0.28293533	4.85652691	5.22981899	1.076864	1.0907214	0.1252826	0.00495	0.0426159

IGFBP4	0.58916731	0.52270409	0.88719127	1.74125037	3.90409283	2.24212032	2.95544294	1.5633744	0.0052719	0.0447956
PRR15	3.24502793	1.42399756	0.43882444	5.24985768	11.8282454	2.25306019	1.61781587	0.6940474	0.0052719	0.0447956
GBP7	1.13981335	0.93558681	0.82082458	1.2824538	1.6916399	1.31906498	1.12514369	0.1701093	0.0052719	0.0447956
MIR570	4.48417241	15.263928	3.40395654	1.87925	4.85555493	2.58377275	2.38615001	-1.2546847	0.0052719	0.0447956
PLEKHB1	4.41859483	1.54275054	0.34914958	5.27363636	5.63399492	1.06833208	1.19350983	0.2552104	0.0056121	0.0470199
BTG2	50.2756345	20.8090633	0.41389957	57.8049	45.1433467	0.78096055	1.14975973	0.2013324	0.0056121	0.0470199
ANKRD54	4.19432724	1.27576636	0.30416472	4.46979705	4.40239995	0.98492167	1.06567676	0.0917699	0.0056121	0.0470199
MIR635	4.05990897	7.94310358	1.95647332	3.90599546	10.4459252	2.67433111	1.03940443	-0.0557571	0.0056121	0.0470199
SNORA19	7.40881621	28.5852312	3.85827242	0.68058182	3.19221169	4.69041576	10.8860037	-3.4444025	0.0056121	0.0470199
ERICH2	0.14151732	0.33211888	2.34684253	1.38393336	4.385489	3.16885852	9.77925044	3.2897239	0.0059716	0.0492869
LAPTM4B	0.35891642	0.2681929	0.74722938	1.00605521	2.64398491	2.62807139	2.80303475	1.4869896	0.0059716	0.0492869
ISG20	6.96264941	7.28836632	1.0467806	18.3836612	45.5203676	2.47613177	2.64032556	1.4007158	0.0059716	0.0492869
SPAG16	1.13429697	0.55342414	0.48790058	2.86900759	6.84967261	2.38747106	2.52932669	1.3387534	0.0059716	0.0492869
MORN1	0.46541989	0.28160922	0.60506485	1.13021202	3.18100415	2.81451984	2.42837068	1.2799887	0.0059716	0.0492869
IQCG	4.23476176	1.56314349	0.36912194	7.19601682	12.2215937	1.69838315	1.69927312	0.7649178	0.0059716	0.0492869
RDH10	5.32290172	1.74615613	0.32804591	7.63175909	12.3180895	1.61405639	1.43375916	0.5198027	0.0059716	0.0492869
NET1	6.79493828	2.59415658	0.3817778	8.261285	8.84243916	1.0703467	1.21579986	0.2819058	0.0059716	0.0492869
JAG1	1.99624676	0.77891352	0.390189	2.28402817	2.68949826	1.17752412	1.14416124	0.1942904	0.0059716	0.0492869
SYNPO	1.93590307	1.91622484	0.98983512	2.11953873	2.95409441	1.39374401	1.09485788	0.1307436	0.0059716	0.0492869
SNORD83A	43.7411631	187.349877	4.28314803	24.8576364	89.5975753	3.60442859	1.75966703	-0.8153025	0.0059716	0.0492869

Supplementary Table 7: List of 64 differentially expressed genes in PBMC for therapy effects test by Wilcoxon rank sum test with average FPKM >1

	PiZZ.off.avg	PiZZ.off.sd	PiZZ.off.cv	PiZZ.on.avg	PiZZ.on.sd	PiZZ.on.cv	FC	logFC	PValue	FDR
SPA17	2.04134669	5.20788491	2.5512006	0.88032173	0.63544833	0.72183647	2.31886437	-1.2134184	1.15E-06	0.00241992
APOA1-AS	1.5799337	6.80134589	4.30482994	0.15120012	0.21501696	1.42206871	10.4492885	-3.3853328	1.31E-06	0.00241992
SNORD95	501.992459	2353.80056	4.68891617	40.1735046	71.2955529	1.7746909	12.4956103	-3.6433495	1.02E-06	0.00241992
SNORA33	90.4070276	439.833163	4.86503289	6.02435546	9.30248559	1.5441462	15.0069212	-3.9075561	8.96E-07	0.00241992
SNORD92	248.214514	1120.36167	4.51368315	11.8432864	36.1376656	3.05132076	20.9582464	-4.3894461	1.31E-06	0.00241992
SNORD12	106.355069	515.606485	4.84797283	5.07442273	15.0313861	2.96218641	20.9590479	-4.3895013	6.94E-07	0.00241992
SCARNA27	64.869891	304.096702	4.68779425	1.91526046	3.1479117	1.64359458	33.8700102	-5.0819365	5.34E-07	0.00241992
MIR192	34.0200441	163.968154	4.81975136	0.375645	1.76193123	4.69041576	90.564347	-6.5008713	1.31E-06	0.00241992
SNORD100	1240.00579	6066.38815	4.89222568	12.4839182	26.2844703	2.1054664	99.3282532	-6.6341322	2.38E-07	0.00241992
SNORD73A	438.018242	2207.16473	5.038979	0.00061464	0.00288241	4.68959871	712643.601	-19.442821	8.96E-07	0.00241992
SNORD45B	232.798052	1015.61427	4.36264075	22.7447364	37.0168696	1.6274917	10.2352495	-3.3554744	1.48E-06	0.00246644
SNORD116-1	46.8468	237.835362	5.07687531	3.15515455	7.3051797	2.31531597	14.8477038	-3.8921679	1.89E-06	0.00246644
SNORD28	277.088655	1425.05528	5.14295786	9.57644546	24.0993246	2.51652084	28.934395	-4.8547136	1.67E-06	0.00246644
SNORD57	2671.09967	13407.5252	5.0194777	74.2533636	168.027358	2.2628922	35.9727767	-5.1688336	1.89E-06	0.00246644
SNORD116-1	197.641997	1043.96543	5.28210322	2.83022727	6.42277281	2.26934878	69.8325532	-6.1258278	1.89E-06	0.00246644
SNORD82	182.776635	947.533266	5.18410501	2.54088636	8.24215086	3.24380932	71.9342026	-6.168606	2.13E-06	0.00248935
MIR342	37.2594155	154.209239	4.13879921	2.70427727	6.38699258	2.36181129	13.7779568	-3.7842901	2.70E-06	0.00249995
SYNE1-AS1	1.24274093	6.49073126	5.22291582	0.04385829	0.07731442	1.76282325	28.3353706	-4.8245322	2.40E-06	0.00249995
SNORD18A	361.751597	1907.70906	5.27353321	7.02165	18.7955412	2.67679836	51.5194572	-5.6870455	3.04E-06	0.00249995
MIR150	129.965021	681.468563	5.24347674	2.43060455	6.33018559	2.60436672	53.4702451	-5.7406644	3.04E-06	0.00249995
SNORD13	292.849819	1567.35134	5.35206526	4.20811455	9.52677256	2.26390524	69.5916937	-6.1208432	2.70E-06	0.00249995
SNORD42B	714.022566	3772.59341	5.28357729	12.4542818	43.4951715	3.49238697	57.3314926	-5.8412559	3.41E-06	0.00261558
SNORA43	71.0059556	380.636379	5.36062611	1.08538486	2.94799032	2.71607836	65.4200722	-6.0316614	3.41E-06	0.00261558
SNORD50B	132.502635	558.846975	4.21762916	11.7717955	20.9900507	1.7830798	11.255941	-3.4926148	4.82E-06	0.00314864
RNU4-1	71.4428772	274.245839	3.83867292	4.51057182	8.20074146	1.81811571	15.8389845	-3.9854079	4.82E-06	0.00314864
SNORD102	249.98129	1339.65136	5.3590065	11.5261	20.6945079	1.79544754	21.6882805	-4.4388438	4.82E-06	0.00314864
SNORD50A	273.628614	1412.34849	5.16155262	23.2385364	34.25963	1.47425937	11.7747783	-3.557628	5.39E-06	0.00342481
SNORD19	5.4743931	14.9404725	2.72915594	0	0	#DIV/0!	Inf	#NAME?	6.03E-06	0.00352894
SCARNA16	35.7307973	127.780622	3.57620406	7.43578864	6.82696032	0.91812189	4.8052465	-2.2646104	6.03E-06	0.00352894
SNORD119	57.7981862	291.887329	5.05011226	8.52621364	25.1948278	2.95498434	6.77888083	-2.7610471	7.53E-06	0.00418498
MIRLET7B	777.944693	3068.3544	3.94418065	212.194741	225.909159	1.06463128	3.66618272	-1.8742787	8.40E-06	0.00424533
SNORD6	1132.0653	5873.85562	5.1886191	47.5965364	195.253362	4.1022599	23.7846151	-4.5719568	8.40E-06	0.00424533
MIRLET7G	55.698231	281.375586	5.05178675	5.60914091	12.5668615	2.24042535	9.92990405	-3.3117798	9.37E-06	0.00443113
SNORD56	217.534717	1158.39669	5.3251118	9.26868182	43.4739713	4.69041576	23.4698657	-4.5527377	9.37E-06	0.00443113
MORN2	3.37994993	8.37566147	2.47804306	1.64333396	0.92266612	0.5614599	2.05676389	-1.0403762	1.29E-05	0.0057445
DDX11L9	1.29783572	3.59381124	2.76908023	0.53329532	0.57850341	1.08477122	2.43361545	-1.2831012	1.59E-05	0.00668777
SNORD125	607.020193	2220.6286	3.65824502	140.812992	189.527894	1.3459546	4.31082519	-2.1079641	1.59E-05	0.00668777
SNORD14C	32.8572966	104.678479	3.18585185	6.60434546	11.0396355	1.67157148	4.97510265	-2.3147263	1.96E-05	0.00751807
SNORD36C	197.280745	1048.45023	5.31450868	12.8375636	26.8269025	2.08971914	15.3674599	-3.9418068	1.96E-05	0.00751807
MIR197	18.5433621	78.7911937	4.24902417	3.82829546	13.2426155	3.45914144	4.84376462	-2.2761288	3.25E-05	0.0111125
MIR375	67.73	364.737212	5.38516481	8.80124546	23.3070965	2.6481589	7.69550177	-2.9440154	3.25E-05	0.0111125
SNORD44	441.858983	2269.91478	5.13719279	177.322609	751.021025	4.2353371	2.49183669	-1.3172095	3.96E-05	0.0127444
SNORD52	32.253769	146.91019	4.55482242	6.38736364	29.9593911	4.69041576	5.04962153	-2.3361753	3.96E-05	0.0127444
SNORD34	533.2687	2265.38089	4.24810398	70.2532546	87.3856355	1.24386601	7.59066186	-2.9242257	3.96E-05	0.0127444
MIR409	24.3007828	117.230334	4.82413819	1.73221818	8.12482346	4.69041576	14.0287078	-3.8103102	4.36E-05	0.01365105
MIR6513	120.007535	630.829675	5.25658391	19.6253227	72.6914005	3.7039595	6.11493305	-2.6123367	4.80E-05	0.01442586
SNORD42A	9846.17783	49221.3215	4.99902828	1410.1818	3991.07029	2.83018139	6.98220459	-2.8036826	5.28E-05	0.01525906
RNU6-15P	2.4461469	7.74070436	3.16444788	0.41491227	1.94611106	4.69041576	5.89557614	-2.5596328	5.81E-05	0.01635821
SNORD41	1326.06126	6848.22735	5.16433708	602.732836	2567.3368	4.25949383	2.20008133	-1.1375569	6.39E-05	0.01753573
CASS4	4.28353103	3.29100095	0.76829161	2.8311325	1.28086294	0.4524207	1.51300974	-0.5974213	8.45E-05	0.02236172
MIR1281	504.494593	2319.52762	4.59772543	108.394959	278.230506	2.56682145	4.6542256	-2.2185411	8.45E-05	0.02236172
SNORD12C	257.384438	1268.09679	4.92685884	231.520773	1065.25966	4.60114073	1.11171207	-0.1527832	9.26E-05	0.02422397
SNORD99	9695.01872	46100.6076	4.75508186	4724.54677	18766.5415	3.97213583	2.05205265	-1.0370677	0.00012151	0.02904823
SNORD48	1502.26963	6917.96159	4.60500663	333.881264	1495.16003	4.478119	4.49941279	-2.1697367	0.00012151	0.02904823
TEC	1.11059505	1.99904381	1.79997544	0.65280374	0.3608817	0.55281806	1.70126943	-0.7666116	0.00013285	0.030767
RNU6-31P	7.62602621	39.4664247	5.17522804	1.59537227	3.46885846	2.1743254	4.78009198	-2.2570384	0.00013285	0.030767
RNY4	3036.72154	10701.1415	3.52391268	277.230777	294.737197	1.06314746	10.9537677	-3.4533553	0.00014516	0.03259864
RMRP	35.8310545	86.5563425	2.41567946	12.6534531	14.2810884	1.1286317	2.83172144	-1.5016794	0.0001585	0.03524031
MIR3184	116.903353	474.628379	4.06000655	67.9357527	256.34553	3.77335232	1.72079278	-0.7830734	0.00018864	0.03994383
SNORD32A	3975.81158	17305.058	4.35258505	847.073455	2665.35885	3.14654985	4.69358538	-2.2306904	0.00018864	0.03994383
SNORD1C	266.379903	1353.71647	5.08190166	215.819114	927.22079	4.29628671	1.23427392	-0.3036626	0.00020561	0.04155707
SNORD12B	166.835319	644.450563	3.86279456	61.5825091	69.9680382	1.13616738	2.70913481	-1.4378322	0.00020561	0.04155707
MIR34A	526.017483	2693.91335	5.12133804	135.681496	429.472581	3.16529956	3.87685496	-1.9548868	0.00022396	0.04445838
SNORD71	2738.57399	13212.4357	4.82456773	1118.03841	4036.23631	3.61010522	2.44944535	-1.2924551	0.00024381	0.04754869

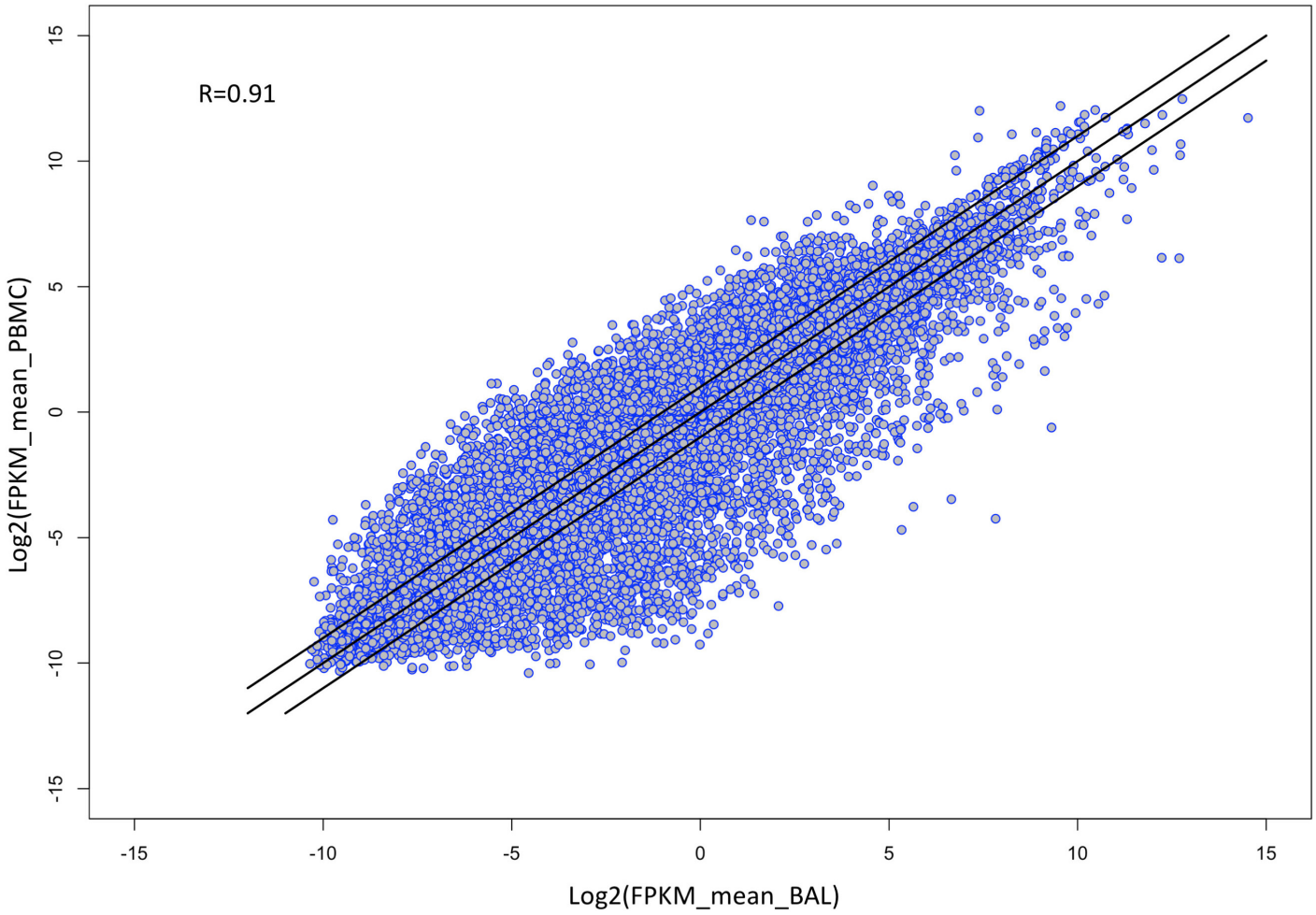
Supplementary Table 8: List of enriched pathways for 773 differentially expressed genes in BAL for therapy effects

Function	FDR	Genes in network	Genes in genome
cilium	4.50E-15	97	596
ciliary part	1.91E-10	71	446
cilium organization	1.91E-10	64	383
cilium assembly	4.43E-10	60	367
cell projection assembly	2.69E-08	73	570
axoneme	1.28E-07	38	117
axonemal dynein complex assembly	2.81E-05	15	33
organelle assembly	2.92E-05	72	823
motile cilium	0.001507113	45	177
plasma membrane region	0.001507113	61	1144
axoneme part	0.004331309	15	36
cilium movement	0.006620196	28	63
cell chemotaxis	0.007785826	25	293
cytokine activity	0.007785826	20	219
axonemal dynein complex	0.00948436	8	17
ciliary transition zone	0.012080052	11	68
epithelial cell differentiation	0.012080052	58	763
glomerular epithelial cell differentiation	0.035903722	6	19
inflammatory response	0.035903722	46	684

Supplementary Table 9: List of differentially expressed MiRNAs in BAL for therapy effects and their target genes

database	mature_mirna_acc	mature_mirna_id	target_symbol	target_entrez	target_ensembl	experiment	support_type	pubmed_id	type
mirecords	MIMAT0000646	hsa-miR-155-5p	CCND1	595	ENSG00000110092			19538740	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	BCL6	604	ENSG00000113916	Luciferase reporter assay	Functional MTI	23041630	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	CCND1	595	ENSG00000110092	Luciferase reporter assay//Western blot	Functional MTI	22858023	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	CCND1	595	ENSG00000110092	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	EGFR	1956	ENSG00000146648	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	PODXL	5420	ENSG00000128567	pSILAC//Proteomics;Other	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	ITGB4	3691	ENSG00000132470	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	TACSTD2	4070	ENSG00000184292	pSILAC//Proteomics;Other	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	MYO1D	4642	ENSG00000176658	Reporter assay;Other	Non-Functional MTI	20584899	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	PLS1	5357	ENSG00000120756	Reporter assay;Other	Non-Functional MTI	20584899	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	PPL	5493	ENSG00000118898	pSILAC//Proteomics;Other	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	PPL	5493	ENSG00000118898	Microarray//qRT-PCR	Functional MTI (Weak)	22815788	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	TPBG	7162	ENSG00000146242	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	FUBP3	8939	ENSG00000107164	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	CLDN1	9076	ENSG00000163347	Immunocytochemistry//Immunohistochemistry//In situ hybridization//Luciferase reporter assay//Microarray//qRT-PCR//Western blot	Functional MTI	24604078	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	CLDN1	9076	ENSG00000163347	pSILAC//Proteomics;Other	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	SLC9A3R2	9351	ENSG00000065054	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	NCKAP1	10787	ENSG00000061676	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	SLC27A2	11001	ENSG00000140284	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	FSTL1	11167	ENSG00000163430	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	PHGDH	26227	ENSG00000092621	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	PLEKHA5	54477	ENSG00000052126	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	TNKS1BP1	85456	ENSG00000149115	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	CXCL8	3576	ENSG00000169429	Western blot	Functional MTI	21030878	validated
mirtarbase	MIMAT0000646	hsa-miR-155-5p	TPBG	7162	ENSG00000283085	Proteomics	Functional MTI (Weak)	18668040	validated
mirtarbase	MIMAT0000077	hsa-miR-22-3p	ERBB3	2065	ENSG00000065361	Luciferase reporter assay//qRT-PCR//Western blot	Functional MTI	22484852	validated
mirtarbase	MIMAT0000077	hsa-miR-22-3p	NET1	10276	ENSG00000173848	Luciferase reporter assay//qRT-PCR//Western blot	Functional MTI	25041463	validated
mirtarbase	MIMAT0000077	hsa-miR-22-3p	TRAF3IP1	26146	ENSG00000204104	HITS-CLIP	Functional MTI (Weak)	19536157	validated
mirtarbase	MIMAT0000077	hsa-miR-22-3p	IFT140	9742	ENSG00000187535	PAR-CLIP	Functional MTI (Weak)	20371350	validated
mirtarbase	MIMAT0000077	hsa-miR-22-3p	C1orf87	127795	ENSG00000162598	HITS-CLIP	Functional MTI (Weak)	23824327	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	CCND1	595	ENSG00000110092	Luciferase reporter assay//qRT-PCR//Western blot	Functional MTI	21569481	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	BTG2	7832	ENSG00000159388	PAR-CLIP	Functional MTI (Weak)	24398324	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	EGFR	1956	ENSG00000146648	Luciferase reporter assay	Functional MTI	23559009	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	EGFR	1956	ENSG00000146648	Luciferase reporter assay//qRT-PCR//Western blot	Functional MTI	23650389	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	CNN3	1266	ENSG00000117519	Microarray//qRT-PCR	Functional MTI (Weak)	22815788	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	TP53INP2	58476	ENSG00000078804	HITS-CLIP	Functional MTI (Weak)	19536157	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	SLC7A2	6542	ENSG00000003989	PAR-CLIP	Functional MTI (Weak)	20371350	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	NR2F2	7026	ENSG00000185551	HITS-CLIP	Functional MTI (Weak)	23824327	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	IER3	8870	ENSG00000230128	HITS-CLIP	Functional MTI (Weak)	22473208	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	IER3	8870	ENSG00000237155	HITS-CLIP	Functional MTI (Weak)	22473208	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	IER3	8870	ENSG00000227231	HITS-CLIP	Functional MTI (Weak)	22473208	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	IER3	8870	ENSG00000137331	HITS-CLIP	Functional MTI (Weak)	22473208	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	IER3	8870	ENSG00000206478	HITS-CLIP	Functional MTI (Weak)	22473208	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	IER3	8870	ENSG00000235030	HITS-CLIP	Functional MTI (Weak)	22473208	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	ABHD17C	58489	ENSG00000136379	Sequencing//PAR-CLIP	Functional MTI (Weak)	20371350	validated
mirtarbase	MIMAT0000084	hsa-miR-27a-3p	ABHD17C	58489	ENSG00000136379	HITS-CLIP	Functional MTI (Weak)	22473208	validated
mirtarbase	MIMAT0000254	hsa-miR-10b-5p	TRIM2	23321	ENSG00000109654	PAR-CLIP	Functional MTI (Weak)	20371350	validated
mirtarbase	MIMAT0000254	hsa-miR-10b-5p	TRIM2	23321	ENSG00000109654	PAR-CLIP	Functional MTI (Weak)	21572407	validated
mirtarbase	MIMAT0000254	hsa-miR-10b-5p	SDC1	6382	ENSG00000115884	Luciferase reporter assay	Functional MTI	22573479	validated
mirtarbase	MIMAT0000254	hsa-miR-10b-5p	SDC1	6382	ENSG00000115884	Luciferase reporter assay	Functional MTI	23206733	validated
mirtarbase	MIMAT0000254	hsa-miR-10b-5p	SDC1	6382	ENSG00000115884	3'LIFE	Functional MTI (Weak)	25074381	validated
mirtarbase	MIMAT0000254	hsa-miR-10b-5p	NR4A3	8013	ENSG00000119508	Reporter assay	Non-Functional MTI	21642433	validated
mirtarbase	MIMAT0000254	hsa-miR-10b-5p	KIF21A	55605	ENSG00000139116	CLASH	Functional MTI (Weak)	23622248	validated
mirtarbase	MIMAT0000254	hsa-miR-10b-5p	STK33	65975	ENSG00000130413	CLASH	Functional MTI (Weak)	23622248	validated

mirtarbase	MIMAT0000254	hsa-miR-10b-5p	SYNPO	11346	ENSG00000171992	PAR-CLIP	Functional MTI (Weak)	22012620	validated
mirtarbase	MIMAT0004495	hsa-miR-22-5p	ERBB2	2064	ENSG00000141736	HITS-CLIP	Functional MTI (Weak)	24906430	validated
mirtarbase	MIMAT0004495	hsa-miR-22-5p	CCDC113	29070	ENSG00000103021	CLASH	Functional MTI (Weak)	23622248	validated
mirtarbase	MIMAT0004556	hsa-miR-10b-3p	CLDN1	9076	ENSG00000163347	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0019756	hsa-miR-4674	SPA17	53340	ENSG00000064199	HITS-CLIP	Functional MTI (Weak)	19536157	validated
mirtarbase	MIMAT0022707	hsa-miR-570-5p	HS3ST1	9957	ENSG00000002587	PAR-CLIP	Functional MTI (Weak)	22100165	validated
mirtarbase	MIMAT0021021	hsa-miR-5001-5p	PODXL	5420	ENSG00000128567	PAR-CLIP	Functional MTI (Weak)	22012620	validated
mirtarbase	MIMAT0021021	hsa-miR-5001-5p	ATP8B1	5205	ENSG00000081923	PAR-CLIP	Functional MTI (Weak)	23446348	validated
mirtarbase	MIMAT0007882	hsa-miR-1909-5p	IGFBP3	3486	ENSG00000146674	HITS-CLIP	Functional MTI (Weak)	23313552	validated
mirtarbase	MIMAT0007882	hsa-miR-1909-5p	CERS4	79603	ENSG00000090661	HITS-CLIP	Functional MTI (Weak)	19536157	validated
mirtarbase	MIMAT0021022	hsa-miR-5001-3p	C3	718	ENSG00000125730	PAR-CLIP	Functional MTI (Weak)	21572407	validated
mirtarbase	MIMAT0021022	hsa-miR-5001-3p	FAM179A	165186	ENSG00000189350	PAR-CLIP	Functional MTI (Weak)	22291592	validated
mirtarbase	MIMAT0021022	hsa-miR-5001-3p	FAM179A	165186	ENSG00000189350	PAR-CLIP	Functional MTI (Weak)	23708386	validated
mirtarbase	MIMAT0021022	hsa-miR-5001-3p	FAM229B	619208	ENSG00000203778	HITS-CLIP	Functional MTI (Weak)	23824327	validated
mirtarbase	MIMAT0003235	hsa-miR-570-3p	PODXL	5420	ENSG00000128567	PAR-CLIP	Functional MTI (Weak)	22012620	validated
mirtarbase	MIMAT0003235	hsa-miR-570-3p	SLC5A8	160728	ENSG00000256870	HITS-CLIP	Functional MTI (Weak)	23824327	validated
mirtarbase	MIMAT0003235	hsa-miR-570-3p	SLC5A8	160728	ENSG00000262217	HITS-CLIP	Functional MTI (Weak)	23824327	validated
mirtarbase	MIMAT0019796	hsa-miR-4700-5p	EFNA1	1942	ENSG00000169242	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0019797	hsa-miR-4700-3p	CMTM4	146223	ENSG00000183723	PAR-CLIP	Functional MTI (Weak)	22100165	validated
mirtarbase	MIMAT0007883	hsa-miR-1909-3p	IGFBP4	3487	ENSG00000141753	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0007883	hsa-miR-1909-3p	BCAM	4059	ENSG00000187244	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0007883	hsa-miR-1909-3p	C9orf3	84909	ENSG00000148120	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0017981	hsa-miR-3605-5p	SOD2	6648	ENSG00000112096	PAR-CLIP	Functional MTI (Weak)	21572407	validated
mirtarbase	MIMAT0017981	hsa-miR-3605-5p	SOD2	6648	ENSG00000112096	PAR-CLIP	Functional MTI (Weak)	23446348	validated
mirtarbase	MIMAT0017981	hsa-miR-3605-5p	SOD2	6648	ENSG00000112096	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0017981	hsa-miR-3605-5p	SOD2	6648	ENSG00000112096	PAR-CLIP	Functional MTI (Weak)	24398324	validated
mirtarbase	MIMAT0017981	hsa-miR-3605-5p	EPHA2	1969	ENSG00000142627	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0017981	hsa-miR-3605-5p	NUCB2	4925	ENSG00000070081	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0017981	hsa-miR-3605-5p	GPRC5C	55890	ENSG00000170412	PAR-CLIP	Functional MTI (Weak)	20371350	validated
mirtarbase	MIMAT0017981	hsa-miR-3605-5p	SLC23A1	9963	ENSG00000170482	PAR-CLIP	Functional MTI (Weak)	22291592	validated
mirtarbase	MIMAT0005896	hsa-miR-1244	TRIM2	23321	ENSG00000109654	PAR-CLIP	Functional MTI (Weak)	20371350	validated
mirtarbase	MIMAT0005896	hsa-miR-1244	TRIM2	23321	ENSG00000109654	PAR-CLIP	Functional MTI (Weak)	21572407	validated
mirtarbase	MIMAT0005896	hsa-miR-1244	GALNT3	2591	ENSG00000115339	PAR-CLIP	Functional MTI (Weak)	22012620	validated
mirtarbase	MIMAT0005896	hsa-miR-1244	WFDC6	140870	ENSG00000243543	HITS-CLIP	Functional MTI (Weak)	23313552	validated
mirtarbase	MIMAT0017982	hsa-miR-3605-3p	PODXL	5420	ENSG00000128567	PAR-CLIP	Functional MTI (Weak)	23592263	validated
mirtarbase	MIMAT0017982	hsa-miR-3605-3p	TMC5	79838	ENSG00000103534	PAR-CLIP	Functional MTI (Weak)	20371350	validated
mirtarbase	MIMAT0017982	hsa-miR-3605-3p	TMC5	79838	ENSG00000103534	HITS-CLIP	Functional MTI (Weak)	21572407	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	CLDN1	9076	ENSG00000163347	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	EGFR	1956	ENSG00000146648	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	FSTL1	11167	ENSG00000163430	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	FUBP3	8939	ENSG00000107164	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	ITGB4	3691	ENSG00000132470	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	MYO1D	4642	ENSG00000176658	Other	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	MYO1D	4642	ENSG00000176658	Reporter assay	negative	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	NCKAP1	10787	ENSG00000061676	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	PHGDH	26227	ENSG00000092621	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	PLEKHA5	54477	ENSG00000052126	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	PLS1	5357	ENSG00000120756	Other	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	PLS1	5357	ENSG00000120756	Reporter assay	negative	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	PODXL	5420	ENSG00000128567	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	PPL	5493	ENSG00000118898	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	SLC27A2	11001	ENSG00000140284	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	SLC9A3R2	9351	ENSG00000065054	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	TACSTD2	4070	ENSG00000184292	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	TNKS1BP1	85456	ENSG00000149115	Proteomics	positive	NA	validated
tarbase	MIMAT0000646	hsa-miR-155-5p	TPBG	7162	ENSG00000146242	Proteomics	positive	NA	validated
tarbase	MIMAT0000254	hsa-miR-10b-5p	NR4A3	8013	ENSG00000119508	Reporter assay	negative	NA	validated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-5
0
5
10
15

Supplementary Table 10: List of 5 overalpping differentially expressed genes between BAL and PBMC in genotype effects

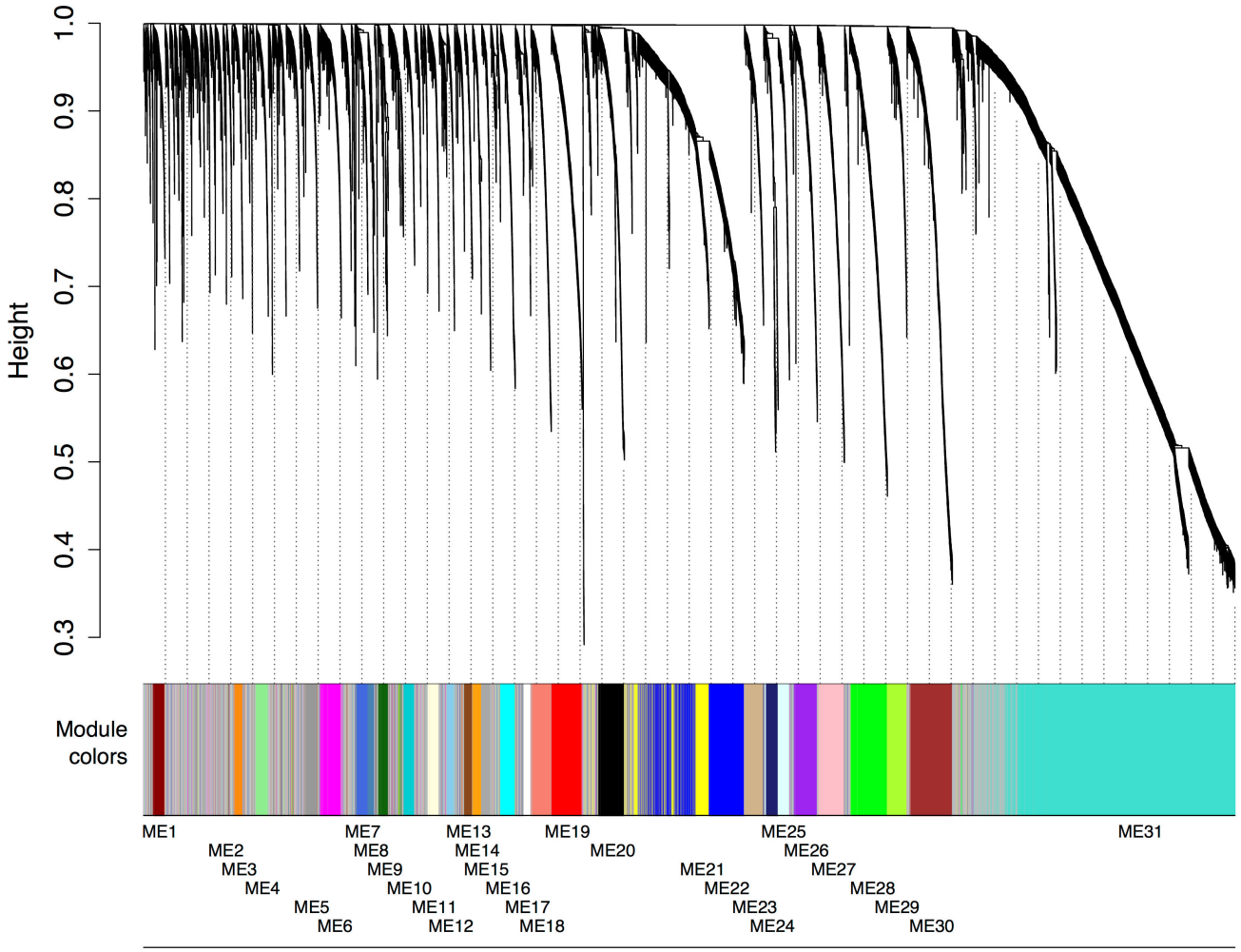
	PiMZ.off avg	PiZZ.off avg	FC	log2FC	PValue	FDR
RNU2-2P	11.4803745	119.963279	10.4494221	3.38535125	1.03E-07	0.00011326
SPA17	123.931599	83.8395707	1.47819935	-0.5638408	0.00011969	0.02933685
RNU5A-1	0.4865785	38.5653337	79.2581957	6.30848822	1.93E-10	4.52E-07
RNU2-1	31.6308104	191.957658	6.06869236	2.60138569	2.61E-08	3.90E-05
EGR3	32.46861	177.972335	5.48136602	2.45453547	1.59E-09	2.90E-06

	PiMZ.off avg	PiZZ.off avg	FC	log2FC	PValue	FDR
RNU2-2P	55.6603932	858.208745	15.4186612	3.9466056	1.83E-09	1.57E-06
SPA17	25.1471467	61.513848	2.44615617	1.29051651	0.00015581	0.01947651
RNU5A-1	2.02689691	54.4742258	26.8756766	4.74822917	1.47E-07	5.44E-05
RNU2-1	123.039606	625.966792	5.08752273	2.34696333	0.00015091	0.01917624
EGR3	44.8550445	142.404904	3.17478013	1.66665668	0.00014562	0.01879718

Supplementary Table 11: List of 6 overalpping differentially expressed genes between BAL and PBMC in therapy effects

	PiZZ.off avg	PiZZ.on avg	FC	logFC	PValue	FDR
MORN2	5.81677862	9.90480545	1.70279911	0.76790824	0.00069725	0.00975231
SNORD13	17.8695748	6.72067727	2.65889495	-1.4108268	0.00294085	0.02865749
SPA17	3.27501666	6.26787182	1.91384426	0.93647343	0.00157806	0.01799586
RNU4-1	9.08256172	6.93514773	1.30964214	-0.3891727	0.00224106	0.02342388
SNORD12C	35.1290069	34.11915	1.02959795	-0.0420811	0.00118116	0.01445895
SNORD12	12.1542828	6.35918182	1.91129663	-0.9345517	0.00101872	0.01294954

	PiZZ.off avg	PiZZ.on avg	FC	logFC	PValue	FDR
MORN2	3.37994993	1.64333395	2.05676389	-1.0403762	1.29E-05	0.0057445
SNORD13	292.849819	4.20811455	69.5916937	-6.1208432	2.70E-06	0.00249995
SPA17	2.04134669	0.88032173	2.31886437	-1.2134184	1.15E-06	0.00241992
RNU4-1	71.4428772	4.51057182	15.8389845	-3.9854079	4.82E-06	0.00314864
SNORD12C	257.384438	231.520773	1.11171207	-0.1527832	9.26E-05	0.02422397
SNORD12	106.355069	5.07442273	20.9590479	-4.3895013	1.59E-05	0.00668777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ME5
ME6
ME7
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ME12
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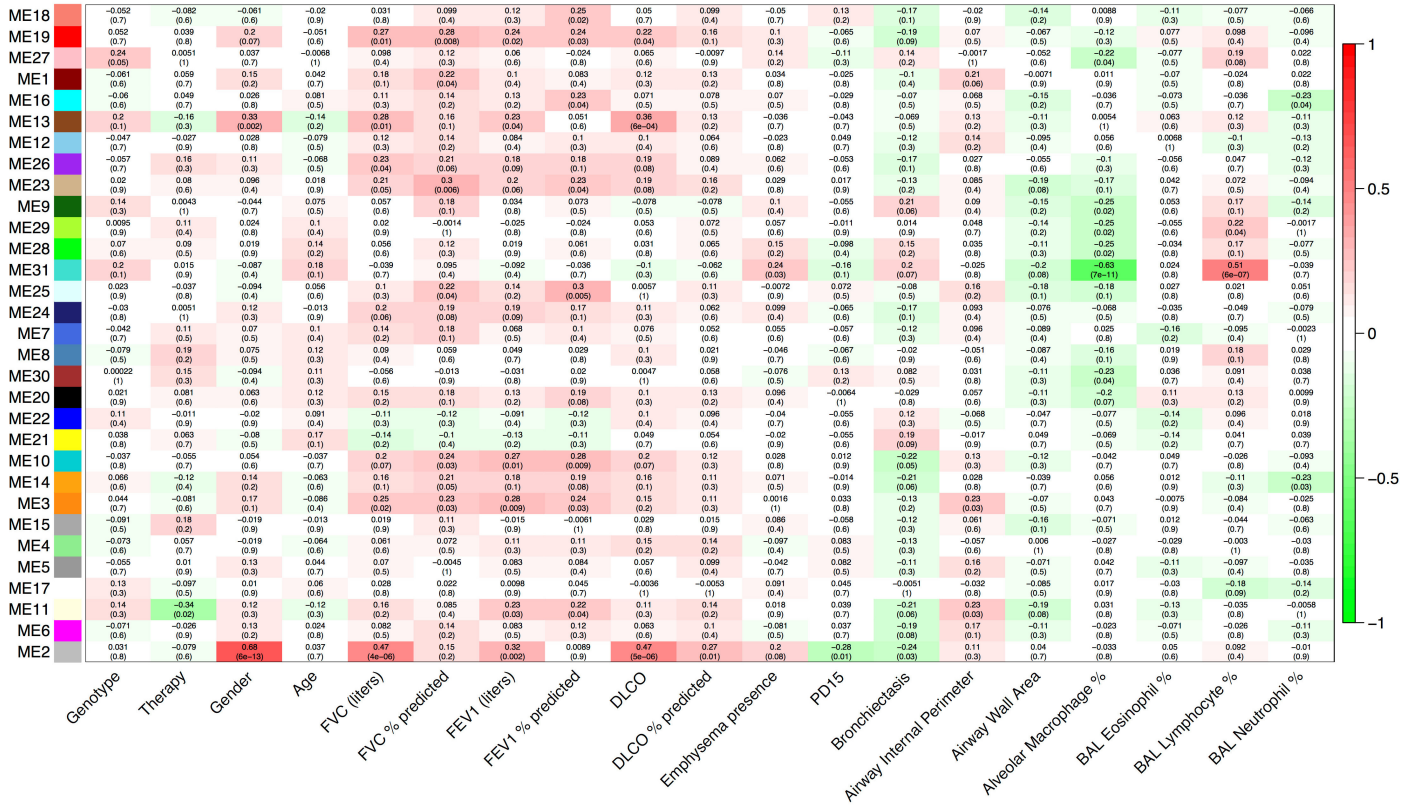
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ME8
ME30
ME20
ME22
ME21
ME10
ME14
ME3
ME15
ME4
ME5
ME17
ME11
ME6
ME2
Genotype
Therapy
Gender
Age
FVC (liters)
FVC % predicted
FEV1 (liters)
FEV1 % predicted
DLCO
DLCO % predicted
Emphysema presence
PD15
Bronchiectasis
Airway Internal Perimeter
Airway Wall Area
Alveolar Macrophage %
BAL Eosinophil %
BAL Lymphocyte %
BAL Neutrophil %
1
0.5
0
−0.5
−1

Supplementary Table 12: List of 666 genes marked red in figure 3 that visually differentiated clusters 2 and 3

	group 2 avg	group 2 sd	group 3 avg	group 3 sd	FC	logFC
LOC285484	0	0	0.01810586	0.0327206	Inf	Inf
KIR2DL1	0.00019698	0.00102356	0.04033766	0.12501806	204.775885	7.67790202
KIR2DL2	0.00079033	0.00410667	0.04423361	0.18788369	55.9685575	5.80654466
KIR3DX1	0.00118973	0.00430089	0.0227923	0.03852748	19.1576091	4.25984561
PDZK1IP1	0.0120123	0.03048899	0.20516608	0.34672501	17.0796668	4.09420792
MMRN1	0.00129724	0.00322589	0.01751809	0.02904393	13.5041587	3.75533186
TNFRSF13C	0.01177415	0.03468898	0.15619067	0.3184038	13.26556	3.72961368
TCAF2P1	0.00182606	0.00542774	0.02205437	0.02692687	12.0775779	3.59425925
RLN2	0.01266902	0.02469827	0.13661401	0.19561325	10.7833115	3.43072838
INSL3	0.0194798	0.08920262	0.18269693	0.33744795	9.37879032	3.22940186
LOC10050553	0.0255723	0.06242097	0.22450113	0.24254849	8.77907459	3.13406887
NUGGC	0.04499276	0.05066229	0.38793592	0.39959135	8.62218456	3.10805344
FCRL5	0.00746028	0.01392186	0.06354694	0.1269395	8.51803669	3.09052095
LOC101927488	0.03730432	0.06629969	0.31773964	0.3789806	8.51750201	3.09043038
DOC2GP	0.01365504	0.04952461	0.11414524	0.25389348	8.35920411	3.06336559
CCR8	0.05110063	0.06744294	0.41492774	0.38787953	8.11981591	3.02144702
GLB1L3	0.00439813	0.00672917	0.03404923	0.05254988	7.74174312	2.95265844
GZMH	0.93155028	1.23517108	6.88897117	9.092698	7.39516839	2.886583
LINC00426	0.07048157	0.08434009	0.51711288	0.39828582	7.33685235	2.87516125
SYNGR3	0.03047795	0.03713027	0.21729968	0.25899474	7.12973366	2.83384818
GZMK	0.58406275	0.61193474	4.13537548	8.12484641	7.08036164	2.82382305
GZMA	1.59157504	1.28944652	11.1507319	13.1751834	7.00609875	2.80861132
IGLL5	0.19034409	0.32844602	1.33032132	2.83167441	6.98903404	2.80509307
B3GAT1	0.02211549	0.04113053	0.15331529	0.14000173	6.93248453	2.79337249
NBL1	0.07160343	0.11469574	0.49466354	0.64854986	6.90837738	2.78834689
LINC00892	0.36028254	0.36043903	2.47645042	1.90479553	6.87363419	2.78107308
GPR174	0.18412317	0.17964951	1.26287521	1.06112107	6.85886101	2.77796902
PRTFDC1	0.0041435	0.01324408	0.02810785	0.06375707	6.78360132	2.76205138
GPR25	0.07518413	0.10728933	0.50525087	0.43144611	6.72017941	2.74849975
THEMIS	0.26184956	0.16378276	1.73566198	1.65597634	6.62847012	2.72867593
SLC14A1	0.0073932	0.01886136	0.04840051	0.06526873	6.54662634	2.71075164
JCHAIN	0.34766809	0.27038767	2.26160038	5.75075282	6.50505605	2.70156149
UGT8	0.00361752	0.00852439	0.02310336	0.03970047	6.38651513	2.67502893
POU2AF1	0.02140636	0.02321959	0.13624998	0.14889212	6.36492885	2.67014439
TRAT1	0.35525602	0.27276737	2.25167879	1.73956235	6.33818626	2.66407006
CCL5	6.28860396	5.10000515	39.8482565	44.7132863	6.33658228	2.66370491
GNLY	1.25147974	1.52840668	7.88663358	7.94289161	6.30184679	2.65577468
CD96	0.56301017	0.31039736	3.51169571	2.86461486	6.23735746	2.64093494
GZMB	1.44071956	1.12212935	8.95852288	11.9174787	6.21808932	2.63647134
SH2D2A	0.48524886	0.36750936	3.01587021	2.97763449	6.2151001	2.63577763
SLA2	0.48852211	0.29108354	3.02720869	3.04579467	6.19666673	2.63149238
FSD1	0.01601426	0.03739742	0.09922711	0.11499317	6.19617209	2.63137721
IL12RB2	0.09705867	0.06793307	0.60008216	0.59241632	6.18267446	2.62823105
AFAP1L2	0.01754869	0.02667657	0.10803521	0.1312316	6.15631175	2.62206629
SCML4	0.1608846	0.13038753	0.98075385	0.75742145	6.09600835	2.60786488
LINC01260	0.04638987	0.06454706	0.28253256	0.40856526	6.09039292	2.60653531
VIPR1	0.02432363	0.03603023	0.14774459	0.16238692	6.07411883	2.60267513
RAB27B	0.02408278	0.02128931	0.14597002	0.16550382	6.06117717	2.59959801
IL32	3.62018982	2.42056331	21.8393594	19.9296256	6.03265588	2.59279329

NCR1	0.05403209	0.08834303	0.32575795	0.52001303	6.02897161	2.59191194
FASLG	0.23764372	0.17998526	1.42355367	1.33041698	5.99028536	2.58262473
MIAT	0.32144928	0.20975936	1.91958777	1.40042729	5.97166615	2.57813351
IGFBP3	0.02510511	0.04034243	0.14862995	0.151472	5.92030737	2.56567208
IKZF3	0.44173267	0.24158121	2.60661892	2.13471487	5.90089689	2.56093425
F2R	0.24021975	0.12736107	1.41504235	1.26025275	5.89061626	2.55841857
PXYLP1	0.03291064	0.0363995	0.19222427	0.13141346	5.84079322	2.54616431
PRF1	0.77566948	0.53383674	4.51654215	5.17800792	5.82276634	2.54170473
ZNF831	0.08438874	0.06140996	0.48948402	0.32372437	5.80034793	2.53613944
TAL1	0.00644937	0.01174021	0.03728549	0.08876141	5.78126128	2.53138427
TBX21	0.17253784	0.13697584	0.99133374	0.76852976	5.74560198	2.52245805
BCL11B	0.16861851	0.09648407	0.96834417	0.76516753	5.74281056	2.52175697
TGFBR3	0.05271254	0.03250121	0.30169622	0.27794859	5.72342412	2.51687852
SH2D1A	0.1621508	0.12367225	0.91850198	0.83990364	5.66449247	2.5019467
DBH	0.01026128	0.01928324	0.05800655	0.06437279	5.65295381	2.49900491
TMIGD2	0.11435374	0.14521283	0.64328589	0.6416285	5.62540295	2.49195644
ATP1A3	0.04544567	0.04465002	0.25521634	0.18724886	5.61585561	2.48950584
HOPX	0.9870594	0.73852169	5.534767	4.91276459	5.60732923	2.48731378
NKG7	1.58680756	1.28456363	8.89509565	14.4594131	5.60565496	2.48688295
CD40LG	0.5825414	0.40721471	3.25870085	2.64685094	5.59393865	2.48386443
TC2N	0.27754756	0.1731116	1.55042306	1.05962994	5.58615268	2.48185501
KCNQ5	0.00315381	0.00456762	0.01730024	0.02118742	5.48551141	2.45562613
CXCR3	0.65944492	0.38110443	3.58074869	2.77191493	5.42994353	2.44093719
CDHR1	0.0124987	0.01802525	0.06781385	0.08818369	5.42567271	2.43980202
GRAP2	0.43113905	0.31029099	2.33914179	1.60805636	5.42549278	2.43975418
PPP1R16B	0.62383882	0.30935568	3.35582698	2.87486904	5.37931738	2.42742311
IL18RAP	0.2293542	0.15773314	1.23269585	1.11029751	5.37463824	2.42616765
ST8SIA1	0.01797936	0.01348514	0.09622619	0.08702098	5.35203631	2.4200879
ABCD2	0.03894318	0.03365154	0.20821499	0.17685115	5.34663583	2.41863142
JAKMIP1	0.17138966	0.21435693	0.91583998	0.8532247	5.34361271	2.41781545
LINC01550	0.01372801	0.02509554	0.07321705	0.09841116	5.3334052	2.41505694
CD3E	2.36125441	1.45388634	12.5811892	8.6942895	5.32818028	2.4136429
IL2RB	1.175121	0.69336739	6.24524646	4.83170144	5.31455608	2.40994919
ITM2A	0.46707747	0.30977972	2.47528883	2.33337692	5.29952518	2.4058631
LCK	1.69059793	0.93399487	8.92982563	6.18071065	5.28205169	2.40109842
SAMD3	0.17467063	0.15299452	0.92018225	1.20653863	5.26809935	2.39728255
TSPAN5	0.09107504	0.06695601	0.47870287	0.38603451	5.25613658	2.39400277
PLXDC1	0.05833162	0.05206994	0.3061764	0.23726055	5.24889225	2.39201298
GZMM	0.25287297	0.33780228	1.32604504	1.30462252	5.24391776	2.39064506
EOMES	0.17169982	0.1154152	0.89647194	1.1828329	5.22115844	2.38436994
NLRC3	0.35255783	0.16862711	1.83988821	1.30881973	5.21868486	2.38368629
EPHA4	0.02687659	0.03316182	0.14006755	0.14274876	5.21150786	2.38170085
LINC00861	0.33229184	0.30050262	1.73172594	1.47982949	5.21146091	2.38168786
LY9	0.39196658	0.20456869	2.03095888	1.62257604	5.18145931	2.37335848
CAMK2N1	0.02592453	0.03886362	0.13214145	0.14272034	5.09715944	2.34969348
SH2D1B	0.05160319	0.04554132	0.26221192	0.47639082	5.08131271	2.34520125
UBASH3A	0.34987843	0.27165859	1.77043002	1.4086806	5.06012904	2.33917418
ZNF683	0.75736665	1.13005618	3.80707567	3.30945475	5.02672736	2.32961944
INPP4B	0.11243197	0.08673199	0.56469019	0.45137603	5.0225057	2.3284073
KLRC3	0.0749891	0.10691804	0.37637755	0.51426297	5.01909702	2.32742784
CCDC141	0.00261344	0.00371813	0.01309654	0.01540419	5.01123353	2.32516577
PTGDR	0.05409146	0.06594804	0.26983797	0.21224665	4.98854998	2.31862053

LZTS1	0.04807353	0.0486097	0.23783221	0.20319939	4.94725954	2.30662959
SPOCK2	1.32542707	0.73149534	6.54782896	3.86814992	4.94016539	2.30455934
ZAP70	0.75990685	0.52542708	3.73737617	2.51110242	4.91820301	2.29813129
CD8A	1.4592963	1.17404821	7.13849431	9.79134177	4.89173743	2.29034697
ITM2C	0.4736768	0.25131552	2.2892474	3.34110407	4.83293118	2.27289845
PLCXD2	0.0341641	0.03799593	0.16503658	0.12013534	4.8307022	2.27223292
ITK	1.0098732	0.51857676	4.86882	3.20192635	4.82121912	2.269398
IL31RA	0.0105281	0.03555224	0.0506839	0.05979556	4.814156	2.26728289
APOBEC3D	0.23356996	0.18780266	1.12318931	0.82136014	4.80879176	2.26567445
LOC440461	0.01804284	0.02495874	0.08647429	0.11502835	4.7927201	2.26084469
CD79A	0.15457058	0.1921099	0.74018684	1.09118799	4.7886657	2.25962372
SEPT1	1.33477448	0.65856087	6.36347396	5.09487502	4.76745252	2.25321857
ETS1	1.51691856	0.67192429	7.220055	4.54809696	4.75968533	2.2508662
KIR2DL4	0.03668346	0.09459103	0.17353914	0.21171529	4.73071894	2.24205945
LINC00299	0.01082372	0.02798454	0.05118091	0.08410532	4.72858645	2.24140897
DMWD	0.07735108	0.07807027	0.36532135	0.23900974	4.72289898	2.23967268
LINC00943	0.01251762	0.0219071	0.0590795	0.07801267	4.71970626	2.23869707
NELL2	0.131742	0.09965594	0.61376983	0.39941419	4.65887744	2.21998238
RORC	0.12125477	0.10814133	0.56227033	0.47124541	4.63709853	2.21322238
GNG2	0.69373204	0.27040548	3.20751354	2.21266124	4.62356266	2.20900494
NPDC1	0.09031202	0.0894995	0.41526988	0.48206219	4.59816865	2.20105938
HIST1H2BH	0.21178374	0.35640484	0.96445954	1.15596662	4.55398294	2.18712889
LOC10099628	0.07256646	0.14070423	0.32947685	0.31987318	4.54034597	2.18280224
TNFRSF25	0.66778993	0.51483209	3.0284016	1.77115553	4.5349615	2.1810903
DOCK9	0.14048824	0.07813332	0.63521503	0.47033861	4.52148169	2.17679562
APBA2	0.05642016	0.07058087	0.25479413	0.24782617	4.51601193	2.1750493
ANO9	0.17690799	0.13102017	0.79866027	0.52170868	4.51455168	2.17458273
GPR171	0.82342663	0.47608588	3.71667646	3.26817247	4.51367047	2.17430109
LAG3	0.43290487	0.25425024	1.94890867	2.74678652	4.50193287	2.17054455
MS4A1	0.15021376	0.13216219	0.67601114	0.59879176	4.50032771	2.17003006
ZNF507	0.06665642	0.04491958	0.29972718	0.16776064	4.4965989	2.1688342
LOXL1-AS1	0.05017862	0.05718057	0.22517566	0.16873282	4.48748222	2.16590622
FRMPD3	0.01271124	0.01746973	0.05691599	0.06613143	4.47761012	2.16272892
CD247	1.03377952	0.58383996	4.62704188	3.41703434	4.47584982	2.16216163
DAPK2	0.16503712	0.10167745	0.73802006	0.66729998	4.47184288	2.1608695
DTX3	0.10698597	0.09421962	0.47573545	0.42844677	4.44670859	2.15273786
ANTXRLP1	0.03899413	0.15009193	0.17298468	0.17355827	4.43617223	2.14931538
KLRD1	0.20663585	0.15618156	0.91662182	1.16592887	4.43592829	2.14923604
RGS9	0.12021737	0.10610308	0.53265303	0.39591383	4.43074919	2.14755066
BACH2	0.0292794	0.02454507	0.12950026	0.09962067	4.42291434	2.1449973
STAT4	0.48318653	0.26097751	2.13665754	1.51803974	4.42201385	2.14470354
ZSWIM5	0.01130869	0.01260686	0.04986438	0.05062723	4.40938491	2.14057742
VSIG1	0.01391095	0.0136939	0.06103802	0.05759834	4.38776714	2.13348696
DOK6	0.00725649	0.00924704	0.03159911	0.03268131	4.35459803	2.12253955
RASGRP1	0.60750393	0.25248517	2.6438124	1.69685668	4.35192644	2.12165417
THEM5	0.05053466	0.07373105	0.21876523	0.24410233	4.32901404	2.11403848
ABLIM1	0.19498067	0.1019451	0.84095429	0.48932114	4.31301356	2.10869625
BTBD11	0.04106285	0.03153554	0.17701067	0.1253447	4.31072588	2.10793082
TRAF3IP3	1.24139607	0.72006131	5.35104108	3.07342127	4.31050266	2.10785612
PYHIN1	0.3313994	0.23330214	1.42356471	1.24353621	4.29561648	2.10286519
BTLA	0.0887307	0.07251019	0.38100154	0.31996848	4.29390874	2.10229153
TNFRSF13B	0.02105781	0.05874161	0.09030562	0.13051875	4.28846266	2.10046056

KLRK1	0.87173129	0.80820027	3.72089858	3.61855318	4.26840088	2.09369568
GCNT4	0.01281027	0.01657013	0.05440817	0.06931804	4.24723118	2.08652264
SYNE2	0.72455889	0.48328222	3.07680788	1.9819903	4.24645658	2.0862595
P2RY10	0.29538967	0.18723001	1.25139983	0.84636577	4.23643741	2.08285155
GPR18	0.13048024	0.1158386	0.55141048	0.57225857	4.22600751	2.07929533
KIF5A	0.00761817	0.01574092	0.03214716	0.03860968	4.21979908	2.07717431
ABCB1	0.05029328	0.04283782	0.21141156	0.16540727	4.20357471	2.07161671
ITPRIPL1	0.18207195	0.21569862	0.76482506	0.65093957	4.20067481	2.07062111
PDCD1	0.15741346	0.13444369	0.65899779	0.68717062	4.18641331	2.06571475
LEF1	0.25584001	0.18374759	1.06651153	0.79700433	4.16866592	2.05958576
ZFR2	0.00881595	0.01405472	0.03650207	0.09980522	4.14046062	2.04979127
MZB1	0.10773059	0.15479974	0.44504572	0.9083906	4.1310991	2.04652567
SIT1	0.57899719	0.30061469	2.38977258	2.03793617	4.12743383	2.04524509
SLC38A1	0.49947222	0.22326894	2.05472077	1.25864227	4.11378387	2.040466
SATB1-AS1	0.0290401	0.06316211	0.11921008	0.19511409	4.10501621	2.03738792
LOC10192810	0.02392208	0.03399693	0.09803842	0.09760926	4.09824053	2.03500466
WNT10B	0.0344504	0.04934519	0.14115638	0.13265328	4.09737966	2.03470158
IFITM1	7.22145444	4.40675271	29.4367513	26.4899932	4.07629121	2.02725712
KLRB1	1.41598993	1.18518225	5.77197548	5.36703836	4.07628287	2.02725417
P2RY8	0.43866363	0.25880378	1.78027054	1.24202792	4.05839559	2.0209095
PTPRCAP	5.41662037	2.85905598	21.975985	18.3436798	4.0571396	2.02046294
CD226	0.37003045	0.25081613	1.49931769	1.15000122	4.05187649	2.0185902
ATP8B2	0.60596485	0.27332635	2.44166588	1.31700613	4.02938531	2.01055977
COLGALT2	0.05646772	0.07363147	0.22562913	0.17966518	3.99571884	1.99845507
TTC22	0.04486629	0.04958631	0.17898917	0.1655503	3.98939071	1.99616842
AGMAT	0.0361667	0.03315411	0.14411137	0.12687322	3.98464208	1.99445014
PRKCQ-AS1	0.16788899	0.15662369	0.66798388	0.47453399	3.97872356	1.99230566
LBH	0.85005926	0.50414502	3.37966135	2.70079356	3.975795	1.99124337
FBXO2	0.0550411	0.07057308	0.21848637	0.22169054	3.96951305	1.98896204
RLTPR	0.24244317	0.16005776	0.960529	0.55748198	3.96187285	1.98618258
KLRC1	0.23663476	0.24832488	0.93401427	0.89705966	3.94707138	1.98078261
CD8B	0.72897788	0.66783745	2.87488879	4.56304921	3.9437257	1.97955921
STYK1	0.03147017	0.03473056	0.12406029	0.13150472	3.94215514	1.97898455
KIF5C	0.04894726	0.03674964	0.19185838	0.12231413	3.91969631	1.97074188
CAMK4	0.21973983	0.18357905	0.85551869	0.63192222	3.89332546	1.96100295
MMP25-AS1	0.05560631	0.05867038	0.2161528	0.17334478	3.88719942	1.95873112
TSPAN2	0.12084282	0.10278336	0.46932267	0.32102459	3.8837447	1.95744837
ACSL6	0.01975236	0.02059027	0.07667204	0.06555886	3.88166506	1.95667564
ZNF827	0.035277	0.04012171	0.13672889	0.08948125	3.875865	1.95451832
FBLN5	0.03794677	0.06475721	0.14702096	0.13906452	3.8743999	1.95397287
TMEM204	0.24178306	0.30375264	0.93564647	0.66402468	3.86977671	1.95225033
LAX1	0.25783866	0.18250264	0.99245159	0.6560089	3.84911859	1.94452812
ACAP1	1.34898719	0.5830828	5.18728771	3.31569001	3.84532023	1.94310375
TMEM156	0.10881392	0.11210414	0.41840614	0.34502073	3.84515286	1.94304095
ZEB1-AS1	0.03955245	0.04680333	0.15194255	0.16820219	3.84154603	1.94168704
NCALD	0.07039886	0.06207058	0.27039708	0.23601208	3.84092964	1.94145554
PLEKHG5	0.01002634	0.0087697	0.03844028	0.03810687	3.83393033	1.93882412
SGSM1	0.0080694	0.01014025	0.03078894	0.03153057	3.81551791	1.9318789
NCAM1	0.04574549	0.02904994	0.17292115	0.19548057	3.78007022	1.91841304
APOBEC3A	0.65706461	0.52206146	2.48011415	4.03350466	3.77453617	1.91629937
EPHA1	0.11120461	0.09984035	0.41800249	0.32008489	3.75885935	1.91029493
LTA	0.31520489	0.1552036	1.18449292	0.71371209	3.75785076	1.90990777

COL5A1	0.01602289	0.01569624	0.06019929	0.05394422	3.75708064	1.90961208
FAM101B	0.58628259	0.26114908	2.20210888	1.39618189	3.75605366	1.90921767
CXCR2P1	0.06542406	0.07573636	0.2443209	0.2462577	3.73441983	1.90088413
SSTR3	0.00612415	0.01486541	0.02280727	0.03270809	3.72415249	1.89691215
CYP4F22	0.08551523	0.08620908	0.31817293	0.30525505	3.72065798	1.89555778
ELOVL6	0.09385708	0.06607996	0.348751	0.26335227	3.71576647	1.89365983
LOC154761	0.0185711	0.02904502	0.06895376	0.08153508	3.71296073	1.89257006
TUBA4A	0.84189041	0.35620018	3.10125998	2.03166611	3.68368609	1.88115012
NSG1	0.06856452	0.05758959	0.25247101	0.19762139	3.68224014	1.88058371
CD3G	1.12502096	0.53067352	4.08665833	2.64659209	3.6325175	1.86096975
DBH-AS1	0.07050975	0.12656521	0.25529764	0.3061545	3.62074241	1.85628554
DBN1	0.11470086	0.06779829	0.41482816	0.31516499	3.61660908	1.85463766
FAM46C	0.29507411	0.15556224	1.06068523	0.97866591	3.59464009	1.84584733
N4BP3	0.01825153	0.02127704	0.06556282	0.04748349	3.59218231	1.84486057
PDE4D	0.11808432	0.07293656	0.4226314	0.66603932	3.57906469	1.83958262
LINC00925	0.01584895	0.02071602	0.05667167	0.05987595	3.57573707	1.83824066
ISG20	1.866629	1.17269357	6.66338167	5.93846024	3.56974078	1.83581932
PPP2R2B	0.14884785	0.11453296	0.52991096	0.39995987	3.56008479	1.8319116
C12orf75	0.46229674	0.27648179	1.64426444	1.32832964	3.55672949	1.83055125
FCRLA	0.0352016	0.05487839	0.12512878	0.16810151	3.55463341	1.82970078
CDCA7	0.21435516	0.17090411	0.76043616	0.63873375	3.54755233	1.82682397
WNT10A	0.05409377	0.06229101	0.19160545	0.20649424	3.5420983	1.82460425
PDZD4	0.05012555	0.07477157	0.176822	0.17375903	3.527582	1.81867962
PLCH2	0.06346079	0.05790378	0.22355141	0.15417743	3.52267002	1.81666934
KLRC4	0.19522675	0.27197722	0.6846136	0.69918703	3.50676126	1.81013922
SIRPG	0.2086567	0.15316721	0.72661699	0.89227475	3.48235631	1.80006383
SLC38A5	0.11492494	0.13405296	0.3990764	0.35927384	3.4724959	1.79597299
TESPA1	0.25051416	0.13264487	0.86921433	0.40980617	3.46972133	1.7948198
ADAM23	0.00527302	0.00979829	0.01826997	0.02941756	3.46480209	1.79277295
JAK3	0.69772626	0.36755739	2.41687125	1.4001124	3.46392474	1.79240759
HIP1R	0.12738629	0.07866755	0.44101966	0.30889946	3.46206526	1.79163292
PRKCQ	0.52660696	0.25327567	1.81582935	1.27471553	3.44816819	1.78583015
CSGALNACT1	0.17515043	0.10494953	0.60369735	0.37934846	3.44673636	1.78523095
PLEKHF1	0.35607182	0.18434126	1.22431929	1.03178791	3.43840552	1.7817397
TIGIT	0.2425286	0.1521917	0.83356488	0.61042886	3.43697558	1.7811396
CARD11	0.6564327	0.35796657	2.25172723	1.41466823	3.4302484	1.77831305
EMB	1.08584793	0.49483109	3.72404333	2.69849918	3.42961776	1.77804779
CRISPLD2	0.03825405	0.05854881	0.13103178	0.28357273	3.42530496	1.77623244
CCR4	0.60698852	0.34617919	2.07664375	1.05036075	3.4212241	1.77451261
GFI1	0.38896349	0.41205902	1.32843596	0.85300369	3.41532299	1.77202202
XCL2	0.713578	0.61616544	2.43478192	1.95989109	3.41207537	1.77064951
SMAD3	0.20074063	0.08746222	0.68128667	0.37155935	3.39386541	1.76292935
CD7	1.10361348	0.56399661	3.7423971	3.25572625	3.39103968	1.76172767
COL6A4P2	0.00175612	0.00274313	0.00594549	0.01029755	3.38557858	1.75940241
SH2D3A	0.13617628	0.0892588	0.45811055	0.30804702	3.36409952	1.75022038
SETBP1	0.03674734	0.03181047	0.12355491	0.10742386	3.36228163	1.74944057
DLL1	0.08283427	0.05916283	0.27844877	0.18669006	3.36151666	1.7491123
CST7	2.28043367	1.17936918	7.65867083	7.27650929	3.35842737	1.74778583
CLEC4C	0.03409192	0.05961784	0.11403395	0.18263081	3.3448964	1.74196153
CLU	1.09491427	0.92675546	3.6545465	3.38636348	3.33774671	1.73887448
APBB1	0.32263382	0.18307457	1.07183629	0.63741	3.32214493	1.73211501
LINC00649	0.0227895	0.02575476	0.07554683	0.09365628	3.3149846	1.72900217

PBX4	0.15977052	0.12556177	0.52886279	0.34955408	3.31014012	1.72689229
SPON1	0.01208359	0.0184528	0.03973529	0.04243113	3.28836879	1.71737211
TNFRSF18	0.26506475	0.23208728	0.87031052	0.58463104	3.28338839	1.71518542
SLC4A10	0.02437996	0.03711274	0.0795673	0.08354728	3.26363592	1.70648012
ANXA6	3.74399111	1.79979527	12.1962044	6.89605146	3.25754095	1.70378332
LOC643733	0.21554969	0.25770032	0.70013593	0.61219602	3.24814168	1.69961456
MSC	0.18619846	0.21367148	0.60470423	0.65413272	3.24763277	1.69938851
ENO2	0.302308	0.1907086	0.98161396	0.51480344	3.24706581	1.69913662
CCDC136	0.03855024	0.06067318	0.12421803	0.09573765	3.22223738	1.68806278
SLC25A23	0.10847643	0.07946255	0.34900248	0.25282204	3.21731155	1.68585565
SERPINE2	0.02958031	0.06722064	0.09513234	0.13720849	3.21606968	1.68529866
CD28	0.23378288	0.12680279	0.74945715	0.46381742	3.20578282	1.68067669
CCNJL	0.01485978	0.02718041	0.0475414	0.12233343	3.1993343	1.67777175
CHRM3-AS2	0.23272512	0.29856693	0.74013667	0.64898398	3.18030414	1.66916474
SEPT9	0.12800506	0.11301859	0.40617917	0.47943086	3.17314926	1.66591538
CLIC3	0.18823982	0.23398278	0.59693712	0.70790804	3.17115224	1.66500714
TJP3	0.09571566	0.09480448	0.3026382	0.44777852	3.16184635	1.66076726
CACNA1H	0.01498041	0.02302935	0.04716175	0.0520087	3.14822809	1.65454007
BCAS4	0.08345412	0.13836059	0.26179572	0.27285456	3.13700179	1.64938635
DYSF	0.70017288	0.62529777	2.19546688	2.55538791	3.13560686	1.64874468
LOC10050680	0.01938578	0.03440713	0.06065965	0.07801671	3.1290802	1.64573864
NKD1	0.02858302	0.03006352	0.08918835	0.06225418	3.120326	1.64169676
TCF7	0.47212193	0.33774568	1.47194321	0.99863797	3.11771839	1.64049062
NAP1L2	0.0266317	0.04190043	0.08298388	0.07431015	3.11598079	1.63968634
CD79B	0.23740863	0.33010865	0.73845196	0.76584044	3.11046801	1.63713167
CCDC88C	0.5276047	0.21687007	1.64007725	0.78175162	3.10853417	1.63623444
LOC100130877	0.02706225	0.02603038	0.08397626	0.08777153	3.10307774	1.63369984
WDR86	0.02587772	0.04953343	0.08016863	0.07873316	3.09797947	1.63132758
CD200R1	0.3662234	0.26050024	1.12816997	0.8150055	3.08055131	1.62318857
DFNB31	0.11525613	0.10296687	0.35482446	0.27885896	3.07857341	1.62226197
AUTS2	0.12932723	0.06927612	0.39494606	0.43444949	3.05385074	1.61062955
PCBP4	0.27185367	0.18231589	0.82352754	0.55373147	3.02930442	1.59898657
TSPAN18	0.07274613	0.10451338	0.21930032	0.14325373	3.01459749	1.59196539
HEATR9	0.03792178	0.07670678	0.11416291	0.12511652	3.01048408	1.58999549
MCTP2	0.07672615	0.05903166	0.23085391	0.29289462	3.00880373	1.58919
FOXP3	0.31953312	0.26422338	0.96093842	0.57223694	3.00732025	1.58847851
POU6F1	0.04881531	0.04412649	0.14674259	0.09805973	3.00607741	1.58788216
HPCAL4	0.03609313	0.04837016	0.10817677	0.09968698	2.99715655	1.58359444
MIR4697HG	0.01579697	0.03170966	0.04717483	0.05390425	2.98632124	1.57836936
FAM102A	1.76773444	0.44226258	5.27488833	2.7079443	2.98398232	1.57723899
FCRL3	0.06228304	0.10141139	0.18546046	0.21613692	2.97770398	1.57420034
TENM1	0.00722396	0.00673581	0.02149217	0.0342498	2.97512193	1.5729488
CERS4	0.22996662	0.15053462	0.6841234	0.61692933	2.97488131	1.57283211
HAPLN3	0.41689785	0.26330677	1.23991555	0.8354498	2.97414716	1.57247603
EBF4	0.0405322	0.04630123	0.11989052	0.10302997	2.95790784	1.5645771
PTPN7	1.3222127	0.64319913	3.87884167	2.41586074	2.93359885	1.55267161
SDR42E1	0.02456963	0.04252015	0.07182567	0.07936132	2.92335179	1.54762345
S1PR1	0.38294896	0.29714371	1.11935417	0.57828583	2.9229853	1.54744257
TMEM40	0.02449595	0.05287435	0.0714256	0.11800835	2.91581283	1.54389812
TSHZ2	0.01228961	0.01172347	0.0357615	0.03222828	2.90989796	1.54096857
LPAL2	0.03747358	0.04815782	0.10864591	0.10460434	2.89926708	1.53568824
PTPRS	0.02868709	0.01873398	0.08310196	0.10877979	2.89684205	1.53448102

TNS4	0.01695509	0.0229679	0.04903551	0.06084209	2.89208223	1.53210857
SYTL2	0.44735774	0.26560362	1.29333119	0.82006339	2.89104462	1.53159087
CCDC102A	0.04052384	0.04464346	0.11700054	0.10259358	2.88720295	1.52967252
IL21R	0.38041284	0.19740585	1.09774415	0.88564273	2.88566532	1.52890399
NMUR1	0.03092917	0.03825942	0.08911689	0.12816369	2.88132215	1.52673097
EMBP1	0.03787995	0.02956801	0.1090752	0.07687148	2.87949691	1.52581678
INADL	0.08247741	0.09822928	0.2368248	0.14809127	2.87138986	1.52174923
KIAA1671	0.15846637	0.08260365	0.45287506	0.35180523	2.85786219	1.51493635
LOC400685	0.01601684	0.03468352	0.04564853	0.05678711	2.85003236	1.5109783
LIMD2	1.11695178	0.66457705	3.17070688	2.02041784	2.8387142	1.50523761
NFATC2	0.89360696	0.71163934	2.53301271	1.7592797	2.83459375	1.50314198
CD244	0.42179933	0.34093589	1.19550621	0.89096596	2.8343009	1.50299293
BAIAP3	0.11669527	0.11172962	0.33073068	0.39949913	2.83413954	1.50291079
ITGB2-AS1	0.44902764	0.32027569	1.27082086	0.79455693	2.83016174	1.50088451
CD27	0.65682685	0.37437332	1.84239256	2.4366357	2.80498971	1.48799548
CLUHP3	0.30921703	0.26702114	0.86414894	0.54293181	2.79463569	1.48266023
PTPRN2	0.08893891	0.09556735	0.2484239	0.21261572	2.79319719	1.48191742
PRDM8	0.1654406	0.10564567	0.46148731	0.62924146	2.7894442	1.47997769
CCDC64	0.39067394	0.16362745	1.08816244	0.60574746	2.7853469	1.47785702
CPNE5	0.04299756	0.06352657	0.11952232	0.13678794	2.77974661	1.47495338
ZNF80	0.04644322	0.08391626	0.12753625	0.15306381	2.7460684	1.45736756
DMPK	0.16936178	0.10917803	0.4640576	0.34048649	2.74003738	1.45419558
RTKN2	0.03881399	0.0346793	0.10633191	0.0799435	2.73952556	1.45392606
CD48	10.0695819	3.84124875	27.4768915	17.31014	2.72870233	1.44821502
DMTN	0.28427616	0.18313198	0.77563695	0.54535276	2.72846284	1.44808839
DTHD1	0.12415864	0.11688699	0.33674395	0.36170743	2.71220721	1.4394674
EEF1A2	0.03704965	0.06220734	0.10034144	0.13988339	2.70829648	1.43738568
LINC00954	0.03240364	0.03669973	0.08771149	0.0943681	2.706841	1.43661015
ASB2	0.20090225	0.1515951	0.54357663	0.44820528	2.70567721	1.43598973
CASS4	0.53870174	0.36720352	1.4536521	1.17236927	2.69843588	1.43212341
C12orf79	0.0284329	0.05392332	0.07665396	0.0746472	2.69595983	1.430799
SPNS3	0.06932108	0.08487194	0.18645627	0.18643561	2.68974859	1.42747133
SLC43A1	0.11767332	0.11935343	0.31582566	0.21857969	2.68391898	1.42434112
CACNA1I	0.01600327	0.02297395	0.04282316	0.03103809	2.67590098	1.42002473
TOX	0.15306841	0.10636992	0.40889573	0.27025189	2.67132669	1.41755642
SLC35F2	0.11384937	0.08267288	0.30373742	0.21472384	2.66788839	1.41569831
ADGRG1	0.17166716	0.16151968	0.45729878	0.45881996	2.66386881	1.41352303
NAP1L3	0.0153954	0.0291954	0.04088805	0.04407974	2.65586183	1.40918009
SLAIN1	0.15947497	0.10400403	0.4223444	0.32867344	2.6483429	1.40508993
ARL4C	2.08156267	1.12657569	5.50154875	2.95371009	2.64298973	1.40217082
FXYD2	0.54848679	0.71750356	1.44953277	1.70215054	2.64278518	1.40205916
IL5RA	0.08924663	0.0921949	0.23532822	0.2352464	2.63683031	1.39880473
CLC	0.55131416	0.567989	1.45036188	1.61712584	2.63073577	1.39546635
CD5	2.18610974	0.88931408	5.74735604	3.15276346	2.62903364	1.3945326
GDF11	0.10614937	0.06567631	0.27801392	0.21297156	2.6190822	1.38906134
RAB33A	0.18234482	0.15993335	0.47720243	0.49781925	2.61703316	1.38793221
RASGRF2	0.03461962	0.03590781	0.09058101	0.07474551	2.61646432	1.38761858
IRS1	0.0110539	0.01571836	0.0288943	0.02842126	2.61394655	1.38622964
FLT4	0.01025574	0.01416707	0.02678337	0.03144409	2.6115505	1.3849066
TRIB2	0.75906563	0.37110423	1.97890321	0.99784246	2.60702518	1.38240452
OLFM2	0.092578	0.10394329	0.24013393	0.35349954	2.59385533	1.37509802
SLC37A3	0.14111793	0.10593579	0.36536265	0.16095365	2.58905907	1.37242788

SYNM	0.07949752	0.07264728	0.2054519	0.21094145	2.58438137	1.36981898
DLG3	0.15220213	0.12903765	0.39227391	0.28401094	2.57732214	1.36587287
GPER1	0.04216921	0.04194256	0.10847762	0.16125591	2.57243665	1.36313555
ADAM8	1.27337619	0.55409827	3.26426463	2.7386001	2.56347234	1.35809933
CDK6	0.29013412	0.13922668	0.74346396	0.34120949	2.5624837	1.35754283
AXIN2	0.03722795	0.05145149	0.09436225	0.0781392	2.53471532	1.34182372
C1orf186	0.05254334	0.08944489	0.13298466	0.1322741	2.53095154	1.33967988
ADGRG5	0.15959363	0.11782115	0.40353297	0.29234543	2.52850304	1.33828352
NCR3	0.44820557	0.30617448	1.12458202	0.86344911	2.5090764	1.3271564
FCMR	0.5243616	0.38648909	1.31355013	1.18401346	2.50504637	1.32483731
SLC23A3	0.04942102	0.05654743	0.12352119	0.11302752	2.49936579	1.32156206
CMKLR1	1.02478519	0.70876937	2.56000673	2.44755617	2.49809108	1.32082608
KLRG1	0.23764299	0.16799946	0.59297505	0.54892094	2.49523482	1.31917559
CD6	3.3172	1.07449443	8.27146063	5.05490091	2.49350676	1.31817611
HOOK1	0.03459511	0.03879681	0.08625781	0.0705635	2.49335258	1.31808691
FBXL16	0.10862906	0.07745607	0.27002811	0.17313242	2.48578161	1.31369955
P2RX5	0.24033473	0.20385588	0.59731431	0.46899009	2.48534331	1.31344515
PXN	1.2549357	0.50862723	3.11516121	1.7702958	2.48232734	1.31169337
FAM160A1	0.01028061	0.02737308	0.02548551	0.03066236	2.47898913	1.30975195
TTC16	0.12306715	0.08648881	0.30436677	0.34589133	2.47317639	1.30636514
CCR7	1.02770485	0.64715393	2.53652283	2.08609066	2.46814329	1.30342615
CCDC65	0.22610662	0.17899629	0.55757829	0.42512887	2.46599717	1.30217114
ANKRD33B	0.05146706	0.03508368	0.12643279	0.11079024	2.45657682	1.29664935
LTK	0.05867726	0.05259314	0.14377786	0.1415795	2.45031653	1.29296813
SLC9A9	0.21018932	0.11321564	0.51495419	0.30422952	2.44995413	1.29275474
PLXNA4	0.01467942	0.01490197	0.03586052	0.0386018	2.4429119	1.28860183
NINL	0.04435845	0.04025859	0.10832955	0.08059538	2.44213993	1.28814587
CMTM8	0.07948395	0.09580193	0.19356136	0.18769916	2.43522579	1.28405554
SERPINB9P1	0.19091561	0.23352432	0.46254853	0.45823487	2.42279056	1.2766697
GAMT	0.12184117	0.14526363	0.29295311	0.29651219	2.40438514	1.26566801
NTNG2	0.06368392	0.04816471	0.15293038	0.14008051	2.40139734	1.26387413
TTC9	0.10780293	0.07257221	0.25855078	0.14828959	2.39836503	1.26205125
SLC4A4	0.0148127	0.02048243	0.03544323	0.04352531	2.3927598	1.25867558
LOC10192924	0.05116596	0.10058345	0.12214369	0.15436688	2.3872063	1.25532325
ANK3	0.11969637	0.06873071	0.28561401	0.15182092	2.38615421	1.25468728
HKDC1	0.01280623	0.02077655	0.03055337	0.05623827	2.38582174	1.25448625
FAM167A	0.03100621	0.03743461	0.07381443	0.062495	2.38063372	1.25134567
PVRIG	0.26986977	0.14242581	0.64199938	0.61675957	2.37892286	1.25030849
SLAMF6	1.59495167	0.69150016	3.78577671	2.08591924	2.37359964	1.24707662
LOC10192815	0.03577543	0.03720442	0.08482202	0.07163632	2.37095741	1.24546975
EGLN3	0.06528754	0.08615536	0.15453955	0.12530595	2.36706053	1.2430966
GAREML	0.02614336	0.02668419	0.06178742	0.07017852	2.36340815	1.2408688
REM2	0.05351363	0.04824688	0.12645042	0.1260638	2.36295728	1.24059355
SLC40A1	0.7803033	0.76961815	1.84092521	2.20351421	2.35924315	1.23832412
EIF4E3	0.50327456	0.24733865	1.18714065	0.63659699	2.35883303	1.2380733
PHLDB2	0.02675157	0.08215181	0.06302245	0.09256898	2.35584087	1.23624209
TRERF1	0.39752246	0.35084648	0.93485998	0.61696315	2.35171613	1.23371393
PRR7	0.08845519	0.10556503	0.20799188	0.26769509	2.3513813	1.23350851
WDR86-AS1	0.6601319	0.70099489	1.55143085	1.28452069	2.35018314	1.23277319
CD3D	4.93680807	2.98757235	11.5795185	7.15250205	2.34554764	1.22992481
RRAS2	0.20817288	0.11272004	0.48648627	0.27011663	2.33693398	1.22461698
RNF207	0.06006301	0.05801897	0.1397065	0.09014941	2.32599915	1.21785057

MAP3K7CL	3.24311204	2.11248428	7.51635383	5.28792365	2.31763619	1.21265412
SPON2	0.16122742	0.1460998	0.37319683	0.38053102	2.31472316	1.21083966
LTB	4.17285	1.57967202	9.64055729	6.11917292	2.31030526	1.20808349
SYNE1	0.3747044	0.12112065	0.86534281	0.38762724	2.30940126	1.20751886
TESC	0.37891292	0.35430374	0.8678816	0.62681075	2.29045132	1.1956319
FBLN7	0.07350078	0.082288	0.1677041	0.18565628	2.28166435	1.19008657
ATP2A3	1.68001111	0.75384891	3.82609479	2.14859819	2.27742231	1.18740184
GPR132	0.65888526	0.36680859	1.49994475	0.94918886	2.27648855	1.18681021
GCH1	2.27851026	0.82284988	5.17747875	3.2508429	2.27230873	1.18415886
MBOAT2	0.04959634	0.03746227	0.11259	0.10424198	2.27012707	1.18277306
RAB37	0.62100096	0.27705658	1.40697473	0.94205255	2.26565628	1.17992901
SLC25A53	0.03372933	0.02594971	0.07622123	0.05135747	2.25979101	1.17618936
GUCY1A3	0.02861054	0.04892251	0.06452429	0.07650182	2.25526293	1.17329564
TLR10	0.1335073	0.09424081	0.30074587	0.17296852	2.25265477	1.17162623
GNG7	0.05743702	0.04023967	0.12926389	0.11466008	2.25053285	1.17026662
KLRC2	0.14823007	0.35744184	0.33208037	0.35260023	2.24030359	1.16369425
RASSF2	1.78959763	1.11326779	4.00156271	2.82743745	2.23601252	1.16092827
ST6GAL1	1.9373343	0.72018613	4.32762896	1.91573492	2.23380599	1.15950389
ISM1	0.01132024	0.0283459	0.02523107	0.04515151	2.22884457	1.15629602
FAM95C	0.02275434	0.04311358	0.05041153	0.06356438	2.21546871	1.14761195
CORO1A	10.6809904	4.76493113	23.6603167	12.3533048	2.21518004	1.14742396
SELL	1.74481763	1.02143751	3.86401771	4.7732997	2.21456824	1.14702545
ARID5B	0.52428189	0.46870356	1.1607021	0.79570713	2.21388938	1.14658314
SCN1B	0.09200811	0.12261822	0.20368487	0.33537118	2.21377092	1.14650594
DPY19L2P2	0.04966863	0.05995146	0.10966549	0.08546187	2.20794254	1.14270263
MSRB3	0.01464345	0.02535769	0.0322609	0.03644478	2.20309495	1.13953167
SBK1	0.09616281	0.05960629	0.21070073	0.11089411	2.19108332	1.13164435
GIMAP7	2.63688196	0.90376375	5.77656229	2.95729633	2.19067913	1.13137819
LRFN3	0.17678677	0.14347375	0.38669703	0.27609418	2.18736409	1.12919338
CD200	0.03478999	0.03849137	0.07601902	0.08090631	2.18508304	1.12768811
TRAF1	1.69899693	0.40737963	3.7115525	1.75356728	2.18455516	1.12733953
SRGAP3	0.09801271	0.06245456	0.2140021	0.14757535	2.18341172	1.1265842
FZD3	0.00926705	0.00920008	0.02021252	0.0182394	2.18111725	1.12506733
SULF2	0.55021093	0.4299658	1.19550113	1.31266647	2.17280514	1.11955879
BIK	0.24496181	0.23458865	0.52696322	0.40921498	2.1512056	1.10514541
HDC	0.06795253	0.08221898	0.14578279	0.17184661	2.14536207	1.10122115
OSBPL7	0.2249644	0.12248101	0.48121007	0.27118854	2.13904984	1.0969701
PAX5	0.04729766	0.03777696	0.10115362	0.07338818	2.13865988	1.09670707
SERPINB9	1.22540437	0.50931493	2.61848248	1.83467205	2.13683135	1.09547305
IGSF9B	0.02417809	0.03190372	0.05138438	0.04335854	2.12524536	1.08762941
PTP4A3	0.09033684	0.06657297	0.19190629	0.16523083	2.1243415	1.08701571
SLC2A1	0.6790195	0.28720092	1.43588871	0.77852915	2.11465017	1.08041902
HLA-DOB	0.66276096	0.64961629	1.39963421	0.76847487	2.11182355	1.0784893
TMEM154	0.64894144	0.31239566	1.35367248	1.62617738	2.08597015	1.06071851
FLT3LG	2.72666296	1.19057547	5.6822975	2.69819186	2.08397502	1.05933798
ALS2CL	0.0389801	0.06265787	0.08095154	0.09899364	2.07674032	1.05432083
EPS8L2	0.16520804	0.12345878	0.34240591	0.28783926	2.07257415	1.05142372
JHDM1D-AS1	0.10288134	0.09199007	0.21314594	0.16278214	2.07176477	1.05086021
LOC729683	0.16219821	0.12405772	0.33589108	0.23968832	2.07086802	1.05023561
OBSCN	0.09198895	0.02426338	0.19013197	0.07462494	2.06690002	1.04746861
AMPD3	0.70883607	0.34482666	1.46270113	1.10255952	2.06352523	1.04511108
LOC374443	0.73768693	0.37351423	1.52218196	0.80179757	2.06345254	1.04506025

DERL3	0.16662125	0.13935474	0.34294442	0.27372106	2.05822738	1.04140237
MT3	0.03969541	0.14303172	0.08167288	0.16905389	2.05748933	1.04088495
ZNRF1	0.32621327	0.13982044	0.66863813	0.36380089	2.04969625	1.03541013
SPIB	0.11474514	0.09315168	0.23495112	0.28188319	2.04759099	1.03392757
SIDT1	0.2058138	0.14934203	0.42079399	0.23617989	2.04453731	1.03177439
SEMA4C	0.12288726	0.13713975	0.25057691	0.18442772	2.03907961	1.0279181
FYN	2.48138667	0.92411957	5.04960792	3.01457292	2.03499438	1.02502481
CHIC1	0.09688618	0.03998696	0.19689279	0.12042017	2.03220717	1.02304749
CHST2	0.17531402	0.11941936	0.35402625	0.38558139	2.01938358	1.01391497
AFAP1	0.2350549	0.11828357	0.47376075	0.21758553	2.01553236	1.01116095
MYCL	0.23346412	0.20059441	0.46962585	0.30715799	2.01155469	1.00831096
TMEM25	0.07570315	0.08127828	0.15195045	0.11776545	2.00718797	1.00517573
KIAA1324L	0.04153852	0.03408695	0.0833259	0.08140681	2.0059912	1.00431528
FAM65B	2.02677196	1.04937817	4.03674396	2.38789833	1.99171097	0.99400831
CXCR5	0.09800537	0.09479189	0.19500579	0.20786357	1.98974603	0.9925843
MARCKSL1	0.90755604	0.36676721	1.80277163	1.14761963	1.98640255	0.99015802
PLCG1	2.11556889	0.41820909	4.20132833	1.64331956	1.98590949	0.98979987
SKAP1	2.15774585	2.0262624	4.28355875	2.60774869	1.98520078	0.98928493
KIAA1324	0.1660467	0.08589312	0.32938974	0.37211279	1.98371741	0.98820652
OXCT1	0.27899359	0.23130685	0.55244079	0.35903295	1.98012002	0.98558788
TRAF5	1.14664007	0.34388	2.26313583	0.85638816	1.97371074	0.98091057
SLC12A3	0.01575949	0.02737507	0.03109861	0.03776071	1.97332654	0.98062971
C1orf21	0.06175243	0.04720858	0.12184676	0.0940798	1.97314919	0.98050004
LRRC4	0.13983063	0.14529404	0.27565647	0.2428525	1.97135967	0.97919101
FRMD3	0.27894925	0.22874966	0.54958507	0.39734971	1.97019733	0.97834014
NLGN2	0.04473264	0.03722419	0.0878735	0.06942942	1.96441578	0.97410031
NPTXR	0.07661486	0.06891019	0.14846388	0.08970218	1.93779501	0.95441597
PRKCB	1.10437752	0.86901245	2.13548967	1.31220002	1.93365913	0.95133349
STMN3	0.8831633	0.34380194	1.70376548	0.86419427	1.92916246	0.94797464
NT5E	0.024336	0.02631373	0.04676439	0.05709717	1.92161345	0.94231816
LGALS2	2.6389953	1.73510289	5.06835788	3.80776861	1.92056344	0.94152962
CDH24	0.03371071	0.03317382	0.06471954	0.06733567	1.9198511	0.94099442
ARHGEF4	0.02843881	0.0402067	0.05457531	0.05493719	1.91904352	0.94038743
LOC389906	0.1229071	0.09628612	0.23485502	0.17712509	1.91083365	0.93420219
PNMA3	0.10902036	0.08870588	0.20789424	0.12379587	1.90693053	0.93125229
TPCN1	0.55034852	0.29810653	1.04904317	0.87150862	1.90614335	0.93065662
RNF157	0.37847373	0.30972125	0.72084567	0.51042365	1.90461213	0.92949723
LOC606724	0.52499364	0.41537114	0.99979036	0.7653536	1.90438564	0.92932566
FAM171A1	0.02248932	0.0327384	0.04274161	0.05711674	1.90052883	0.92640091
GPSM1	0.10620743	0.08591377	0.20125165	0.13396379	1.89489246	0.92211597
PROB1	0.04573309	0.05528607	0.08664323	0.06854515	1.89454124	0.92184854
ZNF853	0.0932672	0.0760426	0.17659931	0.17645873	1.89347724	0.92103808
FAM169A	0.07646435	0.05289691	0.14476502	0.10311907	1.89323544	0.92085383
ADAMTS10	0.03563491	0.04921477	0.06743927	0.05977811	1.89250583	0.92029775
TNFRSF4	0.21233202	0.16153823	0.4016752	0.3685457	1.89173168	0.91970748
TNK1	0.07784576	0.06905724	0.14724074	0.12060613	1.89144195	0.9194865
LSR	0.29521377	0.27217984	0.5573224	0.32372322	1.88786046	0.91675213
TRABD2A	0.44342485	0.24663038	0.83450446	0.39490829	1.8819524	0.91223014
TMEM30B	0.04036486	0.04352372	0.07586792	0.08748057	1.87955341	0.91038991
MTSS1	0.32808463	0.1772025	0.61419783	0.39798662	1.87207134	0.90463542
GPR68	0.70282327	0.98239401	1.31519127	0.99373435	1.87129729	0.90403877
LINC01215	0.13923242	0.08757691	0.26037924	0.13769572	1.87010498	0.90311926

NLRC5	4.76146852	1.31855288	8.89505604	3.19303275	1.86813291	0.9015971
LRRC32	0.03202325	0.0450615	0.05956393	0.06477175	1.86002139	0.89531921
PLCD4	0.08234613	0.07264844	0.15289728	0.08315003	1.8567634	0.89278999
FAM26F	7.07932593	4.3545269	13.0844319	8.98940378	1.84825957	0.88616738
TRAF4	0.34813334	0.16609747	0.64117342	0.48480577	1.84174663	0.8810746
GPR141	0.52515405	0.57792703	0.96376317	1.01996119	1.83520087	0.87593798
PLEKHG1	0.08309864	0.1352493	0.15242122	0.09262883	1.83422036	0.87516697
RNF144A	0.06818007	0.04803902	0.12503103	0.08512135	1.83383552	0.87486424
GALNT3	0.26318132	0.16420665	0.48259412	0.31318005	1.83369445	0.87475326
LIME1	2.11385882	0.7104974	3.8725454	1.98708287	1.83197921	0.87340313
MS4A2	0.07186114	0.09953619	0.13082469	0.14462549	1.82052066	0.86435111
MAP1A	0.13769537	0.08350321	0.25027203	0.19769889	1.81757765	0.862017
GIMAP5	2.55884631	1.28131007	4.63672479	2.43963547	1.81203724	0.8576126
DUSP2	1.75593296	0.41801842	3.16727131	2.76863596	1.80375412	0.85100269
LAMA5	0.0284118	0.02343844	0.05118515	0.03791763	1.80154515	0.84923481
LIPE	0.07550747	0.08364378	0.13592725	0.09043872	1.80018281	0.84814342
CCSER1	0.03318468	0.03544891	0.05957651	0.06099323	1.79530172	0.84422632
ITPR3	1.24688859	0.58637845	2.23807377	0.81990947	1.79492682	0.84392502
CDC14A	1.0168307	0.33180546	1.8249915	0.70783526	1.79478402	0.84381025
STK26	0.79197752	0.39691355	1.41841644	0.76309397	1.79098068	0.84074978
MPP6	0.03166178	0.02947825	0.05664662	0.04153364	1.78911664	0.83924745
RHOF	2.67063511	1.68783904	4.76909833	1.87600122	1.78575438	0.83653366
ZG16B	0.92170343	0.62226502	1.64151552	1.20077411	1.78095846	0.83265387
FAM117A	1.25783552	0.40335474	2.22907046	0.90927688	1.77214781	0.82549894
HCG26	0.81353667	0.52863605	1.43867323	0.77273143	1.76841842	0.82245967
PSD	0.10378465	0.06810173	0.18336729	0.12811866	1.7668055	0.82114323
GSDMB	0.60369033	0.22787568	1.06075956	0.68659778	1.75712531	0.81321708
CHD3	2.26193074	0.69237553	3.97240792	1.44872281	1.75620228	0.81245902
MYBL1	0.26544496	0.11025873	0.4643725	0.23247178	1.74941161	0.80686977
KLF12	0.30934174	0.1333942	0.53945008	0.23322613	1.74386451	0.80228795
GRAP	0.60383404	0.22629668	1.04398767	0.50495597	1.72893147	0.78988068
LOC10099632	0.0735707	0.1876169	0.12673591	0.24319553	1.72264094	0.78462202
PITPNM2	0.07961475	0.04142928	0.13687537	0.08244296	1.7192213	0.78175526
OCIAD2	1.9678097	1.0743713	3.37754302	1.90515924	1.71639718	0.77938343
RARRES3	21.4004689	9.09805835	36.4257229	21.0975077	1.70209929	0.7673152
ISYNA1	0.28343587	0.15207978	0.48100178	0.29011811	1.69703917	0.76301986
ADA	1.29641648	0.5634959	2.19784108	1.27787501	1.69532023	0.76155781
MYLK	0.10338628	0.13179356	0.17478548	0.13070259	1.69060611	0.75754057
IGFBP4	0.3564289	0.31457627	0.60190765	0.39680793	1.68871729	0.75592783
SYNE3	0.97506815	0.48113258	1.63910627	0.64020582	1.68101714	0.74933444
CUBN	0.04470296	0.02075317	0.0750324	0.04447798	1.6784661	0.7471434
LMTK3	0.03940919	0.03508499	0.06588214	0.05418806	1.67174575	0.74135545
GRASP	0.33980559	0.24345393	0.56787162	0.51189407	1.67116621	0.74085522
TSPAN13	0.84802594	0.9275275	1.41607919	1.10629666	1.66985362	0.73972164
AMPH	0.02039701	0.02449961	0.03384589	0.03490323	1.6593552	0.73062275
PATL2	0.79448963	0.27922977	1.31574246	0.60199901	1.65608513	0.72777683
CRACR2A	0.65067782	0.20697202	1.07611017	0.55924127	1.6538295	0.72581051
RUNX3	4.13797889	2.25725167	6.82500125	2.99243299	1.64935623	0.72190303
SYNJ2	0.1959212	0.16863351	0.32291708	0.14362005	1.64819872	0.7208902
LOC606724	0.10175519	0.14593207	0.16671639	0.26725219	1.63840678	0.71229359
HMHA1	4.62585407	1.20218879	7.57656688	2.24237935	1.63787416	0.71182452
FZD6	0.09710999	0.10502974	0.15857204	0.12399445	1.63291171	0.70744678

CARNS1	0.07272736	0.06971375	0.11872773	0.07365743	1.63250427	0.70708676
RASAL3	3.09933037	0.70301508	5.045105	2.02085784	1.62780485	0.70292775
PLXNC1	1.67394578	1.10589979	2.71634744	2.37411373	1.62272128	0.69841522
GDPD5	0.99321552	0.39475804	1.60443738	0.75616104	1.61539701	0.69188877
RAB15	0.17466787	0.12388204	0.28214762	0.14310467	1.61533783	0.69183592
SPEF2	0.31837107	0.1771016	0.51209721	0.31991616	1.60849163	0.68570843
CERKL	0.87138048	0.74259418	1.40104435	0.75702406	1.60784455	0.68512793
ASAP2	0.06669471	0.06278007	0.1072251	0.0767738	1.60770018	0.68499838
DCANP1	0.24031113	0.20594567	0.38435985	0.35135076	1.5994259	0.67755415
TMEM63C	0.06856888	0.11470502	0.10853512	0.14489916	1.58286256	0.66253599
BCL9L	1.33785141	0.42240817	2.11750792	0.75445823	1.58276764	0.66244948
GCSAM	0.27315429	0.14723625	0.42894081	0.23180501	1.57032428	0.65106252
BZRAP1	0.27177237	0.09932988	0.4250975	0.21197822	1.56416747	0.64539499
CD160	0.13690192	0.16004664	0.21388544	0.17706397	1.56232606	0.64369558
FCRL6	1.14877593	0.63940683	1.79399148	1.01166138	1.56165484	0.64307562
PSTPIP1	3.61739148	1.88136336	5.6270275	2.49835243	1.55554839	0.63742328
C1QTNF6	0.22896139	0.12504648	0.35579124	0.22446096	1.55393553	0.63592665
GOLGA2P5	0.40221348	0.2468785	0.62372943	0.40438382	1.55074222	0.63295888
MEI1	0.33555719	0.17686777	0.51897619	0.23333434	1.54661027	0.6291097
POU2F2	0.53010274	0.20930257	0.81784696	0.47254121	1.54280839	0.6255589
AKNA	5.72413667	1.30859221	8.8130975	2.71533221	1.53963786	0.62259105
LRIG1	0.87224241	0.34074454	1.33990802	0.70919665	1.53616473	0.61933293
SPTBN1	0.87166822	0.3322714	1.33456867	0.55487594	1.53105119	0.61452252
MARCH9	0.82930444	0.36926971	1.2669864	0.57237647	1.52776993	0.61142731
PRR5	0.63133278	0.34559156	0.95724369	0.48739497	1.51622682	0.60048559
LOC728743	0.56376607	0.23777456	0.83900554	0.37968195	1.48821573	0.57358368
MEGF6	0.25209734	0.1513084	0.37437556	0.19910821	1.48504369	0.57050537
NMT2	1.08069956	0.48643758	1.599565	0.63288519	1.48011998	0.56571412
ITGA4	7.32204889	4.42840804	10.82484	4.59413485	1.47838947	0.56402639
ADHFE1	0.54439539	0.27349468	0.80431447	0.56279641	1.4774454	0.56310481
SLC22A23	0.20898473	0.12536292	0.30814882	0.2040122	1.47450401	0.56022974
RCSD1	4.6572863	1.80972179	6.78959521	2.92305503	1.45784364	0.54383599
SSBP2	0.27372995	0.1273839	0.39902235	0.15482249	1.45772266	0.54371627
CCL28	0.35432497	0.4487661	0.51621029	0.35837379	1.45688375	0.54288576
VILL	1.20554311	0.36752944	1.73908604	0.61444613	1.44257474	0.52864607
PIK3IP1	7.54400889	1.94489093	10.8801952	3.20697334	1.4422299	0.52830116
TMEM71	1.084578	0.3759032	1.55553392	1.07735841	1.43422964	0.52027604
BNIP3	1.1508893	0.75261448	1.64788594	0.90869499	1.43183705	0.51786732
GPR35	0.75990548	0.53648926	1.08673471	0.7868956	1.43009195	0.51610791
PLD6	0.28552406	0.15755366	0.40690917	0.17191872	1.42513095	0.51109449
PRR5L	1.14021119	0.74996361	1.62388763	0.72206583	1.424199	0.51015074
TIFAB	0.53568632	0.43587268	0.76257754	0.5279458	1.4235524	0.50949559
ACPP	0.1702926	0.21634195	0.24201792	0.20570386	1.42118876	0.50709818
ATHL1	2.21141448	0.91348994	3.12947167	1.58368502	1.41514478	0.50094966
RAB3IP	0.18023782	0.06102083	0.25423295	0.08629673	1.4105417	0.49624932
LMO7	0.15583743	0.09107391	0.21963471	0.0976285	1.40938351	0.49506424
ANXA2R	1.11347315	0.76714379	1.56488269	0.84735049	1.40540676	0.49098774
MLLT3	0.51832659	0.24906803	0.727836	0.28982306	1.40420347	0.489752
PHLDB3	0.26735762	0.15114674	0.37366927	0.21261532	1.39763839	0.48299114
NBEAL2	4.9399463	1.41168328	6.86297083	2.02307943	1.38928045	0.47433787
LRRK2	1.6406287	0.45831201	2.27356498	1.06086317	1.38578886	0.47070746
RBM38	2.98938667	1.03768002	4.12882688	1.5325885	1.38116187	0.46588241

FGL2	9.19228	8.24836579	12.6915988	7.29237874	1.38068017	0.46537917
MSI2	1.4138113	0.4913567	1.95122985	0.62369133	1.38012043	0.46479416
OTUD7B	0.16964529	0.08698034	0.23406265	0.1056937	1.37971797	0.4643734
NT5DC2	0.39529553	0.28131686	0.54375417	0.37187877	1.37556368	0.46002293
MAP3K9	0.0978319	0.05508968	0.13390797	0.06176811	1.36875573	0.45286501
KIAA0125	0.01424063	0.03223041	0.01935032	0.02032486	1.35881122	0.44234503
PIK3CD	9.55905296	2.06679002	12.9102288	3.97890932	1.35057613	0.43357496
SATB1	1.5126533	0.43836756	2.0393379	0.92666136	1.34818593	0.43101948
C10orf95	0.40180437	0.33369536	0.53990993	0.38126986	1.34371345	0.42622552
CBFA2T3	0.35383163	0.3114358	0.47282713	0.25503582	1.33630544	0.4182498
CCR2	2.7709177	2.51695555	3.69541319	1.95732473	1.33364235	0.41537182
SIGIRR	3.49577222	1.61869294	4.65379146	1.93008205	1.33126278	0.41279538
AHDC1	0.34600887	0.1096694	0.45786531	0.14143151	1.32327621	0.40411423
REC8	2.57648419	0.94581551	3.40803021	1.43555265	1.32274447	0.40353439
PDZD2	0.0230955	0.02060231	0.03048888	0.02049892	1.32012199	0.40067126
KDM7A	1.10916744	0.35324867	1.45918223	0.55657857	1.31556533	0.39568289
TCAF2P1	0.00822319	0.02654042	0.0107935	0.01841393	1.31256812	0.3923923
GATS	0.77167411	0.21562139	1.01043346	0.33629812	1.30940438	0.38891071
VAMP1	1.541594	0.8508778	2.0141954	0.78097054	1.30656671	0.38578078
FAM118A	1.21514341	1.1056333	1.58469213	0.90217823	1.30411943	0.38307599
SARDH	0.27780516	0.45494392	0.36228639	0.34084501	1.30410247	0.38305723
ZFPM1	0.32152124	0.15253713	0.41809344	0.18685055	1.30036025	0.37891136
XYLT1	0.48547763	0.54234578	0.62989663	0.24036466	1.29747816	0.37571025
DGKA	4.99517222	1.21963267	6.47895333	1.77828797	1.29704303	0.37522635
FUT7	0.33804859	0.2862798	0.43107748	0.25572499	1.27519386	0.35071659
B3GNT9	0.32328052	0.17348354	0.41220794	0.21874534	1.2750782	0.35058573
EVA1C	0.73309656	0.28964612	0.92807325	0.36106646	1.26596318	0.34023545
TNFRSF1B	17.0446222	4.19253818	21.4212813	12.1218922	1.25677654	0.32972815
SIGLEC10	3.58670593	1.72795871	4.48615269	2.77117932	1.25077237	0.32281926
TNKS1BP1	0.36898547	0.09833374	0.46123581	0.18695464	1.25001077	0.32194053
LAT	9.7780037	4.62858361	12.0992721	5.03241009	1.23739696	0.3073084
METTL7A	4.03122148	1.15933712	4.98170646	1.56332641	1.23578089	0.30542297
FAM198B	1.09161926	1.11615427	1.34882658	0.96307976	1.23562	0.30523512
YPEL3	9.17057667	3.97607447	11.3077667	5.19156309	1.23304859	0.30222966
TNFAIP8L1	1.43823693	0.39591077	1.77077771	0.63174981	1.23121419	0.30008176
TES	8.30882778	2.40632178	10.1822567	2.82011507	1.22547451	0.29334048
YPEL1	1.1586217	0.24600971	1.41127085	0.47745042	1.21806009	0.2845853
TNFSF8	1.47099656	1.18280167	1.76864448	0.8381262	1.20234441	0.26585021
DANCR	3.08134852	0.82854461	3.60868646	1.27150671	1.17113869	0.22791193
GIMAP1	2.69845519	0.51049217	3.09830146	0.74013045	1.14817599	0.19934379
MATK	1.85158322	3.68516919	2.1148809	1.56248528	1.14220137	0.19181702
NFIX	1.17848759	0.26433297	1.33841813	0.30847547	1.13570829	0.18359232
DGKD	1.78375741	0.30500348	2.00014083	0.44016932	1.12130765	0.16518217
S100B	2.24444195	3.28380351	2.48603242	1.63718885	1.10763944	0.14748832
CLEC10A	3.71344259	4.48424023	3.70408308	2.46463582	1.00252681	-0.0036408

Supplementary Table 13: List of enriched pathways for 666 genes in module 31 from WGCNA analysis

Function	FDR	Genes in network	Genes in genome
T cell activation	1.69E-19	66	452
regulation of cell activation	1.18E-14	58	593
regulation of leukocyte activation	1.18E-14	56	556
regulation of lymphocyte activation	5.95E-14	51	480
regulation of T cell activation	8.83E-12	42	309
antigen receptor-mediated signaling pathway	4.21E-11	36	258
positive regulation of leukocyte activation	1.27E-09	39	379
positive regulation of cell activation	2.75E-09	40	391
positive regulation of lymphocyte activation	7.78E-09	37	341
T cell receptor signaling pathway	8.36E-09	27	144
T cell receptor signaling pathway	8.36E-09	21	99
immune response-activating cell surface receptor s	1.86E-08	41	409
T cell receptor complex	3.29E-08	10	17
positive regulation of T cell activation	3.64E-08	30	204
cellular defense response	1.50E-07	15	58
immune response-regulating cell surface receptor	5.57E-07	45	440
T cell differentiation	3.73E-06	37	236
lymphocyte costimulation	5.81E-06	14	56
T cell costimulation	5.81E-06	14	55
lymphocyte differentiation	6.12E-06	48	346
leukocyte differentiation	1.58E-05	56	505
hemopoiesis	2.58E-05	69	831
external side of plasma membrane	9.66E-05	43	365
hematopoietic or lymphoid organ development	0.00010501	73	872
immune system development	0.00010501	77	918
lymphocyte migration	0.00012429	15	103
B cell activation	0.00017007	30	309
cytokine receptor activity	0.00020042	14	94
side of membrane	0.00078533	55	560
receptor complex	0.00088427	41	396
leukocyte migration	0.0009346	36	476
T cell apoptotic process	0.00108952	10	51
leukocyte mediated immunity	0.00125424	52	867
signaling adaptor activity	0.00128438	12	80
T cell migration	0.00206739	11	58
lymphocyte apoptotic process	0.003853	11	72
lymphocyte proliferation	0.00455017	30	268
SH3/SH2 adaptor activity	0.00517188	10	54
mononuclear cell proliferation	0.00526335	30	270
alpha-beta T cell activation	0.00961377	25	131
leukocyte proliferation	0.00988882	31	287
adaptive immune response	0.01106184	64	614
CD4-positive, alpha-beta T cell activation	0.01656242	12	86
lymphocyte mediated immunity	0.01656242	31	345
leukocyte apoptotic process	0.01757722	13	103
regulation of leukocyte mediated immunity	0.01768682	19	190
regulation of natural killer cell mediated immunity	0.0176964	12	42
regulation of T cell apoptotic process	0.0176964	8	37
immunological synapse	0.02453644	12	35
SH2 domain binding	0.02681714	8	33
regulation of lymphocyte differentiation	0.03705731	20	168
regulation of lymphocyte proliferation	0.04707768	25	208

Supplementary Table 14: List of 135 top red genes input in GeneMANIA

	group 2 avg	group 2 sd	group 2 cv	group 3 avg	group 3 sd	group 3 cv	FC	logFC
KIR2DL1	0.00019698	0.00102356	5.19615242	0.04033766	0.12501806	3.09928845	204.775885	7.67790202
PDZK1IP1	0.0120123	0.03048899	2.53814717	0.20516608	0.34672501	1.68997236	17.0796668	4.09420792
MMRN1	0.00129724	0.00322589	2.48673939	0.01751809	0.02904393	1.65793958	13.5041587	3.75533186
TNFRSF13C	0.01177415	0.03468898	2.94619844	0.15619067	0.3184038	2.03855842	13.26556	3.72961368
RLN2	0.01266902	0.02469827	1.94950088	0.13661401	0.19561325	1.43186813	10.7833115	3.43072838
INSL3	0.0194798	0.08920262	4.57923783	0.18269693	0.33744795	1.84703681	9.37879032	3.22940186
NUGGC	0.04499276	0.05066229	1.12600974	0.38793592	0.39959135	1.03004473	8.62218456	3.10805344
FCRL5	0.00746028	0.01392186	1.86613128	0.06354694	0.1269395	1.9975708	8.51803669	3.09052095
CCR8	0.05110063	0.06744294	1.31980631	0.41492774	0.38787953	0.93481226	8.11981591	3.02144702
SYNGR3	0.03047795	0.03713027	1.21826671	0.21729968	0.25899474	1.19187815	7.12973366	2.83384818
GZMA	1.59157504	1.28944652	0.81017011	11.1507319	13.1751834	1.18155325	7.00609875	2.80861132
IGLL5	0.19034409	0.32844602	1.72553831	1.33032132	2.83167441	2.12856426	6.98903404	2.80509307
B3GAT1	0.02211549	0.04113053	1.8598067	0.15331529	0.14000173	0.91316227	6.93248453	2.79337249
NBL1	0.07160343	0.11469574	1.60181899	0.49466354	0.64854986	1.31109293	6.90837738	2.78834689
GPR174	0.18412317	0.17964951	0.97570293	1.26287521	1.06112107	0.84024222	6.85886101	2.77796902
GPR25	0.07518413	0.10728933	1.42702092	0.50525087	0.43144611	0.85392453	6.72017941	2.74849975
THEMIS	0.26184956	0.16378276	0.6254842	1.73566198	1.65597634	0.95408919	6.62847012	2.72867593
SLC14A1	0.0073932	0.01886136	2.55117712	0.04840051	0.06526873	1.34851326	6.54662634	2.71075164
JCHAIN	0.34766809	0.27038767	0.77771782	2.26160038	5.75075282	2.54278027	6.50505605	2.70156149
UGT8	0.00361752	0.00852439	2.35641668	0.02310336	0.03970047	1.7183852	6.38651513	2.67502893
POU2AF1	0.02140636	0.02321959	1.08470518	0.13624998	0.14889212	1.0927864	6.36492885	2.67014439
TRAT1	0.35525602	0.27276737	0.76780508	2.25167879	1.73956235	0.77256239	6.33818626	2.66407006
CCL5	6.28860396	5.10000515	0.81099163	39.8482565	44.7132863	1.1220889	6.33658228	2.66370491
GNLY	1.25147974	1.52840668	1.2212796	7.88663358	7.94289161	1.00713334	6.30184679	2.65577468
CD96	0.56301017	0.31039736	0.5513175	3.51169571	2.86461486	0.8157355	6.23735746	2.64093494
GZMB	1.44071956	1.12212935	0.7788673	8.95852288	11.9174787	1.33029506	6.21808932	2.63647134
SH2D2A	0.48524886	0.36750936	0.75736266	3.01587021	2.97763449	0.98732183	6.2151001	2.63577763
SLA2	0.48852211	0.29108354	0.59584517	3.02720869	3.04579467	1.00613965	6.19666673	2.63149238
FSD1	0.01601426	0.03739742	2.33525765	0.09922711	0.11499317	1.15888864	6.19617209	2.63137721
IL12RB2	0.09705867	0.06793307	0.69991756	0.60008216	0.59241632	0.98722535	6.18267446	2.62823105
AFAP1L2	0.01754869	0.02667657	1.52014585	0.10803521	0.1312316	1.21471133	6.15631175	2.62206629
VIPR1	0.02432363	0.03603023	1.48128544	0.14774459	0.16238692	1.09910574	6.07411883	2.60267513
RAB27B	0.02408278	0.02128931	0.88400546	0.14597002	0.16550382	1.13382063	6.06117717	2.59959801
IL32	3.62018982	2.42056331	0.66862884	21.8393594	19.9296256	0.91255541	6.03265588	2.59279329
NCR1	0.05403209	0.08834303	1.63501041	0.32575795	0.52001303	1.59631721	6.02897161	2.59191194
FASLG	0.23764372	0.17998526	0.75737438	1.42355367	1.33041698	0.93457451	5.99028536	2.58262473
IGFBP3	0.02510511	0.04034243	1.60694138	0.14862995	0.151472	1.01912168	5.92030737	2.56567208
IKZF3	0.44173267	0.24158121	0.54689459	2.60661892	2.13471487	0.81895932	5.90089689	2.56093425
F2R	0.24021975	0.12736107	0.53018568	1.41504235	1.26025275	0.89061133	5.89061626	2.55841857
PXYLP1	0.03291064	0.0363995	1.1060099	0.19222427	0.13141346	0.68364653	5.84079322	2.54616431
PRF1	0.77566948	0.53383674	0.68822707	4.51654215	5.17800792	1.14645403	5.82276634	2.54170473
ZNF831	0.08438874	0.06140996	0.72770327	0.48948402	0.32372437	0.6613584	5.80034793	2.53613944
TAL1	0.00644937	0.01174021	1.82036628	0.03728549	0.08876141	2.38058867	5.78126128	2.53138427
TBX21	0.17253784	0.13697584	0.7938887	0.99133374	0.76852976	0.77524827	5.74560198	2.52245805
BCL11B	0.16861851	0.09648407	0.57220331	0.96834417	0.76516753	0.79018138	5.74281056	2.52175697
TGFBR3	0.05271254	0.03250121	0.61657464	0.30169622	0.27794859	0.92128629	5.72342412	2.51687852
SH2D1A	0.1621508	0.12367225	0.76269899	0.91850198	0.83990364	0.91442769	5.66449247	2.5019467
DBH	0.01026128	0.01928324	1.87922384	0.05800655	0.06437279	1.10975038	5.65295381	2.49900491
TMIGD2	0.11435374	0.14521283	1.26985634	0.64328589	0.6416285	0.99742355	5.62540295	2.49195644
ATP1A3	0.04544567	0.04465002	0.98249229	0.25521634	0.18724886	0.73368679	5.61585561	2.48950584
NKG7	1.58680756	1.28456363	0.80952704	8.89509565	14.4594131	1.62554892	5.60565496	2.48688295
CD40LG	0.5825414	0.40721471	0.69903137	3.25870085	2.64685094	0.81224115	5.59393865	2.48386443
TC2N	0.27754756	0.1731116	0.62371867	1.55042306	1.05962994	0.68344568	5.58615268	2.48185501
KCNQ5	0.00315381	0.00456762	1.44828738	0.01730024	0.02118742	1.22468912	5.48551141	2.45562613
CXCR3	0.65944492	0.38110443	0.57791699	3.58074869	2.77191493	0.77411602	5.42994353	2.44093719
CDHR1	0.0124987	0.01802525	1.44217034	0.06781385	0.08818369	1.30037866	5.42567271	2.43980202
GRAP2	0.43113905	0.31029099	0.7197005	2.33914179	1.60805636	0.6874557	5.42549278	2.43975418
PPP1R16B	0.62383882	0.30935568	0.49589041	3.35582698	2.87486904	0.85667976	5.37931738	2.42742311
IL18RAP	0.2293542	0.15773314	0.68772727	1.23269585	1.11029751	0.90070678	5.37463824	2.42616765
ST8SIA1	0.01797936	0.01348514	0.75003469	0.09622619	0.08702098	0.90433781	5.35203631	2.4200879
ABCD2	0.03894318	0.03365154	0.86411896	0.20821499	0.17685115	0.849368	5.34663583	2.41863142
JAKMIP1	0.17138966	0.21435693	1.25069926	0.91583998	0.8532247	0.93163076	5.34361271	2.41781545
CD3E	2.36125441	1.45388634	0.61572626	12.5811892	8.6942895	0.69105467	5.32818028	2.4136429
IL2RB	1.175121	0.69336739	0.59003914	6.24524646	4.83170144	0.77366065	5.31455608	2.40994919
ITM2A	0.46707747	0.30977972	0.66322985	2.47528883	2.33337692	0.94266854	5.29952518	2.4058631
LCK	1.69059793	0.93399487	0.55246422	8.92982563	6.18071065	0.69214237	5.28205169	2.40109842
TSPAN5	0.09107504	0.06695601	0.73517409	0.47870287	0.38603451	0.80641778	5.25613658	2.39400277
PLXDC1	0.05833162	0.05206994	0.89265371	0.3061764	0.23726055	0.77491456	5.24889225	2.39201298

GZMM	0.25287297	0.33780228	1.33585764	1.32604504	1.30462252	0.9838448	5.24391776	2.39064506
EOMES	0.17169982	0.1154152	0.67219173	0.89647194	1.1828329	1.31943104	5.22115844	2.38436994
NLRC3	0.35255783	0.16862711	0.47829632	1.83988821	1.30881973	0.71135829	5.21868486	2.38368629
EPHA4	0.02687659	0.03316182	1.23385526	0.14006755	0.14274876	1.01914225	5.21150786	2.38170085
LY9	0.39196658	0.20456869	0.52190341	2.03095888	1.62257604	0.79892117	5.18145931	2.37335848
CAMK2N1	0.02592453	0.03886362	1.49910622	0.13214145	0.14272034	1.08005734	5.09715944	2.34969348
SH2D1B	0.05160319	0.04554132	0.88252922	0.26221192	0.47639082	1.81681601	5.08131271	2.34520125
UBASH3A	0.34987843	0.27165859	0.77643707	1.77043002	1.4086806	0.79567144	5.06012904	2.33917418
ZNF683	0.75736665	1.13005618	1.492086	3.80707567	3.30945475	0.86929051	5.02672736	2.32961944
INPP4B	0.11243197	0.08673199	0.77141754	0.56469019	0.45137603	0.79933394	5.0225057	2.3284073
KLRC3	0.0749891	0.10691804	1.4257812	0.37637755	0.51426297	1.36634868	5.01909702	2.32742784
PTGDR	0.05409146	0.06594804	1.21919503	0.26983797	0.21224665	0.78657075	4.98854998	2.31862053
LZTS1	0.04807353	0.0486097	1.01115311	0.23783221	0.20319939	0.85438128	4.94725954	2.30662959
SPOCK2	1.32542707	0.73149534	0.55189407	6.54782896	3.86814992	0.59075305	4.94016539	2.30455934
ZAP70	0.75990685	0.52542708	0.69143616	3.73737617	2.51110242	0.67188913	4.91820301	2.29813129
CD8A	1.4592963	1.17404821	0.80453038	7.13849431	9.79134177	1.37162563	4.89173743	2.29034697
ITM2C	0.4736768	0.25131552	0.53056329	2.2892474	3.34110407	1.45947707	4.83293118	2.27289845
PLCXD2	0.0341641	0.03799593	1.11215952	0.16503658	0.12013534	0.72793162	4.8307022	2.27223292
ITK	1.0098732	0.51857676	0.5135068	4.86882	3.20192635	0.65763909	4.82121912	2.269398
IL31RA	0.0105281	0.03555224	3.3768919	0.0506839	0.05979556	1.17977432	4.814156	2.26728289
APOBEC3D	0.23356996	0.18780266	0.80405314	1.12318931	0.82136014	0.73127489	4.80879176	2.26567445
CD79A	0.15457058	0.1921099	1.242862	0.74018684	1.09118799	1.47420614	4.7886657	2.25962372
ETS1	1.51691856	0.67192429	0.44295344	7.220055	4.54809696	0.62992553	4.75968533	2.2508662
KIR2DL4	0.03668346	0.09459103	2.57857447	0.17353914	0.21171529	1.21998584	4.73071894	2.24205945
RORC	0.12125477	0.10814133	0.89185218	0.56227033	0.47124541	0.83811182	4.63709853	2.21322238
GNG2	0.69373204	0.27040548	0.38978376	3.20751354	2.21266124	0.68983691	4.62356266	2.20900494
NPDC1	0.09031202	0.0894995	0.99100329	0.41526988	0.48206219	1.16084073	4.59816865	2.20105938
TNFRSF25	0.66778993	0.51483209	0.77094917	3.0284016	1.77115553	0.5848483	4.5349615	2.1810903
DOCK9	0.14048824	0.07813332	0.5561556	0.63521503	0.47033861	0.74044	4.52148169	2.17679562
APBA2	0.05642016	0.07058087	1.25098663	0.25479413	0.24782617	0.9726526	4.51601193	2.1750493
ANO9	0.17690799	0.13102017	0.74061192	0.79866027	0.52170868	0.65322979	4.51455168	2.17458273
GPR171	0.82342663	0.47608588	0.57817644	3.71667646	3.26817247	0.8793266	4.51367047	2.17430109
LAG3	0.43290487	0.25425024	0.58731203	1.94890867	2.74678652	1.40939725	4.50193287	2.17054455
MS4A1	0.15021376	0.13216219	0.87982744	0.67601114	0.59879176	0.88577202	4.50032771	2.17003006
FRMPD3	0.01271124	0.01746973	1.37435301	0.05691599	0.06613143	1.16191314	4.47761012	2.16272892
CD247	1.03377952	0.58383996	0.56476255	4.62704188	3.41703434	0.7384922	4.47584982	2.16216163
DAPK2	0.16503712	0.10167745	0.61608835	0.73802006	0.66729998	0.90417593	4.47184288	2.1608695
DTX3	0.10698597	0.09421962	0.8806726	0.47573545	0.42844677	0.90059879	4.44670859	2.15273786
KLRD1	0.20663585	0.15618156	0.75582994	0.91662182	1.16592887	1.27198464	4.43592829	2.14923604
RGS9	0.12021737	0.10610308	0.88259357	0.53265303	0.39591383	0.74328653	4.43074919	2.14755066
STAT4	0.48318653	0.26097751	0.54011752	2.13665754	1.51803974	0.71047405	4.42201385	2.14470354
VSIG1	0.01391095	0.0136939	0.98439718	0.06103802	0.05759834	0.94364696	4.38776714	2.13348696
RASGRP1	0.60750393	0.25248517	0.41561076	2.6438124	1.69685668	0.6418219	4.35192644	2.12165417
BTBD11	0.04106285	0.03153554	0.76798222	0.17701067	0.1253447	0.70811948	4.31072588	2.10793082
TRAF3IP3	1.24139607	0.72006131	0.58004156	5.35104108	3.07342127	0.5743595	4.31050266	2.10785612
PYHIN1	0.3313994	0.23330214	0.70399083	1.42356471	1.24353621	0.87353684	4.29561648	2.10286519
BTLA	0.0887307	0.07251019	0.81719386	0.38100154	0.31996848	0.83980889	4.29390874	2.10229153
TNFRSF13B	0.02105781	0.05874161	2.78954058	0.09030562	0.13051875	1.44530039	4.28846266	2.10046056
KLRK1	0.87173129	0.80820027	0.92712087	3.72089858	3.61855318	0.97249444	4.26840088	2.09369568
GCNT4	0.01281027	0.01657013	1.29350404	0.05440817	0.06931804	1.27403738	4.24723118	2.08652264
SYNE2	0.72455889	0.48328222	0.66700198	3.07680788	1.9819903	0.64417097	4.24645658	2.0862595
P2RY10	0.29538967	0.18723001	0.63384075	1.25139983	0.84636577	0.67633521	4.23643741	2.08285155
GPR18	0.13048024	0.1158386	0.88778651	0.55141048	0.57225857	1.03780866	4.22600751	2.07929533
ABCB1	0.05029328	0.04283782	0.85176027	0.21141156	0.16540727	0.78239464	4.20357471	2.07161671
ITPRIPL1	0.18207195	0.21569862	1.18468889	0.76482506	0.65093957	0.85109602	4.20067481	2.07062111
PDCD1	0.15741346	0.13444369	0.85408005	0.65899779	0.68717062	1.04275102	4.18641331	2.06571475
LEF1	0.25584001	0.18374759	0.71821288	1.06651153	0.79700433	0.74730024	4.16866592	2.05958576
MZB1	0.10773059	0.15479974	1.4369154	0.44504572	0.9083906	2.04111746	4.1310991	2.04652567
SIT1	0.57899719	0.30061469	0.51919887	2.38977258	2.03793617	0.8527741	4.12743383	2.04524509
SLC38A1	0.49947222	0.22326894	0.44700972	2.05472077	1.25864227	0.61256122	4.11378387	2.040466
WNT10B	0.0344504	0.04934519	1.43235448	0.14115638	0.13265328	0.93976112	4.09737966	2.03470158
IFITM1	7.22145444	4.40675271	0.61023063	29.4367513	26.4899932	0.89989527	4.07629121	2.02725712
KLRB1	1.41598993	1.18518225	0.83699907	5.77197548	5.36703836	0.92984428	4.07628287	2.02725417
P2RY8	0.43866363	0.25880378	0.58998231	1.78027054	1.24202792	0.69766245	4.05839559	2.0209095
PTPRCAP	5.41662037	2.85905598	0.52783023	21.975985	18.3436798	0.8347148	4.0571396	2.02046294
CD226	0.37003045	0.25081613	0.67782565	1.49931769	1.15000122	0.76701638	4.05187649	2.0185902
ATP8B2	0.60596485	0.27332635	0.45105974	2.44166588	1.31700613	0.53938835	4.02938531	2.01055977

Supplementary Table 15: List of 125 differentially expressed genes in PBMC for cluster 2 and cluster 3 with FDR

	logFC	logCPM	F	PValue	FDR.CvsB
MIR34A	4.91100099	0.27120568	22.3753333	9.53E-06	0.00372488
C1QC	4.3734327	3.87396901	24.1025232	4.80E-06	0.00284281
C1QB	3.73733466	5.48140523	23.1995994	6.89E-06	0.00311803
SNORD99	4.26487779	3.18160721	24.7999282	3.64E-06	0.00280005
MIR30C1	6.42242847	6.84635877	19.9237262	2.64E-05	0.00766639
SNORD55	2.58873694	0.67154204	16.2112667	0.00012668	0.02343452
SNORD46	3.34768239	1.19952759	15.0308633	0.00021631	0.0348648
C8B	3.69460478	-0.5736955	20.2558161	2.24E-05	0.00688058
GNG12	3.09860304	-1.5409717	22.0395919	1.02E-05	0.0038171
SNORD45C	2.77566822	-1.079895	16.1131521	0.00013025	0.02382456
SCARNA2	-1.3666945	-0.3355686	16.9042117	8.82E-05	0.01888283
PPIAL4F	3.10785705	1.72364089	17.523004	7.26E-05	0.01618733
PPIAL4D	3.10785705	1.72364089	17.523004	7.26E-05	0.01618733
PPIAL4E	3.10785705	1.72364089	17.523004	7.26E-05	0.01618733
MIR9-1	6.85069619	2.89916269	26.3315835	2.00E-06	0.00217
FCGR2A	0.41014682	7.26096165	14.969062	0.00020931	0.03407335
SNORD79	3.19209935	1.86113199	20.9999068	1.67E-05	0.0057981
SNORD75	4.43235062	-1.2565089	18.9425408	3.92E-05	0.01012794
PHLDA3	2.11908127	0.46136705	15.359284	0.00018158	0.03079118
MIR1182	2.18260955	0.35015509	15.0587321	0.000208	0.03407335
ITIH5	3.85651378	1.08786707	24.6639459	3.78E-06	0.00280005
MRC1	4.18318351	4.79250964	30.6944938	3.82E-07	0.00207048
RBP4	4.4050249	-0.5270868	26.3734881	1.89E-06	0.00217
SCD	2.49271936	4.22194854	19.2423532	3.50E-05	0.00919996
NT5C2	0.27901679	5.73860756	15.1463279	0.0001932	0.03229614
HBB	2.23101306	9.46087953	13.9228034	0.00035659	0.04719423
SNORA45B	2.3269267	-0.6207748	16.1755594	0.00012507	0.02343452
SERPING1	2.38264863	4.81622427	20.6409271	1.95E-05	0.00649239
SNORD26	2.59450413	1.2798268	17.5020286	7.25E-05	0.01618733
SLCO2B1	4.63682434	3.03568764	23.9099245	5.18E-06	0.00284281
ADAMTS15	1.58703787	-1.3586196	14.8283988	0.00022307	0.03490981
CCND2	-0.3727651	5.43090696	13.8933963	0.0003417	0.04597155
OLR1	4.54240615	2.76673493	22.1135078	1.07E-05	0.00384105
BCL2L14	2.78357744	0.02979616	19.5645305	2.94E-05	0.00825263
GPD1	4.07133225	1.49535156	25.0678325	3.25E-06	0.00273212
TRHDE	1.77669936	-0.6036691	13.7469686	0.00036858	0.04838851
GLT8D2	2.54335817	-0.8271741	15.6258347	0.00016118	0.02791248
LOC10099667	4.57698958	-1.4377872	22.3431026	9.46E-06	0.00372488
RN7SL1	-2.0962353	9.17208692	36.4565362	4.72E-08	0.00038407
RN7SL2	-2.2266135	9.35487608	39.6622512	1.56E-08	0.00025319
IFI27	4.02409739	1.64053188	24.1018374	4.77E-06	0.00284281
GLDN	3.74779733	0.382585	23.5771756	5.78E-06	0.00290238

SNORD16	2.44099963	0.39635601	13.9642295	0.00034497	0.04603109
PAQR5	3.98213753	-0.5524676	26.7384957	1.61E-06	0.00217
CD276	3.55008184	0.18080116	22.5513794	8.71E-06	0.00363976
LOC727751	-0.6184965	2.24153937	13.6638917	0.00037972	0.0494519
MIR9-3	6.85197407	2.89880577	26.3328837	2.00E-06	0.00217
MSLN	-1.5192962	-1.2791988	17.6740814	6.29E-05	0.01504749
NUPR1	4.20432839	0.13756377	20.4005941	2.14E-05	0.00682675
SNORD71	4.28077833	1.47375209	18.8111143	4.20E-05	0.01052154
BCAR1	1.73299821	-0.8355556	14.4104088	0.00027103	0.0404783
SNORD42A	5.04028802	1.71015222	26.6082088	1.79E-06	0.00217
CCL18	6.43552971	2.70305306	27.0295679	1.53E-06	0.00217
AOC3	3.39140345	1.32578822	20.5593654	2.01E-05	0.0065282
MYL4	2.25664124	-0.8726164	14.0713985	0.00032186	0.04556087
COL5A3	-1.1556464	1.92371427	14.526773	0.00025913	0.03905868
SNORD41	4.91188793	-0.3553899	23.7781929	5.37E-06	0.00284281
AXL	2.20408153	1.9954251	15.2579769	0.00019442	0.03229614
APOE	4.02656548	1.28491126	23.0118765	7.37E-06	0.00324331
APOC1	5.34831154	3.86704221	22.6160174	8.72E-06	0.00363976
APOC1P1	4.22814108	-1.3335144	25.4056883	2.71E-06	0.00259542
APOC4-APOC	4.42897373	0.80201721	26.9555446	1.54E-06	0.00217
APOC2	4.73299234	0.76918221	25.7002562	2.53E-06	0.00257146
SNORD33	3.77285159	2.05683448	19.5422391	3.09E-05	0.00837446
SNORD35B	1.98603044	2.23057928	14.9576553	0.00022182	0.03490981
EIF2AK2	0.48207929	4.04014307	15.3905183	0.00017306	0.02965602
ARHGEF33	2.02124005	-0.8259545	14.3187859	0.00028557	0.04113921
SSFA2	0.36107868	5.61417964	14.2565995	0.00028935	0.04131927
FN1	4.9742134	6.05156465	25.0498677	3.30E-06	0.00273212
SLC19A3	4.56658778	-0.0986405	26.358092	1.92E-06	0.00217
MLPH	4.05670436	0.70126476	23.7611874	5.41E-06	0.00284281
SNORD57	3.48649108	0.96018224	17.1886986	8.38E-05	0.01842603
LOC10192937	4.75167483	-0.955513	23.4015001	6.21E-06	0.00297209
EPB41L1	2.13409946	0.37169549	14.7231116	0.00024184	0.03698418
TGM2	2.59762203	3.22945919	20.3645182	2.18E-05	0.00683524
PPARG	3.26055925	1.80698941	19.5419832	3.08E-05	0.00837446
FGD5	2.83568498	0.61604325	19.912298	2.57E-05	0.0076167
STAC	3.5382405	0.8988528	23.8623959	5.17E-06	0.00284281
VGLL3	2.00383682	-1.1101987	13.9851547	0.00033195	0.04556625
PCOLCE2	4.29192677	0.57763149	23.1656921	6.90E-06	0.00311803
PLSCR1	0.54160823	4.89429892	17.8527167	5.81E-05	0.01412554
MME	3.08929197	2.24808974	23.5680946	5.88E-06	0.00290238
SCARNA22	5.13221565	0.53316123	23.8642599	5.24E-06	0.00284281
SCARB2	0.43232145	5.46818146	16.6610052	9.82E-05	0.01997502
ABCG2	2.00845294	0.31667491	16.3330518	0.0001165	0.02284935
CPE	2.74101943	-0.8690939	18.6416834	4.30E-05	0.01060517
LOC731424	1.68301868	-0.776041	18.6262177	4.15E-05	0.01052154

LINC00461	5.95460778	2.91475836	28.1750259	9.84E-07	0.00217
MIR9-2	6.85820507	2.89915639	26.3840307	1.96E-06	0.00217
PPIC	2.59916575	-1.3195243	16.8205835	9.42E-05	0.01940601
PDE6A	-0.9411419	-1.4870813	16.9550839	8.62E-05	0.01870981
LINC01366	3.03045035	-0.299587	17.5854763	6.93E-05	0.01618733
CPEB4	0.49544332	4.68882063	13.956303	0.00033198	0.04556625
SNORD95	4.62895509	3.08532361	25.0057964	3.36E-06	0.00273212
SNORD48	2.80226979	-0.644886	15.8828136	0.00014505	0.02594878
TREM2	2.64800372	-0.5026554	14.8970676	0.00022517	0.03490981
MIR30C2	6.43257877	6.84657439	19.7749195	2.81E-05	0.0080152
SNORD50B	2.37559599	-0.0635355	16.9316146	9.04E-05	0.0189534
LOC285740	-1.1622933	-1.3946247	14.3342863	0.00027927	0.04095754
SNORA20	3.255814	-0.5312308	19.3466273	3.26E-05	0.00869364
PARK2	2.35458124	0.44165795	16.934751	9.08E-05	0.0189534
GPNMB	4.29275688	3.6467169	26.4384009	1.92E-06	0.00217
INHBA	2.44024735	0.21080984	14.4618433	0.00027474	0.04065871
SND1-IT1	-1.3475479	-1.1813529	13.9490263	0.00033309	0.04556625
RNY3	3.50202742	3.84634921	16.0951261	0.0001356	0.02452702
RNY1	5.24602216	4.09951559	24.50426	4.09E-06	0.00284281
DPP6	3.47045396	0.16808964	22.305132	9.61E-06	0.00372488
MSR1	2.00625524	4.0376114	20.8493123	1.78E-05	0.00603809
SFRP1	2.14327579	-1.4579149	16.2042406	0.00012173	0.02331363
LOC10028784	4.47951767	0.14970278	22.1700955	1.03E-05	0.0038171
FABP4	5.95102578	2.15098324	26.8992858	1.60E-06	0.00217
PLEKHF2	0.41813675	4.21027276	16.1939851	0.00012079	0.02331363
KLF10	0.64769117	5.98169015	14.8810634	0.00022033	0.03490981
DCSTAMP	2.73253482	-1.3426129	16.4177682	0.0001133	0.02249263
MIR30B	4.30823555	-0.3707127	24.0960583	4.69E-06	0.00284281
FRMPD1	2.71291898	-0.8651886	21.871907	1.09E-05	0.00384105
NR4A3	1.73837015	0.20787305	15.650106	0.00015596	0.02759577
MEGF9	0.35783869	6.77739786	13.9242577	0.0003369	0.04570283
RAB14	0.25910675	5.78210174	13.9579629	0.00033173	0.04556625
RNF224	2.59127364	0.82636105	14.4131604	0.00028312	0.04113921
ANOS1	2.26680517	-0.003045	14.7129899	0.00024309	0.03698418
CYBB	0.40760941	9.03421465	16.1004174	0.00012593	0.02343452
MAOA	2.64983143	0.22678808	16.5143484	0.00011036	0.02217865
VSIG4	2.07640964	3.66012607	15.745781	0.00015766	0.02759796
LAMP2	0.37461538	6.35033416	19.9382776	2.37E-05	0.00713167

Supplementary Table 16: List of enriched pathways for 125 differentially expressed genes in PBMC for cluster 2 and cluster 3

Function	FDR	Genes in network	Genes in genome
cholesterol transport	2.00E-06	6	96
sterol transport	2.00E-06	6	106
lipid transport	1.38E-05	15	368
inflammatory response	6.85E-05	13	684
organic hydroxy compound transport	0.00012112	9	256
triglyceride metabolic process	0.000323099	6	104
lipid localization	0.000333566	15	402
regulation of lipid transport	0.000530311	8	121
plasma lipoprotein particle	0.003983562	4	39
protein-lipid complex	0.003983562	4	41
blood microparticle	0.010243507	6	143
heparin binding	0.010243507	8	161
negative regulation of multicellular organismal process	0.011814552	19	1261
very-low-density lipoprotein particle	0.019783759	3	20
glycosaminoglycan binding	0.027839593	9	226
sulfur compound binding	0.027839593	8	238
regulation of fatty acid metabolic process	0.03340859	6	85
negative regulation of lipid transport	0.042806693	5	44