Disulfiram inhibits *M. tuberculosis* growth by altering methionine pool, redox status and host-immune response

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ABSTRACT

Methionine biosynthetic pathway, essential for the growth of *Mycobacterium tuberculosis* (*Mtb*) in the host, represents an attractive target for the development of novel anti-tuberculars. Here, we have biochemically characterized homoserine acetyl transferase (HSAT viz. MetA) of *Mtb*, which catalyses the first committed step of methionine and S-adenosylmethionine (SAM) biosynthesis. High-throughput screening of a 2300 compound library resulted in identification of thiram, an anti-fungal organosulfur compound, as the most potent MetA inhibitor. Further analysis of thiram analogs led to the identification of orally bioavailable disulfiram (DIS, an anti-alcoholism FDA approved drug) as a novel inhibitor of MetA. Both thiram and DIS restricted the growth of drug-sensitive and drug-resistant *Mtb* strains in a bactericidal manner. ThermoFlour assay demonstrated direct binding of DIS with MetA. Metabolomic and transcriptomic studies showed DIS mediated perturbation of methionine and redox homeostasis, respectively, in *Mtb*. In concordance, the effect of DIS on *Mtb* growth was partially rescued by supplementation with either L-methionine as well as N-acetyl cysteine, suggesting a multi-target killing mechanism. In *Mtb*-infected mice, DIS administration restricted bacterial growth, increased efficacy of isoniazid, ameliorated lung pathology, modulated lung immune cell landscape and protective immune response. Taken together, our results demonstrate that DIS can be repurposed for designing an effective anti-tubercular therapy.

INTRODUCTION

Mycobacterium tuberculosis (*Mtb*), the etiological agent of tuberculosis (TB), is a leading cause of infections in the world ¹. The success rate of the current chemotherapy against susceptible and drug resistant (DR) *Mtb* are 85% and 55% respectively, specifically when the drug regimen is strictly adhered. Furthermore, due to prolonged duration of chemotherapy and toxicity associated with first-line TB drugs, there is always a risk of poor patient compliance resulting in emergence of DR strains. Hence, there is a need to develop drugs that possess a novel mechanism of action and that can be administered with other front-line TB drugs in order to shorten the duration of chemotherapy ^{1,2}.

Numerous studies involving either target based or phenotypic screening have identified various metabolic pathways that can be exploited to curtail DR *Mtb* ^{3,4,5,6}. These pathways include enzymes involved in either central carbon metabolism or lipid or amino acid or cofactor biosynthesis that have been shown to be essential for *Mtb* survival *in vivo* ^{3,5,7}. Among these, amino acid biosynthetic pathways are corroborated targets for anti-*Mtb* drugs ^{3,8,9}, since enzymes involved in this pathway lack human orthologs and are essential for *Mtb* growth in the host ^{10,11,12,13}. L-aspartate pathway, which synthesizes four essential amino acids L-threonine, L-lysine, L-methionine, and L-isoleucine plays a pivotal role in cell wall biosynthesis, translation and cellular metabolism of *Mtb* ¹⁴. Disruption of L-aspartate pathway suggest that both L-methionine and L-threonine are indeed required for *Mtb* to establish infection in the host, therefore, demonstrating *in vivo* essentiality of the enzymes involved in this pathway ³.

L-methionine is a precursor for S-adenosyl methionine (SAM), which is an essential co-factor for various enzymatic reactions. The enzyme homoserine acetyl transferase (HSAT) performs

the first committed step in L-methionine biosynthesis by converting L-homoserine to O-acetyl-L-homoserine^{15, 16, 17}. The genome of *Mtb* encodes for MetA (Rv3341), which shares a 30-40% sequence identity with HSAT homologs from *C. glutamicum*¹⁶, *L. interrogans*¹⁸ and *H. influenzae*¹⁹. *Mtb*^{MetA} strain showed auxotrophy for L-methionine during *in vitro* growth condition and was attenuated for growth in macrophages, immunocompetent and immunocompromised mice¹², indicating the essentiality of MetA *in vivo*.

In this study, we have performed target based screen and identified FDA-approved anti-alcoholism drug, disulfiram (DIS), as a small molecule inhibitor of *Mtb* MetA. Using an array of approaches we show that DIS (i) targets MetA enzyme and rewires L-methionine metabolism in *Mtb*; (ii) inhibits the growth of *Mtb in vitro* and in macrophages; (iii) alters redox homeostasis in *Mtb*; (iv) enhances efficacy of isoniazid (INH) in macrophages and *Mtb* infected mice; and (v) reprograms immune response, leading to reduced *Mtb* growth and pathology in lung tissues.

RESULTS

High through put screening identifies Thiram as MetA inhibitor that possesses whole cell activity.

The genome of *Mtb* encodes for enzymes belonging to L-aspartate pathway, most of which have been predicted to be essential *in vitro* (Fig. 1a)^{7, 20}. Previous studies have shown that deletion of the *metA* gene resulted in depletion of L-methionine and SAM leading to growth defects of *Mtb in vitro*, macrophages and host tissues¹². Therefore, we first reassessed the essentiality of MetA by generating *metA* knock down strain using dCas9 based CRISPRi approach²¹. The *metA* transcript levels were reduced by ~16.0-20.0-fold in the knock down strain compared to the parental strain (Fig. S1a). The *metA* knock down strain showed reduced

growth *in vitro* (Figs. 1b and S1b), reconfirming essentiality of L-methionine biosynthetic pathway for *Mtb* growth *in vitro*.

Next, we cloned, purified and biochemically characterized recombinant histidine-tagged MetA. The existing structures from *Mtb*, *M. smegmatis*, *M. abscessus*, and *M. hassiacum* revealed that MetA predominately exists in dimeric oligomeric state^{22, 23}. We performed sedimentation velocity analytical ultracentrifugation (SV-AUC) experiments to determine the MetA oligomeric state(s) in solution. We observed three peaks with apparent molecular weights of 43 kDa, 82.5 kDa and 158 kDa corresponding to monomeric, dimeric and tetrameric oligomeric states, respectively, in solution (Fig. S1c). SV-AUC data further suggested that MetA exists predominantly as a dimer in solution, in concordance with the state observed in the crystal structures. The population of the oligomeric species remained unchanged at three different concentrations used in this study (Fig. S1c). The monomeric, dimeric and tetrameric peak fractions, showed comparable HSAT activity, resulting in the formation of 175 μ M coenzyme A (CoA) in 5,5'-dithiobis-2-nitrobenzoic acid (DTNB) based assay (data not shown). Steady state kinetics revealed that the formation of O-acetyl homoserine followed Michaelis Menten kinetics with K_m of 328 μ M and k_{cat} of 44.12 min⁻¹ for acetyl-CoA (Fig. S1d). The catalytic efficient constant (k_{cat}/K_m) for MetA was 0.134 μ M⁻¹min⁻¹. Investigation into the substrate specificity revealed that in addition to acetyl-CoA (AC), MetA could also utilize propionyl-CoA (PC) as an acyl-donor but not succinyl-CoA (SC) (Fig. S1e). Furthermore, MetA was unable to efficiently utilize L-serine or L-threonine as substrate as approximately 15% activity was observed in comparison to L-homoserine containing reactions (Fig. S1f). We observed comparable MetA activity upon inclusion of either Ca²⁺ or Mg²⁺ or Fe³⁺ in assay buffer, however, the presence of Zn²⁺ ions in assay buffer significantly inhibited the enzymatic activity (data not shown). Furthermore, MetA activity was independent of pH of

the assay buffer (Fig. S1g) and maximal activity was attained within the initial 10 mins of the enzymatic reaction (Fig. S1h).

Using the above standardised parameters, we performed a high-throughput screen (HTS) in duplicates using a 2300 compound library to identify inhibitors for MetA activity *in vitro* (Fig. 1c). In our preliminary screen, 72 compounds were able to inhibit the formation of CoA by more than 50% *in vitro* at 100 μ M concentration (Fig. 1d). To eliminate false positives, inhibition assays were repeated using 26 primary hits. Among these, 8 compounds, NSC1771, NSC48443, NSC73735, NSC98363, NSC369066, NSC635448, NSC645987 and NSC624158, inhibited MetA activity by more than 50% at 100 μ M concentration (Fig. 1e). These active compounds also showed dose dependent inhibition of MetA enzymatic activity *in vitro* (Figs. 1f and S2). Next, we performed assays to evaluate the *in vitro* antitubercular activity of the identified MetA inhibitors. NSC1771, NSC635448 and NSC369066 were found to be the most potent compounds (Fig. 1g), with NSC1771 (also known as Thiram) displaying most potent MIC₉₀ value in the range of 1.56-3.12 μ M against both drug-sensitive and DR strains (Fig. 1h), thereby suggesting it targeted a metabolic pathway that was distinct from the targets of current first- and second-line TB drugs. Taken together, our target-based screen identified thiram as a MetA inhibitor with whole cell activity against *Mtb*.

Disulfiram, an anti-alcoholism drug weakly binds MetA and alters metabolic profiles of *Mtb in vitro*.

Thiram, the most active compound in our HSAT based screen is an organosulfur-based drug, used mainly as a fungicide in plants²⁴. In animals, it has few applications where it is applied directly to the skin or incorporated into sun screen or soaps²⁴. To identify an orally bioavailable thiram analogue we ordered 6 compounds from NIH-DTP (Fig. S3). All analogues except

NSC1339 and NSC93058 inhibited MetA activity by >50% at 100 μ M concentration (Fig. 2a). However, among the 4 active analogues, only DIS displayed an *in vitro* MIC₉₉ values similar to thiram viz. 3.12 μ M (Fig. 2a). DIS inhibited MetA activity *in vitro* in a dose dependent manner (Fig. 2b) and also showed *in vitro* anti-tubercular activity against DR *Mtb* strains (Fig. 2c).

DIS is an FDA approved drug used for treatment of chronic alcoholism and sold under the trade name, Antabuse²⁵. The drug is currently under clinical investigations against certain types of cancer and HIV-1 infection^{26,27}. Since DIS is an electrophile that can readily form disulfide with thiol-bearing molecules, we next performed ThermoFlour assays to determine the strength of DIS binding with recombinant MetA in order to eliminate the possibility of non-specific inhibition in our assay (Fig. 2a,b). A negative shift of about 4°C in MetA T_m reveals that DIS binds MetA with a K_d of ~ 52 μ M (Fig. 2d). No thermal shift was observed with isoniazid (INH), a negative control in the ThermoFlour assays (data not shown). Next, we performed *in vitro* killing experiments, and found that the exposure of early-log phase *M. bovis* BCG cultures to 10x MIC₉₉ DIS resulted in 50- and 120-fold killing at 3- and 6-days post-exposure, respectively (Fig. 2e). The levels of killing seen in 10x MIC₉₉ DIS treated samples was almost comparable to that seen upon exposure to 10x MIC₉₉ INH (Fig. 2f). In order to further validate MetA to be the target for DIS, we compared the intracellular levels of L-methionine and SAM in untreated and DIS treated *Mtb*. The reduced levels of L-methionine and SAM in DIS-treated cultures in comparison to untreated cultures, indicated inhibition of MetA *in vitro* (Fig. 2f). Interestingly, supplementation of medium with L-methionine partially abrogated the killing activity of 1x MIC₉₉ DIS *in vitro* (Fig. 2g). Of note, *Mtb*^{MetA} mutant strain also showed reduction in levels of L-methionine and SAM in liquid cultures¹².

DIS treatment also inhibited the growth of intracellular *Mtb* (~ one log₁₀ fold) in primary human monocytes in a dose-dependent manner (Fig. 2h). Further, we performed checkerboard assays to determine the synergistic effect of DIS with INH against intracellular mycobacteria. The data indicates that combination of 10 µM DIS along with 0.4 µM INH, resulted in an increased inhibition of the intracellular mycobacterial growth compared to either drug alone (Fig. 2i). Taken together, our data suggest that DIS (i) targets methionine biosynthetic pathway, (ii) inhibits *Mtb* growth in a bactericidal manner and (iii) enhances the efficacy of INH against intracellular bacteria.

Disulfiram perturbs redox homeostasis in *Mtb*.

DIS has been shown to inhibit several metabolic enzymes such as urease, aldehyde dehydrogenase and triose phosphate isomerase in various microorganisms^{28, 29, 30}. Therefore, to further delineate the mechanism behind DIS mediated killing *in vitro* we compared the transcriptomic profiles obtained from *Mtb* exposed to either 1x or 10x MIC₉₉ of DIS with DMSO treated samples. Differential gene expression (DGE) analysis (FDR < 0.05 and log₂ fold change > 1.5 or < -1.5) identified that the transcript levels of 107 genes (59 upregulated and 48 downregulated) were altered in 1x MIC₉₉ DIS treated samples in comparison to control (Fig. 3a and Table S1). Majority of the identified DEGs were categorized as either conserved hypothetical proteins or regulatory proteins or the ones involved in cell wall processes or intermediary metabolism (Fig. 3b). Downregulated genes included enzymes involved in (i) cell division (*sepF*, *ftsW*), (ii) copper resistance (*mctB*) (iii) cutinase activity (*cfp21*) and (iv) respiration (type I NADH dehydrogenase; *nuoF*, *nuoH* and *nuoE*), all of which have been shown to be important for *Mtb* growth *in vitro* or *in vivo*^{31, 32}. The exposure of *Mtb* cultures to 10x MIC₉₉ DIS resulted in differential expression of 119 transcripts (Fig. S4a and Table S1), 53 of which were common with the DEGs observed in 1x MIC₉₉ DIS treated samples (Fig. 3c).

In agreement with 1x MIC₉₉ DIS DEGs, 10x MIC₉₉ DIS DEGs were also categorized as either conserved hypothetical proteins or regulatory proteins or the ones involved in cell wall processes or intermediary metabolism (Fig. S4b). Various transcripts such as *espR*, *hupB*, *mctB*, *senX3*, *drrC*, *rpsC*, *dapB*, *Rv2927c*, *murB*, *lgt*, *dnaB*, *ilvC*, etc which are essential for *Mtb* growth or virulence were found to be downregulated upon exposure to 10x MIC₉₉ DIS (Table S1). The more detailed assessment of common 53 DEGs, showed upregulation of genes involved in (i) sulfur metabolism and cysteine biosynthesis (*cysA1*, *cysK2* and *cysN*), (ii) DNA replication and repair (*nrdE*, *nrdH* and *nrdL*), (iii) oxidative stress (*trxC*, *trxB1* and *trxB2*), (iv) transporters (*arsC*, *ctpG*, *cmtR*, *cadL*) and (v) regulatory proteins (*sigE*, *Rv3334*, *Rv3463*, *Rv1086*) (Fig. 3c). The observed downregulation of transcripts belonging to cell wall regulators such as *sepF*, *glmU*, *Rv3400*, *Rv1698* indicated that DIS might effect *Mtb* cell wall integrity (Fig. 3c).

The increased expression of thioredoxins, cysteine biosynthesis enzymes and type I NADH dehydrogenases genes (Fig. 3a,c), suggested that exposure to DIS may result in the alteration of redox homeostasis and generation of reactive oxygen species (ROS), which has been shown to restrict *Mtb* growth^{33, 34}. In agreement, DIS treatment (either by 1x MIC₉₉ or 10x MIC₉₉) increased the ROS production in *Mtb* as early as 6h (Fig. 3d,e), which was maintained till 24h post-treatment (Fig. S4c,d). The addition of ROS-quenching agent N-acetyl Cysteine (NAC) in liquid cultures abolished the ability of DIS to induce ROS (Fig. 3d,e and Fig. S4b,c) and partially abrogated 1x MIC₉₉ DIS mediated killing of *Mtb* (Fig. 3f). Taken together our data suggest that DIS exposure alters the redox homeostasis of *Mtb* and in addition to inhibition of MetA and copper homeostasis³⁵, ROS generation is another mechanism for DIS mediated killing *in vitro*.

Disulfiram reduces *Mtb* burden and tissue pathology in mice.

We next evaluated the *in vivo* efficacy of DIS in acute TB murine model where *Mtb*-infected C57BL/6 mice were treated with DIS starting from day 7 post-infection (Fig. 4a). DIS treated mice showed decreased bacillary load in the lung and spleen compared to untreated mice at 4 weeks (wk) post-treatment (p.t.) or 35 days post-infection (p.i) (Fig. 4b,c). In order to significantly improve the control of TB, drugs should also promote resolution of tissue pathology in addition to accelerating bacillary clearance ³⁶. Therefore we performed histopathologic examination of the lungs from *Mtb*-infected mice treated with DIS at 4 wk p.t. Evaluation of the lungs of uninfected mice showed completely intact lung parenchyma (Fig. 4d). Examination of lungs from untreated *Mtb*-infected mice revealed peribronchial diffuse coalescent lesions with large numbers of infiltrating macrophages and lymphocytes, and numerous intracellular acid-fast-bacilli (AFB) (Fig. 4d,e). Interestingly, DIS treatment was associated with increased lymphocyte infiltration and formation of aggregates in the infected tissues (Fig. 4d), and reduced numbers of AFB (Fig. 4e). These properties have been associated with improved *Mtb* control in mice ³⁷. Taken together, our results indicate that DIS treatment controls *Mtb* growth and ameliorates TB pathology, suggesting the potential of DIS as an adjunct to current TB therapy.

Disulfiram treatment enhances protective innate immune response in lung tissues.

To further investigate the mechanism by which DIS restricts *Mtb* growth in the mouse lung, a genome-wide transcriptional analysis using total RNA isolated from uninfected or untreated or DIS-treated *Mtb*-infected mouse lungs was performed. At 4 wk p.t 2846 transcripts (FDR < 0.05) were differentially expressed in response to infection (*Mtb*-infected vs uninfected, Table S2). Treatment of infected mice with DIS altered the expression of 169 genes (54 decreased and 115 increased) as compared to the untreated group (Fig. S5a and Table S2). Ingenuity

pathway analysis (IPA) of 169 differentially expressed genes (DEGs) revealed that DIS treatment (i) increased the transcript levels of genes associated with mTOR (mechanistic target of rapamycin) signalling and MIF (Macrophage Migration Inhibitory Factor)-mediated innate immunity; and (ii) decreased the expression of genes associated with oxidative phosphorylation (OXPHOS) and Wnt pathway (Fig. S5b). mTOR is crucial for restricting *Mtb* growth by inducing autophagy³⁸. MIF is a critical mediator of the innate immune response to *Mtb*³⁹. MIF deficient mice are susceptible to *Mtb* infection with increased lung pathology and decreased innate cytokine production such as TNF- α ³⁹.

To further dissect the effect of DIS on lung immune response and TB pathogenesis, we next performed a time-course analysis using the RNA-seq data from uninfected or untreated or DIS-treated *Mtb*-infected mouse lungs at 21 and 35 days p.i. This resulted in an identification of five distinct gene clusters (Cluster 1 – 5; Fig. 5a and Table S3) that are differentially expressed between different groups. Cluster 3 and 5 included the genes which were upregulated by *Mtb* as early as 21 days p.i, however DIS treatment had no effect on the expression of these genes at either 21 and 35 days p.i (Fig. 5b). The transcript levels of genes in Cluster 1 initially increased in response to infection and subsequently decreased to the levels observed in uninfected animals (Fig. 5b). DIS treatment, however, resulted in constant increase in the expression of these 61 genes till 35 days p.i (Fig. 5b). The genes in the cluster 1 included mostly innate response genes such as *vim*, *mif*, *card9*, and *nod1* (Table S3), which are important for the control of *Mtb* infection in host cells/tissues^{39, 40, 41, 42}. We also noticed enrichment of MIF-related innate immunity pathways among cluster 1 genes (Fig. 5c). Cluster 2 included the genes associated with OXPHOS (*cox4II* and *uqcrl1*), expression of which was continuously decreased in infected tissues (Fig. 5b,d). DIS treatment resulted in reducing the expression of cluster 2 genes back to the level noticed in uninfected animals (Fig. 5b). The transcript levels

of genes belonging to Cluster 4 were reduced in DIS-treated mice in comparison to untreated mice at 35 days p.i (Fig. 5b). Importantly pathways such as Wnt signaling that promotes TB infection were enriched among cluster 4 genes (Fig. 5e) ⁴³.

MIF has been shown to upregulate TLR4 expression by macrophages resulting in enhanced production of cytokine (including MIF), and other chemokine mediators ⁴⁴. Hence, we measured cytokines and chemokines in the lung homogenates of DIS treated *Mtb*-infected mice. At 4 wk p.t, in comparison to infected mice, DIS-treatment resulted in increased levels of cytokines that constitute innate immune response such as TNF α , IL-6, IL-1 β , and IL-17 in the lung homogenates (Fig. 5f). We also noticed increased levels of chemokines such as IP-10, MIP-1 β and MIP-2 in DIS treated *Mtb*-infected mice (Fig. 5f). These chemokines/cytokines are essential for survival following *Mtb* infection and known to potentiate anti-TB immunity ⁴⁵. Taken together, our results indicates that DIS regulates immunoregulatory mechanisms in the lungs of infected mice leading to the enhancement of protective immune response.

Disulfiram enhances *Mtb* clearance by anti-TB drugs in mice and modulates lung immune cell landscape.

We next investigated the adjunctive efficacy of DIS with INH in the chronic mouse model experiment using C57BL/6 mice ⁴⁶, where treatment was initiated at day 30 p.i. (Fig. 6a). After 4 wk of therapy at 60 days p.i mice treated with INH in combination with DIS showed reduced lung bacillary loads in comparison to INH treated mice (Fig. 6a). To further explore the differential effect of DIS on host immune response, pulmonary immune cells were phenotyped using flow cytometry. Analysis of macrophages at 4 wk p.t. deciphered three unique population viz. alveolar macrophages (AMs, CD64⁺F4/80⁺CD24⁻CD11b⁻CD11c⁺MHC-II⁻), interstitial macrophages (IMs, CD64⁺F4/80⁺CD24⁻CD11b⁺CD11c⁻MHC-II^{hi}) and monocyte-derived

macrophages (MDMs, CD64⁺F4/80⁺CD24⁺CD11b⁺CD11c^{mid}MHC-II^{lo}) (Fig. S6a,b). An increased frequency of AMs, the first line of immune defense against respiratory pathogens such as *Mtb*⁴⁷, was observed in the INH+DIS treated mice in comparison to both untreated and INH-treated groups (Fig. 6b). Lungs of INH and INH+DIS treated mice also had an increased (i) Ly6C^{mid}CD43⁺ intermediate monocytes (int-Mo), and (ii) Ly6C^{lo}CD43⁺ non-classical monocytes (nc-Mo, known as patrolling tissue repair monocytes), at 4 wk p.t (Fig. 6c). However, no differences on the infiltration of Ly6C^{hi}CD43⁺ classical monocytes (c-Mo) was observed between different groups (Fig. 6c). Lungs of both INH and INH+DIS treated mice showed decreased conventional type 1 and 2 dendritic cells (cDC1 and cDC2, respectively), and neutrophils in comparison to untreated groups (Fig. S6c). No effect on the frequency of eosinophils was observed (Fig. S6c). Profiling of lung lymphoid cells (Fig. S7a), which are essential to control primary *Mtb* infection⁴⁸, showed no effect of treatment on the frequency of total CD3⁺, CD4⁺, CD8⁺ T cells; and NK cells in lung tissues (Fig. S7b). However, dissection of T cells based on CD44 and CD62L expression indicated an increased frequency of lung CD8⁺CD44⁺CD62L⁺ naïve T cells (T_N) and decreased CD8⁺CD44⁺CD62L⁺ effector T cells (T_E) in INH+DIS treated mice compared to the untreated or INH treated mice (Fig. 6d). This was paralleled with a similar trend in CD4⁺ T cell subsets (Fig. 6e), thus confirming the dominance of T_N over T_E cells among CD4⁺ and CD8⁺ T cells in lungs of INH+DIS treated mice (Fig. 6f). However, the frequency of CD8⁺ or CD4⁺ central memory T cells (T_{CM}) remained unchanged between different groups (Fig. 6d,e). Overall, our results suggest that apart from direct anti-bacterial effect, DIS also results in the reprogramming of protective immune response, which must be tightly regulated to maintain disease tolerance and host survival^{49, 50, 51}.

DISCUSSION

1 Methionine biosynthesis pathway is (i) involved in several biological processes such as
2 translation initiation, synthesis of SAM, DNA and sulphur containing compounds, (ii) absent
3 in mammalian cells, and (iii) predicted to be essential for the growth of microorganisms ^{12, 52}.
4 Indeed, *Mtb* needs a functional methionine/SAM biosynthesis for survival in the host ¹²,
5 suggesting that the enzymes belonging to this pathway are attractive targets for designing new
6 anti-*Mtb* therapy. Here, using a high-throughput target based screen, we identified 8
7 compounds including thiram (a plant fungicide) and its analogue disulfiram (DIS, a FDA
8 approved anti-alcoholism drug, Antabuse) as inhibitors of *Mtb* homoserine acetyl transferase
9 (HSAT, known as MetA), an enzyme that catalyzes the conversion of homoserine to O-acetyl-
10 L-homoserine in L-methionine biosynthesis pathway ^{15, 16, 17}. The identified scaffolds inhibited
11 *Mtb* MetA's acetyl transferase activity *in vitro* and were structurally different from the known
12 fungal-HSAT inhibitors, CTCQC (a nucleotide substrate analogue) and Ebelactone A ^{52, 53}. All
13 initial hits except NSC635488, NSC369066 and thiram displayed anti-tubercular activity of
14 greater than 10 μ M in whole-cell based assay, which could be attributed to their ineffective
15 transport and/or intracellular metabolism. Among thiram analogues, DIS was the most potent
16 compound displaying comparable anti-tubercular against both drug-sensitive and DR *Mtb*
17 strains. In agreement, DIS treatment resulted in the reduced levels of L-methionine and SAM
18 *in vitro*. Supplementation of liquid cultures with L-methionine partially restored DIS mediated
19 killing of *Mtb*, which phenocopied the effect of L-methionine supplementation on the growth
20 of *Mtb*^{MetA} strain ¹². Since methionine and SAM together play an important role in translation
21 initiation and one-carbon metabolism ⁵⁴, our finding suggest that DIS treatment might lead to
22 a metabolic shutdown in *Mtb*. Importantly, SAM is also required for the biosynthesis of
23 mycolic acid that is essential for viability, drug resistance and cell wall integrity of *Mtb* ⁵⁵.
24 However, DIS exposure did not affect the mycolic acid composition of *Mtb* (data not shown).
25 Of note, DIS has demonstrated anti-bacterial activity against various *Mtb* clinical isolates

including DR strains ⁵⁶, methicillin-resistant *Staphylococcus aureus* ⁵⁷ and *Pseudomonas aeruginosa* ⁵⁸.

In addition to targeting methionine biosynthesis pathway, analysis of *Mtb* transcriptome suggested that DIS might alter redox homeostasis by inducing endogenous oxidative stress in *Mtb*. Indeed, we found DIS elevates endogenous ROS in *Mtb* and supplementation of liquid cultures with NAC partially restored DIS mediated killing *in vitro*. ROS is also accumulated in L-arginine deprived *Mtb* where it leads to oxidative damage of DNA, RNA and proteins resulting in cell death ^{59, 60}. Similarly, drugs such as clofazimine, INH and vitamin C induce rapid death by ROS generation leading to oxidative damage ^{61, 62, 63}. Since redox stress could lead to the generation of drug tolerant *Mtb* and high rates of TB therapy failure ⁶⁴, targeting redox metabolism by FDA approved drugs might enhance mycobactericidal activities of first-line TB drugs ^{64, 65}. Indeed DIS enhanced *Mtb* clearance by INH *in vitro* and *in vivo*, which might be attributed to the ROS generation property of both drugs. DIS has earlier been shown to enhance the efficacy of rifampicin, which also generate ROS in *Mtb* ⁶⁶, in mice lungs ⁵⁶. Importantly, maintaining an appropriate redox balance is critical to the clinical outcome because (i) several anti-TB prodrugs are only effective upon bioreductive activation and (ii) proper homeostasis of oxido-reductive systems is essential for *Mtb* survival, persistence and subsequent reactivation.

In the lungs of infected mice DIS ameliorated TB pathology and augmented anti-*Mtb* protective immune responses ⁴⁵. Specifically, transcriptomic analysis of lung cells revealed that DIS treatment resulted in induction of MIF-mediated innate immunity, which has been shown to be critical for host immunity against TB ³⁹. Mice deficient in MIF had increased lung pathology and decreased innate cytokine production (IL-6, TNF- α and IL-17) ³⁹, all of which were

increased in the lung of DIS-treated *Mtb*-infected mice. In addition, INH+DIS treated mice showed increased recruitment of AMs, cells which are the first immune cells to encounter invading *Mtb* and are responsible for the outcome of TB disease⁴⁹. AMs are known to influence responses of local T cells in the lung⁶⁷, which though are important to contain *Mtb* infection⁴⁸. However, when dysregulated, these cells can promote TB pathology and susceptibility⁵⁰, suggesting that a tightly regulated T cell response is fundamental for host to achieve better control of TB. By rewiring the effector T cell frequency DIS might be strengthening the host immune repertoire involved in combating *Mtb*. Of note, host-directed therapies targeting pathologic effector T cells have been proposed⁶⁸.

Taken together, this study expands our knowledge about the plausible anti-mycobacterial activities of DIS by highlighting that in addition to rewiring methionine metabolism, redox homeostasis, DIS also modulates host protective immunity against *Mtb*. We further speculate that this drug would also be able to clear intracellular bacteria that might acquire mutation during the course of chemotherapy. Lastly, since alcohol consumption increase the risk for TB by three-four fold⁶⁹, greater than that by diabetes and smoking, our study may entice the development of TB treatment strategies for this emerging co-morbidity.

METHODS

Chemicals, Strains and Growth conditions. The chemicals used in the present study were procured from Sigma, Merck unless mentioned. *Escherichia coli* XL-1 Blue and BL-21 (λ DE3, plysS) were used for cloning and protein expression studies, respectively. *Mtb* H37Rv strain was used for MIC₉₉ determination and growth inhibition experiments. In the present study, various *E.coli* and mycobacterial strains were cultured in Luria Bertani and Middlebrook medium, respectively as previously described ⁷⁰. The *metA* knock down strain of *Mtb* were constructed using CRISPRi approach as previously described ²¹. The growth of parental and *metA* knocked down *Mtb* strains was compared by measuring OD_{600nm} at regular intervals and spotting of 10.0 fold serial dilutions at designated time points. The genotypes for various *Mtb* clinical strains used for MIC₉₀ determination are the following; TDR91: RIF^r, EMB^r, TDR116: INH^r, PAS^r, EMB^r; TDR31: INH^r, RIF^r, EMB^r, KAN^r, SM^r, CAP^r; TDR6: RIF^r, INH^r, EMB^r and TDR93: INH^r, EMB^r

Expression and Purification of HSAT protein. For expression studies, *metA* was PCR amplified and cloned into prokaryotic expression vector, pET28b. pET28b-*metA* was transformed into BL-21 (λ DE3, plysS) and protein expression was induced by the addition of 0.3 mM isopropyl β -D-1-thiogalactopyranoside (IPTG) at O.D_{600nm} ~ 0.5 at 18°C, overnight. The induced cultures were lysed by sonication and recombinant protein was purified from clarified lysates using nickel-nitrilotriacetic acid (Ni-NTA) resin as per manufacturer's recommendation. The elution fractions were concentrated and (His)₆-Rv3341 was further purified by gel exclusion chromatography using Superdex 200 Increase 10/300 GL column (GE Healthcare). The purified fractions were pooled, dialysed, concentrated and stored as aliquots in enzyme storage buffer (50 mM NaH₂PO₄, 300 mM NaCl, 10% glycerol). The

amount of protein in purified concentrated fractions was quantified using UV-Vis spectroscopy and Bradford reagent as per standard protocols.

Analytical ultracentrifugation experiments. In order to determine the oligomeric state of MetA, AUC experiments were performed using Beckman-Coulter XL-A analytical ultracentrifuge equipped with a TiAn50 eight hole rotor. The protein samples at three different concentrations (10, 20 and 30 μ M in 20 mM Tris-Cl, pH 7.5 and 150 mM NaCl buffer) were prepared, centrifuged at 40,000 rpm and the absorbance scans were recorded at 280 nm every 3 or 4 mins. To fit multiple scans at regular intervals, SEDFIT continuous distribution c(s) model was used ⁷¹. SEDNTERP (<http://www.rasmb.bbri.org/>) was used to find the solvent viscosity (η) and density (ρ).

Biochemical characterization of MetA enzyme. To optimise the assay condition for MetA enzyme, various parameters such as buffer pH, ion concentration, substrate specificity, and reaction time were standardised. The enzymatic activity was measured spectrophotometrically at 412 nm using 0.2 mM Ellman's reagent ⁷². For K_m , V_{max} , k_{cat}/K_m determination, initial velocities in enzyme reactions (rate of CoA released in μ M) were plotted against different concentration of acetyl-CoA using non-linear regression to the Michaelis-Menten equation using Prism software (GraphPad software, version 8.0). The substrate specificity of MetA was also determined by performing enzymatic reactions in the presence of 1.0 mM L-homoserine or L-serine or L-threonine. The enzymatic reactions were also performed using 1.0 mM L-homoserine in the presence of either 1.0 mM acetyl-CoA or propionyl-CoA or succinyl-CoA.

High-throughput screening to identify MetA inhibitors. An endpoint HSAT activity based assays was performed using the 2300 structurally diverse compounds belonging to small

molecule library of the National Cancer Institute Developmental Therapeutic Program (NCI-DTP) in 96 well format. High through put screening assays were performed in 30 μ l reaction volume containing 100 mM Tris-Cl, pH-7.4, 5.0 mM $MgCl_2$, 500 nM (His)₆-MetA and the corresponding compound of the chemical library at a single concentration of 100 μ M. The enzyme-scaffold mix was incubated at room temperature for 10 mins and the reaction was initiated by the addition of 1.0 mM L-homoserine and 1.0 mM acetyl-CoA. The reaction was further incubated at 37°C for 10 mins, the amount of CoA released in enzymatic reaction was determined upon DTNB addition and subsequently, total activity and percentage inhibition was calculated. All reaction plates contained appropriate enzyme only, substrate only and assay buffer control. The activity assays were also performed in the presence of 3.125 μ M to 100 μ M concentration of various compounds. The final DMSO concentration in each reaction was 10% and each reaction was performed in triplicates.

Characterization of the binding of DIS with MetA using ThermoFlour assays. The SYPRO Orange dye was used to monitor MetA folding in the absence or presence of DIS. The protein samples (5 μ M) were heated from 20°C to 95°C with an increment of 1°C per min cycle. The increase in temperature results in protein unfolding, SYPRO Orange dye binds to unfolded protein and fluorescence intensity is measured at an excitation and emission wavelength of 372/472 nm and 570 nm, respectively. The data was acquired from step-one software and plotted to calculate melting temperature (T_m) of MetA in the absence or presence of DIS.

MIC₉₉ determination and *in vitro* killing experiments. The antimicrobial activity of hits identified from high-throughput screening was measured as previously described^{70,73}. Briefly, the small molecules were serially diluted 2.0-fold with a final volume of 50 μ l. Subsequently

early-logarithmic mycobacterial cultures ($OD_{600nm} \sim 0.2$) were serially diluted 1:1000, 50 μ l of diluted cultures were added to each well and plates were incubated at 37°C for 14 days. The minimum inhibitory concentration (MIC_{99}) was the lowest concentration of compound that completely inhibited *Mtb* growth in 96 well plates. For *in vitro* killing experiments, early-logarithmic cultures ($OD_{600} \sim 0.2$) of *M. bovis* BCG were exposed to 10x MIC_{99} concentration of drugs for different time points. Further, *in vitro* killing experiments were also performed in the absence or presence of 50 μ g/ml or 200 μ g/ml L-methionine or 10 mM N-acetyl-cysteine. At designated time point, 10.0-fold serial dilutions were prepared and 25 μ l was plated on MB7H11 supplemented with oleic acid–ADC (OADC) at 37°C for 3-4 weeks.

Metabolomics experiments: *M. bovis* BCG cultures ($OD_{600nm} \sim 0.4 - 0.6$) were exposed to either DMSO or 10 μ M DIS. At designated time points, cultures were harvested and samples were processed as previously described¹². Briefly, the data was acquired on the orbitrap fusion mass spectrometer equipped with heated electrospray ionization (HESI) source. Data was acquired on positive and negative mode at 120,000 resolution in MS1 mode and 30000 resolution in data-dependent MS2 scan mode. The spray voltage of 4000 and 35000 volt for positive and negative modes was used respectively. Sheath gas and auxiliary gas were set to 42 and 11 respectively. Mass scan range was 60-900 m/z, AGC (automatic gain control) target at 100000 ions and maximum injection time was 50 ms for MS and AGC target was 20000 ions and maximum injection time 60 ms for MS/MS was used. The extracted metabolites were separated on UPLC ultimate 3000 using XBridge BEH Amide column (100 x 2.1 mm i.d, 2.5 micrometre) maintained at 35°C temperature. The mobile phase A was 20 mM ammonium acetate in the water of pH 9.0 and mobile phase B was 100% acetonitrile. The elution gradient is used as follows: 0 min, 85% B, 2 mins, 85% B, 12 mins, 10% B, 14 mins, 10% B, 14.1mins, 85% B, and 16 mins, 85% B. The flow rate of 0.35 mL/min and the sample injection volume

was 5 microliter. The acquired data was processed using Progenesis QI for metabolomics software using the default setting. The untargeted metabolomics workflow of Progenesis QI was used to perform retention time alignment, feature detection, deconvolution, and elemental composition prediction. Metascope plug of Progenesis QI was used for the in-house library with accurate mass, fragmentation pattern and retention time for database search. The available online polar compounds spectral library was used for further confirmation of identification. Samples from three biological replicates in duplicates were harvested at day 1, 2, 4 and 6, metabolites extracted and subjected to UPLC-MS analysis. The data shown is fold change observed relative to the untreated samples.

Flow cytometry for ROS estimation

Reactive oxygen species production in untreated and DIS-treated *M. bovis* BCG samples was evaluated using dihydroethidium (DHE) as probe. Briefly, mid-log phase *M. bovis* BCG cultures ($OD_{600nm} \sim 1$) were diluted to an $OD_{600nm} \sim 0.02$ and treated with either DMSO (vehicle control), 1x MIC₉₉ or 10x MIC₉₉ DIS concentration alone or in the presence of 10 mM NAC. At different timepoints, the cultures were harvested, washed twice with 1x PBS (pH 7.4) and stained with DHE (5 μ M) at 37°C for 30 mins. The fluorescence intensity was detected by FACS calibur (BD Biosciences) and analyzed by FlowJo software v10.

Bacterial RNA-seq and analysis: To assess the effect of DIS on *Mtb* transcriptome, early log phase cultures ($OD_{600nm} \sim 0.2$) and treated with 1x- and 10x-MIC₉₉ concentration of DIS for 24 h. The samples were then processed for total RNA isolation by TRIzol reagent as per manufacturer's protocol. *Mtb* total RNAs were analyzed using an Agilent Bioanalyser for quality assessment with a RNA Integrity Number (RIN) range of 6.2 to 9.7 and a median of 8.1. Ribosomal RNA (rRNA) were depleted from 500ng of bacterial RNA using RiboMinusTM

Bacteria Transcriptome Isolation Kit (Invitrogen Thermo Fisher Scientific), according to manufacturer's protocol. cDNA libraries were prepared from rRNA depleted mRNA using Lexogen SENSE Total RNA-Seq Library Prep Kit according to manufacturer's protocol. The length distribution of the cDNA libraries was monitored using a DNA High Sensitivity Reagent Kit on the Perkin Elmer Labchip. All samples were subjected to an indexed paired-end sequencing run of 2 x 151 cycles on an Illumina HiSeq 4000 system. FASTQ files were mapped to the *Mtb* strain H37Rv (GenBank accession number AL123456.3) using bowtie2. Gene counts were then counted using feature Counts (part of Subread package) using annotations from same GenBank record. The DEG comparisons between 1x MIC₉₉ DIS vs DMSO and 10x MIC₉₉ DIS vs DMSO were performed using DESeq2. Heat maps and volcano plots were generated in R version 3.3.3. The gene type annotations from the GenBank record was used to classify the genes for analysis.

THP-1 cell culture: Human monocyte THP-1 cells (ATCC®, TIB-202™) were cultured in RPMI 1640, complete with the following supplements; 10% heat-inactivated fetal bovine serum (FBS), 1% sodium pyruvate, 1% L-glutamine, 1% non-essential amino acids, and 1% kanamycin, at 37°C in a 5% CO₂ humidified atmosphere. During infection, cells were seeded at a density of 3 x 10⁶ per millilitre and no antibiotic was used.

Isolation of human primary monocytes: Peripheral blood mononuclear cells (PBMCs) were isolated from total blood using a Ficoll gradient. Monocytes were enriched from PBMCs using CD14 magnetic selection. Blood collection from healthy volunteers was approved by the Institutional Review Board (IRB), NHG Domain, Singapore.

Infection of cells with mycobacteria: For infection studies, *Mtb* H37Rv and *M. bovis* BCG were grown till an OD_{600nm} 0.4 – 0.5. The mycobacterial cells were pelleted, resuspended in fresh Middlebrook 7H9 medium with 20% glycerol, and stored at -80°C. A vial of the bacterial stock was thawed to estimate CFU per millilitre. Frozen mycobacterial strains were thawed, washed, resuspended in antibiotic-free complete RPMI 1640, and used to infect cells with a multiplicity of infection of 1:5. The infected cells were incubated at 37°C in 5% CO₂ for 3 hours, subsequently washed twice with antibiotic-free medium, counted and seeded in triplicate or replicate of five, either left treated (by different doses of INH and DIS either alone or in combination) or untreated. At designated time points, treated cells were washed once with 1x PBS, lysed with 0.06% SDS and 10.0-fold serial dilutions were plated on Middlebrook 7H11 agar supplemented with OADC at 37°C for 3-4 weeks.

Mouse models of infection with *Mtb*: The *in vivo* anti-tubercular activity of DIS was evaluated in an acute infection model of C57BL/6 mice. Adjunctive activity of DIS with INH was evaluated in a chronic infection model of C57BL/6 mice. Female C57BL/6 mice (6 to 8 weeks old), were anesthetized then infected intratracheally with *Mtb* at a dose of ~1000 CFU. Three to four animals were sacrificed at day 1 to determine the number of bacteria embedded in the lungs, which is 150-300 CFU. For the acute model, DIS treatment was initiated 7 days after infection, and mice were orally administered with the drug once a day, 6 days a week, for 4 wk. Two treatment groups: (i) infected mice receiving DIS (160 mg/kg), diluted in polyethylene glycol (PEG); (ii) infected mice receiving vehicle only (PEG). For the chronic model, treatment was initiated 30 days after infection, and the drugs were orally administered once a day, 6 days a week, for 4 wk. Three treatment groups: (i) infected mice receiving INH (10 mg/kg), diluted in PEG; (ii) infected mice receiving INH (10 mg/kg) and DIS (160 mg/kg), diluted in PEG; and (iii) Infected mice receiving vehicle only (PEG). All mice were housed in

a biosafety level 3 (BSL3) laboratory, and treated humanely using procedures described in animal care protocols. The proposed animal experiments were approved by the institutional animal ethics committee of Defence Science Organization (DSO), Singapore.

Enumeration of *Mtb* CFU in infected mice: The mycobacterial loads in lungs and spleens of infected mice at different time points was quantified by plating tissue homogenates on Middlebrook 7H11 agar supplemented with OADC. At scheduled time points, mice were euthanized, organs were aseptically collected, washed and homogenised in 1x PBS using a MACS tissue dissociator. Tissue homogenate were serially diluted and plated in triplicate on Middlebrook 7H11 agar supplemented with OADC at 37°C for 3-4 weeks. CFU obtained from two or three dilutions were used to calculate the total number of CFU per tissue per mouse.

Histology: The lower left lobe of the mouse lung was fixed in 10% buffered formalin and paraffin-embedded. Sections were stained with haematoxylin and eosin (H&E) and Ziehl-Neelsen acid-fast stain as described previously ⁴⁶. The histologic examination was performed after coding of the samples. The images were photographed with Olympus Microscope and captured at either 10x or 40x or 60x.

Cytokine and Chemokine Analysis: Lung homogenates from various groups were assayed by Luminex 100 using Exponent 3.2 software and Milliplex MAP for Luminex xMAP Technology Assay (MCYTOMAG-70K Mouse Cytokine 32-Plex) as per manufacturers' instructions.

Lung RNA-seq and analysis: Total RNA from lung tissue samples from different groups was extracted following the double extraction protocol: RNA isolation by acid guanidinium

thiocyanate-phenol-chloroform extraction followed by a Qiagen RNeasy Micro clean-up procedure. Total RNAs were analyzed on Agilent Bioanalyser for quality assessment with RNA Integrity Number (RIN) range from 4.2 to 6.7 and median of RIN 5.1. Ribosomal RNA (rRNA) were depleted from 500ng of RNA using *Ribo-Zero*TM Gold (Human/Mouse/Rat) according to manufacturer's protocol. cDNA libraries were prepared from the resultant rRNA depleted RNA using Lexogen SENSE Total RNA-Seq Library Prep Kit according to manufacturer's protocol for degraded RNA except with 21 PCR cycles and an additional cleanup with 0.9X Ampure XP beads. The length distribution of the cDNA libraries was monitored using a DNA High Sensitivity Reagent Kit on the Perkin Elmer Labchip. All samples were subjected to an indexed paired-end sequencing run of 2x151 cycles on an Illumina HiSeq 4000 system. FASTQ files were mapped to the mouse genome build GRCm38 using STAR based on GENCODE M16 annotations. Gene counts were determined using feature counts (part of the Subread package). DESeq2 was used to identify differentially expressed genes (DEG) from the gene counts in R version 3.3.3. Infection modulated genes were defined as those whose expression was significantly altered in comparison to untreated and uninfected samples using DESeq2. Time and treatment modulated genes were determined using DESeq2 as an interaction model with the main terms being time and treatment and as interaction term time : treatment. Multiple testing correction was performed using the method of Benjamini and Hochberg. Heat maps and volcano plots were generated in R version 3.3.3.

Flowcytometry for characterizing lung immune cells

The lung tissues of chronically infected mice at 60 days p.i were aseptically isolated and incubated at 37°C in 10% FBS RPMI media containing 1.4 mg/ml collagenase A and 30 µg/ml DNase I for 60 mins. The treated lung tissue was dissociated over the 70 µm cell strainer. Strainer was washed to collect single cell suspension. RBC were lysed with ACK lysing buffer

(Lonza) for 5 mins following by washing of cells with culture media. Cells were counted and adjusted to 1×10^6 cells/ml. Live dead staining was performed for 15 mins at room temperature or for 20 mins at 37°C. Non-specific antibody binding was blocked by adding anti-CD16/32 (Fc-block) (BD Biosciences). The surface markers were stained for 20 mins at 4°C with two separate antibody panels. Myeloid panel - anti-CD45-FITC, anti-CD11c-APC-Cy7, anti-MHCII-Qdot-655, anti-CD11b-Qdot-605, anti-CD64-Pacific blue, anti-F4/80-PE-Cy7, anti-Ly6C-APC, anti-CD43-BUV737, anti-CD24-PerCP and anti-CD3/CD19/Ly6G-BUV395 (Lineage mark). Lymphoid panel - anti-CD45-Pacific blue, anti-CD3-FITC, anti-CD4-PerCP, anti-NK1.1-APC, anti-CD44-Qdot-655, and anti-CD62L-PE-Texas Red. The stained cells were acquired using a LSRII cytometer with 5 lasers and flow data was analysed with FlowJo software.

Statistics: All values are expressed as the mean $\pm$ SEM or mean $\pm$ SD of individual samples. Samples were analysed using Mann-Whitney test for two groups and Kruskal Wallis test or 2way ANOVA for multiple groups. Graphs were generated using Graph Pad prism.

Author contributions: R.S. and A.S. conceived the idea, designed and oversaw the study. D.C. and M.M performed the experiments, and analyzed the data. A.L. and R.B. performed flow cytometry. T.P.G. and S.K. performed MIC experiments. Ava.S. and K.G.T. performed protein purification and SV-AUC experiments. F.S. and J.L. performed RNAseq studies. B.L. performed bioinformatics analysis. K.C and N.A. provided reagents. S.K.G. and Y.K performed metabolomic experiments. L.T. performed histopathological analysis. C.G., K.T. and P.K. performed experiments with the DR strains. R.S and A.S. wrote the manuscript. All authors discussed results and commented on the manuscript.

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1 Figure legends

Figure 1

Figure 1. Target based screen against MetA identifies thiram with whole cell activity.

a, The schematic showing L- methionine and SAM biosynthetic pathway in *Mtb*. The gene ID of different enzymes involved are shown. **b**, Growth curve of control and *metA* knock down *Mtb* strain was performed by measuring OD_{600nm} at regular intervals. **c**, Flow-chart depicting experimental steps in HTS for the identification of MetA inhibitors starting from the library screening to the *in vitro* MIC₉₉ determination assays. **d**, Scatter plot showing average of percentage inhibition of HSAT activity (presented as % inhibition of CoA formation) in the presence of small molecules (100 μM) obtained from the 2300 compound library. 72 hits inhibiting MetA activity by atleast 50% are shown in red. **e**, Percentage inhibition of CoA formation by 26 compounds (out of 72 hits) at 100 μM concentration. **f**, MetA activity assay in the presence of different concentrations of NSC1771 (thiram, structure shown). **g**, MIC₉₉ values obtained for 8 active hits identified from panel 1E against *Mtb in vitro*. The data shown

is representative of three independent experiments. **h**, The effect of thiram on the growth of H37Rv and various DR clinical strains. MIC₉₀ values are shown. The data in g and h is representative of two independent experiments. The data in b, e and f is mean $\pm$ SEM and is representative of three independent experiments. * P<0.05 by Mann-Whitney *U*-test.

Figure 2

Figure 2. DIS binds *Mtb* MetaA, inhibits methionine biosynthesis, restricts intracellular *Mtb* growth and enhances INH efficacy.

a, MetaA enzymatic activity in the presence of 6 thiram analogs was determined at 100 μM concentration. MIC₉₉ values of respective analogs are depicted. **b**, MetaA activity assay in the presence of different concentrations of disulfiram (DIS, structure shown). **c**, The effect of DIS on the growth of H37Rv and various DR clinical strains. MIC₉₀ values are shown. **d**, Thermoflour assay demonstrating binding of DIS with MetaA. The dissociation constant (K_d) was calculated as 52.7 μM. **e**, Time kill kinetics of DIS and INH against *M. bovis* BCG. Early-log phase cultures of *M. bovis* BCG were exposed to 10x MIC₉₉ concentration of either DIS or INH and cfu numbers were determined at day 3 and 6 post-exposure. **f**, Measurement of L-methionine and SAM levels in untreated and 10 μM DIS-treated *Mtb* at different time points. **g**, The early-log phase cultures of *M. bovis* BCG were exposed to 1x MIC₉₉ DIS in the presence or absence of 50 μg/ml or 200 μg/ml L-methionine and bacterial numbers were determined at

day 2, 4 and 7 post-exposure. **h**, Intracellular *Mtb* growth at 24 and 48 hr after treatment of primary human monocytes with vehicle control (DMSO) or INH (10 μ M) or DIS (0.625-10 μ M). The data in e, g and h is mean $\pm$ SEM and is representative of two independent experiments. * P<0.05, ** P<0.005, *** P<0.0005 by Kruskal Wallis test. **i**, Intracellular BCG growth after treatment of THP-1 cells with combination of various concentrations of INH and DIS for 24 hr. Representative of 2 experiments, mean of % inhibition of *Mtb* growth is indicated in each box. * P<0.05, *** P<0.0005, 2way ANOVA.

Figure 3

Figure 3. DIS alters transcription profile and redox homeostasis of *Mtb* in vitro.

a, Volcano plot showing the gene expression comparison between 1x MIC₉₉ DIS vs DMSO treated, where individual genes are represented as single dots with the -log₁₀ *P*-value on the y axis and the log₂ fold change on the x axis. The transcript shown in red and blue are significantly upregulated and downregulated, respectively. Non-significant genes are coloured in grey. Selected significant genes are shown with their gene names as the labels. **b**, The identified DEGs in panel A were categorized into various functional categories as listed in Tuberculist. The total number of downregulated (blue) and upregulated (red) genes in each category are depicted as bars. The color intensity reflects the magnitude of the log₂ fold change (FC) for the set of genes in that category. **c**, Venn diagram demonstrating common *Mtb* genes, expression of which was altered upon exposure to either 1x MIC₉₉ or 10x MIC₉₉ DIS in comparison to DMSO treated samples. The heat map corresponding to the 53 common genes is shown, where each column represents a single sample. For each gene expression in log₂

1 RPKM were *z*-score scaled and shown as red for increased expression and blue for reduced
2 expression. The genes are grouped by their annotated functions labelled on the right. **d and e**,
3 *M. bovis* BCG cultures were exposed to different combinations and intracellular ROS was
4 measured by flow cytometry using 5µM DHE. **f**, The killing curves of *Mtb* were performed
5 upon exposure to DIS in the presence or absence of 10 mM NAC and bacterial numbers were
6 determined at day 2, 4 and 7 post-exposure. The data in d-f is mean $\pm$ SEM and is representative
7 of two independent experiments. ** P<0.005, *** P<0.0005 by Kruskal Wallis test.

Figure 4

Figure 4. DIS inhibits proliferation of *Mtb* and TB-associated pathology in mouse lungs.

a, Experimental scheme of acute *Mtb* C57BL/6 mouse model. **b and c**, *Mtb*-infected mice were treated with DIS (160mg/kg) starting 7 days post-infection. Bacterial loads were enumerated in the lungs (**b**) and spleens (**c**) at different time points. UT, Untreated *Mtb*-infected mice; DIS, DIS-treated *Mtb*-infected mice. The data shown in this panel is mean $\pm$ SEM obtained from 4-6 mice per time point. $*P < 0.05$ by Mann-Whitney *U*-test. **d**, Light micrographs of representative H&E stained lung sections of mice, 4 weeks post-treatment. Uninfected, *Mtb*-infected and DIS-treated *Mtb*-infected lungs were observed at 10x and 40x magnification. **e**, Light micrographs of AFB staining of representative lung sections of mice, 4 wk p.t. 60x magnification. AFB is indicated by arrow. $n = 5$ mice per group per time point.

Figure 5

Figure 5. DIS enhances lung immune response in *Mtb*-infected mice.

a, Heat map of genes (N=234) modulated by time, infection and DIS treatment (genes identified as significantly changed during infection as well as being significantly changed during time or DIS treatment). Gene expression in log₂ RPKM values were averaged for each group of treatment and time point and then z-score normalized prior to visualization by heat map. The columns represents the average of the treatment and time point combination for individual genes. The genes were clustered using complete linkage hierarchical clustering using Pearson correlation as the distance metric and 5 clusters were observed and are presented. The number of genes in each of the clusters is shown on the right of the cluster. **b**, Line plots of the averaged z-scores computed in panel A for DIS treated and untreated *Mtb*-infected samples showing the differences in the profiles. Data shown in this panel is mean $\pm$ SD. A list of representative genes for each cluster are shown on the right of the line plots. Trend in cluster 1 and 4 is significant. ****P < 0.0001, 2way ANOVA. **c-e**, Ingenuity pathway analysis (IPA)

of genes in cluster 1, 2 and 4, respectively. **f**, Chemokines and cytokines levels in the lung homogenates of mice, on day 35 after *Mtb* infection, measured by ELISA. UN, Uninfected; IN, *Mtb*-infected; IN + DIS, DIS-treated *Mtb*-infected. * $P < 0.05$, by Mann-Whitney *U*-test. N=4 mice per group per timepoint.

Figure 6

Figure 6. DIS enhances INH efficacy *in vivo* and rewires lung immune cells landscape.

a, *Mtb*-infected mice were treated with INH (10 mg/kg) or INH+DIS (160 mg/kg) starting 30 days post-infection. Bacterial loads were enumerated in the lungs at different time points. UT, Untreated *Mtb*-infected mice; INH, INH treated *Mtb*-infected mice; INH+DIS, INH and DIS treated *Mtb*-infected mice. Statistical differences observed at 4 wk p.t. has been indicated. **b**, Flow cytometric analysis of lung macrophages from mice at 4 wk p.t. Representative dot plots and compiled data is shown. AMs, Alveolar macrophages; IMs, interstitial macrophages; MDMs, monocyte-derived macrophages. **c**, Compiled flow cytometric analysis of lung monocytes from mice at 4 wk p.t. c-Mo, classical monocytes; int-Mo, intermediate monocytes; nc-Mo, nonclassical monocytes. **d**, Flow cytometric analysis of lung CD8⁺ T cell subsets from mice at 4 wk p.t. Representative dot plots and compiled data is shown. T_E, effector T cells; T_{CM}, central memory T cells; T_N, naïve T cells. **e**, Compiled flow cytometric analysis of lung CD4⁺ T cell subsets from mice at 4 wk p.t. **f**, T_N/T_E and T_{CM}/T_E ratio among lung CD4⁺ and CD8⁺ T cells at 4 wk p.t. The data in A-F is mean $\pm$ SEM obtained from 4-6 mice per time point. *P < 0.05, **P < 0.005, ***P < 0.001 by one-way ANOVA.

Supplemental Information

Supplementary Figures

Supplementary Figure 1

Figure S1. Functional and biochemical characterization of MetA from *M. tuberculosis*.

a, Silencing of MetA expression in *Mtb* using CRISPRi approach. The expression of *metA* was quantified in knock down strains after normalization to the transcript levels of house-keeping gene, *sigA*. The data shown in this panel is representative of two different experiments. **b**, The effect of conditional repression of MetA on *in vitro* growth of *Mtb* was determined by spotting serial dilutions of various strains at different time points post-induction. The data shown in this panel is representative of two independent experiments. **c**, Oligomeric state of MetA enzyme. SV-AUC was performed using purified MetA protein at 10 μ M, 20 μ M and 30 μ M concentration. **d**, Michaelis Menten plot for MetA enzymatic activity. The data shown on y-axis is μ M CoA released in enzymatic reaction. **e**, Substrate specificity of MetA enzyme. Enzymatic reactions were performed in the presence of either 1.0 mM acetyl-CoA (AC) or propionyl-CoA (PC) or succinyl-CoA (SC). **f**, The specificity for L-homoserine (L-HS) was

determined by performing enzymatic reactions in the presence of either 1.0 mM L-HS or L-serine (L-Ser) or L-threonine (L-Thr). **g**, Effect of buffer pH on MetA activity *in vitro*. MetA activity assays were performed in buffers of pH in the range of 6.0 – 9.0. **h**, Time kinetics analysis of MetA activity. The MetA activity was calculated after 10 mins, 20 mins, 40 mins and 60 mins post-incubation. The in panels d-h is mean $\pm$ SEM of CoA released obtained from three independent experiments performed in duplicates.

Figure S2. The chemical structure of various MetA inhibitors identified from the high-throughput screening.

The enzymatic activity was performed in the presence of different concentrations of various identified preliminary hits. The y-axis depicts mean $\pm$ S.E. of percentage inhibition of enzymatic activity obtained from three independent experiments.

Figure S3. The chemical structures of various Thiram analogs used in the study are shown.

Figure S4. DIS alters transcription profile and redox homeostasis of *Mtb*.

a, *Mtb* was treated with 10x MIC₉₉ DIS and at 24 h total RNA was extracted. Differentially expressed genes (DEGs) upon 10x MIC₉₉ DIS treatment are shown in the volcano plot (blue – downregulated, red - upregulated). **b**, The DEGS identified in panel A were categorized into 9 functional categories as listed in Tuberculist. The number of downregulated (43 DEGS) and upregulated (76 DEGS) transcript in each functional category are depicted as bars. The bar color is proportional to the average mean $\log_2$ fold change (FC) of all DEGs together for a particular functional category. **c and d**, *M. bovis* BCG cultures were exposed to different combinations and intracellular ROS was measured by flow cytometry using 5 μ M DHE. The data shown in panels c and d is mean $\pm$ SEM and is representative of two independent experiments. *P<0.05, ** P<0.005, *** P<0.0005 by one-way ANOVA.

Figure S5. DIS treatment alters transcription profiles of lung tissues.

a, Volcano plot of the effects of DIS at 4 weeks p.t. Significantly differentially expressed transcripts in the lung of *Mtb*-infected mice upon DIS treatment are shown in the volcano plot (blue – downregulated, red - upregulated). Genes in grey are not significant. The x axis shows the log₂ fold changes while the y-axis show the -log₁₀ nominal P-value. **b**, Ingenuity pathway analysis (IPA) of downregulated (blue bar) or upregulated (red bar) genes by DIS treatment by 4 weeks p.t. x-axis, - log₁₀ P-value of the enriched pathway from IPA.

Figure S7. Phenotyping of lung lymphoid cells in untreated and *Mtb*-infected INH/INH+DIS treated mice.

a, Flow cytometry gating strategy to phenotype lung T and NK cells at 4 wk p.t. in chronic infection model. **b**, Compiled flow cytometry analysis of lung CD3⁺, CD4⁺, CD8⁺ T cells and NK cells.

Supplementary Tables

Table S1: Differentially expressed genes between 1x MIC₉₉ DIS, 10x MIC₉₉ DIS and DMSO treated *Mtb*. Sheets contacting corresponding log fold changes of 1x MIC₉₉ DIS vs DMSO and 10x MIC₉₉ DIS vs DMSO DEGs is shown. 53 common DEGs are also indicated.

Table S2: Differentially expressed genes between the RNA isolated from the lungs of uninfected, *Mtb*-infected and DIS-treated *Mtb*-infected mice at 4 wk p.t. Two sheets depict differentially expressed genes of uninfected vs *Mtb*-infected and DIS-treated vs untreated *Mtb*-infected animals.

Table S3: Genes modulated by time, infection and DIS treatment (genes identified as significantly changed during infection as well as being significantly changed during time or DIS treatment) are shown. Expression (log₂ RPKM) of cluster specific genes (Figure 5A) is depicted for all groups.

Table S1

DEGs - 1x DIS vs DMSO

gene_id	gene_name	Function coded	log2FoldChange	FDR	state
Rv0847	lpqS	Cell wall and cell processes	5.317196019	8.45895E-14	Up
Rv2641	cadI	Conserved hypothetical	6.540000625	1.91859E-09	Up
Rv2643	arsC	Cell wall and cell processes	6.330073789	3.16821E-09	Up
Rv0848	cysK2	Intermediary metabolism and respiration	5.127759972	3.50219E-09	Up
Rv0969	ctpV	Cell wall and cell processes	4.512182616	7.5408E-08	Up
Rv0846c	Rv0846c	Intermediary metabolism and respiration	3.808860261	3.10315E-06	Up
Rv2642	Rv2642	Regulatory proteins	5.827675553	3.10315E-06	Up
Rv1908c	katG	Virulence, detoxification and adaptation	3.512718138	4.77398E-06	Up
Rv0179c	lprO	Cell wall and cell processes	-4.891639882	1.04619E-05	Down
Rv0327c	cyp135A1	Intermediary metabolism and respiration	6.15928792	1.79234E-05	Up
Rv2154c	ftsW	Cell wall and cell processes	-5.551994743	5.4403E-05	Down
Rv1698	mctB	Cell wall and cell processes	-7.265494906	5.44282E-05	Down
Rv3123	Rv3123	Conserved hypothetical	6.259647651	0.000157134	Up
Rv0849	Rv0849	Cell wall and cell processes	5.205275718	0.000259968	Up
Rv2927c	Rv2927c	Conserved hypothetical	-5.426606297	0.000259968	Down
Rv0850	Rv0850	Insertion sequence and phages	4.95798083	0.000274162	Up
Rv3178	Rv3178	Conserved hypothetical	6.637358648	0.000392997	Up
Rv1461	Rv1461	Conserved hypothetical	2.809030798	0.000435607	Up
Rv2055c	rpsR2	Information pathways	6.539208285	0.000435607	Up
Rv2147c	Rv2147c	Conserved hypothetical	-3.360546892	0.000455133	Down
Rv0326	Rv0326	Unknown	5.878078401	0.000586824	Up
Rv1586c	Rv1586c	Insertion sequence and phages	3.98826987	0.000586824	Up
Rv1463	Rv1463	Cell wall and cell processes	3.064664226	0.0007494	Up
Rv0744c	Rv0744c	Regulatory proteins	5.857475031	0.000848914	Up
Rv0186	bgIS	Intermediary metabolism and respiration	3.243642076	0.00086413	Up
Rv3914	trxC	Intermediary metabolism and respiration	3.271682315	0.001113445	Up
Rv2460c	clpP2	Intermediary metabolism and respiration	2.54502572	0.001479011	Up
Rv0465c	Rv0465c	Regulatory proteins	4.065619966	0.001701787	Up
Rv3149	nuoE	Intermediary metabolism and respiration	-5.761565056	0.001808425	Down
Rv2963	Rv2963	Cell wall and cell processes	3.746201192	0.002499282	Up
Rv2726c	dapF	Intermediary metabolism and respiration	6.65744654	0.002506072	Up
Rv1460	Rv1460	Regulatory proteins	3.044136363	0.002627952	Up
Rv3310	sapM	Cell wall and cell processes	-4.521946631	0.004134295	Down
Rv3152	nuoH	Intermediary metabolism and respiration	-4.910582754	0.004258778	Down
Rv3334	Rv3334	Regulatory proteins	2.392156254	0.004359121	Up
Rv2446c	Rv2446c	Cell wall and cell processes	6.102197475	0.004359121	Up
Rv0117	oxyS	Regulatory proteins	5.654657832	0.004369351	Up
Rv3052c	nrpI	Information pathways	2.429392111	0.004618876	Up
Rv0791c	Rv0791c	Conserved hypothetical	3.830237859	0.004790241	Up
Rv2397c	cysA1	Cell wall and cell processes	5.248019505	0.00579991	Up
Rv2748c	ftsK	Cell wall and cell processes	-3.58472621	0.006336137	Down
Rv3810	pirG	Cell wall and cell processes	-3.824699949	0.006336137	Down
Rv0464c	Rv0464c	Conserved hypothetical	2.28025967	0.00795411	Up
Rv1471	trxB1	Intermediary metabolism and respiration	3.396356379	0.008554922	Up
Rv1286	cysN	Intermediary metabolism and respiration	2.956742076	0.009546908	Up
Rv3717	Rv3717	Conserved hypothetical	-4.225955205	0.009833844	Down
Rv3651	Rv3651	Conserved hypothetical	-2.674039156	0.010819617	Down
Rv3224	Rv3224	Intermediary metabolism and respiration	-3.46635393	0.0109262	Down
Rv2242	Rv2242	Conserved hypothetical	4.862539323	0.011880344	Up
Rv2582	ppiB	Information pathways	-3.029967542	0.011880344	Down
Rv1991A	mazE6	Virulence, detoxification and adaptation	5.070338629	0.011880344	Up
Rv0567	Rv0567	Intermediary metabolism and respiration	-5.216325977	0.012132609	Down
Rv3913	trxB2	Intermediary metabolism and respiration	3.414898568	0.012132609	Up
Rv3498c	mce4B	Virulence, detoxification and adaptation	-4.935984109	0.0122051	Down
Rv0769	Rv0769	Intermediary metabolism and respiration	5.220254376	0.013001916	Up
Rv1994c	cmtR	Regulatory proteins	4.830948772	0.013001916	Up

Rv1984c	cfp21	Cell wall and cell processes	-5.168073549	0.013001916	Down
Rv0340	Rv0340	Conserved hypothetical	-3.652786407	0.013001916	Down
Rv3811	Rv3811	Conserved hypothetical	-2.859061666	0.013009129	Down
Rv3324c	moaC3	Intermediary metabolism and respiration	-4.553035408	0.014000134	Down
Rv0518	Rv0518	Cell wall and cell processes	-4.719067239	0.014683359	Down
Rv2059	Rv2059	Conserved hypothetical	3.620188195	0.014731969	Up
Rv1433	Rv1433	Cell wall and cell processes	-4.302543101	0.01557631	Down
Rv3441c	mrsA	Intermediary metabolism and respiration	-5.327267824	0.016275412	Down
Rv3768	Rv3768	Conserved hypothetical	-4.945196994	0.016275412	Down
Rv1909c	furA	Regulatory proteins	2.610076567	0.016970316	Up
Rv1754c	Rv1754c	Conserved hypothetical	-4.120934198	0.016970316	Down
Rv2461c	clpP1	Intermediary metabolism and respiration	2.456424378	0.016970316	Up
Rv2753c	dapA	Intermediary metabolism and respiration	4.971853357	0.016970316	Up
Rv3201c	Rv3201c	Information pathways	-4.902979568	0.018400411	Down
Rv0129c	fbpC	Lipid metabolism	-3.317242763	0.018577586	Down
Rv2058c	rpmB2	Information pathways	5.019574495	0.019822917	Up
Rv3400	Rv3400	Intermediary metabolism and respiration	-3.771664323	0.020961553	Down
Rv3075c	Rv3075c	Conserved hypothetical	-3.604751588	0.024071034	Down
Rv2565	Rv2565	Conserved hypothetical	-4.961334161	0.025448889	Down
Rv1700	Rv1700	Information pathways	-4.809614495	0.027335505	Down
Rv1995	Rv1995	Conserved hypothetical	4.047679058	0.028812507	Up
Rv0896	gltA2	Intermediary metabolism and respiration	-2.399685943	0.029977746	Down
Rv2447c	folC	Intermediary metabolism and respiration	-3.764905181	0.030322434	Down
Rv2037c	Rv2037c	Cell wall and cell processes	4.897876069	0.031093384	Up
Rv3003c	ilvB1	Intermediary metabolism and respiration	-3.286269654	0.03205812	Down
Rv3150	nuoF	Intermediary metabolism and respiration	-4.581061452	0.03205812	Down
Rv1177	fdxC	Intermediary metabolism and respiration	-3.208296211	0.035594969	Down
Rv3053c	nrdH	Information pathways	2.280977796	0.038293416	Up
Rv2411c	Rv2411c	Conserved hypothetical	4.303873328	0.03849093	Up
Rv0106	Rv0106	Conserved hypothetical	3.584848533	0.039228265	Up
Rv3463	Rv3463	Conserved hypothetical	3.685683683	0.039228265	Up
Rv1585c	Rv1585c	Insertion sequence and phages	4.138395452	0.039228265	Up
Rv0888	Rv0888	Cell wall and cell processes	-2.730781013	0.039228265	Down
Rv1221	sigE	Information pathways	2.617205014	0.039228265	Up
Rv0787	Rv0787	Conserved hypothetical	-4.534001873	0.039228265	Down
Rv3051c	nrdE	Information pathways	1.719196859	0.040546134	Up
Rv1477	ripA	Virulence, detoxification and adaptation	-3.778227257	0.040546134	Down
Rv1992c	ctpG	Cell wall and cell processes	3.13171955	0.041104729	Up
Rv3617	ephA	Virulence, detoxification and adaptation	-4.878567503	0.041209539	Down
Rv2287	yjcE	Cell wall and cell processes	-4.415378182	0.041209539	Down
Rv2964	purU	Intermediary metabolism and respiration	3.434182718	0.041209539	Up
Rv0651	rplJ	Information pathways	-4.580751298	0.044512843	Down
Rv3338	Rv3338	Conserved hypothetical	-5.030956883	0.044512843	Down
Rv3437	Rv3437	Cell wall and cell processes	3.484348642	0.044512843	Up
Rv0991c	Rv0991c	Conserved hypothetical	3.817814737	0.044742331	Up
Rv3477	PE31	PE-PPE	-5.155418153	0.046353156	Down
Rv1533	Rv1533	Conserved hypothetical	-5.026524502	0.046353156	Down
Rv1018c	glmU	Cell wall and cell processes	-2.564781183	0.04636725	Down
Rv0638	secE1	Cell wall and cell processes	-4.07946691	0.048078438	Down
Rv3054c	Rv3054c	Conserved hypothetical	3.522839663	0.048078438	Up
Rv1029	kdpA	Cell wall and cell processes	-4.528504413	0.049046083	Down

DEGs - 10x DIS vs DMSO

gene_id	gene_name	Function coded	log2FoldChange	padj	state
Rv2641	cadI	Conserved hypothetical	7.266428036	9.50145E-12	Up
Rv0847	lpqS	Cell wall and cell processes	4.470466776	1.7687E-09	Up
Rv2643	arsC	Cell wall and cell processes	6.281670446	4.64158E-09	Up

Rv2642	Rv2642	Regulatory proteins	6.866639097	7.04787E-09	Up
Rv0969	ctpV	Cell wall and cell processes	4.702472102	1.23931E-08	Up
Rv1908c	katG	Virulence, detoxification and adaptation	3.948817225	8.02298E-08	Up
Rv0846c	Rv0846c	Intermediary metabolism and respiration	3.821489544	2.76985E-06	Up
Rv0186	bglS	Intermediary metabolism and respiration	4.150279657	3.55141E-06	Up
Rv1463	Rv1463	Cell wall and cell processes	3.499914251	7.47271E-05	Up
Rv3914	trxC	Intermediary metabolism and respiration	3.710670886	0.000157279	Up
Rv3123	Rv3123	Conserved hypothetical	6.292947099	0.000164005	Up
Rv2242	Rv2242	Conserved hypothetical	6.401892111	0.000242497	Up
Rv0848	cysK2	Intermediary metabolism and respiration	3.609953711	0.000258156	Up
Rv0744c	Rv0744c	Regulatory proteins	6.286730881	0.000296573	Up
Rv3849	espR	Regulatory proteins	-5.952461623	0.000373074	Down
Rv2753c	dapA	Intermediary metabolism and respiration	6.655943019	0.000392109	Up
Rv3400	Rv3400	Intermediary metabolism and respiration	-5.22193481	0.000580255	Down
Rv3334	Rv3334	Regulatory proteins	2.709740611	0.000754538	Up
Rv1461	Rv1461	Conserved hypothetical	2.73315041	0.000771396	Up
Rv0327c	cyp135A1	Intermediary metabolism and respiration	5.111991449	0.001027598	Up
Rv3270	ctpC	Cell wall and cell processes	3.53739137	0.00121232	Up
Rv1050	Rv1050	Intermediary metabolism and respiration	6.661554353	0.001463786	Up
Rv1460	Rv1460	Regulatory proteins	3.192938604	0.001463901	Up
Rv2963	Rv2963	Cell wall and cell processes	3.891346556	0.00150227	Up
Rv0465c	Rv0465c	Regulatory proteins	4.101380569	0.001609309	Up
Rv1994c	cmtR	Regulatory proteins	5.697741234	0.001766661	Up
Rv0707	rpsC	Information pathways	-4.99604987	0.001766661	Down
Rv1992c	ctpG	Cell wall and cell processes	4.160568015	0.002032118	Up
Rv2986c	hupB	Information pathways	-4.845911468	0.002032118	Down
Rv2431c	PE25	PE-PPE	-4.255577842	0.002603221	Down
Rv1586c	Rv1586c	Insertion sequence and phages	3.644216425	0.002603221	Up
Rv1726	Rv1726	Intermediary metabolism and respiration	5.517948058	0.00268073	Up
Rv3271c	Rv3271c	Cell wall and cell processes	2.899145124	0.00268073	Up
Rv1993c	Rv1993c	Conserved hypothetical	6.14225172	0.002795804	Up
Rv1221	sigE	Information pathways	3.340633399	0.003041534	Up
Rv1698	mctB	Cell wall and cell processes	-5.810232257	0.003114462	Down
Rv1909c	furA	Regulatory proteins	2.993529041	0.003671292	Up
Rv1991A	mazE6	Virulence, detoxification and adaptation	5.559434519	0.003671292	Up
Rv2773c	dapB	Intermediary metabolism and respiration	-4.711815258	0.004137559	Down
Rv1018c	glmU	Cell wall and cell processes	-3.256822943	0.0053454	Down
Rv2927c	Rv2927c	Conserved hypothetical	-4.471291354	0.005415697	Down
Rv2397c	cysA1	Cell wall and cell processes	5.248512461	0.005568658	Up
Rv2548A	Rv2548A	Conserved hypothetical	5.97962258	0.005676138	Up
Rv0950c	Rv0950c	Conserved hypothetical	-5.198573105	0.006582171	Down
Rv0308	Rv0308	Cell wall and cell processes	-5.258189443	0.007065548	Down
Rv1813c	Rv1813c	Conserved hypothetical	2.752247868	0.007346371	Up
Rv3053c	nrdH	Information pathways	2.685705633	0.007566676	Up
Rv1286	cysN	Intermediary metabolism and respiration	2.988415026	0.007598309	Up
Rv2202c	adoK	Intermediary metabolism and respiration	2.978352698	0.007980201	Up
Rv1462	Rv1462	Conserved hypothetical	4.423186186	0.008044421	Up
Rv0849	Rv0849	Cell wall and cell processes	4.101069257	0.008044421	Up
Rv0490	senX3	Regulatory proteins	-5.482096824	0.008591001	Down
Rv1471	trxB1	Intermediary metabolism and respiration	3.347904093	0.008863993	Up
Rv3913	trxB2	Intermediary metabolism and respiration	3.473281114	0.009278558	Up
Rv2938	drnC	Cell wall and cell processes	-4.74407444	0.009395163	Down
Rv0850	Rv0850	Insertion sequence and phages	3.835004081	0.010424443	Up
Rv0791c	Rv0791c	Conserved hypothetical	3.556173669	0.010592492	Up
Rv3491	Rv3491	Conserved hypothetical	-4.472877513	0.010779137	Down
Rv2640c	Rv2640c	Regulatory proteins	4.76275305	0.011724747	Up
Rv3075c	Rv3075c	Conserved hypothetical	-3.896581345	0.012622303	Down
Rv0697	Rv0697	Intermediary metabolism and respiration	-5.58481224	0.014420848	Down

Rv2058c	rpmB2	Information pathways	5.195175546	0.014596318	Up
Rv2055c	rpsR2	Information pathways	5.013758673	0.015603136	Up
Rv0135c	Rv0135c	Regulatory proteins	-4.394121177	0.015603136	Down
Rv2627c	Rv2627c	Conserved hypothetical	-4.38768611	0.016396437	Down
Rv3052c	nrdI	Information pathways	2.149665985	0.017087178	Up
Rv2280	Rv2280	Intermediary metabolism and respiration	-4.159861346	0.017243126	Down
Rv0781	ptrBa	Intermediary metabolism and respiration	-3.596312763	0.018382743	Down
Rv3148	nuoD	Intermediary metabolism and respiration	-4.141839146	0.019131075	Down
Rv0482	murB	Cell wall and cell processes	-4.420892676	0.020599715	Down
Rv0350	dnaK	Virulence, detoxification and adaptation	2.429578322	0.021079395	Up
Rv1995	Rv1995	Conserved hypothetical	4.172003606	0.021096644	Up
Rv2466c	Rv2466c	Conserved hypothetical	3.450067631	0.021096644	Up
Rv2488c	Rv2488c	Regulatory proteins	4.986038803	0.021096644	Up
Rv0058	dnaB	Information pathways	-3.65490894	0.021404367	Down
Rv2147c	Rv2147c	Conserved hypothetical	-2.484101307	0.022264232	Down
Rv2460c	clpP2	Intermediary metabolism and respiration	2.010648113	0.022382169	Up
Rv2461c	clpP1	Intermediary metabolism and respiration	2.378869536	0.022382169	Up
Rv3051c	nrdE	Information pathways	1.830561413	0.022382169	Up
Rv0106	Rv0106	Conserved hypothetical	3.789969391	0.022382169	Up
Rv1910c	Rv1910c	Cell wall and cell processes	4.900154394	0.022382169	Up
Rv0894	Rv0894	Regulatory proteins	-3.869230923	0.023280719	Down
Rv1464	csd	Intermediary metabolism and respiration	2.956349773	0.023280719	Up
Rv0545c	pitA	Cell wall and cell processes	-4.148475387	0.024236748	Down
Rv0815c	cysA2	Intermediary metabolism and respiration	1.889198741	0.024236748	Up
Rv1614	lgt	Cell wall and cell processes	-4.062799432	0.024236748	Down
Rv3232c	ppk2	Intermediary metabolism and respiration	-4.488432659	0.024397788	Down
Rv0813c	Rv0813c	Conserved hypothetical	4.34729446	0.02509032	Up
Rv0326	Rv0326	Unknown	4.302527392	0.025497665	Up
Rv3117	cysA3	Intermediary metabolism and respiration	1.859585766	0.025594025	Up
Rv0501	galE2	Intermediary metabolism and respiration	-4.121953281	0.025594025	Down
Rv1807	PPE31	PE-PPE	-5.01013642	0.025594025	Down
Rv2917	Rv2917	Conserved hypothetical	-4.172161765	0.02775778	Down
Rv1754c	Rv1754c	Conserved hypothetical	-3.889081272	0.02775778	Down
Rv1673c	Rv1673c	Conserved hypothetical	3.989270841	0.028439385	Up
Rv1544	Rv1544	Lipid metabolism	-4.247466456	0.029117722	Down
Rv0384c	clpB	Virulence, detoxification and adaptation	3.375081	0.030708509	Up
Rv3463	Rv3463	Conserved hypothetical	3.728433162	0.031094249	Up
Rv0140	Rv0140	Conserved hypothetical	3.600832474	0.031094249	Up
Rv3017c	esxQ	Cell wall and cell processes	4.966302444	0.034144835	Up
Rv0240	vapC24	Virulence, detoxification and adaptation	-3.98514154	0.034144835	Down
Rv0698	Rv0698	Conserved hypothetical	-4.718634753	0.034144835	Down
Rv0108c	Rv0108c	Conserved hypothetical	-3.928775687	0.034144835	Down
Rv2359	zur	Regulatory proteins	2.525948889	0.034144835	Up
Rv1285	cysD	Intermediary metabolism and respiration	4.848447406	0.034144835	Up
Rv3241c	Rv3241c	Information pathways	2.269408398	0.034144835	Up
Rv0528	Rv0528	Cell wall and cell processes	-4.005755403	0.034144835	Down
Rv0991c	Rv0991c	Conserved hypothetical	3.887183213	0.034144835	Up
Rv3097c	lipY	PE-PPE	4.831312478	0.034144835	Up
Rv2290	lppO	Cell wall and cell processes	-3.721202201	0.034226629	Down
Rv3001c	ilvC	Intermediary metabolism and respiration	-3.636183223	0.034226629	Down
Rv0792c	Rv0792c	Regulatory proteins	3.792463854	0.03536779	Up
Rv3233c	Rv3233c	Lipid metabolism	-4.661027406	0.03536779	Down
Rv1881c	lppE	Cell wall and cell processes	-4.296845572	0.036291766	Down
Rv3214	gpm2	Intermediary metabolism and respiration	4.948427918	0.037206509	Up
Rv1006	Rv1006	Conserved hypothetical	-2.690390369	0.044859135	Down
Rv1334	mec	Intermediary metabolism and respiration	2.34340666	0.045911116	Up
Rv1335	cysO	Intermediary metabolism and respiration	2.60829429	0.047043047	Up
Rv0700	rpsJ	Information pathways	-3.586193604	0.049593893	Down

Common DEGs

gene_id	gene_name	lfc (1x DIS vs DMSO)	(10x DIS vs DMSO)
Rv0847	lpqS	5.317196019	4.470466776
Rv2641	cadI	6.540000625	7.266428036
Rv2643	arsC	6.330073789	6.281670446
Rv0848	cysK2	5.127759972	3.609953711
Rv0969	ctpV	4.512182616	4.702472102
Rv0846c	Rv0846c	3.808860261	3.821489544
Rv2642	Rv2642	5.827675553	6.866639097
Rv1908c	katG	3.512718138	3.948817225
Rv0327c	cyp135A1	6.15928792	5.111991449
Rv1698	mctB	-7.265494906	-5.810232257
Rv3123	Rv3123	6.259647651	6.292947099
Rv0849	Rv0849	5.205275718	4.101069257
Rv2927c	Rv2927c	-5.426606297	-4.471291354
Rv0850	Rv0850	4.95798083	3.835004081
Rv1461	Rv1461	2.809030798	2.73315041
Rv2055c	rpsR2	6.539208285	5.013758673
Rv2147c	Rv2147c	-3.360546892	-2.484101307
Rv0326	Rv0326	5.878078401	4.302527392
Rv1586c	Rv1586c	3.98826987	3.644216425
Rv1463	Rv1463	3.064664226	3.499914251
Rv0744c	Rv0744c	5.857475031	6.286730881
Rv0186	bgIS	3.243642076	4.150279657
Rv3914	trxC	3.271682315	3.710670886
Rv2460c	clpP2	2.54502572	2.010648113
Rv0465c	Rv0465c	4.065619966	4.101380569
Rv2963	Rv2963	3.746201192	3.891346556
Rv1460	Rv1460	3.044136363	3.192938604
Rv3334	Rv3334	2.392156254	2.709740611
Rv3052c	nrdI	2.429392111	2.149665985
Rv0791c	Rv0791c	3.830237859	3.556173669
Rv2397c	cysA1	5.248019505	5.248512461
Rv1471	trxB1	3.396356379	3.347904093
Rv1286	cysN	2.956742076	2.988415026
Rv2242	Rv2242	4.862539323	6.401892111
Rv1991A	mazE6	5.070338629	5.559434519
Rv3913	trxB2	3.414898568	3.473281114
Rv1994c	cmtR	4.830948772	5.697741234
Rv1909c	furA	2.610076567	2.993529041
Rv1754c	Rv1754c	-4.120934198	-3.889081272
Rv2461c	clpP1	2.456424378	2.378869536
Rv2753c	dapA	4.971853357	6.655943019
Rv2058c	rpmB2	5.019574495	5.195175546
Rv3400	Rv3400	-3.771664323	-5.22193481
Rv3075c	Rv3075c	-3.604751588	-3.896581345
Rv1995	Rv1995	4.047679058	4.172003606
Rv3053c	nrdH	2.280977796	2.685705633
Rv0106	Rv0106	3.584848533	3.789969391
Rv3463	Rv3463	3.685683683	3.728433162
Rv1221	sigE	2.617205014	3.340633399
Rv3051c	nrdE	1.719196859	1.830561413
Rv1992c	ctpG	3.13171955	4.160568015
Rv0991c	Rv0991c	3.817814737	3.887183213
Rv1018c	glmU	-2.564781183	-3.256822943

Table S2

Uninfected vs Infected d35

gene_id	gene_name	log2FoldChange	FDR
ENSMUSG00000029417.9	Cxcl9	-6.706614154	2.95E-287
ENSMUSG00000022586.11	Ly6i	-6.257566986	6.01E-168
ENSMUSG00000020826.8	Nos2	-6.07814393	4.43E-165
ENSMUSG00000022126.6	Acod1	-6.386822441	1.44E-159
ENSMUSG00000040026.8	Saa3	-6.377451505	4.82E-139
ENSMUSG00000035186.6	Ubd	-6.868507857	7.25E-135
ENSMUSG00000034438.16	Gbp8	-4.436879826	1.19E-132
ENSMUSG000000105096.1	Gbp10	-5.253224574	1.54E-126
ENSMUSG00000036594.14	H2-Aa	-3.066589933	6.91E-124
ENSMUSG00000015340.10	Cybb	-3.721904697	5.57E-109
ENSMUSG00000038642.10	Ctss	-4.209669046	6.78E-103
ENSMUSG00000028270.12	Gbp2	-3.887484299	3.94E-99
ENSMUSG00000034855.13	Cxcl10	-5.165018369	1.26E-98
ENSMUSG00000033220.6	Rac2	-3.271129833	3.54E-98
ENSMUSG00000036896.5	C1qc	-3.766291545	7.64E-93
ENSMUSG00000022584.14	Ly6c2	-4.282948616	2.16E-92
ENSMUSG00000025498.15	Irf7	-3.319230316	3.73E-92
ENSMUSG00000031004.8	Mki67	-2.91468711	8.68E-85
ENSMUSG00000030142.10	Clec4e	-6.193637082	2.08E-84
ENSMUSG000000105504.4	Gbp5	-4.372120215	1.41E-81
ENSMUSG00000021281.15	Tnfaip2	-3.431199829	1.19E-80
ENSMUSG00000036905.8	C1qb	-3.547010655	1.41E-80
ENSMUSG00000037321.17	Tap1	-3.215827872	1.37E-79
ENSMUSG00000027611.12	Procr	-4.086489432	3.05E-76
ENSMUSG00000078921.3	Tgtp2	-3.445972811	3.15E-76
ENSMUSG00000054072.11	Ilgp1	-4.175956761	2.36E-75
ENSMUSG00000026177.11	Slc11a1	-3.818774904	3.89E-75
ENSMUSG00000038179.13	Slamf7	-3.694066432	1.86E-74
ENSMUSG00000058715.11	Fcer1g	-3.658834533	3.71E-71
ENSMUSG00000025877.14	Hk3	-5.214527284	8.54E-69
ENSMUSG00000046879.7	Irgm1	-3.129517947	2.49E-68
ENSMUSG00000055541.17	Lair1	-3.413868096	4.43E-68
ENSMUSG00000027347.18	Rasgrp1	-3.836674346	2.72E-67
ENSMUSG00000036887.5	C1qa	-3.655269561	2.93E-67
ENSMUSG00000024677.13	Ms4a6b	-4.321002103	3.17E-66
ENSMUSG00000003477.5	Inmt	3.134875647	3.85E-65
ENSMUSG00000059089.4	Fcgr4	-4.756228166	8.77E-65
ENSMUSG00000035385.5	Ccl2	-4.418389056	9.81E-65
ENSMUSG00000068227.8	Il2rb	-2.842340815	9.81E-65
ENSMUSG00000035042.2	Ccl5	-5.511648492	1.25E-64
ENSMUSG00000029816.10	GpnmB	-4.051844213	4.10E-62
ENSMUSG00000032661.9	Oas3	-4.583012373	3.45E-59
ENSMUSG00000009185.2	Ccl8	-4.826914886	5.04E-59
ENSMUSG00000018774.13	Cd68	-3.056678147	4.57E-58
ENSMUSG00000048852.13	Gm12185	-3.815320639	1.50E-56
ENSMUSG00000059498.13	Fcgr3	-3.042962525	2.12E-56
ENSMUSG00000040264.10	Gbp2b	-5.549906439	2.23E-56
ENSMUSG00000053977.13	Cd8a	-4.705931181	4.10E-56
ENSMUSG00000004207.14	Psap	-2.266780967	2.51E-54
ENSMUSG00000023078.6	Cxcl13	-4.68565453	4.37E-54
ENSMUSG00000076928.5	Trac	-5.067306633	1.08E-53
ENSMUSG00000002699.13	Lcp2	-3.329263323	4.54E-52

ENSMUSG00000015950.13	Ncf1	-3.03802598	9.75E-52
ENSMUSG00000032011.5	Thy1	-2.867275943	9.75E-52
ENSMUSG000000092021.8	Gbp11	-6.042569239	2.31E-51
ENSMUSG000000023947.7	Nfkbie	-3.392794822	2.78E-51
ENSMUSG000000073902.5	Gm1966	-3.460849683	9.27E-51
ENSMUSG000000090942.1	F830016B08R	-4.53668269	4.48E-50
ENSMUSG000000024669.7	Cd5	-4.489916915	8.03E-49
ENSMUSG000000073555.1	Gm4951	-3.717408416	8.11E-49
ENSMUSG000000075010.4	AW112010	-3.855408856	2.70E-48
ENSMUSG000000049109.15	Themis	-3.776599204	1.07E-47
ENSMUSG000000020395.13	Itk	-3.374097119	6.80E-47
ENSMUSG000000070327.14	Rnf213	-1.61441731	9.20E-47
ENSMUSG000000033192.5	Lpcat2	-3.590831987	1.03E-46
ENSMUSG000000051457.7	Spn	-2.851788112	1.34E-46
ENSMUSG000000018168.8	Ikzf3	-3.771967017	5.84E-46
ENSMUSG000000015947.10	Fcgr1	-4.408465016	8.97E-46
ENSMUSG000000044827.10	Tlr1	-4.207640252	1.05E-45
ENSMUSG000000024401.14	Tnf	-4.571465242	2.81E-45
ENSMUSG000000040253.15	Gbp7	-2.412367305	6.04E-45
ENSMUSG000000016283.13	H2-M2	-5.563669513	9.28E-45
ENSMUSG000000042345.14	Ubash3a	-4.522973726	2.76E-44
ENSMUSG000000052336.7	Cx3cr1	-3.580092977	3.42E-44
ENSMUSG000000048163.13	Selplg	-2.241184647	3.76E-44
ENSMUSG000000023913.17	Pla2g7	-4.939336554	8.45E-44
ENSMUSG000000000791.9	Il12rb1	-5.329941112	3.43E-43
ENSMUSG000000025150.10	Cbr2	2.460622359	4.07E-43
ENSMUSG000000099569.1	Gm18301	-4.557845745	4.07E-43
ENSMUSG000000026068.11	Il18rap	-3.186309973	2.43E-41
ENSMUSG000000028859.14	Csf3r	-3.511209112	3.32E-41
ENSMUSG000000082292.3	Gm12250	-4.293993797	3.56E-41
ENSMUSG000000028581.17	Laptn5	-2.017207067	3.68E-41
ENSMUSG000000024334.8	H2-Oa	-3.817106837	1.26E-40
ENSMUSG000000110631.1	Gm42047	-3.004070152	2.78E-39
ENSMUSG000000005413.8	Hmox1	-2.366499058	1.86E-38
ENSMUSG000000031551.12	Ido1	-5.146204534	1.96E-38
ENSMUSG000000021322.8	Aoah	-4.619882085	2.01E-38
ENSMUSG000000053541.3	Gm4759	-3.666331541	3.03E-38
ENSMUSG000000039621.13	Prex1	-1.954339109	1.49E-37
ENSMUSG000000073489.6	Ifi204	-3.90841222	3.02E-37
ENSMUSG000000056888.11	Glpr1	-2.46148356	1.48E-36
ENSMUSG000000035493.10	Tgfb1	-2.74183137	3.55E-36
ENSMUSG000000063286.7	Gm8995	-3.073064995	3.99E-36
ENSMUSG000000029561.17	Oasl2	-2.383095857	8.08E-36
ENSMUSG000000009292.18	Trpm2	-4.287171074	2.24E-35
ENSMUSG000000037731.5	Themis2	-2.404974019	2.61E-35
ENSMUSG000000068606.5	Gm4841	-5.219097641	5.90E-35
ENSMUSG000000096727.2	Psmb9	-2.477877108	7.57E-35
ENSMUSG000000020893.17	Per1	2.858766644	1.11E-34
ENSMUSG000000063234.4	Gpr84	-6.024918285	1.94E-34
ENSMUSG000000028071.12	Sh2d2a	-3.337880646	6.95E-34
ENSMUSG000000039699.13	Batf2	-3.380969858	8.34E-34
ENSMUSG000000022014.15	Epsti1	-4.3308102	1.02E-33
ENSMUSG000000027544.16	Nfatc2	-2.632346469	1.67E-33
ENSMUSG000000034116.17	Vav1	-3.166528828	2.24E-33

ENSMUSG00000009687.14	Fxyd5	-2.093560315	2.55E-33
ENSMUSG00000035004.3	Igsf6	-3.390621164	9.10E-33
ENSMUSG000000041827.15	Oasl1	-3.294748189	1.11E-32
ENSMUSG000000024308.14	Tapbp	-1.929547382	1.56E-32
ENSMUSG000000028885.8	Smpd13b	-3.622209944	1.84E-32
ENSMUSG000000005547.14	Cyp2a5	3.150496034	2.58E-32
ENSMUSG000000047798.15	Cd300lf	-2.812647351	3.75E-32
ENSMUSG000000026981.15	Il1rn	-3.363745468	4.74E-32
ENSMUSG000000054203.7	Ifi205	-3.008158987	5.84E-32
ENSMUSG000000031444.16	F10	-4.0755948	1.21E-31
ENSMUSG000000027843.13	Ptpn22	-3.104716997	1.23E-31
ENSMUSG000000030921.17	Trim30a	-2.125707506	1.26E-31
ENSMUSG000000026829.9	Gbgt1	-2.932022533	1.60E-31
ENSMUSG000000020437.12	Myo1g	-2.089918396	1.72E-31
ENSMUSG000000003363.15	Pld3	-1.687804082	3.72E-31
ENSMUSG000000036067.12	Slc2a6	-3.617887524	3.72E-31
ENSMUSG000000022389.14	Tef	2.852196702	4.01E-31
ENSMUSG000000030220.13	Arhgdib	-2.449773472	5.63E-31
ENSMUSG000000028713.17	Cyp4b1	1.91882919	7.48E-31
ENSMUSG000000000594.7	Gm2a	-1.478878247	8.57E-31
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ENSMUSG000000019850.11	Tnfaip3	-2.234529905	2.22E-30
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ENSMUSG000000025969.15	Nrp2	-1.367952117	3.95E-30
ENSMUSG000000026980.15	Ly75	-1.865402783	4.14E-30
ENSMUSG000000040613.14	Apobec1	-2.48097634	5.78E-30
ENSMUSG000000026536.9	Ifi211	-4.059040709	1.65E-29
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ENSMUSG000000016256.10	Ctsz	-2.231532391	2.51E-29
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ENSMUSG000000034422.14	Parp14	-1.818758326	1.05E-28
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ENSMUSG000000030579.10	Tyrobp	-2.5107743	9.11E-28
ENSMUSG000000085977.1	Gm5970	-5.63227994	1.12E-27
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ENSMUSG00000024672.11	Ms4a7	-3.838742854	2.24E-25
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ENSMUSG00000022534.13	Mefv	-4.79587596	4.29E-25
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ENSMUSG00000008193.13	Spib	-3.193105153	1.18E-24
ENSMUSG00000033213.16	AA467197	-4.732576695	1.20E-24
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ENSMUSG00000015354.8	Pcolce2	3.003493078	2.56E-23
ENSMUSG00000045827.10	Serpinb9	-1.941755166	4.80E-23
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ENSMUSG00000033863.1	Klf9	2.26081359	1.19E-22
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ENSMUSG00000004707.14	Ly9	-2.980766798	4.53E-22
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ENSMUSG000000039158.11	Akna	-1.607087196	1.26E-21
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ENSMUSG000000049791.4	Fzd4	2.106102282	1.37E-21
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ENSMUSG000000022893.14	Adamts1	2.365283395	1.95E-21
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ENSMUSG000000054252.17	Fgfr3	2.23678923	3.84E-21
ENSMUSG000000036931.15	Nfkbid	-2.694025699	4.78E-21
ENSMUSG000000026656.15	Fcgr2b	-2.126895075	5.20E-21
ENSMUSG000000018819.10	Lsp1	-1.55732359	6.49E-21
ENSMUSG000000041515.9	Irf8	-2.248705654	6.94E-21
ENSMUSG000000002111.8	Spi1	-2.07612882	8.40E-21
ENSMUSG00000002033.14	Cd3g	-3.409232105	1.00E-20
ENSMUSG000000038037.4	Socs1	-3.756525496	1.07E-20
ENSMUSG000000038147.13	Cd84	-2.998374501	1.26E-20
ENSMUSG000000050350.8	Gpr18	-3.443035795	1.40E-20
ENSMUSG000000109713.1	Pvrig	-5.6433454	1.43E-20
ENSMUSG000000028327.14	Stra6l	-4.049199087	1.74E-20
ENSMUSG000000047180.8	Neurl3	-3.018589089	1.95E-20
ENSMUSG000000026768.10	Itga8	2.080730869	2.30E-20
ENSMUSG000000030577.14	Cd22	-2.859293306	2.44E-20
ENSMUSG000000025647.16	Shisa5	-1.209222869	2.71E-20
ENSMUSG000000048960.13	Prex2	1.801492825	4.97E-20
ENSMUSG000000091649.3	Phf11b	-3.193618177	5.38E-20
ENSMUSG000000076441.9	Ass1	-2.060631355	5.92E-20
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ENSMUSG000000049744.15	Arhgap15	-3.098368808	6.79E-20
ENSMUSG000000020400.17	Tnip1	-1.785412644	7.14E-20
ENSMUSG000000061132.13	Blnk	-2.679279374	7.17E-20
ENSMUSG000000027715.9	Ccna2	-2.516676969	7.19E-20
ENSMUSG000000028369.15	Svep1	1.458269291	7.58E-20
ENSMUSG000000070691.10	Runx3	-3.606342877	9.21E-20
ENSMUSG000000048865.16	Arhgap30	-1.84343758	1.27E-19
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ENSMUSG000000099757.1	BE692007	-4.213935235	1.79E-19
ENSMUSG000000044703.5	Phf11a	-4.911493783	2.13E-19
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ENSMUSG000000004612.9	Nkg7	-2.609463417	3.28E-19
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ENSMUSG000000044309.7	Apol7c	-4.582414368	3.79E-19
ENSMUSG000000033777.3	Tlr13	-3.545688131	4.60E-19
ENSMUSG000000003032.8	Klf4	2.264368365	6.24E-19
ENSMUSG000000055413.12	H2-Q5	-2.338079872	6.32E-19
ENSMUSG000000040488.17	Ltbp4	2.004132222	6.74E-19
ENSMUSG000000046245.13	Pilra	-3.09778952	7.40E-19

ENSMUSG00000066842.18	Hmcn1	1.643276499	9.60E-19
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ENSMUSG00000025422.9	Agap2	-2.457048623	1.30E-18
ENSMUSG00000026480.12	Ncf2	-1.954590427	1.51E-18
ENSMUSG00000039981.6	Zc3h12d	-3.189814887	1.92E-18
ENSMUSG00000054435.16	Gimap4	-1.519239722	2.65E-18
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ENSMUSG00000001281.9	Itgb7	-2.079307853	2.84E-18
ENSMUSG00000114608.1	AC238811.2	-4.633868022	3.16E-18
ENSMUSG00000056290.15	Ms4a4b	-2.907775669	3.39E-18
ENSMUSG00000022122.15	Ednrb	2.832043211	3.61E-18
ENSMUSG00000039899.5	Fgl2	-2.436038443	3.61E-18
ENSMUSG00000040170.13	Fmo2	1.998232602	3.91E-18
ENSMUSG00000073412.6	Lst1	-3.832040025	4.62E-18
ENSMUSG00000028459.11	Cd72	-3.424735261	8.10E-18
ENSMUSG00000041992.9	Rapgef5	1.541842848	8.36E-18
ENSMUSG00000026208.9	Des	1.525135507	9.72E-18
ENSMUSG00000104713.4	Gbp6	-3.744602059	1.25E-17
ENSMUSG00000028843.8	Sh3bgrl3	-1.719708003	1.33E-17
ENSMUSG00000040181.14	Fmo1	2.038104632	1.35E-17
ENSMUSG00000026012.2	Cd28	-3.657030796	1.57E-17
ENSMUSG00000024653.2	Scgb1a1	1.964978676	1.75E-17
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ENSMUSG00000022378.14	Fam49b	-1.898613416	1.95E-17
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ENSMUSG00000039943.16	Plcb4	1.713361891	2.61E-17
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ENSMUSG00000023903.7	Mmp25	-3.63830321	3.53E-17
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ENSMUSG00000054986.13	Sec14l3	1.362142024	3.69E-17
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ENSMUSG00000000530.16	Acvrl1	1.501224006	6.11E-17
ENSMUSG00000033960.5	Jcad	1.42723292	6.33E-17
ENSMUSG00000038910.6	Plcl2	-2.110417922	7.97E-17
ENSMUSG00000001403.13	Ube2c	-2.580248438	9.30E-17
ENSMUSG00000032436.17	Cmtm7	-1.977985229	9.31E-17
ENSMUSG00000037548.14	H2-DMb2	-3.188776632	9.47E-17
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ENSMUSG00000021591.8	Glrx	-2.628603631	1.15E-16
ENSMUSG00000037544.14	Dlgap5	-3.42138597	1.28E-16
ENSMUSG00000054675.5	Tmem119	1.955588249	1.30E-16
ENSMUSG00000026181.11	Ppm1f	1.498640278	1.38E-16
ENSMUSG00000026222.16	Sp100	-1.466595239	1.40E-16

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ENSMUSG00000028862.6	Map3k6	3.459522009	1.54E-16
ENSMUSG00000044162.12	Tnip3	-3.878160946	1.55E-16
ENSMUSG00000058254.12	Tspan7	1.714638894	1.66E-16
ENSMUSG00000022575.4	Gsdmd	-1.675154343	1.67E-16
ENSMUSG00000055172.10	C1ra	-1.525009683	1.76E-16
ENSMUSG00000034981.9	Parm1	-1.687837644	1.95E-16
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ENSMUSG00000079057.4	Cyp4v3	-1.353544863	2.19E-16
ENSMUSG00000027863.8	Cd2	-2.607052065	2.55E-16
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ENSMUSG00000024965.8	Fermt3	-2.010820548	3.25E-16
ENSMUSG00000021298.8	Gpr132	-2.548620503	4.00E-16
ENSMUSG00000018293.4	Pfn1	-1.327642561	4.05E-16
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ENSMUSG00000057789.13	Bak1	-1.606763295	4.62E-16
ENSMUSG00000044583.13	Tlr7	-2.960401358	4.85E-16
ENSMUSG00000056737.14	Capg	-1.953743547	5.07E-16
ENSMUSG00000047810.8	Ccdc88b	-2.99170559	5.76E-16
ENSMUSG00000061577.12	Adrg5	-3.384708031	5.91E-16
ENSMUSG00000033207.6	Mamdc2	2.143328066	6.47E-16
ENSMUSG00000034947.13	Tmem106a	-1.900772186	6.56E-16
ENSMUSG00000024998.17	Plce1	1.518504284	8.16E-16
ENSMUSG00000098112.7	Bin2	-1.941144079	9.04E-16
ENSMUSG000000111118.1	Gm6545	-4.765704109	9.17E-16
ENSMUSG00000043931.10	Gimap7	-3.996969714	1.24E-15
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ENSMUSG00000024190.6	Dusp1	2.500496097	1.51E-15
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ENSMUSG00000022901.13	Cd86	-2.965260574	1.58E-15
ENSMUSG00000053063.11	Clec12a	-3.210170253	1.87E-15
ENSMUSG00000040328.15	Olfr56	-4.284008436	1.94E-15
ENSMUSG00000024660.8	Incenp	-1.762430268	2.37E-15
ENSMUSG00000021775.11	Nr1d2	2.488501734	2.82E-15
ENSMUSG00000025473.16	Adam8	-1.578005614	3.06E-15
ENSMUSG00000035783.8	Acta2	1.665002506	3.14E-15
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ENSMUSG00000023927.15	Satb1	-2.241399033	9.56E-15
ENSMUSG00000023046.6	Igfbp6	2.27057946	1.03E-14
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ENSMUSG00000015316.11	Slamf1	-4.021400695	1.03E-14
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ENSMUSG00000015355.13	Cd48	-2.672297856	1.91E-14
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ENSMUSG00000026786.14	Apbb1ip	-2.361161717	2.99E-14
ENSMUSG00000051439.6	Cd14	-1.877111529	3.08E-14
ENSMUSG00000074794.10	Arrdc3	1.249261458	3.21E-14
ENSMUSG00000030214.6	Plbd1	-2.079053196	3.40E-14
ENSMUSG00000027483.7	Bpifa1	3.458696099	3.88E-14
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ENSMUSG00000030798.15	Cd37	-2.090161836	6.84E-14
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ENSMUSG00000056973.6	Ces1d	1.599116407	1.29E-13
ENSMUSG00000030187.15	Klra2	-3.786014535	1.33E-13
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ENSMUSG00000037940.17	Inpp4b	-1.536830956	1.43E-13
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ENSMUSG00000034593.16	Myo5a	-1.695058299	8.32E-13
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ENSMUSG000000050921.12	P2ry10	-2.67652593	8.15E-11
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ENSMUSG000000038421.13	Fcrla	-2.549105365	8.63E-11
ENSMUSG000000035852.11	Misp	-1.825132839	9.35E-11
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ENSMUSG000000045328.11	Cenpe	-3.564424248	9.84E-11

ENSMUSG00000035148.4	Gpr33	-4.260662919	1.01E-10
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ENSMUSG00000079197.10	Psme2	-1.541093586	1.71E-10
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ENSMUSG00000049521.1	Cdc42ep1	1.279758627	2.08E-10
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ENSMUSG00000022262.8	Dnah5	1.421372403	2.31E-10
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ENSMUSG00000018604.18	Tbx3	1.710349096	3.18E-10
ENSMUSG00000067149.6	Jchain	-3.728847395	3.20E-10
ENSMUSG00000042436.12	Mfap4	1.112309289	3.33E-10
ENSMUSG00000026335.16	Pam	1.107332149	3.43E-10
ENSMUSG00000001946.14	Esam	1.14880958	3.44E-10
ENSMUSG00000015396.4	Cd83	-1.920089973	3.61E-10
ENSMUSG00000020178.6	Adora2a	-3.266148296	3.65E-10
ENSMUSG00000019278.5	Dpep1	1.577714532	3.74E-10
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ENSMUSG00000047409.13	Ctdspl	1.347715626	4.87E-10
ENSMUSG00000029455.14	Aldh2	1.468384929	5.13E-10
ENSMUSG00000031613.9	Hpgd	1.490850296	6.04E-10
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ENSMUSG00000064065.15	Ipcef1	-2.496370724	6.67E-10
ENSMUSG00000020262.15	Adarb1	1.565576	7.39E-10
ENSMUSG00000033450.8	Tagap	-2.036778147	7.43E-10
ENSMUSG00000024339.12	Tap2	-1.790072267	7.44E-10
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ENSMUSG00000033307.7	Mif	-2.14305045	7.80E-10

ENSMUSG00000069516.8	Lyz2	-0.939135845	8.40E-10
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ENSMUSG00000027217.13	Tspan18	1.646231352	1.56E-09
ENSMUSG00000036570.14	Fxyd1	1.868269585	1.57E-09
ENSMUSG00000015468.14	Notch4	1.569100559	1.59E-09
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ENSMUSG00000032691.14	Nlrp3	-2.519913829	1.68E-09
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ENSMUSG00000060131.11	Atp8b4	-2.005149413	1.88E-09
ENSMUSG00000052776.10	Oas1a	-1.968718084	1.93E-09
ENSMUSG00000044708.5	Kcnj10	-3.017914808	1.95E-09
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ENSMUSG00000020653.12	Klf11	1.835826406	2.02E-09
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ENSMUSG00000038011.15	Dnah10	1.585450066	2.18E-09
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ENSMUSG00000074677.11	Sirpb1c	-2.118453822	2.46E-09
ENSMUSG00000042404.16	Dennd4b	-1.34183645	2.49E-09
ENSMUSG00000049723.14	Mmp12	-2.776401458	2.52E-09
ENSMUSG00000001131.11	Timp1	-1.796267555	2.53E-09
ENSMUSG00000063268.12	Parp10	-1.588916029	2.63E-09
ENSMUSG00000026417.13	Pigr	-1.751423916	2.70E-09
ENSMUSG00000038007.14	Acer2	1.369866688	2.82E-09
ENSMUSG00000068744.12	Psrc1	-2.066649172	2.84E-09
ENSMUSG00000019832.5	Rab32	-2.042736459	2.84E-09
ENSMUSG00000074802.11	Gas2l3	-2.572349021	2.84E-09
ENSMUSG00000008575.17	Nfib	1.01261318	2.94E-09
ENSMUSG00000030852.17	Tacc2	1.421932032	2.96E-09
ENSMUSG00000034936.2	Arl4d	2.452095732	2.99E-09
ENSMUSG00000037185.8	Krt80	1.686151694	3.02E-09
ENSMUSG00000003348.10	Mob3a	-1.433828676	3.04E-09
ENSMUSG00000001700.9	Gramd3	-1.78443562	3.22E-09
ENSMUSG00000020900.15	Myh10	1.439148834	3.33E-09
ENSMUSG00000062329.4	Cytl1	2.371181851	3.46E-09
ENSMUSG00000030786.18	Itgam	-3.814503993	3.52E-09

ENSMUSG00000019124.10	Scrn1	2.112431231	3.60E-09
ENSMUSG00000041828.15	Abca8a	1.951122323	3.62E-09
ENSMUSG00000042961.13	Egflam	1.699341545	3.93E-09
ENSMUSG00000024854.3	Pold4	-1.195983946	4.05E-09
ENSMUSG00000028780.13	Sema3c	1.124172136	4.10E-09
ENSMUSG00000020019.4	Ntn4	1.422625046	4.21E-09
ENSMUSG00000037966.15	Ninj1	-2.192706642	4.33E-09
ENSMUSG00000042985.7	Upk3b	1.32609927	4.33E-09
ENSMUSG00000059588.13	Calcr1	1.03765255	4.40E-09
ENSMUSG00000024640.9	Psat1	-1.873826502	4.46E-09
ENSMUSG00000052861.13	Dnah6	1.316813269	4.54E-09
ENSMUSG00000045826.8	Ptpcap	-2.40318468	4.54E-09
ENSMUSG00000036040.14	Adamtsl2	1.68132481	5.36E-09
ENSMUSG00000069792.5	Wfdc17	-2.698885195	5.76E-09
ENSMUSG00000029335.5	Bmp3	1.588555071	5.77E-09
ENSMUSG00000030495.12	Slc7a10	3.084135186	5.86E-09
ENSMUSG00000050967.5	Creg2	-4.170240257	5.94E-09
ENSMUSG00000052212.6	Cd177	-2.213528025	6.08E-09
ENSMUSG00000017716.15	Birc5	-3.606291163	6.17E-09
ENSMUSG00000047021.14	Cfap65	1.559960173	6.31E-09
ENSMUSG00000049871.13	Nlrc3	-1.984491861	6.35E-09
ENSMUSG00000030966.13	Trim21	-1.526989217	6.57E-09
ENSMUSG00000014846.12	Tppp3	1.537525857	6.73E-09
ENSMUSG00000022231.10	Sema5a	1.637718006	6.75E-09
ENSMUSG00000020092.9	Pald1	1.470489012	6.85E-09
ENSMUSG00000041431.16	Ccnb1	-3.427196271	6.94E-09
ENSMUSG00000034595.17	Ppp1r18	-1.208367144	7.09E-09
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ENSMUSG00000033826.9	Dnah8	-1.940506909	7.35E-09
ENSMUSG00000023092.16	Fhl1	1.355562955	7.40E-09
ENSMUSG00000027533.10	Fabp5	-1.751326558	7.77E-09
ENSMUSG00000104823.1	Gm43182	-3.23079751	7.87E-09
ENSMUSG00000004730.14	Adgre1	-1.788719002	8.41E-09
ENSMUSG00000055368.14	Slc6a2	1.978410418	8.48E-09
ENSMUSG00000096422.2	Igkv12-44	-4.667038666	8.59E-09
ENSMUSG00000062545.4	Tlr12	-2.273187101	8.94E-09
ENSMUSG00000028005.13	Gucy1b3	1.503131769	8.99E-09
ENSMUSG00000001444.2	Tbx21	-3.116964082	9.04E-09
ENSMUSG00000069892.9	9930111J21Ri	-1.585352041	9.06E-09
ENSMUSG00000033294.11	Noc4l	-1.474557054	1.05E-08
ENSMUSG00000041831.15	Sytl3	-2.363786977	1.09E-08
ENSMUSG00000024074.7	Crim1	1.162419636	1.10E-08
ENSMUSG00000042474.6	Fcmr	-2.400712322	1.10E-08
ENSMUSG00000062980.15	Cped1	1.74268141	1.19E-08
ENSMUSG00000079105.4	C7	1.877551666	1.19E-08
ENSMUSG00000001930.17	Vwf	1.281013427	1.19E-08
ENSMUSG00000001349.5	Cnn1	2.118723356	1.22E-08
ENSMUSG00000029718.14	Pcolce	1.294697748	1.23E-08
ENSMUSG00000108752.1	Gm45191	-2.549999747	1.30E-08
ENSMUSG00000040703.11	Cyp2s1	1.227047485	1.42E-08
ENSMUSG00000005410.6	Mcm5	-1.98771826	1.46E-08
ENSMUSG00000032094.8	Cd3d	-4.141577156	1.48E-08
ENSMUSG00000031563.8	Wwc2	1.376415825	1.49E-08
ENSMUSG00000020142.12	Slc1a4	1.25812001	1.50E-08

ENSMUSG00000070501.14	Ifi214	-3.086514655	1.59E-08
ENSMUSG00000053716.9	Dusp7	1.228557453	1.68E-08
ENSMUSG00000076613.4	Ighg2b	-3.989510672	1.74E-08
ENSMUSG00000070643.11	Sox13	1.664989203	1.78E-08
ENSMUSG00000067341.5	H2-Eb2	-4.0146125	1.80E-08
ENSMUSG00000069833.12	Ahnak	0.88747851	1.87E-08
ENSMUSG00000023992.14	Trem2	-3.042442129	1.97E-08
ENSMUSG00000026669.14	Mcm10	-1.806123844	1.97E-08
ENSMUSG00000097423.1	Gm26522	-2.433372891	2.00E-08
ENSMUSG00000076937.3	Iglc2	-3.258020383	2.16E-08
ENSMUSG00000106957.1	Gm43085	-0.850516089	2.23E-08
ENSMUSG00000096459.1	Ighv9-3	-4.613579149	2.31E-08
ENSMUSG00000031608.13	Galnt7	-1.870602489	2.41E-08
ENSMUSG00000004296.14	Il12b	-4.165693769	2.44E-08
ENSMUSG00000055653.13	Gpc3	1.524135402	2.56E-08
ENSMUSG00000018796.13	Acsl1	-1.134158686	2.66E-08
ENSMUSG00000095217.1	Hist1h2bn	-2.655537458	2.71E-08
ENSMUSG00000024781.15	Lipa	-1.305814703	2.76E-08
ENSMUSG00000042066.15	Tmcc2	1.502491855	2.85E-08
ENSMUSG00000092274.2	Neat1	1.129230797	2.91E-08
ENSMUSG00000102561.1	Gm37039	-3.846600963	3.11E-08
ENSMUSG00000000386.14	Mx1	-2.501066817	3.17E-08
ENSMUSG00000002227.15	Mov10	-1.319933394	3.18E-08
ENSMUSG00000024858.13	Grk2	-1.016692564	3.25E-08
ENSMUSG00000018012.11	Rac3	2.418745996	3.27E-08
ENSMUSG00000020638.8	Cmpk2	-1.557536567	3.30E-08
ENSMUSG00000040990.17	Sh3kbp1	-1.522699777	3.32E-08
ENSMUSG00000035934.16	Pknos2	1.820299106	3.33E-08
ENSMUSG00000024395.8	Lims2	1.789587152	3.44E-08
ENSMUSG00000029798.11	Herc6	-1.780652494	3.53E-08
ENSMUSG00000039982.7	Dtx4	-1.416709407	3.61E-08
ENSMUSG00000015243.4	Abca1	-0.898649517	3.91E-08
ENSMUSG00000090307.7	1700071M16l	-3.638363188	3.97E-08
ENSMUSG00000032300.7	1700017B05R	-1.244511433	4.06E-08
ENSMUSG00000035860.9	Cdhr3	1.602916015	4.06E-08
ENSMUSG00000022123.9	Scel	1.513500757	4.07E-08
ENSMUSG00000035258.14	Abi3bp	1.682743931	4.39E-08
ENSMUSG00000045730.3	Adrb2	1.86453139	4.40E-08
ENSMUSG00000032332.17	Col12a1	1.551611391	4.70E-08
ENSMUSG00000030651.5	Art2b	-3.681681804	4.76E-08
ENSMUSG00000028460.6	Sit1	-3.211421709	4.78E-08
ENSMUSG00000064325.4	Hhip	1.469625202	4.79E-08
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ENSMUSG00000029581.14	Fscn1	-2.058107415	4.96E-08
ENSMUSG00000084796.1	Mir142hg	-2.99549056	5.24E-08
ENSMUSG00000026185.8	Igfbp5	1.254403475	5.35E-08
ENSMUSG00000032024.10	Clmp	-2.454929852	5.43E-08
ENSMUSG00000038146.7	Notch3	1.242059313	5.50E-08
ENSMUSG00000028195.4	Cyr61	1.359394026	5.57E-08
ENSMUSG00000017754.13	Pltp	1.353454808	5.77E-08
ENSMUSG00000022436.15	Sh3bp1	-1.336580798	5.81E-08
ENSMUSG00000035352.3	Ccl12	-3.246933437	6.74E-08
ENSMUSG00000028337.14	Coro2a	-1.107801845	6.85E-08
ENSMUSG00000060791.15	Gmfg	-1.655580589	7.05E-08

ENSMUSG00000029193.7	Cckar	1.365531299	7.05E-08
ENSMUSG00000034959.8	Rubcnl	-1.839170676	7.38E-08
ENSMUSG000000097324.8	Carmn	1.847377138	7.38E-08
ENSMUSG00000030695.16	Aldoa	-0.831467773	7.48E-08
ENSMUSG00000032514.11	Ttc21a	1.780763969	8.11E-08
ENSMUSG00000054717.7	Hmgb2	-1.951237583	8.20E-08
ENSMUSG00000047501.3	Cldn4	-2.648361788	8.75E-08
ENSMUSG00000026358.13	Rgs1	-2.659486554	8.76E-08
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ENSMUSG00000052384.13	Nrros	-1.420749393	9.29E-08
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ENSMUSG00000101972.1	Hist1h3i	-4.086247385	9.73E-08
ENSMUSG00000005533.10	Igf1r	1.233245202	1.00E-07
ENSMUSG00000047867.11	Gimap6	-1.166142227	1.02E-07
ENSMUSG00000062960.10	Kdr	1.307636169	1.02E-07
ENSMUSG00000044453.5	Ffar1	-4.341136576	1.03E-07
ENSMUSG00000046314.16	Stxbp6	1.859713462	1.08E-07
ENSMUSG00000029449.11	Rhof	-1.719765157	1.15E-07
ENSMUSG00000003153.10	Slc2a3	-1.746038372	1.16E-07
ENSMUSG00000021573.15	Tppp	1.762541191	1.18E-07
ENSMUSG00000010047.12	Hyal2	1.219447342	1.20E-07
ENSMUSG00000040084.9	Bub1b	-1.817578619	1.24E-07
ENSMUSG00000042099.15	Kank3	1.55307286	1.24E-07
ENSMUSG00000044350.14	Lacc1	-2.509023459	1.27E-07
ENSMUSG00000022385.10	Gtse1	-2.475524871	1.31E-07
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ENSMUSG00000021508.11	Cxcl14	1.394481023	1.42E-07
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ENSMUSG00000022018.7	Rgcc	2.282956025	1.43E-07
ENSMUSG00000039531.8	Zufsp	-1.516183333	1.44E-07
ENSMUSG00000026770.5	Il2ra	-2.69948427	1.44E-07
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ENSMUSG00000019122.8	Ccl9	-2.109714389	1.45E-07
ENSMUSG00000034459.8	Ifit1	-1.432725902	1.50E-07
ENSMUSG00000056313.5	Tcim	2.428767779	1.58E-07
ENSMUSG00000024910.4	Ctsw	-2.015959813	1.62E-07
ENSMUSG00000038507.6	Parp12	-0.903881879	1.65E-07
ENSMUSG00000022237.17	Ankrd33b	1.327655163	1.66E-07
ENSMUSG00000004642.13	Slbp	-1.690147603	1.66E-07
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ENSMUSG00000027332.11	Ivd	1.139938248	1.73E-07
ENSMUSG00000038379.15	Ttk	-3.102778951	1.77E-07
ENSMUSG00000073008.11	Gpr174	-3.176623132	1.82E-07
ENSMUSG00000023349.14	Clec4n	-2.597408976	1.85E-07
ENSMUSG00000053101.3	Gpr141	-2.83238554	1.90E-07
ENSMUSG00000005763.15	Cd247	-1.900960258	1.92E-07
ENSMUSG00000038175.10	Mylip	-1.191553859	1.98E-07
ENSMUSG00000001507.16	Itga3	0.772394626	2.01E-07
ENSMUSG00000022518.15	4930562C15R	1.903168225	2.06E-07
ENSMUSG00000027636.11	Sla2	-1.842215025	2.11E-07
ENSMUSG00000020649.11	Rrm2	-2.46532143	2.11E-07

ENSMUSG00000022945.11	Chaf1b	-2.017086095	2.20E-07
ENSMUSG00000024048.14	Myl12a	0.855191431	2.39E-07
ENSMUSG00000029675.12	Eln	-1.266133494	2.39E-07
ENSMUSG000000052760.15	A630001G21F	-2.312558731	2.41E-07
ENSMUSG00000024402.5	Lta	-3.759531808	2.48E-07
ENSMUSG000000066687.5	Zbtb16	2.944763383	2.50E-07
ENSMUSG000000037860.15	Aim2	-1.862786769	2.55E-07
ENSMUSG000000023249.15	Parp3	-1.20813099	2.57E-07
ENSMUSG000000020737.12	Jpt1	-1.126017795	2.60E-07
ENSMUSG000000034227.7	Foxj1	1.208128938	2.61E-07
ENSMUSG000000062866.16	Phactr2	0.930141854	2.62E-07
ENSMUSG000000032020.15	Ubash3b	-1.380448697	2.66E-07
ENSMUSG000000071547.4	Nt5dc2	1.834947083	2.72E-07
ENSMUSG000000017830.15	Dhx58	-1.737968779	2.74E-07
ENSMUSG000000028645.11	Slc2a1	-1.528156295	2.81E-07
ENSMUSG000000052229.5	Gpr17	2.26355435	2.88E-07
ENSMUSG000000031934.14	Panx1	-2.074664984	2.91E-07
ENSMUSG000000012519.14	Mlkl	-1.708508347	3.05E-07
ENSMUSG000000036181.2	Hist1h1c	-1.350361456	3.18E-07
ENSMUSG000000027423.15	Snx5	-1.257913533	3.19E-07
ENSMUSG000000038296.14	Galnt18	1.201880911	3.27E-07
ENSMUSG000000031805.17	Jak3	-1.261032253	3.41E-07
ENSMUSG000000057182.14	Scn3a	1.812327886	3.41E-07
ENSMUSG000000062082.16	Cd200r4	-2.902448358	3.49E-07
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ENSMUSG000000006445.3	Epha2	1.206565955	3.52E-07
ENSMUSG000000025608.9	Podxl	0.991048299	3.55E-07
ENSMUSG000000097295.1	Hmgb1-ps8	-3.076066908	3.61E-07
ENSMUSG000000031264.13	Btk	-2.161124188	3.61E-07
ENSMUSG000000031565.18	Fgfr1	1.309266939	3.63E-07
ENSMUSG000000034684.12	Sema3f	1.066264158	3.68E-07
ENSMUSG000000054342.8	Kcnn4	-2.016706045	3.69E-07
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ENSMUSG000000026749.11	Nek6	-1.099681291	3.90E-07
ENSMUSG000000029910.14	Mad2l1	-2.019763359	3.92E-07
ENSMUSG000000050957.4	Ins16	-3.290308383	3.92E-07
ENSMUSG000000042817.15	Flt3	-1.979836173	3.92E-07
ENSMUSG000000027227.7	Sord	1.445774114	3.96E-07
ENSMUSG000000037921.15	Ddx60	-1.63583175	3.96E-07
ENSMUSG000000057068.15	Fam47e	2.531015826	4.01E-07
ENSMUSG000000041859.10	Mcm3	-1.412412711	4.16E-07
ENSMUSG000000028476.13	Reck	1.734847971	4.20E-07
ENSMUSG000000071068.6	Trem12	-2.405891983	4.22E-07
ENSMUSG000000022656.15	Nectin3	1.056595383	4.43E-07
ENSMUSG000000047415.12	Gpr68	-1.79706931	4.46E-07
ENSMUSG000000000093.6	Tbx2	1.463776195	4.46E-07
ENSMUSG000000038550.10	Ciart	2.750163268	4.56E-07
ENSMUSG000000043415.5	Otud1	2.065465359	4.61E-07
ENSMUSG000000094075.1	Ighv1-80	-4.052500261	4.66E-07
ENSMUSG000000022949.9	Clic6	2.072180221	4.86E-07
ENSMUSG000000090675.2	Olf111	-3.973057231	4.88E-07
ENSMUSG000000111394.1	AC160637.1	-1.429897107	4.90E-07
ENSMUSG000000032547.12	Ryk	1.264624347	5.03E-07
ENSMUSG000000024644.16	Cndp2	-1.253575753	5.10E-07

ENSMUSG00000003746.16	Man1a	-1.307654249	5.16E-07
ENSMUSG000000028756.12	Pink1	1.036977844	5.23E-07
ENSMUSG000000052087.14	Rgs14	-1.567821792	5.28E-07
ENSMUSG000000044313.13	Mab21l3	-3.677703588	5.35E-07
ENSMUSG000000015314.10	Slamf6	-2.829854006	5.71E-07
ENSMUSG000000004698.10	Hdac9	-2.158840793	5.71E-07
ENSMUSG000000053175.17	Bcl3	-1.629870689	5.76E-07
ENSMUSG000000078607.5	1810010H24F	2.38181316	5.99E-07
ENSMUSG000000051212.8	Gpr183	-1.690272593	6.00E-07
ENSMUSG000000051627.3	Hist1h1e	-1.265960099	6.30E-07
ENSMUSG000000103907.1	Gm37498	-4.024012179	6.30E-07
ENSMUSG000000060112.4	Olfr60	-3.966157851	6.40E-07
ENSMUSG000000015709.9	Arnt2	-3.295880574	6.60E-07
ENSMUSG000000076549.2	Igkv4-68	-4.192915908	6.60E-07
ENSMUSG000000023505.13	Cdca3	-2.488791197	7.04E-07
ENSMUSG000000022623.15	Shank3	1.327673569	7.08E-07
ENSMUSG000000022220.14	Adcy4	1.222602718	7.08E-07
ENSMUSG000000057219.11	Armc7	-1.807313044	7.20E-07
ENSMUSG000000025078.8	Nhlrc2	1.254480207	7.24E-07
ENSMUSG000000029155.16	Spata18	1.610396898	7.29E-07
ENSMUSG000000052062.14	Pard3b	1.594900964	7.52E-07
ENSMUSG000000001300.16	Efnb2	1.720377133	7.67E-07
ENSMUSG000000019944.14	Rhobtb1	1.271550956	8.28E-07
ENSMUSG000000039116.5	Adgrg6	1.099662388	8.34E-07
ENSMUSG000000020717.19	Pecam1	0.907823444	8.42E-07
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ENSMUSG000000076615.4	Ighg3	-3.860225774	8.47E-07
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ENSMUSG000000049916.10	2610318N02F	-3.731810593	9.18E-07
ENSMUSG000000042351.8	Grap2	-1.930802536	9.18E-07
ENSMUSG000000001517.14	Foxm1	-1.761730872	9.18E-07
ENSMUSG000000020467.15	Efemp1	1.373688705	9.75E-07
ENSMUSG000000003882.5	Il7r	-1.500306838	9.92E-07
ENSMUSG000000037846.18	Rtkn2	1.276356104	1.00E-06
ENSMUSG000000037653.7	Kctd8	3.57010515	1.02E-06
ENSMUSG000000030530.15	Furin	-0.841358151	1.02E-06
ENSMUSG000000095630.2	Igkv6-23	-4.057515083	1.06E-06
ENSMUSG000000108912.1	E230020D15F	2.156508531	1.08E-06
ENSMUSG000000030554.16	Synm	1.858602536	1.09E-06
ENSMUSG000000102037.1	Bcl2a1a	-3.847675762	1.09E-06
ENSMUSG000000024013.14	Fgd2	-1.341523228	1.13E-06
ENSMUSG000000056220.14	Pla2g4a	-1.406611609	1.13E-06
ENSMUSG000000020486.18	Sep-04	1.022353072	1.14E-06
ENSMUSG000000090958.2	Lrrc32	1.611868889	1.15E-06
ENSMUSG000000005320.9	Fgfr4	2.42970836	1.17E-06
ENSMUSG000000019027.8	Dnah1	1.463511222	1.17E-06
ENSMUSG000000021390.6	Ogn	1.302842678	1.23E-06
ENSMUSG000000096490.1	Igkv10-94	-4.001964164	1.31E-06
ENSMUSG000000017652.16	Cd40	-1.487821026	1.32E-06
ENSMUSG000000021277.16	Traf3	-1.172916533	1.34E-06
ENSMUSG000000002458.13	Rgs19	-1.416127991	1.38E-06

ENSMUSG00000002847.6	Pla1a	-3.540646521	1.38E-06
ENSMUSG000000022408.6	Fam83f	-3.245845037	1.39E-06
ENSMUSG000000048031.15	Fcrl5	-3.876840366	1.39E-06
ENSMUSG000000052273.4	Dnah3	1.206911058	1.40E-06
ENSMUSG000000001918.17	Slc1a5	0.817022052	1.40E-06
ENSMUSG000000062939.11	Stat4	-2.914530513	1.49E-06
ENSMUSG000000041324.14	Inhba	-2.1908521	1.51E-06
ENSMUSG000000015053.14	Gata2	1.409999129	1.52E-06
ENSMUSG000000019487.11	Trip10	1.346442421	1.53E-06
ENSMUSG000000064294.12	Aox3	1.157782302	1.54E-06
ENSMUSG000000090103.1	Gm16094	-2.68430593	1.56E-06
ENSMUSG000000046718.8	Bst2	-1.539511773	1.58E-06
ENSMUSG000000039193.7	Nlrc4	-2.743598348	1.61E-06
ENSMUSG000000043822.18	Adamtsl5	1.911185302	1.64E-06
ENSMUSG000000021708.17	Rasgrf2	1.089209448	1.64E-06
ENSMUSG000000076612.8	Ighg2c	-3.868274606	1.65E-06
ENSMUSG000000001029.15	Icam2	0.929897222	1.66E-06
ENSMUSG000000018171.9	Vmp1	-0.977964733	1.69E-06
ENSMUSG000000040562.12	Gstm2	1.298031069	1.69E-06
ENSMUSG000000050002.14	Idnk	-1.315101872	1.71E-06
ENSMUSG000000026110.15	Mgat4a	-1.201895816	1.73E-06
ENSMUSG000000034634.7	Ly6d	-2.103740546	1.75E-06
ENSMUSG000000032657.15	Fam189b	-1.729109891	1.77E-06
ENSMUSG000000029641.8	Rasl11a	-1.704338197	1.79E-06
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ENSMUSG000000024769.7	Cdc42bpg	1.179106513	1.87E-06
ENSMUSG000000030134.11	Rasgef1a	1.122585308	1.88E-06
ENSMUSG000000041323.6	Ak7	1.719276992	1.89E-06
ENSMUSG000000014599.10	Csf1	-0.946415871	1.93E-06
ENSMUSG000000027306.15	Nusap1	-1.973865916	1.95E-06
ENSMUSG000000046280.9	She	1.341189961	1.96E-06
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ENSMUSG000000024424.14	Ttc39c	-1.734215916	2.11E-06
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ENSMUSG000000024989.14	Cep55	-2.903667875	2.23E-06
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ENSMUSG000000031380.10	Vegfd	1.701179471	2.39E-06
ENSMUSG000000028718.16	Stil	-2.820069943	2.53E-06
ENSMUSG000000022500.14	Litaf	-1.11137315	2.53E-06
ENSMUSG000000030747.5	Dgat2	1.801186834	2.55E-06
ENSMUSG000000034833.10	Tespa1	-2.252974676	2.56E-06
ENSMUSG000000068270.15	Shroom4	1.026743666	2.60E-06
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ENSMUSG000000033538.13	Casp4	-1.641571078	2.67E-06
ENSMUSG000000027602.9	Map1lc3a	0.993795314	2.67E-06

ENSMUSG00000074785.5	Plxnc1	-1.204542047	2.68E-06
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ENSMUSG00000041842.15	Fhdc1	1.261720365	2.90E-06
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ENSMUSG00000025089.15	Gfra1	2.82130449	3.01E-06
ENSMUSG00000029772.17	Ahcyl2	-1.007127049	3.04E-06
ENSMUSG00000039145.16	Camk1d	-1.274636188	3.07E-06
ENSMUSG00000045103.17	Dmd	1.558769357	3.08E-06
ENSMUSG00000022283.15	Pabpc1	-0.92153866	3.13E-06
ENSMUSG00000034258.4	Flvcr2	1.784726801	3.13E-06
ENSMUSG00000032374.14	Plod2	1.396373911	3.15E-06
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ENSMUSG000000106818.1	Gm43790	3.984369541	3.17E-06
ENSMUSG00000024079.4	Eif2ak2	-1.463306294	3.25E-06
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ENSMUSG00000029710.15	Ephb4	1.025403497	3.29E-06
ENSMUSG00000062210.13	Tnfaip8	-1.630213288	3.29E-06
ENSMUSG00000039110.14	Mycbpap	1.475275803	3.39E-06
ENSMUSG00000030562.17	Nox4	1.366828234	3.39E-06
ENSMUSG00000033209.17	Ttc28	1.193622308	3.40E-06
ENSMUSG00000026014.15	Raph1	0.905362675	3.49E-06
ENSMUSG00000023456.14	Tpi1	-1.075023003	3.58E-06
ENSMUSG00000054320.16	Lrrc36	1.785740008	3.66E-06
ENSMUSG00000021838.17	Samd4	1.282448338	3.69E-06
ENSMUSG00000017210.14	Med24	-0.858645115	3.72E-06
ENSMUSG00000033498.14	Strc	-3.77057376	3.81E-06
ENSMUSG00000036526.8	Card11	-1.558030762	3.87E-06
ENSMUSG00000004044.9	Cavin1	1.011140032	3.93E-06
ENSMUSG00000026928.14	Card9	-1.347417656	3.94E-06
ENSMUSG00000051359.15	Ncald	1.045641748	4.02E-06
ENSMUSG00000030077.11	Chl1	-2.835186837	4.07E-06
ENSMUSG00000036585.15	Fgf1	1.171758085	4.15E-06
ENSMUSG00000039084.8	Chad	1.53337258	4.15E-06
ENSMUSG00000017499.15	Cdc6	-2.204911327	4.28E-06
ENSMUSG00000020577.17	Tspan13	1.044446525	4.30E-06
ENSMUSG000000105986.1	Gm43065	-2.997282451	4.33E-06
ENSMUSG00000026490.18	Cdc42bpa	0.944506259	4.34E-06
ENSMUSG00000029413.14	Naaa	-1.071397676	4.34E-06
ENSMUSG00000031400.10	G6pdx	-0.912968441	4.35E-06
ENSMUSG00000034460.9	Six4	1.5325188	4.37E-06
ENSMUSG00000029622.16	Arpc1b	-1.083908439	4.44E-06
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ENSMUSG00000027513.11	Pck1	3.475088785	4.49E-06
ENSMUSG00000029379.10	Cxcl3	-3.238261748	4.50E-06
ENSMUSG00000024590.8	Lmnbl1	-2.082426899	4.56E-06
ENSMUSG00000040260.8	Daam2	1.643734667	4.56E-06
ENSMUSG00000029372.7	Ppbp	2.139097097	4.61E-06
ENSMUSG00000071005.7	Ccl19	-1.793050803	4.72E-06
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ENSMUSG00000034471.12	Caskin2	1.36907256	4.77E-06

ENSMUSG00000028399.18	Ptprd	0.93069037	4.82E-06
ENSMUSG00000022876.18	Samsn1	-2.226090758	4.92E-06
ENSMUSG00000019876.15	Pkib	-2.122778834	4.93E-06
ENSMUSG00000032377.8	Plscr4	1.494738596	5.01E-06
ENSMUSG00000033952.14	Aspm	-2.674071756	5.04E-06
ENSMUSG00000074259.10	Gramd2	1.262363051	5.06E-06
ENSMUSG00000059325.14	Hopx	1.280226898	5.06E-06
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ENSMUSG00000034361.10	Cpne2	-1.729556116	5.30E-06
ENSMUSG00000096054.3	Syne1	0.866030611	5.51E-06
ENSMUSG00000025888.5	Casp1	-2.62191549	5.77E-06
ENSMUSG00000024675.19	Ms4a4c	-2.360641039	5.79E-06
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ENSMUSG00000040466.16	Blvrb	-1.485745587	5.85E-06
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ENSMUSG00000045930.3	Clec14a	1.023045313	5.91E-06
ENSMUSG00000029249.15	Rest	-0.950010041	5.91E-06
ENSMUSG00000061410.6	Zcchc14	1.158701526	5.91E-06
ENSMUSG00000062007.13	Hsh2d	-2.844013099	5.98E-06
ENSMUSG00000024014.7	Pim1	-1.951822427	6.01E-06
ENSMUSG00000019647.16	Sema6a	1.233034744	6.05E-06
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ENSMUSG00000000058.6	Cav2	1.078757945	6.24E-06
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ENSMUSG00000054892.14	Txk	-2.812447291	7.48E-06
ENSMUSG00000029669.14	Tspan12	1.435821711	7.62E-06
ENSMUSG00000048756.11	Foxo3	0.885559192	7.66E-06
ENSMUSG00000037418.5	Best1	-2.606137814	8.06E-06
ENSMUSG00000030657.11	Xylt1	-1.437264685	8.09E-06
ENSMUSG00000052105.16	Mtcl1	1.321642201	8.10E-06
ENSMUSG00000054263.12	Lifr	0.960723396	8.11E-06
ENSMUSG00000024691.13	Fam111a	-2.056669066	8.18E-06
ENSMUSG00000027540.13	Ptpn1	-1.027250163	8.22E-06
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ENSMUSG00000025006.16	Sorbs1	1.22499041	8.55E-06
ENSMUSG00000018209.15	Stk4	-0.744169512	8.55E-06
ENSMUSG00000025165.12	Sectm1a	-3.588303037	8.87E-06
ENSMUSG00000022957.19	Itsn1	0.96764312	9.02E-06
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ENSMUSG00000042359.18	Osbpl6	1.325234021	9.43E-06
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ENSMUSG00000048922.18	Cdca2	-2.311278091	9.69E-06
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ENSMUSG00000107075.1	Gm43068	-3.4619157	1.09E-05
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ENSMUSG00000051498.6	Tlr6	-2.563398197	1.19E-05
ENSMUSG00000038637.15	Lrrc56	1.821458574	1.20E-05
ENSMUSG00000054364.5	Rhob	1.187873755	1.21E-05
ENSMUSG00000031451.6	Gas6	0.995430136	1.21E-05
ENSMUSG00000035828.10	Pim3	1.658144071	1.23E-05
ENSMUSG00000020469.8	Myl7	1.871800378	1.26E-05
ENSMUSG00000014303.13	Glis2	1.204577155	1.28E-05
ENSMUSG00000026701.15	Prdx6	0.926596452	1.28E-05
ENSMUSG00000068735.14	Trp53i11	-1.269345082	1.30E-05
ENSMUSG00000040907.15	Atp1a3	-2.550053215	1.32E-05
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ENSMUSG00000039167.11	Adgrl4	1.037517315	1.47E-05
ENSMUSG00000023942.15	Slc29a1	1.118326017	1.49E-05
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ENSMUSG00000057135.12	Scimp	-2.662708659	1.50E-05
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ENSMUSG00000039004.6	Bmp6	1.250842013	1.60E-05
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ENSMUSG00000019590.16	Cyb561	1.140305133	1.62E-05
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ENSMUSG000000073982.11	Rhog	-0.870484687	2.10E-05
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ENSMUSG000000029580.14	Actb	-0.558361605	2.11E-05
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ENSMUSG000000027188.8	Pamr1	1.979414979	2.16E-05
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ENSMUSG000000039395.8	Mreg	-2.00955297	2.32E-05
ENSMUSG000000048521.8	Cxcr6	-1.826744867	2.32E-05
ENSMUSG000000036745.15	Ttll7	0.925668513	2.34E-05
ENSMUSG000000001248.15	Gramd1a	-1.070974969	2.35E-05
ENSMUSG000000048794.14	Cfap100	2.483256415	2.37E-05
ENSMUSG000000034911.8	Ushbp1	1.034558117	2.42E-05
ENSMUSG000000019326.14	Aoc3	1.839859772	2.44E-05
ENSMUSG000000037541.21	Shank2	1.619649091	2.46E-05
ENSMUSG000000046402.10	Rbp1	1.619866288	2.48E-05
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ENSMUSG000000034028.15	Cd226	-1.784293378	2.54E-05
ENSMUSG000000045038.14	Prkce	1.229006063	2.59E-05
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ENSMUSG000000039304.11	Tnfsf10	-0.986071111	2.75E-05
ENSMUSG000000048721.2	Fndc9	-2.90465868	2.75E-05
ENSMUSG000000086953.1	Aknaos	-2.885351484	2.76E-05
ENSMUSG000000020593.15	Lpin1	1.159411094	2.77E-05
ENSMUSG000000085599.1	Gm13449	-2.999566521	2.78E-05
ENSMUSG000000027718.8	Il21	-3.495660982	2.93E-05
ENSMUSG000000097296.1	Gm26532	1.43438348	2.94E-05
ENSMUSG000000031548.7	Sfrp1	-1.740406418	2.99E-05
ENSMUSG000000042029.7	Ncapg2	-1.792361592	2.99E-05
ENSMUSG000000049866.12	Arl4c	-1.273276055	3.05E-05
ENSMUSG000000041119.11	Pde9a	1.432739468	3.07E-05
ENSMUSG000000025813.14	Homer2	2.057486312	3.10E-05
ENSMUSG000000020101.14	Vsir	-0.871911083	3.16E-05
ENSMUSG000000108238.1	Gm43984	-1.786532843	3.17E-05
ENSMUSG000000020473.13	Aebp1	0.895962243	3.17E-05
ENSMUSG000000037643.14	Prkci	1.160854233	3.20E-05
ENSMUSG000000052485.7	Tmem171	-2.953007767	3.20E-05
ENSMUSG000000090213.1	Tmem189	-0.949493316	3.20E-05
ENSMUSG000000099398.1	Ms4a14	-3.138377971	3.20E-05
ENSMUSG000000026548.4	Slamf9	-1.84586946	3.21E-05
ENSMUSG000000024798.15	Htr7	-2.993782608	3.21E-05
ENSMUSG000000020399.14	Havcr2	-1.917657519	3.21E-05

ENSMUSG00000051586.16	Mical3	0.922505828	3.21E-05
ENSMUSG00000046532.8	Ar	1.675198956	3.36E-05
ENSMUSG00000047394.8	Odf3b	1.617667495	3.37E-05
ENSMUSG00000043157.8	Arl11	-2.206040919	3.42E-05
ENSMUSG00000028434.12	Epb41l4b	1.361497485	3.42E-05
ENSMUSG00000030873.9	Scnn1b	1.003135768	3.46E-05
ENSMUSG00000034786.17	Gpsm3	-1.404573635	3.47E-05
ENSMUSG00000004099.16	Dnmt1	-0.647163509	3.54E-05
ENSMUSG00000006567.11	Atp7b	2.016662589	3.58E-05
ENSMUSG00000028184.12	Adgrl2	0.823626272	3.59E-05
ENSMUSG00000025357.8	Dgka	-0.903855028	3.61E-05
ENSMUSG00000022489.6	Pde1b	-1.462220037	3.65E-05
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ENSMUSG00000024011.16	Pi16	1.540934212	3.80E-05
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ENSMUSG00000037887.11	Dusp8	2.059598087	3.90E-05
ENSMUSG00000070565.11	Rasal2	1.174743102	3.90E-05
ENSMUSG00000051669.5	AU021092	0.88672314	3.95E-05
ENSMUSG00000034570.12	Inpp5j	-2.629804939	3.99E-05
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ENSMUSG00000032340.8	Neo1	0.926883681	4.10E-05
ENSMUSG00000028402.18	Mpdz	1.17807214	4.16E-05
ENSMUSG00000029366.10	Dck	-1.858585962	4.16E-05
ENSMUSG00000036948.17	BC037034	-0.97366079	4.17E-05
ENSMUSG00000020014.17	Cfap54	1.13117785	4.22E-05
ENSMUSG00000020439.17	Smtn	1.293997789	4.22E-05
ENSMUSG00000042677.7	Zc3h12a	-1.356214734	4.27E-05
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ENSMUSG00000022667.17	Cd200r1	-2.875494453	4.32E-05
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ENSMUSG00000022261.6	Sdc2	1.34382235	4.36E-05
ENSMUSG00000028691.12	Prdx1	-0.882053182	4.45E-05
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ENSMUSG00000050410.15	Tcf19	-1.108219343	4.51E-05
ENSMUSG00000032776.9	Mctp2	-1.58538537	4.59E-05
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ENSMUSG00000030774.13	Pak1	-1.089848433	4.95E-05
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ENSMUSG00000075225.14	Ccdc162	1.283691035	5.17E-05
ENSMUSG00000021876.15	Rnase4	0.795174642	5.17E-05
ENSMUSG00000050069.3	Grem2	1.224756355	5.21E-05
ENSMUSG00000034738.8	Nostrin	1.213037612	5.35E-05
ENSMUSG00000027955.16	Fam198b	1.394991567	5.36E-05
ENSMUSG00000029007.8	Agtrap	-0.904903533	5.36E-05
ENSMUSG00000045362.8	Tnfrsf26	-1.955373365	5.47E-05

ENSMUSG00000035184.15	Fam124a	2.168502649	5.54E-05
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ENSMUSG00000024764.9	Naa40	-0.97385122	5.90E-05
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ENSMUSG00000032076.19	Cadm1	0.71884349	6.33E-05
ENSMUSG00000038807.18	Rap1gap2	-1.125544594	6.35E-05
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ENSMUSG00000032870.8	Smap2	-0.95535395	6.54E-05
ENSMUSG00000046275.2	Tusc5	1.91794413	6.54E-05
ENSMUSG00000027087.11	Itgav	-0.718187655	6.59E-05
ENSMUSG00000040928.15	S100pbb	-0.996558053	6.61E-05
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ENSMUSG00000000094.12	Tbx4	1.101141384	7.00E-05
ENSMUSG00000038128.6	Camk4	-1.693003489	7.00E-05
ENSMUSG00000079620.13	Muc4	-1.033227864	7.07E-05
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ENSMUSG00000031833.10	Mast3	-0.949503698	7.32E-05
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ENSMUSG00000051397.5	Tacstd2	-1.38596342	7.54E-05
ENSMUSG00000027485.15	Bpifb1	1.800330835	7.74E-05
ENSMUSG00000039977.16	Deup1	2.856882448	7.75E-05
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ENSMUSG000000105703.2	Gm43305	-2.139781814	7.77E-05
ENSMUSG00000095771.2	Igkv14-111	-3.46871901	7.86E-05
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ENSMUSG00000025163.6	Cd7	-2.22820359	8.07E-05
ENSMUSG00000091549.1	Gm6548	-1.271612586	8.08E-05
ENSMUSG00000017146.12	Brca1	-2.049042367	8.11E-05

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ENSMUSG00000020744.13	Slc25a19	-1.393371161	8.24E-05
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ENSMUSG00000048537.16	Phldb1	1.093042547	8.51E-05
ENSMUSG00000024098.5	Twsg1	0.636556962	8.51E-05
ENSMUSG00000048285.9	Frmd6	1.068389098	8.51E-05
ENSMUSG00000076925.2	Traj3	-3.215346005	8.52E-05
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ENSMUSG00000057596.13	Trim30d	-1.429457877	8.82E-05
ENSMUSG00000030208.15	Emp1	0.979175112	8.90E-05
ENSMUSG00000086652.1	Gm14029	-3.442051257	9.02E-05
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ENSMUSG00000002688.8	Prkd1	1.629525179	9.27E-05
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ENSMUSG00000035021.13	Baz1a	-1.017235193	9.60E-05
ENSMUSG00000051339.10	2900026A02R	1.00205951	9.74E-05
ENSMUSG00000023886.9	Smoc2	1.796080628	9.76E-05
ENSMUSG00000035373.2	Ccl7	-2.617561616	1.00E-04
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ENSMUSG00000031340.8	Gabre	2.581329654	1.03E-04
ENSMUSG00000001542.7	Ell2	-1.12974178	1.03E-04
ENSMUSG00000058385.8	Hist1h2bg	-1.717726856	1.04E-04
ENSMUSG00000023011.7	Faim2	2.935055113	1.04E-04
ENSMUSG00000061462.17	Obscn	2.056067534	1.04E-04
ENSMUSG00000030546.14	Plin1	2.848553257	1.08E-04
ENSMUSG00000032175.11	Tyk2	-0.967328592	1.09E-04
ENSMUSG00000028631.7	Kcnq4	2.248396208	1.12E-04
ENSMUSG00000030162.14	Olr1	-1.887346595	1.12E-04
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ENSMUSG00000058773.2	Hist1h1b	-2.248936726	1.12E-04
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ENSMUSG00000003500.13	Impdh1	1.055834625	1.15E-04
ENSMUSG00000018217.12	Pmp22	0.833661203	1.16E-04

ENSMUSG00000000861.15	Bcl11a	-2.083557035	1.18E-04
ENSMUSG000000097352.7	C920009B18R	-2.153083675	1.19E-04
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ENSMUSG000000039323.18	Igfbp2	1.182062715	1.19E-04
ENSMUSG000000028121.8	Bcar3	1.250403216	1.20E-04
ENSMUSG000000024302.16	Dtna	1.264442247	1.20E-04
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ENSMUSG000000070469.12	Adamtsl3	1.547745091	1.23E-04
ENSMUSG000000028965.13	Tnfrsf9	-2.747677617	1.26E-04
ENSMUSG000000027314.6	Dll4	1.438506586	1.26E-04
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ENSMUSG000000051435.11	Fhad1	1.468720859	1.27E-04
ENSMUSG000000024818.14	Slc25a45	-1.09970079	1.27E-04
ENSMUSG000000043164.3	Tmem212	1.954992546	1.28E-04
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ENSMUSG000000036943.9	Rab8b	-1.024991204	1.30E-04
ENSMUSG000000049775.16	Tmsb4x	-0.760574226	1.32E-04
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ENSMUSG000000035914.11	Cd276	-1.672652793	1.40E-04
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ENSMUSG000000085109.1	Gm15356	-2.143152843	1.45E-04
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ENSMUSG000000025488.9	Cox8b	2.286914937	1.45E-04
ENSMUSG000000093721.1	Gm3896	2.782422466	1.46E-04
ENSMUSG000000047821.16	Trim16	0.951728007	1.49E-04
ENSMUSG000000026355.11	Mcm6	-1.165309977	1.50E-04
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ENSMUSG000000038393.14	Txnip	0.749290189	1.51E-04
ENSMUSG000000051236.13	Msrb3	1.033486017	1.52E-04
ENSMUSG000000038526.14	Car14	1.835436664	1.55E-04
ENSMUSG000000089844.7	A530032D15F	-2.855515057	1.57E-04
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ENSMUSG000000032515.8	Csrnp1	1.265047419	1.59E-04
ENSMUSG000000005483.10	Dnajb1	1.051668862	1.60E-04
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ENSMUSG00000031274.16	Col4a5	0.959743654	1.79E-04
ENSMUSG00000044337.5	Ackr3	0.956105787	1.80E-04
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ENSMUSG00000030766.15	Arhgap17	-0.933299208	1.81E-04
ENSMUSG00000069310.4	Hist1h3c	-2.743846661	1.81E-04
ENSMUSG00000007029.16	Vars	-0.788945784	1.81E-04
ENSMUSG00000073102.7	Drc1	1.996968362	1.87E-04
ENSMUSG00000037095.7	Lrg1	-1.509435017	1.89E-04
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ENSMUSG00000050029.7	Rap2c	-1.44242024	1.98E-04
ENSMUSG00000025058.4	5430427O19F	-2.094414348	1.99E-04
ENSMUSG00000000782.15	Tcf7	-1.124046129	2.01E-04
ENSMUSG00000043421.8	Hilpda	1.327315435	2.02E-04
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ENSMUSG00000029375.6	Cxcl15	-0.735090322	2.23E-04
ENSMUSG00000062995.12	Ica1	1.62485742	2.24E-04
ENSMUSG00000022995.16	Enah	1.103804992	2.25E-04
ENSMUSG00000037960.11	Card19	-0.98555773	2.25E-04
ENSMUSG00000029999.14	Tgfa	1.07777163	2.27E-04
ENSMUSG00000029101.15	Rgs12	0.937186523	2.29E-04
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ENSMUSG00000023034.6	Nr4a1	1.21760098	2.32E-04
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ENSMUSG00000028873.16	Cdca8	-2.502838719	2.36E-04
ENSMUSG00000030302.16	Atp2b2	1.817398996	2.40E-04
ENSMUSG00000001751.9	Naglu	-1.08753148	2.45E-04
ENSMUSG00000024907.6	Gal	3.420366311	2.47E-04
ENSMUSG00000013822.7	Elof1	0.679579292	2.48E-04
ENSMUSG00000022883.10	Robo1	1.138493522	2.48E-04
ENSMUSG00000083745.1	Gm13543	3.065355694	2.54E-04
ENSMUSG00000034311.3	Kif4	-2.439225684	2.55E-04
ENSMUSG00000030889.14	Vwa3a	1.140647445	2.55E-04
ENSMUSG00000019838.11	Slc16a10	-1.392447795	2.56E-04
ENSMUSG00000021288.18	Klc1	0.824664767	2.57E-04
ENSMUSG00000025489.5	Ifitm5	3.328311443	2.59E-04
ENSMUSG00000006221.7	Hspb7	1.764872774	2.60E-04
ENSMUSG00000036777.8	Anln	-1.207795031	2.61E-04
ENSMUSG00000044770.14	Scml4	-1.860105938	2.62E-04
ENSMUSG00000026080.13	Chst10	-2.998495736	2.63E-04
ENSMUSG00000029490.3	Mfsd7a	-1.964895464	2.69E-04
ENSMUSG00000021795.10	Sftpd	-0.745950704	2.69E-04
ENSMUSG00000007080.14	Pole	-1.80424779	2.73E-04
ENSMUSG00000025757.12	Hspa4l	0.968143798	2.76E-04
ENSMUSG00000005718.7	Tfap4	1.554496452	2.79E-04
ENSMUSG00000049076.9	Acap2	0.722888015	2.86E-04
ENSMUSG00000040035.14	Disp2	1.433743156	2.91E-04

ENSMUSG00000025227.14	Mfsd13a	-1.79521412	2.94E-04
ENSMUSG00000076569.3	Igkv5-39	-3.352370852	2.95E-04
ENSMUSG00000034926.3	Dhcr24	0.826659908	3.04E-04
ENSMUSG00000035202.8	Lars2	-1.568838896	3.06E-04
ENSMUSG00000076752.2	Tcrg-C2	-2.808066842	3.12E-04
ENSMUSG00000032122.15	Slc37a2	-1.475180796	3.17E-04
ENSMUSG00000006575.14	Rundc3a	-2.693328202	3.17E-04
ENSMUSG00000042268.10	Slc26a9	-0.864099566	3.19E-04
ENSMUSG00000029657.15	Hsph1	1.350406635	3.23E-04
ENSMUSG00000068874.13	Selenbp1	0.813846657	3.29E-04
ENSMUSG00000069303.6	Hist1h2br	-3.332065095	3.33E-04
ENSMUSG00000095788.6	Sirpb1a	-2.109166764	3.44E-04
ENSMUSG00000086602.1	Gm15609	1.993961971	3.48E-04
ENSMUSG00000035407.8	Kank4	1.775368434	3.48E-04
ENSMUSG00000108455.1	Gm44745	-3.206682692	3.48E-04
ENSMUSG00000034641.2	Cd300ld	-1.585418484	3.50E-04
ENSMUSG00000071230.6	Npw	2.898960943	3.50E-04
ENSMUSG00000036249.16	Rbm43	-1.141095627	3.50E-04
ENSMUSG00000024049.14	Myom1	1.459166703	3.50E-04
ENSMUSG00000040957.15	Cables1	1.897141538	3.52E-04
ENSMUSG00000037443.13	Cep85	-1.155650631	3.54E-04
ENSMUSG00000030107.10	Usp18	-1.002285745	3.54E-04
ENSMUSG00000027248.13	Pdia3	-0.796319008	3.54E-04
ENSMUSG00000051314.11	Ffar2	-2.255838455	3.57E-04
ENSMUSG00000111601.1	Gm18986	2.037584614	3.63E-04
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ENSMUSG00000001228.14	Uhrf1	-1.413798061	3.71E-04
ENSMUSG00000022759.13	Lrrc74b	1.676771286	3.73E-04
ENSMUSG00000030269.14	Mtmr14	-0.939993753	3.76E-04
ENSMUSG00000061578.8	Ksr2	-2.303474171	3.77E-04
ENSMUSG00000030223.14	Ptpro	-1.938751271	3.79E-04
ENSMUSG00000022438.6	Parvb	0.977138339	3.80E-04
ENSMUSG00000022696.17	Sidt1	-1.516406558	3.84E-04
ENSMUSG00000027326.13	Kn1l	-2.201439003	3.84E-04
ENSMUSG00000027215.13	Cd82	-0.849174878	3.90E-04
ENSMUSG00000045664.4	Cdc42ep2	0.954140807	3.90E-04
ENSMUSG00000046318.15	Ccbe1	1.73606683	3.92E-04
ENSMUSG00000071350.12	Setdb2	-1.139291177	3.92E-04
ENSMUSG00000047880.15	Cxcr5	-2.201871699	3.96E-04
ENSMUSG00000031558.15	Slit2	1.057735234	4.04E-04
ENSMUSG00000019817.18	Plagl1	1.266576634	4.12E-04
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ENSMUSG00000037816.10	Fbxw17	-1.192031786	4.13E-04
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ENSMUSG00000037033.9	Clca3b	-2.892087781	4.22E-04
ENSMUSG00000030720.16	Cln3	-1.198501378	4.22E-04
ENSMUSG00000032254.10	Kif23	-1.514581839	4.26E-04
ENSMUSG00000096141.2	Dnah7a	1.917446326	4.28E-04
ENSMUSG00000041040.12	Fam117b	0.845464814	4.33E-04
ENSMUSG00000035158.15	Mitf	-1.091866598	4.34E-04
ENSMUSG00000038604.9	Ripor1	1.019850019	4.34E-04
ENSMUSG00000020476.14	Dbnl	-0.767024657	4.34E-04
ENSMUSG00000035778.17	Ggta1	-0.805094241	4.43E-04

ENSMUSG00000044921.5	Rassf9	1.029820844	4.43E-04
ENSMUSG00000002055.9	Spag5	-1.870640256	4.46E-04
ENSMUSG000000018263.11	Tbx5	1.059568247	4.50E-04
ENSMUSG000000043015.15	Nemp2	-1.582130896	4.50E-04
ENSMUSG000000027187.10	Cat	0.693227233	4.51E-04
ENSMUSG000000015981.12	Stk32c	-3.135343707	4.53E-04
ENSMUSG000000029275.18	Gfi1	-2.673474373	4.54E-04
ENSMUSG000000027510.17	Rbm38	-1.954097822	4.55E-04
ENSMUSG000000035168.16	Tanc1	0.693666354	4.63E-04
ENSMUSG000000032194.9	Kank2	1.038039395	4.67E-04
ENSMUSG000000064030.15	Pym1	-1.166646345	4.68E-04
ENSMUSG000000054455.4	Vapb	0.890262214	4.73E-04
ENSMUSG000000075297.10	H60b	-2.500156289	4.75E-04
ENSMUSG000000062248.5	Cks2	-1.910859547	4.76E-04
ENSMUSG000000041771.13	Slc24a4	1.368028494	4.78E-04
ENSMUSG000000056724.14	Nbeal2	-0.814139077	4.80E-04
ENSMUSG000000096945.1	Gm26546	-1.451459773	4.85E-04
ENSMUSG000000099021.1	Rn7s1	-1.311286305	4.92E-04
ENSMUSG000000020458.16	Rtn4	-0.851116152	4.93E-04
ENSMUSG000000032508.8	Myd88	-0.92618916	4.94E-04
ENSMUSG000000021929.9	Kpna3	-1.042552041	4.94E-04
ENSMUSG000000030409.15	Dmpk	1.845360957	4.97E-04
ENSMUSG000000085058.2	8030453O22F	3.210727096	4.97E-04
ENSMUSG000000089829.2	Gm16565	-2.960444848	5.03E-04
ENSMUSG0000000101355.1	Hist1h3h	-3.110868188	5.10E-04
ENSMUSG000000027931.12	Npr1	1.038609906	5.15E-04
ENSMUSG000000029053.16	Prkcz	1.00972397	5.17E-04
ENSMUSG000000028678.13	Kif2c	-2.261016494	5.26E-04
ENSMUSG000000032946.16	Rasgrp2	0.999418895	5.26E-04
ENSMUSG000000026576.12	Atp1b1	0.859672878	5.28E-04
ENSMUSG000000060477.14	Irak2	-0.89563466	5.30E-04
ENSMUSG000000030365.11	Clec2i	-2.112131145	5.35E-04
ENSMUSG000000042115.4	Klhdc8a	-1.622215899	5.40E-04
ENSMUSG000000052516.18	Robo2	1.097429797	5.40E-04
ENSMUSG000000017314.12	Mpp2	1.446582029	5.45E-04
ENSMUSG000000031155.16	Pim2	-1.322651627	5.45E-04
ENSMUSG000000057113.13	Npm1	-0.912335133	5.46E-04
ENSMUSG000000037868.15	Egr2	-1.825312372	5.53E-04
ENSMUSG000000022537.17	Tmem44	1.038328699	5.65E-04
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ENSMUSG000000047419.5	Cmya5	1.505016103	5.85E-04
ENSMUSG000000032643.12	Fhl3	-1.935490386	5.93E-04
ENSMUSG000000025511.14	Tspan4	1.406091396	5.95E-04
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ENSMUSG000000109807.1	Gm45244	-2.752844743	6.23E-04
ENSMUSG000000030867.7	Plk1	-1.860349058	6.28E-04
ENSMUSG000000035539.13	Ccdc180	1.738511419	6.40E-04
ENSMUSG000000027368.6	Dusp2	-2.594407109	6.49E-04
ENSMUSG000000031792.15	Usb1	-1.057949345	6.54E-04
ENSMUSG000000021198.16	Unc79	2.35822167	6.55E-04
ENSMUSG000000103358.1	Gm37593	-3.183951848	6.64E-04
ENSMUSG000000035818.14	Plekhs1	-3.046636203	6.71E-04

ENSMUSG00000028294.15	Cfap206	1.103565951	6.71E-04
ENSMUSG00000041696.14	Rasl12	1.253037544	6.81E-04
ENSMUSG00000036918.15	Ttc7	-0.620389385	6.96E-04
ENSMUSG00000032010.15	Usp2	1.759440945	6.96E-04
ENSMUSG00000002307.15	Daxx	-0.619914937	6.99E-04
ENSMUSG00000034235.17	Usp54	0.832176562	7.20E-04
ENSMUSG00000036768.6	Kif15	-2.292352702	7.25E-04
ENSMUSG00000073529.9	F830208F22R	-2.792253922	7.30E-04
ENSMUSG00000042073.15	Abhd14b	1.366173632	7.31E-04
ENSMUSG00000028878.11	Fam76a	1.002590485	7.34E-04
ENSMUSG00000057069.7	Ero1lb	-1.242489548	7.40E-04
ENSMUSG00000056214.8	Pard6g	1.036226796	7.45E-04
ENSMUSG00000039316.14	Rftn1	-0.838218642	7.52E-04
ENSMUSG00000032878.16	Ccdc85a	2.005518239	7.54E-04
ENSMUSG00000039883.5	Lrrc17	2.297816974	7.61E-04
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ENSMUSG00000055538.7	Zcchc24	0.937824927	7.93E-04
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ENSMUSG00000031266.6	Gla	-1.555497902	8.04E-04
ENSMUSG00000002831.13	Plin4	1.595863048	8.08E-04
ENSMUSG00000054889.10	Dsp	1.20775517	8.10E-04
ENSMUSG00000020686.12	Gas2l2	1.99896788	8.18E-04
ENSMUSG00000102973.1	E430014B02R	-2.995912334	8.21E-04
ENSMUSG00000042292.16	Mkl1	-0.736669748	8.31E-04
ENSMUSG00000076927.3	Traj1	-2.30432247	8.41E-04
ENSMUSG00000056486.17	Chn1	1.942230884	8.49E-04
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ENSMUSG00000068246.5	Apol9b	-2.251736918	8.60E-04
ENSMUSG00000000266.11	Mid2	0.897550728	8.67E-04
ENSMUSG00000074971.4	Fibin	2.683753446	8.78E-04
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ENSMUSG00000020601.8	Trib2	0.927680718	8.83E-04
ENSMUSG00000059336.14	Slc14a1	-2.125024232	8.83E-04
ENSMUSG00000031994.13	Adamts8	2.131769033	8.91E-04
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ENSMUSG00000032648.14	Pygm	1.503797614	9.07E-04
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ENSMUSG00000020806.15	Rhbdf2	-0.955818817	9.22E-04
ENSMUSG00000022994.9	Adcy6	0.727699484	9.26E-04
ENSMUSG00000034613.12	Ppm1h	-0.827588899	9.26E-04
ENSMUSG00000037313.16	Tacc3	-1.265902975	9.40E-04
ENSMUSG00000024743.15	Syt7	1.011761189	9.46E-04
ENSMUSG00000030739.18	Myh14	0.771942906	9.49E-04
ENSMUSG00000034349.14	Smc4	-0.945836418	9.60E-04

ENSMUSG00000092077.2	Olfr101	-2.985212273	9.67E-04
ENSMUSG00000036437.6	Npy1r	2.685249995	9.68E-04
ENSMUSG00000026604.17	Ptpn14	0.844880334	9.72E-04
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ENSMUSG00000030849.18	Fgfr2	0.690049308	9.79E-04
ENSMUSG00000030413.7	Pglyrp1	-1.788604938	9.84E-04
ENSMUSG00000051378.10	Kif18b	-1.827719819	9.84E-04
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ENSMUSG00000004110.16	Cacna1e	-1.670106294	1.00E-03
ENSMUSG00000051682.15	Trem14	-1.80069387	1.01E-03
ENSMUSG00000040950.13	Mgl2	2.740476989	1.02E-03
ENSMUSG00000021880.7	Rnase6	-1.661079094	1.02E-03
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ENSMUSG00000021313.16	Ryr2	1.380774791	1.04E-03
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ENSMUSG00000039552.14	Rsph4a	1.448648375	1.07E-03
ENSMUSG00000025510.14	Cd151	0.718214868	1.08E-03
ENSMUSG000000087001.2	Gm15475	2.790788847	1.09E-03
ENSMUSG00000027959.13	Sass6	-2.169836718	1.09E-03
ENSMUSG00000031616.7	Ednra	0.97873992	1.09E-03
ENSMUSG000000103734.1	Gm37651	-2.532889154	1.09E-03
ENSMUSG00000070699.5	Sars2	-1.312405236	1.09E-03
ENSMUSG00000028370.7	Pappa	1.915463309	1.10E-03
ENSMUSG00000039364.13	Sectm1b	-2.701789411	1.10E-03
ENSMUSG00000059430.14	Actg2	1.421103557	1.10E-03
ENSMUSG00000062488.9	Ifit3b	-1.598905849	1.11E-03
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ENSMUSG00000024913.16	Lrp5	0.723858353	1.14E-03
ENSMUSG00000037211.12	Spry1	0.828750707	1.14E-03
ENSMUSG00000026840.14	Lamc3	1.382790309	1.15E-03
ENSMUSG00000016756.17	Cmah	-1.131085554	1.15E-03
ENSMUSG00000046027.17	Stard5	-0.865280781	1.16E-03
ENSMUSG000000106847.1	Peg13	1.114187389	1.16E-03
ENSMUSG00000033596.5	Rfwd3	-0.829687543	1.20E-03
ENSMUSG00000031955.10	Bcar1	0.884646486	1.23E-03
ENSMUSG00000021215.15	Net1	1.065414025	1.24E-03
ENSMUSG00000028978.12	Nos3	1.135384043	1.24E-03
ENSMUSG00000017418.13	Arl5b	0.915218041	1.24E-03
ENSMUSG00000034687.8	Fras1	1.330096543	1.25E-03
ENSMUSG00000021903.11	Galnt15	1.46211542	1.26E-03
ENSMUSG00000063229.15	Ldha	-0.69194068	1.26E-03
ENSMUSG00000048911.15	Rnf24	1.009544266	1.26E-03
ENSMUSG00000028826.14	Tmem57	1.110098598	1.27E-03
ENSMUSG00000066152.11	Slc31a2	-1.050992085	1.27E-03
ENSMUSG00000053626.5	Tll1	2.337549995	1.28E-03
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ENSMUSG00000018581.15	Dnah11	1.099329755	1.28E-03

ENSMUSG00000033763.14	Mtss1l	1.374557974	1.28E-03
ENSMUSG00000050931.7	Sgms2	-1.324813562	1.31E-03
ENSMUSG00000025064.14	Col17a1	1.639583578	1.32E-03
ENSMUSG00000042804.13	Gpr153	1.608629815	1.32E-03
ENSMUSG00000032911.6	Cspg4	0.968783368	1.33E-03
ENSMUSG00000039232.12	Stx11	-1.513921103	1.34E-03
ENSMUSG00000019564.12	Arid3a	-1.431006947	1.34E-03
ENSMUSG00000039521.12	Foxp3	-1.658483033	1.36E-03
ENSMUSG00000032883.15	Acsl3	2.185392212	1.38E-03
ENSMUSG00000024663.17	Rab3il1	-1.024973047	1.39E-03
ENSMUSG00000028207.18	Asph	0.925479166	1.40E-03
ENSMUSG00000041132.11	N4bp2l1	-1.398300328	1.41E-03
ENSMUSG00000034462.9	Pkd2	0.900291644	1.41E-03
ENSMUSG00000109096.1	Gm44888	-2.896753958	1.42E-03
ENSMUSG00000025190.13	Got1	-0.914736928	1.44E-03
ENSMUSG00000031933.17	Izumo1r	-2.495251262	1.46E-03
ENSMUSG00000035441.14	Myo1d	0.854295038	1.46E-03
ENSMUSG00000031453.16	Rasa3	-0.668040436	1.46E-03
ENSMUSG00000037280.12	Galnt6	-1.805370449	1.46E-03
ENSMUSG00000030353.15	Tead4	1.513866149	1.46E-03
ENSMUSG00000022035.6	Ccdc25	-1.395517157	1.46E-03
ENSMUSG00000064330.9	Pde6h	2.974810396	1.47E-03
ENSMUSG00000001025.8	S100a6	0.853646762	1.48E-03
ENSMUSG00000032714.6	Syde1	0.740307675	1.48E-03
ENSMUSG00000109036.1	2210406H18F	-2.625132799	1.49E-03
ENSMUSG00000044534.8	Ackr2	1.103851911	1.50E-03
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ENSMUSG00000044201.9	Cdc25c	-2.859547965	1.51E-03
ENSMUSG00000043091.8	Tuba1c	-0.773462969	1.52E-03
ENSMUSG00000056260.15	Lr1f1	-1.434770923	1.52E-03
ENSMUSG00000054676.15	1600014C10R	-1.163284073	1.53E-03
ENSMUSG00000037933.16	Bicd2	0.769457232	1.53E-03
ENSMUSG00000079641.3	Rpl39	-0.951802998	1.53E-03
ENSMUSG00000106024.1	A530083M17	-1.928987196	1.54E-03
ENSMUSG00000052539.15	Magi3	0.727389103	1.54E-03
ENSMUSG00000023341.14	Mx2	-2.135961131	1.55E-03
ENSMUSG00000027559.5	Car3	1.958321037	1.55E-03
ENSMUSG00000031636.7	Pdlim3	1.25141869	1.55E-03
ENSMUSG00000090231.10	Cfb	-2.972005782	1.56E-03
ENSMUSG00000086245.1	Gm16170	-2.596268923	1.56E-03
ENSMUSG00000061119.7	Prcp	-0.919738402	1.57E-03
ENSMUSG00000038756.13	Ttll6	1.863719396	1.57E-03
ENSMUSG00000024795.11	Kif20b	-2.403563364	1.57E-03
ENSMUSG00000022114.5	Spry2	1.437095051	1.58E-03
ENSMUSG00000048332.13	Lhfp	1.327320601	1.58E-03
ENSMUSG00000037225.13	Fgf2	1.34955906	1.59E-03
ENSMUSG00000040133.2	Gpr176	-2.212682703	1.59E-03
ENSMUSG00000094433.2	Igkv5-43	-3.026318317	1.62E-03
ENSMUSG00000097915.1	A330009N23F	1.743867553	1.62E-03
ENSMUSG00000021798.14	Ldb3	1.495704857	1.65E-03
ENSMUSG00000101970.6	1810026B05R	-0.87908315	1.65E-03
ENSMUSG00000053093.16	Myh7	1.532368102	1.66E-03
ENSMUSG00000031398.13	Plxna3	1.450647778	1.67E-03
ENSMUSG00000030259.12	Rassf8	1.143757892	1.67E-03

ENSMUSG00000056370.15	Sftpb	0.623109972	1.70E-03
ENSMUSG00000102594.1	Gm38381	1.314385164	1.73E-03
ENSMUSG00000064080.12	Fbln2	1.642098185	1.73E-03
ENSMUSG000000028076.12	Cd1d1	-1.570424953	1.73E-03
ENSMUSG000000005686.17	Ampd3	0.912645225	1.74E-03
ENSMUSG000000000385.7	Tmprss2	0.794627074	1.74E-03
ENSMUSG000000027379.13	Bub1	-2.377462289	1.75E-03
ENSMUSG000000067203.7	H2-K2	-1.553791204	1.75E-03
ENSMUSG000000024613.16	Tcof1	-1.073544711	1.76E-03
ENSMUSG00000103089.1	Gm38118	1.19275386	1.77E-03
ENSMUSG000000049539.3	Hist1h1a	-2.044969782	1.79E-03
ENSMUSG000000050730.17	Arhgap42	1.123539378	1.81E-03
ENSMUSG000000057143.15	Trim12c	-1.300605976	1.82E-03
ENSMUSG000000113313.1	Gm32036	-1.963235067	1.82E-03
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ENSMUSG000000024059.9	Clip4	-0.965121942	1.85E-03
ENSMUSG00000104876.1	Trdc	-2.196730406	1.85E-03
ENSMUSG000000031698.14	Mylk3	2.615332761	1.87E-03
ENSMUSG000000073405.6	H2-T-ps	-2.175242258	1.87E-03
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ENSMUSG000000022464.13	Slc38a4	2.607045876	1.88E-03
ENSMUSG000000024083.15	Pja2	0.933579504	1.88E-03
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ENSMUSG000000071856.10	Mcc	0.791628783	1.91E-03
ENSMUSG000000034610.14	Zcchc11	-0.744264918	1.91E-03
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ENSMUSG000000039967.14	Zfp292	-0.685768374	1.93E-03
ENSMUSG000000031591.14	Asah1	-0.641309731	1.94E-03
ENSMUSG000000025001.11	Hells	-1.598509376	1.94E-03
ENSMUSG000000041548.4	Hspb8	0.898436563	1.94E-03
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ENSMUSG000000027221.5	Chst1	1.359676994	1.96E-03
ENSMUSG000000020808.3	Pimreg	-1.996316676	1.98E-03
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ENSMUSG000000075122.4	Cd80	-2.210394662	1.98E-03
ENSMUSG000000032125.20	Robo4	0.989671565	2.00E-03
ENSMUSG000000050708.16	Ftl1	-1.006634822	2.01E-03
ENSMUSG000000068614.7	Actc1	1.753410058	2.03E-03
ENSMUSG00000101337.6	Dnah7c	1.269449521	2.04E-03
ENSMUSG000000024646.13	Cyb5a	0.982034897	2.07E-03
ENSMUSG000000062070.12	Pgk1	-1.091835814	2.10E-03
ENSMUSG000000050014.7	Apol10b	-2.480122019	2.11E-03
ENSMUSG000000074457.10	S100a16	0.857817147	2.13E-03
ENSMUSG000000064147.6	Rab44	2.432651903	2.13E-03
ENSMUSG00000115681.1	AC140209.1	-1.891919298	2.14E-03
ENSMUSG000000095351.2	Igkv3-2	-2.902509221	2.16E-03
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ENSMUSG00000105272.1	Gm43071	-1.579197013	2.16E-03
ENSMUSG000000008318.10	Relt	-1.333864351	2.17E-03
ENSMUSG00000100210.2	Hist1h3f	-1.956751414	2.17E-03

ENSMUSG00000015093.15	Clic3	0.734690873	2.18E-03
ENSMUSG00000079523.8	Tmsb10	-1.488120214	2.20E-03
ENSMUSG00000046329.14	Slc25a23	0.968153087	2.21E-03
ENSMUSG00000022419.16	Deptor	0.855910925	2.21E-03
ENSMUSG00000055994.15	Nod2	-1.071143393	2.21E-03
ENSMUSG00000020524.16	Gria1	2.598391013	2.21E-03
ENSMUSG00000096833.2	Igkv4-55	-2.857038887	2.23E-03
ENSMUSG00000025743.14	Sdc3	-0.701284342	2.23E-03
ENSMUSG00000031278.12	Acsl4	-0.61380066	2.24E-03
ENSMUSG00000096715.2	Igkv3-4	-2.943494715	2.24E-03
ENSMUSG00000036591.15	Arhgap21	0.831575204	2.25E-03
ENSMUSG00000031877.9	Ces2g	1.753063562	2.26E-03
ENSMUSG00000064339.1	mt-Rnr2	-1.175202856	2.29E-03
ENSMUSG00000047517.11	Dmbt1	-2.719963725	2.29E-03
ENSMUSG00000046591.10	Ticrr	-2.416220927	2.29E-03
ENSMUSG00000028217.11	Cdh17	-2.640542758	2.29E-03
ENSMUSG00000027574.15	Nkain4	1.658987292	2.29E-03
ENSMUSG00000083186.1	Gm11805	-2.584129653	2.30E-03
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ENSMUSG00000045975.7	C2cd2	0.797696389	2.36E-03
ENSMUSG00000021763.17	BC067074	1.305088252	2.37E-03
ENSMUSG00000033590.8	Myo5c	0.731876113	2.41E-03
ENSMUSG00000024186.15	Rgs11	1.238584766	2.44E-03
ENSMUSG00000022971.18	Ifnar2	-0.776789385	2.44E-03
ENSMUSG00000024054.13	Smchd1	-0.920645013	2.45E-03
ENSMUSG00000028044.6	Cks1b	-1.620938669	2.45E-03
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ENSMUSG00000042901.10	Aida	-0.756661101	2.46E-03
ENSMUSG00000061601.15	Pclo	1.961943501	2.47E-03
ENSMUSG00000071176.10	Arhgef10	0.96896017	2.47E-03
ENSMUSG00000095753.2	Igkv4-53	-2.902045398	2.49E-03
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ENSMUSG00000017309.11	Cd300lg	2.704962687	2.50E-03
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ENSMUSG00000043017.9	Ptgir	-1.661134005	2.51E-03
ENSMUSG00000056144.14	Trim34a	-1.370612771	2.53E-03
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ENSMUSG00000025154.14	Arhgap19	-1.533526874	2.62E-03
ENSMUSG00000038304.14	Cd160	-2.447740155	2.62E-03
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ENSMUSG00000045314.5	Sowahb	-1.647291527	2.63E-03
ENSMUSG00000007476.18	Lrrc8a	1.303854011	2.64E-03
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ENSMUSG00000005824.6	Tnfsf14	-2.49466054	2.64E-03
ENSMUSG00000052302.6	Tbc1d30	0.801806226	2.65E-03

ENSMUSG00000021486.7	Prelid1	-0.603090806	2.67E-03
ENSMUSG00000024008.15	Cpne5	2.487965756	2.68E-03
ENSMUSG00000031673.6	Cdh11	0.670836667	2.69E-03
ENSMUSG00000033730.4	Egr3	-1.599963769	2.70E-03
ENSMUSG00000079414.2	Gm11110	-2.508301965	2.71E-03
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ENSMUSG00000032740.16	Ccdc88a	-1.160822715	2.78E-03
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ENSMUSG00000079343.4	C1s2	-1.207738805	2.79E-03
ENSMUSG00000037166.5	Ppp1r14a	1.596921553	2.79E-03
ENSMUSG00000026991.20	Pkp4	0.768252084	2.80E-03
ENSMUSG00000040751.12	Lat2	-1.44497764	2.80E-03
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ENSMUSG00000036880.9	Acaa2	1.070935949	2.98E-03
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ENSMUSG00000020810.5	Cygb	1.002413551	2.99E-03
ENSMUSG00000003644.17	Rps6ka1	-0.642072618	3.01E-03
ENSMUSG00000069274.3	Hist1h4f	-2.347070442	3.04E-03
ENSMUSG00000029563.16	Foxp2	1.211013712	3.05E-03
ENSMUSG00000076934.2	Iglv1	-2.497700508	3.05E-03
ENSMUSG00000048200.12	Cracr2b	1.48108649	3.06E-03
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ENSMUSG00000029217.16	Tec	-1.343680525	3.13E-03
ENSMUSG00000037465.10	Klf10	0.818872325	3.18E-03
ENSMUSG00000022309.9	Angpt1	1.569766082	3.18E-03
ENSMUSG00000025076.9	Casp7	-0.936016475	3.22E-03
ENSMUSG00000002844.8	Adprh	-1.095679831	3.23E-03
ENSMUSG00000029405.16	G3bp2	-0.899939124	3.25E-03
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ENSMUSG00000044134.9	Fam109a	2.008250179	3.27E-03

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ENSMUSG00000026683.14	Nuf2	-2.608176816	3.40E-03
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ENSMUSG00000030711.15	Sult1a1	0.974963363	3.47E-03
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ENSMUSG00000094094.2	Igkv5-45	-2.841858699	3.50E-03
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ENSMUSG00000003380.11	Rabac1	0.635178434	3.61E-03
ENSMUSG00000043673.11	Kcns3	2.303701939	3.65E-03
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ENSMUSG00000031517.8	Gpm6a	0.947037256	3.89E-03
ENSMUSG00000034845.6	Plvap	0.73366353	3.89E-03
ENSMUSG00000051278.12	Zgrf1	-1.604033923	3.90E-03
ENSMUSG00000018143.10	Mafk	1.146927103	3.91E-03
ENSMUSG00000099930.1	Gm2396	-2.465586755	3.91E-03
ENSMUSG00000032558.19	Nphp3	1.251850739	3.97E-03
ENSMUSG00000054509.7	Parp4	-0.74295352	3.98E-03
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ENSMUSG00000030465.19	Psd3	0.730618528	4.00E-03
ENSMUSG00000024381.15	Bin1	-0.976621732	4.03E-03
ENSMUSG00000001334.9	Fndc5	1.990134516	4.03E-03
ENSMUSG00000037005.16	Xpnpep2	1.209282922	4.03E-03
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ENSMUSG00000073599.9	Ecscr	0.810055921	4.07E-03
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ENSMUSG00000026896.14	Ifih1	-0.743709662	4.09E-03
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ENSMUSG00000051427.14	Ccdc157	1.02973208	4.11E-03
ENSMUSG00000053702.16	Nebi	0.593600793	4.15E-03
ENSMUSG00000025929.4	Il17a	-2.770790259	4.16E-03

ENSMUSG00000031881.6	Cdh16	1.328886939	4.17E-03
ENSMUSG00000025854.15	Fam20c	-1.219313443	4.17E-03
ENSMUSG00000033009.15	Ogfod1	0.996834526	4.18E-03
ENSMUSG00000042759.12	Apobr	-1.671487375	4.19E-03
ENSMUSG00000017493.12	Igfbp4	0.778982241	4.20E-03
ENSMUSG00000074918.4	Inafm2	0.902994707	4.25E-03
ENSMUSG00000050106.17	Tmc8	-1.447300695	4.27E-03
ENSMUSG00000096746.3	Trav7d-3	-2.755858494	4.27E-03
ENSMUSG00000023473.12	Celsr3	-2.453341466	4.29E-03
ENSMUSG00000031776.17	Arl2bp	0.693932682	4.31E-03
ENSMUSG00000052609.9	Plekkg3	0.951739339	4.32E-03
ENSMUSG00000099517.2	Hist1h3g	-2.702851899	4.34E-03
ENSMUSG00000014725.15	Adam28	1.201324368	4.35E-03
ENSMUSG00000036995.7	Asap3	-1.170319421	4.36E-03
ENSMUSG00000023832.13	Acat2	1.38141589	4.37E-03
ENSMUSG00000022758.12	P2rx6	1.79352509	4.38E-03
ENSMUSG00000070601.4	Vmn2r84	-2.71952517	4.40E-03
ENSMUSG00000020607.7	Fam84a	1.209319378	4.49E-03
ENSMUSG00000053914.9	Kdm4d	-2.638048637	4.50E-03
ENSMUSG00000057367.12	Birc2	-0.829155936	4.50E-03
ENSMUSG00000022097.4	Sftpc	0.521558233	4.51E-03
ENSMUSG00000068923.14	Syt11	-0.927009369	4.52E-03
ENSMUSG00000071203.6	Naip5	-1.16248183	4.52E-03
ENSMUSG00000076562.1	Igkv4-50	-2.760187092	4.53E-03
ENSMUSG00000031077.7	Fadd	-1.024120951	4.57E-03
ENSMUSG00000060002.14	Chpt1	0.984275066	4.62E-03
ENSMUSG00000026259.14	Ngef	1.762093714	4.63E-03
ENSMUSG00000024176.10	Sox8	-2.764238335	4.64E-03
ENSMUSG00000102009.6	4933400F21R	1.614853129	4.65E-03
ENSMUSG00000114279.1	Hist1h2bm	-2.089500196	4.65E-03
ENSMUSG00000055301.8	Adh7	2.599659063	4.66E-03
ENSMUSG00000038264.8	Sema7a	0.756469283	4.69E-03
ENSMUSG00000059049.14	Frem1	1.035423181	4.69E-03
ENSMUSG00000025915.14	Sgk3	-0.974247184	4.70E-03
ENSMUSG00000021835.15	Bmp4	0.867117434	4.70E-03
ENSMUSG00000034906.15	Ncaph	-1.061133439	4.72E-03
ENSMUSG00000044217.16	Aqp5	0.754493197	4.74E-03
ENSMUSG00000021375.10	Kif13a	0.84156287	4.78E-03
ENSMUSG00000028068.14	Iqgap3	-1.229991365	4.79E-03
ENSMUSG00000026389.16	Steap3	1.293067556	4.82E-03
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ENSMUSG00000076914.1	Traj15	-2.74132852	4.84E-03
ENSMUSG00000000732.9	Icosl	-0.810762917	4.86E-03
ENSMUSG00000034917.8	Tjp3	-1.170626846	4.88E-03
ENSMUSG00000097195.9	Snhg5	-2.424854868	4.90E-03
ENSMUSG00000090665.2	Gad1-ps	-2.639009608	4.90E-03
ENSMUSG00000024842.7	Cabp4	-2.33452705	4.92E-03
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ENSMUSG00000031480.15	Thsd1	1.145939654	4.99E-03
ENSMUSG00000018415.14	Gid4	0.890159502	4.99E-03
ENSMUSG00000034271.16	Jdp2	1.198741415	5.00E-03
ENSMUSG00000061859.16	Patj	0.647580846	5.00E-03
ENSMUSG00000060441.15	Trim5	-1.912125552	5.09E-03
ENSMUSG00000020707.6	Rnf135	-0.986270924	5.10E-03

ENSMUSG00000083041.2	Gmfg-ps	-2.49626089	5.12E-03
ENSMUSG00000020877.11	Scrn2	1.597648231	5.14E-03
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ENSMUSG00000049719.14	Prss46	-2.736120401	5.16E-03
ENSMUSG00000034584.3	Exph5	0.978781046	5.17E-03
ENSMUSG00000049299.14	Trappc1	-0.90442889	5.18E-03
ENSMUSG00000096188.1	Cmtm4	0.723821316	5.22E-03
ENSMUSG000000113292.1	Gm18413	-2.685323249	5.28E-03
ENSMUSG00000022369.13	Mtbp	-1.337777142	5.28E-03
ENSMUSG00000031661.12	Nkd1	0.736626561	5.32E-03
ENSMUSG00000090069.2	E430024P14R	2.431252654	5.35E-03
ENSMUSG00000041570.14	Camsap2	0.706158507	5.37E-03
ENSMUSG00000001986.16	Gria3	1.543035595	5.41E-03
ENSMUSG00000028717.12	Tal1	1.634369725	5.42E-03
ENSMUSG00000076555.3	Igkv4-57-1	-2.732923217	5.46E-03
ENSMUSG00000026196.7	Bard1	-1.456999429	5.49E-03
ENSMUSG00000089525.1	Gm23833	-1.422994237	5.49E-03
ENSMUSG00000032376.12	Usp3	-0.858262985	5.51E-03
ENSMUSG00000009092.5	Derl3	-1.879731724	5.51E-03
ENSMUSG00000041247.7	Lamp3	-0.684459283	5.54E-03
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ENSMUSG00000020427.11	Igfbp3	1.222979289	5.58E-03
ENSMUSG00000021699.17	Pde4d	0.740687592	5.59E-03
ENSMUSG00000078495.10	Zfp984	-1.029222547	5.61E-03
ENSMUSG00000024856.10	Cdk2ap2	-0.657434697	5.62E-03
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ENSMUSG00000035984.14	Nme5	1.440412872	5.67E-03
ENSMUSG00000036026.15	Tmem63b	0.939242545	5.69E-03
ENSMUSG00000037973.6	Ccdc129	1.909014398	5.74E-03
ENSMUSG00000032050.17	Rdx	0.736785981	5.74E-03
ENSMUSG00000029168.14	Dpysl5	2.092688584	5.81E-03
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ENSMUSG00000022178.11	Ajuba	0.736949139	6.04E-03
ENSMUSG00000015451.16	C4a	-1.320215051	6.04E-03
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ENSMUSG00000049571.18	Cfap46	1.378103399	6.05E-03
ENSMUSG00000015452.14	Ager	0.519294545	6.06E-03
ENSMUSG00000030336.14	Cd27	-1.371921687	6.09E-03
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ENSMUSG00000038260.10	Trpm4	0.753321339	6.18E-03
ENSMUSG00000031342.17	Gpm6b	0.813963851	6.21E-03
ENSMUSG00000053846.4	Lipg	1.069892835	6.21E-03
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ENSMUSG00000025784.5	Clec3b	2.286792124	6.29E-03
ENSMUSG00000074813.13	Gm14005	-1.264680527	6.37E-03
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ENSMUSG00000033595.7	Lgi3	0.597113233	6.41E-03
ENSMUSG00000027605.18	Acss2	1.205988547	6.44E-03
ENSMUSG00000057604.9	Lmcd1	1.180669532	6.44E-03
ENSMUSG00000025059.16	Gk	-1.103856545	6.48E-03
ENSMUSG00000028393.10	Alad	0.786638488	6.51E-03
ENSMUSG00000056268.15	Dennd1b	-0.73457536	6.51E-03
ENSMUSG00000002588.12	Pon1	2.337747255	6.59E-03
ENSMUSG00000020520.14	Galnt10	-0.836702907	6.60E-03
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ENSMUSG00000029380.11	Cxcl1	-2.230177914	6.64E-03
ENSMUSG00000041920.14	Slc16a6	-1.208595859	6.68E-03
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ENSMUSG00000025429.8	Pstpip2	-1.909773175	6.71E-03
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ENSMUSG00000000440.12	Pparg	1.434354727	6.93E-03
ENSMUSG00000021185.16	Dglucy	-0.831590316	6.94E-03
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ENSMUSG00000030410.16	Dmwd	0.984351567	7.06E-03
ENSMUSG00000020598.16	Nrcam	-1.064997996	7.12E-03
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ENSMUSG00000034382.14	Al661453	0.946328605	7.15E-03
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ENSMUSG00000047648.13	Fbxo30	1.313203452	7.80E-03
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ENSMUSG00000042215.8	Bag2	1.321085749	8.34E-03
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ENSMUSG00000112981.1	5033424D13F	2.418640581	8.77E-03
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ENSMUSG00000028766.10	Alpl	-1.190420998	8.89E-03
ENSMUSG00000049281.16	Scn3b	0.665036824	8.91E-03
ENSMUSG00000055884.8	Fancm	-1.366077187	8.91E-03
ENSMUSG00000080966.1	Gm6263	2.493078174	8.92E-03
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ENSMUSG00000010136.14	Pifo	1.882578386	9.00E-03
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ENSMUSG00000037493.6	Cib2	1.852574856	9.20E-03
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ENSMUSG00000030751.18	Psma1	-0.926916745	9.27E-03
ENSMUSG00000068428.6	Gmnc	1.779833806	9.27E-03
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ENSMUSG00000033577.18	Myo6	0.833493452	9.34E-03
ENSMUSG00000052125.16	F730043M19I	-1.310689309	9.37E-03
ENSMUSG00000078350.11	Smim1	0.948723302	9.52E-03
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ENSMUSG00000030278.11	Cidec	1.711775447	9.66E-03
ENSMUSG00000001435.15	Col18a1	-0.713471959	9.68E-03
ENSMUSG00000024791.10	Cdca5	-1.962756317	9.68E-03
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ENSMUSG00000037573.5	Tob1	0.903618351	9.94E-03
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ENSMUSG00000113035.1	5830428M24I	-1.275818627	1.02E-02
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ENSMUSG00000025758.10	Plk4	-1.444443393	1.05E-02
ENSMUSG00000027075.16	Slc43a1	1.377234126	1.06E-02
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ENSMUSG00000038539.15	Atf5	1.532149098	1.07E-02
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ENSMUSG00000018378.13	Cuedc1	1.267199968	1.08E-02
ENSMUSG00000019467.15	Arhgef25	1.149245379	1.08E-02
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ENSMUSG00000039199.6	Zdhhc1	0.654401059	1.09E-02
ENSMUSG00000074876.5	Spata5l1	-2.426413429	1.09E-02
ENSMUSG00000085887.2	Arhgap27os3	-1.315833736	1.11E-02
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ENSMUSG00000021986.8	Amer2	-2.527064036	1.13E-02
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ENSMUSG00000022615.7	Tymp	2.134345715	1.13E-02
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ENSMUSG00000042500.11	Ago4	1.231897485	1.13E-02
ENSMUSG00000029182.10	1700001C02R	1.490411675	1.13E-02
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ENSMUSG00000037126.16	Psd	-1.266351685	1.13E-02
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ENSMUSG00000020279.10	Il9r	-2.027825498	1.14E-02
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ENSMUSG00000007659.18	Bcl2l1	0.898543965	1.15E-02
ENSMUSG00000015405.15	Ace2	1.616660054	1.15E-02
ENSMUSG00000038402.2	Foxf2	1.211958543	1.15E-02
ENSMUSG00000030313.15	Dennd5b	0.826393202	1.15E-02
ENSMUSG00000085913.2	Gm15601	-1.67240781	1.16E-02
ENSMUSG000000107633.1	Gm44078	-2.505413296	1.16E-02
ENSMUSG00000025355.7	Mmp19	-1.02050872	1.16E-02
ENSMUSG00000030346.16	Rad51ap1	-2.181878872	1.17E-02
ENSMUSG000000104835.4	Gm5547	-2.411582727	1.18E-02
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ENSMUSG00000015627.5	Gata5	1.413049163	1.18E-02
ENSMUSG00000028927.6	Padi2	-0.891763272	1.18E-02
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ENSMUSG00000023932.8	Cdc5l	-0.693347246	1.22E-02
ENSMUSG00000020212.14	Mdm1	1.712692704	1.22E-02
ENSMUSG000000105239.1	Gm43091	2.403286408	1.23E-02
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ENSMUSG00000070509.15	Rgma	1.105967381	1.26E-02
ENSMUSG00000018068.13	Ints2	-0.766442086	1.27E-02
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ENSMUSG00000025648.17	Pfkfb4	0.749089922	1.27E-02
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ENSMUSG00000000134.17	Tfe3	-0.640070927	1.29E-02
ENSMUSG00000008734.9	Gprc5b	0.964924634	1.29E-02
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ENSMUSG00000085337.1	Gm15964	-2.444759211	1.32E-02
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ENSMUSG00000078502.10	Gm13212	-2.051046484	1.40E-02
ENSMUSG00000040435.12	Ppp1r15a	0.836880876	1.40E-02
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ENSMUSG00000092601.2	Olfr760-ps1	-2.457828655	1.40E-02
ENSMUSG00000021360.16	Gcnt2	0.783390205	1.40E-02
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ENSMUSG00000026688.5	Mgst3	1.218603919	1.49E-02
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ENSMUSG00000048482.14	Bdnf	1.879294368	1.51E-02
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ENSMUSG000000028518.8	Prkaa2	0.7835215	2.10E-02
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ENSMUSG000000068205.14	MacroD2	1.85125045	2.33E-02
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ENSMUSG000000008384.8	Sertad1	0.800576381	2.40E-02
ENSMUSG000000076672.7	Ighv3-6	-2.321381092	2.40E-02
ENSMUSG000000026377.12	Nifk	-1.125839472	2.40E-02
ENSMUSG000000031075.18	Ano1	0.567186276	2.40E-02
ENSMUSG000000068745.6	Mybphl	1.110515373	2.40E-02
ENSMUSG000000079427.10	Mthfsl	-1.294482878	2.41E-02
ENSMUSG000000042328.13	Hps4	-0.832462159	2.42E-02
ENSMUSG000000017057.9	Il13ra1	-0.767917939	2.42E-02
ENSMUSG000000105128.1	Gm42870	-2.275659352	2.42E-02
ENSMUSG000000024777.9	Ppp2r5b	0.618084952	2.45E-02
ENSMUSG000000031527.7	Eri1	-0.961107261	2.45E-02
ENSMUSG000000031821.11	Gins2	-1.68963533	2.45E-02
ENSMUSG000000041986.16	Elmod1	1.212385279	2.45E-02
ENSMUSG000000019929.16	Dcn	0.593667362	2.47E-02
ENSMUSG000000028673.10	Fuca1	-0.693670142	2.47E-02
ENSMUSG000000046192.4	Iqub	1.847440181	2.47E-02
ENSMUSG000000027867.10	Spag17	1.032805529	2.48E-02
ENSMUSG000000038738.15	Shank1	-2.109754074	2.48E-02
ENSMUSG000000028175.15	Depdc1a	-2.097915377	2.49E-02
ENSMUSG000000046687.6	Gm5424	-1.925875834	2.49E-02
ENSMUSG000000090080.2	Gm15872	-2.28517673	2.49E-02
ENSMUSG000000032484.8	Ngp	-2.227049575	2.51E-02
ENSMUSG000000039616.9	Mocos	-1.022778868	2.52E-02
ENSMUSG000000024212.8	Mllt1	0.587285071	2.53E-02
ENSMUSG000000103291.1	Gm38235	1.178375001	2.53E-02
ENSMUSG000000103253.1	Gm37520	-1.88391315	2.54E-02
ENSMUSG000000102975.1	Gm37347	-2.230723921	2.54E-02
ENSMUSG000000016942.5	Tmprss6	2.295622597	2.55E-02
ENSMUSG000000006019.15	Dhx34	-0.849988286	2.56E-02
ENSMUSG000000028116.13	Myoz2	1.664520962	2.57E-02
ENSMUSG000000037103.8	Dcaf15	-0.774237926	2.57E-02
ENSMUSG000000005338.13	Cadm3	-1.522310715	2.58E-02

ENSMUSG00000047547.14	Cltb	0.606322498	2.58E-02
ENSMUSG00000017550.14	Atad5	-1.219525603	2.59E-02
ENSMUSG000000037610.15	Kcnmb2	2.098941798	2.59E-02
ENSMUSG000000029321.1	Slc10a6	1.428990876	2.59E-02
ENSMUSG000000032555.10	Topbp1	-0.543962943	2.60E-02
ENSMUSG000000037784.14	Dzip1l	0.799501196	2.61E-02
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ENSMUSG000000032796.7	Lama1	-1.326123531	2.62E-02
ENSMUSG000000027800.14	Tm4sf1	0.683735216	2.62E-02
ENSMUSG000000102145.1	Gm38056	1.43898213	2.64E-02
ENSMUSG000000028487.18	Bnc2	0.862032484	2.65E-02
ENSMUSG000000108693.1	Gm45153	-1.923069063	2.65E-02
ENSMUSG000000063873.10	Slc24a3	1.103088327	2.66E-02
ENSMUSG000000035704.17	Alg8	-0.946361809	2.69E-02
ENSMUSG000000020250.10	Txnrd1	-0.657414449	2.69E-02
ENSMUSG000000032939.14	Nup93	-0.921089007	2.70E-02
ENSMUSG000000031714.9	Gab1	0.588109934	2.72E-02
ENSMUSG000000073598.3	1700066B19R	-2.105926354	2.72E-02
ENSMUSG000000034177.15	Rnf43	0.851532228	2.72E-02
ENSMUSG000000098470.1	C1rb	-1.38643267	2.73E-02
ENSMUSG000000041064.13	Pif1	-2.048244029	2.73E-02
ENSMUSG000000050103.18	Agmo	0.983453787	2.74E-02
ENSMUSG000000028033.16	Kcnq5	1.022008024	2.75E-02
ENSMUSG000000048988.8	Elfn1	1.405877575	2.75E-02
ENSMUSG000000027316.15	Gfra4	2.282954551	2.76E-02
ENSMUSG000000068263.11	Efcc1	1.46599559	2.78E-02
ENSMUSG000000054474.15	Thns12	1.483496851	2.78E-02
ENSMUSG000000111171.1	AC112265.1	2.224492619	2.79E-02
ENSMUSG000000028128.13	F3	0.86855601	2.79E-02
ENSMUSG000000070867.4	Trabd2b	0.95626684	2.79E-02
ENSMUSG000000039976.4	Tbc1d16	0.784877921	2.79E-02
ENSMUSG000000039315.15	Clnk	-1.68371286	2.79E-02
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ENSMUSG000000078716.9	Tmem8b	1.226524783	2.81E-02
ENSMUSG000000039835.16	Nhsl1	0.781011619	2.83E-02
ENSMUSG000000082088.1	Gm15753	-1.878281488	2.84E-02
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ENSMUSG000000021750.15	Fam107a	1.874555084	2.85E-02
ENSMUSG000000105601.1	Gm42725	-2.123514994	2.87E-02
ENSMUSG000000030704.14	Rab6a	0.841978343	2.89E-02
ENSMUSG000000031226.13	Pbdc1	-1.131419772	2.89E-02
ENSMUSG000000029265.4	Dr1	-0.803224388	2.91E-02
ENSMUSG000000013736.16	Trnt1	-0.826532422	2.91E-02
ENSMUSG000000005696.11	Sh2d1a	-2.229354236	2.91E-02
ENSMUSG000000017817.11	Jph2	1.034195448	2.91E-02
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ENSMUSG000000032733.6	Snx33	0.692121318	2.94E-02
ENSMUSG000000025408.15	Ddit3	0.964294924	2.94E-02
ENSMUSG000000037613.16	Tnfrsf23	-1.787692824	2.94E-02
ENSMUSG000000091144.2	Phf11c	-1.324537333	2.94E-02
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ENSMUSG00000029086.15	Prom1	0.886926621	2.95E-02
ENSMUSG00000028024.14	Enpep	0.646314849	2.95E-02
ENSMUSG00000030276.19	Ttll3	0.637911238	2.95E-02
ENSMUSG00000028453.10	Fancg	-0.796770873	2.96E-02
ENSMUSG00000031537.15	Ikbkb	-0.491512097	2.97E-02
ENSMUSG00000102460.1	Gm38197	1.21624202	2.98E-02
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ENSMUSG00000061360.7	Phf5a	1.357075824	2.99E-02
ENSMUSG00000020166.15	Cnot2	-0.84061264	3.01E-02
ENSMUSG00000053907.10	Mat2a	0.536686987	3.01E-02
ENSMUSG00000042104.18	Uggt2	1.383845339	3.01E-02
ENSMUSG00000046207.14	Pik3r6	-0.902845053	3.05E-02
ENSMUSG00000076596.3	Igkv3-10	-2.236522316	3.07E-02
ENSMUSG00000098404.1	Mrip-ps	1.40048757	3.08E-02
ENSMUSG00000040857.15	Erf	0.872100359	3.08E-02
ENSMUSG00000021675.4	F2rl2	-2.01323288	3.08E-02
ENSMUSG00000020620.14	Abca8b	1.73300448	3.08E-02
ENSMUSG00000028367.5	Txn1	-0.780941219	3.08E-02
ENSMUSG00000040943.12	Tet2	-0.509101468	3.09E-02
ENSMUSG00000019848.14	Popdc3	1.044430682	3.11E-02
ENSMUSG00000021179.8	Nrde2	-0.88481076	3.11E-02
ENSMUSG00000093765.7	Gm20658	-2.057811949	3.11E-02
ENSMUSG00000112980.1	D430020J02R	-1.255909628	3.11E-02
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ENSMUSG00000030401.16	Rtn2	0.80122612	3.18E-02
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ENSMUSG00000032652.13	Crebl2	0.896071167	3.20E-02
ENSMUSG00000040640.11	Erc2	1.998938704	3.21E-02
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ENSMUSG00000000600.15	Krit1	-0.629599897	3.26E-02
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ENSMUSG00000025316.16	Banp	0.825923231	3.33E-02
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ENSMUSG00000004187.10	Kifc2	1.68778995	3.33E-02
ENSMUSG00000014470.4	Rnf166	-0.524213329	3.34E-02
ENSMUSG00000040289.8	Hey1	1.099924541	3.35E-02
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ENSMUSG00000026611.17	Spata17	1.65576598	3.41E-02
ENSMUSG00000041729.15	Coro2b	0.812371159	3.41E-02
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ENSMUSG000000047193.16	Dync2h1	0.853874971	3.44E-02
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ENSMUSG000000062372.13	Otof	2.133604309	3.64E-02
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ENSMUSG000000027496.15	Aurka	-1.301026643	3.72E-02
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ENSMUSG00000104735.1	C130075A20R	0.972538528	4.25E-02

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ENSMUSG00000025949.16	Pikfyve	-0.500224363	4.30E-02
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ENSMUSG00000052430.15	Bmpr1b	1.516437011	4.34E-02
ENSMUSG00000030246.11	Ldhb	0.748632088	4.35E-02
ENSMUSG00000028871.7	Rspo1	1.487619439	4.36E-02
ENSMUSG00000042680.7	Garem1	1.074011852	4.36E-02
ENSMUSG00000027378.16	Nphp1	1.051561319	4.36E-02
ENSMUSG00000040936.15	Ulk4	0.90804594	4.37E-02
ENSMUSG00000062778.12	Chia1	1.119670236	4.37E-02
ENSMUSG00000049811.16	Fam161a	0.987301273	4.38E-02
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ENSMUSG00000021636.15	Marveld2	1.261594197	4.39E-02
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ENSMUSG00000026860.16	Sh3glb2	0.546464164	4.42E-02
ENSMUSG00000041498.13	Kif14	-1.530158169	4.42E-02
ENSMUSG00000021023.14	1110008L16R	-0.944820566	4.44E-02
ENSMUSG00000003662.10	Ciao1	0.834107413	4.45E-02
ENSMUSG00000104615.1	Gm43804	1.683466655	4.45E-02
ENSMUSG00000023963.9	Cyp39a1	1.267586268	4.46E-02
ENSMUSG00000020102.15	Slc16a7	0.976767984	4.47E-02
ENSMUSG00000029122.11	Evc	1.016619687	4.48E-02
ENSMUSG00000109429.1	Gm45223	-0.988712026	4.50E-02
ENSMUSG00000088459.1	Mir1941	1.959033383	
ENSMUSG00000037716.15	Ccdc33	1.34697366	4.52E-02
ENSMUSG00000034647.14	Ankrd12	0.478838134	4.52E-02
ENSMUSG00000000365.9	Rnf17	-2.124542765	4.52E-02
ENSMUSG00000078439.9	Smim24	-1.089554973	4.52E-02
ENSMUSG00000041889.7	Shisa4	-1.094215491	4.53E-02
ENSMUSG00000020087.5	Tysnd1	-0.801506466	4.54E-02
ENSMUSG00000066438.6	Plekhd1	0.931893141	4.56E-02
ENSMUSG00000004849.14	Ap1s1	-0.774250714	4.56E-02
ENSMUSG00000042357.2	Gjb5	-2.117303133	4.57E-02
ENSMUSG00000030337.16	Vamp1	-0.850646394	4.57E-02
ENSMUSG00000108772.1	Gm6063	-2.119266087	4.57E-02
ENSMUSG00000059602.14	Syn3	1.170577623	4.59E-02
ENSMUSG00000026415.11	Fcamr	-1.207732588	4.59E-02
ENSMUSG00000031377.11	Bmx	1.865304059	4.62E-02
ENSMUSG00000072623.6	Zfp9	1.54695103	4.64E-02
ENSMUSG00000097815.1	Gm26809	-0.878507851	4.64E-02
ENSMUSG00000088609.1	Gm24187	-1.624227441	4.64E-02
ENSMUSG00000075033.3	Nxpe3	-0.995871944	4.64E-02
ENSMUSG00000049436.4	Upk1b	0.812170486	4.65E-02
ENSMUSG00000057406.16	Nsd2	-0.4831426	4.66E-02
ENSMUSG00000022102.13	Dok2	-1.036818947	4.66E-02

ENSMUSG00000081219.1	Bambi-ps1	-2.084203115	4.67E-02
ENSMUSG00000026712.3	Mrc1	0.683459185	4.67E-02
ENSMUSG00000021209.12	Ppp4r4	1.480352825	4.67E-02
ENSMUSG00000098188.1	Sowahc	-0.681995352	4.67E-02
ENSMUSG000000109245.1	Gm44860	-1.925289646	4.67E-02
ENSMUSG00000032446.14	Eomes	-1.887457816	4.69E-02
ENSMUSG00000030671.9	Pde3b	-1.023311493	4.69E-02
ENSMUSG00000040350.16	Trim7	-1.34539694	4.69E-02
ENSMUSG00000037190.12	Cyb561d2	-1.207501776	4.69E-02
ENSMUSG00000031583.13	Wrn	-0.710144607	4.72E-02
ENSMUSG00000039196.2	Orm1	-1.920812275	4.73E-02
ENSMUSG00000025981.13	Coq10b	0.981389763	4.73E-02
ENSMUSG00000008601.12	Rab25	0.797722672	4.73E-02
ENSMUSG00000043391.9	2510009E07R	0.82858035	4.73E-02
ENSMUSG00000074419.11	Gm15448	-1.952275407	4.74E-02
ENSMUSG00000021003.10	Galc	-1.274322763	4.75E-02
ENSMUSG00000031647.10	Mfap3l	1.012127981	4.75E-02
ENSMUSG00000025586.17	Cpeb1	0.825385697	4.75E-02
ENSMUSG00000063317.7	Usp31	0.676359226	4.78E-02
ENSMUSG00000033964.12	Zbtb41	0.854849269	4.78E-02
ENSMUSG00000060475.12	Wtap	-0.851742892	4.78E-02
ENSMUSG00000086868.1	Gm15883	1.706680418	4.78E-02
ENSMUSG00000073650.8	Catip	1.777146512	4.80E-02
ENSMUSG00000030880.14	Polr3e	0.805724852	4.80E-02
ENSMUSG00000082101.3	Slfn14	-1.955527697	
ENSMUSG000000105160.1	A530030E21R	-1.848813384	4.86E-02
ENSMUSG00000022751.8	Nit2	-0.930617526	4.86E-02
ENSMUSG00000026961.6	Lrrc26	1.76454718	4.87E-02
ENSMUSG00000078616.2	Trim30c	-2.097751447	4.89E-02
ENSMUSG000000106149.1	Gm43430	-1.081209789	4.90E-02
ENSMUSG00000085471.1	4933423P22R	-0.796368795	4.90E-02
ENSMUSG000000107676.1	Gm44178	2.095866063	4.92E-02
ENSMUSG00000053317.11	Sec61b	-1.359118304	4.93E-02
ENSMUSG00000085105.2	Gm12758	2.094089622	4.93E-02
ENSMUSG00000006527.16	Sfmbt1	-0.950499614	4.94E-02
ENSMUSG00000036962.12	Cfap221	1.811386224	4.94E-02
ENSMUSG00000001768.15	Rin2	0.622691982	4.95E-02
ENSMUSG00000030522.14	Mtmr10	0.753776184	4.97E-02
ENSMUSG00000030125.11	Lrrc23	0.84581255	4.97E-02
ENSMUSG00000070524.1	Fcrlb	-2.009963332	4.99E-02

DIS-Infected d35 vs Infected d35

gene_id	gene_name	log2FoldChange	padj
ENSMUSG00000067288.12	Rps28	1.4212992	5.00E-12
ENSMUSG00000050359.7	Sprr1a	4.17470209	1.40E-06
ENSMUSG00000060678.5	Hist1h4c	4.025617504	1.57E-06
ENSMUSG00000027820.12	Mme	-1.29912402	4.78E-05
ENSMUSG00000076614.7	Ighg1	3.444155672	3.67E-04
ENSMUSG00000045826.8	Ptprcap	1.982015637	4.52E-04
ENSMUSG00000033307.7	Mif	1.61333407	1.27E-03
ENSMUSG00000028444.17	Cntfr	3.675486926	1.27E-03
ENSMUSG00000035697.14	Arhgap45	0.937272089	1.27E-03
ENSMUSG00000032300.7	1700017B05R	1.01827824	1.65E-03

ENSMUSG00000026728.9	Vim	0.703000378	1.65E-03
ENSMUSG00000047501.3	Cldn4	2.196948585	1.65E-03
ENSMUSG00000024661.6	Fth1	0.741531687	1.84E-03
ENSMUSG00000040663.8	Clcf1	1.485982159	2.03E-03
ENSMUSG00000097324.8	Carmn	-1.503139077	2.03E-03
ENSMUSG00000034684.12	Sema3f	0.909228933	2.11E-03
ENSMUSG00000007892.8	Rplp1	1.074898874	2.11E-03
ENSMUSG00000020142.12	Slc1a4	-0.966220456	2.27E-03
ENSMUSG00000022090.10	Pdlim2	1.190362007	2.78E-03
ENSMUSG00000023987.14	Pgc	3.628562754	3.08E-03
ENSMUSG00000039977.16	Deup1	-2.933936677	3.33E-03
ENSMUSG00000106957.1	Gm43085	-0.63833172	3.40E-03
ENSMUSG00000004561.14	Mettl17	1.549522455	3.40E-03
ENSMUSG00000020496.9	Rnf187	0.788530627	3.40E-03
ENSMUSG00000030695.16	Aldoa	0.643270671	3.40E-03
ENSMUSG00000064345.1	mt-Nd2	-0.9690798	3.40E-03
ENSMUSG00000083745.1	Gm13543	-3.304175855	3.40E-03
ENSMUSG00000018293.4	Pfn1	0.701220757	3.40E-03
ENSMUSG00000090291.2	Lrrc10b	3.420670428	3.40E-03
ENSMUSG00000099250.1	Rn7s2	1.424316699	3.40E-03
ENSMUSG00000025757.12	Hspa4l	-1.045840129	3.40E-03
ENSMUSG00000034810.7	Scn7a	-0.937898317	3.40E-03
ENSMUSG00000060803.5	Gstp1	1.156127152	3.40E-03
ENSMUSG00000090069.2	E430024P14R	-3.244997641	3.40E-03
ENSMUSG00000022568.16	Scrib	0.990836204	3.40E-03
ENSMUSG00000024856.10	Cdk2ap2	0.882937125	3.40E-03
ENSMUSG00000020400.17	Tnip1	0.835691473	3.43E-03
ENSMUSG00000028849.17	Map7d1	1.127214724	3.73E-03
ENSMUSG00000073407.1	Gm6034	-3.428524923	3.73E-03
ENSMUSG00000097971.3	Gm26917	1.394507703	3.99E-03
ENSMUSG00000051359.15	Ncald	-0.901813134	4.09E-03
ENSMUSG00000032053.8	Pou2af1	1.725456083	4.09E-03
ENSMUSG00000000934.8	Top1mt	3.194421222	4.09E-03
ENSMUSG00000028207.18	Asph	-1.082445803	4.26E-03
ENSMUSG00000060227.15	Casc4	-0.939742212	4.33E-03
ENSMUSG00000024845.17	Tmem134	0.845964997	4.53E-03
ENSMUSG00000036002.12	Fam214b	1.140136738	4.56E-03
ENSMUSG00000028234.6	Rps20	1.102203913	5.07E-03
ENSMUSG00000037653.7	Kctd8	-2.869681265	5.07E-03
ENSMUSG00000035202.8	Lars2	1.635167678	5.07E-03
ENSMUSG00000041247.7	Lamp3	-0.883301543	5.07E-03
ENSMUSG00000002763.16	Pex6	1.342290318	5.16E-03
ENSMUSG00000039943.16	Plcb4	-0.833535348	5.16E-03
ENSMUSG00000037095.7	Lrg1	1.512787459	5.93E-03
ENSMUSG00000036622.15	Atp13a2	0.963466341	5.93E-03
ENSMUSG00000048960.13	Prex2	-0.803484526	6.01E-03
ENSMUSG00000054342.8	Kcnn4	1.529769296	6.42E-03
ENSMUSG00000026883.17	Dab2ip	0.817302604	6.90E-03
ENSMUSG00000025971.6	Maip1	-2.15015716	7.19E-03
ENSMUSG00000039158.11	Akna	0.678170921	7.19E-03
ENSMUSG00000020163.12	Uqcr11	0.865878416	7.19E-03
ENSMUSG00000024854.3	Pold4	0.782102414	8.57E-03
ENSMUSG00000076258.1	Gm23935	3.09620023	1.03E-02
ENSMUSG00000028843.8	Sh3bgrl3	0.785152886	1.07E-02

ENSMUSG00000070003.7	Ssbp4	1.422965677	1.07E-02
ENSMUSG00000047246.7	Hist1h2be	1.565507837	1.07E-02
ENSMUSG00000060279.14	Ap2a1	0.864129112	1.07E-02
ENSMUSG00000028073.15	Pear1	1.353699273	1.08E-02
ENSMUSG00000025731.15	Mettl26	1.661294404	1.13E-02
ENSMUSG00000064325.4	Hhip	-1.005086215	1.17E-02
ENSMUSG00000027778.15	Ift80	-1.340014953	1.21E-02
ENSMUSG00000022995.16	Enah	-1.057745673	1.21E-02
ENSMUSG00000114456.1	Hist1h2bh	1.951321043	1.30E-02
ENSMUSG00000023947.7	Nfkbie	0.874952584	1.30E-02
ENSMUSG00000038058.14	Nod1	0.966595075	1.50E-02
ENSMUSG00000002524.16	Puf60	1.042012196	1.50E-02
ENSMUSG00000035754.8	Wdr18	1.26175829	1.50E-02
ENSMUSG00000031832.15	Taf1c	1.526635793	1.50E-02
ENSMUSG00000032312.7	Csk	0.96233879	1.77E-02
ENSMUSG00000004642.13	Slbp	1.157560291	1.80E-02
ENSMUSG00000100130.1	Gm28379	-1.729362974	1.82E-02
ENSMUSG00000046314.16	Stxbp6	-1.254720472	1.90E-02
ENSMUSG00000031838.8	Ifi30	0.707318409	1.92E-02
ENSMUSG00000039117.16	Taf4	0.997914197	1.92E-02
ENSMUSG00000039646.5	Vasn	0.787633585	1.92E-02
ENSMUSG00000025225.14	Nfkb2	0.841337631	2.14E-02
ENSMUSG00000059895.12	Ptp4a3	0.932513375	2.14E-02
ENSMUSG00000057411.8	Fam173a	1.680167117	2.14E-02
ENSMUSG00000063457.14	Rps15	0.838902214	2.14E-02
ENSMUSG00000017002.14	Slpi	1.424876749	2.16E-02
ENSMUSG00000014704.10	Hoxa2	-2.299299244	2.20E-02
ENSMUSG00000043866.11	Taf10	0.95936716	2.20E-02
ENSMUSG00000033416.15	Gucd1	1.044506645	2.20E-02
ENSMUSG00000015452.14	Ager	0.601021877	2.20E-02
ENSMUSG00000001525.10	Tubb5	0.628561084	2.30E-02
ENSMUSG00000038155.10	Gstp2	1.819578846	2.34E-02
ENSMUSG00000049076.9	Acap2	-0.661973119	2.35E-02
ENSMUSG00000028066.15	Pmf1	2.043218933	2.35E-02
ENSMUSG00000040945.13	Rcc2	0.910929514	2.37E-02
ENSMUSG00000019966.18	Kitl	-0.784227572	2.39E-02
ENSMUSG00000028780.13	Sema3c	-0.671777734	2.46E-02
ENSMUSG00000041608.8	Entpd3	1.882735452	2.46E-02
ENSMUSG00000014763.7	Fam120b	-0.870010759	2.51E-02
ENSMUSG00000042198.12	Chchd7	2.389853105	2.51E-02
ENSMUSG00000039630.10	Hnrnpu	-0.551898106	2.52E-02
ENSMUSG00000039621.13	Prex1	0.554653541	2.79E-02
ENSMUSG00000028132.15	Tmem56	-0.840712599	2.79E-02
ENSMUSG00000022514.14	Il1rap	-0.972539432	2.79E-02
ENSMUSG00000004207.14	Psap	0.534859633	2.79E-02
ENSMUSG00000051278.12	Zgrf1	1.740581759	2.79E-02
ENSMUSG00000034845.6	Plvap	0.795645768	2.79E-02
ENSMUSG00000021879.13	Dnah12	-0.799010621	2.79E-02
ENSMUSG00000062995.12	Ica1	-1.435316371	2.84E-02
ENSMUSG00000051397.5	Tacstd2	1.149690115	2.91E-02
ENSMUSG00000070780.11	Rbm47	0.746763409	3.05E-02
ENSMUSG00000030145.14	Zfp248	-2.799635656	3.09E-02
ENSMUSG00000001313.12	Rnd2	2.85528856	3.09E-02
ENSMUSG00000083716.4	Gm13436	1.578627957	3.09E-02

ENSMUSG00000059824.12	Dbp	2.418055722	3.11E-02
ENSMUSG00000064068.13	Mtx1	1.16390987	3.19E-02
ENSMUSG00000052837.6	Junb	1.613816439	3.19E-02
ENSMUSG00000034723.11	Tmx4	-1.217418325	3.19E-02
ENSMUSG00000064341.1	mt-Nd1	-0.67807933	3.19E-02
ENSMUSG00000006019.15	Dhx34	1.107646434	3.19E-02
ENSMUSG00000015354.8	Pcolce2	-1.071005402	3.19E-02
ENSMUSG00000019261.3	Map1s	1.100587871	3.25E-02
ENSMUSG00000027459.16	Fam110a	1.292315469	3.25E-02
ENSMUSG00000001376.17	Vps50	-1.227930402	3.33E-02
ENSMUSG00000019878.8	Hsf2	-1.301478722	3.36E-02
ENSMUSG00000022564.6	Grina	0.643995869	3.40E-02
ENSMUSG00000040298.6	Btbd16	2.949971358	3.42E-02
ENSMUSG00000045948.8	Mrps12	1.605840131	3.42E-02
ENSMUSG00000029714.11	Gigyf1	0.901928677	3.53E-02
ENSMUSG00000016256.10	Ctsz	0.694775064	3.57E-02
ENSMUSG00000047423.9	Al837181	1.061657492	3.60E-02
ENSMUSG00000041992.9	Rapgef5	-0.619100999	3.75E-02
ENSMUSG00000045176.3	Borcs6	2.734208853	3.77E-02
ENSMUSG00000004951.10	Hspb1	0.941296128	3.77E-02
ENSMUSG00000064330.9	Pde6h	-2.862895237	3.88E-02
ENSMUSG00000061878.15	Sphk1	1.341572038	4.14E-02
ENSMUSG00000059588.13	Calcr1	-0.585475762	4.14E-02
ENSMUSG00000029622.16	Arpc1b	0.75896234	4.22E-02
ENSMUSG00000062762.16	Ei24	-0.944447156	4.28E-02
ENSMUSG00000017418.13	Arl5b	-0.861391407	4.28E-02
ENSMUSG00000070473.4	Cldn3	1.212775193	4.28E-02
ENSMUSG00000037339.17	Fam53a	1.017272412	4.29E-02
ENSMUSG00000028041.17	Adam15	0.781849966	4.45E-02
ENSMUSG00000019899.16	Lama2	-0.658816783	4.45E-02
ENSMUSG00000043154.15	Ppp2r3a	-0.791696814	4.49E-02
ENSMUSG00000031827.13	Cotl1	0.909399863	4.49E-02
ENSMUSG00000076532.3	Igkv4-91	2.860671071	4.61E-02
ENSMUSG00000112981.1	5033424D13F	-2.665094776	4.66E-02
ENSMUSG00000071547.4	Nt5dc2	1.16250851	4.74E-02
ENSMUSG00000035234.18	Abraxas1	-2.002953553	4.78E-02
ENSMUSG00000002210.11	Smg9	1.062813268	4.80E-02
ENSMUSG00000040181.14	Fmo1	-0.798763182	4.86E-02
ENSMUSG00000030397.10	Mark4	1.182704338	4.86E-02
ENSMUSG00000003644.17	Rps6ka1	0.637357457	4.86E-02
ENSMUSG00000028330.8	Ncbp1	-0.942524221	4.86E-02
ENSMUSG00000106904.1	Gm43029	-2.307352299	4.86E-02
ENSMUSG00000025409.14	Mbd6	1.010370113	4.86E-02
ENSMUSG00000063171.4	Rps4l	1.482360606	4.86E-02
ENSMUSG00000090862.3	Rps13	1.004812935	4.86E-02
ENSMUSG00000037960.11	Card19	0.814404267	4.95E-02
ENSMUSG00000032714.6	Syde1	0.695151431	4.97E-02
ENSMUSG00000029033.16	Acap3	0.978009006	4.97E-02
ENSMUSG00000105864.1	Gm10484	-1.653491226	4.97E-02
ENSMUSG00000020167.14	Tcf3	1.009832169	4.97E-02
ENSMUSG00000058656.13	Samd12	-1.057014923	4.97E-02

Table S3

		DIS_treated_inf	DIS_treated_inf	DIS_treated_inf		DIS_treated_inf	DIS_treated_inf		DIS_treated_inf	Untreated_inf	Untreated_inf	
		ected_day21_A	ected_day21_A	ected_day21_A	DIS_treated_inf	ected_day35_A	ected_day35_A	DIS_treated_inf	ected_day35_A	ected_day21_	ected_day21_	Untreated_inf
Gene symbol	cluster_id	1	2	3	ected_day21_A4	1	2	ected_day35_A3	4	A5	A6	cted_day21_A
1700017B05Rik	1	4.005792324	3.816818243	4.202384629	4.761175246	4.976923677	4.519852377	4.653035966	4.75381065	4.199017495	4.276074026	4.4995583
Aldoa	1	5.389180623	1.405814163	4.652033953	4.566645896	5.378800004	5.563427362	1.631899698	3.823810284	4.305585232	5.03579772	5.99186712
Arhgap45	1	5.064125493	5.516307658	5.67290277	5.856418944	6.151139875	6.131658233	5.926358216	6.310734905	6.013698157	5.875033503	5.89596634
Arhgdib	1	6.773998413	6.865734135	6.994795021	6.632402671	6.472497348	7.553463442	6.90729417	7.14518633	7.278053943	7.385298263	7.34065097
Atp5o	1	6.085567486	5.412390747	5.780875017	5.664458706	5.565872818	5.734947485	5.753671053	5.8949556	6.431615291	6.88742513	5.78572298
Card19	1	4.919231409	4.852044074	5.704393004	5.605487748	5.697467193	5.92908909	6.342764744	5.910832387	5.895245678	6.012534358	5.61791286
Card9	1	2.703890405	2.965244473	2.687781838	2.685657564	3.333814979	3.485949193	3.87453461	3.884042576	3.447815605	3.689483931	3.8684676
Cd37	1	2.878534756	2.844480712	3.437245314	3.429891613	3.588431395	4.011869686	4.043349329	3.889872284	3.681021808	3.832142035	4.29639431
Cd79b	1	5.597216939	5.166162552	5.71609752	5.593389024	6.322847766	5.874472747	5.943551859	6.672435625	5.676230802	7.034752996	5.78361518
Cdk2ap2	1	5.769836264	5.796197221	6.259816093	6.371895675	6.309558442	6.112439608	6.524919144	6.186060344	6.742997939	6.475187575	6.35806371
Cldn4	1	2.91402715	3.357984695	3.197711965	2.698133648	4.474690189	4.443052663	3.10813118	3.019078542	3.419601466	2.908944129	2.13001597
Cotl1	1	6.676699005	7.557527273	7.870705513	7.98746353	7.769781326	7.945137822	8.012422734	8.086219367	8.00647661	7.760397294	8.18085734
Crif2	1	0.078482693	7.444979733	3.431480812	3.335670663	3.939912947	4.191173368	4.008634348	3.911338955	4.547329862	4.076732609	4.80653938
Csk	1	4.324216861	4.511110918	5.249482086	5.619715612	5.514525505	5.790493769	5.559649175	5.944543947	5.542432703	5.618553672	5.64830700
Derl3	1	0.50648821	0.223833677	1.099913632	0.64943319	4.789521339	1.850556297	2.655294286	2.964686969	1.755768044	2.470229753	1.6196756
Dpep3	1	-7.055261495	-7.055261495	-7.055261495	-7.055261495	1.430142416	-0.057958634	1.536690156	-7.055261495	-7.055261495	-0.373673184	-2.56757390
Fcmr	1	3.610459957	4.023624784	3.324238309	4.352998213	4.380751066	4.569759377	4.130211411	5.116463424	4.502868678	5.778735801	4.40667591
Fcrl1	1	2.39294599	1.992706524	2.122345174	1.276336755	2.986210779	2.260634258	2.539796253	3.46880132	1.994118386	3.756781212	2.2026049
Fth1	1	10.20358864	10.55481477	10.71500434	10.82121994	11.26776365	11.6558828	11.2499828	11.10514216	11.07112067	10.97481671	10.9243446
Gucd1	1	2.273662762	2.558910394	2.0170458	3.010400034	3.74838227	2.40603109	2.616168716	3.141634876	2.98417542	2.820036034	3.04049281
Hist1h2be	1	2.088334508	2.259624449	2.331170131	3.13209397	2.38218915	3.272196208	3.002727899	3.348124949	4.077015662	3.725966456	2.87335547
Hist1h2bg	1	3.722005909	5.185680168	5.384132346	5.778350096	5.702727019	6.223837722	5.846982344	6.274638987	6.691145664	6.074020286	5.60020302
Hist1h2bh	1	2.494214093	3.491693991	2.82169375	2.834921475	1.887831165	3.471490313	3.501894196	3.349422346	3.545282341	3.310029263	3.31865163
Hist1h2bn	1	4.304532738	5.43503665	5.248516549	6.518975241	6.158446558	6.880637796	6.381151809	6.595500164	6.775161834	6.745907363	6.62464530
Hist1h2br	1	-2.361878161	-0.918683935	-3.422109	-1.890705396	0.465676307	-0.260230415	0.267987906	-0.199680088	0.690251067	-0.244837467	-0.19793315
Hist1h3b	1	0.262026101	1.668865303	2.909686747	3.004263401	2.599116832	3.871658893	3.168088919	4.119299906	4.173816178	3.896965019	4.2756312
Hist1h3e	1	1.178141741	-0.038443008	0.604533971	2.515464294	3.142747416	3.775605919	3.847970214	3.964098409	4.873880723	3.352830191	3.16395512
lghg1	1	3.267561224	1.565002936	3.712909051	3.825239392	7.216371468	5.451980423	7.775648668	7.531615607	1.631130063	5.31827212	5.88151788
lghv1-53	1	-4.780967972	-4.780967972	-4.780967972	-4.780967972	1.025967982	2.765278475	-4.780967972	0.798943002	-4.780967972	1.556525004	2.7078850
lgkv3-7	1	1.40736467	-4.813480785	-0.494847905	3.144596316	6.4165136	-4.813480785	3.618445992	3.860500805	4.998039304	4.38893017	-1.26287993
lgkv4-57-1	1	-1.67076095	-4.868672572	-4.868672572	-4.868672572	3.286563881	4.751396449	3.177515881	2.825244945	2.45486522	2.805871308	5.48507292
lgkv4-91	1	-4.809456529	-4.809456529	-4.809456529	-4.809456529	2.716292368	4.593679665	-4.809456529	1.437171191	-0.026535871	1.242488875	3.20300907
Junb	1	1.126394897	2.407680658	3.40687937	3.837649315	4.033690319	4.20420951	4.714178134	4.222084556	4.764928363	3.763618214	4.00553326
Kcnn4	1	1.340906386	2.423124064	1.516035644	1.978137863	2.344936192	2.477957054	2.034850177	2.408569147	2.369480227	2.448230341	2.33615498
Ly6d	1	5.511486242	4.868610672	5.719978862	4.94241866	6.702096262	6.261722727	5.542101467	6.479323458	5.450269557	6.226862156	6.2601785
Mif	1	5.923340373	6.26853942	5.667304575	6.925999223	7.162295885	8.140944293	7.450964288	7.747819464	7.370746932	7.590622294	6.84693708
Myliip	1	3.590653332	4.020001728	3.7556375	4.205649422	5.014364731	4.713379836	4.494506445	4.735270023	4.448252606	4.459153222	4.34577900
Nfkbid	1	4.76985011	4.550827517	4.524071787	5.02872821	4.807765138	5.035445329	4.72283157	4.639879115	5.085683215	5.046941159	5.43054037

Nfkbie	1	5.329745558	5.259539432	5.552285429	5.710038652	5.530132464	6.10868343	5.894317902	6.08363099	6.064405126	5.87240321	5.74062818
Nit2	1	2.861592872	2.531786327	3.096823638	2.393592619	3.63702174	3.592571527	3.83327283	4.0070927	4.123543558	3.958300991	3.53934023
Nod1	1	4.307052775	4.632078441	4.59391204	5.355386169	4.994221832	5.111652905	5.333302018	5.320393659	5.320475071	5.177709612	5.53616252
Pfn1	1	7.946960822	8.211074835	7.842733793	8.036243595	7.853771429	8.466896337	8.237400214	8.254792369	8.203460918	8.45772519	8.48712659
Plk1	1	2.182449715	2.467824621	2.738687369	2.445676101	2.663838096	2.214850893	2.56447615	2.760467493	3.139320839	3.703943245	3.71764592
Pold4	1	6.987378793	6.994241887	6.884981442	6.280604351	7.540561745	7.065331901	7.528767467	7.556061406	7.048711632	7.209702207	7.18305813
Pou2af1	1	2.667353005	2.67729877	3.567186133	4.134441039	5.479588677	4.721081639	4.041437585	5.056004196	3.812074937	4.828186684	4.43073882
Ptpcrap	1	4.268264809	4.43765976	4.265060028	5.033838494	5.459370861	5.831049145	4.293653957	5.820573957	4.890959278	5.055851679	4.99979348
Rnf19b	1	5.438492519	5.598578872	6.01453599	5.951384799	6.072146418	6.238659628	6.362138521	6.471407928	6.393219425	6.107418129	6.53553073
Rps13	1	4.27512922	3.940684617	4.53864802	5.177743846	4.64158437	4.954053707	4.589664084	5.017920406	5.085207877	5.56799967	4.64512586
Rps20	1	5.678767285	5.793093123	5.837432761	6.800692856	6.512197338	6.941822938	6.689214967	6.810299541	6.945506051	7.164028743	6.33658476
Sh3bgrl3	1	8.06494142	7.973700172	7.901231448	7.861957633	8.250198749	8.324340568	8.389089556	8.257212793	7.747443486	8.070666153	8.50894531
Slbp	1	2.187414414	2.81008575	2.628386842	3.447137952	3.801487037	4.141076771	3.69981431	3.691840454	3.773814461	3.341987434	3.27026268
Slc2a6	1	3.740423215	3.625503906	4.080278972	4.458540925	3.717813983	4.85553313	4.75190803	4.51891913	4.408804882	4.497863108	4.34457681
Slpi	1	4.420827364	3.0999835	4.52998559	4.414436653	4.55820515	4.311201538	4.440144392	4.334688085	4.339650871	4.412780128	5.34053910
Sprrr1a	1	3.098235409	-0.559412876	2.23252688	2.810860502	2.803932446	3.188770139	2.822669041	2.460835069	3.985922953	3.032376168	3.23413603
Tacstd2	1	4.221779864	4.760250439	5.256407804	4.952402581	5.810238853	5.824209624	5.852156014	6.054189967	5.966779442	5.467476175	5.13674620
Tmem134	1	4.561998431	4.259946421	4.425817828	4.539983311	4.826860505	4.689146201	4.808500492	4.746204304	4.871720346	4.85371095	4.12843397
Tnip1	1	4.992322953	5.446233752	5.327038214	4.604876647	5.156160254	5.450257251	5.661807429	5.531227028	5.172062394	5.187392708	5.35484397
Trbv1	1	-5.029544325	-5.029544325	-5.029544325	-5.029544325	2.757933578	3.512837745	1.496402233	3.660885249	1.453184058	2.299000874	-0.54185673
Tubb5	1	7.330296436	7.89449383	7.76929535	7.819779463	7.680125722	7.924971835	7.716872509	7.818198283	8.106303802	8.212437816	7.86405742
Tubb6	1	3.682612016	4.348852259	3.692246671	4.853625298	4.688027896	4.736481007	4.802171031	4.685612179	5.14099801	5.197763103	5.09684450
Vim	1	7.694143276	7.570824882	7.903237274	8.17235252	8.047988389	8.602134517	8.543268317	8.402385182	8.12189595	7.982840571	8.08155287
1810024B03Rik	2	-8.119244061	-8.119244061	-8.119244061	-8.119244061	-1.325250938	-3.957238972	-4.643118894	-0.3003764	0.159270374	-2.423669246	-2.25728014
A230083G16Rik	2	-1.390026971	-3.283219316	-6.278381999	-6.278381999	-2.005768024	1.201117749	0.879392342	1.655471302	0.054134584	1.75716185	1.37310894
Aip	2	2.848215129	2.173395674	1.381375991	1.990822078	3.22786137	4.124390875	3.30544695	3.761031249	3.859985746	3.973018639	3.56977467
Chchd10	2	6.867359141	6.600423036	6.863455561	6.380399224	7.245391199	7.102130204	7.347044352	6.598258014	7.529620909	7.867579482	7.55445310
Cldn3	2	4.670413243	5.100389367	5.222546613	5.091256651	5.772207367	6.05643433	6.448912005	5.518502565	6.129338277	5.437642844	5.55562514
Clic3	2	7.678188266	7.986117312	8.000368741	8.03971046	9.058077946	8.373427043	8.310443256	8.316331575	8.322835307	7.904698414	8.43506370
Cntfr	2	-3.650468509	-7.767547456	-1.244283798	-3.190924813	0.923770508	-4.527121932	0.824404195	-0.073629939	-1.284819073	0.740387212	-0.39829045
Cox4i1	2	5.895039855	5.005206515	4.931441541	5.287277753	5.155253926	5.738687773	5.469423457	4.937191431	5.975960827	6.370145817	5.71760632
Dand5	2	-2.280938911	-0.14029907	-0.691634582	-0.834293203	1.97186106	1.682294917	1.145436704	0.863870289	2.050371425	1.158259571	1.01698587
Exoc3l2	2	-4.180105358	-8.297184305	-8.297184305	-8.297184305	0.784095235	-2.196925093	0.689798416	-3.031680671	-3.514263647	-8.297184305	-1.74435292
Gm18821	2	1.767377818	2.640072853	0.842251286	2.227633581	4.499868817	2.959562011	4.314488431	4.531374927	2.398624526	2.823389822	4.0655803
Gm2238	2	-8.166811941	-8.166811941	-5.065540352	-8.166811941	-1.783529126	-0.757297383	-0.817656007	0.350035877	0.229980143	-2.114866537	-8.16681194
Gnb2	2	4.790818133	5.431518198	5.961853751	6.16793196	6.211707654	6.271043683	6.209953	6.048592462	6.647156445	6.245575719	6.3037447
Gstp2	2	2.901656	2.159620189	4.009661015	2.268441451	3.587387415	2.987917676	3.91133151	4.056051954	3.115627881	4.209143296	4.54931816
Hist1h4c	2	0.625918347	0.97807777	1.44922131	4.292244178	4.513761481	4.875620094	4.475720825	5.331463128	5.754582877	4.538950276	2.83497334
Hspa1b	2	-4.580485159	-7.77839678	-1.08695192	-2.489197859	1.37430714	-0.688690447	2.27748515	3.0159714	-0.340074768	0.372201271	0.15193527
Hyal3	2	-7.253418714	-4.258256031	-7.253418714	-4.145638112	-2.420940317	0.156095845	0.09573722	0.978888209	-3.954282994	-0.791882303	-0.317184
Ier5l	2	-1.344359093	-2.076834788	-0.324686402	-1.761903643	1.038633109	-0.305757533	-1.357294914	0.325074929	0.478635004	1.701538995	-0.34601508
Kcnh6	2	-8.11883761	-8.11883761	-5.017566022	-8.11883761	-2.093195354	-0.782877086	-2.743378129	0.711749135	-0.213342709	-8.11883761	-3.23227905

Lrrc10b	2	1.416766665	0.462349873	0.169473658	-1.799855227	1.607844331	0.907808846	1.879409539	-0.931486182	1.294125414	0.427682447	1.3019725
Ltbp3	2	3.705522332	3.949477857	4.714425383	3.843242182	5.402339079	4.796827552	4.872300846	4.629935092	5.006959124	4.039440142	4.61287168
Map7d1	2	3.464249365	4.024647373	3.674205888	4.454762732	4.552758681	4.575600288	4.447186387	4.21486631	4.457386402	4.339588	4.80951051
Mef2b	2	-6.780967972	-6.780967972	-3.679696383	-3.67318737	0.12750194	0.554992552	-0.83217729	1.30981614	0.281335648	-0.729022568	-2.29328037
Mettl17	2	2.251703449	2.755568047	2.186018276	2.181736285	3.130255678	1.999344879	2.552360625	3.058630141	3.547405191	2.583135381	3.30168309
Mrps12	2	2.794517934	4.109479085	4.382726159	4.970469633	4.903836223	5.479656945	4.363819709	5.108825019	5.594597292	4.863649023	4.5929560
Nt5dc2	2	1.910188095	2.912732113	2.858158866	2.005362499	1.885713125	2.909620513	3.144278904	2.346063514	3.092152627	3.177773413	3.27384991
Pex6	2	2.059880243	2.813023019	1.784849964	3.194301335	3.452184212	3.664453292	3.386934158	3.637695264	3.271250066	2.814819697	3.47009855
Plvap	2	5.061456113	5.753599827	5.701387745	5.659289681	6.372472217	6.180890856	6.203047587	5.882279751	5.964684968	5.760658394	6.67460617
Ptp4a3	2	3.226354597	3.598917729	3.934549969	3.867875017	4.379273434	3.922407805	4.687703492	4.595167179	4.289632288	4.502110135	4.37292856
Rabac1	2	6.777072569	7.440529544	7.201379804	6.944168282	7.972752711	7.766457031	7.754027529	7.479610311	7.655687704	7.461434387	7.25524528
Rnf187	2	6.081208291	6.334052881	6.597727424	6.546587876	7.120544265	6.749445798	6.914732836	6.456258021	6.869209942	6.861945833	6.83138718
Rplp1	2	7.68999536	7.912185412	7.538074266	8.30503396	8.411864699	8.76072993	8.277672555	8.734279443	9.107590337	8.701910632	8.35184286
Rps28	2	6.148836531	6.198463445	5.977722033	6.053085671	6.452805753	6.630179545	6.457635703	6.363593689	6.585298237	6.455103774	5.83029431
Scrib	2	3.193307905	3.805968074	4.093529217	4.235589985	4.636112118	4.135067145	4.334713384	4.072647213	4.341694711	4.130972233	4.33737982
Sema3f	2	4.168283993	4.690800659	4.927293692	5.161757624	4.79260946	4.83897899	4.968779012	4.861158336	5.122584049	4.586687507	5.01226190
Sptssb	2	-7.160111801	-4.164949119	-7.160111801	-7.160111801	-0.776828987	-0.606167515	0.509201488	-0.220370603	-1.97531472	-7.160111801	2.42018372
Tmem38a	2	1.502083573	0.875567752	1.744169547	1.29790149	1.916391379	2.039513518	3.543091817	2.21401204	2.755468227	3.347088672	2.07795392
Unkl	2	1.185705438	0.967951082	1.105782997	1.448432132	2.880654906	2.661262673	2.687354725	1.642458378	1.821634893	1.604799752	2.48699992
Uqcr11	2	6.828961778	7.070335611	6.918605238	7.283074124	7.567974811	7.570235372	7.430406328	7.398029597	8.124671372	8.116531199	7.55905044
Wfikkn2	2	-8.227638937	-8.227638937	-5.126367348	-5.119858335	-8.227638937	-3.106502756	-2.852179456	0.048916722	-1.264100149	-0.715746639	0.25719263
4933424L21Rik	3	2.450957486	3.819985102	2.926204957	3.214220209	3.296647559	1.405402508	2.954503383	0.027221767	0.937110879	0.194200618	1.00759854
AI504432	3	1.810441478	1.943734984	1.630489288	1.776727991	2.121374592	1.850308726	1.555556284	2.311073905	0.547923507	0.932204741	1.10306290
Abca1	3	4.93395349	4.497407511	4.615909916	5.083935334	5.880763634	5.72179998	5.505049268	5.668977412	4.837671968	4.509409865	4.79860524
Apoe	3	7.080535386	7.342339649	7.057489883	7.469665227	9.601593308	9.471069009	8.910892257	9.070976851	7.487833522	7.491366572	7.67631213
Apol7c	3	0.883444891	2.338768435	2.288057106	0.314778468	4.048620718	3.307912459	3.247228208	3.772619563	2.753831474	2.781774662	3.11507575
C1qa	3	8.413535961	8.389402899	8.217535722	8.312413185	8.648501696	9.111018977	8.934822554	9.327636863	8.934237008	8.381555563	8.2654247
C1qc	3	8.476434991	8.664445319	8.507736107	8.343004791	8.897915184	9.63845602	9.303329122	9.370312074	9.055076932	8.498754928	8.59107799
Ccl5	3	6.311897721	6.275174025	6.81040805	6.605954159	7.22683657	8.046595922	7.883440613	7.690291399	6.754574468	6.73039121	6.67203389
Cd19	3	2.746037611	3.376220081	3.287257215	3.071165383	4.673287479	4.04394438	3.833830573	4.862590476	3.485766543	4.517266264	3.71329057
Cd68	3	7.259538129	7.180516564	7.125389039	7.493442876	7.777975706	8.661661896	8.113922145	8.245933034	7.55632474	7.166580236	7.48824442
Cd79a	3	3.187094544	2.524187459	2.903576275	2.345886355	4.762889846	4.278724233	3.551327361	4.342066337	3.372069298	4.506020785	4.26056434
Csmd1	3	0.037656115	0.04249636	-0.995115772	0.250168147	0.940248651	1.0136599	0.993894666	1.528558743	-0.57542896	-0.076871159	0.32950748
Ctsd	3	7.907792945	8.159987121	7.751014183	8.185762998	8.690272544	8.710477899	8.528773745	8.630969961	8.167522998	8.00797666	8.10607806
Ctss	3	7.176683231	7.317522355	7.308972969	7.368246276	7.71164742	8.522688906	8.266519916	8.476555108	7.477834534	7.328490842	7.09636358
Cxcl15	3	7.846765634	8.25923636	7.916817474	8.166000077	7.402147447	7.493497615	7.859807175	7.695334311	7.93773285	7.825724092	7.41530109
Cxcl9	3	7.693706718	7.730370971	7.666033053	7.463326026	7.658453122	8.335064034	8.481808208	8.590790111	7.605398349	7.857571213	8.24198371
Ddhd1	3	3.104917723	3.185728005	3.01454699	3.094337867	3.259441729	3.136912349	3.242256785	3.072351298	2.619400762	2.750187404	2.66498654
Glipr1	3	5.210003544	5.693052665	5.18684748	5.332701162	5.823982696	6.279059997	5.754255375	6.109792942	5.434705007	5.682116059	5.35261369
Gm2a	3	6.156214814	6.116647052	6.416777585	6.104947865	6.476510499	6.975912758	7.004500977	6.87632937	6.469442414	6.437654305	6.53870538
Gm43085	3	5.739606612	6.048899738	5.695371579	5.807275221	5.435016859	5.192615921	5.591100013	5.213963269	5.328395794	5.431017203	5.2801277
Gm6034	3	1.842999607	1.806104458	0.685498683	0.582355109	-2.16647143	-3.758524303	-6.998949827	-6.998949827	-0.516221444	-0.218763115	-0.82002745

Gpnmb	3	3.976971502	5.495606574	4.494692608	4.385242707	6.275514371	6.877531085	6.535321101	6.821038223	4.377361014	3.993957497	4.85399780
H2-Aa	3	10.36985211	10.44823186	10.36014332	10.25294596	10.69431132	11.2518295	11.02504785	11.08191247	10.31656868	10.30837086	10.2516685
H2-DMb2	3	5.599243127	4.778455552	4.818940562	5.027196224	5.391725387	6.477810343	6.169068607	6.507049313	4.882038103	5.815165421	5.59590728
H2-M2	3	4.008428256	3.511238602	4.535637359	4.84015788	5.22586058	6.50331104	6.240772484	6.23377298	4.52425097	5.028607252	4.05769054
H2-Oa	3	4.933355388	4.388567343	4.931086762	4.62445236	5.311833156	6.1269013	5.926583616	6.463367199	4.647099081	5.168047922	4.83328260
Hmox1	3	7.146236343	6.949937074	7.102903685	7.594803159	8.030834768	8.140640732	7.720001226	8.148740864	7.144724543	7.087012702	7.34519593
Hnrnpu	3	3.818915891	3.396687226	3.94936898	3.77640897	3.266627534	3.492058329	3.297723202	3.464360955	3.265756553	3.509642036	3.0905931
Ift80	3	1.270021402	0.782630338	-0.182554793	0.928539995	0.159094521	-0.453523228	-0.653596226	-0.305295794	0.167318096	0.247294778	0.79043582
Igha	3	6.312324777	5.731849097	6.523191954	5.863527612	8.841259274	8.638476274	7.470566475	8.659006717	4.765200604	5.304117545	5.63818762
Ighd	3	4.669272057	5.166812651	4.453741414	4.50243286	5.875800399	5.825440822	5.249815241	6.724414301	4.041484316	6.283958519	5.64623528
Ighg2c	3	9.433541574	6.503284512	7.646421707	8.728401411	13.24717203	11.45855879	9.127880243	11.14655543	7.997834562	11.98931001	9.94852045
Igkc	3	9.151426658	7.733947642	9.300093741	9.210586594	12.03350541	11.0596328	9.621179298	11.13047798	8.85879646	10.68881342	10.1913936
Ilgae	3	3.564290148	3.66378307	3.207367804	3.020732636	3.815077226	4.181860794	4.55120069	4.405939553	3.606187608	3.321791763	3.55843079
Lamp3	3	7.298407931	7.717376437	7.450087639	7.10544943	6.851918816	7.423749924	7.432349938	7.561011295	7.264013096	7.044177625	6.86899583
Lgals3	3	6.577270009	6.788854285	6.994231172	7.545066701	7.31263941	8.140379008	7.938757454	7.865735762	7.459553503	6.822544956	7.23397501
Ltbp2	3	4.801704229	5.35914527	4.934879523	5.034616936	6.352935724	6.436218739	6.213757011	6.396401987	4.843832805	4.534213739	4.89595138
Mafb	3	1.678485869	2.607040714	2.358158802	3.29016152	4.037773362	3.728313154	4.141767258	3.439498097	3.407700878	3.211844814	3.2639447
Mmp2	3	4.768405627	5.523042887	5.030380943	5.037745428	5.738311107	6.094574345	5.646727007	5.611371839	5.355138172	4.839453512	4.98418983
Nos2	3	6.93680258	6.366550349	7.03382383	7.476576025	7.182048279	8.495976594	8.02694717	7.916113589	6.814716913	6.756526488	6.77440175
Olfr754-ps1	3	3.384231419	1.238434534	0.534496865	2.186786479	4.017551469	4.340978223	3.516017736	4.276168587	3.056151847	3.499366804	2.77042385
Olfr760-ps1	3	-5.872535211	-5.872535211	-5.872535211	-5.872535211	3.05432322	-5.872535211	1.645562248	0.184159157	-5.872535211	-5.872535211	-5.87253521
Pax5	3	1.510465453	2.042458556	0.886944051	2.390546733	3.234333693	2.960294396	2.242978549	3.276959779	1.270091656	3.171780779	2.86418277
Pld3	3	6.246426847	6.776295545	6.59226019	6.763894592	7.531406001	7.795283477	7.686592431	7.633569084	6.906104059	6.589950583	6.62380356
Procr	3	4.104221609	4.734103465	4.914137772	4.926055318	5.319294048	6.025342924	5.725541219	6.024508914	4.72004988	4.773238559	4.96863194
Psap	3	9.855353337	10.12321881	10.01745195	10.23622786	10.85615054	11.25558232	11.02454902	11.22358139	10.44297792	10.40955851	10.5154573
Scai	3	2.113569999	1.055655993	0.428892005	0.947548214	0.743574253	0.444131482	0.574217901	0.695315446	0.663336266	0.81451114	0.67261
Slc11a1	3	4.757622887	4.784756695	4.991494325	5.186365758	5.80428706	6.074735722	5.832336374	5.751463503	5.48686188	5.303675801	5.49928995
Sox8	3	-7.932045964	-4.936883282	-7.932045964	-7.932045964	0.223190488	0.473219486	-1.983255282	-0.787421646	-3.708120457	-2.047310006	-7.93204596
Spib	3	3.505944669	3.568325498	3.791004639	3.480944928	4.840052029	4.616595603	4.297321361	5.011488097	3.36163863	4.622547825	4.40190187
Syncr1p	3	1.491007939	0.809883611	1.762856525	1.988719714	1.085916796	0.490410859	0.897031001	0.971242264	0.305593037	0.903447729	0.77165086
Tmem56	3	3.07267975	3.700901524	3.169968582	2.976820882	2.127656603	2.732746837	2.4008766	2.700806629	2.594119899	2.593384061	2.93723286
Ubd	3	6.819192151	5.935798449	6.551447021	6.249672457	7.099272196	7.929797713	7.863754226	7.651268808	6.919359124	6.856877889	6.6932499
Wdfy4	3	5.149791855	4.895240151	5.124064093	4.841786036	5.746818819	5.533539115	5.547482621	5.630744873	5.125962481	5.261712676	5.36452735
Zmynd15	3	3.565707706	3.62058682	4.028128532	4.238021402	4.341728988	4.675268692	4.976643073	4.87191525	4.119146685	3.817623285	4.08479251
5033424D13Rik	4	3.069785301	3.13956353	1.437497671	0.098554878	-1.085955077	-0.37904286	-5.665490754	-5.665490754	2.840612583	2.30889159	2.22195179
8030453O22Rik	4	-1.49086774	0.510983005	-7.544203988	0.435811512	-7.544203988	-7.544203988	-7.544203988	-7.544203988	-1.379376413	-2.322963613	-0.60796967
Abca8a	4	2.943227399	2.557201976	2.182499396	1.308144366	1.874806488	2.081933415	1.676972946	0.939734457	1.509040088	2.054892627	1.70162628
Adamts9	4	1.946482901	2.121763144	2.363699705	1.930640129	1.507204001	0.638488549	1.295201322	1.265877099	2.292841877	1.693737114	2.02878051
Atp1a2	4	3.351377728	2.891574693	3.454614659	2.996060925	2.254835439	1.53943979	2.031991463	2.472321867	2.919447142	3.569123222	3.21142493
Bcl6b	4	4.187453817	4.356351309	4.128791337	4.092574603	2.836872693	1.960098557	3.268196958	3.155459891	3.080357167	3.465381527	3.98407129
Bpifb1	4	6.963753661	6.419500891	6.861330162	6.286574305	2.791954451	5.80792931	5.304021348	5.137387846	6.4827355	6.387261241	7.0698695
CT009696.3	4	-0.375964715	1.219942459	-0.895134234	-4.31061729	-3.145783917	-3.256392803	-1.46960721	-7.418397892	-4.119262172	-7.418397892	-7.41839789

Calclrl	4	6.502099625	6.549538109	6.362574704	6.257750607	6.189588375	5.594334143	6.05663473	5.977058562	6.049049374	6.033441777	6.09631960
Car4	4	5.248820916	6.151358002	6.115408964	5.363874786	4.282910455	4.755248789	4.865076466	4.253626067	5.092483154	4.970930899	5.16670496
Casc4	4	3.550729273	3.76596702	3.566792009	3.297835791	2.630769555	3.025531214	2.698603967	2.441529701	2.873029402	3.132377516	3.50516143
Deup1	4	0.062486194	-0.593737067	-0.503292137	0.308021779	-3.746078072	-3.856686958	-8.018692047	-2.438781073	-0.167413523	1.367138028	0.91922741
E430024P14Rik	4	-0.036078306	-0.045548799	-3.297170401	-0.887414682	-8.579192814	-4.417187725	-5.103067647	-8.579192814	-1.77776628	-0.085717685	-0.60720957
Ednrb	4	4.086184158	4.143978633	4.226702501	3.68035004	1.568006088	2.933736614	3.232555256	2.443899139	3.967559103	2.636366881	2.62825789
Enah	4	0.509877722	1.391468013	0.40347142	1.043983572	0.033091511	0.058921854	0.417620975	0.179130745	0.355596188	0.52128247	0.37106898
Fam47e	4	2.692036505	3.099511922	3.018464603	2.534279127	1.474303978	-0.371365174	0.06743016	1.288675885	2.558751783	2.487352946	2.00960299
Fmo1	4	4.825745814	4.454178804	4.621965295	3.980978806	3.856734568	3.719382479	4.218498641	3.845114388	3.730435077	3.710302157	3.87244322
Fzd4	4	4.095664567	3.318719748	3.956962263	3.920857746	2.703399694	2.916069557	3.380142215	2.707671176	3.041662341	3.531267218	3.6905702
Gal	4	-5.801374182	1.259226664	1.828896262	3.175781417	-5.801374182	-5.801374182	-5.801374182	-5.801374182	-1.577448676	-5.801374182	-2.77545184
Gja6	4	-1.915395937	-1.4761786	0.532113979	-7.30363612	-7.30363612	-7.30363612	-7.30363612	-7.30363612	-1.804865608	-0.344422234	0.00188712
Gm13543	4	1.661477562	-0.428517109	2.357106117	0.444170871	-5.962265372	-1.800260283	-3.361993098	-5.962265372	1.192472828	0.239506995	0.88724218
Gm43790	4	1.161037256	1.02910561	0.948435756	-7.300772208	-3.955381994	-7.300772208	-4.700499934	-3.926922905	1.461840971	-1.098999841	0.67121103
Gmnc	4	1.251447338	0.875548937	1.317532581	0.518883718	-3.488576207	-0.841554856	-1.383989758	-1.27523786	0.113102426	-1.280022826	0.49636948
Hhip	4	2.802620171	2.320271842	2.18081561	2.567892228	1.474763395	2.067557723	1.086922994	2.065117741	2.512229818	2.136959224	1.79449876
Hspa4l	4	2.117283513	1.897989117	1.438267724	1.589028636	1.152866635	1.245381416	1.1622423	0.908553802	1.77970051	1.633333476	1.52354296
Ifitm5	4	2.74479674	2.601281454	1.93079341	-3.638836702	-5.904956689	-5.904956689	-3.304684415	-5.904956689	1.918429953	-0.83142863	-0.44978538
Inmt	4	6.968181081	7.261810046	7.591529223	7.320769394	6.673152902	6.444542862	6.652827918	6.312753759	7.115844476	6.701295285	6.87807175
Kitl	4	3.862458914	3.713764398	3.715398977	3.835175167	2.405126859	3.12245175	3.222189047	3.229432107	3.378838336	3.221149895	3.15364245
Lrrc56	4	1.243371459	2.843292794	1.660201779	2.404145564	-0.370816974	0.492369697	1.085689829	0.466337177	2.407322066	1.386477787	1.93377600
Lrme	4	1.826360611	2.289106222	2.390301	1.730350386	1.6146502	1.265117998	1.288871654	1.247131434	1.98651226	1.862076624	1.85318846
Muc5b	4	6.203824741	5.873417778	6.313070408	6.350749084	3.197857899	4.931390944	4.814581674	4.10150254	5.991150601	5.847288653	6.14152107
Ncald	4	2.634989009	3.17519255	2.927916462	2.960716733	2.114508349	2.33977393	1.809409049	2.015370861	2.618089889	2.585539892	2.69736829
Nes	4	2.734736286	3.456521472	3.391611659	3.336459319	1.674981887	2.001511406	2.70077822	2.790092867	2.782920568	2.678622133	2.29488123
Pbx1	4	2.825537749	2.93066571	2.453028083	2.430611495	2.329154436	2.373928944	2.607718828	2.378763095	2.073507176	2.607437053	2.49939788
Plcb4	4	2.654724959	2.797828769	2.771220027	2.739285473	2.486318425	2.065976656	1.820966635	1.793928644	2.143836682	2.00585909	2.56563192
Pls3	4	4.421712848	4.029053642	4.063681707	4.696084722	4.328181824	4.088226907	4.019665663	4.098499371	4.15371764	3.844255171	3.58919972
Podxl	4	5.879056073	6.014535641	6.233368804	5.667582603	5.041758124	5.308019022	5.528917456	5.091841399	5.58181767	5.397886268	5.93124959
Ppbp	4	3.509126403	3.797470077	3.299160828	3.197717812	1.189307095	1.806769875	1.693975797	1.527395022	2.740666314	3.63493046	3.39788314
Psd3	4	2.519688235	2.710842031	2.547797679	2.033877137	1.775953688	1.973097989	2.192048143	2.321682085	1.757731574	2.348374087	2.21297371
Rapgef5	4	3.565600658	3.511425473	3.550105751	3.259730531	3.079303947	2.673738628	3.080004643	3.326601808	3.067968475	2.834287931	3.22409195
Scn7a	4	4.391742926	4.762777721	4.221419594	4.562876525	3.487789064	4.166841657	4.100651967	3.63074788	4.207321404	4.002930946	4.03769836
Scrn1	4	2.004726599	1.019649389	1.125483057	1.19110342	-0.87611172	0.252786354	0.48302923	-0.080713126	1.135627833	1.021643529	1.8189864
Slc1a4	4	3.649978704	3.49775734	3.850663406	3.51131224	2.839031827	2.870514577	3.184835687	2.917833607	3.224890352	3.81270452	3.38508394
Stxbp6	4	2.580980504	2.992882177	2.062812892	2.085863715	0.976871321	0.613568292	1.054745676	0.652056616	1.734424838	1.231080674	1.96777987
Svep1	4	3.665870625	3.304538951	3.252800515	3.485265066	2.870754642	2.987954739	2.673334281	2.782156876	2.966908899	2.92792113	3.24636355
Bmp10	5	0.530346051	-8.458140481	-1.616089085	-4.436562311	-8.458140481	-8.458140481	-8.458140481	-8.458140481	2.605974503	2.724518376	-1.08888347
Ccl2	5	6.930322261	6.807859886	6.965353178	6.731733185	5.022323895	6.121018922	6.274074974	6.131349824	7.021577097	6.8252706	7.14458398
Cd177	5	5.225117597	5.114527141	5.545840047	6.135838674	2.559626496	4.845181652	4.294838979	3.877710092	4.716015052	4.770390787	5.27700398
Cdca3	5	3.890301889	4.320358237	3.252292883	4.217809763	2.787317662	3.127328712	2.700730647	3.0325334	4.069206652	3.898700209	3.69231222
Cp	5	5.345178331	5.319462694	5.519163868	5.427212291	4.874311391	4.924260978	4.910593235	4.63352495	5.347873939	5.458017863	5.04379955

Gm16035	5	3.585740606	3.043760255	1.059108818	1.725639935	-4.973099178	-4.973099178	-4.973099178	-4.973099178	1.191728397	-1.926833981	-4.97309917
Gzmb	5	5.586739674	5.297009767	5.926244345	5.574065266	3.775744051	4.832099322	4.40392261	4.828100326	5.175373031	4.962919882	5.06002009
Ifit1	5	4.986516388	4.761396656	4.953393259	4.801217112	4.501221246	3.723216612	4.269316527	3.846975506	5.132345628	5.249062625	4.9121031
Ifit3	5	5.740316394	5.757216877	5.77789759	5.956947277	4.759919665	5.038670669	5.074078213	5.006621979	5.834745497	5.802507471	5.3700797
Ifitm3	5	9.542684442	9.85161219	9.642864625	9.391601073	8.834845254	9.162522772	9.22471343	9.017635943	9.565640764	9.46363951	10.0571063
Il1b	5	5.540243804	4.917036989	5.247913389	5.573102188	1.783404208	4.146909985	4.051823681	4.733055361	4.936183878	5.126500949	5.28688560
Iqgap3	5	2.395043696	2.225812139	1.650162458	2.534955865	0.855935766	0.7226393	0.459959721	1.708406812	2.375196106	2.051661428	1.84438757
Muc20	5	2.475972779	3.07866505	3.361625708	2.955784528	0.421820443	2.310249154	0.769755527	1.779453051	3.036297713	3.337509129	3.22280273
Muc4	5	5.128598668	4.880003351	4.911562544	4.564131592	2.950142361	4.136549943	3.81882379	4.008715561	4.504482832	4.741215884	4.79929107
Muc5ac	5	1.979259361	2.048622063	2.159152288	2.208075673	-0.519529777	0.373667568	-0.948104099	-2.89271521	2.188546678	1.430499864	2.2563342
Mxd1	5	3.731881002	4.044891695	3.557401347	4.030223802	2.786708372	3.177708539	3.053599323	3.345435691	3.712471566	3.945180788	3.99619240
Ncapd2	5	3.920577635	3.055271634	3.529514843	3.219830053	2.500464062	2.809180044	2.613449033	2.286083733	3.709428172	2.962946073	3.77370693
Oasl1	5	4.816760409	5.048766799	4.789513667	4.922871379	4.329308008	4.01616814	4.150125133	4.213509281	4.683587936	4.422084728	4.3893230
Poc1a	5	3.074020912	2.257252037	2.5943405	3.080913332	0.754664901	1.695093735	1.687490725	-0.041461772	2.85050878	2.089251582	2.15736475
Rfc5	5	2.662190057	2.554744716	2.739499644	2.835870095	1.005326648	1.740643712	1.924813258	1.75852346	2.787957388	2.387984368	2.4905243
Rnf213	5	7.139323899	7.109540432	7.083654291	7.202208349	6.577860641	6.710130691	6.835221249	6.843512215	7.150918146	7.034855703	7.23833963
Rsad2	5	5.518142616	5.617853144	5.611875574	5.655344183	5.121231736	4.303010987	4.886436015	4.950752487	5.654577171	5.481690066	5.41826973
S100a9	5	3.850273929	4.933249614	3.838239479	5.305162331	-2.008156534	2.486725538	1.583518098	0.484362925	3.700638069	2.868953413	4.91501856
Saa4	5	0.586520859	-0.953760053	2.090472878	0.786770391	-7.357686478	-7.357686478	-3.881561312	-7.357686478	-0.874958096	-7.357686478	-3.42316184
Slc26a4	5	3.790500165	4.206307103	3.134880876	3.80818711	1.920712296	2.266174306	2.775214217	2.816167181	3.609504995	2.98010925	3.05952497
Slfn4	5	3.524958267	3.122029547	3.066767992	3.187299474	0.313649556	1.790721997	-0.177947923	1.426582605	2.433110453	2.373787634	3.81273890
Slfn9	5	3.505846427	3.378154614	3.204665479	3.512399592	2.100233251	2.371596652	2.64775174	2.802940421	3.557663625	3.657743387	3.04484890
Steap4	5	4.426949381	4.348901742	4.880554318	4.635701751	3.766970742	3.642230953	4.109230116	3.814127003	4.242945001	4.498143071	4.58856005
Stmn1	5	5.440588614	5.265877313	4.911610528	5.31448887	4.039335812	4.149363218	4.410478507	4.906677047	5.463430709	5.342274826	5.08700709
Timp1	5	6.303970434	6.553894637	6.258072202	6.791593808	5.716553455	5.789116969	5.072589364	5.707754707	6.712969193	7.055924897	6.41409687
Tpx2	5	3.565980126	3.572860135	3.589484675	3.705510976	2.480567858	2.815292286	2.062619739	3.010190007	3.620827802	3.572251314	2.6469926
Trem1	5	3.347413129	2.246071725	3.343294529	3.717678709	-4.529072446	2.324781775	0.639694179	-0.353681555	2.461056638	2.741454414	2.5219715
Ube2c	5	5.393724666	5.250366931	4.393760722	5.085126694	4.289608615	4.366584534	3.656747508	4.201806107	5.036144976	4.926808156	4.80297797

Untreated_inf

ected_day21_	Untreated_infe	Untreated_infe	Untreated_infe	Untreated_infe	Uninfected_A		Uninfected_A	Uninfected_A
A8	cted_day35_A5	cted_day35_A6	cted_day35_A7	cted_day35_A8	1	Uninfected_A2	3	4
4.370490219	3.640640367	4.096226033	3.456157473	3.511991115	3.195425393	3.259125455	3.578432375	3.8259612
5.826880282	5.624763398	1.404695509	1.128123322	4.375489302	4.712066654	2.434090175	4.144156688	4.707867301
5.633019022	5.614274405	5.360770986	4.725230198	4.855109843	4.27894886	4.587729796	4.7138994	4.814482182
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6.298741843	5.194017197	5.600792335	5.122594304	5.29426489	5.071333573	5.899872752	5.516140408	6.203326358
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6.484379876	5.516830317	5.404017112	5.197394963	5.563163014	3.916279948	4.844699582	4.153252632	3.953091071
6.116368527	5.497359494	5.333462553	5.484920115	5.24430129	4.966699604	5.711474177	5.917396821	5.798426511
2.599975275	1.080083577	1.889875356	1.8081086	1.161007886	-0.211699794	2.229072393	0.69759847	0.232514243
7.517910392	7.407035975	7.39936524	6.707032774	6.268667818	4.788654081	5.936223241	5.984846947	6.021771297
2.756564951	2.457677039	2.307748777	2.81964101	0.656425699	1.806079862	1.011151531	2.356826503	3.143299148
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0.196175862	-7.767547456	-7.767547456	-4.530984391	-7.767547456	1.690447997	1.334069765	2.934819831	1.969043934
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