



TRANSLATIONAL SCIENCE

Role of CD14+ monocyte-derived oxidised mitochondrial DNA in the inflammatory interferon type 1 signature in juvenile dermatomyositis

Meredyth G LI Wilkinson ^{1,2,3} Dale Moulding ^{3,4} Thomas C R McDonnell ⁵
 Michael Orford,⁴ Chris Wincup ⁵ Joanna Y J Ting ¹ Georg W Otto ^{3,6,7}
 Restuadi Restuadi ^{1,2,3} Daniel Kelberman ^{3,6,7}
 Charalampia Papadopoulou ^{1,8} Sergi Castellano ^{3,7} Simon Eaton ^{3,4}
 Claire T Deakin ^{1,2,3} Elizabeth C Rosser ^{2,5} Lucy R Wedderburn ^{1,2,3}

Handling editor Josef S Smolen

► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/ard-2022-223469>).

For numbered affiliations see end of article.

Correspondence to

Dr Meredyth G LI Wilkinson, Infection, Immunity and Inflammation Research and Teaching Department, UCL, London, WC1N 1EH, UK; meredyth.wilkinson.14@ucl.ac.uk and Dr Elizabeth C Rosser, Department of Rheumatology, University College London, London, UK; e.rosser@ucl.ac.uk

SE, CTD, ECR and LRW are joint senior authors.

Received 11 October 2022
Accepted 1 December 2022



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY. Published by BMJ.

To cite: Wilkinson MGL, Moulding D, McDonnell TCR, et al. *Ann Rheum Dis* Epub ahead of print: [please include Day Month Year]. doi:10.1136/ard-2022-223469

ABSTRACT

Objectives To define the host mechanisms contributing to the pathological interferon (IFN) type 1 signature in Juvenile dermatomyositis (JDM).

Methods RNA-sequencing was performed on CD4⁺, CD8⁺, CD14⁺ and CD19⁺ cells sorted from pretreatment and on-treatment JDM (pretreatment n=10, on-treatment n=11) and age/sex-matched child healthy-control (CHC n=4) peripheral blood mononuclear cell (PBMC). Mitochondrial morphology and superoxide were assessed by fluorescence microscopy, cellular metabolism by ¹³C glucose uptake assays, and oxidised mitochondrial DNA (oxmtDNA) content by dot-blot. Healthy-control PBMC and JDM pretreatment PBMC were cultured with IFN- α , oxmtDNA, cGAS-inhibitor, TLR-9 antagonist and/or *n*-acetyl cysteine (NAC). IFN-stimulated gene (ISGs) expression was measured by qPCR. Total numbers of patient and controls for functional experiments, JDM n=82, total CHC n=35.

Results Dysregulated mitochondrial-associated gene expression correlated with increased ISG expression in JDM CD14⁺ monocytes. Altered mitochondrial-associated gene expression was paralleled by altered mitochondrial biology, including 'megamitochondria', cellular metabolism and a decrease in gene expression of superoxide dismutase (*SOD*)1. This was associated with enhanced production of oxidised mitochondrial (oxmt)DNA. OxmtDNA induced ISG expression in healthy PBMC, which was blocked by targeting oxidative stress and intracellular nucleic acid sensing pathways. Complementary experiments showed that, under in vitro experimental conditions, targeting these pathways via the antioxidant drug NAC, TLR9 antagonist and to a lesser extent cGAS-inhibitor, suppressed ISG expression in pretreatment JDM PBMC.

Conclusions These results describe a novel pathway where altered mitochondrial biology in JDM CD14⁺ monocytes lead to oxmtDNA production and stimulates ISG expression. Targeting this pathway has therapeutical potential in JDM and other IFN type 1-driven autoimmune diseases.

INTRODUCTION

Juvenile dermatomyositis (JDM) is a rare systemic autoimmune disease with a median age of onset of

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Juvenile Dermatomyositis (JDM) has a well-defined upregulated IFN type 1 signature in peripheral blood and at the inflammatory tissue sites, muscle and skin, but little is known about mechanisms upstream of this IFN type 1 signature.

WHAT THIS STUDY ADDS

⇒ Dysregulated mitochondrial gene expression is associated with IFN type 1 upregulation in JDM.
 ⇒ Mitochondrial morphology and superoxide regulation are abnormal in JDM CD14⁺ monocytes, leading to increased oxidised mitochondrial DNA (oxmtDNA).
 ⇒ Targeting oxidative stress and intracellular nucleic acid sensing pathways suppresses both the ISG upregulation following culture of healthy control peripheral blood mononuclear cell with oxmtDNA and the ISG signature in cells from pretreatment JDM patients.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ These data suggest that therapeutically targeting abnormal mitochondrial biology and oxmtDNA production may suppress pathological IFN type 1 signatures.

~7 years and incidence of 2–4 cases per million/year.^{1,2} Symptoms include proximal muscle weakness and characteristic skin changes.³ Currently, the proposed disease pathology includes complement-mediated vasculopathy and autoimmune muscle damage.⁴ Not all patients respond to first-line treatments, prednisolone and methotrexate, and patients can develop treatment side effects and disease complications.⁵ There is as yet no evidence-based biomarker to indicate treatment response. In severe cases complications can lead to myositis-related mortality.^{2,6} There is a significant unmet need to develop more effective targeted treatments by exploring novel underlying pathogenic mechanisms.

One proposed mechanism is interferon (IFN)-driven pathogenesis. An upregulation of IFN type 1 signature has been found in JDM, detected at both gene expression and protein level in peripheral blood and tissue.^{7–9} Currently little is known about mechanisms up-stream of the IFN type 1 signature in JDM.¹⁰ Evidence suggests that mitochondrial dysfunction may activate IFN type 1 production in the absence of a pathogen.¹¹ The innate immune system can recognise mitochondrial (mt)DNA as an immunogenic damage-associated molecular pattern and trigger a proinflammatory response¹²; injecting mtDNA in vivo triggers both local and systemic inflammation.^{13 14} This is due to structural features shared between bacterial DNA and mtDNA which include a circular genome and a high frequency of unmethylated CpG dinucleotide repeats.¹⁵ Several mechanisms have been highlighted as potential drivers of mtDNA-mediated inflammation. These include ligation of endosomal Toll-like receptor 9 (TLR9) on sensing of hypomethylated DNA with CpG motifs and the cytosolic cGAS-STING (protein cyclic GMP-AMP synthase stimulator of IFN genes) pathway.^{16 17}

Reactive oxygen species (ROS) damage mtDNA, which if not repaired can lead to defective complex I and III function leading to increased superoxide production.¹⁸ This increased superoxide flux, in turn leads to genomic instability, metabolic stress and cellular injury. Once mtDNA is damaged it is susceptible to oxidation which can perpetuate the ROS cycle leading to inappropriate mitochondrial fission and fusion.¹⁹ This causes changes in mitochondrial morphology such as fragmentation and enlarged mitochondrial networks (mega mitochondria).¹⁸ Emerging evidence from IFN type 1-driven autoimmune diseases such as systemic lupus erythematosus (SLE) and JDM, and rare monogenic type 1 interferonopathies, suggest that there is a relationship between mitochondrial dysfunction, inappropriate production of ROS and IFN-driven disease pathology.^{20–25} However, the mechanisms underlying this association remain ill-defined.

In this article, we propose a novel pathogenic mechanism whereby CD14+monocyte-derived oxidised mtDNA induces IFN stimulatory gene (ISG) expression in the rare childhood autoimmune disease JDM. We identify that in JDM CD14+monocytes, the pathogenic interferon (IFN) type 1 signature is associated with dysregulation of mitochondrial-associated gene expression. Assessment of mitochondrial biology in JDM CD14+monocytes demonstrates that compared with age-matched healthy controls there is abnormal mitochondrial morphology, cellular metabolism and decreased gene expression of the antioxidant enzyme superoxide dismutase 1 (*SOD1*). This is associated with enhanced generation of mitochondrial superoxide and increased intracellular oxidised mitochondrial DNA (oxmtDNA). We delineated that oxmtDNA directly amplifies ISG expression, as oxmtDNA is able to induce the upregulation of ISG in healthy peripheral blood mononuclear cells (PBMCs) in vitro, which can be blocked by TLR-9 antagonism and the antioxidant drug, *N*-acetylcysteine (NAC). Interestingly, under these experimental conditions, TLR-9 antagonism and NAC, and to a lesser extent cGAS-STING inhibition, can also suppress ISG expression in PBMC from treatment naïve (pretreatment) JDM patients in vitro. This suggests an important role for nucleic acid sensing and oxidative stress in pathological IFN type 1 signatures in JDM. Collectively, these data identify abnormal mitochondrial biology and oxmtDNA as potential targets to therapeutically modulate downstream effects of IFN type 1 in multiple autoimmune diseases.

PATIENTS, MATERIALS AND METHODS

See online supplemental material 1 and methods.

RESULTS

A dysregulated mitochondrial gene signature characterises CD14+ monocytes from JDM patients

To define possible mechanisms upstream of the strong IFN type 1 signature and identify a transcriptional signature associated with immune dysfunction in JDM, we performed gene expression profiling on isolated CD4+T cells, CD8+T cells, CD19+B cells and CD14+monocytes from PBMC collected from JDM patients naïve to treatment (pre-treatment), at ~12 months on-treatment and age-matched controls (For demographics see online supplemental table 4). Transcriptional analysis showed significant differences in both pretreatment, and on-treatment JDM patients compared with controls and validated a strong IFN type 1 signature across all cell-types, which was largely normalised by treatment (online supplemental figure 1). CD14+monocytes had markedly more differentially expressed genes (DEG) than all other cell types with 1832 DEG in pretreatment JDM compared with controls, 1594 DEG in on-treatment JDM compared with controls, and 2666 DEG in pretreatment compared with on-treatment JDM (figure 1A and online supplemental tables 1–3). This was not due to differences in the total transcript levels detected in each cell type (n=16 751, data not shown). Notably, there were 744 (664+80) shared DEG in both pretreatment and on-treatment JDM compared with controls (figure 1B). This would suggest that the expression of these 744 genes in JDM CD14+monocytes was not normalised with current treatment strategies.

To further explore the functional nature of the pathways that remained dysregulated in JDM CD14+monocytes after treatment, we performed gene ontology analysis of the 1594 DEG from JDM patients on treatment compared with controls. This showed a significant differential expression of terms related to mitochondrial function in CD14+monocytes from JDM on-treatment compared with controls (figure 1C). Further analysis of the mitochondrion GO term, identified decreased expression of mitochondrially associated genes, this included 6 mitochondrial-coded genes and 59 nuclear-encoded genes for mitochondrial proteins. In contrast, CD4+T cells, CD8+T cells and CD19+B cells did not show differential expression in these genes in pretreatment or on-treatment JDM compared with controls (figure 1D left and middle panels), with the exception of the IFN-stimulated gene *IFI6* which is overexpressed in all cell types.

Given existing evidence that mitochondrial dysfunction may activate IFN type 1 production in the absence of a pathogen,¹¹ we next investigated whether the expression of mitochondrial-encoded genes was associated with altered IFN type 1 gene expression in JDM CD14+monocytes. IFN type 1 gene expression was assessed using a set of ISG first used in studies of Aicardi-Goutières Syndrome, a prototypical monogenic type 1 interferonopathy.²⁶ These data demonstrated reduced expression of mitochondrial genes was associated with increased expression of ISG in JDM pretreatment CD14+monocytes (figure 1E). No such association was seen in CD14+monocytes from patients on-treatment, as IFN type 1 signature was largely normalised by treatment (figure 1E). These data suggest that there is a possible relationship between mitochondrial dysfunction and IFN type 1 in JDM patients, and that although current treatment strategies normalise IFN type 1 signatures, mitochondrial biology remains abnormal.

Changes in mitochondrial morphology are associated with abnormal cellular metabolism in CD14+ monocytes in JDM patients

We next assessed whether changes in mitochondrial gene expression were reflected in altered mitochondrial biology in JDM CD14+ monocytes. To do this, we measured mitochondrial content using citrate synthase activity (a quantitative enzymatic marker for the presence of mitochondria)²⁷ and visualised mitochondrial morphology using fluorescence microscopy. Although we identified no significant difference in citrate synthase activity (figure 2A), visualisation of mitochondria by fluorescent microscopy, using MitoTracker green-fluorescent stain, showed that mitochondrial morphology was markedly altered in JDM CD14+ monocytes compared with controls. These data demonstrated that although, in keeping with the citrate synthase activity, there was no overall difference in the mitochondrial volume per cell (figure 2B,C), there was a greater range and variance in the size of the mitochondrial fragments themselves (figure 2B,D). Overall, the size of the mitochondrial fragments was significantly decreased in JDM CD14+ monocytes suggesting the mitochondria were generally more fragmented compared with controls (figure 2B,C). However, in some JDM CD14+ monocytes the wide variance in the size of mitochondrial fragments was depicted by the presence of abnormally enlarged mitochondrial networks or ‘megamitochondria’ (figure 2B and D). To investigate whether altered mitochondrial morphology was associated with altered cellular metabolic capacity we next assessed whether the ability of JDM CD14+ monocytes to metabolise glucose was altered using a ¹³C glucose uptake assay. These data showed there was a significant reduction in the rate and final concentration of ¹³C lactate production (figure 2E), but no difference in the rate and final concentration of ¹³C CO₂ in JDM CD14+ monocytes compared with controls (online supplemental figure 2A). These data demonstrate that glucose metabolism but not glucose oxidation is altered in these cells. Due to the fragility of mitochondria and altered cellular metabolic capacity post-thawing, these functional assays could only be carried out on fresh blood samples. In addition, due to the rarity of JDM, these fresh samples could only be obtained from on-treatment JDM patients for these assays. Differences in the metabolic capacity of the cell was not due to a decrease in glucose transport or potentially uptake as there was no difference in the expression of glucose transporter 1 (GLUT1), a significant increase in the expression of glucose transporter 4 (GLUT4) and an increase in glucose uptake measured using the fluorescent glucose analogue 2-NBDG (2-(N-(7-Nitrobenz-2-oxa-1,3-diazol-4-yl)Amino)-2-Deoxyglucose) in JDM CD14+ monocytes on-treatment compared with controls (online supplemental figure 2B–D). Given previous reports that the endocytic GTPase protein Rab4 has been shown to regulate GLUT4 expression,²⁸ we next checked the gene expression of *RAB4A* in the transcriptional dataset; however, there was no difference in the expression of *RAB4A* in JDM on-treatment compared with control (data not shown).

Transcriptional data reveals changes to oxidative phosphorylation and superoxide regulation in JDM CD14+ monocytes

Aberrant changes to mitochondrial morphology and cellular metabolism are key features of mitochondrial stress and are

associated with decreased oxidative phosphorylation.^{18 19} Assessment of the KEGG pathway ‘oxidative phosphorylation’ in the RNAseq data-set demonstrated a global down-regulation of the expression of genes in this pathway in both pretreatment and on-treatment JDM CD14+ monocytes compared with controls (figure 3A), with limited differences between pretreatment and on-treatment JDM CD14+ monocytes (figure 3A). To prevent oxidative stress, changes to mitochondrial morphology and cellular metabolism lead to upregulation of compensatory mechanisms that regulate the production of superoxide.²⁹ Interrogation of the transcriptomic data for DE genes involved in superoxide regulation demonstrated that the expression of the gene superoxide dismutase 1 (*SOD1*), which is localised in the cytosol and the mitochondrial intermembrane space and has an important role in protecting against mitochondrially-produced superoxide,³⁰ was significantly decreased in both pretreatment and on-treatment JDM CD14+ monocytes compared with controls (figure 3B). There was no difference in the gene expression of superoxide dismutase 2 (*SOD2*), which is localised in the mitochondrial matrix and has a role regulating intramitochondrial superoxide levels (figure 3C).³¹ Notably, the expression of *SOD1* and *SOD2* genes only negatively correlated with the up-regulated expression of ISGs *MX1* and *RSAD2* (representative ISGs) in CD14+ monocytes from pretreatment JDM patients, but not on-treatment JDM patients and controls which do not have upregulated ISGs, suggesting a possible association between oxidative stress in JDM CD14+ monocytes and the IFN type 1 gene signature (figure 3D,E, online supplemental figure 3A).

Enhanced oxidative stress leads to increased oxmtDNA content in JDM CD14+ monocytes

To assess oxidative stress in CD14+ monocytes, we next measured the abundance and location of mitochondrial superoxide using MitoSox, which fluoresces when oxidised by superoxide specifically in mitochondria. These data showed a significant increase in the amount of superoxide as measured by an increase in MitoSox in JDM CD14+ monocytes compared with controls (figure 4A). Dysregulation in superoxide has previously been shown to increase intracellular oxidised mtDNA (oxmtDNA), which is thought to be pathogenic in SLE.²⁰ To test whether superoxide dysregulation was associated with an increase in intracellular oxmtDNA in JDM CD14+ monocytes, we used dot blot with densitometry to quantify 8-Hydroxy-2'-deoxyguanosine (8-OhDG) from mitochondria isolated from CD14+ monocytes. These data showed a significant increase in oxmtDNA from JDM CD14+ monocytes compared with controls (figure 4B). Due to requirement for fresh samples, these experiments could only be carried out on samples from JDM patients on-treatment.

To investigate whether release of oxmtDNA into the periphery could contribute to the systemic pathology observed in JDM patients and to assess this signature in pretreatment samples, we finally measured the levels of cell-free circulating mtDNA in plasma of JDM and controls (online supplemental figure 3B). JDM plasma mtDNA levels were increased compared with controls (online supplemental figure 3C). In JDM pretreatment patients with both transcriptional data and data assessing mtDNA levels in plasma (n=3), the levels of cell-free mtDNA positively correlated with *MX1* and *RSAD2* expression (online supplemental

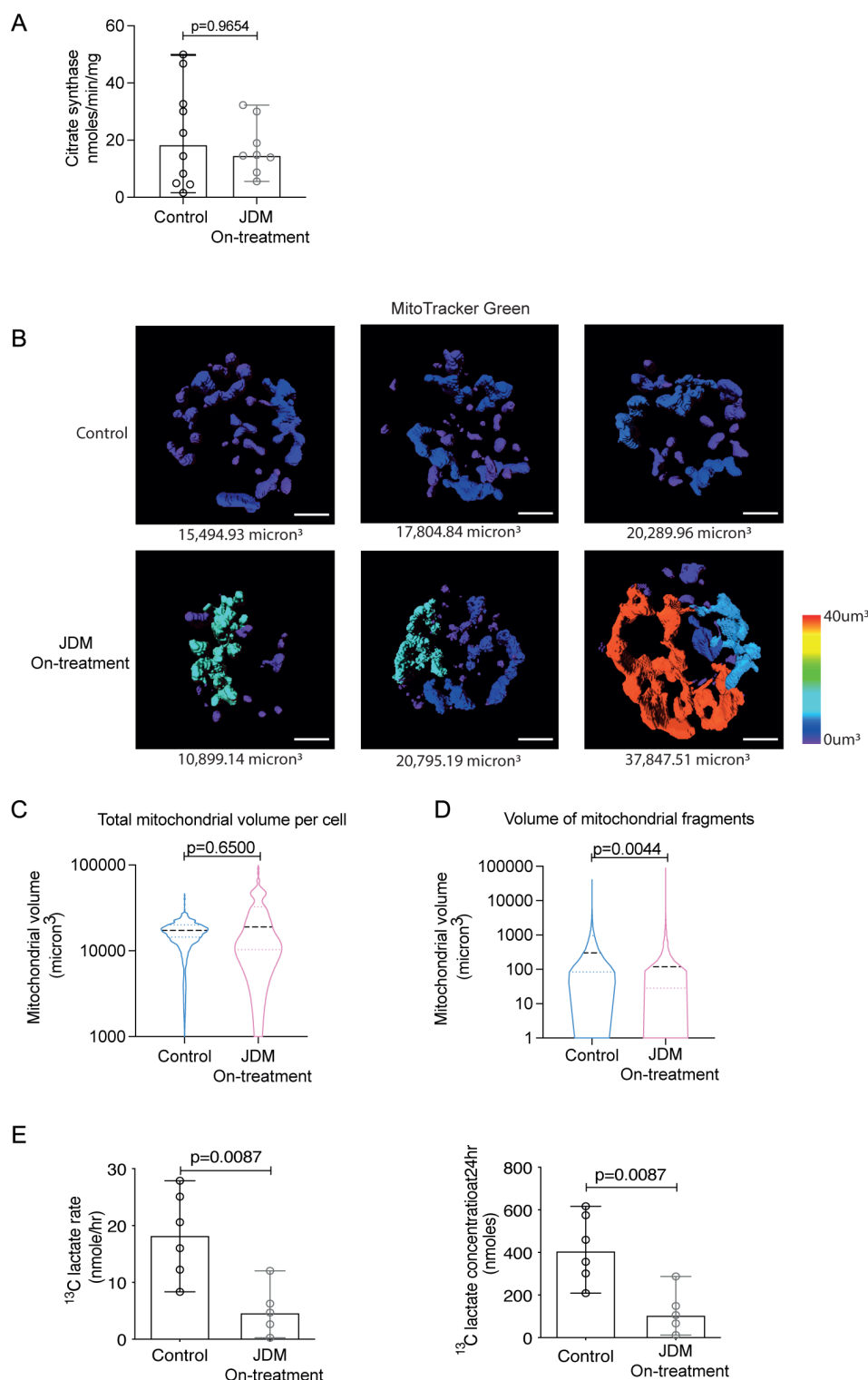


Figure 2 Changes in mitochondrial morphology are associated with abnormal cellular metabolism in CD14⁺ monocytes in JDM patients. (A) Bar chart shows citrate synthase rate normalised to protein content in JDM on-treatment (n=8) CD14⁺ monocytes compared with controls (n=10). (B) Representative images showing the range of mitochondrial fragment size in individual CD14⁺ monocytes from JDM on-treatment (n=6) and control (n=9). Images are representative for the lowest interquartile range (left), median (central) and highest IQR (right) of total mitochondrial volume per cell from control (top) and JDM (bottom) CD14⁺ monocytes. (C) Violin plot showing the distribution of total mitochondrial volume (μm^3) per cell in JDM on-treatment CD14⁺ monocytes (n=6) compared with controls (n=9) (D) Violin plot showing the distribution of the individual mitochondrial fragment volume (μm^3) from all CD14⁺ monocytes in JDM on-treatment (n=6) compared with controls (n=9). (E) Bar graphs show ^{13}C labelled glucose metabolism rate (left) and final concentration (right) into lactate in CD14⁺ monocytes from JDM on-treatment (n=5) and controls (n=6). (A, E) Bar graphs: median with range shown. statistical analysis: (A, E) Non-parametric Mann-Whitney tests, p values. (C, D) Violin plots of distribution with median and IQR. Analysis of the effect of JDM compared with controls as a fixed effect in a linear mixed effects model, with a random effect included to account for individual-specific effects. P values were generated using nested ANOVA. ANOVA, analysis of variance; JDM, juvenile dermatomyositis.

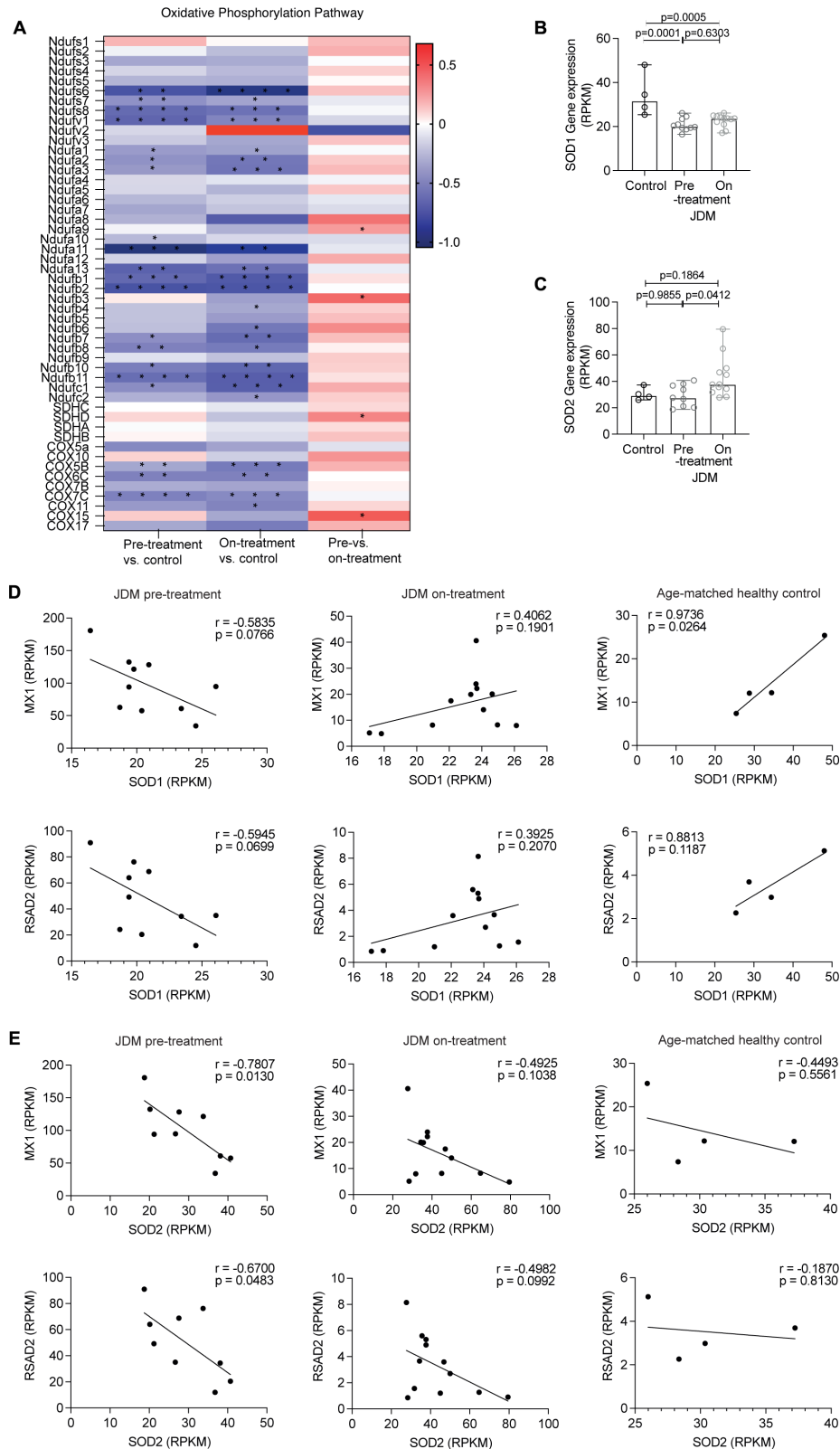


Figure 3 Transcriptional data reveal changes to oxidative phosphorylation and superoxide regulation in JDM CD14+ monocytes. (A) Heatmap showing fold change (FC) of differentially expressed genes (DEG) from KEGG oxidative phosphorylation pathway in CD14+ monocytes from JDM patients taken pretreatment (n=10) and ~12 months on-treatment (n=11), and controls (n=4). Red is upregulated (positive Fc) and blue is downregulated (negative Fc), stars represent adjusted p values (* $p<0.05$, ** $p<0.01$, *** $p<0.001$, **** $p<0.0001$). Gene expression analysis of CD14+ monocytes from JDM patients taken pretreatment (n=10) and ~12 months on-treatment (n=11), and age-matched healthy (controls (n=4)). Reads per kilobase pair of transcript (RPKM) gene expression of (B) *SOD1* and (C) *SOD2*. Correlation plots of RPKM gene expression of *SOD1* (D) and *SOD2* (E), to *MX1* and *RSAD2* (top to bottom) in CD14+ monocytes from JDM patients taken pretreatment (n=10) (left) and 12 months on-treatment (n=11) (middle) and controls (n=4) (right). All bar graphs: median with range shown. Statistical analysis: (B, C) Non-parametric Kruskal-Wallis test with Dunn's multiple comparisons, adjusted p values. (D–E) R and p values calculated by Pearson correlation. JDM, juvenile dermatomyositis.

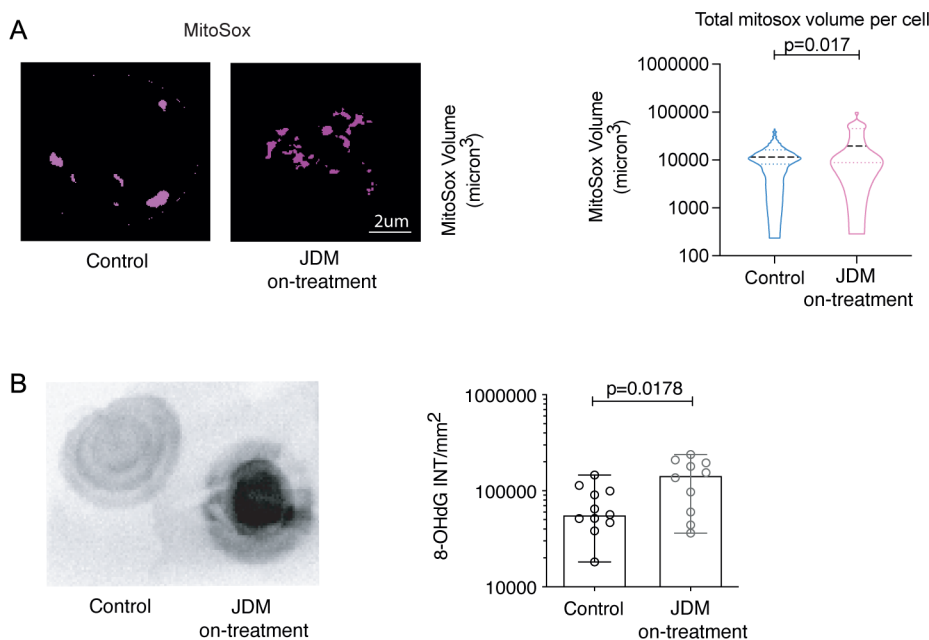


Figure 4 There is enhanced oxidative stress in JDM CD14+ monocytes, which is associated with increased oxidised mitochondrial DNA (oxmtDNA). (A) representative images (left), and violin plot (right) showing MitoSox volume (μm^3) per cell in CD14+ monocytes from JDM on-treatment (n=6) compared with controls (n=9). (B) Representative densitometry plots (left) and bar graph (right) of 8-hydroxy-2'-deoxyguanosine (8-OHdG) concentration from isolated CD14+ monocyte-derived mitochondria from JDM on-treatment patients (n=10) and controls (n=11). All bar graphs: median with range shown. (A) Violin plots of distribution with median and IQR. Analysis of the effect of JDM versus healthy control as a fixed effect in a linear mixed effects model, with a random effect included to account for individual-specific effects. P values were generated using nested ANOVA. (B) Non-parametric Mann-Whitney tests, p values. ANOVA, analysis of variance; JDM, juvenile dermatomyositis.

figure 3D). These data further support the notion that dysregulated mitochondrial biology is associated with IFN type 1 in patients with JDM.

Oxidised mtDNA modulates interferon stimulated gene (ISG) expression in vitro

Given these findings suggest a relationship between IFN type 1, superoxide dysregulation and an increase in oxmtDNA within JDM CD14+ monocytes compared with controls, we next tested the hypothesis that oxmtDNA can induce expression of ISG. We generated human oxmtDNA using a novel in house method (figure 5A) and then cultured control PBMC from healthy individuals in the presence of IFN- α , non-oxidised mtDNA, oxmtDNA or no stimuli. Both forms of mtDNA were cultured with the cationic peptide LL37 to aid cellular uptake of self-DNA.³² These results showed a comparable increase in *MX1* and *RSAD2* gene expression for both IFN- α and oxmtDNA (figure 5B and online supplemental figure 4B). Of note, non-oxidised mtDNA in vitro did not lead to upregulation of *MX1* gene expression suggesting a critical role for mtDNA oxidation to amplify IFN type 1 gene expression (online supplemental figure 4A).

Pathways downstream of mtDNA-mediated inflammation include activation of TLR9 and the cGAS-STING pathway.^{16 17} To interrogate the mechanistic pathways by which oxmtDNA increases the expression of ISG, we next investigated whether cGAS-inhibitor (G-140), TLR-9 antagonist (ODN TTAGGG (A1511)) and the antioxidant drug *N*-acetylcysteine (NAC) could block upregulation of ISG expression by oxmtDNA. Healthy control PBMC were prestimulated with oxmtDNA and then cultured in the presence or absence of cGAS-inhibitor, TLR-9 antagonist or NAC. Under these experimental conditions, TLR-9 antagonist and NAC, but not cGAS-inhibitor, significantly

downregulated *MX1* gene expression (figure 5C), while these drugs did not significantly alter the expression of *RSAD2* (online supplemental figure 4D). Finally, to investigate the therapeutic potential of targeting these pathways to suppress ISG expression in JDM, we cultured PBMC from pretreatment JDM with cGAS-inhibitor, TLR-9 antagonist, NAC or medium alone. TLR-9 antagonist and NAC significantly down-regulated both *MX1* and *RSAD2* gene expression, while cGAS-inhibition only down-regulated *MX1* (figure 5D and online supplemental figure 4D). Collectively, these data provide evidence that targeting broad host mechanisms upstream of oxmtDNA ISG upregulation may be efficacious for the treatment of JDM.

DISCUSSION

A growing body of literature has underlined a central role for dysregulated IFN type 1 production in the immunopathology of multiple autoimmune rheumatic diseases (ARDs).^{7 8 33 34} Accordingly, study of upstream mechanisms contributing to upregulation of ISGs is likely to identify novel therapeutic targets for multiple ARDs. To date, most studies interrogating dysfunctional host responses leading to enhanced IFN production in autoimmunity have focused on SLE.^{35 36} There remains a paucity of mechanistic data from other IFN-driven ARDs.^{21 37 38} Here, using bulk RNA-sequencing of sorted CD4+T cells, CD8+T cells, CD19+B cells and CD14+monocytes from PBMC, we corroborate previous studies reporting a strong IFN type 1 signature in JDM pretreatment.⁷⁻⁹ We also demonstrate that this signature is associated with altered expression of mitochondria associated genes in CD14+monocytes—a gene signature which is not normalised by current treatment strategies. We further report that mitochondrial morphology and biology is altered in JDM CD14+monocytes compared with controls, which leads to enhanced production of oxmtDNA. oxmtDNA, in turn,

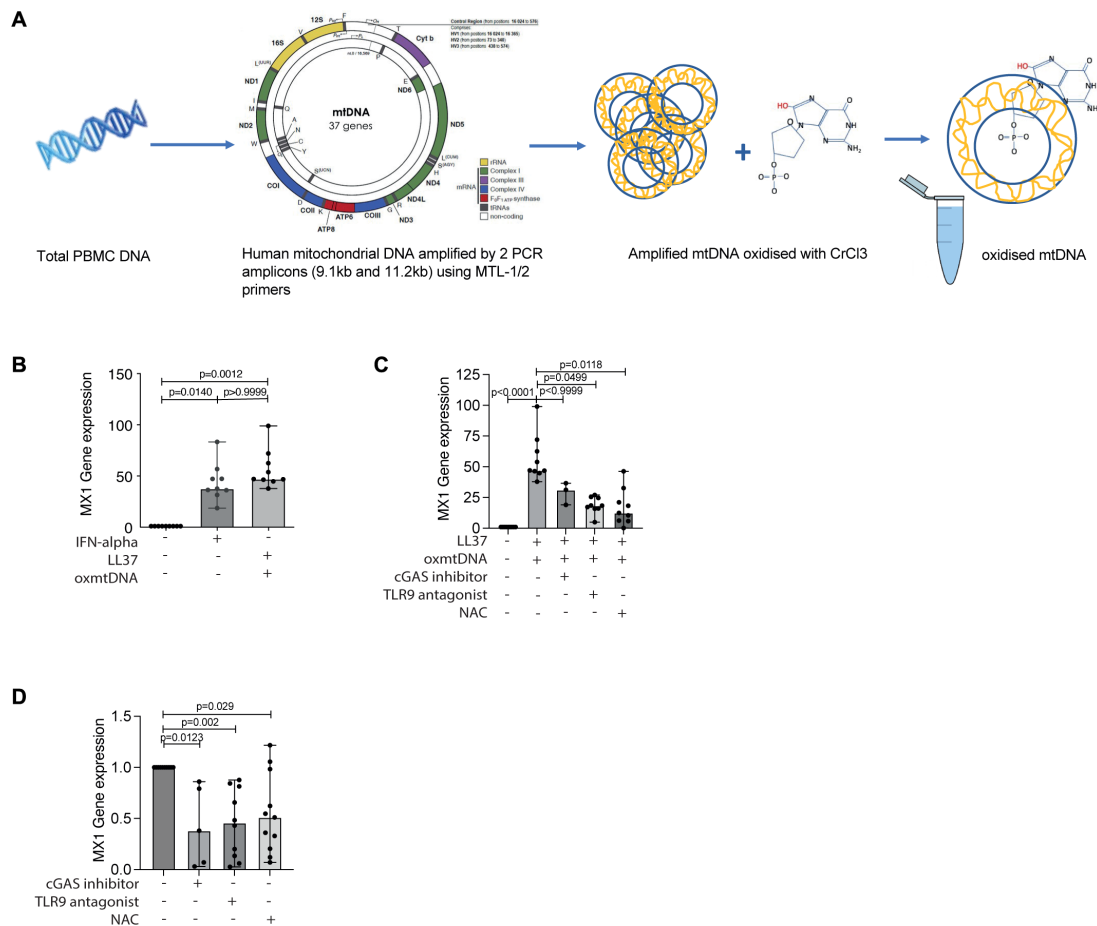


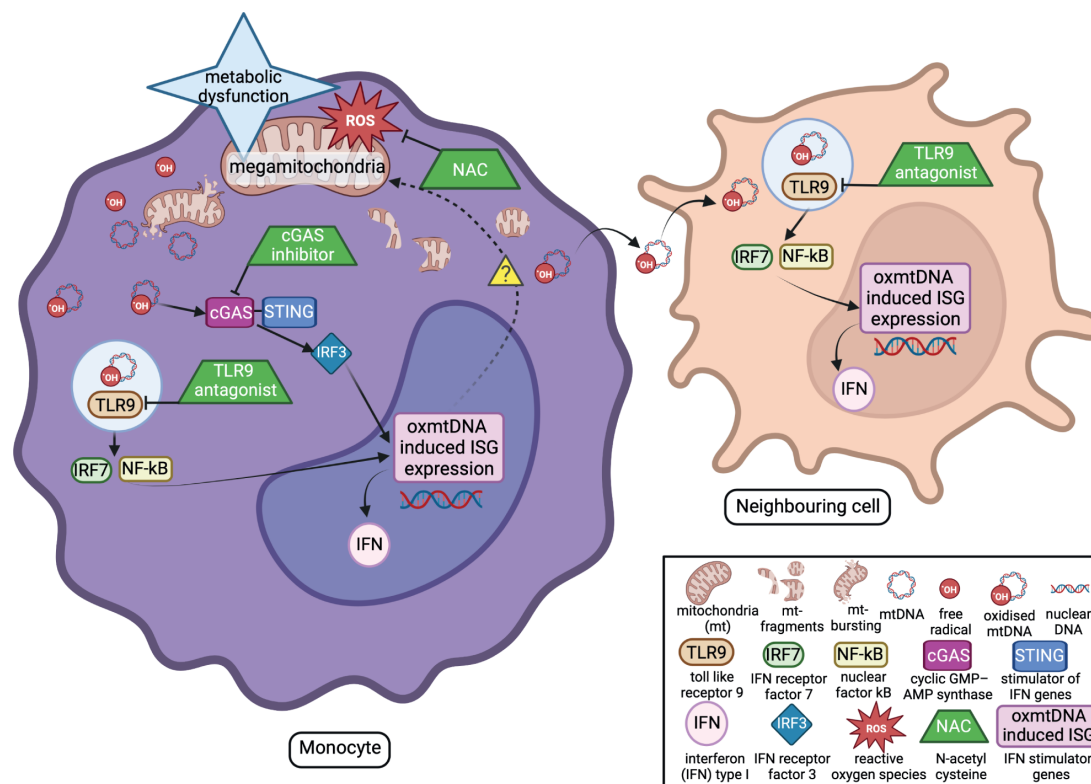
Figure 5 Oxidised mtDNA induces ISGs in vitro which can be blocked by treatment with TLR-9 antagonist and the antioxidant *N*-acetylcysteine (NAC). (A) Schematic shows methodology for generation of oxidised mtDNA (oxmtDNA). (B) Bar graphs show relative expression of IFN stimulated gene (ISG) *Mx1* in control PBMC (n=12) incubated with IFN-alpha, oxmtDNA (with LL-37) or no stimuli (unstim). (C) Bar graphs show relative expression of ISG *MX1* in control PBMC incubated with no stimuli, oxmtDNA (+LL-37) (n=12) with or without cGAS inhibitor (n=6), TLR-9 antagonist (ODN TTAGGG(A151)) (n=11) or *N*-acetylcysteine (NAC) (n=11). (D) Bar graphs show gene expression of ISG *MX1* in PBMC from JDM patients pretreatment cultured with or without cGAS inhibitor (n=5), TLR-9 antagonist (n=10), NAC (n=11) or in medium alone (untreated) (n=11). All bar graphs: median with range shown. Statistical analysis: (B–D) Non-parametric Kruskal-Wallis test with Dunn’s multiple comparisons, adjusted p values. JDM, juvenile dermatomyositis; PBMC, peripheral blood mononuclear cell.

upregulate ISGs in vitro. Based on these findings, we propose the hypothesis that in JDM, CD14+ monocytes act as a source of oxmtDNA, which contributes, at least in part, to the disease’s IFN-driven signature. Further exploration of this hypothesis is needed to understand whether targeting this pathogenic mechanism could be a novel treatment strategy in JDM and other disorders with the aim of suppressing interferonopathy and associated pathology.

This is not the first time that altered mitochondrial function has been linked with IFN production. Indeed, evidence from multiple autoimmune diseases, including JDM, demonstrate a relationship between mitochondrial pathways, and particularly mtDNA, to disease pathology and IFN-driven inflammation - although predominately in the context of neutrophil extracellular traps (NETs).^{20,21,39} In SLE, Caielli and collaborators showed that NETs contained high levels of oxidised mtDNA which up-regulated IFN type 1 in vitro as measured in plasmacytoid dendritic cells,²¹ while a study in JDM demonstrated that engulfment of calcium crystals in neutrophils infiltrating inflamed muscles, lead to cell death and production of NETs containing mtDNA.³⁹ In our study, only oxmtDNA, but not mtDNA, was able to upregulate ISG expression suggesting a central pathogenic role for oxidative stress in IFN-driven diseases. This was corroborated by data

showing that NAC a potent, clinically approved, anti-oxidant therapy, which decreases cellular levels of oxidised DNA,⁴⁰ reduced ISG expression in pretreatment JDM PBMC. Pilot studies have demonstrated that NAC reduces disease activity in SLE.⁴¹ Although the ability of NAC to suppress disease activity in SLE was attributed to its ability to block mTOR activation in T cells,⁴¹ comparing the ability of NAC to suppress oxmtDNA production, ISG expression and disease activity in SLE and JDM could be an interesting focus of future studies. Future research will focus on uncovering the mechanism of action by which NAC reduces oxmtDNA-induced ISG expression, and more specifically what are the upstream mechanisms controlling oxidative stress in JDM. Possibilities include damage to the mitochondrial respiratory chain and altered function of complex I activity and/or changes to mitophagy and scavenging of ROS through alterations in pathways that control redox signalling.⁴²⁻⁴⁴ Notably, NAC has been previously shown to reduce oxidative stress by blocking mitochondrial oxygen consumption via inhibition of complex I of the electron transport chain⁴⁵ and by inhibiting mitophagy and supporting mitochondrial biogenesis⁴⁶ suggesting multiple possibilities for its mechanisms of action.

In this study, we have proposed that CD14+ monocytes are the major source of oxmtDNA in JDM and monocytes have



Created with BioRender.com

Figure 6 Schematic of the proposed mechanism. mitochondria are damaged by reactive oxygen species (ROS) and other mitochondrial stresses, leading to mitochondrial metabolic dysfunction. This dysfunction leads to fragmented mitochondria and the release of mitochondrial (MT) DNA. An increase of superoxide production leads to mtDNA becoming oxidised (ox). This oxmtDNA then activates the cGAS-STING and endosomal TLR9 pathways inducing the upregulation of IFN stimulatory gene (ISG) expression. Potential therapeutic agents (shown as green trapezium symbol), which can block different levels of the mechanism and down regulate oxmtDNA induced ISG expression. These therapeutic agents include the anti-oxidant NAC, which targets oxidative stress, cGAS inhibitor which targets the cGAS-STING pathway, and TLR9 antagonist which blocks the TLR9 pathway.

previously been implicated in JDM and our findings further strengthen their potential role.^{47–49} However, gene expression modules associated with mitochondrial dysfunction and IFN type 1 have also been identified in JDM bulk muscle, the inflammatory site of the disease.²³ A study in adult dermatomyositis showed a correlation between mitochondrial dysfunction and IFN type 1, and using an experimental autoimmune mouse model identified that NAC prevented mitochondrial dysfunction, IFN type I transcript and muscle weakness.⁵⁰ Studies have also demonstrated that single nucleotide polymorphisms or altered copy number within mtDNA are associated with the development of adult idiopathic inflammatory myopathies.⁵¹ These studies, taken together with the high mitochondrial content in skeletal muscle⁵² and the growing interest in understanding immune cell function within inflamed tissues,⁵³ demonstrate that new research is needed to interrogate mitochondrial biology within biopsies from JDM muscle.

Sensing of intracellular DNA via activation of the cGAS-STING pathway and TLR9 have been previously shown to induce IFN production.^{16 54} In this study, under these experimental conditions, we found that while TLR9-antagonism but not cGAS inhibition significantly downregulated oxmtDNA-induced ISG expression in healthy PBMC, both TLR9 antagonism and cGAS inhibition could suppress *MX1* (representative ISG) in pretreatment JDM PBMC. Notably, TLR9 antagonism also suppressed the expression of a second ISG in JDM, *RSAD2*. Of note, TLR9 and cGAS-STING pathway sense intracellular DNA oligonucleotides within different cellular compartments.^{54–56} cGAS-STING

pathways sense DNA within the cytoplasm, while TLR9 senses DNA within endosomes. The divergent effects of TLR9 antagonism versus cGAS-inhibition could be due to limitation in experimental conditions with the cationic peptide LL37³² preferentially facilitating uptake of oxmtDNA by endosomes rather than into the cytosolic compartment. Alternatively our results could also suggest a dominant role for TLR9, and therefore, endosomal oxmtDNA, in controlling ISG upregulation in JDM. Uptake of oxmtDNA in JDM within endosomes could be due to multiple mechanisms including uptake of oxmtDNA from the extracellular space^{20 57} or changes in mitophagy—recent studies demonstrate that endosomes and endosome-related protein actively participate in this process.⁵⁸ Presently our data support the possible contribution of both these pathways. First, mtDNA levels are increased in JDM plasma compared with controls and there is a positive correlation between mtDNA levels in plasma and ISG expression in JDM CD14+ monocytes. Second, JDM mitochondria in CD14+ monocytes are significantly more fragmented than controls, with increased mitochondrial fragmentation being previously reported to be linked to enhanced mitochondrial fission and mitophagy.⁵⁹ Our data also do not discount an important role for cytosolic release of oxmtDNA by mitochondria, which has been shown to be an important driver of innate immune activation in multiple experimental settings.^{60–62} Future studies are needed to investigate the synergistic and/or diverging roles of TLR9-activation versus the cGAS-STING pathway, and therefore, the relative contribution of endosomal versus cytosolically released oxmtDNA, in the pathology of JDM.

Our study is not without its limitations. Analyses have not been stratified based on the heterogeneous clinical features of JDM, which has been proposed as an umbrella diagnostic term for a group of diseases.⁶³ Patients can present with an array of different symptoms, including muscle weakness, skin rashes, calcinosis, dysphagia, joint pain and interstitial lung disease (ILD). Myositis specific/associated autoantibody (MSA) subtypes have been associated with different disease phenotypes. Patients with anti-Mi2 autoantibodies present with a classic JDM characterised⁶⁴ with proximal muscle weakness and skin rash, while patients with anti-MDA5 autoantibodies are more likely to have associated ILD and have milder muscle disease.⁶⁵ Unfortunately, despite accessing samples from the large Juvenile Dermatomyositis Cohort and Biobank study (JDCBS), we were still underpowered to stratify our data based on MSA subtype. Another significant limitation of the study was the necessity of using fresh blood samples to assess mitochondrial biology. Mitochondria, and indeed monocytes, have been previously shown to be significantly affected by freeze-thaw cycles^{66–68} and using frozen samples would have significantly affected the accuracy of these functional experiments. Fresh samples were obtained from patients who were also having blood drawn as part of clinical care. This prevented any selection criteria being used and therefore patients were on-treatment with varying lengths of disease duration. For analyses where we could use frozen samples collected longitudinally for the JDCBS, we were able to include samples from JDM patients both pre and on-treatment adding significant leverage to this study. Due to the rarity of JDM and difficulty in obtaining fresh whole blood samples, for use on the same day in mechanistic studies, another significant limitation was that our study did not assess mitochondrial function, including oxidative stress and production of oxmtDNA, in neutrophils from JDM patients or healthy controls. This would be an important avenue of work in future studies due to the well-described association between mitochondrial dysfunction in neutrophil and ISG signatures in other IFN-driven autoimmune disorders such as SLE.^{20–22}

Here, we have identified that altered mitochondrial morphology and biology in JDM CD14+monocytes leads to enhanced oxmtDNA production, which has the potential to drive aberrant ISG expression in this rare childhood disease (schematic in figure 6). We also identify two new potential therapeutic strategies for JDM—targeting nucleic acid sensing and oxidative stress—which suppress ISG expression *in vitro*. New translational studies are now needed to develop pipelines to take these potential therapeutic agents (cGAS inhibitor, TLR9 antagonist and NAC) closer to clinical trial testing, including further detailed mechanistic studies, dose response curves to determine the most effective concentration of each therapeutic agent and assessment of bio availability in children with JDM or related diseases where appropriate. Considering that up to 50% of JDM patients fail first-line therapies there remains an urgent need for new, more targeted treatments.^{69–71} Thus, the identification of a novel, ‘druggable’ target that modulates the IFN type 1 signature has broad implications for the development of new treatment strategies in JDM and potentially other IFN-driven disorders.

Patient, public, involvement and engagement

This research has been carried out on biological samples and clinical data collected from young people and adults with and without JDM. In the early development of this body of work, it was presented and discussed at the JDM family day as part of the JDCBS. Patients, families, researchers and clinical professionals

were in attendance at this meeting. Additionally, there are two young people on our advisory board at the Centre for Adolescent Rheumatology Versus Arthritis at UCL, UCLH and GOSH. They play a vital part of the Centre and attend major meetings where this project has been presented.

Author affiliations

¹Infection, Immunity and Inflammation Research and Teaching Department, UCL Great Ormond Street Institute of Child Health, London, UK

²Centre for Adolescent Rheumatology Versus Arthritis at UCL UCLH and GOSH, UCL, London, UK

³NIHR Biomedical Research Centre, Great Ormond Street Hospital, London, UK

⁴Developmental Biology and Cancer Research & Teaching Department, UCL Great Ormond Street Institute of Child Health, London, UK

⁵Centre for Rheumatology Research, Division of Medicine, University College London, London, UK

⁶Experimental and Personalised Medicine, Genetics and Genomic Medicine, UCL Great Ormond Street Institute of Child Health, London, UK

⁷Genetics and Genomic Medicine Research & Teaching Department, UCL Great Ormond Street Institute of Child Health, London, UK

⁸Rheumatology, Great Ormond Street Hospital NHS Trust, London, UK

Twitter Meredithy G LI Wilkinson @meredythwilk, Thomas C R McDonnell @UCLAPS, Chris Wincup @chrishwincup and Claire T Deakin @ClaireDeakin10

Acknowledgements We thank all local research coordinators and principal investigators who have made this research possible. The JDRG members were as follows: Dr Kate Armon, and Ms Louise Coke (Norfolk and Norwich University Hospitals); Dr Liza McCann, Mr Ian Roberts, Dr Eileen Baildam, Ms Louise Hanna, Ms Olivia Lloyd, Susan Wadeson and Ms Michelle Andrews (The Royal Liverpool Children's Hospital, Alder Hey, Liverpool); Dr Phil Riley, Ms Ann McGovern, and Ms Verna Cuthbert (Royal Manchester Children's Hospital, Manchester); Dr Clive Ryder, Ms Janis Scott, Ms Beverley Thomas, Professor Taunton Southwood, Dr Eslam Al-Abadi and Ms Ruth Howman (Birmingham Children's Hospital, Birmingham); Dr Sue Wyatt, Mrs Gillian Jackson, Dr Mark Wood, Dr Tania Amin, Dr Vanessa VanRooyen, Ms Deborah Burton, Ms Louise Turner, Ms Heather Rostron, and Ms Sarah Hanson (Leeds General Infirmary, Leeds); Dr Joyce Davidson, Dr Janet Gardner-Medwin, Dr Neil Martin, Ms Sue Ferguson, Ms Liz Waxman and Mr Michael Browne, Ms Roisin Boyle, and Ms Emily Blyth (The Royal Hospital for Sick Children, Yorkhill, Glasgow); Dr Mark Friswell, Professor Helen Foster, Ms Alison Swift, Dr Sharmila Jandial, Ms Vicky Stevenson, Ms Debbie Wade, Dr Ethan Sen, Dr Eve Smith, Ms Lisa Qiao, Mr Stuart Watson and Ms Claire Duong, Dr Stephen Crulley, Mr Andrew Davies, Miss Caroline Miller, Ms Lynne Bell, Dr Flora McErlane, Dr Sunil Sampath, Dr Josh Bennet and Mrs Sharon King (Great North Children's Hospital, Newcastle); Dr Helen Venning, Dr Rangaraj Satyapal, Mrs Elizabeth Stretton, Ms Mary Jordan, Dr Ellen Mosley, Ms Anna Frost, Ms Lindsay Crate, Dr Kishore Warriar, Ms Stefanie Stafford and Mrs Brogan Wrest (Queens Medical Centre, Nottingham); Professor Lucy Wedderburn, Dr Clarissa Pilkington, Dr Nathan Hasson, Dr Muthana Al-Obadi, Dr Giulia Varnier, Dr Sandrine Lacassagne, Ms Sue Maillard, Mrs Lauren Stone, Ms Elizabeth Halkon, Ms Virginia Brown, Ms Audrey Juggins, Dr Sally Smith, Ms Sian Lunt, Ms Elli Enayat, Ms Hemlata Varsani, Ms Laura Kassoumeri, Miss Laura Beard, Ms Katie Arnold, Mrs Yvonne Glackin, Ms Stephanie Simer, Dr Beverley Almeida, Dr Helen Nistala, Dr Raquel Marques, Dr Claire Deakin, Dr Parichat Khaosut, Ms Stefanie Dowle, Dr Charalampia Papadopoulou, Dr Shireena Yasin, Dr Christina Boros, Dr Meredithy Wilkinson, Dr Chris Piper, Ms Cerise Johnson-Moore, Ms Lucy Marshall, Ms Kathryn O'Brien, Ms Emily Robinson, Mr Dominic Igbelina, Dr Polly Livermore, Dr Socrates Varakliotis, Ms Rosie Hamilton, Ms Lucy Nguyen and Mr Dario Cancemi (Great Ormond Street Hospital, London); Dr Kevin Murray (Princess Margaret Hospital, Perth, Western Australia); Dr Coziana Ciurtin, Dr John Ioannou, Mrs Caitlin Clifford, Ms Linda Suffield and Ms Laura Hennelly (University College London Hospital, London); Ms Helen Lee, Ms Sam Leach, Ms Helen Smith, Dr Anne-Marie McMahon, Ms Heather Chisem, and Ms Jeanette Hall (Sheffield's Children's Hospital, Sheffield); Dr Nick Wilkinson, Ms Emma Inness, Ms Eunice Kendall, Mr David Mayers, Ms Ruth Etherton, Ms Danielle Miller and Dr Kathryn Bailey (Oxford University Hospitals, Oxford); Dr Jacqui Clinch, Ms Natalie Fineman, Ms Helen Pluess-Hall, Ms Suzanne Sketchley, Ms Melanie Marsh, Ms Anna Fry, Ms Maisy Dawkins-Lloyd and Ms Mashal Asif (Bristol Royal Hospital for Children, Bristol); Dr Joyce Davidson, Margaret Connon and Ms Lindsay Vallance (Royal Aberdeen Children's Hospital); Dr Kirsty Haslam, Ms Charlene Bass-Woodcock, Ms Trudy Booth, and Ms Louise Akeroyd (Bradford Teaching Hospitals); Dr Alice Leahy, Amy Collier, Rebecca Cutts, Emma Macleod, Dr Hans De Graaf, Dr Brian Davidson, Sarah Hartfree, Ms Elizabeth Fofana and Ms Lorena Caruana (University Hospital Southampton) and all the children, young people and their families who have contributed to this research.

Contributors MW conceptualised the study, designed and performed experiments, answered reviewers comments and performed additional experiments, analysed data, co-wrote the manuscript and obtained funding. DM developed fluorescence microscopy techniques and analysis pathway with bespoke macros. TM developed

and supported analysis of oxmtDNA by western dot blot. MO developed and supported generation of human oxidised mtDNA. CW performed and optimised MitoTracker/MitoSox fluorescence microscopy. JYT performed MTCOD qPCR. GWO, DK and SC performed analysis of RNA-seq (HIGH-5 project). RR supported statistical analyses. CP calculated disease activity scores. SE designed, performed and supported all metabolic assays, critically reviewed the manuscript and obtained funding. CTD conceptualised the study, designed and performed experiments, carried out RNA-seq analysis, critically reviewed the manuscript and obtained funding. ECR conceptualised the study, designed experiments, co-wrote the manuscript, answered reviewers comments and obtained funding. LRW is the lead investigator for the JDCBS and the Centre for Adolescent Rheumatology at UCL, UCLH and GOSH, co supervised the project and obtained funding and is the guarantor. All authors critically reviewed the manuscript and approved the final draft for submission.

Funding MW was supported by fellowships from Cure JM (Early Career Investigator Award GOSH042019), NIHR Biomedical Research Centre (BRC) at Great Ormond Street Hospital (GOSH) (NIHR GOSH BRC 18IR33), Connect immune research (22936). ECR is supported by a Senior Research Fellowship from the Kennedy Trust for Rheumatology Research (KENN 21 22 09), a Medical Research Foundation Fellowship (MRF-057-0001-RG-ROSS-C0797) and a Versus Arthritis Centre for Excellence grant awarded to LRW (21593). LRW is supported by grants from the NIHR (Senior Investigator award and the NIHR GOSH BRC), Myositis UK, Versus Arthritis (21593,21552) and Great Ormond Street Childrens Charity. This research was funded by NIHR GOSH BRC Pump Prime Grant (18DS03). Funding for the UK JDM Cohort and Biomarker study has been provided by generous grants from the Wellcome Trust UK (085860); Action Medical Research UK (SP4252); the Myositis Support Group UK, Arthritis Research UK now Versus Arthritis (14518, 20164, 21593); the Henry Smith Charity and Great Ormond Street Children's Charity (V1268); Tiny Hearts Society, the Myositis Association, Cure JM, the Medical Research Council (MR/N003322/1), and the National Institute for Health Research (NIHR) via the Translational Research Collaboration (TRC) Rare Diseases and the NIHR-Biomedical Research Centre at GOSH.

Disclaimer The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health. The Juvenile Dermatomyositis Research Group would like to thank all of the patients and their families who contributed to the Juvenile Dermatomyositis Cohort & Biomarker Study & Repository.

Competing interests LRW declares a consultancy from Pfizer unrelated to this study but in the field of this disease.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval The study had full ethical approval through London-Bloomsbury and North-East Yorkshire Research Ethics Committees (MREC 01/3/022). Controls samples were donated under the North Harrow ethics committee approval (REC 11/0101). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available in a public, open access repository. Data are available on reasonable request. The full RNA-seq dataset is publically available on GEO with accession number: GSE221091. The RNA-seq files for sorted CD19+ B cells are also part of a previous publication with accession number: E-MTAB-5616.⁷³

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution 4.0 Unported (CC BY 4.0) license, which permits others to copy, redistribute, remix, transform and build upon this work for any purpose, provided the original work is properly cited, a link to the licence is given, and indication of whether changes were made. See: <https://creativecommons.org/licenses/by/4.0/>.

ORCID iDs

Meredyth G LI Wilkinson <http://orcid.org/0000-0002-7972-8066>
Dale Moulding <http://orcid.org/0000-0002-1431-7047>
Thomas C R McDonnell <http://orcid.org/0000-0002-1712-9957>
Chris Wincup <http://orcid.org/0000-0002-8742-8311>

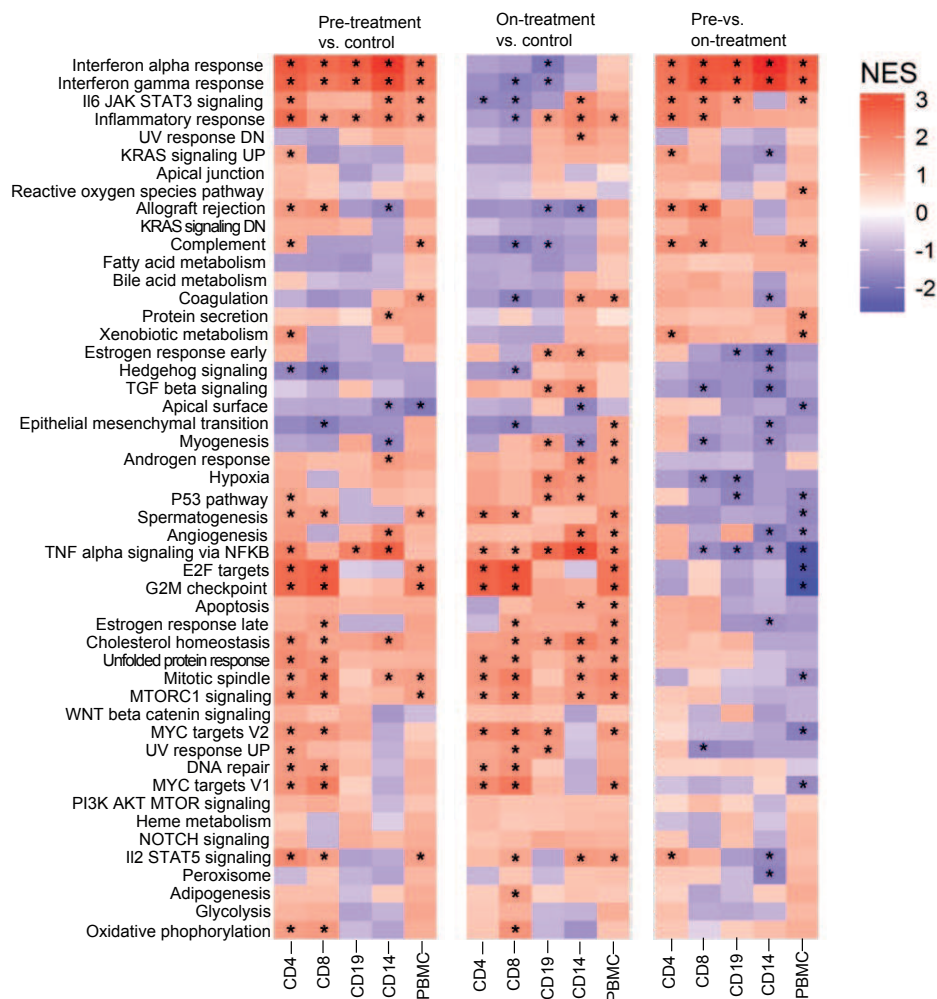
Joanna Y J Ting <http://orcid.org/0000-0003-0177-7623>
Georg W Otto <http://orcid.org/0000-0002-3929-948X>
Restuadi Restuadi <http://orcid.org/0000-0001-8434-4465>
Daniel Kelberman <http://orcid.org/0000-0003-0583-5237>
Charalampia Papadopoulou <http://orcid.org/0000-0002-1237-0557>
Sergi Castellano <http://orcid.org/0000-0002-5819-4210>
Simon Eaton <http://orcid.org/0000-0003-0892-9204>
Claire T Deakin <http://orcid.org/0000-0002-7044-5801>
Elizabeth C Rosser <http://orcid.org/0000-0003-4800-4695>
Lucy R Wedderburn <http://orcid.org/0000-0002-7495-1429>

REFERENCES

- Meyer A, Meyer N, Schaeffer M, *et al*. Incidence and prevalence of inflammatory myopathies: a systematic review. *Rheumatology* 2015;54:50–63.
- Rider LG, Nistala K. The juvenile idiopathic inflammatory myopathies: pathogenesis, clinical and autoantibody phenotypes, and outcomes. *J Intern Med* 2016;280:24–38.
- Nistala K, Wedderburn LR. Update in juvenile myositis. *Curr Opin Rheumatol* 2013;25:742–6.
- Dalakas MC. Mechanisms of disease: signaling pathways and immunobiology of inflammatory myopathies. *Nat Clin Pract Rheumatol* 2006;2:219–27.
- Tansley SL, Betteridge ZE, Shaddick G, *et al*. Calcinosis in juvenile dermatomyositis is influenced by both anti-NXP2 autoantibody status and age at disease onset. *Rheumatology* 2014;53:2204–8.
- Lega J-C, Reynaud Q, Belot A, *et al*. Idiopathic inflammatory myopathies and the lung. *Eur Respir Rev* 2015;24:216–38.
- Rodero MP, Decalf J, Bondet V, *et al*. Detection of interferon alpha protein reveals differential levels and cellular sources in disease. *J Exp Med* 2017;214:1547–55.
- Rice GI, Melki I, Frémond M-L, *et al*. Assessment of type I interferon signaling in pediatric inflammatory disease. *J Clin Immunol* 2017;37:123–32.
- Soponkanaporn S, Deakin CT, Schutz PW, *et al*. Expression of myxovirus-resistance protein A: a possible marker of muscle disease activity and autoantibody specificities in juvenile dermatomyositis. *Neuropathol Appl Neurobiol* 2019;45:410–20.
- LI Wilkinson MG, Deakin CT, Papadopoulou C, *et al*. Jak inhibitors: a potential treatment for JDM in the context of the role of interferon-driven pathology. *Pediatr Rheumatol Online J* 2021;19:1–12.
- West AP, Khoury-Hanold W, Staron M, *et al*. Mitochondrial DNA stress primes the antiviral innate immune response. *Nature* 2015;520:553–7.
- Boyapati RK, Tamborska A, Dorward DA, *et al*. Advances in the understanding of mitochondrial DNA as a pathogenic factor in inflammatory diseases. *F1000Res* 2017;6:169.
- Collins LV, Hajizadeh S, Holme E, *et al*. Endogenously oxidized mitochondrial DNA induces in vivo and in vitro inflammatory responses. *J Leukoc Biol* 2004;75:995–1000.
- Hu Q, Wood CR, Cimen S, *et al*. Mitochondrial damage-associated molecular patterns (MTDs) are released during hepatic ischemia reperfusion and induce inflammatory responses. *PLoS One* 2015;10:e0140105.
- Meyer A, Laverny G, Bernardi L, *et al*. Mitochondria: an organelle of bacterial origin controlling inflammation. *Front Immunol* 2018;9:1–8.
- Chen Q, Sun L, Chen ZJ. Regulation and function of the cGAS-STING pathway of cytosolic DNA sensing. *Nat Immunol* 2016;17:1142–9.
- Maekawa H, Inoue T, Ouchi H, *et al*. Mitochondrial damage causes inflammation via cGAS-STING signaling in acute kidney injury. *Cell Rep* 2019;29:1261–73.
- Guo C, Sun L, Chen X, *et al*. Oxidative stress, mitochondrial damage and neurodegenerative diseases. *Neural Regen Res* 2013;8:2003–14.
- Ježek J, Cooper KF, Strich R. The impact of mitochondrial fission-stimulated ROS production on pro-apoptotic chemotherapy. *Biology* 2021;10:1–20.
- Lood C, Blanco LP, Purmalek MM, *et al*. Neutrophil extracellular traps enriched in oxidized mitochondrial DNA are interferogenic and contribute to lupus-like disease. *Nat Med* 2016;22:146–53.
- Caielli S, Athale S, Domic B, *et al*. Oxidized mitochondrial nucleoids released by neutrophils drive type I interferon production in human lupus. *J Exp Med* 2016;213:697–713.
- Duvvuri B, Pachman LM, Morgan G, *et al*. Neutrophil extracellular traps in tissue and periphery in juvenile dermatomyositis. *Arthritis Rheumatol* 2019.
- Zhong D, Wu C, Bai J, *et al*. Co-expression network analysis reveals the pivotal role of mitochondrial dysfunction and interferon signature in juvenile dermatomyositis. *PeerJ* 2020;8:e8611.
- Buang N, Tapeng L, Gray V, *et al*. Type I interferons affect the metabolic fitness of CD8+ T cells from patients with systemic lupus erythematosus. *Nat Commun* 2021;12:1–15.
- Lepelletier A, Wai T, Crow YJ. Mitochondrial nucleic acid as a driver of pathogenic type I interferon induction in mendelian disease. *Front Immunol* 2021;12:1–10.
- Rice GI, Kasher PR, Forte GMA, *et al*. Mutations in ADAR1 cause icardi-goutières syndrome associated with a type I interferon signature. *Nat Genet* 2012;44:1243–8.
- Cai Q, Zhao M, Liu X, *et al*. Reduced expression of citrate synthase leads to excessive superoxide formation and cell apoptosis. *Biochem Biophys Res Commun* 2017;485:388–94.

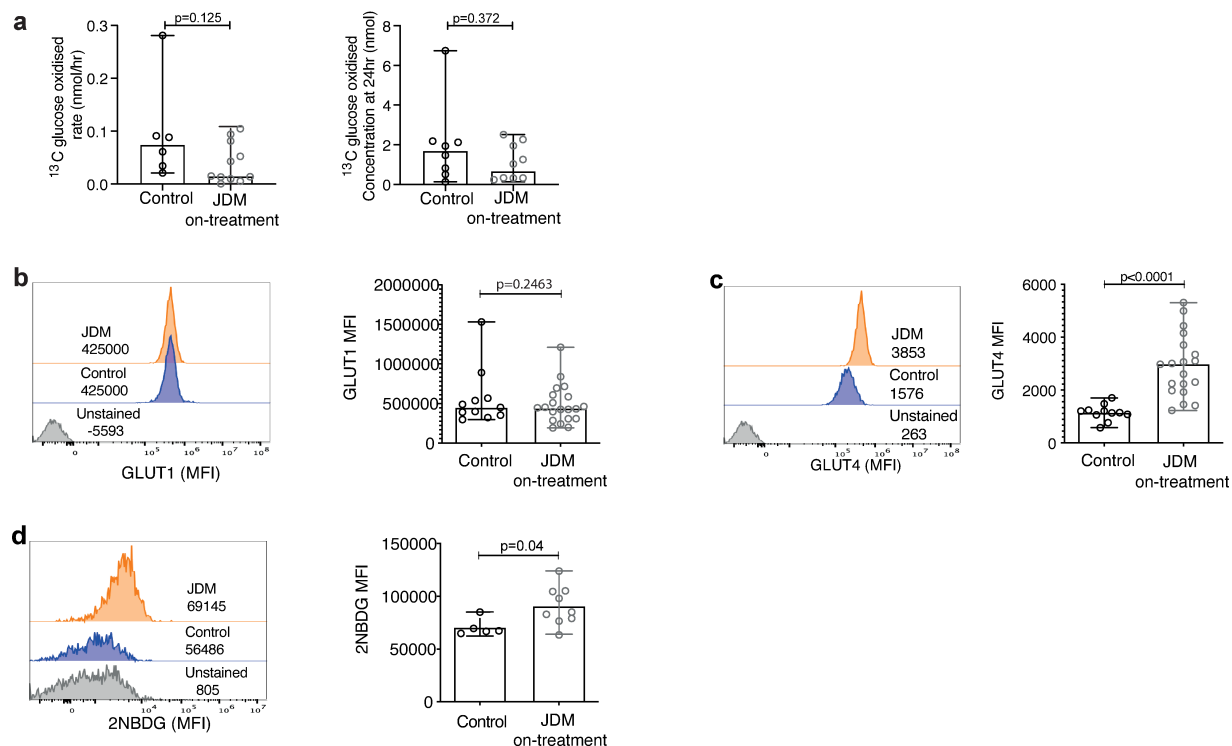
- 28 Caza TN, Talaber G, Perl A. Metabolic regulation of organelle homeostasis in lupus T cells. *Clin Immunol* 2012;144:200–13.
- 29 Zorov DB, Juhaszova M, Sollott SJ. Mitochondrial reactive oxygen species (ROS) and ROS-induced ROS release. *Physiol Rev* 2014;94:909–50.
- 30 Wang Y, Branicky R, Noè A, et al. Superoxide dismutases: dual roles in controlling ROS damage and regulating ROS signaling. *J Cell Biol* 2018;217:1915–28.
- 31 Li X, Fang P, Mai J, et al. Targeting mitochondrial reactive oxygen species as novel therapy for inflammatory diseases and cancers. *J Hematol Oncol* 2013;6:1–19.
- 32 Lande R, Gregorio J, Facchinetti V, et al. Plasmacytoid dendritic cells sense self-DNA coupled with antimicrobial peptide. *Nature* 2007;449:564–9.
- 33 Cooles FAH, Anderson AE, Lendrem DW, et al. The interferon gene signature is increased in patients with early treatment-naïve rheumatoid arthritis and predicts a poorer response to initial therapy. *J Allergy Clin Immunol* 2018;141:445–8.
- 34 Baechler EC, Bilgic H, Reed AM. Type I interferon pathway in adult and juvenile dermatomyositis. *Arthritis Res Ther* 2011;13:249.
- 35 Mauri C, Menon M. The many faces of type I interferon in systemic lupus erythematosus. *J Clin Invest* 2015;125:2562–4.
- 36 Rönnblom L, Eloranta M-L. The interferon signature in autoimmune diseases. *Curr Opin Rheumatol* 2013;25:248–53.
- 37 Menon M, Blair PA, Isenberg DA, et al. A regulatory feedback between plasmacytoid dendritic cells and regulatory B cells is aberrant in systemic lupus erythematosus. *Immunity* 2016;44:683–97.
- 38 Becker AM, Dao KH, Han BK, et al. SLE peripheral blood B cell, T cell and myeloid cell transcriptomes display unique profiles and each subset contributes to the interferon signature. *PLoS One* 2013;8:e67003.
- 39 Duvvuri B, Pachman LM, Morgan G, et al. Neutrophil extracellular traps in tissue and periphery in juvenile dermatomyositis. *Arthritis Rheumatol* 2020;72:348–58.
- 40 Zhou J, Terluk MR, Orchard PJ, et al. N-acetylcysteine reverses the mitochondrial dysfunction induced by very long-chain fatty acids in murine oligodendrocyte model of adrenoleukodystrophy. *Biomedicines* 2021;9. doi:10.3390/biomedicines9121826. [Epub ahead of print: 03 12 2021].
- 41 Lai Z-W, Hanczko R, Bonilla E, et al. N-acetylcysteine reduces disease activity by blocking mammalian target of rapamycin in T cells from systemic lupus erythematosus patients: a randomized, double-blind, placebo-controlled trial. *Arthritis Rheum* 2012;64:2937–46.
- 42 Zhang F, Lau SS, Monks TJ. The cytoprotective effect of N-acetyl-L-cysteine against ROS-induced cytotoxicity is independent of its ability to enhance glutathione synthesis. *Toxicol Sci* 2011;120:87–97.
- 43 Zhang C, Nie P, Zhou C, et al. Oxidative stress-induced mitophagy is suppressed by the miR-106b-93-25 cluster in a protective manner. *Cell Death Dis* 2021;12.
- 44 Lin Y-C, Lin Y-C, Tsai M-L, et al. TSLP regulates mitochondrial ROS-induced mitophagy via histone modification in human monocytes. *Cell Biosci* 2022;12:1–14.
- 45 Zalewska A, Szarmach I, Żendzian-Piotrowska M, et al. The effect of N-acetylcysteine on respiratory enzymes, ADP/ATP ratio, glutathione metabolism, and nitrosative stress in the salivary gland mitochondria of insulin resistant rats. *Nutrients* 2020;12:458–19.
- 46 Hang W, Shu H, Wen Z, et al. N-acetyl cysteine ameliorates high-fat diet-induced nonalcoholic fatty liver disease and intracellular triglyceride accumulation by preserving mitochondrial function. *Front Pharmacol* 2021;12:1–14.
- 47 Aeschlimann FA, Frémond M-L, Duffy D, et al. A child with severe juvenile dermatomyositis treated with ruxolitinib. *Brain* 2018;141:e80.
- 48 Lerkvaleekul B, Veldkamp SR, van der Wal MM, et al. Siglec-1 expression on monocytes is associated with the interferon signature in juvenile dermatomyositis and can predict treatment response. *Rheumatology* 2021;1–12.
- 49 Neely J, Hartoularos G, Bunis D, et al. Multi-modal single-cell sequencing identifies cellular immunophenotypes associated with juvenile dermatomyositis disease activity. *medRxiv* 2021.
- 50 Meyer A, Laverny G, Allenbach Y, et al. IFN-β-induced reactive oxygen species and mitochondrial damage contribute to muscle impairment and inflammation maintenance in dermatomyositis. *Acta Neuropathol* 2017;134:655–66.
- 51 Zhao Y, Peng C, Lai R, et al. The SNPs of mitochondrial DNA displacement loop region and mitochondrial DNA copy number associated with risk of polymyositis and dermatomyositis. *Sci Rep* 2022;12:1–7.
- 52 Franzini-Armstrong C, Engel AG. *Skeletal muscle: architecture of membrane systems*. First Edit. Elsevier Inc, 2012.
- 53 Turnier JL, Pachman LM, Lowe L, et al. Comparison of lesional juvenile myositis and lupus skin reveals overlapping yet unique disease pathophysiology. *Arthritis Rheumatol* 2021;73:1062–72.
- 54 Rodríguez-Nuevo A, Díaz-Ramos A, Noguera E, et al. Mitochondrial DNA and TLR9 drive muscle inflammation upon OPA1 deficiency. *Embo J* 2018;37:1–18.
- 55 Amadio R, Piperno GM, Benvenuti F. Self-DNA sensing by cGAS-STING and TLR9 in autoimmunity: is the cytoskeleton in control? *Front Immunol* 2021;12:1–10.
- 56 Gao D, Wu J, Wu Y. *Cyclic GMP-AMP synthase is an*. 1375, 2013: 903–7.
- 57 Sansone P, Savini C, Kurelac I, et al. Packaging and transfer of mitochondrial DNA via exosomes regulate escape from dormancy in hormonal therapy-resistant breast cancer. *Proc Natl Acad Sci U S A* 2017;114:E9066–75.
- 58 Hammerling BC, Najor RH, Cortez MQ, et al. A Rab5 endosomal pathway mediates parkin-dependent mitochondrial clearance. *Nat Commun* 2017;8:14050.
- 59 Kobayashi S, Zhao F, Zhang Z, et al. Mitochondrial fission and mitophagy coordinately restrict high glucose toxicity in cardiomyocytes. *Front Physiol* 2020;11:1–19.
- 60 Hwang I, Uchida H, Dai Z, et al. Cellular stress signaling activates type-I IFN response through FOXO3-regulated lamin posttranslational modification. *Nat Commun* 2021;12:640.
- 61 Gkirtzimanaki K, Kabrani E, Nikoleri D, et al. IFNα impairs autophagic degradation of mtDNA promoting autoreactivity of SLE monocytes in a STING-dependent fashion. *Cell Rep* 2018;25:921–33.
- 62 Willemsen J, Neuhoff M-T, Hoyle T, et al. TNF leads to mtDNA release and cGAS/STING-dependent interferon responses that support inflammatory arthritis. *Cell Rep* 2021;37:109977.
- 63 Li D, Tansley SL. Juvenile dermatomyositis—clinical phenotypes. *Curr Rheumatol Rep* 2019;21.
- 64 Tansley SL, Simou S, Shaddick G, et al. Autoantibodies in juvenile-onset myositis: their diagnostic value and associated clinical phenotype in a large UK cohort. *J Autoimmun* 2017;84:55–64.
- 65 Melki I, Devilliers H, Gitiaux C, et al. Anti-MDA5 juvenile idiopathic inflammatory myopathy: a specific subgroup defined by differentially enhanced interferon-α signalling. *Rheumatology* 2020;59:1927–37.
- 66 Meijerink M, Ulluwishewa D, Anderson RC, et al. Cryopreservation of monocytes or differentiated immature DCs leads to an altered cytokine response to TLR agonists and microbial stimulation. *J Immunol Methods* 2011;373:136–42.
- 67 Nukala VN, Singh IN, Davis LM, et al. Cryopreservation of brain mitochondria: a novel methodology for functional studies. *J Neurosci Methods* 2006;152:48–54.
- 68 Lee CP. Biochemical studies of isolated mitochondria from normal and diseased tissues. *Biochim Biophys Acta* 1995;1271:21–8.
- 69 Deakin CT, Campaniello-Marques R, Simou S, et al. Efficacy and safety of cyclophosphamide treatment in severe juvenile dermatomyositis shown by marginal structural modeling. *Arthritis Rheumatol* 2018;70:785–93.
- 70 Deakin CT, Yasin SA, Simou S, et al. Muscle biopsy in combination with myositis-specific autoantibodies predicts outcomes in juvenile dermatomyositis. *Arthritis Rheumatol* 2016;11:2806–16.
- 71 Albayda J, Christopher-Stine L. Novel approaches in the treatment of myositis and myopathies. *Ther Adv Musculoskelet Dis* 2012;4:369–77.
- 73 Piper CJM, Wilkinson MGL, Deakin CT, et al. CD19⁺CD24^{hi}CD38^{hi} B Cells Are Expanded in Juvenile Dermatomyositis and Exhibit a Pro-Inflammatory Phenotype After Activation Through Toll-Like Receptor 7 and Interferon-α. *Front Immunol* 2018;9:1372.

Supplementary Figure 1

**Supplementary Figure 1. Transcriptional analysis validates strong IFN type 1 signature in all cell types in JDM pre-treatment.**

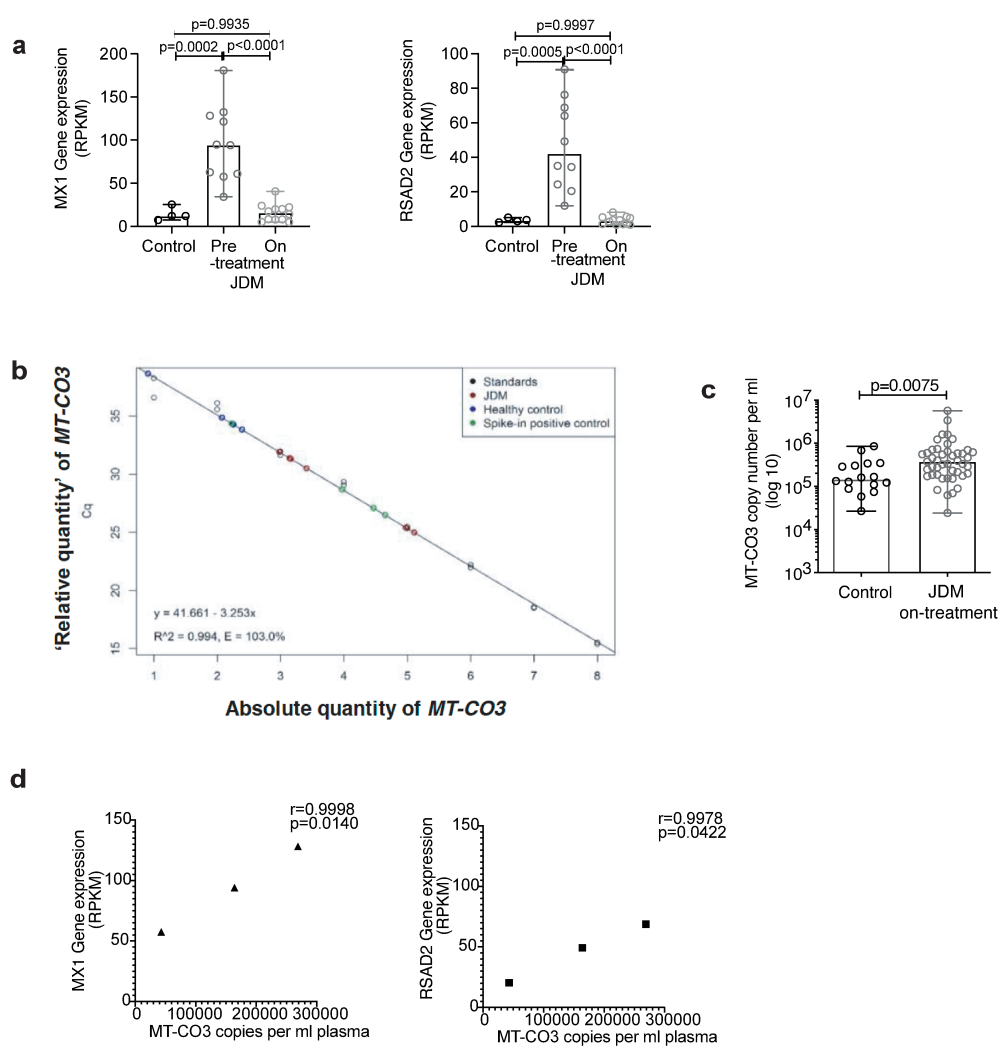
Transcriptomic analysis of flow-sorted CD4+, CD8+, CD19+ and CD14+ cells from JDM patients taken pre-treatment [n=10] and 12 months on-treatment [n=11], and age-matched healthy controls [n=4]. Heatmap of Gene-Set Enrichment Analysis (GSEA) for enriched Hallmark gene-sets. For each cell type every gene was ranked comparing pre-treatment vs. control, on-treatment vs. control and pre- vs. on-treatment. Normalised Enrichment Score (NES): red represents an up-regulated pathway and blue a down-regulated pathway, stars represent adjusted p-values (* p<0.05).

Supplementary Figure 2

**Supplementary Figure 2. There is abnormal cellular metabolism in JDM CD14+ monocytes.**

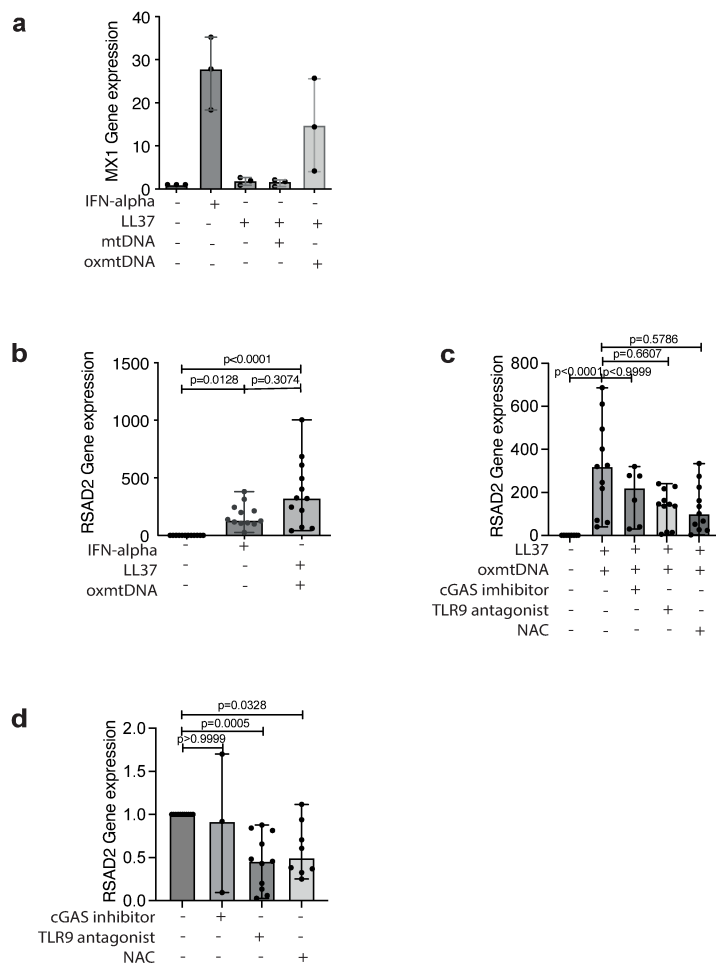
(a) Bar graphs show ^{13}C labelled glucose metabolism rate (left) and final concentration into oxidised glucose in CD14+ monocytes from JDM [n=6] and controls [n=6]. Representative histogram (left) and bar graphs (right) show (b) GLUT1 and (c) GLUT4 MFI in CD14+ monocytes from JDM [n=20] vs. control [n=11]. (d) Representative histogram (left) and bar graphs (right) show 2NBDG MFI in JDM CD14+ monocytes [n=9] compared to controls [n=5]. All bar graphs: median with range shown. Statistical analysis: non-parametric Mann-Whitney test, p-value.

Supplementary Figure 3

**Supplementary Figure 3. Non-oxidised mitochondrial DNA correlated with increased ISG in pre-treatment JDM**

(a) Gene expression analysis of CD14⁺ monocytes from JDM patients taken pre-treatment [n=10] and 12 months on-treatment [n=12], and controls [n=3]. Reads per kilobase pair of transcript (RPKM) gene expression of *MX1* and *RSAD2* (left to right). (b) Standard curve of MT-CO3 for standards, spike-in positive controls, JDM and age-matched healthy control samples. (c) MT-CO3 copy number per ml of plasma (mtDNA) for JDM pre-treatment [n=45] and controls [n=16]. (d) MT-CO3 copy number per ml of blood for JDM pre-treatment [n=3] correlated to matched sample RPKM gene expression values for *MX1* and *RSAD2* (left to right). Bar graph: median with range shown. Statistical analysis: (a) Non-parametric Kruskal-Wallis test with Dunn's multiple comparisons, adjusted p-values. (c) Non-parametric Mann-Whitney tests, p-values. (d) r and p-values calculated by Pearson correlation.

Supplementary Figure 4



Supplementary Figure 3. Non-oxidised mitochondrial does not induce ISG, but oxidised does and can be blocked by TLR9 antagonist and NAC

(a) Bar graph shows relative expression of IFN stimulated gene (ISG) *MX1* in control PBMC [n=3] incubated with IFN-alpha, LL37, mtDNA (+LL37), oxidised mtDNA (with LL37) or no stimuli. (b) Bar graphs show relative expression of ISG *RSAD2* in control PBMC [n=12] incubated with IFN-alpha, oxmtDNA (with LL-37) or no stimuli (unstim). (c) Bar graphs show relative expression of ISG *RSAD2* in control PBMC incubated with no stimuli, oxmtDNA (+LL-37) [n=12] with or without cGAS inhibitor [n=6], TLR-9 antagonist [ODN TTAGGG(A151)] [n=11] or N-acetylcysteine (NAC) [n=11]. (d) Bar graphs show gene expression of ISG *RSAD2* in PBMC from JDM patients pre-treatment cultured with or without cGAS inhibitor [n=3], TLR-9 antagonist [n=11], NAC [n=8] or in medium alone (untreated) [n=6]. Bar graph: median with range shown. Statistical analysis: (a-d) Non-parametric Kruskal-Wallis test with Dunn's multiple comparisons, adjusted p-values.

Supplementary Table 1 - JDM pre-treatment vs age-matched healthy control significantly DEG ($p \leq 0.05$)

Ensemble ID	hgnc_symbol	log fold change	Adjusted p value
ENSG00000172575	RASGRP1	-4.37211198	2.24E-24
ENSG00000167286	CD3D	-4.666564649	1.72E-22
ENSG00000107742	SPOCK2	-4.360415147	1.72E-22
ENSG00000180096		-2.213826247	4.96E-22
ENSG00000198821	CD247	-4.212664852	6.77E-22
ENSG00000198286	CARD11	-3.980638073	9.31E-21
ENSG00000211751	TRBC1	-4.429073007	2.03E-18
ENSG00000111371	SLC38A1	-2.385863349	2.03E-18
ENSG00000167984	NLRC3	-2.851013671	2.03E-18
ENSG00000211772	TRBC2	-3.848305286	4.30E-17
ENSG00000185101	ANO9	-4.119222231	4.76E-17
ENSG00000182866	LCK	-4.062812135	5.72E-17
ENSG00000115085	ZAP70	-4.147512211	9.18E-17
ENSG00000069667	RORA	-4.869341336	1.04E-16
ENSG00000101096	NFATC2	-2.831487036	1.35E-16
ENSG00000135127	BICDL1	-3.576759892	2.62E-16
ENSG00000160185	UBASH3A	-4.657218676	4.20E-15
ENSG00000172005	MAL	-5.377418997	6.46E-15
ENSG00000142173	COL6A2	-5.335273567	9.75E-15
ENSG00000088387	DOCK9	-3.222329725	1.77E-14
ENSG00000138795	LEF1	-4.449435465	2.96E-14
ENSG00000099204	ABLIM1	-3.584001413	5.79E-14
ENSG00000165929	TC2N	-4.804614256	1.08E-13
ENSG00000113263	ITK	-3.192369031	1.22E-13
ENSG00000197540	GZMM	-3.579783868	1.40E-13
ENSG00000198851	CD3E	-4.400703314	1.89E-13
ENSG00000127152	BCL11B	-4.806303961	3.23E-13
ENSG00000100385	IL2RB	-4.83925198	4.29E-13
ENSG00000142303	ADAMTS10	-2.457574491	4.40E-13
ENSG00000280135		-4.826963634	4.98E-13
ENSG00000152495	CAMK4	-3.355410449	6.37E-13
ENSG00000110448	CD5	-3.765399452	7.45E-13
ENSG00000111796	KLRB1	-5.177955918	1.17E-12
ENSG00000139193	CD27	-4.160431804	1.43E-12
ENSG00000215788	TNFRSF25	-2.605278827	1.55E-12
ENSG00000141293	SKAP1	-3.675465711	2.39E-12
ENSG00000277734	TRAC	-3.934848077	2.57E-12
ENSG00000013725	CD6	-3.720643916	4.88E-12
ENSG00000081059	TCF7	-3.983272099	6.34E-12
ENSG00000245164	LINC00861	-4.331322342	1.19E-11
ENSG00000163519	TRAT1	-4.069345096	2.49E-11
ENSG00000159753	CARMIL2	-2.23931152	3.71E-11
ENSG00000067840	PDZD4	-4.607733843	4.43E-11
ENSG00000162894	FCMR	-3.132791023	4.83E-11

ENSG00000168685	IL7R	-4.307669584	5.03E-11
ENSG00000146674	IGFBP3	-7.787654438	5.50E-11
ENSG00000174080	CTSF	-2.407169086	5.50E-11
ENSG00000175265	GOLGA8A	-2.453462265	5.50E-11
ENSG00000124181	PLCG1	-2.348427418	5.64E-11
ENSG00000134954	ETS1	-2.08406885	5.94E-11
ENSG00000065675	PRKCQ	-3.00987945	6.44E-11
ENSG00000211829	TRDC	-4.777951319	4.53E-10
ENSG00000130787	HIP1R	-2.935653694	5.00E-10
ENSG00000089012	SIRPG	-4.022974816	6.87E-10
ENSG00000165185	KIAA1958	1.963697048	7.68E-10
ENSG00000179639	FCER1A	-5.514315116	8.07E-10
ENSG00000112182	BACH2	-3.006094519	9.97E-10
ENSG00000008517	IL32	-3.607461402	1.04E-09
ENSG00000226950	DANCR	-1.844394618	1.14E-09
ENSG00000255198	SNHG9	-1.584034177	1.45E-09
ENSG00000187109	NAP1L1	-1.053601182	1.46E-09
ENSG00000100346	CACNA1I	-4.863194194	1.68E-09
ENSG00000079616	KIF22	-1.151215826	3.09E-09
ENSG00000116106	EPHA4	-5.567887063	3.15E-09
ENSG00000124203	ZNF831	-3.510236283	4.43E-09
ENSG00000173208	ABCD2	-4.72311326	4.46E-09
ENSG00000111674	ENO2	-3.196163577	6.30E-09
ENSG00000101224	CDC25B	-1.129481246	7.84E-09
ENSG00000107485	GATA3	-3.353634116	7.95E-09
ENSG00000055130	CUL1	1.136163256	8.91E-09
ENSG00000228903	RASA4CP	-1.536207884	9.19E-09
ENSG00000116251	RPL22	-0.877542988	9.87E-09
ENSG00000163359	COL6A3	-3.888005371	9.96E-09
ENSG00000114942	EEF1B2	-0.939459883	1.74E-08
ENSG00000027869	SH2D2A	-3.852281814	1.84E-08
ENSG00000101082	SLA2	-2.520074843	1.97E-08
ENSG00000184613	NELL2	-3.946342491	1.97E-08
ENSG00000181847	TIGIT	-5.155733666	3.11E-08
ENSG00000233355	CHRM3-AS2	-3.400645916	3.87E-08
ENSG00000107833	NPM3	-1.578034237	4.14E-08
ENSG00000197635	DPP4	-3.733699696	4.70E-08
ENSG00000130589	HELZ2	2.2513553	5.58E-08
ENSG00000178562	CD28	-3.098517385	6.00E-08
ENSG00000160710	ADAR	1.215480815	6.50E-08
ENSG00000227507	LTB	-1.862720539	6.84E-08
ENSG00000089009	RPL6	-0.748397376	9.87E-08
ENSG00000085662	AKR1B1	-1.089965676	1.10E-07
ENSG00000128739	SNRPN	-1.290619576	1.25E-07
ENSG00000112514	CUTA	-0.756058338	1.55E-07
ENSG00000213626	LBH	-2.388225632	1.67E-07
ENSG00000127586	CHTF18	-1.221094486	1.72E-07
ENSG00000196705	ZNF431	-1.021681712	1.84E-07

ENSG00000149527	PLCH2	-3.276347883	2.03E-07
ENSG00000115607	IL18RAP	-4.42371749	2.12E-07
ENSG00000172428	COPS9	-0.808347429	2.68E-07
ENSG00000160654	CD3G	-2.123428048	2.92E-07
ENSG00000118922	KLF12	-1.513965177	2.94E-07
ENSG00000178922	HYI	-2.027160481	3.36E-07
ENSG00000135960	EDAR	-5.309092358	3.67E-07
ENSG00000063180	CA11	-1.687963992	3.87E-07
ENSG00000204475	NCR3	-4.61496023	4.12E-07
ENSG00000183486	MX2	2.118433822	4.12E-07
ENSG00000137970	RPL7P9	-0.916475831	4.21E-07
ENSG00000224877	NDUF8	-1.514406584	4.21E-07
ENSG00000227008		-1.349140593	4.41E-07
ENSG00000198034	RPS4X	-0.787257334	4.53E-07
ENSG00000220205	VAMP2	-0.865276062	4.53E-07
ENSG00000162910	MRPL55	-0.98446521	4.65E-07
ENSG00000172673	THEMIS	-2.612768154	5.50E-07
ENSG00000144741	SLC25A26	-0.937348354	5.73E-07
ENSG00000105369	CD79A	-2.533950726	5.73E-07
ENSG00000211747	TRBV20-1	-5.001990395	6.45E-07
ENSG00000178429	RPS3AP5	-1.119313459	6.65E-07
ENSG00000153283	CD96	-3.718072664	6.94E-07
ENSG00000169116	PARM1	-3.833469332	6.99E-07
ENSG00000141542	RAB40B	-1.584822227	7.12E-07
ENSG00000136816	TOR1B	1.661466843	7.14E-07
ENSG00000167792	NDUFV1	-0.748355878	7.57E-07
ENSG00000105808	RASA4	-1.51149014	7.68E-07
ENSG00000255026		-3.923439409	8.16E-07
ENSG00000204252	HLA-DOA	-2.090582557	8.20E-07
ENSG00000157778	PSMG3	-0.957103712	9.02E-07
ENSG00000178982	EIF3K	-0.707875815	9.42E-07
ENSG00000113319	RASGRF2	-3.131596639	9.46E-07
ENSG00000109452	INPP4B	-2.808950053	9.80E-07
ENSG00000186468	RPS23	-0.801626846	1.06E-06
ENSG00000114023	FAM162A	-1.070150643	1.12E-06
ENSG00000170486	KRT72	-4.804621154	1.15E-06
ENSG00000249115	HAUS5	-0.900095482	1.24E-06
ENSG00000146285	SCML4	-2.5735471	1.29E-06
ENSG00000156110	ADK	-1.426476686	1.36E-06
ENSG00000055332	EIF2AK2	1.922776604	1.37E-06
ENSG00000151612	ZNF827	-3.605420689	1.44E-06
ENSG00000224078	SNHG14	-1.307941758	1.48E-06
ENSG00000161405	IKZF3	-1.575632044	1.58E-06
ENSG00000143947	RPS27A	-0.835493668	1.71E-06
ENSG00000138035	PNPT1	1.755181454	1.78E-06
ENSG00000169583	CLIC3	-5.395727002	1.93E-06
ENSG00000172366	MCRIP2	-1.306734612	2.31E-06
ENSG00000260314	MRC1	-2.728732538	2.38E-06

ENSG00000122406	RPL5	-0.740590485	2.44E-06
ENSG00000165272	AQP3	-3.260598656	2.49E-06
ENSG00000116824	CD2	-1.501793069	2.74E-06
ENSG00000168913	ENHO	-2.311462504	2.76E-06
ENSG00000262049		-1.147766491	2.76E-06
ENSG00000188157	AGRN	2.326251896	3.05E-06
ENSG00000142168	SOD1	-0.685890108	3.05E-06
ENSG00000135736	CCDC102A	-4.883665353	3.28E-06
ENSG00000132274	TRIM22	1.370483686	3.34E-06
ENSG00000198780	FAM169A	-3.813724924	3.46E-06
ENSG00000172508	CARNS1	-3.055639748	3.54E-06
ENSG00000076685	NT5C2	0.770884796	3.55E-06
ENSG00000126756	UXT	-0.744742703	3.63E-06
ENSG00000166889	PATL1	1.091549368	3.66E-06
ENSG00000106628	POLD2	-1.06206495	3.72E-06
ENSG00000188186	LAMTOR4	-0.916393548	3.72E-06
ENSG00000135919	SERPINE2	-3.558353077	3.76E-06
ENSG00000278133		-0.932403977	3.94E-06
ENSG00000117419	ERI3	-0.721420156	4.50E-06
ENSG00000124201	ZNFX1	1.267927481	4.50E-06
ENSG00000078596	ITM2A	-2.477412718	4.59E-06
ENSG00000132704	FCRL2	-2.799716883	4.89E-06
ENSG00000188322	SBK1	-2.399130703	4.89E-06
ENSG00000105373	GLTSCR2	-0.898508387	4.99E-06
ENSG00000126353	CCR7	-2.679354515	5.00E-06
ENSG00000174917	C19orf70	-0.871664951	5.25E-06
ENSG00000034053	APBA2	-2.53295175	5.27E-06
ENSG00000235162	C12orf75	-2.973063118	5.51E-06
ENSG00000142937	RPS8	-0.817559569	5.53E-06
ENSG00000153107	ANAPC1	-0.64329563	5.83E-06
ENSG00000213609	RPL7AP50	-1.845605555	6.32E-06
ENSG00000136573	BLK	-3.314176969	6.53E-06
ENSG00000185885	IFITM1	2.444848625	6.71E-06
ENSG00000115604	IL18R1	-3.674621514	6.90E-06
ENSG00000232869	TRBV29-1	-4.319513882	7.00E-06
ENSG00000147604	RPL7	-0.762630505	7.98E-06
ENSG00000137200	CMTR1	1.045635766	8.03E-06
ENSG00000173193	PARP14	1.73485482	8.53E-06
ENSG00000188785	ZNF548	-1.066082348	8.79E-06
ENSG00000106624	AEBP1	-2.950264749	9.39E-06
ENSG00000102245	CD40LG	-4.01657469	9.42E-06
ENSG00000271109		-3.797923107	9.42E-06
ENSG00000197180		-1.555610547	1.01E-05
ENSG00000007255	TRAPPC6A	-1.159126999	1.02E-05
ENSG00000117298	ECE1	1.020685313	1.07E-05
ENSG00000073861	TBX21	-3.363953663	1.08E-05
ENSG00000182774	RPS17	-0.762953277	1.09E-05
ENSG00000100836	PABPN1	-0.637710325	1.16E-05

ENSG00000186395	KRT10	-0.970691422	1.17E-05
ENSG00000232442		-1.609582123	1.18E-05
ENSG00000137154	RPS6	-0.712467915	1.18E-05
ENSG00000167106	FAM102A	-1.30879207	1.18E-05
ENSG00000119922	IFIT2	3.752091831	1.18E-05
ENSG00000160856	FCRL3	-2.978467614	1.24E-05
ENSG00000099622	CIRBP	-0.657377765	1.24E-05
ENSG00000188243	COMMD6	-0.655725038	1.24E-05
ENSG00000237702	TRBV3-1	-4.213118599	1.28E-05
ENSG00000186567	CEACAM19	-1.770816673	1.28E-05
ENSG00000185697	MYBL1	-2.32613539	1.30E-05
ENSG00000100316	RPL3	-0.705990222	1.34E-05
ENSG00000279865		-1.312120358	1.41E-05
ENSG00000174444	RPL4	-0.662627634	1.41E-05
ENSG00000100814	CCNB1IP1	-0.811013886	1.43E-05
ENSG00000180644	PRF1	-3.423921806	1.47E-05
ENSG00000089157	RPLP0	-0.733627731	1.47E-05
ENSG00000163600	ICOS	-2.73399507	1.48E-05
ENSG00000204580	DDR1	-1.78061951	1.61E-05
ENSG00000178035	IMPDH2	-1.092394288	1.62E-05
ENSG00000090266	NDUFB2	-0.839182412	1.62E-05
ENSG00000021300	PLEKHB1	-2.525709748	1.63E-05
ENSG00000105202	FBL	-0.625597097	1.63E-05
ENSG00000211896	IGHG1	-4.268185717	1.66E-05
ENSG00000072858	SIDT1	-1.381490694	1.73E-05
ENSG00000145649	GZMA	-3.776231117	1.73E-05
ENSG00000100351	GRAP2	-1.973045386	1.94E-05
ENSG00000263731		-1.264369828	1.95E-05
ENSG00000114127	XRN1	0.867428862	1.99E-05
ENSG00000205413	SAMD9	2.377337732	1.99E-05
ENSG00000198467	TPM2	-1.528219096	2.01E-05
ENSG00000196531	NACA	-0.570138659	2.01E-05
ENSG00000168028	RPSA	-0.753447691	2.06E-05
ENSG00000134321	RSAD2	3.564939193	2.21E-05
ENSG00000244968	LIFR-AS1	3.624087319	2.31E-05
ENSG00000145425	RPS3A	-0.801073471	2.50E-05
ENSG00000102921	N4BP1	1.093827658	2.50E-05
ENSG00000083845	RPS5	-0.834016354	2.74E-05
ENSG00000232573	RPL3P4	-0.932267398	2.82E-05
ENSG00000173114	LRRN3	-3.644425747	2.84E-05
ENSG00000225200		-1.295341307	2.88E-05
ENSG00000211897	IGHG3	-5.163121427	3.05E-05
ENSG00000166016	ABTB2	3.448181273	3.05E-05
ENSG00000168813	ZNF507	-1.327248828	3.05E-05
ENSG00000110717	NDUFS8	-0.717896287	3.29E-05
ENSG00000269892		-1.847138793	3.29E-05
ENSG00000214485	RPL7P1	-1.260392854	3.40E-05
ENSG00000162585	FAAP20	-0.74898593	3.45E-05

ENSG00000111716	LDHB	-0.844356557	3.50E-05
ENSG00000173436	MINOS1	-0.771644993	3.57E-05
ENSG00000174748	RPL15	-0.556475452	3.57E-05
ENSG00000148303	RPL7A	-0.661606989	3.57E-05
ENSG00000181754	AMIGO1	-2.495577933	3.63E-05
ENSG00000198755	RPL10A	-0.692288949	3.75E-05
ENSG00000089220	PEBP1	-0.806614569	3.90E-05
ENSG00000140464	PML	1.133861417	3.90E-05
ENSG00000198932	GPRASP1	-1.831353092	4.18E-05
ENSG00000169567	HINT1	-0.574863325	4.34E-05
ENSG00000108821	COL1A1	-5.660872721	4.35E-05
ENSG00000153933	DGKE	-1.000084265	4.36E-05
ENSG00000269911		-4.60673373	4.39E-05
ENSG00000173821	RNF213	1.400489637	4.54E-05
ENSG00000141664	ZCCHC2	1.437673678	4.63E-05
ENSG00000170989	S1PR1	-2.303846168	4.73E-05
ENSG00000228956	SATB1-AS1	-2.179636384	4.74E-05
ENSG00000005448	WDR54	-1.225430467	4.75E-05
ENSG00000114391	RPL24	-0.645439042	4.89E-05
ENSG00000137628	DDX60	2.140555487	4.99E-05
ENSG00000104490	NCALD	-2.941458087	4.99E-05
ENSG00000078589	P2RY10	-2.578006789	5.12E-05
ENSG00000124256	ZBP1	2.313964477	5.12E-05
ENSG00000160075	SSU72	-0.490398411	5.33E-05
ENSG00000127184	COX7C	-0.591688198	5.50E-05
ENSG00000175061	LRRC75A-AS1	-0.712997209	5.70E-05
ENSG00000187514	PTMA	-0.66370439	5.74E-05
ENSG00000164692	COL1A2	-5.311908165	5.74E-05
ENSG00000107201	DDX58	1.948164449	5.74E-05
ENSG00000247774	PCED1B-AS1	-1.138208676	5.74E-05
ENSG00000124172	ATP5E	-0.564331315	5.74E-05
ENSG00000184979	USP18	3.862304262	5.74E-05
ENSG00000232112	TMA7	-0.607479602	6.26E-05
ENSG00000183691	NOG	-3.790342064	6.33E-05
ENSG00000157570	TSPAN18	-3.930782241	6.38E-05
ENSG00000054654	SYNE2	-1.438675458	6.38E-05
ENSG00000163682	RPL9	-0.837035041	6.56E-05
ENSG00000137078	SIT1	-3.410523475	6.70E-05
ENSG00000100453	GZMB	-3.48671265	7.07E-05
ENSG00000138646	HERC5	2.73760257	7.23E-05
ENSG00000268205		-0.947871769	7.25E-05
ENSG00000167526	RPL13	-0.838321988	7.45E-05
ENSG00000168118	RAB4A	-0.570659018	8.24E-05
ENSG00000198934	MAGEE1	-4.44609927	8.30E-05
ENSG00000107223	EDF1	-0.640913802	8.32E-05
ENSG00000109475	RPL34	-0.774306329	8.49E-05
ENSG00000123349	PFDN5	-0.650102849	8.60E-05
ENSG00000269293	ZSCAN16-AS1	-0.895664556	8.93E-05

ENSG00000147123	NDUFB11	-0.704269437	8.93E-05
ENSG00000175854	SWI5	-0.989809919	9.57E-05
ENSG00000111912	NCOA7	1.315900313	9.87E-05
ENSG00000102030	NAA10	-0.832584601	1.00E-04
ENSG00000115267	IFIH1	1.787770848	0.000101806
ENSG00000280237	MIR4697HG	-4.082282477	0.000103373
ENSG00000213904	LIPE-AS1	-1.310858245	0.000103724
ENSG00000132185	FCRLA	-3.311934728	0.000104026
ENSG00000237943	PRKCQ-AS1	-1.856660035	0.000104932
ENSG00000213139	CRYGS	-1.280665004	0.000105641
ENSG00000259959		-1.394450458	0.000105641
ENSG00000168646	AXIN2	-4.548723571	0.000105641
ENSG00000163520	FBLN2	-2.726185674	0.000105795
ENSG00000111331	OAS3	2.922369795	0.000106087
ENSG00000172432	GTPBP2	0.835450041	0.000108081
ENSG00000196683	TOMM7	-0.829828497	0.00010827
ENSG00000104529	EEF1D	-0.58691008	0.000111495
ENSG00000165138	ANKS6	-1.514079768	0.000111495
ENSG00000213862		-0.801439697	0.000111495
ENSG00000105699	LSR	-3.418783114	0.000111731
ENSG00000155366	RHOC	-1.637991254	0.000114139
ENSG00000174500	GCSAM	-3.917508071	0.000114179
ENSG00000280120		-1.261390784	0.000114214
ENSG00000100027	YPEL1	-1.703045367	0.000114214
ENSG00000157601	MX1	2.59560948	0.000114214
ENSG00000113088	GZMK	-3.822962222	0.00011818
ENSG00000274383		-1.542970616	0.000120276
ENSG00000161970	RPL26	-0.715400108	0.000130254
ENSG00000164615	CAMLG	-0.629958807	0.000130772
ENSG00000065717	TLE2	-3.347003756	0.000131315
ENSG00000167747	C19orf48	-1.049405836	0.000132886
ENSG00000182004	SNRPE	-0.713832565	0.000136285
ENSG00000172943	PHF8	0.538152116	0.000136865
ENSG00000139537	CCDC65	-4.443297198	0.000141543
ENSG00000122026	RPL21	-0.723086137	0.000141632
ENSG00000130332	LSM7	-0.746420001	0.000147483
ENSG00000133112	TPT1	-0.658410948	0.000148679
ENSG00000231113		-0.7788648	0.000151269
ENSG00000185163	DDX51	-0.687193113	0.000158872
ENSG00000134326	CMPK2	2.977159049	0.000159499
ENSG00000169884	WNT10B	-2.333576677	0.000159516
ENSG00000102878	HSF4	-1.147820473	0.000159808
ENSG00000133065	SLC41A1	-0.89957492	0.000163039
ENSG00000183648	NDUFB1	-0.728642114	0.000163039
ENSG00000154764	WNT7A	-4.449363065	0.000165811
ENSG00000236778	INTS6-AS1	-1.077927255	0.000185365
ENSG00000260807		-3.673407639	0.000185618
ENSG00000099624	ATP5D	-0.832580335	0.000188578

ENSG00000145912	NHP2	-0.773872402	0.000192316
ENSG00000168824		-3.494911903	0.000197172
ENSG00000204628	RACK1	-0.537567004	0.000197172
ENSG00000104907	TRMT1	-0.73790355	0.000209028
ENSG00000237550	RPL9P9	-0.746466662	0.000219689
ENSG00000213015	ZNF580	-0.888078276	0.000223953
ENSG00000172663	TMEM134	-0.797327479	0.000232242
ENSG00000270189		-1.463036366	0.000238693
ENSG00000183918	SH2D1A	-2.864633564	0.000238693
ENSG00000174886	NDUFA11	-1.04574285	0.000238693
ENSG00000269044		-1.037537922	0.000238693
ENSG00000108679	LGALS3BP	2.291162548	0.000241285
ENSG00000172878	METAP1D	-1.448666428	0.000241285
ENSG00000111907	TPD52L1	2.690874455	0.000248813
ENSG00000105939	ZC3HAV1	0.933584465	0.000251153
ENSG00000155265	GOLGA7B	-3.06933314	0.000262446
ENSG00000105427	CNFN	-2.164900281	0.00026337
ENSG00000167799	NUDT8	-1.956469458	0.000267099
ENSG00000213757		-1.127686732	0.000267232
ENSG00000102471	NDFIP2	-3.956319941	0.000280208
ENSG00000184990	SIVA1	-0.726001441	0.000286118
ENSG00000147804	SLC39A4	-1.101649423	0.000286208
ENSG00000234797	RPS3AP6	-0.778314029	0.000290261
ENSG00000106355	LSM5	-0.689110229	0.000305367
ENSG00000167283	ATP5L	-0.496159342	0.000305367
ENSG00000214548	MEG3	-3.07822972	0.000307298
ENSG00000235552	RPL6P27	-0.861926108	0.000307298
ENSG00000278030	TRBV7-9	-4.25691186	0.000307447
ENSG00000211749	TRBV23-1	-4.263401984	0.000309205
ENSG00000174946	GPR171	-3.539090325	0.00031141
ENSG00000158321	AUTS2	-2.087307202	0.00031141
ENSG00000148516	ZEB1	-2.393228406	0.000314244
ENSG00000067066	SP100	0.896173461	0.000316288
ENSG00000105193	RPS16	-0.672198552	0.000324618
ENSG00000241837	ATP5O	-0.613730551	0.000329148
ENSG00000221983	UBA52	-0.599121868	0.000329169
ENSG00000140391	TSPAN3	-1.060016498	0.000334674
ENSG00000156411	C14orf2	-0.615265546	0.000336796
ENSG00000007264	MATK	-2.859583582	0.000339424
ENSG00000162244	RPL29	-0.673454697	0.000347712
ENSG00000130635	COL5A1	-3.550996646	0.000352748
ENSG00000212694	LINC01089	-1.197254106	0.000352748
ENSG00000160226	C21orf2	-1.088532364	0.000360717
ENSG00000101596	SMCHD1	0.931369794	0.000360786
ENSG00000156467	UQCRB	-0.645589241	0.000361718
ENSG00000164483	SAMD3	-2.564111255	0.000362078
ENSG00000115155	OTOF	7.186284502	0.000364835
ENSG00000148362	C9orf142	-0.847290552	0.000365754

ENSG00000103266	STUB1	-0.588735726	0.000365782
ENSG00000248275	TRIM52-AS1	-0.964355792	0.000369752
ENSG00000110700	RPS13	-0.622623297	0.000374754
ENSG00000180530	NRIP1	1.351034401	0.000376561
ENSG00000163534	FCRL1	-2.617711203	0.000377729
ENSG00000211677	IGLC2	-3.642816904	0.000378943
ENSG00000117322	CR2	-2.515040768	0.000380931
ENSG00000204922	UQCC3	-1.013559247	0.000383374
ENSG00000240509	RPL34P18	-1.494481611	0.000387277
ENSG00000162227	TAF6L	-0.827682662	0.000398126
ENSG00000152778	IFIT5	2.080060897	0.000403181
ENSG00000166428	PLD4	-2.205792302	0.000407427
ENSG00000186049	KRT73	-3.932644419	0.00041245
ENSG00000144218	AFF3	-1.392336948	0.000416883
ENSG00000112306	RPS12	-0.703565345	0.000419577
ENSG00000163820	FYCO1	0.809399307	0.000423912
ENSG00000137198	GMPR	3.072909968	0.000431438
ENSG00000172183	ISG20	1.501926779	0.000431438
ENSG00000156873	PHKG2	-0.586125261	0.0004467
ENSG00000138642	HERC6	2.011489193	0.000453786
ENSG00000153563	CD8A	-3.217171453	0.000462698
ENSG00000198087	CD2AP	1.153941069	0.000471446
ENSG00000189227	C15orf61	-0.916327124	0.000482372
ENSG00000135426	TESPA1	-1.379724059	0.000488308
ENSG00000136942	RPL35	-0.690777745	0.000488637
ENSG00000276136		-1.561701407	0.000488637
ENSG00000128185	DGCR6L	-0.869029126	0.000492227
ENSG00000213553	RPLP0P6	-0.732793466	0.000500474
ENSG00000172116	CD8B	-2.758943834	0.000501998
ENSG00000168002	POLR2G	-0.55077571	0.000501998
ENSG00000117691	NENF	-0.912177248	0.000502636
ENSG00000197756	RPL37A	-0.68148802	0.000502636
ENSG00000204257	HLA-DMA	-1.149520954	0.000502636
ENSG00000225964	NRIR	3.248312012	0.000508147
ENSG00000005075	POLR2J	-0.660280637	0.000508147
ENSG00000162614	NEXN	2.732093552	0.000512538
ENSG00000141698	NT5C3B	-1.203616145	0.00051257
ENSG00000256338	RPL41P2	-1.490949053	0.000531511
ENSG00000161381	PLXDC1	-1.793972135	0.000532809
ENSG00000111335	OAS2	2.436463858	0.000537786
ENSG00000099385	BCL7C	-0.660592553	0.000545778
ENSG00000104814	MAP4K1	-0.858644073	0.000551874
ENSG00000198168	SVIP	-1.080144347	0.000552879
ENSG00000130731	METTL26	-0.897489836	0.000559458
ENSG00000185920	PTCH1	-2.347887924	0.000580108
ENSG00000211679	IGLC3	-3.788516443	0.000584189
ENSG00000164442	CITED2	1.083600372	0.000585482
ENSG00000197696	NMB	-1.362725379	0.000593211

ENSG00000274307		1.616351746	0.000603422
ENSG00000235621	LINC00494	-4.274984155	0.000603422
ENSG00000181163	NPM1	-0.601003416	0.000639249
ENSG00000272034	SNORD14A	-1.193770842	0.000653186
ENSG00000225828	FAM229A	-0.830548392	0.000657598
ENSG00000137441	FGFBP2	-3.790425572	0.00065815
ENSG00000175390	EIF3F	-0.52428776	0.000659607
ENSG00000125743	SNRPD2	-0.526163585	0.000659607
ENSG00000076554	TPD52	-1.722912955	0.000679518
ENSG00000042088	TDP1	-0.598070112	0.0006851
ENSG00000137959	IFI44L	3.262678279	0.000694365
ENSG00000103024	NME3	-1.112249155	0.000694365
ENSG00000214253	FIS1	-0.573966318	0.000698112
ENSG00000239569	KMT2E-AS1	-0.986097199	0.000698112
ENSG00000115239	ASB3	-0.691984058	0.000708812
ENSG00000123144	C19orf43	-0.601773846	0.000714047
ENSG00000002549	LAP3	1.527329536	0.000734181
ENSG00000166405	RIC3	-1.953717093	0.000734181
ENSG00000156738	MS4A1	-2.687154081	0.000734181
ENSG00000178449	COX14	-0.790579915	0.000734181
ENSG00000082458	DLG3	-3.029361896	0.000735233
ENSG00000229677		2.37648562	0.000740348
ENSG00000229833	PET100	-0.833837555	0.000788199
ENSG00000273271		-1.13364832	0.000788199
ENSG00000130520	LSM4	-0.698924172	0.000789245
ENSG00000272990		-1.594571719	0.000792484
ENSG00000211789	TRAV12-2	-3.449639215	0.000796876
ENSG00000122224	LY9	-1.779083331	0.00080638
ENSG00000137818	RPLP1	-0.689717968	0.00080638
ENSG00000230124	ACBD6	-0.56347087	0.000809756
ENSG00000176533	GNG7	-1.254440406	0.000809756
ENSG00000268836		-2.221562663	0.000835904
ENSG00000059378	PARP12	1.067986187	0.000839654
ENSG00000170542	SERPINB9	1.265338028	0.000839834
ENSG00000008988	RPS20	-0.62137657	0.000845933
ENSG00000198816	ZNF358	-1.02355722	0.000845933
ENSG00000232788		-1.903169505	0.000850641
ENSG00000172053	QARS	-0.433830254	0.000851892
ENSG00000174915	PTDSS2	-0.581039639	0.000851892
ENSG00000174171		-2.84227074	0.000851892
ENSG00000134419	RPS15A	-0.597579856	0.000851892
ENSG00000198931	APRT	-0.698983586	0.000851892
ENSG00000244398		-0.728765348	0.000853682
ENSG00000028116	VRK2	0.916992924	0.00085393
ENSG00000169976	SF3B5	-0.566241373	0.000857732
ENSG00000171159	C9orf16	-0.723287904	0.000869224
ENSG00000206190	ATP10A	1.778549959	0.000877263
ENSG00000167113	COQ4	-0.819426269	0.000895068

ENSG00000166289	PLEKHF1	-2.423207789	0.000895068
ENSG00000186854	TRABD2A	-1.505448806	0.000896599
ENSG00000101298	SNPH	-2.019688124	0.000896599
ENSG00000171858	RPS21	-0.733252591	0.000906927
ENSG00000117859	OSBPL9	0.671279343	0.000915519
ENSG00000181381	DDX60L	1.480272687	0.000925248
ENSG00000226287	TMEM191A	-1.398998211	0.000925248
ENSG00000007392	LUC7L	-0.623415398	0.000930727
ENSG00000278942		-4.04277027	0.000932838
ENSG00000274752	TRBV12-3	-4.062410555	0.000936739
ENSG00000143793	C1orf35	-0.81751732	0.000944431
ENSG00000111224	PARP11	0.981807815	0.00094515
ENSG00000120915	EPHX2	-2.782795904	0.000945858
ENSG00000139343	SNRPF	-0.622475292	0.000945858
ENSG00000272256		-1.282807815	0.000947051
ENSG00000226660	TRBV2	-4.050964885	0.000950942
ENSG00000197111	PCBP2	-0.510434783	0.000950942
ENSG00000063177	RPL18	-0.629860584	0.000950942
ENSG00000244313		-0.726036477	0.000951188
ENSG00000272579		-1.283930549	0.000955848
ENSG00000262528		-1.513211868	0.000964192
ENSG00000145016	RUBCN	0.692873429	0.000974716
ENSG00000092098	RNF31	0.817304263	0.000980019
ENSG00000211949	IGHV3-23	-3.661538369	0.000981957
ENSG00000133106	EPST11	2.03174243	0.000995216
ENSG00000141759	TXNL4A	-0.540128229	0.001014911
ENSG00000147403	RPL10	-0.620919688	0.001027031
ENSG00000166136	NDUFB8	-0.595560865	0.001048067
ENSG00000186010	NDUFA13	-0.763046639	0.001048067
ENSG00000100353	EIF3D	-0.370004705	0.001048067
ENSG00000161016	RPL8	-0.58028892	0.001048281
ENSG00000241351	IGKV3-11	-3.814088215	0.001065742
ENSG00000105402	NAPA	0.89282043	0.001066532
ENSG00000142541	RPL13A	-0.58764181	0.001066532
ENSG00000245910	SNHG6	-0.615873018	0.001074624
ENSG00000211655	IGLV1-36	-3.925276528	0.001093393
ENSG00000205307	SAP25	-1.34213169	0.001094842
ENSG00000099797	TECR	-0.791804103	0.001095487
ENSG00000155313	USP25	0.705780993	0.001095487
ENSG00000100129	EIF3L	-0.647889814	0.001105604
ENSG00000224094	RPS24P8	-0.845518034	0.001110634
ENSG00000227678		-4.069594174	0.001110634
ENSG00000121060	TRIM25	1.051969862	0.001112355
ENSG00000145494	NDUFS6	-0.838805501	0.001122967
ENSG00000242299		-0.853538668	0.001137483
ENSG00000246898	LINC00920	-1.973204412	0.001137483
ENSG00000054148	PHPT1	-0.936621982	0.001139699
ENSG00000264608		-1.105491679	0.001179681

ENSG00000130748	TMEM160	-1.256579576	0.001182756
ENSG00000143727	ACP1	-0.490573907	0.001184478
ENSG00000187051	RPS19BP1	-0.659686861	0.001184478
ENSG00000152558	TMEM123	1.156386842	0.00120837
ENSG00000237886	NALT1	-1.376118894	0.001230807
ENSG00000188878	FBF1	-1.113251078	0.001277927
ENSG00000223865	HLA-DPB1	-1.455681856	0.001294508
ENSG00000273361		-1.249836565	0.001302778
ENSG00000180354	MTURN	-0.956829225	0.001319483
ENSG00000211694	TRGV10	-4.059447193	0.00131964
ENSG00000115523	GNLY	-3.205977592	0.001323716
ENSG00000165821	SALL2	-4.057857259	0.001332566
ENSG00000109686	SH3D19	-3.056590787	0.001353039
ENSG00000149273	RPS3	-0.632249355	0.001353039
ENSG00000269858	EGLN2	-0.637138193	0.001353039
ENSG00000140905	GCSH	-1.704869283	0.001353462
ENSG00000177600	RPLP2	-0.744696481	0.001367523
ENSG00000260257		-0.972711331	0.001385133
ENSG00000025770	NCAPH2	-0.881499361	0.001385133
ENSG00000071655	MBD3	-0.657395733	0.001386439
ENSG00000255135		-1.419252405	0.001386508
ENSG00000167515	TRAPPC2L	-0.592403767	0.001394041
ENSG00000278784		-0.904804063	0.001399262
ENSG00000186501	TMEM222	-0.588097508	0.001417079
ENSG00000205078	SYCE1L	-1.430591716	0.001426743
ENSG00000002330	BAD	-0.647117355	0.001435023
ENSG00000197457	STMN3	-1.145236243	0.00144081
ENSG00000211899	IGHM	-2.574942964	0.001449424
ENSG00000141577	CEP131	-0.74588634	0.001449424
ENSG00000100380	ST13	-0.484762754	0.001451092
ENSG00000188786	MTF1	0.811727258	0.001452303
ENSG00000198918	RPL39	-0.644881892	0.001472786
ENSG00000228205		-1.216856117	0.001492991
ENSG00000133134	BEX2	-2.145700919	0.001503998
ENSG00000170074	FAM153A	-2.953352319	0.001508862
ENSG00000164919	COX6C	-0.595258792	0.001508862
ENSG00000166441	RPL27A	-0.614488637	0.001508862
ENSG00000100220	RTCB	0.905331566	0.00151378
ENSG00000100450	GZMH	-3.724857618	0.001518872
ENSG00000091129	NRCAM	-4.253359495	0.001526301
ENSG00000149541	B3GAT3	-0.625789499	0.001532483
ENSG00000189171	S100A13	-1.114933609	0.001536871
ENSG00000189046	ALKBH2	-0.919972205	0.001541163
ENSG00000091640	SPAG7	-0.4975212	0.001541352
ENSG00000100575	TIMM9	-0.659123505	0.001545275
ENSG00000130313	PGLS	-0.612708684	0.001561499
ENSG00000110200	ANAPC15	-0.562857539	0.001565445
ENSG00000182899	RPL35A	-0.605205841	0.001591652

ENSG00000215021	PHB2	-0.430860393	0.001618179
ENSG00000187630	DHRS4L2	-0.946029428	0.001626834
ENSG00000155657	TTN	-1.78681676	0.00162855
ENSG00000131591	C1orf159	-0.688736972	0.001632085
ENSG00000169020	ATP5I	-0.623640967	0.001633719
ENSG00000105197	TIMM50	-0.491195493	0.001635692
ENSG00000213339	QTRT1	-0.749302748	0.001654195
ENSG00000211898	IGHD	-2.55267733	0.001672761
ENSG00000174292	TNK1	-3.290263786	0.001681447
ENSG00000229659	RPL26P6	-0.965676181	0.001699132
ENSG00000186230	ZNF749	-1.364432637	0.001699132
ENSG00000163564	PYHIN1	-1.984386029	0.001699953
ENSG00000237976		-1.509758139	0.00171109
ENSG00000138496	PARP9	1.801034041	0.00171727
ENSG00000211750	TRBV24-1	-4.048281756	0.00171727
ENSG00000198695	MT-ND6	-0.986855952	0.00171727
ENSG00000085563	ABCB1	-3.433711933	0.001729403
ENSG00000170581	STAT2	1.156446139	0.001736038
ENSG00000117475	BLZF1	0.791724459	0.001740117
ENSG00000123989	CHPF	-3.450819145	0.001745049
ENSG00000132661	NXT1	-1.000164202	0.001749114
ENSG00000242485	MRPL20	-0.484480762	0.001759918
ENSG00000214706	IFRD2	-0.695175693	0.001759918
ENSG00000017483	SLC38A5	1.894708707	0.001759918
ENSG00000137054	POLR1E	-0.762689218	0.001759918
ENSG00000180089	TMEM86B	-0.912626736	0.001759918
ENSG00000184207	PGP	-0.719111418	0.001782345
ENSG00000170634	ACYP2	-0.749196686	0.001789678
ENSG00000119514	GALNT12	-2.139334428	0.001789678
ENSG00000163644	PPM1K	1.329797369	0.001799887
ENSG00000233927	RPS28	-0.673091597	0.001822475
ENSG00000204946	ZNF783	-0.64326063	0.001836448
ENSG00000171863	RPS7	-0.500801482	0.001853573
ENSG00000165688	PMPCA	-0.518455131	0.001853573
ENSG00000186184	POLR1D	-0.488676474	0.00185704
ENSG00000244723	ASLP1	-1.637695406	0.0018602
ENSG00000162066	AMDHD2	-0.742738166	0.001864273
ENSG00000058804	NDC1	-0.751211513	0.001888927
ENSG00000149809	TM7SF2	-0.878526484	0.001888927
ENSG00000250479	CHCHD10	-0.841421525	0.001888927
ENSG00000172543	CTSW	-1.924427039	0.00190583
ENSG00000128951	DUT	-0.892362449	0.001927018
ENSG00000100075	SLC25A1	-0.706864944	0.001937437
ENSG00000242574	HLA-DMB	-1.19739345	0.001963359
ENSG00000169100	SLC25A6	-0.505082516	0.001972833
ENSG00000204228	HSD17B8	-1.232960818	0.001985164
ENSG00000243147	MRPL33	-0.58097028	0.001987346
ENSG00000135617	PRADC1	-0.947177642	0.001987346

ENSG00000136938	ANP32B	-0.585334749	0.001987346
ENSG00000183508	FAM46C	-2.505402765	0.002012319
ENSG00000132465	JCHAIN	-3.097013532	0.002012319
ENSG00000163794	UCN	-1.346560013	0.002061377
ENSG00000135899	SP110	1.209762012	0.002061377
ENSG00000262089		-0.93514743	0.002068321
ENSG00000240230	COX19	-0.510066253	0.002092485
ENSG00000198604	BAZ1A	0.566140772	0.002092485
ENSG00000105726	ATP13A1	0.743610974	0.002092618
ENSG00000171960	PPIH	-0.601896186	0.002109336
ENSG00000243199		-1.051029871	0.002109336
ENSG00000151623	NR3C2	-1.587172362	0.002116577
ENSG00000211689	TRGC1	-2.732172873	0.002134044
ENSG00000247317		2.126325574	0.002134044
ENSG00000272030		-1.234836076	0.002137164
ENSG00000105974	CAV1	-4.932177264	0.002165857
ENSG00000188747	NOXA1	-1.068235379	0.002165857
ENSG00000148950	IMMP1L	-1.172082041	0.002189815
ENSG00000103528	SYT17	-1.790244717	0.002222068
ENSG00000104936	DMPK	-1.255140736	0.002234058
ENSG00000232472	EEF1B2P3	-0.83829887	0.00224768
ENSG00000134262	AP4B1	-0.568181244	0.002276349
ENSG00000137288	UQCC2	-1.038190718	0.002276349
ENSG00000145390	USP53	-1.876875698	0.002284196
ENSG00000234009	RPL5P34	-0.879525116	0.002286318
ENSG00000257303		-1.543800209	0.00229383
ENSG00000176476	SGF29	-0.599437713	0.002295797
ENSG00000198258	UBL5	-0.47887206	0.002307212
ENSG00000211648	IGLV1-47	-3.188128985	0.002307212
ENSG00000006015	C19orf60	-0.840431313	0.00231205
ENSG00000206828		-1.377334777	0.002320347
ENSG00000272195		-0.978505399	0.002325887
ENSG00000140988	RPS2	-0.607745473	0.002336322
ENSG00000104852	SNRNP70	-0.615869688	0.002339089
ENSG00000173486	FKBP2	-0.860658965	0.002356163
ENSG00000130204	TOMM40	-0.570189763	0.002387003
ENSG00000179331	RAB39A	1.698831443	0.002418351
ENSG00000130487	KLHDC7B	1.733113513	0.002424667
ENSG00000008018	PSMB1	-0.464907359	0.002496126
ENSG00000030419	IKZF2	-1.919486819	0.002510426
ENSG00000228434		-1.063039478	0.002516966
ENSG00000177409	SAMD9L	2.423278265	0.002523246
ENSG00000167633	KIR3DL1	-4.223411078	0.002529204
ENSG00000146215	CRIP3	-1.406669613	0.002559541
ENSG00000171425	ZNF581	-0.719104478	0.002561286
ENSG00000162576	MXRA8	-3.572319884	0.002566536
ENSG00000185418	TARSL2	-0.784803254	0.002566536
ENSG00000145741	BTF3	-0.461851102	0.002581089

ENSG00000122643	NT5C3A	1.317325129	0.002585847
ENSG00000125991	ERGIC3	-0.43800389	0.00260207
ENSG00000071859	FAM50A	-0.476306782	0.002616467
ENSG00000281404	LINC01176	-1.164551407	0.002618652
ENSG00000075568	TMEM131	0.535251034	0.002629514
ENSG00000081052	COL4A4	-4.037508604	0.002629579
ENSG00000242060	RPS3AP49	-1.273964318	0.002629579
ENSG00000110011	DNAJC4	-0.516651123	0.002648646
ENSG00000186020	ZNF529	-0.908780081	0.002662185
ENSG00000226777	FAM30A	-2.661282073	0.002668113
ENSG00000137965	IFI44	2.196433674	0.002683332
ENSG00000139428	MMAB	-0.733197563	0.002699017
ENSG00000272888	LINC01578	-0.772752541	0.002739942
ENSG00000144713	RPL32	-0.600024025	0.002749482
ENSG00000154102	C16orf74	-1.258071379	0.002751801
ENSG00000185722	ANKFY1	0.737371206	0.002751801
ENSG00000142676	RPL11	-0.566461908	0.002778411
ENSG00000232629	HLA-DQB2	-1.916052661	0.002778411
ENSG00000119943	PYROXD2	-0.930166582	0.002778411
ENSG00000170430	MGMT	-0.954731592	0.002778411
ENSG00000168395	ING5	-0.750204282	0.002818468
ENSG00000251580		-1.315980363	0.002818468
ENSG00000072121	ZFYVE26	0.593596358	0.002835307
ENSG00000163430	FSTL1	-2.806135045	0.002849376
ENSG00000071082	RPL31	-0.569869918	0.002885416
ENSG00000163599	CTLA4	-3.272974814	0.002888091
ENSG00000215845	TSTD1	-0.942904412	0.002929217
ENSG00000244720		-3.810560581	0.002931755
ENSG00000107719	PALD1	-2.691280411	0.002936921
ENSG00000125652	ALKBH7	-0.790550229	0.002949662
ENSG00000205544	TMEM256	-0.88921173	0.002965688
ENSG00000101546	RBFA	-0.802965533	0.002975178
ENSG00000092203	TOX4	0.462109871	0.002987653
ENSG00000108771	DHX58	1.375746139	0.002995762
ENSG00000185745	IFIT1	3.378298653	0.002996848
ENSG00000267281		-1.02312114	0.002996848
ENSG00000211785	TRAV12-1	-3.81000108	0.003005494
ENSG00000163666	HESX1	2.753459921	0.003040557
ENSG00000131116	ZNF428	-0.597583836	0.00310363
ENSG00000211794	TRAV12-3	-3.809812145	0.003111502
ENSG00000176083	ZNF683	-4.031645831	0.003114556
ENSG00000172936	MYD88	0.759411381	0.003130104
ENSG00000235043	TECRP1	-1.250033025	0.003145723
ENSG00000130255	RPL36	-0.690341816	0.003152721
ENSG00000149806	FAU	-0.530142028	0.003164132
ENSG00000234327		-1.578682041	0.003182264
ENSG00000211795	TRAV8-6	-3.806193568	0.003187335
ENSG00000125691	RPL23	-0.560708956	0.003228424

ENSG00000167930	FAM234A	-0.612626129	0.003239193
ENSG00000100823	APEX1	-0.557053616	0.003261212
ENSG00000103260	METRN	-1.248967867	0.003305281
ENSG00000211598	IGKV4-1	-3.558413387	0.003341618
ENSG00000005022	SLC25A5	-0.636064927	0.003350222
ENSG00000272556	GTF2IP13	-1.18145431	0.003351949
ENSG00000167543	TP53I13	-0.775157309	0.003388679
ENSG00000260911		-1.447742281	0.003399717
ENSG00000258472		-0.78515948	0.003399717
ENSG00000100416	TRMU	-0.598521785	0.00344042
ENSG00000124614	RPS10	-0.628770672	0.003442988
ENSG00000281205	LINC00950	-1.386752916	0.003442988
ENSG00000167393	PPP2R3B	-0.984206651	0.003516662
ENSG00000135469	COQ10A	-0.898849317	0.003524877
ENSG00000211788	TRAV13-1	-3.475946962	0.003561299
ENSG00000221957	KIR2DS4	-4.037811821	0.003607637
ENSG00000138326	RPS24	-0.569181556	0.003618007
ENSG00000273338		-1.383005876	0.003621488
ENSG00000235194	PPP1R3E	-0.914048074	0.003666741
ENSG00000173660	UQCRH	-0.468939113	0.003687002
ENSG00000168229	PTGDR	-3.293510903	0.003687002
ENSG00000120885	CLU	2.915827551	0.003687796
ENSG00000105258	POLR2I	-0.775322734	0.003742581
ENSG00000211803	TRAV23DV6	-3.464460059	0.003756506
ENSG00000115760	BIRC6	0.631050579	0.003762099
ENSG00000172590	MRPL52	-0.718302792	0.003762099
ENSG00000042753	AP2S1	-0.729217046	0.003762099
ENSG00000108984	MAP2K6	1.423757981	0.003814168
ENSG00000099977	DDT	-0.739303715	0.003837421
ENSG00000130813	C19orf66	0.869096867	0.00385685
ENSG00000105519	CAPS	-0.845084843	0.003862811
ENSG00000180543	TSPYL5	-1.166334836	0.003887091
ENSG00000224631	RPS27AP16	-0.675220599	0.003887091
ENSG00000115274	INO80B	-0.895649136	0.003897304
ENSG00000105088	OLFM2	-3.790403614	0.003897304
ENSG00000100227	POLDIP3	0.450905706	0.003897304
ENSG00000148291	SURF2	-0.655670304	0.003906084
ENSG00000237772		-1.439841811	0.003966043
ENSG00000164649	CDCA7L	-1.040443289	0.003975205
ENSG00000257093	KIAA1147	-0.727090515	0.003975205
ENSG00000228444		-2.247101102	0.004099374
ENSG00000211956	IGHV4-34	-3.138745881	0.004123423
ENSG00000260910	LINC00565	-2.529063483	0.004166361
ENSG00000152795	HNRNPDL	-0.421574064	0.004191667
ENSG00000150401	DCUN1D2	-0.551935879	0.00424472
ENSG00000136643	RPS6KC1	0.551647774	0.004367828
ENSG00000254709	IGLL5	-3.286423802	0.004398542
ENSG00000117010	ZNF684	1.02726853	0.004400343

ENSG00000177455	CD19	-1.77450544	0.004400343
ENSG00000242125	SNHG3	-0.718633146	0.00441103
ENSG00000119917	IFIT3	3.31607972	0.00444772
ENSG00000173581	CCDC106	-1.069160411	0.004512892
ENSG00000232346		-1.400608068	0.004629858
ENSG00000054523	KIF1B	0.867949541	0.004663531
ENSG00000166435	XRRA1	2.277636235	0.004756594
ENSG00000274605		-1.617476553	0.004783684
ENSG00000101391	CDK5RAP1	-0.441121525	0.004823892
ENSG00000095906	NUBP2	-0.648566954	0.004902994
ENSG00000279605		-1.817388061	0.004916951
ENSG00000275413		-1.692304565	0.004916951
ENSG00000091409	ITGA6	-1.554797367	0.004926076
ENSG00000269893	SNHG8	-0.915979704	0.004930682
ENSG00000115415	STAT1	1.631028864	0.005030293
ENSG00000260676	LINC01541	1.909867909	0.005030293
ENSG00000158552	ZFAND2B	-0.459763435	0.005035996
ENSG00000007402	CACNA2D2	-2.329048542	0.005035996
ENSG00000145287	PLAC8	1.207345184	0.005076234
ENSG00000269951		-1.510942157	0.005100218
ENSG00000215375	MYL5	-1.026525087	0.005103966
ENSG00000150456	EEF1AKMT1	-1.268231703	0.005109127
ENSG00000171703	TCEA2	-0.622922133	0.00512065
ENSG00000149743	TRPT1	-0.74074439	0.005141504
ENSG00000119682	AREL1	0.520490859	0.005182733
ENSG00000125520	SLC2A4RG	-0.613552049	0.005196793
ENSG00000168393	DTYMK	-0.983196818	0.00522779
ENSG00000254911	SCARNA9	-1.088930455	0.00522779
ENSG00000197776	KLHDC1	-1.022240961	0.00522779
ENSG00000090238	YPEL3	-0.710406775	0.00522779
ENSG00000083457	ITGAE	-0.854994519	0.00522779
ENSG00000118418	HMG3	-0.693139145	0.005287534
ENSG00000261662		-0.722111336	0.005305765
ENSG00000137310	TCF19	-1.450430084	0.005345435
ENSG00000228106		-1.161429656	0.005364505
ENSG00000238142		-1.12786702	0.005376731
ENSG00000147687	TATDN1	-0.651493085	0.005376731
ENSG00000163508	EOMES	-3.617920749	0.005394996
ENSG00000251023		-1.235655791	0.005404381
ENSG00000213397	HAUS7	-0.841543258	0.005488566
ENSG00000257621	PSMA3-AS1	-0.590866684	0.005488566
ENSG00000088356	PDRG1	-0.743535963	0.005488566
ENSG00000198646	NCOA6	0.530406081	0.005488566
ENSG00000141096	DPEP3	-1.338357677	0.005516815
ENSG00000211592	IGKC	-2.561833705	0.005550161
ENSG00000186265	BTLA	-2.090466358	0.005550161
ENSG00000161021	MAML1	0.557207852	0.005550161
ENSG00000197958	RPL12	-0.567477825	0.005550161

ENSG00000179632	MAF1	-0.45651211	0.005570885
ENSG00000136874	STX17	0.711504393	0.005613442
ENSG00000221963	APOL6	1.146832025	0.005650226
ENSG00000143515	ATP8B2	-1.126132109	0.005696364
ENSG00000176978	DPP7	-0.511238488	0.005696364
ENSG00000214026	MRPL23	-0.747557922	0.005701526
ENSG00000110497	AMBRA1	0.515659085	0.005701526
ENSG00000169992	NLGN2	-1.255464012	0.005710946
ENSG00000141858	SAMD1	-0.867063732	0.005719449
ENSG00000163840	DTX3L	1.463076465	0.005749765
ENSG00000182685	BRICD5	-1.163377704	0.005749765
ENSG00000188599	NPIPP1	-1.016073719	0.005771272
ENSG00000108961	RANGRF	-0.556180848	0.005771272
ENSG00000175756	AURKAIP1	-0.548553001	0.005780322
ENSG00000196116	TDRD7	0.978683141	0.005817583
ENSG00000112419	PHACTR2	0.984741176	0.005846391
ENSG00000119650	IFT43	-0.723296864	0.005953883
ENSG00000159958	TNFRSF13C	-1.733520596	0.005990995
ENSG00000263465	SRSF8	-0.619473845	0.006022803
ENSG00000143222	UFC1	-0.408895501	0.006047557
ENSG00000229809	ZNF688	-0.6131909	0.006102597
ENSG00000105640	RPL18A	-0.680237544	0.006102597
ENSG00000091972	CD200	-2.772195836	0.006115276
ENSG00000105968	H2AFV	-0.549793474	0.006115276
ENSG00000106133	NSUN5P2	-1.23934778	0.006115276
ENSG00000282034		-0.927210969	0.006115276
ENSG00000198242	RPL23A	-0.535653341	0.006115276
ENSG00000160050	CCDC28B	-1.127235447	0.006248614
ENSG00000131143	COX4I1	-0.615828106	0.006248614
ENSG00000125458	NT5C	-0.732257873	0.00625249
ENSG00000143297	FCRL5	-1.66640251	0.006257931
ENSG00000167671	UBXN6	-0.503331314	0.006275423
ENSG00000187912	CLEC17A	-1.71336925	0.006316004
ENSG00000133818	RRAS2	-2.12788443	0.00638121
ENSG00000211890	IGHA2	-3.768716107	0.00638121
ENSG00000170448	NFXL1	-0.96615348	0.006390453
ENSG00000279491		-1.341594364	0.006390453
ENSG00000154358	OBSCN	-1.116533745	0.006390892
ENSG00000175193	PARL	-0.42071223	0.006412079
ENSG00000164168	TMEM184C	0.675968208	0.006412079
ENSG00000242071	RPL7AP6	-0.507626688	0.006412079
ENSG00000170476	MZB1	-2.600215232	0.006412354
ENSG00000112651	MRPL2	-0.590654242	0.006412354
ENSG00000260711		-2.386545413	0.006412354
ENSG00000106268	NUDT1	-0.794925259	0.006430892
ENSG00000143365	RORC	-3.295107354	0.006448205
ENSG00000125877	ITPA	-0.629610102	0.006501465
ENSG00000189007	ADAT2	-0.67748119	0.006502166

ENSG00000239246		-0.967740524	0.006502166
ENSG00000277476		-0.84517529	0.006502166
ENSG00000262814	MRPL12	-1.126811985	0.006520707
ENSG00000109084	TMEM97	-1.565088168	0.006552117
ENSG00000105618	PRPF31	-0.320470529	0.006566947
ENSG00000164587	RPS14	-0.591232133	0.00656868
ENSG00000116983	HPCAL4	-2.564606275	0.006608617
ENSG00000234608	MAPKAPK5-AS1	-0.736441449	0.006608617
ENSG00000196814	MVB12B	1.194285859	0.006715757
ENSG00000167775	CD320	-1.157253018	0.006787393
ENSG00000160683	CXCR5	-2.663328355	0.006794946
ENSG00000173991	TCAP	-1.137628099	0.00684445
ENSG00000132530	XAF1	2.062417745	0.006941968
ENSG00000187801	ZFP69B	1.615322312	0.006976912
ENSG00000180739	S1PR5	-3.19314575	0.006996496
ENSG00000162739	SLAMF6	-1.609125103	0.007035685
ENSG00000106211	HSPB1	-0.86800819	0.007052093
ENSG00000177294	FBXO39	3.196448003	0.007101112
ENSG00000154451	GBP5	1.617552062	0.007108739
ENSG00000226396		-1.17527956	0.007132617
ENSG00000168297	PXK	0.61349204	0.007173042
ENSG00000204514	ZNF814	-0.862573314	0.00724662
ENSG00000159674	SPON2	-1.574587655	0.007250759
ENSG00000245954		-3.478701616	0.007250759
ENSG00000021355	SERPINB1	0.539946934	0.007250759
ENSG00000122140	MRPS2	-0.618453026	0.007250759
ENSG00000116898	MRPS15	-0.502582497	0.007261059
ENSG00000205336	ADGRG1	-2.665424849	0.007270512
ENSG00000165716	FAM69B	-3.63476677	0.007274028
ENSG00000137414	FAM8A1	0.78297763	0.007353886
ENSG00000178498	DTX3	-1.273556045	0.007353886
ENSG00000118523	CTGF	-4.009995666	0.007430689
ENSG00000011590	ZBTB32	-3.796516973	0.007439447
ENSG00000108298	RPL19	-0.459548471	0.007453444
ENSG00000119778	ATAD2B	0.632073686	0.007461982
ENSG00000230155		-0.878134987	0.007461982
ENSG00000188542	DUSP28	-0.532924972	0.007489458
ENSG00000115286	NDUFS7	-0.510651899	0.00750534
ENSG00000172809	RPL38	-0.586652241	0.007509344
ENSG00000159445	THEM4	-1.083386903	0.007513328
ENSG00000205581	HMG1	-0.588019394	0.007529621
ENSG00000134371	CDC73	0.545193613	0.007577534
ENSG00000169738	DCXR	-0.796433956	0.007632459
ENSG00000114388	NPRL2	-0.606056714	0.007653417
ENSG00000182749	PAQR7	-0.988648959	0.00770553
ENSG00000139211	AMIGO2	1.112058967	0.007728162
ENSG00000170291	ELP5	-0.451100699	0.007728162
ENSG00000148308	GTF3C5	-0.38828101	0.007832655

ENSG00000211746	TRBV19	-3.261524859	0.007834932
ENSG00000235776		-0.570357062	0.007857373
ENSG00000146066	HIGD2A	-0.508846717	0.007858926
ENSG00000138615	CILP	-2.164202421	0.007881525
ENSG00000101337	TM9SF4	0.507323909	0.007915246
ENSG00000167658	EEF2	-0.433244129	0.007923108
ENSG00000071462	WBSCR22	-0.564191381	0.0079999
ENSG00000240972	MIF	-0.687637951	0.008014965
ENSG00000115159	GPD2	0.770871213	0.008019556
ENSG00000163867	ZMYM6	-0.49786665	0.00805075
ENSG00000163156	SCNM1	-0.469275116	0.00805075
ENSG00000218175		-1.081957236	0.00805075
ENSG00000272758		-0.94366131	0.00805075
ENSG00000258704	SRP54-AS1	-1.150107289	0.00805075
ENSG00000165516	KLHDC2	-0.546779085	0.00805075
ENSG00000170860	LSM3	-0.552215245	0.008084872
ENSG00000136444	RSAD1	-0.732249455	0.00814951
ENSG00000144161	ZC3H8	-0.700336371	0.008183046
ENSG00000137876	RSL24D1	-0.612271686	0.008266927
ENSG00000174721	FGFBP3	-1.051599989	0.008283057
ENSG00000254815		-2.522746154	0.008294645
ENSG00000063046	EIF4B	-0.58158112	0.008364561
ENSG00000144645	OSBPL10	-1.651067855	0.008398028
ENSG00000174547	MRPL11	-0.538131263	0.008398028
ENSG00000184436	THAP7	-0.612059548	0.008398028
ENSG00000235954	TTC28-AS1	-0.695683084	0.008443031
ENSG00000105372	RPS19	-0.567716037	0.008500143
ENSG00000143543	JTB	-0.42606116	0.008503651
ENSG00000273466		-0.940854962	0.008503651
ENSG00000161179	YDJC	-0.590714262	0.008595385
ENSG00000211734	TRBV5-1	-2.961716816	0.008627493
ENSG00000107872	FBXL15	-0.780552922	0.008627493
ENSG00000135114	OASL	2.577039865	0.008683968
ENSG00000170835	CEL	-1.690082517	0.008712379
ENSG00000089639	GMIP	0.424562652	0.008712379
ENSG00000158457	TSPAN33	-1.350702828	0.008751976
ENSG00000161395	PGAP3	-0.524266369	0.008751976
ENSG00000130684	ZNF337	-0.631394636	0.008751976
ENSG00000122218	COPA	0.670270176	0.008762951
ENSG00000205837	LINC00487	3.37091216	0.008762951
ENSG00000111879	FAM184A	-3.25943725	0.008762951
ENSG00000108515	ENO3	-0.830504914	0.008762951
ENSG00000196262	PPIA	-0.442714248	0.008768219
ENSG00000235065	RPL24P2	-0.966378673	0.00878134
ENSG00000272688		-1.227797565	0.008800031
ENSG00000133056	PIK3C2B	-0.981242108	0.008835169
ENSG00000199753	SNORD104	-1.304484153	0.008842684
ENSG00000161912	ADCY10P1	-0.791950249	0.008877956

ENSG00000182541	LIMK2	0.882307148	0.008877956
ENSG00000185839		1.374076737	0.008912945
ENSG00000272645	GTF2IP20	-0.761703148	0.008913296
ENSG00000220201	ZGLP1	-1.087373653	0.008952935
ENSG00000109046	WSB1	0.77860666	0.008980635
ENSG00000142552	RCN3	-1.137756026	0.008980635
ENSG00000254402	LRRC24	-1.138701897	0.00899864
ENSG00000167965	MLST8	-0.572348225	0.00899864
ENSG00000142534	RPS11	-0.481796891	0.00899864
ENSG00000178015	GPR150	-3.272440266	0.009045584
ENSG00000073536	NLE1	-0.906236214	0.009045584
ENSG00000188846	RPL14	-0.503545819	0.009050934
ENSG00000140612	SEC11A	-0.509756232	0.009075581
ENSG00000142684	ZNF593	-0.813535566	0.009136119
ENSG00000152082	MZT2B	-0.630803266	0.009147456
ENSG00000262919	FAM58A	-0.610755004	0.009147456
ENSG00000160932	LY6E	1.413642928	0.009350999
ENSG00000056972	TRAF3IP2	0.998618502	0.009460534
ENSG00000264812		-1.508854906	0.009474529
ENSG00000163584	RPL22L1	-0.677480246	0.009493084
ENSG00000196141	SPATS2L	2.044626281	0.009502716
ENSG00000004838	ZMYND10	-1.401441026	0.009527713
ENSG00000266677		-1.098088957	0.009584396
ENSG00000275056		-1.232632003	0.009590821
ENSG00000135390	ATP5G2	-0.451582539	0.00966023
ENSG00000233830	EIF4HP1	0.974566396	0.009667971
ENSG00000176490	DIRAS1	-3.326449375	0.009685261
ENSG00000146859	TMEM140	1.215696037	0.009686831
ENSG00000123545	NDUF4F4	-0.759418845	0.009694831
ENSG00000177595	PIDD1	-0.614003906	0.009983975
ENSG00000240342	RPS2P5	-0.667195142	0.009993581
ENSG00000214113	LYRM4	-0.589422964	0.009999842
ENSG00000149823	VPS51	-0.470844894	0.010006046
ENSG00000211787	TRAV8-3	-3.516730014	0.010017909
ENSG00000156482	RPL30	-0.504390862	0.010065681
ENSG00000211796	TRAV16	-3.513118229	0.010065732
ENSG00000230074		-0.989848975	0.010070915
ENSG00000155792	DEPTOR	-1.977539954	0.010071985
ENSG00000227191	TRGC2	-1.939551456	0.010072877
ENSG00000204272	LINC01420	-0.623368116	0.010084068
ENSG00000147576	ADHFE1	-0.987441136	0.010084068
ENSG00000230099	TRBV5-4	-3.512069871	0.010137044
ENSG00000106785	TRIM14	1.227136586	0.010137044
ENSG00000228775	WEE2-AS1	-2.286094723	0.01015285
ENSG00000161640	SIGLEC11	2.079317375	0.01015285
ENSG00000229638	RPL4P4	-0.573320279	0.010165869
ENSG00000188313	PLSCR1	1.414142798	0.01029454
ENSG00000211793	TRAV9-2	-3.519189578	0.01029454

ENSG00000109184	DCUN1D4	-0.617892413	0.010307042
ENSG00000235508	RPS2P7	-1.03657292	0.010393145
ENSG00000211792	TRAV14DV4	-3.522500562	0.010395799
ENSG00000271347		-2.509799967	0.010395799
ENSG00000127554	GFER	-0.520493058	0.010395799
ENSG00000115268	RPS15	-0.581637692	0.010395799
ENSG00000276557	TRBV18	-3.512673109	0.010537167
ENSG00000117519	CNN3	-3.145971047	0.010615606
ENSG00000250317	SMIM20	-0.680619236	0.010660228
ENSG00000211776	TRAV2	-3.514952937	0.010738187
ENSG00000111863	ADTRP	-2.187277092	0.010784797
ENSG00000204899	MZT1	-0.653170484	0.010790587
ENSG00000225756	DBH-AS1	-3.525047568	0.010809409
ENSG00000244701		-1.141700309	0.010855666
ENSG00000080854	IGSF9B	-3.528749915	0.010855666
ENSG00000211797	TRAV17	-3.264627863	0.010855666
ENSG00000140931	CMTM3	-0.492798671	0.010855666
ENSG00000267321		-0.803758289	0.010855666
ENSG00000105364	MRPL4	-0.518903762	0.010855666
ENSG00000198938	MT-CO3	-0.626052709	0.010855666
ENSG00000113532	ST8SIA4	0.784943979	0.010858983
ENSG00000147677	EIF3H	-0.338769488	0.010861233
ENSG00000104960	PTOV1	-0.576627852	0.010894709
ENSG00000211801	TRAV21	-3.511473158	0.010922375
ENSG00000068079	IFI35	1.15231457	0.010939216
ENSG00000135486	HNRNPA1	-0.417812673	0.010948901
ENSG00000273253		-1.081207127	0.010998336
ENSG00000231500	RPS18	-0.54357054	0.011034398
ENSG00000175866	BAIAP2	-0.813323971	0.011171871
ENSG00000136758	YME1L1	0.566346097	0.011177577
ENSG00000173726	TOMM20	-0.472514253	0.011191411
ENSG00000215030	RPL13P12	-1.140904216	0.011216558
ENSG00000211724	TRBV6-6	-3.502610175	0.011251369
ENSG00000132109	TRIM21	1.218594881	0.01129568
ENSG00000134644	PUM1	0.416965865	0.011327546
ENSG00000163050	COQ8A	-0.499149956	0.011327546
ENSG00000242324		2.037023439	0.011327546
ENSG00000269343	ZNF587B	-0.811509516	0.011327546
ENSG00000234785	EEF1GP5	-1.594136713	0.011399882
ENSG00000100307	CBX7	-0.812090482	0.011399882
ENSG00000113494	PRLR	1.385197353	0.011453567
ENSG00000258297		-0.806255263	0.011549089
ENSG00000248578	NPM1P21	-1.520715588	0.011676495
ENSG00000086065	CHMP5	0.869300596	0.011710083
ENSG00000236552	RPL13AP5	-0.548815384	0.011710083
ENSG00000212802	RPL15P3	-0.609619552	0.0117448
ENSG00000235576		-3.250263954	0.011771528
ENSG00000172534	HCFC1	0.54318123	0.011779969

ENSG00000143437	ARNT	0.526541535	0.011829351
ENSG00000205702	CYP2D7	-0.966229542	0.011829351
ENSG00000186918	ZNF395	-0.78480884	0.011842238
ENSG00000189409	MMP23B	-2.018668172	0.011881165
ENSG00000275491		-2.857909953	0.011949426
ENSG00000156795	WDYHV1	-0.734407989	0.012025556
ENSG00000267858	MZF1-AS1	-1.014687982	0.012056385
ENSG00000182512	GLRX5	-0.597080126	0.012067336
ENSG00000245970		-1.596422478	0.012070909
ENSG00000273344	PAXIP1-AS1	-1.015181513	0.012207509
ENSG00000273015		-0.561246381	0.012207509
ENSG00000178226	PRSS36	-0.930012719	0.012207509
ENSG00000234912	SNHG20	-0.938012453	0.01221256
ENSG00000079337	RAPGEF3	-2.175191126	0.012234211
ENSG00000273486		-1.151880901	0.012269658
ENSG00000140990	NDUFB10	-0.611648871	0.012285141
ENSG00000166750	SLFN5	1.722154134	0.012285141
ENSG00000136960	ENPP2	2.168941175	0.012334015
ENSG00000267469		-2.881437085	0.012334015
ENSG00000213928	IRF9	0.62902664	0.012341389
ENSG00000126709	IFI6	1.794015013	0.012377059
ENSG00000105700	KXD1	-0.311496337	0.012377059
ENSG00000237276	ANO7L1	1.687105099	0.012382767
ENSG00000130725	UBE2M	-0.471654901	0.012382767
ENSG00000213949	ITGA1	2.013415713	0.01247131
ENSG00000277998		-0.797598276	0.012473961
ENSG00000273314		1.270971866	0.012473961
ENSG00000167094	TTC16	-1.517629408	0.012473961
ENSG00000171222	SCAND1	-0.628919313	0.012473961
ENSG00000260260	SNHG19	-1.405936689	0.012517745
ENSG00000211965	IGHV3-49	-3.258177567	0.012580941
ENSG00000178467	P4HTM	-0.513301586	0.012592552
ENSG00000254470	AP5B1	0.835257258	0.012592552
ENSG00000229117	RPL41	-0.517651162	0.012611787
ENSG00000256053	APOPT1	-0.616681079	0.012634351
ENSG00000257704	INAFM1	-0.838635791	0.012684804
ENSG00000105518	TMEM205	-0.607528472	0.012707897
ENSG00000258944		-0.848551425	0.012751867
ENSG00000168056	LTBP3	-1.005572136	0.012775509
ENSG00000120896	SORBS3	-0.842239839	0.012851865
ENSG00000183542	KLRC4	-3.519342173	0.012898851
ENSG00000087237	CETP	-1.662371153	0.012929308
ENSG00000233762		-0.748191464	0.012948624
ENSG00000215769		-0.520146682	0.012948624
ENSG00000149927	DOC2A	-1.315887536	0.012984483
ENSG00000169087	HSPBAP1	-0.597915642	0.01307667
ENSG00000272449		-0.971077091	0.013084774
ENSG00000055118	KCNH2	-3.506917944	0.013084774

ENSG00000165795	NDRG2	-0.79173943	0.013084774
ENSG00000210151	MT-TS1	-1.737677285	0.013085773
ENSG00000065526	SPEN	0.563420163	0.013224068
ENSG00000147180	ZNF711	-2.16869665	0.013224068
ENSG00000277394	NA	-1.089742096	0.013258969
ENSG00000213190	MLLT11	-0.858086348	0.013296148
ENSG00000204217	BMPR2	0.733837102	0.013296148
ENSG00000164054	SHISA5	0.70956252	0.013296148
ENSG00000273437		-1.66056545	0.013296148
ENSG00000007520	TSR3	-0.588449868	0.013296148
ENSG00000081985	IL12RB2	-3.073461965	0.013317586
ENSG00000198677	TTC37	0.552528011	0.013317586
ENSG00000237190	CDKN2AIPNL	-0.520466358	0.01336401
ENSG00000166912	MTMR10	0.514013269	0.013380965
ENSG00000162736	NCSTN	0.480432559	0.013407314
ENSG00000114779	ABHD14B	-0.494157949	0.013409732
ENSG00000271553		-1.510245242	0.013409732
ENSG00000240682	ISY1	-0.360776119	0.013435811
ENSG00000258199		-0.622151467	0.013435811
ENSG00000211669	IGLV3-10	-3.782053925	0.013435811
ENSG00000259658		-1.677475795	0.013483798
ENSG00000163382	NAXE	-0.575187072	0.013484458
ENSG00000184897	H1FX	-0.727008081	0.013506469
ENSG00000084207	GSTP1	-0.731848515	0.013506469
ENSG00000273149		-2.045756456	0.013506469
ENSG00000187840	EIF4EBP1	-0.780402165	0.013530932
ENSG00000113615	SEC24A	0.778597553	0.01354129
ENSG00000127884	ECHS1	-0.653674984	0.013647942
ENSG00000148019	CEP78	-0.899135607	0.013734942
ENSG00000265206	MIR142	-1.187633688	0.013734942
ENSG00000078487	ZCWPW1	-0.789108602	0.013792294
ENSG00000163565	IFI16	1.190751141	0.01382954
ENSG00000122543	OCM	-2.267874837	0.01382954
ENSG00000118181	RPS25	-0.477755511	0.013890027
ENSG00000167969	ECI1	-0.645584092	0.013949731
ENSG00000270605		-1.346253765	0.013978934
ENSG00000144034	TPRKB	-0.537903195	0.013997871
ENSG00000170667	RASA4B	-1.240791366	0.013997871
ENSG00000198964	SGMS1	0.705460877	0.014002392
ENSG00000103264	FBXO31	-0.560267772	0.014002392
ENSG00000198455	ZXDB	-0.672364179	0.014052034
ENSG00000241343	RPL36A	-0.670842947	0.014052034
ENSG00000177990	DPY19L2	-3.250715843	0.014052034
ENSG00000180228	PRKRA	-0.459795781	0.01407087
ENSG00000141560	FN3KRP	-0.504027964	0.01407087
ENSG00000214389	RPS3AP26	-0.595167186	0.014071635
ENSG00000124713	GNMT	-0.859496577	0.014142833
ENSG00000251867		-1.065093226	0.014142833

ENSG00000160307	S100B	-2.579918498	0.014260542
ENSG00000211666	IGLV2-14	-3.150814001	0.014275095
ENSG00000078043	PIAS2	-0.509689419	0.014284663
ENSG00000165874	FAM35BP	-0.957846385	0.014362961
ENSG00000128602	SMO	-2.47765222	0.014538935
ENSG00000140092	FBLN5	-2.600765358	0.014558065
ENSG00000273192		-1.08003371	0.014558065
ENSG00000162032	SPSB3	-0.464910746	0.014732074
ENSG00000125356	NDUFA1	-0.455288831	0.01475699
ENSG00000257151	PWAR6	-1.432849402	0.014785091
ENSG00000204564	C6orf136	-0.538589027	0.014811965
ENSG00000228224	NACAP1	-0.739638833	0.014834346
ENSG00000225151	GOLGA2P7	-1.565221751	0.014834346
ENSG00000167555	ZNF528	-0.992826985	0.014834346
ENSG00000064651	SLC12A2	-0.793090469	0.014917375
ENSG00000182196	ARL6IP4	-0.952481405	0.015075074
ENSG00000134709	HOOK1	-2.319506226	0.015107209
ENSG00000102901	CENPT	-0.468266771	0.015117836
ENSG00000139725	RHOF	-0.580107087	0.015132893
ENSG00000211649	IGLV7-46	-3.531368153	0.015286754
ENSG00000137449	CPEB2	0.888801964	0.01530045
ENSG00000124507	PACSIN1	-3.250094497	0.01530045
ENSG00000176058	TPRN	-0.729942091	0.01530045
ENSG00000166166	TRMT61A	-0.526308335	0.01530045
ENSG00000213977	TAX1BP3	-0.780254217	0.01530045
ENSG00000168610	STAT3	0.627057265	0.01530045
ENSG00000196684	HSH2D	1.097571501	0.01530045
ENSG00000186806	VSIG10L	1.094711625	0.01530045
ENSG00000245904		-0.995704509	0.015323231
ENSG00000196998	WDR45	-0.375541741	0.015340111
ENSG00000095139	ARCN1	0.669919323	0.01539867
ENSG00000152154	TMEM178A	-2.620103925	0.015501269
ENSG00000141576	RNF157	-1.207778393	0.015555059
ENSG00000148290	SURF1	-0.443691169	0.015577545
ENSG00000278740		-2.274704525	0.015577545
ENSG00000143185	XCL2	-3.599545714	0.015751381
ENSG00000118640	VAMP8	-0.606932233	0.015751381
ENSG00000144199	FAHD2B	-1.343568358	0.015790049
ENSG00000234771	SLC25A25-AS1	-0.68349797	0.015790049
ENSG00000144659	SLC25A38	-0.550482755	0.015833578
ENSG00000211970	IGHV4-61	-3.507718434	0.015879956
ENSG00000145431	PDGFC	-1.318507701	0.015933389
ENSG00000006062	MAP3K14	-0.474045138	0.015933389
ENSG00000161010	MRNIP	-0.970403607	0.015979724
ENSG00000171219	CDC42BPG	2.720608889	0.015989686
ENSG00000274227		-1.37366901	0.015989686
ENSG00000243477	NAT6	-0.585740782	0.016012226
ENSG00000138443	ABI2	-0.745451512	0.016092459

ENSG00000163872	YEATS2	0.48064512	0.016092459
ENSG00000131876	SNRPA1	-0.593698081	0.016092459
ENSG00000160917	CPSF4	-0.38248416	0.016274831
ENSG00000271895		-0.94121064	0.016288805
ENSG00000131469	RPL27	-0.45630887	0.016304221
ENSG00000263528	IKBKE	0.810852139	0.016342747
ENSG00000117543	DPH5	-0.6276373	0.016344359
ENSG00000143344	RGL1	2.221136158	0.016534809
ENSG00000134070	IRAK2	3.119286725	0.016534809
ENSG00000153560	UBP1	0.526902565	0.016650644
ENSG00000238105	GOLGA2P5	-1.202551167	0.016650644
ENSG00000265100		-1.356446539	0.016650644
ENSG00000099800	TIMM13	-0.749442818	0.016650644
ENSG00000173706	HEG1	0.970456093	0.016654306
ENSG00000167664	TMIGD2	-1.908609514	0.016661754
ENSG00000106992	AK1	-1.287630367	0.016663329
ENSG00000232022	FAAHP1	-2.037324409	0.016671838
ENSG00000184083	FAM120C	-0.673984701	0.016671838
ENSG00000130119	GNL3L	0.718507143	0.016671838
ENSG00000243678	NME2	-0.71329529	0.016671838
ENSG00000218891	ZNF579	-1.011762189	0.016674018
ENSG00000007312	CD79B	-1.218079983	0.016712204
ENSG00000211895	IGHA1	-3.770559918	0.016766434
ENSG00000179715	PCED1B	-1.164952896	0.016774318
ENSG00000152969	JAKMIP1	-3.326069988	0.016796722
ENSG00000133398	MED10	-0.446388581	0.016838577
ENSG00000126012	KDM5C	0.441850841	0.016902087
ENSG00000137502	RAB30	-1.489518732	0.016906639
ENSG00000181036	FCRL6	-2.954016753	0.016913816
ENSG00000273066		-1.115420026	0.016967723
ENSG00000185641		-0.722022497	0.017013121
ENSG00000260136		-1.1586933	0.017013121
ENSG00000111786	SRSF9	-0.290775124	0.01716427
ENSG00000136718	IMP4	-0.447974818	0.017191643
ENSG00000107672	NSMCE4A	-0.530124376	0.017191643
ENSG00000164904	ALDH7A1	-1.637303333	0.017204497
ENSG00000174775	HRAS	-0.608484071	0.017204497
ENSG00000213741	RPS29	-0.609704231	0.017272022
ENSG00000256060	TRAPPC2B	-0.890904051	0.017272022
ENSG00000164406	LEAP2	-1.156953371	0.017356553
ENSG00000179085	DPM3	-0.657218469	0.01736454
ENSG00000131368	MRPS25	-0.572713299	0.017405633
ENSG00000242660		-1.084394867	0.017591376
ENSG00000108773	KAT2A	-0.691814886	0.017591376
ENSG00000103253	HAGHL	-1.105040543	0.017644567
ENSG00000135185	TMEM243	-0.534280262	0.017692163
ENSG00000234444	ZNF736	-0.568903991	0.017776319
ENSG00000275764		-0.67758894	0.017776546

ENSG00000175262	C1orf127	-1.068850696	0.017884059
ENSG00000138688	KIAA1109	0.578015415	0.017884059
ENSG00000134545	KLRC1	-3.060498156	0.017884059
ENSG00000160948	VPS28	-0.482331785	0.017912834
ENSG00000198680	TUSC1	-1.63488801	0.017912834
ENSG00000244380		-1.210808817	0.017913014
ENSG00000279088		-0.7841835	0.017913014
ENSG00000214140	PRCD	-3.55381793	0.017913014
ENSG00000160113	NR2F6	-1.212454217	0.017945887
ENSG00000165775	FUNDC2	-0.418516625	0.018028659
ENSG00000086619	ERO1B	-0.585984108	0.018068441
ENSG00000105443	CYTH2	-0.466271863	0.018074086
ENSG00000090971	NAT14	-0.839564025	0.01810492
ENSG00000027075	PRKCH	-0.683584209	0.018111054
ENSG00000266998		-1.625654577	0.018288125
ENSG00000224420	ADM5	-1.025623561	0.018441558
ENSG00000275055		-1.160901851	0.018536175
ENSG00000173818	ENDOV	-0.614846388	0.018655075
ENSG00000215421	ZNF407	0.484096377	0.018655075
ENSG00000057757	PITHD1	-0.534868587	0.018773235
ENSG00000203791	METTL10	-0.543901435	0.018789729
ENSG00000247092	SNHG10	-1.005768906	0.018809841
ENSG00000116096	SPR	-0.969625501	0.018816244
ENSG00000066135	KDM4A	0.499997993	0.018864213
ENSG00000149970	CNKSR2	-2.458232537	0.018864213
ENSG00000279576		-2.385761474	0.01887525
ENSG00000171428	NAT1	0.969547683	0.018880774
ENSG00000278611		-1.463296899	0.018880774
ENSG00000012061	ERCC1	-0.522775716	0.018880774
ENSG00000171680	PLEKHG5	-2.557725989	0.019029394
ENSG00000074071	MRPS34	-0.739213557	0.019083891
ENSG00000153827	TRIP12	0.389922822	0.019096363
ENSG00000101132	PFDN4	-0.597024801	0.019096363
ENSG00000271335		-1.052149329	0.019336499
ENSG00000253948		-1.081048827	0.019360299
ENSG00000101444	AHCY	-0.670269235	0.019465108
ENSG00000173653	RCE1	-0.534707693	0.019468974
ENSG00000138385	SSB	0.58752727	0.019510674
ENSG00000148334	PTGES2	-0.439576683	0.019510674
ENSG00000268061	NAPA-AS1	-1.312402907	0.019510674
ENSG00000241370	RPP21	-0.727817679	0.019566259
ENSG00000100429	HDAC10	-0.663306707	0.019566259
ENSG00000102103	PQBP1	-0.428839085	0.019568386
ENSG00000157500	APPL1	0.524342498	0.019609845
ENSG00000106603	COA1	0.60388005	0.019609845
ENSG00000181074	OR52N4	4.200486331	0.01962332
ENSG00000008324	SS18L2	-0.537276551	0.019633656
ENSG00000260081		-1.673892894	0.019668701

ENSG00000104408	EIF3E	-0.441967395	0.019908287
ENSG00000230629	RPS23P8	-0.677825922	0.019953543
ENSG00000004059	ARF5	-0.355552505	0.020012146
ENSG00000183826	BTBD9	0.69115264	0.020024064
ENSG00000105552	BCAT2	-0.681559824	0.020066095
ENSG00000248015		-1.806609329	0.020078169
ENSG00000124602	UNC5CL	-0.856182346	0.020130699
ENSG00000153339	TRAPPC8	0.512528972	0.020179015
ENSG00000011478	QPCTL	-0.732466564	0.020200488
ENSG00000258352		-2.125330043	0.020205048
ENSG00000132635	PCED1A	-0.528318267	0.02023885
ENSG00000164405	UQCRQ	-0.49806451	0.020393923
ENSG00000158062	UBXN11	-0.447512591	0.020627017
ENSG00000127445	PIN1	-0.41622989	0.020669226
ENSG00000108700	CCL8	4.226346124	0.020937793
ENSG00000151131	C12orf45	-0.578411949	0.020964103
ENSG00000180902	D2HGDH	-0.831927348	0.021049121
ENSG00000196756	SNHG17	-0.679295818	0.02112766
ENSG00000165949	IFI27	4.770825258	0.021135298
ENSG00000095066	HOOK2	-0.664706979	0.021227486
ENSG00000130770	ATPIF1	-0.4965366	0.021237623
ENSG00000239855	IGKV1-6	-3.375942046	0.021303799
ENSG00000100393	EP300	0.549368911	0.021388682
ENSG00000169902	TPST1	2.406367558	0.021675445
ENSG00000089289	IGBP1	-0.365223557	0.021732681
ENSG00000179526	SHARPIN	-0.464015576	0.02174475
ENSG00000242259	C22orf39	-0.477965785	0.021754934
ENSG00000142089	IFITM3	1.848748676	0.021904001
ENSG00000207110	RNU1-106P	-2.150701395	0.02193966
ENSG00000239951	IGKV3-20	-2.719894061	0.021964437
ENSG00000248124	RRN3P1	-0.723521661	0.021980056
ENSG00000128191	DGCR8	-0.445673273	0.021983008
ENSG00000165914	TTC7B	0.899027111	0.022018751
ENSG00000038219	BOD1L1	0.59881334	0.022030571
ENSG00000060140	STYK1	-3.490852114	0.022077729
ENSG00000170906	NDUFA3	-0.466914138	0.022114575
ENSG00000176101	SSNA1	-0.527596025	0.022180152
ENSG00000054690	PLEKHH1	1.179106108	0.022366335
ENSG00000273759		-1.389663899	0.022366335
ENSG00000008128	CDK11A	-0.661219865	0.022470092
ENSG00000185187	SIGIRR	-0.597020231	0.022470092
ENSG00000105677	TMEM147	-0.514631162	0.022617544
ENSG00000261416		-0.743872654	0.022847321
ENSG00000226419	SLC16A1-AS1	-0.59680562	0.022882342
ENSG00000160131	VMA21	-0.424717368	0.022882342
ENSG00000050426	LETMD1	-0.514785631	0.022883852
ENSG00000183763	TRAIP	-1.366846428	0.022910014
ENSG00000164048	ZNF589	-0.710868126	0.022916539

ENSG0000083838	ZNF446	-0.561847927	0.022922934
ENSG00000266340		-1.228944183	0.022948669
ENSG00000268713		-0.724836241	0.023065269
ENSG00000213066	FGFR1OP	-0.727638304	0.023151449
ENSG00000280325		-1.149338207	0.023299174
ENSG00000255760		-1.565508151	0.023299174
ENSG00000103363	TCEB2	-0.531490165	0.023394081
ENSG00000272221		-1.56219835	0.023413879
ENSG00000174109	C16orf91	-0.630689789	0.023529239
ENSG00000265241	RBM8A	-0.328568895	0.023582225
ENSG00000234389		-2.778933482	0.023634995
ENSG00000277511		1.541838154	0.023634995
ENSG00000202198		-1.454250762	0.023697983
ENSG00000123338	NCKAP1L	0.45373088	0.023697983
ENSG00000135636	DYSF	1.700525736	0.023771406
ENSG00000271964		-1.568971033	0.023771406
ENSG00000243449	C4orf48	-1.020338705	0.023771406
ENSG00000147155	EBP	-0.61772847	0.023771406
ENSG00000159399	HK2	0.626258385	0.023851496
ENSG00000105583	WDR83OS	-0.414973876	0.023851496
ENSG00000231584	FAHD2CP	-1.220708606	0.023855496
ENSG00000248019	FAM13A-AS1	-0.581646659	0.023855496
ENSG00000109390	NDUFC1	-0.53457162	0.023855496
ENSG00000145592	RPL37	-0.453959462	0.024162562
ENSG00000175602	CCDC85B	-0.666596767	0.024201645
ENSG00000183617	MRPL54	-0.601750994	0.024201645
ENSG00000105379	ETFB	-0.557088643	0.024201645
ENSG00000100226	GTPBP1	0.860357193	0.024258111
ENSG00000233483		-3.000399729	0.024368275
ENSG00000272533	SNORA28	1.931306279	0.024373057
ENSG00000198556	ZNF789	-0.647327969	0.024401395
ENSG00000087460	GNAS	-0.282287506	0.024401395
ENSG00000129515	SNX6	0.508605882	0.02440616
ENSG00000127415	IDUA	-0.545859643	0.024551469
ENSG00000120733	KDM3B	0.438746364	0.024564399
ENSG00000213442	RPL18AP3	-0.597550007	0.024569108
ENSG00000217094	PPIAP31	-0.489413968	0.024617783
ENSG00000168101	NUDT16L1	-0.508281781	0.024765368
ENSG00000260793		-0.691976833	0.024765368
ENSG00000266402	SNHG25	-1.096040587	0.024765368
ENSG00000100379	KCTD17	-0.717785173	0.024765368
ENSG00000142856	ITGB3BP	-0.879563266	0.024801954
ENSG00000103037	SETD6	-0.605072025	0.024838144
ENSG00000184702	Sep-05	4.670108675	0.02489078
ENSG00000188690	UROS	-0.439894774	0.024999856
ENSG00000130165	ELOF1	-0.533120665	0.025007238
ENSG00000211799	TRAV19	-3.018557236	0.02501746
ENSG00000177548	RABEP2	-0.547405608	0.025031193

ENSG00000115750	TAF1B	0.661856621	0.025236953
ENSG00000177272	KCNA3	1.044102485	0.025240999
ENSG00000267074		-2.394314047	0.025240999
ENSG00000249855	EEF1A1P19	-0.730287065	0.025253359
ENSG00000134313	KIDINS220	0.538479177	0.025324746
ENSG00000067829	IDH3G	-0.301618797	0.025430056
ENSG00000103254	FAM173A	-0.927221358	0.025566554
ENSG00000053501	USE1	-0.4832401	0.025566554
ENSG00000182173	TSEN54	-0.706992645	0.025744107
ENSG00000115042	FAHD2A	-0.563994819	0.025773698
ENSG00000243466	IGKV1-5	-2.781513217	0.025848782
ENSG00000126768	TIMM17B	-0.409820478	0.025848782
ENSG00000204344	STK19	-0.519017861	0.025894128
ENSG00000107537	PHYH	-0.634643832	0.025894128
ENSG00000124243	BCAS4	-1.002085367	0.025916237
ENSG00000179954	SSC5D	-1.765948635	0.025981434
ENSG00000198546	ZNF511	-0.428775611	0.026051472
ENSG00000140030	GPR65	0.7729409	0.026108199
ENSG00000117410	ATP6V0B	-0.484516882	0.02615247
ENSG00000117228	GBP1	1.651625141	0.02615247
ENSG00000268403		-0.747181123	0.02615247
ENSG00000152766	ANKRD22	1.646745787	0.02615247
ENSG00000131979	GCH1	0.716517277	0.02615247
ENSG00000006282	SPATA20	-0.829620121	0.02615247
ENSG00000250506	CDK3	-0.952524997	0.02615247
ENSG00000229299		-1.395536895	0.02615247
ENSG00000100483	VCPKMT	-0.648172718	0.026160239
ENSG00000164114	MAP9	-2.175604169	0.0261846
ENSG00000134516	DOCK2	0.441522733	0.0261846
ENSG00000156508	EEF1A1	-0.475740995	0.0261846
ENSG00000162654	GBP4	1.243618971	0.026437529
ENSG00000005810	MYCBP2	0.504227306	0.02654205
ENSG00000270170	NCBP2-AS2	-0.548623003	0.02655931
ENSG00000085465	OVGP1	-1.160938159	0.026573702
ENSG00000129484	PARP2	-0.691438455	0.026573702
ENSG00000103485	QPRT	-0.898589475	0.026573702
ENSG00000104964	AES	-0.427359696	0.026574843
ENSG00000162415	ZSWIM5	-2.559771739	0.026613747
ENSG00000243244	STON1	-0.906717588	0.026613747
ENSG00000126262	FFAR2	1.838254989	0.026613747
ENSG00000100596	SPTLC2	0.823111971	0.026648202
ENSG00000276259		-1.140236704	0.026648202
ENSG00000140853	NLRC5	0.588146336	0.026665938
ENSG00000069493	CLEC2D	-0.772199969	0.026715137
ENSG00000072195	SPEG	-1.707509795	0.026798481
ENSG00000173762	CD7	-0.887402753	0.026843681
ENSG00000169592	INO80E	-0.680623857	0.026884029
ENSG00000279377		-3.228588384	0.026946663

ENSG00000120699	EXOSC8	-0.495694196	0.027067486
ENSG00000135930	EIF4E2	-0.334957596	0.027132009
ENSG00000218426		-0.566652354	0.027132009
ENSG00000135144	DTX1	-2.360087427	0.027132009
ENSG00000174365	SNHG11	-0.601499649	0.027132009
ENSG00000204136	GGTA1P	-1.548244445	0.027168336
ENSG00000173141	MRPL57	-0.545204375	0.027218216
ENSG00000171476	HOPX	-1.814377133	0.02725711
ENSG00000153815	CMIP	0.446230822	0.02725711
ENSG00000099840	IZUMO4	-0.761666539	0.02725711
ENSG00000174718	KIAA1551	0.801038844	0.027293241
ENSG00000125611	CHCHD5	-0.596177327	0.027449928
ENSG00000274943		-1.251394839	0.027449928
ENSG00000151773	CCDC122	-0.999013396	0.027559353
ENSG00000226360	RPL10AP6	-0.78768006	0.027649747
ENSG00000115307	AUP1	-0.266297755	0.027976139
ENSG00000129559	NEDD8	-0.442027223	0.028238449
ENSG00000168890	TMEM150A	-0.582318444	0.028273716
ENSG00000244733		-0.93714824	0.028307948
ENSG00000011028	MRC2	-2.970589196	0.028437908
ENSG00000112294	ALDH5A1	-1.585114286	0.028502674
ENSG00000214535	RPS15AP1	-0.78077908	0.028502674
ENSG00000159374	M1AP	-0.956396706	0.028673255
ENSG00000102554	KLF5	2.351671248	0.02875739
ENSG00000113161	HMGCR	0.529940949	0.028764719
ENSG00000182154	MRPL41	-0.731952208	0.028781917
ENSG00000182010	RTKN2	-1.804522747	0.028930998
ENSG00000167107	ACSF2	-0.76704756	0.028960748
ENSG00000218227		-0.546770316	0.029115269
ENSG00000218208	RPS27AP11	-1.482902823	0.02955142
ENSG00000256039		-2.381107855	0.02955142
ENSG00000260778	MIR940	-1.170978183	0.02955142
ENSG00000109927	TECTA	1.566860643	0.029701385
ENSG00000177732	SOX12	-0.922954635	0.029830304
ENSG00000110777	POU2AF1	-1.398913506	0.029950324
ENSG00000035720	STAP1	2.025980146	0.029990802
ENSG00000213366	GSTM2	-0.893209751	0.030044717
ENSG00000138031	ADCY3	1.254956405	0.030417542
ENSG00000204852	TCTN1	-0.761580057	0.030417542
ENSG00000037749	MFAP3	0.77347169	0.030526444
ENSG00000100100	PIK3IP1	-0.88295031	0.030526444
ENSG00000275832	ARHGAP23	1.352456469	0.030574038
ENSG00000224032	EPB41L4A-AS1	-0.690196819	0.030603847
ENSG00000139626	ITGB7	0.88692263	0.030603847
ENSG00000233276	GPX1	-0.686458178	0.030638697
ENSG00000159714	ZDHHC1	-1.665590938	0.030669032
ENSG00000183401	CCDC159	-0.541278862	0.03069316
ENSG00000123219	CENPK	-1.610867724	0.030743588

ENSG00000100345	MYH9	0.597007844	0.030743588
ENSG00000084623	EIF3I	-0.416293458	0.030748141
ENSG00000171453	POLR1C	-0.646887259	0.030924664
ENSG00000100417	PMM1	-0.47264246	0.030924898
ENSG00000112378	PERP	-2.635919782	0.03095675
ENSG00000007080	CCDC124	-0.466497542	0.03095675
ENSG00000276819	TRBV15	-3.145480665	0.030959377
ENSG00000270550	IGHV3-30	-2.957175826	0.030980999
ENSG00000251259		-0.675131068	0.031101143
ENSG00000272936		-1.075203312	0.031194165
ENSG00000214941	ZSWIM7	-0.594116675	0.031194165
ENSG00000274104		-0.910782647	0.031194165
ENSG00000189403	HMGB1	-0.453300593	0.031260233
ENSG00000255987	TOMM20P2	-3.003159261	0.031260233
ENSG00000169885	CALML6	-2.07770488	0.031301221
ENSG00000136149	RPL13AP25	-0.875344528	0.031360857
ENSG00000137501	SYTL2	-1.024627903	0.031654105
ENSG00000182957	SPATA13	0.620572627	0.031654105
ENSG00000211706	TRBV6-1	-3.141847884	0.031793589
ENSG00000100403	ZC3H7B	0.41059234	0.031793589
ENSG00000154511	FAM69A	0.942666024	0.03179971
ENSG00000196131	VN1R2	-1.355878047	0.03179971
ENSG00000211767	TRBJ2-3	-3.139457305	0.03189769
ENSG00000185972	CCIN	-1.214521614	0.031949625
ENSG00000163041	H3F3A	-0.341386509	0.03204973
ENSG00000175283	DOLK	0.864708389	0.032067566
ENSG00000232613		-3.126739335	0.032087895
ENSG00000105875	WDR91	-0.500434143	0.032105275
ENSG00000255857	PXN-AS1	-1.156244751	0.032110066
ENSG00000005436	GCFC2	-0.547052323	0.032224574
ENSG00000262484	CCER2	-1.238904014	0.032293073
ENSG00000241741	RPL7AP30	-0.54297574	0.032676997
ENSG00000204977	TRIM13	-0.703229421	0.032676997
ENSG00000073605	GSDMB	-0.916128152	0.032676997
ENSG00000205089	CCNI2	-3.132477657	0.032699469
ENSG00000213654	GPSM3	-0.350420323	0.032699469
ENSG00000228623	ZNF883	-1.666408122	0.032699469
ENSG00000176994	SMCR8	0.614262407	0.032762852
ENSG00000013306	SLC25A39	-0.406357824	0.032994327
ENSG00000177954	RPS27	-0.508490461	0.03302649
ENSG00000282133	TRBJ1-3	-3.122122768	0.03302649
ENSG00000013288	MAN2B2	0.458291424	0.033037605
ENSG00000215252	GOLGA8B	-0.960610528	0.033108971
ENSG00000272106		-0.544321447	0.033155345
ENSG00000174669	SLC29A2	-0.778754721	0.033155345
ENSG00000223496	EXOSC6	-0.60991536	0.033155345
ENSG00000176171	BNIP3	-0.714475273	0.033256389
ENSG00000274712		-0.79595103	0.033330956

ENSG00000255569	TRAV1-1	-3.157950142	0.033368408
ENSG00000183049	CAMK1D	-0.527030404	0.033368662
ENSG00000267787		0.735793459	0.033478936
ENSG00000232586	KIAA1614-AS1	1.348247254	0.033492287
ENSG00000213533	TMEM110	0.744363971	0.033620468
ENSG00000087191	PSMC5	-0.391997405	0.033733249
ENSG00000196642	RABL6	-0.356265258	0.033745323
ENSG00000177700	POLR2L	-0.603986621	0.033789369
ENSG00000169740	ZNF32	-0.471885165	0.033860637
ENSG00000133466	C1QTNF6	-0.916499763	0.033862151
ENSG00000154153	FAM134B	1.041060832	0.033871397
ENSG00000122034	GTF3A	-0.386096365	0.033902402
ENSG00000114923	SLC4A3	-2.051646499	0.033909632
ENSG00000185495		-0.84349115	0.033927887
ENSG00000124374	PAIP2B	-1.228347126	0.033969352
ENSG00000238578	SNORD4A	-0.922500975	0.034027811
ENSG00000159884	CCDC107	-0.574303765	0.034072779
ENSG00000128253	RFPL2	-2.198988304	0.034094497
ENSG00000182827	ACBD3	0.610083456	0.034193911
ENSG00000095787	WAC	0.350905793	0.034205993
ENSG00000267128		-3.170802408	0.034232141
ENSG00000280033		-0.950904987	0.034287409
ENSG00000165813	CCDC186	0.623636172	0.034411608
ENSG00000211765	TRBJ2-2	-3.127492404	0.03460093
ENSG00000001497	LAS1L	-0.335848855	0.03460093
ENSG00000107014	RLN2	-3.124462695	0.034609656
ENSG00000196557	CACNA1H	-3.13753811	0.034682679
ENSG00000135423	GLS2	-3.134050793	0.034688976
ENSG00000182195	LDOC1	-2.564106141	0.034741283
ENSG00000234936		-1.215175687	0.034762409
ENSG00000224650	IGHV3-74	-3.013773143	0.034804186
ENSG00000132256	TRIM5	1.293361757	0.034851519
ENSG00000119862	LGALSL	-1.980550104	0.034865078
ENSG00000171049	FPR2	1.784377785	0.03487645
ENSG00000103145	HCFC1R1	-0.580117969	0.034891638
ENSG00000120899	PTK2B	0.419871291	0.034929569
ENSG00000274349	ZNF658	1.776641156	0.034967937
ENSG00000164151	ICE1	0.430903588	0.034988015
ENSG00000127054	CPSF3L	-0.350677884	0.035066143
ENSG00000166669	ATF7IP2	-0.586445406	0.035067442
ENSG00000125901	MRPS26	-0.637862287	0.035067442
ENSG00000084072	PPIE	-0.906582112	0.035143519
ENSG00000213889	PPM1N	-1.131579967	0.035212093
ENSG00000131504	DIAPH1	0.451591587	0.035247204
ENSG00000166317	SYNPO2L	-1.023135003	0.035247204
ENSG00000211941	IGHV3-11	-3.140047156	0.035247204
ENSG00000175886	RPL7AP66	-0.900023271	0.035317555
ENSG00000204311	DFNB59	-1.283434607	0.035362496

ENSG00000273428		-2.552165904	0.035362496
ENSG00000183762	KREMEN1	1.345888704	0.035488619
ENSG00000187608	ISG15	1.574771231	0.035526645
ENSG00000106537	TSPAN13	-1.752663132	0.035546336
ENSG00000104133	SPG11	0.540094832	0.035546336
ENSG00000165996	HACD1	1.579230811	0.035559015
ENSG00000033178	UBA6	0.415569765	0.035559978
ENSG00000250318		-0.949237485	0.03568527
ENSG00000173915	USMG5	-0.480903549	0.035790317
ENSG00000198840	MT-ND3	-0.637821133	0.035790317
ENSG00000165113	GKAP1	-0.844105722	0.035813908
ENSG00000162191	UBXN1	-0.397399403	0.035830161
ENSG00000157734	SNX22	-1.134628183	0.035852094
ENSG00000105135	ILVBL	-0.614590821	0.035878418
ENSG00000206573	THUMPD3-AS1	-0.50434949	0.035878721
ENSG00000225783	MIAT	-1.514720714	0.035903707
ENSG00000010818	HIVEP2	0.707613798	0.035934976
ENSG00000213398	LCAT	-0.610943667	0.035934976
ENSG00000210154	MT-TD	-1.252216756	0.03613769
ENSG00000004487	KDM1A	-0.325836012	0.036151703
ENSG00000160058	BSDC1	0.386309303	0.036151703
ENSG00000162714	ZNF496	0.797889866	0.036151703
ENSG00000166394	CYB5R2	2.156661439	0.036151703
ENSG00000256525	POLG2	-0.595708069	0.036375289
ENSG00000228863		-0.916112411	0.036647666
ENSG00000272282		-3.14211798	0.036647666
ENSG00000066084	DIP2B	0.623097424	0.036647666
ENSG00000240403	KIR3DL2	-3.01134738	0.036647666
ENSG00000242252	BGLAP	-1.303679641	0.036820939
ENSG00000151923	TIAL1	-0.350926698	0.036966771
ENSG00000259865		-0.615671285	0.037040779
ENSG00000225663	MCRIP1	-0.506342952	0.037040779
ENSG00000165637	VDAC2	-0.405267524	0.037064592
ENSG00000175634	RPS6KB2	-0.359565405	0.037097045
ENSG00000129244	ATP1B2	2.452024696	0.037097045
ENSG00000173281	PPP1R3B	1.00650917	0.037148637
ENSG00000138942	RNF185	0.438314908	0.03717129
ENSG00000110047	EHD1	1.190250834	0.037343987
ENSG00000125844	RRBP1	0.760931306	0.037419802
ENSG00000164008	C1orf50	-0.582178789	0.037429087
ENSG00000211943	IGHV3-15	-2.766614175	0.037449513
ENSG00000204348	DXO	-0.608004481	0.037464351
ENSG00000226525	RPS7P10	-0.665779571	0.037464351
ENSG00000104979	C19orf53	-0.392887873	0.037464351
ENSG00000126215	XRCC3	-0.778518787	0.037486446
ENSG00000070718	AP3M2	-0.755236337	0.037567436
ENSG00000050165	DKK3	-3.07002126	0.037722116
ENSG00000143353	LYPLAL1	-0.67515051	0.03773692

ENSG00000105851	PIK3CG	0.650600721	0.037782087
ENSG00000161618	ALDH16A1	-0.538054593	0.037782087
ENSG00000134193	REG4	-3.132365841	0.03779011
ENSG00000112851	ERBIN	0.407055497	0.03779011
ENSG00000231621		-3.108294666	0.037792476
ENSG00000103495	MAZ	-0.383223456	0.037792476
ENSG00000219665		-0.577610071	0.037792476
ENSG00000196456	ZNF775	-0.841372749	0.037894597
ENSG00000130299	GTPBP3	-0.560963736	0.038045497
ENSG00000164327	RICTOR	0.577728085	0.038089008
ENSG00000242686		-1.980835601	0.038230786
ENSG00000211934	IGHV1-2	-3.132088986	0.038230786
ENSG00000169689	CENPX	-0.677395594	0.038230786
ENSG00000139610	CELA1	-1.856303945	0.038291031
ENSG00000196459	TRAPPC2	-0.650900414	0.038295141
ENSG00000272010		-1.835313899	0.038367689
ENSG00000168672	FAM84B	-1.180598628	0.038423588
ENSG00000067900	ROCK1	0.496609082	0.038423588
ENSG00000231793	DOC2GP	-2.180461708	0.038429123
ENSG00000085831	TTC39A	3.959541993	0.038460999
ENSG00000106400	ZNHIT1	-0.454793794	0.038460999
ENSG00000163354	DCST2	-0.917820082	0.038577925
ENSG00000131495	NDUFA2	-0.506561418	0.038577925
ENSG00000256453	DND1	-0.968704311	0.038577925
ENSG00000105649	RAB3A	-1.295725834	0.038577925
ENSG00000167685	ZNF444	-0.539939093	0.038577925
ENSG00000211651	IGLV1-44	-2.342070004	0.038577925
ENSG00000171861	MRM3	-0.543922883	0.03879922
ENSG00000204314	PRRT1	-2.135957472	0.038925099
ENSG00000211710	TRBV4-1	-2.583422807	0.038925858
ENSG00000197381	ADARB1	0.752879288	0.038961365
ENSG00000235499		1.34965032	0.039043741
ENSG00000104886	PLEKHJ1	-0.591586089	0.039043741
ENSG00000125868	DSTN	-0.62240147	0.039070752
ENSG00000005513	SOX8	-3.13322069	0.039194706
ENSG00000171443	ZNF524	-0.57660138	0.039247214
ENSG00000180316	PNPLA1	1.508094716	0.039253828
ENSG00000167118	URM1	-0.352221087	0.039253828
ENSG00000127540	UQCR11	-0.456021005	0.039253828
ENSG00000205726	ITSN1	0.814969215	0.039253828
ENSG00000154134	ROBO3	-1.100776893	0.039299674
ENSG00000141696	P3H4	-1.281001714	0.039390117
ENSG00000136147	PHF11	0.604548822	0.039440758
ENSG00000213145	CRIP1	-0.823440506	0.039440758
ENSG00000171596	NMUR1	-2.218089977	0.039540801
ENSG00000079462	PAFAH1B3	-0.62658285	0.039540801
ENSG00000271869		-0.849887104	0.039619223
ENSG00000181038	METTL23	-0.400895686	0.039619223

ENSG00000234127	TRIM26	0.525215859	0.039621182
ENSG00000068305	MEF2A	0.430996933	0.039688689
ENSG00000086289	EPDR1	1.976097468	0.039701695
ENSG00000109832	DDX25	1.086776017	0.039702803
ENSG00000133216	EPHB2	2.16308285	0.039724731
ENSG00000120217	CD274	1.243001197	0.039751034
ENSG00000256427		-3.133555552	0.039751034
ENSG00000260404		0.813739748	0.039797937
ENSG00000111364	DDX55	-0.583195421	0.039797937
ENSG00000204859	ZBTB48	-0.433862951	0.039801849
ENSG00000181097		-1.263586778	0.039801849
ENSG00000253755	IGHGP	-3.00592943	0.039860683
ENSG00000183066	WBP2NL	-1.017491409	0.039860683
ENSG00000173511	VEGFB	-1.362026273	0.039932513
ENSG00000112695	COX7A2	-0.403153351	0.040112174
ENSG00000124802	EEF1E1	-0.748242645	0.040136221
ENSG00000111678	C12orf57	-0.665255545	0.0402159
ENSG00000089248	ERP29	-0.340637481	0.040305685
ENSG00000197774	EME2	-0.456831248	0.040496763
ENSG00000116688	MFN2	0.402679218	0.040519935
ENSG00000144061	NPHP1	-1.476097749	0.040648248
ENSG00000169964	TMEM42	-0.724959272	0.040709488
ENSG00000245937	LINC01184	-0.655871615	0.040709488
ENSG00000137411	VAR2	-0.683622059	0.040709488
ENSG00000120647	CCDC77	-0.607987808	0.040709488
ENSG00000159618	ADGRG5	-1.371534879	0.040709488
ENSG00000204435	CSNK2B	-0.62467718	0.041049268
ENSG00000125900	SIRPD	1.071804264	0.041148223
ENSG00000167601	AXL	2.128461992	0.041327364
ENSG00000158470	B4GALT5	0.908361385	0.041515923
ENSG00000107020	PLGRKT	-0.576859872	0.041560699
ENSG00000173272	MZT2A	-0.661258639	0.041601303
ENSG00000142039	CCDC97	0.536404253	0.041601303
ENSG00000278376		-0.906271269	0.041643198
ENSG00000225450		1.692333359	0.041643198
ENSG00000258301		-0.871121577	0.041831183
ENSG00000106333	PCOLCE	-0.704478829	0.041922642
ENSG00000106028	SSBP1	-0.363930247	0.042031514
ENSG00000272800		-1.712527844	0.042133816
ENSG00000272994		-0.79097072	0.042199206
ENSG00000206417	H1FX-AS1	-0.942880325	0.042202502
ENSG00000276278		-0.848138028	0.042286316
ENSG00000116514	RNF19B	0.832445142	0.042665573
ENSG00000167702	KIFC2	-0.586367448	0.042697787
ENSG00000162496	DHRS3	-2.953784123	0.042812027
ENSG00000136271	DDX56	-0.353571533	0.042812027
ENSG00000172009	THOP1	-0.569723692	0.04282179
ENSG00000101945	SUV39H1	-0.702152696	0.042843327

ENSG00000137877	SPTBN5	1.403632516	0.042903445
ENSG00000272821		-0.871258572	0.042944917
ENSG00000135632	SMYD5	-0.570038878	0.043090539
ENSG00000100731	PCNX1	0.483813871	0.043090539
ENSG00000242588		1.055293802	0.043117698
ENSG00000225079	FTH1P22	-3.140275162	0.043390405
ENSG00000126264	HCST	-0.654984793	0.043390405
ENSG00000233392		-2.558434638	0.04353287
ENSG00000107036	RIC1	0.43582337	0.043601244
ENSG00000105185	PDCD5	-0.532190421	0.043712374
ENSG00000165475	CRYL1	-0.539781942	0.043790511
ENSG00000205937	RNPS1	-0.341590993	0.043790511
ENSG00000244187	TMEM141	-0.685220211	0.043860002
ENSG00000159388	BTG2	-0.944487292	0.043897981
ENSG00000204856	FAM216A	-0.84682993	0.043897981
ENSG00000137962	ARHGAP29	1.051223956	0.043926876
ENSG00000227195	MIR663AHG	-1.411534919	0.043926876
ENSG00000104881	PPP1R13L	-0.780944437	0.043926876
ENSG00000197705	KLHL14	-2.316990813	0.04404741
ENSG00000137038	TMEM261	-0.694989459	0.044770388
ENSG00000164190	NIPBL	0.406450507	0.044985003
ENSG00000198959	TGM2	1.490232505	0.044985003
ENSG00000261584		-1.96951796	0.045126389
ENSG00000261526		-0.879334188	0.045126389
ENSG00000105173	CCNE1	-1.187241324	0.045126389
ENSG00000142252	GEMIN7	-0.802416502	0.045209433
ENSG00000106605	BLVRA	0.910923507	0.045212033
ENSG00000115944	COX7A2L	-0.356609109	0.045220017
ENSG00000155640	NA	0.951748226	0.0452337
ENSG00000198911	SREBF2	0.468409952	0.045313804
ENSG00000162913	C1orf145	-2.21393863	0.045386569
ENSG00000007541	PIGQ	-0.437298481	0.045538056
ENSG00000196236	XPNPEP3	-0.527608079	0.045538056
ENSG00000105393	BABAM1	-0.423358927	0.04567379
ENSG00000159199	ATP5G1	-0.51456978	0.045726191
ENSG00000198832	SELENOM	-1.121426814	0.045900198
ENSG00000104320	NBN	0.741137042	0.046047821
ENSG00000096746	HNRNPH3	-0.438036113	0.046047821
ENSG00000225721		-1.538240325	0.046107389
ENSG00000214182	PTMAP5	-0.588603403	0.046171062
ENSG00000263001	GTF2I	0.574629654	0.046399404
ENSG00000138623	SEMA7A	-1.368472432	0.046754566
ENSG00000250151	ARPC4-TTLL3	1.245367423	0.046975622
ENSG00000142156	COL6A1	-2.06833588	0.047099833
ENSG00000164466	SFXN1	-0.616506192	0.047297351
ENSG00000178209	PLEC	0.612449371	0.047297351
ENSG00000166133	RPUSD2	-0.802790943	0.047297351
ENSG00000188827	SLX4	0.472253708	0.047297351

ENSG0000059769	DNAJC25	-0.727050959	0.04734267
ENSG00000100348	TXN2	-0.431569558	0.047433324
ENSG00000259321		-0.893552333	0.047544863
ENSG00000135940	COX5B	-0.40428577	0.047670323
ENSG00000138796	HADH	-0.680955157	0.047670323
ENSG00000185507	IRF7	1.082613662	0.047670323
ENSG00000281026	N4BP2L2-IT2	-0.881571941	0.047670323
ENSG00000146433	TMEM181	-0.477544591	0.047703669
ENSG00000099795	NDUFB7	-0.525882947	0.047841331
ENSG00000231672	DIRC3	-1.523878666	0.047960102
ENSG00000125386	FAM193A	0.359108794	0.047960102
ENSG00000204392	LSM2	-0.629947929	0.047960102
ENSG00000108465	CDK5RAP3	-0.396188459	0.047960102
ENSG00000229980	TOB1-AS1	-0.975982243	0.048004744
ENSG00000231389	HLA-DPA1	-1.104625514	0.048179614
ENSG00000276997		0.932703116	0.048298129
ENSG00000163510	CWC22	0.462638555	0.048298129
ENSG00000130414	NDUFA10	-0.315100921	0.048298129
ENSG00000090097	PCBP4	-0.995523988	0.048298129
ENSG00000229119		-0.934256325	0.048298129
ENSG00000113761	ZNF346	0.700737438	0.048298129
ENSG00000146677		-0.736273637	0.048298129
ENSG00000239789	MRPS17	-0.600990221	0.048298129
ENSG00000279265		-0.835295678	0.048298129
ENSG00000253716	MINCR	-1.008397938	0.048298129
ENSG00000137145	DENND4C	0.502569146	0.048298129
ENSG00000136908	DPM2	-0.544418804	0.048298129
ENSG00000168062	BATF2	2.116146273	0.048298129
ENSG00000175463	TBC1D10C	-0.501811702	0.048298129
ENSG00000205846	CLEC6A	1.25079601	0.048298129
ENSG00000123104	ITPR2	0.54579055	0.048298129
ENSG00000188735	TMEM120B	-0.638201046	0.048298129
ENSG00000263264		0.854515448	0.048298129
ENSG00000213923	CSNK1E	-0.540789582	0.048298129
ENSG00000100413	POLR3H	-0.555760907	0.048298129
ENSG00000116863	ADPRHL2	0.719165735	0.048327459
ENSG00000132549	VPS13B	0.456118001	0.048327459
ENSG00000124562	SNRPC	-0.435171679	0.048385038
ENSG00000211892	IGHG4	-3.171870814	0.048421228
ENSG00000156453	PCDH1	-3.131173973	0.048505302
ENSG00000239672	NME1	-0.941710009	0.048505302
ENSG00000173786	CNP	0.831595126	0.048564692
ENSG00000178146		0.953944381	0.048565964
ENSG00000239523	MYLK-AS1	-1.295860527	0.048618705
ENSG00000131398	KCNC3	-0.876916763	0.048651234
ENSG00000235174	RPL39P3	-0.593208277	0.048837099
ENSG00000198265	HELZ	0.432727014	0.048936843
ENSG00000172215	CXCR6	-3.076835336	0.048950544

ENSG00000169857	AVEN	-0.739128209	0.048950544
ENSG00000214087	ARL16	-0.675812865	0.048950544
ENSG00000152454	ZNF256	-0.901045616	0.049059893
ENSG00000278356		-1.236502025	0.049492704
ENSG00000184384	MAML2	0.687402868	0.049581291
ENSG00000165724	ZMYND19	-0.668099105	0.049640255
ENSG00000236618	PITPNA-AS1	-0.985406381	0.049640255
ENSG00000107951	MTPAP	-0.426214188	0.049642973
ENSG00000166557	TMED3	-0.430704924	0.049642973
ENSG00000100024	UPB1	2.84838004	0.049642973
ENSG00000196655	TRAPPC4	-0.510673309	0.049802622
ENSG00000197057	DTHD1	-2.997926109	0.049825364

Supplementary Table 2 - JDM on-treatment vs age-matched healthy control significantly DEG (p≤0.05)

Ensemble ID	hgnc_symbol	log fold change	Adjusted p value
ENSG00000180096		-2.052255975	2.09E-19
ENSG00000198821	CD247	-3.6853539	1.16E-18
ENSG00000167286	CD3D	-3.551669908	1.66E-16
ENSG00000172575	RASGRP1	-3.070795975	3.11E-15
ENSG00000211751	TRBC1	-3.419045734	2.20E-12
ENSG00000198286	CARD11	-2.796358277	5.84E-12
ENSG00000167984	NLRC3	-2.222497714	5.84E-12
ENSG00000146674	IGFBP3	-7.778707429	2.51E-11
ENSG00000211772	TRBC2	-2.989690802	2.61E-11
ENSG00000116824	CD2	-2.03086348	4.60E-11
ENSG00000160185	UBASH3A	-3.418915682	1.15E-10
ENSG00000135127	BICDL1	-2.590545427	1.25E-10
ENSG00000141293	SKAP1	-3.21275476	1.41E-10
ENSG00000107742	SPOCK2	-2.784990372	1.97E-10
ENSG00000211829	TRDC	-4.848737373	2.72E-10
ENSG00000100385	IL2RB	-4.05203449	3.01E-10
ENSG00000088387	DOCK9	-2.478453034	4.58E-10
ENSG00000107485	GATA3	-3.652286077	4.99E-10
ENSG00000111796	KLRB1	-4.239620129	4.99E-10
ENSG00000198851	CD3E	-3.527372282	1.25E-09
ENSG00000277734	TRAC	-3.315118258	1.58E-09
ENSG00000115085	ZAP70	-2.976472679	1.67E-09
ENSG00000245164	LINC00861	-3.746240843	1.67E-09
ENSG00000134954	ETS1	-1.916657616	2.44E-09
ENSG00000172005	MAL	-3.406085971	2.85E-09
ENSG00000159753	CARMIL2	-1.985304372	4.46E-09
ENSG00000139193	CD27	-3.232615925	4.63E-09
ENSG00000280135		-3.4001965	6.13E-09
ENSG00000185101	ANO9	-2.653857897	6.33E-09
ENSG00000227507	LTB	-1.880852284	2.48E-08
ENSG00000142173	COL6A2	-3.544316837	2.79E-08
ENSG00000145649	GZMA	-4.803964357	3.00E-08
ENSG00000165929	TC2N	-3.376202958	5.06E-08
ENSG00000067840	PDZD4	-3.586877431	5.94E-08
ENSG00000182866	LCK	-2.590769579	7.96E-08
ENSG00000100453	GZMB	-4.723558647	8.69E-08
ENSG00000152495	CAMK4	-2.462194431	8.92E-08
ENSG00000174917	C19orf70	-0.986150564	1.05E-07
ENSG00000101096	NFATC2	-1.775717851	1.24E-07
ENSG00000215788	TNFRSF25	-1.983277632	1.24E-07
ENSG00000100346	CACNA1I	-3.960522984	1.34E-07
ENSG00000110448	CD5	-2.699677477	1.67E-07
ENSG00000180644	PRF1	-3.978196809	1.67E-07
ENSG00000160856	FCRL3	-3.505239678	1.90E-07

ENSG00000112514	CUTA	-0.741980867	2.48E-07
ENSG00000274383		-1.929741987	2.48E-07
ENSG00000197635	DPP4	-3.321883831	4.53E-07
ENSG00000237702	TRBV3-1	-5.008641945	4.55E-07
ENSG00000181847	TIGIT	-4.389997803	4.99E-07
ENSG00000172428	COPS9	-0.788434886	5.05E-07
ENSG00000102245	CD40LG	-4.62875827	7.18E-07
ENSG00000175265	GOLGA8A	-1.927842692	7.18E-07
ENSG00000069667	RORA	-2.806765832	7.95E-07
ENSG00000130787	HIP1R	-2.317642191	9.45E-07
ENSG00000149527	PLCH2	-3.00759078	9.82E-07
ENSG00000127152	BCL11B	-3.159044333	9.85E-07
ENSG00000163600	ICOS	-3.065807292	1.89E-06
ENSG00000008517	IL32	-2.825328248	1.89E-06
ENSG00000013725	CD6	-2.598998759	1.89E-06
ENSG00000113263	ITK	-2.142174449	1.94E-06
ENSG00000089012	SIRPG	-2.841535191	1.95E-06
ENSG00000233355	CHRM3-AS2	-2.892835397	2.20E-06
ENSG00000157778	PSMG3	-0.925377317	2.32E-06
ENSG00000162894	FCMR	-2.313777415	2.39E-06
ENSG00000065675	PRKCQ	-2.086724153	2.49E-06
ENSG00000242485	MRPL20	-0.672956033	2.76E-06
ENSG00000163519	TRAT1	-2.572266006	2.93E-06
ENSG00000138795	LEF1	-2.744313922	3.13E-06
ENSG00000021300	PLEKHB1	-2.755212735	3.52E-06
ENSG00000172590	MRPL52	-1.039478499	3.75E-06
ENSG00000204922	UQCC3	-1.252279855	3.79E-06
ENSG00000168685	IL7R	-3.06562649	4.07E-06
ENSG00000115607	IL18RAP	-3.868129846	4.20E-06
ENSG00000163359	COL6A3	-3.042481553	5.16E-06
ENSG00000123545	NDUF4F4	-1.230931388	5.34E-06
ENSG00000188186	LAMTOR4	-0.896653885	5.75E-06
ENSG00000111371	SLC38A1	-1.333852375	6.23E-06
ENSG00000211747	TRBV20-1	-4.29557068	6.29E-06
ENSG00000147123	NDUFB11	-0.782339867	7.83E-06
ENSG00000108821	COL1A1	-5.839627398	1.19E-05
ENSG00000130332	LSM7	-0.840516981	1.19E-05
ENSG00000168813	ZNF507	-1.397131392	1.46E-05
ENSG00000027869	SH2D2A	-2.822038779	1.60E-05
ENSG00000099204	ABLIM1	-2.152294171	1.64E-05
ENSG00000073861	TBX21	-3.297294039	1.64E-05
ENSG00000100351	GRAP2	-2.003475841	1.78E-05
ENSG00000197540	GZMM	-2.01951176	1.84E-05
ENSG00000183648	NDUFB1	-0.807264541	2.03E-05
ENSG00000184260	HIST2H2AC	-1.373431101	2.65E-05
ENSG00000090266	NDUFB2	-0.824472141	2.75E-05
ENSG00000135426	TESPA1	-1.629451726	3.04E-05
ENSG00000116106	EPHA4	-3.313173692	3.48E-05

ENSG00000167515	TRAPPC2L	-0.735897306	3.59E-05
ENSG00000145494	NDUFS6	-1.015043482	3.67E-05
ENSG00000269911		-4.606404955	3.99E-05
ENSG00000162910	MRPL55	-0.83495544	4.65E-05
ENSG00000198780	FAM169A	-3.221200275	4.91E-05
ENSG00000100393	EP300	0.906548266	4.97E-05
ENSG00000149932	TMEM219	-0.585507926	5.00E-05
ENSG00000106624	AEBP1	-2.687495998	5.28E-05
ENSG00000280120		-1.334309218	5.39E-05
ENSG00000183918	SH2D1A	-3.218760784	5.93E-05
ENSG00000099624	ATP5D	-0.885647999	6.05E-05
ENSG00000185697	MYBL1	-2.184309898	6.07E-05
ENSG00000135972	MRPS9	-0.835375097	6.25E-05
ENSG00000237943	PRKCQ-AS1	-1.934661782	6.37E-05
ENSG00000188322	SBK1	-2.122566913	6.37E-05
ENSG00000081059	TCF7	-2.481024953	6.65E-05
ENSG00000106211	HSPB1	-1.187404627	6.97E-05
ENSG00000124203	ZNF831	-2.320006272	6.97E-05
ENSG00000172673	THEMIS	-2.063839691	7.28E-05
ENSG00000130635	COL5A1	-3.973796372	7.31E-05
ENSG00000007520	TSR3	-0.855987865	7.80E-05
ENSG00000174500	GCSAM	-4.046367946	7.97E-05
ENSG00000105369	CD79A	-2.076747185	8.79E-05
ENSG00000211655	IGLV1-36	-4.72487216	9.00E-05
ENSG00000137078	SIT1	-3.347098458	9.59E-05
ENSG00000131116	ZNF428	-0.760473447	9.82E-05
ENSG00000124181	PLCG1	-1.526371087	9.97E-05
ENSG00000214253	FIS1	-0.645207704	0.000104149
ENSG00000105379	ETFB	-0.859182741	0.000106419
ENSG00000076554	TPD52	-1.97094825	0.000121484
ENSG00000156110	ADK	-1.196227224	0.00012391
ENSG00000137288	UQCC2	-1.251893378	0.000125616
ENSG00000107223	EDF1	-0.632596227	0.000131092
ENSG00000110717	NDUFS8	-0.678684054	0.000140299
ENSG00000157570	TSPAN18	-3.716968277	0.000140877
ENSG00000146285	SCML4	-2.029414028	0.000144535
ENSG00000269293	ZSCAN16-AS1	-0.887401584	0.000145942
ENSG00000175854	SWI5	-0.98164604	0.000150055
ENSG00000211648	IGLV1-47	-4.162451755	0.000151866
ENSG00000154764	WNT7A	-4.452672944	0.000157734
ENSG00000135736	CCDC102A	-3.706893682	0.000177087
ENSG00000270189		-1.50166595	0.000185057
ENSG00000186265	BTLA	-2.860145709	0.000191827
ENSG00000173208	ABCD2	-2.674134864	0.000203269
ENSG00000124198	ARFGEF2	0.762532979	0.000206119
ENSG00000108961	RANGRF	-0.715893364	0.000220644
ENSG00000132704	FCRL2	-2.358634214	0.0002207
ENSG00000102030	NAA10	-0.808561228	0.0002207

ENSG00000103266	STUB1	-0.614031322	0.00022242
ENSG00000149541	B3GAT3	-0.715026991	0.000231571
ENSG00000189171	S100A13	-1.276796156	0.000232557
ENSG00000182004	SNRPE	-0.702748144	0.000241368
ENSG00000105851	PIK3CG	1.072334784	0.000256536
ENSG00000124172	ATP5E	-0.530371079	0.000256883
ENSG00000100075	SLC25A1	-0.814500073	0.000269424
ENSG00000142168	SOD1	-0.569101957	0.000277946
ENSG00000220205	VAMP2	-0.674680527	0.000278827
ENSG00000112182	BACH2	-1.875630295	0.000283723
ENSG00000268205		-0.897853759	0.000283723
ENSG00000241837	ATP5O	-0.627082799	0.000287438
ENSG00000112651	MRPL2	-0.754335639	0.000291318
ENSG00000278030	TRBV7-9	-4.257279795	0.000302609
ENSG00000143322	ABL2	0.930760122	0.00030897
ENSG00000170486	KRT72	-3.312303799	0.000310573
ENSG00000170291	ELP5	-0.585991686	0.000310573
ENSG00000127184	COX7C	-0.548030399	0.00031646
ENSG00000106355	LSM5	-0.69826303	0.000323502
ENSG00000137441	FGFBP2	-3.96553518	0.000341439
ENSG00000235162	C12orf75	-2.376290004	0.000341439
ENSG00000178982	EIF3K	-0.556702503	0.000346212
ENSG00000213626	LBH	-1.73764558	0.00035002
ENSG00000169397	RNASE3	-2.905581045	0.000353281
ENSG00000109390	NDUFC1	-0.778152395	0.000357875
ENSG00000280237	MIR4697HG	-3.6930875	0.000370798
ENSG00000165272	AQP3	-2.503749656	0.000388947
ENSG00000272034	SNORD14A	-1.246736407	0.000396447
ENSG00000161405	IKZF3	-1.248053926	0.000396447
ENSG00000130313	PGLS	-0.676717342	0.000409576
ENSG00000204392	LSM2	-1.002115829	0.000416218
ENSG00000143793	C1orf35	-0.872094409	0.000420175
ENSG00000106400	ZNHIT1	-0.695513813	0.000424608
ENSG00000176476	SGF29	-0.685619041	0.000424608
ENSG00000170906	NDUFA3	-0.663695681	0.000426697
ENSG00000153283	CD96	-2.727977245	0.000428379
ENSG00000123066	MED13L	0.969391831	0.000429434
ENSG00000254521	SIGLEC12	-3.383033923	0.000459732
ENSG00000243449	C4orf48	-1.427472708	0.000475129
ENSG00000167792	NDUFV1	-0.572069152	0.000498831
ENSG00000130748	TMEM160	-1.336986115	0.000500391
ENSG00000100450	GZMH	-4.033767324	0.00050574
ENSG00000135940	COX5B	-0.631352572	0.000505886
ENSG00000100372	SLC25A17	-0.872895189	0.000505886
ENSG00000228903	RASA4CP	-1.021244905	0.000523693
ENSG00000115523	GNLY	-3.381977425	0.00053024
ENSG00000145912	NHP2	-0.73974099	0.000533554
ENSG00000178922	HYI	-1.471570573	0.000585641

ENSG00000196456	ZNF775	-1.261727966	0.000600014
ENSG00000166136	NDUFB8	-0.630795623	0.000601971
ENSG00000173915	USMG5	-0.713718359	0.000602892
ENSG00000255198	SNHG9	-0.998551623	0.000612206
ENSG00000235621	LINC00494	-4.271244394	0.000612206
ENSG00000130731	METTL26	-0.900618751	0.00061549
ENSG00000125901	MRPS26	-0.941146865	0.000620267
ENSG00000130770	ATPIF1	-0.685815934	0.000630569
ENSG00000113088	GZMK	-3.38635086	0.000630569
ENSG00000211789	TRAV12-2	-3.568982501	0.000630569
ENSG00000135919	SERPINE2	-2.691219945	0.000660959
ENSG00000124782	RREB1	0.647120023	0.000660959
ENSG00000156411	C14orf2	-0.597727634	0.000660959
ENSG00000128185	DGCR6L	-0.863877878	0.000660959
ENSG00000050165	DKK3	-4.787872624	0.000663704
ENSG00000224877	NDUFAF8	-1.104881901	0.000701391
ENSG00000105258	POLR2I	-0.891264653	0.000707797
ENSG00000169976	SF3B5	-0.580444487	0.000721086
ENSG00000109686	SH3D19	-3.202135976	0.00072893
ENSG00000196498	NCOR2	0.790243881	0.000776069
ENSG00000173141	MRPL57	-0.769830645	0.000776121
ENSG00000034053	APBA2	-1.941769966	0.000803438
ENSG00000115685	PPP1R7	-0.618937955	0.000871845
ENSG00000136573	BLK	-2.535242251	0.000875463
ENSG00000174080	CTSF	-1.358855208	0.00092528
ENSG00000100027	YPEL1	-1.531721793	0.000929974
ENSG00000161381	PLXDC1	-1.758478027	0.000940066
ENSG00000129559	NEDD8	-0.618396927	0.000944673
ENSG00000204228	HSD17B8	-1.326715677	0.000949783
ENSG00000153207	AHCTF1	1.46492768	0.000964021
ENSG00000101082	SLA2	-1.510618291	0.000979842
ENSG00000120733	KDM3B	0.617003549	0.000986782
ENSG00000148362	C9orf142	-0.805896401	0.000986782
ENSG00000168646	AXIN2	-3.805669646	0.00101752
ENSG00000008083	JARID2	1.484396023	0.001018111
ENSG00000198258	UBL5	-0.518241849	0.001019919
ENSG00000158552	ZFAND2B	-0.530277112	0.001025477
ENSG00000140332	TLE3	1.13848898	0.001059245
ENSG00000232442		-1.292940585	0.001062457
ENSG00000178980	SELENOW	-0.592817766	0.001066345
ENSG00000188243	COMMD6	-0.529169941	0.001085746
ENSG00000163430	FSTL1	-3.126233143	0.001086546
ENSG00000205138	SDHAF1	-1.096661584	0.001088015
ENSG00000168002	POLR2G	-0.532471779	0.001096663
ENSG00000210151	MT-TS1	-2.200485555	0.00110886
ENSG00000170430	MGMT	-1.03459222	0.001126459
ENSG00000276136		-1.500710793	0.001137814
ENSG00000143515	ATP8B2	-1.300025565	0.001159268

ENSG00000067900	ROCK1	0.740341417	0.001159268
ENSG00000082458	DLG3	-2.943436749	0.001179363
ENSG00000087191	PSMC5	-0.552768277	0.001179363
ENSG00000173436	MINOS1	-0.646132624	0.001198012
ENSG00000106089	STX1A	4.590319195	0.001202837
ENSG00000259865		-0.875600656	0.001235819
ENSG00000099977	DDT	-0.821115861	0.001235819
ENSG00000250251	PKD1P6	1.093497086	0.001241575
ENSG00000178498	DTX3	-1.539877493	0.00125692
ENSG00000055609	KMT2C	0.798575161	0.00129472
ENSG00000136908	DPM2	-0.80553397	0.00129472
ENSG00000232869	TRBV29-1	-2.85196455	0.001310797
ENSG00000107872	FBXL15	-0.924591084	0.001321719
ENSG00000163534	FCRL1	-2.423717463	0.001386628
ENSG00000142546	NOSIP	-0.941657275	0.001420714
ENSG00000164692	COL1A2	-4.352695936	0.001435805
ENSG00000211896	IGHG1	-3.283908874	0.001435805
ENSG00000211797	TRAV17	-4.051771056	0.00146041
ENSG00000174946	GPR171	-3.131352456	0.001476075
ENSG00000106399	RPA3	-0.813822282	0.001476075
ENSG00000174886	NDUFA11	-0.941108386	0.001531853
ENSG00000148290	SURF1	-0.558868668	0.00153948
ENSG00000121671	CRY2	1.223840349	0.001581574
ENSG00000134809	TIMM10	-0.936517161	0.001586879
ENSG00000196655	TRAPPC4	-0.753344316	0.001586879
ENSG00000085231	AK6	-0.933091766	0.001587935
ENSG00000065526	SPEN	0.708670026	0.00162693
ENSG00000124151	NCOA3	0.657226203	0.001668737
ENSG00000196705	ZNF431	-0.693030839	0.001692454
ENSG00000105518	TMEM205	-0.736130692	0.001743982
ENSG00000130856	ZNF236	0.65320043	0.001744548
ENSG00000090273	NUDC	-0.61733871	0.001745767
ENSG00000140990	NDUFB10	-0.738105046	0.001755565
ENSG00000229809	ZNF688	-0.692887812	0.001793471
ENSG00000134545	KLRC1	-4.079430013	0.00179426
ENSG00000211750	TRBV24-1	-4.04677386	0.001844893
ENSG00000072364	AFF4	0.882034479	0.001890326
ENSG00000148291	SURF2	-0.711917554	0.001890326
ENSG00000187630	DHRS4L2	-0.951131089	0.001890326
ENSG00000164919	COX6C	-0.594725036	0.001996994
ENSG00000206828		-1.402511589	0.002073839
ENSG00000211899	IGHM	-2.516390861	0.00210415
ENSG00000132326	PER2	1.617704987	0.00211366
ENSG00000070961	ATP2B1	1.97538625	0.00211366
ENSG00000272579		-1.23634543	0.00214336
ENSG00000091972	CD200	-3.208271292	0.002217994
ENSG00000180992	MRPL14	-0.792139988	0.002217994
ENSG00000167799	NUDT8	-1.689812174	0.002217994

ENSG00000258199		-0.756805886	0.002217994
ENSG00000259959		-1.177368418	0.002219683
ENSG00000247774	PCED1B-AS1	-0.935354286	0.002219683
ENSG00000211898	IGHD	-2.516143722	0.002219683
ENSG00000095906	NUBP2	-0.704321541	0.002219683
ENSG00000105404	RABAC1	-0.71092015	0.002219683
ENSG00000238142		-1.232822857	0.002230551
ENSG00000213139	CRYGS	-1.076148013	0.002230551
ENSG00000211677	IGLC2	-3.176288711	0.002230551
ENSG00000164442	CITED2	1.009950175	0.002238492
ENSG00000151131	C12orf45	-0.74306226	0.002238492
ENSG00000164008	C1orf50	-0.804396737	0.002246465
ENSG00000211592	IGKC	-2.783545648	0.002246465
ENSG00000135960	EDAR	-2.855390559	0.002246465
ENSG00000066379	ZNRD1	-0.806445845	0.002246465
ENSG00000273466		-1.09284548	0.002253779
ENSG00000111674	ENO2	-1.749155517	0.002326211
ENSG00000169155	ZBTB43	1.527093901	0.002378582
ENSG00000156873	PHKG2	-0.532089104	0.002385462
ENSG00000125743	SNRPD2	-0.489067056	0.002385462
ENSG00000235499		1.888817223	0.002385723
ENSG00000160654	CD3G	-1.342797889	0.002385723
ENSG00000180089	TMEM86B	-0.911842024	0.002385723
ENSG00000180530	NRIP1	1.215876229	0.002385723
ENSG00000107833	NPM3	-0.969928202	0.002409829
ENSG00000241351	IGKV3-11	-3.615749194	0.002422507
ENSG00000160124	CCDC58	-0.92968934	0.002471394
ENSG00000128951	DUT	-0.889271259	0.002508397
ENSG00000185920	PTCH1	-2.127072769	0.002536447
ENSG00000215845	TSTD1	-0.975940459	0.002573252
ENSG00000204580	DDR1	-1.354183492	0.002573252
ENSG00000156650	KAT6B	0.721919037	0.002573252
ENSG00000143297	FCRL5	-1.841088613	0.002590936
ENSG00000101224	CDC25B	-0.683124858	0.002644042
ENSG00000205352	PRR13	-0.499615457	0.002659719
ENSG00000168061	SAC3D1	-1.605755115	0.0026856
ENSG00000213904	LIPE-AS1	-1.074855614	0.0026856
ENSG00000186501	TMEM222	-0.571760714	0.00270021
ENSG00000175602	CCDC85B	-0.840267144	0.00270021
ENSG00000141759	TXNL4A	-0.511850743	0.00270021
ENSG00000220201	ZGLP1	-1.232843285	0.00270021
ENSG00000227191	TRGC2	-2.280472747	0.002701707
ENSG00000237886	NALT1	-1.317446891	0.002707822
ENSG00000166912	MTMR10	0.619269305	0.002728082
ENSG00000099797	TECR	-0.749774487	0.002803735
ENSG00000002822	MAD1L1	-0.941831532	0.002863033
ENSG00000113319	RASGRF2	-1.911608929	0.002871806
ENSG00000113712	CSNK1A1	0.631575602	0.002886691

ENSG00000175193	PARL	-0.46027997	0.00290763
ENSG00000078596	ITM2A	-1.678050878	0.00290763
ENSG00000235245		1.18866358	0.002909427
ENSG00000071655	MBD3	-0.630403085	0.002979797
ENSG00000124201	ZNFX1	0.892768364	0.003031446
ENSG00000125650	PSPN	-1.058034777	0.003031446
ENSG00000173113	TRMT112	-0.572052472	0.003059826
ENSG00000115317	HTRA2	-0.68723354	0.003090521
ENSG00000118900	UBN1	0.503806277	0.003092371
ENSG00000143543	JTB	-0.474491257	0.003142449
ENSG00000164405	UQCRQ	-0.61097571	0.003180774
ENSG00000064490	RFXANK	-0.551589636	0.003258643
ENSG00000163794	UCN	-1.312929891	0.003284201
ENSG00000071859	FAM50A	-0.476889204	0.003284201
ENSG00000186049	KRT73	-3.206404934	0.00331186
ENSG00000091409	ITGA6	-1.636973357	0.003317157
ENSG00000117419	ERI3	-0.513444099	0.003318012
ENSG00000262814	MRPL12	-1.209334265	0.003350118
ENSG00000042753	AP2S1	-0.746866157	0.003350118
ENSG00000166405	RIC3	-1.752528741	0.003431247
ENSG00000211788	TRAV13-1	-3.553683346	0.003431247
ENSG00000174547	MRPL11	-0.595259725	0.003436893
ENSG00000211795	TRAV8-6	-3.805808293	0.003436893
ENSG00000214026	MRPL23	-0.789860978	0.003468972
ENSG00000126756	UXT	-0.523879046	0.003552209
ENSG00000188690	UROS	-0.552418701	0.003552209
ENSG00000280649		-1.069214829	0.003555564
ENSG00000142197	DOPEY2	0.716765403	0.003584705
ENSG00000156030	ELMSAN1	0.844193989	0.003618581
ENSG00000279865		-0.962117861	0.003623064
ENSG00000272800		-2.492216361	0.003623358
ENSG00000103254	FAM173A	-1.145538369	0.003651756
ENSG00000167258	CDK12	0.527733912	0.003651756
ENSG00000156639	ZFAND3	0.559111948	0.003698614
ENSG00000156738	MS4A1	-2.391621523	0.003698614
ENSG00000005339	CREBBP	0.63934494	0.003698614
ENSG00000271109		-2.376468688	0.003711817
ENSG00000106133	NSUN5P2	-1.307507949	0.003742354
ENSG00000099795	NDUFB7	-0.71305014	0.003746865
ENSG00000009413	REV3L	0.676640564	0.003780849
ENSG00000110711	AIP	-0.588127852	0.003811454
ENSG00000172586	CHCHD1	-0.959143303	0.003828244
ENSG00000143727	ACP1	-0.457656693	0.003831007
ENSG00000056050	HPF1	-1.194549826	0.003831007
ENSG00000257727	CNPY2	-0.602750121	0.003831007
ENSG00000184076	UQCR10	-0.694618584	0.003831007
ENSG00000210154	MT-TD	-1.64971623	0.003851474
ENSG00000074071	MRPS34	-0.879326358	0.003859763

ENSG00000115604	IL18R1	-2.291033659	0.003862624
ENSG00000109452	INPP4B	-1.778829582	0.003862624
ENSG00000234389		-3.587673289	0.003887425
ENSG00000171443	ZNF524	-0.7577136	0.003894411
ENSG00000029639	TFB1M	-1.05552499	0.003955229
ENSG00000168229	PTGDR	-3.346215593	0.004155694
ENSG00000265206	MIR142	-1.341339875	0.004208594
ENSG00000166557	TMED3	-0.586738861	0.004209418
ENSG00000196998	WDR45	-0.436944407	0.004247827
ENSG00000090238	YPEL3	-0.733561139	0.004298452
ENSG00000156983	BRPF1	0.635801863	0.004313453
ENSG00000111344	RASAL1	6.217511069	0.004375212
ENSG00000172500	FIBP	-0.638607312	0.004547109
ENSG00000205981	DNAJC19	-0.784600758	0.004598665
ENSG00000110497	AMBRA1	0.542060184	0.004598665
ENSG00000151500	THYN1	-0.919232373	0.004598665
ENSG00000182173	TSEN54	-0.866716776	0.004598665
ENSG00000133657	ATP13A3	1.464715552	0.004616096
ENSG00000198931	APRT	-0.623803831	0.004616096
ENSG00000175756	AURKAIP1	-0.569076116	0.004632373
ENSG00000131495	NDUFA2	-0.654725751	0.004653323
ENSG00000139537	CCDC65	-3.255032493	0.004672159
ENSG00000176903	PNMA1	1.067291673	0.004679466
ENSG00000125877	ITPA	-0.659170325	0.004679466
ENSG00000117322	CR2	-2.058452531	0.004697359
ENSG00000168090	COPS6	-0.520882211	0.004697359
ENSG00000169020	ATP5I	-0.581944407	0.004744626
ENSG00000163376	KBTBD8	1.69629381	0.004746086
ENSG00000070047	PHRF1	0.612452552	0.00478137
ENSG00000104872	PIH1D1	-0.576006924	0.004872391
ENSG00000213977	TAX1BP3	-0.896311437	0.004889339
ENSG00000186010	NDUFA13	-0.688117962	0.004922006
ENSG00000069956	MAPK6	1.602058488	0.004974083
ENSG00000172922	RNASEH2C	-0.87678512	0.004976652
ENSG00000167578	RAB4B	-0.735835132	0.004976652
ENSG00000131591	C1orf159	-0.64080934	0.005041661
ENSG00000198932	GPRASP1	-1.350685503	0.005041661
ENSG00000134899	ERCC5	-0.588623353	0.005041661
ENSG00000099385	BCL7C	-0.569823388	0.005041661
ENSG00000197457	STMN3	-1.053407853	0.005041661
ENSG00000114023	FAM162A	-0.691068522	0.005252977
ENSG00000178449	COX14	-0.690788727	0.005252977
ENSG00000130590	SAMD10	-1.307193	0.005261554
ENSG00000034713	GABARAPL2	-0.561366346	0.005265767
ENSG00000144214	LYG1	-1.120042901	0.00529096
ENSG00000104490	NCALD	-2.023883943	0.005293655
ENSG00000084112	SSH1	0.753636123	0.005359294
ENSG00000260228		-1.433661047	0.005382074

ENSG00000125445	MRPS7	-0.559504093	0.005382074
ENSG00000163788	SNRK	0.718576358	0.005393953
ENSG00000104517	UBR5	0.492054034	0.005395523
ENSG00000070785	EIF2B3	-0.88466032	0.00542296
ENSG00000186854	TRABD2A	-1.331249571	0.005429133
ENSG00000179526	SHARPIN	-0.548163304	0.005473194
ENSG00000118640	VAMP8	-0.685860856	0.005483552
ENSG00000245910	SNHG6	-0.551261653	0.005483552
ENSG00000100647	SUSD6	0.565222141	0.005483552
ENSG00000250318		-1.206752337	0.005522994
ENSG00000125611	CHCHD5	-0.725028072	0.005523755
ENSG00000255026		-2.264980191	0.005523755
ENSG00000100575	TIMM9	-0.60669243	0.005523755
ENSG00000235374	SSR4P1	-1.330021487	0.005523755
ENSG00000140992	PDPK1	0.520647984	0.005657625
ENSG00000106268	NUDT1	-0.815513472	0.005690673
ENSG00000150456	EEF1AKMT1	-1.281259874	0.005690673
ENSG00000137145	DENND4C	0.676878109	0.005760933
ENSG00000138821	SLC39A8	2.9969628	0.005789507
ENSG00000225864	HCG4P11	-2.075218108	0.005789507
ENSG00000102471	NDFIP2	-2.908439267	0.005789507
ENSG00000103024	NME3	-0.957076304	0.005789507
ENSG00000188599	NPIPP1	-1.032795375	0.005789507
ENSG00000167863	ATP5H	-0.547746035	0.005789507
ENSG00000164483	SAMD3	-2.057449628	0.005810141
ENSG00000211689	TRGC1	-2.531900415	0.005814115
ENSG00000159958	TNFRSF13C	-1.780009242	0.005852956
ENSG00000262049		-0.75359782	0.005874615
ENSG00000169884	WNT10B	-1.73390122	0.005889351
ENSG00000196683	TOMM7	-0.644165299	0.005916319
ENSG00000154122	ANKH	1.370777137	0.005924707
ENSG00000183826	BTBD9	0.815322268	0.005958191
ENSG00000008294	SPAG9	0.794114758	0.006039216
ENSG00000213654	GPSM3	-0.430822002	0.006218697
ENSG00000144645	OSBPL10	-1.758380303	0.006218903
ENSG00000125458	NT5C	-0.743265943	0.006225642
ENSG00000185761	ADAMTSL5	-2.661834133	0.006259272
ENSG00000273361		-1.100278211	0.006447564
ENSG00000171159	C9orf16	-0.627737641	0.006461552
ENSG00000107672	NSMCE4A	-0.599851448	0.006466577
ENSG00000122140	MRPS2	-0.636939704	0.006480008
ENSG00000250317	SMIM20	-0.729397288	0.006492425
ENSG00000180185	FAHD1	-0.968801184	0.006517199
ENSG00000002330	BAD	-0.581869768	0.006544074
ENSG00000243147	MRPL33	-0.536515258	0.006545909
ENSG00000213465	ARL2	-0.981755571	0.006588779
ENSG00000161677	JOSD2	-0.920446461	0.006604838
ENSG00000179361	ARID3B	0.927101168	0.006613523

ENSG0000006015	C19orf60	-0.780166117	0.006613523
ENSG00000174137	FAM53A	-1.375105073	0.006625594
ENSG00000124802	EEF1E1	-0.955883398	0.006667583
ENSG00000174109	C16orf91	-0.741345419	0.006716842
ENSG0000007312	CD79B	-1.347501038	0.0068066
ENSG00000141698	NT5C3B	-1.002899219	0.006808457
ENSG00000179715	PCED1B	-1.320473421	0.006820642
ENSG00000089057	SLC23A2	0.760865366	0.006831429
ENSG00000183506	PI4KAP2	0.893927285	0.006852984
ENSG00000114388	NPRL2	-0.623300389	0.006871054
ENSG00000176386	CDC26	-0.60545355	0.006871054
ENSG00000256576		-1.17913261	0.006929097
ENSG00000169660	HEXDC	-1.092809856	0.00695082
ENSG00000038219	BOD1L1	0.705169705	0.00697272
ENSG00000211746	TRBV19	-3.353187647	0.00697272
ENSG00000126353	CCR7	-1.751876737	0.00697272
ENSG00000163382	NAXE	-0.62706082	0.006983897
ENSG00000278942		-3.335752477	0.006983897
ENSG00000160318	CLDND2	-1.99093826	0.007042153
ENSG00000126088	UROD	-0.559917552	0.00704863
ENSG00000274752	TRBV12-3	-3.352646309	0.007049759
ENSG00000246898	LINC00920	-1.70753076	0.007090887
ENSG00000275055		-1.326554878	0.007090887
ENSG00000079337	RAPGEF3	-2.291477983	0.007138
ENSG00000167283	ATP5L	-0.39914685	0.007189213
ENSG00000121851	POLR3GL	-0.68194242	0.007224777
ENSG00000196313	POM121	0.456303883	0.007226902
ENSG00000211734	TRBV5-1	-3.083916417	0.007226902
ENSG00000011590	ZBTB32	-3.803327816	0.0072278
ENSG00000165006	UBAP1	1.016658482	0.00739764
ENSG00000122482	ZNF644	0.738126182	0.007402587
ENSG00000156603	MED19	-0.882511586	0.007402587
ENSG00000169288	MRPL1	-0.755986704	0.007405513
ENSG00000109111	SUPT6H	0.700370583	0.007405513
ENSG00000126768	TIMM17B	-0.480768	0.007419159
ENSG00000052749	RRP12	0.998350248	0.007481409
ENSG00000054523	KIF1B	0.850753922	0.007499987
ENSG00000117298	ECE1	0.684569348	0.007499987
ENSG00000167548	KMT2D	0.73715763	0.007499987
ENSG00000123374	CDK2	-0.702921321	0.007499987
ENSG00000179085	DPM3	-0.733500172	0.007541218
ENSG00000118689	FOXO3	1.100354544	0.007541218
ENSG00000118523	CTGF	-3.998429189	0.007541218
ENSG00000148308	GTF3C5	-0.396713262	0.007541218
ENSG00000244242	IFITM10	3.156558887	0.007541218
ENSG00000185475	TMEM179B	-0.528857069	0.007541218
ENSG00000069493	CLEC2D	-0.90173644	0.007541218
ENSG00000159884	CCDC107	-0.696373822	0.007634489

ENSG00000171222	SCAND1	-0.669945727	0.007694843
ENSG00000158373	HIST1H2BD	-1.387658487	0.007774524
ENSG00000085998	POMGNT1	-0.647726487	0.007945138
ENSG00000127720	METTTL25	-0.741156437	0.00798012
ENSG00000123144	C19orf43	-0.503997248	0.008019324
ENSG00000151012	SLC7A11	4.902298063	0.008051755
ENSG00000197057	DTHD1	-3.805928592	0.008116641
ENSG00000102908	NFAT5	0.981381277	0.008116641
ENSG00000256053	APOPT1	-0.658065501	0.008183364
ENSG00000071994	PDCD2	-0.60987101	0.008244768
ENSG00000065057	NTHL1	-1.184372773	0.008314765
ENSG00000184897	H1FX	-0.775405838	0.008331622
ENSG00000092010	PSME1	-0.511324215	0.008331622
ENSG00000262919	FAM58A	-0.627878435	0.008362198
ENSG00000159055	MIS18A	-1.043089659	0.008366143
ENSG00000204475	NCR3	-2.116045347	0.00838112
ENSG00000163882	POLR2H	-0.909984956	0.00841218
ENSG00000103522	IL21R	-1.203079914	0.008440305
ENSG00000130779	CLIP1	0.546550403	0.008508457
ENSG00000112695	COX7A2	-0.495596793	0.008522097
ENSG00000160271	RALGDS	1.141697686	0.008577309
ENSG00000211679	IGLC3	-2.968040453	0.008577309
ENSG00000104823	ECH1	-0.718591918	0.008625612
ENSG00000181222	POLR2A	0.692733328	0.008689805
ENSG00000229980	TOB1-AS1	-1.256182501	0.008689805
ENSG00000154102	C16orf74	-1.149512594	0.008694687
ENSG00000130595	TNNT3	2.348720037	0.00872194
ENSG00000260404		1.022837811	0.008740797
ENSG00000182154	MRPL41	-0.848860402	0.008740797
ENSG00000119640	ACYP1	-1.116742955	0.008740797
ENSG00000198171	DDRGK1	-0.49552446	0.008740797
ENSG00000171988	JMJD1C	1.010236425	0.008917932
ENSG00000205643	CDPF1	-1.128518232	0.008956775
ENSG00000153406	NMRAL1	-0.595889722	0.008987048
ENSG00000126456	IRF3	-0.714217599	0.008998585
ENSG00000186660	ZFP91	0.597590983	0.009006979
ENSG00000204237	OXL1	-1.025946823	0.009073642
ENSG00000110713	NUP98	0.882132592	0.009158382
ENSG00000164053	ATRIP	-0.728953802	0.009224283
ENSG00000078487	ZCWPW1	-0.845208243	0.009224283
ENSG00000123154	WDR83	-0.614399137	0.009242716
ENSG00000100429	HDAC10	-0.731867229	0.009335951
ENSG00000100836	PABPN1	-0.428739719	0.009491196
ENSG00000092841	MYL6	-0.504395967	0.009498655
ENSG00000173281	PPP1R3B	1.243839275	0.009543041
ENSG00000096070	BRPF3	0.707036581	0.009596317
ENSG00000101391	CDK5RAP1	-0.420646444	0.009629149
ENSG00000103145	HCFC1R1	-0.688743261	0.009640343

ENSG00000151694	ADAM17	0.569148211	0.009906186
ENSG00000004478	FKBP4	-0.89182819	0.009912238
ENSG00000267858	MZF1-AS1	-1.054222285	0.009939332
ENSG00000074755	ZZEF1	0.513853931	0.009965996
ENSG00000235576		-3.361892329	0.009986244
ENSG00000197180		-0.988773749	0.009986244
ENSG00000254815		-2.504189188	0.009986244
ENSG00000163832	ELP6	-0.764820394	0.010119668
ENSG00000167106	FAM102A	-0.873366138	0.010119668
ENSG00000129158	SERGEF	-0.764695252	0.010119668
ENSG00000185947	ZNF267	1.292854277	0.010119668
ENSG00000169738	DCXR	-0.782485701	0.010119668
ENSG00000007080	CCDC124	-0.542143805	0.010119668
ENSG00000218283	MORF4L1P1	0.715295624	0.010127251
ENSG00000211787	TRAV8-3	-3.515642452	0.010127251
ENSG00000211803	TRAV23DV6	-3.081398705	0.010127251
ENSG00000270550	IGHV3-30	-3.542578363	0.010127251
ENSG00000131873	CHSY1	1.018118022	0.010127251
ENSG00000211796	TRAV16	-3.512417221	0.010149637
ENSG00000139428	MMAB	-0.661591617	0.010151954
ENSG00000092148	HECTD1	0.466240494	0.010151954
ENSG00000007255	TRAPPC6A	-0.76496011	0.010151954
ENSG00000105552	BCAT2	-0.74845306	0.010177324
ENSG00000132185	FCRLA	-2.305145584	0.010194588
ENSG00000008018	PSMB1	-0.416022639	0.010304931
ENSG00000211793	TRAV9-2	-3.517548871	0.010432614
ENSG00000198900	TOP1	0.836552447	0.010465627
ENSG00000160218	TRAPPC10	0.637481657	0.010513856
ENSG00000100258	LMF2	-0.443550151	0.010547929
ENSG00000160075	SSU72	-0.348001585	0.010582203
ENSG00000167664	TMIGD2	-2.086310356	0.010582203
ENSG00000100426	ZBED4	0.497435326	0.010582203
ENSG00000157933	SKI	0.935934355	0.010665116
ENSG00000148396	SEC16A	0.643827032	0.010665116
ENSG00000141506	PIK3R5	0.828460647	0.010665116
ENSG00000228623	ZNF883	-1.996685019	0.010667322
ENSG00000244187	TMEM141	-0.829574021	0.010714819
ENSG00000211776	TRAV2	-3.513699695	0.010789534
ENSG00000278784		-0.768907227	0.01102224
ENSG00000169592	INO80E	-0.76604936	0.01105392
ENSG00000128218	VPREB3	-2.928684917	0.011115322
ENSG00000271869		-1.023913028	0.011145692
ENSG00000232788		-1.504401745	0.011197599
ENSG00000184281	TSSC4	-0.488502198	0.011209778
ENSG00000134709	HOOK1	-2.47967242	0.011225555
ENSG00000119431	HDHD3	-0.979936133	0.011238674
ENSG00000149474	KAT14	-0.716682945	0.011242405
ENSG00000181036	FCRL6	-3.124764485	0.011258843

ENSG00000164151	ICE1	0.511579922	0.011258843
ENSG00000211724	TRBV6-6	-3.503652548	0.011258843
ENSG00000089195	TRMT6	0.956671269	0.011258843
ENSG00000184702	Sep-05	5.290109037	0.011258843
ENSG00000136942	RPL35	-0.54378298	0.011451824
ENSG00000236778	INTS6-AS1	-0.795329139	0.011456401
ENSG00000211965	IGHV3-49	-3.335291477	0.011456401
ENSG00000140365	COMMD4	-0.7034297	0.011456401
ENSG00000104907	TRMT1	-0.553588205	0.011456401
ENSG00000152082	MZT2B	-0.623376319	0.011548949
ENSG00000169583	CLIC3	-2.689926713	0.011548949
ENSG00000176101	SSNA1	-0.577695533	0.011548949
ENSG00000149016	TUT1	-0.788231419	0.011596103
ENSG00000242660		-1.169198951	0.011596103
ENSG00000130159	ECSIT	-0.505207333	0.011596103
ENSG00000151135	TMEM263	-0.876701318	0.011648517
ENSG00000268861		2.61984339	0.011661629
ENSG00000182196	ARL6IP4	-1.001977368	0.011665313
ENSG00000169641	LUZP1	0.625289533	0.01167294
ENSG00000205544	TMEM256	-0.792489914	0.01167294
ENSG00000163508	EOMES	-3.275261219	0.011694319
ENSG00000054148	PHPT1	-0.776620283	0.01177888
ENSG00000186480	INSIG1	1.315479277	0.011783712
ENSG00000116251	RPL22	-0.463786509	0.011845418
ENSG00000128739	SNRPN	-0.707532418	0.011878046
ENSG00000116353	MECR	-0.807489511	0.011878208
ENSG00000149357	LAMTOR1	-0.434026736	0.011917173
ENSG00000100150	DEPDC5	0.52941313	0.011942502
ENSG00000232119	MCTS1	-0.742378736	0.01198379
ENSG00000187193	MT1X	-1.121972998	0.01198379
ENSG00000130755	GMFG	-0.501314106	0.012087163
ENSG00000263264		1.060693793	0.01213979
ENSG00000171425	ZNF581	-0.632109021	0.012171032
ENSG00000230797	YY2	-1.246828083	0.01221308
ENSG00000139697	SBNO1	0.418215004	0.01221308
ENSG00000250479	CHCHD10	-0.720388657	0.01221308
ENSG00000163156	SCNM1	-0.455904748	0.012274706
ENSG00000115760	BIRC6	0.574664816	0.012274706
ENSG00000144034	TPRKB	-0.555336328	0.012333286
ENSG00000238035		1.143984139	0.012333286
ENSG00000085662	AKR1B1	-0.608501557	0.012333286
ENSG00000211897	IGHG3	-3.059172484	0.012418681
ENSG00000141873	SLC39A3	-0.676751369	0.01242397
ENSG00000232112	TMA7	-0.425568338	0.01255484
ENSG00000234585	CCT6P3	-0.661809283	0.01255484
ENSG00000127540	UQCR11	-0.535392033	0.012592905
ENSG00000084093	REST	0.542868348	0.012616576
ENSG00000136929	HEMGN	-3.521369393	0.012616576

ENSG00000119650	IFT43	-0.679602136	0.012616576
ENSG00000128908	INO80	0.417690386	0.012616576
ENSG00000105364	MRPL4	-0.518232258	0.012616576
ENSG00000164091	WDR82	0.501613749	0.01275049
ENSG00000240509	RPL34P18	-1.100601614	0.01275049
ENSG00000226121		1.420788405	0.012753751
ENSG00000100348	TXN2	-0.519550688	0.012754773
ENSG00000088356	PDRG1	-0.692255991	0.012794362
ENSG00000063180	CA11	-0.913260126	0.012794362
ENSG00000204348	DXO	-0.704852622	0.012863791
ENSG00000239569	KMT2E-AS1	-0.780131937	0.012866918
ENSG00000183542	KLRC4	-3.514610921	0.012866918
ENSG00000113194	FAF2	0.508316541	0.012888579
ENSG00000055118	KCNH2	-3.506980657	0.012888579
ENSG00000228434		-0.926355879	0.01289901
ENSG00000162227	TAF6L	-0.634185948	0.012905998
ENSG00000079462	PAFAH1B3	-0.735947342	0.012905998
ENSG00000143353	LYPLAL1	-0.78320972	0.012963649
ENSG00000164897	TMUB1	-0.510471368	0.012994771
ENSG00000160446	ZDHHC12	-0.543488114	0.013011998
ENSG00000142303	ADAMTS10	-0.99278428	0.013011998
ENSG00000258352		-2.31256717	0.013380413
ENSG00000211669	IGLV3-10	-3.776343772	0.013380413
ENSG00000230074		-0.975183916	0.013450949
ENSG00000189227	C15orf61	-0.703454096	0.013483123
ENSG00000119705	SLIRP	-0.612477138	0.013497508
ENSG00000181754	AMIGO1	-1.557921234	0.013821976
ENSG00000205531	NAP1L4	-0.475105962	0.013911691
ENSG00000225200		-0.851500695	0.014016709
ENSG00000143575	HAX1	-0.501677597	0.01401709
ENSG00000175463	TBC1D10C	-0.598721484	0.01401709
ENSG00000253701		-3.479250159	0.01401709
ENSG00000104885	DOT1L	0.98944776	0.01401709
ENSG00000105185	PDCD5	-0.627200691	0.01401709
ENSG00000268516		-1.195863546	0.01401709
ENSG00000115548	KDM3A	0.857988301	0.014046053
ENSG00000132432	SEC61G	-0.630003682	0.014065801
ENSG00000259820		1.33531448	0.014065801
ENSG00000254402	LRRC24	-1.095698885	0.014065801
ENSG00000182957	SPATA13	0.708399388	0.014065801
ENSG00000265401		-2.260507505	0.014065801
ENSG00000105677	TMEM147	-0.551182542	0.014065801
ENSG00000135930	EIF4E2	-0.369012552	0.014080576
ENSG00000151881	TMEM267	-0.693398605	0.014147513
ENSG00000186184	POLR1D	-0.412131316	0.014221566
ENSG00000089163	SIRT4	-2.057745926	0.014309859
ENSG00000164406	LEAP2	-1.205092658	0.014399458
ENSG00000155640	NA	1.146410748	0.01449837

ENSG00000137764	MAP2K5	-0.501140706	0.014583377
ENSG00000204220	PFDN6	-0.783255514	0.014588639
ENSG00000131242	RAB11FIP4	0.656101092	0.014613544
ENSG00000108826	MRPL27	-0.80556646	0.014695844
ENSG00000183978	COA3	-0.974422621	0.014733691
ENSG00000138698	RAP1GDS1	-0.516958978	0.014770098
ENSG00000251259		-0.75282835	0.014797644
ENSG00000273338		-1.216803237	0.014867394
ENSG00000156467	UQCRB	-0.484809458	0.014871945
ENSG00000279605		-1.620703984	0.014871945
ENSG00000133065	SLC41A1	-0.638509472	0.014947076
ENSG00000181038	METTL23	-0.465127571	0.014947076
ENSG00000175575	PAAF1	-0.698798243	0.015137728
ENSG00000169964	TMEM42	-0.837805388	0.015166065
ENSG00000126012	KDM5C	0.459150422	0.015171416
ENSG00000267121		-0.888009605	0.015244267
ENSG00000149743	TRPT1	-0.671511952	0.015251061
ENSG00000087589	CASS4	1.291610171	0.015308293
ENSG00000272092		-1.212907017	0.015329451
ENSG00000272398	CD24	-2.290591013	0.0153805
ENSG00000163975	MELTF	2.767519441	0.015386305
ENSG00000113161	HMGCR	0.589442305	0.015439855
ENSG00000127554	GFER	-0.50603521	0.015439855
ENSG00000115274	INO80B	-0.791604845	0.015450086
ENSG00000166199	ALKBH3	-0.580863458	0.015540239
ENSG00000141040	ZNF287	-1.32951221	0.015554176
ENSG00000168028	RPSA	-0.489559504	0.015563532
ENSG00000211710	TRBV4-1	-3.063068168	0.015563532
ENSG00000181924	COA4	-0.638982455	0.01569311
ENSG00000280234		1.507619243	0.01569311
ENSG00000143314	MRPL24	-0.83250627	0.015760222
ENSG00000168672	FAM84B	-1.379975765	0.015760222
ENSG00000108510	MED13	0.546937903	0.015839186
ENSG00000178209	PLEC	0.733447941	0.015867444
ENSG00000107020	PLGRKT	-0.670750168	0.015919642
ENSG00000083720	OXCT1	-0.737619309	0.015928244
ENSG00000127125	PPCS	-0.514972908	0.016172749
ENSG00000116586	LAMTOR2	-0.797776193	0.016180097
ENSG00000089902	RCOR1	0.456121086	0.016234438
ENSG00000137094	DNAJB5	1.598453551	0.016268665
ENSG00000169189	NSMCE1	-0.740969212	0.016295056
ENSG00000187837	HIST1H1C	-1.033703419	0.016298479
ENSG00000010278	CD9	2.722071032	0.016312303
ENSG00000124486	USP9X	0.639318343	0.016378231
ENSG00000076944	STXBP2	-0.466986659	0.016440125
ENSG00000080573	COL5A3	-3.286877814	0.016492319
ENSG00000158417	EIF5B	-0.561929254	0.016548667
ENSG00000272936		-1.204234034	0.016548667

ENSG00000162461	SLC25A34	1.441304093	0.016719869
ENSG00000008324	SS18L2	-0.557987557	0.016719869
ENSG00000174238	PITPNA	0.662681943	0.016719869
ENSG00000167491	GATAD2A	0.454136142	0.016719869
ENSG00000147576	ADHFE1	-0.944342615	0.016725311
ENSG00000182208	MOB2	-0.483077133	0.016725877
ENSG00000260400		-1.851112734	0.016725877
ENSG00000177455	CD19	-1.56320814	0.016725877
ENSG00000176022	B3GALT6	-0.817116125	0.016749951
ENSG00000166428	PLD4	-1.624997893	0.016749951
ENSG00000163820	FYCO1	0.602913102	0.016838712
ENSG00000084207	GSTP1	-0.719923973	0.016838712
ENSG00000081692	JMJD4	-0.710916057	0.016859408
ENSG00000202198		-1.53550549	0.017038046
ENSG00000151690	MFSD6	0.663052075	0.017083799
ENSG00000162384	C1orf123	-0.583146387	0.017090057
ENSG00000267751		-1.126347789	0.017090057
ENSG00000163520	FBLN2	-1.798052601	0.017108446
ENSG00000167113	COQ4	-0.639611138	0.017197666
ENSG00000167930	FAM234A	-0.527185565	0.017197666
ENSG00000127445	PIN1	-0.432245487	0.017199534
ENSG00000214140	PRCD	-3.565630981	0.017206811
ENSG00000188933	USP32P1	2.68321166	0.017217238
ENSG00000211450	SELENOH	-0.656786736	0.017281296
ENSG00000167543	TP53I13	-0.668919347	0.017281296
ENSG00000005448	WDR54	-0.799870239	0.017356757
ENSG00000101126	ADNP	0.467245568	0.017356757
ENSG00000130255	RPL36	-0.590408855	0.017356757
ENSG00000167522	ANKRD11	0.42398405	0.017462204
ENSG00000081052	COL4A4	-3.311201244	0.017606123
ENSG00000211949	IGHV3-23	-2.685467977	0.017606123
ENSG00000156795	WDYHV1	-0.712728747	0.01774331
ENSG00000226777	FAM30A	-2.206740334	0.01774331
ENSG00000172543	CTSW	-1.576645984	0.017766059
ENSG00000134070	IRAK2	3.229985846	0.017776281
ENSG00000139343	SNRPF	-0.486220851	0.017776281
ENSG00000167685	ZNF444	-0.608755174	0.017776281
ENSG00000140511	HAPLN3	-1.313810827	0.017930992
ENSG00000260807		-2.312167126	0.017930992
ENSG00000101473	ACOT8	-0.5547786	0.017939198
ENSG00000198695	MT-ND6	-0.804090324	0.017939198
ENSG00000144591	GMPPA	-0.626791367	0.017964909
ENSG00000211651	IGLV1-44	-2.70687554	0.017996276
ENSG00000099381	SETD1A	0.584340349	0.018003584
ENSG00000166289	PLEKHF1	-1.778150216	0.018069848
ENSG00000197386	HTT	0.552496367	0.0181707
ENSG00000212694	LINC01089	-0.87676789	0.0181707
ENSG00000228205		-0.966419529	0.018234874

ENSG00000229659	RPL26P6	-0.778032572	0.018234874
ENSG00000105393	BABAM1	-0.488138017	0.018234874
ENSG00000231584	FAHD2CP	-1.291835289	0.01823871
ENSG00000254709	IGLL5	-2.733281699	0.018239823
ENSG00000173575	CHD2	0.697761212	0.018277794
ENSG00000138629	UBL7	-0.552734623	0.018375108
ENSG00000114956	DGUOK	-0.403319234	0.018399221
ENSG00000141378	PTRH2	-0.685700234	0.018399221
ENSG00000170604	IRF2BP1	-0.732467824	0.018490551
ENSG00000135999	EPC2	0.537027555	0.018496839
ENSG00000241468	ATP5J2	-0.583158339	0.0185079
ENSG00000128626	MRPS12	-0.734994349	0.0185079
ENSG00000187608	ISG15	-1.46119361	0.018532403
ENSG00000237190	CDKN2AIPNL	-0.509589406	0.01855445
ENSG00000083814	ZNF671	-0.853461458	0.018564748
ENSG00000197705	KLHL14	-2.750140245	0.018631271
ENSG00000189046	ALKBH2	-0.733517608	0.018739732
ENSG00000109475	RPL34	-0.523209863	0.018782154
ENSG00000134278	SPIRE1	1.74525424	0.018782154
ENSG00000119682	AREL1	0.461581929	0.01879741
ENSG00000211785	TRAV12-1	-3.101811298	0.018882497
ENSG00000269044		-0.738577114	0.018882497
ENSG00000214176	PLEKHM1P1	0.561640744	0.018926246
ENSG00000143222	UFC1	-0.36644964	0.018926496
ENSG00000226660	TRBV2	-2.870183762	0.018926496
ENSG00000182985	CADM1	4.984035986	0.018926496
ENSG00000272333	KMT2B	0.445024101	0.018926496
ENSG00000185608	MRPL40	-0.613151071	0.018926496
ENSG00000115464	USP34	0.425242877	0.01897551
ENSG00000267074		-2.544539019	0.01897551
ENSG00000105855	ITGB8	3.226866868	0.019044746
ENSG00000168036	CTNNB1	0.699145409	0.019070822
ENSG00000164182	NDUFAF2	-0.671904715	0.019070822
ENSG00000088833	NSFL1C	-0.513270334	0.019070822
ENSG00000215375	MYL5	-0.902588712	0.019100198
ENSG00000063438	AHRR	4.138876321	0.01912396
ENSG00000110871	COQ5	-0.740620258	0.01919413
ENSG00000205155	PSENE1	-0.540505486	0.01919413
ENSG00000123472	ATPAF1	-0.600531509	0.019213778
ENSG00000172939	OXSRL1	0.928779097	0.019213778
ENSG00000078589	P2RY10	-1.516465551	0.019213778
ENSG00000110011	DNAJC4	-0.430690776	0.019213778
ENSG00000257698		-1.122545736	0.019213778
ENSG00000100442	FKBP3	-0.70410967	0.019213778
ENSG00000179044	EXOC3L1	-1.564527187	0.019213778
ENSG00000126267	COX6B1	-0.496403471	0.019213778
ENSG00000269968		-1.880810938	0.019223317
ENSG00000166747	AP1G1	0.764752289	0.019223317

ENSG00000271601	LIX1L	-0.587030616	0.019245139
ENSG00000169955	ZNF747	-0.58272777	0.019247213
ENSG00000272156		-2.24750863	0.019318046
ENSG00000145675	PIK3R1	1.141154294	0.019404171
ENSG00000167088	SNRPD1	-0.590306922	0.019404171
ENSG00000144741	SLC25A26	-0.508524868	0.019408097
ENSG00000153006	SREK1IP1	-0.452129897	0.019408097
ENSG00000230551		0.931141552	0.019408097
ENSG00000072786	STK10	0.431289025	0.019408097
ENSG00000159199	ATP5G1	-0.583927881	0.019408097
ENSG00000183751	TBL3	-0.442827112	0.019597081
ENSG00000120699	EXOSC8	-0.523296597	0.019599898
ENSG00000136158	SPRY2	3.763750349	0.019640602
ENSG00000184371	CSF1	2.794324569	0.019641343
ENSG00000014641	MDH1	-0.567221626	0.019641343
ENSG00000186577	C6orf1	-0.497074092	0.019641343
ENSG00000182774	RPS17	-0.467072548	0.019641343
ENSG00000181555	SETD2	0.456207411	0.019654511
ENSG00000260912		-1.257022729	0.019654511
ENSG00000167526	RPL13	-0.558412207	0.019654511
ENSG00000264608		-0.851528187	0.019654511
ENSG00000232388	LINC00493	-0.498133742	0.019654511
ENSG00000176533	GNG7	-0.948468332	0.019654511
ENSG00000079432	CIC	0.526654341	0.019654511
ENSG00000172071	EIF2AK3	1.236870324	0.019677201
ENSG00000162032	SPSB3	-0.452726034	0.019677201
ENSG00000141294	LRRC46	-1.182141108	0.019677201
ENSG00000152102	FAM168B	0.453109026	0.019756778
ENSG00000141933	TPGS1	-0.758279532	0.019756778
ENSG00000144674	GOLGA4	0.641678	0.019840151
ENSG00000140526	ABHD2	0.738472671	0.019840151
ENSG00000111879	FAM184A	-2.878102781	0.019870515
ENSG00000143947	RPS27A	-0.477264582	0.019974425
ENSG00000175634	RPS6KB2	-0.39429141	0.019995216
ENSG00000132436	FIGNL1	-1.187557042	0.020011769
ENSG00000133256	PDE6B	-0.745521031	0.020048245
ENSG00000186073	C15orf41	-1.060874064	0.020048245
ENSG00000157540	DYRK1A	0.394608175	0.020048245
ENSG00000178015	GPR150	-2.899968292	0.020186734
ENSG00000204356	NELFE	-0.378936214	0.020186734
ENSG00000182180	MRPS16	-0.515018401	0.020218243
ENSG00000011566	MAP4K3	1.174054156	0.020336903
ENSG00000183828	NUDT14	-0.776059832	0.020336903
ENSG00000228444		-1.852320423	0.020437818
ENSG00000139289	PHLDA1	3.023396358	0.020560825
ENSG00000266302		3.306370388	0.020560825
ENSG00000153201	RANBP2	1.120313459	0.020578159
ENSG00000237753		-1.217946732	0.020578159

ENSG00000145354	CISD2	-0.680419254	0.020578159
ENSG00000116688	MFN2	0.451240508	0.020653781
ENSG00000162191	UBXN1	-0.430653488	0.020653781
ENSG00000267598		-1.552476277	0.020653781
ENSG00000204536	CCHCR1	-0.692154496	0.020659197
ENSG00000058063	ATP11B	0.5765797	0.020860331
ENSG00000100416	TRMU	-0.503297854	0.020905118
ENSG00000060140	STYK1	-3.481975038	0.021009306
ENSG00000112078	KCTD20	0.482488032	0.021072367
ENSG00000147804	SLC39A4	-0.77013501	0.021137455
ENSG00000227678		-2.882857908	0.02114369
ENSG00000064393	HIPK2	1.005115978	0.021228159
ENSG00000147687	TATDN1	-0.567515132	0.021248518
ENSG00000115211	EIF2B4	-0.441372971	0.021272985
ENSG00000136295	TTYH3	0.855994704	0.021272985
ENSG00000272155		-1.373165187	0.021272985
ENSG00000165905	LARGE2	-2.444323027	0.021272985
ENSG00000183741	CBX6	0.67828884	0.02127616
ENSG00000272990		-1.166285837	0.0214968
ENSG00000163564	PYHIN1	-1.545648957	0.021593723
ENSG00000124562	SNRPC	-0.491495509	0.021593723
ENSG00000149150	SLC43A1	-0.919327556	0.021593723
ENSG00000179639	FCER1A	-2.346231754	0.021600619
ENSG00000223797	ENTPD3-AS1	-0.931001236	0.021600619
ENSG00000251580		-1.061409631	0.021600619
ENSG00000111196	MAGOHB	-0.647828677	0.021600619
ENSG00000169228	RAB24	-0.794945772	0.021640774
ENSG00000174292	TNK1	-2.337306501	0.021696075
ENSG00000164211	STARD4	1.08989202	0.021754687
ENSG00000152672	CLEC4F	-3.679629777	0.021793424
ENSG00000258704	SRP54-AS1	-1.029317941	0.021793424
ENSG00000262089		-0.744351419	0.021851801
ENSG00000178896	EXOSC4	-0.914135302	0.021867556
ENSG00000175352	NRIP3	3.048087477	0.021867556
ENSG00000225190	PLEKHM1	0.473557832	0.021867556
ENSG00000248015		-1.798970906	0.021867556
ENSG00000104886	PLEKHJ1	-0.643088924	0.021867556
ENSG00000169567	HINT1	-0.367376398	0.021974635
ENSG00000166435	XRRA1	1.937104971	0.022002878
ENSG00000174276	ZNHIT2	-0.982702503	0.022014493
ENSG00000148300	REXO4	-0.555414562	0.02201515
ENSG00000137449	CPEB2	0.864311924	0.022065141
ENSG00000104529	EEF1D	-0.392033023	0.022065141
ENSG00000103707	MTFMT	-0.867908231	0.022065141
ENSG00000174915	PTDSS2	-0.434865214	0.022115256
ENSG00000101464	PIGU	-0.780536522	0.022119203
ENSG00000080603	SRCAP	0.732573402	0.02217788
ENSG00000127481	UBR4	0.613054729	0.022203271

ENSG0000005075	POLR2J	-0.477421522	0.022203271
ENSG00000125846	ZNF133	-0.827304101	0.022203271
ENSG00000080189	SLC35C2	-0.364600267	0.022203271
ENSG00000105617	LENG1	-0.722161335	0.022203271
ENSG00000115350	POLE4	-0.524230201	0.022241406
ENSG00000168386	FILIP1L	1.962897175	0.022241406
ENSG00000196367	TRRAP	0.534933607	0.022268476
ENSG00000257764		-1.082228226	0.022345117
ENSG00000260711		-2.0245142	0.022345117
ENSG00000161956	SENP3	-0.557711345	0.022345117
ENSG00000180739	S1PR5	-2.739359395	0.022407855
ENSG00000172943	PHF8	0.36111685	0.022451374
ENSG00000112306	RPS12	-0.502564872	0.022526066
ENSG00000135018	UBQLN1	0.363803742	0.022526066
ENSG00000116918	TSNAX	-0.651962658	0.022543549
ENSG00000242588		1.178892176	0.022598144
ENSG00000279491		-1.167603432	0.022653507
ENSG00000170776	AKAP13	0.514985147	0.022653507
ENSG00000160113	NR2F6	-1.177526509	0.022653507
ENSG00000138495	COX17	-0.619447435	0.022731675
ENSG00000115594	IL1R1	2.939034403	0.022845218
ENSG00000104979	C19orf53	-0.423029129	0.0228483
ENSG00000174165	ZDHHC24	-0.502229558	0.023105361
ENSG00000198934	MAGEE1	-2.384939115	0.023117824
ENSG00000174437	ATP2A2	0.506316562	0.023120664
ENSG00000171163	ZNF692	-0.921576367	0.023154541
ENSG00000114902	SPCS1	-0.491996822	0.023157331
ENSG00000249592		-0.910765919	0.023157331
ENSG00000166886	NAB2	1.97677917	0.023286188
ENSG00000050327	ARHGEF5	-2.373990214	0.023341233
ENSG00000123908	AGO2	0.664061762	0.023341233
ENSG00000197818	SLC9A8	0.72859215	0.023341233
ENSG00000099800	TIMM13	-0.720533109	0.023341233
ENSG00000172508	CARNS1	-1.485707396	0.023400022
ENSG00000116539	ASH1L	0.547707622	0.023450197
ENSG00000103152	MPG	-0.535601238	0.023464566
ENSG00000107874	CUEDC2	-0.383210917	0.023576584
ENSG00000099377	HSD3B7	1.513181453	0.023798187
ENSG00000095059	DHPS	-0.602556942	0.023798187
ENSG00000162585	FAAP20	-0.468043532	0.023835383
ENSG00000198917	SPOUT1	-0.587528877	0.024111185
ENSG00000160050	CCDC28B	-0.971277019	0.024122808
ENSG00000116521	SCAMP3	-0.459754925	0.024207964
ENSG00000211598	IGKV4-1	-2.813064947	0.024207964
ENSG00000206560	ANKRD28	1.283861498	0.024207964
ENSG00000167272	POP5	-0.854945603	0.02432929
ENSG00000178974	FBXO34	0.617300566	0.024390219
ENSG00000173848	NET1	1.695556157	0.024456599

ENSG00000165516	KLHDC2	-0.485259048	0.024456599
ENSG00000104964	AES	-0.433751564	0.024456599
ENSG00000186222	BLOC1S4	-0.559900092	0.024470398
ENSG00000242686		-2.162350471	0.024487354
ENSG00000146072	TNFRSF21	3.710797389	0.024499016
ENSG00000101187	SLCO4A1	3.982247529	0.024499016
ENSG00000005436	GCFC2	-0.572646452	0.024565687
ENSG00000170860	LSM3	-0.489732634	0.024565687
ENSG00000281206	NA	-3.368165918	0.024565687
ENSG00000099849	RASSF7	-0.972206305	0.024595753
ENSG00000165813	CCDC186	0.663766732	0.024687163
ENSG00000221792	MIR1282	-2.544690167	0.024687163
ENSG00000041988	THAP3	-0.775738062	0.024738204
ENSG00000183513	COA5	-0.681995003	0.024769634
ENSG00000078269	SYNJ2	1.124244178	0.024769634
ENSG00000178429	RPS3AP5	-0.591234328	0.024769634
ENSG00000106733	NMRK1	-0.915429515	0.024808254
ENSG00000161618	ALDH16A1	-0.570966986	0.024808254
ENSG00000109927	TECTA	1.621176029	0.024825641
ENSG00000225921	NOL7	-0.357614315	0.024887423
ENSG00000125356	NDUFA1	-0.429324296	0.024903547
ENSG00000134109	EDEM1	0.588197648	0.0249238
ENSG00000272047	GTF2H5	-0.603290404	0.0249238
ENSG00000158716	DUSP23	-0.766487048	0.024952719
ENSG00000214293	APTR	-0.807379196	0.024957679
ENSG00000004779	NDUFAB1	-0.604613464	0.025040438
ENSG00000279800	BCLAF1P2	1.289804498	0.025040438
ENSG00000126934	MAP2K2	-0.457215538	0.025040438
ENSG00000173120	KDM2A	0.504028514	0.025124885
ENSG00000107862	GBF1	0.372153055	0.025348284
ENSG00000215421	ZNF407	0.473216201	0.025348284
ENSG00000280387		1.18402471	0.025378752
ENSG00000171621	SPSB1	2.114236491	0.025381006
ENSG00000164190	NIPBL	0.44846775	0.025381006
ENSG00000037749	MFAP3	0.805727863	0.025381006
ENSG00000206344	HCG27	-1.285257158	0.025381006
ENSG00000136936	XPA	-0.472543218	0.025381006
ENSG00000148450	MSRB2	-0.767262355	0.025381006
ENSG00000042088	TDP1	-0.431474674	0.025381006
ENSG00000246067	RAB30-AS1	-0.915751057	0.025399413
ENSG00000099331	MYO9B	0.482696177	0.025399413
ENSG00000176261	ZBTB8OS	-0.490437415	0.025431111
ENSG00000137496	IL18BP	0.880616844	0.025528674
ENSG00000134531	EMP1	2.55052526	0.025528674
ENSG00000141699	FAM134C	-0.673472558	0.025565125
ENSG00000173660	UQCRH	-0.384529578	0.025588813
ENSG00000213015	ZNF580	-0.601527207	0.025663166
ENSG00000167969	ECI1	-0.600681358	0.025743214

ENSG0000056972	TRAF3IP2	0.897113637	0.026002178
ENSG00000235065	RPL24P2	-0.851508615	0.02603448
ENSG00000104884	ERCC2	-0.624171592	0.026050533
ENSG00000166716	ZNF592	0.438000546	0.026062079
ENSG00000206417	H1FX-AS1	-1.010726089	0.026078839
ENSG00000163964	PIGX	-0.576009217	0.026078839
ENSG00000169902	TPST1	2.392070706	0.026078839
ENSG00000139546	TARBP2	-0.583239623	0.026078839
ENSG00000100288	CHKB	-0.584222445	0.026078839
ENSG00000171316	CHD7	1.073733163	0.026081784
ENSG00000267469		-2.554997863	0.026131442
ENSG00000077312	SNRPA	-0.558935214	0.026131442
ENSG00000184162	NR2C2AP	-0.726067336	0.02623281
ENSG00000136280	CCM2	-0.648850426	0.026343438
ENSG00000165113	GKAP1	-0.88964509	0.026344776
ENSG00000244625	MIATNB	-0.690042785	0.026501044
ENSG00000184613	NELL2	-1.740079443	0.026825109
ENSG00000138031	ADCY3	1.297865892	0.02690032
ENSG00000130520	LSM4	-0.506509294	0.027006809
ENSG00000277972	CISD3	-0.680067855	0.027043623
ENSG00000184508	HDCC3	-0.77332777	0.027124592
ENSG00000054267	ARID4B	0.421114391	0.02719172
ENSG00000075539	FRYL	0.475720877	0.02719172
ENSG00000272221		-1.528425184	0.02719172
ENSG00000130724	CHMP2A	-0.501909261	0.02719172
ENSG00000180098	TRNAU1AP	-0.49471064	0.027333643
ENSG00000204954	C12orf73	-0.952217125	0.027333643
ENSG00000122971	ACADS	-0.619653718	0.027333643
ENSG00000139597	N4BP2L1	-0.554044707	0.027333643
ENSG00000182512	GLRX5	-0.54314681	0.027405529
ENSG00000134262	AP4B1	-0.44425215	0.027669504
ENSG00000173992	CCS	-0.701176639	0.027669504
ENSG00000143373	ZNF687	0.479829483	0.027690243
ENSG00000152894	PTPRK	-1.937761807	0.027690243
ENSG00000176641	RNF152	3.483770873	0.027718994
ENSG00000114982	KANSL3	0.440411366	0.02776254
ENSG00000172348	RCAN2	-3.731697861	0.02779231
ENSG00000112667	DNPH1	-0.789091427	0.027850794
ENSG00000114841	DNAH1	0.534116579	0.027866299
ENSG00000164292	RHOBTB3	2.007126965	0.027866299
ENSG00000146067	FAM193B	-0.456480654	0.027866299
ENSG00000256338	RPL41P2	-1.007196144	0.027866299
ENSG00000141503	MINK1	0.498882757	0.027866299
ENSG00000125995	ROMO1	-0.653782255	0.027866299
ENSG00000105373	GLTSCR2	-0.508819392	0.027866299
ENSG00000162244	RPL29	-0.461104731	0.027897926
ENSG00000055208	TAB2	0.714201364	0.027922011
ENSG00000154723	ATP5J	-0.469016379	0.028012532

ENSG00000224094	RPS24P8	-0.613556698	0.028034635
ENSG00000176058	TPRN	-0.678657317	0.0280373
ENSG00000136444	RSAD1	-0.636304619	0.0280373
ENSG00000243466	IGKV1-5	-2.747646761	0.028041033
ENSG00000238045		-0.987291268	0.028041033
ENSG00000172534	HCFC1	0.491773922	0.028087681
ENSG00000132912	DCTN4	0.651916738	0.028094624
ENSG00000177600	RPLP2	-0.556323162	0.028094624
ENSG00000276819	TRBV15	-3.14436854	0.028126446
ENSG00000149922	TBX6	-0.932450331	0.028236084
ENSG00000198830	HMG2	-0.473773275	0.028322698
ENSG00000198816	ZNF358	-0.737212475	0.028790984
ENSG00000132196	HSD17B7	-0.828725168	0.028858721
ENSG00000114383	TUSC2	-0.42975637	0.028864099
ENSG00000279648		1.261521369	0.028950354
ENSG00000211767	TRBJ2-3	-3.138841709	0.029129037
ENSG00000172296	SPTLC3	1.518676567	0.029177577
ENSG00000170242	USP47	0.524550822	0.029279897
ENSG00000135905	DOCK10	0.526719754	0.029487881
ENSG00000160948	VPS28	-0.453991722	0.029487881
ENSG00000107263	RAPGEF1	0.794697107	0.029487881
ENSG00000120647	CCDC77	-0.642454516	0.029487881
ENSG00000257303		-1.147572618	0.029487881
ENSG00000130052	STARD8	1.440779885	0.029531387
ENSG00000111641	NOP2	0.626715697	0.029693735
ENSG00000160131	VMA21	-0.412572078	0.029721222
ENSG00000231672	DIRC3	-1.669331958	0.029803167
ENSG00000205089	CCNI2	-3.132667856	0.029803167
ENSG00000164649	CDCA7L	-0.838360063	0.029861994
ENSG00000183617	MRPL54	-0.584433109	0.029921019
ENSG00000213079	SCAF8	0.568275652	0.029952713
ENSG00000211806	TRAV25	-3.150083487	0.029952713
ENSG00000245970		-1.424898207	0.029957007
ENSG00000124507	PACSIN1	-2.900353487	0.029967501
ENSG00000137970	RPL7P9	-0.468088405	0.030003886
ENSG00000168393	DTYMK	-0.809829934	0.030003886
ENSG00000101997	CCDC22	-0.528870618	0.030003886
ENSG00000272010		-1.909548289	0.030003886
ENSG00000110046	ATG2A	1.03334571	0.030003886
ENSG00000127884	ECHS1	-0.594112929	0.030003886
ENSG00000156535	CD109	2.355823865	0.030020281
ENSG00000105619	TFPT	-0.567208273	0.030052758
ENSG00000091732	ZC3HC1	-0.523477153	0.030117626
ENSG00000162636	FAM102B	0.809820526	0.030119011
ENSG00000163001	CFAP36	-0.658800152	0.030119011
ENSG00000170476	MZB1	-2.134287917	0.030119011
ENSG00000186432	KPNA4	0.449671953	0.030205799
ENSG00000173114	LRRN3	-1.945331465	0.030205799

ENSG00000196878	LAMB3	4.640058503	0.030307255
ENSG00000183207	RUVBL2	-0.693767535	0.030307255
ENSG00000184436	THAP7	-0.527344163	0.030408947
ENSG00000148334	PTGES2	-0.417092349	0.030449131
ENSG00000174721	FGFBP3	-0.89856109	0.030449131
ENSG00000103363	TCEB2	-0.511962579	0.030555376
ENSG00000187051	RPS19BP1	-0.483204817	0.030555376
ENSG00000243317	C7orf73	-0.356230575	0.030646771
ENSG00000137700	SLC37A4	-0.767660534	0.030768163
ENSG00000105655	ISYNA1	1.129457882	0.030924052
ENSG00000092203	TOX4	0.362644096	0.030980072
ENSG00000095564	BTAF1	0.614609346	0.031170324
ENSG00000125633	CCDC93	0.497019736	0.031231138
ENSG00000247828	TMEM161B-AS1	-0.906054292	0.031231138
ENSG00000105808	RASA4	-0.792830397	0.031231138
ENSG00000239697	TNFSF12	-0.602025011	0.031231138
ENSG00000164967	RPP25L	-0.945716033	0.031241588
ENSG00000211765	TRBJ2-2	-3.128743004	0.031268971
ENSG00000273437		-1.480941907	0.031323549
ENSG00000256690		-1.35061744	0.031323549
ENSG00000241370	RPP21	-0.686097162	0.031344836
ENSG00000135423	GLS2	-3.134035196	0.031408719
ENSG00000054654	SYNE2	-0.892314379	0.031408719
ENSG00000162066	AMDHD2	-0.561184696	0.031408719
ENSG00000211890	IGHA2	-3.043639092	0.031431437
ENSG00000167136	ENDOG	-0.988204244	0.031565691
ENSG00000159445	THEM4	-0.917400374	0.031650323
ENSG00000213609	RPL7AP50	-0.936589701	0.03166195
ENSG00000106346	USP42	0.699110953	0.03195095
ENSG00000198406	BZW1P2	1.057910367	0.031954257
ENSG00000272556	GTF2IP13	-0.919675828	0.031983814
ENSG00000104983	CCDC61	-0.810447964	0.031983814
ENSG00000036054	TBC1D23	0.661130285	0.031985522
ENSG00000196976	LAGE3	-0.81100185	0.031985522
ENSG00000226049	TLK2P1	1.406651258	0.031985522
ENSG00000164167	LSM6	-0.504758442	0.032074462
ENSG00000137133	HINT2	-0.631687853	0.032162283
ENSG00000132254	ARFIP2	-0.373804473	0.032187691
ENSG00000228889	UBAC2-AS1	-1.064954549	0.03229863
ENSG00000227766	HCG4P5	-1.819950371	0.032445553
ENSG00000086102	NFX1	0.665089384	0.032445553
ENSG00000115020	PIKFYVE	0.514275688	0.032463413
ENSG00000234506	LINC01506	-1.091454761	0.032561016
ENSG00000274425		-1.245238567	0.032561016
ENSG00000213689	TREX1	-0.868830453	0.032639315
ENSG00000004059	ARF5	-0.334508584	0.032658839
ENSG00000172985	SH3RF3	2.470593277	0.032675987
ENSG00000171858	RPS21	-0.520884107	0.032675987

ENSG00000130725	UBE2M	-0.419222937	0.032675987
ENSG00000272886	DCP1A	0.664263129	0.032713515
ENSG00000233830	EIF4HP1	0.855207374	0.032721838
ENSG00000115307	AUP1	-0.261371295	0.032800944
ENSG00000072818	ACAP1	-0.580695267	0.032800944
ENSG00000197417	SHPK	-0.817123117	0.033029423
ENSG00000131263	RLIM	0.802493937	0.033050614
ENSG00000187605	TET3	0.563025251	0.033157234
ENSG00000267547		-1.151716539	0.033274209
ENSG00000065717	TLE2	-1.826407142	0.033274209
ENSG00000237976		-1.087958933	0.033356063
ENSG00000257433		-0.936390659	0.033398898
ENSG00000135441	BLOC1S1	-0.583296421	0.033398898
ENSG00000258230		1.880877523	0.033398898
ENSG00000230124	ACBD6	-0.395426883	0.033433735
ENSG00000063241	ISOC2	-0.91618381	0.033433735
ENSG00000136715	SAP130	0.385084825	0.033508369
ENSG00000255760		-1.486432153	0.033526628
ENSG00000270091		-0.997941738	0.033526628
ENSG00000198680	TUSC1	-1.48592915	0.033540244
ENSG00000176928	GCNT4	-1.706038951	0.033542851
ENSG00000113615	SEC24A	0.699303865	0.033542851
ENSG00000276997		0.997353262	0.033575959
ENSG00000089009	RPL6	-0.362646871	0.033575959
ENSG00000233762		-0.663632072	0.033650837
ENSG00000243477	NAT6	-0.534245084	0.033798149
ENSG00000164530	PI16	-2.767710551	0.033798149
ENSG00000267216		1.599049828	0.033798149
ENSG00000163516	ANKZF1	-0.770054168	0.033980388
ENSG00000198498	TMA16	-0.85210163	0.033980388
ENSG00000165219	GAPVD1	0.449676267	0.033980388
ENSG00000261996		-3.133718706	0.033980388
ENSG00000205078	SYCE1L	-1.021721736	0.033991493
ENSG00000162496	DHRS3	4.235173009	0.034011857
ENSG00000134193	REG4	-3.134612984	0.034086813
ENSG00000229833	PET100	-0.583040601	0.03414091
ENSG00000171530	TBCA	-0.519696424	0.034205608
ENSG00000277496		-1.080679107	0.034217811
ENSG00000132465	JCHAIN	-2.282890009	0.034291752
ENSG00000121753	ADGRB2	-3.13423177	0.034323713
ENSG00000237765	FAM200B	-0.56472199	0.034323713
ENSG00000236810	TCEB3-AS1	-0.930230335	0.034447011
ENSG00000167680	SEMA6B	4.630329697	0.034447011
ENSG00000159082	SYNJ1	0.606780167	0.034478766
ENSG00000142684	ZNF593	-0.692685113	0.034509516
ENSG00000225873	LINC00694	-0.979060396	0.034509516
ENSG00000064313	TAF2	0.45085625	0.034509516
ENSG00000245205	EEF1A1P4	2.082654308	0.034509516

ENSG00000105202	FBL	-0.358253286	0.034509516
ENSG00000110200	ANAPC15	-0.412695928	0.034543209
ENSG00000116786	PLEKHM2	0.687089511	0.034720043
ENSG00000163344	PMVK	-0.849333057	0.034720043
ENSG00000002587	HS3ST1	4.214811479	0.034720043
ENSG00000118418	HMG3	-0.558436062	0.034720043
ENSG00000198467	TPM2	-0.881114274	0.034720043
ENSG00000133321	RARRES3	-0.64986815	0.034720043
ENSG00000277662		-1.299843575	0.034720043
ENSG00000170175	CHRNA1	-0.828973863	0.034720043
ENSG00000204584		-0.871994181	0.034720043
ENSG00000144711	IQSEC1	0.576502418	0.034744985
ENSG00000109756	RAPGEF2	0.726793779	0.034776622
ENSG00000280734	LINC01232	-0.566448856	0.03483338
ENSG00000126264	HCST	-0.673432407	0.03483338
ENSG00000204859	ZBTB48	-0.442831744	0.034872497
ENSG00000163374	YY1AP1	0.323546435	0.034872497
ENSG00000008056	SYN1	3.570921175	0.034956775
ENSG00000104518	GSDMD	-0.77677151	0.034992233
ENSG00000186468	RPS23	-0.415367533	0.035065093
ENSG00000166233	ARIH1	0.632115774	0.035065093
ENSG00000188011	RTP5	5.027326556	0.03512535
ENSG00000170846		-0.7221086	0.035135891
ENSG00000140264	SERF2	-0.399073562	0.035135891
ENSG00000148690	FRA10AC1	-0.711114025	0.035296032
ENSG00000240972	MIF	-0.575281757	0.035296032
ENSG00000168488	ATXN2L	0.365518268	0.035431286
ENSG00000261643		-1.142226958	0.035494446
ENSG00000167700	MFSD3	-1.152338368	0.035494446
ENSG00000272750		-1.094186671	0.035509504
ENSG00000165874	FAM35BP	-0.849186131	0.035509504
ENSG00000185088	RPS27L	-0.403231651	0.035509504
ENSG00000233223		-0.984342917	0.035509504
ENSG00000167536	DHRS13	-0.787779416	0.035509504
ENSG00000101363	MANBAL	-0.44015654	0.035509504
ENSG00000169241	SLC50A1	-0.549755493	0.035522393
ENSG00000253200		1.080062197	0.035522393
ENSG00000198879	SFMBT2	1.009872758	0.035522393
ENSG00000166669	ATF7IP2	-0.587252968	0.035522393
ENSG00000140829	DHX38	0.370106386	0.035522393
ENSG00000005884	ITGA3	-1.158850528	0.035522393
ENSG00000115268	RPS15	-0.497812116	0.035522393
ENSG00000129932	DOHH	-0.655050634	0.035522393
ENSG00000105427	CNFN	-1.272617389	0.035734522
ENSG00000137502	RAB30	-1.33987915	0.035843763
ENSG00000082805	ERC1	0.529342446	0.035843763
ENSG00000075336	TMM21	-0.622482362	0.03593511
ENSG00000100330	MTMR3	0.460353296	0.036049747

ENSG00000239246		-0.781696498	0.036090388
ENSG00000148600	CDHR1	-3.138213034	0.036102288
ENSG00000183691	NOG	-1.972410561	0.036117435
ENSG00000168060	NAALADL1	-0.723939726	0.036160311
ENSG00000102886	GDPD3	-0.986775891	0.036211636
ENSG00000050426	LETMD1	-0.482779896	0.036262099
ENSG00000160752	FDPS	-0.437762523	0.036362095
ENSG00000227057	WDR46	-0.605025324	0.036413212
ENSG00000180611	MB21D2	2.695103339	0.036440443
ENSG00000266472	MRPS21	-0.469383388	0.036549244
ENSG00000173166	RAPH1	1.555459747	0.036549244
ENSG00000160469	BRSK1	-2.008328061	0.036596343
ENSG00000244398		-0.505156221	0.036692324
ENSG00000160789	LMNA	2.260854059	0.036705214
ENSG00000161202	DVL3	0.505403401	0.036705214
ENSG00000176973	FAM89B	-0.658946552	0.036723107
ENSG00000164114	MAP9	-2.037066706	0.036748652
ENSG00000011405	PIK3C2A	0.526700347	0.036753474
ENSG00000134291	TMEM106C	-0.83027396	0.036753474
ENSG00000185187	SIGIRR	-0.555850669	0.036844175
ENSG00000176102	CSTF3	-0.521079157	0.036844175
ENSG00000186026	ZNF284	-1.06684792	0.036844175
ENSG00000170445	HARS	-0.357359517	0.037227683
ENSG00000227008		-0.639990128	0.037227683
ENSG00000250571	GLI4	-0.540572947	0.037227683
ENSG00000143622	RIT1	0.664447278	0.037230484
ENSG00000276728		-1.144631216	0.037230484
ENSG00000031698	SARS	-0.462762811	0.037233831
ENSG00000013588	GPRC5A	2.556559033	0.037233831
ENSG00000225614	ZNF469	1.661462497	0.037233831
ENSG00000173065	FAM222B	0.60139117	0.037233831
ENSG00000141446	ESCO1	0.497014238	0.037240263
ENSG00000244575	IGKV1-27	-3.104042085	0.037264327
ENSG00000104129	DNAJC17	-0.464809803	0.037321913
ENSG00000133935	C14orf1	-0.658710655	0.037491226
ENSG00000103260	METRN	-0.946916408	0.037605871
ENSG00000127774	EMC6	-0.614312464	0.037607826
ENSG00000152969	JAKMIP1	-2.882368512	0.037609403
ENSG00000167034	NKX3-1	2.341004939	0.037609403
ENSG00000277610	RNVU1-4	-1.001377715	0.037649498
ENSG00000125351	UPF3B	-0.554899265	0.037649498
ENSG00000054116	TRAPPC3	-0.386469139	0.037842764
ENSG00000182827	ACBD3	0.604497749	0.037842764
ENSG00000144161	ZC3H8	-0.581582319	0.037842764
ENSG00000118777	ABCG2	4.62118608	0.037842764
ENSG00000123219	CENPK	-1.552335559	0.037842764
ENSG00000196531	NACA	-0.324584756	0.037842764
ENSG00000263766		-1.013943188	0.037842764

ENSG00000242299		-0.600059343	0.037897903
ENSG00000104936	DMPK	-0.925328832	0.037925675
ENSG00000115286	NDUFS7	-0.41871695	0.037966589
ENSG00000225079	FTH1P22	-3.145246135	0.038144542
ENSG00000172803	SNX32	-1.691732441	0.038144542
ENSG00000168701	TMEM208	-0.586997584	0.038144542
ENSG00000015133	CCDC88C	0.518586117	0.038170442
ENSG00000112282	MED23	0.511116481	0.038177911
ENSG00000183154		0.858841273	0.038177911
ENSG00000268758	ADGRE4P	2.916243913	0.038177911
ENSG00000108175	ZMIZ1	0.997346408	0.038283131
ENSG00000264577		-2.047081656	0.038408804
ENSG00000101132	PFDN4	-0.543590927	0.038416475
ENSG00000159377	PSMB4	-0.326962868	0.038475571
ENSG00000143742	SRP9	-0.49710727	0.038475571
ENSG00000168894	RNF181	-0.569500978	0.038475571
ENSG00000152784	PRDM8	1.832420454	0.038475571
ENSG00000083845	RPS5	-0.479993169	0.038475571
ENSG00000142252	GEMIN7	-0.815185734	0.03856322
ENSG00000172992	DCAKD	-0.580232999	0.038775116
ENSG00000272256		-0.888298201	0.038849526
ENSG00000198964	SGMS1	0.618150485	0.038849526
ENSG00000075089	ACTR6	-0.554268402	0.038849526
ENSG00000099814	CEP170B	2.400863132	0.038849526
ENSG00000259972		-0.748618274	0.038849526
ENSG00000160307	S100B	-2.241887589	0.038849526
ENSG00000207652	MIR621	3.819437286	0.038891609
ENSG00000196396	PTPN1	0.628100761	0.038936863
ENSG00000143365	RORC	-2.50333728	0.038957382
ENSG00000213614	HEXA	-0.335577228	0.038985474
ENSG00000183856	IQGAP3	3.666347635	0.039159362
ENSG00000241973	PI4KA	0.371268385	0.039190661
ENSG00000090263	MRPS33	-0.603244457	0.039195073
ENSG00000143442	POGZ	0.368986727	0.039531694
ENSG00000056097	ZFR	0.368369844	0.039531694
ENSG00000176485	PLA2G16	-1.193605918	0.039531694
ENSG00000102977	ACD	-0.671711797	0.039531694
ENSG00000198918	RPL39	-0.458895957	0.039550276
ENSG00000173465	SSSCA1	-0.544505937	0.039693033
ENSG00000188211	NCR3LG1	2.352754732	0.0399304
ENSG00000102871	TRADD	-0.744357518	0.0399304
ENSG00000149600	COMMD7	-0.376624037	0.0399304
ENSG00000079616	KIF22	-0.494760231	0.04002808
ENSG00000089289	IGBP1	-0.335047747	0.04006359
ENSG00000125430	HS3ST3B1	2.154403761	0.040267757
ENSG00000176978	DPP7	-0.404499071	0.040267896
ENSG00000116288	PARK7	-0.437181375	0.040293696
ENSG00000267745		-0.8100025	0.040293696

ENSG00000066583	ISOC1	-0.627870879	0.04032593
ENSG00000125450	NUP85	-0.398775131	0.040592692
ENSG00000165644	COMTD1	-0.893950878	0.040610066
ENSG00000174788	PCP2	-1.020760564	0.040697684
ENSG00000260778	MIR940	-1.109840597	0.040734363
ENSG00000275963		-1.298079871	0.04075364
ENSG00000079313	REXO1	0.479942387	0.04075364
ENSG00000065518	NDUFB4	-0.396480005	0.040855389
ENSG00000268836		-1.393338904	0.040874666
ENSG00000125652	ALKBH7	-0.590172107	0.041000836
ENSG00000204498	NFKBIL1	-0.538349511	0.041101864
ENSG00000134056	MRPS36	-0.477634342	0.041129802
ENSG00000005889	ZFX	0.430223485	0.041129802
ENSG00000211956	IGHV4-34	-2.172525313	0.041136114
ENSG00000250151	ARPC4-TTLL3	1.278367205	0.04121907
ENSG00000053900	ANAPC4	-0.452468824	0.04122998
ENSG00000113716	HMGXB3	0.515021026	0.04122998
ENSG00000188994	ZNF292	0.646942274	0.04122998
ENSG00000111850	SMIM8	-0.709960319	0.04122998
ENSG00000164896	FASTK	-0.464674551	0.04122998
ENSG00000140093	SERPINA10	1.081806644	0.04122998
ENSG00000176182	MYPOP	-0.644262633	0.041252576
ENSG00000136068	FLNB	1.255746722	0.041307809
ENSG00000244313		-0.495374021	0.041307809
ENSG00000059573	ALDH18A1	-0.78946868	0.041307809
ENSG00000155366	RHOC	-0.999335826	0.041575484
ENSG00000151366	NDUFC2	-0.480518107	0.041775988
ENSG00000152484	USP12	0.612807653	0.041812197
ENSG00000152942	RAD17	-0.43926317	0.041876117
ENSG00000214837	LINC01347	0.683228702	0.042079574
ENSG00000064989	CALCRL	1.015284999	0.042079574
ENSG00000172215	CXCR6	-3.094011166	0.042079574
ENSG00000137411	VAR2	-0.677797605	0.042079574
ENSG00000137038	TMEM261	-0.697762687	0.042079574
ENSG00000178385	PLEKHM3	0.739302205	0.042112829
ENSG00000105701	FKBP8	-0.329476009	0.042139473
ENSG00000175556	LONRF3	1.623222537	0.042344602
ENSG00000163681	SLMAP	0.360179808	0.042350077
ENSG00000141295	SCRN2	-0.646756333	0.042433675
ENSG00000007392	LUC7L	-0.425680524	0.042435215
ENSG00000213339	QTRT1	-0.531245531	0.042437675
ENSG00000182584	ACTL10	-1.479857702	0.042639209
ENSG00000114391	RPL24	-0.374240223	0.042687469
ENSG00000196510	ANAPC7	-0.481863706	0.042687469
ENSG00000183604	SMG1P5	0.880796342	0.042687469
ENSG00000275895	U2AF1L5	5.913744174	0.042687469
ENSG00000147996	CBWD5	-0.688029137	0.042785673
ENSG00000187713	TMEM203	-0.636473079	0.042785673

ENSG00000164081	TEX264	-0.540537203	0.042968209
ENSG00000162407	PLPP3	3.145969591	0.043022223
ENSG00000138081	FBXO11	0.449977243	0.043022223
ENSG00000153563	CD8A	-2.050716022	0.043022223
ENSG00000156453	PCDH1	-3.12587616	0.043022223
ENSG00000211892	IGHG4	-3.166033524	0.043022223
ENSG00000125863	MKKS	-0.897783103	0.043022223
ENSG00000276712	MIR7111	-1.361628487	0.043024639
ENSG00000243302		0.718076454	0.043024639
ENSG00000083838	ZNF446	-0.512358189	0.043024639
ENSG00000138138	ATAD1	-0.479364235	0.04305438
ENSG00000100911	PSME2	-0.626742098	0.043168295
ENSG00000074054	CLASP1	0.476317638	0.043224672
ENSG00000100417	PMM1	-0.44781228	0.043234026
ENSG00000197756	RPL37A	-0.445030749	0.043352636
ENSG00000117543	DPH5	-0.549269986	0.043532228
ENSG00000038358	EDC4	0.486825432	0.04355646
ENSG00000270605		-1.147999537	0.043560072
ENSG00000169031	COL4A3	-2.784241315	0.043596329
ENSG00000185201	IFITM2	-0.680326556	0.043596329
ENSG00000089248	ERP29	-0.335387141	0.043596329
ENSG00000007376	RPUSD1	-0.479283752	0.043596329
ENSG00000165283	STOML2	-0.403867517	0.043602501
ENSG00000241839	PLEKHO2	1.038009555	0.043602501
ENSG00000181284	TMEM102	-0.911080072	0.043602501
ENSG00000134250	NOTCH2	0.552101049	0.04367452
ENSG00000165029	ABCA1	2.249596942	0.043707196
ENSG00000224051	CPTP	-0.728960139	0.043714595
ENSG00000159267	HLCS	0.687399117	0.043782987
ENSG00000204397	CARD16	-0.617636936	0.043795369
ENSG00000139514	SLC7A1	0.96426974	0.044117767
ENSG00000175518	UBQLNL	-1.764303285	0.044146853
ENSG00000106628	POLD2	-0.550058631	0.044175918
ENSG00000008513	ST3GAL1	0.614799761	0.044175918
ENSG00000076108	BAZ2A	0.500597808	0.04433456
ENSG00000173064	HECTD4	0.495802002	0.044356752
ENSG00000013619	MAMLD1	3.182839061	0.044431646
ENSG00000111906	HDHC2	-0.621072395	0.044687602
ENSG00000170515	PA2G4	-0.543868305	0.044687602
ENSG00000103160	HSDL1	-0.424304955	0.044687602
ENSG00000165821	SALL2	-2.520845648	0.0446893
ENSG00000108021	FAM208B	0.520706809	0.04473796
ENSG00000175416	CLTB	-0.441417134	0.044813376
ENSG00000108465	CDK5RAP3	-0.397619978	0.044890508
ENSG00000221983	UBA52	-0.378732299	0.044890508
ENSG00000162639	HENMT1	-0.614746534	0.045033552
ENSG00000204099	NEU4	4.571648435	0.045252122
ENSG00000130340	SNX9	1.710301274	0.045252122

ENSG00000164985	PSIP1	-0.477574706	0.045252122
ENSG00000100731	PCNX1	0.48188969	0.045254671
ENSG00000185808	PIGP	-0.579636581	0.045263533
ENSG00000279417		1.17850504	0.045319801
ENSG00000158042	MRPL17	-0.851891606	0.045339578
ENSG00000108559	NUP88	-0.410590254	0.045375128
ENSG00000005483	KMT2E	0.556782054	0.045426292
ENSG00000153815	CMIP	0.414299968	0.045426292
ENSG00000113312	TTC1	-0.565693253	0.045661177
ENSG00000214160	ALG3	-0.477797403	0.045678508
ENSG00000136271	DDX56	-0.348796062	0.045678508
ENSG00000113742	CPEB4	0.613652719	0.045793706
ENSG00000196459	TRAPPC2	-0.632702775	0.045793706
ENSG00000266094	RASSF5	0.481892776	0.045806928
ENSG00000169129	AFAP1L2	-2.635499441	0.045806928
ENSG00000146066	HIGD2A	-0.406287221	0.045985098
ENSG00000119632	IFI27L2	-0.661359919	0.045985098
ENSG00000100804	PSMB5	-0.626161402	0.046091549
ENSG00000169696	ASPSR1	-0.532934677	0.046091549
ENSG00000141867	BRD4	0.394385805	0.046091549
ENSG00000198855	FICD	0.736091453	0.046333313
ENSG00000068120	COASY	-0.487687283	0.046333353
ENSG00000279838		1.125539749	0.046444112
ENSG00000165264	NDUFB6	-0.643801407	0.046444112
ENSG00000234608	MAPKAPK5-AS1	-0.578323069	0.046453159
ENSG00000163682	RPL9	-0.486288806	0.046509883
ENSG00000149806	FAU	-0.39010556	0.04656741
ENSG00000163960	UBXN7	0.469049934	0.046642192
ENSG00000198218	QRICH1	0.399087459	0.046739914
ENSG00000165288	BRWD3	0.461127357	0.046739914
ENSG00000253865		-1.512638706	0.046822565
ENSG00000124177	CHD6	0.496285604	0.046827136
ENSG00000276278		-0.830475578	0.046855934
ENSG00000261596		-0.8753326	0.046855934
ENSG00000127054	CPSF3L	-0.333532212	0.046870577
ENSG00000233184		-0.83810111	0.046870577
ENSG00000243943	ZNF512	-0.760413436	0.046870577
ENSG00000153827	TRIP12	0.343271928	0.046870577
ENSG00000235043	TECRP1	-0.89425472	0.046870577
ENSG00000140396	NCOA2	0.437324447	0.046870577
ENSG00000211792	TRAV14DV4	-2.825447806	0.046870577
ENSG00000158545	ZC3H18	0.370776374	0.046870577
ENSG00000175826	CTDNEP1	-0.281163998	0.046870577
ENSG00000132635	PCED1A	-0.467450736	0.046870577
ENSG00000174851	YIF1A	-0.580696444	0.047034157
ENSG00000158865	SLC5A11	4.463636688	0.047034157
ENSG00000105618	PRPF31	-0.250974817	0.047034157
ENSG00000062524	LTK	-1.752478068	0.047155952

ENSG00000174775	HRAS	-0.527554391	0.047199047
ENSG00000218208	RPS27AP11	-1.358157596	0.047273666
ENSG00000170962	PDGFD	-2.848460513	0.047273666
ENSG00000083750	RRAGB	-0.47812908	0.047298109
ENSG00000176542	USF3	0.552887719	0.047449321
ENSG00000176171	BNIP3	-0.674813715	0.047449321
ENSG00000117519	CNN3	-2.418513176	0.047549774
ENSG00000113648	H2AFY	0.409077499	0.047549774
ENSG00000211727	TRBV7-6	-2.8067004	0.047549774
ENSG00000228956	SATB1-AS1	-1.150655167	0.047632971
ENSG00000156469	MTERF3	-0.579078213	0.047632971
ENSG00000277147	LINC00869	-0.611240371	0.047848454
ENSG00000065613	SLK	0.482132723	0.047848454
ENSG00000177374	HIC1	2.512285629	0.047848454
ENSG00000099901	RANBP1	-0.527919484	0.047848454
ENSG00000146535	GNA12	0.715639718	0.04800415
ENSG00000165685	TMEM52B	1.930705573	0.048029777
ENSG00000212864	RNF208	-1.188753499	0.04803598
ENSG00000276557	TRBV18	-2.80364527	0.048122956
ENSG00000005007	UPF1	0.327711974	0.04816041
ENSG00000185909	KLHDC8B	-0.910884779	0.048210537
ENSG00000211749	TRBV23-1	-2.202724337	0.048210537
ENSG00000125485	DDX31	-0.705100038	0.048210537
ENSG00000105705	SUGP1	-0.446533939	0.048210537
ENSG00000163814	CDCP1	2.585311156	0.048273761
ENSG00000198034	RPS4X	-0.374882348	0.048273761
ENSG00000184224	C11orf72	-0.590217528	0.048273761
ENSG00000235194	PPP1R3E	-0.676363427	0.048273761
ENSG00000170160	CCDC144A	2.0941978	0.048273761
ENSG00000176083	ZNF683	-2.746475406	0.048297436
ENSG00000136938	ANP32B	-0.413056473	0.048297436
ENSG00000211799	TRAV19	-2.622837243	0.048297436
ENSG00000161970	RPL26	-0.425785903	0.048297436
ENSG00000095066	HOOK2	-0.586715222	0.048297436
ENSG00000123349	PFDN5	-0.378672844	0.048338906
ENSG00000246089		-0.859377388	0.048349634
ENSG00000174365	SNHG11	-0.548663065	0.048349634
ENSG00000232573	RPL3P4	-0.513539086	0.048400112
ENSG00000108107	RPL28	-0.498554608	0.048505086
ENSG00000141741	MIEN1	-0.433235287	0.048578998
ENSG00000175691	ZNF77	-0.661634871	0.048597452
ENSG00000221957	KIR2DS4	-2.836379083	0.048630853
ENSG00000171604	CXXC5	1.237317544	0.048660088
ENSG00000196405	EVL	-0.561072486	0.04878382
ENSG00000105372	RPS19	-0.450332596	0.04878382
ENSG00000170310	STX8	-0.562564209	0.048815188
ENSG00000138434	SSFA2	0.528129852	0.0488323
ENSG00000275210		1.076490581	0.049225823

ENSG00000123636	BAZ2B	0.560267986	0.04934826
ENSG00000111237	VPS29	-0.430740893	0.04934826
ENSG00000165795	NDRG2	-0.658068382	0.049404882
ENSG00000175334	BANF1	-0.649785154	0.049445404
ENSG00000055483	USP36	1.123912858	0.049483958
ENSG00000088826	SMOX	2.190063302	0.049483958
ENSG00000116213	WRAP73	-0.433489267	0.04952632
ENSG00000121743	GJA3	4.694189654	0.049555674
ENSG00000232164		1.005172495	0.04964665
ENSG00000166260	COX11	-0.576599855	0.049649613
ENSG00000161671	EMC10	-0.255675902	0.049649613
ENSG00000151612	ZNF827	-1.351829445	0.049771673
ENSG00000096080	MRPS18A	-0.526340363	0.049801233
ENSG00000143924	EML4	0.660037635	0.049852282

Supplementary Table 3 - JDM pre-treatment vs on-treatment significantly DEG ($p \leq 0.05$)

Ensemble ID	hgnc_symbol	log fold change	Adjusted p value
ENSG00000185885	IFITM1	3.39862585	4.74E-33
ENSG00000055130	CUL1	1.164987546	3.41E-25
ENSG00000172183	ISG20	2.238676981	1.46E-23
ENSG00000183486	MX2	2.125286181	9.79E-22
ENSG00000136816	TOR1B	1.710487232	5.11E-21
ENSG00000134321	RSAD2	3.866490322	3.14E-20
ENSG00000124256	ZBP1	2.703954114	4.35E-20
ENSG00000138646	HERC5	3.179408173	9.85E-20
ENSG00000119922	IFIT2	3.804908949	2.40E-19
ENSG00000138035	PNPT1	1.77089402	3.41E-19
ENSG00000140464	PML	1.333071397	4.59E-19
ENSG00000165185	KIAA1958	1.555823901	5.45E-19
ENSG00000130487	KLHDC7B	2.573064724	5.45E-19
ENSG00000059378	PARP12	1.457083108	2.77E-18
ENSG00000184979	USP18	4.107072601	2.77E-18
ENSG00000163644	PPM1K	1.890727422	1.28E-17
ENSG00000187608	ISG15	3.03596484	1.51E-17
ENSG00000107201	DDX58	2.13754173	2.14E-17
ENSG00000137200	CMTR1	1.092391744	3.45E-17
ENSG00000115267	IFIH1	1.934848208	9.16E-16
ENSG00000138642	HERC6	2.337045112	1.80E-15
ENSG00000132274	TRIM22	1.28588343	1.95E-15
ENSG00000100220	RTCB	1.199853067	1.98E-15
ENSG00000188157	AGRN	2.05537899	2.86E-15
ENSG00000086065	CHMP5	1.371126076	5.01E-15
ENSG00000108771	DHX58	1.848937929	6.53E-15
ENSG00000163666	HESX1	3.695272206	6.61E-15
ENSG00000137628	DDX60	2.127830975	6.61E-15
ENSG00000157601	MX1	2.598859926	1.73E-14
ENSG00000160710	ADAR	0.977133921	2.02E-14
ENSG00000105726	ATP13A1	0.976478109	3.23E-14
ENSG00000173193	PARP14	1.576849779	3.99E-14
ENSG00000055332	EIF2AK2	1.601466148	6.89E-14
ENSG00000111912	NCOA7	1.360989368	7.47E-14
ENSG00000017483	SLC38A5	2.431681538	7.47E-14
ENSG00000172432	GTPBP2	0.890297882	8.81E-14
ENSG00000205413	SAMD9	2.142860258	9.27E-14
ENSG00000185745	IFIT1	4.09959233	1.09E-13
ENSG00000134326	CMPK2	2.888452244	1.40E-13
ENSG00000111335	OAS2	2.603698835	1.44E-13
ENSG00000130589	HELZ2	1.632039344	1.73E-13
ENSG00000164054	SHISA5	1.074129998	2.00E-13
ENSG00000160932	LY6E	1.955040544	3.81E-13
ENSG00000138385	SSB	0.93349414	3.88E-13

ENSG00000137198	GMPR	3.067849652	7.88E-13
ENSG00000068079	IFI35	1.613553029	1.41E-12
ENSG00000185201	IFITM2	1.26248619	2.89E-12
ENSG00000170581	STAT2	1.353047658	2.92E-12
ENSG00000118922	KLF12	-1.403238223	3.65E-12
ENSG00000111331	OAS3	2.585404184	6.99E-12
ENSG00000162614	NEXN	2.681249354	8.16E-12
ENSG00000154122	ANKH	-1.750924848	8.84E-12
ENSG00000105939	ZC3HAV1	0.950150676	1.11E-11
ENSG00000196116	TDRD7	1.251876971	1.20E-11
ENSG00000137959	IFI44L	3.167495964	1.32E-11
ENSG00000117010	ZNF684	1.305517008	1.37E-11
ENSG00000138496	PARP9	1.979935564	1.46E-11
ENSG00000100129	EIF3L	-0.808894816	1.60E-11
ENSG00000122643	NT5C3A	1.527976155	1.96E-11
ENSG00000162496	DHRS3	-7.188957132	2.02E-11
ENSG00000126709	IFI6	2.337677573	2.75E-11
ENSG00000076685	NT5C2	0.639429253	3.22E-11
ENSG00000137965	IFI44	2.419785274	3.35E-11
ENSG00000145287	PLAC8	1.458065947	4.91E-11
ENSG00000152102	FAM168B	-0.662531972	6.19E-11
ENSG00000119917	IFIT3	3.650993356	6.50E-11
ENSG00000146859	TMEM140	1.582845349	6.89E-11
ENSG00000185507	IRF7	1.716623152	7.29E-11
ENSG00000108700	CCL8	5.675703163	7.62E-11
ENSG00000108679	LGALS3BP	2.067284751	8.43E-11
ENSG00000133106	EPSTI1	2.031143247	9.29E-11
ENSG00000111344	RASAL1	-6.839063999	1.22E-10
ENSG00000163840	DTX3L	1.708226909	2.62E-10
ENSG00000188542	DUSP28	-0.714087951	2.62E-10
ENSG00000247317		2.306715849	2.85E-10
ENSG00000106603	COA1	0.850492432	3.15E-10
ENSG00000137414	FAM8A1	0.969940671	3.28E-10
ENSG00000102921	N4BP1	0.91262895	4.33E-10
ENSG00000130813	C19orf66	0.991247446	6.69E-10
ENSG00000132530	XAF1	2.318501921	9.68E-10
ENSG00000136147	PHF11	0.907090338	1.01E-09
ENSG00000163565	IFI16	1.503157981	1.02E-09
ENSG00000226950	DANCR	-1.353528168	1.36E-09
ENSG00000135899	SP110	1.265405777	1.37E-09
ENSG00000273314		1.60592131	1.39E-09
ENSG00000035720	STAP1	2.855107916	1.61E-09
ENSG00000105655	ISYNA1	-1.63253399	2.30E-09
ENSG00000168394	TAP1	1.113012556	2.48E-09
ENSG00000130595	TNNT3	-2.729036726	2.52E-09
ENSG00000131979	GCH1	0.985678555	2.66E-09
ENSG00000132109	TRIM21	1.466413305	2.80E-09
ENSG00000152766	ANKRD22	2.152048724	3.21E-09

ENSG00000204977	TRIM13	-1.089383113	3.93E-09
ENSG00000177409	SAMD9L	2.362901281	3.97E-09
ENSG00000168395	ING5	-0.888022519	6.13E-09
ENSG00000173786	CNP	1.218181809	6.45E-09
ENSG00000196684	HSH2D	1.342544902	6.51E-09
ENSG00000244242	IFITM10	-3.373797553	6.78E-09
ENSG00000173511	VEGFB	-2.291712704	6.87E-09
ENSG00000143153	ATP1B1	-1.982808024	7.41E-09
ENSG00000272666		2.340167326	7.95E-09
ENSG00000132256	TRIM5	1.7459755	8.59E-09
ENSG00000105875	WDR91	-0.747971626	9.11E-09
ENSG00000114554	PLXNA1	-1.546334268	9.98E-09
ENSG00000020577	SAMD4A	1.762586794	1.69E-08
ENSG00000011295	TTC19	-0.927237278	1.74E-08
ENSG00000002549	LAP3	1.358550585	1.77E-08
ENSG00000106785	TRIM14	1.384610627	2.06E-08
ENSG00000206190	ATP10A	1.571632761	2.10E-08
ENSG00000186918	ZNF395	-1.034639557	2.16E-08
ENSG00000120885	CLU	2.768088043	2.16E-08
ENSG00000136514	RTP4	2.01509088	2.26E-08
ENSG00000090621	PABPC4	-0.890861943	2.78E-08
ENSG00000118971	CCND2	-1.344484191	2.88E-08
ENSG00000115548	KDM3A	-1.014779224	2.98E-08
ENSG00000169116	PARM1	-3.366287644	3.15E-08
ENSG00000197381	ADARB1	1.035654568	3.36E-08
ENSG00000011028	MRC2	-5.213021828	3.50E-08
ENSG00000187109	NAP1L1	-0.673935184	3.87E-08
ENSG00000151012	SLC7A11	-4.836930734	4.24E-08
ENSG00000223960		1.301859947	4.28E-08
ENSG00000184205	TSPYL2	-2.231777018	4.52E-08
ENSG00000063046	EIF4B	-0.711048257	5.39E-08
ENSG00000167658	EEF2	-0.518344329	6.05E-08
ENSG00000152778	IFIT5	1.658173162	7.45E-08
ENSG00000160683	CXCR5	-3.467915731	9.19E-08
ENSG00000142303	ADAMTS10	-1.464790211	9.78E-08
ENSG00000181381	DDX60L	1.280730632	1.00E-07
ENSG00000249115	HAUS5	-0.672667761	1.03E-07
ENSG00000160223	ICOSLG	-2.039035137	1.08E-07
ENSG00000204252	HLA-DOA	-1.638926132	1.17E-07
ENSG00000225964	NRIR	2.436769194	1.19E-07
ENSG00000126351	THRA	-1.035777727	1.32E-07
ENSG00000106605	BLVRA	1.206214582	1.32E-07
ENSG00000168036	CTNNB1	-0.83374275	1.36E-07
ENSG00000183049	CAMK1D	-0.733665124	1.44E-07
ENSG00000138190	EXOC6	0.765153527	1.51E-07
ENSG00000186806	VSIG10L	1.262496147	1.60E-07
ENSG00000111224	PARP11	0.866476841	1.72E-07
ENSG00000135114	OASL	2.504420841	1.72E-07

ENSG00000136807	CDK9	-0.539151053	1.88E-07
ENSG00000274307		1.336375001	1.88E-07
ENSG00000173821	RNF213	1.004067082	2.07E-07
ENSG00000188042	ARL4C	-1.774995168	2.14E-07
ENSG00000114942	EEF1B2	-0.601299458	2.34E-07
ENSG00000173166	RAPH1	-1.95395738	2.63E-07
ENSG00000166889	PATL1	0.713042639	2.65E-07
ENSG00000122406	RPL5	-0.537680981	3.44E-07
ENSG00000142089	IFITM3	2.029849262	3.51E-07
ENSG00000177374	HIC1	-3.240136612	3.51E-07
ENSG00000169245	CXCL10	3.806084402	3.59E-07
ENSG00000196141	SPATS2L	2.014015163	3.90E-07
ENSG00000155252	PI4K2A	-1.562633789	4.07E-07
ENSG00000166016	ABTB2	2.093295717	4.48E-07
ENSG00000078043	PIAS2	-0.614212044	4.54E-07
ENSG00000104660	LEPROTL1	0.900080769	4.62E-07
ENSG00000099381	SETD1A	-0.666231938	4.67E-07
ENSG00000205837	LINC00487	3.087271877	4.93E-07
ENSG00000107554	DNMBP	-0.952033074	5.54E-07
ENSG00000277511		1.77450674	5.56E-07
ENSG00000137496	IL18BP	-1.040802477	5.67E-07
ENSG00000038210	PI4K2B	1.163066402	5.86E-07
ENSG00000213923	CSNK1E	-0.766043381	6.19E-07
ENSG00000141580	WDR45B	-0.558538853	6.34E-07
ENSG00000090975	PITPNM2	-1.130435881	6.35E-07
ENSG00000079263	SP140	1.246952671	6.36E-07
ENSG00000089127	OAS1	2.212336219	6.46E-07
ENSG00000237276	ANO7L1	1.779747225	6.51E-07
ENSG00000155363	MOV10	0.79261934	6.51E-07
ENSG00000105639	JAK3	0.821263537	6.59E-07
ENSG00000013619	MAMLD1	-4.085532493	6.96E-07
ENSG00000145016	RUBCN	0.595392711	7.12E-07
ENSG00000111907	TPD52L1	1.840165917	7.37E-07
ENSG00000156587	UBE2L6	1.215580969	7.71E-07
ENSG00000117226	GBP3	1.100639307	7.78E-07
ENSG00000174748	RPL15	-0.433326646	7.78E-07
ENSG00000150907	FOXO1	-0.79279773	7.78E-07
ENSG00000197111	PCBP2	-0.474091574	8.44E-07
ENSG00000072858	SIDT1	-1.108238212	8.66E-07
ENSG00000184441		-1.00444378	8.66E-07
ENSG00000007264	MATK	-2.898568619	8.87E-07
ENSG00000152061	RABGAP1L	0.880162684	9.09E-07
ENSG00000152484	USP12	-0.780864659	9.26E-07
ENSG00000137337	MDC1	-0.702141844	1.05E-06
ENSG00000089057	SLC23A2	-0.743401657	1.05E-06
ENSG00000153933	DGKE	-0.80495567	1.11E-06
ENSG00000163961	RNF168	-0.776970575	1.14E-06
ENSG00000099814	CEP170B	-2.880547134	1.18E-06

ENSG00000103264	FBXO31	-0.65283109	1.18E-06
ENSG00000198417	MT1F	1.419087813	1.35E-06
ENSG00000221963	APOL6	1.075556893	1.36E-06
ENSG00000108387	Sep-04	1.519492957	1.39E-06
ENSG00000188011	RTP5	-5.656952796	1.42E-06
ENSG00000101596	SMCHD1	0.715963375	1.65E-06
ENSG00000156650	KAT6B	-0.636735769	1.80E-06
ENSG00000111641	NOP2	-0.731968652	1.95E-06
ENSG00000140332	TLE3	-0.914136936	1.99E-06
ENSG00000137936	BCAR3	-2.532099701	2.01E-06
ENSG00000116863	ADPRHL2	0.892617688	2.07E-06
ENSG00000122224	LY9	-1.747438413	2.17E-06
ENSG00000117475	BLZF1	0.679762449	2.34E-06
ENSG00000136682	CBWD2	0.630063435	2.40E-06
ENSG00000135094	SDS	-2.9578259	2.74E-06
ENSG00000135622	SEMA4F	1.321107742	2.77E-06
ENSG00000116663	FBXO6	1.237564887	2.81E-06
ENSG00000149313	AASDHPPT	0.756579925	2.81E-06
ENSG00000115415	STAT1	1.426331566	3.14E-06
ENSG00000198087	CD2AP	0.867196522	3.45E-06
ENSG00000079616	KIF22	-0.656455595	3.46E-06
ENSG00000156983	BRPF1	-0.573671399	3.47E-06
ENSG00000152558	TMEM123	0.925174701	3.47E-06
ENSG00000182179	UBA7	0.612332345	4.01E-06
ENSG00000188315	C3orf62	-0.591170073	4.35E-06
ENSG00000171604	CXXC5	-1.490211538	4.50E-06
ENSG00000089157	RPLP0	-0.522383942	4.50E-06
ENSG00000070961	ATP2B1	-1.55794677	4.64E-06
ENSG00000185722	ANKFY1	0.640516461	4.64E-06
ENSG00000198604	BAZ1A	0.487198546	4.67E-06
ENSG00000117228	GBP1	1.713005252	4.87E-06
ENSG00000162407	PLPP3	-3.54686187	4.92E-06
ENSG00000062598	ELMO2	0.575344044	5.03E-06
ENSG00000178685	PARP10	1.188771447	5.16E-06
ENSG00000136877	FPGS	-0.904542002	5.28E-06
ENSG00000111371	SLC38A1	-1.052010974	5.88E-06
ENSG00000067066	SP100	0.654604751	6.07E-06
ENSG00000021355	SERPINB1	0.511822821	6.07E-06
ENSG00000089094	KDM2B	-0.504498644	6.11E-06
ENSG00000140280	LYSMD2	0.789711493	7.29E-06
ENSG00000170175	CHRN1	1.014278816	7.61E-06
ENSG00000165804	ZNF219	-1.496984008	7.76E-06
ENSG00000100814	CCNB1IP1	-0.575396059	7.76E-06
ENSG00000008083	JARID2	-1.103933263	7.95E-06
ENSG00000141385	AFG3L2	-0.447760418	7.95E-06
ENSG00000115155	OTOF	3.857485425	7.98E-06
ENSG00000239713	APOBEC3G	1.184218522	7.98E-06
ENSG00000123609	NMI	1.231034648	8.36E-06

ENSG00000228106		-1.183741944	8.42E-06
ENSG00000115159	GPD2	0.718650372	8.49E-06
ENSG00000185880	TRIM69	1.291070632	8.53E-06
ENSG00000167680	SEMA6B	-4.661726901	9.16E-06
ENSG00000065923	SLC9A7	-1.232417107	1.03E-05
ENSG00000160271	RALGDS	-1.038228728	1.04E-05
ENSG00000100600	LGMN	-2.040086501	1.05E-05
ENSG00000040199	PHLPP2	-0.699169146	1.09E-05
ENSG00000166527	CLEC4D	0.977116827	1.14E-05
ENSG00000087589	CASS4	-1.238973567	1.15E-05
ENSG00000084112	SSH1	-0.658357856	1.15E-05
ENSG00000167601	AXL	2.291470244	1.18E-05
ENSG00000168118	RAB4A	-0.420845252	1.21E-05
ENSG00000164687	FABP5	-2.260390179	1.22E-05
ENSG00000179840	PIK3CD-AS1	1.535622504	1.23E-05
ENSG00000168234	TTC39C	0.668293223	1.23E-05
ENSG00000196329	GIMAP5	1.743179476	1.24E-05
ENSG00000182378	PLCXD1	-1.31576293	1.24E-05
ENSG00000179361	ARID3B	-0.817864248	1.26E-05
ENSG00000179144	GIMAP7	1.923890158	1.31E-05
ENSG00000269951		-1.54628417	1.32E-05
ENSG00000213689	TREX1	1.028890952	1.42E-05
ENSG00000148516	ZEB1	-2.091137645	1.44E-05
ENSG00000167747	C19orf48	-0.810855845	1.46E-05
ENSG00000186480	INSIG1	-1.210473156	1.49E-05
ENSG00000176102	CSTF3	0.614702984	1.51E-05
ENSG00000171316	CHD7	-1.114085896	1.57E-05
ENSG00000167208	SNX20	0.62475524	1.62E-05
ENSG00000165943	MOAP1	-0.726591275	1.62E-05
ENSG00000163319	MRPS18C	0.779359451	1.62E-05
ENSG00000174738	NR1D2	-1.272606588	1.67E-05
ENSG00000169251	NMD3	-0.595299337	1.71E-05
ENSG00000172053	QARS	-0.354545675	1.80E-05
ENSG00000127586	CHTF18	-0.730284598	1.86E-05
ENSG00000179044	EXOC3L1	1.717437121	1.89E-05
ENSG00000186567	CEACAM19	-1.267100062	1.89E-05
ENSG00000183655	KLHL25	-1.382444036	1.90E-05
ENSG00000204519	ZNF551	-0.875989431	1.95E-05
ENSG00000107371	EXOSC3	0.895054014	2.00E-05
ENSG00000174444	RPL4	-0.440854929	2.00E-05
ENSG00000168062	BATF2	2.240757993	2.02E-05
ENSG00000197121	PGAP1	1.447110583	2.06E-05
ENSG00000181045	SLC26A11	-1.166545948	2.06E-05
ENSG00000141542	RAB40B	-1.022591809	2.09E-05
ENSG00000106991	ENG	-1.122279696	2.15E-05
ENSG00000106089	STX1A	-2.870610165	2.24E-05
ENSG00000169100	SLC25A6	-0.436436931	2.25E-05
ENSG00000149131	SERPING1	2.288858944	2.25E-05

ENSG00000103942	HOMER2	-1.27813326	2.62E-05
ENSG00000136874	STX17	0.613744675	2.79E-05
ENSG00000170989	S1PR1	-1.784781687	2.81E-05
ENSG00000011566	MAP4K3	-1.132576152	2.84E-05
ENSG00000244968	LIFR-AS1	1.57107458	3.14E-05
ENSG00000197771	MCMBP	0.796348939	3.16E-05
ENSG00000172345	STARD5	-1.389809437	3.16E-05
ENSG00000142687	KIAA0319L	0.626951341	3.28E-05
ENSG00000163376	KBTBD8	-1.344776184	3.28E-05
ENSG00000090971	NAT14	-0.900750389	3.35E-05
ENSG00000141577	CEP131	-0.630148552	3.46E-05
ENSG00000100316	RPL3	-0.458586504	3.49E-05
ENSG00000013374	NUB1	0.718228941	3.51E-05
ENSG00000250575		-1.025266105	3.54E-05
ENSG00000187912	CLEC17A	-1.71599741	3.54E-05
ENSG00000174238	PITPNA	-0.629925673	3.58E-05
ENSG00000278948		-0.807242396	3.78E-05
ENSG00000081913	PHLPP1	-0.784347179	3.81E-05
ENSG00000115594	IL1R1	-2.656777092	3.86E-05
ENSG00000229677		1.466942666	3.87E-05
ENSG00000176903	PNMA1	-0.856810624	4.04E-05
ENSG00000047634	SCML1	-1.254746261	4.11E-05
ENSG00000136960	ENPP2	1.823721083	4.19E-05
ENSG00000263528	IKBKE	0.760962027	4.19E-05
ENSG00000041357	PSMA4	0.626588215	4.21E-05
ENSG00000168310	IRF2	0.893810835	4.22E-05
ENSG00000137094	DNAJB5	-1.441911986	4.27E-05
ENSG00000075275	CELSR1	-2.480099685	4.27E-05
ENSG00000181873	IBA57	-1.112273742	4.34E-05
ENSG00000133657	ATP13A3	-1.151906378	4.34E-05
ENSG00000133574	GIMAP4	1.73080655	4.34E-05
ENSG00000004660	CAMKK1	-1.252767227	4.34E-05
ENSG00000278133		-0.586839078	4.45E-05
ENSG00000179639	FCER1A	-3.168083362	4.48E-05
ENSG00000257167	TMPO-AS1	1.357880418	4.79E-05
ENSG00000260314	MRC1	-1.867118896	4.82E-05
ENSG00000213553	RPLP0P6	-0.567495616	4.92E-05
ENSG00000009844	VTA1	0.649836472	4.93E-05
ENSG00000120802	TMPO	0.764181361	4.95E-05
ENSG00000108984	MAP2K6	1.100308846	4.95E-05
ENSG00000130303	BST2	0.987622762	5.00E-05
ENSG00000185477	GPRIN3	-1.284802201	5.08E-05
ENSG00000125148	MT2A	1.454438015	5.08E-05
ENSG00000234771	SLC25A25-AS1	-0.705097171	5.29E-05
ENSG00000234076	TPRG1-AS1	1.581286793	5.35E-05
ENSG00000077782	FGFR1	-1.282063118	5.37E-05
ENSG00000153107	ANAPC1	-0.397941423	5.57E-05
ENSG00000011478	QPCTL	-0.777385003	5.63E-05

ENSG0000055147	FAM114A2	0.665563046	5.78E-05
ENSG00000105855	ITGB8	-2.718925735	5.93E-05
ENSG00000198133	TMEM229B	1.15327429	5.93E-05
ENSG00000169871	TRIM56	0.775608291	6.07E-05
ENSG00000010030	ETV7	2.594473037	6.15E-05
ENSG00000138050	THUMPD2	-0.771335101	6.25E-05
ENSG00000025770	NCAPH2	-0.726976069	6.41E-05
ENSG00000087502	ERGIC2	0.625494534	6.65E-05
ENSG00000178562	CD28	-1.954441242	6.71E-05
ENSG00000161996	WDR90	-0.852152073	6.87E-05
ENSG00000160408	ST6GALNAC6	-0.710024092	7.68E-05
ENSG00000279700		-1.454026647	7.68E-05
ENSG00000121858	TNFSF10	1.749419492	7.72E-05
ENSG00000151445	VIPAS39	0.699011261	7.72E-05
ENSG00000114127	XRN1	0.496051553	7.74E-05
ENSG00000118689	FOXO3	-0.901663426	7.81E-05
ENSG00000172175	MALT1	-0.580820234	7.81E-05
ENSG00000100083	GGA1	-0.561239318	7.93E-05
ENSG00000112576	CCND3	0.814158484	7.96E-05
ENSG00000173848	NET1	-1.562362603	8.11E-05
ENSG00000149798	CDC42EP2	1.156420117	8.60E-05
ENSG00000121486	TRMT1L	0.829774148	8.74E-05
ENSG00000178988	MRFAP1L1	0.746308646	9.32E-05
ENSG00000214193	SH3D21	-1.422035038	9.54E-05
ENSG00000165322	ARHGAP12	-0.65845662	9.72E-05
ENSG00000156030	ELMSAN1	-0.64073141	9.86E-05
ENSG00000228794	LINC01128	-0.868981877	9.93E-05
ENSG00000180354	MTURN	-0.774395092	0.000100761
ENSG00000104824	HNRNPL	-0.428226405	0.000102601
ENSG00000123240	OPTN	0.980441457	0.000103815
ENSG00000091844	RGS17	-1.163278233	0.000106195
ENSG00000135972	MRPS9	0.547856247	0.000106573
ENSG00000119392	GLE1	0.463023511	0.000110155
ENSG00000177294	FBXO39	2.166020902	0.000111065
ENSG00000167962	ZNF598	-0.383260068	0.000111582
ENSG00000121743	GJA3	-4.663854813	0.000112057
ENSG00000100084	HIRA	0.536134223	0.000115463
ENSG00000126804	ZBTB1	-0.634843883	0.000116396
ENSG00000263465	SRSF8	-0.548968652	0.000120269
ENSG00000204590	GNL1	-0.656763835	0.000124912
ENSG00000188428	BLOC1S5	0.713600295	0.00012625
ENSG00000089009	RPL6	-0.385750505	0.000127094
ENSG00000141664	ZCCHC2	0.798179934	0.000129966
ENSG00000137409	MTCH1	-0.564803158	0.00013145
ENSG00000169490	TM2D2	0.613147499	0.00013145
ENSG00000128394	APOBEC3F	1.001475441	0.000138154
ENSG00000235374	SSR4P1	1.152551738	0.000140558
ENSG00000137767	SQRDL	0.635331095	0.000142421

ENSG0000010165	METTL13	1.146182024	0.000142564
ENSG00000157693	TMEM268	0.533761546	0.000143969
ENSG00000128513	POT1	0.652853904	0.000144108
ENSG00000110435	PDHX	0.510902232	0.000145327
ENSG00000153207	AHCTF1	-0.955919729	0.000146229
ENSG00000168092	PAFAH1B2	-0.568709913	0.000146229
ENSG00000186395	KRT10	-0.601294301	0.000146229
ENSG00000142039	CCDC97	0.547267037	0.000151973
ENSG00000109046	WSB1	0.641472881	0.000153219
ENSG00000153914	SREK1	-0.602385998	0.000154176
ENSG00000100353	EIF3D	-0.275762782	0.000154477
ENSG00000169016	E2F6	-0.612782077	0.000155566
ENSG00000162654	GBP4	1.127807025	0.000158319
ENSG00000172366	MCRIP2	-0.760076904	0.000160855
ENSG00000221955	SLC12A8	1.163099192	0.000161946
ENSG00000136235	GPNMB	-2.321371038	0.000161946
ENSG00000166750	SLFN5	1.376716628	0.000164864
ENSG00000248124	RRN3P1	-0.732887093	0.000165366
ENSG00000136897	MRPL50	0.748939508	0.000166417
ENSG00000158042	MRPL17	0.948546956	0.000166417
ENSG00000189091	SF3B3	0.515032226	0.000166417
ENSG00000229638	RPL4P4	-0.525682406	0.00017015
ENSG00000107742	SPOCK2	-1.575424776	0.000173606
ENSG00000008130	NADK	0.662553271	0.000174577
ENSG00000105699	LSR	-2.709226241	0.000174577
ENSG00000229473	RGS17P1	-1.286837968	0.000175214
ENSG00000055483	USP36	-1.159074028	0.000177215
ENSG00000068394	GPKOW	0.6496998	0.000177994
ENSG00000188636	LDOC1L	-0.806442776	0.000190103
ENSG00000147180	ZNF711	-2.157212175	0.000190296
ENSG00000147604	RPL7	-0.446282287	0.000190296
ENSG00000079313	REXO1	-0.487040087	0.000194593
ENSG00000273015		-0.520152557	0.000195816
ENSG00000204264	PSMB8	0.546565892	0.000196593
ENSG00000165806	CASP7	0.73489208	0.000197413
ENSG00000275835	TUBGCP5	-0.647677587	0.000198525
ENSG00000167394	ZNF668	-0.754453899	0.000203653
ENSG00000188313	PLSCR1	1.115187823	0.000204169
ENSG00000152404	CWF19L2	0.595188127	0.000204169
ENSG00000007350	TKTL1	-2.676305808	0.000204704
ENSG00000154451	GBP5	1.209108397	0.000209658
ENSG00000008294	SPAG9	-0.60974498	0.000210192
ENSG00000174243	DDX23	0.582955734	0.000211991
ENSG00000198034	RPS4X	-0.412374986	0.000223443
ENSG00000087460	GNAS	-0.275284087	0.000233998
ENSG00000173575	CHD2	-0.608070916	0.00023434
ENSG00000100596	SPTLC2	0.750866178	0.000237427
ENSG00000170779	CDCA4	-1.196210439	0.000238064

ENSG00000150401	DCUN1D2	-0.455693008	0.000245156
ENSG00000225614	ZNF469	-1.540774895	0.000245156
ENSG00000116251	RPL22	-0.413756479	0.00025144
ENSG00000135486	HNRNPA1	-0.372166192	0.000253765
ENSG00000117479	SLC19A2	-1.170965105	0.000263044
ENSG00000260910	LINC00565	-2.346547811	0.000265889
ENSG00000244733		-0.970225992	0.000267499
ENSG00000006327	TNFRSF12A	-2.321590777	0.000275346
ENSG00000175061	LRRC75A-AS1	-0.44562655	0.000278005
ENSG00000240053	LY6G5B	-0.719395311	0.000278868
ENSG00000267745		0.857705384	0.000281583
ENSG00000106366	SERPINE1	-2.72667949	0.000284636
ENSG00000116983	HPCAL4	-2.407025788	0.00028785
ENSG00000065150	IPO5	-0.44573155	0.000299975
ENSG00000121671	CRY2	-0.800736661	0.000303268
ENSG00000170633	RNF34	0.719798696	0.000304054
ENSG00000159131	GART	0.7919839	0.000317404
ENSG00000225492	GBP1P1	1.959963119	0.000317887
ENSG00000186020	ZNF529	-0.728377255	0.000317935
ENSG00000088827	SIGLEC1	3.281898024	0.000319255
ENSG00000125812	GZF1	-1.008801698	0.000323248
ENSG00000188404	SELL	0.957574985	0.000327896
ENSG00000261526		-0.964661291	0.000331671
ENSG00000071575	TRIB2	0.972465536	0.000333713
ENSG00000242125	SNHG3	-0.591404545	0.000340212
ENSG00000133313	CNDP2	0.530637433	0.000342137
ENSG00000164002	EXO5	0.645052463	0.000349446
ENSG00000168040	FADD	0.746274455	0.000349446
ENSG00000183426	NP1PA1	-0.68477835	0.000349739
ENSG00000169635	HIC2	-0.771176053	0.000351248
ENSG00000075089	ACTR6	0.56638928	0.00035641
ENSG00000126767	ELK1	-0.465679119	0.000360931
ENSG00000186891	TNFRSF18	-3.215125936	0.000364104
ENSG00000179833	SERTAD2	-0.580610144	0.000364104
ENSG00000026103	FAS	1.089690817	0.000365387
ENSG00000113716	HMGXB3	-0.503814686	0.000371154
ENSG00000165934	CPSF2	0.643536001	0.00037176
ENSG00000185163	DDX51	-0.446355609	0.000376043
ENSG00000134001	EIF2S1	0.654161104	0.000377176
ENSG00000072364	AFF4	-0.587180662	0.000386373
ENSG00000150637	CD226	-2.062766121	0.000386373
ENSG00000069667	RORA	-2.062575504	0.000387295
ENSG00000184613	NELL2	-2.206263048	0.000398476
ENSG00000132661	NXT1	-0.76797271	0.000398476
ENSG00000146476	ARMT1	0.989242923	0.000401662
ENSG00000110060	PUS3	0.687919163	0.000403947
ENSG00000072415	MPP5	-0.662558609	0.000406205
ENSG00000186260	MKL2	-0.599016826	0.000406205

ENSG0000024862	CCDC28A	0.516838403	0.000407338
ENSG00000197536	C5orf56	0.952821793	0.00041531
ENSG00000183742	MACC1	-2.363135473	0.00041603
ENSG00000266947		1.070342082	0.00041603
ENSG00000008256	CYTH3	-0.839798658	0.000423775
ENSG00000102401	ARMCX3	0.627426885	0.000429185
ENSG00000099331	MYO9B	-0.431504685	0.000429185
ENSG00000125355	TMEM255A	2.438326014	0.000435395
ENSG00000095585	BLNK	1.473622657	0.000446772
ENSG00000110871	COQ5	0.679871355	0.000447428
ENSG00000120265	PCMT1	0.721502669	0.00045417
ENSG00000107651	SEC23IP	0.632687892	0.00045417
ENSG00000267278	MAP3K14-AS1	-1.20825475	0.00045417
ENSG00000099622	CIRBP	-0.369616515	0.000457678
ENSG00000116604	MEF2D	-0.888174324	0.000457805
ENSG00000124357	NAGK	0.636272269	0.000467215
ENSG00000184260	HIST2H2AC	0.834364766	0.000468306
ENSG00000140092	FBLN5	-2.619756347	0.000468306
ENSG00000112130	RNF8	0.636794264	0.000469517
ENSG00000127074	RGS13	-3.648287451	0.000485487
ENSG00000137154	RPS6	-0.400052554	0.000489491
ENSG00000166908	PIP4K2C	0.553617992	0.000492224
ENSG00000267787		0.673766048	0.000494224
ENSG00000168275	COA6	0.743198224	0.000496937
ENSG00000262001	DLGAP1-AS2	-1.25376464	0.000504685
ENSG00000059769	DNAJC25	-0.769789169	0.000507849
ENSG00000089220	PEBP1	-0.482333891	0.000510609
ENSG00000181350	LRRC75A	-1.098532463	0.000515296
ENSG00000121931	LRIF1	1.017077612	0.000516421
ENSG00000058799	YIPF1	0.494505475	0.000519794
ENSG00000162461	SLC25A34	-1.147552355	0.000521877
ENSG00000158290	CUL4B	0.434800778	0.00052673
ENSG00000168758	SEMA4C	-1.32914342	0.000534554
ENSG00000134278	SPIRE1	-1.368853735	0.000534554
ENSG00000129515	SNX6	0.446253597	0.000534651
ENSG00000119787	ATL2	-0.549171367	0.000536356
ENSG00000102699	PARP4	0.66138094	0.000536356
ENSG00000171988	JMJD1C	-0.755357307	0.000542702
ENSG00000141506	PIK3R5	-0.636028191	0.000546475
ENSG00000258839	MC1R	-1.121386423	0.000552469
ENSG00000105974	CAV1	-4.706892355	0.000555806
ENSG00000107951	MTPAP	-0.443357352	0.000567752
ENSG00000185972	CCIN	-1.2442068	0.000581306
ENSG00000085563	ABCB1	-2.9476247	0.000583079
ENSG00000162510	MATN1	-3.227287704	0.000583629
ENSG00000175573	C11orf68	0.735371849	0.000587954
ENSG00000125900	SIRPD	0.979969338	0.0005962
ENSG00000135636	DYSF	1.366026602	0.000602827

ENSG00000129465	RIPK3	0.645888137	0.000607302
ENSG00000183955	KMT5A	-0.487024526	0.000630381
ENSG00000172123	SLFN12	0.828206361	0.000641103
ENSG00000123908	AGO2	-0.56674282	0.00064834
ENSG00000140563	MCTP2	0.848449008	0.000652678
ENSG00000139354	GAS2L3	-2.020515813	0.000661021
ENSG00000158321	AUTS2	-1.493841901	0.000664983
ENSG00000267547		1.142301901	0.000664983
ENSG00000084733	RAB10	0.820251111	0.00066749
ENSG00000168913	ENHO	-1.328424093	0.00067624
ENSG00000196358	NTNG2	0.948743615	0.000679974
ENSG00000050405	LIMA1	1.125777182	0.000680458
ENSG00000145425	RPS3A	-0.457724792	0.000681416
ENSG00000142961	MOB3C	0.645737283	0.000698753
ENSG00000133059	DSTYK	-0.450296198	0.000704365
ENSG00000055609	KMT2C	-0.500068285	0.000704365
ENSG00000100744	GSKIP	0.573847976	0.000707955
ENSG00000146535	GNA12	-0.683447656	0.000708654
ENSG00000110046	ATG2A	-0.893817214	0.000708654
ENSG00000162804	SNED1	-1.375976858	0.000710093
ENSG00000123737	EXOSC9	0.516300174	0.000710093
ENSG00000196814	MVB12B	0.849846097	0.000710093
ENSG00000259004		0.976892706	0.000717706
ENSG00000124193	SRSF6	-0.420374983	0.000729468
ENSG00000276672		-1.210138361	0.000730102
ENSG00000227008		-0.709150465	0.000736821
ENSG00000152784	PRDM8	-1.631393144	0.00074195
ENSG00000173083	HPSE	0.837529447	0.000752794
ENSG00000111615	KRR1	-0.647860608	0.000755266
ENSG00000130489	SCO2	1.0201548	0.000755266
ENSG00000067334	DNTTIP2	-0.641553182	0.000756395
ENSG00000115368	WDR75	-0.409548566	0.00076425
ENSG00000087095	NLK	0.514866952	0.000765046
ENSG00000110721	CHKA	-1.108500102	0.000771349
ENSG00000206573	THUMPD3-AS1	-0.491845102	0.000778481
ENSG00000241127	YAE1D1	1.136148644	0.000778481
ENSG00000246731		1.057725225	0.000779455
ENSG00000153201	RANBP2	-0.903719437	0.000816183
ENSG00000177613	CSTF2T	0.522047078	0.00083215
ENSG00000260676	LINC01541	1.195670001	0.000835704
ENSG00000120217	CD274	1.097828593	0.000835806
ENSG00000271646		0.906616243	0.000837795
ENSG00000012983	MAP4K5	-0.463227343	0.000840541
ENSG00000165138	ANKS6	-0.988007477	0.000842167
ENSG00000006062	MAP3K14	-0.410631203	0.000842167
ENSG00000152904	GGPS1	0.706719827	0.000848915
ENSG00000224078	SNHG14	-0.704628226	0.000848915
ENSG00000151136	BTBD11	-0.881300506	0.000848991

ENSG00000108256	NUFIP2	-0.416079355	0.000848991
ENSG00000130024	PHF10	-0.613615016	0.000854446
ENSG00000139289	PHLDA1	-2.221942292	0.000855753
ENSG00000155827	RNF20	0.669528016	0.000859276
ENSG00000180917	CMTR2	0.760476344	0.000859616
ENSG00000109099	PMP22	-1.838299258	0.000859616
ENSG00000152256	PDK1	-0.693049817	0.000866111
ENSG00000137970	RPL7P9	-0.448387426	0.000871371
ENSG00000071242	RPS6KA2	-0.882373548	0.000871371
ENSG00000071462	WBSCR22	-0.455600095	0.000874122
ENSG00000205765	C5orf51	0.706774384	0.000877395
ENSG00000151065	DCP1B	0.763548342	0.000880076
ENSG00000267102		0.902218707	0.000881033
ENSG00000133121	STARD13	-1.892183647	0.000881427
ENSG00000105173	CCNE1	-1.230467594	0.000881915
ENSG00000180422	LINC00304	-1.495484368	0.000891161
ENSG00000125520	SLC2A4RG	-0.475698097	0.000893102
ENSG00000107282	APBA1	-1.313081527	0.000896928
ENSG00000069956	MAPK6	-1.056812301	0.000900227
ENSG00000188785	ZNF548	-0.584028283	0.000916573
ENSG00000166484	MAPK7	-0.608233711	0.000917422
ENSG00000145365	TIFA	1.010469623	0.000918278
ENSG00000151692	RNF144A	0.860448686	0.000920821
ENSG00000153767	GTF2E1	0.787214863	0.000920821
ENSG00000213203	GIMAP1	1.271800597	0.000924743
ENSG00000136158	SPRY2	-2.695449735	0.000924743
ENSG00000264247	LINC00909	0.582296252	0.000924743
ENSG00000005022	SLC25A5	-0.473894021	0.000927634
ENSG00000123095	BHLHE41	-3.018744279	0.000927634
ENSG00000125149	C16orf70	-0.324403793	0.000936368
ENSG00000114126	TFDP2	-0.51983228	0.000951987
ENSG00000131398	KCNC3	-0.907101678	0.000962088
ENSG00000250959	GLUD1P3	-0.679864207	0.000971482
ENSG00000170275	CRTAP	-0.401965428	0.000986032
ENSG00000019144	PHLDB1	-1.233928049	0.000987994
ENSG00000197272	IL27	1.517297463	0.000991351
ENSG00000217128	FNIP1	-0.729409442	0.000993379
ENSG00000219665		-0.556028562	0.000995326
ENSG00000121022	COPS5	0.443743237	0.001005794
ENSG00000104133	SPG11	0.476739099	0.00100747
ENSG00000140391	TSPAN3	-0.683726778	0.00100747
ENSG00000088826	SMOX	-1.89968936	0.001009907
ENSG00000146963	LUC7L2	-0.543136035	0.001012891
ENSG00000135469	COQ10A	-0.688085788	0.001012891
ENSG00000257093	KIAA1147	-0.54972848	0.00101516
ENSG00000123562	MORF4L2	-0.439129765	0.00101735
ENSG00000171049	FPR2	1.452303042	0.001027092
ENSG00000100422	CERK	-0.445472715	0.001027092

ENSG00000197279	ZNF165	-1.761980415	0.001031878
ENSG00000111716	LDHB	-0.477823687	0.001047689
ENSG00000116786	PLEKHM2	-0.60073958	0.00105791
ENSG00000164933	SLC25A32	-0.488959153	0.001058285
ENSG00000133103	COG6	0.505468791	0.001064513
ENSG00000101213	PTK6	0.930949624	0.001076405
ENSG00000197561	ELANE	1.376350969	0.001076405
ENSG00000135297	MTO1	0.581332808	0.001077131
ENSG00000163811	WDR43	-0.539315413	0.00108048
ENSG00000166886	NAB2	-1.530499477	0.001081394
ENSG00000070444	MNT	-0.675865847	0.001091473
ENSG00000169439	SDC2	-4.259772633	0.001093429
ENSG00000158669	GPAT4	-0.339264694	0.001094771
ENSG00000250182	EEF1A1P13	-0.628232724	0.001105663
ENSG00000162517	PEF1	0.425393853	0.001109924
ENSG00000157500	APPL1	0.425634044	0.001109924
ENSG00000129691	ASH2L	0.536818735	0.001109924
ENSG00000178202	KDEL2	0.762721399	0.001109924
ENSG00000125826	RBCK1	0.615426804	0.001109924
ENSG00000105135	ILVBL	-0.587168709	0.001109924
ENSG00000124103	FAM209A	-1.030997425	0.00111274
ENSG00000174080	CTSF	-1.048313878	0.0011172
ENSG00000128335	APOL2	0.856787768	0.0011172
ENSG00000064961	HMG20B	-0.47487092	0.001120428
ENSG00000182372	CLN8	-0.658905984	0.001121766
ENSG00000075391	RASAL2	-1.192013497	0.001127232
ENSG00000116883		-1.511997834	0.001134121
ENSG00000007944	MYLIP	-0.809367191	0.00113701
ENSG00000070756	PABPC1	-0.377539068	0.001144377
ENSG00000152147	GEMIN6	0.90137077	0.001158083
ENSG00000143322	ABL2	-0.508554195	0.001163089
ENSG00000132953	XPO4	-0.383135443	0.001163089
ENSG00000117394	SLC2A1	-0.761848025	0.001181968
ENSG00000156535	CD109	-1.822655014	0.001183654
ENSG00000119714	GPR68	-1.685719913	0.001184792
ENSG00000163166	IWS1	0.407905441	0.001185303
ENSG00000163464	CXCR1	1.854012177	0.001189675
ENSG00000159921	GNE	-0.43330716	0.001204356
ENSG00000143772	ITPKB	-0.432049661	0.001206639
ENSG00000114423	CBLB	-0.570091374	0.00121441
ENSG00000197343	ZNF655	-0.353369609	0.001241471
ENSG00000147140	NONO	-0.232742232	0.001243151
ENSG00000114982	KANSL3	-0.371761758	0.001245306
ENSG00000160789	LMNA	-1.819950417	0.001264951
ENSG00000022267	FHL1	-1.305068946	0.001264951
ENSG00000010404	IDS	-0.393210738	0.001264951
ENSG00000244165	P2RY11	-0.768019747	0.001272029
ENSG00000272367		-1.03514018	0.001285361

ENSG00000175352	NRIP3	-2.207187446	0.001290978
ENSG00000113312	TTC1	0.547392732	0.001293233
ENSG00000059691	GATB	0.593336028	0.001298333
ENSG00000143622	RIT1	-0.577800748	0.001298806
ENSG00000186468	RPS23	-0.386259313	0.001306387
ENSG00000099204	ABLIM1	-1.431707243	0.001315578
ENSG00000166582	CENPV	-1.192382512	0.001315578
ENSG00000073969	NSF	0.388039439	0.001315578
ENSG00000104814	MAP4K1	-0.550798338	0.001333933
ENSG00000154642	C21orf91	0.626782529	0.001333933
ENSG00000105793	GTPBP10	0.452614785	0.001336344
ENSG00000165898	ISCA2	0.618824577	0.001343971
ENSG00000112146	FBXO9	0.453498164	0.001360656
ENSG00000170542	SERPINB9	0.724667001	0.001361511
ENSG00000101187	SLCO4A1	-2.720257568	0.001361735
ENSG00000166123	GPT2	1.011548813	0.001365393
ENSG00000205846	CLEC6A	1.085465767	0.00136704
ENSG00000082516	GEMIN5	0.685484511	0.001370312
ENSG00000181467	RAP2B	-0.630428263	0.001373212
ENSG00000120860	CCDC53	0.604891082	0.001373212
ENSG00000180747	SMG1P3	-0.743595809	0.001373212
ENSG00000197566	ZNF624	0.803137893	0.001373212
ENSG00000159228	CBR1	1.002745593	0.001376735
ENSG00000266053	NDUFV2-AS1	-0.973932965	0.001381816
ENSG00000158373	HIST1H2BD	1.100422121	0.001383957
ENSG00000204619	PPP1R11	0.433403251	0.001383957
ENSG00000119383	PTPA	0.527811388	0.001383957
ENSG00000133884	DPF2	0.47490156	0.001383957
ENSG00000166579	NDEL1	-0.738023823	0.001383957
ENSG00000173065	FAM222B	-0.522863845	0.001402045
ENSG00000120833	SOCS2	-2.019377725	0.001425221
ENSG00000121060	TRIM25	0.618261981	0.001431688
ENSG00000173145	NOC3L	0.639078549	0.00143334
ENSG00000232472	EEF1B2P3	-0.5992394	0.001434122
ENSG00000135148	TRAFD1	0.869601981	0.001438844
ENSG00000272899		-1.519246156	0.001448549
ENSG00000205981	DNAJC19	0.569055062	0.00145506
ENSG00000197713	RPE	0.913021929	0.001485688
ENSG00000181284	TMEM102	0.878394958	0.001487092
ENSG00000237550	RPL9P9	-0.44735338	0.001487868
ENSG00000138375	SMARCAL1	0.634022228	0.001494783
ENSG00000163050	COQ8A	-0.398073839	0.001509736
ENSG00000144218	AFF3	-0.904581633	0.001518891
ENSG00000275111	ZNF2	1.256951591	0.001522456
ENSG00000272888	LINC01578	-0.549277646	0.001522703
ENSG00000148840	PPRC1	-0.520390533	0.001526429
ENSG00000168961	LGALS9	0.818247253	0.001526429
ENSG00000137309	HMGA1	-0.930714698	0.001526434

ENSG00000159479	MED8	0.514087846	0.001539389
ENSG00000239305	RNF103	-0.851279568	0.001539389
ENSG00000154065	ANKRD29	-1.95715992	0.001549441
ENSG00000151612	ZNF827	-2.253591244	0.00154998
ENSG00000178409	BEND3	-0.89701931	0.001552164
ENSG00000002587	HS3ST1	-3.008805433	0.001571953
ENSG00000164252	AGGF1	0.569976073	0.001589435
ENSG00000113368	LMNB1	1.297864941	0.001589435
ENSG00000139697	SBNO1	-0.308954423	0.001591807
ENSG00000197548	ATG7	0.490371174	0.00160687
ENSG00000280067		-1.019171967	0.001611687
ENSG00000179918	SEPHS2	0.642672415	0.001617053
ENSG00000178146		0.834389461	0.001625535
ENSG00000272941		0.949156805	0.001626683
ENSG00000196873	CBWD3	0.679897229	0.001638638
ENSG00000186166	CCDC84	-0.56568997	0.001638638
ENSG00000144843	ADPRH	0.840543649	0.001649275
ENSG00000198682	PAPSS2	-1.404597753	0.001656099
ENSG00000115421	PAPOLG	0.492905949	0.001669779
ENSG00000104290	FZD3	-1.021503905	0.001697901
ENSG00000101457	DNTTIP1	0.611726949	0.001697901
ENSG00000169155	ZBTB43	-0.902012578	0.001703492
ENSG00000151470	C4orf33	0.587556676	0.001716463
ENSG00000112419	PHACTR2	0.653629273	0.001722145
ENSG00000185482	STAC3	0.762572209	0.001722145
ENSG00000168386	FILIP1L	-1.424791854	0.001723347
ENSG00000240065	PSMB9	0.766967271	0.001738154
ENSG00000115317	HTRA2	0.472740871	0.001747398
ENSG00000184432	COPB2	0.731016808	0.001747398
ENSG00000152749	GPR180	0.890235212	0.001761127
ENSG00000152454	ZNF256	-0.878892329	0.001796186
ENSG00000182866	LCK	-1.472042556	0.00180276
ENSG00000102678	FGF9	-2.452433735	0.001818618
ENSG00000065978	YBX1	-0.356271045	0.001830965
ENSG00000172500	FIBP	0.44843236	0.00183207
ENSG00000124198	ARFGEF2	-0.396652744	0.001840387
ENSG00000008056	SYN1	-2.586175443	0.001884338
ENSG00000198019	FCGR1B	1.173608328	0.001890804
ENSG00000076716	GPC4	-1.5959933	0.00189146
ENSG00000142937	RPS8	-0.405359284	0.001896324
ENSG00000112685	EXOC2	0.3995941	0.001909865
ENSG00000175390	EIF3F	-0.323593766	0.001914783
ENSG00000117009	KMO	0.973774064	0.001915401
ENSG00000156671	SAMD8	-0.471733352	0.001915401
ENSG00000257242	LINC01619	-1.542005183	0.001915401
ENSG00000138623	SEMA7A	-1.37740608	0.001915401
ENSG00000101150	TPD52L2	-0.461200119	0.001916761
ENSG00000112033	PPARD	-0.549104566	0.001936739

ENSG00000132670	PTPRA	0.292647466	0.001941395
ENSG00000131263	RLIM	-0.658386329	0.001961048
ENSG00000123353	ORMDL2	0.65412774	0.001961092
ENSG00000099251	HSD17B7P2	1.086181995	0.001964812
ENSG00000197540	GZMM	-1.560272108	0.00197097
ENSG00000145431	PDGFC	-1.132217388	0.001976851
ENSG00000113532	ST8SIA4	0.556252089	0.001978767
ENSG00000140941	MAP1LC3B	-0.551219032	0.001978767
ENSG00000118900	UBN1	-0.317051554	0.001992637
ENSG00000166477	LEO1	0.667645751	0.002013906
ENSG00000204516	MICB	0.717911701	0.002043789
ENSG00000198455	ZXDB	-0.545110074	0.002057087
ENSG00000064651	SLC12A2	-0.652318238	0.002057444
ENSG00000005471	ABCB4	-2.158818941	0.002067146
ENSG00000242324		1.324755085	0.002067146
ENSG00000234444	ZNF736	-0.470181398	0.002071936
ENSG00000225032		-1.158091157	0.002071936
ENSG00000109184	DCUN1D4	-0.480659184	0.002073664
ENSG00000133112	TPT1	-0.373508402	0.002086916
ENSG00000155097	ATP6V1C1	0.441054363	0.002094667
ENSG00000198890	PRMT6	0.783825537	0.002111952
ENSG00000231721	LINC-PINT	-0.949654682	0.002111952
ENSG00000186642	PDE2A	-2.211339618	0.002111952
ENSG00000230551		-0.696209101	0.002113761
ENSG00000029363	BCLAF1	-0.457014873	0.00211579
ENSG00000214199	EEF1A1P12	-0.405441756	0.002132462
ENSG00000188522	FAM83G	-1.426268838	0.002133903
ENSG00000138795	LEF1	-1.705121542	0.002145146
ENSG00000085662	AKR1B1	-0.481464119	0.002148679
ENSG00000103489	XYLT1	-0.578515207	0.002148679
ENSG00000229299		-1.262747337	0.002148679
ENSG00000156381	ANKRD9	-0.917564001	0.002151057
ENSG00000167733	HSD11B1L	-0.735223028	0.002161375
ENSG00000136870	ZNF189	0.718656168	0.002179116
ENSG00000181523	SGSH	-0.533860181	0.002182772
ENSG00000188811	NHLRC3	0.727683633	0.002188172
ENSG00000228486	LINC01125	-0.727659466	0.002194321
ENSG00000104517	UBR5	-0.322859584	0.002194321
ENSG00000198734	F5	0.945549826	0.002196139
ENSG00000251022	THAP9-AS1	-0.550503054	0.002199729
ENSG00000155592	ZKSCAN2	-0.68618356	0.002199729
ENSG00000101096	NFATC2	-1.055769185	0.002201553
ENSG00000087903	RFX2	-0.782614828	0.002213087
ENSG00000181220	ZNF746	-0.439060526	0.002233386
ENSG00000107758	PPP3CB	0.339719388	0.002237911
ENSG00000147996	CBWD5	0.633264026	0.002241191
ENSG00000110079	MS4A4A	1.603026507	0.002245104
ENSG00000105808	RASA4	-0.718659743	0.002253892

ENSG00000156345	CDK20	-0.968509517	0.002253892
ENSG00000189079	ARID2	-0.496494458	0.002253892
ENSG00000260920		0.97796023	0.002259585
ENSG00000105705	SUGP1	0.413381891	0.002280656
ENSG00000135211	TMEM60	0.998917981	0.00231268
ENSG00000178429	RPS3AP5	-0.528079131	0.002321199
ENSG00000088298	EDEM2	0.35983172	0.002321199
ENSG00000163814	CDCP1	-2.046984228	0.002329915
ENSG00000154511	FAM69A	0.740266775	0.002337168
ENSG00000235245		-0.698754264	0.002338797
ENSG00000197043	ANXA6	0.758189956	0.002340164
ENSG00000143771	CNIH4	0.561687449	0.002353002
ENSG00000155463	OXA1L	-0.332314722	0.002364361
ENSG00000127452	FBXL12	-0.347490918	0.002364361
ENSG00000145779	TNFAIP8	0.691544159	0.002382236
ENSG00000185728	YTHDF3	-0.57907665	0.002382236
ENSG00000112406	HECA	-0.50456269	0.002386707
ENSG00000243811	APOBEC3D	0.900172025	0.002398436
ENSG00000063438	AHRR	-2.663526848	0.002404336
ENSG00000092330	TINF2	0.367548403	0.002405518
ENSG00000141503	MINK1	-0.39728031	0.002415639
ENSG00000171612	SLC25A33	-0.76273916	0.00242878
ENSG00000005302	MSL3	0.400123849	0.002436153
ENSG00000140931	CMTM3	-0.374850365	0.002436153
ENSG00000119878	CRIP1	0.536964804	0.002449795
ENSG00000134324	LPIN1	-0.463255715	0.002466378
ENSG00000038274	MAT2B	0.622065353	0.002466396
ENSG00000239521	GATS	-0.702756499	0.002466396
ENSG00000173726	TOMM20	-0.360701421	0.002468173
ENSG00000121067	SPOP	0.405001966	0.002475639
ENSG00000163159	VPS72	0.707506597	0.002517001
ENSG00000242689	CNTF	-0.946525195	0.002517377
ENSG00000145741	BTF3	-0.306689547	0.002541567
ENSG00000138413	IDH1	0.743664583	0.002545322
ENSG00000188282	RUFY4	1.339308965	0.002545322
ENSG00000170271	FAXDC2	-1.250922936	0.002547717
ENSG00000072818	ACAP1	0.503038547	0.002547717
ENSG00000148303	RPL7A	-0.342156243	0.002636741
ENSG00000163512	AZI2	0.431146161	0.002673478
ENSG00000095002	MSH2	0.870178884	0.002684521
ENSG00000065559	MAP2K4	0.332679557	0.002690452
ENSG00000048342	CC2D2A	-1.206130607	0.002693687
ENSG00000182742	HOXB4	1.424964527	0.002693687
ENSG00000129038	LOXL1	-2.389580353	0.002710877
ENSG00000163975	MELTF	-1.763904257	0.002722932
ENSG00000052802	MSMO1	0.577940857	0.002722932
ENSG00000151491	EPS8	-0.811184201	0.002722932
ENSG00000105186	ANKRD27	0.397796209	0.002722932

ENSG00000106263	EIF3B	-0.328586201	0.00273199
ENSG00000137642	SORL1	-0.675938827	0.00273199
ENSG00000183508	FAM46C	-1.873468474	0.002732891
ENSG00000116691	MIIP	0.446395452	0.002739519
ENSG00000175518	UBQLNL	1.688013065	0.002739519
ENSG00000225648	SBDSP1	-0.615524031	0.002740653
ENSG00000232613		-3.101347329	0.002742538
ENSG00000114270	COL7A1	-0.692185253	0.002742538
ENSG00000133985	TTC9	1.011320421	0.002742538
ENSG00000260911		-1.058791999	0.002742538
ENSG00000267701	NA	-1.385703261	0.002742538
ENSG00000104408	EIF3E	-0.357645225	0.002746011
ENSG00000128739	SNRPN	-0.583087158	0.002746011
ENSG00000119471	HSDL2	0.740598601	0.002756564
ENSG00000212802	RPL15P3	-0.471378113	0.00278304
ENSG00000196187	TMEM63A	0.693663309	0.002796133
ENSG00000204568	MRPS18B	0.746888019	0.002796133
ENSG00000133561	GIMAP6	1.258948028	0.002796133
ENSG00000277117		-1.90266652	0.002810758
ENSG00000035687	ADSS	0.390433351	0.00282683
ENSG00000178035	IMPDH2	-0.55879923	0.002832768
ENSG00000101574	METTL4	0.51907169	0.002850752
ENSG00000144741	SLC25A26	-0.428823486	0.002857066
ENSG00000077420	APBB1IP	0.488684342	0.002858359
ENSG00000106628	POLD2	-0.512006318	0.002882353
ENSG00000231607	DLEU2	0.752516441	0.002882353
ENSG00000253797	UTP14C	0.692443349	0.002882931
ENSG00000138760	SCARB2	0.5483248	0.002885948
ENSG00000111911	HINT3	0.551235273	0.002920095
ENSG00000120158	RCL1	-0.6376707	0.002920095
ENSG00000103353	UBFD1	0.557723342	0.002928257
ENSG00000138246	DNAJC13	0.546192067	0.002938018
ENSG00000110321	EIF4G2	-0.33140512	0.002949318
ENSG00000224032	EPB41L4A-AS1	-0.595186025	0.002959798
ENSG00000120254	MTHFD1L	-0.959522713	0.002959798
ENSG00000057757	PITHD1	-0.428899191	0.002981896
ENSG00000170606	HSPA4	0.403559175	0.002981896
ENSG00000033050	ABCF2	0.467389161	0.002981896
ENSG00000168259	DNAJC7	0.382558516	0.002981896
ENSG00000136717	BIN1	-0.901516662	0.002995912
ENSG00000121741	ZMYM2	-0.414711538	0.002995912
ENSG00000156508	EEF1A1	-0.395567064	0.003008415
ENSG00000168066	SF1	-0.389846469	0.003008415
ENSG00000151500	THYN1	0.630691037	0.003008415
ENSG00000242071	RPL7AP6	-0.360892463	0.003008415
ENSG00000185359	HGS	-0.402970899	0.003008415
ENSG00000132199	ENOSF1	-0.682445271	0.003008415
ENSG00000130749	ZC3H4	0.391554119	0.003008415

ENSG00000155876	RRAGA	0.436951518	0.003016512
ENSG00000152465	NMT2	-0.887883228	0.003016512
ENSG00000167461	RAB8A	0.504435874	0.003016512
ENSG00000169764	UGP2	0.595925211	0.003053978
ENSG00000105829	BET1	0.64074169	0.003062201
ENSG00000170677	SOCS6	-0.840702925	0.003063876
ENSG00000109084	TMEM97	-1.201365509	0.003071105
ENSG00000156711	MAPK13	-0.733256623	0.003090011
ENSG00000087263	OGFOD1	0.696571451	0.003090011
ENSG00000111196	MAGOHB	0.519461483	0.003090902
ENSG00000215271	HOMEZ	1.031949055	0.003102659
ENSG00000138594	TMOD3	0.57275193	0.003102659
ENSG00000131051	RBM39	-0.420589579	0.003114034
ENSG00000143155	TIPRL	0.433952927	0.003142887
ENSG00000085465	OVGP1	-1.008737082	0.003213631
ENSG00000112996	MRPS30	0.458430944	0.003213631
ENSG00000234797	RPS3AP6	-0.447115672	0.003213631
ENSG00000155093	PTPRN2	0.950989755	0.003217944
ENSG00000065491	TBC1D22B	0.324272694	0.003221871
ENSG00000032742	IFT88	-0.649316149	0.003302557
ENSG00000260708		-0.846713898	0.003320601
ENSG00000171115	GIMAP8	1.367493149	0.003327345
ENSG00000267040		0.73455108	0.003361249
ENSG00000151929	BAG3	-0.712147427	0.003365203
ENSG00000153561	RMND5A	-0.354876164	0.003368201
ENSG00000159164	SV2A	-1.245528172	0.003407143
ENSG00000146830	GIGYF1	-0.307077586	0.003407143
ENSG00000203814	HIST2H2BF	0.892231409	0.003471852
ENSG00000137492	THAP12	-0.357476833	0.003471852
ENSG00000161860	SYCE2	-1.856873737	0.003471852
ENSG00000109079	TNFAIP1	0.637721372	0.003500491
ENSG00000128272	ATF4	-0.458125728	0.003538844
ENSG00000105821	DNAJC2	-0.555727941	0.003589115
ENSG00000141994	DUS3L	-0.557466223	0.003594956
ENSG00000135828	RNASL	0.944457289	0.003602617
ENSG00000090470	PDCD7	0.447409352	0.003607657
ENSG00000101224	CDC25B	-0.446356389	0.003626123
ENSG00000117318	ID3	-1.402232471	0.003626385
ENSG00000100266	PACSIN2	0.491889448	0.003626385
ENSG00000177733	HNRNPA0	-0.341285914	0.003646708
ENSG00000145675	PIK3R1	-0.799355782	0.003683009
ENSG00000102119	EMD	-0.681298894	0.003683229
ENSG00000270972		2.339624225	0.003683229
ENSG00000182809	CRIP2	-1.718237104	0.003683229
ENSG00000062485	CS	-0.310243883	0.003687181
ENSG00000110619	CARS	0.359987316	0.003696748
ENSG00000095139	ARCN1	0.472500928	0.003704925
ENSG00000100100	PIK3IP1	-0.757973921	0.003727115

ENSG00000075884	ARHGAP15	0.382479451	0.003728793
ENSG00000163738	MTHFD2L	-0.632850604	0.003728793
ENSG00000140992	PDPK1	-0.32678655	0.003728793
ENSG00000196428	TSC22D2	-0.567821406	0.003769818
ENSG00000177426	TGIF1	-0.928134831	0.003769818
ENSG00000226742	HSBP1L1	-0.754967928	0.00377588
ENSG00000025156	HSF2	-0.599702548	0.003797059
ENSG00000081059	TCF7	-1.502247146	0.003830239
ENSG00000167671	UBXN6	-0.348177671	0.00383292
ENSG00000115137	DNAJC27	-0.43848122	0.003864424
ENSG00000239857	GET4	-0.525152197	0.003864548
ENSG00000131931	THAP1	0.546022301	0.003864548
ENSG00000132357	CARD6	0.959201238	0.003887367
ENSG00000079215	SLC1A3	0.948336765	0.003895587
ENSG00000244486	SCARF2	-1.086773404	0.003910019
ENSG00000259330	INAFM2	-0.504622876	0.003926619
ENSG00000138138	ATAD1	0.415767959	0.003936665
ENSG00000037897	METTL1	-0.855166662	0.003965447
ENSG00000120063	GNA13	-0.797514915	0.003965447
ENSG00000240857	RDH14	0.552851645	0.00398134
ENSG00000100181	TPTEP1	-1.279376839	0.003991633
ENSG00000114120	SLC25A36	-0.472102694	0.003995881
ENSG00000142396	ERVK3-1	-0.512859788	0.003995881
ENSG00000226751		1.850187574	0.003995881
ENSG00000117143	UAP1	-0.870433256	0.003999211
ENSG00000280088		0.437007254	0.004009782
ENSG00000141378	PTRH2	0.527586739	0.004009782
ENSG00000172071	EIF2AK3	-0.863570188	0.004024549
ENSG00000169508	GPR183	-1.445374853	0.004032169
ENSG00000084093	REST	-0.368091238	0.004041988
ENSG00000279088		-0.620452528	0.004041988
ENSG00000144554	FANCD2	-0.577871221	0.004054148
ENSG00000089916	GPATCH2L	-0.407177448	0.004073434
ENSG00000131779	PEX11B	0.696371753	0.004115505
ENSG00000198755	RPL10A	-0.345006014	0.004120043
ENSG00000240849	TMEM189	-0.346427548	0.004132724
ENSG00000105127	AKAP8	-0.415689144	0.004133052
ENSG00000273559	CWC25	-0.526035563	0.004135911
ENSG00000228057	SEC63P1	-1.018442994	0.004150716
ENSG00000142655	PEX14	0.424557177	0.00415339
ENSG00000231113		-0.424773256	0.004185619
ENSG00000258944		-0.642554447	0.004212061
ENSG00000188554	NBR1	0.537043113	0.004248265
ENSG00000113790	EHHADH	1.02957952	0.004249646
ENSG00000143891	GALM	0.76978955	0.004262553
ENSG00000136802	LRRC8A	-0.426706411	0.004323039
ENSG00000184216	IRAK1	-0.46717127	0.004337294
ENSG00000129636	ITFG1	0.345955211	0.004337294

ENSG00000149932	TMEM219	0.288209132	0.004346287
ENSG00000095637	SORBS1	-1.364236544	0.004348138
ENSG00000158715	SLC45A3	-1.756009011	0.004364752
ENSG00000079785	DDX1	0.402876363	0.004365301
ENSG00000151893	CACUL1	-0.333772346	0.004421109
ENSG00000204257	HLA-DMA	-0.671203134	0.00445413
ENSG00000134014	ELP3	0.49249769	0.00445413
ENSG00000101413	RPRD1B	-0.696530138	0.00445413
ENSG00000123360	PDE1B	-0.980697582	0.004473053
ENSG00000130340	SNX9	-1.314108429	0.004479385
ENSG00000117533	VAMP4	0.546016805	0.004503412
ENSG00000105402	NAPA	0.479950895	0.004503412
ENSG00000048471	SNX29	-0.494968337	0.004541102
ENSG00000182118	FAM89A	0.776591098	0.004548564
ENSG00000235776		-0.403129559	0.004569934
ENSG00000086544	ITPKC	0.531837431	0.004578335
ENSG00000261067		-0.598860883	0.004592313
ENSG00000130561	SAG	-0.769700237	0.004636669
ENSG00000196498	NCOR2	-0.408760145	0.00464789
ENSG00000075292	ZNF638	0.481174779	0.004661128
ENSG00000115514	TXNDC9	0.648884912	0.004697421
ENSG00000131351	HAUS8	-0.617590196	0.004697421
ENSG00000274211	SOCS7	-0.430254139	0.004730424
ENSG00000160908	ZNF394	-0.633633542	0.004730995
ENSG00000204389	HSPA1A	0.996114962	0.004736582
ENSG00000053770	AP5M1	0.408331424	0.004736582
ENSG00000203395		-1.182160645	0.004738939
ENSG00000197380	DACT3	-1.211222538	0.004738939
ENSG00000162222	TTC9C	0.995410635	0.004741123
ENSG00000133216	EPHB2	1.536408503	0.004750334
ENSG00000184988	TMEM106A	0.813528041	0.004750334
ENSG00000141219	C17orf80	0.925637788	0.004750334
ENSG00000196313	POM121	-0.288348754	0.004750406
ENSG00000166313	APBB1	-0.812425969	0.00477059
ENSG00000169045	HNRNPH1	-0.332226899	0.004805989
ENSG00000129696	TTI2	0.536370621	0.00484213
ENSG00000138834	MAPK8IP3	-0.366391972	0.004843194
ENSG00000145495	Mar-06	-0.383230108	0.004856012
ENSG00000181896	ZNF101	0.555646753	0.004894174
ENSG00000169057	MECP2	-0.436106579	0.004909923
ENSG00000243335	KCTD7	-0.796191835	0.004919515
ENSG00000186767	SPIN4	-0.900213594	0.004924221
ENSG00000136840	ST6GALNAC4	-0.662363748	0.004924221
ENSG00000267194		0.999715344	0.004924221
ENSG00000263731		-0.645757012	0.004964164
ENSG00000065809	FAM107B	-0.539028823	0.004992053
ENSG00000172171	TEFM	0.619390759	0.005053308
ENSG00000119986	AVPI1	-1.715508023	0.005062354

ENSG00000170921	TANC2	-0.65379686	0.005062354
ENSG00000108604	SMARCD2	0.385815056	0.005062354
ENSG00000105193	RPS16	-0.366462054	0.005062354
ENSG00000074935	TUBE1	0.501642903	0.005079893
ENSG00000156011	PSD3	-1.141983907	0.005086192
ENSG00000170456	DENND5B	-0.932568281	0.005086192
ENSG00000148154	UGCG	-0.538806481	0.005094296
ENSG00000273173	SNURF	-2.217540928	0.005111438
ENSG00000179933	C14orf119	0.794324598	0.00511222
ENSG00000213261	EEF1B2P6	-1.038674193	0.0051182
ENSG00000115271	GCA	0.739496265	0.005168825
ENSG00000176641	RNF152	-2.261924743	0.005170812
ENSG00000120333	MRPS14	0.735598161	0.005197307
ENSG00000136448	NMT1	0.587891536	0.005218012
ENSG00000102575	ACP5	-0.726247964	0.005221542
ENSG00000135535	CD164	0.418337365	0.005244605
ENSG00000162139	NEU3	-0.436111378	0.005249626
ENSG00000116560	SFPQ	-0.450624477	0.005285127
ENSG00000165392	WRN	-0.508090059	0.005297533
ENSG00000140367	UBE2Q2	-0.414974025	0.005297533
ENSG00000250251	PKD1P6	-0.555179691	0.005297533
ENSG00000187583	PLEKHN1	0.995157948	0.00530671
ENSG00000144744	UBA3	0.481381467	0.00530671
ENSG00000280398		-1.24218104	0.00530671
ENSG00000103365	GGA2	-0.482086248	0.00530671
ENSG00000174871	CNIH2	-1.073034677	0.00531574
ENSG00000254685	FPGT	0.694235577	0.005325862
ENSG00000114956	DGUOK	0.296644351	0.005329528
ENSG00000251634		1.530203258	0.005329528
ENSG00000004766	VPS50	0.383330107	0.005329528
ENSG00000258875		-1.25041477	0.005369947
ENSG00000162664	ZNF326	-0.584624974	0.005415307
ENSG00000165637	VDAC2	-0.334719472	0.005420225
ENSG00000092067	CEBPE	1.049692247	0.005420225
ENSG00000260179		-0.990734441	0.005441017
ENSG00000146757	ZNF92	-0.646496131	0.005466108
ENSG00000258890	CEP95	-0.516769844	0.005481472
ENSG00000211668	IGLV2-11	-3.090378021	0.00549512
ENSG00000086102	NFX1	-0.497546651	0.005501067
ENSG00000162714	ZNF496	0.601448994	0.005509897
ENSG00000115524	SF3B1	-0.302908893	0.005509897
ENSG00000182568	SATB1	-0.605837848	0.005509897
ENSG00000103496	STX4	-0.497818001	0.005565844
ENSG00000173706	HEG1	0.648331689	0.005601333
ENSG00000164430	MB21D1	0.749612566	0.005606658
ENSG00000142546	NOSIP	0.55327582	0.005628744
ENSG00000028116	VRK2	0.471576161	0.005657054
ENSG00000176155	CCDC57	-0.350473698	0.005668479

ENSG00000198363	ASPH	-0.80004184	0.005679244
ENSG00000100387	RBX1	0.454776249	0.005679733
ENSG00000096717	SIRT1	-0.566389559	0.00568568
ENSG00000172828	CES3	-1.07716118	0.00568568
ENSG00000063180	CA11	-0.774703867	0.005720175
ENSG00000231925	TAPBP	0.349117523	0.005734262
ENSG00000105708	ZNF14	-0.707494272	0.005748332
ENSG00000107262	BAG1	0.347251125	0.005781448
ENSG00000140853	NLRC5	0.427735217	0.005814087
ENSG00000123136	DDX39A	-0.518246929	0.005823587
ENSG00000164104	HMGB2	0.586157999	0.005826264
ENSG00000154310	TNIK	0.684416319	0.005833838
ENSG00000143947	RPS27A	-0.358229086	0.005874523
ENSG00000139211	AMIGO2	0.671162168	0.005874523
ENSG00000167522	ANKRD11	-0.291400579	0.005874523
ENSG00000147457	CHMP7	0.553792076	0.005879205
ENSG00000231025	NA	-0.390402367	0.005888426
ENSG00000198677	TTC37	0.369855754	0.005902078
ENSG00000204099	NEU4	-2.993766429	0.00590791
ENSG00000213085	CFAP45	-1.362197238	0.005924911
ENSG00000126262	FFAR2	1.244244867	0.005924911
ENSG00000100425	BRD1	-0.604378712	0.005924911
ENSG00000144468	RHBDD1	0.384446412	0.005928463
ENSG00000166822	TMEM170A	-0.325968286	0.005928463
ENSG00000116754	SRSF11	-0.331662641	0.005944418
ENSG00000163069	SGCB	-0.75797434	0.006010373
ENSG00000112137	PHACTR1	-1.659830782	0.006085466
ENSG00000214783		-0.900235444	0.006085514
ENSG00000173801	JUP	1.40050464	0.006096912
ENSG00000176624	MEX3C	-0.505350944	0.006113141
ENSG00000187193	MT1X	0.811502077	0.006126881
ENSG00000169682	SPNS1	-0.530827012	0.006144655
ENSG00000244945		-1.138333755	0.006153577
ENSG00000254521	SIGLEC12	2.062237778	0.006153577
ENSG00000130517	PGPEP1	-0.505299159	0.006158499
ENSG00000049759	NEDD4L	-0.61833592	0.006167465
ENSG00000185404	SP140L	0.475448775	0.006176314
ENSG00000158186	MRAS	-0.985298402	0.006176314
ENSG00000163960	UBXN7	-0.373557167	0.006176314
ENSG00000106635	BCL7B	-0.534213873	0.006176314
ENSG00000147677	EIF3H	-0.23475146	0.006176314
ENSG00000140153	WDR20	-0.314328779	0.006181292
ENSG00000131558	EXOC4	0.491375214	0.006204808
ENSG00000139514	SLC7A1	-0.742072689	0.006211784
ENSG00000237940		-0.934675342	0.006279192
ENSG00000172936	MYD88	0.433265576	0.006314639
ENSG00000198218	QRICH1	-0.319064079	0.006314639
ENSG00000244005	NFS1	0.449698464	0.006314639

ENSG00000139370	SLC15A4	0.64431983	0.006323004
ENSG00000169371	SNUPN	0.482440001	0.006327888
ENSG00000100647	SUSD6	-0.335353982	0.006354977
ENSG00000273038		-1.36446766	0.006363872
ENSG00000117091	CD48	0.345558491	0.006404225
ENSG00000204315	FKBPL	0.982817143	0.006404225
ENSG00000112110	MRPL18	0.629604924	0.006404225
ENSG00000134575	ACP2	0.520967547	0.006404225
ENSG00000067057	PFKP	0.533079489	0.006418017
ENSG00000198301	SDAD1	0.435980877	0.006453446
ENSG00000124782	RREB1	-0.323654434	0.006453446
ENSG00000147168	IL2RG	0.406207749	0.006462908
ENSG00000198668	CALM1	0.392599644	0.006462908
ENSG00000020633	RUNX3	-0.649457449	0.006492187
ENSG00000203710	CR1	0.890272328	0.006492187
ENSG00000137806	NDUFAF1	0.76567439	0.006492187
ENSG00000089639	GMIP	0.270232922	0.006492187
ENSG00000070476	ZXDC	-0.276739323	0.006586063
ENSG00000103671	TRIP4	0.450119598	0.006602879
ENSG00000125779	PANK2	0.490713033	0.006605745
ENSG00000225828	FAM229A	-0.468384966	0.006608517
ENSG00000129116	PALLD	-1.117418915	0.006608517
ENSG00000262528		-0.933071539	0.006610113
ENSG00000171204	TMEM126B	0.458516949	0.00662034
ENSG00000100911	PSME2	0.521288919	0.006626801
ENSG00000174574	AKIRIN1	-0.320501246	0.00663208
ENSG00000181163	NPM1	-0.331979103	0.006645034
ENSG00000175550	DRAP1	0.552334676	0.006645034
ENSG00000140406	MESDC1	-0.629453814	0.00667554
ENSG00000132326	PER2	-0.823907868	0.006685867
ENSG00000161202	DVL3	-0.381516088	0.006748785
ENSG00000274943		-1.028371141	0.006768992
ENSG00000136485	DCAF7	0.630624909	0.006768992
ENSG00000154710	RABGEF1	-0.898492609	0.006785451
ENSG00000229754	CXCR2P1	1.70987682	0.006857107
ENSG00000077514	POLD3	0.693416471	0.006857107
ENSG00000111674	ENO2	-1.447008061	0.006870145
ENSG00000168237	GLYCTK	0.414668706	0.006879233
ENSG00000148229	POLE3	-0.397883651	0.006879233
ENSG00000246100	LINC00900	-1.183314972	0.006879233
ENSG00000100804	PSMB5	0.52485759	0.006879233
ENSG00000171497	PPID	0.459303006	0.006885191
ENSG00000006634	DBF4	-0.826507354	0.006885191
ENSG00000139567	ACVRL1	1.073481706	0.006885191
ENSG00000123836	PFKFB2	-0.636721554	0.006897326
ENSG00000135336	ORC3	0.457259274	0.006932821
ENSG00000122482	ZNF644	-0.443447853	0.00696676
ENSG00000168993	CPLX1	-2.794725464	0.00696676

ENSG00000157933	SKI	-0.577433559	0.006974959
ENSG00000119844	AFTPH	0.416343601	0.006981491
ENSG00000204217	BMPR2	0.47535105	0.00701143
ENSG00000204160	ZDHHC18	-0.343957698	0.0070219
ENSG00000163877	SNIP1	-0.776925784	0.007024228
ENSG00000227345	PARG	0.392048469	0.007057764
ENSG00000113761	ZNF346	0.542375262	0.007083275
ENSG00000170881	RNF139	-0.443427011	0.007108989
ENSG00000095397	WHRN	-1.258378992	0.007111994
ENSG00000185101	ANO9	-1.465364334	0.007111994
ENSG00000083635	NUFIP1	-0.624158305	0.007111994
ENSG00000114857	NKTR	-0.391024314	0.007148284
ENSG00000134644	PUM1	0.270884298	0.007152408
ENSG00000137500	CCDC90B	0.374120906	0.00715338
ENSG00000278864		-1.013063444	0.007154587
ENSG00000112303	VNN2	0.540578974	0.007223292
ENSG00000160602	NEK8	0.566476006	0.007238506
ENSG00000185753	CXorf38	0.556653198	0.007249285
ENSG00000204628	RACK1	-0.271909915	0.007350765
ENSG00000137817	PARP6	-0.313575325	0.007401721
ENSG00000163870	TPRA1	-0.792006276	0.007412809
ENSG00000157593	SLC35B2	-0.599545516	0.007415582
ENSG00000147403	RPL10	-0.349829086	0.007448887
ENSG00000185085	INTS5	0.742620433	0.007448887
ENSG00000137752	CASP1	0.631293426	0.007448887
ENSG00000175197	DDIT3	-0.90100809	0.007448887
ENSG00000119431	HDHD3	0.679148654	0.00745723
ENSG00000171262	FAM98B	0.716497362	0.007459158
ENSG00000180228	PRKRA	-0.326004434	0.007460649
ENSG00000176225	RTTN	-0.456910107	0.007475541
ENSG00000085231	AK6	0.544412458	0.007487801
ENSG00000149809	TM7SF2	-0.538699981	0.007525097
ENSG00000188529	SRSF10	-0.434248664	0.007563363
ENSG00000140807	NKD1	1.233724958	0.00758644
ENSG00000105722	ERF	-0.576947878	0.00758644
ENSG00000139163	ETNK1	0.516094283	0.007616156
ENSG00000106610	STAG3L4	-0.428683335	0.007623706
ENSG00000205808	PLPP6	0.964355791	0.007644434
ENSG00000269318		-1.178182003	0.007677121
ENSG00000144848	ATG3	0.433121761	0.007724529
ENSG00000105373	GLTSCR2	-0.389688994	0.007744356
ENSG00000179051	RCC2	-0.329498269	0.007778274
ENSG00000128284	APOL3	0.603843182	0.007778274
ENSG00000239557		-0.865559034	0.007801648
ENSG00000174327	SLC16A13	0.908652078	0.007801648
ENSG00000224470	ATXN1L	-0.517587353	0.007832762
ENSG00000168404	MLKL	0.689418162	0.007841578
ENSG00000182670	TTC3	-0.467301702	0.007905316

ENSG0000006704	GTF2IRD1	-1.532415753	0.007927114
ENSG00000104412	EMC2	0.459316077	0.007927114
ENSG00000204713	TRIM27	0.694329014	0.007954744
ENSG00000095209	TMEM38B	-0.569408975	0.0079627
ENSG0000004455	AK2	0.453083729	0.007988757
ENSG00000165355	FBXO33	-0.677448985	0.007988757
ENSG00000125952	MAX	0.319146789	0.00799144
ENSG00000129351	ILF3	-0.352154832	0.00799144
ENSG00000178700	DHFR2	0.855561913	0.007994493
ENSG00000110057	UNC93B1	0.494228505	0.008027609
ENSG00000086827	ZW10	0.677287112	0.008052886
ENSG00000144306	SCRN3	0.568366155	0.008082109
ENSG00000178127	NDUFV2	-0.848697106	0.00808596
ENSG00000255198	SNHG9	-0.585482553	0.008097207
ENSG00000104823	ECH1	0.470772207	0.008126122
ENSG00000261438		1.172591661	0.008140711
ENSG00000106723	SPIN1	-0.348618896	0.008164994
ENSG00000272047	GTF2H5	0.450985627	0.008175599
ENSG00000091129	NRCAM	-3.024302008	0.008199952
ENSG00000106399	RPA3	0.466299913	0.008202241
ENSG00000091732	ZC3HC1	0.398695686	0.008204437
ENSG00000028310	BRD9	-0.270845366	0.008212617
ENSG00000146072	TNFRSF21	-2.198826464	0.008234652
ENSG00000278740		-1.827269448	0.008247285
ENSG00000185418	TARSL2	-0.48121706	0.00824743
ENSG00000047579	DTNBP1	0.422815436	0.008253783
ENSG00000143845	ETNK2	-2.682277132	0.008254699
ENSG00000075188	NUP37	0.633313312	0.008264258
ENSG00000159708	LRRC36	-1.063043861	0.008264258
ENSG00000162402	USP24	-0.347743016	0.008293746
ENSG00000138073	PREB	0.623848643	0.008373587
ENSG00000117139	KDM5B	-0.496434231	0.00837567
ENSG00000168056	LTBP3	-0.717381812	0.008376262
ENSG00000247853		1.070975403	0.008420772
ENSG00000077380	DYNC112	0.596898507	0.008467845
ENSG00000187815	ZFP69	0.647831988	0.008502705
ENSG00000197021	CXorf40B	-0.480413194	0.008516244
ENSG00000259408		-0.910479905	0.008516244
ENSG00000102317	RBM3	-0.335360091	0.00853863
ENSG00000182584	ACTL10	1.260766808	0.008539241
ENSG00000008128	CDK11A	-0.494094753	0.008551978
ENSG00000183496	MEX3B	-1.139155318	0.008556313
ENSG00000109519	GRPEL1	-0.388683272	0.008624469
ENSG00000185100	ADSSL1	-0.617725868	0.008642763
ENSG00000136213	CHST12	0.64795469	0.008738581
ENSG00000109062	SLC9A3R1	-0.602428679	0.008744899
ENSG00000108946	PRKAR1A	0.462731826	0.008756258
ENSG00000139687	RB1	0.434396005	0.008773943

ENSG00000279549		-0.859289043	0.008833802
ENSG00000173457	PPP1R14B	-0.731435393	0.008833802
ENSG00000150337	FCGR1A	1.211071648	0.008875534
ENSG00000198026	ZNF335	-0.283195661	0.008875534
ENSG00000124641	MED20	0.760162398	0.008876664
ENSG00000177565	TBL1XR1	-0.469048301	0.009054239
ENSG00000254858	MPV17L2	-0.600213453	0.009068432
ENSG00000145945	FAM50B	0.832261192	0.009078325
ENSG00000038382	TRIO	-0.539720477	0.009125796
ENSG00000168016	TRANK1	0.682928547	0.009132193
ENSG00000161653	NAGS	0.925107721	0.009144376
ENSG00000115457	IGFBP2	1.481886829	0.009149893
ENSG00000100068	LRP5L	-0.552160339	0.009149893
ENSG00000231528	FAM225A	1.220437677	0.009191262
ENSG00000162777	DENND2D	0.778766002	0.009241897
ENSG00000145390	USP53	-1.204775386	0.009245362
ENSG00000096968	JAK2	0.548986531	0.009268721
ENSG00000100372	SLC25A17	0.460522789	0.0092832
ENSG00000153560	UBP1	0.345028817	0.009317584
ENSG00000197147	LRRC8B	-0.615159877	0.009322388
ENSG00000235725		-0.718634839	0.009325558
ENSG00000113263	ITK	-1.050194582	0.009330516
ENSG00000102760	RGCC	-1.435156318	0.009341918
ENSG00000099834	CDHR5	1.298712698	0.009352147
ENSG00000120686	UFM1	-0.284504998	0.009375994
ENSG00000134882	UBAC2	0.322924845	0.009386229
ENSG00000179409	GEMIN4	-0.410793182	0.009399867
ENSG00000213609	RPL7AP50	-0.909015854	0.009421707
ENSG00000132196	HSD17B7	0.631485767	0.009426284
ENSG00000204209	DAXX	0.670188983	0.009472685
ENSG00000166747	AP1G1	-0.497675827	0.009472685
ENSG00000175643	RMI2	1.431612797	0.009514466
ENSG00000186469	GNG2	-0.477545054	0.009532333
ENSG00000118496	FBXO30	-0.576723397	0.009567051
ENSG00000174010	KLHL15	-0.679360378	0.009661858
ENSG00000145780	FEM1C	-0.747152598	0.009691069
ENSG00000144749	LRIG1	-0.587848604	0.009697198
ENSG00000111875	ASF1A	0.645695143	0.009697198
ENSG00000278231		-0.6997846	0.009697198
ENSG00000143376	SNX27	0.482786415	0.009788204
ENSG00000237063		-1.48372325	0.009794862
ENSG00000102524	TNFSF13B	0.965208442	0.009847153
ENSG00000133466	C1QTNF6	-0.727627648	0.009847153
ENSG00000273216		-1.216175178	0.009889719
ENSG00000100664	EIF5	-0.472451271	0.009904268
ENSG00000249992	TMEM158	-2.37050781	0.009913004
ENSG00000173812	EIF1	-0.369588335	0.009917353
ENSG00000101945	SUV39H1	-0.568441761	0.009941305

ENSG00000165688	PMPCA	-0.295800822	0.009941305
ENSG00000065427	KARS	0.320291728	0.009965087
ENSG00000048405	ZNF800	-0.464089494	0.010007767
ENSG00000183647	ZNF530	-0.557820525	0.010011142
ENSG00000187626	ZKSCAN4	0.830452673	0.010033703
ENSG00000072422	RHOBTB1	-1.338649265	0.010033703
ENSG00000015479	MATR3	-0.640899689	0.010082307
ENSG00000010278	CD9	-1.522380008	0.010088354
ENSG00000152464	RPP38	0.447056634	0.010115254
ENSG00000119599	DCAF4	-0.578034756	0.010133434
ENSG00000155189	AGPAT5	0.653363719	0.010135705
ENSG00000198517	MAFK	-0.583097787	0.010144413
ENSG00000272106		-0.418522363	0.010157658
ENSG00000232119	MCTS1	0.49497145	0.010157658
ENSG00000170439	METTL7B	1.789405787	0.010157658
ENSG00000144597	EAF1	-0.715351769	0.010176749
ENSG00000151882	CCL28	-0.807333765	0.01023727
ENSG00000167333	TRIM68	0.623735924	0.01023727
ENSG00000123700	KCNJ2	1.65275555	0.01023727
ENSG00000100426	ZBED4	-0.300306997	0.01023727
ENSG00000176024	ZNF613	0.998190702	0.010246726
ENSG00000235750	KIAA0040	0.831901698	0.010248203
ENSG00000184371	CSF1	-1.629885219	0.010278565
ENSG00000139725	RHOF	-0.402502424	0.010278565
ENSG00000157350	ST3GAL2	0.408521934	0.010278565
ENSG00000139291	TMEM19	0.453262504	0.010295546
ENSG00000261490		-0.642723177	0.010304765
ENSG00000281205	LINC00950	-0.887529522	0.010322056
ENSG00000112079	STK38	0.48621714	0.010402968
ENSG00000130396	AFDN	-0.963852482	0.010417731
ENSG00000112078	KCTD20	-0.319183335	0.010431422
ENSG00000183665	TRMT12	0.548340864	0.010530936
ENSG00000151490	PTPRO	0.691981945	0.010551545
ENSG00000140450	ARRDC4	-0.956157033	0.010576656
ENSG00000091157	WDR7	0.366367055	0.010576656
ENSG00000227467	LINC01537	-1.124694812	0.010578054
ENSG00000118257	NRP2	-1.106177452	0.010661371
ENSG00000115275	MOGS	0.405759171	0.010747452
ENSG00000110987	BCL7A	-0.877960362	0.010750973
ENSG00000101247	NDUFAF5	-0.669208234	0.01076466
ENSG00000124181	PLCG1	-0.822056331	0.01076466
ENSG00000078061	ARAF	-0.297340064	0.010765021
ENSG00000112394	SLC16A10	-1.026965917	0.010772781
ENSG00000175606	TMEM70	-0.510251453	0.010772781
ENSG00000143498	TAF1A	0.801410434	0.010783983
ENSG00000279192	PWAR5	-1.023472312	0.010799938
ENSG00000204611	ZNF616	0.937894905	0.01085223
ENSG00000106560	GIMAP2	0.715697116	0.010863459

ENSG00000117859	OSBPL9	0.329513527	0.010922631
ENSG00000184678	HIST2H2BE	0.645713919	0.010929579
ENSG00000105576	TNPO2	-0.269337665	0.010929579
ENSG00000165685	TMEM52B	-1.376651884	0.010943869
ENSG00000111913	FAM65B	0.677645283	0.010947176
ENSG00000139793	MBNL2	-0.532411004	0.010947176
ENSG00000215021	PHB2	-0.238456254	0.011030923
ENSG00000152128	TMEM163	-2.723328171	0.011040311
ENSG00000196470	SIAH1	-0.608044219	0.011040311
ENSG00000149646	CNBD2	-0.587721586	0.011052374
ENSG00000136827	TOR1A	0.453389956	0.01114214
ENSG00000274677		-1.103887622	0.011217764
ENSG00000135047	CTSL	-2.178937835	0.011237565
ENSG00000224861	YBX1P1	-0.494580126	0.011255946
ENSG00000241878	PISD	0.330863577	0.011268269
ENSG00000093072	CECR1	0.507576421	0.011278599
ENSG00000172575	RASGRP1	-1.301316005	0.01132234
ENSG00000120616	EPC1	-0.306413322	0.011395791
ENSG00000205302	SNX2	0.348213872	0.011481776
ENSG00000108448	TRIM16L	-0.84121242	0.011533686
ENSG00000188981	MSANTD1	-0.744405338	0.011533869
ENSG00000118777	ABCG2	-2.444714128	0.011536587
ENSG00000130844	ZNF331	-1.743897304	0.011617529
ENSG00000138686	BBS7	0.564508275	0.011621882
ENSG00000134900	TPP2	-0.342898367	0.011621882
ENSG00000140993	TIGD7	0.827536126	0.011621882
ENSG00000279207		-0.836447548	0.011621882
ENSG00000169093	ASMTL	-0.435371444	0.01164282
ENSG00000204136	GGTA1P	-1.223767944	0.01164282
ENSG00000196659	TTC30B	0.89732534	0.011718918
ENSG00000197093	GAL3ST4	-1.1693339	0.011718918
ENSG00000146833	TRIM4	0.453707808	0.011735899
ENSG00000104518	GSDMD	0.590236684	0.011750986
ENSG00000196696		-0.407097022	0.011750986
ENSG00000041988	THAP3	0.560838981	0.011789126
ENSG00000013288	MAN2B2	0.320791342	0.011789126
ENSG00000081087	OSTM1	0.422499163	0.011789126
ENSG00000156603	MED19	0.558642716	0.011789126
ENSG00000152380	FAM151B	0.543876658	0.011813668
ENSG00000204475	NCR3	-2.498914882	0.011826822
ENSG00000067369	TP53BP1	-0.380611487	0.01192734
ENSG00000132581	SDF2	0.302887083	0.01192734
ENSG00000183458		-0.856682685	0.011929794
ENSG00000125746	EML2	0.371447771	0.011935647
ENSG00000112308	C6orf62	0.30896216	0.011970858
ENSG00000115020	PIKFYVE	-0.356137488	0.01199274
ENSG00000119138	KLF9	-0.742522499	0.012099882
ENSG00000196531	NACA	-0.245553903	0.012099882

ENSG00000170604	IRF2BP1	0.504883852	0.012099882
ENSG00000100483	VCPKMT	-0.475667155	0.012100588
ENSG00000137955	RABGGTB	-0.365197339	0.012145751
ENSG00000277476		-0.537037296	0.012170216
ENSG00000174233	ADCY6	-0.830295385	0.012191169
ENSG00000251867		-0.74901416	0.012202945
ENSG00000008710	PKD1	-0.447959481	0.012202945
ENSG00000139921	TMX1	0.52794344	0.012204141
ENSG00000277449	CEBPB-AS1	-0.797850142	0.012204141
ENSG00000181315	ZNF322	0.920967052	0.012229476
ENSG00000089280	FUS	-0.355957161	0.012231404
ENSG00000196345	ZKSCAN7	1.007529486	0.0122611
ENSG00000279117		-0.406535152	0.012270469
ENSG00000214485	RPL7P1	-0.608025118	0.012301001
ENSG00000219545	UMAD1	0.475322536	0.012306459
ENSG00000143575	HAX1	0.328578358	0.012327035
ENSG00000232573	RPL3P4	-0.418728312	0.01237718
ENSG00000183161	FANCF	0.79330166	0.012401158
ENSG00000276533		0.713304183	0.012410119
ENSG00000140948	ZCCHC14	-0.590063404	0.012447972
ENSG00000196365	LONP1	-0.38267872	0.012447972
ENSG00000162889	MAPKAPK2	-0.587050588	0.012454704
ENSG00000165244	ZNF367	-1.002459455	0.012461018
ENSG00000153944	MSI2	-0.318068756	0.012461018
ENSG00000197063	MAFG	-0.544762284	0.012486792
ENSG00000100403	ZC3H7B	0.284880562	0.012486792
ENSG00000277496		0.827818263	0.012508718
ENSG00000100644	HIF1A	-0.88007474	0.012556536
ENSG00000168502	MTCL1	-2.142307464	0.012604929
ENSG00000205581	HMGN1	-0.368462064	0.012690892
ENSG00000166716	ZNF592	-0.293002161	0.012692246
ENSG00000154124	OTULIN	-0.327974652	0.012748744
ENSG00000165533	TTC8	-0.562079816	0.012748744
ENSG00000127152	BCL11B	-1.647259628	0.012779145
ENSG00000177352	CCDC71	0.562554646	0.012842984
ENSG00000146425	DYNLT1	0.714478222	0.012842984
ENSG00000268043	NBPF12	-0.355930753	0.012863886
ENSG00000105202	FBL	-0.267343811	0.012898705
ENSG00000164056	SPRY1	-1.454047617	0.012936938
ENSG00000173295	FAM86B3P	-0.706379014	0.012936938
ENSG00000101298	SNPH	-1.216655006	0.012936938
ENSG00000184787	UBE2G2	-0.341447667	0.012936938
ENSG00000162408	NOL9	-0.448479554	0.012966884
ENSG00000244560		-0.716927664	0.012966884
ENSG00000272760		0.734128768	0.012966884
ENSG00000153902	LGI4	-1.311523116	0.012966884
ENSG00000276337		-1.258948073	0.012971689
ENSG00000273658		-1.212536159	0.012983829

ENSG00000132471	WBP2	0.229871493	0.012988148
ENSG00000170260	ZNF212	-0.502397834	0.013038051
ENSG00000275769		-2.783833153	0.013038051
ENSG00000158427	TMSB15B	-1.06668155	0.013066616
ENSG00000187514	PTMA	-0.298954347	0.013087953
ENSG00000227066		-1.020536245	0.01310982
ENSG00000107833	NPM3	-0.608106035	0.01310982
ENSG00000167978	SRRM2	-0.332279508	0.01310982
ENSG00000108469	RECQL5	0.442638305	0.01310982
ENSG00000259891		-0.7009997	0.013127815
ENSG00000152409	JMY	-0.882788541	0.013132208
ENSG00000079134	THOC1	-0.334198976	0.013132208
ENSG00000270681		-1.419972593	0.013162596
ENSG00000137364	TPMT	0.453440486	0.013162596
ENSG00000143653	SCCPDH	0.562189773	0.013198334
ENSG00000112200	ZNF451	-0.362848586	0.013198334
ENSG00000165233	CARD19	-0.402622244	0.013198334
ENSG00000167778	SPRYD3	0.572969903	0.013198334
ENSG00000184990	SIVA1	-0.356671344	0.013198334
ENSG00000150593	PDCD4	-0.483243738	0.013204388
ENSG00000136450	SRSF1	0.448100213	0.013204388
ENSG00000196557	CACNA1H	-2.727503936	0.013207141
ENSG00000119812	FAM98A	0.492063613	0.013250187
ENSG00000025708	TYMP	1.096598581	0.01332707
ENSG00000100342	APOL1	0.903648657	0.013351339
ENSG00000253982		-0.658066466	0.013360943
ENSG00000115364	MRPL19	0.561757287	0.013366095
ENSG00000101882	NKAP	0.388363916	0.013366095
ENSG00000133195	SLC39A11	0.494487776	0.013366095
ENSG00000066379	ZNRD1	0.445468328	0.013381335
ENSG00000167103	PIP5KL1	-1.239645214	0.013381335
ENSG00000166130	IKBIP	0.665234519	0.013381335
ENSG00000182400	TRAPPC6B	0.622586916	0.013381335
ENSG00000187775	DNAH17	-1.864960928	0.013381335
ENSG00000173818	ENDOV	-0.427237977	0.013381335
ENSG00000100393	EP300	-0.357179355	0.013381335
ENSG00000146054	TRIM7	0.677035115	0.013506502
ENSG00000131849	ZNF132	1.22111034	0.013517549
ENSG00000198815	FOXJ3	-0.273636812	0.013529208
ENSG00000196338	NLGN3	-1.01818573	0.013529208
ENSG00000196233	LCOR	-0.366372468	0.013529208
ENSG00000278991		-1.07672584	0.013529208
ENSG00000076604	TRAF4	-0.905454061	0.013529208
ENSG00000181894	ZNF329	-0.554832158	0.013529208
ENSG00000075415	SLC25A3	-0.408499397	0.013534613
ENSG00000261338		-0.629625597	0.013570525
ENSG00000141002	TCF25	-0.342872017	0.013570525
ENSG00000143553	SNAPIN	0.536914722	0.013653919

ENSG00000165410	CFL2	-0.774062258	0.013662343
ENSG00000169967	MAP3K2	-0.439452057	0.013703788
ENSG00000054967	RELT	-0.609656103	0.013767028
ENSG00000100815	TRIP11	0.562917154	0.013800363
ENSG00000180257	ZNF816	0.653206163	0.013800363
ENSG00000162396	PARS2	1.245998393	0.013850874
ENSG00000152520	PAN3	-0.287241218	0.013850874
ENSG00000214706	IFRD2	-0.385211141	0.013957369
ENSG00000162636	FAM102B	-0.53908749	0.01396362
ENSG00000114209	PDCD10	0.410498599	0.013976783
ENSG00000147526	TACC1	-0.474504481	0.013976783
ENSG00000256087	ZNF432	-0.417329495	0.013976783
ENSG00000160211	G6PD	0.371185381	0.013986122
ENSG00000177989	ODF3B	1.009484678	0.014039564
ENSG00000196776	CD47	0.283130588	0.014079474
ENSG00000156928	MALSU1	0.48104448	0.014079758
ENSG00000165406	Mar-08	-0.354790928	0.014079758
ENSG00000107566	ERLIN1	0.631271191	0.014079758
ENSG00000201457	SNORA55	-1.032818426	0.014086115
ENSG00000115085	ZAP70	-1.171039532	0.014153528
ENSG00000033867	SLC4A7	-0.452615794	0.014153528
ENSG00000211445	GPX3	-1.280226968	0.014153528
ENSG00000205352	PRR13	0.271583641	0.014202401
ENSG00000260841	NA	-0.480733308	0.014204917
ENSG00000106443	PHF14	0.35178097	0.014204917
ENSG00000125772	GPCPD1	-0.503125267	0.014204917
ENSG00000163435	ELF3	-0.584877662	0.014243064
ENSG00000145723	GIN1	0.85850129	0.014285957
ENSG00000101138	CSTF1	0.443844066	0.014297384
ENSG00000149823	VPS51	-0.296110127	0.014319643
ENSG00000178053	MLF1	-1.419331224	0.014330984
ENSG00000113621	TXNDC15	0.461729007	0.014330984
ENSG00000170234	PWWP2A	0.405766737	0.014330984
ENSG00000109787	KLF3	-0.524085349	0.014352391
ENSG00000147475	ERLIN2	0.318722922	0.014352391
ENSG00000092208	GEMIN2	0.45546431	0.014352391
ENSG00000126775	ATG14	-0.352099688	0.014352391
ENSG00000172116	CD8B	-1.5979435	0.014407037
ENSG00000056050	HPF1	0.699403302	0.014407037
ENSG00000172508	CARNS1	-1.569932352	0.014407037
ENSG00000279133		-0.728822529	0.01440922
ENSG00000141985	SH3GL1	-0.449249752	0.01440922
ENSG00000254503		1.164722053	0.01440922
ENSG00000167635	ZNF146	0.504505586	0.014438476
ENSG00000169914	OTUD3	-0.383907543	0.014587647
ENSG00000198286	CARD11	-1.184279797	0.014587647
ENSG00000131196	NFATC1	-0.31592961	0.014587647
ENSG00000105617	LENG1	0.498513414	0.014668496

ENSG0000073111	MCM2	-1.217496771	0.014680098
ENSG00000146834	MEPCE	-0.527876321	0.014737818
ENSG00000115165	CYTIP	-0.551921761	0.014783838
ENSG00000108433	GOSR2	0.346541467	0.014797495
ENSG00000165782	TMEM55B	-0.363227789	0.014829124
ENSG00000280434		-0.655165894	0.0148399
ENSG00000135249	RINT1	-0.369045954	0.014861567
ENSG00000197265	GTF2E2	0.35479877	0.014861567
ENSG00000103269	RHBDL1	-1.089234066	0.014861567
ENSG00000169715	MT1E	1.923426191	0.014861567
ENSG00000141034	GID4	0.58593624	0.014861567
ENSG00000165792	METTL17	0.449008687	0.014906342
ENSG00000164292	RHOBTB3	-1.188525264	0.014949876
ENSG00000006576	PHTF2	-0.332669249	0.014967093
ENSG00000099364	FBXL19	0.382539547	0.015011333
ENSG00000162438	CTRC	-0.894067243	0.015034065
ENSG00000168026	TTC21A	0.755254097	0.015056522
ENSG00000172530	BANP	-0.307086928	0.015087612
ENSG00000136244	IL6	2.590540282	0.01512651
ENSG00000269892		-0.911853643	0.015157579
ENSG00000186594	MIR22HG	-0.864102324	0.015157579
ENSG00000112787	FBRSL1	-0.343267063	0.015184556
ENSG00000175866	BAIAP2	-0.524368835	0.015184556
ENSG00000128602	SMO	-1.864855503	0.015188495
ENSG00000082153	BZW1	-0.478794844	0.015203847
ENSG00000144711	IQSEC1	-0.391513738	0.015203847
ENSG00000247240	UBL7-AS1	-0.556858484	0.015223055
ENSG00000177628	GBA	0.496043523	0.015233323
ENSG00000107882	SUFU	0.420421845	0.015283168
ENSG00000279432		-0.836283367	0.015299171
ENSG00000187257	RSBN1L	0.48697984	0.015333163
ENSG00000100401	RANGAP1	0.389883935	0.015333163
ENSG00000164080	RAD54L2	-0.291551856	0.015356081
ENSG00000279838		-0.787304177	0.015368636
ENSG00000085721	RRN3	-0.493160874	0.015368636
ENSG00000180423	HARBI1	0.601878338	0.015536786
ENSG00000100554	ATP6V1D	0.572694094	0.01554846
ENSG00000092929	UNC13D	0.340610142	0.01554846
ENSG00000204439	C6orf47	0.526600757	0.015572591
ENSG00000155792	DEPTOR	-1.398433478	0.015572591
ENSG00000141076	UTP4	-0.392375392	0.015674991
ENSG00000141622	RNF165	1.589739775	0.015683446
ENSG00000008513	ST3GAL1	-0.431940148	0.01569281
ENSG00000111727	HCFC2	0.456527358	0.015701377
ENSG00000183506	PI4KAP2	-0.476137755	0.015701377
ENSG00000259494	MRPL46	0.504004711	0.015811742
ENSG00000088854	C20orf194	-0.39912825	0.015811742
ENSG00000118961	LDAH	0.602369807	0.015819751

ENSG00000182903	ZNF721	0.545309845	0.015819751
ENSG00000175137	SH3BP5L	0.476062016	0.015822188
ENSG00000172086	KRCC1	0.664240453	0.015838878
ENSG00000110367	DDX6	-0.376656154	0.015839532
ENSG00000185864	NPIP4	-0.503199348	0.015839532
ENSG00000265531	FCGR1CP	1.559938605	0.015942793
ENSG00000121966	CXCR4	-0.721284059	0.015946357
ENSG00000180346	TIGD2	0.531875458	0.015955515
ENSG00000198938	MT-CO3	-0.395812053	0.015966379
ENSG00000163704	PRRT3	-0.786552177	0.016048822
ENSG00000153140	CETN3	0.852668901	0.016048822
ENSG00000213024	NUP62	0.40494672	0.016048893
ENSG00000181274	FRAT2	0.507284178	0.016066377
ENSG00000129484	PARP2	-0.491812875	0.016066377
ENSG00000181826	RELL1	-0.809059904	0.016088239
ENSG00000136699	SMPD4	-0.382473078	0.016115153
ENSG00000073464	CLCN4	1.161370092	0.016127645
ENSG00000001084	GCLC	-0.323747123	0.016133034
ENSG00000272918		-0.838623919	0.016133034
ENSG00000111319	SCNN1A	-0.721269728	0.016166711
ENSG00000158417	EIF5B	0.362855097	0.01618331
ENSG00000181218	HIST3H2A	-1.062291012	0.016201031
ENSG00000164967	RPP25L	0.683096893	0.016201031
ENSG00000111011	RSRC2	-0.467810704	0.016201031
ENSG00000279800	BCLAF1P2	-0.768592816	0.016201031
ENSG00000204642	HLA-F	0.407509896	0.016202203
ENSG00000224691		-0.692950384	0.016204193
ENSG00000075142	SRI	0.304042721	0.016211066
ENSG00000120875	DUSP4	-2.801239695	0.016211066
ENSG00000125844	RRBP1	0.509592582	0.016211066
ENSG00000070413	DGCR2	0.326921561	0.016211066
ENSG00000052723	SIKE1	0.432385534	0.016239577
ENSG00000236383	LINC00854	-1.266444916	0.016239577
ENSG00000165118	C9orf64	0.919741941	0.016293021
ENSG00000083845	RPS5	-0.354023185	0.016314733
ENSG00000164169	PRMT9	-0.587412348	0.016322974
ENSG00000139131	YARS2	0.465530113	0.016322974
ENSG00000158792	SPATA2L	-0.705919474	0.016394691
ENSG00000184203	PPP1R2	-0.36902068	0.016416068
ENSG00000102316	MAGED2	0.33833894	0.016416068
ENSG00000103769	RAB11A	0.321496808	0.016416068
ENSG00000100650	SRSF5	-0.3209159	0.016506382
ENSG00000206337	HCP5	0.664002815	0.016509227
ENSG00000130203	APOE	-1.091477713	0.01654814
ENSG00000172059	KLF11	-0.580138614	0.016631185
ENSG00000114166	KAT2B	0.429569703	0.016662525
ENSG00000259820		-0.734705549	0.016669246
ENSG00000148090	AUH	0.439576971	0.016669246

ENSG00000269952		-2.270043005	0.016669246
ENSG00000167775	CD320	-0.737987358	0.016669246
ENSG00000116273	PHF13	-0.992391385	0.016718381
ENSG00000185127	C6orf120	0.400926239	0.016747397
ENSG00000141497	ZMYND15	-0.970023821	0.016821327
ENSG00000076382	SPAG5	-1.03583025	0.01685969
ENSG00000116918	TSNAX	0.440886285	0.01688591
ENSG00000141096	DPEP3	-0.833567185	0.01688591
ENSG00000104885	DOT1L	-0.567206574	0.01688591
ENSG00000131876	SNRPA1	-0.389797323	0.017032617
ENSG00000121104	FAM117A	0.508247772	0.017054741
ENSG00000178732	GP5	-1.670959392	0.017196185
ENSG00000196418	ZNF124	-0.414075236	0.017198039
ENSG00000102710	SUPT20H	0.483292986	0.017198039
ENSG00000100811	YY1	-0.207518234	0.017260482
ENSG00000261685	NA	1.491706019	0.017260482
ENSG00000141376	BCAS3	0.375653053	0.017421961
ENSG00000157045	NTAN1	-0.60119083	0.017436953
ENSG00000136504	KAT7	-0.406352366	0.017453075
ENSG00000184047	DIABLO	-0.634296834	0.017610596
ENSG00000100567	PSMA3	0.40580712	0.017610596
ENSG00000015285	WAS	0.258870058	0.017631433
ENSG00000073670	ADAM11	-0.961329301	0.017631433
ENSG00000125691	RPL23	-0.310335703	0.017639457
ENSG00000113638	TTC33	0.544562689	0.017646198
ENSG00000185024	BRF1	-0.309783019	0.017646198
ENSG00000245869		-2.616566371	0.017656779
ENSG00000241769	LINC00893	-0.515825387	0.017682945
ENSG00000068878	PSME4	-0.45453494	0.017683265
ENSG00000213862		-0.370541885	0.017683265
ENSG00000177335	C8orf31	0.970464927	0.017695275
ENSG00000253276	CCDC71L	-0.732688117	0.017719143
ENSG00000120159	CAAP1	0.289611932	0.017719143
ENSG00000196139	AKR1C3	-1.517936562	0.017823028
ENSG00000207110	RNU1-106P	-1.622779758	0.017839783
ENSG00000031691	CENPQ	0.864436863	0.017857698
ENSG00000176386	CDC26	0.352377835	0.017857698
ENSG00000140612	SEC11A	-0.309039911	0.017908005
ENSG00000169583	CLIC3	-2.705800289	0.018009952
ENSG00000116337	AMPD2	-0.477601392	0.018027739
ENSG00000142959	BEST4	-1.417811575	0.018040328
ENSG00000013306	SLC25A39	-0.286106099	0.018071353
ENSG00000183340	JRKL	0.738512202	0.018090103
ENSG00000074416	MGLL	-1.363793381	0.018108106
ENSG00000176407	KCMF1	-0.265092854	0.018167301
ENSG00000141971	MVB12A	0.440618437	0.018167301
ENSG00000266094	RASSF5	-0.337812271	0.018193693
ENSG00000136720	HS6ST1	-0.547600452	0.018234834

ENSG00000167491	GATAD2A	-0.271224717	0.018234834
ENSG00000269688		-0.582097789	0.018234834
ENSG00000273951		-1.029545713	0.01824163
ENSG00000118816	CCNI	-0.237801867	0.018256937
ENSG00000266962		0.680920342	0.018288538
ENSG00000213757		-0.564540219	0.018301577
ENSG00000167468	GPX4	-0.408200023	0.018310337
ENSG00000109065	NAT9	-0.429676626	0.018317588
ENSG00000171566	PLRG1	0.358582197	0.018364614
ENSG00000173991	TCAP	-0.712846571	0.018364614
ENSG00000177946	CENPBD1	0.715300498	0.018394013
ENSG00000088451	TGDS	0.56890934	0.018416028
ENSG00000259768		-1.013017853	0.018425453
ENSG00000178921	PFAS	-0.410135021	0.018441262
ENSG00000222937		-0.9341341	0.018462057
ENSG00000169223	LMAN2	0.384806715	0.0184917
ENSG00000161714	PLCD3	-0.496516052	0.018512165
ENSG00000158411	MITD1	0.624908717	0.018539502
ENSG00000236552	RPL13AP5	-0.34226092	0.018673763
ENSG00000151729	SLC25A4	-1.866841968	0.018733117
ENSG00000169641	LUZP1	-0.351038842	0.018739195
ENSG00000165949	IFI27	2.320325941	0.018773545
ENSG00000205268	PDE7A	0.425407236	0.018808594
ENSG00000151623	NR3C2	-0.922658593	0.018830467
ENSG00000254470	AP5B1	0.474571829	0.018830467
ENSG00000175582	RAB6A	0.319108684	0.018830467
ENSG00000101608	MYL12A	0.347208281	0.018830467
ENSG00000137331	IER3	-1.029027976	0.018846681
ENSG00000165417	GTF2A1	0.386868689	0.018900135
ENSG00000171155	C1GALT1C1	0.735623055	0.018934083
ENSG00000171608	PIK3CD	0.348353855	0.018941258
ENSG00000123066	MED13L	-0.407014276	0.01895409
ENSG00000139880	CDH24	-1.67539365	0.01895409
ENSG00000151702	FLI1	0.530637635	0.018983657
ENSG00000187676	B3GLCT	-0.461585486	0.019029083
ENSG00000108179	PPIF	-1.017125132	0.019053388
ENSG00000166974	MAPRE2	-0.266570637	0.019053388
ENSG00000248578	NPM1P21	-1.024446412	0.019115827
ENSG00000168297	PXK	0.33275745	0.019159152
ENSG00000151117	TMEM86A	-0.621612366	0.019165043
ENSG00000158270	COLEC12	-0.666440333	0.019165043
ENSG00000188419	CHM	0.356730362	0.019177252
ENSG00000157184	CPT2	0.570198494	0.019183087
ENSG00000164168	TMEM184C	0.359351343	0.019284442
ENSG00000196205	EEF1A1P5	-0.399105169	0.019284442
ENSG00000139180	NDUFA9	0.298971052	0.019284442
ENSG00000117697	NSL1	0.517642071	0.019310721
ENSG00000163312	HELQ	0.373691113	0.019310721

ENSG00000161395	PGAP3	-0.315618328	0.019310721
ENSG00000100997	ABHD12	-0.535997114	0.019310721
ENSG00000198814	GK	0.436026434	0.019401741
ENSG00000122692	SMU1	0.299079564	0.019420665
ENSG00000103018	CYB5B	0.484426125	0.019466041
ENSG00000178175	ZNF366	1.190809817	0.01947524
ENSG00000186105	LRRC70	-1.100009569	0.019522782
ENSG00000147471	PROSC	0.515760823	0.019591339
ENSG00000173230	GOLGB1	-0.321492999	0.019624597
ENSG00000119661	DNAL1	-0.398996421	0.019665708
ENSG00000157426	AASDH	0.517129099	0.019675039
ENSG00000247121		0.661638409	0.019684567
ENSG00000177479	ARIH2	-0.186122565	0.01977908
ENSG00000092096	SLC22A17	-2.60208744	0.01977908
ENSG00000157379	DHRS1	0.373563806	0.019797041
ENSG00000173875	ZNF791	-0.39314879	0.019828106
ENSG00000134369	NAV1	-0.683233996	0.019897792
ENSG00000234284	ZNF879	0.64586156	0.020069463
ENSG00000107937	GTPBP4	-0.480423599	0.020069463
ENSG00000170425	ADORA2B	-1.706511879	0.020069733
ENSG00000157191	NECAP2	0.386255306	0.020118242
ENSG00000130363	RSPH3	0.562413485	0.020126425
ENSG00000116809	ZBTB17	-0.414597622	0.020153725
ENSG00000186446	ZNF501	0.965879132	0.020156299
ENSG00000248275	TRIM52-AS1	-0.471480154	0.020156299
ENSG00000180992	MRPL14	0.41408436	0.020216891
ENSG00000101558	VAPA	-0.380920413	0.02022725
ENSG00000159596	TMEM69	0.521688007	0.020233855
ENSG00000187866	FAM122A	0.472488007	0.020233855
ENSG00000187624	C17orf97	2.130628705	0.020233855
ENSG00000114391	RPL24	-0.271198819	0.020269009
ENSG00000182473	EXOC7	0.249715879	0.020327167
ENSG00000166170	BAG5	-0.317726586	0.020382778
ENSG00000119321	FKBP15	0.510974894	0.020384951
ENSG00000138111	MFSD13A	0.574886224	0.020429119
ENSG00000088833	NSFL1C	0.326316343	0.020429119
ENSG00000213997	PGAM1P7	-2.21309187	0.020464326
ENSG00000111605	CPSF6	-0.301334396	0.020464326
ENSG00000206077	ZDHHC11B	-2.618992322	0.020482588
ENSG00000142173	COL6A2	-1.79095673	0.020482588
ENSG00000260774		-1.069450473	0.020494511
ENSG00000009413	REV3L	-0.333215416	0.020494511
ENSG00000109917	ZPR1	-0.339361333	0.020494511
ENSG00000136315		0.766664802	0.020494511
ENSG00000113194	FAF2	-0.288549321	0.020503567
ENSG00000156502	SUPV3L1	-0.564641129	0.020514345
ENSG00000205423	CNEP1R1	-0.404255672	0.020514432
ENSG00000170871	KIAA0232	-0.301810408	0.020601014

ENSG00000170027	YWHAG	0.573746765	0.020601014
ENSG00000166233	ARIH1	-0.41217038	0.020691743
ENSG00000067177	PHKA1	-1.229407724	0.020710192
ENSG00000102805	CLN5	0.525327911	0.020725826
ENSG00000161513	FDXR	0.679523345	0.020725826
ENSG00000156256	USP16	-0.44131167	0.020725826
ENSG00000143207	RFWD2	0.234044751	0.020737935
ENSG00000079332	SAR1A	-0.467551207	0.020737935
ENSG00000196387	ZNF140	0.411230208	0.020737935
ENSG00000069345	DNAJA2	0.275110674	0.020741048
ENSG00000100883	SRP54	0.406563763	0.020746166
ENSG00000225855	RUSC1-AS1	0.752496087	0.020760376
ENSG00000143633	C1orf131	0.409208278	0.020760376
ENSG00000269929		-0.834823707	0.020760376
ENSG00000134453	RBM17	-0.243963419	0.020760376
ENSG00000205659	LIN52	0.453779367	0.020820274
ENSG00000113360	DROSHA	0.340658186	0.020836986
ENSG00000069329	VPS35	0.425849386	0.020857591
ENSG00000186432	KPNA4	-0.288310839	0.020890966
ENSG00000116514	RNF19B	0.551486564	0.020905019
ENSG00000254901	BORCS8	0.440056124	0.020919707
ENSG00000143183	TMCO1	0.405759558	0.021009694
ENSG00000112367	FIG4	0.509480081	0.021009694
ENSG00000224596	ZMIZ1-AS1	-1.497825871	0.021009694
ENSG00000101337	TM9SF4	0.276242925	0.021009694
ENSG00000267796	LIN37	0.495393277	0.021009694
ENSG00000163872	YEATS2	0.283766269	0.021084019
ENSG00000132170	PPARG	-1.893252982	0.021101117
ENSG00000132467	UTP3	0.440011152	0.021101117
ENSG00000198408	MGEA5	-0.248404764	0.021101117
ENSG00000277589		-0.955567191	0.021148408
ENSG00000124356	STAMPB	0.405090848	0.021175472
ENSG00000112182	BACH2	-1.130464225	0.021180941
ENSG00000135439	AGAP2	0.504029867	0.021201289
ENSG00000137818	RPLP1	-0.336800552	0.021201289
ENSG00000130640	TUBGCP2	-0.24410695	0.021226663
ENSG00000140598	EFL1	0.37408397	0.021228401
ENSG00000114062	UBE3A	-0.345604533	0.021242539
ENSG00000127993	RBM48	-0.495433642	0.0212457
ENSG00000130734	ATG4D	-0.403996989	0.0212457
ENSG00000058056	USP13	-0.457445449	0.021248832
ENSG00000118217	ATF6	0.308472568	0.021256562
ENSG00000155545	MIER3	-0.4490495	0.021265933
ENSG00000163568	AIM2	1.344082769	0.021292802
ENSG00000164620	RELL2	0.612961146	0.021302466
ENSG00000071205	ARHGAP10	-0.722831525	0.021361324
ENSG00000240230	COX19	-0.267039542	0.021361324
ENSG00000230673	PABPC1P3	-1.002525544	0.021363196

ENSG00000196664	TLR7	1.101928589	0.021379262
ENSG00000163599	CTLA4	-2.178263584	0.021385236
ENSG00000172785	CBWD1	0.394417969	0.021402331
ENSG00000101654	RNMT	-0.546687576	0.021467019
ENSG00000168894	RNF181	0.401094468	0.021479942
ENSG00000041802	LSG1	-0.4162874	0.021479942
ENSG00000198888	MT-ND1	-0.398498691	0.021479942
ENSG00000205213	LGR4	-0.774479102	0.021490578
ENSG00000214389	RPS3AP26	-0.376833181	0.021493562
ENSG00000142541	RPL13A	-0.28957975	0.021569963
ENSG00000153130	SCOC	0.550316826	0.02167541
ENSG00000139675	HNRNPA1L2	-0.529448267	0.02167541
ENSG00000184451	CCR10	-1.217533483	0.02167541
ENSG00000196704	AMZ2	-0.347083637	0.02167541
ENSG00000169385	RNASE2	1.241545217	0.021682847
ENSG00000119013	NDUFB3	0.486258774	0.021705212
ENSG00000164117	FBXO8	0.48110913	0.021705212
ENSG00000197170	PSMD12	-0.464694453	0.021766819
ENSG00000187801	ZFP69B	0.743902167	0.021785285
ENSG00000105053	VRK3	0.323867275	0.021787551
ENSG00000013297	CLDN11	-0.669836342	0.021809272
ENSG00000279738		-0.516017051	0.021847684
ENSG00000105851	PIK3CG	-0.421734063	0.021919486
ENSG00000170632	ARMC10	0.449098915	0.021984546
ENSG00000169193	CCDC126	0.649092566	0.02199144
ENSG00000164144	ARFIP1	0.567571865	0.02201764
ENSG00000145632	PLK2	-1.241959776	0.02201764
ENSG00000278869		0.919738243	0.02207143
ENSG00000171453	POLR1C	-0.447139717	0.022094203
ENSG00000180573	HIST1H2AC	0.788502375	0.022198293
ENSG00000132773	TOE1	-0.525841403	0.022227068
ENSG00000136541	ERMN	-1.102525456	0.022305211
ENSG00000115520	COQ10B	-0.499709545	0.022312718
ENSG00000185839		0.679622288	0.022327724
ENSG00000140988	RPS2	-0.317461985	0.022327724
ENSG00000101193	GID8	-0.225897044	0.022330218
ENSG00000188305	C19orf35	1.348891479	0.022335458
ENSG00000167595	PROSER3	-0.3782278	0.022335458
ENSG00000105464	GRIN2D	0.514558638	0.022356099
ENSG00000223725		-0.812367236	0.022545798
ENSG00000135315	CEP162	0.519174322	0.022545798
ENSG00000272391	POM121C	-0.265144567	0.022545798
ENSG00000232187	FTH1P7	-0.672972284	0.022545798
ENSG00000155959	VBP1	0.3981992	0.022683588
ENSG00000166839	ANKDD1A	-1.291713553	0.022683588
ENSG00000146410	MTRF2	-1.0115123	0.022713833
ENSG00000104626	ERI1	0.448061077	0.022713833
ENSG00000163932	PRKCD	0.400200345	0.022714955

ENSG00000205726	ITSN1	0.52336164	0.022714955
ENSG00000188997	KCTD21	0.765791477	0.022724652
ENSG00000019995	ZRANB1	-0.366256244	0.022724652
ENSG00000182774	RPS17	-0.295880729	0.022777165
ENSG00000173221	GLRX	0.63629033	0.02282667
ENSG00000122557	HERPUD2	0.253590503	0.022957692
ENSG00000133874	RNF122	0.479239266	0.022957692
ENSG00000013364	MVP	0.340141533	0.022970899
ENSG00000176087	SLC35A4	0.346051007	0.022985359
ENSG00000117899	MESDC2	0.393788444	0.023012047
ENSG00000108239	TBC1D12	-0.661752119	0.023063219
ENSG00000113273	ARSB	0.354678537	0.023112697
ENSG00000146676	PURB	-0.465334907	0.023112697
ENSG00000120896	SORBS3	-0.52014262	0.023112697
ENSG00000125971	DYNLRB1	0.345618945	0.023112697
ENSG00000130348	QRSL1	0.506518894	0.023132118
ENSG00000102738	MRPS31	0.758228773	0.023174473
ENSG00000132155	RAF1	-0.211023508	0.023222519
ENSG00000123411	IKZF4	-0.467913854	0.023222519
ENSG00000162735	PEX19	0.277669731	0.023255297
ENSG00000122547	EEDP1	-0.705965223	0.023255297
ENSG00000118162	KPTN	0.548741734	0.023297651
ENSG00000255328		1.369051989	0.023329756
ENSG00000175262	C1orf127	-0.706589533	0.023495234
ENSG00000136842	TMOD1	1.383668339	0.023495234
ENSG00000140859	KIFC3	-1.26741219	0.023495234
ENSG00000125629	INSIG2	0.459492111	0.023542334
ENSG00000146842	TMEM209	0.423612446	0.023542334
ENSG00000138835	RGS3	0.855667684	0.023542334
ENSG00000163946	FAM208A	0.364706287	0.023550027
ENSG00000183431	SF3A3	-0.320324731	0.02363545
ENSG00000156860	FBRS	-0.362880135	0.023685765
ENSG00000164916	FOXK1	-0.354941799	0.023705842
ENSG00000160191	PDE9A	1.120258958	0.023707822
ENSG00000197696	NMB	-0.704113916	0.023718043
ENSG00000179115	FARSA	0.514515264	0.023718043
ENSG00000198467	TPM2	-0.647104822	0.023739607
ENSG00000177272	KCNA3	0.618896655	0.023956789
ENSG00000168214	RBPJ	-0.405724104	0.023986452
ENSG00000162650	ATXN7L2	-0.408080182	0.024025353
ENSG00000272636	DOC2B	-1.268083011	0.024075722
ENSG00000102878	HSF4	-0.521359852	0.024094552
ENSG00000275700	AATF	0.2766232	0.024121993
ENSG00000237296	SMG1P1	-0.550841726	0.024144141
ENSG00000100889	PCK2	0.55739065	0.024262385
ENSG00000229119		-0.701493551	0.024327632
ENSG00000101082	SLA2	-1.009456552	0.024355116
ENSG00000271976		0.673771471	0.024379757

ENSG00000163682	RPL9	-0.350746234	0.024384186
ENSG00000009307	CSDE1	-0.256954189	0.024612346
ENSG00000113441	LNPEP	0.361939856	0.024612346
ENSG00000148842	CNNM2	-0.459341286	0.024612346
ENSG00000138660	AP1AR	0.458831962	0.024641909
ENSG00000230207	RPL4P5	-0.418145803	0.024641909
ENSG00000181191	PJA1	0.415429543	0.024653772
ENSG00000165832	TRUB1	0.479650463	0.024653772
ENSG00000104177	MYEF2	-0.797859257	0.024653772
ENSG00000278311	GGNBP2	-0.358103322	0.024722274
ENSG00000213928	IRF9	0.348157723	0.024759535
ENSG00000153029	MR1	0.310943142	0.024761525
ENSG00000228903	RASA4CP	-0.514962978	0.024761525
ENSG00000174125	TLR1	0.559602298	0.024766902
ENSG00000126062	TMEM115	0.39084013	0.024822345
ENSG00000123349	PFDN5	-0.271430006	0.02486348
ENSG00000251417		-0.621119789	0.02486348
ENSG00000100823	APEX1	-0.294555944	0.02487951
ENSG00000107863	ARHGAP21	-0.530504992	0.024944584
ENSG00000274104		-0.632243527	0.02498281
ENSG00000196247	ZNF107	0.504961762	0.02510789
ENSG00000119397	CNTRL	0.418885224	0.02510789
ENSG00000113384	GOLPH3	0.320425559	0.025140179
ENSG00000160293	VAV2	-0.458190075	0.025140179
ENSG00000175354	PTPN2	0.229756156	0.025140179
ENSG00000124422	USP22	-0.263524063	0.025229455
ENSG00000164615	CAMLG	-0.272765501	0.025314596
ENSG00000278535	DHRS11	-0.652487715	0.025314596
ENSG00000196497	IPO4	-0.562927872	0.025349808
ENSG00000094880	CDC23	0.383285113	0.025536936
ENSG00000123610	TNFAIP6	1.424234372	0.025605474
ENSG00000226314	ZNF192P1	1.087709613	0.025636939
ENSG00000108021	FAM208B	-0.344585059	0.025636939
ENSG00000130005	GAMT	-0.938484288	0.025636939
ENSG00000137168	PPIL1	0.686970109	0.025661973
ENSG00000164051	CCDC51	0.566130309	0.025676093
ENSG00000188389	PDCD1	-1.953211853	0.025689771
ENSG00000148680	HTR7	-0.890837831	0.025689771
ENSG00000107719	PALD1	-1.670577392	0.025764563
ENSG00000122026	RPL21	-0.310778751	0.025794745
ENSG00000185122	HSF1	-0.213300943	0.025801434
ENSG00000176946	THAP4	-0.345401549	0.025839184
ENSG00000108666	C17orf75	0.362735547	0.025855212
ENSG00000105321	CCDC9	-0.540761326	0.02588555
ENSG00000064607	SUGP2	-0.26531027	0.025943907
ENSG00000198315	ZKSCAN8	-0.438919762	0.025983877
ENSG00000155265	GOLGA7B	-1.716421516	0.025987505
ENSG00000269858	EGLN2	-0.314913981	0.025997166

ENSG00000109381	ELF2	-0.317797947	0.026000377
ENSG00000113448	PDE4D	-1.072962291	0.026005266
ENSG00000266677		-0.67371878	0.026005266
ENSG00000163735	CXCL5	-2.600151247	0.026066841
ENSG00000182307	C8orf33	-0.279259188	0.026066841
ENSG00000141837	CACNA1A	1.203234089	0.026066841
ENSG00000257815		-0.501876584	0.026077939
ENSG00000143158	MPC2	-0.276519624	0.026088966
ENSG00000013441	CLK1	-0.507476583	0.026088966
ENSG00000113732	ATP6V0E1	0.387757413	0.026088966
ENSG00000111726	CMAS	0.400901302	0.026122911
ENSG00000204438	GPANK1	0.425195795	0.026350651
ENSG00000259834		0.485590811	0.026368849
ENSG00000267896	NA	-0.414558615	0.026443441
ENSG00000277916		-0.897174086	0.026506114
ENSG00000171863	RPS7	-0.249433943	0.026572158
ENSG00000277687		-0.591521533	0.026572158
ENSG00000162543	UBXN10	-1.372160057	0.026626892
ENSG00000171631	P2RY6	1.054444279	0.026626892
ENSG00000171456	ASXL1	-0.24031222	0.026626892
ENSG00000124920	MYRF	-1.291243572	0.026640077
ENSG00000096060	FKBP5	0.761525972	0.026658305
ENSG00000139112	GABARAPL1	-1.184924212	0.026665079
ENSG00000163257	DCAF16	-0.380003496	0.026705042
ENSG00000016864	GLT8D1	0.550054565	0.026784655
ENSG00000273272		0.974585173	0.026784655
ENSG00000138669	PRKG2	-2.329019701	0.026870125
ENSG00000261269		1.171418616	0.026870125
ENSG00000065665	SEC61A2	-0.544848296	0.026889249
ENSG00000167904	TMEM68	0.486023683	0.026919308
ENSG00000156886	ITGAD	-1.999947611	0.026950767
ENSG00000186063	AIDA	0.461306594	0.026964856
ENSG00000186660	ZFP91	-0.310424503	0.027003573
ENSG00000265100		-0.886260984	0.027009618
ENSG00000128654	MTX2	0.365727671	0.027073782
ENSG00000103194	USP10	0.254588142	0.027073782
ENSG00000169180	XPO6	0.239426151	0.027107494
ENSG00000130147	SH3BP4	-0.935306494	0.027118314
ENSG00000146409	SLC18B1	0.447270242	0.027179779
ENSG00000198171	DDRGK1	0.275723553	0.027206792
ENSG00000058804	NDC1	-0.383462833	0.027260404
ENSG00000214765	SEPT7P2	-0.373209107	0.027260404
ENSG00000117569	PTBP2	-0.45304669	0.027388161
ENSG00000167615	LENG8	-0.37100811	0.027439796
ENSG00000181074	OR52N4	1.625211081	0.027440053
ENSG00000113070	HBEGF	-1.285977231	0.027622845
ENSG00000148835	TAF5	0.492318204	0.027707634
ENSG00000255135		-0.76442528	0.027749908

ENSG00000214548	MEG3	-1.520985253	0.027749908
ENSG00000198886	MT-ND4	-0.379259049	0.027771769
ENSG00000130810	PPAN	-0.436886618	0.027786488
ENSG00000151116	UEVLD	0.453162667	0.027788711
ENSG00000171067	C11orf24	0.42830543	0.027788711
ENSG00000123104	ITPR2	0.358527349	0.027817322
ENSG00000136867	SLC31A2	0.634688867	0.027827955
ENSG00000152990	ADGRA3	-1.063321341	0.027862907
ENSG00000174945	AMZ1	-1.348541781	0.027862907
ENSG00000062716	VMP1	0.469120456	0.027862907
ENSG00000184293	CLECL1	1.133070863	0.027882627
ENSG00000112167	SAYSD1	0.357578897	0.0278962
ENSG00000180509	KCNE1	0.571797184	0.0278962
ENSG00000224531	SMIM13	-0.352099272	0.027912282
ENSG00000169313	P2RY12	1.546173895	0.02793253
ENSG00000169660	HEXDC	0.606761164	0.027966911
ENSG00000127526	SLC35E1	-0.322145481	0.027988018
ENSG00000053501	USE1	-0.313111258	0.028000792
ENSG00000157303	SUSD3	0.579862795	0.028110889
ENSG00000141699	FAM134C	0.430435057	0.028193106
ENSG00000163626	COX18	0.405050345	0.028216019
ENSG00000160446	ZDHHC12	0.315742373	0.028228875
ENSG00000196236	XPNPEP3	-0.371069213	0.028280139
ENSG00000204852	TCTN1	-0.511456294	0.028366996
ENSG00000198146	ZNF770	0.427674987	0.028387673
ENSG00000225978	HAR1A	-1.665351888	0.028387673
ENSG00000014138	POLA2	0.60777428	0.028406156
ENSG00000092148	HECTD1	-0.245694951	0.028406156
ENSG00000176049	JAKMIP2	-1.474742022	0.028409472
ENSG00000131018	SYNE1	0.454234127	0.028409472
ENSG00000146700	SSC4D	0.86910199	0.028409472
ENSG00000198730	CTR9	0.377058708	0.028409472
ENSG00000104164	BLOC1S6	-0.305417901	0.02847244
ENSG00000228956	SATB1-AS1	-1.028981217	0.028500066
ENSG00000234742		-0.784120689	0.028540322
ENSG00000273253		-0.649806281	0.028601951
ENSG00000257122	RRN3P3	-0.318107289	0.028605169
ENSG00000143554	SLC27A3	0.539087206	0.028616749
ENSG00000204272	LINC01420	-0.362599758	0.028616749
ENSG00000126005	MMP24-AS1	-0.3926302	0.028619222
ENSG00000189067	LITAF	-0.525767201	0.028670541
ENSG00000255150	EID3	-0.621062512	0.028684785
ENSG00000175283	DOLK	0.516196795	0.028746308
ENSG00000203879	GDI1	-0.250422903	0.02878944
ENSG00000010539	ZNF200	0.523783775	0.028795508
ENSG00000226287	TMEM191A	-0.7146285	0.028795508
ENSG00000183726	TMEM50A	0.283975219	0.028803055
ENSG00000112511	PHF1	-0.482948806	0.028828246

ENSG00000099365	STX1B	-0.871980215	0.028840055
ENSG00000257335	MGAM	1.073260963	0.028926551
ENSG00000111012	CYP27B1	-1.305897315	0.028947675
ENSG00000145979	TBC1D7	-0.604497722	0.028993276
ENSG00000123595	RAB9A	0.448067865	0.028993276
ENSG00000140694	PARN	0.254625456	0.028993276
ENSG00000073331	ALPK1	0.434869616	0.02903456
ENSG00000124785	NRN1	1.550322669	0.029077178
ENSG00000107643	MAPK8	-0.405130527	0.029077178
ENSG00000170191	NANP	-0.620072359	0.029077178
ENSG00000176915	ANKLE2	-0.272000226	0.029197116
ENSG00000110711	AIP	0.299719925	0.029229464
ENSG00000182149	IST1	-0.337666916	0.029296897
ENSG00000000457	SCYL3	0.577764804	0.029355785
ENSG00000115904	SOS1	0.536716466	0.029557764
ENSG00000172985	SH3RF3	-1.336202585	0.029695977
ENSG00000103196	CRISPLD2	0.700349816	0.029695977
ENSG00000187474	FPR3	1.447497325	0.029695977
ENSG00000101544	ADNP2	-0.749776404	0.029719861
ENSG00000107175	CREB3	0.396513403	0.029720362
ENSG00000026508	CD44	-0.339167412	0.029752372
ENSG00000237772		-0.79425688	0.029805361
ENSG00000128000	ZNF780B	0.779555945	0.029819982
ENSG00000109220	CHIC2	0.300941188	0.029990526
ENSG00000101811	CSTF2	0.453972316	0.029990526
ENSG00000198742	SMURF1	-0.61736846	0.030028506
ENSG00000144659	SLC25A38	-0.334018759	0.030066473
ENSG00000120705	ETF1	-0.688634342	0.030066473
ENSG00000204390	HSPA1L	0.748184995	0.030066473
ENSG00000127418	FGFRL1	-0.624712415	0.030121367
ENSG00000095574	IKZF5	-0.430843465	0.030121367
ENSG00000133935	C14orf1	0.445356615	0.030160124
ENSG00000229692	SOS1-IT1	1.074741804	0.030166
ENSG00000082213	C5orf22	0.485518004	0.030175761
ENSG00000198786	MT-ND5	-0.446921678	0.030175761
ENSG00000225830	ERCC6	-0.391245406	0.030201238
ENSG00000159403	C1R	-0.678303518	0.030207922
ENSG00000100490	CDKL1	0.706669142	0.030239253
ENSG00000198416	ZNF658B	1.263909834	0.030278931
ENSG00000119950	MXI1	-0.583828018	0.030302298
ENSG00000278727		0.704429101	0.030470559
ENSG00000102096	PIM2	-0.496537412	0.03051267
ENSG00000164877	MICALL2	-0.693862265	0.030543444
ENSG00000182979	MTA1	-0.221859244	0.030543444
ENSG00000151690	MFSD6	-0.362764016	0.030646186
ENSG00000135960	EDAR	-2.453701799	0.030682095
ENSG00000152683	SLC30A6	0.388203707	0.030711068
ENSG00000091527	CDV3	-0.272773725	0.030743659

ENSG0000096696	DSP	3.034074689	0.030743659
ENSG00000214063	TSPAN4	-0.516570707	0.030743659
ENSG00000205937	RNPS1	-0.231990593	0.030743659
ENSG00000280987		-1.051249936	0.030864774
ENSG00000120306	CYSTM1	0.53322688	0.030864774
ENSG00000152193	RNF219	0.519221184	0.030894578
ENSG00000115414	FN1	-2.834571821	0.030998612
ENSG00000123243	ITIH5	-0.613063205	0.030998612
ENSG00000125457	MIF4GD	0.257533342	0.031009977
ENSG00000128383	APOBEC3A	1.35979118	0.031125722
ENSG00000090447	TFAP4	-0.521785565	0.031224586
ENSG00000136040	PLXNC1	0.435314751	0.031228312
ENSG00000124571	XPO5	0.296271303	0.031244354
ENSG00000105609	LILRB5	0.527959495	0.031244354
ENSG00000117298	ECE1	0.336115966	0.031340187
ENSG00000168795	ZBTB5	-0.551230062	0.031340187
ENSG00000133704	IPO8	0.359383704	0.031346058
ENSG00000162736	NCSTN	0.261857201	0.031378131
ENSG00000145241	CENPC	-0.379886934	0.031433789
ENSG00000260966		-0.507962462	0.031457041
ENSG00000169860	P2RY1	-0.889190916	0.03147335
ENSG00000108788	MLX	0.346100545	0.03149664
ENSG00000101782	RIOK3	-0.355006561	0.031566207
ENSG00000096746	HNRNPH3	-0.300106202	0.031580246
ENSG00000264083		-0.498308093	0.031580246
ENSG00000249855	EEF1A1P19	-0.474554493	0.031599581
ENSG00000014919	COX15	0.536248365	0.031639168
ENSG00000271857		-1.644194035	0.031748889
ENSG00000066697	MSANTD3	-0.595873076	0.031748889
ENSG00000173349	SFT2D3	-0.410657097	0.03183109
ENSG00000166902	MRPL16	0.40260536	0.031855528
ENSG00000163930	BAP1	-0.25849132	0.03194476
ENSG00000272599		-0.878486036	0.03194476
ENSG00000266865		-0.564245685	0.031986649
ENSG00000180155	LYNX1	-0.825777428	0.032034376
ENSG00000069431	ABCC9	-0.516577769	0.032034376
ENSG00000066827	ZFAT	-1.406289372	0.032044384
ENSG00000141446	ESCO1	-0.30876805	0.032044384
ENSG00000198736	MSRB1	0.634456685	0.032056777
ENSG00000249915	PDCD6	0.313889614	0.032064611
ENSG00000124613	ZNF391	1.230859204	0.032064611
ENSG00000139178	C1RL	0.468290567	0.032064611
ENSG00000182324	KCNJ14	-0.830595214	0.032064611
ENSG00000182885	ADGRG3	-2.408081847	0.032133978
ENSG00000143190	POU2F1	-0.362145787	0.032135943
ENSG00000108175	ZMIZ1	-0.602906192	0.032135943
ENSG00000279430		-0.719495296	0.032164286
ENSG00000143702	CEP170	-0.351424507	0.032164286

ENSG00000225470	JPX	0.392503264	0.032164286
ENSG00000214517	PPME1	0.275012301	0.032164286
ENSG00000127311	HELB	0.418284283	0.032164286
ENSG00000261609	GAN	-0.333675452	0.032164286
ENSG00000162747	FCGR3B	1.316085001	0.032244992
ENSG00000068745	IP6K2	-0.242133281	0.032381398
ENSG00000182545	RNASE10	-0.879565137	0.032381398
ENSG00000196131	VN1R2	-0.941433439	0.032408689
ENSG00000163634	THOC7	0.314951738	0.032419453
ENSG00000163608	NEPRO	-0.275192484	0.032419453
ENSG00000107929	LARP4B	0.28600014	0.032419453
ENSG00000123200	ZC3H13	0.34482021	0.032419453
ENSG00000131473	ACLY	0.398885569	0.032444892
ENSG00000084073	ZMPSTE24	0.355223603	0.032485428
ENSG00000275202		-1.066937809	0.032529353
ENSG00000126001	CEP250	0.430556094	0.032698585
ENSG00000213420	GPC2	-0.815422857	0.032746985
ENSG00000092098	RNF31	0.342545948	0.032746985
ENSG00000103160	HSDL1	0.2871398	0.032746985
ENSG00000176783	RUFY1	0.260402364	0.032763325
ENSG00000180902	D2HGDH	-0.517436769	0.032777429
ENSG00000173208	ABCD2	-2.048978396	0.032777922
ENSG00000099250	NRP1	-0.943257226	0.032899142
ENSG00000113522	RAD50	0.399483748	0.03298804
ENSG00000082898	XPO1	0.326361107	0.033008491
ENSG00000051009	FAM160A2	0.357009297	0.033140632
ENSG00000123545	NDUFAF4	0.471512543	0.033188596
ENSG00000205534	SMG1P2	-0.635590571	0.03321358
ENSG00000163867	ZMYM6	-0.272634173	0.033381118
ENSG00000154305	MIA3	0.337401862	0.033381118
ENSG00000163539	CLASP2	-0.292578538	0.033381118
ENSG00000101844	ATG4A	0.372912658	0.033381118
ENSG00000267655		-0.968572962	0.033381118
ENSG00000151414	NEK7	0.378588385	0.033389883
ENSG00000103248	MTHFSD	0.444377192	0.03339768
ENSG00000243199		-0.536425096	0.033481638
ENSG00000180104	EXOC3	-0.234564915	0.03350296
ENSG00000204370	SDHD	0.381418429	0.03350296
ENSG00000274712		-0.53279755	0.03350296
ENSG00000135776	ABCB10	0.272773132	0.033522356
ENSG00000197258	EIF4BP6	-0.528029314	0.033522356
ENSG00000105856	HBP1	-0.490712686	0.033530528
ENSG00000107816	LZTS2	-0.510887076	0.033530528
ENSG00000198538	ZNF28	0.6917002	0.033530528
ENSG00000258727		-0.385686767	0.033551592
ENSG00000173846	PLK3	-0.725348799	0.033729844
ENSG00000092964	DPYSL2	0.734380955	0.03376967
ENSG00000154277	UCHL1	-2.751269243	0.03380761

ENSG00000173276	ZBTB21	-0.855492864	0.033811221
ENSG00000237775	DDR1-AS1	-0.729743869	0.033849878
ENSG00000137944	KYAT3	0.295793013	0.033864072
ENSG00000260060		-0.84288095	0.033876747
ENSG00000078618	NRDC	0.326231169	0.033910719
ENSG00000267281		-0.532362826	0.033910719
ENSG00000168477	TNXB	-0.81635374	0.033966612
ENSG00000136436	CALCOCO2	0.260044474	0.034006362
ENSG00000124151	NCOA3	-0.281400933	0.034006362
ENSG00000100221	JOSD1	-0.750025401	0.034046551
ENSG00000143811	PYCR2	0.441056012	0.034244687
ENSG00000213949	ITGA1	0.959570611	0.034261679
ENSG00000162927	PUS10	0.476444226	0.034276043
ENSG00000079950	STX7	0.526197441	0.034311451
ENSG00000143797	MBOAT2	-0.584851923	0.034457498
ENSG00000234506	LINC01506	0.721442219	0.034457498
ENSG00000170004	CHD3	-0.307720213	0.034457498
ENSG00000114023	FAM162A	-0.379082121	0.034463698
ENSG00000170485	NPAS2	-1.890029621	0.034483417
ENSG00000174137	FAM53A	0.77783232	0.034507504
ENSG00000105676	ARMC6	0.456727863	0.034514072
ENSG00000233426	EIF3FP3	-0.563626121	0.03451472
ENSG00000204444	APOM	-0.663761701	0.034547939
ENSG00000223496	EXOSC6	-0.395383401	0.034585486
ENSG00000141510	TP53	0.438092183	0.034585486
ENSG00000167862	MRPL58	0.430181856	0.034634626
ENSG00000113648	H2AFY	-0.26271846	0.034654127
ENSG00000165650	PDZD8	-0.432950607	0.034667086
ENSG00000080845	DLGAP4	0.318070336	0.034667086
ENSG00000131188	PRR7	-0.660548268	0.03471395
ENSG00000132017	DCAF15	-0.23660626	0.03471395
ENSG00000144029	MRPS5	0.373180698	0.034770812
ENSG00000010818	HIVP2	0.422645257	0.034770812
ENSG00000173480	ZNF417	-0.359425575	0.034770812
ENSG00000273247		0.464835015	0.034793804
ENSG00000232022	FAAHP1	-1.3560911	0.034796865
ENSG00000180871	CXCR2	0.991782402	0.034819374
ENSG00000197620	CXorf40A	-0.635073339	0.034825891
ENSG00000130939	UBE4B	-0.189201101	0.034841365
ENSG00000106608	URGCP	-0.348512793	0.034930722
ENSG00000028839	TBPL1	0.297510227	0.035018789
ENSG00000135953	MFSD9	0.352192635	0.03502022
ENSG00000198727	MT-CYB	-0.42811006	0.03502022
ENSG00000091106	NLRC4	1.224301418	0.035023656
ENSG00000275400		-0.553786121	0.035026948
ENSG00000083457	ITGAE	-0.455838291	0.035026948
ENSG00000105556	MIER2	-0.274903286	0.035026948
ENSG00000259071		0.815400535	0.03505975

ENSG00000206560	ANKRD28	-0.704533634	0.035088987
ENSG00000153898	MCOLN2	0.833384175	0.035093441
ENSG00000196850	PPTC7	-0.275245906	0.035093441
ENSG00000170310	STX8	0.385711337	0.035103278
ENSG00000156531	PHF6	0.512954681	0.035200652
ENSG00000182985	CADM1	-1.874173353	0.035217779
ENSG00000109854	HTATIP2	0.404781777	0.035266431
ENSG00000247982	LINC00926	-0.805296695	0.035437367
ENSG00000198064	NPIP3	-1.082238996	0.035443246
ENSG00000119203	CPSF3	0.365426479	0.035478434
ENSG00000131016	AKAP12	-1.700567064	0.035480675
ENSG00000260196		-1.284752133	0.035530483
ENSG00000148925	BTBD10	0.34361637	0.035608937
ENSG00000075568	TMEM131	0.243709744	0.035658151
ENSG00000146457	WTAP	-0.425833086	0.035658151
ENSG00000254528		1.037673527	0.035675321
ENSG00000148110	MFSD14B	0.423307197	0.035861701
ENSG00000170734	POLH	0.691014048	0.035898215
ENSG00000142544	CTU1	0.803372039	0.035898215
ENSG00000124486	USP9X	-0.340071551	0.035906046
ENSG00000090097	PCBP4	-0.704864045	0.035993517
ENSG00000152219	ARL14EP	0.40207731	0.035993517
ENSG00000162600	OMA1	0.507531477	0.036009694
ENSG00000231259		-0.548259879	0.036009694
ENSG00000186230	ZNF749	-0.711976209	0.036009694
ENSG00000064102	ASUN	0.393888645	0.036038849
ENSG00000231312		-0.664786088	0.03612226
ENSG00000164039	BDH2	0.510593212	0.03612226
ENSG00000187837	HIST1H1C	0.609776145	0.03612226
ENSG00000152240	HAUS1	0.461742977	0.03612226
ENSG00000185989	RASA3	-0.321502352	0.03612692
ENSG00000263266	RPS7P1	-0.346779398	0.03612692
ENSG00000204524	ZNF805	-0.541040595	0.03612692
ENSG00000147650	LRP12	-1.007822987	0.036132086
ENSG00000178966	RMI1	0.749174568	0.036132086
ENSG00000122970	IFT81	-0.52266654	0.036140154
ENSG00000255026		-1.658459218	0.036210494
ENSG00000148300	REXO4	0.332655646	0.036266311
ENSG00000163788	SNRK	-0.335001598	0.036278497
ENSG00000132589	FLOT2	0.415491164	0.036285974
ENSG00000002919	SNX11	0.470320926	0.036296613
ENSG00000132613	MTSS1L	-0.810139966	0.036350904
ENSG00000151576	QTRT2	-0.264858292	0.036403749
ENSG00000118985	ELL2	-1.187754745	0.036445232
ENSG00000163602	RYBP	-0.485028572	0.036525391
ENSG00000013725	CD6	-1.121645157	0.036590092
ENSG00000185650	ZFP36L1	-0.447460785	0.036590092
ENSG00000169246	NPIP3	-0.521782738	0.036590092

ENSG00000154370	TRIM11	-0.286416628	0.03662827
ENSG00000183696	UPP1	-0.556061099	0.03662827
ENSG00000198168	SVIP	-0.502546133	0.03662827
ENSG00000168003	SLC3A2	-0.27871577	0.03662827
ENSG00000257017	HP	1.308981432	0.03662827
ENSG00000274370		-0.975292888	0.03662827
ENSG00000134769	DTNA	-0.913840759	0.036714672
ENSG00000135124	P2RX4	-0.509625459	0.036718554
ENSG00000161970	RPL26	-0.289614205	0.036718554
ENSG00000110063	DCPS	0.58696357	0.036721391
ENSG00000131732	ZCCHC9	0.293512874	0.0367471
ENSG00000173198	CYSLTR1	0.662927335	0.036876696
ENSG00000137269	LRRC1	0.676033089	0.036886105
ENSG00000115942	ORC2	0.53291029	0.036889902
ENSG00000115525	ST3GAL5	0.389047629	0.036943369
ENSG00000153250	RBMS1	0.288370037	0.036943369
ENSG00000226221	RPL26P19	-0.5273178	0.036943369
ENSG00000268069		-0.924631665	0.037012861
ENSG00000060642	PIGV	0.561898722	0.037079092
ENSG00000197557	TTC30A	0.711222383	0.037085677
ENSG00000083896	YTHDC1	-0.411977645	0.037085677
ENSG00000176248	ANAPC2	-0.277175863	0.037180211
ENSG00000173085	COQ2	0.391570205	0.037186513
ENSG00000253958	CLDN23	0.806079368	0.037186513
ENSG00000171169	NAIF1	0.363423337	0.037186513
ENSG00000110700	RPS13	-0.264627202	0.037186513
ENSG00000198879	SFMBT2	-0.589242124	0.037186513
ENSG00000183889		-1.069073754	0.037186513
ENSG00000152104	PTPN14	-0.619498542	0.037219728
ENSG00000272462		-0.532388084	0.037223404
ENSG00000138002	IFT172	-0.453193509	0.037275033
ENSG00000027847	B4GALT7	-0.281002539	0.037275033
ENSG00000149218	ENDOD1	0.54207209	0.037275033
ENSG00000126003	PLAGL2	0.326944029	0.037281579
ENSG00000216490	IFI30	-0.813367007	0.037284405
ENSG00000196705	ZNF431	-0.328650873	0.037284405
ENSG00000180370	PAK2	0.230585814	0.03733814
ENSG00000260257		-0.469113636	0.03733814
ENSG00000173762	CD7	-0.56245249	0.037553944
ENSG00000198715	GLMP	0.382378831	0.037575294
ENSG00000131368	MRPS25	-0.336828733	0.037832636
ENSG00000177383	MAGEF1	0.706738085	0.037832636
ENSG00000163947	ARHGEF3	0.547514663	0.037863261
ENSG00000080603	SRCAP	-0.398507369	0.037886148
ENSG00000134086	VHL	-0.262732875	0.037905577
ENSG00000170629	DPY19L2P2	-0.598018769	0.037905577
ENSG00000108100	CCNY	-0.263992683	0.037909922
ENSG00000227500	SCAMP4	-0.342359009	0.037923236

ENSG00000183741	CBX6	-0.370634398	0.037923236
ENSG00000153214	TMEM87B	0.397705533	0.038008573
ENSG00000156127	BATF	0.654899607	0.038008573
ENSG00000254911	SCARNA9	-0.592535024	0.038058197
ENSG00000140299	BNIP2	-0.285808905	0.038058197
ENSG00000130559	CAMSAP1	-0.305531077	0.038070276
ENSG00000177683	THAP5	0.420175908	0.038086572
ENSG00000072121	ZFYVE26	0.267627165	0.038192743
ENSG00000146223	RPL7L1	0.296922074	0.038226689
ENSG00000104687	GSR	0.377520887	0.03831234
ENSG00000136280	CCM2	0.395854229	0.038320988
ENSG00000128891	C15orf57	0.388431126	0.038320988
ENSG00000134265	NAPG	-0.302704768	0.038320988
ENSG00000277161	PIGW	-0.489908164	0.038496064
ENSG00000158528	PPP1R9A	-2.268325607	0.038510195
ENSG00000100629	CEP128	-0.774120272	0.038525345
ENSG00000140905	GCSH	-0.879119692	0.038525345
ENSG00000091640	SPAG7	-0.230907834	0.038549601
ENSG00000173692	PSMD1	0.374898571	0.038549777
ENSG00000141480	ARRB2	-0.24534073	0.038581481
ENSG00000157551	KCNJ15	0.66988429	0.038646068
ENSG00000177706	FAM20C	-1.202401645	0.038707361
ENSG00000226396		-0.655417463	0.03872307
ENSG00000163219	ARHGAP25	0.354671017	0.038768863
ENSG00000121310	ECHDC2	0.583513361	0.038824436
ENSG00000138286	FAM149B1	0.316611707	0.038824436
ENSG00000224614	TNK2-AS1	0.73618491	0.03904766
ENSG00000129219	PLD2	-0.370666711	0.03904766
ENSG00000108963	DPH1	-0.316337831	0.039087445
ENSG00000068120	COASY	0.322307976	0.039087445
ENSG00000187210	GCNT1	0.960829139	0.039130579
ENSG00000256262	USP30-AS1	0.64364203	0.039130579
ENSG00000162972	MAIP1	0.424773266	0.039155126
ENSG00000101310	SEC23B	0.359781143	0.039220051
ENSG00000069712	KIAA1107	0.586408918	0.03927648
ENSG00000198435	NRARP	-1.654212686	0.039316824
ENSG00000085788	DDHD2	-0.281584402	0.039357484
ENSG00000133895	MEN1	0.338780617	0.039440914
ENSG00000196588	MKL1	0.306818654	0.039510589
ENSG00000142686	C1orf216	0.721074747	0.039533234
ENSG00000155561	NUP205	0.252771452	0.039596997
ENSG00000278158		-1.853594391	0.039660029
ENSG00000102309	PIN4	0.437210493	0.039661773
ENSG00000211454	AKR7L	-0.95172348	0.039840362
ENSG00000160867	FGFR4	-1.141097483	0.039888239
ENSG00000114796	KLHL24	-0.416266687	0.039896402
ENSG00000068976	PYGM	-0.641340758	0.039924452
ENSG00000174718	KIAA1551	0.44710491	0.039924452

ENSG00000167258	CDK12	-0.236408477	0.039929247
ENSG00000227939	RPL3P2	-0.773690725	0.039932807
ENSG00000154429	CCSAP	-0.455182531	0.039947253
ENSG00000157837	SPPL3	-0.263162521	0.039947253
ENSG00000136463	TACO1	0.387622596	0.039979135
ENSG00000117305	HMGCL	0.470802752	0.040011381
ENSG00000104325	DECR1	0.333155619	0.040011381
ENSG00000225331		-0.762466392	0.040011381
ENSG00000172005	MAL	-1.971333026	0.040022908
ENSG00000164253	WDR41	0.388880869	0.040137917
ENSG00000135441	BLOC1S1	0.363617854	0.0401607
ENSG00000153790	C7orf31	0.36227258	0.04023191
ENSG00000185608	MRPL40	0.354022916	0.04023191
ENSG00000196912	ANKRD36B	-0.565924907	0.0403698
ENSG00000112053	SLC26A8	0.654299926	0.040380201
ENSG00000198205	ZXDA	-0.582631378	0.040386377
ENSG00000144120	TMEM177	0.981317947	0.040391303
ENSG00000161921	CXCL16	-1.165787698	0.040413343
ENSG00000227543	SPAG5-AS1	-0.853084203	0.040461498
ENSG00000002016	RAD52	0.56627894	0.040492207
ENSG00000230373	GOLGA6L5P	-1.271894843	0.040547271
ENSG00000235954	TTC28-AS1	-0.378263679	0.040568952
ENSG00000204954	C12orf73	0.596008074	0.040699447
ENSG00000108559	NUP88	0.268242492	0.040762732
ENSG00000176014	TUBB6	-1.307920894	0.040856661
ENSG00000132394	EEFSEC	0.342262871	0.040953629
ENSG00000120509	PDZD11	0.497368452	0.040953629
ENSG00000028528	SNX1	0.447987947	0.040953629
ENSG00000125319	C17orf53	-1.428027682	0.040953629
ENSG00000177369		-0.704985136	0.040953629
ENSG00000175221	MED16	0.44462848	0.040953629
ENSG00000227199	ST7-AS1	-0.841681688	0.040960335
ENSG00000105656	ELL	-0.326904548	0.0410085
ENSG00000178226	PRSS36	-0.531042414	0.041064117
ENSG00000168685	IL7R	-1.242043094	0.041087773
ENSG00000250771		0.775421951	0.041262274
ENSG00000166446	CDYL2	-0.582170322	0.041318856
ENSG00000162585	FAAP20	-0.280942397	0.041384979
ENSG00000145103	ILDR1	-1.098861341	0.041432673
ENSG00000234009	RPL5P34	-0.438800084	0.041509774
ENSG00000233476	EEF1A1P6	-0.3897842	0.041553561
ENSG00000125977	EIF2S2	0.387969379	0.041561104
ENSG00000099284	H2AFY2	0.545455547	0.041575839
ENSG00000106591	MRPL32	0.346527499	0.041611098
ENSG00000145817	YIPF5	0.33578122	0.041673088
ENSG00000172172	MRPL13	0.441746224	0.041674832
ENSG00000197324	LRP10	0.304316904	0.041674832
ENSG00000174446	SNAPC5	0.363669584	0.04169002

ENSG00000223865	HLA-DPB1	-0.688057405	0.041841627
ENSG00000116406	EDEM3	0.460639006	0.041847037
ENSG00000273356		-0.481645855	0.041847037
ENSG00000154099	DNAAF1	1.250435172	0.041847037
ENSG00000133193	FAM104A	0.317135673	0.041847037
ENSG00000108669	CYTH1	-0.198919909	0.041972874
ENSG00000280407		-1.033229289	0.042020308
ENSG00000101452	DHX35	-0.214841508	0.042276354
ENSG00000087299	L2HGDH	-0.367299609	0.042340539
ENSG00000111237	VPS29	0.283397043	0.042580232
ENSG00000032389	TSSC1	0.310229671	0.042693848
ENSG00000113013	HSPA9	-0.368502899	0.042693848
ENSG00000235863	B3GALT4	0.477679624	0.042693848
ENSG00000227741		-0.930529938	0.042696792
ENSG00000115145	STAM2	0.382387839	0.042774762
ENSG00000189007	ADAT2	-0.356462794	0.042774762
ENSG00000225541		2.249359447	0.042774762
ENSG00000175556	LONRF3	-0.918903565	0.042774762
ENSG00000275832	ARHGAP23	0.717112713	0.04279235
ENSG00000133639	BTG1	-0.460511089	0.042827912
ENSG00000198723	C19orf45	-1.567148549	0.042830057
ENSG00000105926	MPP6	-0.84294628	0.042862648
ENSG00000063177	RPL18	-0.277348455	0.042862648
ENSG00000088986	DYNLL1	0.525379326	0.042879728
ENSG00000198900	TOP1	-0.403948978	0.042889834
ENSG00000147533	GOLGA7	0.25392236	0.042949017
ENSG00000084463	WBP11	-0.380455483	0.042949017
ENSG00000196839	ADA	-0.824826609	0.04297269
ENSG00000181418	DDN	-1.099892677	0.043274246
ENSG00000143106	PSMA5	0.400959094	0.04336335
ENSG00000166503		-0.867732991	0.043396802
ENSG00000165929	TC2N	-1.428411299	0.043411892
ENSG00000226824		-0.823860615	0.043450248
ENSG00000108651	UTP6	0.34033531	0.0435784
ENSG00000196975	ANXA4	0.638797679	0.043673562
ENSG00000205560	CPT1B	0.623633115	0.043683729
ENSG00000188177	ZC3H6	0.449787696	0.043878307
ENSG00000185304	RGPD2	-1.768965475	0.043905488
ENSG00000124201	ZNFX1	0.375159117	0.04403241
ENSG00000163798	SLC4A1AP	0.301696422	0.044073242
ENSG00000278022		-0.980288454	0.044199742
ENSG00000118242	MREG	-0.617635401	0.044200879
ENSG00000279821		-1.008505044	0.044260872
ENSG00000187808	SOWAHD	1.218738067	0.044260872
ENSG00000259924		0.649498847	0.044260872
ENSG00000265681	RPL17	-0.322254002	0.044463052
ENSG00000182749	PAQR7	-0.528763541	0.044516311
ENSG00000160654	CD3G	-0.780630159	0.044516311

ENSG00000263990		-0.594817431	0.044516311
ENSG00000173114	LRRN3	-1.699094283	0.044539379
ENSG00000100095	SEZ6L	-0.938291307	0.044577054
ENSG00000139620	KANSL2	-0.462329484	0.044722008
ENSG00000100528	CNIH1	-0.248019123	0.044797941
ENSG00000156299	TIAM1	-0.509851187	0.04482844
ENSG00000012211	PRICKLE3	0.530638254	0.044855243
ENSG00000145901	TNIP1	0.301651002	0.044857373
ENSG00000160991	ORAI2	-0.3372836	0.044858279
ENSG00000114315	HES1	-1.512167804	0.044865232
ENSG00000274561		-0.587398073	0.044865232
ENSG00000121742	GJB6	-2.374130992	0.044871971
ENSG00000256039		-1.667006254	0.044874164
ENSG00000115685	PPP1R7	0.264195526	0.044926578
ENSG00000106330	MOSPD3	0.376196546	0.044933582
ENSG00000180198	RCC1	-0.472205636	0.044970514
ENSG00000174928	C3orf33	-0.682857018	0.044970514
ENSG00000134627	PIWIL4	0.444831463	0.044989199
ENSG00000139719	VPS33A	0.37666336	0.044989199
ENSG00000213213	CCDC183	-0.792931235	0.045171397
ENSG00000003402	CFLAR	0.293497243	0.045189933
ENSG00000166189	HPS6	0.708055471	0.045234117
ENSG00000162458	FBLIM1	-0.822791418	0.045286099
ENSG00000143742	SRP9	0.311417364	0.045306519
ENSG00000113649	TCERG1	-0.238592072	0.045376255
ENSG00000213714	FAM209B	-0.726170325	0.045396255
ENSG00000085832	EPS15	0.31207967	0.045516747
ENSG00000268001	CARD8-AS1	0.709165379	0.045516747
ENSG00000059588	TARBP1	-0.313006246	0.045585754
ENSG00000172878	METAP1D	-0.642964167	0.045585754
ENSG00000020129	NCDN	0.549441244	0.045627992
ENSG00000123933	MXD4	-0.356007475	0.045627992
ENSG00000168282	MGAT2	0.388705667	0.045731508
ENSG00000171806	METTL18	0.588245147	0.045745433
ENSG00000170915	PAQR8	0.932034789	0.045745433
ENSG00000086062	B4GALT1	-0.456301025	0.045745433
ENSG00000138615	CILP	-1.31464858	0.045745433
ENSG00000103528	SYT17	-0.898680906	0.045842189
ENSG00000280279		-0.505064265	0.045842189
ENSG00000273271		-0.526163077	0.045913818
ENSG00000259939		-0.92813522	0.046173337
ENSG00000176531	PHLDB3	-0.574883081	0.04619206
ENSG00000211459	MT-RNR1	-0.460542974	0.046385506
ENSG00000116106	EPHA4	-2.254713371	0.046492435
ENSG00000165775	FUNDC2	-0.236742852	0.046561541
ENSG00000150768	DLAT	0.464735805	0.046608097
ENSG00000180316	PNPLA1	0.838732404	0.046660785
ENSG00000130803	ZNF317	-0.321704863	0.046660785

ENSG00000197857	ZNF44	-0.375613915	0.046708887
ENSG00000112234	FBXL4	0.36697866	0.046778011
ENSG00000067221	STOML1	0.421421147	0.046778011
ENSG00000133134	BEX2	-1.149672845	0.046794426
ENSG00000136854	STXBP1	-1.050364583	0.046867269
ENSG00000179331	RAB39A	0.66645974	0.046867269
ENSG00000182899	RPL35A	-0.272608879	0.04690721
ENSG00000070770	CSNK2A2	-0.21445563	0.047047533
ENSG00000155329	ZCCHC10	0.303668517	0.047095574
ENSG00000279908		-0.943357879	0.047109696
ENSG00000247679		-0.506079651	0.047109696
ENSG00000146904	EPHA1	0.838391387	0.047109696
ENSG00000140525	FANCI	-0.777778724	0.047109696
ENSG00000152795	HNRNPDL	-0.203319536	0.047181915
ENSG00000145050	MANF	0.546621078	0.047198457
ENSG00000057019	DCBLD2	-0.772443534	0.047204011
ENSG00000170017	ALCAM	-0.588982674	0.047204011
ENSG00000130985	UBA1	0.245383755	0.047204011
ENSG00000172732	MUS81	0.357585623	0.047219096
ENSG00000165424	ZCCHC24	-0.467881975	0.047235937
ENSG00000119537	KDSR	-0.364971925	0.0472644
ENSG00000102879	CORO1A	0.316893985	0.047275306
ENSG00000066294	CD84	-0.603034975	0.047291975
ENSG00000177917	ARL6IP6	0.371794566	0.047334376
ENSG00000079459	FDFT1	0.397234506	0.047334376
ENSG00000251682		-0.736975765	0.047349932
ENSG00000117280	RAB29	0.405213701	0.047360416
ENSG00000104973	MED25	0.309300426	0.047375201
ENSG00000143774	GUK1	-0.28575131	0.047378261
ENSG00000132792	CTNBL1	0.222409877	0.047412235
ENSG00000064490	RFXANK	0.255588988	0.047412235
ENSG00000100591	AHSA1	0.475421296	0.047453672
ENSG00000152767	FARP1	-0.543825983	0.047576994
ENSG00000276107		-1.900576921	0.047614533
ENSG00000107263	RAPGEF1	-0.433751587	0.047666734
ENSG00000120915	EPHX2	-1.489241779	0.047757715
ENSG00000163519	TRAT1	-1.497079091	0.047814511
ENSG00000185621	LMLN	-0.497515298	0.047823476
ENSG00000157764	BRAF	-0.368742043	0.047831449
ENSG00000204267	TAP2	0.419002327	0.047834583
ENSG00000005889	ZFX	-0.254474425	0.047835616
ENSG00000161021	MAML1	0.256537412	0.047835798
ENSG00000126266	FFAR1	-1.47947673	0.047922337
ENSG00000177663	IL17RA	0.371892279	0.048013504
ENSG00000101843	PSMD10	0.335532476	0.048090088
ENSG00000251143		-0.482046572	0.048097795
ENSG00000198700	IPO9	-0.210696739	0.048327272
ENSG00000103544	C16orf62	0.282296215	0.048350537

ENSG00000224546	EIF4BP3	-0.86005885	0.048355103
ENSG00000263823		-0.711279753	0.04835595
ENSG00000091622	PITPNM3	-0.9075971	0.048766873
ENSG00000169188	APEX2	0.367235417	0.048850196
ENSG00000076650	GPATCH1	0.445153009	0.048850196
ENSG00000234719	NPIP2	-0.56032154	0.048944245
ENSG00000164077	MON1A	0.673529645	0.048984921
ENSG00000118507	AKAP7	0.454734326	0.048984921
ENSG00000188021	UBQLN2	0.299783638	0.048984921
ENSG00000183628	DGCR6	-0.533488766	0.048984921
ENSG00000102786	INTS6	0.289793148	0.048987491
ENSG00000181638	ZFP41	0.585588698	0.048994559
ENSG00000171311	EXOSC1	0.338695053	0.048994559
ENSG00000264112		-0.530351163	0.049155104
ENSG00000166068	SPRED1	-0.756548733	0.049207196
ENSG00000142208	AKT1	-0.197456006	0.049330083
ENSG00000167863	ATP5H	0.265483745	0.049392328
ENSG00000271122		0.549068993	0.049420702
ENSG00000274349	ZNF658	0.877733289	0.049443985
ENSG00000040531	CTNS	0.315283048	0.049443985
ENSG00000137054	POLR1E	-0.355078721	0.049445463
ENSG00000040608	RTN4R	-2.251146231	0.049445463
ENSG00000112304	ACOT13	0.540197293	0.049568218
ENSG00000120526	NUDCD1	0.527432194	0.049585109
ENSG00000157353	FUK	0.264948418	0.049662752
ENSG00000114316	USP4	-0.186229097	0.049723752
ENSG00000137824	RMDN3	-0.230261014	0.04972421
ENSG00000165512	ZNF22	0.380158705	0.049731719
ENSG00000087087	SRRT	-0.245257146	0.049888954
ENSG00000117153	KLHL12	0.255408858	0.049966643

Table 1 - Patient and control demographics and clinical characteristics

Patient characteristics	RNA-seq #			Functional experiments	
	JDM pre-treatment	JDM on-treatment	Controls	JDM	Controls
Number of participants	10	11	4	82	35
Age at onset (years), median [range]	9.14 [3.71-15.19]	8.03 [2.56-15.19]	N/A	5.81 [0.79-15.37]	N/A
Age at diagnosis (years), median [range]	9.35 [3.96-15.36]	8.45 [2.73-15.36]	N/A	6.11 [1.28-16.20]	N/A
Age at sample (years), median [range]	9.78 [4.00-15.39]	9.56 [3.79-16.13]	9.34 [7.15-11.12]	7.50 [1.28-25.74]	11.45 [6.33-17.98]
Time since diagnosis (years), median [range]	0.12 [0.00-0.82]	0.97 [0.77-1.12]	N/A	0.07 [0.00-14.69]	N/A
Sex Female/Male (%F)	8/2 [80.00]	7/4 [63.64]	2/2	56/26 [68.29]	23/12 [65.71]
Clinical information at time of sample:					
PGA*(median [range])	7.1 [3.0-9.6]	1.5 [0.0-6.7]	N/A	3.5 [0.0-9.0]	N/A
CMAS* (median [range])	16 [0-31]	46 [23-53]	N/A	41 [0-53]	N/A
CK* value (median [range])	7282 [68-25937]	1355 [66-12689]	N/A	118 [17-25937]	N/A
Medication at time of sample [n=yes(%)]:					
Oral steroids	1 (10.00)	9 (81.82)	N/A	36 (34.28)	N/A
Methotrexate	0 (0.00)	11 (100.0)	N/A	40 (38.09)	N/A
Ciclosporin	0 (0.00)	0 (0.00)	N/A	1 (0.95)	N/A
Azathioprine	0 (0.00)	1 (9.09)	N/A	3 (2.86)	N/A
Cyclophosphamide	0 (0.00)	0 (0.00)	N/A	4 (3.81)	N/A
Hydroxychloroquine	0 (0.00)	1 (9.09)	N/A	9 (8.57)	N/A
Myositis Specific Autoantibody (MSA)- [n=positive(%)]:					
anti-Mi2	2 (20.00)	3 (27.27)	N/A	5 (5.75)	N/A
anti-TIF1g	1 (10.00)	2 (18.18)	N/A	11 (12.64)	N/A
anti-NXP2	3 (30.00)	1 (9.09)	N/A	15 (17.24)	N/A
anti-MDA5 [^]	0 (0.00)	0 (0.00)	N/A	9 (10.34)	N/A
anti-SRP	1 (10.00)	1 (9.09)	N/A	4 (4.60)	N/A
anti-OJ	0 (0.00)	0 (0.00)	N/A	1 (1.15)	N/A
anti-HMGCR	0 (0.00)	0 (0.00)	N/A	1 (1.15)	N/A
Myositis Associated Autoantibody (MAA) [n=positive(%)]:					
anti-PmScl 75	0 (0.00)	1 (9.09)	N/A	5 (5.75)	N/A
anti-Ro52 [^]	0 (0.00)	0 (0.00)	N/A	2 (2.30)	N/A
anti-U1RNP	0 (0.00)	0 (0.00)	N/A	3 (3.45)	N/A
Unknown bands	2 (20.00)	1 (9.09)	N/A	8 (9.20)	N/A
Negative	1 (10.00)	2 (18.18)	N/A	23 (26.44)	N/A
Not Done	0 (0.00)	0 (0.00)	N/A	2 (2.30)	N/A
ANA[^] [n=positive(%)]:	4 (40.00)	6 (54.55)	N/A	43 (55.84)[^]	N/A

6 RNA-seq samples were paired

*Physical Global Assessment (PGA) [0-10] (2.65% of samples missing data), Childhood Myositis Assessment Scale (CMAS) [0-53] (19.47% of samples missing data),

Creatine Kinase (CK) [U/L - >0 measured in serum] (15.92% of samples missing data)

[^]2 patients were positive for both anti-MDA5 and anti-Ro52

[~]MSA/MAA method - Immunoprecipitation (70.11%), Extended myositis Immunoblot, RUH, Bath (26.44%), Extended Myositis Immunoblot, RMCH, Manchester (1.15%), Not done (2.30%)

ANA[^] - data for ANA result missing in n=5 patients

1 **Methods**

2 ***Patient information***

3 Patients who met the Bohan and Peter criteria for probable or definite JDM were
4 included in this study, with a median age of 7 years at time of sample, recruited
5 through the UK JDM Cohort and Biomarker Study (JDCBS)^{33–35}. Inclusion in the
6 JDCBS is offered to all patients with JDM seen in the 17 contributing centres. 99% of
7 families consent to being in this observational study, which had 660 cases at time of
8 this investigation; 6 have declined in >20 years. The 90 patient cases used in this
9 study were consecutive cases available for analysis that were representative of the
10 whole cohort (74 unique cases in functional experiments, 8 unique cases in the
11 RNAseq experiments and 8 cases in both functional experimental and RNAseq
12 experiments). In addition, 39 age-matched child healthy controls (controls) were
13 recruited through the Centre for Adolescent Rheumatology. Parents and patients
14 gave written informed consent or age-appropriate assent. The study had full ethical
15 approval through London-Bloomsbury and North-East Yorkshire Research Ethics
16 Committees (MREC 01/3/022). Controls samples were donated under the North
17 Harrow ethics committee approval (REC 11/0101). All consent was obtained in
18 accordance with the Declaration of Helsinki. Patient and control demographics are
19 summarised in Table 1: number of participants, age at onset, diagnosis and at
20 sample collection were collated for medications, Physicians Global Assessment
21 (PGA; range 0–10; low scores indicate minimal disease)^{36,37}, Childhood Myositis
22 Assessment Scale (CMAS; range 0–52; high scores indicate no weakness)³⁸, serum
23 creatine kinase levels (U/l), medications at time of sample (oral steroids,
24 methotrexate, ciclosporin, azathioprine, cyclophosphamide and hydroxychloroquine),
25 myositis specific autoantibody (MSA) status, myositis associated autoantibody (MAA)
26 status and anti-nuclear autoantibody (ANA) status (Table 1).

27

28 ***PBMC isolation***

29 Peripheral blood mononuclear cells (PBMC) were isolated by density centrifugation
30 using Lymphoprep (Stemcell technologies, Cat# 07851/07861). PBMC were stored
31 in 90% Fetal Bovine Serum (FBS) (Gibco, cat# 10270-106) and 10% Dimethyl-
32 sulfoxide (DMSO) (Sigma, Cat# D2650-5x10ml, CAS: 67-68-5) and cryopreserved in
33 liquid nitrogen until use. For some assays PBMC were used fresh, as indicated.

34

35 **Cell sorting and RNA preparation**

36 Patient and control CD4+, CD8+, CD19+ and CD14+ cells were sorted by flow
37 cytometry (FACS Aria III). DAPI was used to exclude dead cells. Sorted cell RNA
38 was extracted using the PicoPure™ RNA Isolation Kit (Thermo Fisher Scientific,
39 Cat# KIT0204).

40

41

42 **Library preparation**

43 Library preparation and sequencing were performed at UCL Genomics. Samples
44 were processed using Illumina's TruSeq Stranded mRNA LT sample preparation kit
45 (p/n RS-122-2101) according to manufacturer's instructions with minor alterations.
46 Briefly, mRNA was isolated from 250 ng total RNA using Oligo dT beads to pull down
47 Poly-Adenylated transcripts. The purified mRNA was fragmented using chemical
48 fragmentation (heat and divalent metal cation) for 10 minutes and primed with
49 random hexamers. Strand specific first strand cDNA was generated using Reverse
50 Transcriptase and Actinomycin D. This allows for RNA dependent synthesis while
51 preventing spurious DNA-dependent synthesis. The second cDNA strand was
52 synthesised using dUTP in place of dTTP, to mark the second strand. The resultant
53 cDNA is then "A-tailed" at the 3' end to prevent self-ligation and adapter dimerisation.
54 Full length TruSeq adaptors, containing a T overhang are ligated to the A-Tailed
55 cDNA. These adaptors contain sequences that allow the libraries to be uniquely
56 identified by way of a 6 bp Index sequence. Successfully ligated fragments were
57 enriched with 14 cycles of PCR. The polymerase is unable to read through uracil, so
58 only the first strand is amplified, thus making the library strand specific.

59

60 **RNA Sequencing**

61 Libraries to be multiplexed in the same run were pooled in equimolar quantities,
62 calculated from Qubit and Bioanalyser fragment analysis. Samples were sequenced
63 on the NextSeq 500 instrument (Illumina, San Diego, US) using a 43 bp paired end
64 run resulting in >15million reads per sample.

65

66 **RNA Sequencing analysis**

67 Run data were demultiplexed and converted to fastq files using Illumina's bcl2fastq

68 Conversion Software v2.16. Sequencing reads (in fastq format) were aligned to the
69 GRCh38 reference sequence using TopHat v2.1.0³⁹. Alignments were processed
70 using samtools version 1.2 and Picard tools version 1.140
71 (<http://picard.sourceforge.net/>)⁴⁰. Aligned reads were filtered for mapq ≥ 4 , i.e.
72 uniquely mapping reads, and putative PCR duplicates were removed. Read
73 summarization was performed using featureCounts⁴¹. Expression analysis was
74 carried out using R version 3.2.2⁴², and differential gene expression was analysed
75 using edgeR⁴³. RNAseq data are available from ArrayExpress, accession number
76 E-MTAB-5616.

77

78 **Gene Set Enrichment Analysis**

79 GO term and pathway enrichment analysis was carried out using 'goseq' which uses
80 a test based on the Wallenius' noncentral hypergeometric distribution⁴⁴. Gene set
81 enrichment analysis was carried out with "Hallmark" gene sets from databases⁴⁵
82 based on calculated normalised enrichment scores (NES) and multiple adjusted p-
83 values (q-values) were calculated. Gene scores were established for IFN type 1
84 (*Ly6E*, *MX1*, *USP18*, *RSAD2*, *OAS1*, *IFFI44L*, *IFI27*, *ISG15*, *IFIT1*, *IFI44*, *IFI6*,
85 *SIGLEC1*, *IFIT3*, *IRF7*, *STAT1* [15 genes]) and mitochondrially encoded-genes (*MT-*
86 *ND1*, *MT-ND2*, *MT-ND3*, *MT-ND4*, *MT-ND4L*, *MT-ND5*, *MT-ND6*, *MT-CO1*, *MT-CO2*,
87 *MT-CO3*, *MT-CYB*, *MT-ATP6*, *MT-ATP8* [13 genes]).

88

89 **Flow cytometry**

90 Frozen PBMC were used for all flow cytometry analysis. After thawing, PBMC were
91 plated in a 96 well plate at 200,000 per well, washed with 1xPBS and incubated with
92 Live/Dead fixable cell stains (Life Technologies) according to manufacturer's
93 instructions. For extracellular staining, antibodies to surface proteins (see Methods
94 table 2) were diluted in FACS buffer (500ml 1x PBS (Sigma Aldrich), 1%FBS, 0.01%
95 sodium azide) and cells were incubated at 4°C for 20 minutes with appropriate
96 antibody cocktails. Samples were either fixed with intracellular fixation buffer
97 (eBioscience™ Intracellular Fixation & Permeabilization Buffer Set, Thermo Fisher
98 Scientific, Cat# 88-8824-00) for 20 minutes at 4°C or for MitoTracker and MitoSox
99 stains were incubated for 30 minutes at 37°C with the respective mitochondrial dyes
100 in 1x PBS (Methods table 2) and left unfixed. For intra-cellular staining the PBMC
101 were washed with permeabilization buffer and then incubated in the presence of

102 intracellular markers for 30 minutes at 4°C. The samples were washed in FACS
 103 buffer and run on BD LSR II Flow Cytometer (BD Biosciences) or on CytoFLEX Flow
 104 Cytometer (Beckman Coulter Life Sciences).

105

106 For the 2NBDG assay PBMC were stained with surface markers (as above) and then
 107 stained with the fluorescent tagged glucose tracer, 2NBDG (2-(N-(7-Nitrobenz-2-oxa-
 108 1,3-diazol-4-yl)Amino)-2-Deoxyglucose) according to manufacturer's instructions (2-
 109 NBDG Glucose Uptake Assay Kit, Abcam, Cat# Ab235976).

110

111 **Methods table 2 – Antibodies and dyes used for flowcytometry, fluorescence**
 112 **microscopy and dot blot western**

Antibody	Company	Catalogue and PRID
GLUT 1 monoclonal anti-human	Invitrogen	Cat#MA5-11315; PRID: AB_2809254
Goat anti-mouse IgG (H+L), AF488	Invitrogen	Cat# A11001; PRID: AB_2534069
GLUT 4 monoclonal anti-human	Invitrogen	Cat# PA5-23052; PRID: AB_11153908
Goat ant-rabbit IgG (H+L), AF555	Invitrogen	Cat# A21428; PRID: AB_2535849
CD3 anti-human monoclonal, PerCP-cy5.5	eBioscience	Cat# 45-0037-42; PRID: AB_10548513
CD4 anti-human monoclonal, APC-cy7	BioLegend	Cat# 317418; PRID: AB_571947
CD8 anti-human monoclonal, BV421	BioLegend	Cat# 301036; PRID: AB_10960142
CD19 anti-human monoclonal, Pe-cy7	BioLegend	Cat# 302216; PRID: AB_314246
CD14 anti-human monoclonal, AF700	BioLegend	Cat# 367114; PRID: AB_2566716
CD16 anti-human monoclonal, BV711	BioLegend	Cat# 367114; PRID: AB_2563802
HLA-DR anti-human monoclonal, BV510	BioLegend	Cat# 307646; PRID: AB_2561948
CD8 anti-human monoclonal, AF700	BioLegend	Cat# 344724; PRID: AB_2562790
CD3 anti-human monoclonal, BUV395	BD Bioscience	Cat# 563546; PRID: AB_2744387
CD19 anti-human monoclonal, BUV805	BD Bioscience	Cat# 749173; PRID: AB_2873553
CD4 anti-human monoclonal, Pe-cy7	BioLegend	Cat# 317414; PRID: AB_571959
CD14 anti-human monoclonal, BV421	BioLegend	Cat# 301830; PRID:AB_10959324

TO-PRO-3 Iodide (642/661)- 1mM solution in DMSO	ThermoFisher Scientific	Cat# T3605
LIVE/DEAD™ Fixable Blue Dead Cell Stain Kit, for UV excitation	ThermoFisher Scientific	Cat# L23105

113

114 **Citrate synthase activity assay**

115 CD14+ Monocytes were isolated from PBMC by positive selection (EasySep™
116 human CD14 positive selection kit II – Stemcell - 17858). The monocyte cell pellet
117 was spun down (1000xg, 5 minutes), supernatant removed. Monocyte cell pellet was
118 stored in -80°C freezer. All samples were thawed and re-suspended in 50µl of citrate
119 synthase (CS) buffer (1L at pH 8.0: 12.011g Trizma base, 990ml of ddH₂O and 1ml
120 of Triton x100). Assay carried out at 37°C in Uvikon XL spectrophotometer, pre-
121 warmed to correct temperature. Spectrophotometer set up to measure 'aurate
122 assay'; absorbance 412nm; one measurement per 0.5 min; set cell changer mode to
123 6S/6R; autozero on. Pre-warmed citrate synthase (CS) assay buffer to 37°C and
124 keep warm throughout experiment. To each 1.5ml polystyrene cuvette for sample:
125 10µl 5,5'-dithio-bis-(2-nitrobenzoic acid) (DTNB; 20mM), 10µl Acetyl-CoA (10mM),
126 20µl sample homogenate and 950µl CS assay buffer. For reference cuvette: 10µl
127 DTNB (20mM), 10µl Acetyl-CoA (10mM), and 960µl CS assay buffer. Cuvette
128 inverted to mix. Assay run for 2 minutes to confirm flat baseline. 10µl oxaloacetate
129 (20mM) added, cuvette inverted to mix and assay run for another 8 minutes. Protein
130 content quantified against standard curve using Bradford assay (Pierce™
131 Coomassie (Bradford) Protein Assay Kit-23200) measured by Tecan F200 plate
132 reader, with i-control 2.0 Tecan software, at 600nm absorbance. The calculation of
133 CS activity is derived from the Beer-Lambert law: $A = c * \epsilon * l$, where A is the
134 measured absorbance, c is the sample concentration, ϵ is the molar extinction
135 coefficient of 2-nitro-5-thiobenzoate (TNB ($13.6 \times 10^3 \text{ M}^{-1} \text{ cm}^{-1}$)) and l is the path length
136 (1cm cuvettes). CS activity expressed as nmol/min/mg protein.

137

138 **Imaging**

139 Live cell imaging was performed on a Zeiss Observer 7 microscope with a 63xNA1.4
140 Oil objective and Hamamatsu Flash 4 camera. PBMC were stained with CD14+
141 (APC) in FACS buffer for 20 minutes and then with MitoTracker and MitoSox,
142 incubated for 30 minutes at 37°C with the respective mitochondrial dyes in 1x PBS

143 (Methods table 1) and left unfixed. PBMC were suspended in FACS buffer in 96-well
 144 glass bottom imaging plates with a #1.5 coverslip base. LED illumination at 470nm,
 145 555nm or 630nm with single band filters at (CD14 APC, MitoTracker green
 146 (excitation/emission 490/516nm) MitoSox (excitation/emission 510/580 nm) were
 147 used to take z-stacks at Nyquist sampling in xy & z for deconvolution with SVI
 148 Huygens software. Exposure times (20ms) and illumination intensity were kept to
 149 minimal levels to avoid phototoxicity and allow rapid imaging of each cell. Typically
 150 500 grey levels (on a 16 bit detector) were used for each channel. Individual cells
 151 were manually cropped using Zen2.3 software, deconvolved (SVI Huygens), then
 152 processed with in house macros (GitHub) to measure within a cropped spheroid
 153 around each cell the volume & surface area of each stain (MitoTracker and MitoSox)
 154 and regions of overlap. 3D model images were created using Imaris cell imaging
 155 software (Oxford instruments).

156

157 **Methods table 3 – Antibodies and dyes used for fluorescence microscopy**

158

Antibody	Company	Catalogue and PRID
CD14 anti-human monoclonal, APC	BioLegend	Cat# 325608; RRID:AB_830681
MitoTracker green	ThermoFisher Scientific	Cat# M7514
MitoSox red	ThermoFisher Scientific	Cat# M36008

159

160 ***Incubation of monocytes with [U-¹³C₆]glucose***

161 CD14+ monocytes were isolated from PBMC by positive selection (EasySep™
 162 human CD14 positive selection kit II – Stemcell - 17858). 0.5 million CD14+
 163 monocytes were cultured in 1ml per well glucose starved media (Gibco™ DMEM, no
 164 glucose, Fisher scientific, cat# 11520416) plus 3mM glucose (D-(+)-Glucose, Sigma-
 165 Aldrich, #G8270-100G) over-night in a 24 well plate. The medium was changed to
 166 1ml per well DMEM plus [U-¹³C₆]glucose (10mM) (D-glucose (U-13C₆,99%),
 167 Cambridge isotope laboratories, Inc, Cat# CLM-1396-1). 1ml mineral oil was layered
 168 on top of the cell suspension to trap gas release. Every hour for six hours and a
 169 further 24hr time point a 100µl and 10µl media samples were taken and stored
 170 before analysis for ¹³CO₂ and ¹³C lactate.

171

172 ***¹³CO₂ Gas Chromatography-Isotope ratio mass spectrometry***

173 Samples in 12ml Exetainer Tubes (Labco Ltd) were thawed at room temperature,
174 and 100µl 1M hydrochloric acid was injected through the septum into each vial to
175 release CO₂ from the medium. Vials were centrifuged for 30s at 500xg. Samples
176 were then analysed on a GasBench II coupled to a Thermo Delta-XP isotope-ratio
177 mass spectrometer (Thermo-Finnigan, Bremen, Germany). Ten repeat injections
178 were carried out per sample, with ¹³CO₂/¹²CO₂ ratios measured against Vienna Pee
179 Dee Belemnite (VPDB) using a calibrated CO₂ reference gas. Following this,
180 ¹³CO₂/¹²CO₂ ratios were then converted to mole percent excess using absolute
181 molar ratio of ¹³C to ¹²C (0.0111796) in VPDB. The change in mole percent excess
182 was then converted to pmol ¹³CO₂ generated using the volume of medium and
183 concentration of bicarbonate (2.9 mM) present, which was then corrected for the
184 number of labelled carbon atoms (6 for glucose) to obtain picomoles of substrate
185 oxidised ⁴⁶.

186

187 **Lactate Gas Chromatography Mass Spectrometry**

188 Samples were defrosted; 10-50µl sample +25µl internal standard (1mM ¹³C₄-beta
189 hydroxybutyrate (BOHB)) plus 225µl of acetonitrile were mixed in an 1.5ml
190 microcentrifuge tube. The samples were vortexed, and spun in a microcentrifuge for
191 5 minutes at 15,000xg. Supernatant was transferred to a GC vial and dried down
192 under N₂ gas at room temperature. For the standards (100-1µM): 50µl standard
193 (¹³C₃-lactate) +25µl internal standard (1mM ¹³C₄ BOHB) were added to a GC vial.
194 Dried down under N₂ gas at room temperature. To ensure all water was removed,
195 200µl of 100% ethanol was added, and dried down under N₂ gas at room
196 temperature. To each vial, 30µl of ethyl acetate + 30µl of
197 Bis(trimethylsilyl)trifluoroacetamide /10% trimethylsilyl chloride was added. Samples
198 and standards were vortexed and incubated for 30 minutes at 37°C on a heat block.
199 The samples and standards were analysed by GC/MS (Thermo DSQII trace Ultra
200 GC) using a RXI-5Sil MS fused silica (30m x 0.25mm I.D, 0.25µm film thickness)
201 column (Thames Restek) at a helium flow rate of 1.2ml/minute. 2µl of sample was
202 injected into the inlet (250°C) with a split ratio of 1:8 using the following temperature
203 programme: 60°C hold for 1 minute, 140°C increased at a rate of 10°C/minute,
204 240°C at a rate of 40°C/minute. Ionisation mode was positive chemical ionisation
205 with methane at 2ml/minute. The detection mode used was Selected Ion Monitoring

206 (SIM), collecting peak-area data on the following ions: Lactate (m/z 219), $^{13}\text{C}_3$ -
207 lactate (m/z 222), and $^{13}\text{C}_4$ -BOHB (internal standard) (m/z 237). The sample
208 concentrations were calculated against a standard curve of peak area ratio 222/237.
209 Method was modified from ⁴⁷.

210

211 ***Mitochondria isolation and western/dot blot assay***

212 CD14+ Monocytes were isolated from PBMC by positive selection (EasySep™
213 human CD14 positive selection kit II, Stemcell, cat#17858) and then mitochondria
214 were isolated from monocytes using Mitochondria Isolation Kit for Cultured Cells
215 (Thermo Fisher, cat#89874). Samples were prepared by diluting with 4x loading dye.
216 PVDF membrane strips were prepared in Methanol for 1-2 minutes. Membranes
217 were blotted and sample mix was applied in dots and left to dry for an hour. The
218 membrane was blocked with 5% skimmed milk in PBST for an hour. The membrane
219 was incubated with the antibody (8-OHdG – Santa Cruz – cat#sc-393871) in 5ml of 5%
220 skimmed milk in 0.1%PBST for an hour/overnight. Membrane was washed with 5ml
221 of 5% skimmed milk in 0.1%PBST. The membrane was incubated with the
222 secondary antibody (rabbit anti-mouse 1:1000) in 5ml of 5% skimmed milk in 0.1%
223 PBST for an hour. Membranes washed with 0.1%PBST. Substrate was applied to
224 the membrane (ECL™ Prime Western Blotting System, Merck, Cat# RPN2232),
225 image was recorded and analysed (Quantity One 1-D analysis software, Bio-rad,
226 RRID:SCR_014280).

227

228 ***MT-CO3 plasmid transformation***

229 100µl XL 10-Gold® Ultracompetent cells (Stratagene, Cat#200314) were thawed on
230 ice and put into a new RNA/DNA free Eppendorf. 4µl of mercaptoethanol was added
231 to the bacteria cells and incubated on ice for 10 minutes. Next, 1µl of 70ng/µl 10^{10}
232 *Mt-CO3* plasmid was added to the sample, mixed and incubated on ice for 30
233 minutes. Then the sample was heat shocked at 42°C for 30 seconds and 900µl LB
234 broth was added. The sample was then incubated for 1 hour at 37°C and shaken at
235 300rpm. To grow the cells, 200µl of the sample was spread over an agar plate
236 (containing LB agar and 100mg/ml ampicillin), the plate was sealed and incubated at
237 37°C overnight. 3 cell populations were picked from the agar plate and added to 5ml
238 of LB broth in a 50ml falcon which was incubated and shaken at 37°C overnight.

239

240 Mitochondrial DNA amplification by qPCR

241 MT-CO3 sequence was amplified by PCR insertion of DNA molecule containing MT-
242 CO3 into plasmid vector. The plasmid vector was diluted to a known concentration of
243 10^{10} copy standard with the template containing 10^{10} copies per $5\mu\text{l}$. The plasmid
244 vector sample was serially diluted to 1:10 to make standards down to 10^0 . Myoblast
245 genomic DNA was used as a non-template control (NTC) and was made to a
246 concentration of $63.4\text{ng}/\mu\text{l}$ in $200\mu\text{l}$. From this the NTC was made up as 2x $1350\mu\text{l}$ of
247 $0.5\text{ng}/\mu\text{l}$ (675ng in $1350\mu\text{l}$). The positive control was diluted 1:10 and 1:100 (neat
248 gives Ct ~ 21, 1:10 gives Ct ~ 24, 1:100 gives Ct ~ 27). DNA from the plasma
249 samples, JDM and control, were extracted using Norgen Biotek kit Plasma/Serum
250 RNA Purification Mini Kit (Norgen Biotek Corp, Cat#55000)– these were eluted in a
251 minimal volume ($25\mu\text{l}$), $5\mu\text{l}$ used per reaction. $20\mu\text{l}$ of the PCR master mix was
252 pipetted into each well; $5\mu\text{l}$ dH_2O , $1.25\mu\text{l}$ $5\mu\text{M}$ forward primer (5'-
253 CCTTCACCATTTCGGACGGCAT), $1.25\mu\text{l}$ $5\mu\text{M}$ reverse primer (5'-
254 ACGTGAAGTCCGTGGAAGCC), $12.5\mu\text{l}$ iQ™ SYBR® Green Supermix (BioRad,
255 Cat# 170-8882). $5\mu\text{l}$ of NTC, standard or sample was added to each well plus $20\mu\text{l}$
256 master mix. Thermo cycling programme used: 95°C for 5 minutes, 44 cycles of: 95°C
257 for 15 seconds, 63°C for 60 seconds, hold 63 degrees for 3 minutes. Melt curve;
258 start at 68°C , increase by increments of 0.5°C for 30 seconds to 95°C . CFX Maestro
259 software (RRID:SCR_018057) was used to analyse qPCR data against the standard
260 curve to quantify MT-CO3 copy number per volume of plasma sample.

261

262 Oxidised mitochondrial DNA reagent generation

263 Whole blood was collected into EDTA, lysed, and DNA was purified using
264 UltraPure™ Phenol:Chloroform:Isoamyl Alcohol (25:24:1, v/v) (ThermoFisher
265 Scientific, cat#15593031) and precipitated using ethanol (method previously
266 described)⁴⁸. Amplification of the DNA sample generated two long PCR amplicons
267 (9.1kb and 11.2kb) spanning the entire mtDNA genome using PCR primers MTL-1/2
268 (*MTL-F1* 5'-AAAGCACATACCAAGGCCAC, *MTL-R1* 5'-
269 TTGGCTCTCCTTGCAAAGTT, *MTL-F2* 5'-TATCCGCCATCCCATACATT, *MTL-R2*
270 5'-AATGTTGAGCCGTAGATGC (Merck)). $10\mu\text{l}$ of human genomic DNA per $200\mu\text{l}$
271 PCR tube, $40\mu\text{l}$ PCR master mix per $200\mu\text{l}$ PCR tube ($5\mu\text{l}$ 10X LA PCR Buffer II

272 (25mM MgC₂), 2µl 10µM forward primer (MTL-F1, MRL-F2), 2µl 10µM reverse
273 primer (MTL-R1, MRL-R2), 8µl 2.5mM dNTP mix, 22.5µl nuclease free water, 0.5µl
274 TaKaRa LA Taq (5U/µl) (TaKaRa LA Taq® DNA Polymerase (Mg²⁺ free buffer),
275 TaKaRa, Cat# RR002A). Sample ran on pre-programmed thermal cycler.
276 Programme: pre-heat lid set to 100°C. 94°C for 5 minutes. 30 cycles of; 98°C for 15s,
277 68°C for 10s 9slow ramp from 68°C to 60°C at 0.2°C per second), 60°C for 15s,
278 68°C for 11 minutes. 72°C for 10 minutes. Hold at 10°C. Amplicons of mtDNA were
279 purified from residual primers and dNTPs by MSB Spin PCRapace (B-Bridge
280 International). The DNA samples were quantified using a nanodrop, and agarose gel
281 run with 1kb plus DNA ladder (BioLabs inc.). The mtDNA samples were oxidised
282 using the oxidation method: 3µl of H₂O, 50µl mtDNA (500µg) in phosphate buffer
283 (100mM 1M K₂HPO₄ and 1M KH₂PO₄ pH 7.4), 42µl 2.4mM CrCl₃, 6µl H₂O₂ (1:1000)
284 (Merck, Cat# 230723-100G). The mix was incubated at 37°C for 2hr in water bath.
285 To precipitate the mtDNA, 10µl sodium acetate (3M, pH5) and 200µl of -20°C 100%
286 ethanol (ETOH) was added to the mtDNA sample and incubated at -20°C for 10
287 minutes. The sample was spun at 13,000xg at 4°C for 10 minutes, then the
288 supernatant was discarded. 500µl of 70% ETOH was added to the remaining mtDNA
289 pellet. The sample was spun again at 13,000xg at 4°C for 10 minutes, then the
290 ETOH was removed. The sample pellet was spun again at 13,000xg at 4°C for 10
291 minutes to dry. The mtDNA sample was re-suspended in DNA/RNA free ddH₂O at
292 the required concentration. To confirm the mtDNA was oxidised, the oxmtDNA
293 samples were quantified for oxidation using HT 8-oxo-dG ELISA kit II (Bio-technie
294 R&D systems, Cat# 4380-096-K) according to manufacturer's instructions.

295

296 ***Oxidised mitochondrial DNA culture***

297 PBMC were thawed and re-suspended in RPMI medium 1640 (Gibco, cat# 21875-
298 034), supplemented with 10% FBS and 1% penicillin streptomycin (Pen Strep, Gibco,
299 Cat# 15140-122). 0.2M thawed PBMC were cultured with either; RPMI medium
300 (unstimulated or untreated control), IFN-α (1000U/ml – R&D – Cat#11100-1-5UM),
301 oxidised/non-oxidised mtDNA (4µg/ml) with LL37 (InvivoGen, Cat#tlrl-l37), with or
302 without cGAS inhibitor (G140) (1mM) (InvivoGen, Cat# inh-g140), TLR-9 antagonist
303 (ODN TTAGGG (A151)) (5mg/ml - 1:500 dilution) (InvivoGen, Cat#tlrl-ttag151) or N-
304 acetyl-L-cysteine (7.5mM) (Sigma Aldrich, Cat#A7250-5G) added 24hr into the

305 culture with oxidised mtDNA for a further 24hr. PBMC prepared for RNA extraction
306 and isolation using the PicoPure™ RNA Isolation Kit (Thermo Fisher Scientific, Cat#
307 KIT0204). Nanodrop quantification; all samples diluted to the same concentration
308 with ddH₂O (RNA/DNA free) to make 10µl of RNA. cDNA generated using iScript™
309 cDNA synthesis kit (Bio-Rad, Cat#1708891) according to manufacturer's instructions.
310

311 **Gene expression analysis by qPCR**

312 qPCR was run for 3 genes; *PPIA* (House keeper), *MX1* and *RSAD2*
313 (Hs99999904_m1 *PPIA*, Hs00895608_m1 *MX1*, Hs00369813_m1 *RSAD2*, TaqMan
314 gene Expression Assay (FAM), Applied Biosystems™, Cat#4331182). Master mix
315 per well (16µl): 1µl primer, 5µl dH₂O, 10µl master mix (TaqMan™ fast advanced
316 master mix, Applied Biosystems™, Cat#4444557). 16µl of the master mix was added
317 to 4µl cDNA sample. Thermo cycler programme: 50°C for 2 minutes, 95°C for 10
318 minutes 39 cycles of: 95°C for 15 seconds, 60°C for 60 seconds, plate read. Analysis
319 by Bio-Rad CFX Maestro software. Gene expression normalised to house keeper
320 (*PPIA*) by dCT, normalised to experimental control by ddCT and expressed as power
321 of control.

322

323 **Statistics**

324 RNA-seq expression analysis was carried out using R version 3.2.2⁴², and
325 differential gene expression was analysed using edgeR⁴³. GO term and pathway
326 enrichment analysis was carried out using 'goseq' which uses a test based on the
327 Wallenius' noncentral hypergeometric distribution⁴⁴. Gene set enrichment analysis
328 (GSEA) was carried out with "Hallmark" gene sets from databases⁴⁵ based on
329 calculated normalised enrichment scores (NES) and multiple adjusted p-values (q-
330 values) were calculated. For the imaging data analysis of the effect of JDM versus
331 health control as a fixed effect in a linear mixed effects model, with a random effect
332 included to account for individual-specific effects. For each outcome, models were
333 built sequentially starting with an intercept-only model with a random effect for
334 individual, followed by an otherwise identical model with the outcome log- or square
335 root-transformed as appropriate, followed by the addition of disease status as a fixed
336 effect. P-values were generated using nested ANOVA. All other statistics were
337 performed using Prism 9. Bar charts shown with median values and whole range.

338 For parametric data, t-test or one-way ANOVA with Tukey's multiple comparison
339 were used to calculate significance. For non-parametric data Mann-Whitney test or
340 Kruskal-Wallis test with Dunn's multiple comparisons were used to calculate
341 significance. Pearson's correlation test was used to calculate correlation among
342 variables of interest, significance and r-value.
343